

INTRODUCTION

How to Use This Manual

This manual is divided into 14 sections. The first page of each section is marked with a black tab that lines up with its corresponding thumb index tab on this page. You can quickly find the first page of each section without looking through a full table of contents. The symbols printed at the top corner of each page can also be used as a quick reference system.

Each section includes:

1. A table of contents, or an exploded view index showing:
 - Parts disassembly sequence.
 - Bolt torques and thread sizes.
 - Page references to descriptions in text.
2. Disassembly/assembly procedures and tools.
3. Inspection.
4. Testing/troubleshooting.
5. Repair.
6. Adjustments.

Special Information

⚠ WARNING Indicates a strong possibility of severe personal injury or loss of life if instructions are not followed.

CAUTION: Indicates a possibility of personal injury or equipment damage if instructions are not followed.

NOTE: Gives helpful information.

CAUTION: Detailed descriptions of *standard workshop* procedures, safety principles and service operations are not included. Please note that this manual contains warnings and cautions against some specific service methods which could cause **PERSONAL INJURY**, damage a vehicle or make it unsafe. Please understand that these warnings cannot cover all conceivable ways in which service, whether or not recommended by HONDA MOTOR might be done, or of the possible hazardous consequences of every conceivable way, nor could HONDA MOTOR investigate all such ways. Anyone using service procedures or tools, whether or not recommended by HONDA MOTOR, *must satisfy himself thoroughly* that neither personal safety nor vehicle safety will be jeopardized.

All information contained in this manual is based on the latest product information available at the time of printing. We reserve the right to make changes at any time without notice. No part of this publication may be reproduced, stored in retrieval system, or transmitted, in any form by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the publisher. This includes text, figures and tables.

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HONDA MOTOR CO., LTD.
Service Publication Office

General Info



Special Tools



Specifications

specs

Maintenance



Engine



Cooling



Fuel and Emissions



Transaxle



* Steering



Suspension



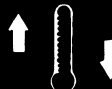
Brakes (Including ABS)



* Body



* Heater and Air Conditioner



* Electrical (Including SRS)



As sections with * include SRS components, special precautions are required when servicing.



General Information

Chassis and Engine Numbers	1-2
Identification Number Locations	1-4
Warning/Caution Label Locations	1-5
Lift and Support Points	1-9
Towing	1-12

Chassis and Engine Numbers

European Model

Vehicle Identification Number

JHMBB21500C000001

Manufacturer, Make and

Type of Vehicle

JHM: HONDA MOTOR CO., LTD.
HONDA Passenger car

Body Type

BB2: Prelude 2300
BB3: Prelude 2000

Body and Transmission Type

1: 2-door 5-speed Manual
2: 2-door 4-speed Automatic

Vehicle Grade

4: 2.0i
5: 2.3i

Fixed Code

Auxiliary Number

Factory Code

C: Sayama Factory in Japan

Model Year

0: 1992

Serial Number

Engine Number

F20A4-9100001

Engine Type

F20A4: 2.0 l SOHC Fuel-injected engine
H23A2: 2.3 l DOHC Fuel-injected engine

Transmission Type

100: H23A2 engine with Manual
150: H23A2 engine with Automatic
910: F20A4 engine with Manual
915: F20A4 engine with Automatic

Serial Number

Transmission Number

M2J4-1000001

Transmission Type

M2J4: Manual with F20A4 engine
M2K4: Manual with H23A2 engine
MP1A: Automatic

Serial Number



Except European Model

Vehicle Identification Number _____

JHMB A81400CO00001

Manufacturer, Make and Type of Vehicle _____
JHM: HONDA MOTOR CO., LTD.
HONDA Passenger car

Body Type _____
BA8: Prelude 2200
BB2: Prelude 2300

Body and Transmission Type _____
1: 2-door 5-speed Manual
2: 2-door 4-speed Automatic

Vehicle Grade _____
4: CX (KQ), Si (KT/KY)
5: Si (KQ) and Si-SPECIAL (KQ)

Fixed Code _____

Auxiliary Number _____

Factory Code _____
C: Sayama Factory in Japan

Model Year _____
0: 1992

Serial Number _____

Engine Number _____

F22A1-9190001

Engine Type _____
F22A1: 2.2 ℓ SOHC Fuel-injected engine (KQ)
F22A2: 2.2 ℓ SOHC Fuel-injected engine (KT/KY)
H23A1: 2.3 ℓ DOHC Fuel-injected engine

Country Code _____
180: H23A1 engine (KQ)
910: F22A2 engine (KT/KY)
919: F22A1 engine (KQ)

Serial Number _____

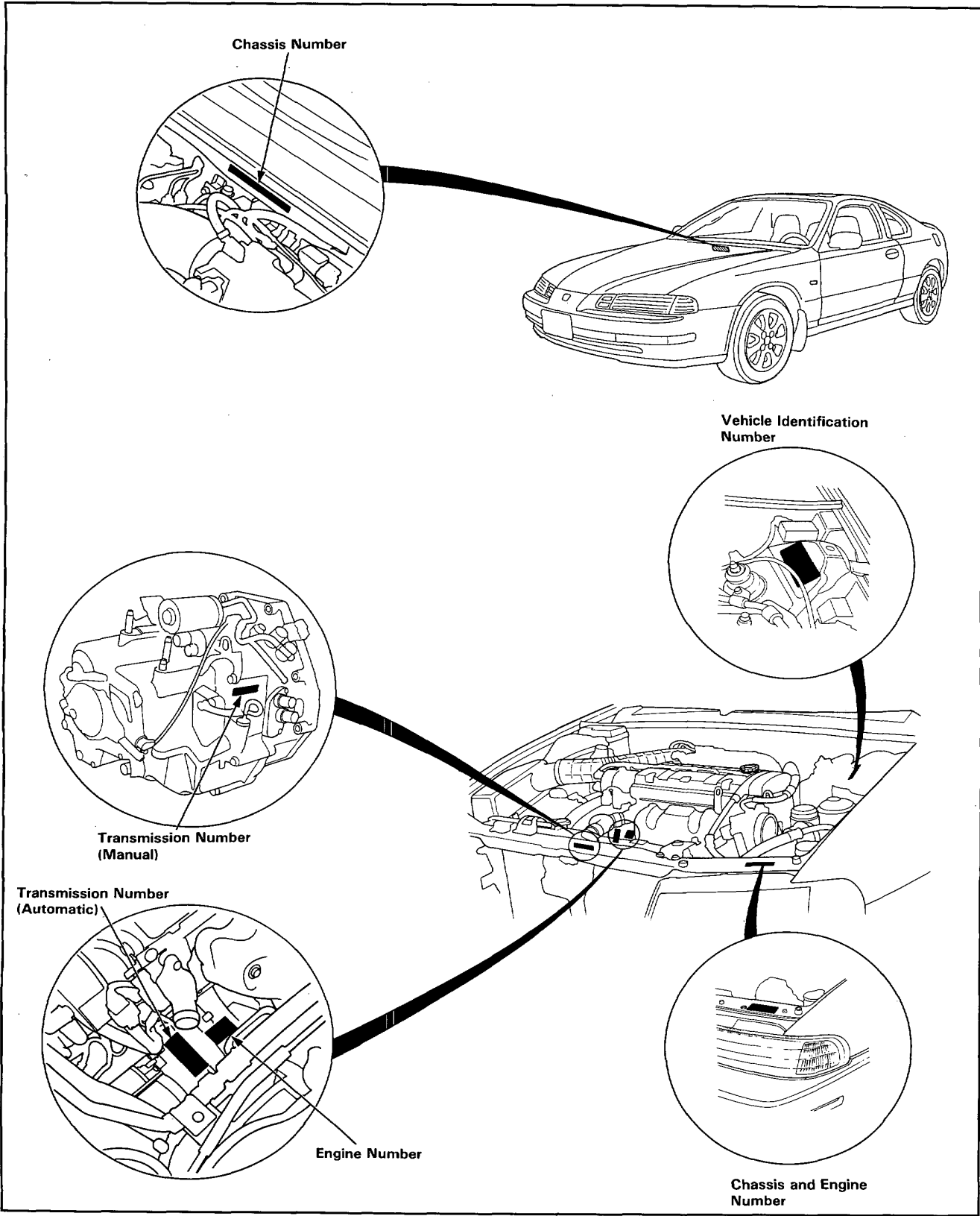
Transmission Number _____

M2C4-1000001

Transmission Type _____
M2C4: Manual with F22A2 engine (KT/KY)
M2J4: Manual with F22A1 engine (KQ)
M2K4: Manual with H23A1 engine (KQ)
MP1A: Automatic

Serial Number _____

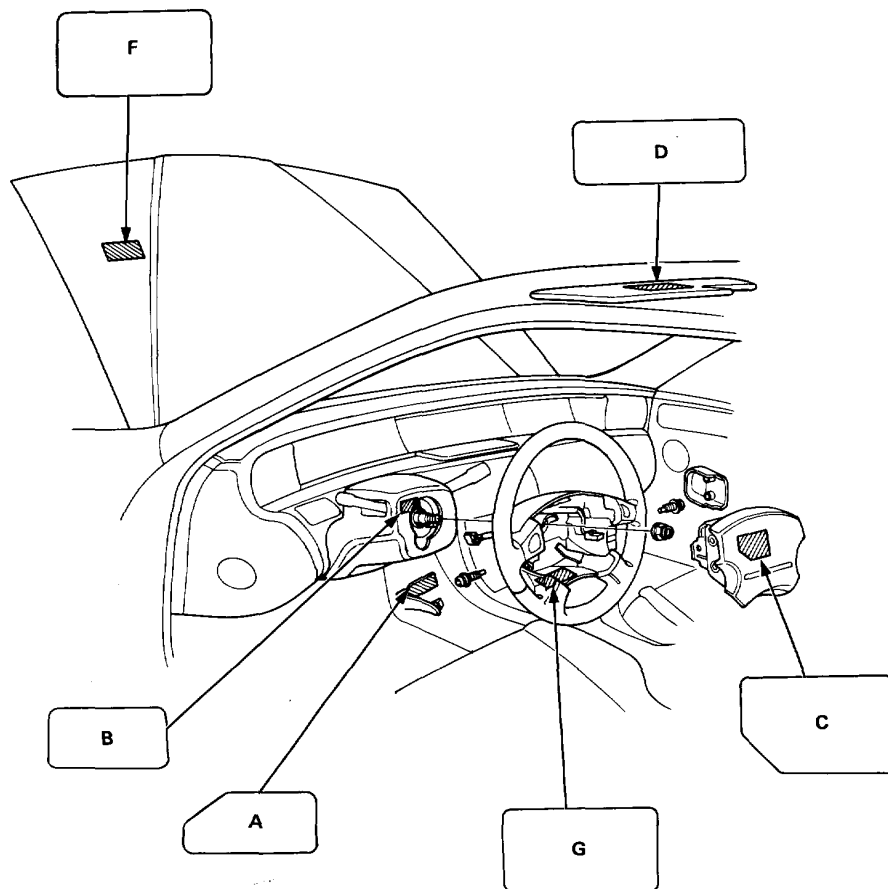
Identification Number Locations





Label Locations

Warning/Caution Labels



A: MAINTENANCE LID CAUTION

CAUTION **SRS**
BEFORE MAINTENANCE, SWITCH OFF THE IGNITION.
ATTENTION
AVANT TOUT ENTRETIEN, COUPER LE CONTACT.
ACHTUNG
VOR WARTUNG ZÜNDUNG AUSSCHALTEN.
LET OP
ZET HET KONTAKTSLOT AF ALVORENS MET HET
ONDERHOUD TE BEGINNEN.

B: SLIP RING CAUTION

SRS
● **CAUTION** REFER TO THE SHOP MANUAL.
● **ACHTUNG** WERKSTATT HANDBUCH LESEN.
● **ATTENTION** SE REPORTER AU MANUEL
D'ATELIER.
● **WAARSCHUWING** LEES HET WERKPLAATS
HANDBOEK.

C: MONITOR CAUTION

CAUTION **SRS**
REFER TO THE SHOP MANUAL
ATTENTION
SE REPORTER AU MANUEL D'ATELIER
WAARSCHUWING
LEES HET WERKPLAATS HANDBOEK
ACHTUNG
● WERKSTATT HANDBUCH LESEN
● DER GASGENERATOR IN DIESEM GEHÄUSE
DARF NUR FÜR INSASSEN-RÜCKHALTESYSTEME
MIT LUFTSACK IN KRAFTFAHRZEUGE
MONTIERT WERDEN.
DIE MONTAGE UND DEMONTAGE
DES GASGENERATORS
DARF NUR VON DAFÜR
GESCHULTEM PERSONAL
VORGEGEHEN VERDEN.

Label Locations

Warning/Caution Labels (cont'd)

D: DRIVER INFORMATION

ALWAYS WEAR YOUR SEAT BELT

SRS

- THIS CAR IS EQUIPPED WITH A DRIVER AIRBAG AS A SUPPLEMENTAL RESTRAINT SYSTEM (S.R.S.).
- IT IS DESIGNED TO SUPPLEMENT THE SEAT BELT.
- IF YOUR SRS INDICATOR LIGHTS WHILE DRIVING, SEE YOUR AUTHORIZED HONDA DEALER.

ATTACHEZ TOUJOURS VOTRE CEINTURE

SRS

- CE VEHICULE EST EQUIPE D'UN COUSSIN D'AIR POUR LE CONDUCTEUR QUI CONSTITUE UN SYSTEME DE RETENUE COMPLEMENTAIRE (S.R.S.).
- CE COUSSIN D'AIR COMPLETE LA FONCTION DE LA CEINTURE DE SECURITE.
- SI LE TMOIN SRS S'ALLUME PENDANT LA CONDUITE, ADRESSEZ-VOUS A VOTRE CONCESSIONNAIRE HONDA OFFICIEL.

SICHERHEITSGURTE

BEI JEDER FAHRT ANLEGEN

SRS

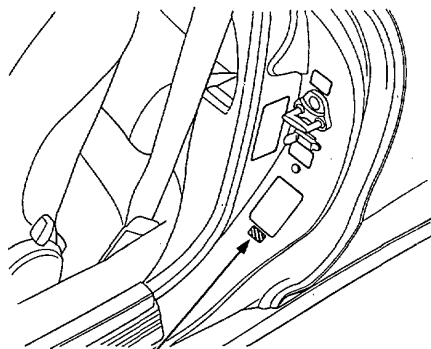
- DIESES FAHRZEUG BESITZT EINEN FAHRER-AIRBAG ALS ZUSÄTZLICHES RÜCKHALTESYSTEM (S.R.S.).
- ES IST EINE ERGÄNZUNG ZUM SICHERHEITGURT.
- WENN DIE SRS-KONTROLLEUCHTE WAHREND DER FAHRT AUFLEUCHTET, UMGEHEND FINEN HONDA HÄNDLER AUFSUCHEN.

DRAAG ALTIJD UW VEILIGHEIDSGORDEL

SRS

- DIT VOERTUIG IS UITGERUST MET EEN LUCHTKUSSEN AAN DE BESTUURDESKANT ALTS EXTRA BESCHERMING (S.R.S.).
- DIT IS ONTWERPEN ALS EXTRA BESCHERMING BIJ DE VEILIGHEIDSGORDEL.
- ALS HEL SRS-WAARSCHUWINGSLAMPJE GAAT BRANDEN ONDER HET RIJDEN. NEEM DAN KONTAKT OP MET EEN HONDA DEALER.

E: LABEL AIRBAG



E

F: UNDER-HOOD WARNING

WARNING

SRS

THIS VEHICLE IS EQUIPPED WITH A DRIVER AIRBAG AS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). ALL S.R.S. ELECTRICAL WIRING AND CONNECTORS ARE COLORED YELLOW. DO NOT USE ELECTRICAL TEST EQUIPMENT ON THESE CIRCUITS. TAMPERING WITH OR DISCONNECTING THE S.R.S. WIRING COULD RESULT IN ACCIDENTAL FIRING OF THE INFLATOR OR MAKE THE SYSTEM INOPERATIVE, WHICH MAY RESULT IN SERIOUS INJURY.

ATTENTION

SRS

CE VEHICULE EST EQUIPE D'UN COUSSIN D'AIR DU COTE CONDUCTEUR QUI CONSTITUE UN SYSTEME DE RETENUE COMPLEMENTAIRE (S.R.S.)
TOUS LES FILS ET CONNECTEURS ELECTRIQUES DU SYSTEME DE RETENUE COMPLEMENTAIRE (S.R.S.) SONT DE COULEUR JAUNE. N'UTILISEZ PAS UN EQUIPEMENT D'ESSAIS ELECTRIQUES SUR CES CIRCUITS. NE TOUCHEZ PAS ET NE DEBRANCHEZ PAS LES FILS DU SYSTEME S.R.S. CAR CECI POURRAIT DE TRADUIRE PAR LE DECLENCHEMENT ACCIDENTEL DU GONFLEUR OU RENDRE LE SYSTEME INOPERANT ET VOUS EXPOSER AINSI A DE GRAVES BLESSURES.

WARNUNG

SRS

DIESES FAHRZEUG IST MIT EINEM FAHRER-AIRBAG (SRS) ALS ZUSÄTZLICHEM RÜCKHALTESYSTEM AUSGERÜSTET.

ALLE ELEKTRISCHEN KABEL, SOWIE DIE ZUGEHÖRIGEN STECKVERBINDER DES S.R.S. -SYSTEMS SIND IN GELBER FARBE AUSGEFÜHRT.

KEINE ELEKTRISCHEN PRÜGERÄTE AN DIE S.R.S. -VERKABELUNG ANSCHLIEßEN. VERÄNDERN ODER UNTERBRECHEN DER S.R.S. -VERKABELUNG KANN UNKONTROLLIERTES ZÜNDEN DES GASGENERATORS AUSLÖSEN, ODER DAS SYSTEM AUßER FUNKTION SETZEN. WAS ZU ERNSTHAFTEN VERLETZUNGEN FÜHREN KANN.

WAARSCHUWING

SRS

DIT VOERTUIG IS UITGERUST MET EEN LUCHTKUSSEN AAN DE BESTUURDESKANT ALS EXTRA BESCHERMING (S.R.S.).

ALLE ELEKTRISCHE LEIDINGEN EN AANSLUITINGEN VAN DE S.R.S. ZIJN GEEL GEKLEURD. GEBRUIK GEEN ELEKTRISCHE TESTAPPARATUUR VOOR DEZE CIRCUITS. KNOEIEN MET OF LOSKOPPELEN VAN DE S.R.S. LEIDINGEN KAN LEIDEN TOT BRAND IN DE VULINRICHTING OF TOT UITSCHAKELLEN VAN HET SYSTEEM DIT KAN TOT ERNSTIGE ONGELUKKEN LEIDEN.

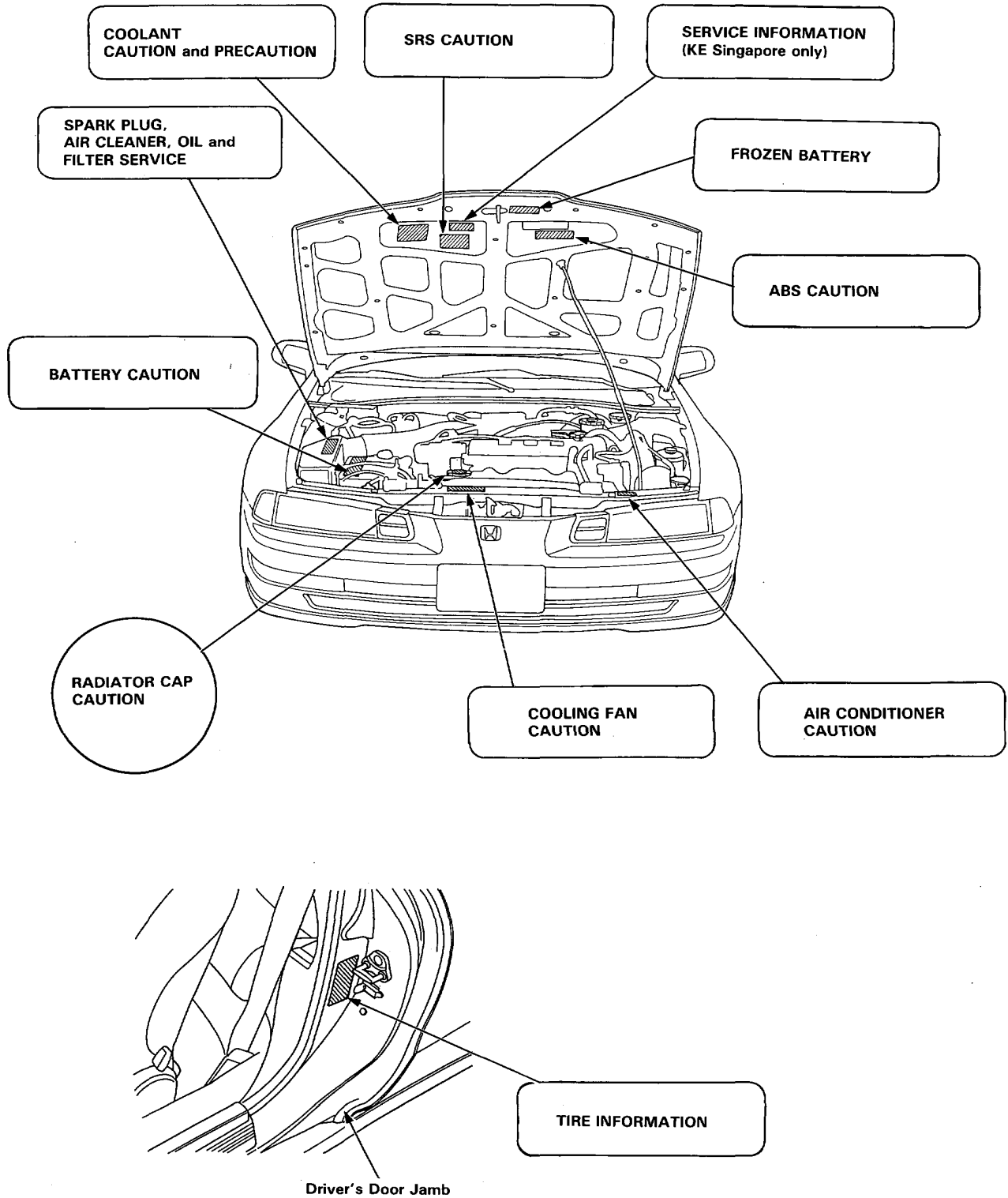
G: COVER CAUTION

CAUTION

SRS

ACHTUNG

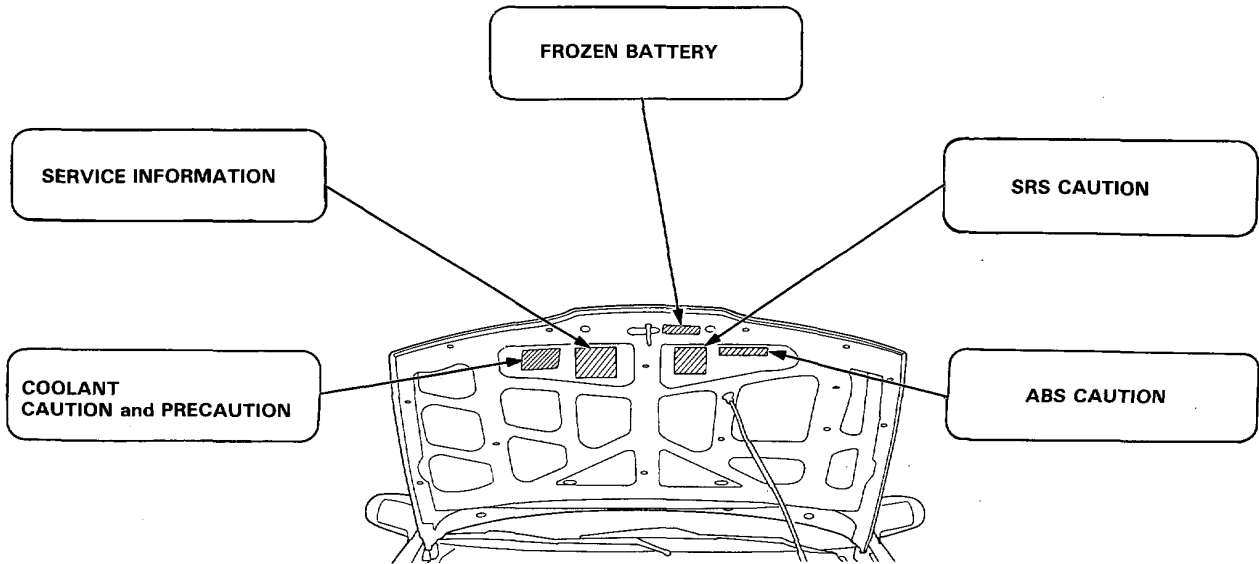
- REFER TO THE SHOP MANUAL.
- SE REPORTER AU MANUEL D'ATELIER.
- WERKSTATT HANDBUCH LESEN.
- LEES HET WERKPLAATSHANDBOEK.



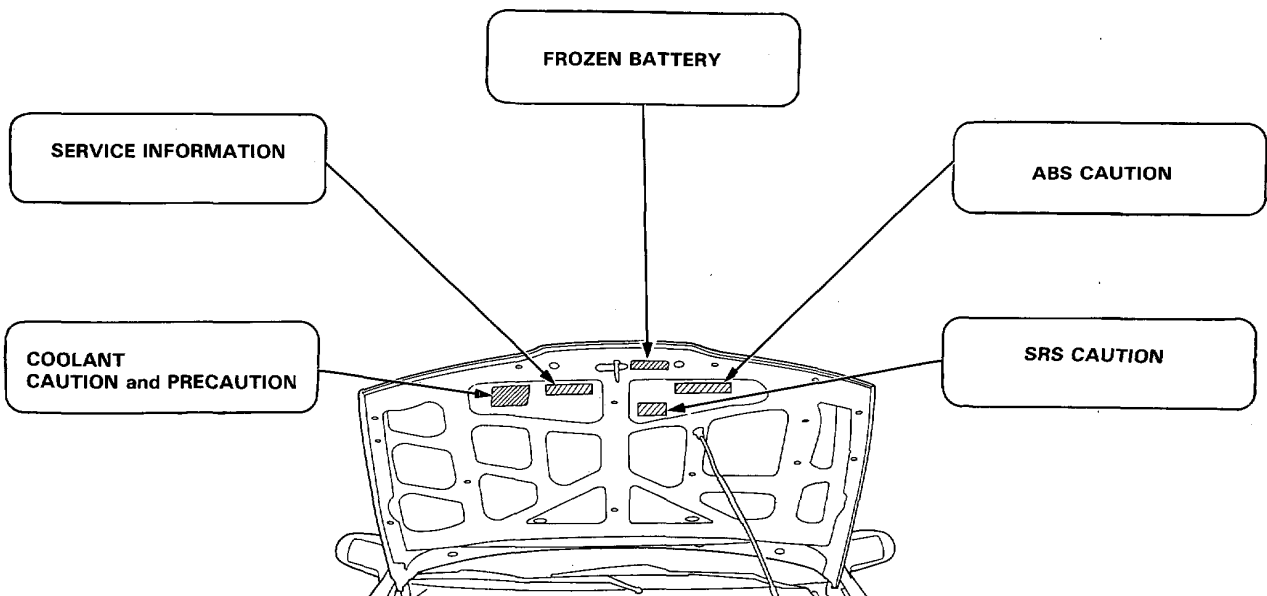
Label Locations

Warning Caution Labels (cont'd)

KS:



KQ:



Lift and Support Points

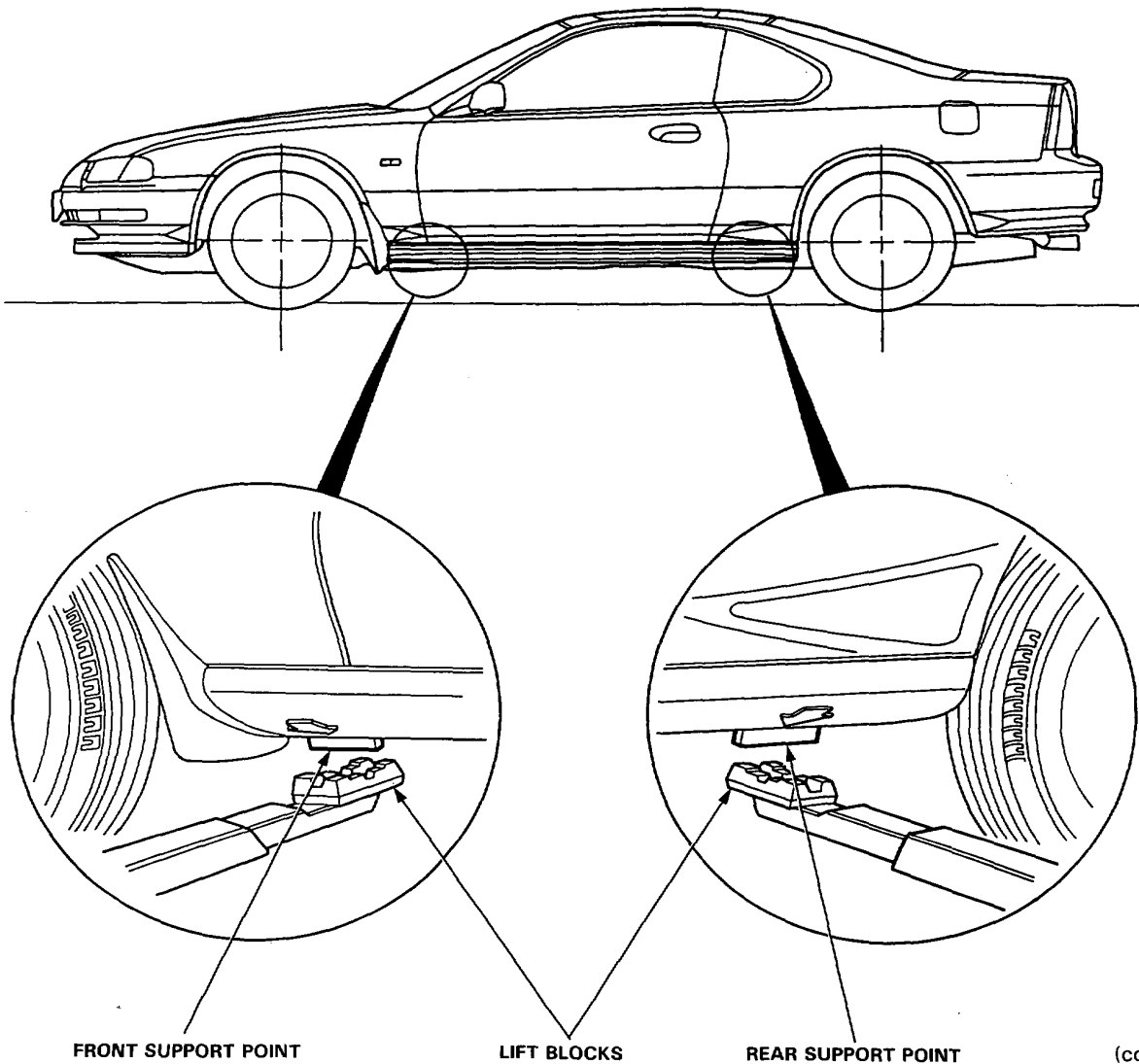


Hoist

1. Place the lift blocks as shown.
2. Raise the hoist a few inches and rock the car to be sure it is firmly supported.
3. Raise the hoist to full height and inspect lift points for solid support.

⚠ WARNING When heavy rear components such as suspension, fuel tank, spare tire and trunk lid are to be removed, place additional weight in the trunk before hoisting. When substantial weight is removed from the rear of the car, the center of gravity may change and can cause the car to tip forward on the hoist.

NOTE: Since each tire/wheel assembly weighs approximately 14 kg (30 lbs), placing the front wheels in the trunk can assist with weight distribution.



Lift and Support Points (cont'd)

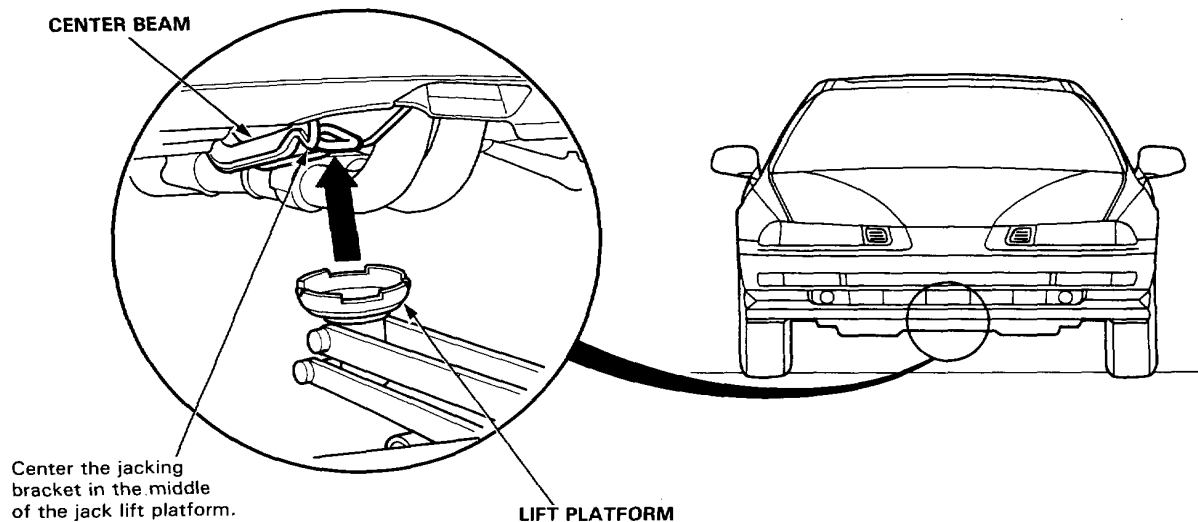
Floor Jack

1. Set the parking brake and block the wheels that are not being lifted.
2. When lifting the rear of the car, put the gearshift lever in reverse (Automatic in PARK).
3. Raise the car high enough to insert the safety stands.
4. Adjust and place the safety stands as shown on page 1-11 so the car will be approximately level, then lower the car onto them.

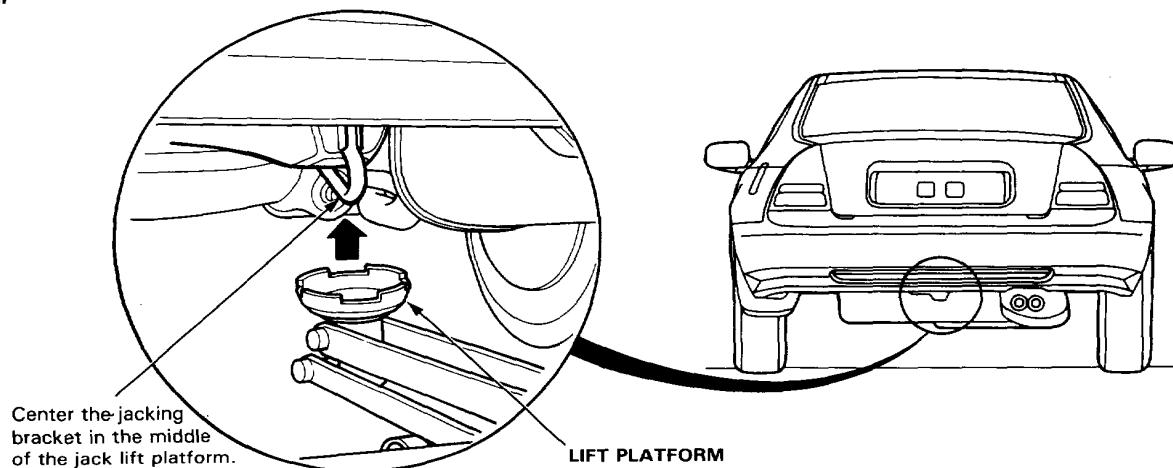
⚠ WARNING

- Always use safety stands when working on or under any vehicle that is supported only by a jack.
- Never attempt to use a bumper jack for lifting or supporting the car.

Front

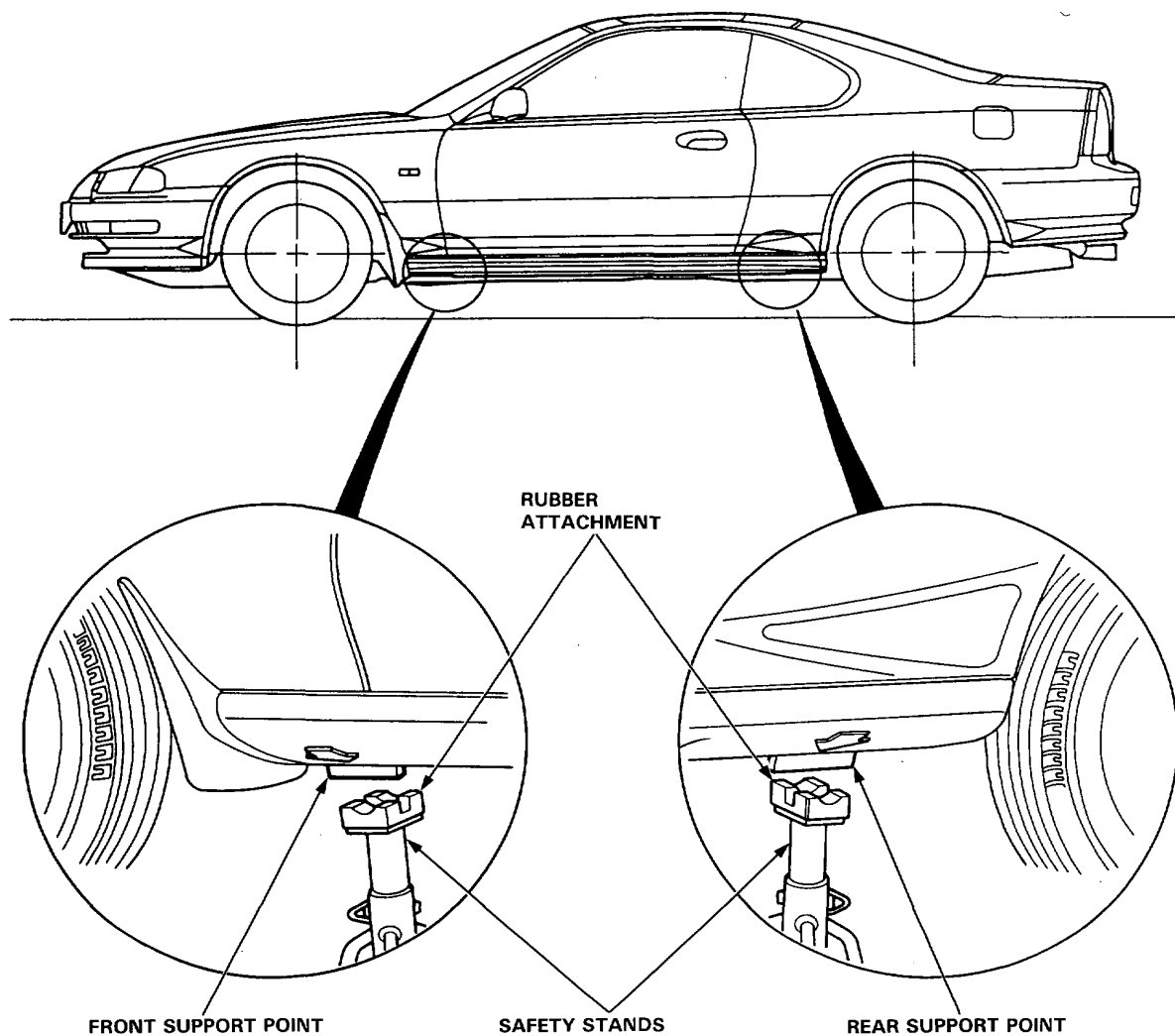


Rear





Safety Stands



Towing

If the car needs to be towed, call a professional towing service. Never tow the car behind another car with just a rope or chain. It is very dangerous.

Emergency Towing

There are three popular methods of towing a car:

Flat-bed Equipment — The operator loads the car on the back of a truck. This is the best way of towing the car.

Wheel Lift Equipment — The tow truck uses two pivoting arms that go under the tires (front or rear) and lifts them off the ground. The other two wheels remain on the ground.

Sling-type Equipment — The tow truck uses metal cables with hooks on the ends. These hooks go around parts of the frame or suspension and the cables lift that end of the car off the ground. The car's suspension and body can be seriously damaged if this method of towing is attempted.

If the car cannot be transported by flat-bed, it should be towed with the front wheels off the ground. If due to damage, the car must be towed with the front wheels on the ground, do the following:

5-Speed Transmission

- Release the parking brake.
- Shift the transmission to Neutral.

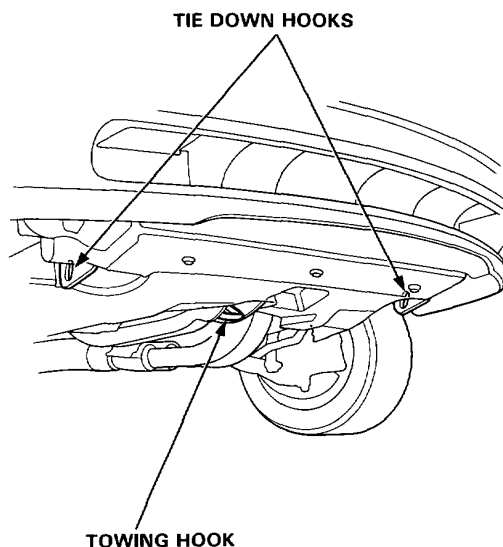
Automatic Transmission

- Release the parking brake.
- Start the engine.
- Shift to D₄, then to N.
- Turn off the engine.

NOTICE: Improper towing preparation will damage the transmission. Follow the above procedure exactly. If you can not shift the transmission or start the engine (automatic transmission), your car must be transported on a flat-bed.

- It is best to tow the car no farther than 80 km (50 miles), and keep the speed below 55 km/h (35 mph).

NOTICE: Trying to lift or tow the car by the bumpers will cause serious damage. The bumpers are not designed to support the car's weight.





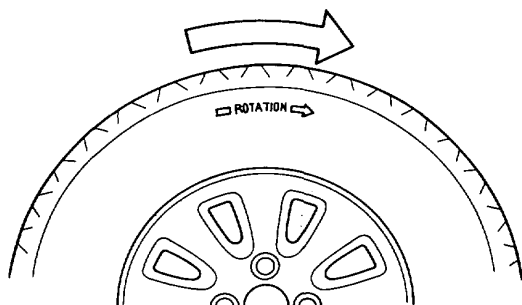
Service Precautions

Handling of tires

Tire Rotational Direction

The "Dunlop Performa 8000 (tire size: 205/55R15 87V)" is designed to turn only in one direction. This direction is indicated on the side wall of the tire with the arrow mark.

- When installing the wheels, do not interchange the right and left tires. Install the wheels with the arrow mark pointing in the direction of rotation.
- When replacing the tires, install the tires with the arrow mark pointing in the direction of the wheel rotation.





Special Tools

Individual tool lists are located at the front of each section.

Specifications

Standards and Service Limits	3-2
Design Specifications	3-14
Body Specifications	3-17

Standards and Service Limits

Cylinder Head/Valve Train (F20A, F22A engine) — Sections 6

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Compression	250 min ⁻¹ (rpm) and wide open throttle kPa (kg/cm ² , psi)	Nominal Minimum Maximum variation	1,250 (12.5, 178) 950 (9.5, 135) 200 (2, 28)	
Cylinder head	Warpage Height		— 99.95-100.05 (3.935-3.939)	0.05 (0.002) —
Camshaft	End play		0.05-0.15 (0.002-0.006)	0.50 (0.02)
	Oil clearance		0.050-0.089 (0.002-0.004)	0.15 (0.006)
	Runout		0.015 (0.0006) max.	0.03 (0.001)
	Cam lobe Height	F20A, F22A engine IN	38.741 (1.5252)	—
		EX	38.972 (1.5343)	—
		F22A engine IN	38.526 (1.5167)	—
		EX	38.778 (1.5266)	—
Valve	Valve clearance	IN	0.23-0.28 (0.009-0.011)	—
		EX	0.27-0.32 (0.011-0.013)	—
	Valve stem O.D.	IN	5.485-5.495 (0.2159-0.2163)	5.455 (0.2148)
		EX	5.450-5.460 (0.2146-0.2150)	5.42 (0.2134)
	Stem-to-guide clearance	IN	0.020-0.045 (0.0008-0.0018)	0.075 (0.0029)
		EX	0.055-0.080 (0.0021-0.0031)	0.12 (0.0047)
Valve seat	Width	IN	1.25-1.55 (0.049-0.061)	2.0 (0.079)
		EX	1.25-1.55 (0.049-0.061)	2.0 (0.079)
	Stem installed height	IN	48.245-48.715 (1.8994-1.9179)	—
		EX	50.315-50.785 (1.9809-1.9994)	—
Valve spring	Free length	F20A, F22A engine IN	53.16 (2.0929) *1	—
			53.15 (2.0925) *2	—
	F22A engine	EX	55.80 (2.1968) *1	—
			55.78 (2.1960) *2	—
		IN	54.81 (2.1578) *1	—
		EX	54.82 (2.1582) *2	—
Valve guide	I.D.	IN	5.515-5.530 (0.2171-0.2177)	5.53 (0.218)
		EX	5.515-5.530 (0.2171-0.2177)	5.53 (0.218)
	Installed height	IN	23.75-24.25 (0.915-0.955)	—
		EX	15.05-15.55 (0.593-0.612)	—
Rocker arm	Arm-to-shaft clearance	IN	0.017-0.050 (0.0007-0.0020)	0.080 (0.0031)
		EX	0.018-0.054 (0.0007-0.0021)	0.080 (0.0031)

*1: CHUO HATSUJO manufacture, *2: NIHON HATSUJO manufacture.

Cylinder Head/Valve Train (H23A engine) — Sections 6

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Compression	250 min ⁻¹ (rpm) and wide open throttle kPa (kg/cm ² , psi)	Nominal Minimum Maximum variation	1,250 (12.5, 178) 950 (9.5, 135) 200 (2, 28)	
Cylinder head	Warpage Height		— 131.95-132.05 (5.195-5.199)	0.05 (0.002) —
Camshaft	End play Oil clearance Runout Cam lobe Height		0.05-0.15 (0.002-0.006) 0.050-0.089 (0.002-0.004) 0.015 (0.0006) max. 33.661 (1.3252) 33.725 (1.3278)	0.5 (0.02) 0.15 (0.006) 0.03 (0.001) — —
Valve	Valve clearance	IN	0.07-0.11 (0.003-0.004)	—
		EX	0.15-0.19 (0.006-0.007)	—
	Valve stem O.D.	IN	6.58-6.59 (0.2591-0.2594)	6.55 (0.2579)
		EX	6.55-6.56 (0.2579-0.2583)	6.52 (0.2567)
	Stem-to-guide clearance	IN	0.02-0.05 (0.0008-0.0020)	0.08 (0.003)
		EX	0.05-0.08 (0.002-0.003)	0.11 (0.004)
Valve seat	Width	IN	1.25-1.55 (0.049-0.061)	2.0 (0.079)
		EX	1.25-1.55 (0.049-0.061)	2.0 (0.079)
	Stem installed height	IN	39.365-39.835 (1.5498-1.5683)	40.085 (1.5781)
		EX	39.165-39.635 (1.5419-1.5604)	39.885 (1.5703)
Valve spring	Free length	IN	47.14 (1.856)	—
		EX	47.14 (1.856)	—
Valve guide	I.D.	IN	6.61-6.63 (0.260-0.261)	6.70 (0.264)
		EX	6.61-6.63 (0.260-0.261)	6.70 (0.264)
	Installed height	IN	13.25-13.75 (0.522-0.541)	—
		EX	13.75-14.25 (0.541-0.561)	—

Standards and Service Limits

Unit of length: mm (in)

Engine Block — Section 7

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Cylinder block	Warpage of deck surface	0.07 (0.003) max.	0.10 (0.004)
	Bore diameter F22A engine	85.00-85.02 (3.346-3.347)	85.07 (3.349)
	Bore diameter H23A engine	87.00-87.02 (3.425-3.426)	87.07 (3.428)
	Bore taper	—	0.05 (0.002)
	Reboring limit	—	0.5 (0.02)
Piston	Skirt O.D.	F20A, F22A engine	
	at F20A, F22A: 21 mm (0.83 in.)	NO MARK	84.98-84.99 (3.3457-3.3461)
	H23A: 15 mm (0.59 in.)	MARK B	84.97-84.98 (3.3453-3.3457)
	from bottom of skirt	H23A engine	
		NO MARK	86.990-87.003 (3.4248-3.4253)
		MARK B	86.980-86.993 (3.4244-3.4249)
	Clearance in cylinder	F20A, F22A engine	0.02-0.04 (0.0008-0.0016)
		H23A engine	0.007-0.030 (0.0003-0.0012)
	Groove width (for ring)	F20A, F22A engine	
		Top	1.220-1.230 (0.0480-0.0484)
		Second	1.220-1.230 (0.0480-0.0484)
		Oil	2.805-2.825 (0.1104-0.1112)
Piston ring	Ring-to-groove clearance	Top	0.035-0.060 (0.0014-0.0024)
		Second	0.030-0.055 (0.0012-0.0022)
	Ring end gap	F20A, F22A engine	
		Top	0.20-0.35 (0.008-0.014)
		Second	0.40-0.55 (0.016-0.022)
		Oil	0.20-0.70 (0.008-0.028)
		H23A engine	
		Top	0.25-0.35 (0.010-0.014)
		Second	0.60-0.75 (0.024-0.030)
		Oil	0.20-0.50 (0.008-0.020) *1
			0.20-0.70 (0.008-0.028) *2
Piston Pin	O.D.		21.994-22.000 (0.8659-0.8661)
	Pin-to-piston clearance	F20A, F22A engine	0.012-0.024 (0.0005-0.0009)
		H23A engine	0.012-0.026 (0.0005-0.0010)
			—
Connecting rod	Pin-to-rod interference		0.013-0.032 (0.0005-0.0013)
	Small end bore diameter		21.968-21.981 (0.8649-0.8654)
	Large end bore diameter	Nominal F20A engine	48.00 (1.890)
		F22A, H23A engine	51.00 (2.008)
	End play installed on crankshaft		0.15-0.30 (0.006-0.012)
	Small end bore-to-large end bore parallelism		0.12 (0.005)/100 max.
Crankshaft	Main journal diameter	No. 1 and 2 journals	49.976-50.000 (1.9676-1.9685)
		No. 3 journal	49.972-49.996 (1.9674-1.9683)
		No. 4 and 5 journals	49.984-50.008 (1.9679-1.9688)
	Rod journal diameter	F20A engine	44.976-45.000 (1.7707-1.7717)
		F22A, H23A engine	47.976-48.000 (1.8888-1.8898)
	Taper		0.005 (0.0002) max.
	Out-of-round		0.005 (0.0002) max.
	End play		0.10-0.35 (0.004-0.014)
	Runout		0.015 (0.0006) max.
			0.01 (0.0004)
Bearings	Main bearing-to-journal oil clearance	No. 1 and 2 journals	0.021-0.045 (0.0008-0.0018)
		No. 3 journal	0.025-0.049 (0.0010-0.0020)
		No. 4 journal	0.013-0.037 (0.0005-0.0015)
		No. 5 journal	0.009-0.033 (0.0004-0.0013)
	Rod bearing-to-journal oil clearance	F20A engine	0.015-0.043 (0.0006-0.0017)
		F22A engine	0.021-0.049 (0.0008-0.0020)
		H23A engine	0.027-0.055 (0.0011-0.0022)
			0.050 (0.0020)
			0.055 (0.0022)
			0.050 (0.0020)

*1: TEIKOKU PISTON RING manufacture, *2: RIKEN manufacture.

Engine Block — Section 7 (cont'd)

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Balancer shaft	Journal diameter	No. 1 journal (front)	42.722-42.734 (1.6820-1.6824)	42.91 (1.689)
		No. 1 journal (rear)	20.938-20.956 (0.8243-0.8248)	20.92 (0.824)
		No. 2 journals	38.712-38.724 (1.5241-1.5246)	38.70 (1.524)
		No. 3 journals	34.722-34.734 (1.3670-1.3674)	34.71 (1.367)
	Journal taper		0.005 (0.0002)	—
	End play	Front	0.100-0.350 (0.0040-0.0138)	—
		Rear	0.060-0.180 (0.0024-0.0070)	—
	Runout		0.020 (0.0008)	—
Balancer shaft bearing	Oil clearance	No. 1 journal (rear)	0.050-0.075 (0.0020-0.0030)	0.09 (0.0035)
		No. 1 (front) and No. 3 journal	0.066-0.118 (0.0026-0.0046)	0.12 (0.0047)
		No. 2 journals	0.075-0.128 (0.0030-0.0050)	0.13 (0.0051)
Balancer shaft bearing	I.D.	No. 1 journal (front)	42.800-42.820 (1.6850-1.6958)	42.83 (1.686)
		No. 1 journal (rear)	21.000-21.013 (0.8268-0.8273)	21.02 (0.828)
		No. 2 journals	38.800-38.820 (1.5276-1.5283)	38.43 (1.513)
		No. 3 journals	34.800-34.820 (1.3701-1.3710)	34.83 (1.371)

Engine Lubrication — Section 8

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Engine oil	Capacity ℓ (US qt, Imp qt)	F20A, F22A engine	4.9 (5.2, 4.3) for engine overhaul	
		H23A engine	3.8 (4.0, 3.3) for oil change, including filter	
Oil pump	Displacement ℓ (US gal, Imp gal)/min @ min ⁻¹ (rpm)		5.4 (5.7, 4.8) for engine overhaul	
			4.3 (4.5, 3.8) for oil change, including filter	
			F20A, F22A engine: 53.7 (14.19, 11.81) @ 6,000	
			H23A engine: 59.1 (15.61, 13.00) @ 6,000	
Relief valve	Pressure setting 80°C (176°F) kPa (kg/cm ² , psi)	at idle at 3,000 rpm	0.02-0.16 (0.001-0.006)	0.20 (0.008)
			0.10-0.19 (0.004-0.007)	0.21 (0.008)
			0.02-0.07 (0.001-0.003)	0.12 (0.006)
			70 (0.7, 10) min.	
			350 (3.5, 50) min.	

Cooling — Section 10

	MEASUREMENT		STANDARD (NEW)
Radiator	Coolant capacity ℓ (US gal, Imp gal) F20A, F22A engine (including engine, heater, cooling line and reservoir)		M/T: 7.1 (1.88, 1.56) for overhaul
			3.5 (0.92, 0.77) for coolant change
Radiator	reservoir capacity: 0.6 ℓ (0.63 US qt, 0.53 Imp qt) H23A engine		A/T: 7.0 (1.85, 1.54) for overhaul
			3.4 (0.90, 0.75) for coolant change
Radiator cap	Opening pressure kPa (kg/cm ² , psi)		M/T: 7.6 (2.01, 1.67) for overhaul
Thermostat	Start to open	°C (°F)	4.0 (1.06, 0.88) for coolant change
	Fully open	°C (°F)	A/T: 7.3 (1.93, 1.61) for overhaul
	Valve lift at fully open		3.7 (0.98, 0.81) for coolant change
Water pump	Displacement ℓ (US gal, Imp gal)/min F20A, F22A engine @ min ⁻¹ (rpm) H23A engine		95-125 (0.95-1.25, 13.5-17.8)
			165 (43.5, 36.3) @ 6,000
Cooling fan	Thermoswitch "ON" temperature	°C (°F)	159 (42.0, 35.0) @ 6,000
			92.0-98.0 (198-208)
			87.0-93.0 (189-199)
Cooling fan	Fan timer "ON" temperature	°C (°F)	105-111 (221-231)
			98-109 (208-228)
Cooling fan	Fan timer "OFF" temperature	°C (°F)	

Standards and Service Limits

Fuel and Emissions — Section 11

	MEASUREMENT	STANDARD (NEW)
Fuel pump	Displacement cc (US oz, Imp oz) in 10 seconds Relief valve opening pressure kPa (kg/cm ² , psi)	230 (7.8, 8.1) min. 450-600 (4.5-6.0, 64.0-85, 3)
Pressure regulator	Pressure with regulator vacuum hose disconnected kPa (kg/cm ² , psi)	F22A, H23A, engine: 255-305 (2.55-3.05, 36-43) F20A, F22A engine: 245-285 (2.45-2.85, 35-41)
Fuel tank	Capacity ℓ (US gal, Imp gal)	60 (15.9, 13.2)
Engine	Fast idle min ⁻¹ (rpm)	1,400 ± 200
	Idle speed min ⁻¹ (rpm) F20A, F22A engine (with headlights and cooling fan off) F22A, H23A engine H23A engine	M/T: 770 ± 50 A/T: 770 ± 50 (N or P) M/T: 700 ± 50 A/T: 700 ± 50 (N or P) M/T: 780 ± 50 A/T: 780 ± 50 (N or P)
	Idle CO %	0.1% max.

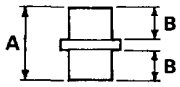
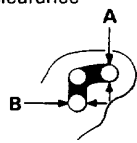
Clutch — Section 12

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Clutch pedal	Pedal height to floor	LHD: 190 (7.48) RHD: 206 (8.11)	
	Stroke	135-145 (5.31-5.71)	
	Pedal play	9-15 (0.35-0.59)	
	Disengagement height to floor	LHD: 94 (3.70) min. RHD: 109 (4.29) min.	
Flywheel	Clutch surface runout	0.05 (0.002) max.	0.15 (0.006)
Clutch disc	Rivet head depth	1.3 (0.05) min.	0.2 (0.01)
	Surface runout	0.6 (0.02) max.	1.0 (0.04)
	Thickness	8.4-9.1 (0.33-0.36)	6.0 (0.24)
Clutch cover	Pressure plate warpage	0.03 (0.001) max.	0.15 (0.03)

Manual Transmission — Section 13

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission oil	Capacity ℓ (US qt, Imp qt)	1.9 (2.0, 1.7) at oil change 2.0 (2.1, 1.8) at assembly	
Mainshaft	End play	0.10-0.16 (0.0039-0.0063)	Adjust with a shim.
	Diameter of ball bearing contact area	27.977-27.990 (1.1015-1.1020)	27.94 (1.100)
	Diameter of third gear contact area	37.984-38.000 (1.4954-1.4961)	37.93 (1.493)
	Diameter of ball bearing contact area	27.987-28.000 (1.1018-1.1024)	27.94 (1.100)
	Runout	0.02 (0.0008) max.	0.05 (0.002)
Mainshaft third and fourth gears	I.D.	43.009-43.025 (1.6933-1.6939)	43.080 (1.6961)
	End play	0.06-0.21 (0.0024-0.0083)	0.30 (0.012)
	Thickness 3rd gear	32.42-32.47 (1.276-1.278)	32.3 (1.27)
	4th gear	30.92-30.97 (1.217-1.219)	30.8 (1.21)
Mainshaft fifth gear	I.D.	43.009-43.025 (1.6933-1.6939)	43.080 (1.6961)
	End play	0.06-0.21 (0.0024-0.0083)	0.30 (0.012)
	Thickness	30.92-30.97 (1.217-1.219)	30.8 (1.213)
Countershaft	End play	0.05-0.40 (0.0019-0.0157)	0.50 (0.02)
	Diameter of needle bearing contact area	38.000-38.015 (1.4961-1.4967)	37.95 (1.494)
	Diameter of ball bearing and needle bearing contact area	24.987-25.000 (0.9837-0.9845)	24.94 (0.982)
	Diameter of low gear contact area	39.984-40.000 (1.5742-1.5748)	39.93 (1.572)
	Runout	0.02 (0.0008) max.	0.05 (0.002)
Countershaft low gear	I.D.	46.009-46.025 (1.8114-1.8120)	46.08 (1.814)
	End play	0.04-0.10 (0.002-0.004)	Adjust with a washer.
Countershaft second gear	I.D.	47.009-47.025 (1.8507-1.8514)	47.08 (1.854)
	End play	0.04-0.10 (0.002-0.004)	Adjust with a collar.
	Thickness	28.92-28.97 (1.139-1.141)	28.8 (1.13)

Manual Transmission — Section 13

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Spacer collar (Countershaft second gear)	I.D. O.D. Length <div style="text-align: right;">A B</div>	36.48-36.49 (1.4362-1.4366) 41.989-42.000 (1.6531-1.6535) 29.02-29.04 (1.1425-1.1433) 29.07-29.09 (1.144-1.145)	36.50 (1.437) 41.94 (1.652) — —
Spacer collar (Mainshaft fourth and fifth gear)	I.D. O.D. Length <div style="text-align: center;"></div> <div style="text-align: right;">A B</div>	31.002-31.012 (1.2205-1.2209) 37.989-38.000 (1.4956-1.4961) 56.45-56.55 (2.222-2.226) 26.03-26.08 (1.0248-1.0268)	31.06 (1.223) 37.94 (1.494) — —
Reverse idler gear	I.D. Gear-to-reverse gear shaft clearance	20.016-20.043 (0.7880-0.7891) 0.036-0.084 (0.0014-0.0033)	20.09 (0.7909) 0.160 (0.0006)
Syncro ring	Ring-to-gear clearance (ring pushed against gear)	0.85-1.10 (0.0335-0.0433)	0.40 (0.016)
Shift fork	Synchro sleeve groove width Fork-to-synchro sleeve clearance	6.75-6.85 (0.266-0.270) 0.35-0.65 (0.014-0.026)	— 1.0 (0.039)
Reverse shift fork	Pawl groove width Fork-to-reverse idle gear clearance Groove width <div style="text-align: center;"></div> <div style="text-align: right;">at A at B at A at B</div> Fork-to-fifth/ reverse shift shaft clearance	13.0-13.3 (0.51-0.52) 0.5-1.1 (0.02-0.43) 7.05-7.25 (0.278-0.2854) 7.4-7.7 (0.29-0.30) 0.05-0.35 (0.002-0.014) 0.4-0.8 (0.02-0.03)	— 1.8 (0.07) — — 0.5 (0.02) 1.0 (0.04)
Shift arm	I.D. Shift arm-to-shaft clearance Shift fork diameter at contact area Shift-arm-to-shift fork shaft clearance	15.973-16.000 (0.6289-0.6299) 0.005-0.059 (0.0002-0.0023) 12.9-13.0 (0.508-0.512) 0.2-0.5 (0.01-0.02)	— — — 0.6 (0.2)
Select lever	Pin size of contact area Select lever-to-shift piece clearance Shaft outer diameter Shift arm cover clearance	7.9-8.0 (0.311-0.315) 0.05-0.25 (0.002-0.010) 15.41-15.68 (0.607-0.617) 0.032-0.102 (0.003-0.0040)	— 0.5 (0.020) — —
Shift arm lever	O.D. Transmission housing clearance	15.941-15.968 (0.6276-0.6287) 0.027-0.139 (0.0011-0.0055)	— —
Interlock	Bore diameter Shift arm lever clearance	16.00-16.05 (0.630-0.632) 0.032-0.109 (0.0013-0.0043)	— —

Standards and Service Limits

Unit of length: mm (in)

Automatic Transmission — Section 14

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission fluid	Capacity ℓ (US qt, Imp qt)	6.0 (6.4, 5.2) for overhaul 2.4 (2.6, 2.1) for fluid change	
Hydraulic pressure (F20A, F22A engine) kPa (kg/cm ² , psi)	Line pressure at 2,000 min ⁻¹ (rpm) N or P	800 (8.0, 114) throttle fully-closed 850 (8.5, 121) throttle more than 3/16 open	750 (7.5, 107) throttle more than 3/16 open
	4th clutch pressure at 2,000 min ⁻¹ rpm D ₄	520 (5.2, 74) throttle fully-closed 850 (8.5, 121) throttle more than 3/16 open	470 (4.7, 67) throttle fully-closed 750 (7.5, 107) throttle more than 3/16 open
	3rd and 2nd clutch pressure at 2,000 min ⁻¹ (rpm) D ₄	500 (5.0, 71) throttle fully-closed 850 (8.5, 121) throttle more than 3/16 open	450 (4.5, 64) throttle fully-closed 750 (7.5, 107) throttle more than 3/16 open
	2nd clutch pressure at 2,000 min ⁻¹ (rpm) 2	800-850 (8.0-8.5, 114-121)	750 (7.5, 107)
	1st and 1st-hold clutch pressure at 2,000 min ⁻¹ (rpm) 1	800-850 (8.0-8.5, 114-121)	750 (7.5, 107)
	Throttle B pressure	Throttle fully closed Throttle fully open	— 750 (7.5, 107)
		0 (0, 0) 800-850 (8.0-8.5, 114-121)	
Hydraulic pressure (H23A engine) kPa (kg/cm ² , psi)	Line pressure at 2,000 min ⁻¹ (rpm) N or P	850 (8.5, 121) throttle fully-closed 900 (9.0, 128) throttle more than 3/16 open	800 (8.0, 114) throttle more than 3/16 open
	4rd clutch pressure at 2,000 min ⁻¹ (rpm) D ₄	520 (5.2, 74) throttle fully-closed 900 (9.0, 128) throttle more than 3/16 open	470 (4.7, 67) throttle fully-closed 800 (8.0, 114) throttle more than 3/16 open
	3rd and 2nd clutch pressure at 2,000 min ⁻¹ (rpm) D ₄	500 (5.0, 71) throttle fully-closed 900 (9.0, 128) throttle more than 3/16 open	450 (4.5, 64) throttle fully-closed 800 (8.0, 114) throttle more than 3/16 open
	2nd clutch pressure at 2,000 min ⁻¹ (rpm) 2	850-900 (8.5-9.0, 121-128)	800 (8.0, 114)
	1st and 1st-hold clutch pressure at 2,000 min ⁻¹ (rpm) 1	850-900 (8.5-9.0, 121-128)	800 (8.0, 114)
	Throttle B pressure	Throttle fully closed Throttle fully open	— 800 (8.0, 114)
		0 (0, 0) 850-900 (8.5-9.0, 121-128)	
Stall speed rpm (check with car on level ground)	F20A, F22A engine H23A engine	2,350-2,650 2,550-2,850	— —

Automatic Transmission — Section 14

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Clutch	Clutch initial clearance 1st-hold 1st, 2nd 3rd, 4th Clutch return spring free length 1st, 2nd, 3rd, 4th Clutch disc thickness Clutch plate thickness 1st, 1st-hold 2nd, F20A, F22A engine H23A engine 3rd, 4th	0.80-1.00 (0.031-0.039) 0.65-0.85 (0.026-0.033) 0.4-0.6 (0.016-0.024) 33.5 (1.32) 1.88-2.00 (0.074-0.079) 1.95-2.05 (0.077-0.081) 2.55-2.65 (0.089-0.093) 1.95-2.05 (0.077-0.081) 2.25-2.35 (0.089-0.093)	— — — 31.5 (1.24) Until grooves worn out. Discoloration ↑↓ Discoloration
	Clutch end plate thickness Mark 1 Mark 2 Mark 3 Mark 4 Mark 5 Mark 6 Mark 7 Mark 8 Mark 9	2.05-2.10 (0.081-0.083) 2.15-2.20 (0.085-0.087) 2.25-2.30 (0.089-0.091) 2.35-2.40 (0.093-0.094) 2.45-2.50 (0.096-0.098) 2.55-2.60 (0.100-0.102) 2.65-2.70 (0.104-0.106) 2.75-2.80 (0.108-0.110) 2.85-2.90 (0.112-0.114)	Discoloration ↑ ↓ Discoloration
Valve body	Stator shaft needle bearing contact I.D. Torque converter side Oil pump side Oil pump gear side clearance Oil pump gear-to-body clearance Oil pump driven gear I.D. Oil pump shaft O.D.	27.000-27.021 (1.0630-1.1638) 29.000-29.013 (1.1417-1.1422) 0.03-0.05 (0.001-0.002) 0.210-0.265 (0.0083-0.0104) 0.070-0.125 (0.0028-0.0049) 14.016-14.034 (0.5518-0.5525) 13.980-13.990 (0.5504-0.5508)	Wear or damage — 0.07 (0.003) — — Wear or damage Wear or damage
Shifting device, parking brake and throttle control system	Reverse shift fork finger thickness Parking brake ratchet pawl Parking brake gear Throttle cam stopper height	5.90-6.00 (0.232-0.236) — — 17.0-17.1 (0.669-0.673)	5.40 (0.213) } Wear or } other defect
Servo body	Shift fork shaft bore I.D. Shift fork shaft valve bore I.D.	14.000-14.010 (0.5512-0.5516) 37.000-37.039 (1.4567-1.4582)	— 37.045 (1.4585)
Regulator valve body	Sealing ring contact I.D.	35.000-35.025 (1.3780-1.3789)	35.050 (1.3799)
Accumulator body	Sealing ring contact I.D.	32.000-32.013 (1.2598-1.2604)	32.050 (1.2618)
Stator shaft	Sealing ring contact I.D.	29.000-29.013 (1.1417-1.1422)	29.050 (1.1437)
Transmission	Diameter of needle bearing contact area On mainshaft of stator shaft On mainshaft of 3rd gear collar On mainshaft of 4th gear collar On countershaft of 1st gear collar On countershaft of 4th gear On countershaft of parking gear collar On countershaft of reverse gear collar On secondary shaft of 1st gear On secondary shaft of 2nd drive gear On reverse idler gear shaft Inside diameter Mainshaft 3rd gear Mainshaft 4th gear Countershaft 1st gear Countershaft 4th gear Countershaft reverse gear Countershaft idler gear Countershaft reverse gear Reverse idler gear	22.984-23.000 (0.9049-0.9055) 49.984-46.000 (1.9679-1.8110) 31.984-32.000 (1.2592-1.2598) 40.984-41.000 (1.6135-1.6142) 31.975-31.991 (1.2589-1.2595) 39.984-40.000 (1.5742-1.5748) 35.979-36.000 (1.4165-1.4173) 31.975-31.991 (1.2589-1.2595) 31.975-31.991 (1.2589-1.2595) 13.990-14.000 (0.5508-0.5512) 52.000-52.019 (2.0472-2.0480) 38.005-38.021 (1.4963-1.4969) 47.000-47.016 (1.8504-1.8510) 38.000-38.016 (1.4961-1.4967) 42.000-42.016 (1.6535-1.6542) 48.000-48.016 (1.8898-1.8904) 37.000-37.016 (1.4567-1.4573) 37.000-37.016 (1.4567-1.4573)	Wear or damage ↑ ↓ Wear or damage

(cont'd)

Standards and Service Limits

Unit of length: mm (in)

Automatic Transmission — Section 14 (cont'd)

	MEASUREMENT	STANDARD (NEW)				SERVICE LIMIT
		Wire Dia.	O.D.	Free Length	No. of Coils	
Transmission (cont'd)	Mainshaft 3rd gear collar length	19.50-19.55 (0.768-0.770)	—	—	—	—
	Mainshaft 4th gear collar length	47.50-47.55 (1.870-1.872)	—	—	—	—
	Countershaft 1st gear collar length	27.50-27.55 (1.083-1.085)	—	—	—	—
	Thrust washer thickness	—	—	—	—	—
	Countershaft 1st gear	1.45-1.50 (0.057-0.059)	—	—	—	Wear or damage
	Countershaft idler gear	3.45-3.55 (0.136-0.140)	—	—	—	1.40 (0.055)
	Countershaft parking gear length	25.030-25.048 (0.9854-0.9861)	—	—	—	—
	Secondary shaft 1st gear distance collar length	4.95-5.00 (0.195-0.197)	—	—	—	—
	Secondary shaft 2nd gear spline washer thickness 35 x 53 mm	4.02-4.05 (0.158-0.159)	—	—	—	—
		4.07-4.10 (0.160-0.161)	—	—	—	—
		4.12-4.15 (0.162-0.163)	—	—	—	—
		4.17-4.20 (0.164-0.165)	—	—	—	—
		4.22-4.25 (0.166-0.167)	—	—	—	—
		4.27-4.30 (0.168-0.169)	—	—	—	—
		4.32-4.35 (0.170-0.171)	—	—	—	—
		4.37-4.40 (0.172-0.173)	—	—	—	—
		4.42-4.45 (0.174-0.175)	—	—	—	—
Springs	Regulator valve spring A	1.8 (0.071)	14.7 (0.579)	88.5 (3.484)	16.5	
	F20A, F22A engine	1.8 (0.071)	14.7 (0.579)	88.6 (3.488)	16.5	
	H23A engine	1.8 (0.071)	9.6 (0.378)	44.0 (1.732)	12.5	
	Regulator valve spring B	4.5 (0.177)	35.4 (1.394)	30.3 (1.193)	1.92	
	Stator reaction spring	1.1 (0.043)	8.4 (0.331)	36.4 (1.433)	12.0	
	Torque converter check valve spring	1.0 (0.039)	8.4 (0.331)	39.1 (1.539)	15.1	
	Relief valve spring	1.1 (0.043)	8.4 (0.331)	46.8 (1.843)	17.0	
	Cooler relief valve spring	0.6 (0.024)	6.6 (0.260)	55.8 (2.197)	15.8	
	2nd orifice control valve spring	0.8 (0.031)	6.6 (0.260)	52.5 (2.067)	33.0	
	Servo orifice control valve spring	0.9 (0.035)	7.1 (0.280)	60.8 (2.394)	28.9	
	4th exhaust valve spring	0.8 (0.031)	6.2 (0.244)	30.0 (1.181)	8.0	
	Throttle valve B adjusting spring	1.4 (0.055)	8.5 (0.335)	41.5 (1.634)	10.5	
	Throttle valve B spring	1.4 (0.055)	8.5 (0.335)	41.5 (1.634)	11.2	
		1.4 (0.055)	8.5 (0.335)	41.6 (1.638)	12.4	
	1-2 shift valve spring	1.0 (0.039)	8.6 (0.339)	41.3 (1.626)	16.9	
	2-3/3-4 shift valve spring	0.9 (0.035)	7.6 (0.299)	57.0 (2.244)	26.8	
	1st-hold accumulator spring	4.0 (0.157)	25.0 (0.984)	64.7 (2.547)	7.3	
	1st accumulator spring	1.8 (0.071)	16.3 (0.642)	115.4 (4.543)	18.6	
	4th accumulator spring	2.9 (0.114)	22.0 (0.866)	90.1 (3.547)	10.9	
	2nd accumulator spring	3.5 (0.138)	22.0 (0.866)	77.1 (3.035)	10.0	
	3rd accumulator spring	2.8 (0.110)	17.5 (0.689)	94.2 (3.709)	16.1	
	Lock-up shift valve spring	0.9 (0.035)	7.6 (0.299)	73.7 (2.902)	32.0	
	Lock-up timing valve spring	0.8 (0.031)	6.6 (0.260)	51.1 (2.012)	14.7	
	CPC valve spring	1.4 (0.055)	9.4 (0.370)	33.0 (1.299)	10.5	
	Modulator valve spring	1.4 (0.055)	9.4 (0.370)	33.0 (1.299)	10.5	
	Lock-up control valve spring E	0.7 (0.028)	6.6 (0.260)	38.0 (1.496)	14.1	
	4th kick-down spring	1.1 (0.043)	7.6 (0.299)	48.3 (1.902)	23.3	
	3rd kick-down spring	1.2 (0.047)	7.1 (0.280)	46.9 (1.846)	20.6	

Differential (Manual transmission) — Section 15

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Ring gear	Backlash	0.085-0.142 (0.0033-0.0056)	0.20 (0.008)
Differential carrier	Pinion shaft contact area I.D.	18.000-18.018 (0.7087-0.7094)	—
	Carrier-to-pinion clearance	0.013-0.047 (0.0005-0.0019)	0.10 (0.004)
	Driveshaft contact area I.D.	28.005-28.025 (1.1026-1.1033)	—
	Carrier-to-driveshaft clearance	0.020-0.062 (0.0008-0.0024)	0.12 (0.005)
Differential	Backlash	0.05-0.15 (0.002-0.006)	Adjust with a shim
	I.D.	18.042-18.066 (0.7103-0.7113)	—
	Pinion gear-to-pinion shaft clearance	0.055-0.095 (0.0022-0.0037)	0.15 (0.006)
Hypoid pinion	Preload N·m (kg·cm, lb·in)	1.4-2.6 (14-26, 12-23)	Adjust with a shim

Differential (Automatic transmission) — Section 15

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Ring gear	Backlash	0.085-0.142 (0.0033-0.0056)	0.20 (0.008)
Differential carrier	Pinion shaft contact area I.D.	18.000-18.018 (0.7087-0.7094)	—
	Carrier-to-pinion clearance	0.017-0.047 (0.0007-0.0019)	0.10 (0.004)
	Driveshaft contact area I.D.	28.005-28.025 (1.1026-1.1033)	—
	Carrier-to-driveshaft clearance	0.025-0.066 (0.0010-0.0026)	0.12 (0.005)
Differential	Backlash	0.05-0.15 (0.002-0.006)	Adjust with a shim
	I.D.	18.042-18.066 (0.7103-0.7113)	—
	Pinion gear-to-pinion shaft clearance	0.059-0.095 (0.0023-0.0037)	0.15 (0.006)
Hypoid pinion	Preload N·m (kg·cm, lb·in) New bearing	2.8-4.0 (28-40, 24-35)	Adjust with a shim
	Reused bearing	2.5-3.7 (25-37, 22-32)	

Steering — Section 17

	MEASUREMENT	STANDARD (NEW)
Steering wheel	Play at steering wheel circumference	0-10 (0-0.39)
	Starting load at steering wheel circumference N (kg, lb)	30 (3.0, 6.6)
	Engine running When the hydraulic system to the speed sensor is cut off	50 (5.0, 11.0)
Gearbox	Angle of rack-guide-screw loosened from locked position	20° +5° 0
Pump	Pump pressure with valve closed (oil temp./speed: 40°C (105 °F) min./idle. Do not run for more than 5 seconds). kPa (kg/cm ² , psi)	7,000-8,000 (70-80, 995-1,138)
Power steering fluid	Recommended fluid	Honda power steering fluid-V
	Fluid capacity ℓ (US qt, Imp qt)	1.7 (1.80, 1.50) 0.5 (0.53, 0.44)
Power steering belt	Deflection with 100 N (10 kg, 22 lb) between pulleys	13.5-16.5 (0.53-0.65) with used belt 9.5-11.5 (0.37-0.45) with new belt
	Belt tension N (kg, lb) Measured with belt tension gauge	350-500 (35-50, 77-110) with used belt 700-900 (70-90, 154-198) with new belt

Standards and Service Limits

Suspension — Section 18

	MEASUREMENT		STANDARD (NEW)
Wheel alignment (2WS)	Camber	Front	0° 00' ± 1°
		Rear	-0° 45' ± 1°
	Caster	Front	2° 40' ± 1°
	Total toe	Front	0 ± 2.0 (0 ± 0.08)
		Rear	IN 2.0 ± 2.0 (0.08 ± 0.08)
Wheel alignment (4WS)	Front wheel turning angle	Inward wheel	36° 20' ± 2°
		Outward wheel	29° 40'
	Camber	Front	0° 00' ± 1°
		Rear	-0° 45' ± 30'
	Caster	Front	2° 40' ± 1°
Wheel	Total toe	Front	0 ± 2.0 (0 ± 0.08)
		Rear	IN 2.0 ± 2.0 (0.08 ± 0.08)
	Wheel turning angle	Inward wheel	36° 20' ± 2°
		Rear	6° 00' ± 1°
		Outward wheel	29° 40'
Wheel bearing	Rim runout (Aluminum wheel)	Axial	0-0.7 (0-0.03)
		Radial	0-0.7 (0-0.03)
	Rim runout (Steel wheel)	Axial	0-1.0 (0-0.04)
		Radial	0-1.0 (0-0.04)
Wheel bearing	End play	Front	0-0.05 (0-0.002)
		Rear	0-0.05 (0-0.002)

Brakes — Section 19

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Parking brake lever	Play in stroke 200 N (20 kg, 44 lb) lever force		To be locked when pulled 6-10 notches	—
Foot brake pedal	Pedal height (with floor mat removed)	M/T	LHD: 165 (6.50)	—
		A/T	RHD: 180 (7.09)	—
	Free play		186 (7.32)	—
Master cylinder	Piston-to-pushrod clearance		1-5 (0.04-0.20)	—
Disc brake	Disc thickness	Front	0-0.04 (0-0.0016)	—
		Rear	23.0 (0.09)	21.0 (0.83)
	Disc runout	Front	10.0 (0.39)	8.0 (0.31)
		Rear	—	0.10 (0.004)
	Disc parallelism	Front and rear	—	0.10 (0.004)
	Pad thickness	Front	12.5 (0.49)	0.015 (0.0006)
		Rear	11.0 (0.43)*	1.6 (0.06)
			9.0 (0.35)	1.6 (0.06)*
	Characteristics	Vacuum (mmHg)	Pedal Pressure kg (lb)	Line Pressure kPa (kg/cm ² , psi)
	Without ABS	0	20 (44)	1,030 (10.3, 146) min.
With ABS		300	20 (44)	5,690 (56.9, 809) min.
		500	20 (44)	8,030 (8.03, 1,142) min.
		0	20 (44)	790 (7.9, 112) min.
		300	20 (44)	6,320 (63.2, 899) min.
		500	20 (44)	7,880 (78.8, 1,121) min.

* H23A engine

Standards and Service Limits

Air Conditioner — Section 22

	MEASUREMENT	STANDARD (NEW)
Air conditioner system	Lubricant capacity cc (fl oz) Condenser Evaporator Line or hose Receiver	10 (1/3) 30 (1) 10 (1/3) 10 (1/3)
Compressor	Lubricant capacity cc (fl oz) Stator coil resistance at 20°C (68°F) Ω Pulley-to-pressure plate clearance	120-140 (4-4-2/3) 3.05-3.35 0.35-0.65 (0.014-0.026)
Compressor belt	Deflection with 100 N (10 kg, 22 lb) between the pulleys Belt tension N (kg, lb) Measured with belt tension gauge	10.0-12.0 (0.39-0.47) with used belt 4.5-7.5 (0.18-0.30) with new belt 450-600 (45-60, 99-132) with used belt 950-1.150 (9.5-115, 209-254) with new belt

Electrical — Section 23

Electrical — Section 23			
	MEASUREMENT	STANDARD (NEW)	
Ignition coil	Rated voltage V Primary winding resistance Ω at 25 °V (77°F) Secondary winding resistance kΩ at 25 °C (77°F)	12 0.6-0.8 12.9-19.3*1, 14.4-21.6*2	
Spark Plug	Type Gap	See Section 23 1.0-1.1 (0.039-0.043)	
Ignition timing	At idling ° BTDC	15° ± 2° (Red)	
Alternator belt	Deflection with 100 N (10 kg, 22 lb) between pulleys	10.0-12.0 (0.39-0.47) with used belt 8.5-11.0 (0.33-0.43) with new belt	
	Belt tension N (kg, lb) Measured with belt tension gauge	300-500 (30-50, 66-110) with used belt 500-700 (50-70, 110-154) with new belt	
	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Alternator (NIPPONDENSO)	Output 13.5 V at hot A	80/98	—
	Coil resistance (rotor) Ω	2.8-3.0	—
	Slip ring O.D.	14.4 (0.57)	14.0 (0.55)
	Brush length	10.5 (0.41)	5.5 (0.22)
	Brush spring tension g (oz)	300-360 (10.6-12.7)	—
Starter motor (MITSUBA 1.4 kW)	Type	Spur gear reduction, Permanent magnet	
	Mica depth	0.4-0.5 (0.016-0.020)	0.15 (0.006)
	Commutator runout	0-0.02 (0-0.001)	0.05 (0.002)
	Commutator O.D.	28.0-28.1 (1.102-1.106)	27.5 (1.083)
	Brush length	15.8-16.2 (0.62-0.64)	10.0 (0.39)
	Brush spring tension (new) N (kg, lb)	16.0-18.0 (1.60-1.80, 3.53-3.93)	—
Starter motor (MITSUBA 1.6 kW)	Type	Spur gear reduction, Permanent magnet	
	Mica depth	0.4-0.5 (0.016-0.020)	0.15 (0.006)
	Commutator runout	0-0.02 (0-0.001)	0.05 (0.002)
	Commutator O.D.	28.0-28.1 (1.102-1.106)	27.5 (1.083)
	Brush length	15.8-16.2 (0.62-0.64)	10.0 (0.39)
	Brush spring tension (new) N (kg, lb)	16.0-18.0 (1.60-1.80, 3.53-3.93)	—

*1: F20A, F22A, H23A engine *2: F22A, H23A engine

Design Specifications

	ITEM		METRIC	ENGLISH	NOTES
DIMENSIONS	Overall Length		4,440 mm	174.8 in	
	Overall Width		1,765 mm	69.5 in	
	Overall Height		1,290 mm	50.8 in	
	Wheelbase		2,550 mm	100.4 in	
	Track F/R		1,525/1,515 mm	60.0/59.6 in	
	Ground Clearance		145 mm	5.7 in	
	Seating Capacity		Four		
WEIGHT	See page 3-17 to 3-19				
ENGINE	Type	F20A, F22A engine	Water-cooled, 4-stroke SOHC gasoline engine		*1: KQ Type *2: KY type
		H23A engine	Water-cooled, 4-stroke DOHC gasoline engine		
	Cylinder Arrangement		4-cylinder Inline, transverse		
	Bore and Stroke	F20A engine	85.0 × 88.0 mm	3.35 × 3.41 in	
		F22A engine	85.0 × 95.0 mm	3.35 × 3.74 in	
		H23A engine	87.0 × 95.0 mm	3.42 × 3.74 in	
	Displacement	F20A engine	1,997 cm ³ (cc)	121.8 cu in	
		F22A engine	2,156 cm ³ (cc)	131.5 cu in	
		H23A engine	2,259 cm ³ (cc)	137.8 cu in	
			2,258 cm ³ (cc)*1	137.7 cu in*1	
	Compression Ratio	F20A engine	9.5 : 1		
		F22A engine	8.8 : 1, 8.9 : 1*2		
		H23A engine	9.8 : 1		
	Valve Train	F20A, F22A engine	Belt driven, 4 valves per cylinder, single over head camshaft		
		H23A engine	Belt driven, 4 valves per cylinder, double over haed camshaft		
	Lubrication System		Forced and wet sump, torochoid pump		
Fuel Required	F20A, H23A engine	Premium UNLEADED grade gasoline with 95 Research Octane Number or higher			
	F22A engine	UNLEADED grade gasoline with 91 Research Octane Number or higher			
	F22A engine	LEADED or UNLEADED grade gasoline with 91 Research Octane Number or higher			
STARTER	Makes/Type		MITSUBA/Spur gear reduction, permanent magnet		
	Normal Output		1.4 kW, 1.6 kW		
	Nominal Voltage		12 V		
	Hour Rating		30 seconds		
	Direction of Rotation		Counterclockwise as viewed from gear end		
	Weight		3.7 kg	8.2 lb	
CLUTCH	Clutch Type	M/T	Single plate dry, diaphragm spring		
		A/T	Torque converter		
	Clutch Facing Area	M/T	203 cm ²	31 sq in	
TRANSMISSION	Transmission	M/T A/T	Synchronized 5-speed forward, 1 reverse Electronically controlled dual range 4-speed forward automatic, 1 reverse Direct 1 : 1		
	Primary Reduction				
	Type	F20A, F22A engine	Manual	Automatic	
	Gear Ratio	1st	3.307	2.705	
		2nd	1.809	1.366, 1.482*3	
		3rd	1.269, 1.230*3	1.028	
		4th	0.966, 0.903*3	0.750, 0.731*3	
		5th	0.787, 0.757*3	—	
Reverse		3.000	2.047		

*3: KT, KY types

(cont'd)

	ITEM	METRIC	ENGLISH	NOTES
TRANSMISSION (cont'd)	Type H23A engine	Manual	Automatic	
	Gear Ratio	1st 2nd 3rd 4th 5th Reverse	2.705 1.535 1.028 0.750 — 2.047	
	Final Reduction	Gear type Gear ratio	Single helical gear 4.266 4.285	
	Cooling Capacity	3.700 Kcal/h	14,682 BTU/h	
	— Conditions:			
	Compressor Speed	1,800 min ⁻¹ (rpm)		
AIR CONDITIONER	Outside Air Temperature	27 °C	81 °F	
	Outside Air Humidity	50 %		
	Condenser Air Temperature	35 °C	95 °F	
	Condenser Air Velocity	2.5 m/sec	8.2 ft/sec	
	Blower Capacity	460 m ³ /h	16,247 cu ft/h	
	Compressor	Type/Makes No. of Cylinder Capacity Max. Speed Lubricant Capacity	Scroll type/SANDEN — 85.7 cc/rev 5.23 cu in/rev 10,000 min ⁻¹ (rpm) 120-140 cc 4-4-2/3 fl oz	
	Condenser	Type	Corrugated fin type	
	Evaporator	Type	Corrugated fin type	
	Blower	Type Motor Input Speed Control Max. Capacity	Sirocco fan 220 W/12 V 4-speed 460 m ³ /h 16,247 cu ft	
	Temp. Control		Air-mix type	
	Comp. Clutch	Type Power Consumption	Dry, single plate, poly-V-belt drive 42 W max./12 V	
	Refrigerant	Type Quantity	R 12 800-50 g 26.5-1.80 oz	
STEERING SYSTEM	Type	Power assisted, rack and pinion		
	Overall Ratio Turns, Lock-to-Lock Steering Wheel Dia.	2WS: 15.85, 4WS: 15.06 2WS: 2.9, 4WS: 2.7 380 mm 15.0 in		
SUSPENSION	Type, Front	Independent double wishbone, coil spring with stabilizer		
	Type, Rear	Independent double wishbone, coil spring with stabilizer		
	Shock Absorber, Front and Rear	Telescopic, hydraulic nitrogen gas-filled		

(cont'd)

Design Specifications

(cont'd)

	ITEM	METRIC	ENGLISH	NOTES
WHEEL ALIGNMENT	Camber		0° 00'	
	Front		-0° 45'	
	Caster		2° 40'	
	Total Toe	0 mm	0 in	
	Front	In 2.0 mm	In 0.08 in	
	Rear			
BRAKE SYSTEM	Type, Front	Power-assisted self-adjusting ventilated disc		
	Rear	Power-assisted self-adjusting solid disc		
	Pad and Lining Surface Area: Front	58. cm ² x 2	8.99 sq in x 2	Cars with H23A engine Cars with except H23A engine
	Rear	49.4 cm ² x 2	7.66 sq in x 2	
	Parking Brake Kind and Type	27.9 cm ² x 2	4.32 sq in x 2	
		Mechanical actuating, rear two wheel brakes		
TYRE	Size and Pressure	See tyre information label on driver's door jamb.		
ELECTRICAL	Battery	12 V-52AH/5HR, 12 V-55AH/5HR*1, 12 V-38AH/5HR*2		
	Starter	12 V-1.4 kW, 12 V-1.6 kW		
	Alternator	F20A, F22A engine: 12V-80 A H23A engine: 12V-90 A		
	Fuses In The Under-Dash Fuse Box	7.5 A, 10 A, 15 A, 20 A, 30 A		
	In The Under-Hood Fuse/Relay Box	7.5 A, 10 A, 15 A, 20 A, 30 A, 40 A, 50 A, 60 A, 100 A		
	Headlights	12 V-55 W, 12 V-65 W*3		
	Inside	12 V-60/55 W, 12 V-55 W*3		
	Outside	12 V-21 W		
	Front Turn Signal Lights	12 V-5 W		
	Front Position Lights	12 V-5W		
	Side Turn Signal Lights	12 V-21 W		
	Rear Turn Signal Lights	12 V-21/5 W		
	Stop/Taillights	12 V-21 W		
	Back-up Lights	12 V-21 W		
	Rear Fog Light*4	12 V-21 W		
	License Plate Lights	12 V-5 W, 12 V-8 W*5		
	High-mount brake light*6	12 V-45CP		
	Interior Lights	12 V-8 W		
	Luggage area Lights	12 V-3.4 W		
	Gauge Lights	12 V-3.0 W, 1.4 W, 1.7 W		
	Indicator Lights	12 V-1.12 W, 1.4 W, 3.0 W, 3.2 W		
	Illumination and Pilot Lights	12 V-1.4 W, 1.12 W, 0.84 W		
		12 V-0.91 W, 0.56 W, LED		
	Heater Illumination Lihgts	12 V-1.4 W		

*1: KS type, *2: Cars with F22A engine, *3: KY type, *4: Except KQ, KT and KY types, *5: KT and KY types, *6: KQ and KY types.

Design Specifications

European Models

specs

	ITEM	METRIC	ENGLISH	NOTES
WEIGHT	Curb Weight			
	2.0 ℓ M/T	1,220 kg 1,195 kg 1,225 kg	2,690 lb 2,634 lb 2,701 lb	KF, KG*1, KS KG*2 KE
	2.0 ℓ A/T	1,245 kg 1,220 kg 1,250 kg	2,745 lb 2,689 lb 2,756 lb	KF KG*2 KE
	2.0 ℓ M/T with ABS	1,235 kg 1,210 kg 1,240 kg	2,723 lb 2,668 lb 2,734 lb	KF, KG*1, KS KF*2 KE
	2.0 ℓ A/T with ABS	1,260 kg 1,235 kg 1,265 kg	2,778 lb 2,723 lb 2,789 lb	KF, KG*1, KS KG*2 KE
	2.3 ℓ M/T with ABS	1,250 kg 1,225 kg 1,260 kg	2,756 lb 2,701 lb 2,778 lb	KF, KG*1, KS KG*2 KE
	2.3 ℓ A/T with ABS	1,275 kg 1,250 kg 1,285 kg	2,811 lb 2,756 lb 2,833 lb	KF KG*2 KE
	2.3 ℓ M/T with ABS, 4WS	1,270 kg 1,245 kg 1,280 kg	2,800 lb 2,745 lb 2,822 lb	KF, KG*1, KS KG*2 KE
	2.3 ℓ A/T with ABS, 4WS	1,295 kg 1,270 kg 1,305 kg	2,855 lb 2,800 lb 2,877 lb	KF, KG*1, KS KG*2 KE

KG*1: KG type except Netherlands, KG*2: KG type for Netherlands (half tank of gasoline).

(cont'd)

Design Specifications

European Models

	ITEM	METRIC	ENGLISH	NOTES
WEIGHT (cont'd)	Weight Distributions (Front/Rear)			
	2.0 ℓ M/T	760/460 kg —	1,675/1,014 lb —	KF, KG*1, KS KG*2
		760/465 kg	1,675/1,025 lb	KE
	2.0 ℓ A/T	785/460 kg —	1,731/1,014 lb —	KF KG*2
		785/465 kg	1,731/1,025 lb	KE
	2.0 ℓ M/T with ABS	773/462 kg —	1,704/1,019 lb —	KF, KG*1, KS KG*2
		773/467 kg	1,704/1,030 lb	KE
	2.0 ℓ A/T with ABS	798/462 kg —	1,759/1,018 lb —	KF, KG*1, KS KG*2
		798/467 kg	1,759/1,030 lb	KE
	2.3 ℓ M/T with ABS	785/465 kg —	1,731/1,025 lb —	KF, KG*1, KS KG*2
		785/475 kg	1,731/1,047 lb	KE
	2.3 ℓ A/T with ABS	810/465 kg —	1,786/1,025 lb —	KF KG*2
		810/475 kg	1,786/1,047 lb	KE
	2.3 ℓ M/T with ABS, 4WS	785/485 kg —	1,731/1,069 lb —	KF, KG*1, KS KG*2
		785/495 kg	1,731/1,091 lb	KE
	2.3 ℓ A/T with ABS, 4WS	810/485 kg —	1,786/1,069 lb —	KF, KG*1, KS KG*2
		810/495 kg	1,786/1,091 lb	KE
	Max. Permissible Weight (MPW)	1,720 kg	3,792 lb	

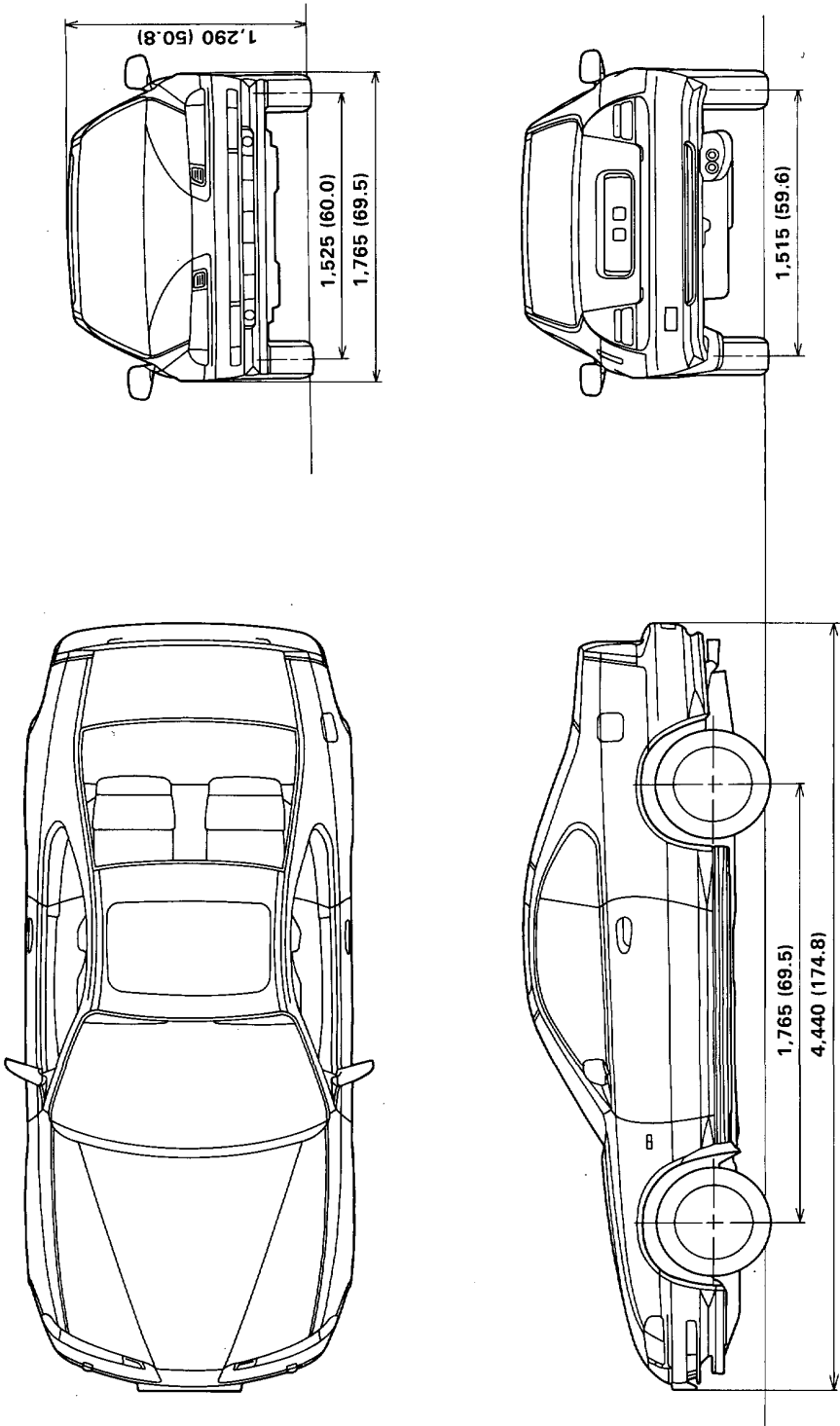
KG*1: KG type except Netherlands, KG*2: KG type for Netherlands (half tank of gasoline).

Except European Models

	ITEM	METRIC	ENGLISH	NOTES
WEIGHT	Curb Weight			
	2.2 ℓ M/T	1,225 kg	2,701 lb	KQ
		1,260 kg	2,778 lb	KY
	2.2 ℓ A/T	1,245 kg	2,745 lb	KQ
		1,285 kg	2,833 lb	KY
	2.3 ℓ M/T with ABS, 4WS	1,275 kg	2,811 lb	KQ
	2.3 ℓ A/T with ABS, 4WS	1,300 kg	2,866 lb	KQ
	Weight Distributions (Front/Rear)			
	2.2 ℓ M/T	755/470 kg	1,664/1,036 lb	KQ
		775/485 kg	1,709/1,069 lb	KY
	2.2 ℓ A/T	780/465 kg	1,720/1,025 lb	KQ
		800/485 kg	1,764/1,069 lb	KY
	2.3 ℓ M/T with ABS, 4WS	780/495 kg	1,720/1,091 lb	KQ
	2.3 ℓ A/T with ABS, 4WS	805/495 kg	1,775/1,091 lb	KQ
	Max. Loaded Vehicle Weight (ADR)	1,653 kg	3,644 lb	KQ
	Max. Vehicle Weight (MVW)	1,720 kg	3,792 lb	KY

Body Specifications

Unit: mm (in)



Maintenance

Lubrication Points 4-2

Maintenance Schedule 4-4

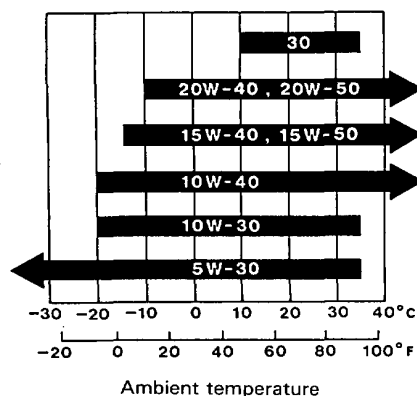


Lubrication Points

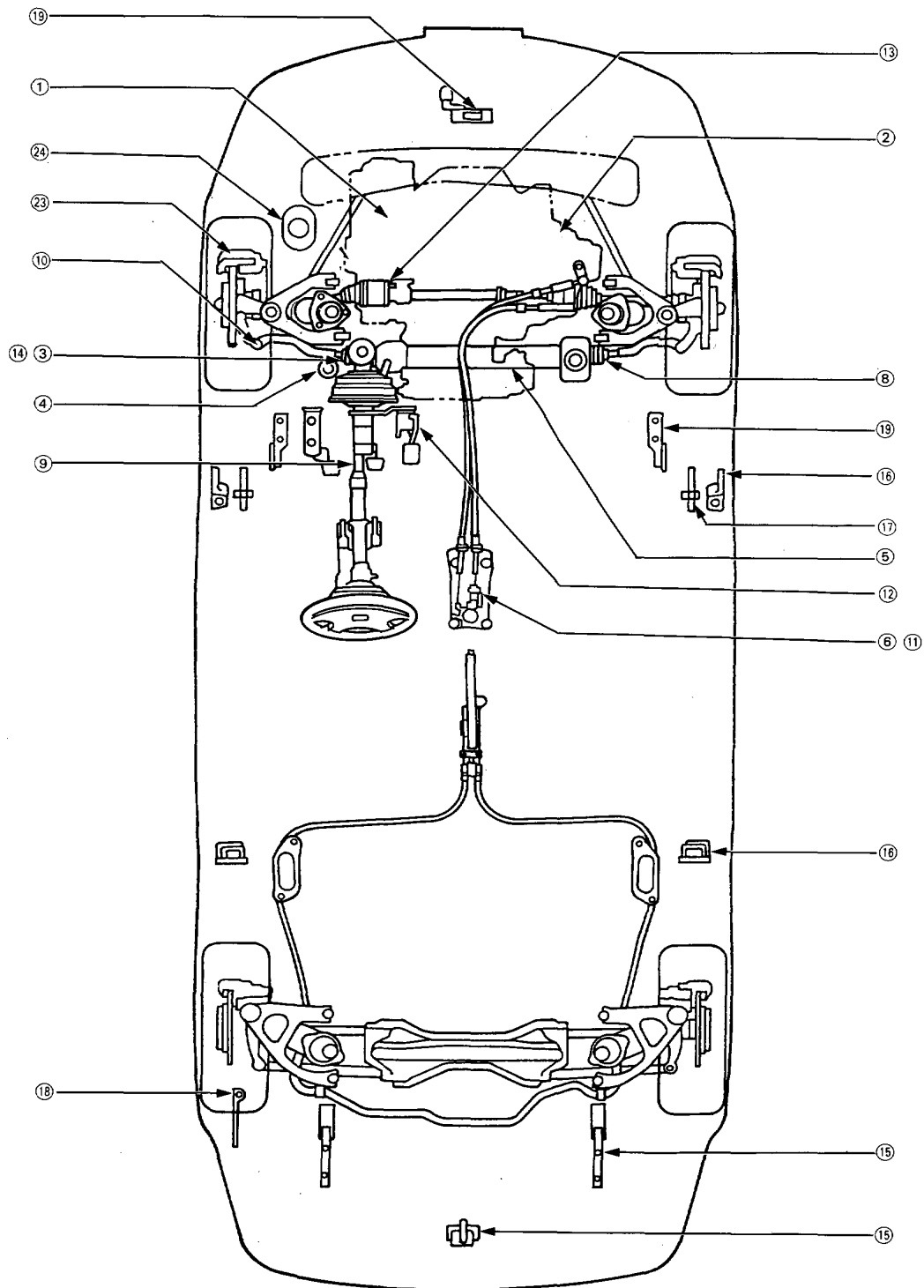
For the details of lubrication points and types of lubricants to be applied, refer to the Illustrated Index and various work procedures (such as Assembly/Reassembly, Replacement, Overhaul, Installation, etc.) contained in each section.

No.	LUBRICATION POINTS	LUBRICANT
1	Engine	Always use a fuel-efficient oil is that says "API Service SG or SF." SAE Viscosity: See chart below.
2	Transmission Manual Automatic	API Service Grade: SF or SG Honda Premium Formula Automatic Transmission Fluid or an equivalent DEXRON® II Automatic transmission fluid
3	Brake Line	Brake fluid DOT3 or DOT4
4	Clutch Line	Brake fluid DOT3 or DOT4
5	Power steering gearbox	Steering grease P/N 08733-B070E
6	Shift lever pivots (Manual)	Silicone grease with molybdenum disulfide
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	Release fork (Manual) Steering boots Steering column bushings Steering ball joints Select lever (Automatic) Pedal linkage Intermediate shaft Brake master cylinder pushrod Trunk hinges and latches Door hinges upper/lower and latches Door opening detents Fuel filler lid Engine hood hinges and engine hood latch Clutch master cylinder pushrod Throttle cable end Brake pipe joint (Front and rear wheel house)	Multi-purpose grease
23	Caliper Piston seal, Dust seal, Caliper pin, Piston	Silicone grease
24	Power steering system	Honda power steering fluid-V

Select the oil for the car according to this chart:



CAUTION: Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil.



Maintenance Schedule

R = Replace I = Inspect After inspection, clean, adjust, repair or replace if necessary.

Service at the interval listed x 1,000 km (or miles) or after that number of months, whichever comes first.		10	20	30	40	50	60	70	80	90	100
		x 1,000 km	6	12	18	24	30	36	42	48	54
		x 1,000 miles months	6	12	18	24	30	36	42	48	54
Emission Related											
<input type="checkbox"/> Air cleaner element	For European and KQ types				R					R	
	Except for European and KQ types				R		R			R	
Idle speed and idle CO	Except for KS and Swiss KG types		I			I				I	
	For KS and Swiss KG types										I
E.G.R. System	For cars using unleaded gasoline										I
Evaporative emission control system											I
Ignition timing	Except for KS and Swiss KG types					I				I	
	For KS and Swiss KG types										I
Positive crankcase ventilation valve	Except for KS and Swiss KG types					I				I	
	For KS and Swiss KG types										I
Valve clearance			I			I		I		I	
Fuel filter						R				R	
Tank, fuel line and connections						I				I	
Spark plugs	For cars using unleaded gasoline				R*1					R*1	
	For cars using leaded gasoline		R			R		R		R	
Distributor cap and rotor	Except for KS and Swiss types					I				I	
	For KS and Swiss KG types										I
Ignition wiring	Except for KS and Swiss KG types					I				I	
	For KS and Swiss KG types										I
<input checked="" type="checkbox"/> Engine oil and oil filter		R	R	R	R	R	R	R	R	R	R
Alternator drive belt					I					I	
Power steering pump belt					I					I	
Cooling system hoses and connections					I					I	
Emission related											
• Radiator coolant										R*2	
<input type="checkbox"/> Transmission oil					R					R	
Engine (Non-Emission Related)											
Timing belt and timing balancer belt											R
Water pump											I
Exhaust pipe and muffler			I			I				I	
Catalytic converter heat shield (For cars with catalytic converter)											I

• : Day to day care (engine oil, ATF and coolant level) should be done practically according to the owner's manual by the customer.

☐ : Under severe driving conditions, service these items more often.

*1: For KS type, replace every 2 years or 40,000 km (24,000 miles), whichever comes first after 30,000 km (18,000 miles).

*2: Thereafter, replace every 2 years or 40,000 km (24,000 miles), whichever comes first.



R = Replace I = Inspect After inspection, clean, adjust, repair or replace if necessary.

Service at the interval listed x 1,000 km (or miles) or after that number of months, whichever comes first.		x 1,000 km	10	20	30	40	50	60	70	80	90	100
		x 1,000 miles	6	12	18	24	30	36	42	48	54	60
		months	6	12	18	24	30	36	42	48	54	60
Brakes (Non Emission Related)												
Front brake pads			I	I	I	I	I	I	I	I	I	I
<input type="checkbox"/> Front brake discs and calipers				I		I		I		I		I
<input type="checkbox"/> Rear brake discs, calipers and pads						I				I		
Brake hoses and lines (including Anti-lock brake system *3)				I	I	I	I	I	I	I	I	I
Parking brake				I	I	I	I			I		
Brake fluid (including Anti-lock brake system *3)						R				R		
Anti-lock brake system high pressure hose *3										R		
Anti-lock brake system operation *3				I		I				I		
Steering and suspension (Non-Emission Related)												
Front wheel alignment				I		I		I		I		I
Front and rear wheel alignment *4				I		I		I		I		I
Steering operation, tie rod ends, steering gear box and boots (including rear actuator for 4WS model)		Except for 4WS model For 4WS model		I		I		I		I		I
Suspension mounting bolts				I		I		I		I		I
<input type="checkbox"/> Power steering system				I		I		I		I		I

• : Day to day care (engine oil, ATF and coolant level) should be done practically according to the owner's manual by customer.

☐ : Under severe driving conditions, service these items more often.

*3: For cars with Anti-lock brake system.

*4: For cars with four wheel steering.

Severe Driving Conditions

Items with a ☐ in the chart will need service more often, if you drive in some severe conditions.

The conditions are:

- A. Repeated short distance driving.
- B. Dusty conditions.
- C. Severe cold weather.
- D. Areas with road salt or other corrosive materials.
- E. Rough or muddy roads.
- F. Towing a trailer.

The services are:

- Replace engine oil and oil filter every 5,000 km (3,000 miles) or 3 months under condition A, B or F.
- Clean the air cleaner element every 20,000 km (12,000 miles) or 12 months and replace every 40,000 km (24,000 miles) or 24 months for European and KQ types under condition B or E.
- Clean the air cleaner element every 10,000 km (6,000 miles) or 6 months and replace every 20,000 km (12,000 miles) or 12 months for other than European and KQ types under condition B or E.
- Replace transmission oil every 20,000 km (12,000 miles) or 12 months under condition F.
- Inspect front brake discs and calipers, every 10,000 km (6,000 miles) or 6 months under condition A, B, D, E or F.
- Inspect rear brake discs, calipers and pads every 20,000 km (12,000 miles) or 12 months under condition A, B, D, E or F.
- Inspect the power steering system every 10,000 km (6,000 miles) or 6 months under condition B, C, or E.

CAUTION: Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil.

Engine

Engine Removal/Installation	5-1
Cylinder Head/Valve Train	6-1
Engine Block	7-1
Engine Lubrication	8-1
Intake Manifold/Exhaust System	9-1
Cooling	10-1

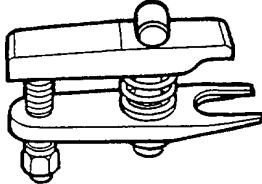


Engine Removal/Installation

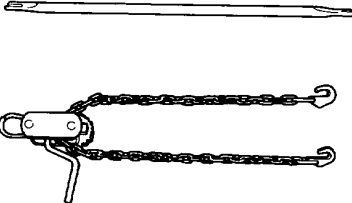


Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07MAC-SL00100	Ball Joint Remover, 32 mm	1	5-9
②	07KAK-SL40101	Engine Tilt Hanger Set	1	5-10



①



②

Engine Removal/Installation

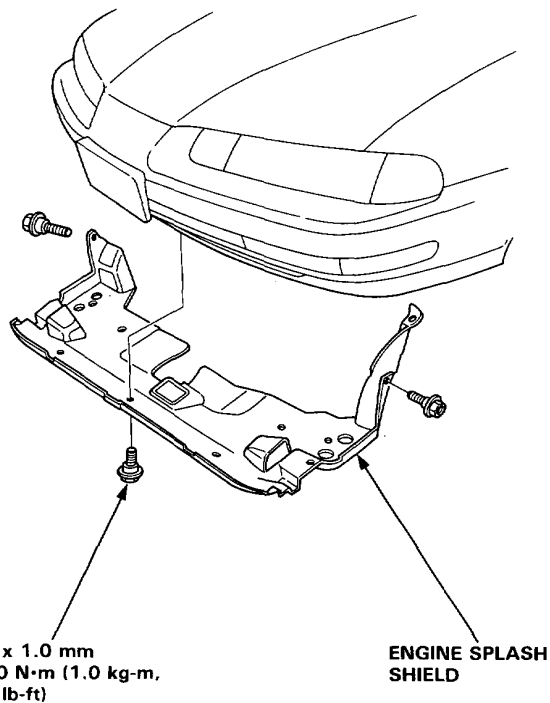


⚠ WARNING

- Make sure jacks and safety stands are placed properly and hoist brackets are attached to the correct positions on the engine.
- Make sure the car will not roll off stands and fall while you are working under it.

CAUTION:

- Use fender covers to avoid damaging painted surface.
- Unspecified items are common for the M/T cars, A/T cars.
- Unplug the wiring connectors carefully while holding the connector portion to avoid damage.
- Make all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses or interference with other parts.

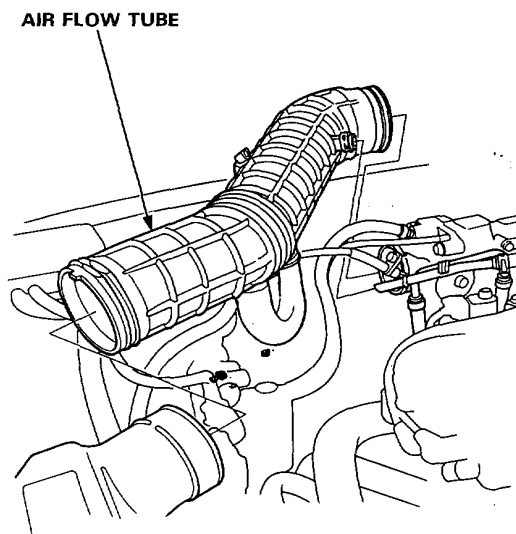


1. Secure the hood as far open as possible.
2. Disconnect the battery negative terminal first, then the positive terminal.
3. Remove the radiator cap.

⚠ WARNING

Use care when removing the radiator cap to avoid scalding by hot coolant or steam.

4. Raise the hoist to full height.
5. Remove the front tire/wheel and the engine splash shield.
6. Loosen the drain plug from the radiator lower tank.
7. Drain the transmission oil/fluid. Use a 3/8" drive socket wrench to remove the drain plug. Reinstall the drain plug using a new washer.
8. Drain the engine oil. Reinstall the drain plug using a new washer.
9. Lower the hoist.
10. Remove the air flow tube.



(cont'd)

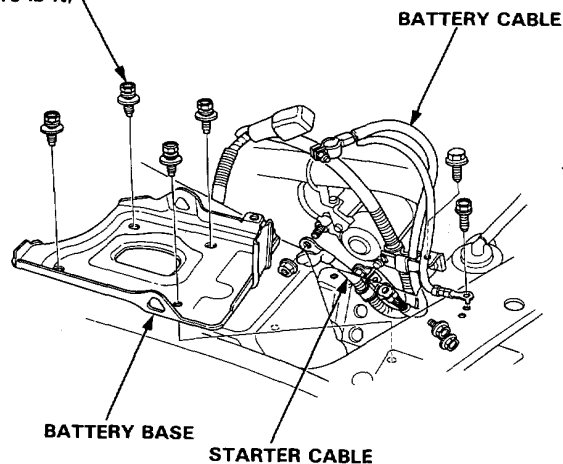
Engine Removal/Installation

(cont'd)

11. Remove the battery, battery base, battery cable and starter cable.

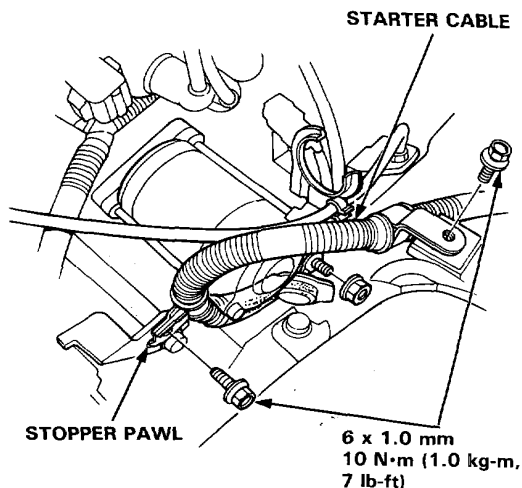
M/T:

8 x 1.25 mm
22 N·m (2.2 kg-m,
16 lb-ft)



A/T:

CAUTION: When installing the starter cable clamp, the stopper pawl put in to the hole surely.



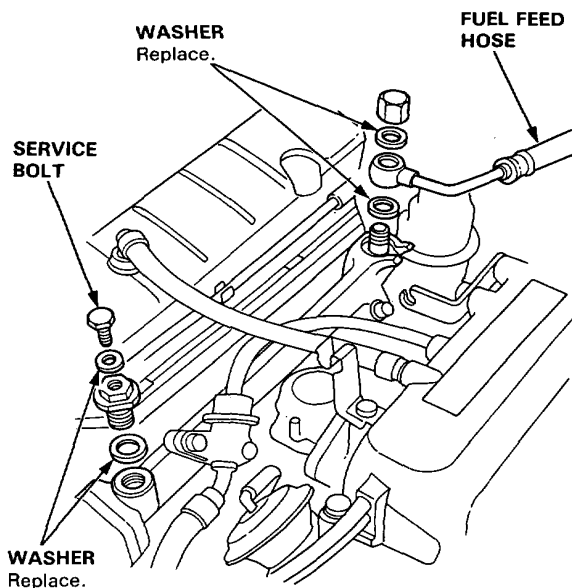
12. Relieve fuel pressure by slowly loosening the service bolt on the fuel pipe about one turn (See section 11).

⚠ WARNING Do not smoke while working on the fuel system. Keep away from work area. Drain fuel only into an approved container.

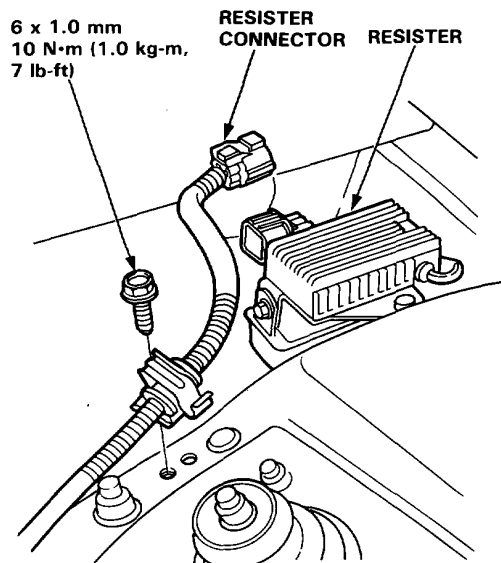
CAUTION:

- Before disconnecting any fuel line, the fuel pressure should be relieved as described above.
- Place a shop towel over the fuel pipe to prevent pressurized fuel from splaying over the engine.

13. Remove the fuel feed hose from the fuel pipe.



14. Remove the resistor connector on the left side of engine compartment.

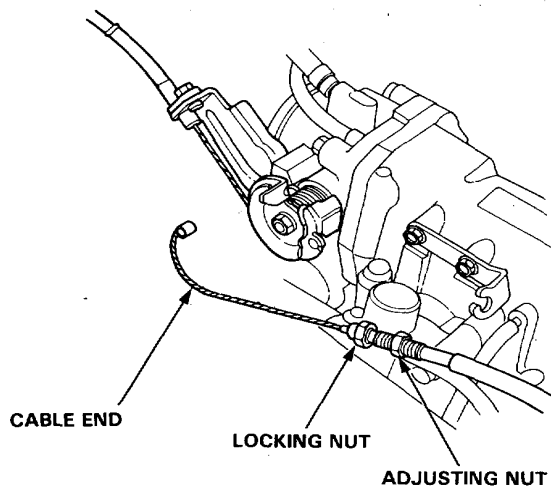




15. Remove the throttle cable by loosening the locknut, then slip the cable end out of the accelerator linkage.

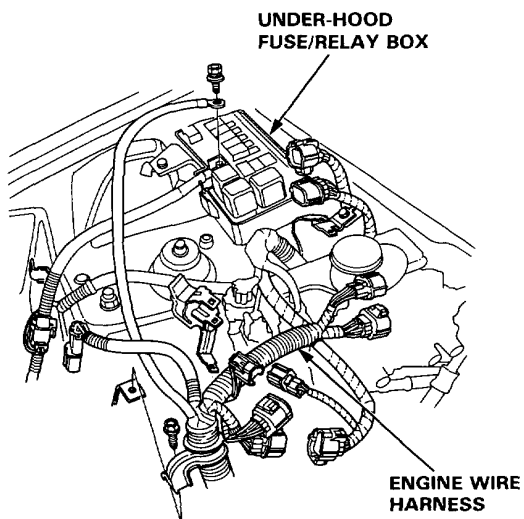
NOTE:

- Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.
- Adjust the throttle cable when installing (See section 11).

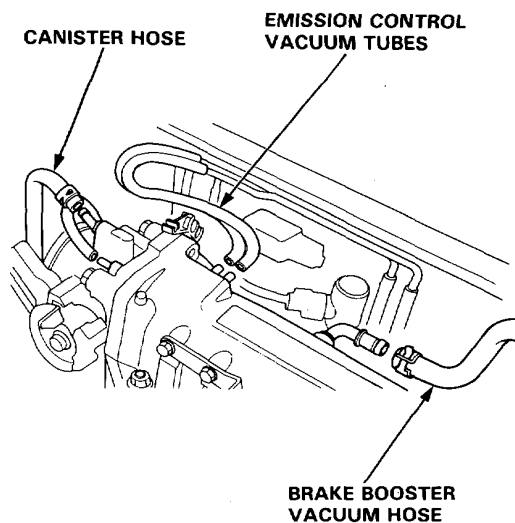


16. Remove the engine wire harness connectors, terminal and clamps on the right side of engine compartment.

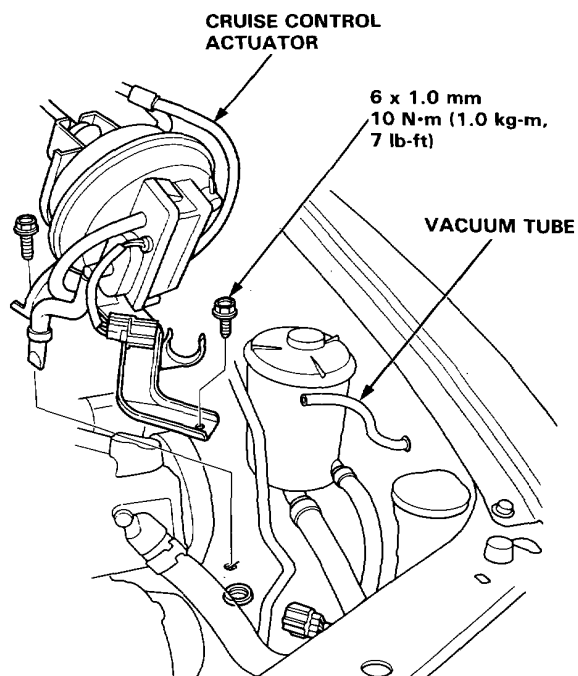
17. Remove the power cable from the under-hood fuse/relay box.



18. Remove the brake booster vacuum hose and emission control vacuum tubes from the intake manifold.



19. Disconnect the connector and vacuum tube, then remove the cruise control actuator.



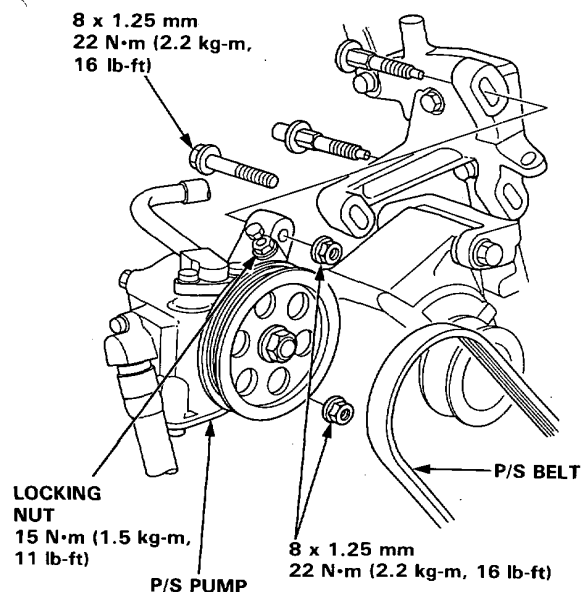
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Engine Removal/Installation

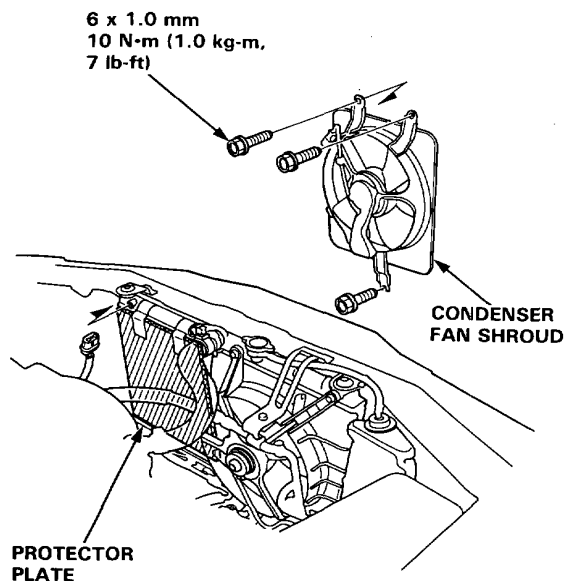
(cont'd)

20. Remove the engine ground cable on the cylinder head.

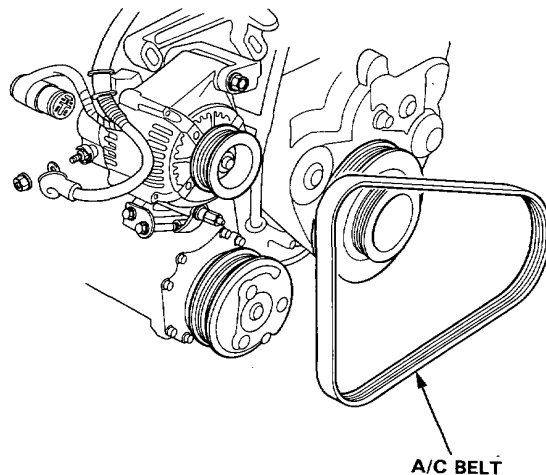
21. Remove the P/S belt and pump.
 • Do not disconnect the P/S hoses.



22. Remove the A/C condenser fan shroud then install a protector plate to the radiator.

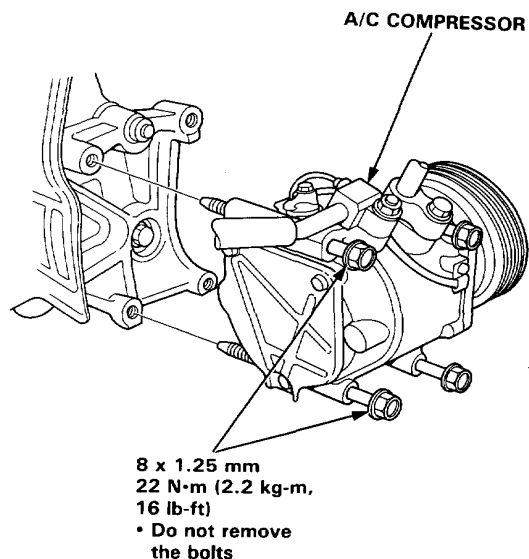


23. Remove the A/C belt.



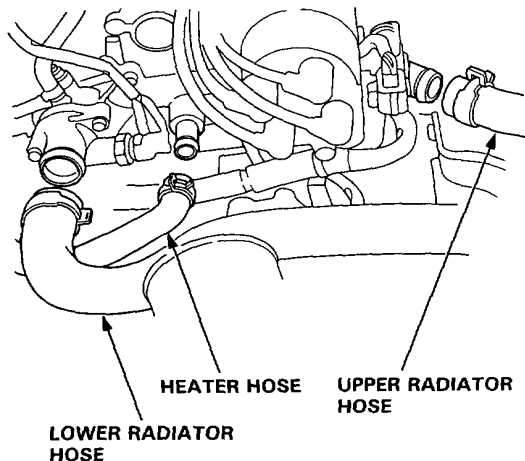
24. Loosen the mountingbolt, the remove the A/C compressor.

- Do not disconnect the A/C hoses.
- Disconnect the connector.

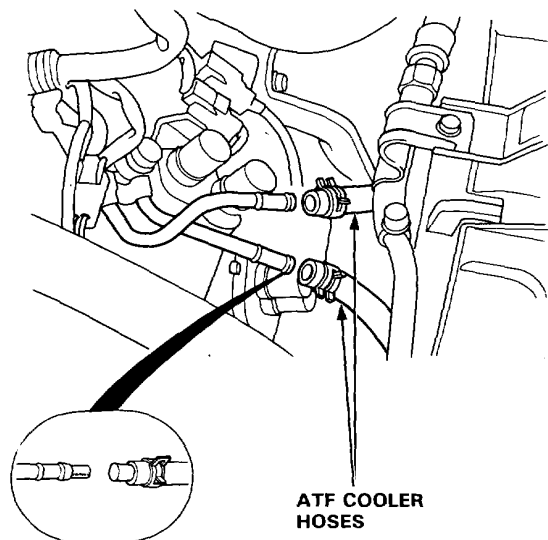




25. Remove the upper and lower radiator hoses and the heater hoses.



26. Remove the transmission ground cable and the ATF cooler hoses (A/T).

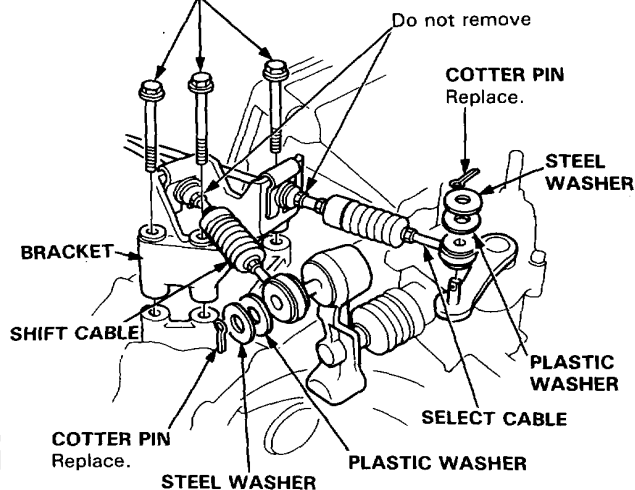


27. Remove the shift cable and select cable (M/T).

NOTE:

- Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.
- Adjust the shift cable and select cable when installing (See section 13).

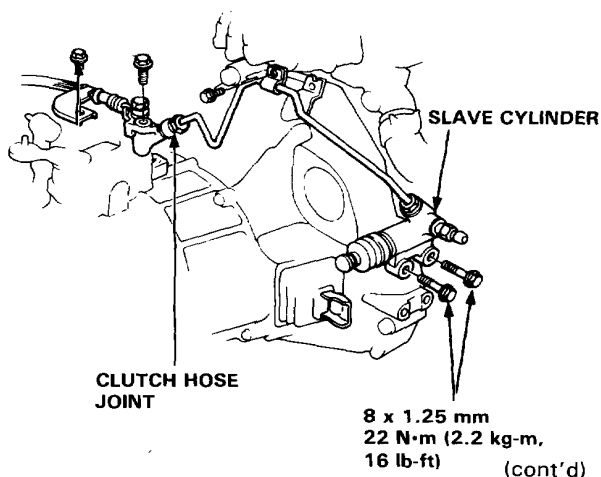
8 x 1.25 mm
22 N·m (2.2 kg-m, 16 lb-ft)



28. Remove the clutch slave cylinder and the pipe/hose assembly (M/T).

NOTE:

- Do not operate the clutch pedal once the slave cylinder has been removed.
- Take care, not to bend the pipe.

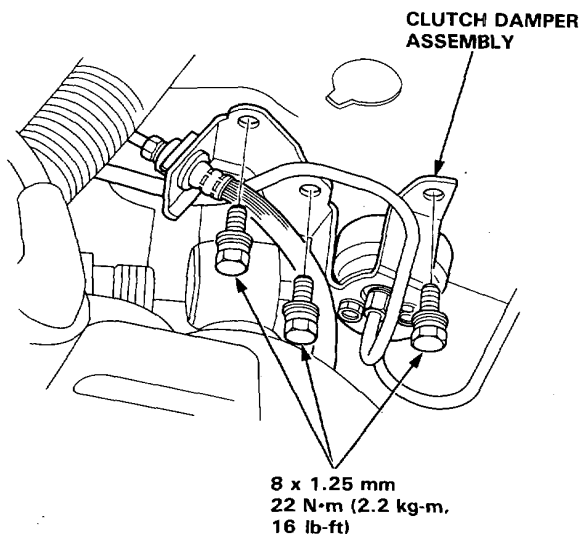


Engine Removal/Installation

(cont'd)

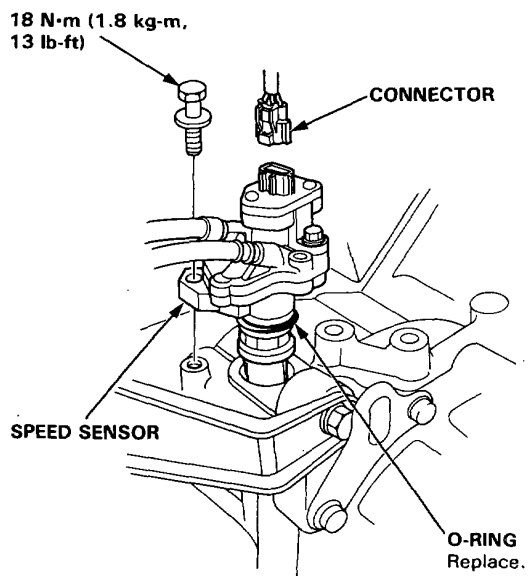
29. Remove the clutch damper assembly.

NOTE: Take care, not to bend the pipe.



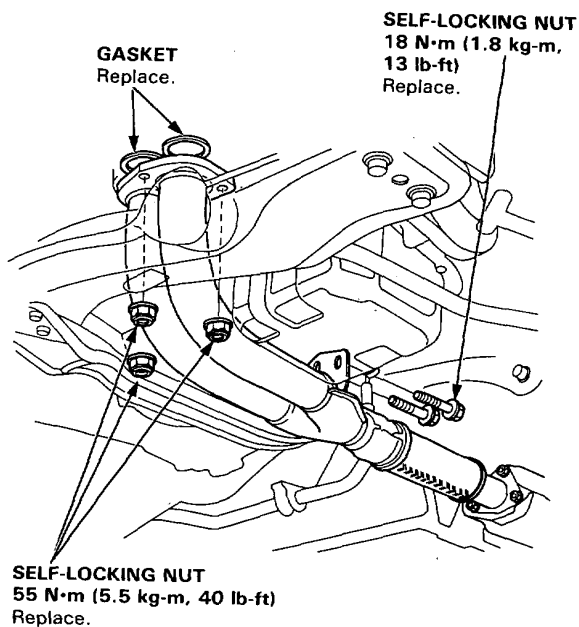
30. Remove the speed sensor assembly.

NOTE: Do not disconnect the hoses.



31. Raise the hoist to full height.

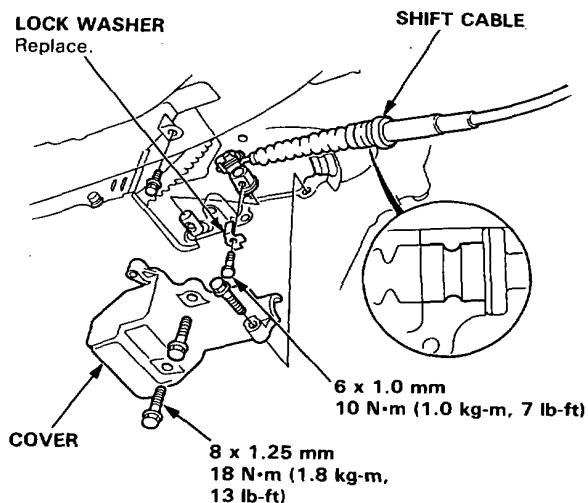
32. Remove the exhaust pipe and stay.



33. Remove the A/T shift cable (A/T).

NOTE:

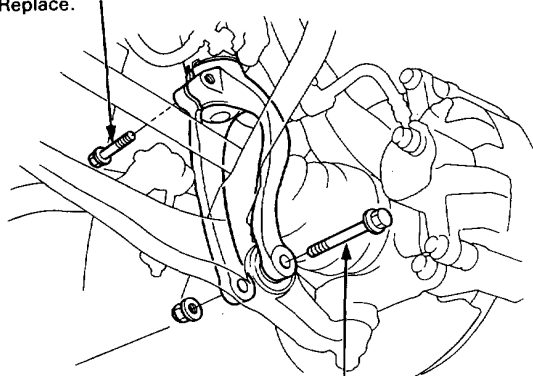
- Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.
- Adjust the shift cable when installing (See section 14).





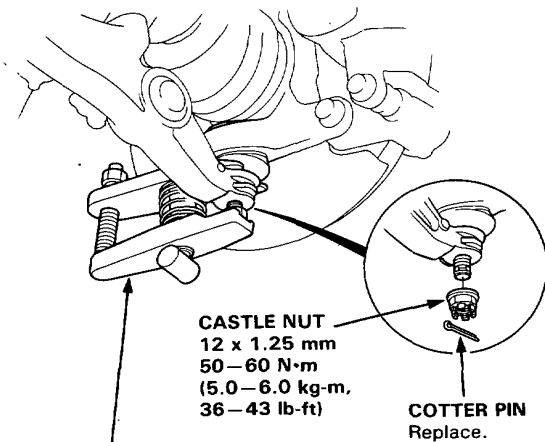
34. Remove the damper fork.

SELF-LOCKING NUT
10 x 1.25 mm
44 N·m (4.4 kg-m, 32 lb-ft)
Replace.



SELF-LOCKING NUT
12 x 1.25 mm
65 N·m (6.5 kg-m, 47 lb-ft)
Replace.

35. Disconnect the suspension lower arm ball joint with the special tool. Refer to section 18 for the procedure.



BALL JOINT REMOVER, 32 mm
07MAC-SL00100

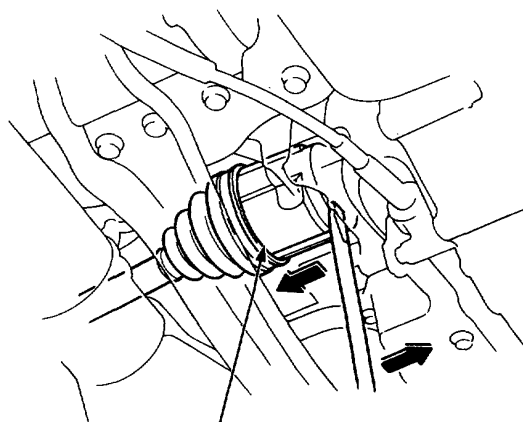
CASTLE NUT
12 x 1.25 mm
50–60 N·m
(5.0–6.0 kg-m,
36–43 lb-ft)

COTTER PIN
Replace.

36. Remove the driveshafts.

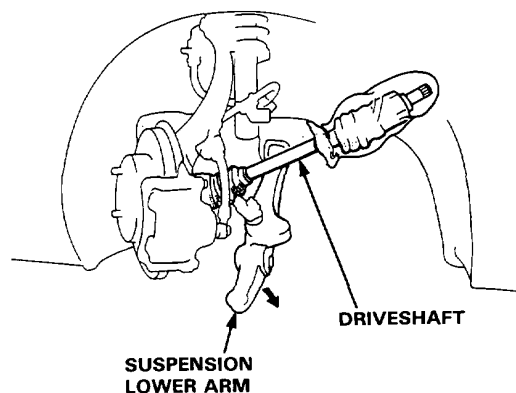
NOTE:

- Coat all precision finished surfaces with clean engine oil or grease.
- Tie plastic bags over the driveshaft ends.



DRIVESHAFT

37. Swing the driveshaft under the fender.



**SUSPENSION
LOWER ARM**

DRIVESHAFT

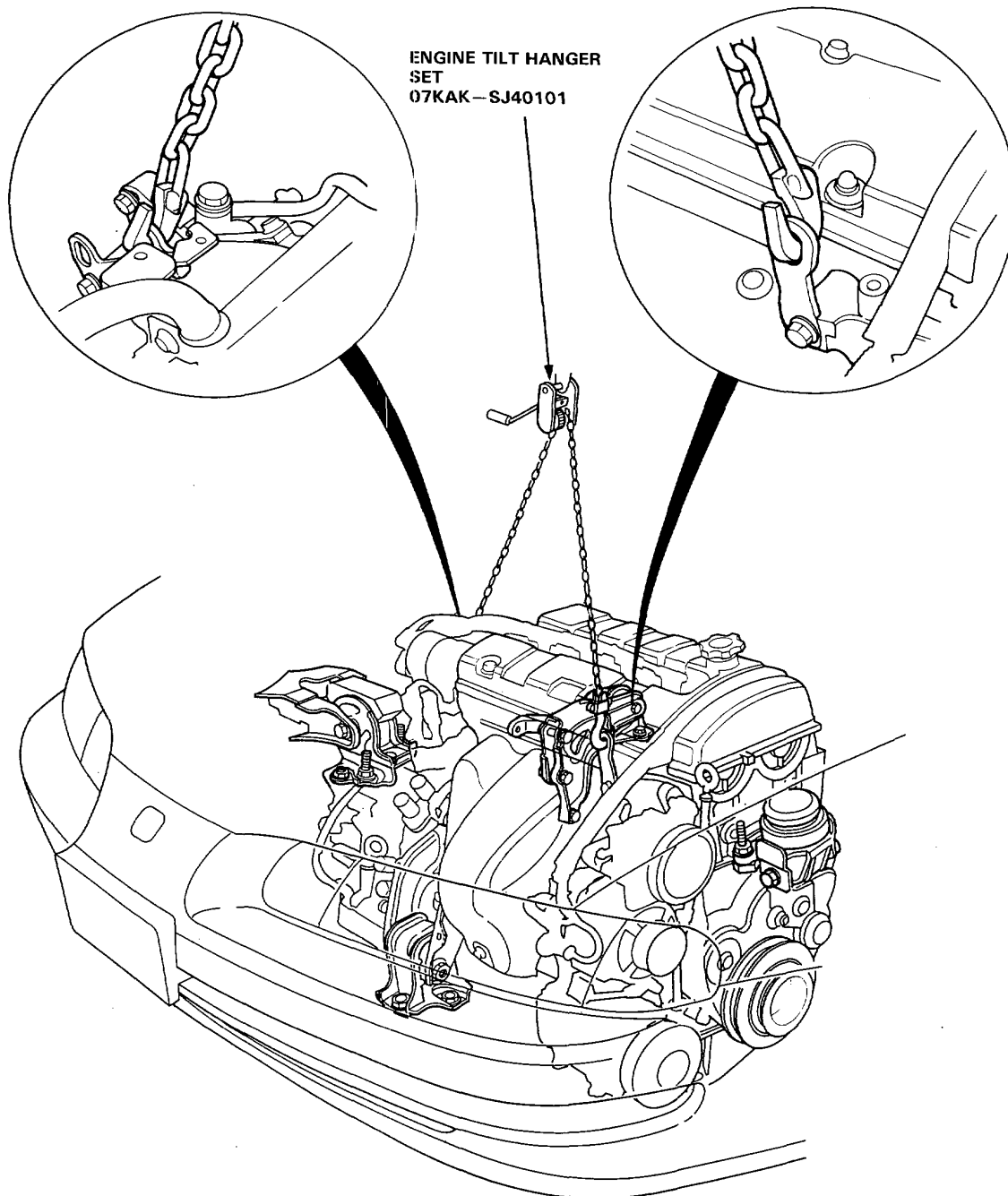
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Engine Removal/Installation

(cont'd)

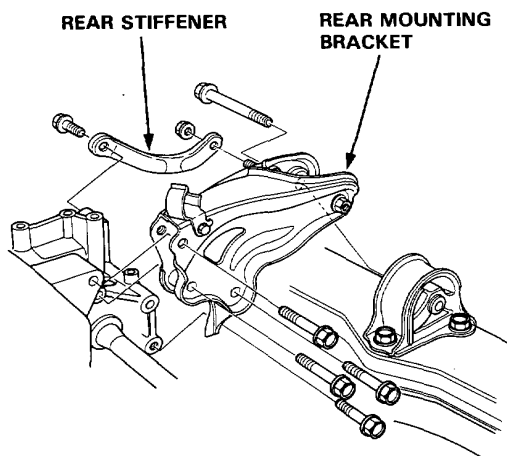
38. Lower the hoist.

39. Attach the chain hoist to the engine.

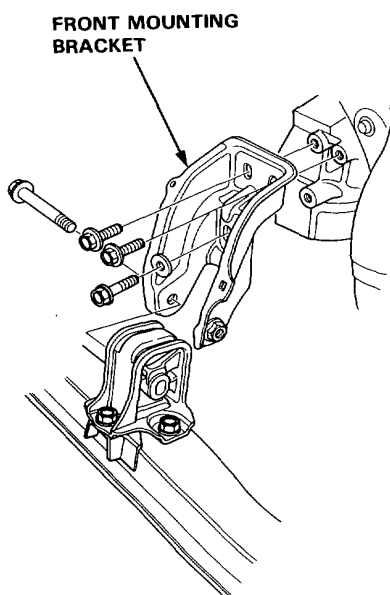




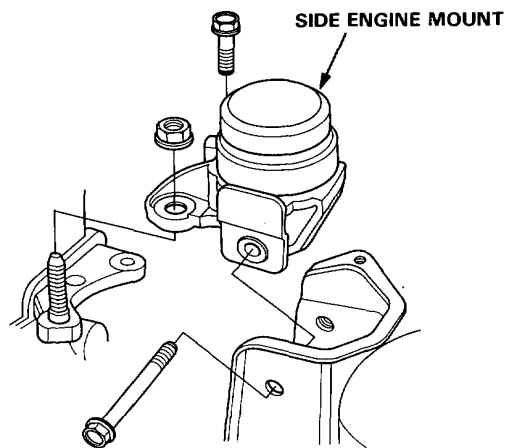
40. Remove the rear mounting bracket.



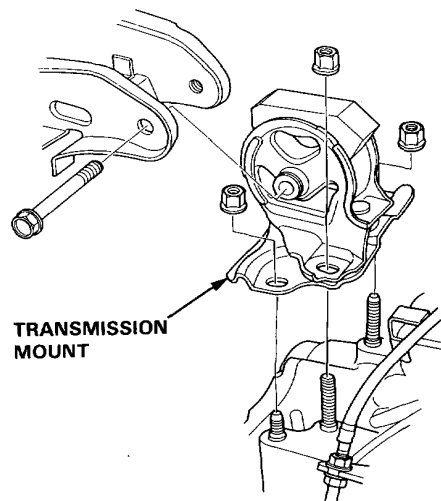
41. Remove the front mounting bracket.



42. Remove the left side engine mount.



43. Remove the transmission mount and mounting bracket.



44. Raise the chain hoist to remove all slack from the chain.

45. Check that the engine is completely free of vacuum hoses, fuel and coolant hoses, and electrical wiring.

46. Slowly raise the engine approximately 6". Check once again that all hoses and wires have been disconnected from the engine.

47. Raise the engine all the way and remove it from the car.

(cont'd)

Engine Removal/Installation

(cont'd)

48. Install the engine in the reverse order of removal.

NOTE:

After the engine is in place:

- Torque the engine mounting bolts in the sequence shown below.

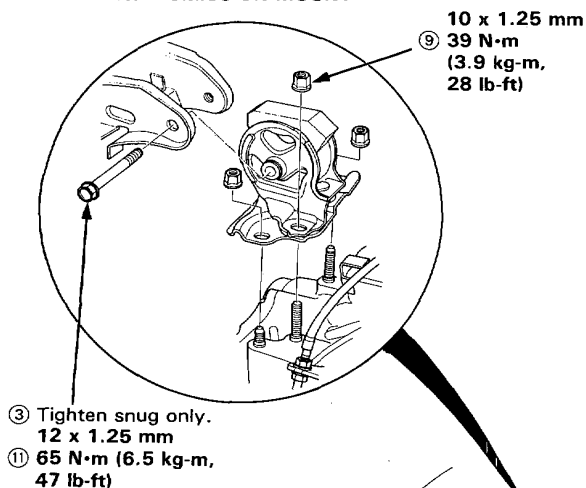
CAUTION: Failure to tighten the bolts in the proper sequence can cause excessive noise and vibration, and reduce bushing life; check that the bushings are not twisted or offset.

- Check that the spring clip on the end of each driveshaft clicks in to place.

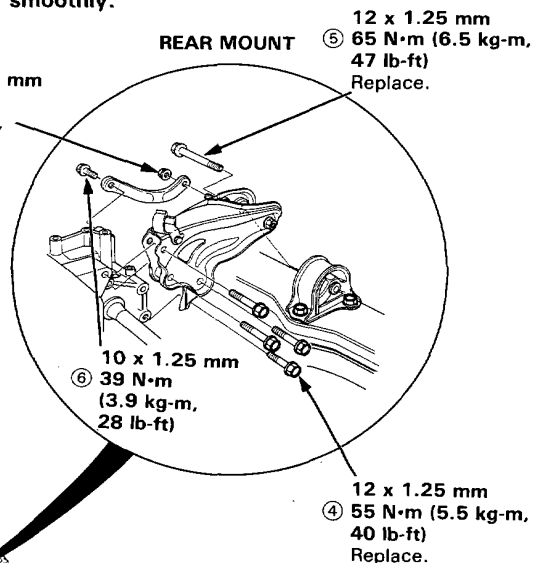
CAUTION: Install new spring clips.

- Bleed air from the cooling system at the bleed bolt with the heater valve open.
- Adjust the throttle cable tension.
- Check the clutch pedal free play (M/T).
- Check that the transmission shift into gear smoothly.

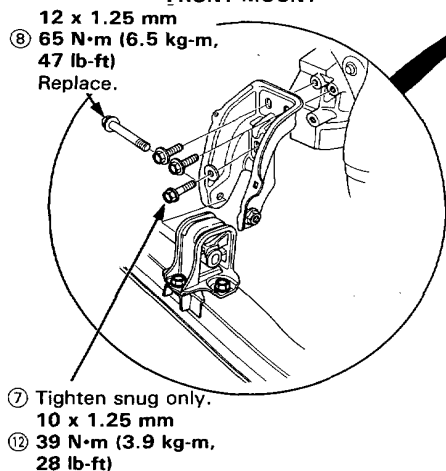
TRANSMISSION MOUNT



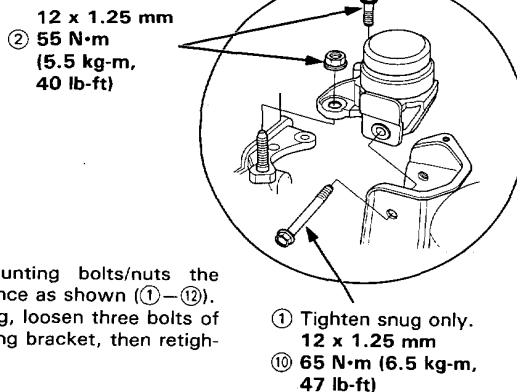
REAR MOUNT



FRONT MOUNT



SIDE ENGINE MOUNT



NOTE

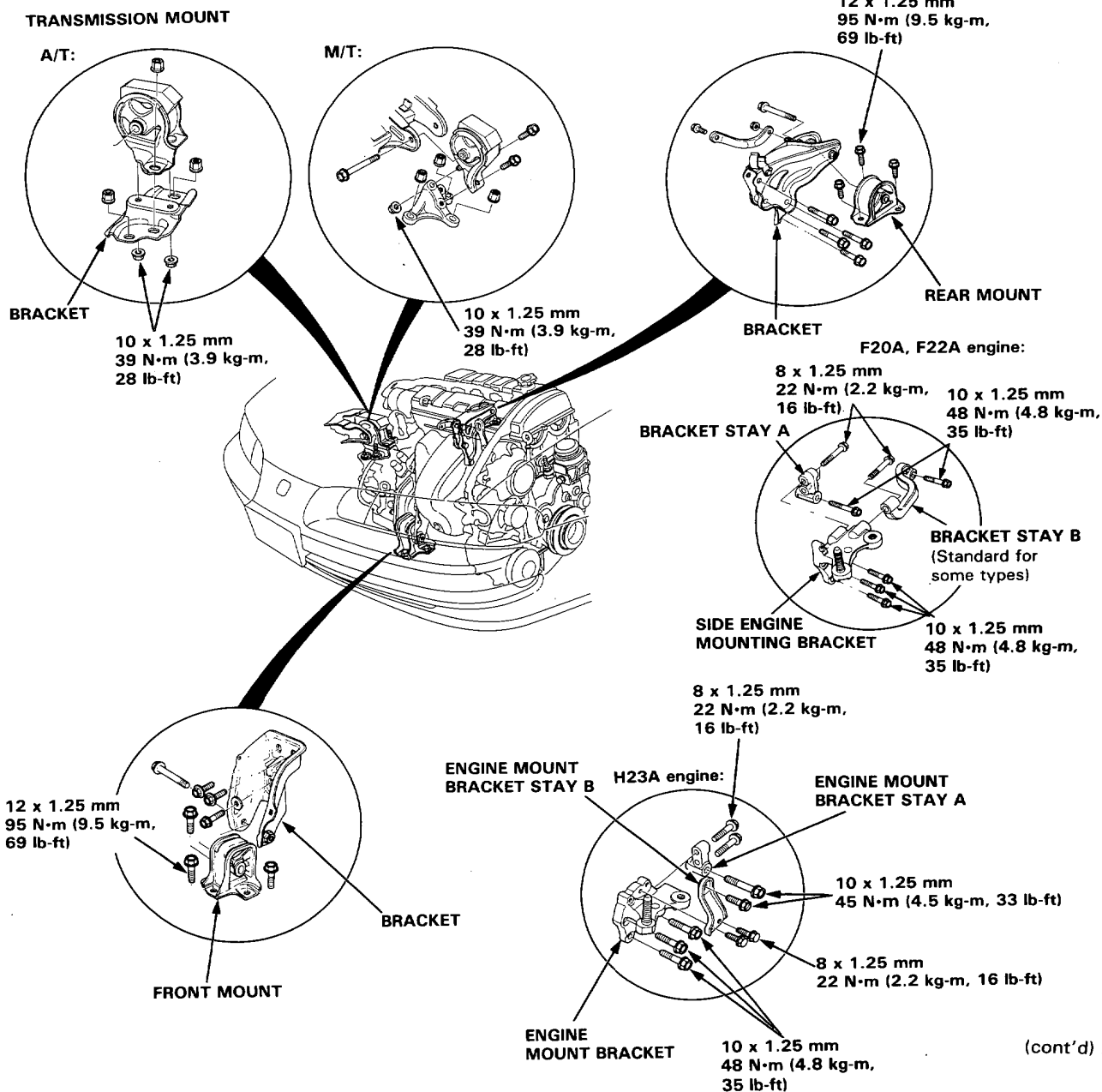
- Torque the mounting bolts/nuts the numbered sequence as shown (①—⑫).
- After road testing, loosen three bolts of the front mounting bracket, then retighten the bolts.



- Adjust the tension of the following drive belts.
Alternator belt (Section 23).
Power steering pump belt (Section 17).
Air conditioner compressor belt (Section 22).
- Clean battery posts and cable terminals with sandpaper, assemble, then apply grease to prevent corrosion.

- Inspect for fuel leakage.
After connecting all fuel line parts, turn on the ignition switch (do not operate the starter) so that the fuel pump is operated for approximately two seconds and the fuel is pressurized. Repeat this operation two or three times and check whether any fuel leakage has occurred at any point in the fuel line.

Mount and Bracket Bolts/Nuts Torque Value Specifications:

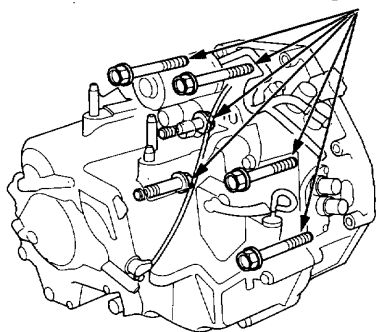


Engine Removal/Installation

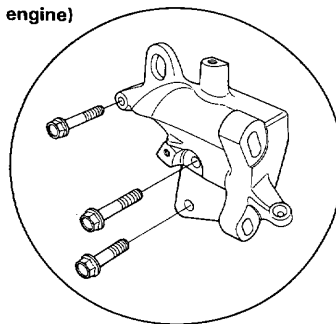
(cont'd)

Additional Torque Value Specifications;

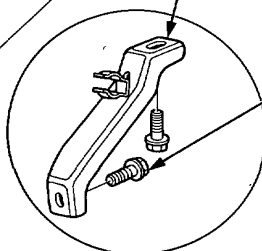
TRANSMISSION MOUNT BOLTS
65 N·m (6.5 kg-m, 47 lb-ft)



P/S BRACKET
(F20A, F22A engine)



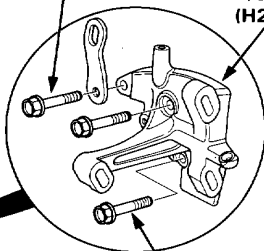
INTAKE MANIFOLD BRACKET



8 x 1.25 mm
22 N·m (2.2 kg-m,
16 lb-ft)

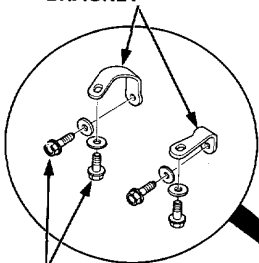
10 x 1.25 mm
50 N·m (5.0 kg-m, 36 lb-ft)

P/S BRACKET
(H23A engine)



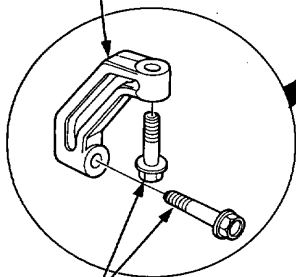
10 x 1.25 mm
50 N·m (5.0 kg-m,
36 lb-ft)

EXHAUST MANIFOLD BRACKET

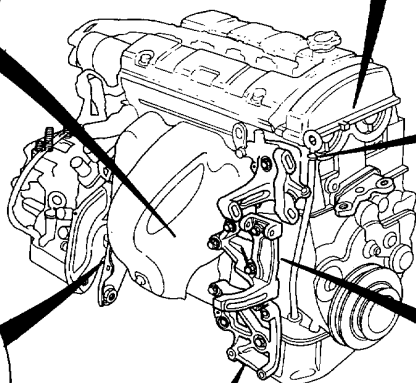


10 x 1.25 mm
45 N·m (4.5 kg-m,
33 lb-ft)

FRONT STIFFENER

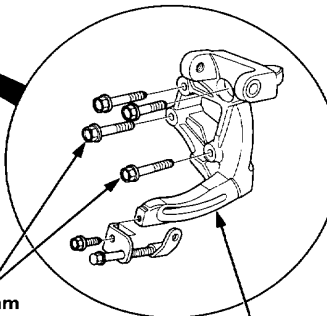


10 x 1.25 mm
40 N·m (4.0 kg-m,
29 lb-ft)



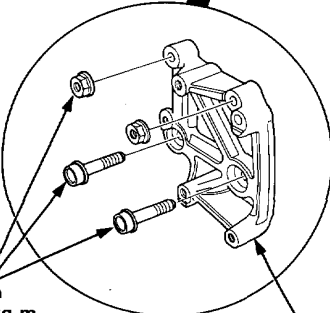
10 x 1.25 mm
50 N·m (5.0 kg-m,
36 lb-ft)
Apply liquid gasket
to the bolt threads.

ALTERNATOR BRACKET



10 x 1.25 mm
50 N·m (5.0 kg-m,
36 lb-ft)

A/C BRACKET



NOTE: After removing and installing the engine additional parts, loosen three bolts of the front mounting, then retighten the bolts (page 5-12).

Cylinder Head/Valve Train

F20A, F22A engine	6-1
H23A engine	6-39



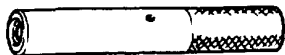
Cylinder Head/Valve Train F20A, F22A engine

Special Tools	6-2
Illustrated Index	6-3
Cylinder Head Removal	6-5
Camshaft Pulley	6-10
Rocker Arm Assembly	6-10
Rocker Arms Overhaul	6-11
Camshaft	6-12
Rocker Arms Clearance	6-13
Valves and Valve Seals	6-14
Valve Seats	6-15
Cylinder Head	6-16
Valves	6-16
Valve Guides	6-17
Valve Springs and Valves	6-18
Camshaft/Rocker Arms and Camshaft Seal/Pulley	6-19
Cylinder Head Installation	6-20
Timing Belt and Timing Balancer Belt	6-22
Valve Clearance Adjustment	6-36



Special Tools

Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07HAD—PJ70200	Valve Seal Installer	1	6-18
②	07HAH—PJ70100	Valve Guide Reamer	1	6-17
③	07JAA—0010200	Socket Wrench 19 mm	1	6-27, 30, 32, 35
④	07JAB—0010200	Handle	1	6-27, 30, 32, 35
⑤	07LAG—PT20100	Balancer Shaft Lock Pin	1	6-28, 33
⑥	07MAB—PY30100	Pulley Holder Attachment HEX 50 mm	1	6-27, 30, 32, 35
⑦	07742—0010100	Valve Guide Driver	1	6-17
⑧	07757—0010000	Valve Spring Compressor	1	6-14



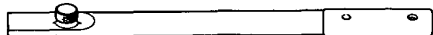
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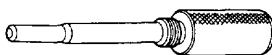
②



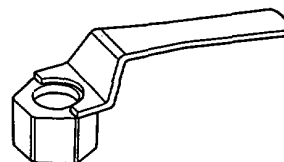
③



④



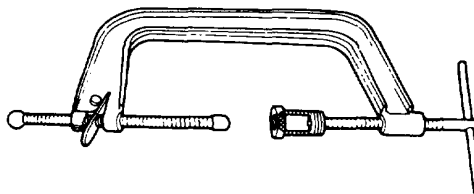
⑤



⑥



⑦



⑧

Cylinder Head/Valve Train

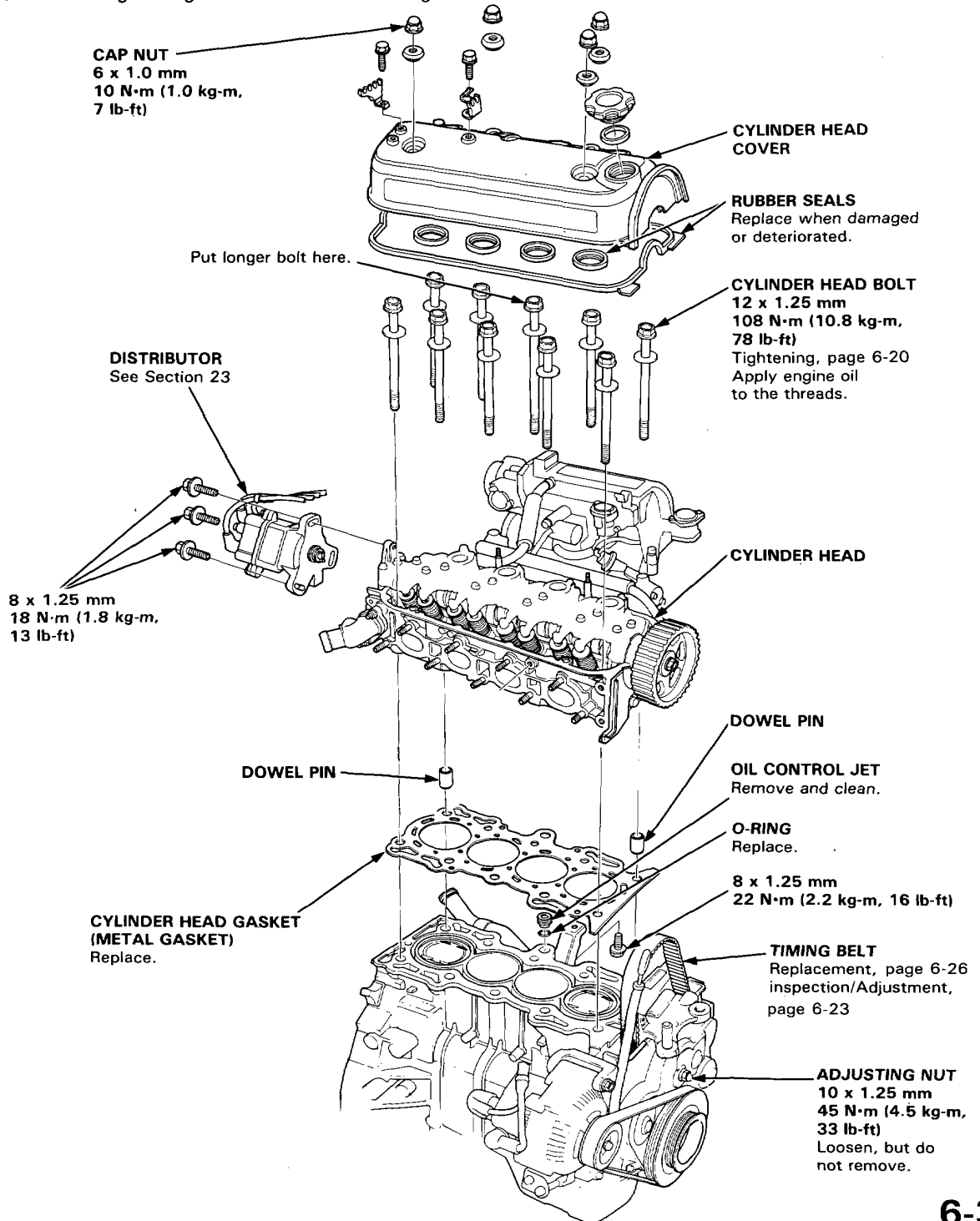
Illustrated Index



CAUTION:

- To avoid damaging the cylinder head, wait until the coolant temperature drops below 38°C (100°F) before removing it.
- In handling a metal gasket, care should be taken not to fold it or damage the contact surface of the gasket.

NOTE: Use new O-rings and gaskets when reassembling.

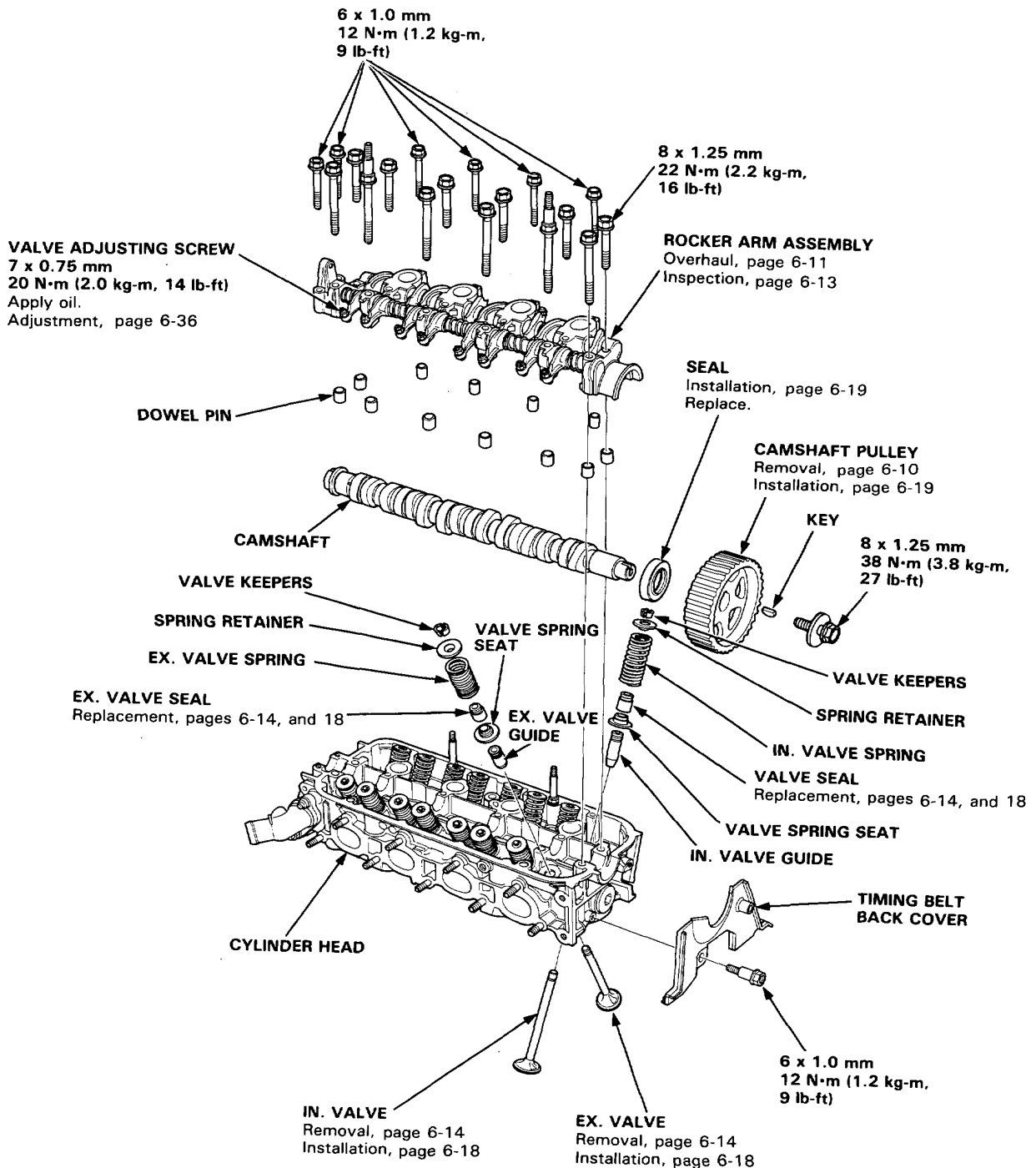


Cylinder Head/Valve Train

Illustrated Index



Prior to reassembling, clean all the parts in solvent, dry them and apply lubricant to any contact parts.



Cylinder Head

Removal



Engine removal is not required for this procedure.

⚠ WARNING

- Make sure jacks and safety stands are placed properly and hoist brackets are attached to the correct positions on the engine.
- Make sure the car will not roll off stands and fall while you are working under it.

CAUTION:

- Use fender covers to avoid damaging painted surface.
- Unspecified items are common.
- Unplug the wiring connectors carefully while holding the connector portion to avoid damage.
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses or interfere with other parts.
- To avoid damaging the cylinder head, wait until the coolant temperature drops below 38 °C (100° F) before loosening the retaining bolts.

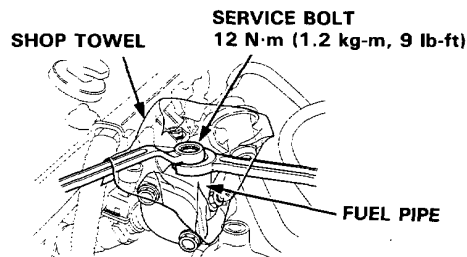
NOTE:

- Inspect the timing belt before removing the cylinder head.
- Turn the crankshaft pulley so that the No.1 piston is at top-dead-center (page 6-25)
- Mark all emission hoses before disconnecting them.

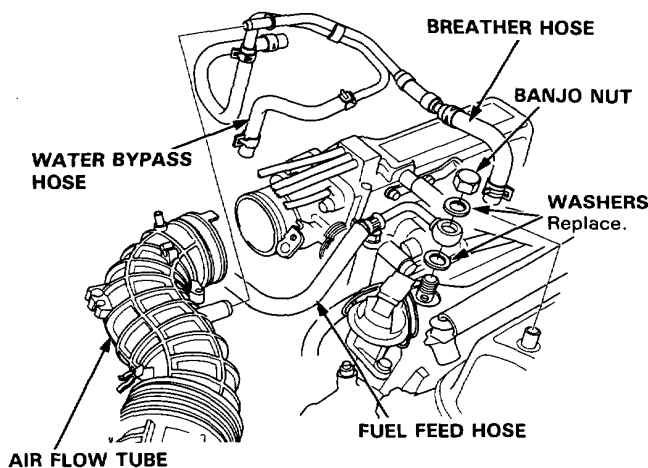
1. Disconnect the negative terminal from the battery.
2. Drain the coolant (See section 10).
 - Remove the radiator cap to speed draining
3. Relieve fuel pressure.

⚠ WARNING

Do not smoke while working on fuel system, keep open flame or spark away from work area. Drain fuel only into an approved container.



4. Remove the vacuum tube, breather hose and air flow tube.
5. Remove the water bypass hose from the cylinder head
6. Remove the fuel feed hose and charcoal canister hose from the intake manifold.



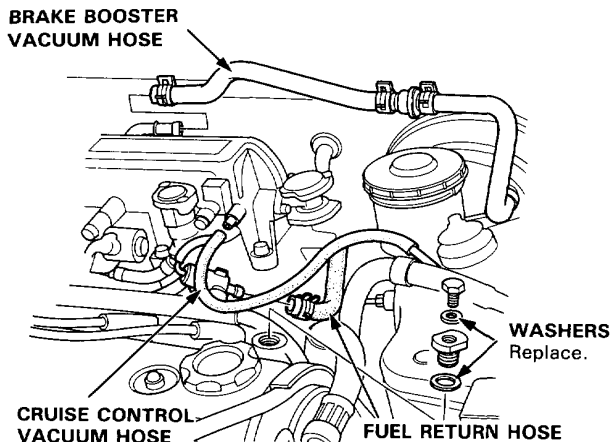
(cont'd)

Cylinder Head

Removal (cont'd)

7. Remove the brake booster vacuum hose and vacuum hose mount (A/T only) from the intake manifold.

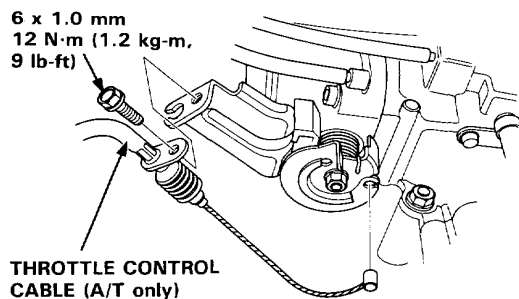
8. Remove the fuel return hose and cruise control vacuum hose.



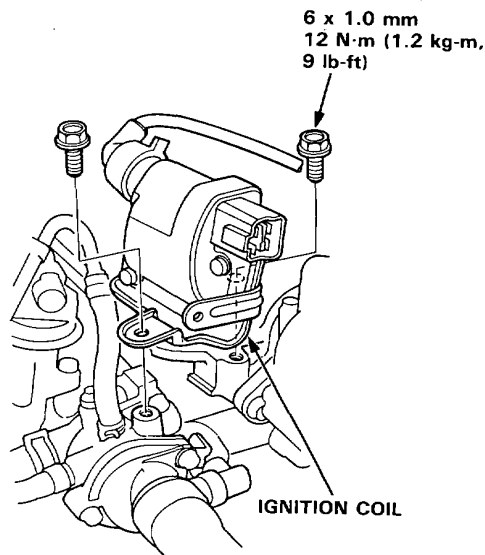
9. Remove the throttle cable and the throttle control cable (A/T only) from the throttle body.

NOTE:

- Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.
- Adjust the throttle cable when installing (See section 11).



10. Removal the ignition coil. (F22A engine only)



11. Remove the spark plug caps and the distributor.

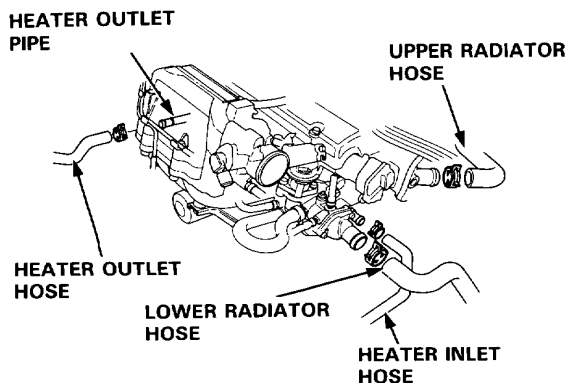
12. Remove the connector and the terminal from the alternator, then remove the engine wire harness from the cylinder head cover.

13. Remove the following engine wire harness connectors and clamps from the cylinder head and the intake manifold:

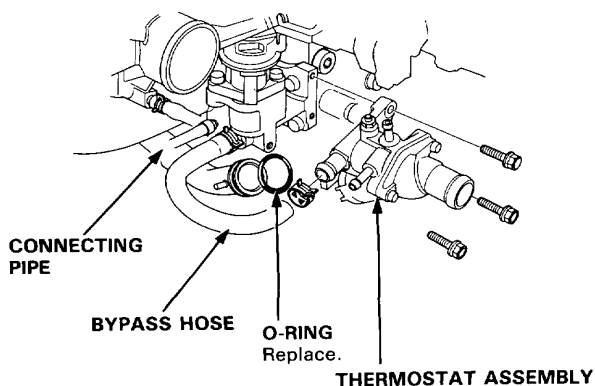
- Four injector connectors
- TA sensor connector
- EACV connector
- Throttle sensor connector
- EGR valve lift sensor connector
- Ground terminal
- Thermoswitch connector (for cooling fan)
- Oxygen sensor connector
- TW sensor connector (for emissions)
- Temperature unit connector
- Speed sensor connector



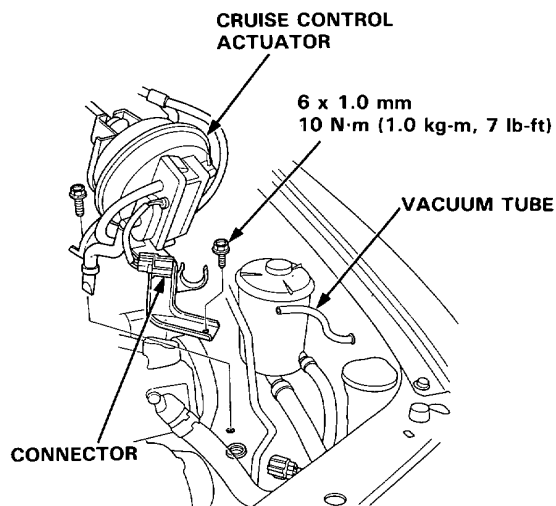
14. Remove the upper and lower radiator hoses and heater hoses.



15. Remove the emission vacuum hoses and water bypass hoses from the intake manifold assembly.
16. Remove the water bypass hose from thermostat housing.
17. Remove the thermostat assembly from intake manifold.



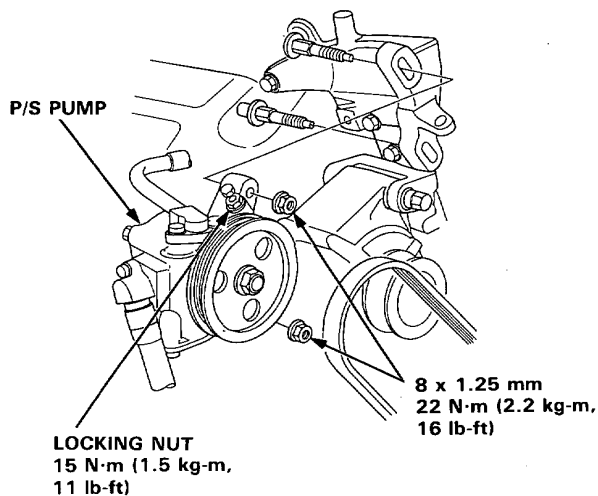
18. Disconnect the connector and vacuum tube, then remove the cruise control actuator.



19. Remove the engine ground cable from the cylinder head cover.
20. Remove the P/S belt and pump.

NOTE:

- Do not disconnect the P/S hoses.
- After installing, adjust the tension of the P/S belt (See section 17).

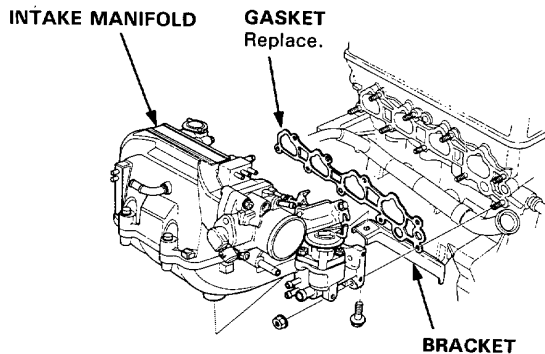


(cont'd)

Cylinder Head

Removal (cont'd)

21. Remove the intake manifold bracket and intake manifold.



22. Lift the front of the car up and place it on safety stands.

⚠ WARNING

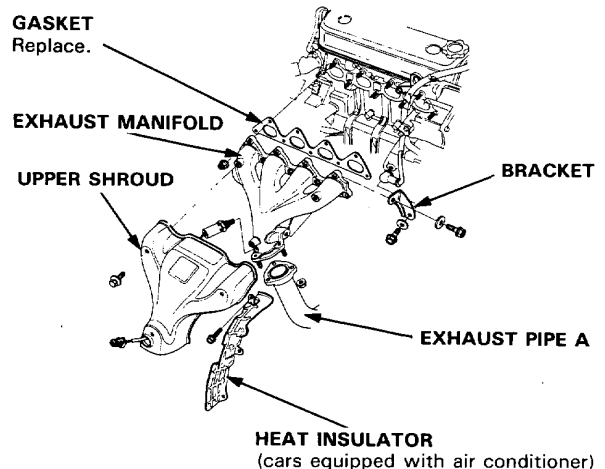
- Make sure jacks and safety stands are placed properly and hoist brackets are attached to correct positions on the engine (See section 1).
- Apply the parking brake and block the rear wheels so the car will not roll off stands and fall while you are working under it.

23. Remove the front wheels and the engine splash shield (page 5-2).

24. Remove the heat insulator (cars equipped with air conditioner only).

25. Remove the self-locking nuts and disconnect the exhaust manifold and exhaust pipe A.

26. Remove the exhaust manifold bracket and exhaust manifold.

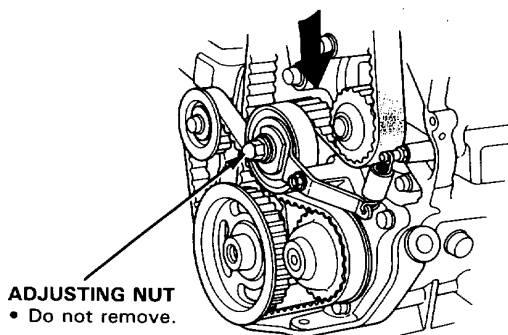


27. Remove the PCV hose, then remove the cylinder head cover.

28. Remove the timing belt upper cover.

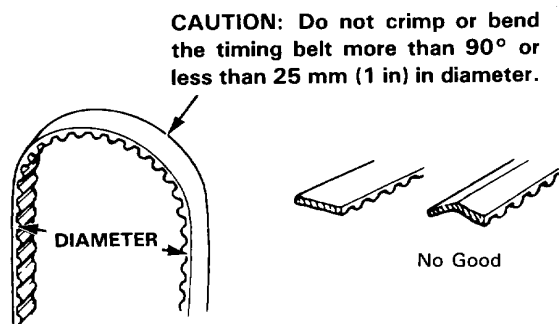
29. Loosen the timing belt adjusting nut 270–360°.

30. Push the tensioner to release tension from the timing belt, then retighten the adjusting nut.





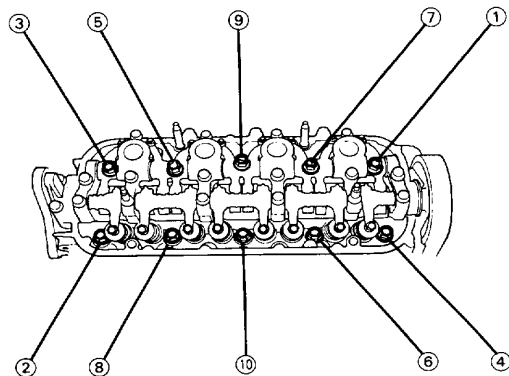
31. Remove the belt from the camshaft pulley.



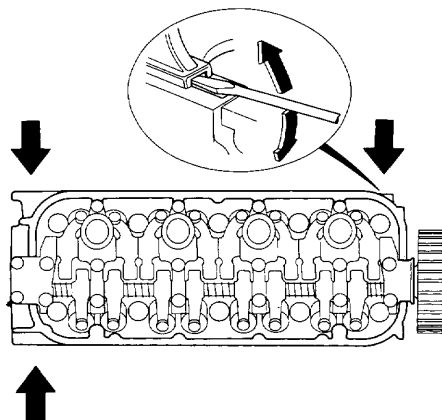
32. Remove the cylinder head bolts, then remove the cylinder head.

CAUTION: To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat until all bolts are loosened.

CYLINDER HEAD BOLT LOOSENING SEQUENCE



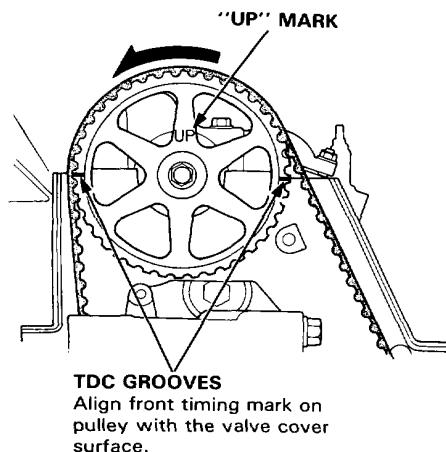
NOTE: Separate the cylinder head from the block with a tip blade screwdriver as shown.



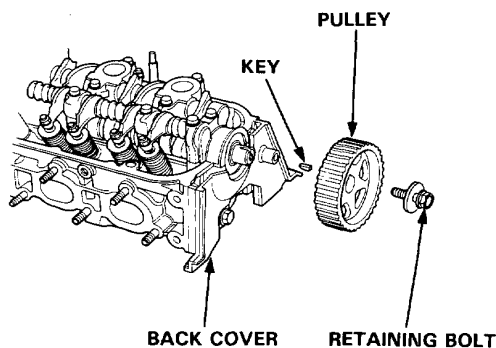
Camshaft Pulley

Removal

1. To ease reassembly, turn the pulley until the "UP" mark faces up, and the front timing mark is aligned with the valve cover surface.



2. Remove the retaining bolt, the special washer, the pulley and the key, then remove the back cover.



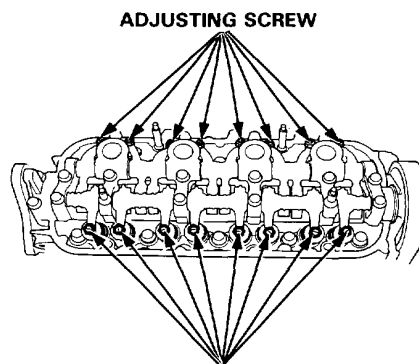
Rocker Arm Assembly

Removal

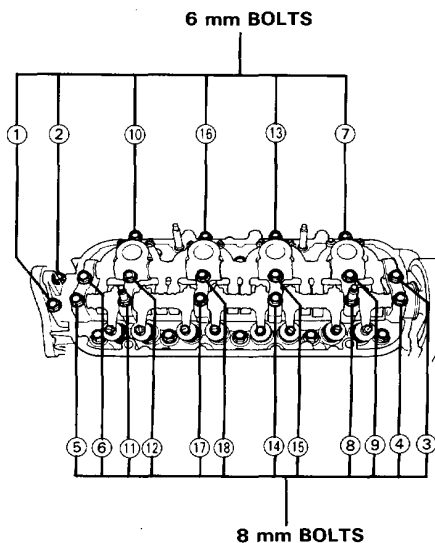
1. Loosen the adjusting screws, then remove the bolts and the rocker arm assembly.

NOTE:

- Unscrew the cam holder bolts two turns at a time, in a criss-cross pattern, to prevent damaging the valves or rocker arm assembly.
- When removing the rocker arm assembly, do not remove the cam holder bolts. The bolts will keep the cam holders, the springs and the rocker arms on the shafts.



ADJUSTING SCREW

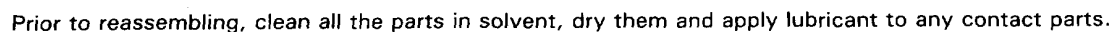




Overhaul

- Identify parts as they are removed to ensure reinstallation in original locations.
- Inspect rocker shafts and rocker arms (page 6-13).

- Rocker arms must be installed in the same position if reused.
- When removing or installing rocker arm assembly, do not remove the cam holder bolts. The bolts will keep the holders, springs and rocker arms on the shaft.
- When reassembling, fit the projection of the intake rocker shaft to the notch of the cam holder.



Camshaft

Inspection

NOTE:

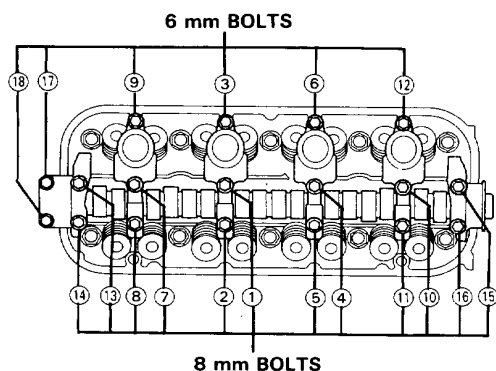
- Do not rotate the camshaft during inspection.
- Remove the rocker arms and rocker shafts.

1. Put the camshaft and the cam holders on the cylinder head, then tighten the bolts to the specified torque.

Specified torque:

8 mm bolts: 22 N·m (2.2 kg-m, 16 lb-ft)

6 mm bolts: 12 N·m (1.2 kg-m, 9 lb-ft)

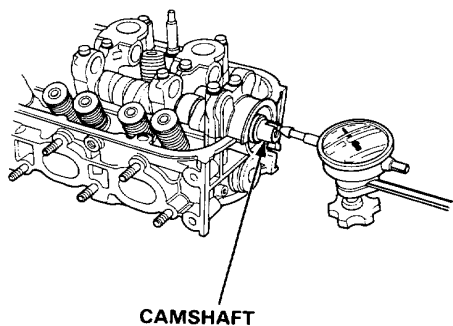


2. Seat the camshaft by pushing it toward distributor end of cylinder head.
3. Zero the dial indicator against end of distributor drive, then push the camshaft back and forth and read the end play.

Camshaft End Play:

Standard (New): 0.05–0.15 mm
(0.002–0.006 in)

Service Limit: 0.5 mm (0.02 in)



4. Remove the bolts, then remove the cam holders from the cylinder head.

— Lift camshaft out of cylinder head, wipe clean, then inspect lift ramps. Replace camshaft if lobes are pitted, scored, or excessively worn.

— Clean the camshaft bearing surfaces in the cylinder head, then set camshaft back in place.

— Insert plastigage strip across each journal.

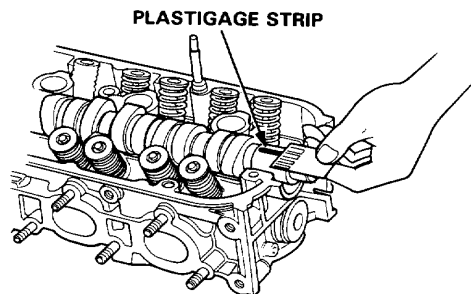
5. Install the cam holders, then tighten the bolts to the specified torque as shown and in the left column on this page.

6. Measure widest portion of plastigage on each journal.

Camshaft Bearing Radial Clearance:

Standard (New): 0.050–0.089 mm
(0.002–0.004 in)

Service Limit: 0.15 mm (0.006 in)





Rocker Arms

Clearance

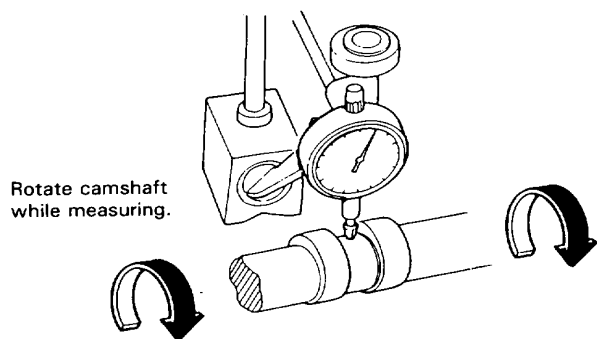
7. If camshaft bearing radial clearance is out of tolerance:

- And the camshaft has already been replaced, you must replace the cylinder head.
- If camshaft has not been replaced, first check total runout with the camshaft supported on V-blocks.

Camshaft Total Runout:

Standard (New): 0.015 mm (0.0006 in)

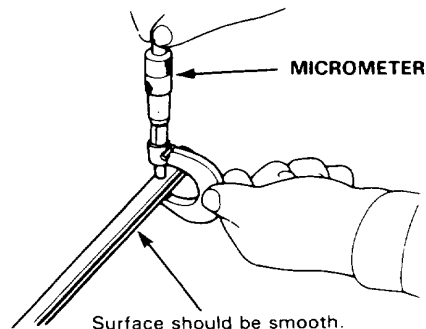
Service Limit: 0.030 mm (0.0010 in)



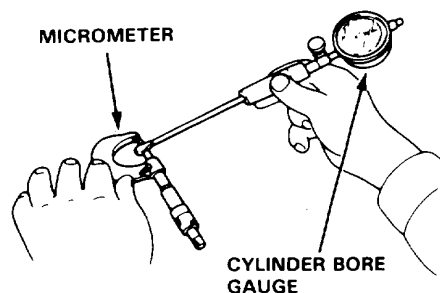
- If the total runout of the camshaft is within tolerance, replace the cylinder head.
- If the total runout is out of tolerance, replace the camshaft and recheck. If the bearing clearance is still out of tolerance, replace the cylinder head.

Measure both the intake rocker shaft and exhaust rocker shaft.

1. Measure diameter of shaft at the first rocker location.



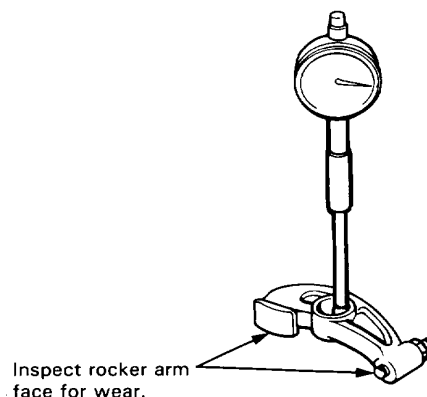
2. Zero the gauge to the shaft diameter.



3. Measure the inside diameter of the rocker arm and check for out-of-round condition.

Rocker Arm Radial Clearance:

Service Limit: 0.08 mm (0.003 in.)



Repeat for all rockers. If over limit, replace the rocker shaft and all over-tolerance rocker arms.

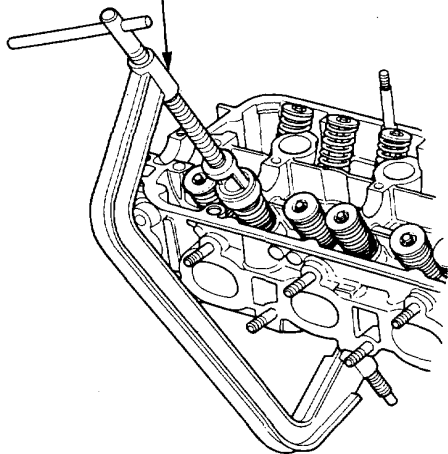
Valves and Valve Seals

Replacement

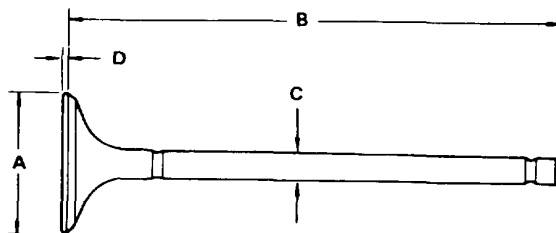
NOTE: Identify valves and valve springs as they are removed so that each item can be reinstalled in its original position.

1. Tap each valve stem with a plastic mallet to loosen valve keepers before installing the spring compressor.
2. Install the spring compressor. Compress the spring and remove the valve keepers.

VALVE SPRING COMPRESSOR
07757-0010000



3. Install the special tool as shown.
4. Remove the valve guide seal.



Intake Valve Dimensions

- A Standard (New):** 33.90–34.10 mm
(1.335–1.343 in)
B Standard (New): 111.15–111.45 mm
(4.376–4.388 in)
C Standard (New): 5.485–5.495 mm
(0.2159–0.2163 in)
C Service Limit: 5.455 mm (0.2148 in)
D Standard (New): 0.85–1.15 mm
(0.033–0.045 in)
D Service Limit: 0.65 mm (0.026 in)

Exhaust Valve Dimensions

- A Standard (New):** 28.9–29.1 mm
(1.138–1.146 in)
B Standard (New): 122.15–122.45 mm
(4.809–4.821 in)
C Standard (New): 5.450–5.460 mm
(0.2146–0.2150 in)
C Service Limit: 5.420 mm (0.2134 in)
D Standard (New): 1.05–1.35 mm
(0.041–0.053 in)
D Service Limit: 0.95 mm (0.037 in)

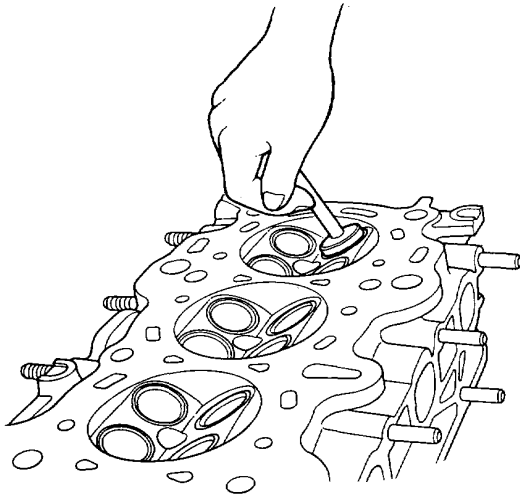
Valve Seats

Reconditioning



1. Renew the valve seats in the cylinder head using a valve seat grinder.

NOTE: If guides are worn (page 6-17), replace them (page 6-18) before grinding the valve seats.

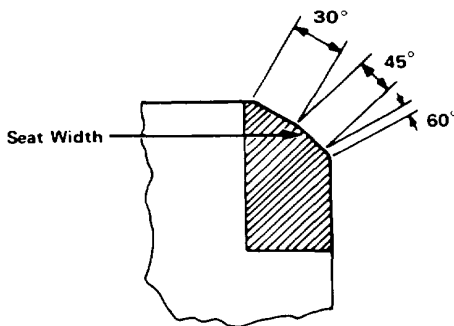


2. Carefully grind a 45° seat, removing only enough material to ensure a smooth and concentric seat.
3. Bevel the upper edge of the seat with the 30° stone and the lower edge of the seat with the 60° stone. Check width of seat and adjust accordingly.
4. Make one more very light pass with the 45° stone to remove any possible burrs caused by the other stones.

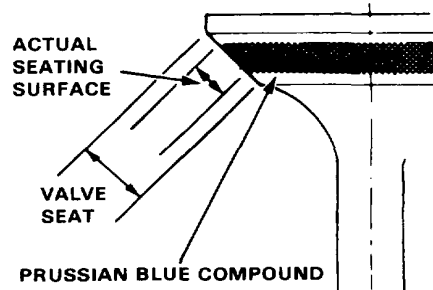
Valve Seat Width:

Standard: 1.25–1.55 mm (0.049–0.061 in.)

Service Limit: 2.0 mm (0.079 in.)



5. After resurfacing the seat, inspect for even valve seating: Apply Prussian Blue compound to the valve face, and insert valve in original location in the head, then lift it and snap it closed against the seat several times.



6. The actual valve seating surface, as shown by the blue compound, should be centered on the seat.
 - If it is too high (closer to the valve stem), you must make a second cut with the 60° stone to move it down, then one more cut with the 45° stone to restore seat width.
 - If it is too low (closer to the valve edge), you must make a second cut with the 30° stone to move it up, then one more cut with the 45° stone to restore seat width.
7. Insert intake and exhaust valves in the head and measure valve stem installed height.

Intake Valve Stem Installed Height:

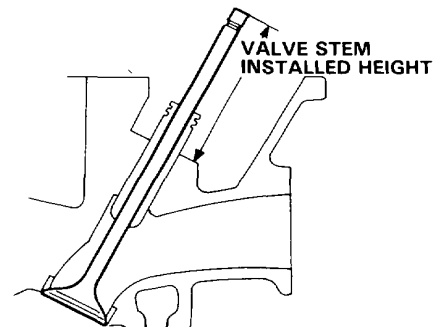
Standard (New): 48.245–48.715 mm
(1.8994–1.9179 in)

Service Limit: 48.965 mm (1.9278 in)

Exhaust Valve Stem Installed Height:

Standard (New): 50.315–50.785 mm
(1.9809–1.9994 in)

Service Limit: 51.035 mm (2.0092 in)



8. If valve stem installed height is over the service limit, replace the valve and recheck. If still over the service limit, replace the cylinder head; the valve seat in the head is too deep.

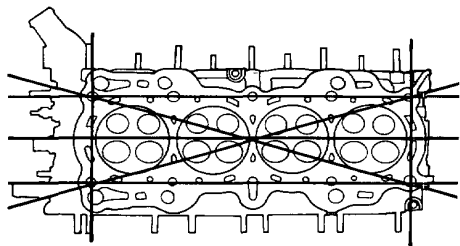
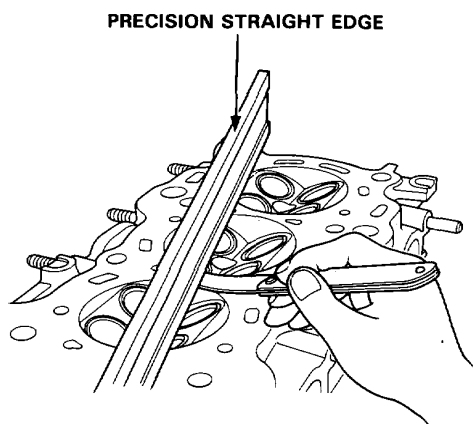
Cylinder Head

Warpage

NOTE: If camshaft bearing clearance (page 6-12) are not within specification, the head cannot be resurfaced.

If camshaft bearing radial clearances are within specifications, check the head for warpage.

- If warpage is less than 0.05 mm (0.002 in.) cylinder head resurfacing is not required.
- If warpage is between 0.05 mm (0.002 in.) and 0.2 mm (0.008 in.), resurface cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in.) based on a height of 100 mm (3.94 in.)



Cylinder Head Height:

Standard (New): 99.95–100.05 mm
(3.935–3.939 in.)

Service Limit: 0.05 mm (0.002 in.)

Measure along edges, and 3 ways across center.

Valves

Valve Movement

Measure the guide-to-stem clearance with a dial indicator while rocking the stem in the direction of normal thrust (wobble method).

Intake Valve Stem-to-Guide Clearance:

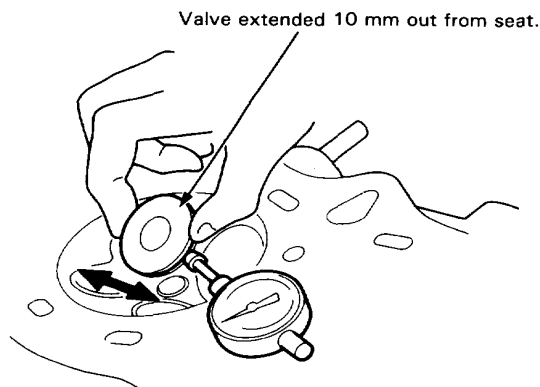
Standard (New): 0.04–0.09 mm
(0.0016–0.0035 in.)

Service Limit: 0.16 mm (0.006 in.)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.11–0.16 mm
(0.004–0.006 in.)

Service Limit: 0.24 mm (0.009 in.)



- If measurement exceeds the service limit, recheck using a new valve.
- If measurement is now within the service limit, reassemble using a new valve.
- If measurement still exceeds limit, recheck using alternate method below, then replace valve and guide, if necessary.

NOTE: An alternate method of checking guide to stem clearance is to subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or ball gauge.

Take the measurements in three places along the valve stem and three places inside the valve guide. The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit.

Intake Valve Stem-to-Guide Clearance:

Standard (New): 0.020–0.045 mm
(0.0007–0.0017 in.)

Service Limit: 0.075 mm (0.0029 in.)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.055–0.080 mm
(0.0021–0.0031 in.)

Service Limit: 0.12 mm (0.0047 in.)



Valve Guides

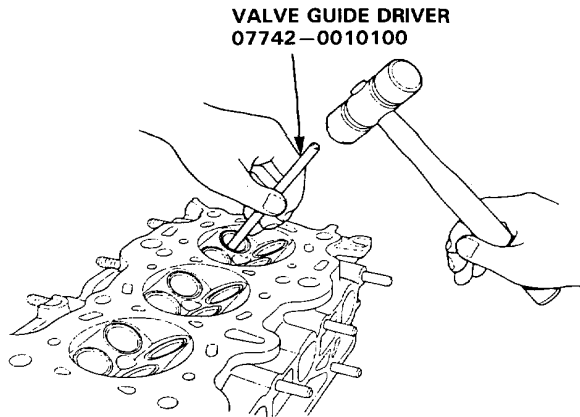
Replacement

NOTE:

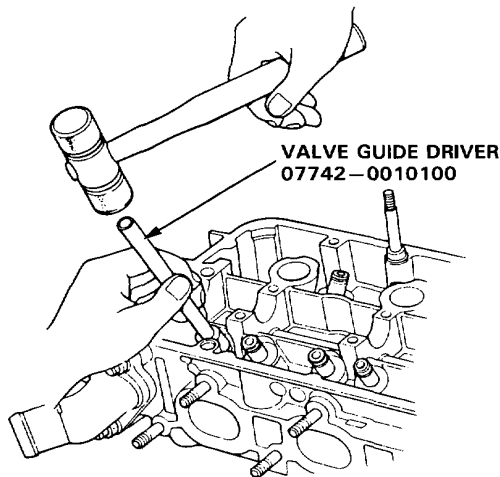
- For best results, heat cylinder head to 150°C (300°F) before removing or installing guides.
- It may be necessary to use an air hammer to remove some valve guides.

CAUTION: To avoid burns, use heavy gloves when handling heated cylinder head.

1. Drive the valve guide out from the bottom of the cylinder head.



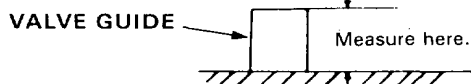
2. Drive in a new valve guide to the specified depth.



Valve Guide Installed Height:

Intake: 24.0 mm (0.94 in.)

Exhaust: 15.3 mm (0.60 in.)



Valve Guide Reaming

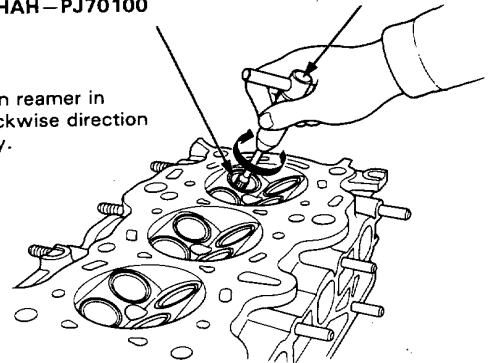
NOTE: For new valve guides only.

1. Coat both reamer and valve guide with cutting oil.
2. Rotate the reamer clockwise the full length of the valve guide bore.
3. Continue to rotate the reamer clockwise while removing it from the bore.
4. Thoroughly wash the guide in detergent and water to remove any cutting residue.
5. Check clearance with a valve (page 6-16).
 - Verify that the valve slides in the IN, EX valve guides without exerting pressure.

**VALVE GUIDE REAMER, 5.5 mm
07HAH-PJ70100**

REAMER HANDLE

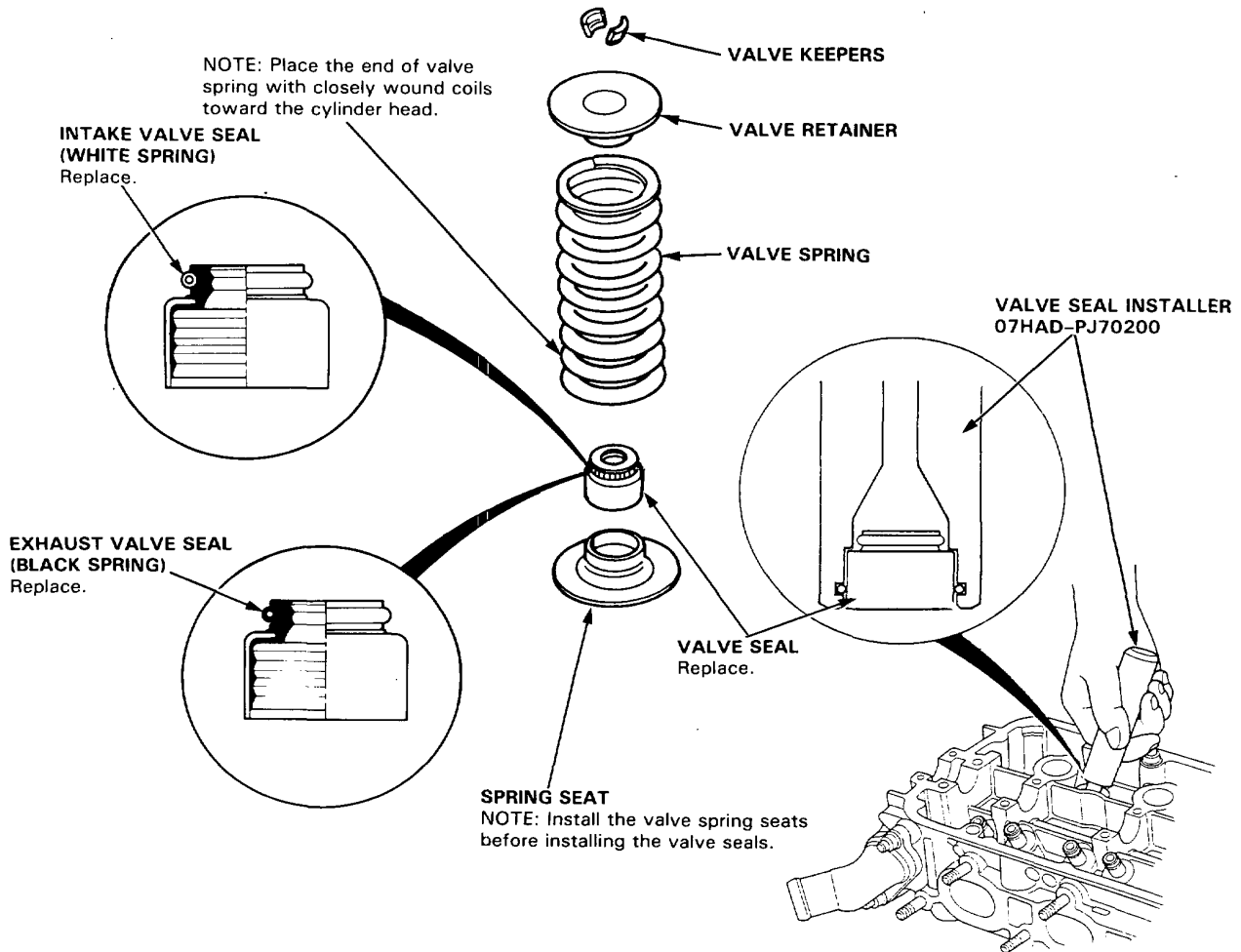
Turn reamer in clockwise direction only.



Valve Springs and Valves

Valve Spring and Valve Seal Installation Sequence

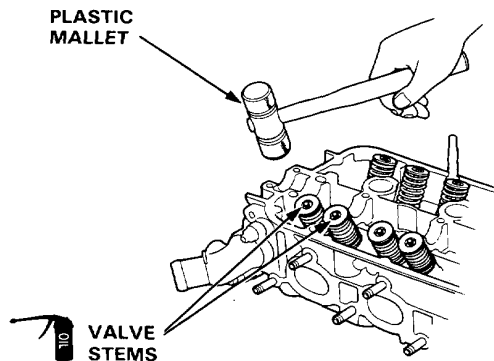
NOTE: Exhaust and intake valve seals are NOT interchangeable.



Valve Installation

When installing valves in cylinder head, coat valve stems with oil before inserting into valve guides, and make sure valves move up and down smoothly.

When valves and springs are in place, lightly tap the end of each valve stem two or three times with a plastic mallet to ensure proper seating of valve and valve keepers.



Camshaft/Rocker Arms and Camshaft Seal/Pulley



Installation

CAUTION:

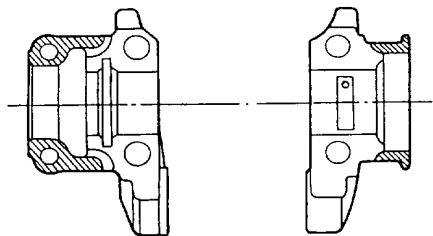
- Make sure that all rockers are in alignment with valves when torquing rocker assembly bolts.
- Valve locknuts should be loosened and adjust screws backed off before installation.
- To prevent rocker arm assembly from coming apart, leave cam holder holding bolts in the holes.

1. After wiping down cam and journals in cylinder head, lubricate both surfaces and install camshaft.
2. Turn camshaft until its keyway is facing up. (No. 1 cylinder TDC).
3. Install the camshaft seal with the open side (spring) facing in.

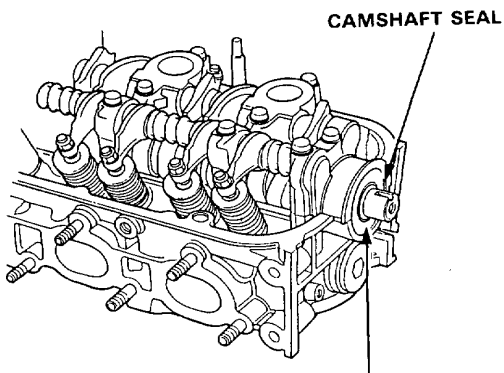


Lubricate cam lobes when reassembly.

4. Apply liquid gasket to the head mating surfaces of the No. 1 and the No. 6 cam holders.
— Apply liquid gasket to the shaded areas.



5. Set rocker arm assembly in place and loosely install the bolts.
Make sure that the rocker arms are properly positioned on the valve stems.
6. Press in the camshaft seal.



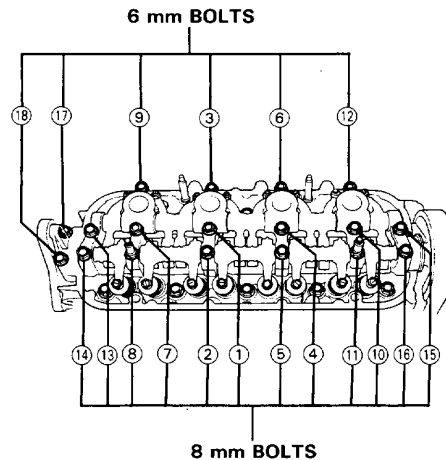
Seal housing surface should be dry.
Apply a light coat of oil to camshaft and inner lip of seal.

7. Tighten each bolt two turns at a time in the sequence shown below to ensure that the rockers do not bind on the valves.

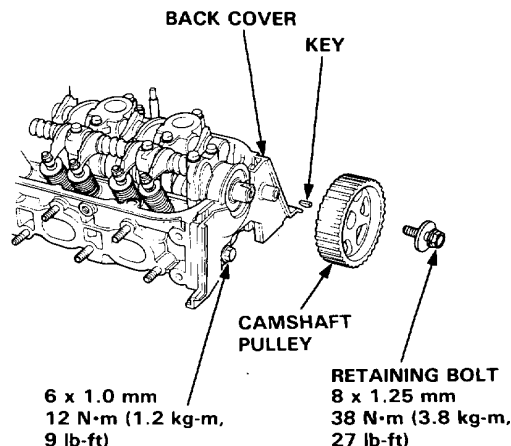
Specified torque:

8 mm bolts: 22 N·m (2.2 kg-m, 16 lb-ft)

6 mm bolts: 12 N·m (1.2 kg-m, 9 lb-ft)



8. Install the back cover
9. Install the key and the camshaft pulley onto the camshaft, then tighten the retaining bolt to the torque shown.

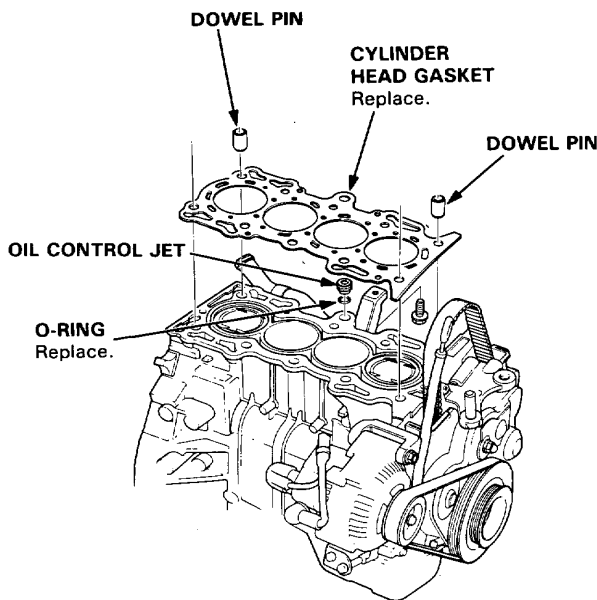


Cylinder Head

Installation

Install the cylinder head in the reverse order of removal:

- Always use a new head gasket.
 - Cylinder head and engine block surface must be clean.
 - "UP" mark on camshaft pulley should be at the top.
 - Turn the crankshaft so the No. 1 cylinder is at TDC (top dead center) (page 6-25).
1. Cylinder head dowel pins and oil control jet must be aligned.



2. Install the bolts that secure the intake manifold to its bracket but do not tighten them yet.
3. Position the cam correctly (page 6-25).
4. Tighten the cylinder head bolts sequentially in three steps.

1st step torque: 40 N·m (4.0 kg-m, 29 lb-ft)

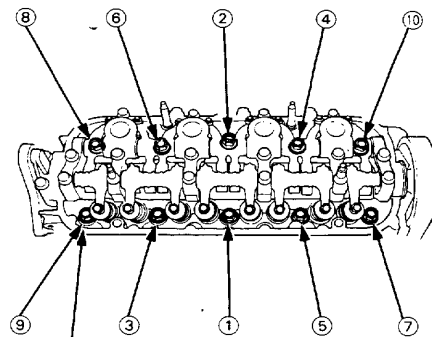
2nd step torque: 70 N·m (7.0 kg-m, 51 lb-ft)

3rd step torque: 100 N·m (10.0 kg-m, 72 lb-ft)

NOTE:

- We recommend using a beam-type torque
- If a bolt makes any noise while you are torquing it, loosen the bolt and retighten it from the 1st step.

CYLINDER HEAD BOLTS TORQUE SEQUENCE



CYLINDER HEAD BOLTS

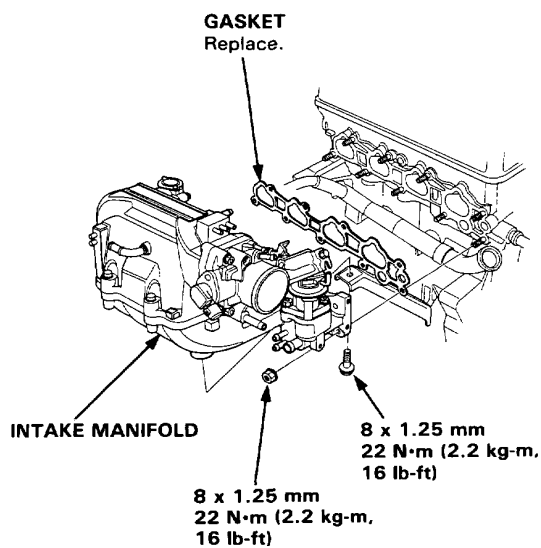
12 x 1.25 mm

100 N·m (10.0 kg-m, 72 lb-ft)

Apply clean engine oil to bolt threads and under bolt heads.

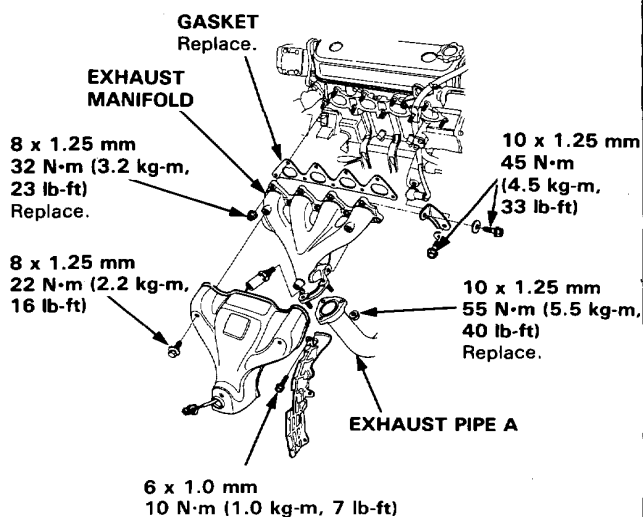


5. Install the intake manifold and tighten the nuts in a criss-cross pattern in 2 or 3 steps, beginning with the inner nuts.
 - Always use a new intake manifold gasket.



6. Install the heat insulator to the cylinder head and the block.

7. Install the exhaust manifold and tighten the nuts in a criss-cross pattern in 2 or 3 steps, beginning with the inner nut.
 - Always use a new exhaust manifold gasket.
8. Install the exhaust manifold bracket, then install the exhaust pipe A and the bracket, and then install the upper shroud.

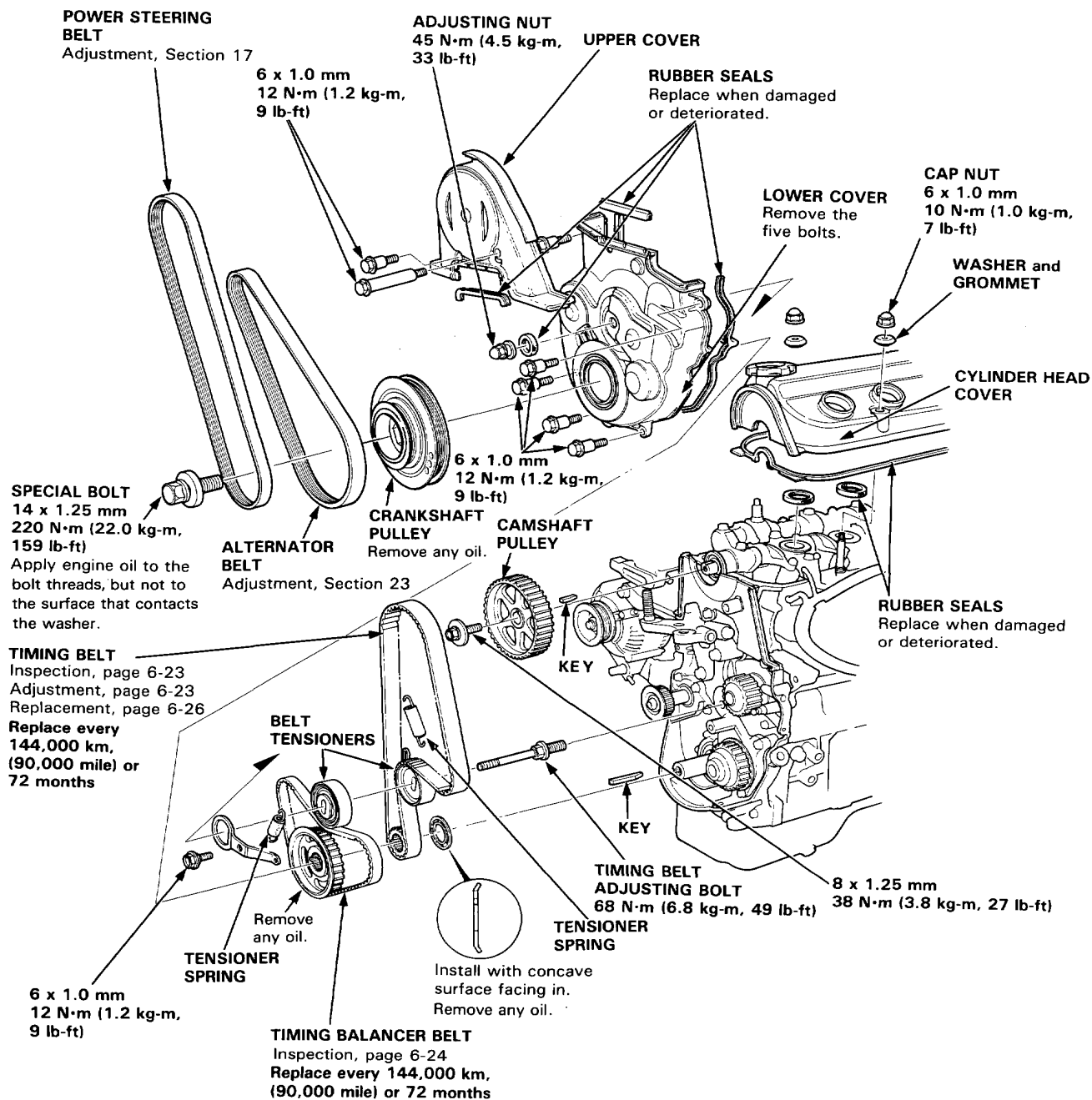


Timing Belt and Timing Balancer Belt

Illustrated Index

NOTE:

- Refer to page 6-25 for positioning crank and pulley before installing timing belt.
- Before removing, mark direction of rotation.





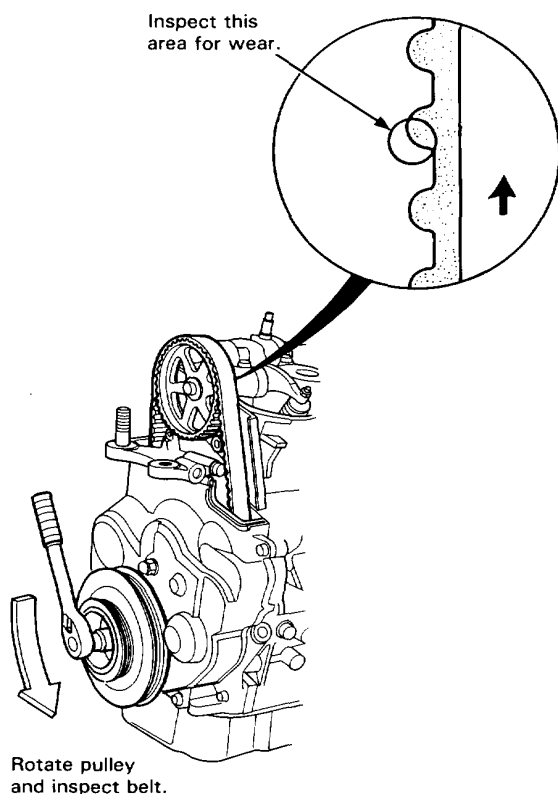
Timing Belt

Inspection

1. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
2. Remove the cylinder head cover.
3. Remove the timing belt upper cover.
4. Inspect the timing belt for cracks and oil soaking.

NOTE:

- Replace the belt if oil soaked.
- Remove any oil or solvent that gets on the belt.



Rotate pulley and inspect belt.

5. After inspecting, retorque the crank pulley bolt to 220 N·m (22.0 kg-m, 159 lb-ft).

Tension Adjustment

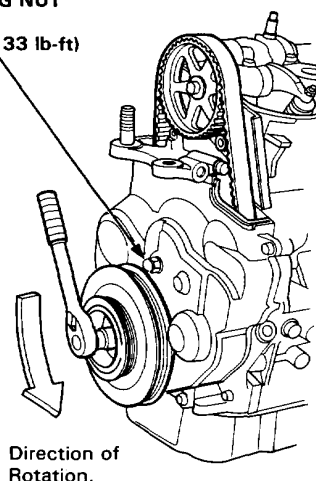
CAUTION: Always adjust timing belt tension with the engine cold.

NOTE:

- The adjuster is spring-loaded to properly tension the belt. Do not apply any extra pressure to the belt while performing the adjustment.
- Inspect the timing balancer belt before adjusting the belt tension.
- Do not loosen the adjusting nut more than one full turn.

1. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
2. Remove the cylinder head cover.
3. Set the No. 1 piston at TDC (page 6-25).
4. Loosen the adjusting nut 2/3-1 turn, then tighten it.

ADJUSTING NUT
45 N·m
(4.5 kg-m, 33 lb-ft)



Direction of Rotation.

5. Rotate the crankshaft counterclockwise 3-teeth on the camshaft pulley, then retighten the adjusting nut to create tension on the timing belt.
6. Tighten the adjusting nut.
7. After adjusting, retorque the crank pulley bolt to 220 N·m (22.0 kg-m, 159 lb-ft).

Timing Balancer Belt

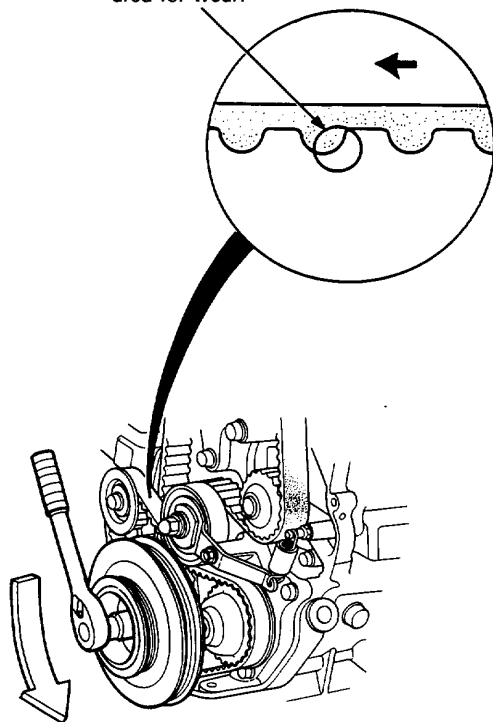
Inspection

1. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
2. Remove the cylinder head cover.
3. Remove the timing belt upper cover.
4. Remove the crankshaft pulley.
5. Remove the timing belt lower cover.
6. Install the crankshaft pulley.
7. Inspect the timing balancer belt for cracks and oil soaking.

NOTE:

- Replace the belt if oil soaked.
- Remove any oil or solvent that gets on the belt.

Inspect this area for wear.



Rotate pulley and inspect belt.

8. After inspecting, retorque the crank pulley bolt to 220 N·m (22.0 kg-m, 159 lb-ft).

NOTE: Refer to page 6-34 for timing balancer belt tension adjustment.



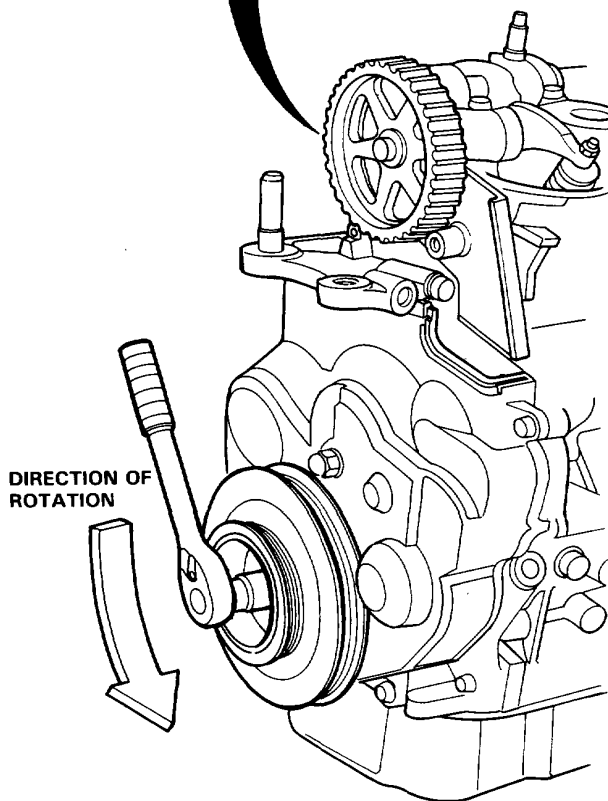
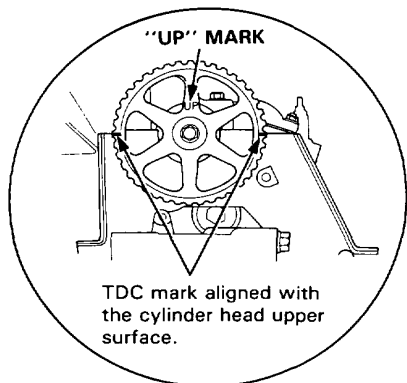
Timing Belt

Positioning Crankshaft Before Installing Timing Belt

NOTE:

- Install the timing belt with the No. 1 piston at TDC (Top Dead Center) on the compression stroke.
- After installing, retorque the crank pulley bolt to 220 N·m (22.0 kg·m, 159 lb·ft).

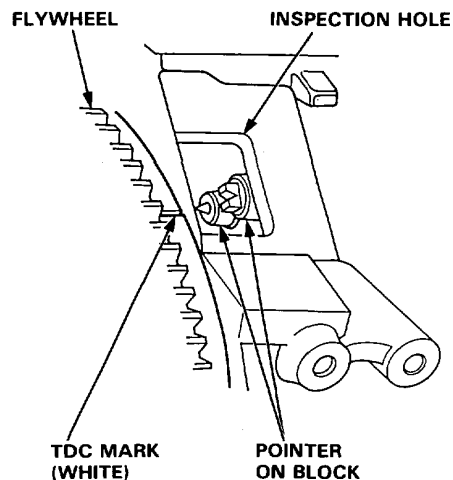
CAMSHAFT TDC POSITION:



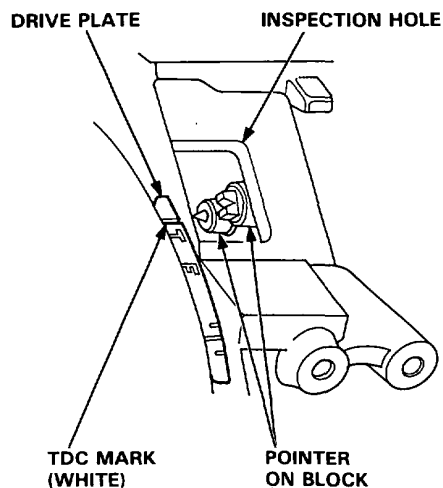
NOTE: When turning the crankshaft with a socket wrench, install the crankshaft pulley and the pulley bolt.

CRANKSHAFT TDC POSITION:

MANUAL TRANSMISSION:



AUTOMATIC TRANSMISSION:

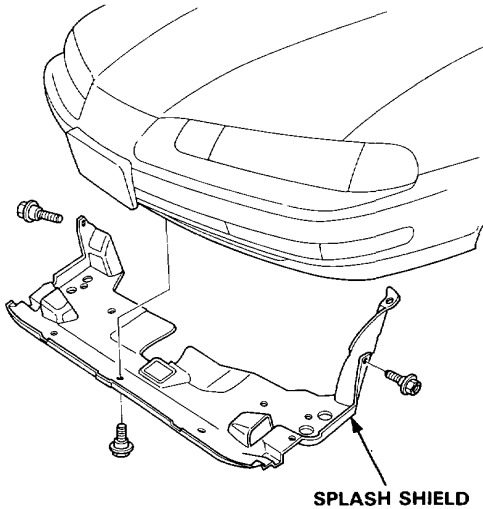


Timing Belt and Timing Balancer Belt

Replacement

NOTE: Turn the crankshaft so that the No. 1 cylinder is at TDC (page 6-25).

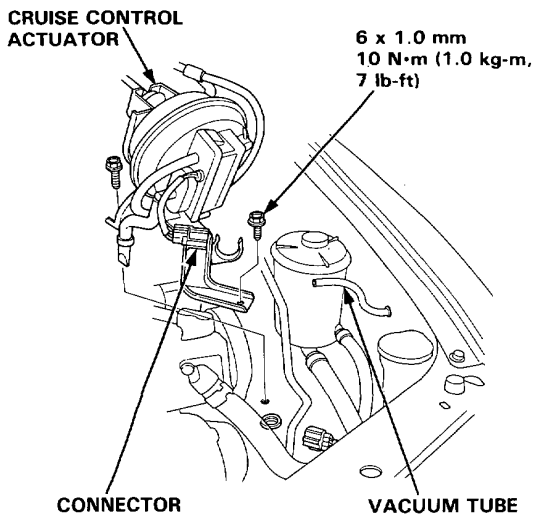
1. Remove the splash shield.



2. Disconnect the connector, then remove the cruise control actuator.

NOTE:

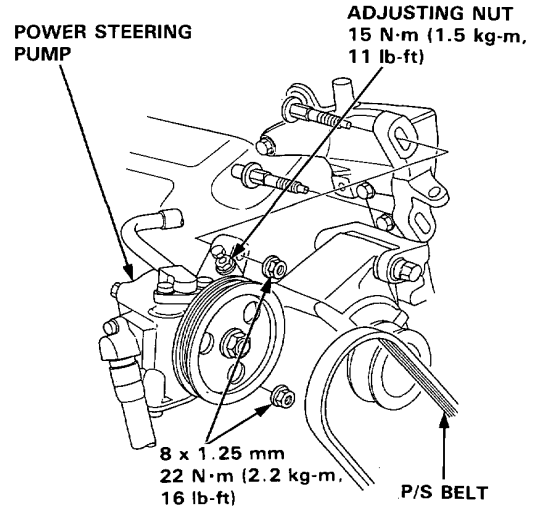
- Do not disconnect the control cable.
- Take care not to bend the cable when removing the actuator. Always replace a kinked cable with a new one.



3. Remove the mounting bolt, nut and V-belt from the power steering pump.

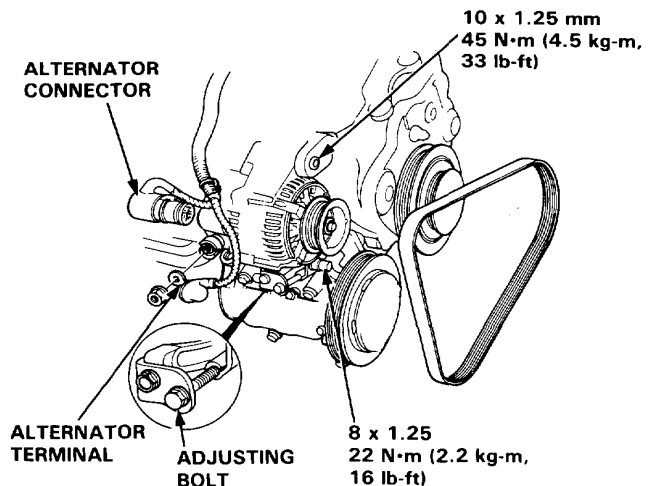
NOTE:

- Do not disconnect the P/S pipe and hose.
- After installing, adjust the tension of the P/S belt (See Section 17).



4. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
5. Loosen the alternator mounting bolt, nut and the adjusting nut, then remove the alternator belt.

NOTE: After installing, adjust the tension of the alternator belt (See Section 23).

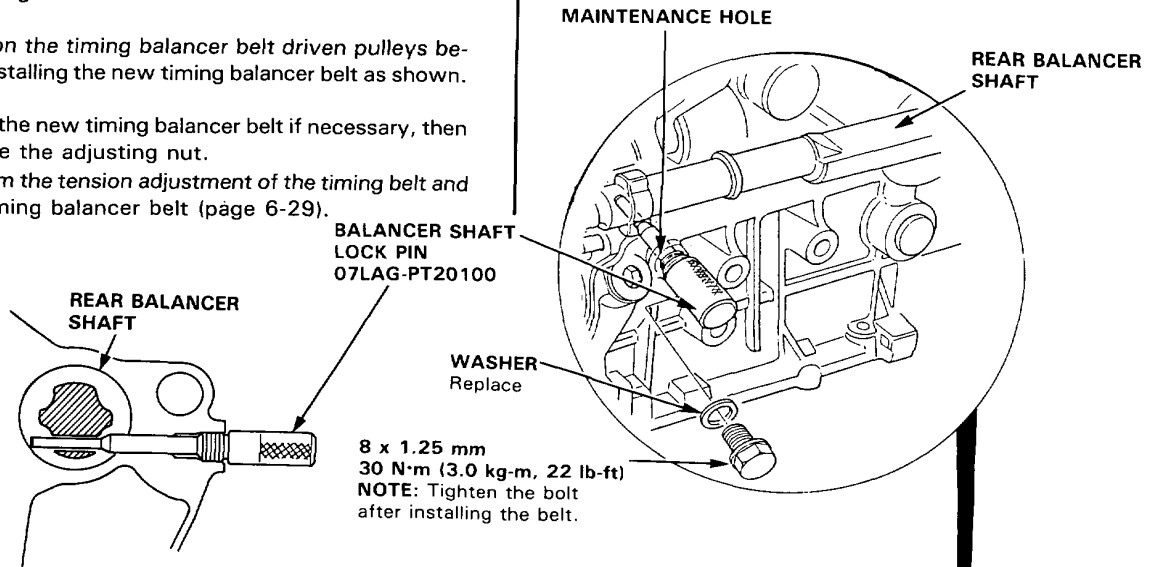


Timing Belt and Timing Balancer Belt

Replacement (cont'd)

16. Install the timing belt in the reverse order of removal; adjust the valve clearance (page 6-36).
 - Refer to page 6-29 for positioning the crankshaft and the camshaft pulley before installing the new timing belt.
17. Position the timing balancer belt driven pulleys before installing the new timing balancer belt as shown.
18. Install the new timing balancer belt if necessary, then remove the adjusting nut.
19. Perform the tension adjustment of the timing belt and the timing balancer belt (page 6-29).

NOTE: Align the maintenance hole and the balancer shaft hole, then insert the special tool to fix the rear balancer shaft.



Align the groove of the front timing balancer belt driven pulley with the pointer on the oil pump body.

FRONT TIMING BALANCER BELT DRIVEN PULLEY

REAR TIMING BALANCER BELT DRIVEN PULLEY

TIMING BALANCER BELT DRIVE PULLEY
Set the crankshaft at TDC.



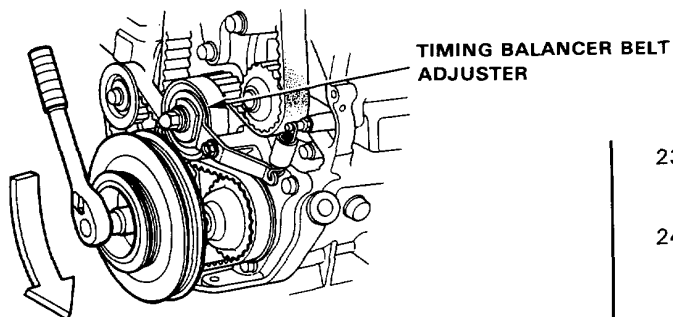
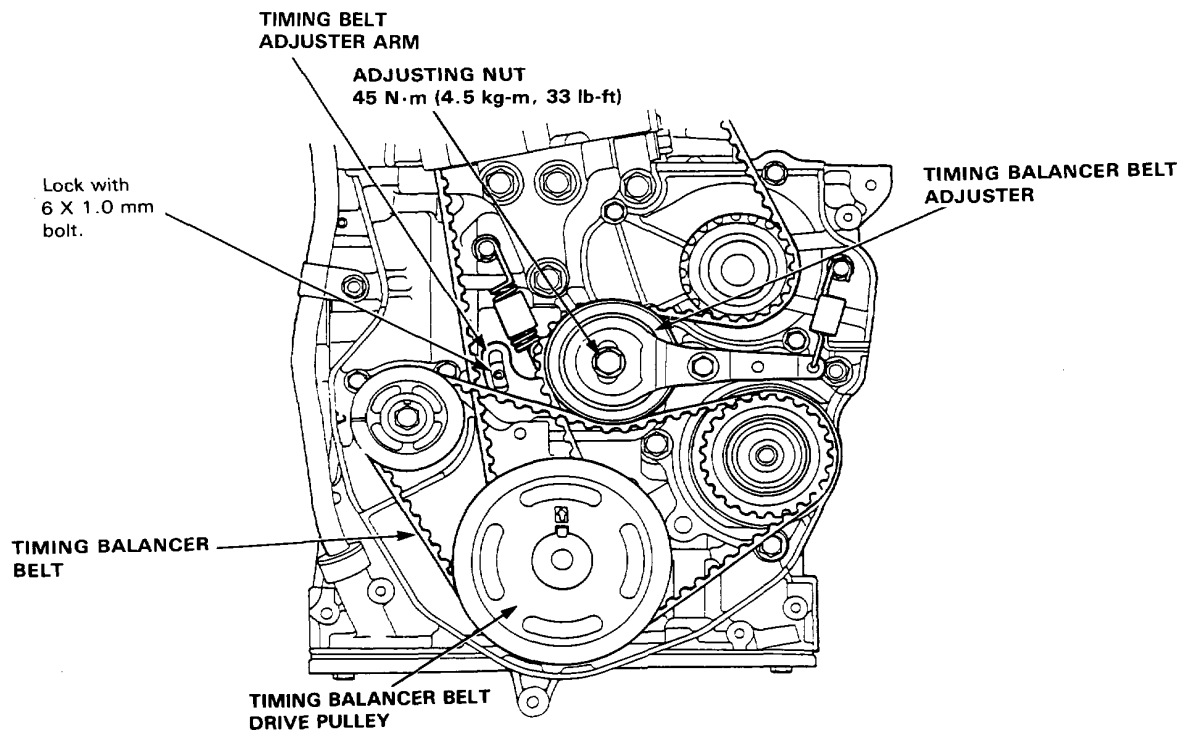
20. After adjusting the belt tension, lock the timing belt adjuster arm with a 6 x 1.0 mm bolt used to tighten timing belt lower cover.

21. Loosen the adjusting nut and check that the timing balancer belt adjuster moves freely.

22. Turn the crankshaft pulley about one turn: tighten the adjusting nut (adjustment is completed).

NOTE: Do not apply pressure to the tensioner when tightening the adjusting nut as the tensioner is spring loaded.

CAUTION: Do not apply excessive tension to the timing balancer belt. It is designed to operate with less tension than other belts.



23. Tighten the adjusting nut and the 6 x 1.0 mm bolt from the timing belt adjuster arm.

24. Remove the crankshaft pulley.

(cont'd)

Timing Belt and Timing Balancer Belt

Replacement (cont'd)

25. Install the timing belt lower cover.

26. Install a new timing belt adjuster rubber seal without loosening the adjusting nut.

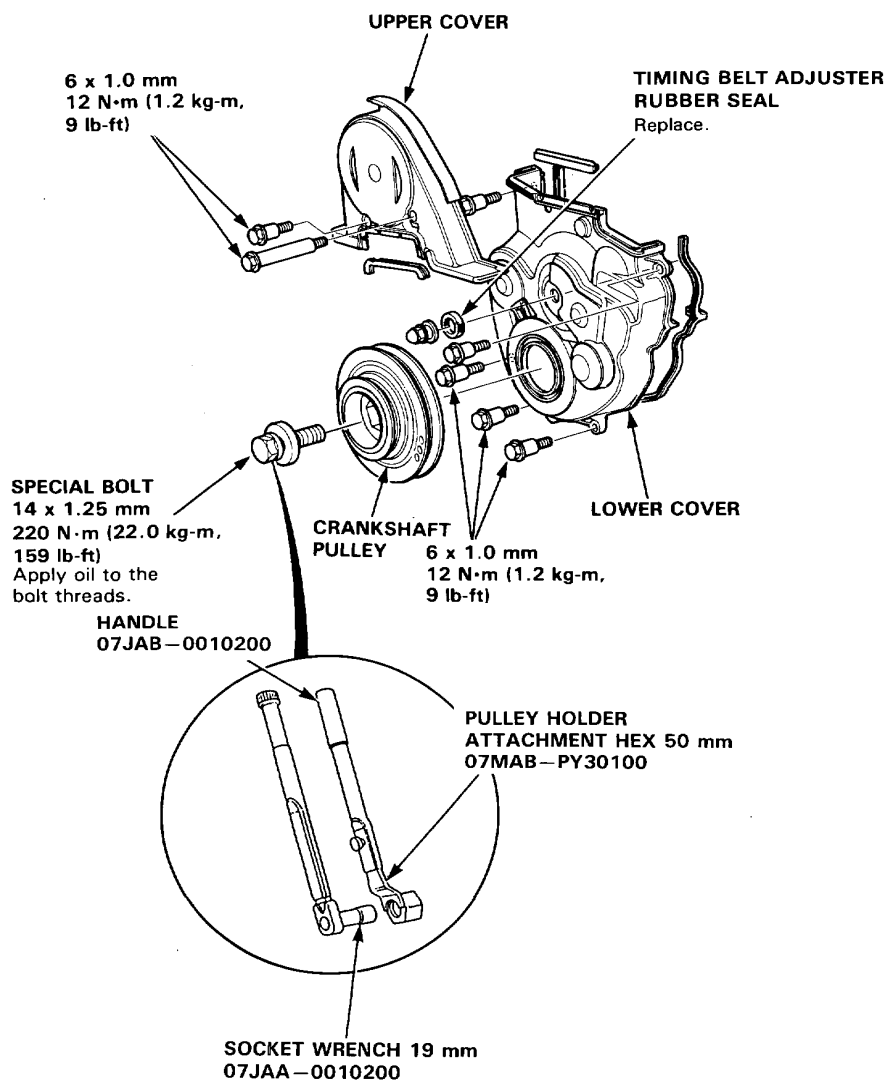
NOTE: Never loosen the adjusting nut as this will be disturb the adjustment of the timing and balancer belt.

27. Install the timing belt upper cover.

28. Install the crankshaft pulley.

29. Coat the threads and seating face of the pulley bolt with engine oil, and tighten to the specified torque.

Specified Torque: 220 N·m (22.0 kg-m, 159 lb-ft)



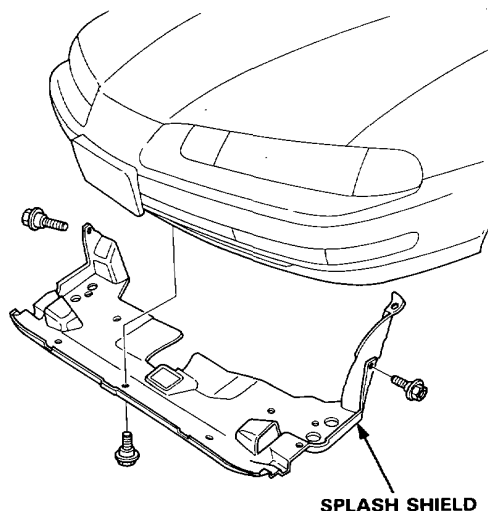


Timing Balancer Belt

Replacement and Adjustment

NOTE: Turn the crankshaft so that the No. 1 cylinder is at TDC (page 6-25)

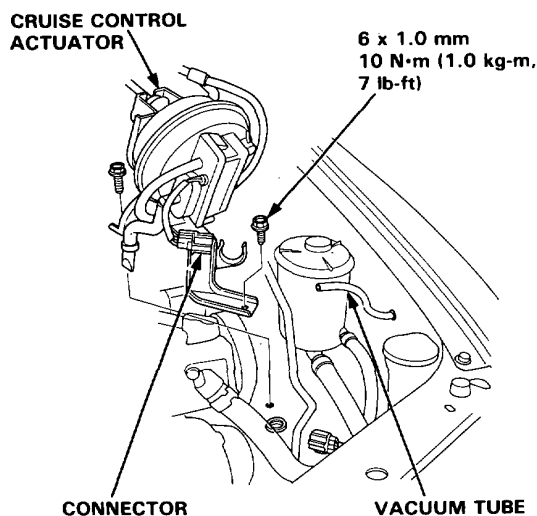
1. Remove the splash shield.



2. Disconnect the connector, then remove the cruise control actuator.

NOTE:

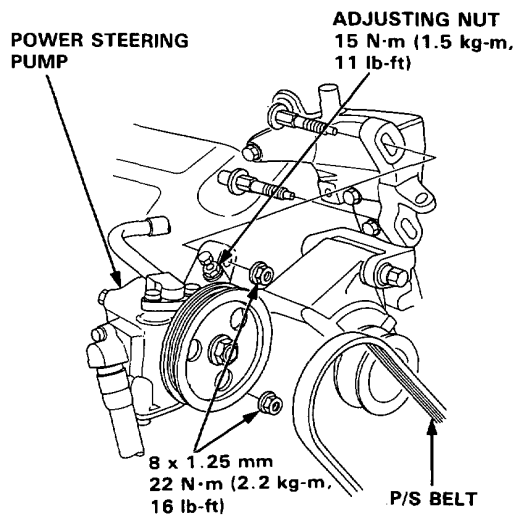
- Do not disconnect the control cable.
- Take care not to bend the cable when removing the actuator. Always replace a kinked cable with a new one.



3. Remove the mounting bolt, nut and V-belt from the power steering pump.

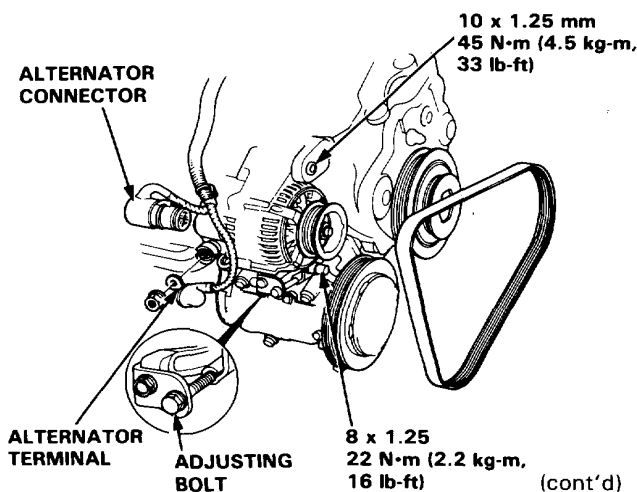
NOTE:

- Do not disconnect the P/S pipe and hose.
- After installing, adjust the tension of the P/S belt (See Section 17).



4. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
5. Loosen the alternator mounting bolt, nut and the adjusting nut, then remove the alternator belt.

NOTE: After installing, adjust the tension of the alternator belt (See Section 23).

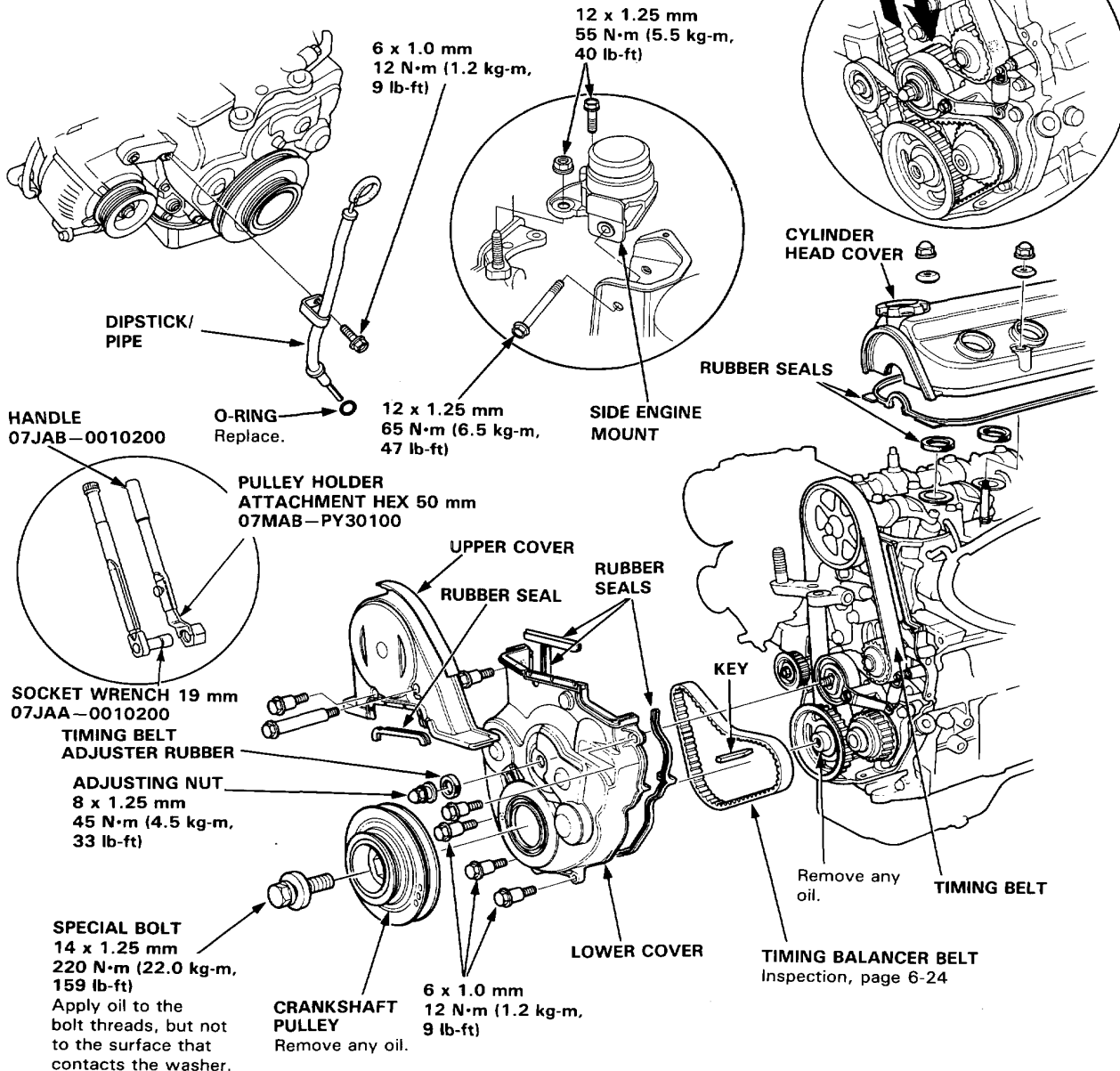


(cont'd)

Replacement and Adjustment (cont'd)

6. Remove the cylinder head cover.
7. Remove the side engine mount bracket stay B (standard for some types).
8. Remove the upper cover.
9. Remove the side engine mount.
10. Remove the dipstick and the pipe.
11. Remove the timing belt adjuster rubber, do not loosen the adjusting nut.
12. Remove the special bolt and the crankshaft pulley. Remove the two rear bolts from the center beam to allow the engine to dropdown and give clearance to remove the lower cover.

13. Remove the lower cover.
14. Lock the timing belt adjuster arm with the 6 x 1.0 mm lower cover bolt.
15. Loosen the adjusting nut and push the timing balancer belt tensioner to remove tension on the belts, then tighten the adjusting nut.
16. Remove the timing balancer belt.



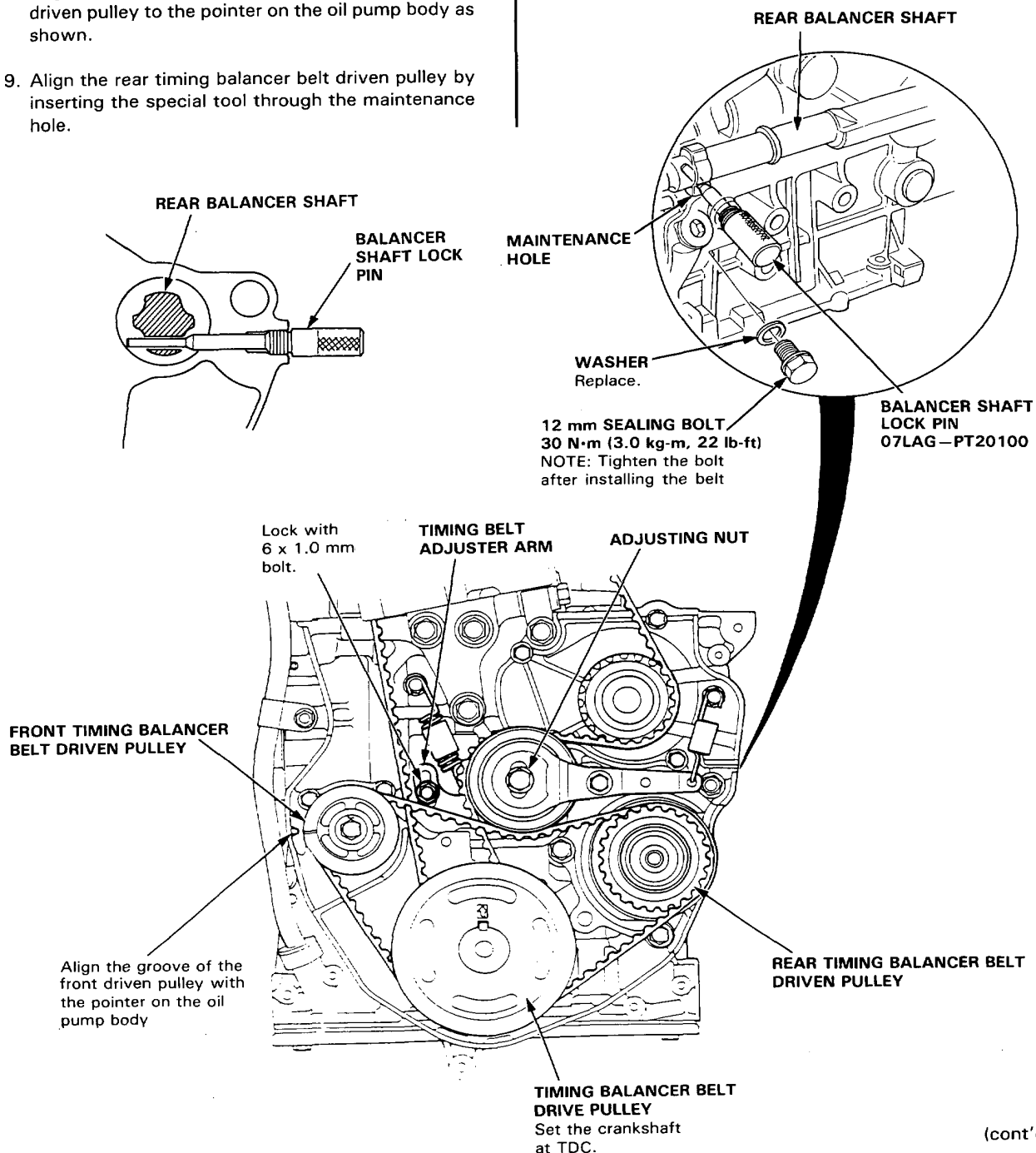


17. Install the timing balancer belt in the reverse order of removal; turn the crankshaft so that the No. 1 cylinder is at TDC (page 6-28).

18. Align the groove on the front timing balancer belt driven pulley to the pointer on the oil pump body as shown.

19. Align the rear timing balancer belt driven pulley by inserting the special tool through the maintenance hole.

20. Check the timing belt adjuster arm is lock with a 6 x 1.0 mm lower cover bolt, if loosen it adjust the timing belt tension.



(cont'd)

Timing Balancer Belt

Replacement and Adjustment (cont'd)

21. Loosen the adjusting nut and check that the timing balancer belt adjuster moves freely.

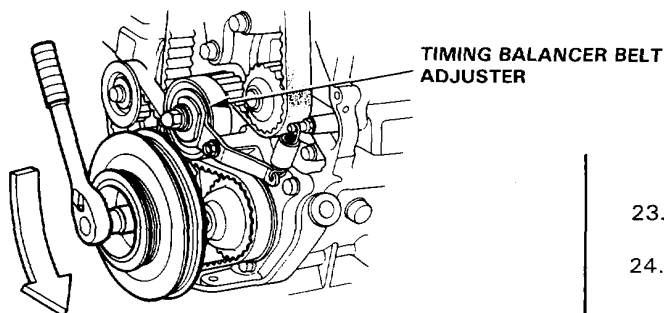
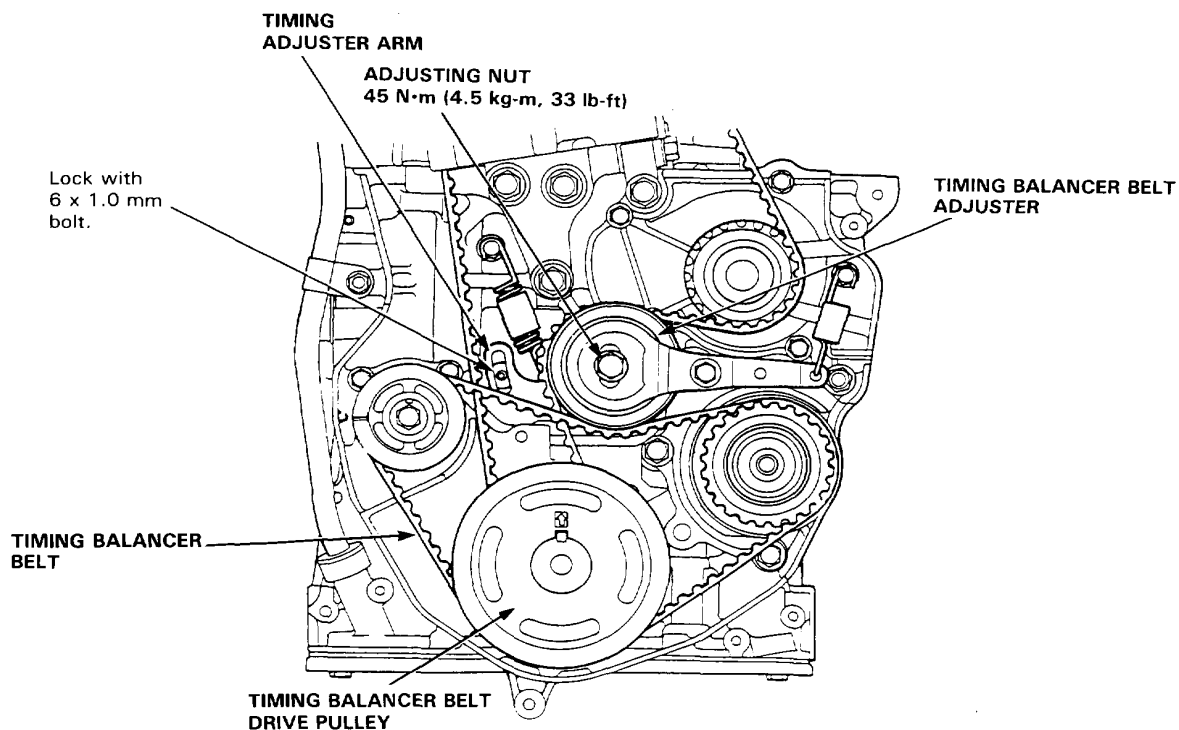
22. Turn the crankshaft pulley about one turn: tighten the adjusting nut (adjustment is completed).

NOTE:

- Do not apply tension on the tensioner when tightening the adjusting nut as the tensioner is spring loaded.

CAUTION:

- Do not apply excessive tension to the timing balancer belt. It is designed to operate with smaller tension than those of other belts.



23. Tighten the adjusting nut and a 6 x 1.0 mm bolt from the timing belt adjuster arm.

24. Remove the crankshaft pulley.



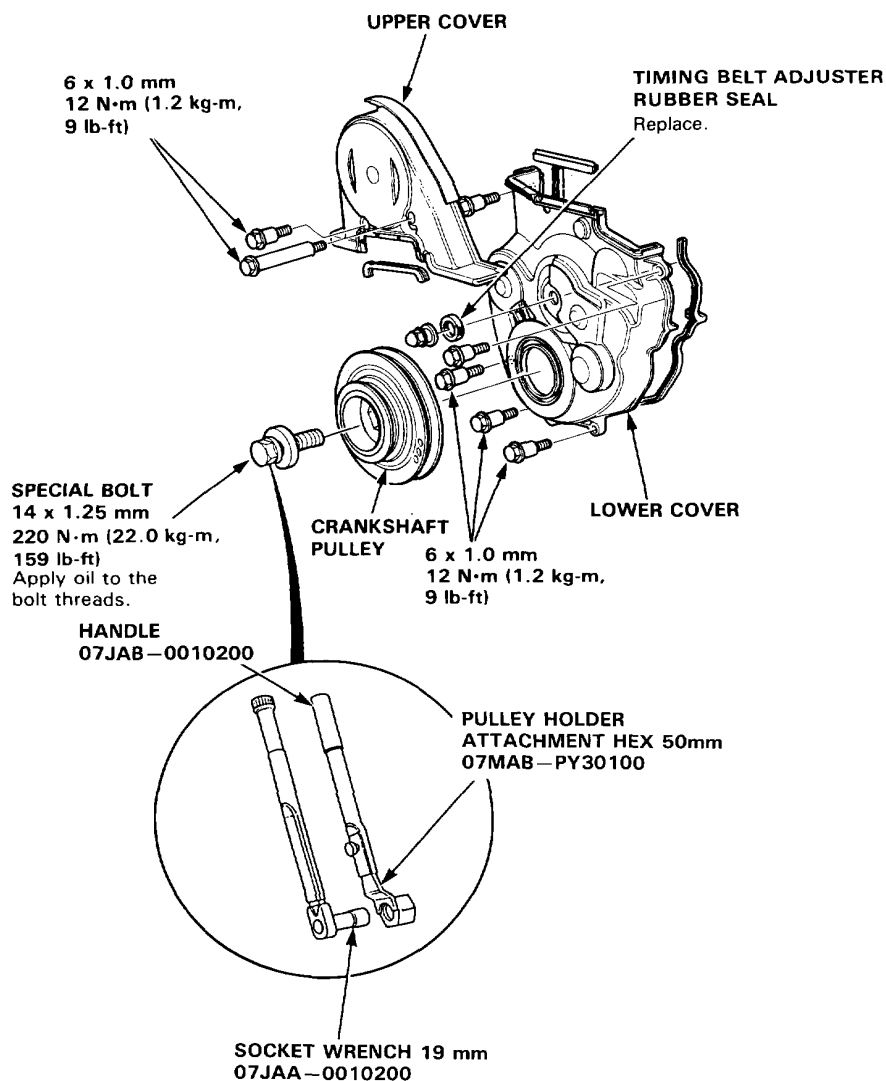
25. Install the timing belt lower cover.
26. Install a new timing belt adjuster rubber seal without loosening the adjusting nut.

NOTE:

- Never loosen the adjusting nut as this will be disturb the adjustment of the timing and balancer belt.

27. Install the timing belt upper cover.
28. Install the crankshaft pulley.
29. Coat the threads and seating face fo the pulley bolt with engine oil, and tighten to the specified torque.

Specified Torque: 220 N·m (22.0 kg-m, 159 lb-ft)



Valve Clearance

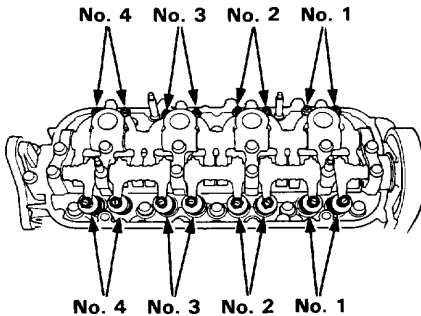
Adjustment

NOTE:

- Valves should be adjusted cold when the cylinder head temperature is less than 38°C (100°F).
- After adjusting, retorque the crank pulley bolt to 220 N·m (22.0 kg-m, 159 lb-ft).

1. Remove the cylinder head cover.

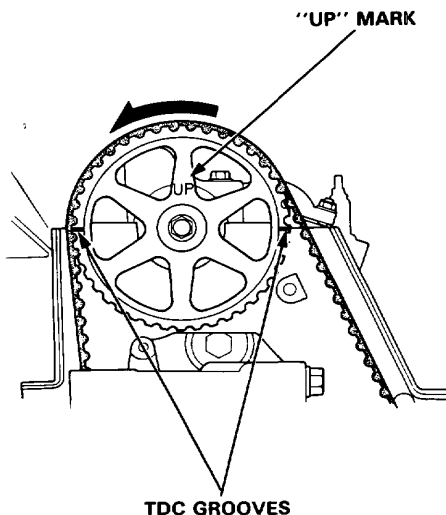
INTAKE



EXHAUST

2. Set No. 1 piston at TDC. "UP" mark on the pulley should be at top, and TDC grooves on the pulley should align with cylinder head surface.

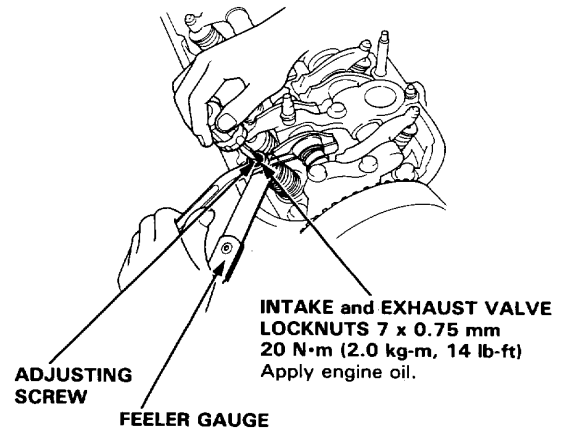
Number 1 piston at TDC:



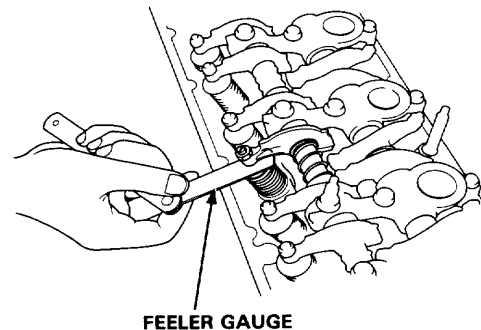
3. Adjust valves on No. 1 cylinder.

Intake: 0.26 ± 0.02 mm (0.010 ± 0.0008 in)
 Exhaust: 0.30 ± 0.02 mm (0.012 ± 0.0008 in)

4. Loosen locknut and turn adjustment screw until feeler gauge slides back and forth with slight amount of drag.



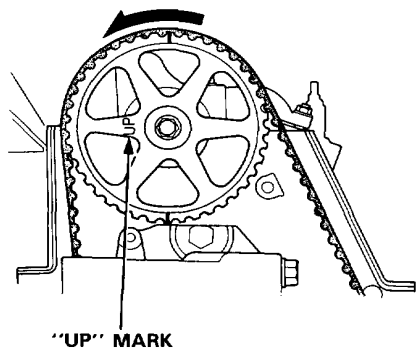
5. Tighten locknut and check clearance again. Repeat adjustment if necessary.





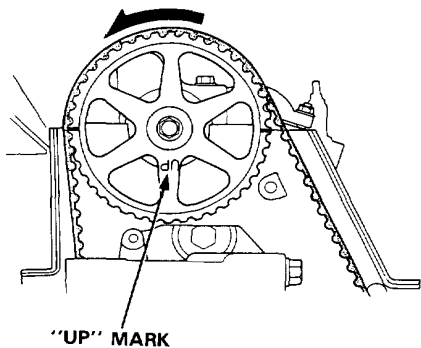
6. Rotate crankshaft 180° counterclockwise (camshaft pulley turns 90°). The "UP" mark should be at exhaust side. Adjust valves on No. 3 cylinder.

Number 3 Piston at TDC:



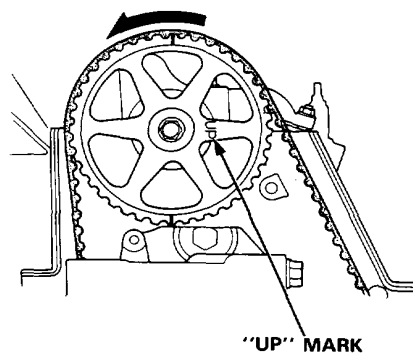
7. Rotate crankshaft 180° counterclockwise to bring No.4 piston to TDC. Both TDC grooves are once again visible. Adjust valves on No. 4 cylinder.

Number 4 Piston at TDC:



8. Rotate crankshaft 180° counterclockwise to bring No. 2 piston to TDC. The "UP" mark should be at intake side. Adjust valves on No. 2 cylinder.

Number 2 Piston at TDC:



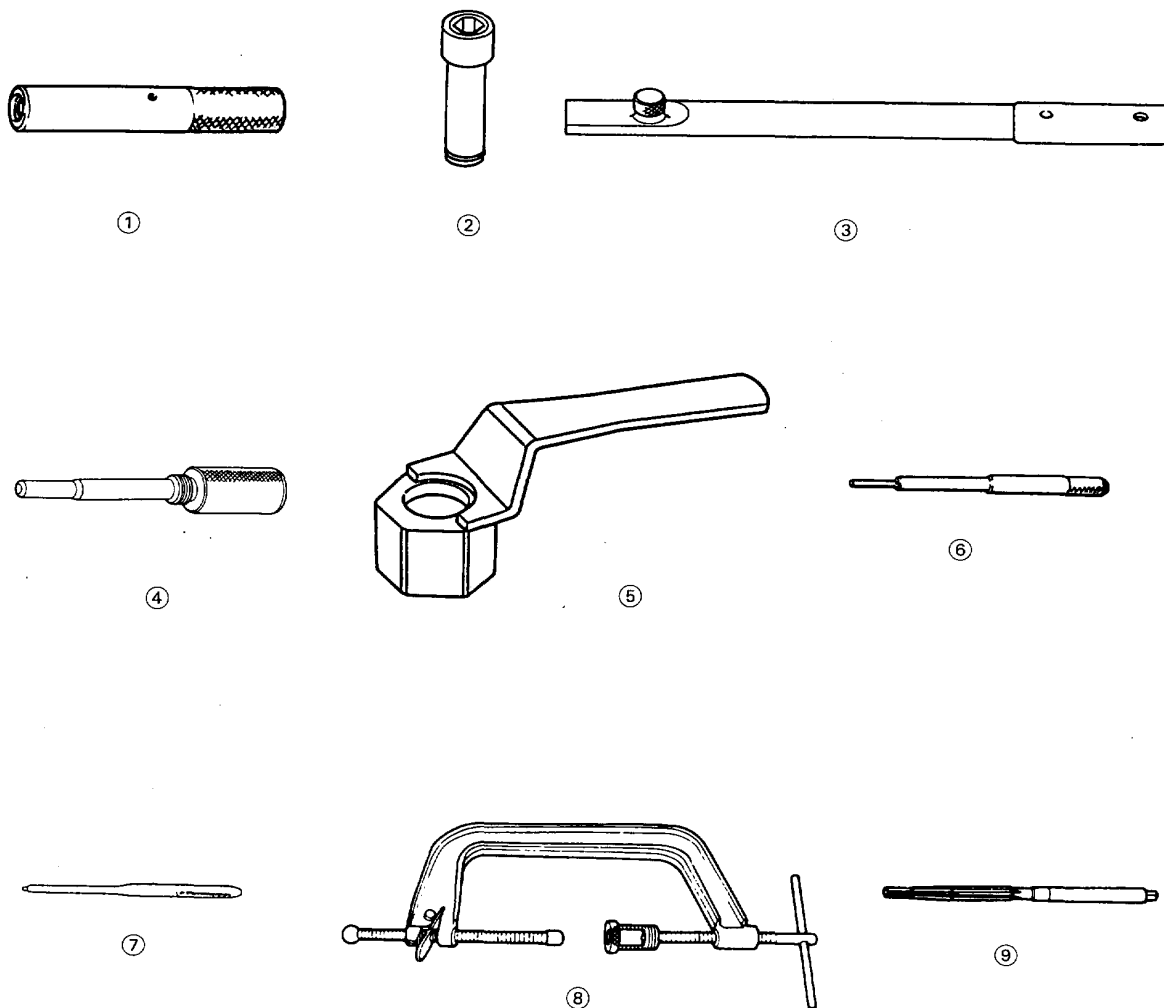
Cylinder Head/Valve Train H23A engine

Special Tools	6-40
Illustrated Index	6-41
Cylinder Head Removal	6-43
Camshaft Pulleys	6-48
Camshafts	6-48
Valves and Valve Seals	6-50
Valve Seats	6-51
Cylinder Head	6-52
Valves	6-52
Valve Guides	6-53
Valve Springs and Valves	6-54
Cylinder Head Installation	6-55
Rocker Arms/Camshafts and Seals/Pulleys	6-56
Timing Belt and Timing Balancer Belt	6-58
Valve Clearance Adjustment	6-72



Special Tools

Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07GAD-PH70100	Valve Seal Installer	1	6-54
②	07JAA-0010200	Socket Wrench 19 mm	1	6-63, 66, 68, 71
③	07JAB-0010200	Handle	1	6-63, 66, 68, 71
④	07LAG-PT20100	Balancer Shaft Lock Pin	1	6-64, 69
⑤	07MAB-PY30100	Pulley Holder Attachment HEX 50 mm	1	6-63, 66, 68, 71
⑥	07742-0010200	Valve Guide Driver	1	6-53
⑦	07744-0010400	Pin Driver	2	6-46, 48, 57, 61
⑧	07757-0010000	Valve Spring Compressor	1	6-50
⑨	07984-6570101	Value Guide Reamar	1	6-53



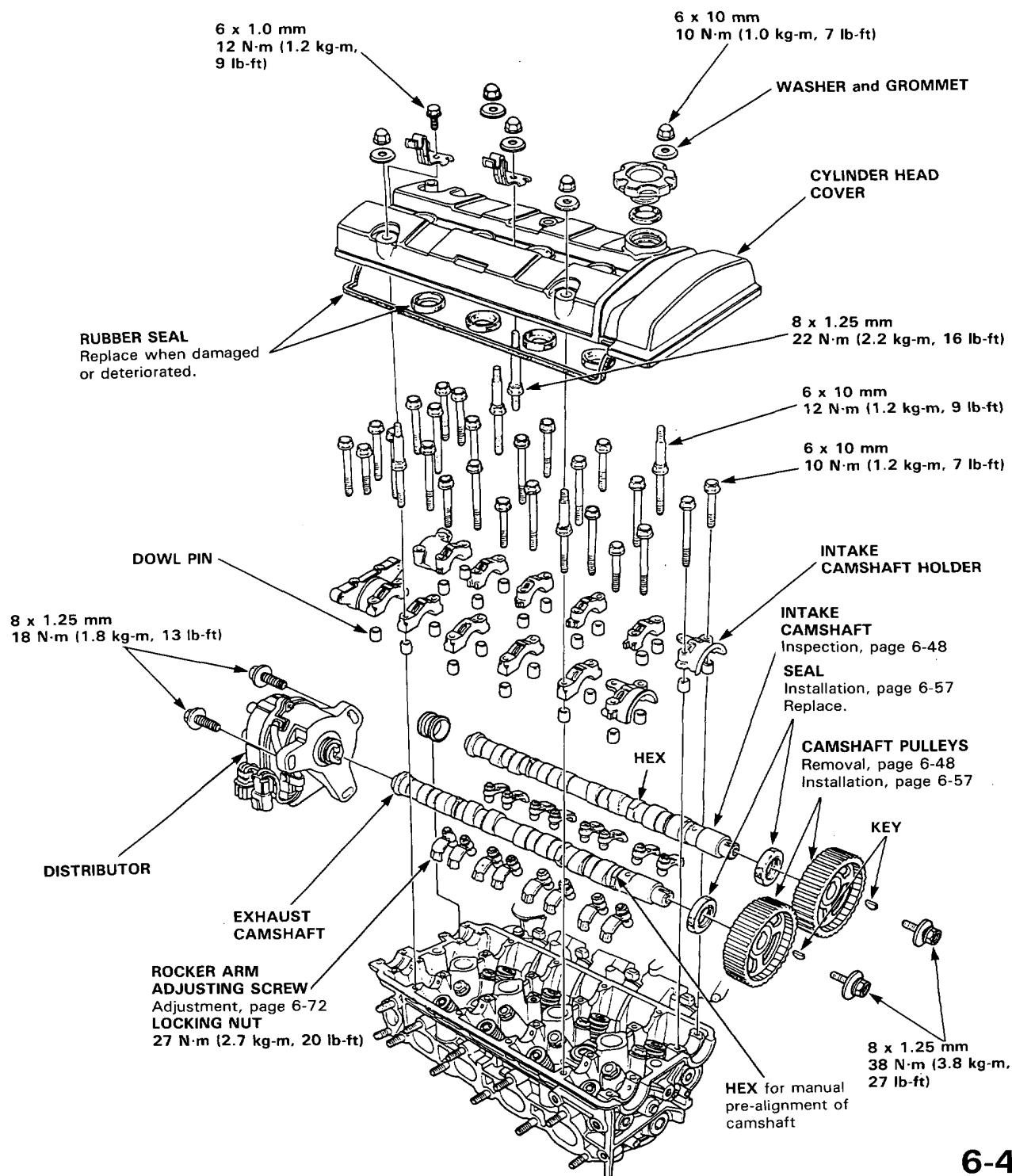
Cylinder Head/Valve Train

Illustrated Index



CAUTION: To avoid damaging the cylinder head, wait until the coolant temperature drops below 38 °C (100 °F) before removing it.

NOTE: Use new O-rings and gaskets when reassembling

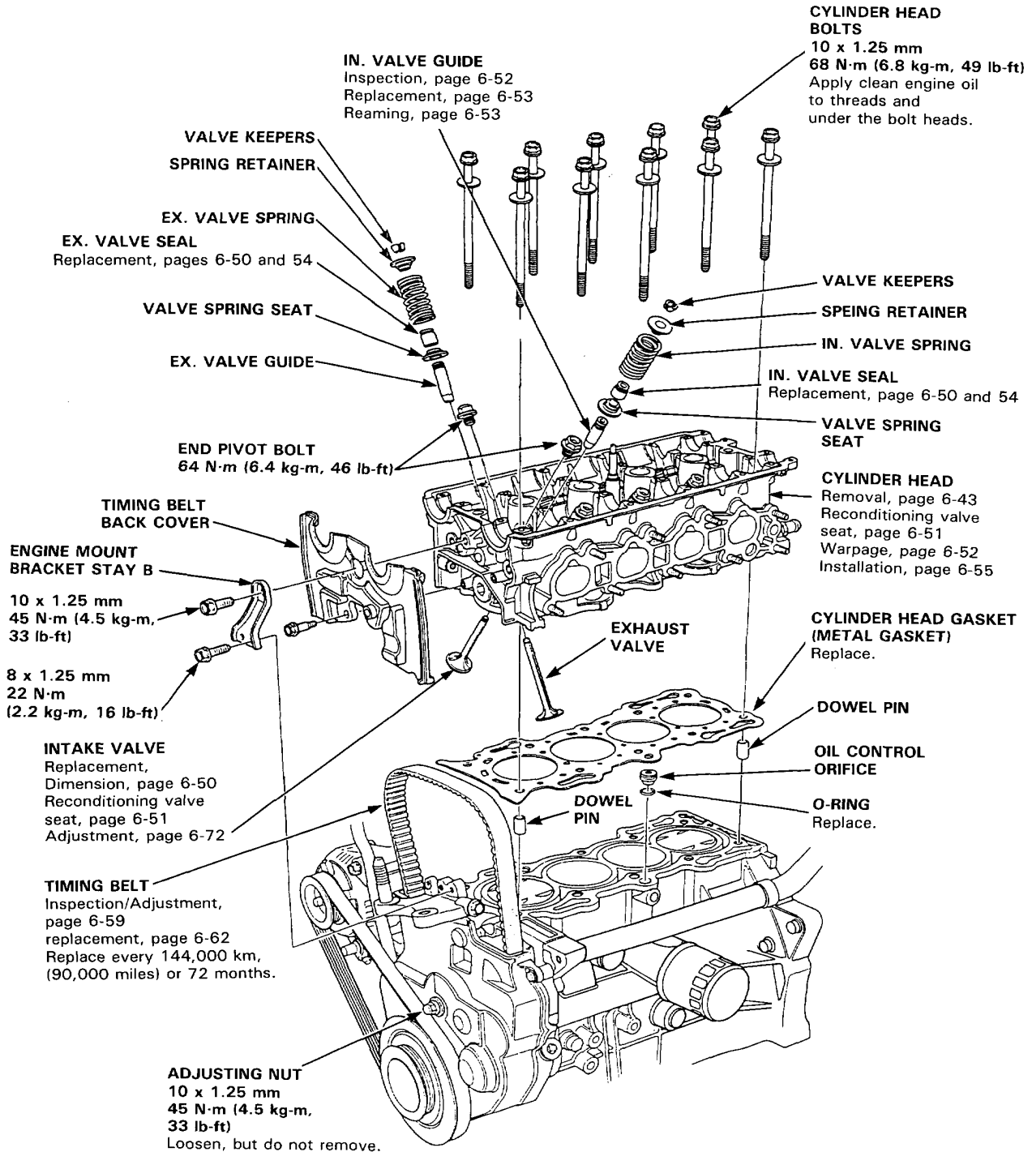


Cylinder Head/Valve Train

Illustrated Index

CAUTION: In handling a metal gasket, care should be taken not to fold it or damage the contact surface of the gasket.

 Prior to reassembling, clean all the parts in solvent, dry them and apply lubricant to any contact parts.



Cylinder Head

Removal



Engine removal is not required for this procedure.

⚠ WARNING

- Make sure jacks and safety stands are placed properly and hoist brackets are attached to the correct positions on the engine.
- Make sure the car will not roll off stands and fall while you are working under it.

CAUTION:

- Use fender covers to avoid damaging painted surface.
- Unspecified items are common.
- Unplug the wiring connectors carefully while holding the connector portion to avoid damage.
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses or interfere with other parts.
- To avoid damaging the cylinder head, wait until the coolant temperature drops below 38 °C (100 °F) before loosening the retaining bolts.

NOTE:

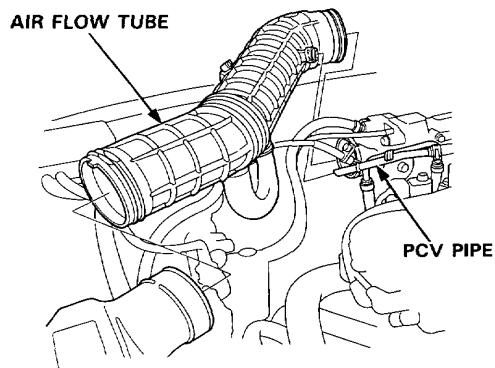
- Inspect the timing belt before removing the cylinder head.
- Turn the crankshaft pulley so that the No. 1 piston is at top-dead-center (page 6-61).
- Mark all emission hoses before disconnecting them.

1. Disconnect the negative terminal from the battery.
2. Drain the coolant (see section 10).
 - Remove the radiator cap to speed draining.
3. Relieve fuel pressure.

⚠ WARNING

Do not smoke while working on fuel system, keep open flame or spark away from work area. Drain fuel only into an approved container.

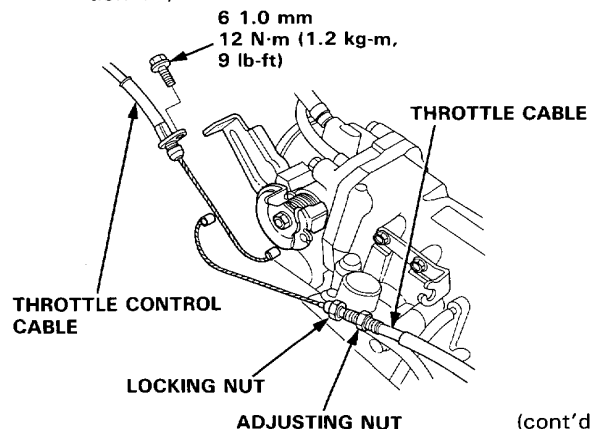
4. Remove the air flow tube.
5. Remove the fuel feed hose and charcoal canister hose from the intake manifold.



6. Remove the throttle control cable from the throttle body (A/T only).

NOTE:

- Take care not to bend the cable when removing it. Always replace any kinked cable with a new one.
- Adjust the throttle cable when installing (see section 11).

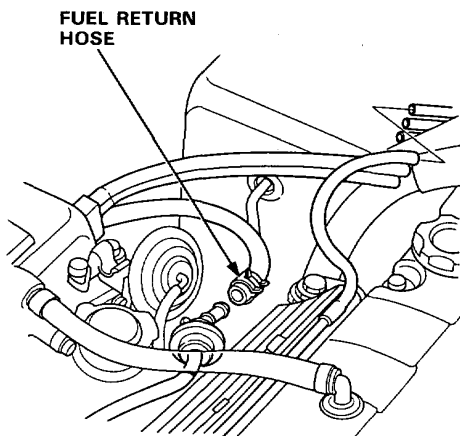
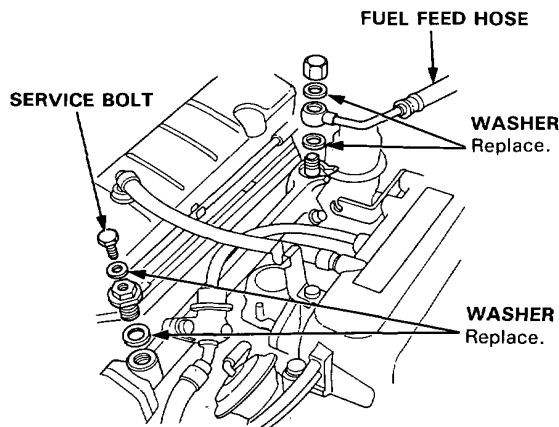


(cont'd)

Cylinder Head

Removal (cont'd)

7. Remove the fuel feed hose, the fuel return hose and the brake booster vacuum hose.



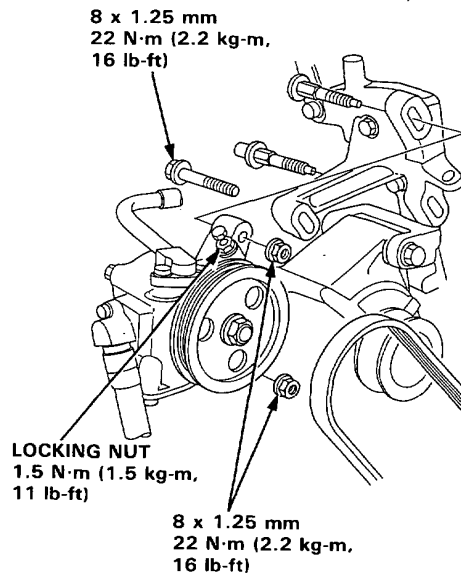
8. Remove the following engine wire harness connectors and clamps from the cylinder head and the intake manifold.

- Four injector connectors
- TA sensor connector
- EACV connector
- Throttle sensor connector
- EGR valve lift sensor connector
- Ground terminal
- Themoswitch connector (for cooling fan)
- Oxygen sensor connector
- TW sensor connector (for emissions)
- Temperature unit connector
- Ignition coil connector
- CRANK/TDC/CYLINDER sensor connector
- Speed sensor connector

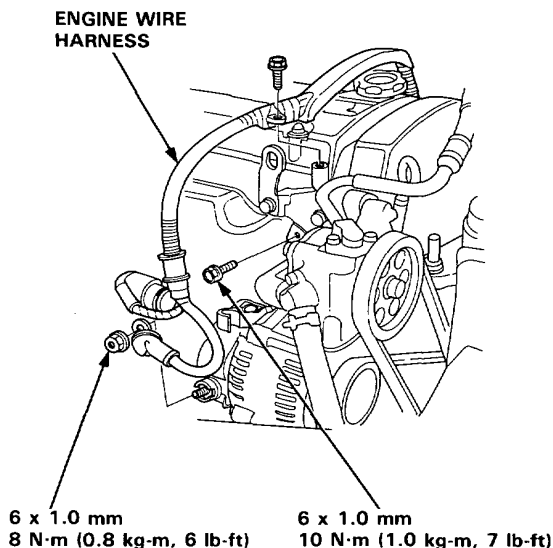
9. Remove the engine ground cable from the cylinder head cover.

10. Remove the P/S belt and pump.

- Do not disconnect the P/S hoses.

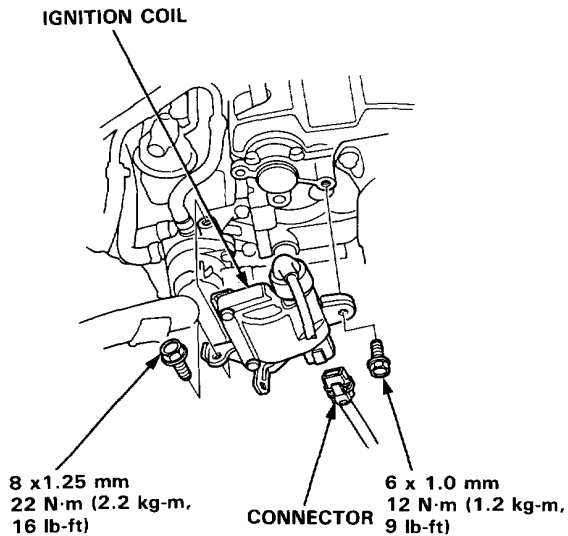


11. Disconnect the alternator terminal and connector, then remove the engine wire harness from the cylinder head cover.

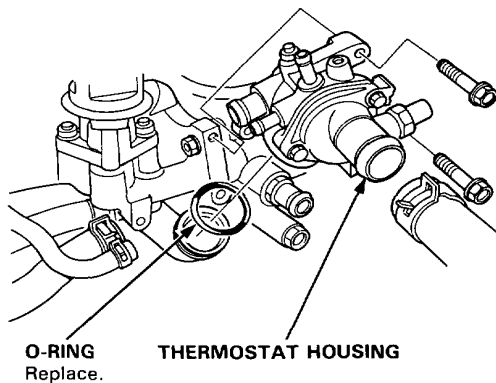




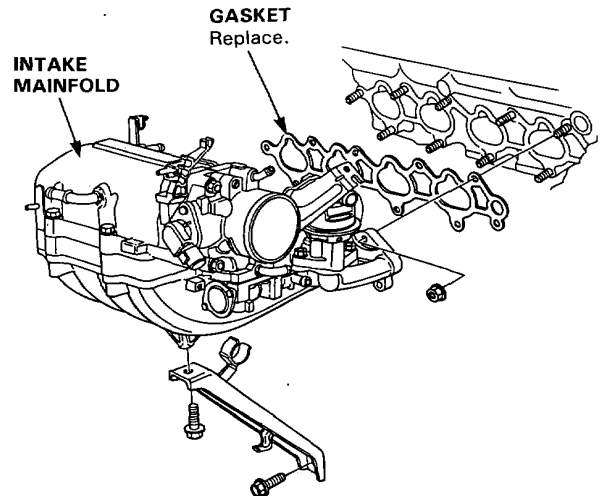
12. Remove the ignition coil.



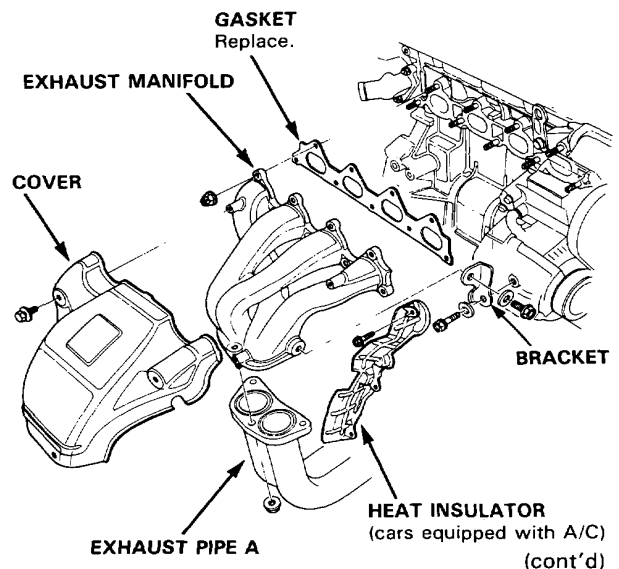
13. Remove the emission vacuum hoses and water bypass hoses from the intake manifold assembly.
14. Remove the radiator upper hose and heater hose from the cylinder head.
15. Remove the water bypass hose and the thermostat housing.



16. Remove the intake manifold bracket and intake manifold.



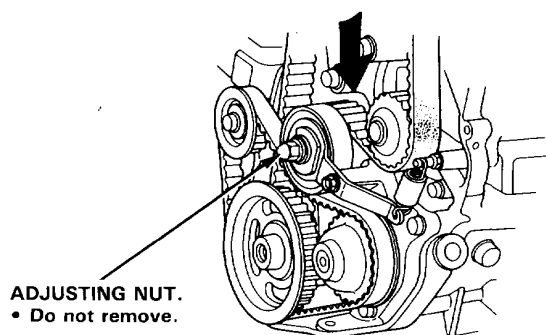
17. Remove the self-locking nuts and disconnect the exhaust manifold and exhaust pipe A.
18. Remove the heat insulator (cars equipped with A/C), exhaust manifold bracket and exhaust manifold.



Cylinder Head

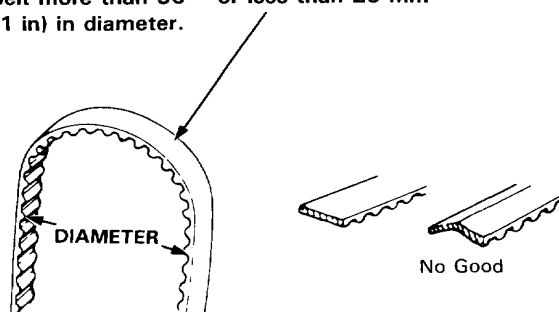
Removal (cont'd)

19. Remove the PCV hose, then remove the cylinder head cover.
20. Remove the timing belt middle cover.
21. Loosen the timing belt adjusting bolt 180°.
22. Push the tensioner to release tension from the timing belt, then retighten the adjusting bolt.

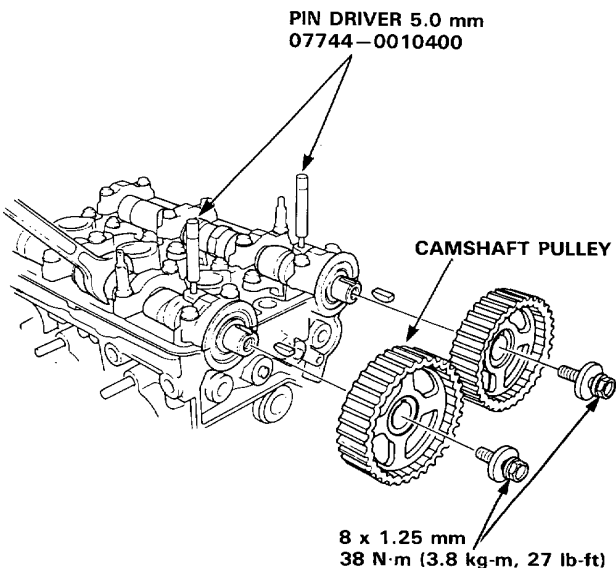


23. Remove the belt from the camshaft pulleys.

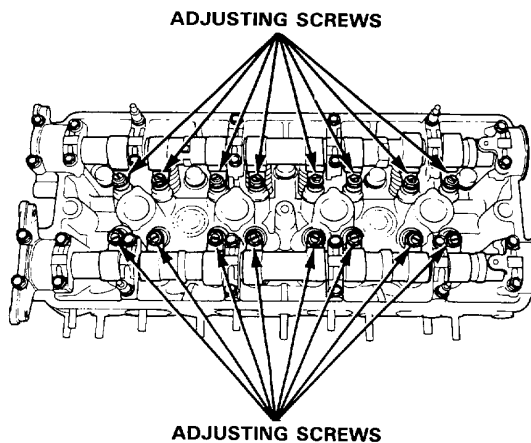
CAUTION: Do not crimp or band the timing belt more than 90 ° or less than 25 mm (1 in) in diameter.



24. Remove the camshaft pulleys.

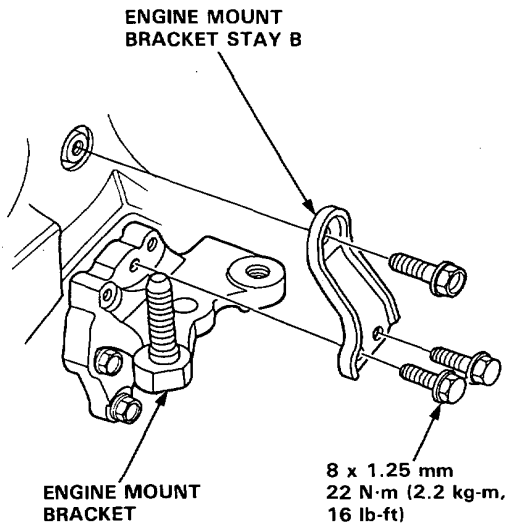


25. Loosen the rocker arm adjusting screws, then remove the camshaft holders and camshafts.





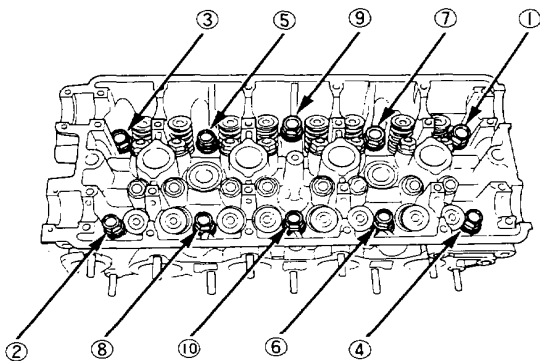
26. Remove the side engine mount bracket stay B and timing belt back cover



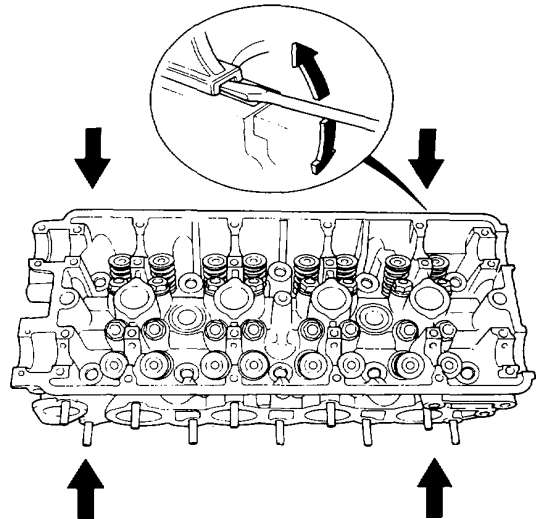
27. Remove the cylinder head bolts, then remove the cylinder head.

CAUTION: To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat until all bolts are loosened.

CYLINDER HEAD BOLT LOOSENING SEQUENCE



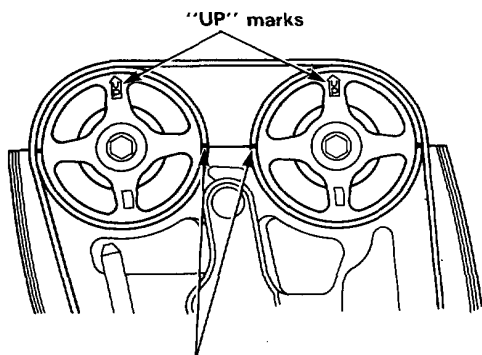
NOTE: Separate the cylinder head from the block with a flat tip screwdriver as shown.



Camshaft Pulleys

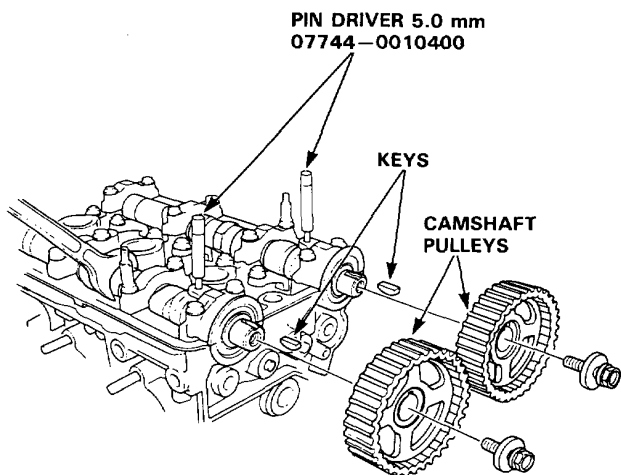
Removal

1. To ease reassembly, turn the pulley until the "UP" marks face up, and the front timing marks are aligned with the marks on the pulleys.



Align the marks on the pulleys.

2. Remove the pulley retaining bolts, then remove the camshaft pulleys.



NOTE: Before removing the camshaft assemblies, check camshaft end play.

Camshafts

Inspection

NOTE: Do not rotate camshaft during inspection.

1. Remove the rocker arms.

NOTE: Rocker arms must be installed in the same position if reused.

2. Put the camshafts and the cam holders on the cylinder head, then tighten the bolts to the specified torque.

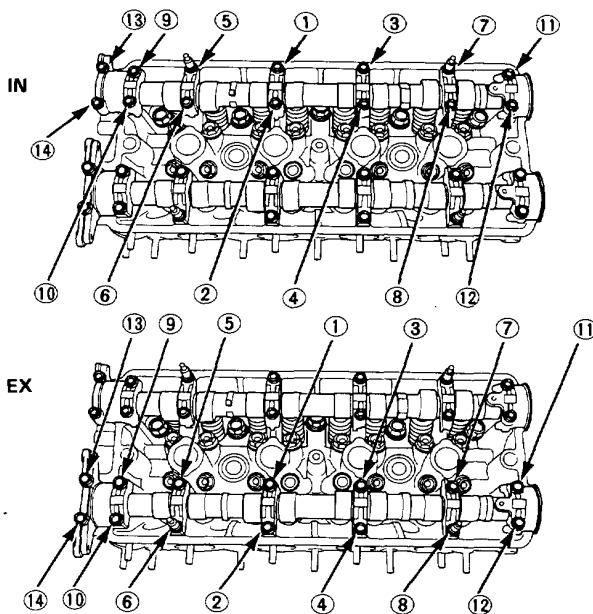
Specified torque:

Except IN (5,7). EX (6,8)

: 10 N·m (1.0 kg-m, 7 lb-ft) IN (5,7). EX (6,8)

: 12 N·m (1.2 kg-m, 9 lb-ft)

TIGHTENING SEQUENCE

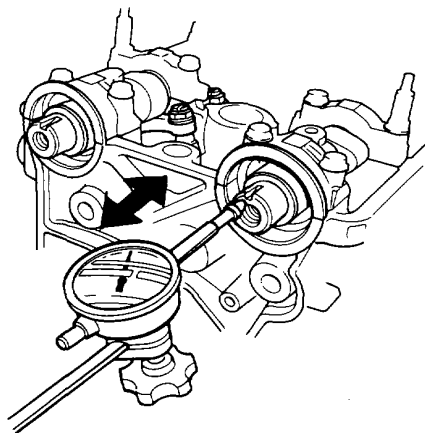




3. Seat camshafts by pushing them toward distributor end of cylinder head.
4. Zero dial indicator against end of distributor drive, then push camshafts back and forth, and read the end play.

Camshaft End Play:

Standard (New): 0.05—0.15 mm
(0.002—0.006 in)
Service Limit: 0.50 mm (0.02 in)



5. Remove the camshaft holder bolts from the cylinder head.

- Lift camshaft out of cylinder head, wipe clean, then inspect lift ramps. Replace camshaft if lobes are pitted, scored, or excessively worn.
- Clean the camshaft bearing surfaces in the cylinder head, then set camshaft back in place.
- Insert plastigage strip across each journal.
- Install the camshaft holders and torque bolts to the values and in the sequence shown on page 6-48.

6. Measure widest portion of plastigage on each journal.

Camshaft Bearing Radial Clearance:

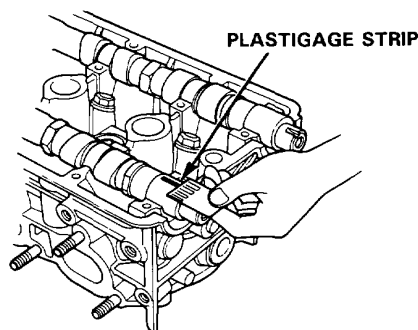
Standard (New): 0.050—0.089 mm
(0.002—0.004 in)

Service Limit: 0.15 mm (0.006 in)

No.5 Journal:

Standard (New): 0.05—0.139 mm
(0.002—0.005)

Service Limit: 0.15 mm (0.006 in)



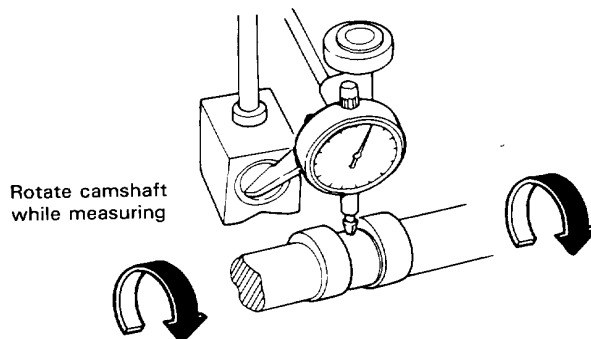
7. If camshaft bearing radial clearance is out of tolerance:

- And the camshaft has already been replaced, you must replace the cylinder head.
- If camshaft has not been replaced, first check total runout with the camshaft supported on V-blocks.

Camshaft Total Runout:

Standard (New): 0.015 mm (0.0006 in) max.

Service Limit: 0.030 mm (0.0012 in)



- If the total runout of the camshaft is within tolerance, replace the cylinder head.
- If the total runout is out of tolerance, replace the camshaft and recheck. If the bearing clearance is still out of tolerance, replace the cylinder head.

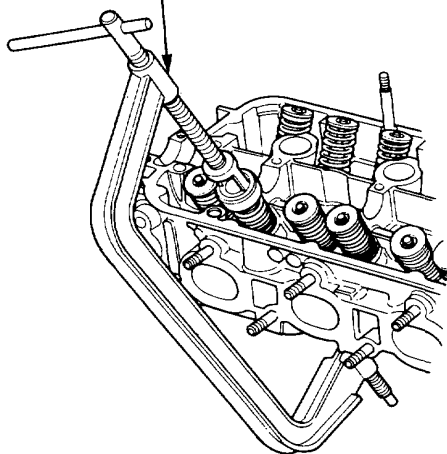
Valves and Valve Seals

Replacement

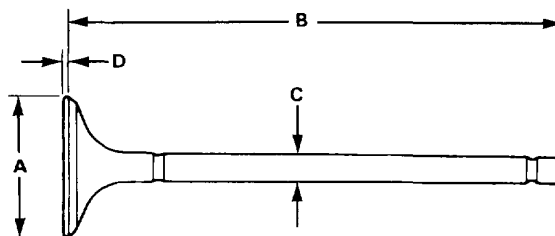
NOTE: Identify valves and valve springs as they are removed so that each item can be reinstalled in its original position.

1. Tap each valve stem with a plastic mallet to loosen valve keepers before installing the spring compressor.
2. Install the spring compressor. Compress spring and remove valve keeper.

VALVE SPRING COMPRESSOR
07757-0010000



3. Install the special tools as shown.
4. Remove the valve guide seal.



Intake Valve Dimensions

- A Standard (New): 33.9–34.1 mm
(1.335–1.343 in)
B Standard (New): 102.50–102.80 mm
(4.035–4.047 in)
C Standard (New): 6.58–6.59 mm
(0.2591–0.2594 in).
C Service Limit: 6.55 mm (0.258 in.)
D Standard (New): 0.85–1.15 mm
(0.033–0.045 in)
D Service Limit: 0.65 mm (0.026 in.)

Exhaust Valve Dimensions

- A Standard (New): 28.9–29.5 mm
(1.138–1.146 in)
B Standard (New): 101.40–101.70 mm
(3.992–4.004 in)
C Standard (New): 6.55–6.56 mm
(0.2579–0.2583 in).
C Service Limit: 6.52 mm (0.257 in.)
D Standard (New): 1.05–1.35 mm
(0.041–0.053 in)
D Service Limit: 0.85 mm (0.033 in)

Valve Seats

Reconditioning



1. Renew the valve seats in the cylinder head using a valve seat cutter.

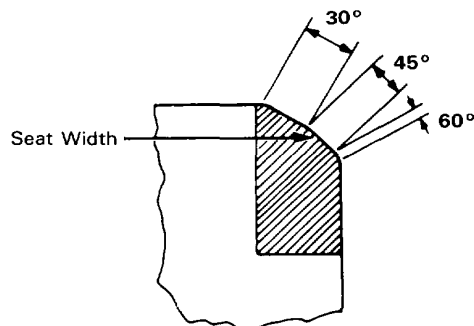
NOTE: If guides are worn (page 6-52), replace them (page 6-53) before cutting the valve seats.

2. Carefully cut a 45° seat, removing only enough material to ensure a smooth and concentric seat.
3. Bevel the upper edge of the seat with the 30° cutter and the lower edge of the seat with the 60° cutter. Check width of seat and adjust accordingly.
4. Make one more very light pass with the 45° cutter to remove any possible burrs caused by the other cutters.

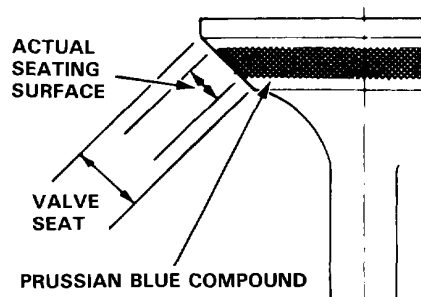
Valve Seat Width: (IN and EX):

Standard: 1.25–1.55 mm
(0.049–0.061 in)

Service Limit: 2.0 mm (0.079 in)



5. After resurfacing the seat, inspect for even valve seating: Apply Prussian Blue compound to the valve face, and insert valve in original location in the head, then lift it and snap it closed against the seat several times.



6. The actual valve seating surface, as shown by the blue compound, should be centered on the seat.
 - If it is too high (closer to the valve stem), you must make a second cut with the 60° cutter to move it down, then one more cut with the 45° cutter to restore seat width.
 - If it is too low (close to the valve edge), you must make a second cut with the 30° cutter to move it up, then one more cut with the 45° cutter to restore seat width.

NOTE: The final cut should always be made with the 45° cutter.

7. Insert intake and exhaust valves in the head and measure valve stem installed height.

Intake Valve Stem Installed Height:

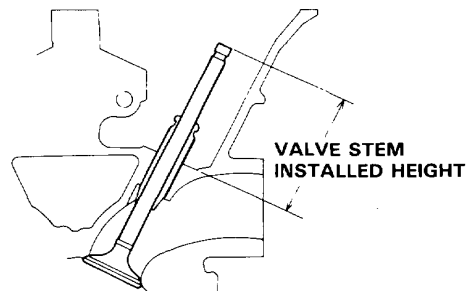
Standard (New): 39.365–39.835 mm
(1.5498–1.5683 in)

Service Limit: 40.085 (1.5781 in)

Exhaust Valve Stem Installed Height:

Standard (New): 39.165–39.635 mm
(1.5419–1.5604 in)

Service Limit: 39.885 mm (1.5703 in)



8. If valve stem installed height is over the service limit, replace valve and recheck. If still over the service limit, replace cylinder head: the valve seat in the head is too deep.

Cylinder Head

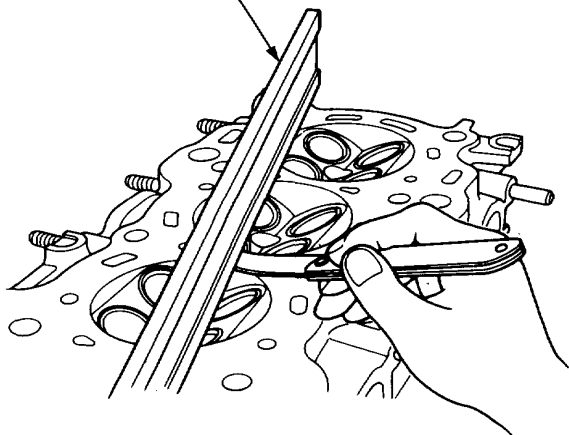
Warpage

NOTE: If camshaft bearing clearances (page 6-49) are not within specification, the head cannot be resurfaced.

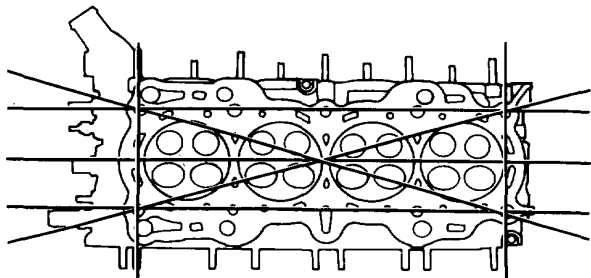
If camshaft bearing radial clearances are within specifications, check the head for warpage.

- If warpage is less than 0.05 mm (0.002 in) cylinder head resurfacing is not required.
- If warpage is between 0.05 mm (0.02 in) and 0.2 mm (0.008 in), resurface cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in) based on a height of 132.0 mm (5.20 in)

PRECISION STRAIGHT EDGE



Measure along edges, and 3 ways across center.



Cylinder Head Height:

Standard (New): 131.95–132.05 mm
(5.195–5.199 in)

Service Limit: 131.80 mm (5.189 in)

Valves

Valve Movement

Measure the guide-to-stem clearance with a dial indicator while rocking the stem in the direction of normal thrust (wobble method).

Intake Valve Stem-to-Guide Clearance:

Standard (New): 0.04–0.10 mm
(0.002–0.004 in)

Service Limit: 0.16 mm (0.006 in)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.10–0.16 mm
(0.004–0.006 in)

Service Limit: 0.22 mm (0.009 in)

Valve extended 10 mm out from seat.



- If measurement exceeds the service limit, recheck using a new valve.
- If measurement is now within the service limit, reassemble using a new valve.
- If measurement still exceeds limit, recheck using alternate method below, then replace valve and guide, if necessary.

NOTE: An alternate method of checking guide to stem clearance is to subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or ball gauge.

Take the measurements in three places along the valve stem and three places inside the valve guide. The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit.

Intake Valve Stem-to-guide Clearance:

Standard (New): 0.02–0.05 mm
(0.0008–0.002 in)

Service Limit: 0.08 mm (0.003 in)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.05–0.08 mm
(0.002–0.003 in)

Service Limit: 0.11 mm (0.004 in)



Valve Guides

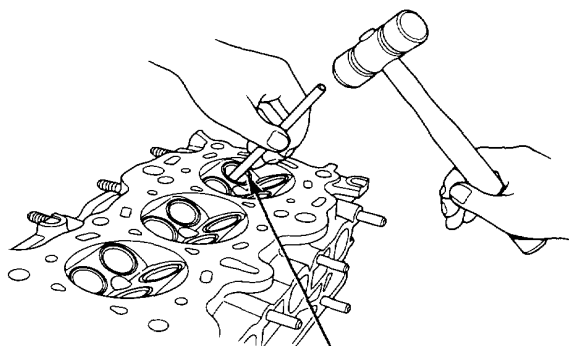
Replacement (cont'd)

NOTE:

- For best results, heat cylinder head to 150 °C (300 °F) before removing or installing guides.
- It may be necessary to use an air hammer to remove some valve guides.

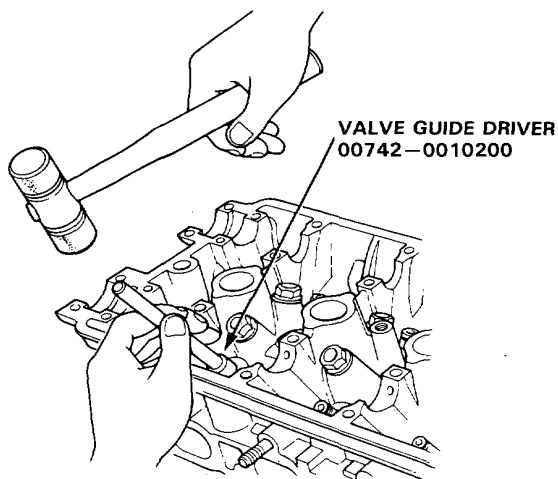
CAUTION: To avoid burns, use heavy gloves when handling heated cylinder head.

1. Drive the valve guide out from the bottom of the cylinder head.



VALVE GUIDE DRIVER
00742-0010200

2. Drive in a new valve guide to the specified depth.

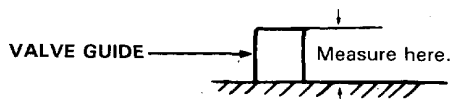


VALVE GUIDE DRIVER
00742-0010200

Valve Guide Installed Height:

Intake: 13.25–13.75 mm (0.522–0.541 in)

Exhaust: 13.75–14.25 mm (0.5412–0.561 in)



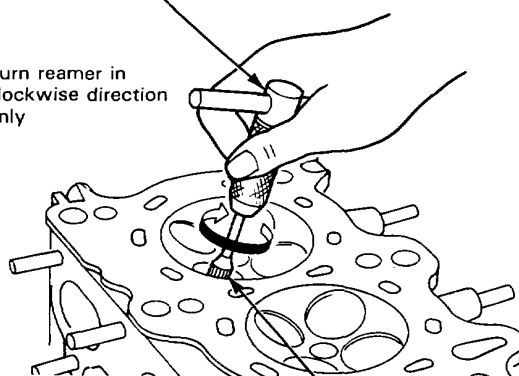
Valve Guide Reaming

NOTE: For new valve guides only.

1. Coat both reamer and valve guide with cutting oil.
2. Rotate the reamer clockwise the full length of the valve guide bore.
3. Continue to rotate the reamer clockwise while removing it from the bore.
4. Thoroughly wash the guide in detergent and water to remove any cutting residue.
5. Check clearance with a valve (page 6-52).
 - Verify that the valve slides in the IN, EX valve guides without exerting pressure.

REAMER HANDLE

Turn reamer in clockwise direction only

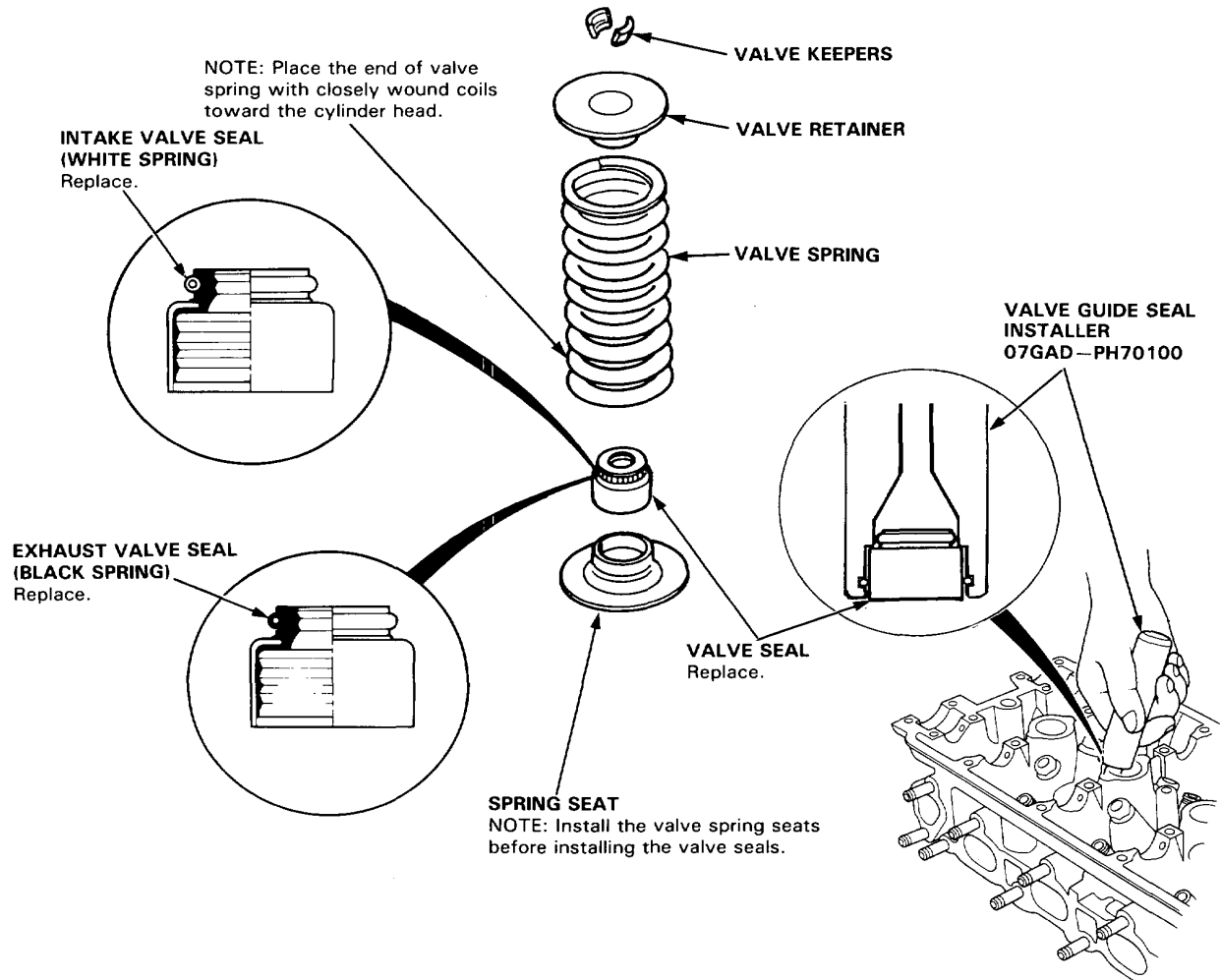


VALVE GUIDE REAMER, 6.6 mm
07984-6570101

Valve Springs and Valves

Valve Spring and Valve Seal Installation Sequence

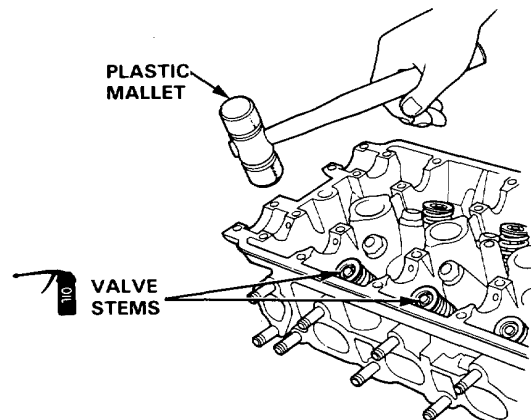
NOTE: Exhaust and intake valve seals are NOT interchangeable.



Valve Installation

When installing valves in cylinder head, coat valve stems with oil before inserting into valve guides, and make sure valves move up and down smoothly.

When valves and springs are in place, lightly tap the end of each valve stem two or three times with a plastic mallet to ensure proper seating of valve and valve keepers.



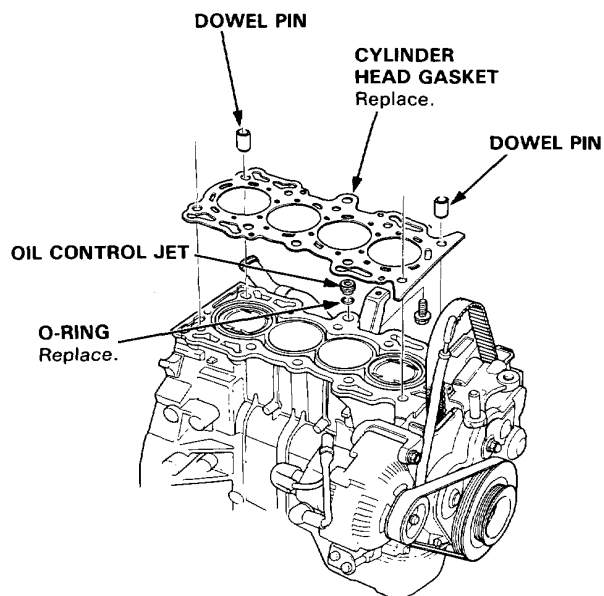
Cylinder Head

Installation



Install the cylinder head in the reverse order of removal:

- Always use a new head gasket.
 - Cylinder head and engine block surface must be clean.
 - "UP" marks on camshaft pulleys should be at the top.
 - Turn the crankshaft so the No. 1 cylinder is at TDC (top dead center) (page 6-61).
1. Cylinder head dowel pins and oil control jet must be aligned.



2. Tighten the cylinder head bolts sequentially in three steps.

1st step torque: 40 N·m (4.0 kg-m, 29 lb-ft)

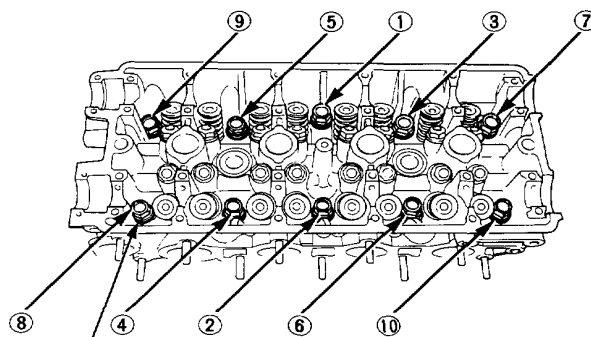
2nd step torque: 70 N·m (7.0 kg-m, 51 lb-ft)

3rd step torque: 100 N·m (10.0 kg-m, 72 lb-ft)

NOTE:

- We recommend using a beam-type torque wrench. When using a preset-type torque wrench, be sure to tighten slowly and not to overtighten.
- If a bolt makes any noise while you are torquing it, loosen the bolt and retighten it from the 1st step.

CYLINDER HEAD BOLTS TORQUE SEQUENCE



CYLINDER HEAD BOLTS

12 x 1.25 mm

100 N·m (10.0 kg-m, 72 lb-ft)

Apply clean engine oil to bolt threads and under bolt heads.

(cont'd)

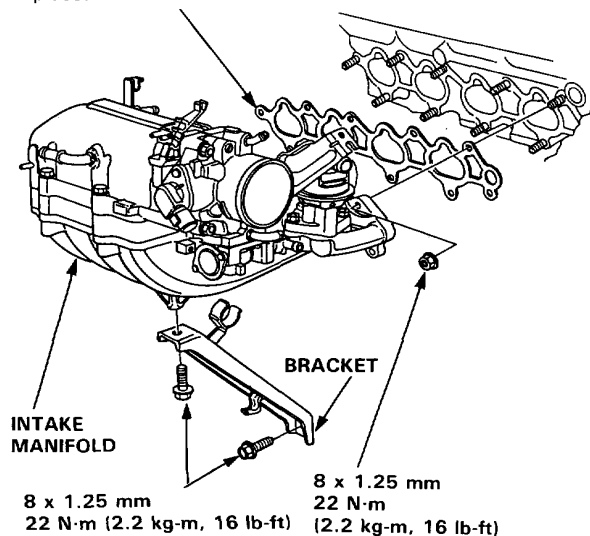
Cylinder Head

Installation (cont'd)

3. Install the intake manifold and tighten the nuts in a criss-cross pattern in 2 or 3 steps, beginning with the inner nuts.

INTAKE MANIFOLD GASKET

Replace.

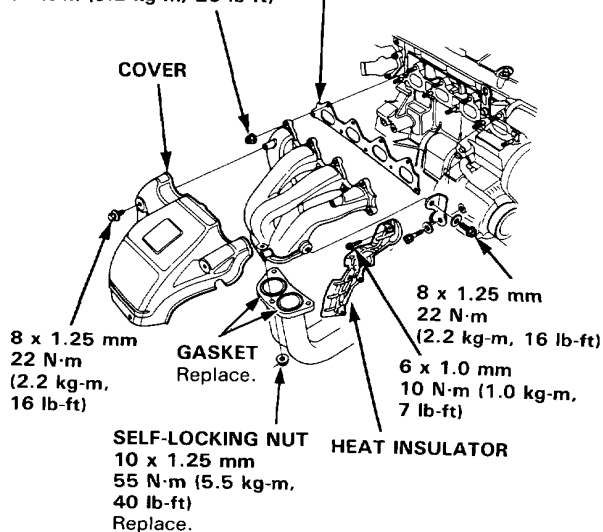


4. Install the exhaust manifold and bracket. Tighten the nuts in a criss-cross pattern in 2 or 3 steps, beginning with the inner nuts.

EXHAUST MANIFOLD GASKET

Replace.

8 x 1.25 mm
32 N·m (3.2 kg-m, 26 lb-ft)



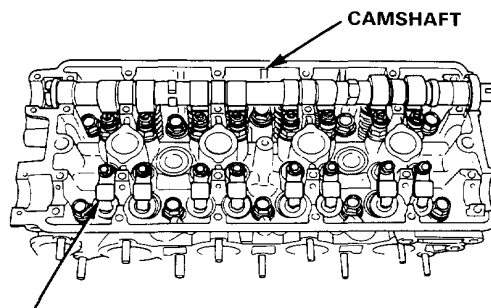
Rocker Arms/Camshafts and Seals/Pulleys

Installation

CAUTION:

- Make sure that the keyways on the camshafts are facing up. (No. 1 cylinder TDC).
- Valve locknuts should be loosened and before screws backed off before installation.
- Replace the rocker arms in their original positions.

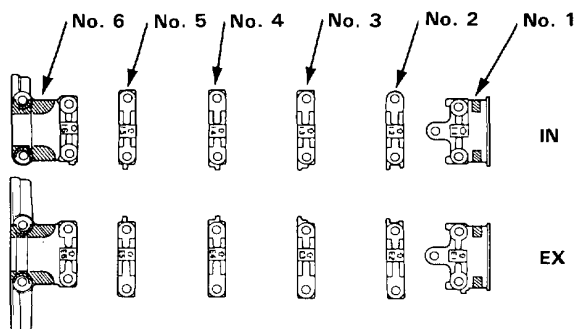
1. Place the rocker arms on the pivot bolts and the valve stems.
2. Install the camshafts and the camshaft seals with the open side (spring) facing in.



3. Apply liquid gasket to the head mating surfaces of the No.1 and No. 6 camshaft holders, then install them, along with No. 2, 3, 4 and 5.

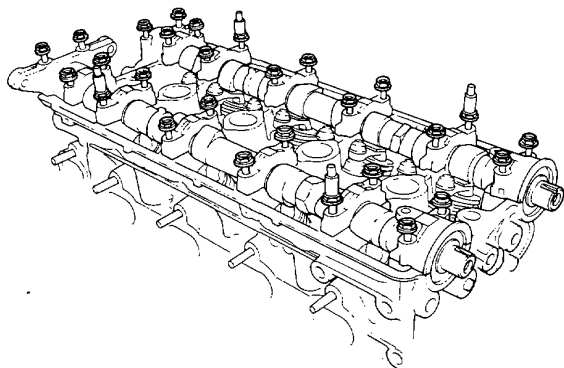
NOTE:

- "I" or "E" marks are stamped on the camshaft holders.
- Do not apply oil to the holder mating surface of camshaft seals.
- Apply liquid gasket to the shaded areas.
- The arrows marked on the camshaft holders should point toward the timing belt.

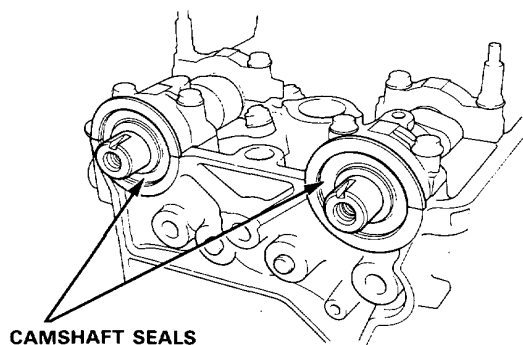




4. Tighten the camshaft holders temporarily.
 - Make sure that the rocker arms are properly positioned on the valve stems.



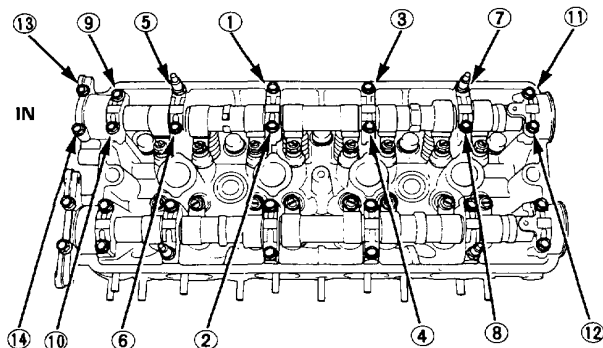
5. Press in the camshaft seals securely.



6. Tighten each bolt in two steps to ensure that the rockers do not bind on the valves.

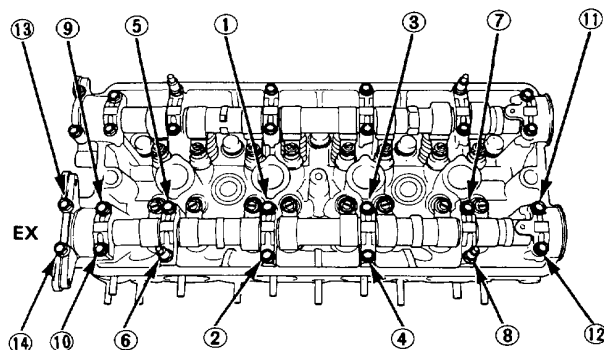
Specified Torque:

All except IN ⑤, ⑦: 10 N·m (1.0 kg-m, 7 lb-ft)
 IN ⑤, ⑦: 12 N·m (1.2 kg-m, 9 lb-ft)



Specified Torque:

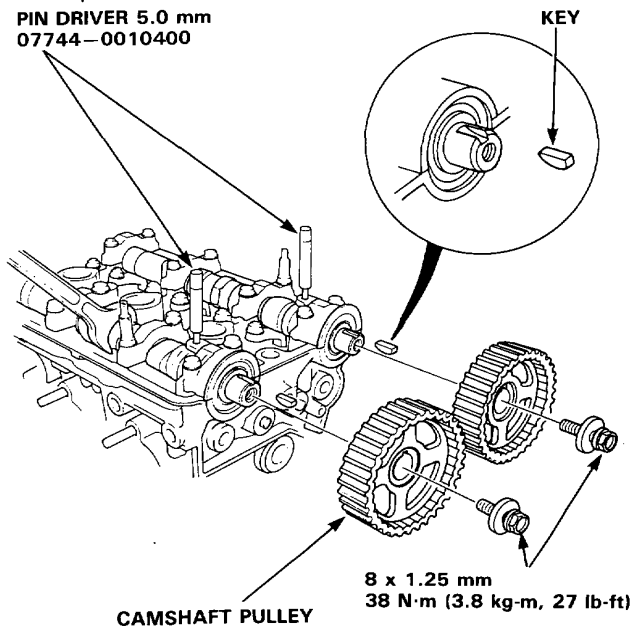
All except EX ⑥, ⑧: 10 N·m (1.0 kg-m, 7 lb-ft)
 EX ⑥, ⑧: 12 N·m (1.2 kg-m, 9 lb-ft)



7. Install the timing belt back cover.
8. Install keys into camshaft grooves.

NOTE: To set the camshafts at TDC position for No. 1 cylinder, align the holes in the camshafts with the holes in No. 1 camshaft holders and insert 5.0 mm pin driver in the holes.

PIN DRIVER 5.0 mm
 07744-0010400



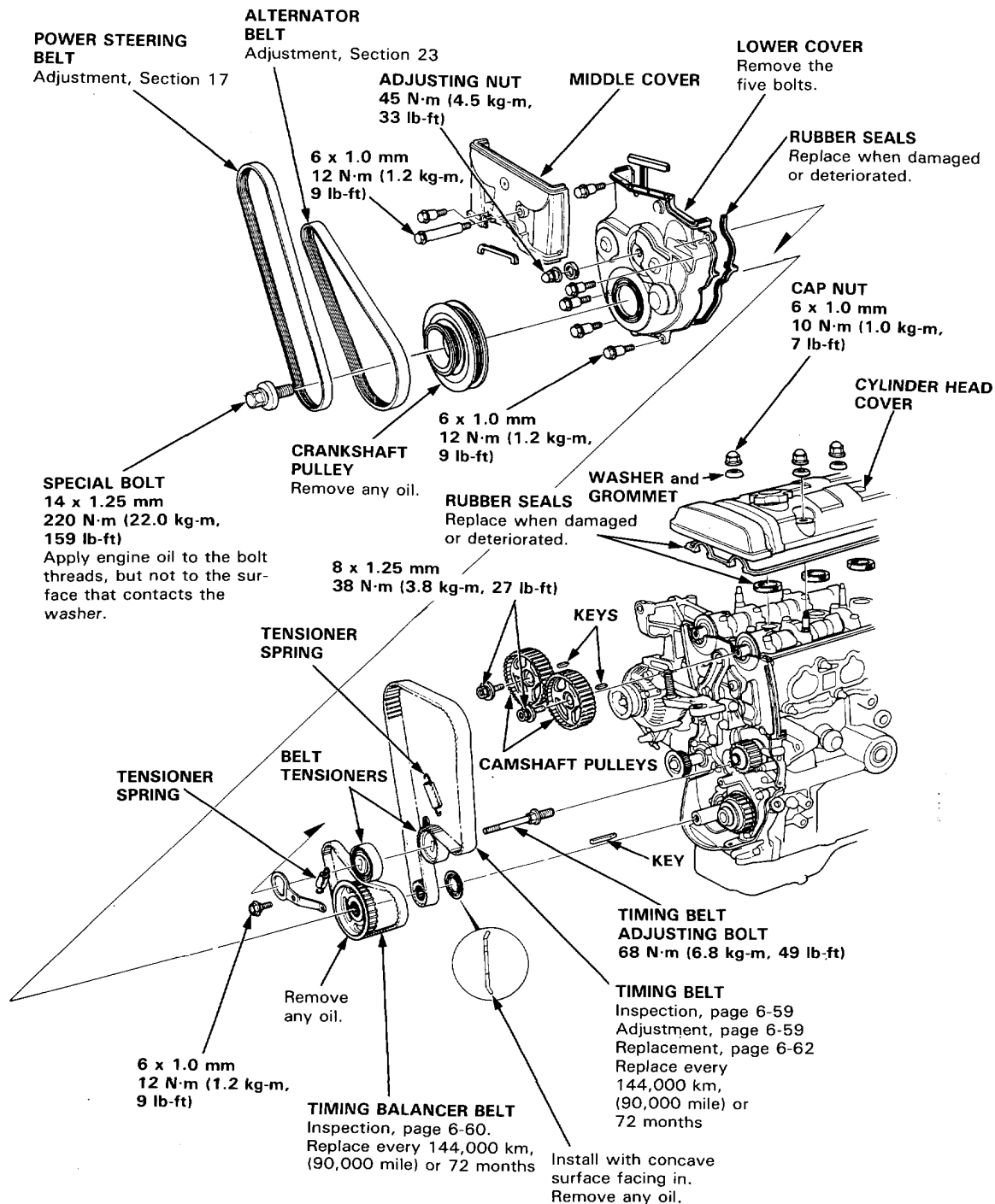
9. Push camshaft pulleys onto camshafts, then tighten the retaining bolts to the torque specified.
10. Adjust the valve clearance (page 6-72).
11. After installation, check that the all tubes, hoses and connectors are installed correctly.

Timing Belt and Timing Balancer Belt

Illustrated Index

NOTE:

- Refer to page 6-61 for positioning crank and pulley before installing timing belt.
- Before removing, mark direction of rotation on each belt.





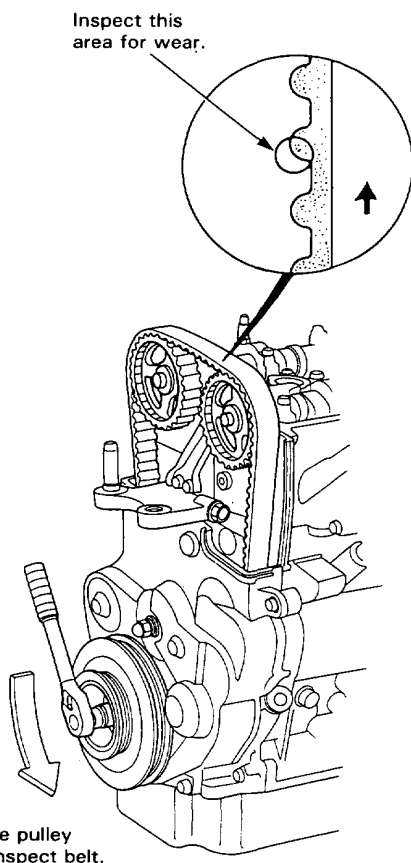
Timing Belt

Inspection

1. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
2. Remove the cylinder head cover.
3. Remove the timing belt middle cover.
4. Inspect the timing belt for cracks and oil soaking.

NOTE:

- Replace the belt if oil soaked.
- Remove any oil or solvent that gets on the belt.



Rotate pulley
and inspect belt.

5. After inspecting, retorque the crank pulley bolt to 220 N·m (22.0 kg·m, 159 lb·ft).

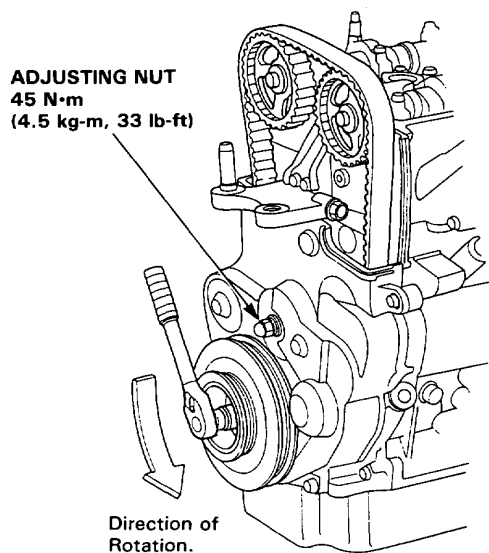
Tension Adjustment

CAUTION: Always adjust timing belt tension with the engine cold.

NOTE:

- The adjuster is spring-loaded to properly tension the belt. Do not apply any extra pressure to the belt while performing the adjustment.
- Inspect the timing balancer belt before adjusting the belt tension.
- Do not loosen the adjusting nut more than one full turn.

1. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
2. Remove the cylinder head cover.
3. Set the No. 1 piston at TDC (page 6-61).
4. Loosen the adjusting nut 2/3–1 turn, then tighten it.



5. Rotate the crankshaft counterclockwise 3-teeth on the camshaft pulley, then reloosen the adjusting nut to create tension on the timing belt.
6. Tighten the adjusting nut.
7. After adjusting, retorque the crank pulley bolt to 220 N·m (22.0 kg·m, 159 lb·ft).

Timing Balancer Belt

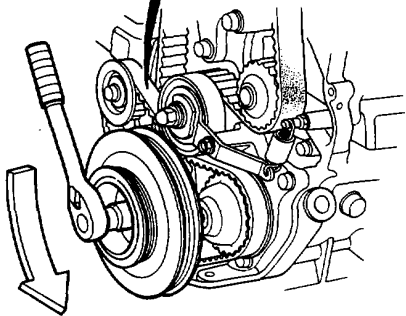
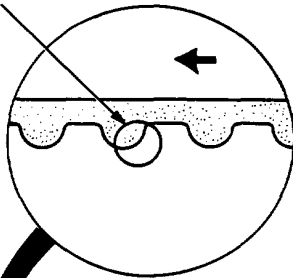
Inspection

1. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
2. Remove the cylinder head cover.
3. Remove the timing belt middle cover.
4. Remove the crankshaft pulley.
5. Remove the timing belt lower cover.
6. Install the crankshaft pulley.
7. Inspect the timing belt for cracks and oil soaking.

NOTE:

- Replace the belt if oil soaked.
- Remove any oil or solvent that gets on the belt.

Inspect this area for wear.



Rotate pulley and inspect belt.

8. After inspecting, retorque the crank pulley bolt to 220 N·m (22.0 kg-m, 159 lb-ft).

NOTE: Refer to page 6-69 for timing balancer belt tension adjustment.



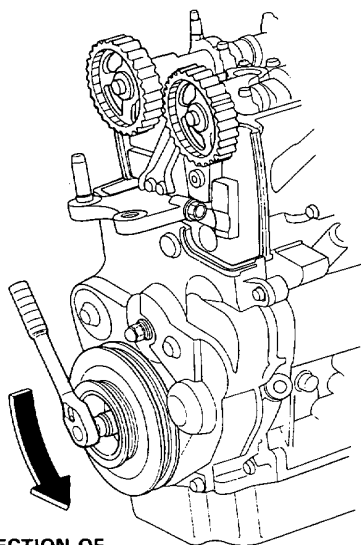
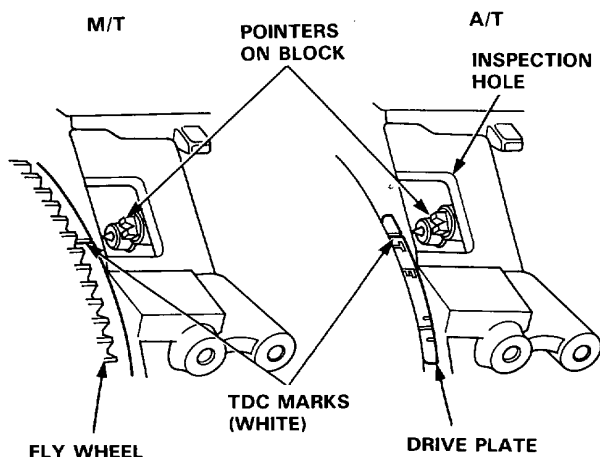
Timing Belt

Positioning Crankshaft Before Installing Timing Belt.

NOTE:

- Install the timing belt with the No. 1 piston at TDC (Top Dead Center) on the compression stroke.
- After installing, retorque the crank pulley bolt to 220 N·m (22.0 kg·m, 159 lb·ft).

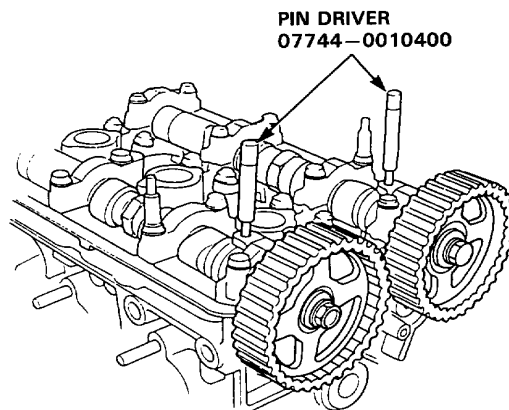
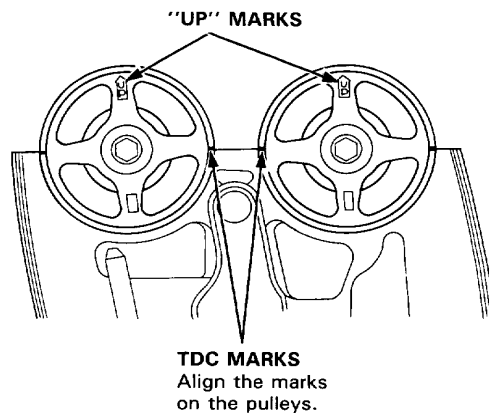
CRANKSHAFT TDC POSITION:



**DIRECTION OF
ROTATION**

NOTE: When turning the crankshaft with a socket wrench, install the crankshaft pulley and the pulley bolt.

CAMSHAFT TDC POSITION:



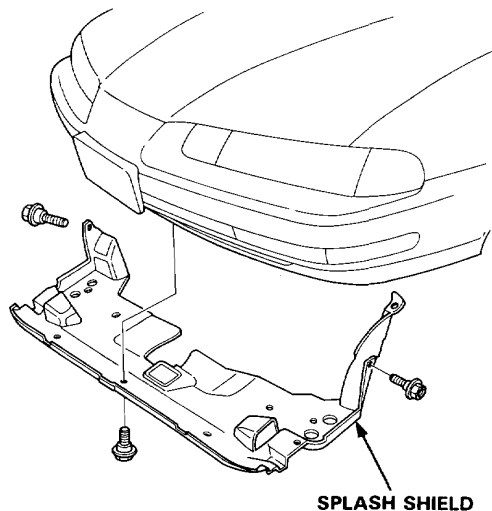
CAUTION: Remove the pin Driver after installing the timing belt.

Timing Belt and Timing Balancer Belt

Replacement

NOTE: Turn the crankshaft so that the No. 1 cylinder is at TDC (page 6-61).

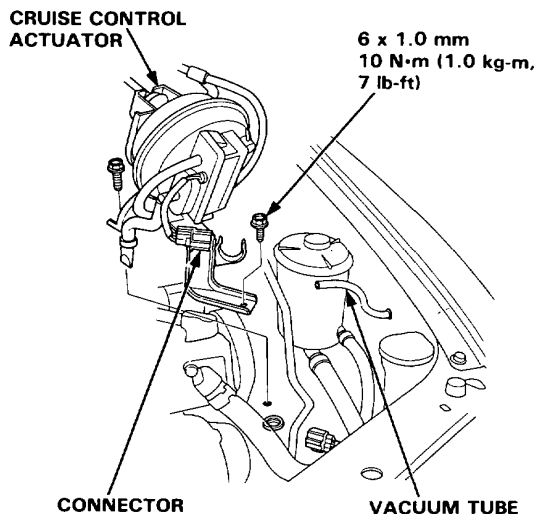
1. Remove the splash shield.



2. Disconnect the connector, then remove the cruise control actuator.

NOTE:

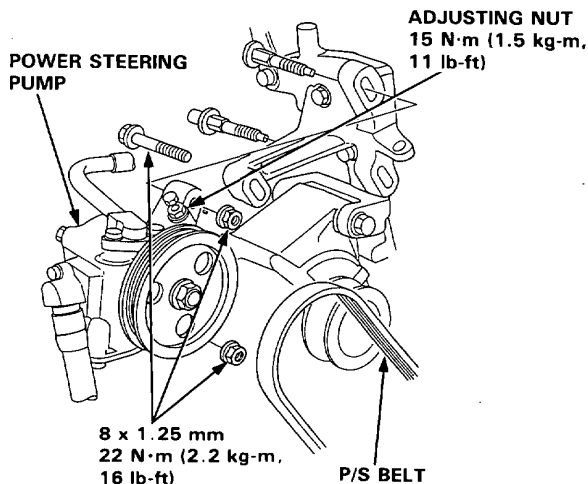
- Do not disconnect the control cable.
- Take care not to bend the cable when removing the actuator. Always replace a kinked cable with a new one.



3. Remove the mounting bolt, nut and V-belt from the power steering pump.

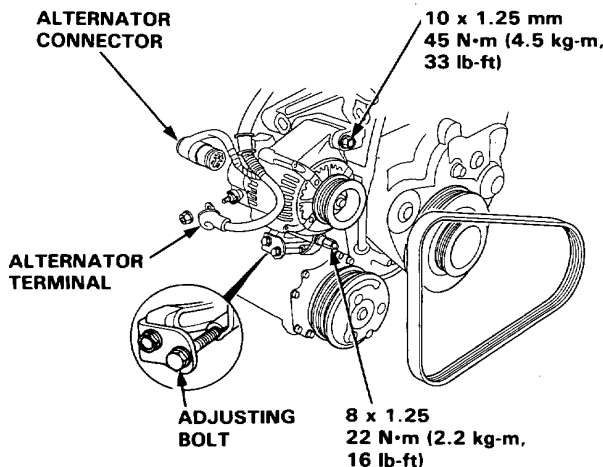
NOTE:

- Do not disconnect the P/S pipe and hose.
- After installing, adjust the tension of the P/S belt (see section 17).



4. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
5. Loosen the alternator mounting bolt, nut and the adjusting nut, then remove the alternator belt.

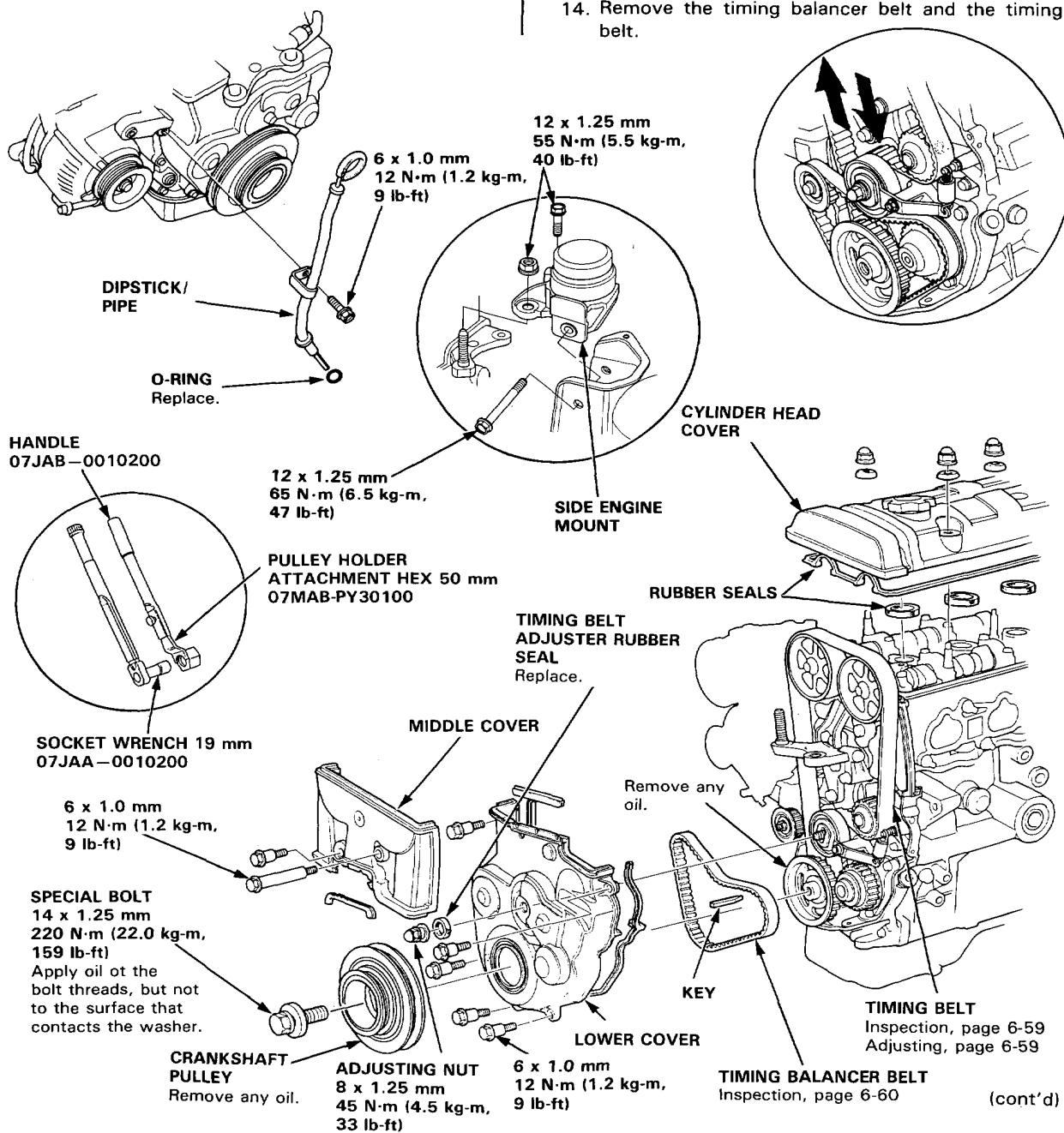
NOTE: After installing, adjust the tension of the alternator belt (see section 23).





6. Remove the cylinder head cover.
7. Remove the middle cover.
8. Remove the side engine mount.
9. Remove the dipstick and the pipe.
10. Remove the adjusting nut.

11. Remove the special bolt and the crankshaft pulley. Remove the two rear bolts from the center beam to allow the engine to drop down and give clearance to remove the lower cover.
12. Remove the lower cover.
13. Push the timing balancer belt tensioner and the timing belt tensioner to remove tension on the belts, then tighten the adjusting nut.
14. Remove the timing balancer belt and the timing belt.



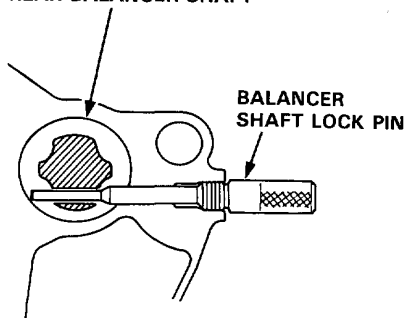
Timing Belt and Timing Balancer Belt

Replacement (cont'd)

15. Install the timing belt in the reverse order of removal; adjust the valve clearances (page 6-72).
 - Refer to page 6-61 for positioning the crankshaft and the camshaft pulley before installing the new timing belt.
16. Align the groove on the front timing balancer belt driven pulley to the pointer on the oil pump body as shown.
17. Align the rear timing balancer belt driven pulley by inserting the special tool through the maintenance hole.

18. Install the new timing balancer belt if necessary, then remove the adjusting nut.
19. Perform the tension adjustment of the timing belt and the timing balancer belt (pages 6-59 and 60).

REAR BALANCER SHAFT



MAINTENANCE HOLE

WASHER
Replace .

12 mm SEALING BOLT
30 N·m (3.0 kg-m, 22 lb-ft)
NOTE: Tighten the bolt
after installing the belt

BALANCER SHAFT
LOCK PIN
07LAG-PT20100

FRONT TIMING BALANCER
BELT DRIVEN PULLEY

Align the groove of the
front driven pulley with
the pointer on the oil
pump body.

Lock with
6 x 1.0 mm
bolt.

TIMING BELT
ADJUSTMENT

ADJUSTING NUT

REAR TIMING BALANCER BELT
DRIVEN PULLEY

TIMING BALANCER BELT
DRIVE PULLEY
Set the crankshaft
at TDC.

Timing Belt and Timing Balancer Belt

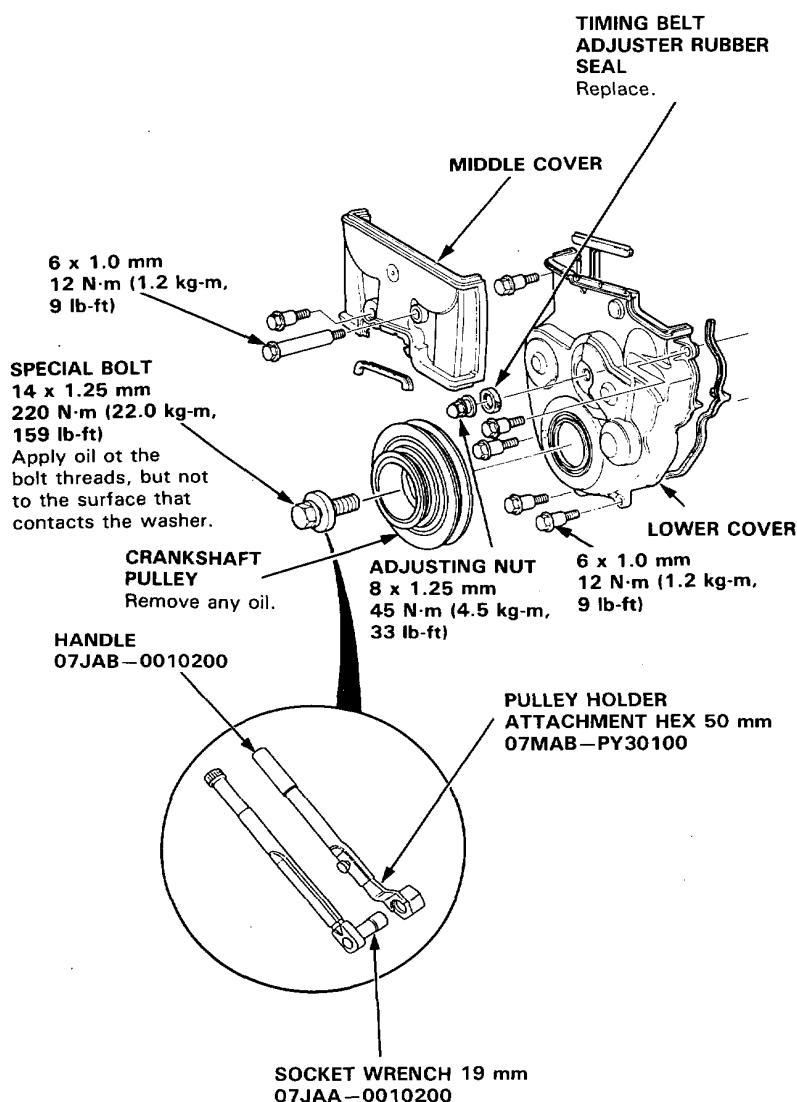
Replacement (cont'd)

25. Install the timing belt lower cover.
26. Install a new timing belt adjuster rubber seal without loosening the adjusting nut.

NOTE: Never loosen the adjusting nut as this will disturb the adjustment of the timing and balancer belt.

27. Install the timing belt middle cover.
28. Install the crankshaft pulley.
29. Coat the threads and seat face of the pulley bolt with engine oil, and tighten to the specified torque.

Specified Torque: 220 N·m (22.0 kg-m, 159 lb-ft)



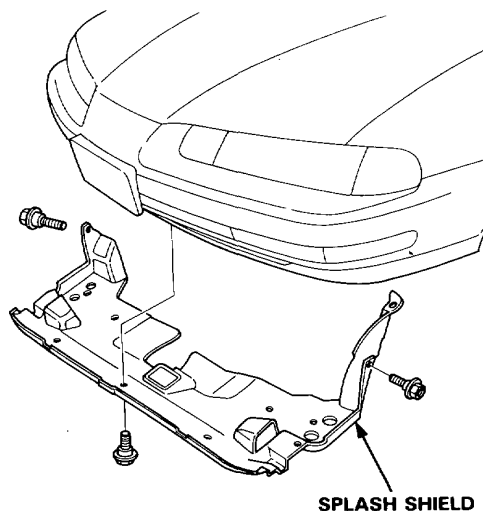


Timing Balancer Belt

Replacement and Adjustment

NOTE: Turn the crankshaft so that the No. 1 cylinder is at TDC (page 6-61).

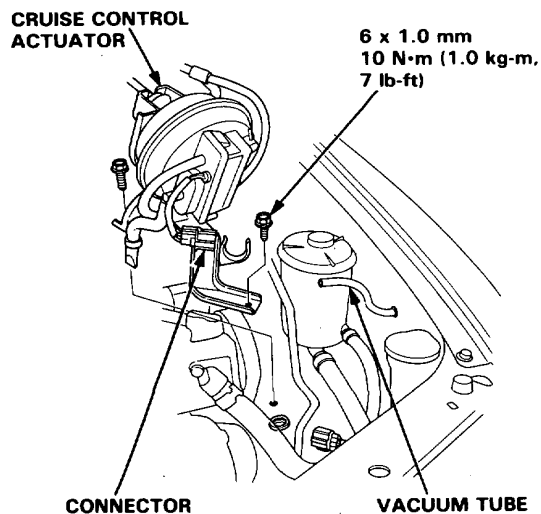
1. Remove the splash shield.



2. Disconnect the connector, then remove the cruise control actuator.

NOTE:

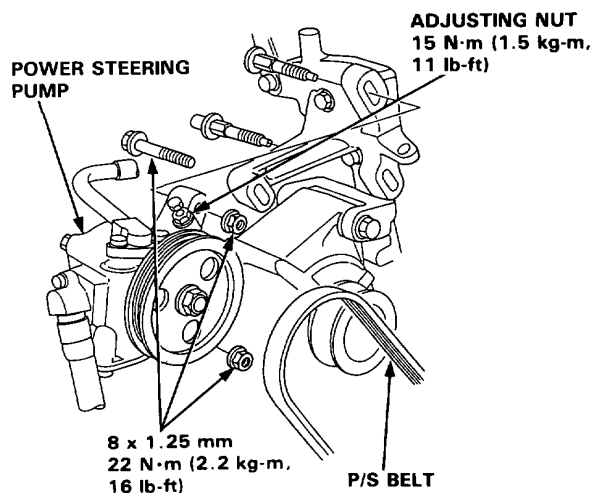
- Do not disconnect the control cable.
- Take care not to bend the cable when removing the actuator. Always replace a kinked cable with a new one.



3. Remove the mounting bolt, nut and V-belt from the power steering pump.

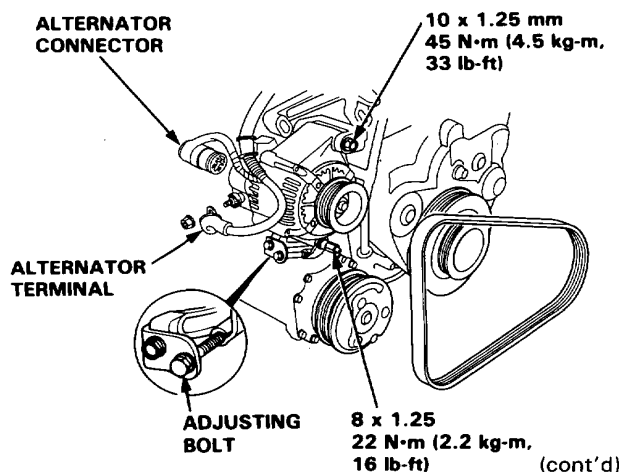
NOTE:

- Do not disconnect the P/S pipe and hose.
- After installing, adjust the tension of the P/S belt (see section 17).



4. Disconnect the alternator terminal and the connector, then remove the engine wire harness from the cylinder head cover.
5. Loosen the alternator mounting bolt, nut and the adjusting nut, then remove the alternator belt.

NOTE: After installing, adjust the tension of the alternator belt (see section 23).



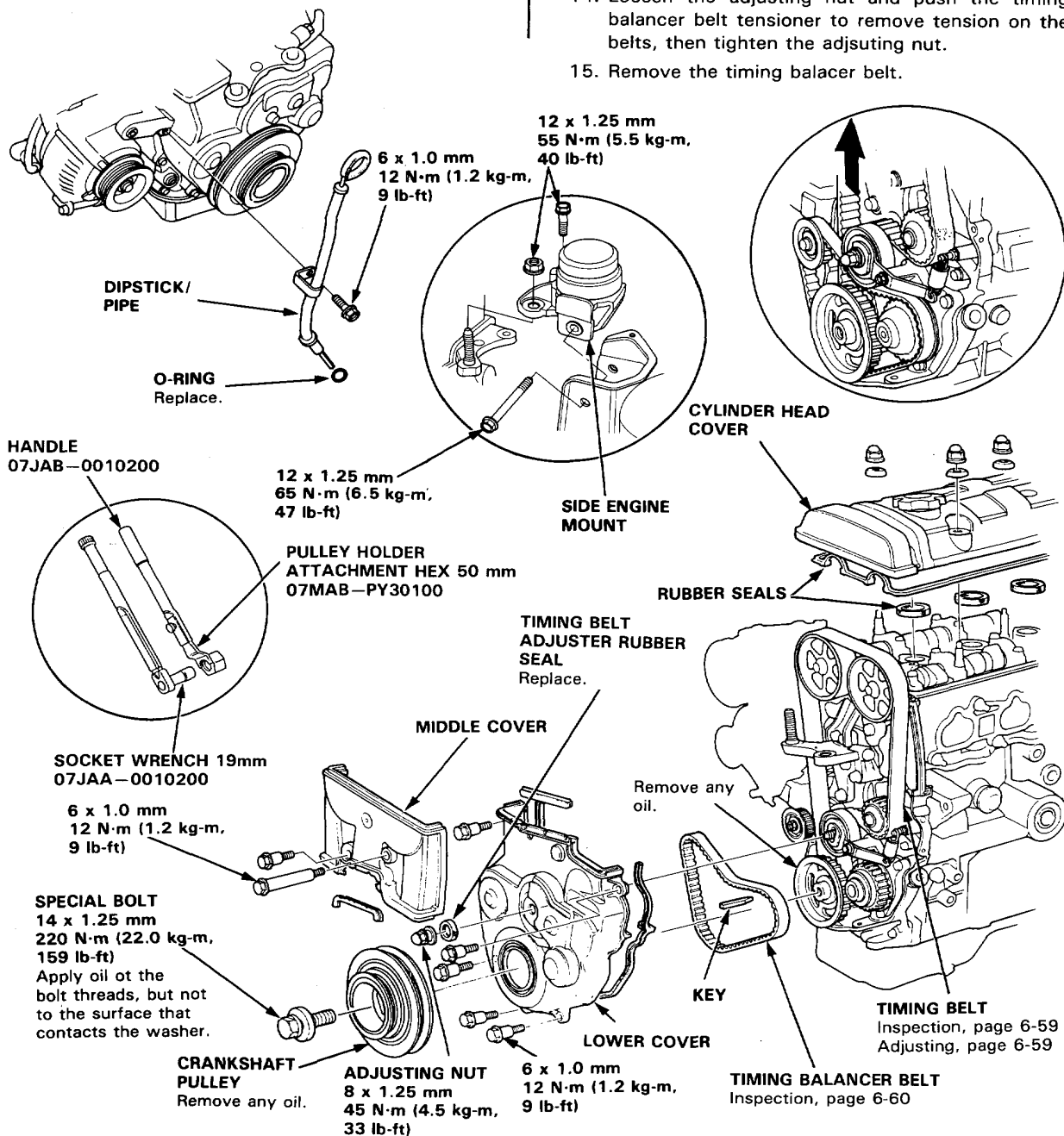
(cont'd)

Timing Balancer Belt

Replacement and Adjustment (cont'd)

6. Remove the cylinder head cover.
7. Remove the middle cover.
8. Remove the side engine mount.
9. Remove the dipstick and the pipe.
10. Remove the timing belt adjuster rubber, do not loosen the adjusting nut.

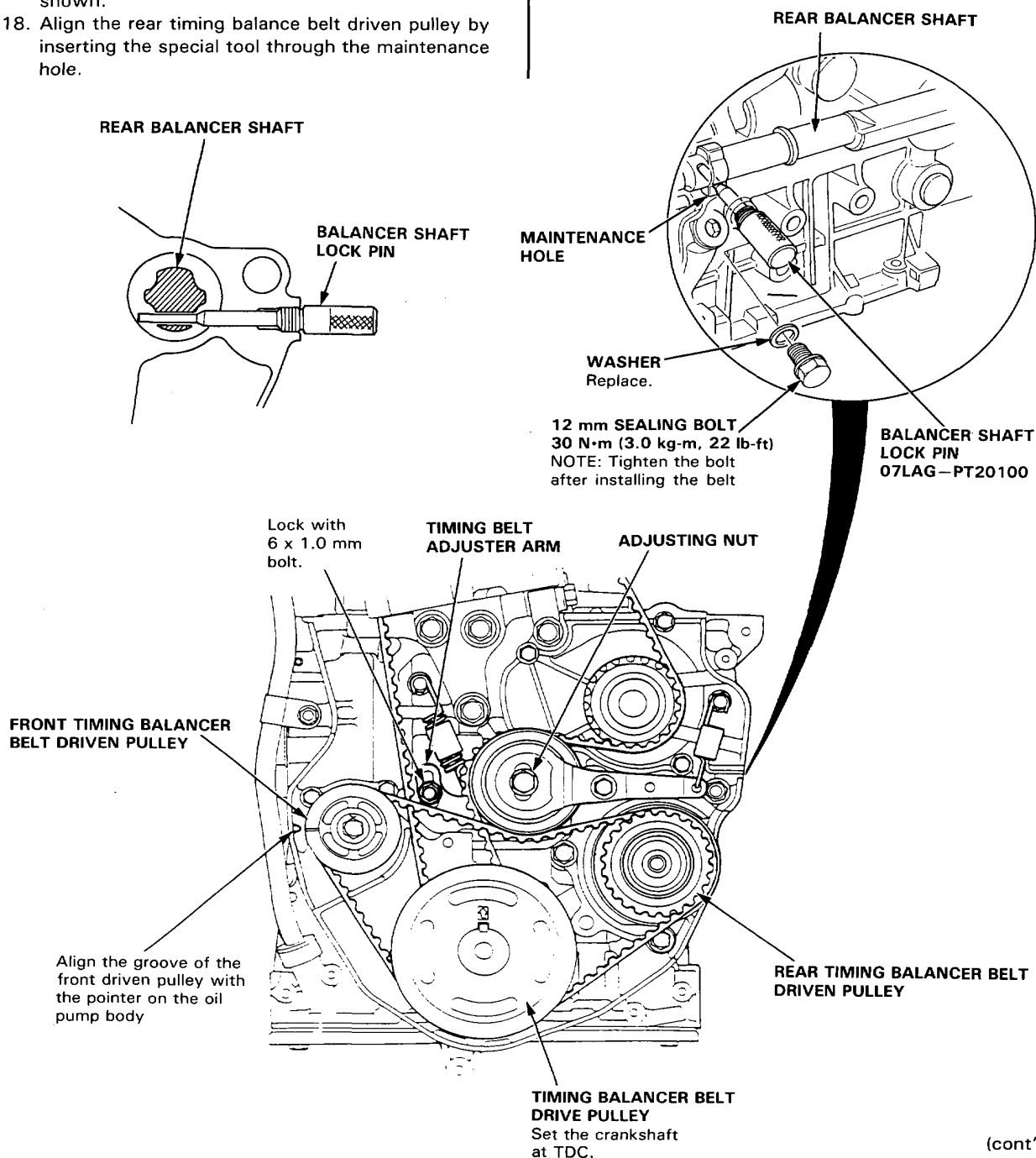
11. Remove the special bolt and the crankshaft pulley. Remove the two rear bolts from the center beam to allow the engine to drop down and give clearance to remove the lower cover.
12. Remove the lower cover.
13. Lock the timing belt adjuster arm with the 6 x 1.0 mm lower cover blot.
14. Loosen the adjusting nut and push the timing balancer belt tensioner to remove tension on the belts, then tighten the adjusting nut.
15. Remove the timing balancer belt.





16. Install the timing balancer belt in the reverse order of removal; turn the crankshaft so that the No. 1 cylinder is at TDC (page 6-61).
17. Align the groove on the front timing balancer belt driven pulley to the pointer on the oil pump body as shown.
18. Align the rear timing balance belt driven pulley by inserting the special tool through the maintenance hole.

19. Check the timing belt adjuster arm is lock with a 6 x 1.0 mm lower cover bolt, if loosen it adjust the timing belt tension.



(cont'd)

Timing Balance Belt

Replacement and Adjustment (cont'd)

20. Loosen the adjusting nut and check that the timing balancer belt adjuster moves freely.

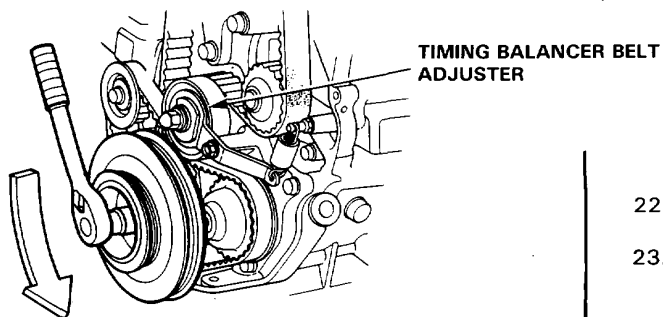
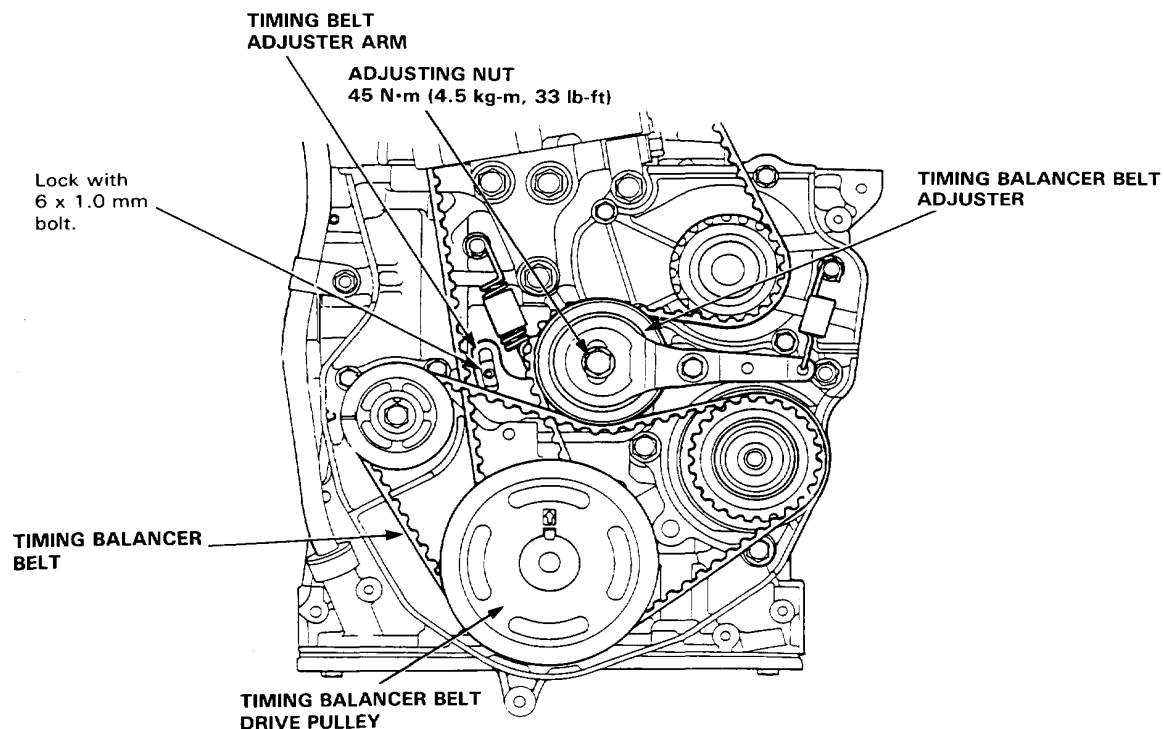
21. Turn the crankshaft pulley about one turn: tighten the adjusting nut (adjustment is completed).

NOTE:

- Do not apply tension on the tensioner when tightening the adjusting nut as the tensioner is spring loaded.

CAUTION:

- Do not apply excessive tension to the timing balancer belt. It is designed to operate with smaller tension than those of other belts.



22. Tighten the adjusting nut and a 6 x 1.0 mm bolt from the timing belt adjuster arm.
23. Remove the crankshaft pulley.



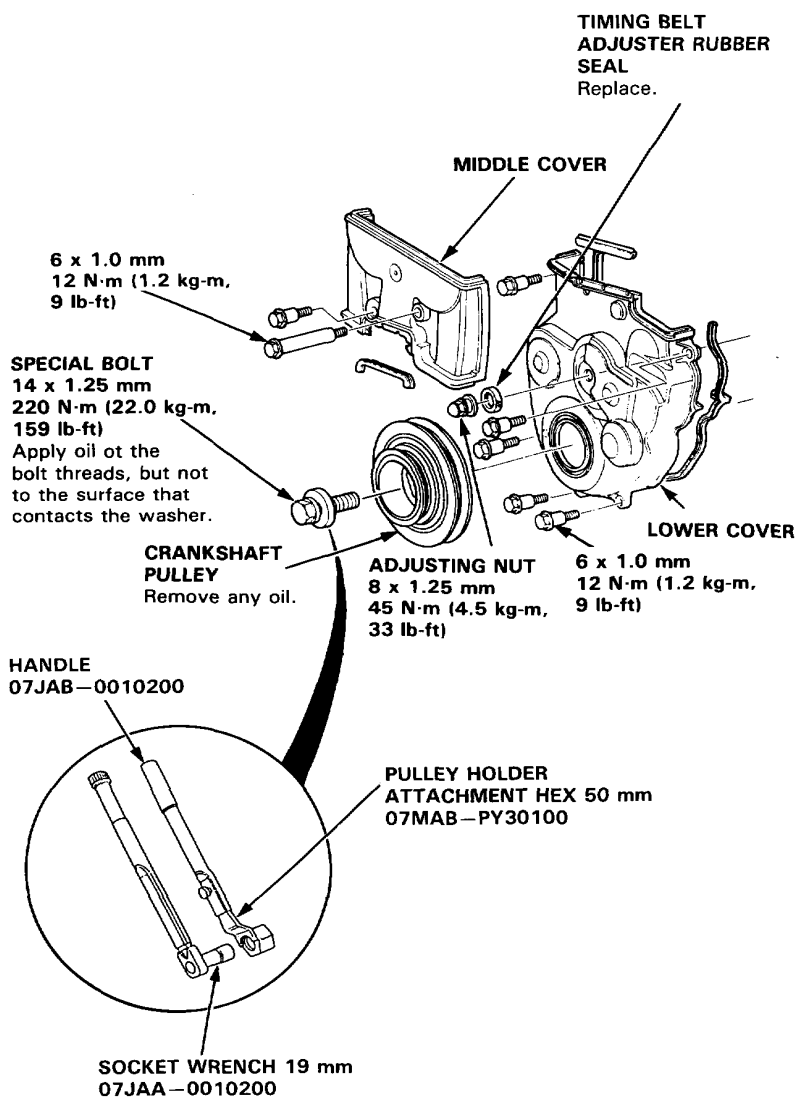
24. Install the timing belt lower cover.
25. Install a new timing belt adjuster rubber seal without loosening the adjusting nut.

NOTE:

- Never loosen the adjusting nut as this will be disturb the adjustment of the timing and balancer belt.

26. Install the timing belt middle cover.
27. Install the crankshaft pulley.
28. Coat the threads and seating face of the pulley bolt with engine oil, and tighten to the specified torque.

Specified Torque: 220 N·m (22.0 kg-m, 159 lb-ft)



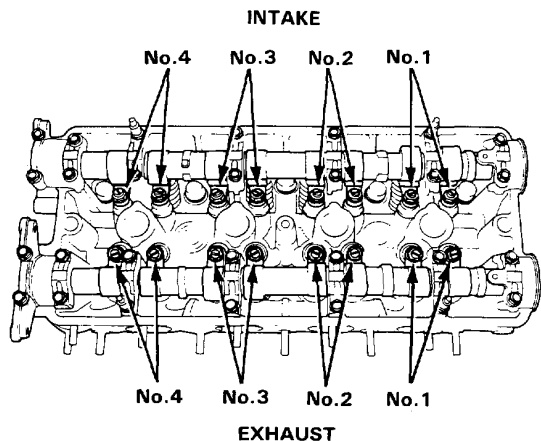
Valve Clearance

Adjustment

NOTE:

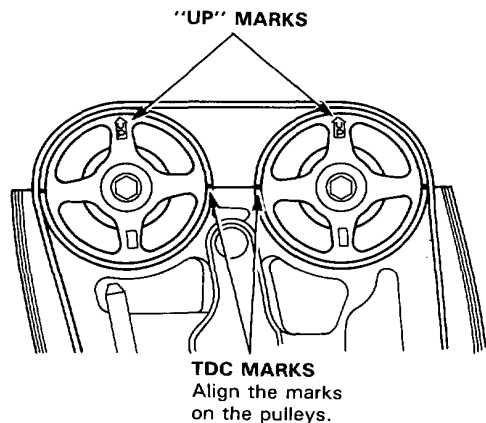
- Valves should be adjusted cold when the cylinder head temperature is less than 38 °C (100 °F).
- After adjusting, retorque the crank pulley bolt to 220 N·m (22.0 kg·m, 159 lb·ft).

1. Remove the cylinder head cover.



2. Set No. 1 piston at TDC. "UP" marks on the pulleys should be at top, and TDC grooves on the pulleys should align with cylinder head surface.

Number 1 piston at TDC:



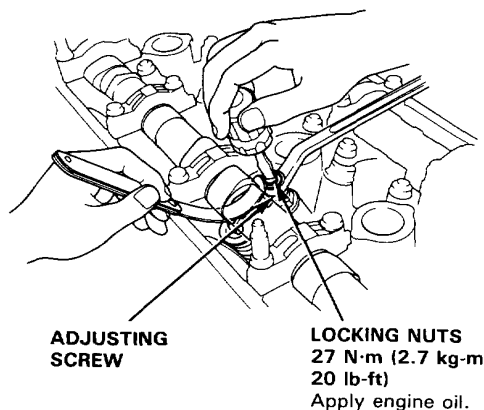
3. Adjust valves on No. 1 cylinder.

Valve Clearance:

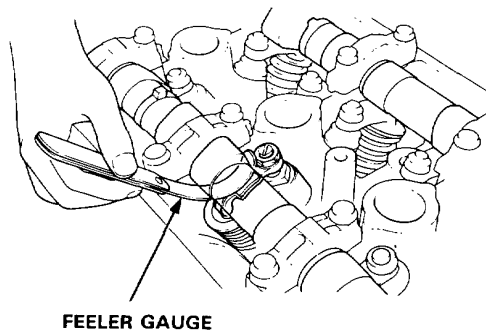
Intake: 0.07–0.11 mm (0.003–0.004 in)

Exhaust: 0.15–0.19 mm (0.006–0.007 in)

4. Loosen locknut and turn adjustment screw until feeler gauge slides back and forth with slight amount of drag.



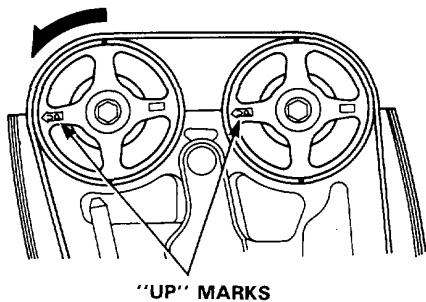
5. Tighten locknut and check clearance again. Repeat adjustment if necessary.





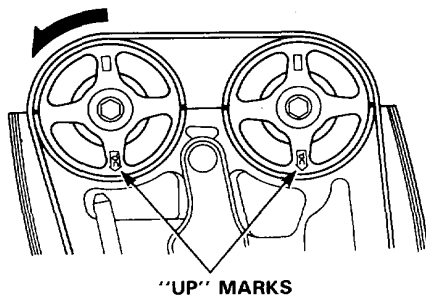
6. Rotate crankshaft 180° counterclockwise (camshaft pulleys turn 90°). The "UP" marks should be at exhaust side. Adjust valves on No. 3 cylinder.

Number 3 piston at TDC:



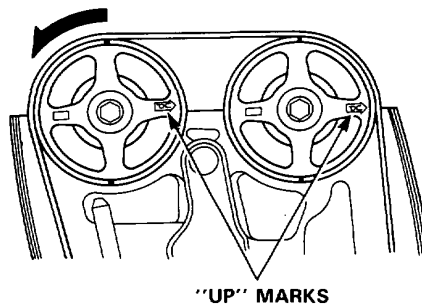
7. Rotate crankshaft 180° counterclockwise to bring No. 4 piston to TDC. The TDC grooves are once again aligned. Adjust valves on No. 4 cylinder.

Number 4 piston at TDC:



8. Rotate crankshaft 180° counterclockwise to bring No. 2 piston to TDC. The "UP" marks should be at intake side. Adjust valves on No. 2 cylinder.

Number 2 piston at TDC:



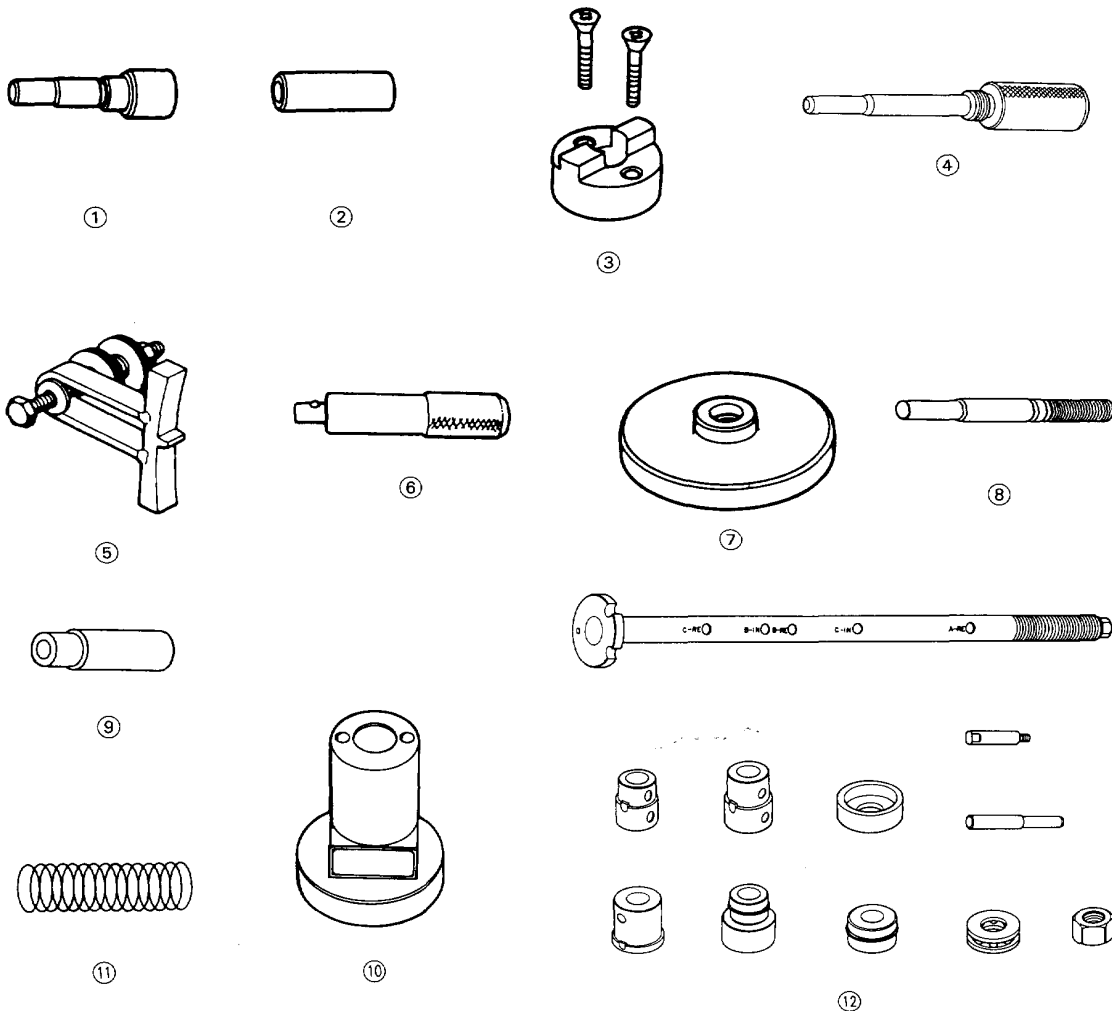
Engine Block

Special Tools	7-2
Illustrated Index	7-3
Flywheel and Drive Plate	7-6
Connecting Rod and Crankshaft	7-6
Main Bearings	7-7
Rod Bearings	7-9
Crankshaft, Balancer Shafts and Pistons Removal	7-11
Cranksahft	7-14
Pistons	7-15
Cylinder Block	7-16
Piston Pins	7-18
Piston Rings	7-21
Oil Seal	7-24
Crankshaft and Balancer Shafts Installation	7-25
Balancer Shafts	7-29
Balancer Shafts Bearings	7-32



Special Tools

Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07GAF—PH60300	Piston Pin Base Insert	1	7-18, 19
②	07GAF—PH70100	Pilot Collar	1	7-18, 19
③	07HAF—PL20102	Piston Base Head	1	7-18, 19
④	07LAG—PT20100	Balancer Shaft Lock Pin	1	7-11, 27
⑤	07LAF—PV00100	Ring Gear Holder	1	7-6
⑥	07749—0010000	Driver	1	7-24
⑦	07948—SB00101	Driver Attachment	1	7-24
⑧	07973—PE00310	Piston Pin Driver Shaft	1	7-18, 19
⑨	07973—PE00320	Piston Pin Driver Head	1	7-18, 19
⑩	07973—6570500	Piston Base	1	7-18, 19
⑪	07973—6570600	Piston Base Spring	1	7-18, 19
⑫	07LAF—PT20100	Bearng Replacement Tool Set	1	7-32

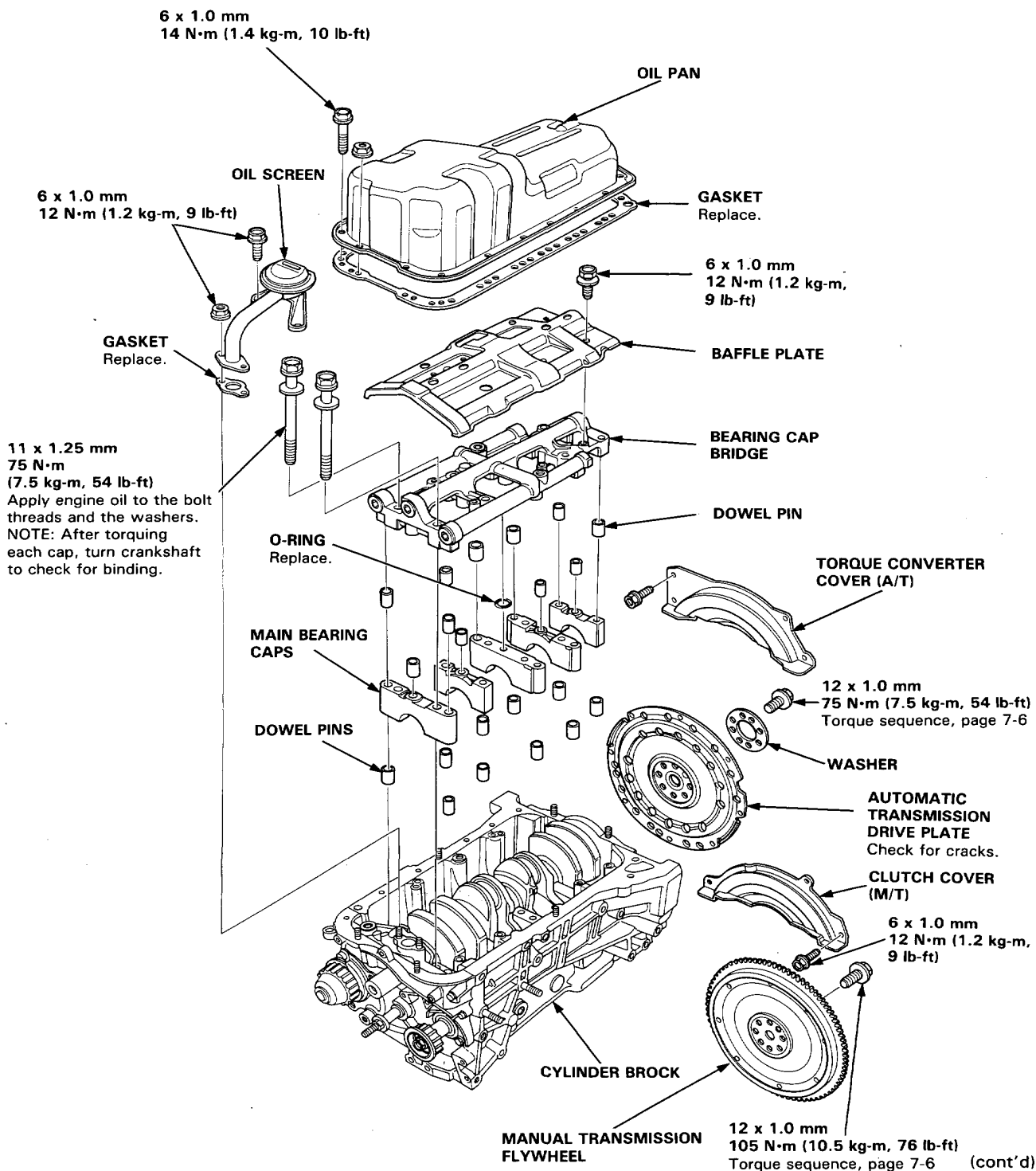


Engine Block

Illustrated Index



Lubricate all internal parts with engine oil during reassembly.



Engine Block

Illustrated Index (cont'd)



Lubricate all internal parts with engine oil during reassembly.

NOTE:

- Apply liquid gasket to the mating surfaces of the right side cover and oil pump case before installing them.
- Use liquid gasket, part No. 0Y740—99986.

MAIN BEARINGS

Radial clearance, page 7-7

Selection, page 7-8

NOTE: New main bearings must be selected by matching crank and block identification markings.

CRANKSHAFT

End play, page 7-6

Runout, Taper and Out-of-Round, page 7-14

Installation, page 7-25

THRUST WASHERS

Grooved sides face outward.

NOTE: Thrust washer thickness is fixed and must not be changed by grinding or shimming.

REAR BALANCER SHAFT

End play, page 7-29

Runout, Taper and

Out-of-Round, pages 7-29 and 30

Installation, page 7-25

BALANCER SHAFT BEARINGS

Inspection, page 7-29

Replacement, page 7-32

THRUST METAL

NOTE: Thrust metal thickness is fixed and must not be changed by grinding or shimming.

FRONT BALANCER SHAFT

6 x 1.0 mm
2.0 N·m (2.0 kg-m,
14 lb-ft)

BALANCER DRIVE GEAR CASE

CRANK SEAL

Installation, pages 8-9
Replace.

THRUST WASHER

BALANCER DRIVEN GEAR

8 x 1.25 mm
25 N·m (2.5 kg-m,
18 lb-ft)

8 x 1.25 mm
30 N·m (3.0 kg-m,
22 lb-ft)

TIMING BALANCER BELT DRIVEN PULLEY

BALANCER SHAFT SEAL

Installation, pages 8-9
Replace.

O-RINGS

Replace.

CRANK SEAL

Installation, pages 7-24

6 x 1.0 mm
12 N·m (1.2 kg-m, 9 lb-ft)
Apply liquid gasket
to the bolt threads.

R. SIDE COVER

Apply liquid gasket
to block mating surface.

O-RINGS

Replace.

DOWEL PIN

OIL PUMP

See page 8-7
Apply liquid gasket
to block mating
surface.

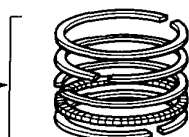
6 x 1.0 mm
12 N·m (1.2 kg-m,
9 lb-ft)
Apply liquid gasket
to the bolt threads.



NOTE: New rod bearings must be selected by matching connecting rod and crankshaft identification markings (page 7-9 and 10).

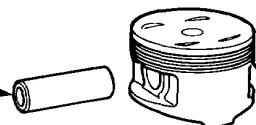
PISTON RINGS

Replacement, page 7-22
Measurement, pages 7-21 and 22
Alignment, page 7-23



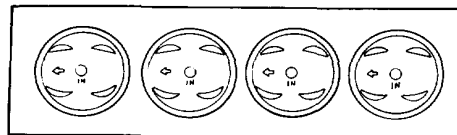
PISTON PIN

Removal, page 7-18
Installation, page 7-19
Inspection, page 7-20



PISTON INSTALLATION DIRECTION

EXHAUST



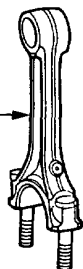
INTAKE

PISTON

Removal, page 7-11
Measurement, page 7-15

CONNECTING ROD

End play, page 7-6
Selection, page 7-19
Small end measurement, page 7-20



Inspect top of each cylinder bore for carbon build-up or ridge before removing piston.
Remove ridge if necessary, page 7-13

CONNECTING ROD BEARINGS

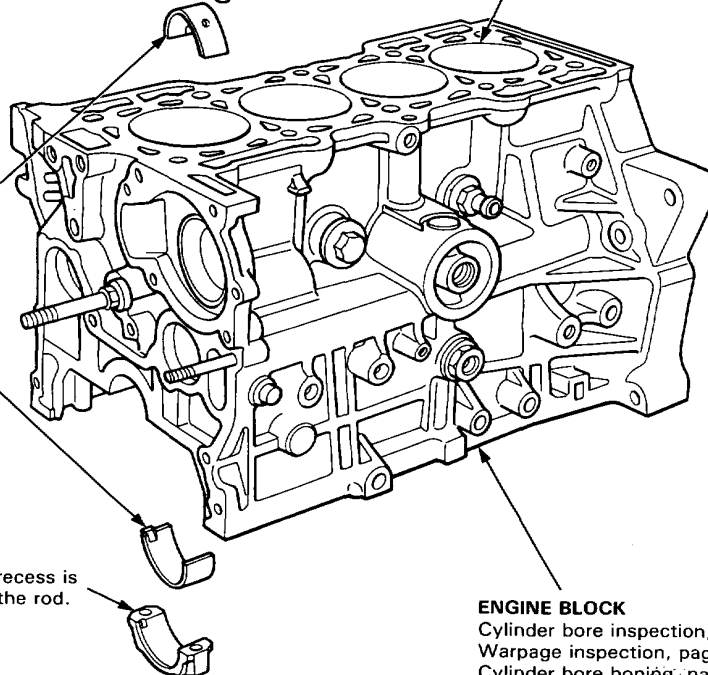
Clearance, page 7-9
Selection, page 7-10

CONNECTING ROD BEARING CAP

Installation, page 7-25
NOTE: Install caps so the bearing recess is on the same side as the recess in the rod.

CONNECTING ROD NUT

8 x 0.75 mm
47 N·m (4.7 kg-m, 34 lb-ft)
After torquing each bearing cap, rotate crankshaft to check for binding.



ENGINE BLOCK

Cylinder bore inspection, page 7-16
Warp inspection, page 7-16
Cylinder bore honing, page 7-17 and 18

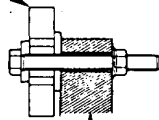
Flywheel and Drive Plate

Replacement

Manual Transmission:

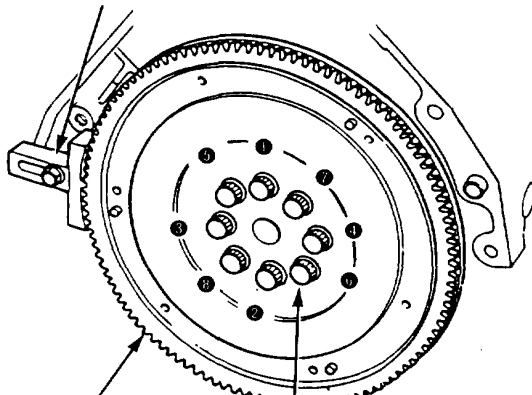
Remove the eight flywheel bolts, then separate the flywheel from the crankshaft flange. After installation, tighten the bolts in the sequence shown.

RING GEAR HOLDER
07LAF—PV00100



ENGINE
BLOCK

RING GEAR HOLDER
07LAF—PV00100

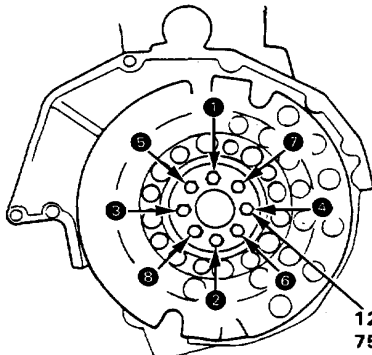


RING GEAR
Inspect ring gear
teeth for wear or
damage.

12 x 1.0 mm
105 N·m
(10.5 kg-m, 76 lb-ft)

Automatic Transmission:

Remove the eight drive plate bolts, then separate the drive plate from the crankshaft flange. After installation, tighten the bolts in the sequence shown.



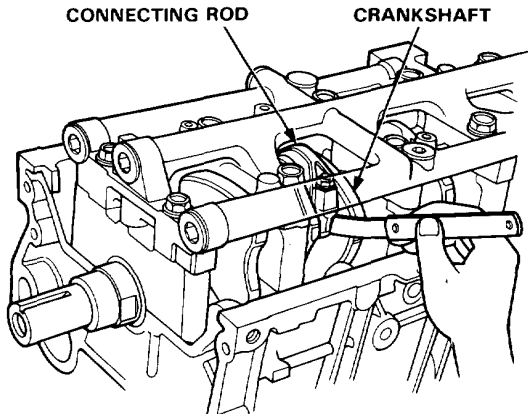
12 x 1.0 mm
75 N·m
(7.5 kg-m, 54 lb-ft)

Connecting Rod and Crankshaft

End Play

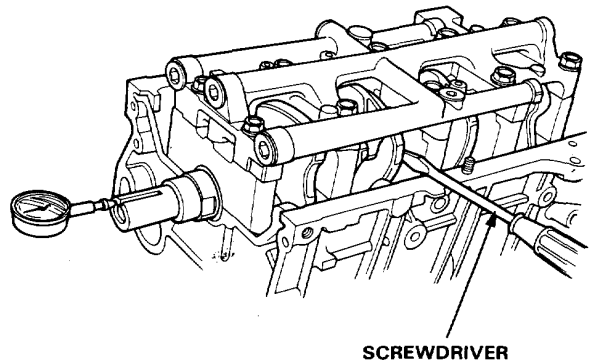
Connecting Rod End Play:

Standard (New): 0.15—0.30 mm
(0.006—0.012 in.)
Service Limit: 0.40 mm (0.016 in.)



- If out-of-tolerance, install a new connecting rod.
- If still out-of-tolerance, replace the crankshaft (pages 7-9 and 7-21).

Push the crank firmly away from the dial indicator, and zero the dial against the end of the crank. Then pull the crank firmly back toward the indicator; dial reading should not exceed service limit.



SCREWDRIVER

Crankshaft End Play:

Standard (New): 0.10—0.35 mm
(0.004—0.014 in.)
Service Limit: 0.45 mm (0.018 in.)

- If end play is excessive, inspect the thrust washers and thrust surface on the crankshaft. Replace parts as necessary.

NOTE: Thrust washer thickness is fixed and must not be changed either by grinding or shimming. Thrust washers are installed with grooved sides facing outward.



Main Bearings

Clearance

1. To check main bearing clearance, remove the main caps and bearing halves.
2. Clean each main journal and bearing half with a clean shop rag.
3. Place one strip of plastigage across each main journal.

NOTE: If the engine is still in the car when you bolt the main cap down to check clearance, the weight of the crank and flywheel will flatten the plastigage further than just the torque on the cap bolt, and give you an incorrect reading. For an accurate reading, support the crank with a jack under the counterweights and check only one bearing at a time.

4. Reinstall the bearings and caps, then torque the bolts.

75 N·m (7.5 kg-m, 54 lb-ft)

NOTE: Do not rotate the crank during inspection.

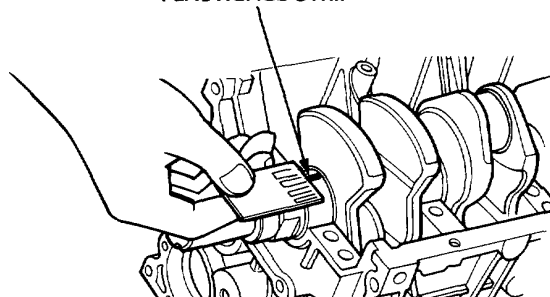
5. Remove the cap and bearings again, and measure the widest part of the plastigage.

Main Bearing Clearance:

Standard (New):

No. 1, 2:	0.021–0.045 mm (0.0008–0.0018 in)
Service Limit:	0.050 mm (0.0020 in)
No. 3:	0.025–0.049 mm (0.0010–0.0020 in)
Service Limit:	0.055 mm (0.0022 in)
No. 4:	0.013–0.037 mm (0.0005–0.0015 in)
Service Limit:	0.050 mm (0.0020 in)
No. 5:	0.009–0.033 mm (0.0004–0.0013 in)
Service Limit:	0.040 (0.0016 in)

PLASTIGAGE STRIP



6. If the plastigage measures too wide or too narrow, (remove the engine if it's still in the car), remove the crank, and remove the upper half of the bearing. Install a new, complete bearing with the same color code (select the color as shown on the next page), and recheck the clearance.

CAUTION: Do not file, shim, or scrape the bearings or the caps to adjust clearance.

7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check again.

NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crank and start over.

Main Bearings

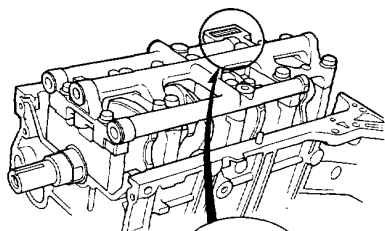
Selection

CAUTION: If the codes are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or driver. Clean them only with washing oil or detergent.

Crank Bore Code Location (Numbers, Letters or Bars)

Numbers or Marks or Bars have been stamped on the end of the block as a code for the size of each of the 5 main journal bores.

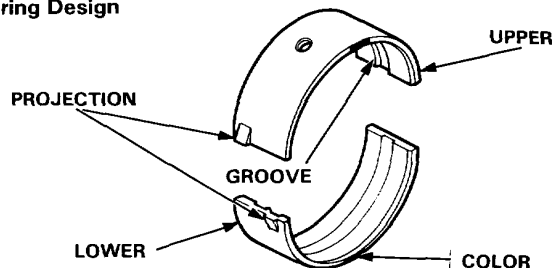
Use them, and the numbers stamped on the crank (codes for main journal size), to choose the correct bearings.



PULLEY END
(No. 1 JOURNAL)

FLYWHEEL END
(No. 5 JOURNAL)

Bearing Design



Bearing Identification

Color code is on the edge of the bearing.

FLYWHEEL END

1 or I
2 or il
3 or ul
4 or uil
5 or uul
6 or uul

Smaller
main
journal

Smaller
bearing
(thicker)

BLDK → Larger crank bore			
1 or A or I	2 or B or il	3 or C or ul	4 or D or uil
→ Smaller bearing (thicker)			

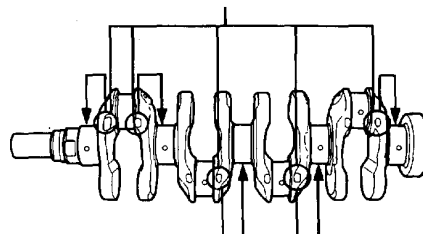
Pink	Pink/ Yellow	Yellow	Yellow/ Green
Pink/ Yellow	Yellow	Yellow/ Green	Green
Yellow	Yellow/ Green	Green	Green/ Brown
Yellow/ Green	Green	Green/ Brown	Brown
Green	Green/ Brown	Brown	Brown/ Black
Green/ Brown	Brown	Brown/ Black	Black

NOTE: When the different color bearings in top and bottom are mated, the color is irrespective of top or bottom.

Main Journal Code Locations (Numbers or Bars)

F20A, F22A engine:

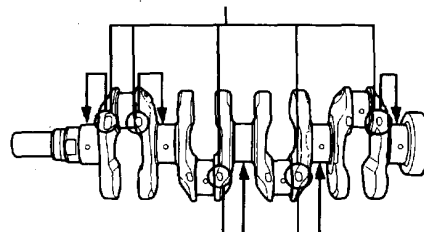
Main Journal Code Locations (Numbers or Bars)



H23A engine:

The Main Journal Codes are stamped in one of the following locations.

Main Journal Code Locations (Numbers or Bars)



Main Journal Code Locations (Numbers or Bars)

No. 5 JOURNAL
(FLYWHEEL END)

No. 1 JOURNAL
(PULLEY END)

No. 1 CRANK WEB

Rod Bearings



Clearance

1. Remove the connecting rod cap and bearing half.
2. Clean the crankshaft rod journal and bearing half with a clean shop rag.
3. Place the plastigage across the rod journal.

4. Reinstall the bearing half and cap, and torque the nuts to 47 N·m (4.7 kg-m, 34 lb-ft).

NOTE: Do not rotate the crank during inspection.

5. Remove the rod cap and bearing half and measure the widest part of the plastigage.

Connecting Rod Bearing Clearance:

F20A engine

Standard (New): 0.015–0.043 mm

(0.0006–0.0017 in)

Service Limit: 0.050 mm (0.0020 in)

F22A engine

Standard (New): 0.021–0.049 mm

(0.0008–0.0020 in)

Service Limit: 0.055 mm (0.0022 in)

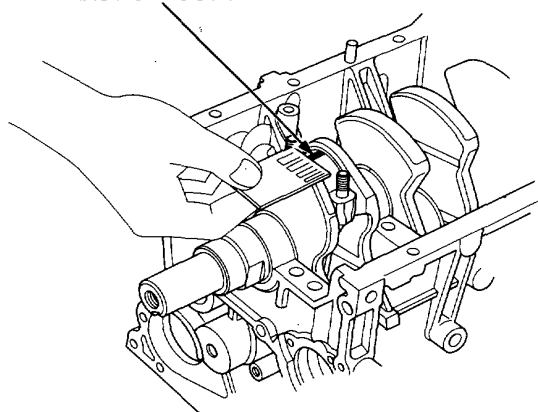
H23A engine

Standard (New): 0.027–0.055 mm

(0.0011–0.0022 in)

Service Limit: 0.060 mm (0.0024 in)

PLASTIGAGE STRIP



6. If the plastigage measures too wide or too narrow, remove the upper half of the bearing, install a new, complete bearing with the same color code (select the color as shown on the next page), and recheck the clearance.

CAUTION: Do not file, shim, or scrape the bearings or the caps to adjust clearance.

7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check clearance again.

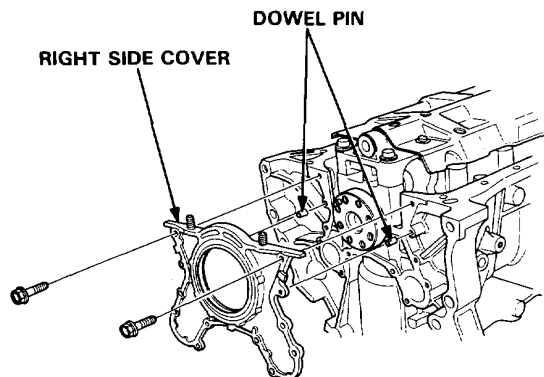
NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crank and start over.

Crankshaft, Balancer Shafts and Pistons

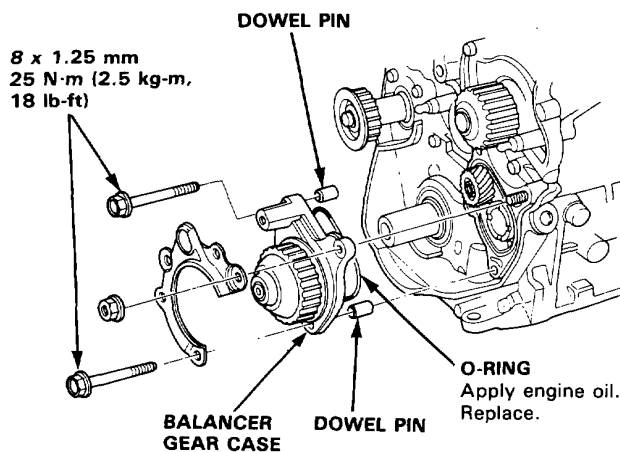


Removal

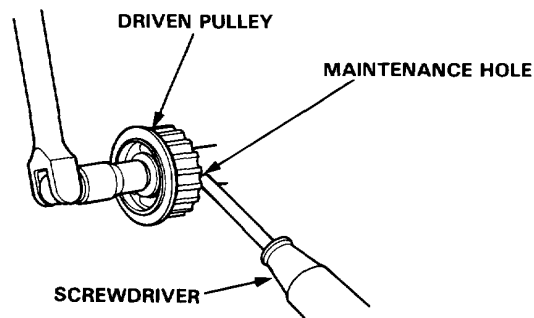
1. Remove the right side cover.



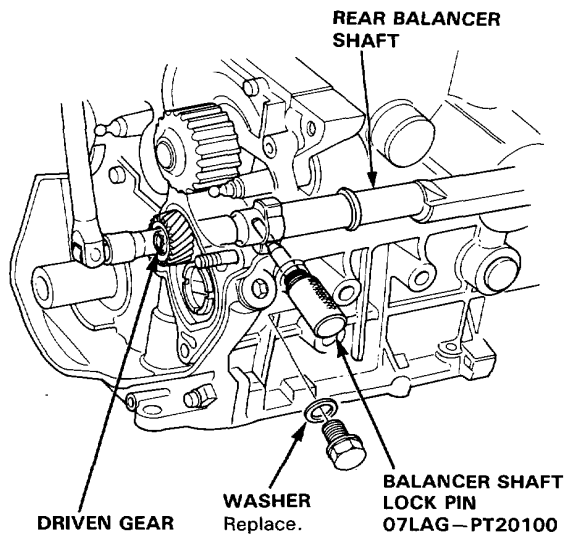
2. Remove the balancer drive gear case.



3. Remove the front balancer driven pulley as shown.



4. Align the bolt hole and the balancer shaft hole, then insert a special tool to hold the rear balancer shaft.
5. Remove the bolt and the balancer drive gear.

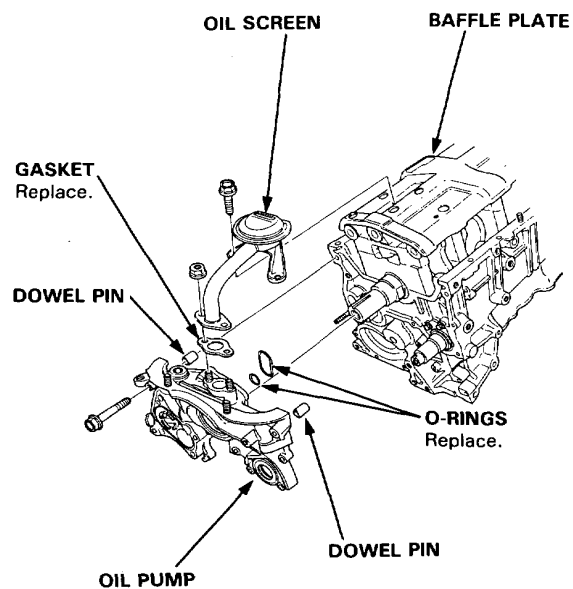


(cont'd)

Crankshaft, Balancer Shafts and Pistons

Removal (cont'd)

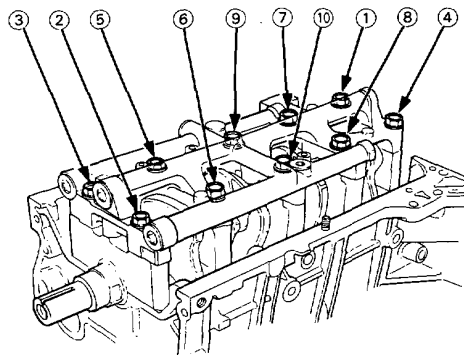
6. Remove the oil screen and the oil pump.
7. Remove the baffle plate.



8. Remove the bolts and the bearing cap bridge, then remove the bearing caps.

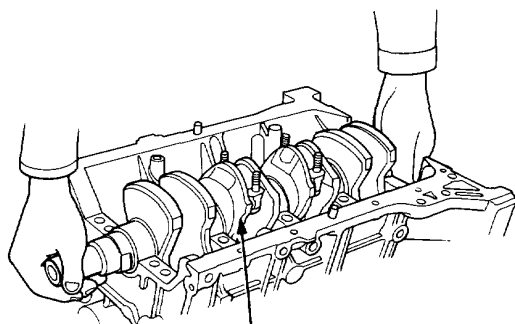
CAUTION: To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

MAIN BEARING CAP BOLTS LOOSENING SEQUENCE





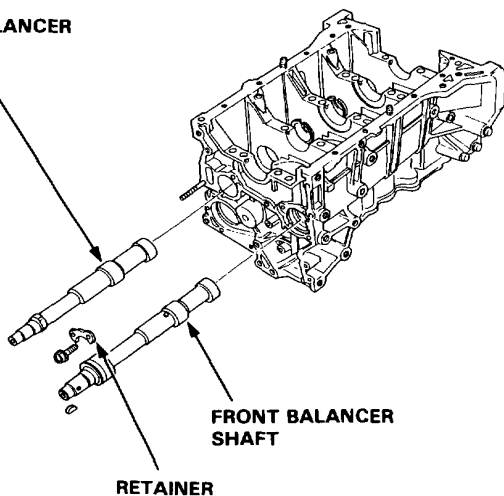
9. Turn the crankshaft so No. 2 and 3 crankpins are at the bottom.
10. Remove the rod caps/bearings and main caps/bearings. Keep all caps/bearings in order.
11. Lift the crankshaft out of the engine, being careful not to damage journals.



CRANKSHAFT

12. Remove the bolts and the retainer, then remove the front balancer shaft and the rear balancer shaft.

REAR BALANCER
SHAFT

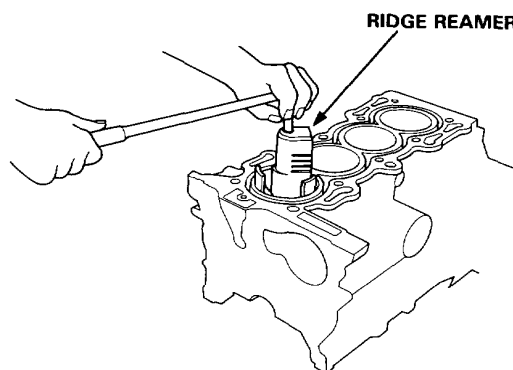


FRONT BALANCER
SHAFT

RETAINER

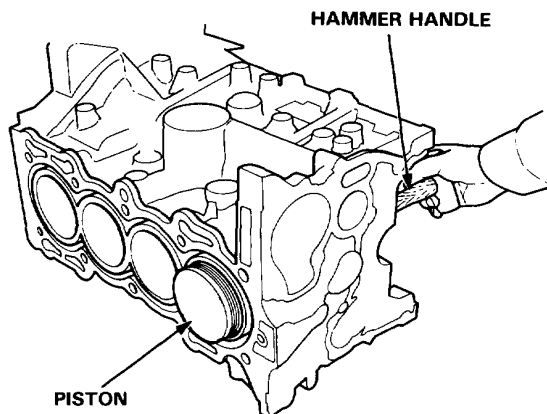
13. Remove the upper bearing halves from the connecting rods and set them aside with their respective caps.
14. Reinstall the main caps and bearings on the engine in proper order.
15. If you can feel a ridge of metal or hard carbon around the top of each cylinder, remove it with a ridge reamer. Follow the reamer manufacturer's instructions.

CAUTION: If the ridge is not removed, it may damage the pistons as they are pushed out.



RIDGE REAMER

16. Use the wooden handle of a hammer to drive the pistons out.



HAMMER HANDLE

PISTON

17. Reinstall the rod bearings and caps after removing each piston/connecting rod assembly.
18. Mark each piston/connecting rod assembly with its cylinder number to avoid mixup on reassembly.

NOTE: The existing number on the connecting rod does not indicate its position in the engine, it indicates the rod bore size.

Crankshaft

Inspection

- Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
- Check the keyway and threads.

Alignment

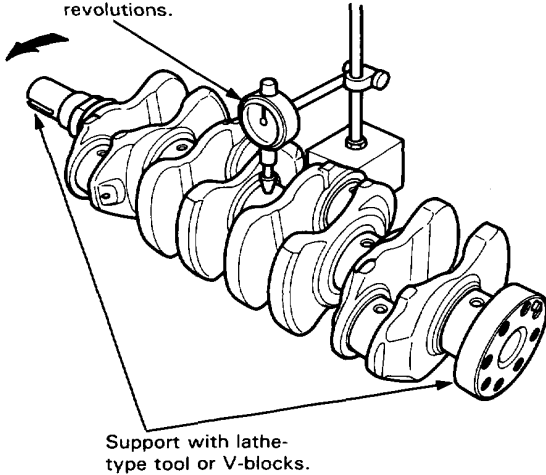
- Measure runout on all main journals to make sure the crank is not bent.
- The difference between measurements on each journal must not be more than the service limit.

Crankshaft Total Indicated Runout:

Standard (New): 0.015 mm (0.0006 in) max.

Service Limit: 0.030 mm (0.0012 in)

DIAL INDICATOR
Rotate two complete revolutions.



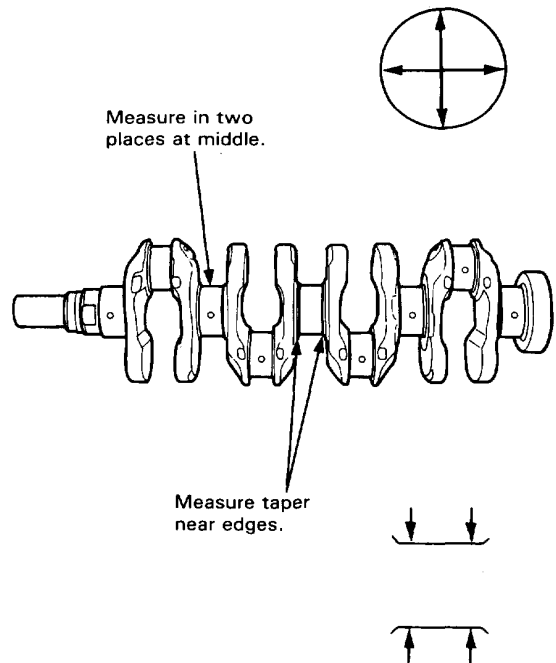
Out-of-Round and Taper

- Measure out-of-round at the middle of each rod and main journal in two places.
- The difference between measurements on each journal must not be more than the service limit.

Journal Out-of-Round:

Standard (New): 0.005 mm (0.0002 in) max.

Service Limit: 0.010 mm (0.0004 in)



- Measure taper at the edges of each rod and main journal.
- The difference between measurements on each journal must not be more than the service limit.

Journal Taper:

Standard (New): 0.005 mm (0.0002 in) max.

Service Limit: 0.010 mm (0.0004 in)

Pistons



Inspection

1. Check the piston for distortion or cracks.

NOTE: If the cylinder is bored, an oversized piston must be used.

2. Measure the piston diameter at a point F20A, F22A: 21 mm (0.83 in) H23A: 15 mm (0.59 in) from the bottom of the skirt.

NOTE: There are two standard-size pistons (A or B). The letter is stamped on the top of the piston. These letters are also stamped on the block as cylinder bore sizes.

Piston Diameter:

F20A, F22A engine:

Standard (New): A: 84.98–84.99 mm
(3.3457–3.3461 in)

B: 84.97–84.98 mm
(3.3453–3.3457 in)

Service Limit: A: 84.97 mm (3.3453 in)
B: 84.96 mm (3.3449 in)

H23A engine:

Standard (New) A: 86.990–87.003 mm
(3.4248–3.4253 in)

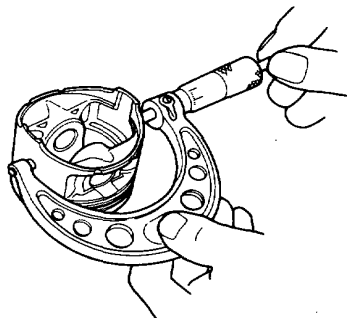
B: 86.980–86.993 mm
(3.4244–3.4249 in)

Service Limit: A: 87.980 mm (3.4638 in)
B: 87.970 mm (3.4634 in)

F20A, F22A engine:
21 mm (0.83 in)

SKIRT
DIAMETER

H23A engine:
15 mm (0.59 in)



3. Calculate the difference between cylinder bore diameter on (page 7-16) and piston diameter.

Piston-to-Cylinder Clearance:

F20A, F22A engine:

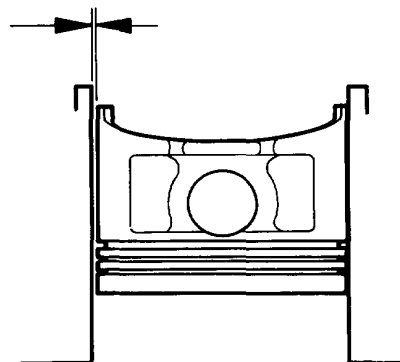
Standard (New): 0.020–0.040 mm
(0.0008–0.0016 in)

Service Limit: 0.05 mm (0.002 in)

H23A engine:

Standard (New): 0.007–0.030 mm
(0.0003–0.0012 in)

Service Limit: 0.04 mm (0.0016 in)



If the clearance is near or exceeds the service limit, inspect the piston and cylinder block for excessive wear.

Oversize Piston Diameter:

F20A, F22A engine:

0.25: 85.23–85.24 mm (3.3555–3.3559 in)

0.50: 85.48–85.49 mm (3.3653–3.3657 in)

H23A engine:

0.25: 87.230–87.243 mm
(3.4342–3.4348 in)

4. Check the piston pin-to-piston clearance. Coat the piston pin with engine oil. It should then be possible to push the piston pin into the piston hole with thumb pressure.

Piston Pin-to-Piston Clearance:

F20A, F22A engine:

Standard (New): 0.012–0.024 mm
(0.0005–0.0009 in)

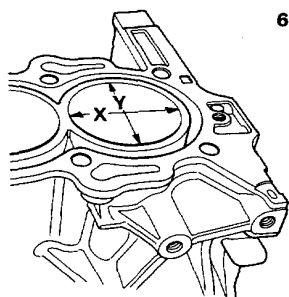
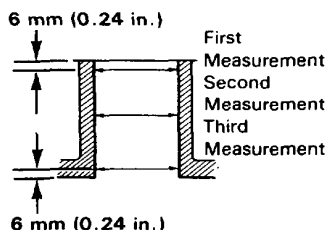
H23A engine:

Standard (New): 0.012–0.026 mm
(0.0005–0.0010 in)

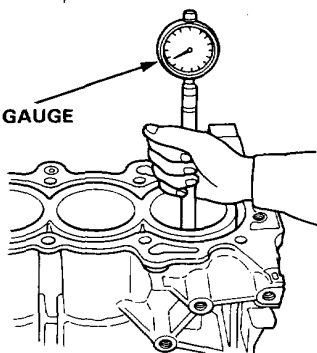
Cylinder Block

Inspection

1. Measure wear and taper in direction X and Y at three levels in each cylinder as shown.



CYLINDER BORE GAUGE



Cylinder Bore Size:

F20A, F22A engine:

Standard (New): 85.00–85.02 mm
(3.3465–3.3472 in)

Service Limit: 85.07 mm (3.3492 in)

H23A engine:

Standard (New): 87.00–87.02 mm
(3.4252–3.4260 in)

Service Limit: 87.07 mm (3.4279 in)

Oversize:

F20A, F22A engine:

0.25: 85.25–85.27 mm (3.3563–3.3571 in)

0.50: 85.50–85.52 mm (3.3661–3.3669 in)

H23A engine:

0.25: 87.26 mm (3.4354 in)

Bore Taper:

Limit: (Difference between first and third measurement) 0.05 mm (0.002 in.)

- If measurements in any cylinder are beyond Oversize Bore Service Limit, replace the block.
- If the block is to be rebored, refer to Piston Clearance Inspection (page 7-15) after reboring.

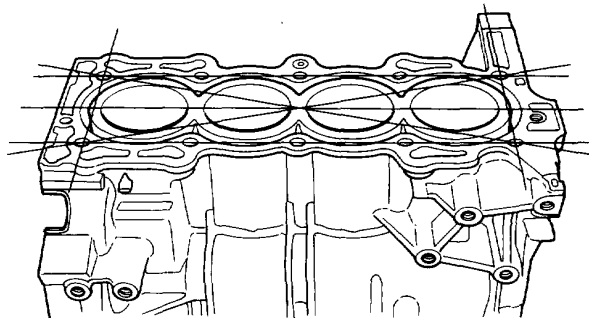
NOTE: Scored or scratched cylinder bores must be honed.

F20A, F22A engine: 0.5 mm (0.02 in)

H23A engine: 0.25 mm (0.01 in)

2. Check the top of the block for warpage.
Measure along the edges and across the center as shown.

SURFACES TO BE MEASURED

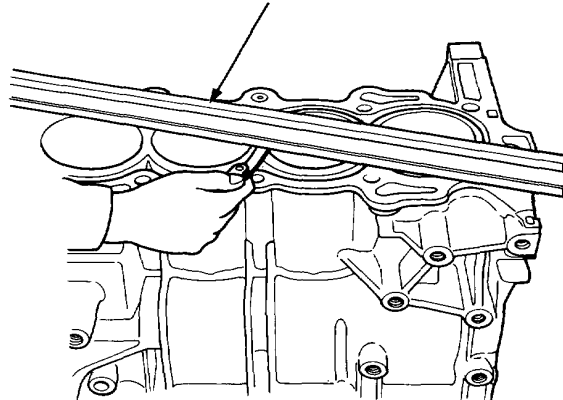


Engine Block Warpage:

Standard (New): below 0.07 mm (0.003 in)

Service Limit: 0.10 mm (0.004 in)

PRECISION STRAIGHT EDGE



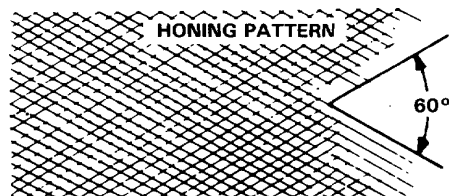


Bore Honing (H23A engine)

CAUTION: This cylinder liner uses FRM (Fiber Reinforced Metal). Hone only as directed below.

1. Measure cylinder bores as shown on page 7-16. If the block is to be re-used, hone the cylinders and remeasure the bores.
2. To hone cylinder bores:
 - Use only a rigid hone.
 - Honing stone: GC-600-J or finer stone (for nonferrous metals)
 - Pressure: 200–300 kPa (2–3 kg-cm², 28–43 psi)
 - Honing rpm: 45–50 rpm
 - Honing thickness: Less than 0.02 mm (0.0008 in)
Do not hone more than 20 cycles
 - Honing lubricant: Oil type
 - Roughness of finished surfaces: $\nabla\nabla$ or 1.2S
 - Honing pattern: 60 degree cross-hatch

CAUTION: Clean the honing stone every 5 cycles.

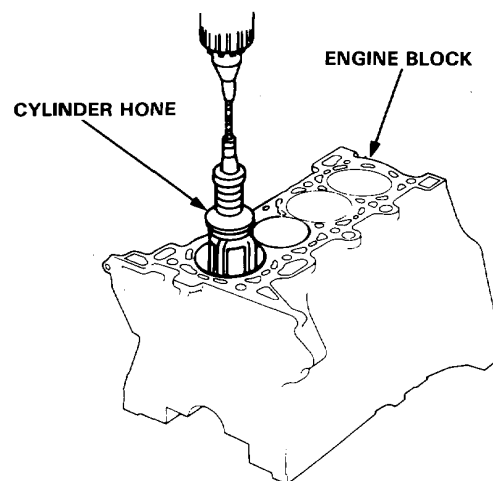


3. When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil immediately to prevent rusting.

NOTE: Never use solvent, it will only redistribute the grit on the cylinder walls.

4. If scoring or scratches are still present in cylinder bores after honing to service limit, rebore the engine block.

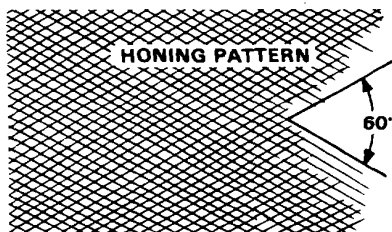
NOTE: Some light vertical scoring and scratching is acceptable if it is not deep enough to catch your fingernail and does not run the full length of the bore.



Cylinder Block

Bore Honing (F20A, F22A engine)

1. Measure cylinder bores as shown on page 7-17.
If the block is to be reused, hone the cylinders and remeasure the bores.
2. Hone cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree cross-hatch pattern.
NOTE:
 - Use only a rigid hone with 400 grit or finer stone such as Sunnen, Ammco, or equivalent.
 - Do not use stones that are worn or broken.

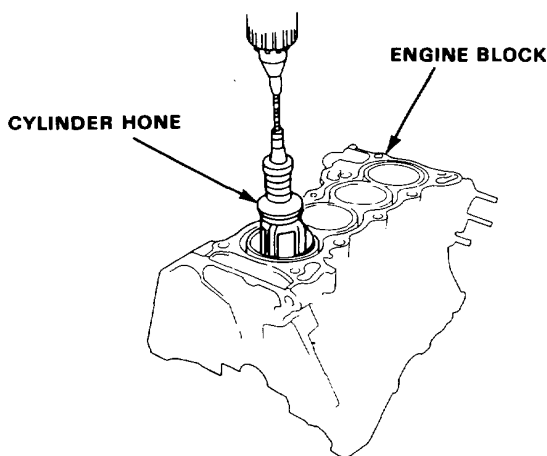


3. When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil immediately to prevent rusting.

NOTE: Never use solvent, it will only redistribute the grit on the cylinder walls.

4. If scoring or scratches are still present in cylinder bores after honing to the service limit, rebore the engine block.

NOTE: Some light vertical scoring and scratching is acceptable if it is not deep enough to catch your fingernail and does not run the full length of the bore.



NOTE:

- After honing, clean the cylinder thoroughly with soapy water.
- Only a scored or scratched cylinder bore must be honed.

Piston Pins

Removal

1. Assemble the Piston Pin Tools as shown.

PISTON BASE HEAD
07HAF-PL20102

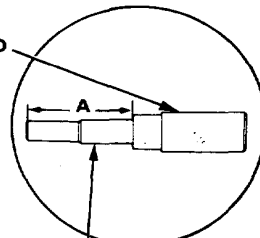
PISTON PIN BASE INSERT
07GAF-PH60300

PISTON BASE SPRING
07973-6570600

PISTON BASE
07973-6570500

2. Adjust the length A of the piston pin driver.
A: 51.5 mm (2.03 in.)

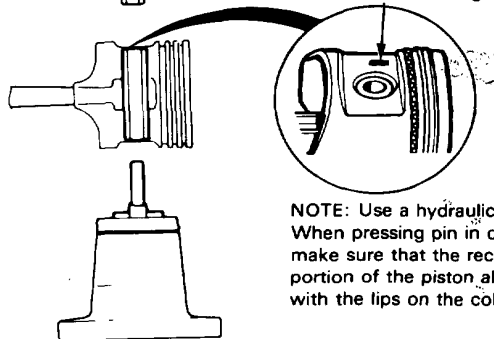
PISTON PIN DRIVER HEAD
07973-PE00320



PISTON PIN DRIVER SHAFT
07973-PE00310

PILOT COLLAR
07GAF-PH70100

Embossed mark facing up.



NOTE: Use a hydraulic press. When pressing pin in or out, make sure that the recessed portion of the piston aligns with the lips on the collar.

3. Place the piston on the piston base and press the pin out with a hydraulic press.

Connecting Rods

Selection

Each rod falls into one of four tolerance ranges (from 0 to +0.024 mm, in 0.006 mm increments) depending on the size of its big end bore. It's then stamped with a number or bar (1, 2, 3, or 4/I, II, III, or IIII) indicating the range.

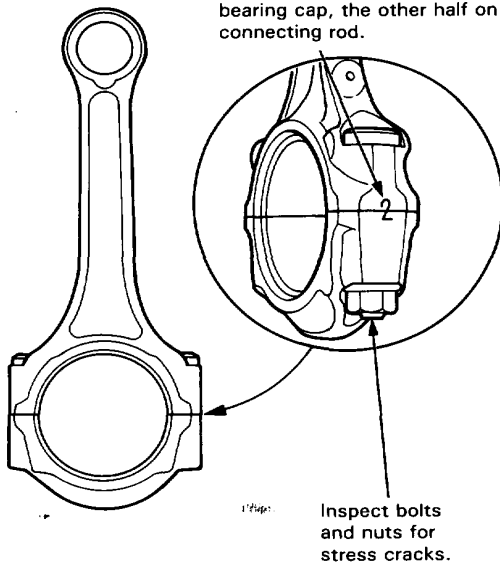
You may find any combination of 1, 2, 3, or 4/I, II, III, or IIII in any engine.

Normal Bore Size: 51 mm (2.01 in)

NOTE:

- Reference numbers or bars are for big end bore size and do not indicate the position of the rod in the engine.
- Inspect connecting rod for cracks and heat damage.

**CONNECTING ROD BORE
REFERENCE NUMBER (or BAR)**
Half of number is stamped on bearing cap, the other half on connecting rod.

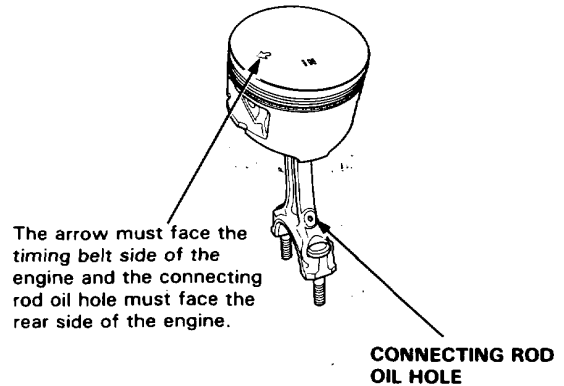


Piston Pins

Installation

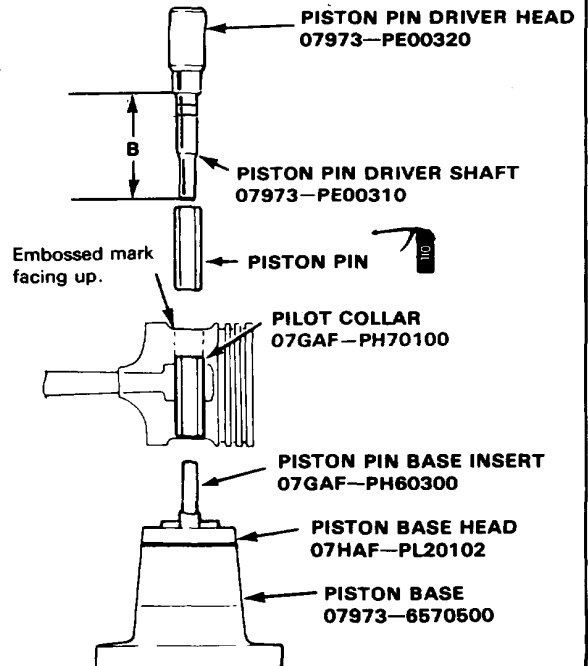
1. Use a hydraulic press for installation.

- When pressing the pin in or out, be sure to position the recessed flat on the piston against the lugs on the base attachment.



2. Adjust the length B of the piston pin driver.

B: 51.5 mm (2.03 in.)



NOTE: Install the assembled piston and rod with the oil hole facing the intake manifold.

Piston Pins

Inspection

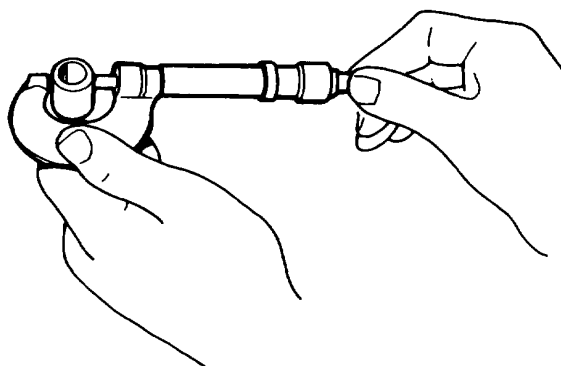
1. Measure the diameter of the piston pin.

Piston Pin Diameter:

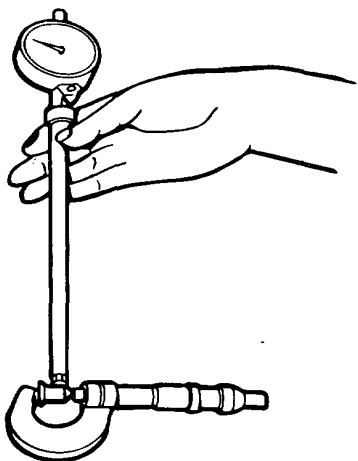
Standard (New): 21.994–22.000 mm
(0.8659–0.8661 in)

Oversize: 21.997–22.003 mm
(0.8660–0.8663 in)

NOTE: All replacement piston pins are oversize.



2. Zero the dial indicator to the piston pin diameter.



3. Measure the piston pin-to-piston clearance.

NOTE: Check the piston for distortion or cracks.

If the piston pin clearance is greater than F20A, F22A engine: 0.024 mm (0.0009 in) H23A engine: 0.026 mm (0.0010 in), remeasure using an oversize piston pin.

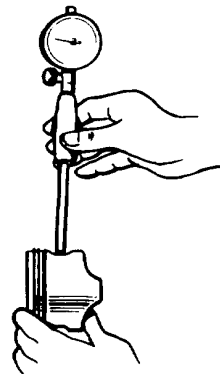
Piston Pin-to-Piston Clearance:

F20A, F22A engine:

Standard (New): 0.012–0.024 mm
(0.0005–0.0009 in)

H23A engine:

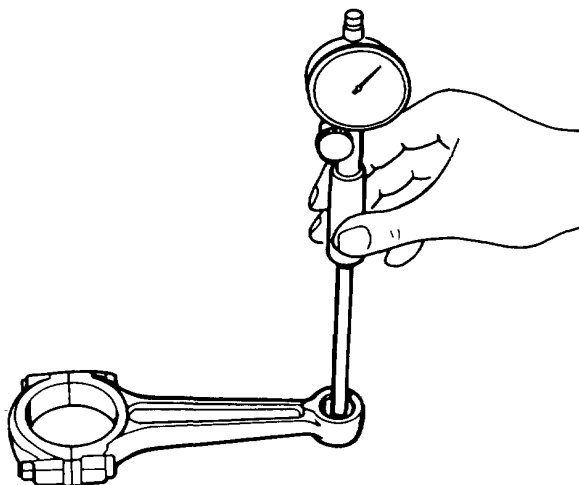
Standard (New): 0.012–0.026 mm
(0.0005–0.0010 in)



4. Check the difference between piston pin diameter and connecting rod small end diameter.

Piston Pin-to-Connecting Rod Interference:

Standard (New): 0.013–0.032 mm
(0.0005–0.0013 in)



Piston Rings



End Gap

1. Using a piston, push a new ring into the cylinder bore 15–20 mm (0.6–0.8 in) from the bottom.

2. Measure the piston ring end-gap with a feeler gauge:

- If the gap is too small, check to see if you have the proper rings for your engine.
- If the gap is too large, recheck the cylinder bore diameter against the wear limits on page 7-14. If the bore is over the service limit, the engine block must be rebored.

Piston Ring End-Gap:

F20A, F22A engine:

Top Ring

Standard (New): 0.20–0.35 mm
(0.008–0.014 in)

Service Limit: 0.60 mm (0.024 in)

Second Ring

Standard (New): 0.40–0.55 mm
(0.016–0.022 in)

Service Limit: 0.70 mm (0.028 in)

Oil Ring

Standard (New): 0.20–0.70 mm
(0.008–0.028 in)

Service Limit: 0.80 mm (0.031 in)

H23A engine:

Top Ring

Standard (New): 0.25–0.35 mm
(0.010–0.014 in)

Service Limit: 0.60 mm (0.024 in)

Second Ring

Standard (New): 0.60–0.75 mm
(0.024–0.030 in)

Service Limit: 0.90 mm (0.035 in)

Oil Ring

Standard (New):

RIKEN made:

0.20–0.70 mm (0.008–0.028 in)

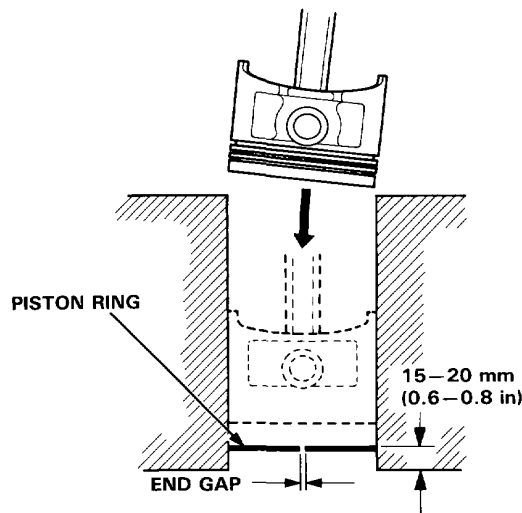
TEIKOKU PISTON RING made:

0.20–0.50 mm (0.008–0.020 in)

Service Limit:

RIKEN made: 0.80 mm (0.031 in)

TEIKOKU PISTON RING: 0.60 mm (0.024 in)



Oversize:

F20A, F22A engine:

0.25: 85.25 mm (3.356 in)

0.50: 85.50 mm (3.366 in)

H23A engine:

0.25: 87.25 mm (3.435 in)

Piston Rings

Replacement

1. Using a ring expander, remove the old piston rings.
2. Clean all ring grooves thoroughly.

NOTE:

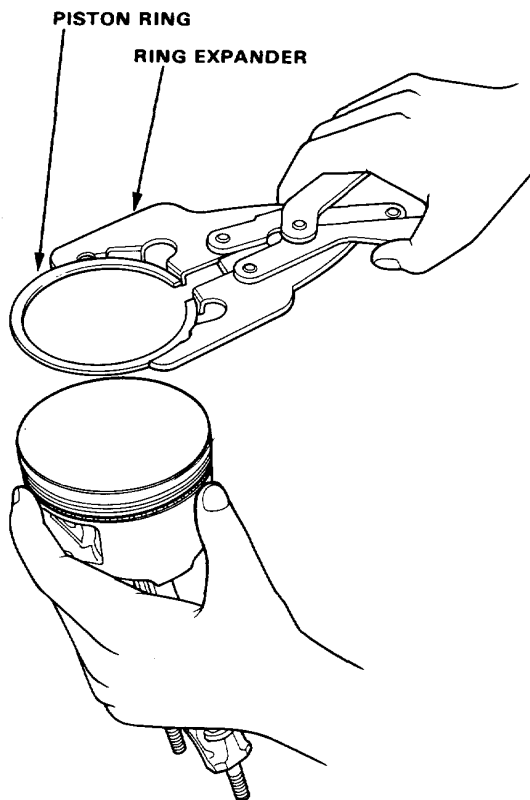
- Use a squared-off broken ring or ring groove cleaner with blade to fit piston grooves.
- Top and 2nd ring grooves are 1.2 mm wide and the oil ring groove is 2.8 mm wide.
- File down blade if necessary.

CAUTION: Do not use a wire brush to clean the ring lands, or cut ring lands deeper with cleaning tool.

NOTE: If the piston is to be separated from the connecting rod, do not install new rings yet.

3. Install new rings in the proper sequence and position (page 7-23).

NOTE: Do not use old piston rings.



Ring Land Clearances

After installing a new set of rings, measure the ring-to-land clearances:

Top Ring Clearance

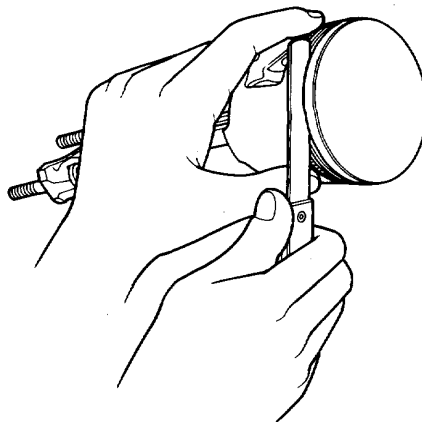
Standard (New): 0.035–0.060 mm
(0.0014–0.0024 in)

Service Limit: 0.13 mm (0.005 in)

Second Ring Clearance

Standard (New): 0.030–0.055 mm
(0.0012–0.0022 in)

Service Limit: 0.13 mm (0.005 in)



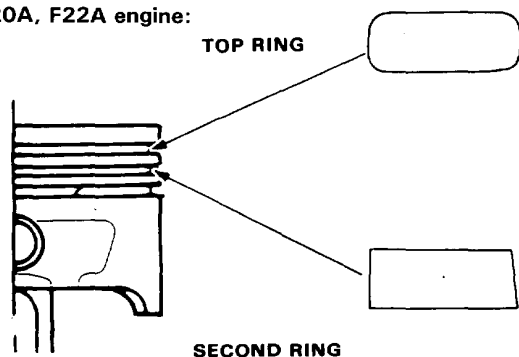


Alignment

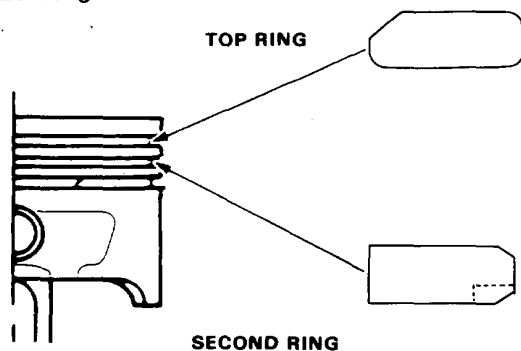
1. Install the rings as shown on page 7-22.

Identify top and second rings by the chamfer on the edge. Make sure they are in their proper grooves on the piston.

F20A, F22A engine:

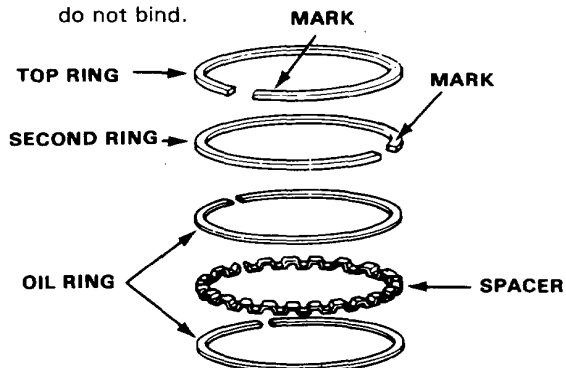


H23A engine:

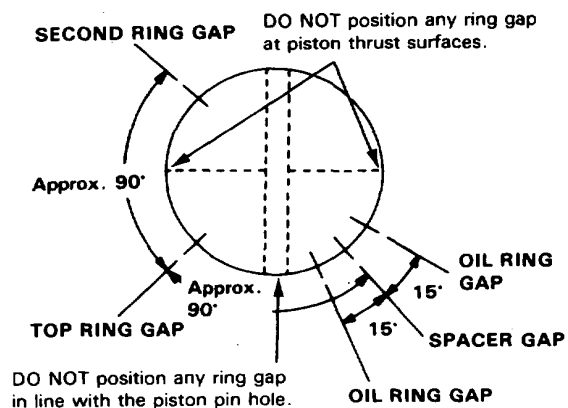


NOTE: The manufacturing marks must be facing upward.

2. Rotate the rings in their grooves to make sure they do not bind.




3. Position the ring end gaps as shown:

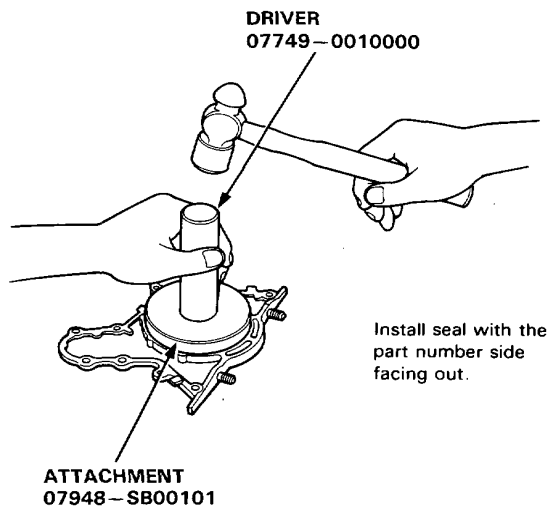


Oil Seal

Installation

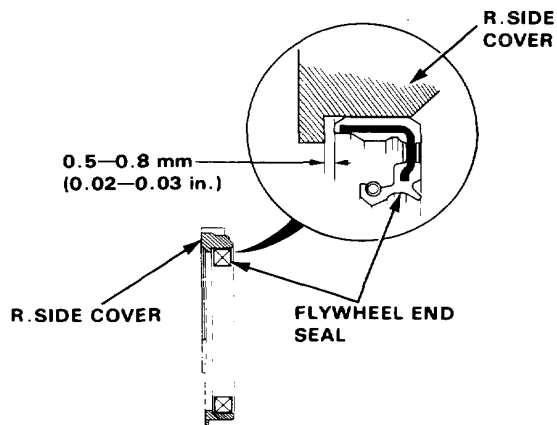
-  The seal surface on the block should be dry. Apply a light coat of oil to the crankshaft and to the lip of the seal.

1. Drive in flywheel end seal against R. side cover.
NOTE: Drive the end seal in squarely.



2. Confirm that the clearance is equal all the way around with a feeler gauge.


Clearance: 0.5—0.8 mm (0.02—0.003 in.)



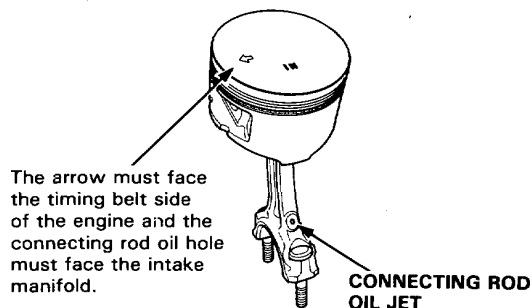
NOTE: Refer to pages 7-25 and 8-9 for installation of the oil pump side oil seal.

Pistons

Installation

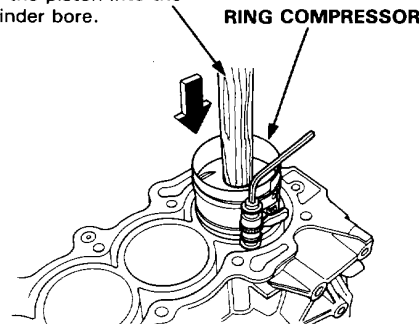
-  Before installing the piston, apply a coat of engine oil to the ring grooves and cylinder bores.

1. If the crankshaft is already installed:
 - Remove the connecting rod caps and slip short sections of rubber hose over the threaded ends of the connecting rod bolts.
 - Install the ring compressor, check that the bearing is securely in place, then position the piston in the cylinder and drive it in using the wooden handle of a hammer.
 - Stop after the ring compressor pops free and check the connecting rod-to-crank journal alignment before driving piston into place.
 - Install the rod caps with bearings, and torque the nuts to 47 N·m (4.7 kg·m, 34 lb·ft).
2. If the crankshaft is not installed:
 - Remove the rod caps and bearings, install the ring compressor, then position the piston in the cylinder and drive it in using the wooden handle of a hammer.
 - Position all pistons at top dead center.



NOTE: Maintain downward force on the ring compressor to prevent rings from expanding before entering the cylinder bore.

Use the wooden handle of a hammer to push, or tap the piston into the cylinder bore.



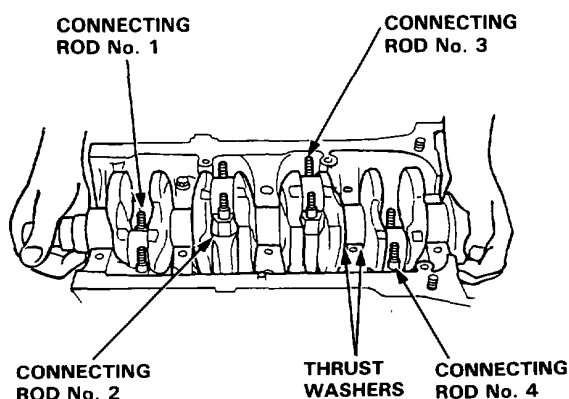
Crankshaft and Balancer Shafts



Installation

Before installing the crankshaft, apply a coat of engine oil to the main bearings, rod bearings and balancer shaft bearings.

1. Insert bearing halves in the engine block and connecting rods.
2. Hold the crankshaft so rod journals for cylinders No. 2 and No. 3 are straight down.
3. Lower the crankshaft into the block, seating the rod journals into connecting rods No. 2 and No. 3. Install the rod caps and nuts finger tight.



4. Rotate the crankshaft clockwise, seat journals into connecting rods No. 1 and No. 4, and install the rod caps and nuts finger tight.

NOTE: Install caps so the bearing recess is on the same side as the recess in the rod.

5. Check rod bearing clearance with plastigage (page 7-8), then torque the capnuts.

47 N·m (4.7 kg-m, 34 lb-ft)

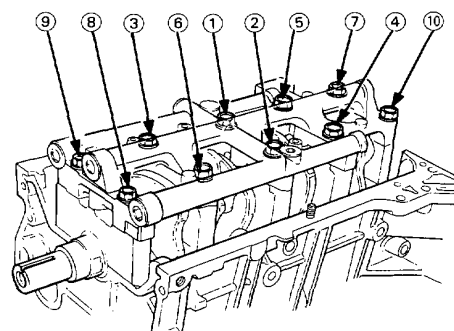
NOTE: Reference numbers on connecting rod are for big-end bore tolerance and do not indicate the position of piston in the engine.

6. Install the thrust washers, main bearing caps and bearing cap bridge.

Check clearance with plastigage (page 7-7), then tighten the bearing cap bolts in 2 steps.

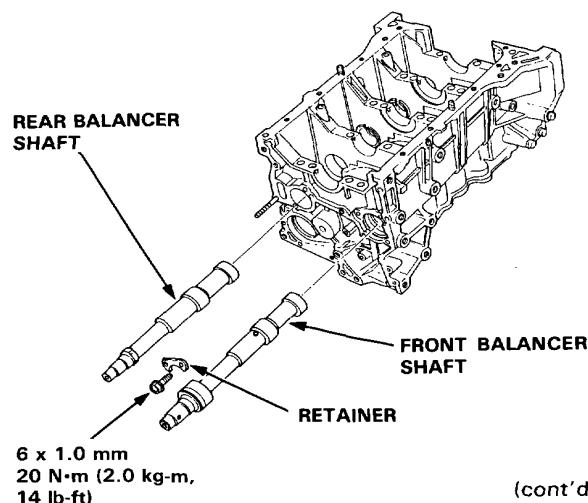
In the first step tighten all bolts in sequence, to about 30 N·m (3.0 kg-m, 22 lb-ft); in the final step tighten in same sequence, to 75 N·m (7.5 kg-m, 54 lb-ft).

NOTE: Coat thrust washer surfaces and bolt threads with oil.



CAUTION: Whenever any crankshaft or connecting rod bearing is replaced, it is necessary after reassembly to run the engine at idling speed until it reaches normal operating temperature, then continue to run it for approximately 15 minutes.

7. Insert the balancer shafts into the block, then install the retainer to the front balancer shaft and block.



(cont'd)

Crankshaft and Balancer Shafts

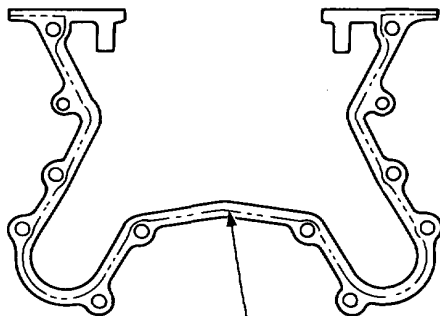
Installation (cont'd)

NOTE:

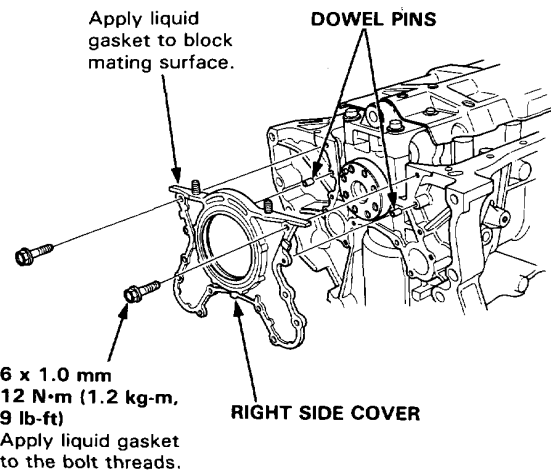
- Use liquid gasket, part No, OY740—99986.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket evenly, being careful to cover all the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.
- Do not install the parts if 20 minutes or more have elapsed since applying the liquid gasket. *Instead reapply liquid gasket after removing the old residue.*
- After assembly, wait at least 30 minutes before filling the engine with oil.

8. Apply liquid gasket to the block mating surface of the right side cover, then install it on the engine block.

RIGHT SIDE COVER:



Apply liquid gasket on the broken

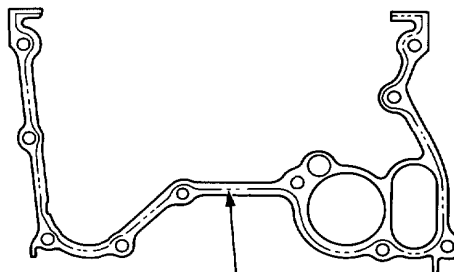


9. Apply liquid gasket to the block mating surface of the oil pump, then install it on the engine block.

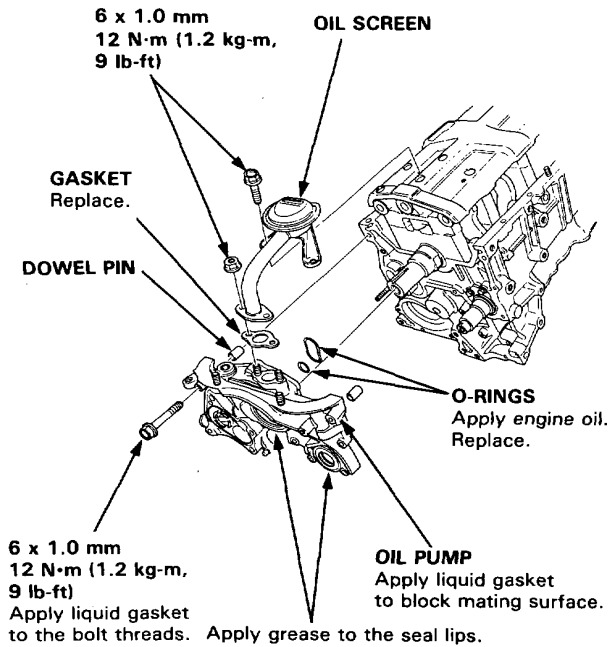
- Apply grease to the lips of the oil pump seal and the balancer seal.

Then, install the oil pump while aligning the inner rotor with the crankshaft. When the pump is in place, clean any excess grease off the crankshaft and the balancer shaft, then check that the oil seal lips are not distorted.

OIL PUMP:

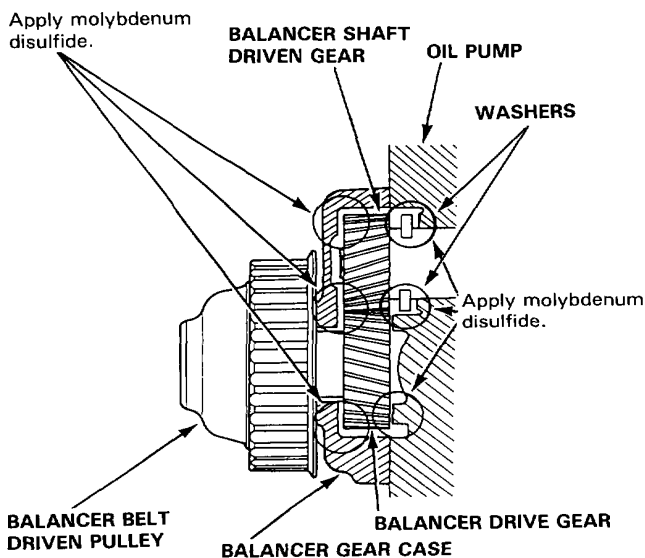


Apply liquid gasket on the broken line.



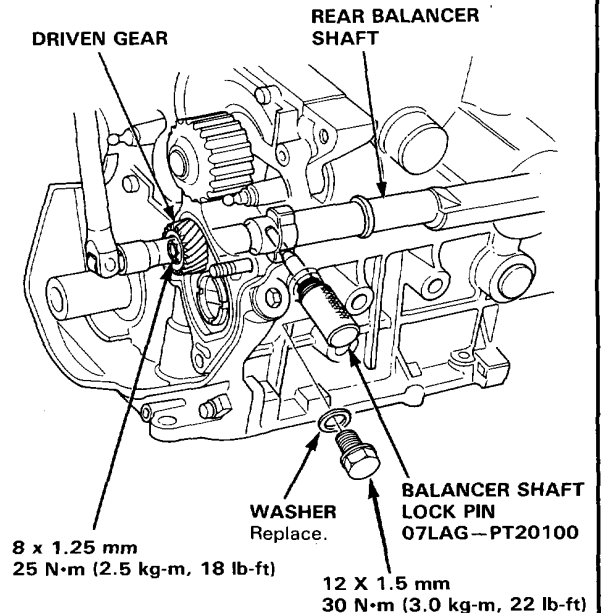
10. Install the baffle plate, then install the oil screen.

11. Apply the molybdenum disulfide to the thrust surfaces of the balancer gears as shown, before installing the balancer driven gear and the balancer drive gear case.



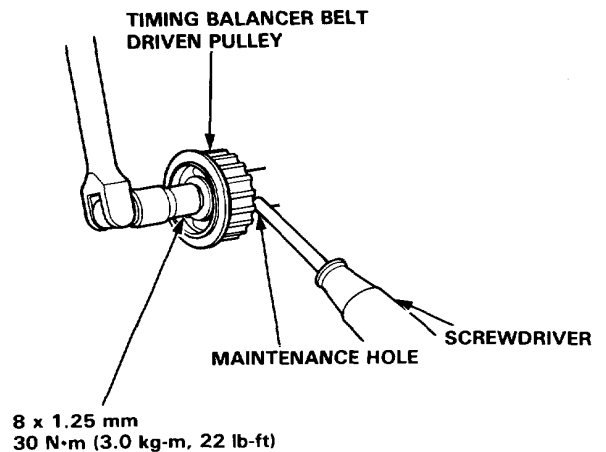
12. Fix the balancer shaft with the special tool, then install the balancer driven gear and the timing balancer belt driven pulley.

REAR BALANCER:



13. Hold the front balancer shaft with a screwdriver, then install the timing balancer belt driven pulley.

FRONT BALANCER:



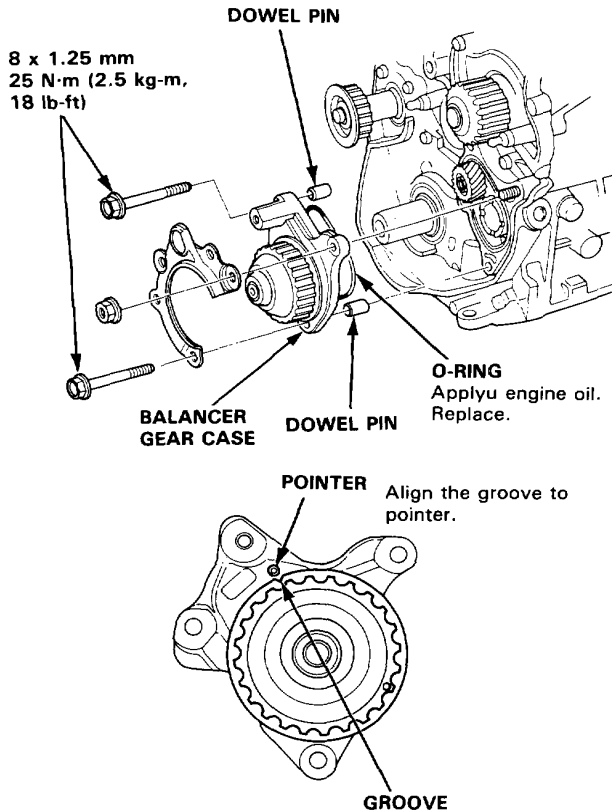
(cont'd)

Crankshaft and Balancer Shafts

Installation (cont'd)

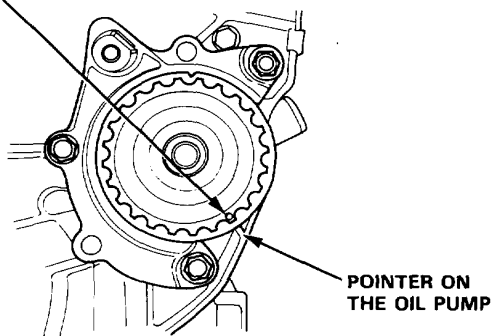
14. Install the balancer gear case to the oil pump.

NOTE: Align the groove on the pulley edge to the pointer on the gear case when holding the rear balancer with a special tool, then install the gear case.

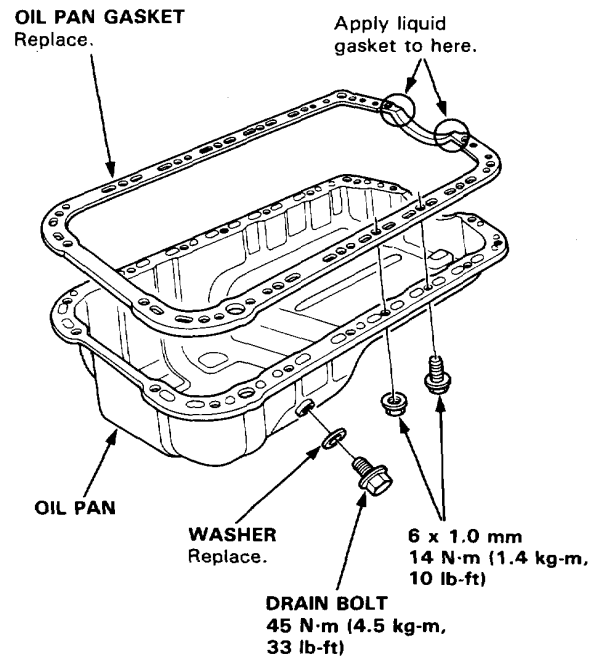


15. Check alignment of pointers after installing the gear case.

POINTER ON THE PULLEY

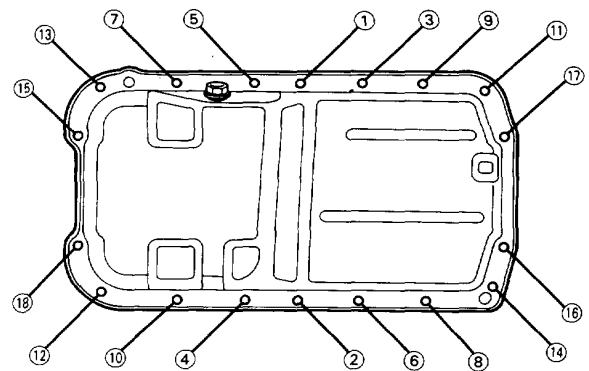


16. Install the oil pan.



17. Tighten the bolts and nuts as shown below.

Torque: 14 N·m (1.4 kg-m, 10 lb-ft)



NOTE: Tighten the bolts and nuts in two steps and torque them in a criss-cross pattern.

Balancer Shafts



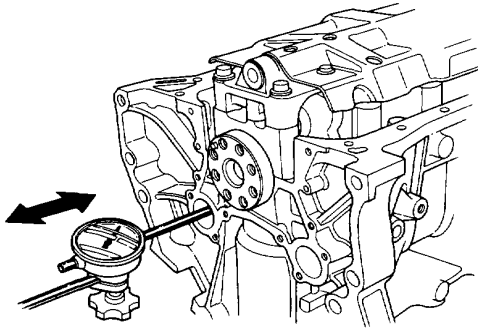
Inspection

NOTE: Inspect the balancer shaft before removing the right side cover and the balancer gear case (page 7-11).

1. Push the balancer shaft firmly away from the dial indicator, and zero the dial against the front end of the balancer shaft, then pull the balancer shaft firmly back toward the indicator.

Front Balancer Shaft End Play

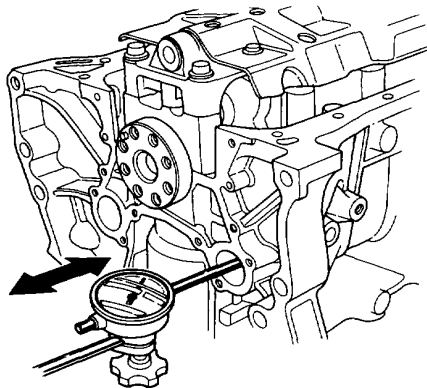
Standard (New): 0.10–0.35 mm
(0.0040–0.0138 in)



- If end play is excessive, inspect the retainer and thrust surfaces on the balancer shaft.

Rear Balancer Shaft End Play

Standard (New): 0.06–0.18 mm
(0.002–0.007 in)



- If end play is excessive, inspect the thrust washer and thrust surfaces on the driven gear and oil pump body.

NOTE: The thickness of the retainer (front) and thrust washer (rear) are fixed and must not be changed either by grinding or shimming.

2. Remove the balancer shafts (page 7-11).

NOTE: Clean the balancer shafts.

3. Inspect the surface of the balancer shaft journal and the balancer bearing.
4. Replace if there is wear, damage or discoloration on the surface of the bearing or the balancer shaft journal. When replacing the rear No. 1 bearing be sure to replace the oil pump body with a new one.

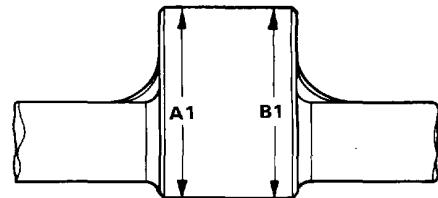
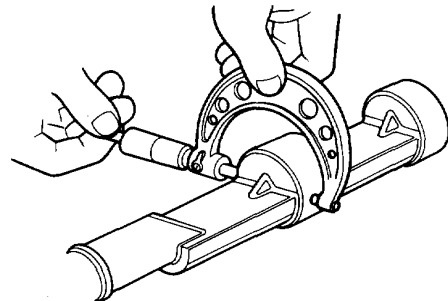
NOTE: It is normal if the surface is shining like the surface of a mirror.

5. Measure taper at the edges of each journal.

- The difference between measurements on each journal.

Journal Taper

Standard (New): 0.05 mm (0.002 in)



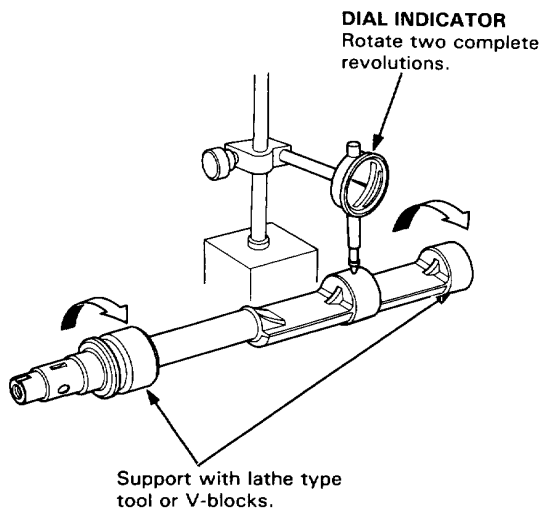
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Balancer Shafts

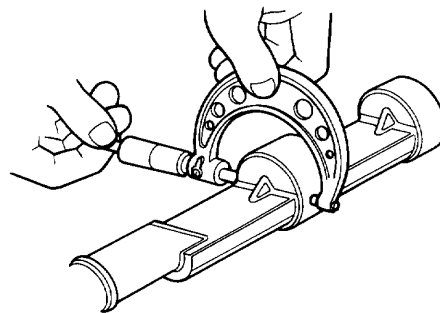
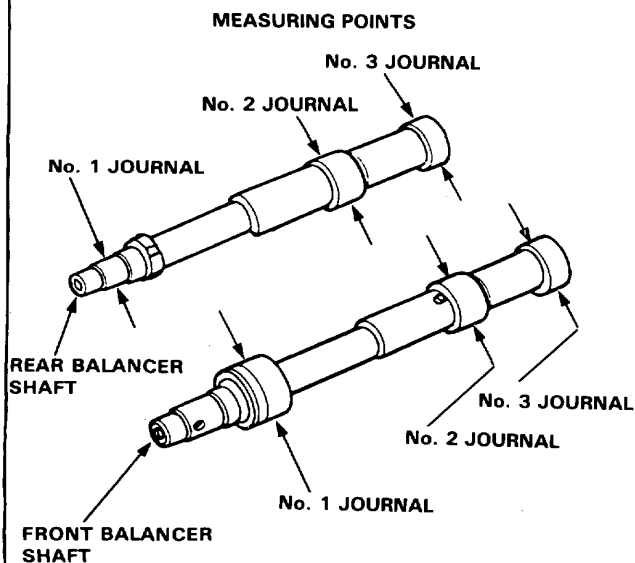
Inspection (cont'd)

- Measure runout on the No. 2 journal of each balancer shaft to make sure the balancer shafts are not bent.

Balancer Shaft Total Indicated Runout
Standard (New): 0.02 mm (0.0008 in)
Service Limit: 0.03 mm (0.0012 in)



- Measure the diameters of the balancer shaft journals.



Journal Diameter Standard (New)

No. 1 journal:	
Front:	42.722–42.734mm (1.6820–1.6824 in)
Rear:	20.938–20.956 mm (0.8243–0.8248 in)
No. 2 journal:	
	38.712–38.724 mm (1.5241–1.5246 in)
No. 3 journal:	
	34.722–34.734 mm (1.3670–1.3674 in)

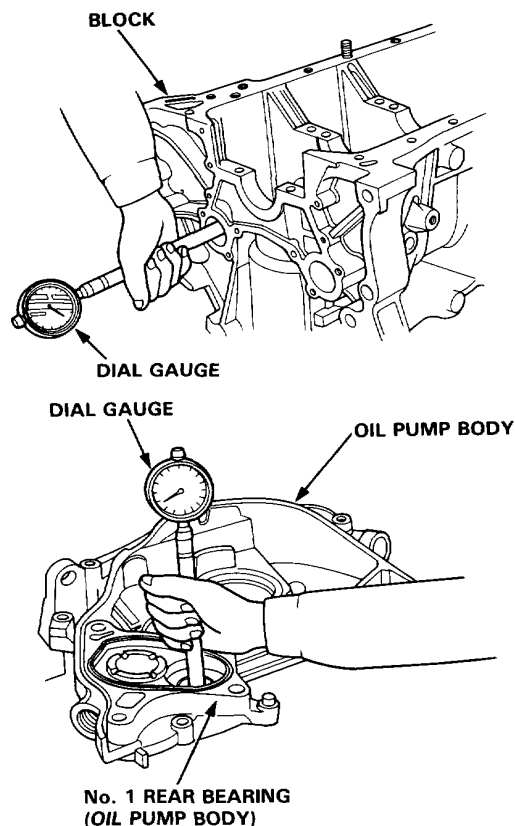
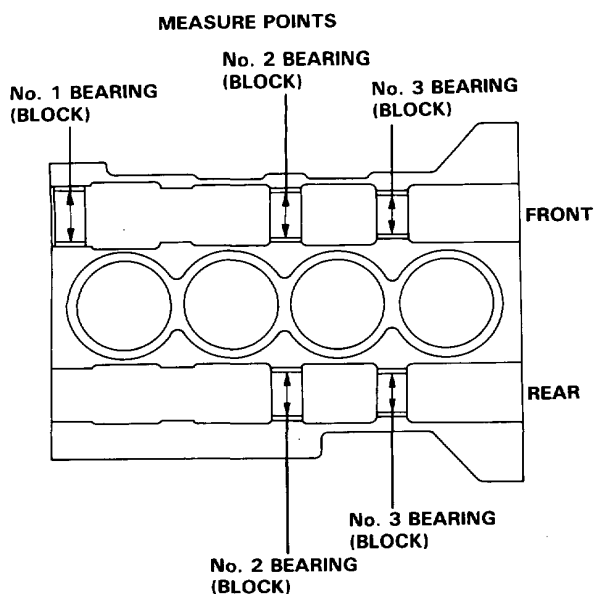
Service Limit:

No. 1 journal:	
Front:	42.910 mm (1.689 in)
Rear:	20.920 mm (0.824 in)
No. 2 journal:	
	38.700 mm (1.524 in)
No. 3 journal:	
	34.710 mm (1.367 in)

- Remove the crankshaft, the pistons and the other parts from the block, then clean the balancer shaft journal bearings of the block and the oil pump body with a clean shop rag.
- Check the surface of the bearings, if there is wear, damage or discoloration, replace the bearings or the oil pump body.



10. Measure the inner diameters of the balancer shaft journal bearings.



Bearing Inner Diameter

Standard (New):

No. 1 journal:

Front: 42.800–42.820 mm
(1.6850–1.6858 in)

Rear: 21.000–21.013 mm
(0.8268–0.8273 in)

No. 2 journal: 38.800–38.820 mm
(1.5276–1.5283 in)

No. 3 journal: 34.800–34.820 mm
(1.3701–1.310 in)

Service Limit:

No. 1 journal:

Front: 42.83 mm (1.686 in)
Rear: 21.02 mm (0.828 in)

No. 2 journal: 38.43 mm (1.513 in)

No. 3 journal: 34.83 mm (1.371 in)

11. Calculate the shaft-to-bearings oil clearances.

$$\text{BEARING I.D.} - \text{JOURNAL O.D.} = \text{OIL CLEARANCE}$$

Bearing-to-shaft Oil Clearance

Standard (New)

No. 1 journal front and No. 3 journals:

0.066–0.118 mm (0.0026–0.0046 in)

No. 2 journals:

0.076–0.128 mm (0.0030–0.0050 in)
repair bearing

No. 1 journal rear:

0.050–0.075 mm (0.0020–0.0030 in)
new bearing

Service Limit:

No. 1 journal front and No. 3 journals:
0.12 mm (0.005 in)

No. 2 journals: 0.13 mm (0.005 in)

No. 1 journal rear: 0.09 mm (0.004 in)

No. 1 REAR BEARING
(OIL PUMP BODY)

Balancer Shaft Bearing

Replacement

The procedure shown below is used when using the bearing replacement tool set (07LAF—PT20100).

CAUTION:

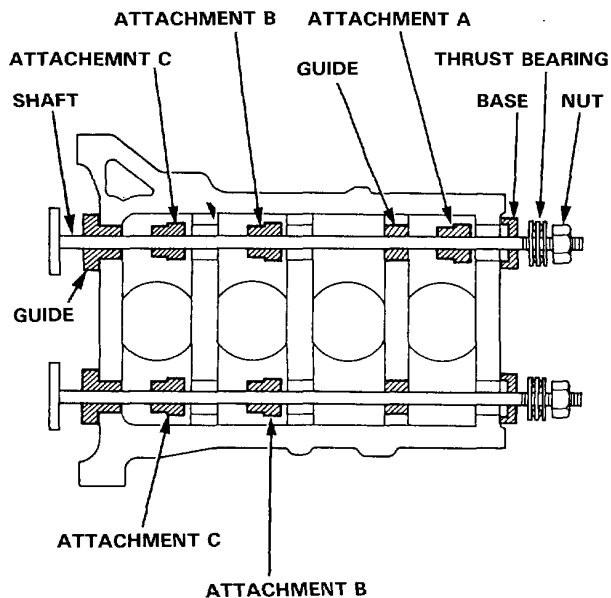
- Remove all attachment parts from the cylinder block and lay it with its oil pan side up.
- Remove or reinstall bearings one at a time.
- Remove bearings from the transmission side to the timing belt side and reinstall them in reverse sequence.

Removal:

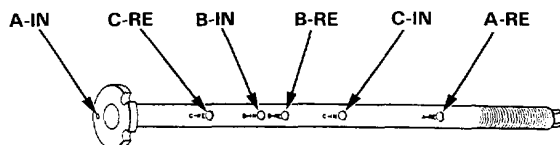
NOTE:

- By changing the size and attachment point of the attachment, all balancer bearings can be removed from the cylinder block in the same procedure.
- The illustration shows the attachment points of each special tool.
- When removing bearings successively, put the corresponding attachment through the shaft without fixing them in advance.

SPECIAL TOOL SET LOCATION

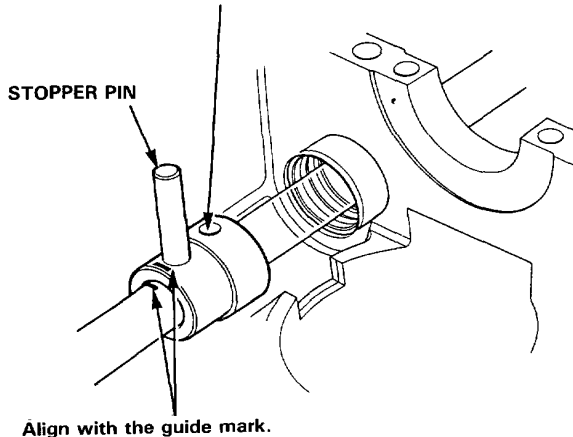


- Position of attachment fixing holes and guide marks on the shaft.



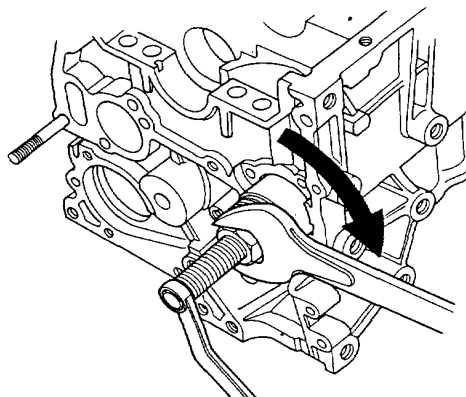
1. Put the attachment with the side having larger diameter facing the bearing. Align the stopper pin holes of the attachment and the shaft. Insert the stopper pin to fix the attachment.

FRONT No. 1 BEARING: ATTACHEMNT A
No. 2 BEARINGS: ATTACHEMNT B
No. 3 BEARINGS: ATTACHEMNT C



2. Hold the shaft end with a wrench and turn the nut clockwise until the bearing comes off.

- Do not rotate the shaft.



3. When removing bearings in succession, loosen the nut, remove the stopper pin from the pin hole you have finished and repeat above procedure ① and ② on the next bearing.



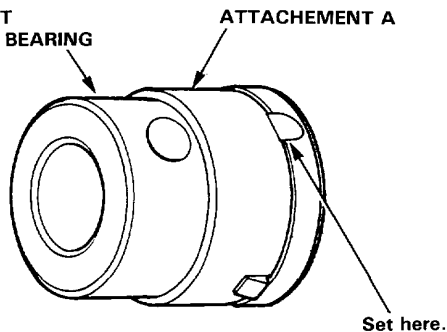
Installation:

Front No. 1 bearing

NOTE: Always use new bearings.

1. Set the resess of the bearing to the detent of the attachment.

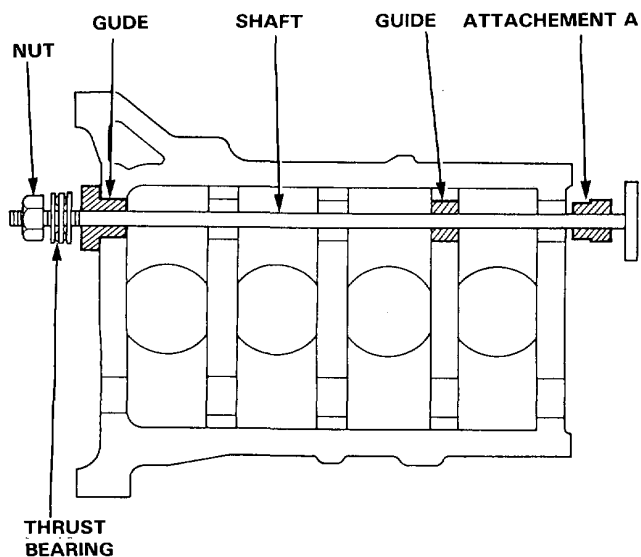
FRONT
No. 1 BEARING



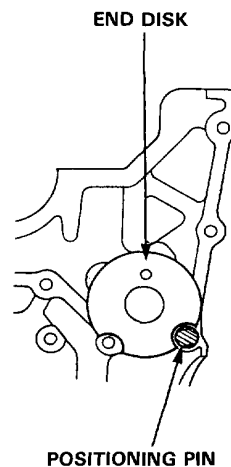
Attachment

Front No. 1 bearing: Attachment No. 1

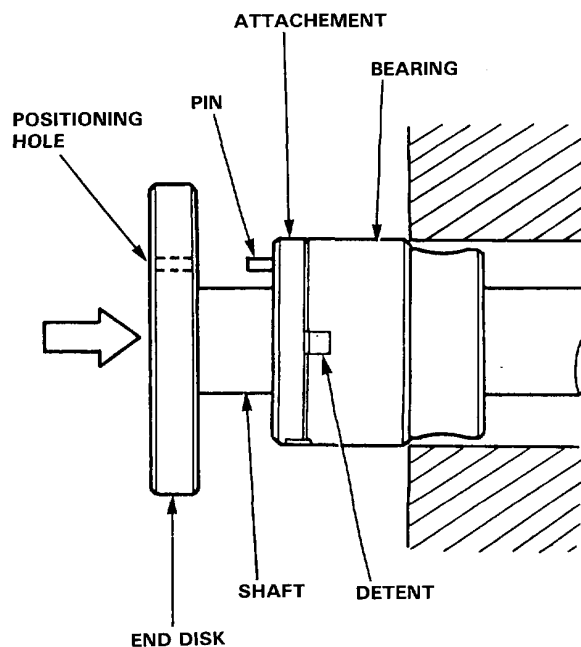
- The illustration shows the attachment points of the special tools.



2. Install the shaft positioning pin.



3. Set the shaft so that the attachment pin is aligned with the positioning hole in the end disc.

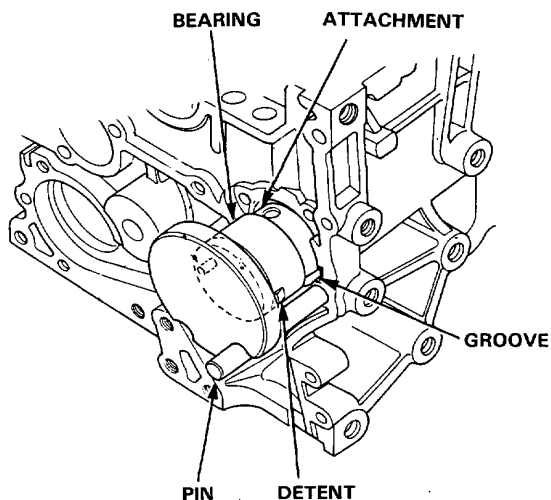


(cont'd)

Balancer Shaft Bearing

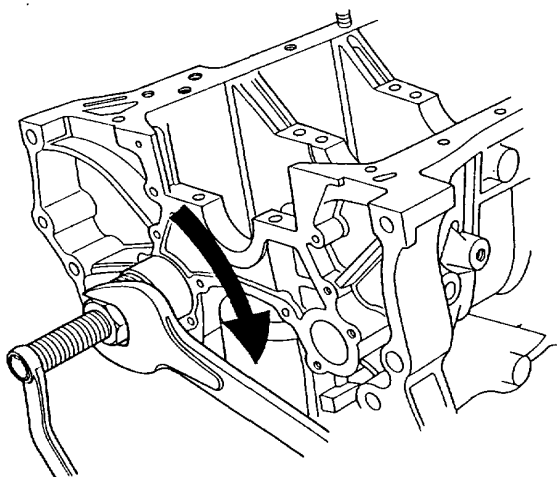
Replacement (cont'd)

4. Set the detent of the bearing to the groove of the cylinder block.



5. Hold the end of the shaft with wrench and install the bearing by turning the nut clockwise.

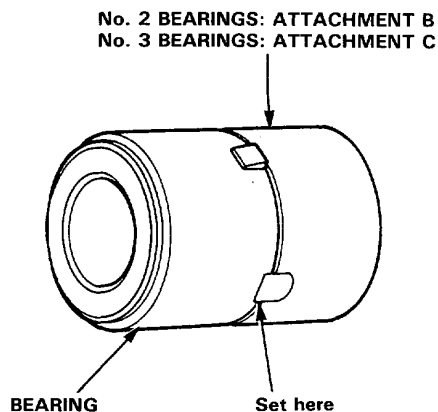
- Do not rotate the shaft.



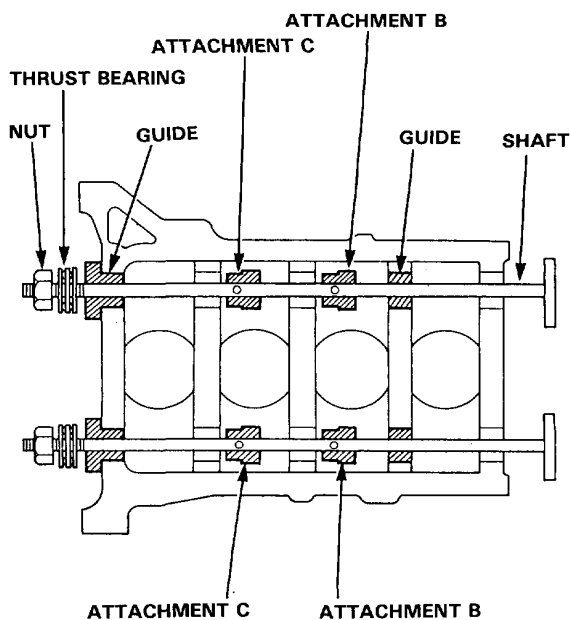
Installation:

No. 2 and No. 3 Bearings

1. Set the resess of the bearing to the detent of the attachment.

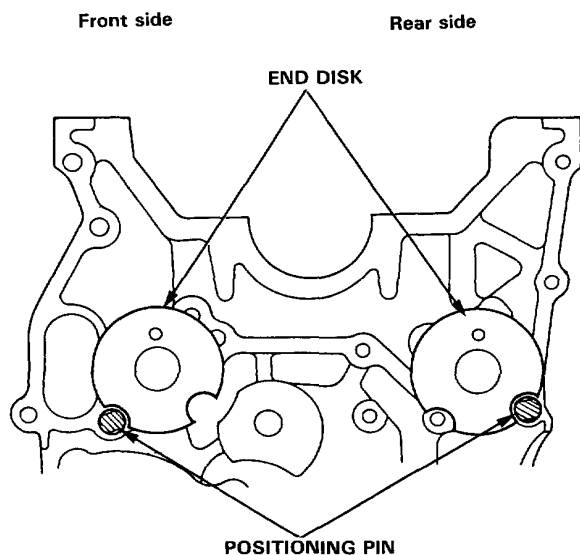


- The illustration shows attachment points of each special tool.
- When installing bearings successively, set the bearings to the attachment and put them through the shaft without fixing them in advance.

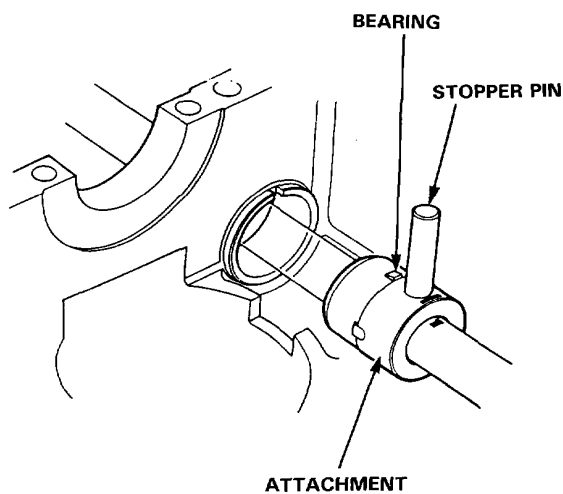




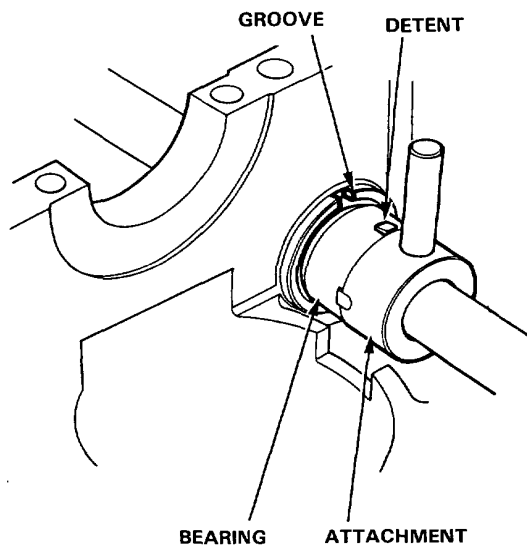
2. Install the shaft positioning pin.



3. Align the attachment with the guide mark. Applicable bearing No. is indicated at the guide mark. Align the pin holes of the attachment and the shaft. Insert the stopper pin to fix the attachment (for No. 2, and No. 3 bearings).

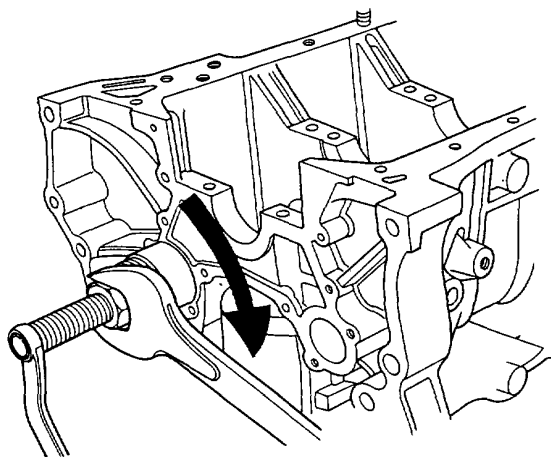


4. Set the detent of the bearing to the groove of the cylinder block.



5. Hold the end of the shaft with wrench and install the bearing by turning the nut clockwise.

- Do not rotate the shaft.



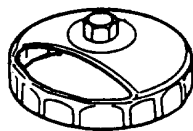
Engine Lubrication

Special Tools	8-2
Illustrated Index	8-3
Engine Oil	8-4
Filter	8-5
Oil Pressure	8-6
Oil Pump	8-7



Special Tools

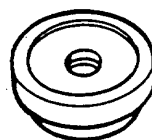
Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07912-6110001	Oil Filter Wrench	1	8-5
②	07406-0030000	Oil Pressure Gauge Adapter	1	8-6
③	07746-0010300	Attachment 42 x 47 mm	1	8-9
④	07746-0010400	Attachment 52 x 55 mm	1	8-9
⑤	07749-0010000	Driver	1	8-9
⑥	07LAG-PT20100	Balancer Shaft Lock Pin	1	8-10



①



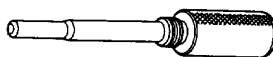
②



③ ④



⑤



⑥

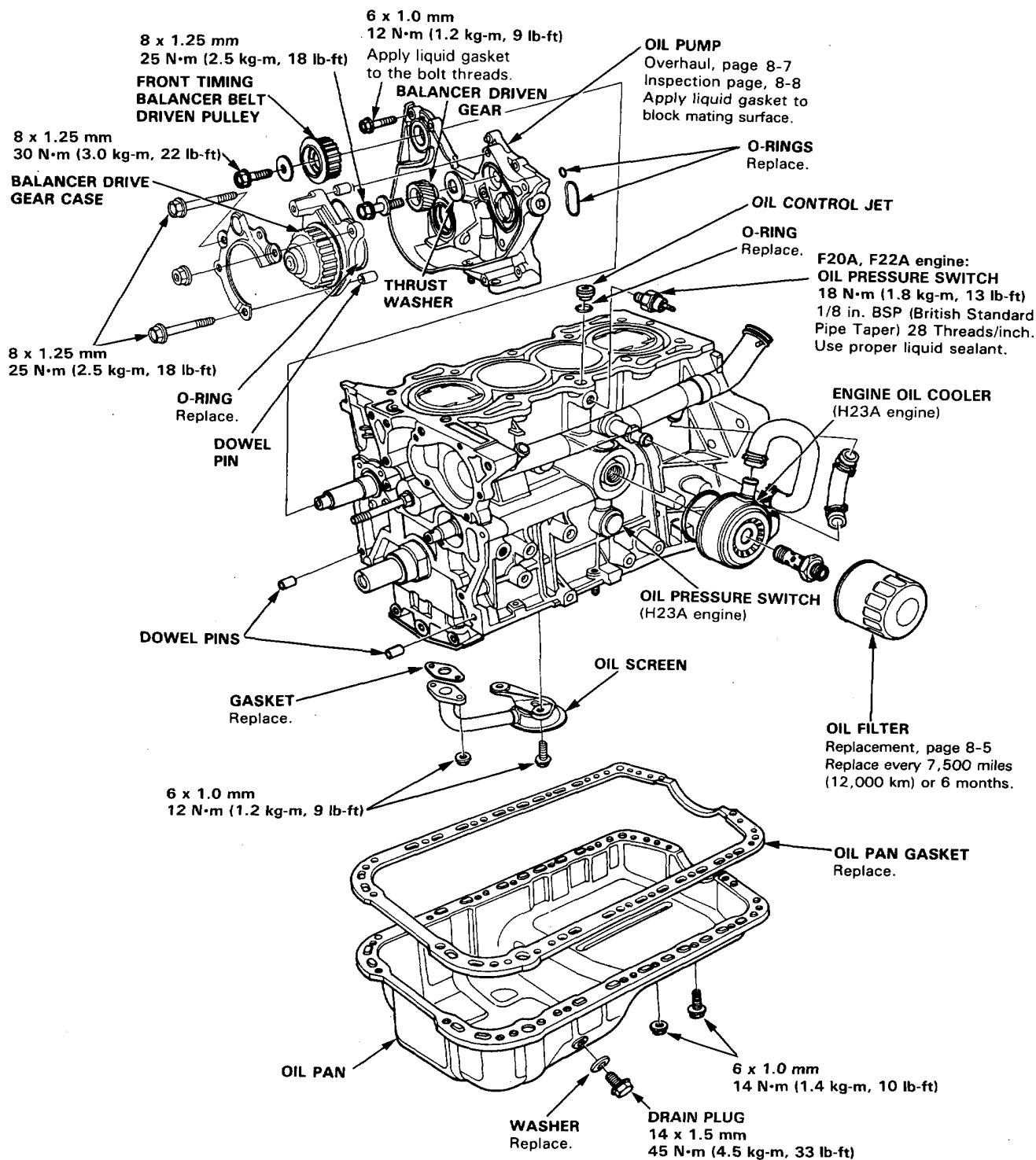


Engine Lubrication

Illustrated Index

NOTE:

- Use new O-rings when reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 0Y740-99986.

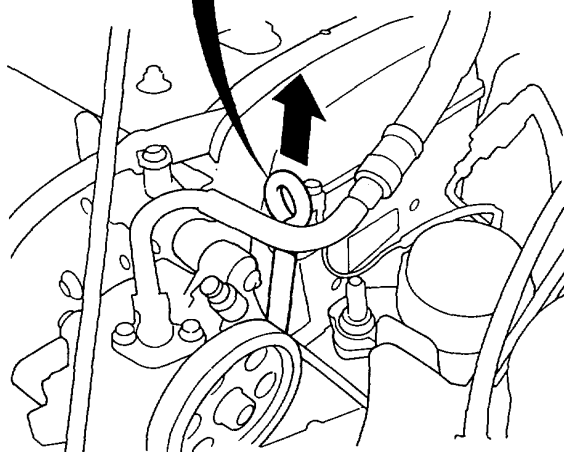
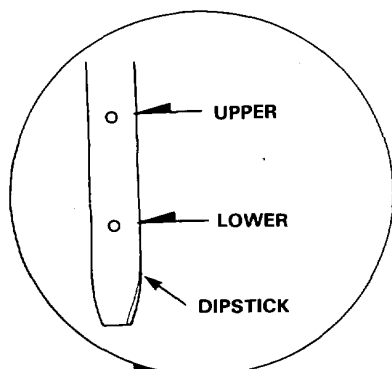


Engine Oil

Oil Level Inspection

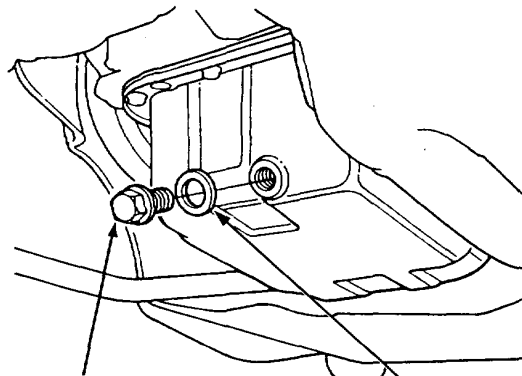
1. Check engine oil with the engine off and the car parked on level ground.
2. Make certain that the oil level indicated on the dipstick is between the upper and lower marks.
3. If the level has dropped close to the lower mark, add oil until it reaches the upper mark.

CAUTION: Insert the dipstick carefully to avoid bending it.



Replacement

1. Warm up the engine.
2. Drain the engine oil.



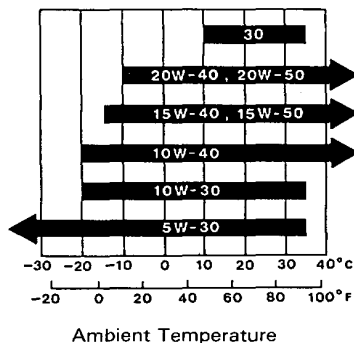
OIL DRAIN PLUG
45 N·m (4.5 kg-m, 33 lb-ft)

WASHER
Replace.

3. Reinstall the drain plug with a new washer, and refill with the recommended oil.

Requirement	Always use a fuel-efficient oil is that says "API Service SG or SF". SAE Viscosity: See chart below.
Capacity	F20A, F22A engine: 3.8 ℓ (4.0 US qt, 3.3 Imp qt) at change, including filter. 4.9 ℓ (5.2 US qt, 4.3 Imp qt) after engine overhaul. H23A engine: 4.3 ℓ (4.5 US qt, 3.8 Imp qt) at change, including filter 5.4 ℓ (5.7 US qt, 4.8 Imp qt) after engine overhaul.
Change	Every 7,500 miles (12,000 km) or 6 months

Select the oil for the car according to this cart:



Filter



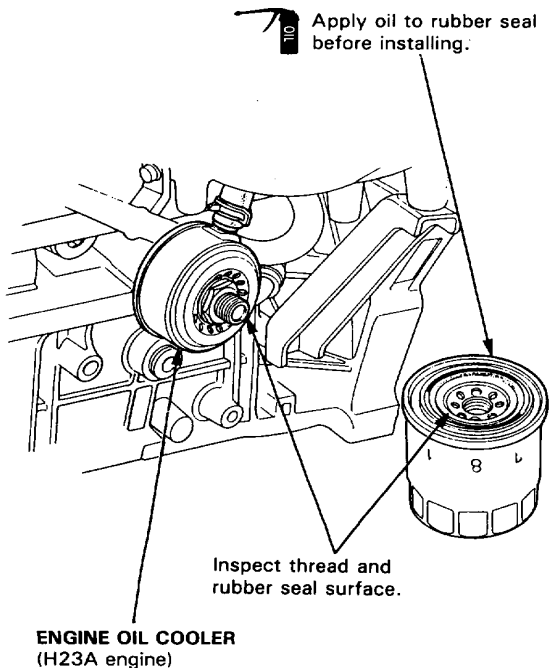
Replacement

⚠ WARNING

- After the engine has been run, the exhaust pipe will be hot; be careful when working around the exhaust pipe.
- Be careful when loosening the drain bolt while the engine is hot. Burns can result because the oil temperature is very high.

1. Remove the oil filter with the special oil filter wrench.
2. Inspect the threads and rubber seal on the new filter. Wipe off seat on engine block, then apply a light coat of oil to the filter rubber seal.

NOTE: Use only filters with a built-in bypass system.

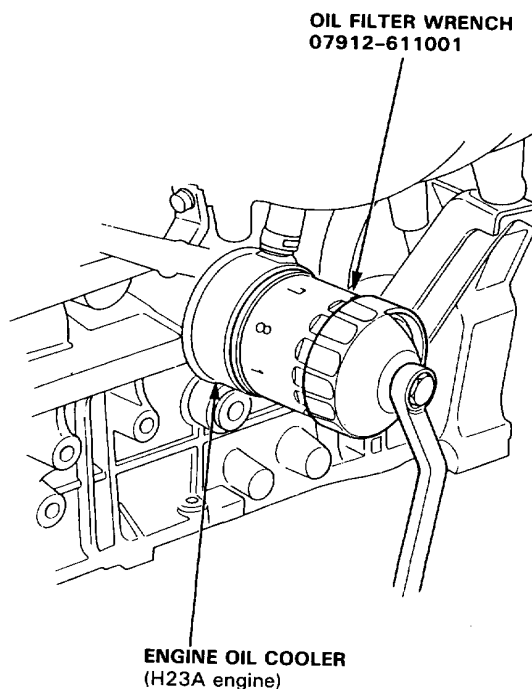


3. Install the oil filter by hand.
4. After the rubber seal is seated, tighten the oil filter clockwise with the special tool.

Tighten: 7/8 turn clockwise.

Tightening torque: 22 N·m (2.2 kg-m, 16 lb-ft)

CAUTION: Installation using other than the above procedure could result in serious engine defects due to oil leakage.



(cont'd)

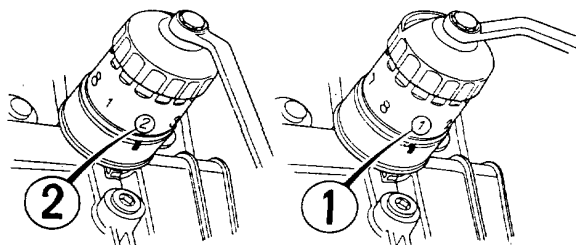
Filter

Replacement (cont'd)

Eight numbers (1 to 8) are printed on the surface of the filter.

The following explains the procedure for tightening filters using these numbers.

- 1) Make a mark on the cylinder block under the number that shows at the bottom of the filter when the rubber seal is seated.
- 2) Tighten the filter by turning it clockwise seven numbers from the marked point. For example, if a mark is made under the number 2 when the rubber seal is seated, the filter should be tightened until the number 1 comes up to the marked point.



Number when rubber seal is seated.

Number after tightening.

Number when rubber seal is seated	1	2	3	4	5	6	7	8
Number after tightening	8	1	2	3	4	5	6	7

5. After installation, fill the engine with oil up to the specified level, run the engine for more than 3 minutes, then check for oil leakage.

Oil Pressure

Test

If the oil pressure warning light stays on with the engine running, check the engine oil level. If the oil level is correct:

1. Connect a tachometer.
2. Remove the oil pressure switch and install an oil pressure gauge.
3. Start the engine. Shut it off immediately if the gauge registers no oil pressure. Repair the problem before continuing.
4. Allow the engine to reach operating temperature (fan comes on at least twice). The pressure should be:

Engine Oil Pressure: 80°C (176°F)

At Idle: 70 kPa (0.7 kg/cm², 10 psi) minimum

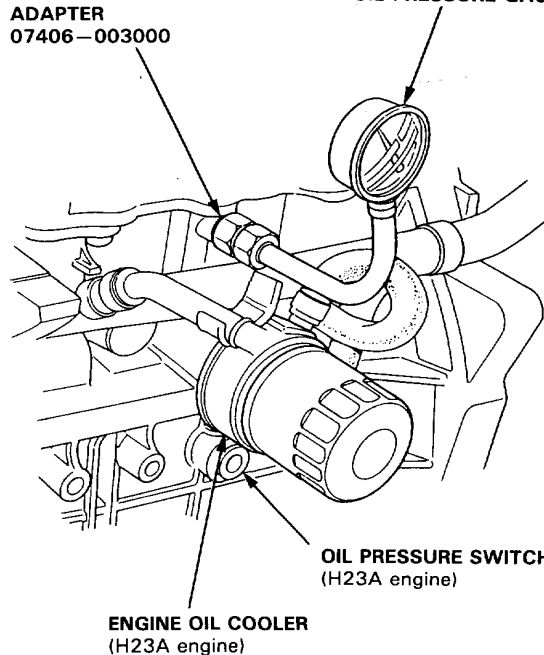
At 3,000 rpm: 350 kPa (3.5 kg/cm², 50 psi) minimum

- If oil pressure is within specifications, replace the oil pressure sender and recheck.
- If oil pressure is NOT within specifications, inspect the oil pump (pages 8-8 and 9).

F20A, F22A engine:

OIL PRESSURE GAUGE ADAPTER
07406-003000

OIL PRESSURE GAUGE



OIL PRESSURE SWITCH
(H23A engine)

ENGINE OIL COOLER
(H23A engine)

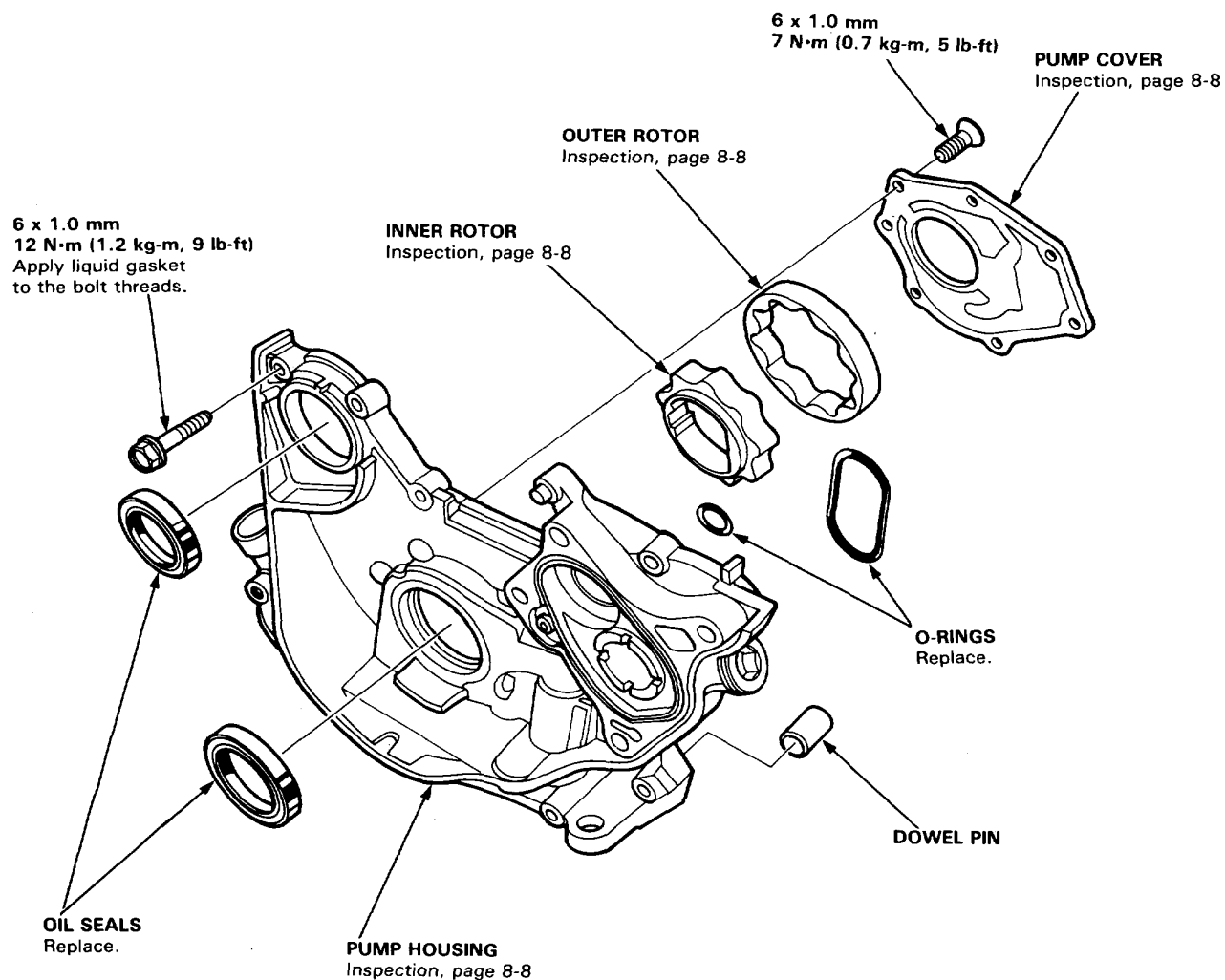


Oil Pump

Overhaul

NOTE:

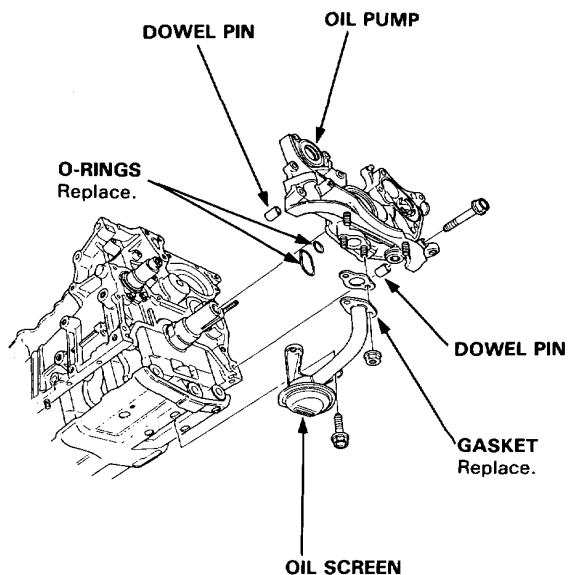
- Use new O-rings when reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 0Y740—99986.



Oil Pump

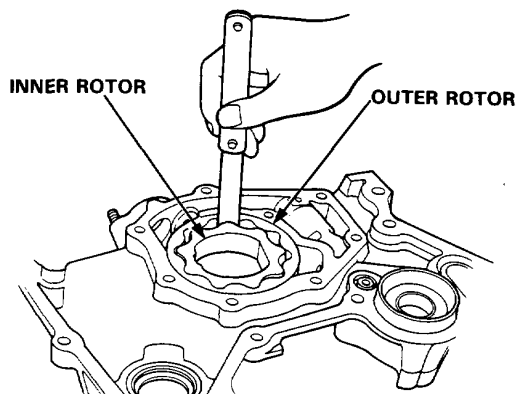
Removal/Inspection/Installation

1. Drain the engine oil.
2. Turn the crankshaft so that the No. 1 cylinder is at top-dead-center (F20A, F22A engine: page 6-25, H23A engine: page 6-61).
3. Remove the timing belt and the timing balancer belt (F20A, F22A engine: page 6-26, H23A engine: page 6-62).
4. Remove the timing belt tensioner and the timing balancer belt tensioner.
5. Remove the timing belt drive pulley and the timing balancer belt driven pulley (page 7-11).
6. Remove the balancer drive gear case and the balancer driven gear (page 7-11).
7. Remove the oil pan and the oil screen.
8. Remove the mounting bolts and the oil pump assembly.



9. Remove the screws from the pump housing, then separate the housing and cover.
10. Check the radial clearance on the pump rotor.

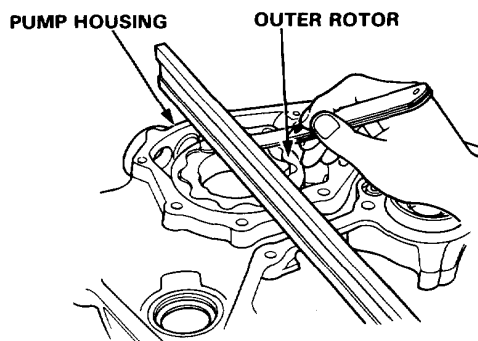
Inner Rotor-to-Outer Rotor Radial Clearance
Standard (New): 0.02–0.16 mm
(0.001–0.006 in)
Service Limit: 0.20 mm (0.008 in)



— If the radial clearance exceeds the service limit, replace the inner and outer rotors.

11. Check the axial clearance on the pump rotor.

Housing-to-Rotor Axial Clearance
Standard (New): 0.02–0.07 mm
(0.001–0.003 in)
Service Limit: 0.12 mm (0.005 in)

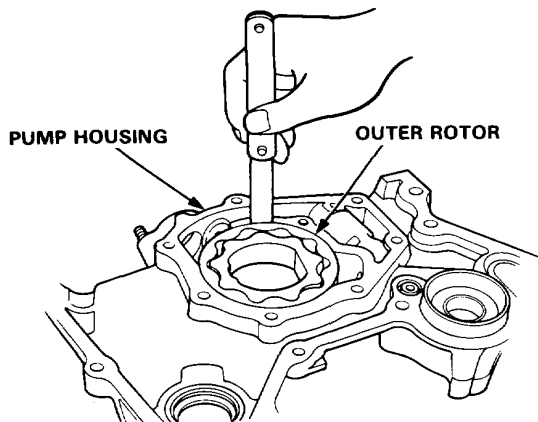


— If the axial clearance exceeds the service limit, replace the set of inner and outer rotors and/or the pump housing.



12. Check the radial clearance between the housing and the outer rotor.

Housing-to-Rotor Radial Clearance
Standard (New): 0.10–0.19 mm
(0.004–0.007 in)
Service Limit: 0.21 mm (0.008 in)



— If the radial clearance exceeds the service limit, replace the set of inner and outer rotors and/or the pump housing.

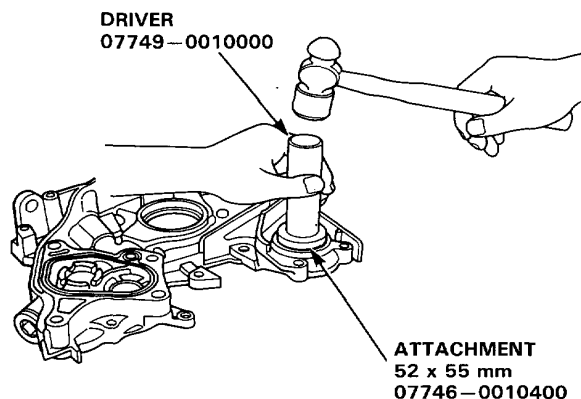
13. Inspect both rotors and the pump housing for scoring or other damage. Replace parts if necessary.

14. Remove the old oil seals from the oil pump.

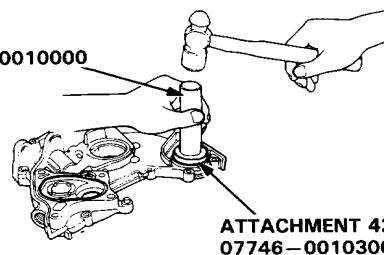
15. Gently tap in the new oil seals until the tool bottoms on the pump.

NOTE: The oil seals alone can be replaced without removing the oil pump using the special tool.

F20A, F22A engine:



DRIVER
07749-0010000



16. Reassemble the oil pump, applying locking fluid to the pump housing screws.

17. Check that the oil pump turns freely.

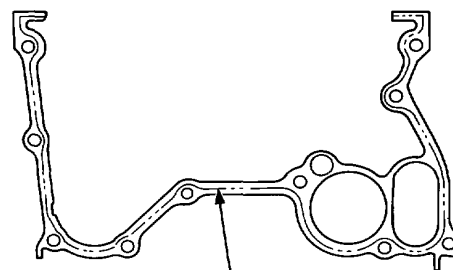
18. Install the two dowel pins on the cylinder block and the new O-ring on the pump.

NOTE:

- Use liquid gasket, Part No. 0Y740-99986.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket evenly, in a narrow bead centered on the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.
- Do not install the parts if 20 minutes or more have elapsed since applying liquid gasket. Instead reapply liquid gasket after removing the old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.

19. Apply liquid gasket to the block mating surface of the oil pump, then install it on the engine block.

- Apply grease to the lips of the oil pump seal and the balancer seal. Then, install the oil pump onto the inner rotor to the crankshaft. When the pump is in place, clean any excess grease off the crankshaft and the balancer shaft, then check that the oil seal lips are not distorted.



Apply liquid gasket
on the broken line.

(cont'd)

Oil Pump

Removal/Inspection/Installation (cont'd)

OIL PUMP

Apply liquid gasket to block mating surface.

Apply grease to the seal lips.

6 x 1.0 mm
12 N·m (1.2 kg-m, 9 lb-ft)
Apply liquid gasket to the bolt threads.

O-RINGS

Apply engine oil. Replace.

DOWEL PIN

GASKET
Replace.

OIL SCREEN

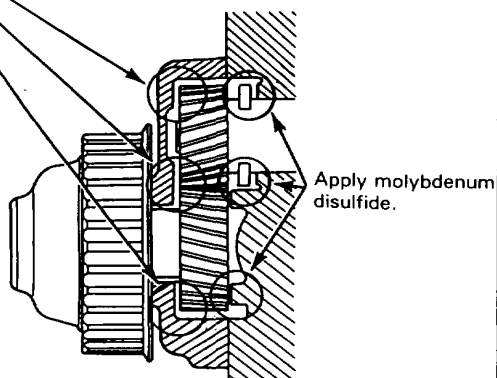
6 x 1.0 mm
12 N·m (1.2 kg-m, 9 lb-ft)

20. Install the baffle plate.

21. Install the oil screen.

22. Apply molybdenum disulfide to the thrust surfaces of the balancer gears, as shown, before installing the balancer driven gear and the balancer drive gear case.

Apply molybdenum disulfide.



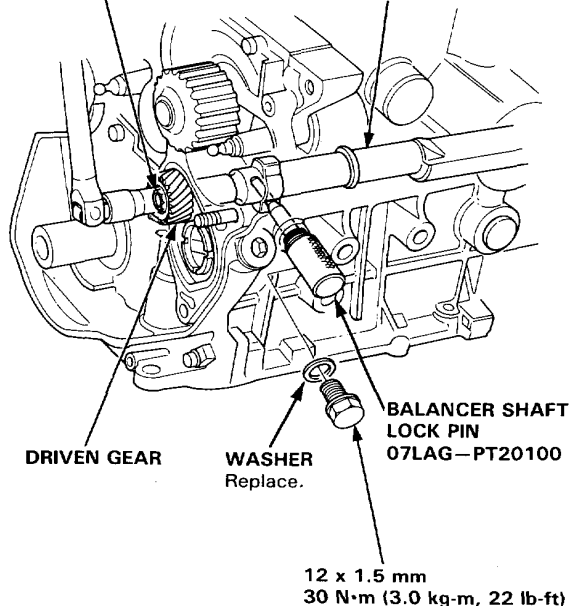
Apply molybdenum disulfide.

23. Fix the balancer shaft with the special tool, then install the balancer driven gear and the timing balancer belt driven pulley.

REAR BALANCER:

8 x 1.25 mm
25 N·m (2.5 kg-m, 18 lb-ft)

REAR BALANCER
SHAFT



DRIVEN GEAR

WASHER
Replace.

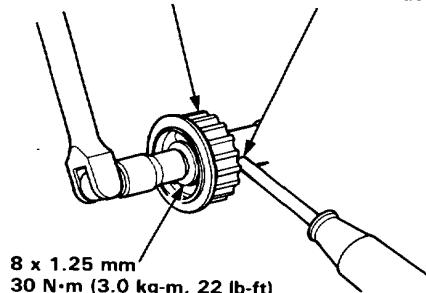
BALANCER SHAFT
LOCK PIN
07LAG-PT20100

12 x 1.5 mm
30 N·m (3.0 kg-m, 22 lb-ft)

FRONT BALANCER:

TIMING BALANCER BELT
DRIVEN PULLEY

MAINTENANCE HOLE

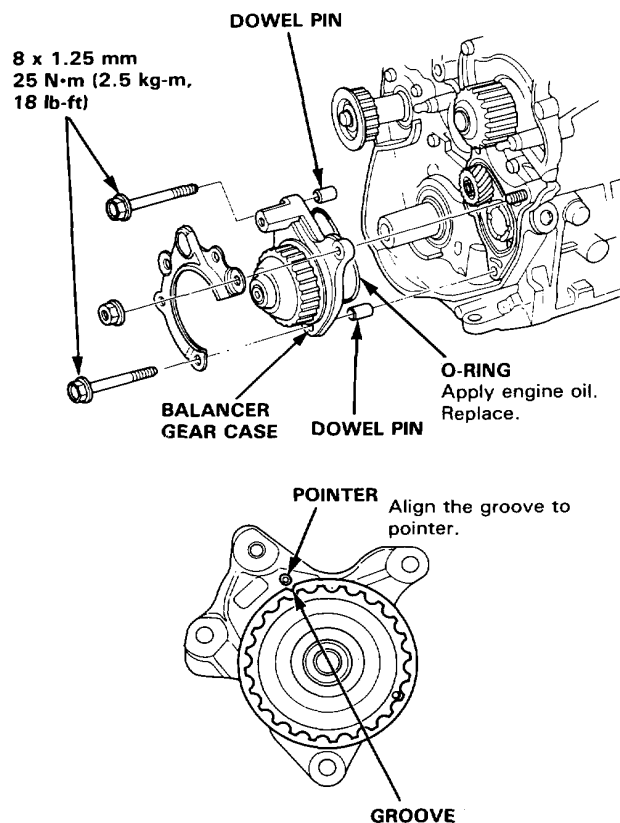


8 x 1.25 mm
30 N·m (3.0 kg-m, 22 lb-ft)

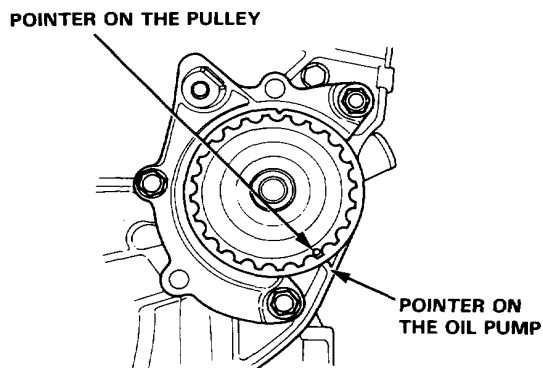


24. Install the balancer gear case to the oil pump.

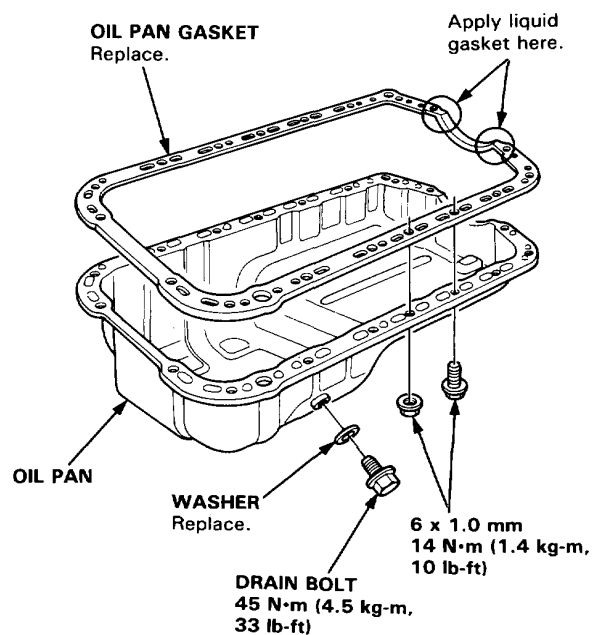
NOTE: Align the groove on the pulley edge to the pointer on the gear case when holding the rear balancer with the special tool, then install the gear case.



25. Check alignment of pointers after installing the gear case.

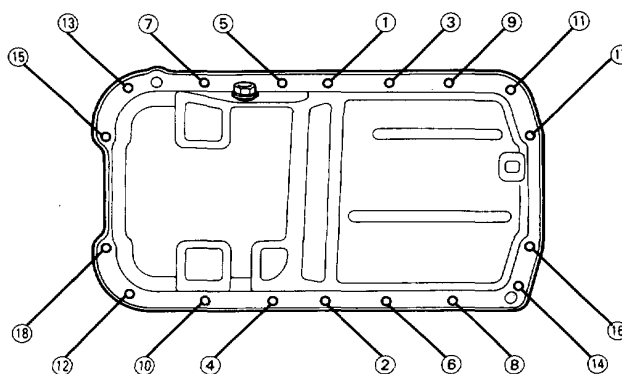


26. Install the oil pan.



27. Tighten the bolts and nuts as shown below.

Torque: 14 N·m (1.4 kg-m, 10 lb-ft)



NOTE: Tighten the bolts and nuts in two steps and torque them in a criss-cross pattern.

Intake Manifold/Exhaust System

Intake Manifold	9-2
Exhaust Manifold	9-4
Exhaust Pipe and Muffler	9-6

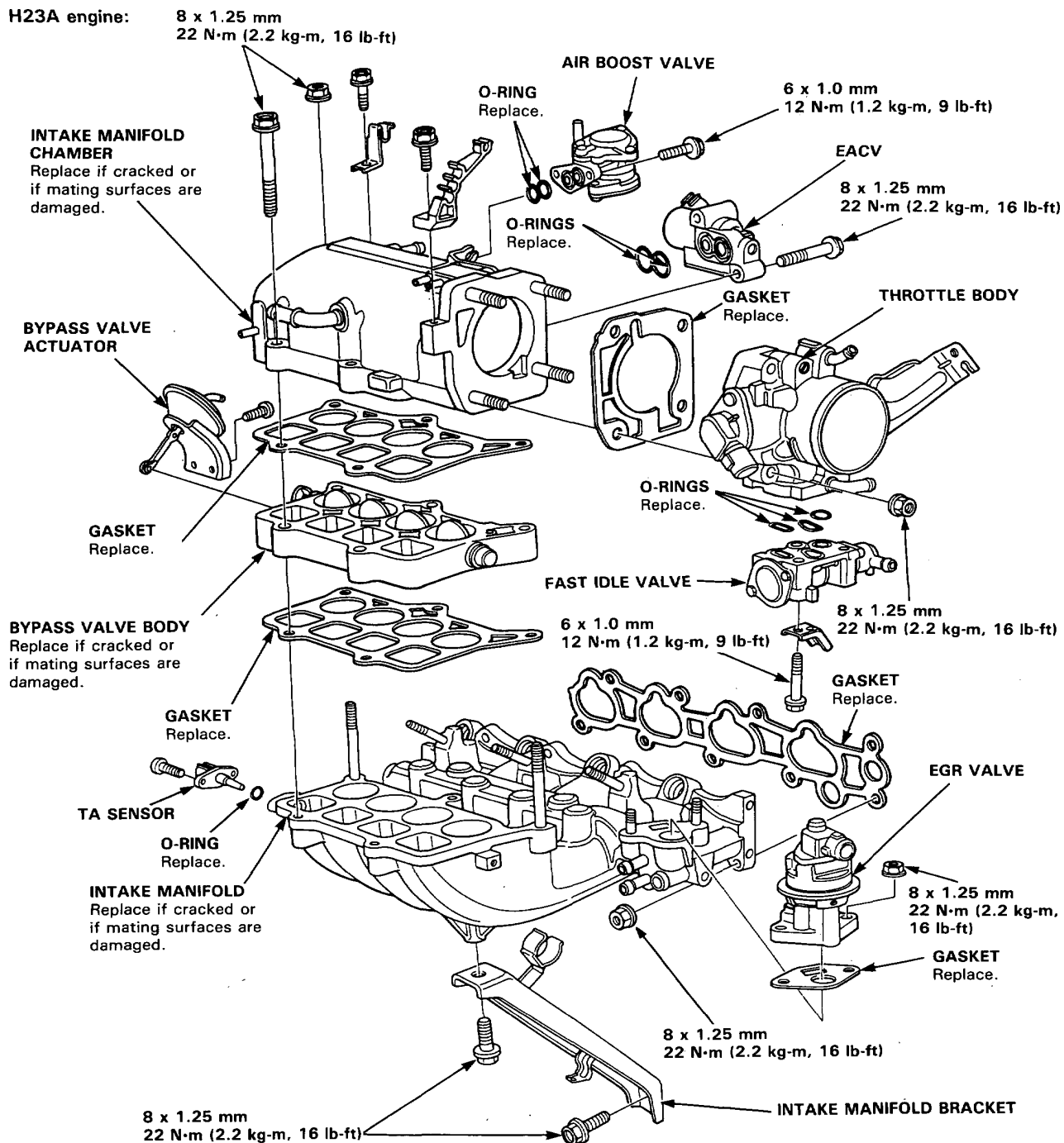


Intake Manifold

Replacement

NOTE: Use new O-rings and gaskets when reassembling.

CAUTION: Check for folds or scratches on the surface of the gasket. Replace with a new gasket if damaged.

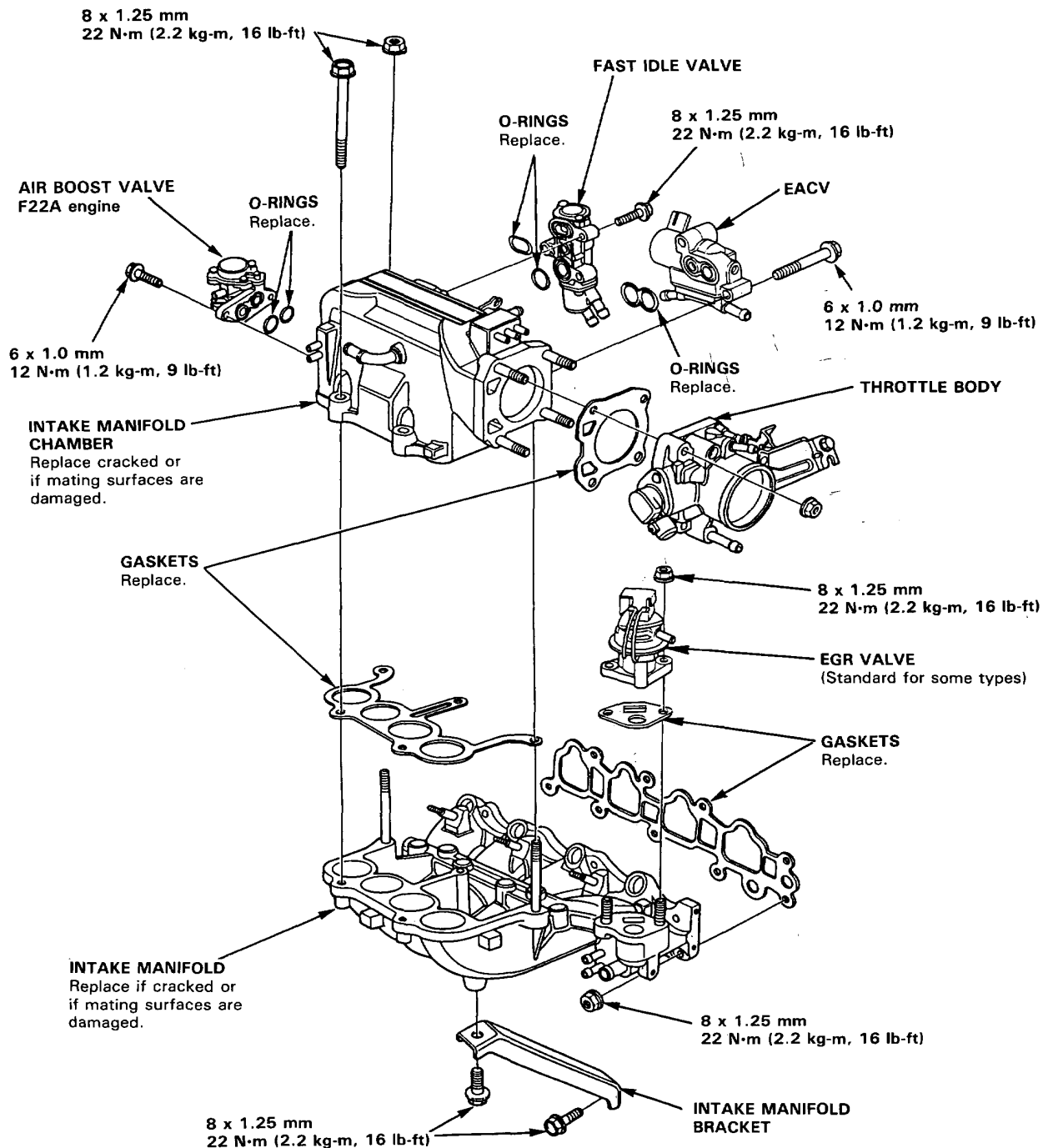




NOTE: Use new O-rings and gaskets when reassembling.

CAUTION: Check for folds or scratches on the surface of the gasket. Replace with a new gasket if damaged.

F20A, F22A engine:



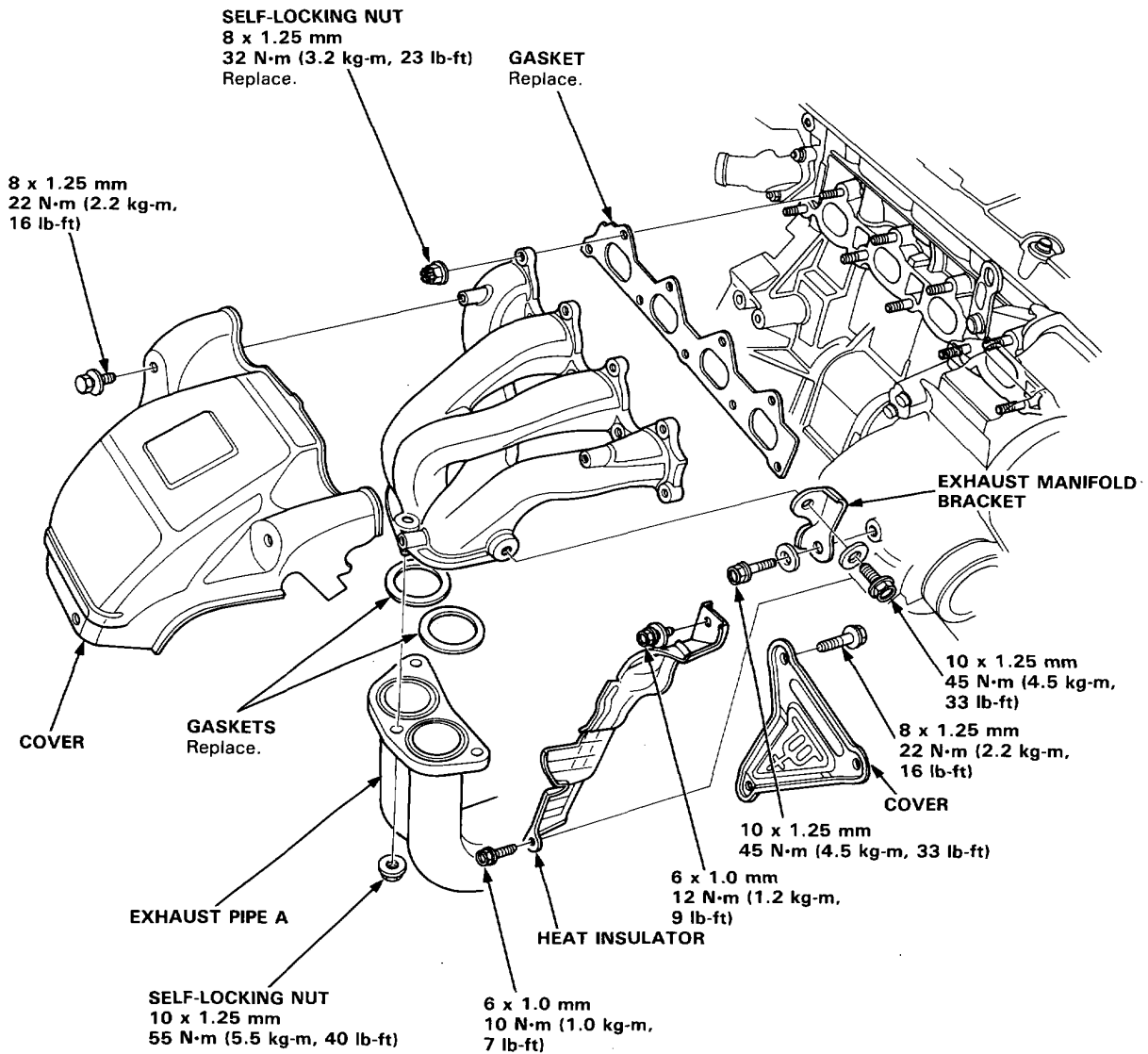
Exhaust Manifold

Replacement

NOTE: Use new gaskets and self-locking nuts when reassembling.

CAUTION: Check for folds or scratches on the surface of the gasket. Replace with a new gasket if damaged.

H23A engine:

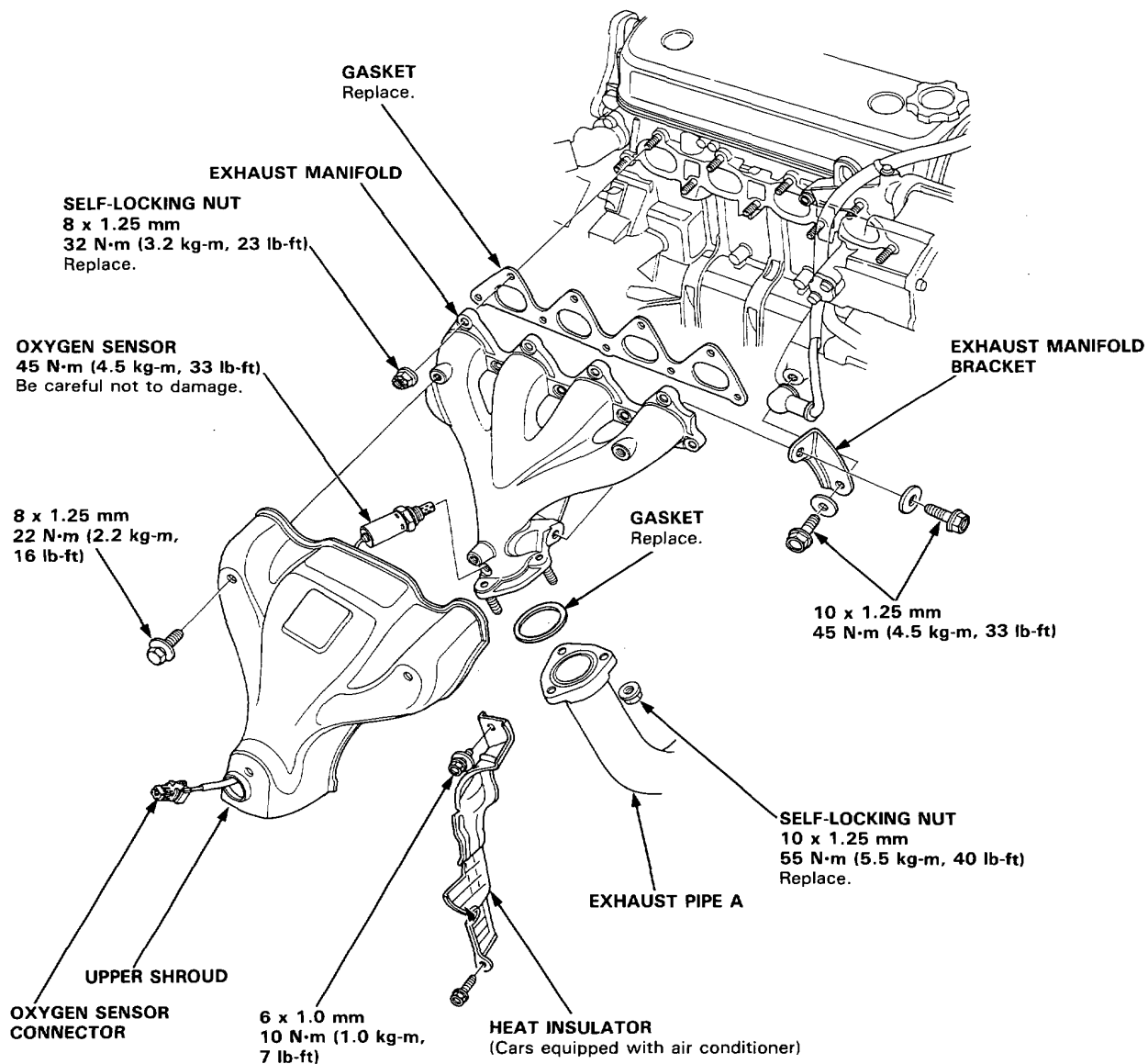




NOTE: Use new gaskets and self-locking nuts when reassembling.

CAUTION: Check for folds or scratches on the surface of the gasket. Replace with a new gasket if damaged.

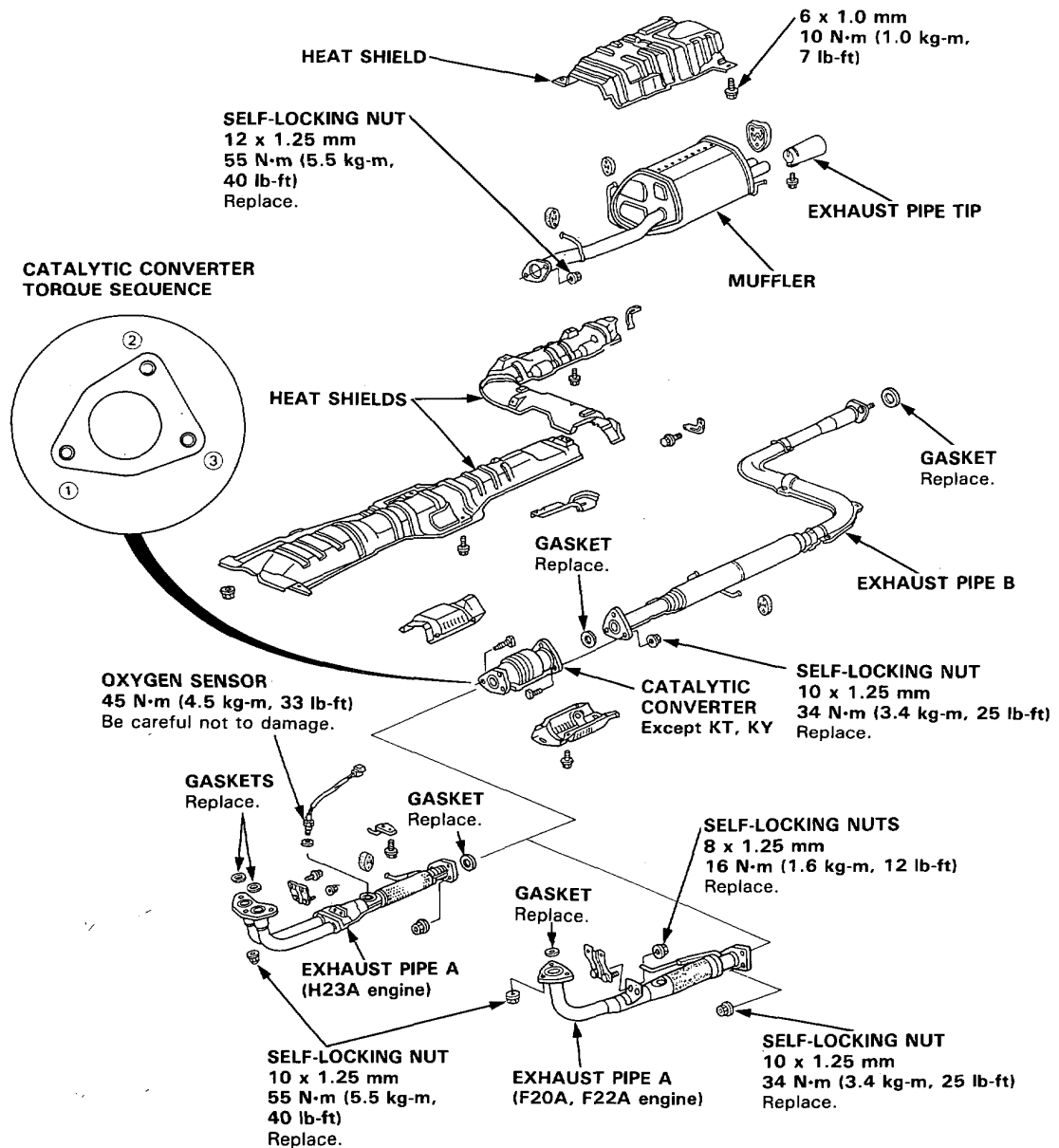
F20A, F22A engine:



Exhaust Pipe and Muffler

Replacement

NOTE: Use new gaskets and self-locking nuts when reassembling.



Cooling

Radiator

Illustrated Index	10-2
Replacement	10-4
Refilling and Bleeding	10-5
Cap Testing	10-6
Testing	10-6

Thermostat

Replacement	10-7
Testing	10-7

Water Pump

Illustrated Index	10-8
Inspection	10-9
Replacement	10-9



Radiator

Illustrated Index

⚠ WARNING System is under high pressure when engine is hot. To avoid danger of releasing scalding coolant, remove cap only when engine is cool.

Total Cooling System Capacity (Including heater and reservoir)

F20A, F22A engine:

Manual: 7.1 ℓ (1.88 US gal, 1.56 Imp gal)

Automatic: 7.0 ℓ (1.85 US gal, 1.54 Imp gal)

H23A engine:

Manual: 7.6 ℓ (2.01 US gal, 1.67 Imp gal)

Automatic: 7.3 ℓ (1.93 US gal, 1.61 Imp gal)

Reservoir capacity: 0.6 ℓ (0.16 US gal, 0.13 Imp gal)

CAUTION: When pouring coolant, be sure to shut the relay box lid and not to let coolant spill on the electrical parts or the paint. If any coolant spills, rinse it off immediately.

NOTE:

- Check all cooling system hoses for damage, leaks or deterioration and replace if necessary.
- Check all hose clamps and retighten if necessary.
- Use new O-rings when reassembling.

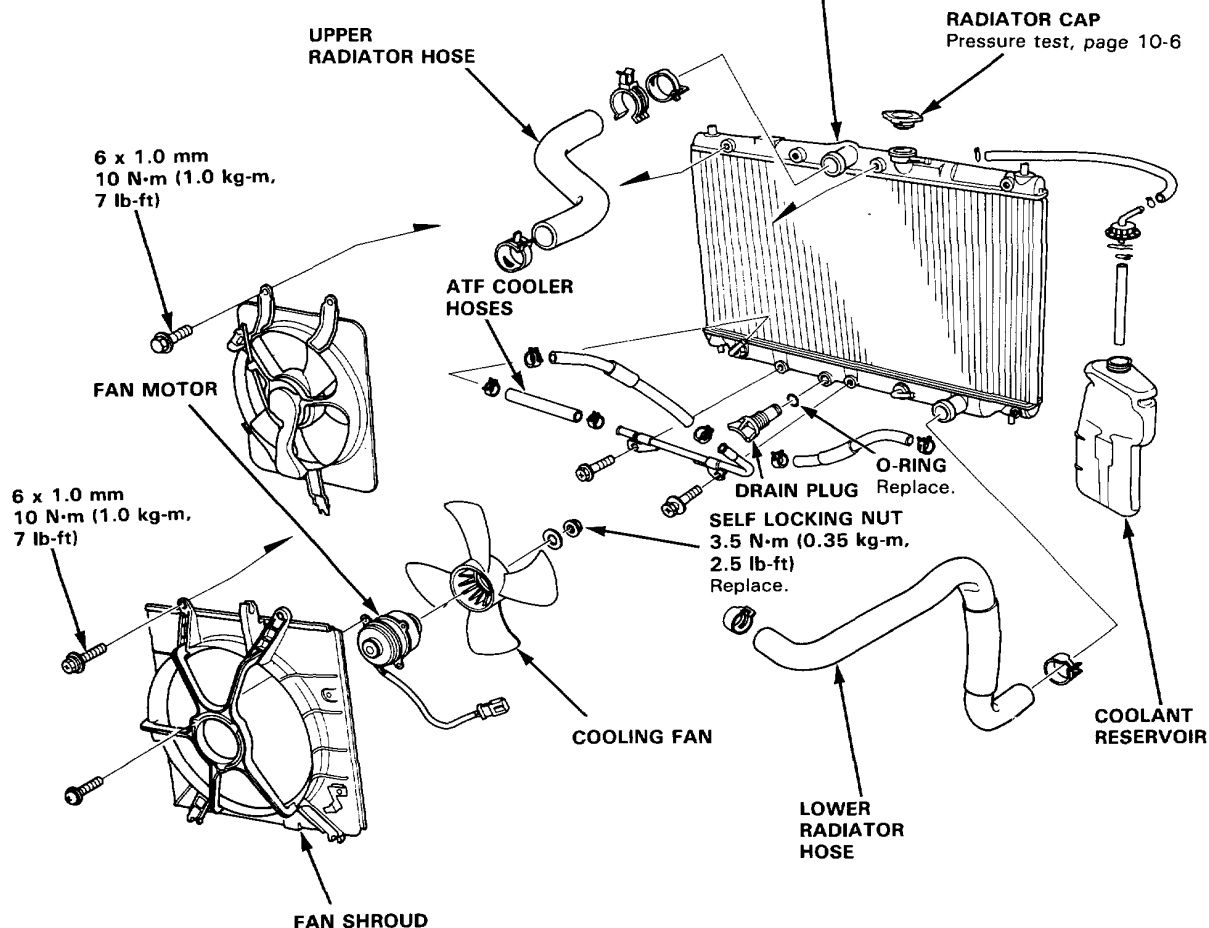
RADIATOR

Refilling and bleeding, page 10-5

Leak test, page 10-6

Inspect soldered joints and seams for leaks.

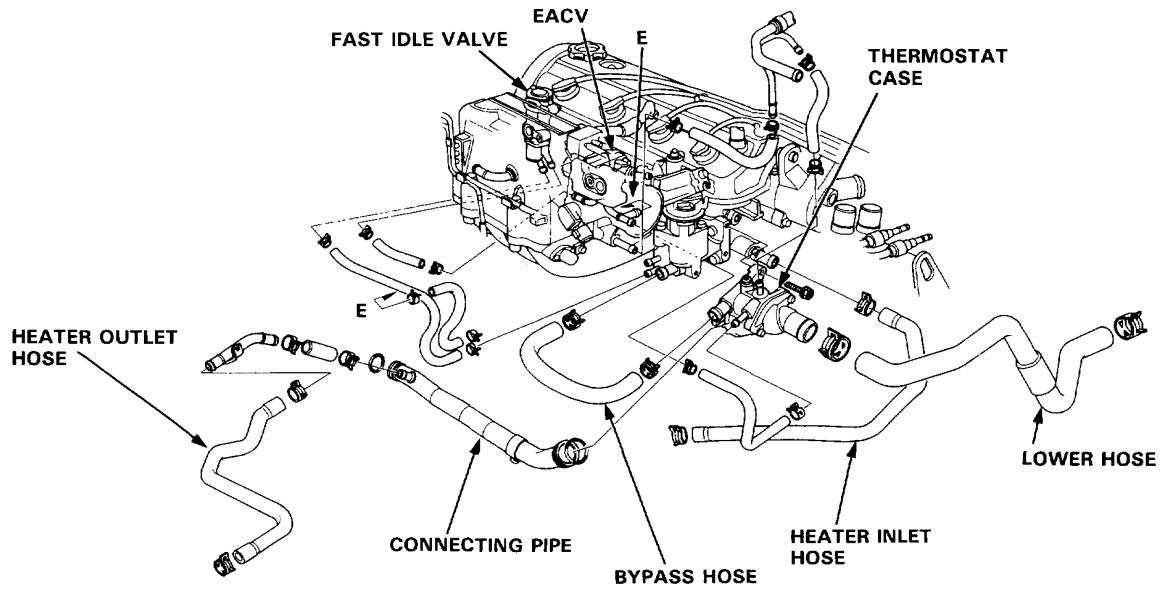
Blow out dirt from between core fins with compressed air. If insects, etc., are clogging radiator, wash them off with low pressure water.



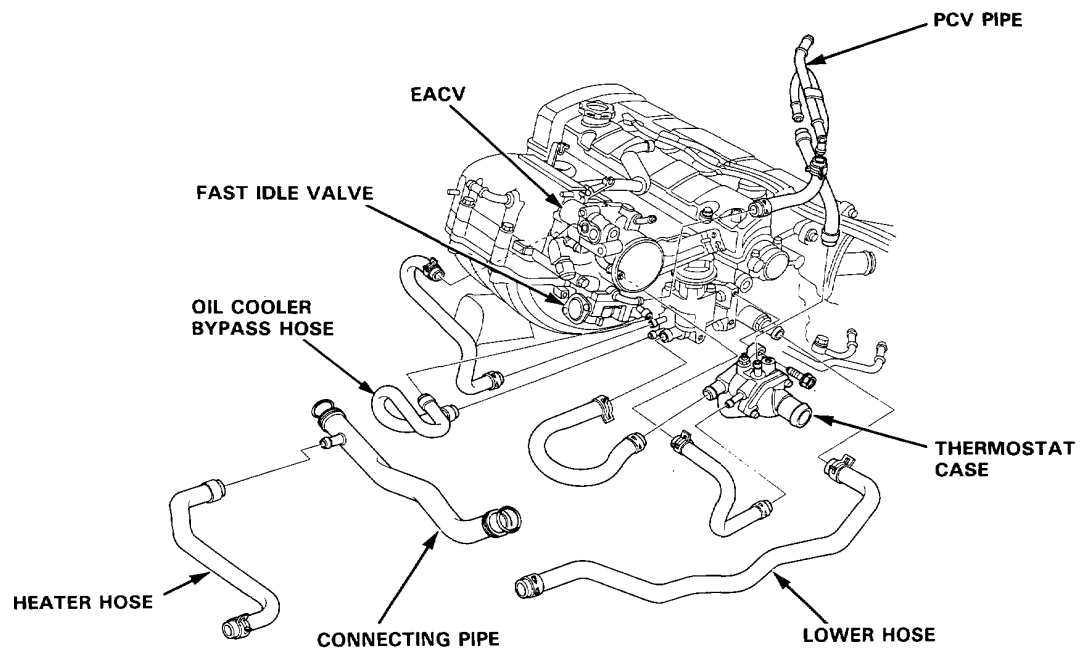


Engine Hose Connections:

F20A, F22A engine:



H23A engine:



Radiator

Repalcement

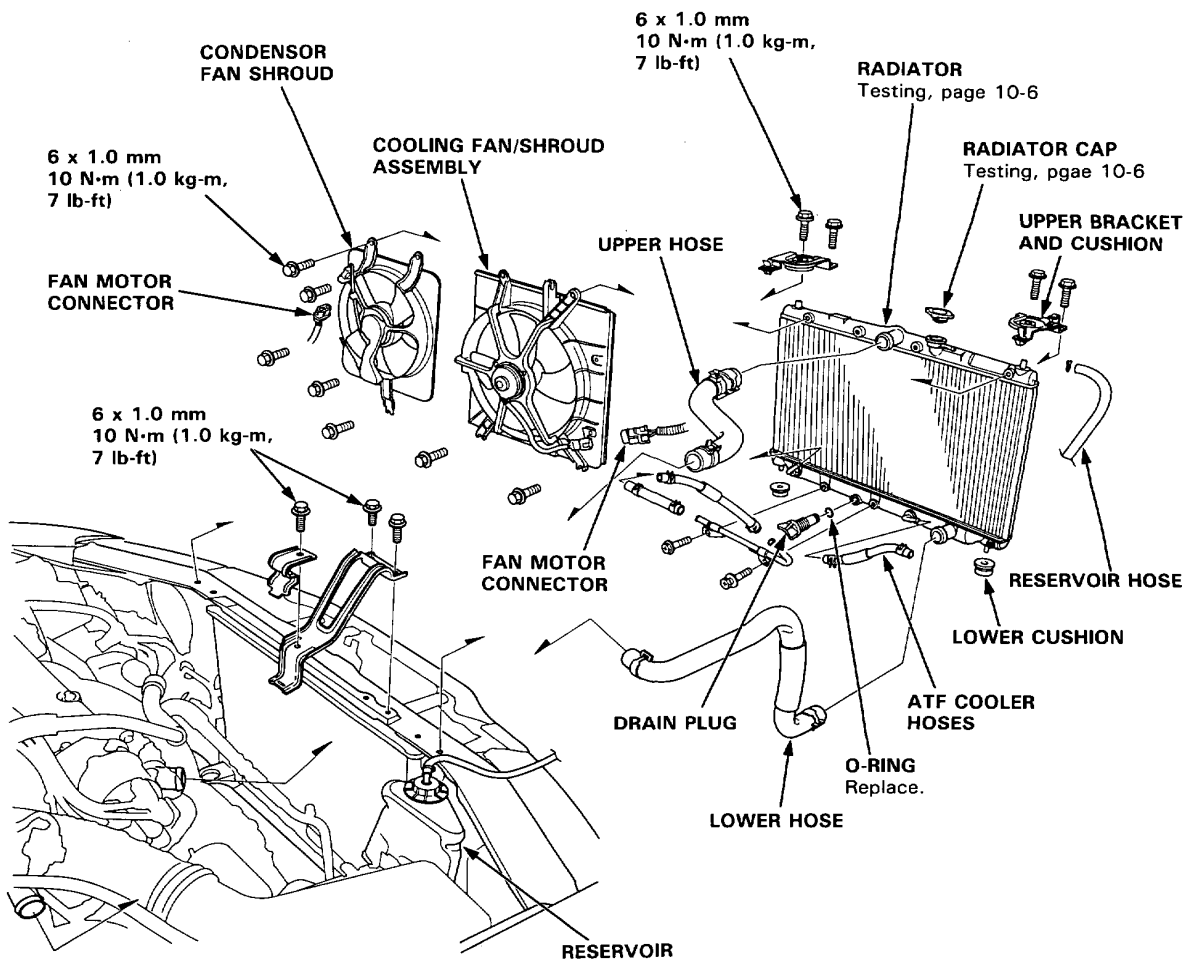
1. Drain radiator coolant.
2. Remove the upper and lower radiator hoses, and ATF cooler hoses.
3. Disconnect the fan motor connectors.
4. Remove the radiator upper brackets, then pull up the radiator.

5. Remove the fan shroud assemblies and other parts from radiator.

Install the radiator in the reverse order of removal:

NOTE:

- Set the upper and lower cushions securely.
- Fill the radiator and bleed the air.





Refilling and Bleeding

CAUTION: When pouring coolant, be sure to shut the relay box lid and not to let coolant spill on the electrical parts or the paint. If any coolant spills, rinse it off immediately.

1. Set the heater temperature lever or control dial to maximum heat.
2. Remove the engine splash shield under the engine.
3. When the radiator is cool, remove the radiator cap. Loosen the drain plug, and drain the radiator.
4. Remove the drain bolt from the rear side of the cylinder block to drain the block and heater.
5. Apply liquid gasket to the drain bolt threads, then reinstall the bolt with a new washer and tighten it securely.
6. Tighten the radiator drain plug securely.
7. Remove, drain and reinstall the reservoir. Fill the tank halfway to the MAX mark with water, then up to the MAX mark with coolant.
8. Mix the recommended anti-freeze with an equal amount of water in a clean container.

NOTE:

- Use only HONDA-recommended anti-freeze/coolant.
- For best corrosion protection, the coolant concentration must be maintained year-round at 50% MINIMUM. Coolant concentrations less than 50% may not provide sufficient protection against corrosion or freezing.
- Coolant concentrations greater than 60% will impair cooling efficiency and are not recommended.

CAUTION:

- Do not mix different brands of anti-freeze/coolants.
- Do not use additional rust inhibitors or anti-rust products; they may not be compatible with the recommended coolant.

Radiator Coolant Refill Capacity: including reservoir (0.6 ℓ (0.6 US qt, 0.5 Imp qt)) and heater (0.6 ℓ (0.6 US qt, 0.5 Imp qt)).

F20A, F22A engine:

Manual: 3.5 ℓ (0.92 US gal, 0.77 Imp gal)
Automatic: 3.4 ℓ (0.90 US gal, 0.75 Imp gal)

H23A engine:

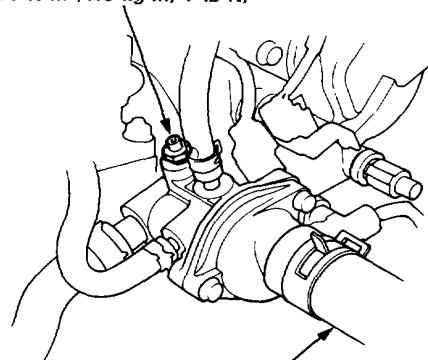
Manual: 3.8 ℓ (1.00 US gal, 0.84 Imp gal)

Automatic: 3.7 ℓ (0.98 US gal, 0.81 Imp gal)

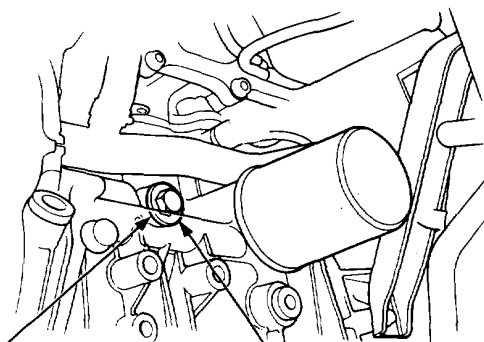
9. Loosen the air bleed bolt in the water outlet, then fill the radiator to the bottom of the filler neck with the coolant mixture. Tighten the bleed bolt as soon as coolant starts to run out in a steady stream without bubbles.

BLEED BOLT

10 N·m (1.0 kg-m, 7 lb-ft)



UPPER HOSE



WASHER
Replace.

DRAIN BOLT

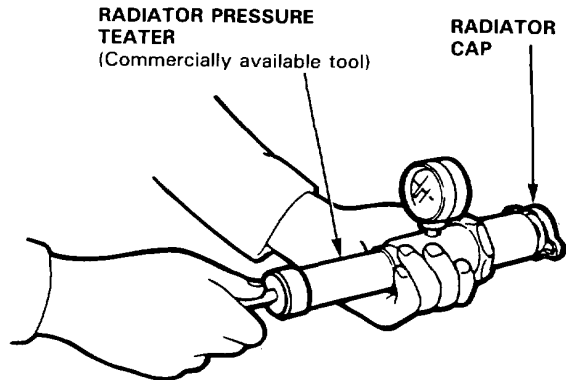
60 N·m (6.0 kg-m, 43 lb-ft)
Apply liquid gasket to the bolt threads when installing.

10. With the radiator cap off, start the engine and let it run until warmed up (fan goes on at least twice). Then, if necessary, add more coolant mix to bring the level back up to the bottom of the filler neck.
11. Put the radiator cap on, then run the engine again and check for leaks.

Radiator

Cap Testing

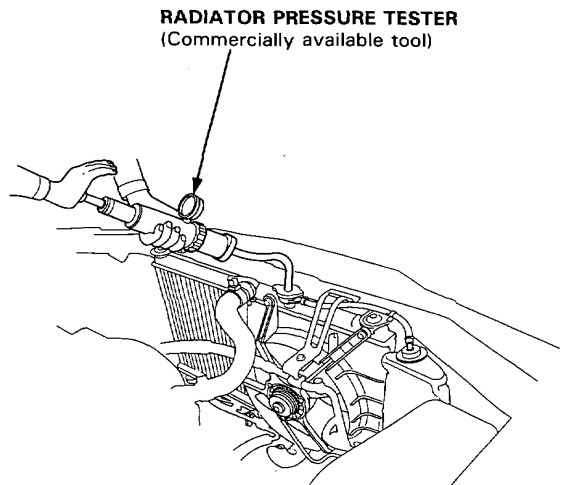
1. Remove the radiator cap, wet its seal with coolant, then install it on the pressure tester.
2. Apply a pressure of 95–125 kPa (0.95–1.25 kg/cm², 13.5–17.8 psi).
3. Check for a drop in pressure.
4. If the pressure drops, replace the cap.



Testing

1. Wait until the engine is cool, then carefully remove the radiator cap and fill the radiator with coolant to the top of the filler neck.
2. Attach the pressure tester to the radiator and apply a pressure of 95–125 kPa (0.95–1.25 kg/cm², 13.5–17.8 psi).
3. Inspect for coolant leaks and a drop in pressure.
4. Remove the tester and reinstall the radiator cap.

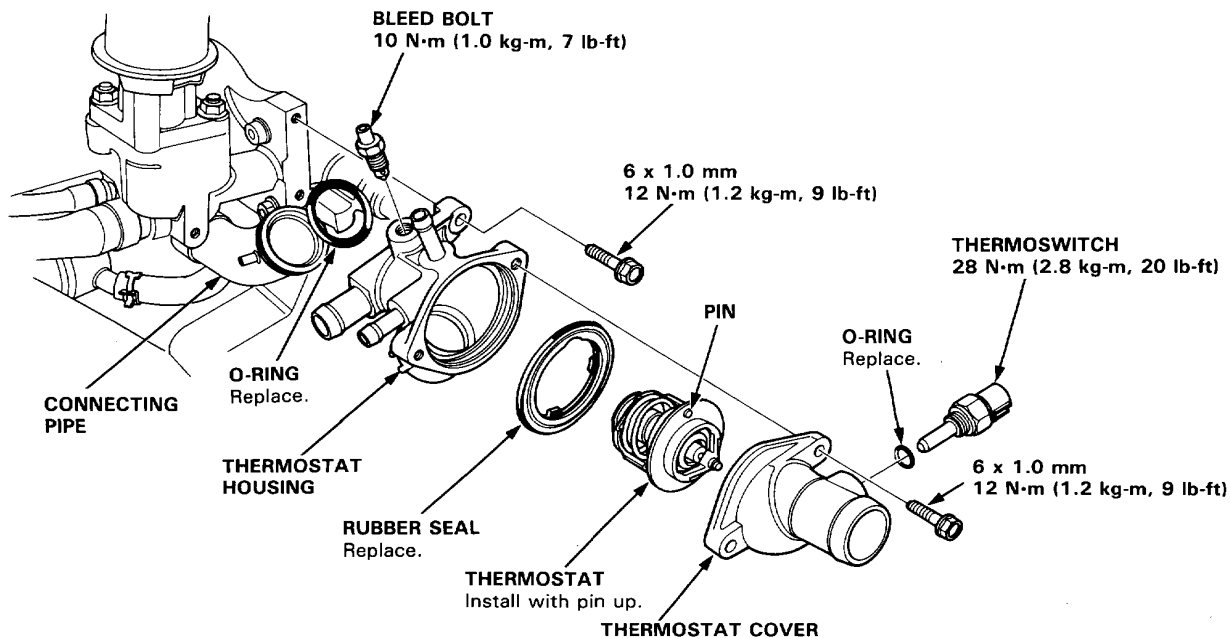
NOTE: Check for engine oil in the coolant and/or coolant in engine oil.





Thermostat Replacement

NOTE: Use new O-rings when reassembling.



Testing

Replace the thermostat if it is open at room temperature.

To test a closed thermostat:

1. Suspend the thermostat in a container of water as shown.
2. Heat the water and check the temperature with a thermometer. Check the temperature at which the thermostat first opens, and at which it is fully open.

CAUTION: Do not let the thermometer touch the bottom of hot container.

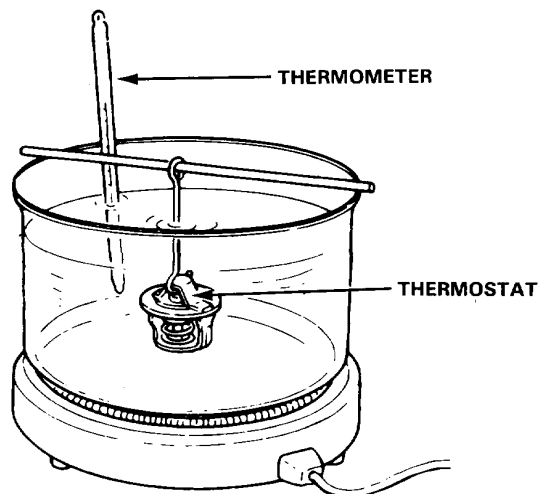
3. Measure lift height of the thermostat when fully open.

STANDARD THERMOSTAT

Lift height: above 8.0 mm (0.31 in.)

Starts opening: 76–80°C (169–176°F)

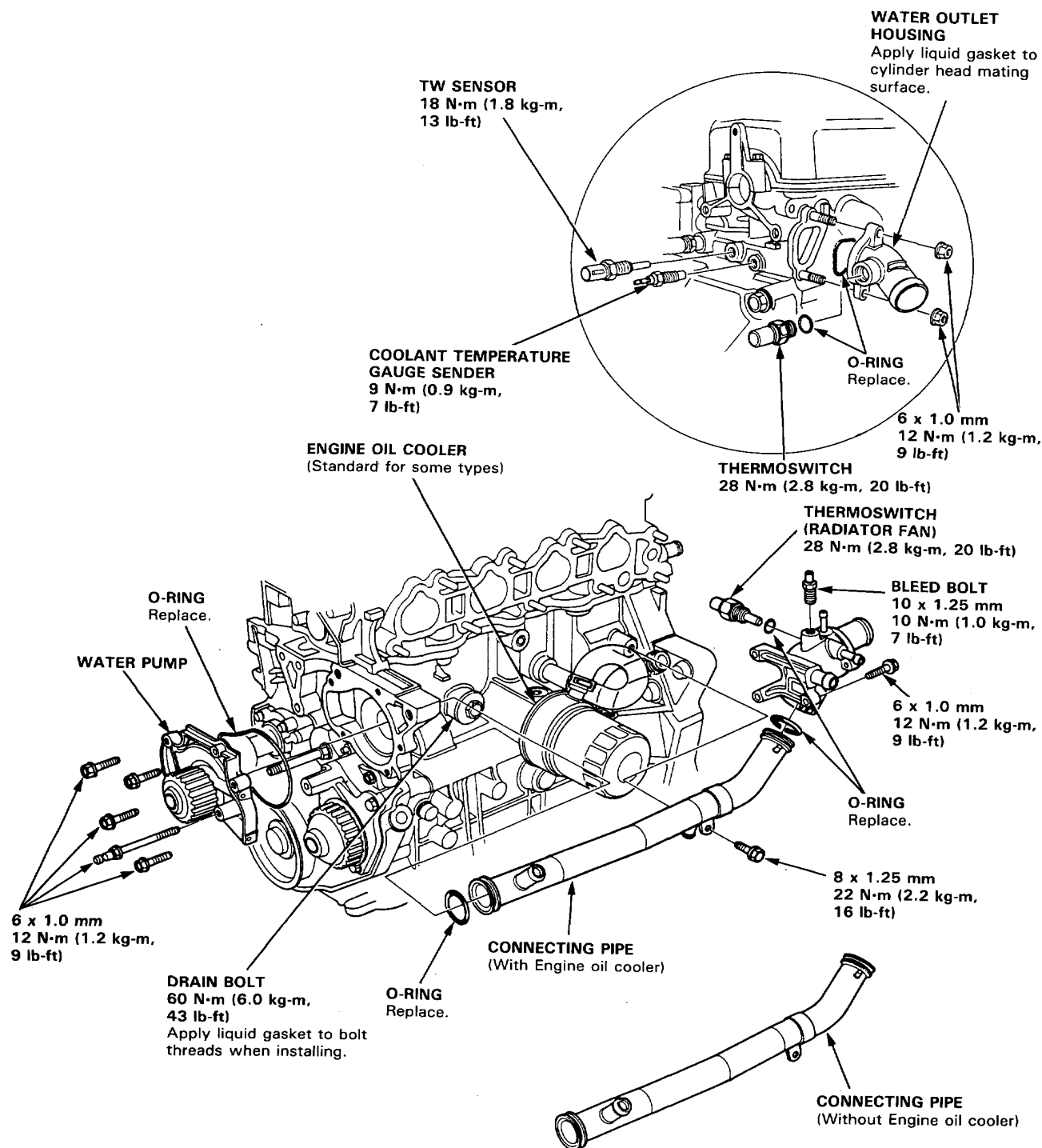
Fully open: 90°C (194°F)



Water Pump

Illustrated Index

NOTE: Use new O-rings when reassembling.

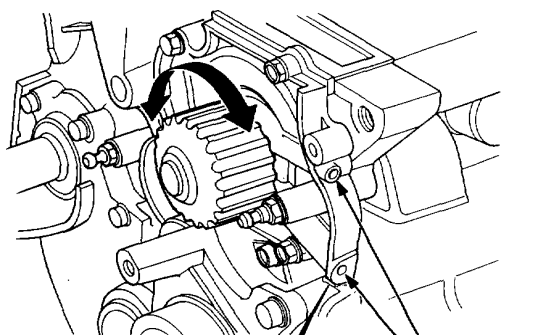




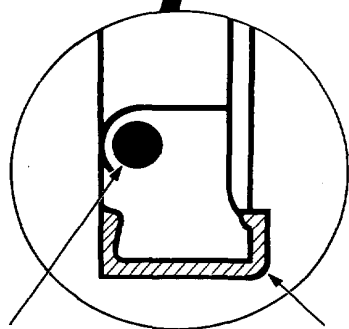
Inspection

1. Remove the timing balancer belt and timing belt (F20A, F22A engine: page 6-26, H23A engine: page 6-62).
2. Check that the water pump pulley turns freely.
3. Check for signs of seal leakage.

NOTE: Small amount of "weeping" from bleed hole is normal.



BLEED HOLES

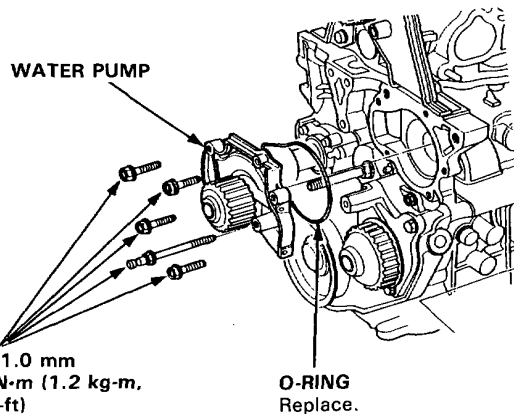


BLEED HOLE

RUBBER SEAL
Apply liquid gasket
to the water pump
mating surface.

Replacement

1. Remove the timing balancer belt and timing belt (F20A, F22A engine: page 6-26, H23A engine: page 6-62).
2. Unscrew the bolts, then remove the water pump.



3. Install the water pump in the reverse order of removal.

Fuel and Emissions

Special Tools	11-2
Component Locations	
Index	11-3
System Description	
Vacuum Connections	11-10
Electrical Connections	11-18
Troubleshooting	
Troubleshooting Guide	11-20
Self-diagnostic Procedures	11-22
How to Read Flowcharts	11-27

PGM-FI Control System

Troubleshooting Flowcharts	
System Description	11-28
Engine Will Not Start	11-30
Electronic Control Unit	11-31
Oxygen Sensor	11-36
Oxygen Sensor Heater	11-38
Fuel Supply System	11-42
Manifold Absolute Pressure	
Sensor	11-44,
	48
TDC/CRANK/CYL Sensor	11-50
Coolant Temperature Sensor	11-52
Throttle Angle Sensor	11-54
Intake Air Temperature Sensor	11-56
IMA Sensor [F22A2 engine]	11-58
Atmospheric Pressure Sensor	11-60
Ignition Output Signal	11-62
Vehicle Speed Sensor	11-64
Electric Load Detector	11-66
Knock Sensor [H23A1 engine]	11-70
A/T FI Signal A/B	11-72

Idle Control System

System Troubleshooting Guide	11-74
System Description	11-75
Troubleshooting Flowcharts	
Electronic Air Control Valve	11-78
Air Conditioning Signal	11-80
Alternator FR Signal	11-82
A/T Shift Position Signal	11-84
Starter Switch Signal	11-86
Brake Switch Signal	11-88
P/S Oil Pressure Switch Signal	11-90
Fast Idle Valve	11-91
Air Boost Valve	11-92
Idle speed Setting	11-93

Fuel Supply System

System Troubleshooting Guide	11-95
System Description	11-96
Fuel Pressure	11-96
Fuel Injectors	11-98
Injector Resistor	11-101
Pressure Regulator	11-102
Fuel Filter	11-103
Fuel Pump	11-105
Main Relay	11-107
Fuel Tank	11-110

Air Intake System

System troubleshooting Guide	11-111
System Description	11-112
Air Cleaner	11-113
Intake Control System	11-114
Throttle Cable	11-118
Bypass Control System	
[H23A1, H23A2 engine]	11-124
Intake Manifold	
[F20A4, F22A1, F22A2 engine]	11-129

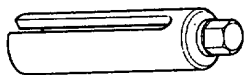
Emission Control System

System Troubleshooting Guide	11-131
System Description	11-132
Tailpipe Emission	11-132
Catalytic Converter	11-133
Exhaust Gas Recirculation System	11-135
Positive Crankcase Ventilation	
System	11-141
Evaporative Emission Controls	11-142

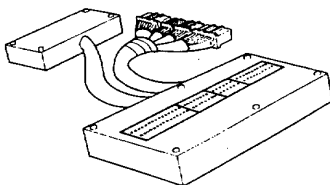


Special Tools

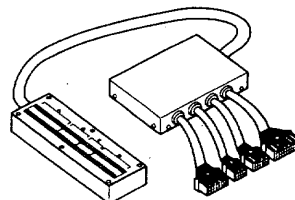
Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07LAA-PT50101	O ₂ Sensor Socket Wrench	1	Component Tools
②	07LAJ-PT30100 or 07LAJ-PT3010A	Test Harness	1	
③	07406-0040001	Fuel Pressure Gauge Set	1	
③-1	07406-0040100	Pressure Gauge	(1)	
③-2	07406-0040201	Hose Assy	(1)	
④	07411-0020000	Digital Circuit Tester	1	



①



②



②



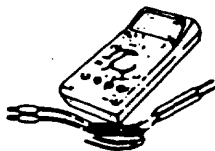
③



③-1



③-2



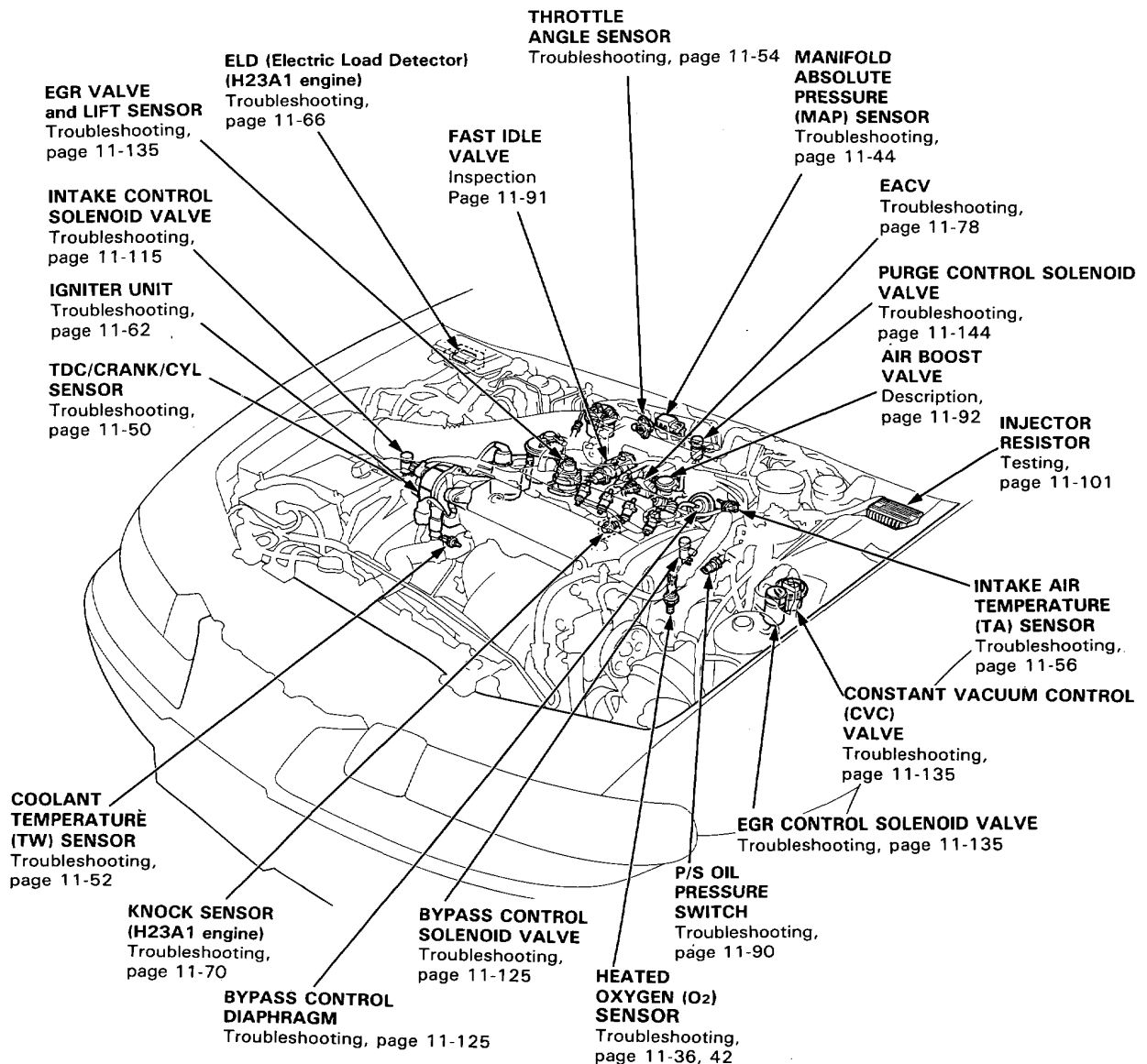
④

Component Locations

Index



H23A1, H23A2 engine:

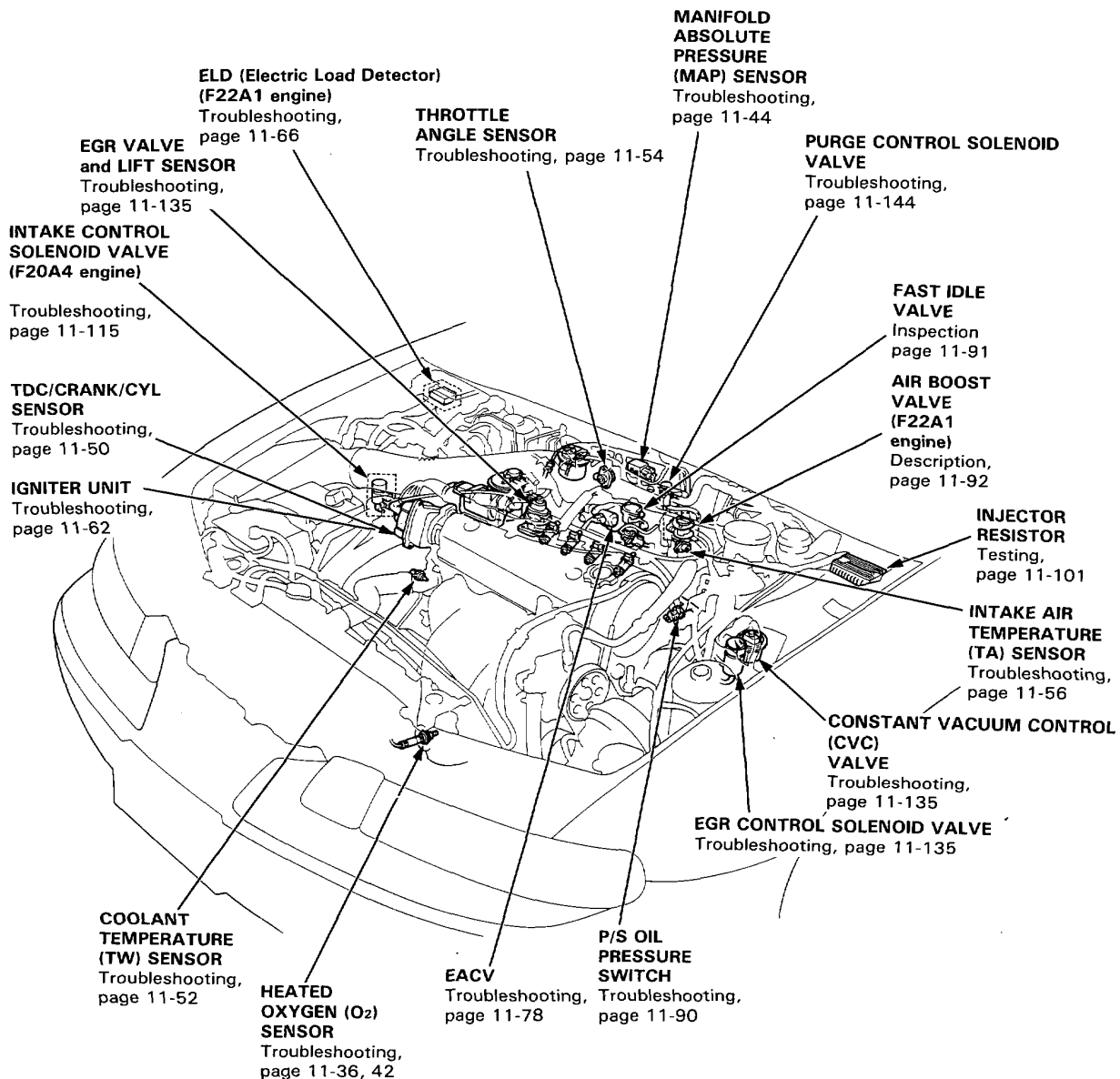


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Component Locations

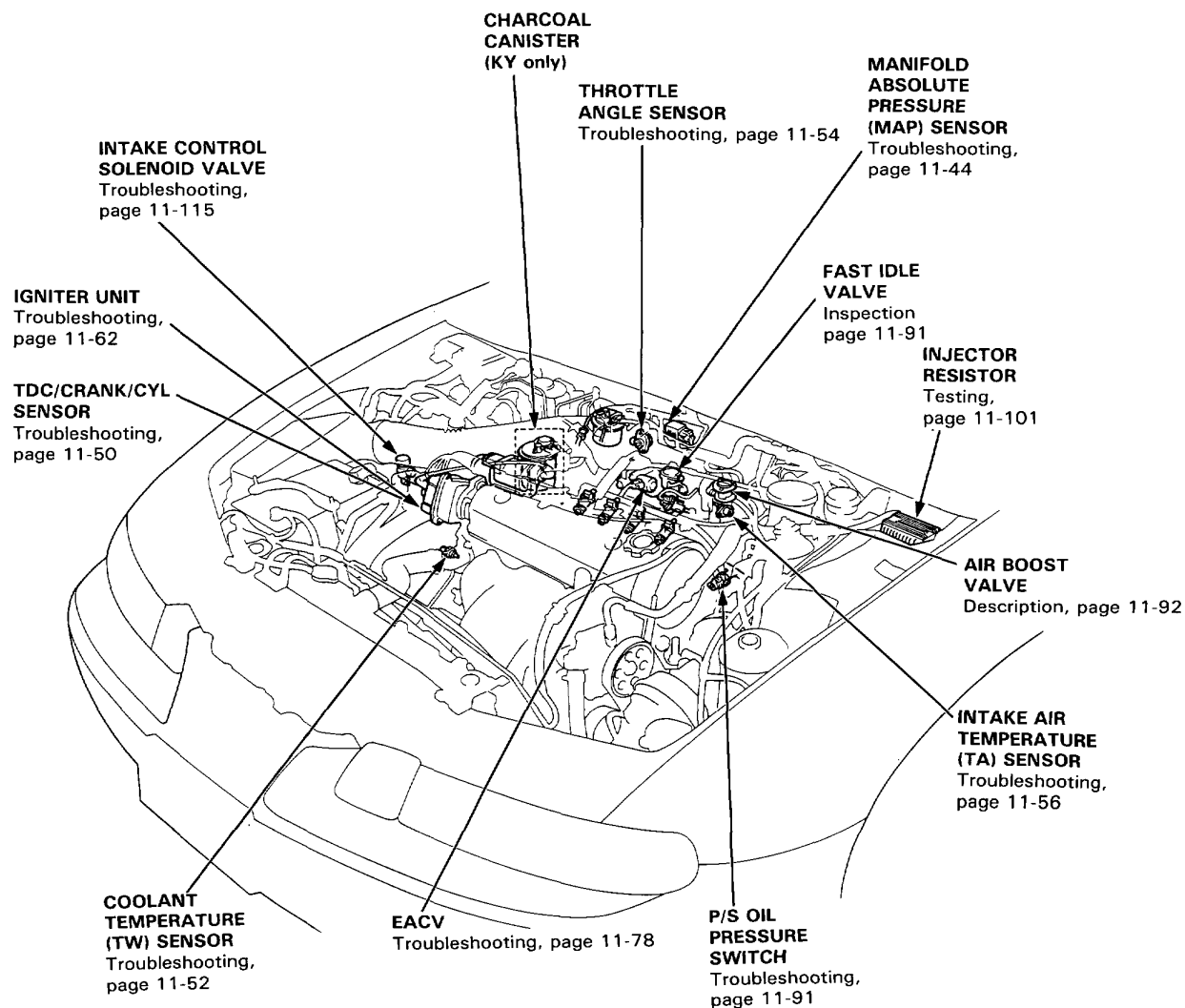
Index (cont'd)

F20A4, F22A1 engine:





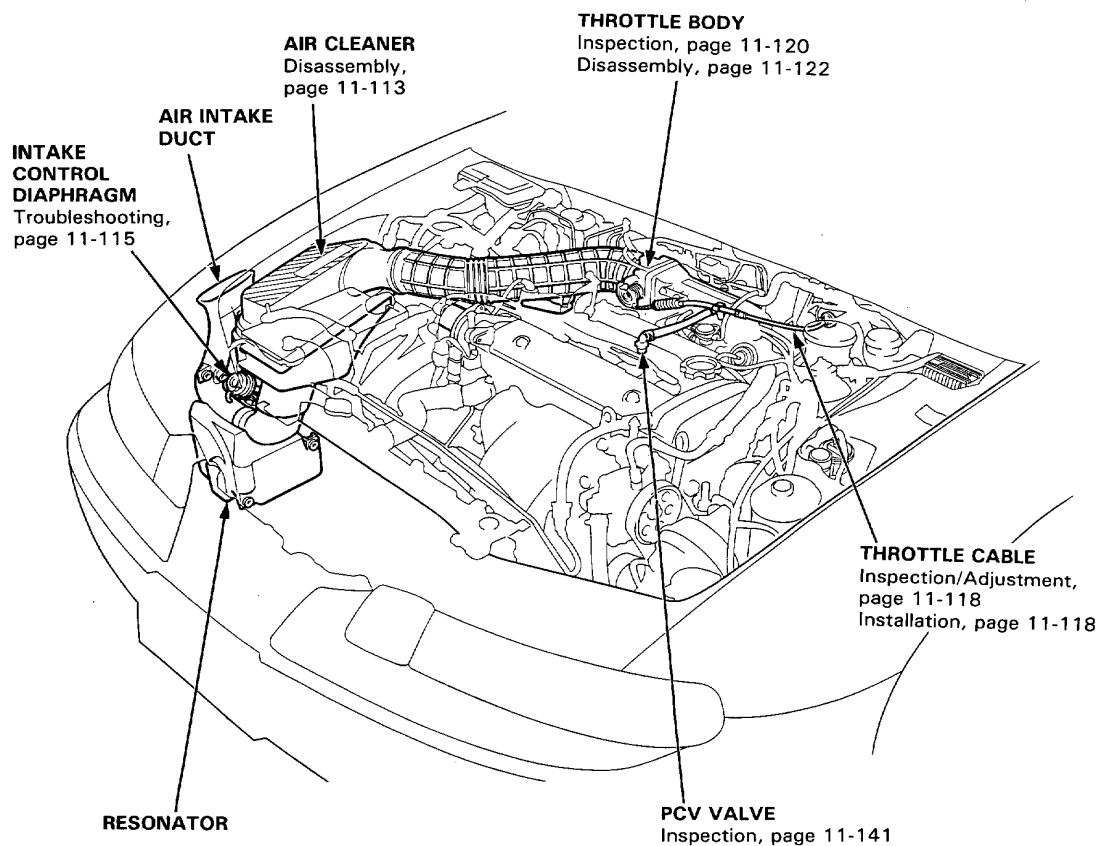
F22A2 engine:



(cont'd)

Component Locations

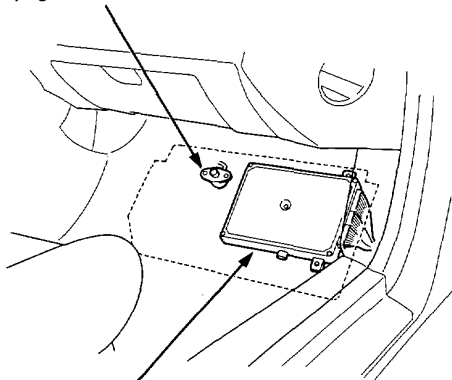
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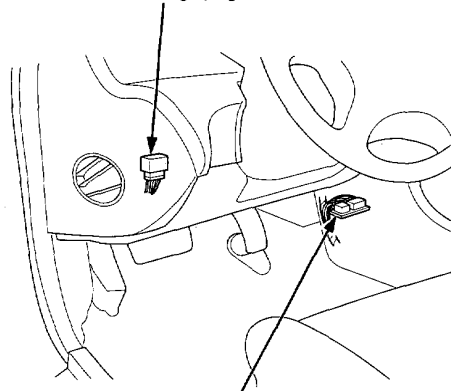
LHD:

**IMA SENSOR
(F22A2 engine)**
Troubleshooting,
page 11-58



ELECTRONIC CONTROL UNIT (ECU)
Self-diagnostic Procedures, page 11-22
Troubleshooting, page 11-30

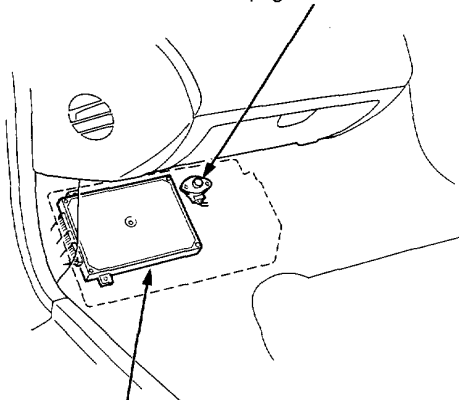
MAIN RELAY
Relay Testing, page 11-107
Troubleshooting, page 11-108



SERVICE CHECK CONNECTOR (2P)
Self-diagnostic Procedures, page 11-22.

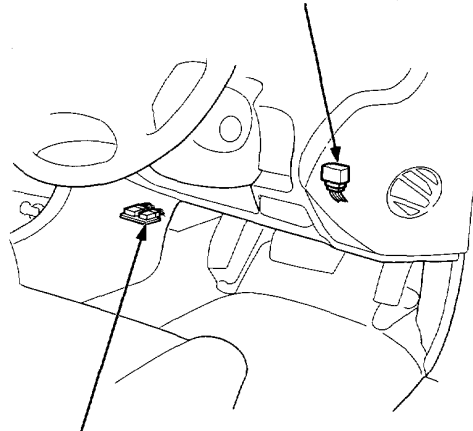
RHD:

**IMA SENSOR
(F22A2 engine)**
Troubleshooting,
page 11-58



ELECTRONIC CONTROL UNIT (ECU)
Self-diagnostic Procedures, page 11-22
Troubleshooting, page 11-30

MAIN RELAY
Relay Testing, page 11-107
Troubleshooting, page 11-108



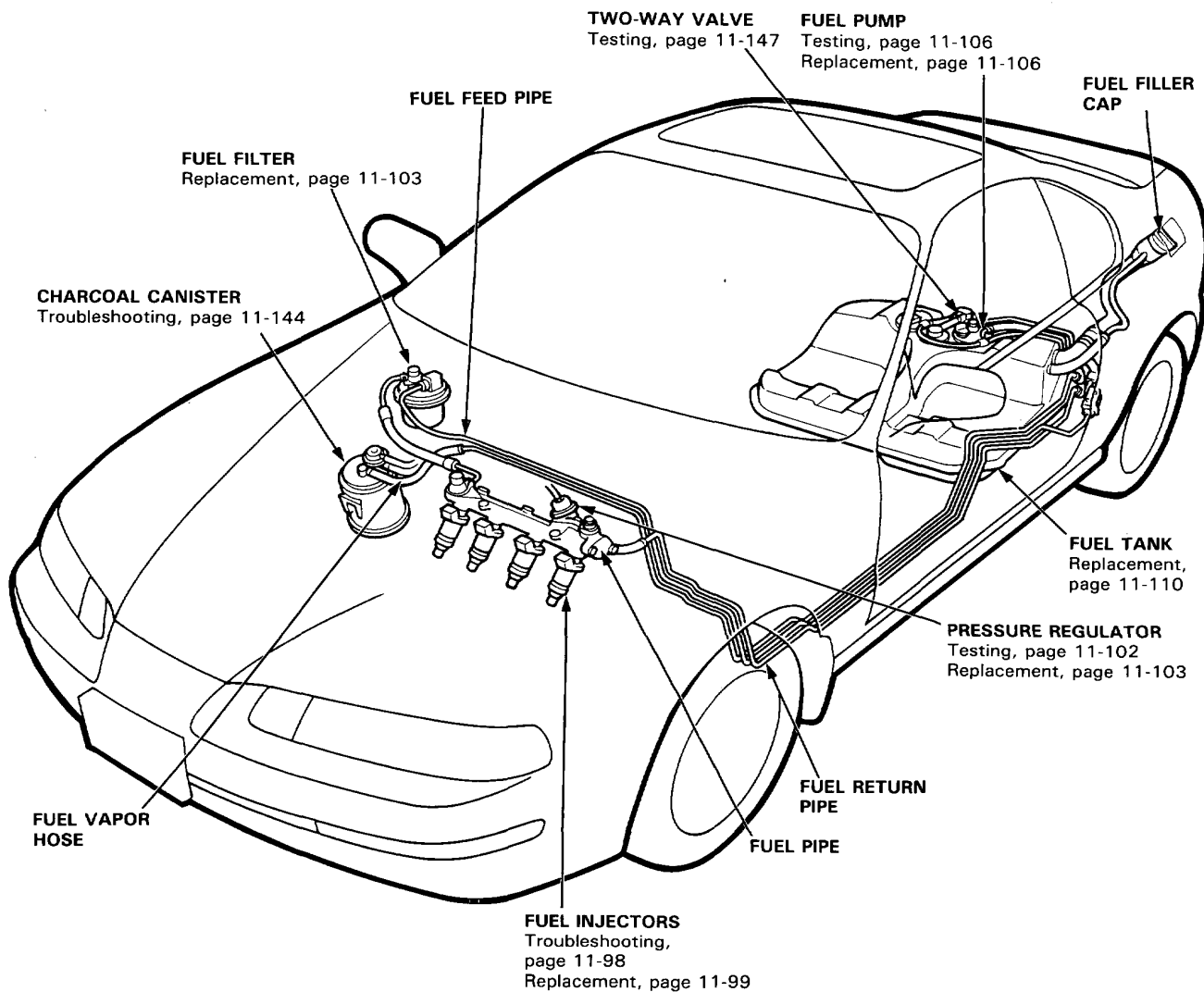
SERVICE CHECK CONNECTOR (2P)
Self-diagnostic Procedures, page 11-22.

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Component Locations

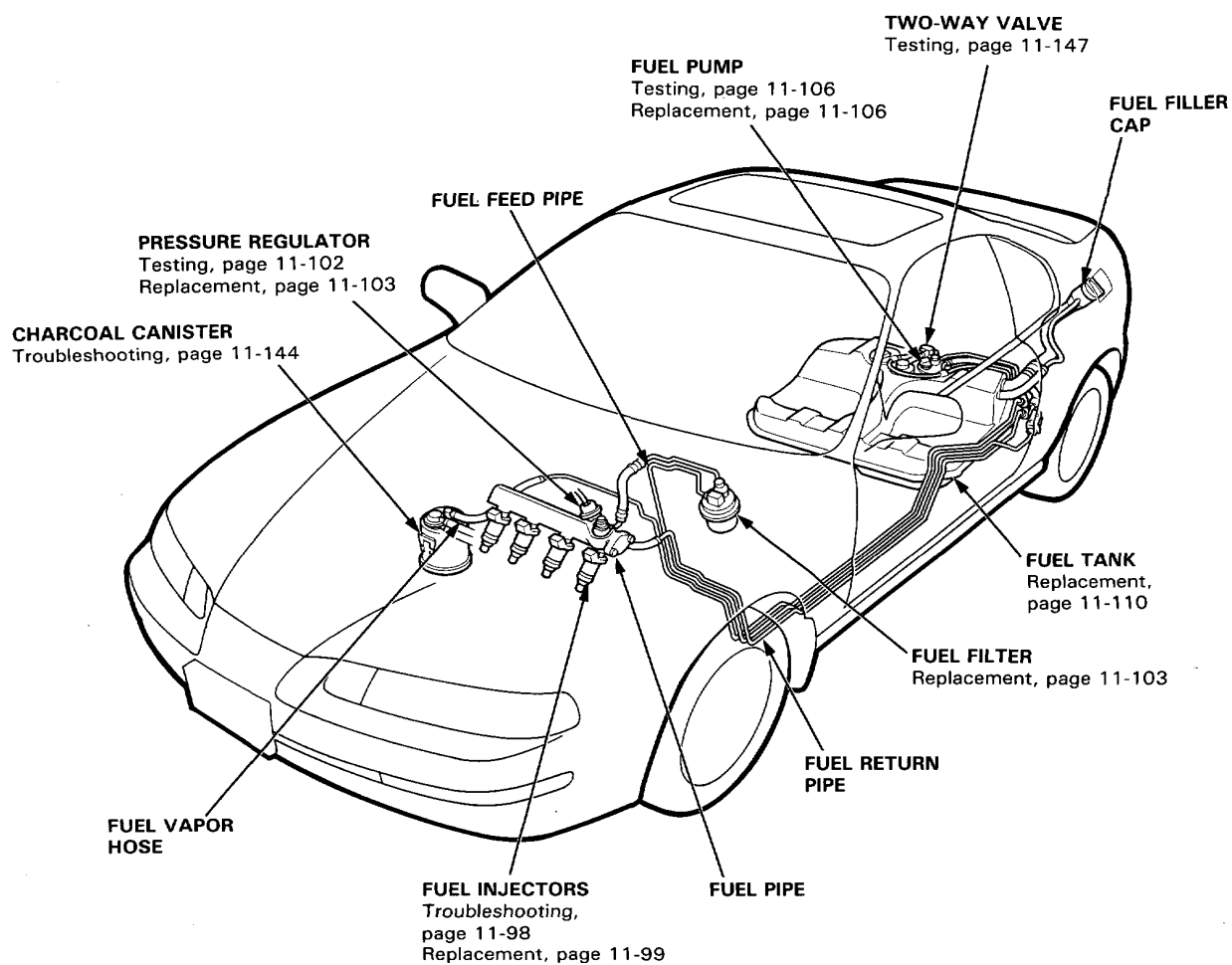
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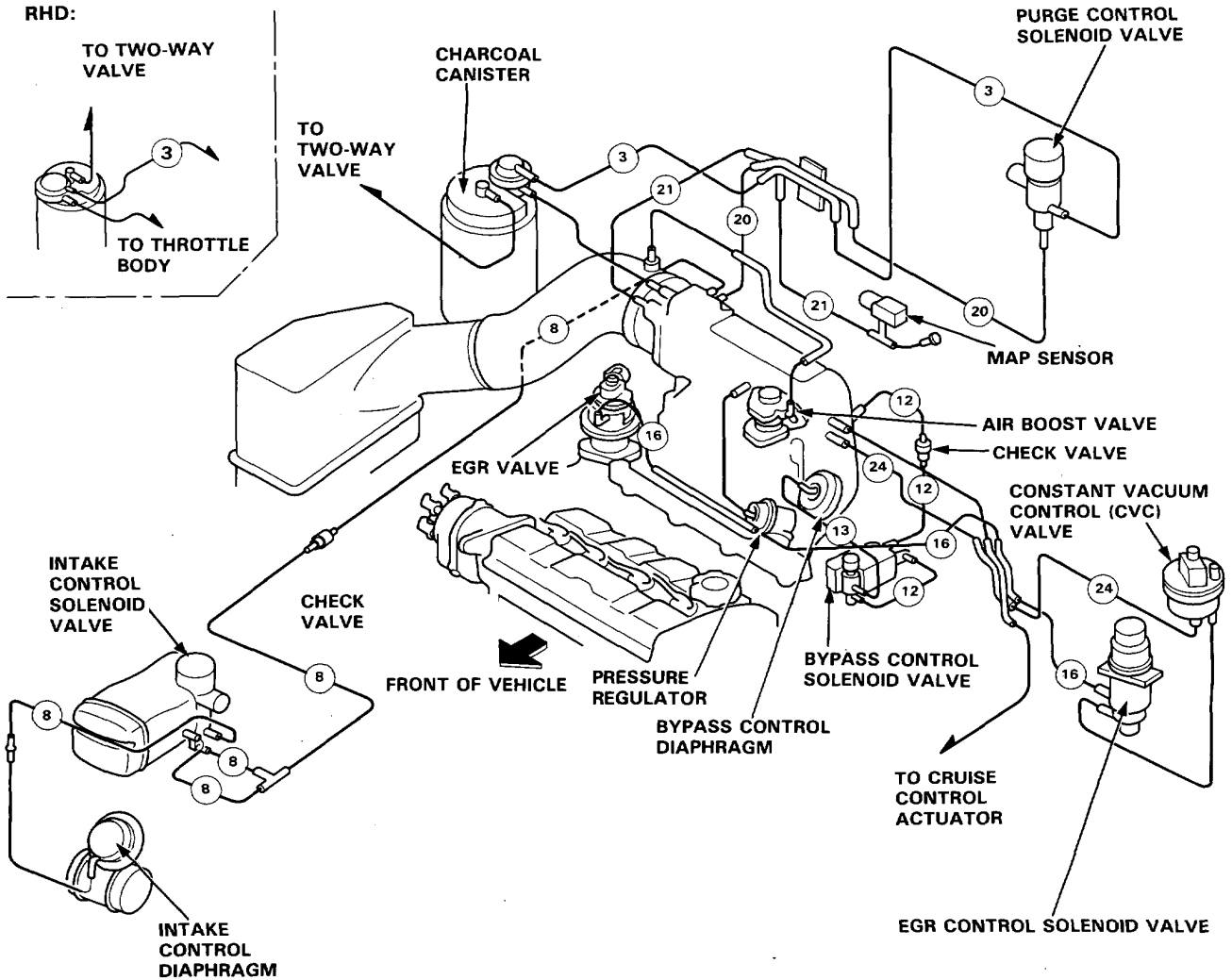
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System Description

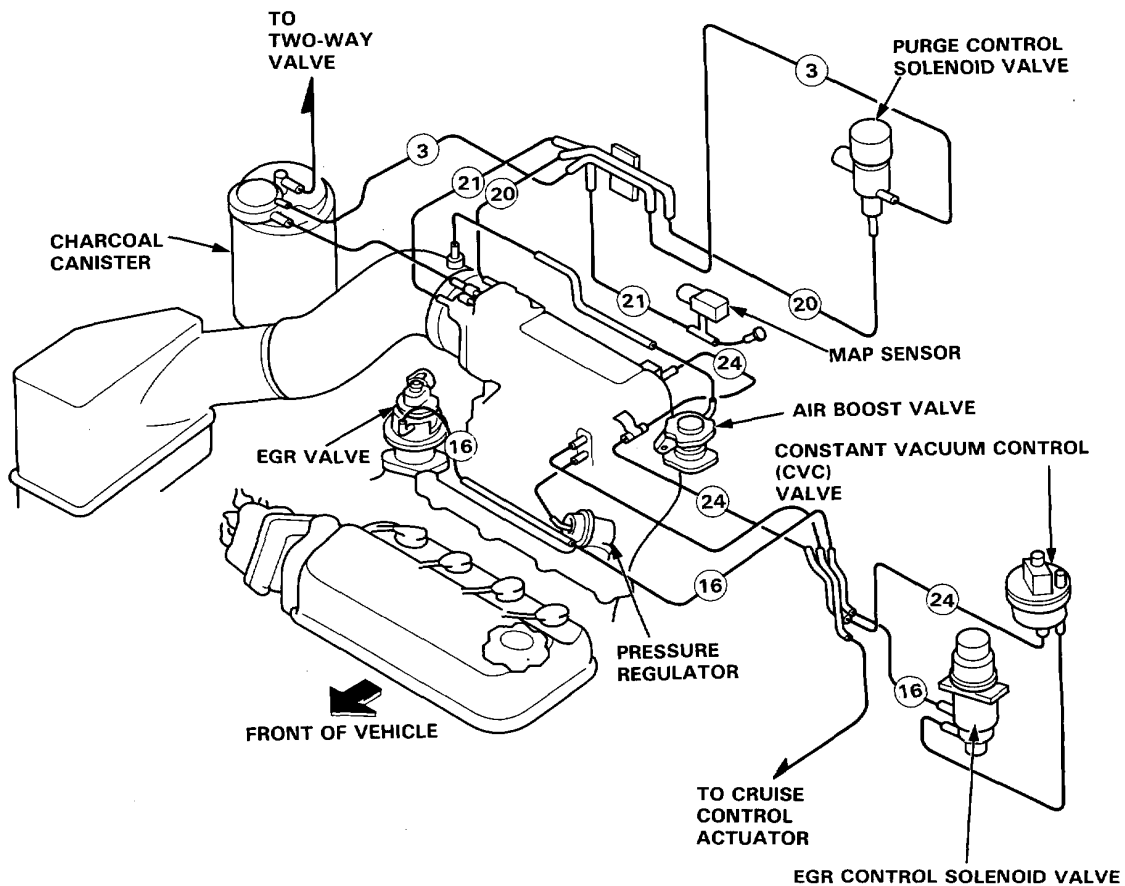
Vacuum Connections

H23A1, H23A2 engine:





F22A1 engine:

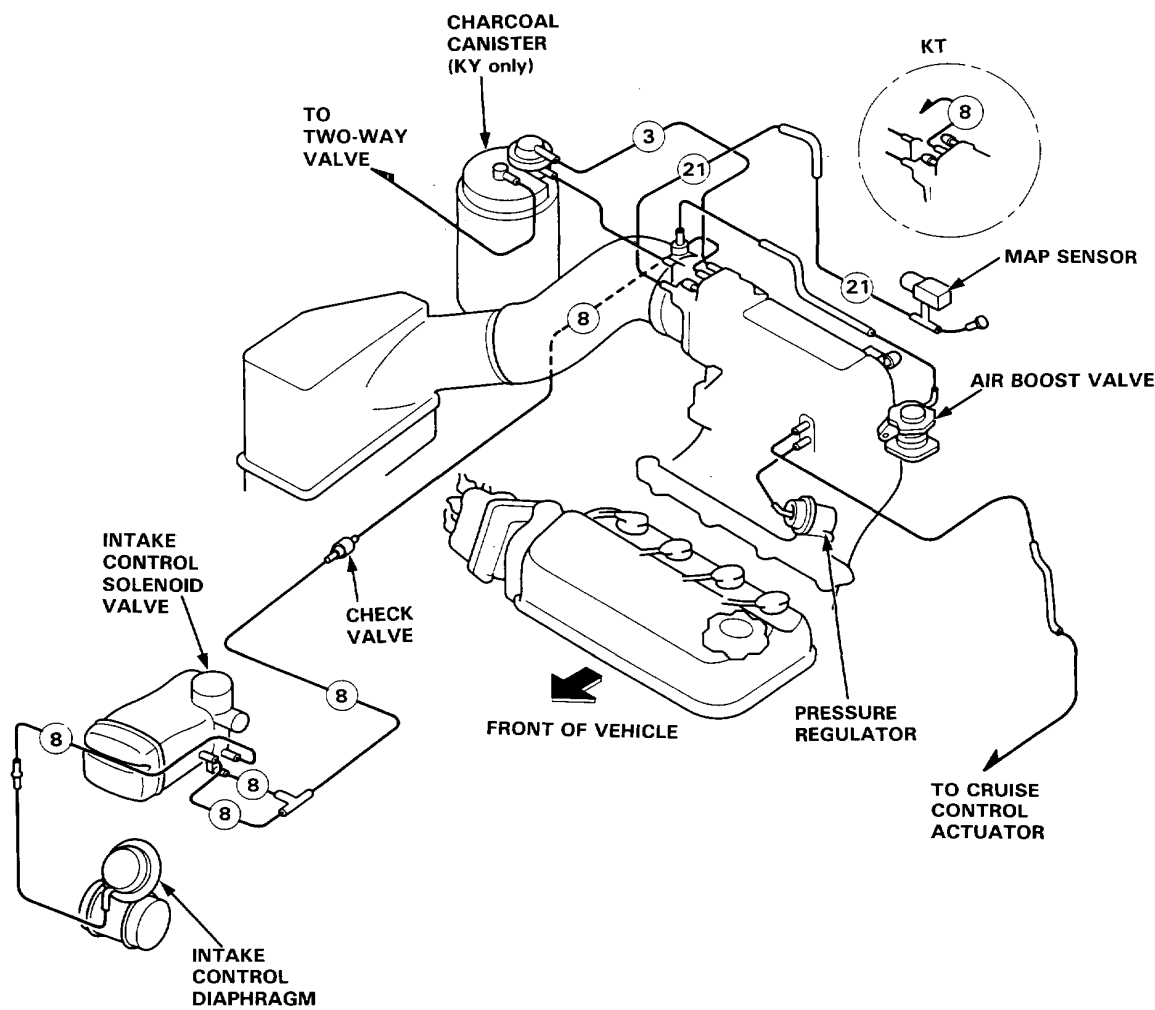


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System Description

Vacuum Connections (cont'd)

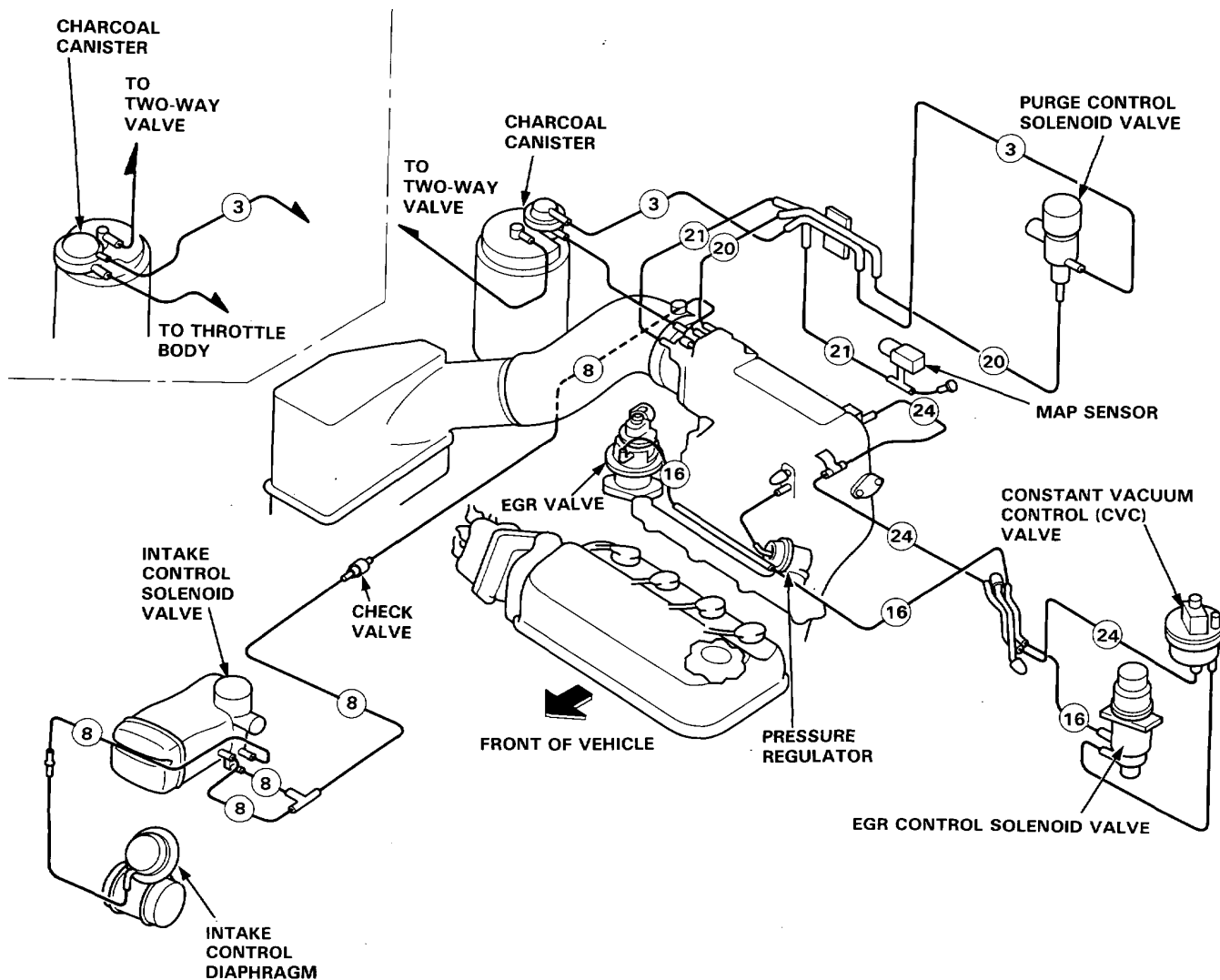
F22A2 engine:





F20A4 engine:

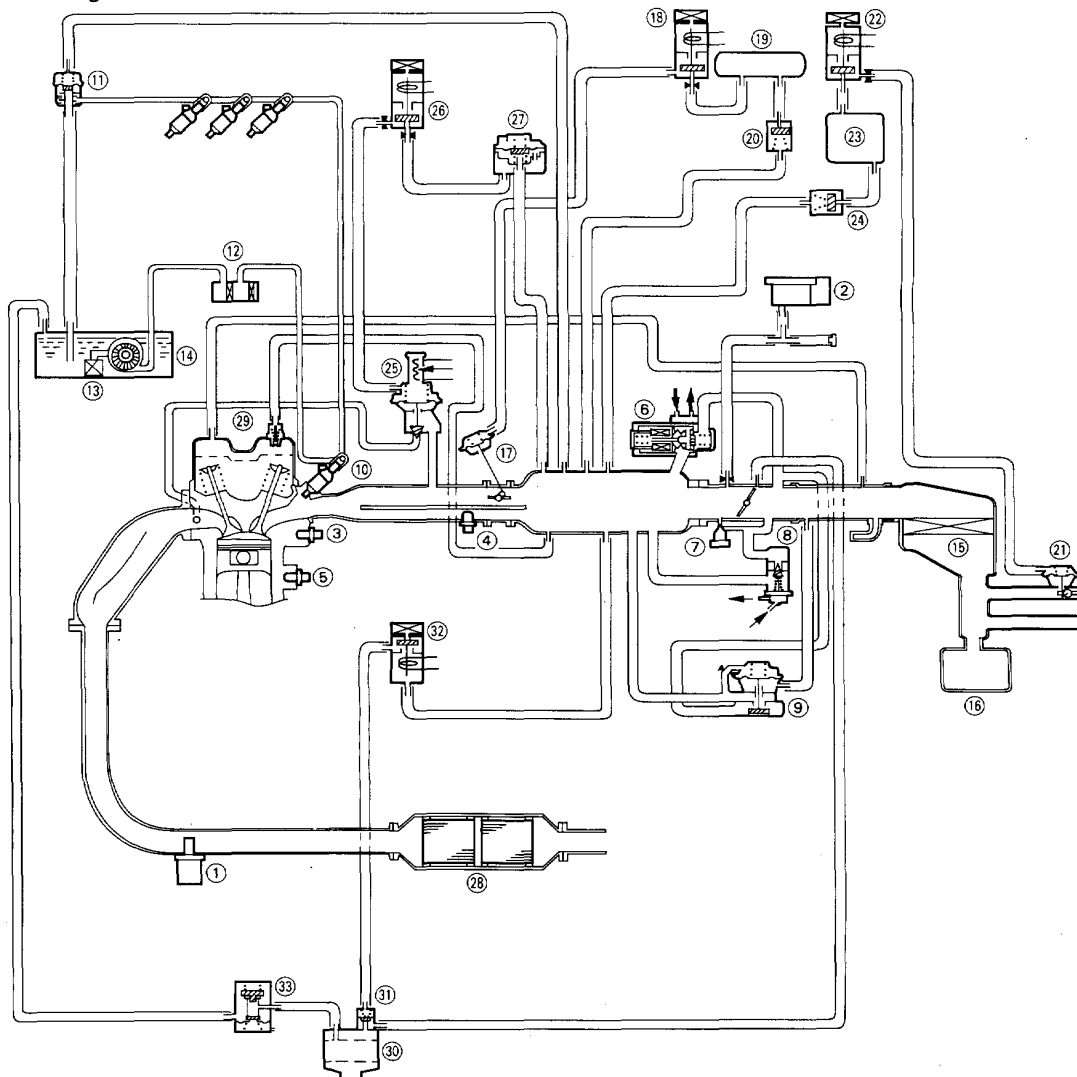
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System Description

Vacuum Connections

H23A1, H23A2 engine:

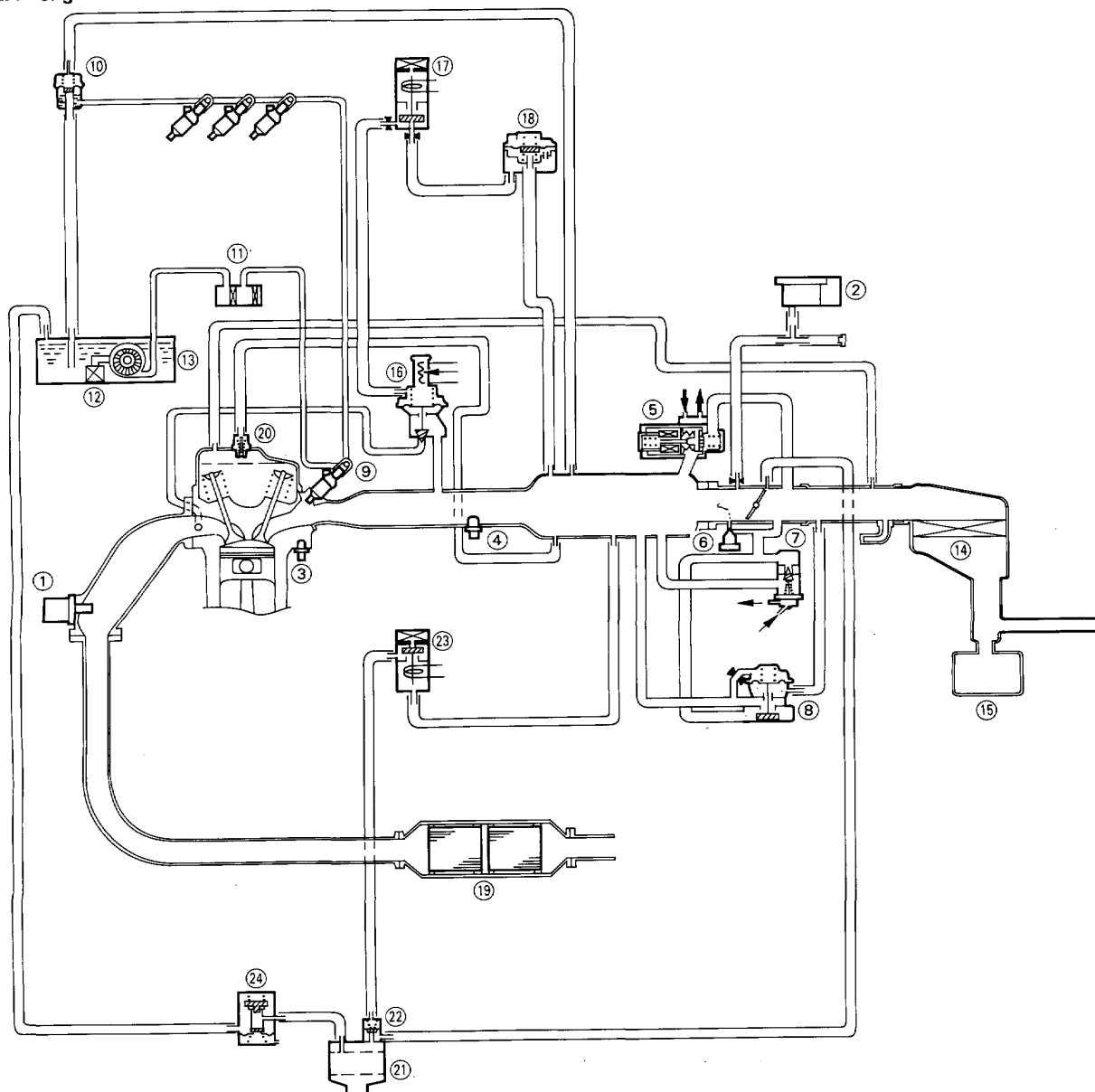


- ① OXYGEN (O₂) SENSOR
- ② MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
- ③ COOLANT TEMPERATURE SENSOR
- ④ INTAKE AIR TEMPERATURE SENSOR
- ⑤ KNOCK SENSOR (H23A1 engine)
- ⑥ ELECTRONIC AIR CONTROL VALVE (EACV)
- ⑦ IDLE ADJUSTING SCREW
- ⑧ FAST IDLE VALVE
- ⑨ AIR BOOST VALVE
- ⑩ FUEL INJECTOR
- ⑪ PRESSURE REGULATOR
- ⑫ FUEL FILTER
- ⑬ FUEL PUMP
- ⑭ FUEL TANK
- ⑮ AIR CLEANER
- ⑯ RESONATOR

- ⑰ BYPASS CONTROL DIAPHRAGM
- ⑱ BYPASS CONTROL SOLENOID VALVE
- ⑲ VACUUM TANK
- ⑳ CHECK VALVE
- ㉑ INTAKE CONTROL DIAPHRAGM
- ㉒ INTAKE CONTROL SOLENOID VALVE
- ㉓ VACUUM TANK
- ㉔ CHECK VALVE
- ㉕ EGR VALVE
- ㉖ EGR CONTROL SOLENOID VALVE
- ㉗ CONSTANT VACUUM CONTROL (CVC) VALVE
- ㉘ CATALYTIC CONVERTER
- ㉙ PCV VALVE
- ㉚ CHARCOAL CANISTER
- ㉛ PURGE CONTROL DIAPHRAGM VALVE
- ㉜ PURGE CONTROL SOLENOID VALVE
- ㉝ TWO-WAY VALVE



F22A1 engine:



- ① OXYGEN (O₂) SENSOR
- ② MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
- ③ COOLANT TEMPERATURE SENSOR
- ④ INTAKE AIR TEMPERATURE SENSOR
- ⑤ ELECTRONIC AIR CONTROL VALVE (EACV)
- ⑥ IDLE ADJUSTING SCREW
- ⑦ FAST IDLE VALVE
- ⑧ AIR BOOST VALVE
- ⑨ FUEL INJECTOR
- ⑩ PRESSURE REGULATOR
- ⑪ FUEL FILTER
- ⑫ FUEL PUMP

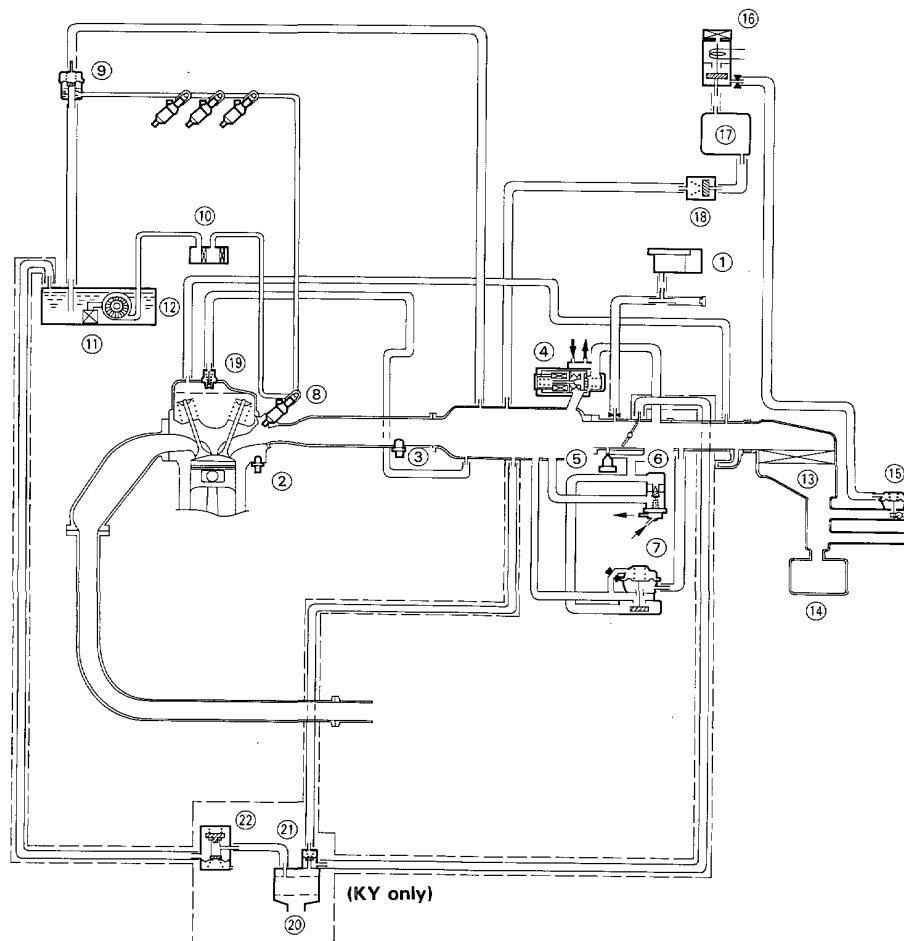
- ⑬ FUEL TANK
- ⑭ AIR CLEANER
- ⑮ RESONATOR
- ⑯ EGR VALVE
- ⑰ EGR CONTROL SOLENOID VALVE
- ⑱ CONSTANT VACUUM CONTROL (CVC) VALVE
- ⑲ CATALYTIC CONVERTER
- ⑳ PCV VALVE
- ㉑ CHARCOAL CANISTER
- ㉒ PURGE CONTROL DIAPHRAGM VALVE
- ㉓ PURGE CONTROL SOLENOID VALVE
- ㉔ TWO-WAY VALVE

(cont'd)

System Description

Vacuum Connections (cont'd)

F22A2 engine:

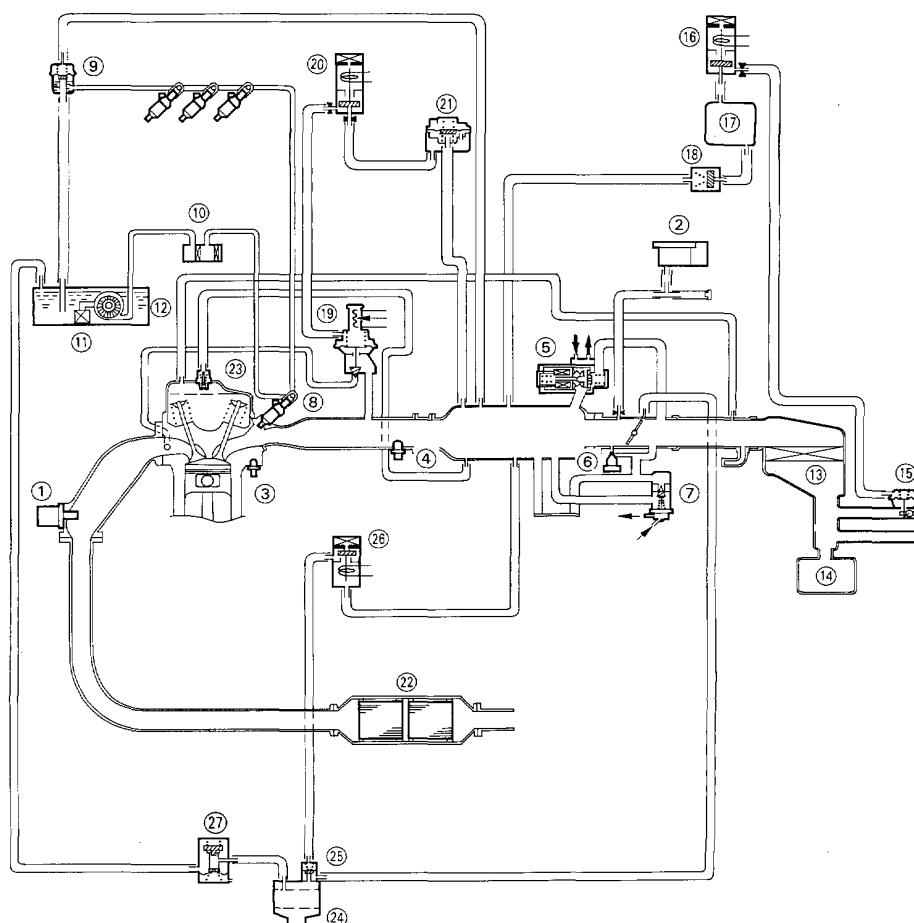


- ① MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
- ② COOLANT TEMPERATURE SENSOR
- ③ INTAKE AIR TEMPERATURE SENSOR
- ④ ELECTRONIC AIR CONTROL VALVE (EACV)
- ⑤ IDLE ADJUSTING SCREW
- ⑥ FAST IDLE VALVE
- ⑦ AIR BOOST VALVE
- ⑧ FUEL INJECTOR
- ⑨ PRESSURE REGULATOR
- ⑩ FUEL FILTER
- ⑪ FUEL PUMP

- ⑫ FUEL TANK
- ⑬ AIR CLEANER
- ⑭ RESONATOR
- ⑮ INTAKE CONTROL DIAPHRAGM
- ⑯ INTAKE CONTROL SOLENOID VALVE
- ⑰ VACUUM TANK
- ⑱ CHECK VALVE
- ⑲ PCV VALVE
- ⑳ CHARCOAL CANISTER
- ㉑ PURGE CONTROL DIAPHRAGM VALVE
- ㉒ TWO-WAY VALVE



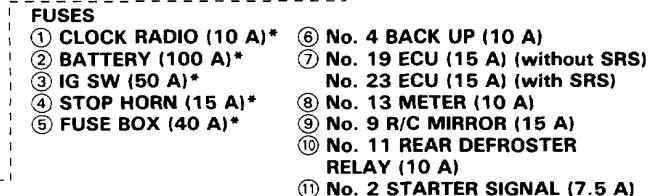
F20A4 engine:



- ① OXYGEN (O₂) SENSOR
- ② MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
- ③ COOLANT TEMPERATURE SENSOR
- ④ INTAKE AIR TEMPERATURE SENSOR
- ⑤ ELECTRONIC AIR CONTROL VALVE (EACV)
- ⑥ IDLE ADJUSTING SCREW
- ⑦ FAST IDLE VALVE
- ⑧ FUEL INJECTOR
- ⑨ PRESSURE REGULATOR
- ⑩ FUEL FILTER
- ⑪ FUEL PUMP
- ⑫ FUEL TANK
- ⑬ AIR CLEANER
- ⑭ RESONATOR

- ⑮ INTAKE CONTROL DIAPHRAGM
- ⑯ INTAKE CONTROL SOLENOID VALVE
- ⑰ VACUUM TANK
- ⑱ CHECK VALVE
- ⑲ EGR VALVE
- ⑳ EGR CONTROL SOLENOID VALVE
- ㉑ CONSTANT VACUUM CONTROL (CVC) VALVE
- ㉒ CATALYTIC CONVERTER
- ㉓ PCV VALVE
- ㉔ CHARCOAL CANISTER
- ㉕ PURGE CONTROL DIAPHRAGM VALVE
- ㉖ PURGE CONTROL SOLENOID VALVE
- ㉗ TWO-WAY VALVE

Electrical Connections



***: in the UNDER-HOOD FUSE/RELAY BOX**

Troubleshooting

Troubleshooting Guide

NOTE: Across each row in the chart, the systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next most likely system ②, etc.

PAGE	SYSTEM	PGM-FI									
		ECU	OXYGEN SENSOR	MANIFOLD ABSOLUTE PRESSURE SENSOR	TDC/CRANK/CYL SENSOR	COOLANT TEMPERATURE SENSOR	THROTTLE ANGLE SENSOR	INTAKE AIR TEMPERATURE SENSOR	IMA SENSOR (F22A2 engine)	ATMOSPHERIC PRESSURE SENSOR	IGNITION OUTPUT SIGNAL
SYMPTOM		31	36, 38, 42	44, 48	50	52	54	56	58	60	62
CHECK ENGINE LIGHT TURNS ON											
CHECK ENGINE LIGHT BLINKS		1 or 2	1 or 11 or 9	3 or 5	4 or 8 or 9	3	7	10	11	13	15
ENGINE WON'T START		③			③						③
DIFFICULT TO START ENGINE WHEN COLD		BU		③	②	①					
IRREGULAR IDLING	WHEN COLD FAST IDLE OUT OF SPEC	BU				③					
	ROUGH IDLE	BU		③							
	WHEN WARM RPM TOO HIGH	BU									
	WHEN WARM RPM TOO LOW	BU									
FREQUENT STALLING	WHILE WARMING UP	BU				③					
	AFTER WARMING UP	BU									
POOR PERFORMANCE	MISFIRE OR ROUGH RUNNING	BU		②	③						
	FAILS EMISSION TEST	BU	③	②							
	LOSS OF POWER	BU		③			②				

* If codes other than those listed above are indicated, count the number of blinks again. If the indicator is in fact blinking these codes, substitute a known-good ECU and recheck. If the indication goes away, replace the original ECU.

BU If the Check Engine light is on while the engine is running, jump the service check connector. If no code is displayed (Check Engine light stays on steady), the back-up system may be in operation.

Substitute a known-good ECU and recheck. If the indication goes away, replace the original ECU.



2

PGM-FI					IDLE CONTROL		FUEL SUPPLY		AIR INTAKE	EMISSION CONTROL	
VEHICLE SPEED SENSOR	ELECTRIC LOAD DETECTOR	KNOCK SENSOR (H23A1 engine)	A/T FI SIGNAL A	A/T FI SIGNAL B	ELEC-TRONIC AIR CONTROL VALVE	OTHER IDLE CONTROLS	FUEL INJECTOR	OTHER FUEL SUPPLY		EGR CONTROL SYSTEM	OTHER EMISSION CONTROLS
64	66	70	72	72	78	74	98	95	111	135	131
							②	①			
					①	②					
					①		②			③	
					①	②					
	③				①		②				
					①	②		③			
					③			①		②	
							①			③	
											①
							③	①	③		

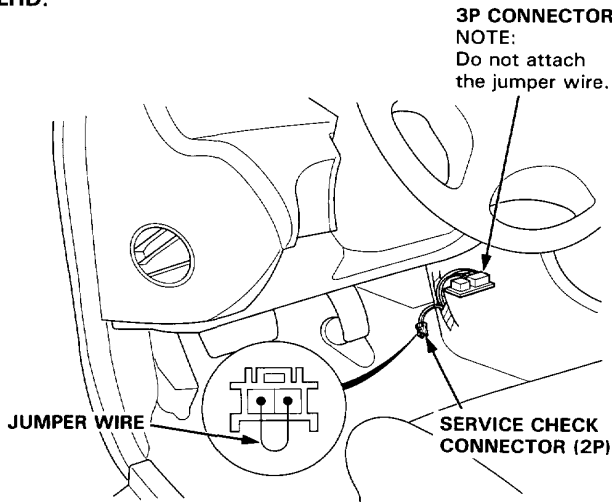
Troubleshooting

Self-diagnostic Procedures

- I. When the Check Engine light has been reported on, do the following:

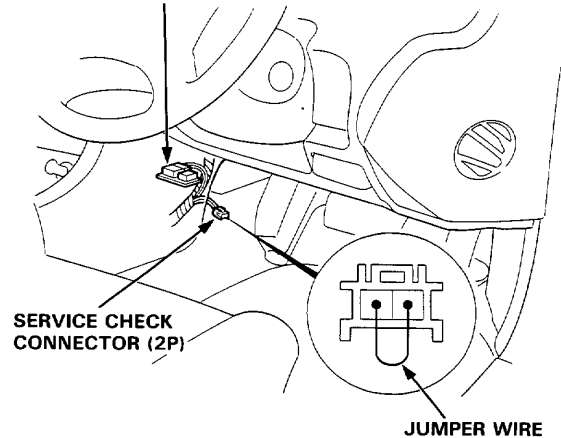
1. Connect the Service Check Connector terminals with a jumper wire as shown (the 2P Service Check Connector is located behind the center console). Turn the ignition switch on.

LHD:



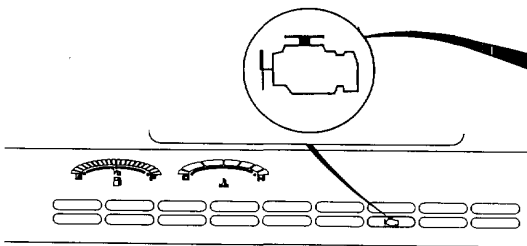
RHD: 3P CONNECTOR

NOTE:
Do not attach
the jumper wire.



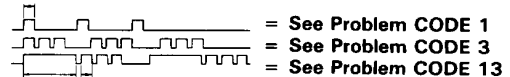
2. Note the CODE: the Check Engine light indicates a failure code by the length and number of blinks. The Check Engine light can indicate simultaneous component problems by blinking separate codes, one after another. Problem codes 1 through 9 are indicated by individual short blinks. Problem codes 10 through 43 are indicated by a series of long and short blinks. The number of long blinks equals the first digit, the number of short blinks equals the second digit.

CHECK ENGINE LIGHT



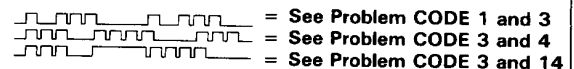
Separate Problems:

Short



Long short

Simultaneous Problems:



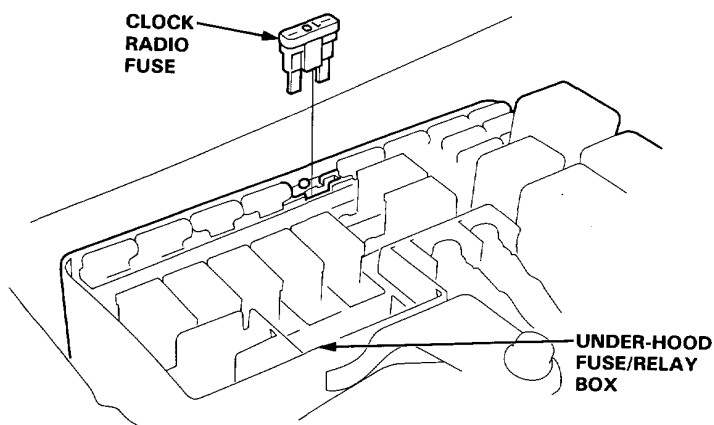


II. ECU Reset Procedure

1. Turn the ignition switch off.
2. Remove the CLOCK RADIO fuse (10 A) from the under-hood fuse/relay box for 10 seconds to reset the ECU.

NOTE:

- Disconnecting the BACK UP fuse also cancels the radio preset stations and the clock setting. Make note of the radio presets before removing the fuse so you reset them.



III. Final Procedure (this procedure must be done after any troubleshooting)

1. Remove the jumper wire.

NOTE: If the Service Check Connector is jumped, the Check Engine light will stay on.

2. Do the ECU Reset Procedure.
3. Set the radio preset stations and the clock setting.

(cont'd)

Troubleshooting

Self-diagnostic Procedures (cont'd)

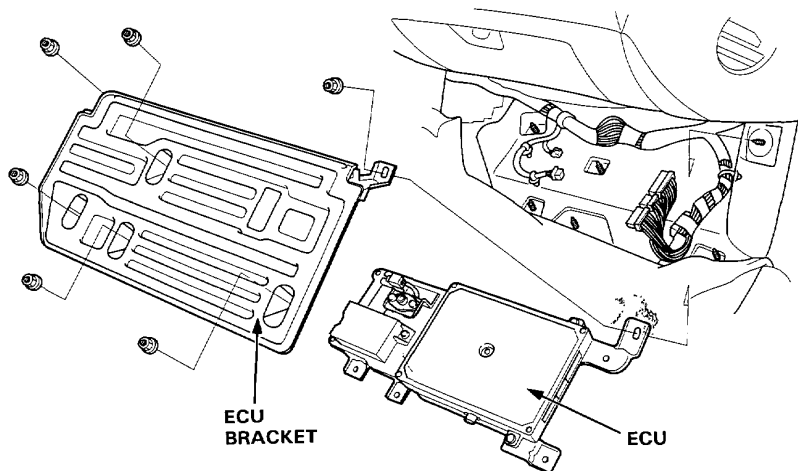
SELF-DIAGNOSIS INDICATOR BLINKS	SYSTEM INDICATED	PAGE
0	ECU	11-31
1	OXYGEN SENSOR	11-36
3	MANIFOLD ABSOLUTE PRESSURE (MAP SENSOR)	11-44
5		11-48
4	CRANK ANGLE (CRANK SENSOR)	11-50
6	COOLANT TEMPERATURE (TW SENSOR)	11-52
7	THROTTLE ANGLE	11-54
8	TDC POSITION (TDC SENSOR)	11-50
9	No. 1 CYLINDER POSITION (CYL SENSOR)	11-50
10	INTAKE AIR TEMPERATURE (TA SENSOR)	11-56
11	IMA SENSOR (F22A2 engine)	11-58
12	EXHAUST GAS RECIRCULATION SYSTEM (EGR)	11-135
13	ATMOSPHERIC PRESSURE (PA SENSOR)	11-60
14	ELECTRONIC AIR CONTROL (EACV)	11-78
15	IGNITION OUTPUT SIGNAL	11-62
17	VEHICLE SPEED SENSOR	11-64
20	ELECTRIC LOAD DETECTOR (ELD)	11-66
23	KNOCK SENSOR (H23A1 engine)	11-70
30	A/T FI SIGNAL A	11-72
31	A/T FI SIGNAL B	11-72
41	OXYGEN SENSOR HEATER	11-38
43	FUEL SUPPLY SYSTEM	11-42

- If codes other than those listed above are indicated, verify the code. If the code indicated is not listed above, replace the ECU.
- The Check Engine light may come on, indicating a system problem when, in fact, there is a poor or intermittent electrical connection. First, check the electrical connections, clean or repair connections if necessary.
- The Check Engine light and S light may light simultaneously when the self-diagnosis indicator blinks 6, 7 and 17. Check the PGM-FI system according to the PGM-FI control system troubleshooting, then recheck the S light. If it lights, see page 14-36, 37.
- The Check Engine light does not come on when there is a malfunction in the A/T FI signal or Electric Load Detector circuits. However, it will indicate the codes when the Service Check Connector is jumped.

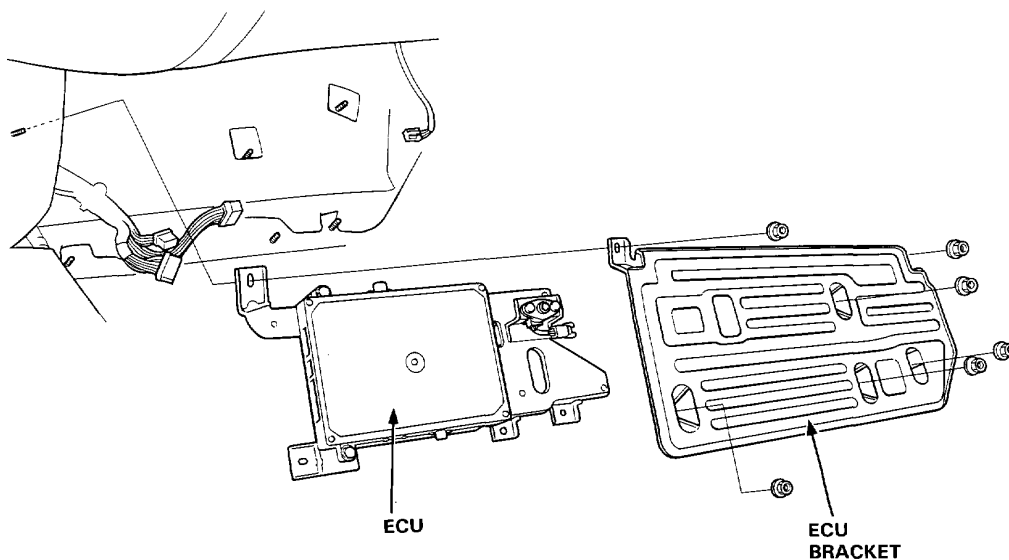


If the inspection for a particular failure code requires the test harness, remove the right door sill molding and the small cover on the right (or left) kick panel and pull the carpet back to expose the ECU. Unbolt the ECU bracket. With the ignition switch off, connect the test harness. Check the system according to the procedure described for the appropriate code(s) listed on the following pages.

LHD:



RHD:

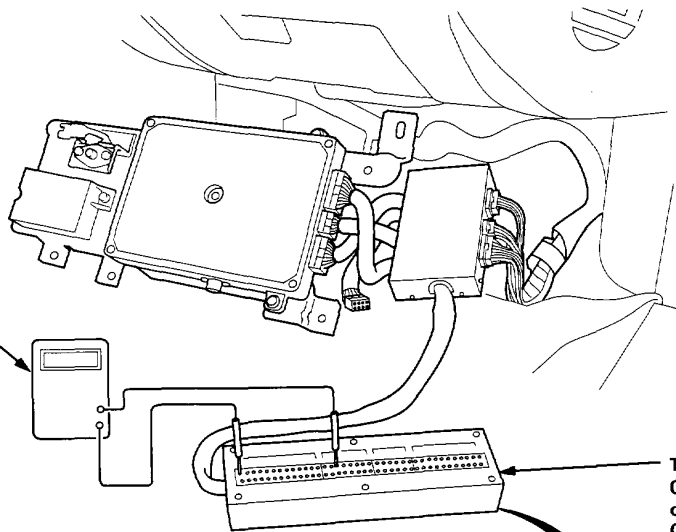


(cont'd)

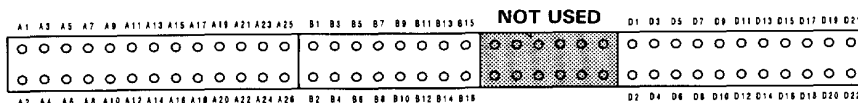
Troubleshooting

Self-diagnostic Procedures (cont'd)

DIGITAL CIRCUIT
TESTER
07411-0020000



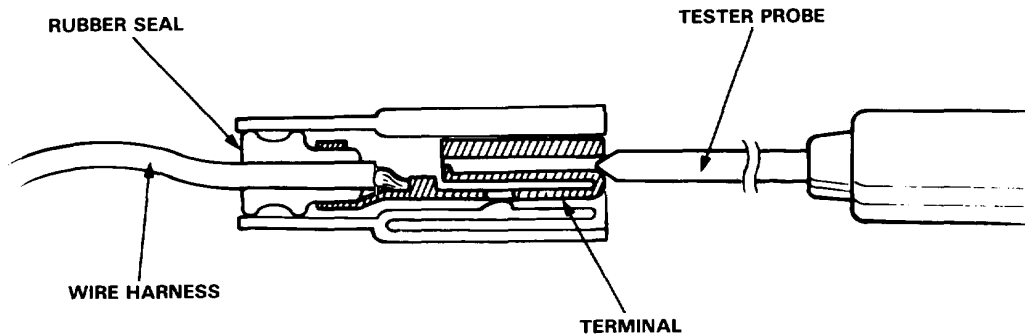
TEST HARNESS
07LAJ-PT30100
or
07LAJ-PT3010A



TERMINAL LOCATIONS

CAUTION:

- Puncturing the insulation on a wire can cause poor or intermittent electrical connections.
- For testing at connectors other than the test harness, bring the tester probe into contact with the terminal from the connector side of wire harness connectors in the engine compartment. For female connectors, just touch lightly with the tester probe and do not insert the probe.





How to Read Flowcharts

A flowchart is designed to be used from start to final repair. It's like a map showing you the shortest distance. But beware: if you go off the "map" anywhere but a "stop" symbol, you can easily get lost.

START

(bold type)

Describes the conditions or situation to start a troubleshooting flowchart.

ACTION

Asks you to do something; perform a test, set up a condition etc.

DECISION

Asks you about the result of an action, then sends you in the appropriate troubleshooting direction.

STOP

(bold type)

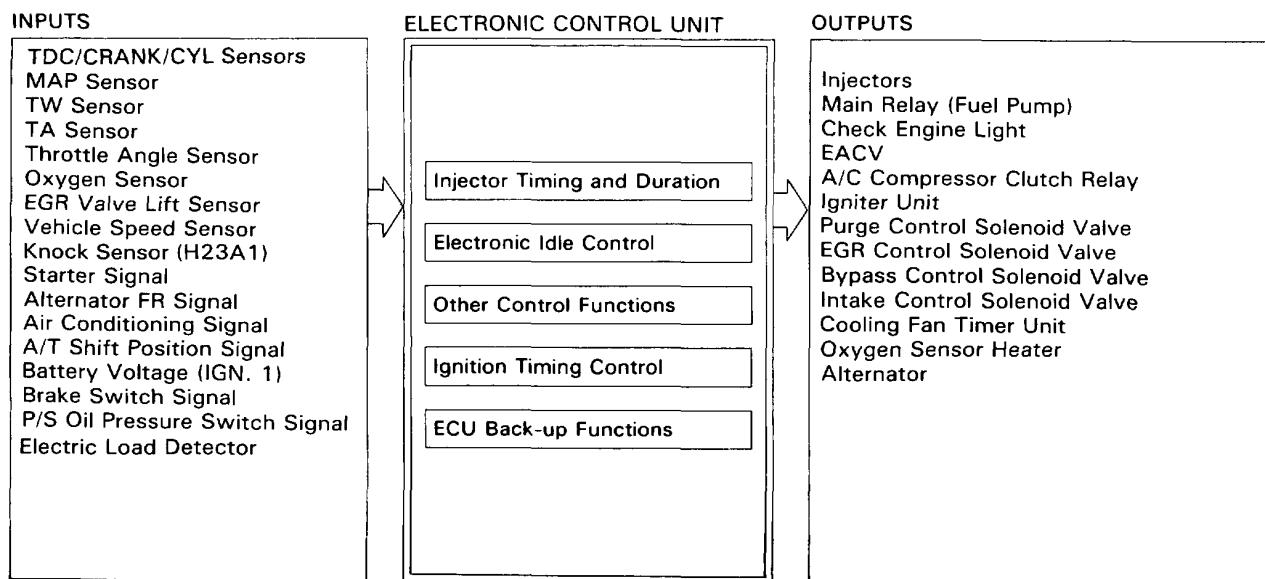
The end of a series of actions and decisions, describes a final repair action and sometimes directs you to an earlier part of the flowchart to confirm your repair.

NOTE:

- The term "Intermittent Failure" is used in these charts. It simply means a system may have had a failure, but it checks out OK through all your tests. You may need to road test the car to reproduce the failure or, if the problem was a loose connection, you may have unknowingly solved it while doing the tests. In any event, if the Check Engine light on the dash does not come on, check for poor connections or loose wires at all connectors related to the circuit that you are troubleshooting.
- Most of the troubleshooting flowcharts have you reset the ECU and try to duplicate the problem code. If the problem is intermittent and you can't duplicate the code, do not continue through the flowchart. To do so will only result in confusion and, possibly, a needlessly replaced ECU.
- "Open" and "Short" are common electrical terms. An open is a break in a wire or at a connection. A short is an accidental connection of a wire to ground or to another wire. In simple electronics, this usually means something won't work at all. In complex electronics (like ECU's), this can sometimes mean something works, but not the way it's supposed to.
- If the electrical readings are not as specified when using the test harness, check the test harness connections before proceeding.

PGM-FI Control System

System Description



Injector Timing and Duration

The ECU contains memories for the basic discharge durations at various engine speeds and manifold pressures. The basic discharge duration, after being read out from the memory, is further modified by signals sent from various sensors to obtain the final discharge duration.

Electronic Air Control

Electronic Air Control Valve (EACV)

When the engine is cold, the A/C compressor is on, the transmission is in gear (A/T only) or the alternator is charging, the ECU controls current to the EACV to maintain correct idle speed.

Ignition Timing Control

- The ECU contains memories for basic ignition timing at various engine speeds and manifold pressures. Ignition timing is also adjusted for coolant temperature.
- A Knock Control System (H23A1 engine) is also used. When detonation is detected by the knock sensors, the ignition timing is retarded.

Other Control Functions

1. Starting Control
When the engine is started, the ECU provides a rich mixture.
2. Fuel Pump Control
 - When the ignition switch is initially turned on, the ECU supplies ground to the main relay that supplies current to the fuel pump for two seconds to pressurize the fuel system.
 - When the engine is running, the ECU supplies ground to the main relay that supplies current to the fuel pump.
 - When the engine is not running and the ignition is on, the ECU cuts ground to the main relay which cuts current to the fuel pump.
3. Fuel Cut-off Control
 - During deceleration with the throttle valve closed, current to the injectors is cut off to improve fuel economy at speeds over 1400 min⁻¹ (rpm) (M/T) or 1100 min⁻¹ (rpm) (A.T).
 - Fuel cut-off action also takes place when engine speed exceeds, F20A4: 6600 min⁻¹ (rpm), F22A1/A2: 6600 min⁻¹ (rpm), H23A1/A2: 6800 min⁻¹ (rpm), regardless of the position of the throttle valve, to protect the engine from over-revving.



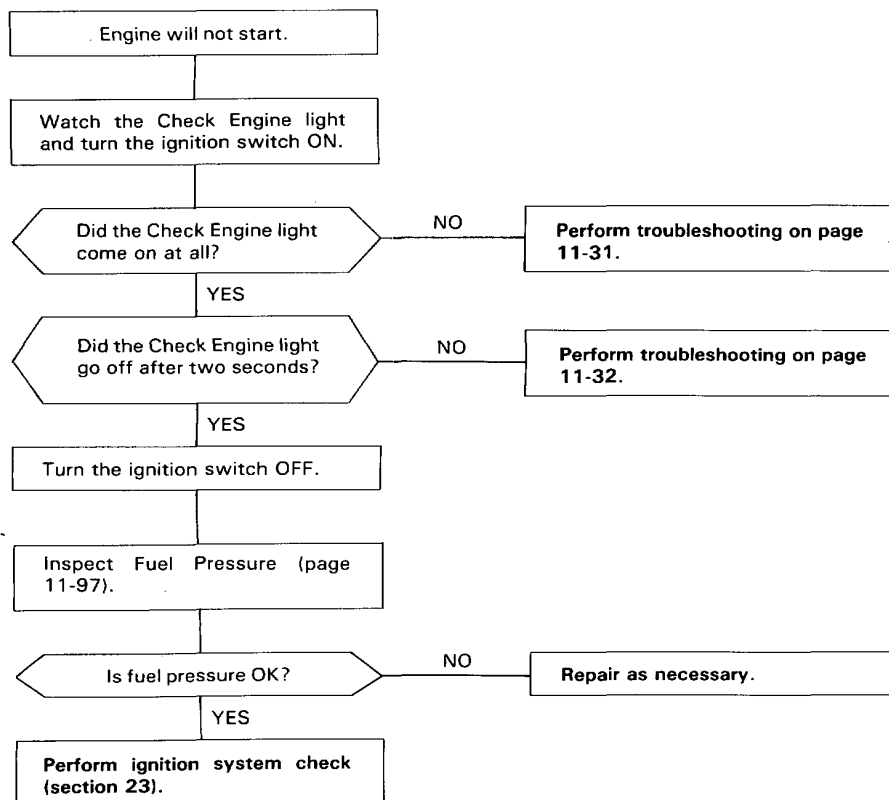
4. **A/C Compressor Clutch Relay**
When the ECU receives a demand for cooling from the air conditioning system (compressor control unit), it delays the compressor from being energized, and enriches the mixture to assure smooth transition to the A/C mode.
5. **Purge Control Solenoid Valve (Except F22A2 engine)**
When the coolant temperature is below 75°C (167°F), the ECU supplies a ground to the purge control solenoid valve which cuts vacuum to the purge control valve.
6. **Bypass Control Solenoid Valve (H23A1/A2 engine)**
When the engine speed is below 4,800 min⁻¹ (rpm), the Bypass Control Solenoid Valve is activated by a signal from the ECU, intake air flows through the long intake path, then high torque is delivered. At speeds higher than 4,900 min⁻¹ (rpm), the solenoid valve is deactivated by the ECU, and intake air flows through the short intake path in order to reduce the resistance in airflow.
7. **Intake Control Solenoid Valve (Except F22A1 engine)**
When the engine speed is below 4,000 min⁻¹ (rpm), the ECU supplies a ground to the intake control solenoid valve. This opens the solenoid valve sending intake manifold vacuum to the intake control diaphragm.
8. **EGR Control Solenoid Valve (Except F22A2 engine)**
When the EGR is required for control of oxides of nitrogen (NOx) emissions, the ECU supplies ground to the EGR Control Solenoid Valve which supplies regulated vacuum to the EGR valve.
9. **Alternator Control**
The system controls the voltage generated at the alternator in accordance with the electric load and drive mode, and reduces the engine load to improve the fuel economy.

ECU Back-up Functions

1. **Fail-Safe Function**
When an abnormality occurs in a signal from a sensor, the ECU ignores that signal and assumes a pre-programmed value that allows the engine to continue to run.
2. **Back-up Function**
When an abnormality occurs in the ECU itself, the injectors are controlled by a back-up circuit independent of the system in order to permit minimal driving.
3. **Self-diagnosis Function (Check Engine light)**
When an abnormality occurs in a signal from a sensor, the ECU lights the Check Engine light and stores the failure code in erasable memory. When the ignition is initially turned on, the ECU supplies ground for the Check Engine light for two seconds.

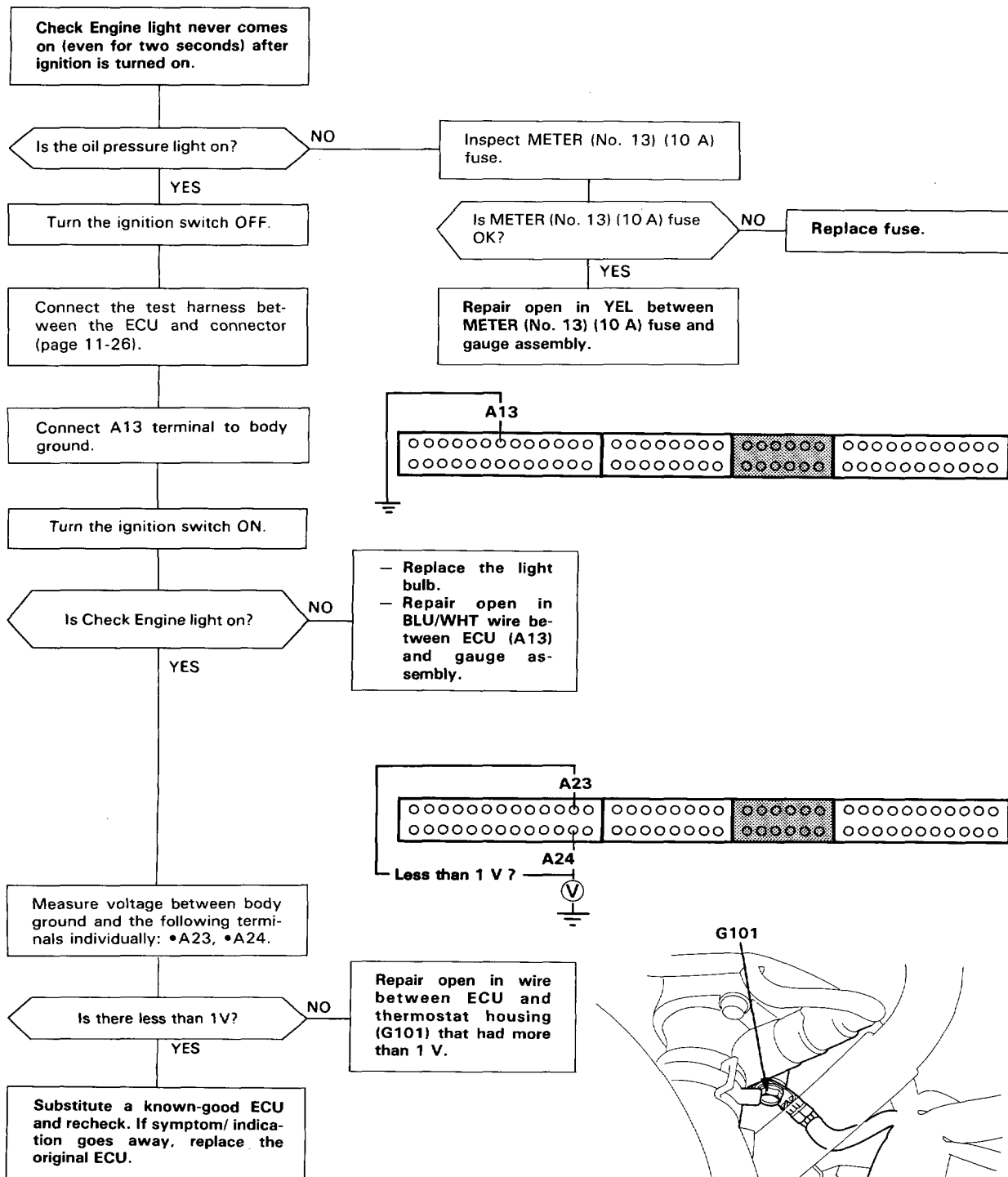
PGM-FI Control System

Troubleshooting Flowchart — Engine Will Not Start





Troubleshooting Flowchart — ECU

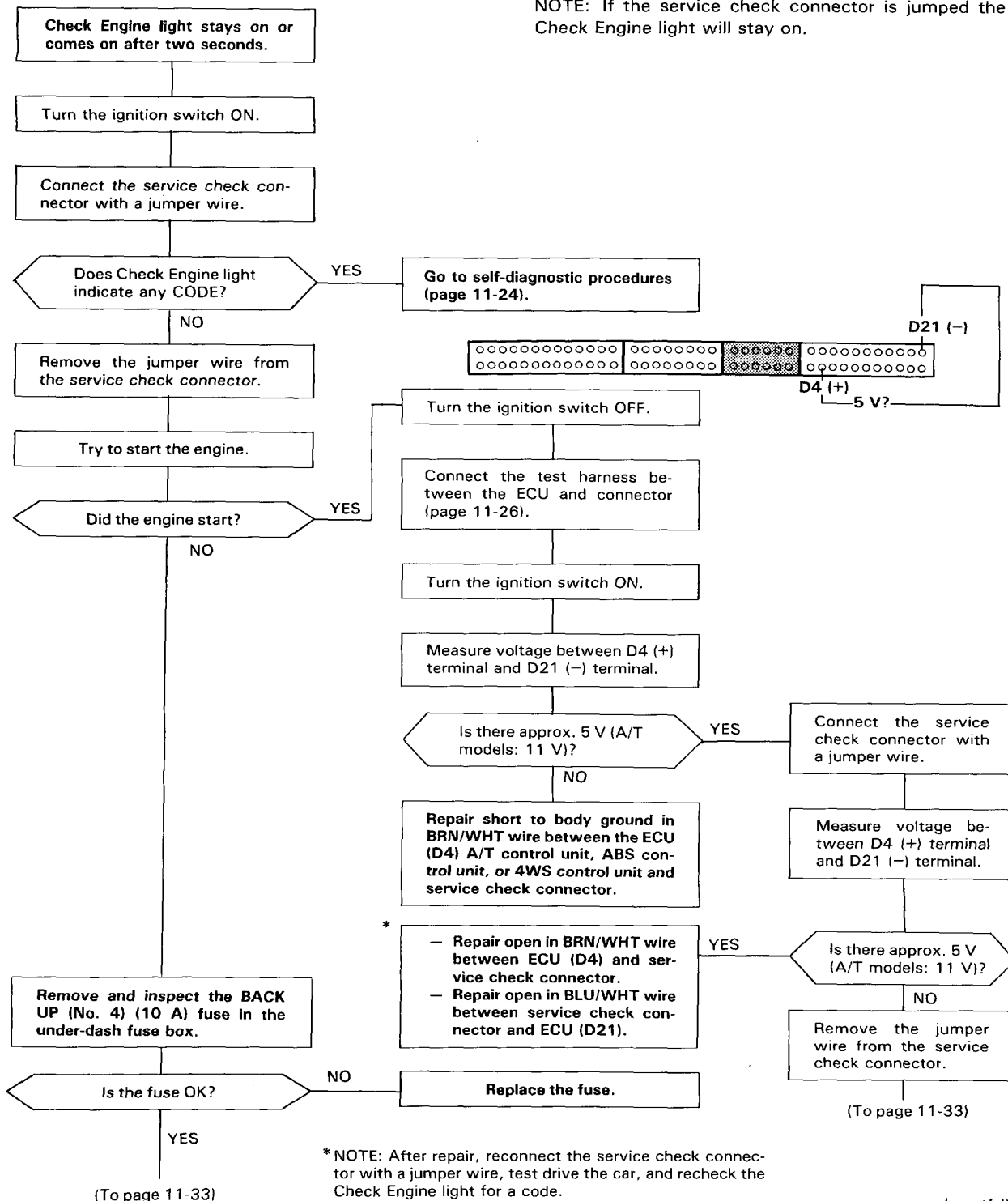


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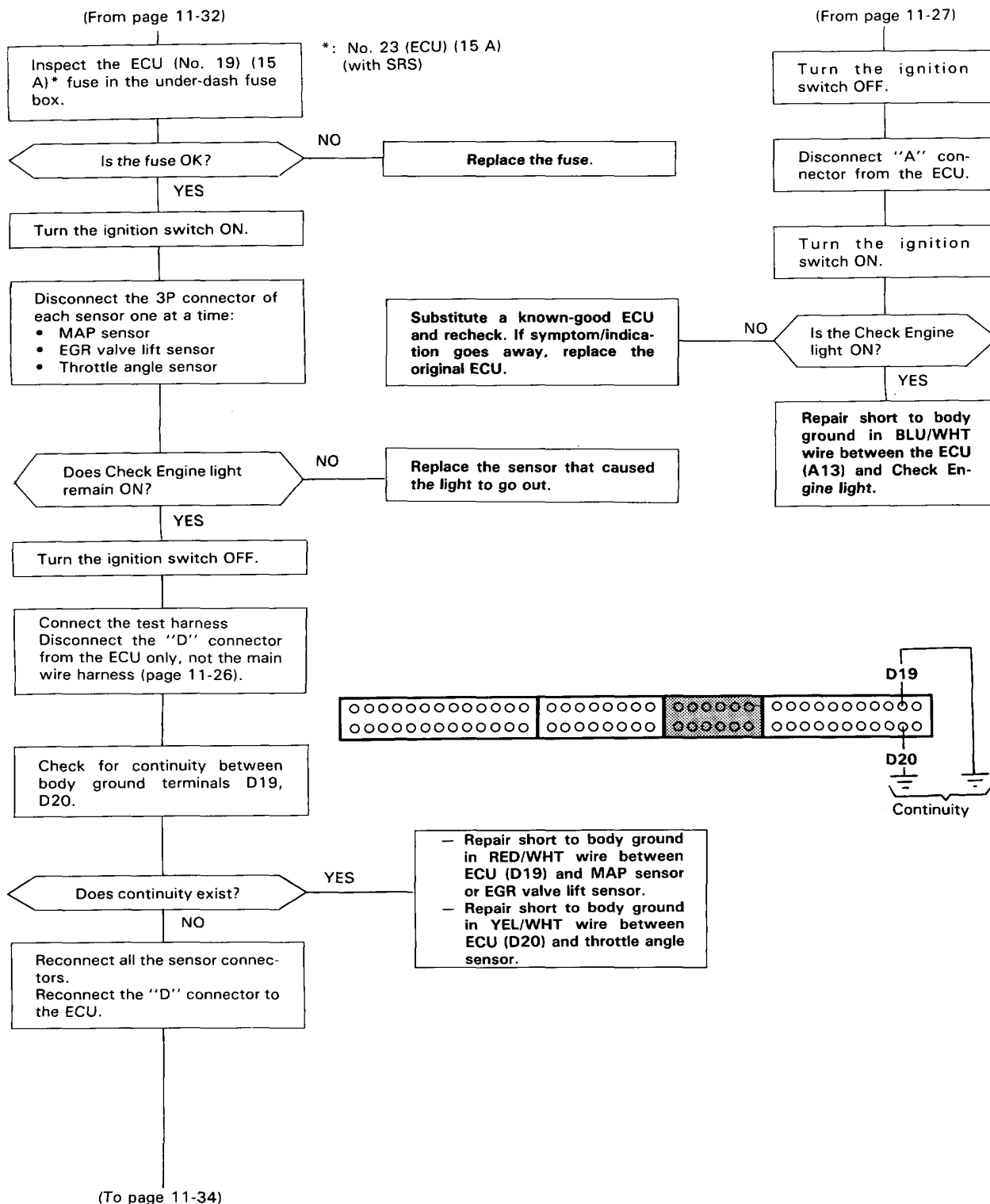
PGM-FI Control System

Troubleshooting Flowchart — ECU (cont'd)

NOTE: If the service check connector is jumped the Check Engine light will stay on.



(cont'd)



PGM-FI Control System

Troubleshooting Flowchart — ECU (cont'd)

(From page 11-33)

Turn the ignition switch ON.

Measure voltage between body ground and the following terminal individually: •A26, •B2.

Is there less than 1 V?

NO

Repair open in BLK/RED (A26) or BRN/BLK (B2) and G101.

YES

Measure voltage between A26 (–) and the following: B1 (+) and A25 (+).

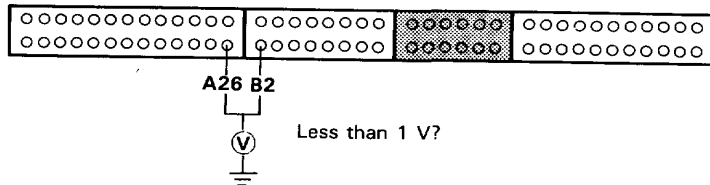
Is there battery voltage?

NO

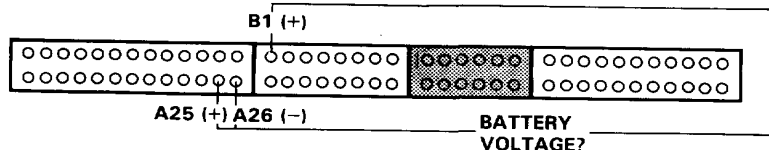
- Repair open in YEL/BLK wire between ECU (A25, B1) and main relay.
- Check main relay and wiring connectors at main relay.

YES

Substitute a known-good ECU and recheck. If symptom/indication goes away, replace the original ECU.



Less than 1 V?

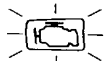


BATTERY VOLTAGE?



PGM-FI Control System

Troubleshooting Flowchart — Oxygen Sensor

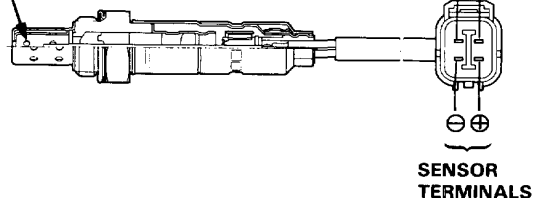


1

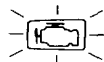
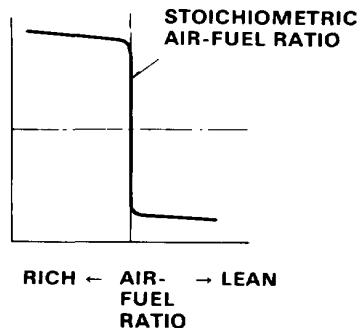
Self-diagnosis Check Engine light indicates code 1: A problem in the Oxygen (O₂) Sensor circuit.

The Oxygen sensor detects the oxygen content in the exhaust gas and signals the ECU. In operation, the ECU receives the signals from the sensor and varies the duration during which fuel is injected. The oxygen sensor has an internal heater. The heater stabilizes the sensor's output. The oxygen sensor is installed in the exhaust manifold.

ZIRCONIA
ELEMENT



VOLTAGE (V)



1

- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 1 is indicated.

Do the ECU Reset Procedure (page 11-23).

Warm up engine to normal operating temperature (cooling fan comes on).

Run engine for 60 seconds.

Road test with the transmission in 2nd gear (M/T: 4th gear). Starting at 1600 min⁻¹ (rpm), accelerate using wide open throttle for at least 5 seconds. Then decelerate for at least 5 seconds with the throttle completely closed.

Is Check Engine light on and does it indicate CODE 1?

NO

Intermittent failure, system is OK at this time. Check for poor connections or loose wires at the O₂ sensor and ECU.


YES

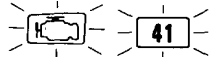
Go to page 11-42 and perform test for CODE 43.



PGM-FI Control System

Troubleshooting Flowchart — Oxygen Sensor Heater

 **41** Self-diagnosis Check Engine light indicates code 41: A problem in the Oxygen (O₂) Sensor Heater circuit.



- Engine is running.
- Check Engine light has been reported on. With service check connector jumped (page 11-22), CODE 41 is indicated.

Do the ECU Reset Procedure (page 11-23).

Start the engine.

Is Check Engine light on and does it indicate CODE 41?

NO

Intermittent failure, system is OK at this time (test drive may be necessary). Check for poor connections or loose wires at O₂ sensor and ECU.

YES

Stop the engine.

Disconnect the 4P connector from the O₂ sensor.

Measure resistance between terminals C and D on the O₂ sensor.

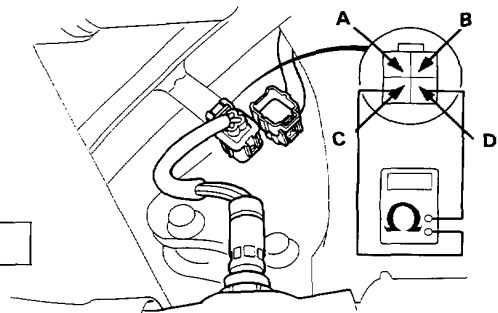
Is there 10–40 Ω ?

NO

Replace O₂ sensor.

YES

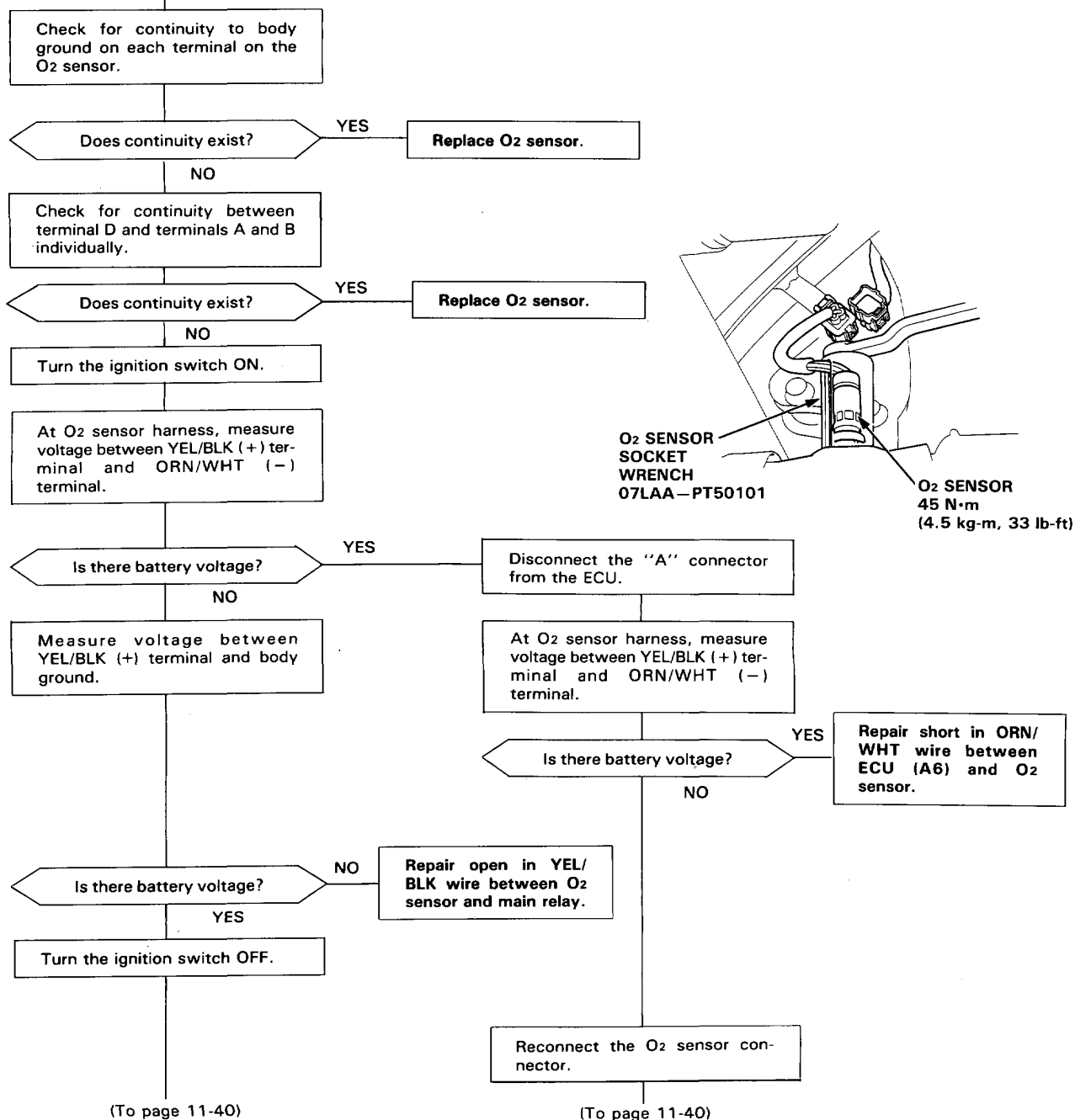
(To page 11-39)



10–40 Ω ?
DIGITAL
CIRCUIT TESTER
07411–0020000



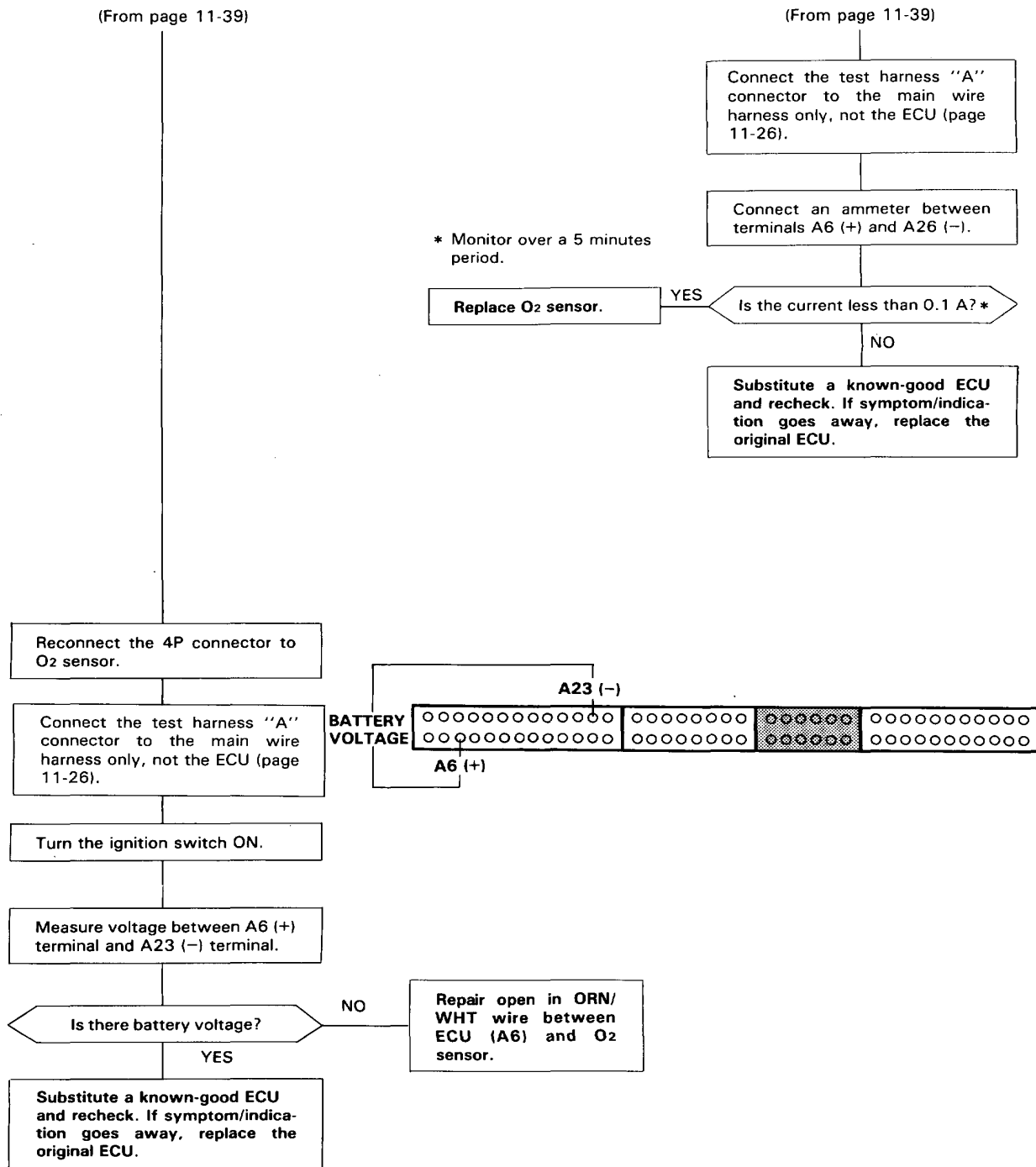
(From page 11-38)



(cont'd)

PGM-FI Control System

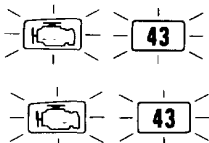
Troubleshooting Flowchart — Oxygen Sensor Heater (cont'd)





PGM-FI Control System

Troubleshooting Flowchart — Fuel Supply System



Self-diagnosis Check Engine light indicates code 43: A problem in the Oxygen (O₂) Sensor circuit or a problem in the Fuel Supply System.

Continued from code 1.

- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 43 is indicated.

Is the 43 code accompanied by the Check Engine light and poor driveability?

YES

Go to Fuel Supply System (page 11-95).

NO

Do the ECU Reset Procedure (page 11-23).

Warm up engine to normal operating temperature (cooling fan comes on).

Hold engine at 3,000 min⁻¹ (rpm) for 2 minutes.
(A/T): Transmission in **[N]** or **[P]**.)

Is the Check Engine light on and does it indicate CODE 43?

NO

Intermittent failure, system is OK at this time (test drive may be necessary).
Check for poor connections or loose wires at O₂ sensor and ECU.

YES

Turn the ignition switch OFF.

Connect the test harness between the ECU and connector (page 11-26).

With the ignition switch OFF, wait for at least two minutes.

Install a jumper wire on the test harness between A6 and A26.

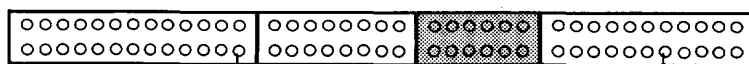
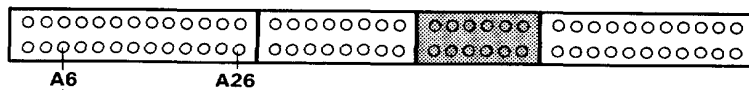
Turn the ignition switch ON.

Measure voltage between D14 (+) terminal and A26 (-) terminal as soon as the ignition switch is turned on.

(To page 11-43)

NOTE:

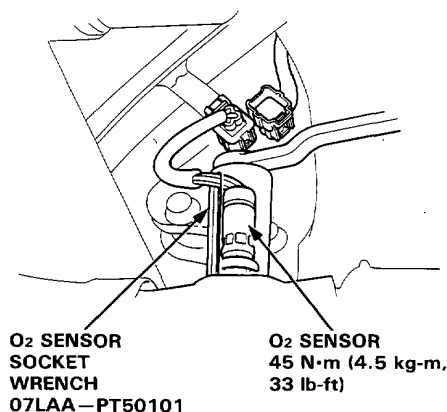
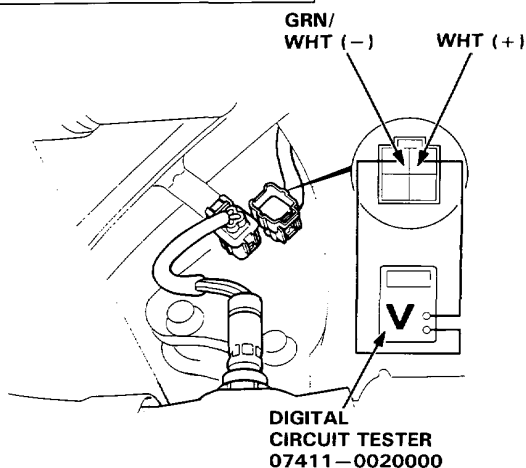
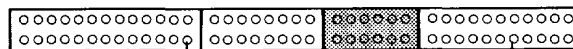
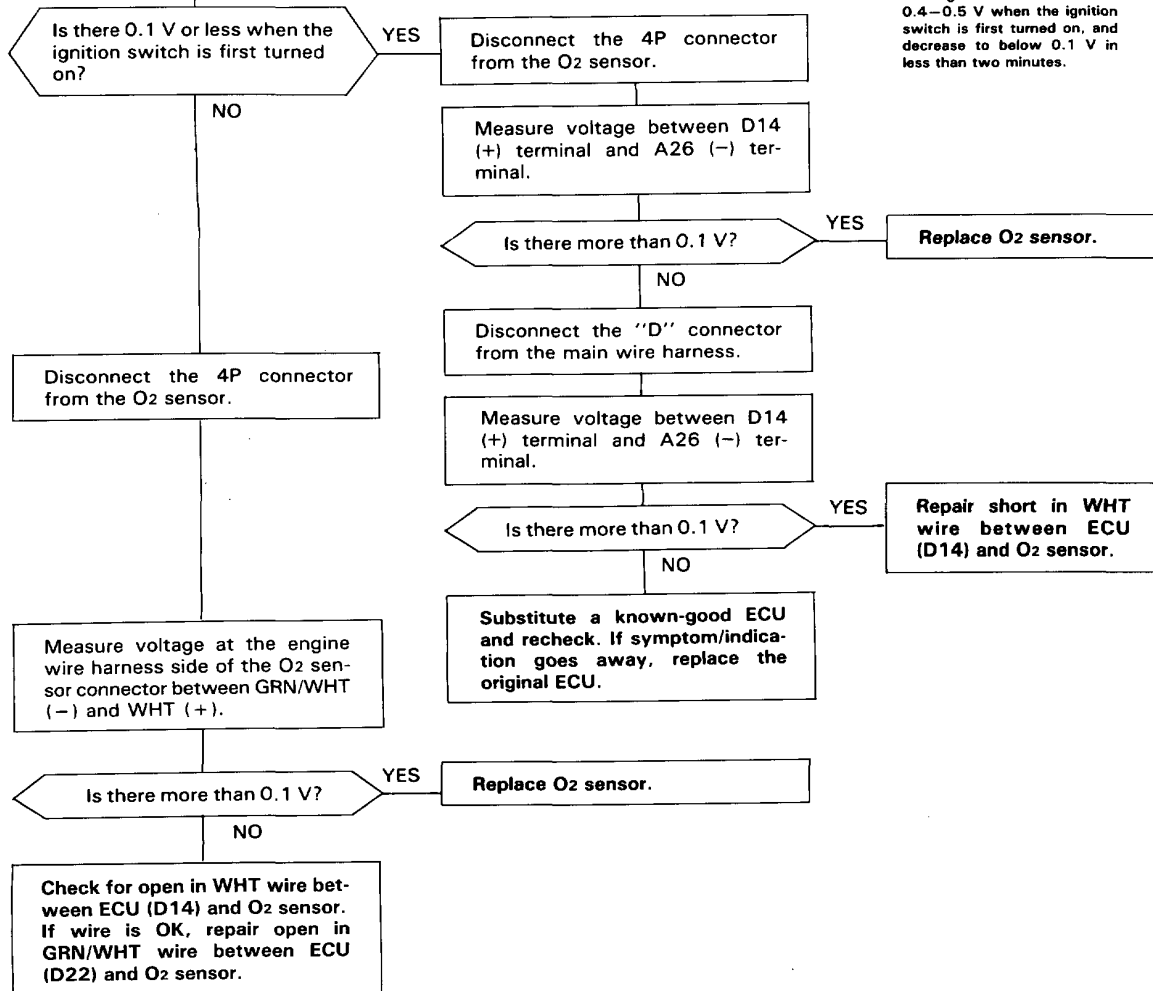
- Use DIGITAL CIRCUIT TESTER (07411-0020000) or equivalent.
- Use 2 Volt range.



Voltage should start at 0.4–0.5 V when the ignition switch is first turned on, and decrease to below 0.1 V in less than two minutes.

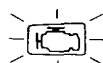
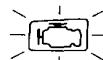


(From page 11-42)

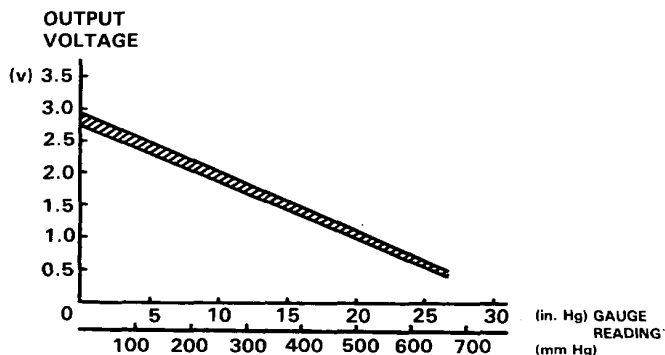
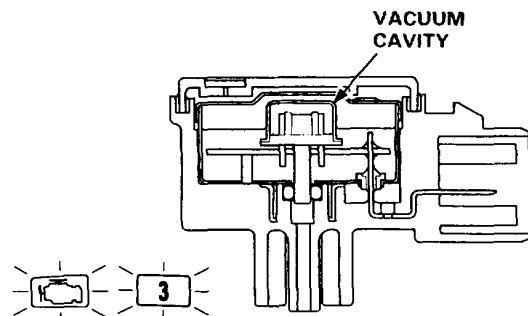


PGM-FI Control System

Troubleshooting Flowchart — MAP Sensor

-  **3** Self-diagnosis Check Engine light indicates code 3: An electrical problem in the Manifold Absolute Pressure (MAP) Sensor system.
-  **5** Self-diagnosis Check Engine light indicates code 5: A mechanical problem (broken hose) in the Manifold Absolute Pressure (MAP) sensor System.

The MAP sensor converts manifold absolute pressure into electrical signals and inputs the ECU.



- Engine is warm and running.
- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 3 is indicated.

Do the ECU Reset Procedure (page 11-23).

Start the engine and allow it to idle.

Is Check Engine light on and does it indicate CODE 3?

NO

Intermittent failure, system is OK at this time (test drive may be necessary). Check for poor connections or loose wires at MAP sensor and ECU.

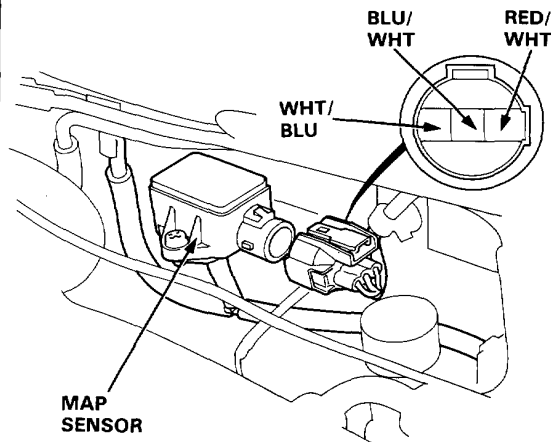
YES

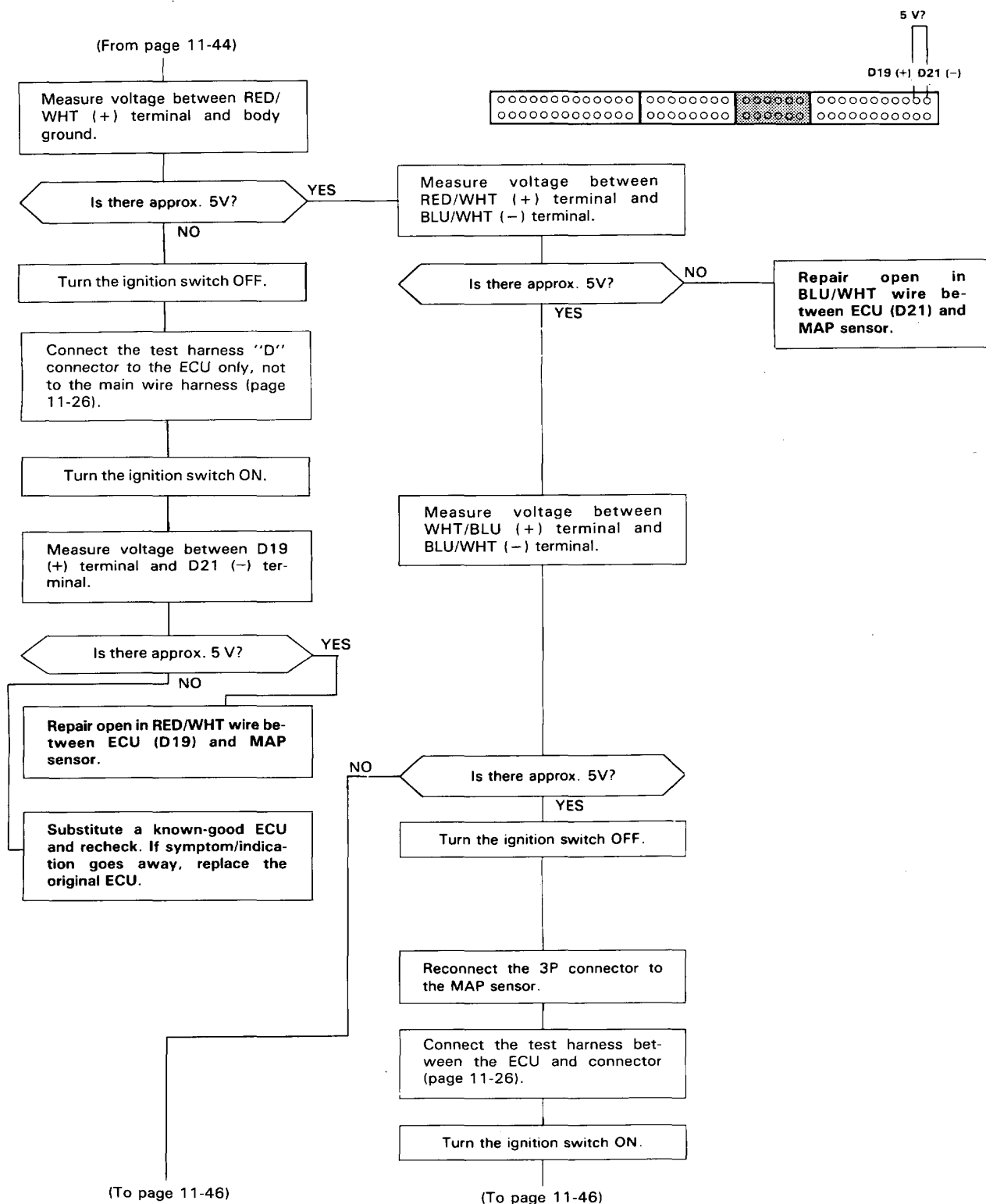
Turn the ignition switch OFF.

Disconnect the 3P connector from the MAP sensor.

Turn the ignition switch ON.

(To page 11-45)

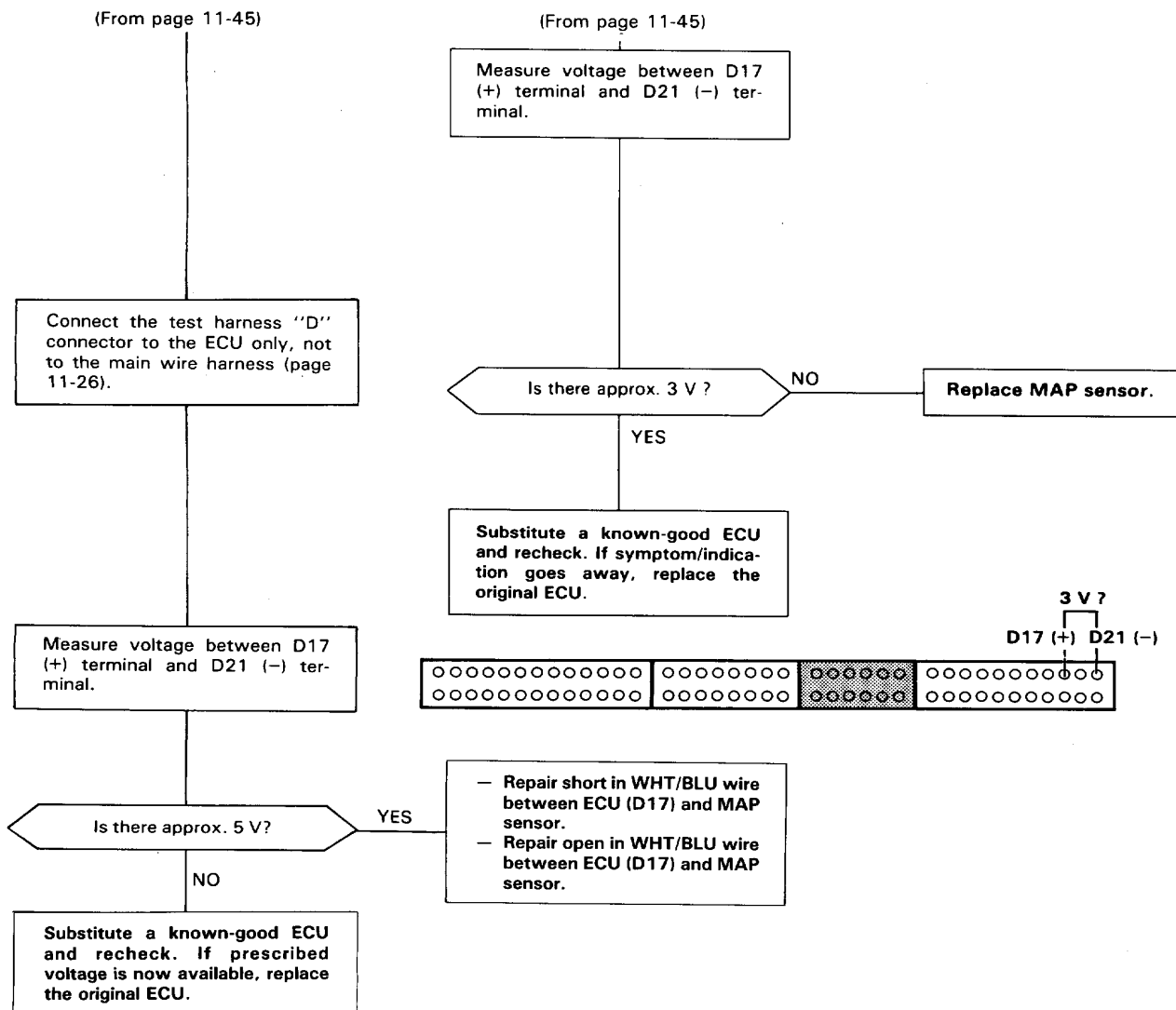




(cont'd)

PGM-FI Control System

Troubleshooting Flowchart — MAP Sensor (cont'd)

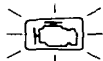


(cont'd)



PGM-FI Control System

Troubleshooting Flowchart — MAP Sensor (cont'd)



- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 5 is indicated.

Do the ECU Reset Procedure (page 11-23).

Start the engine and keep engine rpm at idle.

Is Check Engine light on and does it indicate CODE 5?

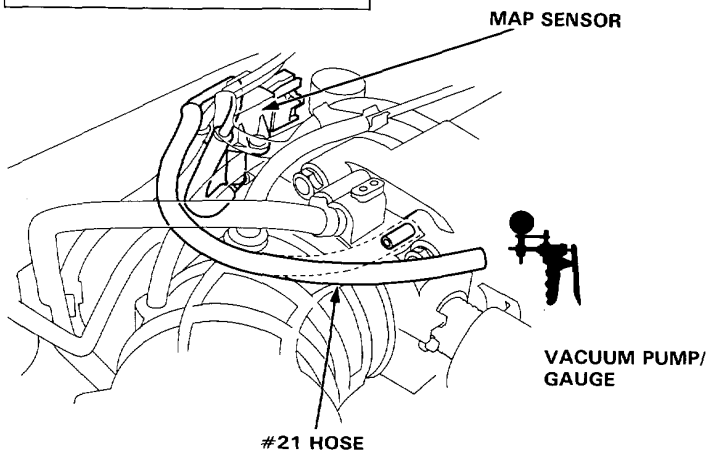
NO

- Intermittent failure, system is OK at this time (test drive may be necessary).
- Check vacuum hoses, pipes and connections.

YES

Stop the engine.

Disconnect #21 hose from the throttle body, connect vacuum pump to the hose and apply vacuum.



Does it hold vacuum?

NO

Connect a vacuum pump to the MAP sensor and apply vacuum.

Does it hold vacuum?

NO

Replace MAP sensor.

YES

Connect a T-fitting from a vacuum gauge between the throttle body base and #21 hose.

Repair vacuum leak in hose routing between MAP sensor and intake manifold.

(To page 11-49)



(From page 11-48)

Start the engine.

Is there manifold vacuum?

NO

Remove restriction from throttle body.

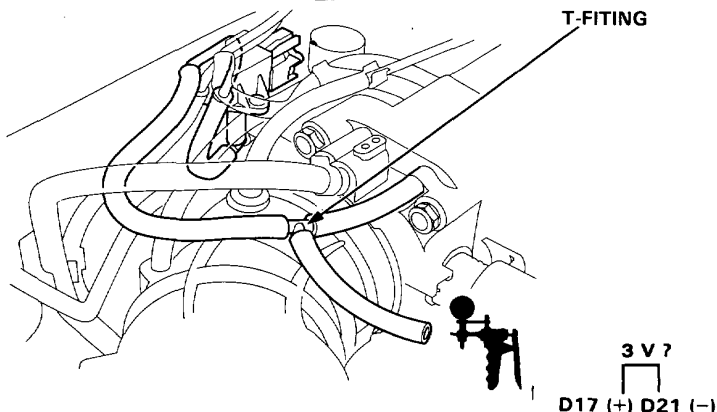
YES

Stop the engine.

Connect the test harness between the ECU and connector (page 11-26).

Turn the ignition switch ON.

Measure voltage between D17 (+) terminal and D21 (-) terminal.



Is there approx. 3 V ?

NO

Replace MAP sensor.

YES

Start the engine and allow it to idle.

Is there approx. 1 V ?

NO


Replace MAP sensor.


YES


Substitute a known-good ECU and recheck. If symptom/indication goes away, replace the original ECU.

PGM-FI Control System




Troubleshooting Flowchart — TDC/CRANK/CYL Sensor

 **4** Self-diagnosis Check Engine light indicates code 4: A problem in the CRANK Sensor circuit.

 **8** Self-diagnosis Check Engine light indicated code 8: A problem in the TDC Sensor circuit.

 **9** Self-diagnosis Check Engine light indicates code 9: A problem in the CYL Sensor circuit.

The CRANK sensor determines timing for fuel injection and ignition of each cylinder and also detects engine RPM. The TDC sensor determines ignition timing at start-up (cranking) and when crank angle is abnormal. The CYL sensor detects the position of No. 1 cylinder for sequential fuel injection to each cylinder.

 **4**  **8** or  **9**

- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 4, 8 and/or 9 are indicated.

Do the ECU Reset Procedure (page 11-23).

Start the engine.

Is Check Engine light on and does it indicate CODE 4, 8 or 9?

NO

YES

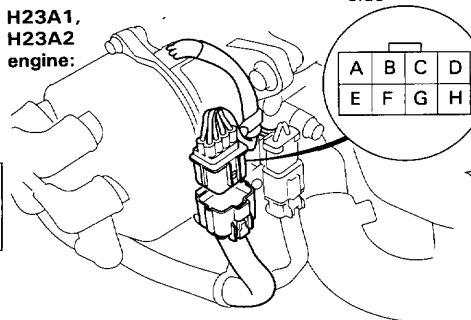
Stop the engine.

Disconnect the 8P connector from the TDC/CRANK/CYL sensor.

(To page 11-51)

Intermittent failure, system is OK at this time (test drive may be necessary). Check for poor connections or loose wires at TDC/CRANK/CYL sensor and ECU.

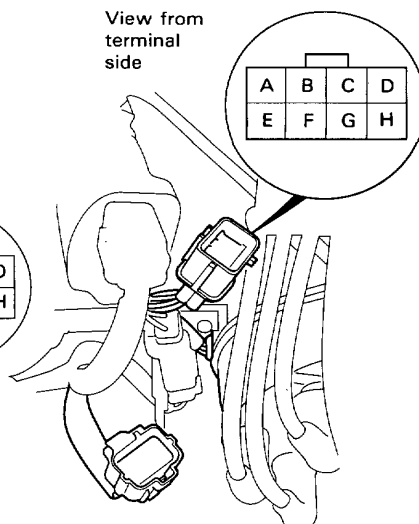
H23A1, H23A2 engine:



View from terminal side

F20A4, F22A1, F22A2 engine:

View from terminal side





(From page 11-50)

Measure resistance between terminals of the indicated sensor.
*see table

Is there 350 – 700 Ω ?
YES

NO

Replace the distributor sub-assembly (Section 23).

Check for continuity to body ground on both terminals of the indicated sensor.

Does continuity exist?
YES

NO

Replace the distributor sub-assembly (Section 23).

Reconnect the connector.

Connect the test harness to the main wire harness only, not to the ECU (page 11-26).

Measure resistance between terminals of the indicated sensor on test harness.
*see table

Is there 350 – 700 Ω ?
YES

NO

Repair open in the indicated sensor wires.
*see table

Check for continuity to body ground on B15: B13 or B11 terminals.

Does continuity exist?
YES

NO

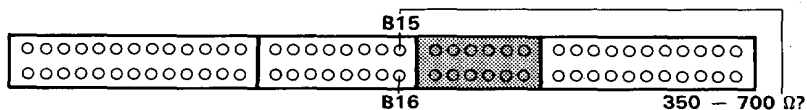
Repair short to body ground in the indicated sensor wires.
*see table

Substitute a known-good ECU and recheck. If symptom/indication goes away, replace the original ECU.

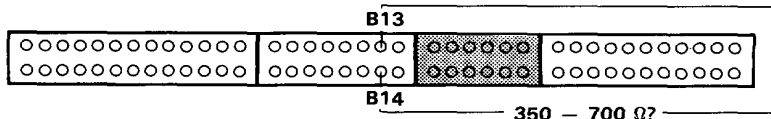
*

SENSOR	CODE	SENSOR TERMINAL	ECU TERMINAL	WIRE COLOR
CRANK	4	B	B15	BLU/GRN
		F	B16	BLU/YEL
TDC	8	C	B13	ORN/BLU
		G	B14	WHT/BLU
CYL	9	D	B11	ORN
		H	B12	WHT

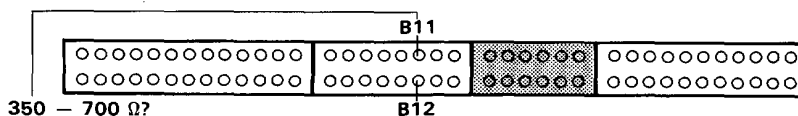
CRANK:



TDC:

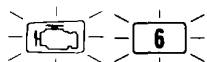


CYL:



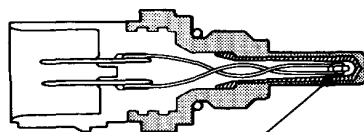
PGM-FI Control System

Troubleshooting Flowchart — TW Sensor



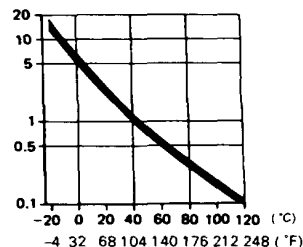
Self-diagnosis Check Engine light indicates code 6: A problem in the Coolant Temperature (TW) Sensor circuit.

The TW sensor is a temperature dependant resistor (thermistor). The resistance of the thermistor decreases as the coolant temperature increases as shown below.

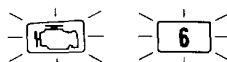


THERMISTOR

RESISTANCE
(k Ω)



COOLANT TEMPERATURE



- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 6 is indicated.

Do the ECU Reset Procedure (page 11-23).

Turn the ignition switch ON.

Is Check Engine light on and does it indicate CODE 6?

NO

Intermittent failure, system is OK at this time (test drive may be necessary).
Check for poor connections or loose wires at TW sensor and ECU.

YES

Warm up engine to normal operating temperature (cooling fan comes on).

Turn the ignition switch OFF.

Disconnect the 2P connector from the TW sensor.

Measure resistance between the 2 terminals on the TW sensor.

Is there 20 – 400 Ω ?

NO

Replace TW sensor.

YES

(To page 11-53)



(From page 11-52)

Turn the ignition switch ON.

Measure voltage between YEL/
BLU and body ground.

Is there approx. 5V ?

YES

Measure voltage between YEL/
BLU (+) terminal and GRN/WHT
(-) terminal.

NO

Is there approx. 5V ?

NO

Repair open in GRN/
WHT wire between
ECU (D22) and TW
sensor.

YES

Substitute a known-good ECU
and recheck. If symptom/indica-
tion goes away, replace the
original ECU.

A/T only

Disconnect the 22P connector
from the A/T control unit.

Is there approx. 5V ?

YES

Replace the A/T control unit.

NO

Turn the ignition switch OFF.

Connect the test harness "D"
connector to the ECU only, not
to the main wire harness (page
11-26).

Turn the ignition switch ON.

Measure voltage between D13
(+) terminal and D22 (-) ter-
minal.

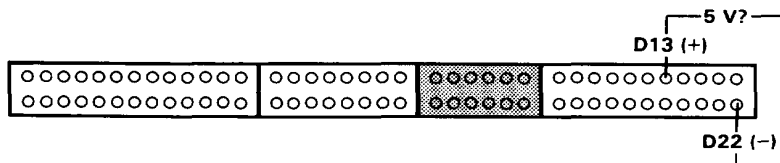
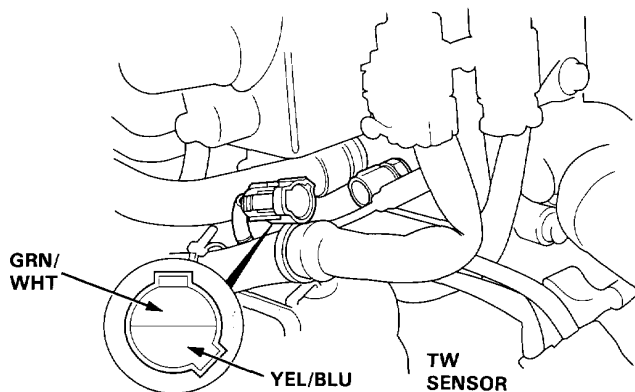
Is there approx. 5V ?

YES

Repair open or short in YEL/BLU
wire between ECU (D13), A/T
control unit and sensor.

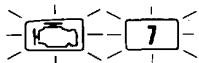
NO

Substitute a known-good ECU
and recheck. If symptom/indica-
tion goes away, replace the
original ECU.



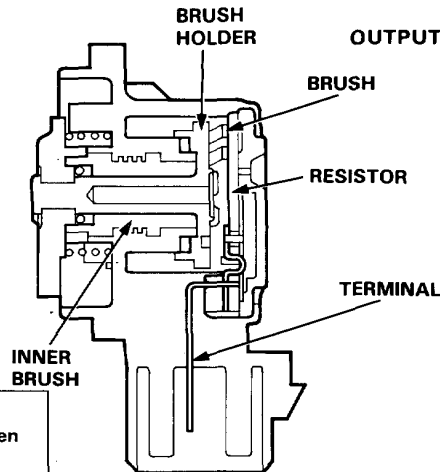
PGM-FI Control System

Troubleshooting Flowchart — Throttle Angle Sensor

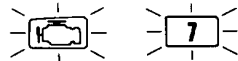
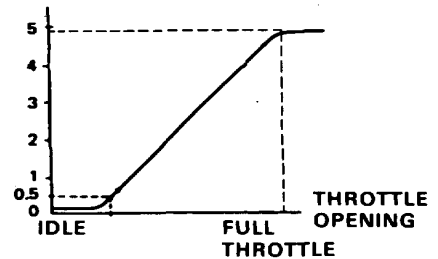


Self-diagnosis Check Engine light indicates code 7: A problem in the Throttle Angle Sensor circuit.

The throttle angle sensor is a potentiometer. It is connected to the throttle valve shaft. As the throttle angle changes, the throttle angle sensor varies the voltage signal to the ECU.



OUTPUT VOLTAGE (V)



- Engine is running.
- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 7 is indicated.

Do the ECU Reset Procedure (page 11-23).

Start the engine.

Is Check Engine light on and does it indicate CODE 7?

NO

Intermittent failure, system is OK at this time (test drive may be necessary).
Check for poor connections or loose wires at throttle angle sensor and ECU.

YES

Turn the ignition switch OFF.

Disconnect the 3P connector from the throttle angle sensor.

Turn the ignition switch ON.

Measure voltage between YEL/ WHT (+) terminal and GRN/ WHT (-) terminal.

Is there approx. 5V ?

NO

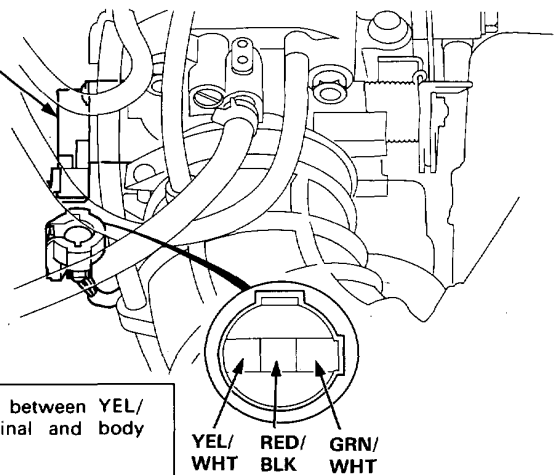
Measure voltage between YEL/ WHT (+) terminal and body ground.

YES

(To page 11-55)

(To page 11-55)

THROTTLE
ANGLE
SENSOR





(From page 11-54)

Turn the ignition switch OFF.

Reconnect the 3P connector.

Connect the test harness between the ECU and connector (page 11-26).

Turn the ignition switch ON.

Measure voltage between D11(+) terminal and D22 (-) terminal.

Is voltage 0.5 V at full close throttle, and approx. 4.5 V at full open throttle?
NOTE: There should be a smooth transition from 0.5 V to approx. 4.5 V as the throttle is depressed.

YES

Substitute a known-good ECU and recheck. If symptom/indication goes away, replace the original ECU.

NO

(From page 11-54)

Is there approx. 5V ?

YES

Repair open in GRN/ WHT wire between ECU (D22) and throttle angle sensor.

NO

Turn the ignition switch OFF.

Connect the test harness between the ECU and connector (page 11-26).

Turn the ignition switch ON.

Measure voltage between D20 (+) terminal and D22 (-) terminal.

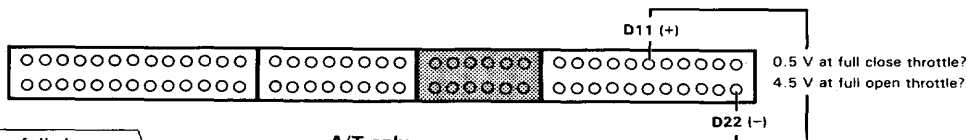
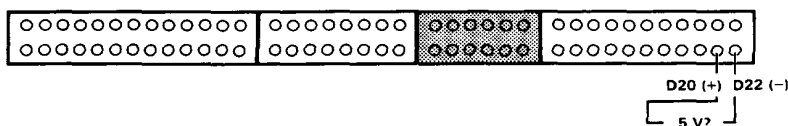
Is there approx. 5V ?

YES

Repair open in YEL/ WHT wire between ECU (D20) and throttle angle sensor.

NO

Substitute a known-good ECU and recheck. If prescribed voltage is now available, replace the original ECU.



A/T only

Disconnect the 22P connector from the A/T control unit.

Is voltage 0.5 V at full close throttle, and 4.5 V at full open throttle?
NOTE: There should be a smooth transition from 0.5 V to 4.5 V as the throttle is depressed.

YES

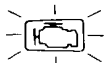
Replace the A/T control unit.

NO

— Replace throttle angle sensor.
— Repair open or short in RED/BLK wire between ECU (D11), A/T control unit and throttle angle sensor.

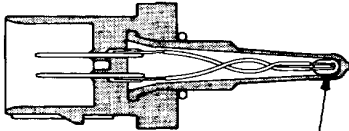
PGM-FI Control System

Troubleshooting Flowchart — TA Sensor

**10**

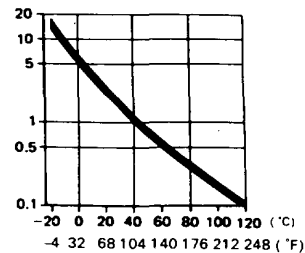
Self-diagnosis Check Engine light indicates code 10: A problem in the Intake Air Temperature (TA) Sensor circuit.

The TA sensor is a temperature dependant resistor (thermistor). The resistance of the thermistor decreases as the intake air temperature increases as shown below.

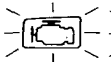


THERMISTOR

RESISTANCE (k Ω)



INTAKE AIR TEMPERATURE

**10**

- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 10 is indicated.

Do the ECU Reset Procedure (page 11-23).

Turn the ignition switch ON.

Is Check Engine light on and does it indicate CODE 10?

NO

Intermittent failure, system is OK at this time (test drive may be necessary). Check for poor connections or loose wires at TA sensor and ECU.

YES

Turn the ignition switch OFF.

Disconnect the 2P connector from the TA sensor.

Measure resistance between the 2 terminals on the TA sensor.

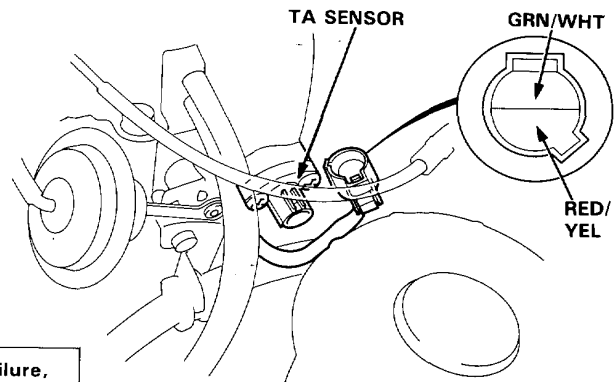
Is there 0.4—4.0 k Ω ?

NO

Replace TA sensor.

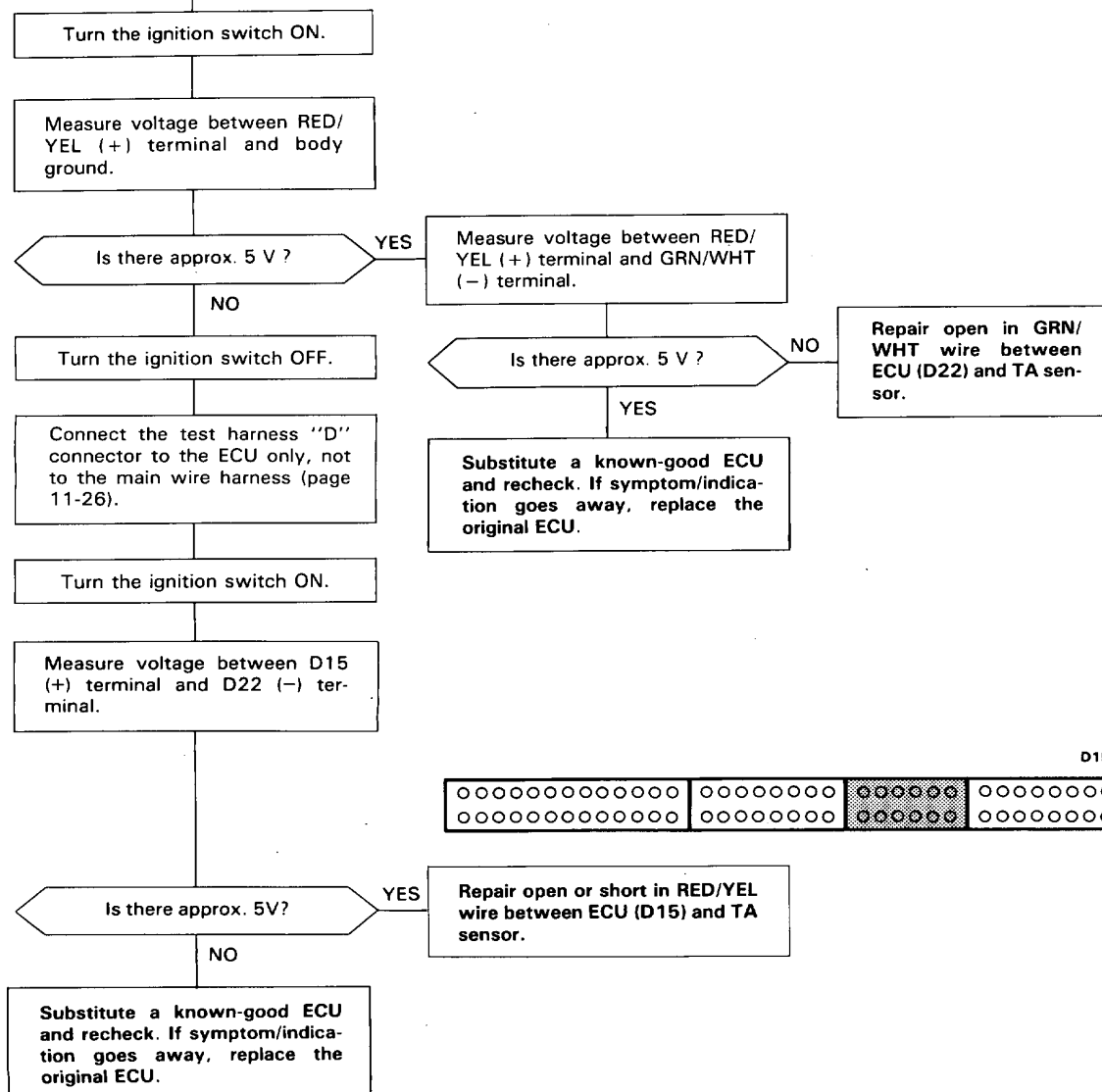
YES

(To page 11-57)



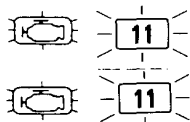


(From page 11-56)



PGM-FI Control System

Troubleshooting Flowchart — IMA Sensor [F22A2 engine only]



Self-diagnosis Check Engine light indicates code 11: A problem in the IMA Sensor circuit.

- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 11 is indicated.

Do the ECU Reset Procedure (page 11-23).

Turn the ignition switch ON.

Is Check Engine light on and does it indicate CODE 11?

NO

Intermittent failure, system is OK at this time (test drive may be necessary).
Check for poor connections or loose wires at IMA sensor and ECU.

YES

Turn the ignition switch OFF.

Disconnect the 3P connector from the IMA sensor.

Measure resistance between A terminal and C terminal on IMA sensor harness.

Is there 4—6 kΩ ?

NO

Replace IMA sensor.

YES

Measure resistance between A and B terminals and between C and B terminals.

Does the sum of the two resistance checks equal 4—6 kΩ ?

NO

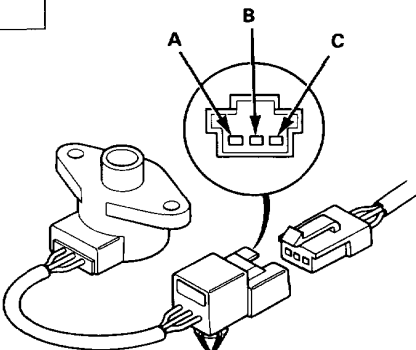
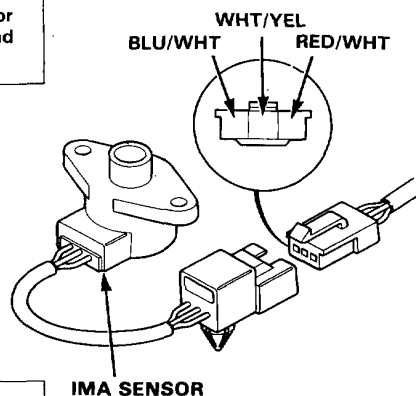
Replace IMA sensor.

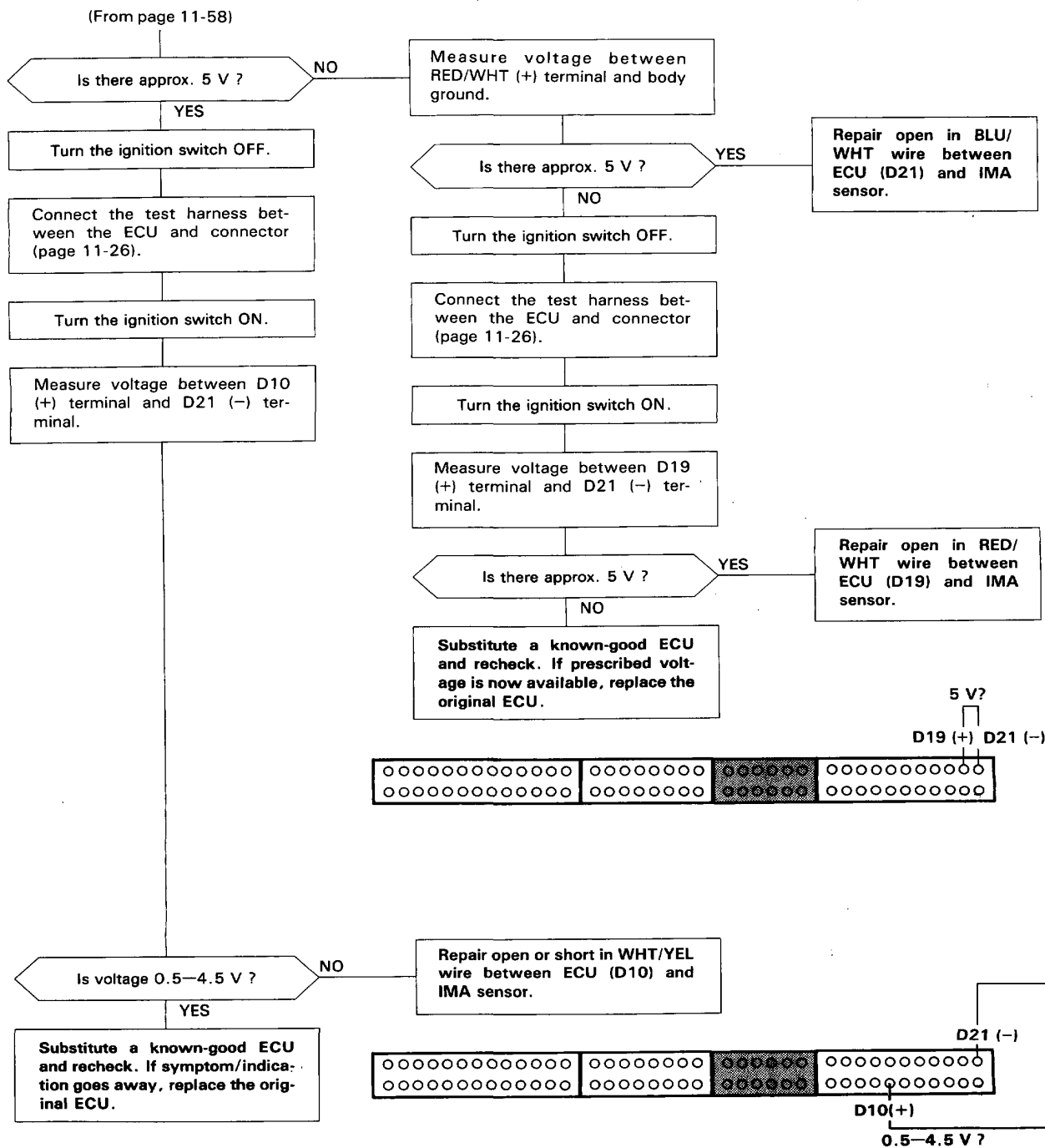
YES

Turn the ignition switch ON.

Measure voltage between RED/ WHT (+) terminal and BLU/ WHT (−) terminal on the wire harness.


(To page 11-59)



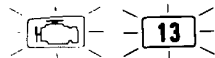


PGM-FI Control System

Troubleshooting Flowchart — PA Sensor

 **13** Self-diagnosis Check Engine light indicates code 13: A problem in the Atmospheric Pressure (PA) Sensor.

The PA sensor is built into the ECU.



- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 13 is indicated.

Do the ECU Reset Procedure (page 11-23).

Turn the ignition switch ON.

Is Check Engine light on and does it indicate CODE 13?

NO

Intermittent failure, system is OK at this time (test drive may be necessary).

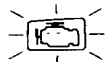
YES

Substitute a known-good ECU and recheck. If symptom/indication goes away, replace the original ECU.



PGM-FI Control System

Troubleshooting Flowchart — Ignition Output Signal



15

Self-diagnosis Check Engine light indicates code 15: A problem in the Ignition Output Signal circuit.

- Check Engine light has been reported on.
- With service check connector jumped (see page 11-22), CODE 15 is indicated.

Do the ECU Reset Procedure (page 11-23).

Start the engine.

NOTE: If the engine won't start, it may take 20 seconds of cranking to set the code.

Is Check Engine light on and does it indicate CODE 15?

NO

Intermittent failure, system is OK at this time (test drive may be necessary).
Check for poor connections or loose wires at igniter unit and ECU.

F20A4, F22A1, F22A2 engine:

Turn the ignition switch OFF.

Disconnect the 2P connector at the distributor.

Turn the ignition switch ON.

Measure voltage between YEL or BLK/YEL* (+) terminal and body ground.

Is there battery voltage?

NO

YES

(To page 11-63)

*: F20A4, F22A2, H23A2 engine

(H22A1, F22A1 engine)

Test the ignition coil (section 23).

Is the ignition coil OK?

NO

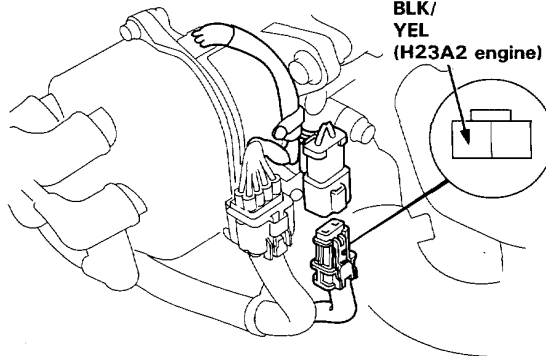
Replace the ignition coil.

YES

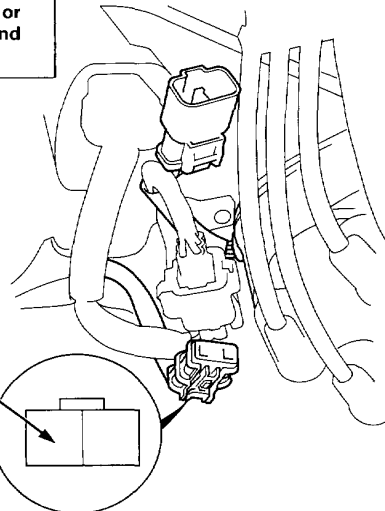
- Repair open in YEL wire between the 2P connector and ignition coil (H23A1, F22A1 engine).
- Repair open in BLK/YEL wire between the ignition coil and ignition switch (Except H23A1, F22A1 engine).

H23A1
H23A2
engine:

YEL (H23A1 engine)
BLK/
YEL
(H23A2 engine)



YEL
(F22A1 engine)
BLK/YEL
(F20A4, F22A2 engine)





(From page 11-62)

Turn the ignition switch OFF.

Reconnect the 2P connector.

Connect the test harness between the ECU and connector (page 11-26).

Turn the ignition switch ON.

Measure voltage individually between A21 (+), A22 (+) terminals and A26 (-) terminal.

Is there approx. 10 V?

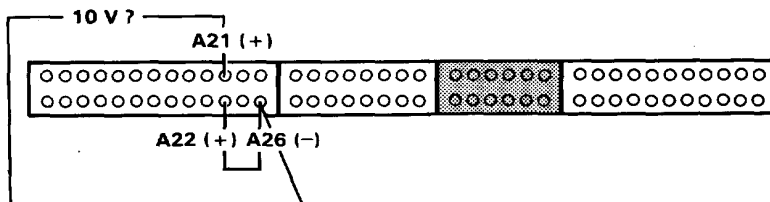
YES

Substitute a known-good ECU and recheck. If symptom/indication goes away, replace the original ECU.

NO

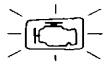
- Replace the igniter unit.
- Repair open or short YEL/GRN wires between igniter unit and ECU (A21 or A22).

NOTE: If the YEL/GRN wire was shorted, the igniter may be damaged.



PGM-FI Control System

Troubleshooting Flowchart — Vehicle Speed Sensor



17

Self-diagnosis Check Engine light indicates code 17: A problem in the Vehicle Speed Sensor circuit.

The signal generated by the speed sensor, produces pulses when the front wheels turn.

- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 17 is indicated.

Do the ECU Reset Procedure (page 11-23).

Road test necessary.
In 2nd gear accelerate to 4,000 min^{-1} (rpm), then decelerate to 1,500 min^{-1} (rpm) with throttle fully closed.

Is Check Engine light on and does it indicate CODE 17?

NO

Intermittent failure, system is OK at this time.
Check for poor connections or loose wires at speed sensor and ECU.

YES

Block rear wheels and set the parking brake. Jack up the front of the car and support with safety stands.

⚠ WARNING Block rear wheels before jacking up front of car.

Connect the test harness between the ECU and connector (page 11-26).

Turn the ignition switch ON.

Block the right front wheel and slowly rotate left front wheel and measure voltage between B10 (+) terminal and A26 (-) terminal.

Does voltage pulse 0 V and 5 V?

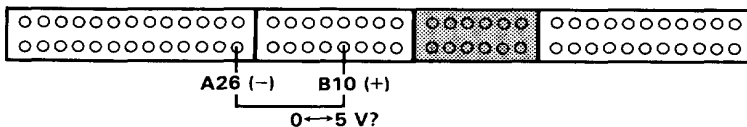
NO

Turn the ignition switch OFF.

YES

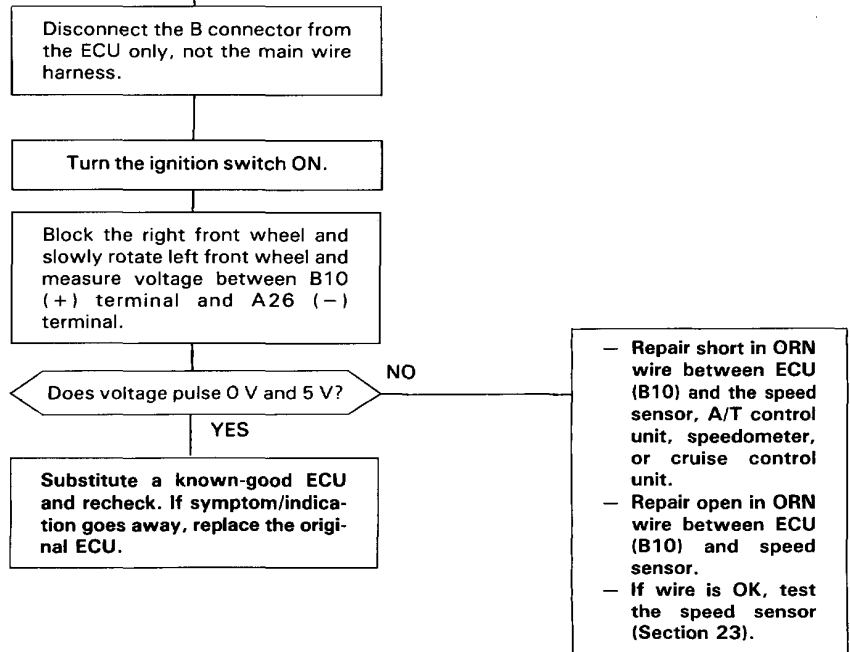
Substitute a known-good ECU and recheck. If symptom/indication goes away, replace the original ECU.

(To page 11-65)






(From page 11-64)



PGM-FI Control System

Troubleshooting Flowchart — Electric Load Detector

 **20** Self-diagnosis Check Engine light indicates code 20: A problem in the Electric Load Detector circuit.

With service check connector jumped (page 11-22), CODE 20 is indicated.

Do the ECU Reset Procedure (page 11-23).

Start engine and keep engine speed at idle.
Turn on headlights.

Does Check Engine light indicate CODE 20?

NO

Intermittent failure, system is OK at this time (test drive may be necessary).
Check for poor connections or loose wires at ELD and ECU.

YES

Turn the ignition switch OFF.

Remove the under-hood fuse/relay box and remove the fuse/relay box lower cover.

Disconnect the 3P connector from the electric load detector.

Turn the ignition switch ON.

Measure voltage between BLK/YEL (+) terminal and BLK (-) terminal.

Is there battery voltage?

NO

Measure voltage between BLK/YEL (+) terminal and body ground.

YES

Is there battery voltage?

YES

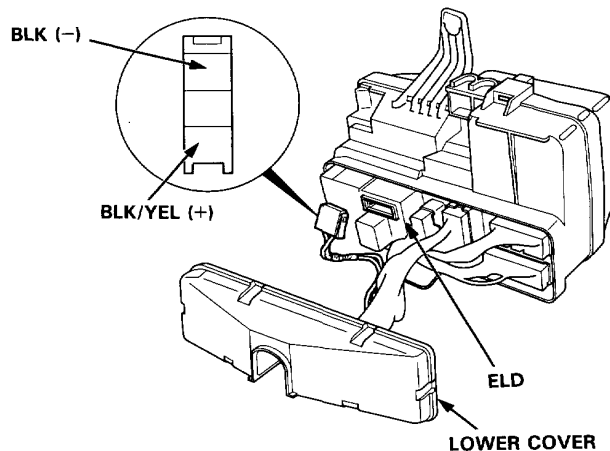
Repair open in BLK wire between the 3P connector and G403.

NO

Repair open in BLK/YEL wire between ECU (No. 19) (15 A)* fuse and the 3P connector.

*: No. 23 (ECU) (15 A)
(with SRS)

(To page 11-67)





(From page 11-66)

Measure voltage between GRN/
RED terminal and body ground.

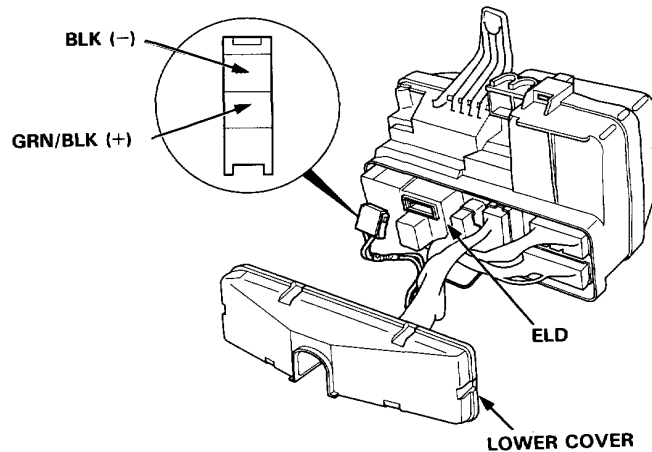
Is there 4.5–5 V?

NO

Repair open or short in GRN/BLK
wire between ECU (D10) and the
3P connector.
If wire is OK, substitute a
known-good ECU and recheck.

YES

Turn the ignition switch OFF.



Connect the 3P connector to the
electric load detector.

Connect the test harness bet-
ween the ECU and connector
(page 11-26).

(To page 11-68)

(cont'd)

PGM-FI Control System

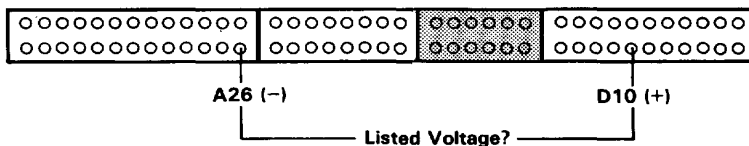
Troubleshooting Flowchart—Electric Load Detector (cont'd)

(From page 11-67)

Start the engine and allow it to idle.

Under the conditions listed in the chart to the right, measure voltage between D10 (+) terminal and A26 (-) terminal.

Condition	Voltage
Headlight switch, first position (•)	1.5–3.0 V
Headlight switch, second position (●)	1.0–2.0 V



Is the voltage listed in the chart available?

NO

Faulty electric load detector.

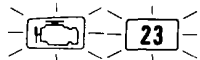
YES

Substitute a known-good ECU and recheck. If symptom/indication goes away, replace the original ECU.

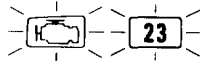


PGM-FI Control System

Troubleshooting Flowchart — Knock Sensor [H23A1 engine]



Self-diagnosis Check Engine light indicates code 23: A problem in the Knock Sensor circuit.



- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 23 is indicated.

Do the ECU Reset Procedure (page 11-23).

Warm up the engine to normal operating temperature (cooling fan comes on.)

Hold engine at 3000–4000 min^{-1} (rpm) for 10 seconds.
(A/T: Transmission is **N** or **P**)

Is Check Engine light on and does it indicate CODE 23?

NO

Intermittent failure, system is OK at this time.

YES

Turn the ignition switch OFF.

Connect the test harness to the engine wire harness only, not to the ECU (page 11-26).

Disconnect the 2P connector from the knock sensor.

Check for continuity between D3 terminal and body ground.

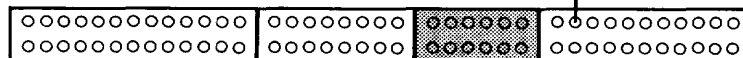
Does continuity exist?

YES

Repair short in RED/BLU wire between ECU and the knock sensor.

NO

(To page 11-71)



D3
—
Continuity



(From page 11-70)

Check for continuity on RED/BLU wire between D3 terminal and 2P connector of engine wire harness.

Does continuity exist?

NO

Repair open in RED/BLU wire between ECU (D3) and the knock sensor.

Substitute a known-good knock sensor and recheck.

Warm up the engine to normal operating temperature (cooling fan comes on.)

Hold engine at 3000–4000 min⁻¹ (rpm) for 10 seconds.
(A/T: Transmission is **N** or **P**)

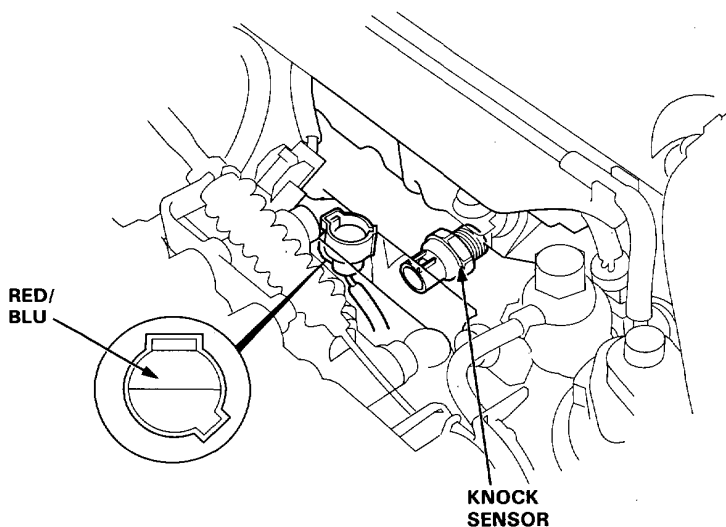
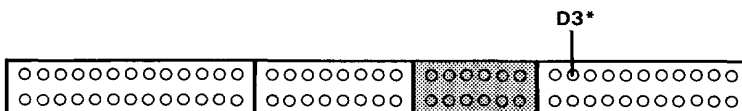
Is Check Engine light on and does it indicate CODE 23?

NO

Replace the original knock sensor.





YES




Substitute a known-good ECU and recheck. If symptom/indication goes away, replace the original ECU.



PGM-FI Control System

Troubleshooting Flowchart — A/T FI Signal A/B

-   Self-diagnosis Check Engine light indicates code 30: A problem in the (A/T FI Signale A) circuit between A/T control unit and ECU.
-   Self-diagnosis Check Engine light indicates code 31: A problem in the (A/T FI Signale B) circuit between A/T control unit and ECU.

  or 

With service check connector jumped (page 11-22), CODE 30 and/or 31 are indicated.

Do the ECU Reset Procedure (page 11-23).

Test drive necessary.
Drive the car for several miles so that the transmission upshifts and downshifts several times.

Does Check Engine light indicate CODE 30 or 31?

NO

Intermittent failure, system is OK at this time.
Check for poor connections or loose wires at A/T control unit and ECU.

YES

Turn the ignition switch OFF.

Connect the test harness to the main harness only, not to the ECU (page 11-26).

Disconnect the 22P connector from the A/T control unit.

Check for continuity between B3 or B4* terminal and body ground.

Continuity?

Continuity

*: CODE 31 (A/T FI Signal B)

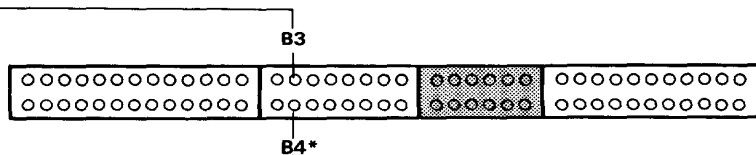
Does continuity exist?

YES

Repair short in ORN or PNK* wire between ECU (B3 or B4*) and the A/T control unit.

NO

(To page 11-73)





(From page 11-72)

Check for continuity on ORN or
PNK* wire between B3 or B4*
and 22P connector of the A/T
control unit.

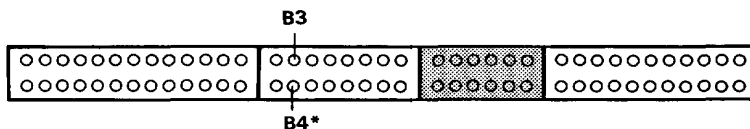
Does continuity exist?

YES

Substitute a known-good ECU
and recheck. If symptom/indica-
tion goes away, replace the origi-
nal ECU.

NO

Repair open in ORN or
PNK* wire between
ECU (B3 or B4*) and
the A/T control unit.



Idle Control System

System Troubleshooting Guide

NOTE:

- Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected, starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next system ②, etc.
- If the idle speed is out of specification and the Check Engine light does not blink CODE 14, go to inspection described on page 11-75.

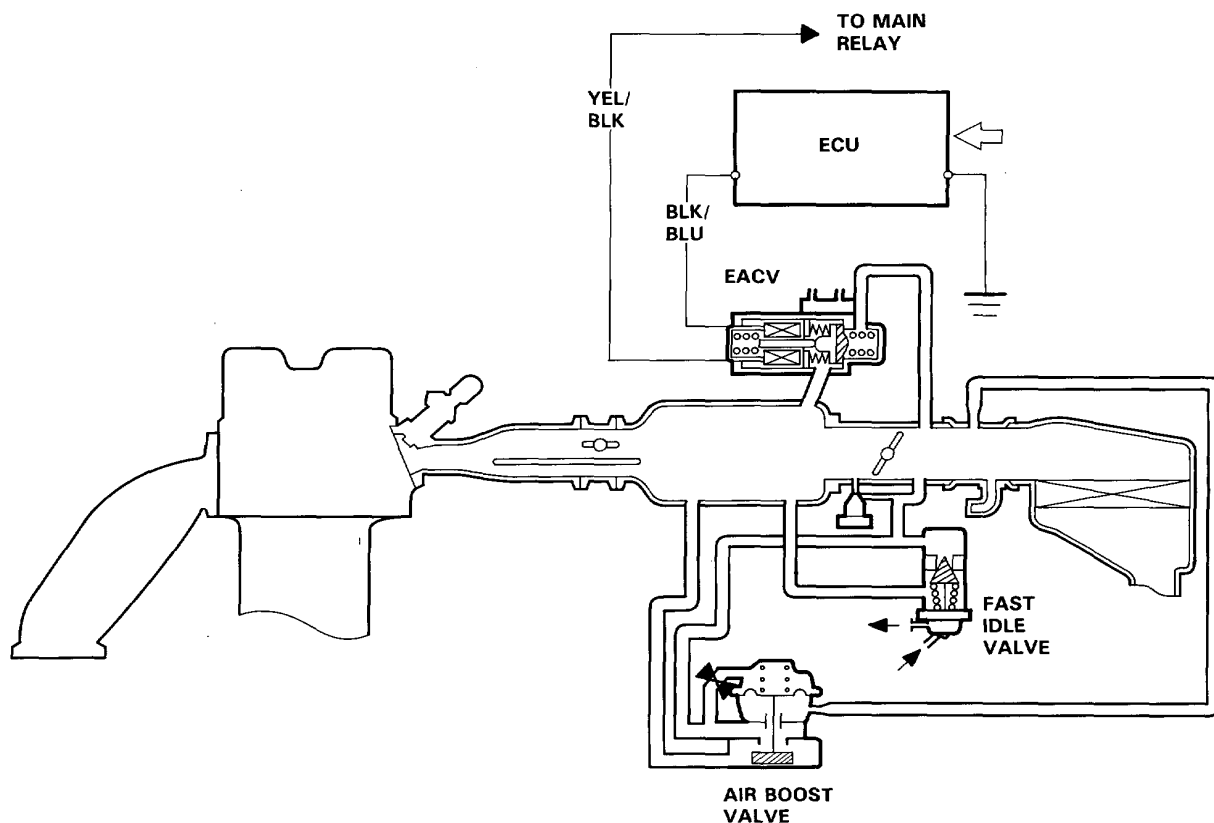
PAGE	SUB-SYSTEM	IDLE ADJUST- ING SCREW	EACV	AIR CONDI- TIONING SIGNAL	ALTER- NATOR FR SIGNAL	A/T SHIFT POSITION SIGNAL	STARTER SWITCH SIGNAL	BRAKE SWITCH SIGNAL	P/S OIL PRESSURE SWITCH SIGNAL	FAST IDLE VALVE	AIR BOOST VALVE	HOSES AND CONNEC- TIONS
SYMPTOM		93	78	80	82	84	86	88	90	91	92	*
DIFFICULT TO START ENGINE WHEN COLD										①		
WHEN COLD FAST IDLE OUT OF SPEC (1,000–2,000 rpm)		③	②							①		
ROUGH IDLE			②									①
WHEN WARM RPM TOO HIGH		③	①						③	②		③
WHEN WARM RPM TOO LOW	Idle speed is below specified rpm (no load)	②	①									
	Idle speed does not increase after initial start up.		①									
	On models with automatic transmis- sion, the idle speed drops in gear		②			①						
	Idle speeds drops when air condi- tioner in ON		②	①								
	Idle speed drops when steering wheel is turning		②						①			
	Idle speed fluc- tuates with elec- trical load		②		③							①
FREQUENT STALLING	WHILE WARMING UP	②	①									
	AFTER WARMING UP	①	②									
FAILS EMISSION TEST												①



System Description

The idle speed of the engine is controlled by the Electronic Air Control Valve (EACV).

The valve changes the amount of air bypassing into the intake manifold in response to electric current controlled by the ECU. When the EACV is activated, the valve opens to maintain the proper idle speed.

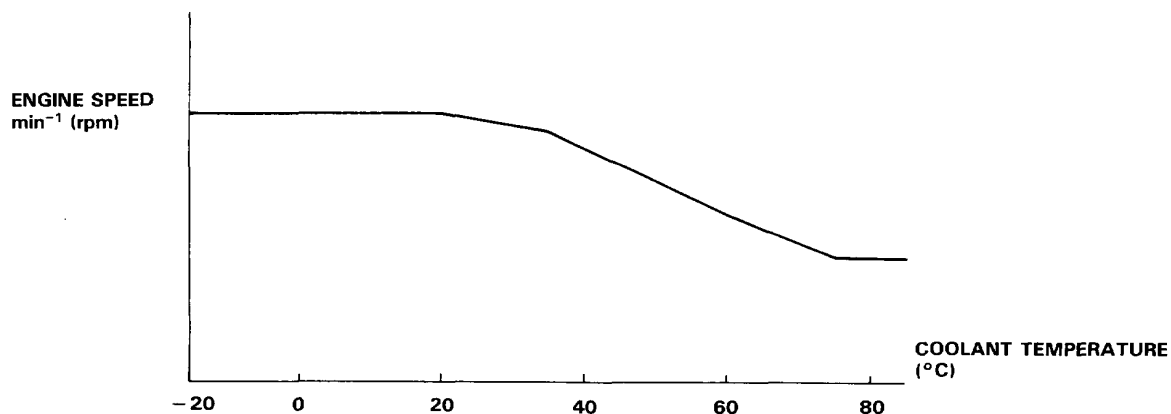


(cont'd)

Idle Control System

System Description (cont'd)

1. After the engine starts, the EACV opens for a certain time. The amount of air is increased to raise the idle speed about $150-300 \text{ min}^{-1}$ (rpm).
2. When the coolant temperature is low, the EACV is opened to obtain the proper fast idle speed. The amount of bypassed air is thus controlled in relation to the coolant temperature.

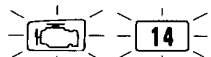




1. When the idle speed is out of specification and the Check Engine light does not blink CODE 14, check the following items:
 - Adjust the idle speed (page 11-93)
 - Air conditioning signal (page 11-80)
 - Alternator FR signal (page 11-82)
 - A/T shift position signal (page 11-84)
 - Starter switch signal (page 11-86)
 - Brake switch signal (page 11-88)
 - P/S oil pressure switch signal (page 11-90)
 - Fast idle valve (page 11-91)
 - Air Boost Valve
 - Hoses and connections
 - EACV and its mounting O-rings
2. If the above items are normal, substitute a known-good EACV and readjust the idle speed (page 11-92).
 - If the idle speed still cannot be adjusted to specification (and the Check Engine light does not blink CODE 14) after EACV replacement, substitute a known-good ECU and recheck. If symptom goes away, replace the original ECU.

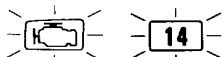
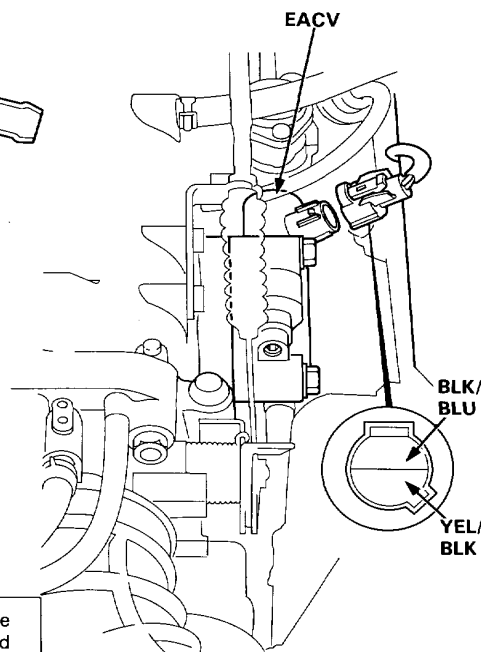
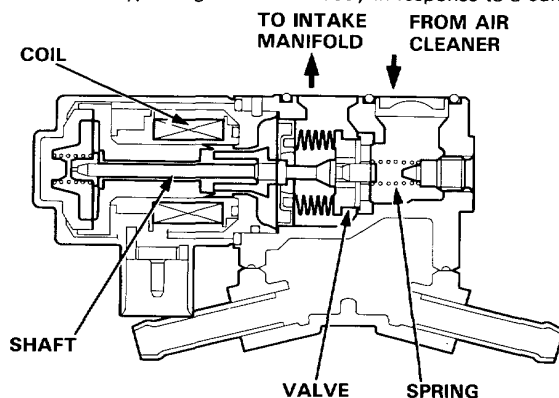
Idle Control System

Troubleshooting Flowchart — EACV



Self-diagnosis Check Engine light indicates code 14: A problem in the Electric Air Control Valve (EACV) circuit.

The EACV changes the amount of air bypassing the throttle body in response to a current signal from the ECU in order to maintain the proper idle speed.



- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 14 is indicated.

Do the ECU Reset Procedure (page 11-23).

Start the engine.

Is Check Engine light on and does it indicate CODE 14?

YES

Remove the 2P connector from the EACV.

NO

With the engine running and the accelerator pedal released disconnect the 2P connector on the EACV.

Is there a reduction in engine speed?

NO

Substitute a known-good EACV and retest.

YES

Intermittent failure, system is OK at this time (test driving may be necessary). Check for poor connection or loose wires at EACV and ECU.

(To page 11-79)



(From page 11-78)

Measure voltage between the YEL/BLK wire and body ground.

Is there battery voltage?

NO

Repair open in YEL/BLK wire between EACV and main relay.

YES

Turn the ignition switch off and reconnect the 2P connector the EACV.

Connect the test harness "A" connector to the main wire harness only, not the ECU (page 11-26).

Turn the ignition switch ON.

Momentarily connect A9 terminal to A26 terminal several times.

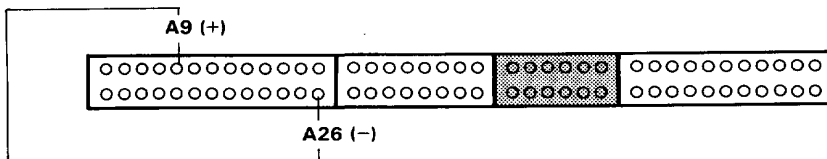
Does the EACV click?

YES

Substitute a known-good ECU and retest. If symptom/indication goes away, replace the original ECU.

NO

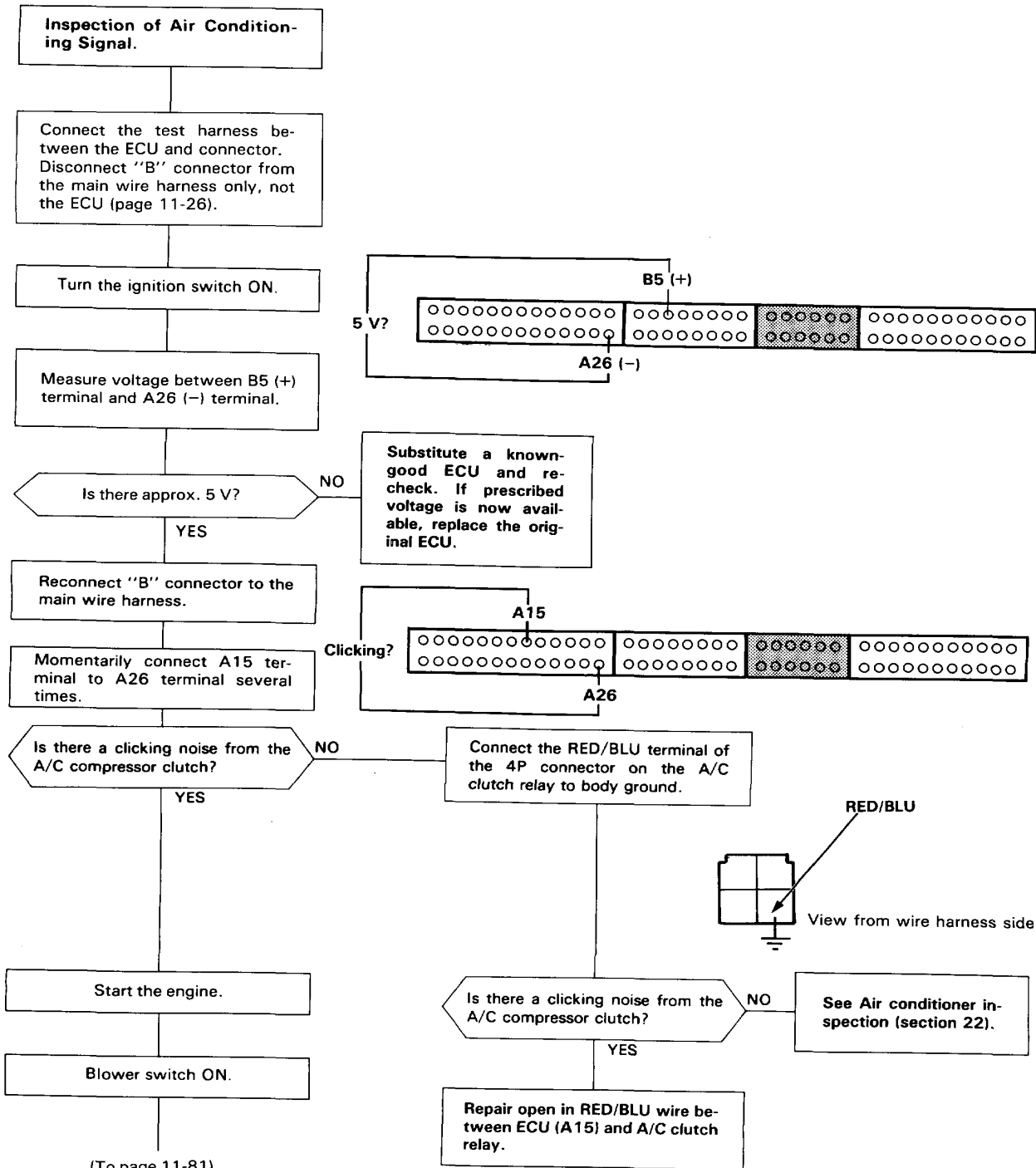
Repair open or short in BLK/BLU wire between EACV and ECU (A9). If the wire is OK, replace the EACV.

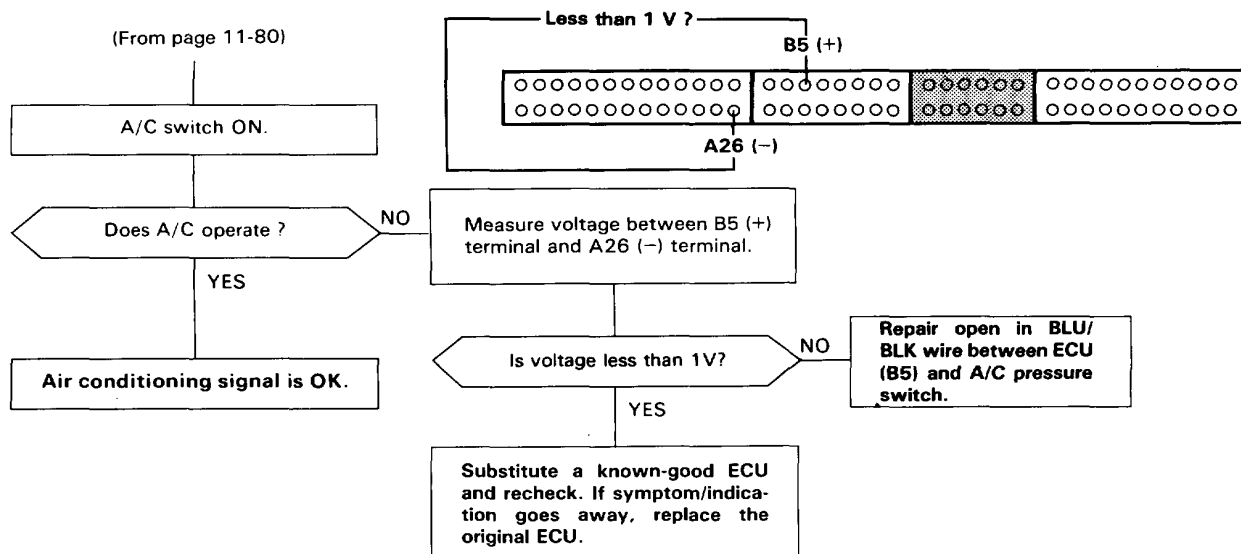


Idle Control System

Troubleshooting Flowchart — Air Conditioning Signal

This signals the ECU when there is a demand for cooling from the air conditioning system.





Idle Control System

Troubleshooting Flowchart — Alternator FR Signal

This signals the ECU when the alternator is charging.

Inspection of Alternator FR signal.

Connect the test harness between the ECU and connector. Disconnect "D" connector from the main wire harness only, not the ECU (page 11-26).

Turn the ignition switch ON.

Measure voltage between D9 (+) terminal and A26 (-) terminal.

Is there approx. 4.5 V?

NO

YES

Turn the ignition switch OFF.

Reconnect "D" connector to the main wire harness.

Warm up engine to normal operating temperature (cooling fan comes on).

Measure voltage between D9 (+) terminal and A26 (-) terminal.

Does the voltage decrease when headlights and rear defogger are turned on?

NO

YES

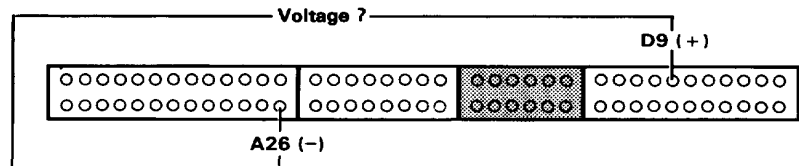
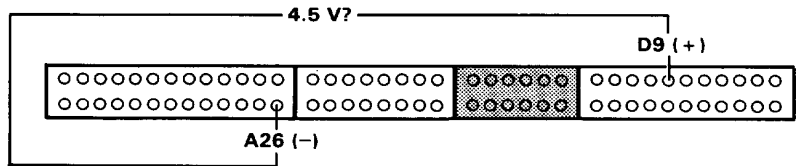
Do the ECU Reset Procedure (page 11-23).

Alternator FR signal is OK.

Substitute a known-good ECU and recheck. If prescribed voltage is now available, replace the original ECU.

Stop the engine.

(To page 11-83)





(From page 11-82)

Disconnect "D" connector from ECU only, not the main wire harness.

Disconnect the negative battery cable from the battery.

Check for continuity between D9 terminal and body ground.

Does continuity exist ?

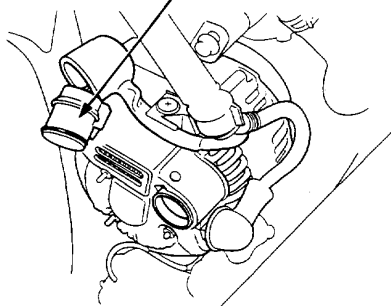
YES

Disconnect GRN connector from the alternator.

NO

Disconnect GRN connector from the alternator.

GRN CONNECTOR



Connect WHT/RED wire to body ground.

Check for continuity between D9 terminal and body ground.

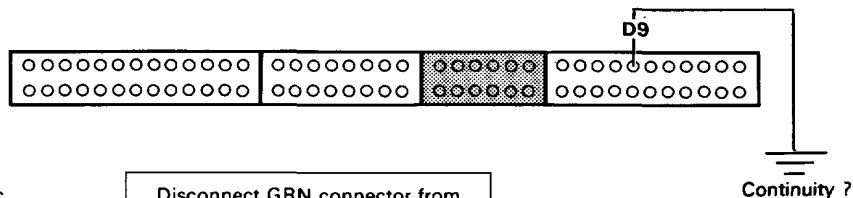
Does continuity exist ?

YES

NO

Repair open in WHT/RED wire between ECU (D9) and alternator.

See Alternator Inspection (section 23).



Check for continuity between D9 terminal and body ground.

Does continuity exist ?

NO

See Alternator Inspection (section 23).

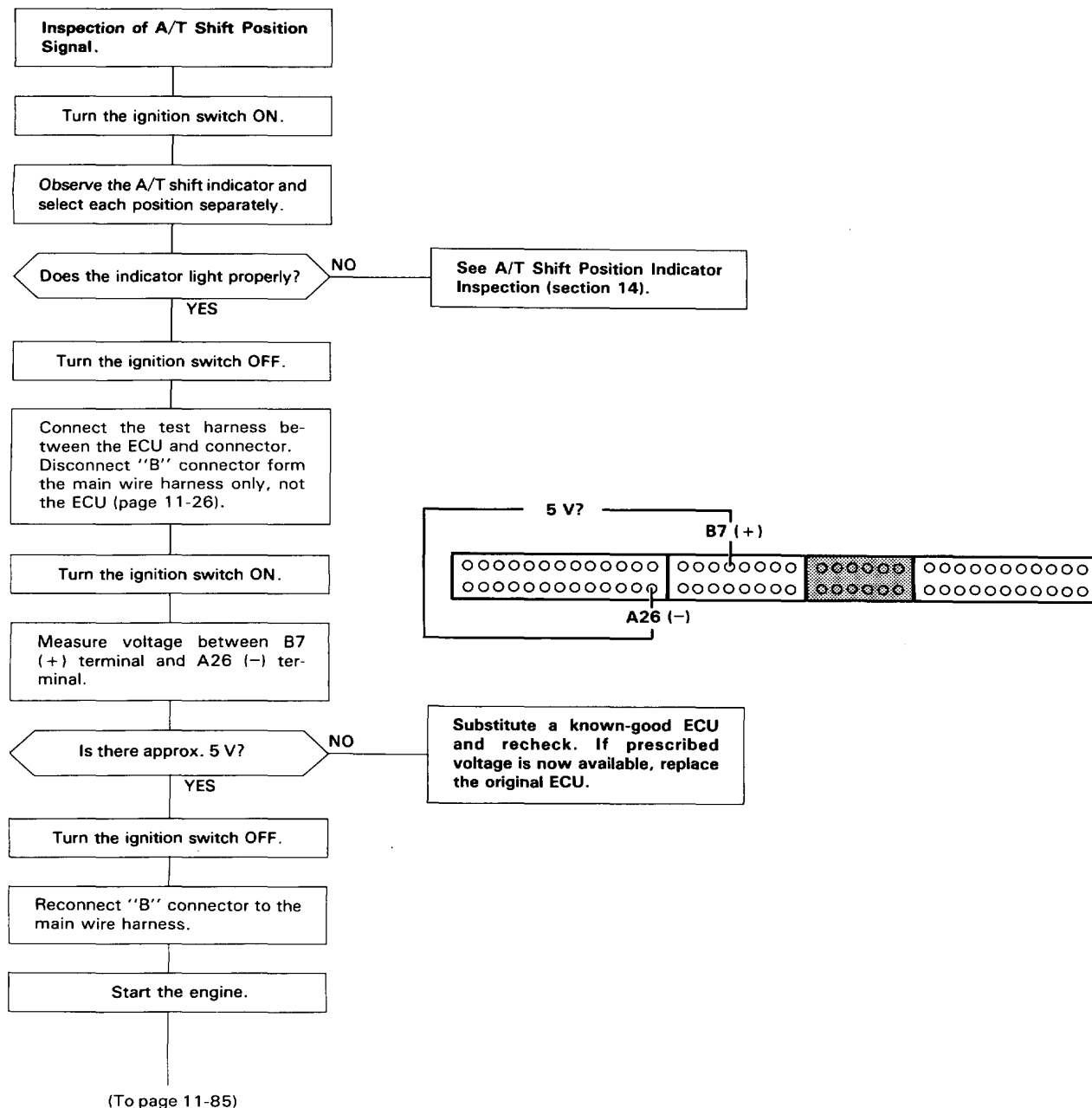
YES

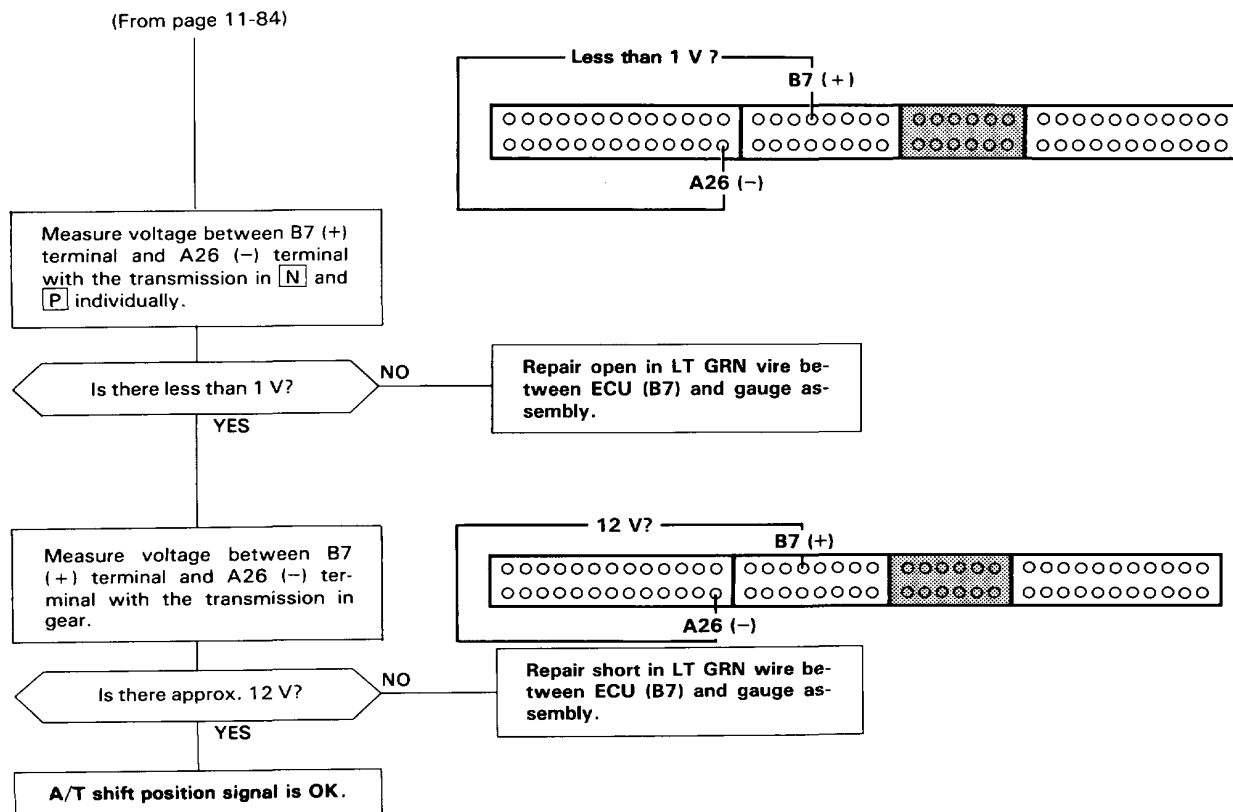
Repair short in WHT/RED wire between ECU (D9) and alternator.

Idle Control System

Troubleshooting Flowchart — A/T Shift Position Signal

This signals the ECU when the transmission is in Neutral or Park.





Idle Control System

Troubleshooting Flowchart — Starter Switch Signal

This signals the ECU when the engine is cranking.

Inspection of Starter Switch Signal.

Connect the test harness between the ECU and connector (page 11-26).

Measure voltage between B9 (+) terminal and A26 (-) terminal when the ignition switch in the start position.

Is there battery voltage ?

YES

Starter switch signal is OK.

NO

Inspect STARTER SIGNAL (No. 2) (7.5 A) fuse

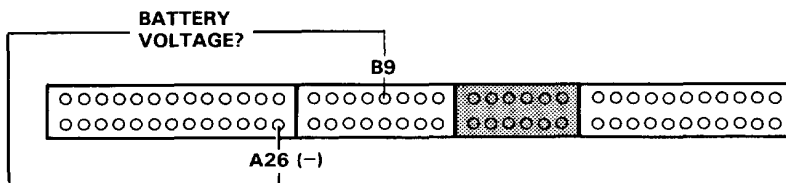
Is STARTER SIGNAL (No. 2) (7.5 A) fuse OK?

NO

Replace fuse.

YES

Repair open in BLU/RED wire between ECU (B9) and STARTER SIGNAL (No. 2) (7.5 A) fuse.

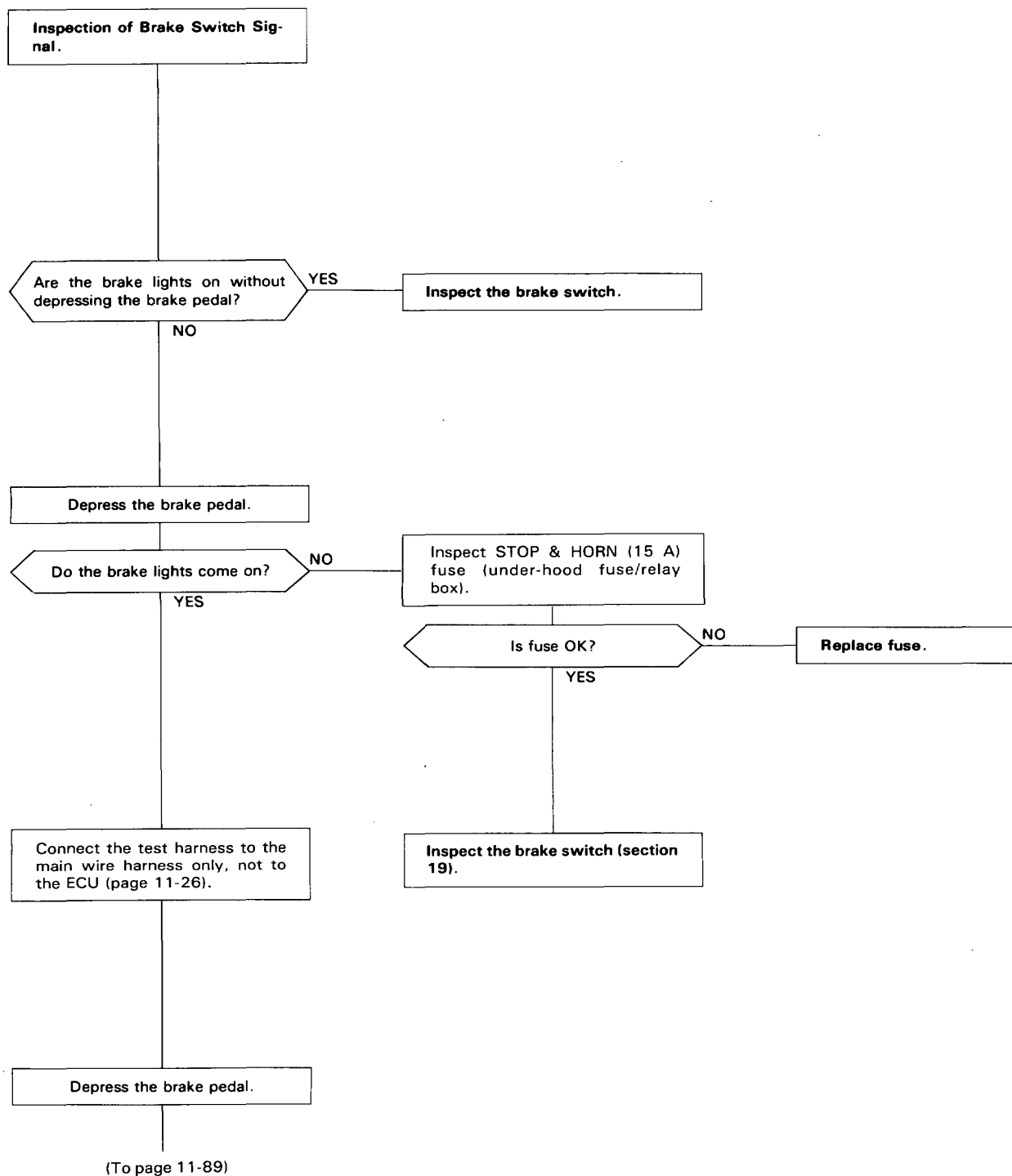




Idle Control System

Troubleshooting Flowchart — Brake Switch Signal

This signals the ECU when the brake pedal is depressed.





(From page 11-88)

Measure voltage between D2 (+) terminal and A26 (-) terminal with the brake pedal depressed.

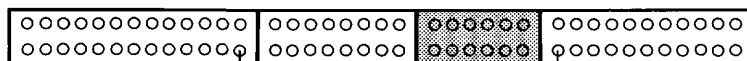
Is there battery voltage?

NO

Repair open in GRN/WHT wire between the brake switch and ECU (D2).

YES

Brake switch signal is OK.



A26 (-)

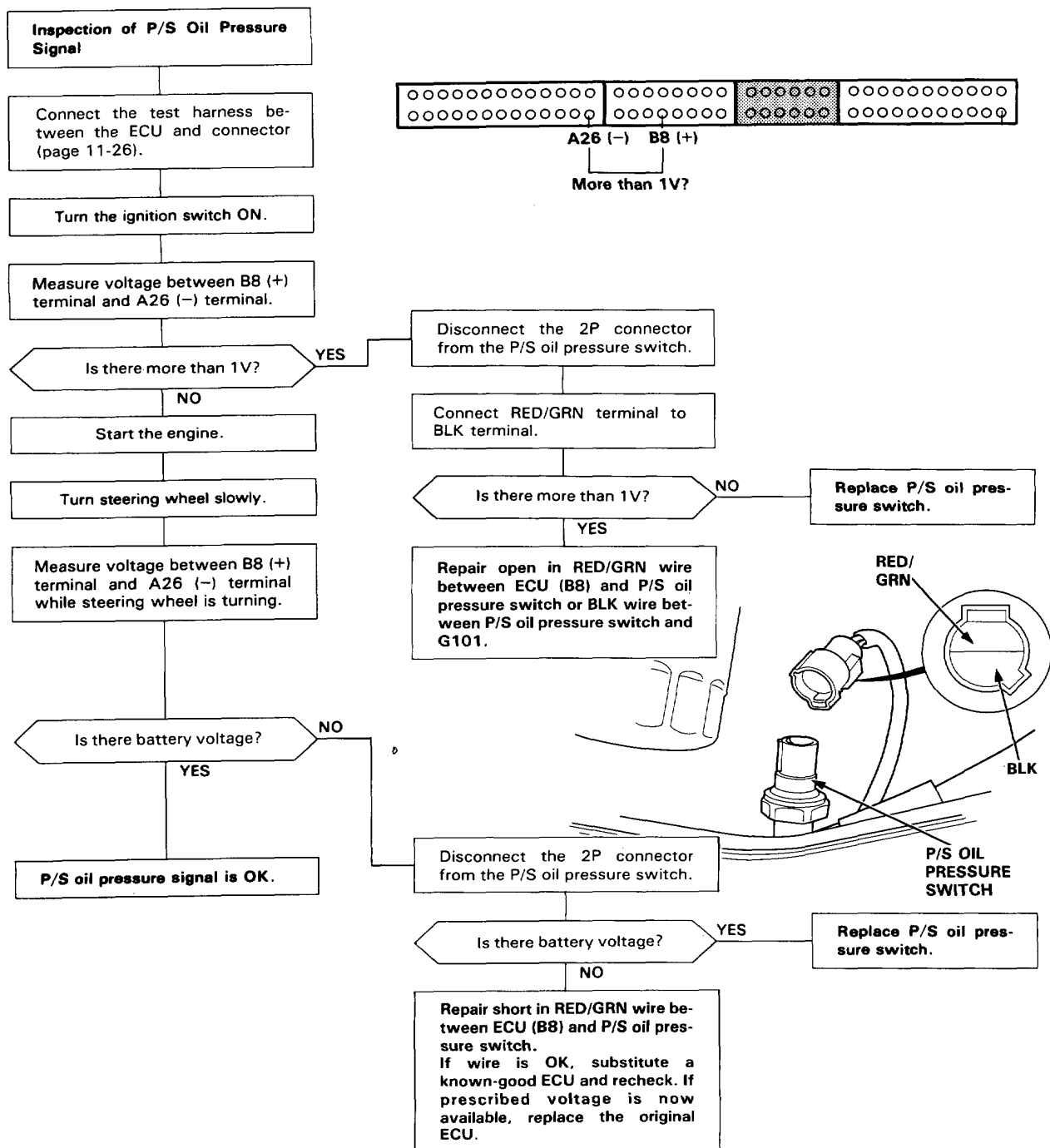
BATTERY
VOLTAGE?

D2 (+)

Idle Control System

Troubleshooting Flowchart — P/S Oil Pressure Signal

This signals the ECU when the power steering load is high.

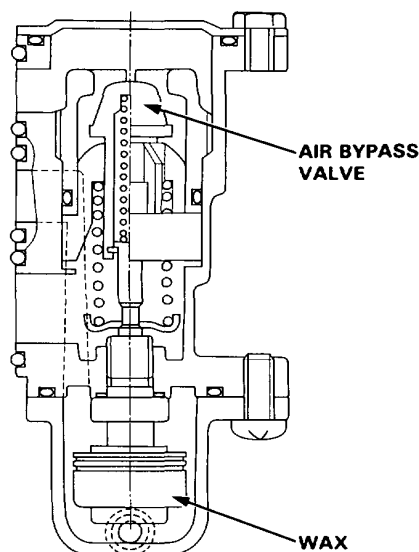
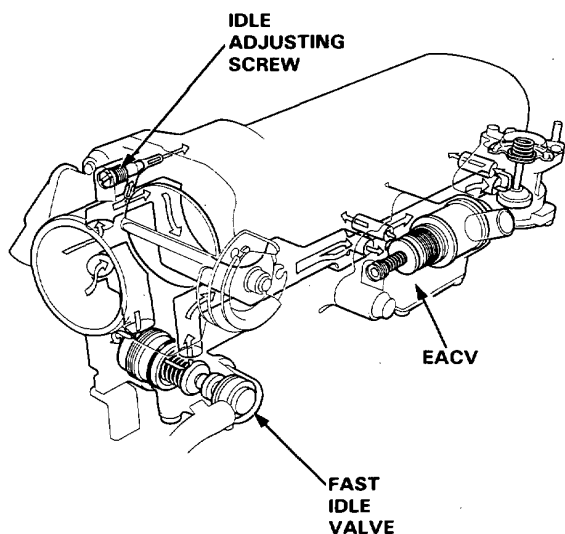




Fast Idle Valve

Description

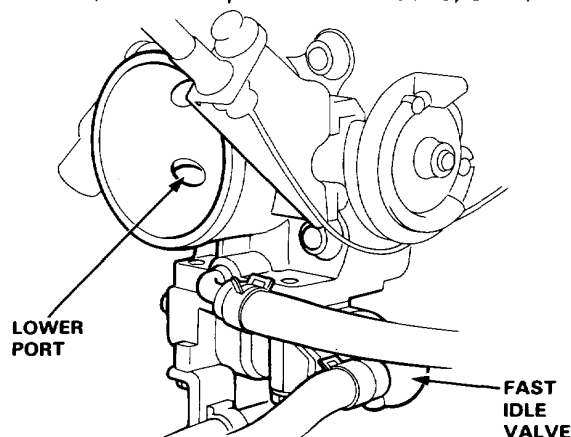
To prevent erratic running when the engine is warming up, it is necessary to raise the idle speed. The fast idle air bypass valve is controlled by a thermowax plunger. When the engine is cold, the engine coolant surrounding the thermowax contracts the plunger, allowing additional air to be bypassed into the intake manifold so that the engine idles faster. When the engine reaches operating temperature, the valve closes, reducing the amount of air bypassing into the manifold.



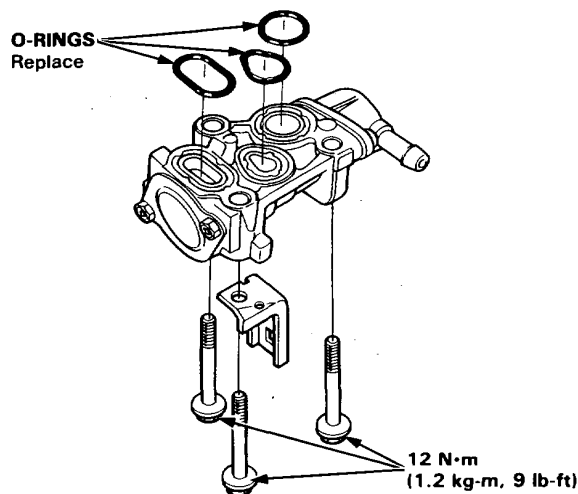
Inspection (H23A1, H23A2 engine)

NOTE: The fast idle valve is factory adjusted; it should not be disassembled.

1. Remove the intake air duct from the throttle body.
2. Start the engine.
3. Put your finger over the lower port in throttle body and make sure that there is air flow with the engine cold (coolant temperature below 30°C, 86°F).



● If not, replace the fast idle valve and retest.



4. Warm up the engine (cooling fan comes on).
5. Check that the valve is completely closed. If not, air suction can be felt at the lower port in the throttle body.
 - If any suction is felt, the valve is leaking. Replace the fast idle valve and recheck.

(cont'd)

Idle Control System

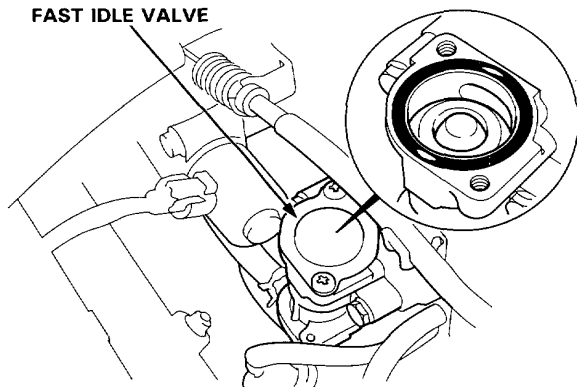
Fast Idle Valve (cont'd)

Inspection (F20A4, F22A1, F22A2 engine)

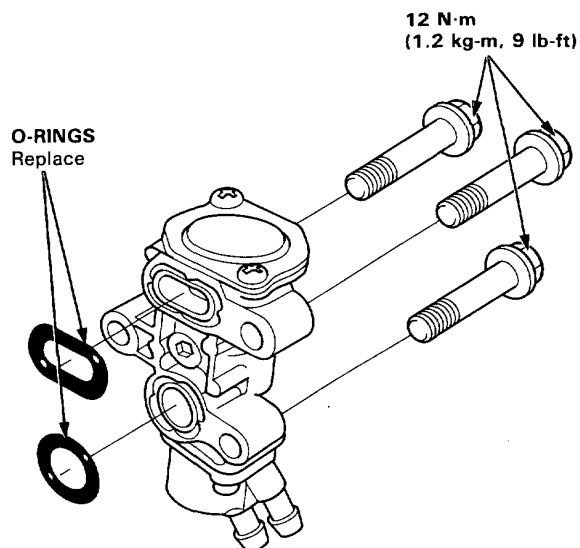
NOTE: The fast idle valve is factory adjusted; it should not be disassembled.

1. Remove the cover of the fast idle valve.
2. Start the engine.
3. Put your finger on the valve seat area and make sure that there is air flow with the engine cold (coolant temperature below 30°C, 86°F) and idling.

FAST IDLE VALVE



- If not, replace the fast idle valve and retest.

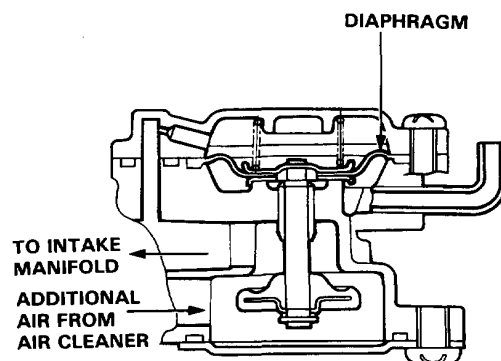


4. Warm up the engine (cooling fan comes on).
5. Check that the valve is completely closed. If not, air suction can be felt in the valve seat area.
 - If any suction is felt, the valve is leaking. Replace the fast idle valve and recheck.

Air Boost Valve

Description

When cranking the engine, the air boost valve supplies additional air to the intake manifold to ease engine starting.



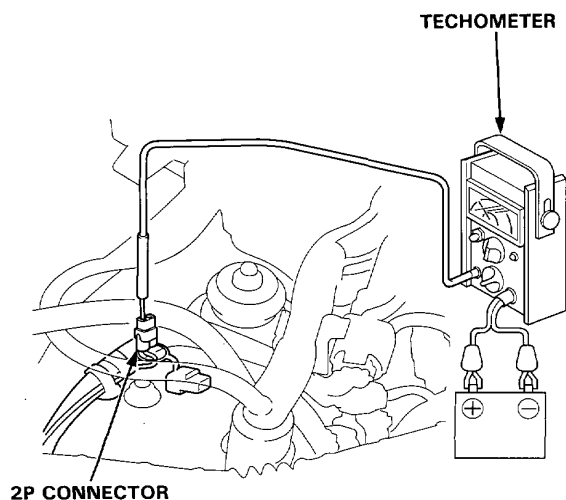


Idle Speed Setting

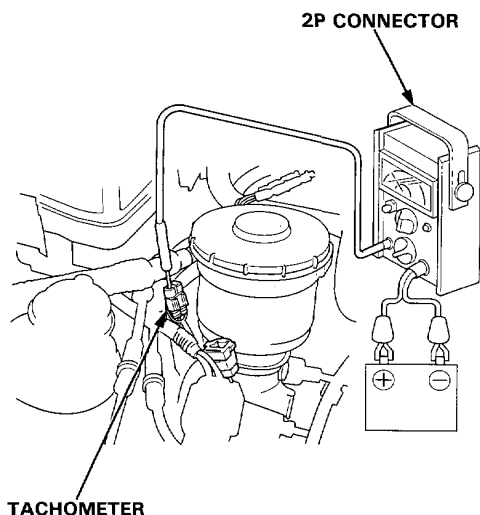
Inspection/Adjustment

1. Start the engine and warm it up to normal operating temperature (the cooling fan comes on).
2. Turn the ignition switch OFF.
3. Connect a tachometer.

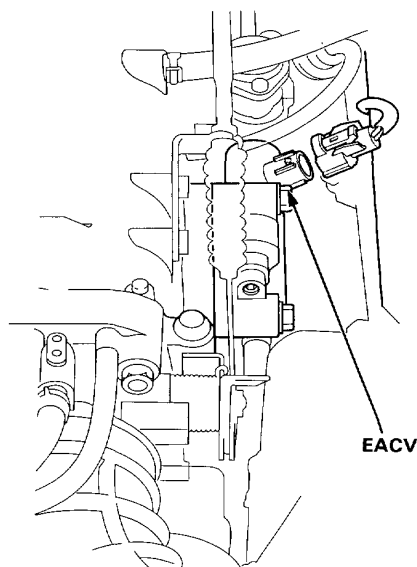
LHD:



RHD:



4. Disconnect the 2P connector from the EACV.



5. Start the engine with the accelerator pedal slightly depressed. Stabilize the engine speed at 1000, then slowly release the pedal until the engine idles.
6. Check idling in no-load conditions: headlights, blower fan, rear defogger, cooling fan, and air conditioner are not operating.

NOTE: (KS) Remove No. 12 (7.5 A) fuse in the under-dash fuse box, then check that the headlights and side marker lights are off.

Idle speed should be:

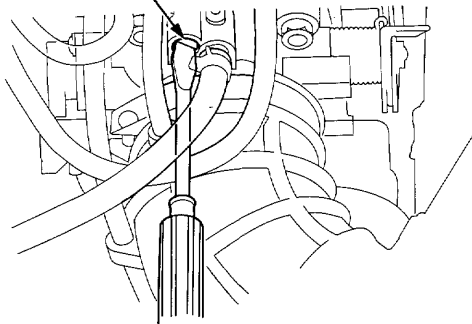
Manual	550 ± 50 min ⁻¹ (rpm)
Automatic	550 ± 50 min ⁻¹ (rpm) (in N or P)

Adjust the idle speed, if necessary, by turning the idle adjusting screw.

Idle Control System

Idle Speed Setting

IDLE ADJUSTING SCREW



7. Turn the ignition switch OFF.
8. Reconnect the 2P connector on the EACV, then remove CLOCK RADIO (10 A) fuse in the under-hood fuse/relay box for 10 seconds to reset the ECU.
9. Restart and idle the engine with no-load conditions for one minute, then check the idle speed.

NOTE: (KS) Remove No. 12 (7.5 A) fuse in the under-dash fuse box, then check that the headlights and side marker lights are off.

Idle speed should be:

(F20A4, F22A2 engine)

Manual	770 ± 50 min ⁻¹ (rpm)
Automatic	770 ± 50 min ⁻¹ (rpm) (in N or P)

(H23A2 engine)

Manual	780 ± 50 min ⁻¹ (rpm)
Automatic	780 ± 50 min ⁻¹ (rpm) (in N or P)

(F22A1, H23A1 engine)

Manual	700 ± 50 min ⁻¹ (rpm)
Automatic	700 ± 50 min ⁻¹ (rpm) (in N or P)

10. Idle the engine for one minute with headlights (Hi) and rear defogger ON and check the idle speed.

Idle speed should be:

(F20A4, F22A1, F22A2 engine)

Manual	770 ± 50 min ⁻¹ (rpm)
Automatic	770 ± 50 min ⁻¹ (rpm) (in N or P)

(H23A1, H23A2 engine)

Manual	780 ± 50 min ⁻¹ (rpm)
Automatic	780 ± 50 min ⁻¹ (rpm) (in N or P)

11. Turn the headlights and rear defogger off.
Idle the engine for one minute with heater fan switch at HI and air conditioner on, then check the idle speed.

Idle speed should be:

(F20A4, F22A1, F22A2 engine)

Manual	770 ± 50 min ⁻¹ (rpm)
Automatic	770 ± 50 min ⁻¹ (rpm) (in N or P)

(H23A1, H23A2 engine)

Manual	780 ± 50 min ⁻¹ (rpm)
Automatic	780 ± 50 min ⁻¹ (rpm) (in N or P)

NOTE: If the idle speed is not within specification, see System Troubleshooting Guide on page 11-74.

Fuel Supply System



System Troubleshooting Guide

NOTE: Across each row in the chart, the Sub-systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next most likely system ②, etc.

PAGE	SUB-SYSTEM	FUEL INJECTOR	PRESSURE REGULATOR	FUEL FILTER	FUEL PUMP	MAIN RELAY	CONTAMINATED FUEL
	SYMPTOM	98	102	103	106	107	*
	ENGINE WON'T START			③	①	②	
	DIFFICULT TO START ENGINE WHEN COLD OR HOT			①			
	ROUGH IDLE	①					②
POOR PERFORMANCE	MISFIRE OR ROUGH RUNNING	①	③				②
	FAILS EMISSION TEST	②	①				
	LOSS OF POWER	③		①	③		②
FREQUENT STALLING	WHILE WARMING UP		①				
	AFTER WARMING UP		①				

Fuel Supply System

System Description

The fuel supply system consists of a fuel tank, in-tank high pressure fuel pump, main relay, fuel filter, pressure regulator, injectors, injector resistor, and fuel delivery and return lines.

This system delivers pressure-regulated fuel to the injectors and cuts the fuel delivery when the engine is not running.

Fuel Pressure

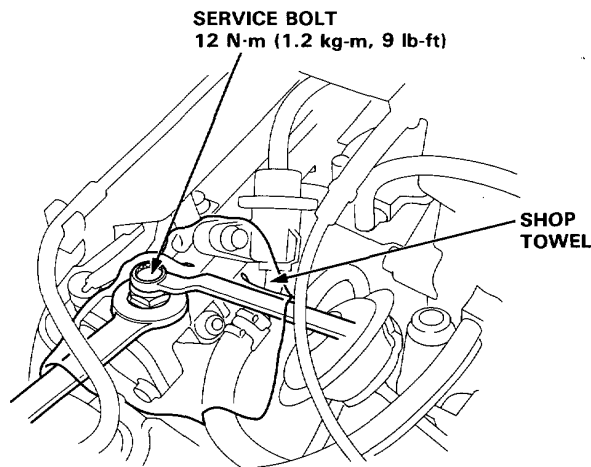
Relieving

⚠ WARNING

- Do not smoke while working on the fuel system. Keep open flames or sparks away from the work area.
- Be sure to relieve fuel pressure while the engine is off.

NOTE: Before disconnecting fuel pipes or hoses, release pressure from the system by loosening the 6 mm service bolt on top of the fuel pipe.

1. Disconnect the battery negative cable from the battery negative terminal.
2. Remove fuel filler cap.
3. Use a box end wrench on the 6 mm service bolt at the fuel pipe, while holding the special banjo bolt with another wrench.
4. Place a rag or shop towel over the 6 mm service bolt.
5. Slowly loosen the 6 mm service bolt one complete turn.



NOTE:

- A fuel pressure gauge can be attached at the 6 mm service bolt hole.
- Always replace the washer between the service bolt and the special banjo bolt, whenever the service bolt is loosened.
- Replace all washers whenever the bolts are removed.



Inspection

1. Relieve fuel pressure (page 11-96).
2. Remove the service bolt on the fuel pipe while holding the banjo bolt with another wrench. Attach the fuel pressure gauge.
3. Start the engine. * Measure the fuel pressure with the engine idling and vacuum hose of the pressure regulator disconnected from the Pressure regulator.

Pressure should be:

(F22A1, H23A1, H23A2 engine)

255–305 kPa (2.55–3.05 kg/cm², 36–43 psi)

(F20A4, F22A2 engine)

245–285 kPa (2.45–2.85 kg/cm², 35–41 psi)

4. Reconnect vacuum hose to the Pressure regulator.

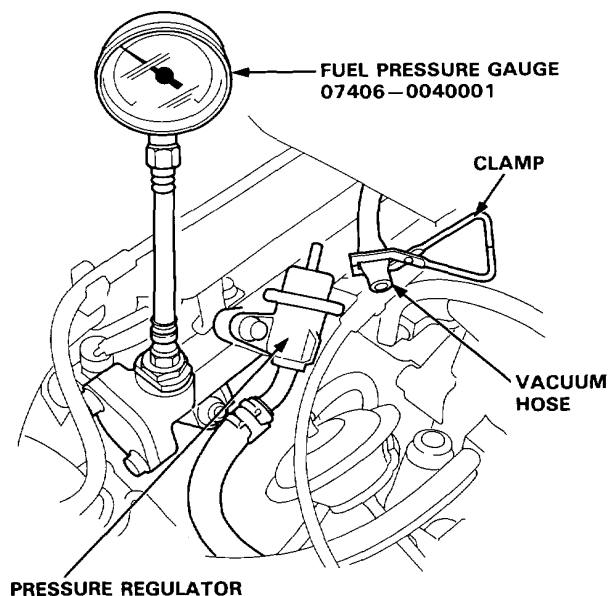
Pressure should be:

(F22A1, H23A1, H23A2 engine)

195–245 kPa (1.95–2.45 kg/cm², 28–35 psi)

(F20A4, F22A2 engine)

190–240 kPa (1.90–2.40 kg/cm², 27–34 psi)



*: If the engine will not start turn the ignition switch on, wait for two seconds, turn it off then back on again and read the fuel pressure.

- If the fuel pressure is not as specified, first check the fuel pump (page 11-106). If the pump is OK, check the following:

- If the pressure is higher than specified, inspect for:
 - Pinched or clogged fuel return hose or piping.
 - Faulty pressure regulator (page 11-102).
- If the pressure is lower than specified, inspect for:
 - Clogged fuel filter.
 - Faulty pressure regulator (page 11-102).
 - Leakage in the fuel line.

Fuel Supply System

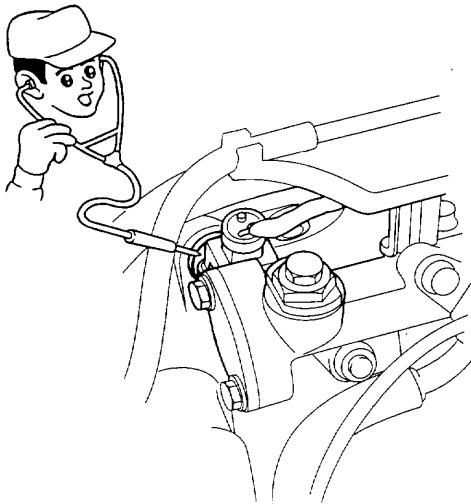
Fuel Injectors

Testing

NOTE: Check the following items before testing: idle speed, ignition timing and idle CO %

If the engine will run:

1. With the engine idling, disconnect each injector connector individually and inspect the change in the idling speed.
 - If the idle speed drop is almost the same for each cylinder, the injectors are normal.
 - If the idle speed or quality remains the same when you disconnect a particular injector, replace the injector and re-test.
2. Check the clicking sound of each injector by means of a stethoscope when the engine is idling.



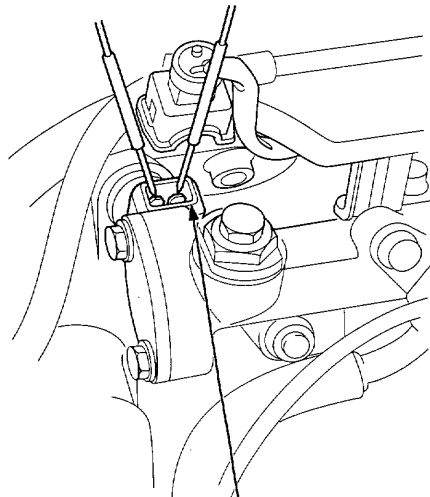
- If any injector fails to make the typical clicking sound, check the sound again after replacing the injector.
- If clicking sound is still absent, check the following.
 - Whether there is any short-circuiting, wire breakage or poor connection in the YEL/BLK wire between the main relay and the resistor.
 - Whether the resistor is open or corroded (page 11-101).
 - Whether there is any short-circuiting, wire breakage or poor connection in the RED/BLK wire between the resistor and the injector.
 - Whether there is any short-circuiting, wire breakage or poor connection in the wire between the injector and the ECU.

If all is OK, check the ECU (page 11-31).

If the engine cannot be started:

1. Remove the connector of the injector, and measure the resistance between the 2 terminals of the injector.

Resistance should be: 1.5—2.5 Ω



INJECTOR

- If the resistance is not as specified, replace the injector.
- If the resistance is as specified, check the fuel pressure (page 11-97).
- If the fuel pressure is as specified, check the following:
 - Whether there is any short-circuiting, wire breakage or poor connection in the YEL/BLK wire between the main relay and the resistor.
 - Whether the resistor is open or corroded (page 11-101).
 - Whether there is any short-circuiting, wire breakage, or poor connection in the RED/BLK wire between the resistor and the injector.
 - Whether there is any short-circuiting, wire breakage or poor connection in the wire between the injector and the ECU.

If all is OK, check the ECU (page 11-31).



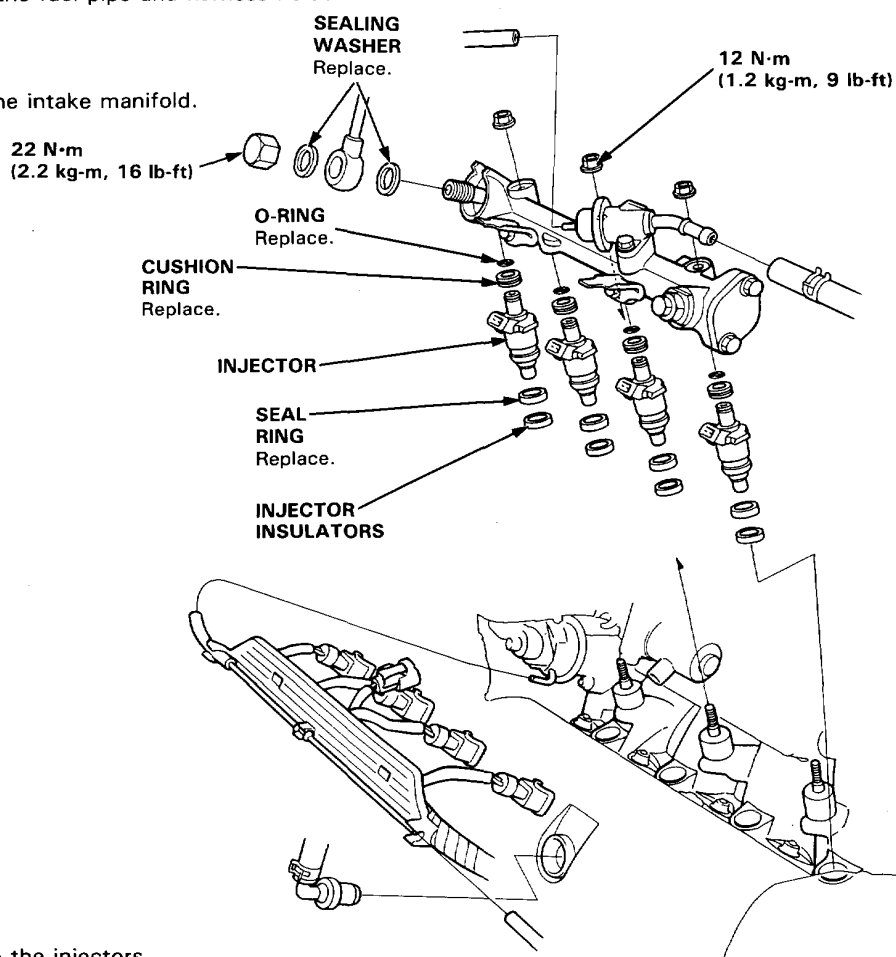
Replacement

⚠ WARNING Do not smoke when working on the fuel system. Keep open flames away from your work area.

1. Relieve fuel pressure (page 11-96).
2. Disconnect the connectors from the injectors.
3. Disconnect the vacuum hose and fuel return hose from the pressure regulator.

NOTE: Place a rag or shop towel over the hoses before disconnecting them.

4. Disconnect the fuel hose from the fuel pipe.
5. Loosen the retainer nuts on the fuel pipe and harness holder.
6. Disconnect the fuel pipe.
7. Remove the injectors from the intake manifold.



8. Slide new cushion rings onto the injectors.
9. Coat new O-rings with clean engine oil and put them on the injectors.
10. Insert the injectors into the fuel pipe first.
11. Coat new seal rings with clean engine oil and press them into the intake manifold.

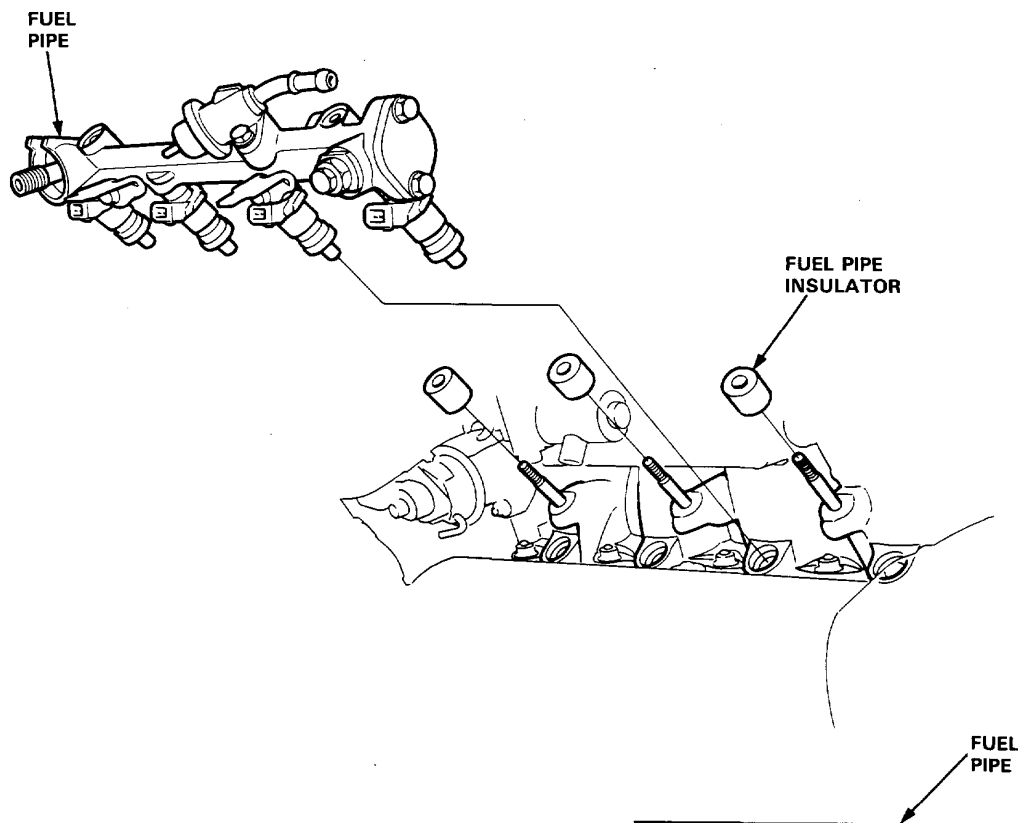
(cont'd)

Fuel Supply System

Fuel Injectors (cont'd)

12. Install the injectors and fuel pipe assembly in the manifold.

CAUTION: To prevent damage to the O-ring, install the injectors in the fuel pipe first, then install them in the intake manifold.



13. Align the center line on the connector with the mark on the fuel pipe.

14. Install and tighten the retainer nuts.

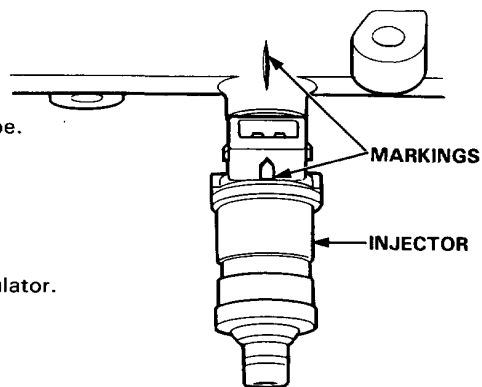
15. Connect the fuel hose to the fuel pipe with new washers.

16. Connect the vacuum hose and fuel return hose to the pressure regulator.

17. Install the connectors on the injectors.

18. Replace the 6 mm service bolt washer and tighten the bolt.

19. Turn the ignition switch ON, but do not operate the starter. After the fuel pump runs for approximately two seconds, the fuel pressure in the fuel line rises. Repeat this two or three times, then check whether there is any fuel leakage.

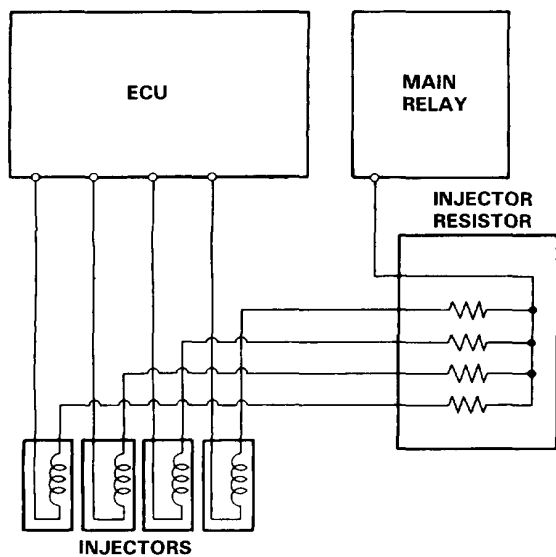




Injector Resistor

Description

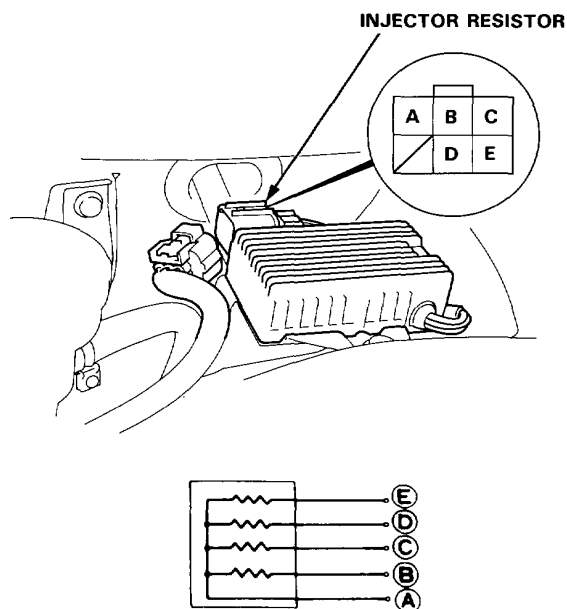
The resistor lowers the current supplied to the injectors to prevent damage to the injector coils. This allows a faster response time of the injectors.



Testing

1. Disconnect the resistor connector.
2. Check for resistance between each of the resistor terminals (E, D, C and B) and the power terminal (A).

Resistance should be: 5—7 Ω



- Replace the resistor with a new one if any of the resistances are outside of the specification.

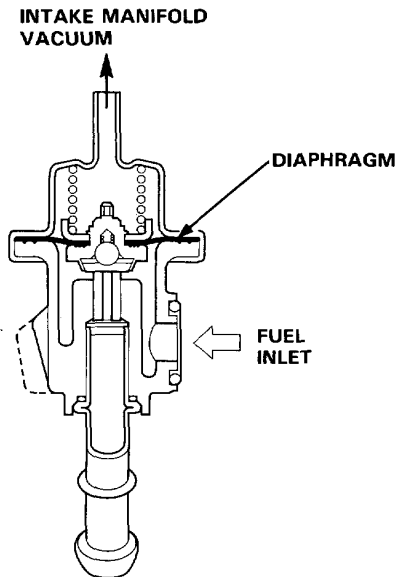
Fuel Supply System

Pressure Regulator

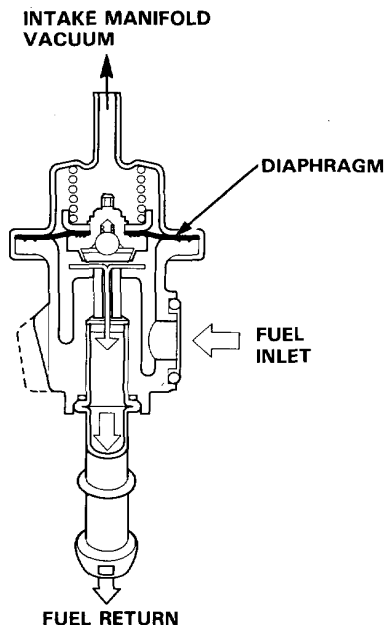
Description

The fuel pressure regulator maintains a constant fuel pressure to the injectors. when the difference between the fuel pressure and manifold pressure exceeds [F22A1, H23A1, H23A2 engine: 300 kPa (3.0 kg/cm², 43 psi). F20A4, F22A2: 255 kPa (2.55 kg/cm², 36 psi)], the diaphragm is pushed upward, and the excess fuel is fed back into the fuel tank through the return line.

CLOSE



OPEN



Testing

⚠ WARNING

Do not smoke during the test. Keep open flames away from your work area.

1. Attach a pressure gauge to the service port of the fuel pipe (page 11-97).

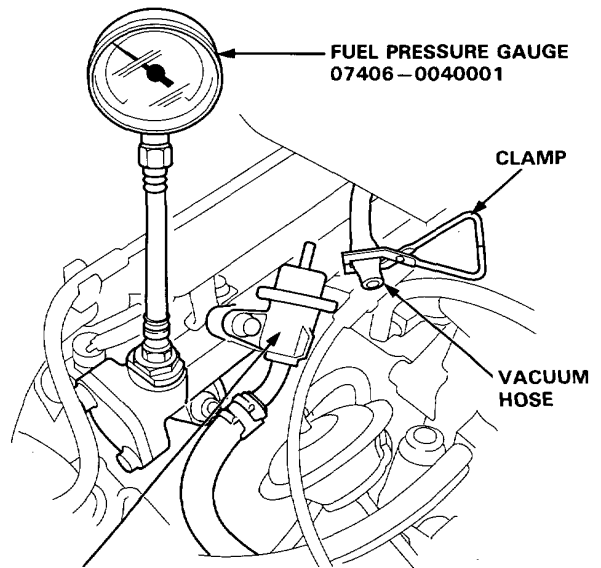
Pressure should be:

(F22A1, H23A1, H23A2 engine)

255–305 kPa (2.55–3.05 kg/cm², 36–43 psi)

(F20A4, F22A2 engine)

245–285 kPa (2.45–2.85 kg/cm², 35–41 psi)



PRESSURE REGULATOR

2. Reconnect the vacuum hose to the fuel pressure regulator.
3. Check that the fuel pressure rises when the vacuum hose from the regulator is disconnected again.

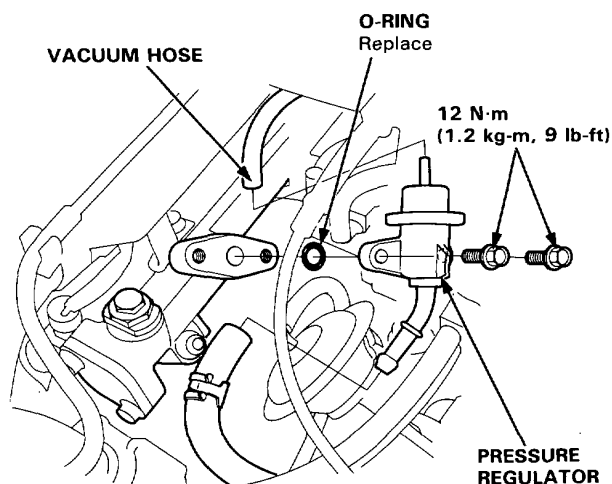
If the fuel pressure did not rise, replace the pressure regulator.



Replacement

⚠ WARNING Do not smoke while working on fuel system. Keep open flame away from work area.

1. Place a shop towel under pressure regulator, then relieve fuel pressure (page 11-96).
2. Disconnect the vacuum hose and fuel return hose.
3. Remove the two 6 mm mounting bolts.



NOTE:

- Replace the O-ring.
- When assembling the regulator, apply clean engine oil to the O-ring and assemble it into its proper position, taking care not to damage the O-ring.

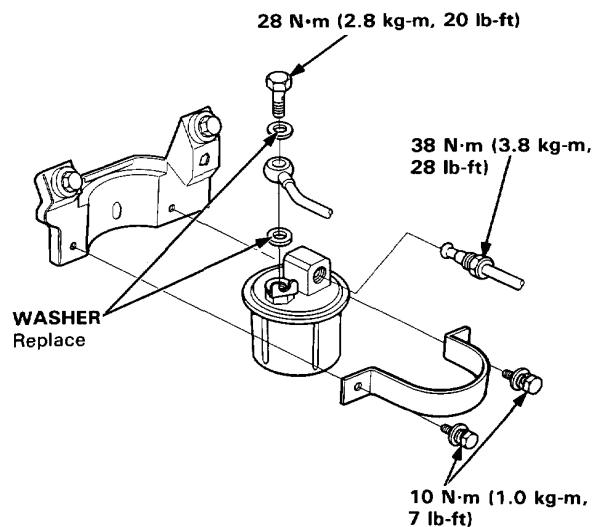
Fuel Filter

Replacement

⚠ WARNING Do not smoke while working on fuel system. Keep open flame away from work area.

The filter should be replaced every 2 years or 40,000 km (24,000 miles), whichever comes first or whenever the fuel pressure drops below the specified value [F22A1, H23A1, H23A2 engine: 255–305 kPa (2.55–3.05 kg/cm², 36–43 psi). F20A4, F22A2 engine: 245–285 kPa (2.45–2.85 kg/cm², 35–41 psi) with the pressure regulator vacuum hose disconnected] after marking sure that the fuel pump and the pressure regulator are OK.

1. Place a shop towel under and around the fuel pipe.
2. Relieve fuel pressure (page 11-96).
3. Remove the 12 mm banjo bolt and the fuel feed pipe from the filter.
4. Remove the fuel filter clamp and fuel filter.
5. When assembling, use new washers, as shown.



NOTE: Clean the flared joint of high pressure hoses thoroughly before reconnecting them.

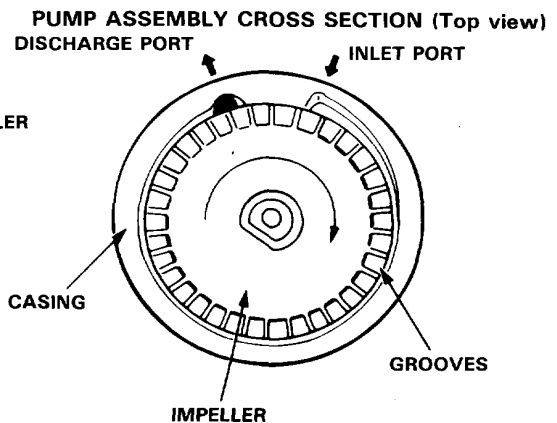
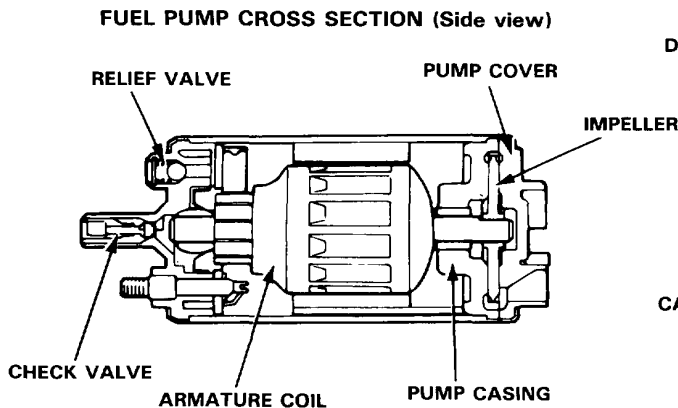
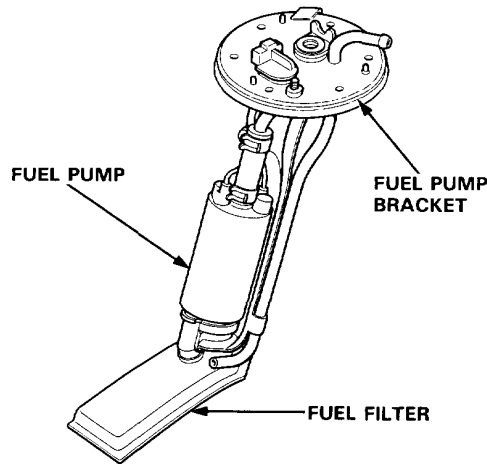
Fuel Supply System



Fuel Pump

Description

Because of its compact impeller design, the fuel pump is installed inside the fuel tank, thereby saving space and simplifying the fuel line system.



The fuel pump is comprised of a DC motor, a circumference flow pump, a relief valve for protecting the fuel line systems, a check valve for retaining residual pressure, an inlet port, and a discharge port. The pump assembly consists of the impeller (driven by the motor), the pump casing (which forms the pumping chamber), and the pump cover.

OPERATION

- (1) When the engine is started, the main relay actuates the pump, and the motor turns the impeller. Differential pressure is generated by the numerous grooves around the impeller.
- (2) Fuel entering the inlet port flows inside the motor from the pumping chamber and is forced through the discharge port via the check valve. If fuel flow is obstructed at the discharges side of the fuel line, the relief valve will open to bypass the fuel to the inlet port and prevent excessive fuel pressure.
- (3) When the engine stops, the pump stops automatically. However, a check valve closes by spring action to retain the residual pressure in the line, helping the engine to restart more easily.

(cont'd)

Fuel Supply System

Fuel Pump (cont'd)

Testing

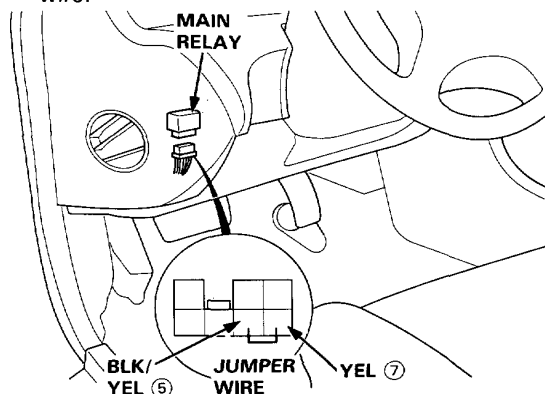
⚠ WARNING Do not smoke during the test. Keep open flame away from your work area.

If you suspect a problem with the fuel pump, check that the fuel pump actually runs; when it is ON, you will hear some noise if you hold your ear near the fuel pipe. The fuel pump should run for two seconds when the ignition switch is first turned on. If there is no noise at the fuel pipe, check as follows:

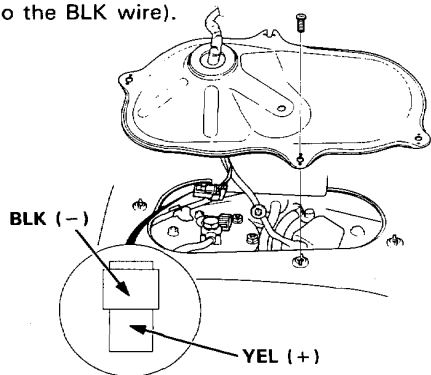
1. Remove the maintenance lid in trunk room.

CAUTION: Be sure to turn the ignition switch OFF before disconnecting the wires.

2. Disconnect the 2P connector.
3. Disconnect the main relay connector and connect the BLK/YEL ⑤ wire and YEL ⑦ wire with a jumper wire.



4. Check that battery voltage is available at the fuel pump connector when the ignition switch is turned ON (positive probe to the YEL wire, negative probe to the BLK wire).

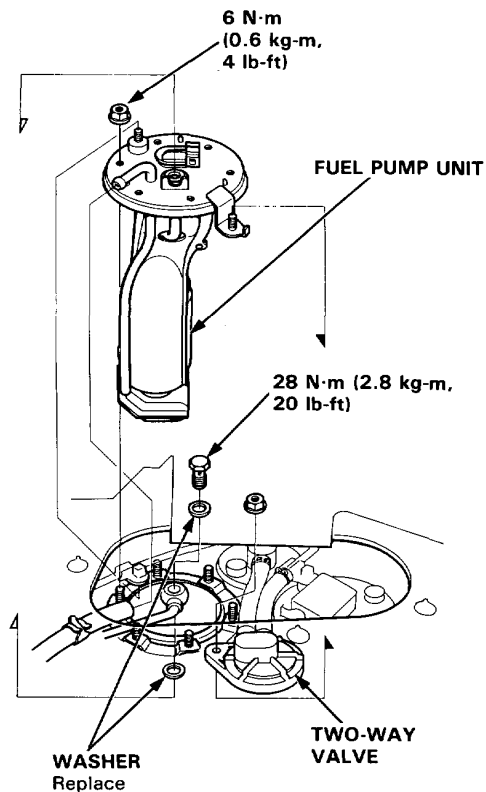


- If battery voltage is available, replace the fuel pump.
- If there is no voltage, check the fuel pump ground and wire harness (page 11-108).

Replacement

⚠ WARNING Do not smoke while working on fuel system. Keep open flames away from your work area.

1. Relieve fuel pressure (page 11-96).
2. Remove the maintenance lid.
3. Disconnect the 2P connector from the fuel pump.
4. Remove the fuel pump mounting nuts.
5. Remove the fuel pump from the fuel tank.





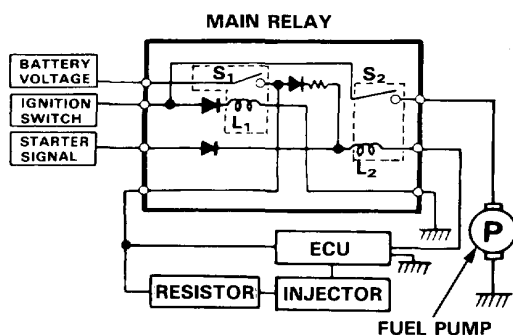
Main Relay

Description

The main relay actually contains two individual relays. This relay is located at the left side of the cowl.

One relay is energized whenever the ignition is on which supplies the battery voltage to the ECU, power to the injectors, and power for the second relay.

The second relay is energized for 2 seconds when the ignition is switched on, and when the engine is running which supplies power to the fuel pump.

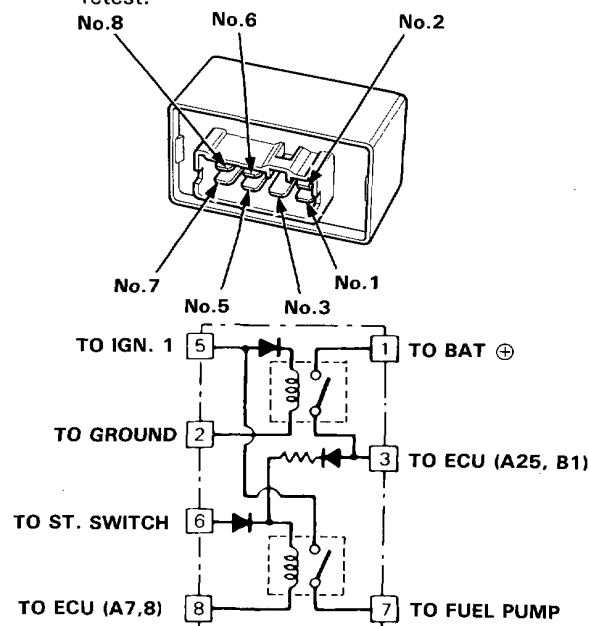


Relay Testing

NOTE: If the car starts and continues to run, the main relay is OK.

1. Remove the main relay.
2. Attach the battery positive terminal to the No. 6 terminal and the battery negative terminal to the No. 8 terminal of the main relay. Then check for continuity between the No. 5 terminal and No. 7 terminal of the main relay.

- If there is continuity, go on to step 3.
- If there is no continuity, replace the relay and retest.



3. Attach the battery positive terminal to the No. 5 terminal and the battery negative terminal to the No. 2 terminal of the main relay. Then check that there is continuity between the No. 1 terminal and No. 3 terminal of the main relay.

- If there is continuity, go on to step 4.
- If there is no continuity, replace the relay and retest.

4. Attach the battery positive terminal to the No. 3 terminal and the battery negative terminal to the No. 8 terminal of the main relay. Then check that there is continuity between the No. 5 terminal and No. 7 terminal of the main relay.

- If there is continuity, the relay is OK.
- If there is no continuity, replace the relay and retest.

(cont'd)

Fuel Supply System

Main Relay (cont'd)

Troubleshooting Flowchart

- Engine will not start.
- Inspection of main relay.

Disconnect the main relay connector.

Check for continuity between BLK terminal ② and body ground.

Does continuity exist?

NO

Repair open in BLK wire between main relay and G101.

YES

Measure the voltage between YEL/BLU terminal ① and body ground.

Is there battery voltage?

NO

- Replace BACK UP (No. 4) (10 A) fuse.
- Repair open in the YEL/BLU wire between the main relay and the BACK UP (No. 4) (10 A) fuse.

YES

Turn the ignition switch ON.

Measure the voltage between BLK/YEL terminal ⑤ and body ground.

Is there battery voltage?

NO

- Replace ECU (No. 19) (15 A)* fuse.
- Repair open in the BLK/YEL wire between the main relay and the ECU (No. 19) (15 A)* fuse.

YES

Turn the ignition switch to the START position.

Measure the voltage between BLU/RED terminal ⑥ and body ground.

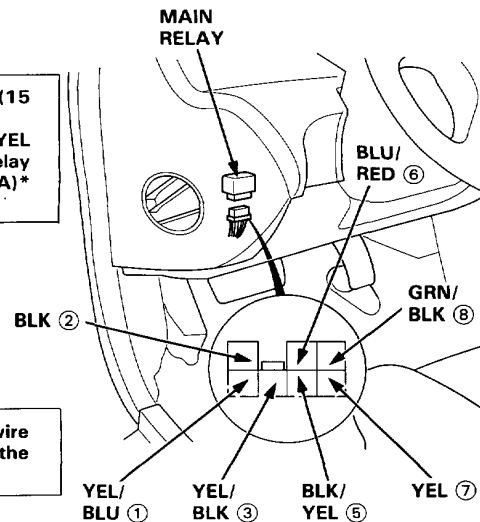
Is there battery voltage?

NO

Repair open in the BLU/RED wire between the main relay and the ignition switch.

YES

(To page 11-109)



*: No. 23 (ECU) (15 A)
(with SRS)



(From page 11-108)

Turn the ignition switch off.

Connect the test harness between the ECU and connector. Disconnect "A" connector from the ECU only, not the main wire harness (page 11-26).

Check for continuity between GRN/BLK terminal ⑧ and the following terminals; A7, A8.

Does continuity exist?

NO

Repair open in GRN/BLK wire between ECU (A7, A8) and main relay.

YES

Reconnect "A" connector to the ECU.

Connect the main relay connector.

Turn the ignition switch ON.

Measure the voltage between A23 (-) terminal and the following terminals: A25 (+) B1 (+).

Is there battery voltage?

NO

— Repair open in the YEL/BLK ③ wire between the ECU (A25, B1) and main relay.
— Replace main relay.

YES

Turn the ignition switch OFF.

Connect a voltmeter between A7 (+) terminal and A23 (-) terminal.

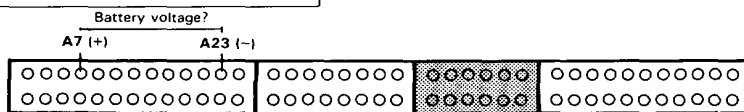
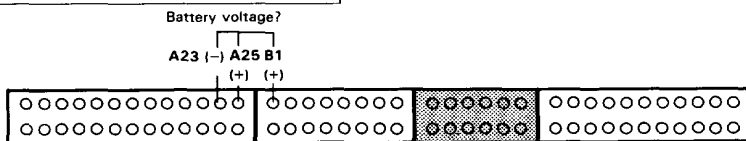
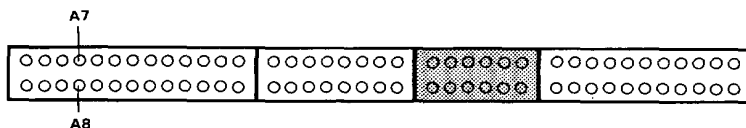
Is there battery voltage for two seconds when the ignition switch is first turned on?

YES

Substitute a known-good ECU and recheck. If prescribed voltage is now available, replace the original ECU.

NO

Check the main relay (page 11-107).



Fuel Supply System

Fuel Tank

Replacement

⚠ WARNING Do not smoke while working on fuel system. Keep open flame away from your work area.

1. Block front wheels. Jack up the rear of the car and support with jackstands.
2. Remove the drain bolt and drain the fuel into an approved container.
3. Remove the maintenance lid.
4. Disconnect the connectors from the fuel gauge sending unit and the fuel pump, then remove the fuel feed line and return hose.

CAUTION: Be sure to turn the ignition switch OFF before disconnecting the wires.

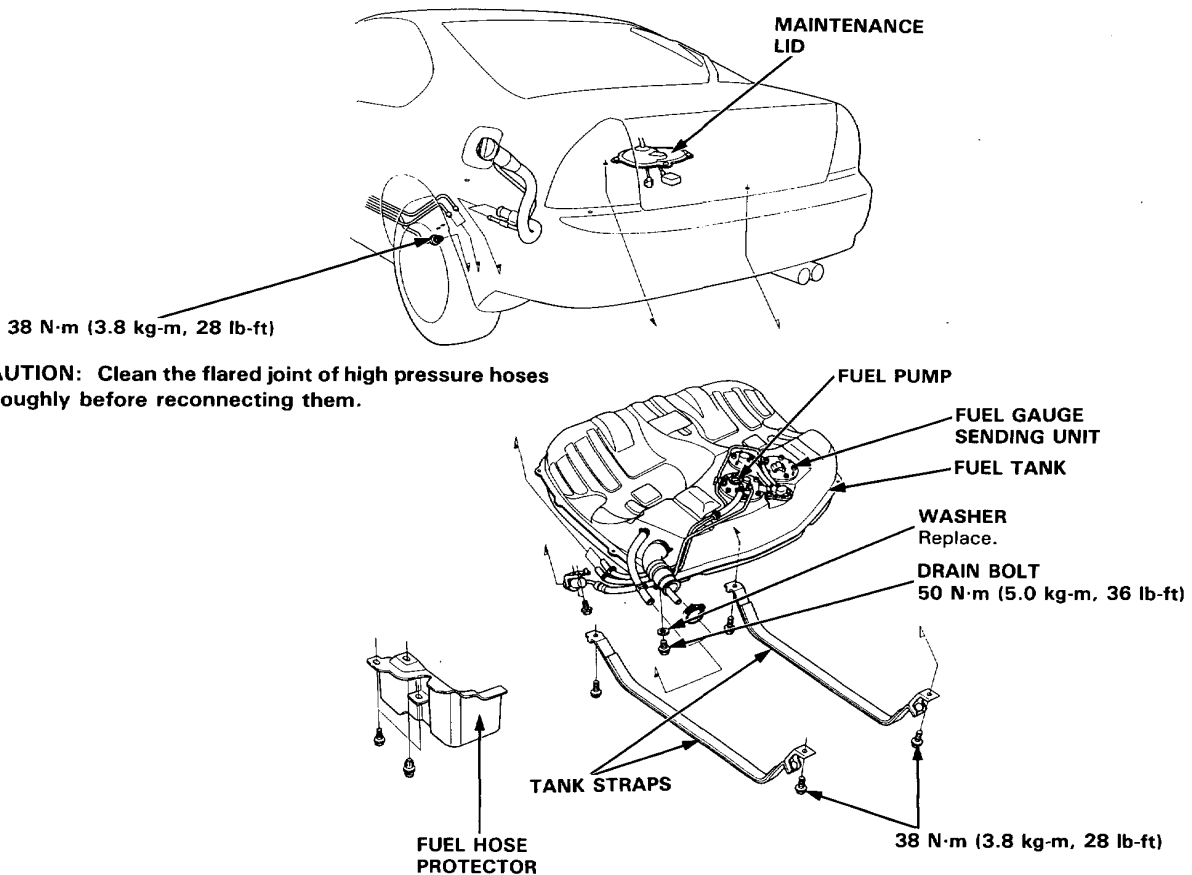
5. Remove the fuel hose protectors.
6. Disconnect the hoses.

CAUTION: When disconnecting the hoses, slide back the clamps, then twist hoses as you pull to avoid damaging them.

7. Place a jack, or other support, under the tank.
8. Remove the strap bolts and nuts, and let the straps fall free.
9. Remove the fuel tank.

NOTE: The tank may stick on the undercoat applied to its mount. To remove, carefully pry it off the mount.

10. Install a new washer on the drain bolt and the fuel pump line, then install parts in the reverse order of removal.



Air Intake System



System Troubleshooting Guide

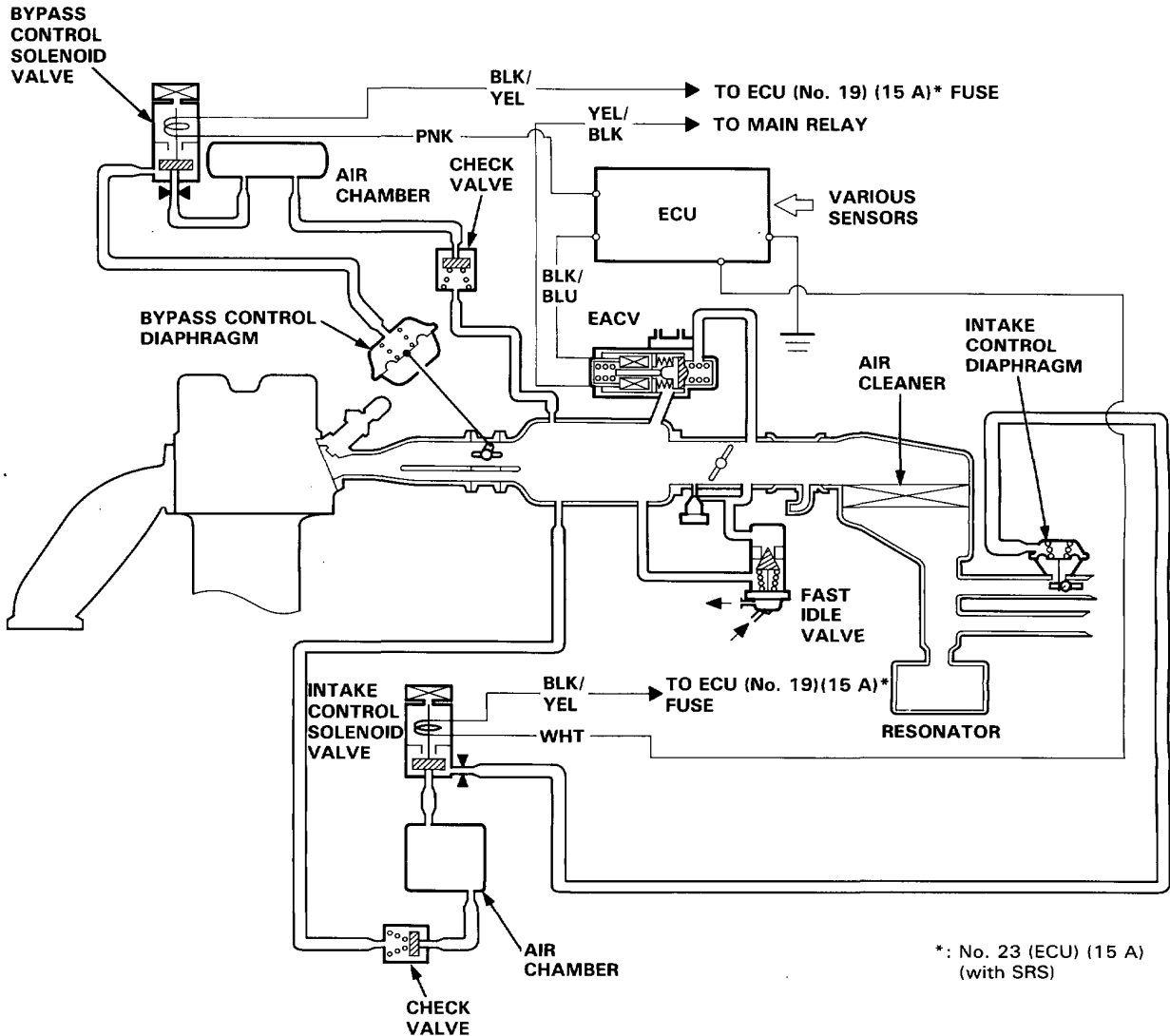
NOTE: Across each row in the chart, the sub-system that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of the column. If inspection shows the system is OK, try the next system ②, etc.

PAGE	SUB-SYSTEM	THROTTLE CABLE	THROTTLE BODY	INTAKE CONTROL SYSTEM	BYPASS CONTROL SYSTEM
SYMPTOM		118	120	115	125
WHEN COLD FAST IDLE OUT OF SPEC		③	②		①
WHEN WARM RPM TOO HIGH		②	①		
LOSS OF POWER		①		③	②

Air Intake System

System Description

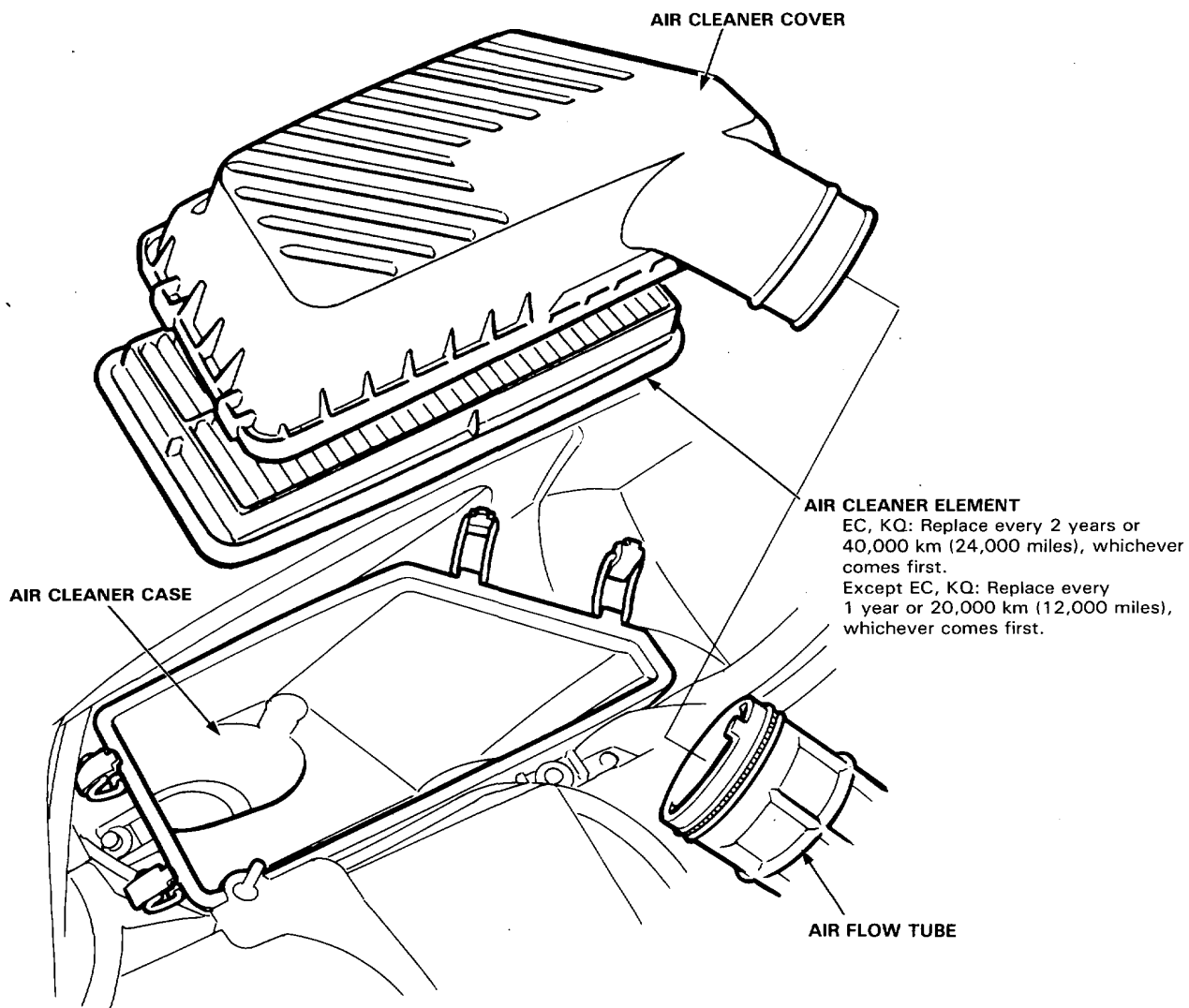
The system supplies air for all engine needs. It consists of the air cleaner, air intake pipe, throttle body, EACV, fast idle valve, and intake manifold. A resonator in the air intake pipe provides additional silencing as air is drawn into the system.





Air Cleaner

Air Cleaner Element Replacement



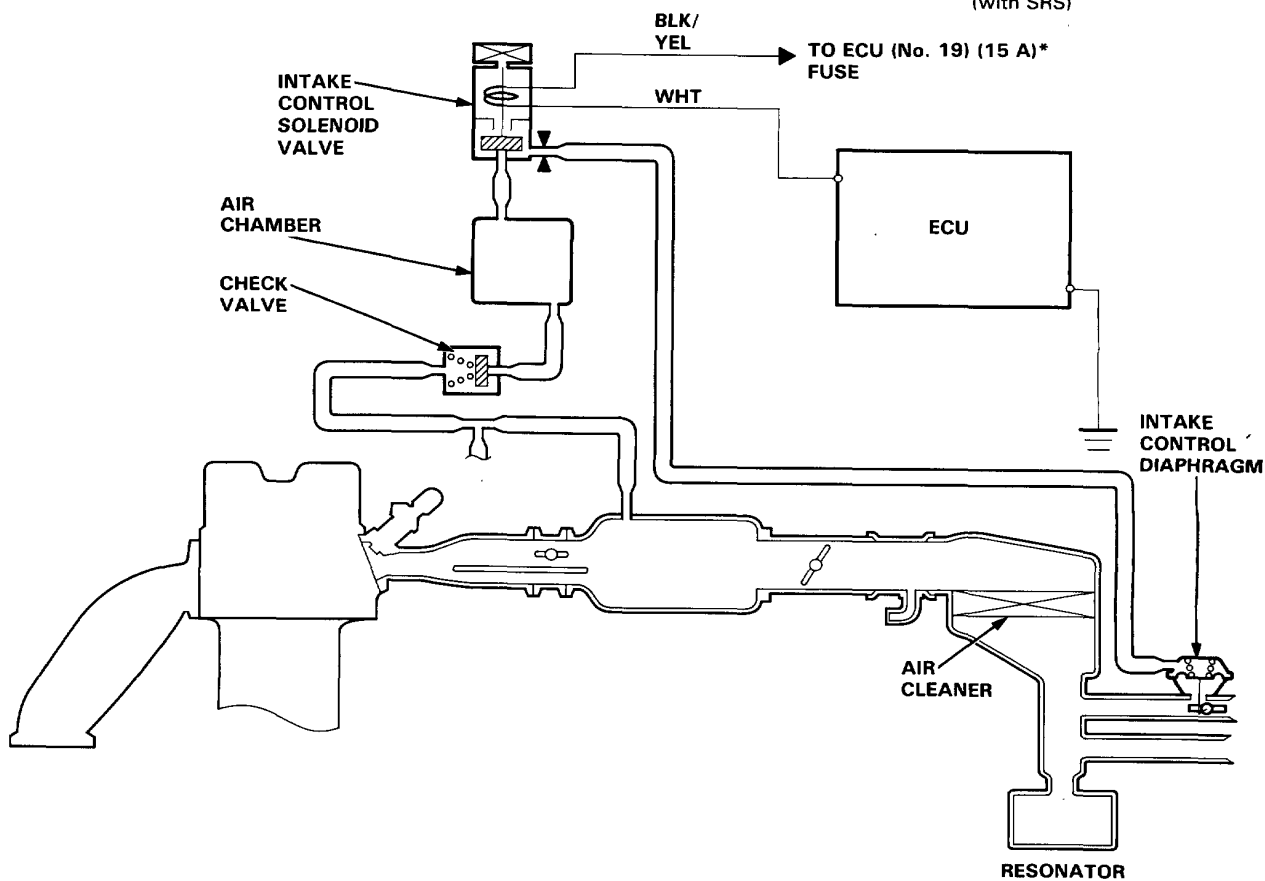
Air Intake System

Intake Control System

Description

The intake control system decreases air intake noise.

*: No. 23 (ECU) (15 A)
(with SRS)



When the engine speed is below 4,000 rpm, the ECU provides ground for the intake control solenoid valve. This opens the solenoid valve sending intake manifold vacuum to the intake control diaphragm.



Troubleshooting Flowchart

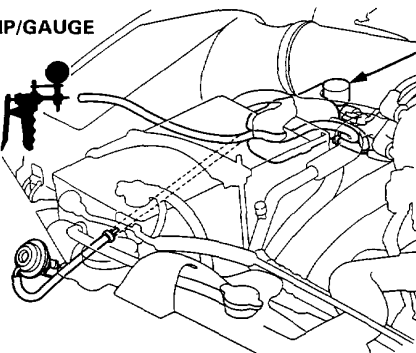
Inspection of Intake Control System

Start engine and allow to idle.

Remove the #8 vacuum hose from the hose joint and connect a vacuum gauge to the solenoid valve.

VACUUM PUMP/GAUGE

INTAKE CONTROL SOLENOID VALVE



Is there vacuum?

NO

Disconnect the lower vacuum hose of the solenoid valve from the air chamber and connect a vacuum gauge to the hose.

YES

Is there manifold vacuum?

NO

- Check the vacuum line for proper connection, cracks, blockage or disconnected hose.
- Clean manifold port.

YES

Disconnect the 2P connector from the intake control solenoid valve.

Measure voltage between BLK/YEL (+) terminal and WHT (–) terminal.

INTAKE CONTROL SOLENOID VALVE

BLK/YEL (+)

WHT (–)

Is there battery voltage?

YES

Replace the intake control solenoid valve.

NO

Measure voltage between BLK/YEL (+) terminal and body ground.

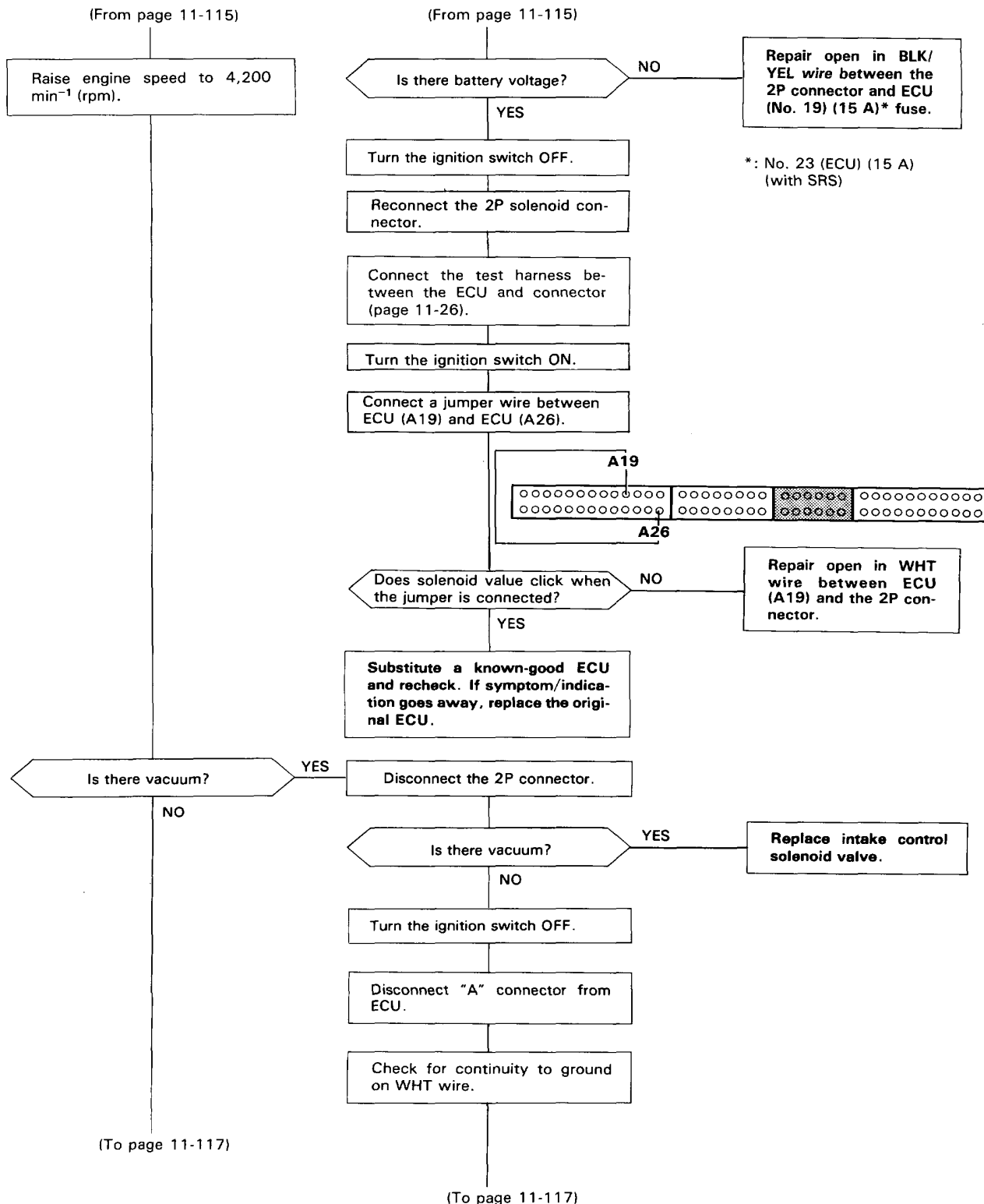
(To page 11-116)

(To page 11-116)

(cont'd)

Air Intake System

Intake Control System (cont'd)





(From page 11-116)

(From page 11-116)

Is there continuity to ground?

YES

Repair short to ground in WHT wire between ECU (A19) and the 2P connector.

NO

Substitute a known-good ECU and recheck. If symptom goes away, replace the original ECU.

Connect a vacuum pump to the #8 vacuum hose.

Apply vacuum.

Does it hold vacuum?

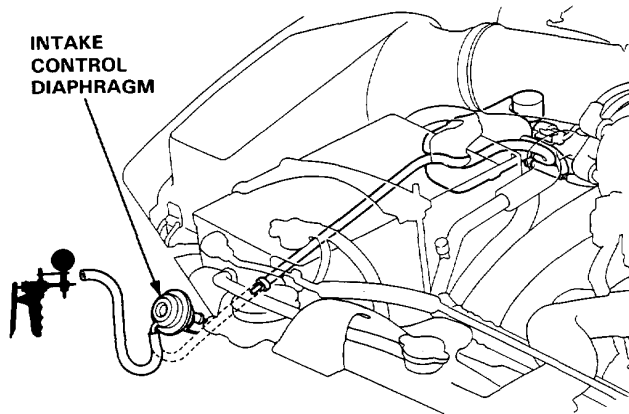
NO

Check the vacuum line for proper connection or disconnected hose.
If OK, replace the intake control diaphragm.

YES

Intake control system is OK.

INTAKE
CONTROL
DIAPHRAGM

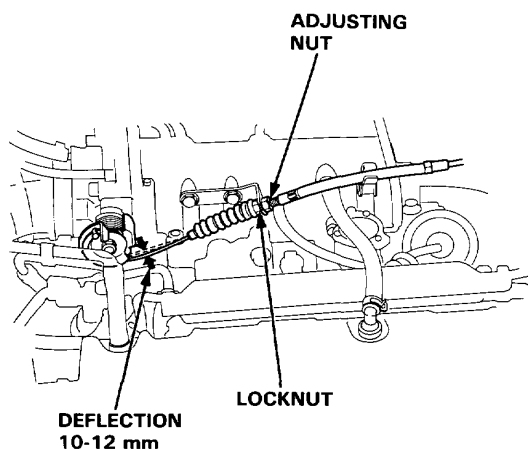


Air Intake System

Throttle Cable

Inspection/Adjustment

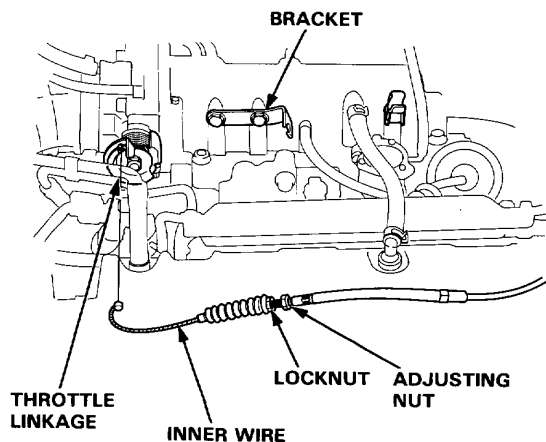
1. Warm up the engine to normal operating temperature (cooling fan comes on).
2. Check that the throttle cable operates smoothly with no binding or sticking. Repair as necessary.
3. Check cable free play at the throttle linkage. Cable deflection should be 10–12 mm (0.39–0.47 in.)



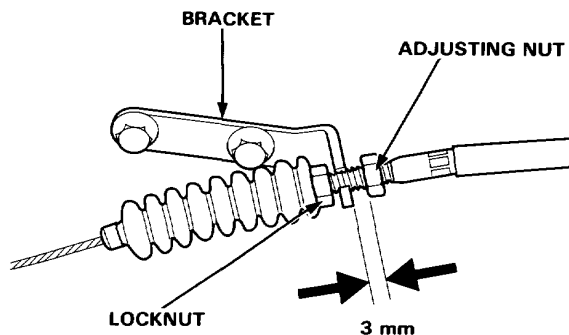
4. If deflection is not within specs, loosen the locknut and turn the adjusting nut until the deflection is as specified.
5. With the cable properly adjusted, check the throttle valve to be sure it opens fully when you push the accelerator pedal to the floor. Also check the throttle valve to be sure it returns to the idle position whenever you release the accelerator.

Installation

1. Fully open the throttle valve, then install the throttle cable in the throttle linkage and install the cable housing in the cable bracket.
2. Warm up the engine to normal operating temperature (the cooling fan comes on).



3. Hold the cable sheath, removing all slack from the cable.
4. Turn the adjusting nut until it is 3 mm away from the cable bracket.
5. Tighten the locknut. The cable deflection should now be 10–12 mm. If not, see Inspection/Adjustment.



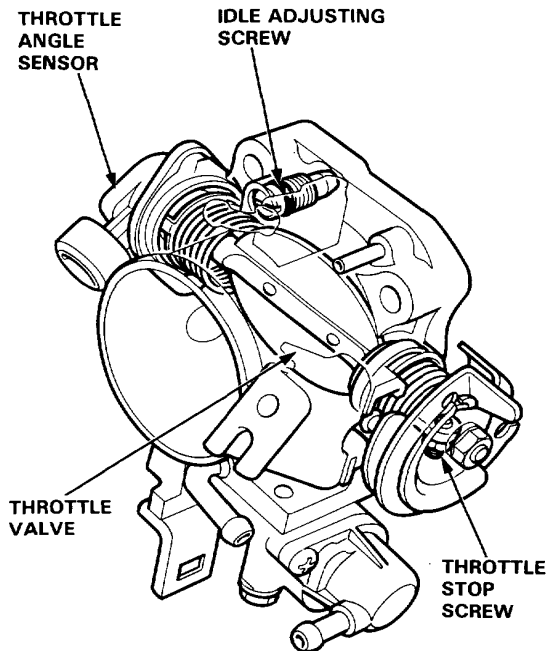


Air Intake System

Throttle Body

Description

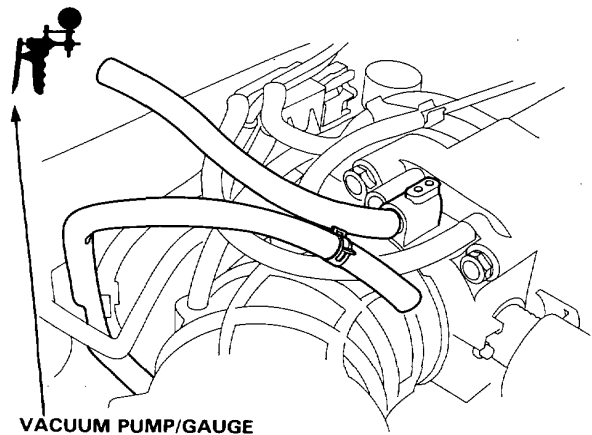
The throttle body is of the single-barrel side-draft type. The lower portion of the throttle valve is heated by engine coolant which is fed from the cylinder head. The idle adjusting screw which increases/decreases bypass air and the canister/purge port are located on the top of the throttle body.



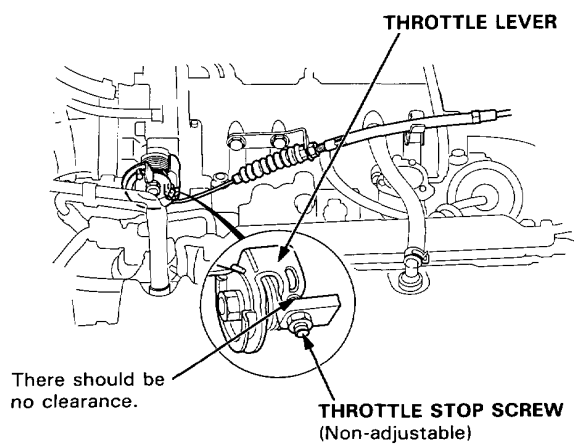
Inspection

CAUTION: Do not adjust the throttle stop screw. It is preset at the factory.

1. Start the engine and allow it to reach normal operating temperature (cooling fan comes on).
2. Disconnect the vacuum hose (to the canister) from the top of the throttle body; connect a vacuum gauge to the throttle body.



3. Allow the engine to idle and check that the gauge indicates no vacuum.
 - If there is vacuum, check the throttle cable (page 11-118).
4. Check that vacuum is indicated on the gauge when the throttle is opened slightly from idle.
 - If the gauge indicates no vacuum, check the throttle body port. If the throttle body port is clogged, clean it with carburetor cleaner.
5. Stop the engine and check that the throttle cable operates smoothly without binding or sticking.
 - If there are any abnormalities in the above steps, check for:
 - Excessive wear or play in the throttle valve shaft.
 - Sticky or binding throttle lever at full close position.
 - Clearance between throttle stop screw and throttle lever at full close position.

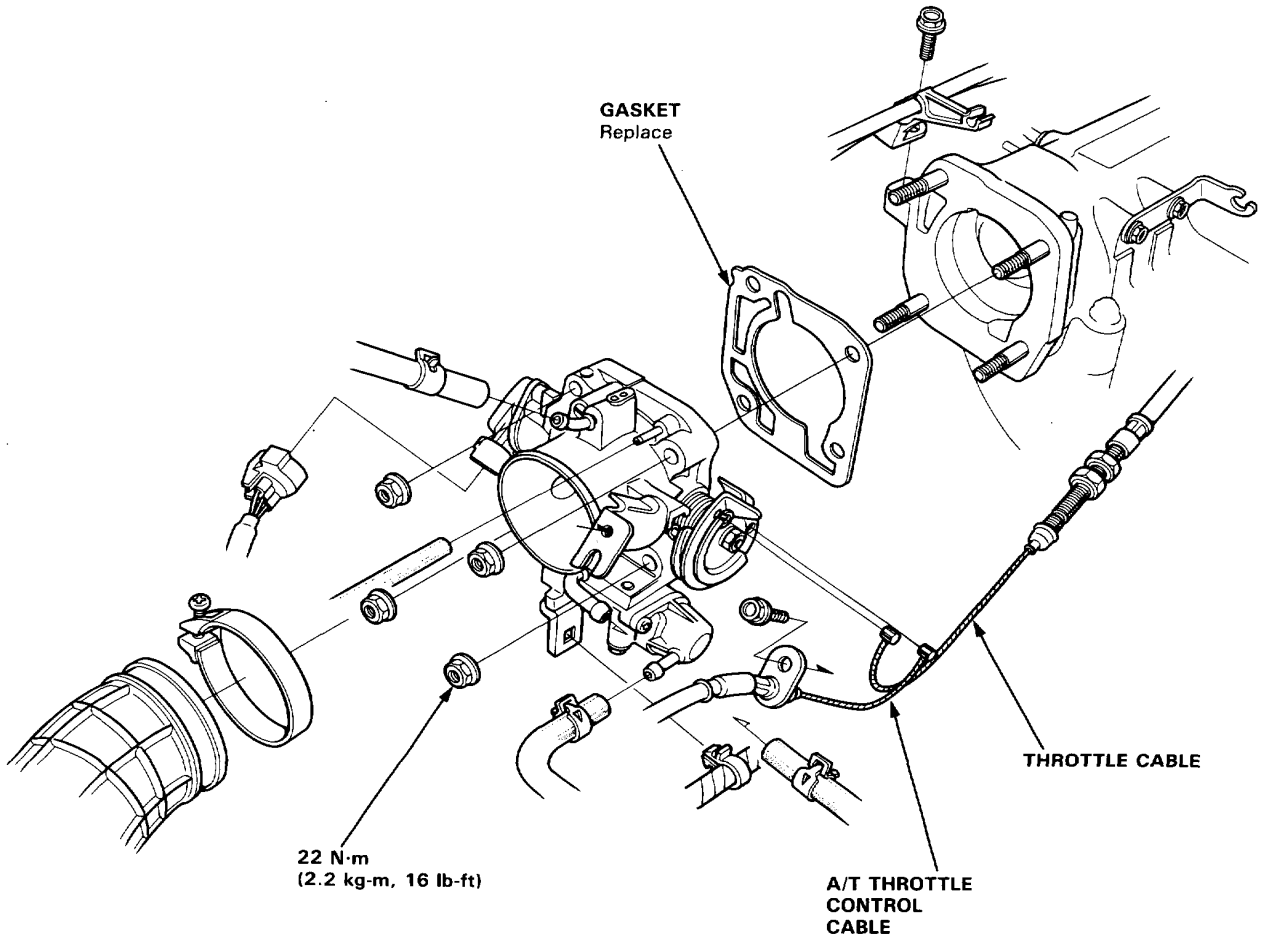


Replace the throttle body if there is excessive play in the throttle valve shaft or if the shaft is binding or sticking.

Air Intake System

Throttle Body (cont'd)

Disassembly

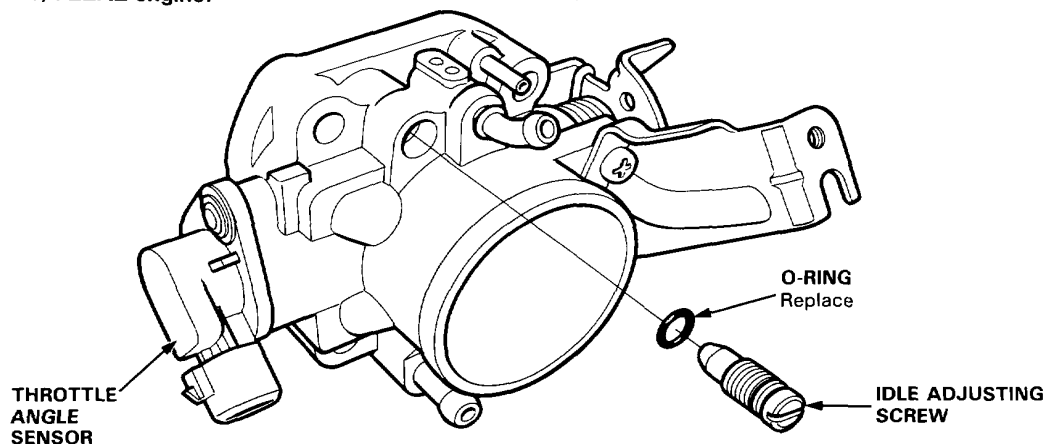




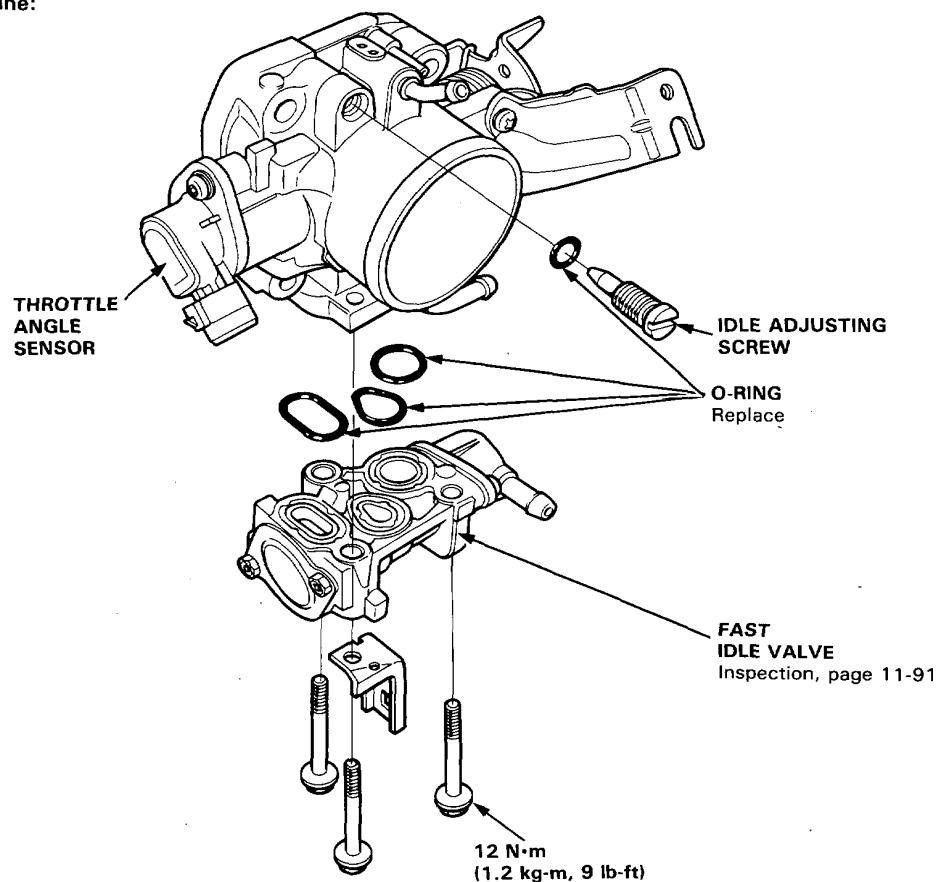
CAUTION:

- The throttle stop screw is non-adjustable.
- After reassembly, adjust the throttle cable (page 11-118), and A/T throttle control cable (section 14) for cars with A/T.

F20A4, F22A1, F22A2 engine:



H23A1, H23A2 engine:



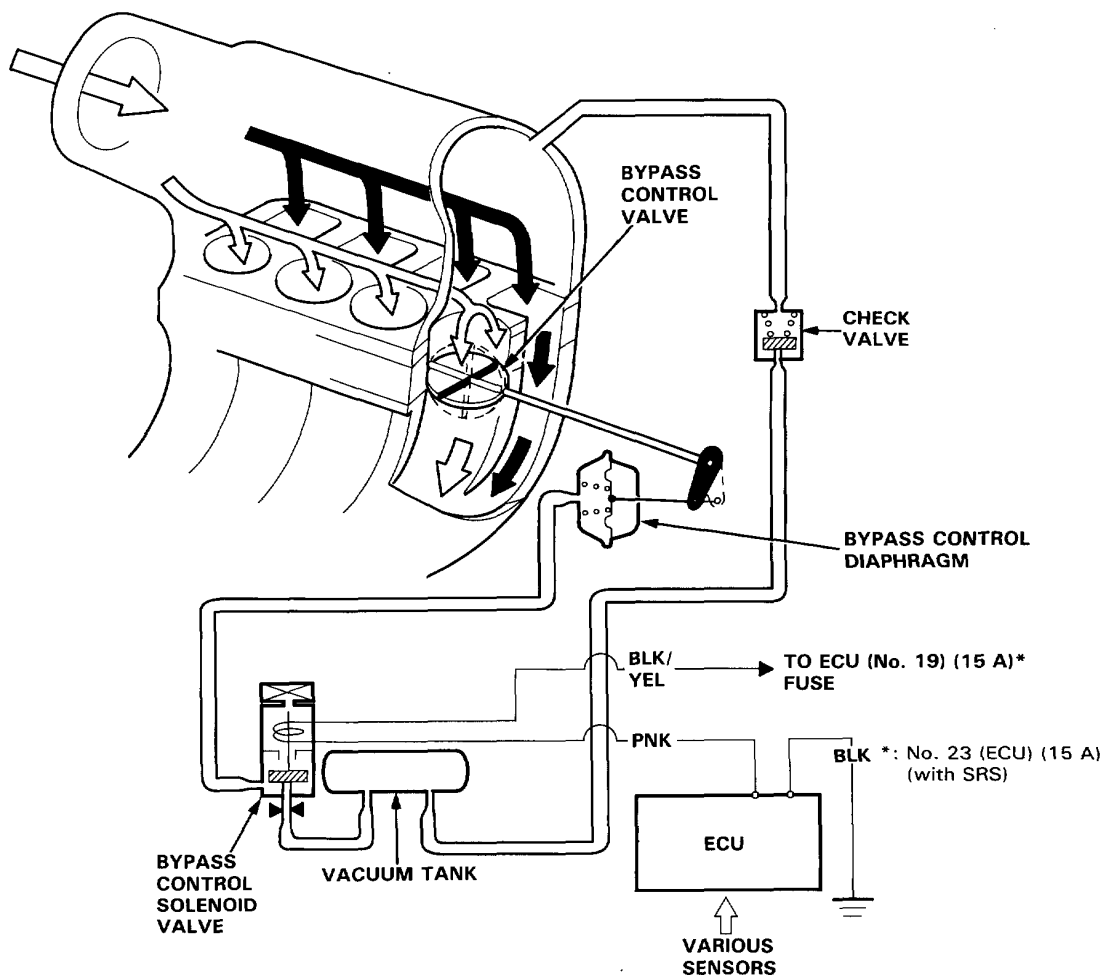
Air Intake System

Bypass Control System [H23A1, H23A2 engine]

Description

Two air intake paths are provided in the intake manifold to allow the selection of the intake path most favorable for a given engine speed.

Optimum performance at any engine speed is achieved by closing and opening the bypass valves. High torque at low engine speed is achieved when the valves are closed, whereas high power at high engine speed is achieved when the valves are opened.



BYPASS CONTROL SOLENOID VALVE OFF

ENGINE RPM IS ABOVE 4.800 min⁻¹ (rpm)



Troubleshooting Flowchart

Inspection of Bypass Control System

Start engine and allow to idle.

Remove #13 vacuum hose from the bypass control diaphragm and connect vacuum gauge to the hose.

Is there vacuum ?

YES

NO

Disconnect the 2P connector from the bypass control solenoid valve.

Measure voltage between BLK/YEL (+) terminal and PNK (-) terminal.

Is there battery voltage ?

NO

Measure voltage between BLK/YEL (+) terminal and body ground.

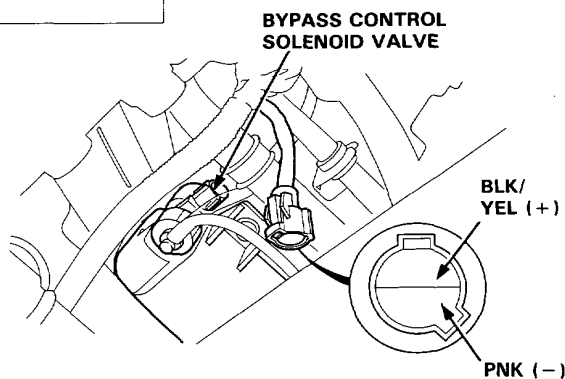
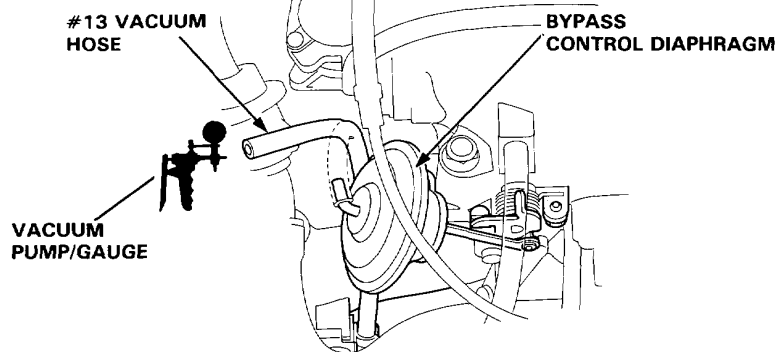
Is there battery voltage ?

YES

Turn the ignition switch OFF.

(To page 11-126)

(To page 11-126)



Repair the blockage or vacuum leak between the intake manifold and diaphragm, if vacuum is OK, replace the bypass control solenoid valve.

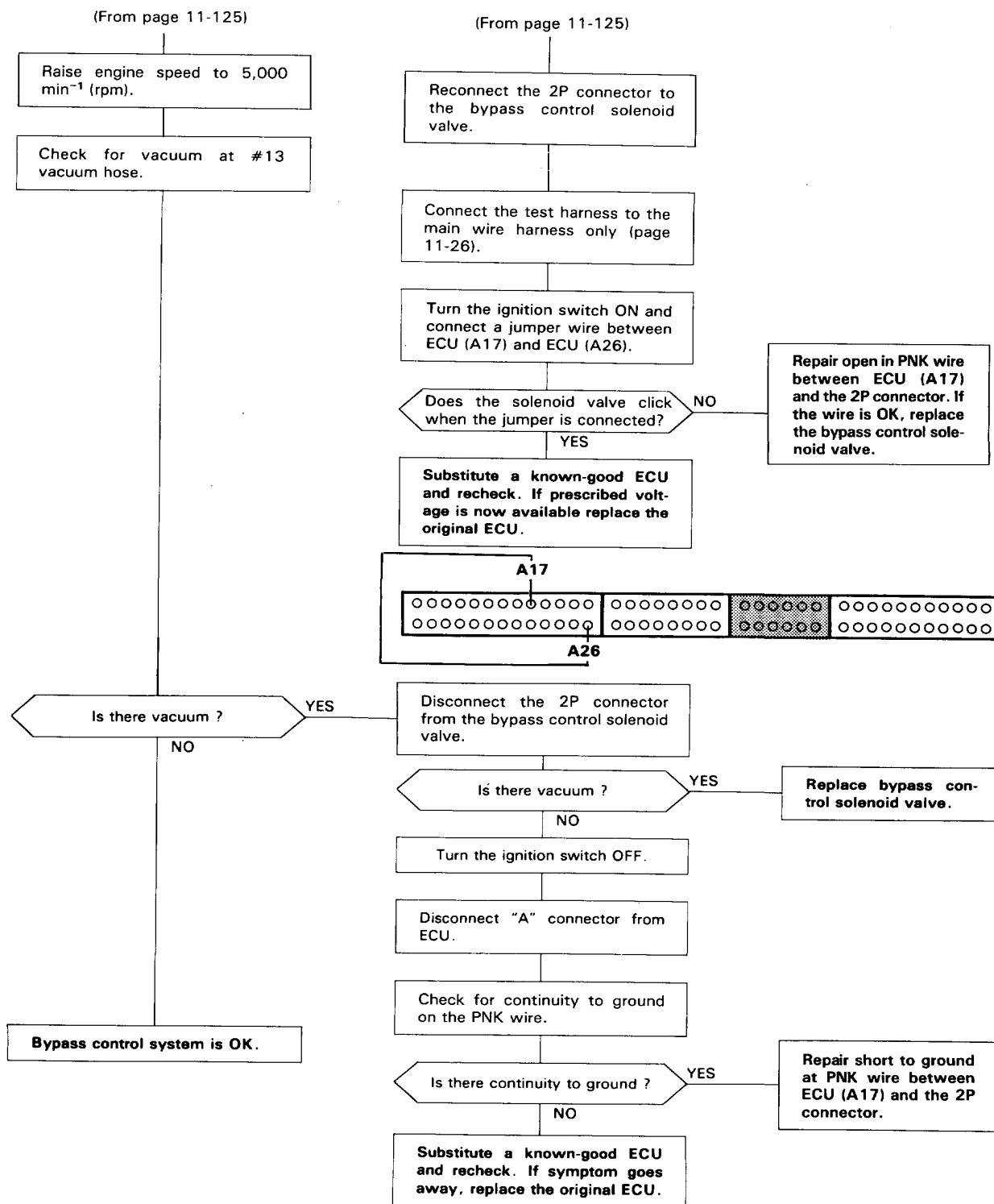
Repair open in BLK/YEL wire between the 2P connector and ECU (No. 19) (15 A)*

*: No. 23 (ECU) (15 A) (with SRS)

(cont'd)

Air Intake System

Bypass Control System [H23A1, H23A2 engine] (cont'd)



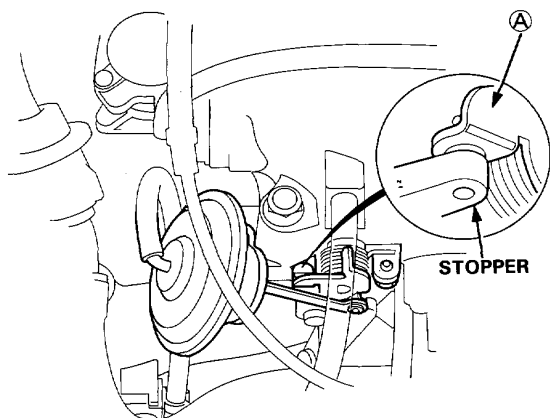


Bypass Valve

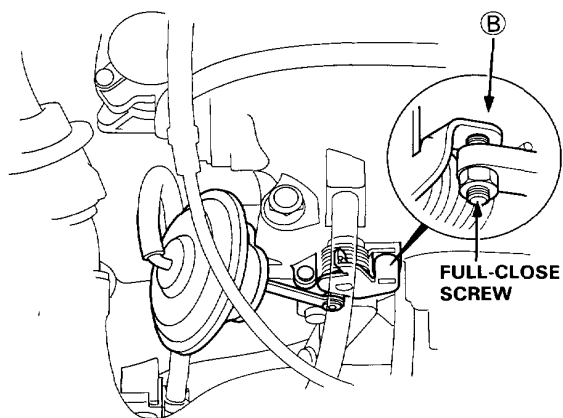
Testing

CAUTION: Do not adjust the bypass valve full-close screw. It was preset at the factory.

1. Check the bypass valve shaft for binding or sticking.
2. Check the bypass valve for smooth movement.
3. With the engine OFF, check that (A) of the bypass valve is in close contact with the stopper.



4. With the engine at idle, check that (B) of the bypass valve is in close contact with the full-close screw.

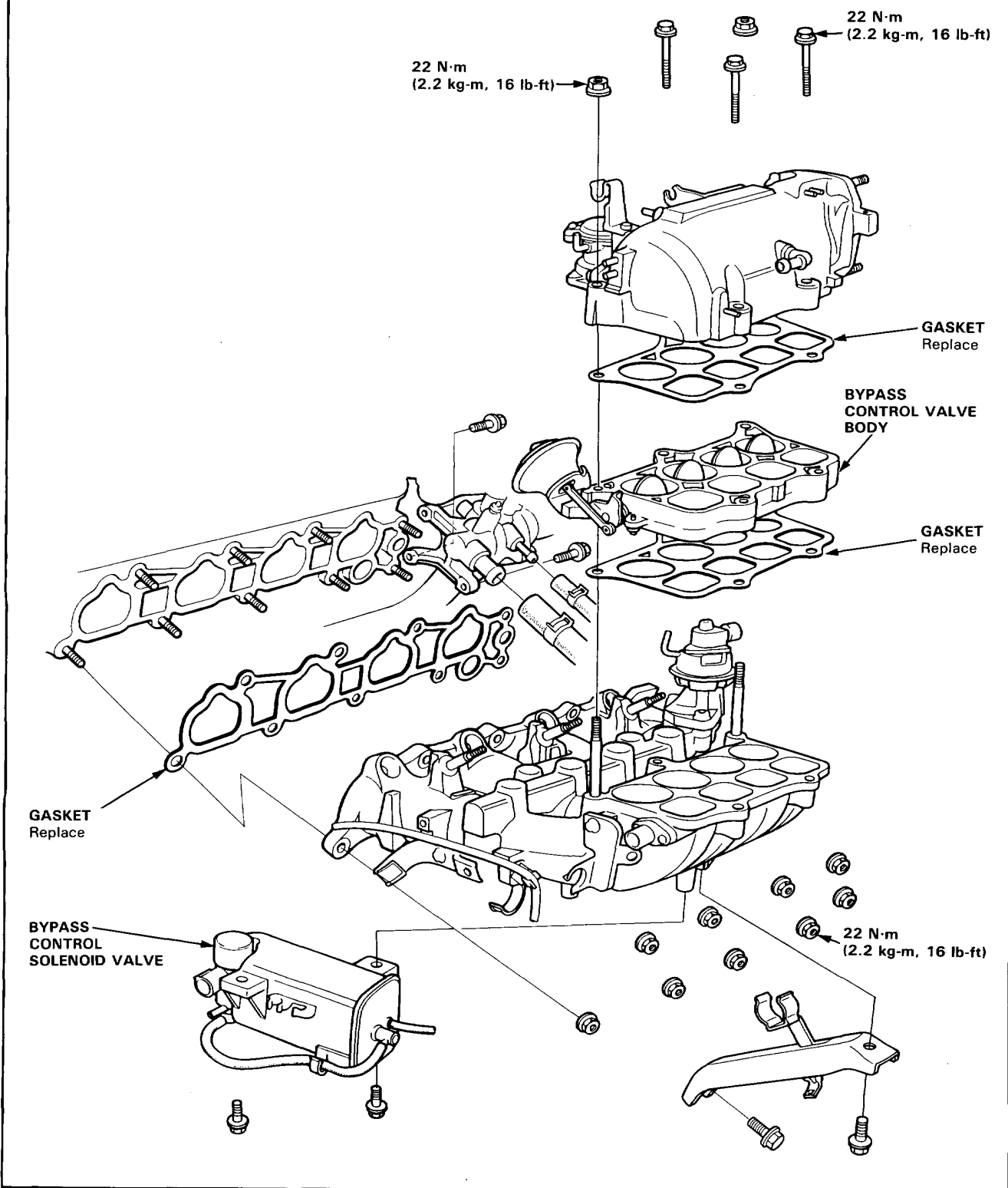


- If any fault is found, clean the linkage and shafts with carburetor cleaner.
- If the problem still exists after cleaning, disassemble the intake manifold and check the bypass valve (page 11-128).

(cont'd)

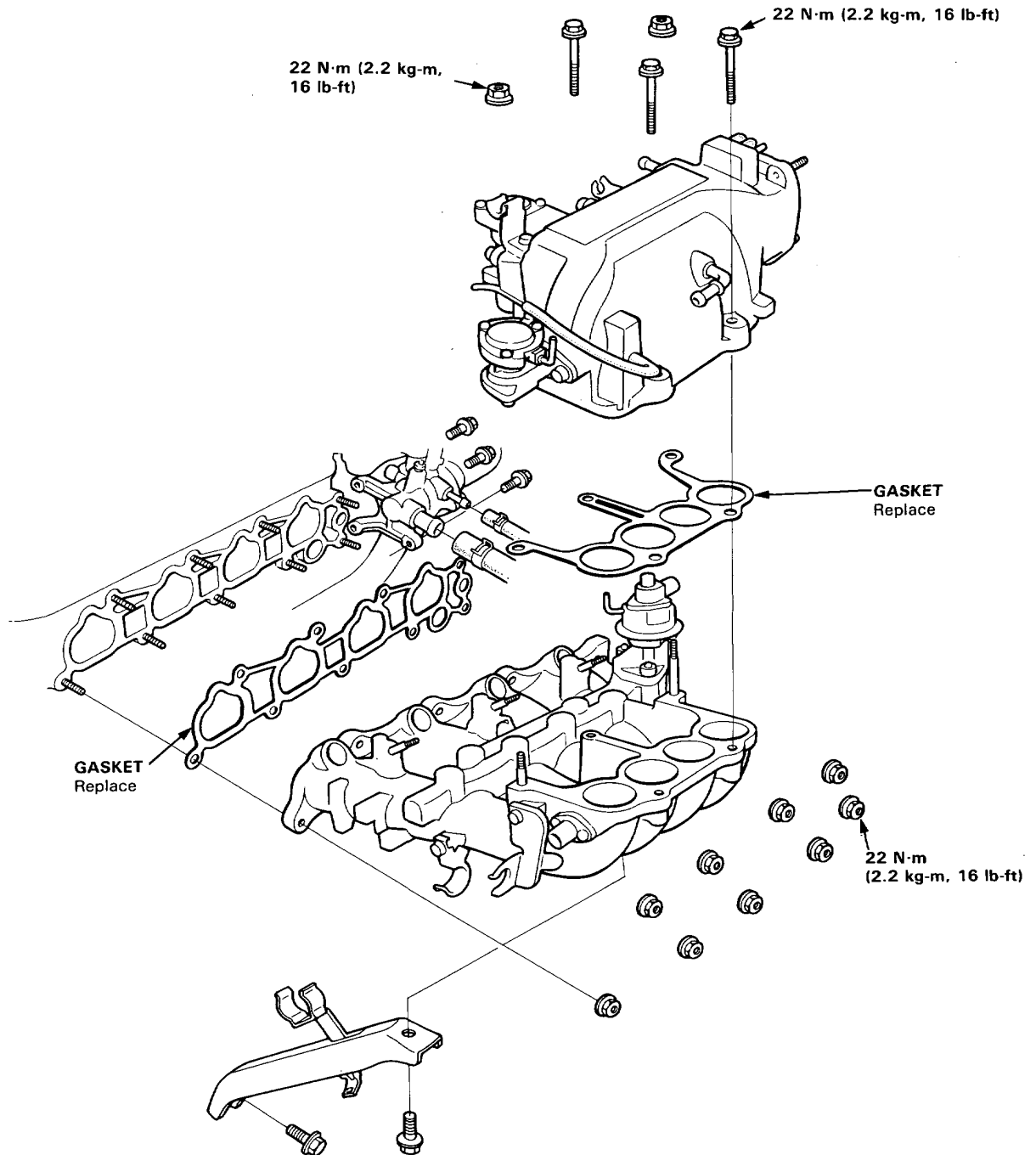
Air Intake System

Bypass Control System [H23A1, H23A2 engine] (cont'd)





Intake Manifold [F20A4, F22A1, F22A2 engine]



Emission Control System

System Troubleshooting Guide



NOTE: Across each row in the chart, the sub-systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next most likely system ②, etc.

PAGE	SUB-SYSTEM	CATALYTIC CONVERTER	EGR SYSTEM	POSITIVE CRANKCASE VENTILATION SYSTEM	EVAPORATIVE EMISSION CONTROLS
SYMPTOM		133	135	141	142
ROUGH IDLE			①	②	
FREQUENT STALLING	AFTER WARMING UP		①		
POOR PERFORMANCE	MISFIRE OR ROUGH RUNNING		①		
	FAILS EMISSION TEST	①	③		②
	LOSS OF POWER	①	②		

Emission Control System

System Description

The emission control system includes a three-way catalytic converter, exhaust gas recirculation (EGR) system, crankcase ventilation system and evaporative control system. The emission control system is designed to meet federal and state emission standards.

Tailpipe Emission

Inspection

⚠ WARNING Do not smoke during this procedure. Keep any open flame away from your work area.

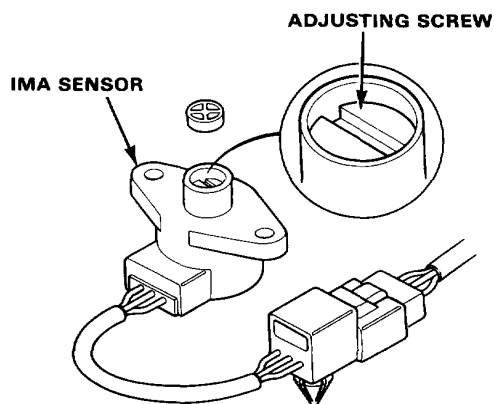
1. Start the engine and warm up to normal operating temperature (cooling fan comes on).
2. Connect tachometer.
3. Check idle speed and adjust the idle speed, if necessary (page 11-93).
4. Warm up and calibrate the CO meter according to the meter manufacture's instructions.
5. Check idle CO with the headlights, heater blower, rear window defogger, cooling fan, and air conditioner off.

Specified CO%:

With CATA: 0.1 % maximum

Without CATA: 1.0 ± 1.0 %

- If unable to obtain this reading:
On With CATA, see ECU troubleshooting guide (page 11-20).
On other models, adjust by turning the adjusting screw of the IMA sensor.



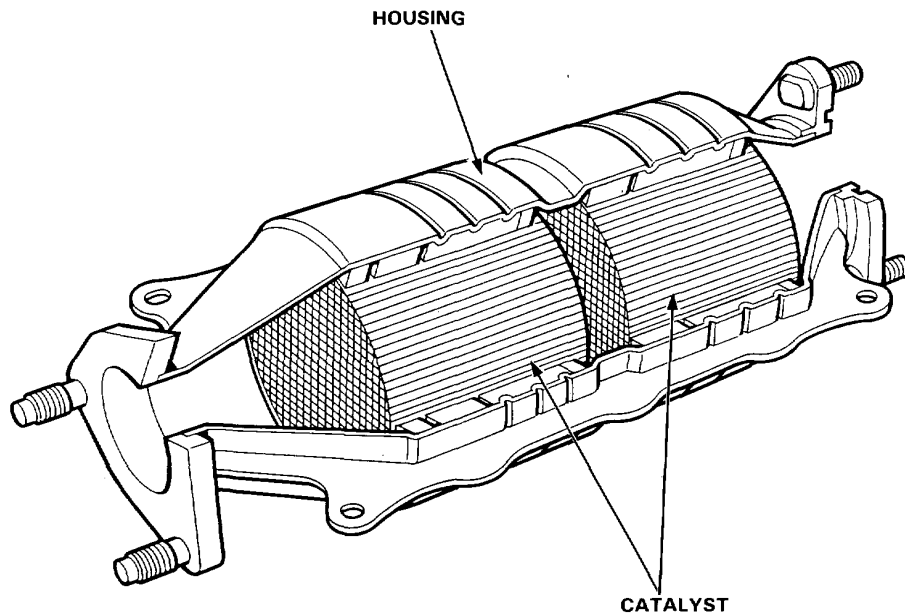
- If unable to obtain a CO reading of specified % by this procedure, check the engine tune-up condition.



Catalytic Converter

Description

The 3-way catalytic converter is used to convert hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) in the exhaust gas to carbon dioxide (CO₂), dinitrogen (N₂) and water vapor.



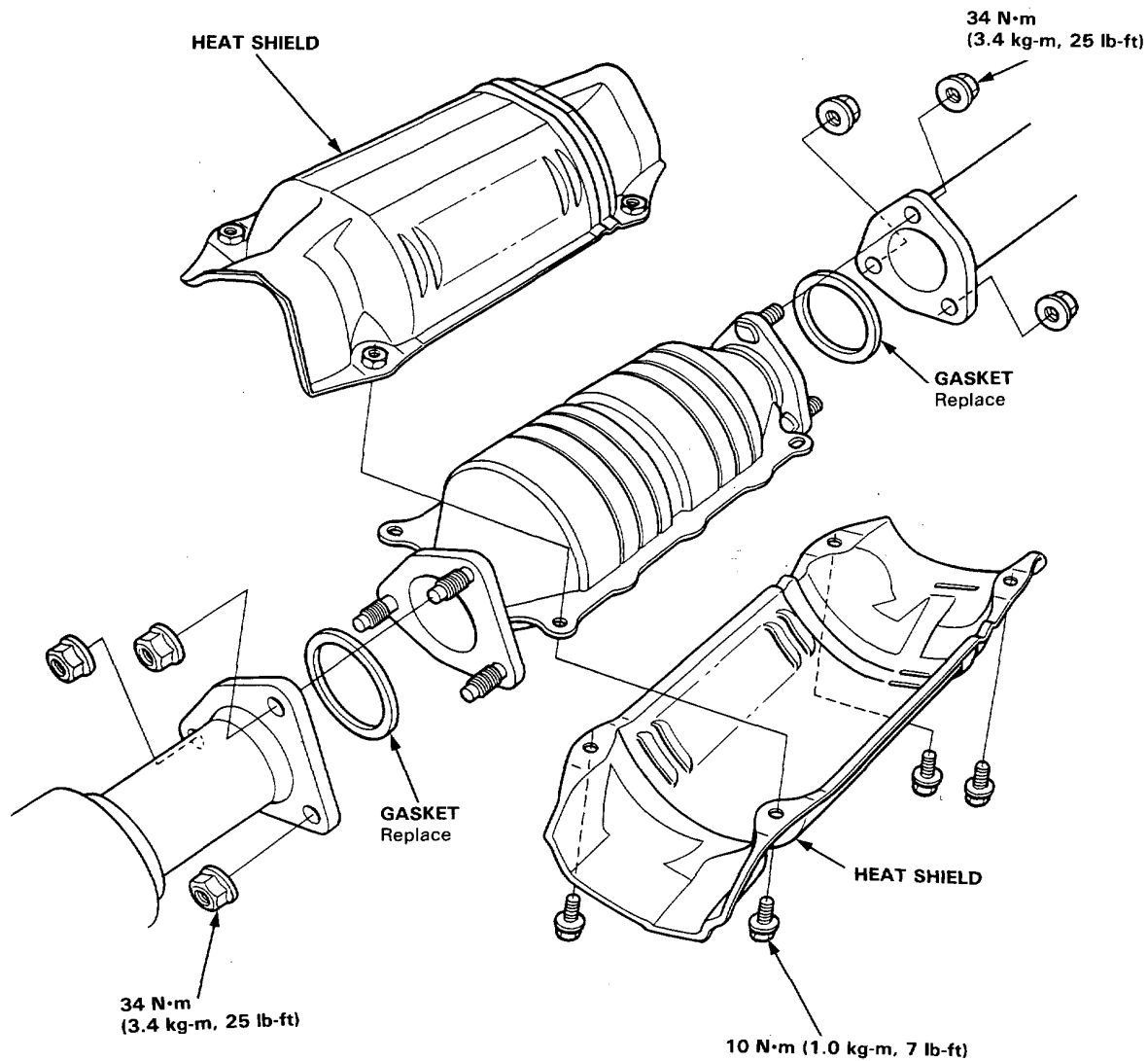
(cont'd)

Emission Control System

Catalytic Converter (cont'd)

Inspection

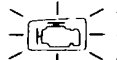
If excessive exhaust system back-pressure is suspected, remove the catalytic converter from the car and make a visual check for plugging, melting or cracking of the catalyst. Replace the catalytic converter if any of the visible area is damaged or plugged.





Exhaust Gas Recirculation System

Troubleshooting Flowchart

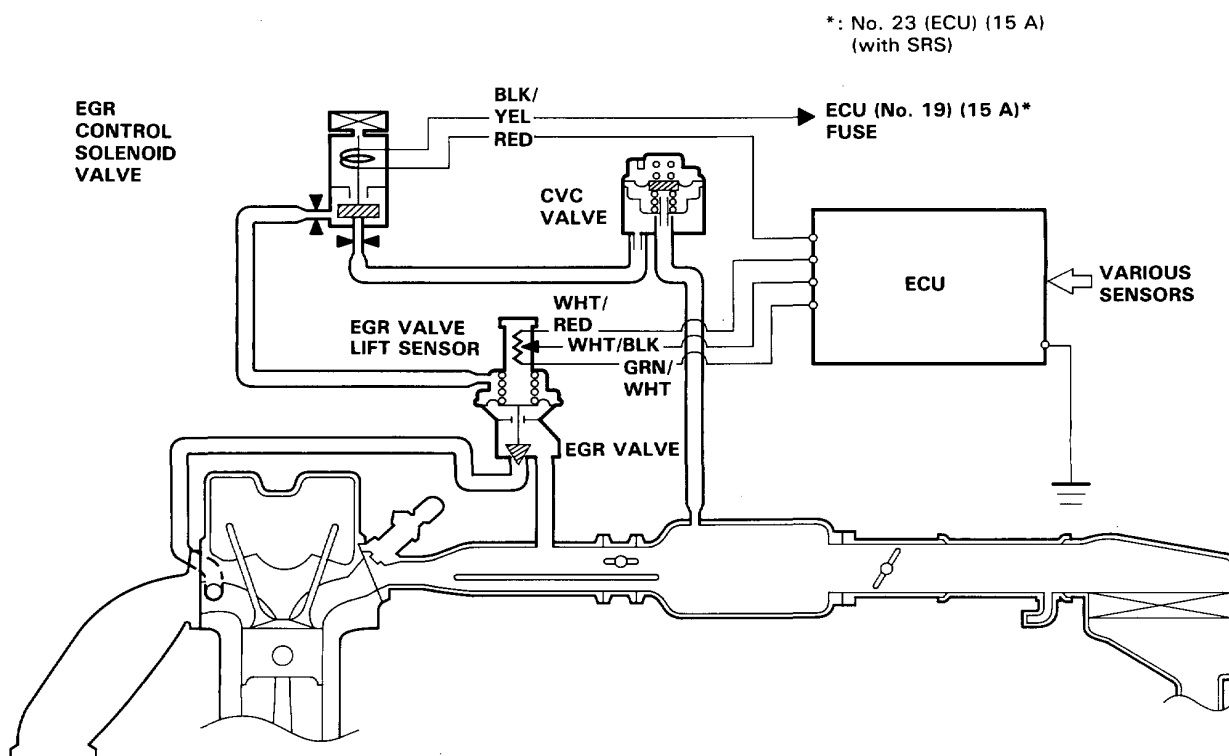


12

Self diagnosis Check Engine light indicates code 12: A problem in the Exhaust Gas Recirculation (EGR) system.

The EGR System is designed to reduce oxides of nitrogen emissions (NO_x) by recirculating exhaust gas through the EGR valve and the intake manifold into the combustion chambers. It is composed of the EGR valve, CVC valve, EGR control solenoid valve, ECU and various sensors.

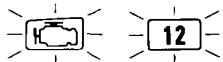
The ECU memory contains ideal EGR valve lifts for varying operating conditions. The EGR valve lift sensor detects the amount of EGR valve lift and sends the information to the ECU. The ECU then compares it with the ideal EGR valve lift which is determined by signals sent from the other sensors. If there is any difference between the two, the ECU varies current to the EGR control solenoid valve to further regulate vacuum applied to the EGR valve.



(cont'd)

Emission Control System

Exhaust Gas Recirculation System (cont'd)



- Check Engine light has been reported on.
- With service check connector jumped (page 11-22), CODE 12 is indicated.

Do the ECU Reset Procedure (page 11-23).

Road test necessary: Warm up the engine to normal operating temperature (cooling fan comes on). Drive the car on the road for approx. 10 minutes. Keep the engine speed in the 1700–2500 range.

Is Check Engine light on and does it indicate CODE 12?

YES

With the engine at idle, disconnect the # 16 hose from the EGR valve and connect a vacuum pump/gauge to the hose.

Is there any vacuum?

NO

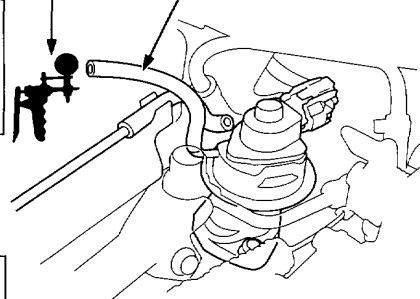
Move the vacuum pump/gauge to the EGR valve.

Intermittent failure, system is OK at this time.
Check for poor connections or loose wires at EGR valve. EGR control solenoid valve and ECU.

Disconnect 2P connector from the EGR control solenoid valve and check the # 16 hose for vacuum again.

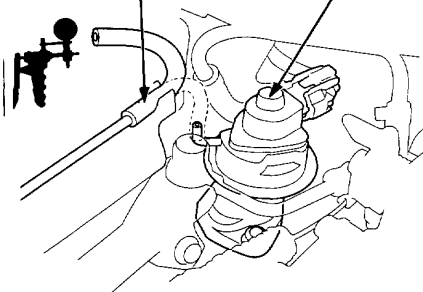
VACUUM PUMP/
GAUGE

16 HOSE



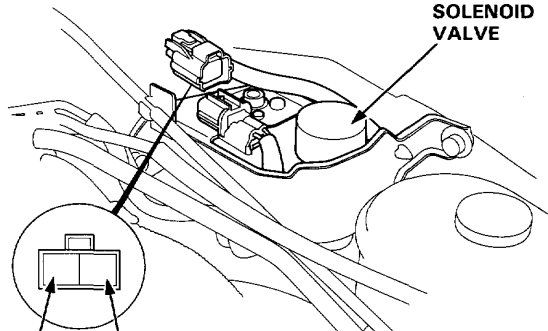
16 HOSE

EGR VALVE



(To page 11-137)

EGR
CONTROL
SOLENOID
VALVE



RED
(RHD)

RED
(LHD)

(To page 11-137)



(From page 11-136)

With the engine at idle, apply 200 mm Hg of vacuum to the EGR valve.

Does the engine stall and or run rough does the EGR valve hold vacuum

NO

Replace EGR valve.

YES

Disconnect the 2P connector from the EGR control solenoid valve.

Measure voltage between BLK/YEL (+) terminal on the main wire harness and body ground.

Is there battery voltage ?

NO

Repair open in BLK/YEL wire between the solenoid valve and ECU (No. 19) (15 A) fuse.

YES

Reconnect the vacuum pump/gauge to the #16 hose.

Start the engine and allow it to idle.

(To page 11-138)

(From page 11-136)

Is there any vacuum ?

YES

Check vacuum hose routing of the entire EGR system. If hose routing is OK, replace EGR control solenoid valve.

NO

Turn the ignition switch OFF and disconnect the "A" connector from the ECU.

Check for continuity to ground on RED wire of 2P connector.

Does continuity exist?

YES

Repair short in RED wire between EGR control solenoid valve and ECU (A11).

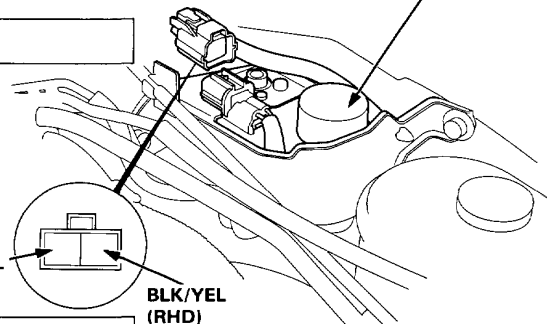
NO

Substitute a known-good ECU and retest. If symptom/indication goes away, replace the original ECU.

EGR CONTROL SOLENOID VALVE

BLK/YEL (LHD)

BLK/YEL (RHD)



(cont'd)

Emission Control System

Exhaust Gas Recirculation System (cont'd)

(From page 11-137)

Connect the battery positive terminal to the A terminal of the 2P connector. While watching the vacuum gauge, connect the battery negative terminal to the B terminal.

Is there approx. 200 mm Hg within 1 second?

YES

Turn the ignition switch OFF and reconnect the 2P connector.

NO

Turn the ignition switch OFF and inspect the #16 and #24 hoses for leaks, restrictions, or mis-routing.

Are the hoses OK?

NO

Correct as necessary.

YES

EGR VALVE
LIFT
SENSOR

RED/
WHT
GRN/
WHT
WHT/BLK

CVC VALVE

EGR CONTROL
SOLENOID VALVE

VACUUM PUMP/
GAUGE

Disconnect the lower hose on EGR control solenoid valve and connect a vacuum gauge to the hose.

Start the engine and allow it to idle.

Is there 150–250 mm Hg of vacuum?

NO

Replace CVC valve.

YES

Replace the EGR control solenoid valve.

Disconnect 3P connector from the EGR valve.

Turn the ignition switch ON.

Measure voltage between RED/WHT (+) terminal and GRN/WHT (–) terminal.

Is there approx. 5 V?

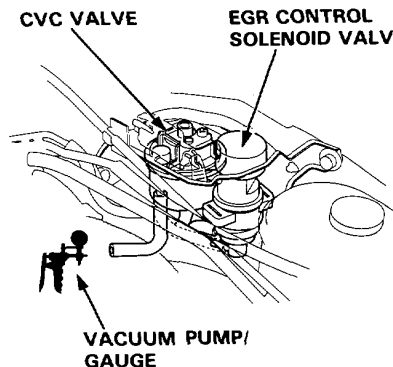
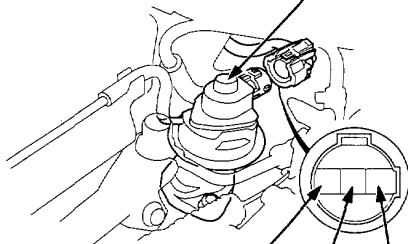
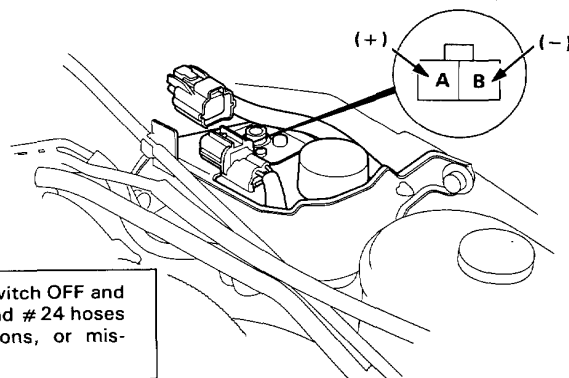
YES

(To page 11-139)

NO

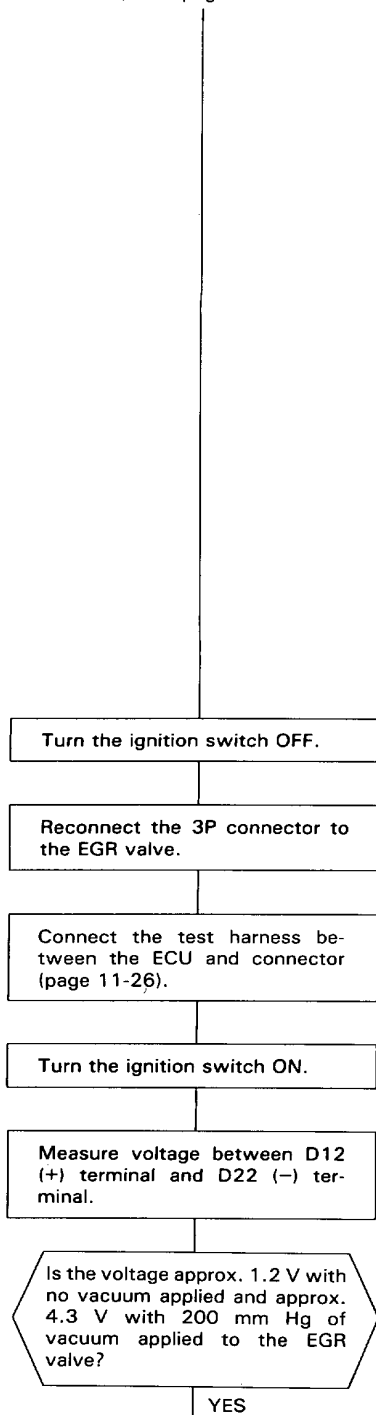
Measure voltage between RED/WHT (+) terminal and body ground.

(To page 11-139)



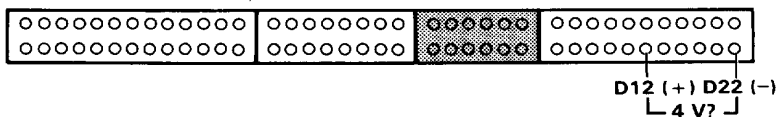
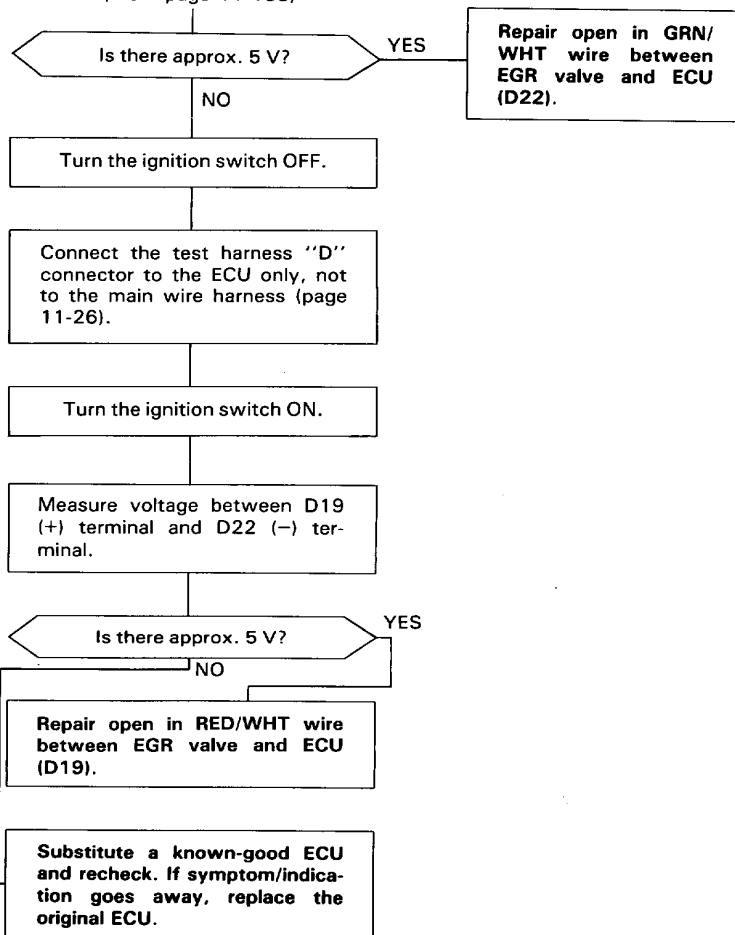


(From page 11-138)



(To page 11-140)

(From page 11-138)



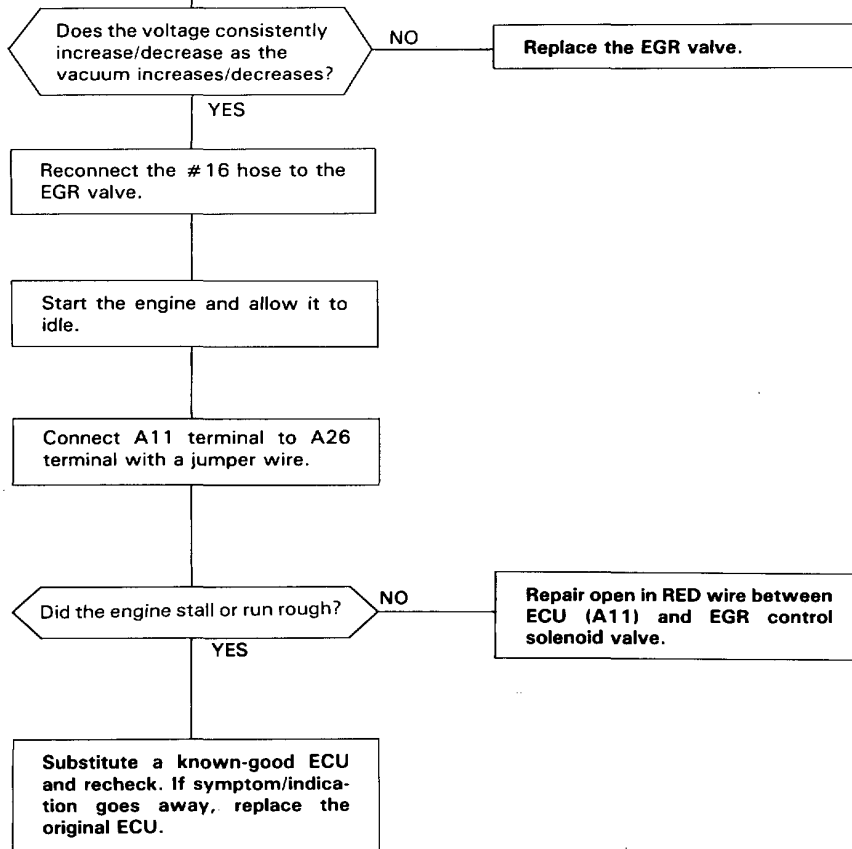
- Repair open or short in WHT/BLK wire between EGR valve and ECU (D12).
- If wire is OK, replace the EGR valve.

(cont'd)

Emission Control System

Exhaust Gas Recirculation System (cont'd)

(From page 11-139)

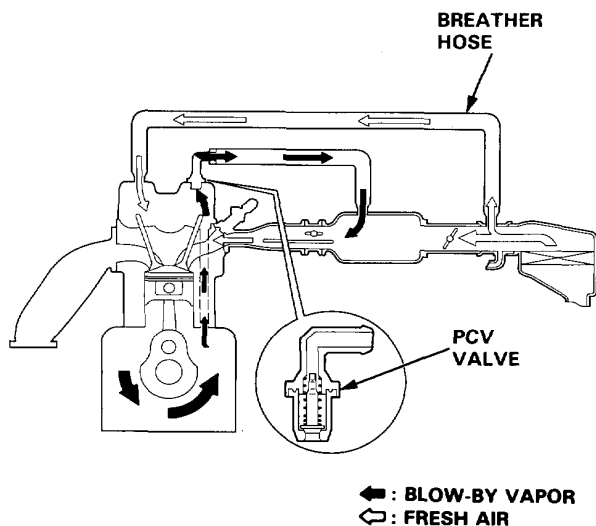




Positive Crankcase Ventilation System

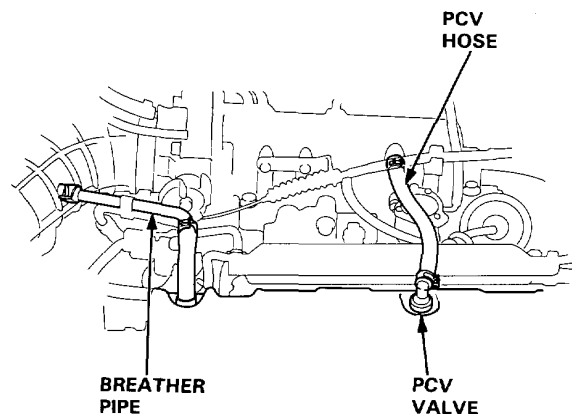
Description

The Positive Crankcase Ventilation (PCV) system is designed to prevent blow-by gas from escaping to the atmosphere. The PCV valve contains a spring-loaded plunger. When the engine starts, the plunger in the PCV valve is lifted in proportion to intake manifold vacuum and the blow-by gas is drawn directly into the intake manifold.

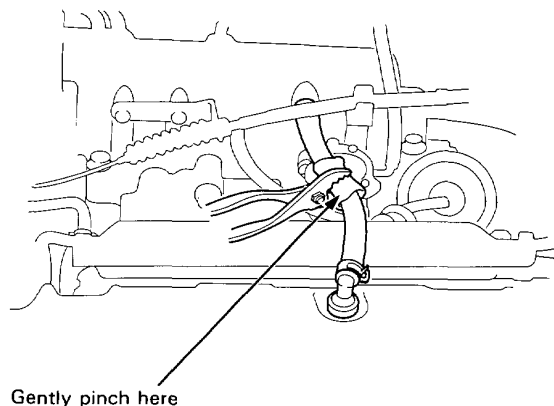


Inspection

1. Check the crankcase ventilation hoses and connections for leaks and clogging.



2. At idle, make sure there is a clicking sound from the PCV valve when the hose between PCV valve and intake manifold is lightly pinched with your fingers or pliers.



- If there is no clicking sound, check the PCV valve grommet for cracks or damage. If the grommet is OK, replace the PCV valve and recheck.

Emission Control System

Evaporative Emission Controls

Description

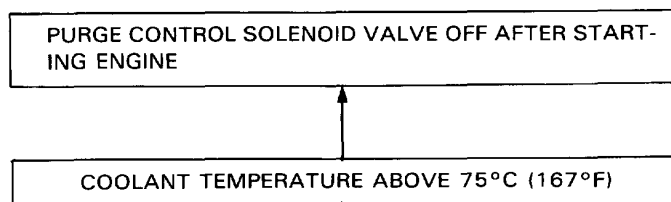
The evaporative controls are designed to minimize the amount of fuel vapor escaping to the atmosphere. The system consists of the following components:

A. Charcoal Canister

A canister is used for the temporary storage of fuel vapor until the fuel vapor can be purged from the canister into the engine and burned.

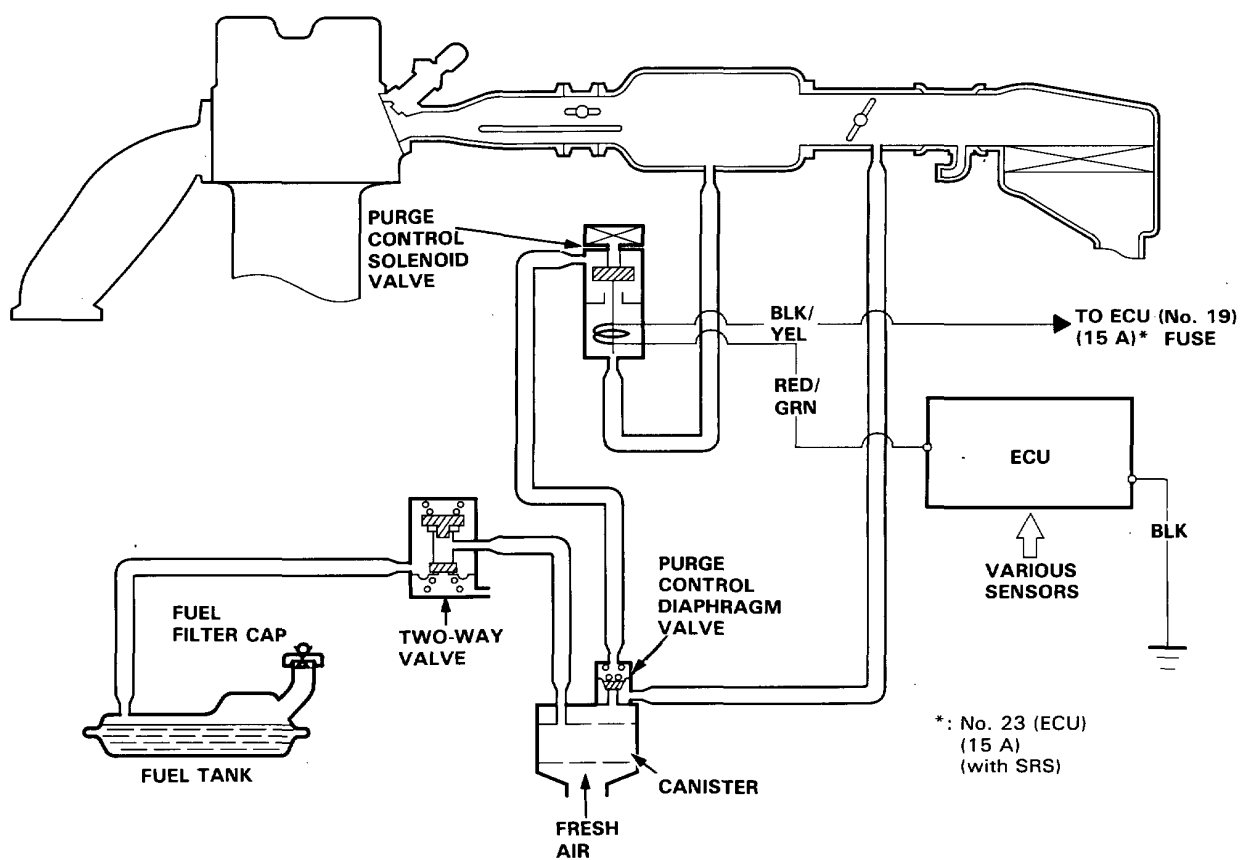
B. Vapor Purge Control System

Canister purging is accomplished by drawing fresh air through the canister and into a port on the throttle body. The purging vacuum is controlled by the purge control diaphragm valve and the purge control solenoid valve.



C. Fuel Tank Vapor Control System

When fuel vapor pressure in the fuel tank is higher than the set value of the two-way valve, the valve opens and regulates the flow of fuel vapor to the canister.



(cont'd)

Emission Control System

Evaporative Emission Controls (cont'd)

Troubleshooting Flowchart

Inspection of Evaporative Emission Controls

Disconnect #3 vacuum hose from the purge control diaphragm valve (on the charcoal canister) and connect a vacuum gauge to the hose.

Start the engine and allow it to idle.
NOTE: Engine coolant temperature must be below 75°C (167°F).

PURGE CONTROL
DIAPHRAGM VALVE

#3 VACUUM HOSE

VACUUM PUMP/GAUGE

CANISTER

Is there vacuum ?

YES

NO

Disconnect the 2P connector.

PURGE CONTROL
SOLENOID VALVE

RED/
GRN (-)

BLK/
YEL (+)

Measure voltage between BLK/
YEL (+) terminal and RED/GRN
(-) terminal.

Is there battery voltage ?

YES

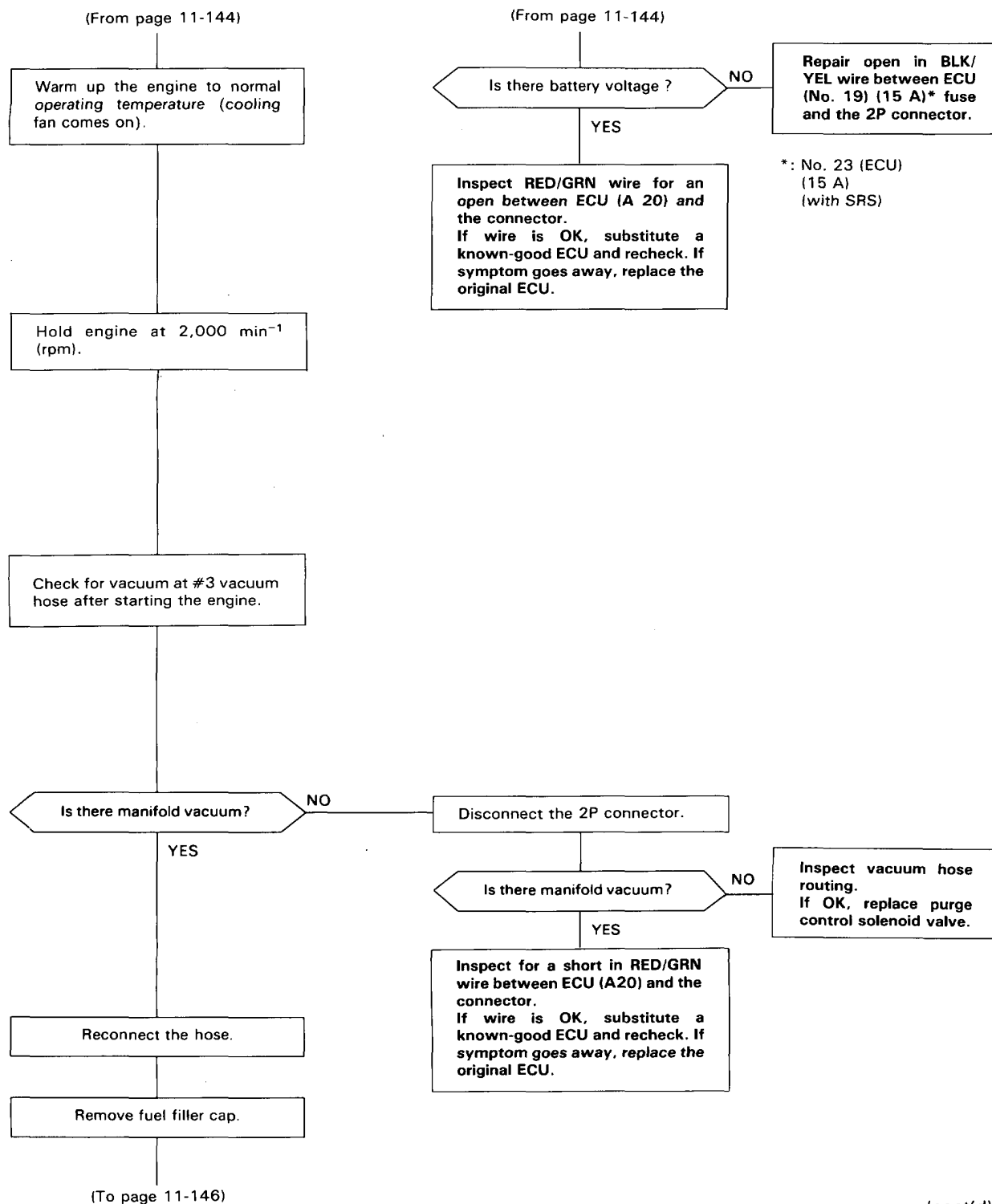
NO

Measure voltage between BLK/
YEL (+) terminal and body
ground.

Inspect vacuum hose
routing.
If OK, replace purge
control solenoid valve.

(To page 11-145)

(To page 11-145)



(cont'd)

Emission Control System

Evaporative Emission Controls (cont'd)

(From page 11-145)

Connect a vacuum gauge to canister purge air hose.

Start the engine and raise speed to 3,500 min^{-1} (rpm).

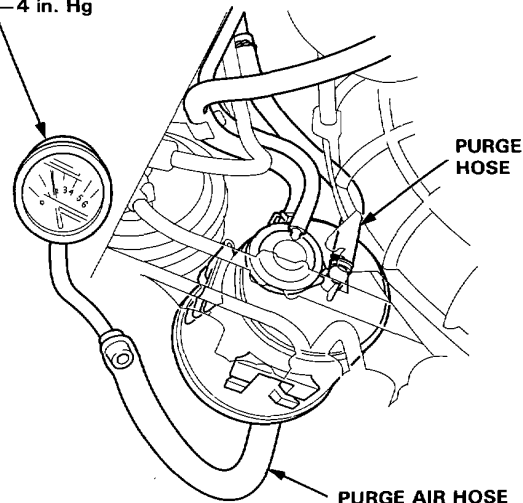
Does vacuum appear on gauge within 1 minute?

YES

See two-way valve test to complete. Evaporative emission controls are OK.

NO

VACUUM PRESSURE
GAUGE 0—4 in. Hg



Connect a vacuum gauge to the canister purge hose and raise the engine speed to 3,500 min^{-1} (rpm).

Does vacuum appear on the gauge?

YES

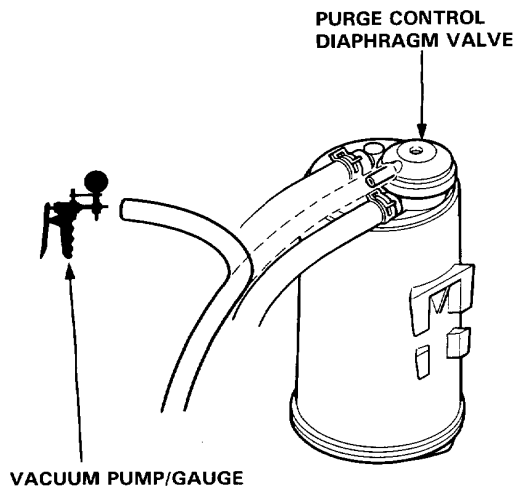
Replace the canister.

NO
Inspect the purge hose and throttle body port for pinch or blockage.



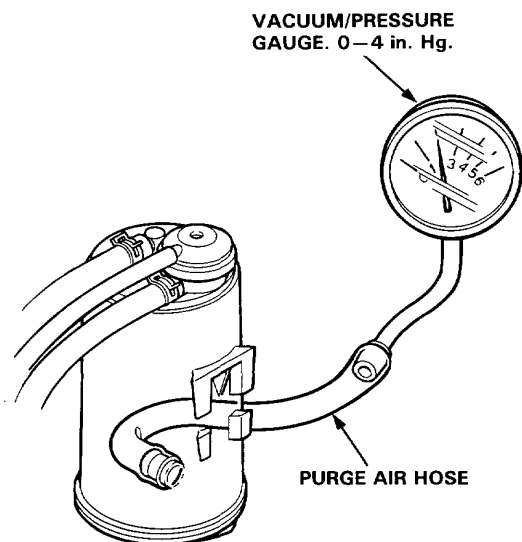
Evaporative Emission Controls [KY only]

1. Remove the fuel filler cap.
2. Start the engine and allow to idle.
3. Disconnect vacuum hose at the purge control diaphragm valve (on the charcoal canister) and connect a vacuum gauge to the hose.



- If there is no vacuum, check vacuum hose for blockage, cracks or disconnected hose, as well as vacuum port for blockage.

4. Disconnect the vacuum gauge and reconnect the hose.
5. Connect a vacuum gauge to canister purge air hose.



6. Raise engine speed to 3,500 min^{-1} (rpm). Vacuum should appear on gauge within 1 minute.

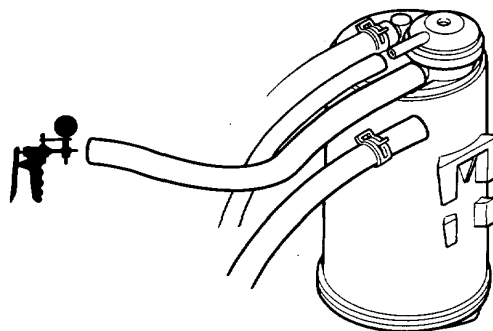
- If vacuum appears on gauge in 1 minute, remove gauge, test is complete.
- If no vacuum, disconnect vacuum gauge and reinstall fuel filler cap.

7. Remove charcoal canister and check for signs of damage or defects.

- If defective, replace canister.

8. Stop engine. Disconnect upper vacuum hose from canister "PCV" fitting. Connect a vacuum pump to canister "purge" fitting as shown, and apply vacuum.

Vacuum should remain steady.



- If vacuum drops, replace canister and retest.

9. Restart engine. Reconnect hose to canister "PCV" fitting.

"PURGE" side vacuum should drop to zero.

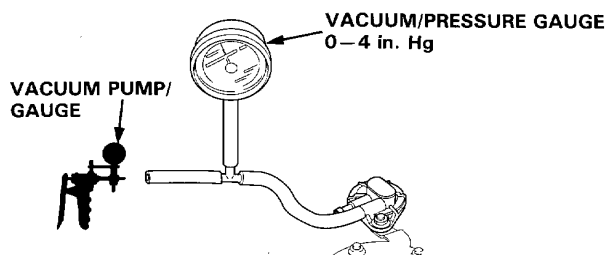
- If "PURGE" side vacuum does not drop to zero, replace the canister and retest.

Emission Control System

Evaporative Emission Controls

Two-Way Valve Test

1. Remove the fuel filler cap.
2. Remove vapor line from the fuel tank and connect to T-fitting from vacuum gauge and vacuum pump as shown.

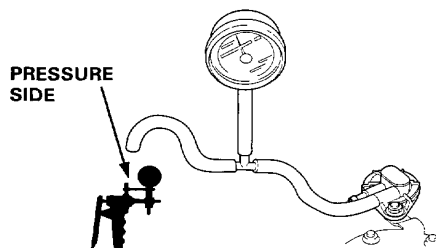


3. Apply vacuum slowly and continuously while watching the gauge.

Vacuum should stabilize momentarily at 5 to 15 mmHg (0.2 to 0.6 in. Hg).

- If vacuum stabilizes (valve opens) below 5 mmHg (0.2 in. Hg) or above 15 mmHg (0.6 in. Hg), install new valve and retest.

4. Move vacuum pump hose from vacuum to pressure fitting, and move vacuum gauge hose from vacuum to pressure side as shown.



5. Slowly pressurize the vapor line while watching the gauge.

Pressure should stabilize at 10 to 35 mmHg (0.4 to 1.4 in. Hg).

- If pressure momentarily stabilize (valve opens) at 10 to 35 mmHg (0.4 to 1.4 in. Hg), the valve is OK.
- If pressure stabilizes below 10 mmHg (0.4 in. Hg) or above 35 mmHg (1.4 in. Hg), install a new valve and retest.

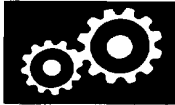
Transaxle

Clutch	12-1
Manual Transmission	13-1
Automatic Transmission	14-1
Differential	
Manual Transmission	15-1
Automatic Transmission	15-13
Driveshafts	16-1



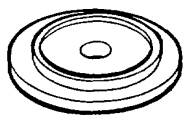
Clutch

Special Tools	12-2
Illustrated Index	12-3
Pedal Free Play	12-4
Clutch Master Cylinder	
Overhaul/Inspection	12-5
Removal/Installation	12-6
Disassembly	12-7
Reassembly	12-7
Slave Cylinder	
Overhaul/Inspection	12-8
Removal	12-9
Installation	12-9
Pressure Plate	
Removal/Inspection	12-10
Clutch Disc	
Inspection	12-11
Flywheel	
Inspection/Removal	12-12
Flywheel and Clutch Disc	
Installation	12-12
Release Bearing	
Disassembly/Inspection	12-13
Inspection	12-14



Special Tools

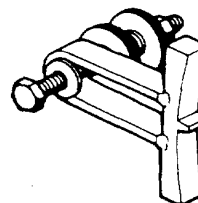
Ref. No.	Tool Number	Description	Qty	Page Reference
①	07JAF—PM7011A	Clutch Alignment Disk	1	12-10
②	07JAF—PM7012A	Clutch Alignment Shaft	1	12-10, 12
③	07LAB—PV00100 or 07924—PD20003	Ring Gear Holder	1	12-10, 11, 12
④	07936—3710100	Handle	1	12-10, 12



①



②



③

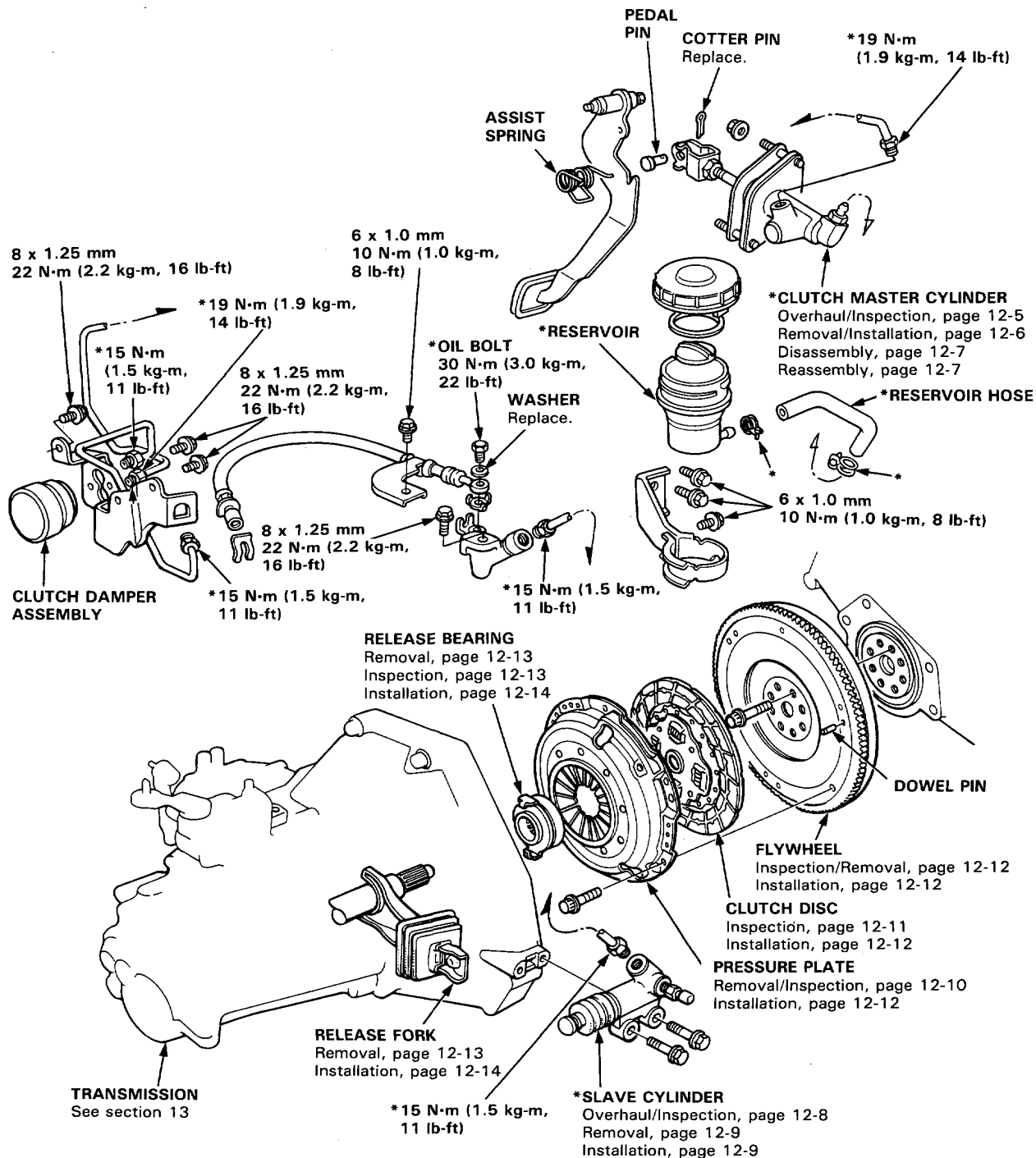


④



NOTE:

- Whenever the transmission is removed, clean and grease the release bearing sliding surface.
- If the parts marked "*" are removed, the clutch hydraulic system must be bled.



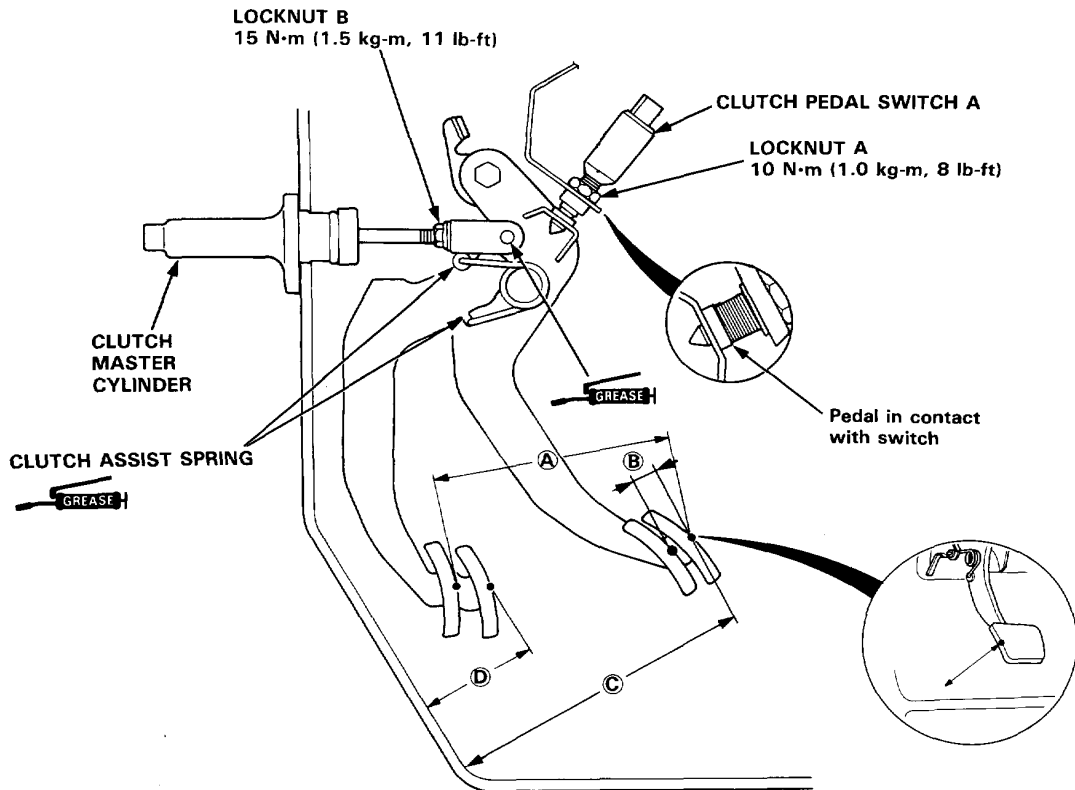
Pedal Free Play

NOTE:

- The clutch is self-adjusting to compensate for wear.
- Total clutch pedal free play is 9–15 mm (0.35–0.59 in).

CAUTION: If there is no clearance between the master cylinder piston and push rod, the release bearing is held against the diaphragm spring, which can result in clutch slippage or other clutch problems.

1. Loosen locknut A, and back off the pedal switch until it no longer touches the clutch pedal.
2. Loosen locknut B, and turn the push rod in or out to get the specified stroke and height at the clutch pedal.
3. Tighten locknut B.
4. Thread the clutch pedal switch A in until it contacts the clutch pedal.
5. Turn the switch in 1/4–1/2 turn further.
6. Tighten locknut A.



Ⓐ (STROKE AT PEDAL): 135–145 mm (5.31–5.71 in)

Ⓑ (PEDAL PLAY): 1.0–7.0 mm (0.04–0.28 in)

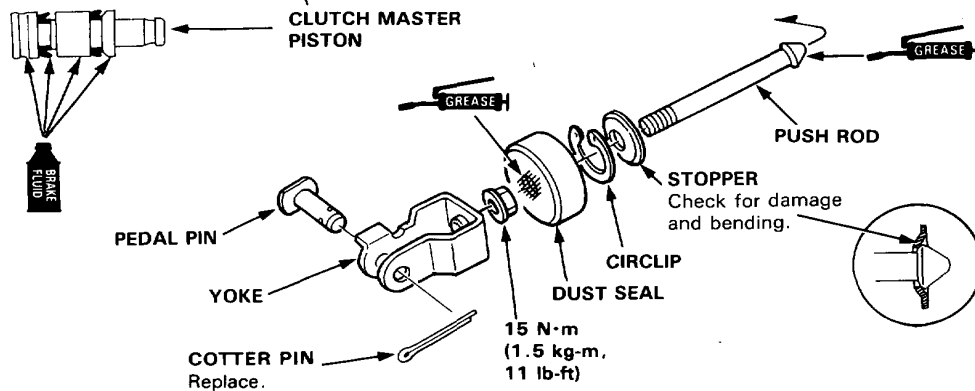
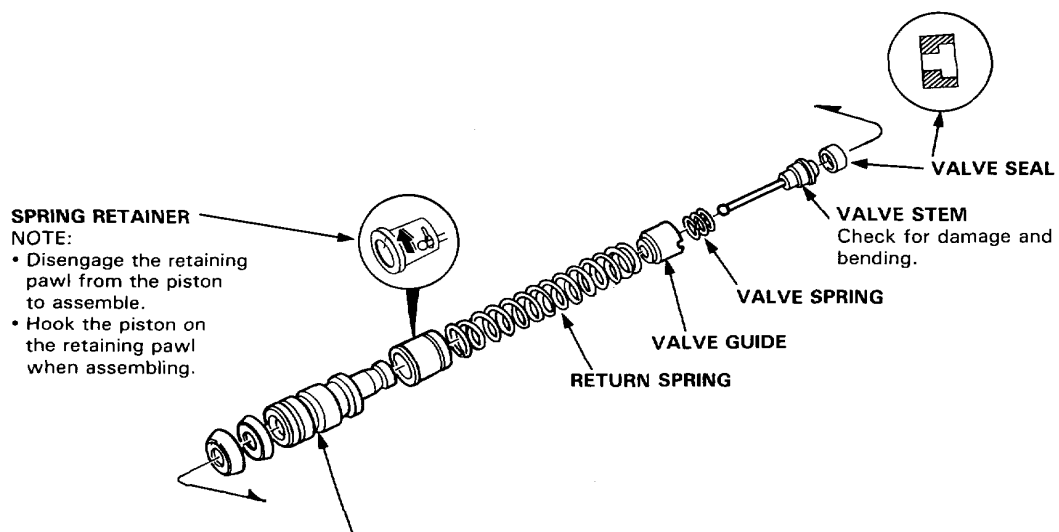
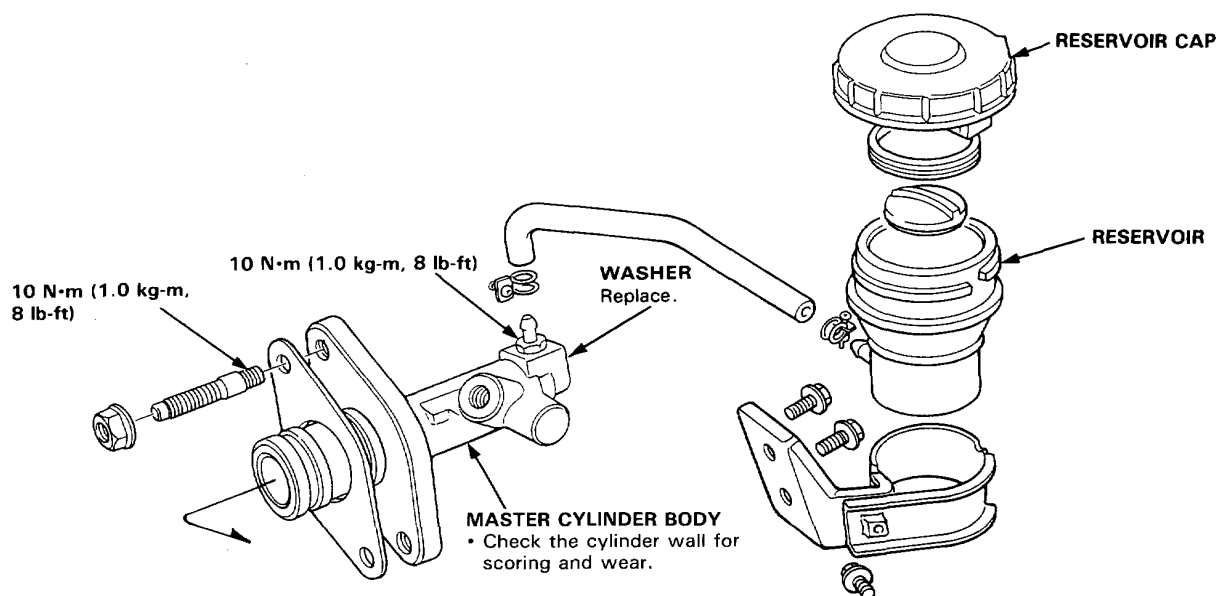
Ⓒ (CLUTCH PEDAL HEIGHT): LHD: 190 mm (7.48 in)
RHD: 206 mm (8.11 in)

Ⓓ (CLUTCH PEDAL DISENGAGEMENT HEIGHT): LHD: 93 mm (3.66 in) minimum to the floor.
RHD: 109 mm (4.29 in) minimum to the floor.



Clutch Master Cylinder

Overhaul/Inspection



Clutch Master Cylinder

Removal/Installation

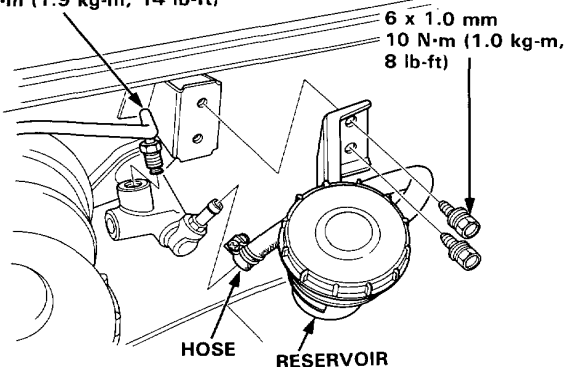
CAUTION:

- Avoid spilling brake fluid on painted surfaces, as it may damage the finish.
- Plug the end of the clutch pipe and reservoir hose with a shop towel to prevent fluid from flowing out of the clutch pipe and reservoir hose after disconnecting.

1. The brake fluid may be sucked out through the top of the reservoir (see Section 19).
2. Disconnect the clutch pipe and clutch hose, then remove the reservoir.

CLUTCH PIPE

19 N·m (1.9 kg-m, 14 lb-ft)



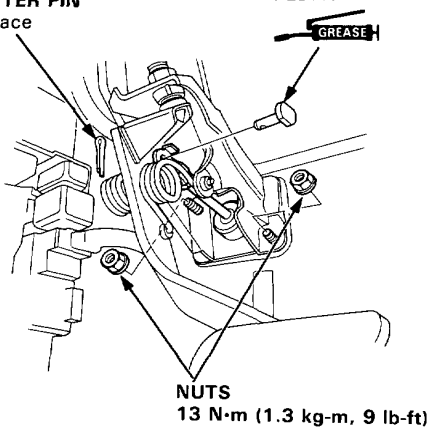
3. Pry out the cotter pin, and pull the pedal pin out of the yoke. Remove the nuts.

COTTER PIN

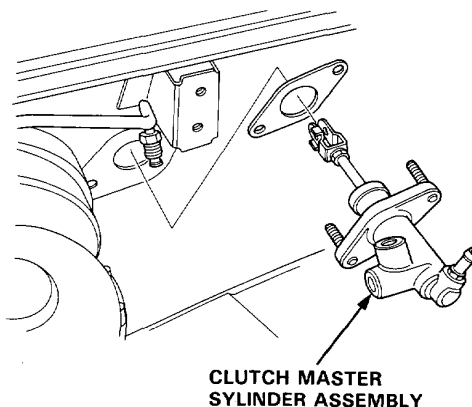
Replace

PEDAL PIN

GREASE



4. Remove the clutch master cylinder assembly.



5. Install the clutch master cylinder in the reverse order of removal.

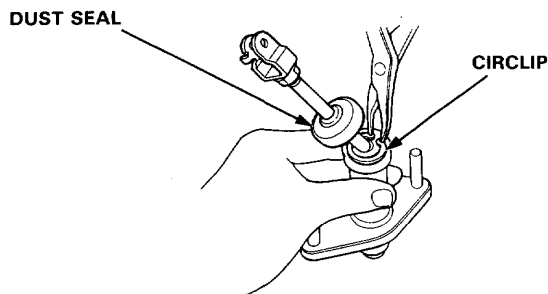
NOTE: Bleed the clutch hydraulic system (see page 12-9).



Disassembly

CAUTION: Avoid spilling brake fluid on paint as it may damage the finish.

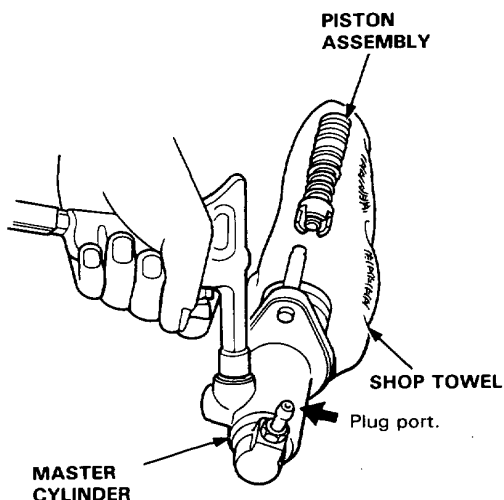
1. Remove the dust seal from the master cylinder.



2. Pry the circlip off the master cylinder.
3. Carefully remove the piston by applying air pressure through the clutch line hole.

CAUTION:

- Hold a shop towel over the master cylinder, to stop the piston in case it comes out suddenly.
- Plug the end of the clutch hose port with a shop towel to prevent fluid from coming out.
- Clean all disassembled parts in solvent and blow through all ports and passages with compressed air.

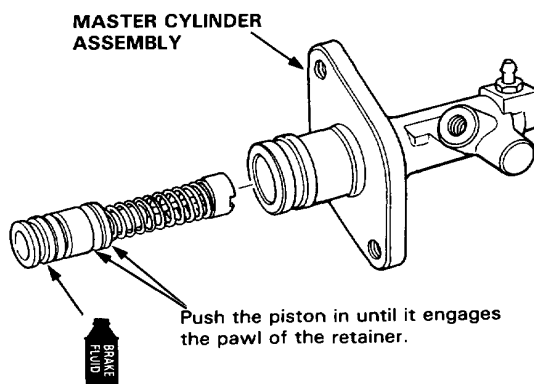


Reassembly

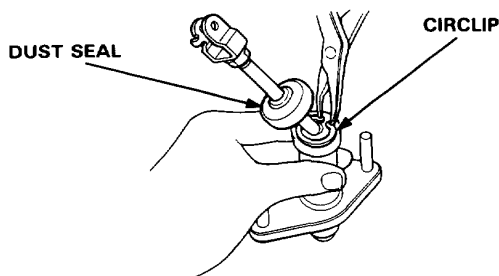
CAUTION:

- Before assembling, make sure all parts are completely clean.
- Replace parts with new ones whenever specified to do so.
- Do not allow dust or water to enter the system.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the brake fluid which was drained out.
- Avoid spilling the brake fluid on painted surfaces, as it may damage the finish.

1. Assemble the piston noting the proper direction of the parts (page 12-5).



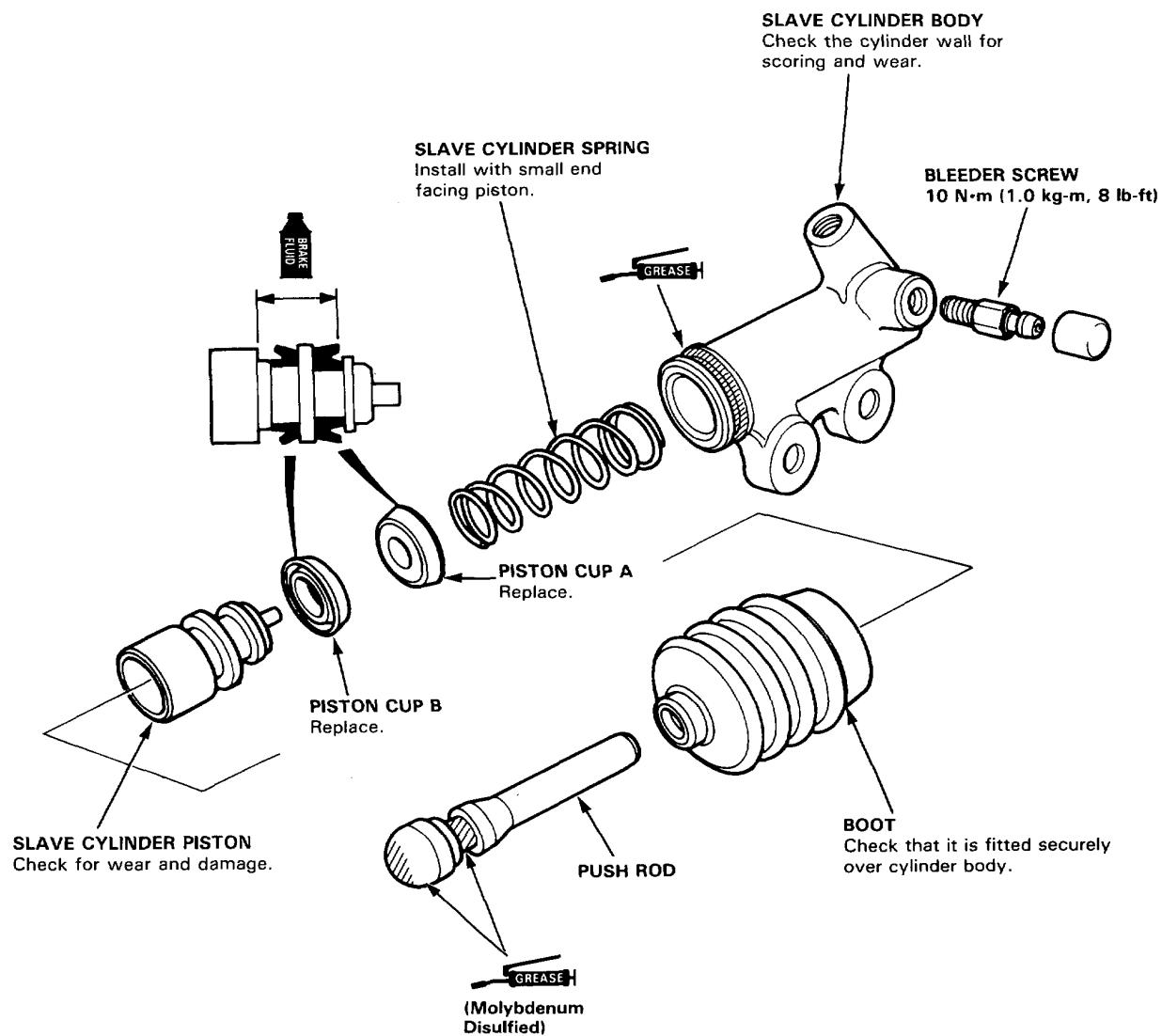
2. Slide the piston assembly into the master cylinder.
3. Install the circlip in the groove of the master cylinder.



4. Install the dust seal.

Slave Cylinder

Overhaul/Inspection





Slave Cylinder

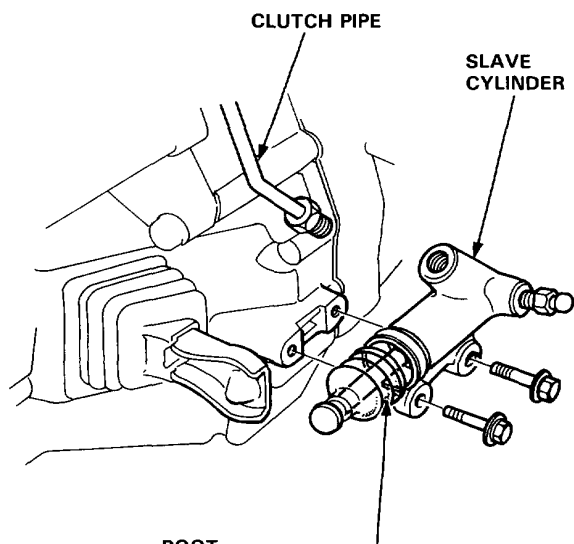
Removal

1. Disconnect the clutch pipe from the slave cylinder.

CAUTION:

- Avoid spilling brake fluid on the painted surfaces, as it may damage the finish.
- Plug the end of the clutch pipe with a shop towel to prevent brake fluid from coming out.

2. Remove the slave cylinder from the clutch housing.

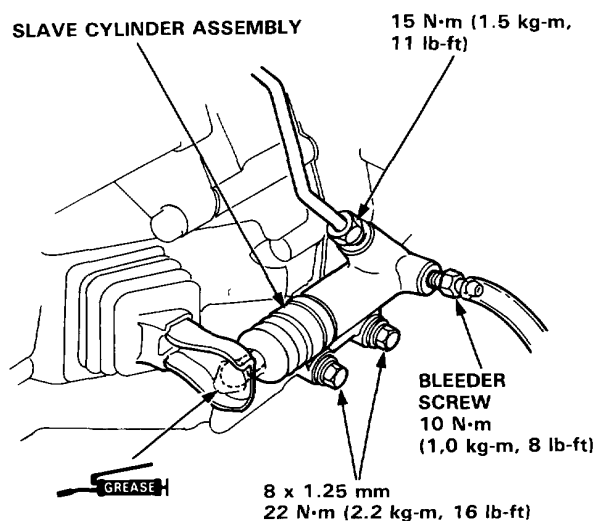


BOOT

Remove and check for signs of leaking or deterioration.

Installation

1. Install the slave cylinder assembly on the clutch housing.



2. Bleed the clutch hydraulic system:

- Attach a hose to the bleeder screw and suspend the hose in a container of brake fluid.
- Make sure there is an adequate supply of fluid at the master cylinder, then slowly pump the clutch pedal until no more bubbles appear at the bleeder hose.
- Refill the master cylinder fluid when done.
- Use only DOT 3 or 4 brake fluid.

Pressure Plate

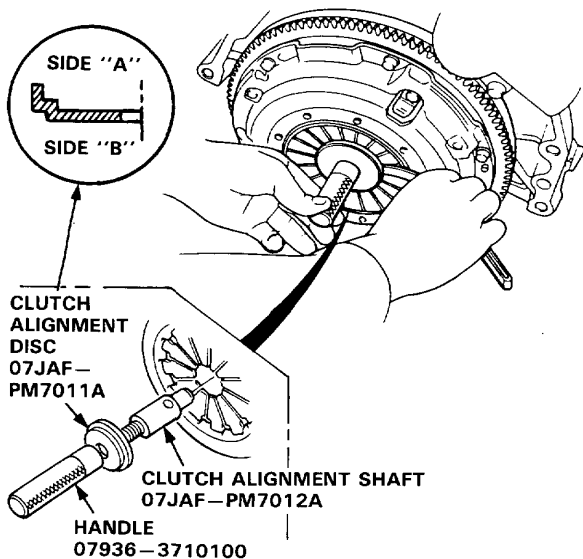
Removal/Inspection

1. Inspect the fingers of the diaphragm spring for wear at the release bearing contact area.
2. Assemble the special tools as shown.

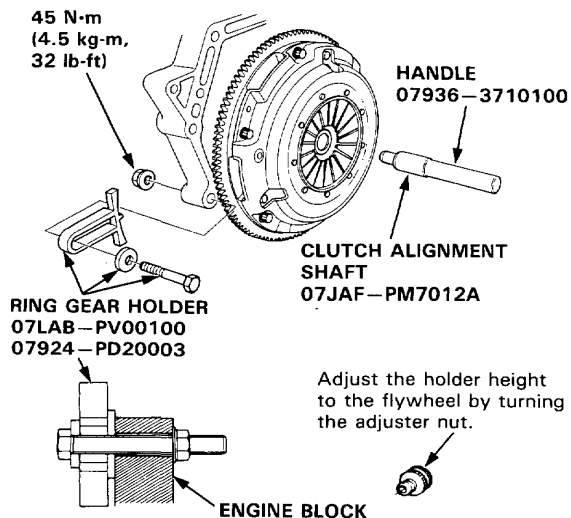
NOTE: Assemble the Clutch Alignment Disc with side "A" facing the diaphragm as shown.

3. Check the diaphragm spring fingers for height using the special tools and a feeler gauge.

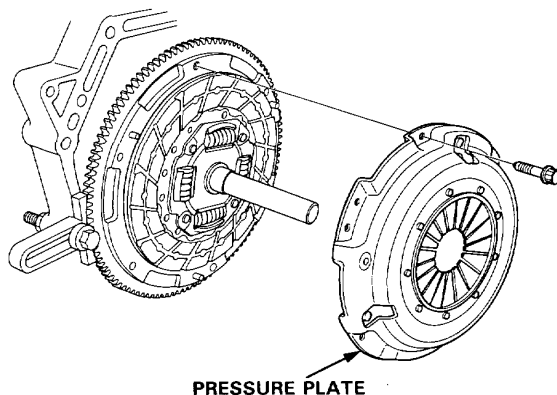
Standard (New): 0.6 mm (0.024 in) Min.
Service Limit: 0.8 mm (0.031 in) Max.



4. Install the Ring Gear Holder and Clutch Alignment Shaft.



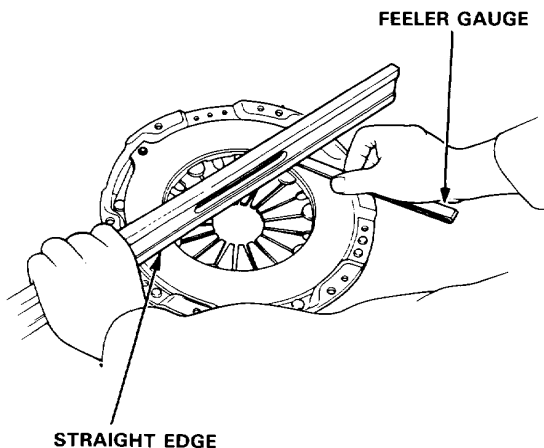
5. To prevent warping, unscrew the pressure plate mounting bolts two turns at a time in a crisscross pattern, then remove the pressure plate.



6. Inspect the pressure plate surface for wear, cracks, and burning.
7. Inspect for warpage using a straight edge and a feeler gauge.

Standard (New): 0.03 mm (0.001 in) Min.
Service Limit: 0.15 mm (0.006 in) Max.

Measure across pressure plate.

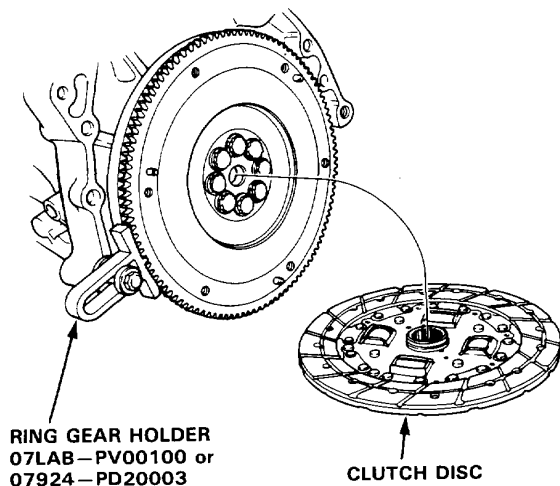




Clutch Disc

Inspection

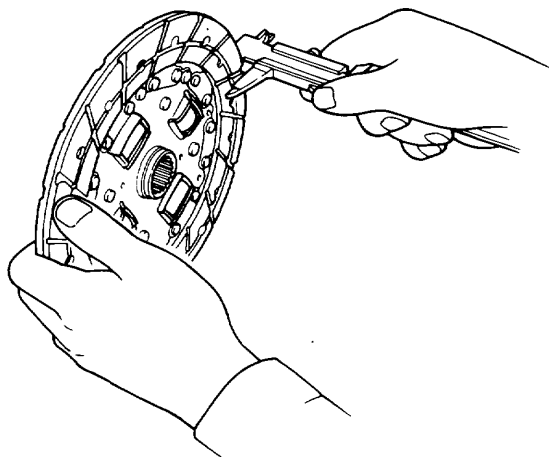
1. Remove the clutch disc.
2. Inspect the lining of the clutch disc for signs of slipping or oil. Replace it if it is burned black or oil soaked.



3. Measure the clutch disc thickness.

Clutch Disc Thickness.

Standard (New): 8.4–9.1 mm (0.331–0.358 in)
Service Limit: 6.0 mm (0.236 in)

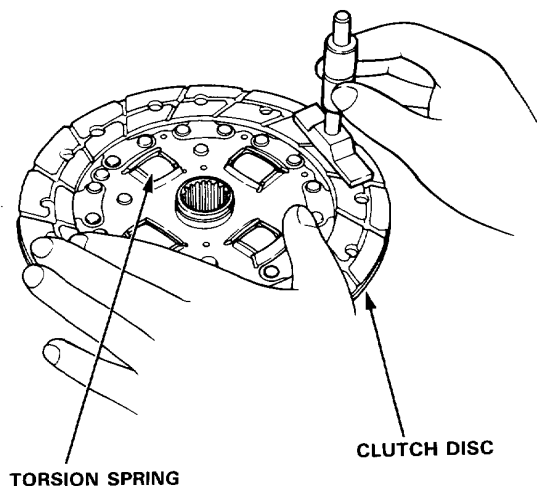


4. Check for loose rubber torsion springs. Replace the clutch disc if any are loose.
5. Measure the depth from the lining surface to the rivets, on both sides.

Rivet Depth:

Standard (New): 1.3 mm (0.051 in) min.

Service Limit: 0.2 mm (0.008 in)



Flywheel

Inspection/Removal

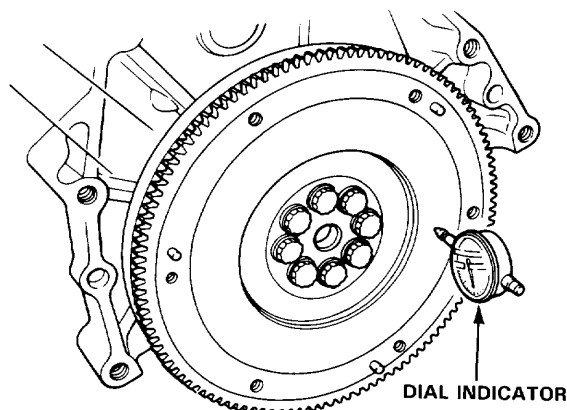
1. Inspect the ring gear teeth for wear and damage.
2. Inspect the clutch disc mating surface on the flywheel for wear, cracks or burning.
3. Measure the flywheel runout using a dial indicator through at least two full turns. Push the flywheel towards the engine to take up the crankshaft thrust washer clearance.

NOTE: The runout can be measured with engine installed.

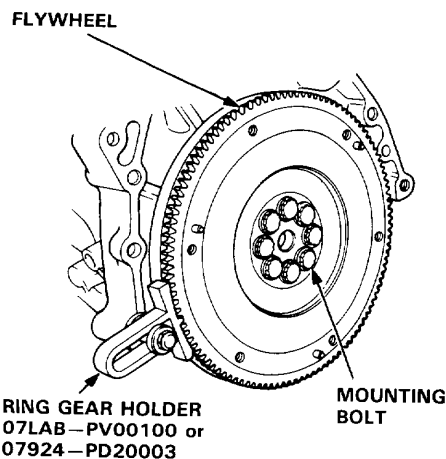
Standard (New): 0.05 mm (0.002 in) max.

Service Limit: 0.15 mm (0.006 in)

If the flywheel is not within the service limit, replace it.



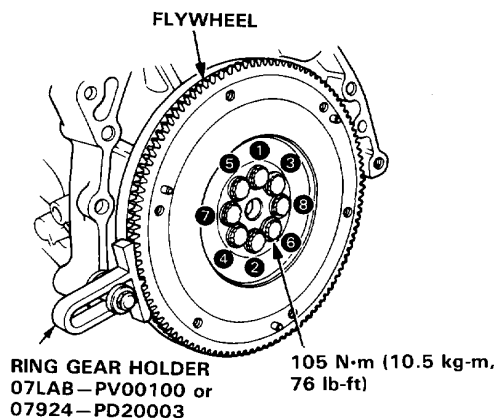
4. Remove the eight flywheel mounting bolts and flywheel.



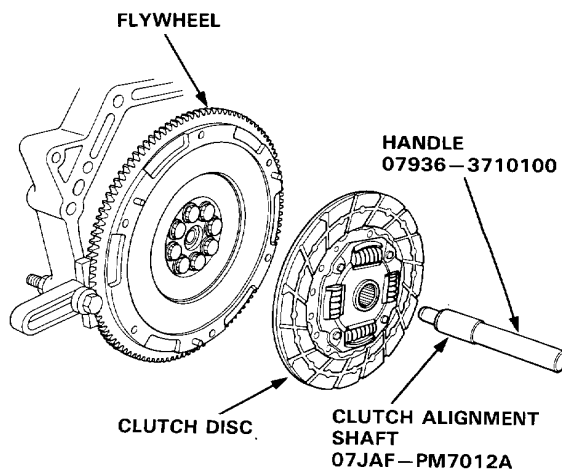
Flywheel and Clutch Disc

Installation

1. Align the hole in the flywheel with the crankshaft dowel pin and assemble. Install the bolts only finger tight.
2. Install the special tool, then torque the flywheel bolts in a crisscross pattern, as shown.



3. Install the clutch disc using the special tools.

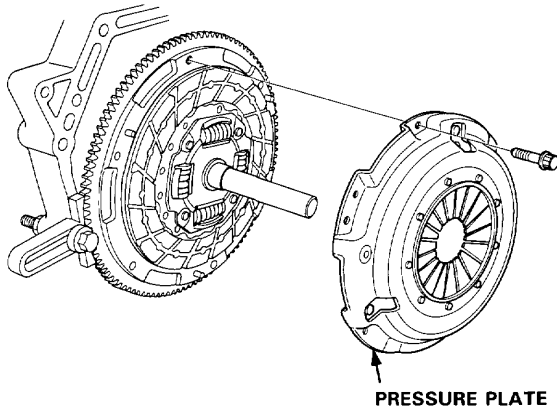




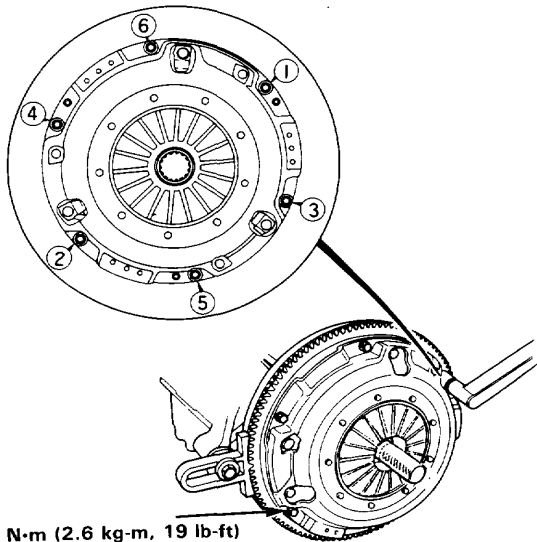
Release Bearing

Disassembly/Inspection

4. Install the pressure plate.

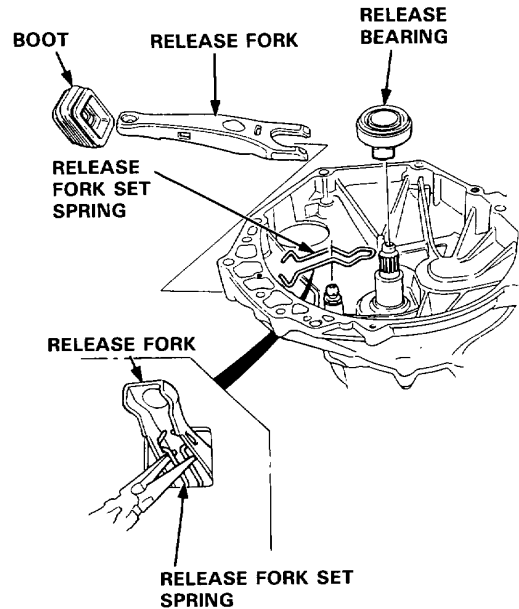


5. Torque the bolts in a crisscross pattern as shown. Tighten them two turns at a time to prevent warping the diaphragm spring.



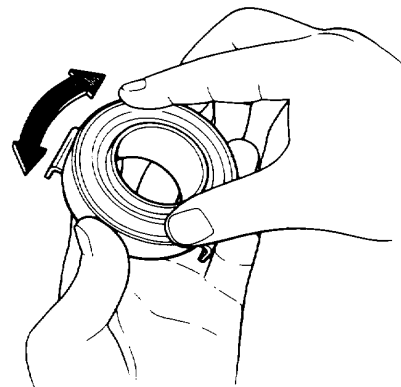
6. Remove the special tools.

1. Remove the boot from the clutch housing.
2. Remove the release fork from the clutch housing by squeezing the release fork set spring with pliers. Remove the release bearing.



3. Check the release bearing for play by spinning it by hand.

CAUTION: The bearing is packed with grease. Do not wash it in solvent.

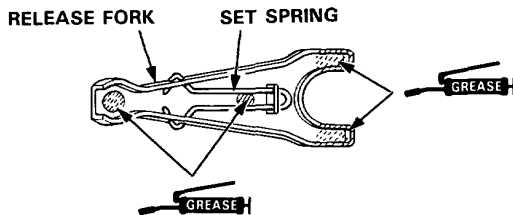


4. Replace the bearing with a new one if there is excessive play.

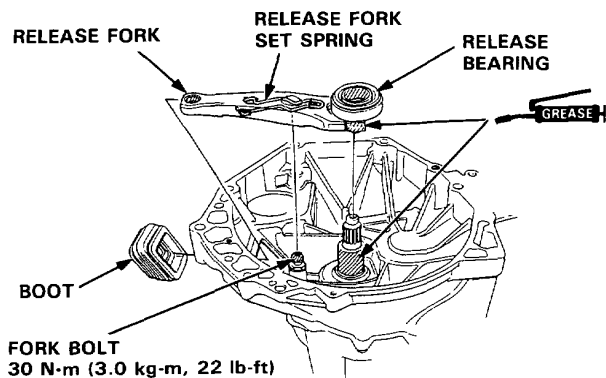
Installation

NOTE: Use only Super High Temp Urea Grease (P/N 08798-9002).

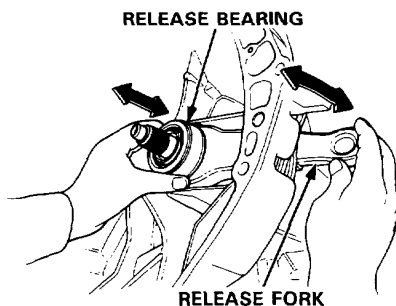
1. Install the release fork set spring on the release fork.



2. With the release fork slid between the release bearing pawls, install the bearing on the mainshaft while inserting the release fork through the hole in clutch housing.
3. Align the detent of the release fork with the release fork bolt, then press the release fork over the release fork bolt squarely.



4. Install the boot, being sure that there is no clearance: release fork-to-boot, and boot-to-clutch housing.
5. Move the release fork right and left to make sure that the fork fits properly against the bearing, and that the bearing slides smoothly.



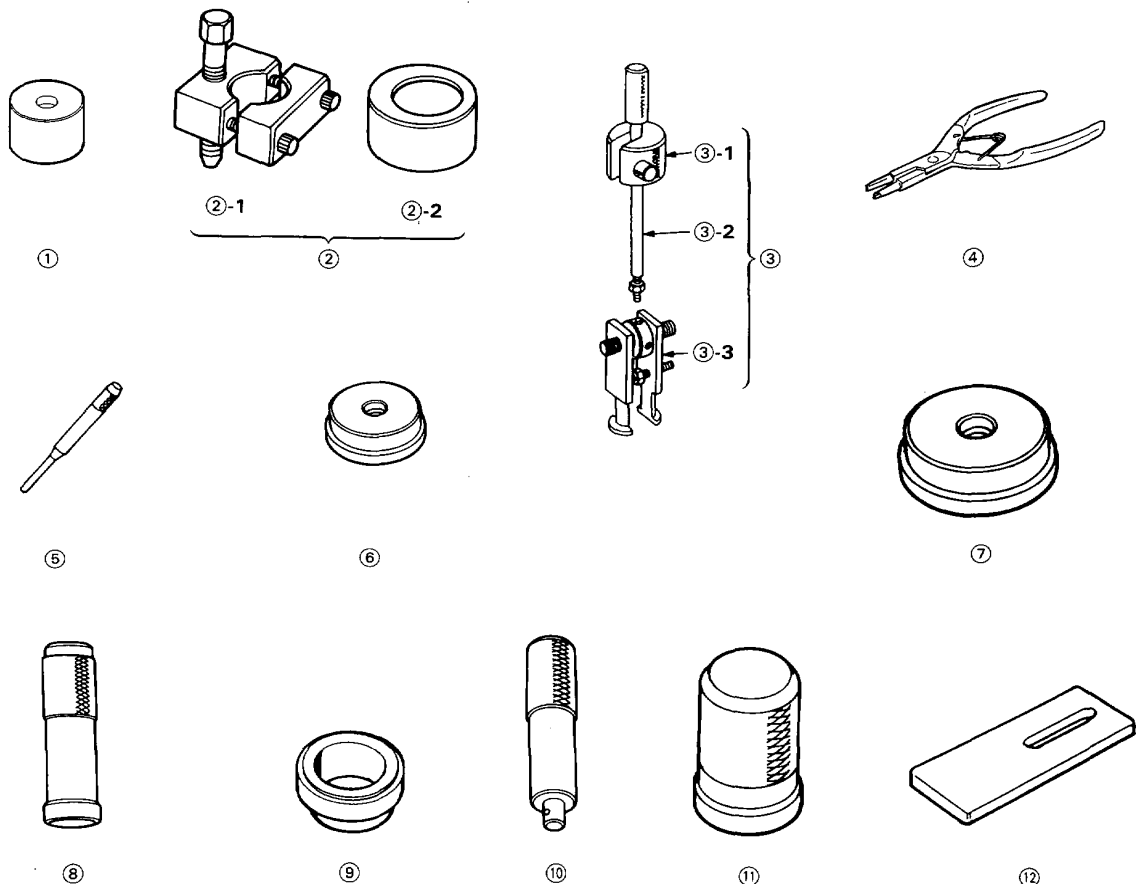
Manual Transmission

Special Tools	13-2	Countershaft	
Maintenance	13-3	Index	13-23
Back-up Light Switch	13-3	Clearance Inspection	13-24
Transmission Assembly		Disassembly	13-25
Removal	13-4	Inspection	13-26
Gerashift Mechanism		Reassembly	13-26
Overhaul	13-9	Shift Fork Assembly	
Illustrated Index	13-10	Disassembly/Reassembly	13-28
Shift Arm Assembly		Clearance Inspection	13-29
Index	13-12	Synchro Sleeve, Synchro Hub	
Disassembly/Reassembly	13-13	Inspection	13-30
Transmission Housing		Installation	13-30
Removal	13-15	Synchro Ring, Gear	
Reverse Shift Fork		Inspection	13-31
Clearance Inspection	13-16	Mainshaft Bearing/Oil Seal	
Reverse Idler Gear		Replacement	13-32
Removal	13-17	Countershaft Bearing	
Mainshaft, Countershaft		Replacement	13-33
Removal	13-17	Mainshaft Thrust Shim	
Mainshaft		Adjustment	13-34
Index	13-18	Transmission	
Clearance Inspection	13-19	Reassembly	13-37
Disassembly	13-20	Transmission Assembly	
Inspection	13-21	Installation	13-40
Reassembly	13-22		



Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAF—SD40200	Attachment	1	13-25
②	07GAJ—PG20102	Mainshaft Clearance Inspection Tools Set	1	13-36, 37
②-1	07GAJ—PG20110	Mainshaft Holder	(1)	
②-2	07GAJ—PG20130	Mainshaft Base	(1)	
③	07JAC—PH80000	Adjustable Bearing Remover Set	1	13-32, 33
③-1	07JAC—PH80100	Bearing Remover Attachment	(1)	
③-2	07JAC—PH80200	Remover Handle Assembly	(1)	
③-3	07741—0010201	Remover Weight	(1)	
④	07LGC—0010100	Snap Ring Plier	1	13-15, 29
⑤	07744—0010400	Pin Driver, 5.0 mm	1	13-28
⑥	07746—0010300	Outer Driver, 42 x 47 mm	1	13-22, 27, 32, 33
⑦	07746—0010500	Outer Driver, 62 x 68 mm	1	13-32, 33
⑧	07746—0030100	Inner Handle C	1	13-22
⑨	07746—0030400	Inner Driver, 35 mm	1	13-22
⑩	07749—0010000	Outer Handle A	1	13-22, 27, 32, 33
⑪	07947—6890100	Seal Driver	1	13-27
⑫	07979—PJ40001	Magnet Stand Base	1	13-37

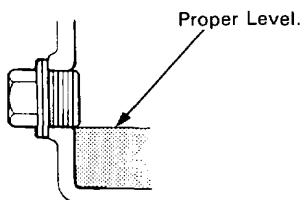


Maintenance

Transmission Oil

NOTE: Check the oil at operating temperature, engine OFF, and the car on level ground.

1. Remove the oil filler plug, then check the level and condition of the oil.



2. The oil level must be up to the fill hole. If it is below the hole, add oil until it runs out, then reinstall the oil filler plug.
3. If the oil is dirty, remove drain plug and drain transmission.
4. Reinstall the drain plug with a new washer, and refill to proper level.

NOTE: The drain plug washer should be replaced at every oil change.

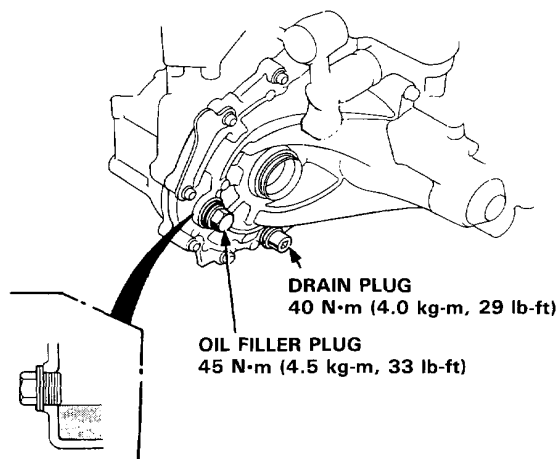
5. Reinstall the oil filler plug with a new washer.

Oil Capacity

1.9 ℓ (2.0 U.S. qt.) after drain.

2.0 ℓ (2.1 U.S. qt.) after overhaul.

Use only SAE 10 W-30 or 10 W-40, SF or SG grade.



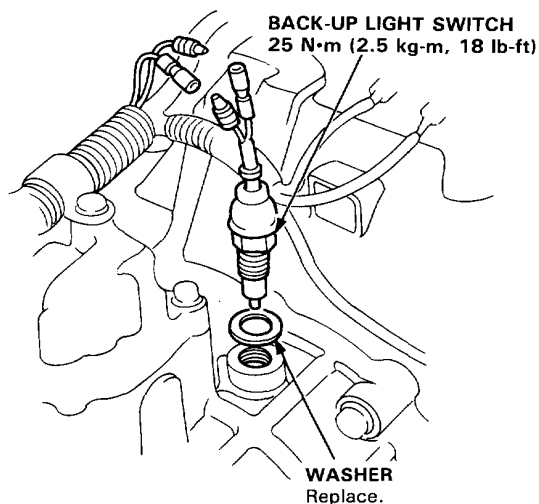
Back-up Light Switch



Replacement

NOTE: Check the switch see section 23.

1. Disconnect the back-up light switch wire connectors.
2. Remove the back-up light switch.



3. Install the new washer and back-up light switch.

Transmission Assembly

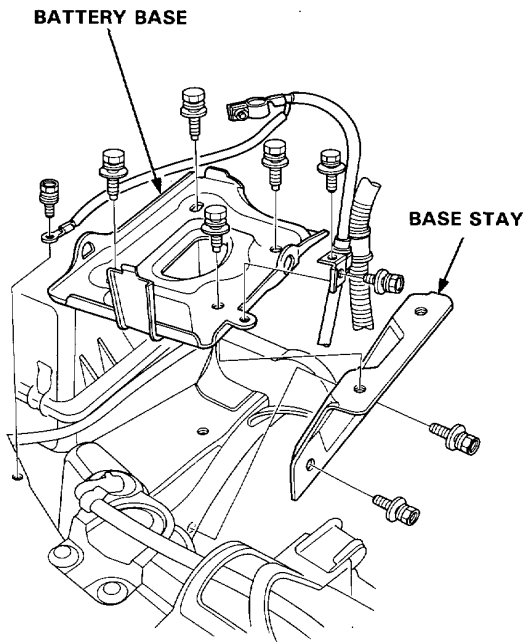
Removal

⚠ WARNING

- Make sure jack and safety stands are placed properly, and hoist brackets are attached to correct position on the engine.
- Apply parking brake and block rear wheels, so car will not roll off stands and fall on you while working under it.

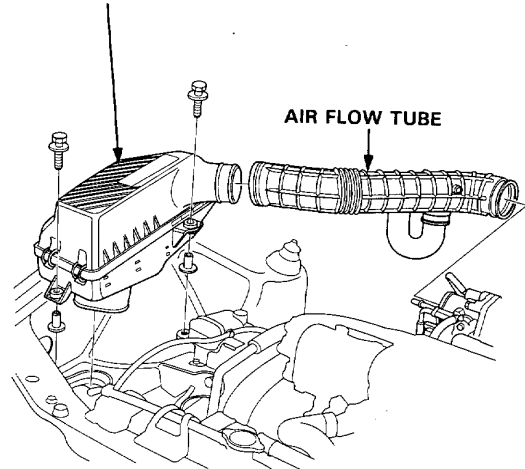
CAUTION: Use fender covers to avoid damaging painted surfaces.

1. Disconnect the negative (–) and positive (+) cables from the battery, then remove the battery.
2. Drain the transmission oil (see page 13-3).
3. Remove the battery base and base stay.



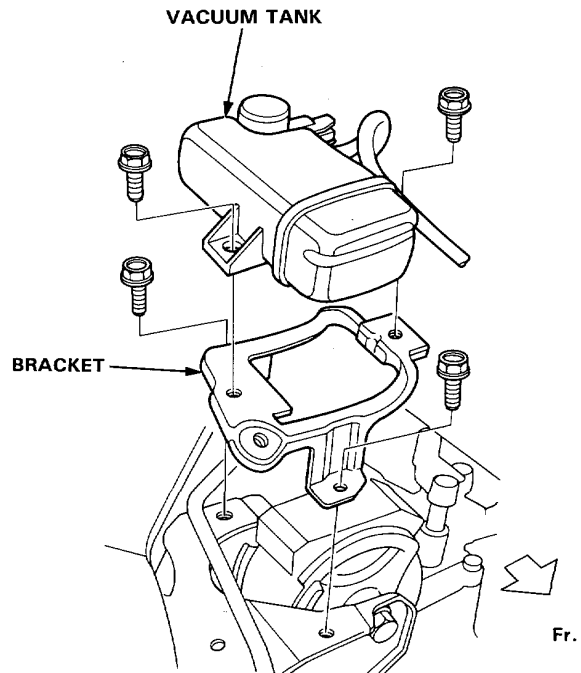
4. Remove the air flow tube and air cleaner case.

AIR CLEANER CASE



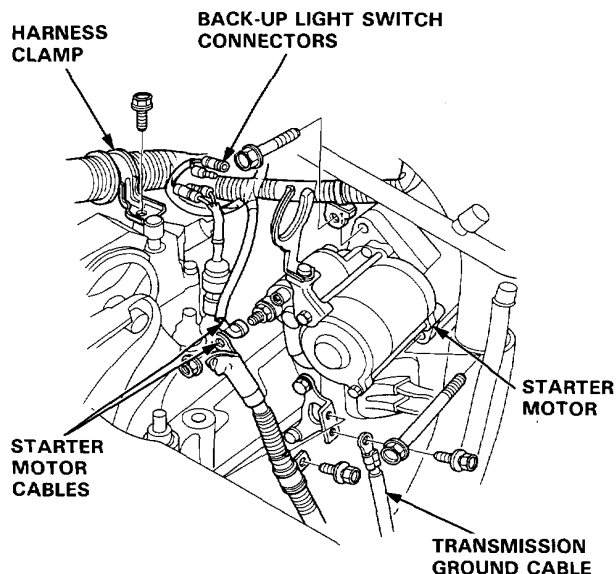
5. Remove the vacuum tank and bracket.

NOTE: Do not disconnect the hoses.





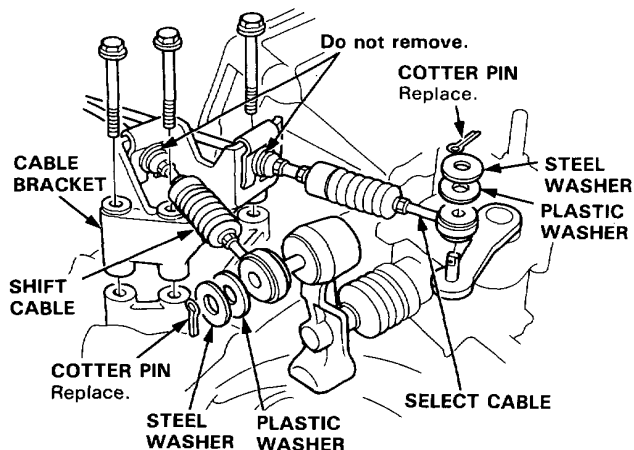
6. Disconnect the starter motor cables, then remove the starter motor.
7. Disconnect the back-up light switch connectors and transmission ground cable.
8. Remove the harness wire clamp.



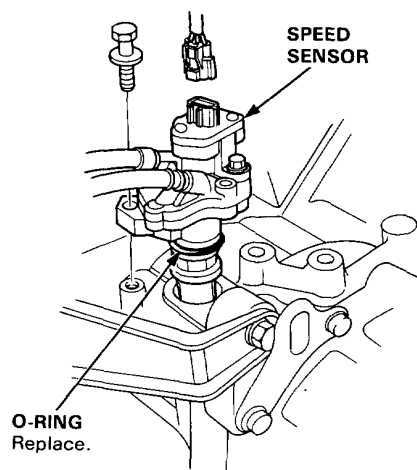
9. Shift the transmission into reverse.
10. First remove the cable bracket, then disconnect the cables from the top housing of the transmission.

NOTE: Remove both cables and the bracket together.

CAUTION: Take care not to bend the cables.



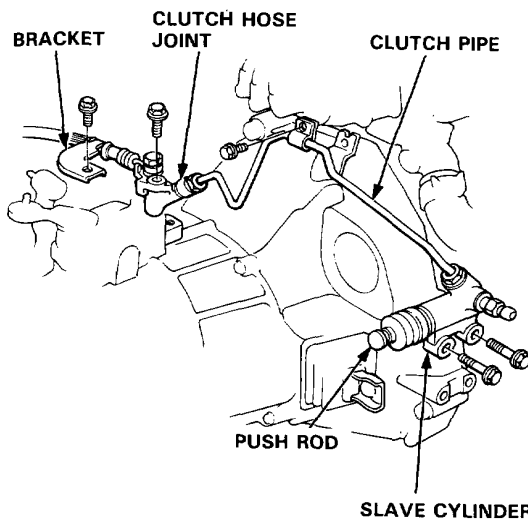
11. Disconnect the connector and remove the speed sensor, but leave its hoses connected.



12. Remove the slave cylinder assembly.

NOTE:

- Do not operate the clutch pedal once the slave cylinder has been removed.
- Take care not to bend the pipe.

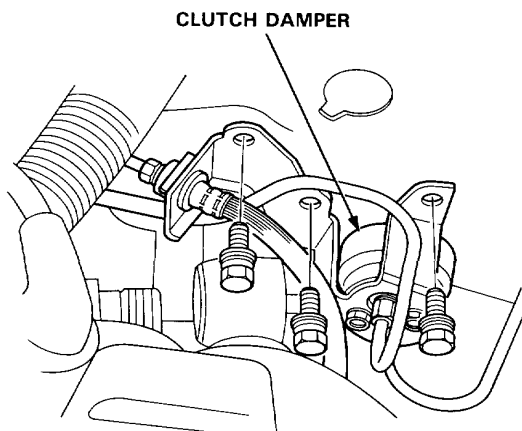


(cont'd)

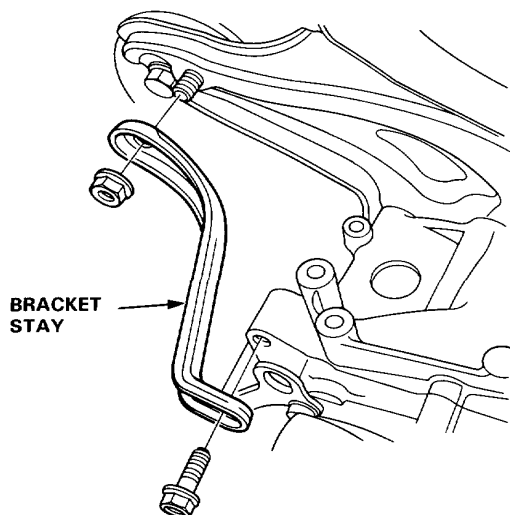
Transmission Assembly

Removal (cont'd)

13. Remove the clutch damper mounting bolts, and raise clutch damper.



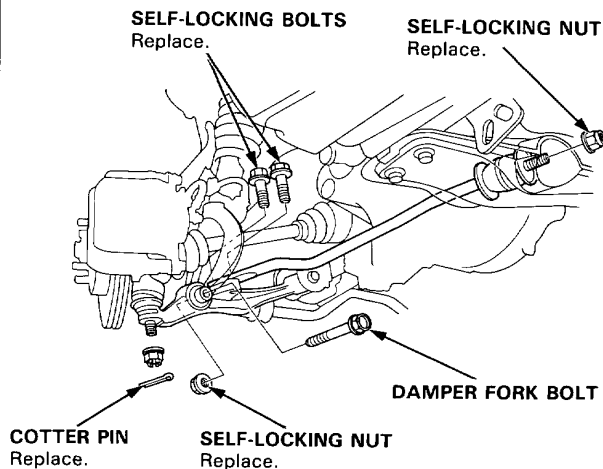
14. Remove the rear engine mount bracket stay.



15. Remove the cotter pins and lower arm ball joint nuts, then separate the ball joints and lower arms (see Section 18).

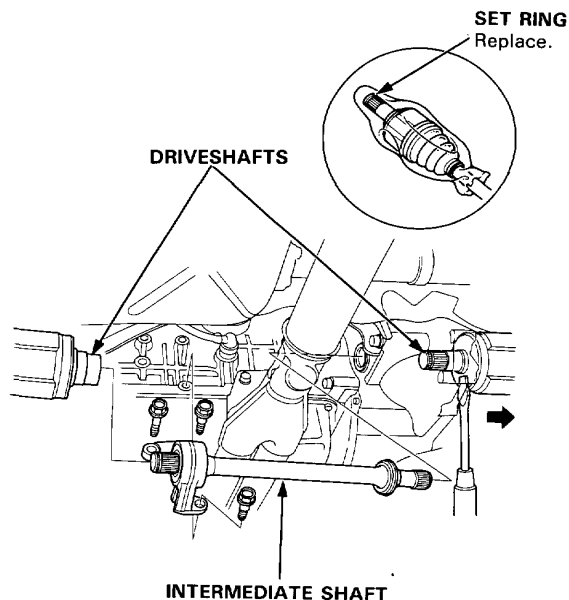
16. Remove the damper fork bolt.

17. Remove the right radius rod.



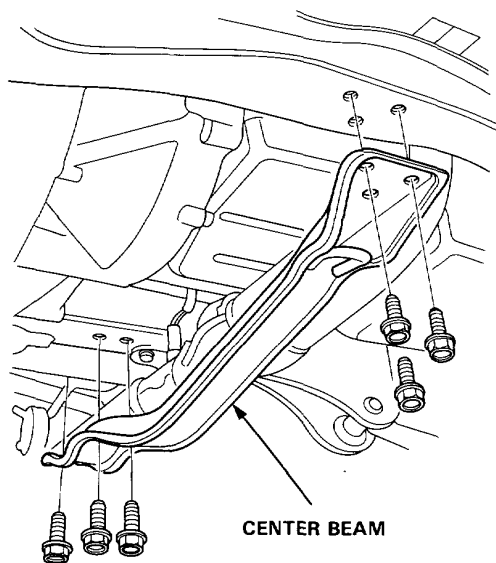
18. Remove the driveshafts and intermediate shaft (see Section 16).

NOTE: Coat all precision finished surfaces with clean engine oil or grease. Tie plastic bags over the driveshaft ends.

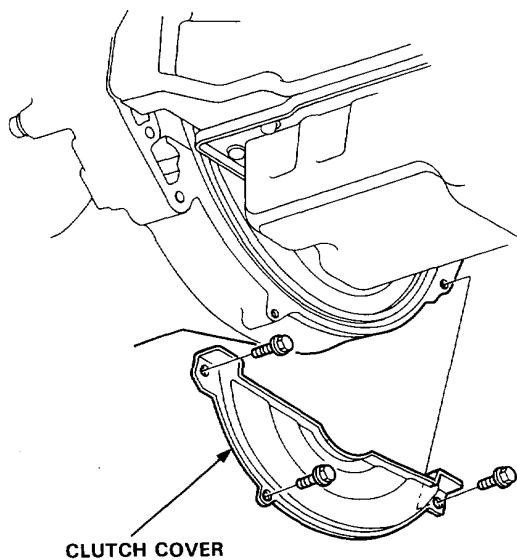




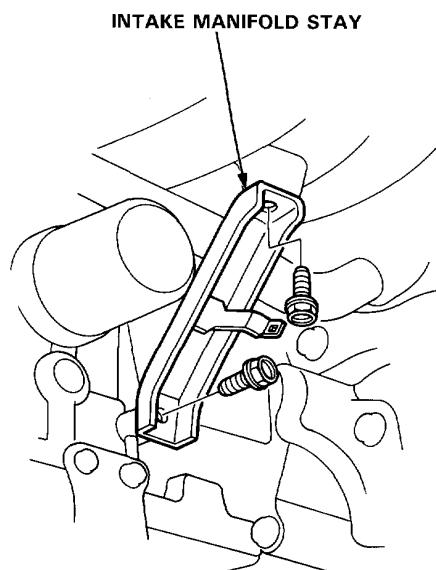
19. Remove the center beam.



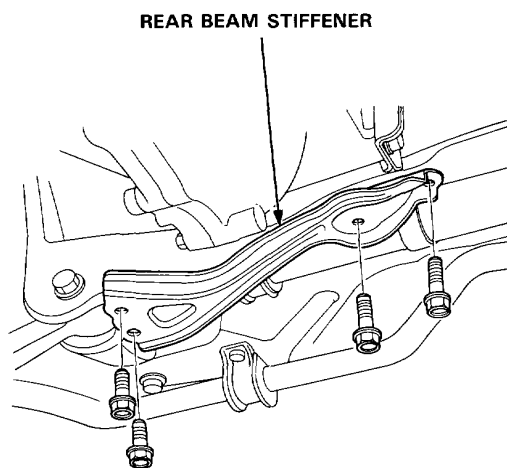
20. Remove the clutch cover.



21. Remove the intake manifold stay.



22. Remove the rear beam stiffener.

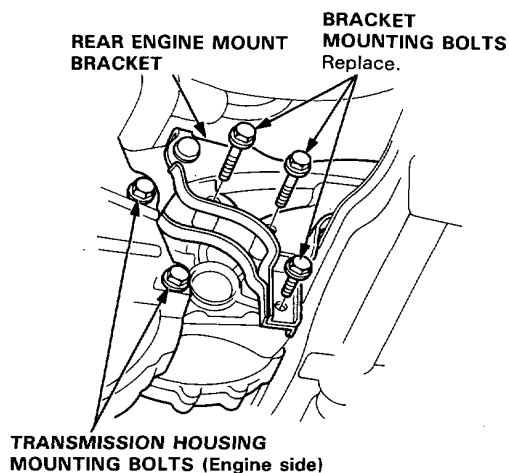


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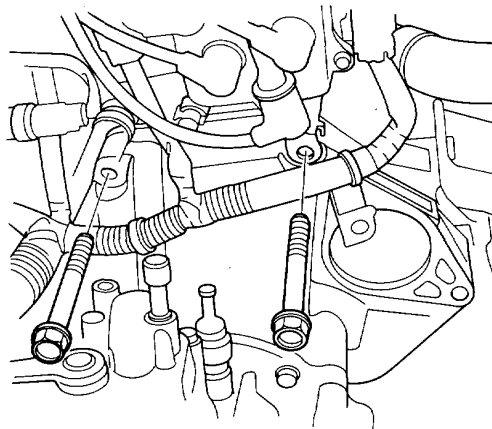
Transmission Assembly

Removal (cont'd)

23. Remove the 3 rear engine mount bracket mounting bolts.

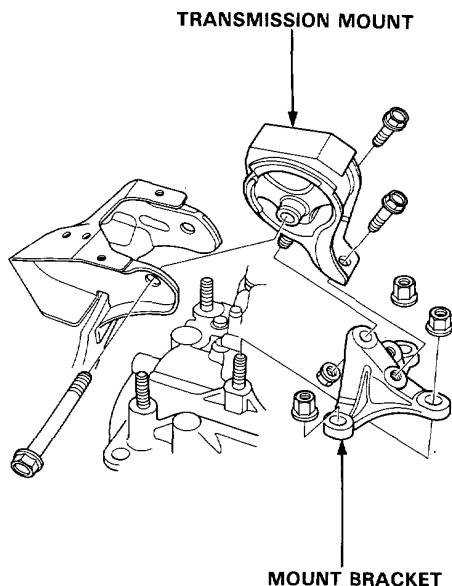


26. Remove the 2 upper transmission housing mounting bolts.



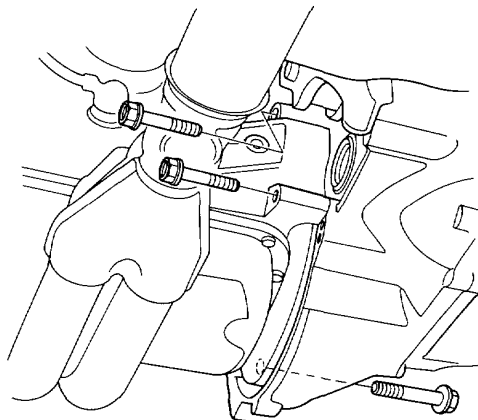
24. Place a floor jack under the transmission and raise the transmission just enough to take weight off of the mounts.

25. Remove the transmission mount and mount bracket.



27. Remove the 3 lower transmission housing mounting bolts.

28. Pull the transmission away from the engine until it clears the mainshaft.



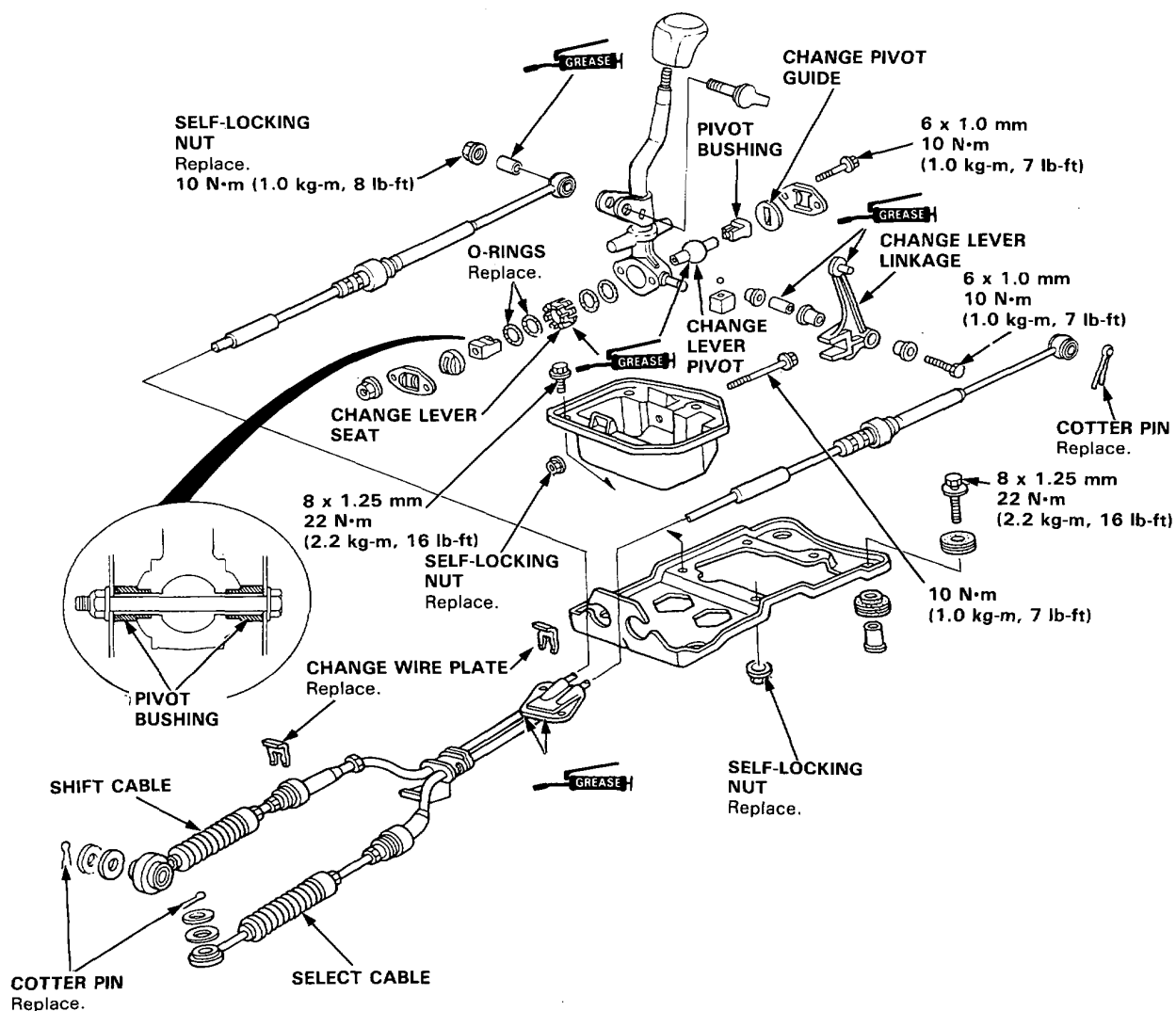


Gearshift Mechanism

Overhaul

NOTE:

- Inspect rubber parts for wear and damage when disassembling.
- Check that the new cotter pin is seated firmly.

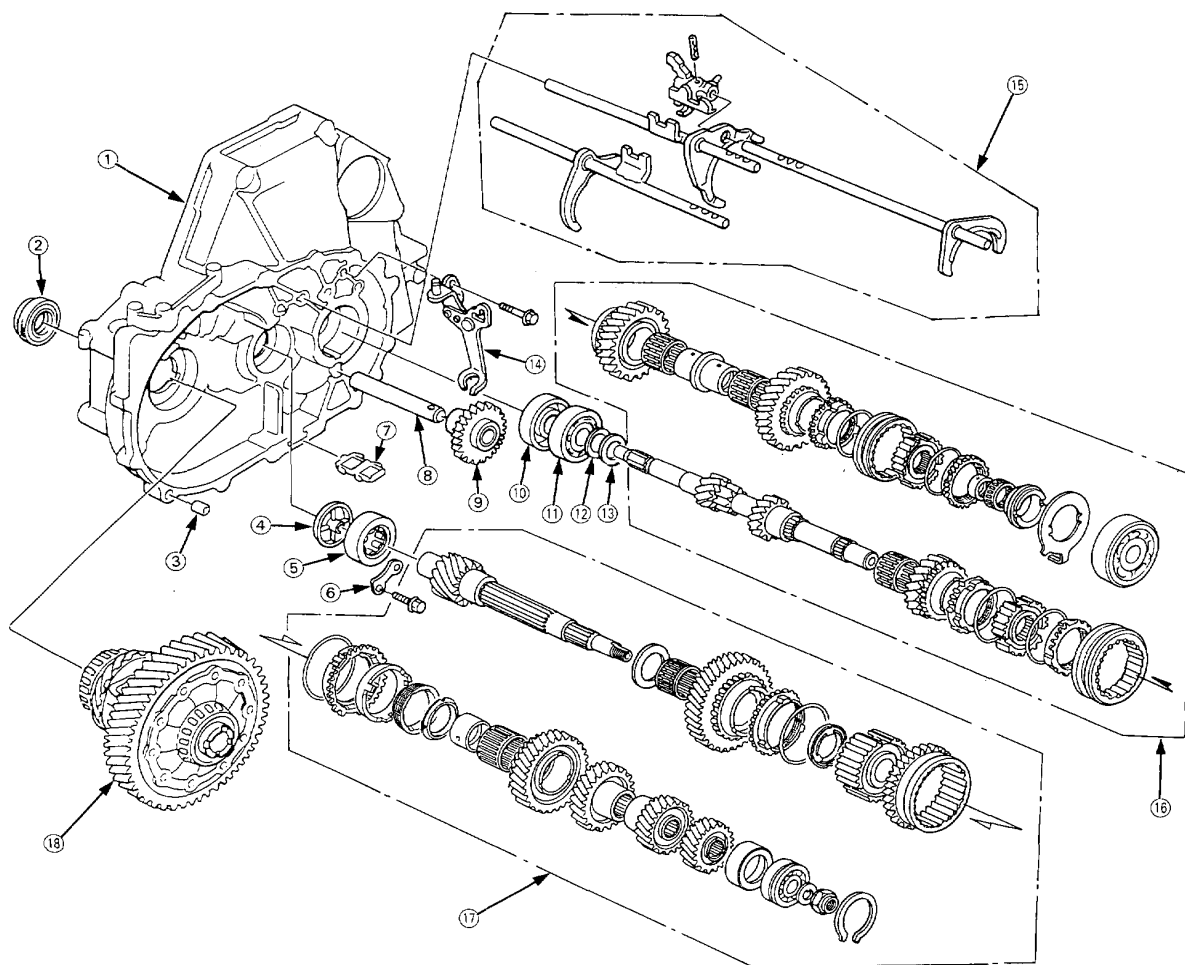


Illustrated Index

Refer to the drawing below for the transmission disassembly.
Clean all parts thoroughly in solvent and dry with compressed air.

Lubricate all parts with oil before reassembly.

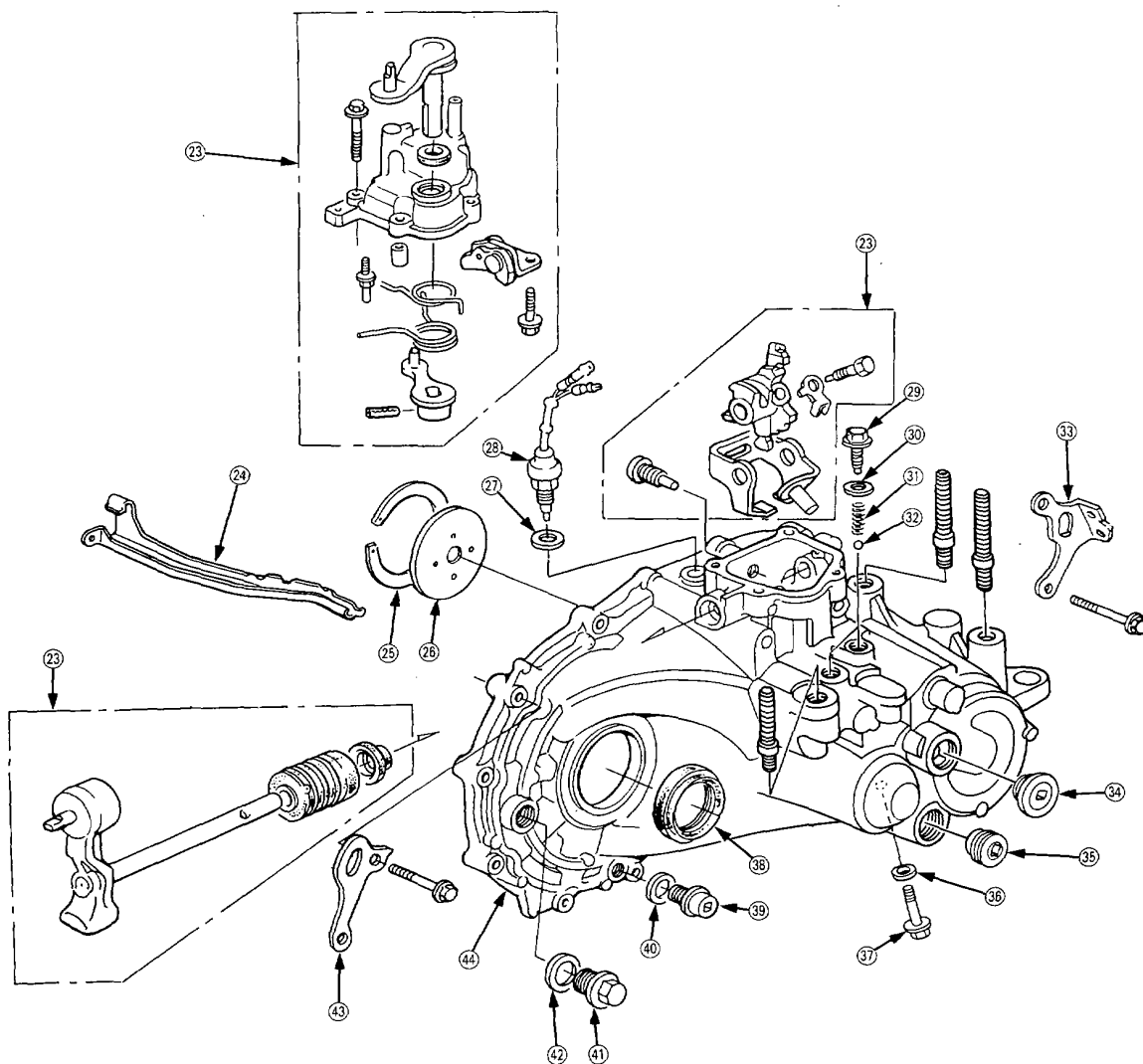
NOTE: This transmission uses no gaskets between the major housings; use Honda Genuine Liquid Gasket (P/N 08718-0001). Assemble the housings within 20 minutes after applying the liquid gasket and allow it to cure at least 30 minutes after assembly before filling the transmission with oil.



- ① CLUTCH HOUSING
- ② OIL SEAL
• see Section 15
- ③ 14 x 20 mm DOWEL PIN
- ④ OIL GUIDE PLATE
- ⑤ NEEDLE BEARING
- ⑥ RETAINING PLATE
- ⑦ MAGNET

- ⑧ REVERSE IDLER GEAR SHAFT
- ⑨ REVERSE IDLER GEAR
- ⑩ OIL SEAL
- ⑪ BALL BEARING
- ⑫ SPRING WASHER
- ⑬ WASHER
- ⑭ REVERSE SHIFT FORK

- ⑮ SHIFT FORK ASSEMBLY
• Index, page 13-28
- ⑯ MAINSHAFT ASSEMBLY
• Index, page 13-18
- ⑰ COUNTERSHAFT ASSEMBLY
• Index, page 13-23
- ⑱ DIFFERENTIAL ASSEMBLY
• see Section 15



- ②③ **SHIFT ARM ASSEMBLY**
• Index, page 13-12
- ②④ **OIL GUTTER PLATE**
- ②⑤ **THRUST SHIM**
• Selection, page 13-34
- ②⑥ **OIL GUIDE PLATE**
- ②⑦ **WASHER**
- ②⑧ **BACK-UP LIGHT SWITCH**
- ②⑨ **SETTING SCREW**
- ③① **WASHER**
- ③② **SPRING (L. = 25 mm)**
- ③③ **STEEL BALL (D. = 5/16 in)**

- ③④ **TRANSMISSION HANGER**
- ③⑤ **28 mm SEALING BOLT**
- ③⑥ **32 mm SEALING BOLT**
- ③⑦ **WASHER**
- ③⑧ **REVERSE IDLER GEAR**
- ③⑨ **SHAFT BOLT**
- ④① **OIL SEAL**
• see Section 15
- ④② **OIL DRAIN PLUG**
- ④③ **WASHER**

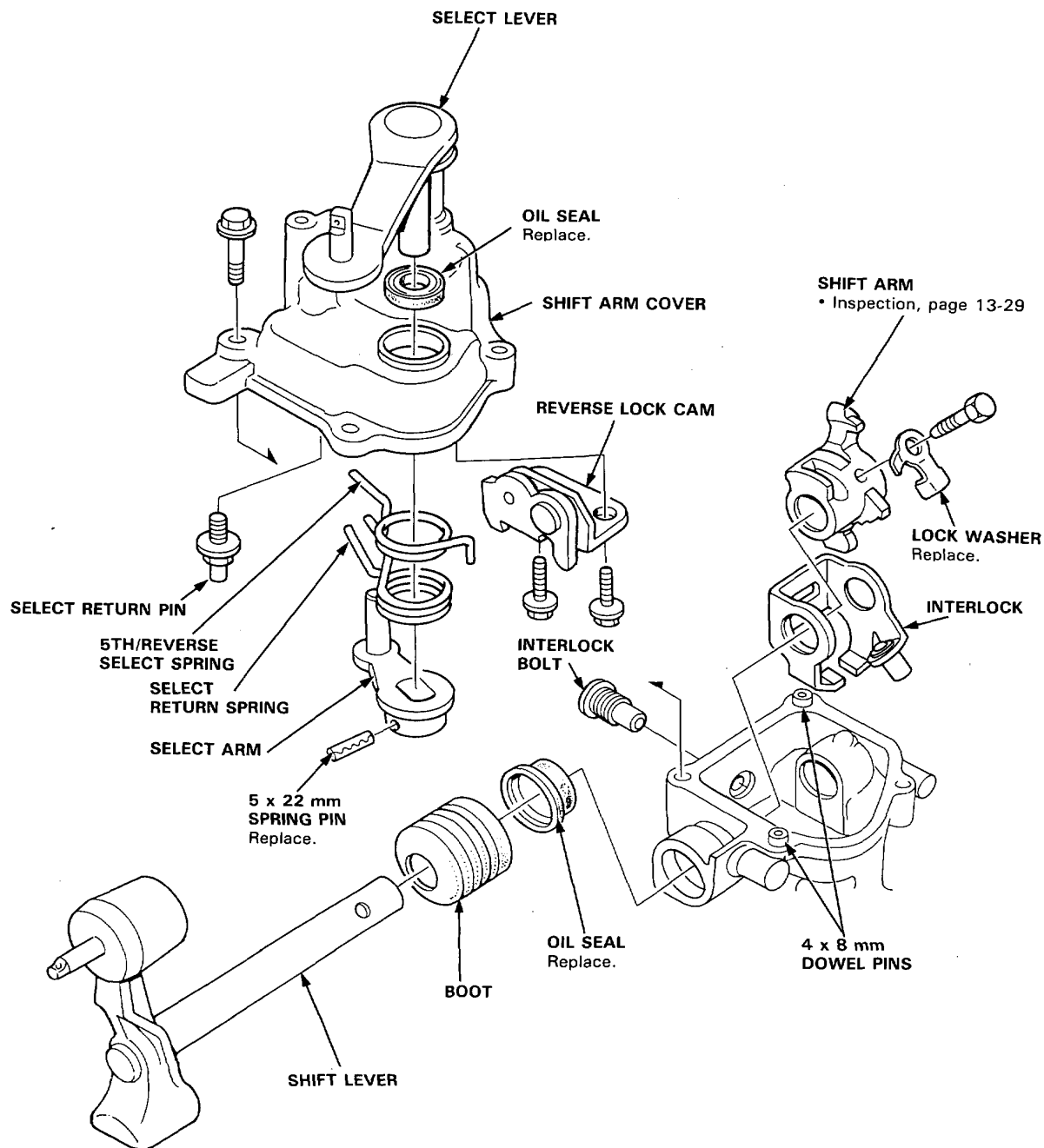
- ④④ **OIL FILLER BOLT**
- ④⑤ **WASHER**
- ④⑥ **TRANSMISSION HANGER**
- ④⑦ **TRANSMISSION HOUSING**

Shift Arm Assembly

Index

NOTE:

- The shift arm cover can be removed and installed with the transmission in the car.
- Lubricate all moving and sliding surfaces with grease.



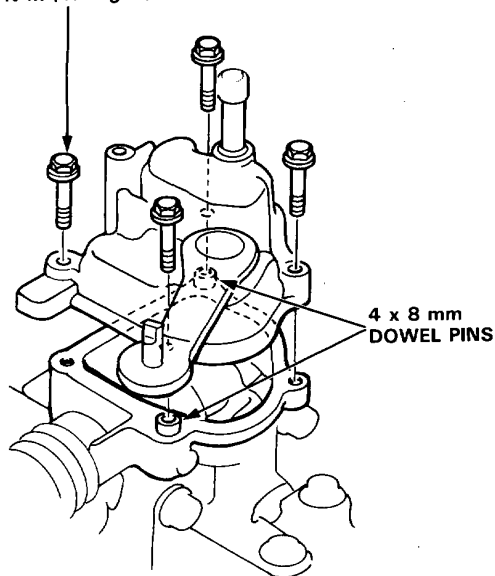


Disassembly/Reassembly

NOTE: During reassembly, grease all sliding parts.

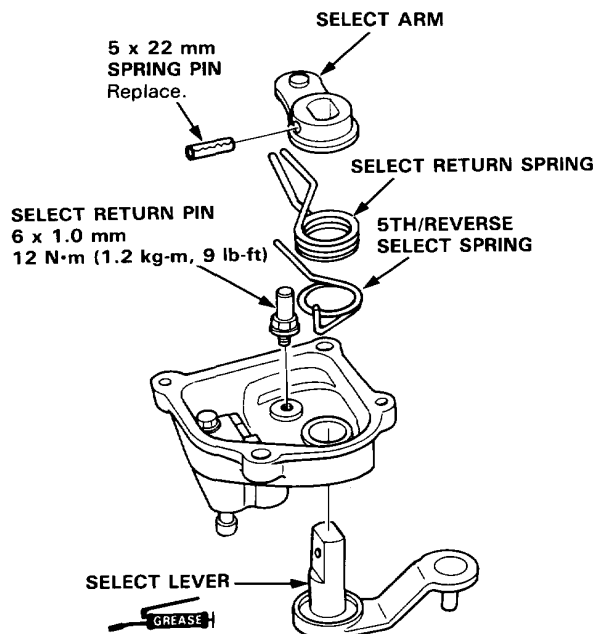
1. Remove the shift arm cover assembly.

6 x 1.0 mm
12 N·m (1.2 kg-m, 9 lb-ft)

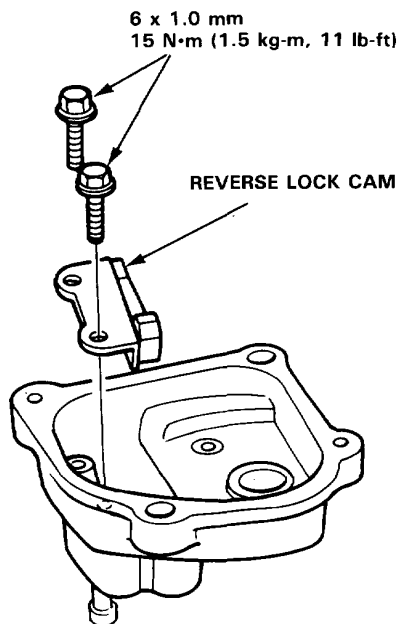


2. Remove the spring pin, then remove the select lever, select arm and springs.

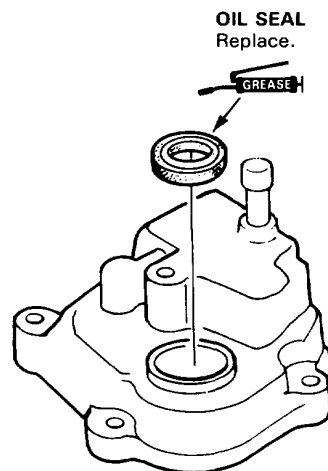
3. Remove the select return pin.



4. Remove the reverse lock cam.



5. Remove the oil seal.



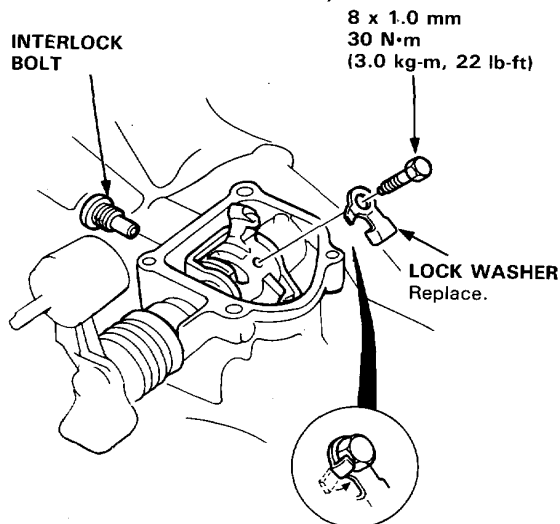
(cont'd)

Shift Arm Assembly

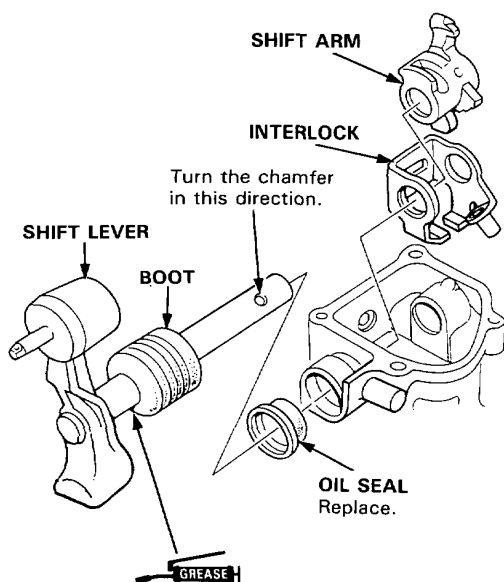
Disassembly/Reassembly (cont'd)

6. Bend the tab of the lock washer, then remove the bolt.
7. Remove the interlock bolt.

NOTE: Apply liquid gasket (P/N 08718—0001) to the threads before reassembly.



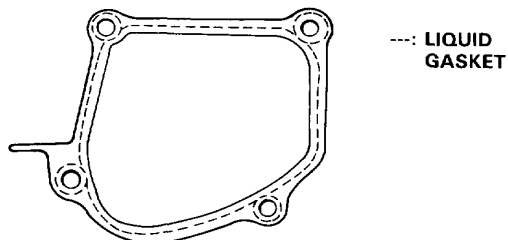
8. Remove the shift lever, shift arm, and interlock.



9. Install the shift arm assembly in the reverse order of removal.

NOTE:

- Apply liquid gasket to the shift arm cover mating surface of the transmission housing.
- Use P/N 08718—0001 for the liquid gasket.
- Remove all dirt and oil from the sealing surface.
- Apply liquid gasket on the central part of the sealing surface.
- Seal the entire circumference of the bolt hole to prevent oil leakage.
- When the sealing surface has remained untouched for more than 20 minutes after application of the liquid gasket, do not replace the parts without sealing the surface again.
- Refill the oil after 30 minutes after replacement.





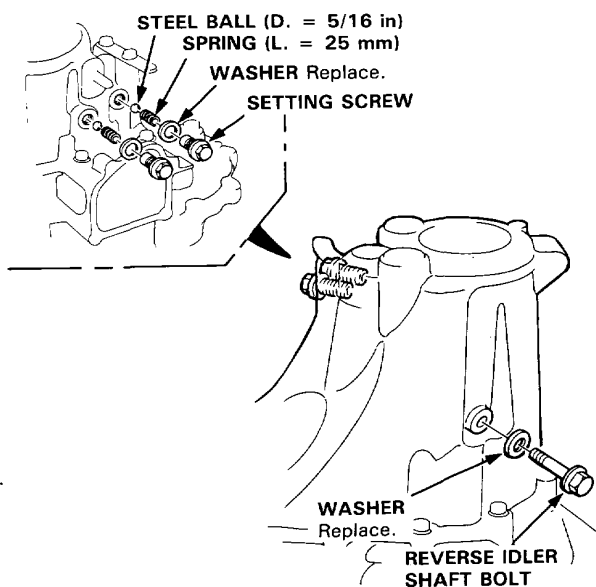
Transmission Housing

Removal

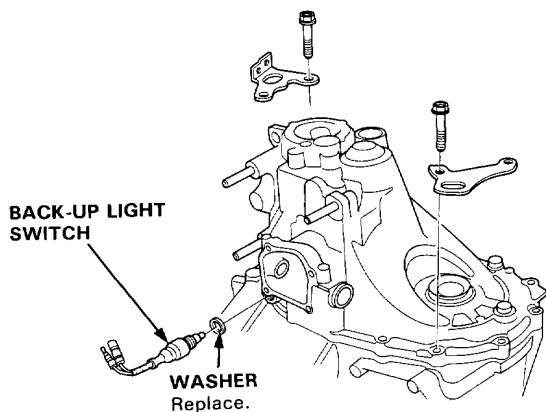
NOTE:

- If the transmission housing or clutch housing were replaced, the bearing preload must be adjusted.
- Place the clutch housing on two pieces of wood thick enough to keep the mainshaft from hitting the work bench.

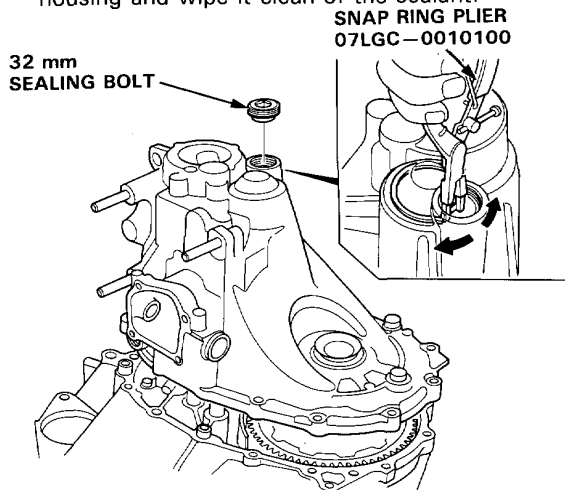
1. Remove the shift arm cover, shift arm and interlock (page 13-13).
2. Remove the reverse idler shaft bolt.
3. Remove the setting screws, then remove the washers, springs and steel balls.



4. Remove the back-up light switch.
5. Remove the 10 mm bolts and 8 mm bolts attaching the transmission housing to the clutch housing.

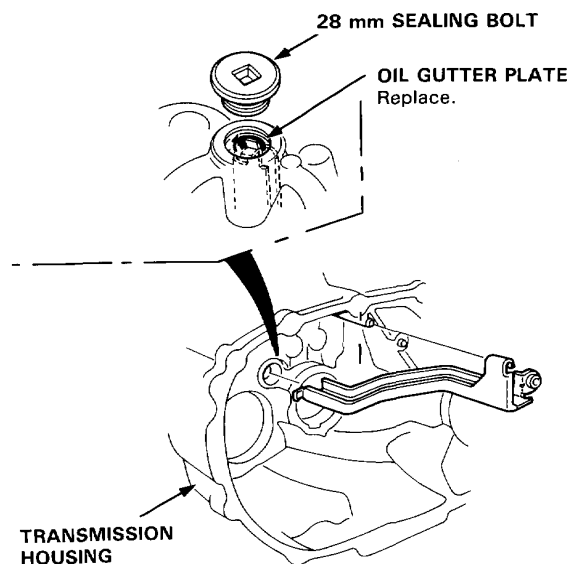


6. Remove the 32 mm sealing bolt.
7. Expand the snap ring on the countershaft ball bearing and remove it from the groove using a pair of snap ring pliers.
8. Separate the transmission housing from the clutch housing and wipe it clean of the sealant.



9. Remove the 28 mm sealing bolt, then remove the oil gutter plate.

NOTE: The transmission housing can be removed with the oil gutter plate in the transmission housing.



Reverse Shift Fork

Clearance Inspection

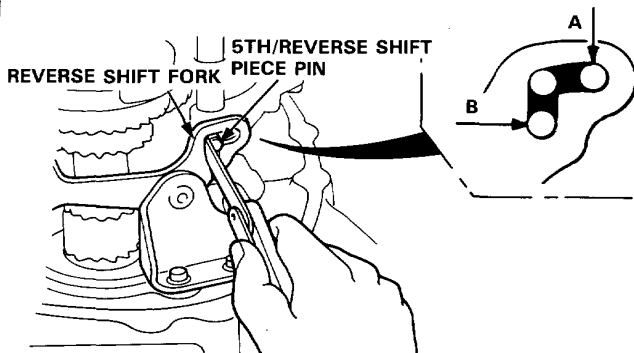
1. Measure the clearance between the reverse shift fork and 5th/reverse shift piece pin.

Standard: A: 0.05–0.35 mm (0.002–0.014 in)

B: 0.4–0.8 mm (0.016–0.031 in)

Service Limit: A: 0.5 mm (0.020 in)

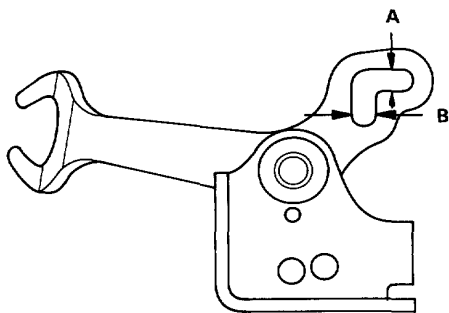
B: 1.0 mm (0.039 in)



2. If the clearance exceeds the service limit, measure the width of the groove in the reverse shift fork.

Standard: A: 7.05–7.25 mm (0.278–0.285 in)

B: 7.4–7.7 mm (0.291–0.303 in)

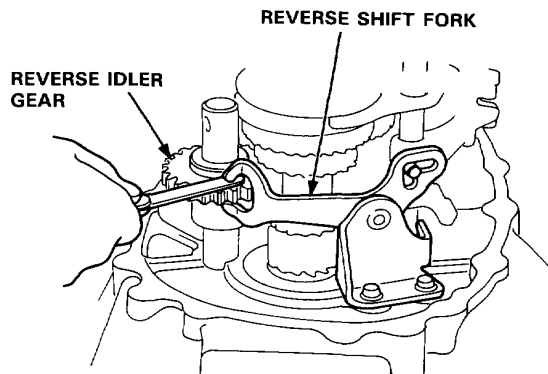


If the width of the groove exceeds the standard, replace the reverse shift fork with a new one.
If the width of the groove is within the standard, replace the 5th/reverse shift piece with a new one.

3. Measure the clearance between the reverse idler gear and reverse shift fork.

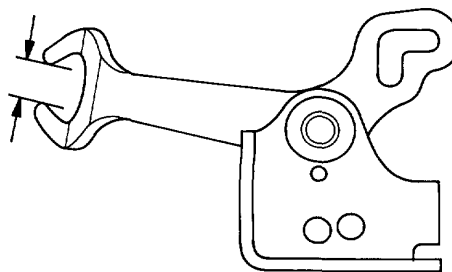
Standard: 0.5–1.1 mm (0.020–0.043 in)

Service Limit: 1.8 mm (0.071 in)



4. If the clearance exceeds the service limit, measure the width of the reverse shift fork pawl groove.

Standard: 13.0–13.3 mm (0.512–0.524 in)

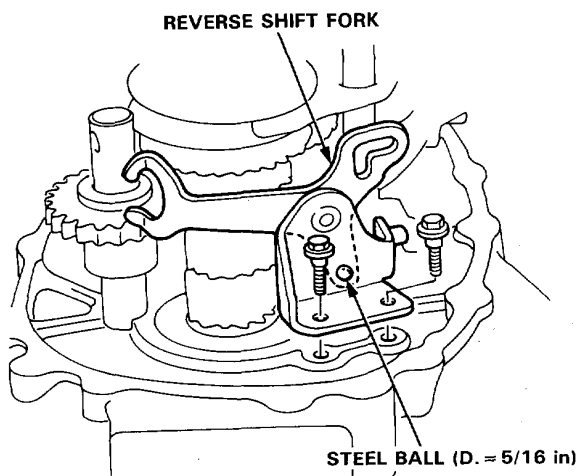


If the width exceeds the standard, replace the reverse shift fork with a new one.
If the width is within the standard, replace the reverse idler gear with a new one.

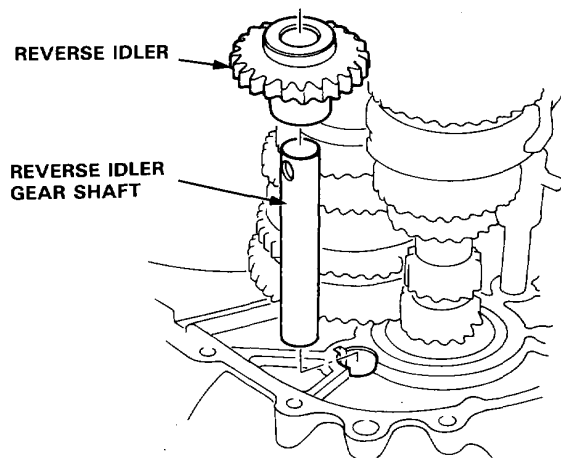
Reverse Idler Gear

Removal

1. Remove the reverse shift fork.



2. Remove the reverse idler gear shaft and gear.



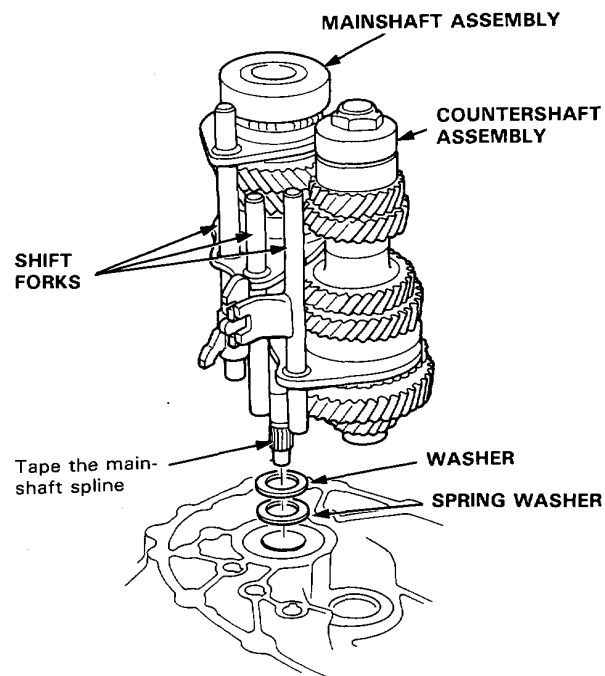
Mainshaft, Countershaft



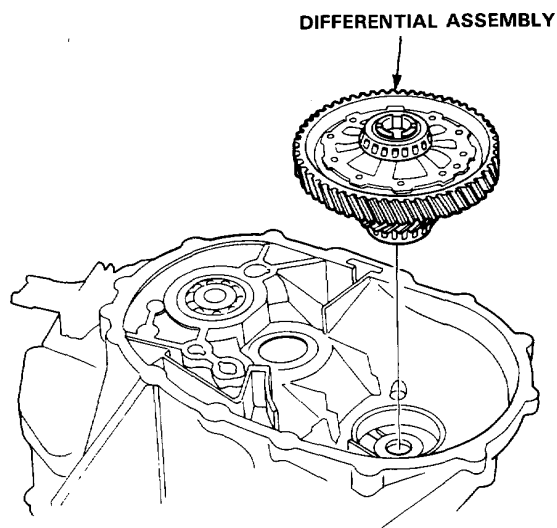
Disassembly

1. Remove the mainshaft and countershaft assemblies with the shift forks from the clutch housing.

NOTE: Tape the mainshaft spline before removing the mainshaft and countershaft assemblies.



2. Remove the differential assembly.

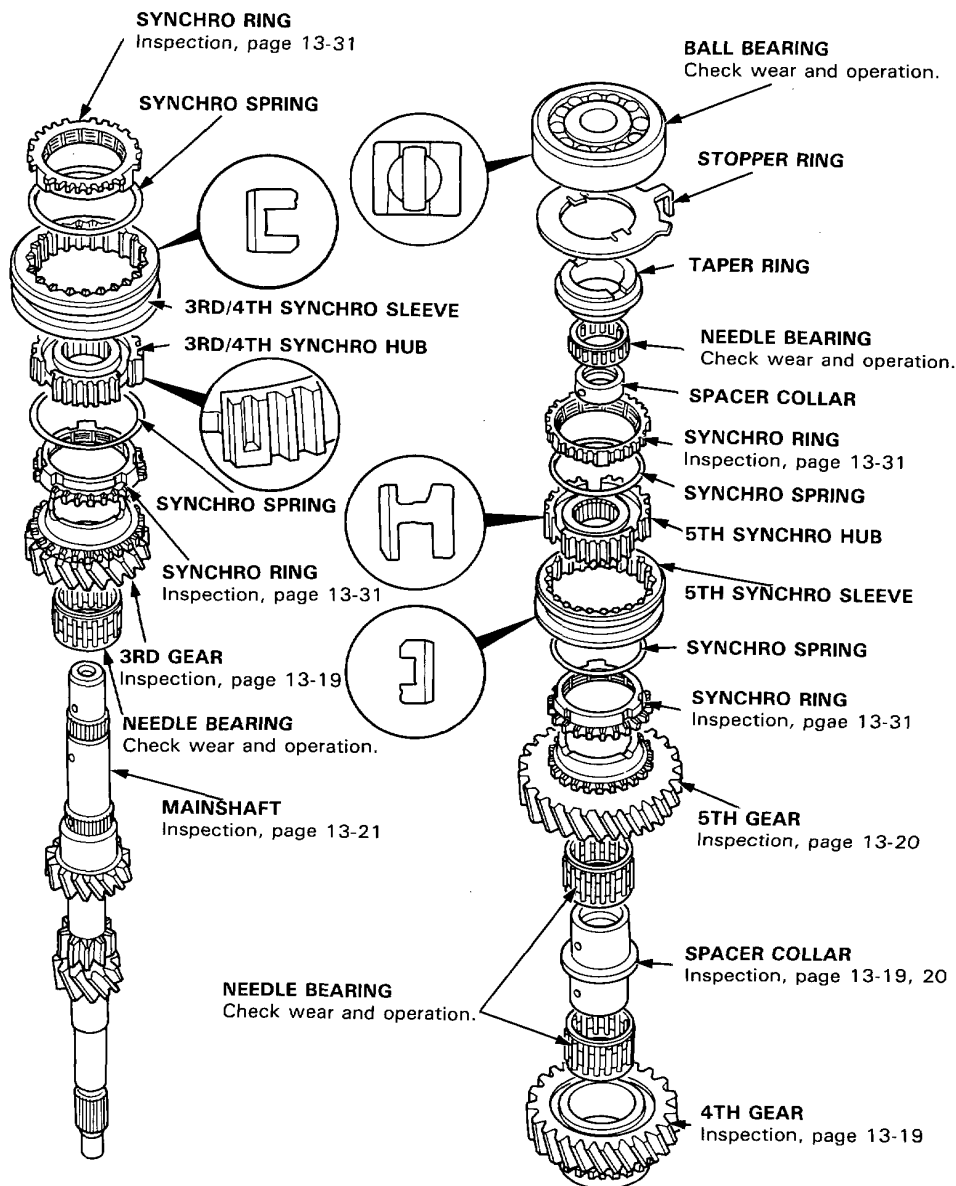


Mainshaft

Index



Before assembling, clean all parts in solvent, dry them with compressed air, then coat them with clean oil.



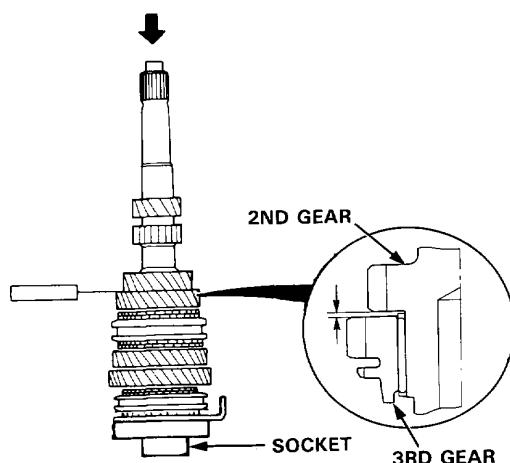


Clearance Inspection

NOTE: If replacement is required, always replace the synchro sleeve and hub as a set.

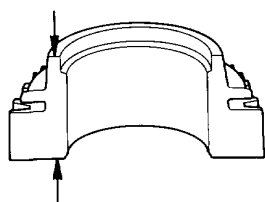
1. Support the bearing inner race with a socket and push down on the shaft.
2. Measure the clearance between 2nd and 3rd gears.

Standard: 0.06–0.21 mm
(0.002–0.008 in)
Service Limit: 0.3 mm (0.012 in)



3. If the clearance exceeds the service limit, measure the thickness of 3rd gear.

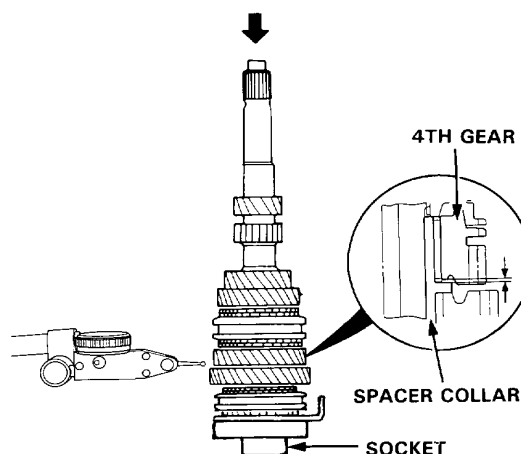
Standard: 32.42–32.47 mm
(1.276–1.278 in)
Service Limit: 32.3 mm (1.272 in)



If the thickness of 3rd gear is less than the service limit, replace 3rd gear with a new one.
If the thickness of 3rd gear is within the service limit, replace the 3rd/4th synchro hub with a new one.

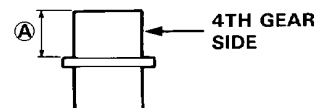
4. Measure the clearance between 4th gear and the spacer collar.

Standard: 0.06–0.21 mm
(0.002–0.008 in)
Service Limit: 0.3 mm (0.012 in)



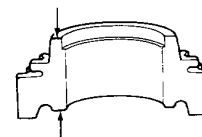
5. If the clearance exceeds the service limit, measure distance A on the spacer collar.

Standard: 26.03–26.08 mm
(1.025–1.027 in)
Service Limit: 26.01 mm (1.024 in)



6. If distance A is more than the service limit, replace the spacer collar with a new one.
If distance A is within the service limit, measure the thickness of 4th gear.

Standard: 30.92–30.97 mm
(1.217–1.219 in)
Service Limit: 30.8 mm (1.213 in)



If the thickness of 4th gear is less than the service limit, replace 4th gear with a new one.
If the thickness of 4th gear is within the service limit, replace the 3rd/4th synchro hub with a new one.

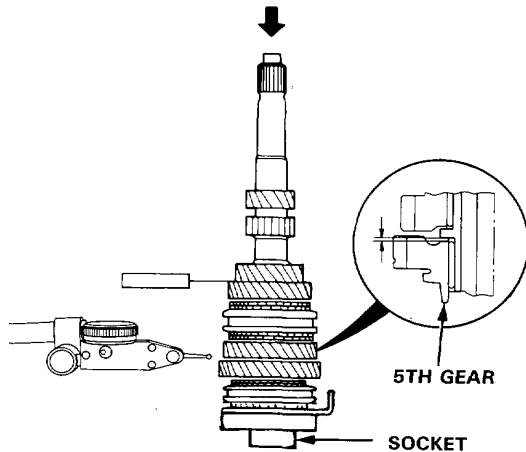
(cont'd)

Mainshaft

Clearance Inspection (cont'd)

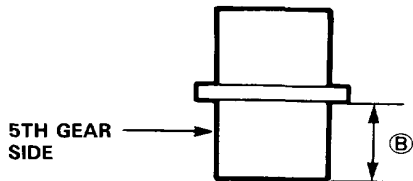
7. Measure the clearance between the spacer collar and 5th gear.

Standard: 0.06–0.21 mm
(0.002–0.008 in)
Service Limit: 0.3 mm (0.012 in)



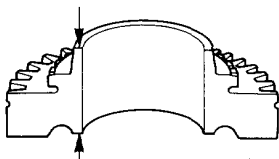
8. If the clearance exceeds the service limit, measure distance ⑧ on the spacer collar.

Standard: 26.03–26.08 mm
(1.025–1.027 in)
Service Limit: 26.01 mm (1.024 in)



9. If distance ⑧ is more than service limit, replace the spacer collar with a new one.
If distance ⑧ is within the service limit, measure thickness of 5th gear.

Standard: 30.92–30.97 mm
(1.217–1.219 in)
Service Limit: 30.8 mm (1.213 in)

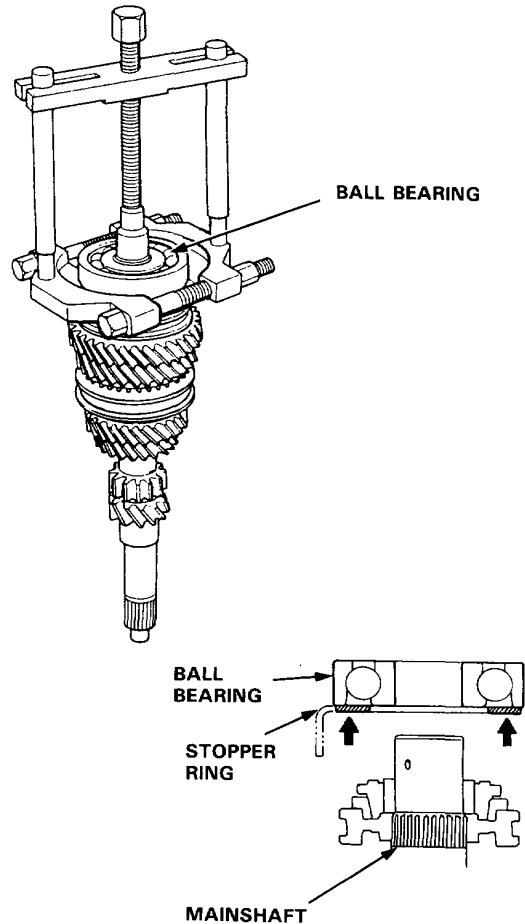


If the thickness of 5th gear is less than the service limit, replace 5th gear with a new one.
If the thickness of 5th gear is within the service limit, replace the 5th synchro hub with a new one.

Disassembly

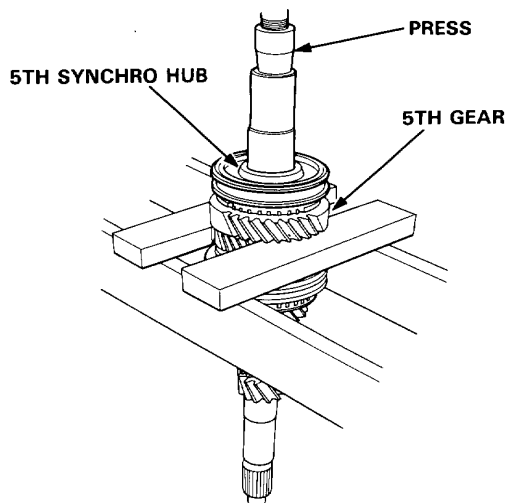
CAUTION: Remove the synchro hubs using a press and steel blocks as shown. Use of a jaw-type puller can damage the gear teeth.

1. Remove the ball bearing using a bearing puller as shown.

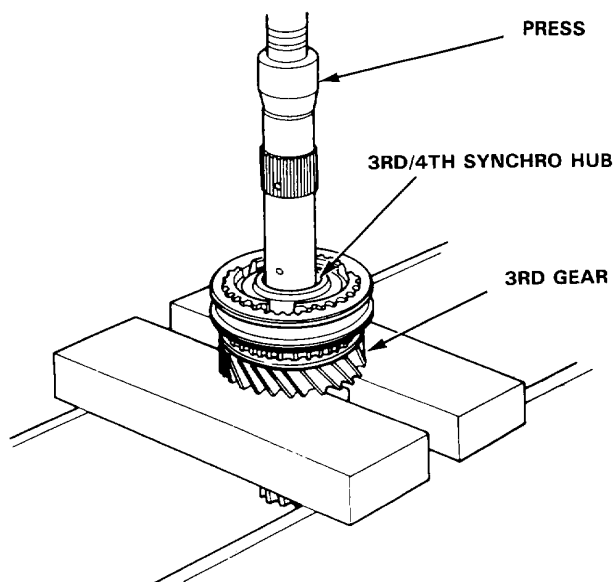




2. Support 5th gear on steel blocks as shown and press the shaft out of the 5th synchro hub.



3. In the same manner as above, support the 3rd gear on steel blocks and press the shaft out of the 3rd/4th synchro hub.



Inspection

1. Inspect the gear surface and bearing surface for wear and damage, then measure the mainshaft at points A, B, and C.

Standard:

A (Ball bearing surface): 27.987–28.000 mm
(1.1018–1.1024 in)

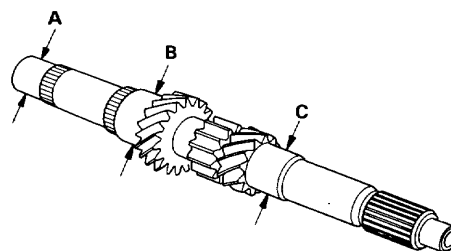
B (Needle bearing surface): 37.984–38.000 mm
(1.4954–1.4961 in)

C (Ball bearing surface): 27.977–27.990 mm
(1.1015–1.1020 in)

Service Limit: A: 27.940 mm (1.1000 in)

B: 37.930 mm (1.4933 in)

C: 27.940 mm (1.1000 in)



Inspect oil passages for clogging.

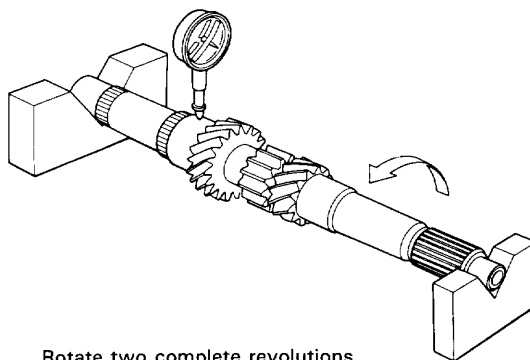
If any part of the mainshaft is less than the service limit, replace it with a new one.

2. Inspect for runout.

Standard: 0.04 mm (0.0016 in)

Service Limit: 0.10 mm (0.0040 in)

NOTE: Support the mainshaft at both ends as shown.



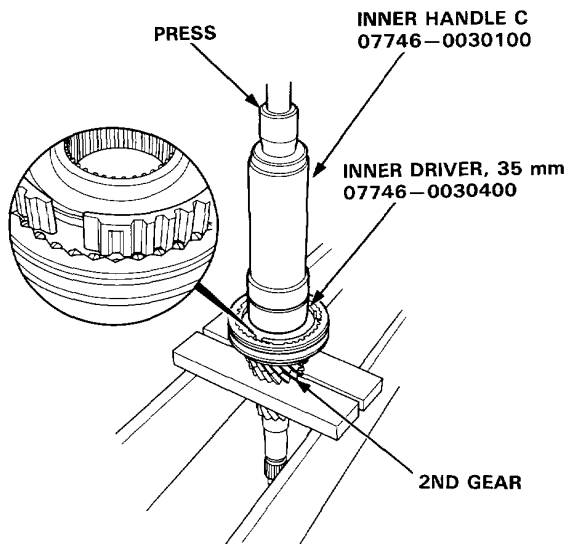
Rotate two complete revolutions.

If the runout exceeds the service limit, replace the mainshaft with a new one.

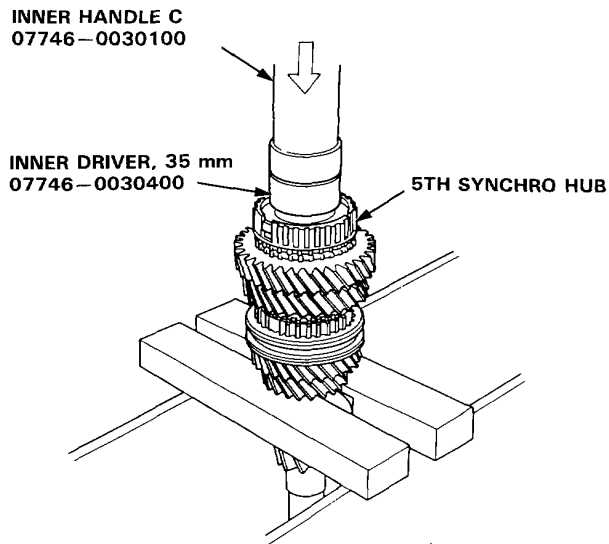
Mainshaft

Reassembly

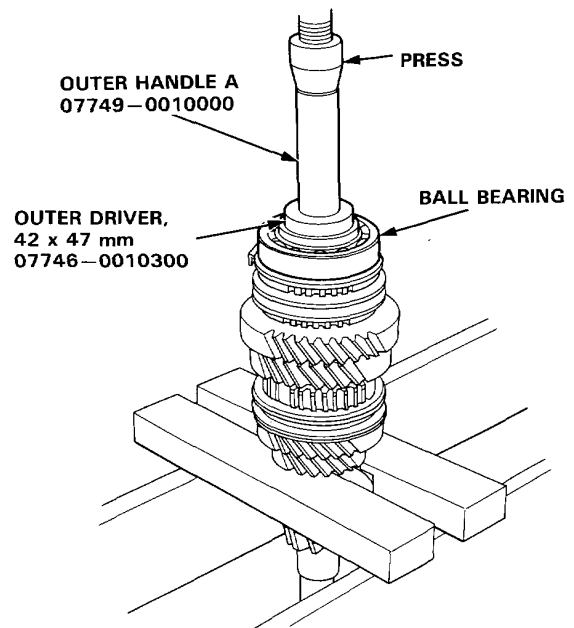
- 1 Support 2nd gear on steel blocks as shown, then install the 3rd/4th synchro hub using the special tools and a press as shown.



2. Install the 5th synchro hub using the special tools and a press as shown.




3. Install the ball bearing using the special tools and a press as shown.

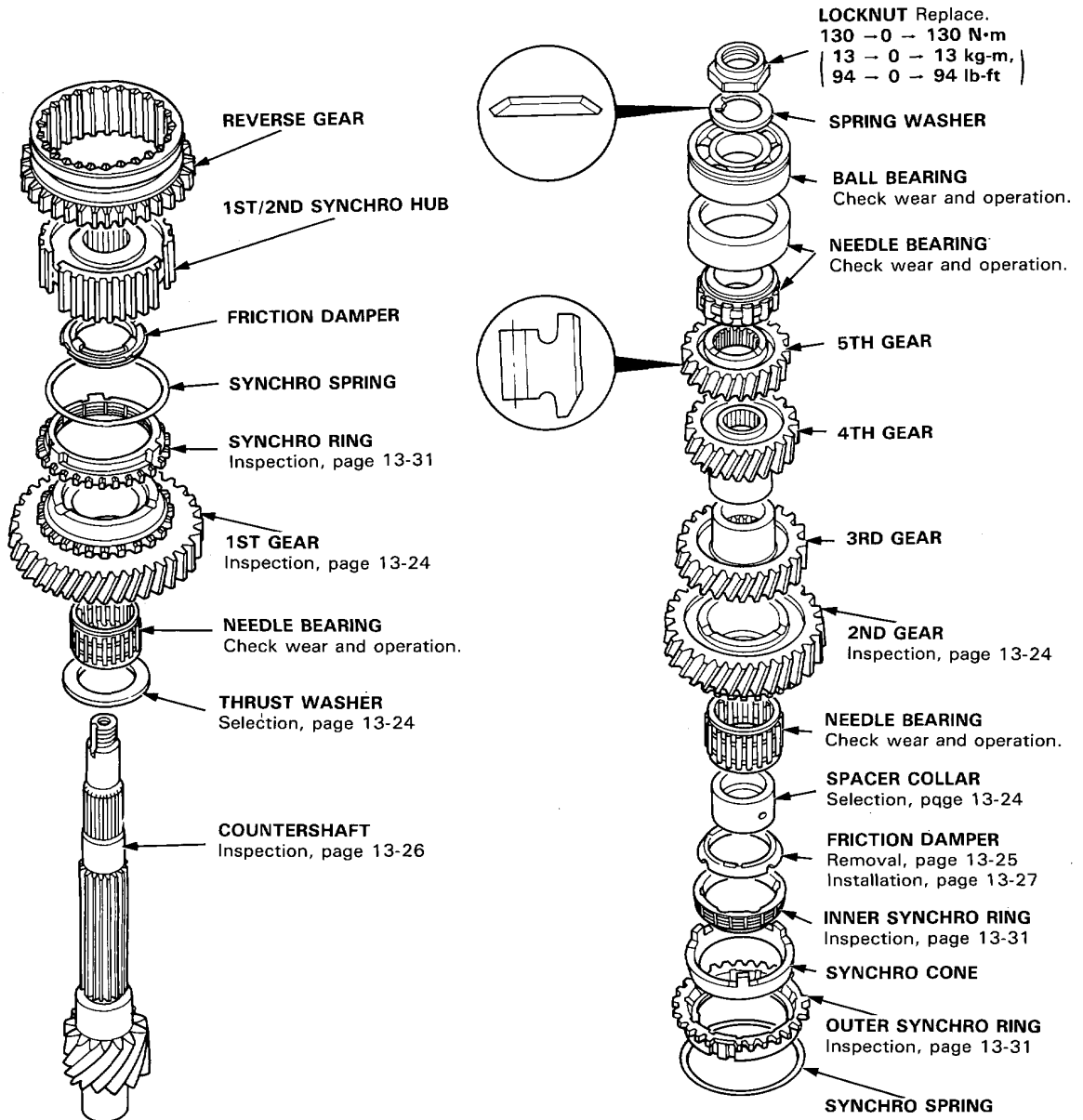


Countershaft

Index



 Before assembling, clean all parts in solvent, dry them with compressed air, then coat them with clean oil.

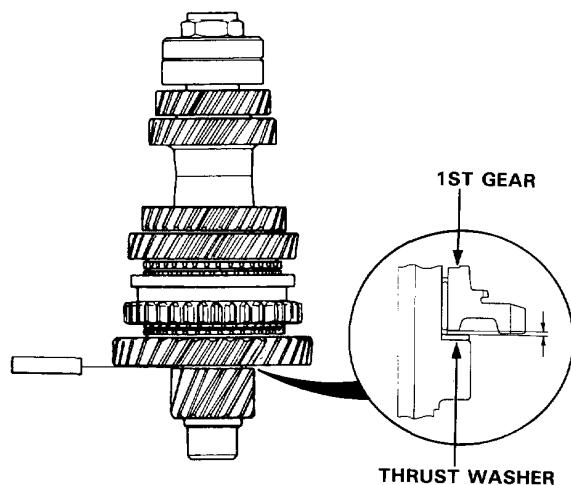


Countershaft

Clearance Inspection

1. Measure the clearance between the 1st gear and thrust washer.

Standard: 0.04–0.10 mm
(0.0016–0.0039 in)



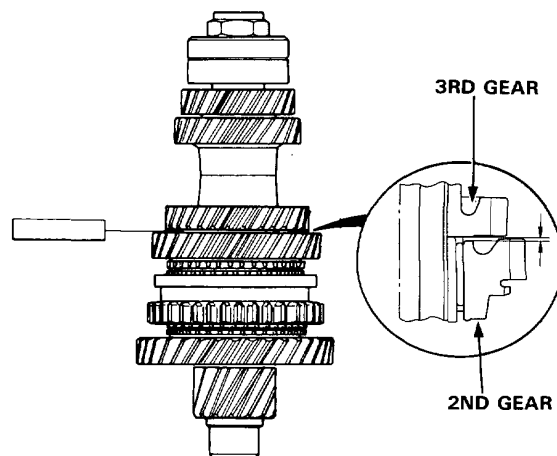
2. If the clearance exceeds the standard, select the appropriate thrust washer for the correct clearance from the chart below.

Thrust Washer

	Part Number	Thickness
A	23921-PG1-000	1.96 mm (0.0771 in)
B	23922-PG1-000	1.99 mm (0.0783 in)
C	23923-PG1-000	2.02 mm (0.0795 in)
D	23924-PG1-000	2.05 mm (0.0807 in)
E	23925-PG1-000	2.08 mm (0.0819 in)

3. Measure the clearance between the 2nd gear and 3rd gear.

Standard: 0.04–0.10 mm
(0.0016–0.0039 in)



4. If the clearance exceeds the standard, select the appropriate spacer collar for the correct clearance from the chart below.

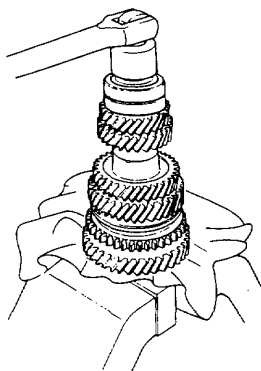
Spacer Collar

	Part Number	Thickness
A	23917-P21-010	29.02–29.04 mm (1.1425–1.1433 in)
B	23918-P21-010	29.07–29.09 mm (1.1445–1.1453 in)

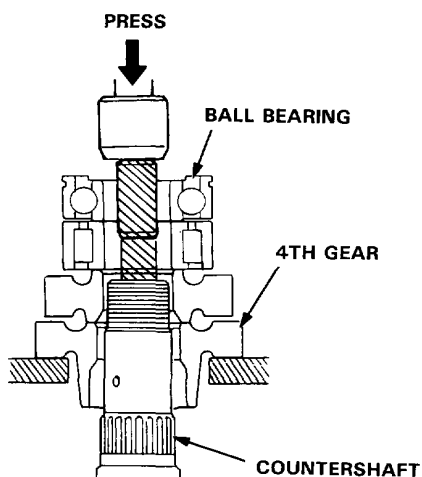


Disassembly

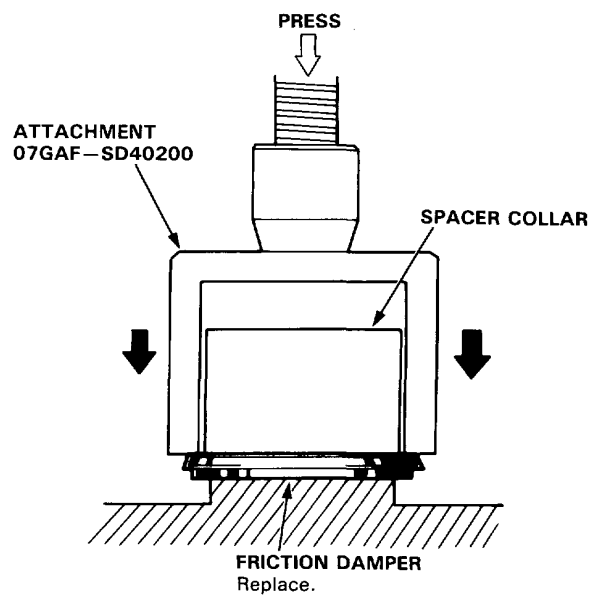
1. Raise the locknut tab from the groove of the shaft and remove the locknut and the spring washer.



2. Remove the ball bearing using a press as shown.



3. Remove the friction damper from the spacer collar using the special tool as shown.



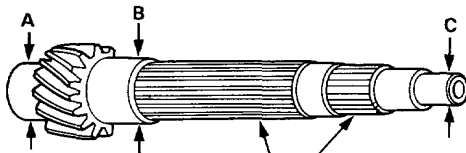
Countershaft

Inspection

1. Inspect the gear surface and bearing surface for wear and damage, then measure the countershaft at points A, B, and C.

Standard: A: 38.000–38.015 mm
(1.4961–1.4967 in)
B: 39.984–40.000 mm
(1.5742–1.5748 in)
C: 24.987–25.000 mm
(0.9837–0.9843 in)

Service Limit: A: 37.950 mm (1.4941 in)
B: 39.930 mm (1.5720 in)
C: 24.940 mm (0.9819 in)



Inspect for wear and damage.

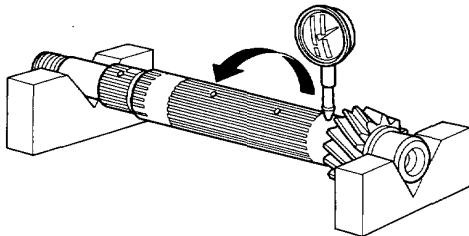
If any part of the countershaft is less than the service limit, replace it with a new one.

2. Inspect for runout.

Standard: 0.02 mm (0.0008 in)
Service Limit: 0.05 mm (0.0020 in)

NOTE: Support the countershaft at both ends as shown.

Rotate two complete revolutions.

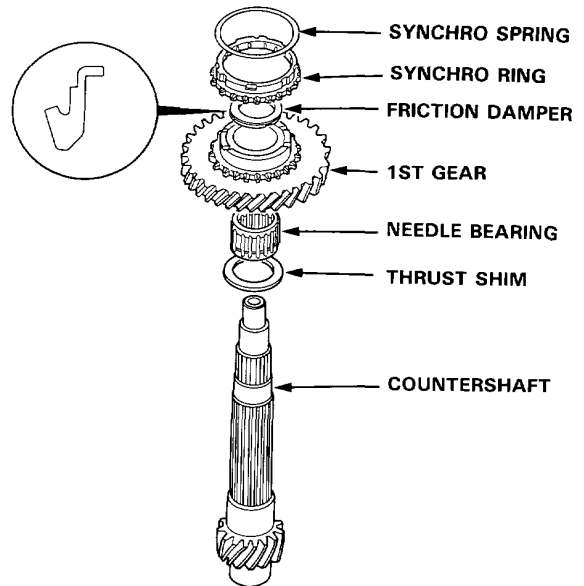


If the runout exceeds the service limit, replace the countershaft with a new one.

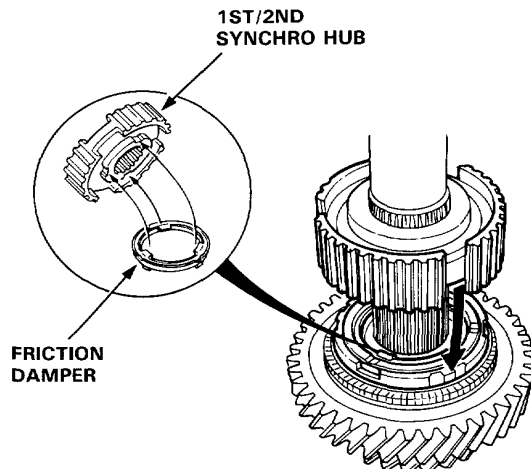
Reassembly

1. Install the thrust shim, needle bearing, 1st gear, friction damper, synchro ring, and synchro spring.

NOTE: Reassemble the 1st gear and friction damper before installation.

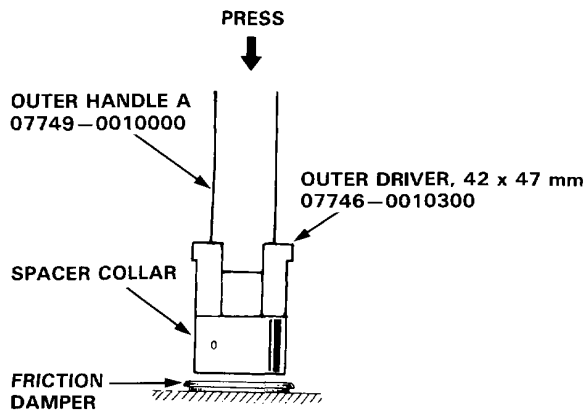


2. Install the 1st/2nd synchro hub by aligning the friction damper fingers with 1st/2nd synchro hub grooves.

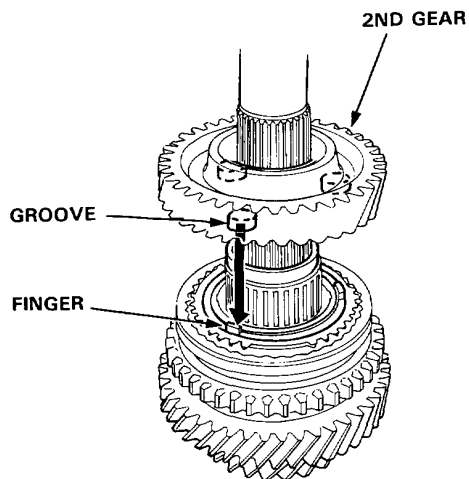




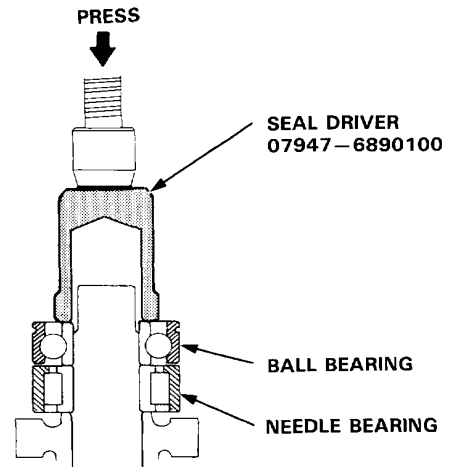
3. Install the friction damper on the spacer collar using the special tools and a press as shown.



4. Install the 2nd gear by aligning the synchro cone fingers with 2nd gear grooves.



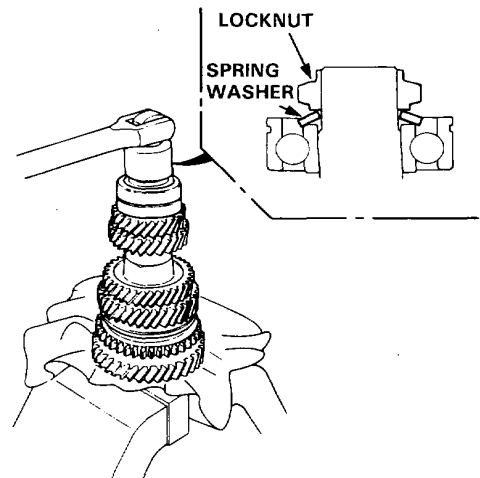
5. Install the needle bearing.
6. Install the ball bearing using a special tool and a press as shown.



7. Install the spring washer.
8. Tighten the countershaft locknut to the correct torque, then stake the locknut tab into the groove.


NOTE: Place the shaft in a vise with soft jaws.

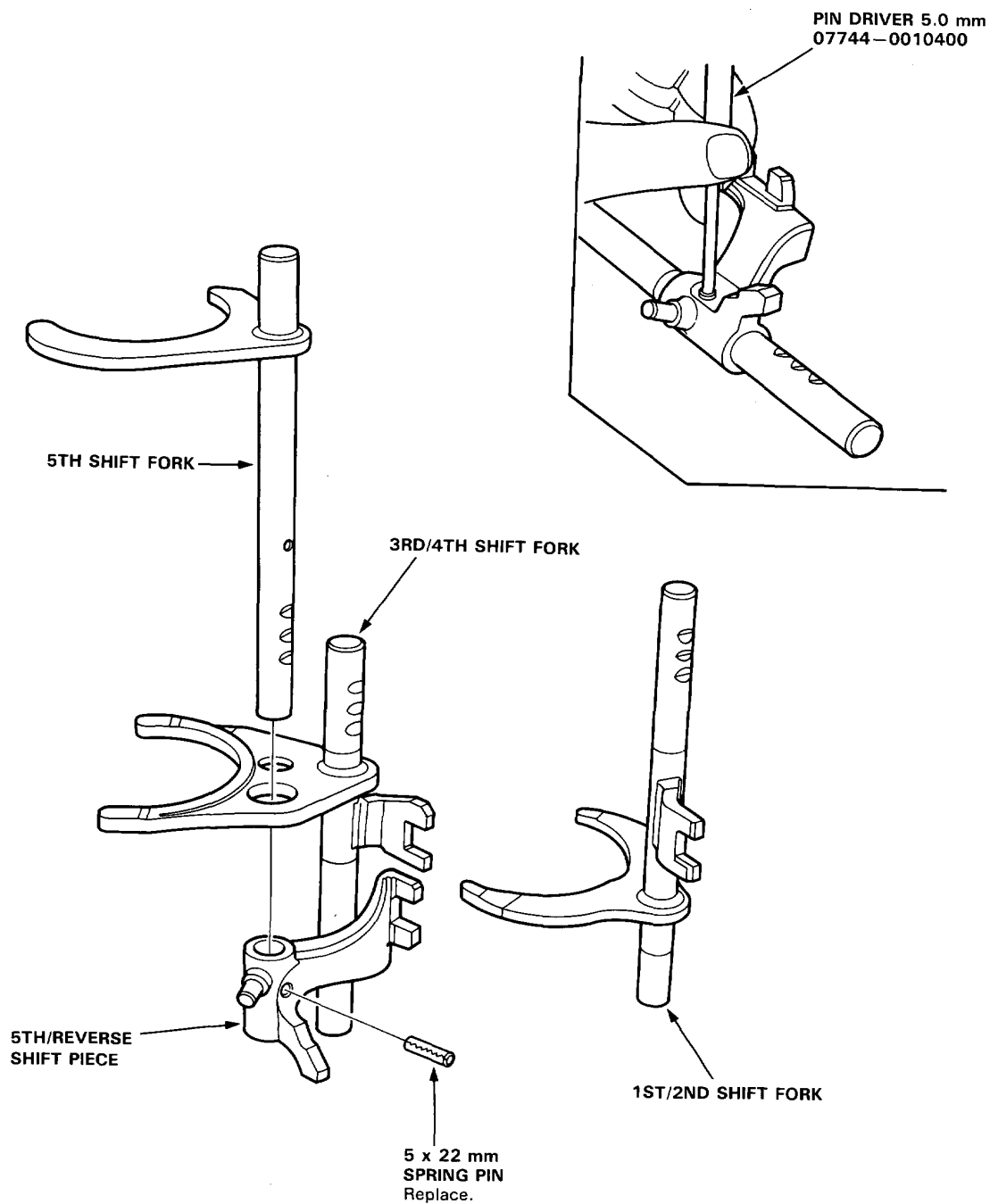
Torque: 130 → 0 → 130 N·m (13.0 → 13.0 kg·m,
94 → 0 → 94 lb·ft)



Shift Fork Assembly

Disassembly/Reassembly

 Prior to reassembling, clean all the parts in solvent, dry them and apply lubricant to any contact parts.

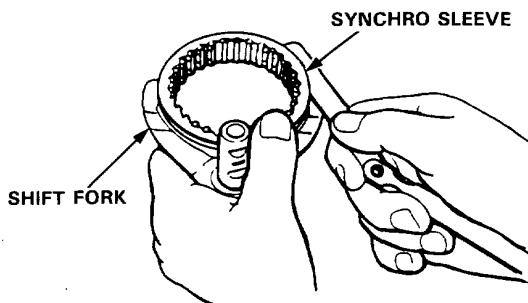




Clearance Inspection

1. Measure the clearance between each shift fork and its matching synchro sleeve.

Standard: 0.35–0.65 mm (0.014–0.026 in)
Service Limit: 1.00 mm (0.039 in)



2. If the clearance exceeds the service limit, measure the thickness of the shift fork fingers.

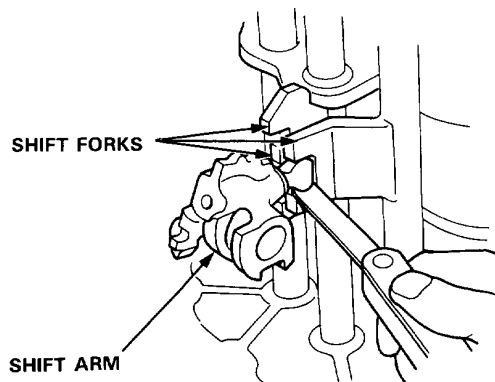
Standard: 6.2–6.4 mm (0.244–0.252 in)



If the thickness of the shift fork finger is less than the standard, replace the shift fork with a new one.
If the thickness of the shift fork finger is within the standard, replace the synchro sleeve with a new one.

3. Measure the clearance between the shift fork and the shift arm.

Standard: 0.2–0.5 mm (0.008–0.019 in)
Service Limit: 0.6 mm (0.024 in)



4. If the clearance exceeds the service limit, measure the width of the shift arm.

Standard: 12.9–13.0 mm (0.508–0.512 in)



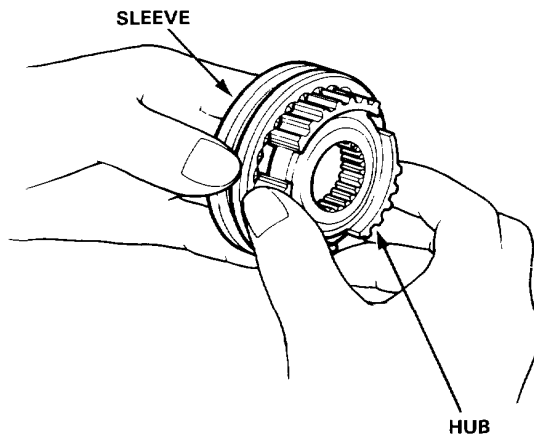
If the width of the shift fork finger is less than the standard, replace the shift arm with a new one.
If the width of the shift fork finger is within the standard, replace the shift fork with a new one.

Synchro Sleeve, Synchro Hub

Inspection

1. Inspect gear teeth on all synchro hubs and sleeves for rounded off corners, which indicates wear.
2. Install each hub in its mating sleeve and check for freedom of movement.

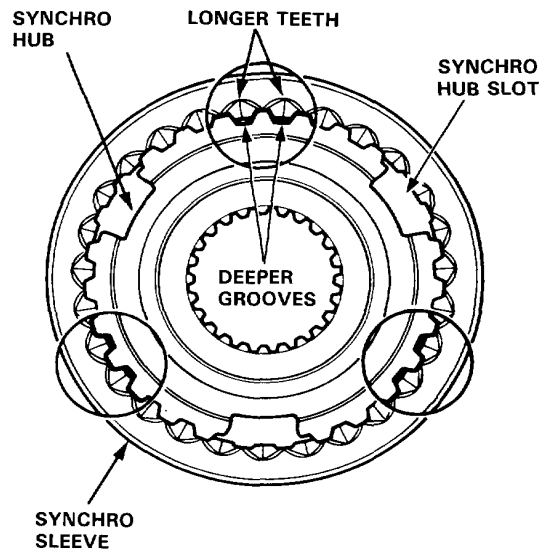
NOTE: If replacement is required, always replace the synchro sleeve and hub as a set.



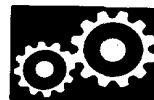
Installation

Each synchro sleeve has three sets of longer teeth (120 degrees apart) that must be matched with the three sets of deeper grooves in the hub when assembled.

NOTE: Installing the synchro sleeve with its longer teeth in the 1st/2nd synchro hub slots will damage the spring ring.



Synchro Ring, Gear



Inspection

1. Inspect the synchro ring and gear.

A: Inspect the inside of the synchro ring for wear.

B: Inspect the synchro sleeve teeth and matching teeth on the synchro ring for wear (rounded off).



C: Inspect the synchro sleeve teeth and matching teeth on the gear for wear (rounded off).



D: Inspect the gear hub thrust surface for wear.

E: Inspect the cone surface for wear and roughness.

F: Inspect the teeth on all gears for uneven wear, scoring, galling, and cracks.

2. Coat the cone surface of the gear with oil and place the synchro ring on the matching gear. Rotate the ring, making sure that it does not slip.

Measure the clearance between the ring and gear all the way around.

NOTE: Hold the ring against the gear evenly while measuring the clearance.

Ring-to-Gear Clearance

Standard: 0.85–1.1 mm
(0.0335–0.0433 in)

Service Limit: 0.4 mm (0.0157 in)

Double Cone Synchro-to-Gear Clearance

Standard:

A: (Outer Synchro Ring to Synchro Cone)

0.5–1.0 mm (0.0197–0.0394 in)

B: (Synchro Cone to Gear)

0.5–1.0 mm (0.0197–0.0394 in)

C: (Outer Synchro Ring to Gear)

0.95–1.68 mm (0.0374–0.0661 in)

Service Limit:

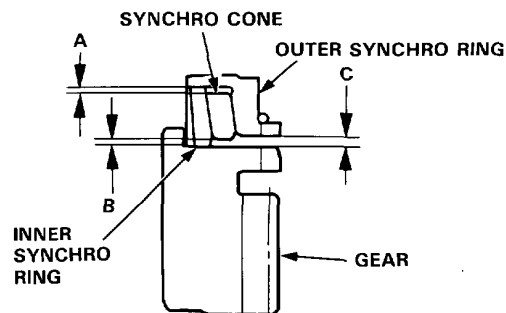
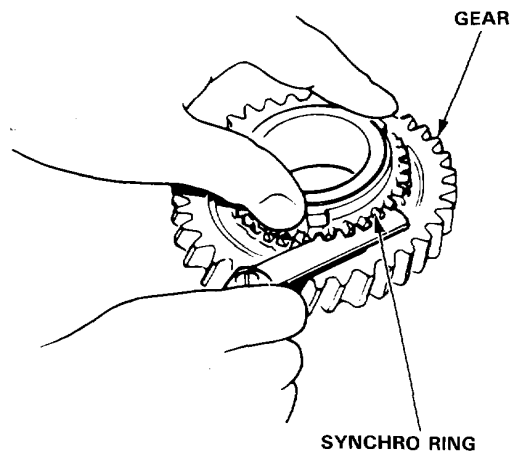
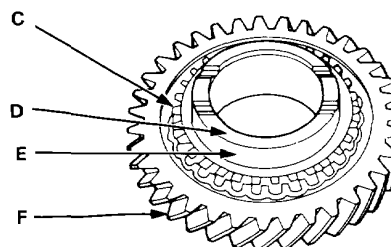
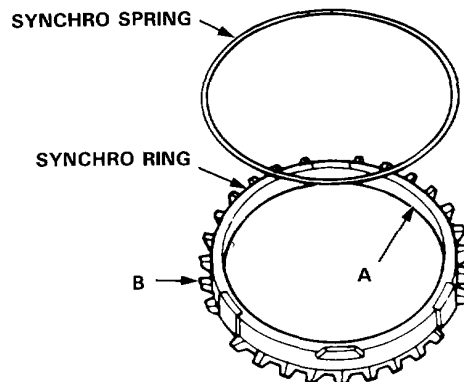
A: 0.3 mm (0.0118 in)

B: 0.3 mm (0.0118 in)

C: 0.6 mm (0.0236 in)

If the clearance exceeds the service limit, replace the synchro ring and synchro cone.

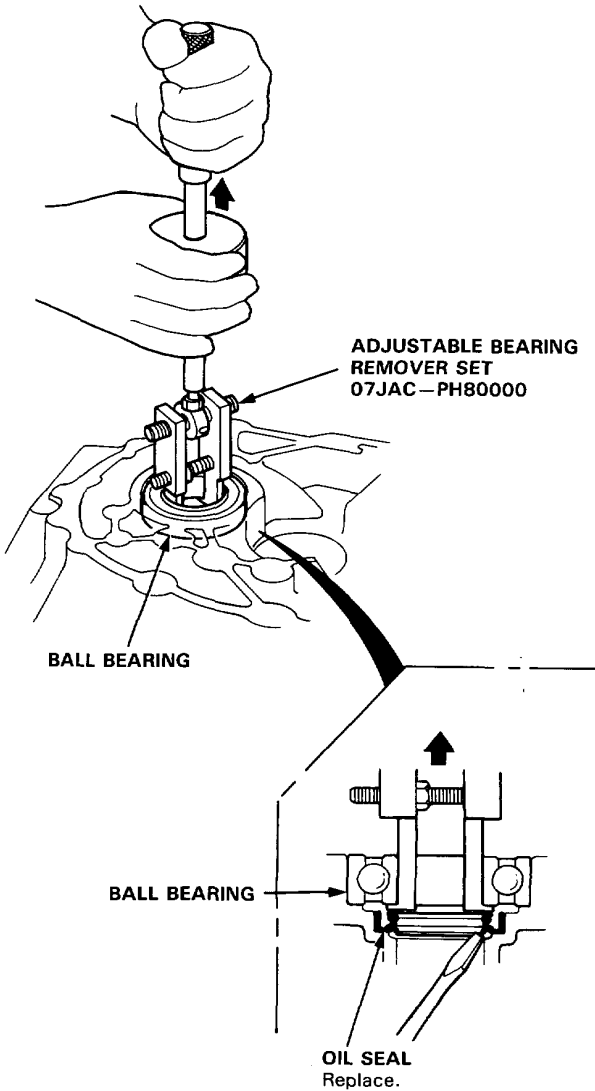
3. Separate the synchro ring and gear, then coat them with oil.
4. Install the synchro spring on the synchro ring, then set it aside for later reassembly.



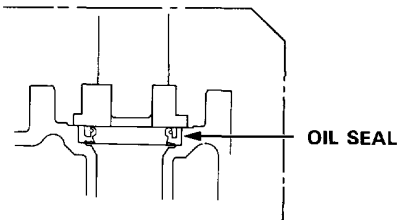
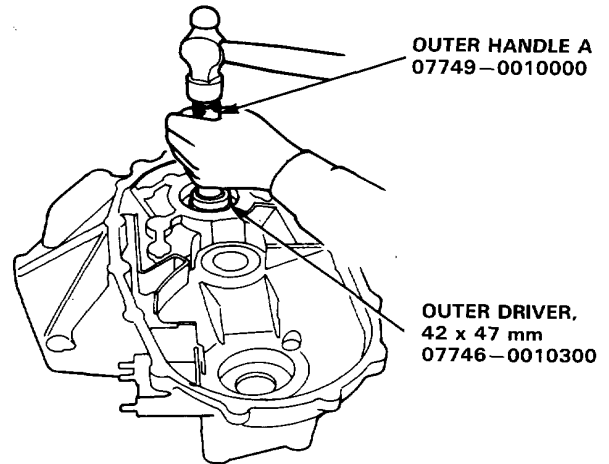
Mainshaft Bearing/Oil Seal

Replacement

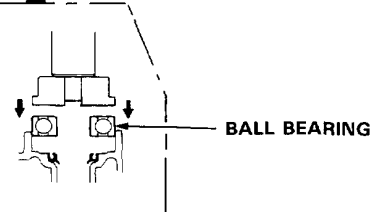
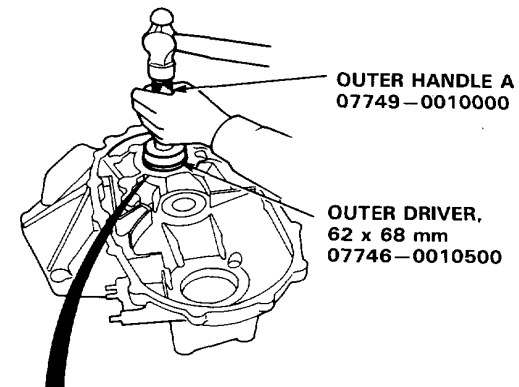
1. Remove the ball bearing with the special tool.
2. Remove the oil seal from the clutch side.



3. Drive the new oil seal in from the transmission side using the special tools.



4. Drive the new bearing in from the transmission side using the special tools.

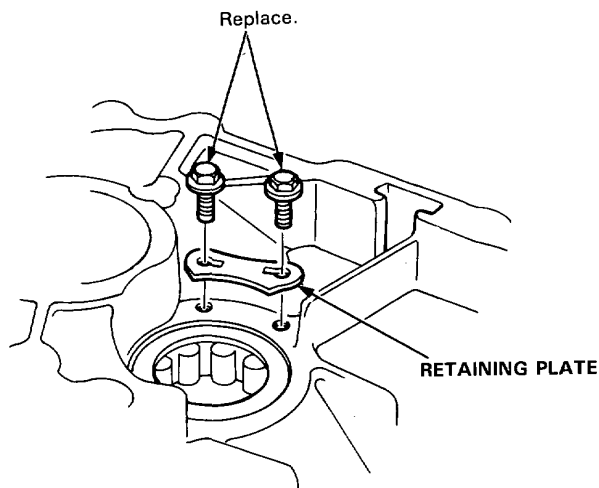




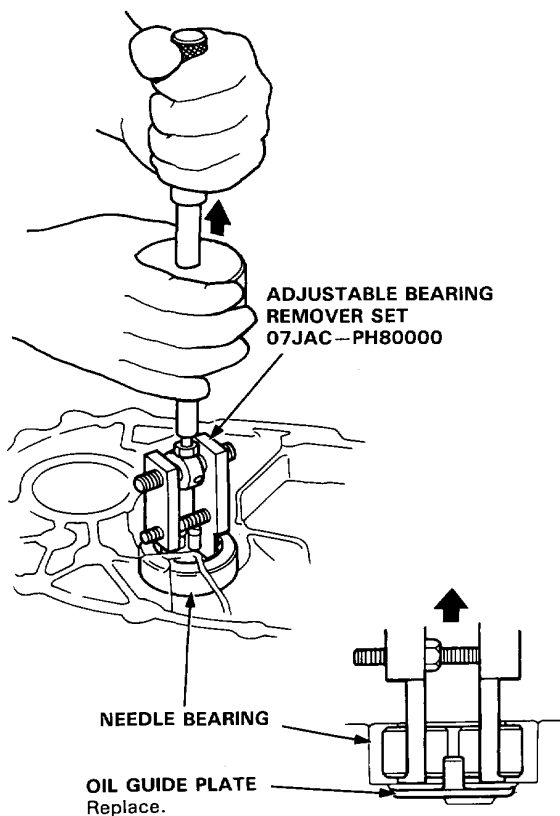
Countershaft Bearing

Replacement

1. Remove the retaining plate from the clutch housing.

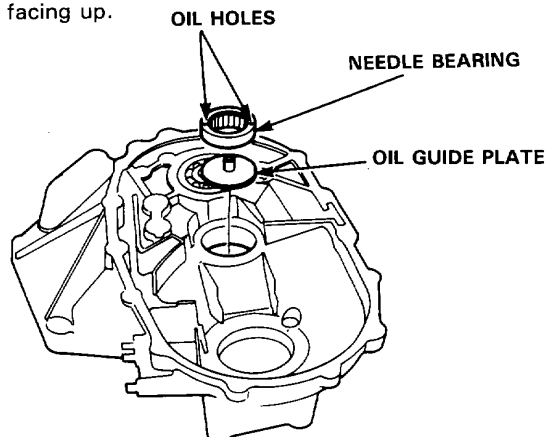


2. Remove the needle bearing with the special tool, then remove the oil guide plate.

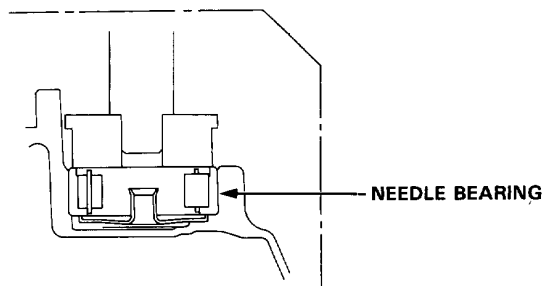
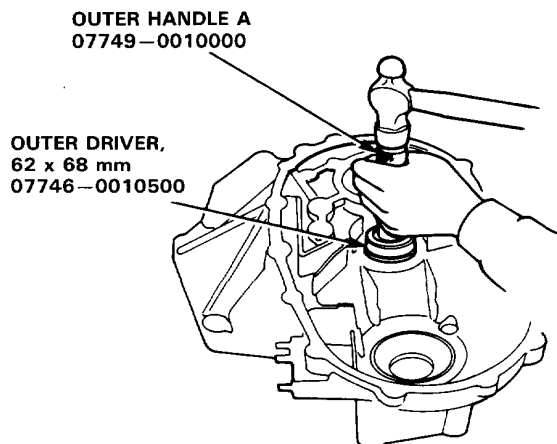


3. Position the oil guide plate and new needle bearing in the bore of the clutch housing.

NOTE: Position the needle bearing with the oil hole facing up.



4. Drive the needle bearing in using the special tools.

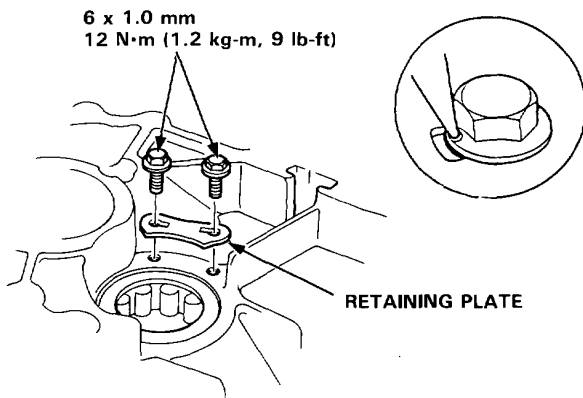


(cont'd)

Countershaft Bearing

Replacement (cont'd)

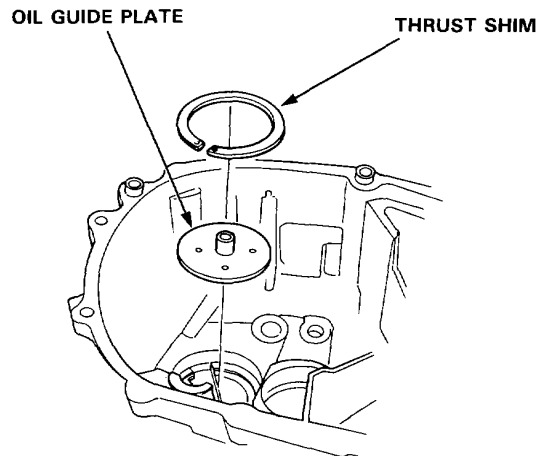
5. Install the retaining plate and stake the bolt heads in the groove in the retaining plate.



Mainshaft Thrust Shim

Adjustment

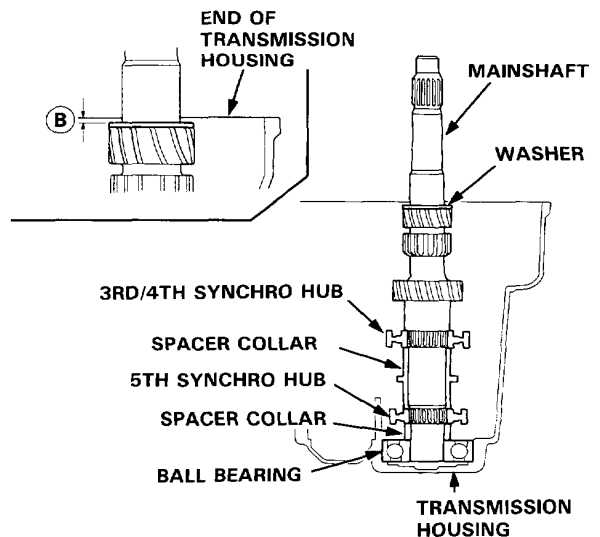
1. Remove the thrust shim and oil guide plate from the transmission housing.



2. Install the 3rd/4th synchro hub, spacer collars, 5th synchro hub, and ball bearing on the mainshaft, then install the above assembly in the transmission housings.
3. Install the washer on the mainshaft.
4. Measure distance **B** between the end of the transmission housing and washer.

NOTE:

- Use a straight edge and vernier caliper.
- Measure at three locations and average the reading.

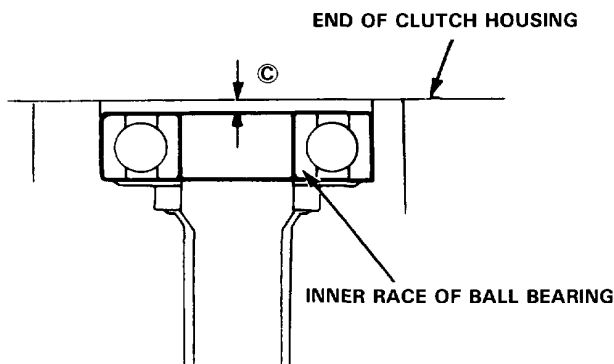




5. Measure distance © between the end of the clutch housing and bearing inner race.

NOTE:

- Use a straight edge and depth gauge.
- Measure at three locations and average the readings.



6. Select proper shim from the formula below and the chart.

NOTE: Do not use more than one shim.

Shim Selection Formula:

From the measurements you made in steps 4 and 5:

- 1. Add distance © (step 5) to distance ② (step 4).
- 2. From this number, subtract 0.93 (which is the mid-point of the flex range of the clutch housing bearing spring washer).
- 3. Take this number and compare it to the available shim sizes in the chart.

(For example)

$$\begin{array}{r}
 \text{B: } 2.39 \\
 + \text{ C: } 0.22 \\
 \hline
 = 2.61
 \end{array}
 \quad
 \begin{array}{r}
 2.61 \\
 - 0.93 \\
 \hline
 = 1.68
 \end{array}$$

- Try the 1.68 mm shim.

	Part Number	Thickness
A	23941—PK5—000	1.20 mm (0.0472 in)
B	23942—PK5—000	1.23 mm (0.0484 in)
C	23943—PK5—000	1.26 mm (0.0496 in)
D	23944—PK5—000	1.29 mm (0.0508 in)
E	23945—PK5—000	1.32 mm (0.0520 in)
F	23946—PK5—000	1.35 mm (0.0531 in)
G	23947—PK5—000	1.38 mm (0.0543 in)
H	23948—PK5—000	1.41 mm (0.0555 in)
I	23949—PK5—000	1.44 mm (0.0567 in)
J	23950—PK5—000	1.47 mm (0.0579 in)
K	23951—PK5—000	1.50 mm (0.0591 in)
L	23952—PK5—000	1.53 mm (0.0602 in)
M	23953—PK5—000	1.56 mm (0.0614 in)
N	23954—PK5—000	1.59 mm (0.0626 in)
O	23955—PK5—000	1.62 mm (0.0638 in)
P	23956—PK5—000	1.65 mm (0.0650 in)
Q	23957—PK5—000	1.68 mm (0.0661 in)
R	23958—PK5—000	1.71 mm (0.0673 in)
S	23959—PK5—000	1.74 mm (0.0685 in)
T	23960—PK5—000	1.77 mm (0.0697 in)
U	23961—PK5—000	1.80 mm (0.0709 in)
V	23962—PK5—000	1.83 mm (0.0720 in)
W	23963—PK5—000	1.86 mm (0.0732 in)
X	23964—PK5—000	1.89 mm (0.0744 in)
Y	23965—PK5—000	1.92 mm (0.0756 in)
Z	23966—PK5—000	1.95 mm (0.0768 in)
AA	23967—PK5—000	1.98 mm (0.0780 in)
AB	23968—PK5—000	2.01 mm (0.0791 in)
AC	23969—PK5—000	2.04 mm (0.0803 in)
AD	23970—PK5—000	2.07 mm (0.0815 in)
AE	23971—PK5—000	2.10 mm (0.0827 in)
AF	23972—PK5—000	2.13 mm (0.0839 in)
AG	23973—PK5—000	2.16 mm (0.0850 in)
AH	23974—PK5—000	2.19 mm (0.0862 in)
AI	23975—PK5—000	2.22 mm (0.0874 in)
AJ	23976—PK5—000	2.25 mm (0.0886 in)
AK	23977—PK5—000	2.28 mm (0.0898 in)
AL	23978—PK5—000	2.31 mm (0.0909 in)
AM	23979—PK5—000	2.34 mm (0.0921 in)
AN	23980—PK5—000	2.37 mm (0.0933 in)

(cont'd)

Mainshaft Thrust Shim

Adjustment (cont'd)

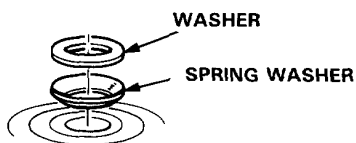
4. Check the thrust clearance in the manner described below.

NOTE: Carry out the measurement at normal room temperature.

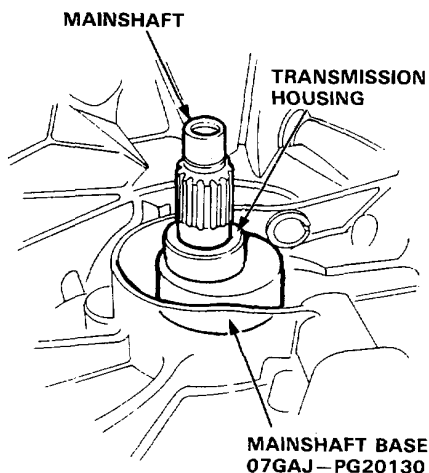
- 1. Install the thrust shim selected and oil guide plate in the transmission housing.
- 2. Install the spring washer and washer on the ball bearing.

NOTE:

- Clean the spring washer, washer and thrust shim thoroughly before installation.
- Install the spring washer, washer and thrust shim properly.



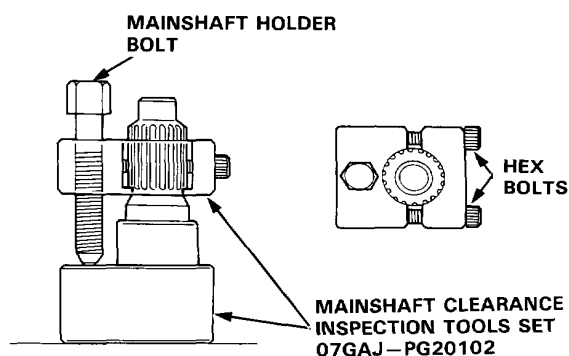
- 3. Install the mainshaft in the clutch housing.
- 4. Place the transmission housing over the mainshaft and onto the clutch housing.
- 5. Tighten the clutch and transmission housings with several 8 mm and 10 mm bolts.
- 6. Tap the mainshaft with a plastic hammer.
- 7. Slide the mainshaft base over the mainshaft.



- 8. Attach the mainshaft holder to the mainshaft as follows:

NOTE:

- Back-out the mainshaft holder bolt and loosen the two hex bolts.
- Fit the holder over the mainshaft so its lip is towards the transmission.
- Align the mainshaft holder's lip around the groove at the inside of the mainshaft splines, then tighten the hex bolts.



- 9. Seat the mainshaft fully by tapping its end with a plastic hammer.
- 10. Thread the mainshaft holder bolt in until it just contacts the wide surface of the mainshaft base.
- 11. Zero a dial gauge on the end of the mainshaft.

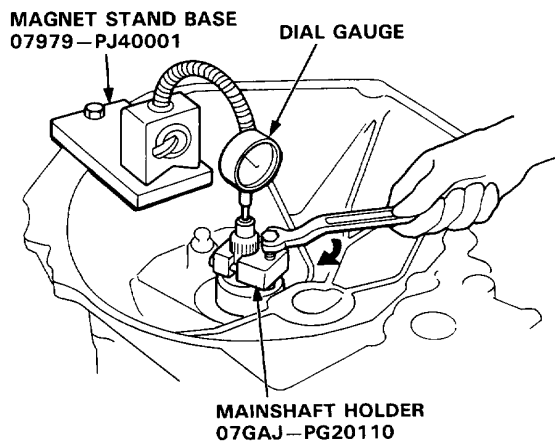


Transmission

Reassembly

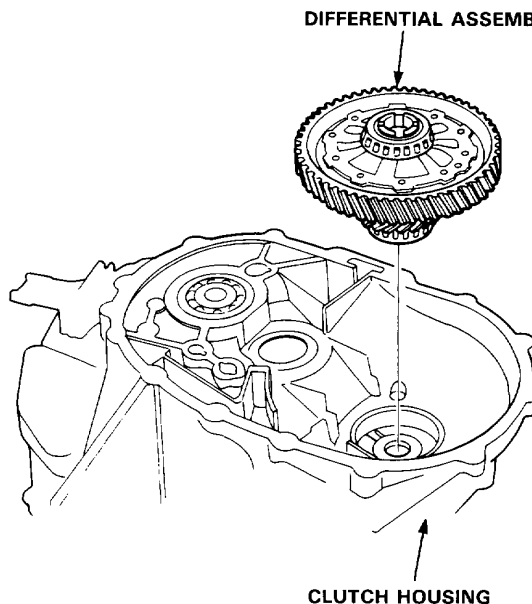
- 12. Turn the mainshaft holder bolt clockwise; stop turning when the dial gauge has reached its maximum movement. The reading on the dial gauge is the amount of mainshaft end play.

CAUTION: Turning the shaft holder bolt more than 60 degrees after the needle of the dial gauge stops moving may damage the transmission.



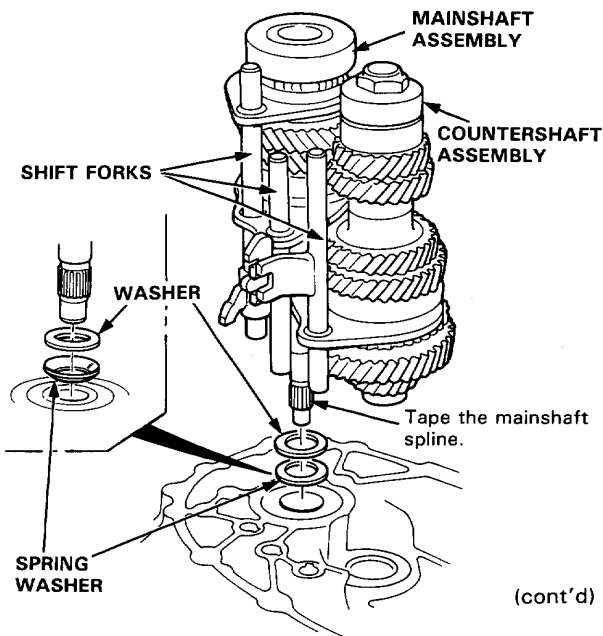
- 13. Clearance is correct if reading is between 0.10–0.16 mm (0.0039–0.0063 in). If not, recheck necessary shim thickness.

1. Install the differential assembly in the clutch housing.



NOTE: Before installing the mainshaft and countershaft assemblies, tape the mainshaft splines to protect them.

2. Install the spring washer and washer with the angle against the clutch housing as shown.
3. Insert the mainshaft and countershaft into the shift forks and install them as an assembly.

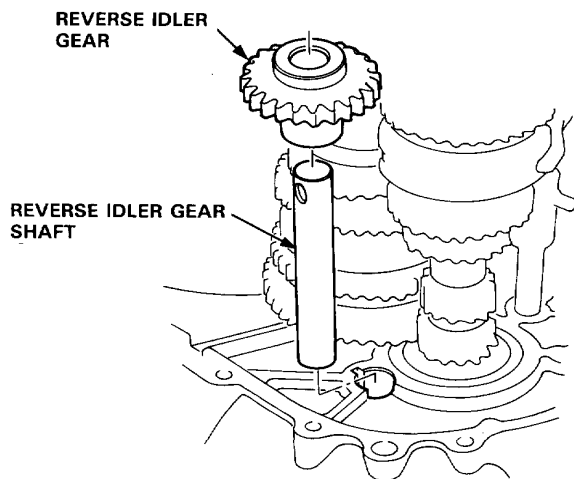


(cont'd)

Transmission

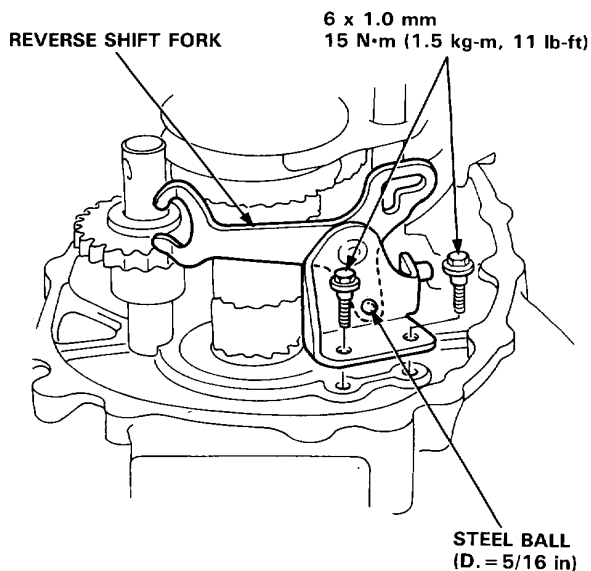
Reassembly (cont'd)

4. Install the reverse idler gear and idler gear shaft in the clutch housing.



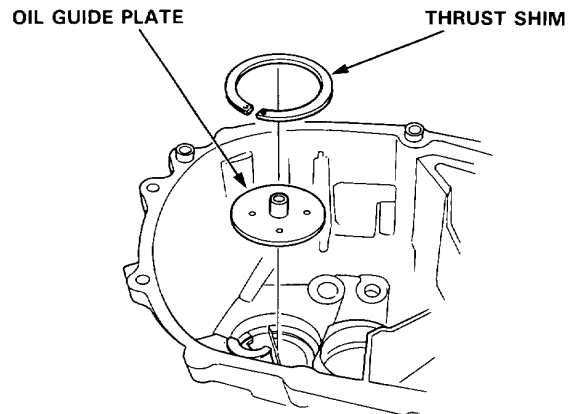
5. Install the reverse shift fork in the clutch housing with the 5th/reverse shift piece pin positioned in the slot of the reverse shift fork.

NOTE: Check that the steel ball is in the proper position.



NOTE: Select the mainshaft thrust shim according to the measurements made on page 13-34.

6. Install the oil guide plate and mainshaft thrust shim into the transmission housing.

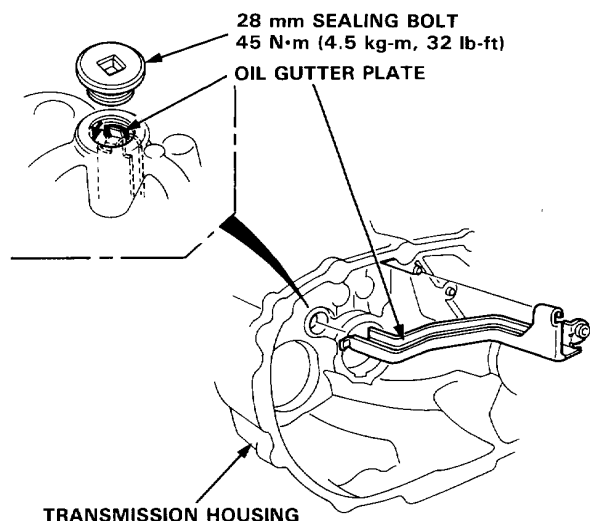


7. Install the oil gutter plate in the transmission housing.

NOTE: Bend the hook of the oil gutter plate into the hole on the transmission housing.

8. Install the 28 mm sealing bolt.

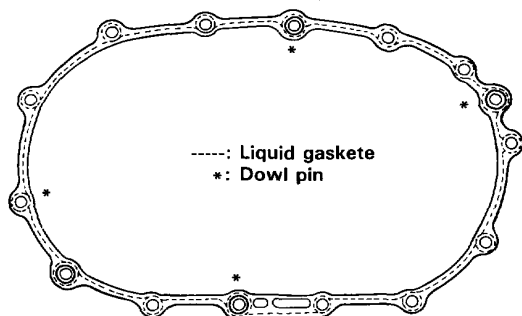
NOTE: Apply liquid gasket (P/N 08718-0001) to the threads.





9. Apply liquid gasket to the transmission mating surface of the clutch housing.

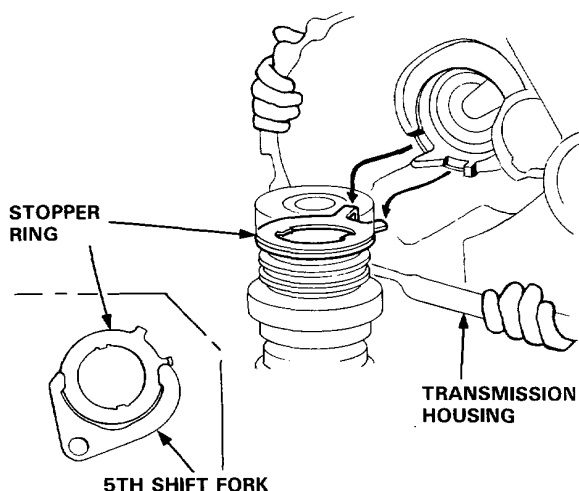
NOTE: This transmission uses no gasket between the major housings; use Honda Genuine liquid gasket (P/N 08718-0001). Assemble the housings within 20 minutes after applying the liquid gasket and allow it to cure for at least 30 minutes after assembly before filling it with oil.



10. Install the 14 x 20 mm dowel pins.

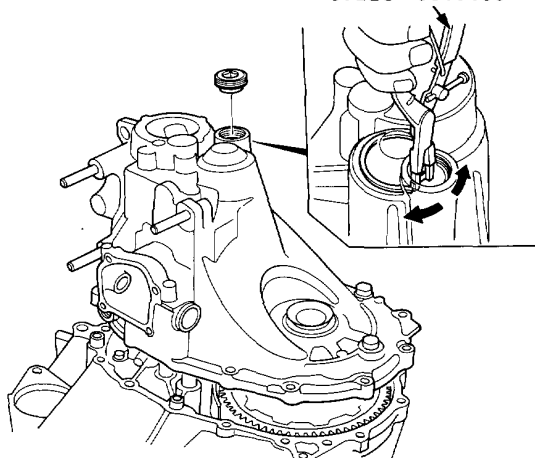
11. Set the stopper ring as shown. Place the transmission housing over the clutch housing, being careful to line up the shafts.

NOTE: Align the long arm of 5th shift fork with the hook on the stopper ring.



12. Lower the transmission housing with the snap ring expanded and set the snap ring in the groove of the countershaft bearing.

SNAP RING PLIER
07LGC-0010100



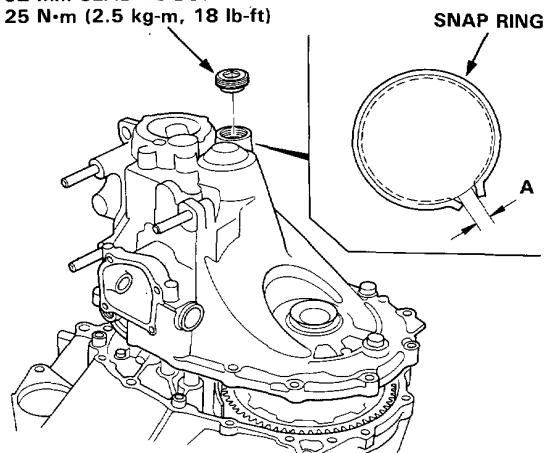
13. Check that the snap ring is securely seated in the groove of the countershaft bearing.

Dimension A as installed: 3.60 – 6.32 mm
(0.142 – 0.249 in)

14. Install the 32 mm sealing bolt.

NOTE: Apply liquid gasket (P/N 08718-0001) to the threads.

32 mm SEALING BOLT
25 N·m (2.5 kg-m, 18 lb-ft)



(cont'd)

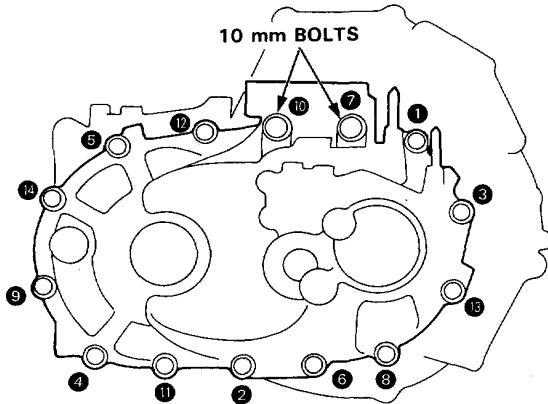
Transmission

Reassembly (cont'd)

15. Torque the bolts in the sequence shown.

8 x 1.25 mm bolts: 28 N·m (2.8 kg-m, 20 lb-ft)

10 x 1.25 mm bolts: 45 N·m (4.5 kg-m, 33 lb-ft)

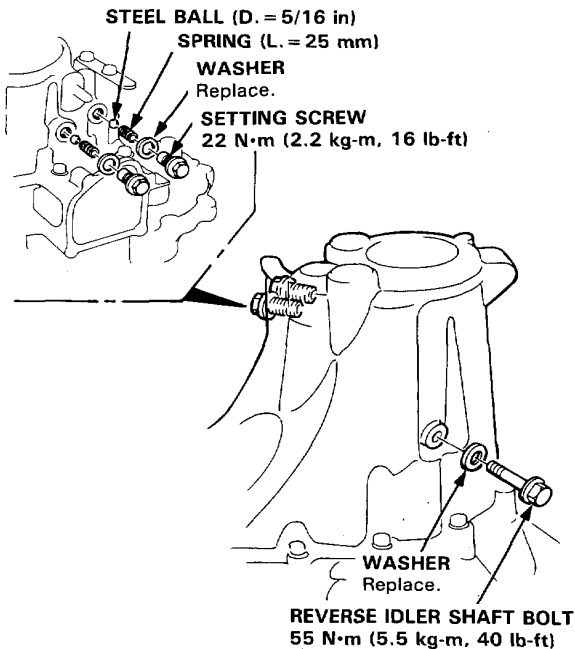


②, ④ : 8 x 50 mm bolts

Other: 8 x 40 mm bolts

16. Install the reverse idler shaft bolt.

17. Install the steel balls, springs, washers and setting screws.



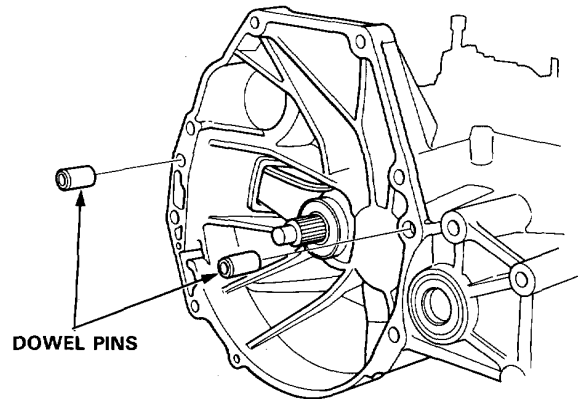
18. Install the shift arm assembly (page 13-13).

19. Shift the transmission through all the gears before installing it.

Transmission Assembly

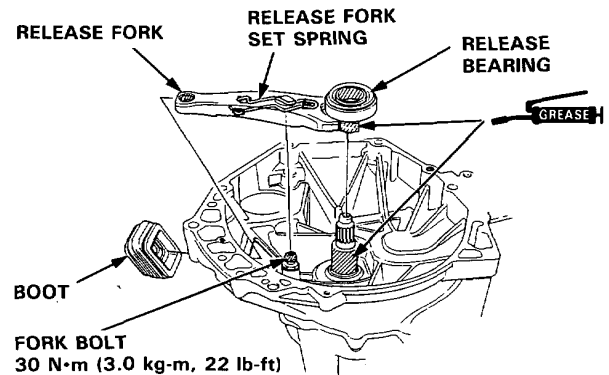
Installation

1. Install the dowel pins.



2. Apply grease to the parts as shown, then install the release bearing and release fork (see page 12-13).

NOTE: Use only Super High Temp Urea Grease (P/N 08798-9002).

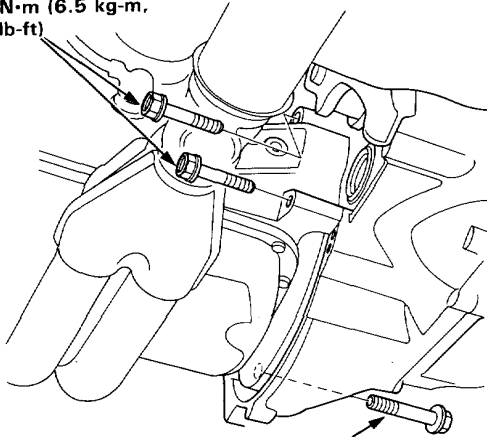


3. Install the release fork boot.



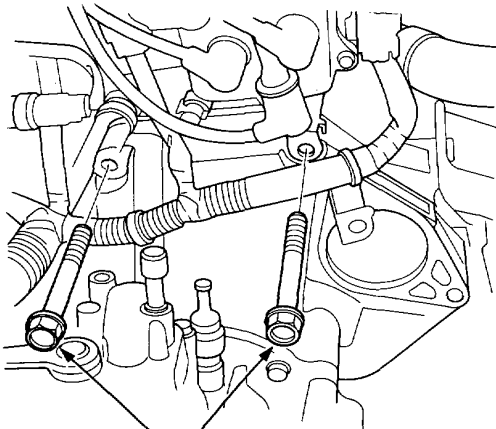
4. Place the transmission on the transmission jack, and raise it to the engine level.
5. Install the 3 lower transmission mounting bolts.

12 x 1.25 mm
65 N·m (6.5 kg-m,
47 lb-ft)



12 x 1.25 mm
65 N·m (6.5 kg-m, 47 lb-ft)

6. Install the 2 upper transmission mounting bolts.

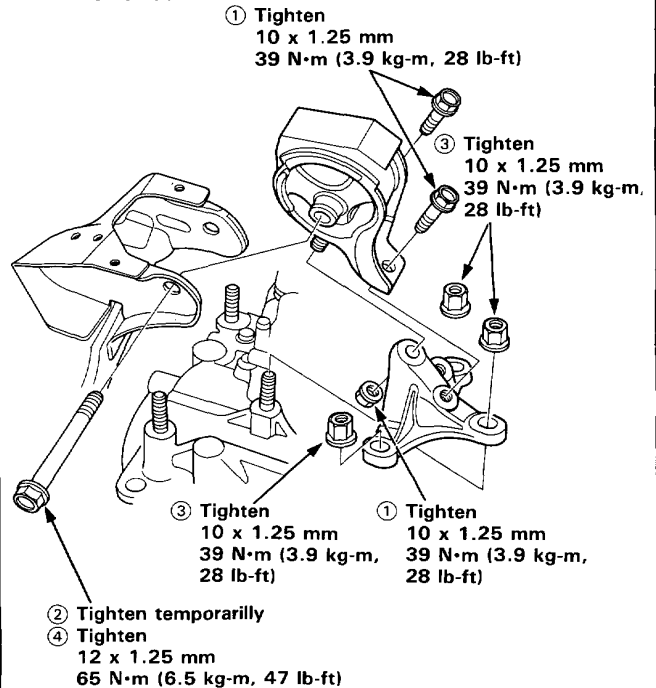


12 x 1.25 mm
65 N·m (6.5 kg-m, 47 lb-ft)

7. Raise the transmission, then install the mount bracket and transmission mount.

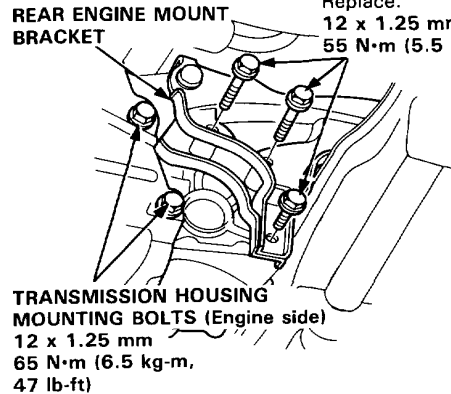
NOTE: Torque mounting bolts and nuts in sequence shown.

CAUTION: Make sure the bushings are not twisted or offset.



8. Install the 3 bracket mounting bolts.

BRACKET MOUNTING BOLTS
Replace.
12 x 1.25 mm
55 N·m (5.5 kg-m, 40 lb-ft)

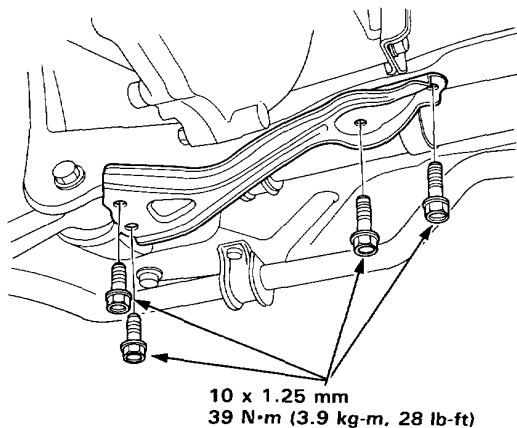


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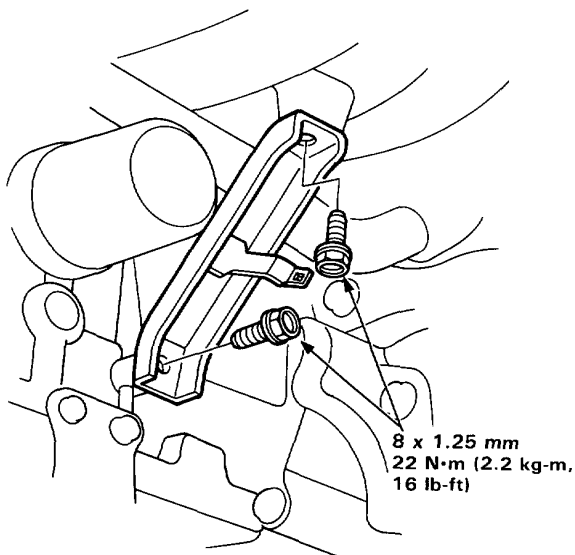
Transmission Assembly

Installation (cont'd)

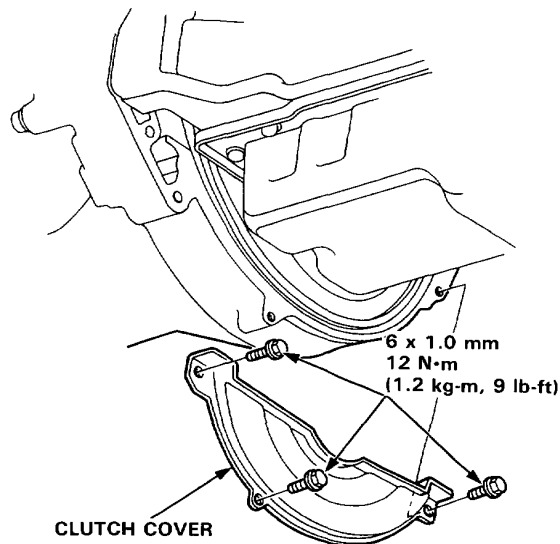
9. Install the rear beam stiffener.



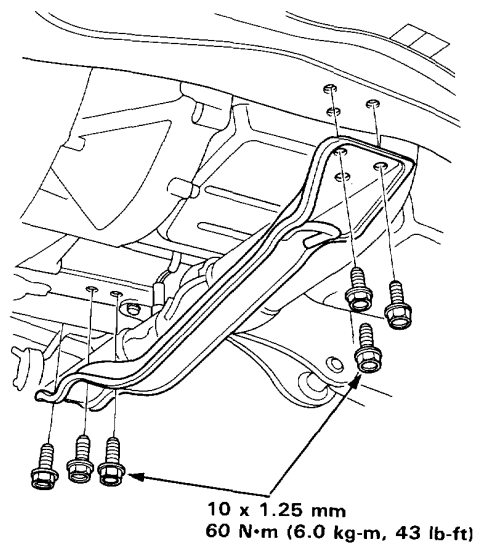
10. Install the intake manifold stay.



11. Install the clutch cover.

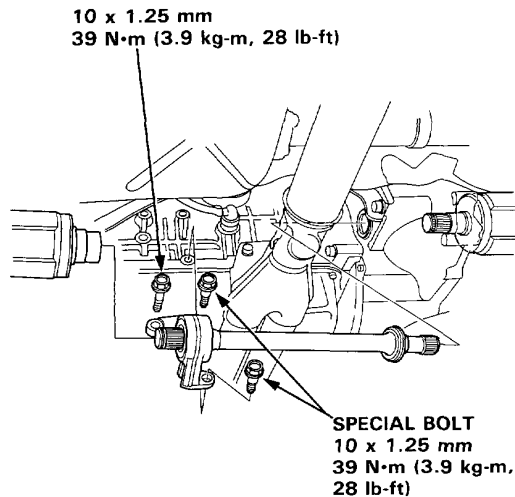


12. Install the center beam.





13. Install the intermediate shaft and driveshafts (see Section 16).



14. Install the radius rod.

NOTE: Check for deterioration or damage of the radius rod rubber bushings.

15. Install the ball joint to the lower arm.

16. Install the damper fork.

SELF-LOCKING BOLTS

Replace.

12 x 1.25 mm

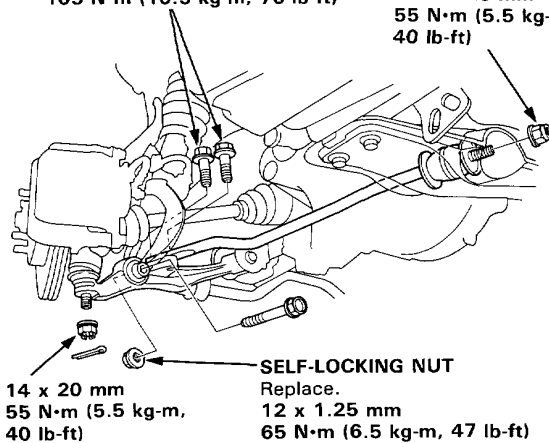
105 N·m (10.5 kg-m, 76 lb-ft)

SELF-LOCKING NUT

Replace.

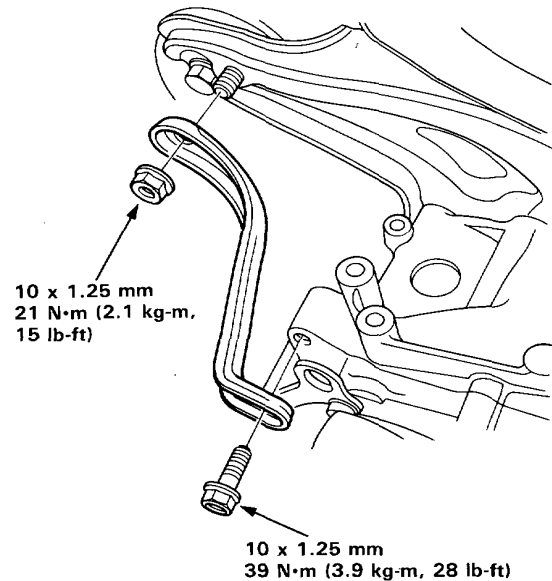
12 x 1.25 mm

55 N·m (5.5 kg-m, 40 lb-ft)

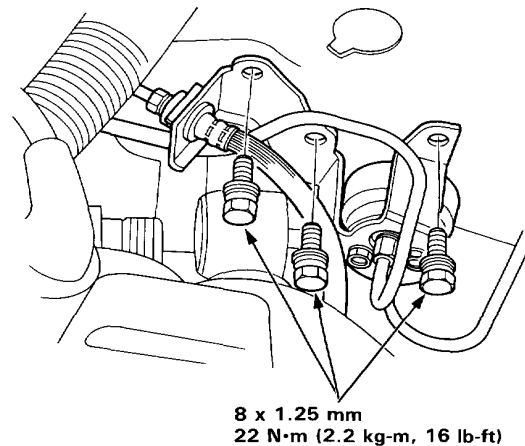


17. Install the rear engine mount bracket stay.

NOTE: Loosely install the stay mounting bolt and nut, then torque in the sequence shown.



18. Install the clutch damper.



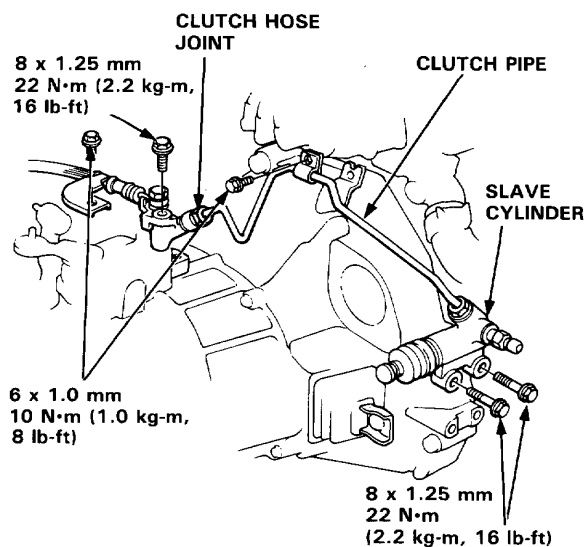
(cont'd)

Transmission Assembly

Installation (cont'd)

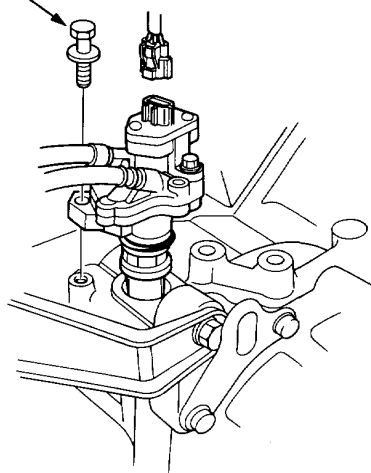
19. Install the slave cylinder, then install the clutch pipe joint and stay.

CAUTION: Take care not to bend the pipe.



20. Install the speed sensor, then connect the connector.

8 x 1.25 mm
19 N·m (1.9 kg-m, 14 lb-ft)

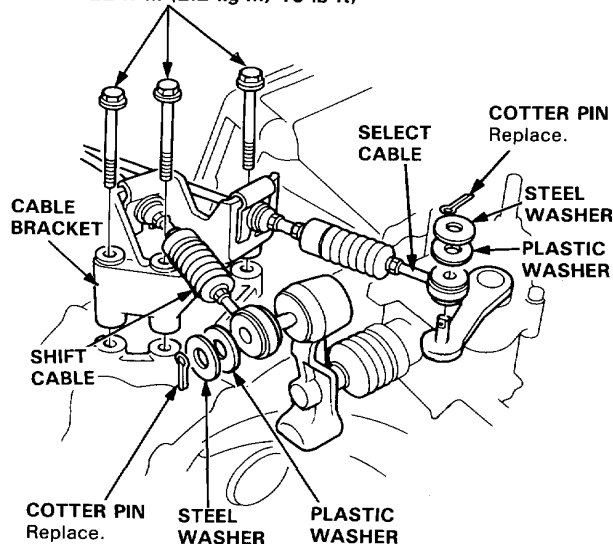


21. Install the shift cable and select cable to the shift arm lever and to select lever respectively.

CAUTION: Take care not to bend the cables.

NOTE: Check that the new cotter pin is seated firmly.

8 x 1.25 mm
22 N·m (2.2 kg-m, 16 lb-ft)



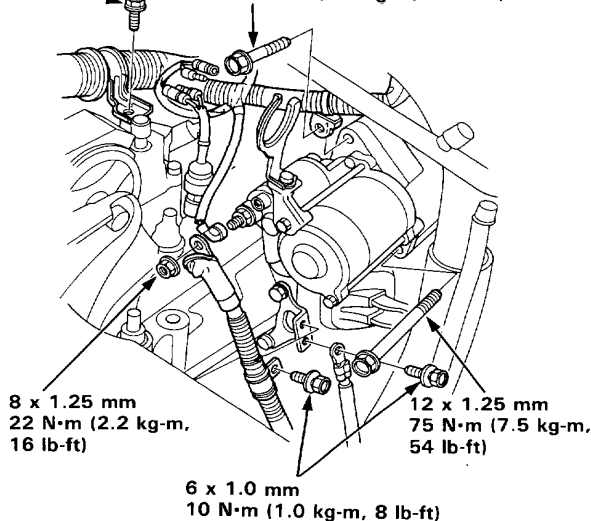
22. Connect the transmission ground cable and back-up light switch connectors.

23. Install the harness clump.

24. Install the starter motor, then connect the cables.

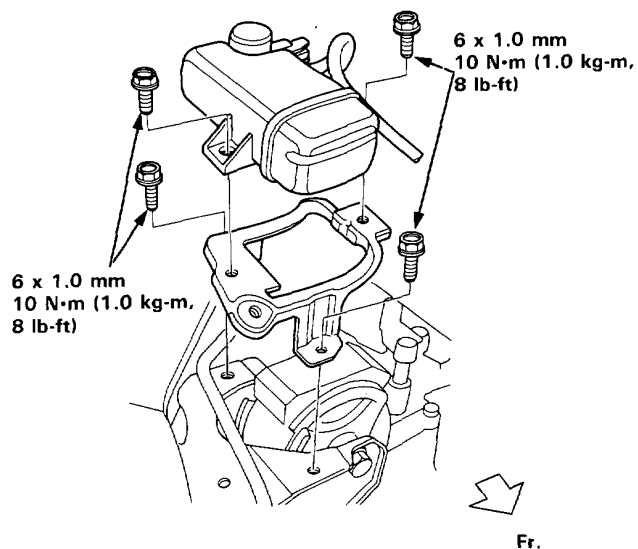
6 x 1.0 mm
10 N·m (1.0 kg-m, 8 lb-ft)

10 x 1.25 mm
45 N·m (4.5 kg-m, 33 lb-ft)

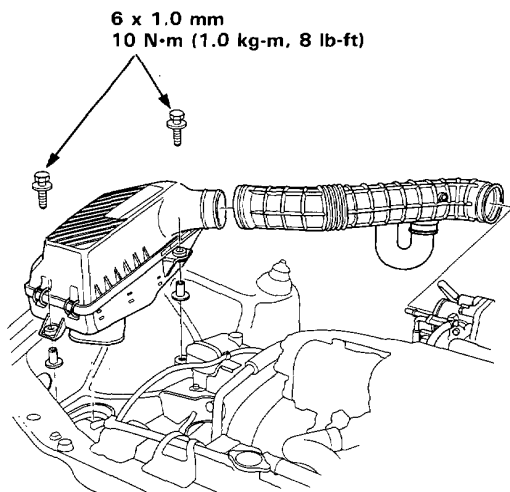




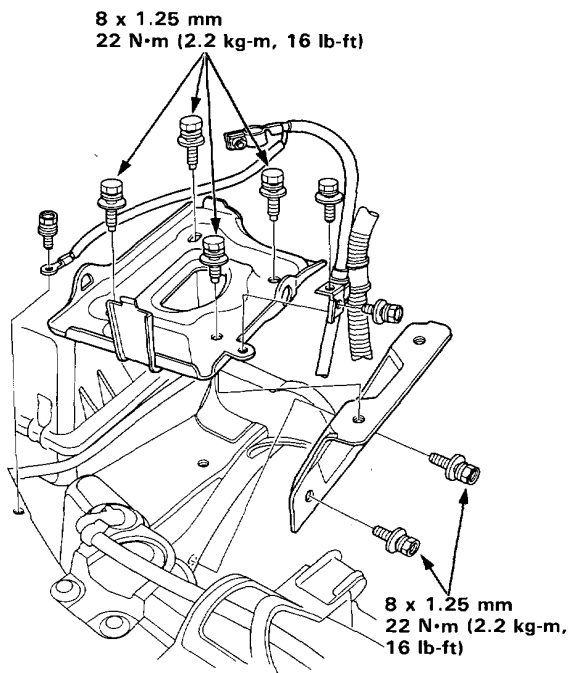
25. Install the bracket and vacuum tank.



26. Install the air cleaner case and air flow tube.



27. Install the base stay and battery base.



28. Refill the transmission with oil.

29. Install the battery, then connect the battery negative (-) and positive (+) cables to the battery.

30. Check the clutch operation.

31. Shift the transmission and check for smooth operation.

(cont'd)

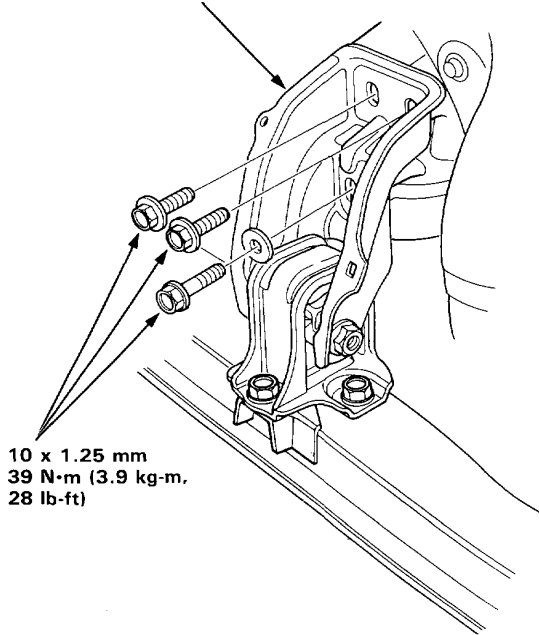
Transmission Assembly

Installation (cont'd)

32. Loosen the 3 mount bolts of the front engine mount bracket, then torque the 3 mount bolts.

CAUTION: Make sure the bushings are not twisted or offset.

FRONT ENGINE MOUNT BRACKET



10 x 1.25 mm
39 N·m (3.9 kg-m,
28 lb-ft)

Automatic Transmission

Special Tools	14-2
Description	14-3

Electrical System

Component Location	14-31
Circuit Diagram	14-32
Troubleshooting Procedures	14-34
Symptom-to-Component Chart	
Electrical System	14-36
Troubleshooting Flowcharts	14-38
A/T Speed Sensor	14-61
S Switch	14-61
Lockup Control Solenoid Valve A/B	14-62
Shift Control Solenoid Valve A/B	14-63

Hydraulic System

Symptom-to-Component Chart	
Hydraulic System	14-64
Road Test	14-68
Stall Speed	14-75
Pressure Testing	14-76
Fluid Level	14-83

Transmission

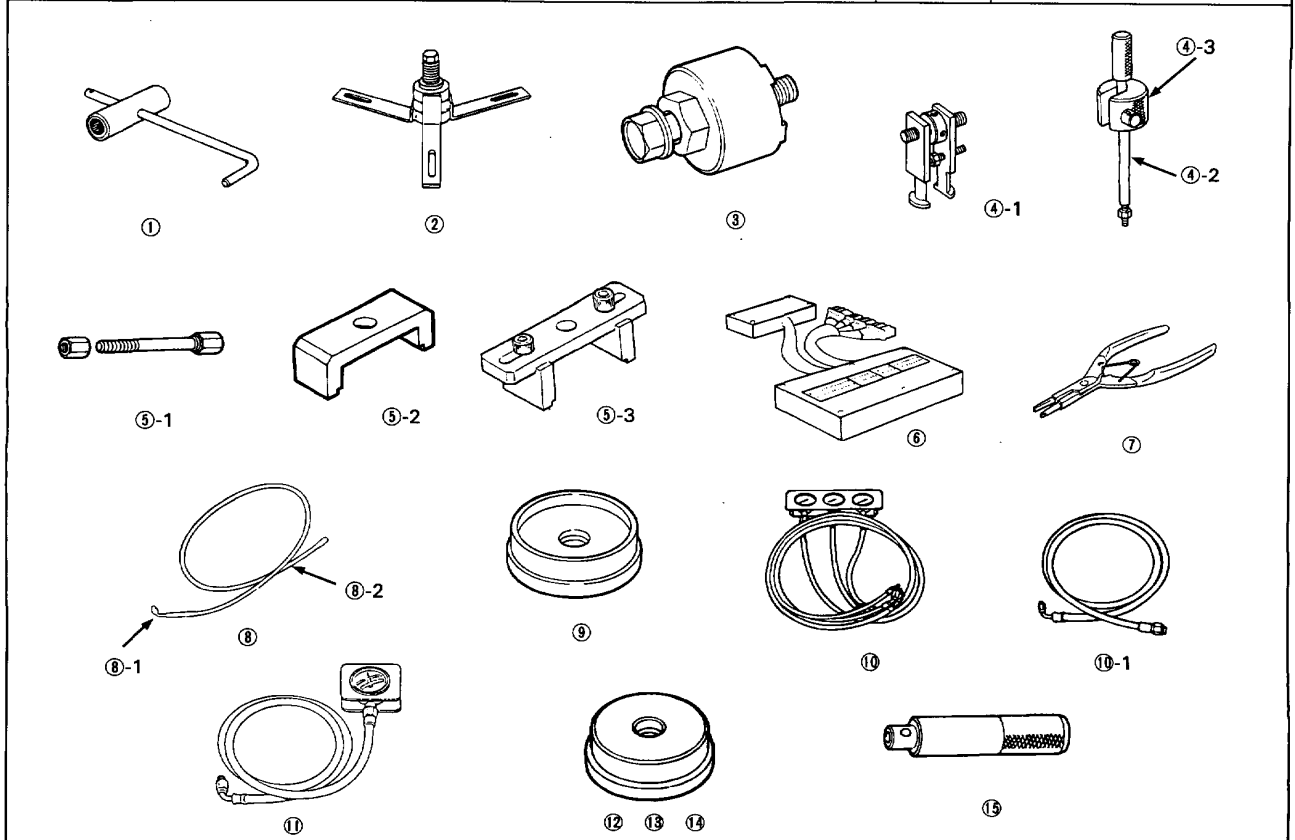
Transmission	
Removal	14-84
Illustrated Index	
R.Side Cover	14-90
Transmission Housing	14-92
Torque Converter Housing	14-94
R.Side Cover	
Removal	14-96
Transmission Housing	
Removal	14-98
Torque Converter Housing/Valve Body	
Removal	14-100
Valve Body	
Repair	14-102
Valve	
Assembly	14-103
Valve Caps	14-104

Oil Pump	14-105
Main Valve Body	14-106
Secondary Valve Body	14-108
Regulator Valve Body	14-110
Throttle Valve Body	14-111
Servo Body	14-112
1st/2nd Accumulator Body	14-113
Mainshaft	14-114
Countershaft	14-115
One-way Clutch	14-118
Secondary Shaft	14-119
Clutch	
Illustrated Index	14-121
Disassembly	14-125
Reassembly	14-127
Torque Converter Housing Bearings	
Mainshaft Bearing/Oil Seal	14-131
Countershaft Bearing	14-132
Secondary Shaft Bearing	14-132
Transmission Housing Bearings	14-133
Transmission	
Reassembly	14-134
R.Side Cover	
Feed Pipe Installation	14-140
Parking Brake Stopper	14-140
Torque Converter	14-141
Transmission	
Installation	14-142
Gearshift Selector	14-147
Shift Indicator Panel	14-148
Shift Cable	
Removal/Installation	14-148
Adjustment	14-150
Throttle Control Cable	14-151



Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAB—PF50101	Mainshaft Holder	1	14-96, 138
②	07HAC—PK40101	Housing Puller	1	14-97
③	07HAF—PK40100	Gear Installer	1	14-138
④	07JAC—PH80000	Adjustable Bearing Remover Set	1	14-131, 132
④-1	07JAC—PH80100	Bearing Remover Attachment	1	14-131, 132
④-2	07JAC—PH80200	Remover Handle Assembly	1	14-131, 132
④-3	07741—0010201	Remover Weight	1	14-131, 132
⑤	07LAE—PX40000	Clutch Spring Compressor Set	1	14-125, 128
⑤-1	07GAE—PG40200	Clutch Spring Compressor Bolt	1	14-125, 128
⑤-2	07HAE—PL50100	Clutch Spring Compressor Attachment	1	14-125, 128
⑤-3	07LAE—PX40100	Clutch Spring Compressor Attachment	1	14-125, 128
⑥	07LAJ—PT30100 or 07LAJ—PT3010A	Test Harness	1	14-35, 68
⑦	07LGC—0010100	Snap Ring Pliers	1	14-133
⑧	07MAJ—PY40100	A/T Oil Pressure Gauge Hose Assembly	1	14-76
⑧-1	07MAJ—PY40110	Oil Pressure Gauge Hose	1	14-76
⑧-2	07MAJ—PY40120	Oil Pressure Joint	1	14-76
⑨	07NAD—PX40100	Attachment, 78 x 80 mm	1	14-133
⑩	07406—0020300	A/T Oil Pressure Gauge Set	1	14-76
⑩-1	07406—0020201	A/T Oil Pressure Gauge Hose	1	14-76
⑪	07406—0070000	A/T Low Pressure Gauge	1	14-76
⑫	07746—0010400	Attachment, 52 x 55 mm	1	14-132
⑬	07746—0010500	Attachment, 62 x 68 mm	1	14-131, 132
⑭	07746—0010600	Attachment, 72 x 75 mm	1	14-131, 133
⑮	07749—0010000	Driver	1	14-131, 132, 133





Description

The Automatic Transmission is a combination of a 3-element torque converter and triple-shaft electronically controlled automatic transmission which provides 4 speeds forward and 1 speed reverse. The entire unit is positioned in line with the engine.

Torque Converter, Gears and Clutches

The torque converter consists of a pump, turbine and stator assembled in a single unit.

They are connected to the engine crankshaft so they turn together as a unit as the engine turns. Around the outside of the torque converter is a ring gear which meshes with the starter pinion when the engine is being started. The entire torque converter assembly serves as a flywheel while transmitting power to the transmission mainshaft.

The transmission has three parallel shafts: the mainshaft, the countershaft, and the secondary shaft. The mainshaft is in line with the engine crankshaft.

The mainshaft includes the clutches for 3rd, and 4th, and gears for 3rd, 4th, Reverse and Idler (Reverse gear is integral with 4th gear).

The countershaft includes the 1st-hold clutch and gears for 2nd, 3rd, 4th, Reverse, 1st and Idler.

The secondary shaft includes 1st and 2nd clutches, and gears for 2nd, 1st and Idler.

The 4th and reverse gears can be locked to the countershaft at its center, providing 4th gear or Reverse, depending on which way the selector is moved.

The gears on the mainshaft are in constant mesh with those on the countershaft and the secondary shaft. When certain combinations of gears in the transmission are engaged by the clutches, power is transmitted from the mainshaft to the countershaft to provide **D4**, **D3**, **2**, **1** and **R**.

Electronic Control

The electronic control system consists of an A/T control unit, sensors, and 4 solenoid valves. Shifting and lockup are electronically controlled for comfortable driving under all conditions.

The A/T control unit is located below the dashboard, behind the right side kick panel on the passenger's side.

Hydraulic Control

The valve assembly includes the main valve body, secondary valve body, servo valve body, regulator valve body and throttle valve body. They are bolted to the torque converter housing as an assembly.

The main valve body contains the manual valve, 1-2 shift valve, 2-3 shift valve, cooler relief valve, lockup shift valve, lockup control valve, 3-2 kick-down valve, modulator valve, CPC valve and oil pump gears.

The secondary valve body includes the 4th exhaust valve, 3rd kick-down valve, 3-4 shift valve, servo control valve, orifice control valve and the 2nd orifice control valve.

The servo valve body contains the accumulator pistons and servo valve. The regulator valve body contains the regulator valve, T/C check valve, and lockup timing valve. The throttle valve body contains the throttle valve B and relief valve. Fluid from the regulator passes through the manual valve to the various control valves.

The clutches receive oil from their respective feed pipes or internal hydraulic circuit.

Shift Control Mechanism

Input from various sensors located throughout the car determines which shift control solenoid valve the A/T control unit will activate. Activating a shift control solenoid valve changes modulator pressure, causing a shift valve to move. This pressurizes a line to one of the clutches, engaging that clutch and its corresponding gear.

Lockup Mechanism

In **D4**, in 2nd, 3rd and 4th, and **D3** in 3rd, pressurized fluid is drained from the back of the torque converter through an oil passage, causing the lockup piston to be held against the torque converter cover. As this takes place, the mainshaft rotates at the same speed as the engine crankshaft. Together with hydraulic control, an A/T control unit optimizes the timing of the lockup mechanism.

The lockup valves control the range of lockup according to lockup control solenoid valves A and B, and throttle valve B.

When lockup control solenoid valves A and B activate, modulator pressure changes. Lockup control solenoid valves A and B are mounted on the torque converter housing, and are controlled by the A/T control unit.

(cont'd)

Description

(cont'd)

Gear Selection

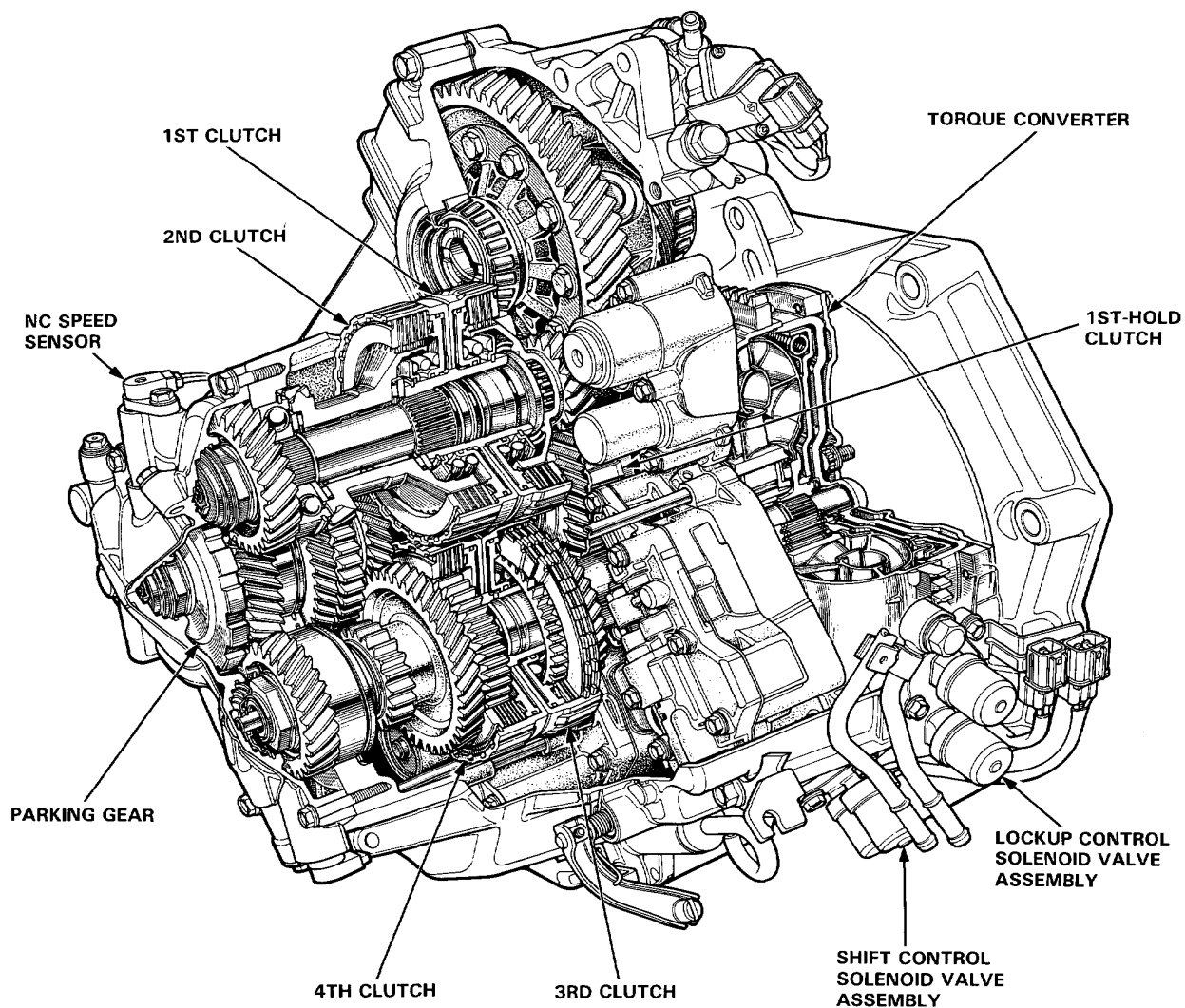
The selector lever has seven positions: **P** PARK, **R** REVERSE, **N** NEUTRAL, **D4** 1st through 4th gear ranges, **D3** 1st through 3rd gear ranges, **2** 2nd gear and **1** 1st gear.

Position	Description
P PARK	Front wheels locked; parking pawl engaged with parking gear on countershaft. All clutches released.
R REVERSE	Reverse; reverse selector engaged with countershaft reverse gear and 4th gear clutch locked.
N NEUTRAL	All clutches released.
D4 DRIVE (1 through 4)	General driving; starts off in 1st, shifts automatically to 2nd, 3rd, then 4th, depending on vehicle speed and throttle position. Downshift through 3rd, 2nd and 1st on deceleration to stop. The lockup mechanism comes into operation in D4 .
D3 DRIVE (1 through 3)	For rapid acceleration at highway speeds and general driving; up-hill and down-hill driving; starts off in 1st, shifts automatically to 2nd, then 3rd, depending on vehicle speed and throttle position. Downshifts through 2nd to 1st on deceleration to stop. The lockup mechanism comes into operation in 3rd speed.
2 SECOND	For engine braking or better traction starting off on loose or slippery surfaces; stays in 2nd gear, does not shift up or down.
1 FIRST	For engine braking; stays in 1st gear, does not shift up or down.

Starting is possible only in **P** and **N** through the use of a slide-type, neutral-safety switch.

Position Indicator

A position indicator in the instrument panel shows what gear has been selected without having to look down at the console.



Description

Clutches

The four-speed automatic transmission uses hydraulically actuated clutches to engage or disengage the transmission gears. When clutch pressure is introduced into the clutch drum, the clutch piston is applied. This presses the friction discs and steel plates together, locking them so they don't slip. Power is then transmitted through the engaged clutch pack to its hub-mounted gear.

Likewise, when clutch pressure is bled from the clutch pack, the piston releases the friction discs and steel plates, and they are free to slide past each other while disengaged. This allows the gear to spin independently of its shaft, transmitting no power.

[1st Clutch]

The first clutch engages/disengages first gear, and is located at the center of the secondary shaft.

The first clutch is joined back-to-back to the second clutch.

The first clutch is supplied clutch pressure by its oil feed pipe within the secondary shaft.

[1st-hold Clutch]

The first-hold clutch engages/disengages 1st-hold or 1 position, and is located at the end of the countershaft, just behind the torque converter housing. The 1st-hold clutch is supplied clutch pressure by its oil feed pipe within the countershaft.

[2nd Clutch]

The second clutch engages/disengages second gear, and is located at the center of the secondary shaft. The second clutch is joined back-to-back to the first clutch. The second clutch is supplied clutch pressure through the secondary shaft by a circuit connected to the 1st/2nd accumulator body.

[3rd Clutch]

The third clutch engages/disengages third gear, and is located at the center of the mainshaft.

The third clutch is joined back-to-back to the fourth clutch.

The third clutch is supplied clutch pressure through the mainshaft by a circuit connected to the regulator valve body.

[4th Clutch]

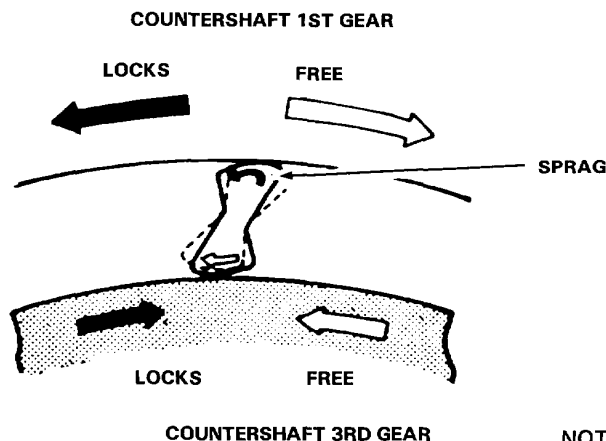
The fourth clutch engages/disengages fourth gear, as well as reverse gear, and is located at the center of the mainshaft. The fourth clutch is joined back-to-back to the third clutch. The fourth clutch is supplied clutch pressure by its oil feed pipe within the mainshaft.

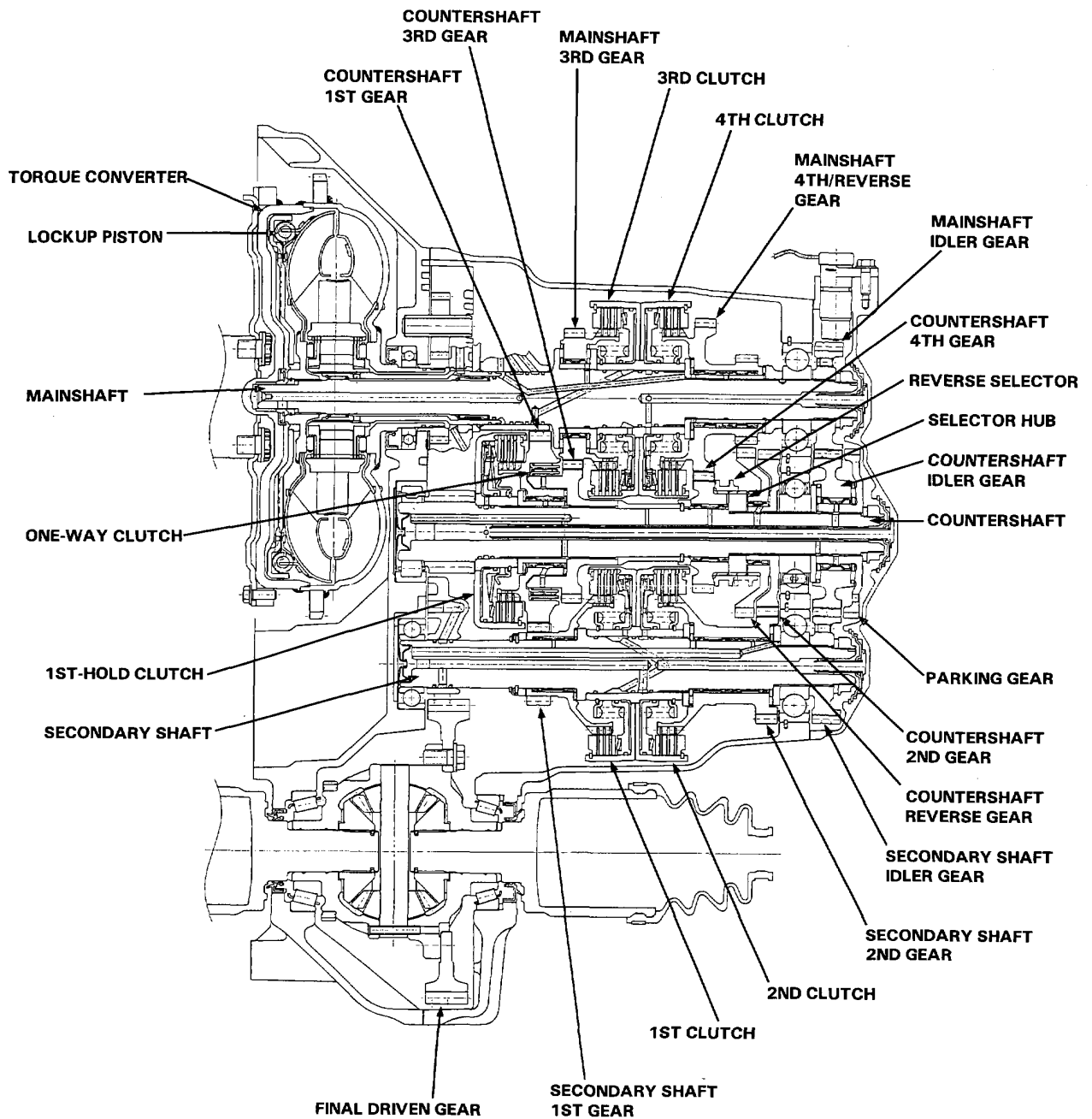
[One-way Clutch]

The one-way clutch is positioned between the countershaft first gear and third gears, with the third gear splined to the countershaft. The first gear provides the outer race surface, and the third gear provides the inner race surface. The one-way clutch locks up when power is transmitted from the mainshaft first gear to the countershaft first gear.

The first clutch and gears remain engaged in the **D4**, **D3** or **2** position.

However, the one-way clutch disengages when the 2nd, 3rd, or 4th clutches/gears are applied in the **D4**, **D3** or **2** position. This is because the increased rotational speed of the gears on the countershaft overrides the locking "speed range" of the one-way clutch. Thereafter, the one-way clutch freewheels with the first clutch still engaged.





(cont'd)

Description

Clutches (cont'd)

Lockup Clutch

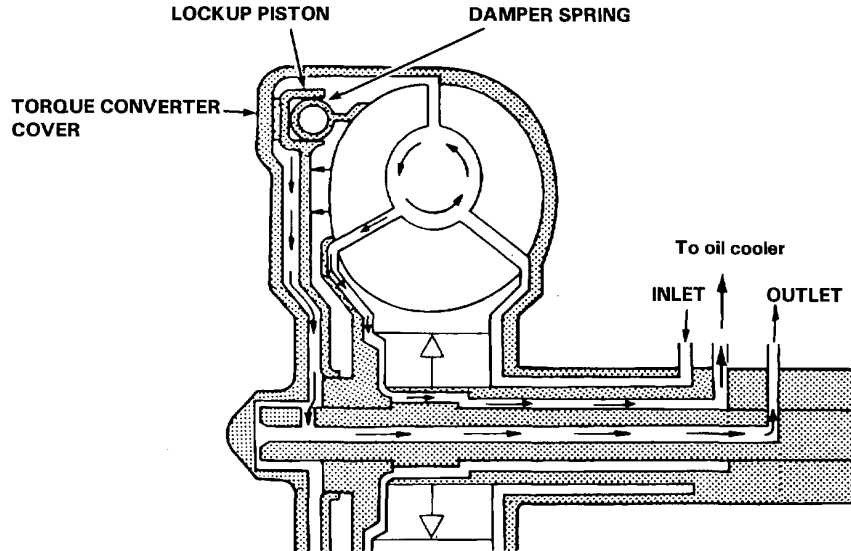
1. Operation (clutch on)

With the lockup clutch on, the oil in the chamber between the converter cover and lockup piston is drained off, and the converter oil exerts pressure through the piston against the converter cover. As a result, the converter turbine is locked to the converter cover. The effect is to bypass the converter, thereby placing the car in direct drive.

Power flow

The power flows by way of:

Engine
↓
Drive plate
↓
Torque converter cover
↓
Lockup piston
↓
Damper spring
↓
Turbine
↓
Mainshaft

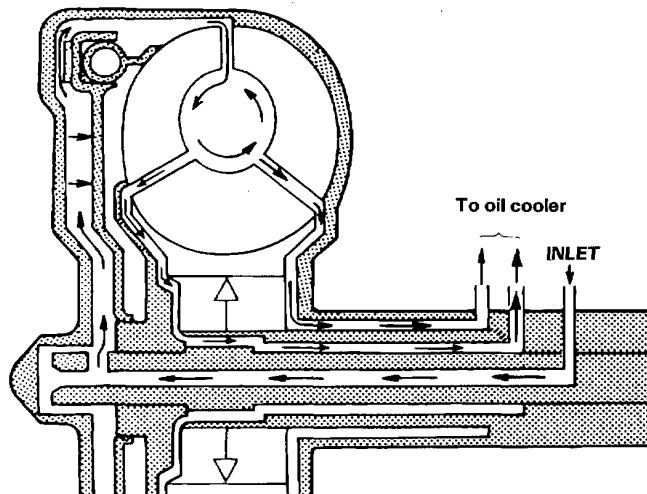


2. Operation (clutch off)

With the lockup clutch off, the oil flows in the reverse of CLUTCH ON. As a result, the lockup piston moves away from the converter cover and the torque converter lockup is released.

Power flow

Engine
↓
Drive plate
↓
Torque converter cover
↓
Pump
↓
Turbine
↓
Mainshaft

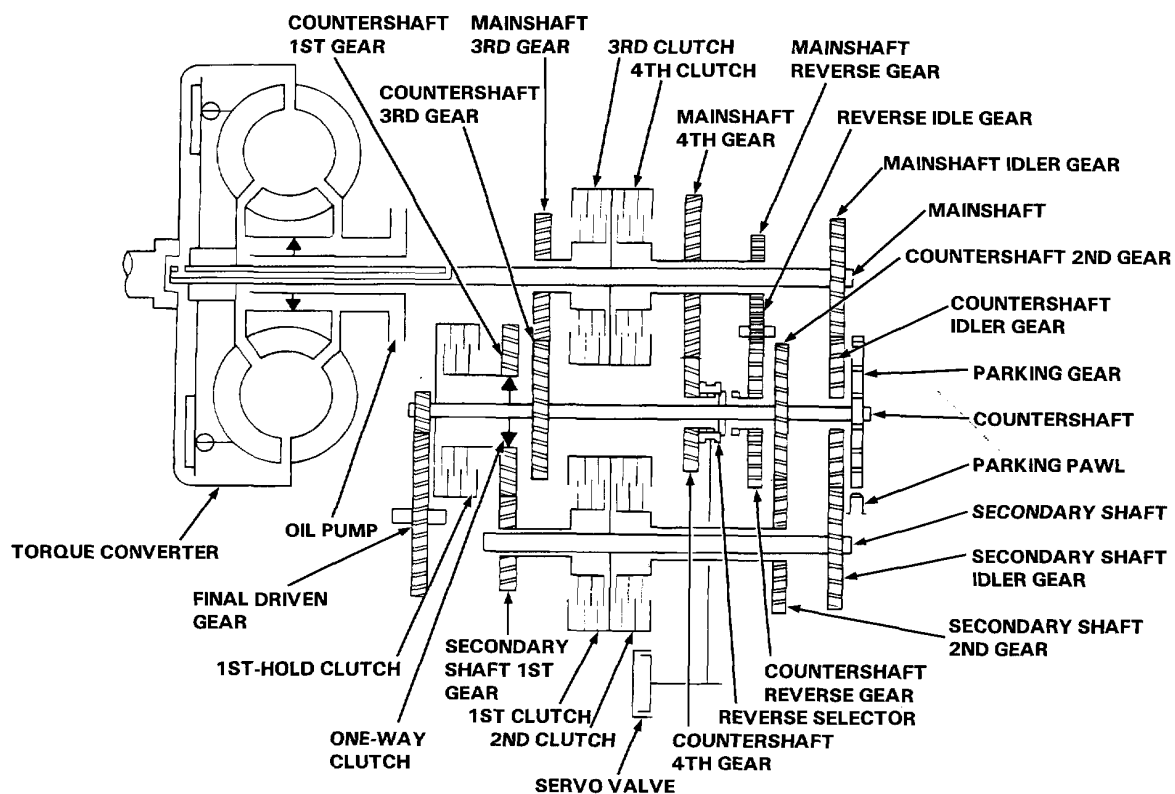




Power Flow

PART RANGE	TORQUE CON- VERTER	1ST GEAR 1ST-HOLD CLUTCH	1ST GEAR 1ST CLUTCH	1ST GEAR ONE-WAY CLUTCH	2ND GEAR 2ND CLUTCH	3RD GEAR 3RD CLUTCH	4TH		REVERSE GEAR	PARKING GEAR
							GEAR	CLUTCH		
P	○	×	×	×	×	×	×	×	×	○
R	○	×	×	×	×	×	×	○	○	×
N	○	×	×	×	×	×	×	×	×	×
D₄	1ST	○	×	○	×	×	×	×	×	×
	2ND	○	×	*○	○	×	×	×	×	×
	3RD	○	×	*○	×	○	×	×	×	×
	4TH	○	×	*○	×	×	○	○	×	×
D₃	1ST	○	×	○	×	×	×	×	×	×
	2ND	○	×	*○	○	×	×	×	×	×
	3RD	○	×	*○	×	○	×	×	×	×
2	○	×	*○	×	○	×	×	×	×	×
1	○	○	○	○	×	×	×	×	×	×

○: Operates, ×: Doesn't operate, *: Although the 1st clutch engages, driving power is not transmitted as the one-way clutch slips.



Description

Electronic Control System

Electronic Control System

The electronic control system consists of the A/T control unit, sensors, and 4 solenoid valves. Shifting and lockup are electronically controlled for comfortable driving under all conditions.

The A/T control unit is located below the dashboard, behind the right side kick panel on the passenger's side.

Shift Control

Getting a signal from each sensor, the A/T control unit determines the appropriate gear and activates shift control solenoid valves A and/or B.

The combination of driving signals to shift control solenoid valves A and B is shown in the table below.

Shift control sol.valve Range (gear)	A	B
1 (1st)	ON	OFF
2 (2nd)	ON	ON
D4 D3 (1st)	OFF	ON
D4 D3 (2nd)	ON	ON
D4 D3 (3rd)	ON	OFF
D4 (4th)	OFF	OFF
R	ON	OFF

Lockup Control

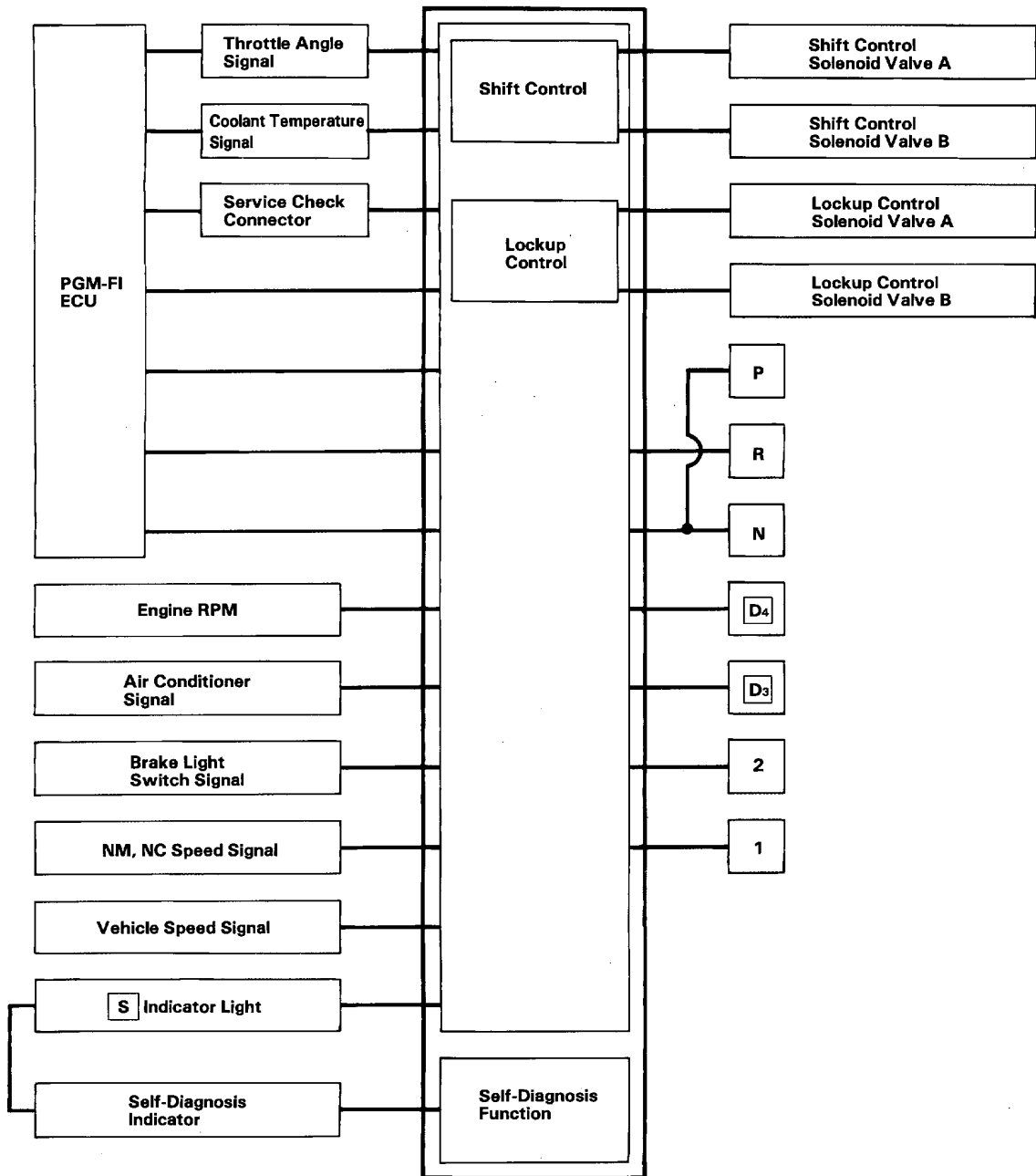
From sensor input signals, the A/T control unit determines whether to turn the lockup ON or OFF and activates lockup control solenoid valve A and/or B accordingly.

The combination of driving signals to lockup control solenoid valves A and B is shown in the table below.

Solenoid valve Lockup condition	A	B
Lockup OFF	OFF	OFF
Lockup, slight	ON	Duty operation OFF ⇔ ON
Lockup, half	ON	ON
Lockup, full	ON	ON
Lockup during deceleration	ON	Duty operation OFF ⇔ ON



A/T CONTROL UNIT



(cont'd)

Electronic Control System (cont'd)

The diagram illustrates the electrical system for a vehicle, showing the connection between the PGM-FI ECU, various sensors, actuators, and the A/T Control Unit.

PGM-FI ECU:

- Inputs:** VBU, VREF, VCC1, TH, SG1, TW, SCS, ACC, AFSA, AFSB, FAS, LG1, LG2, NM SPEED SENSOR, NC SPEED SENSOR, IG COIL, BRAKE LIGHT SWITCH, SPO SW.
- Outputs:** VBU, VREF, D7, ØTH, D5, D6, A22, D13, D11, D16, A25, A26, D19, D12, D15, D9, VSP, A9, D2, A21, A19, A17, A15, A13, A11, D20.

Sensors and Actuators:

- TH SENSOR:** Throttle Position Sensor.
- TW SENSOR:** Throttle Wire Sensor.
- HAC RELAY:** Hill Hold Assist Relay.
- SCS:** Shift Control Solenoid Valve.
- NM SPEED SENSOR:** Normal Mode Speed Sensor.
- NC SPEED SENSOR:** Normal Mode Speed Sensor.
- IG COIL:** Ignition Coil.
- BRAKE LIGHT SWITCH:** Brake Light Switch.
- SPEED SENSOR:** Speed Sensor.
- SHIFT POSITION INDICATOR:** Shift Position Indicator.
- SHIFT POSITION CONSOLE SWITCH:** Shift Position Console Switch.
- S SWITCH:** Shift Switch.

A/T CONTROL UNIT:

- Inputs:** A23, A24, A20, A5, A3, A6, A4, A10, A8.
- Outputs:** A22, D13, D11, D16, A25, A26, D19, D12, D15, D9, VSP, A9, D2, A21, A19, A17, A15, A13, A11, D20.

Other Components:

- SHIFT CONTROL SOLENOID VALVE A:** Shift Control Solenoid Valve A.
- SHIFT CONTROL SOLENOID VALVE B:** Shift Control Solenoid Valve B.
- LOCK-UP CONTROL SOLENOID VALVE A:** Lock-Up Control Solenoid Valve A.
- LOCK-UP CONTROL SOLENOID VALVE B:** Lock-Up Control Solenoid Valve B.
- DIMMING CANCEL CIRCUIT:** Dimming Cancel Circuit.
- INDICATOR LIGHT:** Indicator Light.

	A3	A5		A9	A11	A13	A15	A17	A19	A21	A23	A25
	A4	A6	A8	A10					A20	A22	A24	A26

		D5	D7	D9	D11	D13	D15	D17	D19
D2		D6			D12		D16	D18	D20

14-12



Hydraulic Flow

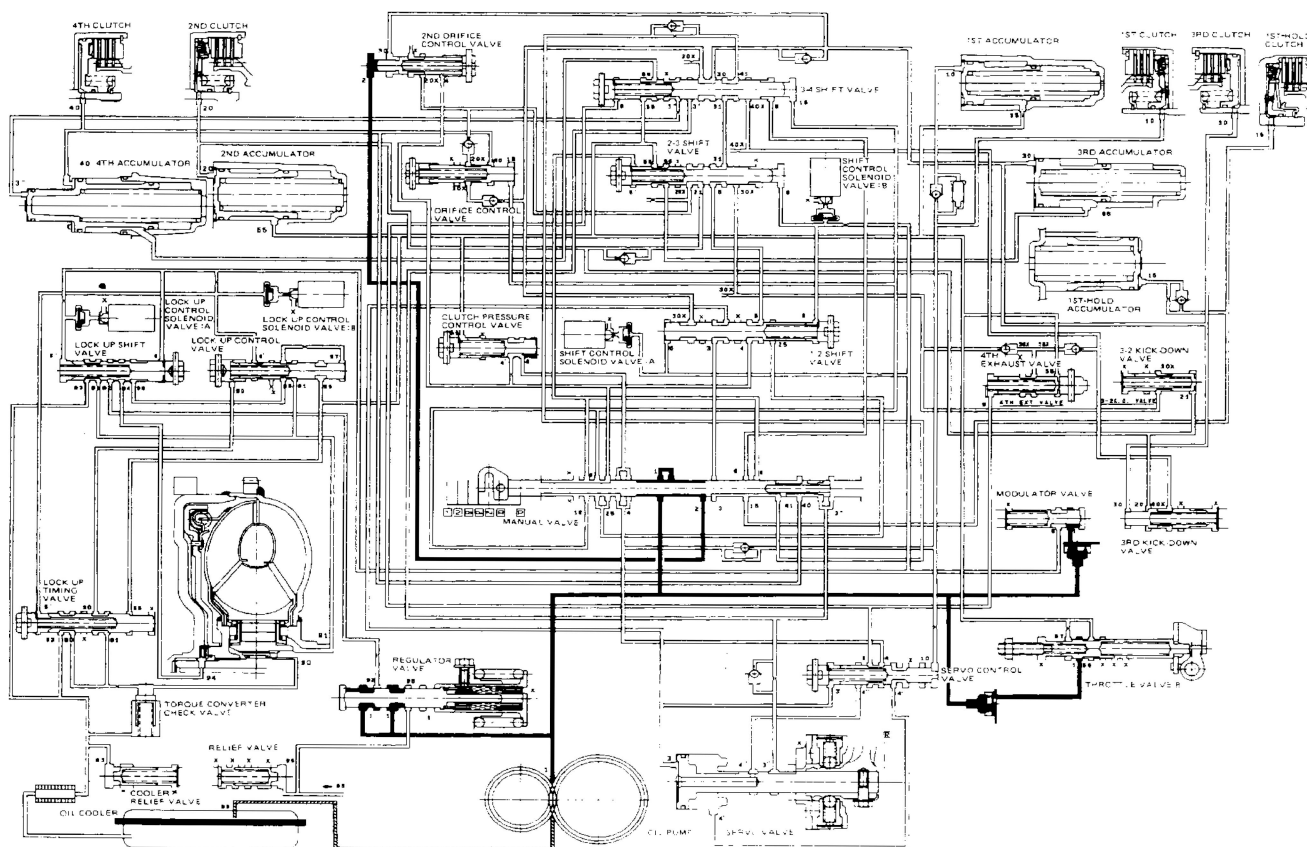
No.	DESCRIPTION OF PRESSURE	No.	DESCRIPTION OF PRESSURE	No.	DESCRIPTION OF PRESSURE	No.	DESCRIPTION OF PRESSURE
1	LINE	6'	MODULATE (DUTY CONTROL)	30	3RD CLUTCH	93	OIL COOLER
2	LINE	9	LINE	31	3RD CLUTCH	94	TORQUE CONVERTER
3	LINE	10	1ST CLUTCH	40	4TH CLUTCH	95	LUBRICATION
3'	LINE	15	1ST-HOLD CLUTCH	41	4TH CLUTCH	96	TORQUE CONVERTER
3''	LINE	16	1ST-HOLD CLUTCH	55	THROTTLE B	99	SUCTION
4	LINE	18	LINE	56	THROTTLE B	X	BLEED
4'	LINE	20	2ND CLUTCH	90	TORQUE CONVERTER		
5	LINE	21	2ND CLUTCH	91	TORQUE CONVERTER		
6	MODULATE	25	LINE	92	TORQUE CONVERTER		

N Position

As the engine turns, the oil pump also starts to operate. Automatic transmission fluid (ATF) is drawn from (99) and discharged into (1). Then, ATF pressure is controlled by the regulator valve and becomes the line pressure (1). The torque converter inlet pressure (92) enters (94) of torque converter through the orifice and discharges into (90).

The torque converter check valve prevents the torque converter pressure from rising.

Under this condition, the hydraulic pressure is not applied to the clutches as the manual valve stops line pressure (1).



(cont'd)

Description

Hydraulic Flow (cont'd)

1 Position

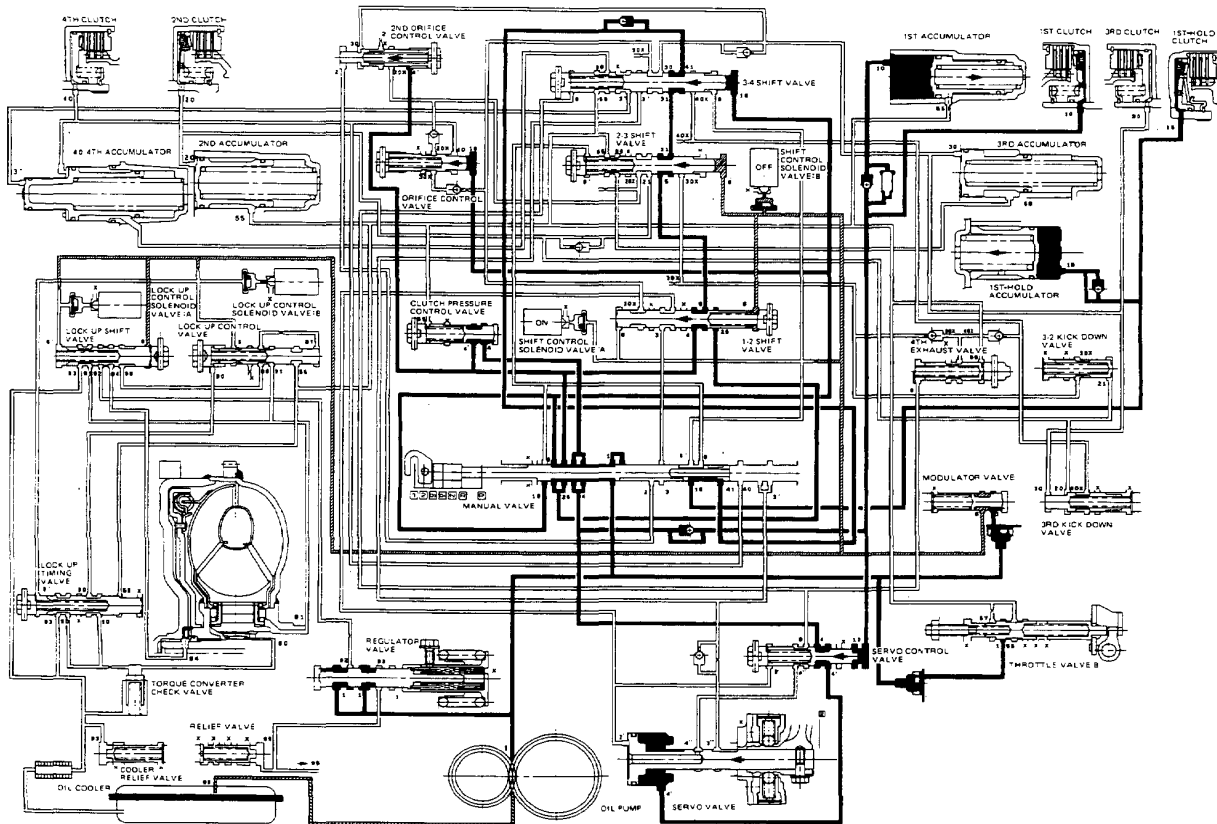
The line pressure (1) becomes the line pressure (4) at the manual valve and passes to the 1st clutch and 1st accumulator. The line pressure (4) flows through the 1st-hold clutch and 1st-hold accumulator. The power is transmitted only during deceleration through the 1st-hold clutch.

Fluid flows by ways of:

—Line Pressure (4)→1-2 Shift Valve→2-3 Shift Valve—3rd Clutch Pressure (31) →3-4 Shift Valve—3rd Clutch Pressure (31)
→3-4 Shift Valve—4th Clutch Pressure (41)→Manual Valve—4th Clutch Pressure (41)→Manual Valve—1st-Hold Clutch
Pressure (16)→1st-Hold Clutch

The modulator pressure (6) is supplied to the 1-2 and 2-3 shift valves.

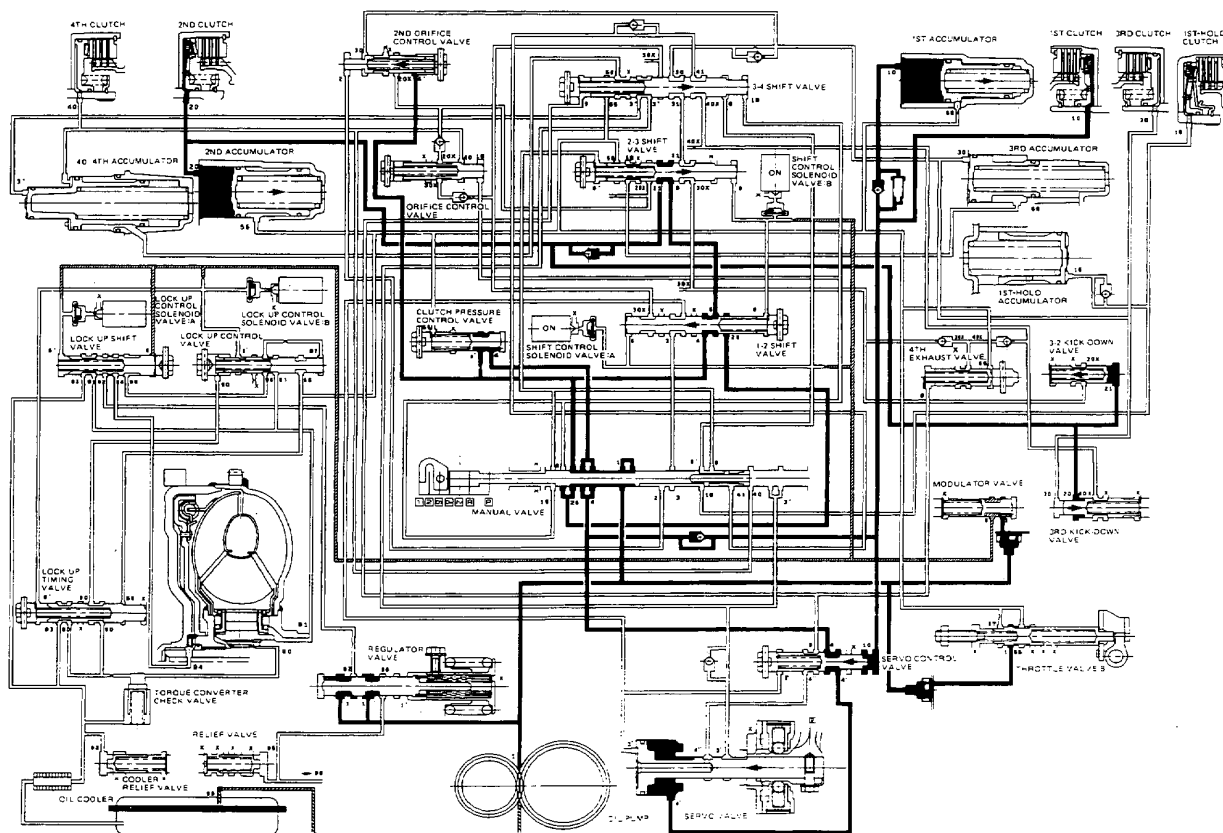
The line pressure (1) also flows to the throttle valve B.





2 Position

The line pressure (1) becomes the line pressure (4) as it passes through the manual valve. It then goes through the line (20) to the 2nd clutch. Also, the line pressure (1) goes to the modulator valve through the filter and becomes the modulator pressure (6). The line pressure (1) also flows to the throttle valve B.



(cont'd)

Description

Hydraulic Flow (cont'd)

Hydraulic Flow (cont'd)

D3 or D4 Position

1. 1st Speed

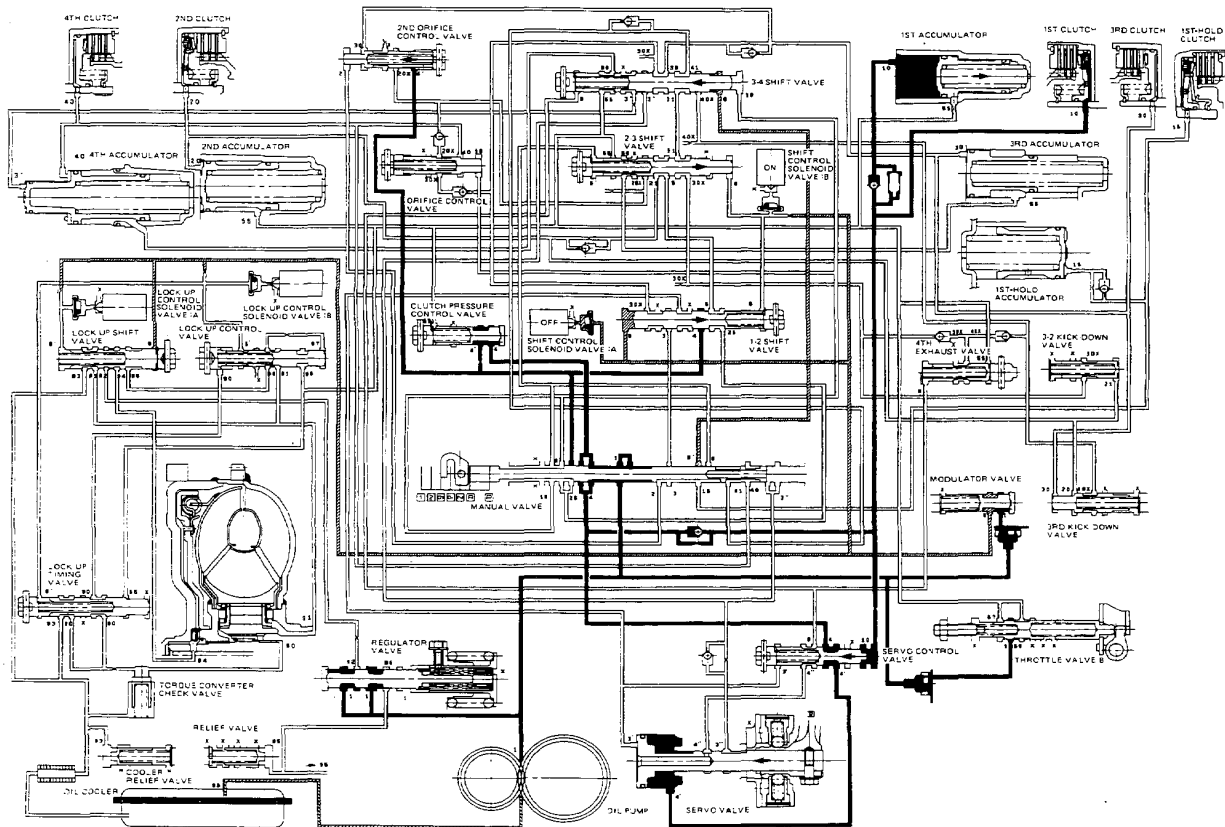
The flow of fluid through the torque converter is the same as in **N** position.

The line pressure (1) becomes the line pressure (4) and it becomes the 1st clutch pressure (10). The 1st clutch pressure is applied to the 1st clutch and 1st accumulator; consequently, the vehicle will move as the engine power is transmitted.

The line pressure (1) becomes the modulator pressure (6) by the modulator valve and travels to 1-2 and 3-4 shift valves. The 1-2 shift valve is moved to the right side because the shift control solenoid valve A is turned off and B is turned on by the A/T control unit. This valve stops 2nd clutch pressure and the power is not transmitted to the 2nd clutch.

The line pressure (4) also flows to the servo valve and line pressure (1) also flows to throttle valve B.

NOTE: When used, "left" or "right" indicates direction of the flow chart.



Description

Hydraulic Flow (cont'd)

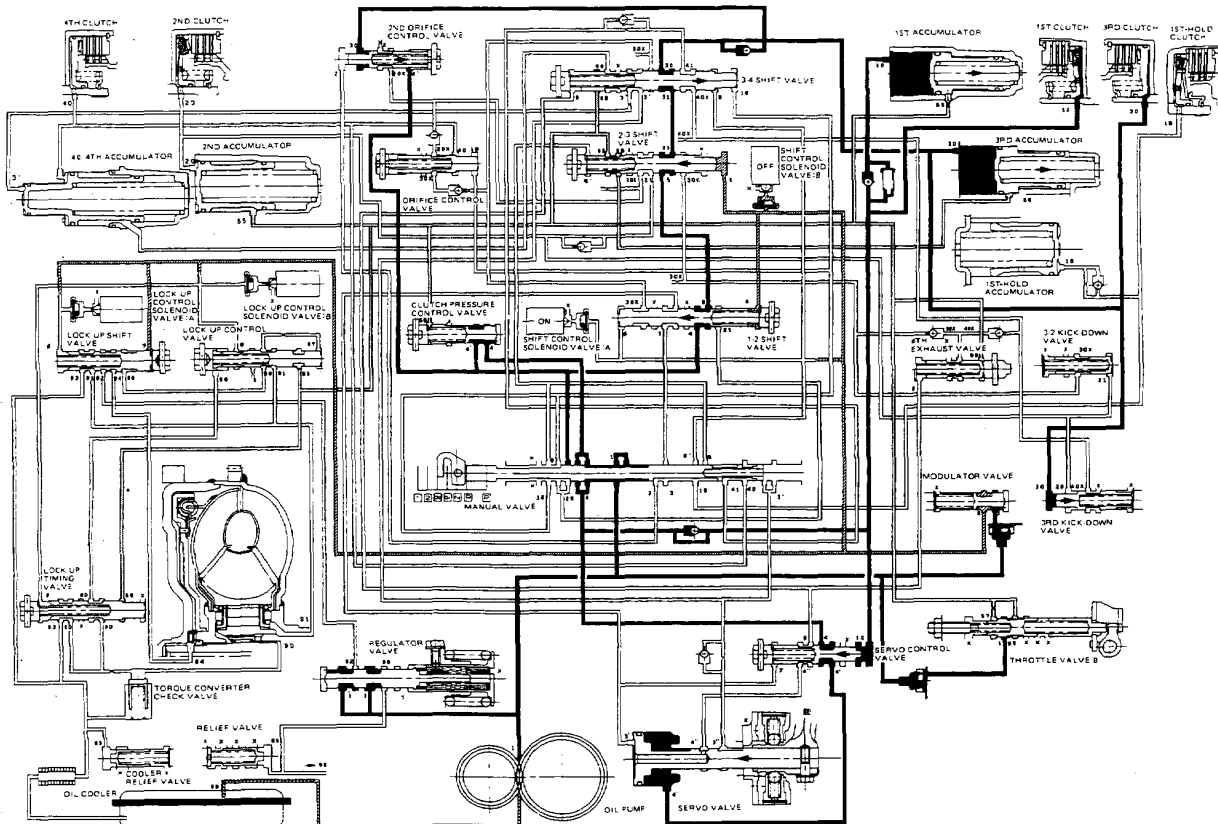
3. 3rd Speed

The flow of fluid up to the 1-2, 2-3 and 3-4 shift valves is the same as in the 2nd speed. As the speed of the car reaches the prescribed value, the shift control solenoid valve B is turned off (shift control solenoid valve A remains on). The 2-3 shift valve is then moved to the left, uncovering the oil port leading to the 3rd clutch. Since the 3-4 shift valve is moved to the right to cover the oil port to the 4th clutch, the 3rd clutch is turned on. Fluid flows by way of:

- Line Pressure (4) → 1-2 Shift Valve → 2-3 Shift Valve — 3rd Clutch Pressure (31) → 3-4 Shift Valve (not controlled)
- 3rd Clutch Pressure (30) → 3rd Clutch

The hydraulic pressure also flows to the 1st clutch. However, no power is transmitted because of the one-way clutch as in the 2nd speed.

NOTE: When used, "left" or "right" indicates direction of the flow chart.



D4 **Position**

4th Speed

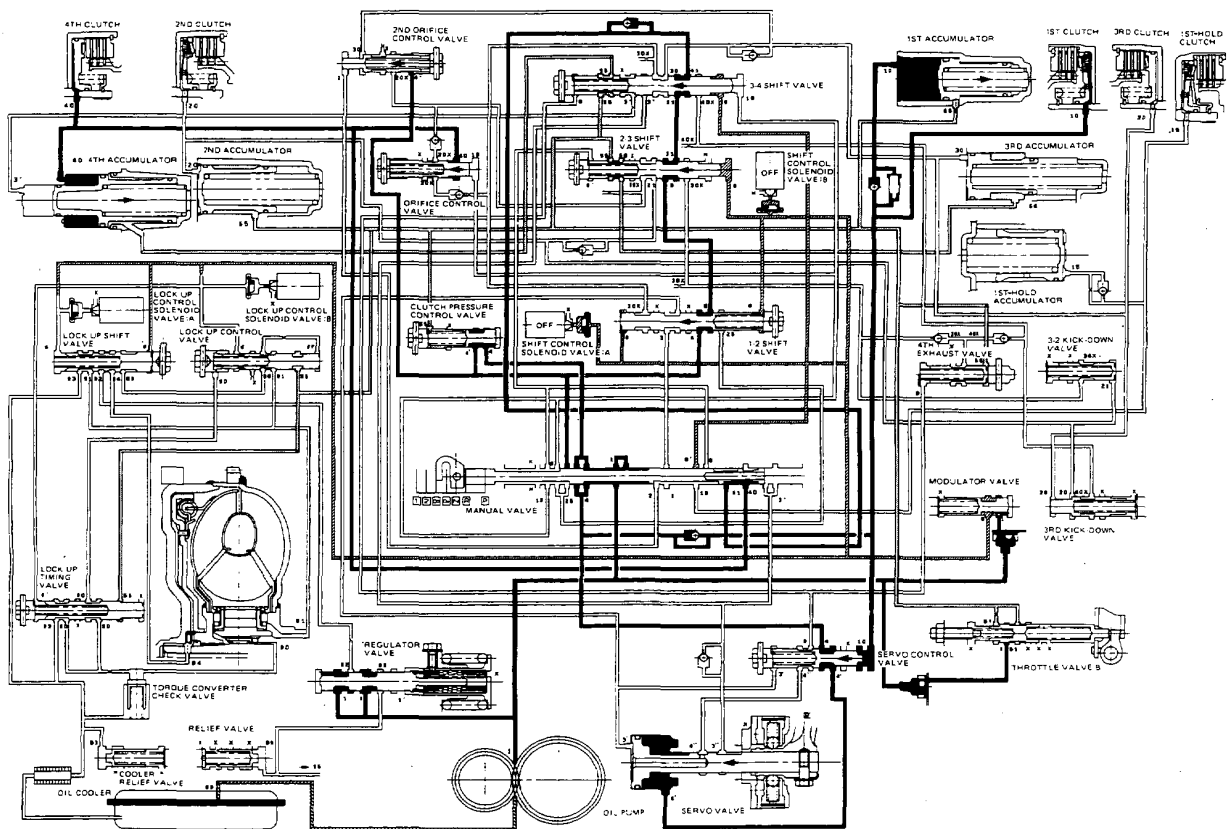
The flow of fluid up to the 1-2, 2-3 and 3-4 sift valves is the same as in the 3rd speed. When the speed of the car reaches the prescribed value, the shift control solenoid valve A is turned off (shift control solenoid valve B remains off).

As this takes place, 3-4 shift valve is moved to the left and uncovers the oil port leading to the 4th clutch. Since the 1-2 and 2-3 shift valves are kept on the left side, the fluid flows through the 4th clutch; the power is transmitted through the 4th clutch. Fluid flows by ways of:

—Line Pressure (4) → 1-2 Shift Valve → 2-3 Shift Valve—3rd Clutch Pressure (31) → 3-4 Shift Valve—3rd Clutch Pressure (31) → 3-4 Shift Valve—4th Clutch pressure (41) → Manual Valve—4th Clutch Pressure (40) → 4th Clutch

The hydraulic pressure also flows to the 1st clutch. However, no power is transmitted because of the one-way clutch as in 2nd and 3rd speed.

NOTE: When used, "left" or "right" indicates direction of the flow chart.



(cont'd)

Description

Hydraulic Flow (cont'd)

R Position

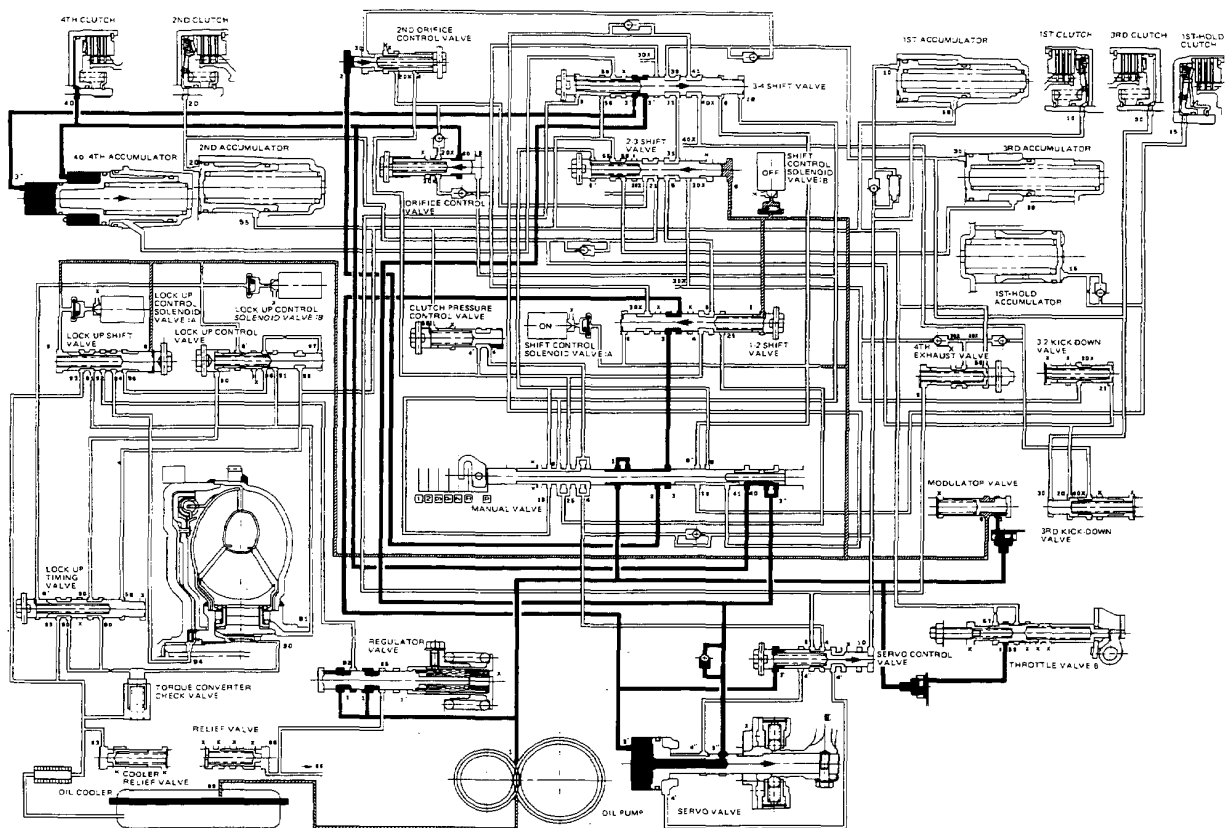
The flow of fluid through the torque converter circuit is the same as in the **N** . The fluid (1) from the oil pump flows through the manual valve and becomes the line pressure (3). It then flows through the 1-2 shift valve to the servo valve (3), causing the shift fork shaft to be moved in the reverse direction.

Under this condition, the shift control solenoid valve A is turned on whereas the valve B is turned off as in 3rd. As a result, the 1-2 shift valve is also moved to the left. The fluid (3') will flow through the servo valve and manual valve to the 4th clutch; power is transmitted through the 4th clutch.

Reverse Inhibitor Control

When the **R** position is selected while the vehicle is moving forward at a speed over 10 km/h (6 mph), the control unit outputs 1st signal (A: OFF, B: ON), and the 1-2 shift valve is moved to the right. The line pressure (3) is intercepted by the 1-2 shift valve; consequently, the power is not transmitted as the 4th clutch and servo valve are not operated.

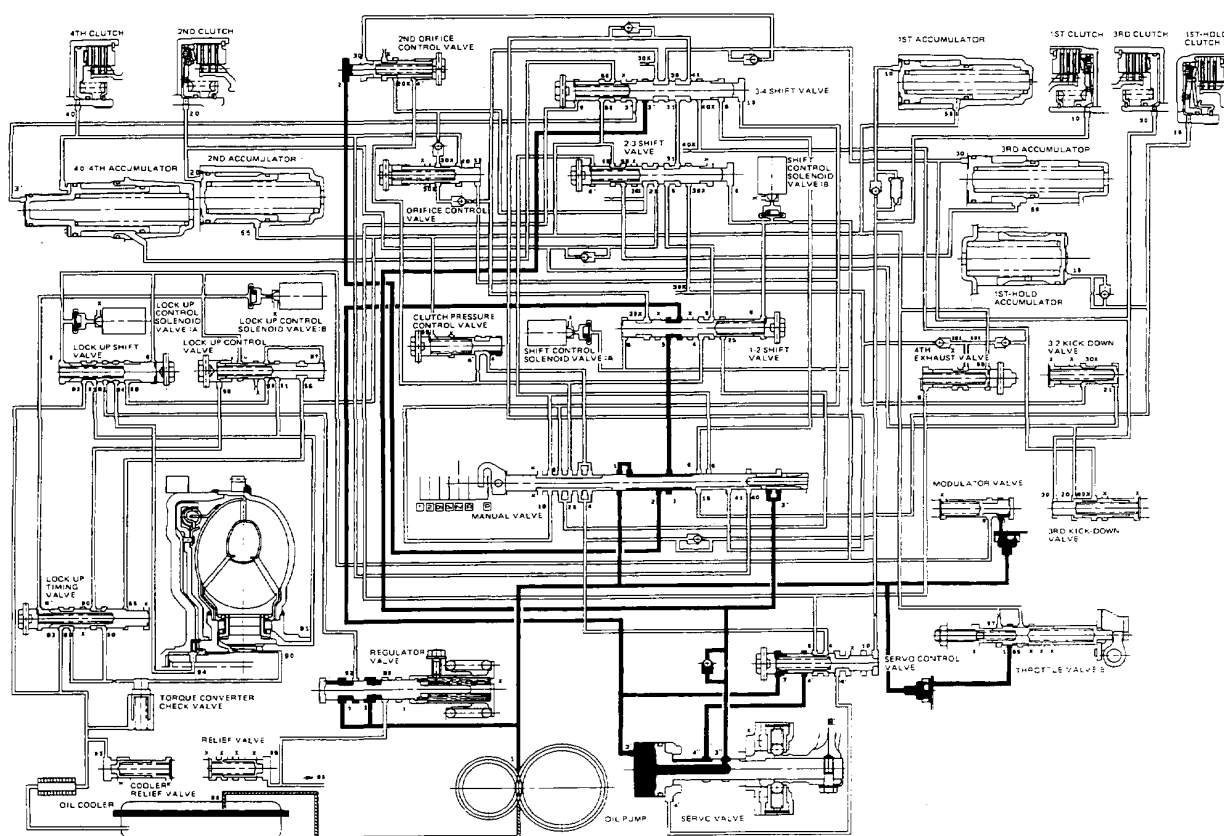
NOTE: When used, "left" or "right" indicates direction of the flow chart.





P Position

The flow of fluid through the torque converter is the same as in **N** position. The line pressure (1) becomes the line pressure (3) as it passes through the manual valve. The line pressure (3) flows through the 1-2 shift valve to the servo valve and the servo control valve, causing the shift fork shaft to be moved to the reverse position as in the **R** position. However, the hydraulic pressure is not supplied to the clutches. The power is not transmitted.

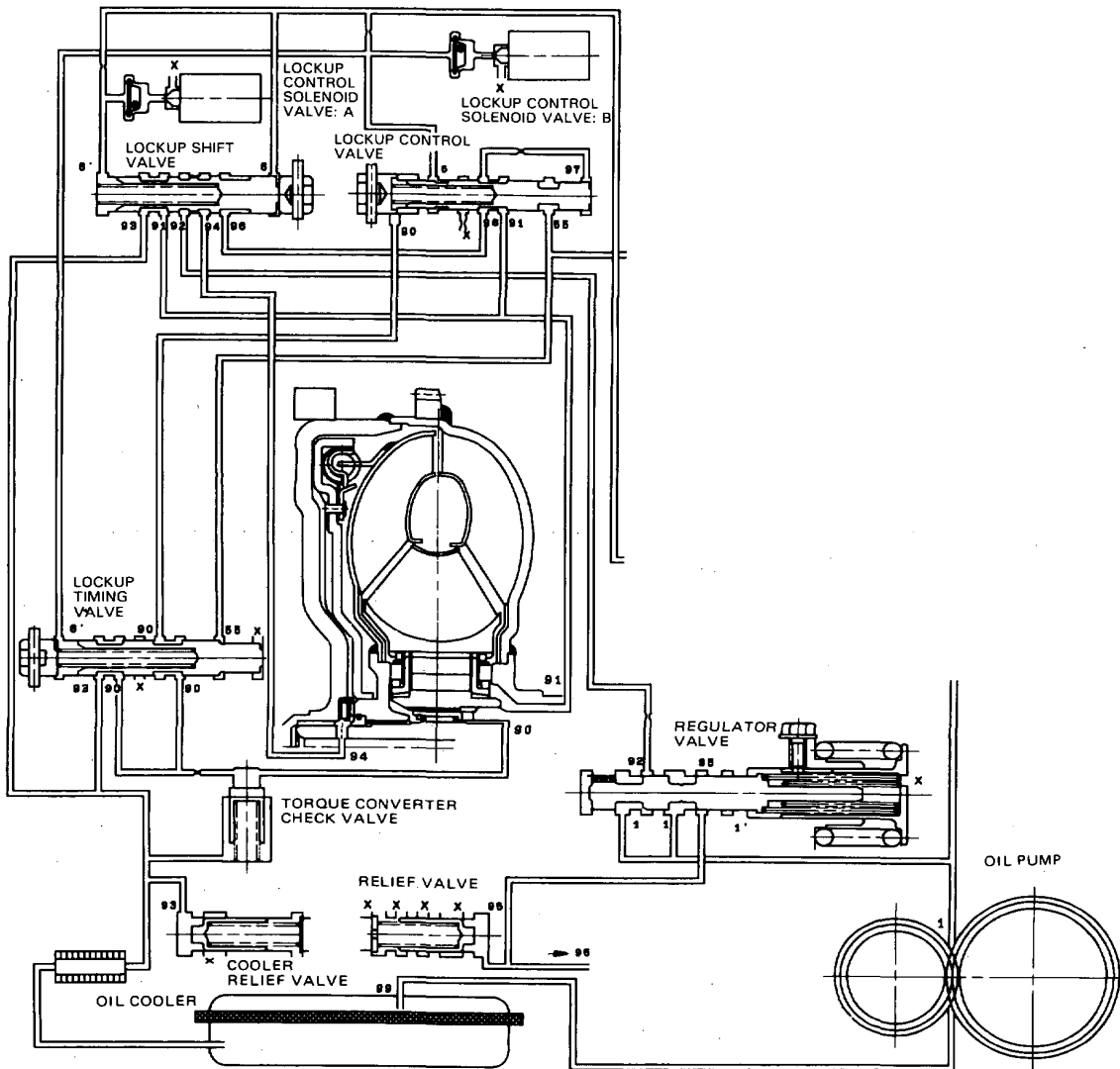


Description

Lockup System

In **D4** in 2nd, 3rd and 4th, and **D3** in 3rd, pressurized fluid is drained from the back of the torque converter through an oil passage, causing the lockup piston to be held against the torque converter cover. As this takes place, the mainshaft rotates at the same speed as the engine crankshaft. Together with hydraulic control, an A/T control unit optimizes the timing of the lockup system. Under certain conditions, the lockup clutch is applied during deceleration, in 3rd and 4th speed.

The lockup system controls the range of lockup according to lockup control solenoid valves A and B, and throttle valve B. When lockup control solenoid valves A and B activate, modulator pressure changes. Lockup control solenoid valves A and B are mounted on the torque converter housing, and are controlled by the A/T control unit.

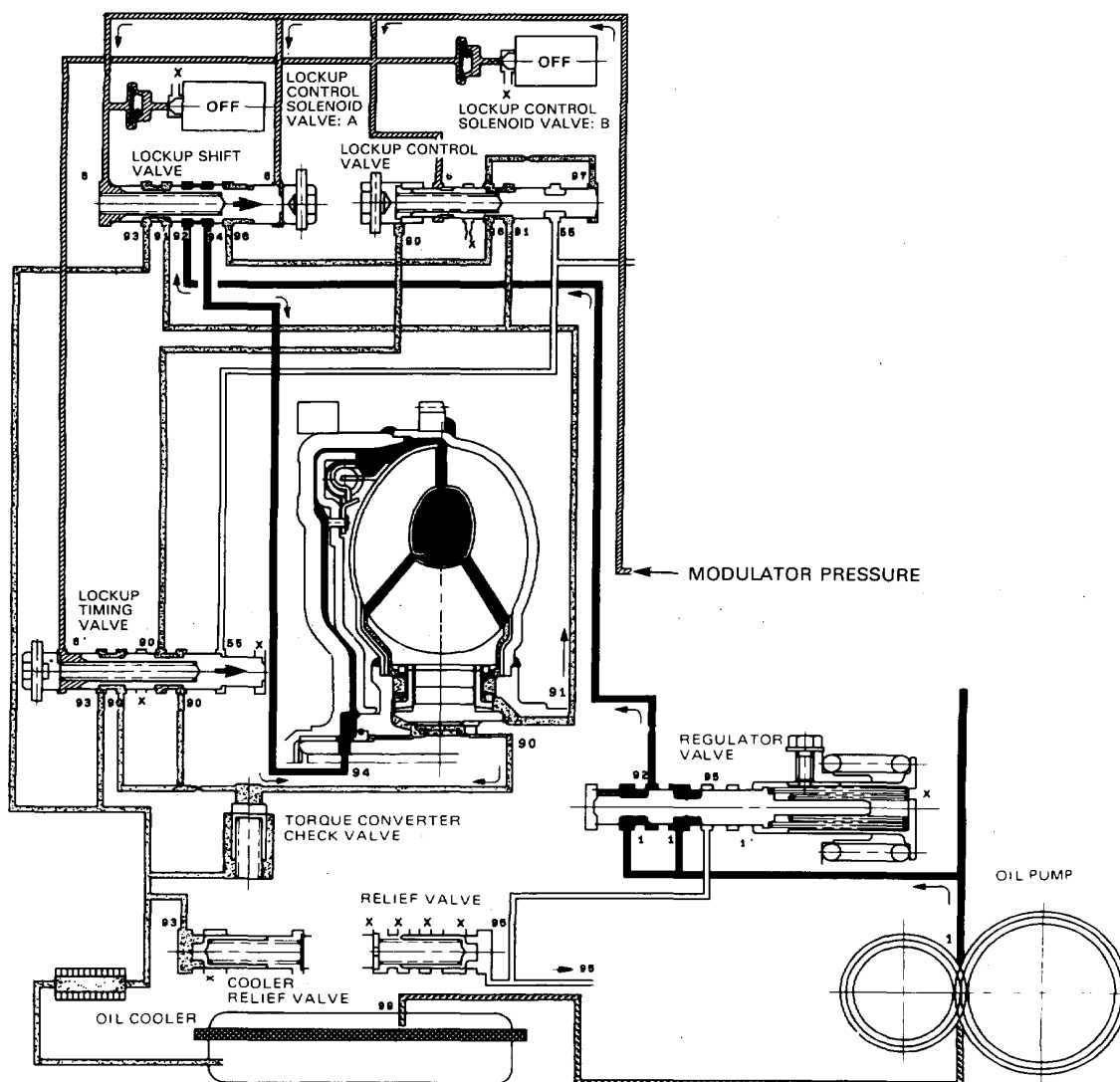




No Lockup

The pressurized fluid regulated by the modulator works on both ends of the lockup shift valve and on the left side of the lockup control valve. Under this condition, the pressures working on both ends of the lockup shift valve are equal, the shift valve is moved to the right by the tension of the valve spring alone. The fluid from the oil pump will flow through the left side of the lockup clutch to the torque converter; i.e., the lockup clutch is in OFF condition.

NOTE: When used, "left" or "right" indicates direction of the flow chart.



(cont'd)

Description

Lockup System (cont'd)

Partial Lockup

Lockup Control Solenoid Valve A: ON Lockup Control Solenoid Valve B: OFF

The A/T control unit switches the solenoid valve A on to release the modulator pressure in the left cavity of the lockup shift valve. The modulator pressure in the right cavity of the lockup shift valve overcomes the spring force, thus the lockup shift valve is moved to the left side.

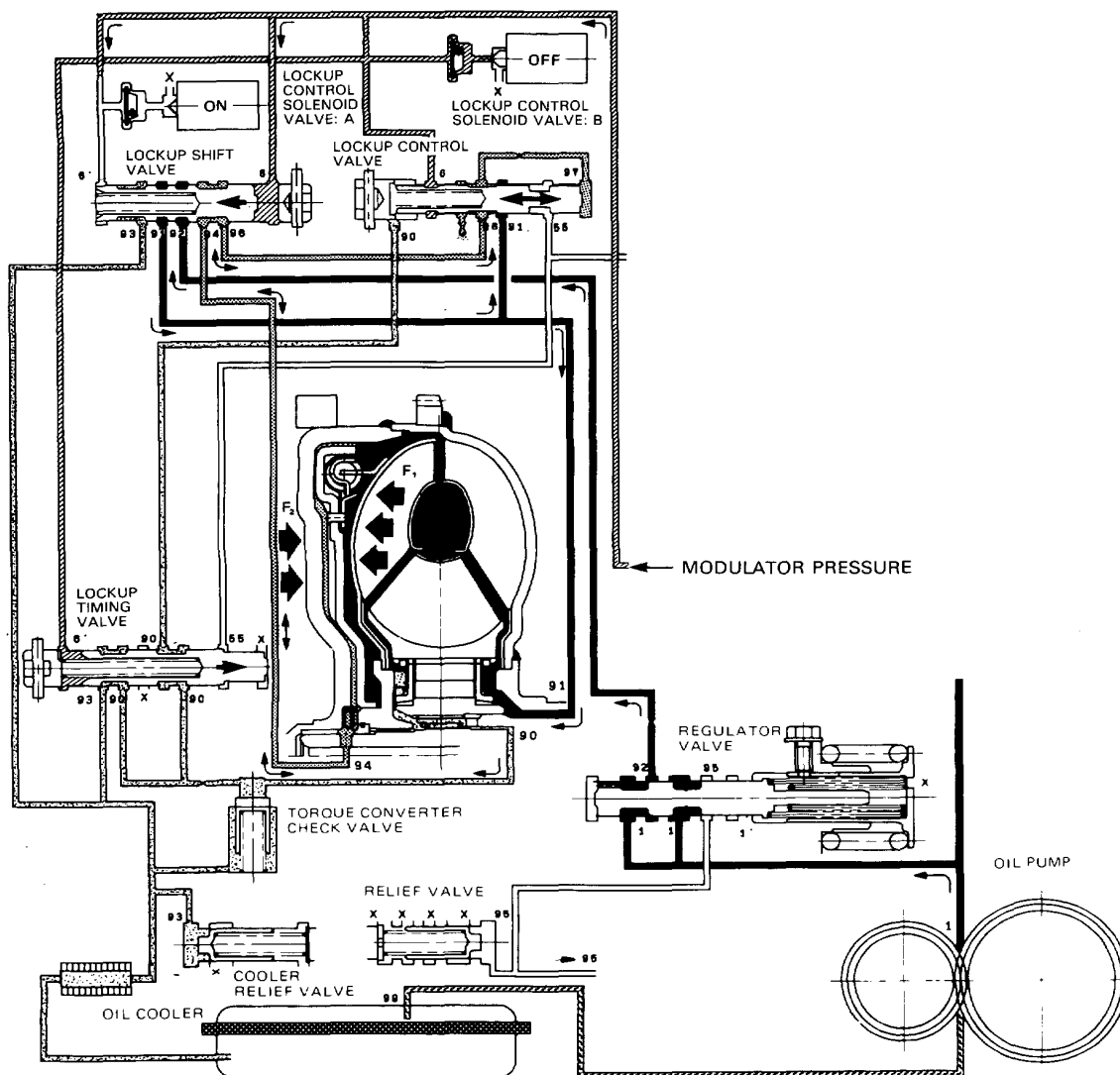
The modulator pressure is separated to the two passages:

Torque Converter Inner Pressure: entered into right side-to engage lockup clutch

Torque Converter Back Pressure: entered into left side-to disengage lockup clutch

The back pressure (F2) is regulated by the lockup control valve whereas the position of the lockup timing valve B is determined by the throttle B pressure, tension of the valve spring and pressure regulated by the modulator. Also the position of the lockup control valve is determined by the back pressure of the lockup control valve and torque converter pressure regulated by the check valve. With the lockup control solenoid valve B kept off, the modulator pressure is maintained in the left end of the lockup control valve; in other words, the lockup control valve is moved but slightly to the left side. This slight movement of the lockup control valve causes the back pressure to be lowered slightly, resulting in partial lockup.

NOTE: When used, "left" or "right" indicates direction of the flow chart.





Half Lockup

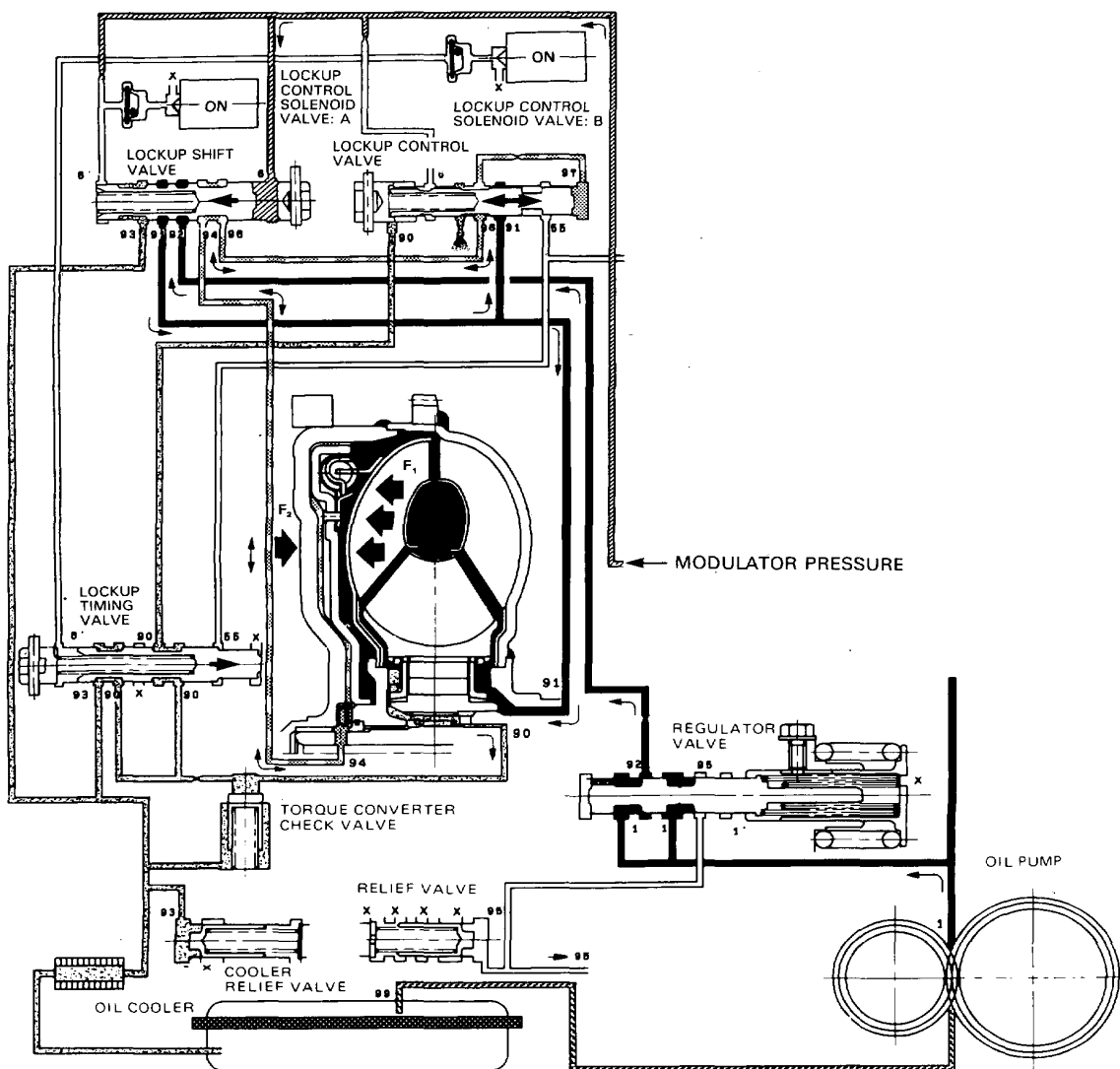
Lockup Control Solenoid Valve A: ON Lockup Control Solenoid Valve B: ON

The modulator pressure is released by the solenoid valve B, causing the modulator pressure in the left cavity of the lockup control valve to lower.

Also the modulator pressure in the left cavity of the lockup timing valve B is low. However the throttle B pressure is still low at this time; consequently, the lockup timing valve B is kept on the right side by the spring force.

With the lockup control solenoid valve B turned on, the lockup control valve is moved somewhat to the left side, causing the back pressure (F2) to lower. This allows a greater amount of the fluid (F1) to work on the lockup clutch so as to engage the clutch. The back pressure (F2) which still exists prevents the clutch from engaging fully.

NOTE: When used, "left" or "right" indicates direction of the flow chart.



(cont'd)

Description

Hydraulic Flow (cont'd)

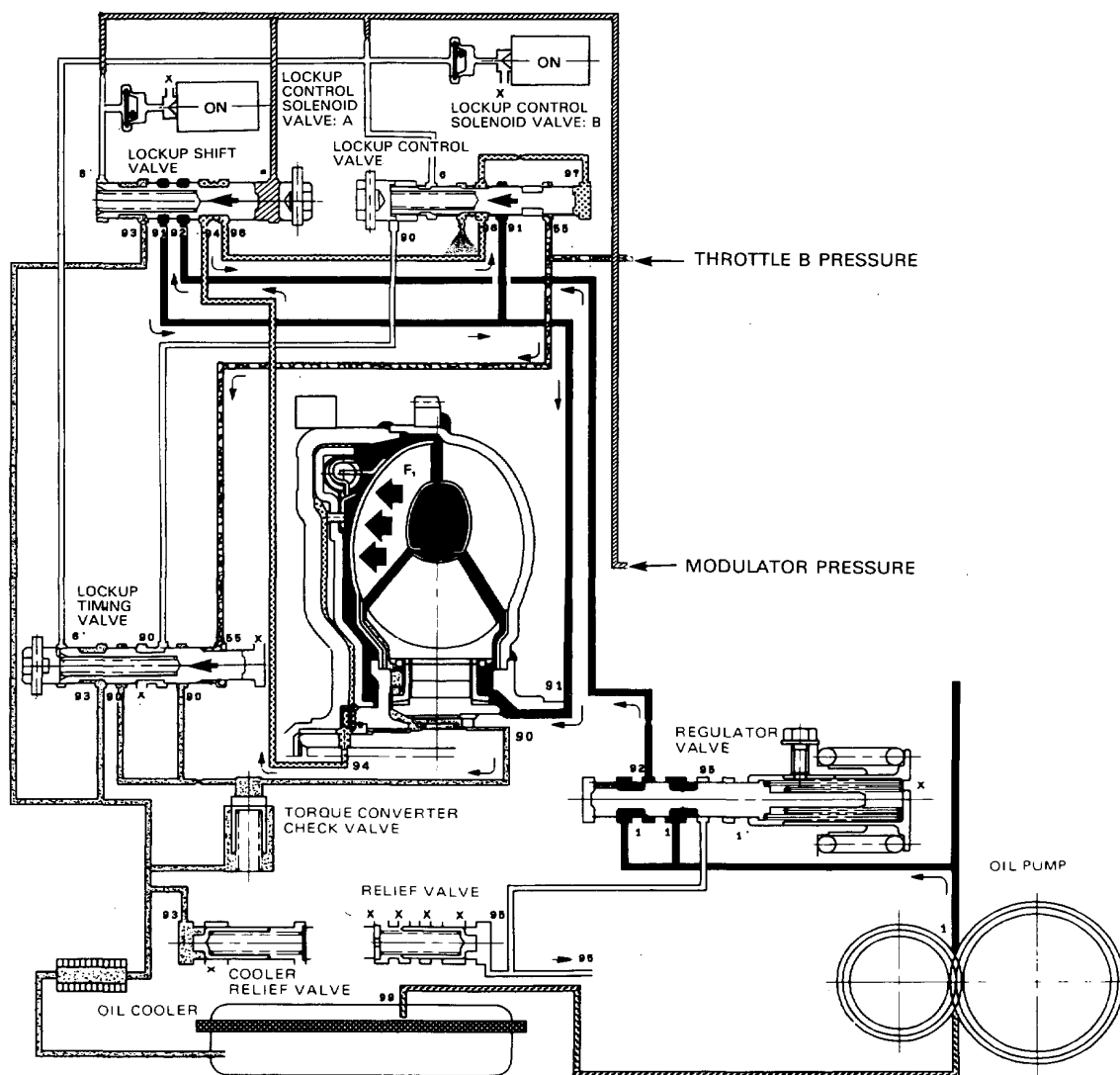
Full Lockup

Lockup Control Solenoid Valve A: ON Lockup Control Solenoid Valve B: ON

When the vehicle speed further increases, the throttle B pressure is increased in accordance with the throttle opening. The lockup timing valve B overcomes the spring force and moves to the left side. Also, this valve closes the oil port leading to the torque converter check valve.

Under this condition, the throttle B pressure working on the right end of the lockup control valve becomes greater than that on the left end (modulator pressure in the left end has already been released by the solenoid valve B); i.e., the lockup control valve is moved to the left. As this happens, the torque converter back pressure is released fully, causing the lockup clutch to be engaged fully.

NOTE: When used, "left" or "right" indicates direction of the flow chart.

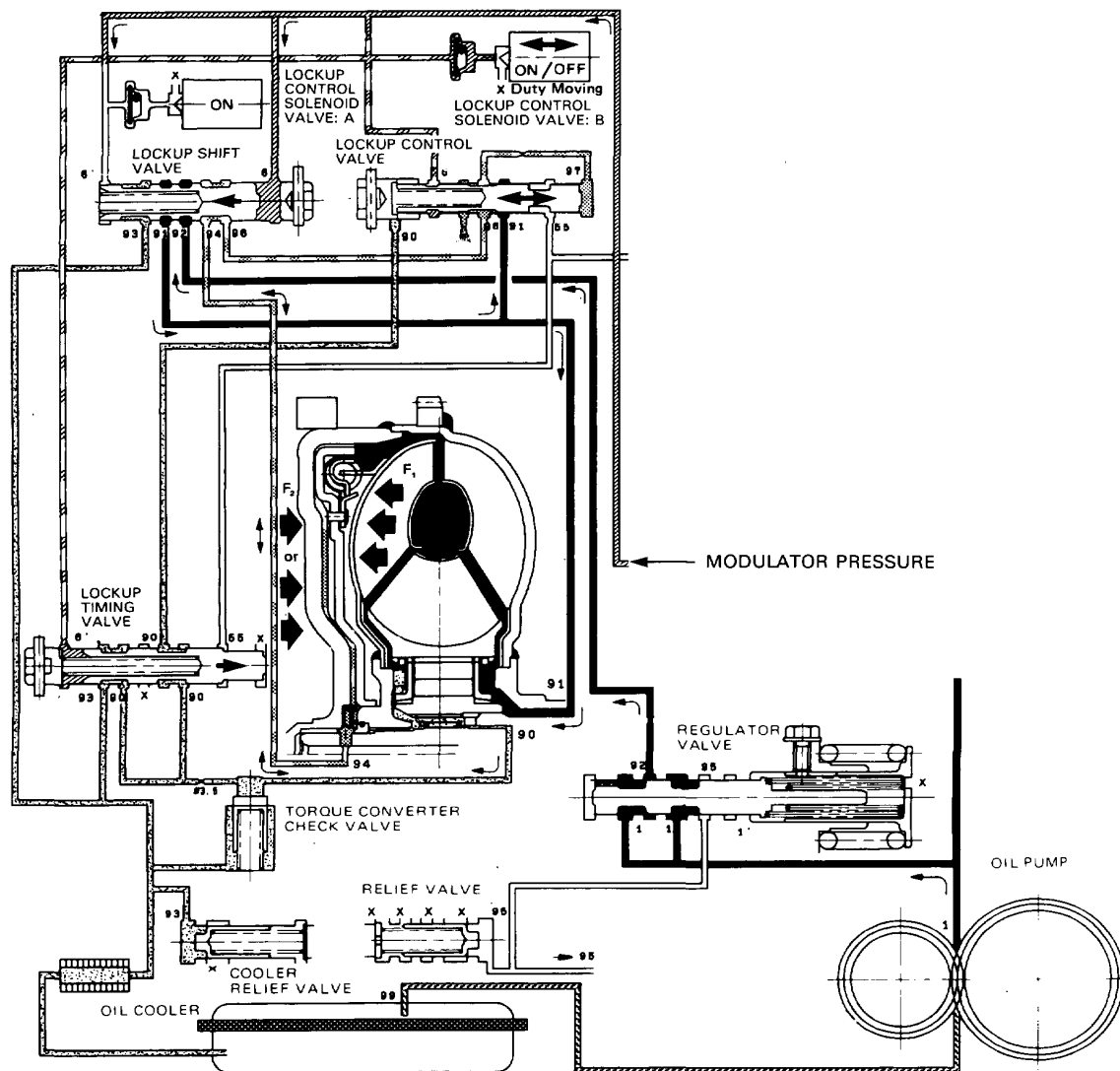




Deceleration Lockup

Lockup Control Solenoid Valve A: ON Lockup Control Solenoid Valve B: Duty Operation (ON \leftrightarrow OFF)

The A/T control unit switches solenoid valve B on and off rapidly under certain conditions. The slight lockup and half lockup regions are maintained so as to lock the torque converter properly.

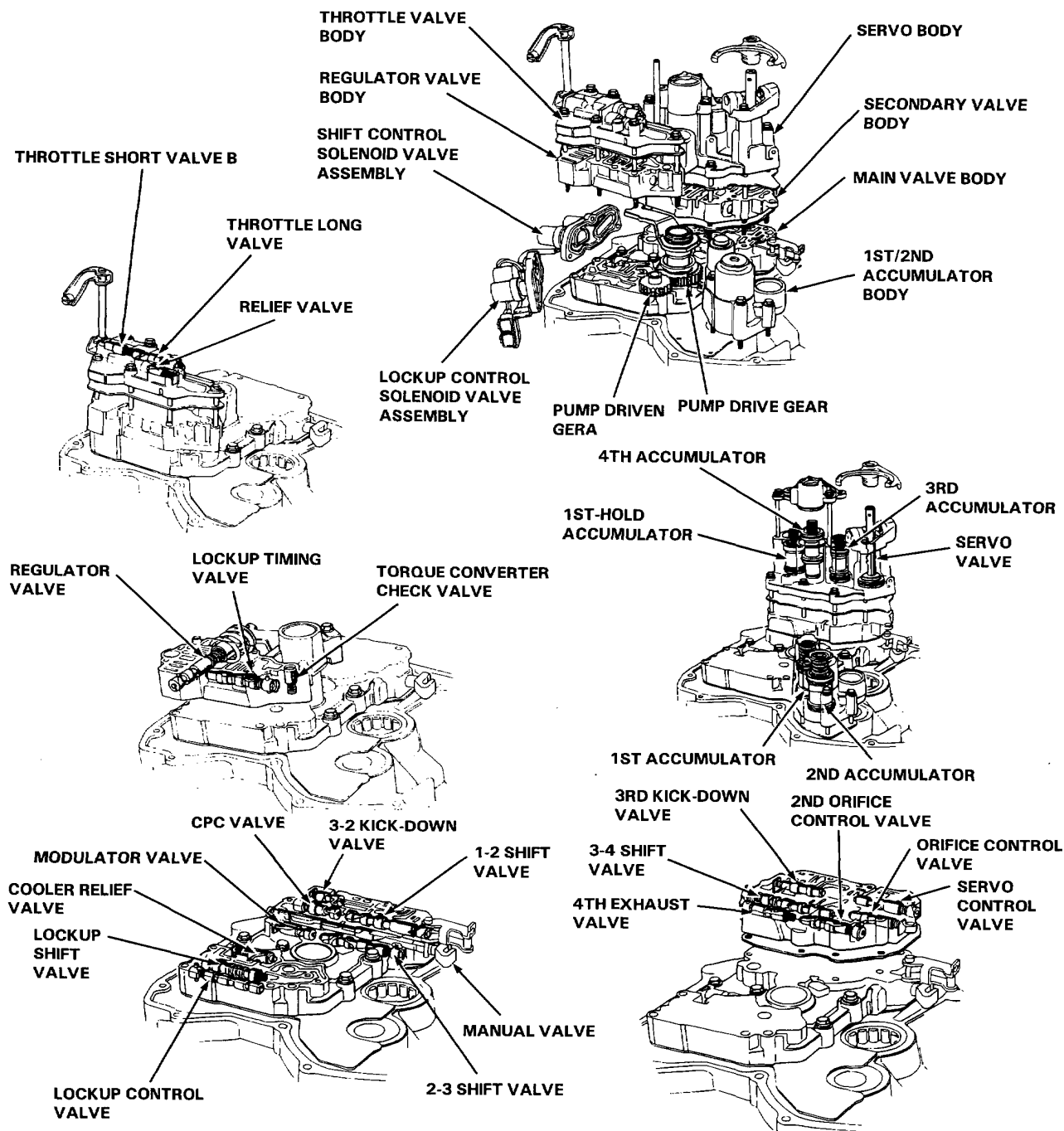


Description

Hydraulic Control

The valve body includes the main valve body, the regulator valve body, the throttle valve body, the secondary valve body, the servo valve body and the 1st/2nd accumulator body.

The oil pump is driven by splines on the right end of the torque converter which is attached to the engine. Oil flows through the regulator valve to maintain specified pressure through the main valve body to the manual valve and the servo body, directing pressure to each of the clutches.



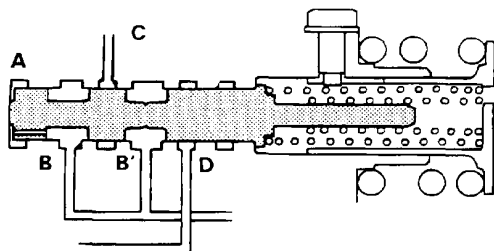


Regulator Valve

The regulator valve maintains a constant hydraulic pressure sent from the oil pump to the hydraulic control system, while also furnishing oil to the lubricating system and torque converter.

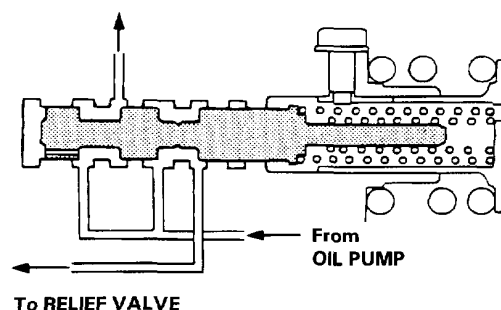
Oil flows through B and B'. The oil which enters through B flows through the valve orifice to A, pushing the regulator valve to the right. According to the level of hydraulic pressure through B, the position of the valve changes, and the amount of the oil through B' from D thus changes. This operation is continued, thus maintaining the line pressure.

(ENGINE NOT RUNNING)



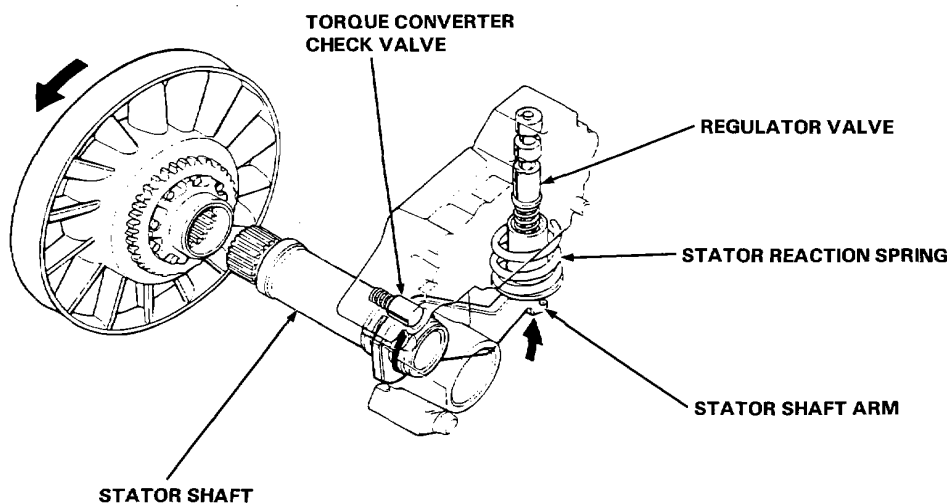
(ENGINE RUNNING)

To TORQUE CONVERTER



Stator Reaction Hydraulic Pressure Control

Hydraulic pressure increase according to torque is performed by the regulator valve using stator torque reaction. The stator shaft is splined in the stator, and its arm end contacts the regulator spring cap. When the car is accelerating or climbing (Torque Converter Range), stator torque reaction acts on the stator shaft, and the stator arm pushes the regulator spring cap in the → direction in proportion to the reaction. The spring compresses, and the valve moves to increase the regulated control pressure or line pressure. Line pressure is maximum when the stator reaction is maximum.



(cont'd)

Description

Hydraulic Control (cont'd)

Throttle Valve B

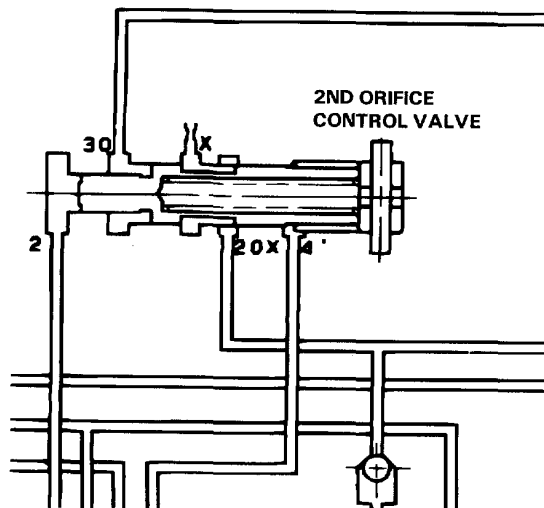
Throttle valve B converts changes in the throttle opening to changes in transmission hydraulic pressure. The end of throttle valve B contacts the throttle cam which is connected by a cable to the throttle body. The cable pulls the cam which, in turn, moves the valve. The valve-to-cam engagement is adjustable for shift smoothness and lockup. Throttle valve B controls the accumulators, to make smooth changes from one gear to another.

Modulator Valve

The modulator valve maintains line pressure from the regulator, to the pressure to shift control solenoid valves A/B and lockup control solenoid valves A/B, thus maintaining accurate shift and lockup characteristics.

Second Orifice Control Valve

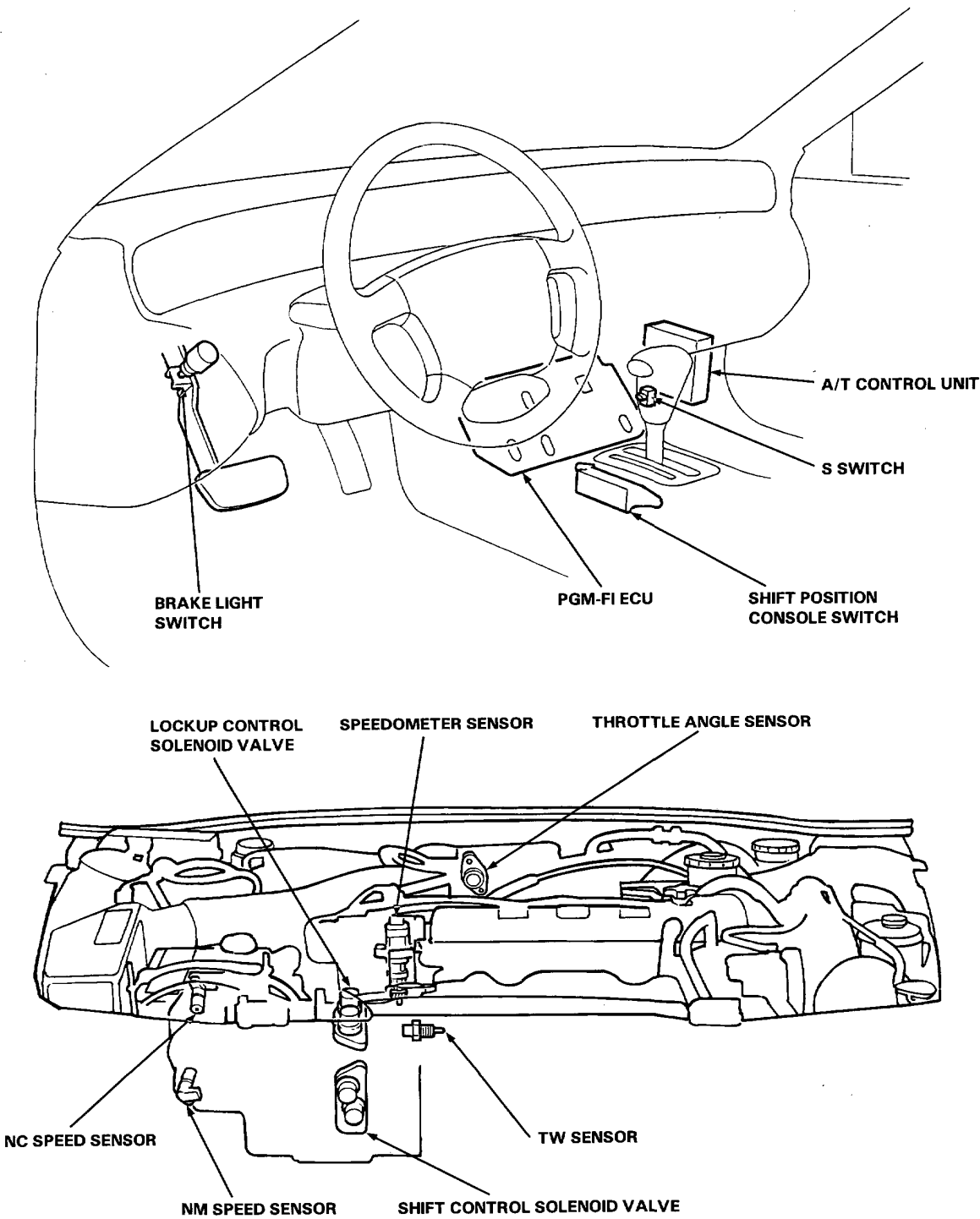
For smooth shifting between second and third, the second orifice control valve relieves the second clutch pressure. As the third clutch pressure is increased, the valve moves to uncover the oil port relieving the second clutch pressure.



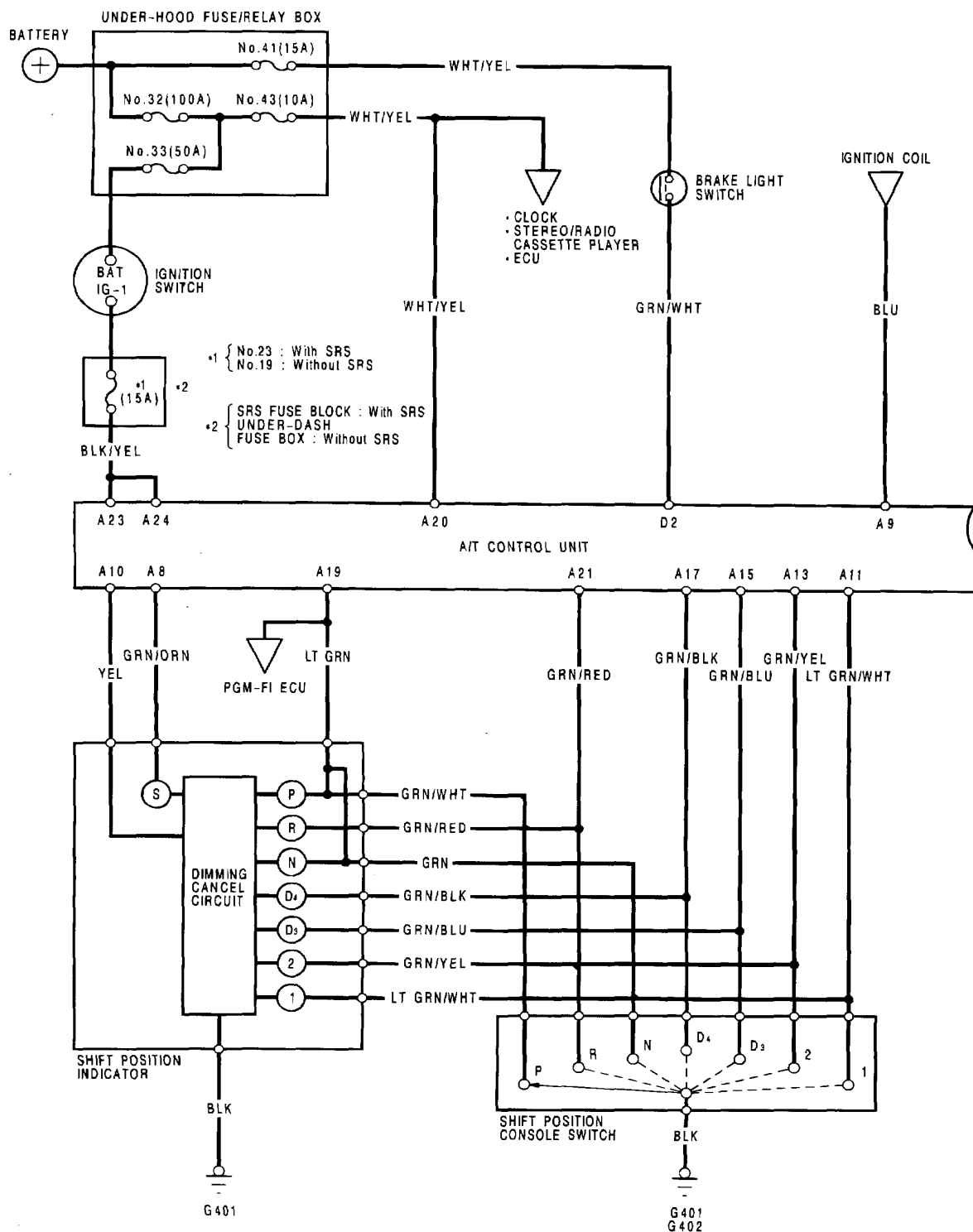


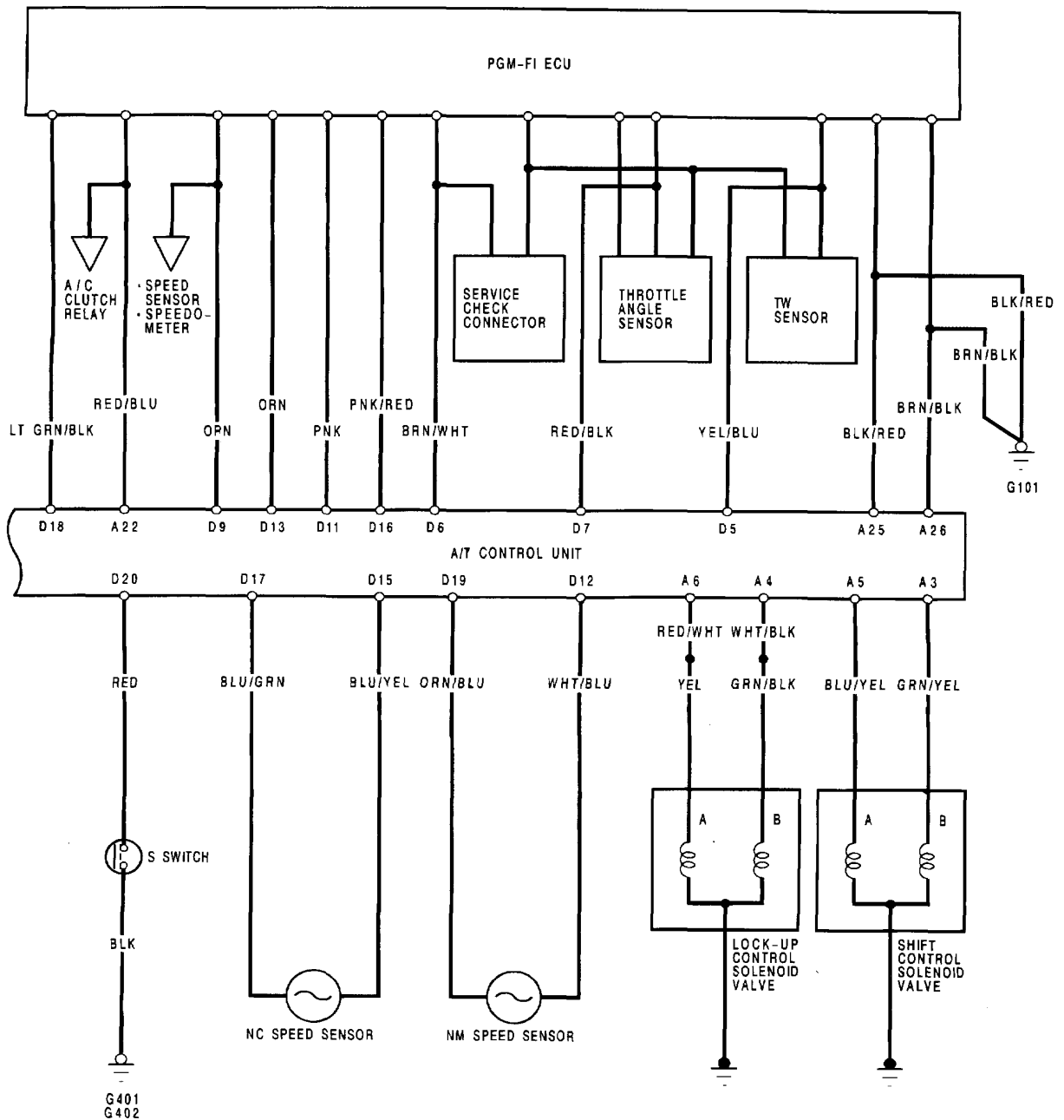
Component Location

LHD is shown: RHD is similar.



Circuit Diagram





A3	A5	A9	A11	A13	A15	A17	A19	A21	A23	A25
A4	A6	A8	A10				A20	A22	A24	A26

	D5	D7	D9	D11	D13	D15	D17	D19		
D2	D6			D12		D16	D18	D20		

A/T Control Unit Terminal Location

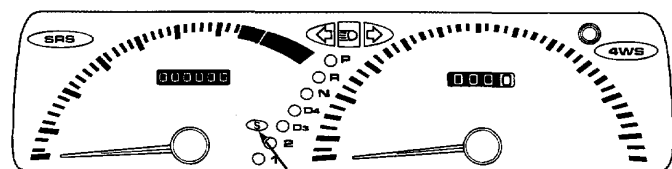
Troubleshooting Procedures

When the A/T control unit senses an abnormality in the input or output systems, the **S** indicator light in the gauge assembly will blink. When the Service Check Connector (located behind the center console) is connected with a jumper wire, the **S** indicator light will blink the problem code when the ignition switch is turned on.

When the **S** indicator light has been reported on, connect the two terminals of the Service Check Connector together with a jumper wire.

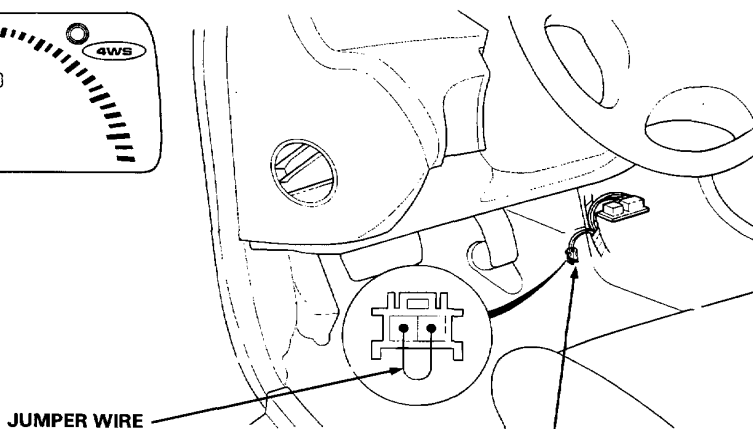
Then turn on the ignition switch and observe the **S** indicator light.

LHD is shown: RHD is similar.



GAUGE ASSEMBLY

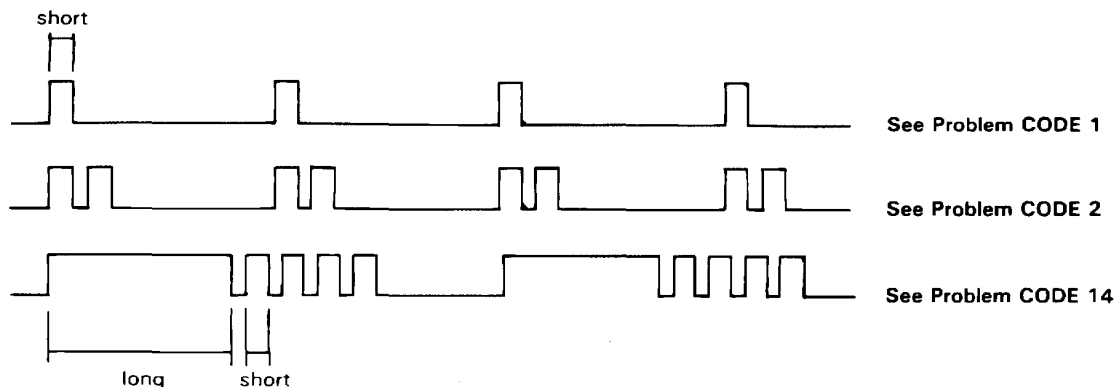
S INDICATOR LIGHT



JUMPER WIRE

SERVICE CHECK
CONNECTOR (2P)

Problem codes 1 through 9 are indicated by individual short blinks, Problem codes 10 through 15 are indicated by a series of long and short blinks. One long blink equals 10 short blinks. Add the long and short blinks together to determine the problem code. After determining the problem code, refer to the electrical system Symptom-to-Component Chart on pages 14-36 and 37.



Some PGM-FI problems will also make the **S** indicator light come on. After repairing the PGM-FI system, disconnect the CLOCK RADIO fuse (10A) in the under-hood fuse/relay box for more than 10 seconds to reset the A/T control unit memory.

NOTE: Disconnecting the CLOCK RADIO fuse also cancels the radio preset stations and the clock setting. Make note of the radio presets before removing the fuse so you can reset them.

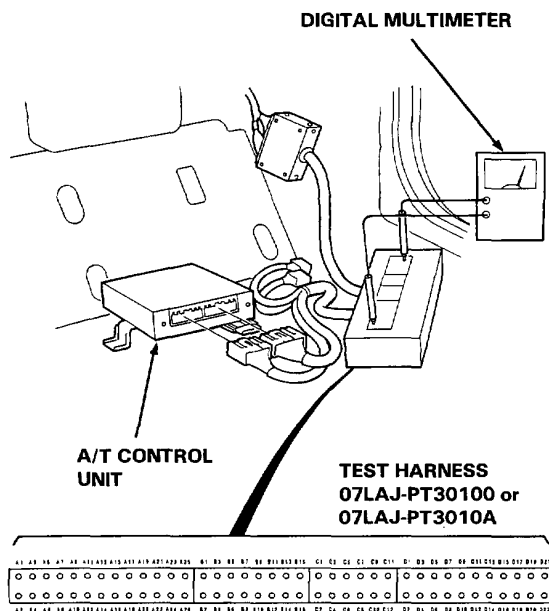


If the inspection for a particular failure code requires the use of Test Harness (07LAJ—PT30100 or 07LAJ—PT 3010A):

1. Remove the right door sill molding, door trim and R. kick panel (see Section 20).
2. Pull the carpet back to expose the A/T control unit.
3. Connect the wire harness to the Test Harness, and/or connect the Test Harness to the A/T control unit according to the troubleshooting flowchart.

NOTE:

- Only the A and D terminals of the Test Harness are used for A/T troubleshooting.
- Unless otherwise notes, use only the Digital Multimeter for testing.



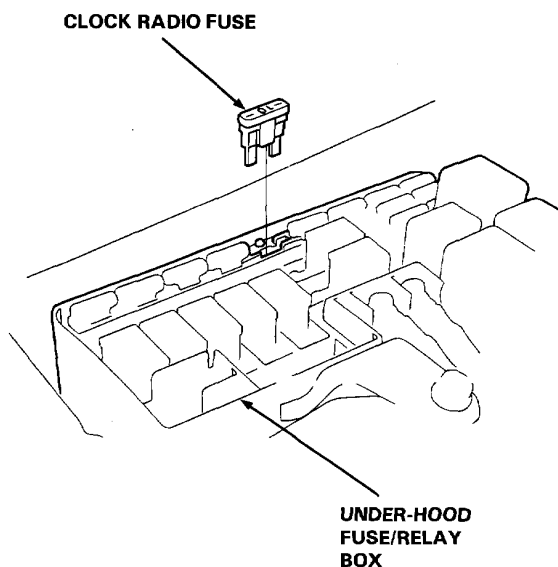
LHD is shown: RHD is similar.

• A/T Control Reset Procedure

1. Turn the ignition switch off.
2. Remove the CLOCK RADIO fuse (10A) from the under-hood fuse/relay box for 10 seconds to reset the A/T control unit.

NOTE:

Disconnecting the CLOCK RADIO fuse also cancels the radio preset stations and the clock setting. Make note of the radio presets before removing the fuse so you can reset them.



• Final Procedure

NOTE:

This procedure must be done after any troubleshooting.

1. Remove the jumper wire from the Service Check Connector.
2. Reset the A/T control unit.
3. Set the radio preset stations and clock setting.

Symptom-to-Component Chart

Electrical System

Number of S indicator light blinks while Service Check Connector is jumped.	S indicator light	Possible Cause	Symptom	Refer to page
1	Blinks	<ul style="list-style-type: none"> • Disconnected lockup control solenoid valve A connector • Short or open in lockup control solenoid valve A wire • Faulty lockup control solenoid valve A 	<ul style="list-style-type: none"> • Lockup clutch does not engage. • Lockup clutch does not disengage. • Unstable idle speed. 	14-38
2	Blinks	<ul style="list-style-type: none"> • Disconnected lockup control solenoid valve B connector • Short or open in lockup control solenoid valve B wire • Faulty lockup control solenoid valve B 	<ul style="list-style-type: none"> • Lockup clutch does not engage. 	14-39
3	Blinks or OFF	<ul style="list-style-type: none"> • Disconnected throttle angle sensor connector • Short or open in throttle angle sensor wire • Faulty throttle angle sensor 	<ul style="list-style-type: none"> • Lockup clutch does not engage. 	14-40
4	Blinks	<ul style="list-style-type: none"> • Disconnected speed sensor connector • Short or open in speed sensor wire • Faulty speed sensor 	<ul style="list-style-type: none"> • Lockup clutch does not engage. 	14-41
5	Blinks	<ul style="list-style-type: none"> • Short in shift position console switch wire • Faulty shift position console switch 	<ul style="list-style-type: none"> • Fails to shift other than 2nd↔4th gears. • Lockup clutch does not engage. 	14-42
6	OFF	<ul style="list-style-type: none"> • Disconnected shift position console switch connector • Open in shift position console switch wire • Faulty shift position console switch 	<ul style="list-style-type: none"> • Fails to shift other than 2nd↔4th gears. • Lockup clutch does not engage. • Lockup clutch engages and disengages alternately. 	14-44
7	Blinks	<ul style="list-style-type: none"> • Disconnected shift control solenoid valve A connector • Short or open in shift control solenoid valve A wire • Faulty shift control solenoid valve A 	<ul style="list-style-type: none"> • Fails to shift (between 1st↔4th, 2nd↔4th or 2nd↔3rd gears only). • Fails to shift (stuck in 4th gear) 	14-46
8	Blinks	<ul style="list-style-type: none"> • Disconnected shift control solenoid valve B connector • Short or open in shift control solenoid valve B wire • Faulty shift control solenoid valve B 	<ul style="list-style-type: none"> • Fails to shift (stuck in 1st or 4th gears). 	14-47



Number of S indicator light blinks while Service Check Connector is jumped.	S indicator light	Possible Cause	Symptom	Refer to page
9	Blinks	<ul style="list-style-type: none"> • Disconnected NC speed sensor connector • Short or open in the NC speed sensor wire • Faulty NC speed sensor 	• Lockup clutch does not engage.	14-48
10	Blinks	<ul style="list-style-type: none"> • Disconnected water temperature sensor connector • Short or open in the water temperature sensor wire • Faulty water temperature sensor 	• Lockup clutch does not engage.	14-50
11	OFF	<ul style="list-style-type: none"> • Disconnected ignition coil connector • Short or open in ignition coil wire • Faulty ignition coil 	• Lockup clutch does not engage.	14-51
14	OFF	<ul style="list-style-type: none"> • Short or open in FAS wire • Trouble in PGM-FI ECU 	• Transmission jerks hard when shifting.	14-52
15	OFF	<ul style="list-style-type: none"> • Disconnected NM speed sensor connector • Short or open in NM speed sensor wire • Faulty NM speed sensor 	• Transmission jerks hard when shifting.	14-54

If the self-diagnosis **S** indicator light does not blink, perform an inspection according to the table below.

Symptom	Probable Cause	Ref. page
S indicator light does not come on for 2 seconds after ignition is first turned on.	_____	14-56
S indicator light is on steady, not blinking whenever the ignition is on.	_____	14-58
Lockup clutch does not have duty operation (ON-OFF).	Check A/C signal with A/C on.	14-59
Lockup clutch does not engage.		
Shift lever cannot be moved from P position with depressing the brake pedal.	Check brake light signal.	14-60

- If a customer describes the symptoms for codes 3, 6, or 11, yet the **S** indicator light is not blinking, it will be necessary to recreate the symptom by test driving, and then checking the **S** indicator light with the ignition still ON.
- If the **S** indicator light displays codes other than those listed above or stays lit continuously, the control unit is faulty.
- Sometimes the **S** indicator light and the Check Engine light may come on simultaneously. If so, check the PGM-FI system according to the number of blinks on the PGM-FI ECU self-diagnosing indicator, then reset the memory by removing the CLOCK RADIO fuse in the under hood fuse/relay box for more than 10 seconds. Drive the vehicle for several minutes at speed over 50 km/h (30 mph), then recheck the lights.

NOTE:

Disconnecting the CLOCK RADIO fuse also cancels the radio preset stations and the clock setting. Make note of the radio presets before removing the fuse so you can reset them.

Electrical Troubleshooting

Troubleshooting Flowchart

Self-diagnosis **S** indicator light blinks once.

Disconnect the 26 P connector from the A/T control unit.

Turn the ignition switch ON.

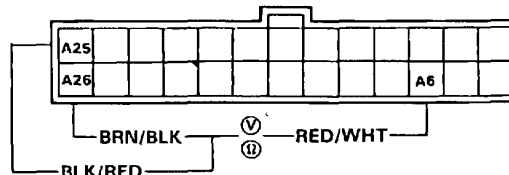
Measure the voltage between the A6 (RED/WHT) and A25 (BLK/RED) or A26 (BRN/BLK) terminals.

Is there voltage? YES

Possible Cause

- Disconnected lockup control solenoid valve A connector
- Short or open in lockup control solenoid valve A wire
- Faulty lockup control solenoid valve A

NOTE: View from terminal side.



Repair short to power source in RED/WHT wire between the A6 terminal and the lock-up control solenoid valve A.

NO
Turn the ignition switch OFF.

Measure the resistance between the A6 (RED/WHT) and A25 (BLK/RED) or A26 (BRN/BLK) terminals.

Is the resistance 12—24 Ω? YES

Check for loose A/T control unit connectors. If necessary, substitute a known-good solenoid valve assembly or A/T control unit and recheck.

NO
Disconnect the 2P connector from the lockup control solenoid valve assembly.

Check for continuity between the A6 (RED/WHT) and A25 (BLK/RED) or A26 (BRN/BLK) terminals.

Is there continuity? YES

Repair short to ground in RED/WHT wire between the A6 terminal and the lockup control solenoid valve A.

NO
Measure the resistance of the solenoid at the 2P connector (14-62).

Is the resistance 12—24 Ω? YES

Check for open in RED/WHT wire between the A6 terminal and the lockup control solenoid valve A.

NO
Replace the lockup control solenoid valve assembly.



Self-diagnosis S indicator light blinks twice.

Disconnect the 26 P connector from the A/T control unit.

Turn the ignition switch ON.

Measure the voltage between the A4 (WHT/BLK) and A25 (BLK/RED) or A26 (BRN/BLK) terminals.

Is there voltage?

YES

Repair short to power source in WHT/BLK wire between the A4 terminal and the lockup control solenoid valve B.

NO

Turn the ignition switch OFF.

Measure the resistance between the A4 (WHT/BLK) and A25 (BLK/RED) or A26 (BRN/BLK) terminals.

Is the resistance 12–24 Ω ?

YES

Check for loose A/T control unit connectors. If necessary, substitute a known-good solenoid valve assembly or A/T control unit and recheck.

NO

Disconnect the 2P connector from the lockup control solenoid valve assembly.

Check for continuity between the A4 (WHT/BLK) and A25 (BLK/RED) or A26 (BRN/BLK) terminals.

Is there continuity?

YES

Repair short to ground in WHT/BLK wire between the A4 terminal and the lockup control solenoid valve B.

NO

Measure the resistance of the solenoid at the 2P connector (14-62).

Is the resistance 12–24 Ω ?

YES

Check for open in WHT/BLK wire between the A4 terminal and the lockup control solenoid valve B.

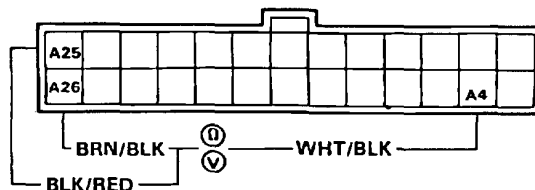
NO

Replace the lockup control solenoid valve assembly.

Possible Cause

- Disconnected lockup control solenoid valve B connector
- Short or open in lockup control solenoid valve B wire
- Faulty lockup control solenoid valve B

NOTE: View from terminal side.



(cont'd)

Electrical Troubleshooting

Troubleshooting Flowchart (cont'd)

Self-diagnosis **S** indicator light blinks three times.

Possible Cause

- Disconnected throttle angle sensor connector
- Short or open in throttle angle sensor wire
- Faulty throttle angle sensor

Turn the ignition switch ON.

Is the Check Engine light on?

YES

Repair the PGM-FI System. See Section 11.

NO

Turn the ignition switch OFF.

Disconnect the 26P and 22P connectors from the A/T control unit. Connect the Test Harness "A" and "D" connectors to the wire harness only, not to the A/T control unit. (14-35)

Turn the ignition switch ON.

Measure the voltage between the D 18 and A 25/A 26 terminals.

Is the voltage 4.75–5.25 V?

NO

Repair open or short in LT GRN/BLK wire between the D 18 terminal and the PGM-FI ECU.

YES

Turn the ignition switch OFF.

Connect the Test Harness "A" and "D" connectors to the A/T control unit.

Turn the ignition switch ON.

Measure the voltage between the D7 and A25/A26 terminals.

Is the voltage 0.44–0.56 V?*

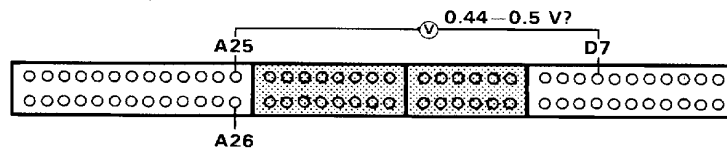
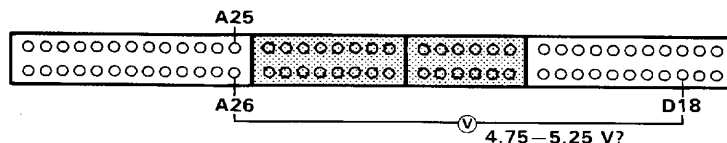
NO

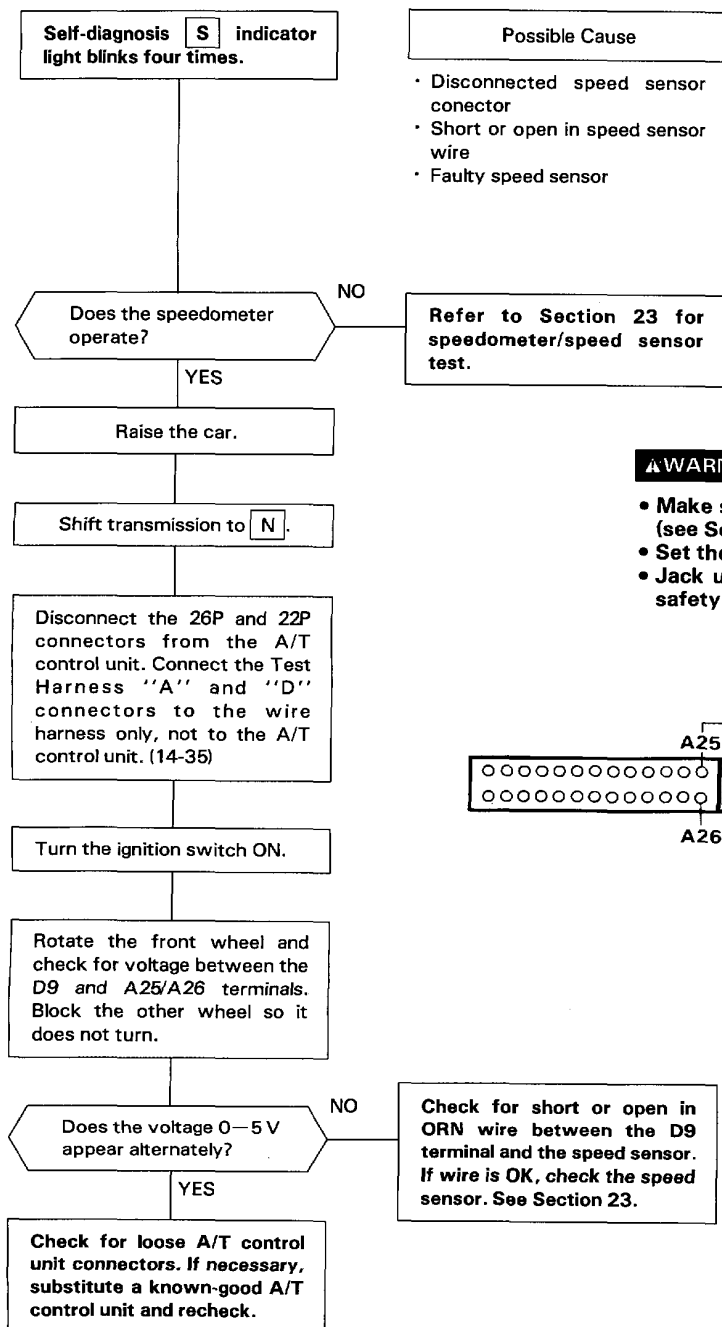
Repair open or short in RED/BLK wire between the D7 terminal and the throttle angle sensor.

YES

* $\pm 10\%$

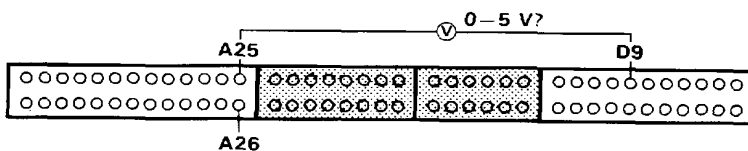
Check for loose A/T control unit connectors. If necessary, substitute a known-good A/T control unit and recheck.





▲WARNING

- Make sure lifts, jacks, and safety stands are placed properly (see Section 1).
- Set the parking brake securely, and block the rear wheels.
- Jack up the front of the car, and support the front with a safety stands.



(cont'd)

Electrical Troubleshooting

Troubleshooting Flowchart (cont'd)

Self-diagnosis **S** indicator light blinks five times.

Turn the ignition switch ON.

Observe the A/T shift indicator, and select each position separately.

Do any indicators fail to light when shifted through all positions?

YES

See A/T shift position indicator inspection (Section 23).

NO

Turn the ignition switch OFF.

Connect the Test Harness between the A/T control unit and connectors. (14-35)

Turn the ignition switch ON.

Shift to other than **R** position.

Measure the voltage between the A 21 and A 25 / A 26 terminals.

Is there battery voltage?

NO

Check for short in GRN/RED wire between the A21 terminal and the shift position console switch or shift position indicator. If wire is OK, check for loose A/T control unit connectors. If necessary, substitute a known-good A/T control unit and recheck.

YES

Shift to other than **N** and **P** position.

Measure the voltage between the A 19 and A 25 / A 26 terminals.

Is there battery voltage?

NO

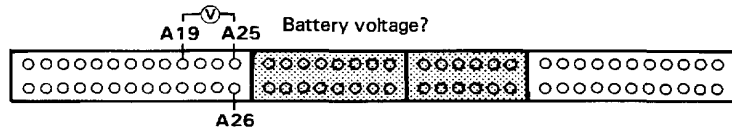
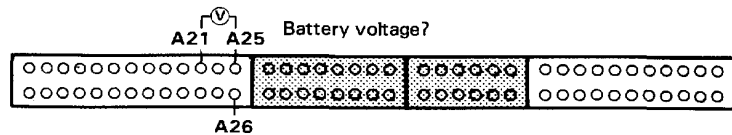
Check for short in LT GRN wire between the A19 terminal and the shift position console switch. If wire is OK, check for loose A/T control unit connectors. If necessary, substitute a known-good A/T control unit and recheck.

YES

To page 14-43

Possible Cause

- Short in shift position console switch wire
- Faulty shift position console switch





From page 14-42

Shift to other than **D4** position.

Measure the voltage between the A 17 and A 25/A 26 terminals.

Is there battery voltage?

YES

Shift to other than **D3** position.

Measure the voltage between the A 15 and A 25/A 26 terminals.

Is there battery voltage?

YES

Shift to other than **2** position.

Measure the voltage between the A 13 and A 25/A 26 terminals.

Is there battery voltage?

YES

Shift to other than **1** position.

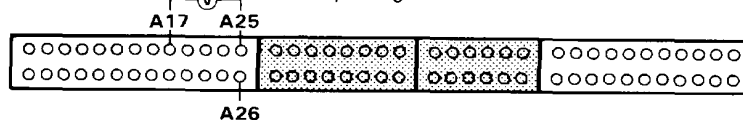
Measure the voltage between the A 11 and A 25/A 26 terminals.

Is there battery voltage?

YES

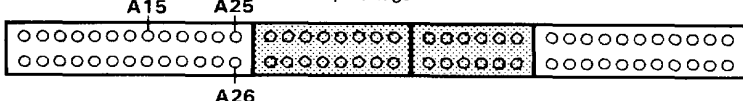
Check for loose A/T control unit connectors. If necessary, substitute a known-good A/T control unit and recheck.

Battery voltage?



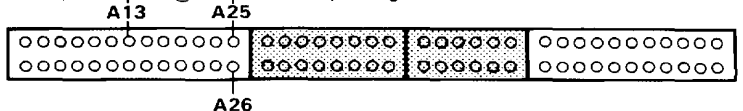
Check for short in GRN/BLK wire between the A17 terminal and the shift position console switch. If wire is OK, check for loose A/T control unit connectors. If necessary, substitute a known-good A/T control unit and recheck.

Battery voltage?



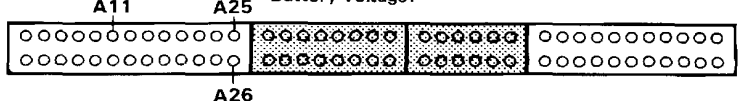
Check for short in GRN/BLU wire between the A15 terminal and the shift position console switch or shift position indicator. If wire is OK, check for loose A/T control unit connectors. If necessary, substitute a known-good A/T control unit and recheck.

Battery voltage?



Check for short in GRN/YEL wire between the A13 terminal and the shift position console switch or shift position indicator. If wire is OK, check for loose A/T control unit connectors. If necessary, substitute a known-good A/T control unit and recheck.

Battery voltage?



Check for short in LT GRN/WHT wire between the A11 terminal and the shift position console switch or shift position indicator. If wire is OK, check for loose A/T control unit connectors. If necessary, substitute a known-good A/T control unit and recheck.

(cont'd)

Electrical Troubleshooting

Troubleshooting Flowchart (cont'd)

Self-diagnosis **S** indicator light blinks six times.

Possible Cause

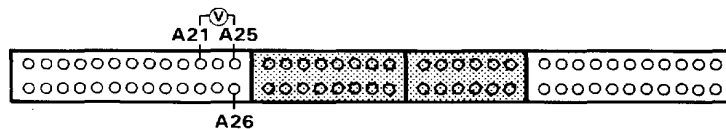
- Disconnected shift position console switch connector
- Open in shift position console switch wire
- Faulty shift position console switch

Connect the Test Harness between the A/T control unit and connectors. (14-35)

Turn the ignition switch ON.

Shift to **R** position.

Measure the voltage between the A 21 and A 25/A 26 terminals.



Is there voltage?

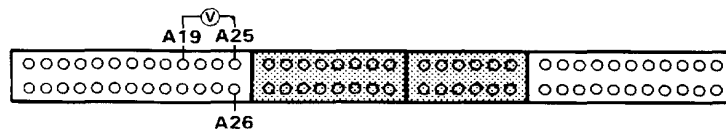
YES

Repair open in GRN/RED wire between the A21 terminal and the shift position console switch.

NO

Shift to **N** or **P** position.

Measure the voltage between the A 19 and A 25/A 26 terminals.



Is there voltage?

YES

Repair open in LT GRN wire between the A19 terminal and the shift position console switch.

NO

To page 14-45



From page 14-44

Shift to **D4** position.

Measure the voltage between the A17 and A25/A26 terminals.

Is there voltage?

YES

Repair open in GRN/BLK wire between the A17 terminal and the shift position console switch.

NO

Shift to **D3** position.

Measure the voltage between the A15 and A25/A26 terminals.

Is there voltage?

YES

Repair open in GRN/BLU wire between the A15 terminal and the shift position console switch.

NO

Shift to **2** position.

Measure the voltage between the A13 and A25/A26 terminals.

Is there voltage?

YES

Repair open in GRN/YEL wire between the A13 terminal and the shift position console switch.

NO

Shift to **1** position.

Measure the voltage between the A11 and A25/A26 terminals.

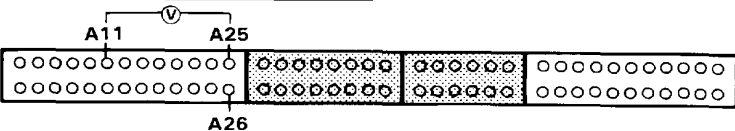
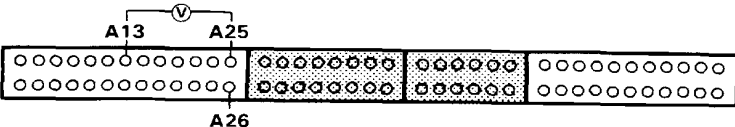
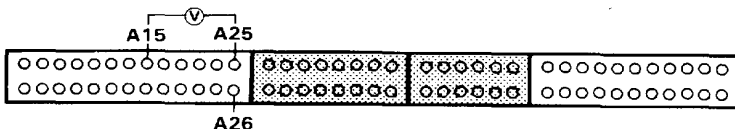
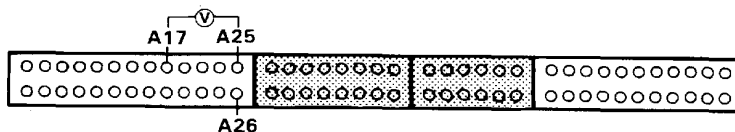
Is there voltage?

YES

Repair open in LT GRN/WHT wire between the A11 terminal and the shift position console switch.

NO

Check for loose A/T control unit connectors. If necessary, substitute a known-good A/T control unit and recheck.



(cont'd)

Electrical Troubleshooting

Troubleshooting Flowchart (cont'd)

Self-diagnosis **S** indicator light blinks seven times.

Disconnect the 26P connector from the A/T control unit.

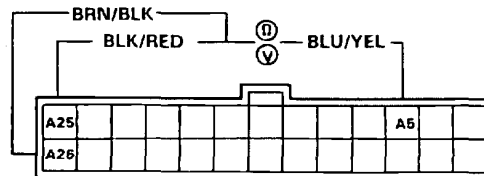
Turn the ignition switch ON.

Measure the voltage between the A5 (BLU/YEL) and A25 (BLK/RED) or A26 (BRN/BLK) terminals.

Is there voltage? YES
NO

Possible Cause

- Disconnected shift control solenoid valve A connector
- Short or open in shift control solenoid valve A wire
- Faulty shift control solenoid valve A



NOTE: View from terminal side.

Repair short to power source in BLU/YEL wire between the A5 terminal and the shift control solenoid valve A.

Turn the ignition switch OFF.

Measure the resistance between the A5 (BLU/YEL) and A25 (BLK/RED) or A26 (BRN/BLK) terminals.

Is the resistance 12–24 Ω ? YES
NO

Check for loose A/T control unit connectors. If necessary, substitute a known-good solenoid valve assembly or A/T control unit and recheck.

Disconnect the 2P connector from the shift control solenoid valve assembly.

Check for continuity between the A5 (BLU/YEL) and A25 (BLK/RED) or A26 (BRN/BLK) terminals.

Is there continuity? YES
NO

Repair short to ground in BLU/YEL wire between the A5 terminal and the shift control solenoid valve A.

Measure the resistance of the solenoid at the 2P connector (14-63).

Is the resistance 12–24 Ω ? YES
NO

Check for open in BLU/YEL wire between the A5 terminal and the shift control solenoid valve A.

Replace the shift control solenoid valve assembly.



Self-diagnosis S Indicator light blinks eight times.

Disconnect the 26P connector from the A/T control unit.

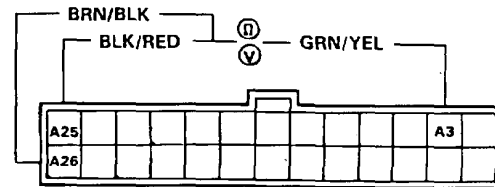
Turn the ignition switch ON.

Measure the voltage between the A3 (GRN/YEL) and A25 (BLK/RED) or A26 (BRN/BLK) terminals.

Is there voltage? YES

Possible Cause

- Disconnected shift control solenoid valve B connector
- Short or open in shift control solenoid valve B wire
- Faulty shift control solenoid valve B



NOTE: View from terminal side.

Repair short to power source in GRN/YEL wire between the A3 terminal and shift control solenoid valve B.

NO

Turn the ignition switch OFF.

Measure the resistance between the A3 (GRN/YEL) and A25 (BLK/RED) or A26 (BRN/BLK) terminals.

Is the resistance 12–24 Ω ? YES

Check for loose A/T control unit connectors. If necessary, substitute a known-good solenoid valve assembly or A/T control unit and recheck.

NO

Disconnect the 2P connector from the shift control solenoid valve assembly.

Check for continuity between the A3 (GRN/YEL) and A25 (BLK/RED) or A26 (BRN/BLK) terminals.

Is there continuity? YES

Repair short to ground in GRN/YEL wire between the A3 terminal and the shift control solenoid valve B.

NO

Measure the resistance of the solenoid at the 2P connector (14-63).

Is the resistance 12–24 Ω ? YES

Check for open in GRN/YEL wire between the A3 terminal and the shift control solenoid valve B.

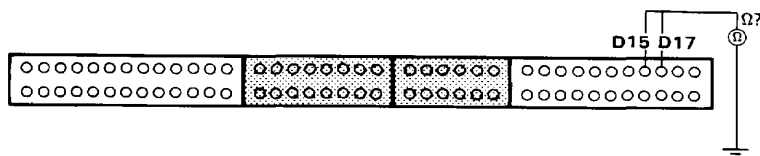
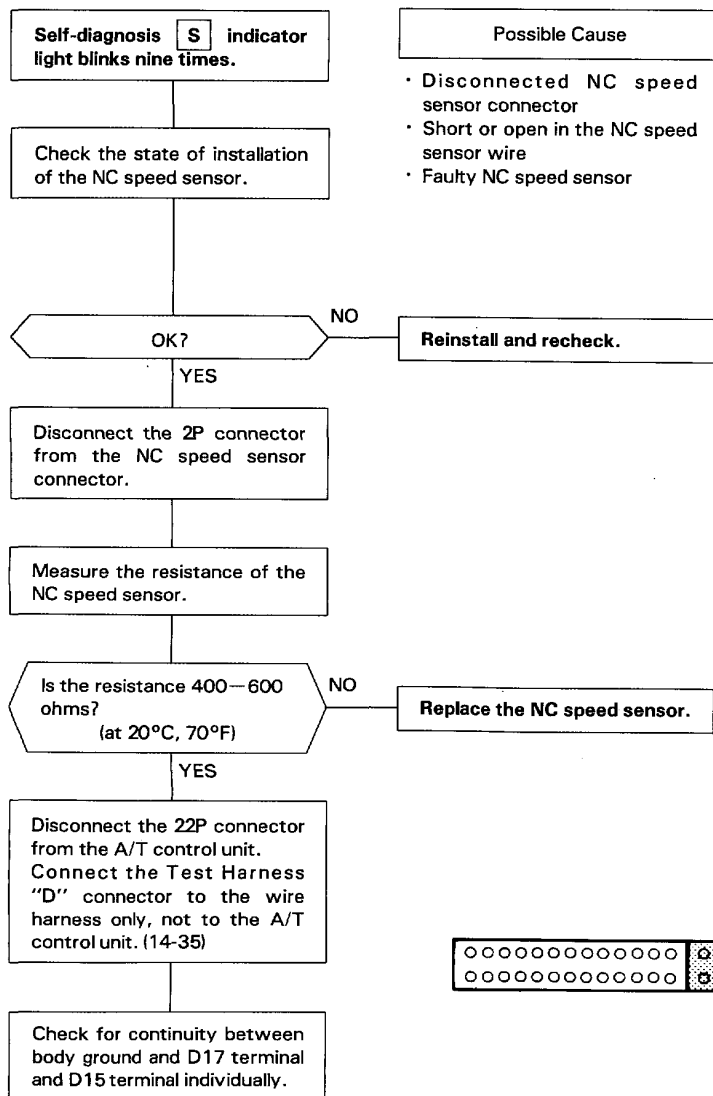
NO

Replace the shift control solenoid valve assembly.

(cont'd)

Electrical Troubleshooting

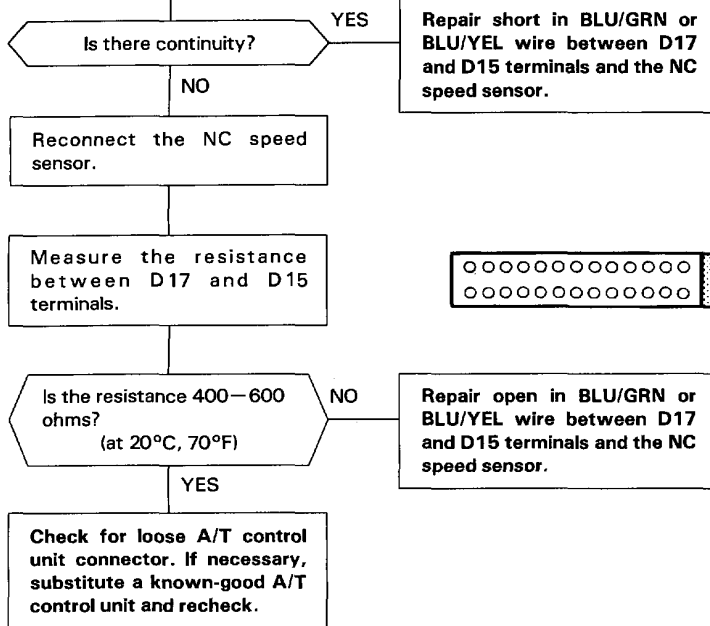
Troubleshooting Flowchart (cont'd)



To page 14-49

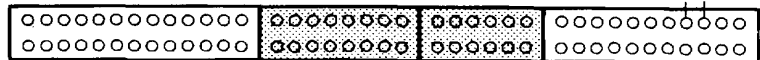


From page 14-48



400–600 Ω ?

D15 D17



(cont'd)

Electrical Troubleshooting

Troubleshooting Flowchart (cont'd)

Self-diagnosis **S** indicator light blinks ten times.

Possible Cause

- Disconnected water temperature sensor connector
- Short or open in the water temperature sensor wire
- Faulty water temperature sensor

Turn the ignition switch ON.

Is the Check Engine light on?

YES

Repair the PGM-FI System. See Section 11.

NO

Turn the ignition switch OFF.

Disconnect the 26P and 22P connectors from the A/T control unit. Connect the Test Harness "A" and "D" connectors to the wire harness only, not to the A/T control unit. (14-35)

Turn the ignition switch ON.

Measure the voltage between the D 18 and A 25/A 26 terminals.

Is the voltage 4.75–5.25 V?

NO

Repair open or short in LT GRN/BLK wire between the D 18 terminal and the PGM-FI ECU.

YES

Turn the ignition switch OFF.

Connect the Test Harness "A" and "D" connectors to the A/T control unit.

Start the engine and warm it up to normal operating temperature.

Measure the voltage between the D5 and A25/A26 terminals.

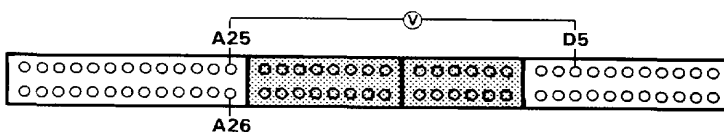
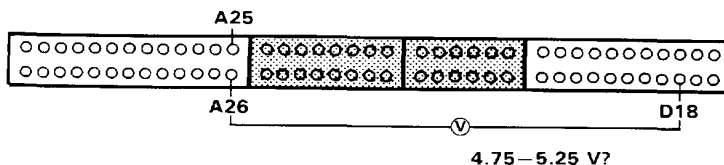
Is the voltage less than 1V?

NO

Repair open or short in YEL/BLU wire between the D5 terminal and the coolant temperature sensor.

YES

Check for loose A/T control unit connectors. If necessary, substitute a known-good A/T control unit and recheck.



Electrical Troubleshooting

Troubleshooting Flowchart (cont'd)

Self-diagnosis **S** indicator light blinks fourteen times.

Possible Cause

- Short or open in FAS wire
- Trouble in PGM-FI ECU

▲ WARNING

- Make sure lifts, jacks and safety stands are placed properly, and hoist brackets are attached to the correct position on the engine (see Section 1).
- While testing, be careful of the rotating front wheels.

Is the Check Engine light on?

YES

Repair the PGM-FI System (Section 11).

NO

Start the engine and warm it up to normal operating temperature.

Shift to **P** position.

Turn the ignition switch OFF.

Connect the Test Harness between the A/T control unit and connectors. (14-35)

Turn the ignition switch ON and wait for at least two seconds.

Measure the voltage between the D16 (+) and A25/A26 (−) terminals.

Is there approx. 5V?

YES

Check for loose A/T control unit connectors. If necessary, substitute a known-good A/T control unit and recheck.

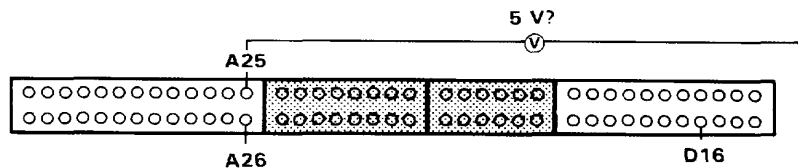
NO

Turn the ignition switch OFF.

Disconnect the Test Harness from the A/T control unit. Leave connected to car harness.

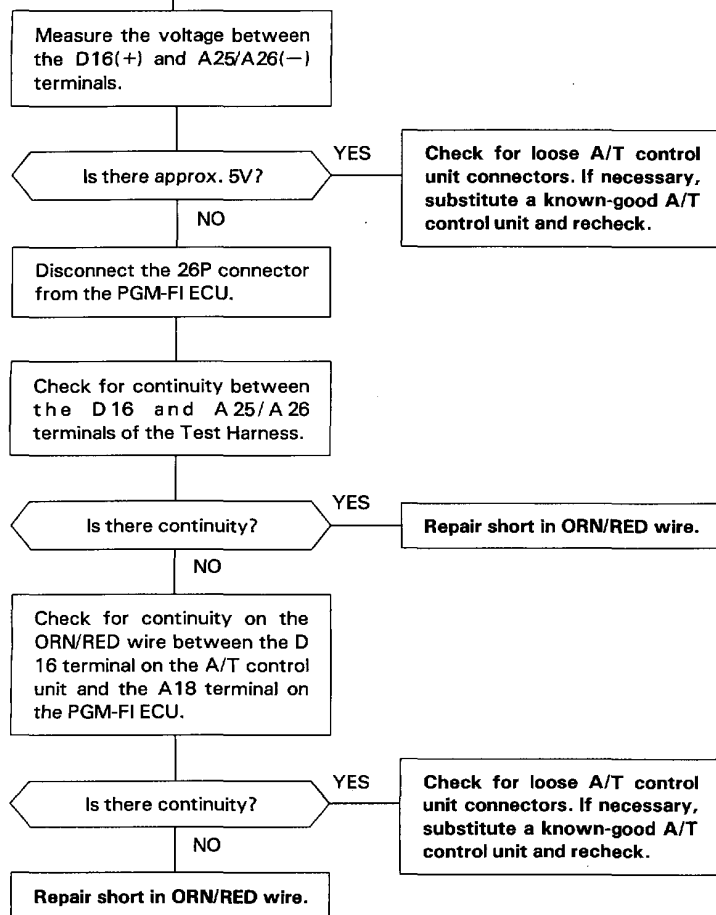
Turn the ignition switch ON.

To page 14-53





From page 14-52



(cont'd)

Electrical Troubleshooting

Troubleshooting Flowchart (cont'd)

Self-diagnosis **S** indicator light blinks fifteen times.

Possible Cause

- Disconnected NM speed sensor connector
- Short or open in NM speed sensor wire
- Faulty NM speed sensor

NOTE:

A code 15 on the A/T control unit doesn't always mean there's an electrical problem in the NM or NC circuit; code 15 may also indicate a mechanical problem in the transmission.

Check the state of installation of NM and NC speed sensor.

OK?

NO

Reinstall and recheck.

YES

Disconnect the 2P connector from the NM speed sensor.

Measure the resistance of the NM speed sensor.

Is the resistance 400–600 ohms? (at 20°C, 70°F)

NO

Replace the NM speed sensor.

YES

Disconnect the 22P connector from the A/T control unit. Connect the Test Harness "D" connector to the wire harness only, not to the A/T control unit. (14-48)

Check the continuity between D19 and D12 terminals and body ground.

Is there continuity?

YES

Repair short in ORN/BLU or WHT/BLU wires between D19 and D12 terminals and the NM speed sensor.

NO

Reconnect the 2P connector to the NM speed sensor.

Measure the resistance between D19 and D12 terminals.

Is the resistance 400–600 ohms? (at 20°C, 70°F)

NO

Check for continuity between D19 terminal and the NM speed sensor.

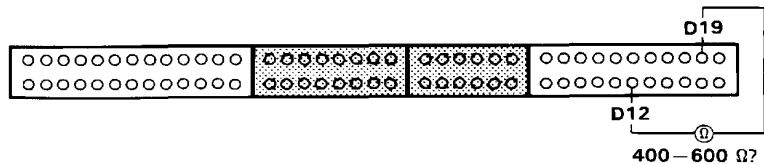
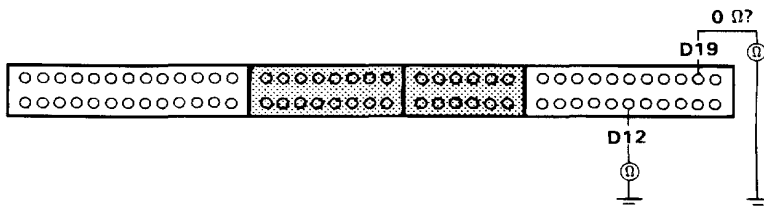
YES

A

To page 14-55

B

To page 14-55





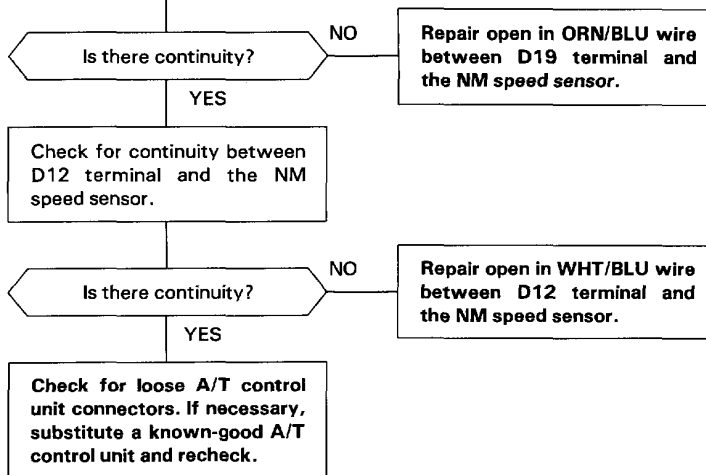
From page 14-54

A

Run **Electrical Troubleshooting** for code 9.
Check for loose A/T control unit connector. If necessary, substitute a known-good A/T control unit and recheck.

From page 14-54

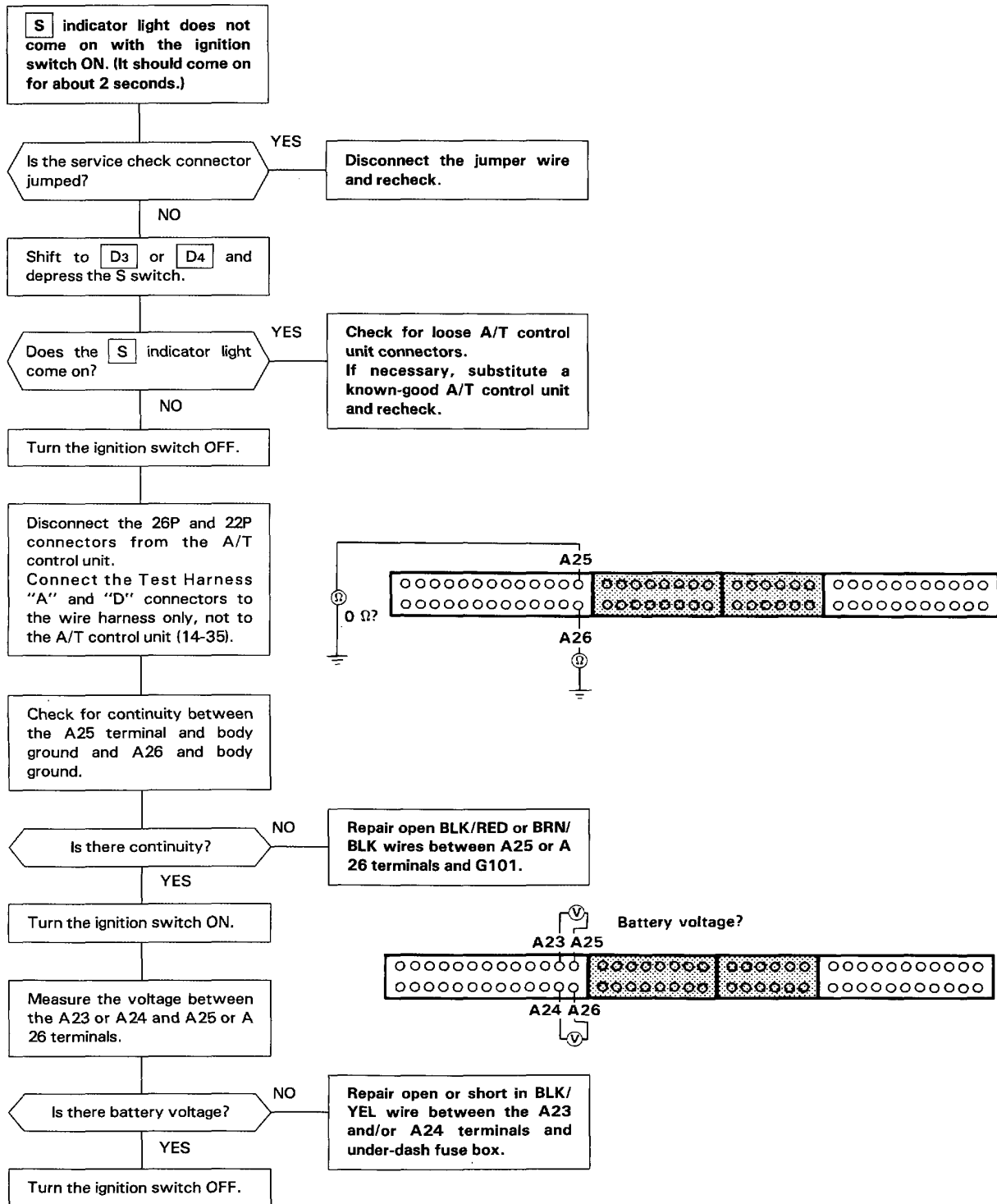
B

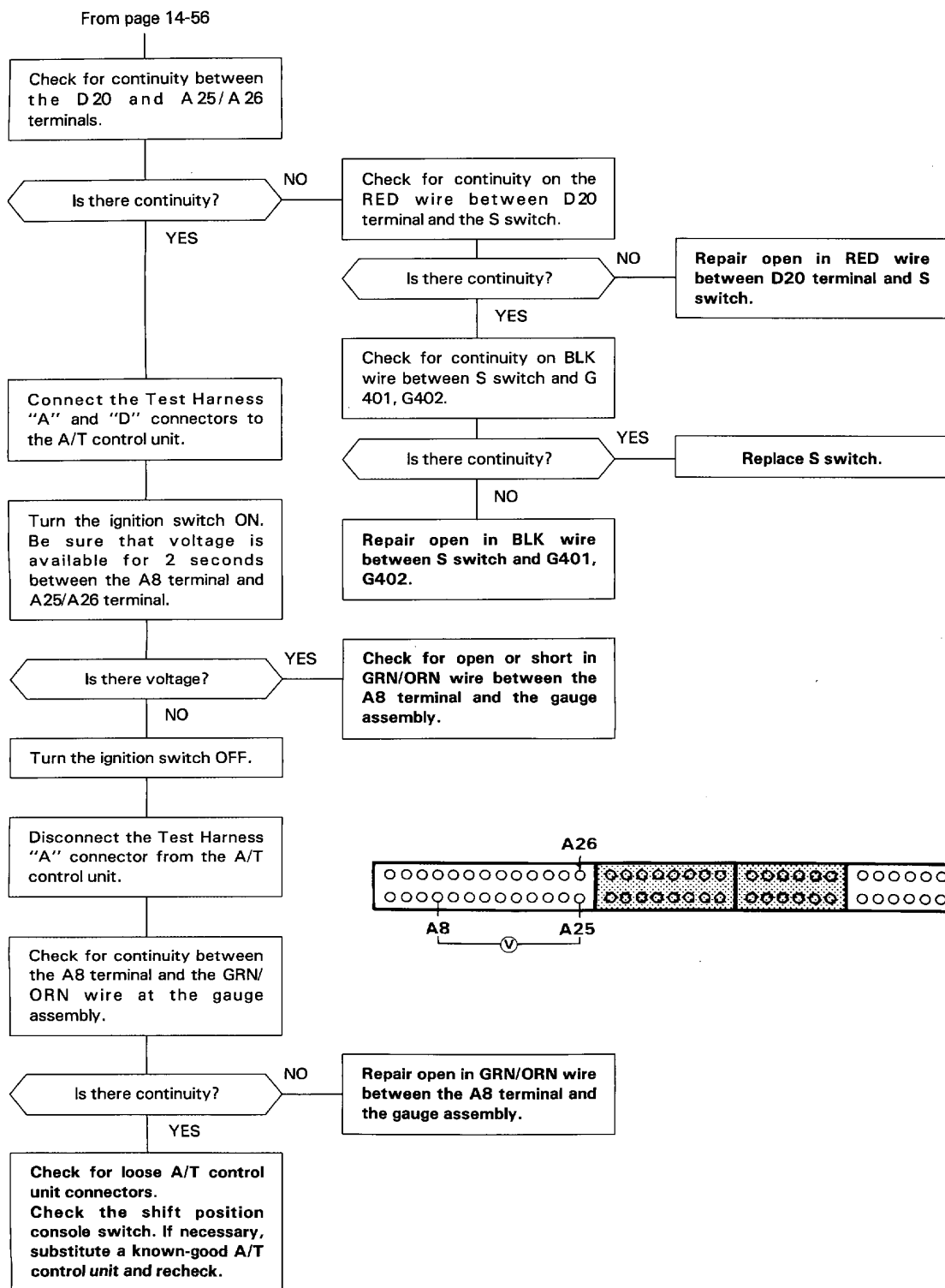


(cont'd)

Electrical Troubleshooting

Troubleshooting Flowchart (cont'd)

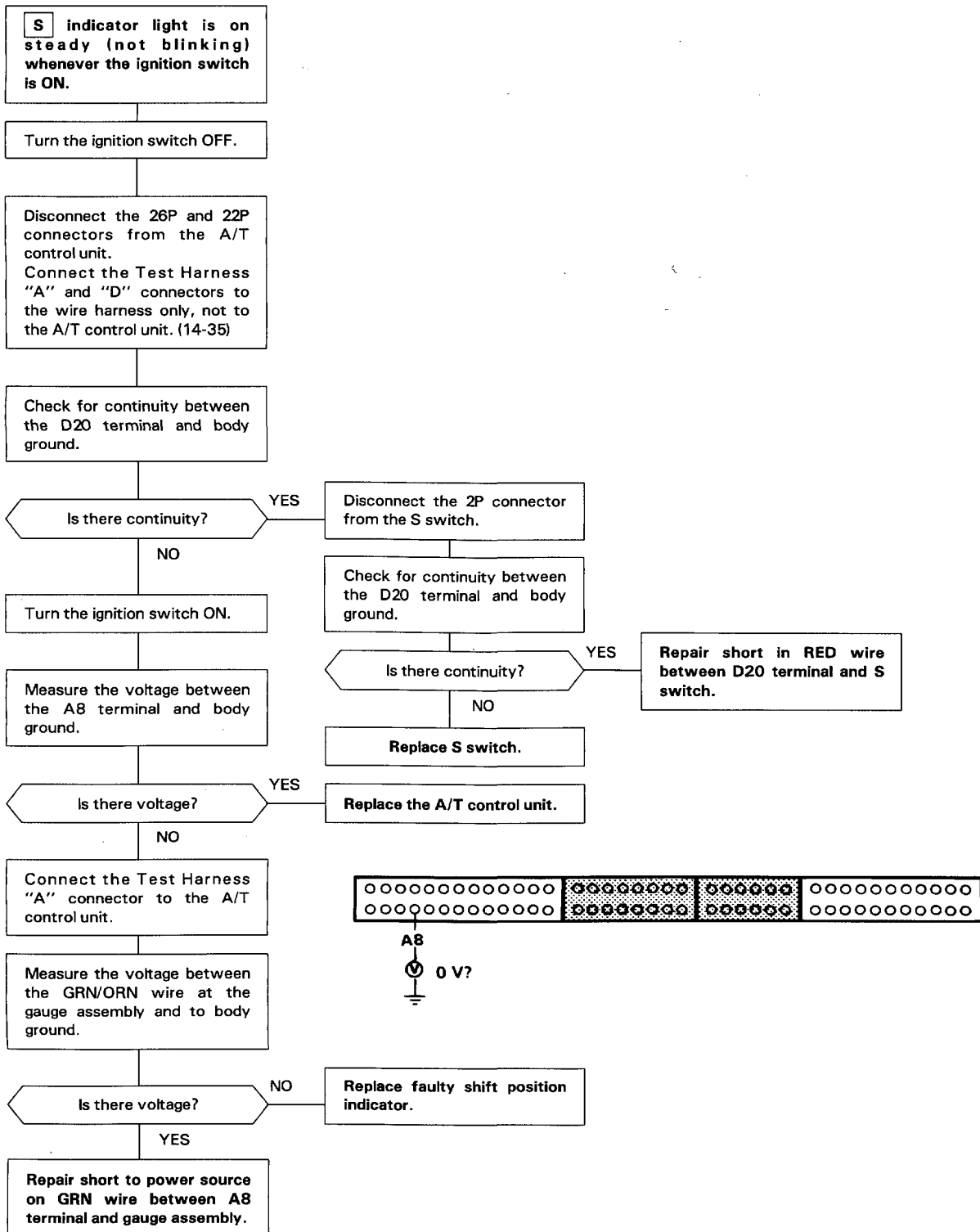


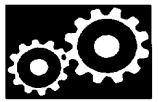


(cont'd)

Electrical Troubleshooting

Troubleshooting Flowchart (cont'd)





Inspection of the A/C signal.

Start the engine.

Turn the blower switch ON.

Push the A/C switch ON.

Does A/C compressor clutch engage?

NO

See Air Conditioner inspection (Section 22).

YES

Stop the engine.

Disconnect the 26P connector from the A/T control unit.

Start the engine.

Measure the voltage between the A22 (RED/BLU) and A25 (BLK/RED) or A26 (BRN/BLK) terminals. (A/C compressor OFF)

Is there battery voltage?

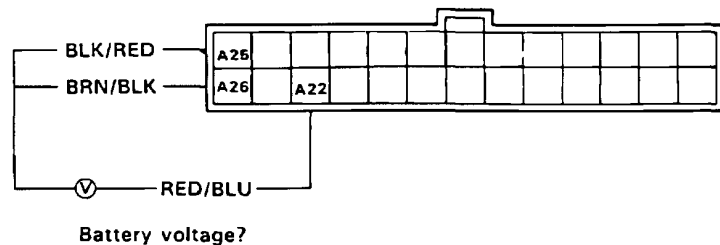
NO

Repair open in RED/BLU wire between the A22 terminal and A/C clutch relay.

YES

A/C signal is OK.

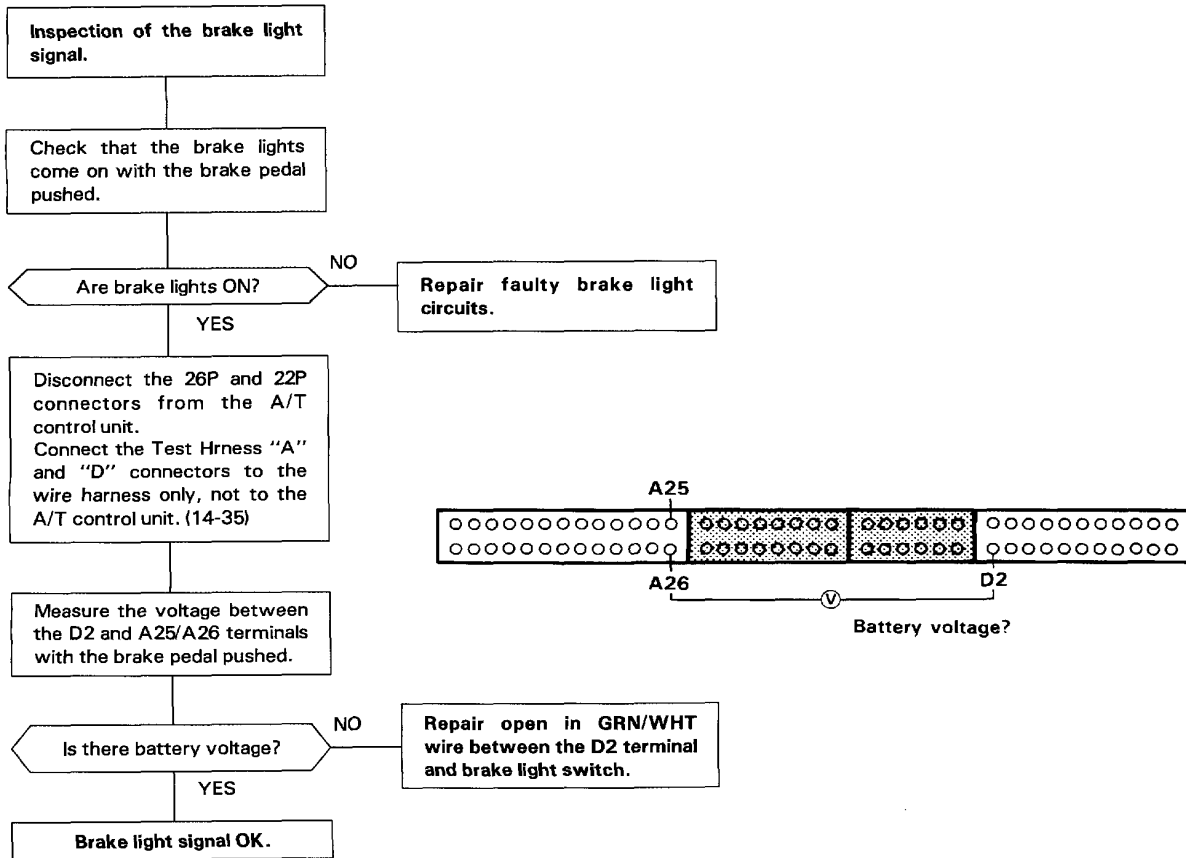
NOTE: View from terminal side.



(cont'd)

Electrical Troubleshooting

Troubleshooting Flowchart (cont'd)

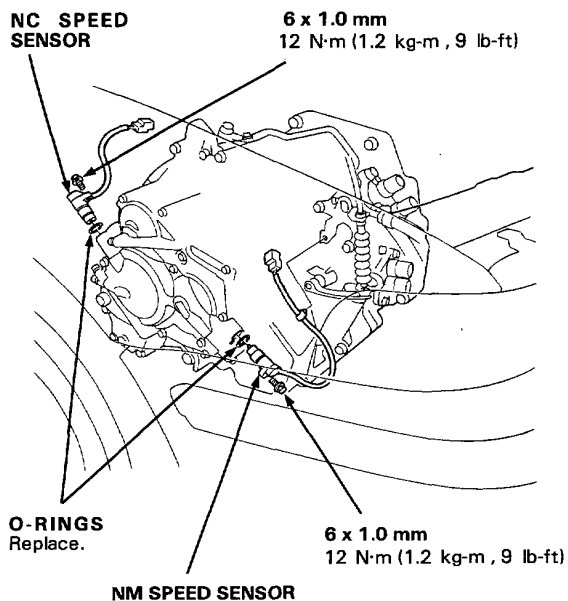




A/T Speed Sensor

Replacement

1. Remove the 6 mm bolt from the transmission housing and remove the A/T speed sensor assembly.



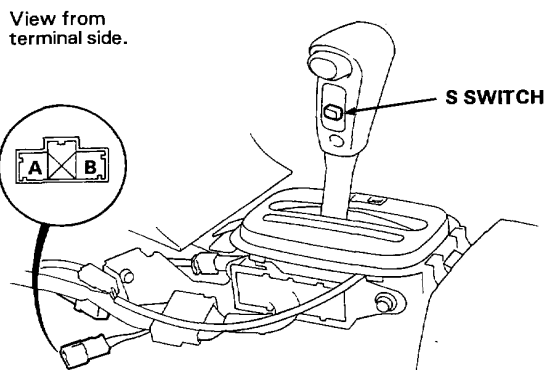
2. Replace the O-ring with a new one before reassembling the A/T speed sensor.

S Switch

Test

1. Remove the front console (see Section 20).
2. Disconnect the switch connector.
3. Check for continuity between A and B terminals. There should be continuity when the switch is pressed.

LHD is shown; RHD is similar.



Lockup Control Solenoid Valve A/B

Test

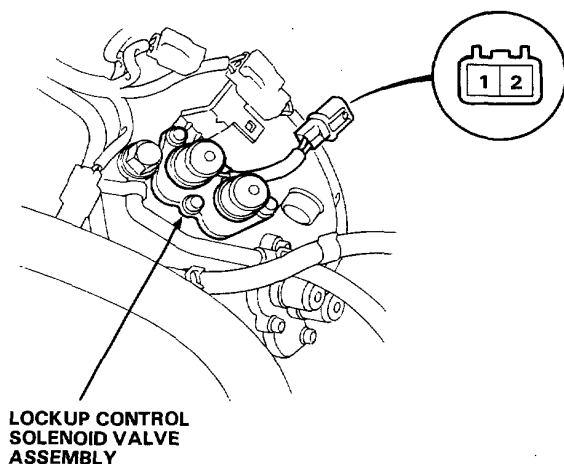
NOTE:

Install the R. side cover.

1. Disconnect the connector from the lockup control solenoid valve A/B.
2. Measure the resistance between the No. 1 terminal (SOL. V A) of the lockup control solenoid valve connector and body ground and between the No. 2 terminal (SOL. V B) and body ground.

STANDARD: 12—24 Ω

View from
terminal side.



3. Replace the lockup control solenoid valve assembly if the resistance is out of specification.
4. Connect the No. 1 terminal of the lockup control solenoid valve connector to the battery positive terminal. A clicking sound should be heard. Connect the No. 2 terminal to the battery positive terminal. A clicking sound should be heard.
5. If not, check for continuity between the A/T control unit A4 or A6 harness and body ground (page 14-38, 39).
6. Replace the lockup control solenoid valve assembly if there is continuity between the A/T control unit A4 or A6 harness and body ground (page 14-38, 39).

Replacement

1. Remove the mounting bolts and lockup control solenoid valve assembly.

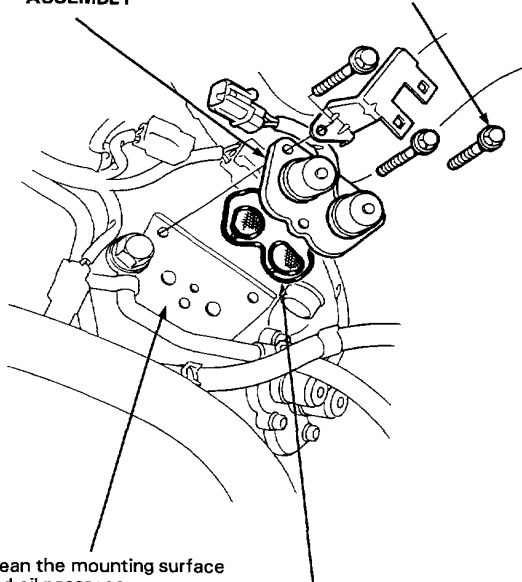
NOTE:

Be sure to remove or replace the lockup control solenoid valves A and B as an assembly.

2. Check the lockup control solenoid valve oil passages for dust or dirt, and replace as an assembly, if necessary.

**LOCKUP CONTROL
SOLENOID VALVE
ASSEMBLY**

6 x 1.0 mm
12 N·m (1.2 kg-m, 9 lb-ft)



BASE GASKET
Replace.

3. Clean the mounting surface and oil passages of the lockup control solenoid valve assembly, and install a new base gasket.
4. Check the connector for rust, dirt or oil, and reconnect it securely.



Shift Control Solenoid Valve A/B

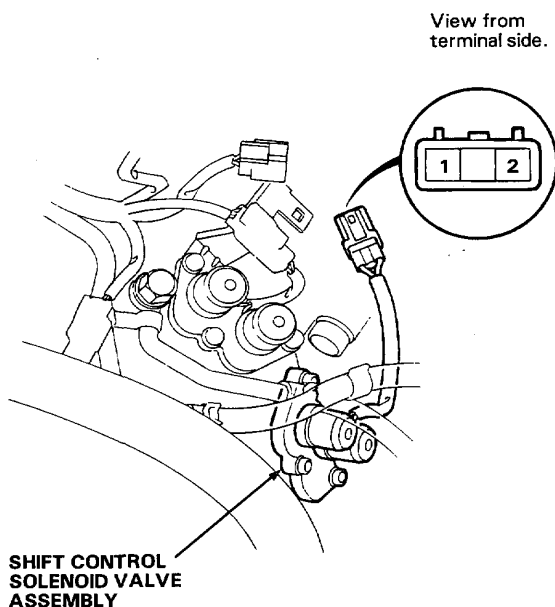
Test

NOTE:

Shift control solenoid valves A and B must be removed/replaced as an assembly.

1. Disconnect the connector from the shift control solenoid valve A/B.
2. Measure the resistance between the No. 1 terminal (SOL. V A) of the shift control solenoid valve connector and body ground and between the No. 2 terminal (SOL. V B) and body ground.

STANDARD: 12–24 Ω



3. Replace the shift control solenoid valve assembly if the resistance is out of specification.
4. Connect the No. 1 terminal of the shift control solenoid valve connector to the battery positive terminal. A clicking sound should be heard. Connect the No. 2 terminal to the battery positive terminal. A clicking sound should be heard.
5. If not, check for continuity between the A/T control unit A3 or A5 harness and body ground (page 14-46, 47).
6. Replace the shift control solenoid valve assembly if there is continuity between the A/T control unit A3 or A5 harness and body ground (page 14-46, 47).

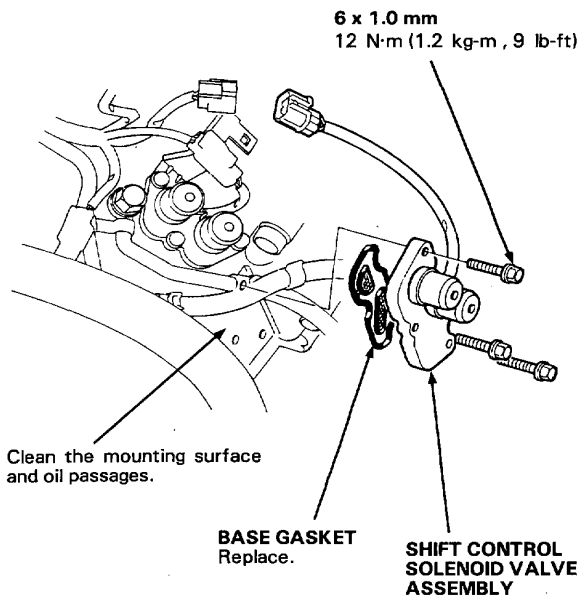
Replacement

1. Remove the mounting bolts and shift control solenoid valve assembly.

NOTE:

Be sure to remove or replace the shift control solenoid valves A and B as an assembly.

2. Check the shift control solenoid valve oil passages for dust or dirt, and replace as an assembly, if necessary.



3. Clean the mounting surface and oil passages of the shift control solenoid valve assembly, and install a new base gasket.
4. Check the connector for rust, dirt or oil, and reconnect it securely.

Symptom-to-Component Chart

Hydraulic System

SYMPTOM	Check these items on the PROBABLE CAUSE List	Check these items on the NOTES List
Engine runs, but car does not move in any gear.	1, 6, 7, 16	K, L, R, S
Car moves in R and 2, but not in D ₃ , D ₄ or 1.	8, 29, 44, 48	C, M, O,
Car moves in D ₃ , D ₄ , 1, R, but not in 2.	9, 30, 49	C, L
Car moves in D ₃ , D ₄ , 2, 1, but not in R.	1, 11, 22, 34, 38, 39, 40	C, L, Q,
Car moves in N.	1, 8, 9, 10, 11, 46, 47	C, D
Excessive idle vibration.	5, 17	B, K, L
Slips in all gears.	6, 7, 16	C, L, U
No engine braking in 1 position.	12	C, D, L
Slips in low gear.	8, 29, 44, 48	C, N, O, U
Slips in 2nd gear.	9, 20, 23, 30, 49	C, L, U
Slips in 3rd gear.	10, 21, 23, 31, 49	C, L, U
Slips in 4th gear.	11, 23, 32, 44	C, L, N, U
Slips in reverse gear.	✓ 11, 32, 34, 44	C, N
Flares on 1-2 upshift.	3, 15, 23	E, L, V
Flares on 2-3 upshift.	3, 15, 23, 24, 49	E, L, V
Flares on 3-4 upshift.	3, 15, 23, 25, 49	E, L, N, V
No upshift; transmission stays in low gear.	14, 19, 23	G, L
No downshift to low gear.	12, 19	G, L
Late upshift.	14	L, V
Erratic shifting.	2, 14, 26	V
Harsh shift (up and down shifting).	2, 4, 15, 23, 24, 25, 26, 27, 47	A, E, H, I, L, V
Harsh shift (1-2).	2, 9, 15, 23	C, D, E, V
Harsh shift (2-3).	2, 10, 15, 23, 24	C, D, E, H, L, V
Harsh shift (3-4).	2, 11, 15, 23, 25	C, D, E, I, L, V
Harsh kick-down shifts.	2, 15, 23, 26, 27, 28	E, L, V, Q
Harsh kick-down shift (2-1).	48	O
Harsh downshift at closed throttle.	2, 15, 23	E, T
Harsh shift when manually shifting to 1.	33	L
Axle(s) slips out of transmission on turns.	43, 50	L, P, Q
Axle(s) stuck in transmission.	43	L, Q
Ratcheting noise when shifting into R.	6, 7, 38, 39, 40	K, L, Q
Loud popping noise when taking off in R.	38, 39, 40	L, Q
Ratcheting noise when shifting from R to P or from R to N.	38, 39, 40, 45	L, Q
Noise from transmission in all selector lever positions.	6, 17	K, L, Q
Noise from transmission only when wheels are rolling.	39, 42	L, Q
Gear whine, rpm related (pitch changes with shifts).	8, 13, 41	K, L, Q
Gear whine, speed related (pitch changes with speed).	38, 42	L, Q
Transmission will not shift into 4th gear in D ₄ .	1, 21, 28, 32	L
Lockup clutch does not lockup smoothly.	17, 36, 37	L
Lockup clutch does not operate properly.	2, 3, 15, 18, 35, 36, 37	E, L, V
Transmission has multitude of problems shifting. At disassembly, large particles of metal are found on magnet.	43	L, Q



PROBABLE CAUSE

1.	Shift cable broken/out of adjustment.
2.	Throttle cable too short.
3.	Throttle cable too long.
4.	Wrong type ATF.
5.	Idle rpm too low/high.
6.	Oil pump worn or binding.
7.	Pressure regulator stuck.
8.	1st clutch defective.
9.	2nd clutch defective.
10.	3rd clutch defective.
11.	4th clutch defective. ✓
12.	1st-hold clutch defective.
13.	Mainshaft, countershaft, and secondary shaft idler gears worn/damaged.
14.	Modulator valve stuck.
15.	Throttle valve B stuck.
16.	ATF strainer clogged.
17.	Torque converter defective.
18.	Torque converter check valve stuck.
19.	1-2 shift valve stuck.
20.	2-3 shift valve stuck.
21.	3-4 shift valve stuck.
22.	Servo control valve stuck.
23.	Clutch pressure control (CPC) valve stuck.
24.	2nd orifice control valve stuck.
25.	Orifice control valve stuck.
26.	3-2 kick-down valve stuck.
27.	3rd kick-down valve stuck.
28.	4th exhaust valve stuck.
29.	1st accumulator defective.
30.	2nd clutch accumulator defective.
31.	3rd clutch accumulator defective.
32.	4th/reverse accumulator defective. ✓
33.	1st-hold clutch accumulator defective.
34.	Servo valve stuck. ✓
35.	Lockup clutch timing valve stuck.
36.	Lockup clutch shift valve stuck.
37.	Lockup clutch control valve stuck.
38.	Shift fork bent.
39.	Reverse gears worn/damaged (3 gears).
40.	Reverse selector worn.
41.	3rd gears worn/damaged (2 gears).
42.	Final gears worn/damaged (2 gears).
43.	Differential pinion shaft worn.
44.	Feedpipe O-ring broken. ✓
45.	4th gears worn/damaged (2 gears).
46.	Gear clearance incorrect.
47.	Clutch clearance incorrect.
48.	One-way (sprag) clutch defective.
49.	Sealing rings/guide worn.
50.	Axle-inboard joint clip missing.

(cont'd)

Symptom-to-Component Chart

Hydraulic System (cont'd)

The following symptoms can be caused by improper repair or assembly.	Check these items on the PROBABLE CAUSE DUE TO IMPROPER REPAIR List	Items on the NOTES List
Car creeps in N.	R1, R2	
Car does not move in D3 or D4.	R4	
Transmission locks up in R.	R3, R12	
Excessive drag in transmission.	R6	R, K
Excessive vibration, rpm related.	R7	
Noise with wheels moving only.	R5	
Main seal pops out.	R8	S
Various shifting problems.	R9, R10	
Harsh upshifts.	R11	

PROBABLE CAUSE DUE TO IMPROPER REPAIR	
R1.	Improper clutch clearance.
R2.	Improper gear clearance.
R3.	Parking brake lever installed upside down.
R4.	One-way (sprag) clutch installed upside down.
R5.	Reverse selector hub installed upside down.
R6.	Oil pump binding.
R7.	Torque converter not fully seated in oil pump.
R8.	Main seal improperly installed.
R9.	Springs improperly installed.
R10.	Valves improperly installed.
R11.	Ball check valves not installed.
R12.	Shift fork bolt not installed.



NOTES

B.	Set idle rpm in gear to specified idle speed. If still no good, adjust motor mounts as outlined in engine section of shop manual.
C.	If the large clutch piston O-ring is broken, inspect the piston groove for rough machining. ✓
D.	If the clutch pack is seized or is excessively worn, inspect the other clutches for wear, and check the orifice control valves and throttle valves for free movement.
E.	If throttle valve B is stuck, inspect the clutches for wear.
G.	If the 1—2 valve is stuck closed, the transmission will not upshift. If stuck open, the transmission has no 1st gear.
H.	If the 2nd orifice control valve is stuck, inspect the 2nd and 3rd clutch packs for wear.
I.	If the orifice control valve is stuck, inspect the 3rd and 4th clutch packs for wear.
J.	If the clutch pressure control valve is stuck closed, the transmission will not shift out of 1st gear.
K.	Improper alignment or main valve body and torque converter housing may cause oil pump seizure. The symptoms are mostly an rpm-related ticking noise or a high-pitched squeak.
L.	If the oil screen is clogged with particles of steel or aluminum, inspect the oil pump and differential pinion shaft. If both are OK and no cause for the contamination is found, replace the torque converter.
M.	If the 1st clutch feedpipe guide in the end cover is scored by the mainshaft, inspect the ball bearing for excessive movement in the transmission housing. If OK, replace the end cover as it is dented. The O-ring under the guide is probably worn.
N.	✓ Replace the mainshaft if the bushings for the 1st and 4th feedpipe are loose or damaged. If the 1st feedpipe is damaged or out of round, replace it. If the 4th feedpipe is damaged or out of round, replace the end cover.
O.	A worn or damaged sprag clutch is mostly a result of shifting the transmission in D3 or D4 while the wheels rotate in reverse, such as rocking the car in snow.
P.	Inspect the frame for collision damage.
Q.	Inspect for damage or wear: 1. Reverse selector gear teeth chamfers. 2. Engagement teeth chamfers of countershaft 4th and reverse gear. 3. Shift fork for scuff marks in center. 4. Differential pinion shaft for wear under pinion gears. 5. Bottom of 1st-hold clutch for swirl marks. Replace items 1, 2, 3 and 4 if worn or damaged. If transmission makes clicking, grinding or whirring noise, also replace mainshaft 4th gear and reverse idler gear and countershaft 4th gear in addition to 1, 2, 3 or 4. If differential pinion shaft is worn, overhaul differential assembly, and replace oil screen, and thoroughly clean transmission flush torque converter, cooler and lines. If bottom of 1st-hold clutch is swirled and transmission makes gear noise, replace the countershaft and ring gear.
R.	Be very careful not to damage the torque converter housing when replacing the main ball bearing. You may also damage the oil pump when you torque down the main valve body. This will result in oil pump seizure if not detected. Use proper tools.
S.	Install the main seal flush with the torque converter housing. If you push it into the torque converter housing until it bottoms out, it will block the oil return passage and result in damage.
T.	Harsh downshifts when coasting to a stop with zero throttle may be caused by a bent-in throttle valve retainer/cam stopper. Throttle cable adjustment may clear this problem.
U.	Check if servo valve stopper cap is installed. If it was not installed, the check valve may have been pushed out by hydraulic pressure causing a leak (internal) affecting all forward gears.
V.	Throttle cable adjustment is essential for proper operation of the transmission. Not only does it affect the shift points if misadjusted, but also the shift quality and lockup clutch operation. A too long adjusted cable will result in throttle pressure being too low for the amount of engine torque input into the transmission and may cause clutch slippage. A too short adjusted cable will result in too high throttle pressures which may cause harsh shifts, erratic shifts and torque converter hunting.

Road Test

NOTE:

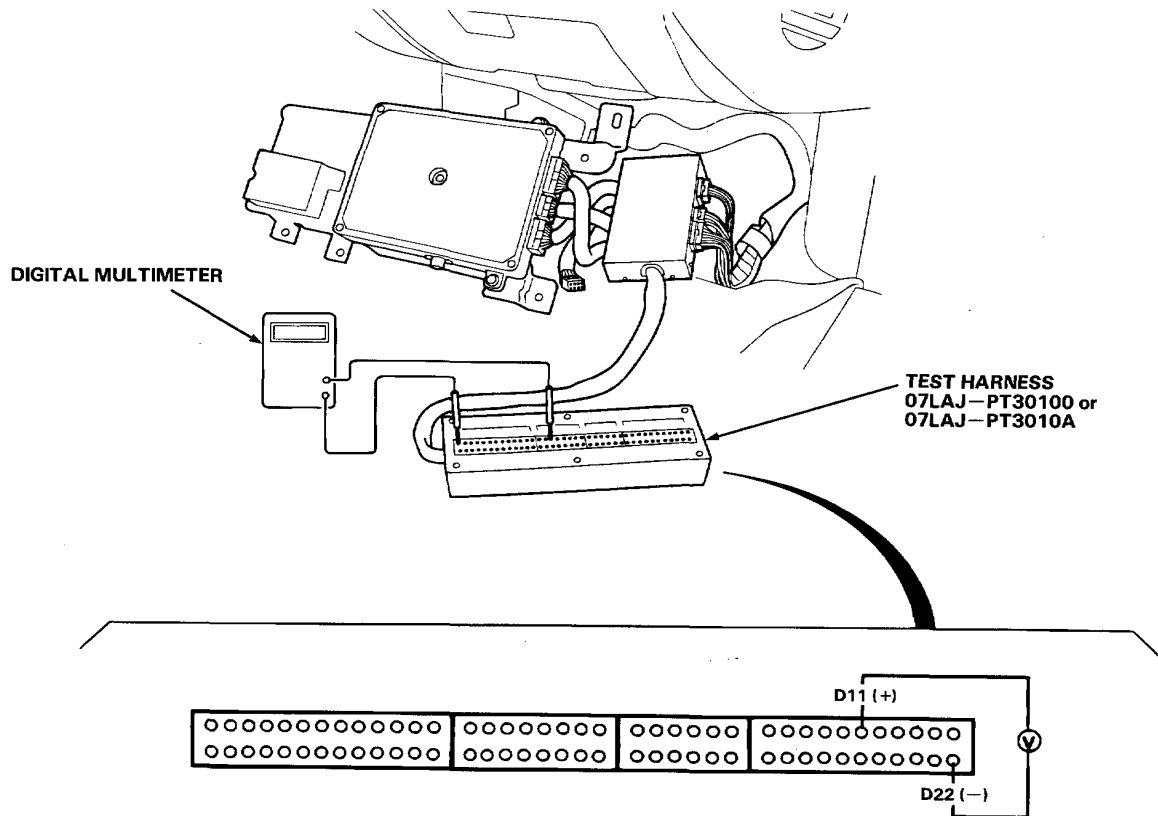
Warm up the engine to operating temperature.

1. Apply parking brake and block the wheels. Start the engine, then move the selector lever to **D₄** position while depressing the brake pedal. Depress the accelerator pedal and release it suddenly. Engine should not stall.
2. Repeat same test in **D₃** position.
3. Shift the selector lever to **D₄** position and check that the shift points occur at approximate speeds shown. Also check for abnormal noise and clutch slippage.

NOTE:

Throttle angle sensor voltage represents the throttle opening.

- 1. Connect the Test Harness between the PGM-FI ECU and connector (see Section 11).
- 2. Set the digital multimeter to check voltage between D11 (+) terminal and D22 (—) terminal for the throttle angle sensor.





F20A4 Engine: KS, KG, KF, KE

D4 Position: Normal Mode (S Switch OFF)

Upshift		1st→2nd	2nd→3rd	3rd→4th	Lockup Clutch ON
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting down-hill from a stop	km/h	22–24	41–45	47–53	22–24
	mph	14–15	25–28	29–33	14–15
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) Acceleration from a stop	km/h	28–34	62–68	86–94	94–102
	mph	17–21	39–42	53–58	58–63
Full-throttle Acceleration from a stop	km/h	46–53	104–112	144–150	135–143
	mph	29–33	65–70	89–93	84–89

• Downshift

		Lockup Clutch OFF	4th→3rd	3rd→2nd	2nd→1st
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting or braking to a stop	km/h	21–25	————	29–34 (4th→2nd)	10–16
	mph	13–16	————	18–21 (4th→2nd)	6–10
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) When car is slowed by increased grade, wind, etc.	km/h	77–85	————	————	————
	mph	48–53	————	————	————
Full-throttle When car is slowed by increased grade, wind, etc.	km/h	129–137	121–130	90–98	39–46
	mph	80–85	75–81	56–61	24–29

D4 Position: S Mode (S Switch ON)

Upshift		1st→2nd	2nd→3rd	3rd→4th	Lockup Clutch ON
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting down-hill from a stop	km/h	23–25	46–50	77–83	37–41
	mph	14–16	29–31	48–52	23–25
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) Acceleration from a stop	km/h	32–38	70–76	97–105	103–111
	mph	20–24	43–47	60–65	64–69
Full-throttle Acceleration from a stop	km/h	46–53	104–112	144–150	135–143
	mph	29–33	65–70	89–93	84–89

• Downshift

		Lockup Clutch OFF	4th→3rd	3rd→2nd	2nd→1st
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting or braking to a stop	km/h	35–39	————	29–34 (4th→2nd)	10–16
	mph	22–24	————	18–21 (4th→2nd)	6–10
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) When car is slowed by increased grade, wind, etc.	km/h	71–79	————	————	————
	mph	44–49	————	————	————
Full-throttle When car is slowed by increased grade, wind, etc.	km/h	129–137	121–129	90–98	39–46
	mph	80–85	75–80	56–61	24–29

(cont'd)

Road Test

(cont'd)

F22A1 Engine: KQ

D4 Position: Normal Mode (S Switch OFF)

· Upshift

1st→2nd

2nd→3rd

3rd→4th

Lockup Clutch ON

Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting down-hill from a stop	km/h	22—24	41—45	58—64	22—24
	mph	14—15	25—28	36—40	14—15
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) Acceleration from a stop	km/h	28—34	62—68	86—94	94—102
	mph	17—21	39—42	53—58	58—63
Full-throttle Acceleration from a stop	km/h	46—53	104—112	144—150	135—143
	mph	29—33	65—70	89—93	84—89

· Downshift

Lockup Clutch OFF

4th→3rd

3rd→2nd

2nd→1st

Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting or braking to a stop	km/h	21—25	————	29—34 (4th→2nd)	10—16
	mph	13—16	————	18—21 (4th→2nd)	6—10
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) When car is slowed by increased grade, wind, etc.	km/h	77—85	————	————	————
	mph	48—53	————	————	————
Full-throttle When car is slowed by increased grade, wind, etc.	km/h	129—137	121—130	90—98	39—46
	mph	80—85	75—81	56—61	24—29

D4 Position: S Mode (S Switch ON)

· Upshift

1st→2nd

2nd→3rd

3rd→4th

Lockup Clutch ON

Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting down-hill from a stop	km/h	23—25	46—50	69—75	37—41
	mph	14—16	29—31	43—47	23—25
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) Acceleration from a stop	km/h	32—38	70—76	97—105	103—111
	mph	20—24	43—47	60—65	64—69
Full-throttle Acceleration from a stop	km/h	46—53	104—112	144—150	135—143
	mph	29—33	65—70	89—93	84—89

· Downshift

Lockup Clutch OFF

4th→3rd

3rd→2nd

2nd→1st

Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting or braking to a stop	km/h	35—39	————	29—34 (4th→2nd)	10—16
	mph	22—24	————	18—21 (4th→2nd)	6—10
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) When car is slowed by increased grade, wind, etc.	km/h	83—91	————	————	————
	mph	52—57	————	————	————
Full-throttle When car is slowed by increased grade, wind, etc.	km/h	129—137	121—129	90—98	39—46
	mph	80—85	75—80	56—61	24—29



F22A2 Engine: KT, KY

D4 Position: Normal Mode (S Switch OFF)

• Upshift

		1st→2nd	2nd→3rd	3rd→4th	Lockup Clutch ON
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting down-hill from a stop	km/h	17—19	27—31	42—48	16—20
	mph	11—12	17—19	26—30	10—12
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) Acceleration from a stop	km/h	25—31	58—64	87—95	95—103
	mph	16—19	36—40	54—59	59—64
Full-throttle Acceleration from a stop	km/h	46—53	96—104	139—148	136—144
	mph	29—33	60—65	86—92	85—89

• Downshift

		Lockup Clutch OFF	4th→3rd	3rd→2nd	2nd→1st
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting or braking to a stop	km/h	15—19	26—32	————	9—15 (3rd→1st)
	mph	9—12	16—20	————	6—9 (3rd→1st)
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) When car is slowed by increased grade, wind, etc.	km/h	81—89	————	————	————
	mph	50—55	————	————	————
Full-throttle When car is slowed by increased grade, wind, etc.	km/h	131—139	129—137	84—92	36—44
	mph	81—86	80—85	52—57	22—27

D4 Position: S Mode (S Switch ON)

• Upshift

		1st→2nd	2nd→3rd	3rd→4th	Lockup Clutch ON
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting down-hill from a stop	km/h	18—20	27—31	77—83	23—27
	mph	11—12	17—19	48—52	14—17
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) Acceleration from a stop	km/h	34—41	67—73	100—108	109—117
	mph	21—25	42—45	62—67	67—73
Full-throttle Acceleration from a stop	km/h	46—53	96—104	139—148	136—144
	mph	29—33	60—65	86—92	85—89

• Downshift

		Lockup Clutch OFF	4th→3rd	3rd→2nd	2nd→1st
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting or braking to a stop	km/h	22—26	31—37	————	11—17 (3rd→1st)
	mph	14—16	19—23	————	7—11 (3rd→1st)
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) When car is slowed by increased grade, wind, etc.	km/h	91—99	————	————	————
	mph	57—62	————	————	————
Full-throttle When car is slowed by increased grade, wind, etc.	km/h	131—139	129—137	84—92	36—44
	mph	81—86	80—85	52—57	22—27

(cont'd)

Road Test

(cont'd)

H23A2 Engine: KS, KG, KF, KE

D4 Position: Normal Mode (S Switch OFF)

Upshift		1st→2nd	2nd→3rd	3rd→4th	Lockup Clutch ON
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting down-hill from a stop	km/h	22-24	41-45	47-53	22-24
	mph	14-15	25-28	29-33	14-15
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) Acceleration from a stop	km/h	28-34	62-68	92-100	95-103
	mph	17-21	39-42	57-62	59-64
Full-throttle Acceleration from a stop	km/h	47-54	106-115	145-154	142-150
	mph	29-34	66-71	90-96	88-93

Downshift		Lockup Clutch OFF	4th→3rd	3rd→2nd	2nd→1st
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting or braking to a stop	km/h	21-25	————	29-34 (4th→2nd)	10-16
	mph	13-16	————	18-21 (4th→2nd)	6-10
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) When car is slowed by increased grade, wind, etc.	km/h	76-84	————	————	————
	mph	47-52	————	————	————
Full-throttle When car is slowed by increased grade, wind, etc.	km/h	135-143	126-135	86-94	39-46
	mph	84-89	78-84	53-58	24-29

D4 Position: S Mode (S Switch ON)

Upshift		1st→2nd	2nd→3rd	3rd→4th	Lockup Clutch ON
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting down-hill from a stop	km/h	23-25	46-50	77-83	37-41
	mph	14-16	29-31	48-52	23-25
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) Acceleration from a stop	km/h	32-38	68-74	100-108	105-113
	mph	20-24	42-46	62-67	65-70
Full-throttle Acceleration from a stop	km/h	47-54	106-115	145-154	142-150
	mph	29-34	66-71	90-96	88-93

Downshift		Lockup Clutch OFF	4th→3rd	3rd→2nd	2nd→1st
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting or braking to a stop	km/h	35-39	————	29-34 (4th→2nd)	10-16
	mph	21-24	————	18-21 (4th→2nd)	6-10
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) When car is slowed by increased grade, wind, etc.	km/h	83-91	————	————	————
	mph	52-57	————	————	————
Full-throttle When car is slowed by increased grade, wind, etc.	km/h	135-143	126-135	86-94	39-46
	mph	84-89	78-84	53-58	24-29



H23A1 Engine: KQ

D4 Position: Normal Mode (S Switch OFF)

Upshift

		1st→2nd	2nd→3rd	3rd→4th	Lockup Clutch ON
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting down-hill from a stop	km/h	22—24	41—45	58—64	22—24
	mph	14—15	25—28	36—40	14—15
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) Acceleration from a stop	km/h	28—34	62—66	91—99	95—103
	mph	17—21	39—41	57—62	59—64
Full-throttle Acceleration from a stop	km/h	47—54	106—115	145—154	142—150
	mph	29—34	66—71	90—96	88—93

Downshift

		Lockup Clutch OFF	4th→3rd	3rd→2nd	2nd→1st
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting or braking to a stop	km/h	21—25	————	29—34 (4th→2nd)	10—16
	mph	13—16	————	18—21 (4th→2nd)	6—10
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) When car is slowed by increased grade, wind, etc.	km/h	76—84	————	————	————
	mph	47—52	————	————	————
Full-throttle When car is slowed by increased grade, wind, etc.	km/h	135—143	126—135	86—94	39—46
	mph	84—89	78—84	53—58	24—29

D4 Position: S Mode (S Switch ON)

Upshift

		1st→2nd	2nd→3rd	3rd→4th	Lockup Clutch ON
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting down-hill from a stop	km/h	23—25	46—50	69—75	37—41
	mph	14—16	29—31	43—47	23—25
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) Acceleration from a stop	km/h	32—38	70—76	100—108	105—113
	mph	20—24	43—47	62—67	65—70
Full-throttle Acceleration from a stop	km/h	47—54	106—115	145—154	142—150
	mph	29—34	66—71	90—96	88—93

Downshift

		Lockup Clutch OFF	4th→3rd	3rd→2nd	2nd→1st
Throttle angle sensor voltage: 0.836V (0.7/8 throttle) Coasting or braking to a stop	km/h	35—39	————	29—34 (4th→2nd)	10—16
	mph	22—24	————	18—21 (4th→2nd)	6—10
Throttle angle sensor voltage: 2.184V (3.5/8 throttle) When car is slowed by increased grade, wind, etc.	km/h	82—90	————	————	————
	mph	51—56	————	————	————
Full-throttle When car is slowed by increased grade, wind, etc.	km/h	135—143	126—135	86—94	39—46
	mph	84—89	78—84	53—58	24—29

(cont'd)

Road Test

(cont'd)

4. Accelerate to about 57 km/h (35 mph) so the transmission is in 4th, then shift **D4** to **2**. The car should immediately begin slowing down from engine braking.

CAUTION:

Do not shift from **D4** or **D3** to **2** or **1** at speeds over 100 km/h (62.5 mph); you may damage the transmission.

5. Check for abnormal noise and clutch slippage in the following positions.

1 (1st Gear) Position

- 1. Accelerate from a stop at full throttle. Check that there is no abnormal noise or clutch slippage.
- 2. Upshifts and downshifts should not occur with the selector in this position.

2 (2nd Gear) Position

- 1. Accelerate from a stop at full throttle. Check that there is no abnormal noise or clutch slippage.
- 2. Upshifts and downshifts should not occur with the selector in this position.

R (Reverse) Position

Accelerate from a stop at full throttle, and check for abnormal noise and clutch slippage.

6. Test in **P** (Parking) Position

Park car on slope (approx. 16°), apply the parking brake, and shift into **P** position. Release the brake; the car should not move.



Stall Speed

Test

CAUTION:

- To prevent transmission damage, do not test stall speed for more than 10 seconds at a time.
- Do not shift the lever while raising the engine speed.
- Be sure to remove the pressure gauge before testing stall speed.

1. Engage parking brake and block the front wheels.
2. Connect tachometer, and start the engine.
3. Push the A/C switch OFF.
4. After the engine has warmed up to normal operating temperature, shift into **2**.
5. Fully depress the brake pedal and accelerator for 6 to 8 seconds, and note engine speed.
6. Allow 2 minutes for cooling, then repeat same test in **D4**, **1**, and **R**.

Stall speed in **D4**, **2**, **1** and **R** must be the same, and must also be within limits:

NOTE:

Stall speed test must be made only for checking the cause of trouble.

Stall Speed RPM:

F20A and F22A Engine

Specification: 2,500 min⁻¹(rpm)
Service Limit: 2,350—2,650 min⁻¹(rpm)

H23A Engine

Specification: 2,750 min⁻¹(rpm)
Service Limit: 2,600—2,900 min⁻¹(rpm)

TROUBLE	PROBABLE CAUSE
Stall rpm high in D4 , 2 , 1 & R	<ul style="list-style-type: none">• Low fluid level or oil pump output• Clogged oil strainer• Pressure regulator valve stuck closed• Slipping clutch
Stall rpm high in R	<ul style="list-style-type: none">• Slippage of 4th clutch
Stall rpm high in 2 , D4	<ul style="list-style-type: none">• Slippage of 2nd clutch
Stall rpm high in 1	<ul style="list-style-type: none">• Slippage of 1st clutch or 1st gear one-way clutch
Stall rpm low in D4 , 2 , 1 & R	<ul style="list-style-type: none">• Engine output low• Torque converter one-way clutch slipping

Pressure Testing

⚠ WARNING

- While testing, be careful of the rotating front wheels.
- Make sure lifts, jacks, and safety stands are placed properly (see Section 1).

CAUTION:

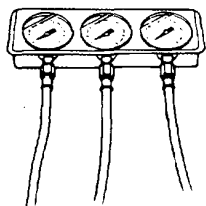
- Before testing, be sure the transmission fluid is filled to the proper level.
- Warm up the engine before testing.

1. Raise the car. (see Section 1).
2. Warm up the engine, then stop the engine and connect a tachometer.
3. Connect the oil pressure gauge to each inspection hole.

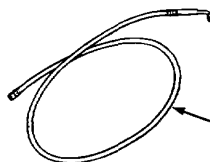
TORQUE: 18 N·m (1.8 kg-m, 13 lb-ft)

CAUTION:

Connect the oil pressure gauge securely; be sure not to allow dust and other foreign particles to enter the inspection hole.



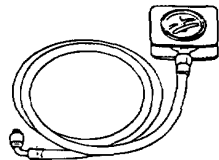
A/T OIL PRESSURE GAUGE SET
07406-0020003



**A/T OIL PRESSURE GAUGE
HOSE ASSEMBLY**
07MAJ-PY40100

OIL PRESSURE JOINT
07MAJ-PY40120

OIL PRESSURE GAUGE HOSE
07MAJ-PY40110



A/T LOW PRESSURE GAUGE
07406-0070000

NOTE:

Use the A/T Oil Pressure Gauge set or A/T Low Pressure Gauge replacing the oil pressure gauge hose assembly. The A/T Oil Pressure Gauge Hose (07746-0020201) may also be used.

4. Start the engine, and measure the respective pressure as follows:
 - Line Pressure
 - Clutch Pressure
 - Clutch Low/High Pressure
 - Throttle B Pressure
5. Install a new washer and the sealing bolt in the inspection hole, and tighten to the specified torque.

TORQUE: 18 N·m (1.8 kg-m, 13 lb-ft)

NOTE:

Do not reuse old aluminum washers.



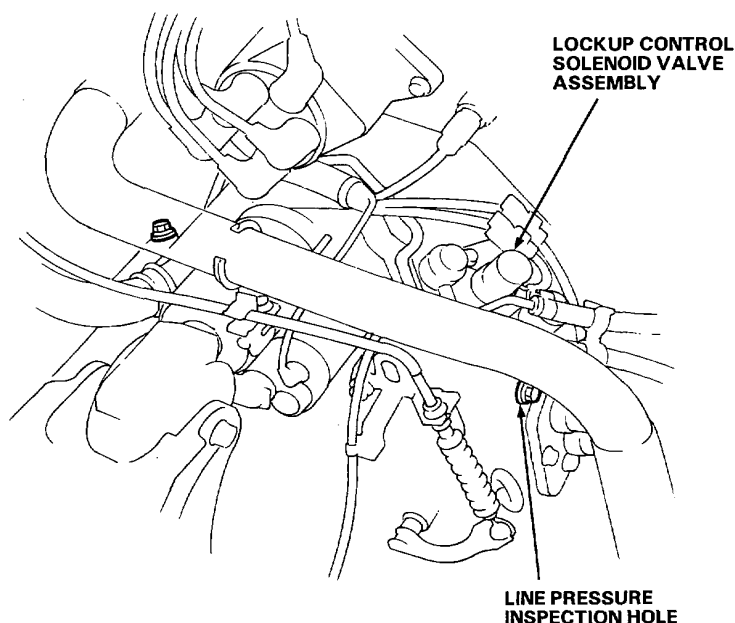
• Line Pressure Measurement

- 1. Set the parking brake and block both rear wheels securely.
- 2. Run the engine at 2,000 min⁻¹ (rpm).
- 3. Shift the select lever to **N** or **P**.

NOTE:

Higher pressures may be indicated if measurements are made in selector positions other than **N** or **P**.

- 4. Measure line pressure.



F20A and F22A Engine

PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
Line	N or P	No (or low) line pressure	Torque converter, oil pump, pressure regulator, torque converter check valve	800—850 kPa (8.0—8.5 kg/cm ² , 114—121 psi)	750 kPa (7.5 kg/cm ² , 107 psi)

H23A Engine

PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
Line	N or P	No (or low) line pressure	Torque converter, oil pump, pressure regulator, torque converter check valve	850—900 kPa (8.5—9.0 kg/cm ² , 121—128 psi)	800 kPa (8.0 kg/cm ² , 114 psi)

(cont'd)

Pressure Testing

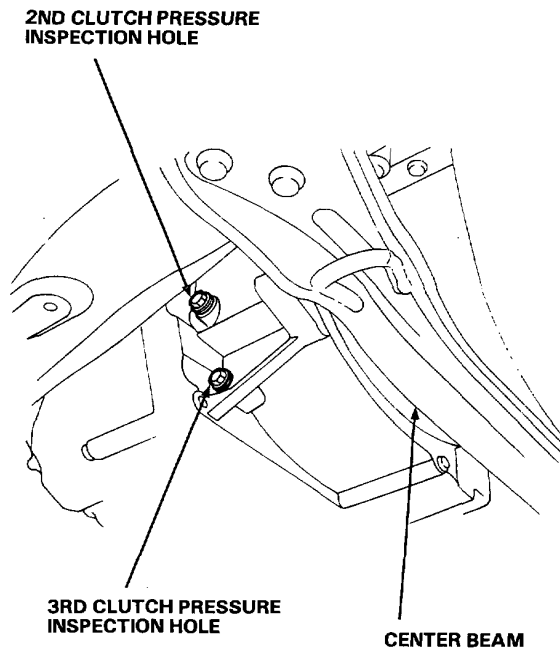
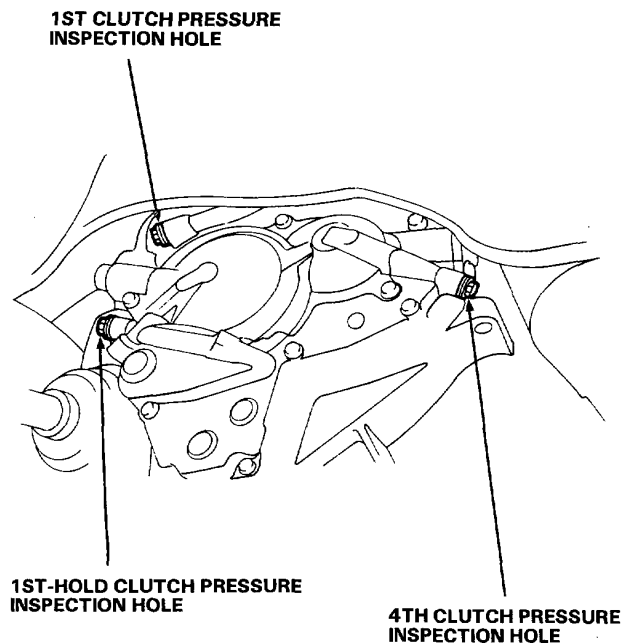
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• Clutch Pressure Measurement

⚠ WARNING

While testing, be careful of the rotating front wheels.

- 1. Set the parking brake and block both rear wheels securely.
- 2. Raise the front of the car and support it with safety stands.
- 3. Allow the front wheels to rotate freely.
- 4. Run the engine at 2,000 min⁻¹ (rpm).
- 5. Measure each clutch pressure.





F20A and F22A Engine

PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
1st Clutch	1 or D ₄	No or low 1st pressure	1st Clutch	800 — 850 kPa (8.0—8.5 kg/cm ² , 114—121 psi)	750 kPa (7.5 kg/cm ² , 107 psi)
1st-hold Clutch	1	No or low 1st-hold pressure	1st-hold Clutch		
2nd Clutch	2	No or low 2nd pressure	2nd Clutch		
2nd Clutch	D ₄	No or low 2nd pressure	2nd Clutch	500 kPa (5.0 kg/cm ² , 71 psi) (Throttle fully closed)	450 kPa (4.5 kg/cm ² , 64 psi) (Throttle fully closed)
3rd Clutch		No or low 3rd pressure	3rd Clutch	850 kPa (8.5 kg/cm ² , 121 psi) (Throttle more than 3/16 opened)	750 kPa (7.5 kg/cm ² , 107 psi) (Throttle more than 3/16 opened)
4th Clutch		No or low 4th pressure	4th Clutch	530 kPa (5.3 kg/cm ² , 75 psi) (Throttle fully closed) 850 kPa (8.5 kg/cm ² , 121 psi) (Throttle more than 3/16 opened)	480 kPa (4.8 kg/cm ² , 68 psi) (Throttle fully closed) 750 kPa (7.5 kg/cm ² , 107 psi) (Throttle more than 3/16 opened)
	R		Servo Valve or 4th Clutch	800—850 kPa (8.0—8.5 kg/cm ² , 114—121 psi)	750 kPa (7.5 kg/cm ² , 107 psi)

H23A Engine

PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
1st Clutch	1 or D ₄	No or low 1st pressure	1st Clutch	850 — 900 kPa (8.5—9.0 kg/cm ² , 121—128 psi)	800 kPa (8.0 kg/cm ² , 114 psi)
1st-hold Clutch	1	No or low 1st-hold pressure	1st-hold Clutch		
2nd Clutch	2	No or low 2nd pressure	2nd Clutch		
2nd Clutch	D ₄	No or low 2nd pressure	2nd Clutch	500 kPa (5.0 kg/cm ² , 71 psi) (Throttle fully closed)	450 kPa (4.5 kg/cm ² , 64 psi) (Throttle fully closed)
3rd Clutch		No or low 3rd pressure	3rd Clutch	900 kPa (9.0 kg/cm ² , 128 psi) (Throttle more than 3/16 opened)	800 kPa (8.0 kg/cm ² , 114 psi) (Throttle more than 3/16 opened)
4th Clutch		No or low 4th pressure	4th Clutch	530 kPa (5.3 kg/cm ² , 75 psi) (Throttle fully closed) 900 kPa (9.0 kg/cm ² , 128 psi) (Throttle more than 3/16 opened)	480 kPa (4.8 kg/cm ² , 68 psi) (Throttle fully closed) 800 kPa (8.0 kg/cm ² , 114 psi) (Throttle more than 3/16 opened)
	R		Servo Valve or 4th Clutch	850—900 kPa (8.5—9.0 kg/cm ² , 121—128 psi)	800 kPa (8.0 kg/cm ² , 114 psi)

(cont'd)

Pressure Testing

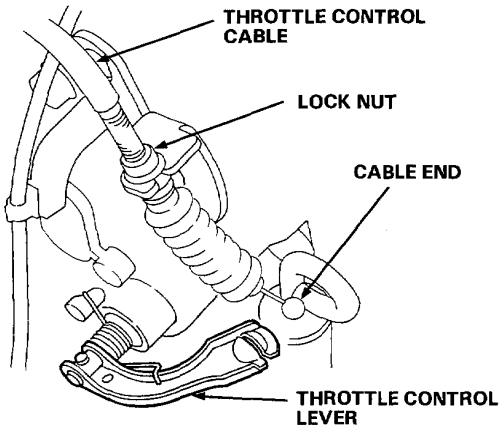
(cont'd)

• Low/High Pressure Test

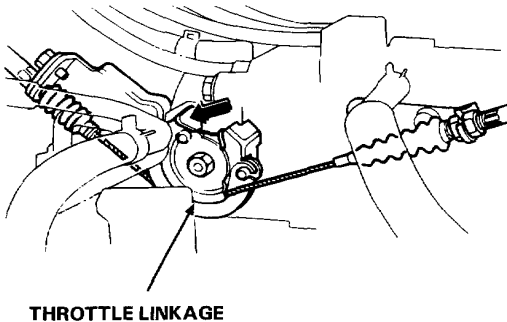
1. Set the parking brake and block the rear wheels securely.
2. Raise the car and support with safety stands.
3. Attach the gauge set to the appropriate pressure test port.
4. Remove the cable end of the throttle control lever.

NOTE:

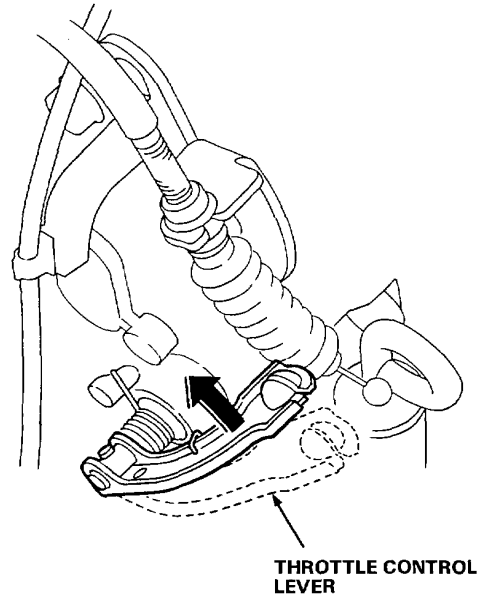
Do not loosen the locknuts; simply unhook the cable end.



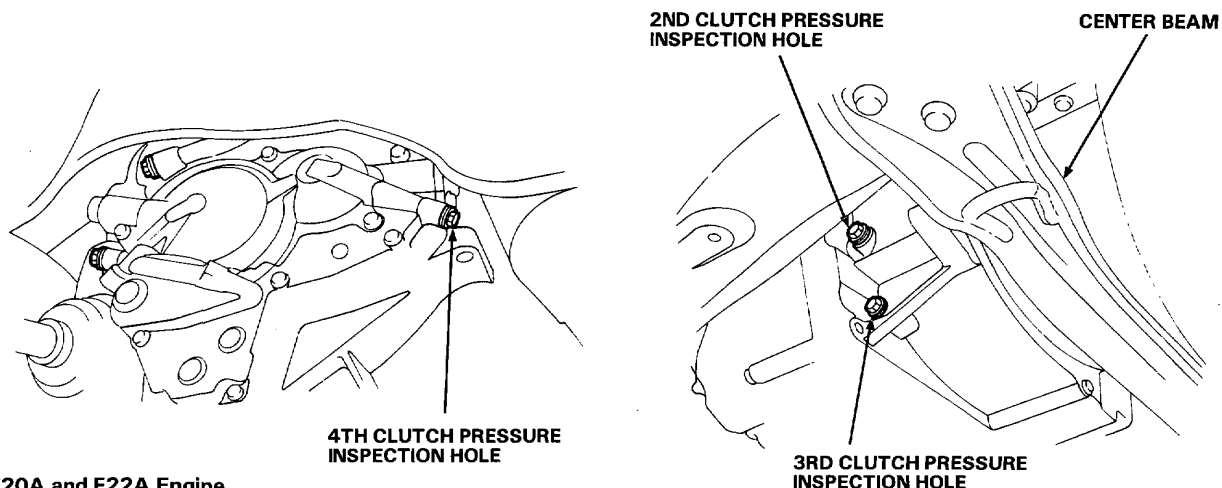
5. Warm up the engine to normal operating temperature (cooling fan comes on).
6. With the engine idling, move the selector lever to **D₄**.
7. Slowly move the throttle linkage to increase engine rpm until pressure is indicated on the appropriate gauge. Then release the throttle linkage, allowing the engine to return to an idle, and record the pressure reading.



8. With the engine idling, lift the throttle control lever up approximately 1/2 of its possible travel and increase the engine rpm until pressure is indicated on the appropriate gauge. Record the highest pressure reading obtained.



9. Repeat steps 7 and 8 for each clutch pressure being inspected.



F20A and F22A Engine

PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
2nd Clutch	D4	No or low 2nd pressure	2nd Clutch	500 — 850 kPa (5.0—8.5 kg/cm ² , 71—121 psi) varies with throttle opening	450 kPa (4.5 kg/cm ² , 64 psi) (Throttle fully closed) 750 kPa (7.5 kg/cm ² , 107 psi) (Throttle more than 3/16 opened)
3rd Clutch		No or low 3rd pressure	3rd Clutch		
4th Clutch		No or low 4th pressure	4th Clutch	530 — 850 kPa (5.3—8.5 kg/cm ² , 75—121 psi) varies with throttle opening	480 kPa (4.8 kg/cm ² , 68 psi) (Throttle fully closed) 750 kPa (7.5 kg/cm ² , 107 psi) (Throttle more than 3/16 opened)

H23A Engine

PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
2nd Clutch	D4	No or low 2nd pressure	2nd Clutch	500 — 900 kPa (5.0—9.0 kg/cm ² , 71—128 psi) varies with throttle opening	450 kPa (4.5 kg/cm ² , 64 psi) (Throttle fully closed) 800 kPa (8.0 kg/cm ² , 114 psi) (Throttle more than 3/16 opened)
3rd Clutch		No or low 3rd pressure	3rd Clutch		
4th Clutch		No or low 4th pressure	4th Clutch	530 — 900 kPa (5.3—9.0 kg/cm ² , 75—128 psi) varies with throttle opening	480 kPa (4.8 kg/cm ² , 68 psi) (Throttle fully closed) 800 kPa (8.0 kg/cm ² , 114 psi) (Throttle more than 3/16 opened)

(cont'd)

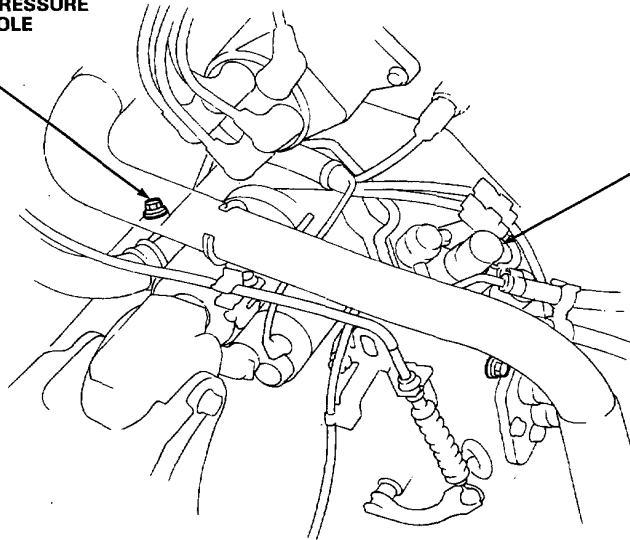
Pressure Testing

(cont'd)

• Throttle B Pressure Measurement

1. Set the parking brake securely and block the wheels.
2. Run the engine at $1,000 \text{ min}^{-1}$ (rpm).
3. Disconnect the throttle control cable from the throttle lever and set the control lever in full throttle position.

THROTTLE B PRESSURE
INSPECTION HOLE



LOCKUP CONTROL
SOLENOID VALVE
ASSEMBLY

F20A and F22A Engine

PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
Throttle B	D4	Pressure too high	Throttle Valve B	0 kPa (0 kg/cm ² , 0.0 psi) throttle lever fully-closed	_____
		No or low pressure		800 — 850 kPa (8.0—8.5 kg/cm ² , 114—121 psi) throttle lever fully-opened	750 kPa (7.5 kg/cm ² , 107 psi) throttle lever fully-opened

H23A Engine

PRESSURE	SELECTOR POSITION	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
				Standard	Service Limit
Throttle B	D4	Pressure too high	Throttle Valve B	0 kPa (0 kg/cm ² , 0.0 psi) throttle lever fully-closed	_____
		No or low pressure		850 — 900 kPa (8.5—9.0 kg/cm ² , 121—128 psi) throttle lever fully-opened	800 kPa (8.0 kg/cm ² , 114 psi) throttle lever fully-opened



Fluid Level

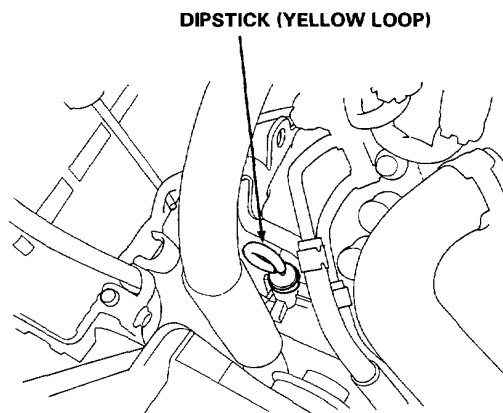
Checking/Changing

Checking

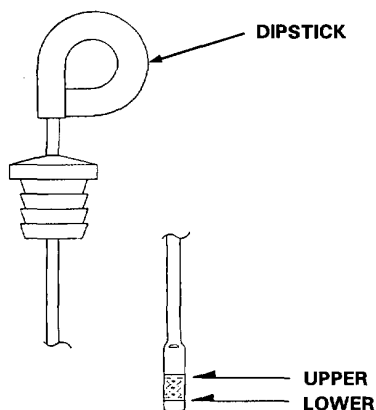
NOTE:

Check the fluid level with the engine at normal operating temperature.

1. Park the car on level ground. Shut off the engine.
2. Remove the dipstick (yellow loop) from the transmission, and wipe it with a clean cloth.
3. Insert the dipstick into the transmission.



4. Remove the dipstick and check the fluid level. It should be between the upper and lower marks.



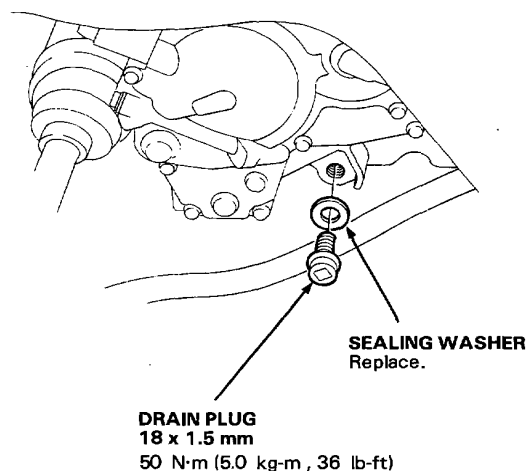
5. If the level is below the lower mark, add fluid into the tube to bring it to the upper mark. Use Honda Premium Formula Automatic Transmission Fluid or an equivalent DEXRON® II Automatic Transmission Fluid (ATF) only.
6. Insert the dipstick back in the transmission.

Changing

1. Bring the transmission up to operating temperature by driving the car. Park the car on level ground, turn the engine off, and then remove the drain plug.
2. Reinstall the drain plug with a new washer; then refill the transmission to the upper mark on the dipstick.

Automatic Transmission Capacity:

2.4 l (2.5 US qt , 2.1 Imp qt)	at changing
6.0 l (6.3 US qt , 5.3 Imp qt)	after overhaul



Transmission

Removal

⚠ WARNING

- Make sure lifts, jacks and safety stands are placed properly, and hoist brackets are attached to the correct position on the engine (see Section 1).
- Apply parking brake and block rear wheels, so car will not roll off stands and fall on you while working under it.

CAUTION:

Use fender covers to avoid damaging painted surfaces.

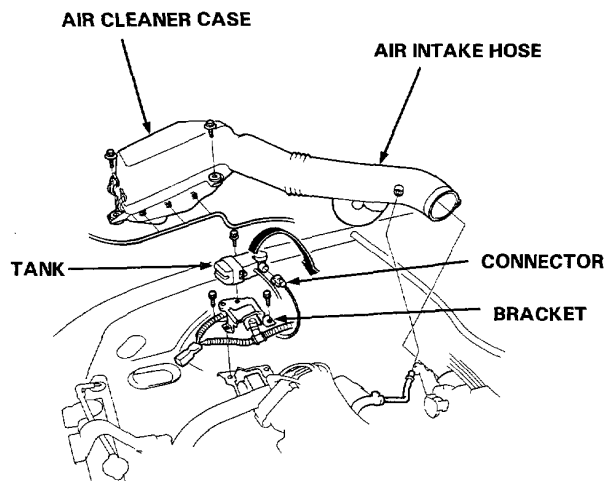
1. Disconnect the battery negative (–) and positive (+) cables from the battery.
2. Remove the battery set plate, then remove the battery.
3. Remove the drain plug, and drain the automatic transmission fluid (ATF). Reinstall the drain plug with a new sealing washer (see page 14-83).

TORQUE: 50 N·m (5.0 kg·m, 36 lb·ft)

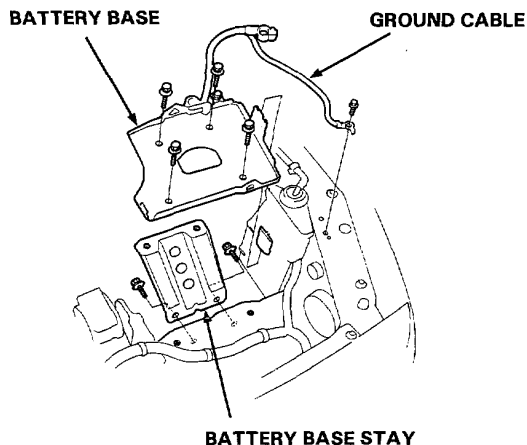
4. Remove the resonator, air intake hose and air cleaner case.
5. Disconnect the connector from the vacuum tank, then remove the vacuum tank and tank bracket.

NOTE:

Do not remove the vacuum tube from the tank.



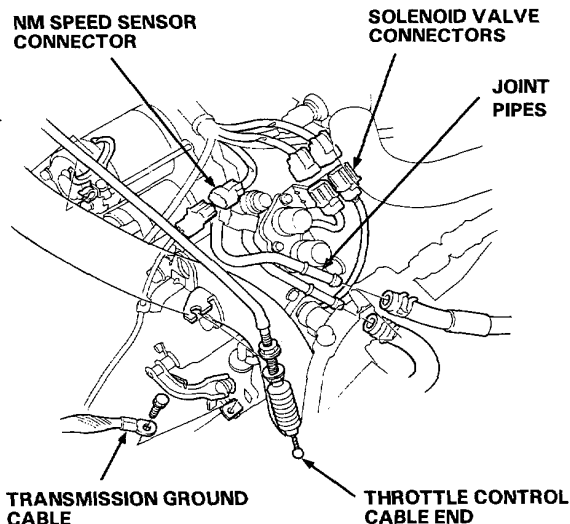
6. Disconnect the ground cable from the transmission and body.
7. Remove the battery base with the ground cable.
8. Remove the battery base stay.

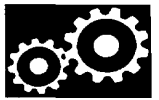


9. Disconnect the lockup control solenoid valve and shift control solenoid valve connectors.
10. Disconnect the throttle control cable from the throttle control lever.
11. Disconnect the NM speed sensor connector.
12. Remove the ATF cooler hoses at the joint pipes. Turn the ends of the cooler hoses up to prevent ATF from flowing out, then plug the joint pipes.

NOTE:

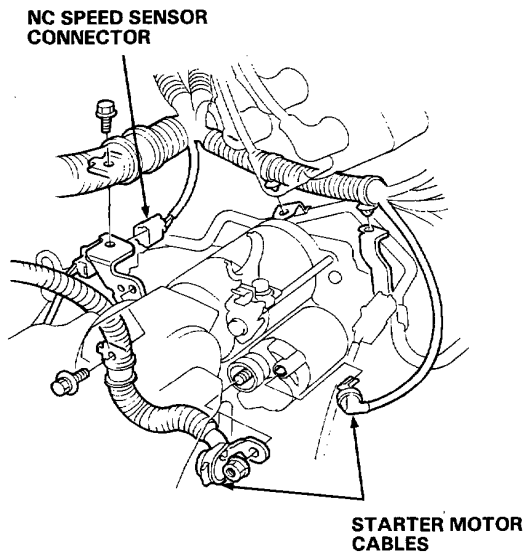
Check for any signs of leakage at the hose joints.





13. Remove the starter motor cable.

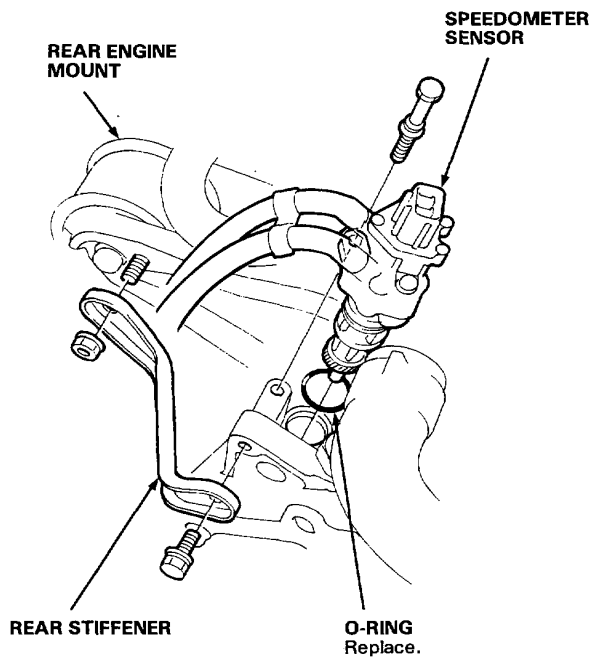
14. Disconnect the NC speed sensor connector.



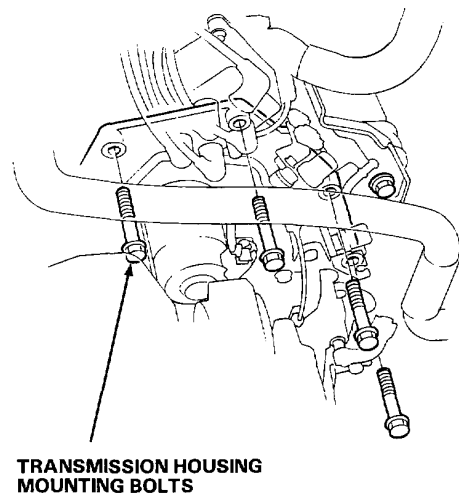
15. Remove the rear stiffener, then remove the speedometer sensor.

NOTE:

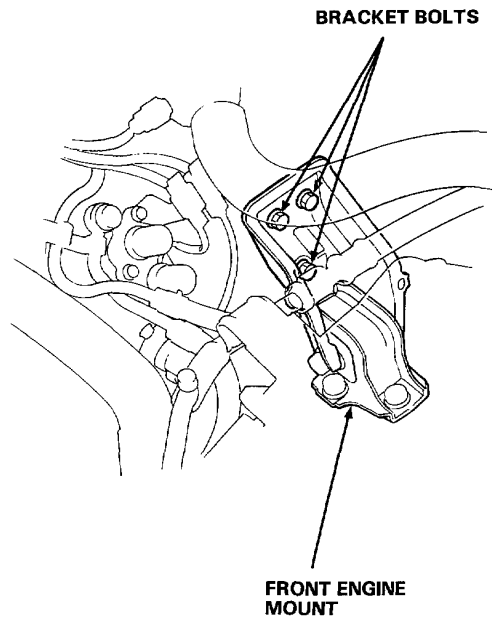
Do not disconnect the P/S hoses from the speedometer sensor.



16. Remove the transmission housing mounting bolts.



17. Loosen the front engine mount bracket bolts.



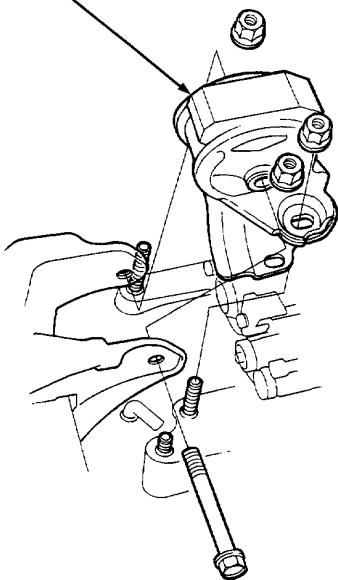
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Transmission

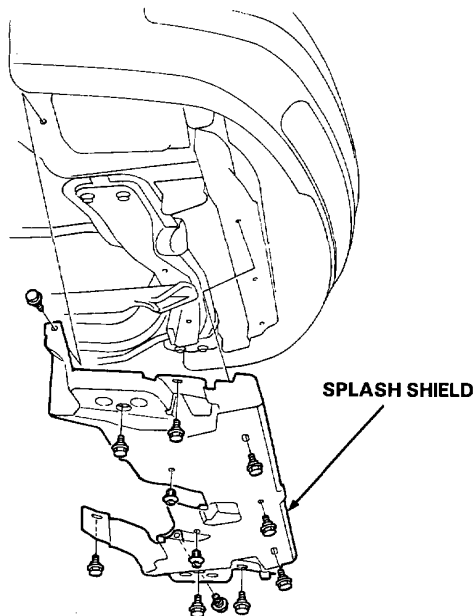
Removal (cont'd)

18. Remove the transmission mount.

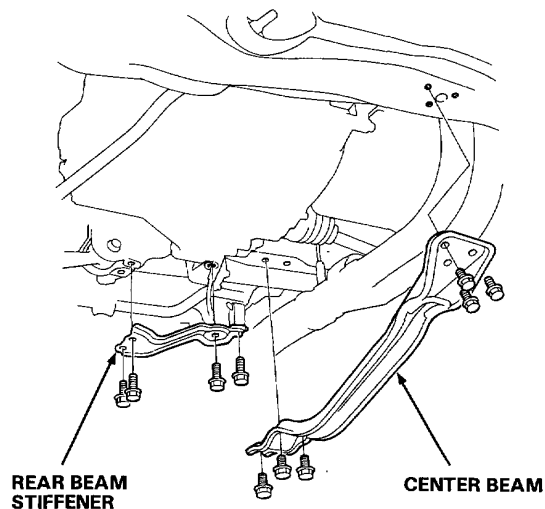
TRANSMISSION MOUNT



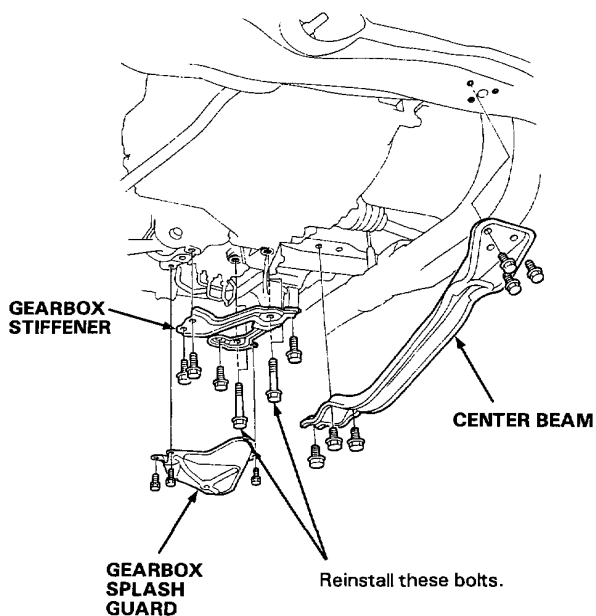
19. Remove the splash shield.



20. • LHD: Remove the center beam and rear beam stiffener.

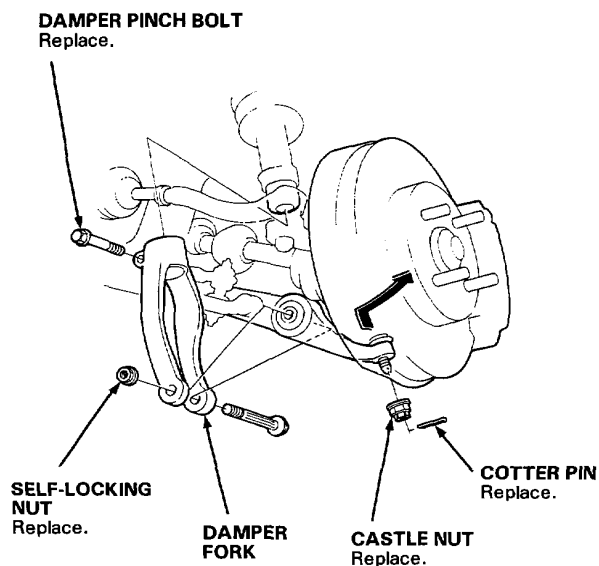


- RHD: Remove the center beam, gearbox splash guard, and stiffener. And reinstall the steering gearbox mounting bolts.





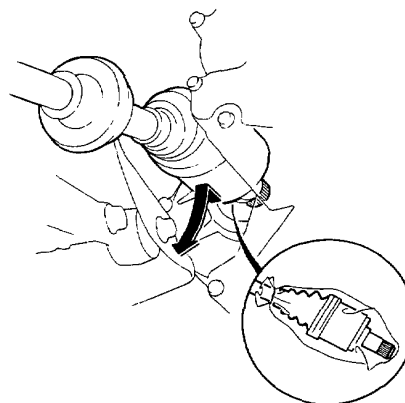
21. Remove the cotter pins and castle nuts, then separate the ball joints from the lower arm (see Section 18).
22. Remove the damper fork bolts, then separate the damper fork and damper.



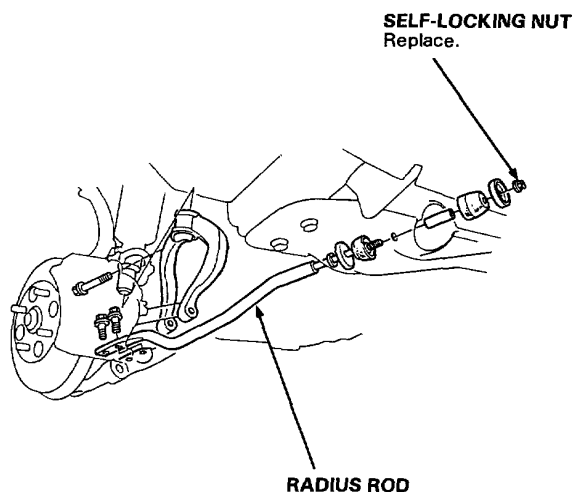
23. Pry the driveshafts out of the differential.
24. Pull on the inboard joint and remove the right and left driveshafts (see Section 16).
25. Tie plastic bags over the driveshaft ends.

NOTE:

Coat all precision finished surfaces with clean engine oil or grease.



26. Remove the right damper pinch bolt, then separate the damper fork and damper.
27. Remove the bolts and nut, then remove the right radius rod.



(cont'd)

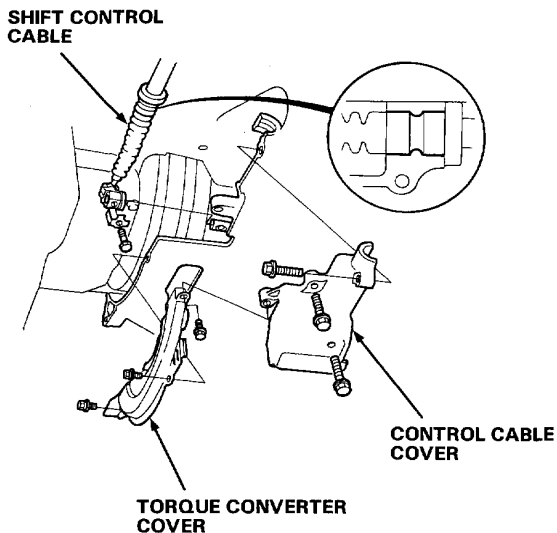
Transmission

Removal (cont'd)

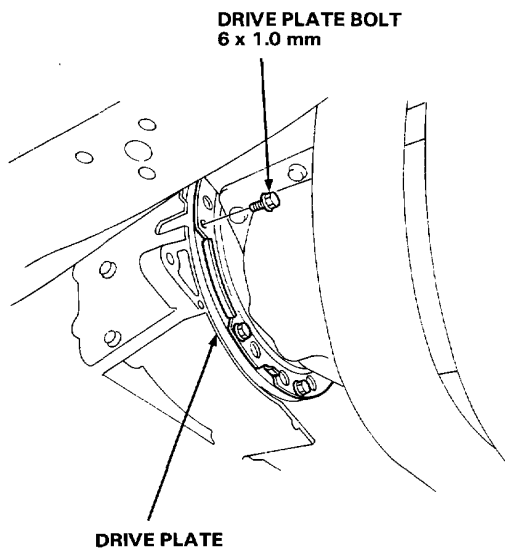
28. Remove the torque converter cover and control cable cover.
29. Remove the lock bolt securing the control lever, then remove the control cable with the control lever.

CAUTION:

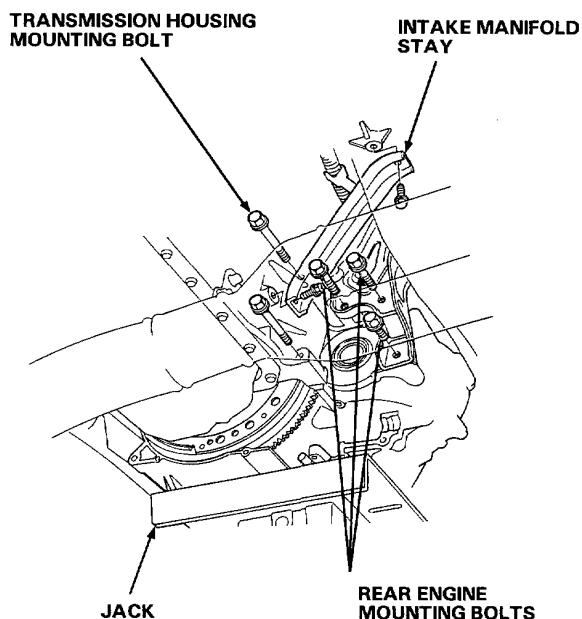
Take care not to bend the shift control cable while removing it.



30. Remove the 8 drive plate bolts one at a time while rotating the crankshaft pulley.

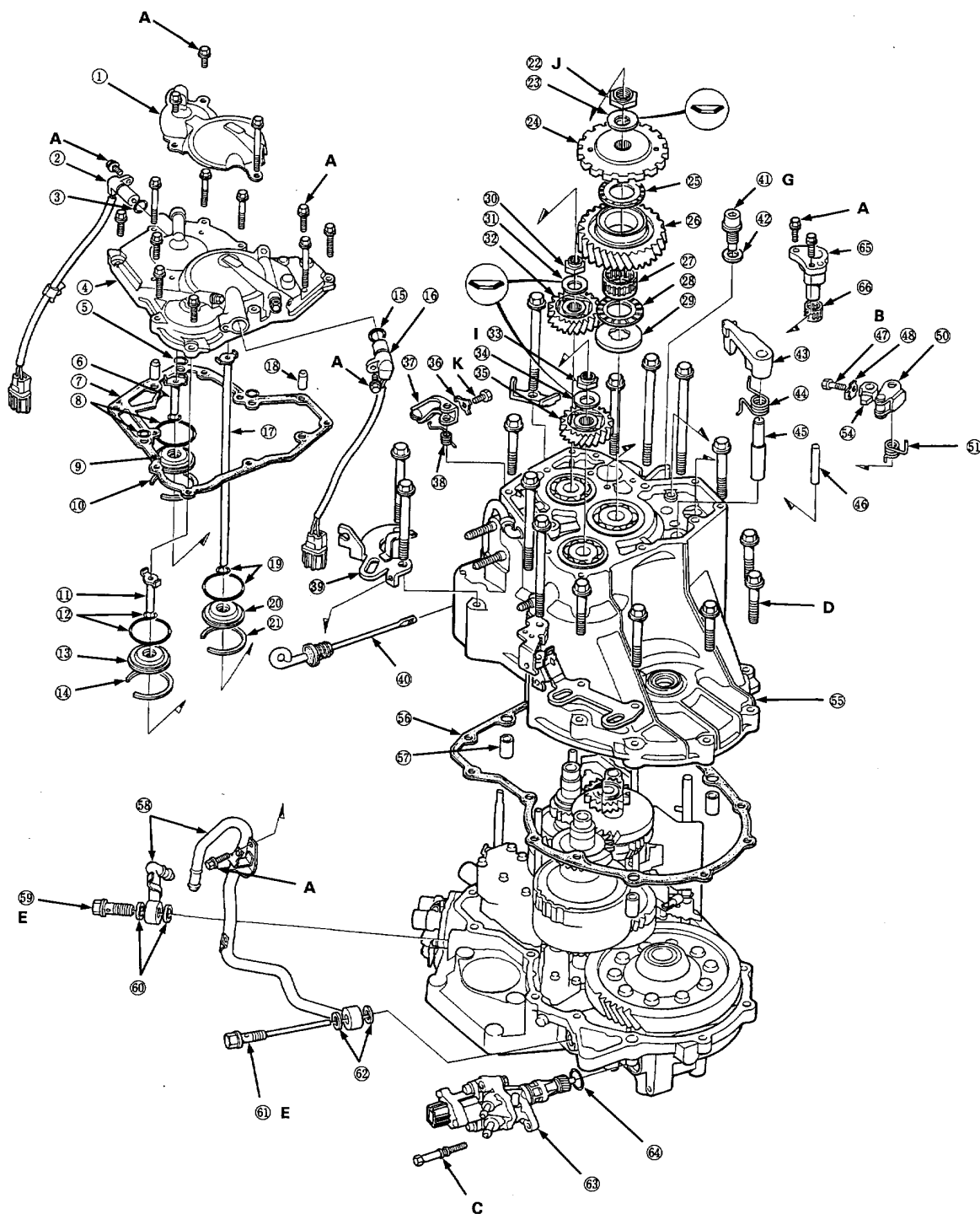


31. Place a jack under the transmission, and raise the transmission just enough to take weight off of the mount.
32. Remove the intake manifold stay.
33. Remove the transmission housing mounting bolts and rear engine mounting bolts.
34. Pull the transmission away from the engine until it clears the 14 mm dowel pins, then lower it on the transmission jack.



Illustrated Index

R. Side Cover



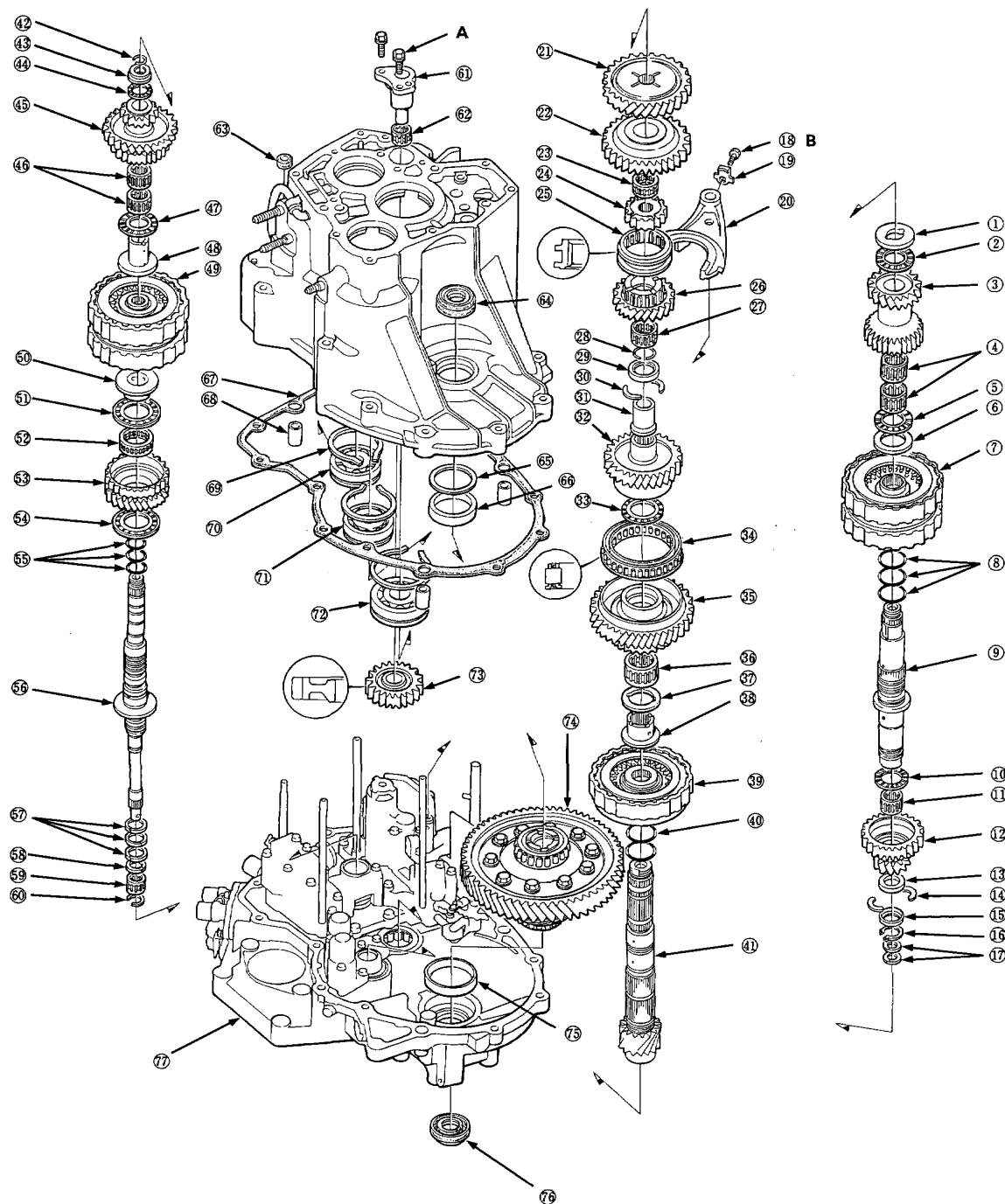


- ① R.SIDE COVER PROTECTOR
- ② NM SPEED SENSOR
- ③ O-RING Replace.
- ④ R.SIDE COVER
- ⑤ O-RING Replace.
- ⑥ 4TH CLUTCH FEED PIPE
- ⑦ R.SIDE COVER GASKET Replace.
- ⑧ O-RINGS Replace.
- ⑨ FEED PIPE GUIDE
- ⑩ SNAP RING
- ⑪ 1ST CLUTCH FEED PIPE
- ⑫ O-RINGS Replace.
- ⑬ FEED PIPE GUIDE
- ⑭ SNAP RING
- ⑮ O-RING Replace.
- ⑯ NC SPEED SENSOR
- ⑰ 1ST-HOLD CLUTCH FEED PIPE
- ⑱ DOWEL PIN
- ⑲ O-RINGS Replace.
- ⑳ FEED PIPE GUIDE
- ㉑ SNAP RING
- ㉒ COUNTERSHAFT LOCKNUT, 24 x 1.25 mm
(Flange nut) Replace.
- ㉓ CONICAL SPRING WASHER Replace.
- ㉔ PARKING GEAR
- ㉕ THRUST NEEDLE BEARING
- ㉖ COUNTERSHAFT IDLER GEAR
- ㉗ NEEDLE BEARING
- ㉘ THRUST NEEDLE BEARING
- ㉙ THRUST WASHER
- ㉚ MAINSHAFT LOCKNUT, 24 x 1.25 mm
(Flange nut) Replace.
- NOTE: Left-hand threads
- ㉛ CONICAL SPRING WASHER Replace.
- ㉜ MAINSHAFT IDLER GEAR
- ㉝ SECONDARY SHAFT LOCKNUT, 24 x 1.25 mm
(Flange nut) Replace.
- ㉞ CONICAL SPRING WASHER Replace.
- ㉟ SECONDARY SHAFT IDLER GEAR
- ㊱ LOCK WASHER Replace.
- ㊲ THROTTLE CONTROL LEVER
- ㊳ THROTTLE CONTROL LEVER SPRING
- ㊴ TRANSMISSION HANGER
- ㊵ ATF LEVEL GAUGE
- ㊶ DRAIN PLUG
- ㊷ SEALING WASHER Replace.
- ㊸ PARKING BRAKE PAWL
- ㊹ PARKING BRAKE PAWL SPRING
- ㊺ PARKING BRAKE PAWL STOPPER
- ㊻ PARKING BRAKE PAWL SHAFT
- ㊼ LOCK BOLT
- ㊽ LOCK WASHER Replace.
- ㊾ PARKING BRAKE LEVER
- ㊿ PARKING BRAKE SPRING
- ㉑ PARKING BRAKE STOPPER
- ㉒ TRANSMISSION HOUSING
- ㉓ TRANSMISSION HOUSING GASKET Replace.
- ㉔ DOWEL PIN
- ㉕ ATF COOLER PIPES
- ㉖ JOINT BOLT
- ㉗ SEALING WASHERS Replace.
- ㉘ JOINT BOLT
- ㉙ SEALING WASHERS Replace.
- ㉚ SPEED SENSOR
- ㉛ O-RING Replace.
- ㉜ REVERSE IDLER GEAR SHAFT HOLDER
- ㉝ NEEDLE BEARING

TORQUE SPECIFICATIONS

Ref No.	Torque Value	Bolt Size	Remarks
A	12 N·m (1.2 kg-m , 9 lb-ft)	6 x 1.0 mm	Joint Bolt Drain Plug Mainshaft Locknut Left-hand threads Secondary Shaft Locknut Countershaft Locknut
B	14 N·m (1.4 kg-m , 10 lb-ft)	6 x 1.0 mm	
C	18 N·m (1.8 kg-m , 13 lb-ft)	8 x 1.25 mm	
D	55 N·m (5.5 kg-m , 40 lb-ft)	10 x 1.25 mm	
E	29 N·m (2.9 kg-m , 21 lb-ft)	12 x 1.25 mm	
G	50 N·m (5.0 kg-m , 36 lb-ft)	18 x 1.5 mm	
H	230 N·m (23.0 kg-m , 166 lb-ft) → 0 →	24 x 1.25 mm	
	170 N·m (17.0 kg-m , 123 lb-ft)		
I	230 N·m (23.0 kg-m , 166 lb-ft) → 0 →	24 x 1.25 mm	
	170 N·m (17.0 kg-m , 123 lb-ft)		
J	230 N·m (23.0 kg-m , 166 lb-ft) → 0 →	24 x 1.25 mm	
	170 N·m (17.0 kg-m , 123 lb-ft)		
K	8 N·m (0.8 kg-m , 5.8 lb-ft)	5 x 0.8 mm	

Illustrated Index
Transmission Housing





- ① THRUST WASHER
- ② THRUST NEEDLE BEARING
- ③ SECONDARY SHAFT 2ND GEAR
- ④ NEEDLE BEARING
- ⑤ THRUST NEEDLE BEARING
- ⑥ SPLINED WASHER Slective
- ⑦ 1ST/2ND CLUTCH ASSEMBLY
- ⑧ O-RINGS Replace.
- ⑨ SECONDARY SHAFT
- ⑩ THRUST NEEDLE BEARING
- ⑪ NEEDLE BEARING
- ⑫ SECONDARY SHAFT 1ST GEAR
- ⑬ DISTANCE COLLAR, 5.0 mm
- ⑭ COTTERS, 29 mm
- ⑮ COTTER RETAINER
- ⑯ SNAP RING
- ⑰ SEALING RINGS, 32 mm
- ⑱ LOCK BOLT
- ⑲ LOCK WASHER Replace.
- ⑳ SHIFT FORK
- ㉑ COUNTERSHAFT 2ND GEAR
- ㉒ COUNTERSHAFT REVERSE GEAR
- ㉓ NEEDLE BEARING
- ㉔ REVERSE SELECTOR
- ㉕ REVERSE SELECTOR HUB
- ㉖ COUNTERSHAFT 4TH GEAR
- ㉗ NEEDLE BEARING
- ㉘ SNAP RING
- ㉙ COLLAR, 32 mm
- ㉚ COTTERS, 29 mm
- ㉛ DISTANCE COLLAR
- ㉜ COUNTERSHAFT 3RD GEAR
- ㉝ THRUST NEEDLE BEARING
- ㉞ ONE-WAY CLUTCH
- ㉟ COUNTERSHAFT 1ST GEAR
- ㊱ NEEDLE BEARING
- ㊲ THRUST WASHER
- ㊳ COUNTERSHAFT 3RD GEAR COLLAR
- ㊴ 1ST-HOLD CLUTCH ASSEMBLY

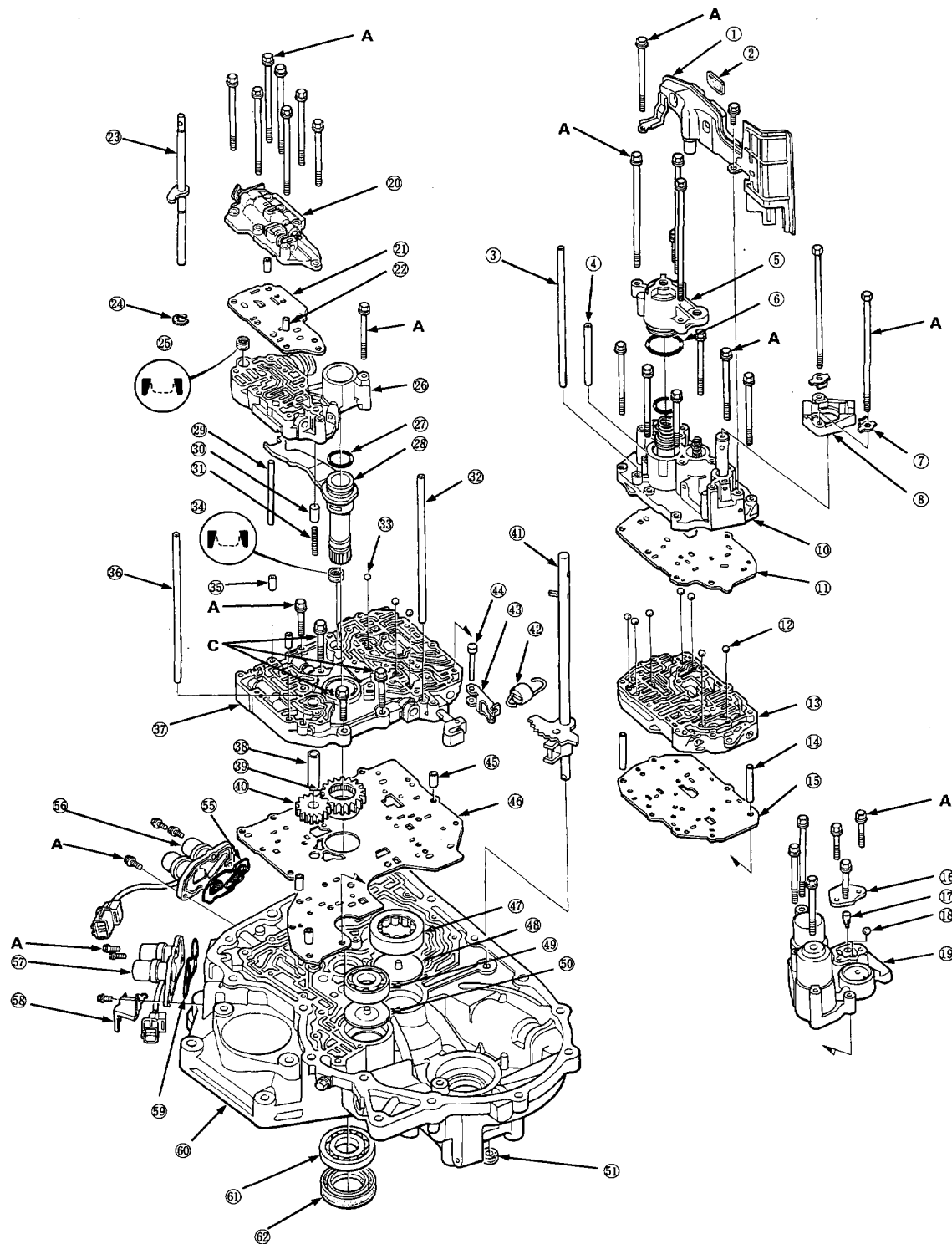
- ㊵ O-RINGS Replace.
- ㊶ COUNTERSHAFT
- ㊷ SNAP RING
- ㊸ COLLAR
- ㊹ THRUST NEEDLE BEARING
- ㊺ MAINSHAFT 4TH/REVERSE GEAR
- ㊻ NEEDLE BEARINGS
- ㊼ THRUST NEEDLE BEARING
- ㊽ 4TH GEAR COLLAR
- ㊾ 3RD/4TH CLUTCH ASSEMBLY
- ㊿ 3RD GEAR COLLAR
- ① THRUST NEEDLE BEARING
- ② NEEDLE BEARING
- ③ MAINSHAFT 3RD GEAR
- ④ THRUST NEEDLE BEARING
- ⑤ O-RINGS Replace.
- ⑥ MAINSHAFT
- ⑦ SEALING RINGS, 35 mm
- ⑧ SEALING RING, 29 mm
- ⑨ NEEDLE BEARING
- ⑩ SET RING
- ⑪ REVERSE IDLER GEAR SHAFT HOLDER
- ⑫ NEEDLE BEARING
- ⑬ OIL SEAL Replace.
- ⑭ TRANSMISSION HOUSING OIL SEAL Replace.
- ⑮ THRUST SHIM Selective part
- ⑯ BEARING OUTER RACE
- ⑰ TRANSMISSION HOUSING GASKET Replace.
- ⑱ DOWEL PIN
- ⑲ SNAP RING
- ㉑ TRANSMISSION HOUSING MAINSHAFT BEARING
- ㉒ TRANSMISSION HOUSING SECONDARY SHAFT BEARING
- ㉓ TRANSMISSION HOUSING COUNTERSHAFT BEARING
- ㉔ REVERSE IDLER GEAR
- ㉕ DIFFERENTIAL ASSEMBLY
- ㉖ BEARING OUTER RACE
- ㉗ TORQUE CONVERTER HOUSING OIL SEAL Replace.
- ㉘ TORQUE CONVERTER HOUSING

TORQUE SPECIFICATIONS

Ref No.	Torque Value	Bolt Size	Remarks
A	12 N·m (1.2 kg-m , 9 lb-ft)	6 x 1.0 mm	
B	14 N·m (1.4 kg-m , 10 lb-ft)	6 x 1.0 mm	

Illustrated Index

Torque Converter Housing





- ①ATF STRAINER
- ②MAGNET
- ③OIL FEED PIPE
- ④OIL FEED PIPE
- ⑤4TH ACCUMULATOR COVER
- ⑥O-RING Replace.
- ⑦LOCK WASHER Replace.
- ⑧SERVO DETENT BASE
- ⑨DOWEL PIN
- ⑩SERVO BODY
- ⑪SERVO SEPARATOR PLATE
- ⑫CHECK BALL
- ⑬SECONDARY VALVE BODY
- ⑭DOWEL PIN
- ⑮SECONDARY SEPARATOR PLATE
- ⑯ACCUMULATOR BODY COVER
- ⑰1ST ACCUMULATOR CHOKE
- ⑱STEEL BALL
- ⑲1ST/2ND ACCUMULATOR BODY
- ⑳THROTTLE VALVE BODY
- ㉑THROTTLE SEPARATOR PLATE
- ㉒DOWEL PIN
- ㉓THROTTLE CONTROL SHAFT
- ㉔E RING Replace.
- ㉕FILTER Replace.
- ㉖REGULATOR VALVE BODY
- ㉗O-RING Replace.
- ㉘STATOR SHAFT
- ㉙STOPPER SHAFT
- ㉚TORQUE CONVERTER CHECK VALVE
- ㉛TORQUE CONVERTER CHECK VALVE SPRING

- ㉜OIL FEED PIPE
- ㉝CHECK BALL
- ㉞FILTER Replace.
- ㉟DOWEL PIN
- ㊱OIL FEED PIPE
- ㊲MAIN VALVE BODY
- ㊳OIL PUMP DRIVEN GEAR SHAFT
- ㊴OIL PUMP DRIVE GEAR
- ㊵OIL PUMP DRIVEN GEAR
- ㊶CONTROL SHAFT
- ㊷DETENT SPRING
- ㊸DETENT ARM
- ㊹DETENT ARM SHAFT
- ㊺DOWEL PIN
- ㊻MAIN SEPARATOR PLATE
- ㊼COUNTERSHAFT NEEDLE BEARING
- ㊽OIL GUIDE PLATE Replace.
- ㊾SECONDARY SHAFT BALL BEARING
- ㊿OIL GUIDE PLATE Replace.
- ①OIL SEAL Replace.
- ②SHIFT CONTROL SOLENOID FILTER/GASKET Replace.
- ③SHIFT CONTROL SOLENOID VALVE ASSEMBLY
- ④LOCKUP CONTROL SOLENOID VALVE ASSEMBLY
- ⑤CONNECTOR HOLDER
- ⑥LOCKUP CONTROL SOLENOID FILTER/GASKET Replace.
- ⑦TORQUE CONVERTER HOUSING
- ⑧MAINSHAFT BALL BEARING
- ⑨OIL SEAL Replace.

TORQUE SPECIFICATIONS

Ref No.	Torque Value	Bolt Size	Remarks
A	12 N·m (1.2 kg-m , 9 lb-ft)	6 x 1.0 mm	
C	18 N·m (1.8 kg-m , 13 lb-ft)	8 x 1.25 mm	

R. Side Cover

Removal

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner and dry with compressed air.
- Blow out all passages.
- When removing the transmission R. side cover, replace the following:
 - R. side cover gasket
 - Lock washers
 - Transmission housing gasket
 - O-rings
 - Each shaft locknut and conical spring washer
 - Sealing washers

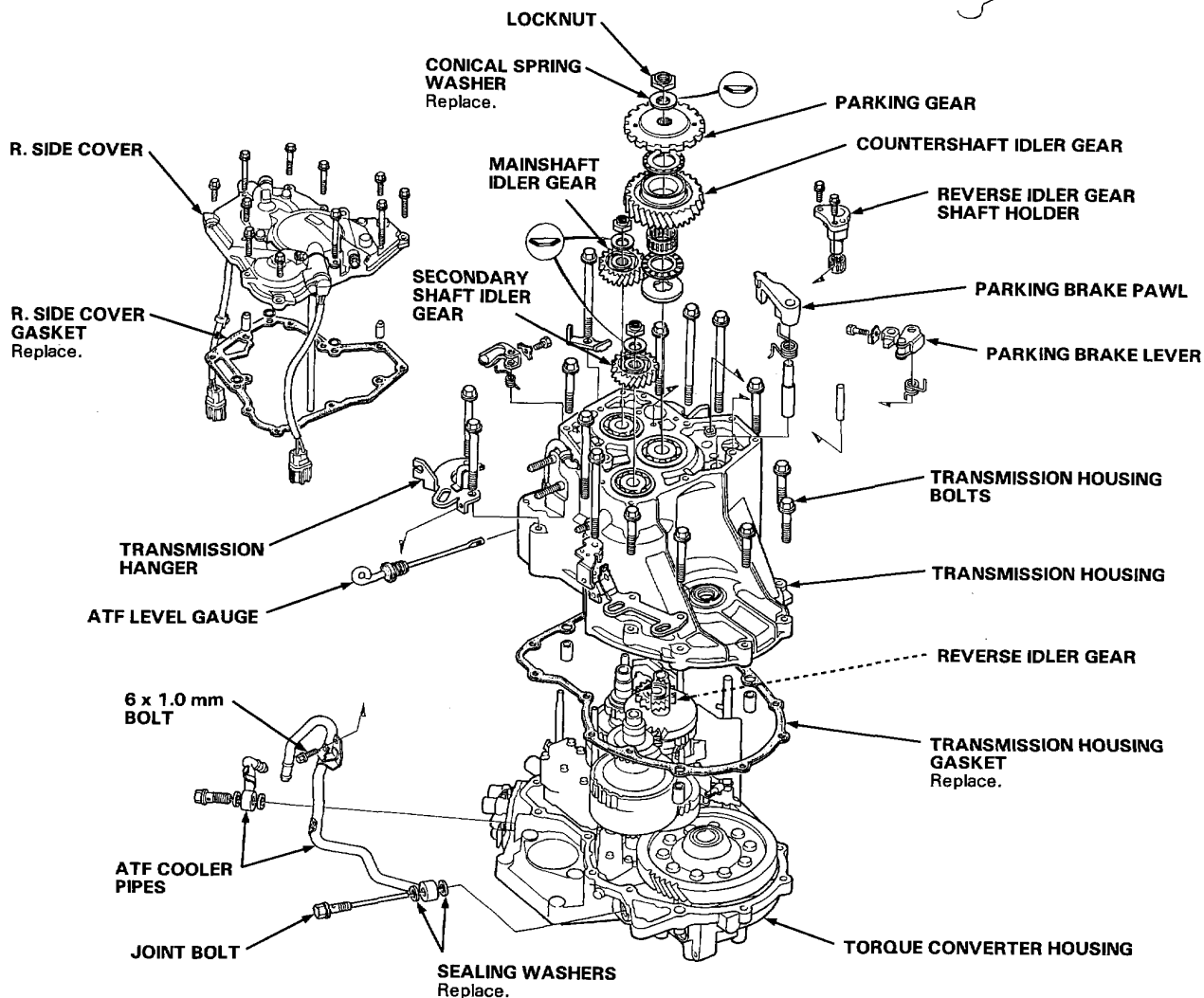
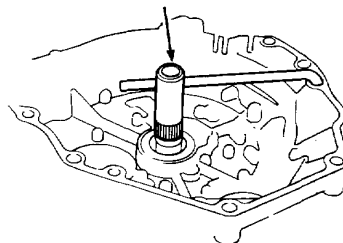
1. Remove the 11 bolts securing the R. side cover, then remove the cover.

NOTE:

It is not necessary to remove the R. side cover protector.

2. Slip the special tool onto the mainshaft.

**MAINSHAFT HOLDER
07GAB—PF50101**





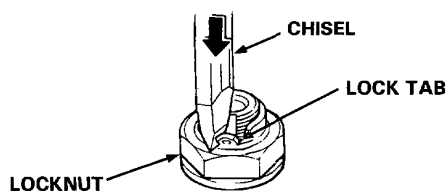
3. Engage the parking brake pawl with the parking gear.
4. Cut the lock tabs of each shaft locknut using a chisel as shown. Then remove the locknuts and conical spring washers from each shaft.

NOTE:

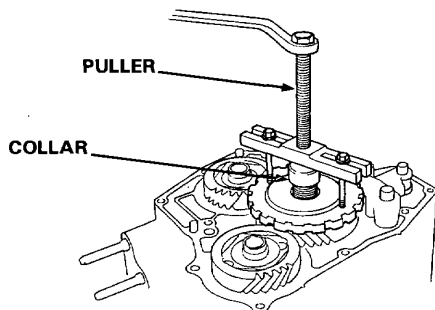
- Mainshaft locknut has left-hand threads.
- Clean the old locknuts; they are used when installing to press the idler gears on the mainshaft and secondary shaft and the parking gear on the countershaft.

CAUTION:

Keep all of the chiseled particles out of the transmission.



5. Remove the special tool from the mainshaft after removing the locknuts.
6. Remove the parking gear using a puller from the countershaft as shown. Then remove the idler gears using a puller from the mainshaft and secondary shaft.



7. Remove the countershaft idler gear, needle bearing, thrust needle bearing, and thrust washer from the countershaft.
8. Remove the parking brake pawl, spring, shaft, and stopper from the housing.
9. Remove the throttle control lever and spring from the throttle control shaft.
10. Remove the ATF cooler pipe mounting bolt from the transmission hanger.
11. Remove the transmission housing mounting bolts.

12. Remove the reverse idler gear shaft assembly.

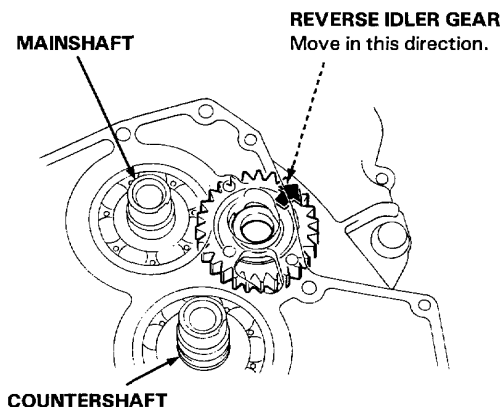
NOTE:

The steel ball will not pop out because it is staked in the shaft.

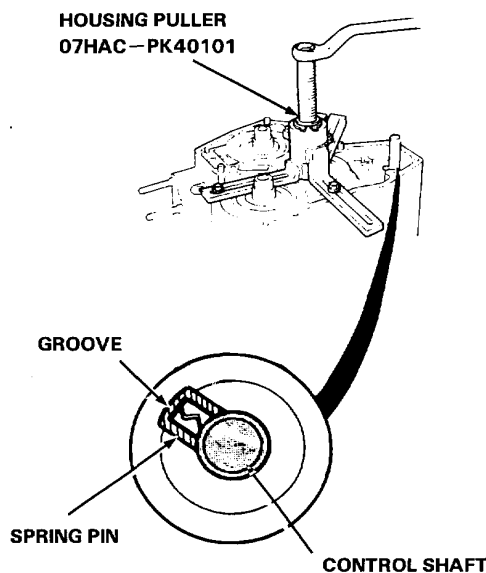
13. Move the reverse idler gear to disengage it from the countershaft reverse gear as shown.

NOTE:

The transmission housing will not separate from the torque converter housing if the reverse idler gear is not removed.

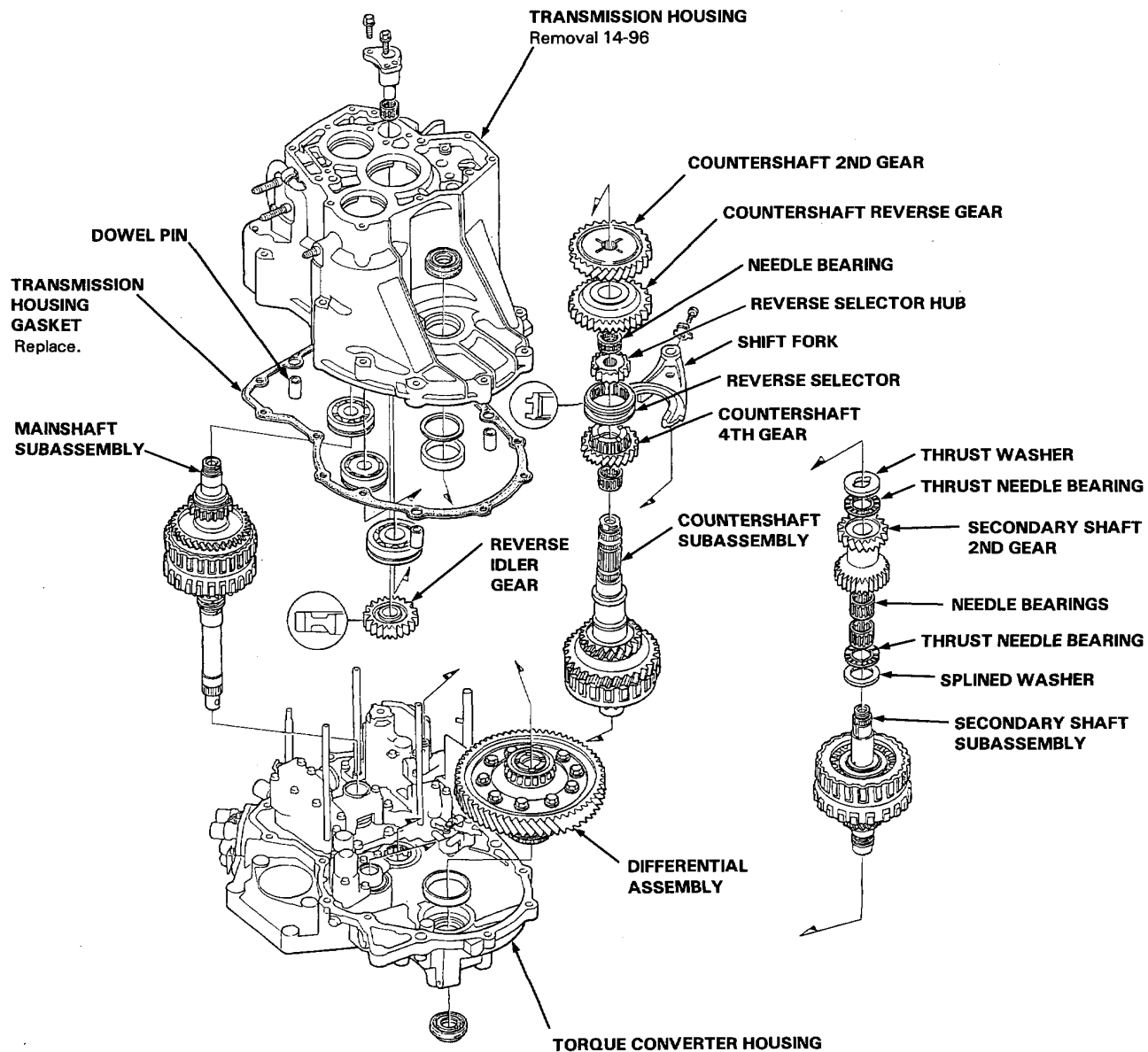


14. Align the spring pin with the transmission housing groove by turning the control shaft.
15. Install the special tool on the transmission housing, then remove the housing as shown.



Transmission Housing

Removal



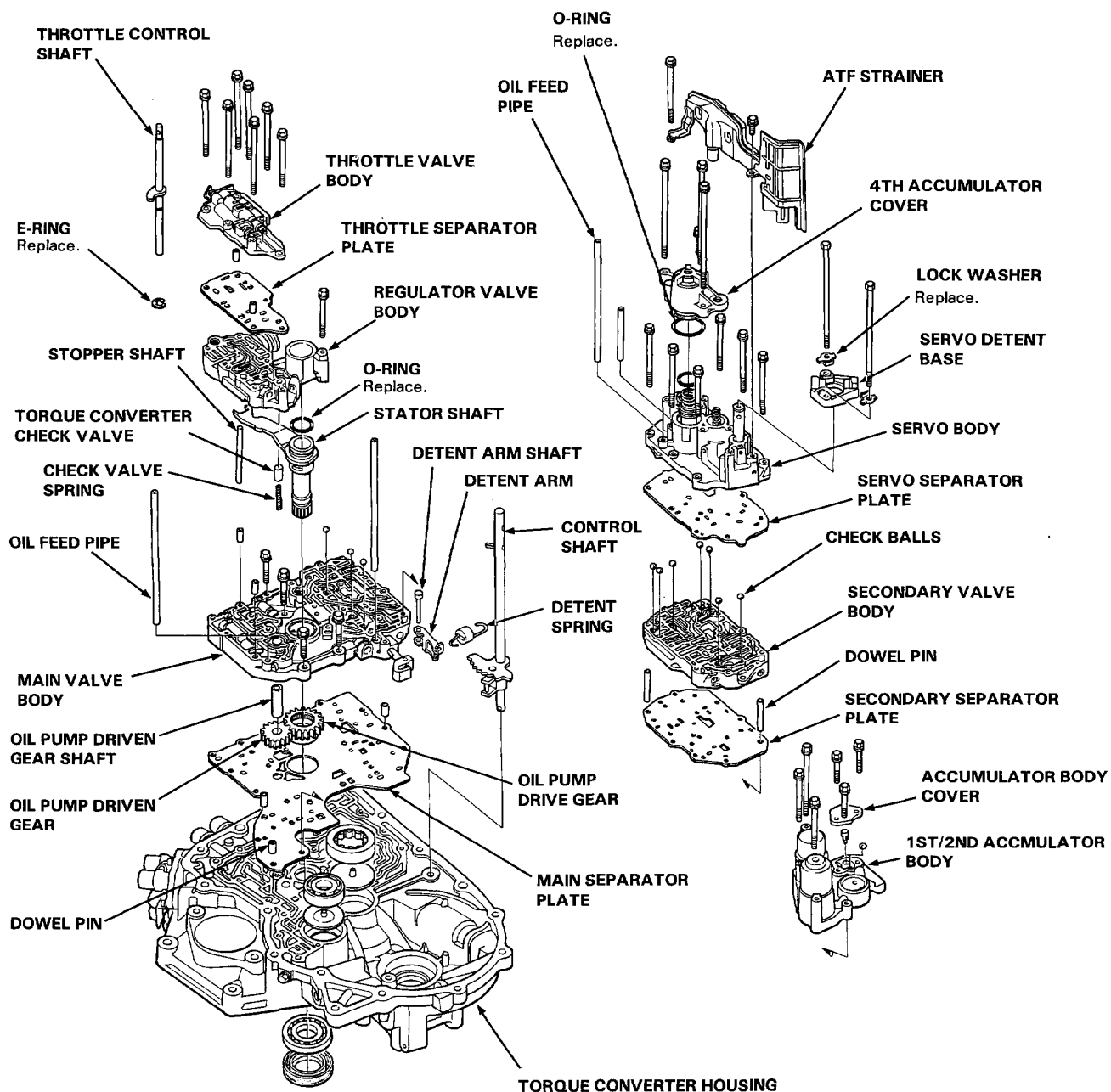


NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner and dry with compressed air.
 - Blow out all passages.
 - When removing the transmission housing, replace the following:
 - Transmission housing gasket
 - Lock washer
1. Remove the transmission housing (14-96).
 2. Remove the reverse idler gear from the transmission housing.
 3. Remove the countershaft 2nd gear, reverse gear, secondary shaft 2nd gear, thrust washer, and thrust needle bearing together from the countershaft and secondary shaft.
 4. Remove the lock bolt securing the shift fork, then remove the fork with the reverse selector from the countershaft.
 5. Remove the needle bearings, thrust needle bearing, and splined washer from the secondary shaft.
 6. Remove the secondary shaft subassembly.
 7. Remove the mainshaft subassembly.
 8. Remove the countershaft subassembly.
 9. Remove the differential assembly.

Torque Converter Housing/Valve Body

Removal





NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner and dry with compressed air.
- Blow out all passages.
- When removing the valve body, replace the following:
 - O-rings
 - Lock washers

1. Remove the 2 bolts securing the servo detent base, then remove the servo detent base.
2. Remove the 2 bolts securing the ATF strainer, then remove the ATF strainer.
3. Remove the oil feed pipes from the servo body and main valve body.
4. Remove the 3 bolts securing the 4th accumulator cover, then remove the 4th accumulator cover.

NOTE:

The 4th accumulator cover is spring loaded, to prevent stripping the threads in the servo body, press down on the accumulator cover while unscrewing the bolts in a crisscross pattern.

5. Remove the 7 bolts securing the servo body, then remove the servo body and separator plate.
6. Remove the secondary valve body and separator plate.
7. Remove the 7 bolts securing the throttle valve body, then remove the throttle valve body and separator plate.
8. Remove the 1 bolt securing the regulator valve body, then remove the regulator valve body.

9. Remove the stator shaft and stopper shaft.

10. Remove the detent spring from the detent arm, then remove the control shaft from the torque converter housing.
11. Remove the detent arm and detent arm shaft from the main valve body.
12. Remove the 4 bolts securing the main valve body, then remove the main valve body.
13. Remove the 6 bolts securing the 1st/2nd accumulator body, then remove the 1st/2nd accumulator body.
14. Remove the oil pump driven gear shaft, then remove the oil pump gears.
15. Remove the main separator plate with 3 dowel pins.

Valve Body

Repair

NOTE:

This repair is only necessary if one or more of the valves in a valve body do not slide smoothly in their bores. You may use this procedure to free the valves in the valve bodies.

1. Soak a sheet of #600 abrasive paper in ATF for about 30 minutes.
2. Carefully tap the valve body so the sticking valve drops out of its bore.

CAUTION:

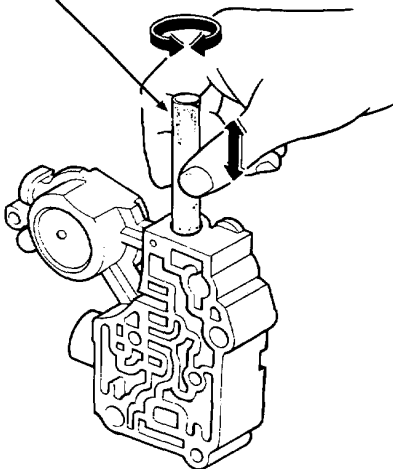
It may be necessary to use a small screwdriver to pry the valve free. Be careful not to scratch the bore with the screwdriver.

3. Inspect the valve for any scuff marks. Use the ATF-soaked #600 paper to polish off any burrs that are on the valve, then wash the valve in solvent and dry it with compressed air.
4. Roll up half a sheet of ATF-soaked #600 paper and insert it in the valve bore of the sticking valve. Twist the paper slightly, so that it unrolls and fits the bore tightly, then polish the bore by twisting the paper as you push it in and out.

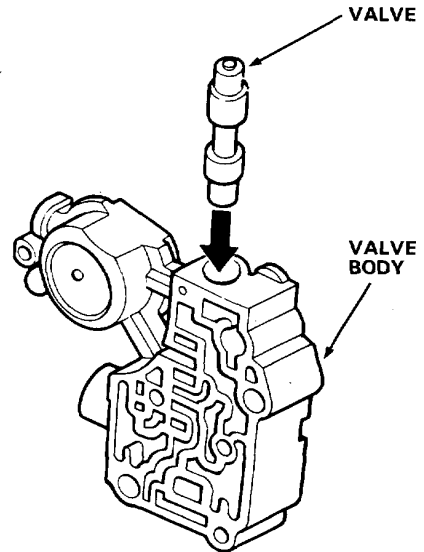
CAUTION:

The valve body is aluminum and doesn't require much polishing to remove any burrs.

ATF-soaked
600 abrasive
paper



5. Remove the #600 paper. Thoroughly wash the entire valve body in solvent, then dry with compressed air.
6. Coat the valve with ATF, then drop it into its bore. It should drop to the bottom of the bore under its own weight. If not, repeat step 4, then retest.



7. Remove the valve and thoroughly clean it and the valve body with solvent. Dry all parts with compressed air, then reassemble using ATF as a lubricant.



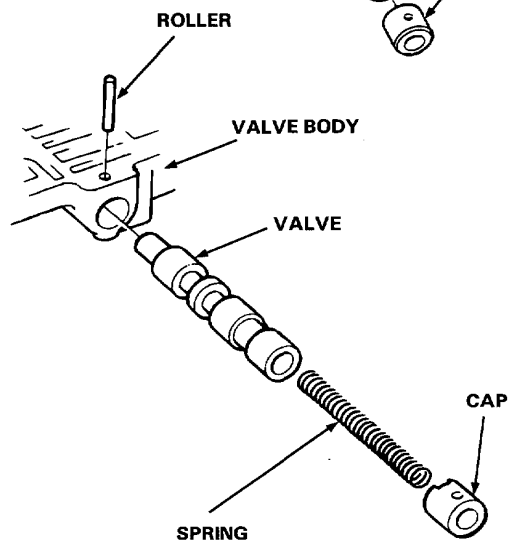
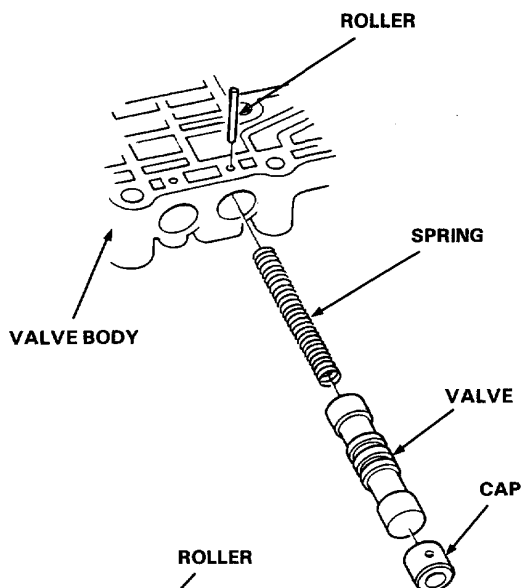
Valves

Assembly

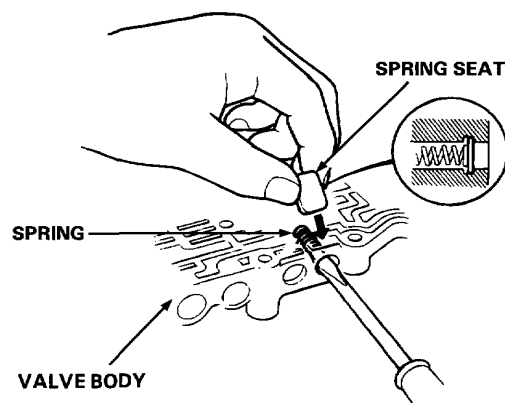
NOTE:

Coat all parts with ATF before assembly.

- Install the valve, valve spring and cap in the valve body, and secure with the roller.



- Set the spring in the valve and install them in the valve body. Push the spring in with a screwdriver, then install the spring seat.

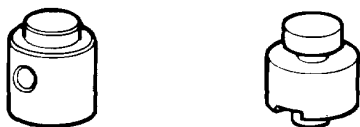


Valve Caps

Description

- Caps with one projected tip and one flat end are installed with the flat end toward the spring.
- Caps with a projected tip on each end are installed with the smaller tip toward the spring. The small tip is a spring guide.

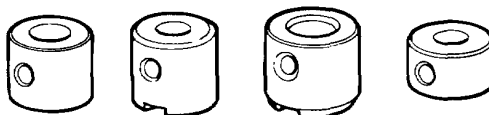
TOWARD OUTSIDE OF VALVE BODY



TOWARD SPRING

- Caps with hollow ends are installed with the hollow away from the spring.
- Caps with notched ends are installed with the notch toward the spring.
- Caps with flat ends and a hole through the center are installed with the smaller hole toward the spring.

TOWARD OUTSIDE OF VALVE BODY



TOWARD SPRING

- Caps with one projected tip and hollow end are installed with the tip toward the spring. The tip is a spring guide.

TOWARD OUTSIDE OF VALVE BODY



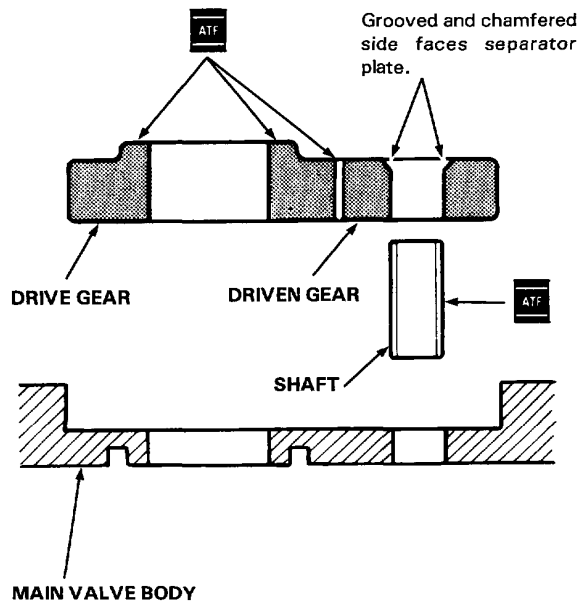
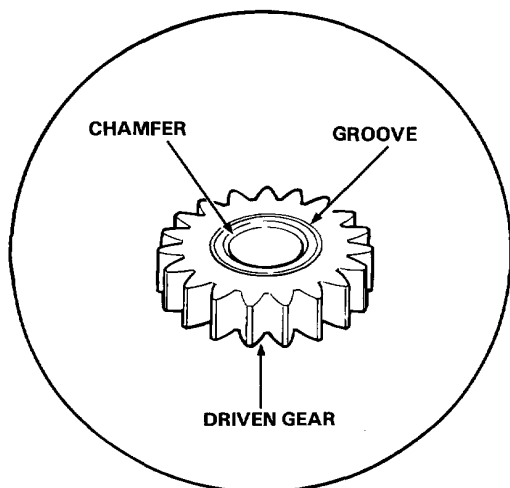
TOWARD SPRING



Oil Pump

Inspection

1. Install the pump gears and shaft in the main valve body.

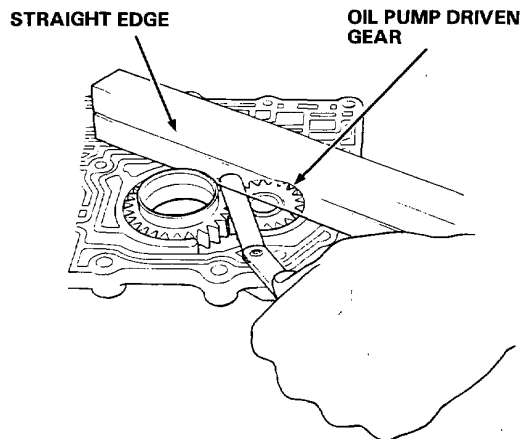


2. Measure the thrust clearance of the driven gear-to-valve body.

Drive/Driven Gear Thrust (Axial) Clearance:

Standard (New): 0.03—0.05 mm (0.001—0.002 in)

Service Limit: 0.07 mm (0.003 in)



3. Install the oil pump shaft. Measure the side clearance of the drive and driven gears.

Pump Gears Side (Radial) Clearance:

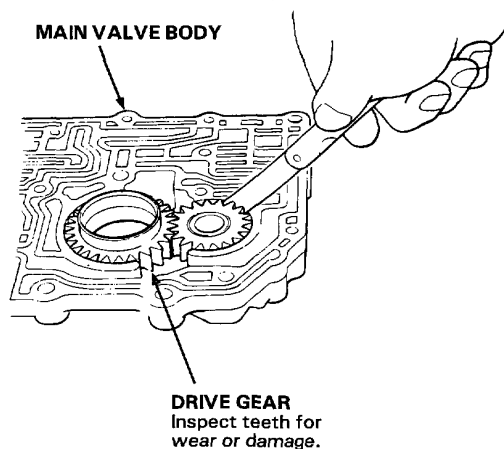
Standard (New):

Drive gear

0.210—0.265 mm (0.0083—0.0104 in)

Driven gear

0.035—0.063 mm (0.0014—0.0025 in)



Main Valve Body

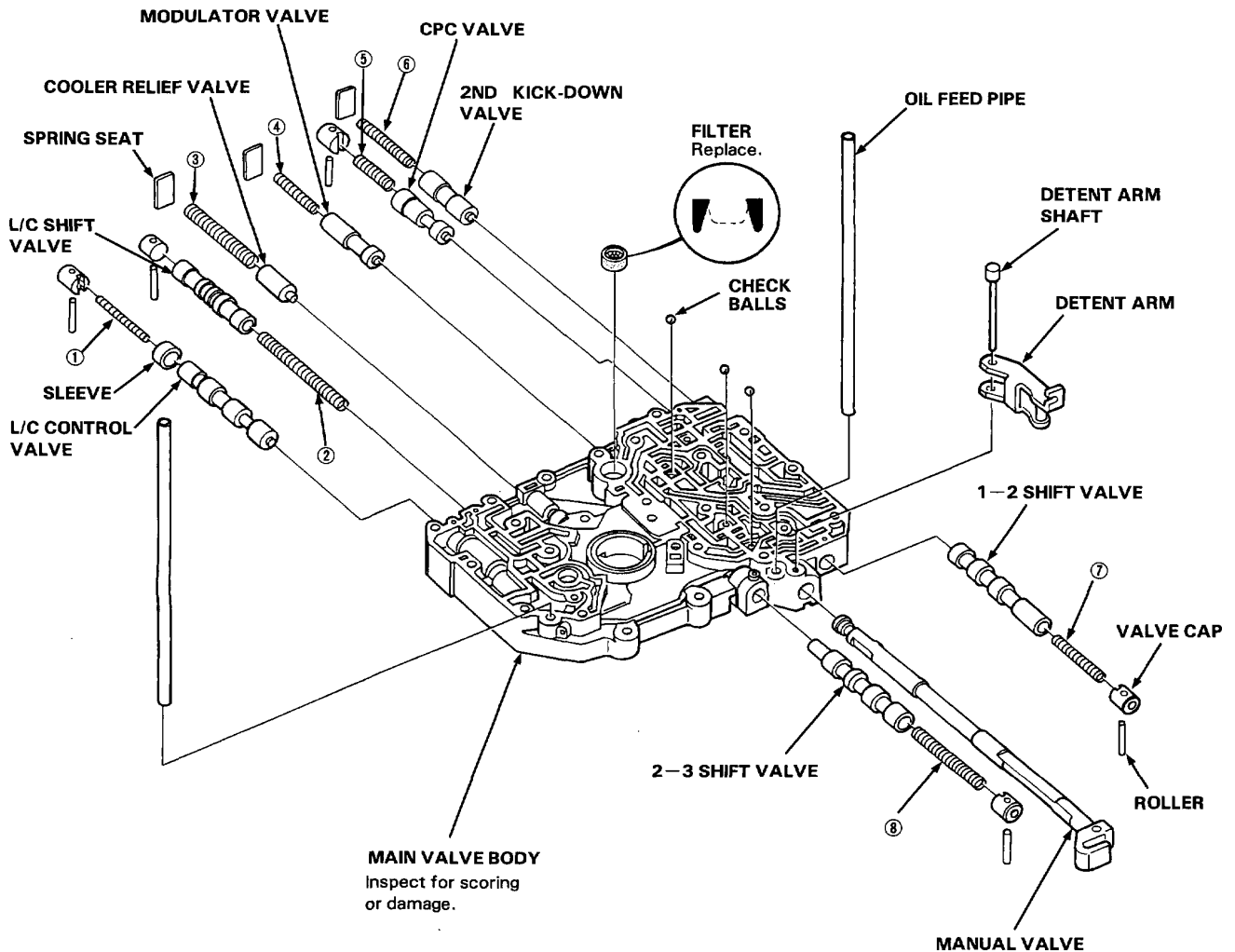
Disassembly/Inspection/Reassembly

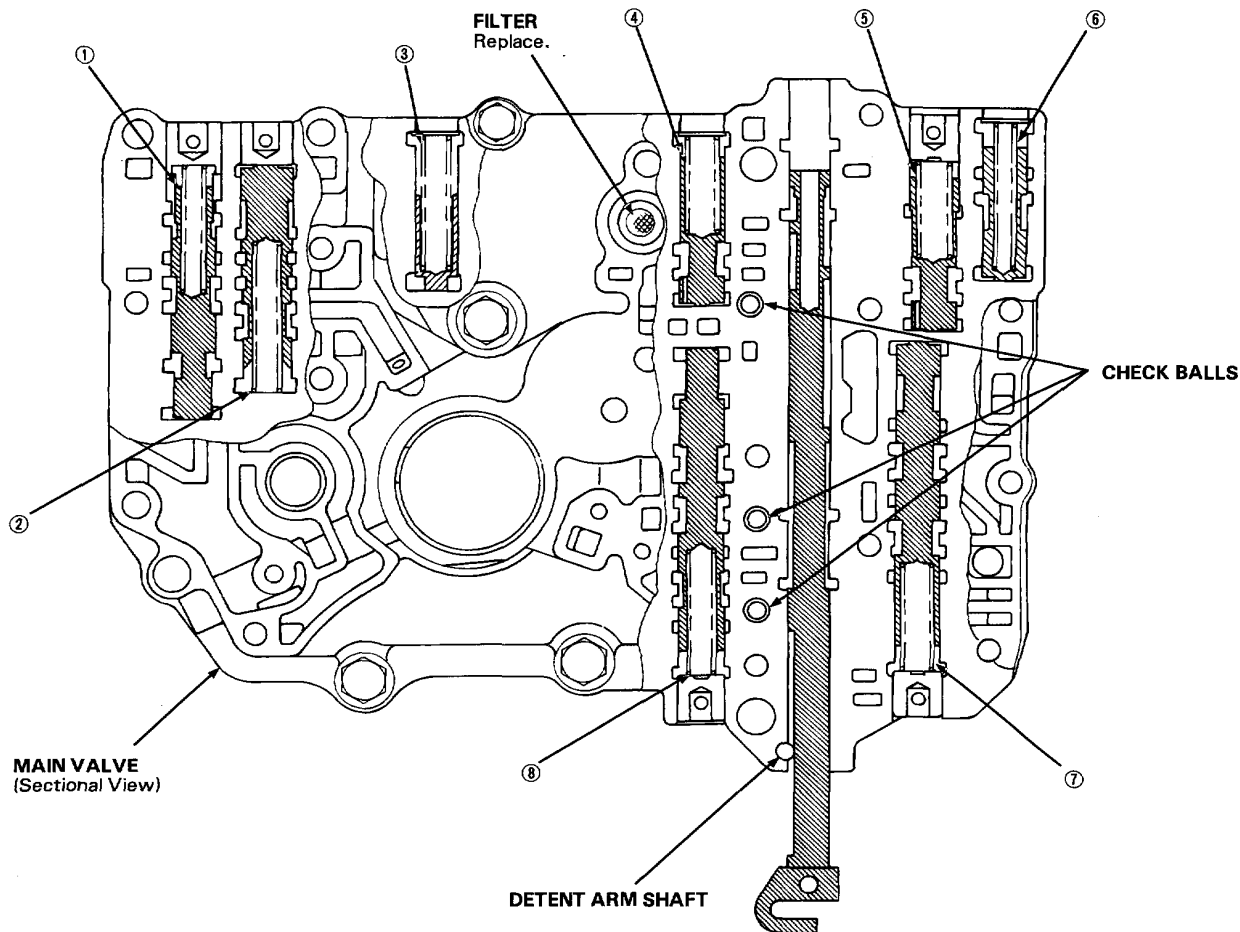
NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Replace valve body as an assembly if any parts are worn or damaged.
- Check all valves for free movement. If any fail to slide freely, see Valve Body Repair on page 14-102.

CAUTION:

Do not use a magnet to remove the check balls; it may magnetize the balls.





SPRING SPECIFICATIONS

Unit of length : mm (in)

No.	Spring	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	Lockup control valve spring	0.70 (0.028)	6.60 (0.260)	38.00 (1.496)	14.1
②	Lockup shift valve spring	0.90 (0.035)	7.60 (0.299)	73.70 (2.902)	32.0
③	Cooler relief valve spring	1.10 (0.043)	8.40 (0.331)	46.80 (1.843)	17.0
④	Modulator valve spring	1.40 (0.055)	9.40 (0.370)	33.00 (1.299)	10.5
⑤	CPC valve spring	1.40 (0.055)	9.40 (0.370)	33.00 (1.299)	10.5
⑥	2nd kick-down valve spring	1.20 (0.047)	7.10 (0.280)	46.90 (1.846)	20.6
⑦	1-2 shift valve spring	1.00 (0.039)	8.60 (0.339)	41.30 (1.626)	16.9
⑧	2-3 shift valve spring	0.90 (0.035)	7.60 (0.299)	57.00 (2.244)	26.8

Secondary Valve Body

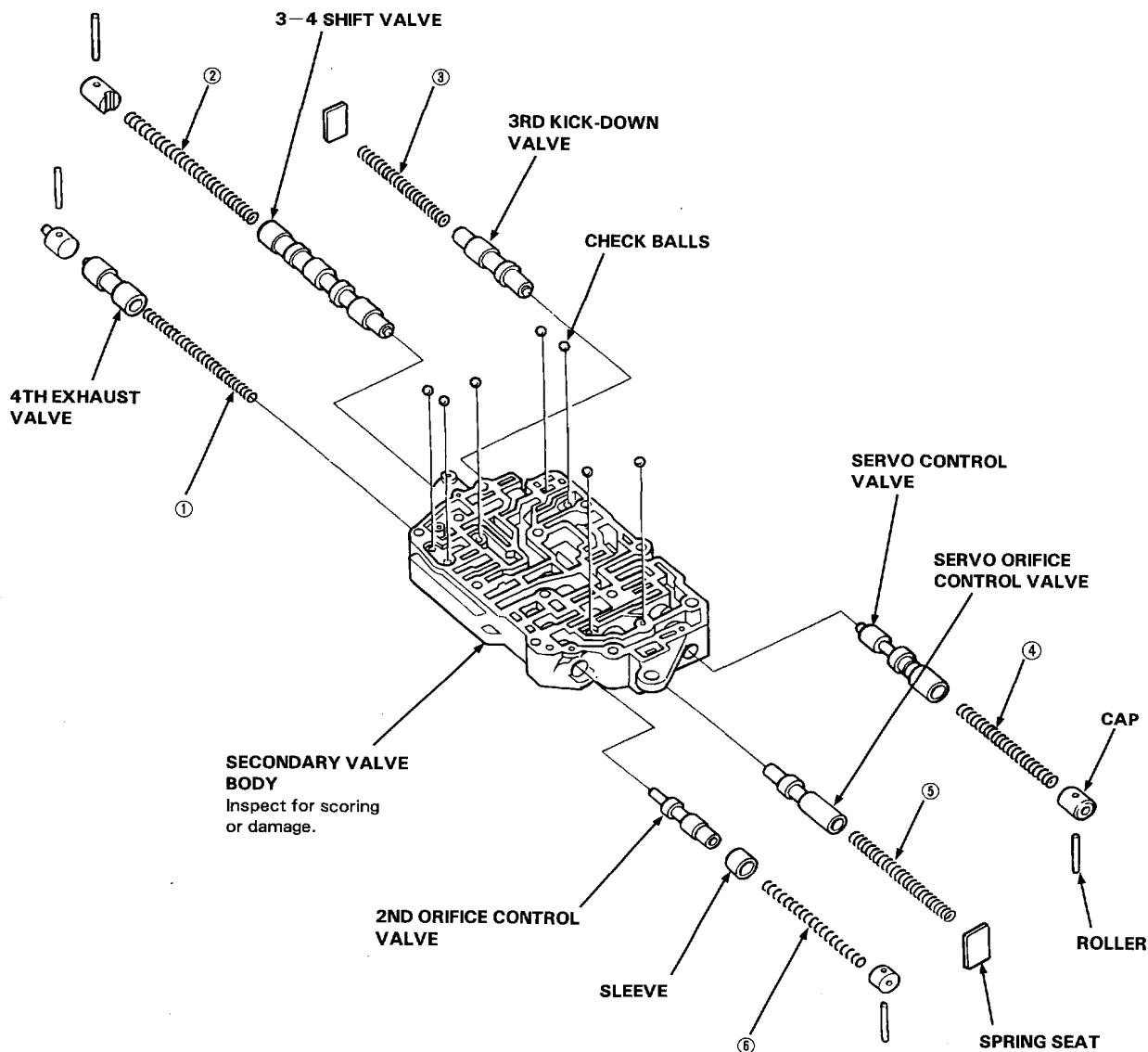
Disassembly/Inspection/Reassembly

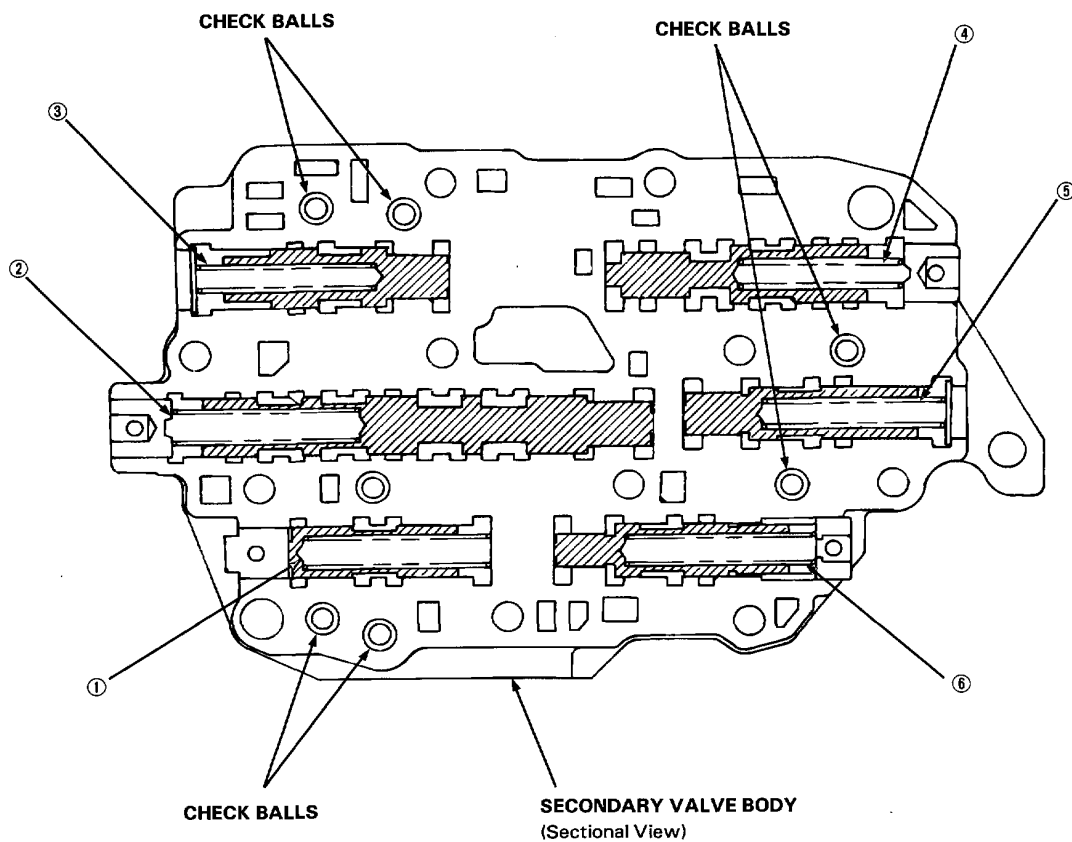
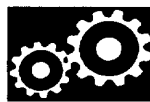
NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Check all valves for free movement. If any fail to slide freely, see Valve Body Repair on page 14-102.
- Coat all parts with ATF before assembling.
- Replace the valve body as an assembly if any parts are worn or damaged.

CAUTION:

Do not use a magnet to remove the check balls; it may magnetize the balls.





SPRING SPECIFICATIONS

Unit of length : mm (in)

No.	Springs	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	4th exhaust valve spring	0.90 (0.035)	7.10 (0.280)	60.80 (2.394)	28.9
②	3-4 shift valve spring	0.90 (0.035)	7.60 (0.299)	57.00 (2.244)	26.8
③	3rd kick-down valve spring	1.10 (0.043)	7.60 (0.299)	48.30 (1.902)	23.3
④	Servo control valve spring	1.00 (0.039)	8.10 (0.319)	52.60 (2.071)	22.4
⑤	Servo orifice control valve spring	0.80 (0.031)	6.60 (0.260)	52.50 (2.067)	33.0
⑥	2nd orifice control valve spring	0.60 (0.024)	6.60 (0.260)	55.80 (2.197)	15.8

Regulator Valve Body

Disassembly/Inspection/Reassembly

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Replace valve body as an assembly if any parts are worn or damaged.
- Check all valves for free movement. If any fail to slide freely, see Valve Body Repair on page 14-102.

1. Hold the regulator spring cap in place while removing the stopper bolt. Once the bolt is removed, release the spring cap slowly.

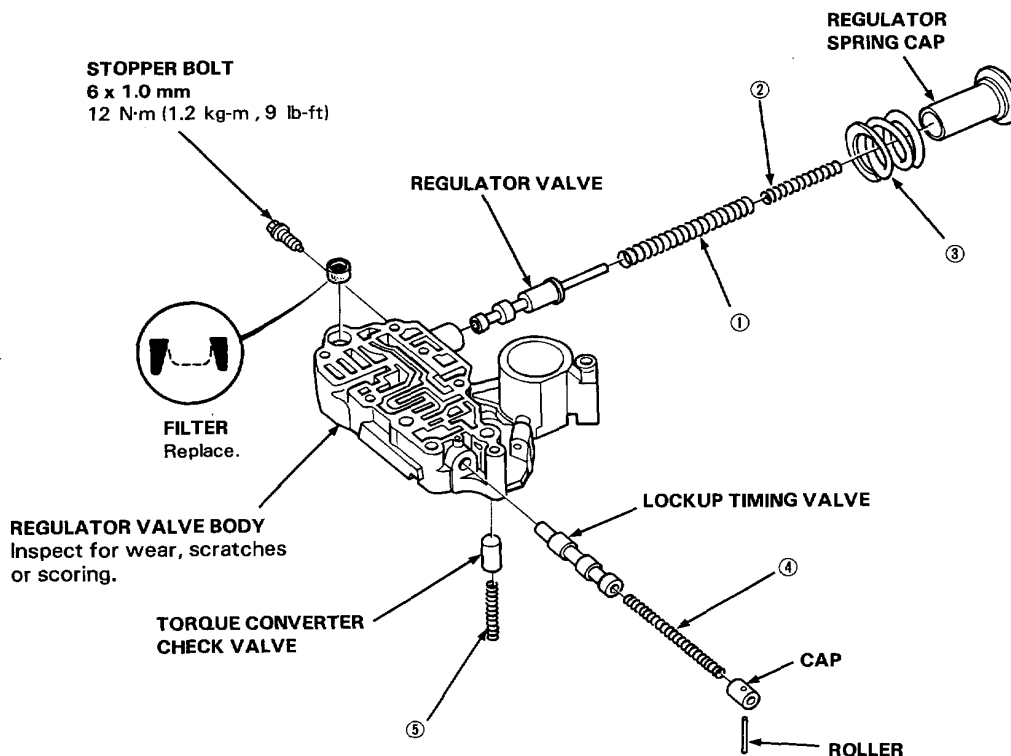
CAUTION:

The regulator spring cap can pop out when the stopper bolt is removed.

2. Reassembly is the reverse order of disassembly.

NOTE:

- Coat all parts with ATF.
- Align the hole in the regulator spring cap with the hole in the valve body; then press the spring cap into the valve body and tighten the stopper bolt.



SPRING SPECIFICATIONS

Unit of length : mm (in)

No.	Springs	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	Regulator valve spring A F20A/F22A H23A	1.80 (0.071)	14.70 (0.579)	86.50 (3.406)	16.5
		1.80 (0.071)	14.70 (0.579)	88.60 (3.488)	16.5
②	Regulator valve spring B	1.80 (0.071)	9.60 (0.378)	44.00 (1.732)	12.7
③	Stator reaction spring	4.50 (0.177)	35.40 (1.394)	30.30 (1.193)	1.92
④	Lockup timing valve spring	0.80 (0.031)	6.60 (0.260)	51.10 (2.012)	14.7
⑤	Torque converter check valve spring	1.10 (0.043)	8.40 (0.331)	36.40 (1.433)	12.0

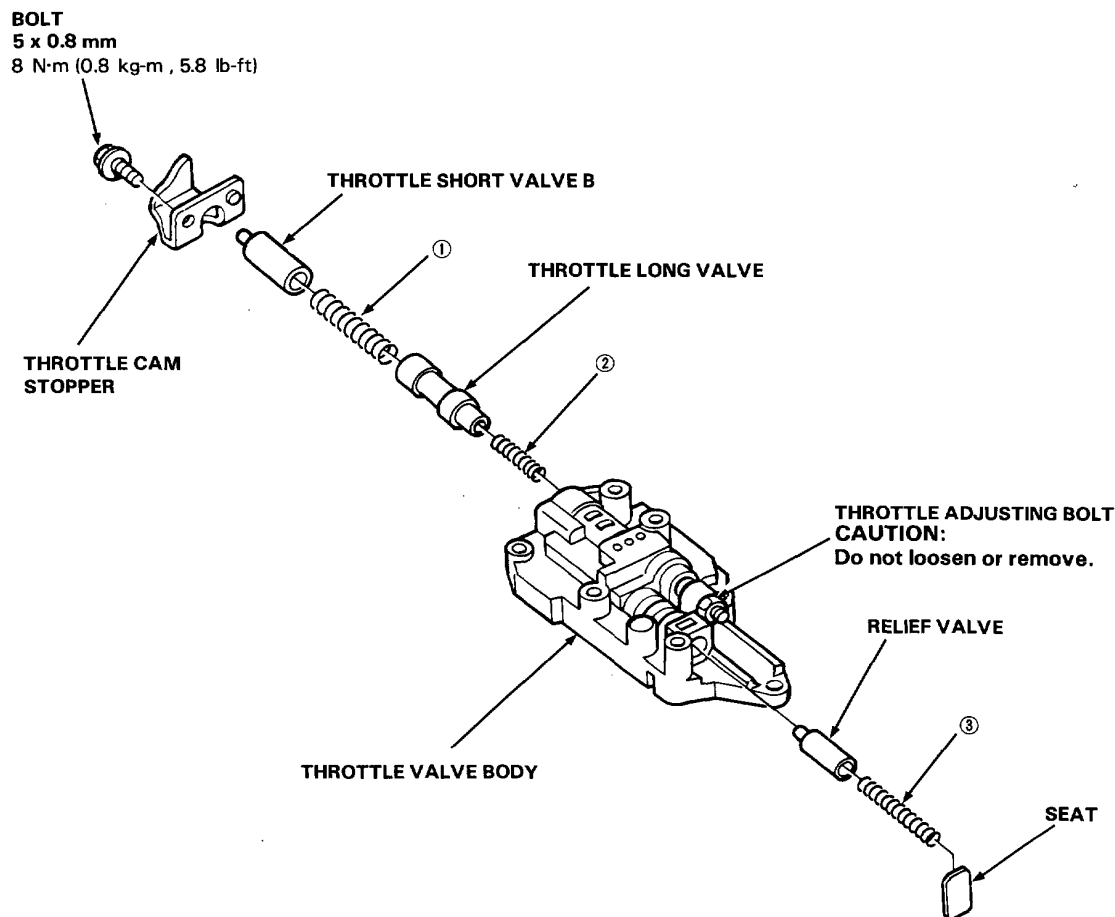


Throttle Valve Body

Disassembly/Inspection/Reassembly

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Check all valves for free movement. If any fail to slide freely, see Valve Body Repair on page 14-102.
- Coat all parts with ATF before assembling.
- Replace the valve body as an assembly if any parts are worn or damaged.



SPRING SPECIFICATIONS

Unit of length : mm (in)

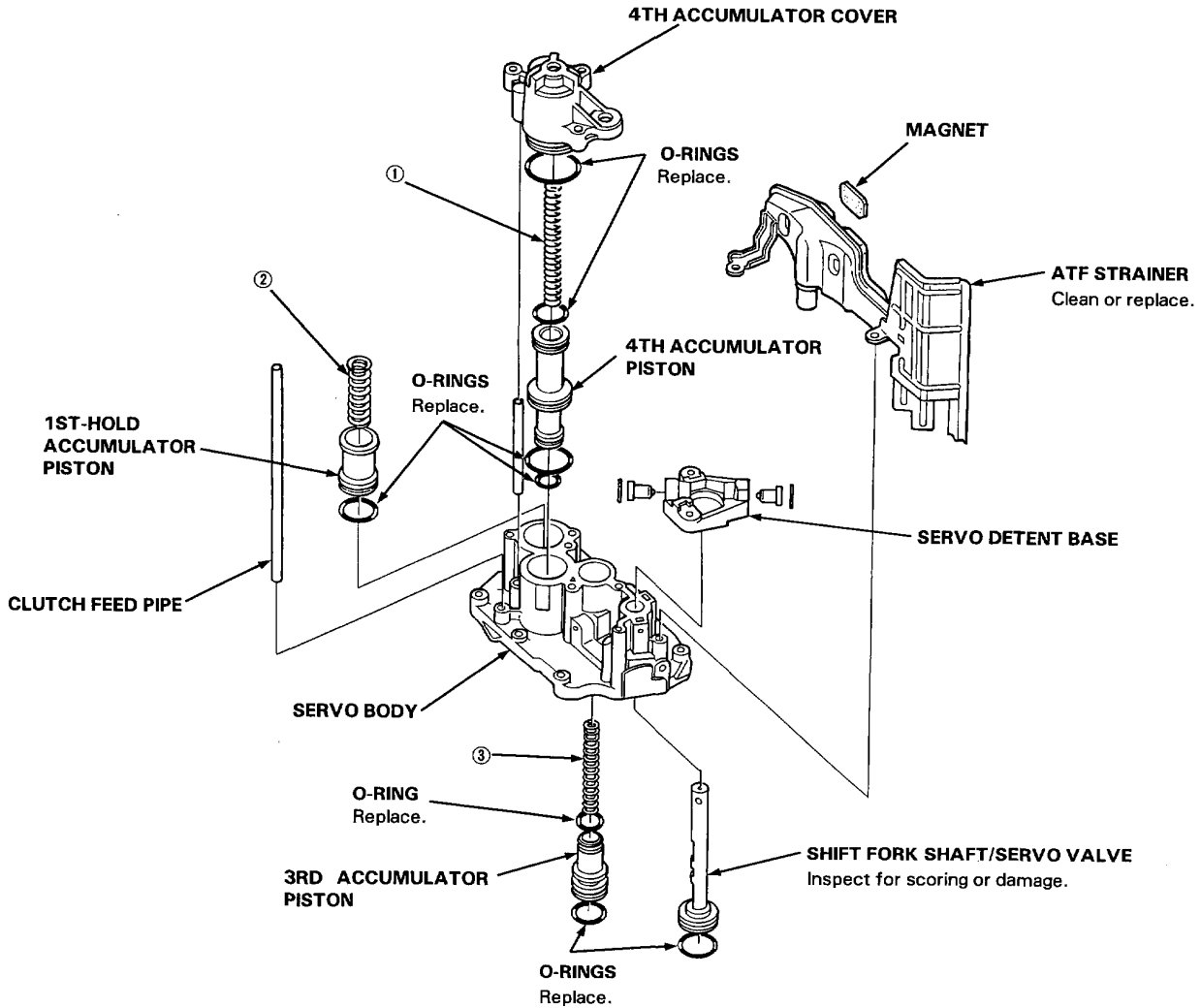
No.	Springs	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	Throttle valve B spring	1.40 (0.055)	8.50 (0.335)	41.50 (1.634)	10.5
		1.40 (0.055)	8.50 (0.335)	41.50 (1.634)	11.2
		1.40 (0.055)	8.50 (0.335)	41.60 (1.638)	12.4
②	Throttle valve B adjusting spring	0.80 (0.031)	6.20 (0.244)	30.00 (1.181)	8.0
③	Relief valve spring	1.00 (0.039)	8.40 (0.331)	39.10 (1.539)	15.1

Servo Body

Disassembly/Inspection/Reassembly

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Replace the servo body as an assembly if any parts are worn or damaged.
- Replace ATF strainer if its inlet opening is clogged.
- Coat all parts with ATF before assembly.



SPRING SPECIFICATIONS

Unit of length : mm (in)

No.	Springs	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	4th accumulator spring	2.90 (0.114)	22.00 (0.866)	90.10 (3.547)	10.9
②	1st-hold accumulator spring	4.00 (0.157)	25.00 (0.984)	64.70 (2.547)	7.3
③	3rd accumulator spring	2.80 (0.110)	17.50 (0.689)	94.20 (3.709)	16.1



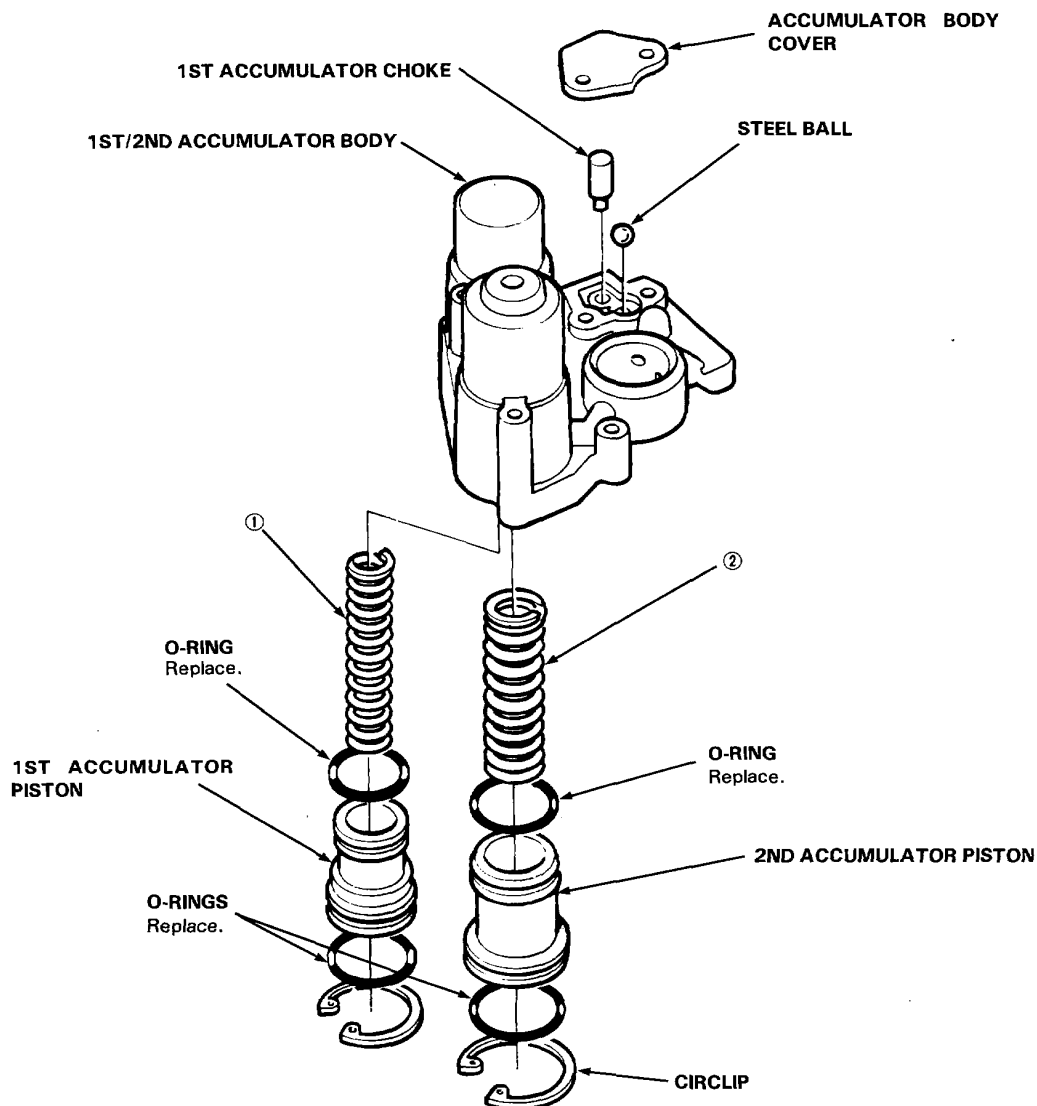
1st/2nd Accumulator Body

Disassembly/Inspection/Reassembly

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Coat all parts with ATF before assembly.

CAUTION: Do not use a magnet to remove the check balls; it may magnetize the balls.



SPRING SPECIFICATIONS

Unit of length : mm (in)

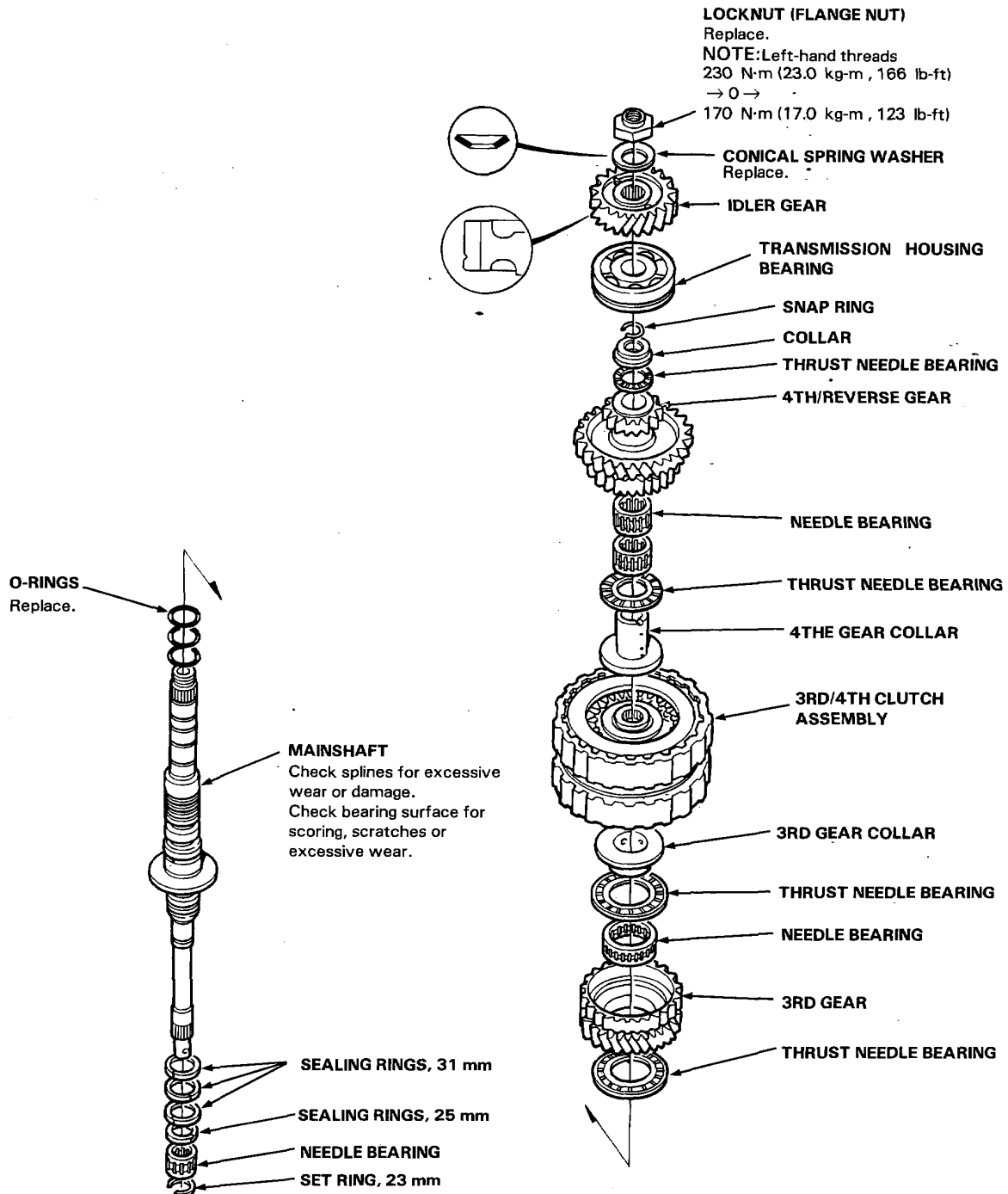
No.	Springs	Standard (New)			
		Wire Dia.	O.D.	Free Length	No. of Coils
①	1st accumulator spring	1.80 (0.071)	16.30 (0.642)	115.40 (4.543)	18.6
②	2nd accumulator spring	3.50 (0.138)	22.00 (0.866)	77.10 (3.035)	10.0

Mainshaft

Disassembly/Inspection/Reassembly

NOTE:

- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearings with unrolled edge of bearing retainer facing washer.
- Inspect thrust needle and needle bearings for galling and rough movement.
- Before installing the O-rings, wrap the shaft splines with tape to prevent damage to the O-rings.



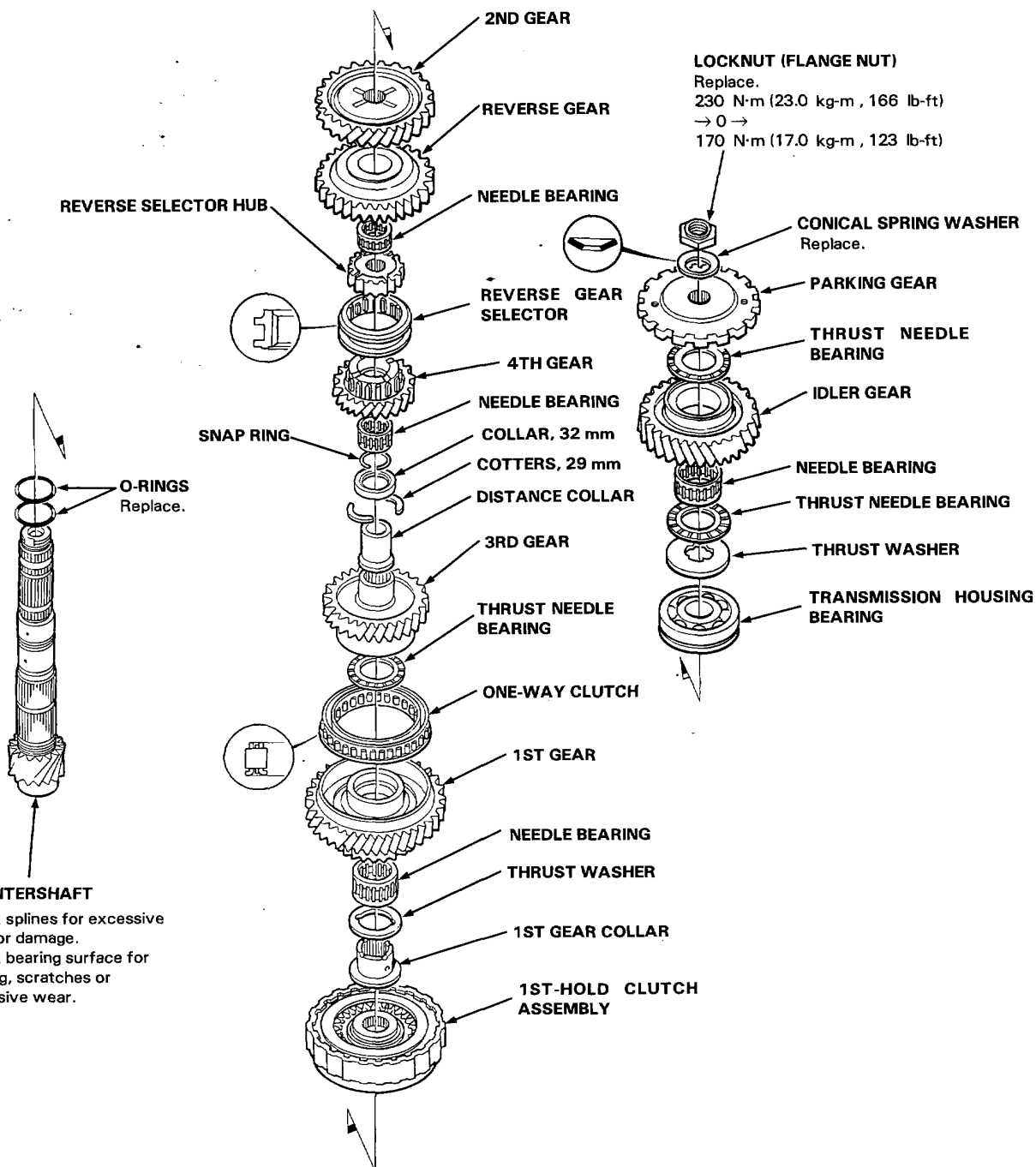


Countershaft

Disassembly/Inspection/Reassembly

NOTE:

- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearings with unrolled edge of bearing retainer facing washer.
- Inspect thrust needle and needle bearings for galling and rough movement.
- Before installing the O-rings, wrap the shaft splines with tape to prevent damage to the O-rings.



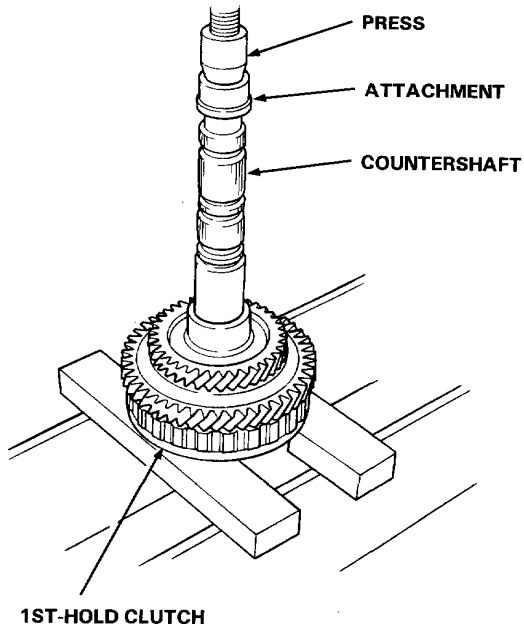
Countershaft

Removal

1. Using a hydraulic press, press out the countershaft while supporting the 1st-hold clutch drum.

NOTE:

Place an attachment between the hydraulic press and countershaft to prevent damage to the shaft.





Installation

NOTE:

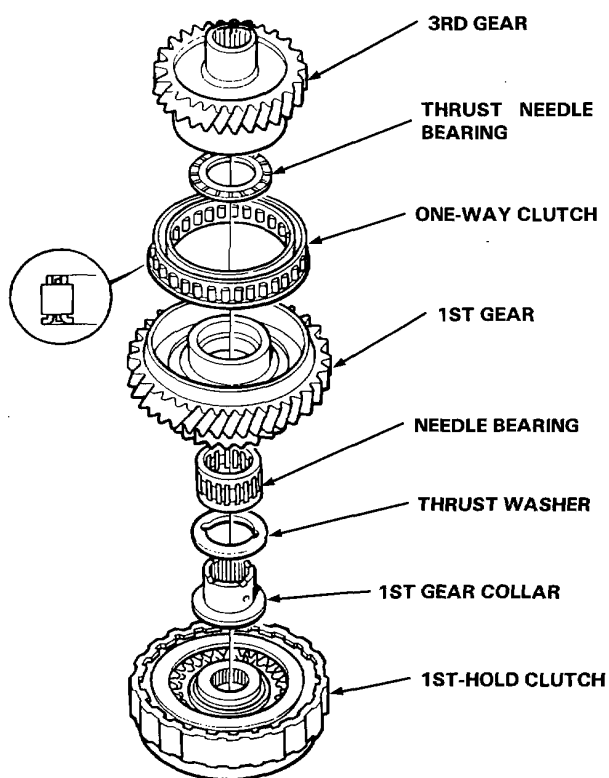
Lubricate all parts with ATF during assembly.

1. Install two new O-rings on the countershaft.

NOTE:

Before installing the O-rings, wrap the shaft splines with tape to prevent damage to the O-rings.

2. Assemble the 1st-hold clutch, 1st gear collar, thrust washer, needle bearing, 1st gear, one-way clutch, thrust needle bearing and 3rd gear.

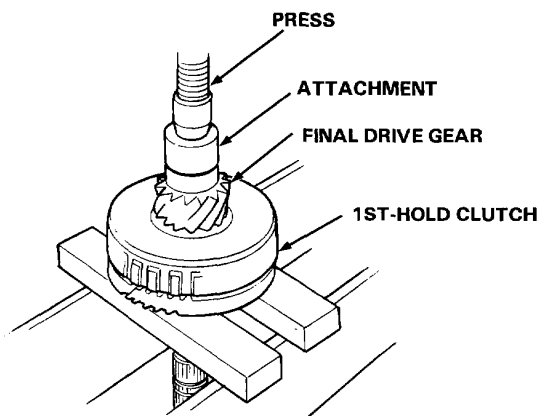


3. Install the above assembly on the countershaft.

4. Align the shaft splines with those of 3rd gear, then press the countershaft into 3rd gear with the hydraulic press.

NOTE:

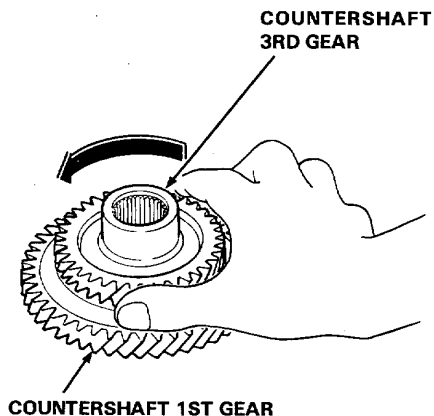
- Also align the shaft splines with those of the 1st-hold clutch when pressing the countershaft into the 3rd gear.
- Use an attachment between the shaft and hydraulic press to prevent damage to the countershaft.
- Stop pressing the countershaft when the 1st-hold clutch contacts the final drive gear.



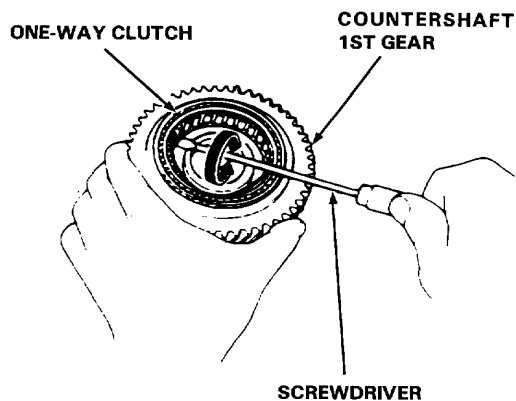
One-way Clutch

Disassembly/Inspection/Reassembly

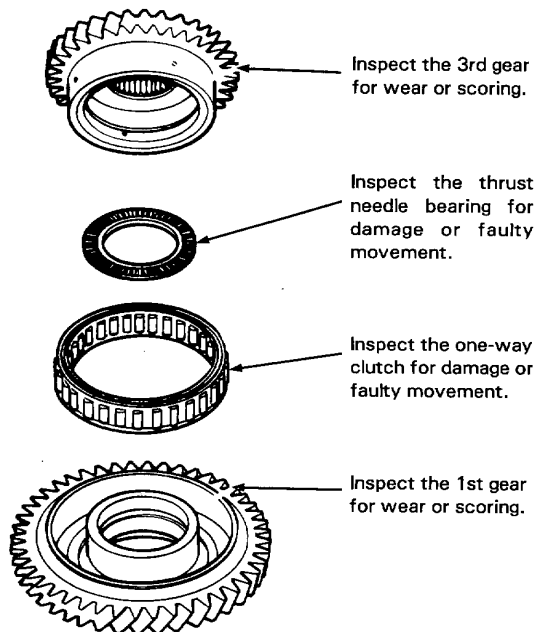
1. Separate the countershaft 3rd gear from the 1st gear by turning the 3rd gear in the direction shown.



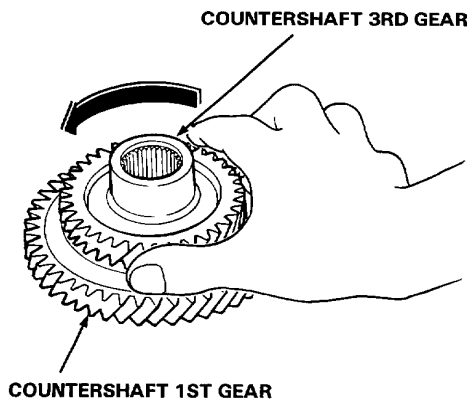
2. Remove the one-way clutch by prying it up with the end of a screwdriver.



3. Inspect the parts as follows:



4. After the parts are assembled, hold the countershaft 1st gear and turn the 3rd gear in direction shown to be sure it turns freely.



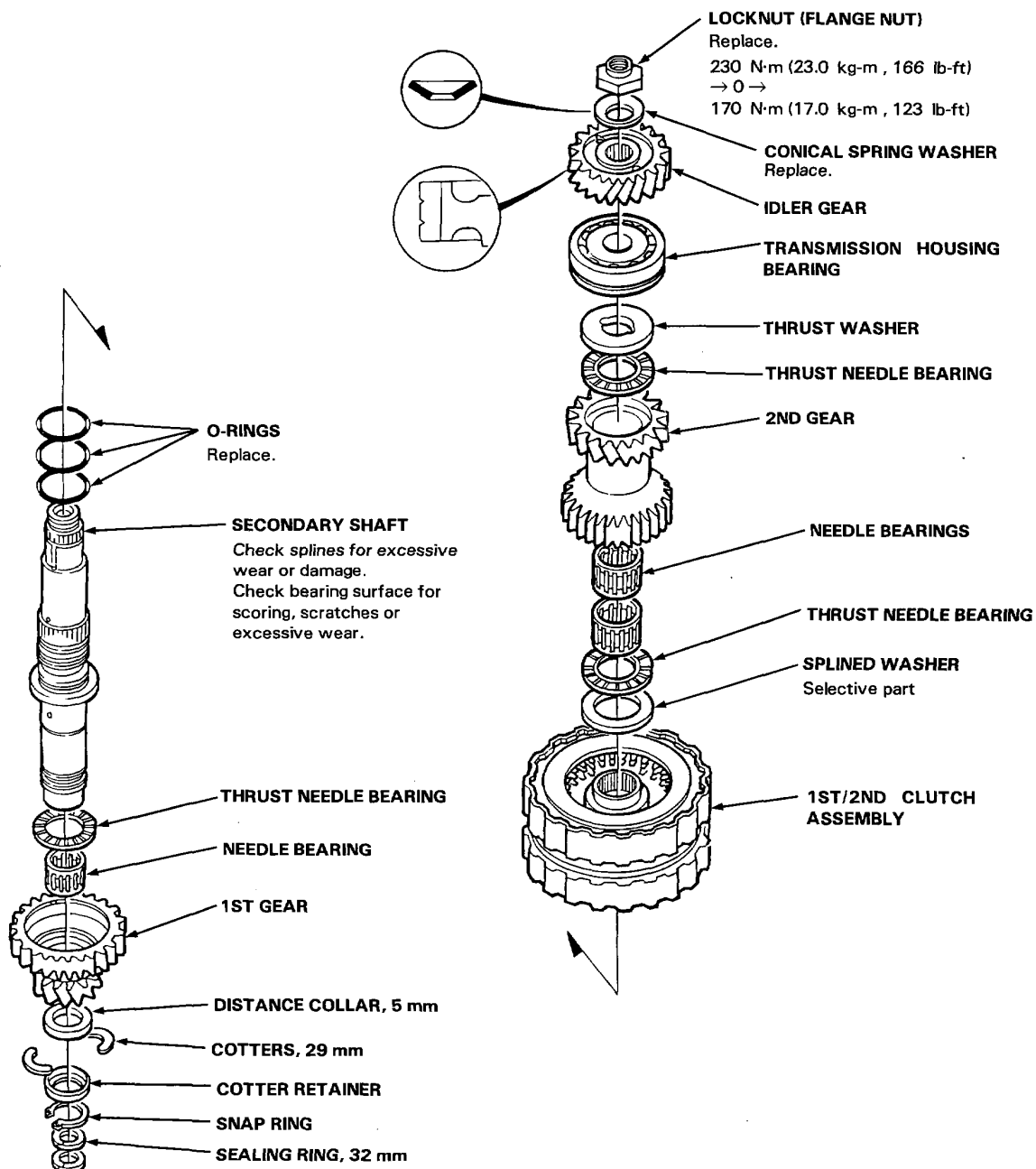


Secondary Shaft

Disassembly/Inspection/Reassembly

NOTE:

- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearings with unrolled edge of bearing retainer facing washer.
- Inspect thrust needle and needle bearings for galling and rough movement.
- Before installing the O-rings, wrap the shaft splines with tape to prevent damage to the O-rings.



Secondary Shaft

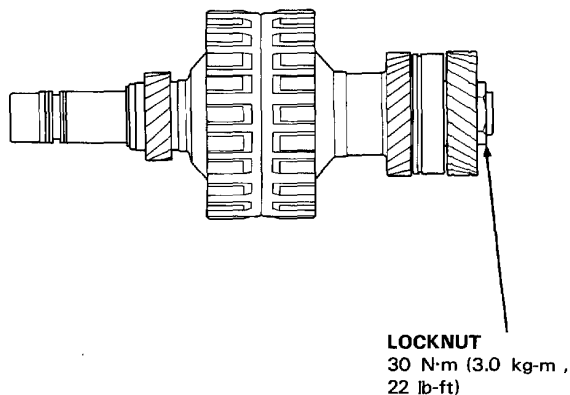
Inspection

• Clearance Measurement

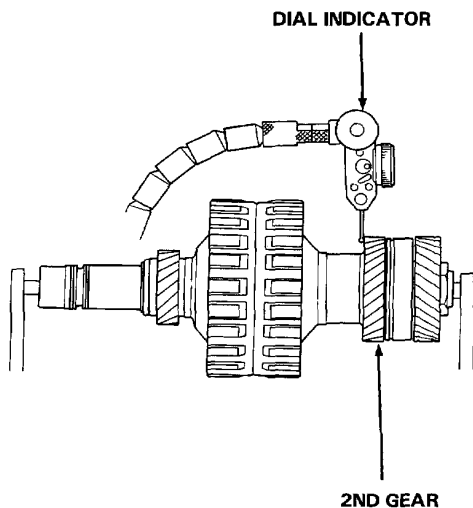
NOTE:

Lubricate all parts with ATF during assembly.

1. Remove the secondary shaft bearing from the transmission housing (see page 14-133).
2. Assemble the secondary shaft assembly without O-rings, then torque the secondary shaft locknut to 30 N·m (3.0 kg·m, 22 lb·ft).



3. Attach the dial indicator to the secondary shaft 2nd gear as shown.

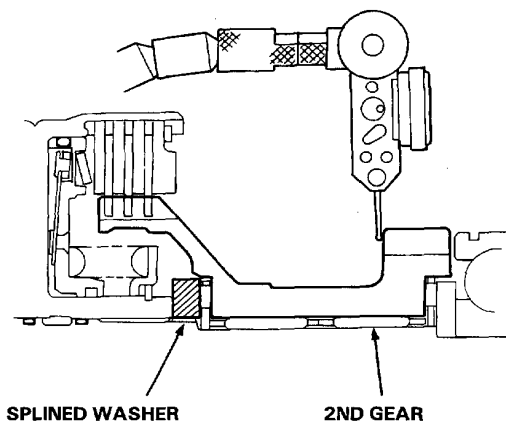


4. Measure the 2nd gear axial clearance while moving the 2nd gear.

STANDARD: 0.07—0.15 mm (0.003—0.006 in)

NOTE:

Take measurements in at least three places, and use the average as the actual clearance.



5. If the clearance is out of tolerance, remove the splined washer and measure the thickness.

SPLINED WASHER

No.	Part Number	Thickness
1	90406—PX4—700	4.05 mm (0.159 in)
2	90407—PX4—700	4.10 mm (0.161 in)
3	90408—PX4—700	4.15 mm (0.163 in)
4	90409—PX4—700	4.20 mm (0.165 in)
5	90410—PX4—700	4.25 mm (0.167 in)
6	90411—PX4—700	4.30 mm (0.169 in)
7	90412—PX4—700	4.35 mm (0.171 in)
8	90413—PX4—700	4.40 mm (0.173 in)
9	90414—PX4—700	4.45 mm (0.175 in)

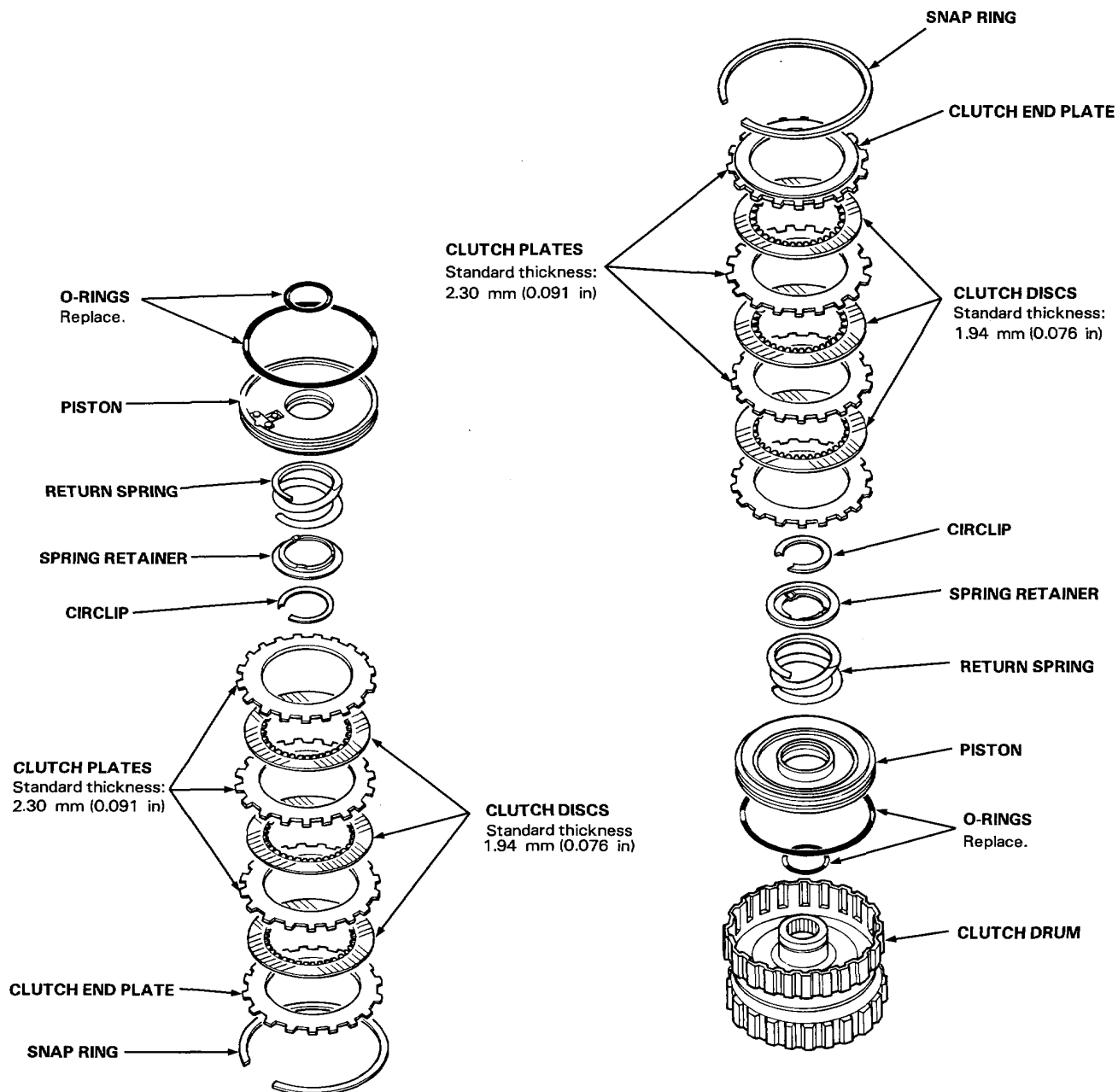
6. After replacing the splined washer, make sure that the clearance is within tolerance.

Clutch

Illustrated Index



3RD/4TH CLUTCH

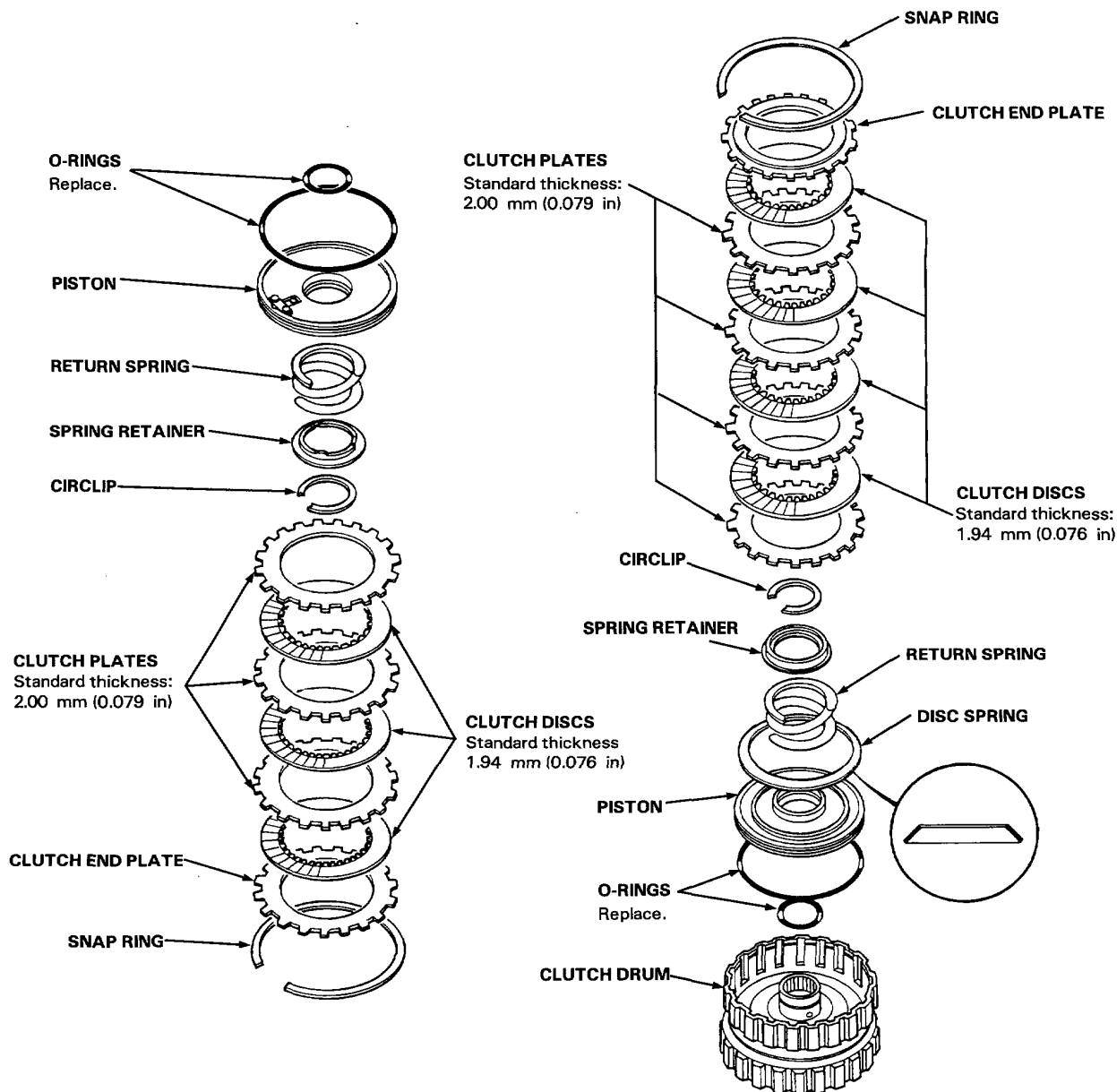


(cont'd)

Clutch

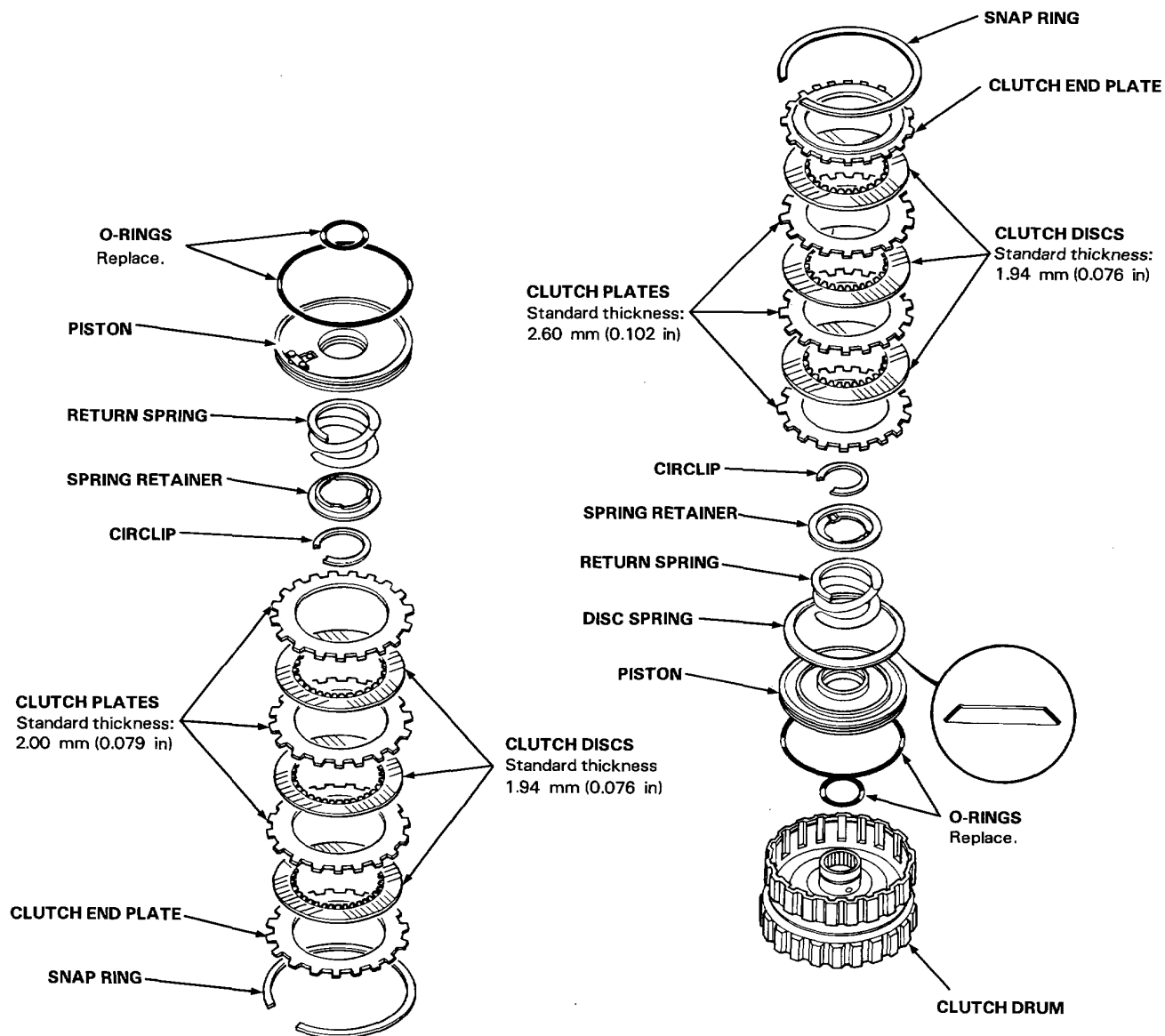
Illustrated Index (cont'd)

1ST/2ND CLUTCH: H23A Engine





1ST/2ND CLUTCH: F20A and F22A Engine

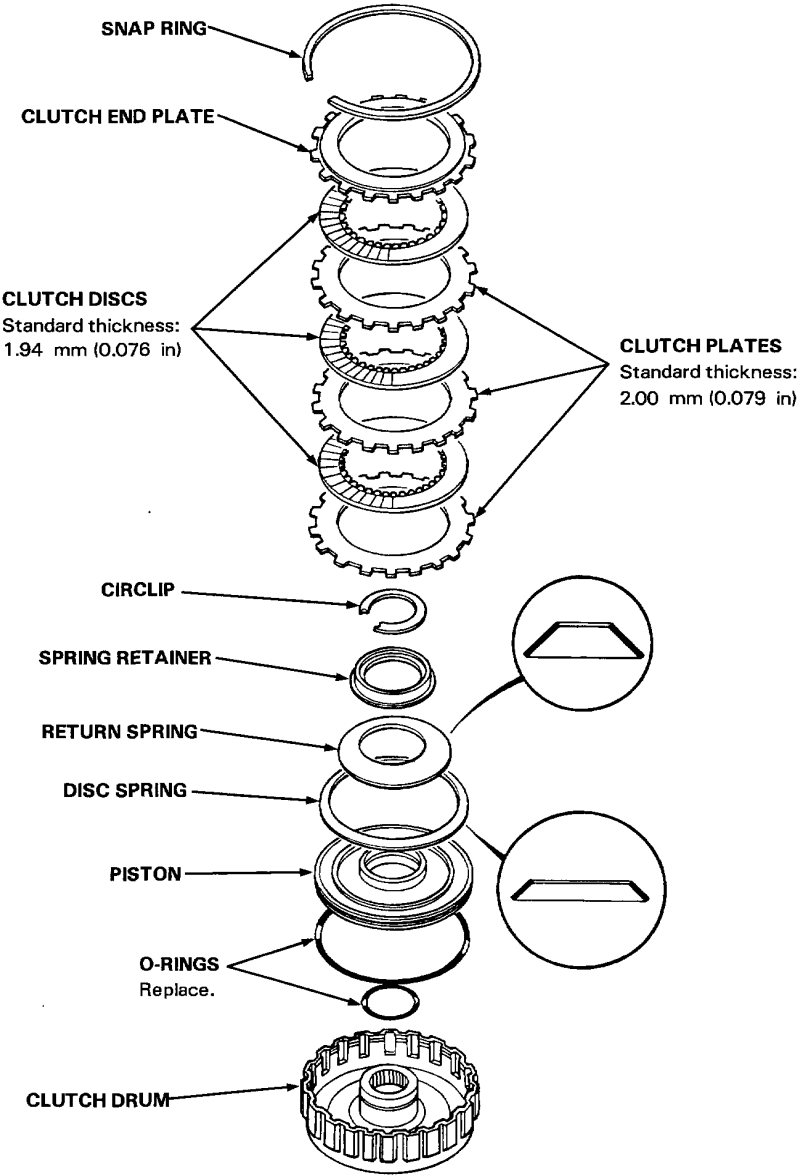


(cont'd)

Clutch

Illustrated Index (cont'd)

1ST-HOLD CLUTCH

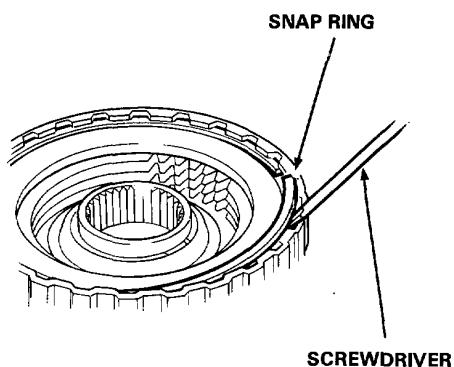




Disassembly

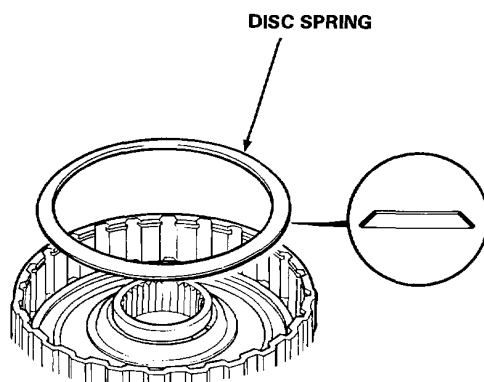
1. Remove the snap ring, then remove the clutch end plate, clutch discs and plates.

NOTE: For all clutches



2. Remove the disc spring.

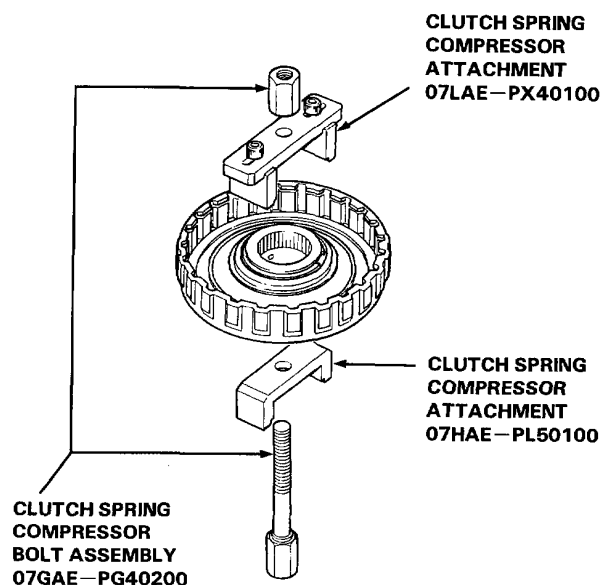
NOTE: For 1st-hold and 2nd clutches



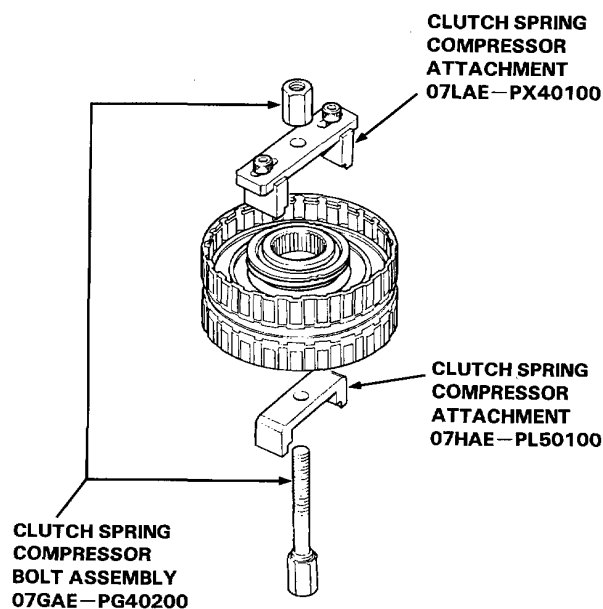
3. Install the special tools as shown.

NOTE: For 1st-hold clutch

CLUTCH SPRING COMPRESSOR SET
07LAE—PX40000



NOTE: For 1st, 2nd, 3rd and 4th clutches.



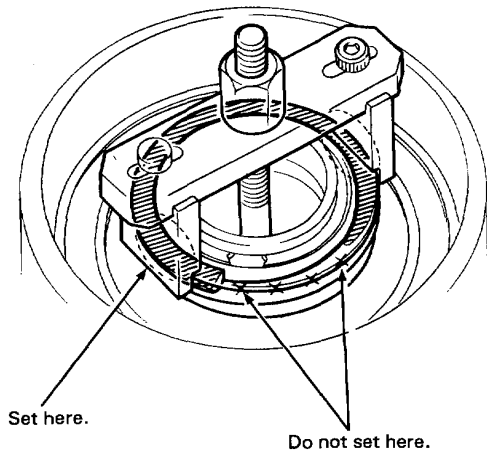
(cont'd)

Clutch

Disassembly (cont'd)

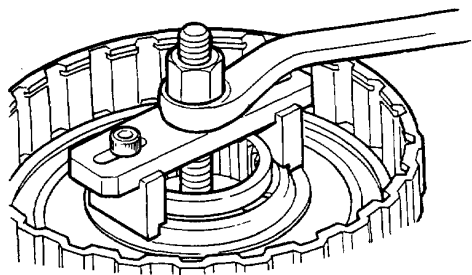
CAUTION:

If either end of the compressor attachment is set over an area of the spring retainer which is unsupported by the return spring, the retainer may be damaged.

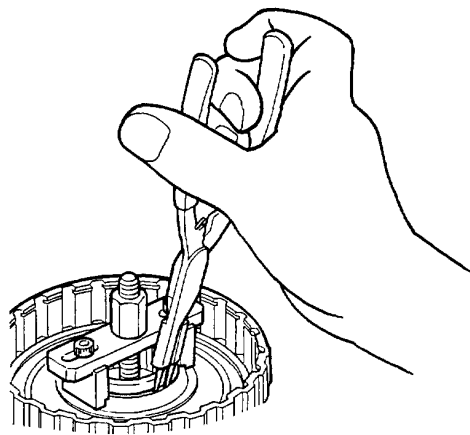


NOTE: Steps 4 thru 6 are for all clutches.

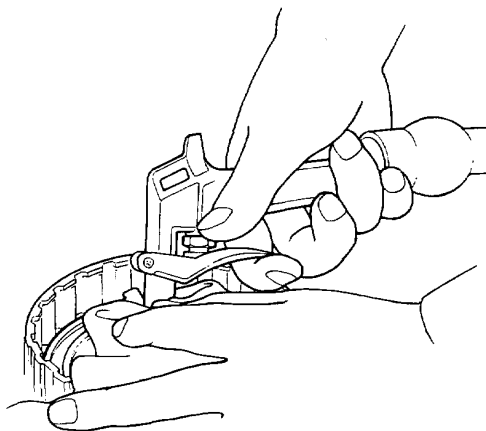
4. Compress the clutch return spring.



5. Remove the circlip. Then remove the special tools, spring retainer and return spring.



6. Wrap a shop rag around the clutch drum and apply air pressure to the oil passage to remove the piston. Place a finger tip on the other end while applying air pressure.



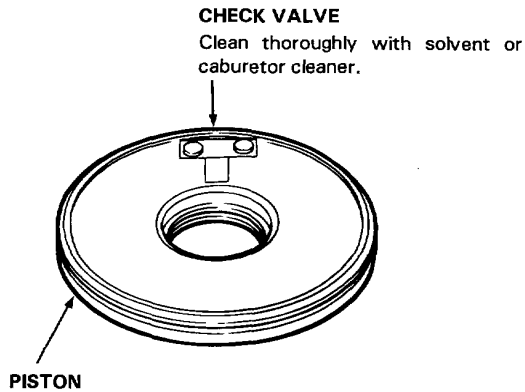


Reassembly

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air.
- Blow out all passages.
- Lubricate all parts with ATF before assembly.

1. Inspect for loose check valve.

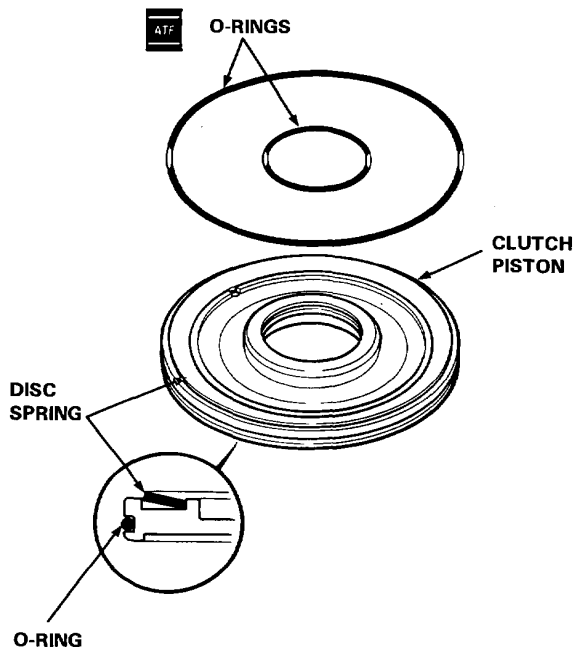


2. Be sure that the disc spring is securely staked.

NOTE:

For 1st, 3rd and 4th clutches

3. Install a new O-ring on the clutch piston.



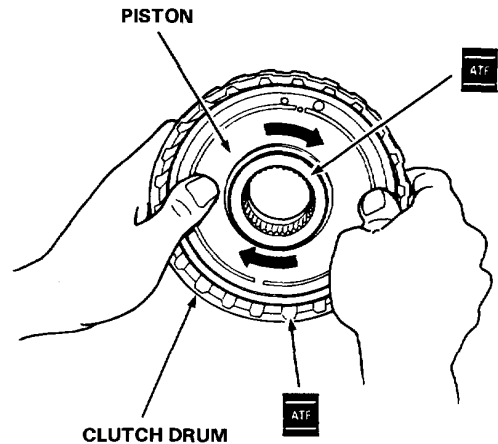
4. Install the piston in the clutch drum. Apply pressure and rotate to ensure proper seating.

NOTE:

- For all clutches
- Lubricate the piston O-ring with ATF before installing.

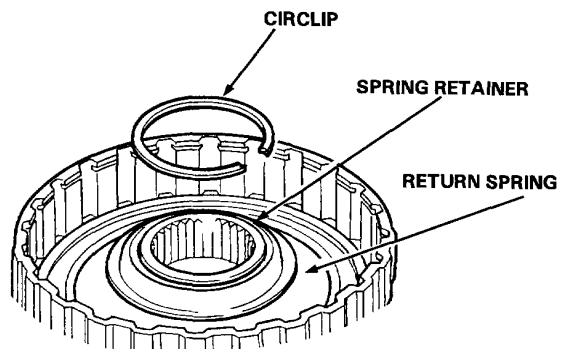
CAUTION:

Do not pinch O-ring by installing the piston with force.



5. Install the return spring and spring retainer and position the circlip on the retainer.

NOTE: For all clutches



(cont'd)

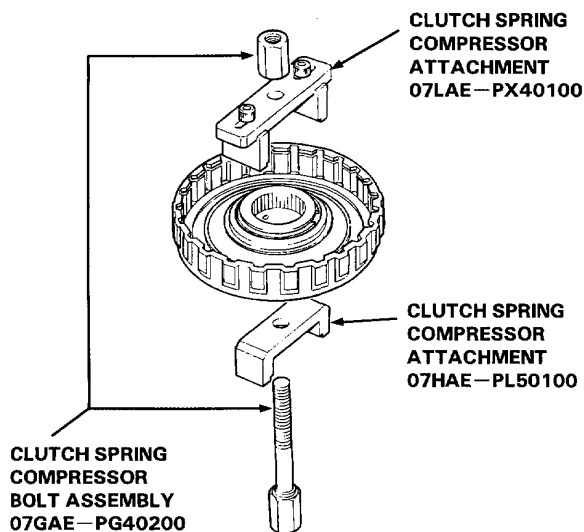
Clutch

Reassembly (cont'd)

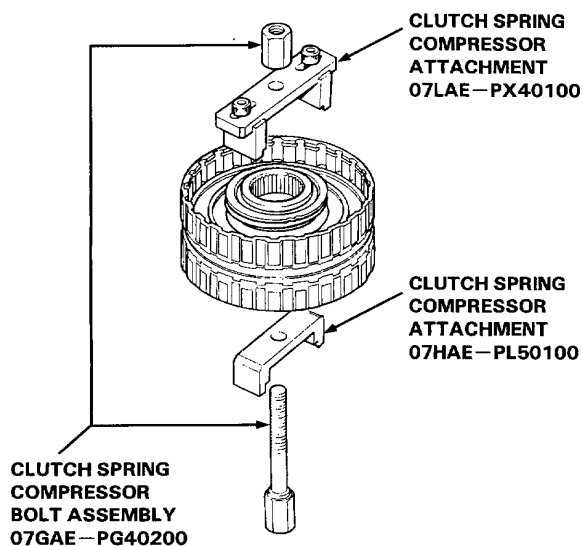
6. Install the special tools as shown.

NOTE: For 1st-hold clutch

CLUTCH SPRING COMPRESSOR SET
07LAE—PX40000

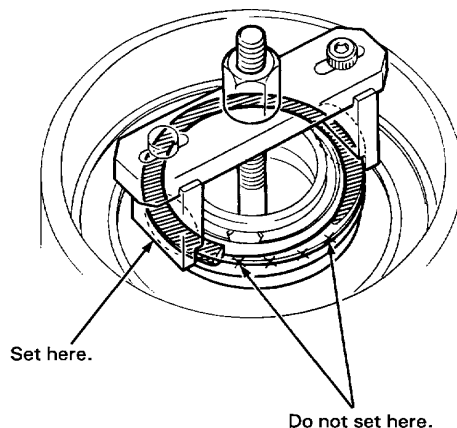


NOTE: For 1st, 2nd, 3rd and 4th clutches.



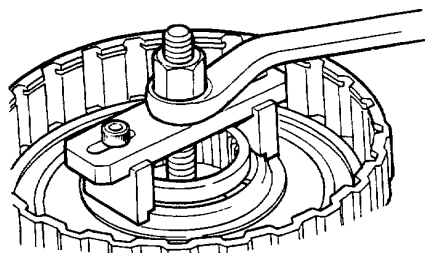
CAUTION:

If either end of the compressor attachment is set over an area of the spring retainer which is unsupported by the return spring, the retainer may be damaged.



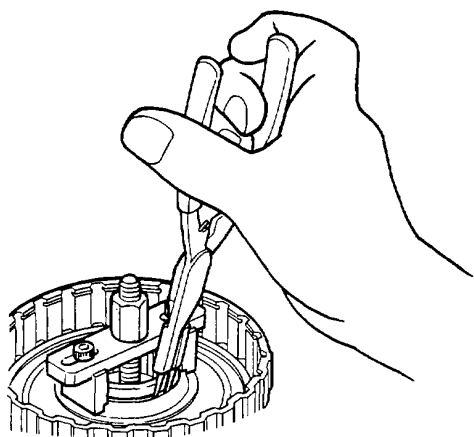
NOTE: Steps 7 thru 9 are for all clutches.

7. Compress the clutch return spring.





8. Install the circlip.

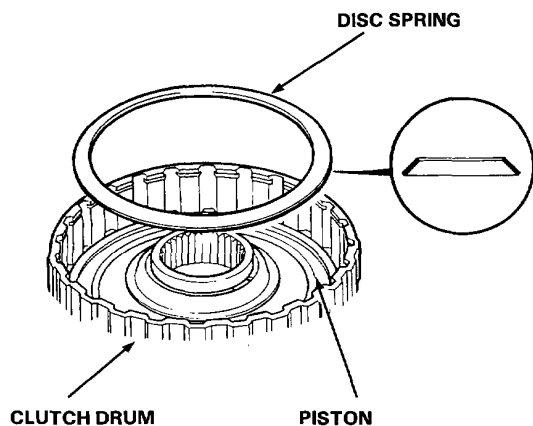


9. Remove the special tools.

10. Install the disc spring.

NOTE:

- For 1st-hold and 2nd clutches
- Install the disc spring in the direction shown.

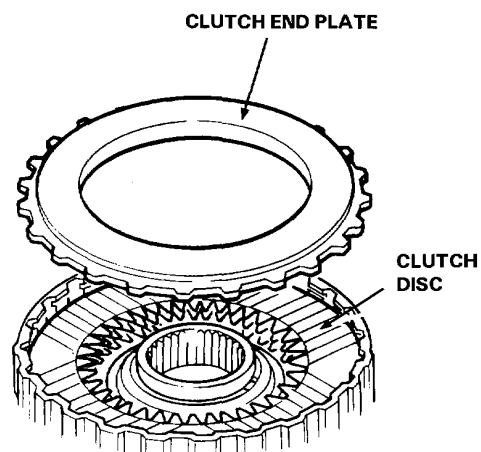


NOTE: Steps 11 thru 15 are for all clutches.

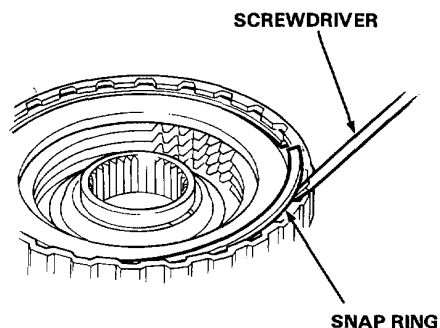
11. Soak the clutch discs thoroughly in ATF for a minimum of 30 minutes.
12. Starting with a clutch plate, alternately install the clutch plates and discs. Install the clutch end plate with flat side toward the disc.

NOTE:

Before installing the plates and discs, make sure the inside of the clutch drum is free of dirt or other foreign matter.



13. Install the snap ring.



(cont'd)

Clutch

Reassembly (cont'd)

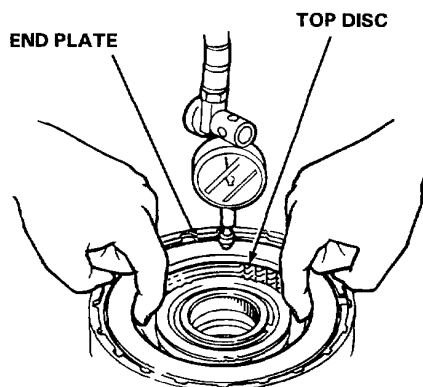
14. Measure the clearance between the clutch end plate and top disc with a dial indicator. Zero the dial indicator with the clutch end plate lowered and lift it up to the snap ring. The distance that the clutch end plate moves is the clearance between the clutch end plate and top disc.

NOTE:

Measure at three locations.

End Plate-to-Top Disc Clearance:

Clutch	Service Limit
1st	0.65—0.85 mm (0.026—0.033 in)
2nd	0.65—0.85 mm (0.026—0.033 in)
3rd	0.40—0.60 mm (0.016—0.024 in)
4th	0.40—0.60 mm (0.016—0.024 in)
1st-Hold	0.80—1.00 mm (0.031—0.039 in)



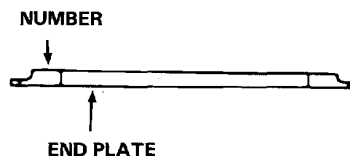
15. If the clearance is not within the service limits, select a new clutch end plate from the following table.

NOTE:

If the thickest clutch end plate is installed but the clearance is still over the standard, replace the clutch discs and clutch plates.

CLUTCH END PLATE

Plate No.	Part Number	Thickness mm (in)
1	22551—PX4—003	2.10 (0.083)
2	22552—PX4—003	2.20 (0.087)
3	22553—PX4—003	2.30 (0.091)
4	22554—PX4—003	2.40 (0.094)
5	22555—PX4—003	2.50 (0.098)
6	22556—PX4—003	2.60 (0.102)
7	22557—PX4—003	2.70 (0.106)
8	22558—PX4—003	2.80 (0.110)
9	22559—PX4—003	2.90 (0.114)



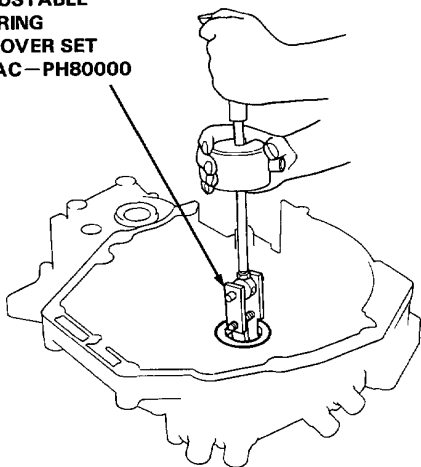


Torque Converter Housing Bearings

Mainshaft Bearing/Oil Seal Replacement

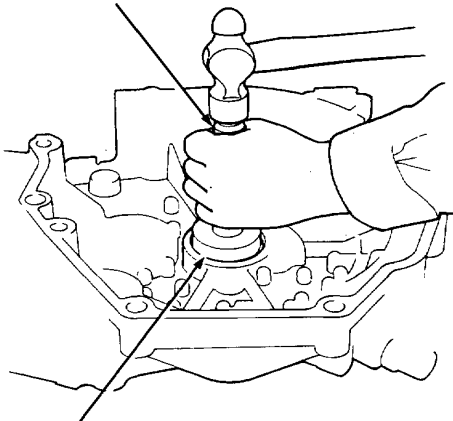
1. Remove the mainshaft bearing and oil seal, using the special tools as shown.

**ADJUSTABLE
BEARING
REMOVER SET
07JAC-PH80000**



2. Drive in the new mainshaft bearing until it bottoms in the housing, using the special tools as shown.

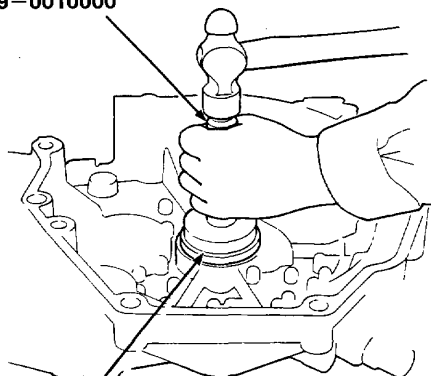
**DRIVER
07749-0010000**



**ATTACHMENT,
62 x 68 mm
07746-0010500**

3. Install the new oil seal flush with the housing, using the special tools as shown.

**DRIVER
07749-0010000**

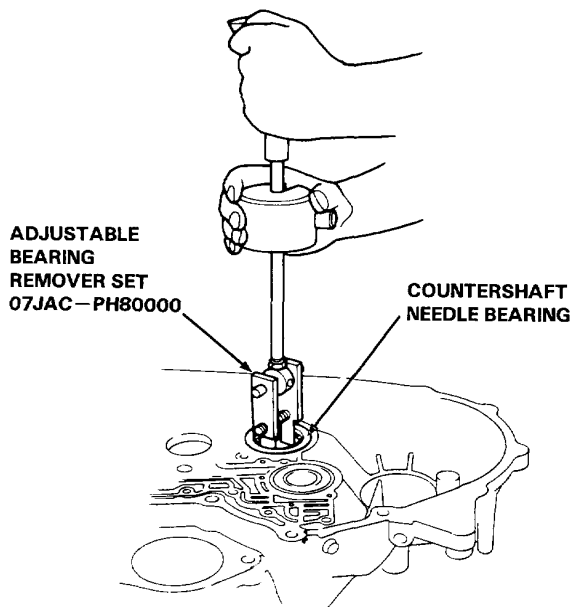


**ATTACHMENT,
72 x 75 mm
07746-0010600**

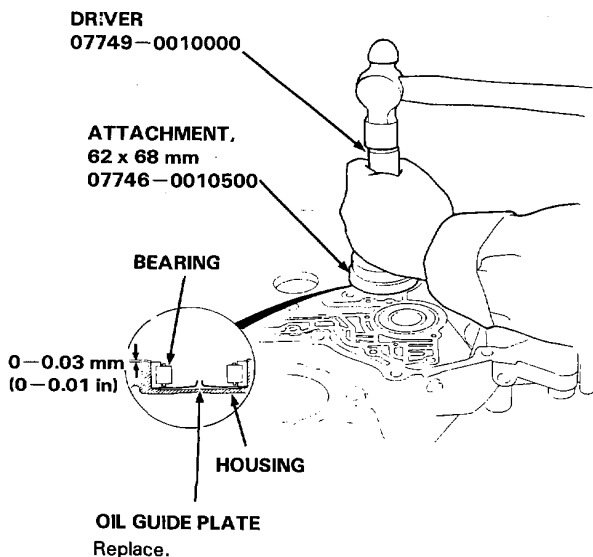
Torque Converter Housing Bearings

Countershaft Bearing Replacement

1. Remove the countershaft bearing using the special tools as shown.



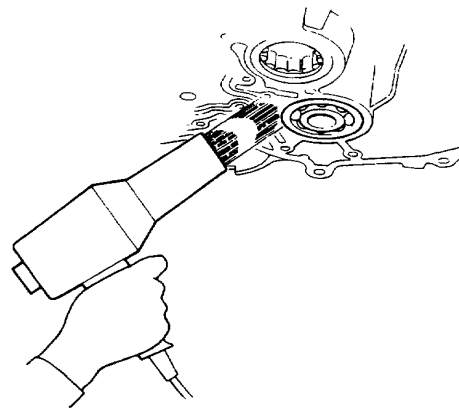
2. Replace the oil guide plate.
3. Drive the new bearing into the housing, using the special tools as shown.



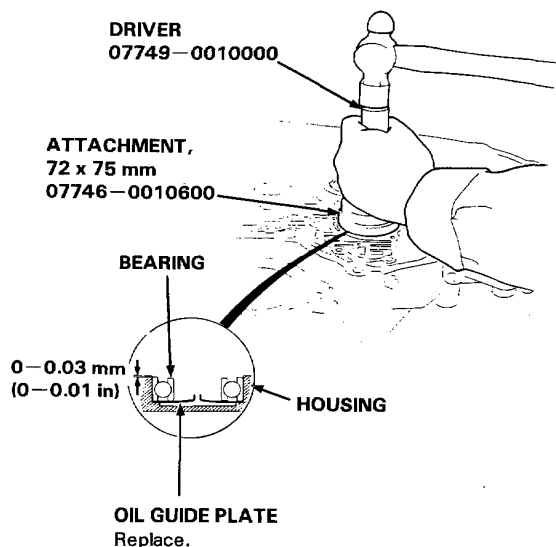
Secondary Shaft Bearing Replacement

1. Remove the secondary shaft bearing by heating the torque converter housing to 100°C (212°F) with a heat gun, then tap the housing until the bearing falls out.

CAUTION:
Do not heat the case in excess of 100°C (212°F).



2. Replace the oil guide plate.
3. Drive the new bearing into the housing, using the special tools as shown.





Transmission Housing Bearings

Removal/Installation

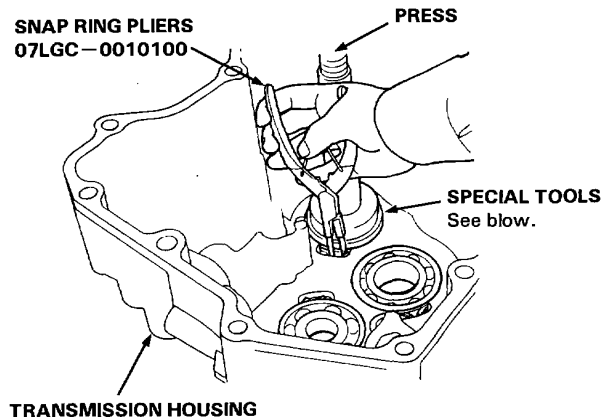
NOTE:

Lubricate all parts with ATF before assembly.

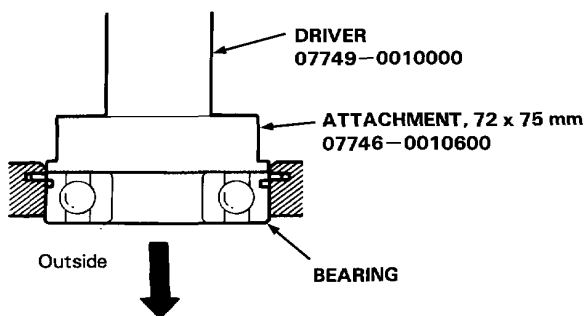
1. To remove the mainshaft, countershaft and secondary shaft bearings from the transmission housing, expand each snap ring with snap ring pliers, then push the bearing out using the special tool and a press as shown.

NOTE:

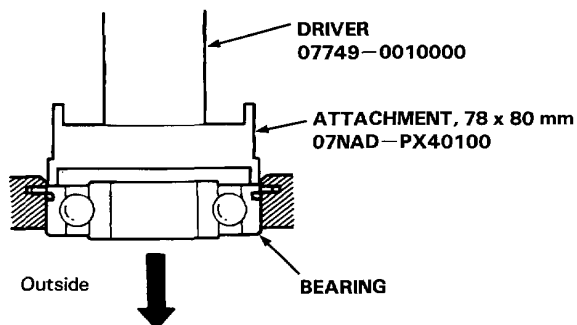
Do not remove the snap rings unless it's necessary to clean the grooves in the housing.



• Mainshaft and Secondary Shaft Bearings

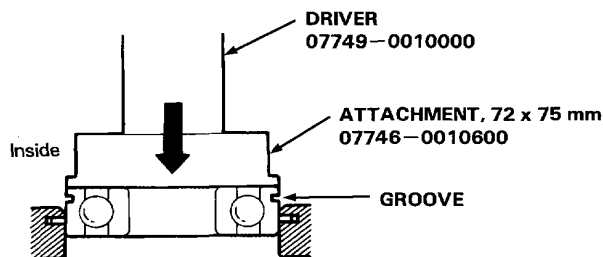


• Countershaft Bearing

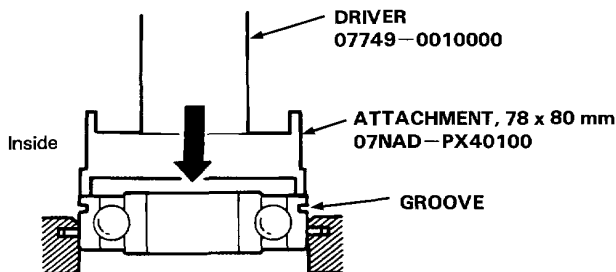


2. Expand each snap ring with snap ring pliers, and insert the new bearing part-way into the housing, using the special tool and a press as shown. Install with groove side of the bearing facing inside the housing.
3. Release the pliers, then push the bearing down into the housing until the snap ring snaps in place around it.

• Mainshaft and Secondary Shaft Bearings

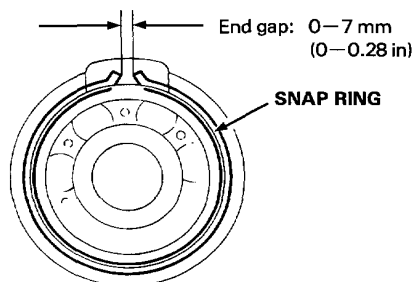


• Countershaft Bearing



4. After installing the ball bearing verify the following:

- The snap ring is seated in the bearing and housing grooves.
- The snap ring operates freely.
- The ring end gap is correct.

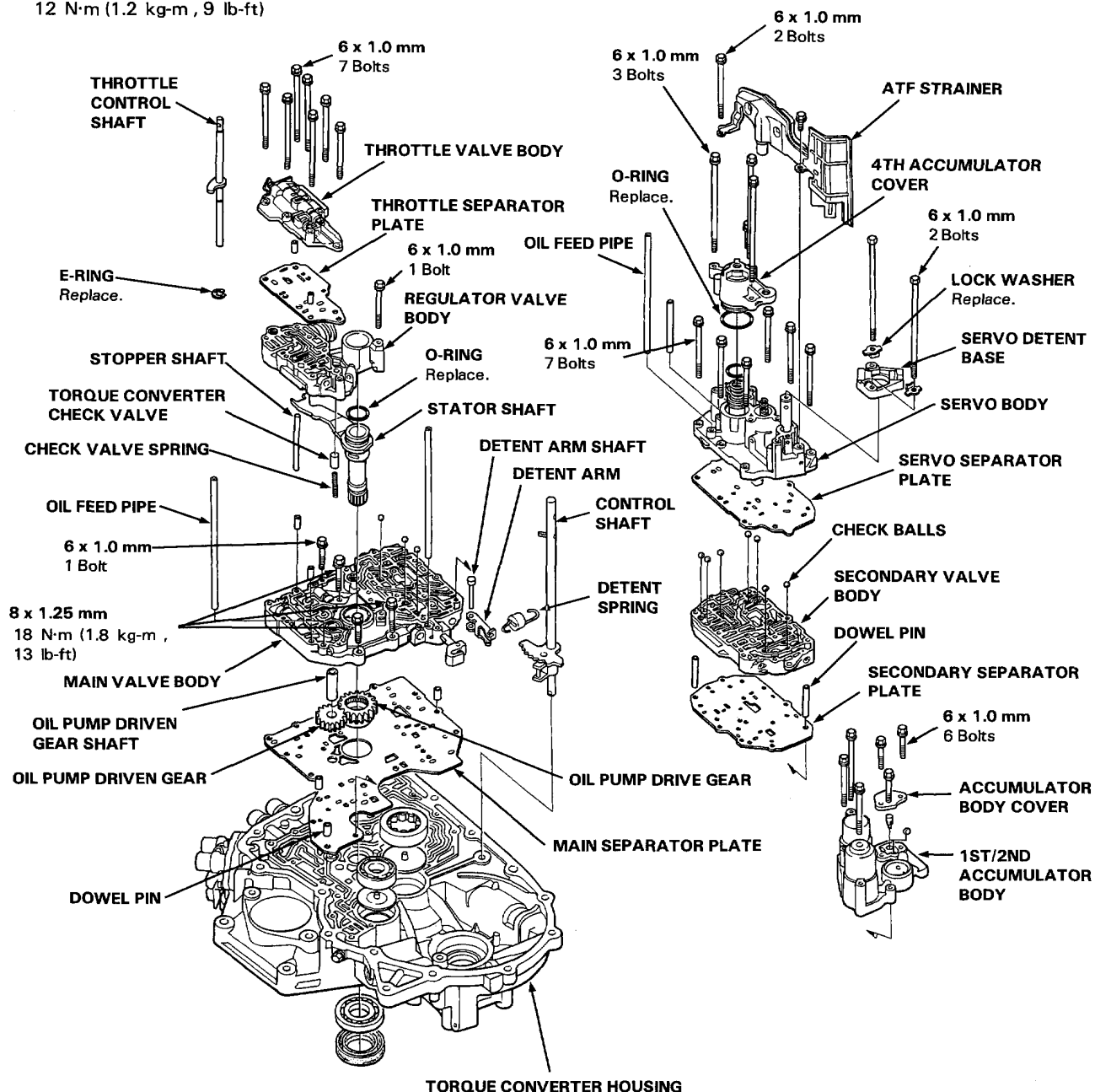


Transmission/Valve Body

Reassembly

NOTE:

- Coat all parts with ATF.
- Replace these parts:
 - O-rings
 - Lock washers
 - Gaskets
 - Locknuts and conical spring washer
 - Sealing washer
- Torque the 6 x 1.0 mm Bolts:
 - 12 N·m (1.2 kg·m , 9 lb·ft)

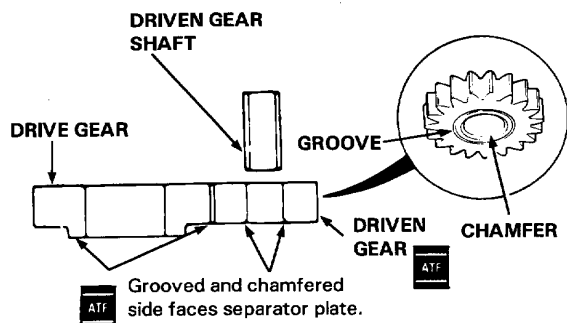




1. Install the main separator plate with 3 dowel pins on the torque converter housing. Then install the oil pump gears and oil pump driven gear shaft.

NOTE:

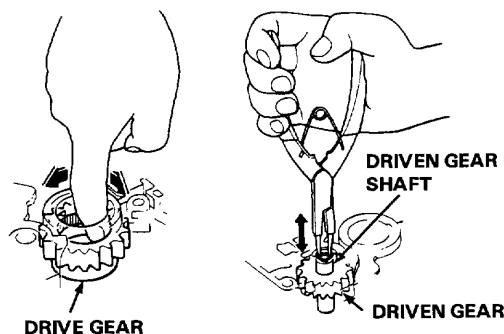
Install the oil pump driven gear with its grooved and chamfered side facing down.



2. Install the main valve body with 4 bolts. Make sure the pump drive gear rotates smoothly in the normal operating direction and pump shaft moves smoothly in the axial and normal operating directions.
3. If the pump gear and pump shaft do not move freely, loosen the valve body bolts, realign the shaft, and then retighten to the specified torque.

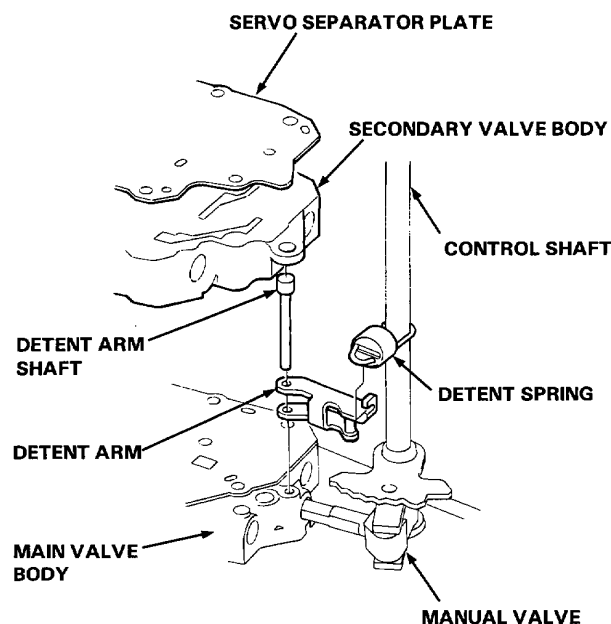
CAUTION:

Failure to align the pump shaft correctly will result in a seized pump gear or pump shaft.



4. Install the stator shaft and stopper shaft.
5. Install the 2 dowel pins, torque converter check valve and spring in the main valve body.
6. Install the regulator valve body with 1 bolt on the main valve body.
7. Install the 2 dowel pins and separator plate on the regulator valve body, then install the throttle valve body with 7 bolts.

8. Install the secondary separator plate with 2 dowel pins on the main valve body.
9. Install the control shaft in the housing with the control shaft and manual valve together.
10. Install the detent arm and arm shaft in the main valve body, then hook the detent spring to the detent arm.



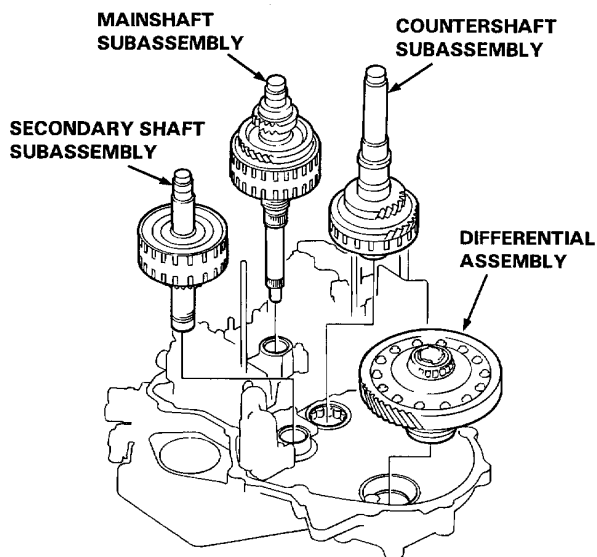
11. Install the secondary valve body, servo separator plate and servo body with 7 bolts.
12. Install the oil feed pipe in the servo body, then install the 4th accumulator cover with 3 bolts.
13. Install the ATF strainer with 2 bolts.
14. Install the servo detent base with 2 bolts and new lock washers.
15. Install the 1st/2nd accumulator body with 6 bolts.
16. Install 2 oil feed pipes in the main valve body and 1 pipe in the servo body.

(cont'd)

Transmission/Transmission Housing

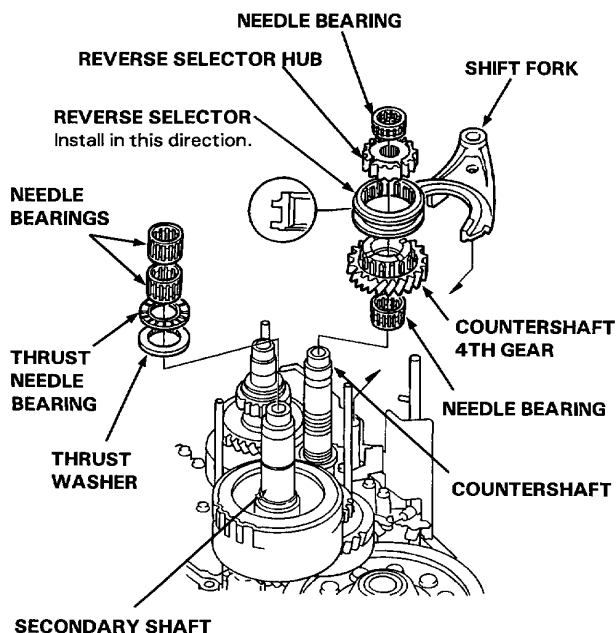
Reassembly (cont'd)

17. Install the differential assembly, countershaft subassembly, mainshaft subassembly, and secondary shaft subassembly in the torque converter housing.

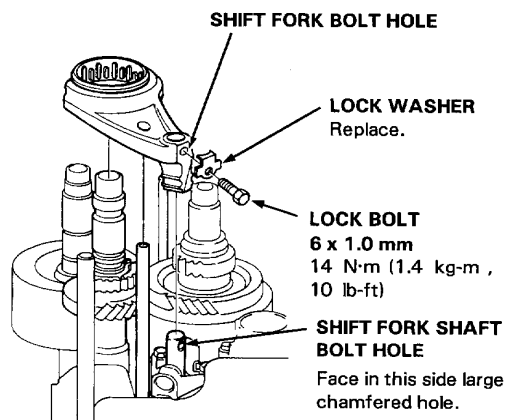


18. Install the splined washer, thrust needle bearing and needle bearings on the secondary shaft.

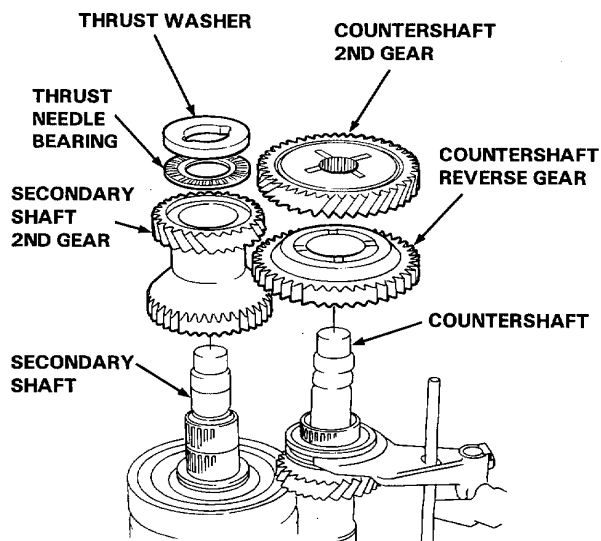
19. Install the needle bearings, reverse selector hub, countershaft 4th gear, and reverse selector with the shift fork on the countershaft.



20. Turn the shift fork shaft so the large chamfered hole is facing the fork bolt hole. Then install the shift fork and torque the lock bolt. Bend the lock tab against the bolt head.

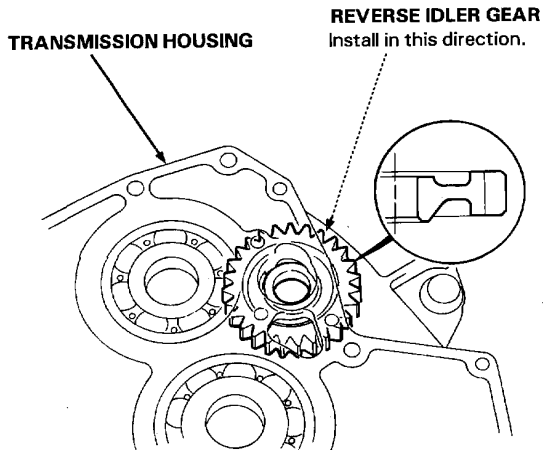


21. Install the secondary shaft 2nd gear, thrust needle bearing and thrust washer on the secondary shaft. Install the countershaft reverse gear and 2nd gear on the countershaft as shown.

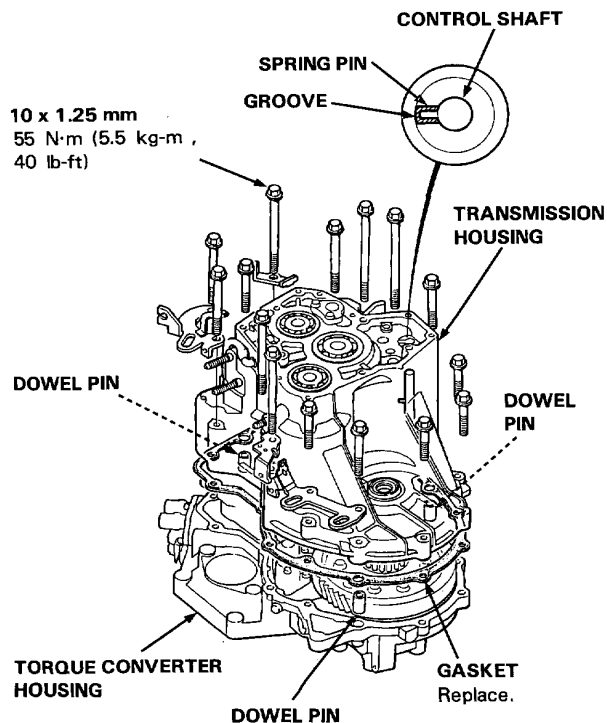




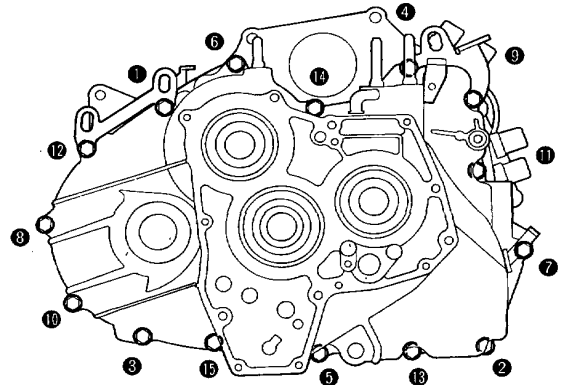
22. Slip the reverse idler gear into the transmission housing as shown.



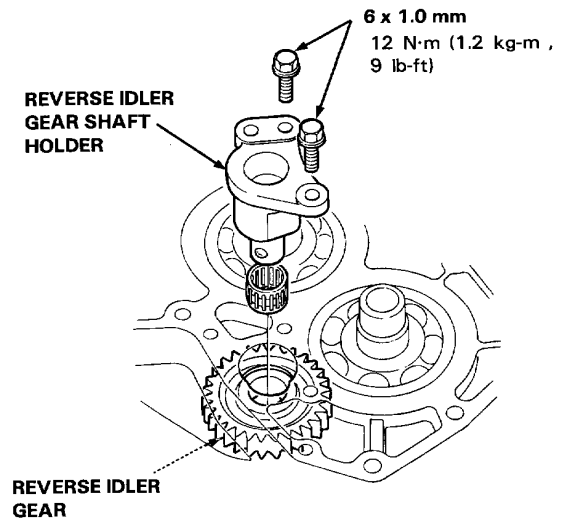
23. Align the spring pin with the transmission housing groove by turning the control shaft.
24. Place the transmission housing on the torque converter housing.



25. Install the transmission housing bolts and transmission hanger, then torque the bolts to 55 N·m (5.5 kg-m, 40 lb-ft) in two or more steps as shown.



26. Engage the reverse idler gear to the countershaft reverse gear, then install the reverse idler gear shaft holder on the transmission housing.



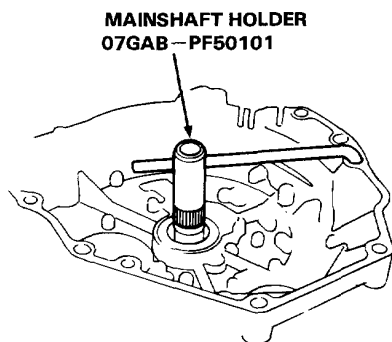
27. Install the parking brake lever on the control shaft, then torque the lock bolt. Bend the lock tab against the bolt head.

(cont'd)

Transmission/R. Side Cover

Reassembly (cont'd)

28. Slip the special tool onto the mainshaft.



NOTE:

Do not drive the gears on with a hammer.

29. Install the mainshaft idler gear.
30. Install the old locknut on the mainshaft to seat the idler gear.

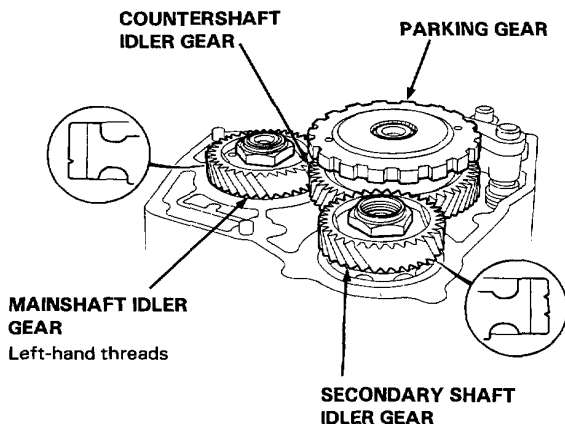
NOTE:

The mainshaft locknut has left-hand threads.

TORQUE: 230 N·m (23.0 kg-m, 166 lb-ft)

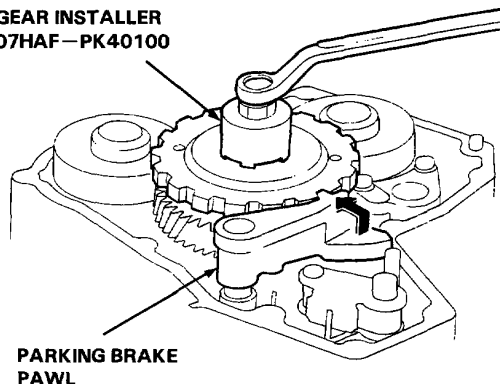
31. Install the secondary shaft idler gear on the secondary shaft.
32. Install the thrust washer, thrust needle bearing, needle bearing, countershaft idler gear and parking gear on the countershaft.
33. Install the old locknut on the secondary shaft. Tighten the old locknut to seat the secondary shaft idler gear by holding the countershaft idler gear.

TORQUE: 230 N·m (23.0 kg-m, 166 lb-ft)



34. Install the special tool on the countershaft, and engage the parking brake pawl with the parking gear by moving up the parking brake pawl.
35. Tightening the special tool and lightly seat the parking gear.

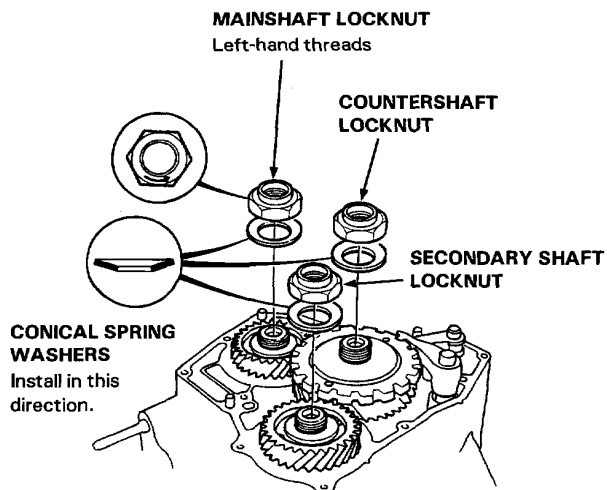
GEAR INSTALLER
07HAF-PK40100



36. Remove the special tool.
37. Install the old locknut on the countershaft to seat the parking gear.
TORQUE: 230 N·m (23.0 kg-m, 166 lb-ft)
38. Remove the old locknuts, then install new conical spring washers and new locknuts on each shaft.

CAUTION:

Install the conical spring washers in the direction shown.





39. Tighten the locknuts to specified torque.

TORQUE:

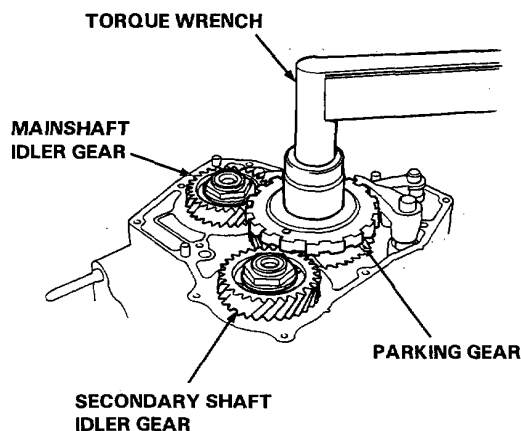
Mainshaft 170 N·m (17.0 kg-m, 123 lb-ft)

Countershaft 170 N·m (17.0 kg-m, 123 lb-ft)

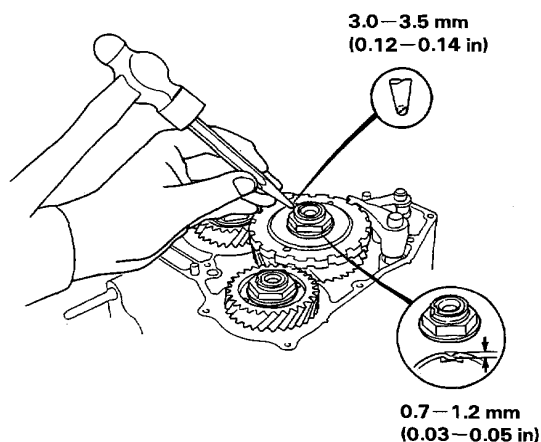
Secondary shaft 170 N·m (17.0 kg-m, 123 lb-ft)

NOTE:

The mainshaft locknut has left-hand threads.



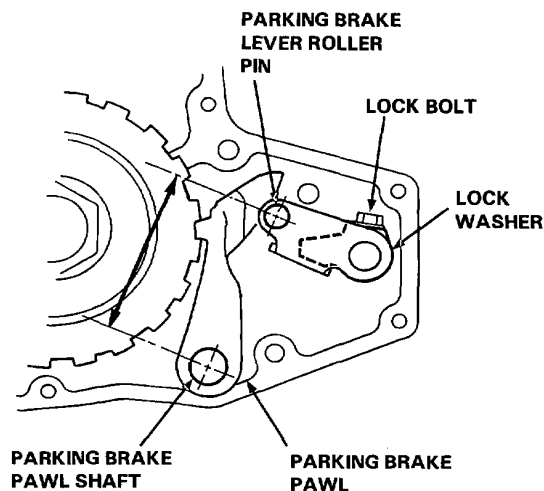
40. Stake each locknut into its shaft using a 3.5 mm punch.



41. Set the parking brake lever in the PARK position, then verify that the parking brake pawl engages the parking gear.

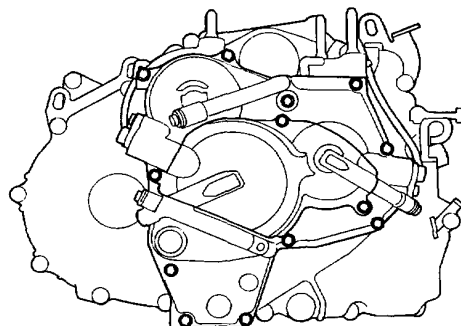
42. If the pawl does not engage fully, check the parking brake pawl stopper clearance as described on page 14-140.

43. Tighten the lock bolt, and bend the lock tab against the bolt head.



44. Install the R. side cover.

TORQUE: 12 N·m (1.2 kg-m, 9 lb-ft)



45. Install the ATF cooler pipes with new sealing washers.

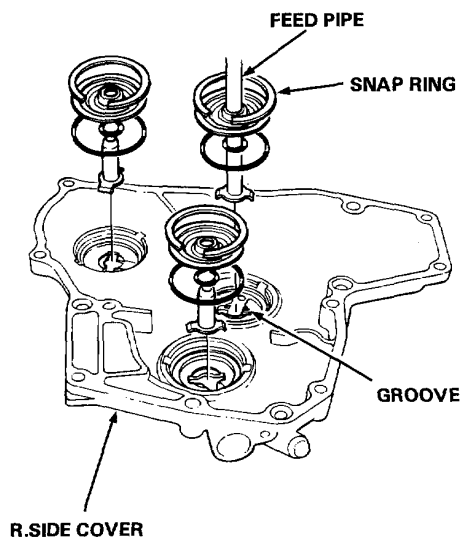
TORQUE: 29 N·m (2.9 kg-m, 21 lb-ft)

46. Install the ATF level gauge.

R. Side Cover

Feed Pipe Installation

1. Install the feed pipes in the R. side cover, aligning the lugs with the grooves in the R. side over.
2. Install the snap rings.

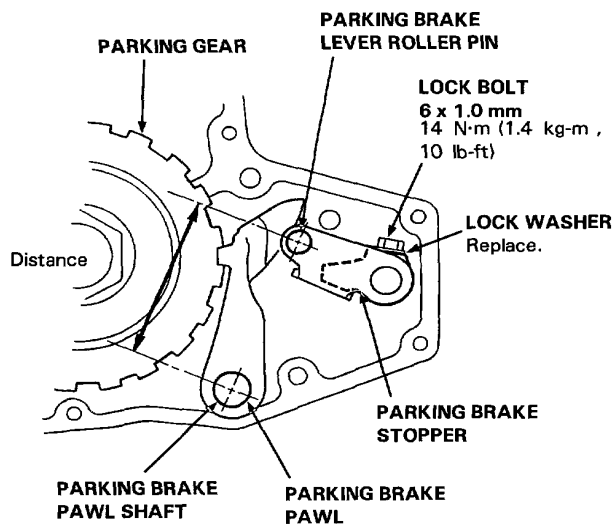


Parking Brake Stopper

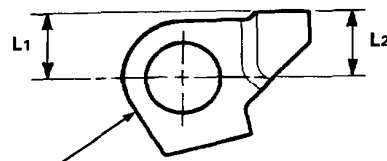
Inspection/Adjustment

1. Set the parking shift arm in the PARK position.
2. Measure the distance between the parking brake pawl and the parking brake lever roller pin as shown.

STANDARD: 64.5—65.5 mm (2.54—2.58 in)



3. If the measurement is out of tolerance, select and install the appropriate parking brake stopper from the table below.



PARKING BRAKE STOPPER

PARKING BRAKE STOPPER

Mark	Part Number	L ₁	L ₂
1	24537-PA9-003	11.00 mm (0.433 in)	11.00 mm (0.433 in)
2	24538-PA9-003	10.80 mm (0.425 in)	10.65 mm (0.419 in)
3	24539-PA9-003	10.60 mm (0.417 in)	10.30 mm (0.406 in)

4. After replacing the parking brake stopper, make sure the distance is within tolerance.



Torque Converter

Disassembly

6 x 1.0 mm
12 N·m (1.2 kg-m , 9 lb-ft)

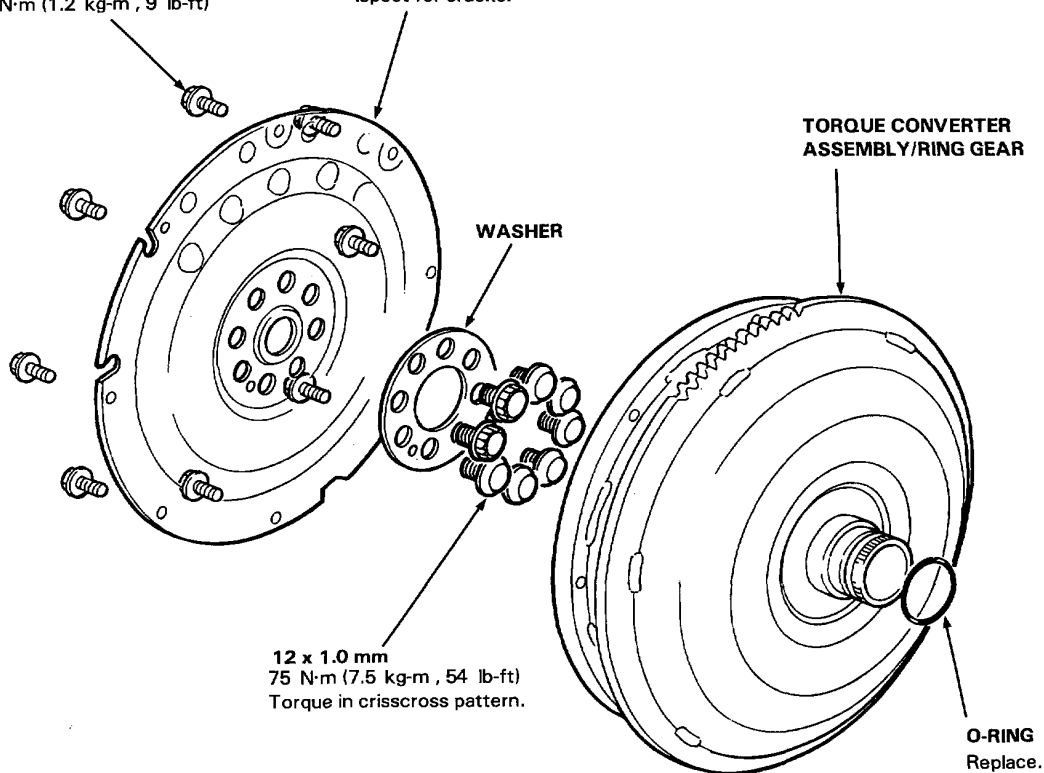
DRIVE PLATE
Inspect for cracks.

WASHER

TORQUE CONVERTER
ASSEMBLY/RING GEAR

12 x 1.0 mm
75 N·m (7.5 kg-m , 54 lb-ft)
Torque in crisscross pattern.

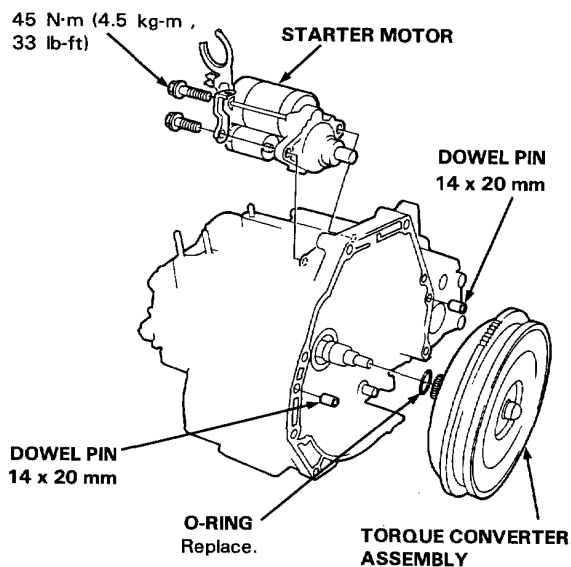
O-RING
Replace.



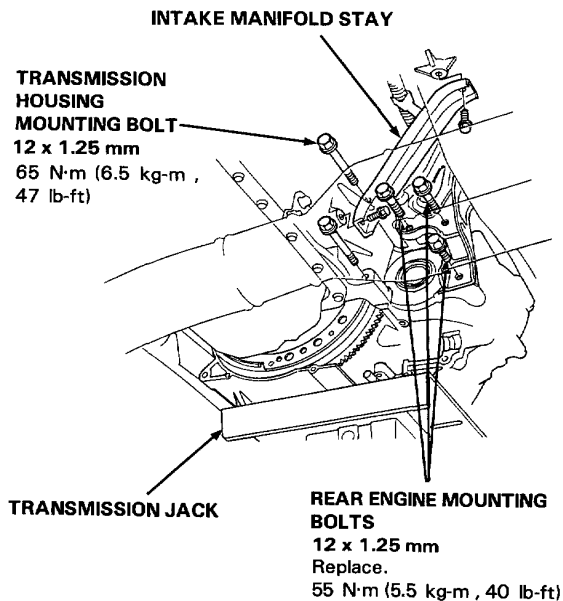
Transmission

Installation

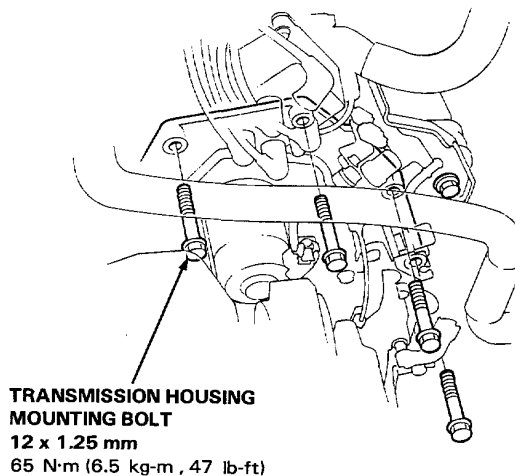
1. Install the starter motor on the torque converter housing, and install the 14 x 20 mm dowel pins in the torque converter housing.



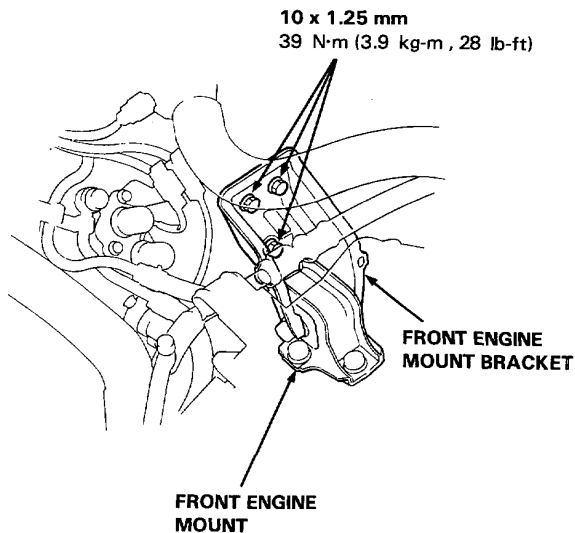
2. Place the transmission on a jack, and raise to the engine level.
3. Attach the transmission on the engine, then install the transmission housing mounting bolts and rear engine mounting bolts.



4. Install the transmission housing mounting bolts.

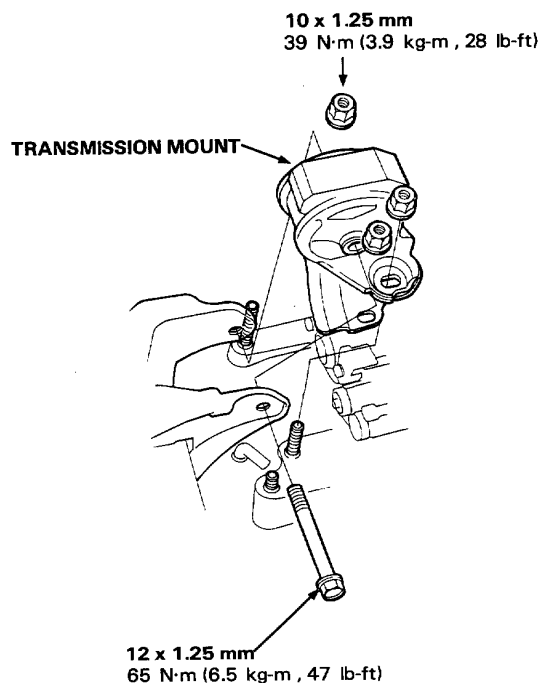


5. Tighten the front engine mount bracket bolts to specified torque.

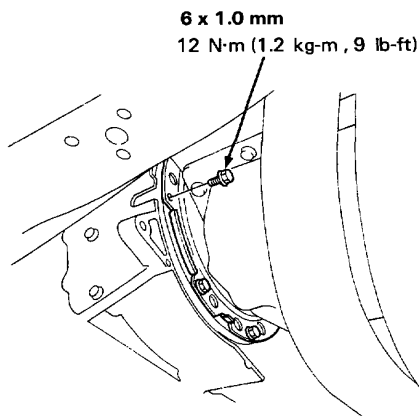




6. Install the transmission mount. Tighten the bolt then tighten the nuts to specified torque, and retighten the bolt to specified torque.



7. Remove the transmission jack.
8. Attach the torque converter to the drive plate with 8 bolts, and torque to 12 N·m (1.2 kg-m, 9 lb-ft). Rotate the crankshaft as necessary to tighten the bolts to 1/2 of the specified torque, then final torque, in a crisscross pattern. Check for free rotation after tightening the last bolt.

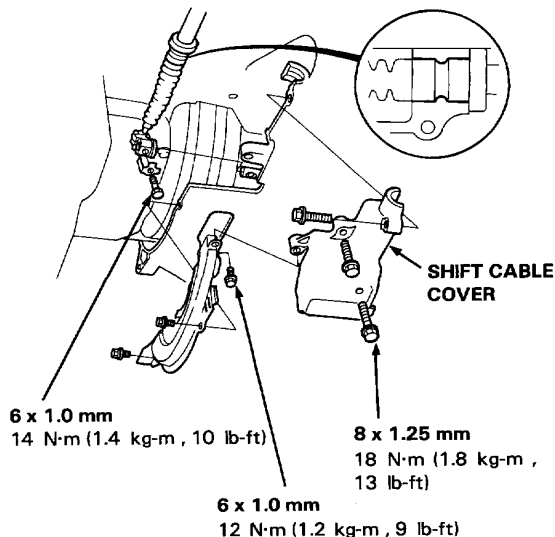


9. Install the shift control lever with the cable on the control shaft.

CAUTION:

Take care not to bend the shift control cable.

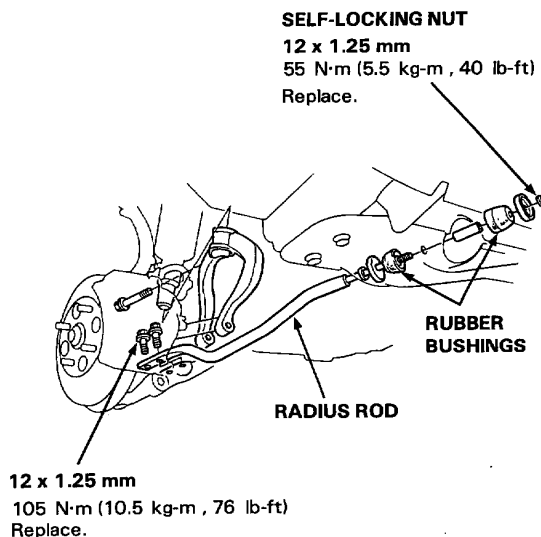
10. Install the torque converter cover and shift cable cover.



11. Install the radius rod.

NOTE:

Check for deterioration or damage of the radius rod rubber bushings.



(cont'd)

Transmission

Installation (cont'd)

12. Install a new set ring on the end of the driveshafts.

13. Install the right and left driveshafts.

NOTE:

Turn the right and left steering knuckles fully outward, and axially into the differential until you feel the spring clip engage the side gear.

14. Install the damper fork. Then install the ball joint to the lower arm. Use new castle nut and cotter pin.

DAMPER PINCH BOLT

10 x 1.25 mm

44 N·m (4.4 kg-m, 32 lb-ft)

Replace.

DAMPER FORK

SELF-LOCKING NUT

12 x 1.25 mm

65 N·m (6.5 kg-m, 47 lb-ft)

Replace.

CASTLE NUT

12 x 1.25 mm

65 N·m (6.5 kg-m, 47 lb-ft)

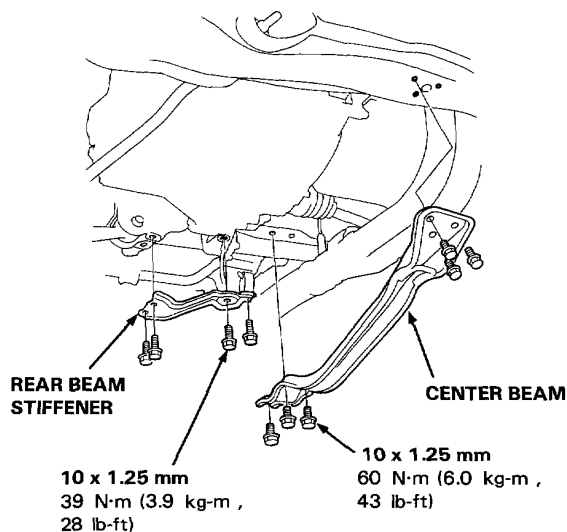
Replace.

COTTER PIN

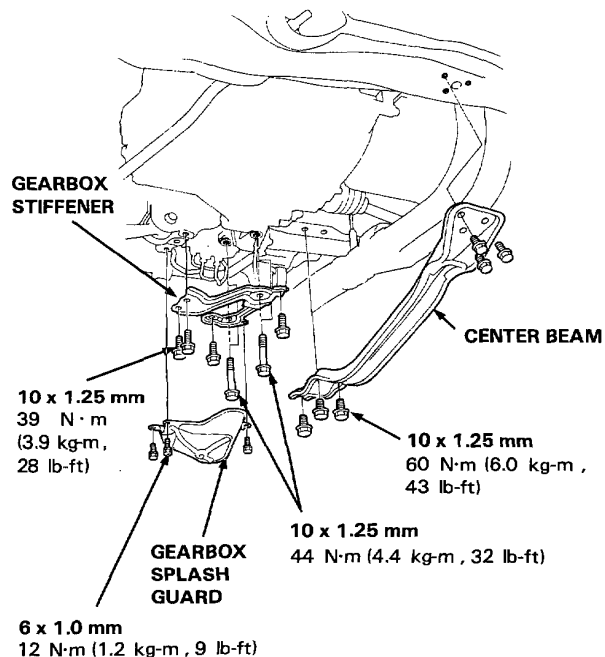
Replace.

15.

- LHD: Install the rear beam stiffener and center beam.

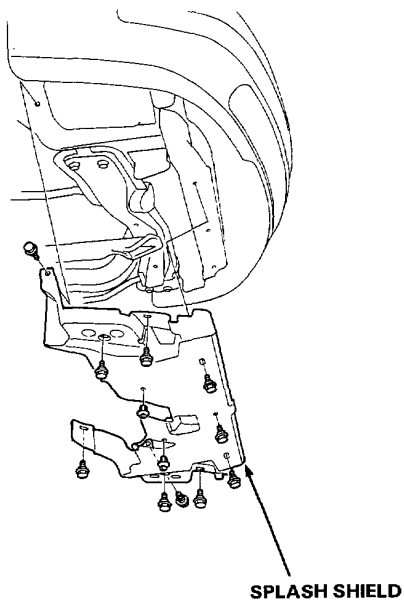


- RHD: Remove the 2 bolts securing the steering gearbox, then install the gearbox stiffener, gearbox splash guard, and center beam.

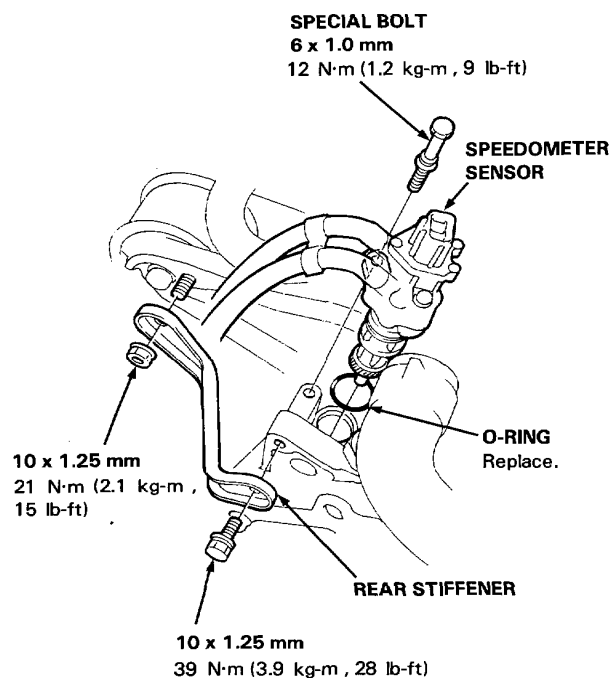




16. Install the splash shield.



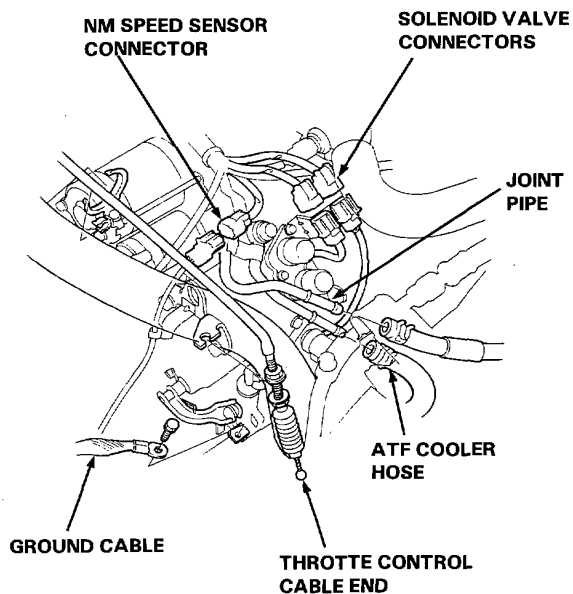
17. Install the speedometer sensor and rear stiffener.



18. Connect the ATF cooler hoses to the joint pipes.

19. Connect the lockup control solenoid and shift control solenoid valve connectors.

20. Connect the NM speed sensor connector.



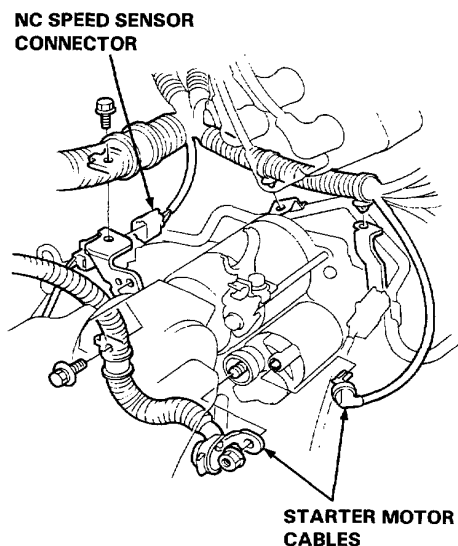
(cont'd)

Transmission

Installation (cont'd)

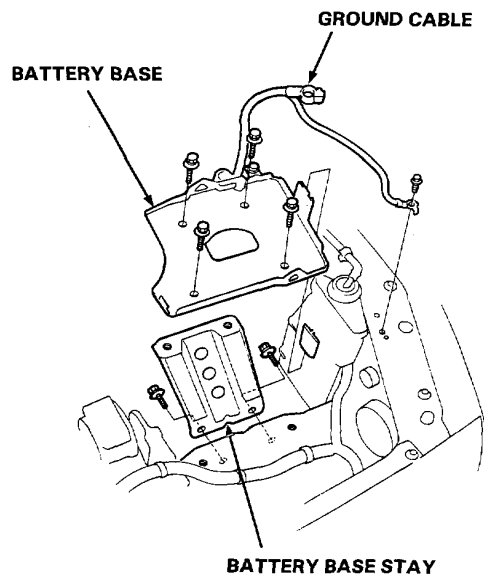
21. Connect the NC speed sensor connector.

22. Connect the starter motor cables.



23. Install the battery base and base stay.

24. Connect the ground cables on the body and transmission.



25. Install the vacuum tank and vacuum tank bracket, then connect the connector.

26. Install the air cleaner case and air intake hose.

27. Refill the transmission with ATF (see page 14-83).

28. Connect the battery positive (+) and negative (-) cables to the battery.

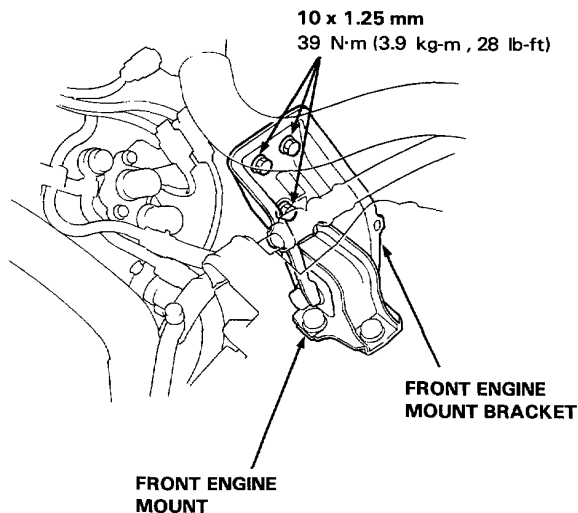
29. Start the engine. Set the parking brake, and shift the transmission through all gears three times. Check for proper shift cable adjustment.

30. Let the engine reach operating temperature with the transmission in Neutral or Park, then turn it off and check fluid level.

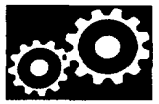
31. Road test as described on pages 14-68 thru 14-74.

32. Reset the radio stations.

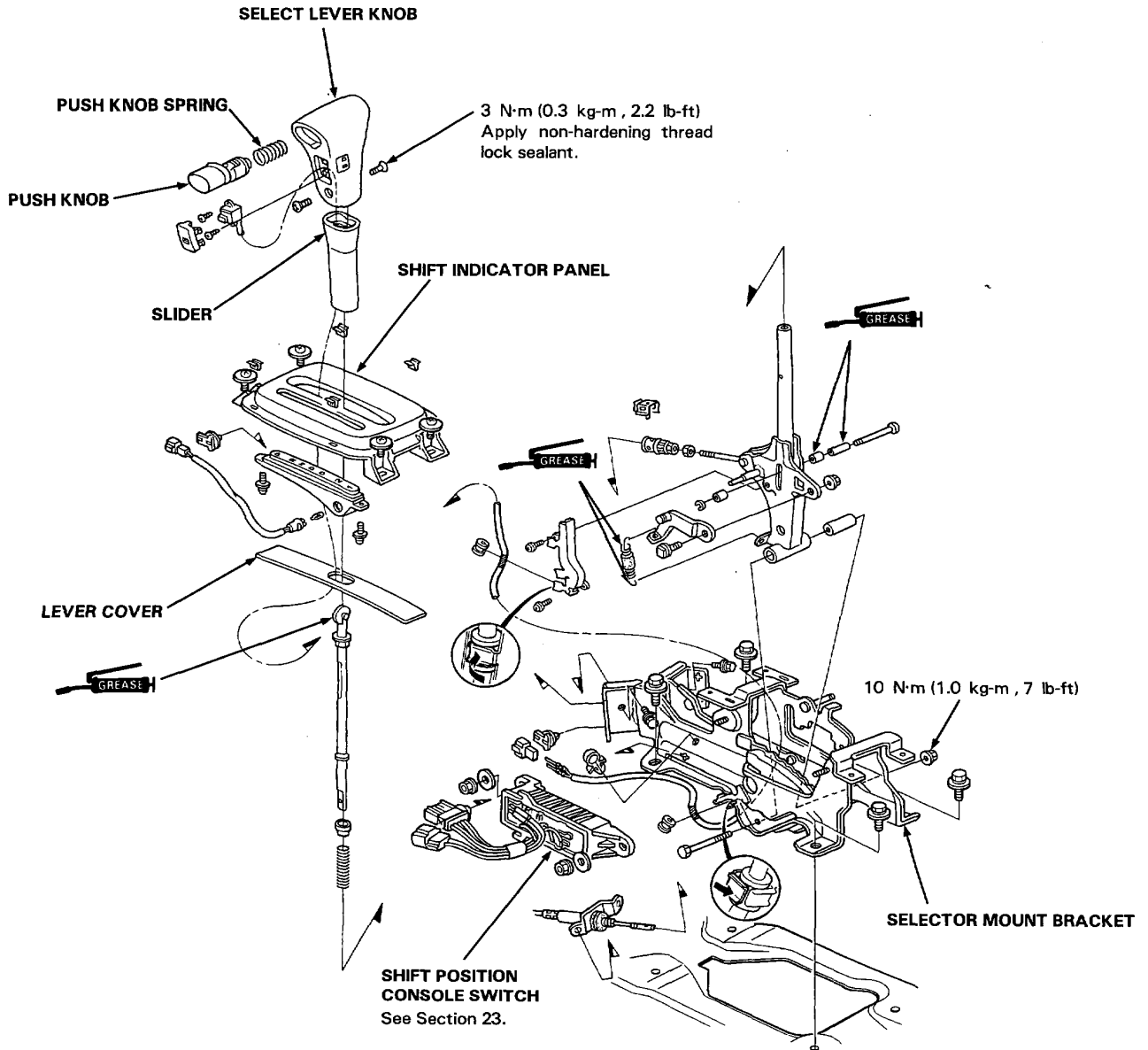
33. Loosen the front engine mount bracket bolts after the road test, and retighten them to specified torque.



Gearshift Selector



NOTE: LHD is shown; RHD is symmetrical.



Shift Indicator Panel

Adjustment

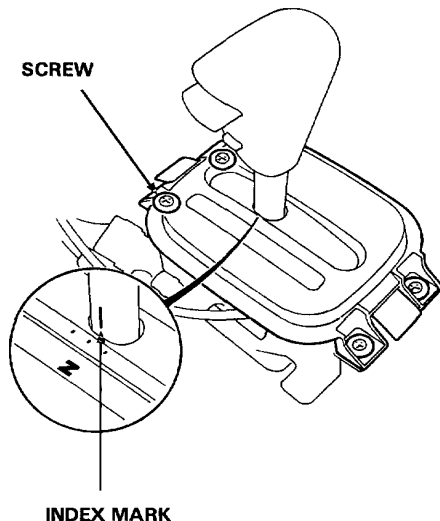
NOTE:

LHD is shown; RHD is similar.

1. With the transmission in NEUTRAL, check that the index mark of the indicator aligns with the N mark of the shift indicator panel.
2. If not aligned, remove the front console (see Section 20).
3. Remove the shift indicator panel mounting screws, and adjust by moving the panel.

NOTE:

Whenever the shift indicator panel is removed, reinstall the panel as described above.



Shift Cable

Removal/Installation

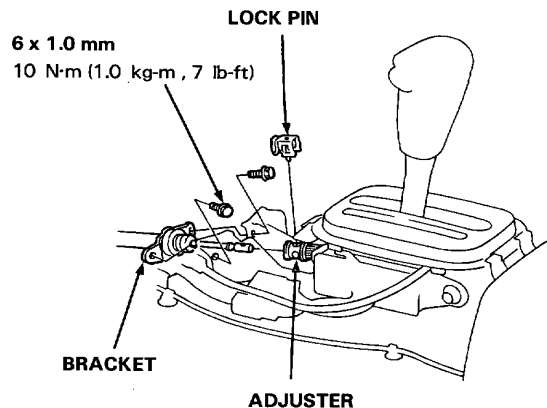
⚠ WARNING

- Make sure lifts, jacks and safety stands are placed properly, and hoist brackets are attached to the correct position on the engine (see Section 1).
- Apply parking brake and block rear wheels, so car will not roll off stands and fall on you while working under it.

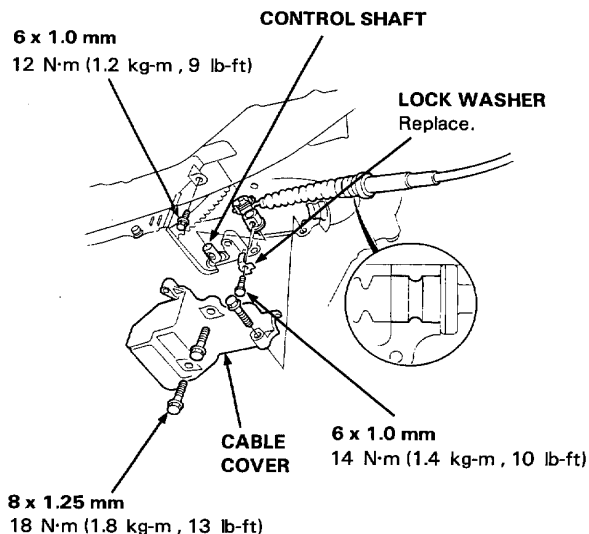
NOTE:

LHD is shown; RHD is similar.

1. Remove the front console (see Section 20).
2. Shift to **N** position, then remove the lock pin from the cable adjuster.
3. Remove the bolts securing the bracket.

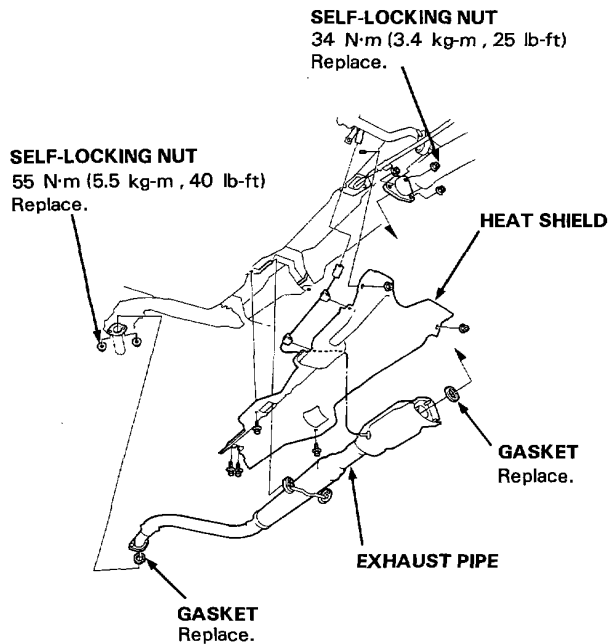


4. Remove the cable cover.
5. Remove the lock bolt securing the control lever, then remove the control lever with the shift cable.

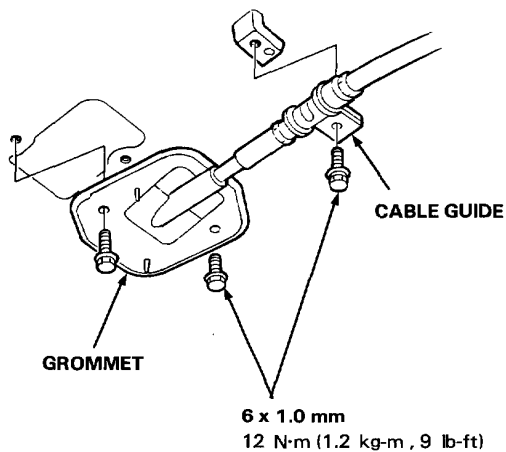




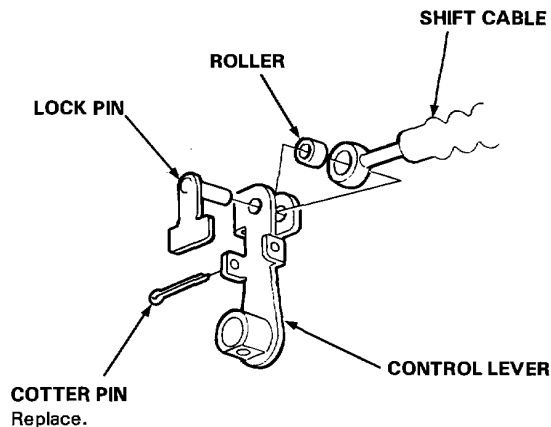
6. Remove the exhaust pipe A/B and heat shield.



7. Remove the cable guide and grommet.



8. Remove the cotter pin and lock pin, then separate the control lever from the shift cable.



9. Install the shift cable in the reverse order of removal.
10. Check the cable adjustment after installing the shift cable (see page 14-150).

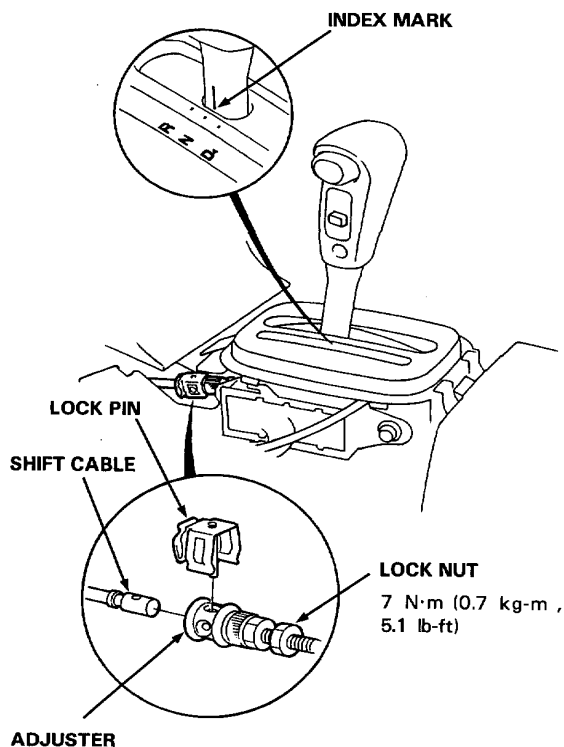
Shift Cable

Adjustment

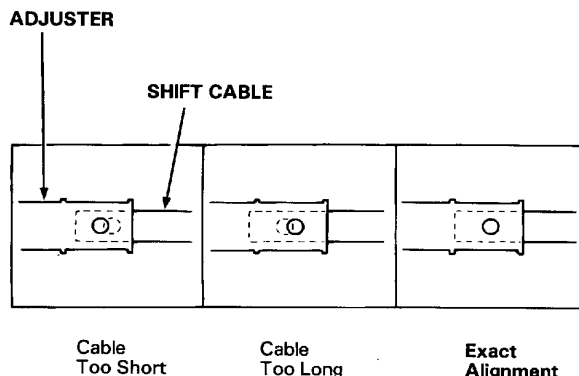
NOTE:

LHD is shown; RHD is similar.

1. Start the engine. Shift to reverse to see if the reverse gear engages. If not, refer to Troubleshooting on page 14-64 thru 67.
2. With the engine off, remove the front console (see Section 20).
3. Shift to **N** position, then remove the lock pin from the cable adjuster.



4. Check that the hole in the adjuster is perfectly aligned with the hole in the shift cable.



NOTE:

There are two holes in the end of the shift cable. They are positioned 90° apart to allow cable adjustments in 1/4 turn increments.

5. If not perfectly aligned, loosen the locknut on the shift cable, and adjust as required.
6. Tighten the locknut.
7. Install the lock pin on the adjuster.

NOTE:

If you feel the lock pin binding as you reinstall it, the cable is still out of adjustment and must be readjusted.

8. Start the engine and check the shift lever in all gears. If any gear does not work properly, refer to troubleshooting on page 14-64 thru 67.



Throttle Control Cable

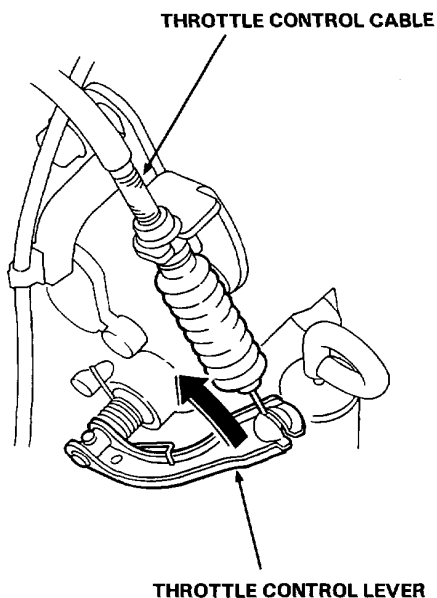
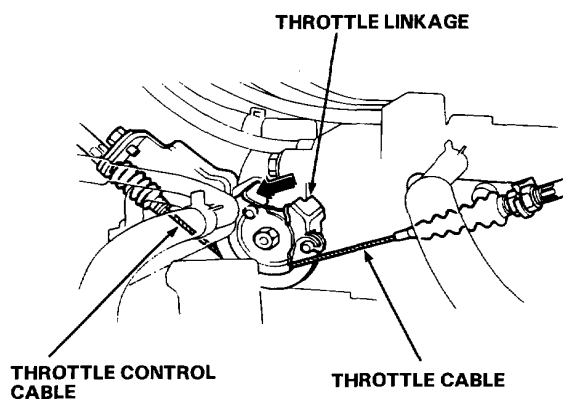
Inspection

NOTE:

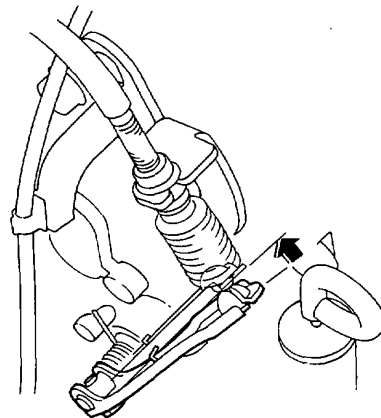
Before inspecting the throttle control cable, make sure that:

- Throttle cable free play is correct (see Section 11).
- Idle speed is correct (see Section 11).
- You warm up the engine to normal operating temperature (cooling fan comes on).

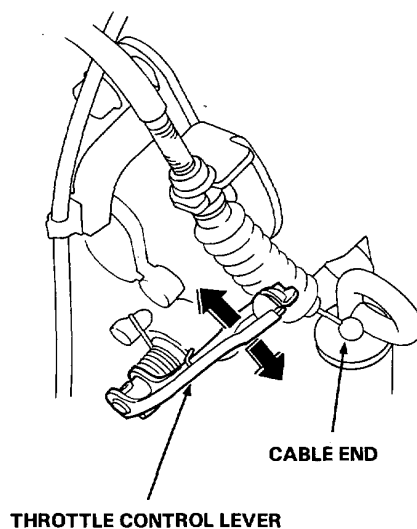
1. Verify that the throttle control lever is synchronized with the throttle linkage while depressing and releasing the accelerator pedal.
2. If the throttle control lever is not synchronized with the throttle linkage, adjust the throttle control cable.



3. Check that there is play in the throttle control lever while depressing the accelerator pedal to the full-throttle position.



4. Remove the cable end of the throttle control cable from the throttle control lever.
5. Check that the throttle control lever moves smoothly.



Throttle Control Cable

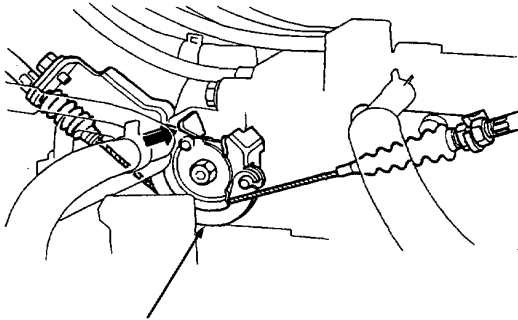
Adjustment

NOTE:

Before adjusting the throttle control cable, make sure that:

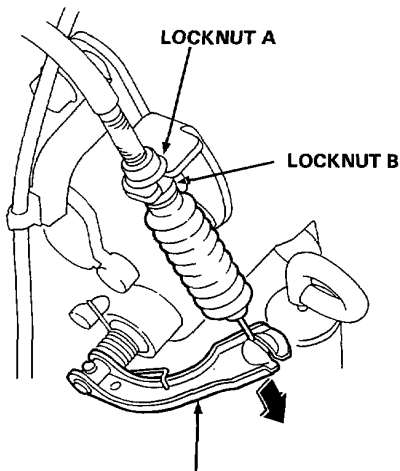
- Throttle cable free play is correct (see Section 11).
- Idle speed is correct (see Section 11).
- You warm up the engine to normal operating temperature (cooling fan comes on).

1. Verify that the throttle linkage is in the fully-closed position.



THROTTLE LINKAGE

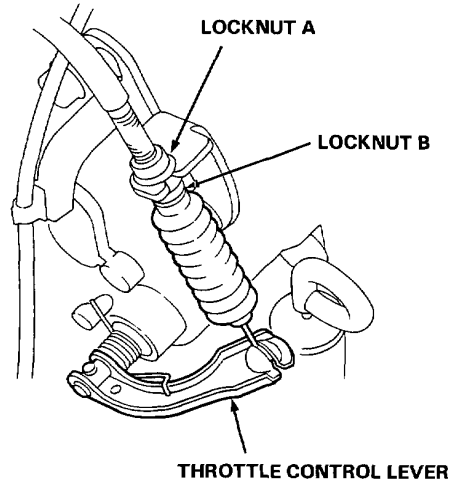
2. Loosen the locknut on the throttle control cable at the throttle control lever.
3. Remove the free play in the throttle control cable with the locknut, while pushing the throttle control lever to the fully-closed position as shown.



THROTTLE CONTROL LEVER

Push in this direction.

4. Tighten the locknut.



5. After tightening the locknuts, inspect the synchronization and throttle control lever movement.

NOTE:

To tailor the shift/lockup characteristics to a particular customer's driving expectations, you can adjust the control cable up to 2mm (0.078 in) shorter than the "synchronized" point.

Differential

Manual Transmission	15-1
Automatic Transmission	15-10



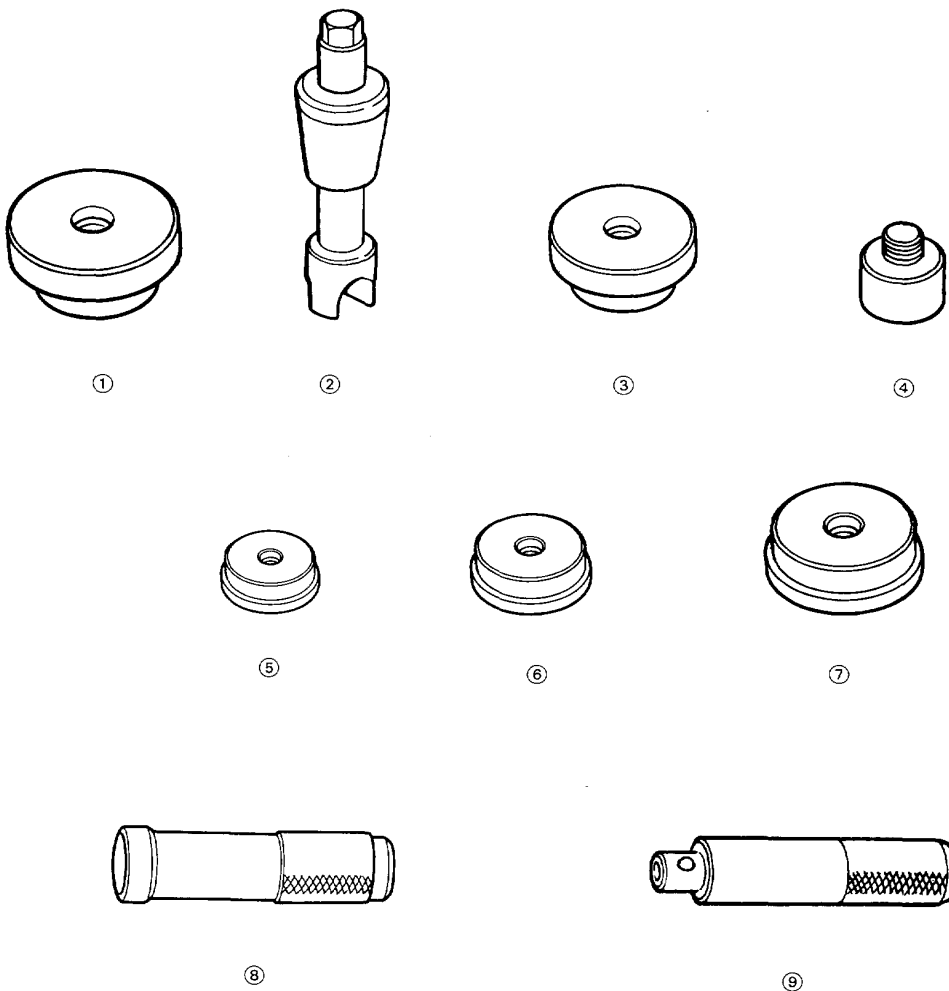
Differential (Manual Transmission)

Special Tools	15-2
Illustrated Index	15-3
Backlash Inspection	15-4
Ring Gear Replacement	15-4
Bearing Replacement	15-5
Oil Seal Removal	15-5
Bearing Outer Race Replacement	15-6
Tapered Roller Bearing Preload Adjustment	15-7
Oil Seal Installation	15-9



Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAD—PG40100	Oil Seal Driver	1	15-9
②	07HAJ—PK40201	Preload Inspection Tool	1	15-7
③	07JAD—PH80101	Oil Seal Driver	1	15-9
④	07JAD—PH80400	Pilot Driver, 28 x 30 mm	1	15-9
⑤	07746—0010400	Outer Driver, 52 x 55 mm	1	15-6
⑥	07746—0010500	Outer Driver, 62 x 68 mm	1	15-6
⑦	07746—0010600	Outer Driver, 72 x 75 mm	1	15-6
⑧	07746—0030100	Inner Handle C	1	15-5
⑨	07749—0010000	Outer Handle A	1	15-6, 9

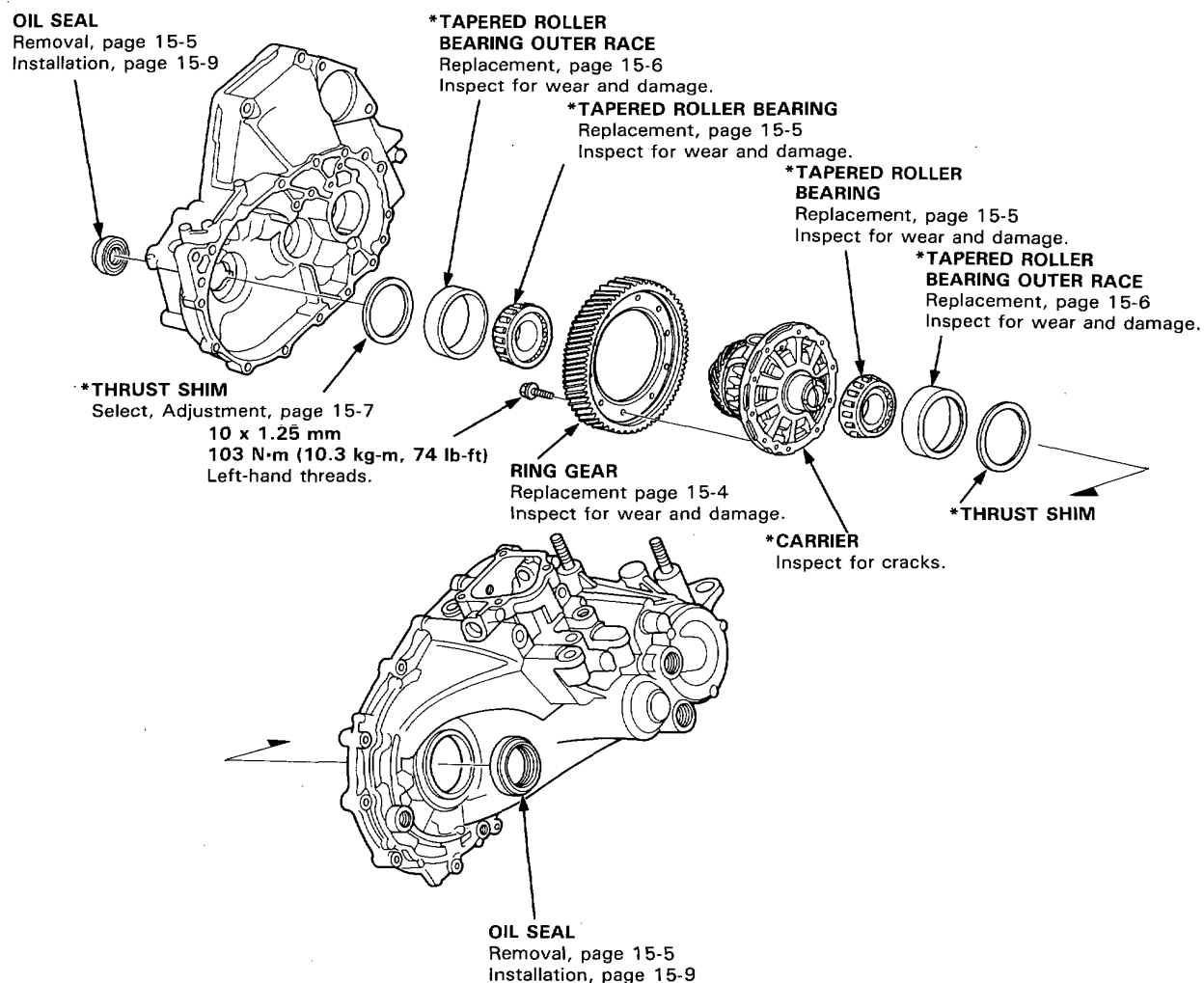




Differential (Manual Transmission)

Illustrated Index

NOTE: If the * mark parts were replaced, the bearing preload must be adjusted (page 15-9).

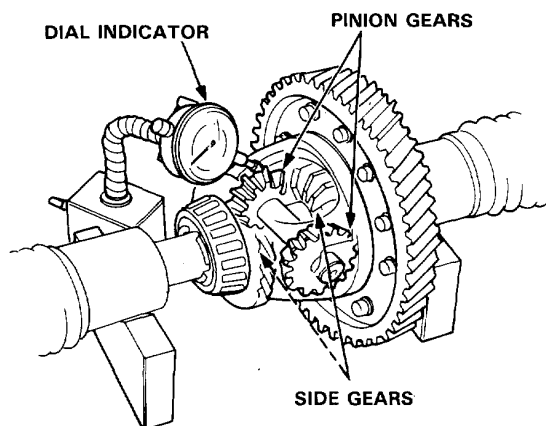


Differential (Manual Transmission)

Backlash Inspection

1. Place differential assembly on V-blocks and install both axles.
2. Check backlash of both pinion gears.

**Standard (New): 0.05—0.15 mm
(0.002—0.006 in)**

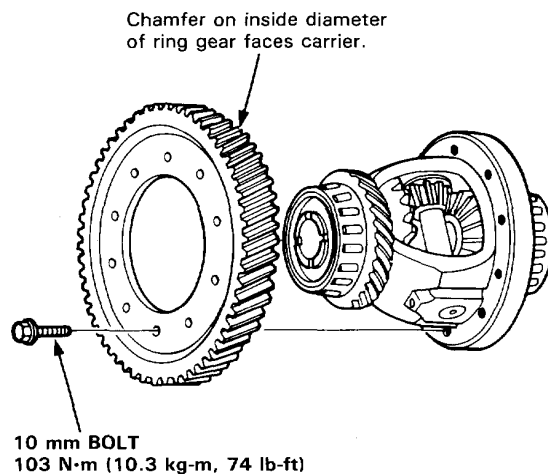


3. If the backlash is not within the standard, replace the differential carrier assembly.

Ring Gear Replacement

1. Remove the ring gear from the differential carrier.

NOTE: The ring gear bolts has left-hand threads.



2. Install the ring gear.

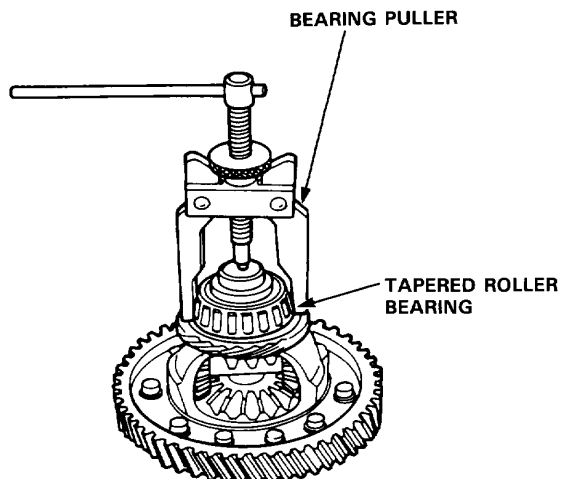


Bearing Replacement

NOTE:

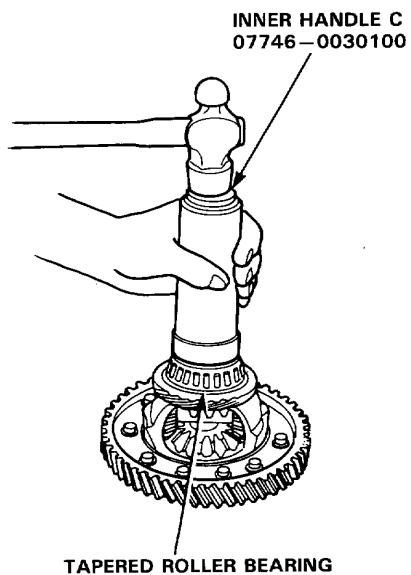
- The bearing and outer race should be replaced as a set.
- Inspect and adjust the bearing preload whenever the bearing is replaced.
- Check bearings for wear and rough rotation. If bearings are OK, removal is not necessary.

1. Remove bearings using a standard bearing puller.



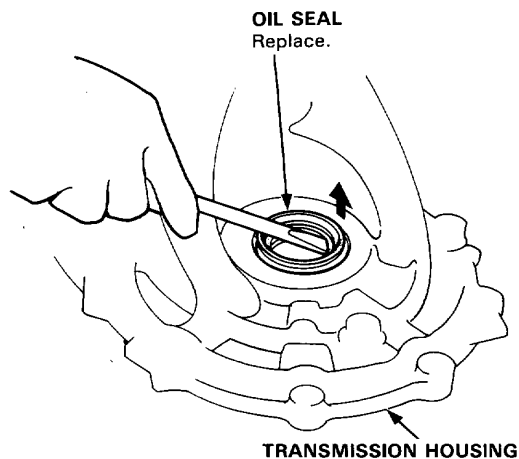
2. Install new bearings using the special tool.

NOTE: Drive the bearings on until they bottom against the carrier.

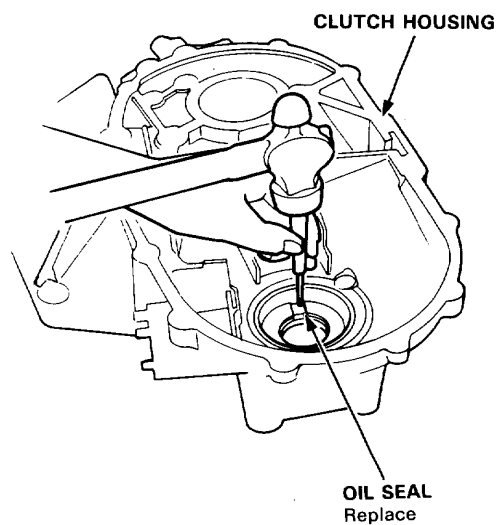


Oil Seal Removal

1. Remove the differential assembly.
2. Remove the oil seal from the transmission housing.



3. Remove the oil seal from the clutch housing.



Differential (Manual Transmission)

Bearing Outer Race Replacement

NOTE:

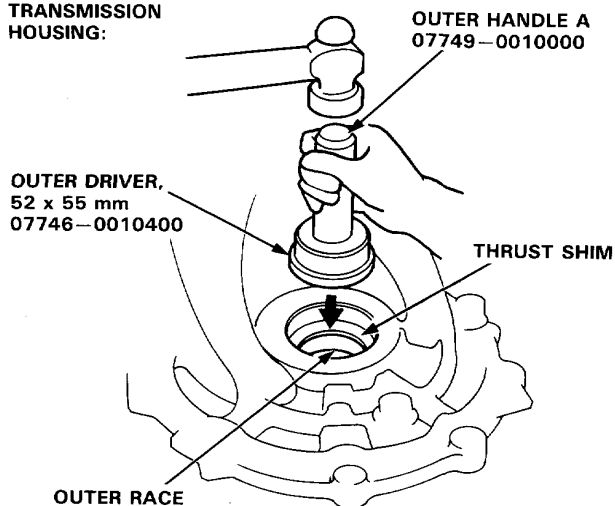
- The outer race and bearing should be replaced as a set.
- Inspect and adjust the bearing preload whenever the bearing is replaced.

1. Remove the oil seals from the transmission housing and clutch housing (page 15-5).
2. Drive the bearing outer race and thrust shim out of the transmission housing, or remove the outer race and shim from the transmission housing by heating the housing to about 100°C (212°F) with a heat gun.

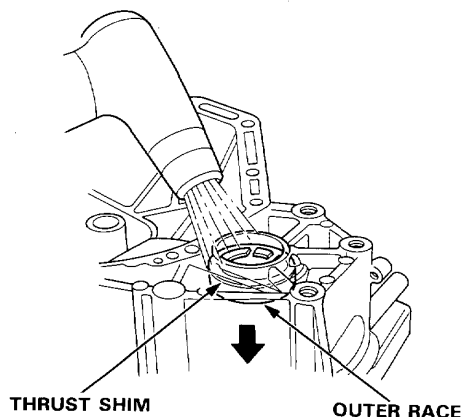
CAUTION: Do not reuse the thrust shim if the outer race was driven out.

NOTE: Do not heat the transmission housing in excess of 100°C (212°F).

TRANSMISSION HOUSING:



CLUTCH HOUSING:

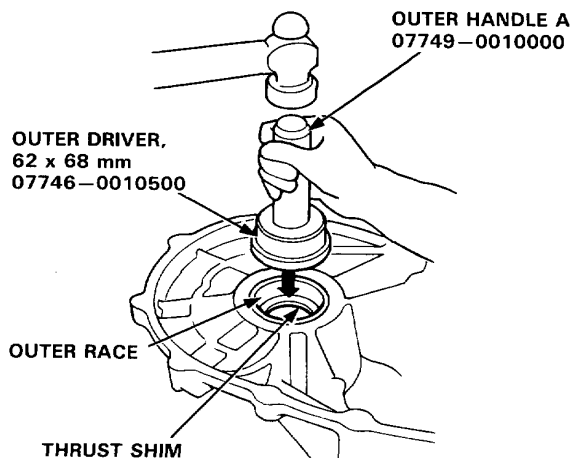


3. After installing the shim, install an outer race in the transmission housing and clutch housing.

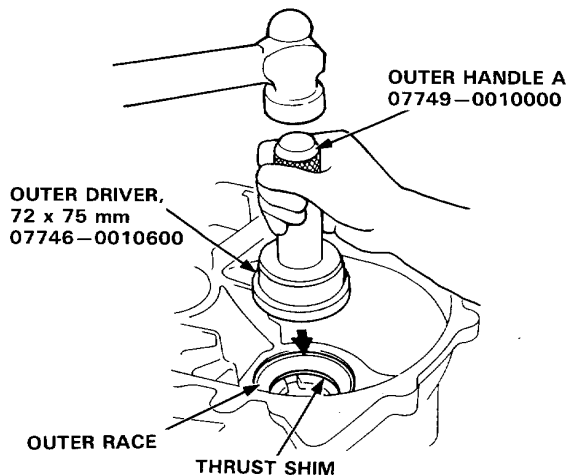
NOTE:

- Install the outer race squarely.
- Check that there is no clearance between the outer race, shim, and transmission housing.

TRANSMISSION HOUSING:



CLUTCH HOUSING:



4. Install the oil seal (page 15-9).



Tapered Roller Bearing Preload Adjustment

NOTE: If any of the items listed below were replaced, the bearing preload must be adjusted.

- Transmission housing
- Clutch housing
- Carrier
- Tapered roller bearing and outer race
- Thrust shim

1. Remove the bearing outer race and thrust shim from the transmission housing (page 15-6).

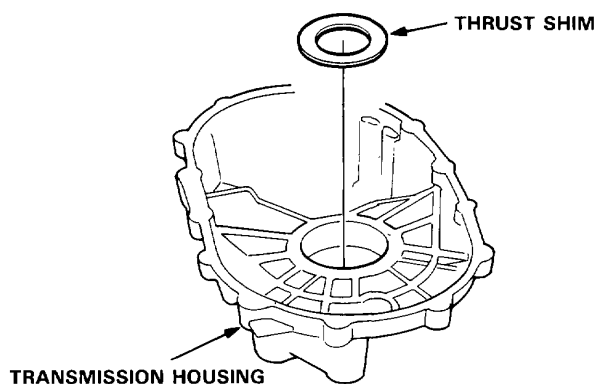
NOTE: Install the thrust shim only on the transmission housing side.

CAUTION: Do not reuse the thrust shim if the outer race was driven out.

NOTE: Let the transmission cool to the room temperature if the outer race was removed by heating the case before adjusting the bearing preload.

2. First try the thrust shim that was removed.

CAUTION: Do not use more than one shim to adjust the bearing preload.



3. After installing the shim, install the outer race in the transmission housing (page 15-6).

NOTE:

- Install the outer race squarely.
- Check that there is no clearance between the outer race, shim and transmission housing.

4. With the mainshaft and countershaft removed, install the differential assembly, and torque the clutch and transmission housing.

TORQUE: 10 x 1.25 mm: 45 N·m
(4.5 kg-m, 33 lb-ft)
8 x 1.25 mm: 28 N·m
(2.8 kg-m, 20 lb-ft)

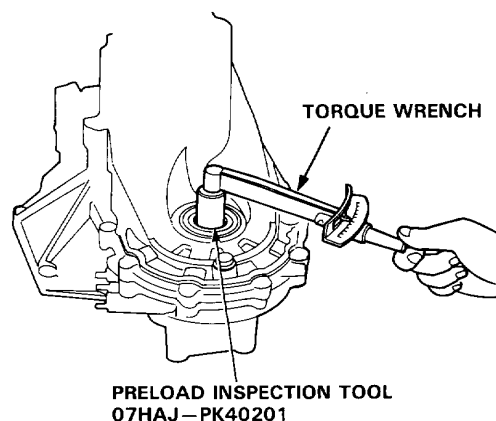
NOTE: It is not necessary to use sealing agent between the housings.

5. Rotate the differential assembly in both directions to seat the bearing.
6. Measure the starting torque of the differential assembly with the Preload Inspection Tool and a torque wrench.

STANDARD: 1.4–2.6 N·m
(14–26 kg-cm, 12–23 lb-in)

NOTE:

- Measure the preload at normal room temperature.
- Measure the preload in both directions.



(cont'd)

Differential (Manual Transmission)

Tapered Roller Bearing Preload Adjustment (cont'd)

7. If the bearing preload is beyond the standard, select the shim which will give the correct preload from the following table.

NOTE: Changing the shim to the next size will increase or decrease preload about 3–4 kg-cm (2.60–3.47 lb-in).

	Part Number	Thickness
A	41381-PX5-000	1.90 mm (0.075 in)
B	41382-PX5-000	1.93 mm (0.076 in)
C	41383-PX5-000	1.96 mm (0.077 in)
D	41384-PX5-000	1.99 mm (0.078 in)
E	41385-PX5-000	2.02 mm (0.079 in)
F	41386-PX5-000	2.05 mm (0.081 in)
G	41387-PX5-000	2.08 mm (0.082 in)
H	41388-PX5-000	2.11 mm (0.083 in)
I	41389-PX5-000	2.14 mm (0.084 in)
J	41390-PX5-000	2.17 mm (0.085 in)
K	41391-PX5-000	2.20 mm (0.087 in)
L	41392-PX5-000	2.23 mm (0.088 in)
M	41393-PX5-000	2.26 mm (0.089 in)
N	41394-PX5-000	2.29 mm (0.090 in)
O	41395-PX5-000	2.32 mm (0.091 in)
P	41396-PX5-000	2.35 mm (0.092 in)
Q	41397-PX5-000	2.38 mm (0.094 in)
R	41398-PX5-000	2.41 mm (0.095 in)
S	41399-PX5-000	2.44 mm (0.096 in)
T	41400-PX5-000	2.47 mm (0.097 in)

8. Recheck the bearing preload.

9. How to select the correct shim:

- 1) Compare the preload you get with the thrust shim that was removed, with the specified preload of 14–26 kg-cm (12–19 lb-in).
- 2) If your measured preload is less than specified, subtract your's from the specified. If your's is more than specified, subtract the specified from your measurement.

For example with a 2.17 mm shim:

$$\begin{array}{rcl} \textcircled{A} \text{ specified} & 26 \text{ kg-cm (23 lb-in)} & \\ - \text{you measure} & 6 \text{ kg-cm (5 lb-in)} & \\ \hline & 20 \text{ kg-cm (18 lb-in) less} & \end{array}$$

$$\begin{array}{rcl} \textcircled{B} \text{ you measure} & 34 \text{ kg-cm (30 lb-in)} & \\ - \text{specified} & 26 \text{ kg-cm (23 lb-in)} & \\ \hline & 8 \text{ kg-cm (7 lb-in) more} & \end{array}$$

- 3) Each shim size up or down from standard makes about 3–4 kg-cm (2.60–3.47 lb-in) difference in preload.
- In example A, your measured preload was 20 kg-cm less than standard so you need a shim five sizes thicker than standard (try the 2.32 mm shim, and recheck).
- In example B, your's was 8 kg-cm more than standard, so you need a shim two sizes thinner (try the 2.11 mm shim, and recheck).

10. After adjusting the preload, assemble the transmission and install the transmission housing (page 13-31).

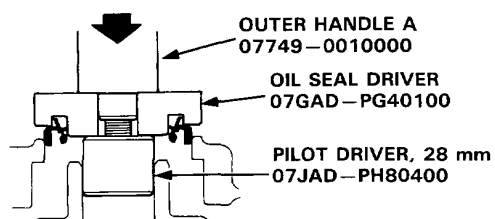
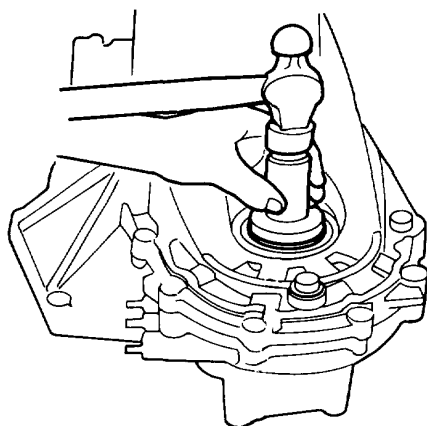
TORQUE: 10 x 1.25 mm: 45 N·m
(4.5 kg-m, 33 lb-ft)
8 x 1.25 mm: 28 N·m
(2.8 kg-m, 20 lb-ft)

11. Rotate the differential assembly in both directions to seat the bearings.

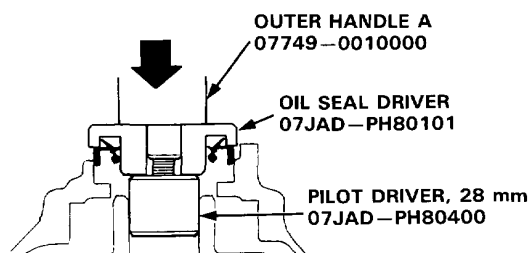
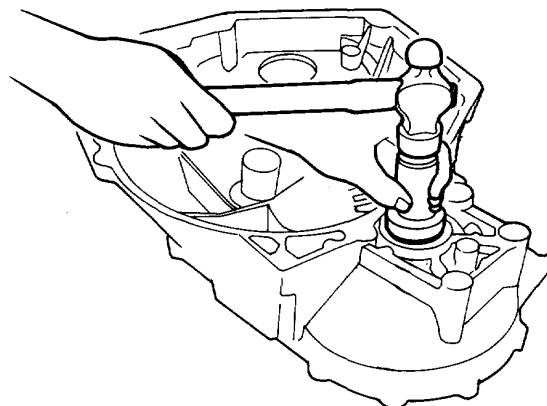


Oil Seal Installation

1. Install the new oil seal flush with the transmission housing using the special tools.



2. Install the new oil seal into the clutch housing using the special tools.



Differential (Automatic Transmission)

Special Tools	15-12
Illustrated Index	15-13
Backlash Inspection	15-14
Bearing Replacement	15-14
Differential Carrier/Ring Gear Replacement	15-15
Oil Seal Removal	15-15
Tapered Roller Bearing Preload Adjustment	15-16
Bearing Outer Race Replacement	15-18
Oil Seal Installation	15-18

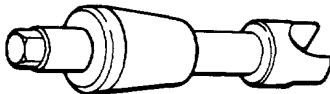


Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAD—SD40101 or 07GAD—SD40100	Driver Attachment	1	15-18
②	07HAJ—PK40201	Preload Inspection Tool	1	15-17
③	07HAD—SF10100	Driver Attachment	1	15-17
④	07JAD—PH80101	Driver Attachment	1	15-18
⑤	07JAD—PH80400	Pilot Driver 28 x 30 mm	1	15-18
⑥	07LAD—PW50601	Attachment, 40 x 50 mm	1	15-14
⑦	07749—0010000	Driver	1	15-17, 18
⑧	07965—SD40200	Driver Attachment	1	15-18



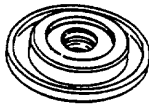
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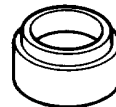
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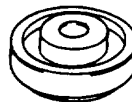
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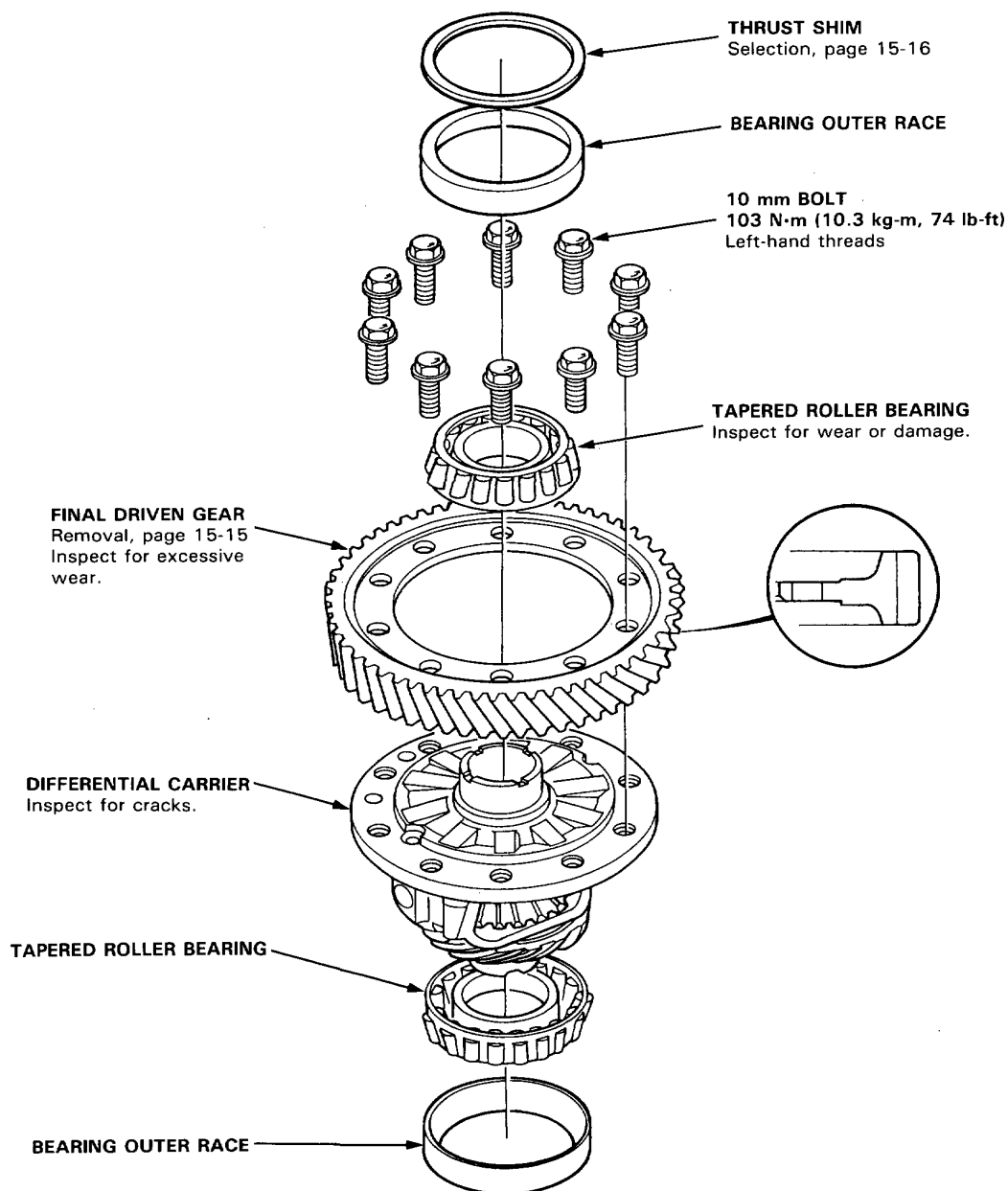


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Differential (Automatic Transmission)

Illustrated Index

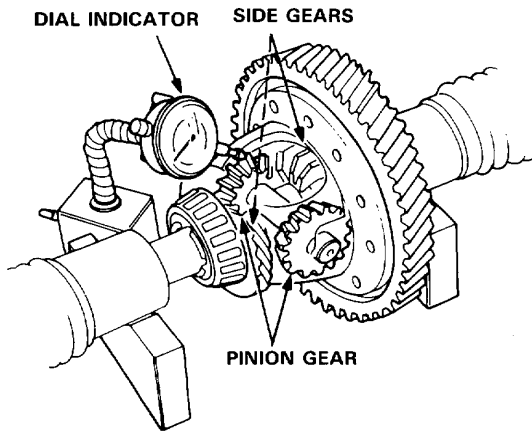


Differential (Automatic Transmission)

Backlash Inspection

1. Place differential assembly on V-blocks and install both axles.
2. Check backlash of both side gears.

Standard (New): 0.08–0.15 mm
(0.003–0.006 in.)

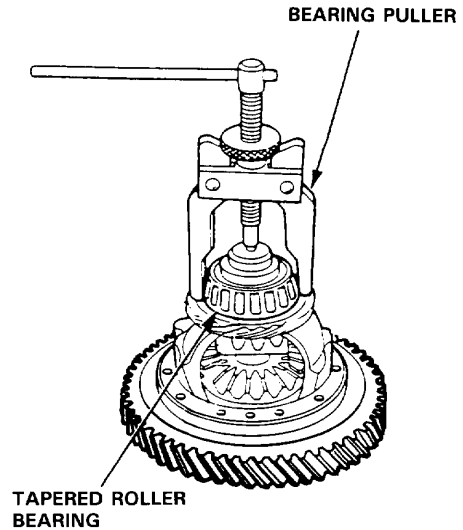


3. If the backlash is out of tolerance, replace the differential carrier assembly.

Bearing Replacement

NOTE: Check bearings for wear and rough rotation. If bearings are OK, removal is not necessary.

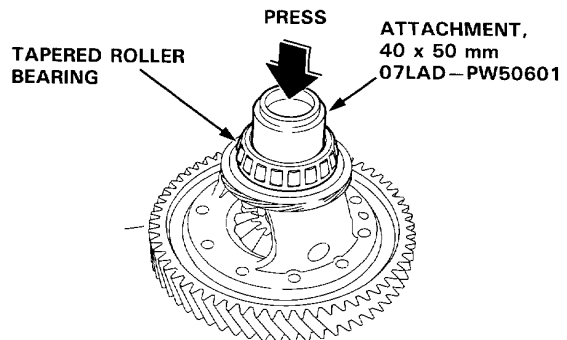
1. Remove bearings using a standard bearing puller.



2. Install new bearings using the special tool as shown.

NOTE:

- Install the bearings on until they bottom.
- Use the special tool:
 - Large end for torque converter housing side bearing.
 - Small end for transmission housing side bearing.



NOTE:

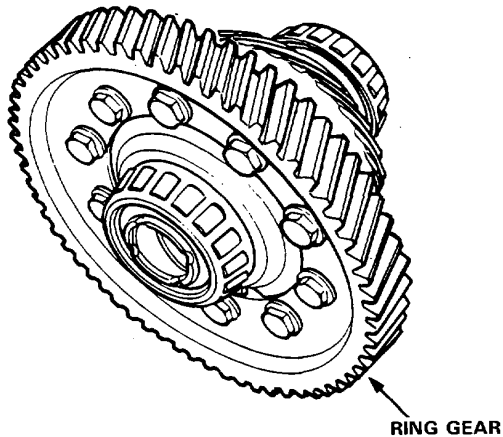
- The bearing and outer race should be replaced as a set.
- Inspect and adjust the bearing preload whenever a bearing is replaced.
- Drive in the bearings securely so that there is no clearance between the bearings and differential carrier.



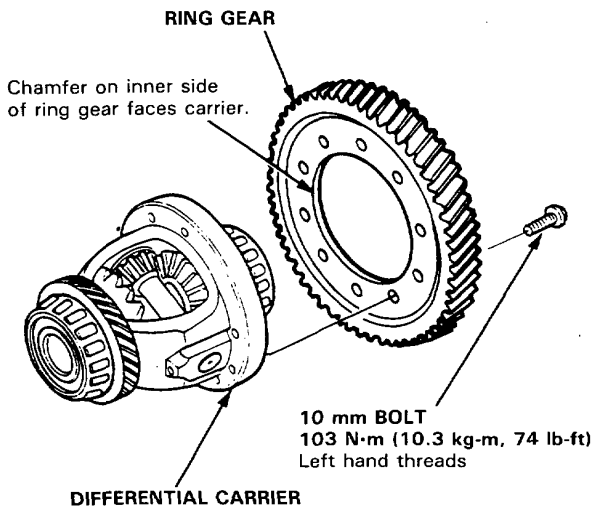
Differential carrier/Ring Gear Replacement

1. Remove the ring gear from the differential carrier.

CAUTION: The ring gear bolts have left-hand threads.

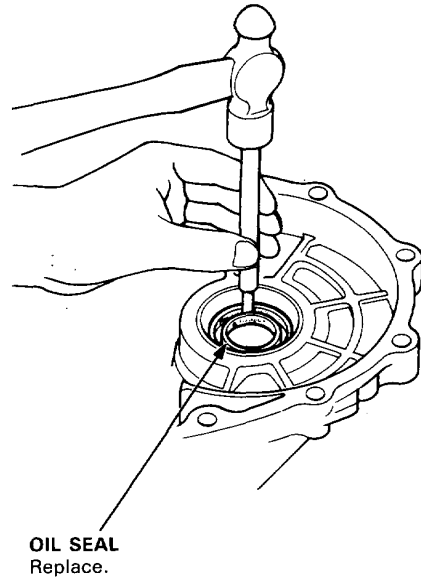


2. Install the ring gear on the differential carrier, then torque the bolts to 103 N·m (10.3 kg-m, 74 lb-ft).

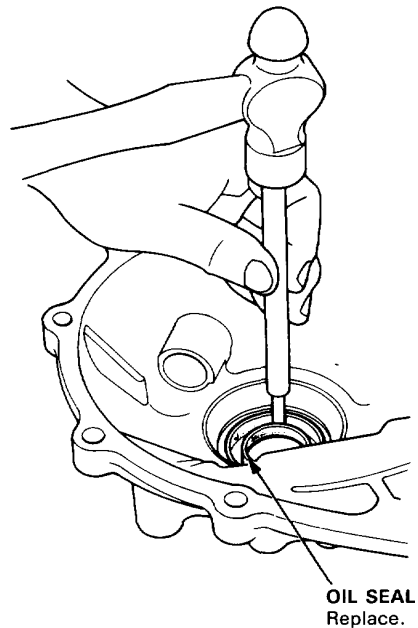


Oil Seal Removal

1. Remove the differential assembly.
2. Remove the oil seal from the transmission housing.



3. Remove the oil seal from the torque converter housing.



Differential (Automatic Transmission)

Tapered Roller Bearing Preload Adjustment

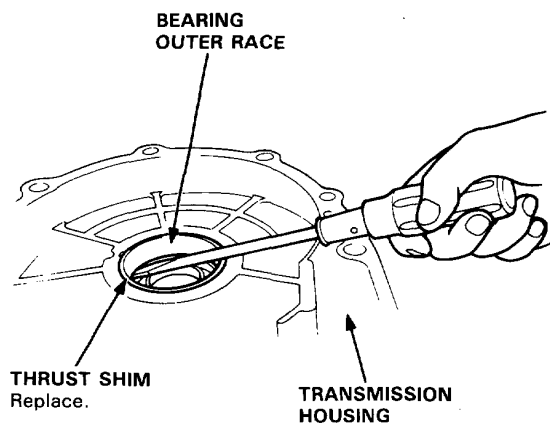
NOTE: If the transmission housing, torque converter housing, differential case, bearing, outer race or thrust shim were replaced, the bearing preload must be adjusted.

1. Remove the bearing outer race and thrust shim from the transmission housing by prying or remove the outer race from the transmission housing by heating the housing to about 100°C (212°F) with a heat gun.

CAUTION:

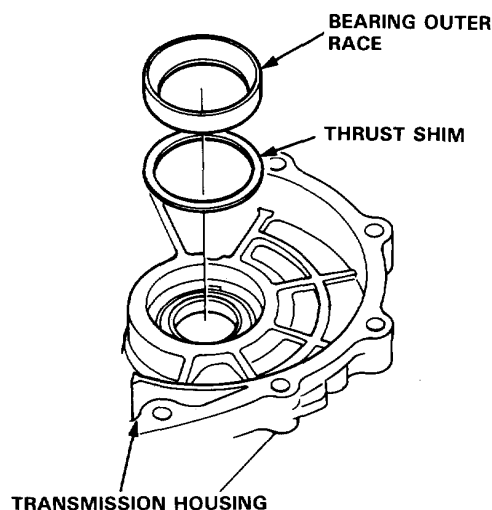
- Do not heat the case in excess of 100°C (212°F).
- Replace the thrust shim with a new one if it is pried out.
- Replace the bearing when the outer race is to be replaced.
- Do not use shim on the torque converter housing side.

NOTE: Let the transmission housing cool to the room temperature before adjusting the bearing preload.



2. Select the thrust shim from the table below so that their total thickness is 2.60 mm (0.102 in).

CAUTION: Do not use more than two shims to adjust the bearing preload.



3. Thrust Shim Table

	Part Number	Thickness
A	41441-PK4-000	2.20 mm (0.087 in)
B	41442-PK4-000	2.25 mm (0.089 in)
C	41443-PK4-000	2.30 mm (0.091 in)
D	41444-PK4-000	2.35 mm (0.093 in)
E	41445-PK4-000	2.40 mm (0.094 in)
F	41446-PK4-000	2.45 mm (0.096 in)
G	41447-PK4-000	2.50 mm (0.098 in)
H	41448-PK4-000	2.55 mm (0.100 in)
*I	41449-PK4-000	2.60 mm (0.102 in)
J	41450-PK4-000	2.65 mm (0.104 in)
K	41451-PK4-000	2.70 mm (0.106 in)
L	41452-PK4-000	2.75 mm (0.108 in)
M	41453-PK4-000	2.80 mm (0.110 in)
N	41454-PK4-000	2.85 mm (0.112 in)
O	41456-PK4-000	2.90 mm (0.114 in)
P	41455-PK4-000	2.95 mm (0.116 in)
Q	41457-PK4-000	3.00 mm (0.118 in)
R	41458-PK4-000	3.05 mm (0.120 in)

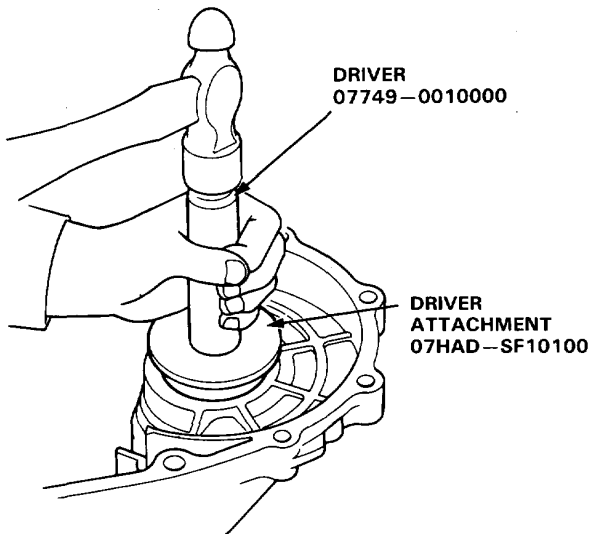
* Standard shim



4. After installing shims, install the outer race in the transmission housing using the special tools as shown.

CAUTION:

- Install the outer race squarely in the transmission housing.
- Check that there is no clearance between the outer race, shim and transmission housing.
- Install gasket when checking preload.

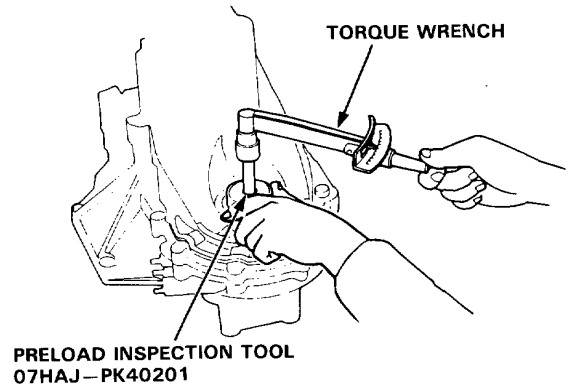


5. With the mainshaft, countershaft and secondary shaft removed, install the differential assembly and torque the transmission housing.

TORQUE: 55 N·m (5.5 kg-m, 40 lb-ft)

6. Rotate the differential assembly in both directions to seat the bearings.

7. Measure the starting torque of the differential assembly with the special tool and a torque wrench.



STANDARD:

New bearings: 2.8–4.0 N·m
(28–40 kg-cm, 24–35 lb-in)

Reuse bearings: 2.5–3.7 N·m
(25–37 kg-cm, 22–32 lb-in)

NOTE:

- Measure the preload at normal room temperature in both direction.
- If out of spec, select two shims which will give the correct preload, and repeat steps 1–7.
- Changing one of the shims to the next size will increase or decrease preload about 3–4 kg-cm (2.60–3.47 lb-in).
- To increase the starting torque, increase the thickness of shims. To decrease the starting torque, decrease the thickness of shims.

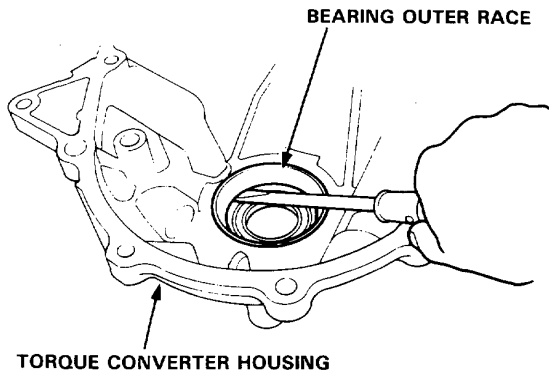
Differential (Automatic Transmission)

Bearing Outer Race Replacement

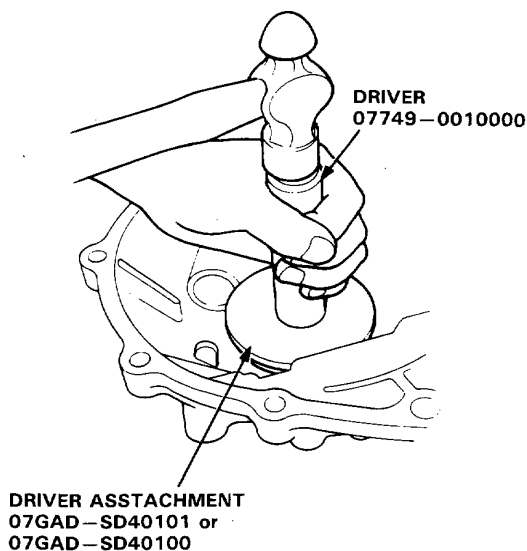
1. Remove the bearing outer race from the torque converter housing.

NOTE:

- Replace the bearing with a new one whenever the outer race is to be replaced.
- Do not use shims on the torque converter housing side.
- Adjust preload after replacing the bearing outer race and bearing.

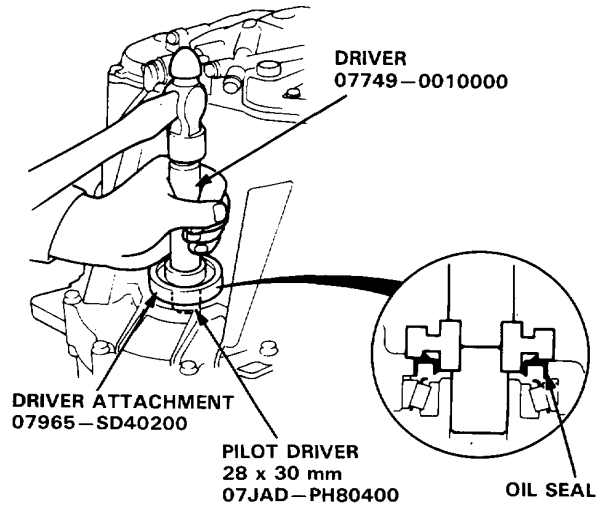


2. Install the new bearing outer race flush with the housing using the special tools.

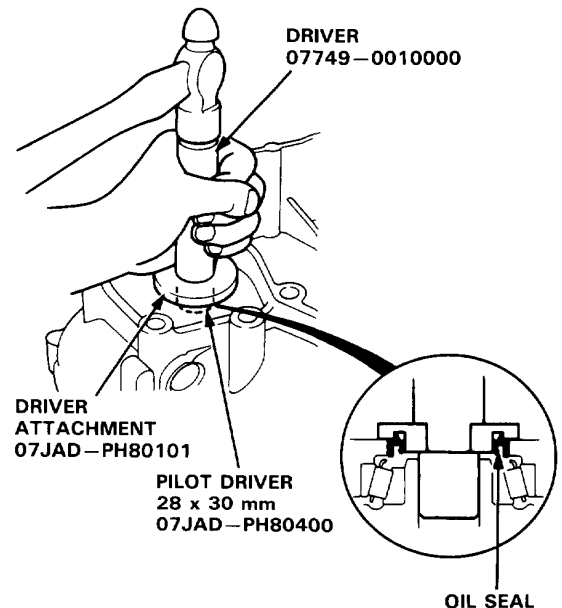


Oil Seal Installation

1. Install the oil seal in the transmission housing using the special tools as shown.



2. Drive the oil seal into the torque converter housing using the special tools as shown.



Driveshafts

Special Tools 16-2

Driveshafts

Removal 16-3

Disassembly 16-5

Disassembly/Inspection 16-6

Reassembly 16-7

Installation 16-9

Intermediate Shaft

Replacement 16-11

Disassembly 16-12

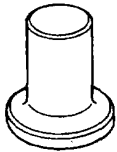
Disassembly/Inspection 16-13

Reassembly 16-14

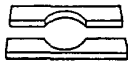


Special Tools

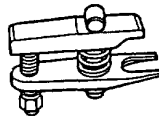
Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07GAD—PH70201	Oil Seal Driver	1	16-14
②	07GAF—SD40700	Hub Dis/Assembly Base	2	16-12, 14
③	07MAC—SL00100	Ball Joint Remover, 32 mm	1	16-3
④	07746—0010200	Attachment, 37 x 40 mm	1	16-12
⑤	07746—0010400	Attachment, 52 x 55 mm	1	16-14
⑥	07746—0030400	Attachment, 35 mm I.D.	1	16-14
⑦	07749—0010000	Driver	1	16-12, 14



①



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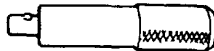
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Driveshafts

Removal

INSPECTION

Driveshaft Boot

Check the boots on the driveshaft for cracks, damage, leaking grease or loose boot bands. If any damage is found, replace the boot.

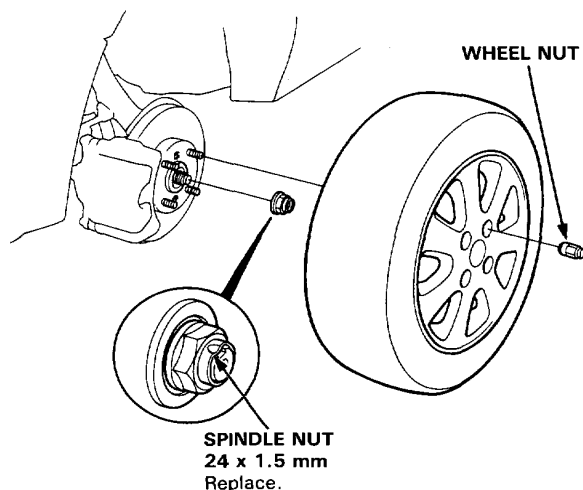
Spline Looseness

Turn the driveshaft by hand and make sure the spline and joint are not excessively loose. If damage is found, replace the inboard joint.

Twisted or Cracked

Make sure the driveshaft is not twisted or cracked. Replace if necessary.

1. Raise the car and place safety stands in the proper locations (see Section 1).
2. Remove the front wheels.
3. Drain the transmission oil (see Section 15).
4. Raise the locking tab on the spindle nut and remove it.

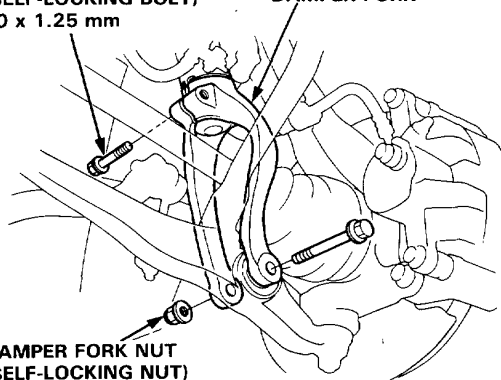


5. Remove the damper fork nut and damper pinch bolt.

6. Remove the damper fork.

**DAMPER PINCH BOLT
(SELF-LOCKING BOLT)**
10 x 1.25 mm

DAMPER FORK



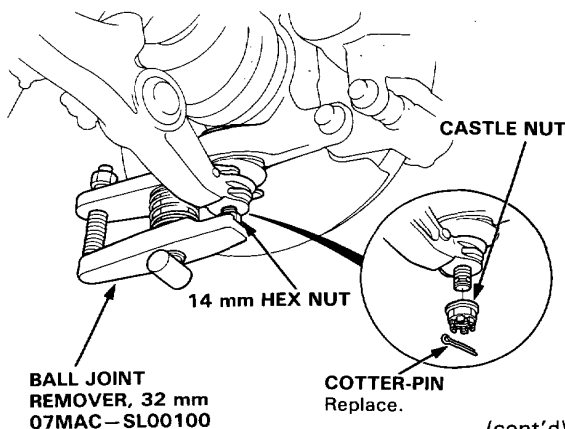
**DAMPER FORK NUT
(SELF-LOCKING NUT)**
12 x 1.25 mm
Replace.

7. Remove the cotter-pin from the lower arm ball joint castle nut and remove the nut.
8. Install a 14 mm hex nut on the ball joint. Be sure that the 14 mm hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.

NOTE: Use the ball joint remover as shown on page 18-17, to separate the ball joint and lower arm.

9. Position the special tool between the knuckle and lower arm as shown, then separate the lower arm.

CAUTION: Be careful not to damage the ball joint boot.

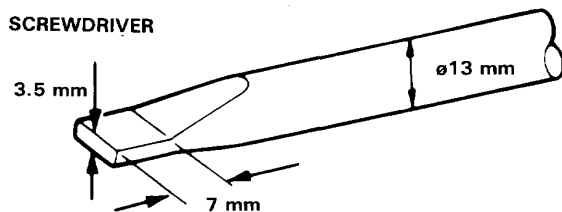


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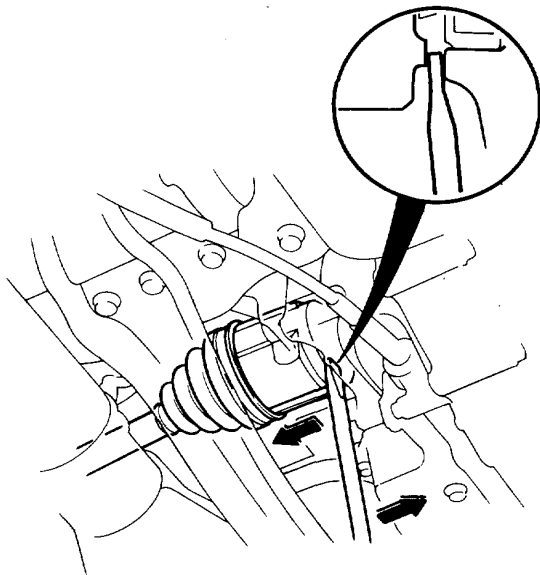
Driveshafts

Removal (cont'd)

10. Pry the driveshaft assembly with a screwdriver as shown to force the set ring at the driveshaft end past the groove.



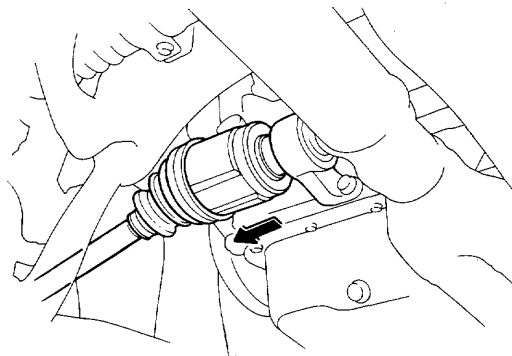
11. Pull the inboard joint and remove the driveshaft and CV joint from the differential case as an assembly.



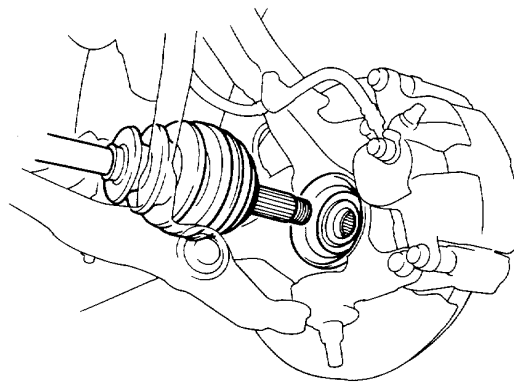
- With Intermediate Shaft:
Remove the left driveshaft from the bearing support by tapping the inboard joint of the driveshaft with a plastic hammer.

CAUTION:

- Do not pull on the driveshaft, as the CV joint may come apart.
- Use care when prying out the assembly and pull it straight to avoid damaging the differential oil seal.



12. Pull the knuckle outward and remove the driveshaft outboard joint from the front wheel hub using a plastic hammer.



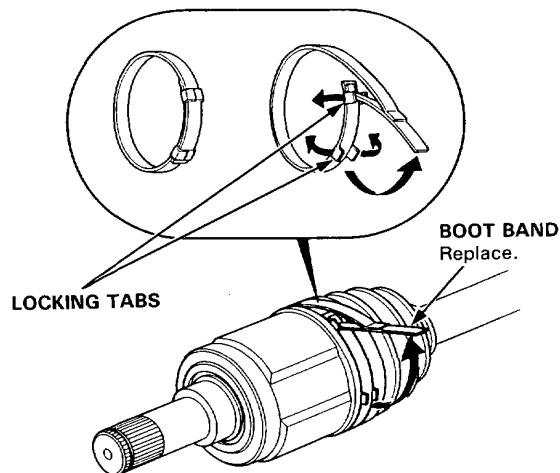


Disassembly

1. To remove the boot band, pry up the locking tabs with a screwdriver and raise the end of the band.

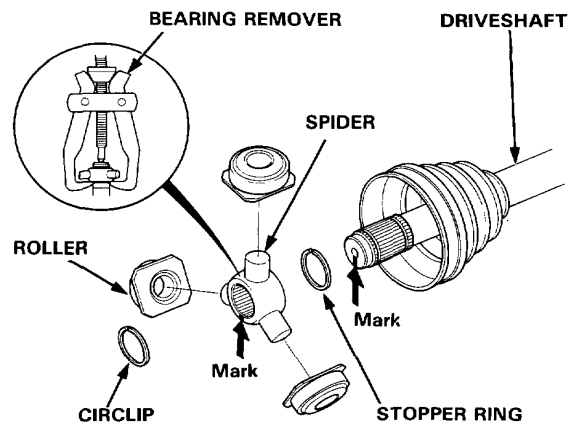
NOTE: Carefully clamp the driveshaft in a vise with soft jaws.

CAUTION: Take care not to damage the boots.



2. Remove the inboard joint and rollers.
3. Remove the circlip, then remove the spider using a commercially-available bearing remover.

NOTE: Before disassembly, mark the spider and driveshaft so they can be reinstalled in their original positions.



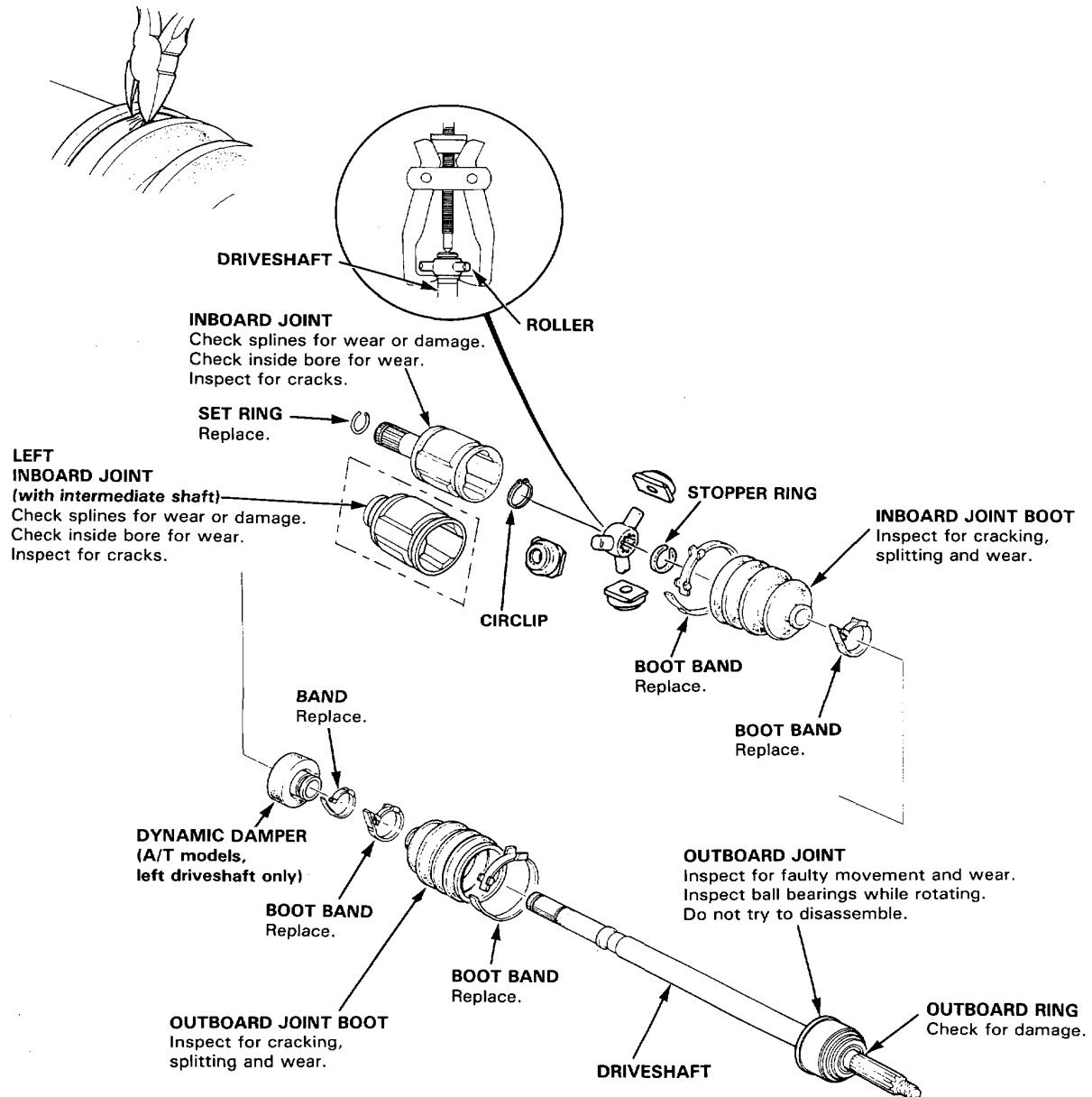
Driveshafts

Disassembly/Inspection

NOTE:

- Mark the rollers and roller grooves during disassembly to ensure proper positioning during reassembly.
- Before disassembly, mark the spider and driveshaft so they can be reinstalled in their original positions.
- The inboard joint must be removed to replace the boots.
- If the boot band is the welded type, cut off as shown.

CAUTION: Take care not to damage the boots.

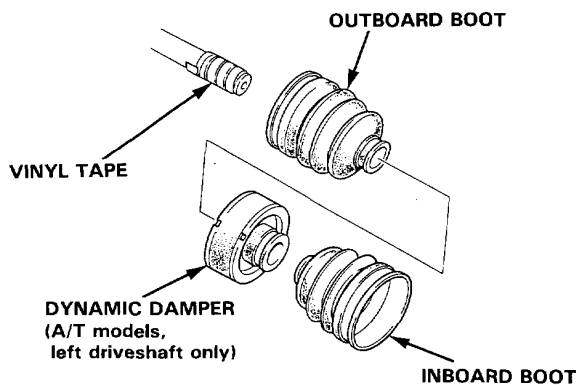




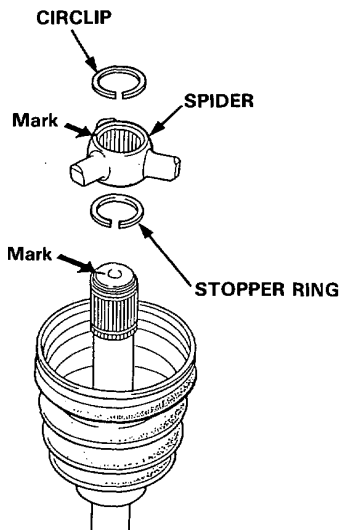
Reassembly

NOTE: Clean the driveshafts before reassembly.

1. Wrap the splines with vinyl tape to prevent damage to the boots and dynamic damper (A/T models, left driveshaft only).
2. Install the outboard boot, dynamic damper and inboard boot to the driveshaft, then remove the vinyl tape.

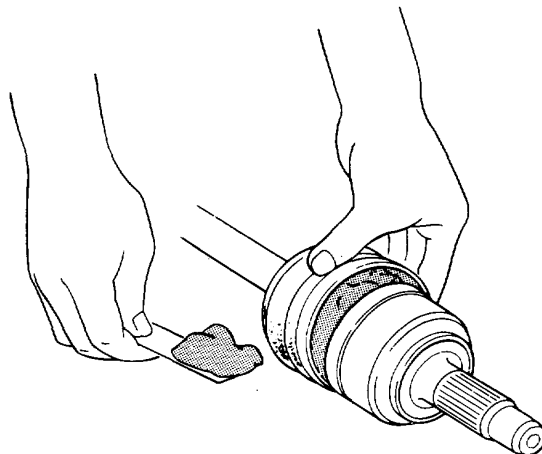


3. Install the stopper ring into the driveshaft groove.
4. Install the spider on the driveshaft by aligning the marks on the spider and end of the driveshaft.
5. Fit the circlip into the driveshaft groove.



6. Pack the outboard joint with the joint grease included in the new driveshaft set.

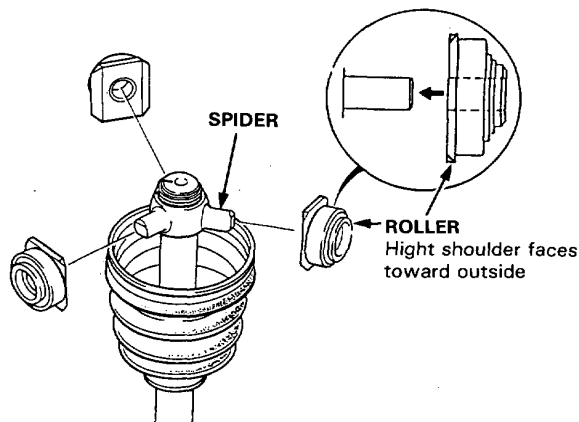
Grease Quantity. 130–140 g (4.6–4.9 oz)



7. Fit the rollers to the spider with their high shoulders facing outward.

CAUTION:

- Reinstall the rollers in their original positions on the spider.
- To prevent it from falling off, hold the driveshaft assembly so the spider and roller point up.



(cont'd)

Driveshafts

Reassembly (cont'd)

8. Pack the inboard joint with the joint grease included in the new driveshaft set.

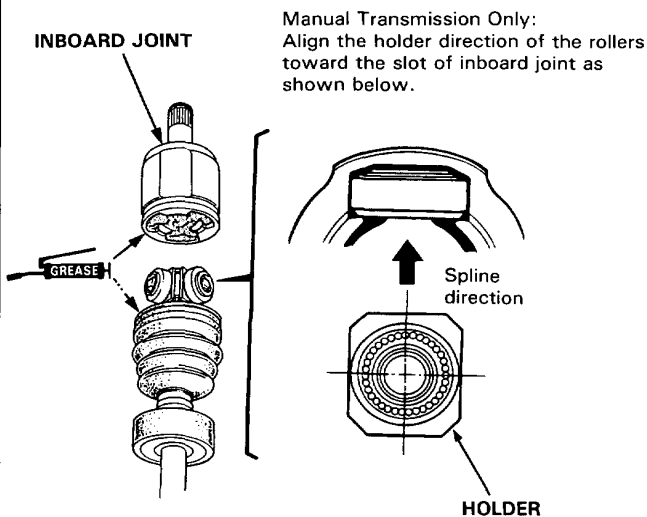
Grease Quantity: 130–140 g (4.6–4.9 oz)

A/T models, Left driveshaft:

120–130 g (4.2–4.6 oz)

9. Fit the inboard joint onto the driveshaft.

CAUTION: To prevent it from falling off, hold the driveshaft assembly so the inboard joint points up.



10. Adjust the length of the driveshafts to the figure below, then adjust the boots to halfway between full compression and full extension.

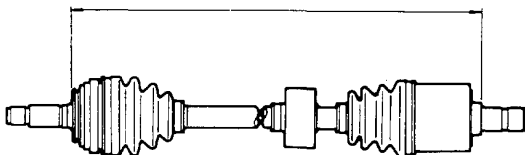
NOTE: The ends of boots seat in the groove of the driveshaft and joint.

Right: 507.9–512.9 mm (20.00–20.20 in)

Left:

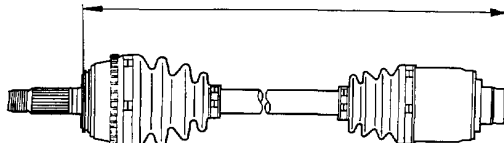
- **A/T models**

862.9–867.9 mm (33.97–34.17 in)



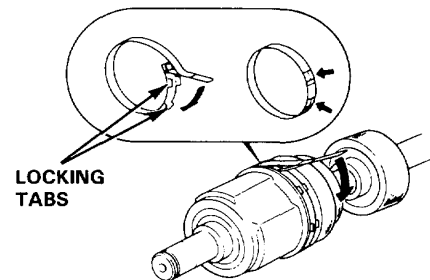
- **M/T models**

520.9–525.9 mm (20.50–20.70 in)



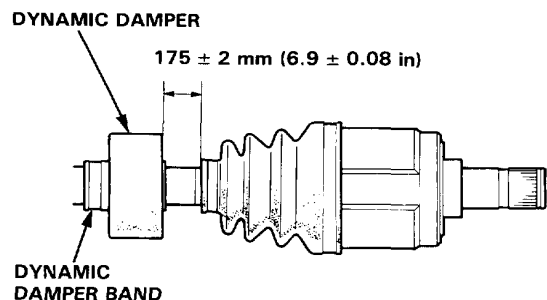
11. Install new boot bands on the boot and bend both sets of locking tabs.

12. Lightly tap on the doubled-over portions to reduce their height.



13. Position the dynamic damper as shown below.

- Install a new dynamic damper band and bend down both sets of locking tabs.
- Lightly tap on the doubled-over portion of the band to reduce its height.





Installation

1. Install the outboard joint in the knuckle, then loosely install the spindle nut.
2. Apply 1–1.5 g (0.03–0.05 oz) of specified grease to the whole spline surface of the intermediate shaft.

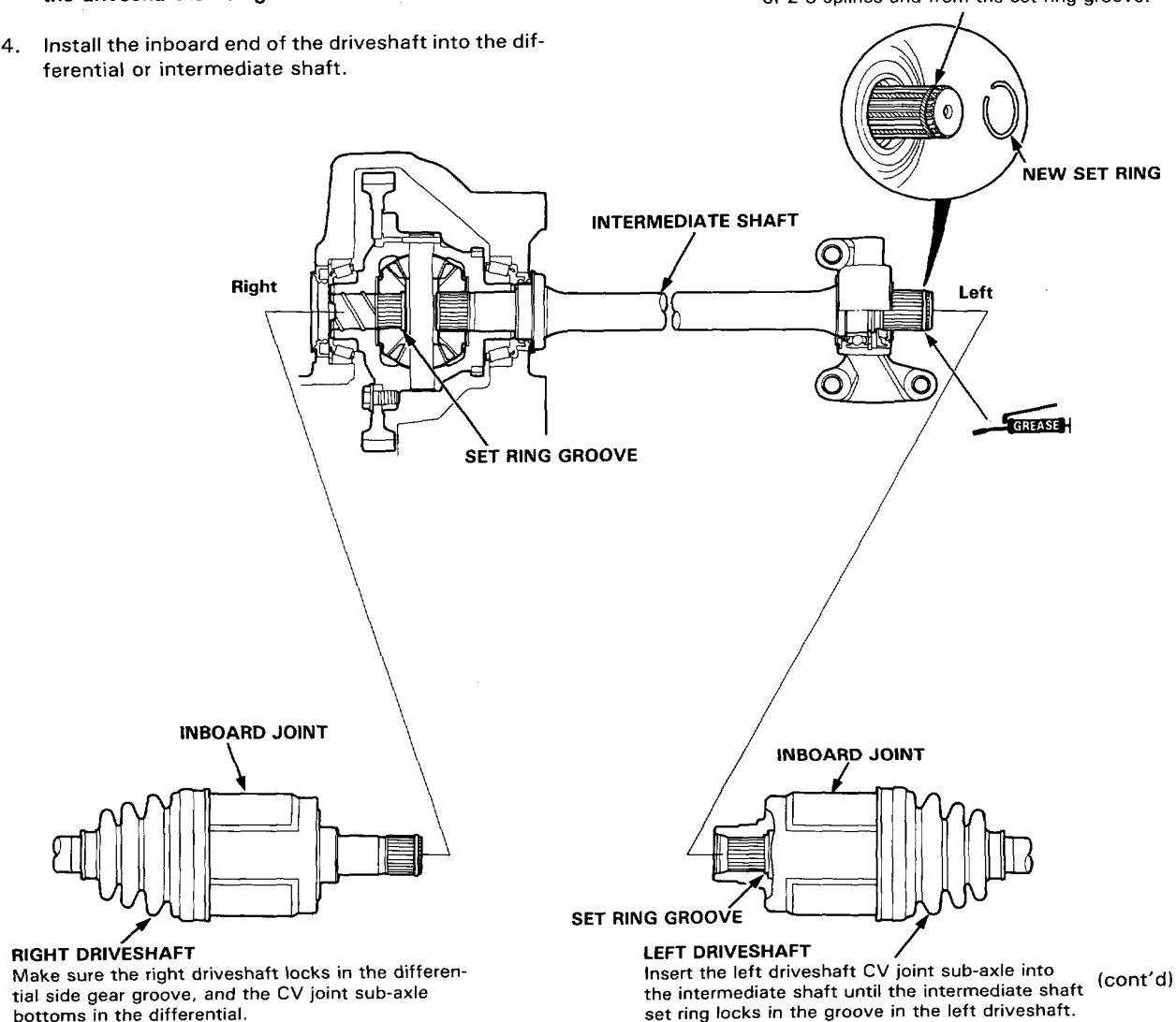
NOTE: After applying grease, remove the grease from the spline grooves at intervals of 2-3 splines and from the set ring groove so air can bleed from the inboard joint.

3. Install the new set ring onto the driveshaft or intermediate shaft groove.

CAUTION: Always use a new set ring whenever the driveshaft is being installed.

4. Install the inboard end of the driveshaft into the differential or intermediate shaft.

NOTE: After applying grease, remove the grease from the spline grooves at intervals of 2-3 splines and from the set ring groove.



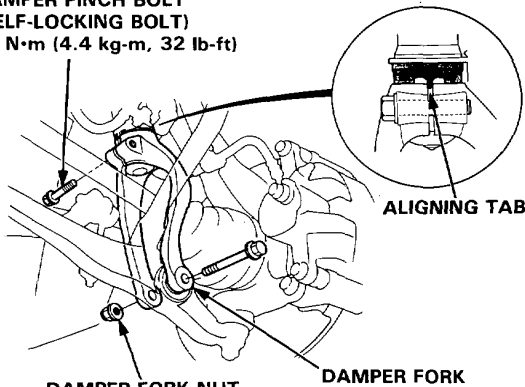
Driveshafts

Installation (cont'd)

5. Install the damper fork over the driveshaft and onto the lower arm. Install the damper in the damper fork so the aligning tab is aligned with the slot in the damper fork.
6. Loosely install the damper pinch bolt and the new damper fork nut.

NOTE: The bolts and nut should be tightened with the vehicle's weight on the damper.

**DAMPER PINCH BOLT
(SELF-LOCKING BOLT)**
44 N·m (4.4 kg-m, 32 lb-ft)

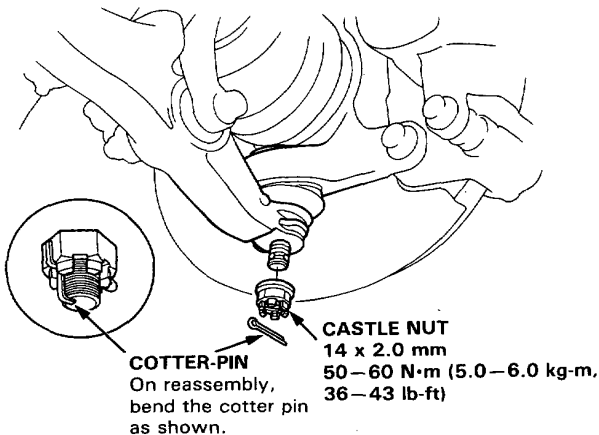


**DAMPER FORK NUT
(SELF-LOCKING NUT)**
65 N·m (6.5 kg-m, 47 lb-ft)

7. Install the knuckle on the lower arm, then tighten the castle nut and install new cotter-pin.

CAUTION:

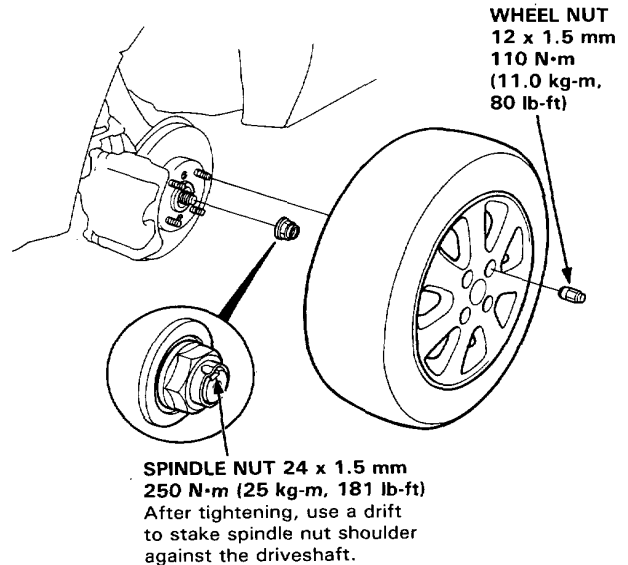
- Be careful not to damage the ball joint boot.
- Torque the castle nut to the lower torque specification, then tighten it only far enough to align the slot with the pin hole. Do not align the nut by loosening.



8. Tighten the new spindle nut.

9. Install the wheel with the wheel nuts.

NOTE: Before installing the wheel, clean the mating surface of the brake disc and inside of the wheel.



10. Tighten the damper pinch bolt and the new damper fork nut with the vehicle's weight on the damper.

11. Refill the transmission (see Section 15).

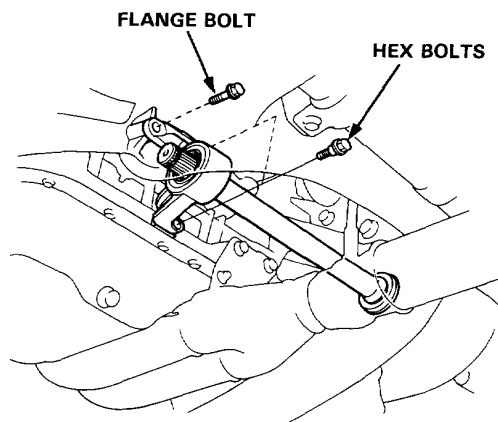
12. Check the front wheel alignment and adjust if necessary (see 18-4).



Intermediate Shaft

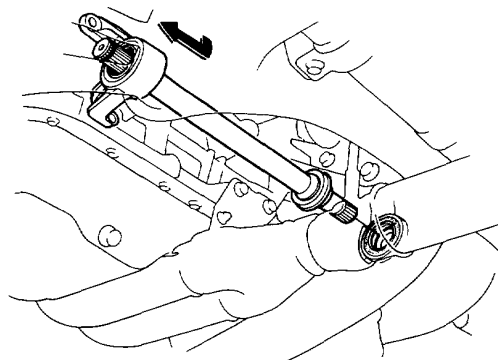
Replacement

1. Drain the transmission oil (see Section 15).
2. Remove the left driveshaft assembly (page 16-4).
3. Remove the flange bolt and hex bolts.

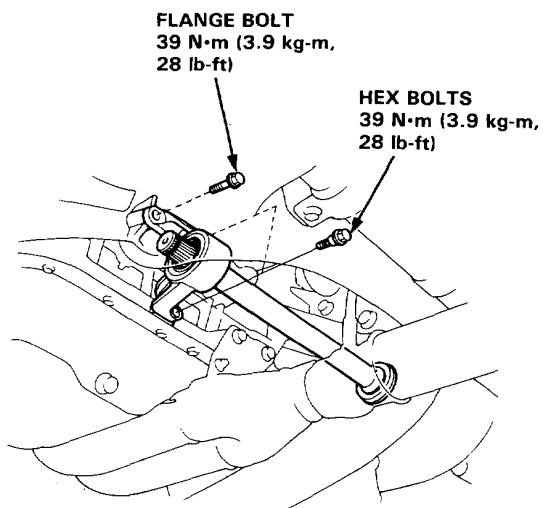


4. Remove the intermediate shaft assembly from the differential.

CAUTION: To prevent damage to the differential oil seal, hold the intermediate shaft horizontal until it is clear of the differential.



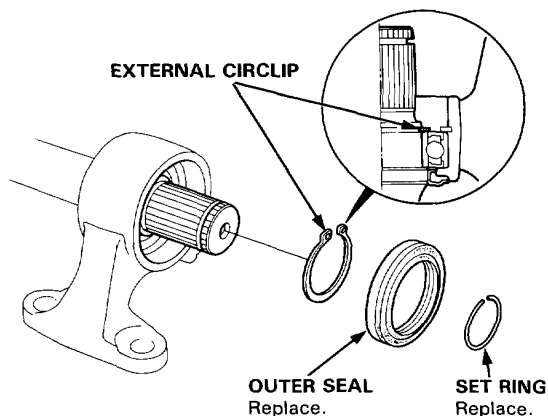
5. Install in the reverse order of removal.



Intermediate Shaft

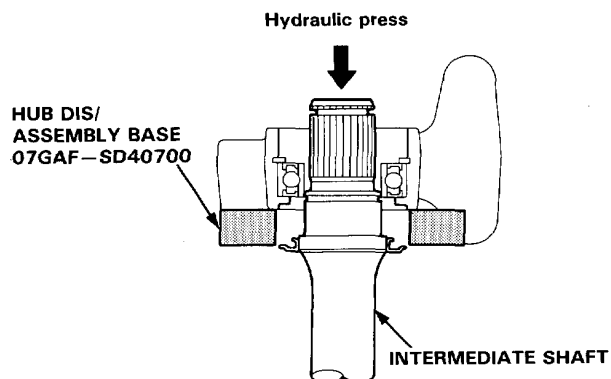
Disassembly

1. Remove the set ring.
2. Remove the intermediate shaft outer seal from the bearing support.
3. Remove the external circlip.

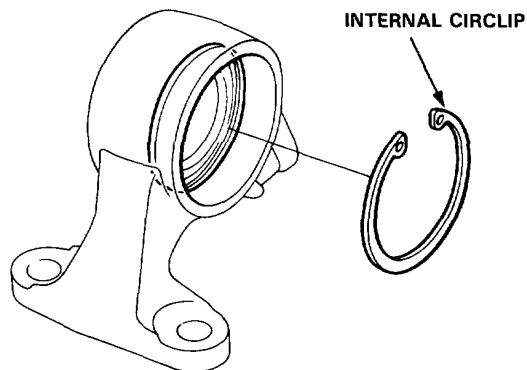


4. Press the intermediate shaft out to the shaft bearing using the special tools and hydraulic press as shown.

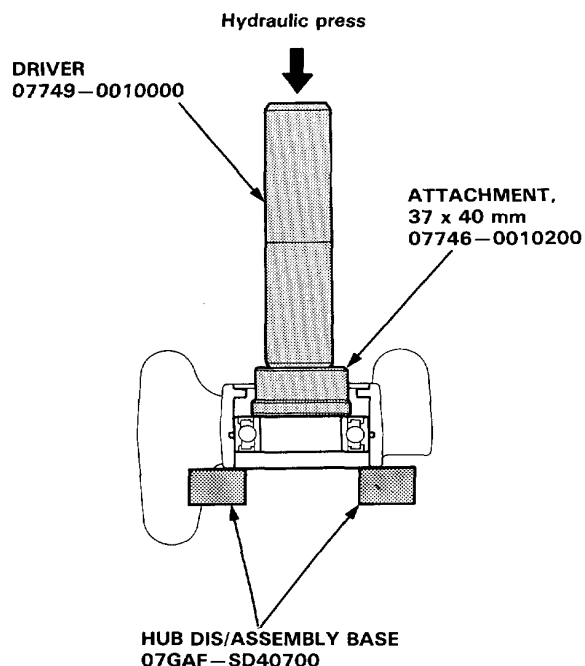
NOTE: Place the Hub Dis/Assembly Bases so they do not damage the flange on the shaft.



5. Remove the internal circlip.



6. Press the intermediate shaft bearing out of the bearing support using the special tools and hydraulic press as shown.





Disassembly/Inspection

INTERMEDIATE SHAFT RING
Check for damage or distortion.

INTERMEDIATE SHAFT
Check for damage.

BEARING SUPPORT RING
Check for damage or distortion.

HEX BOLTS

FLANGE BOLT

INTERNAL CIRCLIP

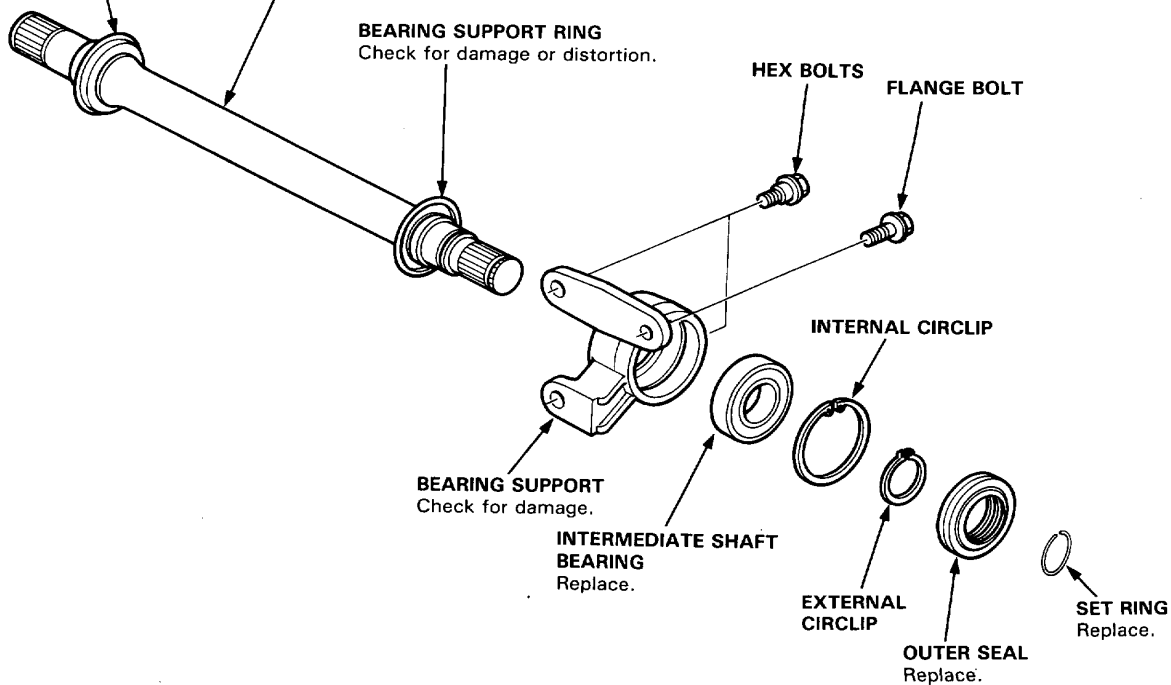
BEARING SUPPORT
Check for damage.

INTERMEDIATE SHAFT BEARING
Replace.

EXTERNAL CIRCLIP

OUTER SEAL
Replace.

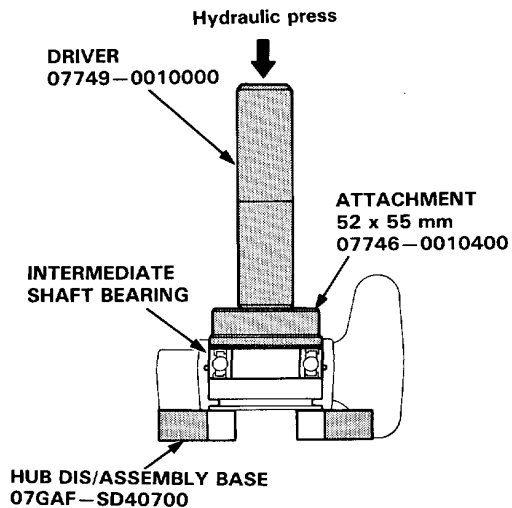
SET RING
Replace.



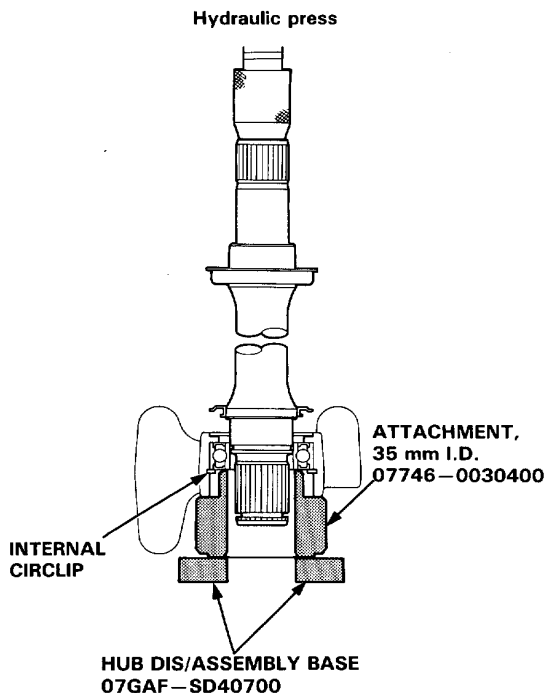
Intermediate Shaft

Reassembly

1. Press the intermediate shaft bearing into the bearing support using the special tools and hydraulic press as shown.



2. Seat the internal circlip in the groove of the bearing support.
3. Press the intermediate shaft into the shaft bearing using the special tool and hydraulic press as shown.



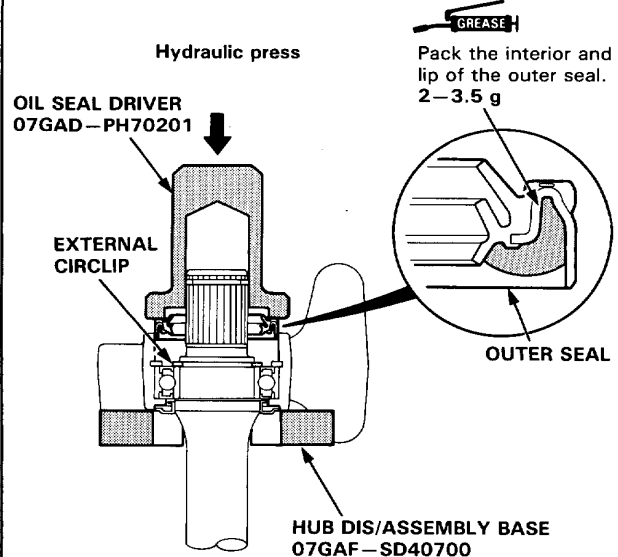
4. Seat the external circlip in the groove of the intermediate shaft.

CAUTION: Install the circlip with the tapered end facing out.

5. Press the outer seal into the bearing support using the special tools and hydraulic press as shown.

NOTE: Press the seal flush with the bearing support.

CAUTION: Do not damage the lip on outer seal during installation.



6. Install the new set ring in the intermediate shaft groove.

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) (If the steering wheel and column servicing are required)

Some models of the PRELUDE include a driver's side airbag, located in the steering wheel hub, as part of a supplemental restraint system (SRS). Information necessary to safely service the SRS is included in this shop manual. Items marked * on the contents page include, or are located near, SRS components. Servicing, disassembling or replacing these items will require special precautions and tools, and should therefore be done only by an authorized HONDA dealer.

⚠ WARNING

- **To avoid rendering the SRS inoperative, which can lead to personal injury or death in the event of a severe frontal collision, all maintenance on this system must be performed by an authorized HONDA dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, and replacing with wrong parts, can lead to personal injury caused by unintentional activation of the airbag.**
- **All SRS electrical wiring harnesses are covered with yellow outer insulation. Related components are located in the steering column, the dashboard, and behind the dashboard lower cover. Do not use electrical test equipment on these circuits.**
- **Servicing, disassembling or replacing nearby the steering wheel, under the dash, or related to the wire harnesses nearby the under-dash fuse box may affect the SRS and must therefore be performed by an authorized HONDA dealer.**

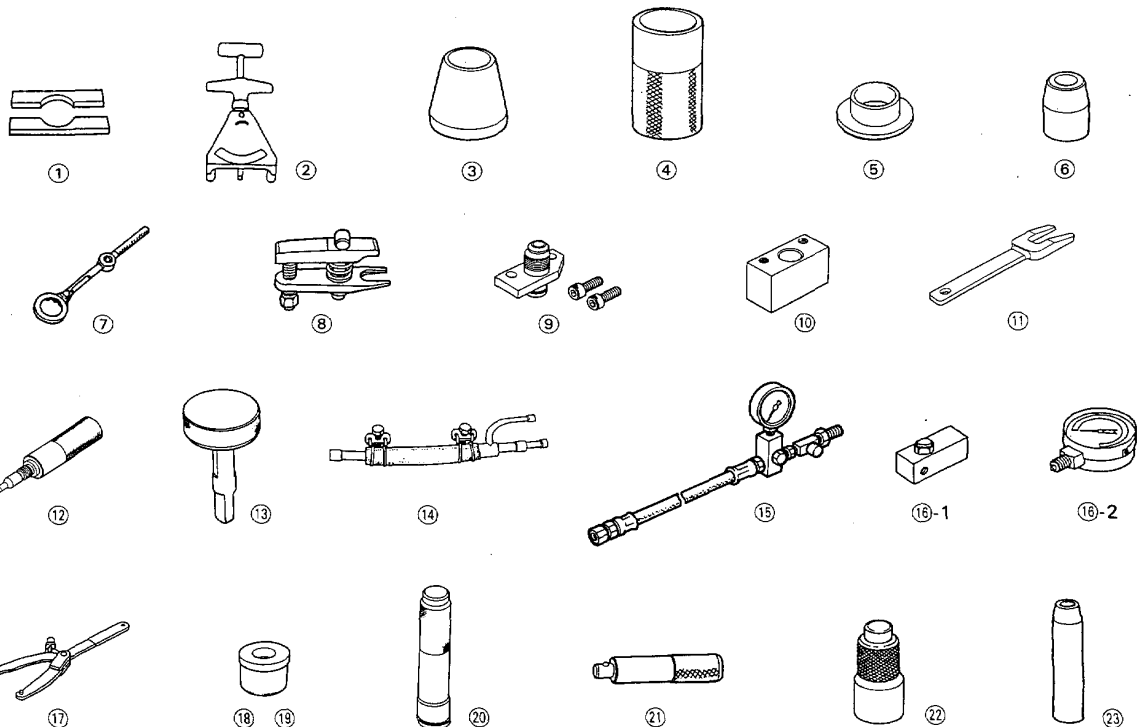
Steering

Special Tools	17-2	Steering Column	
General Information		Removal	17-88
4WS Service Information	17-3	Inspection	17-91
Component Location		Installation	17-92
Index (2WS/4WS)	17-5	Steering Pump	
Component Location		Replacement	17-94
Index (4WS)	17-6	Pulley Replacement	17-94
System Description		Control Valve Inspection and	
Fluid Flow Diagram	17-7	Replacement	17-95
Steering pump	17-8	Disassembly	17-97
Fluid Reservoir/Filter	17-9	Illustrated Index	17-100
Control Valve	17-10	Assembly	17-101
Full-Lock Unloader System	17-12	Steering Gearbox	
Speed Sensor	17-12	Index	17-103
Electronically Controlled Power		Valve Body Unit	17-104
Assisted 4WS	17-15	Gearbox Removal	17-112
Troubleshooting (Power Steering		Illustrated Index	17-115
System)		Overhaul	17-116
General Troubleshooting	17-25	Installation	17-132
Noise and Vibration	17-28	Rear Steering Actuator (4WS)	
Fluid Leaks	17-29	Illustrated Index	17-135
Troubleshooting (4WS)	17-30	Removal	17-136
Maintenance		Disassembly	17-138
Pump Belt Adjustment	17-76	Assembly	17-139
On-Car Checks		Installation	17-142
Rack Guide Adjustment	17-77	4WS Control Unit	
Fluid Replacement	17-79	Removal and Installation	17-143
Pump Pressure Check	17-80	Tie-rod End Boot	
Steering Wheel Rotational Play	17-81	Replacement	17-143
Power Assist Check with		4WS System Inspection	
Car Parked	17-81	Electronic Neutral Check	17-144
Assist Check at Road Speed	17-82	4WS System Adjustment	17-149
Speed Sensor Replacement	17-82	Sub Steering Angle Sensor	
Steering Wheel		Adjustment	17-151
Removal	17-83		
Disassembly/Reassembly	17-84		
Installation			
2WS	17-85		
4WS	17-86		



Special Tools

Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07GAF—SD40700	Hub Dis/Assembly Base	1	17-99
②	07JGG—0010100	Tension Gauge	1	17-76
③	07LAG—SM40100	Piston Seal Ring Guide	1	17-123
④	07LAG—SM40200	Piston Seal Ring Sizing Tool	1	17-123
⑤	07LAG—SM40300	Cylinder End Seal Slider	1	17-124
⑥	07LAG—SM40400	Cylinder End Seal Guide	1	17-126
⑦	07MAA—SL0020A	Locknut Wrench, 43 mm	1	17-77, 129
⑧	07MAC—SL00200	Ball Joint Remover, 28 mm	1	17-112, 136
⑨	07NAK—SR3011A	P/S Joint Adapter (Pump)	1	17-80
⑩	07NAK—SR3012A	P/S Joint Adapter (Hose)	1	17-80
⑪	07NAB—SS00100	Rack End Stopper	1	17-138, 140
⑫	07NAJ—SS00200	Rear Steering Lock Pin	1	17-136, 146
⑬	07NAZ—SR30100	Lock Washer Pilot Clinch	1	17-128
⑭	07406—0010101	Bypass Tube Joint (Included with 07406—0010001)	1	17-82
⑮	07406—0010001	P/S Pressure Gauge Set	1	17-80
⑯-1	07406—0010300	Pressure Control Valve	1	17-80
⑯-2	07406—0010400	Pressure Gauge	1	17-80
⑰	07225—0030000	Universal Holder	1	17-94
⑱	07746—0010200	Attachment, 37 x 40 mm	1	17-101
⑲	07746—0010300	Attachment, 42 x 47 mm	1	17-118, 121
⑳	07746—0020100	Driver Handle	1	17-101
㉑	07749—0010000	Driver	1	17-121
㉒	07974—6790000	Tie-Rod Seal Driver	1	17-143
㉓	07974—SA50600	Pinion Dust Seal Guide	1	17-127





General Information

4WS Service Information

On models equipped with the electronically controlled power assisted 4WS (4-wheel steering system), note the following special precautions before service.

- After performing the following operations, check and adjust the 4WS system to be sure that it is electronically and mechanically in neutral (all 4 wheels in proper alignment).

Operation	Check for mechanical neutral	Check for electronic neutral	Reference page
Rack guide adjustment	—	○	17-77
Steering wheel removal/installation	○	○	17-83, 86
Steering wheel replacement	○	○	17-83, 86
Steering column removal/installation	○	○	17-88, 92
Front steering gearbox removal/installation or disassembly	○	○	17-112, 116, 132
Rear actuator removal/installation	○	○	17-136, 139
Front/rear sub steering angle sensor removal/installation	—	○	17-116, 129
Front main steering angle sensor removal/installation	○	○	17-89, 92
Rear main steering angle sensor removal/installation	—	○	17-139, 140

- The 4WS system must be (1) mechanically and (2) electronically in neutral for proper operation. Perform the following mechanical neutral check on the system and adjust as necessary first, then perform the following electronic neutral check and adjust as necessary. (4WS system adjustment: see page 17-149)

(1) Mechanically neutral:

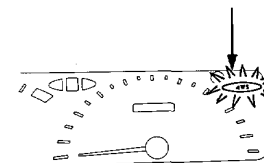
Set the toe inspection gauge (07HGJ—0010000) on each wheel and be sure that the front and rear wheels align properly with the steering wheel in the straight driving position (i.e. difference in toe gauge reading between the right and left wheels is within specification). (See page 18-8 for toe inspection gauge installation.)

(2) Electronic neutral:

Be sure that the following sensors are electronically in neutral with the steering wheel in the straight driving position. Electronic neutral position is indicated by blinking or lighting of the 4WS indicator light.

Front Main Steering Angle Sensor
Front Sub Steering Angle Sensor
Rear Main Steering Angle Sensor
Rear Sub Steering Angle Sensor

4WS INDICATOR LIGHT



(cont'd)

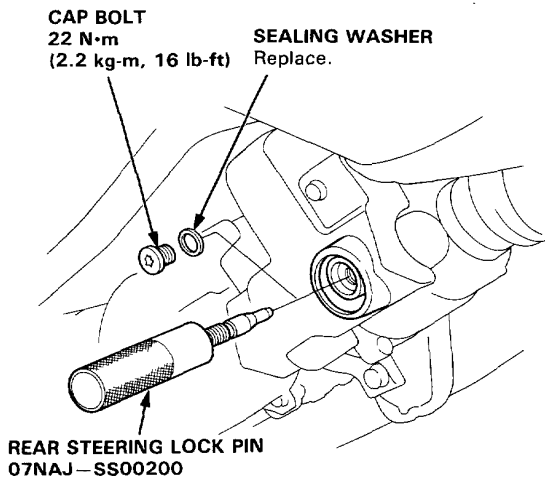
General Information

4WS Service Information (cont'd)

- If the spoke angle of steering wheel is not at the designated angle while driving straight, check whether it was caused simply by an improperly installed steering wheel or by the misalignment of the front and rear wheels. Check the wheels for proper alignment before adjusting the steering wheel spoke angle.
Install the toe inspection gauge (07HGJ—0010000) on the wheels and the rear steering lock pin in the rear actuator and, with the steering wheel in the straight driving position, check the wheels for proper alignment (i.e. difference in toe gauge reading between the right and left wheels is within specification.) (See section 18-8 for gauge installation.) Check the sensors for electronic in neutral to be sure that the rear wheels are in correct steering angle while driving.
- Do not contaminate the front and rear sub steering angle sensor, front and rear main steering angle sensor, and the rear steering actuator motor terminals with mud, oil, and grease.
- The phrase "the steering wheel in the straight driving position" means that the front wheels are in the straight driving position with the steering wheel spokes at a horizontal angle.
- If the power to the 4WS control unit was shut down for the following operations, start the engine and turn the steering wheel fully right and left before checking and adjusting the 4WS system.
 - Battery removal/installation
 - 4WS control unit removal/installation
 - No. 43 fuse CLOCK RADIO removal

CAUTION:

- The rear wheel steering angle is not controlled when the engine is OFF. When the engine is started, the rear wheels are steered to an angle in accordance with the front wheel angle. We recommend that the steering system be serviced with the steering wheel set in the straight driving position.
- Do not start the engine with the lock pin set in the rear actuator. The rear actuator might be damaged when the rear wheels are steered. Be sure to remove the lock pin after service.



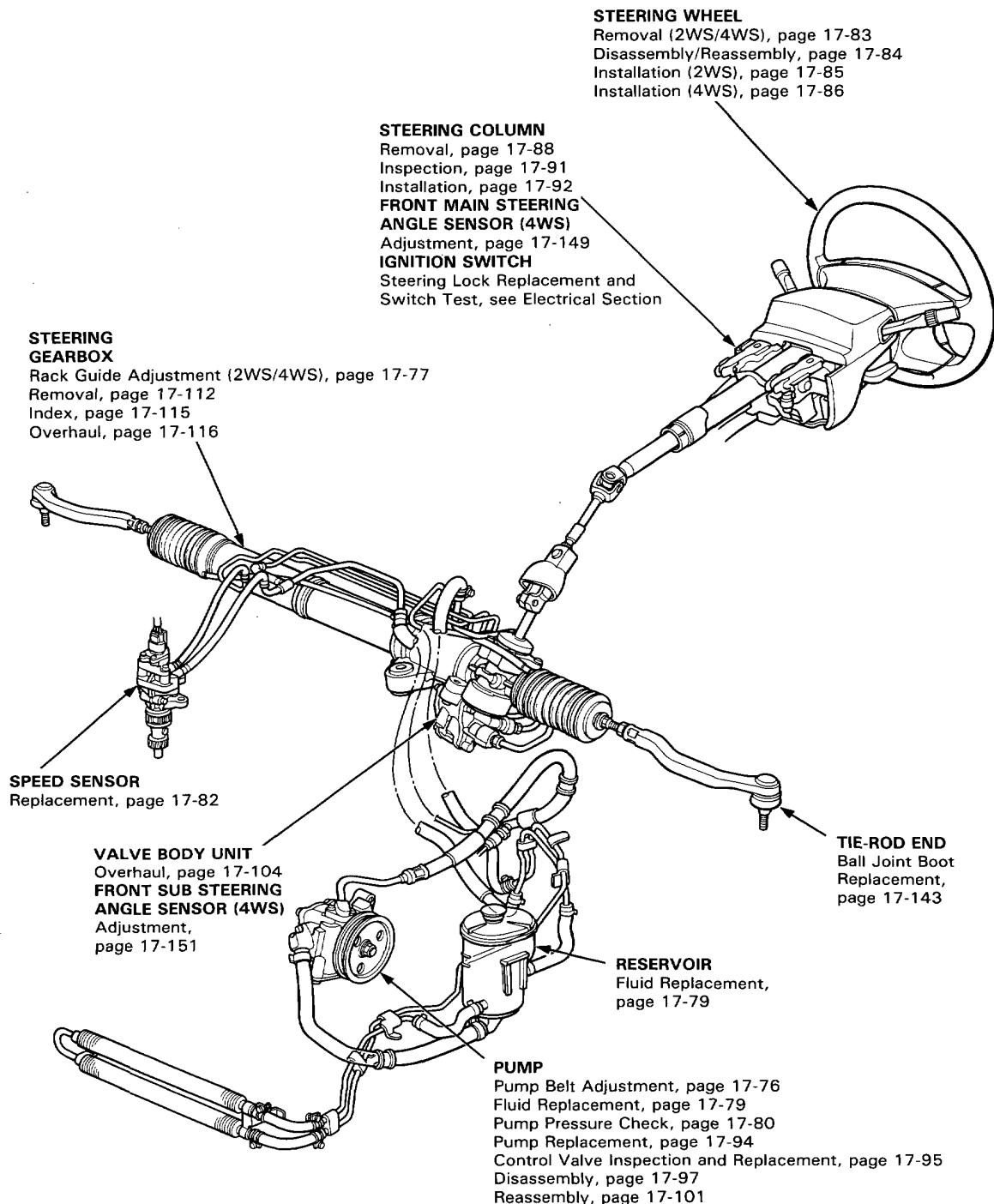


Component Location

Index (2WS/4WS)

NOTE:

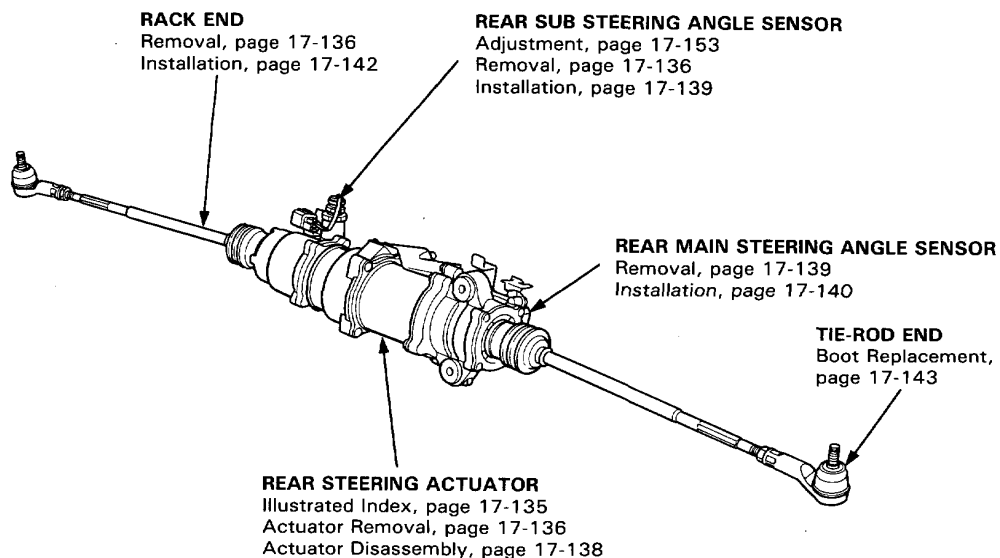
- If an intact airbag assembly has been removed from a scrapped car or has been found defective or damaged during transit, storage or service, it should be deployed (See section 23).
- LH drive shown. RH drive is similar.



Component Location

Index (4WS)

- **4WS CONTROL UNIT**
Removal/Installation, page 17-143
- **4WS SYSTEM INSPECTION and ADJUSTMENT**
Inspection, page 17-149





System Description

Fluid Flow Diagram

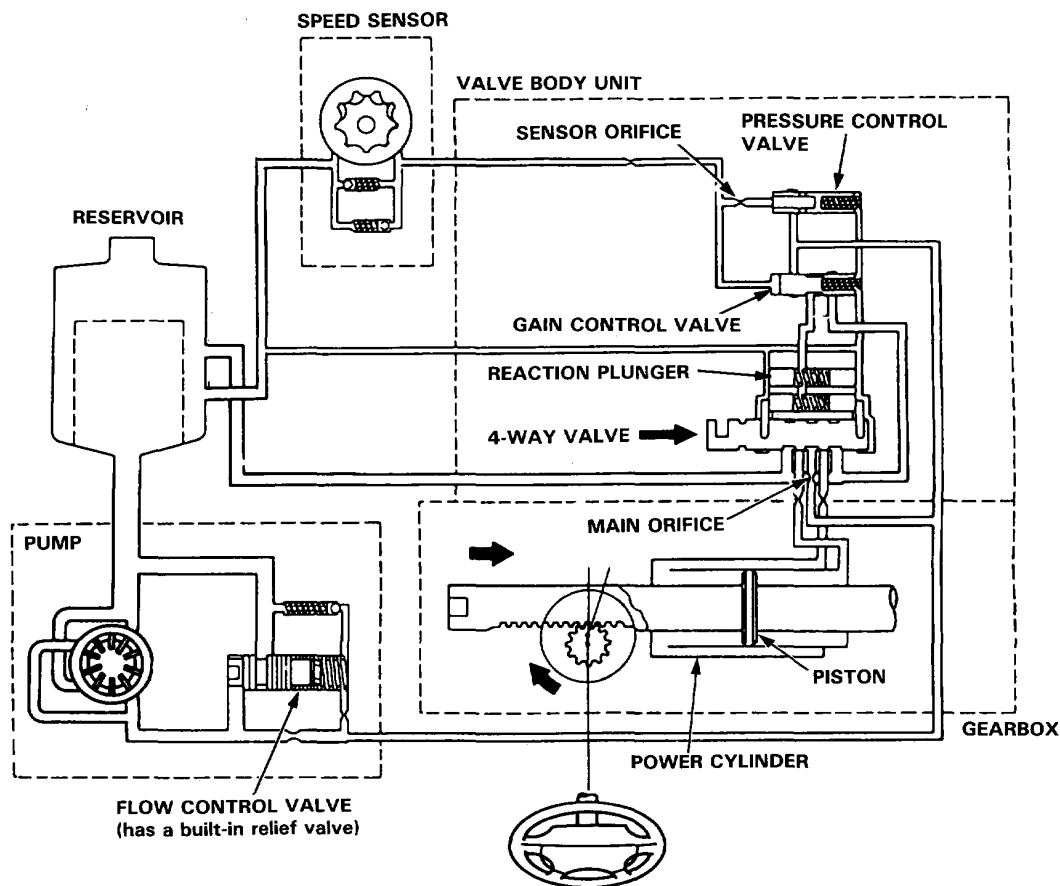
The reservoir supplies power steering fluid to the pump; the pump pressurizes the fluid and delivers it through a high pressure hose to the valve body unit on the gearbox.

The 4-way valve (in the valve body unit) controls the direction of the turn by shifting fluid to the left or right side of the piston on the rack (in the power cylinder).

The gain control valve in the valve body unit controls the amount of the assist by regulating the stroke of the 4-way valve. The operation of the gain control valve is affected by the fluid pressure, which is regulated by the pressure control valve, sensor orifice and speed sensor.

Constant pressure is generated by the pressure control valve. This pressure is used as a reference pressure for the response to the car speed. By introducing this pressure to the speed sensor through the sensor orifice, the pressure downstream of the orifice is changed according to the speed of car. This pressure is then used to operate the gain control valve. Two orifices are provided around the circumference of the gain control valve. These orifices provide the stepless reduction of the pressure from the pump according to the changes in the car speed. The reduced pressure is then sent to the reaction chambers. Therefore the assist varies by regulating the fluid pressure in the valve body unit according to the speed of car.

Fluid returning from the power cylinder flows back through the 4-way valve and out to the reservoir through the cooler.

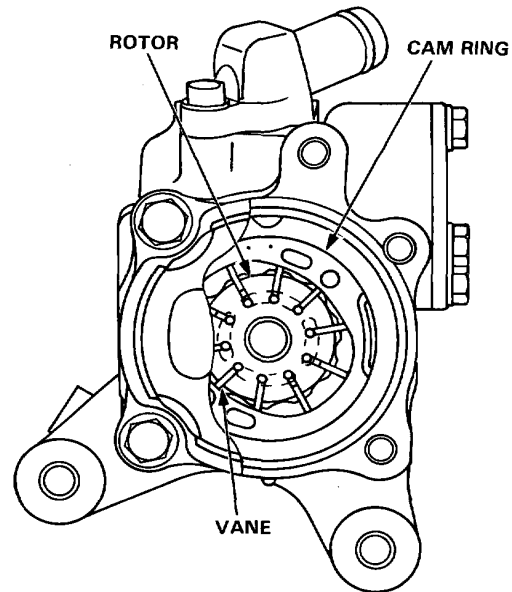
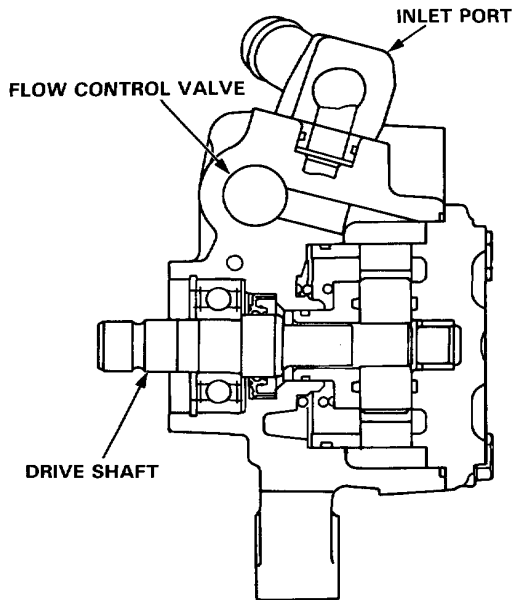


System Description

Steering Pump

Construction

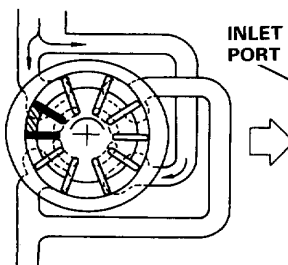
The pump is a vane-type incorporating a flow control valve (with an integrated relief valve) and is driven by a V-belt from the crank pulley. The pump features 10 vanes. Each vane performs two intake/discharge operations for every rotation of the rotor. This means that the hydraulic fluid pressure pulse becomes extremely small during discharge.



Operation

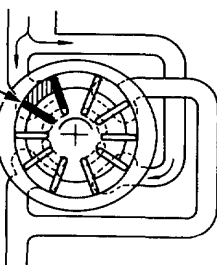
The belt-driven pulley rotates the rotor through the drive shaft. As the rotor rotates, the hydraulic pressure is applied to the vane chamber of the rotor and the vanes will rotate while being pushed onto the inner circumference of the cam ring. The inner circumference of the cam ring has an extended portion with respect to the center of the shaft, so the rollers move downward in the axial direction as the carrier rotates. As a result of this roller movement, the internal volume of the vane chamber will change, resulting in fluid intake and discharge.

START OF FLUID INTAKE



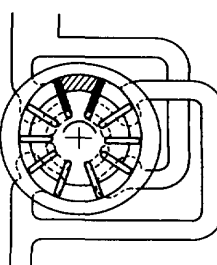
The vanes are pushed onto the inner circumference of the cam ring.

FLUID INTAKE



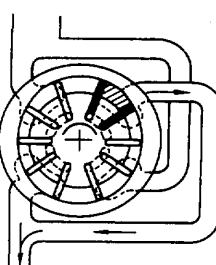
The volume of the vane chamber increases so that fluid is sucked in.

FLUID MOVEMENT



The sucked-in fluid moves toward the discharge port.

FLUID DISCHARGE

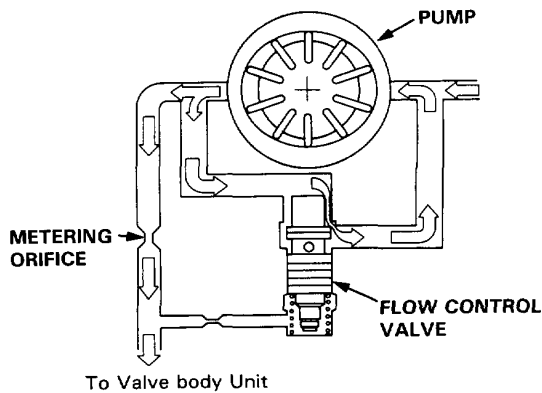


As the vanes return to their original position on the inner side, the volume of the vane chamber decreases so the fluid is discharged from the discharge port.



Flow Control

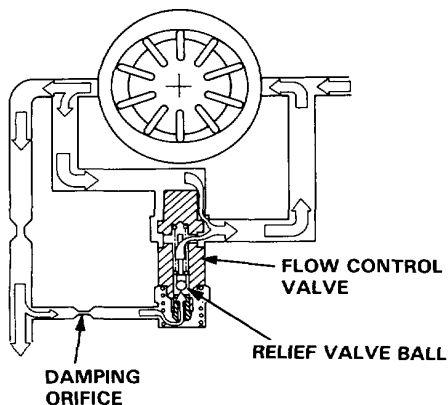
Fluid from the pump runs through a metering orifice to the valve body unit. This creates a pressure difference between the pump and valve body unit sides of the orifice. When pressure in the pump side is higher than the force of the spring holding the flow control valve closed, it pushes the valve down (open), and excess fluid returns to the pump inlet. The combined effect of the metering orifice and the flow control valve provides a relatively constant flow of fluid to the valve body unit.



Pressure Relief

As pressure on the valve body unit side builds up, it pushes the relief valve ball (inside the flow control valve) up against its spring, and excess fluid returns to the pump inlet. As the pressure under the flow control valve drops, the relief valve ball is closed by its spring, and the flow control valve is forced down again, allowing excess fluid from the pump side to return to the inlet. This flow control valve-relief valve cylinder keeps pump output pressure between 7,000–8,000 kPa (70–80 kg/cm², 995–1,138 psi).

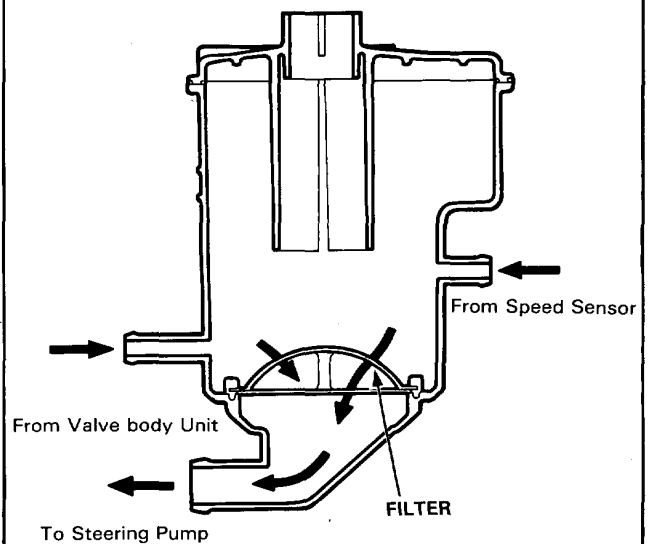
RELIEF VALVE OPEN



Fluid Reservoir/Filter

A one-piece reservoir and filter is attached to the fender apron on the left side of the engine compartment. The fluid and the filter/reservoir should be replaced if the system is opened for repairs, or if the fluid gets water or dirt in it.

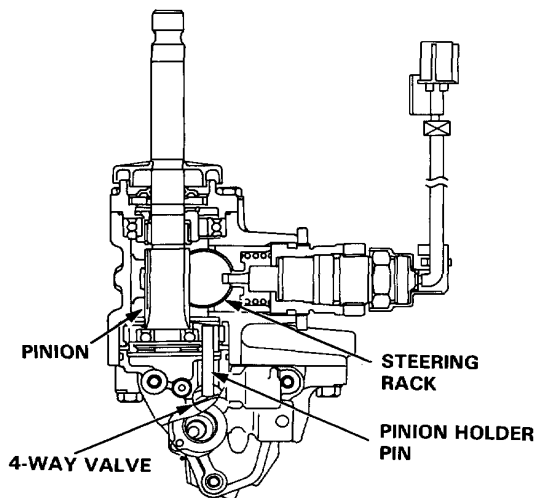
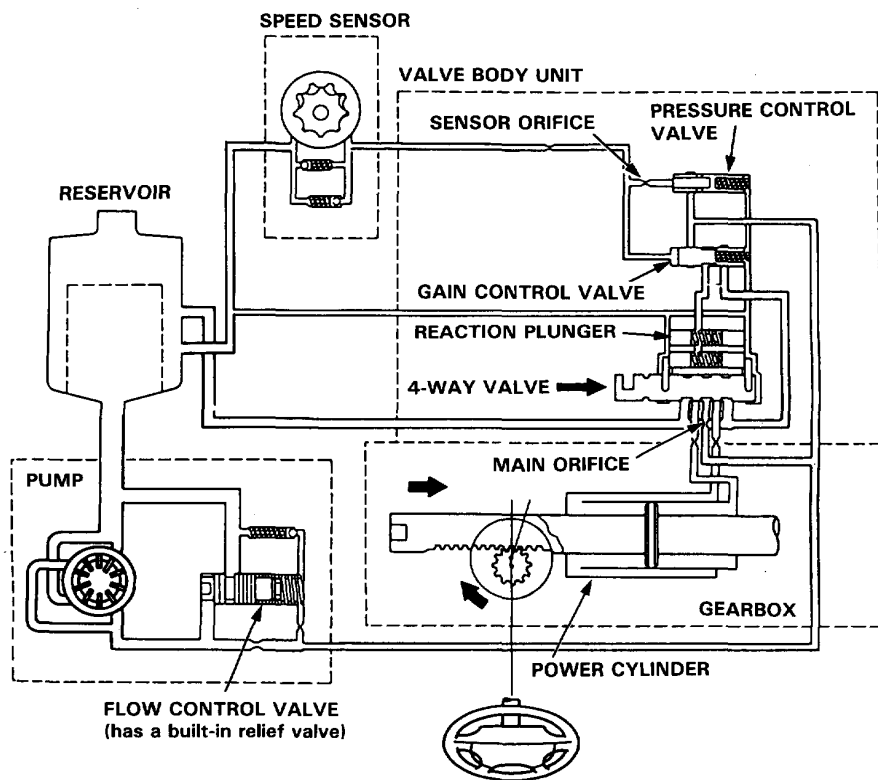
CAUTION: Use only Honda Power steering Fluid-V. The use of other fluid such as A.T.F., or other manufacturer's power steering fluid, will cause damage to the system.



System Description

Control Valve

Mounted on the lower side of the gearbox is a 4-way valve that is moved horizontally by a pin on the pinion holder to shift fluid pressure to the right or left side of the power cylinder when the steering wheel is turned. It has thrust pins at both ends, and two inter-connected reaction chambers, one on each side. Each reaction chamber contains a pair of spring-loaded plungers that rise against right and left thrust pins. The valve body fluid passages are controlled by the 4-way valve. Fluid pressure in the reaction chambers is reduced by the gain control valve in order to change the amount of the assist in accordance with the change in the car's speed.

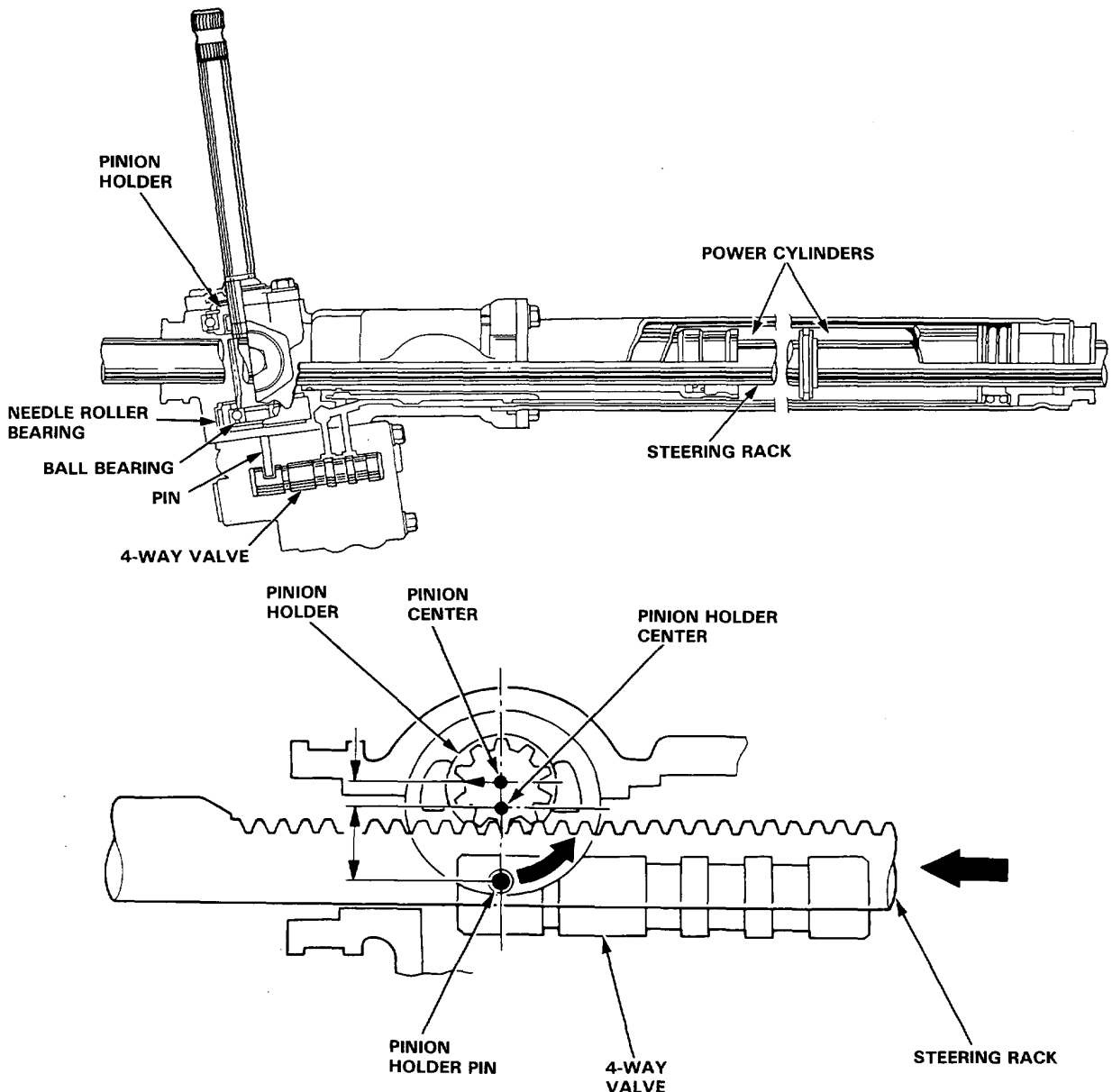




In the power steering unit, the method used to direct a single source of fluid pressure in either of two directions (for left or right turns) involves the pinion gear transferring a "message" of direction to the fluid in the 4-way valve. The pinion is mounted slightly off-center in a pair of bearings, which are in turn mounted in a pinion holder cylinder that rotates, centered in its own outer bearings. At the bottom of the Pinion Holder is a pin, which fits in a slot in the 4-way valve.

As the pinion is turned (to turn left or right), because it is off-center, it also moves slightly along the rack. This movement is transferred to the holder. The pin in the holder then moves the 4-way valve, to direct fluid pressure to either side of the rack in the power cylinder.

The back edges of the pinion holder (facing away from the rack) hit the stops cast into both sides of the gear housing to avoid pushing the 4-way valve too far in either direction. The front edge of the pinion holder cuts off assist at full lock as described on the next page.

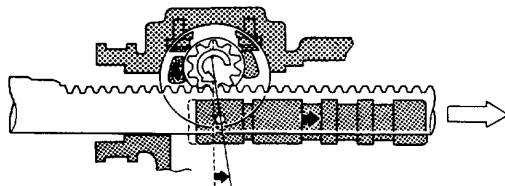


System description

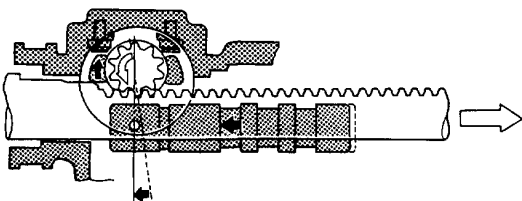
Full-lock Unloader System

The 4-way valve shifts the direction of fluid flow when the steering wheel is turned right or left. However, when the wheel is turned to the right or left lock at parking speed, the edge of the pinion holder rides up on the end of the rack, moving the pin in the opposite direction which pulls the 4-way valve back to neutral.

This keeps pump pressure from building up (which could cause idle speed to drop), and improves steering feel by increasing resistance at left and right lock.



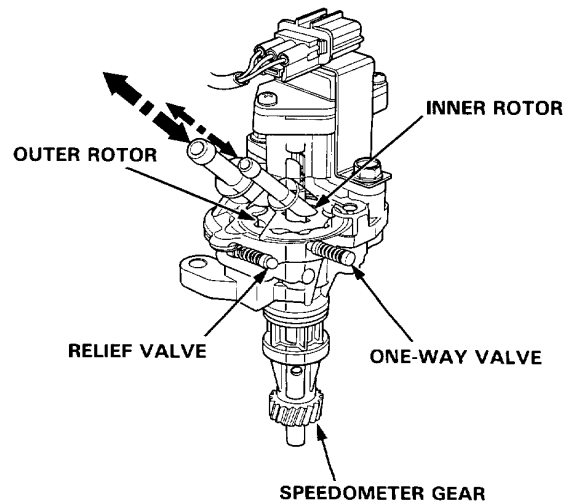
Control in "assist" position



4-way valve moves back to "neutral" position

Speed Sensor

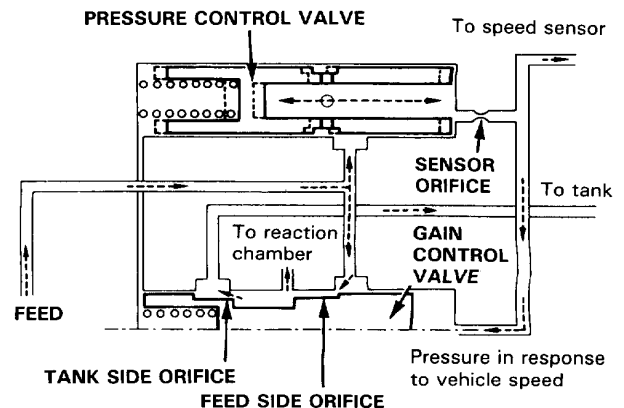
The speed sensor is a trochoid-rotor, hydraulic pump combined with a relief valve and a one-way valve. It is driven by the speedometer gear shaft which in turn is driven by a helical gear on the differential.



The speed sensor turns only when the car is moving, controlling the gain control valve.

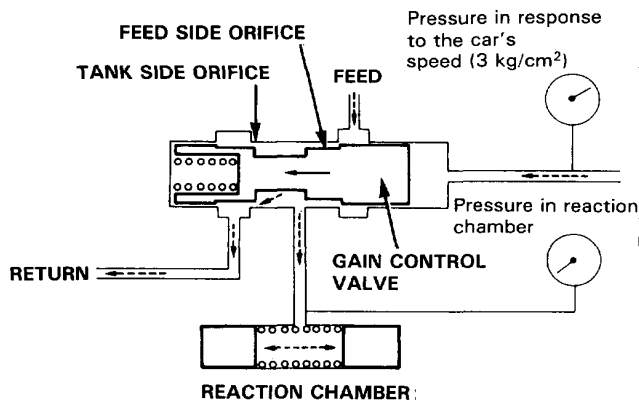
The constant pressure is generated by the pressure control valve.

This pressure is used as a reference pressure for the response to the car's speed. By introducing this pressure to the speed sensor through the sensor orifice, the pressure downstream of the orifice is changed according to the speed of the car.

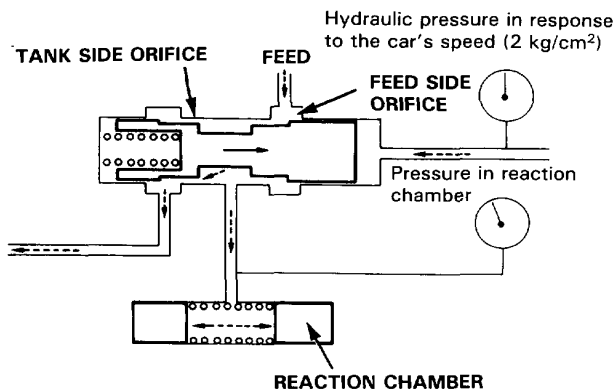




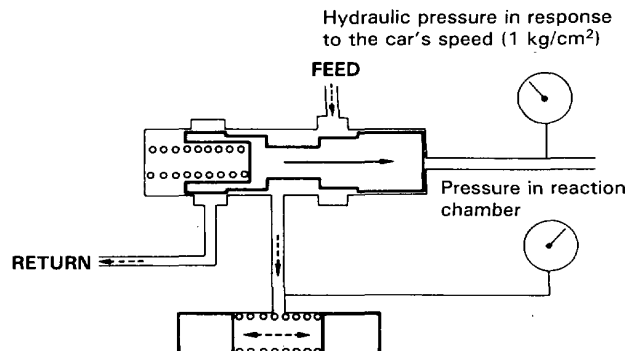
With the engine running at idle in a parked car, fluid flow through the sensor rotors is blocked because the rotors are not turning. Therefore the gain control valve moves to the left. On the gain control valve, the orifice resistance is high on pump side, while it is low on the tank side, with the result that pressure in the reaction chamber is lowered and steering assist is high.



As the car is driven, the rotors start turning and the fluid returns to the reservoir, reducing the fluid pressure at the gain control valve. Therefore, the gain control valve begins to move to the right. The orifice resistance on the pump and tank sides is appropriately balanced, with the result that the reaction chamber is in the medium range and the steering resistance is moderate.



When the car is moving at high speed, the sensor reduces the pressure further and the gain control valve moves further to the right. The orifice pressure on the pump side is low and the pressure on the tank side is high, the fluid pressure in the reaction chamber is also high giving the steering wheel less assist.



(cont'd)

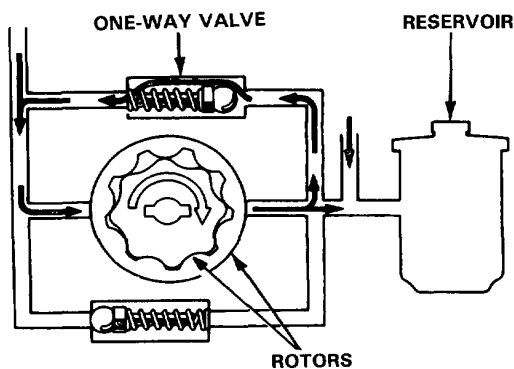
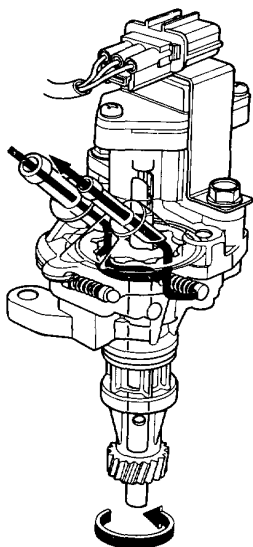
System Description

Speed Sensor (cont'd)

One-way Valve (In Speed Sensor)

When the car is moving at high speed, negative pressure develops at the sensor inlet because the sensor is pumping faster than the fluid can be supplied. To compensate for this, the outlet and inlet ports are connected internally by a passage containing a one-way valve that lets output fluid recirculate to the inlet port to equalize pressure.

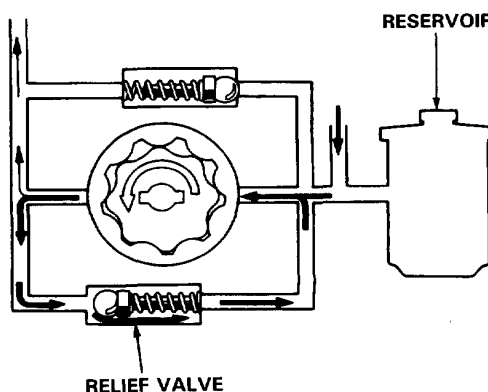
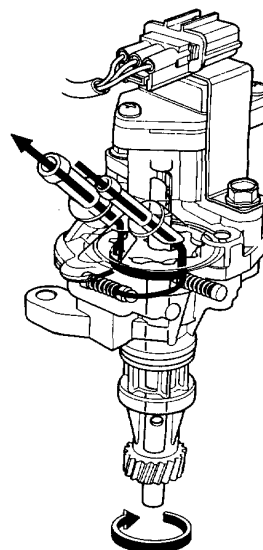
Driving at High Speed:



Relief Valve (In Speed Sensor)

When the car is moving in reverse, the speed sensor also turns backward and pumps fluid in the opposite direction. To avoid building up pressure in the reaction chambers that would increase steering effort while driving in reverse, the inlet and outlet ports are connected by a second internal passage containing a relief valve that allows the fluid to recirculate.

Driving in Reverse:

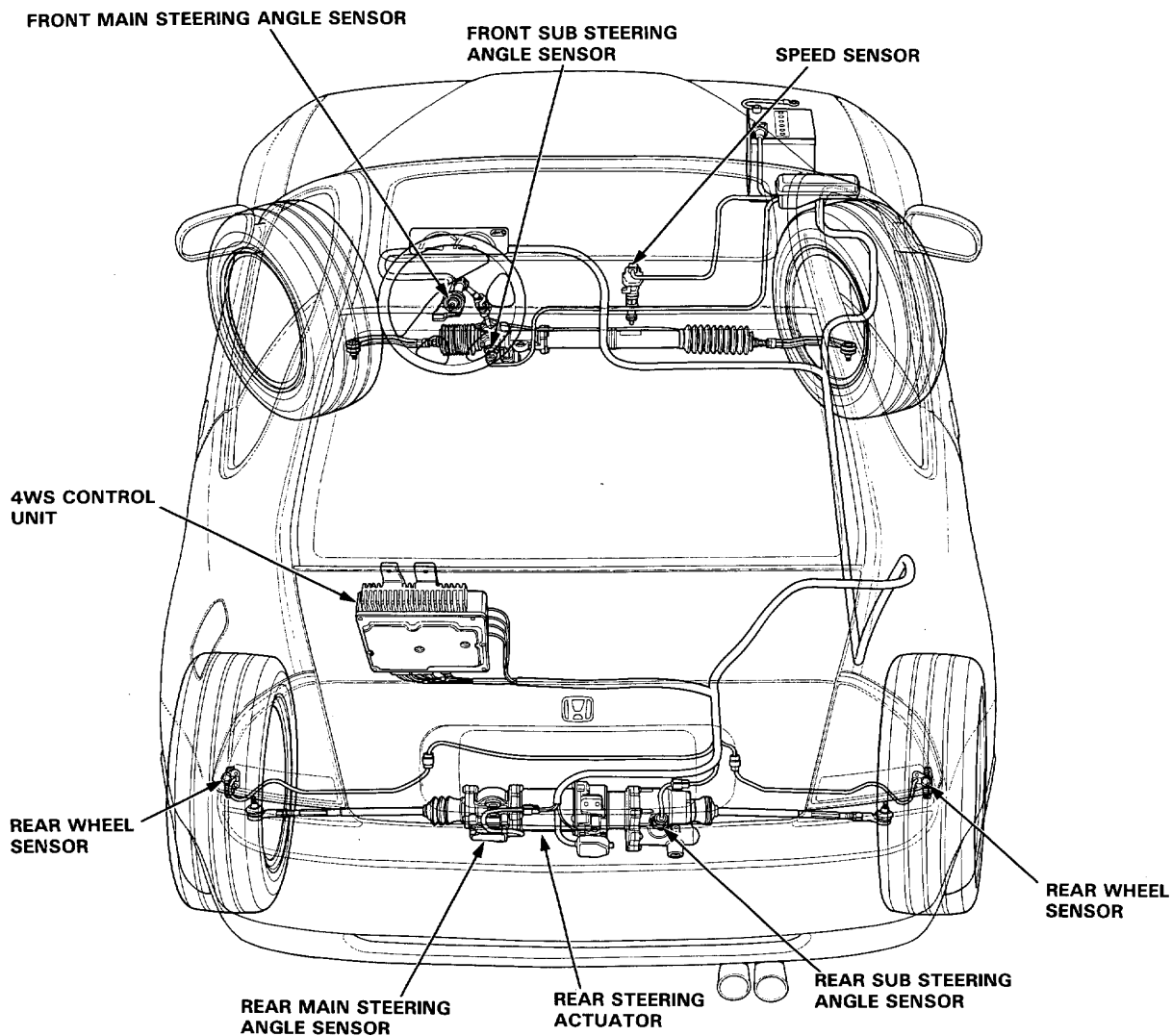




Electronically Controlled Power Assisted 4WS

Outline

The electronically controlled power assisted 4WS (4-wheel steering system) consists of the hydraulic power steering system that steers the front wheels, the rear actuator that steers the rear wheels, the 4WS control unit, and the sensors that detect the car's speed and other steering conditions. The front steering gearbox and the rear actuator are connected by a wire harness. The rear steering angle is controlled electrically, allowing the rear wheels to be set at any designated steering angle.



(cont'd)

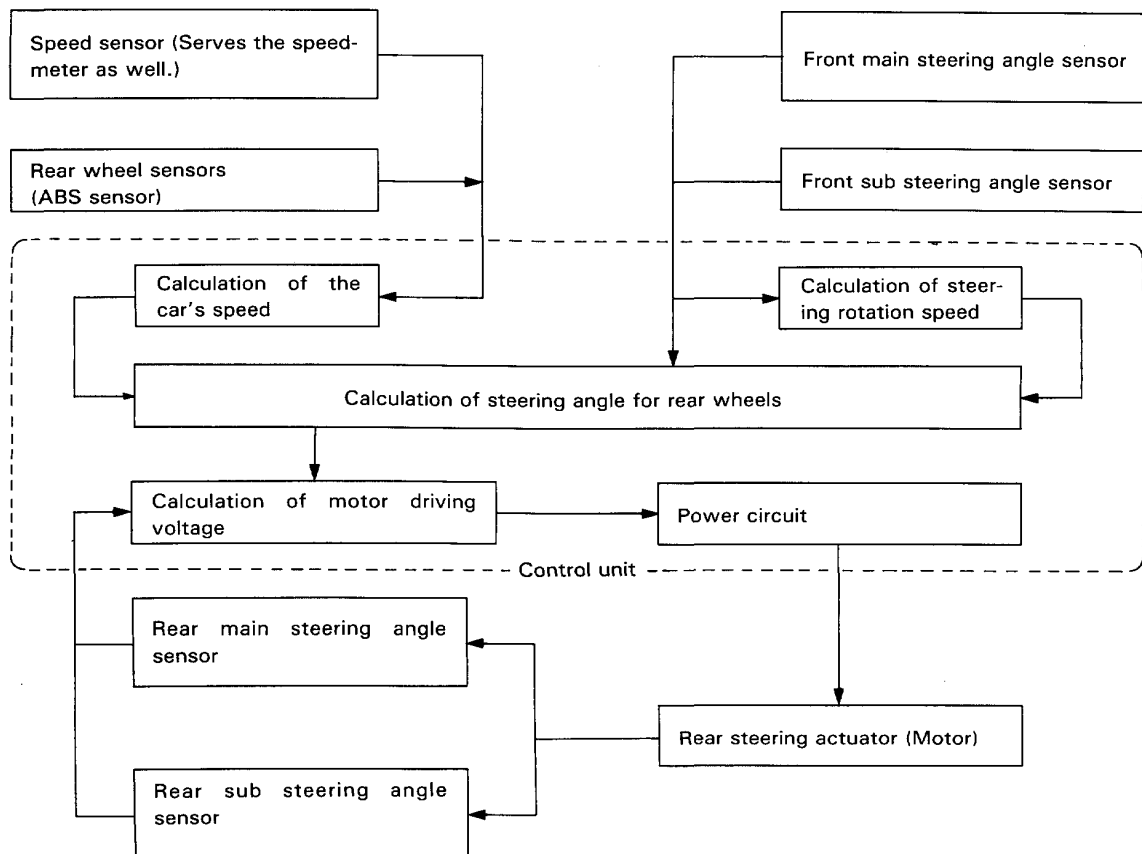
System Description

Electronically Controlled Power Assisted 4WS (cont'd)

System Operation

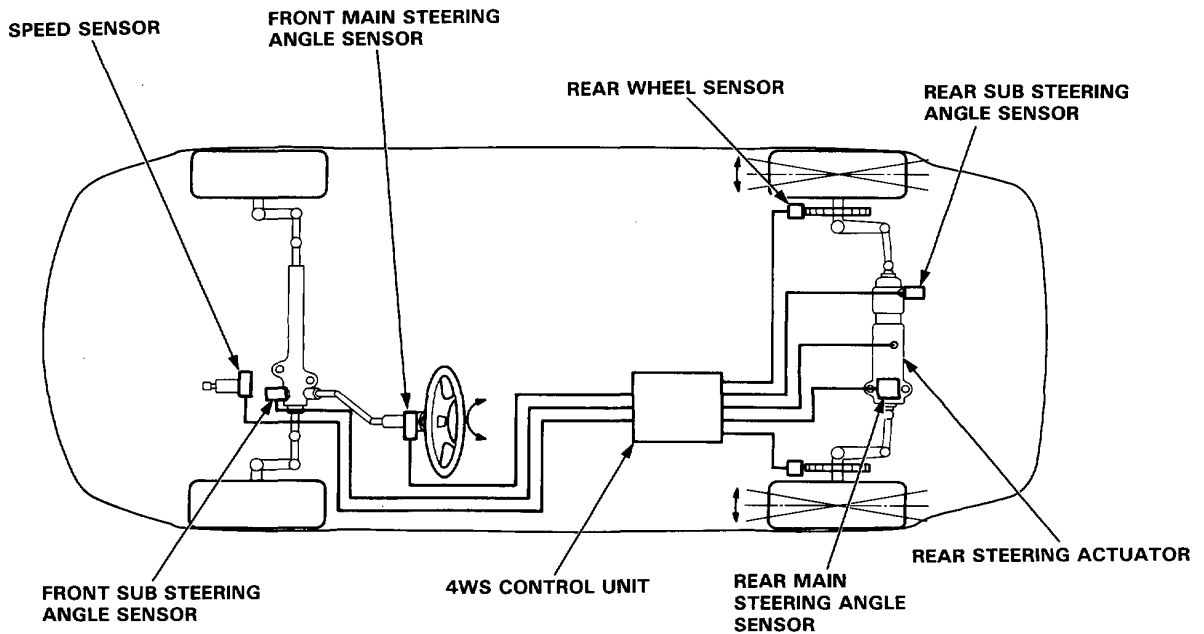
The 4WS control unit receives input from the vehicle speed sensor, front main steering angle sensor, and the front sub steering angle sensor. The control unit calculates the vehicle speed, steering turning angle, steering speed and steering direction to determine the best angle to steer the rear wheels.

(System operation flow)





The rear wheels are turned by a motor built into the rear steering actuator. The motor is activated by the power circuit in the control unit. The actual steering angle of the rear wheels is detected by the rear main steering angle sensor, and the rear sub steering angle sensor. The control unit adjusts the angle according to the difference between the sensed steering angle of the rear wheels and the targeted steering angle of the rear wheels.



System Description

Electronically Controlled Power Assisted 4WS (cont'd)

System Operation

Features of rear wheel steering:

The electronically controlled power assisted 4WS sets the rear wheels at the best steering angle for the car's speed, steering rotation speed, steering wheel angle, etc.

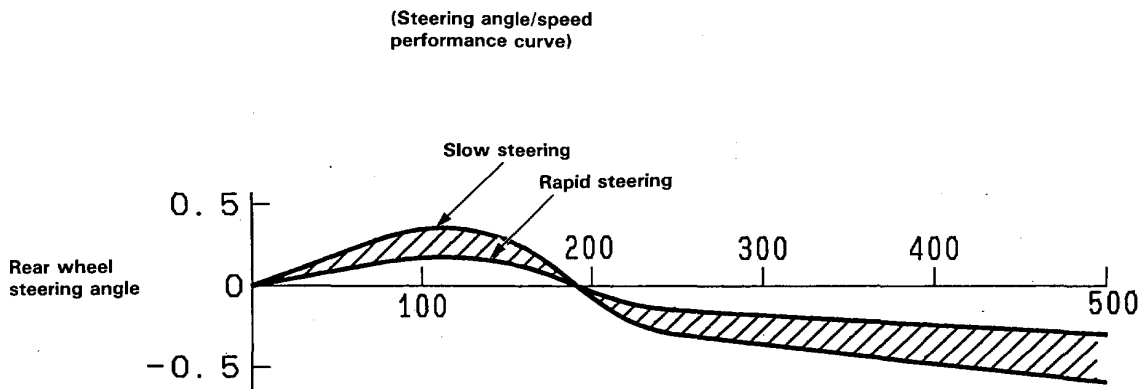
- Car speed

When the car is traveling at low speed, the 4WS system turns the rear wheels in the reverse direction of the front wheels in proportion to the rotation angle of the steering wheel. When the car is traveling a higher speed, the system increases the steering angle of the rear wheels in the same direction as the front wheels.

Changing the steering angle performance of the rear wheels in relation to the car's speed gives the car improved handling characteristics.

- Steering speed 30 km/h (18 mph) or above

The rear wheel steering angle varies with how rapidly the steering wheel is rotated. See graph.



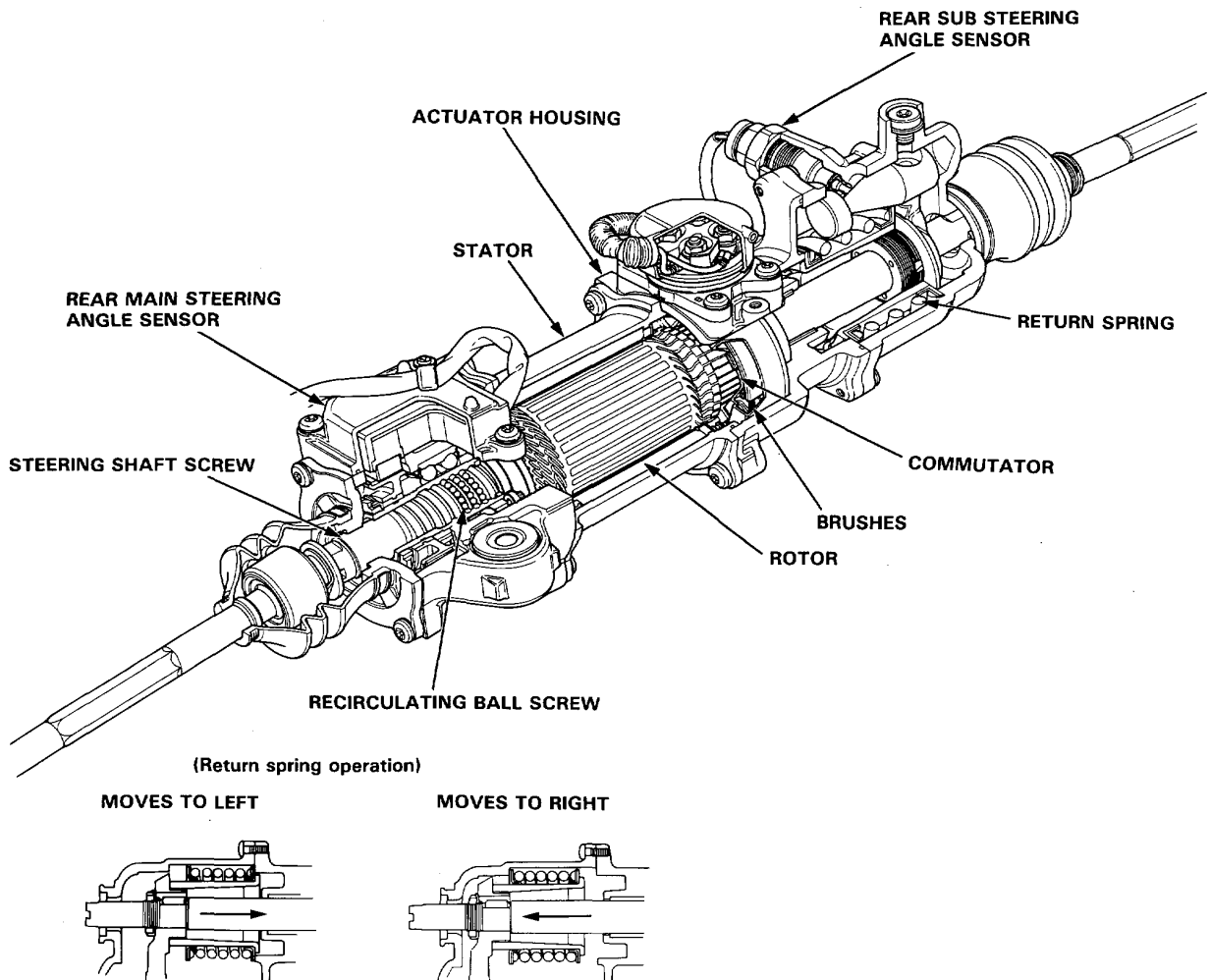


Component Function & Operation

Rear actuator:

The rear actuator is mounted at the rear of the car to steer the rear wheels. The motor, built into the actuator, is made up of a stator with a permanent magnet, a rotor, and brushes that pass electricity to the commutators. The motor is mounted on the same axis as the steering shaft screw, making the rear actuator compact and light in weight. The rear actuator also contains the rear main steering angle sensor and the rear sub steering angle sensor.

The control unit drives the electric motor with DC current. It switches the current polarity to change the motor's direction. Two strong return springs, one at each end of the actuator, provide a centering action. They return the rear wheels to the straight-ahead position whenever current is cut to the motor.



The return spring compresses when the steering shaft screw moves to right or left. When the motor is OFF, the steering shaft screw is held in the straight ahead (neutral) position by the force of the return spring.

(cont'd)

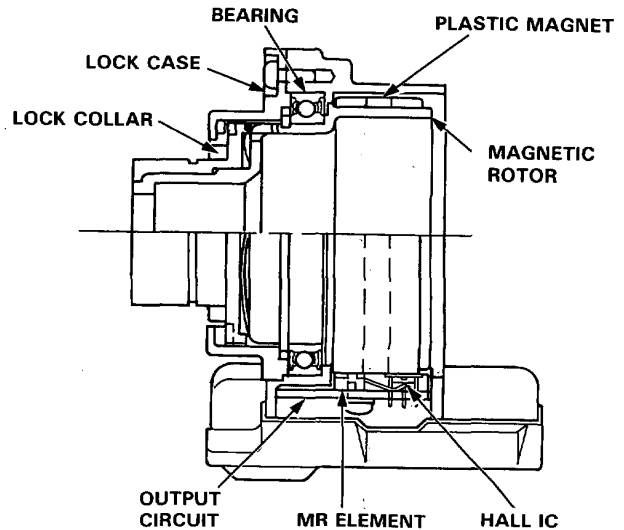
System Description

Electronically Controlled Power Assisted 4WS (cont'd)

Component Function & Operation

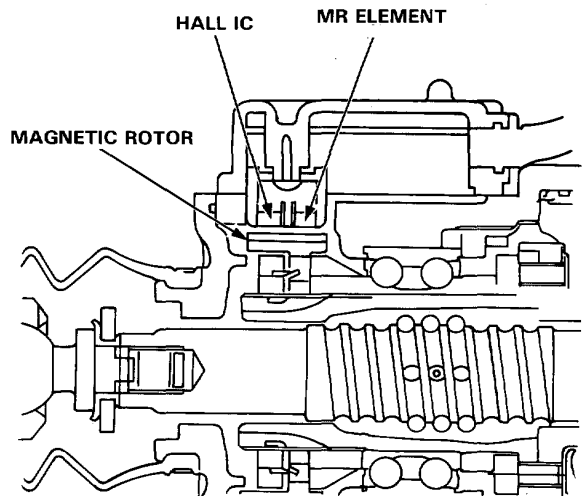
Front main steering angle sensor:

The front main steering angle sensor is mounted in the steering column. It senses the direction and angle of steering wheel rotation and converts it to electrical signals that are sent to the control unit.



Rear main steering angle sensor:

The rear main steering angle sensor is mounted on the rear actuator. It senses the direction and angle of the rear wheels and sends signals to the control unit. The control unit uses this information as feedback to determine if the actual rear wheel position matches the desired position.



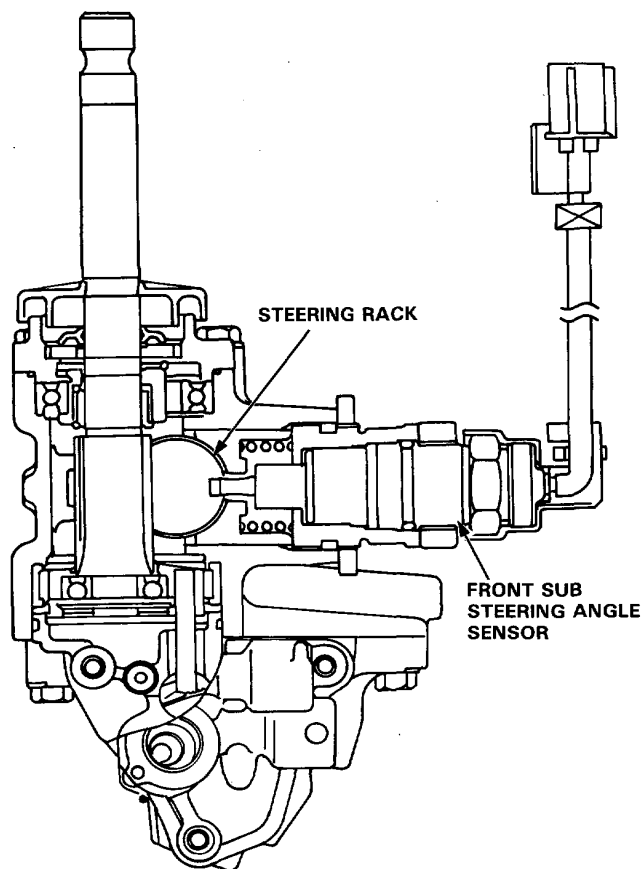
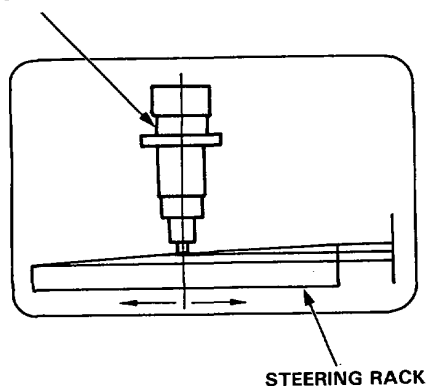


Front sub steering angle sensor:

The front sub steering angle sensor is mounted on the front steering gearbox. Its purpose is to detect the position of the front wheels and convert this information to an electrical signal for the control unit.

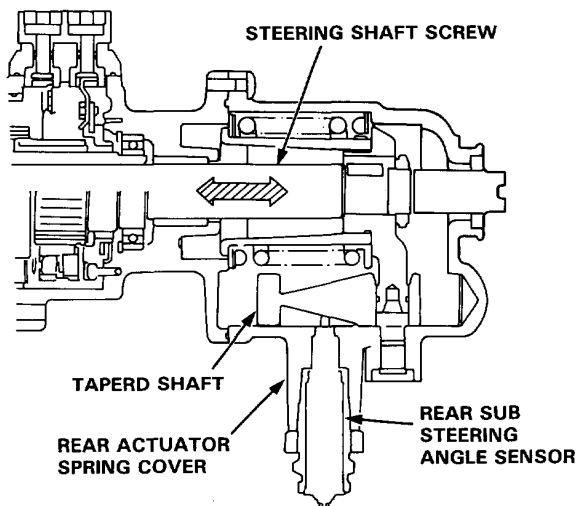
The front sub steering angle sensor uses a spring-loaded plunger that rides in a sloped groove in the rack. As the rack turns the front wheels, the plunger rides up the slope and is pushed into the differential transformer assembly. The plunger's position is used to determine how far the rack is turned.

FRONT SUB STEERING ANGLE SENSOR



Rear sub steering angle sensor:

The rear sub steering angle sensor is mounted on the rear actuator spring cover. It detects the position of the rear wheels as a feedback signal for the control unit. It operates in exactly the same way as the front sub steering angle sensor.



(cont'd)

System Description

Electronically Controlled Power Assisted 4WS (cont'd)

Component Function & Operation (cont'd)

- Average moving current control

The control unit monitors the average moving current of the motor to protect the system. When the average moving current exceeds a given value, the control unit lowers the current to change steering angle of the rear wheels gradually (approximately 6 degrees/30 seconds). When the average moving current to the motor is below the given value, the rear wheels return to the designated steering angle slowly (approximately 6 degrees/2 minutes).

- Over-voltage control

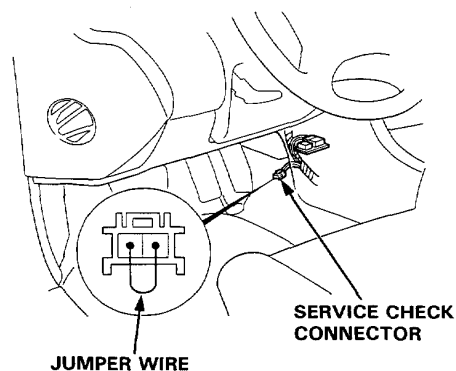
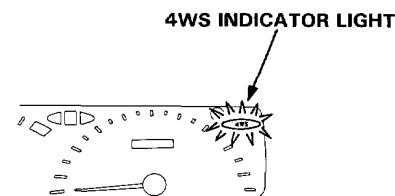
An increase in battery voltage (due to a voltage regulator failure, for example) could cause excessive actuation of the motor and erratic control of the rear wheels. To prevent this, the control unit monitors the voltage. If it exceeds a given value, the control unit slowly returns the rear wheels to the straight-ahead position by reducing voltage to the motor and turns the 4WS indicator light ON.



Fail-safe Function:

When the control unit senses a failure in the system, it switches to fail-safe mode. In this mode, it powers the fail-safe and damper relays. The fail-safe relay cuts power to the rear steering motor, while the damper relay slows the motor's return to neutral. As a result, the rear wheels return slowly to the straight-ahead position and then remain there. The car then drives like conventional 2WS.

When the control unit switches to fail-safe mode, it stores a problem code and turns on the 4WS indicator light to notify the driver of a problem. This error code can be read by connecting the maintenance connector terminals with a jumper wire under the dash. The error code is read as blinks of the 4WS indicator light.



Damper Control:

When the system goes into fail-safe mode, it cuts power to the motor by powering the fail-safe relay. Without some type of damping, the return springs would turn the rear wheels to the straight-ahead position too rapidly, adversely affecting the car's handling.

To counteract this, the control unit also powers the damper relay. The armature of the now deactivated motor is spun by the movement of the steering shaft. This causes the motor to act as a generator. The voltage generated by this action is applied back to the motor through the damper relay. This causes the motor to resist the force of the return springs, allowing the rear wheels to go back to the straight-ahead position slowly.

(cont'd)

System Descripton

Electronically Controlled Power Assisted 4WS (cont'd)

Component Function & Operation (cont'd)

- Electronic neutral position

For the 4WS system to work correctly, it must be in electronic alignment as well as mechanical alignment. In other words, the system's front and rear sensors must signal that the wheels are pointed straight-ahead when the wheels are mechanically pointed straight ahead. The technician can test for "electronic straight-ahead" by connecting the maintenance connector terminals with a jumper wire and turning the front and rear wheels.

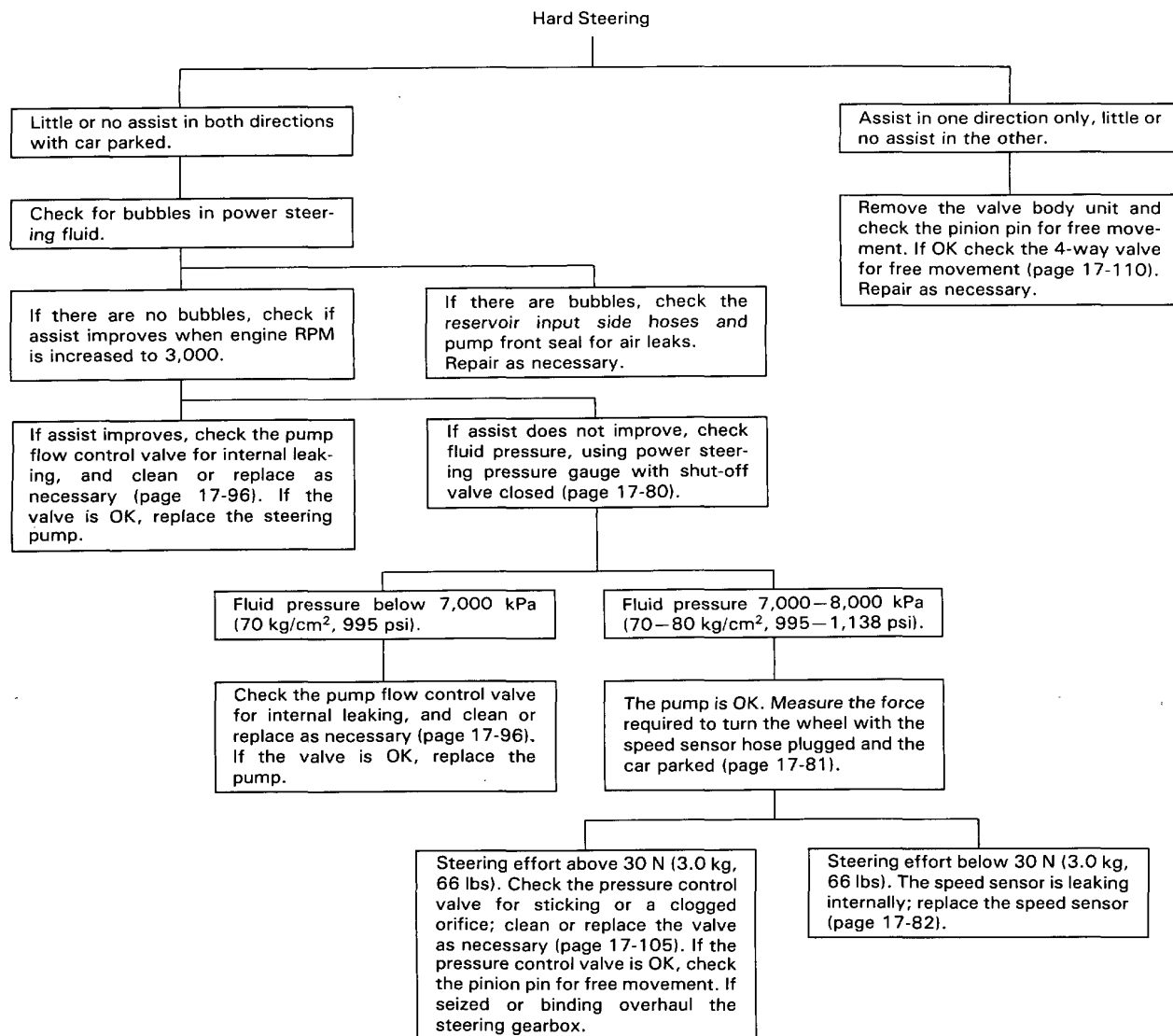


Troubleshooting (Power Steering System)

General Troubleshooting

Check the following before you begin:

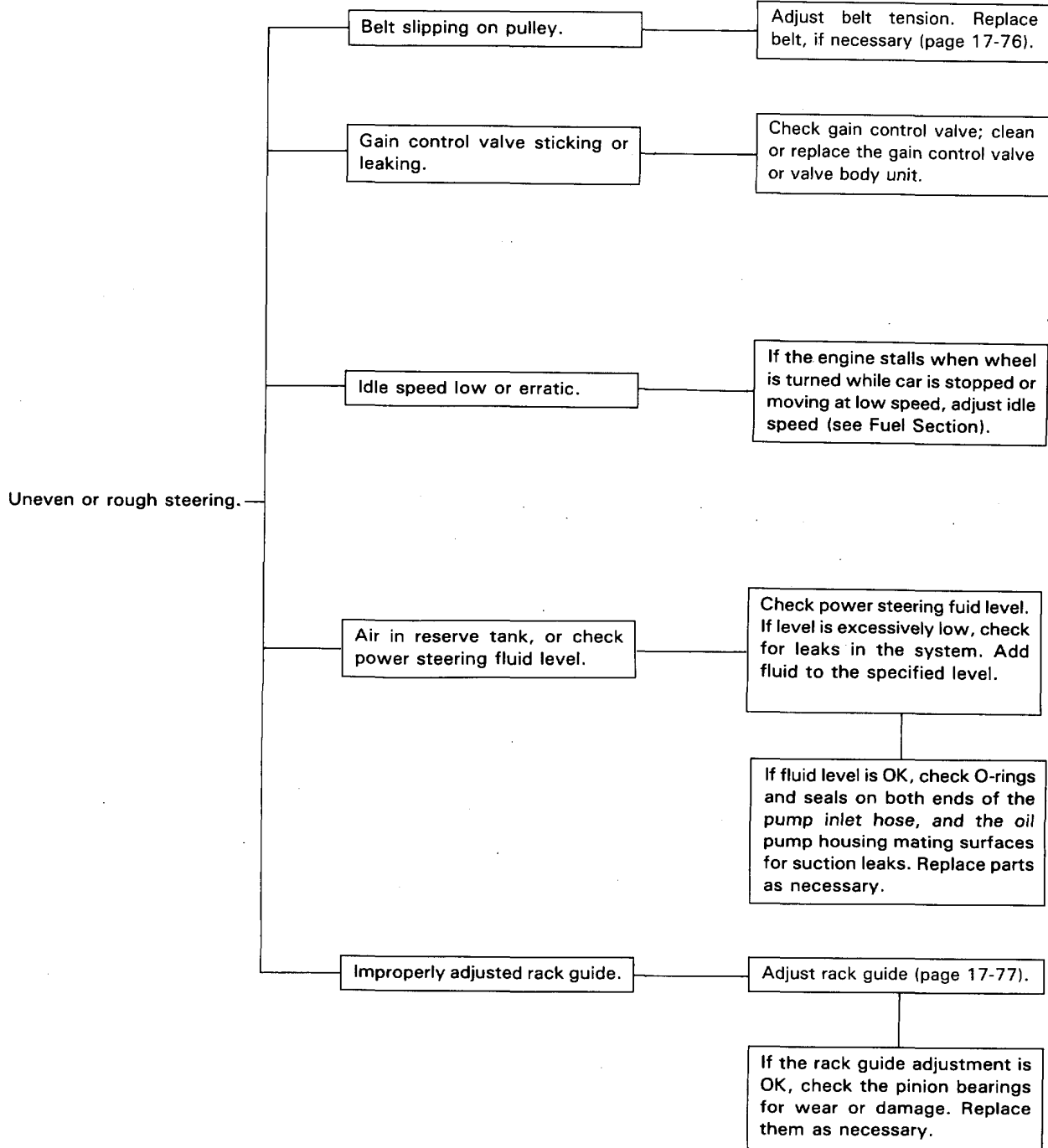
- Has the suspension been modified in a way that would affect steering?
- Are tire sizes and air pressure correct?
- Is the steering wheel original equipment or equivalent?
- Is the power steering pump belt properly adjusted?
- Is steering fluid reservoir filled to proper level?
- Is the engine idle speed correct and steady?



(cont'd)

Troubleshooting (Power Steering System)

General Troubleshooting (cont'd)





Shock or vibration when wheel is turned to full lock.

Pump belt slipping on pulley (pump stops momentarily).

Adjust belt tension (page 17-76) or replace belt.

Set the power steering pressure gauge. Close the shut-off valve fully and measure the pump pressure (see page 17-80).

Check if pump pressure is within the range 7,000–8,000 kPa (70–80 kg/cm², 995–1138 psi) and the gauge needle travel is ± 500 kPa (± 5 kg/cm², ± 70 psi) or less. Check the flow control valve if the needle travel exceeds ± 500 kPa (± 5 kg/cm², ± 70 psi) (see page 17-80). If the flow control valve is normal, replace the pump as an assembly.

Assist (excessively light steering) at high speed:

Measure force required to turn wheel with bypass tube joint installed, and car parked on dry paved surface (page 17-82).

If below, check gain control/pressure control valves and valve body unit and replace parts as necessary.

Pump belt slipping.

Adjust belt tension (page 17-76) or replace belt.

Steering kicks back during wide turns.

Sticking gain control valve or valve body unit.

Replace gain control valve or valve body unit.

Rack guide adjusted too loose.

Adjust rack guide (page 17-77).

Tire pressure too low.

Inflate to correct pressure.

Wheel will not return smoothly.

Improper front wheel alignment.

Readjust front wheel alignment or replace parts as necessary.

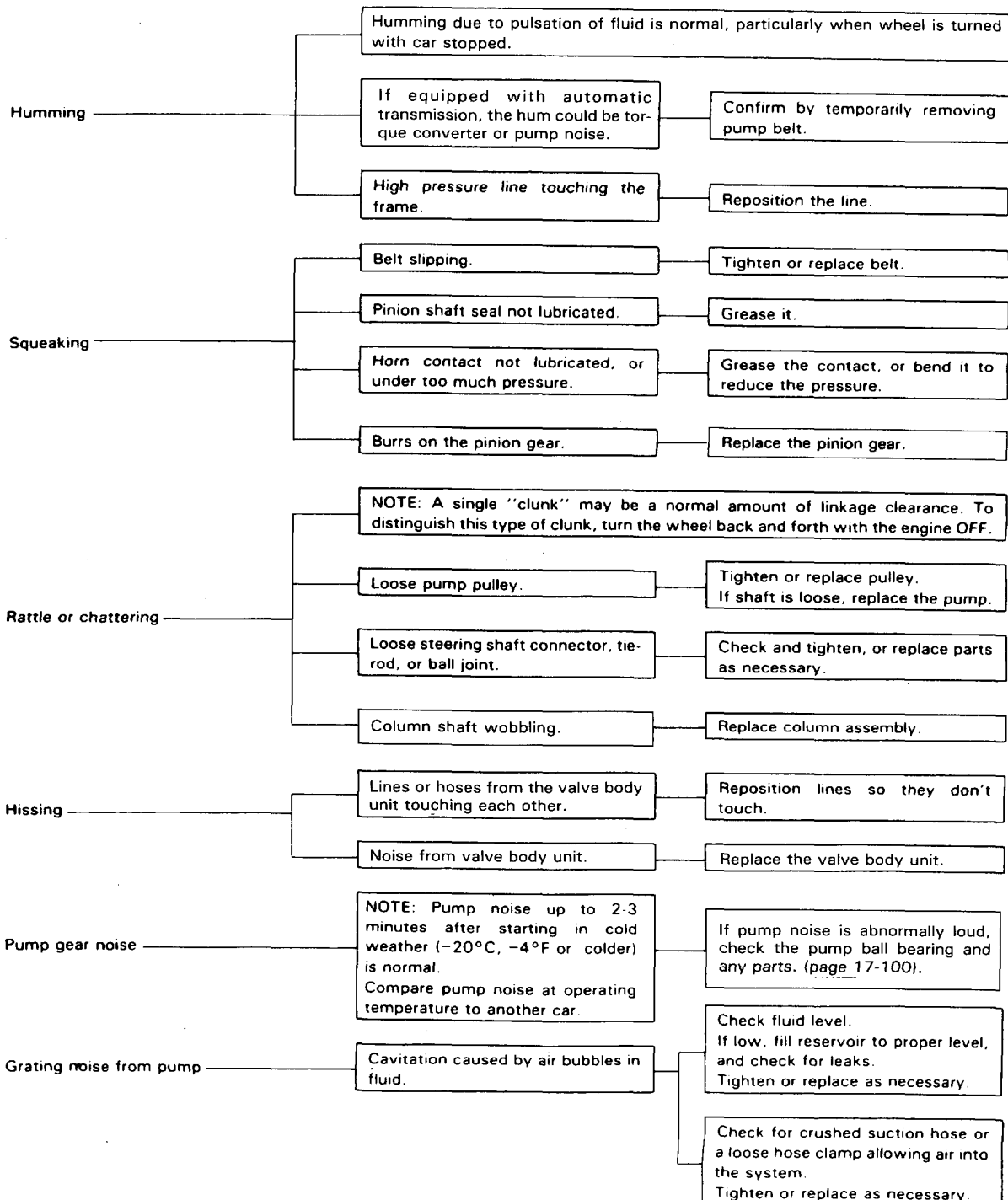
Improperly adjusted rack guide.

Adjust rack guide (page 17-77).

Troubleshooting (Power Steering System)

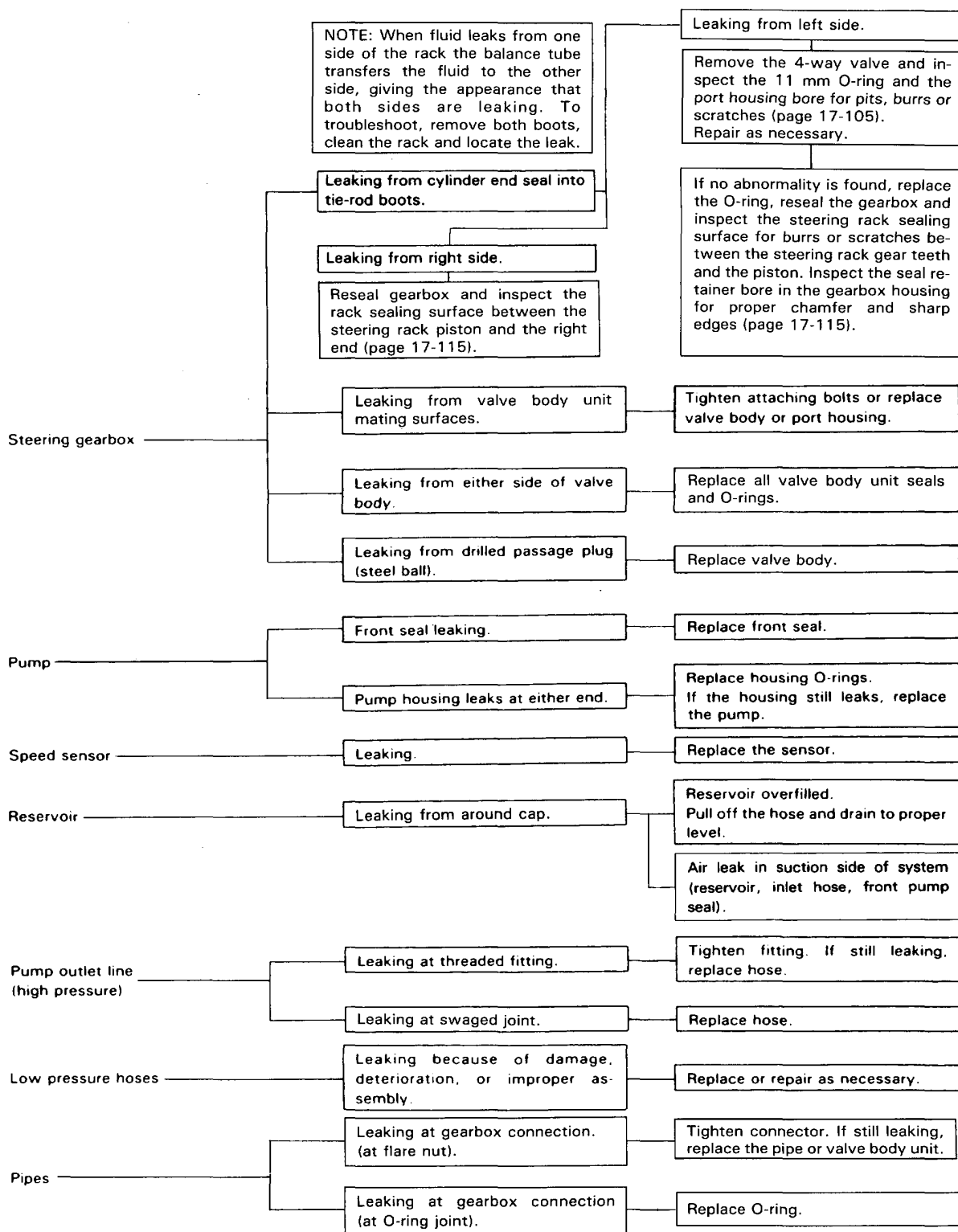
Noise and Vibration

NOTE: Pump noise in first 2—3 minutes after starting in cold weather (-20°C , -4°F or colder) is normal.



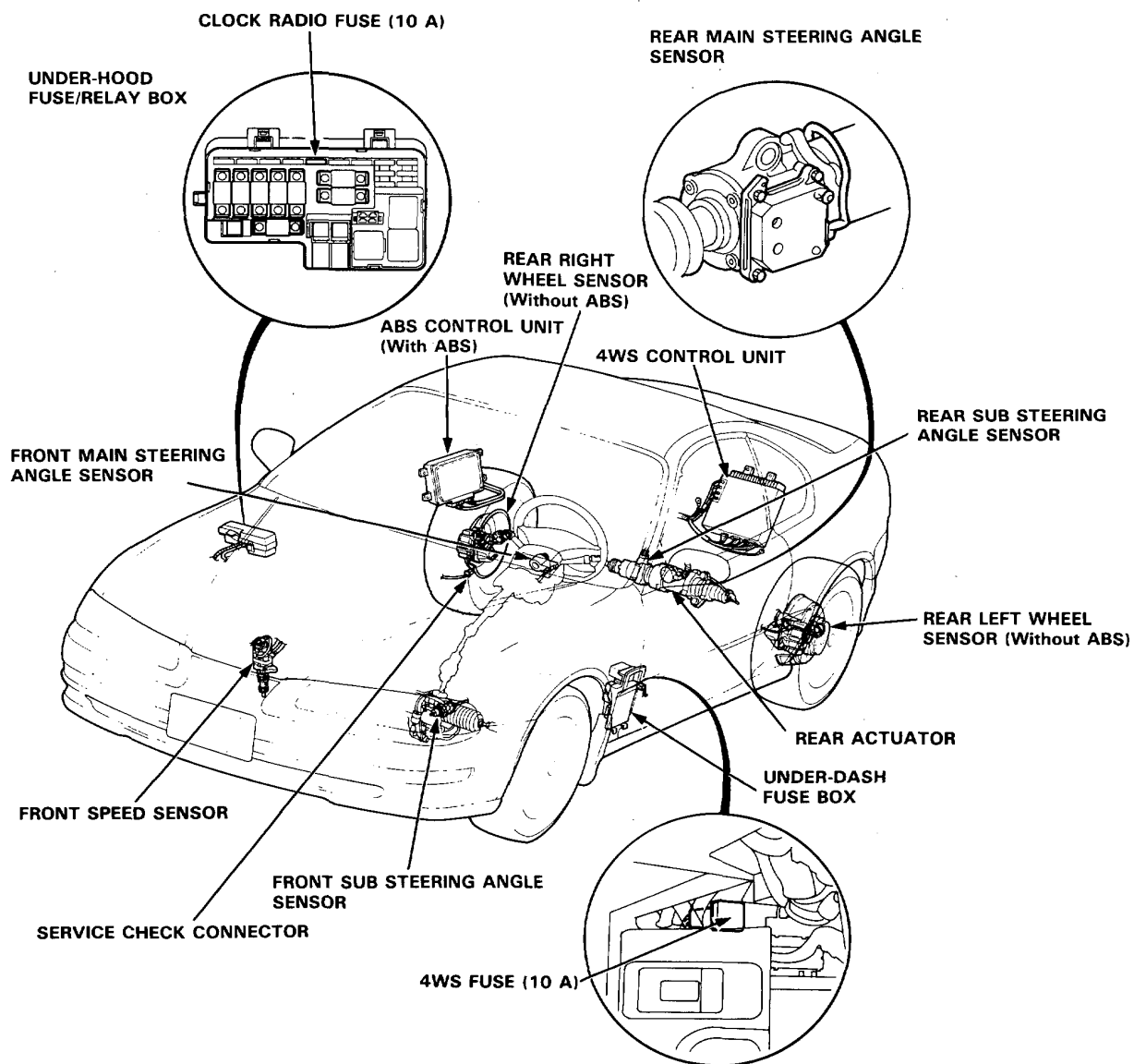


Fluid Leaks



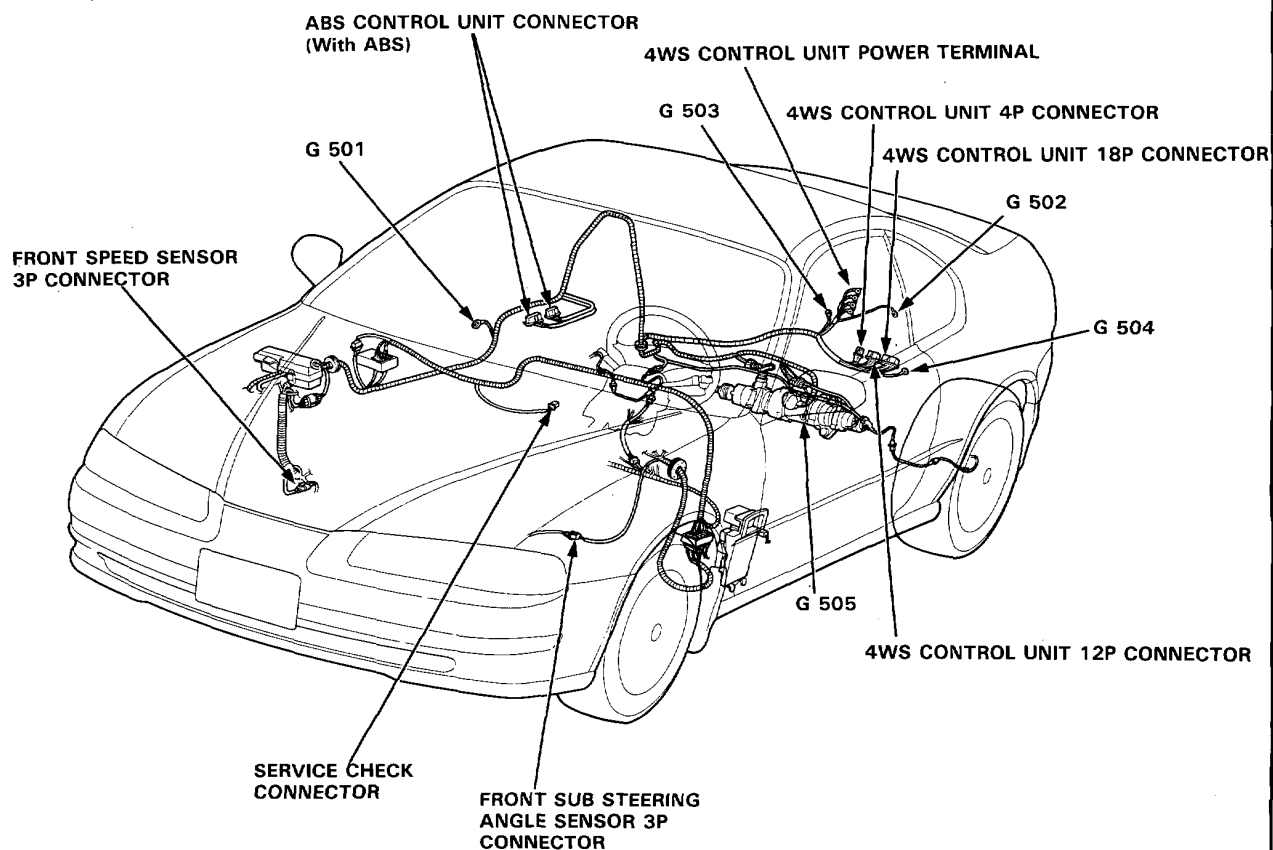
Troubleshooting (4WS)

Component Location



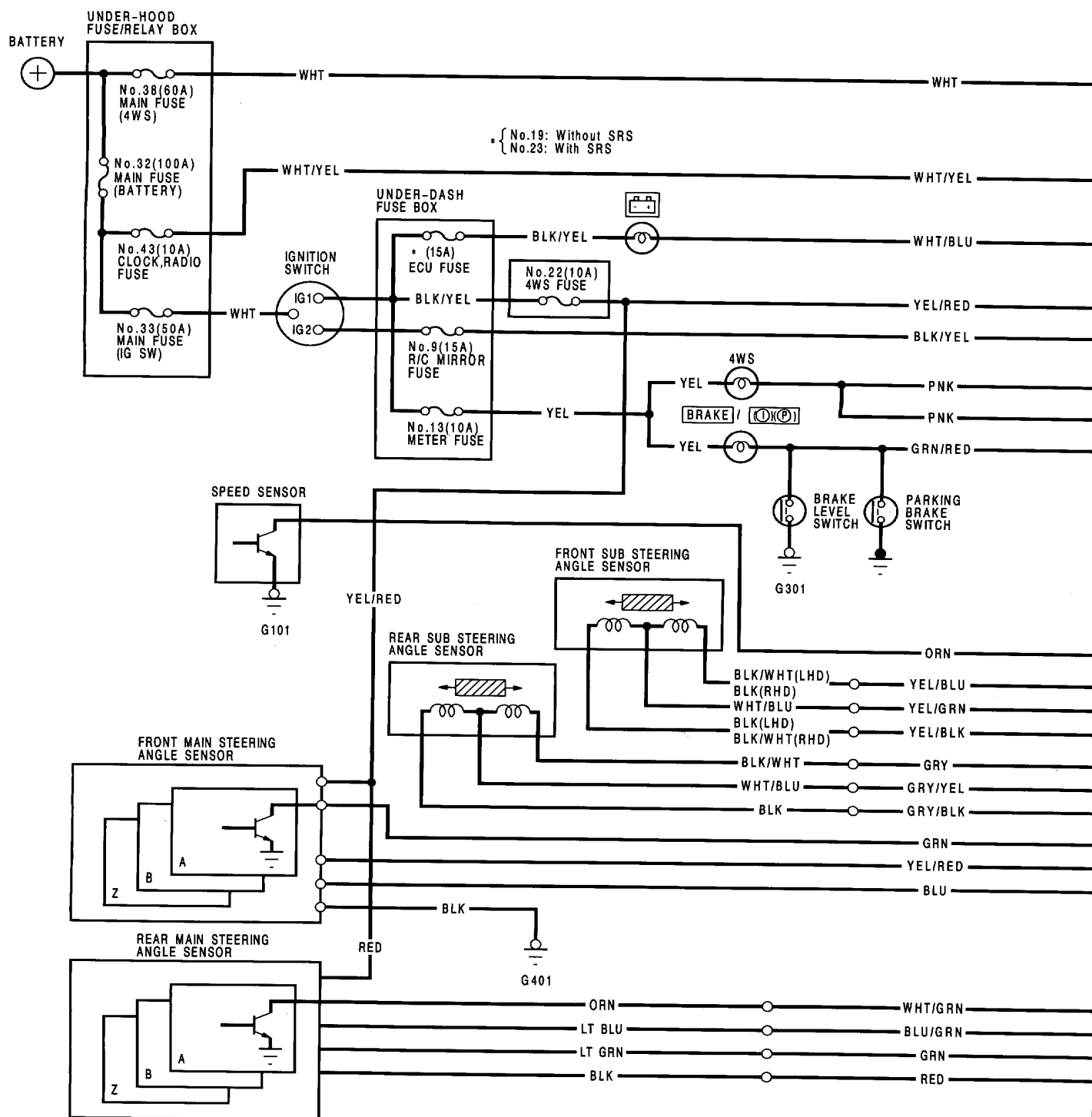


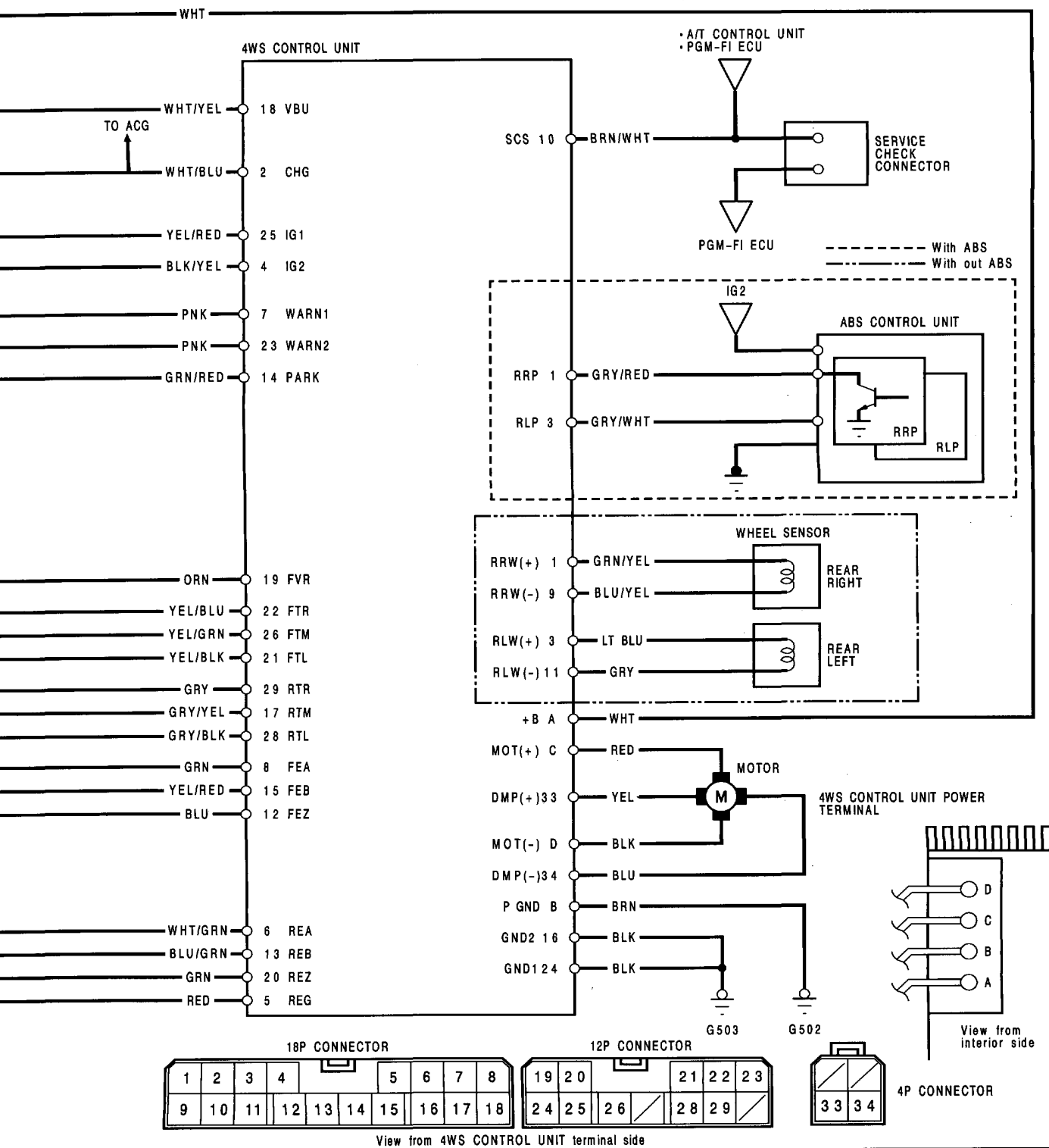
Connector Locations



Troubleshooting (4WS)

Circuit Diagram





Troubleshooting (4WS)

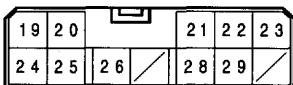
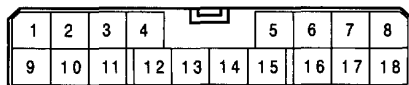
4WS CONTROL UNIT Terminal Arrangement

18P CONNECTOR (A)

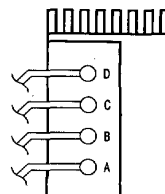
12P CONNECTOR (B)

4P CONNECTOR (C)

POWER TERMINAL (D)



View from control unit terminal side

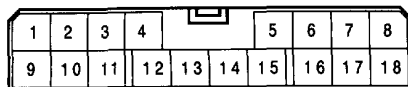


View from interior side

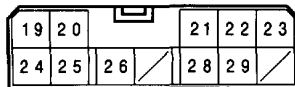
con- connector	con- connector No.	Wire color	Terminal name	Check		
				Measurement condition	Normal voltage	Measuremt terminals
A	1	GRY/RED	Rear right pulse Rear right wheel sensor	While R/R wheel is being rotated. 1 turn/sec. AC range	5 V—0 V 60 mV min	1—24 1—9
	2	WHT/BLU	Charge	Engine ON Engine OFF	Battery voltage. 0 V	2—24
	3	GRY/WHT	Rear left pulse Rear left wheel sensor	While R/L wheel is being rotated. 1 turn/sec. AC range	5 V—0 V 60 mV min	3—24 3—11
	4	BLK/YEL	Ignition 2	IG SW ON IG SW OFF	Battery voltage 0 V	4—24
	5	RED	Rear main steering angle sensor ground	—	0.3 V max.	5—ground
	6	WHT/GRN	Rear main steering angle sensor A phase	While actuator motor is running	5 V—0 V	6—24
	7	PNK	Warning 1	Light ON Light OFF	0 V Battery voltage	7—24
	8	GRN	Front main steering angle sensor A phase	While steering wheel is being rotated	5 V—0 V	8—24
	9	BLU/YEL	Rear right wheel sensor	1 turn/sec. AC range	60 mV min	9—1
	10	BRN/WHT	Service check signal	Short Open	0 V 5 V	10—24
	11	GRY	Rear left wheel sensor	1 turn/sec. AC range	60 mV min	11—3
	12	BLU	Front main steering angle sensor Z phase	While steering wheel is being rotated	5 V—0 V	12—24
	13	BLU/GRN	Rear main steering angle sensor B phase	While actuator motor is running	5 V—0 V	13—24
	14	GRN/RED	Parking brake	ON OFF	0 V Battery voltage	14—24
	15	YEL/RED	Front main steering angle sensor B phase	While steering wheel is being rotated	5 V—0 V	15—24
	16	BLK	Ground 2	—	0.3 V max.	16—ground
	17	GRY/YEL	Rear sub steering angle sensor center	Analog tester DC range	2.5 V	17—24
	18	WHT/YEL	Back up power source	At all times	Battery voltage	18—24



18P CONNECTOR (A)



12P CONNECTOR (B)

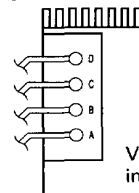


4P CONNECTOR (C)



View from control unit terminal side

POWER TERMINAL (D)



View from interior side

con- nector	con- nector No.	Wire color	Terminal name	Check		
				Measurement condition	Normal voltage	Measuremt terminals
B	19	ORN	Vehicle speed sensor	While front wheel is being rotated	5 V— 0 V	19—24
	20	GRN	Rear main steering angle sensor Z phase	While actuator motor is running	5 V—0 V	20—24
	21	YEL/BLK	Front sub steering angle sensor left	Analog tester DC range	approx. 2.5 V	21—24
	22	YEL/BLU	Front sub steering angle sensor right	Analog tester DC range	approx. 2.5 V	22—24
	23	PNK	Warning 2	Light ON Light OFF	0 V Battery voltage	23—24
	24	BLK	Ground 1	—	0.3 V max.	24—ground
	25	YEL/RED	Ignition 1	IG ON IG OFF	Battery voltage 0 V	25—24
	26	YEL/GRN	Front sub steering angle sensor center	Analog tester DC range	approx. 2.5 V	26—24
	27	—	—	—	—	—
	28	GRY/BLK	Rear sub steering angle sensor left	Analog tester DC range	approx. 2.5 V	28—24
	29	GRY	Rear sub steering angle sensor right	Analog tester DC range	approx. 2.5 V	29—24
	30	—	—	—	—	—
	31	—	—	—	—	—
	32	—	—	—	—	—
C	33	YEL	Damper	Resistance range Disconnect 4P connector. Start the engine	Continuity ↓ Momentarily open, no continuity	33—34 control unit terminal
	34	BLU	Damper			
D	A	WHT	Motor power source	At all times	Battery voltage	A—B
	B	BRN	power (motor) ground	—	0.3 V max.	B—ground
	C	RED	Motor terminal	Start the engine	0 V ↓ Battery voltage	C—B
	D	BLK	Motor terminal			D—B

* The normal voltage is the value when the system is working properly.

Troubleshooting (4WS)

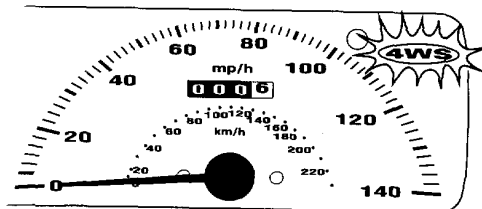
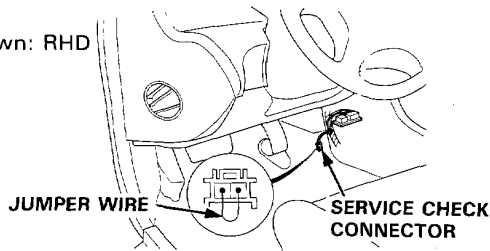
Problem Codes

To display a problem code:

- (1) Turn the ignition switch OFF.
- (2) Pull out the service check connector (2P blue) located behind the center console and connect the two terminals of the connector with a jumper wire.

NOTE:

LHD is shown: RHD is similar.

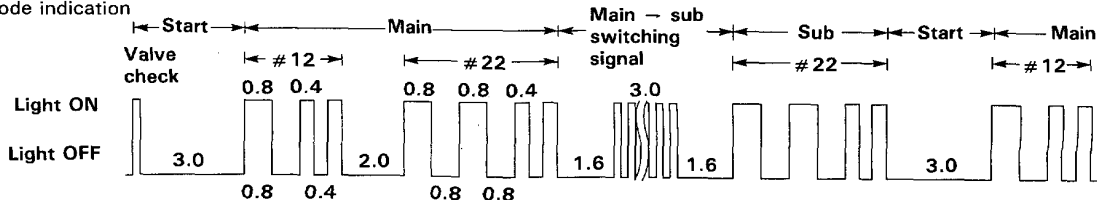


- (3) Turn the ignition switch ON. (Do not start the engine)
- (4) Watch as the 4WS indicator light blinks to display the problem code.
- (5) Record the problem code.

NOTE:

- Be sure to record the problem code. If you do any of the following, the problem code will be erased.
 - Disconnect the battery terminals.
 - Remove No. 43 CLOCK RADIO (10 A) fuse from the under-hood fuse/relay box.
 - Disconnect the 4WS control unit connector.
- If the engine is started with the service connector jumped, the PGM-FI light will stay on.

Problem code indication pattern



The 4WS indicator light displays a problem code by a series of long and short blinks. This indicator light can display multiple component problems by blinking separate codes, one after another. The number of long blinks equals the first digit of the code, the number of short blinks equals the second digit. When there are multiple codes, there is a two second pause between the codes.

System problems can be detected by both the main and sub central processing units (CPUs) in the 4WS control unit. Each CPU can memorize up to 10 problem codes. If both CPUs have stored problem codes, the 4WS indicator light will:

- Blink quickly once as an indicator light check, (this happens only when the ignition switch is first turned on).
- Pause for three seconds.
- Display the problem codes stored in the main CPU.
- Pause for 1.6 seconds.
- Blink rapidly for three seconds to indicate the switch between the main and sub CPU.
- Pause for 1.6 seconds.
- Display the problem codes stored in the sub CPU.
- Pause for three seconds, then repeat the cycle.

This cycle will continue until the ignition is turned OFF.

NOTE: If the main and sub CPUs display the same problem codes, those codes need only be checked once.



Precautions

PROBLEM CODES

The problem code is memorized when the 4WS control unit detects an abnormality, even if it was a temporary condition. To troubleshoot, ask the customer in detail about the conditions when the 4WS indicator light came on, and try to duplicate those conditions during the test drive. If the 4WS indicator light does not come on during the test drive, do not continue to troubleshoot; the system is OK at this time. The troubleshooting procedures assume that the symptom is occurring. Check for loose connections or poor contacts at the connectors by wiggling the harness, etc.

4WS INDICATOR

The 4WS indicator light comes on when the 4WS control unit detects a problem in the system. Depending on the problem, the 4WS indicator light may be canceled by turning the ignition switch off, or it might require removing the clock/radio fuse. If a problem is detected in the main steering angle sensor system, you must remove the clock/radio fuse to cancel the 4WS indicator light. If a problem is detected in any other part of the system, turning the ignition switch off will cancel the 4WS indicator light.

NOTE: If the 4WS light comes on because of a temporary problem in the main steering angle sensor system, it cannot be canceled by simply removing the cause of the problem and cycling the ignition switch; the clock/radio fuse must be removed.

The 4WS indicator light does not come on when the problem code is 71, 72, or 73. However, the 4WS indicator light will flash these codes when the service check connector is jumped.

TEMPORARY DRIVING CONDITIONS:

When the vehicle is operated under extremely harsh or abnormal conditions, the 4WS control unit interprets it as a problem and memorizes the problem code.

Problem code	Operation	4WS Indicator Light
70	The ignition is turned from OFF to ON while driving.	ON
71	The car is driven aggressively with the driver and three passengers on board, or the steering wheel is turned with a rear wheel blocked by the curb, etc.	—
73	The engine is started while quick-charging the battery.	—
74	Driving the car with the parking brake ON.	ON 5 minutes after detection

Fail-safe control:

- When the fail-safe conditions are met, the 4WS control unit stops the 4WS control and returns the rear wheels to the straight driving position slowly.
- When the car is idling with the rear wheels turned to a designated steering angle, the 4WS control unit returns the rear wheels to the straight driving position slowly.
When the steering wheel is turned, the 4WS control unit returns the rear wheels to the designated steering angle slowly.

Troubleshooting (4WS)

Symptom-to-System Chart

PROBLEM CODE	FAIL-SAFE (F/S) ITEM			AFFECTED														ACTION	REFERENCE PAGE
	SYSTEM	POINT	4WS CONTROL UNIT TERMINAL NUMBER	FRONT SUB STEERING ANGLE SENSOR	REAR SUB STEERING ANGLE SENSOR	FRONT MAIN STEERING ANGLE SENSOR	REAR MAIN STEERING ANGLE SENSOR	FRONT WHEEL SPEED SENSOR	*REAR LEFT WHEEL SPEED SENSOR	*REAR RIGHT WHEEL SPEED SENSOR	ABS CONTROL UNIT	4WS CONTROL UNIT	REAR ACTUATOR MOTOR	POWER SYSTEM HARNESS	ALTERNATOR	PARKING BRAKE	HARNESS CONNECTOR		
No code	—	—	7 + 23									○					○	Go to trouble-shooting	17-42
No code	—	—	18 25 4 2 16 + 24									○			○		○	Go to trouble-shooting	17-42
10	SUB STEERING ANGLE SENSOR	FRONT	22 26	○								○					○	Go to trouble-shooting	17-45
11		REAR	29 17		○							○					○	Go to trouble-shooting	17-50
12		FRONT	26 21	○								○					○	Go to trouble-shooting	17-45
13		REAR	17 28		○							○					○	Go to trouble-shooting	17-50
14		FRONT	—									○						Replace 4WS control unit	—
15		REAR	—									○						Replace 4WS control unit	—
16		FRONT	22 26 21	○								○					○	Go to trouble-shooting	17-45
17		REAR	29 17 28		○							○					○	Go to trouble-shooting	17-50
18		—	—									○						Replace 4WS control unit	—



PROBLEM CODE	FAIL-SAFE (F/S) ITEM			AFFECTED														ACTION	REFERENCE PAGE	
	SYSTEM	POINT	4WS CONTROL UNIT TERMINAL NUMBER	FRONT SUB STEERING ANGLE SENSOR	REAR SUB STEERING ANGLE SENSOR	FRONT MAIN STEERING ANGLE SENSOR	REAR MAIN STEERING ANGLE SENSOR	FRONT WHEEL SPEED SENSOR	*REAR LEFT WHEEL SPEED SENSOR	*REAR RIGHT WHEEL SPEED SENSOR	ABS CONTROL UNIT	4WS CONTROL UNIT	REAR ACTUATOR MOTOR	POWER SYSTEM HARNESS	ALTERNATOR	PARKING BRAKE	HARNESS CONNECTOR			
20	MAIN STEERING ANGLE SENSOR	FRONT	8 15	○		○						○					○	Go to trouble-shooting	17-55	
21		REAR	6 13		○		○					○					○	Go to trouble-shooting	17-59	
22		FRONT	8 15	○		○							○					○	Go to trouble-shooting	17-55
23		REAR	6 13		○		○						○					○	Go to trouble-shooting	17-59
24		FRONT	8 15	○		○							○					○	Go to trouble-shooting	17-55
25		REAR	6 13		○			○					○					○	Go to trouble-shooting	17-59
26		FRONT	—										○						Replace 4WS control unit	—
27		REAR	—										○						Replace 4WS control unit	—
28		FRONT	12	○		○							○					○	Go to trouble-shooting	17-55
29	REAR	20		○			○					○					○	Go to trouble-shooting	17-59	
30	WHEEL SPEED	FRONT	19					○				○					○	Go to trouble-shooting	17-63	
31		REAR L	3 3 + 11						○		○	○					○	Go to trouble-shooting	17-64 17-66	
32		REAR R	1 1 + 9							○	○	○						○	Go to trouble-shooting	17-67 17-69

Troubleshooting (4WS)

Symptom-to-System Chart

PROBLEM CODE	FAIL-SAFE (F/S) ITEM			AFFECTED														ACTION	REFERENCE PAGE
	SYSTEM	POINT	4WS CONTROL UNIT TERMINAL NUMBER	FRONT SUB STEERING ANGLE SENSOR	REAR SUB STEERING ANGLE SENSOR	FRONT MAIN STEERING ANGLE SENSOR	REAR MAIN STEERING ANGLE SENSOR	FRONT WHEEL SPEED SENSOR	*REAR LEFT WHEEL SPEED SENSOR	*REAR RIGHT WHEEL SPEED SENSOR	ABS CONTROL UNIT	4WS CONTROL UNIT	REAR ACTUATOR MOTOR	POWER SYSTEM HARNES	ALTERNATOR	PARKING BRAKE	HARNES CONNECTOR		
33	WHEEL SPEED	REAR R/L	3 1 3 + 11 1 + 9								○	○					○	Go to trouble- shooting	17-70
34		FRONT	19					○				○					○	Go to trouble- shooting	17-63
35		REAR L	3 3 + 11						○		○	○					○	Go to trouble- shooting	17-64 17-66
36		REAR R	1 1 + 9							○	○	○					○	Go to trouble- shooting	17-67 17-69
37		REAR L	—									○						Replace 4WS control unit	—
38		VEHICLE SPEED	—									○						Replace 4WS control unit	—
40	4WS CONTROL UNIT	4WS CONTROL UNIT	—									○						Replace 4WS control unit	—
41		4WS CONTROL UNIT	—									○						Replace 4WS control unit	—
42		4WS CONTROL UNIT	—									○						Replace 4WS control unit	—
43		4WS CONTROL UNIT	—									○						Replace 4WS control unit	—
44		4WS CONTROL UNIT	—									○						Replace 4WS control unit	—
45		4WS CONTROL UNIT	—									○						Replace 4WS control unit	—
46		4WS CONTROL UNIT	—									○						Replace 4WS control unit	—
50		CONTROL LOGIC	Motor lock	C + D -									○	○				○	Go to trouble- shooting
51	Wheel caught in ditch; Motor multifunction		C + D -										○	○				○	Go to trouble- shooting

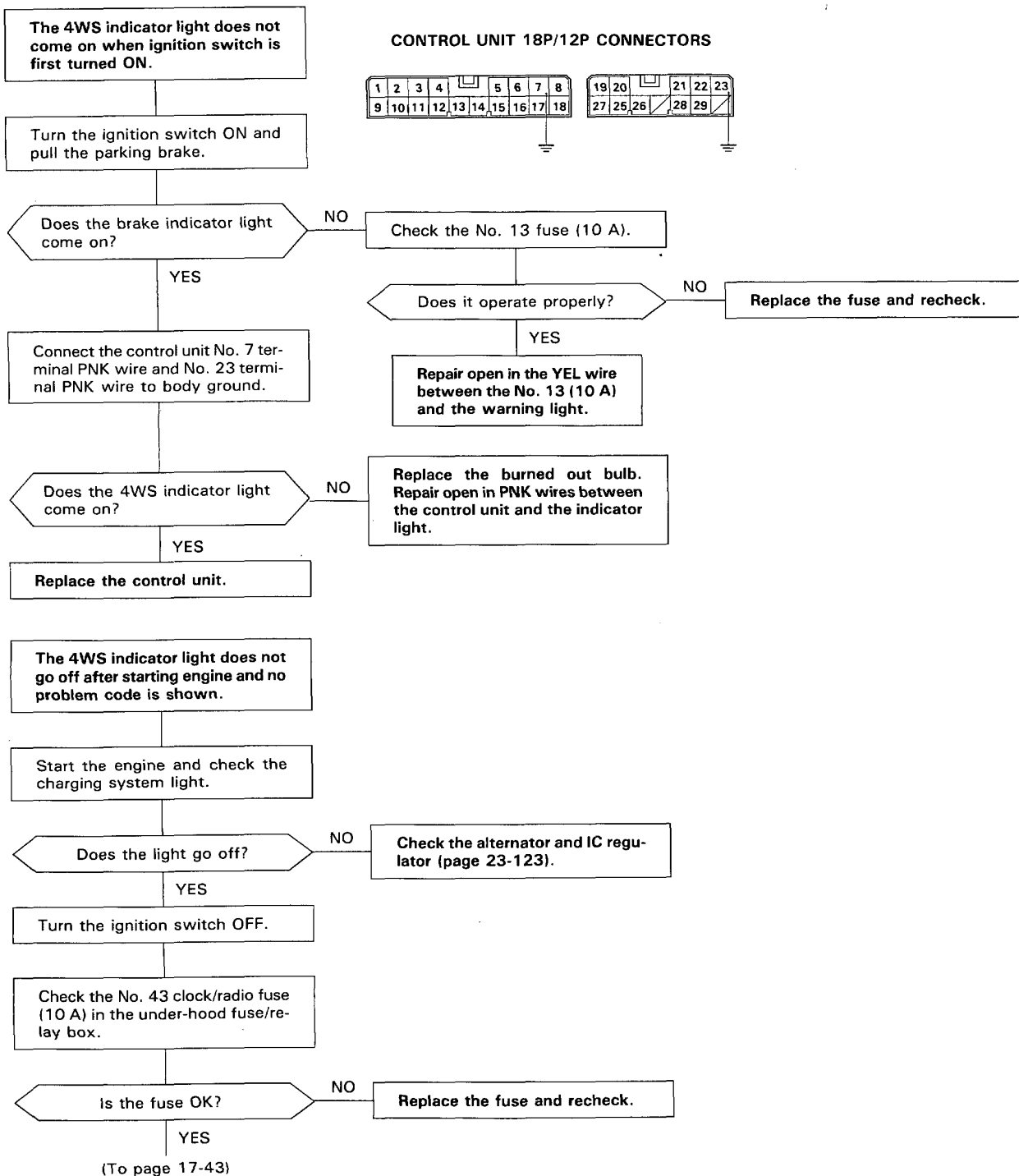


PROBLEM CODE	FAIL-SAFE (F/S) ITEM			AFFECTED														ACTION	REFERENCE PAGE
	SYSTEM	POINT	4WS CONTROL UNIT TERMINAL NUMBER	FRONT SUB STEERING ANGLE SENSOR	REAR SUB STEERING ANGLE SENSOR	FRONT MAIN STEERING ANGLE SENSOR	REAR MAIN STEERING ANGLE SENSOR	FRONT WHEEL SPEED SENSOR	*REAR LEFT WHEEL SPEED SENSOR	*REAR RIGHT WHEEL SPEED SENSOR	ABS CONTROL UNIT	4WS CONTROL UNIT	REAR ACTUATOR MOTOR	POWER SYSTEM HARNESS	ALTERNATOR	PARKING BRAKE	HARNESS CONNECTOR		
60	POWER UNIT	MOTOR	C+•D- 33+•34-									○	○	○			○	Go to trouble- shooting	17-73
61			C+•D-									○	○	○			○	Go to trouble- shooting	17-73
62		Motor	33+•34-									○	○	○			○	Go to trouble- shooting	17-73
63												○	○	○			○	Go to trouble- shooting	17-73
64		4WS CONTROL UNIT	—									○						Replace 4WS con- trol unit	—
65		4WS CONTROL UNIT	—									○						Replace 4WS con- trol unit	—
70	TEMPORARY DRIVING CONDITIONS	—	25									○					○	Ask cus- tomer for symptoms, conditions	—
71		—	—									○						Ask cus- tomer for symptoms, conditions	—
72		—	4									○					○	Ask cus- tomer for symptoms, conditions	—
73		—										○			○			Ask cus- tomer for symptoms, conditions	—
74		—	14									○				○	○	Ask cus- tomer for symptoms, conditions	—

Troubleshooting (4WS)

Flow Charts

4WS indicator light circuit





(From page 17-42)

Check the No. 22 4WS fuse (10 A) in the under-dash fuse box.

Is the fuse OK?

NO

Replace the fuse and recheck.

YES

Check the No. 9 R/C MIRROR fuse (15 A) in the under-dash fuse box.

Is the fuse OK?

NO

Replace the fuse and recheck.

YES

Disconnect the control unit 18P connector and 12P connector.

Does the 4WS indicator light go off?

NO

Repair short in the PNK wires between the control unit and the indicator light.

YES

Connect the control unit 18P connector and 12P connector.

Measure voltage between the control unit No. 18 (VBU) terminal and body ground.

Is there battery voltage?

NO

Repair open in WHT/YEL wire between the control unit and under-hood fuse/relay box.

YES

(To page 17-44)

CONTROL UNIT 18P CONNECTOR

1	2	3	4		5	6	7	8	
9	10	11	12	13	14	15	16	17	18

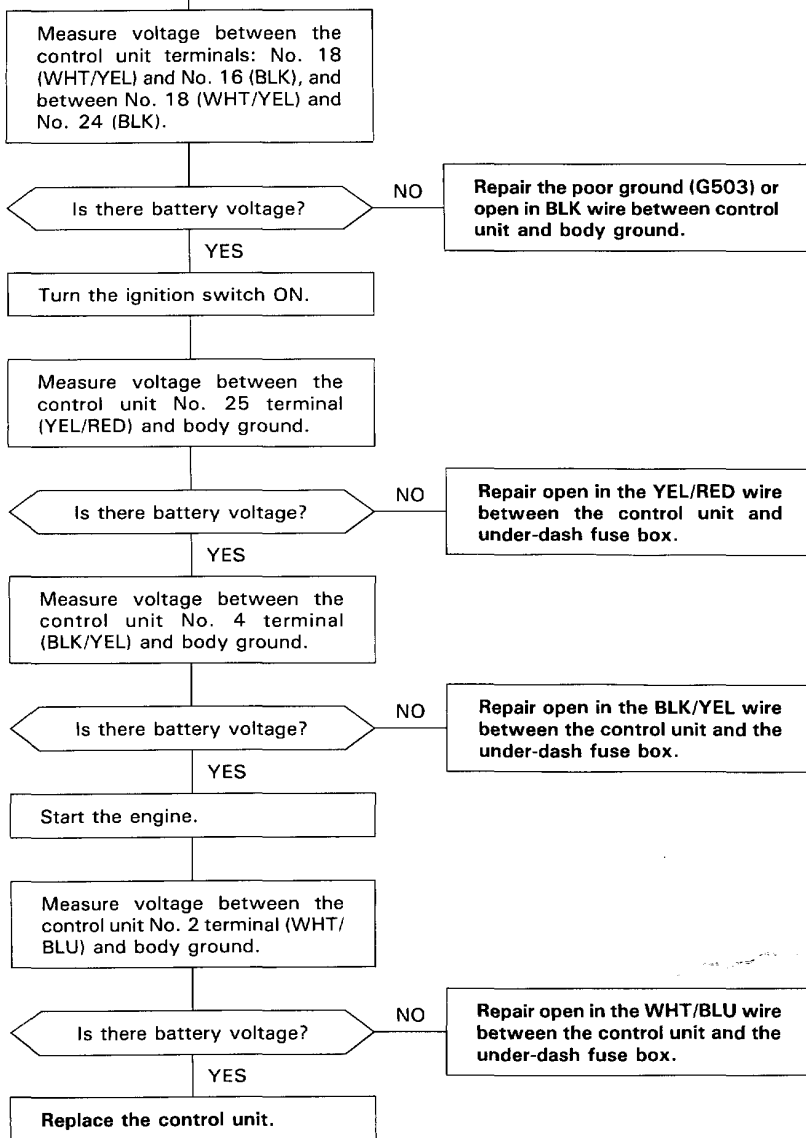


View from terminal side

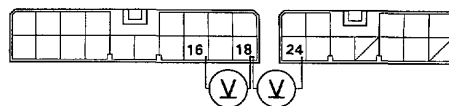
Troubleshooting (4WS)

Flow Charts (cont'd)

(From page 17-43)

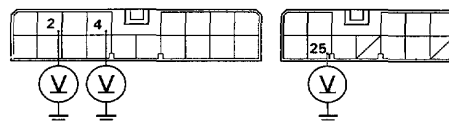


CONTROL UNIT 18P/12P CONNECTORS



View from terminal side

CONTROL UNIT 18P/12P CONNECTORS



View from terminal side



Problem codes: 10, 12, 16

- The 4WS indicator light has been reported on.
- With service check connector jumped CODES 10, 12, 16 are indicated.

Disconnect the front sub steering angle sensor connector.

Measure resistance between the No. 1 terminal (BLK) and No. 2 terminal (WHT/BLU) of the sensor side connector.

Is there $4.0\ \Omega \sim 6.5\ \Omega$

NO

Replace the front sub steering angle sensor.

YES

Measure resistance between the No. 2 terminal (WHT/BLU) and No. 3 terminal (BLK/WHT) of the sensor side connector.

Is there $4.0\ \Omega \sim 6.5\ \Omega$

NO

Replace the front sub steering angle sensor.

YES

Check the No. 1 terminal (BLK) for continuity to body ground.

Is there continuity to ground?

YES

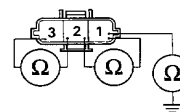
Replace the front sub steering angle sensor

NO

Turn the ignition switch ON.

(To page 17-46)

FRONT SUB STEERING ANGLE SENSOR
SENSOR SIDE CONNECTOR



View from terminal side

Troubleshooting (4WS)

Flow Charts (cont'd)

(From page 17-45)

Measure the voltage between the control unit side of the sensor connector No. 1 terminal (LHD), No. 3 terminal (RHD) YEL/BLK wire and body ground.

Is there approximately 2.5 V?

NO

Disconnect the control unit 12P connector.

YES

Check for continuity between the control unit No. 21 terminal (YEL/BLK) and body ground.

Is there continuity?

YES

Repair short in the YEL/BLK wire between the control unit and the front sub steering angle sensor.

NO

Connect the control unit 12P connector.

Measure voltage between the No. 21 terminal (YEL/BLK) of the control unit and body ground.

Is there approximately 2.5 V?

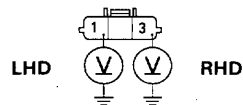
NO

Replace the control unit.

YES

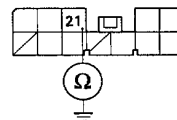
Repair open in the YEL/BLK wire between the control unit and the front sub steering angle sensor.

FRONT SUB STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR



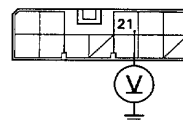
View from terminal side.

CONTROL UNIT 12P SENSOR SIDE CONNECTOR



View from terminal side.

CONTROL UNIT 12P CONNECTOR



View from terminal side.

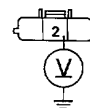
(To page 17-47)



(From page 17-46)

FRONT SUB STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR

Measure the voltage between the control unit side of the sensor connector (YEL/GRN) wire and body ground.



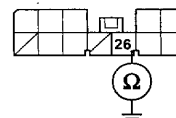
View from terminal side.

Is there approximately 1.25 V?

NO

Disconnect the control unit 12P connector.

CONTROL UNIT 12P SENSOR SIDE CONNECTOR



View from terminal side.

Check for continuity between the control unit No. 26 terminal (YEL/GRN) and body ground.

Is there continuity?

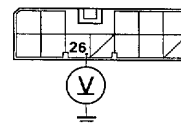
YES

Repair short in the YEL/GRN wire between the control unit and the sub steering angle sensor.

NO

Connect the ECU 12P connector.

CONTROL UNIT 12P CONNECTOR



View from terminal side.

Measure voltage between the control unit No. 26 terminal (YEL/GRN) and body ground.

Is there approximately 1.25 V?

NO

Replace the control unit.

YES

Repair open in the YEL/GRN wire between the control unit and the front sub steering angle sensor.

(To page 17-48)

Troubleshooting (4WS)

Flow Charts (cont'd)

(From page 17-47)

Measure the voltage between the control unit side of the sensor connector No.3 terminal (LHD), No. 1 terminal (RHD) (YEL/BLU) wire and body ground.

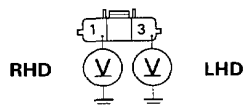
Is there approximately 2.5 V?

YES

NO

Disconnect the control unit 12P connector.

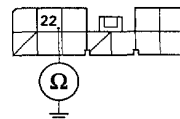
FRONT SUB STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR



View from terminal side.

Check for continuity between the control unit No. 22 terminal (YEL/BLU) and body ground.

CONTROL UNIT 12P SENSOR SIDE CONNECTOR



View from terminal side.

Is there continuity?

YES

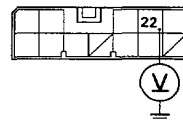
Repair short in the YEL/BLU wire between the control unit and the sub steering angle sensor.

NO

Connect the control unit 12P connector.

Measure voltage between the control unit No. 22 terminal (YEL/BLU) and body ground.

CONTROL UNIT 12P CONNECTOR



View from terminal side.

Is there approximately 2.5 V?

NO

Replace the control unit.

YES

Repair open in the YEL/BLU wire between the control unit and the front sub steering angle sensor.

(To page 17-49)



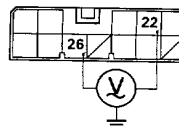
(From page 17-48)

Connect the front sub steering angle sensor connector.

Start the engine.

While turning the steering wheel, measure voltage between No. 22 (YEL/BLU) and No. 26 (YEL/GRN) terminals of the control unit using AC range of analog tester.

CONTROL UNIT 12P CONNECTOR



View from terminal side.

FRONT SUB STEERING ANGLE SENSOR TERMINAL VOLTAGE (REFERENCE)

STEERING WHEEL POSITION	LEFT	CENTER	RIGHT
Voltage	approx 2.0 V	approx 2.5 V	approx 3.0 V

Analog tester

AC range

Does voltage change as shown in the table?

NO

Replace the front sub steering angle sensor.

YES

Check the neutral point of the front sub steering angle sensor. (page 17-144).

Is the neutral point OK?

NO

Adjust the neutral point of the front sub steering sensor.

YES

Replace the control unit

Troubleshooting (4WS)

Flow Charts (cont'd)

Problem codes: 11, 13, 17

- The 4WS indicator light has been reported on.
- With service check connector jumped CODES 11, 13, 17 are indicated.

Disconnect the rear sub steering angle sensor connector.

Measure resistance between the No. 1 terminal (BLK/WHT), and the No. 2 terminal (WHT/BLU) of the sensor side connector.

Is there $4.0 \Omega \sim 6.5 \Omega$?

NO

Replace the rear sub steering angle sensor.

YES

Measure resistance between the No. 2 terminal (BLK/WHT), and the No. 3 terminal (BLK) of the sensor side connector.

Is there $4.0 \Omega \sim 6.5 \Omega$?

NO

Replace the rear sub steering angle sensor.

YES

Check the No. 3 terminal (BLK) for continuity to ground.

Is there continuity?

YES

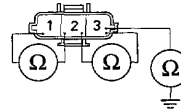
Replace the rear sub steering angle sensor.

NO

Turn the ignition switch ON.

(To page 17-51)

REAR SUB STEERING ANGLE SENSOR
SENSOR SIDE CONNECTOR



View from terminal side.



(From page 17-50)

Measure the voltage between the control unit side of the sensor connector GRY wire and body ground.

Is there approximately 2.5 V?

YES

NO

Disconnect the control unit 12P connector.

Check for continuity between the control unit No. 29 terminal (GRY) and body ground.

Is there continuity?

NO

Connect the control unit 12P connector.

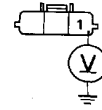
Measure voltage between the control unit No. 29 terminal (GRY) and body ground.

Is there approximately 2.5 V?

YES

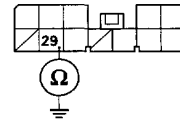
Repair open in the GRY wire between the control unit and the rear sub steering angle sensor.

REAR SUB STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR



View from terminal side.

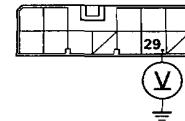
CONTROL UNIT 12P SENSOR SIDE CONNECTOR



View from terminal side.

Repair short in the GRY wire between the control unit and the rear sub steering angle sensor.

CONTROL UNIT 12P CONNECTOR



View from terminal side.

Replace the control unit.

(To page 17-52)

Troubleshooting (4WS)

Flow Charts (cont'd)

(From page 17-51)

Measure the voltage between the control unit side of the sensor connector GRY/YEL wire and body ground.

Is there approximately 1.25 V?

YES

NO

Disconnect the control unit 18P connector.

Check for continuity between the control unit No. 17 terminal (GRY/YEL) and body ground.

Is there continuity?

NO

Connect the control unit 18P connector.

Measure voltage between the control unit No. 17 terminal (GRY/YEL) and body ground.

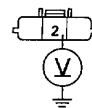
Is there approximately 1.25 V?

YES

Repair open in the GRY/YEL wire between the control unit and the rear sub steering angle sensor.

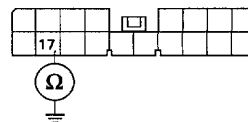
(To page 17-53)

REAR SUB STEERING CONTROL UNIT SIDE CONNECTOR



View from terminal side.

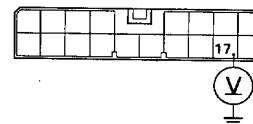
CONTROL UNIT 18P SENSOR SIDE CONNECTOR



View from terminal side.

Repair short in the GRY/YEL wire between the control unit and the rear sub steering angle sensor.

CONTROL UNIT 18P CONNECTOR



View from terminal side.

Replace the control unit.



(From page 17-52)

Measure the voltage between the control unit side of the sensor connector GRY/BLK wire and body ground.

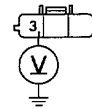
Is there approximately 2.5 V?

YES

NO

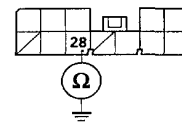
Disconnect the control unit 12P connector.

REAR SUB STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR



View from terminal side.

CONTROL UNIT 12P SENSOR SIDE CONNECTOR



View from terminal side.

Check for continuity between the control unit No. 28 terminal (GRY/BLK) and body ground.

Is there continuity?

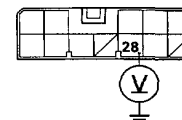
YES

Repair short in the GRY/BLK wire between the control unit and the rear sub steering angle sensor.

NO

Connect the control unit 12P connector.

CONTROL UNIT 12P CONNECTOR



View from terminal side.

Measure voltage between the control unit No. 28 terminal (GRY/BLK) and body ground.

Is there approximately 2.5 V?

NO

Replace the control unit.

YES

Repair open in the GRY/BLK wire between the control unit and the rear sub steering angle sensor.

(To page 17-54)

Troubleshooting (4WS)

Flow Charts (cont'd)

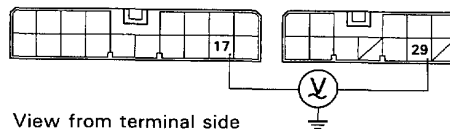
(From page 17-53)

Connect the rear sub steering angle sensor connector.

Start the engine.

While turning the steering wheel and measure voltage between No. 17 (GRY/YEL) and No. 29 (GRY) terminals of the control unit using AC range of an analog tester.

CONTROL UNIT 18P/12P CONNECTORS



REAR SUB STEERING ANGLE SENSOR TERMINAL VOLTAGE (REFERENCE)

STEERING WHEEL POSITION	LEFT	CENTER	RIGHT
Voltage	approx 3.0 V	approx 2.5 V	approx 2.0 V

Analog tester

AC range

Does voltage change as shown in the table?

NO

Replace the rear sub steering angle sensor.

YES

Check the neutral point of the rear sub steering angle sensor. (page 17-144)

Is the neutral point OK?

NO

Adjust the neutral point of the rear sub steering sensor.

YES

Replace the control unit



Problem codes: 20, 22, 24, 28

- The 4WS indicator light has been reported on.
- With service check connector jumped CODES 20, 22, 24, 28 are indicated.

Disconnect the front main steering angle sensor connector.

Turn the ignition switch ON.

Measure voltage between the No. 1 terminal (YEL/RED) of the control unit side connector of the main steering angle sensor and body ground.

Is there battery voltage?

YES

Measure the voltage between the control unit side of the sensor connector GRN wire and body ground.

Is there approximately 4.5 V?

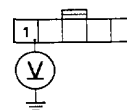
YES

(To page 17-56)

NO

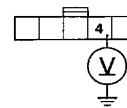
Repair open in the harness wire between the No. 22 4WS fuse and the front main steering angle sensor.

FRONT MAIN STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR



View from terminal side.

FRONT MAIN STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR



View from terminal side.

NO

Disconnect the control unit 18P connector.

Check for continuity between the control unit sensor side connector No. 8 terminal (GRN) and body ground.

Is there continuity?

NO

Connect the control unit 18P connector.

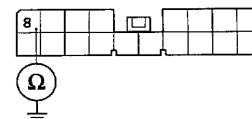
Measure voltage between the control unit No. 8 terminal (GRN) and body ground.

Is there approximately 4.5 V?

YES

Repair open in the GRN wire between the control unit and the front main steering angle sensor.

CONTROL UNIT 18P SENSOR SIDE CONNECTOR

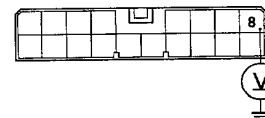


View from terminal side.

YES

Repair short in the GRN wire between the control unit and the main steering angle sensor.

CONTROL UNIT 18P CONNECTOR



View from terminal side.

NO

Replace the control unit.

Troubleshooting (4WS)

Flow Charts (cont'd)

(From page 17-55)

Measure the voltage between the control unit side of the sensor connector BLU wire and body ground.

Is there approximately 4.5 V?

YES

NO

Disconnect the control unit 18P connector.

Check for continuity between the control unit No. 12 terminal (BLU) and body ground.

Is there continuity?

NO

Connect the control unit 18P connector.

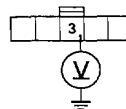
Measure voltage between the control unit No. 12 terminal (BLU) and body ground.

Is there approximately 4.5 V?

YES

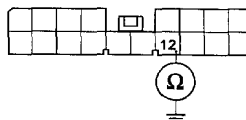
Repair open in the BLU wire between the control unit and the front main steering angle sensor.

FRONT MAIN STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR



View from terminal side.

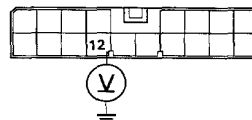
CONTROL UNIT 18P SENSOR SIDE CONNECTOR



View from terminal side.

Repair short in the BLU wire between the control unit and the main steering angle sensor.

CONTROL UNIT 18P CONNECTOR



View from terminal side.

NO

Replace the control unit.

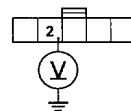
(To page 17-57)



(From page 17-56)

FRONT MAIN STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR

Measure the voltage between the control unit side of the sensor connector YEL/RED wire and body ground.



View from terminal side.

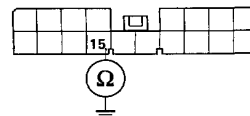
Is there approximately 4.5 V?

NO

Disconnect the control unit 18P connector.

CONTROL UNIT 18P SENSOR SIDE CONNECTOR

Check for continuity between the control unit No. 15 terminal (YEL/RED) and body ground.



View from terminal side.

Is there continuity?

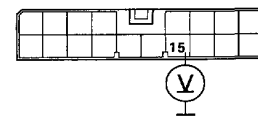
YES

Repair short in the YEL/RED wire between the control unit and the main steering angle sensor.

NO

Measure voltage between the control unit No. 15 terminal (YEL/RED) and body ground.

CONTROL UNIT 18P CONNECTOR



View from terminal side.

Is there approximately 4.5 V?

NO

Replace the control unit.

YES

Repair open in the YEL/RED wire between the control unit and the front main steering angle sensor.

(To page 17-58)

Troubleshooting (4WS)

Flow Charts (cont'd)

(From page 17-57)

Check for voltage between the No. 2 terminal (YEK/RED) and the No. 5 terminal (BLK) of the control unit side connector of the front main steering angle sensor.

Is there approximately 4.5 V?

NO

Repair the poor ground (G 202) or open in the BLK wire between the front main steering angle sensor and body ground.

YES

Reconnect the front main steering angle sensor 5-P connector.

While turning the steering wheel, check for the signals between the following control unit terminals and the ground with an analog voltmeter on the DC range.

FEA: Between No. 8 terminal GRN and ground: should pulse 0—4.5 V rapidly (every 2°)

FEB: Between No. 15 terminal YEL/RED and ground: should pulse 0—4.5 V rapidly (every 2°)

FEZ: Between No. 12 terminal BLU and ground: should pulse 0—4.5 V once per steering wheel revolution

Are the signals available between the respective terminal and the ground?

NO

Replace the front main steering angle sensor.

YES

Check the Z-phase neutral position (page 17-144).

Is the Z-phase in the straight driving position?

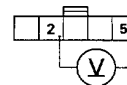
NO

Adjust the front main steering angle sensor neutral position (page 17-151)

YES

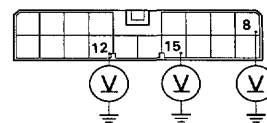
Perform troubleshooting for problem code 10, 12, 16. (page 17-45).

FRONT MAIN STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR



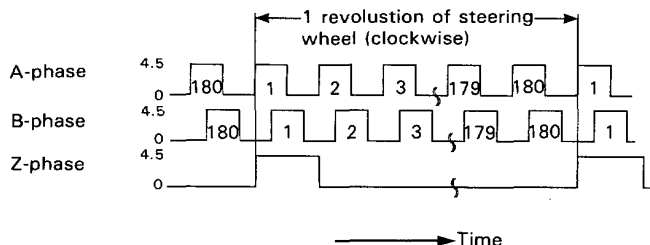
View from terminal side

CONTROL UNIT 18P CONNECTOR



View from terminal side

Straight





Problem codes: 21, 23, 25, 29

- The 4WS indicator light has been reported on.
- With service check connector jumped CODES 21, 23, 25, 29 are indicated.

Disconnect the rear main steering angle sensor connector.

Turn the ignition switch ON.

Measure voltage between the No. 1 terminal (RED) of the control unit side connector of the rear main steering angle sensor and body ground.

Is there battery voltage?

YES

Measure the voltage between the control unit side of the connector (WHT/GRN) wire and body ground.

Is there approximately 4.5 V?

YES

NO

Repair open in the RED wire between the No. 22 4WS fuse and the rear main steering angle sensor.

NO

Disconnect the control unit 18P connector.

Check for continuity between the control unit No. 6 terminal (WHT/GRN) and body ground.

Is there continuity?

YES

Connect the control unit 18P connector.

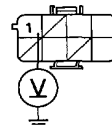
Measure voltage between the control unit No. 6 terminal (WHT/GRN) and body ground.

Is there approximately 4.5 V?

YES

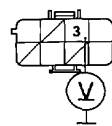
Repair open in the WHT/GRN wire between the control unit and the rear main steering angle sensor.

REAR MAIN STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR



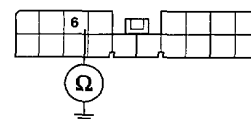
View from terminal side

REAR MAIN STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR



View from terminal side

CONTROL UNIT 18P SENSOR SIDE CONNECTOR



View from terminal side

Repair short in the WHT/GRN wire between the control unit and the main steering angle sensor.

CONTROL UNIT 18P CONNECTOR



View from terminal side

Replace the control unit.

(To page 17-60)

Troubleshooting (4WS)

Flow Charts (cont'd)

(From page 17-59)

Measure the voltage between the control unit side of the connector ORN wire and body ground.

Is there paaroximately 4.5 V?

YES

NO

Disconnect the control unit 12P connector.

Check for continuity between the control unit No. 20 terminal (GRN) and body ground.

Is there continuity?

NO

Connect the control unit 12P connector.

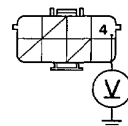
Measure voltage between the No. 20 terminal (GRN) of the control unit and body ground.

Is there approximately 4.5 V?

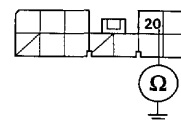
YES

Repair open in the GRN wire between the control unit and the rear main steering angle sensor.

View from terminal side



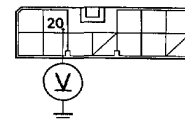
CONTROL UNIT 12P SENSOR SIDE CONNECTOR



View from terminal side

Repair short in the GRN wire between the control unit and the rear main steering angle sensor.

CONTROL UNIT 12P CONNECTOR



View from terminal side

NO

Replace the control unit.

(To page 17-61)



(From page 17-60)

Measure the voltage between the control unit side of the connector BLU/GRN wire and body ground.

Is there approximately 4.5 V?

NO

Disconnect the control unit 18P connector.

Check for continuity between the control unit No. 13 terminal (BLU/GRN) and body ground.

Is there continuity?

YES

Repair short in the BLU/GRN wire between the control unit and the rear main steering angle sensor.

NO

Measure voltage between the control unit No. 13 terminal (BLU/GRN) and body ground.

Is there approximately 4.5 V?

NO

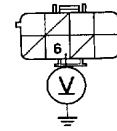
Replace the control unit.

YES

Repair open in the BLU/GRN wire between the control unit and the rear main steering angle sensor.

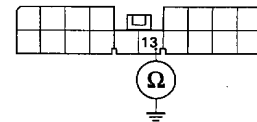
(To page 17-62)

REAR MAIN STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR



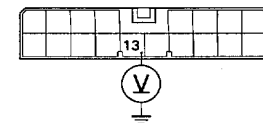
View from terminal side

CONTROL UNIT 18P SENSOR SIDE CONNECTOR



View from terminal side

CONTROL UNIT 18P CONNECTOR



View from terminal side

Troubleshooting (4WS)

Flow Charts (cont'd)

(From page 17-61)

Measure voltage between the No.6 terminal BLU/GRN wire and the No. 8 terminal RED wire of the control unit side connector of the rear main steering angle sensor.

Is there approximately 4.5 V?

NO

Repair the poor ground (G 502 + G 503) or open in the RED wire between the rear main steering angle sensor and body ground.

YES

Reconnect the rear main steering angle sensor 8-P connector.

While turning the steering wheel, check for the signals between the following control unit terminals and the ground with an analog voltmeter on the DC range.

REA: Between No. 6 terminal (WHT/GRN) and ground: should pulse 0—4.5 V rapidly (every 2°)

REB: Between No. 13 terminal (BLU/GRN) and ground: should pulse 0—4.5 V rapidly (every 2°)

REZ: Between No. 20 terminal (GRN) and ground: should pulse 0—4.5 V once per steering wheel revolution

Are the signals available between the respective terminal and the ground?

NO

Replace the rear main steering angle sensor.

YES

Check the Z-phase neutral position (page 144).

Is the Z-phase in the straight driving position?

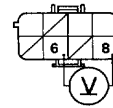
NO

Replace the rear actuator.

YES

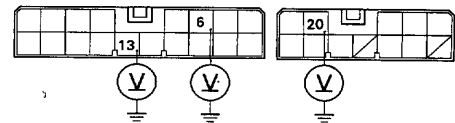
Perform troubleshooting of the problem code 11, 13, 17. (page 17-50)

REAR MAIN STEERING ANGLE SENSOR CONTROL UNIT SIDE CONNECTOR



View from terminal side

CONTROL UNIT 18P/12P CONNECTOR

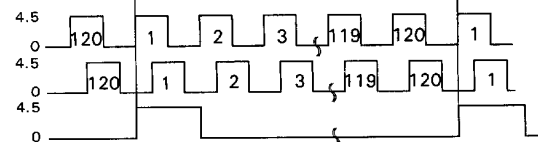


View from terminal side

A-phase

B-phase

Z-phase



neutral → Time



**Problem codes: 30, 34
vehicle speed sensor**

—The 4WS indicator light has been reported on.
—With service check connector jumped CODES 30 and 34 are indicated

Disconnect the No. 43 fuse (10 A) in the under-hood fuse/relay box.

Test drive the car.

Do codes 30 and 34 appear?

NO

System is OK at this time. Inspect the vehicle speed sensor terminal connectors.

YES

Does the speedometer operate properly?

NO

(Go to page 23-166)

YES

Disconnect the control unit 12P connector.

Turn the ignition switch ON.

Measure voltage between the No. 19 terminal (ORN) of sensor side connector of control unit and body ground.

Is there approximately 5 V?

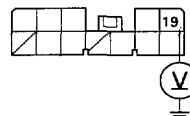
YES

Replace the control unit (When the symptom recurred.)

NO

Repair open or short in the ORN wire to body ground between the vehicle speed sensor and the control unit.

CONTROL UNIT 12P SENSOR SIDE CONNECTOR



View from terminal side

Troubleshooting (4WS)

Flow Charts (cont'd)

Problem codes: 31, 35

- The 4WS indicator light has been reported on.
- With service check connector jumped CODES 31 and 35 are indicated.

Start the engine.

Does the ABS light stay ON?

NO

(Go to page 19-58)
Problem in ABS system

YES

Stop the engine. Then turn the ignition switch back ON.

With the left rear wheel raised OFF ground, slowly rotate the wheel while checking for voltage between the 4WS control unit No. 3 terminal (GRY/WHT) and body ground.

Does the voltage alternate from zero to approximately 5 V?

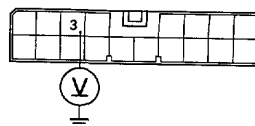
YES

Record the problem codes and clear the 4WS control unit. Test drive the car, if the problem code does not reappear, check the terminal connections of the 4WS control unit 18-P connector and the ABS control unit 14-P connector.

NO

(To page 17-65)

4WS CONTROL UNIT 18P CONNECTOR



View from terminal side



(From page 17-64)

Turn the ignition switch OFF.

Disconnect the 4WS control unit connector and the ABS control unit connector.

Check for continuity between the 4WS control unit No. 3 terminal (GRY/WHT) and body ground.

Is there continuity?

YES

Repair short in the GRY/WHT wire between the 4WS control unit and the ABS control unit.

NO

Reconnect the 4WS control unit connector.

Turn the ignition switch ON.

Measure voltage between the No. 3 terminal of the 4WS control unit connector and body ground.

Is there approximately 5 V?

NO

Replace the 4WS control unit.

YES

Measure voltage between the No. 3 terminal (GRY/WHT) of sensor side connector of ABS control unit 14P connector and body ground.

Is there approximately 5V?

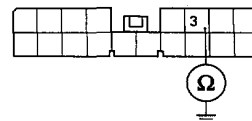
YES

Repair open in the GRY/WHT wire between the 4WS control unit and the ABS control unit.

NO

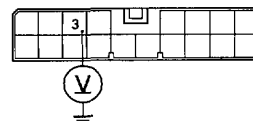
Replace the ABS control unit.

4WS CONTROL UNIT 18P SENSOR SIDE CONNECTOR



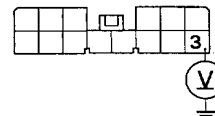
View from terminal side

4WS CONTROL UNIT 18P CONNECTOR



View from terminal side

ABS CONTROL UNIT 14P SENSOR SIDE CONNECTOR



View from terminal side

Troubleshooting (4WS)

Flow Charts (cont'd)

Problem codes: 31, 35 (Without ABS)

- The 4WS indicator light has been reported on.
- With service check connector jumped CODES 31, 35 are indicated.

Disconnect the rear left wheel sensor connector.

Measure resistance between the No. 1 terminal (LT BLU) and the No. 2 terminal (GRY) of the sensor side connector of the wheel sensor.

Is there 1000 Ω ~ 1600 Ω ?

NO

Replace the rear left wheel sensor.

YES

Check for continuity between the wheel sensor No. 1 terminal (LT BLU) and body ground, and between the No. 2 terminal (GRY) and body ground.

Is there continuity?

YES

Replace the rear left wheel sensor.

NO

Reconnect the rear left wheel sensor connector.

Disconnect the control unit 18P sensor connector.

Measure resistance between the No. 3 terminal (LT BLU) and the No. 11 terminal (GRY) of the control unit 18P sensor side connector.

Is there 1000 Ω ~ 1600 Ω ?

NO

Repair open in the LT BLU wire and/or GRY wire between the control unit and the rear left wheel sensor.

YES

Check for continuity between the No. 3 terminal (LT BLU) and body ground, and between the No. 11 terminal (GRY) and body ground.

Is there continuity?

YES

Repair short in the LT BLU wire and/or GRY wire between the control unit and the rear left wheel sensor.

NO

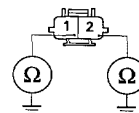
Check that the wheel sensor is properly installed.

WHEEL SENSOR 2P SENSOR SIDE CONNECTOR



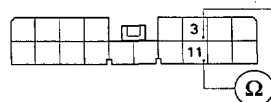
View from terminal side

WHEEL SENSOR 2P SENSOR SIDE CONNECTOR



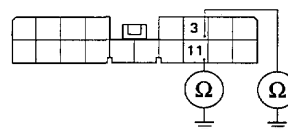
View from terminal side

4WS CONTROL UNIT 18P SENSOR SIDE CONNECTOR



View from terminal side

4WS CONTROL UNIT 18P SENSOR SIDE CONNECTOR



View from terminal side



Problem codes: 32, 36 (With ABS)

—The 4WS indicator light has been reported on.
—With service check connector jumped CODES 32 and 36 are indicated.

Start the engine.

Does the ABS light stay ON?

YES

(Go to page 19-58)
Problem in ABS system

NO

Stop the engine. Then turn the ignition switch back ON.

With the right rear wheel raised OFF the ground, slowly rotate the wheel while checking for voltage between the 4WS control unit No. 1 terminal (GRY/RED) and body ground.

Does the voltage alternate from zero to approximately 5 V?

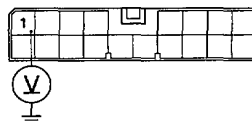
YES

Record the problem code and clear the 4WS control unit. Test drive the car, if the problem code does not reappear, check the terminal connections of the 4WS control unit 18-P connector and the ABS control unit 14-P connector.

NO

(To page 17-68)

4WS CONTROL UNIT 18P CONNECTOR

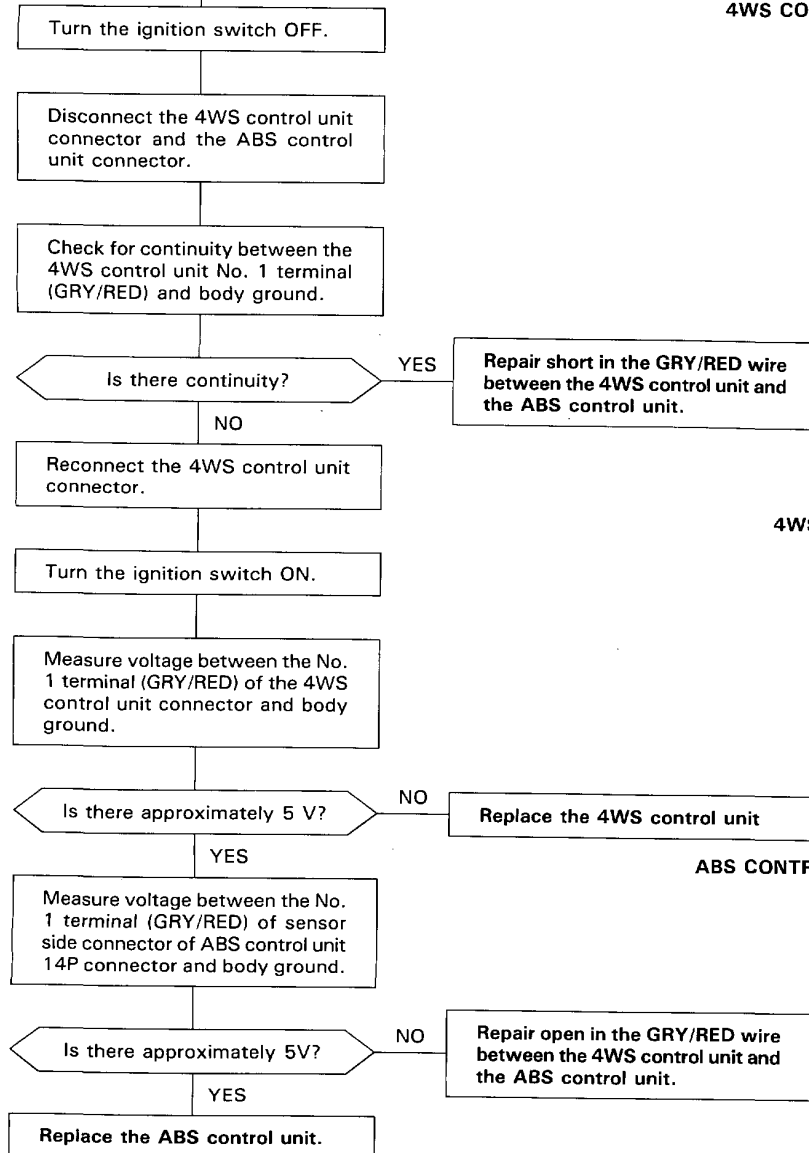


View from terminal side

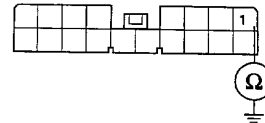
Troubleshooting (4WS)

Flow Charts (cont'd)

(From page 17-67)



4WS CONTROL UNIT 18P SENSOR SIDE CONNECTOR



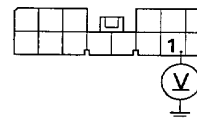
View from terminal side

4WS CONTROL UNIT 18P CONNECTOR



View from terminal side

ABS CONTROL UNIT 14P SENSOR SIDE CONNECTOR



View from terminal side



Problem codes: 32, 36 (Without ABS)

- The 4WS indicator light has been reported on.
- With service check connector jumped CODES 32, 36 are indicated.

Disconnect the rear right wheel sensor connector.

Measure resistance between the No. 1 terminal (GRN/YEL) and the No. 2 terminal (BLU/YEL) of the sensor side connector of the wheel sensor.

Is there 1000 Ω ~ 1600 Ω ?

NO

Replace the rear right wheel sensor.

YES

Check for continuity between the wheel sensor No. 1 terminal (GRN/YEL) and body ground, and between the wheel sensor No. 2 terminal (BLU/YEL) and body ground.

Is there continuity?

YES

Replace the rear right wheel sensor.

NO

Reconnect the rear right wheel sensor connector.

Disconnect the control unit 18P connector.

Measure resistance between the No. 1 terminal (GRN/YEL) and the No. 9 terminal (BLU/YEL) of the control unit 18P sensor side connector.

Is there 1000 Ω ~ 1600 Ω ?

NO

Repair open in the GRN/YEL wire and/or BLU/YEL wire between the control unit and the rear right wheel sensor.

YES

Check for continuity between the No. 1 terminal (GRN/YEL) and body ground, and between the No. 9 terminal (BLU/YEL) and body ground.

Is there continuity?

YES

Repair short in the GRN/YEL wire and/or BLU/YEL wire between the control unit and the rear right wheel sensor.

NO

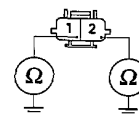
Check that the wheel sensor is properly installed.

WHEEL SENSOR 2P SENSOR SIDE CONNECTOR



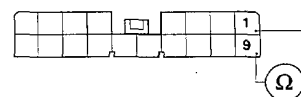
View from terminal side

WHEEL SENSOR 2P SENSOR SIDE CONNECTOR



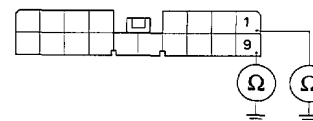
View from terminal side

4WS CONTROL UNIT 18P SENSOR SIDE CONNECTOR



View from terminal side

4WS CONTROL UNIT 18P SENSOR SIDE CONNECTOR



View from terminal side

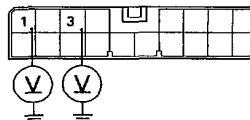
Troubleshooting (4WS)

Flow Charts (cont'd)

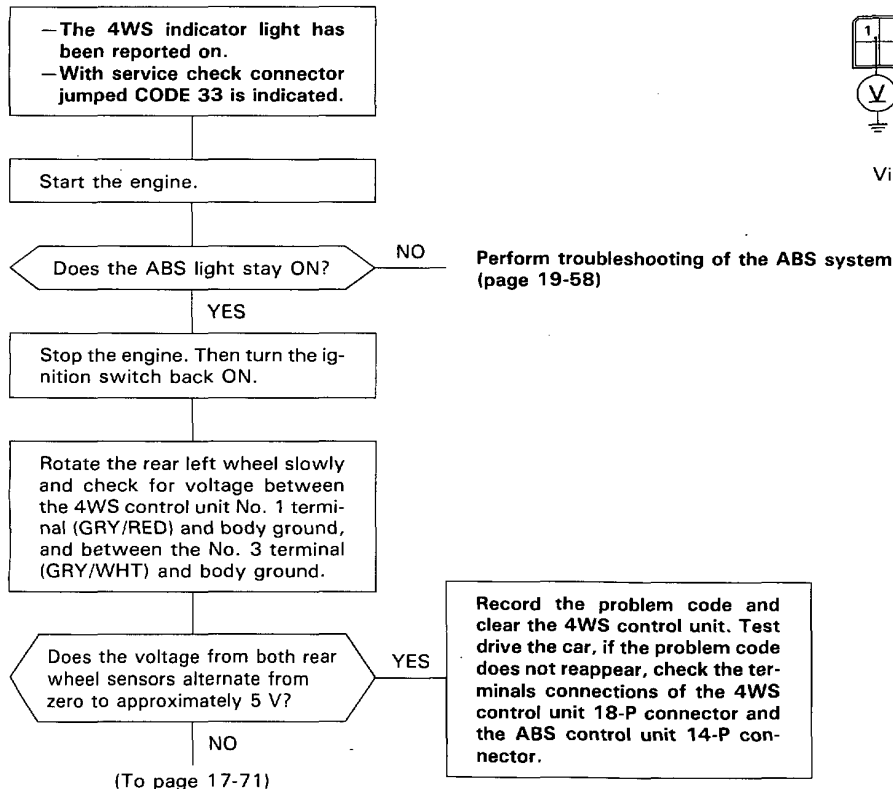
Problem code: 33.

NOTE: Problem code 33 is memorized when the front wheels are turned at a speed of 30 km/h for 2 minutes with the front wheels raised off the ground and the rear wheels blocked. (Parking brake must be off to test this code.)

4WS CONTROL UNIT 18P CONNECTOR



View from terminal side





(From page 17-70)

Disconnect the 4WS control unit connector and the ABS control unit connector.

Check for continuity between the 4WS control unit No. 1 terminal (GRY/RED) and body ground.

Is there continuity?

YES

Repair short in the GRY/RED wire between 4WS control unit and the ABS control unit.

NO

Check for continuity between the 4WS control unit No. 3 terminal (GRY/WHT) and body ground.

Is there continuity?

YES

Repair short in the GRY/WHT wire between the 4WS control unit and the ABS control unit.

NO

Reconnect the 4WS control unit connector.

Measure voltage between the 4WS control unit No. 1 terminal (GRY/RED) and body ground.

Is there approximately 5 V?

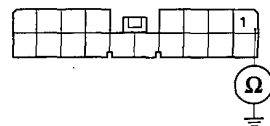
NO

Replace the 4WS control unit.

YES

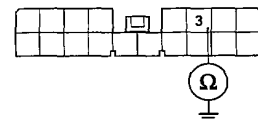
(To page 17-71)

4WS CONTROL UNIT 18P SENSOR SIDE CONNECTOR



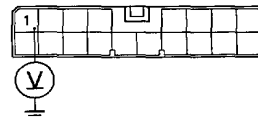
View from terminal side

4WS CONTROL UNIT 18P SENSOR SIDE CONNECTOR



View from terminal side

4WS CONTROL UNIT 18P CONNECTOR



View from terminal side

Troubleshooting (4WS)

Flow Charts (cont'd)

(From page 17-71)

Measure voltage between the 4WS control unit No. 3 terminal (GRY/WHT) and body ground.

Is there approximately 5 V?

NO

Replace the 4WS control unit.

YES

Measure voltage between the No. 7 terminal (GRY/RED) of the 14P connector of the ABS control unit and body ground.

Is there approximately 5 V?

NO

Repair open in the GRY/RED wire.

YES

Measure voltage between the No. 8 terminal of the 14P connector of the ABS control unit and body ground.

Is there approximately 5 V?

NO

Repair open in the GRY/WHT wire.

YES

Replace the ABS control unit.

Problem code: 50

- The 4WS indicator light has been reported on.
- With service check connector jumped CODE 50 is indicated.

Start the engine. Turn the steering wheel and check the rear steering motor for function.

Does it operate properly?

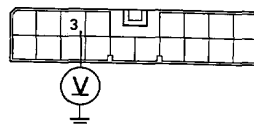
YES

Clear the 4WS control unit and retest, if the problem code reoccurs, then replace the control unit.

NO

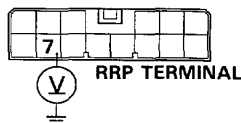
Replace the rear actuator motor.

4WS CONTROL UNIT 18P CONNECTOR



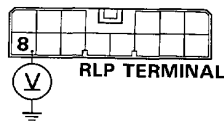
View from terminal side

ABS CONTROL UNIT 14P CONNECTOR



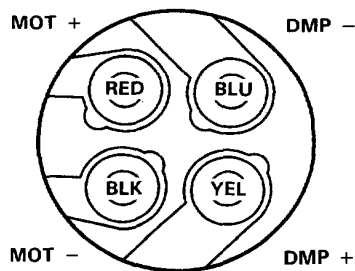
View from terminal side

ABS CONTROL UNIT 14P CONNECTOR

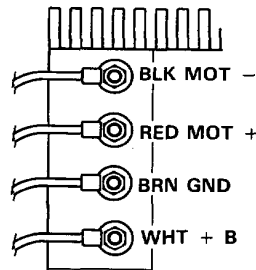


View from terminal side

REAR ACTUATOR MOTOR



4WS CONTROL UNIT POWER TERMINAL



View from interior side



Problem code: 51

- The 4WS indicator light has been reported on.
- With service check connector jumped CODE 51 is indicated.

Start the engine. Turn the steering wheel and check the rear steering motor for function.

Does it operate properly?

YES

NO

Replace the rear actuator motor.

The problem code 51 blinks when the rear wheels cannot be steered because they are blocked with the curb, etc.
If the problem code 51 blinks after the test drive, the control unit is faulty.

Problem codes: 60, 61, 62, 63.

- The 4WS indicator light has been reported on.
- With service check connector jumped CODES 60, 61, 62, 63 are indicated.

Check the No. 38 main fuse (60 A) in the under-hood fuse/relay box.

Is the fuse OK?

NO

Replace the fuse and recheck

YES

Measure voltage between the A terminal (WHT) of the control unit power terminal and body ground.

Is there battery voltage?

NO

Repair open in the WHT wire between the under-hood fuse/relay box and the control unit.

YES

Measure voltage between the B terminal (BRN) of the control unit power terminal and body ground.

Is there 0 V?

NO

Repair the poor ground (G503) or open in the BRN wire between the control unit and body ground (G503).

YES

Start the engine and immediately (within approximately 2 seconds after starting the engine) check for voltage between the C terminal RED wire of the control unit power terminal and body ground.

Is there battery voltage momentarily?

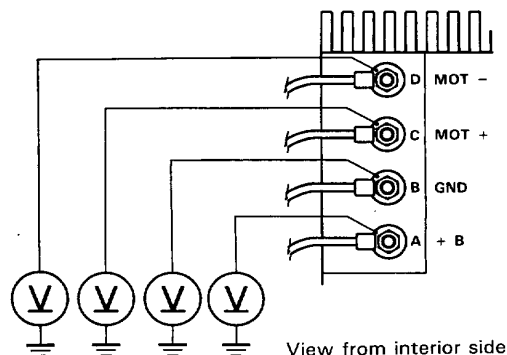
NO

Replace the control unit.

YES

(To page 17-74)

4WS CONTROL UNIT POWER TERMINAL



View from interior side

Troubleshooting (4WS)

Flow Chart (cont'd)

(From page 17-73)

Stop the engine and turn the ignition switch ON.

Measure voltage between the D terminal (BLK) of the control unit power terminal and body ground immediately after (within approximately 2 seconds) starting the engine.

Is there battery voltage momentarily?

NO

Replace the control unit

YES

Measure voltage between the C terminal (RED) of the rear actuator motor and body ground immediately after (within approximately 2 seconds) starting the engine.

Is there battery voltage?

NO

Repair open in the RED wire between the control unit and the rear actuator motor.

YES

Measure voltage between the D terminal (BLK) of the rear actuator motor and body ground immediately after (within approximately 2 seconds) starting the engine.

Is there battery voltage?

NO

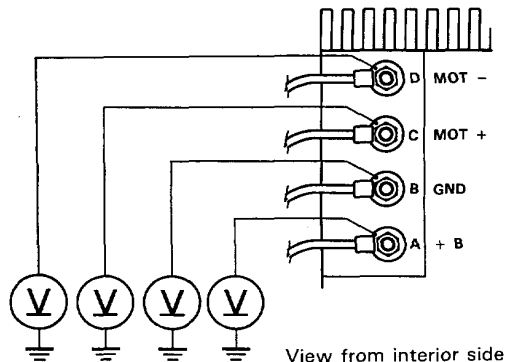
Repair open in the BLK wire between the control unit and the rear actuator motor.

YES

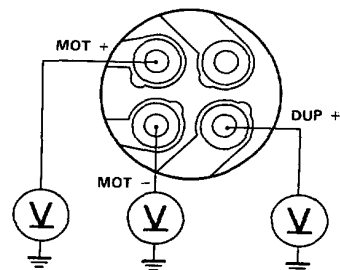
Measure voltage between the No. 33 terminal (YEL) of the rear actuator motor and body ground immediately after (within approximately 2 seconds) starting the engine.

(To page 17-75)

4WS CONTROL UNIT POWER TERMINAL

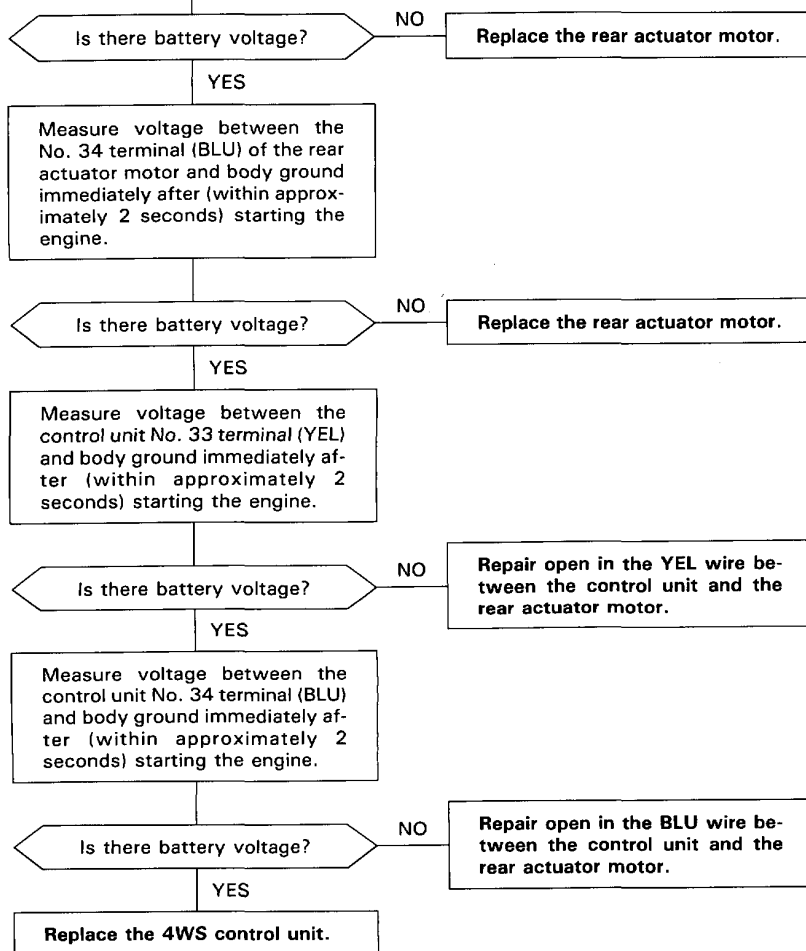


ACTUATOR MOTOR

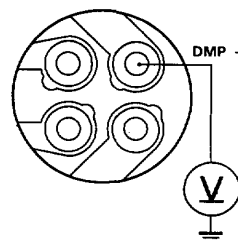




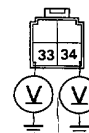
(From page 17-74)



ACTUTOR MOTOR



CONTROL UNIT 4P CONNECTOR



View from terminal side

Maintenance

Pump Belt Adjustment

1. Apply a force of 100 N (10 kg, 22 lb) and measure the deflection between the power steering pump and the crankshaft pulleys.

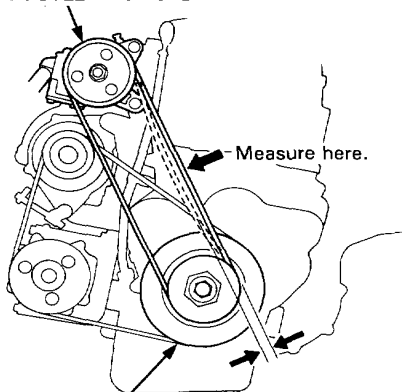
Deflection:

Used belt: 13.5–16.5 mm (0.53–0.65 in)

New belt: 9.5–11.5 mm (0.37–0.45 in)

NOTE: If there are cracks or any damage evident on the belt, replace it with a new one.

POWER STEERING PULLEY



CRANKSHAFT PULLEY

Measure with Belt Tension Gauge:

07JGG-0010100

Attach the belt tension gauge to the belt and measure the tension of the belt.

Tension:

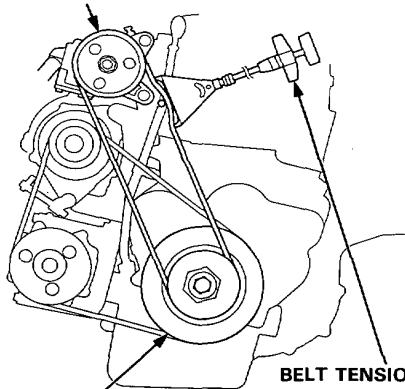
Used belt: 350–500 N (35–70 kg, 77–110 lb)

New belt: 700–900 N (70–90 kg, 154–198 lb)

NOTE: If there are cracks or any damage evident on the belt, replace it with a new one.

Follow the manufacturer's instructions for the tension gauge.

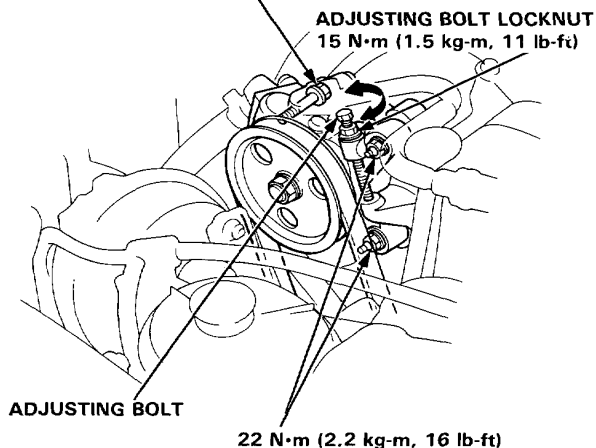
POWER STEERING PULLEY



CRANKSHAFT PULLEY

2. Loosen the power steering pump mounting bolt, nuts and adjusting bolt locknut.
3. Turn the adjusting bolt to get the proper belt tension, then retighten the adjusting bolt locknut and mounting bolts.
4. Start the engine and turn the steering wheel from lock-to-lock several times, then stop the engine and recheck the deflection of the belt.

22 N·m (2.2 kg-m, 16 lb-ft)



22 N·m (2.2 kg-m, 16 lb-ft)



On-Car Checks

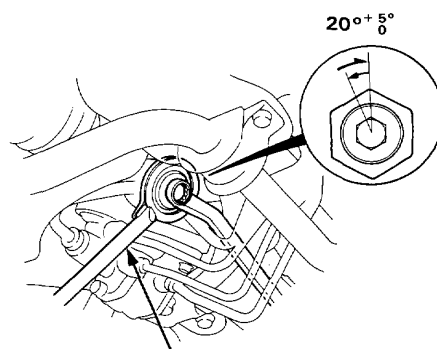
Rack Guide Adjustment

CAUTION: When servicing, be careful not to damage the power steering fluid lines with the special tool.

NOTE: Adjust the rack guide at the center of the rack stroke.

2WS

1. Remove the gearbox shield.
2. Loosen the rack guide screw locknut with the special tool.
3. Tighten, loosen and retighten the rack guide screw two times to 4 N·m (0.4 kg-m, 2.9 lb-ft) then back it off $20^{\circ} + \frac{5^{\circ}}{0}$.
4. Tighten the locknut to about 25 N·m (2.5 kg-m, 18 lb-ft) while holding the guide screw.
5. Check for tight or loose steering through the complete turning travel.
6. Recheck steering assist (page 17-81).



**LOCKNUT WRENCH, 43 mm
07MAA—SL0020A**

(cont'd)

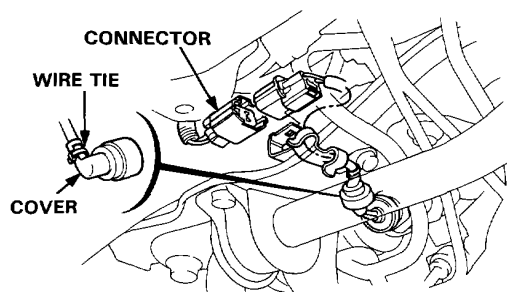
On-Car Checks

Rack Guide Adjustment (cont'd)

4WS

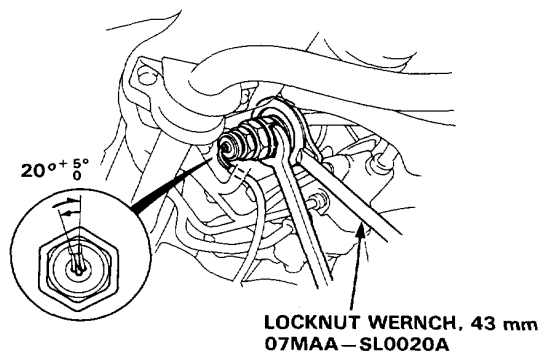
1. Remove the gearbox shield.
2. Cut wire tie from the sub steering angle sensor cover, then remove the cover from the sub steering angle sensor.

CAUTION: Cut the wire tie with carefully, so as not to damage the harness.



3. Remove the sub steering angle sensor wire harness from the clamp and disconnect the connector.

4. Loosen the rack guide screw locknut with the special tool.
5. Tighten, loosen and retighten the rack guide screw two times to 4 N·m (0.4 kg-m, 2.9 lb-ft) then back it off $20^{\circ} \pm 5^{\circ}$.
6. Tighten the locknut to about 25 N·m (2.5 kg-m, 18 lb-ft) while holding the guide screw.
7. Check for tight or loose steering through the complete turning travel.
8. Recheck steering assist (page 17-81).



9. Reconnect the connector and secure the sub steering angle sensor wire harness with the clamp and install the cover.

NOTE:

- Be sure the sensor wire harness does not interfere with the stabilizer and other moving parts.
- Be certain that the sensor wire is not twisted before connecting it.

10. Set the cover on the sub steering angle sensor. Secure the cover with the new wire tie.

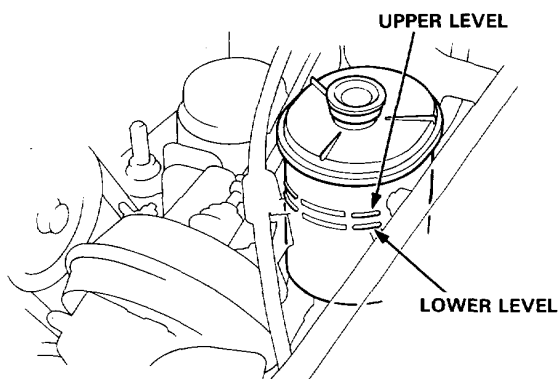
NOTE: After rack guide adjustment, perform the electrical check on the 4WS system (page 17-144).



Fluid Replacement

Check the reservoir at regular intervals, and add fluid as necessary.

CAUTION: Use only GENUINE HONDA Power Steering Fluid-V. Using other fluids such as ATF or other manufacturer's power steering fluid will damage the system.



Fluid Replacement

SYSTEM CAPACITY:

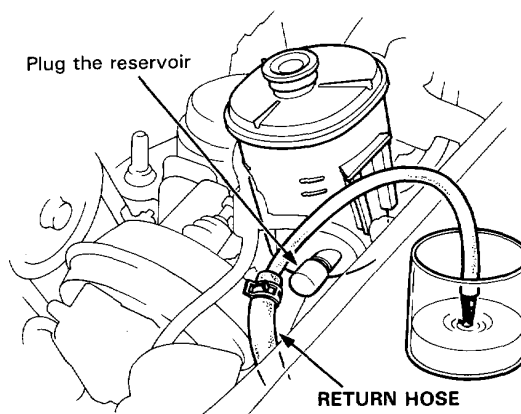
1.7 liter (1.80 US qt, 1.50 Imp qt) at change

RESERVOIR CAPACITY:

0.5 liter (0.53 US qt, 0.44 Imp qt)

1. Raise the reservoir and disconnect the hose that goes to the oil cooler.
2. Connect a hose of suitable diameter to the disconnected hose that goes to the oil cooler and put the hose end in a suitable container.
3. Start the engine, let it run at idle, and turn the steering wheel from lock-to-lock several times. When fluid stops running out of the hose, shut off the engine.
Discard the fluid.

CAUTION: Take care not to spill the fluid on the body and parts. Wipe off the spilled at once.



4. Reconnect the return hose to the reservoir.
5. Fill the reservoir to the upper level mark.
6. Start the engine and run it at fast idle, then turn the steering from lock-to-lock several times to bleed air from the system.
7. Recheck the fluid level and add some if necessary.

CAUTION: Do not fill the reservoir beyond the upper level mark.

On-Car Checks

Pump Pressure Check

Check the fluid pressure as follows to determine whether the trouble is in the pump or gearbox.

NOTE: First check the power steering fluid level and pump belt tension.

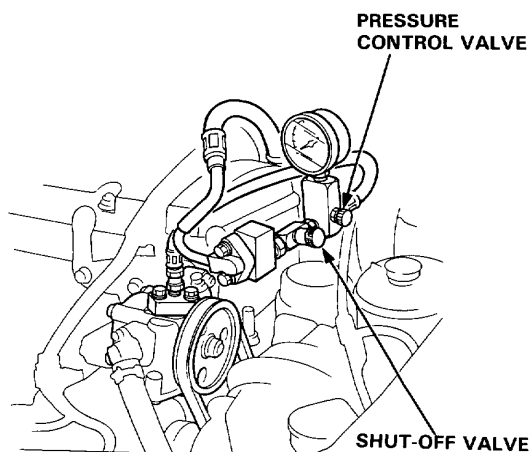
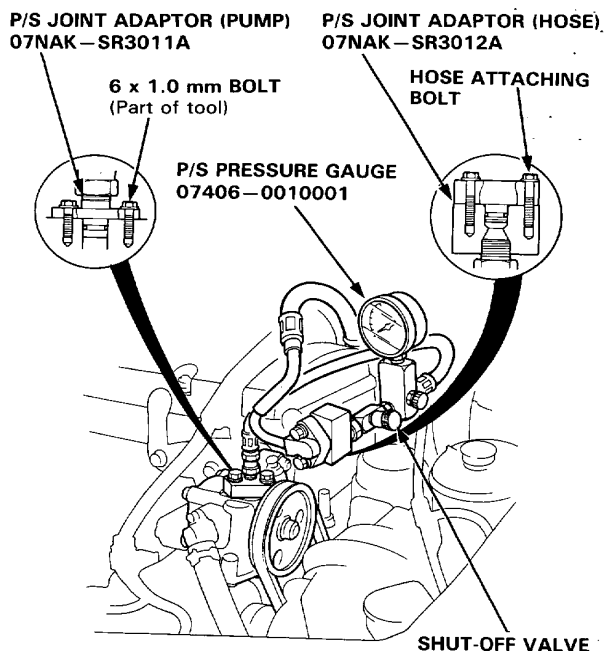
CAUTION: Disconnect the high pressure hose carefully, so as not to spill the power steering fluid on the frame and other parts.

1. Disconnect the outlet hose from the pump outlet fitting, and install the pump joint adaptor on the pump outlet.
2. Connect the hose joint adaptor to the power steering pressure gauge, then connect the outlet hose to the adaptor.
3. Install the power steering pressure gauge to the pump joint adaptor as shown.

4. Open the shut-off valve fully.
5. Open the pressure control valve fully.
6. Start the engine and let it idle.
7. Turn the steering wheel from lock-to-lock several times to warm the fluid to operating temperature.
8. Close the shut-off valve, then close the pressure control valve gradually until the pressure gauge needle is stable. Read the pressure.
9. Immediately open the shut-off valve fully.

CAUTION: Do not keep the shut-off valve closed more than 5 seconds or the pump could be damaged by over-heating.

If the pump is in good condition, the gauge should read at least 7,000–8,000 kpa (70–80 kg/cm², 995–1,138 psi). A low reading means pump output is too low for full assist. Repair or replace the pump.

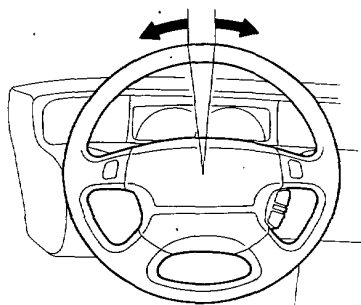




Steering Wheel Rotational Play

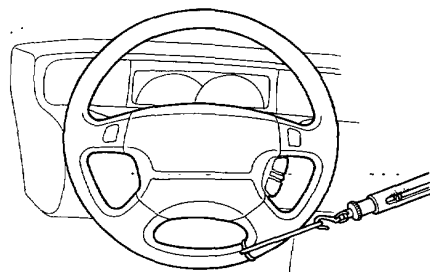
1. Place the front wheels in a straight ahead position and measure the distance the steering wheel can be turned without moving the front wheels.
2. If the play exceeds the service limit, check all steering components.

0–10 mm (0–0.4 in)

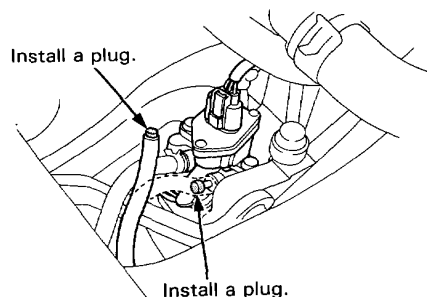


Power Assist Check with Car Parked

1. Check the power steering fluid level and pump belt tension.
2. Start the engine, allow it to idle, and turn steering wheel from lock-to-lock several times to warm up the fluid.
3. Attach a spring scale to the steering wheel. With the engine idling and the car on a clean, dry floor, pull the scale as shown and read it as soon as the tires begin to turn.



4. The scale should read no more than 30 N (3.0 kg, 6.6 lbs).
If it reads more or less, go on step 5.
5. Stop the engine. Disconnect the hose from the speed sensor and plug the hose and the sensor fitting as shown.

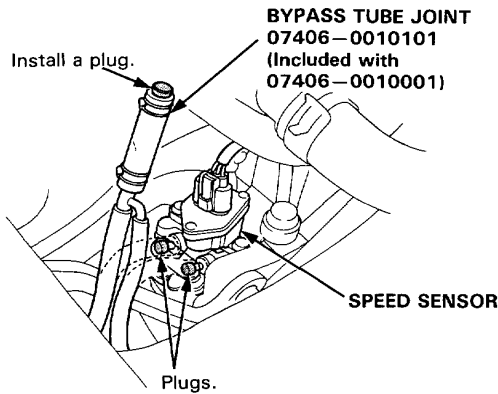


6. Start the engine and let it idle.
 - If the reading is now 30 N (3.0 kg, 6.6 lbs) or less, replace the speed sensor, see page 17-90.
 - If the reading is still more than 30 N (3.0 kg, 6.6 lbs), check the gearbox and pump.

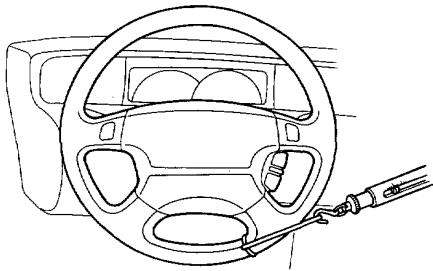
On-Car Checks

Assist Check at Road Speed

1. Check the power steering fluid level and pump belt tension.
2. Start the engine, let it warm up to normal temperature, and turn the steering wheel lock-to-lock a few times to warm up the fluid.
3. Stop the engine. To simulate speeds above 80 km/h (50 mph), disconnect the hoses from the speed sensor and connect them to the bypass tube joint. Plug the end of the bypass tube joint.



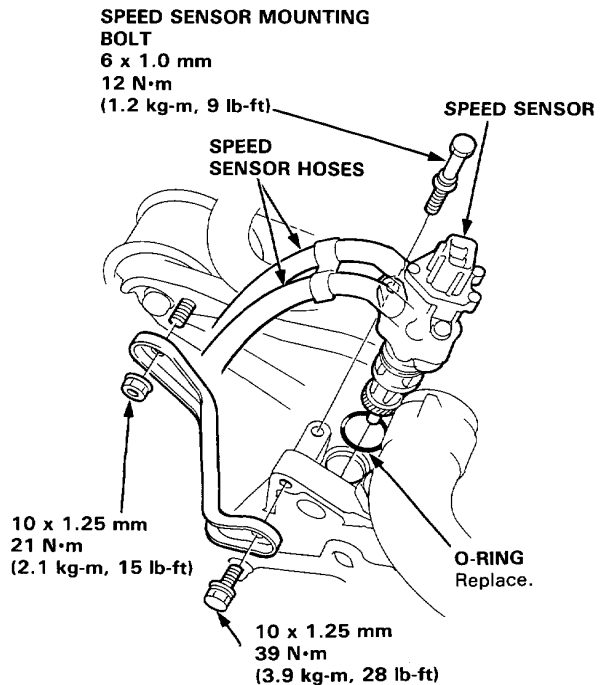
4. Attach the spring scale to the steering wheel. With the engine idling and the car on a clean, dry floor, pull the scale as shown and read it as soon as the tires begin to turn.



- If the scale reads a normal 50 N (5.0 kg, 11 lbs), or more the assist problem at high speeds is being caused by reduced speed sensor output. Replace the sensor.
- If the scale reads less than 50 N (5.0 kg, 11 lbs), the sensor is OK and the problem is in the sensor feed line, the pump, or the valve body unit. See if the feed line is pinched or bent then check pump.
- See General Troubleshooting (page 17-25).

Speed Sensor Replacement

1. Remove the rear mount bracket stay.
2. Disconnect the speed sensor wire connector from the speed sensor.
3. Remove the speed sensor mounting bolt and pull the speed sensor from the differential housing.
4. Disconnect the speed sensor hoses and plug the fittings.



5. After installing a new sensor, turn the steering wheel lock-to-lock with the engine idling to bleed air from the system.
6. Check the reservoir and add fluid if necessary.

Steering Wheel



Removal

Airbag Assembly Removal

▲ WARNING Store a removed airbag assembly with the pad surface up, if the airbag is improperly stored face down, accidental deployment could propel the unit with enough force to cause serious injury.

CAUTION:

- Before beginning work related to the SRS system, turn the ignition switch off, disconnect the negative and positive battery cables, and wait three minutes.
- Do not install used SRS parts from another car. When repairing an SRS, use only new parts.
- Carefully inspect the airbag assembly before installing it. Do not install an airbag assembly that shows signs of being dropped or improperly handled, such as dents, cracks or deformation.
- Do not disassemble or tamper with the airbag assembly.
- Special bolts are necessary for installing the airbag assembly. Do not use other bolts.

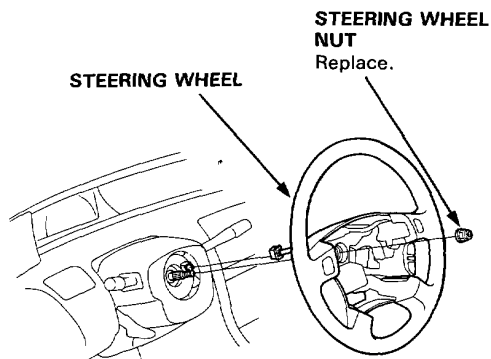
NOTE:

- Make sure the wheels are aligned straight ahead. Remove the left airbag assembly mounting TORX bolt first (the safety switch will automatically turn off).

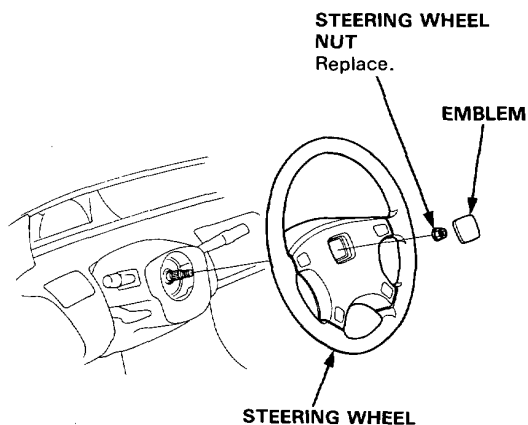
1. Turn the ignition switch off, then disconnect the negative and positive battery cables, and wait three minutes.
2. Remove the airbag assembly (page 23-398).

3. Remove the steering wheel nut.
4. Remove the steering wheel by rocking it slightly from side-to-side as you pull steadily with both hands.

With SRS



Without SRS



Steering Wheel

Disassembly/Reassembly

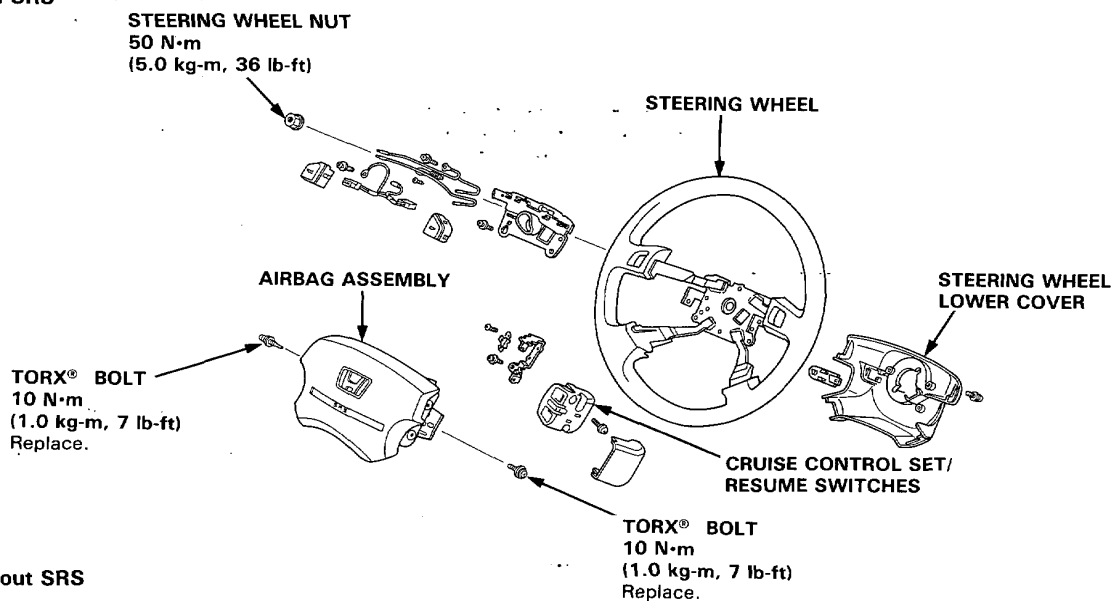
⚠ WARNING Store removed airbag assembly with the pad surface up. If the airbag is improperly stored face down, accidental deployment could propel the unit with enough force to cause serious injury.

NOTE: If an intact airbag assembly has been removed from a scrapped car or has been found defective or damaged during transit, storage or service, it should be deployed (see page, 23-400).

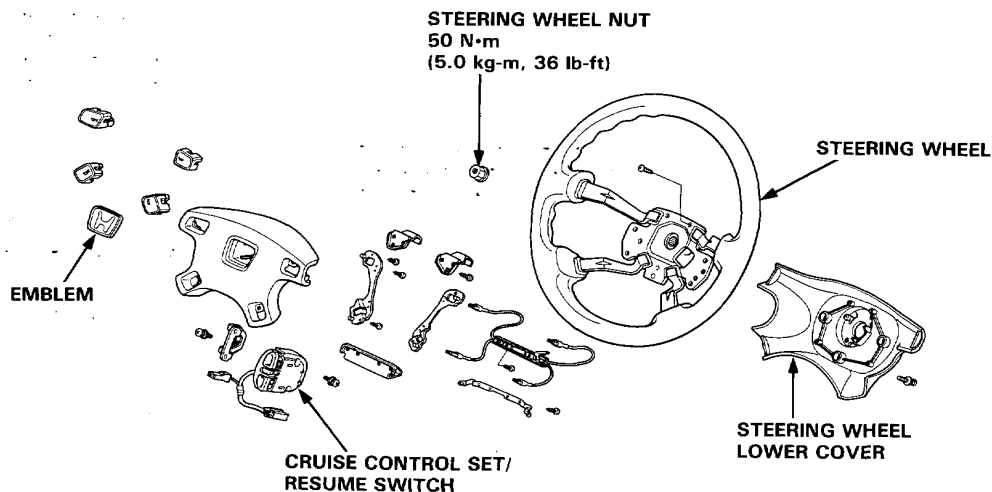
CAUTION:

- Carefully inspect the airbag assembly before installing. Do not install an airbag assembly that shows signs of being dropped or improperly handled, such as dents, cracks or deformation.
- Do not disassemble or tamper with the airbag assembly.

With SRS



Without SRS





Installation (2WS)

CAUTION:

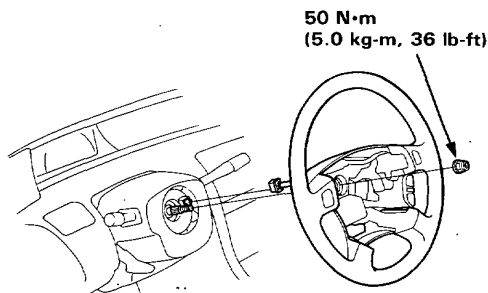
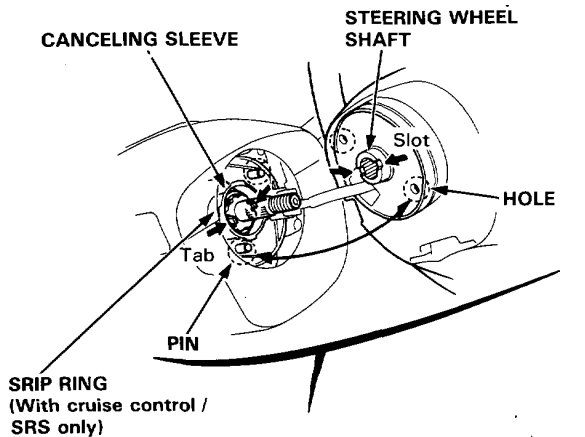
- Before installing the steering wheel, align the front wheels straight ahead.
- Be sure to install the harness wires so that they are not pinched or interfering with other car parts.
- Do not replace the original steering wheel with any other design, since it will make it impossible to properly install the airbag. (Only use genuine HONDA replacement parts)
- After reassembly, confirm that the wheels are still straight ahead and that steering wheel spoke angle is correct.
- Be sure the battery cables are disconnected.

⚠ WARNING Confirm that the airbag assembly is securely attached to the steering wheel; otherwise, severe personal injury could result during airbag deployment.

1. Install the steering wheel on the column.

With Cruise Control/SRS

NOTE: Be sure the steering wheel shaft engages the slip ring and canceling sleeve.



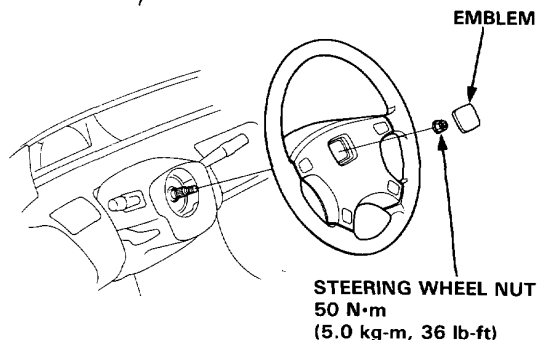
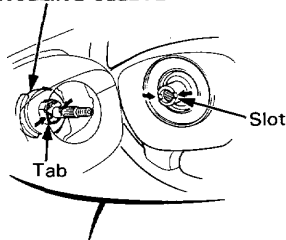
2. Install the airbag assembly (see page 23-399).
3. After installing the airbag assembly, confirm proper system operation:

- Turn the ignition to ON; the instrument panel SRS indicator light should go on for about 6 seconds and then go off.
- The SRS self diagnosis indicator (LED) should blink one time with the ignition switch ON.

Without Cruise Control/SRS

NOTE: Be sure the steering wheel shaft engages the turn signal canceling sleeve.

TURN SIGNAL CANCELING SLEEVE



Steering Wheel

Installation (4WS)

<4WS steering wheel spoke angle adjustment>

CAUTION:

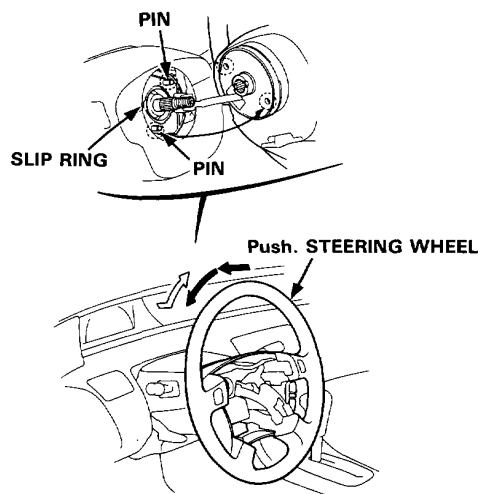
- The front main steering angle sensor with the neutral lock mechanism is mounted on the column shaft of the car. When the steering wheel is removed, the rotation part of the sensor is locked at the electrically neutral position, and it is unlocked when the steering wheel is inserted to the specified installation position.
- If the spoke angle is not at the designated angle while driving straight, check the four front and rear wheels for proper alignment before adjusting the spoke angle.
Perform the electrically neutral check of the 4WS system to be sure that the rear wheels are at the correct steering angle while driving (see page 17-144).
- Before installing the steering wheel, align the front wheels straight ahead.
- Be sure to install the harness wires so that they are not pinched or interfering with other car parts.
- Do not replace the original steering wheel with any other design, since it will make it impossible to properly install the airbag. (Only use genuine HONDA replacement parts)

⚠ WARNING Confirm that the airbag assembly is securely attached to the steering wheel; otherwise, severe personal injury could result during later airbag deployment.

1. Temporarily install the steering wheel aligning it with the column shaft serration.
2. Turn the steering wheel fully to the right and left and set the steering wheel in the center of the range where the front wheels move (i.e. center of the steering rack).

NOTE:

- Be sure that the front wheels are in the straight driving position.
- Be sure the steering wheel shaft engages the slip ring.

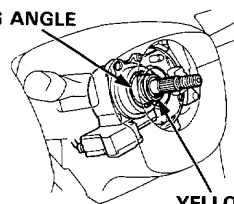


3. Remove the steering wheel.
4. Check whether the yellow paint mark of the front main steering angle sensor rotor is facing down (i.e. in neutral lock position where the rotor does not turn).

NOTE: If the paint mark is not toward down, adjust as follows.

- 1) Temporarily install the steering wheel with the spoke angle at the horizontal angle.
- 2) Turn the steering wheel until the mark is toward down.
- 3) Return the spoke angle to the horizontal angle set in the step 1) being careful not to push in the steering wheel. Remove the steering wheel.

FRONT STEERING ANGLE
SENSOR

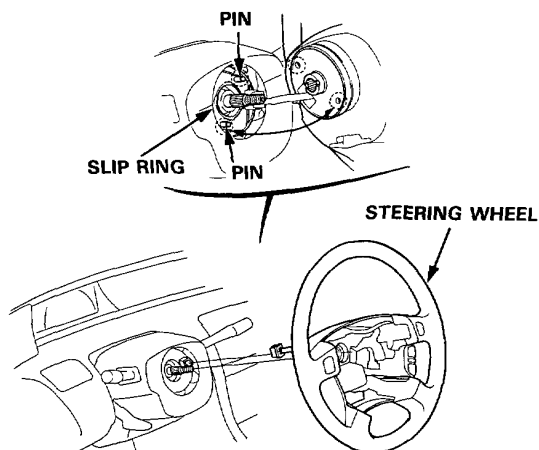




5. Reinstall the steering wheel in the straight driving position, with care not to make it off to the side from the position set in step 3.

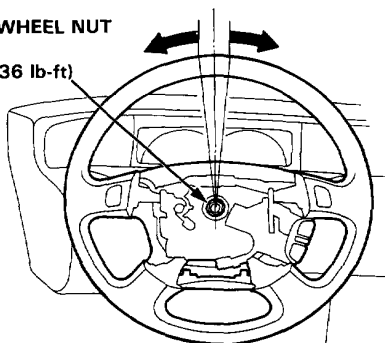
NOTE:

- Align the hole, in the steering wheel with the pin of the slip ring.
- Align the steering wheel with the serrations which makes the spoke angle closest to horizontal.



6. If the spoke angle is not horizontal, adjust the steering wheel slightly right or left, without pushing in the steering wheel too deep.

STEERING WHEEL NUT
50 N·m
(5.0 kg·m, 36 lb·ft)



With the spoke angle set at the horizontal, then push the steering wheel fully. Tighten the steering wheel nut while pushing the steering wheel.

NOTE: Do not turn the steering wheel when pushing the steering wheel.

7. Check the four front and rear wheels for alignment and perform the electronically neutral check on the 4WS system (see page 17-144).

8. Install the airbag assembly (see page 23-399).

9. After installing the airbag assembly, confirm proper system operation:

- Turn the ignition to ON: the instrument panel SRS indicator light should go on for about 6 seconds and then go off.
- The SRS self diagnosis indicator (LED) should blink one time with the ignition switch ON.

Steering Column

Removal

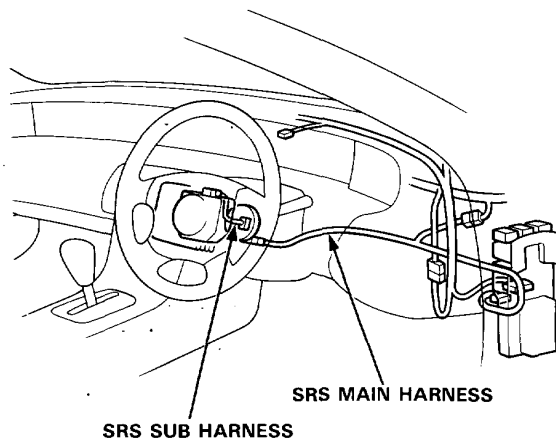
With 4WS

CAUTION: The front main steering angle sensor with the neutral lock mechanism is mounted on the column shaft of the car. When the steering wheel is removed, the rotation part of the sensor is locked at the electrically neutral position, and it is unlocked when the steering wheel is inserted to the specified installation position.

With SRS

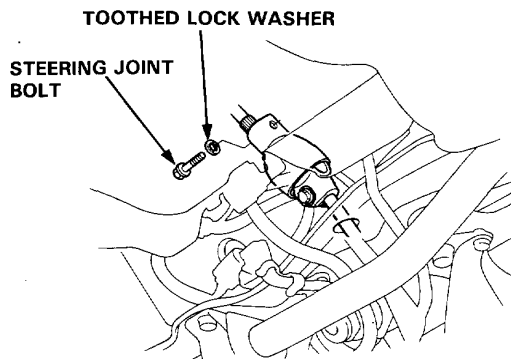
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

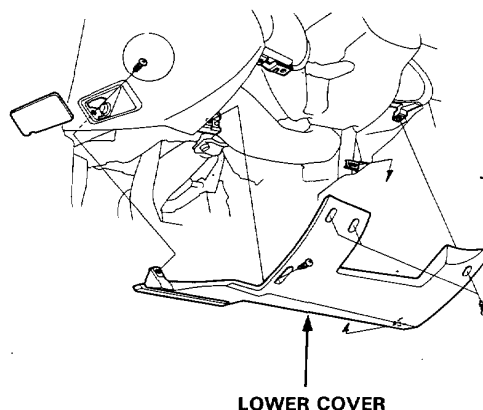


NOTE: RH drive shown. LH drive is similar.

1. Remove the airbag assembly and steering wheel (page 17-83).
2. Remove the steering joint upper bolt and toothed lock washer (from the engine compartment).

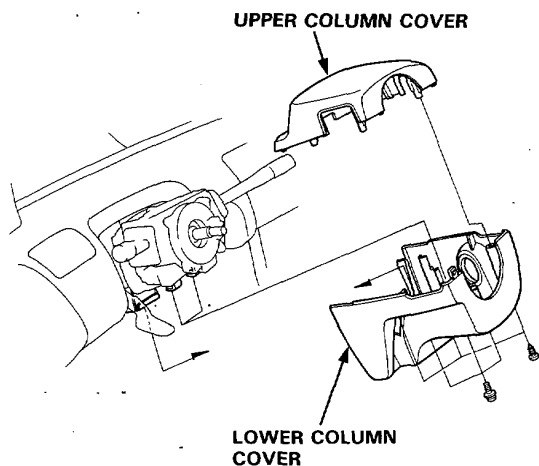


3. Remove the lower cover.





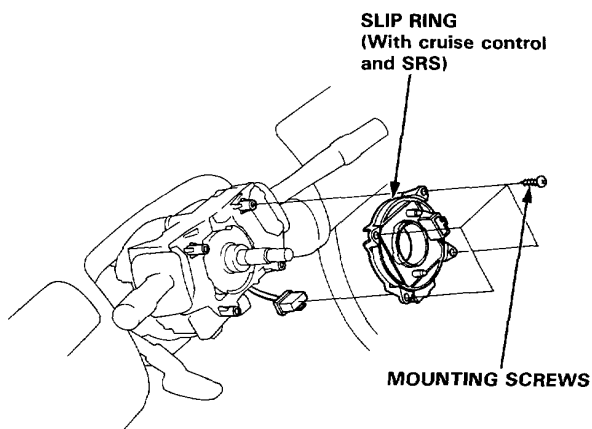
4. Remove the upper and lower column covers.



5. Pull out the connector lock, then disconnect the connector from the slip ring (with cruise control and SRS).

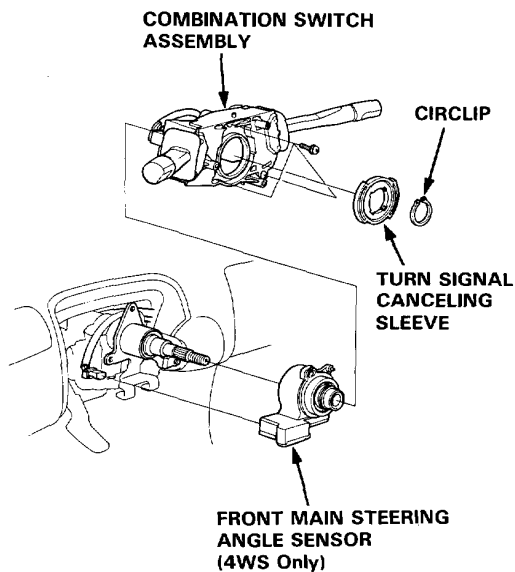
NOTE: Dispose of the connector lock, it is not to be reused.

6. Remove the slip ring from the combination switch assembly.

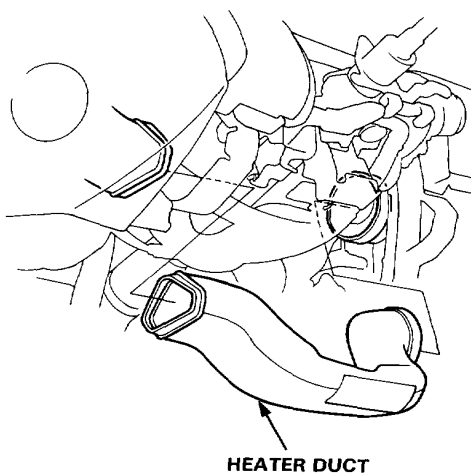


7. Remove the turn signal canceling sleeve, combination switch assembly and front main steering angle sensor (4WS only) by removing the circlip.

NOTE: After removing the combination switch assembly, place it on the floor gently so that it does not hinder you in service. Do not disconnect the cables from the combination switch assembly.



8. Remove the heater duct.

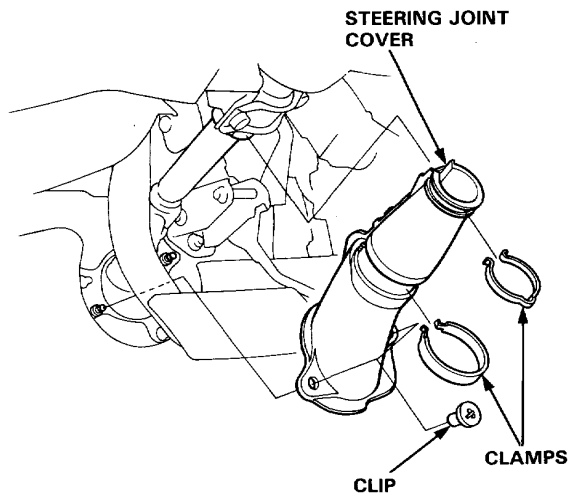


(cont'd)

Steering Column

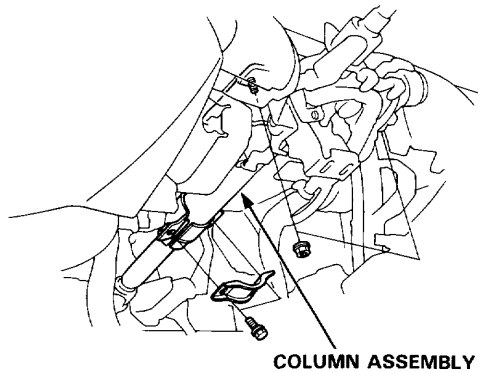
Removal (cont'd)

9. Remove the steering joint cover.



10. Disconnect the wire couple of the ignition switch.

11. Remove the steering column assembly by removing the attaching nuts and bolts.





Inspection

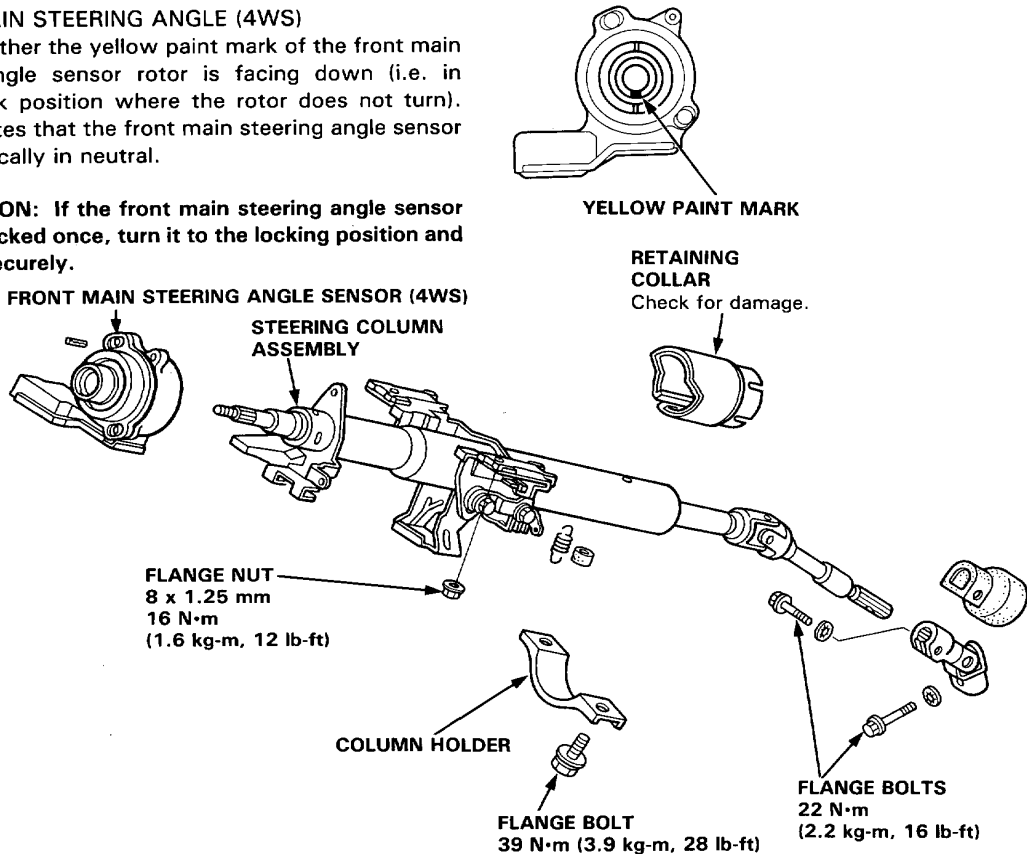
NOTE: Check the tilt mechanism, steering joint bearings and steering shaft for proper movement and damage. Replace as an assembly if damaged or faulty.

CAUTION: Do not apply an impact load to the column shaft in the axial direction.

FRONT MAIN STEERING ANGLE (4WS)

Check whether the yellow paint mark of the front main steering angle sensor rotor is facing down (i.e. in neutral lock position where the rotor does not turn). This indicates that the front main steering angle sensor is electronically in neutral.

CAUTION: If the front main steering angle sensor is unlocked once, turn it to the locking position and lock securely.



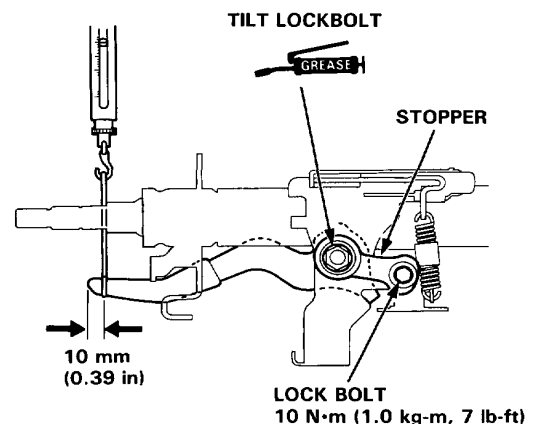
- Attach a spring scale to the knob of the tilt lever. Measure the force required to move the lever.

Preload: 70–90 N (7–9 kg, 15–20 lbs)

NOTE: If adjustment is necessary, install the column assembly on the frame and adjust with the tilt lever in the neutral position.

- If the force measured is not within the specification, loosen the lock bolt, then the stopper, until the correct force can be obtained.
- Check the operation load again. If it is out of specification, repeat the adjustment.

CAUTION: Do not loosen the tilt lever when setting the stopper and when tightening the bolt.



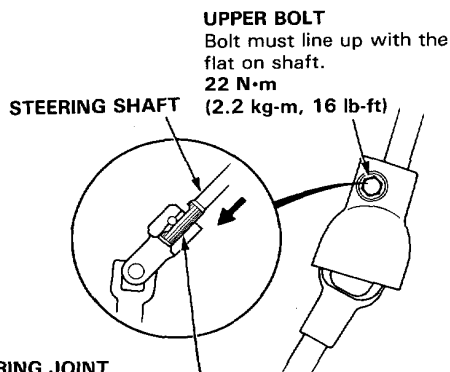
Steering Column

Installation

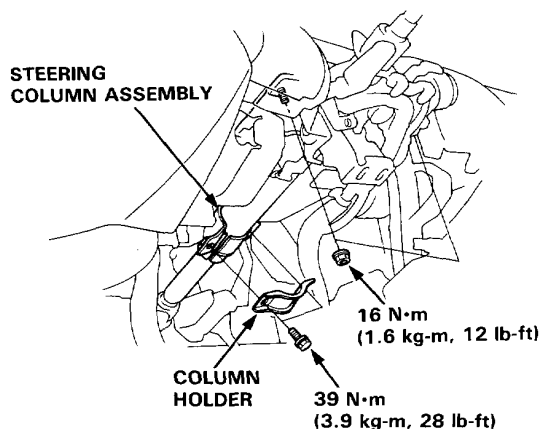
NOTE:

- Be sure the pinion shaft and the steering column shaft are aligned; the joint should slip on freely. If not, reposition the steering rack to correct the misalignment.
- Coat the interior of the steering joint grommet with grease.

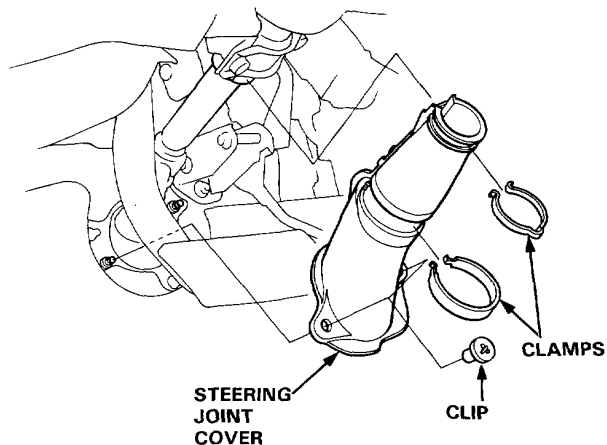
1. Guide the steering shaft through the engine compartment bulkhead. Align the bolt hole in the steering joint with the slot in the steering shaft, and insert the shaft into the steering joint.



2. Install the steering column assembly with the nuts and column holder.
3. Connect the ignition switch connector.

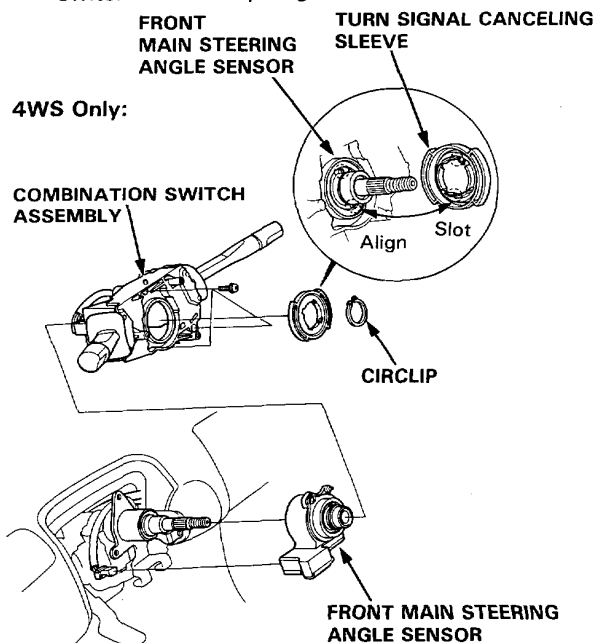


4. Install the steering joint cover with the clamps and clip.



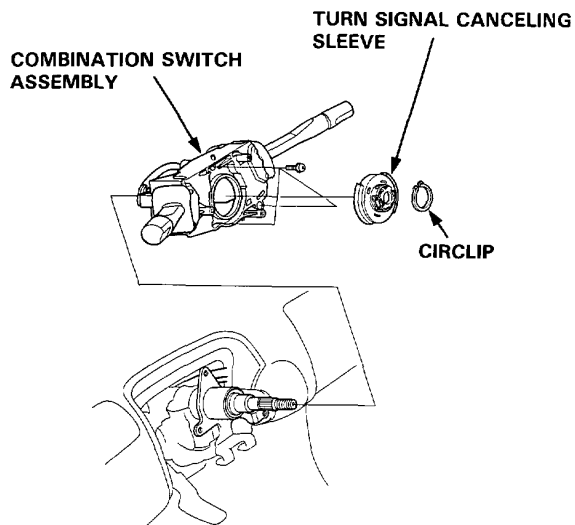
5. Install the front main steering angle sensor (4WS), combination switch assembly and turn signal canceling sleeve with a circlip.

NOTE: Be sure the wires are not caught or pinched by any parts when connecting the combination switch and the slip ring.



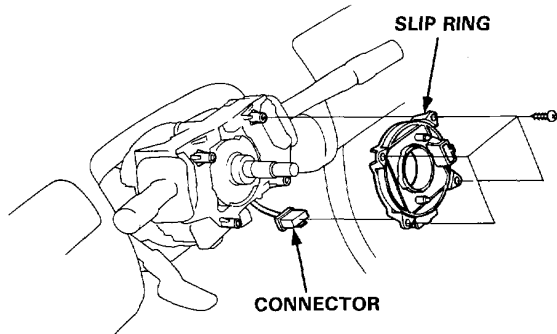


2WS Only:

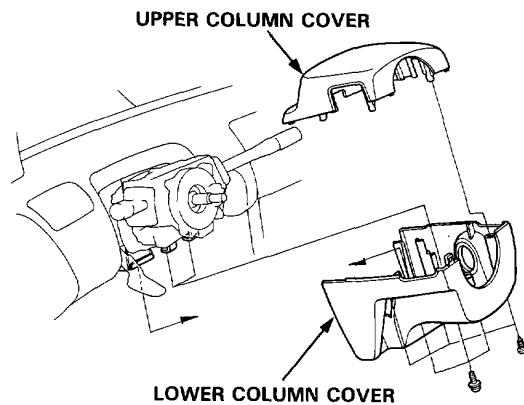


With cruise control and SRS Only

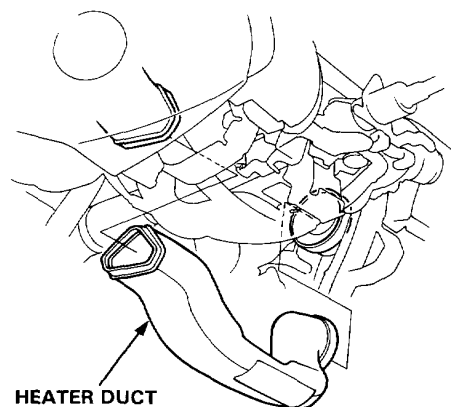
6. Install the slip ring on the steering column, then connect the connector to the slip ring.



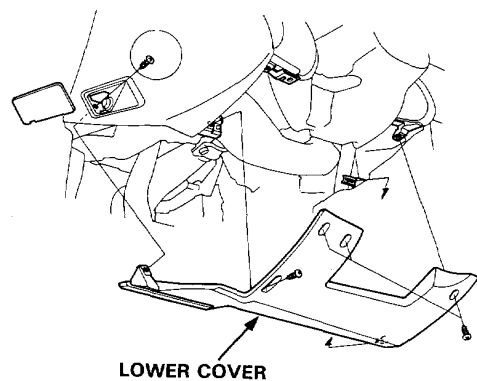
7. Install the upper column cover and lower column cover.



8. Install the heater duct.



9. Install the lower cover.

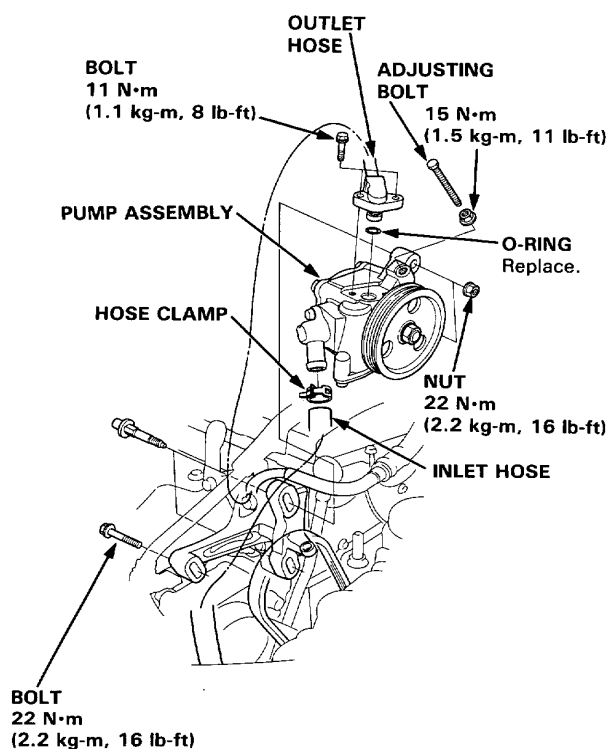


10. Install the steering wheel (page 17-85/86) and air-bag assembly (page 23-399).

Steering Pump

Replacement

1. Drain the fluid from the system (page 17-79).
2. Remove the belt by loosening the bolt, nut and adjusting bolt.
3. Disconnect the inlet and outlet hoses from the pump and plug them.
4. Remove the special bolt and nut, then remove the pump.

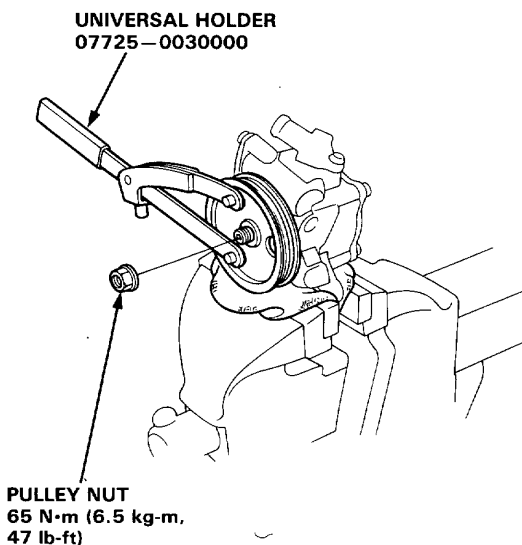


5. Loosely install a new pump on the bracket.
6. Connect the inlet and outlet hoses to the pump.
7. Install and adjust the belt (page 17-76).
8. Fill the reservoir with new fluid to the **UPPER LEVEL** on the reservoir.
9. Start the engine and let it run at fast idle while turning the steering wheel lock-to-lock several times to bleed air from the system.
10. Check the reservoir and add fluid if necessary.

Pulley Replacement

Hold the steering pump in a vise with soft jaws, and hold the pulley with the special tool and remove the pulley nut and pulley.

NOTE: Pulley nut has left-hand threads.

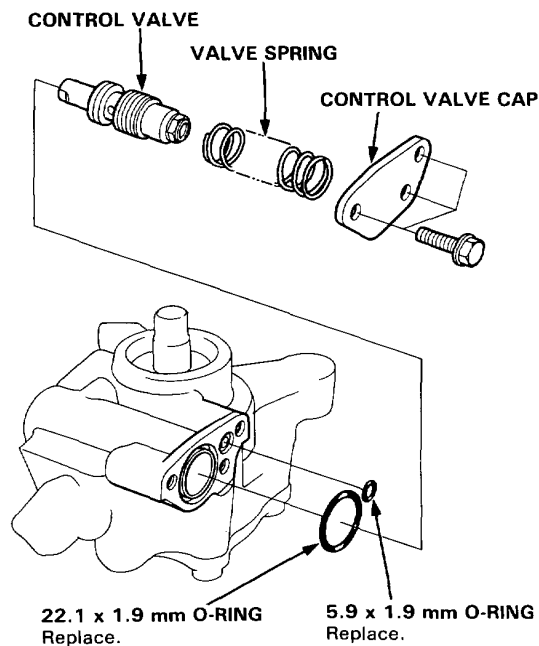


Hold the pulley with the special tool and tighten the pulley nut.

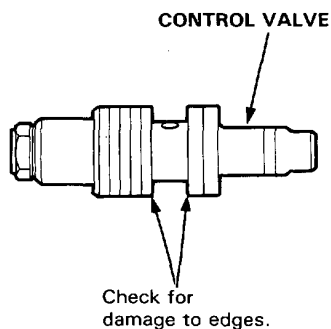


Control Valve Inspection and Replacement

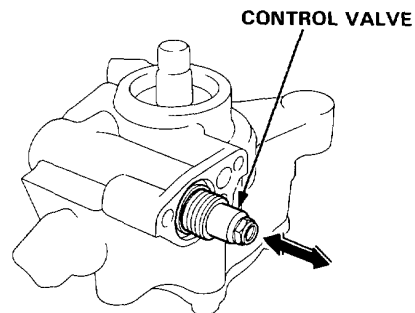
1. Remove the control valve cap by removing the two flange bolts.
2. Remove the control valve, control valve spring and O-rings.



3. Check for wear, burrs, and other damage to the edges of the grooves in the valve.

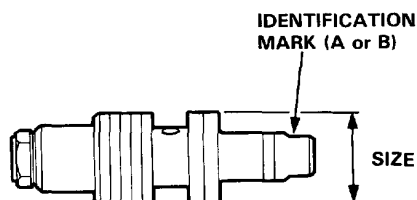


4. Slip the valve back in the pump and check that it moves in and out smoothly.



If OK, go on to step 5; if not, replace the valve:

- The original valve was selected for a precise fit in the pump housing bore, so make sure the new one has the same identification mark.



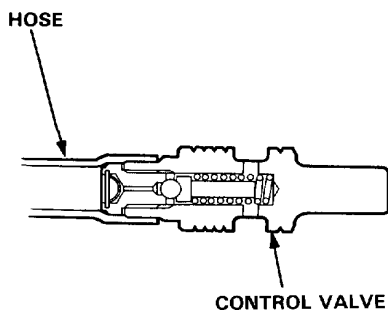
Mark	Part Name	Size mm (in)
A	CONTROL VALVE A	17.991–17.996 (0.7083–0.7085)
B	CONTROL VALVE B	17.996–18.001 (0.7085–0.7087)

(cont'd)

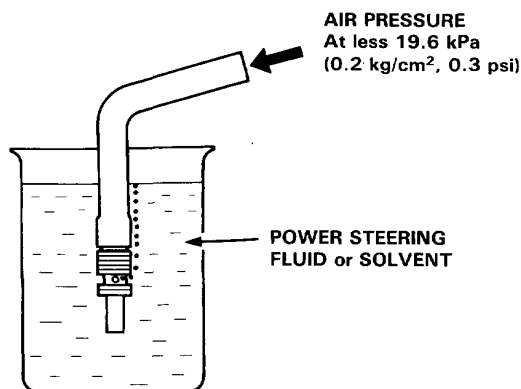
Steering Pump

Control Valve Inspection and Replacement (cont'd)

5. Attach a hose to the end of the valve as shown.

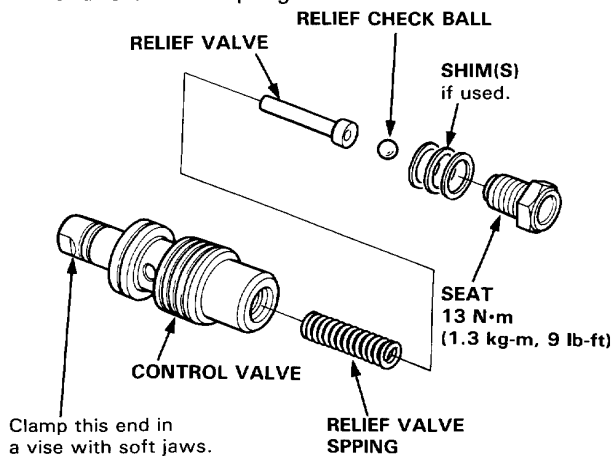


6. Submerge the valve in a container of power steering fluid or solvent, and blow in the hose. If air bubbles leak through the valve, replace or repair it as follows.



7. Clamp the bottom end of the valve in a vise with soft jaws.

8. Unscrew the seat in the top end of the valve, and remove any shims, the relief check ball, relief valve and relief valve spring.



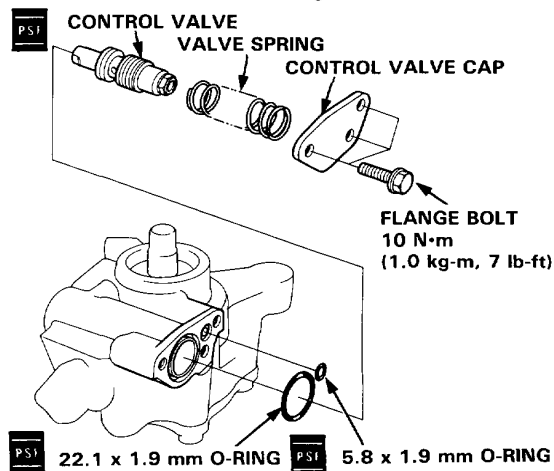
9. Clean all the parts in solvent, dry them off then reassemble and retest the valve.

NOTE: If necessary, relief pressure is adjusted at the factory by adding shims under the check ball seat. If you found shims in your valve, be sure you reinstall as many as you took out.

10. Install the control valve in the reverse order of removal.

NOTE:

- Coat the control valve with power steering fluid, then install it and valve spring.
- When replacing the control valve, be sure the replacement control valve has the same identification letter as the original valve.

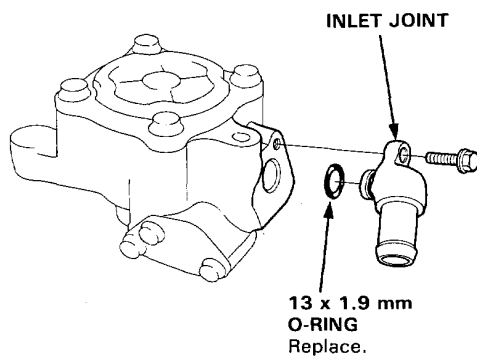




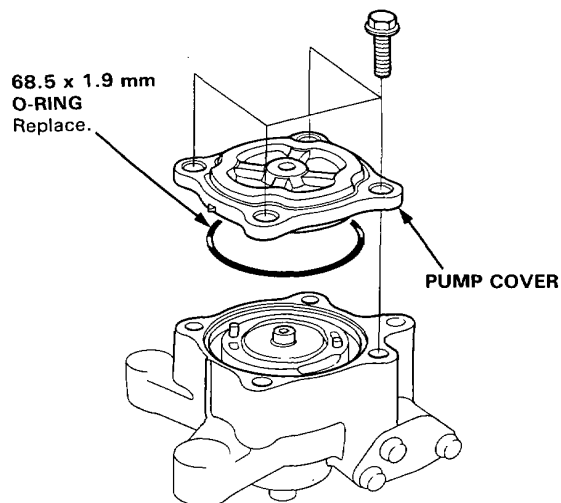
Disassembly

CAUTION: The pump components are made of aluminum. Be careful not to damage them when servicing.

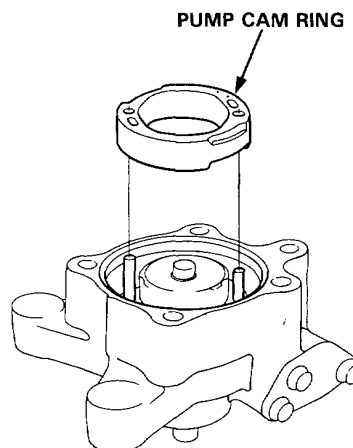
1. Remove the pump from car (page 17-94).
2. Remove the pulley (page 17-94).
3. Remove the control valve (page 17-95).
4. Remove the inlet joint and 13 x 1.9 mm O-ring.



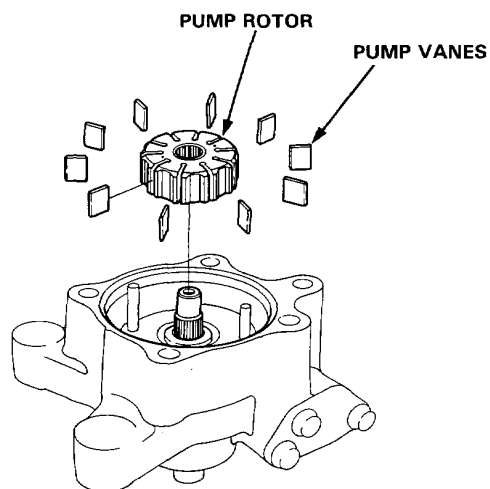
5. Remove the pump cover.



6. Remove the pump cam ring from the pump housing.



7. Remove the pump rotor and vanes.



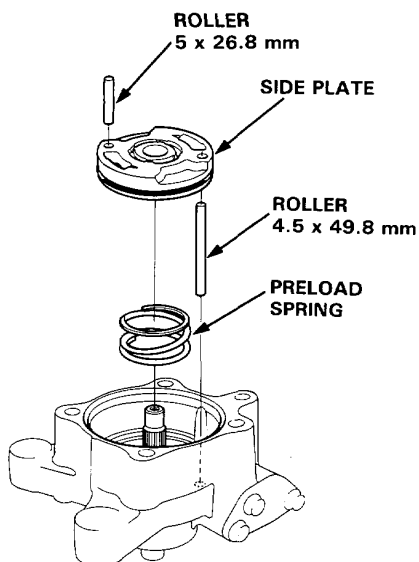
(cont'd)

Steering Pump

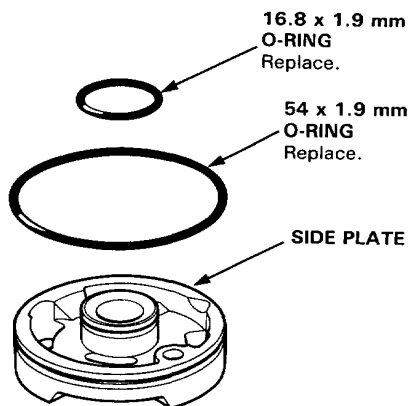
Disassembly (cont'd)

8. Remove the two rollers from the side plate.

9. Remove the side plate and preload spring.

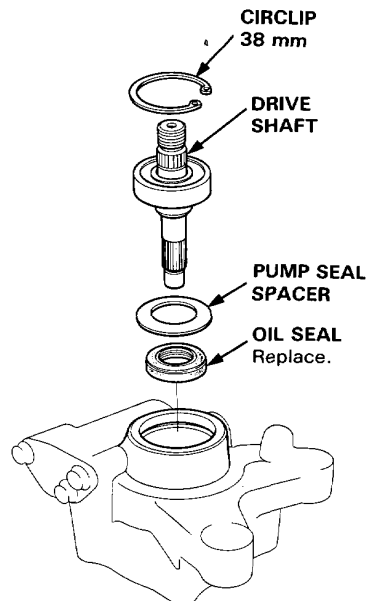


10. Remove the O-ring from the side plate.



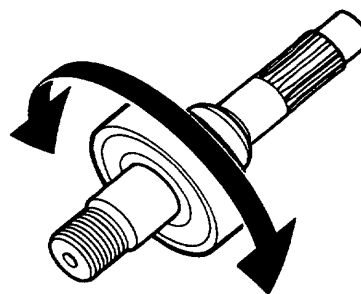
11. Remove the circlip, then remove the drive shaft assembly from the pump housing using a plastic hammer.

12. Remove the seal spacer and oil seal.



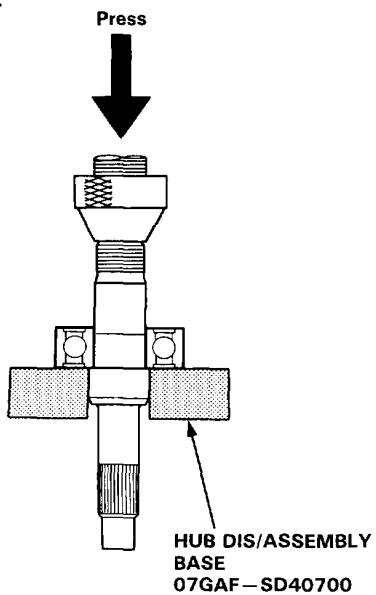
13. Check the pump ball bearing for play; if it is OK, go on step 13.

— If the bearing is noisy or has excessive play, replace the bearing.

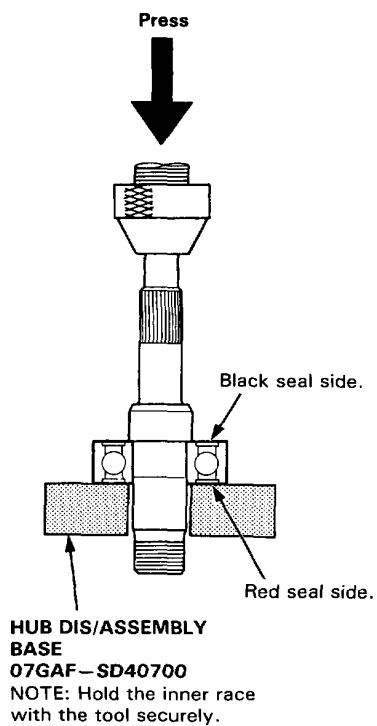




- Remove the bearing using the special tool and press.



- Install the new bearing using the press and special tool.



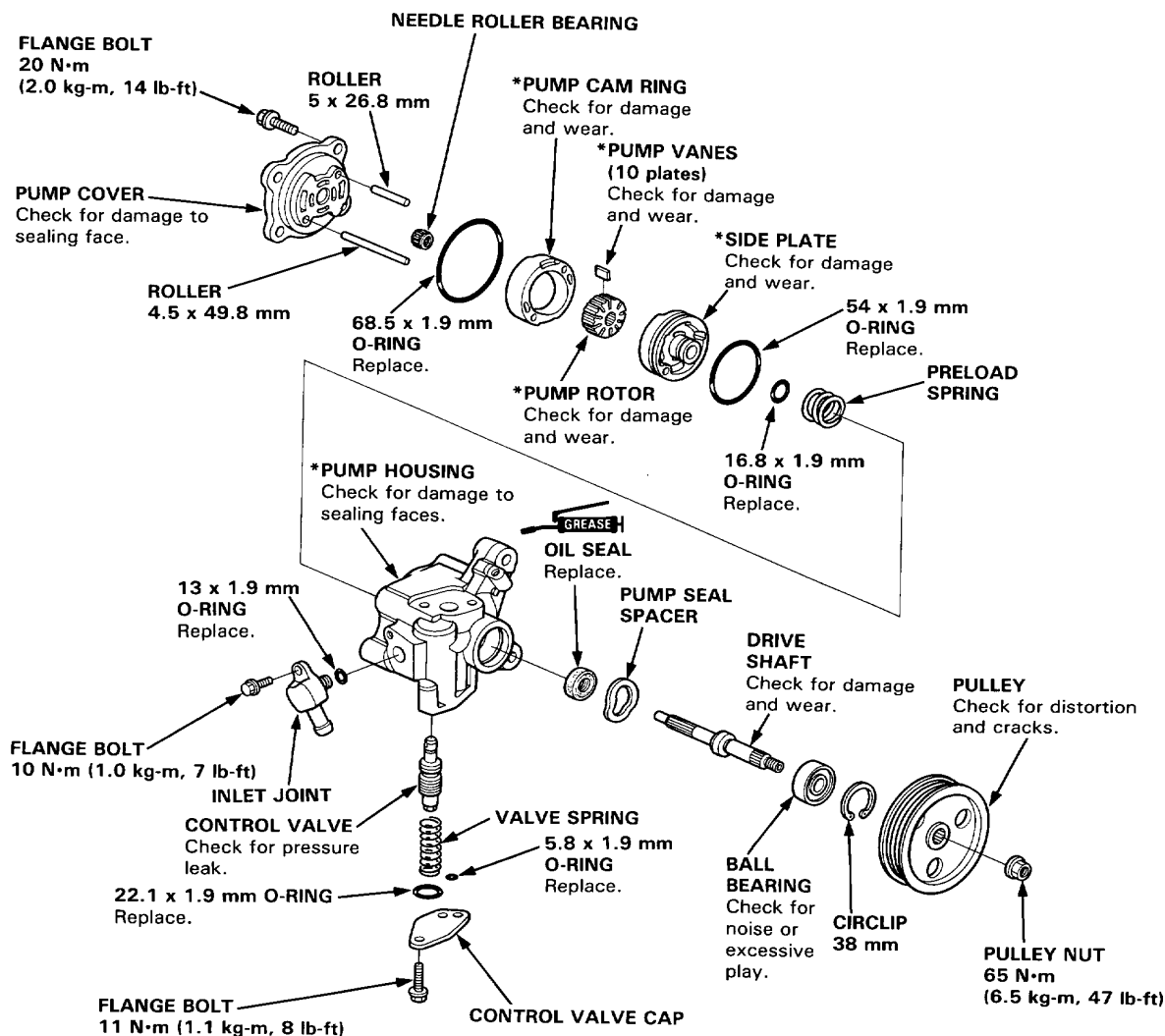
Steering Pump

Illustrated Index

CAUTION: Pump components are made of aluminum. Be careful not to damage them when servicing.

NOTE:

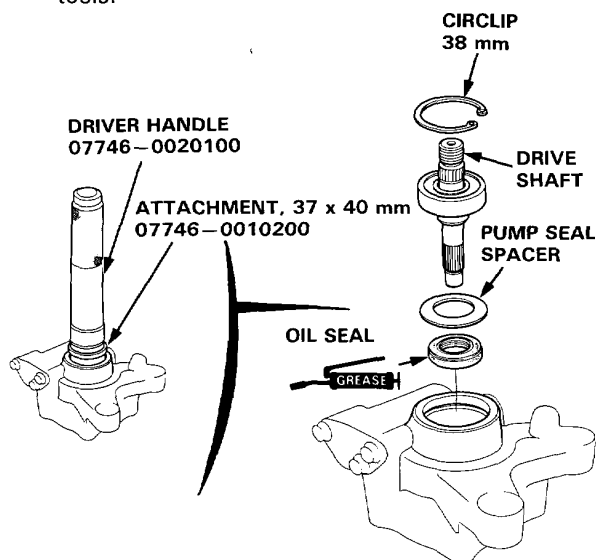
- Clean all of the disassembled parts thoroughly.
- Replace all O-rings and seals. Do not dip new O-rings and seals in solvent; coat O-rings with steering fluid before installation, and make sure they stay in place during reassembly.
- If any part denoted with an asterisk (*) is worn or damaged, replace the complete pump.



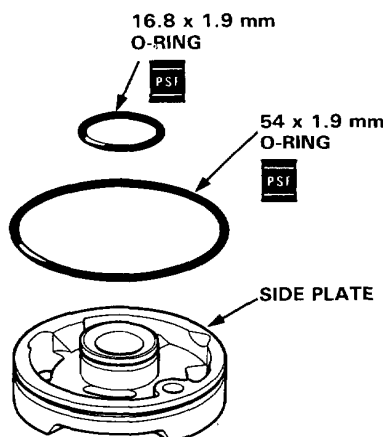


Assembly

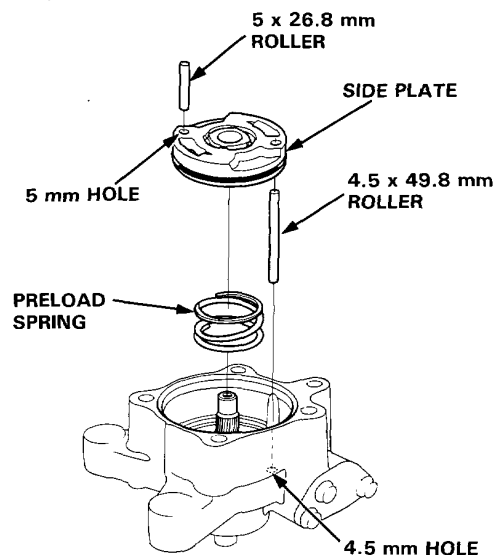
1. Coat the lip of the new oil seal with steering grease (Honda P/N 08733-B070E).
2. Install the new oil seal in the pump housing by hand.
3. Install the pump seal spacer, then install the pump drive shaft in the pump housing using the special tools.



4. Install the 38 mm circlip with its tapered side facing out.
5. Coat the side plate grooves with power steering fluid, then position the 16.8 x 1.9 mm and 54 x 1.9 mm O-rings on the side plate.

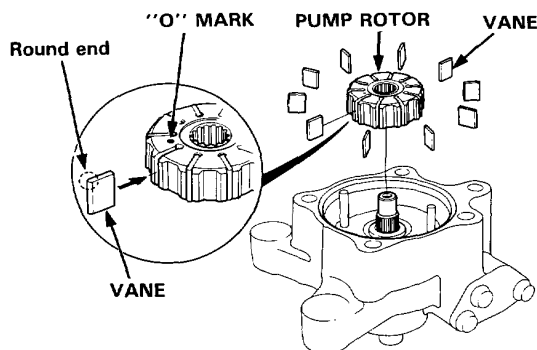


6. Install the preload spring in the pump housing.
7. Set the 4.5 x 49.8 mm roller in the 4.5 mm hole in the pump housing.
8. Set the side plate over the roller and install it on the pump housing.
9. Set the 5 x 26.8 mm roller in the 5 mm hole in the side plate.



10. Assemble the pump rotor to the drive shaft with the "O" mark on the rotor facing upward.
11. Set the 10 vanes in each groove in the rotor.

NOTE: Be sure that the round end of the vanes is in contact with the sliding surface of the cam ring.

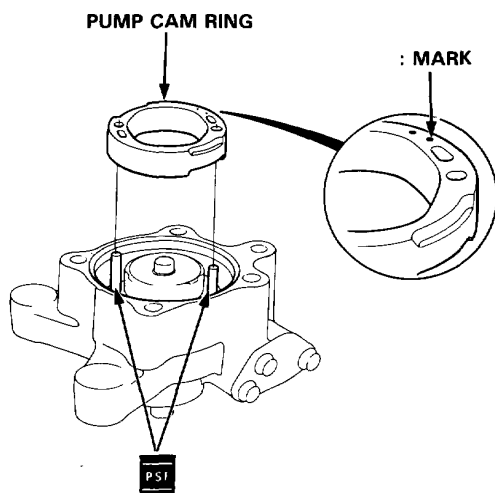


(cont'd)

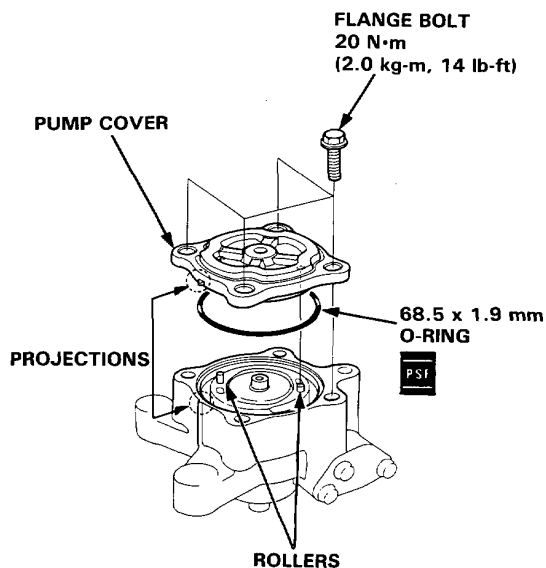
Steering Pump

Assembly (cont'd)

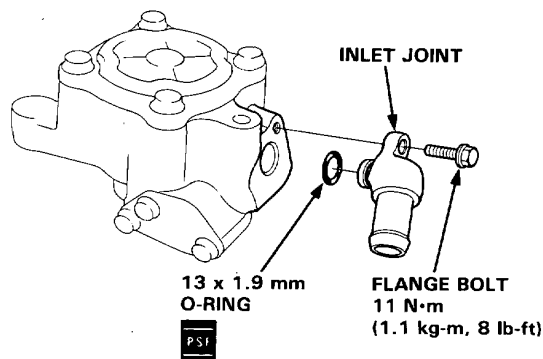
12. Set the pump cam ring over the two rollers with the "·" mark on the cam ring upward.



13. Install the 68.5 x 1.9 mm O-ring on the pump cover.
14. Align the roller set holes in the pump cover with the rollers.
15. Align the projection on the pump housing and the projection on the pump cover, then tighten the four bolts.



16. Set the 13 x 1.9 mm O-ring on the inlet joint, and install the inlet joint on the pump housing.



17. Install the control valve (page 17-96).
18. Install the pulley (page 17-94) and check that the pump turns smoothly by turning the pulley.

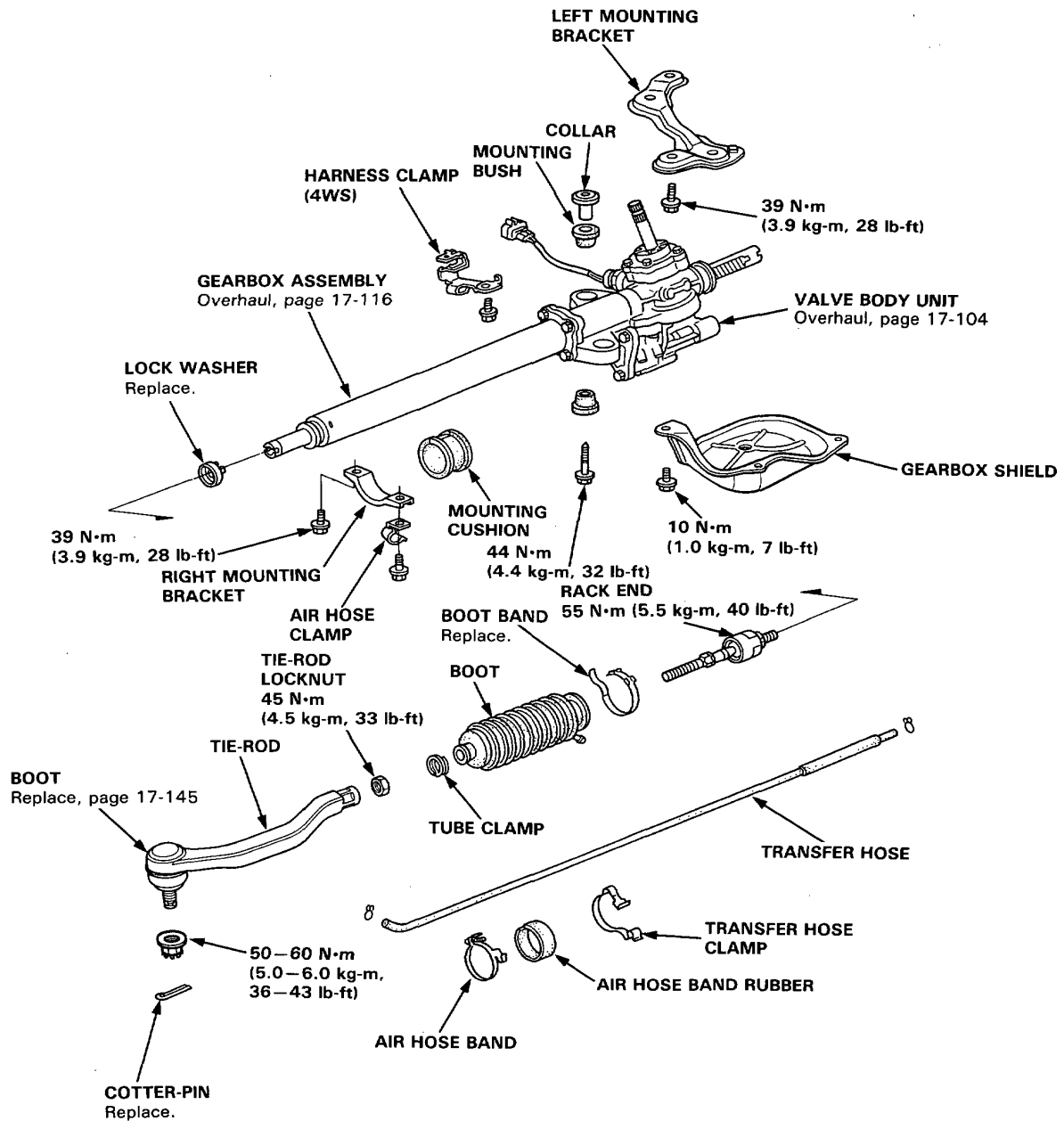


Steering Gearbox

Index

CAUTION: Before disassembling the gearbox, wash it off with solvent and a brush.

NOTE: LH drive shown. RH drive is similar.

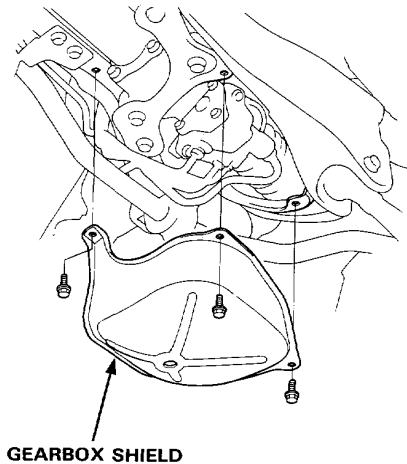


Steering Gearbox

Valve Body Unit

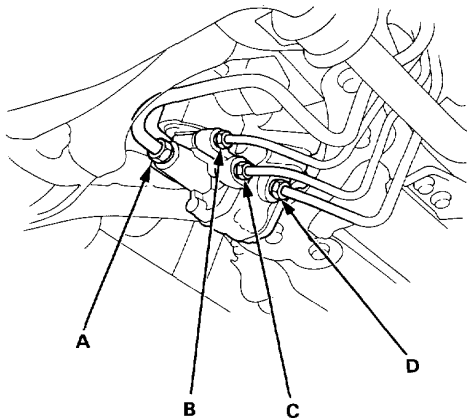
Removal

1. Drain the power steering fluid (page 17-79).
2. Remove the gearbox shield.

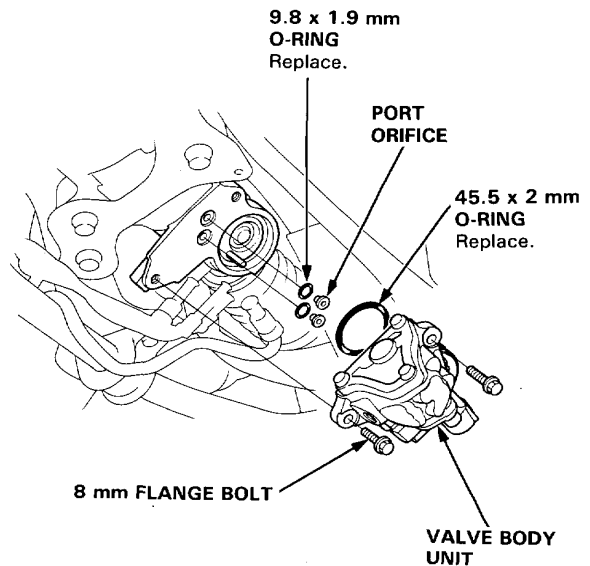


3. Using solvent and a brush, wash any oil and dirt off the valve body unit, its lines, and that end of the gearbox. Blow dry with compressed air.
4. Using flare nut wrenches, disconnect the four lines from the valve body unit.

- A: To oil cooler: 17 mm wrench
B: To speed sensor: 12 mm wrench
C: To reservoir: 12 mm wrench
D: From pump: 14 mm wrench



5. Remove the two 8 mm flange bolts and remove the valve body unit from the gearbox.
6. Remove the O-rings and port orifices from the gearbox.

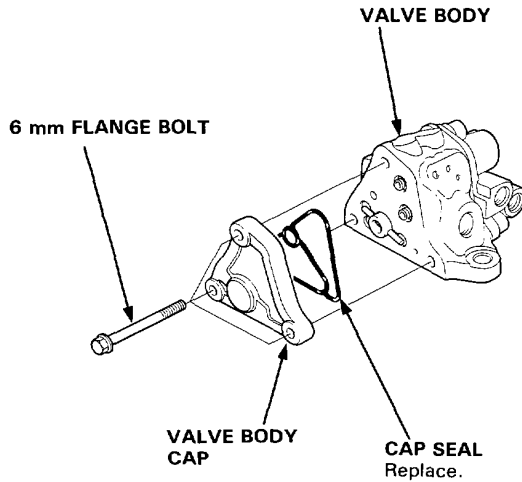




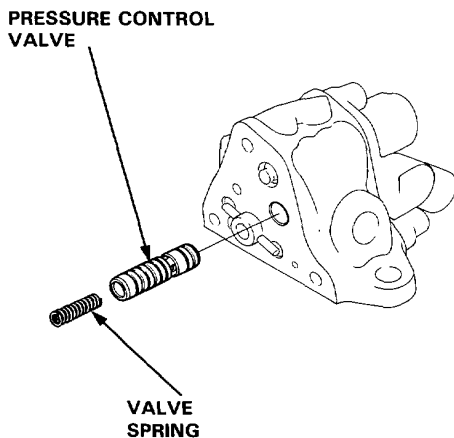
Valve Body Unit

Disassembly

1. Remove the three 6 mm flange bolts, then remove the cap from the valve body.
2. Remove the cap seal from the cap.



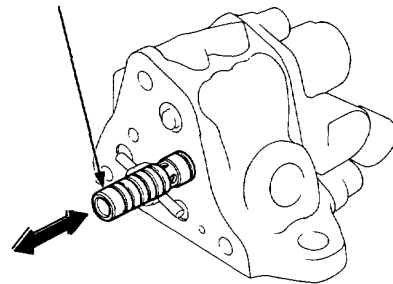
3. Remove the pressure control valve and spring from the valve body.



4. Check the pressure control valve:

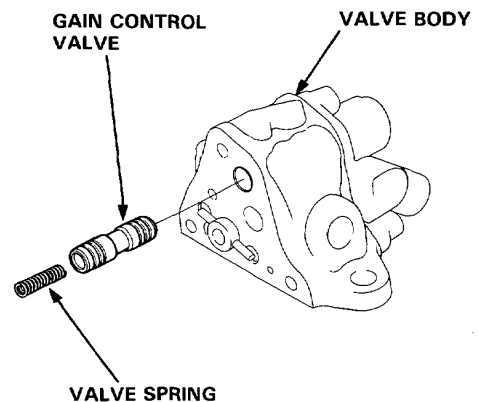
- Inspect its surface for scoring or scratches.
- Slip it back into the valve body, and make sure it slides smoothly without drag and without side play.

PRESSURE CONTROL VALVE
Check for scoring or scratches, and rough operation.



NOTE: If the valve body is damaged, replace the valve body unit (valve body, pressure control valve, gain control valve, 4-way valve) as an assembly.

5. Remove the gain control valve and spring from the valve body.



(cont'd)

Steering Gearbox

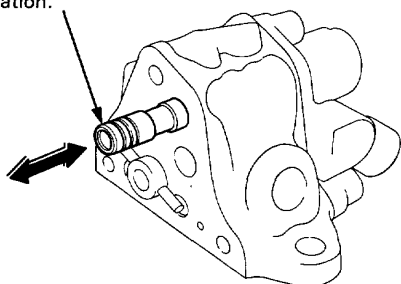
Valve Body Unit (cont'd)

6. Check the gain control valve:

- Inspect its surface for scoring or scratches.
- Slip it back into the valve body and make sure it slides smoothly without drag and without side play.

GAIN CONTROL VALVE

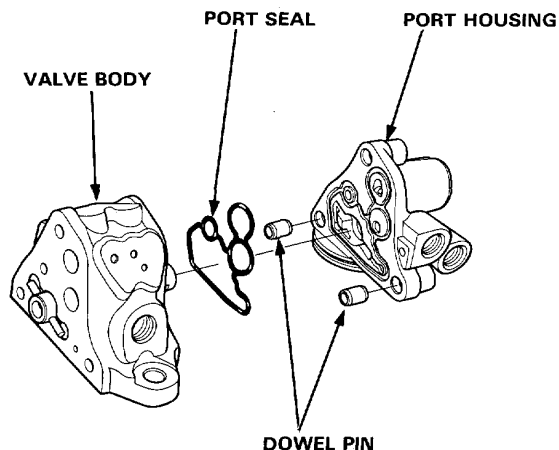
Check for scoring, scratches, or rough operation.



NOTE: If the valve body is damaged, replace the valve body unit (valve body, pressure control valve, gain control valve, 4-way valve) as an assembly.

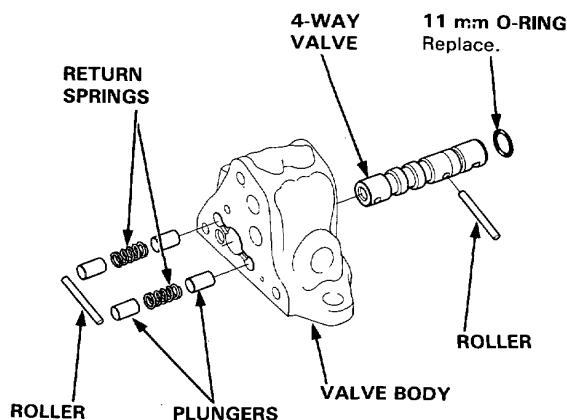
7. Separate the valve body and port housing.

8. Remove the seal and dowel pins from the port housing.



9. Remove the rollers from the 4-way valve by pushing the valve out one side of the valve body, and then the other.

NOTE: When removing the rollers, hold the plungers with your fingers to keep them from popping out.

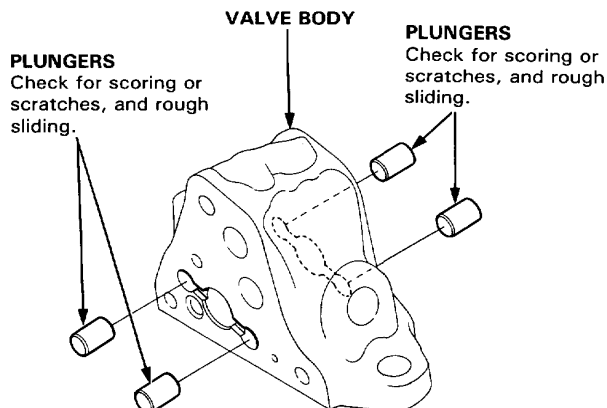


10. Remove the plungers, return springs and 4-way valve from the valve body.

11. Remove the 11 mm O-ring from the 4-way valve.

12. Check the plungers.

- Inspect their surface for scoring or scratches.
- Slip each plunger into the valve body, and make sure it slides smoothly, without drag or side play. If any plunger is damaged, replace it.

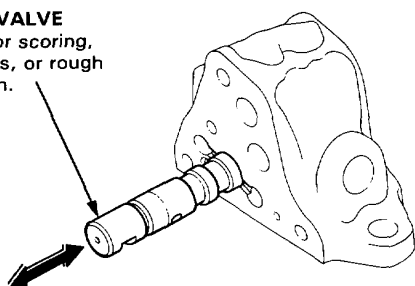




13. Check the 4-way valve.

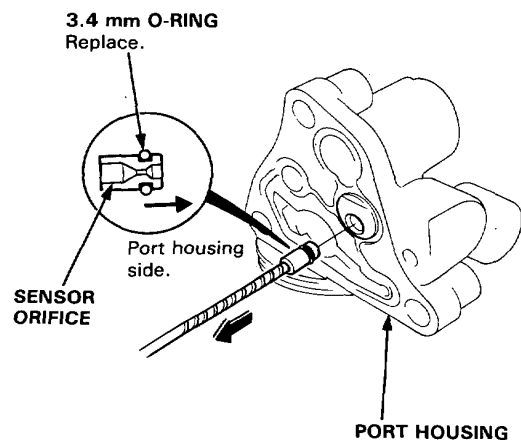
- Inspect its surface for scoring or scratches.
- Slip it into the valve body, and make sure it slides smoothly, without drag or side play.

4-WAY VALVE
Check for scoring,
scratches, or rough
operation.



NOTE: If the valve body is damaged, replace the valve body unit (valve body, pressure control valve, gain control valve, 4-way valve) as an assembly.

14. Using a 3 mm (1/64") drill bit, remove the sensor orifice and 3.4 m O-ring.




Steering Gearbox

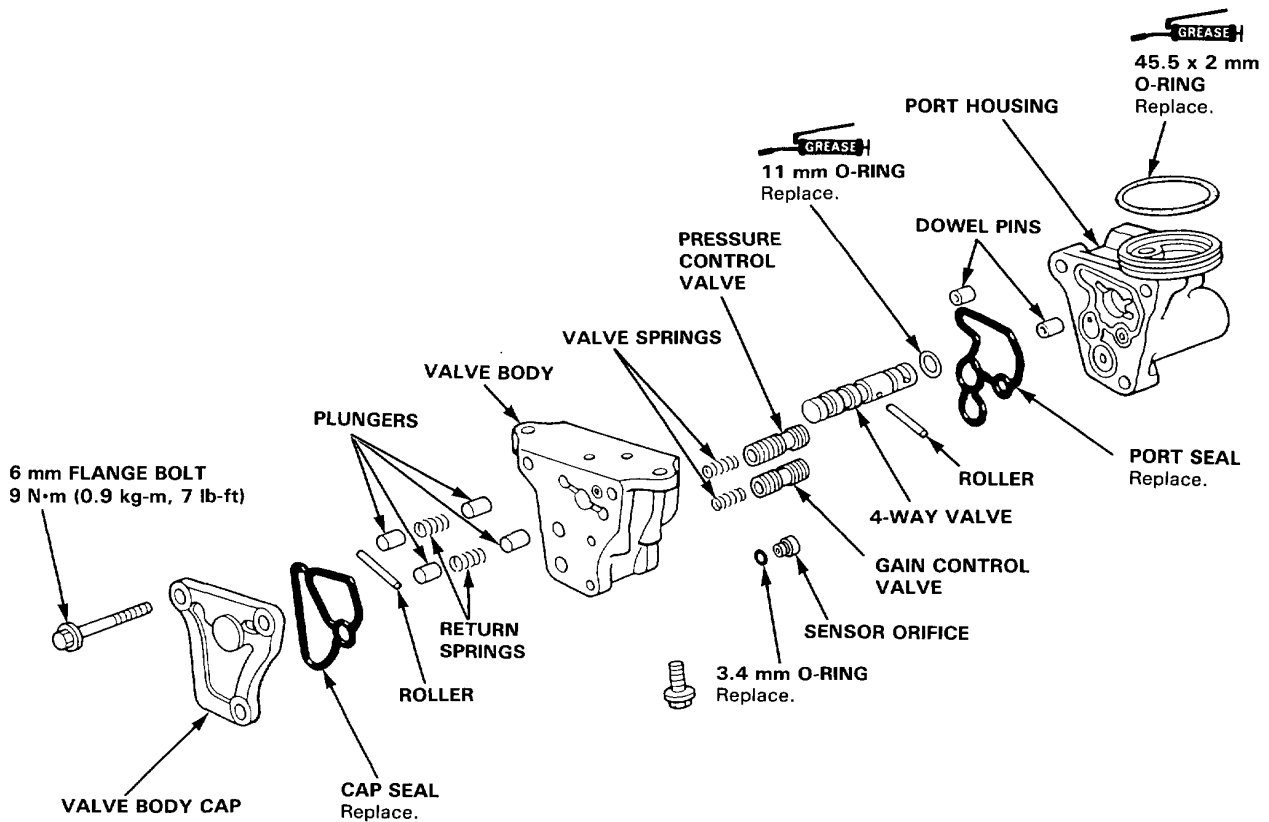
Valve Body Unit

Assembly

1. Thoroughly clean the disassembled parts shown below.
2. Coat the plungers, pressure control valve, gain control valve and 4-way valve surfaces with power steering fluid-V.
3. Reassemble the parts in the reverse order of disassembly.

CAUTION:

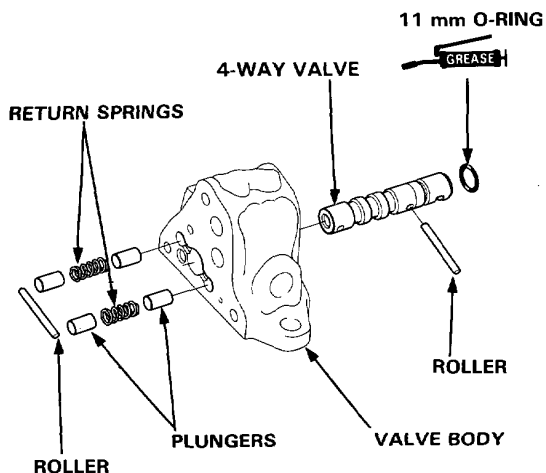
- Replace the O-rings and seals with new ones.
- Do not dip the O-rings and seals in solvent.
- Apply grease in the seal grooves to keep the seals in place.
- Apply grease to new O-rings to keep them in place.
-  STEERING GREASE Part Number 08733-B070E



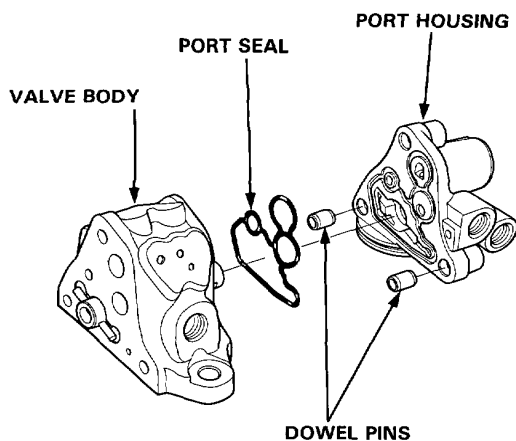
NOTE: If the valve body is damaged, replace the valve body unit (valve body, pressure control valve, gain control valve, 4-way valve) as an assembly.



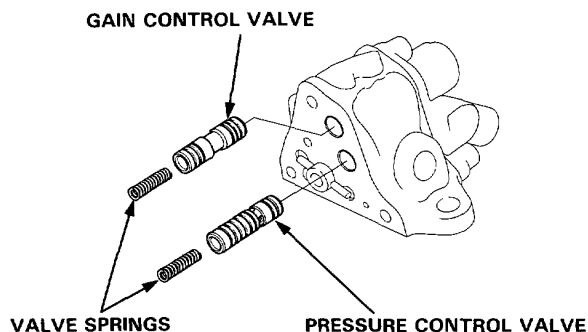
4. Coat the surface of the 4-way valve with power steering fluid, and install into the valve body.
5. Coat the surface of the plungers with power steering fluid, and install the plungers, return springs and rollers on the valve body.



6. Coat the port seal with power steering fluid, and install it in the groove of the port housing. Then install the valve body and port housing.

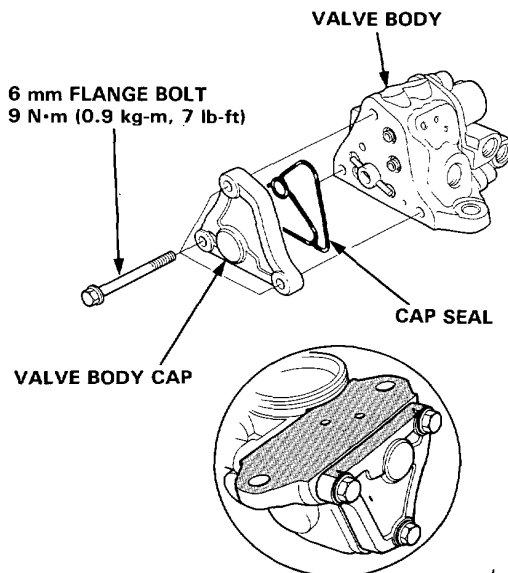


7. Coat the pressure control valve and gain control valve with power steering fluid, and install them into the valve body.
8. Install the valve springs.



9. Coat the cap seal with power steering fluid, and install it in the groove of the valve body cap.
10. Install the valve body cap on the valve body with 6 mm flange bolts.

CAUTION: Make sure the mating surface of the valve body and cap are flush at the upper side.

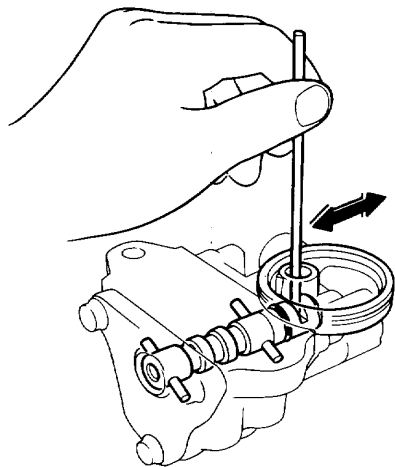


(cont'd)

Steering Gearbox

Valve Body Unit (cont'd)

11. Make sure the 4-way valve moves smoothly, and returns to neutral position.



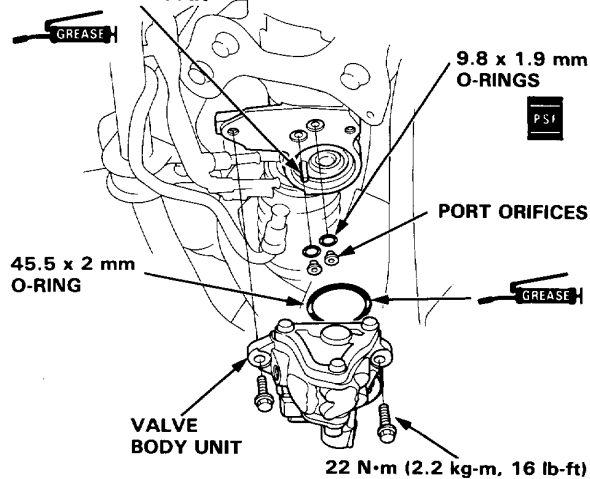
Installation

1. Coat the 9.8 x 1.9 mm O-rings with grease, and install them together with the orifices.
2. Install the valve body unit on the gear housing with the two 8 mm bolts.

CAUTION:

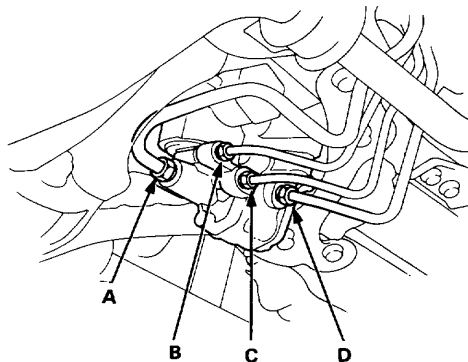
- When installing, be careful not to hit the pinion holder pin.
- Make sure the O-rings are in place and not pinched.

PINION HOLDER PIN



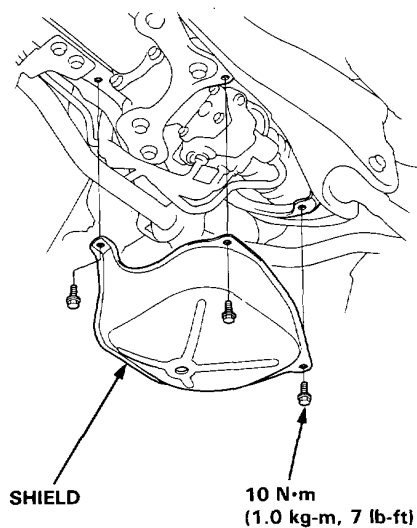
3. Connect the four lines to the valve body unit, using flare nut wrenches.

- | | |
|---------------------|-----------------------------|
| A: To oil cooler: | 17 mm wrench |
| | 29 N·m (2.9 kg-m, 21 lb-ft) |
| B: To speed sensor: | 12 mm wrench |
| | 13 N·m (1.3 kg-m, 9 lb-ft) |
| C: To reservoir: | 12 mm wrench |
| | 13 N·m (1.3 kg-m, 9 lb-ft) |
| D: From pump: | 14 mm wrench |
| | 38 N·m (3.8 kg-m, 28 lb-ft) |





4. Fill the reservoir with power steering fluid and bleed air from the system by turning the steering wheel from lock to lock several times with the engine warm.
5. Make sure there are no fluid leaks, then install the shield.
6. Recheck the fluid level in the reservoir.



Steering Gearbox

Gearbox Removal

NOTE:

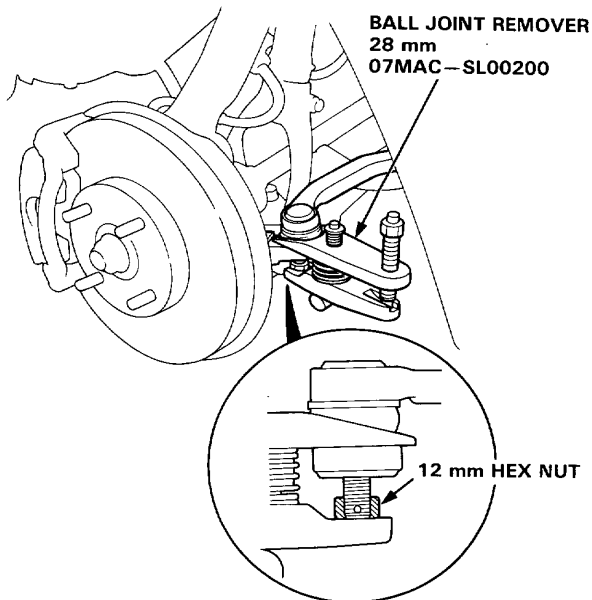
- Before removing the steering gearbox, align the front wheels straight ahead.
- Disconnect the battery negative terminal and then disconnect the positive terminal.

1. Drain the power steering fluid as described on page 17-79.
2. Raise the front of car and support on safety stands in the proper locations.
3. Remove the front wheels.
4. Remove the cotter-pin from the tie-rod ball joint nut and remove the nut.
5. Install a 12 mm hex nut on the ball joint. Be sure that the 12 mm hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.

NOTE: Remove the ball joint using the Ball Joint Remover. Refer to page 18-17 for how to use the ball joint remover.

6. Separate the tie-rod ball joint and knuckle using the special tool.

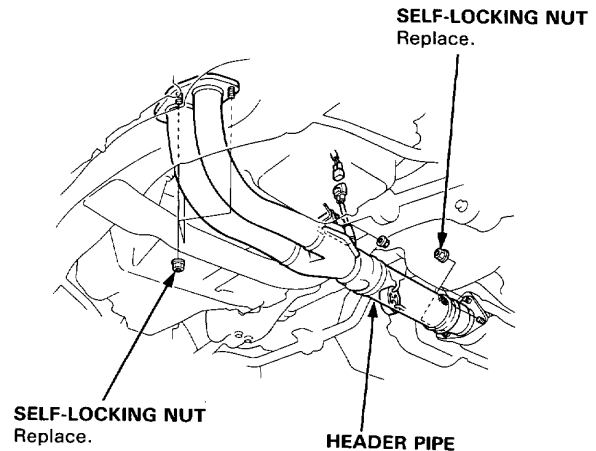
CAUTION: Avoid damaging the ball joint boot.



7. Remove the self-locking nuts that connect the header pipe to the catalytic converter, and the header pipe to the exhaust manifold.

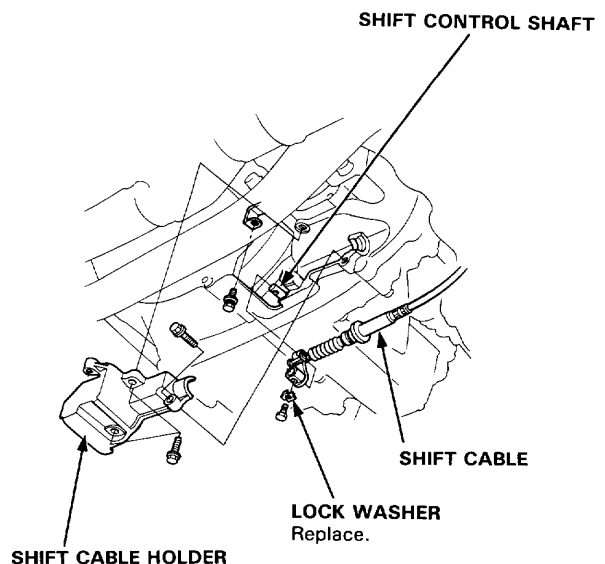
8. Remove the header pipe.

CAUTION: Replace the exhaust gasket and self-locking nuts when you reinstall the pipe.



9. Automatic transmission only.

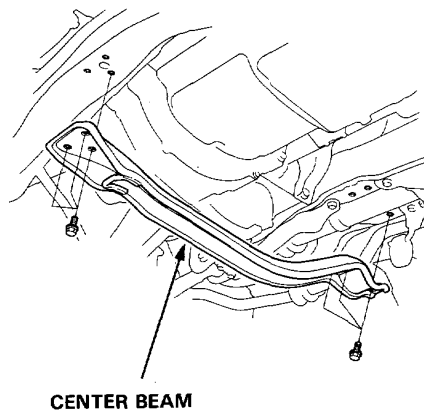
- Remove the shift cable holder and disconnect the shift cable from the shift control shaft.



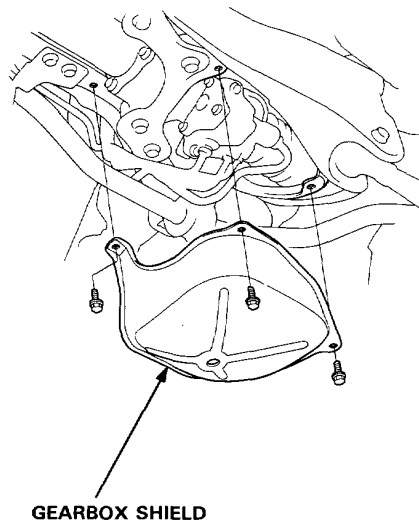


10. Remove the center beam.

NOTE: Replace the self-locking bolts if you can easily thread them in.



11. Remove the gearbox shield.

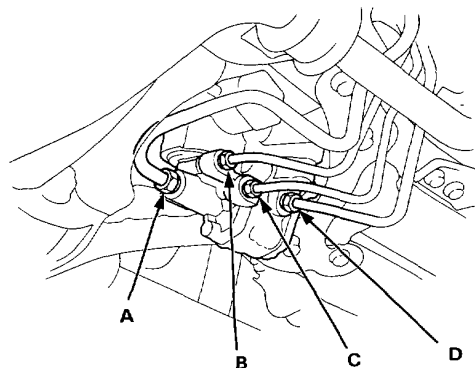


12. Using solvent and a brush, wash any oil and dirt off the valve body unit, its lines, and the end of the gearbox. Blow dry with compressed air.

CAUTION: After disconnecting the hoses and pipes, plug or seal the hoses and pipes with a piece of tape or equivalent to prevent foreign material from entering the valve body unit.

13. Using flare nut wrenches, disconnect the four lines from the valve body unit.

- A:** To oil cooler: 17 mm wrench
B: To speed sensor: 12 mm wrench
C: To reservoir: 12 mm wrench
D: From pump: 14 mm wrench

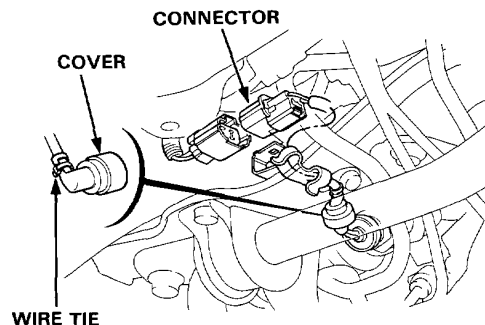


4WS

14. Cut the wire tie from the sub steering angle sensor cover, then remove the cover from the sub steering angle sensor.

CAUTION: Use care when cutting the wire tie so as not to cut into the wire harness.

15. Remove the sub steering angle sensor wire harness from the clamp and disconnect the connector.

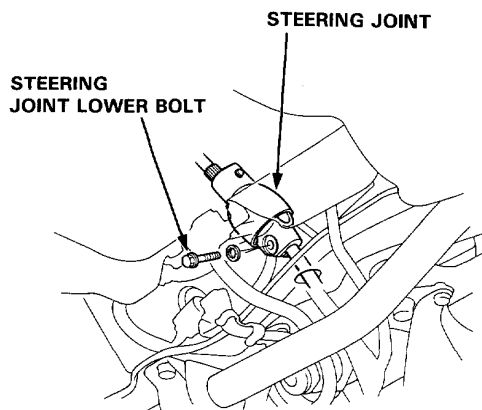


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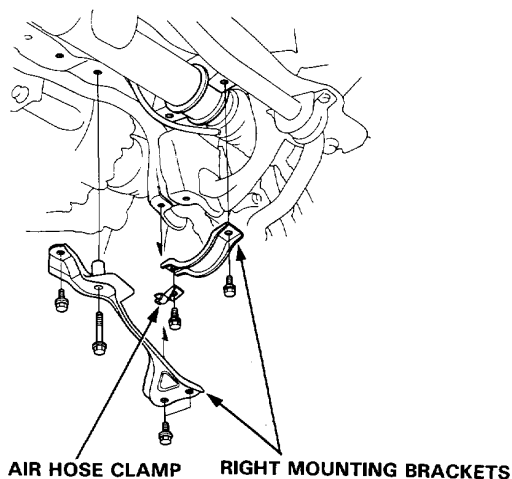
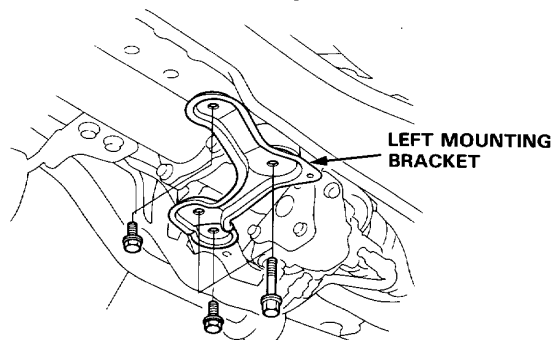
Steering Gearbox

Gearbox Removal (cont'd)

16. Remove the steering joint lower bolt, and move the joint toward the column.



17. Remove the left mounting bracket first, then remove the right mounting brackets.



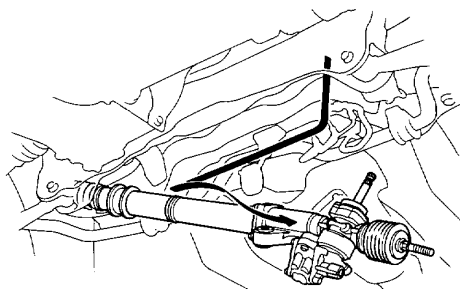
18. Remove the left-tie rod end, then slide the rack all the way to the right.

19. Pull the steering gearbox assembly all the way down to clear the pinion shaft from the bulkhead.

20. Move the steering gearbox assembly to the right so the left rack end clears the rear beam.

21. Hold the steering gearbox assembly and slide the rack all the way to the left. Place the left rack end below the rear beam.

22. Move the steering gearbox assembly to the left and tilt the left side down to remove it from the car.




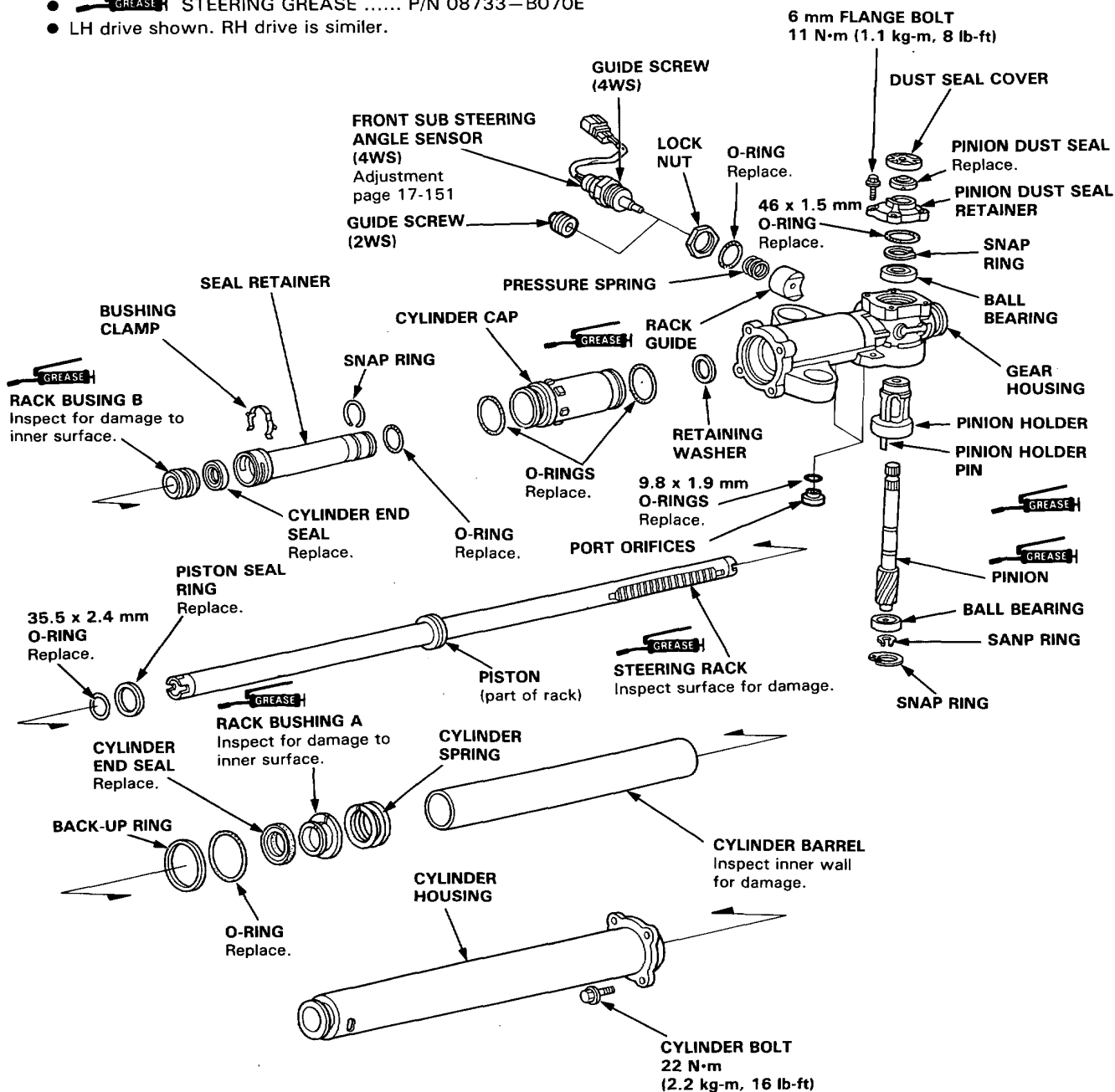
CAUTION: Be careful not to bend or damage the four power steering lines when removing the gearbox assembly.



Illustrated Index

NOTE:

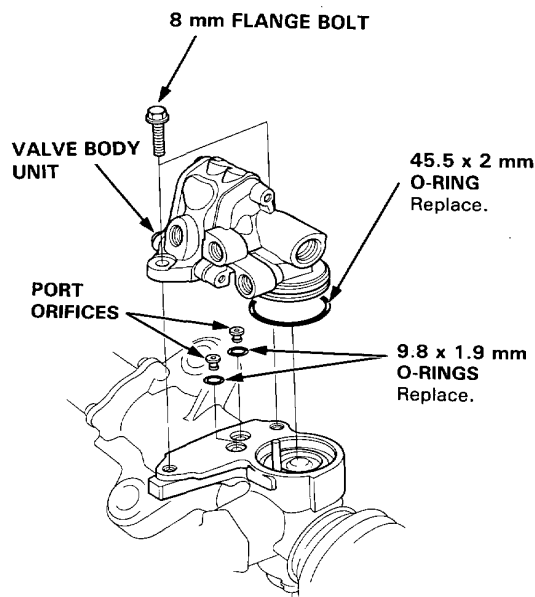
- Thoroughly clean all disassembled parts.
 - Always replace O-rings and seals.
 - Replace parts with damaged sliding surfaces.
 - Do not dip seals and O-rings in solvent; coat O-rings with grease, make sure they stay in position during reassembly, and use the appropriate special tools to install them where necessary.
-  STEERING GREASE P/N 08733-B070E
 - LH drive shown. RH drive is similar.



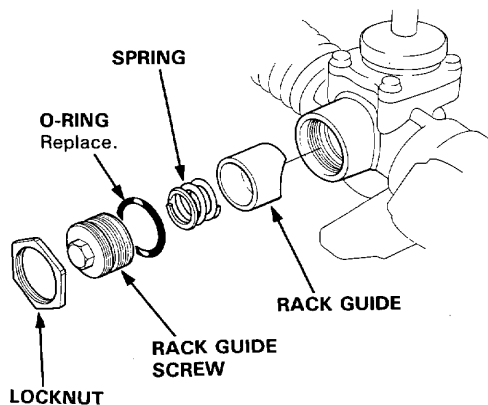
Steering Gearbox

Overhaul

1. Remove the two 8 mm flange bolts and remove the valve body unit from the gearbox.
2. Remove the O-rings and port orifices from the gearbox.
3. Remove the 45.5 x 2 mm O-ring.

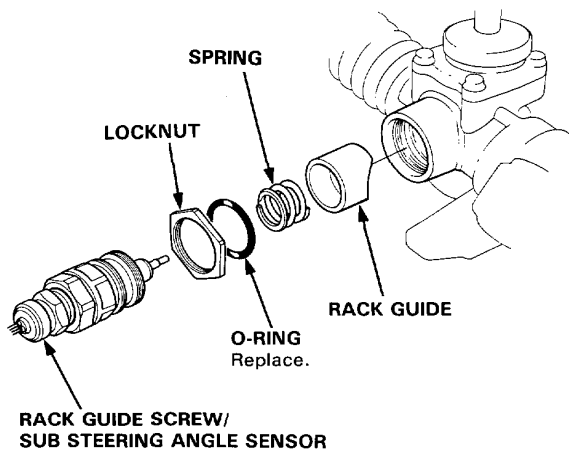


4. Loosen the rack screw locknut and remove the rack guide screw.
5. Remove the spring and rack guide from the gear housing.

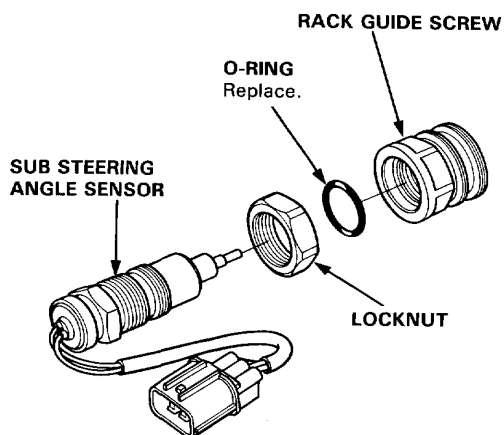


4WS

6. Loosen the rack screw locknut and remove the rack guide screw/sub steering angle sensor assembly.



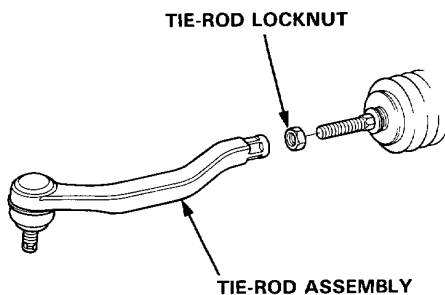
7. Remove the rack guide screw, O-ring and locknut from the sub steering angle sensor.



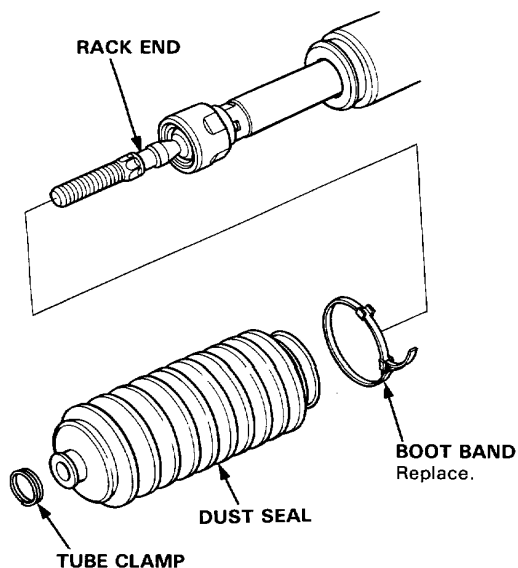


8. Carefully clamp the gearbox in a vise with soft jaws.

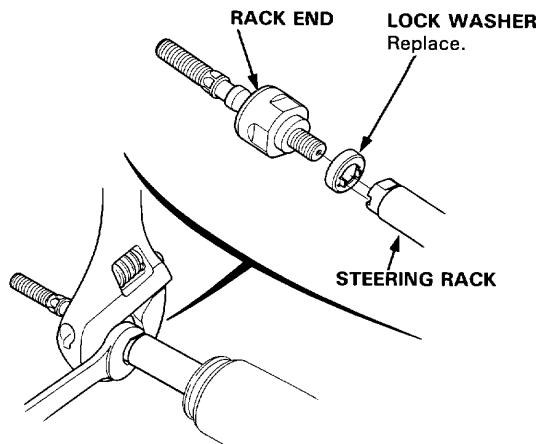
9. Remove the tie-rod assembly.



10. Remove the boot bands and tube clamps. Pull the dust seals away from the ends of the gearbox.



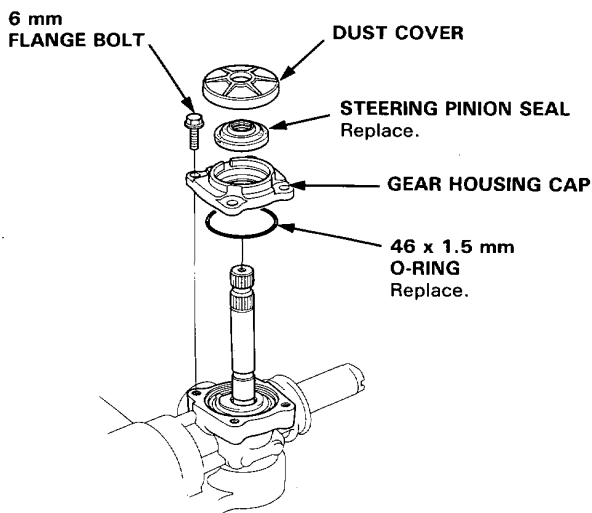
11. Hold the steering rack with a wrench and unscrew the rack end with a wrench.



12. Remove the dust cover.

13. Remove the gear housing cap from the gear housing by removing the four 6 mm flange bolts.

14. Remove the steering pinion seal from the gear housing cap.

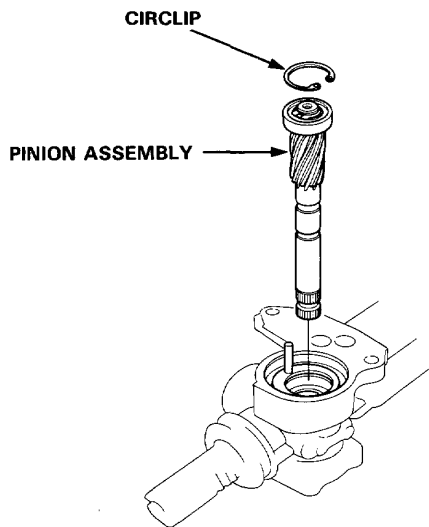


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Steering Gearbox

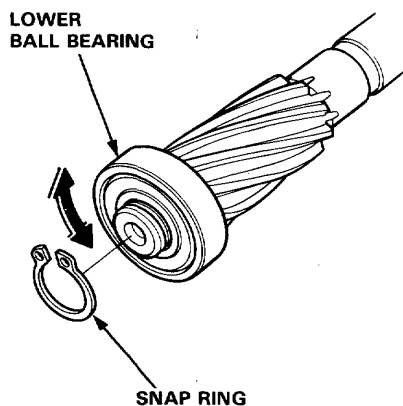
Overhaul (cont'd)

15. Push the right end of the rack back into the cylinder housing so the smooth surface that rides against the seal won't be damaged.

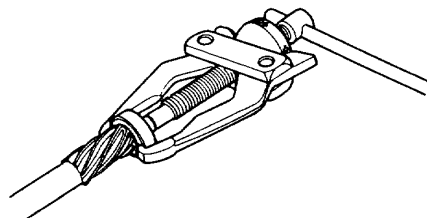


16. Check the pinion lower ball bearing for play; if it is good and the grease in it is clean, go on step 17. If the bearing is noisy or has excessive play, replace the bearing.

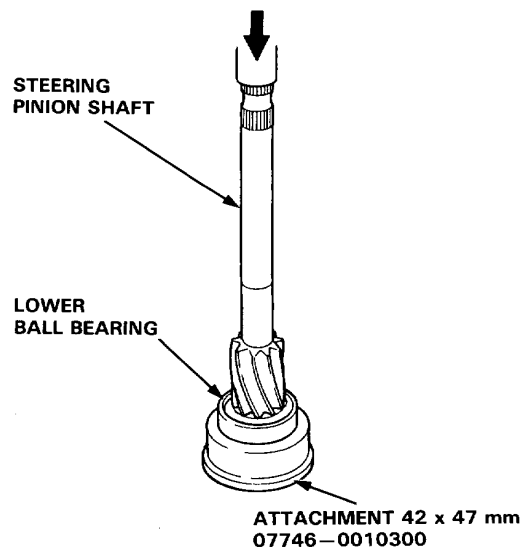
- Remove the snap ring.



- Remove the ball bearing using a commercially available bearing puller.

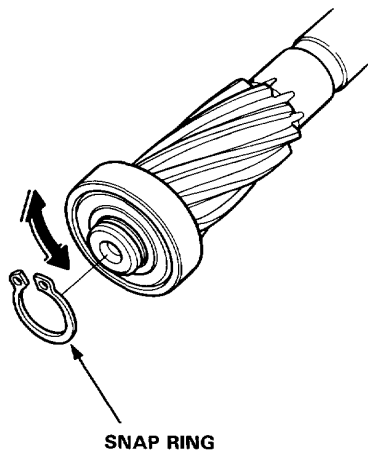


- Using a press, install the lower bearing on the pinion.

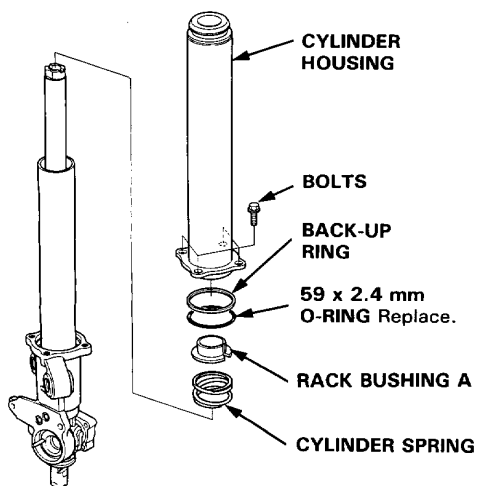




- Install the snap ring on the steering pinion.

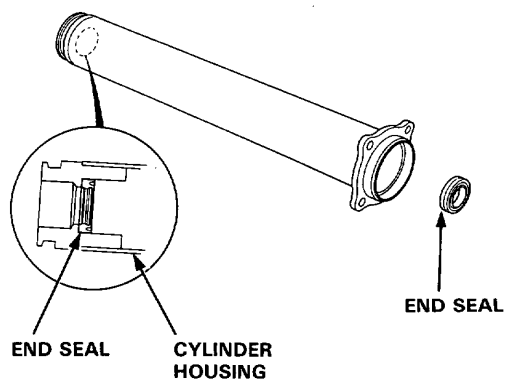


17. Remove the four bolts from the end of the cylinder housing, then slide the housing off the rack.
18. Remove the O-ring, back-up ring, steering rack bushing A and cylinder spring.

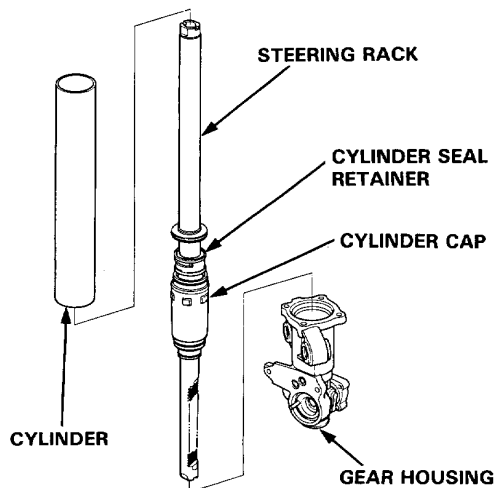


19. Remove the cylinder end seal from the cylinder housing.

NOTE: Use your fingers or a wooden stick to avoid damaging the housing.



20. Remove the cylinder, cylinder seal retainer, cylinder cap and steering rack from the gear housing.

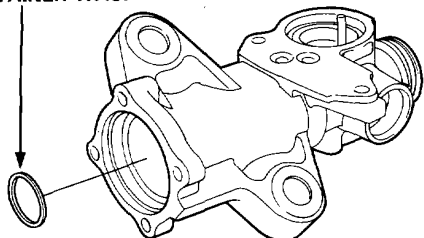


(cont'd)

Steering Gearbox Overhaul (cont'd)

21. Remove the retainer washer from the gear housing.

RETAINER WASHER

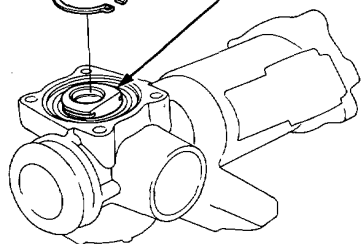


22. Check the pinion holder for free movement, excessive play and rough movement; if it is good go on step 23.

If it is damaged, or if dirt has gone past the seal into the grease, replace the bearing.

- Remove the circlip from the pinion holder.

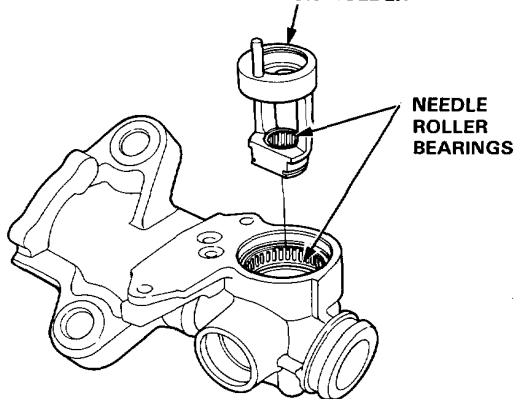
CIRCLIP PINION HOLDER



- Remove the pinion holder from the gear housing.
- Check the needle roller bearings in the pinion holder and gear housing for damage; if OK, pack the needle roller bearing with grease. If the bearings are damaged, replace them as a set.

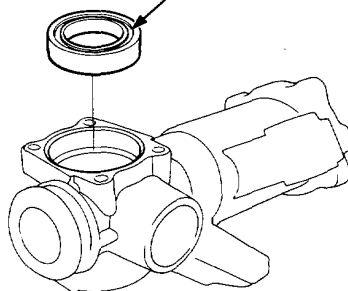
PINION HOLDER

NEEDLE ROLLER BEARINGS



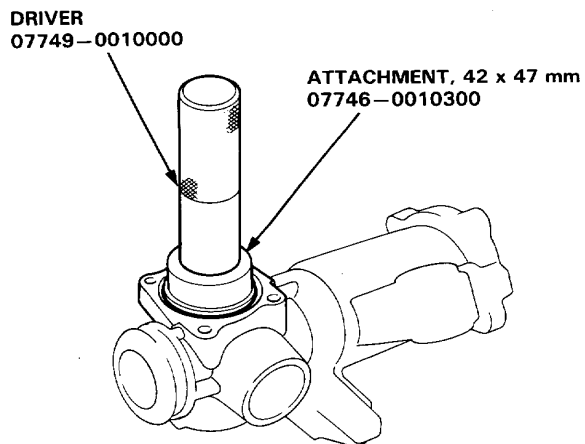
- Check the lower ball bearing for damage; if it is good, go on step 23.
- Remove the pinion lower ball bearing from the gear housing.

LOWER BALL BEARING

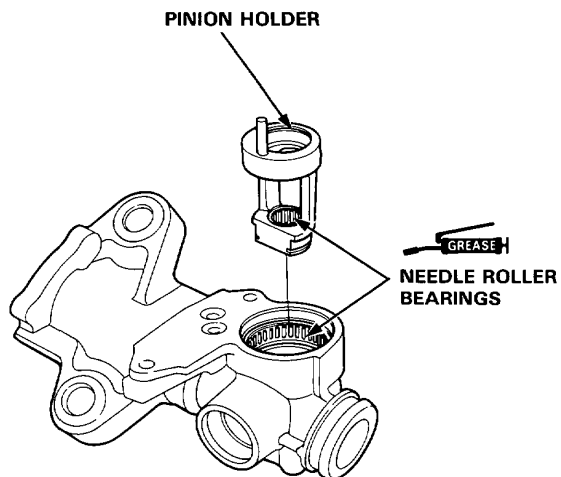




- Drive the new lower ball bearing into the gear housing using the special tools.

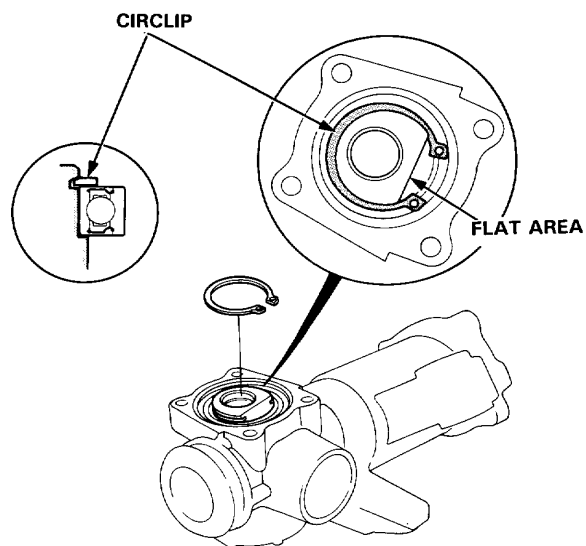


- Install the pinion holder in the gear housing.

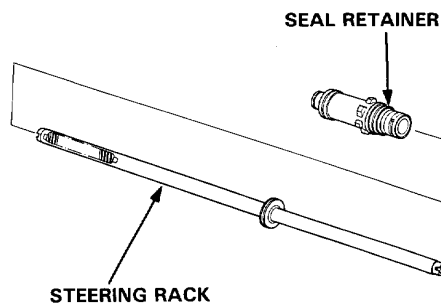


- Reinstall the circlip with its tapered side facing out.

NOTE: Circlip ends must be aligned with the flat area.



23. Remove the cylinder and seal retainer from the steering rack.



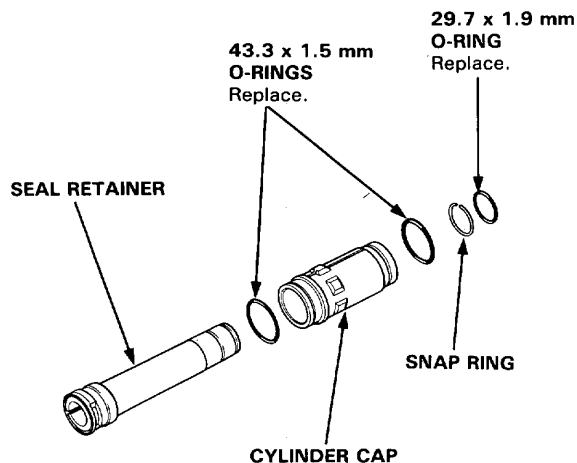
(cont'd)

Steering Gearbox

Overhaul (cont'd)

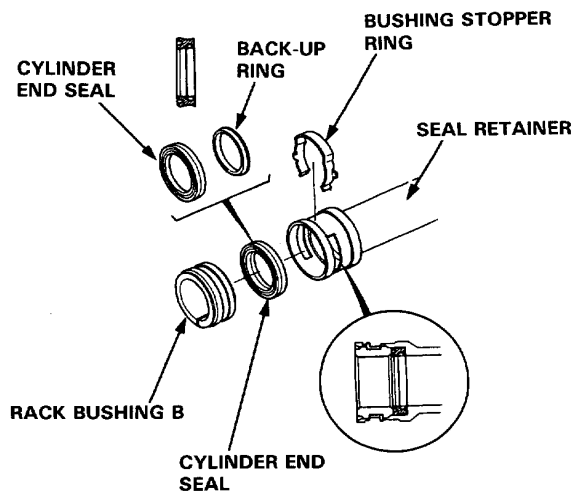
24. Remove the O-ring and snap ring from the seal retainer, then remove the cylinder cap from the seal retainer.

25. Remove the O-rings from the cylinder cap.

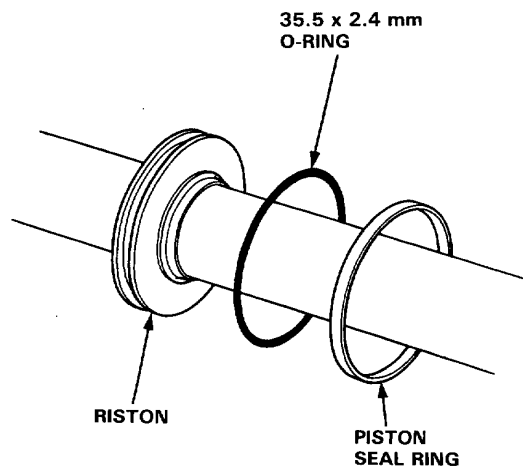


26. Remove the bushing stopper ring from the seal retainer.

27. Remove the cylinder end seal and rack bushing B.



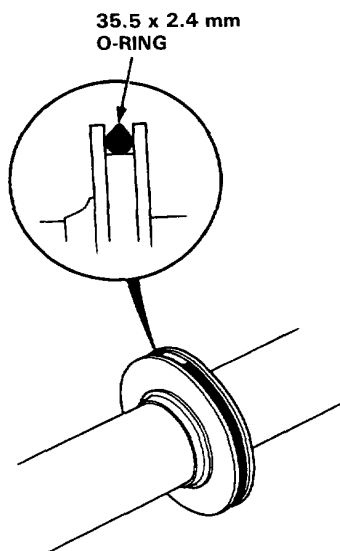
28. Carefully pry the piston seal ring and O-ring off the rack.



NOTE: Before reassembling any parts, inspect them as described on page 17-115 and make sure they are clean. Replace worn or damaged parts.

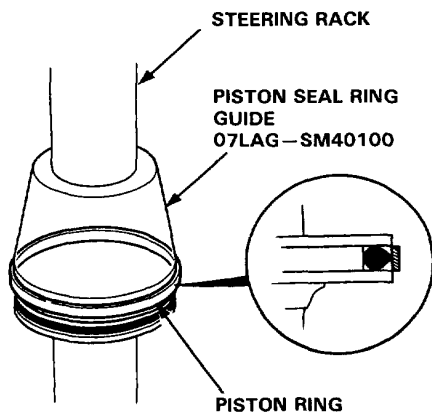


29. Install a new O-ring on the rack with its narrow edge facing out.



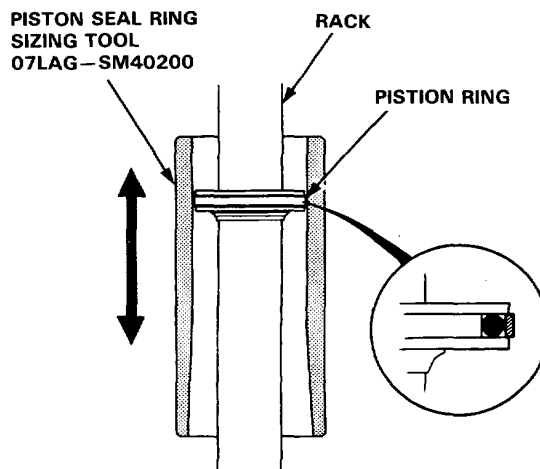
30. Coat the pinion seal ring guide with power steering fluid, then slide it onto the rack, big end first.

31. Position the new piston seal ring on the special tool, slide it down onto the big end of the tool, then pull it off into the piston groove on top of the O-ring.

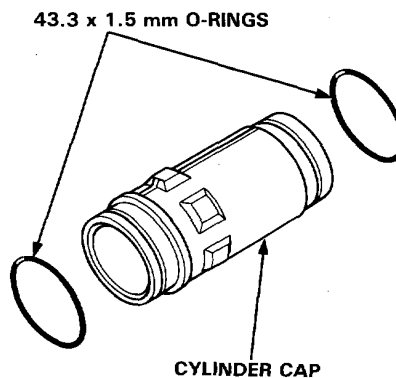


32. Coat the piston seal ring and inside of the special tool with power steering fluid.

33. Carefully slide the tool onto the rack and over the piston ring, then rotate the tool as you move it up and down to seat the piston ring.



34. Coat new O-rings with grease and install them on the cylinder cap.



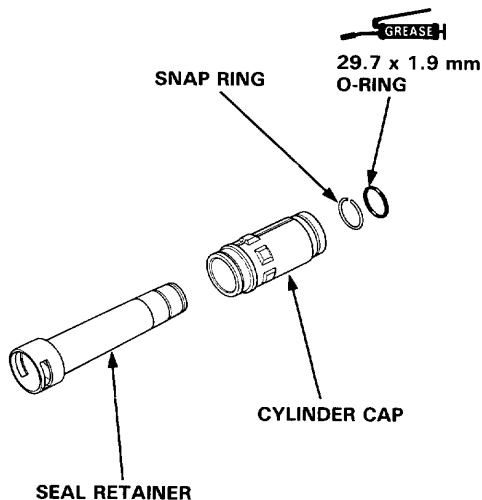
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Steering Gearbox

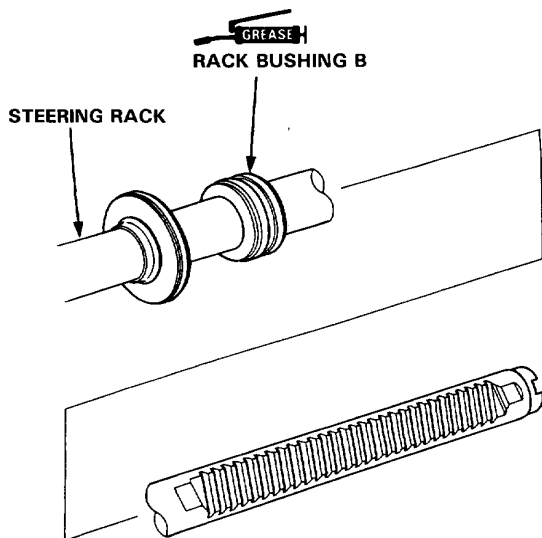
Overhaul (cont'd)

35. Slide the cylinder cap onto the seal retainer.

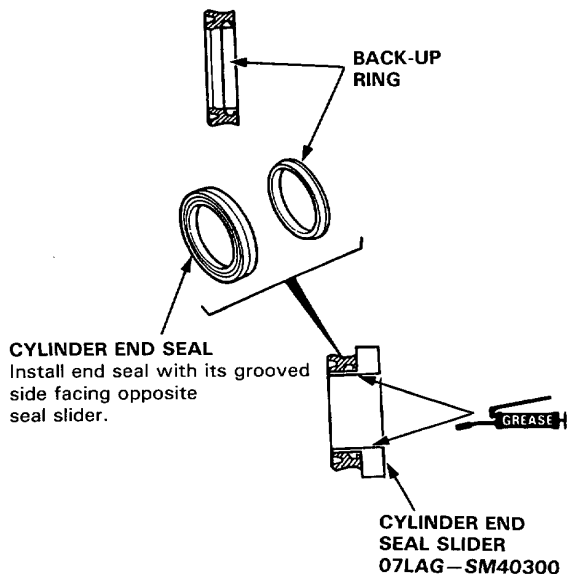
36. Install the snap ring and O-ring on the seal retainer.



37. Grease the sliding surface of the steering rack bushing B, and install the bushing on the steering rack with the groove of the bushing facing the steering rack piston.

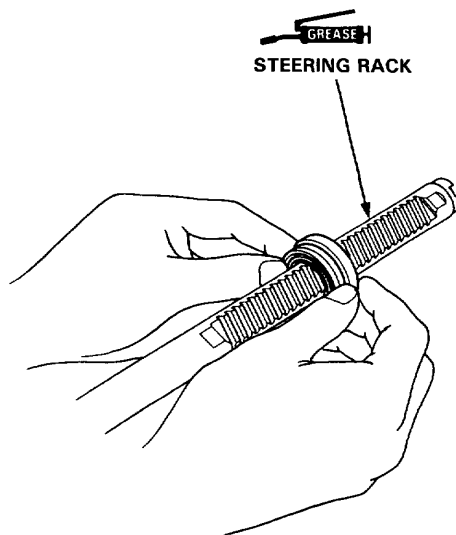


38. Grease the sliding surfaces of the new cylinder end seal and the special tool, then place the seal on the special tool with its grooved side facing opposite the slider.



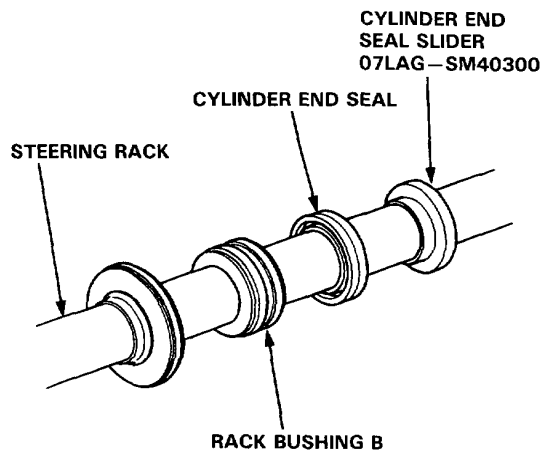
39. Install the special tool and cylinder end seal.

CAUTION: Make sure the rack teeth do not face the slot in the special tool.

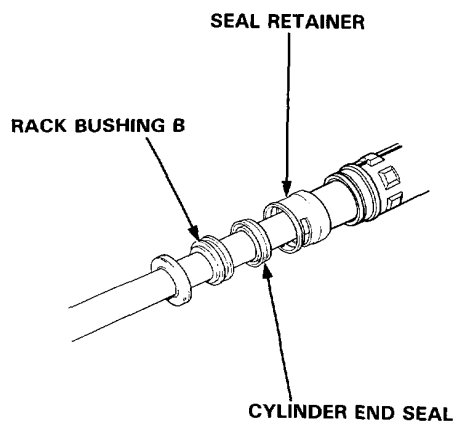




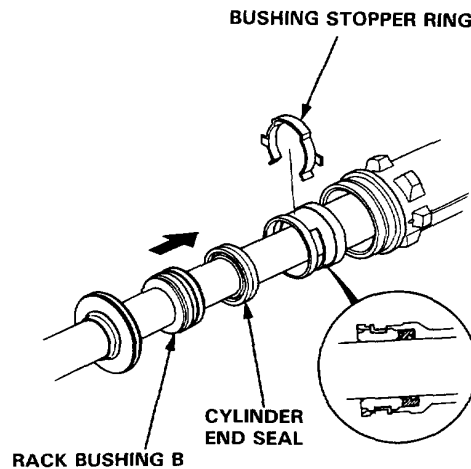
40. Separate the cylinder end seal from the special tool, then remove the special tool from the rack.



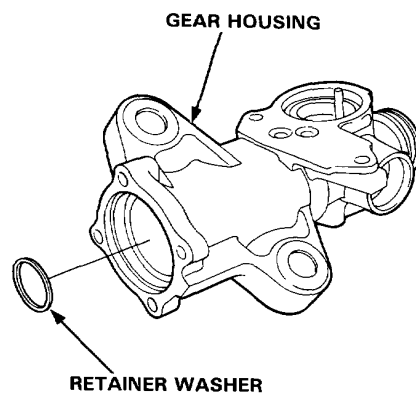
41. Fit the seal retainer on the steering rack.



42. Push the rack bushing B toward the seal retainer by hand until the cylinder end seal is seated in the retainer. Fit the seal stopper ring in the groove of the seal retainer securely. Then grease the steering rack.



43. Install the retainer washer on the gear housing.



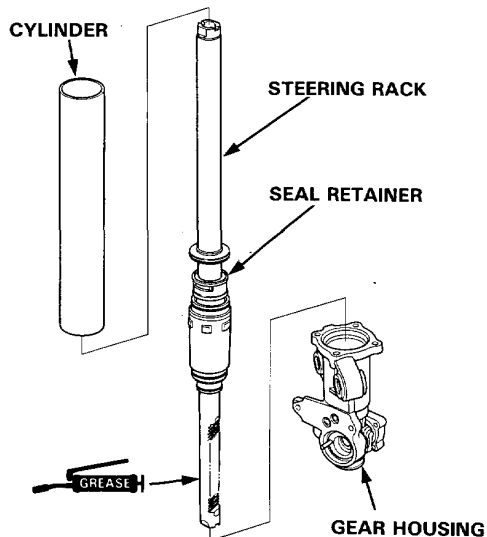
(cont'd)

Steering Gearbox

Overhaul (cont'd)

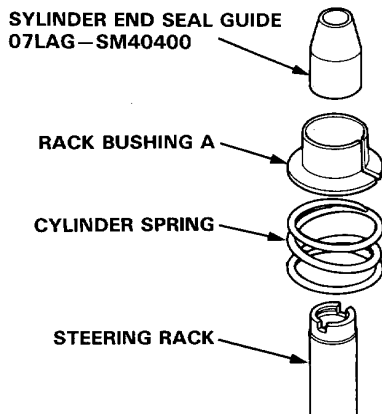
44. Place the gear housing on the work bench and insert the seal retainer and steering rack into the gear housing.

45. Coat the inside surface of the cylinder with power steering fluid, slide it over the rack and into the gear housing; press it into the housing until it seats.

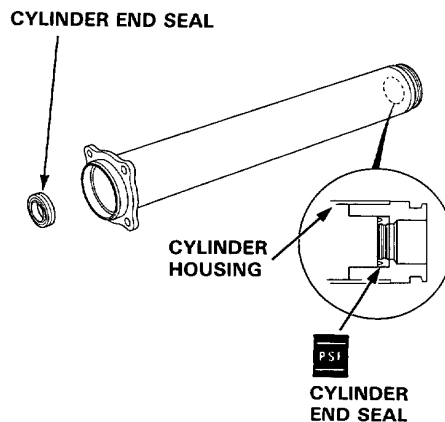


46. Install the cylinder spring over the rack, then coat the rack bushing A with power steering fluid and install it on the spring.

47. Slip the special tool onto the end of the steering rack and grease its outside surface.



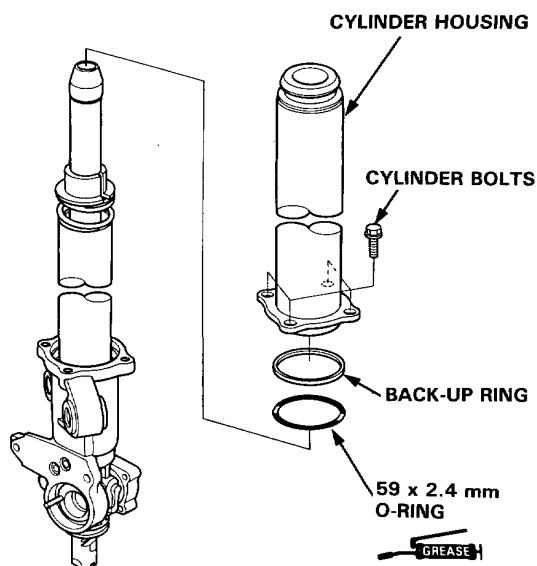
48. Coat the inside surface of the cylinder with power steering fluid and install the cylinder end seal with its grooved side facing out.



49. Install the O-ring and back-up ring on the gear housing.

50. Carefully position the cylinder on the gear housing and loosely install with four bolts.

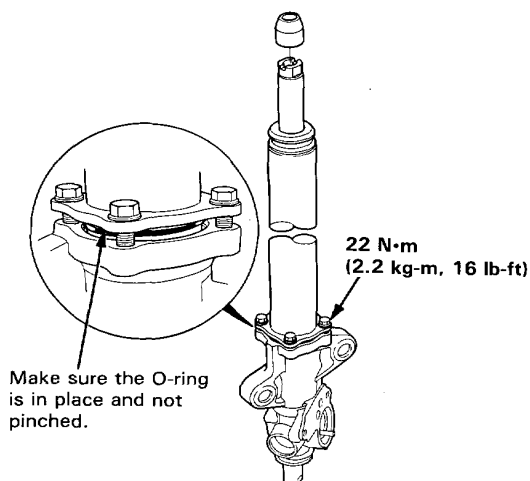
CAUTION: Be careful not to damage the end seal in the cylinder housing.





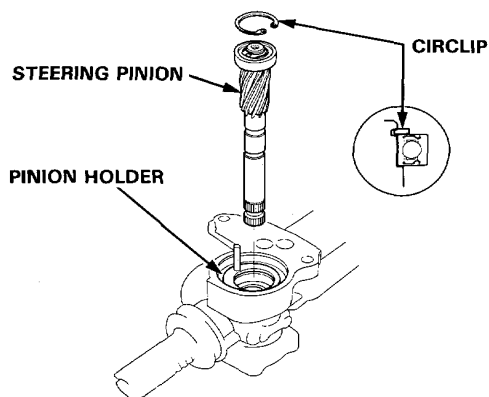
51. Remove the special tool from the steering rack.
52. Tighten the cylinder housing to the gear housing.

NOTE: Before tightening the bolts, make sure the mating surfaces of the cylinder and gear housing fit properly by pushing them together; hold them together while tightening the bolts.

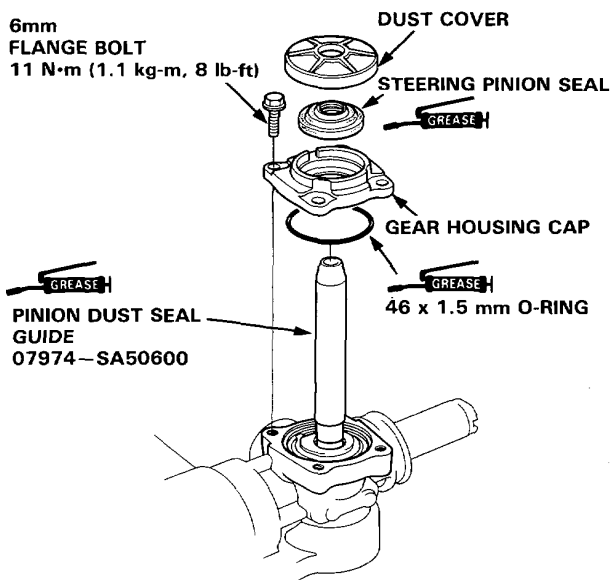


53. Insert the steering rack into the cylinder housing, being careful not to damage the steering rack sliding surface.
54. Install the steering pinion in the pinion holder, and install the circlip securely in the pinion holder groove.

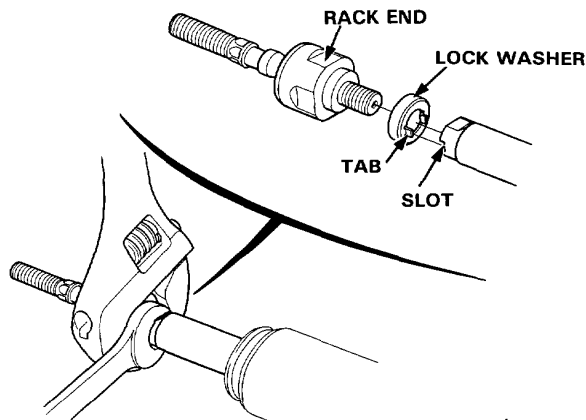
NOTE: Install the circlip with its tapered side facing out.



55. Grease the sealing lip of the steering pinion seal, and install it on the gear housing.
56. Grease the special tool and fit it over the steering pinion.
57. Grease the new O-ring and install it in the gear housing.
58. Slide the gear housing cap over the steering pinion, being careful not to damage the sealing lip of the pinion seal, then remove the special tool.



59. Install the new lock washer in the groove in the steering rack.
60. Hold the steering rack with a wrench and tighten the rack end to 65 N·m (6.5 kg-m, 47 lb-ft).



(cont'd)

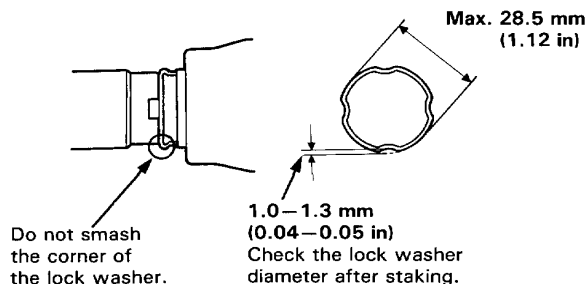
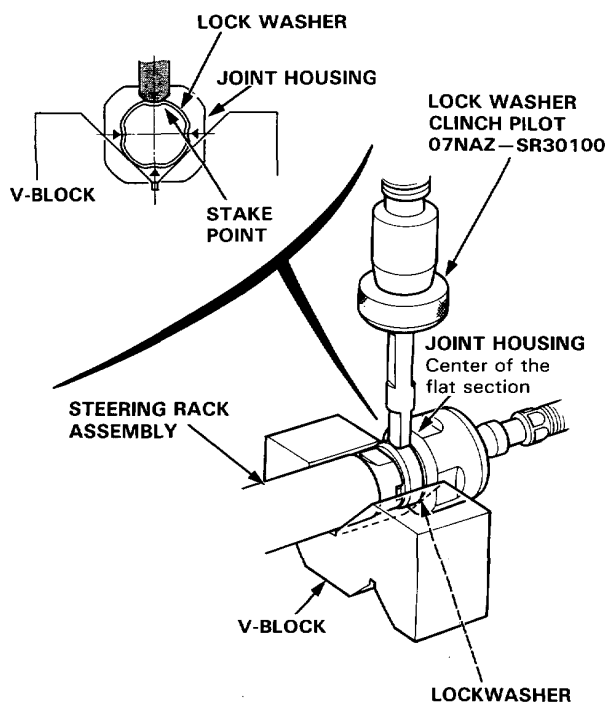
Steering Gearbox

Overhaul (cont'd)

61. After tightening the rack end stake the four section of lockwasher with the special tool and hydraulic press.

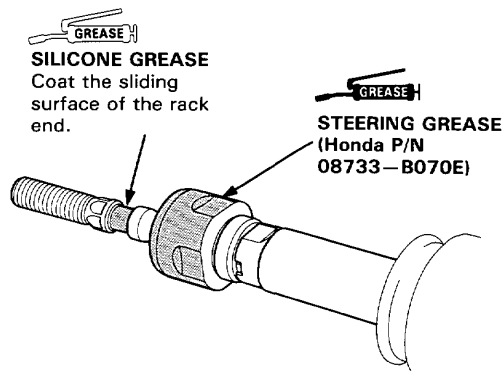
NOTE: Set the V-block on the press table. Set the lock washer section of the rack end on the V-block securely.

- Be sure that the pressing direction, special tool, and each lock washer stake position are in line.
- Stake the lock washer in the center of the flat section of the joint housing. (The bottom end of the stake must be in that position.) See below.



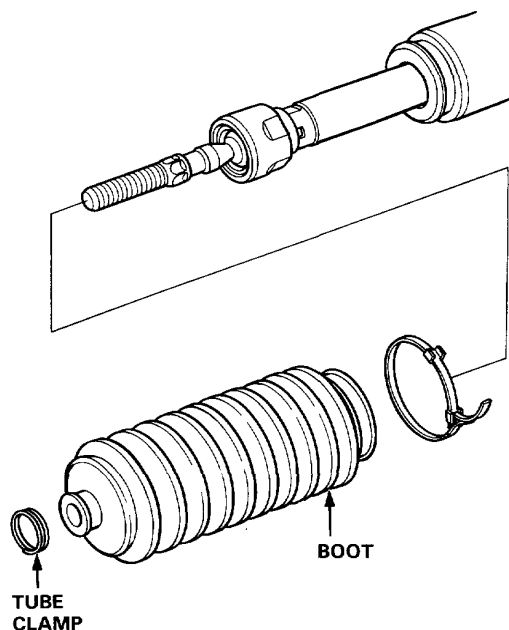
62. Apply steering grease to the circumference of the rack end housing.

63. Coat the rack end groove and inside of the boot with silicone grease.



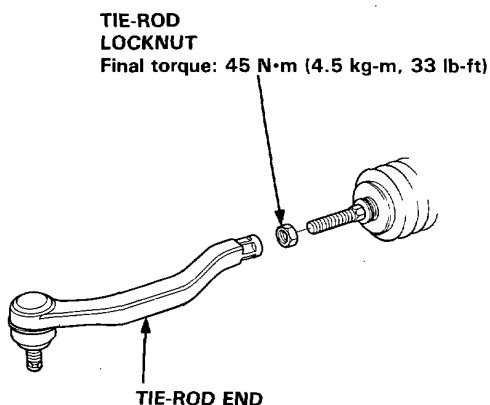
64. Install the boots on the rack end with the tube clamps.

NOTE: Check that the boot joint piece (i.e. air hose joint) is not clogged with grease.





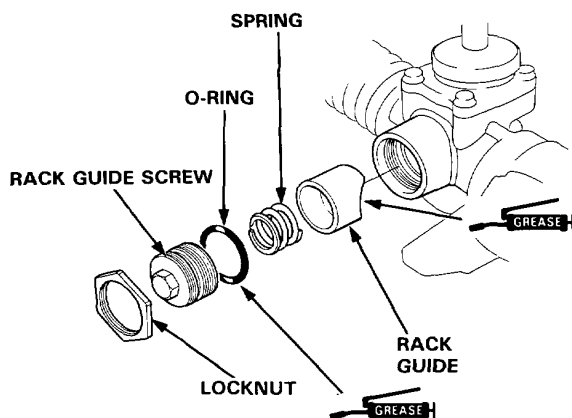
65. Install the right and left tie-rod ends.



66. Grease a new O-ring and install it in the groove in the rack guide screw.

67. Coat the rack guide sliding surface with grease.

68. Install the rack guide, spring and rack guide screw on the gear housing.

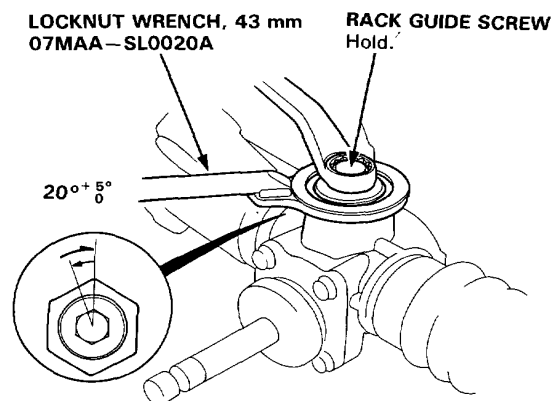


69. Adjust the rack guide at the center of the rack stroke.

70. Tighten the rack guide screw until it compresses the spring and seats against the rack guide, then loosen it.

71. Retighten it to $4 \text{ N}\cdot\text{m}$ ($0.4 \text{ kg}\cdot\text{m}$, $2.9 \text{ lb}\cdot\text{ft}$), back it off about $20^{\circ} \pm 5^{\circ}$ then install the locknut on the rack guide screw.

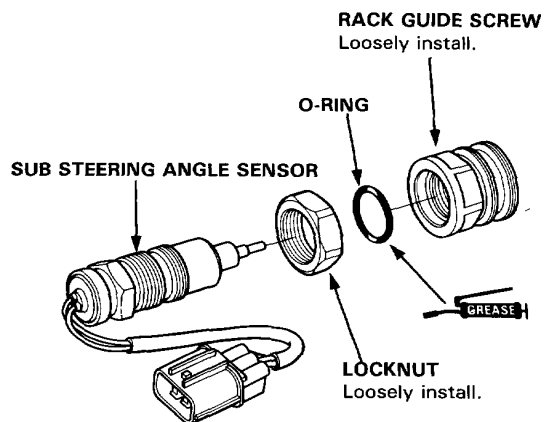
72. Tighten the locknut while holding the rack guide screw with the special tool.



4WS

73. Install the locknut on the sub steering angle sensor.

74. Grease a new O-ring and install it in the groove in the sub steering angle sensor. Install the rack guide screw.

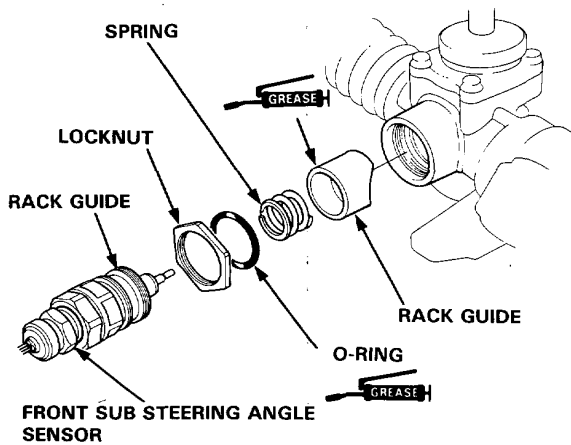


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Steering Gearbox

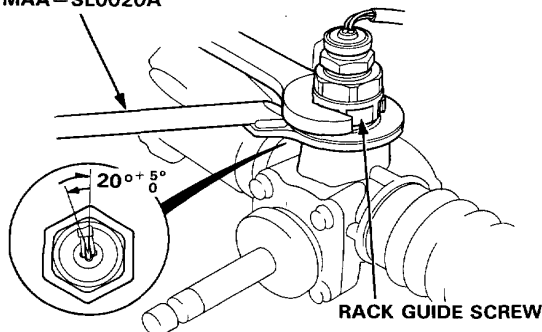
Overhaul (cont'd)

75. Coat the rack guide sliding surface with grease.
76. Install the rack guide, spring, O-ring and the front sub steering angle sensor on the gear housing. Then adjust the rack guide at the center of the rack stroke.



77. Tighten the rack guide screw until it compresses the spring and seats against the rack guide, then loosen it.
78. Retighten it to 4 N·m (0.4 kg-m, 3 lb-ft), back it off about 20^{+5}_0 and install the locknut on the rack guide screw with the special tool.
79. Tighten the locknut to about 25 N·m (2.5 kg-m, 18 lb-ft) while holding the guide screw.

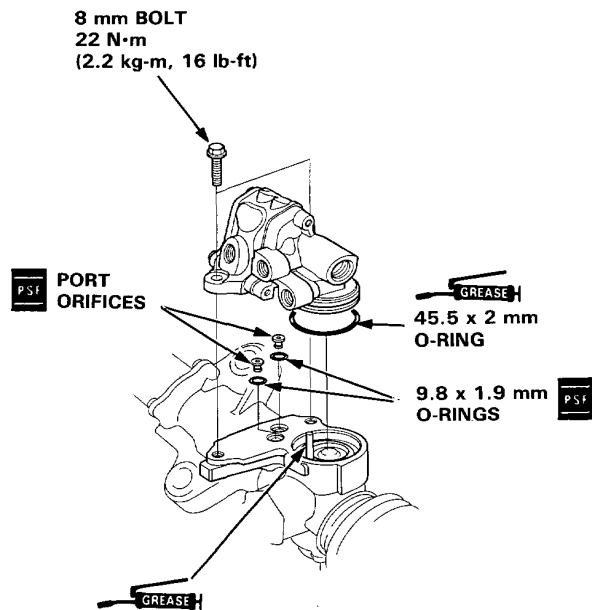
LOCKNUT WRENCH, 43 mm
07MAA-SL0020A



80. Coat the 9.8 x 1.9 mm O-rings with grease, and install them together with the orifices.
81. Coat the 45.5 x 2 mm O-ring and pinion holder pin with grease, then install it in the valve body unit.
82. Install the valve body unit on the gear housing with the two 8 mm bolts.

CAUTION:

- When installing, be careful not to hit the pinion holder pin.
- Make sure the O-rings are in place and not pinched.





NOTE: Install the boot band with the rack in the straight ahead position (i.e. right and left tie-rods are equal in length).

83. Install the boot band so that the locking tabs of the band (stake points) are in the range shown below. (Tabs should face up and slightly forward.)
84. Install new boot bands on the boot and bend both sets of locking tabs.
85. Lightly tap on the doubled-over portions to reduce their height.

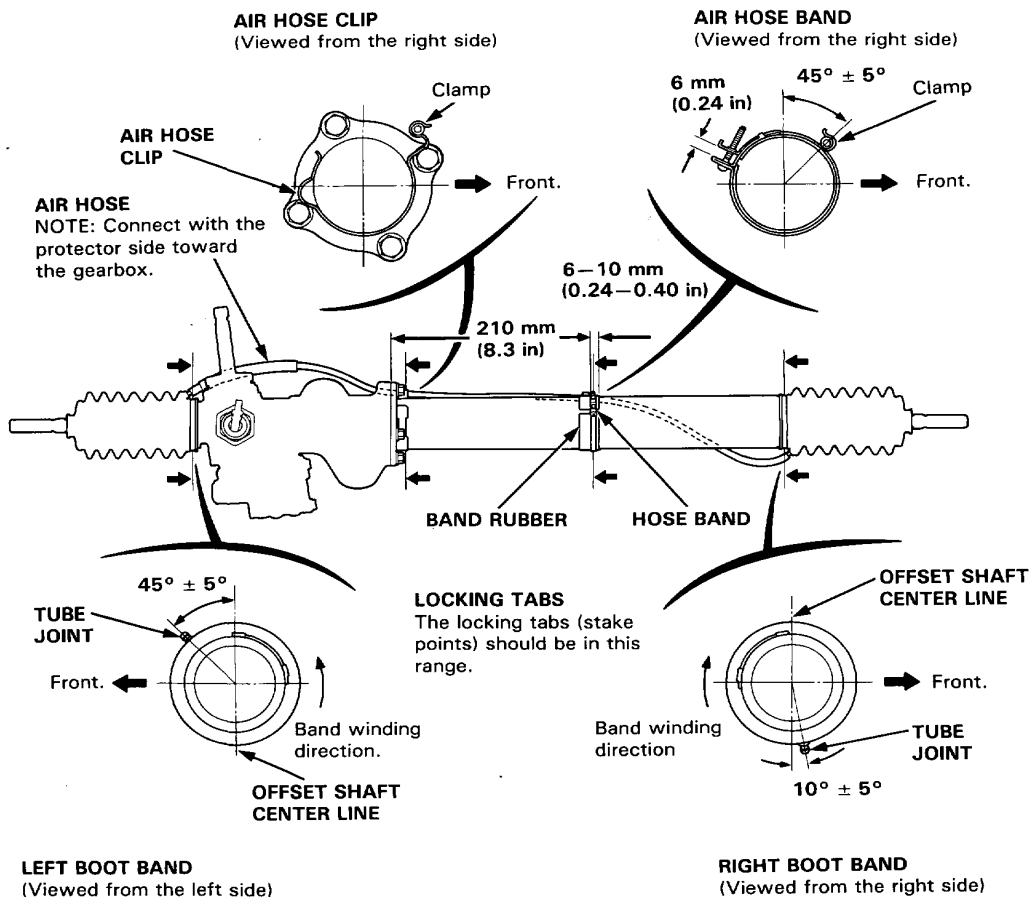
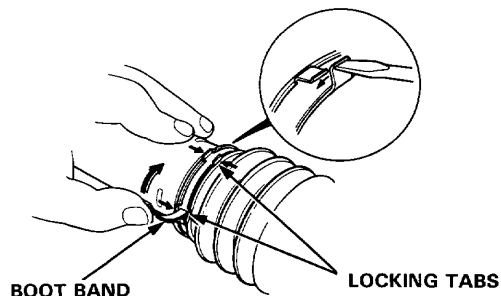
CAUTION:

- Stake the band locking tabs firmly.
- When staking, be careful not to damage the boot.

86. Install the band cushion and air hose band; position the band as shown then tighten it. Install the air hose.

87. After assembling, slide the rack right and left to be certain that the boots are not deformed or twisted.

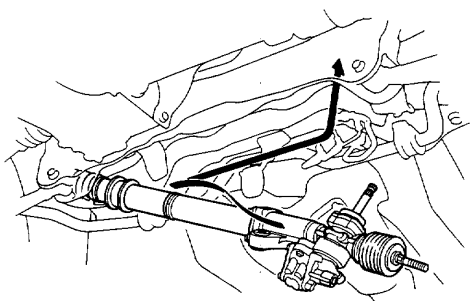
NOTE: After installation, perform the electrical check on the 4WS system (page 17-144).



Steering Gearbox

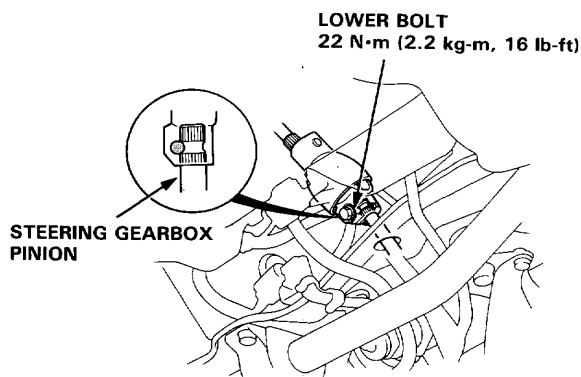
Installation

1. Slide the rack all the way to the right.
2. Pass the right side of the steering gearbox assembly above and through the right side of the rear beam.
3. Hold the steering gearbox assembly and slide the rack all the way to the right.
4. Raise the left side of the steering gearbox assembly above and through the left side of the rear beam.

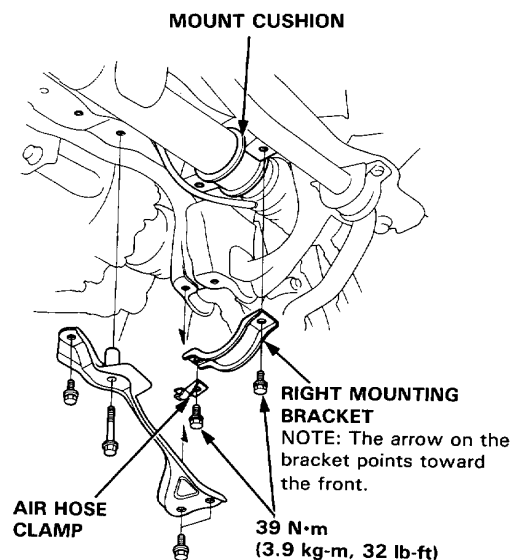
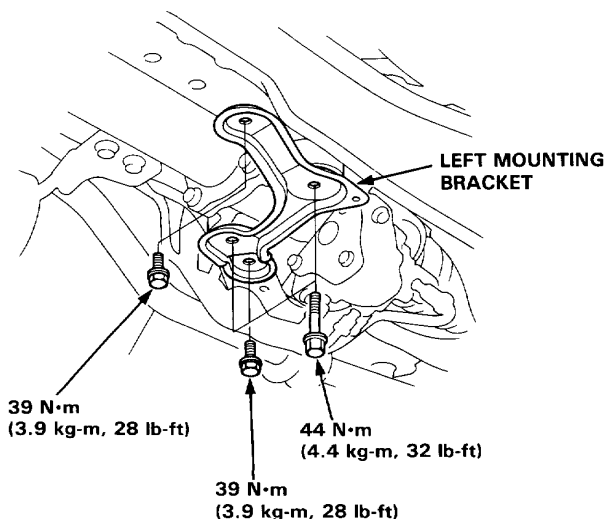


5. Reconnect the steering shaft to the gearbox.

CAUTION: Before tightening the steering joint bolts, pull the steering joint to make sure that the steering joint is fully seated.



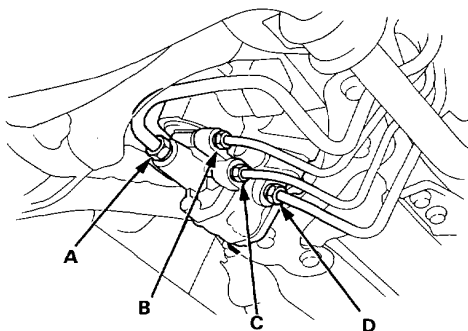
6. Loosely install the mounting brackets.
7. Tighten the six mounting bolts on the left mounting bracket first, then tighten the mounting bolts on the right mounting brackets.





8. Connect the four lines to the valve body unit, using flare nut wrenches.

- A: To oil cooler: 17 mm wrench
29 N·m (2.9 kg-m, 21 lb-ft)
B: To speed sensor: 12 mm wrench
13 N·m (1.3 kg-m, 9 lb-ft)
C: To reservoir: 12 mm wrench
13 N·m (1.3 kg-m, 9 lb-ft)
D: From pump: 14 mm wrench
38 N·m (3.8 kg-m, 28 lb-ft)

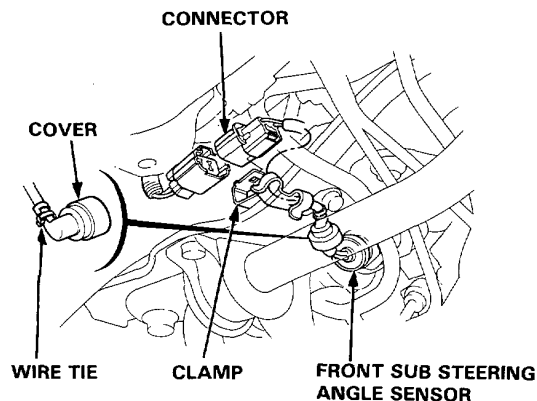


9. Reconnect the connector and secure the sub steering angle sensor wire harness with the clamp and install the cover.

NOTE:

- Be sure the sensor wire harness does not interfere with the stabilizer or other moving parts.
- Be certain that the harness is not twisted before connecting it.

10. Set the cover on the front sub steering angle sensor. Secure the harness and cover with a new wire tie.

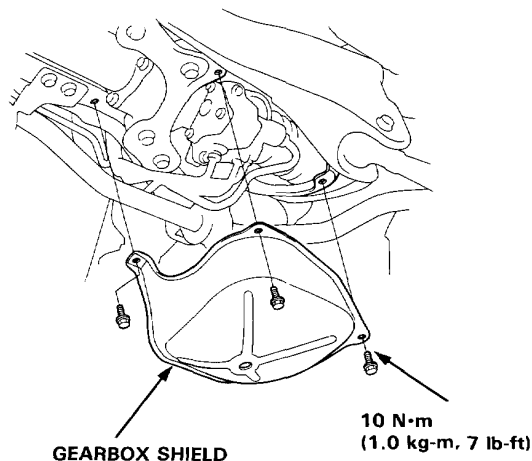


NOTE: After rack guide adjustment, perform the electrical check on the 4WS system (page 17-144).

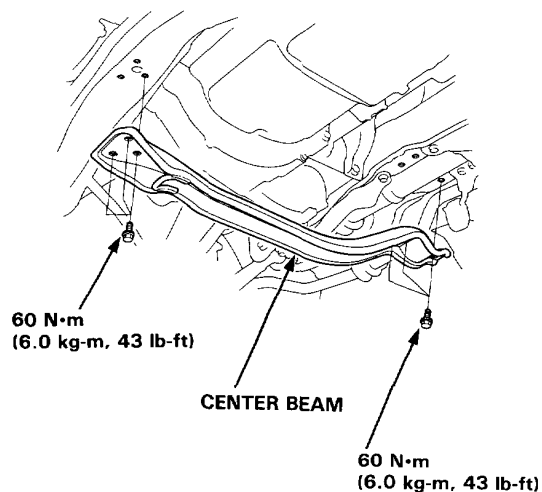
11. Fill the reservoir with power steering fluid and bleed air from the system by turning the steering wheel from lock to lock several times with the engine warm.

12. Make sure there are no fluid leaks, then install the shield.

Recheck the fluid level in the reservoir.



13. Install the center beam.



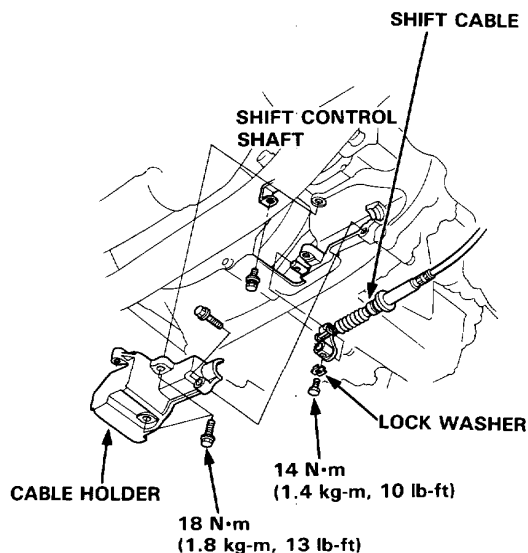
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Steering Gearbox

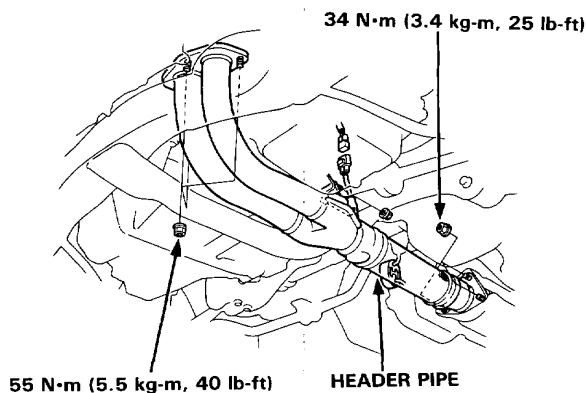
Installation (cont'd)

14. Automatic transmission model only.

- Connect the shift cable end to the shift control shaft, and install the cable holder.

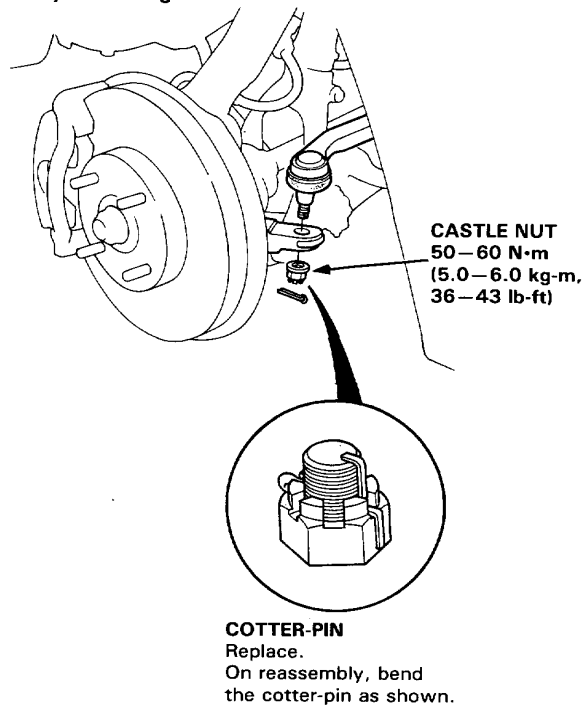


15. Install the header pipe with a new gasket, then tighten the new self-locking nuts.



16. Reconnect the tie-rods to the steering knuckles, tighten the ball joint nut to the specified torque, and install new cotter-pins.

CAUTION: Torque the castle nut to the lower torque specification, then tighten it only far enough to align the slot with the pin hole. Do not align the nut by loosening.



17. Fill the system:

- Fill the reservoir with new Honda Power Steering Fluid-V.
- Connect the battery positive terminal and then connect the negative terminal.

18. After installation, perform the following checks.

- Start the engine and let it run at fast idle, then turn the steering wheel from lock-to-lock several times to bleed air from the system.
- Check the fluid again, and add more if necessary.
- Check the gearbox for leaks.
- Check the front toe.
- Check the steering wheel spoke angle.
- Check the 4WS system (4WS only).

NOTE: If the tires has arrow mark on the side wall of the tire, install the wheels with the arrow mark pointing in the direction of rotation. Do not interchange the right and left tires.

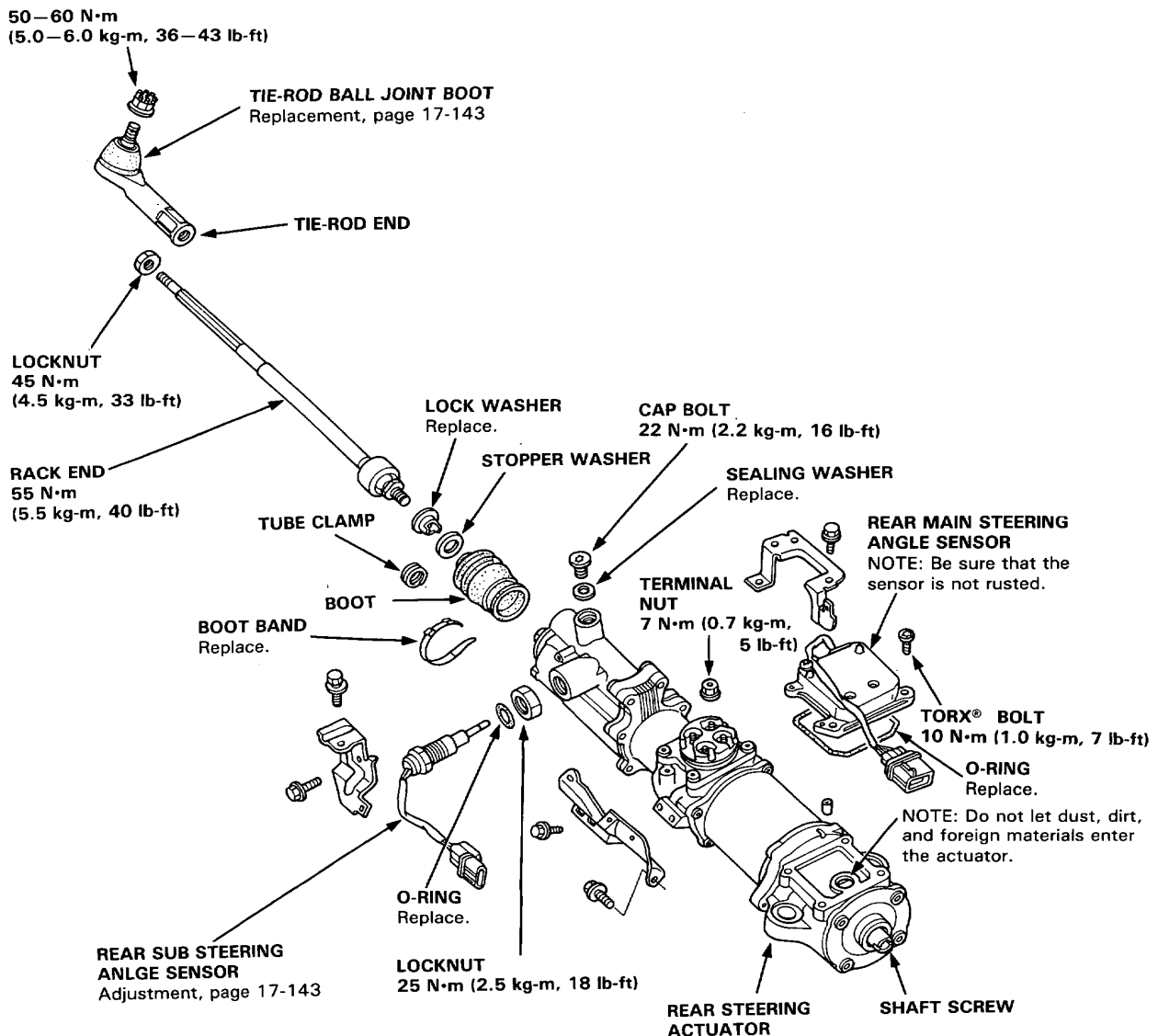


Rear Steering Actuator

Illustrated Index

CAUTION:

- Do not strike the rack end and shaft screw.
- Use the special tool when removing the rear steering actuator. The special tool should remain installed except when the actuator is inspected for function, etc.
- Do not try to disassemble the rear steering actuator. If the actuator is faulty, replace it as an assembly.
- When disassembling and servicing, do not let dust, dirt, and foreign materials enter the rear actuator.
- When either the rear sub steering angle sensor or the rear main steering angle sensor are removed, perform inspection and adjustment of the rear sub steering angle sensor after installing the rear actuator.
- Lock the shaft screw using the rear steering lock pin special tool before removal/installation and disassembly/reassembly of the rear actuator assembly.



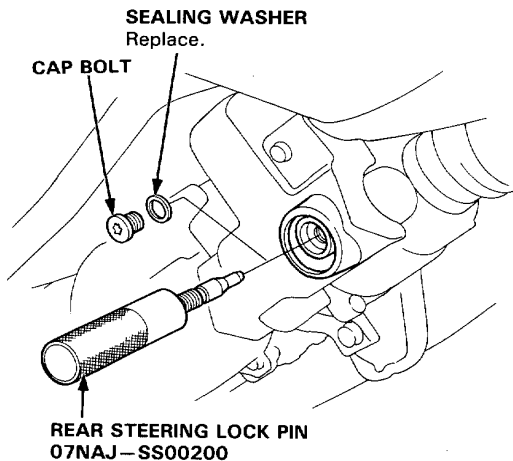
Rear Steering Actuator

Removal

1. Raise the rear of car and support on safety stands in the proper locations.
2. Remove the cap bolt from the actuator using a TORX® T40 BIT.
3. Install the special tool in the actuator.

NOTE: When the engine is OFF, the rear actuator steering rack is held in the neutral position (straight driving position) by the return spring tension. The rear steering lock pin can be set in the rear actuator only when the rear actuator steering rack is set in this neutral position.

CAUTION: Do not start the engine with the rear steering lock pin set in the rear actuator. If the steering wheel is turned with the engine running, the rear actuator will operate, damaging the rear actuator.

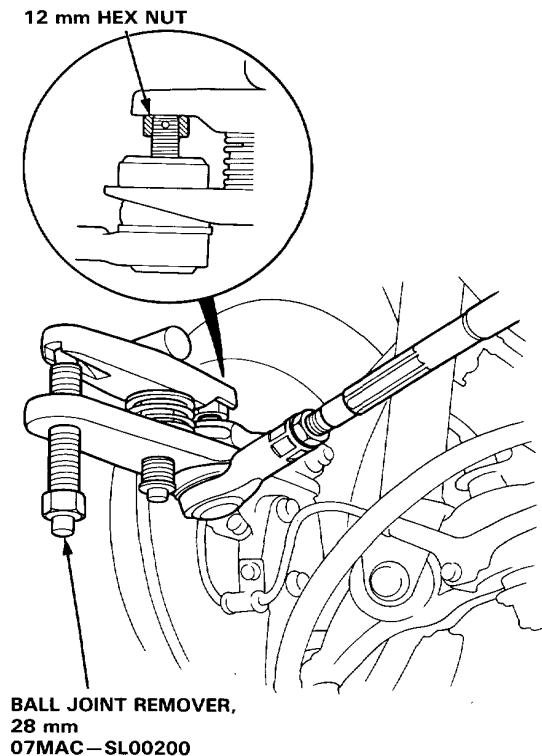


4. Remove the cotter-pin from the tie-rod ball joint nut and remove the nut.
5. Install a 12 mm hex nut on the ball joint. Be sure that the 12 mm hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.

NOTE: Remove the ball joint using the Ball Joint Remover. Refer to page 18-17 for how to use the ball joint remover.

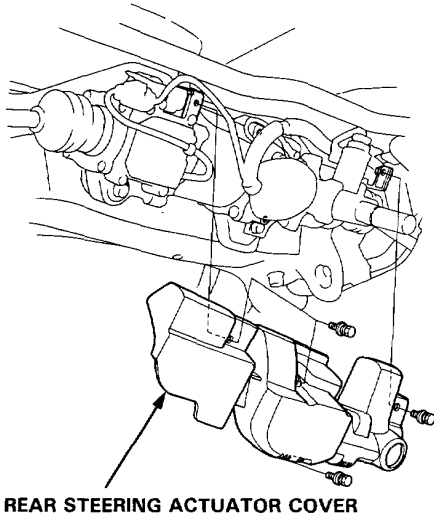
6. Separate the tie-rod ball joint and knuckle using the special tool.

CAUTION: Avoid damaging the ball joint boot.

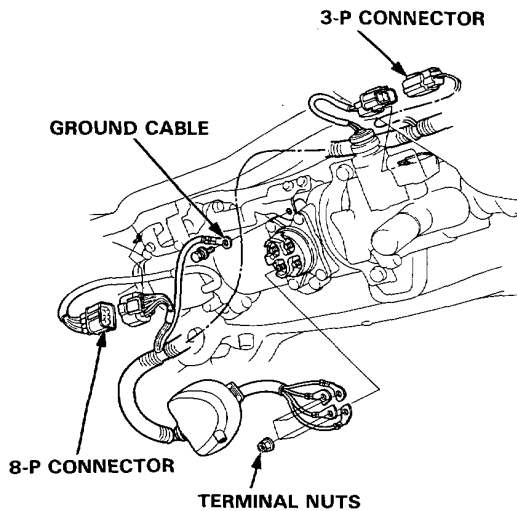




7. Remove the rear steering actuator cover.

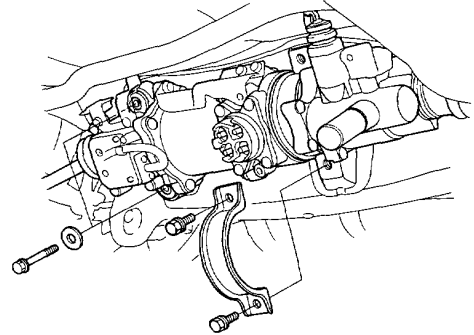


8. Disconnect the connectors and terminals from the actuator.



NOTE: Do not contaminate the terminal bolt and nut with grease. Clean them if necessary.

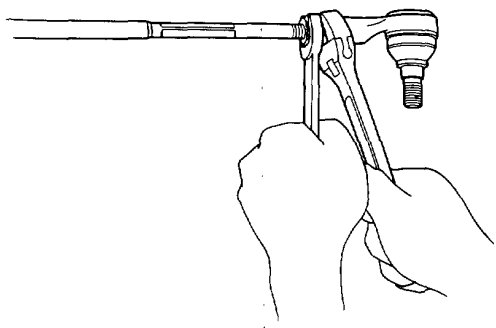
9. Remove the rear steering actuator assembly by removing the four mounting bolts.



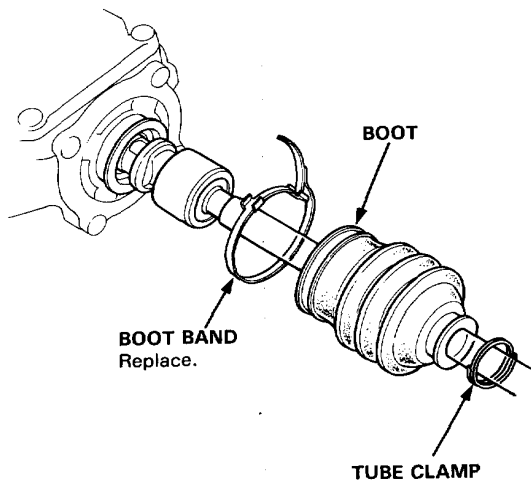
Rear Steering Actuator

Disassembly

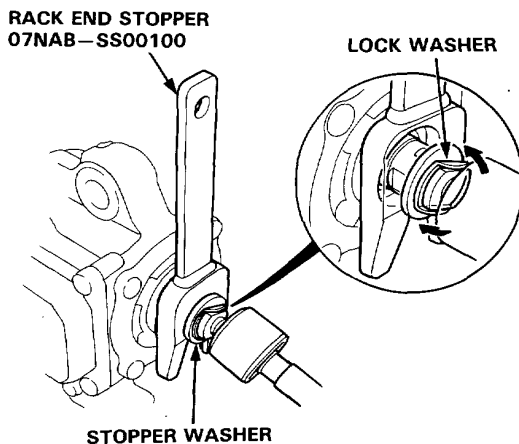
1. Remove the tie-rod assembly.



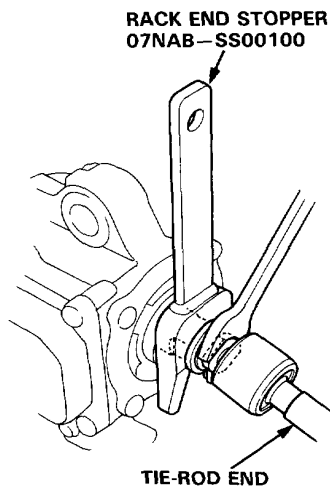
2. Remove the boot bands and tube clamps. Pull the dust seals away from the ends of the rack end.



3. Using a soft hammer, drive in the special tool between the housing and stopper washer with the flat side of the special tool toward the housing.
4. Straighten the tie-rod lock washer.



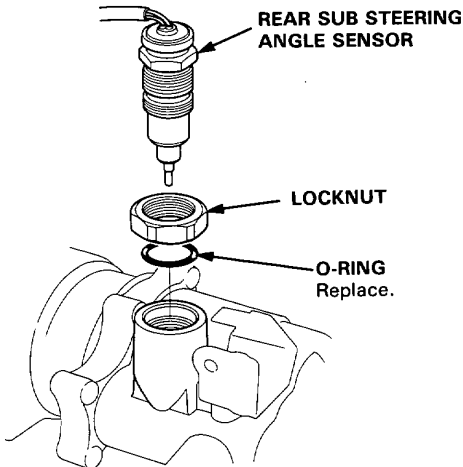
5. Hold the steering rack with the special tool and unscrew the rack end with a wrench.



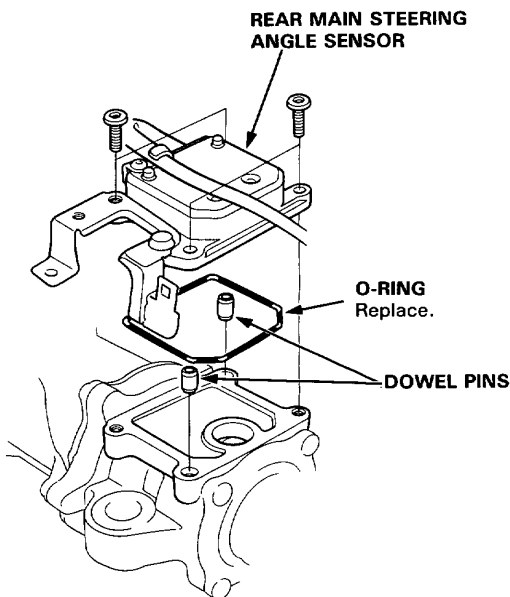
6. Remove the special tool.



7. Remove the rear sub steering angle sensor from the actuator.



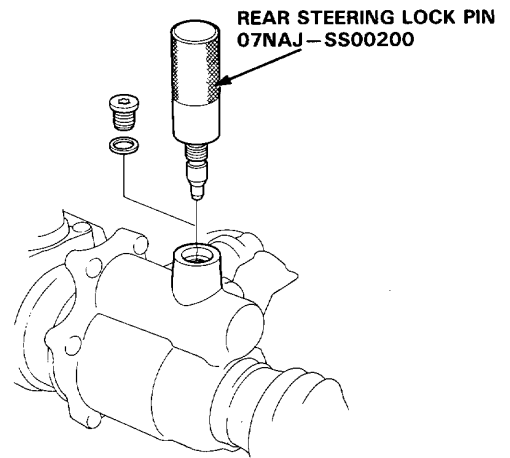
8. Remove the rear main steering angle sensor from the actuator.



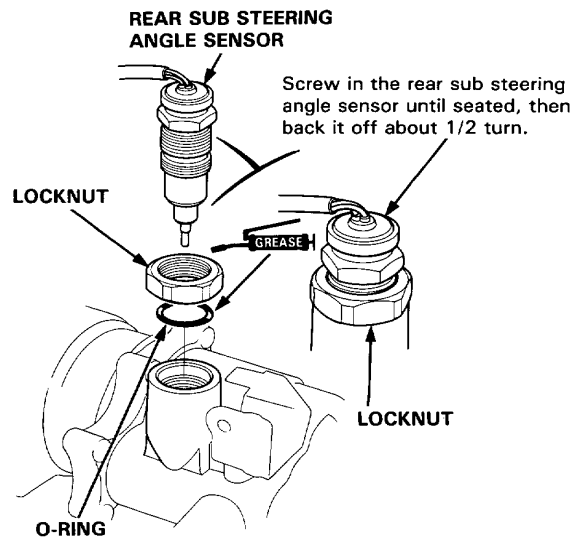
CAUTION: After disassembly, attach a piece of tape or equivalent material on each port and joint of the rear actuator to protect it from dust, dirt, and foreign materials.

Assembly

1. Install the special tool in the actuator.



2. Install the locknut on the rear sub steering angle sensor, then grease a new O-ring and install it.
3. Screw the rear sub steering angle sensor into the actuator housing fully by hand, back it off about 1/2 turn, and loosely tighten the locknut.



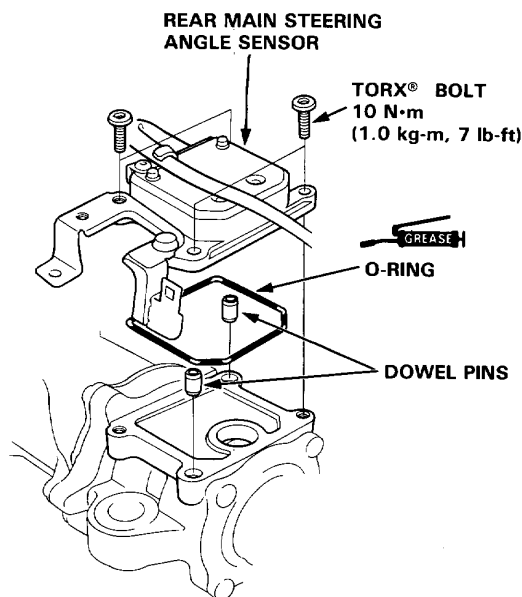
NOTE: Adjust the rear sub steering angle sensor (see page 17-153) after installing the rear actuator on the car.

(cont'd)

Rear Steering Actuator

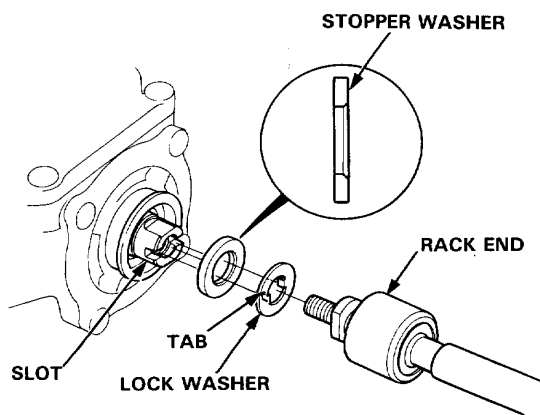
Assembly (cont'd)

- Grease a new O-ring and install it in the rear main steering angle sensor, then install the rear main steering angle sensor.

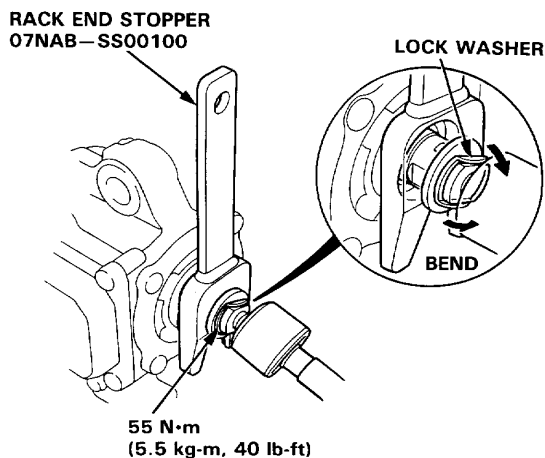


- Screw each tie-rod into the rack while holding the lock washer so its tabs are in the slots the rack end.

NOTE: Install the stopper washer with the chamfered side facing out.



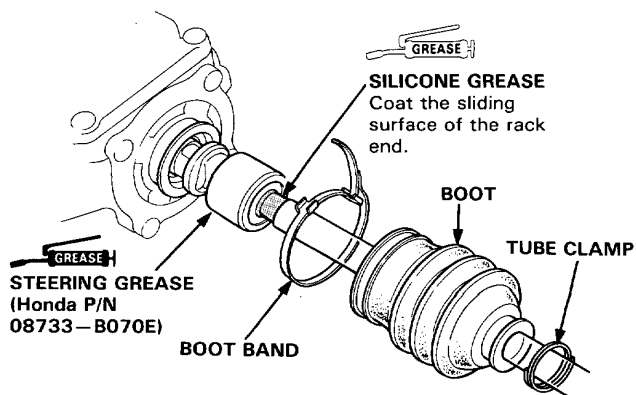
- Using a soft hammer, drive the special tool between the housing and stopper washer with the flat side of the special tool toward the housing.
- Tighten the tie-rod securely, then bend the lock washer back against the flat on the flange as shown.



CAUTION:

- Take extreme care not to apply axial impact and rotational force on the shaft screw.
- Set the projection of the tie-rod lock washer in the groove in the rack securely. After tightening the rack end, bend the tabs of the washer against the flats securely.

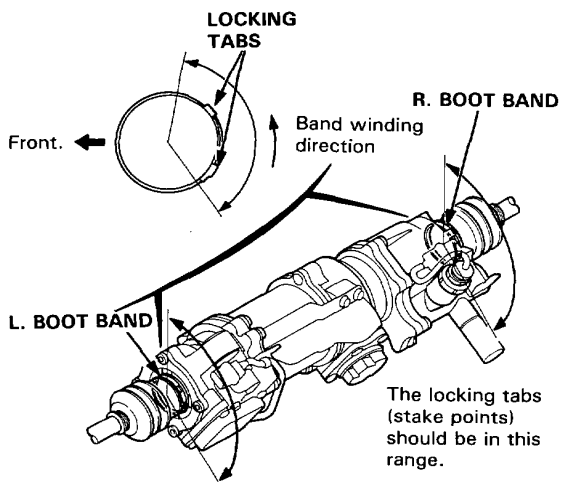
- Remove the special tool.
- Apply steering grease to the circumference of the rack end housing.
- Coat the rack end groove and inside of the boot with silicone grease.





11. Install new boot bands.

- Install the boot band so that the locking tabs of the band (stake points) are in the range shown below.
(Tabs should face up and slightly forward.)

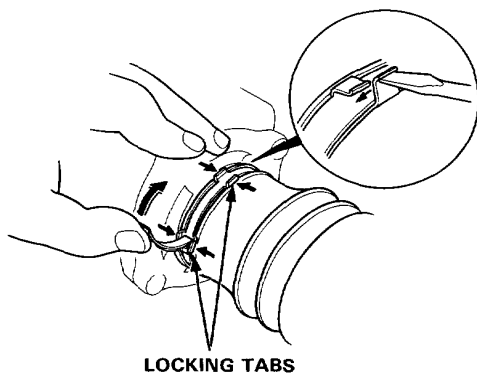


The locking tabs (stake points) should be in this range.

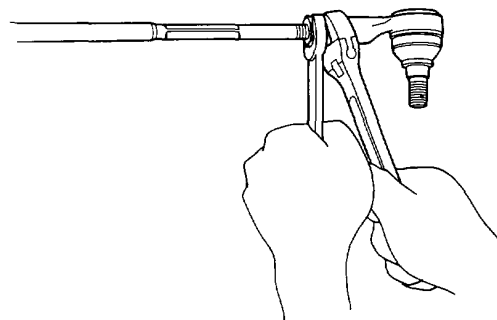
- Install new boot bands on the boot and bend both sets of locking tabs.
- Lightly tap on the doubled-over portions to reduce their height.

CAUTION:

- Stake the band locking tabs firmly.
- When staking, be careful not to damage the boot.



12. Install the right and left tie-rods on the right and left rack ends.

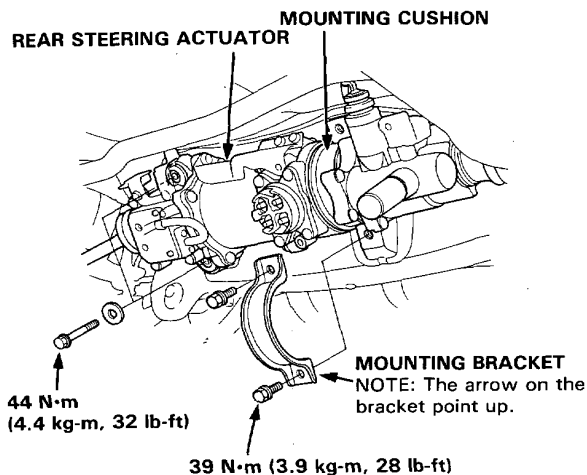


Rear Steering Actuator

Installation

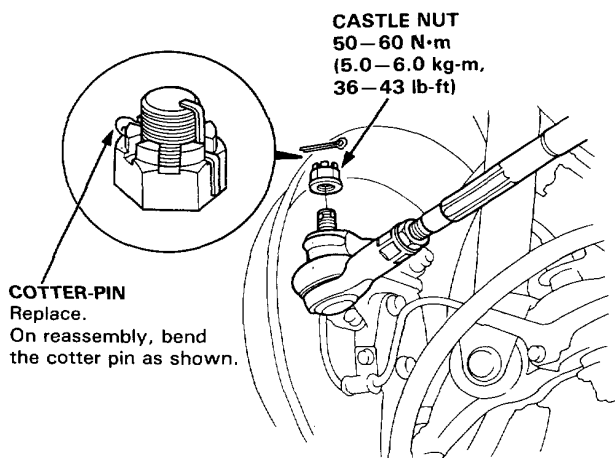
1. Install the rear steering actuator with four mounting bolts and bracket.

NOTE: Install the bolts loosely first, then tighten them.



2. Reconnect the tie-rods to the rear steering knuckles, tighten the ball joint nut to the specified torque, and install new cotter-pins.

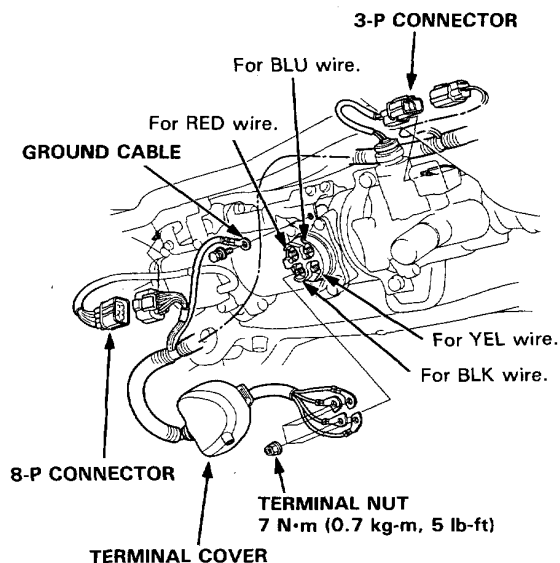
CAUTION: Torque the castle nut to the lower torque specification, then tighten it only far enough to align the slot with the pin hole. Do not align the nut by loosening.



NOTE: Do not contaminate the terminal bolt and nut with grease. Clean them if necessary.

3. Connect the connectors and terminals to the actuator.

NOTE: Be sure the wires are not caught or pinched by any parts.



4. Adjust the rear sub steering angle sensor (see page 17-153).

NOTE:

- Be sure that the front sub steering angle sensor and front main steering angle sensor are in neutral and the steering wheel is in the straight driving position.
- Be sure that the rear steering lock pin (special tool) is set in the rear actuator.

5. Install the terminal cover.
6. After installation, perform the following checks.
 - Check the rear toe.
 - Check the 4WS system.

NOTE: If the tires has arrow mark on the side wall of the tire, install the wheels with the arrow mark pointing in the direction of rotation. Do not interchange the right and left tires.

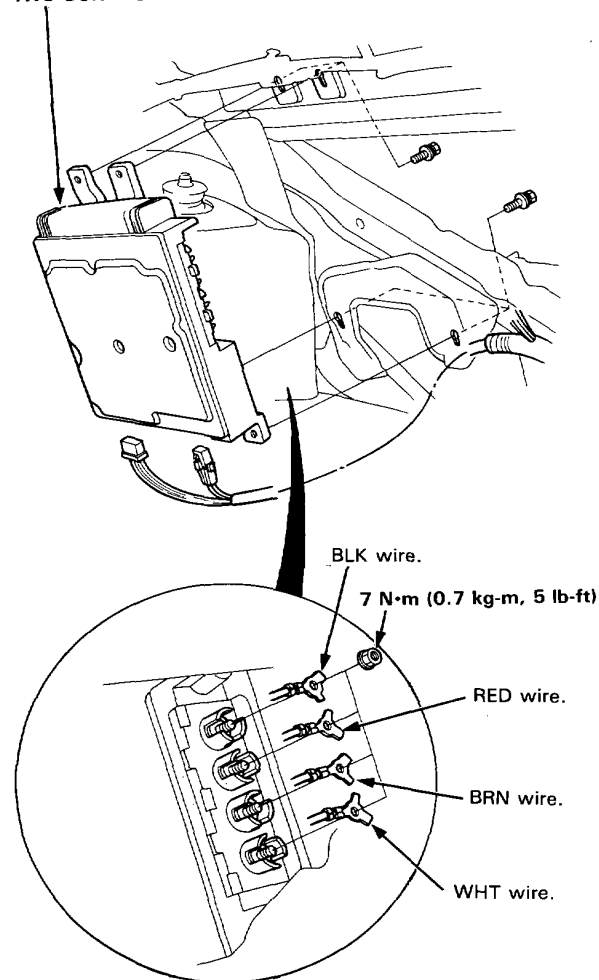


4WS Control Unit

Removal and Installation

1. Remove the rear seat back.
2. Disconnect the terminal wires and connectors from the control unit.
3. Remove the control unit.

4WS CONTROL UNIT



4. Install in the reverse order of removal.

NOTE: Turn the ignition switch ON and check the 4WS indicator light operation.

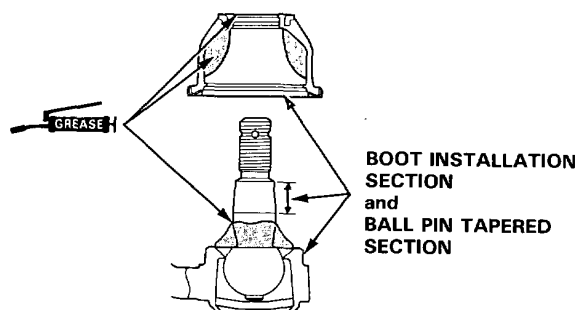
Tie-rod End Boot

Replacement

1. Remove the boot.
2. Pack the interior of the boot and lip with grease.
3. Wipe the grease off the sliding surface of the ball pin, then pack the lower area with fresh grease.

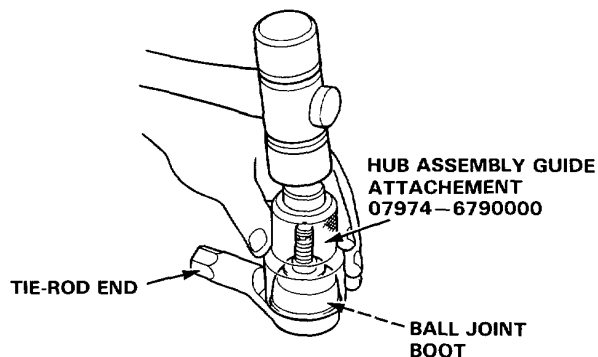
CAUTION:

- Keep grease off the boot installation section and the tapered section of the ball pin.
- Do not allow dust, dirt, or other foreign materials to enter the boot.



4. Install the new ball joint boot using a special tool as shown below.

NOTE: After driving the boot onto the ball joint, apply sealant between the tie-rod end and boot.



CAUTION: After installing the boot, check the ball pin tapered section for grease contamination and wipe it if necessary.

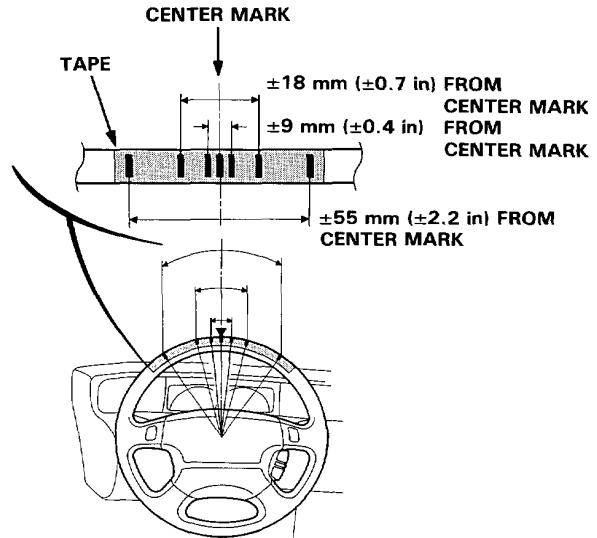
Electronic Neutral Check

Preparation

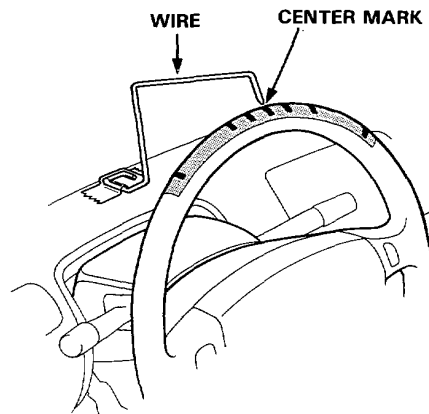
NOTE:

- If the power of the 4WS control unit was shut down for the following operations, start the engine and turn the steering wheel fully right and left.
 - Battery removal/installation
 - 4WS control unit removal/installation
 - No. 43 fuse CLOCK RADIO removal
 - Before performing the electronic neutral check on the 4WS system check the following items.
 - Be sure that the steering wheel spoke angle is at the designated angle while driving straight.
 - Check that the front and rear wheels align properly (i.e. difference in toe gauge reading between the right and left wheels is within specification) using the toe inspection gauge (07HGJ-0010000).
1. Jack up the car and place the four wheels slowly in the center of the turning radius gauge turn tables.
 2. Place a piece of masking tape or equivalent approximately 300 mm (12.0 in) long on the top edge of the steering wheel. Place a mark on the tape at each of the following measurements:
 - Center (highest point of the steering wheel).
 - 9 mm (0.4 in) right and left of center (For front main steering angle sensor).
 - 18 mm (0.7 in) right and left of center (For front sub steering angle sensor adjustment).
 - 55 mm (2.2 in) right and left of center (For front sub steering angle sensor inspection).

NOTE: The specifications are the measurements on the outer circumference of the steering wheel.



3. Fashion a piece of stiff wire (coat hanger) and place it on top of the steering column. Position the wire so the indicating tip is close to the marks on the steering wheel and tape the wire down securely.
4. Set the steering wheel in the straight driving position and set the wire at the center mark on the steering wheel.

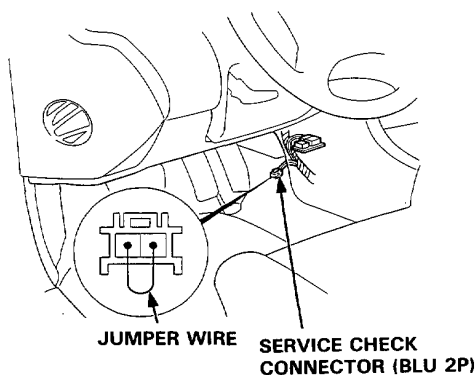




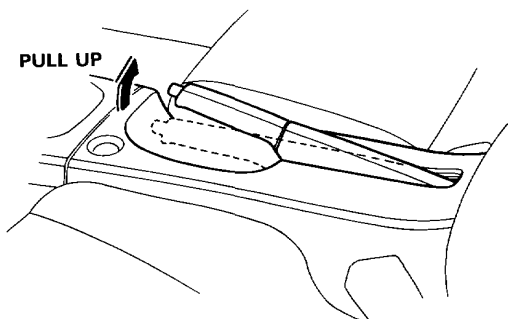
5. Take out the service check connector (BLU 2P) from behind the center console. Connect the terminals with a piece of jumper wire.

NOTE:

- The 4WS indicator light will not indicate that the sensors are in the neutral position when displaying stored problem codes.
- Check and verify any problem codes displayed before checking the neutral position.

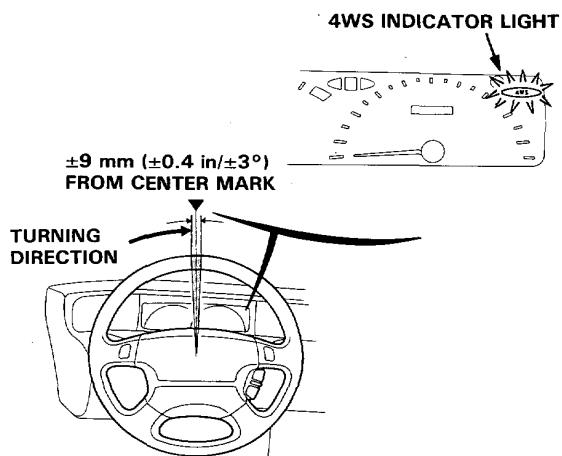


6. Pull up the parking brake lever fully and turn the ignition switch on (engine off) to turn the parking brake indicator light on. This sets the front sensors in the inspection mode.



Front sensors inspection

7. Check the main steering angle sensor with the ignition switch on (engine off).
 - From the straight driving position, turn the steering wheel to the left, then turn the steering wheel slowly to the right beyond the straight driving position. Do not turn the steering wheel inversely.
 - Turn the steering wheel to the right, then turn to the left beyond the straight driving position. Repeat this operation several times until you find the position where the 4WS indicator light starts to come on.



The 4WS indicator light should start to come on within the range of $\pm 9 \text{ mm } (\pm 0.4 \text{ in} / \pm 3^\circ)$ from the center mark on the steering wheel.

NOTE:

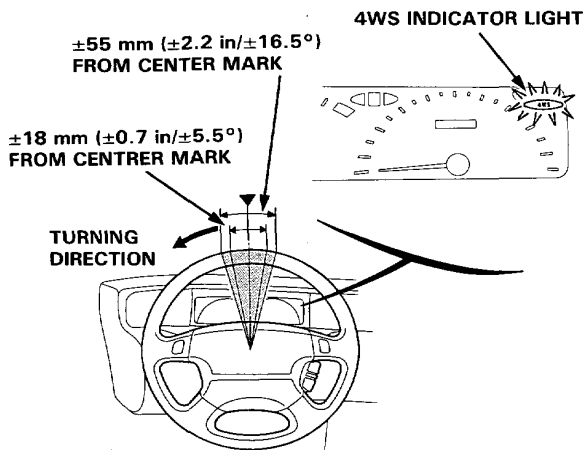
- The 4WS indicator light might look as if it is blinking at a point near the ends of the specified range.
- To determine that the indicator light is on and not blinking, be sure that the 4WS indicator light stays on for more than 2 seconds.
 - Adjust the 4WS system if the indicator light starts to come on at a point outside the marked range on the steering wheel (see page 17-149).

(cont'd)

4WS System Inspection

Electronic Neutral Check (cont'd)

8. Check the front sub steering angle sensor with the ignition switch on (engine off).
 - From the straight driving position, turn the steering wheel to the right, then turn it slowly to the left beyond the straight driving position. Do not turn the steering wheel inversely.
 - Turn the steering wheel to the left, then turn to the right beyond the straight driving position. Repeat this operation several times until you find the center point of the range where the 4WS indicator light blinks (at the intervals of 0.2 seconds).

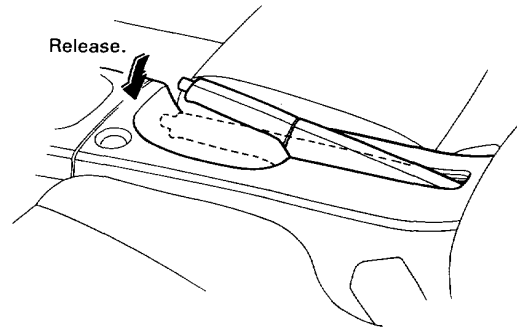


The center point should be within the range of $\pm 55 \text{ mm } (\pm 2.2 \text{ in} / \pm 16.5^\circ)$ from the center mark on the steering wheel. After adjusting the front sub steering angle sensor, however, the center point should be within the range of $\pm 18 \text{ mm } (\pm 0.7 \text{ in} / \pm 5.5^\circ)$ from the center mark.

- If the center point is outside the marked range on the steering wheel, adjust the front sub steering angle sensor (see page 17-151).

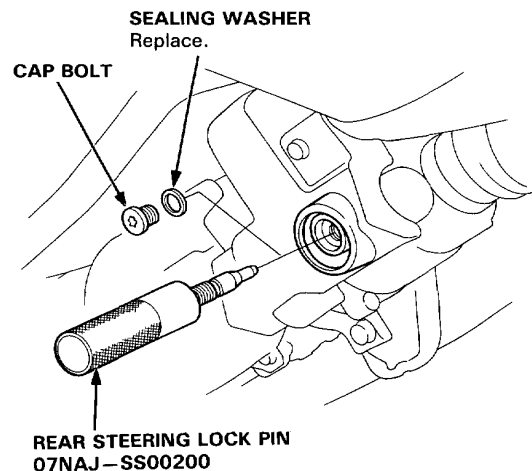
Rear sensors inspection

9. Release the parking brake fully to turn off the parking brake indicator light. This sets the rear sensors in the inspection mode.



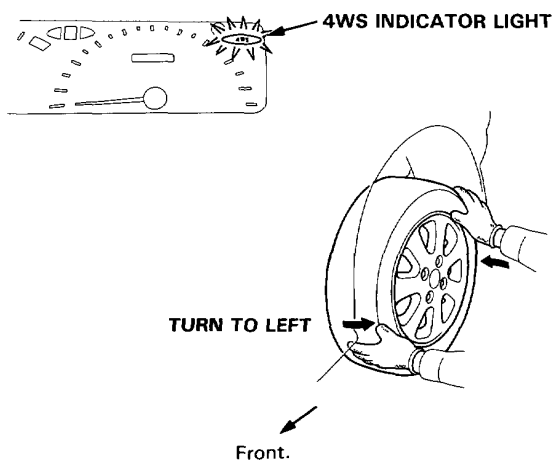
10. Turn the ignition switch off.
11. Remove the cap bolt and sealing washer from the rear actuator, and screw the special tool into the rear actuator as far as it will go.

NOTE: Do not start the engine with the lock pin set in the rear actuator.





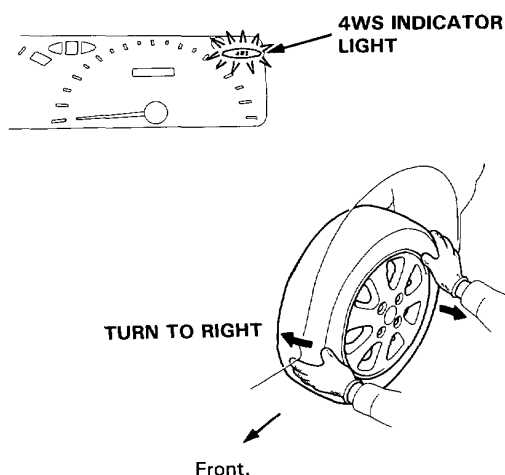
12. Set the steering wheel in the straight driving position to prevent the rear wheels from steering if the engine is started in error.
13. Turn the ignition switch on (engine off) to check the rear sub steering angle sensor.
 - Turn the rear left wheel fully to the right by hand, then turn it slowly to the left.
 - The 4WS indicator light should blink at intervals of 0.2 seconds when the rear wheel is turned to the left.



NOTE: The 4WS indicator light blinks in a narrow range. Take care not to overlook it.

- If the 4WS indicator light does not blink, adjust the rear sub steering sensor (see page 17-153).

14. Set the steering wheel in the straight driving position to prevent the rear wheels from steering if the engine is started in error.
15. Turn the ignition switch on (engine off) and check the rear main steering angle sensor.
 - Turn the rear left wheel fully to the left by hand, then turn it slowly to the right.
 - The 4WS indicator light should turn ON when the rear wheel is turned to the right.



NOTE:

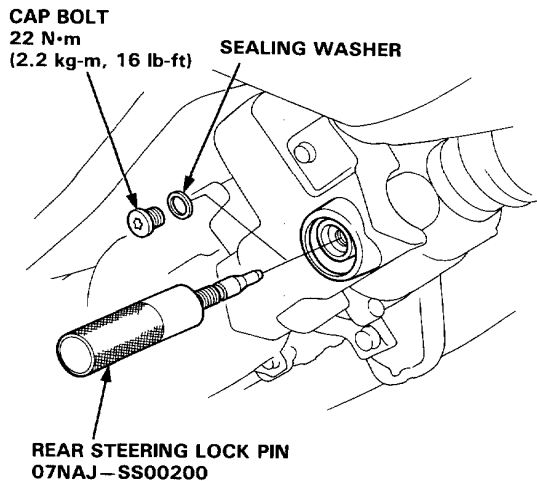
- The 4WS indicator light turns on in a narrow range. Take care not to overlook it.
- The 4WS indicator light might look as if it is blinking at a point near the ends of the range where the light is on.
- To determine that the indicator light is not blinking, be sure that the 4WS indicator light stays on for more than 2 seconds.
- If the 4WS indicator light does not turn on, remove the rear main steering angle sensor and check it for damage.

(cont'd)

4WS System Inspection

Electronic Neutral Check (cont'd)

16. Turn the ignition switch off.
17. Remove the special tool from the rear actuator, and install the cap bolt and the new sealing washer on the rear actuator.



18. Remove the jumper wire from the service check 2P connector terminals.
19. Return the connector behind the center console.
20. Reinstall the removed parts.



4WS System Adjustment

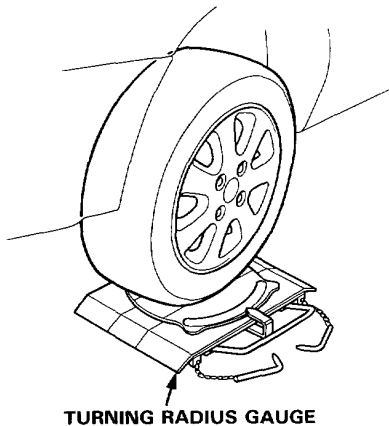
4WS System Adjustment

Adjust the 4WS system using the following procedure.

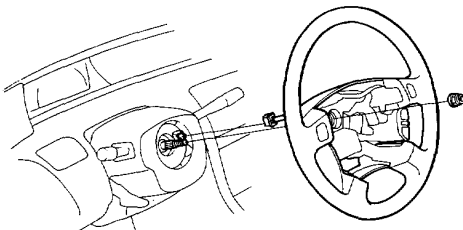
NOTE:

- If the power of the 4WS control unit was shut down for the following operations, start the engine and turn the steering wheel fully right and left.
 - Battery removal/installation
 - 4WS control unit removal/installation
 - No. 43 fuse CLOCK RADIO removal

1. Jack up the car and place the wheel in the center of the turning radius gauge turn tables.

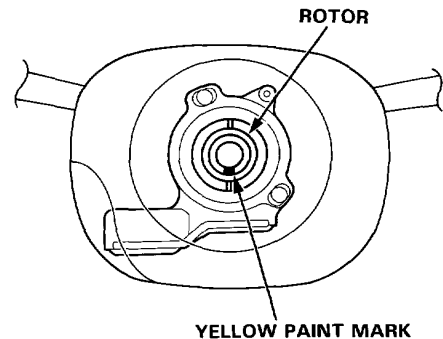


2. Set the steering wheel so that it is positioned in the center of the range where the steering wheel turns fully to the right and left. (This centers the front steering rack.)
3. If the steering wheel spoke angle is not at the designated angle with the steering wheel set in the position explained in step 2, adjust the front main steering angle sensor and spoke angle as follows.
 - Set the steering wheel in the straight driving position, then remove it.

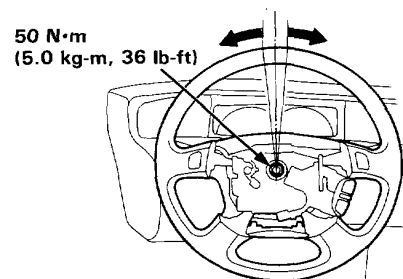


- Check whether the yellow paint mark of the front main steering angle sensor rotor is facing down (i.e. in neutral lock position where the rotor does not turn). This indicates that the front main steering angle sensor is electronically in neutral.

NOTE: If the paint mark is not facing down, adjust as instructed in step 5, (1) through (3) on page 17-86.



- Install the steering wheel, aligning it with the serration which makes the spoke angle closest to horizontal.
 - If the spoke angle is not horizontal, adjust the steering wheel slightly right or left, being careful not to push in on the steering wheel.



- With the spoke angle set at horizontal, then push the steering wheel in fully.
Tighten the steering wheel nut while pushing the steering wheel in.

NOTE:

- Do not remove the steering wheel until adjustment is completed.
- Do not turn the steering wheel when pushing the steering wheel.

(cont'd)

4WS System Adjustment

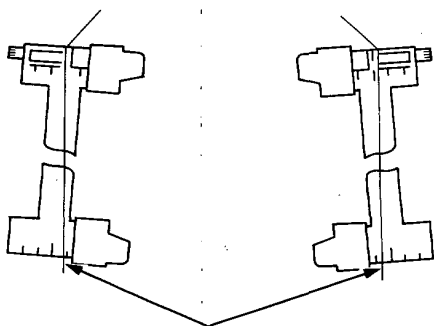
4WS System Adjustment (cont'd)

- Install the toe inspection gauge (07HGJ-0010000) on the wheels and adjust the toe of the front and rear wheels (see section 18).

NOTE: Insert the rear steering lock pin into the rear actuator to adjust the toe of the front and rear wheels.

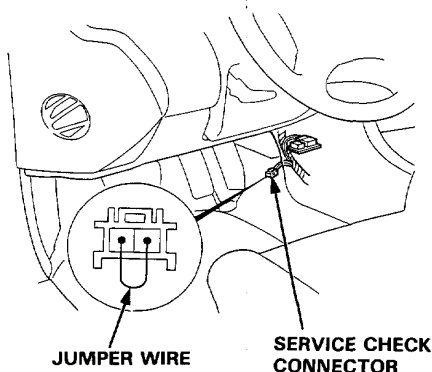
- Read the toe inspection gauge on each wheels and be sure that the front and rear wheels are in proper alignment (i.e. difference in toe gauge reading between the right and left wheels is within specification).

NOTE: Perform this inspection with the rear steering lock pin set in the rear actuator and the engine stopped.



Difference in toe gauge reading between right and left wheels: 0.5 mm max.

- Take out the service check connector (BLU 2P) from behind the center console. Connect the terminals with a piece of jumper wire.



- Check the sub and main steering angle sensors using the table shown below (see page 17-144).

NOTE:

- Turn the ignition switch on (engine stopped) to check.
- The 4WS indicator light does not indicate the electronic neutral position when it is indicating problem codes.
- Check the sensors by turning the specified wheel in the specified direction shown in the table below. The sensors are adjusted properly if the 4WS indicator light turns on in the specified range on the steering wheel, or if the center of the range where the 4WS indicator light blinks is within the specified range on the steering wheel.

Sensor type	Check	Parking brake lever	
		*1 Pull	*2 Release
Front main steering angle sensor	Turn front wheels to right	*2 ON	—
Front sub steering angle sensor	Turn front wheels to left	*3 Blinks	—
Rear sub steering angle sensor	*4 Turn rear wheels to left	—	*3 Blinks
Rear main steering angle sensor	*4 Turn rear wheels to right	—	*2 Blinks

- *1: Be sure that the parking brake indicator light operates properly.
- *2: The 4WS indicator light might look as if it is blinking at a point near the ends of the range where the light is ON.
- *3: The 4WS indicator light blinks in the intervals of 0.2 seconds. When the indicator light is indicating the main steering angle sensor condition (light ON), indication of the sub steering angle sensor condition by blinking is canceled.
- *4: Turn the rear wheel slowly by hand with the lock pin set in the rear actuator.



8. If the sensors are not adjusted properly, adjust each sensor.

- If the front main steering angle sensor is not adjusted properly, start with the step 2.
- Front sub steering angle sensor adjustment: see page 17-151.
- Rear sub steering angle sensor: see page 17-153.

NOTE: The rear main steering angle sensor cannot be adjusted. If the rear main steering angle sensor is abnormal, remove it and check it for damage.

Sub Steering Angle Sensor Adjustment

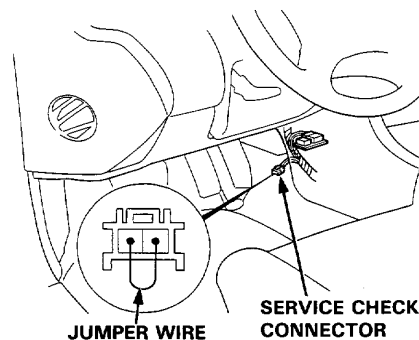
Front sub steering angle sensor

NOTE: Before adjusting the sub steering angle sensor, check that the front main steering angle sensor is adjusted properly (see page 17-144).

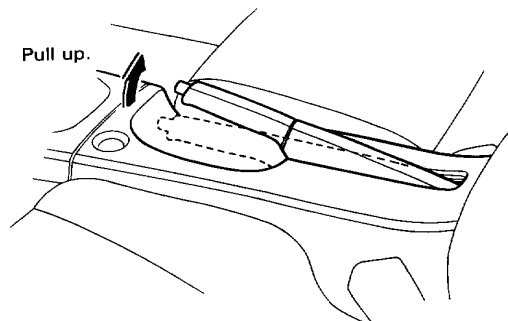
1. Jack up the car and raise all four wheels off the ground. Place the safety stands in the proper locations to support the car.
2. Set the steering wheel in the straight driving position.
3. Take out the service check connector (BLU 2P) from behind the center console. Connect the terminals with a piece of jumper wire.

NOTE:

- The 4WS indicator light will not indicate that the sensors are in the electronic neutral position when displaying stored problem codes.
- Check and verify any problem codes displayed before checking the electronic neutral position.



4. Set the parking brake lever and turn the ignition switch on (engine off). Be sure that the parking brake indicator light turns on.
5. Turn the ignition switch off.



(cont'd)

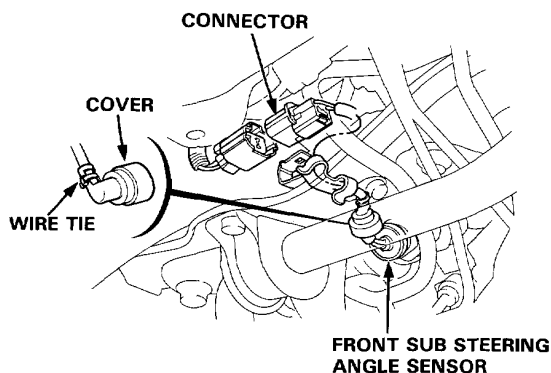
4WS System Adjustment

Sub Steering Angle Sensor Adjustment (cont'd)

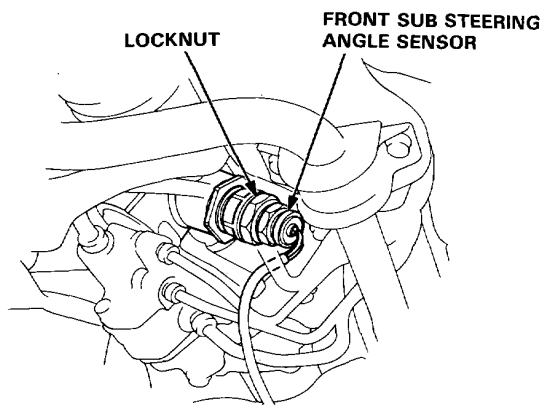
6. Cut the wire tie from the sub steering angle sensor cover, then remove the cover from the sub steering angle sensor.

CAUTION: Use care when cutting the wire tie so as not to cut into the wire harness.

7. Remove the sub steering angle sensor wire harness from the clamp and disconnect the connector.



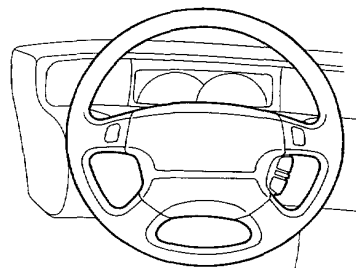
8. Loosen the locknut. Tighten the locknut fully by hand, back it off about 3/4 turns and connect the connector.



9. Turn the ignition switch on (engine off).

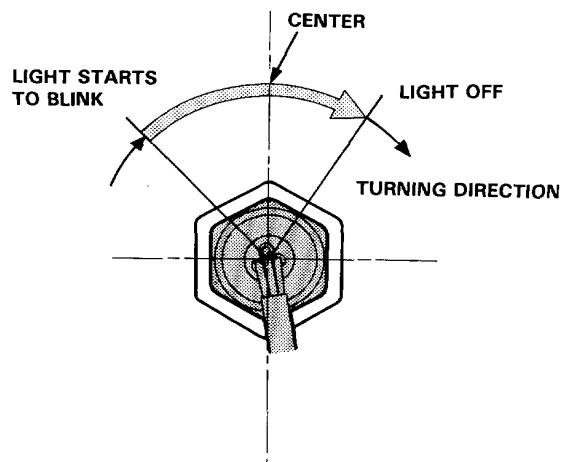
10. Set the steering wheel in the straight driving position. Set the front main steering angle sensor electronically in neutral (4WS indicator light is blinking) this time.

NOTE: Hold the steering wheel in this position until adjustment is completed. If the steering wheel is moved in error, repeat the adjustment procedure starting with step 10.



11. Turn the front sub steering angle sensor slowly clockwise, and check the range from where the light starts to blink to where it stops.

12. Loosen the front sub steering angle sensor. Repeat the step 11 several times to set the sub steering angle sensor in the center of the range from where the light starts to blink to where it stops.



NOTE:

- Turn the front sub steering angle sensor clockwise to make the 4WS indicator light blink.
- If the sub steering angle sensor wire is twisted excessively, turn the ignition switch off, disconnect the connector, and straighten the wire.



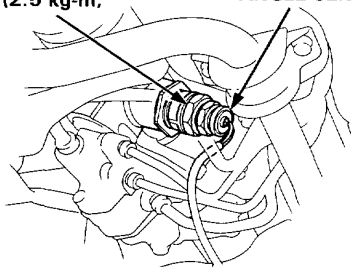
13. Tighten the locknut while holding the front sub steering angle sensor with a wrench.

NOTE: Take care not to turn the front sub steering angle sensor.

LOCKNUT

25 N·m (2.5 kg-m,
18 lb-ft)

**FRONT SUB STEERING
ANGLE SENSOR**



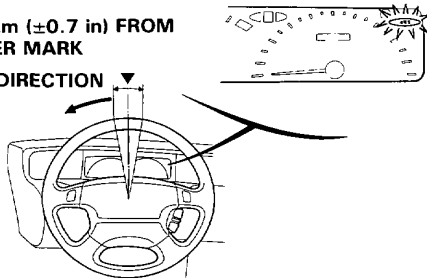
14. Disconnect the front sub steering angle sensor connector to straighten the wire. Reconnect the connector.

NOTE: Do not contaminate the front sub steering angle sensor connector terminals with mud, oil, and grease.

15. Check that each sensor is electronically in neutral (see page 17-144).

NOTE: Be sure that the center of the range where the 4WS indicator light blinks (indicating that the front sub steering angle sensor is electronically in neutral), is in the range ± 18 mm (± 0.7 in/ $\pm 5.5^\circ$) from the center mark on the steering wheel.

± 18 mm (± 0.7 in) FROM
CENTER MARK
TURNING DIRECTION



16. Reconnect the connector and secure the sub steering angle sensor wire harness with the clamp and install the cover.

NOTE:

- Be sure the sensor wire harness does not interfere with the stabilizer or other moving parts.
- Be certain that the wire is not twisted before connecting it.

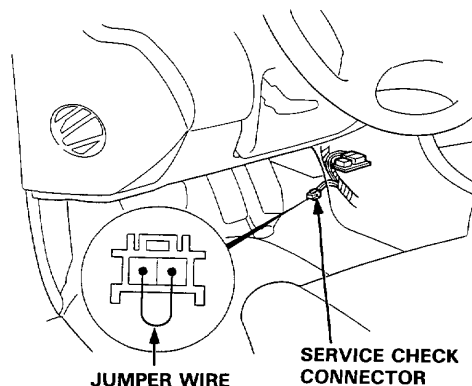
17. Secure the cover with a new wire tie.

Rear sub steering angle sensor

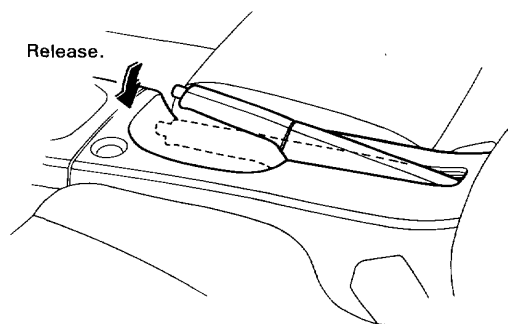
1. Jack up the car and raise all four wheels off the ground. Place the safety stands in the proper locations to support the car.
2. Take out the service check connector (BLU 2P) from behind the center console. Connect the terminals with a piece of jumper wire.

NOTE:

- The 4WS indicator light will not indicate that the sensor are in electrically neutral position, when displaying stored problem codes.
- Check and verify any problem codes displayed before checking the electrically neutral position.



3. Release the parking brake lever fully and turn the ignition switch on (engine off). Be sure that the parking brake indicator light goes off.
4. Turn the ignition switch off.

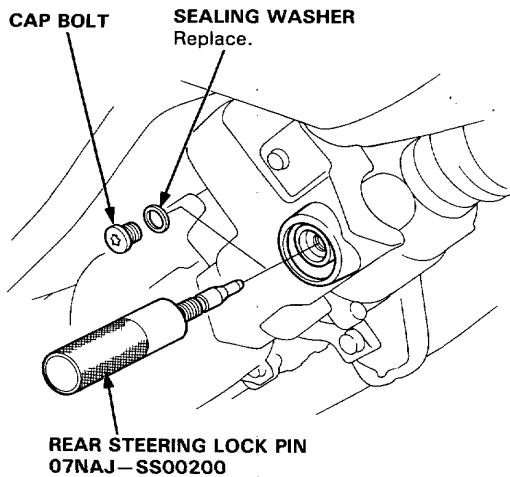


(cont'd)

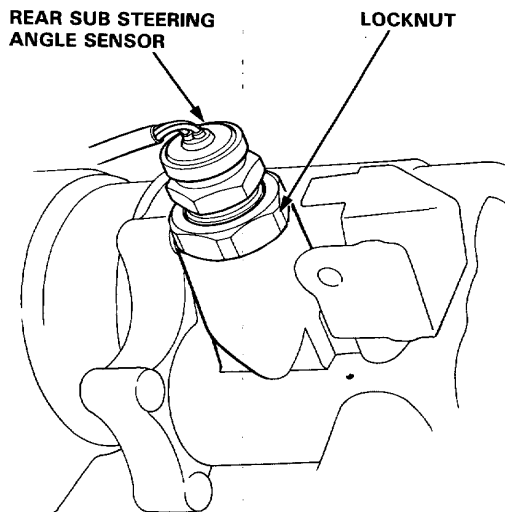
4WS System Adjustment

Sub Steering Angle Sensor Adjustment (cont'd)

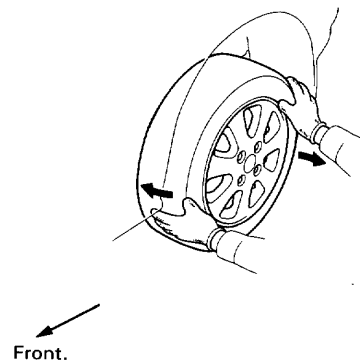
5. Remove the rear actuator cover.
6. Remove the cap bolt and sealing washer from the rear actuator. Screw the special tool in as far as it will go.



7. Remove the rear sub steering angle sensor wire from the clamp and disconnect the connector.
8. Loosen the angle sensor locknut. Tighten the locknut fully by hand, then back it off about 1/2 turn and connect the connector.



9. Set the steering wheel in the straight driving position to prevent the rear wheels from steering if the engine is started in error.
10. Turn the ignition switch on (engine off).
11. Turn the rear left wheel fully to the left by hand, then turn it slowly to the right to turn the 4WS indicator light on (i.e. rear main steering angle sensor is electronically in neutral).

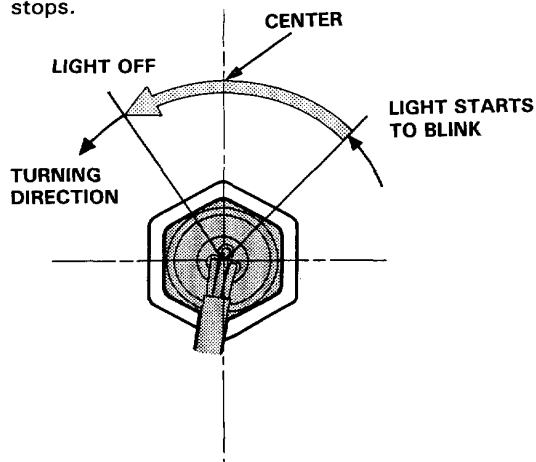


NOTE:

- The 4WS indicator light turns on in a narrow range. Do not overlook it.
- Work with care so as not to move the rear wheels from this neutral position.



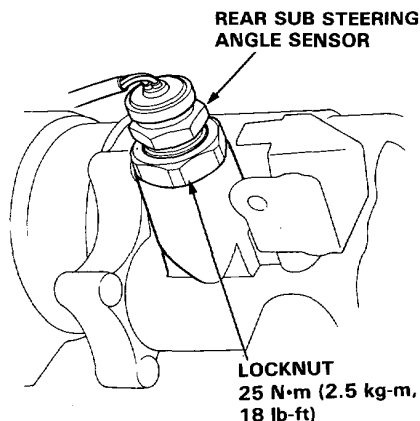
12. Turn the ignition switch on (engine off).
13. Turn the rear sub steering angle sensor slowly counterclockwise, and check the range from where the light starts to blink, to where it stops.
14. Tighten the rear sub steering angle sensor a little. Repeat the step 13 several times to set the sub steering angle sensor in the center of the range from where the light starts to blink, to where it stops.



NOTE:

- Turn the rear sub steering angle sensor counterclockwise to make the 4WS indicator light blink.
 - If the rear sub steering angle sensor wire is twisted excessively, turn the ignition switch off, disconnect the connector, and straighten the wire.
15. Tighten the locknut while holding the rear sub steering angle sensor with a wrench.

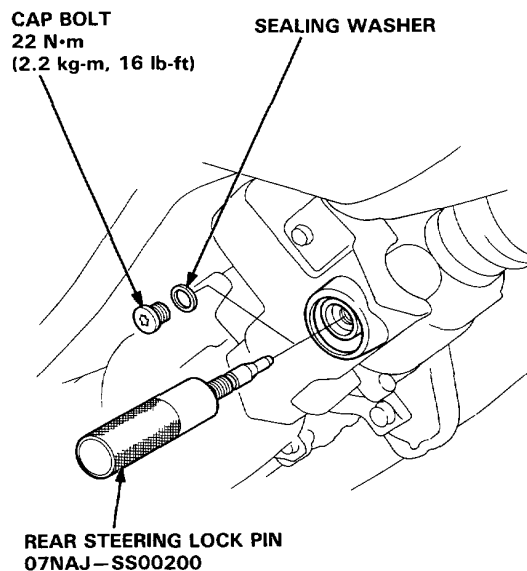
NOTE: Take care not to turn the rear sub steering angle sensor.



16. Disconnect the rear sub steering angle sensor connector to straighten the wire. Reconnect the connector.

NOTE: Do not contaminate the rear sub steering angle sensor connector terminals with mud, oil, and grease.

17. Check that each sensor is electronic in neutral (see page 17-144).
18. Turn the ignition switch off. Remove the special tool from the rear actuator, and install the cap bolt and the new sealing washer on the rear actuator.
19. Install the rear actuator cover.



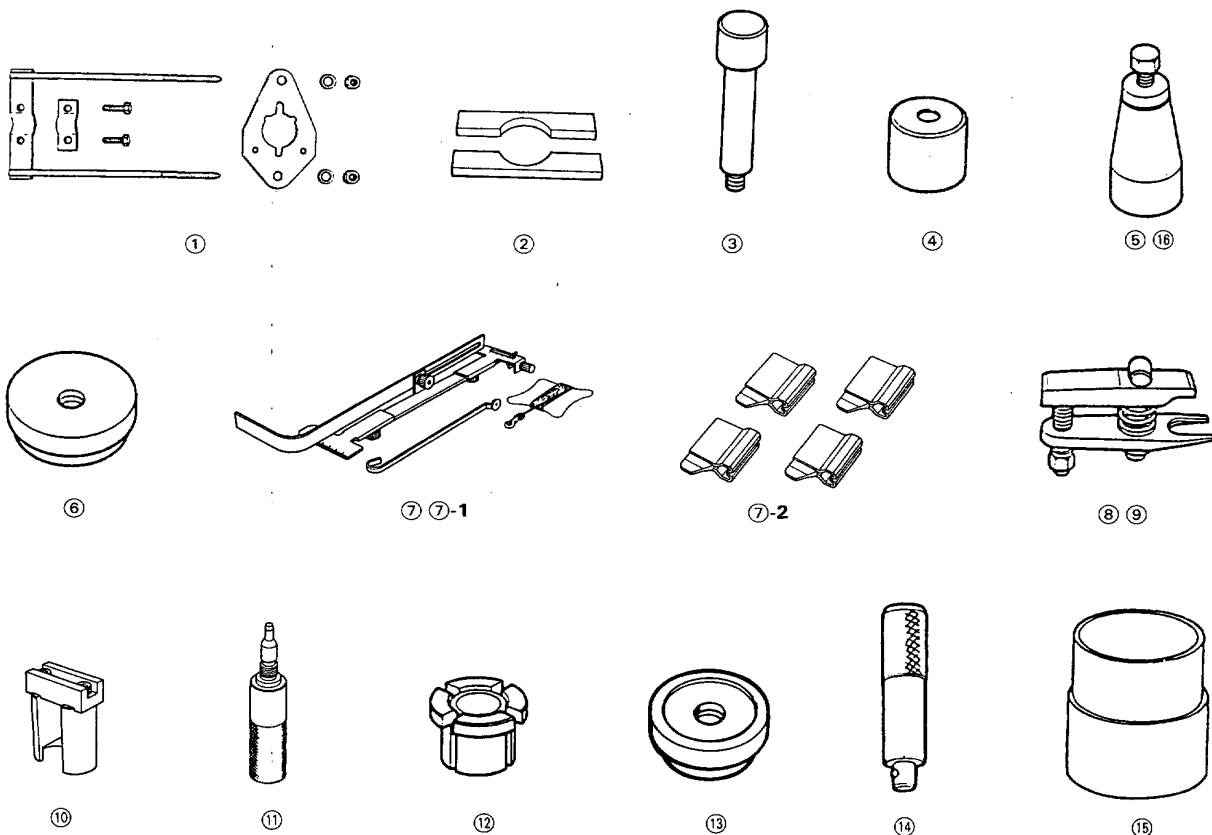
Suspension

Special Tools	18-2	Front Damper	
Component Location		Removal	18-26
Index	18-3	Disassembly/Inspection	18-26
Wheel Alignment		Reassembly	18-28
Service Information	18-4	Installation	18-29
Camber	18-5	Rear Suspension	
Caster	18-6	Torque Specifications	18-30
Front Toe Inspection/ Adjustment (2WS)	18-7	Knuckle/Hub	
Rear Toe Inspection/ Adjustment (2WS)	18-8	Illustrated Index	18-31
Toe Inspection/ Adjustment (4WS)	18-8	Removal	18-32
Turning Angle Inspection/ Adjustment	18-12	Installation	18-35
Wheel Measurements		Suspension Arms	
Bearing End Play	18-13	Removal/Inspection	18-37
Runout	18-13	Installation	18-38
Front Suspension		Ball Joint Boot Replacement	18-39
Torque Specifications	18-14	Lower Arm Bushing	
Knuckle/Hub		Replacement	18-39
Illustrated Index	18-15	Rear Damper	
Removal	18-16	Removal	18-40
Hub Unit and Wheel Bearing		Disassembly	18-41
Replacement	18-19	Inspection	18-41
Installation	18-21	Reassembly	18-43
Suspension Arms		Installation	18-44
Removal/Inspection	18-23	Damper Disposal	18-45
Installation	18-24		
Ball Joint Boot Replacement	18-25		
Lower arm Bushing			
Replacement	18-25		



Special Tools

Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07GAE—SE00101	Spring Compressor	1	18-26, 28, 41, 43
②	07GAF—SD40700	Hub Dis/Assembly Base	2	18-19
③	07GAF—SE00100	Hub Dis/Assembly Tool	1	18-19, 20, 21
④	07GAF—SE00200	Hub Assembly Guide Attachment	1	18-21
⑤	07GAG—SD40700	Ball Joint Boot Clip Guide	1	18-25, 39
⑥	07HAD—SG00100	Driver Attachment	1	18-20
⑦-1	07HGJ—0010000	Toe Inspection Gauge Set	1	18-9
⑦	07HGJ—0010001	Toe Inspection Gauge Set	1	18-9
⑦-2	07HGJ—0010100	Toe Inspection Gauge Attachment	8	18-9
⑧	07MAC—SL00100	Ball Joint Remover, 32 mm	1	18-18, 34
⑨	07MAC—SL00200	Ball Joint Remover, 28 mm	1	18-17, 18, 34, 40
⑩	07NAD—SS00100	Bushing Driver	1	18-25, 39
⑪	07NAJ—SS00200	Rear Steering Lock Pin	1	18-4, 8
⑫	07NAJ—SS00300	Wheel Alignment Gauge Attachment	1	18-4, 5, 6
⑬	07746—0010500	Attachment, 62 x 68 mm	1	18-19
⑭	07749—0010000	Driver	1	18-19, 20
⑮	07965—SD90100	Support Base	1	18-20, 21
⑯	07974—SA50800	Ball Joint Boot Clip Guide	1	18-25, 39





Component Location

Index

⚠ WARNING The front and rear dampers contain nitrogen gas and oil under pressure. The pressure must be relieved before disposal to prevent explosion and possible injury when scrapping.

Wheel Alignment, page 18-5

Front Suspension:

FRONT DAMPER

- Removal, page 18-26
- Disassembly/Inspection, page 18-26
- Reassembly, page 18-28
- Installation, page 18-29
- Disposal, page 18-45

FRONT LOWER ARM

- Removal/Inspection, page 18-23
- Installation, page 18-24

FRONT UPPER ARM

- Removal/Inspection, page 18-23
- Installation, page 18-24

STABILIZER BAR

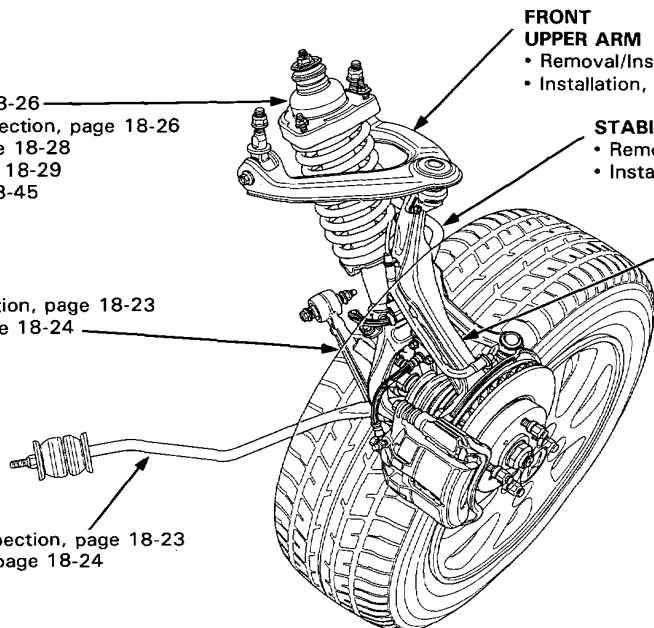
- Removal/Inspection, page 18-23
- Installation, page 18-24

FRONT KNUCKLE/HUB

- Removal, page 18-16
- Bearing Replacement, page 18-19
- Installation, page 18-21

RADIUS ROD

- Removal/Inspection, page 18-23
- Installation, page 18-24



Rear Suspension:

REAR DAMPER

- Removal, page 18-40
- Disassembly/Inspection, page 18-41
- Reassembly/Installation, page 18-43
- Disposal, page 18-45

REAR UPPER ARM

- Removal/Inspection, page 18-37
- Installation, page 18-38

REAR KNUCKLE/HUB

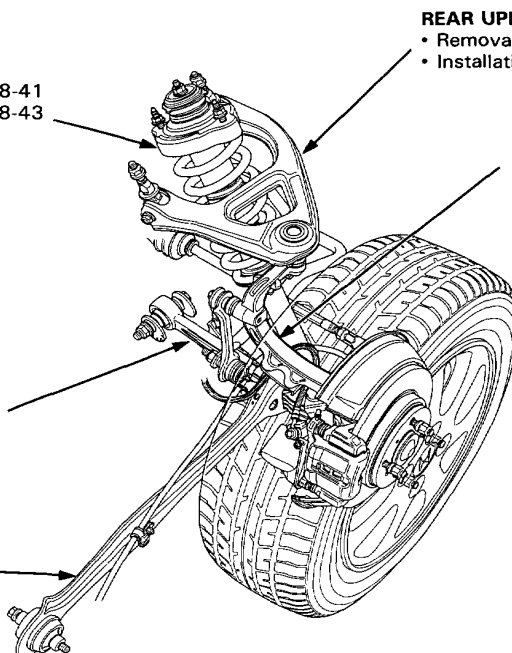
- Removal, page 18-32
- Installation, page 18-35

REAR LOWER ARM

- Removal/Inspection, page 18-37
- Installation, page 18-38

TRAILING ARM

- Removal/Inspection, page 18-37
- Installation, page 18-38

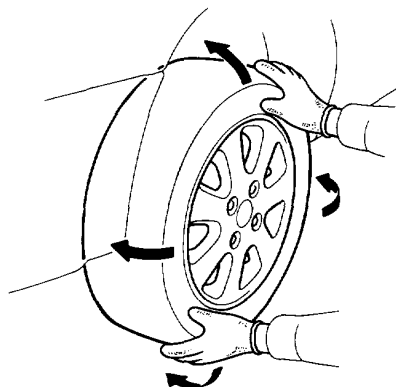


Wheel Alignment

Service Information

NOTE: For proper inspection/adjustment of the wheel alignment, check and adjust the following before checking the alignment.

- Check that the suspension is not modified.
- Check the tire size and tire pressure.
- Check the runout of the wheels and tires.
- Check the suspension ball joints. (Hold a wheel with your hands and move it up and down and right and left to check for wobbling.)



Wheel alignment adjustment procedure

Each of the wheel alignment elements relates to the other. Therefore, the total adjustment of the front/rear wheel alignment is required whenever either one of elements (i.e. camber, caster, toe, and/or turning angle) is adjusted.

Special Tools Information

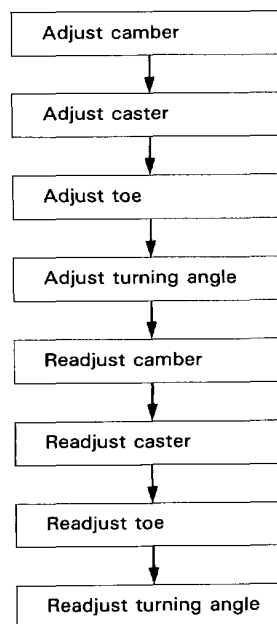
Wheel alignment gauge attachment:

NOTE:

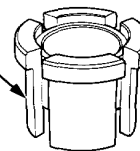
- As the wheel alignment gauge attachment can be installed by magnetic force of camber/caster gauge, make sure the wheel hubs are clean and rust-free before installing the wheel alignment gauge attachment.
- When installing the special tool, align the special tool groove and mating surface groove of the camber/caster gauge, to make the most of the magnetic force of the camber/caster gauge.
- For accurate readings, measure the wheel alignment at the car must be level.

Rear steering lock pin for 4WS:

CAUTION: Do not start the engine while the lock pin installed in the rear steering actuator. The rear steering actuator might be damaged when the rear wheels are steered. Be sure to remove the lock pin after service.

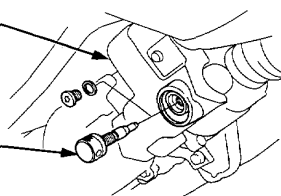


**WHEEL ALIGNMENT
GAUGE ATTACHMENT
07NAJ-SS00300**



**REAR STEERING
ACTUATOR**

**REAR STEERING
LOCK PIN
07NAJ-SS00200**





Camber

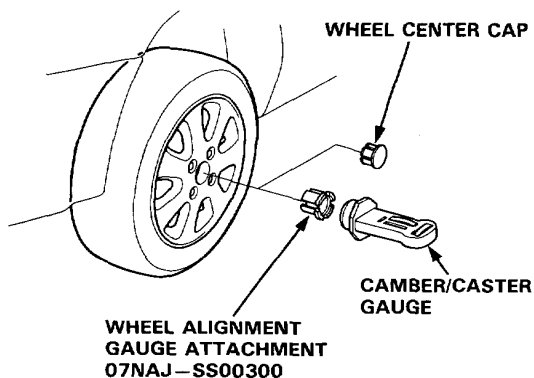
Front camber:

Inspection

1. Remove the wheel center cap.
2. Install the Wheel Alignment Gauge Attachment and camber/caster gauge on the wheel hub.
3. Turn the front wheels to the straight ahead position.
4. Read the camber on the gauge with the bubble at the center of the gauge.

Camber angle Front: $0^{\circ}00' \pm 1^{\circ}$

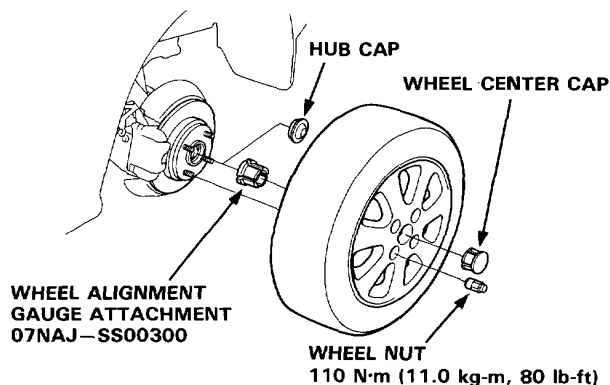
5. If out of specification, check for damaged suspension components.



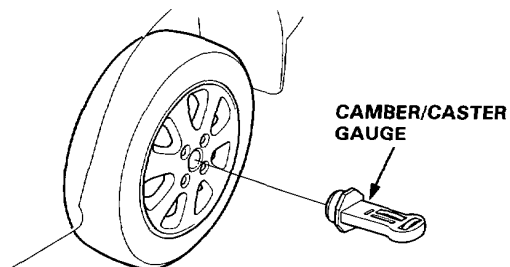
Rear camber:

Inspection

6. Remove the rear wheel and wheel center cap (see page 18-32).
7. Remove the hub cap from the rear wheel hub (see page 18-32).
8. Install the wheel Alignment Gauge Attachment into the rear wheel as shown, then install the wheel.
9. Install the wheel nut and hand tighten them, then lower the car.



10. Install the camber/caster gauge on the special tool.



(cont'd)

Wheel Alignment

Camber (cont'd)

11. Make sure the rear wheels so that the straight ahead position (4WS only).
12. Read the camber on the gauge with the bubble at the center of the gauge.

Camber angle Rear: $-0^{\circ}45' \pm 1^{\circ}$ (2WS)
 $-0^{\circ}45' \pm 30'$ (4WS)

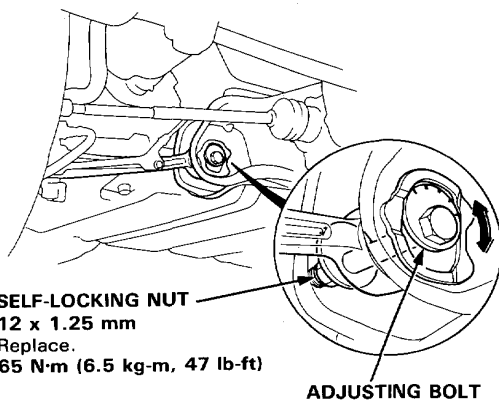
13. 2WS: If out of specification, check for damaged suspension components.

4WS:

- If adjustment is required, go to step 14.
- If no adjustment is required, remove alignment equipment.

Adjustment (4WS only)

14. Hold the adjusting bolt and loosen the self-locking nut.
15. Adjust the rear camber by turning the adjusting bolt until camber is correct.
16. Install the new self-locking nut and tighten it while holding the adjusting bolt.



Caster

Inspection

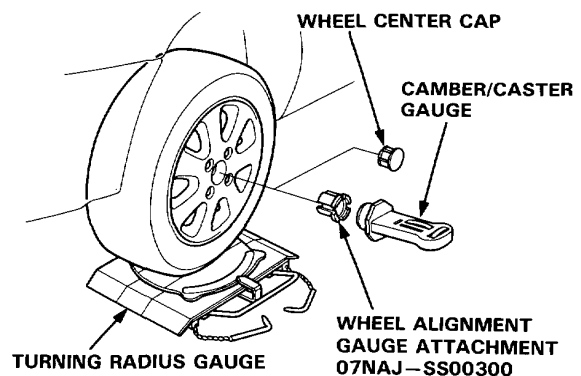
1. Remove the wheel center cap.
2. Raise the car and set the turning radius gauges beneath the front wheels, and place boards under the rear wheels the same thickness as one of the turning radius gauges, then lower the car.

NOTE: Be sure that the car is parallel to the ground with the wheels on the turning radius gauges and boards.

3. Install the Wheel Alignment Gauge Attachment and camber/caster gauge on the wheel hub, and apply the front brake.
4. Turn the front wheel 20° outward, then turn the adjust screw so that the bubble in the camber/caster gauge is at 0° .
5. Turn the wheel 20° inward and read the caster on the gauge with the bubble at the center of the gauge.

Caster angle: $2^{\circ}40' \pm 1^{\circ}$

6. ● If adjustment is required, record the caster reading, then go to step 7.
● If no adjustment is required, remove alignment equipment.





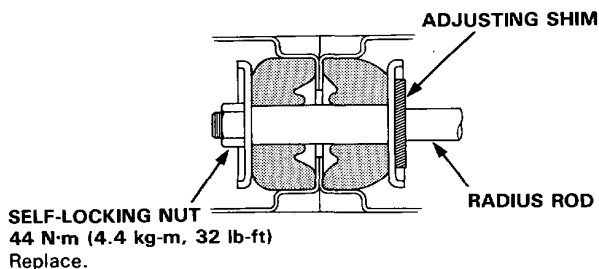
Adjustment

NOTE: Caster angle can be adjusted by increasing/decreasing the number of the adjusting shims. Remove and install the radius rod each time the caster angle is adjusted.

7. Raise the front of the car and place safty stands in the proper Locations.
8. Remove the self-locking nut on the end of the radius rod.
9. Remove the radius rod attaching bolts at the lower arm, then remove the radius rod (see page 18-23).
10. Adjust the caster angle by increasing/decreasing the number of adjusting shims.
 - One adjusting shim changes the caster angle by 40' and the caster angle can be adjusted by 1°20' maximum.
 - One adjusting shim is 3.2 mm (0.13 in) in thickness.

NOTE:

- Do not use more than two adjusting shims.
- After the adjustment, tighten the self-locking nut to the specified torque.



Front Toe Inspection/ Adjustment (2WS)

Inspection

1. Center steering wheel spokes.

NOTE: Measure difference in toe measurements with the wheels pointed straight ahead.

2. Check the front toe.

Front toe: 0 ± 2.0 mm (0 ± 0.08 in)

- If adjustment is required, go on to step 3.
- If no adjustment is required, remove alignment equipment.

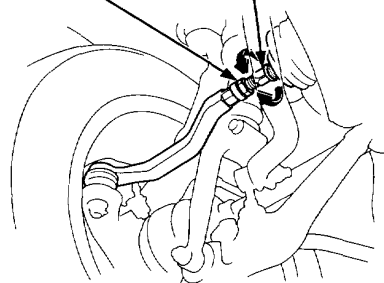
Adjustment

3. Loosen the tie-rod locknuts and turn both tie-rods in the same direction until the front wheels are in straight ahead position.
4. Turn both tie-rods equally until the toe reading on the turning radius gauge is correct.
5. After adjusting, tighten the tie-rod locknuts.

NOTE: Reposition the tie-rod boot if twisted or displaced after adjustment has been made.

TIE-ROD LOCKNUT
14 x 1.5 mm
45 N·m (4.5 kg-m, 33 lb-ft)

TIE-ROD



Wheel Alignment

Rear Toe Inspection/ Adjustment (2WS)

Inspection

1. Release parking brake.

NOTE: If the parking brake is engaged, you may get an incorrect reading.

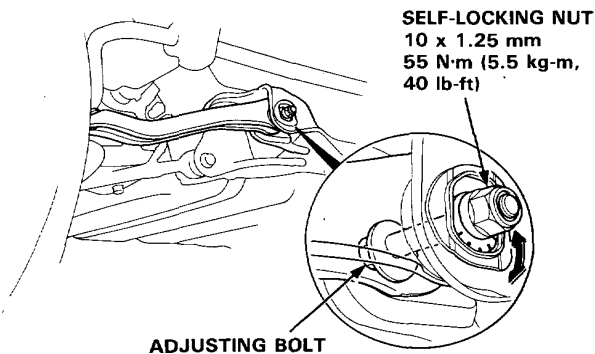
2. Check the rear toe.

Rear toe-in 2.0 ± 2.0 mm (0.08 ± 0.08 in)

- If adjustment is required, go to step 3.
- If no adjustment is required, remove alignment equipment.

Adjustment

3. Hold the adjusting bolt on the rear lower arm A and loosen the locknut.
4. Adjust the rear toe by turning the adjusting bolt until toe is correct.
5. Install a new locknut and tighten while holding the adjusting bolt.



Toe Inspection/Adjustment (4WS) -

Inspection

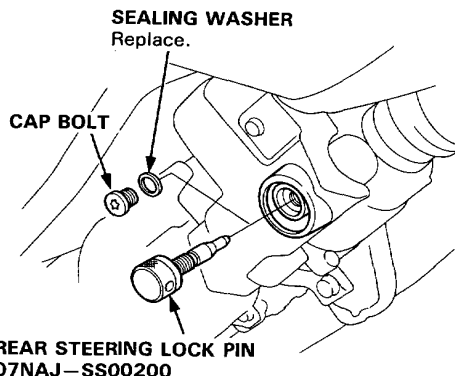
CAUTION: Do not start the engine while installing the lock pin on the rear steering actuator.

NOTE:

- Install the rear steering lock pin on the rear steering actuator while toe inspection and adjustment.
- Keep the front wheels to straight ahead position during inspection and adjustment.

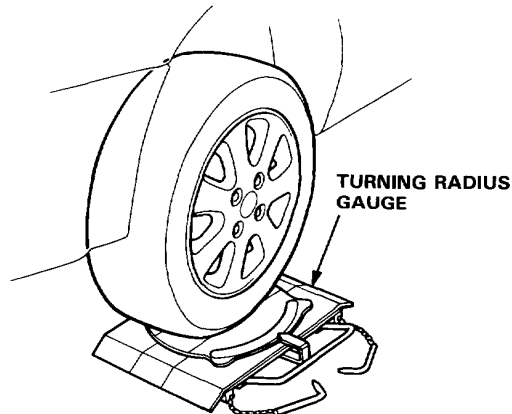
1. Raise the rear of the car and support it with safety stand in proper locations.
2. Remove the cap bolt and sealing washer from the rear steering actuator.
3. Install the rear steering lock pin on the rear steering actuator, and tighten the lock pin securely.

CAUTION: Do not start the engine while installing the lock pin on the rear steering actuator.



4. Set the turning radius gauges beneath the front and rear wheels, then lower the car.

NOTE: Be sure that the car is parallel to the ground with wheels on the turning radius gauges.

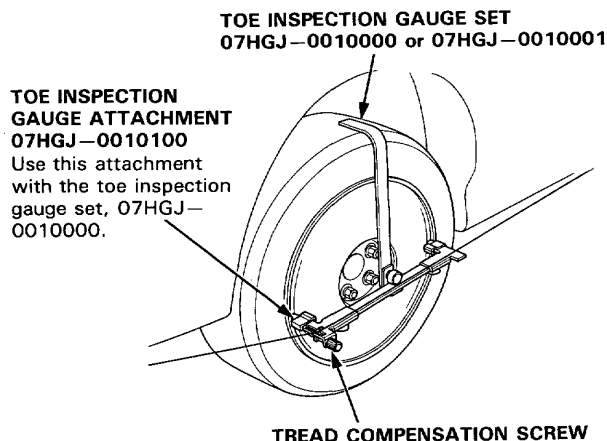




5. Install the toe inspection gauge on each wheel.

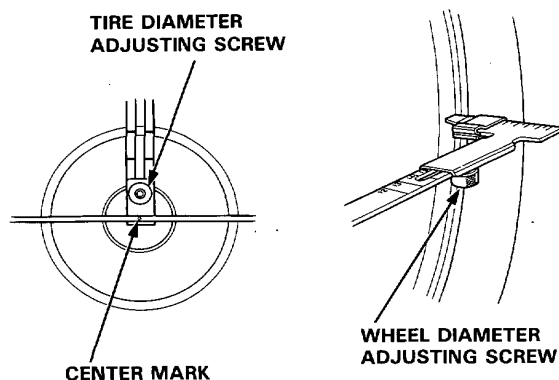
NOTE:

- For aluminum wheel, set the toe inspection gauge attachments on the scales of the toe inspection gauge.
- Position the inspection gauges with its tread compensation screws are facing forward for front wheels, and facing rearward for the rear wheels.



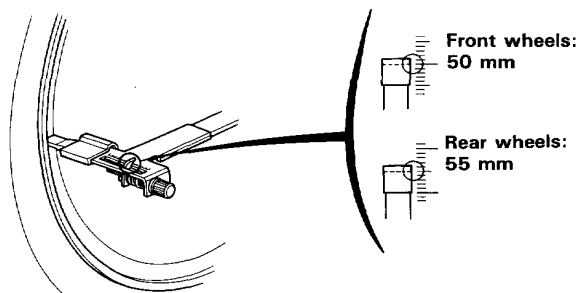
6. Align the center mark of the gauge with the center of the wheel for each wheel, and tighten the tire diameter adjusting screws securely.
7. Align the scales to the side of the rim flange as shown for each wheel, and tighten the wheel diameter adjusting screws securely.

NOTE: Make sure that the toe gauge does not interfere with the balance weight of the wheel.



8. Set the tread compensation scale on the front wheels at 50 mm and on the rear wheel at 55 mm.

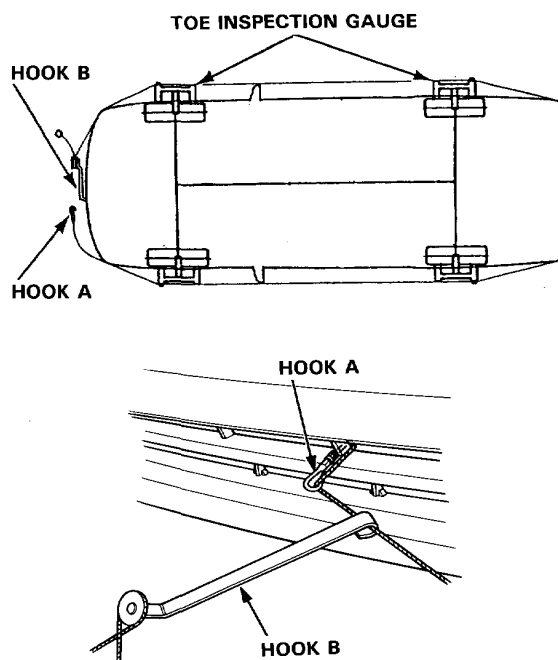
NOTE: Always adjust the tread compensation scales on the rear wheels increases 5 mm from the front wheel side.



9. Route the string around the car as shown, and secure with the hooks including the toe inspection gauge set.

NOTE:

- Make sure that there is no slack in the string.
- Avoid the string contact to the hot parts or sharp edges.



(cont'd)

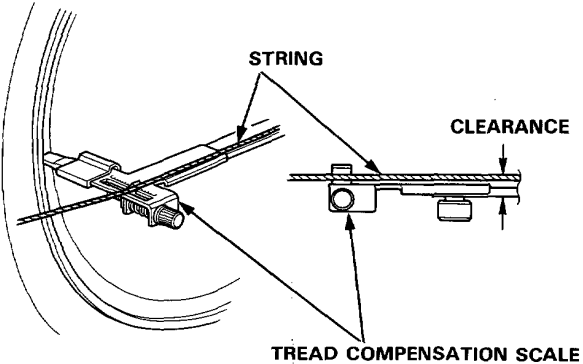
Wheel Alignment

Toe Inspection/ Adjustment (4WS: cont'd)

10. Hook the string on each tread compensation scale.

NOTE:

- Keep a slight clearance between the string and scales of the toe gauge.
- Be sure that the toe gauge is parallel with the ground.

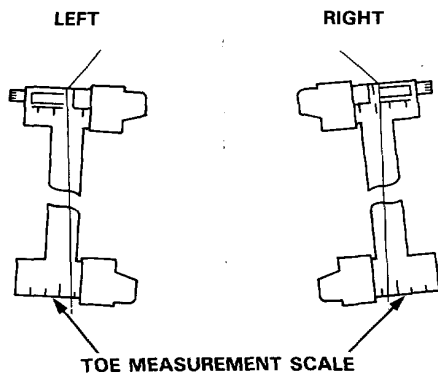


11. Turn the front wheels to straight ahead position.

12. Read the toe measurement scale on each wheels, and inspect their difference between right and left wheels for front and rear side.

NOTE: Measurement varies according to the angle you are looking. Always read the scales at the vertical position.

Difference: 0–0.5 mm (0–0.02 in)



13. If the difference is out of the specification, adjust the toe.

14. If the difference is within the specification, check the toe.

Front toe: 0 ± 2.0 mm (0 ± 0.08 in)

Rear toe-in: 2.0 ± 2.0 mm (0.08 ± 0.08 in)

15. ● If no adjustment is required, remove alignment equipment.
● If adjustment is required, perform the toe adjustment as described below.

Adjustment

NOTE: Make sure that the front encoder are adjusted correctly before toe adjustment. Adjust the front encoder by repositioning the steering wheel if necessary (see page 17-144).

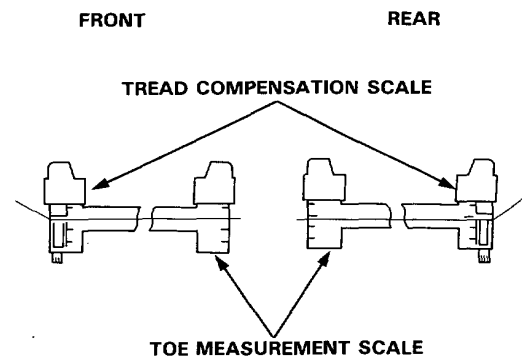
16. Turn the steering wheel to straight ahead position.

NOTE: Keep this position during adjustment.

17. Loosen the tie-rod locknuts.

18. Adjust the toe by turning the tie-rods until the compensation and measurement scales are same reading on each wheel.

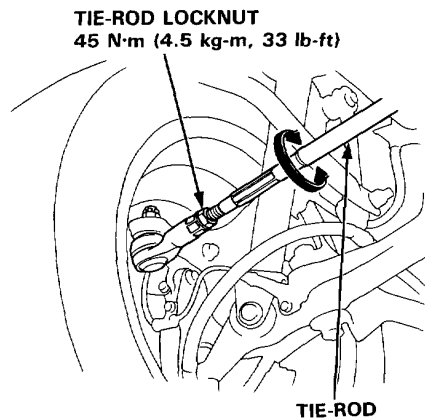
NOTE: The toe is adjusted zero, when the same readings between the compensation and measurement scales.





19. After adjusted the toe is zero, turn the rear wheel tie-rod 60° for each to correct the rear wheel toe-in to 2.0 mm (0.08 in). Then tighten the tie-rod locknut.

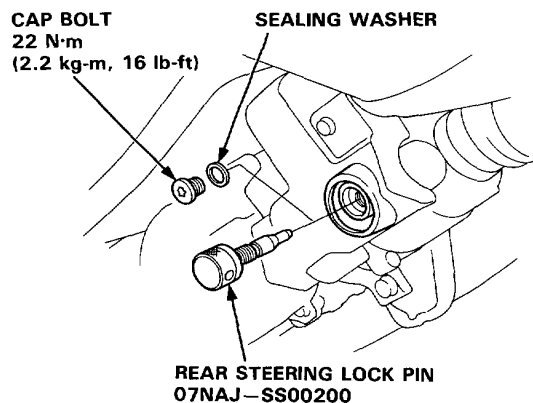
NOTE: The front toe is zero, so this procedure is not necessary.



20. Recheck the difference of measurement between the right and left wheels for the front and rear side.

Difference: 0–0.5 mm (0–0.02 in)

21. If the difference is out of the specification, readjust the toe.
22. Remove the toe inspection gauge from the car.
23. Inspect the 4WS system are adjusted correctly, and adjust the sensors if necessary (see page 17-144).
24. Remove the rear steering lock pin from the rear steering actuator.
25. Install the new sealing washer and the cap bolt, then tighten the cap bolt to specified torque.



Wheel Alignment

Turning Angle Inspection/Adjustment

NOTE: Use commercially available computerized four wheel alignment equipment to measure wheel alignment (i.e. toe, turning angle, camber, and/or caster). Follow the equipment manufacturer's instructions.

1. Jack up the front of the car. Set the turning radius gauges beneath the front wheels, then lower the car.
2. 2WS: Jack up the rear of the car. Place boards that are the same thickness as the turning radius gauges under the rear wheels, then lower the car.
4WS: Jack up the rear of the car. Set the turning radius gauges beneath the rear wheels, then lower the car.

NOTE: For accurate readings, the car must be level.

3. Turn the wheel right and left while applying the brake. Measure the turning angle of both front wheels, and both rear wheels (4WS models).

Front turning angle:

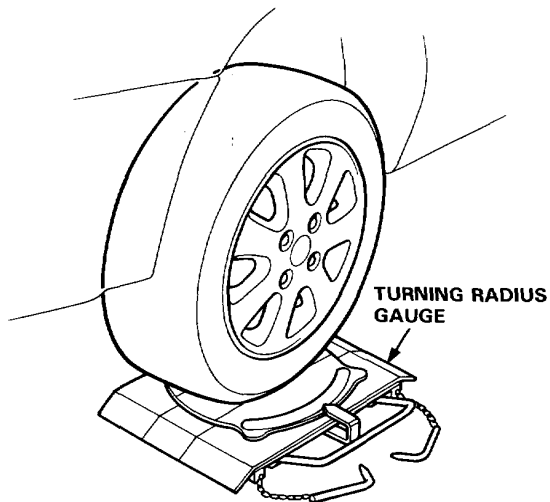
Inward wheel: $36^{\circ}20' \pm 2^{\circ}$

(Outward wheel: $29^{\circ}40'$)

Rear turning angle (4WS):

Inward wheel: $6^{\circ}00' \pm 1^{\circ}$

(Outward wheel: $29^{\circ}40'$)



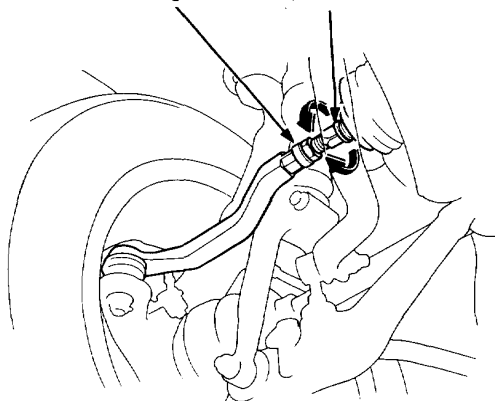
4. If the measurements are not within the specifications, adjust as required by turning the tie-rods.

NOTE: After adjusting, recheck the front wheel toe and readjust if necessary. Reposition the tie-rod boot if twisted or displaced.

TIE-ROD LOCKNUT

14 x 1.5 mm

45 N·m (4.5 kg-m, 33 lb-ft) TIE-ROD



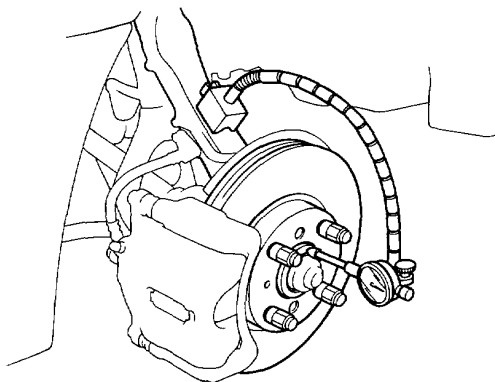
Wheel Measurements



Bearing End Play

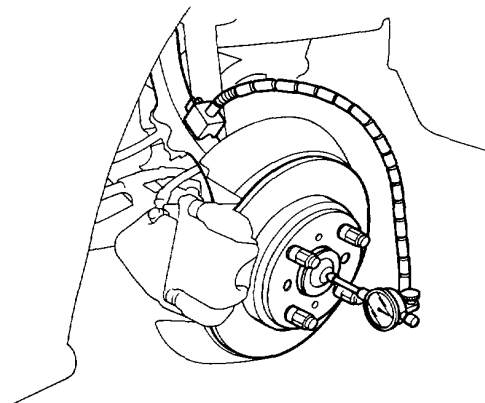
Front Wheel End Play

Standard: 0–0.05 mm (0–0.002 in)



Rear Wheel End Play

Standard: 0–0.05 mm (0–0.002 in)



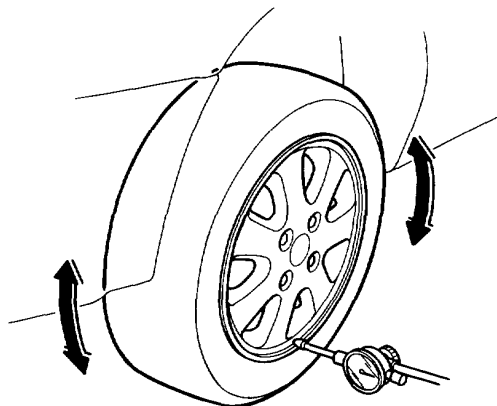
Runout

Front and Rear Wheel Axial Runout

Standard:

Steel Wheel: 0–1.0 mm (0–0.04 in)

Aluminum Wheel: 0–0.7 mm (0–0.03 in)

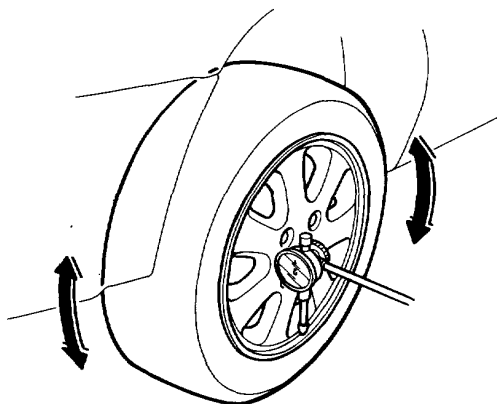


Front and Rear Wheel Radial Runout

Standard:

Steel Wheel: 0–1.0 mm (0–0.04 in)

Aluminum Wheel: 0–0.7 mm (0–0.03 in)



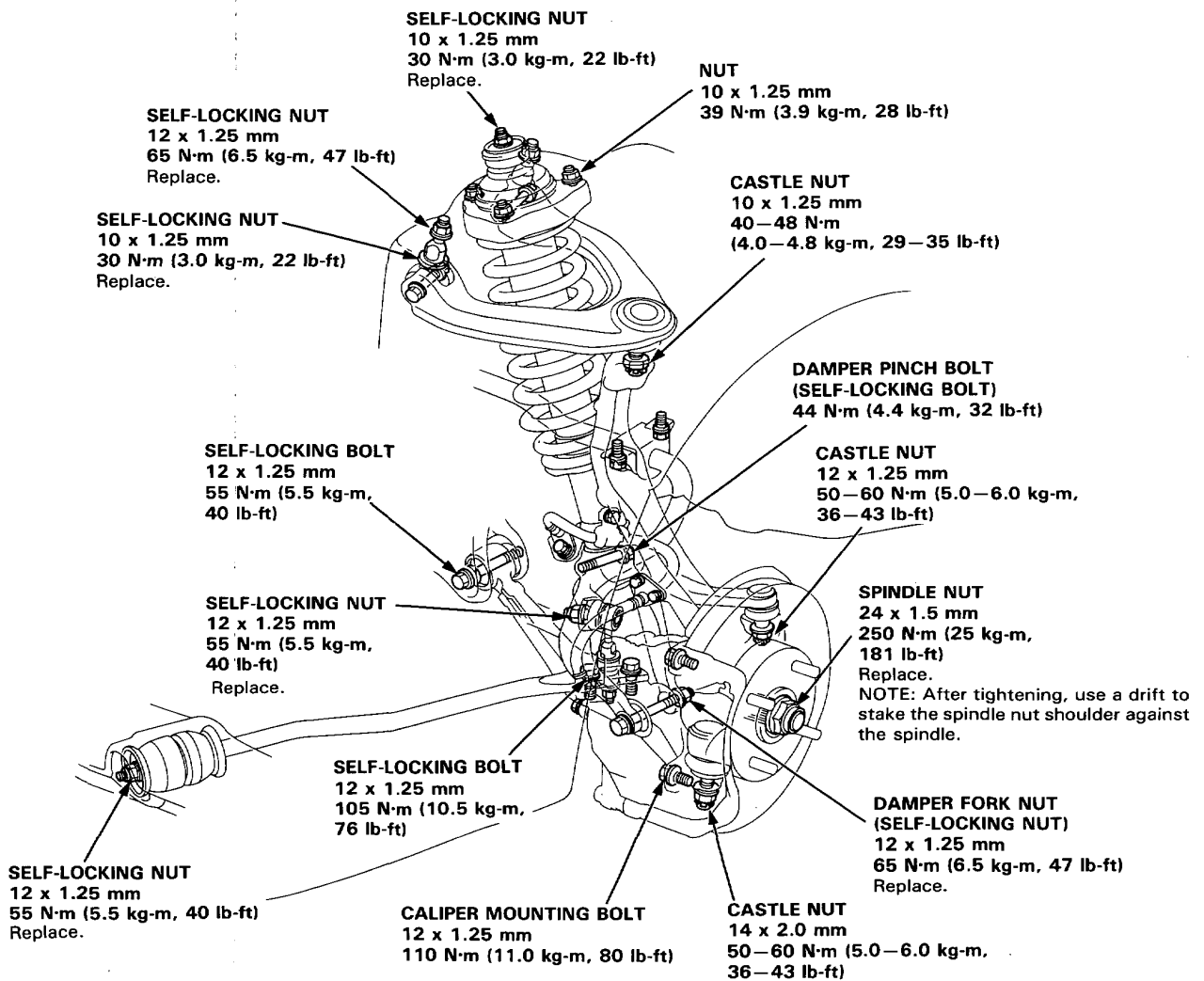
Front Suspension

Torque Specifications

CAUTION:

- Replace the self-locking nuts after removal.
- Replace the self-locking bolts if you can easily thread a non-self-locking nut past their nylon locking inserts. (It should require 1 N·m (0.1 kg-m, 0.7 lb-ft) of torque to turn the nut on the bolt).
- The vehicle should be on the ground before any bolts or nuts connected to rubber mounts or bushing are tightened.
- Torque the castle nut to the lower torque specification, then tighten it only far enough to align the slot with the pin hole. Do not align the nut by loosening.

NOTE: Wipe off the grease before tightening the nut at the ball joint.



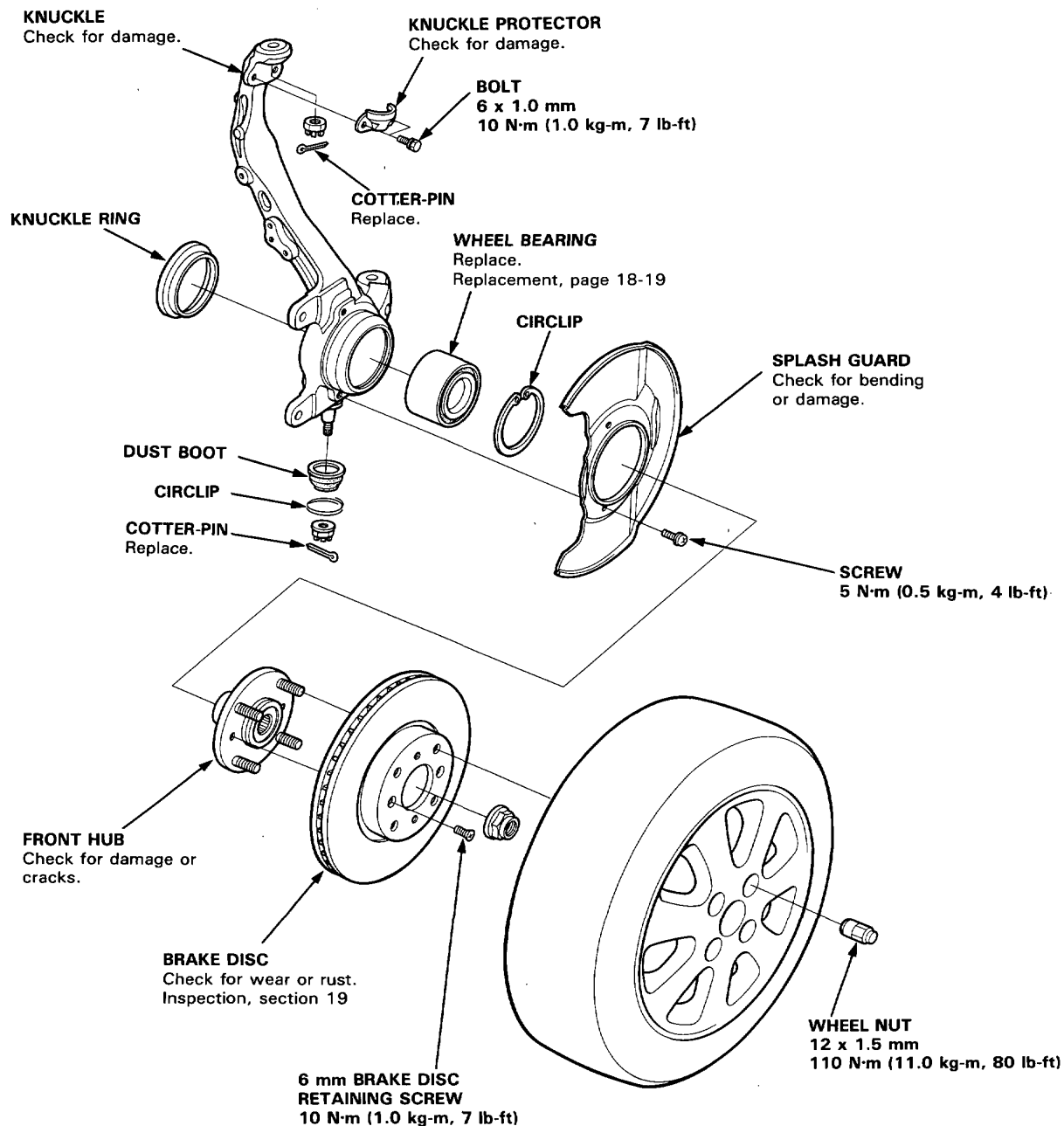


Knuckle/Hub

Illustrated Index

NOTE:

- Use only genuine Honda wheel weights for aluminum wheels. Non-genuine wheel weights may corrode and damage the aluminum wheels.
- Remove the center cap by prying it out with a flat screwdriver. Use a rag at the point you are going to pry because aluminum alloy wheels can be easily damaged. Avoid damage to the cap by not allowing it to fall during removal.
- Before installing the wheel, clean the mating surface of the brake disc and inside of the wheel.
- If the tires has arrow mark on the side wall of the tire, install the wheels with the arrow mark pointing in the direction of rotation. Do not interchange the right and left tires.

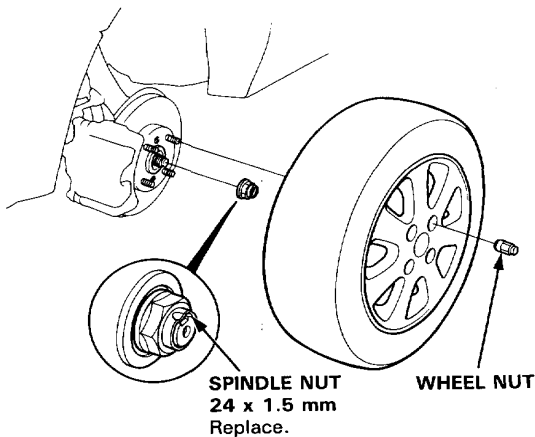


Front Suspension

Knuckle/Hub

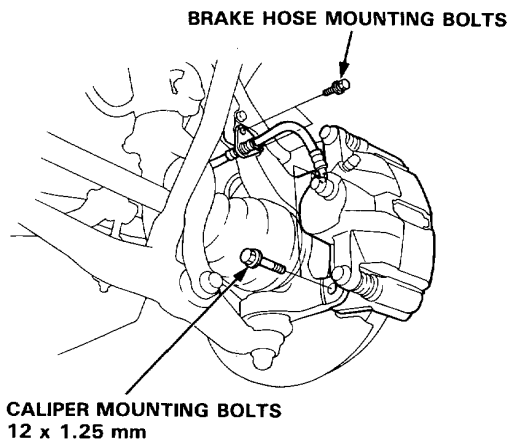
Removal

1. Loosen the wheel nuts slightly.
2. Raise the front of car and support on safety stands in proper locations.
3. Remove the wheel nuts and wheel.
4. Raise the locking tab on the spindle nut, then remove the nut.



5. Remove the mounting bolts for the brake hose bracket.
6. Remove the caliper mounting bolts and hang the caliper assembly to one side.

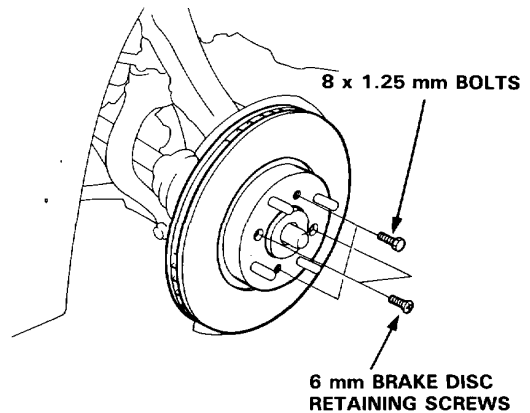
CAUTION: To prevent accidental damage to the caliper assembly or brake hose, use a short piece of wire to hang the caliper assembly from the undercarriage.



7. Remove the 6 mm brake disc retaining screws.
8. Screw two 8 x 1.25 mm bolts into the disc to push it away from the hub.

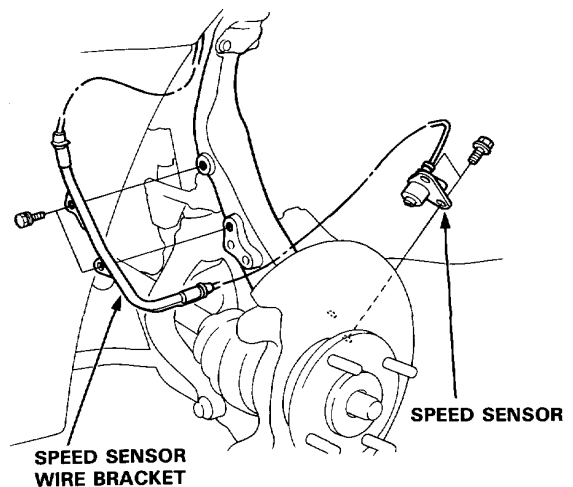
NOTE: Turn each bolt two turns at a time to prevent cocking the disc excessively.

9. Remove the brake disc from the knuckle.



10. Remove the speed sensor wire bracket, then remove the speed sensor from the knuckle.

NOTE: Do not disconnect the speed sensor wire.

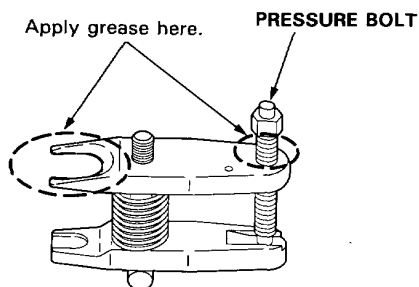




NOTE: Use ball joint removers, to separate the ball joints from the suspension or steering arm.

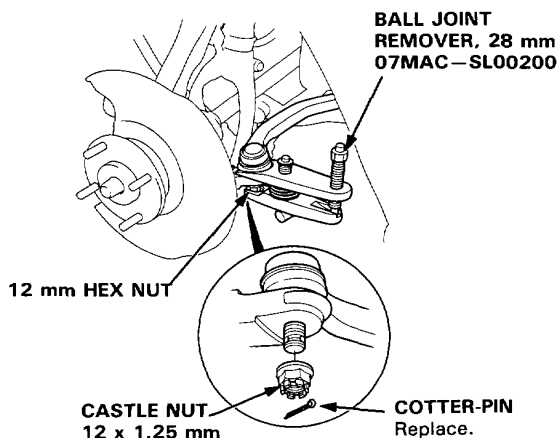
CAUTION: Be careful not to damage the ball joint boot.

11. Clean any dirt or grease off the ball joint.
12. Apply grease to the special tool on the areas shown. This will ease installation of the tool and prevent damage to the pressure bolt threads.

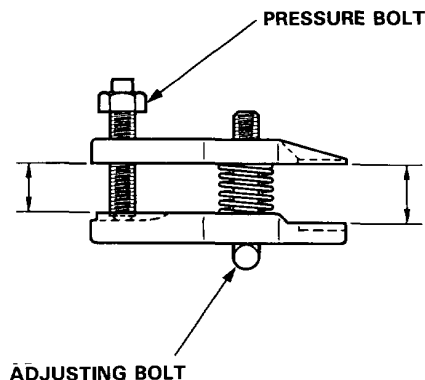


13. Remove the cotter-pin from the steering arm and remove the nut.
14. Install a 12 mm hex nut on the ball joint. Be sure that the hex nut is flush with the ball joint pin end to prevent damage to the threaded end of the ball joint.
15. Use the ball joint remover as shown. Insert the jaws carefully, making sure you do not damage the ball joint boot. Adjust the jaw spacing by turning the pressure bolt.

NOTE: If necessary, apply penetrating type lubricant to loosen the ball joint.



16. Once the tool is in place, turn the adjusting bolt as necessary to make the jaws parallel. Then hand-tighten the pressure bolt and recheck the jaws to make sure they are still parallel.



17. With a wrench, tighten the pressure bolt until the ball joint shaft pops loose from the steering arm.

⚠ WARNING Wear eye protection. The ball joint can break loose suddenly and scatter dirt or other debris in your eyes.

18. Remove the tool, then remove the nut from the end of the ball joint and pull the ball joint out of the steering/suspension arm. Inspect the ball joint boot and replace it if damaged.

(cont'd)

Front Suspension

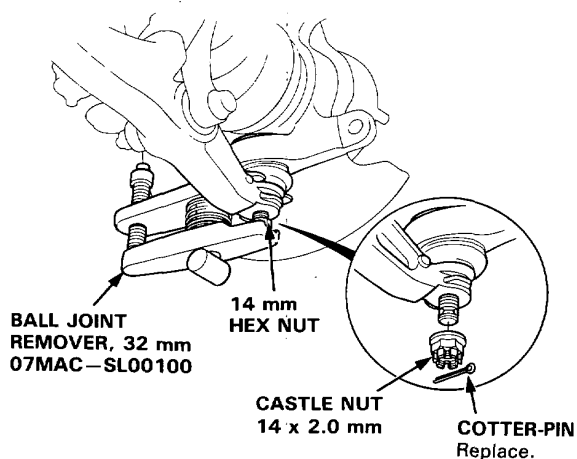
Knuckle/Hub (cont'd)

19 Remove the cotter-pin and lower arm ball joint nut.

20. Install a 14 mm hex nut on the ball joint. Be sure that the hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.

21. Use the ball joint remover as shown on page 18-17 to separate the ball joint and lower arm.

NOTE: If necessary, apply penetrating type lubricant to loosen the ball joint.



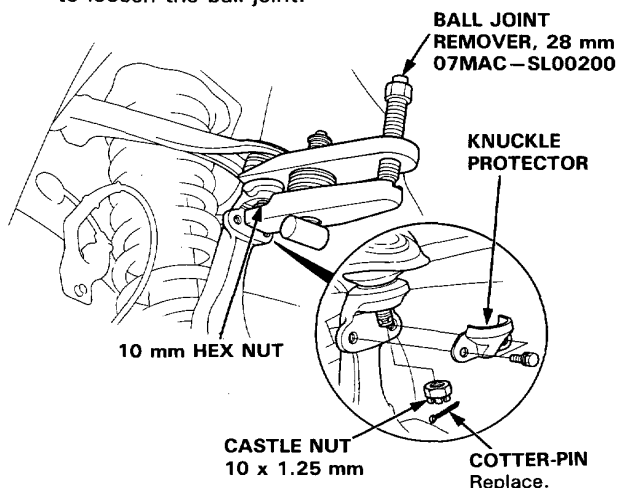
22. Remove the knuckle protector.

23. Remove the cotter-pin and the upper ball joint nut.

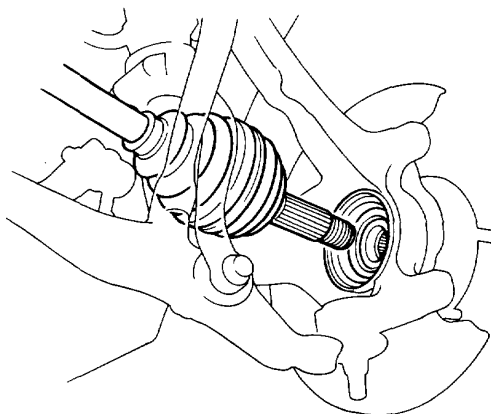
24. Install a 10 mm hex nut on the ball joint. Be sure that the hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.

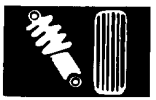
25. Use the ball joint remover as shown on page 18-17 to separate the ball joint and knuckle.

NOTE: If necessary, apply penetrating type lubricant to loosen the ball joint.



26. Pull the knuckle outward and remove the driveshaft outboard joint from the knuckle using a plastic hammer, then remove the knuckle.





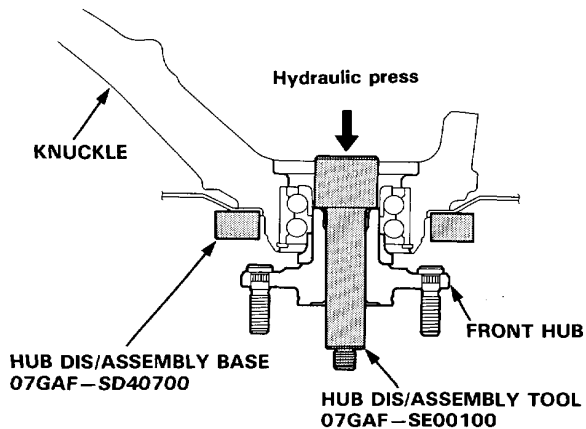
Hub Unit and Wheel Bearing Replacement

NOTE: Replace the bearing with a new one after removal.

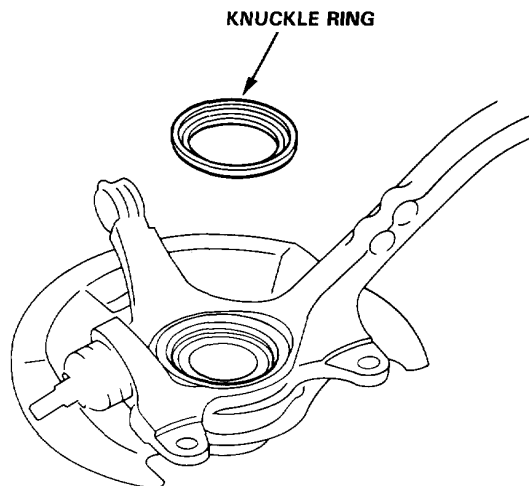
27. Separate the hub from the knuckle using the special tools and a hydraulic press.

CAUTION:

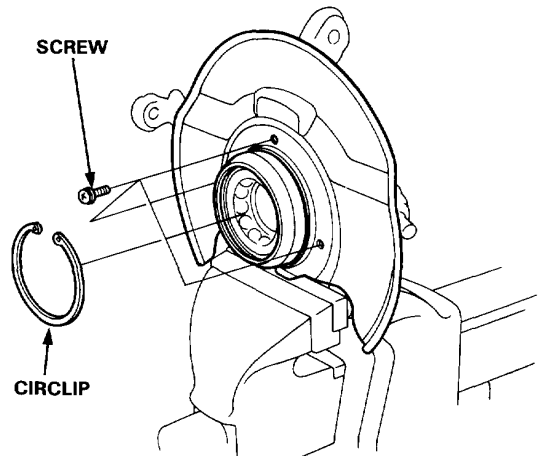
- Take care not to distort the splash guard.
- Hold onto the hub to keep it from falling when pressed clear.



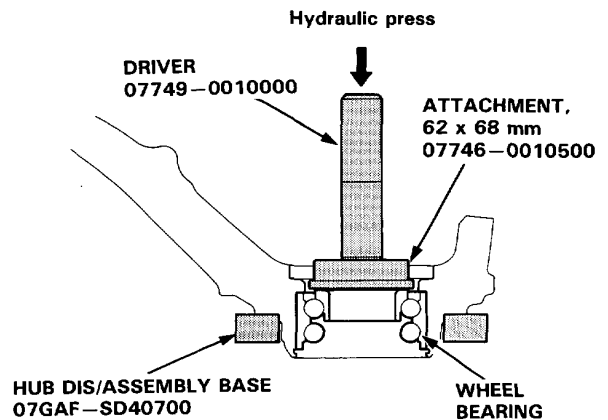
28. Remove the knuckle ring from the knuckle.



29. Remove the circlip and the splash guard from the knuckle.



30. Press the wheel bearing out of the knuckle using a hydraulic press and the special tools shown below.

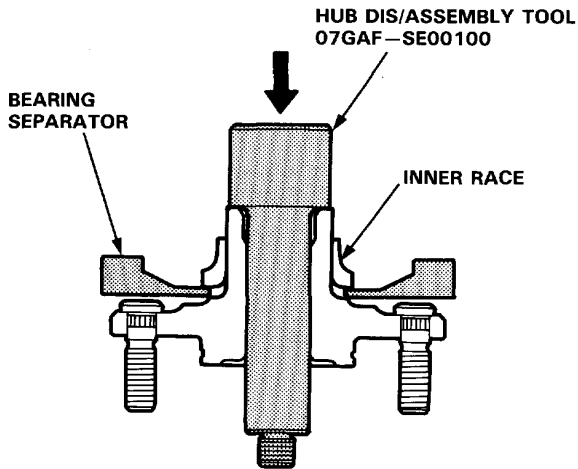


(cont'd)

Front Suspension

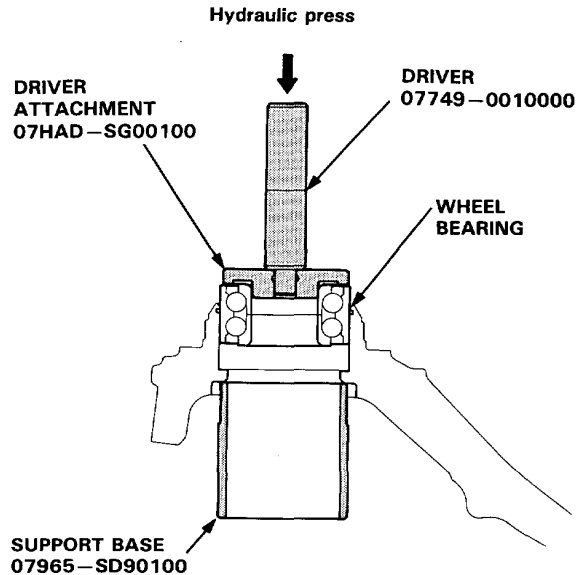
Knuckle/Hub (cont'd)

31. Remove the outboard bearing inner race from the hub using the special tools shown and a commercially available bearing separator.



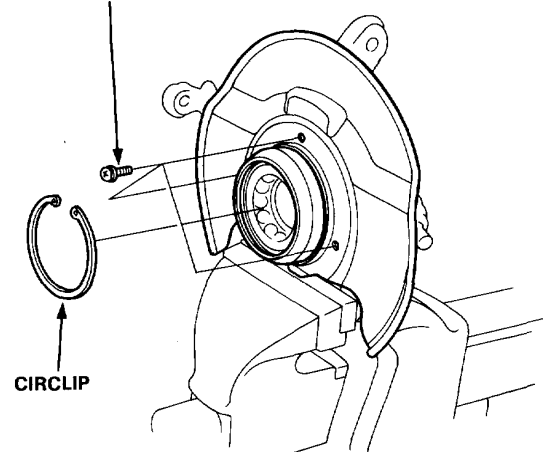
NOTE: Wash the knuckle and hub thoroughly in high flash-point solvent before reassembly.

32. Press a new wheel bearing into the hub using the special tools shown and a hydraulic press.



33. Install the circlip securely in the knuckle groove.
34. Install the splash guard and tighten the screws.

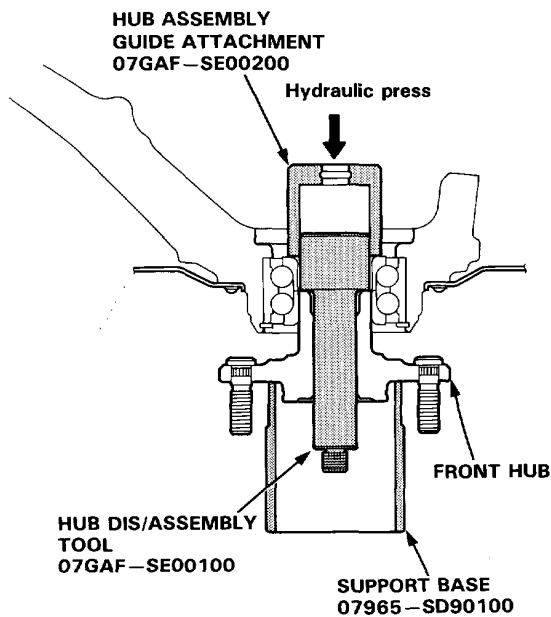
SCREWS
5 N·m (0.5 kg-m, 3.6 lb-ft)



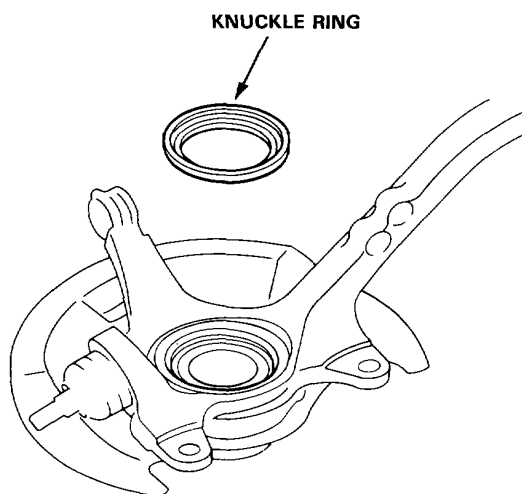


35. Install the hub on the knuckle using the special tools shown and a hydraulic press.

CAUTION: Take care not to distort the splash guard.



36. Install the knuckle ring on the knuckle.



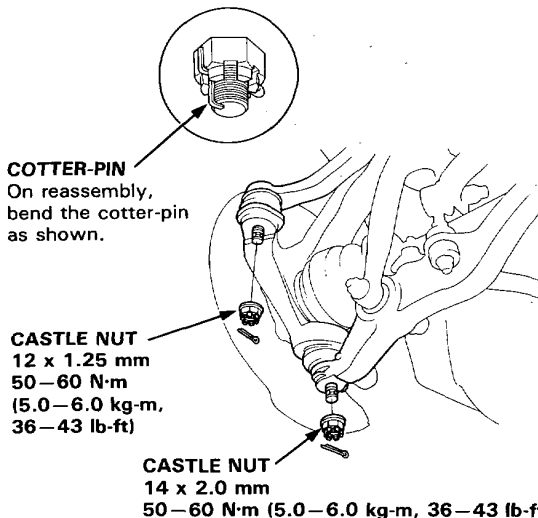
Installation

CAUTION:

- Be careful not to damage the ball joint boot.
- Torque the castle nut to the lower torque specification, then tighten it only far enough to align the slot with the pin hole. Do not align the nut by loosening.

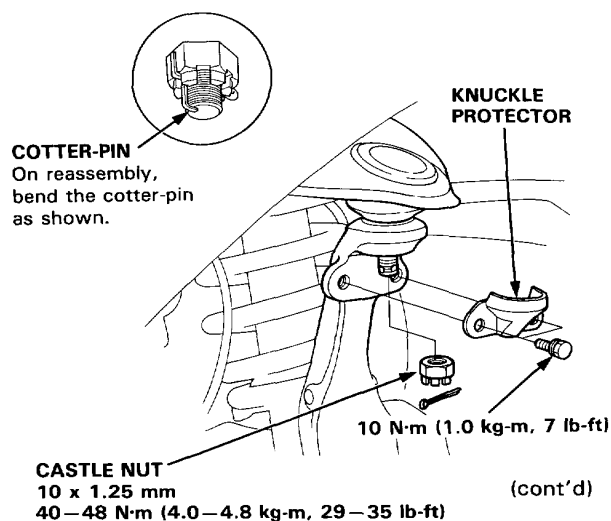
37. Install the knuckle on the driveshaft.

38. Install the knuckle on the lower arm and the tie-rod, then tighten the castle nuts and install new cotter-pins.



39. Install the knuckle on the upper arm, then tighten the castle nut and install a new cotter-pin.

40. Install the knuckle protector with the 6 mm bolt.



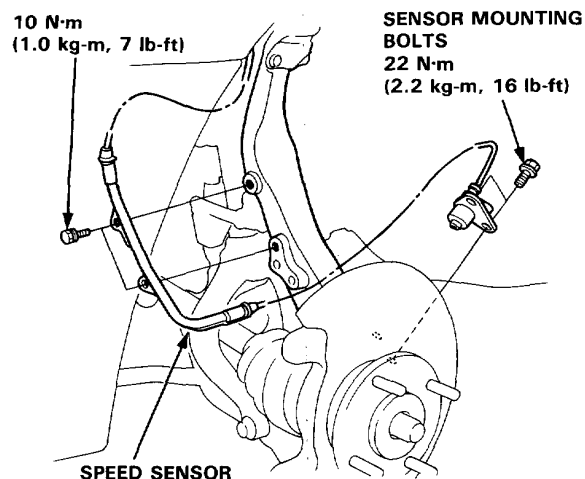
Front Suspension

Knuckle/Hub (cont'd)

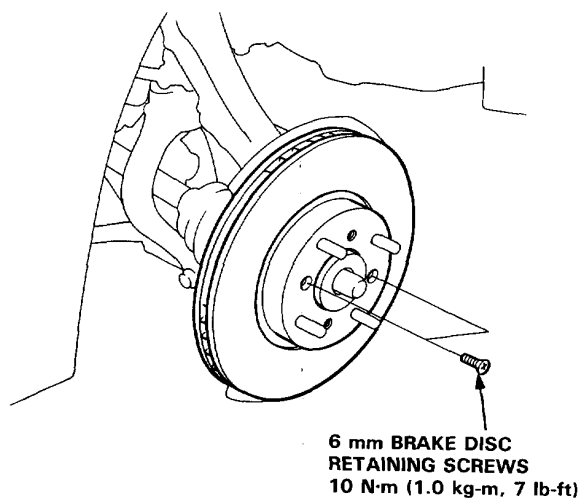
41. Install the speed sensor with the sensor mounting bolts.

NOTE: Be careful when installing the sensors to avoid twisting wires.

42. Install the sensor wire with the two bolts.

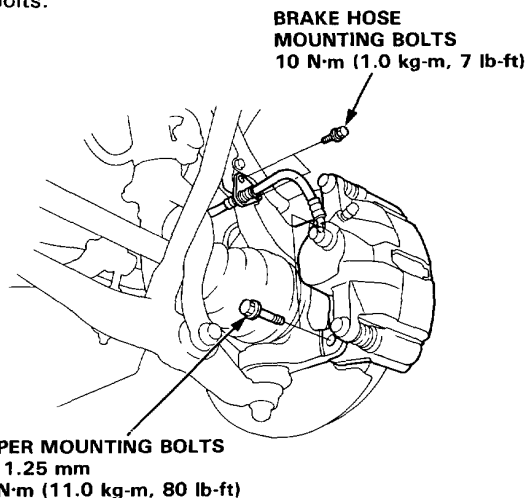


43. Install the brake disc with the 6 mm brake disc retaining screws.



44. Install the brake caliper with the caliper mounting bolts.

45. Install the brake hose with the brake hose mounting bolts.

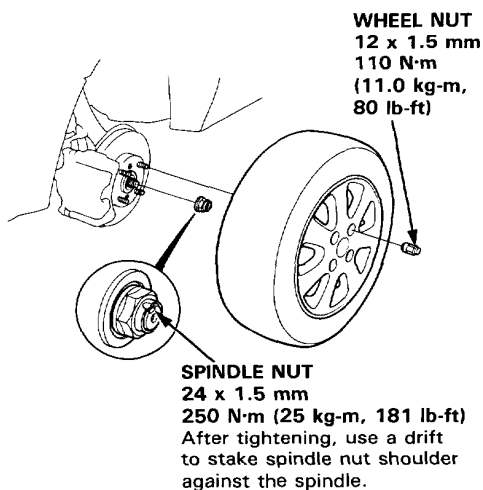


46. Tighten the new spindle nut.

47. Install the wheel with the wheel nuts.

NOTE:

- Before installing the wheel, clean the mating surface of the brake disc and inside of the wheel.
- If the tires has arrow mark on the side wall of the tire, install the wheels with the arrow mark pointing in the direction of rotation. Do not interchange the right and left tires.



48. Check the front wheel alignment and adjust if necessary (see 18-4).

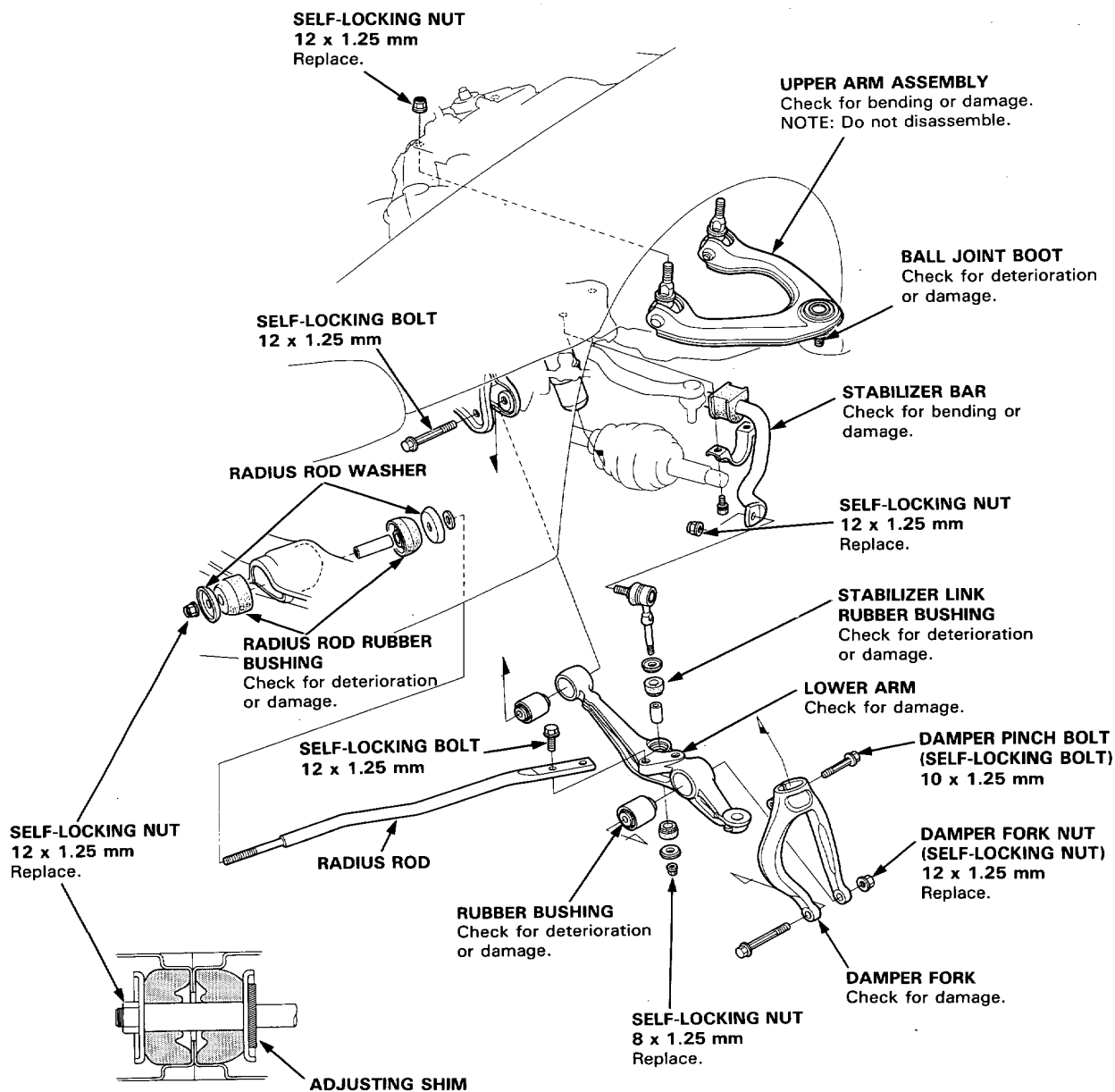


Suspension Arms

Removal/Inspection

CAUTION:

- Replace the self-locking nuts after removal.
- Replace the self-locking bolts if you can easily thread a non-self-locking nut past their nylon locking inserts. (It should require 1 N·m (0.1 kg·m, 0.7 lb·ft) of torque to turn the nut on the bolt).
- Be careful not to damage the ball joint boots.



NOTE: Adjust the caster angle by increasing/decreasing the adjusting shims (page 18-4).

(cont'd)

Front Suspension

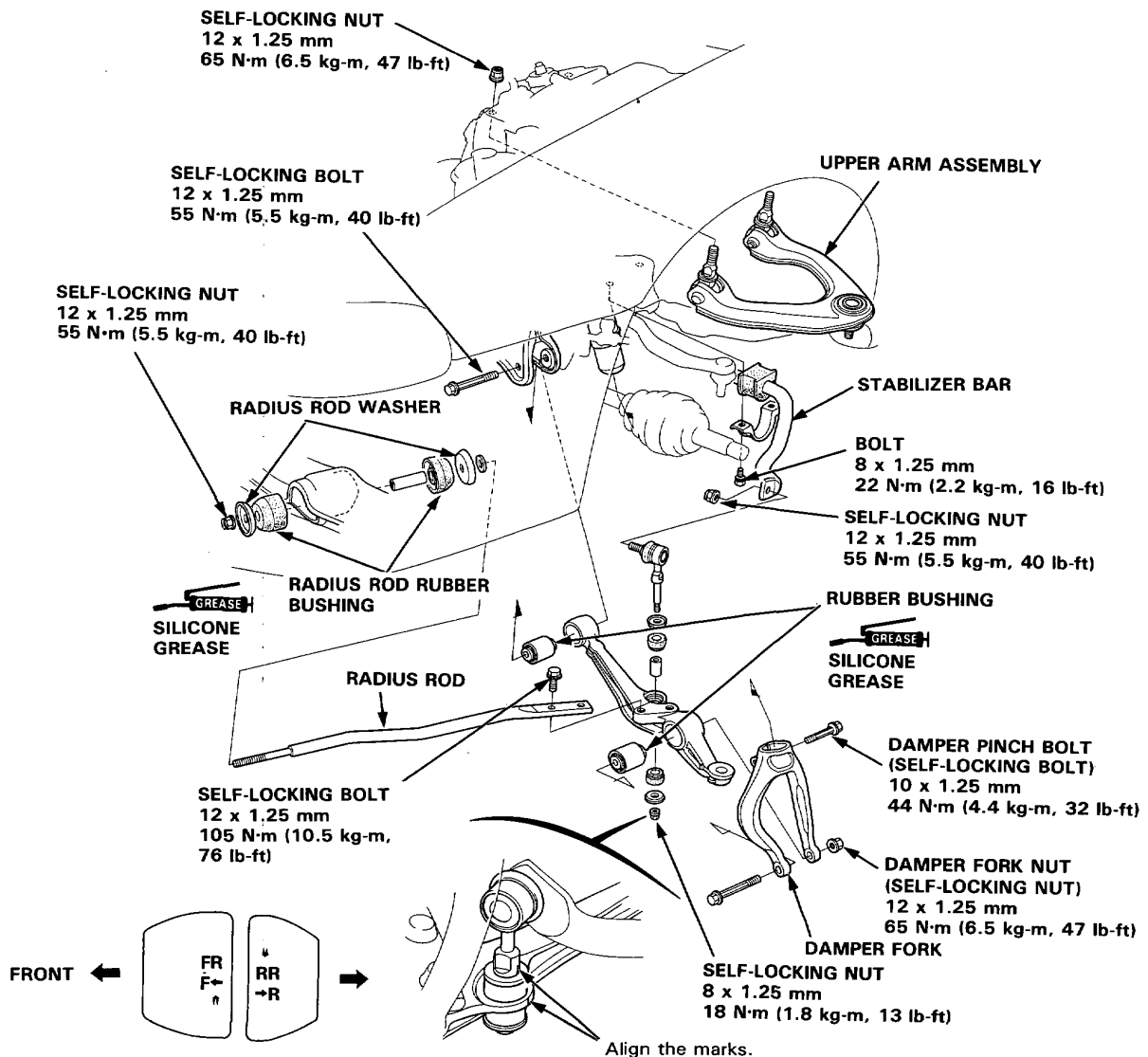
Suspension Arms (cont'd)

Installation

NOTE:

- Wipe off the grease before tightening the nut at the ball joint.
- The right and left damper forks are symmetrical. The left damper fork is marked with "SL" while the right damper fork is marked with "SR". Do not interchange them.
- The right and left upper arms are symmetrical. The left upper arm is marked with "SL" or "SLJ" while the right arm is marked with "SR" or "SRJ". Do not interchange them.
- After installing the suspension arm, check the wheel alignment and adjust if necessary.
- When installing the radius rod washers, the "FR" mark faces the front of the car.

CAUTION: The vehicle should be on the ground before any bolts or nuts connected to rubber mounts or bushing are tightened.



CAUTION: Do not interchange the radius rod rubber bushings.

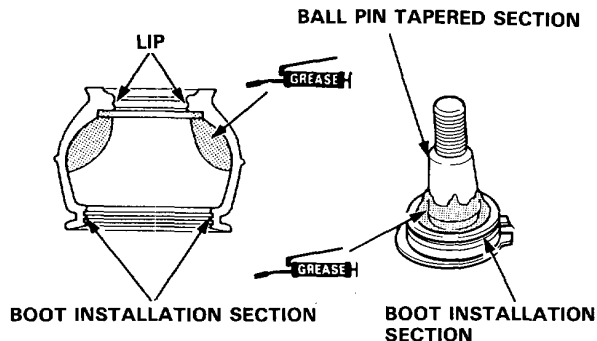


Ball Joint Boot Replacement

1. Remove the circlip and the boot.

CAUTION: Do not contaminate the boot installation section with grease.

2. Pack the interior of the boot and lip with grease.



3. Wipe the grease off the sliding surface of the ball pin and pack with fresh grease.

CAUTION:

- Keep grease off the boot installation section and the tapered section of the ball pin.
- Do not allow dust, dirt, or other foreign materials to enter the boot.

4. Install the boot in the groove of the boot installation section securely, then bleed air.
5. Install the upper and lower ball joint boot clips using the special tools as follows:

Lower ball joint: Adjust the special tool with the adjusting bolt until the end of the tool aligns with the groove on the boot. Slide the clip over the tool and into position.

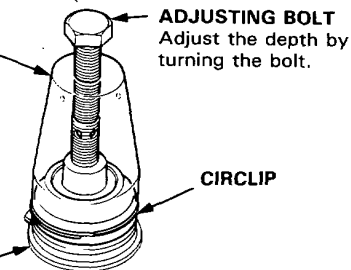
Upper ball joint: Hold the tool over the ball joint, then slide the clip over the tool and into position.

BALL JOINT BOOT CLIP GUIDE

UPPER BALL JOINT BOOT:
07974-SA50800

LOWER BALL JOINT BOOT:
07GAG-SD40700

40 mm CIRCLIP

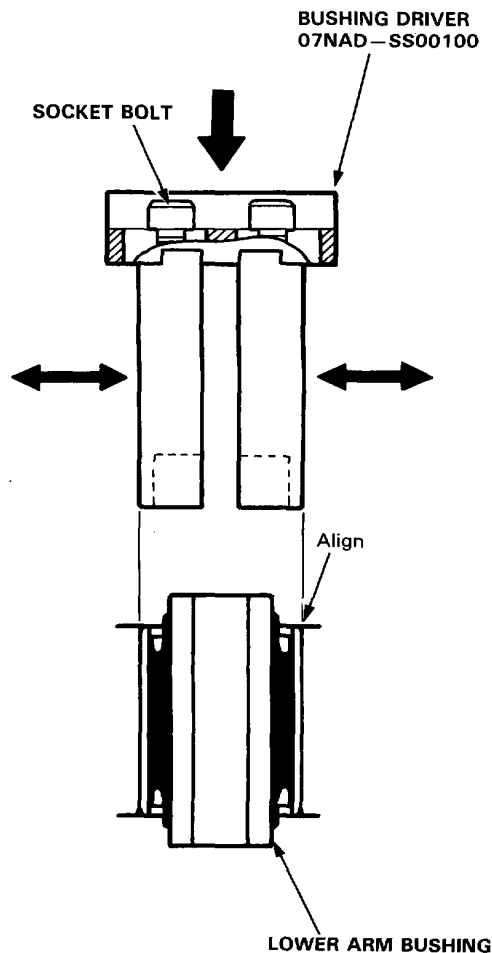


CAUTION: After installing the boot, check the ball pin tapered section for grease contamination and wipe it if necessary.

Lower Arm Bushing Replacement

Adjust the bushing driver so that it matches the outside dimension of the lower arm bushing, then replace the lower arm bushing.

NOTE: When installing the lower arm bushing, press it so that its leading edges are flush with the lower arm.



Front Damper

Removal

1. Remove the brake hose clamp bolts from the damper.
2. Remove the damper pinch bolt.
3. Remove the damper fork bolt and remove the damper fork.

DAMPER PINCH BOLT
(SELF-LOCKING
BOLT)

BRAKE HOSE
CLAMP BOLTS

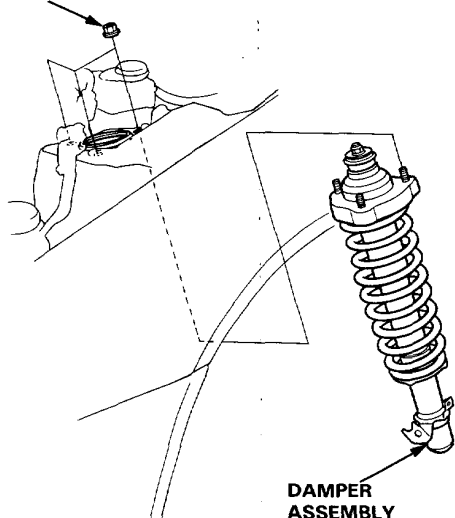
DAMPER FORK

DAMPER FORK NUT
(SELF-LOCKING NUT)
Replace.

DAMPER FORK BOLT

4. Remove the damper by removing the three nuts.

NUT
10 x 1.25 mm



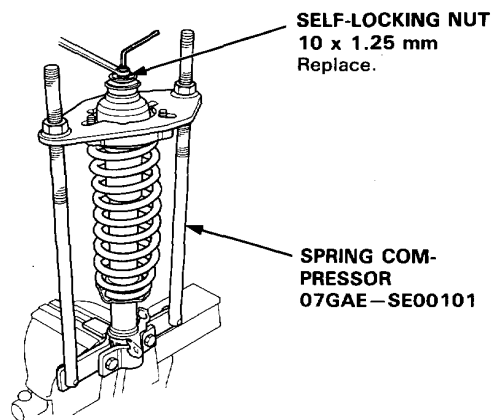
DAMPER
ASSEMBLY

Disassembly/Inspection

Disassembly:

1. Compress the damper spring with the spring compressor according to the manufacturer's instructions, then remove the self-locking nut.

CAUTION: Do not compress the spring more than necessary to remove the nut.



2. Remove the spring compressor then disassemble the damper as shown on the next page.

Inspection:

1. Reassemble all parts, except the spring.
2. Push on the damper assembly as shown.
3. Check for smooth operation through a full stroke, both compression and extension.

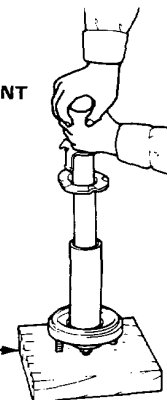
NOTE: The damper should move smoothly. If it does not (no compression or no extension), then gas is leaking, and the damper should be replaced.

NORMAL

NEEDS
REPLACEMENT



WOOD
BLOCK



4. Check for oil leaks, abnormal noises or binding during these tests.



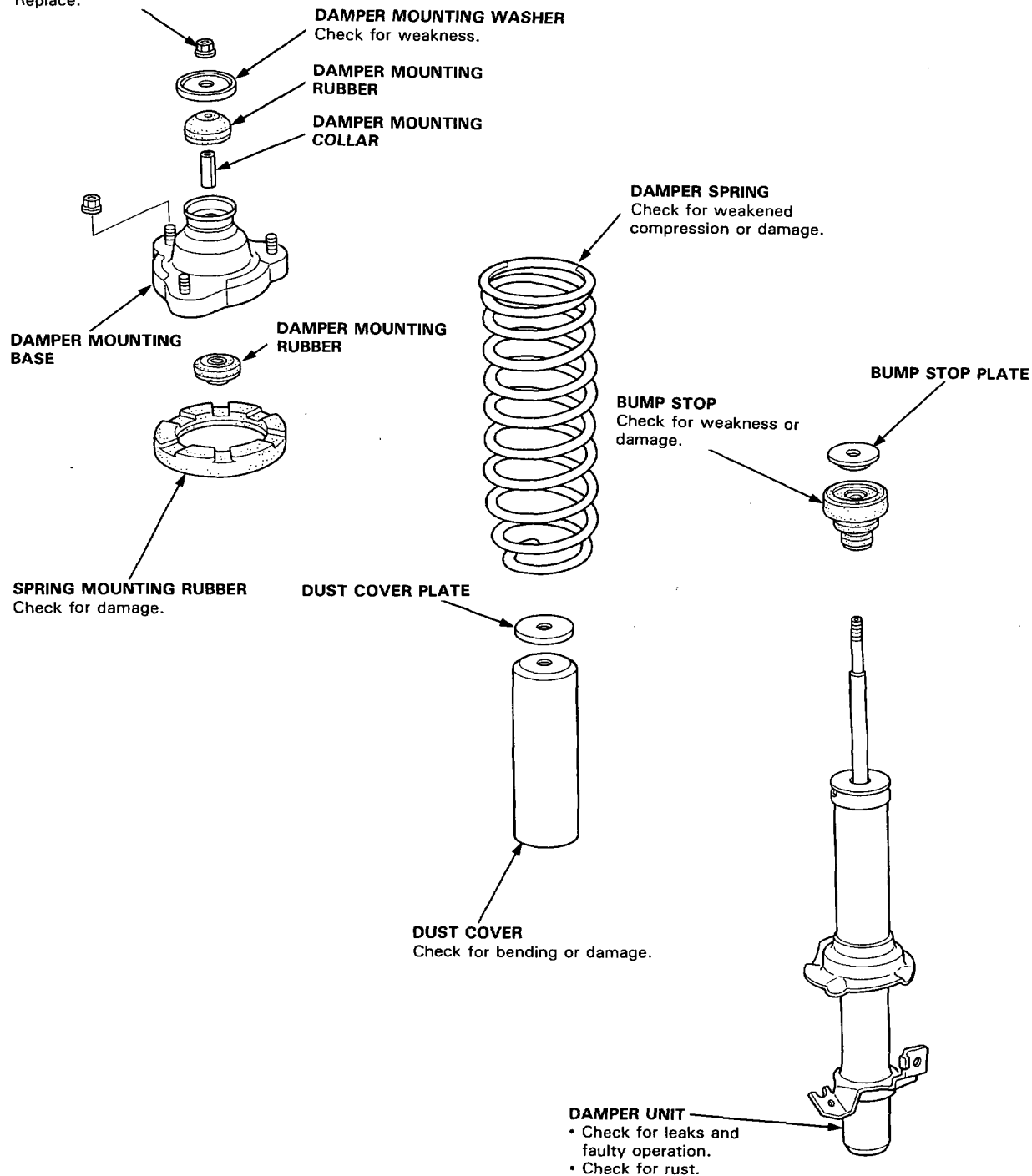
Inspection

SELF-LOCKING NUT

10 x 1.25 mm

30 N·m (3.0 kg-m, 22 lb-ft)

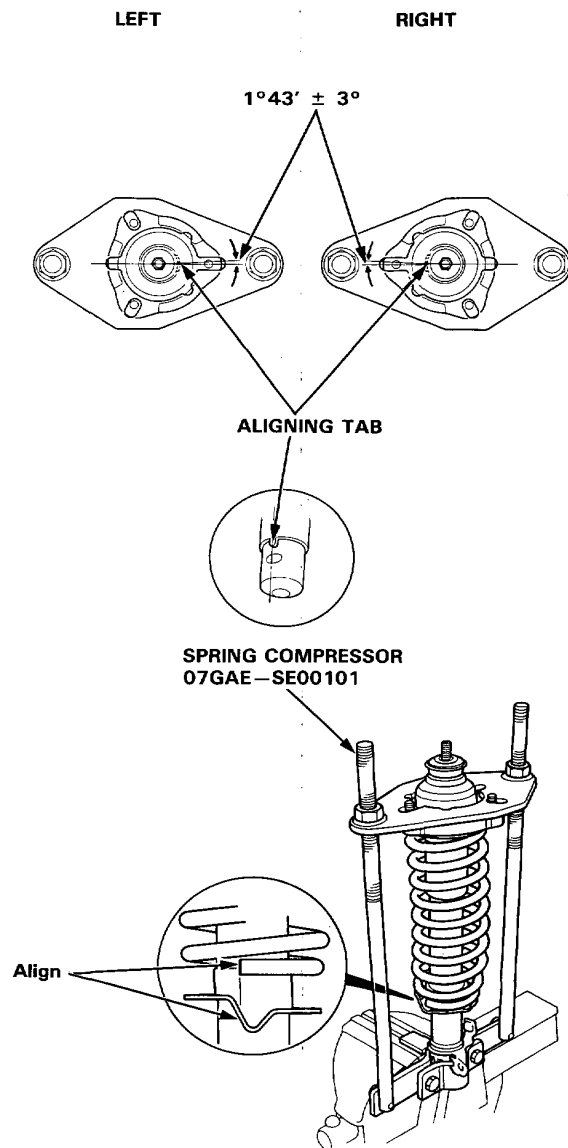
Replace.



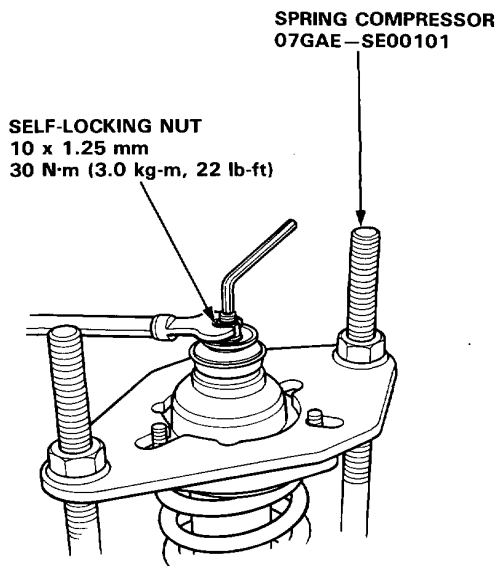
Front Damper

Reassembly

1. Install the damper unit on a spring compressor.
2. Install the damper spring, bump stop, bump stop plate, dust cover, dust cover plate and spring mounting rubber on the damper unit.
3. Reassemble the damper mounting rubbers and damper mounting collar on the damper mounting base.
4. Install the damper mounting base assembly on the damper unit as shown.



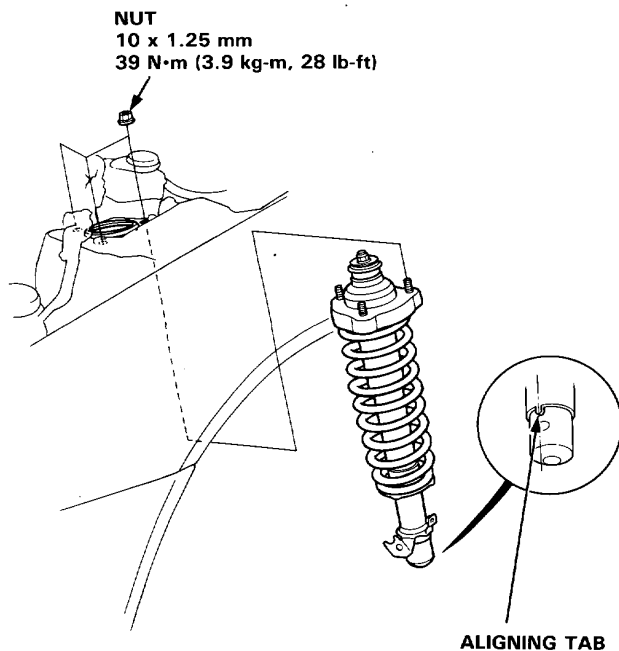
5. Compress the damper spring with the spring compressor.
6. Install the damper mounting washer, then loosely install the new self-locking nut.
7. Hold the damper shaft and tighten the new self-locking nut.





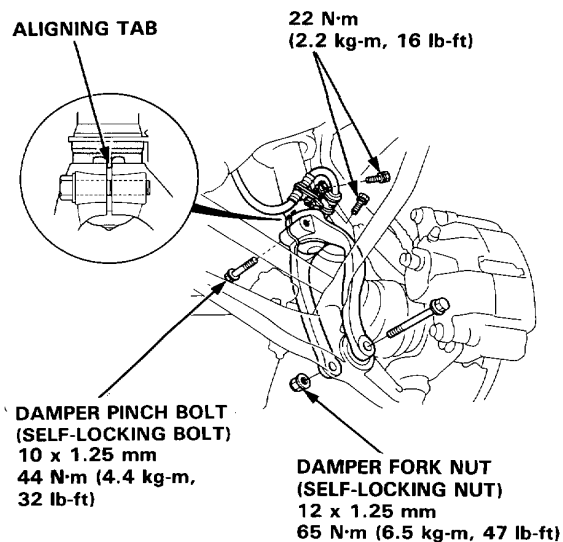
Installation

1. Loosely install the damper on the frame with the aligning tab facing inside.



2. Install the damper fork over the driveshaft and onto the lower arm. Install the damper in the damper fork so the aligning tab is aligned with the slot in the damper fork.
3. Hand-tighten the bolts and nuts.
4. Raise the knuckle with a floor jack until the car just lifts off the safety stand.

NOTE: The bolts and nuts should be tightened with the vehicle's weight on the damper.



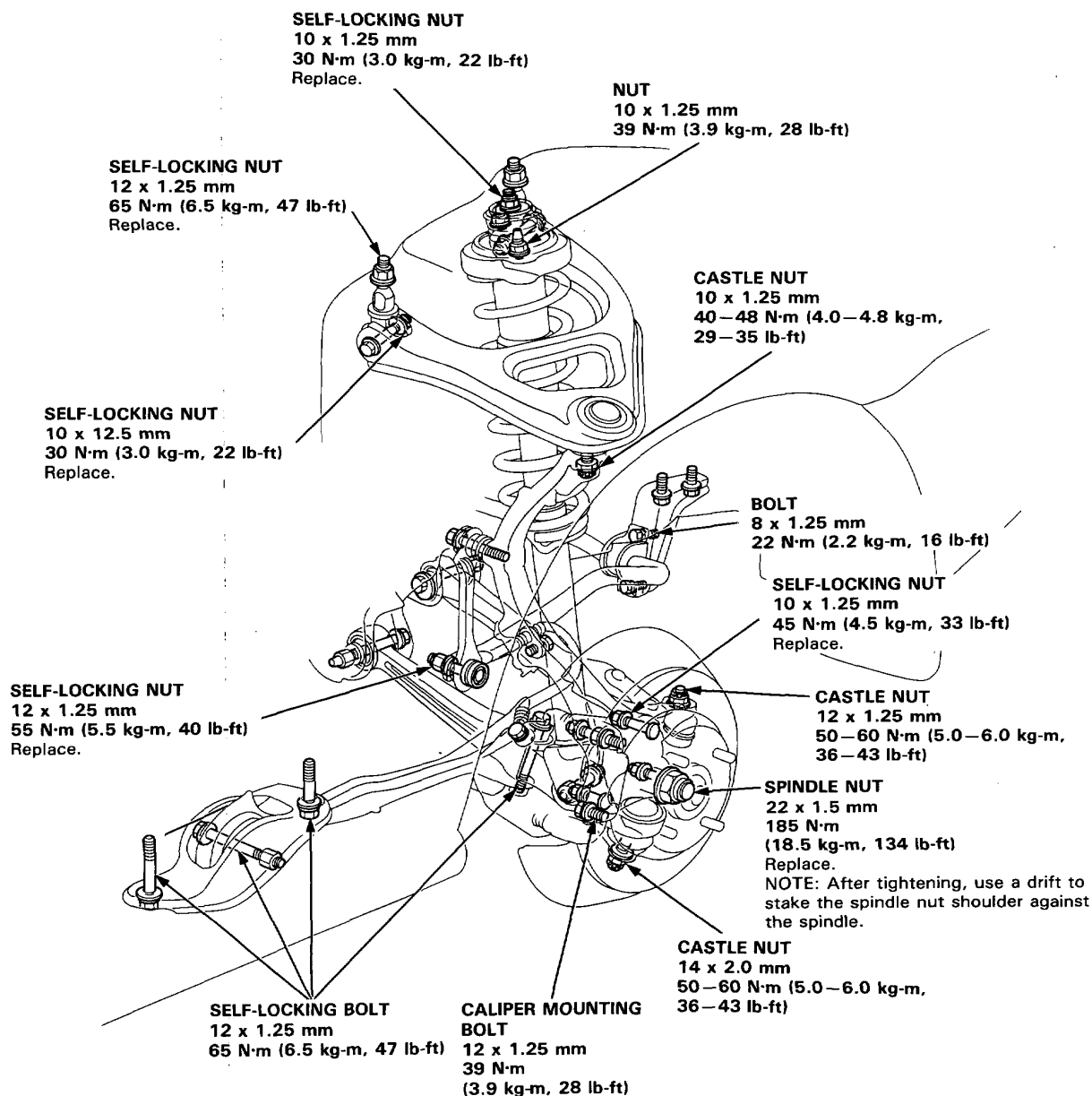
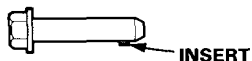
5. Tighten the damper pinch bolt.
6. Secure the damper fork bolt with a new self-locking nut.
7. Secure the damper assembly to the frame with the flange nuts.
8. Install the brake hose clamps with the two bolts.

Rear Suspension

Torque Specifications

CAUTION:

- Replace the self-locking nuts after removal.
- Replace the self-locking bolts if you can easily thread a non-self-locking nut past their nylon locking inserts. (It should require 1 N·m (0.1 kg-m, 0.7 lb-ft) of torque to turn the nut on the bolt).
- The vehicle should be on the ground before any bolts or nuts connected to rubber mounts or bushings are tightened.
- Torque the castle nut to the lower torque specification, then tighten it only far enough to align the slot with the pin hole. Do not align the nut by loosening.



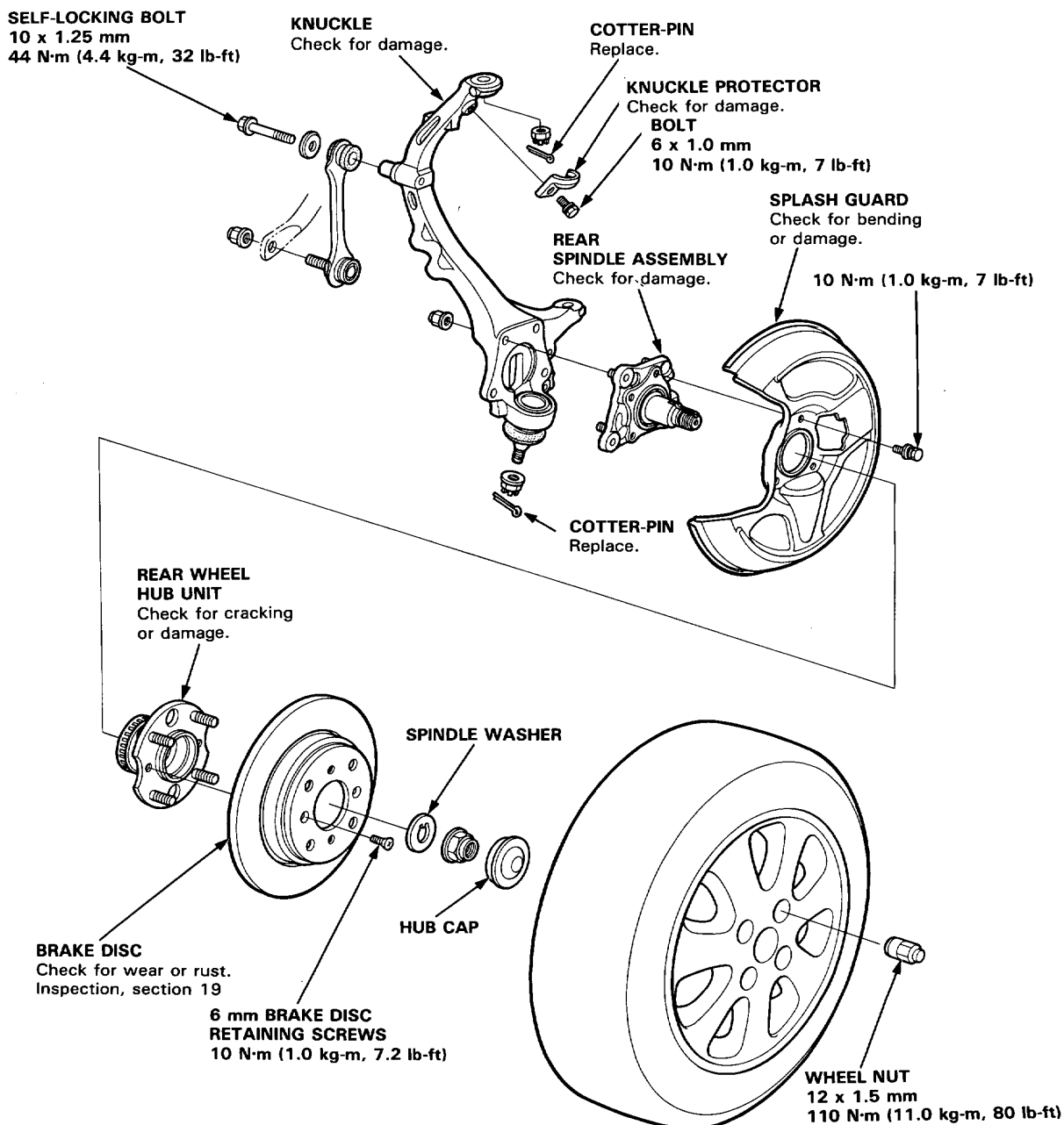


Knuckle/Hub

Illustrated Index

NOTE:

- Use only genuine Honda wheel weights for aluminum wheels. Non-genuine wheel weights may corrode and damage the aluminum wheels.
- Remove the center cap by prying it out with a flat screwdriver. Use a rag at the point you are going to pry because aluminum alloy wheels can be easily damaged. Avoid damage to the cap by not allowing it to fall during removal.
- Before installing the wheel, clean the mating surface of the brake disc and inside of the wheel.
- If the tires has arrow mark on the side wall of the tire, install the wheels with the arrow mark pointing in the direction of rotation. Do not interchange the right and left tires.



Rear Suspension

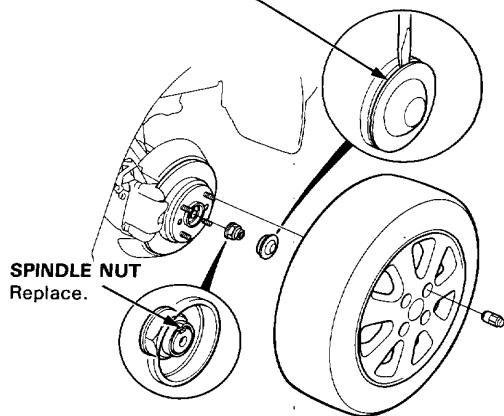
Knuckle/Hub

Removal

1. Raise the rear of car and support it with safety stands in proper locations.
2. Remove the rear wheel.
3. Pull the parking brake lever up.
4. Remove the hub cap, then raise the locking tab on the spindle nut, then remove the nut.

HUB CAP

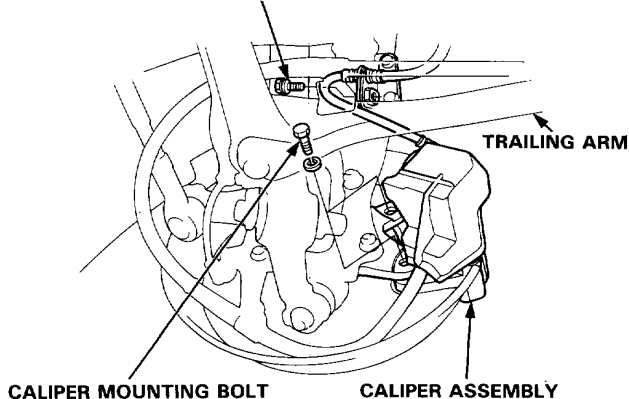
NOTE: Take care not to damage the hub cap and hub unit on disassembly.
Replace the hub cap if it is damaged.



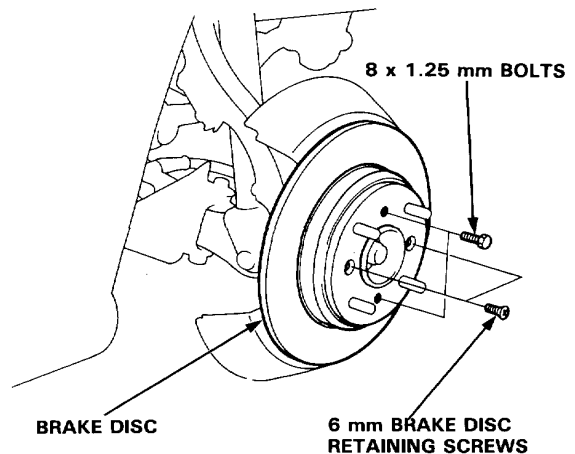
5. Remove the brake hose mounting bolts.
6. Remove the caliper bracket mounting bolts and hang the caliper assembly to one side.

CAUTION: To prevent accidental damage to the caliper assembly or brake hose, use a short piece of wire to hang the caliper assembly from the undercarriage.

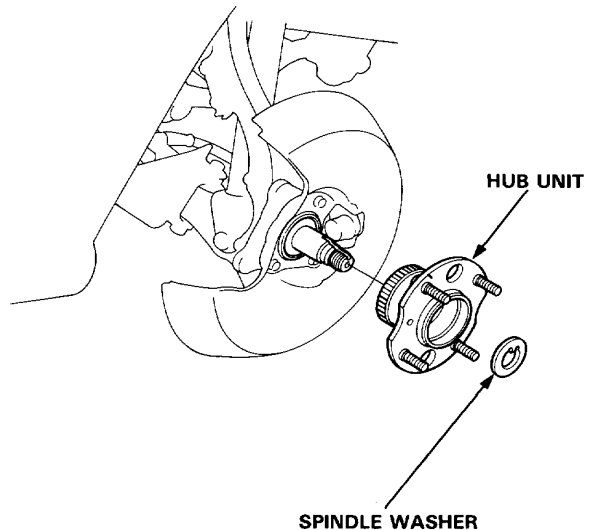
BRAKE HOSE MOUNTING BOLT



7. Remove the 6 mm brake disc retaining screws.
 8. Screw two 8 x 1.25 mm bolts into the disc to push it away from the hub.
- NOTE: Turn each bolt two turns at time to prevent cocking the disc excessively.
9. Remove the brake disc.

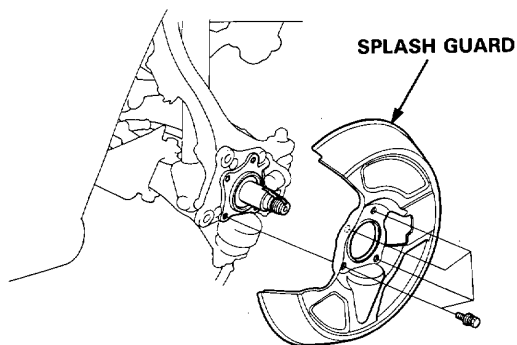


10. Remove the hub unit from the knuckle.



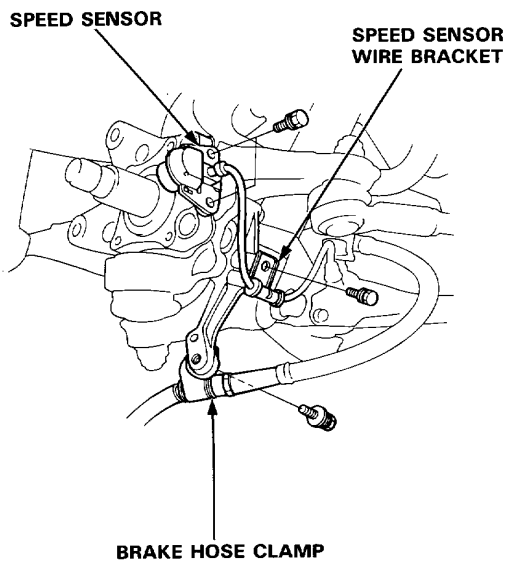


11. Remove the splash guard from the knuckle.

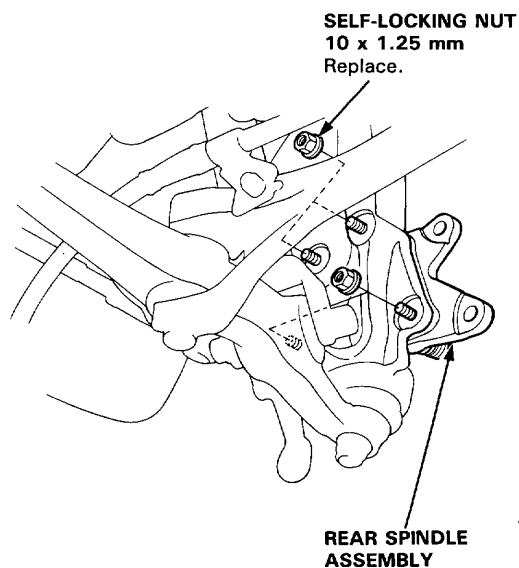


12. Remove the brake hose clamp from the knuckle.
13. Remove the speed sensor wire bracket, then remove the speed sensor from the knuckle.

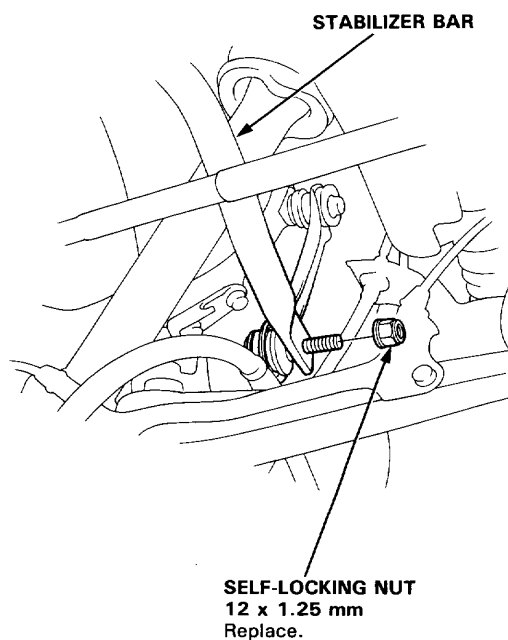
NOTE: Do not disconnect the speed sensor wire.



14. Remove the rear spindle assembly from the knuckle.



15. Disconnect the knuckle from the stabilizer bar.



(cont'd)

Rear Suspension

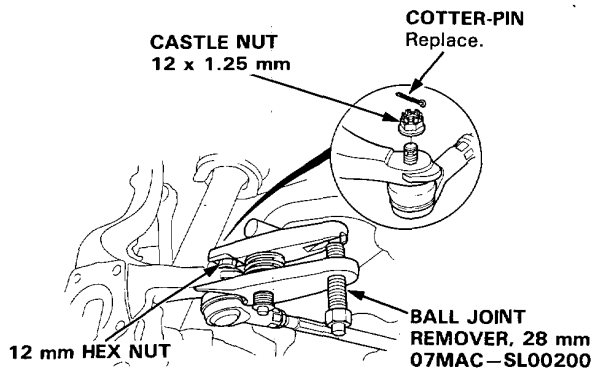
Knuckle/Hub (cont'd)

16. Remove the cotter-pin from the tie-rod end (4WS) or lower arm B (2WS) and remove the nut.

17. Install a 12 mm hex nut on the ball joint. Be sure that the hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.

18. Use the ball joint remover as shown on page 18-17 to separate the ball joint and knuckle.

NOTE: If necessary, apply penetrating type lubricant to loosen the ball joint.

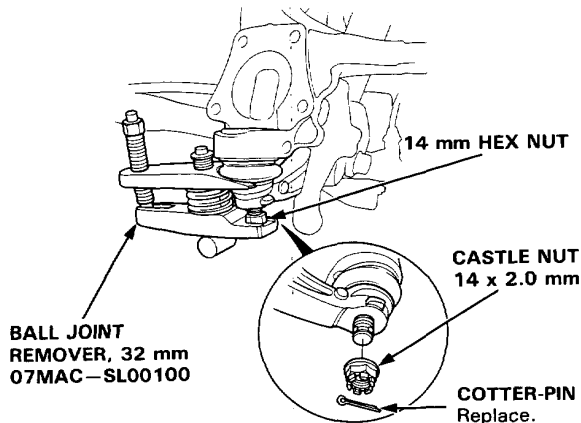


19. Remove the cotter-pin and lower arm ball joint nut.

20. Install a 14 mm hex nut on the ball joint. Be sure that the hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.

21. Use the ball joint remover as shown on page 18-17 to separate the ball joint and lower arm.

NOTE: If necessary, apply penetrating type lubricant to loosen the ball joint.



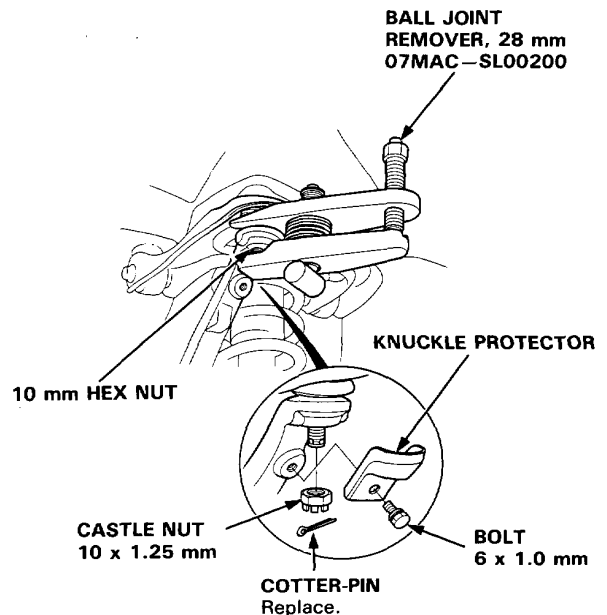
22. Remove the knuckle protector.

23. Remove the cotter-pin and the upper ball joint nut.

24. Install a 10 mm hex nut on the ball joint. Be sure that the hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.

25. Use the ball joint remover as shown on page 18-17 to separate the ball joint and knuckle, then remove the knuckle.

NOTE: If necessary, apply penetrating type lubricant to loosen the ball joint.





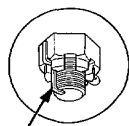
Installation

26. Connect the lower arm, lower arm B (2WS) or tie-rod end (4WS) and upper arm with the knuckle, then tighten the castle nuts.

27. Install the new cotter-pins.

28. Install the knuckle protector with the bolt.

29. Connect the knuckle and the stabilizer bar, then tighten the new self-locking nut.



COTTER-PIN

On reassembly, bend the cotter-pin as shown.

SELF-LOCKING NUT

12 x 1.25 mm
55 N·m (5.5 kg-m, 40 lb-ft)

CASTLE NUT

14 x 2.0 mm
50–60 N·m (5.0–6.0 kg-m,
36–43 lb-ft)

COTTER-PIN

CASTLE NUT

10 x 1.25 mm
40–48 N·m (4.0–4.8 kg-m,
29–35 lb-ft)

COTTER-PINS

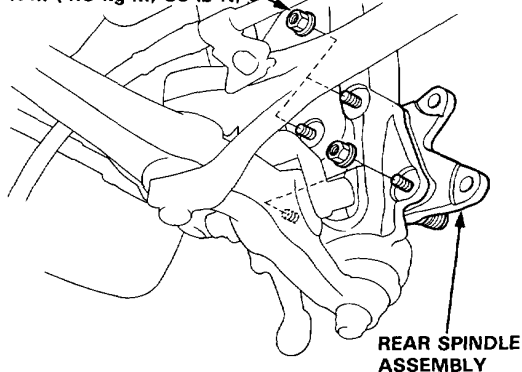
CASTLE NUT

12 x 1.25 mm
50–60 N·m (5.0–6.0 kg-m,
36–43 lb-ft)

30. Install the rear spindle assembly on the knuckle, then tighten the new self-locking nuts.

SELF-LOCKING NUT

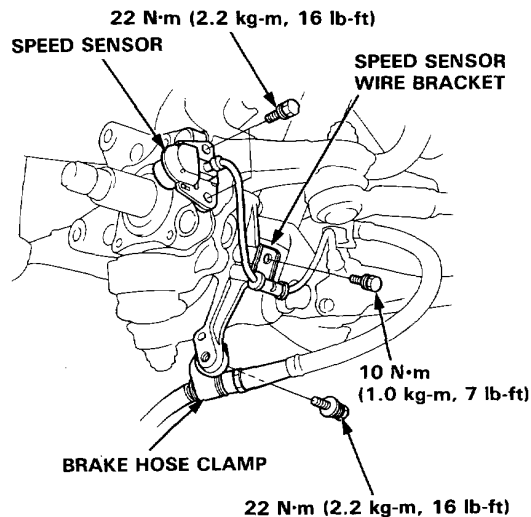
10 x 1.25 mm
45 N·m (4.5 kg-m, 33 lb-ft)



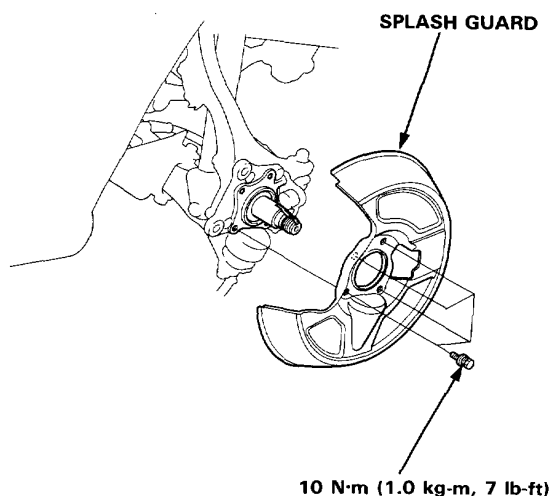
REAR SPINDLE ASSEMBLY

31. Install the speed sensor, speed sensor wire bracket and brake hose clamp on the knuckle.

NOTE: Be careful when installing the sensor to avoid twisting the wire.



32. Install the splash guard with the bolts.

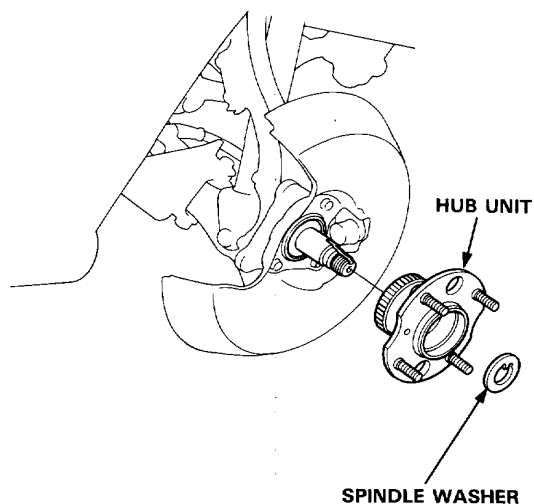


(cont'd)

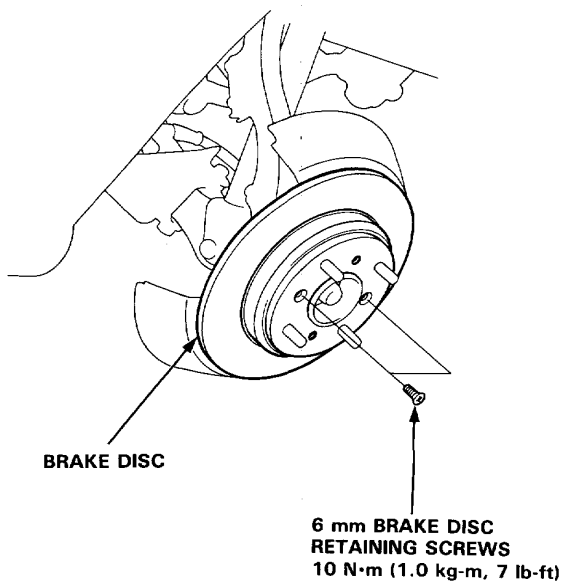
Rear Suspension

Knuckle/Hub (cont'd)

33. Install the hub unit and spindle washer on the knuckle.



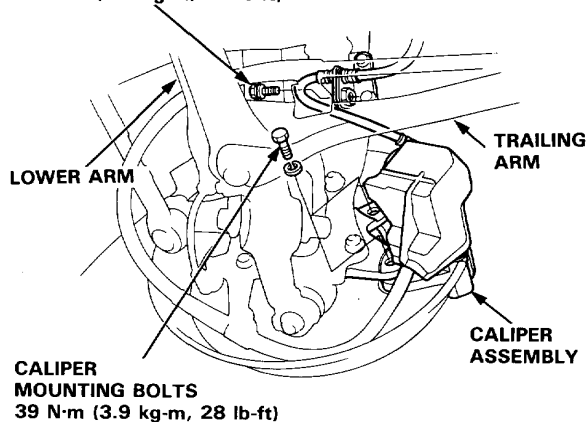
34. Install the brake disc with the 6 mm brake disc retaining screws.



35. Install the caliper assembly with the caliper mounting bolts.

36. Install the brake hose with the brake hose mounting bolts.

BRAKE HOSE MOUNTING BOLT
22 N·m (2.2 kg-m, 16 lb-ft)



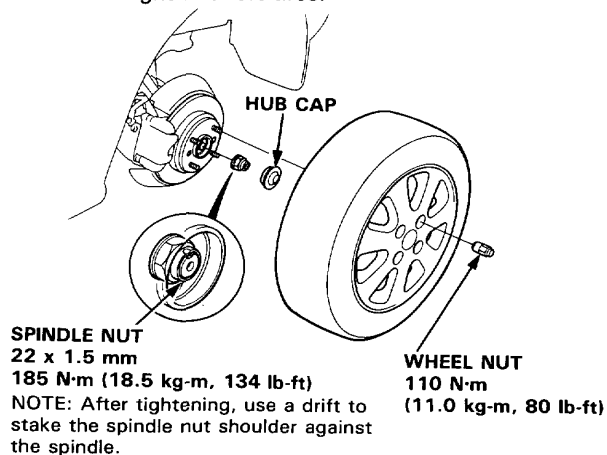
37. Install the new spindle nut, then tighten the nut.

38. Install the hub cap.

39. Install the wheel with the wheel nuts.

NOTE:

- Before installing the wheel, clean the mating surface of the brake disc and inside of the wheel.
- If the tires has arrow mark on the side wall of the tire, install the wheels with the arrow mark pointing in the direction of rotation. Do not interchange the right and left tires.



40. Check the rear wheel alignment and adjust if necessary (see page 18-4).

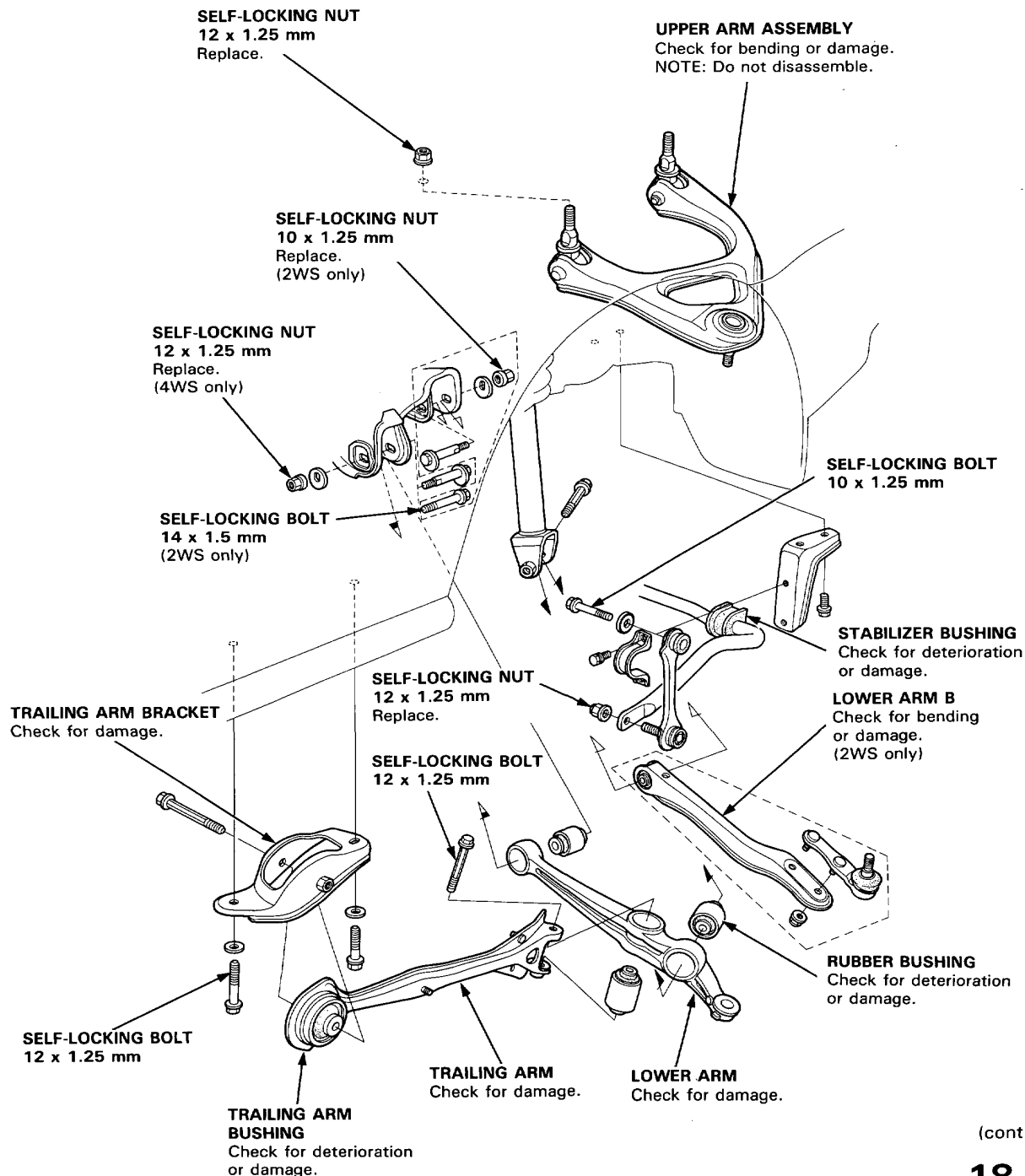


Suspension Arms

Removal/Inspection

CAUTION:

- Replace the self-locking nuts after removal.
- Replace the self-locking bolts if you can easily thread a non-self-locking nut past their nylon locking inserts. (It should require 1 N·m (0.1 kg-m, 0.7 lb-ft) of torque to turn the nut on the bolt).
- Be careful not to damage the ball joint boots.



(cont'd)

Rear Suspension

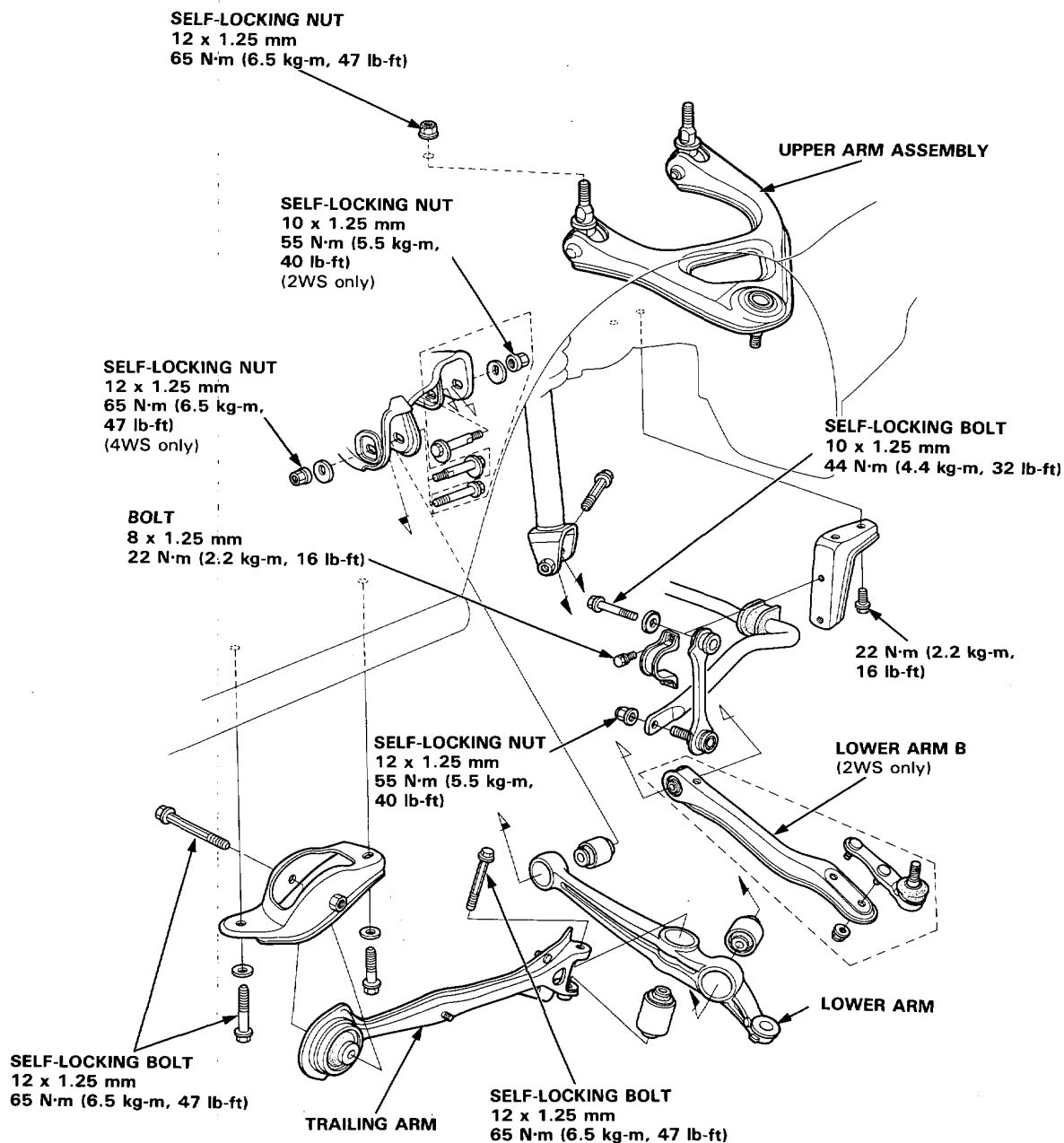
Suspension Arms (cont'd)

Installation

NOTE:

- Wipe off the grease before tightening the nut at the ball joint.
- The right lower arm B is identified by white paint.
- The right and left upper arms are symmetrical. The left upper arm is marked with "L" while the right arm is marked with "R". Do not interchange them.
- After installing the suspension arm, check the wheel alignment and adjust if necessary.

CAUTION: The vehicle should be on the ground before any bolts or nuts connected to rubber mounts or bushing are tightened.



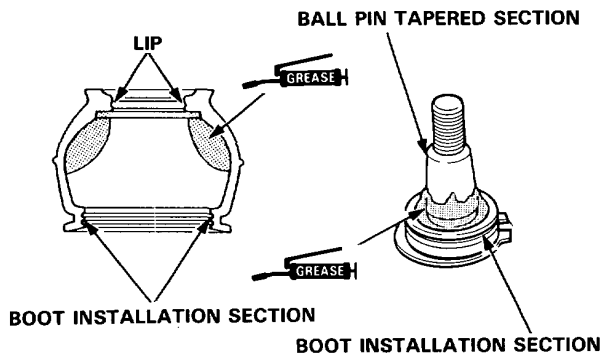


Ball Joint Boot Replacement

1. Remove the circlip and the boot.

CAUTION: Do not contaminate the boot installation section with grease.

2. Pack the interior of the boot and lip with grease.



3. Wipe the grease off the sliding surface of the ball pin and pack with fresh grease.

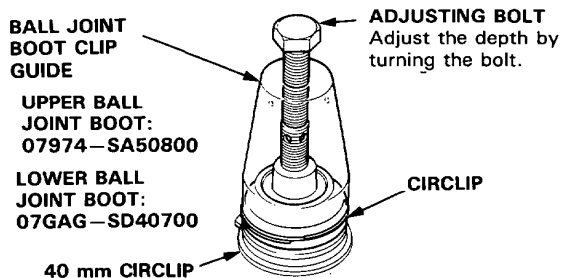
CAUTION:

- Keep grease off the boot installation section and the tapered section of the ball pin.
- Do not allow dust, dirt, or other foreign materials to enter the boot.

4. Install the boot in the groove of the boot installation section securely, then bleed air.
5. Install the upper and lower ball joint boot clips using the special tools as follows:

Lower ball joint: Adjust the special tool with the adjusting bolt until the end of the tool aligns with the groove on the boot. Slide the clip over the tool and into position.

Upper ball joint: Hold the tool over the ball joint, then slide the clip over the tool and into position.

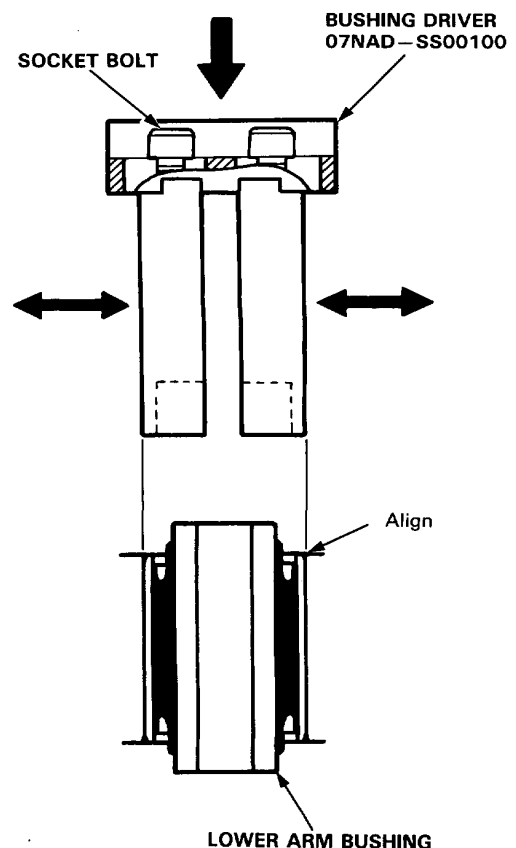


CAUTION: After installing the boot, check the ball pin tapered section for grease contamination and wipe it if necessary.

Lower Arm Bushing Replacement

Adjust the bushing driver so that it matches the outside dimension of the lower arm bushing, then replace the lower arm bushing.

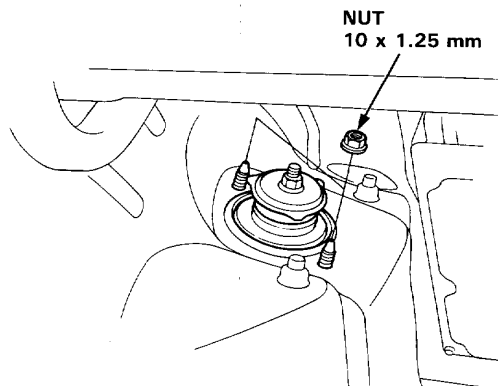
NOTE: When installing the lower arm bushing, press it so that its leading edges are flush with the lower arm.



Rear Damper

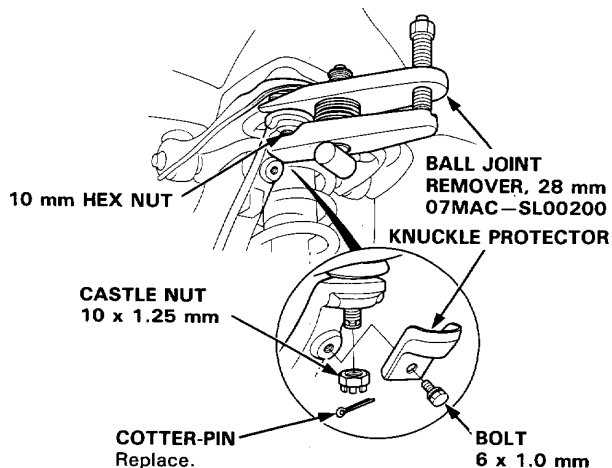
Removal

1. Jack up the rear of car and support on safety stands in proper locations.
2. Remove the rear wheel.
3. Remove the trunk side trim.
4. Remove the two nuts.



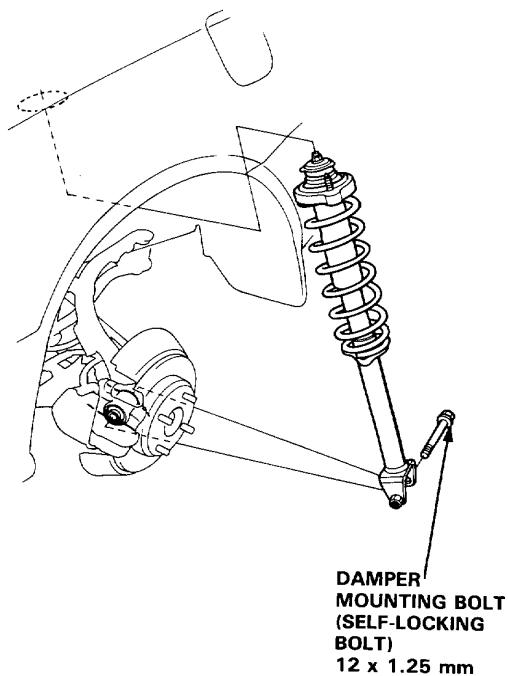
5. Remove the knuckle protector.
6. Remove the cotter-pin and the upper ball joint nut.
7. Install a 10 mm hex nut on the ball joint. Be sure that the hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.
8. Use the ball joint remover as shown on page 18-17 to separate the ball joint and knuckle.

NOTE: If necessary, apply penetrating type lubricant to loosen the ball joint.



9. Remove the damper mounting bolt.

10. Lower the rear suspension and remove the damper assembly.





Disassembly

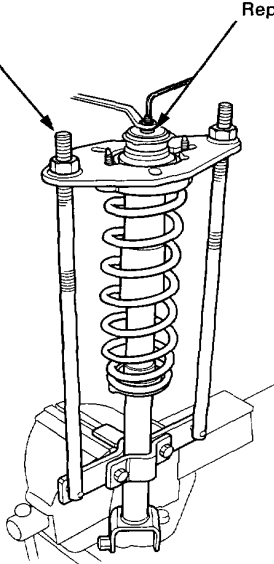
1. Compress the damper spring with the spring compressor according to the manufacturer's instructions.

CAUTION: Do not compress the spring more than necessary to remove the self-locking nut.

2. Remove the self-locking nut from the damper assembly.

SPRING COMPRESSOR
07GAE-SE00101

SELF-LOCKING NUT
10 x 1.25 mm
Replace.

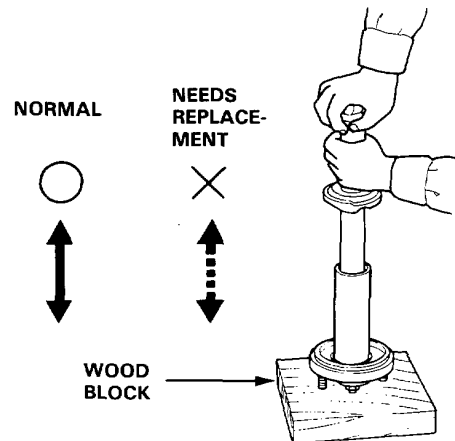


3. Remove the spring compressor and disassemble the damper as shown on page 18-38.

Inspection

1. Reassemble all parts, except the spring.
2. Push on the damper assembly as shown.
3. Check for smooth operation through a full stroke, both compression and extension.

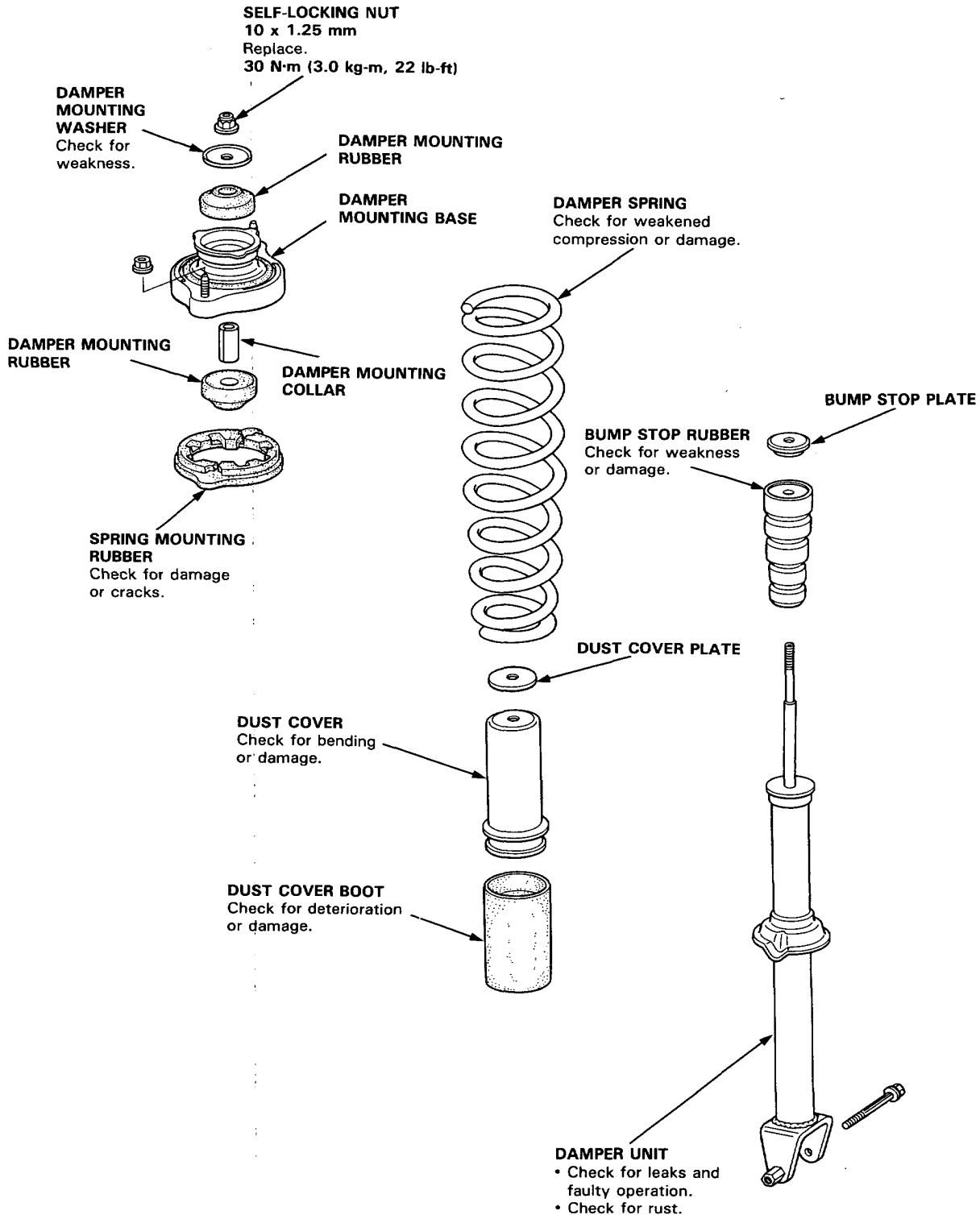
NOTE: The damper should move smoothly. If it does not (no compression or no extension), then gas is leaking, and the damper should be replaced.



4. Check for oil leaks, abnormal noises or binding during these tests.

Rear Damper

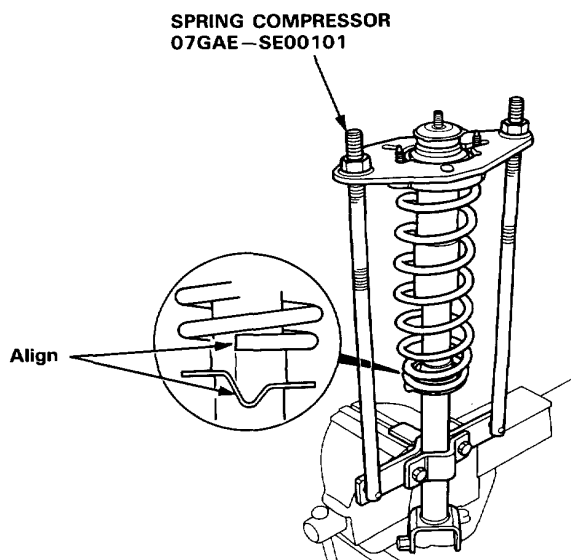
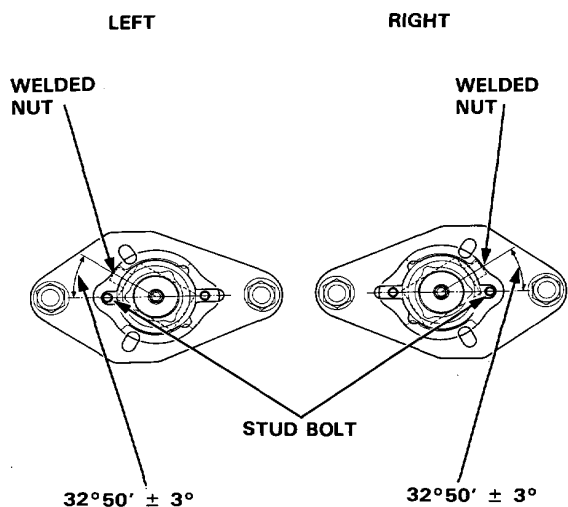
Inspection



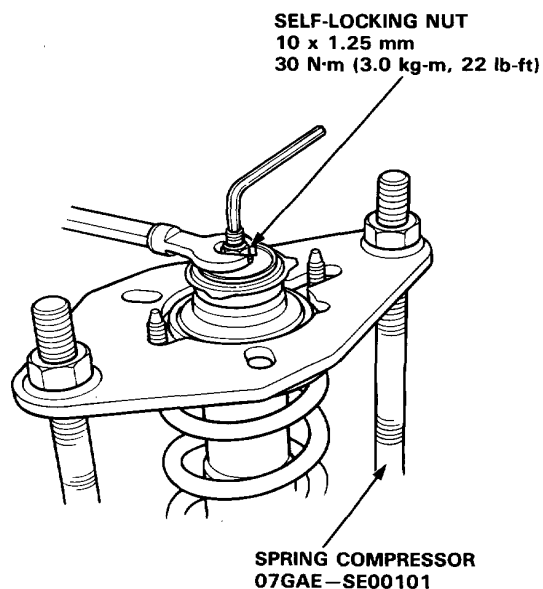


Reassembly

1. Install the damper unit on a spring compressor.
2. Install the bump stop rubber, bump stop plate, dust cover boot, dust cover, dust cover plate, damper spring and spring mounting rubber on the damper unit.
3. Reassemble the damper mounting rubbers and damper mounting collar on the damper mounting base.
4. Install the damper mounting base assembly on the damper unit as shown.



5. Compress the damper spring with the spring compressor.
6. Install the damper mounting washer, then loosely install the new self-locking nut.
7. Hold the damper shaft and tighten the self-locking nut.

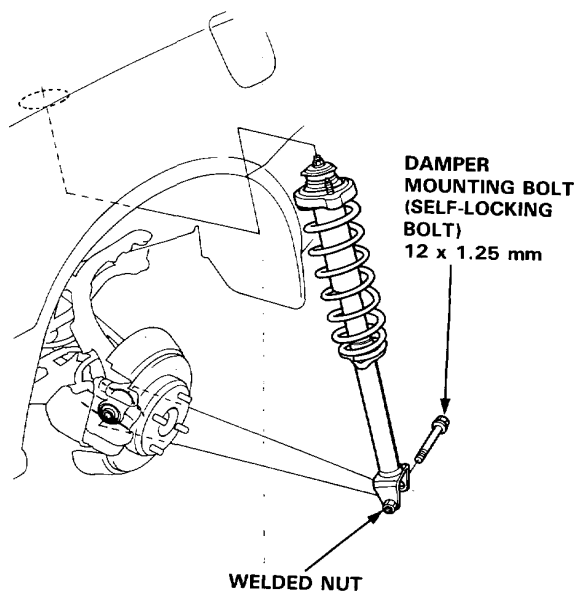


Rear Damper

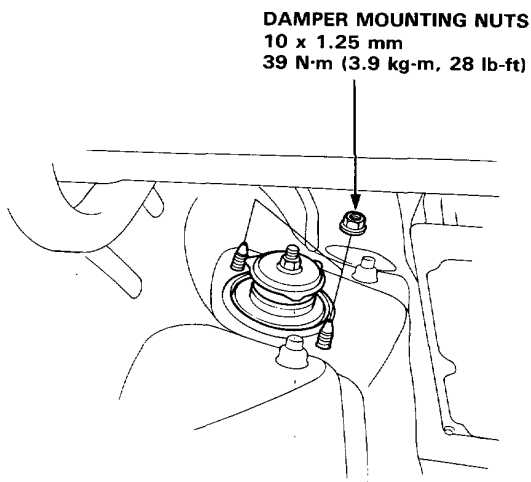
Installation

1. Lower the rear suspension and set the damper assembly.
2. Connect the damper assembly and the lower arm, then loosely install the damper mounting bolt.

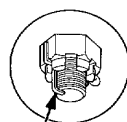
NOTE: The damper mounting bolt should be tightened with the damper under vehicle load.



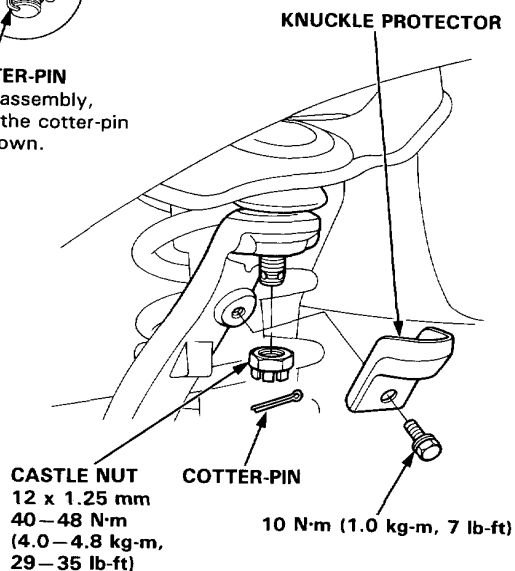
3. Tighten the damper mounting nuts.



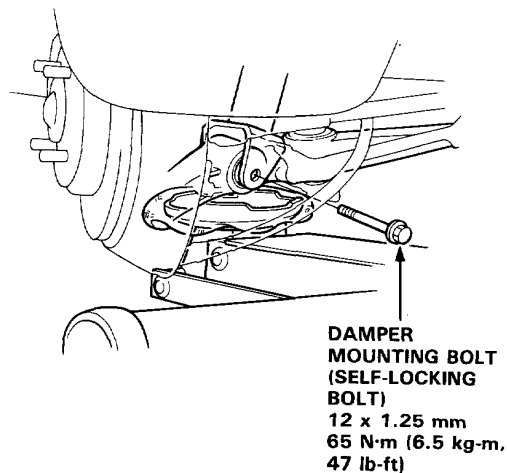
4. Connect the upper arm and knuckle, then tighten the castle nut.
5. Install the knuckle protector with the bolt.



COTTER-PIN
On reassembly, bend the cotter-pin as shown.



6. Raise the rear suspension with a floor jack until the weight of the car is on the damper.
7. Tighten the damper mounting bolt.



8. Check the rear wheel alignment and adjust if necessary (see 18-4).

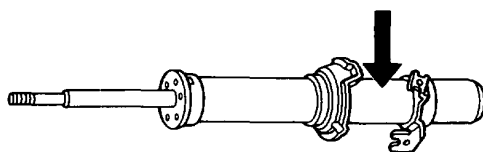


Damper Disposal

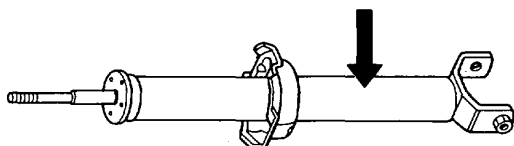
⚠ WARNING The dampers contain nitrogen gas and oil under pressure. The pressure must be relieved before disposal to prevent explosion and possible injury when scrapping.

Place the damper on a level surface with its rod extended and drill a hole of 2.0–3.0 mm (0.08–0.12 in) diameter in the body to release the gas.

Front Damper



Rear Damper



⚠ WARNING Always wear eye protection to avoid getting metal shavings in your eyes when the gas damper pressure is relieved.

Brakes

Conventional Brakes	19-1
Anti-lock Brake System	19-35



Conventional Brakes

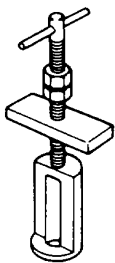
Special Tools	19-2	Rear Disc Brakes	
Illustrated Index	19-3	Torque/Inspection	19-21
Pedal Height		Rear Brake Pads	
Adjustment	19-4	Inspection/Replacement	19-22
Parking Brake		Rear Brake Disc	
Adjustment	19-5	Runout Inspection	19-24
Front Brakes		Thickness and Parallelism	
Torque/Inspection	19-6	Inspection	19-24
Front Brake Pads		Rear Caliper	
Inspection/Replacement	19-7	Disassembly	19-25
Front Caliper		Reassembly	19-28
Disassembly	19-9	Brake Hoses/Pipes	
Reassembly	19-10	Inspection	19-31
Front Brake Disc		Brake Hose Replacement	19-32
Runout Inspection	19-11	Parking Brake	
Thickness and Parallelism		Disassembly and Reassembly	19-33
Inspection	19-11		
Bleeding	19-12		
Master Cylinder and Brake Booster			
Removal/Installation	19-13		
Master Cylinder			
Inspection	19-14		
Disassembly	19-15		
Reassembly	19-16		
Brake Booster			
Tests	19-18		
Pushrod Clearance Adjustment	19-19		



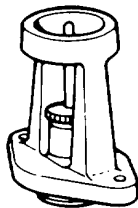
Special Tools

*Cars with ABS

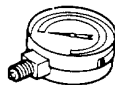
Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07HAE—SG00100	Brake Spring Compressor	1	19-26, 19-29
②	07JAG—SD40100	Pushrod Adjustment Gauge	1	19-19
③	07404—5790300	Vacuum Gauge	1	19-18, 19-19
④	07406—5790200	Pressure Gauges	2	19-18
⑤	07410—5790100	Pressure Gauge Attachment C	1	19-18
⑥	07410—5790500	Tube Joint Adaptor	1	19-18, 19-19
⑦	07510—6340101	Pressure Gauge Joint Pipe	2 (*1)	19-18
	*07HAK—SG00110	Pressure Gauge Joint Pipe	1	19-18
⑧	07510—6340300	Vacuum Joint Tube A	1	19-18, 19-19
⑨	07914—SA50000	Snap Ring Pliers	1	19-26, 19-29
⑩	07916—6390001	Locknut Wrench	1	19-25, 19-30



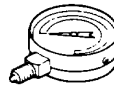
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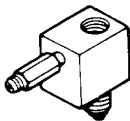
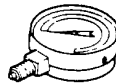
②



③



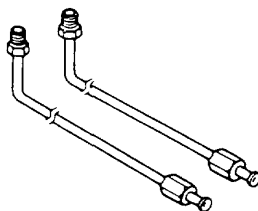
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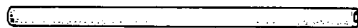
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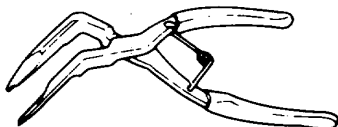
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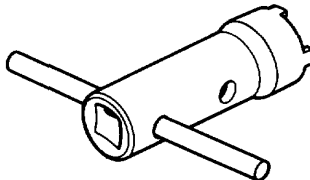
⑦



⑧



⑨



⑩



FRONT BRAKES

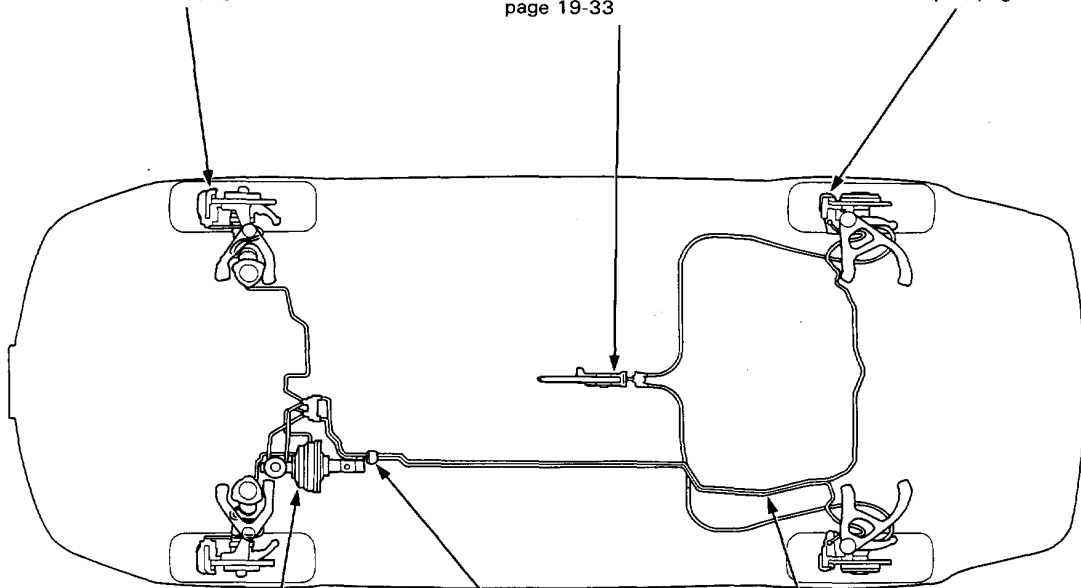
Torque/Inspection, page 19-6
Front Brake Pads, page 19-7
Front Caliper, page 19-9
Front Brake Disc, page 19-11

PARKING BRAKE

Adjustment, page 19-5
Disassembly and Reassembly,
page 19-33

REAR DISC BRAKES

Torque/Inspection, page 19-21
Rear Brake Pads, page 19-22
Rear Brake Disc, page 19-24
Rear Caliper, page 19-25



BRAKE PEDAL

Adjustment, page 19-4

MASTER CYLINDER AND BRAKE BOOSTER

Removal/Installation, page 19-13
Master Cylinder, page 19-14
Brake Booster 19-18

BRAKE HOSES/PIPES

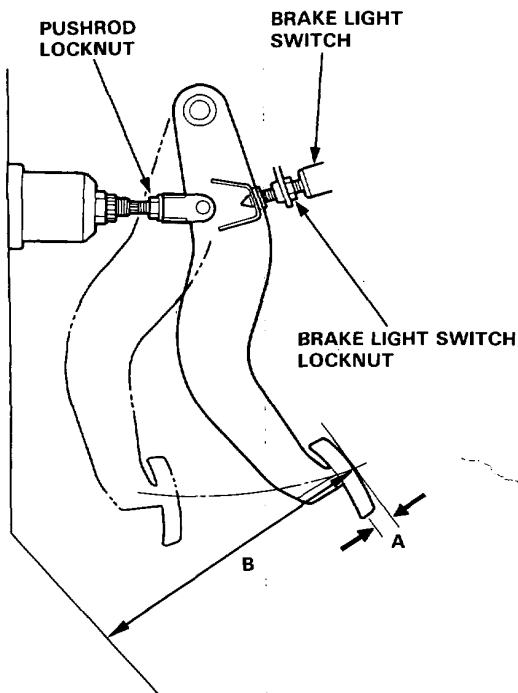
Inspection, page 19-31
Brake Hose Replacement, page 19-32

Pedal Height

Adjustment

1. Disconnect the brake light switch connector, loosen the brake light switch locknut and back off the brake light switch until it is no longer touching the brake pedal.

NOTE: Measure the pedal height from the left (RHD: right) side center of the pedal surface.



A: Pedal Play

1—5 mm (1/16—13/64 in)

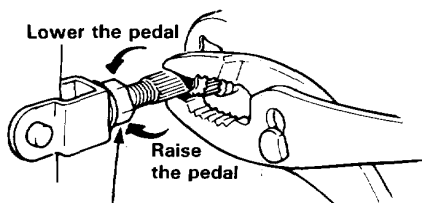
B: Standard Pedal Height

Manual Transmission: LHD: 165 mm (6.50 in)

RHD: 180 mm (7.09 in)

Automatic Transmission: 186 mm (7.32 in)
(with floor mat removed)

2. Loosen the pushrod locknut and screw the pushrod in or out with pliers until the standard pedal height from the floor is reached. After adjustment, tighten the locknut firmly.



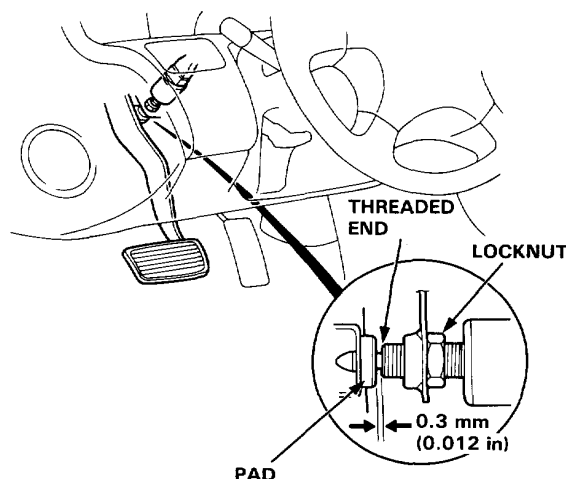
PUSHROD LOCKNUT

15 N·m (1.5 kg-m, 11 lb-ft) for cars without ABS

19 N·m (1.9 kg-m, 14 lb-ft) for cars with ABS

3. Screw in the brake light switch until its plunger is fully depressed (threaded end touching the pad on the pedal arm). Then back off the switch 1/4 turn to make 0.3 mm (0.012 in) of clearance between the threaded end and pad. Tighten the locknut firmly. Connect the brake light switch connector.

CAUTION: Check that the brake lights go off when the pedal is released.



Brake Pedal Play Inspection:

Stop the engine and inspect the play by pushing the pedal by hand.

Brake Pedal Play: 1—5 mm (1/16—13/64 in)

NOTE: Do not adjust the pedal height with the pushrod depressed.

CAUTION: If the pedal free play is out of specification, brake drag may occur.



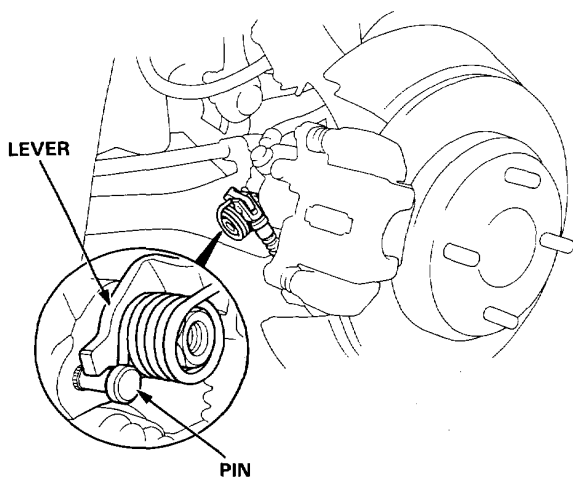
Parking Brake

Adjustment

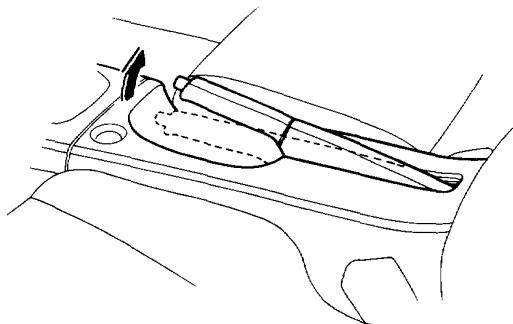
NOTE: After rear brake caliper servicing, loosen the parking brake adjusting nut, start the engine and depress the brake pedal several times to set the self-adjusting brake before adjusting the parking brake.

⚠ WARNING Block the front wheels before jacking up the rear of the car.

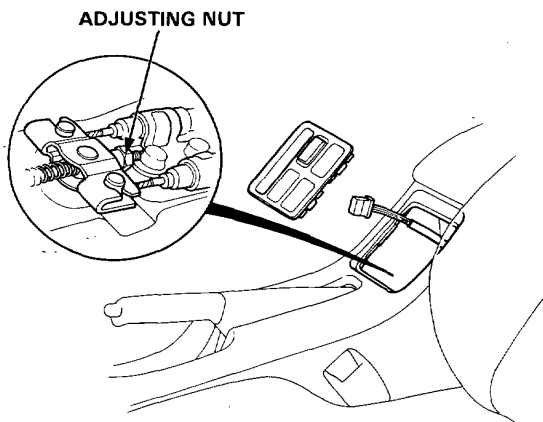
1. Raise the rear wheels off the ground.
2. Make sure the lever of the rear brake caliper contacts the brake caliper pin.



3. Pull the parking brake lever up one notch.



4. Tighten the adjusting nut until the rear wheels drag slightly when turned.



5. Release the parking brake lever and check that the rear wheels do not drag when turned. Readjust if necessary.
6. With the equalizer properly adjusted, the rear brakes should be fully applied when the parking brake lever is pulled up 6 to 10 clicks.

Front Brakes

Torque/Inspection

⚠ WARNING

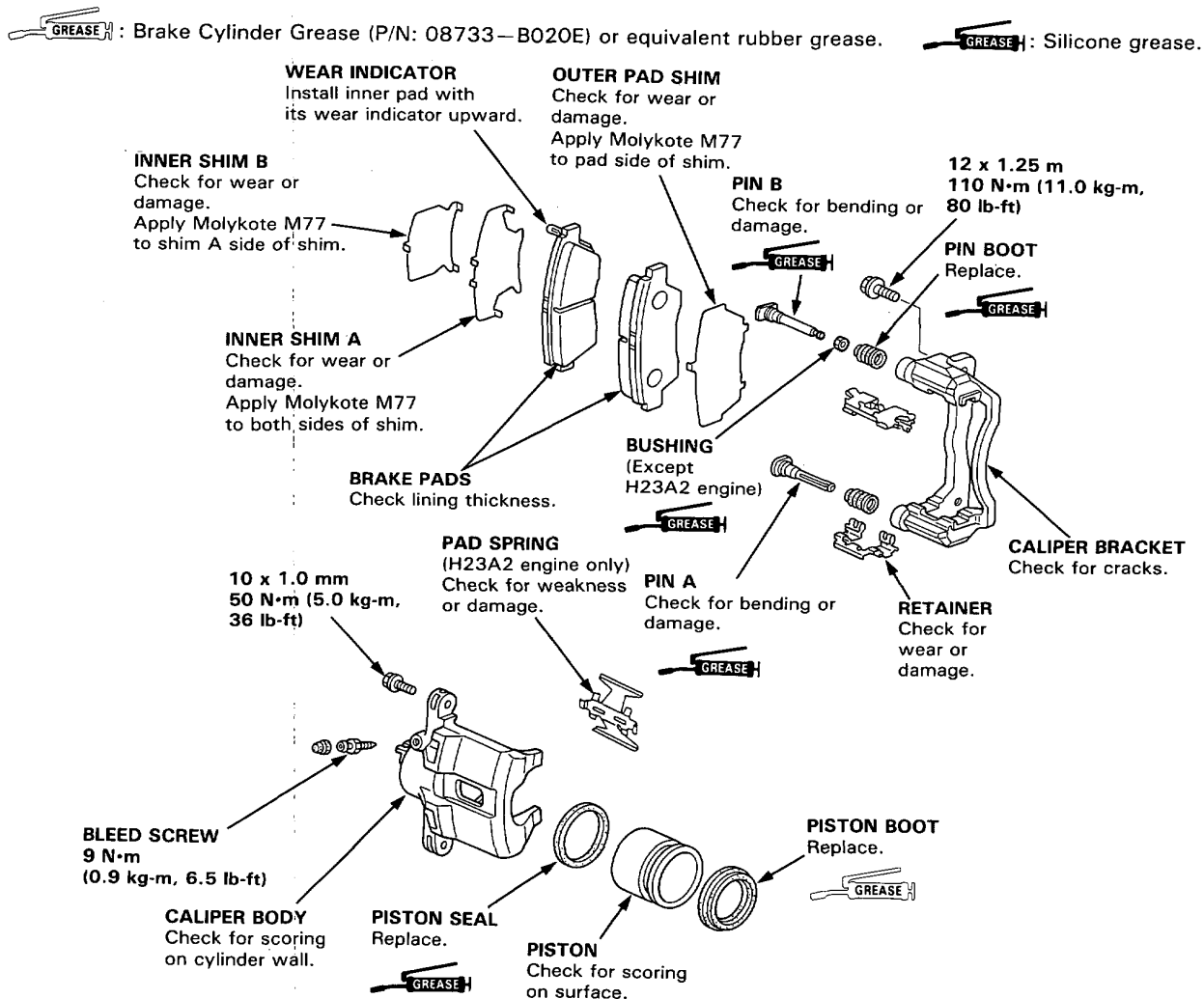
- Never use an air hose or dry brush to clean brake assemblies.
- Use a vacuum cleaner, to avoid breathing brake dust.
- Contaminated brake discs or pads reduce stopping ability.

CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.

NOTE:

- Coat piston, piston seal, and caliper bore with clean brake fluid.
- Replace all rubber parts with new ones whenever disassembled.





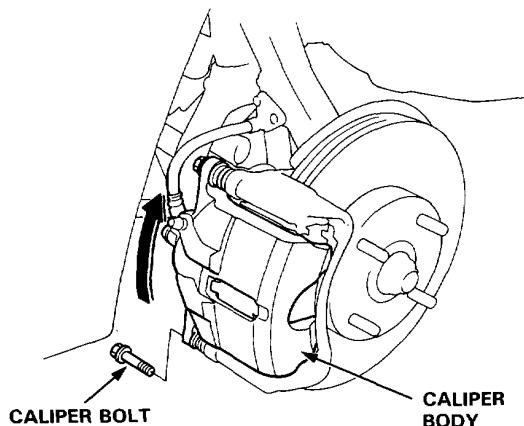
Front Brake Pads

Inspection/Replacement

⚠ WARNING

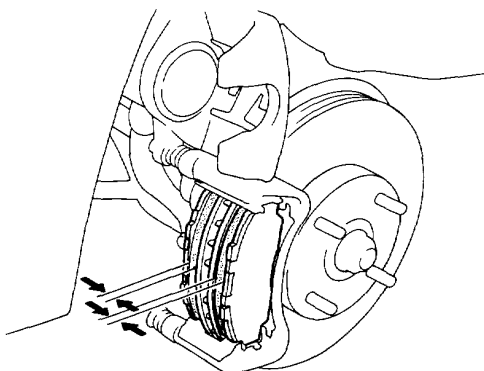
- Never use an air hose or dry brush to clean brake assemblies.
- Use a vacuum cleaner, to avoid breathing brake dust.

1. Loosen the front wheel lug nuts slightly, then raise the car and support on safety stands. Remove the front wheels.
2. Remove the caliper bolt and pivot the caliper body up out of the way.



3. If the brake pad thickness is less than service limit at step 5, replace the front pads as a set.

NOTE: Engagement of the brake may require a greater pedal stroke immediately after the brake pads have been replaced as a set. Several applications of the brake pedal will restore the normal pedal stroke.



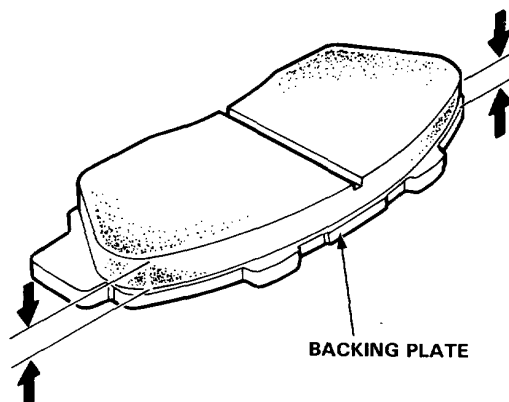
4. Remove the pad shims, pad retainers and pads.
5. Using vernier calipers, measure the thickness of each brake pad lining.

Brake Pad Thickness:

Standard: 12.5 mm (0.49 in)

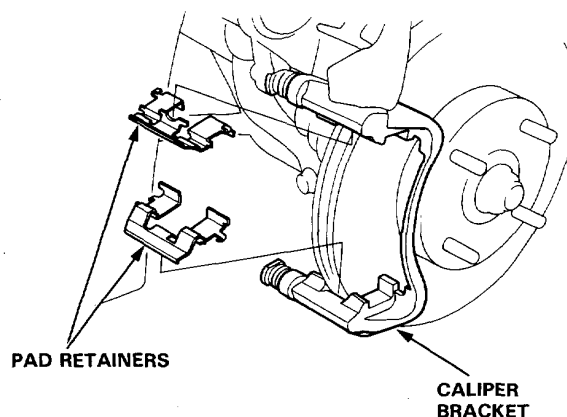
H23A2 engine: 11.0 mm (0.43 in)

Service Limit: 1.6 mm (0.06 in)



NOTE: Measurement does not include pad backing plate thickness.

6. Clean the caliper thoroughly; remove any rust, and check for grooves or cracks.
7. Install the pad retainers.



(cont'd)

Front Brake Pads

Inspection/Replacement (cont'd)

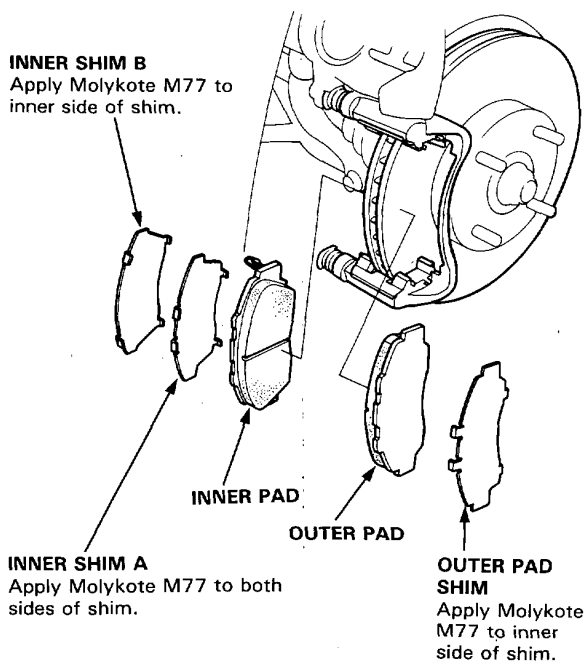
8. Apply Molykote M77 compound to the pad shims and the back of the pads. Wipe off excess.

9. Install the brake pads and pad shims correctly.

⚠ WARNING

- When reusing the pads, always reinstall the brake pads in their original positions to prevent loss of braking efficiency.
- Contaminated brake discs or pads reduce stopping ability. Keep grease off the discs and pads.

NOTE: Install the pad with the wear indicator on the inside.

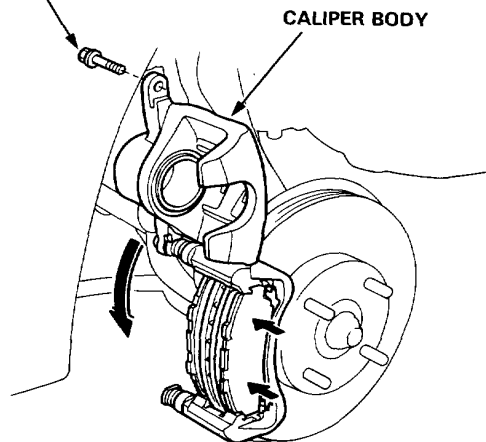


10. Push in the piston so that the caliper will fit over the pads. Keep the boot in position to prevent damaging the boot when pivoting the caliper body down.

11. Pivot the caliper body down into position, then install the caliper bolt (flange bolt).

NOTE: Make sure the pin is clean before installation, then apply a clean silicone grease to the inside of the boot and the pin.

CALIPER BOLT
50 N·m (5.0 kg-m,
36 lb-ft)



12. Depress the brake pedal several times to make sure the brakes work, then road-test.



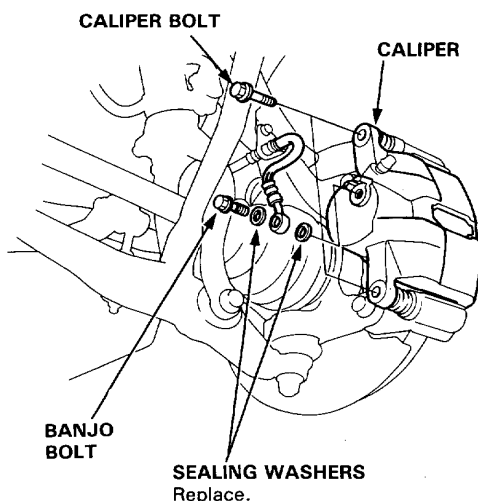
Front Caliper

Disassembly

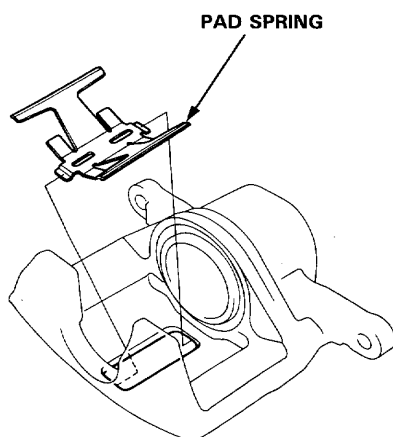
CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.

1. Remove the banjo bolt and disconnect the brake hose from the caliper.
2. Remove the caliper bolts, then remove the caliper.



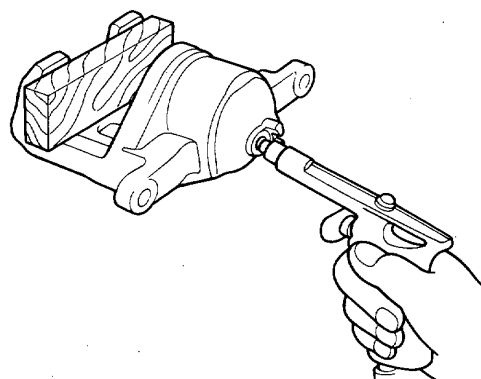
3. On H23A2 engine, remove the pad spring from the caliper body.



4. If necessary, apply compressed air to the caliper fluid inlet to get the piston out. Place a shop rag or wooden block as shown to cushion the piston when it is expelled. Use low pressure air in short spurts. Remove the piston from the caliper.

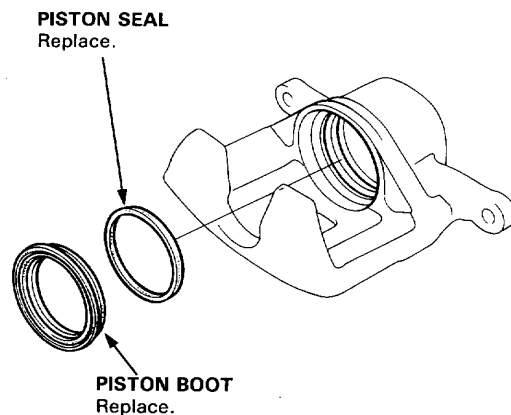
⚠ WARNING

- Do not place your fingers in front of the piston.
- Do not use high air pressure.



5. Remove the piston boot and piston seal.

CAUTION: Take care not to damage the cylinder.



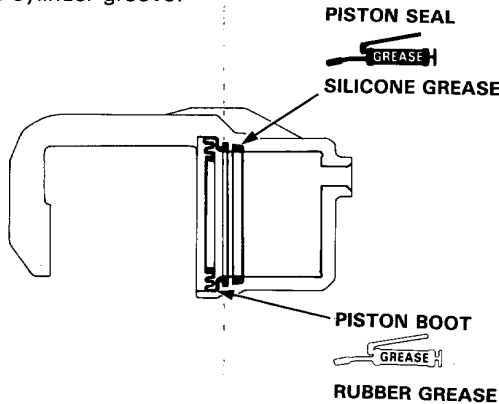
Front Caliper

Reassembly

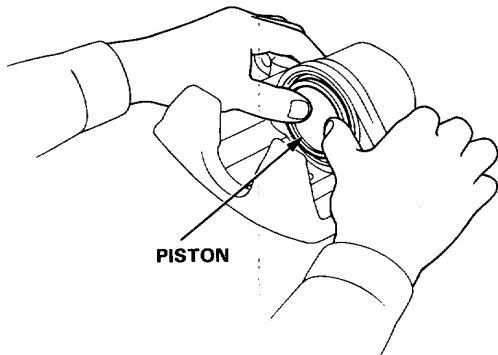
CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.

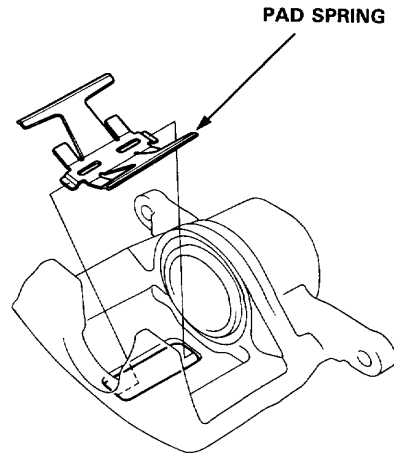
1. Clean the piston and caliper bore with brake fluid and inspect for wear or damage.
2. Coat a new piston seal with silicone grease and install it in the cylinder groove.
3. Apply Brake cylinder Grease (P/N: 08733-B020E) or equivalent rubber grease to the sealing lips and inside of a new piston boot, and install the boot in the cylinder groove.



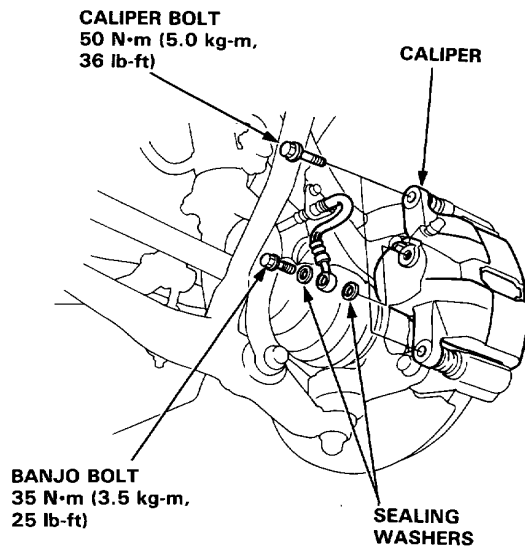
4. Lubricate the caliper cylinder and piston with brake fluid, then install the piston in the cylinder with the dished end facing in.



5. On H23A2 engine, install the pad spring.



6. Install the brake pad retainers and brake pads in their original positions.
7. Install the caliper on the caliper bracket and tighten the caliper bolts.
8. Connect the brake hose to the caliper with new sealing washers and tighten the banjo bolt.



9. Fill the brake reservoir up and bleed the brake system (page 19-12).



Front Brake Disc

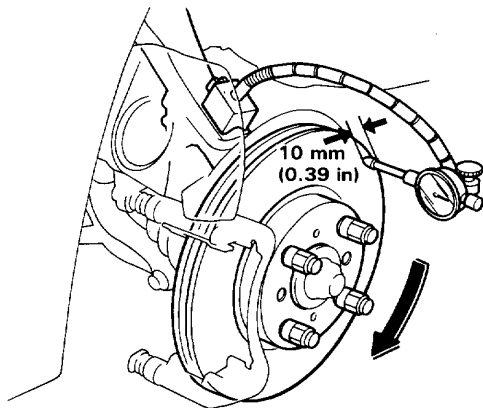
Runout Inspection

1. Loosen the front wheel lug nuts slightly, then raise the car and support on safety stands. Remove the front wheels.
2. Remove the brake pads (page 19-7).
3. Inspect the disc surface for cracks, and rust. Clean the disc thoroughly and remove all rust.
4. Use lug nuts and suitable plain washers to hold the disc securely against the hub, then mount a dial indicator as shown and measure the runout at 10 mm (0.39 in) from the outer edge of the disc.

Brake Disc Runout:

Service Limit: 0.1 mm (0.004 in)

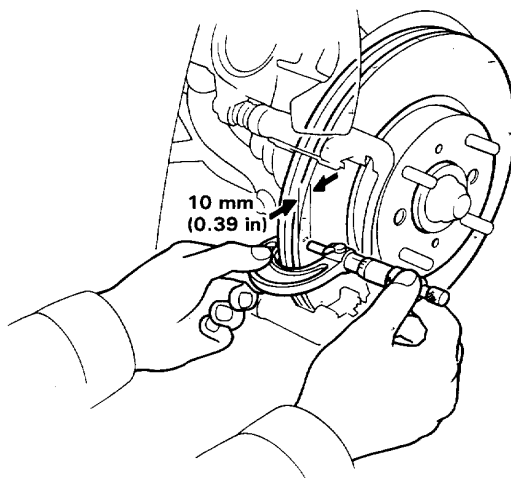
5. If the disc is beyond the service limit, refinish the rotor with an on-car brake lathe. The Kwik-Lathe produced by Kwik-Way Manufacturing Co. and the "Front Brake Disc Lathe" offered by Snap-on Tools Co. are approved for this operation.



NOTE: A new disc should be refinished if its runout is greater than 0.1 mm (0.004 in).

Thickness and Parallelism Inspection

1. Loosen the front wheel lug nuts slightly, then raise the car and support on safety stands. Remove the front wheels.
2. Remove the brake pads (page 19-7).
3. Using a micrometer, measure disc thickness at eight points, approximately 45° apart and 10 mm (0.39 in) in from the outer edge of the disc.



Brake disc thickness:

Standard: 23 mm (0.906 in)

Max. Refinishing Limit: 21 mm (0.827 in)

Brake Disc Parallelism:

The difference between any thickness measurements should not be more than 0.015 mm (0.0006 in).

4. If the disc is beyond the service limit for parallelism, refinish the rotor with an on-car brake lathe. The Kwik-Lathe produced by Kwik-Way Manufacturing Co. and the "Front Brake Disc Lathe" offered by Snap-on Tools Co. are approved for this operation.

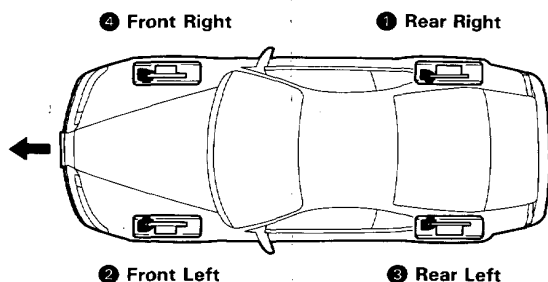
Bleeding

CAUTION:

- Use only clean DOT 3 or 4 brake fluid.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.

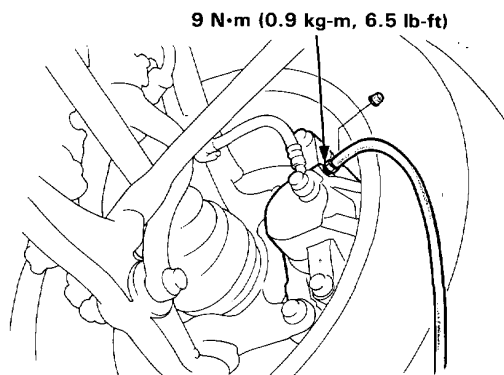
NOTE: The reservoir on the master cylinder must be full at the start of bleeding procedure, and checked after bleeding each brake caliper. Add fluid as required. Use only clean DOT 3 or 4 brake fluid.

BLEEDING SEQUENCE

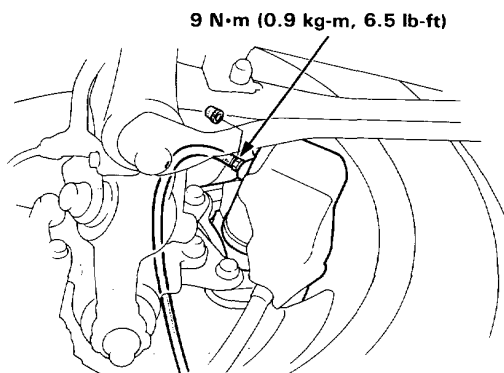


1. Have someone slowly pump the brake pedal several times, then apply steady pressure.
2. Loosen the brake bleed screw to allow air to escape from the system. Then tighten the bleed screw securely.
3. Repeat the procedure for each wheel in the sequence shown above, until air bubbles no longer appear in the fluid.

FRONT



REAR





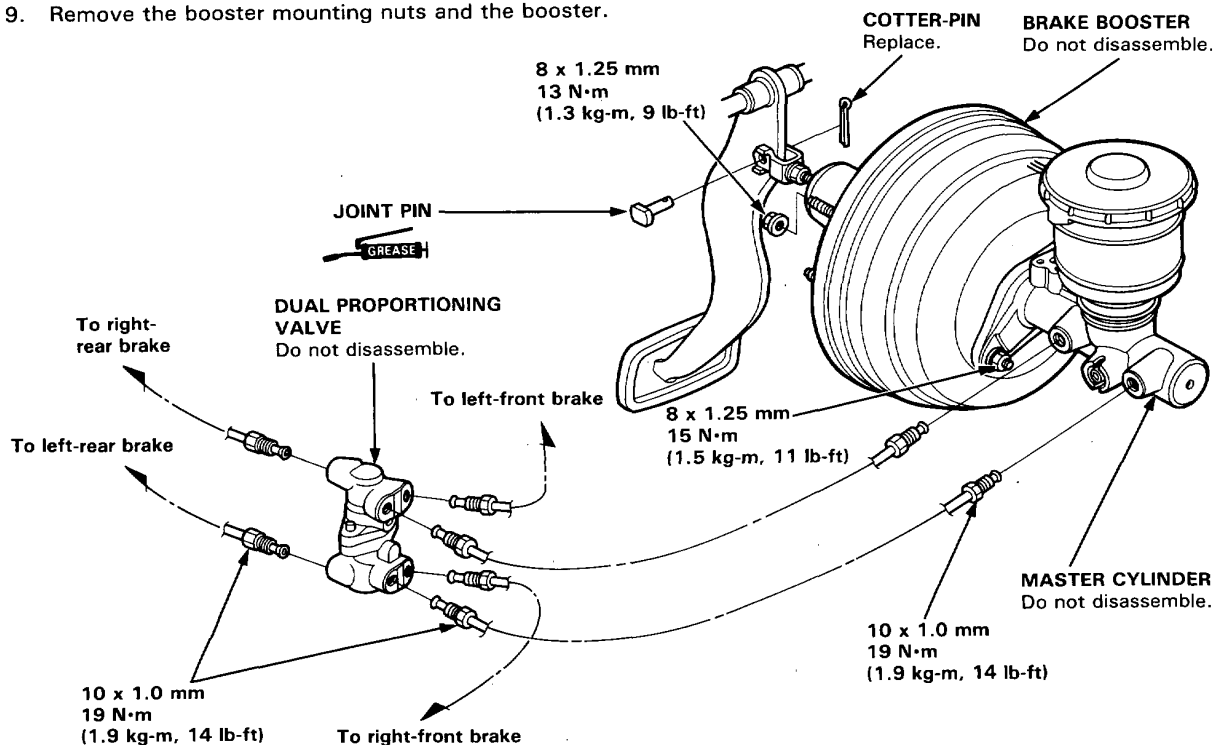
Master Cylinder and Brake Booster

Removal/Installation

CAUTION:

- Be careful not to bend or damage the brake pipes when removing the master cylinder and booster.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.
- When connecting the brake pipes, make sure that there is no interference between the brake pipes and other parts.
- Do not disassemble the master cylinder or booster. Replace them as complete assemblies.

1. Drain the brake fluid from the master cylinder.
2. Disconnect the brake fluid level switch connectors.
3. Disconnect the brake pipes from the master cylinder.
4. Remove the master cylinder mounting nuts and the master cylinder.
5. Disconnect the vacuum hose from the booster and remove the vacuum hose bracket.
6. Remove the throttle/cruise control cable bracket, then remove the throttle cable grommet from the engine compartment bulkhead.
7. Remove the Ta sensor from the intake manifold.
8. Remove the cotter-pin and joint pin.
9. Remove the booster mounting nuts and the booster.



10. Install the brake booster and master cylinder in the reverse order of removal.

NOTE: Before installing the master cylinder, check and adjust the pushrod clearance (page 19-19).

11. After installation, check and adjust the brake pedal height (page 19-4).
12. Fill and bleed the brake system (page 19-12).

Master Cylinder



Inspection

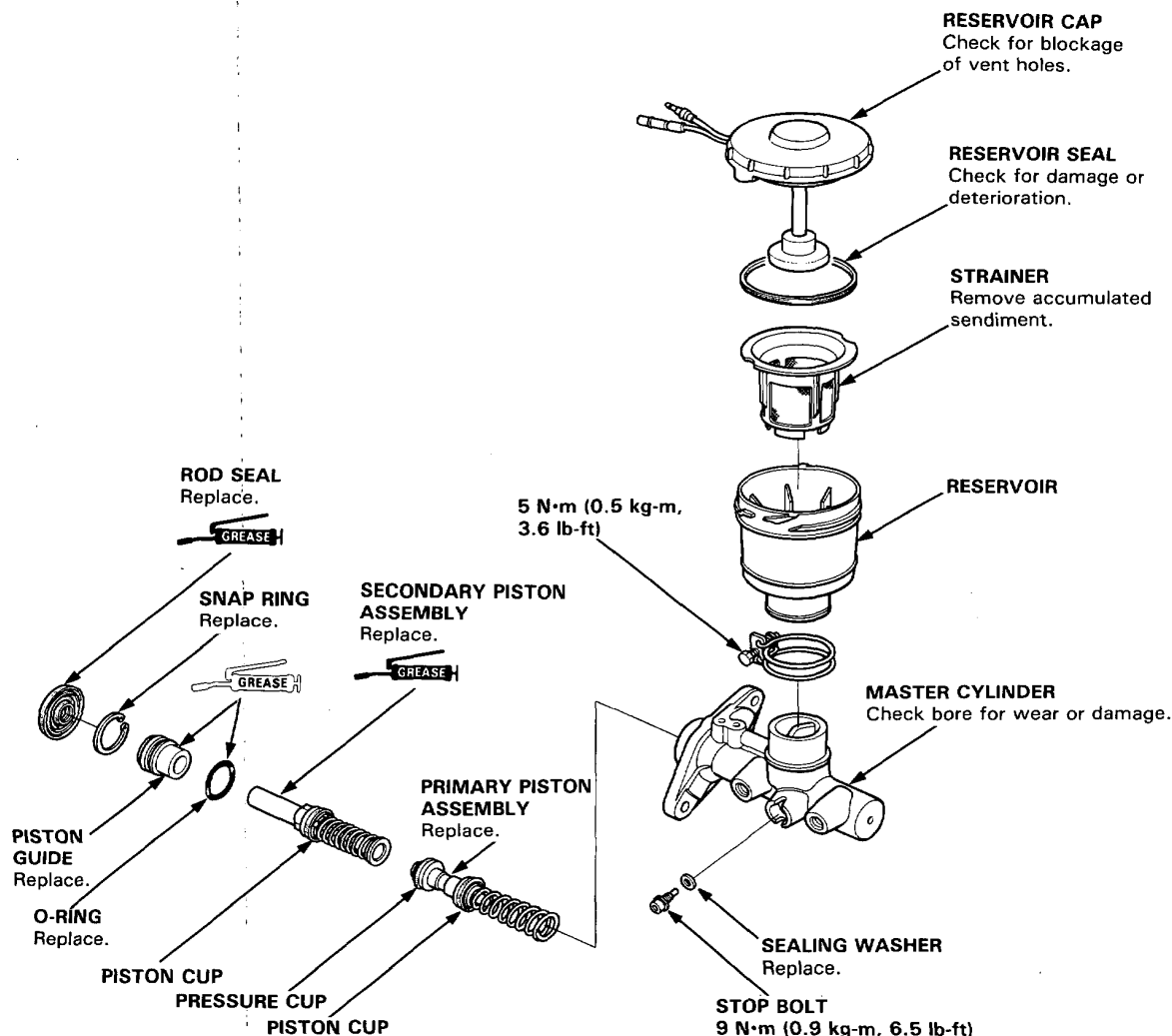
CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.
- Replace the master cylinder if the bore is damaged or worn. Do not hone or attempt to refinish the bore.

NOTE:

- Coat piston cup, pressure cup and master cylinder bore with clean brake fluid.
- Replace all rubber parts with new ones whenever disassembled.

 : Brake Cylinder Grease (P/N: 08733—B020E) or equivalent rubber grease.  : Silicone grease.



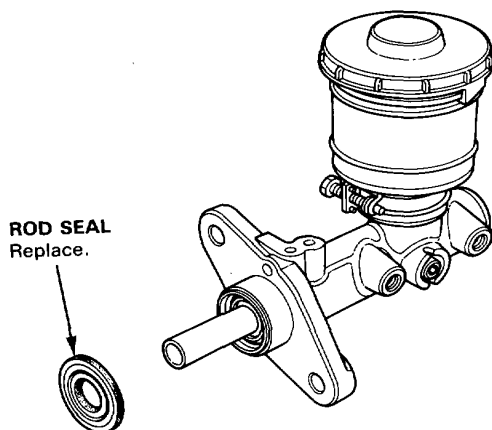


Disassembly

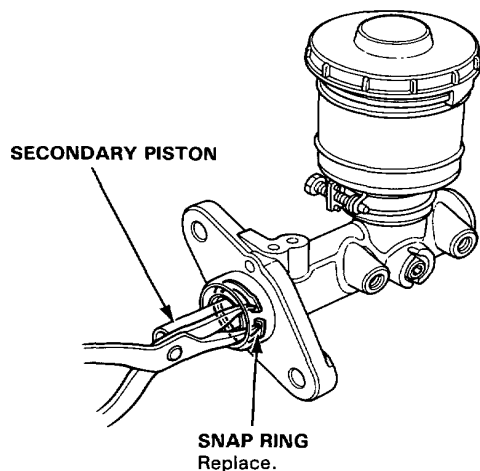
CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.

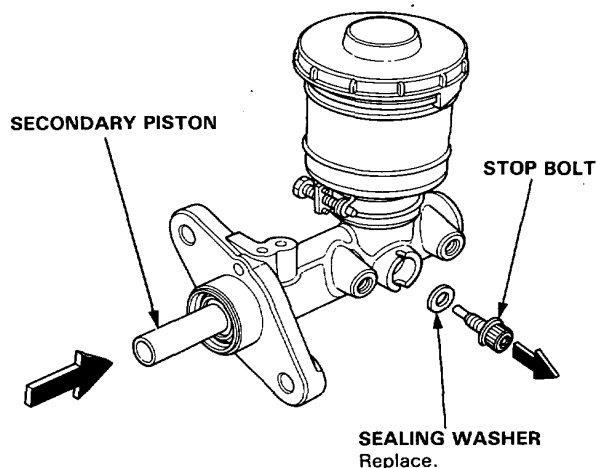
1. Remove the rod seal.



2. Push the secondary piston, then remove the snap ring.



3. Remove the stop bolt while pushing in the secondary piston.



4. Remove the piston guide, secondary piston assembly and primary piston assembly.

NOTE: If the primary piston assembly is difficult to remove, apply compressed air from the primary piston side port.

CAUTION:

- Do not use high pressure air or bring the nozzle too close to the port.
- Place a shop rag over the master cylinder to prevent the primary piston from becoming a projectile.

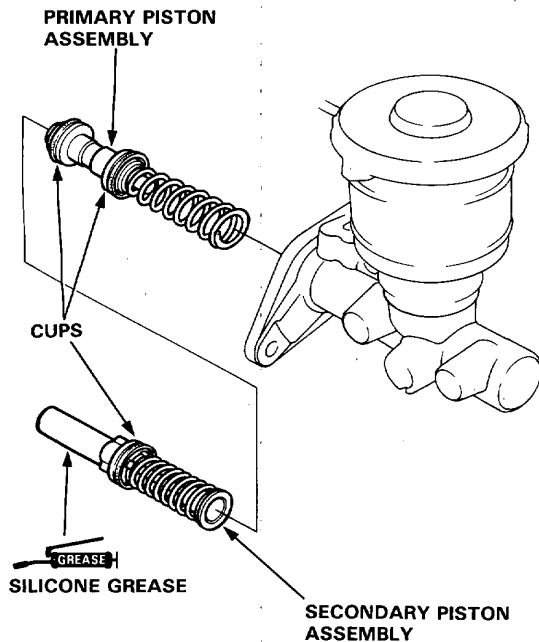
Master Cylinder

Reassembly

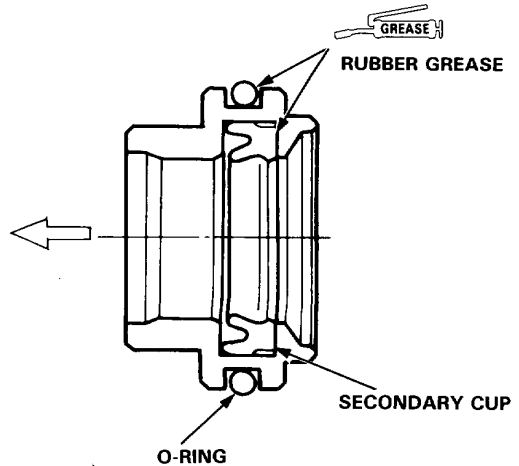
CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.

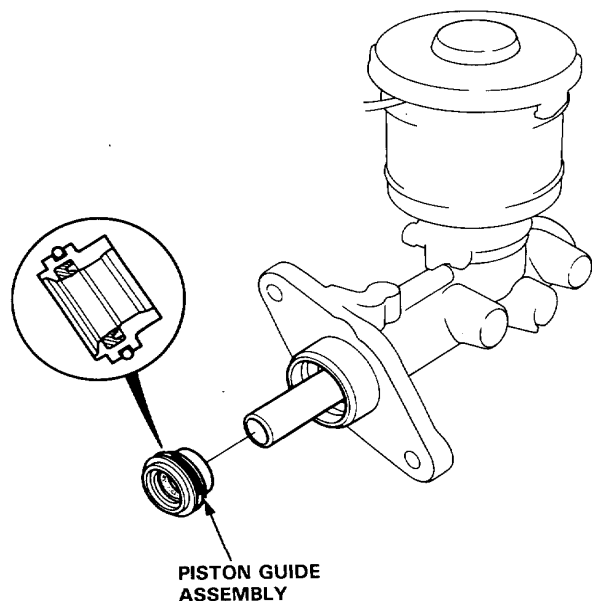
1. Apply silicone grease to a new secondary piston.
2. Lubricate the cups of new primary and secondary piston assemblies with brake fluid, and install them into the master cylinder:



3. Apply Brake Cylinder Grease (P/N: 08733—B020E) or equivalent rubber grease to a new O-ring and the secondary cup in a new piston guide and install the O-ring onto the piston guide.

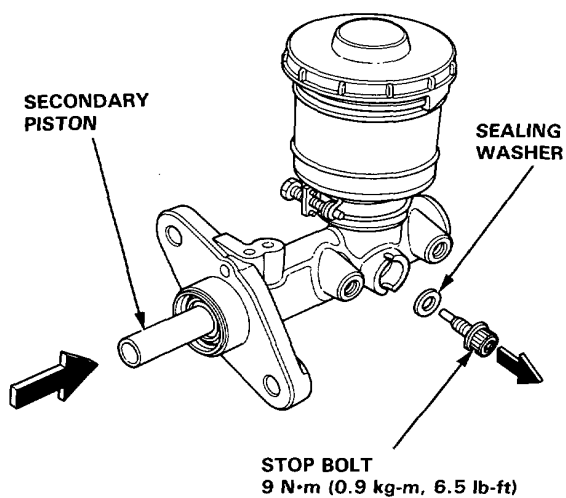


4. Install the piston guide assembly into the master cylinder.

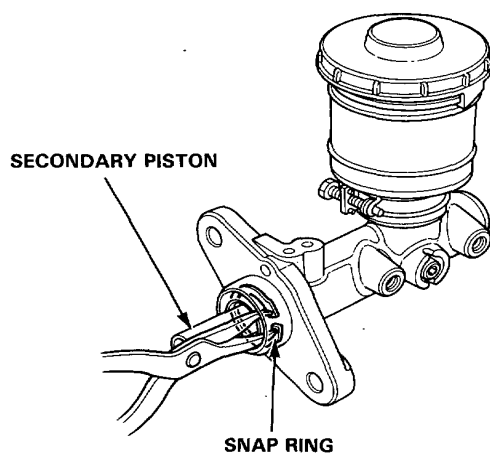




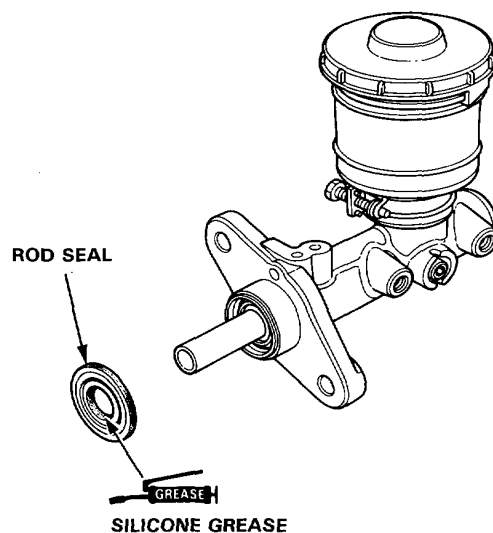
5. Install the stop bolt with a new sealing washer while pushing in the secondary piston, and tighten the stop bolt.



6. Install a new snap ring while pushing in the secondary piston.



7. Apply silicone grease to a new rod seal and install the seal onto the master cylinder.

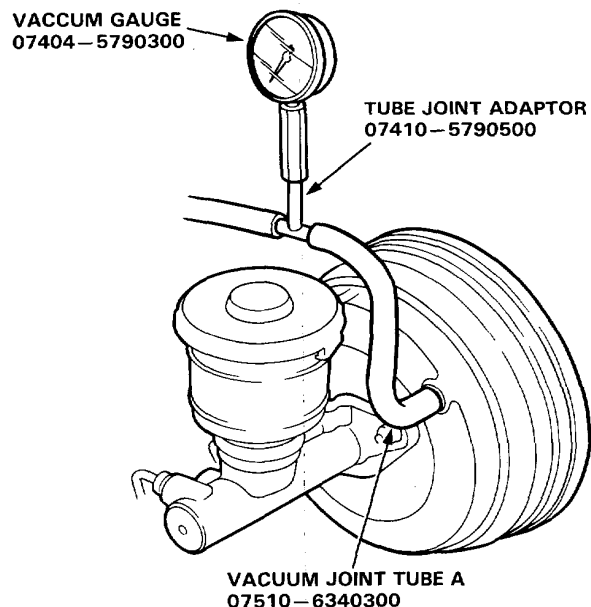


Brake Booster

Tests

Leak Test

1. Install the Brake Power Kit (07504-6340100) as shown.



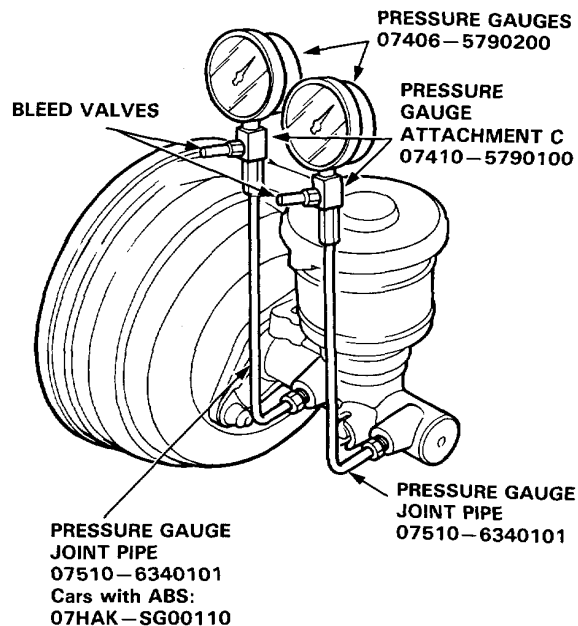
2. Start the engine, adjust the engine speed with the accelerator pedal so that the vacuum gauge readings show 300-500 mmHg (11.8-19.7 in-Hg), then stop the engine.
3. Read the vacuum gauge.

If the vacuum readings decreases 20 mmHg (0.8 inHg) or more after 30 seconds, check following parts for leaks.

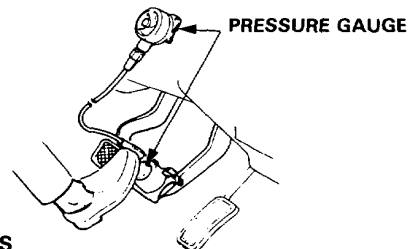
- Check valve
- Vacuum hose, pipe
- Seals
- Diaphragm
- Master cylinder rod seal and cup

Function Test

1. Install the vacuum gauge as same the leak test.
2. Connect the oil pressure gauges to the master cylinder using the attachments as shown.
3. Bleed air through the valves.



4. Start the engine.
5. Depress the brake pedal with a 200 N (20 kg, 44 lbs) of pressure. The following pressures should be observed at the pressure gauges in each vacuum.



Cars Without ABS

Vacuum mm (in) Hg	Mim. Line Pressure kPa (kg/cm, psi)
0 (0)	1,030 (10.3, 146)
300 (11.8)	5,690 (56.9, 809)
500 (19.7)	8,030 (80.3, 1,142)



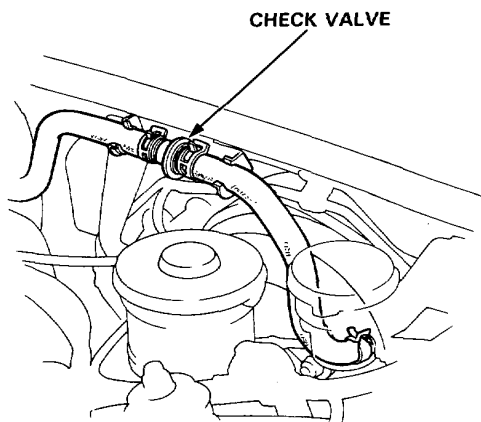
Cars with ABS

Vacuum mm (in) Hg	Mim. Line Pressure kPa (kg/cm, psi)
0 (0)	790 (7.9, 112)
300 (11.8)	6,320 (63.2, 899)
500 (19.7)	7,880 (78.8, 1,121)

- Inspect the master cylinder pistons and cups if the readings do not fall within the limits shown above.

Check Valve Test

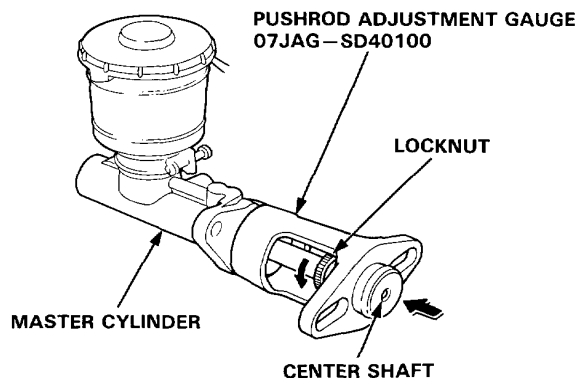
- Disconnect the brake booster vacuum hose at the booster.
- Start the engine and let it idle. There should be vacuum available. If no vacuum is available, the check valve is not working correctly. Replace the check valve and retest.



Pushrod Clearance Adjustment

NOTE: Master cylinder pushrod-to-piston clearance must be checked and adjustments made, if necessary, before installing master cylinder.

- Set the special tool on the master cylinder body; push in the center shaft until the top of it contacts with the end of the secondary piston and lock it with locknut.

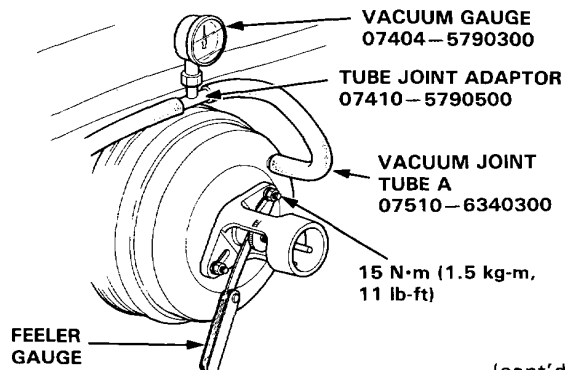


- Install the special tool upside down on the booster without disturbing the adjusting bolt's position.
- Install the master cylinder nuts and tighten to the specified torque.
- Connect the booster in-line with the Brake Power Kit (07504-6340100) to the booster's engine vacuum supply, and maintain a engine speed that will deliver 500 mm Hg (20 in Hg) vacuum.
- With a feeler gauge, measure the clearance between the gauge body and the adjusting nut as shown.

Clearance:

Cars without ABS: 0–0.4 mm (0–0.016 in)

Cars with ABS: 0–0.2 mm (0–0.008 in)

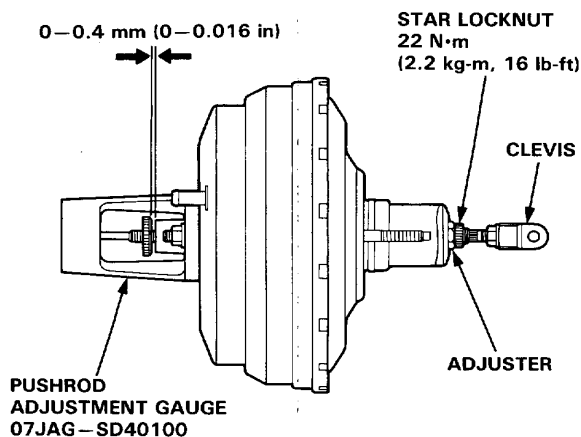


(cont'd)

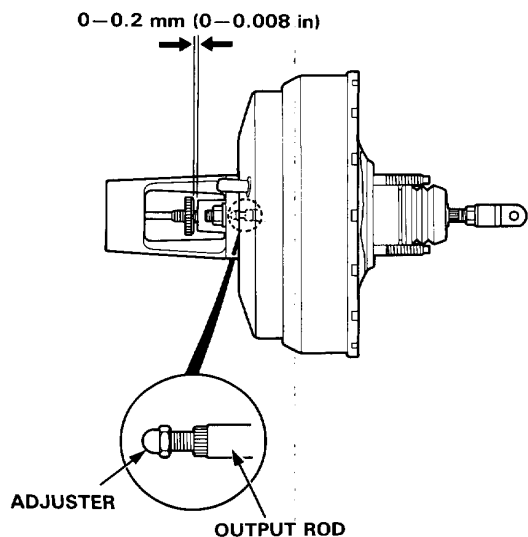
Brake Booster

Pushrod Clearance Adjustment (cont'd)

6. If the clearance is incorrect:
- Cars without ABS: loosen the star locknut and adjust the clearance by turning the adjuster in or out while holding the pushrod.
- Tighten the star locknut to the specified torque and remove the special tool.



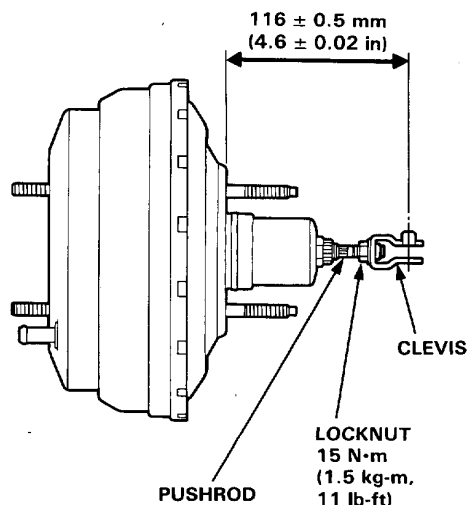
- Cars with ABS: remove the special tool and adjust the clearance by turning the adjuster in or out while holding the output rod.



NOTE: If the clearance between the gauge body and adjusting nut is 0.4 mm (cars with ABS: 0.2 mm), the pushrod-to-piston clearance is 0 mm. If the clearance between the gauge body and adjusting nut is 0 mm, the pushrod-to-piston clearance is 0.4 mm (cars with ABS: 0.2 mm) or more.

Therefore, it must be adjusted and rechecked.

7. Adjust the pushrod length as shown if necessary.



8. After adjustment, loosen the clevis end pushrod locknut and turn the pushrod to obtain the correct pedal height.

Standard Pedal Height From Floor:

Manual Transmission: LHD: 165 mm (6.50 in)
RHD: 180 mm (7.09 in)

Automatic Transmission: 186 mm (7.32 in)
(with floor mat removed)

The pedal should have 1–5 mm (1/16–13/64 in) free play.

9. Adjust the brake light switch (page 19-4).

Rear Disc Brakes

Torque/Inspection

⚠ WARNING


- **Never use an air hose or dry brush to clean brake assemblies.**
- **Use an OSHA-approved vacuum cleaner, to avoid breathing brake dust.**
- **Contaminated brake discs or pads reduce stopping ability.**

CAUTION:

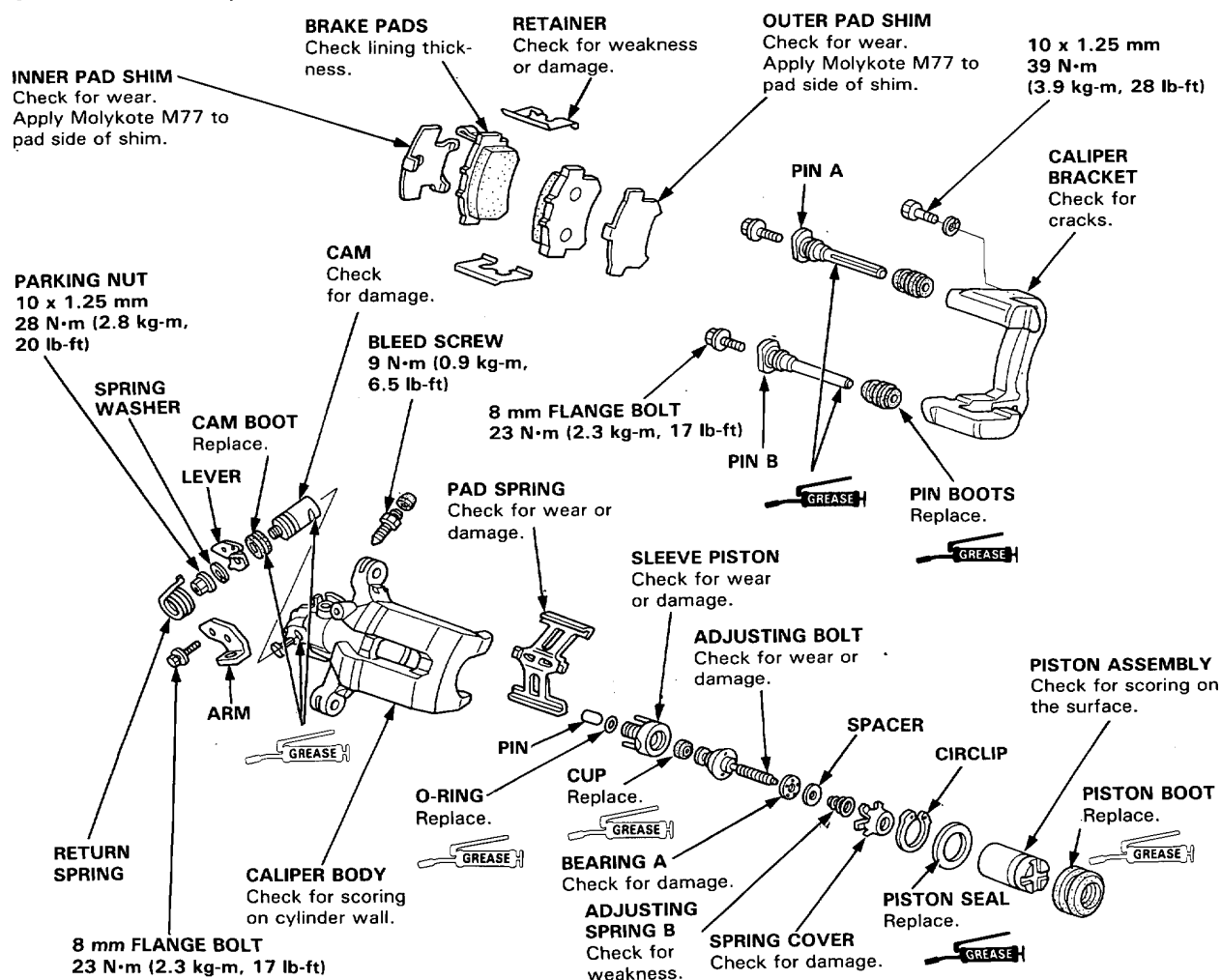
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Clean all parts in brake fluid and air dry; blow out all passage with compressed air.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.

NOTE:

- Coat piston, piston seal, and caliper bore with clean brake fluid.
- Replace all rubber parts with new ones whenever disassembled.

 : Brake Cylinder Grease (P/N: 08733—B020E) or equivalent rubber grease.

GREASE : Silicone grease.



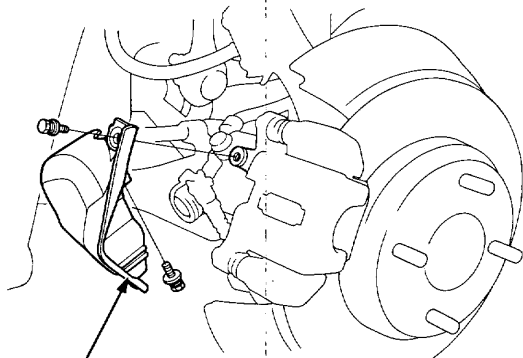
Rear Brake Pads

Inspection/Replacement

⚠ WARNING

- Never use an air hose or dry brush to clean brake assemblies.
- Use a vacuum cleaner, to avoid breathing brake dust.

1. Block the front wheels; loosen the rear wheel lug nuts slightly, support the rear of car on safety stands, then remove the rear wheels. Release the parking brake.
2. Remove the caliper shield.



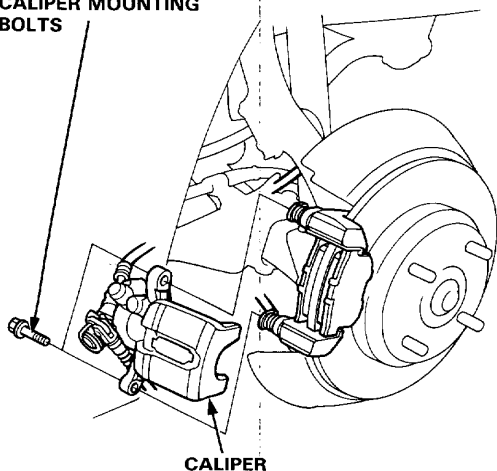
CALIPER SHIELD

3. Remove the two caliper mounting bolts and the caliper from the bracket.

CAUTION:

- Thoroughly clean the outside of the caliper to prevent dust and dirt from entering inside.
- Support the caliper with a piece of wire so that it does not hang from the brake hose.

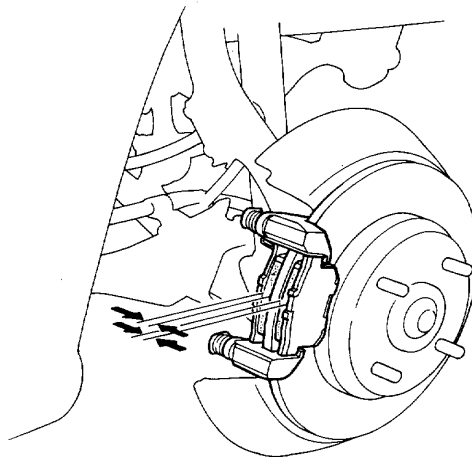
CALIPER MOUNTING BOLTS



CALIPER

If lining thickness is less than service limit at step 5, replace the rear pads as a set.

NOTE: Engagement of the brake may require a greater pedal stroke immediately after the brake pads have been replaced as a set. Several applications of the brake pedal will restore the normal pedal stroke.

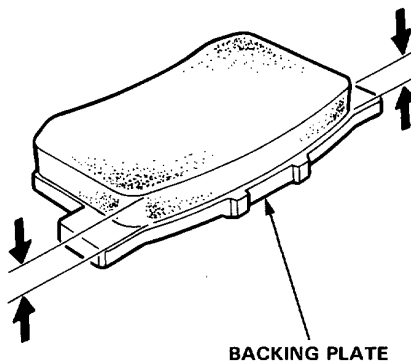


4. Remove the pad shims, pads and pad retainers.
5. Using vernier calipers, measure the thickness of each brake pad lining.

Brake Pad Thickness:

Standard: 9.0 mm (0.35 in)

Service Limit: 1.6 mm (0.06 in)



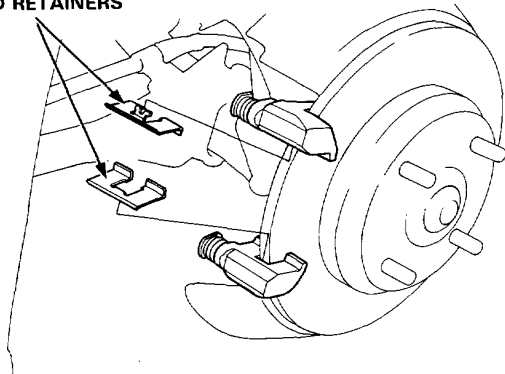
BACKING PLATE

NOTE: Measurement does not include pad backing plate thickness.



6. Clean the caliper thoroughly; remove any rust, and check for grooves or cracks.
7. Make sure that the pad retainers are installed in the correct positions.

PAD RETAINERS



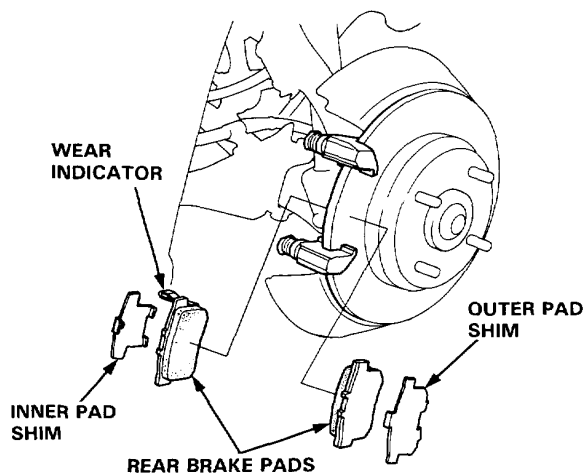
8. Install the brake pads and pad shims on caliper bracket.

⚠ WARNING

- When reusing the pads, always reinstall the brake pads in their original positions to prevent loss of braking efficiency.
- Contaminated brake discs or pads reduce stopping ability. Keep grease off the discs and pads.

NOTE:

- Apply Molykote M77 to the pad side of the shims. Wipe excess grease off the shims.
- Install the inner pad with its wear indicator facing upward.

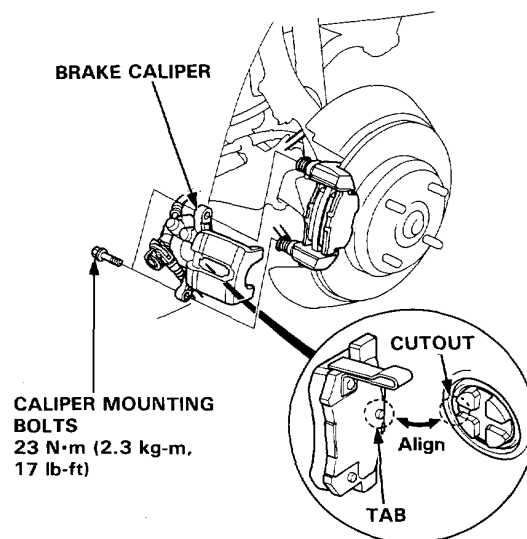


9. Rotate the caliper piston clockwise into place in the cylinder, then align the cutout in the piston with the tab on the inner pad by turning the piston back.

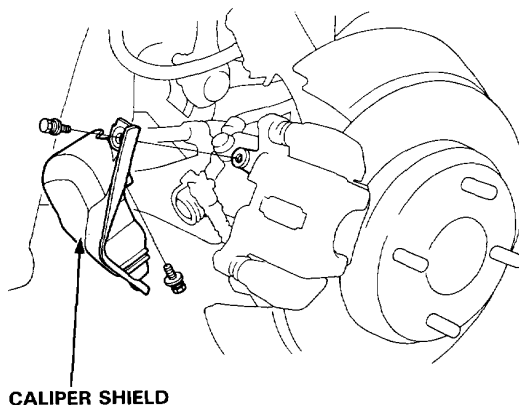
CAUTION: Lubricate the boot with silicone grease to avoid twisting the piston boot. If piston boot is twisted, back it out so it sits properly.

10. Install the brake caliper.

11. Install and tighten the caliper mounting bolts.



12. Install the caliper shield.



13. Depress the brake pedal several times to make sure the brakes work, then road-test.

Rear Brake Disc

Runout Inspection

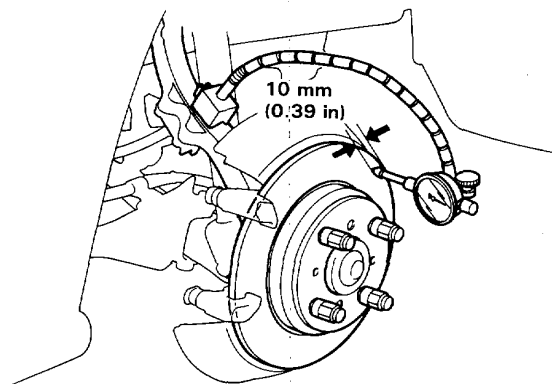
1. Loosen the rear wheel lug nuts slightly, then raise the car and support on safety stands. Remove the rear wheels.
2. Remove the brake pads (page 19-22).
3. Inspect the disc surface for grooves, cracks, and rust. Clean the disc thoroughly and remove all rust.
4. Use lug nuts and suitable plain washers to hold the disc securely against the hub, then mount a dial indicator as shown and measure the runout at 10 mm (0.39 in) from the outer edge of the disc.

Brake Disc Runout:

Service Limit: 0.1 mm (0.004 in)

Max. Refinishing Limit: 8 mm (0.32 in)

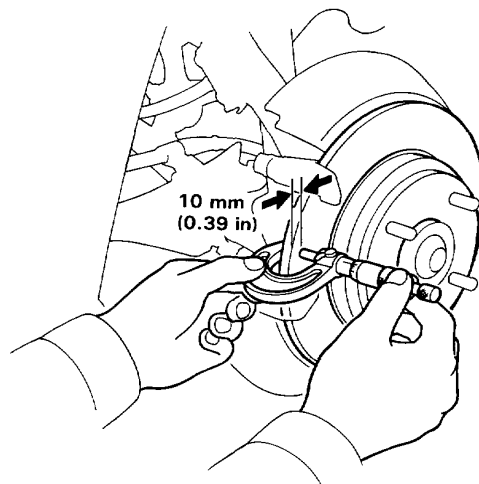
5. If the disc is beyond the service limit, refinish the rotor.



NOTE: A new disc should be refinished if its runout is greater than 0.1 mm (0.004 in).

Thickness and Parallelism Inspection

1. Loosen the rear wheel lug nuts slightly, then raise the car and support on safety stands. Remove the rear wheels.
2. Remove the brake pads (page 19-22).
3. Using a micrometer, measure disc thickness at eight points, approximately 45° apart and 10 mm (0.39 in) in from the outer edge of the disc.



Brake Disc Thickness:

Standard: 10 mm (0.39 in)

Max. Refinishing Limit: 8 mm (0.32 in)

Brake Disc Parallelism:

The difference between any thickness measurements should not be more than 0.015 mm (0.0006 in).

4. If the disc is beyond the service limit for parallelism, refinish the rotor.



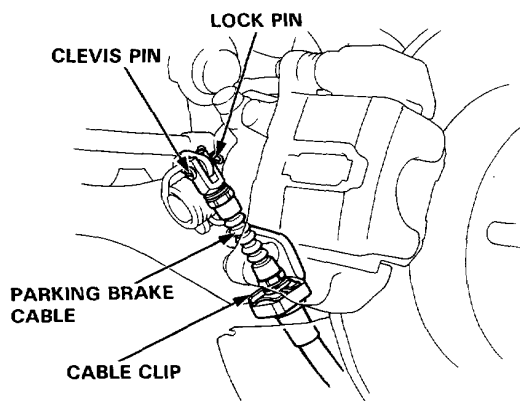
Rear Caliper

Disassembly

CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.

1. Remove the caliper shield (page 19-22).
2. Remove the lock pin and clevis pin. Remove the cable clip and disconnect the cable from the arm.



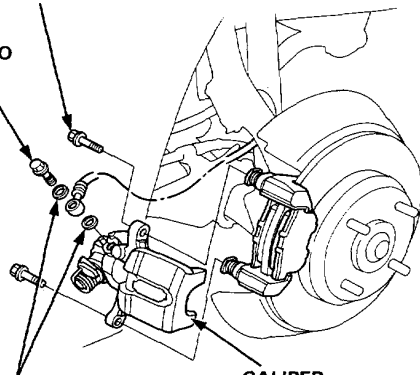
3. Remove the banjo bolt and two sealing washers.
4. Remove the two caliper mounting bolts and caliper body from the bracket.

CALIPER MOUNTING BOLT

BANJO BOLT

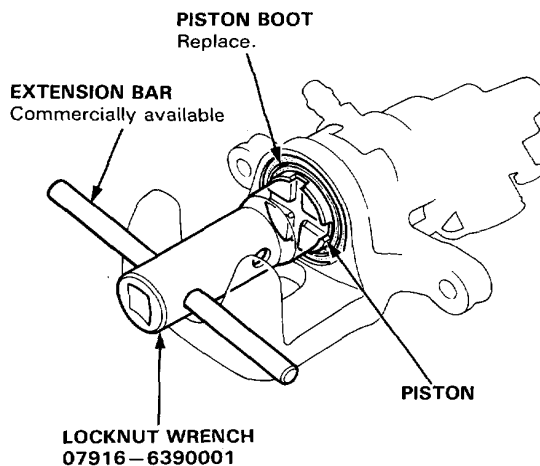
SEALING WASHERS
Replace.

CALIPER BODY



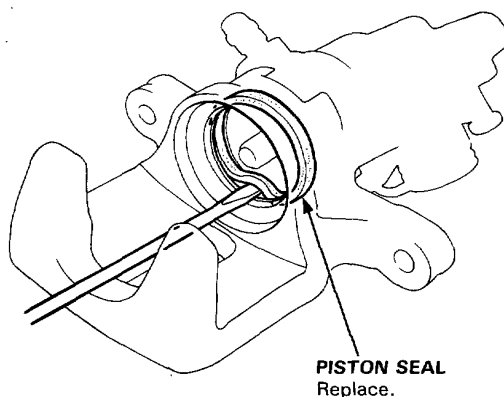
5. Remove the pad spring from the caliper body.
6. Remove the piston by rotating the piston counterclockwise with the special tool and remove the piston boot.

CAUTION: Avoid damaging the piston.



7. Remove the piston seal.

CAUTION: Take care not to damage the cylinder bore.



(cont'd)

Rear Caliper

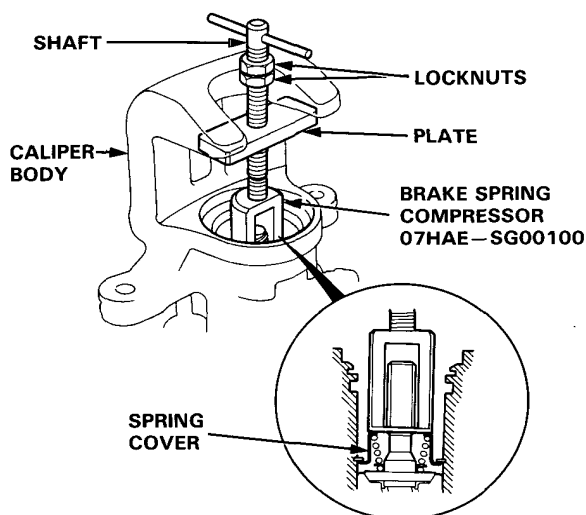
Disassembly (cont'd)

8. Install the special tool between the caliper body and spring cover.

CAUTION: Be careful not to damage the inside of the caliper cylinder during caliper disassembly.

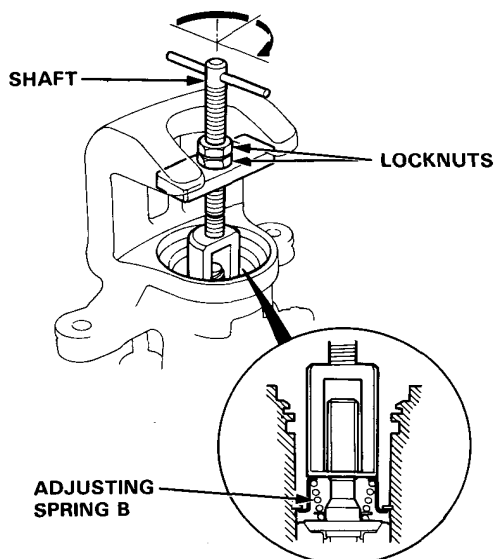
9. Position the locknuts as shown, then turn the shaft until the plate just contacts the caliper body.

NOTE: Do not compress the spring under the spring cover.



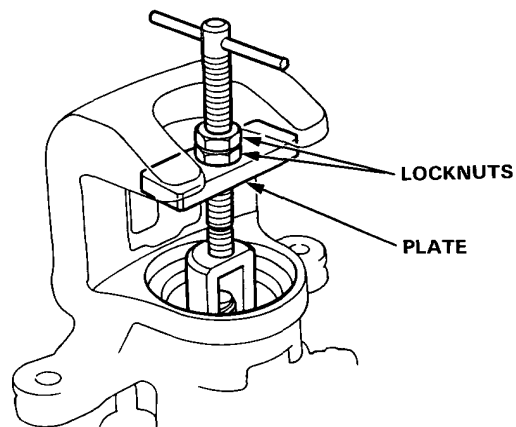
10. Turn the shaft clockwise $1/4$ – $1/2$ turn to compress the adjusting spring B in the caliper body.

CAUTION: To prevent damage to the inner components, do not turn the shaft more than $1/2$ turn.

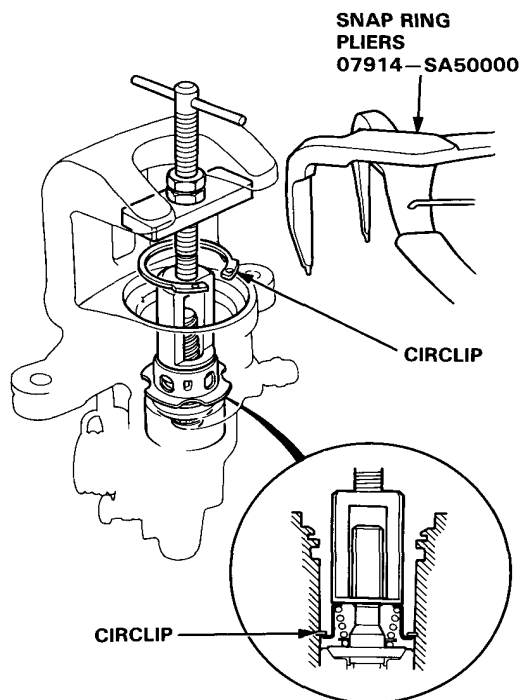


11. Lower the locknuts fully and tighten the locknuts securely.

NOTE: Keep the locknuts in this position until you reinstall the circlip.

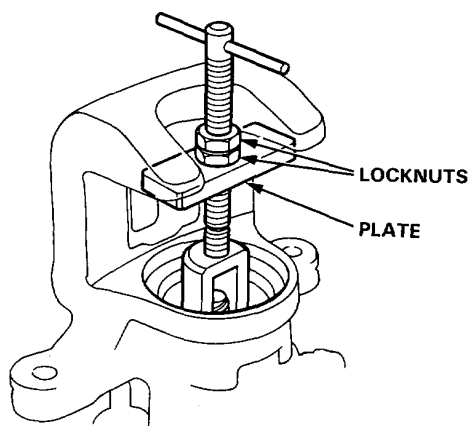


12. Remove the circlip with snap ring pliers.



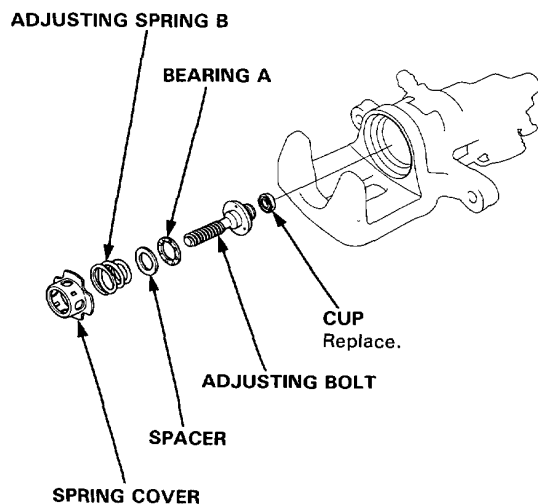


13. Hold the plate with your fingers and turn the shaft counterclockwise. Remove the special tool from the caliper.

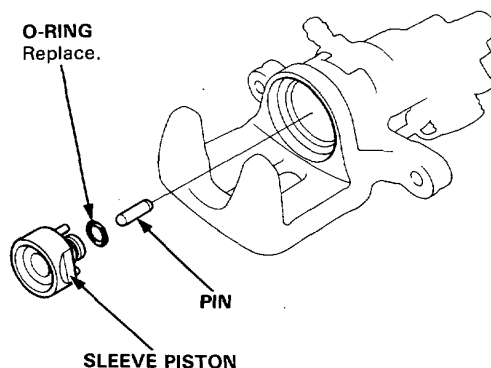


14. Remove the adjusting bolt.

15. Remove the spring cover, adjusting spring B, spacer, bearing A and cup from the adjusting bolt.



16. Remove the sleeve piston, and remove the pin from the cam.

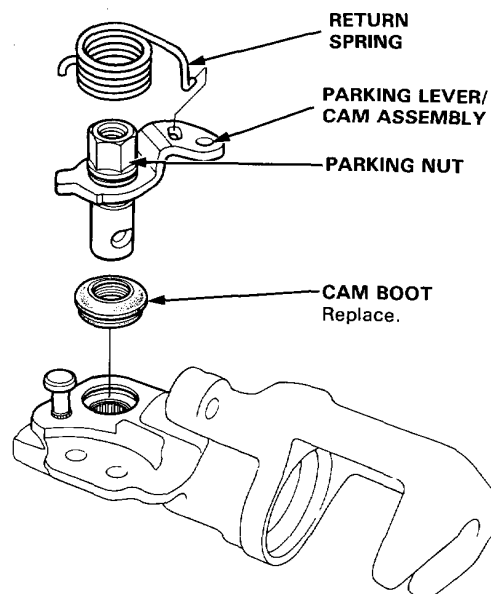


17. Remove the return spring.

18. Remove the parking lever and cam as an assembly from the caliper body.

CAUTION: Do not loosen the parking nut with the cam installed in the caliper body. If the lever and shaft must be separated, hold the lever in a vise and loosen the parking nut.

19. Remove the cam boot.



Rear Caliper

Reassembly

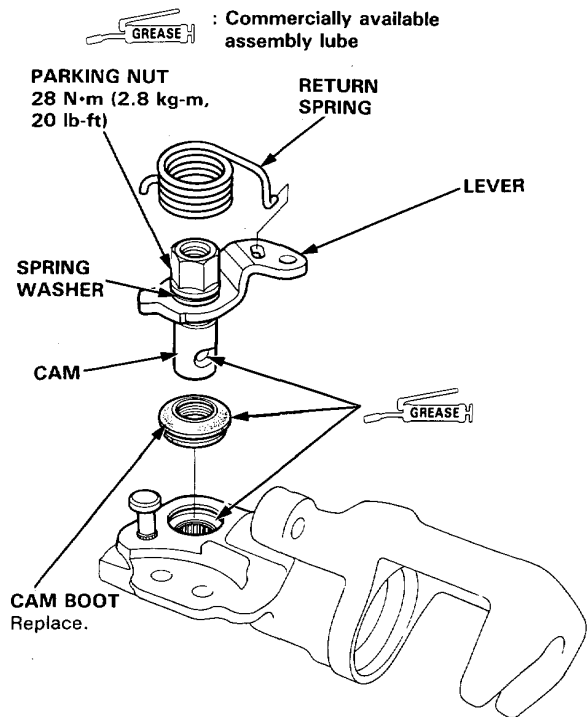
CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.

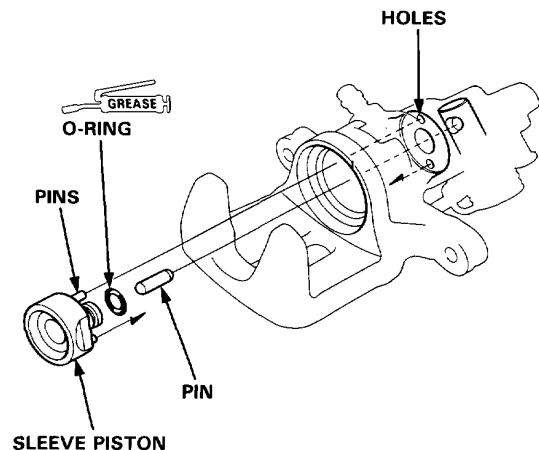
1. Pack all cavities of the needle bearing with commercially available assembly lube.
2. Coat the new cam boot with commercially available assembly lube and install it in the caliper body.
3. Apply commercially available assembly lube to the pin contacting area of the cam and install the cam and lever assembly into the caliper body.
4. Install the return spring.

CAUTION:

- When the cam and lever were separated, be sure to assemble them before installing the cam in the caliper body. Install the lever and spring washer, apply locking agent to the threads, and tighten the parking nut while holding the lever with a vise.
- Avoid damaging the cam boot since it must be installed before the cam.
- When installing the cam, do not allow the cam boot lips to turn outside in.



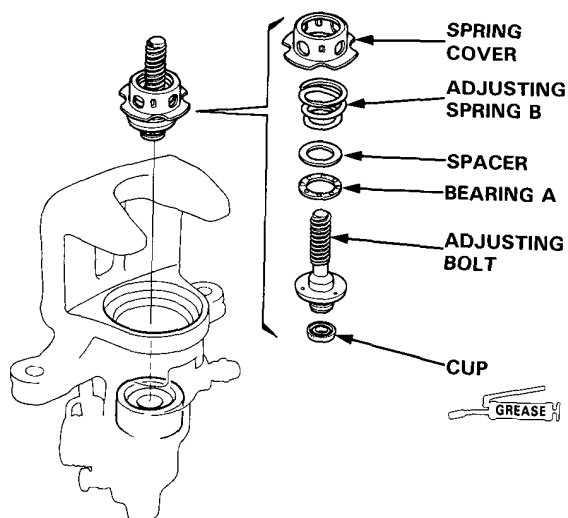
5. Install the pin in the cam.
6. Install a new O-ring on the sleeve piston.
7. Install the sleeve piston so the hole in the bottom of the piston is aligned with the pin in the cam, and two pins on the piston are aligned with the holes in the caliper.



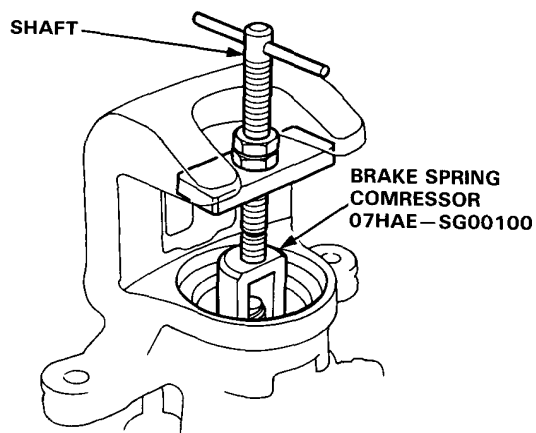


8. Coat a new cup with Brake Cylinder Grease (P/N: 08733—B020E) or equivalent rubber grease, and install it with its groove facing the bearing A side of the adjusting bolt.

9. Fit the bearing A, spacer, adjusting spring B and spring cover on the adjusting bolt, and install them in the caliper cylinder.



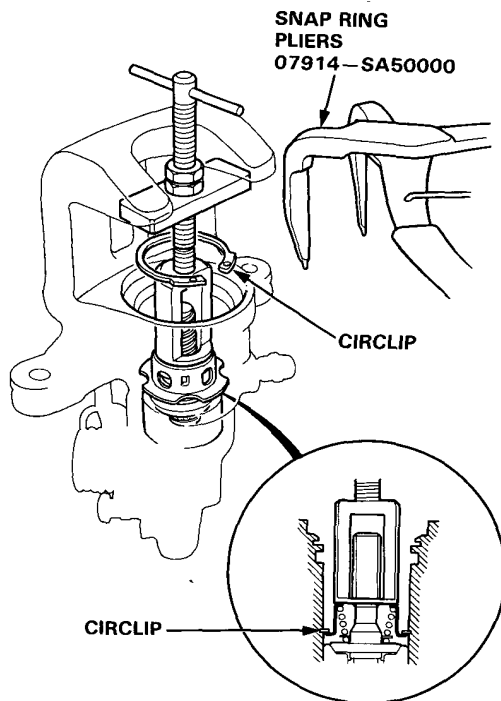
10. Install the special tool on the spring cover and turn the shaft until the locknut contacts the plate.



11. Check that the flared end of the spring cover is below the circlip groove.

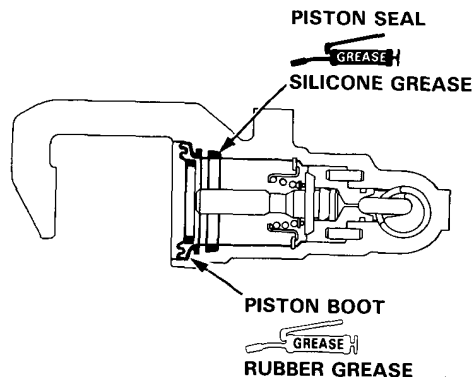
12. Install the circlip in the groove, then remove the special tool.

NOTE: Check that the circlip is seated in the groove properly.



13. Coat a new piston seal with silicone grease and install it in the caliper.

14. Apply Brake Cylinder Grease (P/N: 08733—B020E) or equivalent rubber grease to the sealing lips and inside of a new piston boot, and install it in the caliper.



(cont'd)

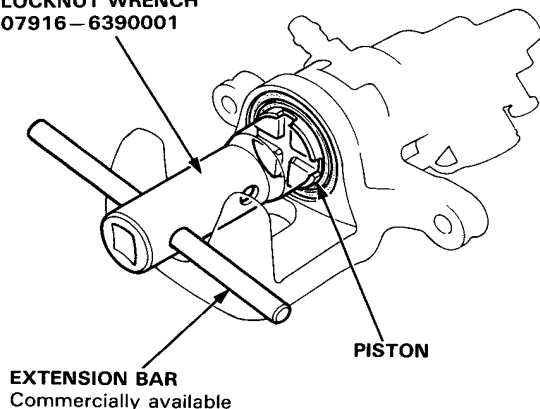
Rear Caliper

Reassembly (cont'd)

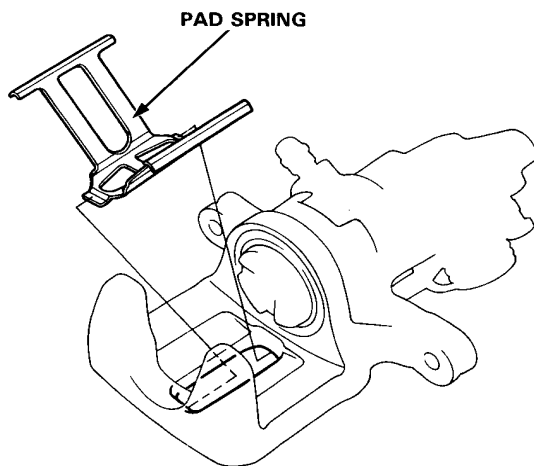
15. Coat the outside of the piston with brake fluid and install it on the adjusting bolt while rotating it clockwise with the special tool.

CAUTION: Avoid damaging the piston and piston boot.

LOCKNUT WRENCH
07916-6390001



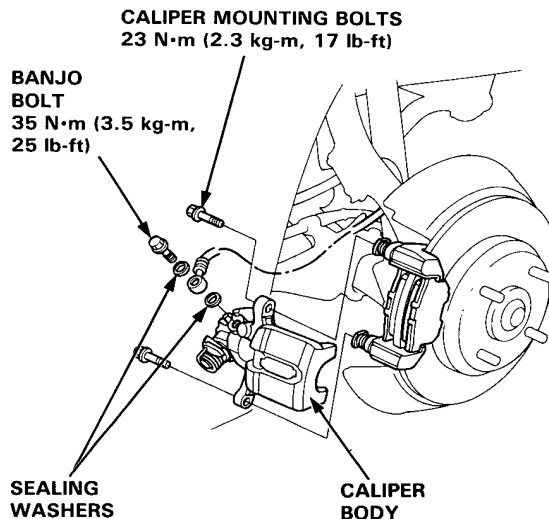
16. Install the pad spring on the caliper.



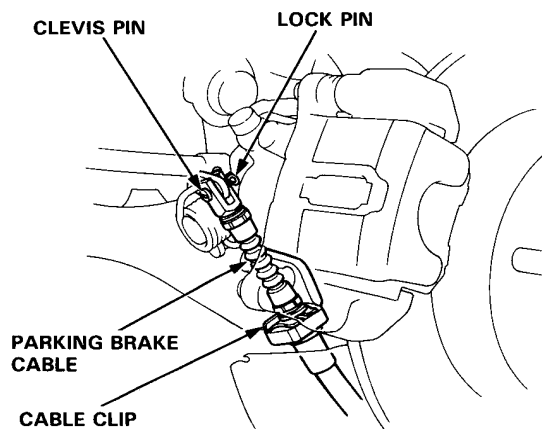
17. Install the brake pad retainers and brake pads.
18. Align the cutout in the piston with the tab on the inner pad (page 19-23).

19. Install the caliper on the caliper bracket and tighten the caliper mounting bolts.

20. Connect the brake hose to the caliper with new sealing washers and tighten the banjo bolt.



21. Insert the cable through the arm and connect the cable to the lever with the clevis pin and lock pin. Install the cable clip securely.



22. Fill the brake reservoir up and bleed the brake system (page 19-12).

23. Operate the brake pedal several times, then adjust the parking brake (page 19-5).

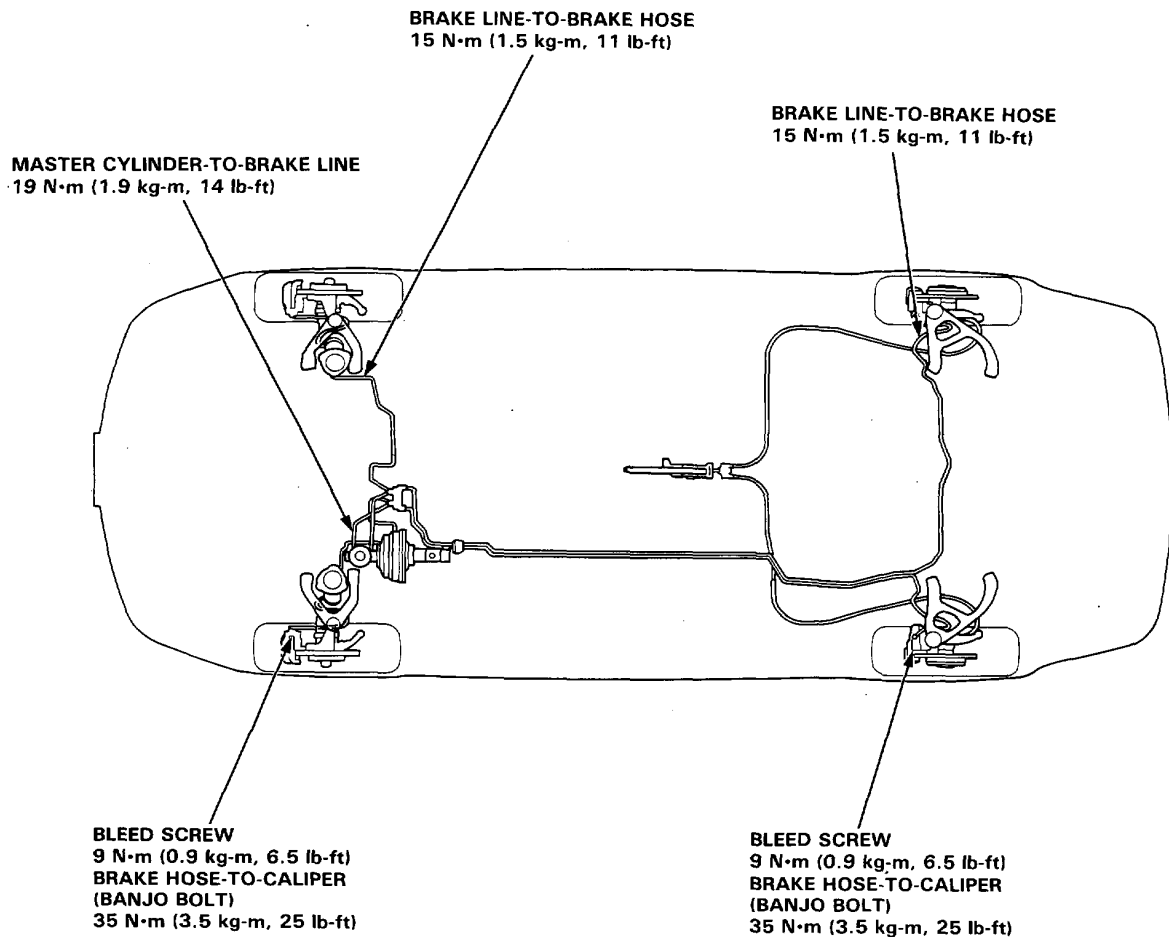
Brake Hoses/Pipes

Inspection



1. Inspect the brake hoses for damage, leaks, interference or twisting.
2. Check the brake lines for damage, rusting or leakage. Also check for bent brake lines.
3. Check for leaks at hose and line joints or connections, and retighten if necessary.

CAUTION: Replace the brake hose clip whenever the brake hose is serviced.



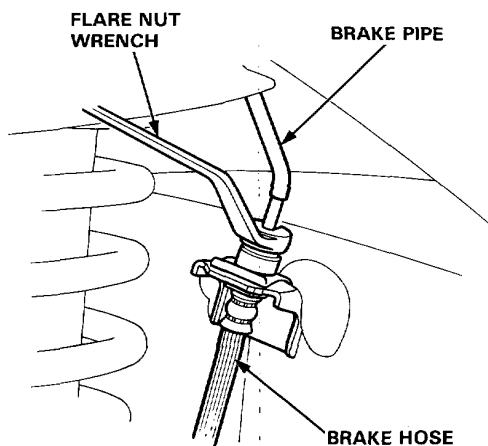
Brake Hoses/Pipes

Brake Hose Replacement

CAUTION:

- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Use only clean DOT 3 or DOT 4 brake fluid.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.

1. Replace the brake hose if the hose is twisted, cracked or if it leaks.
2. Disconnect the brake hose from the brake pipe using a 10 mm flare nut wrench.



3. Remove and discard the brake hose clip from the brake hose.
4. Remove the banjo bolt and disconnect the brake hose from the caliper.
5. Remove the brake hose clamp bolts and the brake hose.

BRAKE HOSE CLIP Replace.

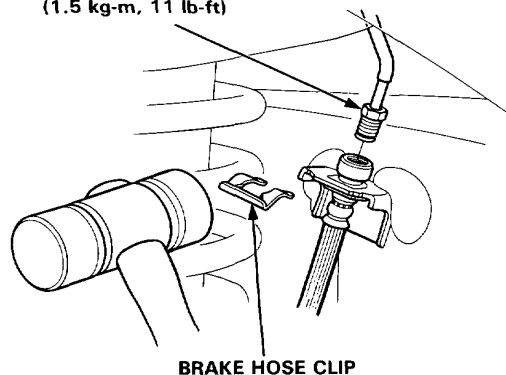
8 x 1.25 mm
22 N·m (2.2 kg-m,
16 lb-ft)

BANJO BOLT
10 x 1.0 mm
35 N·m
(3.5 kg-m, 25 lb-ft)

6 x 1.0 mm
10 N·m (1.0 kg-m,
7 lb-ft)

6. Install a new brake hose with the brake hose clamp bolts.
7. Connect the brake hose to the caliper with the banjo bolt and new sealing washers.
8. Install a new brake hose clip on the brake hose.
9. Connect the brake hose to the brake pipe.

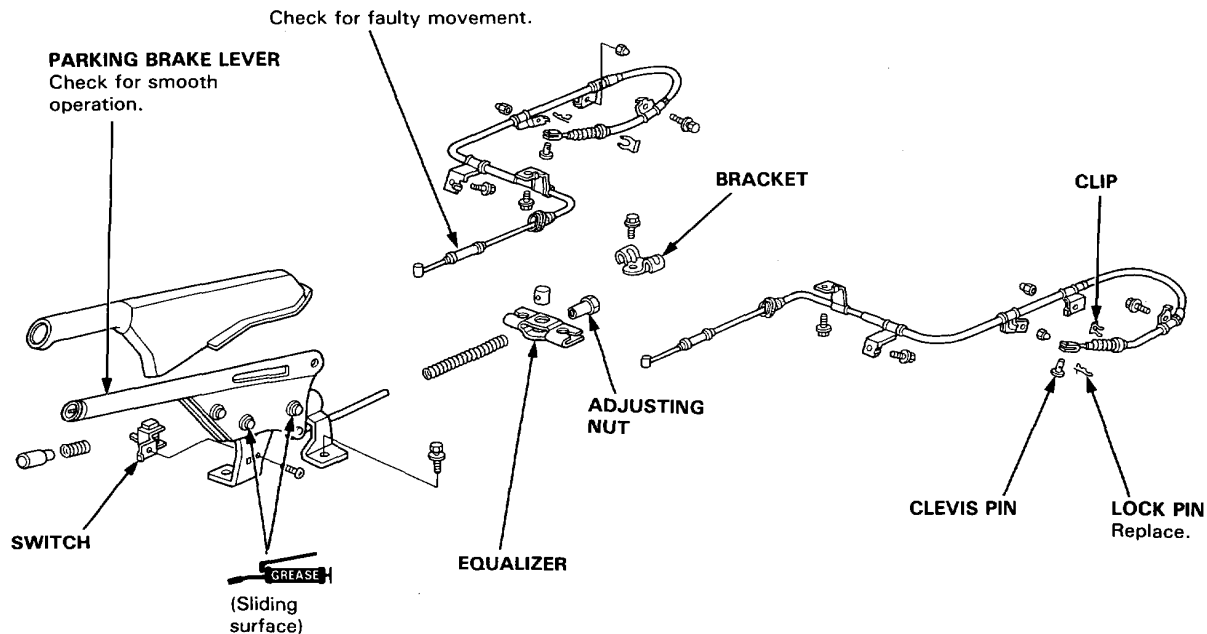
15 N·m
(1.5 kg-m, 11 lb-ft)



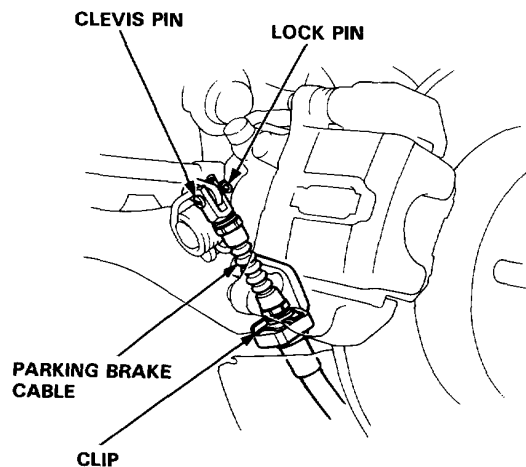
10. After installing the brake hose, bleed the brake system (page 19-12), check the hose and line joints for leaks, and tighten if necessary.

Parking Brake

Disassembly and Reassembly



Disconnect the parking brake cable from the lever on the caliper by removing the lock pin and clevis pin, and remove the cable from the arm by removing the clip.



Anti-lock Brake System

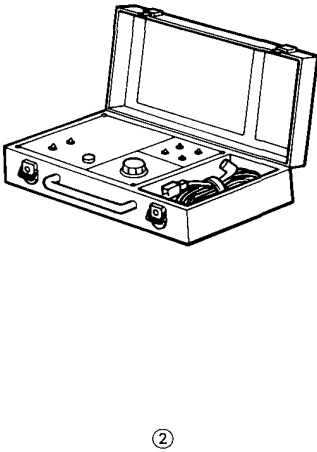
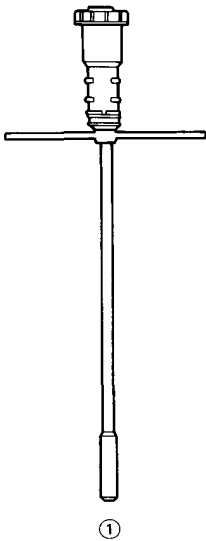
Special Tools	19-36	Modulator/Pump (for RHD)	
Illustrated Index	19-37	Removal/Installation	19-88
Anti-lock Brake System		Solenoids	
Features/Construction/		Leak Test	19-90
Operation	19-38	Modulator	
Circuit Diagram	19-50	Index/Torque	19-91
Wiring/Connector Locations	19-54	Piston	
ALB Checker		Replacement	19-92
Function Test	19-55	Pump (for RHD)	
Wheel Sensor Signal		Replacement	19-94
Confirmation	19-57	Accumulator	
Troubleshooting		Disposal	19-94
Anti-lock Brake System		Bleeding	19-95
Indicator Light	19-58	Master Cylinder	
Symptom-to-System Chart	19-60	Inspection	19-96
Flowcharts	19-61	Disassembly	19-97
Hydraulic System		Reassembly	19-98
Index/Hydraulic Connections	19-84	Electronic Components	
Relieving Accumulator/		Control Unit Replacement	19-100
Line Pressure	19-85	Relay Inspection	19-100
Modulator Unit (for LHD)		Pulsers/Sensors	
Removal/Installation	19-86	Inspection	19-101
Index/Torque	19-87	Replacement	19-102



ABS

Special Tools

Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07HAA—SG00100 or 07HAA—SG00101	Bleeder-T Wrench	1	19-61, 19-68, 19-85, 19-95
②	07HAJ—SG00602 or 07HAJ—SG00601 or 07508—SB00000 and 07HAJ—SG00400	ALB Checker	1	19-55, 19-57, 19-95
		Adaptor	1	



Illustrated Index

⚠ WARNING The accumulator contains high-pressure nitrogen gas, do not puncture, expose to flame or attempt to disassemble the accumulator or it may explode; severe personal injury may result.

HYDRAULIC SYSTEM

Hydraulic Connection, page 19-84
Relieving Accumulator/Line
Pressure, page 19-85
Bleeding, page 19-95

MODULATOR UNIT (for LHD)

Removal/Installation, page 19-86
Index/Torque, page 19-87

MODULATOR/PUMP (for RHD)

Removal/Installation, page 19-88
Pump Replacement, page 19-94

SOLENOIDS

Leak Test, page 19-90

MODULATOR

Index/Torque, page 19-91
Piston Replacement, page 19-92

CONTROL UNIT

Replacement, page 19-100

REAR SPEED SENSOR

Inspection, page 19-101
Replacement, page 19-102

BRAKE HOSES/PIPES

Inspection, page 19-31
Brake Hose Replacement,
page 19-32

PARKING BRAKE

Adjustment, page 19-5
Disassembly and
Reassembly, page 19-33

BRAKE PEDAL

Adjustment, page 19-4

FRONT BRAKES

Torque/Inspection, page 19-6
Front Brake Pads, page 19-7
Front Caliper, page 19-9
Front Brake Disc, page 19-11

MASTER CYLINDER AND BRAKE BOOSTER

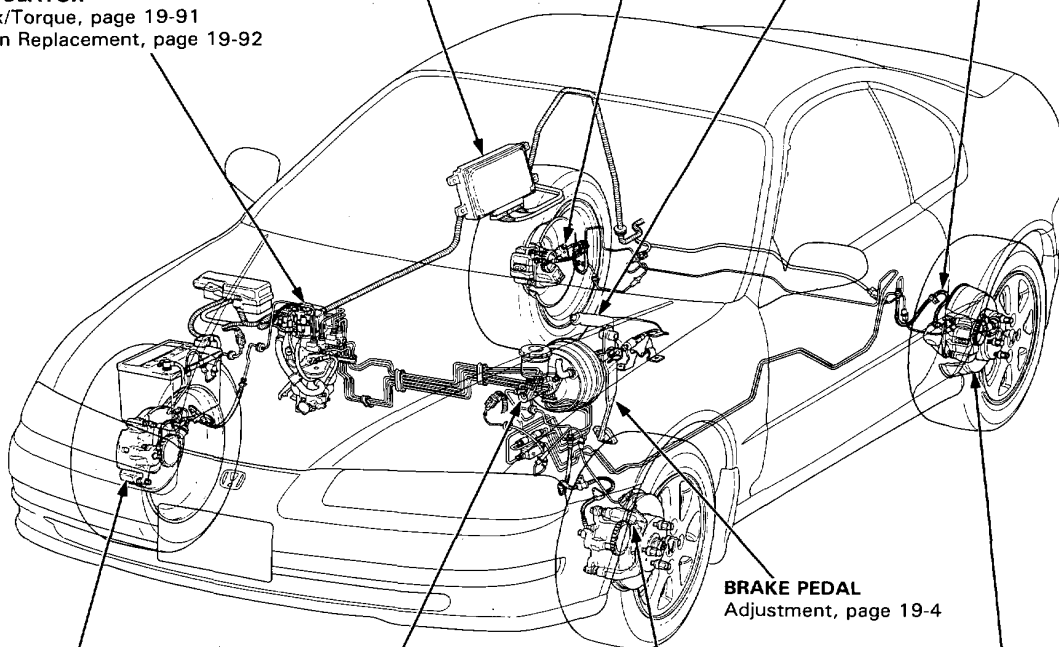
Hydraulic Connection, page 19-84
Master Cylinder, page 19-96
Brake Booster, page 19-18

FRONT SPEED SENSOR

Inspection, page 19-101
Replacement, page 19-102

REAR DISC BRAKES

Torque/Inspection, page 19-21
Rear Brake Pads, page 19-22
Rear Brake Disc, page 19-24
Rear Caliper, page 19-25



Anti-lock Brake System

Features/Construction/Operation

In a conventional brake system, if the brake pedal is depressed very hard, the wheels can lock before the vehicle comes to a stop. In such a case, the stability of the vehicle is reduced if the rear wheels are locked, and maneuverability of the vehicle is reduced if the front wheels are locked, creating an extremely unstable condition.

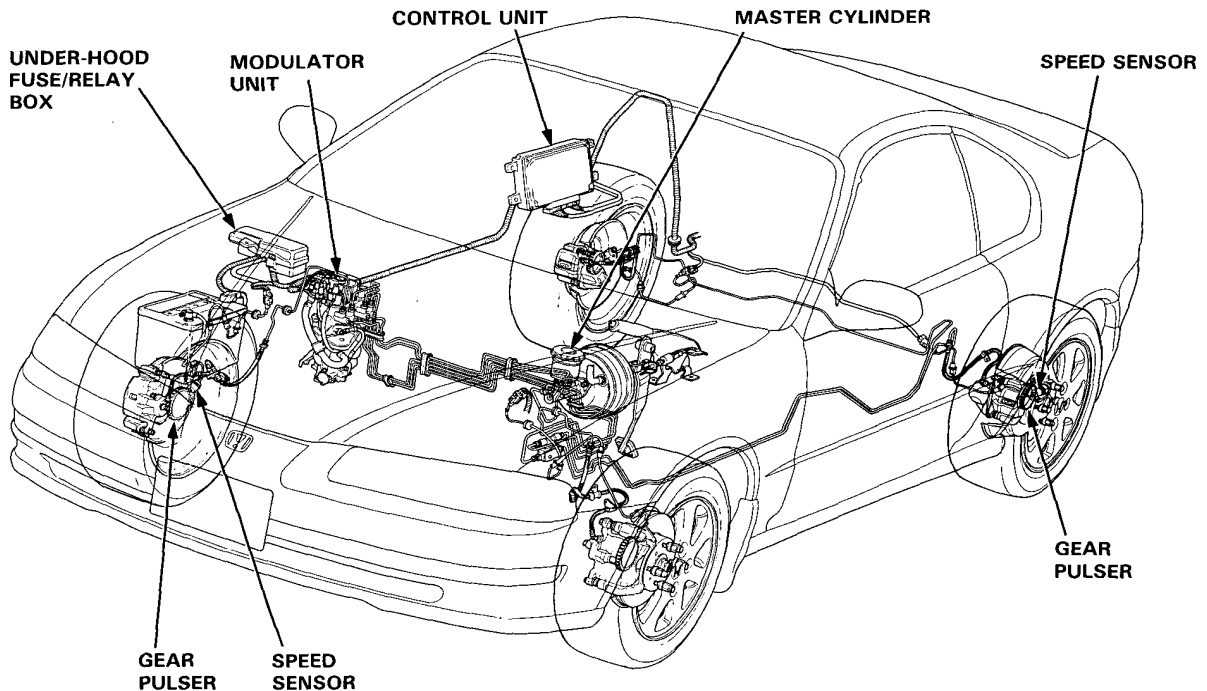
The Anti-lock Brake System (ABS) modulates the pressure of the brake fluid applied to each front caliper or both rear calipers thereby preventing the locking of the wheels, whenever the wheels are likely to be locked due to hard braking. It then restores normal hydraulic pressure when there is no longer any possibility of wheel locking.

Features

- Increased braking stability can be achieved regardless of changing driving conditions.
- The maneuverability of the vehicle is improved as the system prevents the front wheels from locking.
- When the anti-lock brake system goes into action, a kickback is felt on the brake pedal.
- The system is equipped with a self-diagnosis function. When an abnormality is detected, the anti-lock brake system indicator light comes on. The location of the system's trouble can be diagnosed from the frequency of the system indicator light blinks.
- This system has individual control of the front wheels and common control ("Select Low") for the rear wheels. "Select Low" means that the rear wheel that would lock first (the one with the lowest resistance to lock-up) determines anti-lock brake system activation for both rear wheels.
- The system has a fail-safe function that allows normal braking if there's a problem with the anti-lock brake system.

Construction

In addition to the conventional braking system, the anti-lock brake system consists of: gear pulsers attached to the rotating part of individual wheels; speed sensors, which generate pulse signals corresponding to the revolution of the gear pulsers; control unit, which controls the working of the anti-lock brake system by performing calculations based on the signals from the individual speed sensors and the individual switches; modulator unit, which adjusts the hydraulic pressure applied to each caliper on the basis of the signals received from the control unit; an accumulator, in which high-pressure brake fluid is stored, a pressure switch, which detects the pressure in the accumulator and transmits signals to the control unit; a power unit, which supplies the high-pressure working fluid to the accumulator by means of a pump; a motor relay for driving the power unit; fail-safe relays, which cut off the solenoid valve ground circuit when the fail-safe device is at work; and, an indicator light.



Master Cylinder

1. Construction

A tandem master cylinder is used to improve the safety of the braking system. In addition, center valves are used so as to match the anti-lock brake system operation.

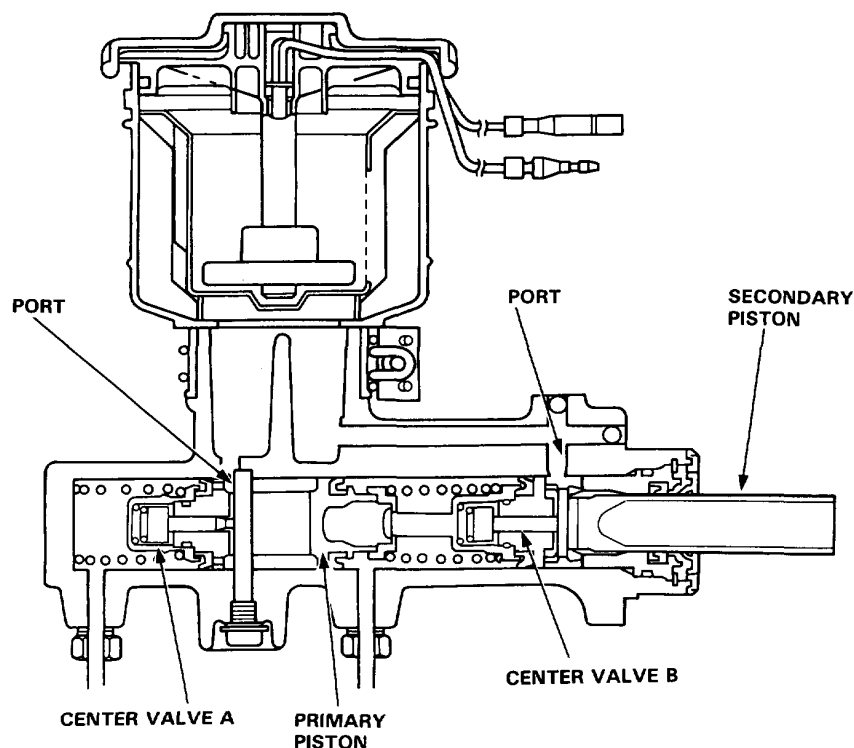
The master cylinder has one reservoir tank which is connected to the cylinder sections by two small holes. It has two pistons: primary and secondary, which are criss-cross connected with the calipers so that the fluid pressure works separately on each system (front right wheel & rear left wheel, and front left wheel & rear right wheel).

A stop bolt for controlling movement of the primary piston is provided at the side of the master cylinder body. A reed switch for detecting the brake fluid volume is also provided in the cap of the reservoir tank.

2. Operation

When the brake pedal is depressed, the secondary piston is pushed through the brake booster and the center valve B is closed so that fluid pressure is generated on the secondary side. At the same time, the primary piston is pushed by the secondary fluid pressure and the center valve A is closed so that braking fluid pressure is generated both on the primary and secondary sides.

When the brake pedal is released, the primary and secondary pistons are returned to the original position by the brake fluid pressure and piston spring.



(cont'd)

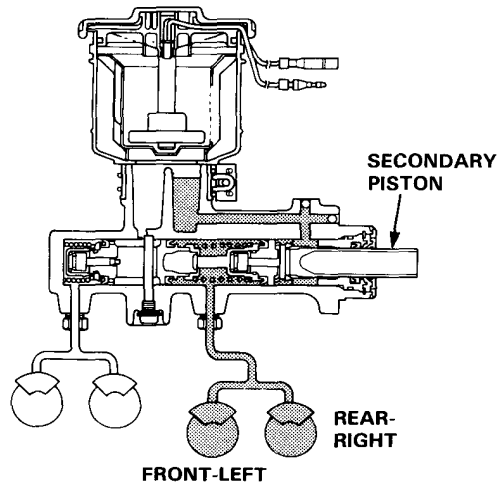
Anti-lock Brake System

Features/Construction/Operation (cont'd)

3. Responses when fluid is leaking

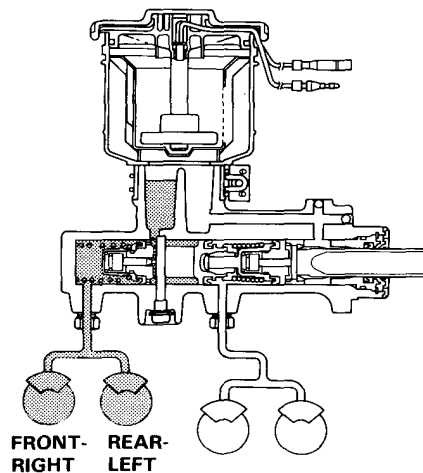
(1) In case of leaking from the primary system:

Since the fluid pressure on the primary side does not rise, the primary piston is pushed by the fluid pressure of the secondary piston and the tension of the piston spring until the end hits on the cylinder. The braking is performed by the fluid pressure on the secondary side.



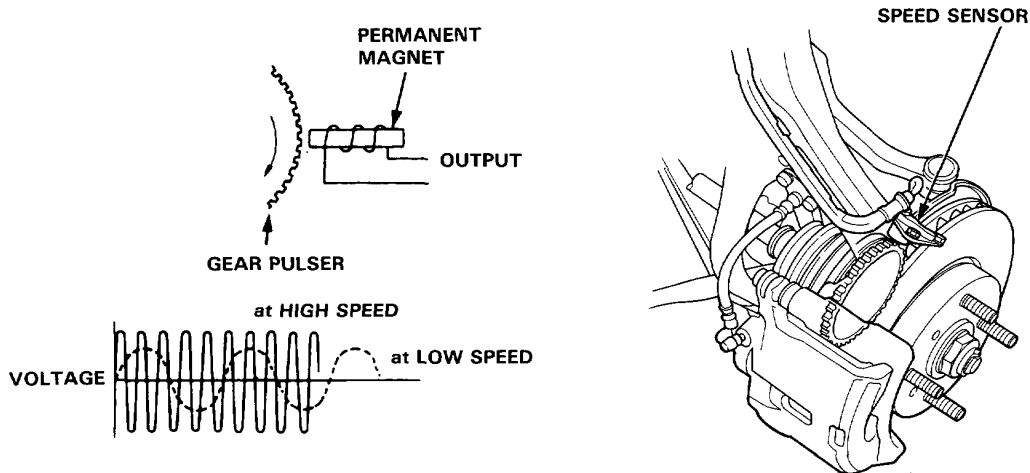
(2) In case of leaking from the secondary system:

The secondary piston does not produce fluid pressure, keeps moving ahead, hits on the end surface of the primary piston so that the primary piston is pushed under the same condition as an ordinary rod. Therefore, the braking is conducted by the fluid pressure on the primary side.



Speed Sensor

The speed sensor is a contactless type that detects the rotating speed of a wheel. It is comprised of a permanent magnet and coil. When the gear pulsers attached to the rotating parts of each wheel (front wheel: outboard joint of the driveshaft, rear: hub bearing unit) turn, the magnetic flux around the coil in the speed sensor alternates, generating voltages with frequency in proportion to wheel rotating speed. These pulses are sent to the control unit and the control unit identifies the wheel speeds.



Control Unit

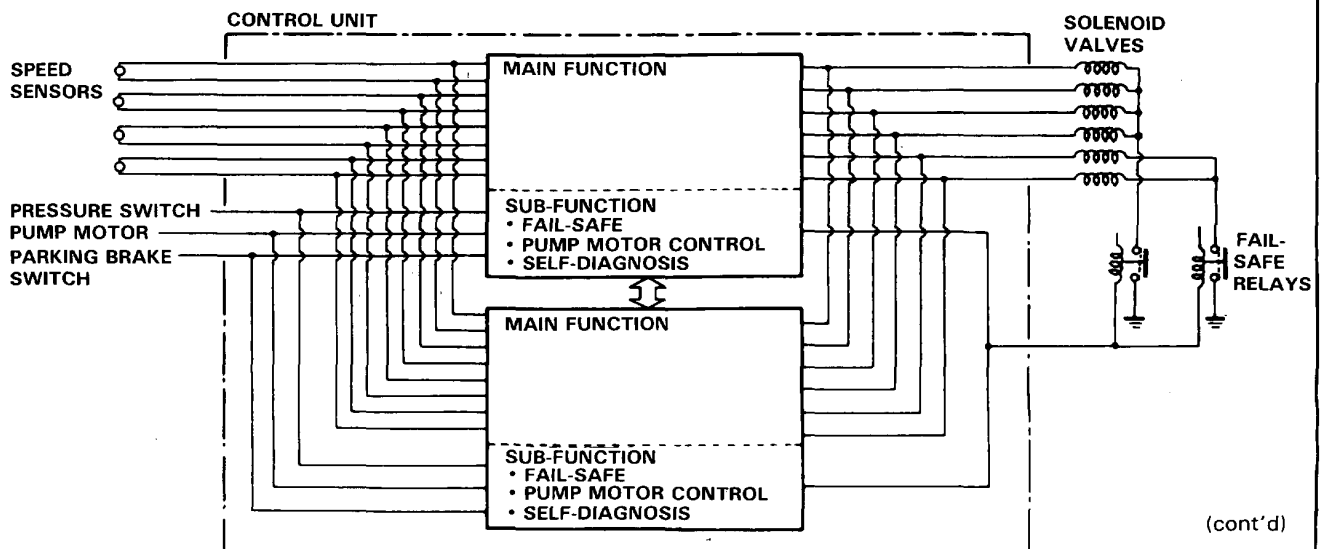
The control unit consists of a main function section, which controls the operation of the anti-lock brake system, and sub-function, which controls the pump motor and "self-diagnosis".

1. Main Function

The main function section of the control unit performs calculations on the basis of the signals from each speed sensor and controls the operation of the anti-lock brake system by putting into action the solenoid valves in the modulator unit for each front brake and for the two rear brakes.

2. Sub-function

The sub-function section gives driving signals to the pump motor and also gives "self-diagnosis" signals, necessary for backing up the anti-lock brake system.



(cont'd)

Anti-lock Brake System

Features/Construction/Operation (cont'd)

1. Self-diagnostic Function

Since the anti-lock brake system modulates the braking pressure when a wheel is about to lock, regardless of the driver's intention, the system operation and the braking power will be impaired if there is a malfunction in the system. To prevent this possibility, at speeds above 6 km/h, the self-diagnosis function, provided in the sub-function of the control unit, monitors the main system functions. When an abnormality is detected, the anti-lock brake system indicator light goes on. There is also a check mode of the self-diagnosis system itself; when the ignition switch is first turned on, the anti-lock brake system indicator light comes on and stays on for a few seconds after the engine starts, to signify that the self-diagnosis system is functional.

2. Fail-safe Function

When abnormality is detected in the control system by the self-diagnosis, the solenoid operations are suspended by turning off the relays (fail-safe relays) which disconnect the ground lines of all the solenoid valves to inhibit anti-lock brake system operations. Under these conditions, the braking system functions just as an ordinary one, maintaining the necessary braking function. When the anti-lock brake system indicator light is turned on, it means the fail-safe is functioning.

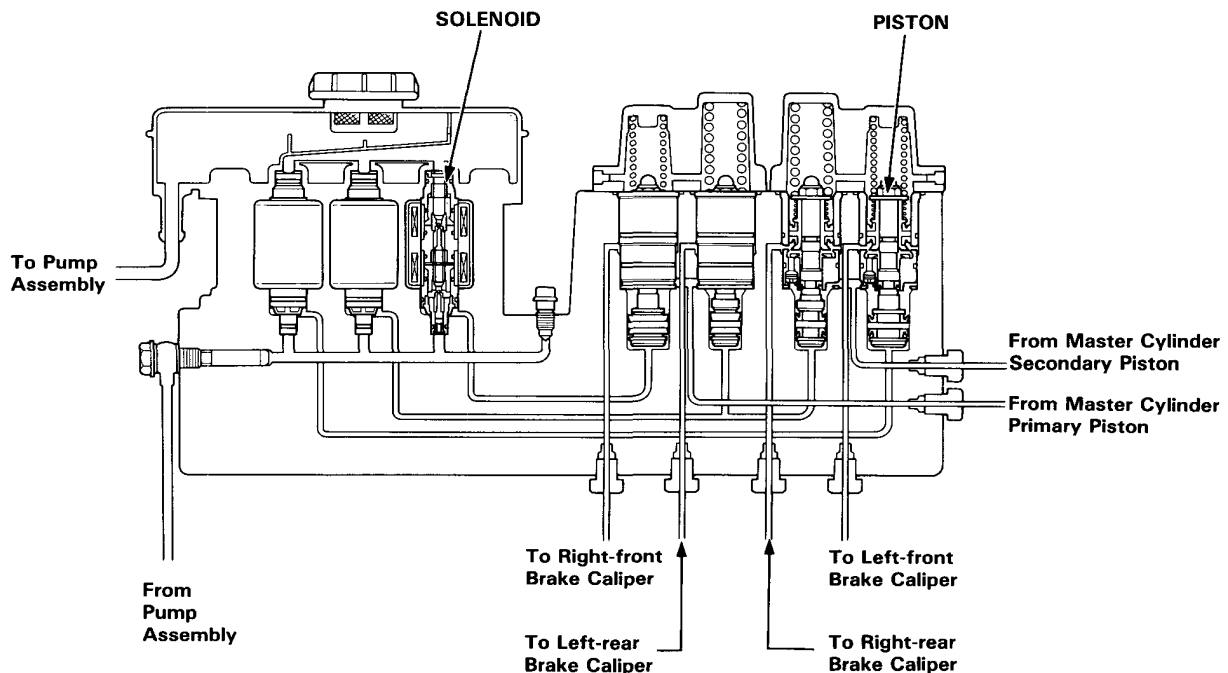
Modulator Unit

Modulators for each wheel and solenoid valves are integrated in the modulator unit.

The modulators for front and rear brakes are of independent construction and are positioned vertically for improved maintainability. The modulators for rear brakes are provided with a PCV function (Proportioning Control Valve) in order to prevent the rear wheel from locking when the anti-lock brake system is malfunctioning or the anti-lock brake system is not activated.

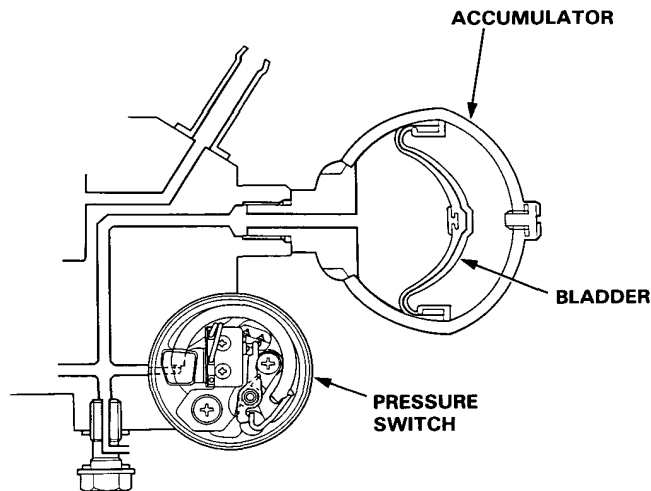
The solenoid valve features quick response (5 ms or less).

The inlet and outlet valves are integrated in the solenoid valve unit. There are three solenoid valves provided, one for each front wheel, and one for the rear wheels.



Accumulator

The accumulator is a pneumatic type which accumulates high-pressure brake fluid fed from the pump incorporated in the power unit. When the anti-lock brake system operates, the accumulator and the power unit supply high-pressure brake fluid to the modulator valve via the inlet side of the solenoid valve.

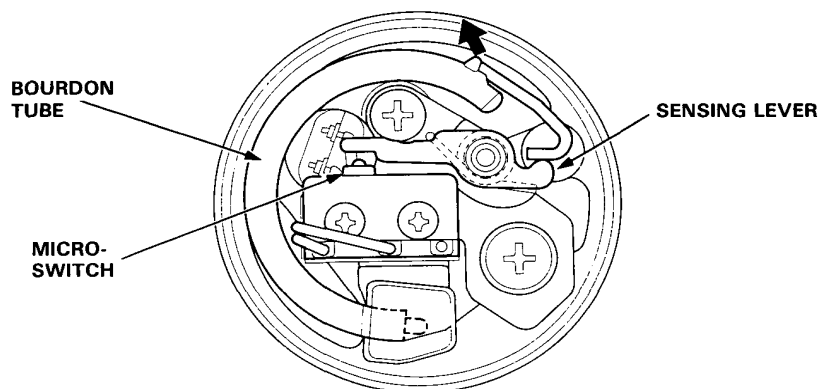


Pressure Switch

The pressure switch monitors the pressure accumulation (pressure from the pump) in the accumulator and is turned off when the pressure becomes lower than a prescribed level. When the pressure switch is turned off, the switching signal is sent to the control unit. Upon receiving the signal, the control unit activates the pump motor relay to operate the motor. If the pressure doesn't reach the prescribed value, the anti-lock brake system indicator light comes on.

Operation

When the pressure in the accumulator rises, the Bourdon tube in the pressure switch deforms outwards. When the free end of the Bourdon tube moves more than the prescribed amount, the micro-switch is activated by the force of the spring attached to the sensing lever. When the pressure in the accumulator decreases due to anti-lock brake system operations, the Bourdon tube moves in the direction opposite to the one described above, and the micro-switch is eventually turned off. Upon receiving this signal, the control unit activates the motor relay to operate the motor.



(cont'd)

Anti-lock Brake System

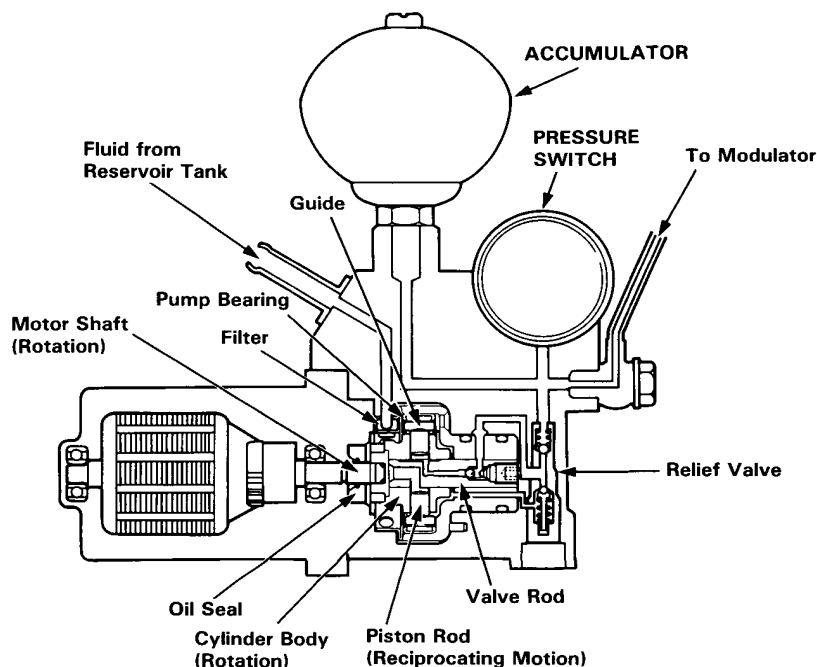
Features/Construction/Operation (cont'd)

Power Unit

The power unit consists of a motor, filter, guide, piston rod and cylinder body. Since a guide is positioned off-set to the center of the motor shaft, the rotation of the motor and cylinder body provides the reciprocating motion to the piston rod. The brake fluid is thus pressurized and fed to the relief valve, accumulator and modulator.

As the pressure in the accumulator exceeds the prescribed level, the pressure switch is turned on. Approx. 0.5 seconds after receiving the ON-signal, the control unit stops the motor relay operation. In this state, the pressure in the accumulator reaches 230 kg/cm².

If the pressure doesn't reach the prescribed value after the motor has operated continuously for a specified period, the control unit stops the motor and activates the anti-lock brake system indicator light.



Anti-lock Brake System Indicator Light

This warning system turns on the anti-lock brake indicator light when one or more of the below described abnormalities is detected. This is only a partial list.

- When the operating time of the motor in the power unit exceeds the specified period.
- When vehicle running time exceeds 30 seconds without releasing the parking brake lever.
- When one of the rear wheels is locked during running.
- When absence of speed signals from any of the four speed sensors is detected.
- When the activation time of all solenoids exceeds a given time or an open or short circuit is detected in the solenoid system.
- When solenoid output is not detected in the simulated anti-lock brake system operation carried out during running at speeds of 6 mph (10 km/h) or more.

To check the indicator light bulb, the light is activated when the ignition switch is turned on. It is turned off after the engine is started if there is no abnormality in the system.

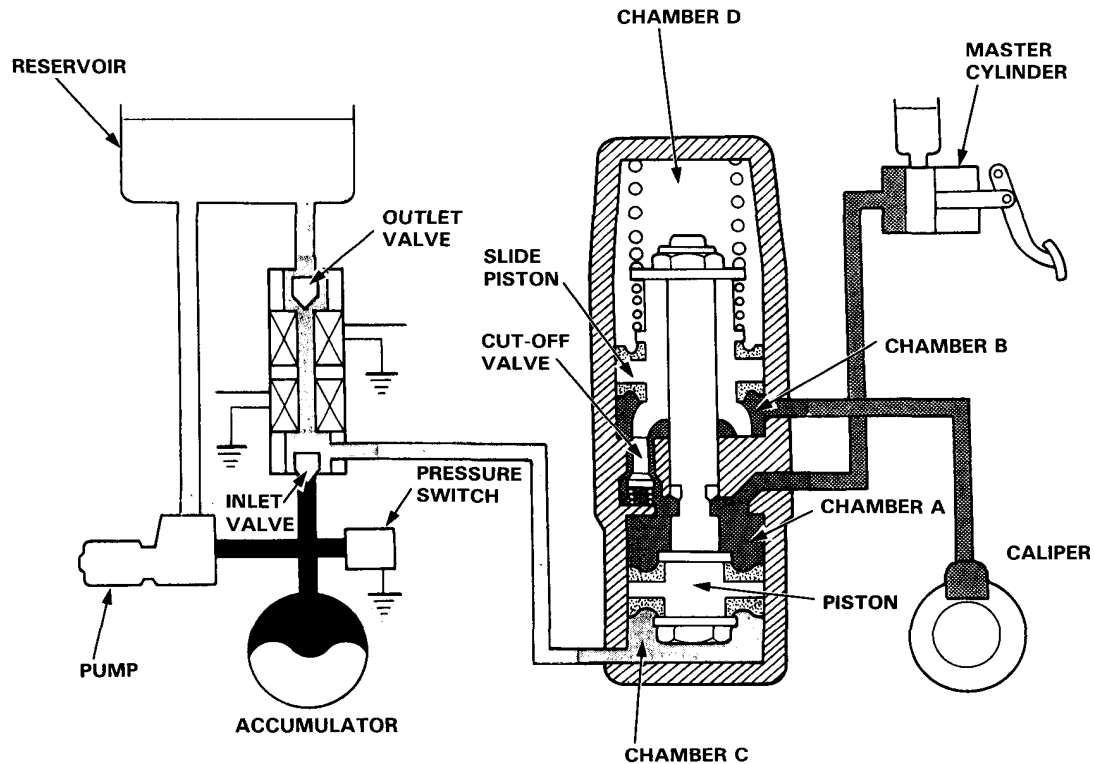
Opeartion

1. Ordinary Braking Function

In ordinary brake operations, the cut-off valve in the modulator is open, transmitting the hydraulic pressure from the master cylinder to the brake calipers via chamber A and chamber B.

Chamber C is connected to the reservoir through the outlet valve, which is normally open. It is also connected to the hydraulic pressure source (pump, accumulator, pressure switch, etc.) via the inlet valve, which is normally closed.

Chamber D serves as an air chamber. Under these conditions, the pressures of chambers C and D are maintained at about atmospheric pressure, permitting regular braking operations.



(cont'd)

Anti-lock Brake System

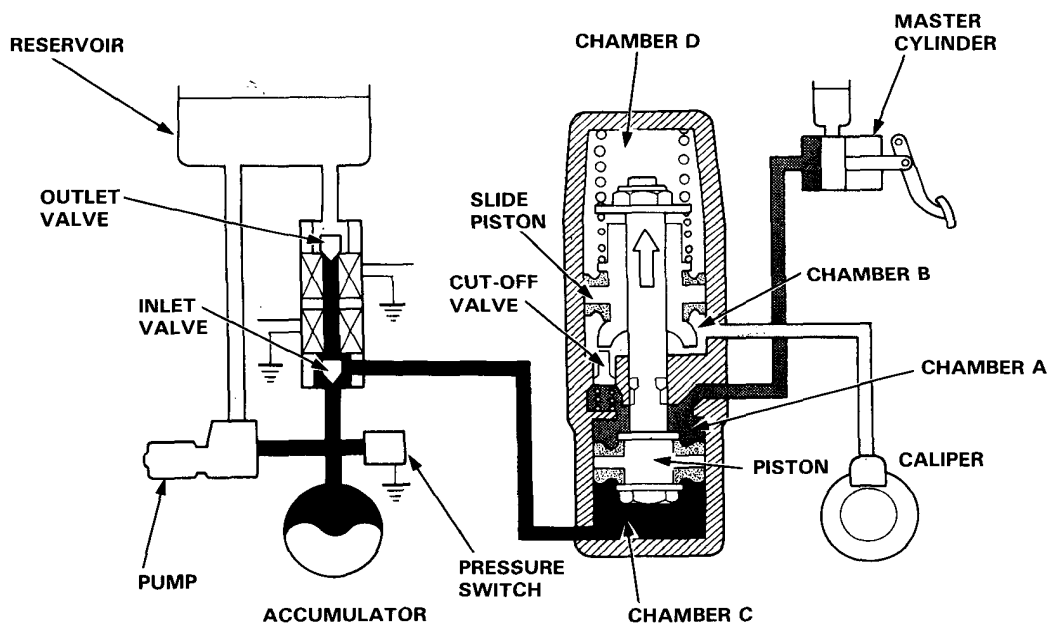
Features/Construction/Operation (cont'd)

If brake inputs (force exerted on brake pedal) are excessively large and a possibility of wheel locking occurs, the control unit operates the solenoid valve, closing the outlet valve and opening the inlet valve. As a result, the high pressure is directed into chamber C, the piston is pushed upward, causing the slide piston to move upward and the cut-off valve to close. As the cut-off valve closes, the flow from the master cylinder to the caliper is interrupted, the volume of chamber B, which is connected to the caliper, increases, and the fluid pressure in the caliper declines.

When both of the valves, inlet and outlet, are closed (when only the outlet valve is activated) the pressure in the caliper is maintained constant.

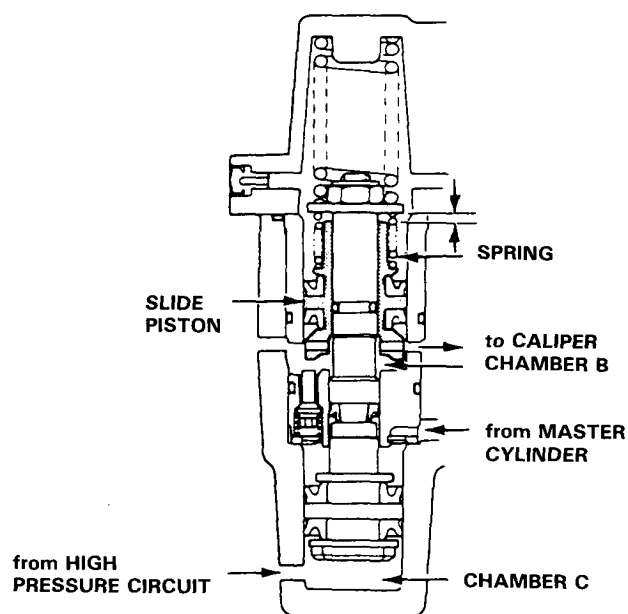
When the possibility of wheel locking ceases, it is necessary to restore the pressure in the caliper. The solenoid valve is therefore turned off (outlet valve: open, inlet valve: closed).

Process	Caliper Pressure	Outlet Valve		Inlet Valve	
		Electric Power	Hydraulic Circuit	Electric Power	Hydraulic Circuit
Caliper pressure declining	→	ON	Close	ON	Open
Caliper pressure constant	→	ON	Close	OFF	Close
Caliper pressure increasing	→	OFF	Open	OFF	Close



2. Slide Piston Function

When the car is used on rough roads where the tires sometimes lose adhesion, the anti-lock brake system may function excessively, causing a very large volume of brake fluid to flow into chamber C. When this occurs, the piston is moved excessively, resulting in an abnormal loss of pressure in chamber B. In order to overcome this problem, the slide piston is kept in proper position by spring force to prevent the pressure in chamber B from becoming negative.



(cont'd)

Anti-lock Brake System

Features/Construction/Operation (cont'd)

3. Kickback

When the anti-lock brake system is functioning, the piston moves upward, the volume of chamber B increases, and the fluid pressure on the caliper side is reduced. At the same time, the volume of chamber A is reduced and the brake fluid is returned to the master cylinder. When the brake fluid is pushed back to the master cylinder, the driver can feel the functioning of the anti-lock brake system because the brake pedal is kicked back.

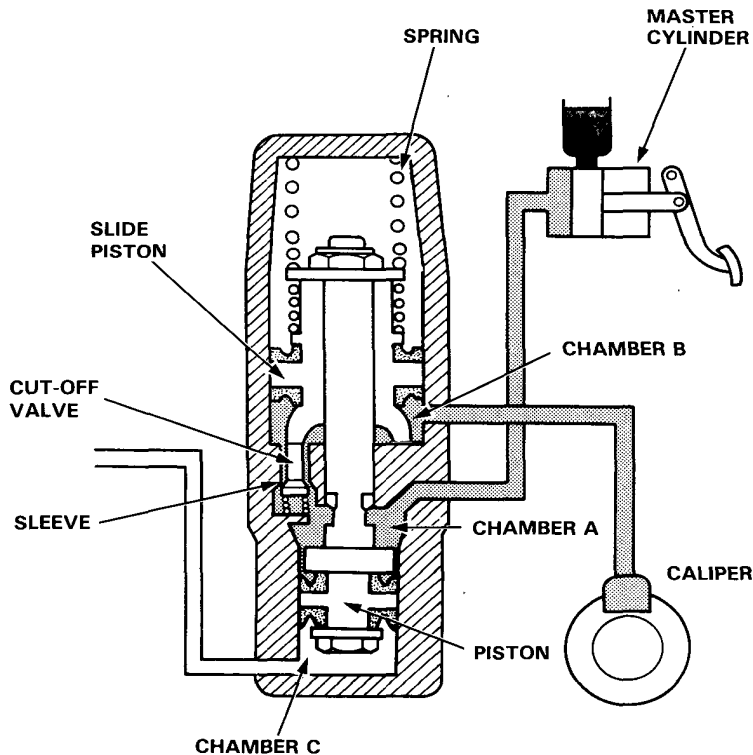
4. PCV (Proportioning Control Valve) Function

In the modulator for the rear wheels, the diameters of the piston and the slide piston are distinctly different. This provides a PCV (Proportioning Control Valve) function to prevent the rear wheels from locking during an emergency stop.

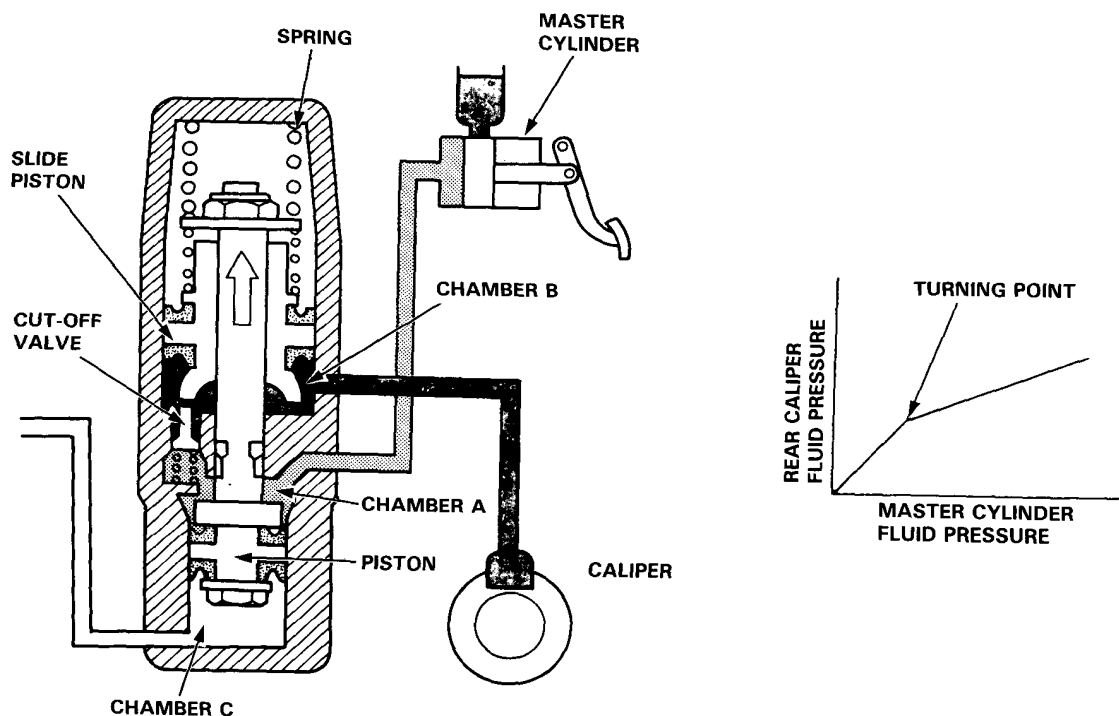
(1) Before the Turning Point:

1) When the fluid pressure from the master cylinder is below the turning point, the cut-off valve is always pushed downward by the force of the slide piston and its spring.

Under these conditions, there is a gap between the cut-off valve shoulder and the sleeve. Chamber A and chamber B are therefore connected through the gap. The pressure from the master cylinder flows into the rear calipers through chamber A and chamber B.



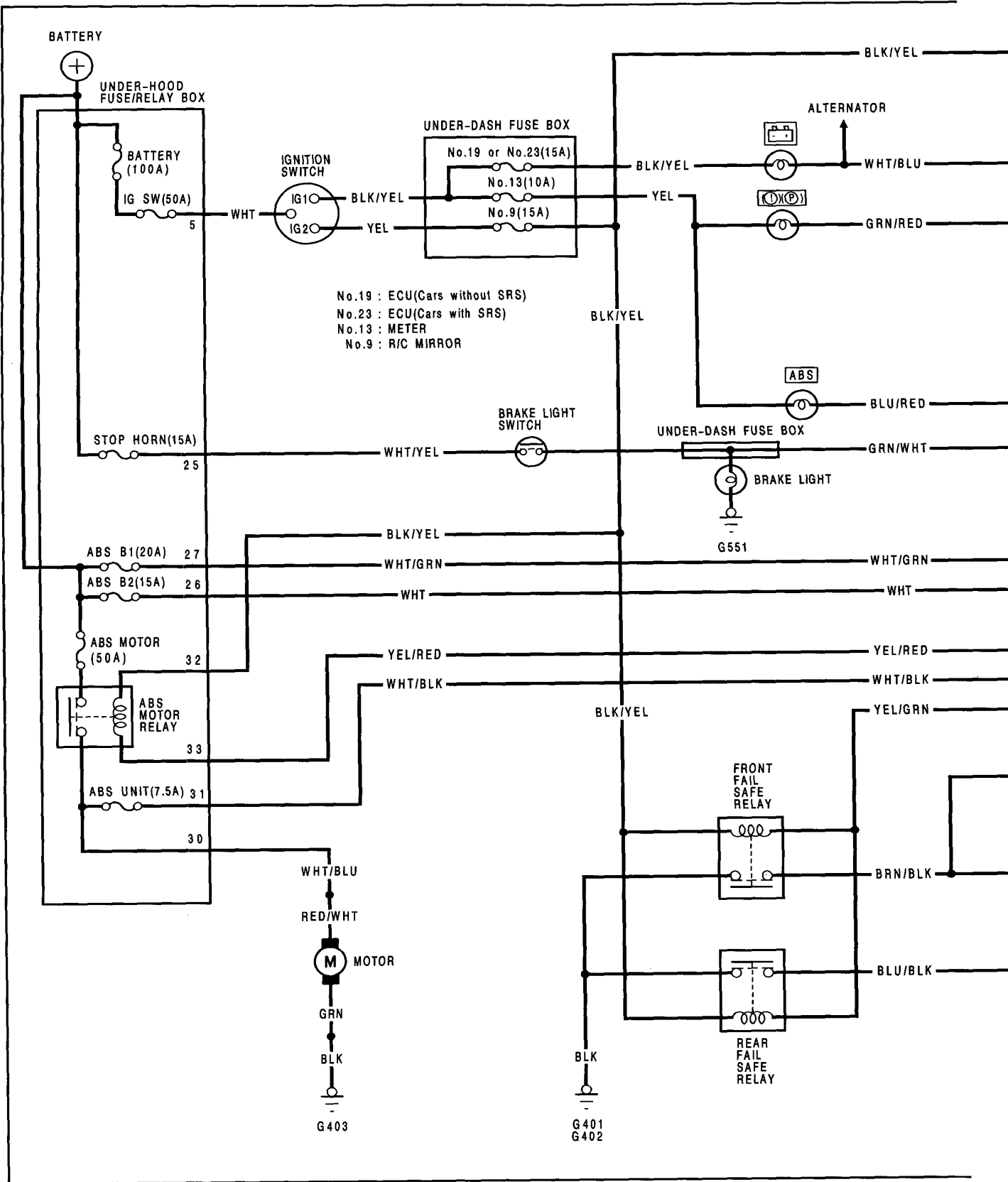
- 2) When the fluid pressure from the master cylinder reaches the turning point, the force on the slide piston overcomes the force of the spring, causing the slide piston to travel upward. The cut-off valve, previously being in contact with the bottom of the slide piston, then moves upward and the cut-off valve shoulder hits the sleeve, blocking the fluid passages (the fluid pressure at this point is called the turning point).

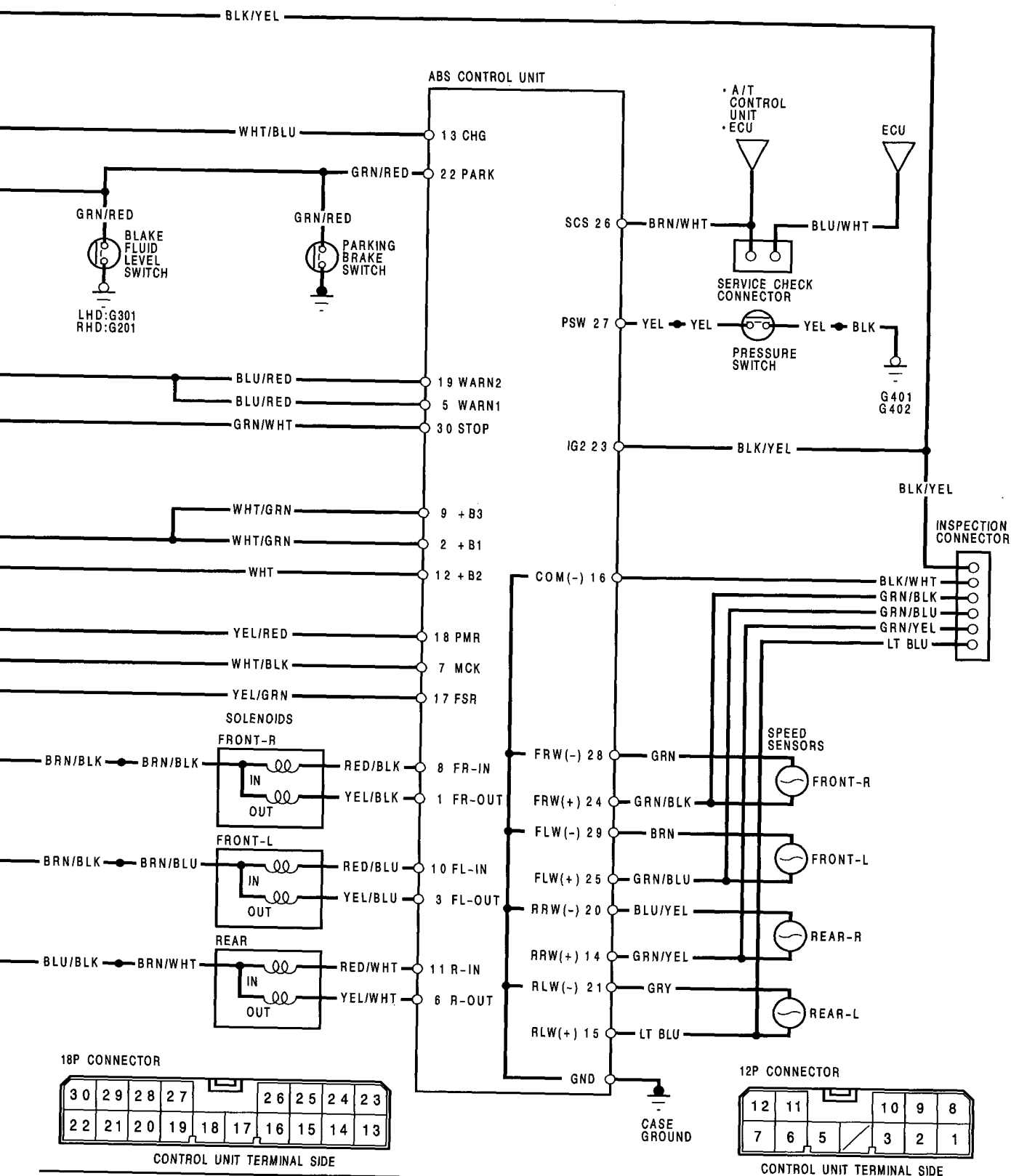


- (2) After the turning point:

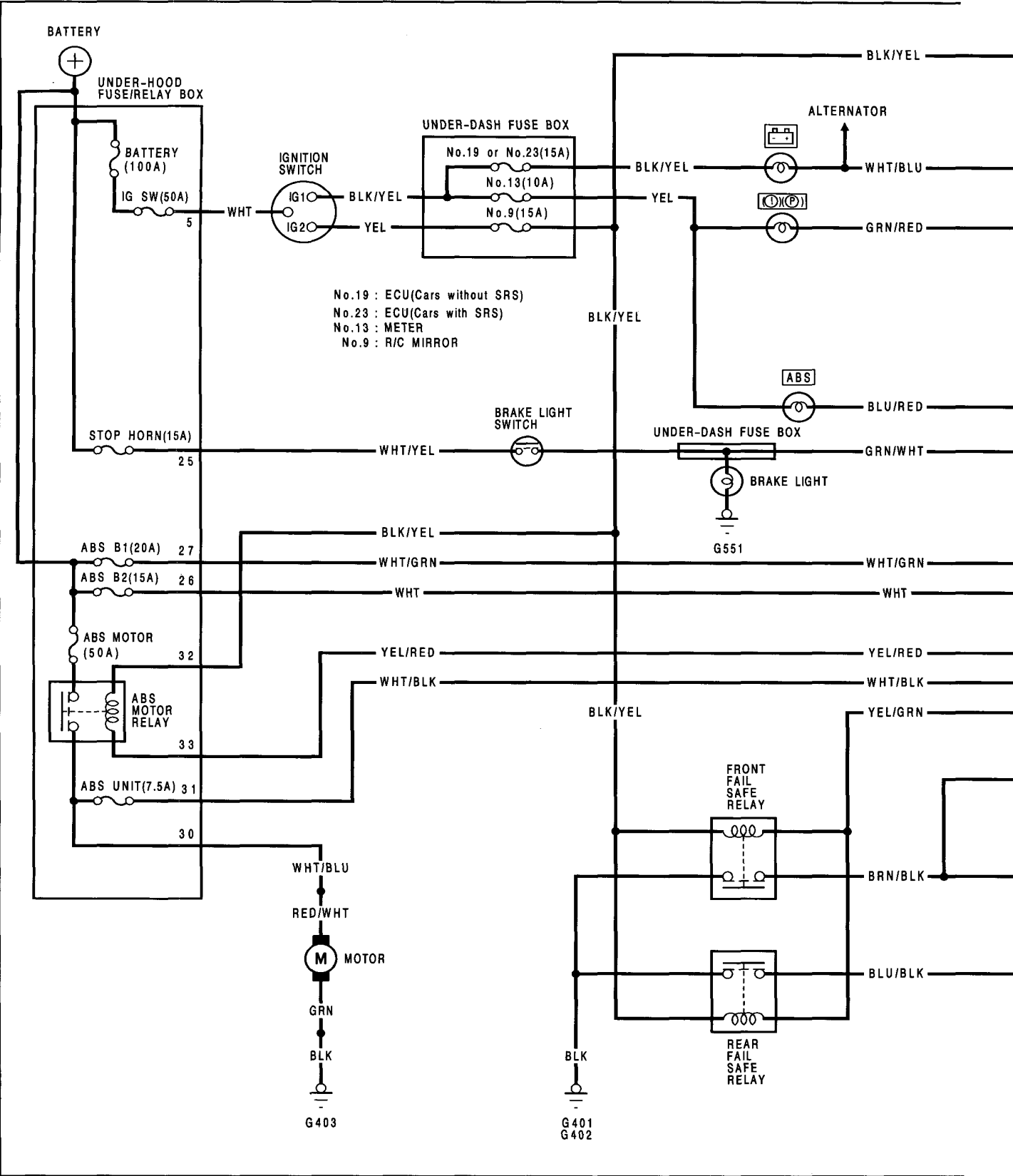
As the fluid pressure from the master cylinder increases, the pressure in chamber A becomes higher, causing a force to push down the large diameter portion of the piston. Consequently, the slide piston comes down, the cut-off valve is pushed downward by the bottom of the slide piston, allowing chambers A and B to connect momentarily. As this occurs, pressure in chamber B increases, the slide piston is pushed upward, the cut-off valve goes up, and the connection between chamber A and chamber B is blocked again. As described above, when the pressure in the master cylinder is above the turning point, the slide piston reduces the pressure in the rear caliper to the prescribed amount by repeating this process.

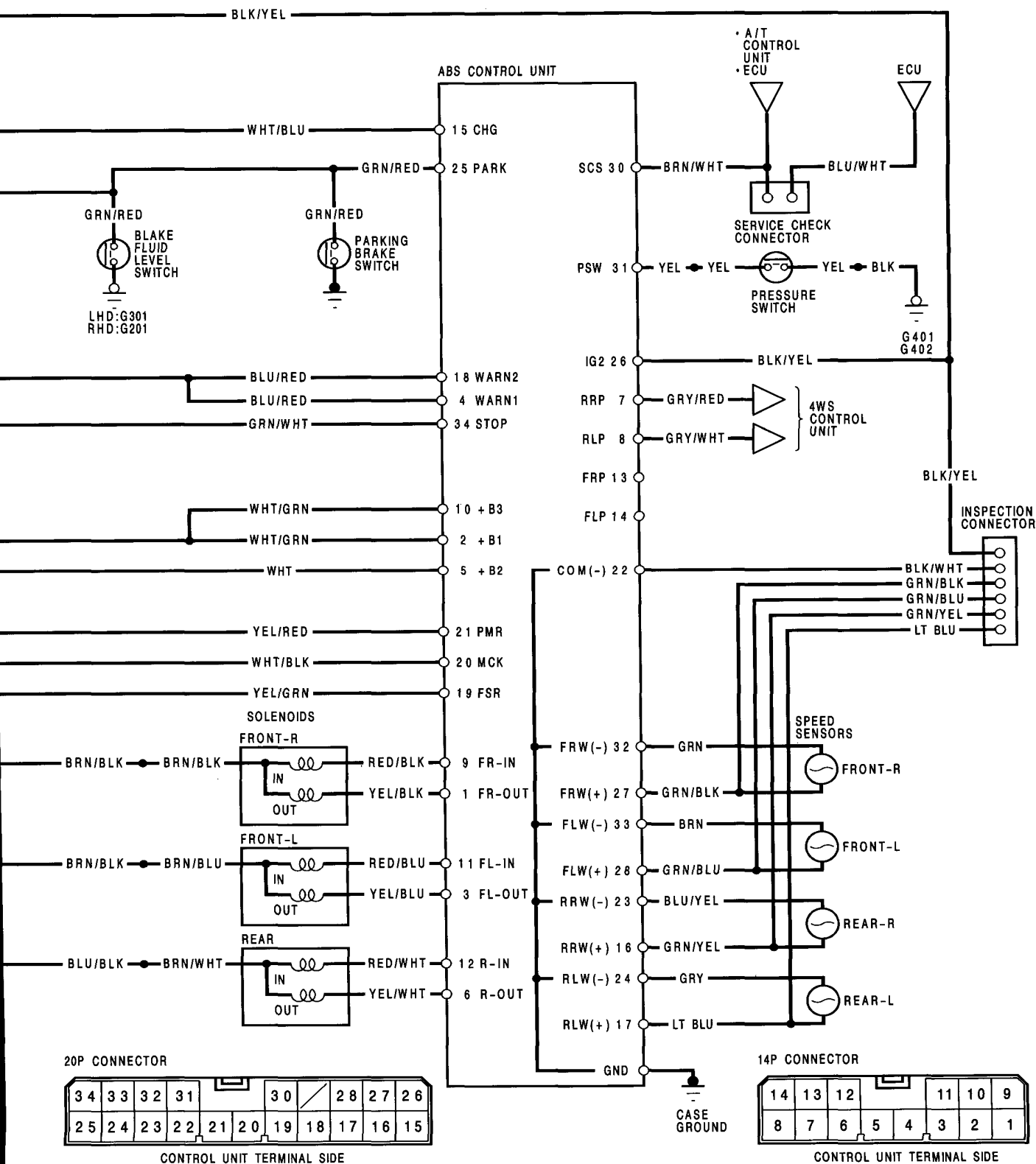
Circuit Diagram (2WS)



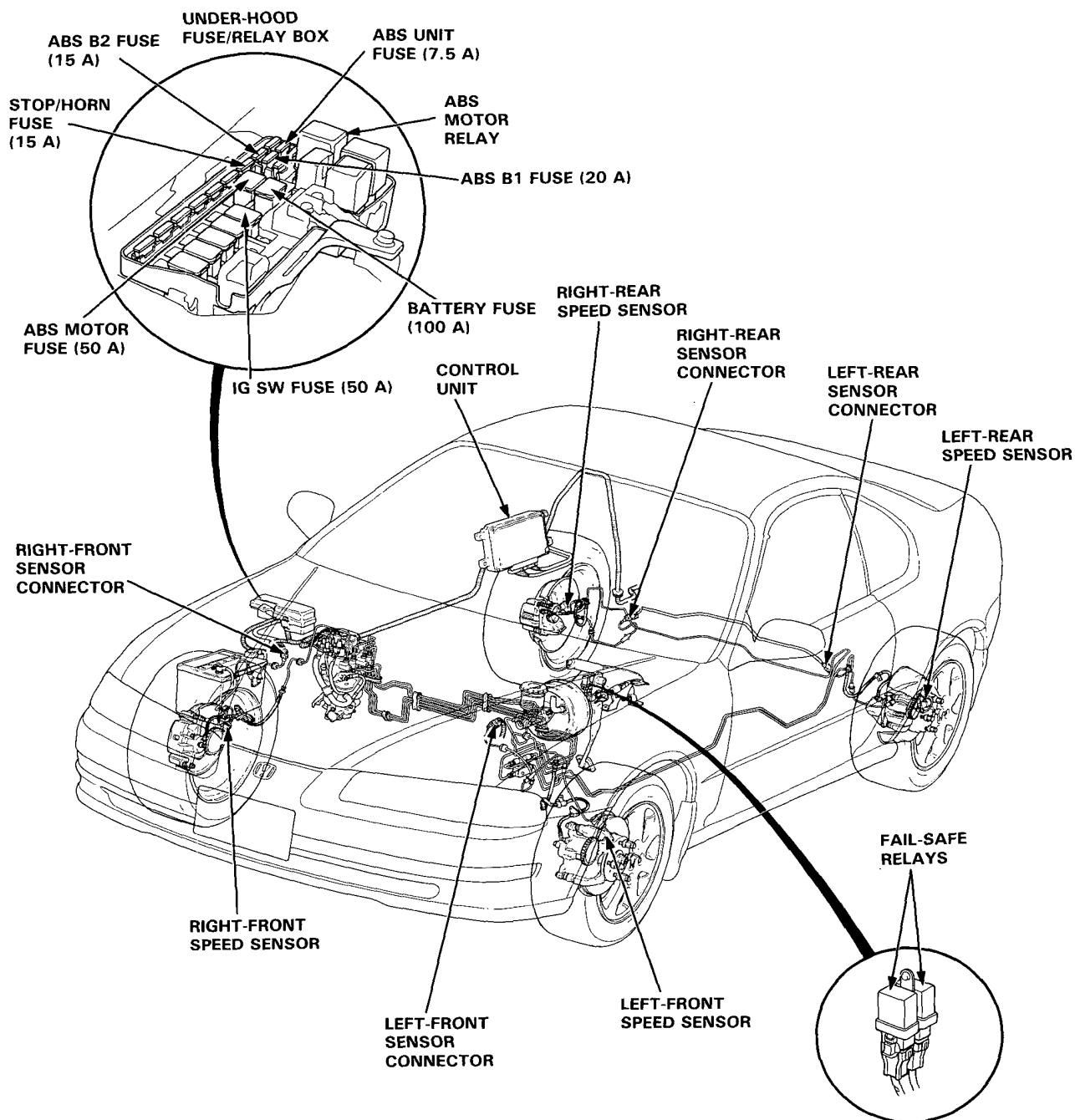


Circuit Diagram (4WS)





Wiring/Connector Locations



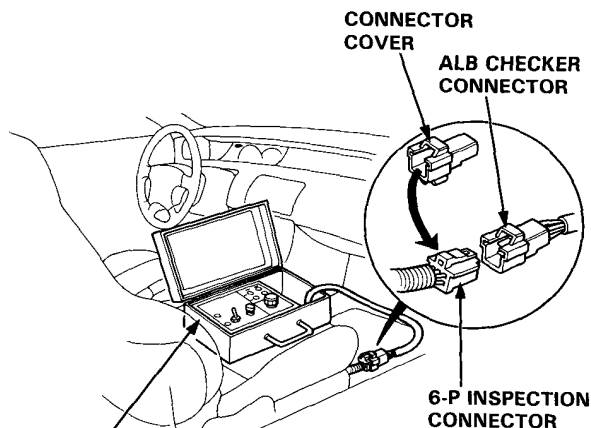
Function Test

NOTE:

- The ALB checker is designed to confirm proper operation of the anti-lock brake system by simulating each system function and operating condition. Before using the checker, confirm that the anti-lock brake system indicator light is not indicating some other problem with the system. The light should go on when the ignition is first turned on and then go off and stay off one second after the engine is started.
- The checker should be used through modes 1–5 to confirm proper operation of the system in any one of the following situations:
 - After replacing any anti-lock brake system component.
 - After replacing or bleeding the system fluid (0 mode not necessary).
 - After any body or suspension repair that may have affected the sensors or their wiring.
- The procedure for modes 1–5 are on this page and 19-56, mode 0 (wheel sensor signal) is on page 19-57.
- Use one of the following models of ALB checkers:
 - 07HAJ–SG00601 or
 - 07HAJ–SG00602 or
 - 07508–SB00000 and 07HAJ–SG00400 (Adaptor)

⚠ WARNING Disconnect the ALB checker before driving the car. A collision can result from a reduction, or complete loss, of braking ability causing severe personal injury or death.

1. With the ignition switch off, disconnect the 6-P inspection connector from the connector cover located on the cross-member under the passenger's seat and connect the 6-P inspection connector to the ALB checker.

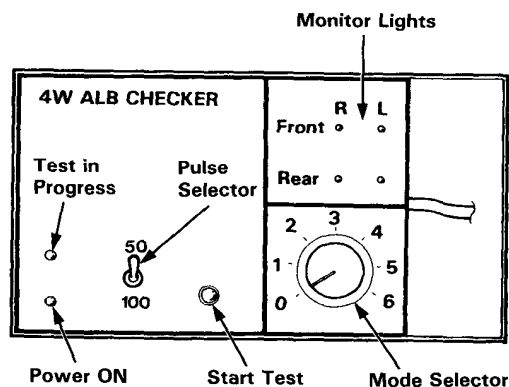


07HAJ–SG00601 or
07HAJ–SG00602 or
07508–SB00000 and 07HAJ–SG00400 (Adaptor)

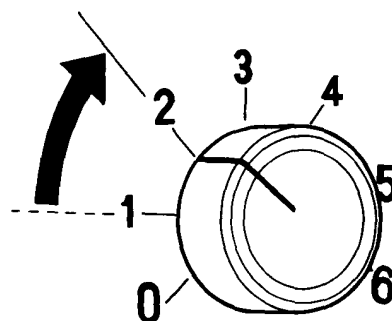
NOTE: Place the vehicle on level ground with the wheels blocked, put the transmission in neutral for manual transmission models, and in P for automatic transmission models.

2. Start the engine and release the parking brake.
3. Operate the ALB checker as follows:
 - (1) Set the pulse selector switch to 50.
 - (2) Turn the Mode Selector switch to "1".
 - (3) Push the Start Test switch:
 - The test in progress light should come ON.
 - In one or two more seconds, all four monitor lights should come on (If not the checker is faulty).
 - The anti-lock brake system indicator light should not come ON (If it comes on the checker harness to the 6-P connector connection is faulty).

NOTE: When the test in progress indicator light is ON, don't turn the Mode Selector switch.



4. Turn the Mode Selector Switch to "2".



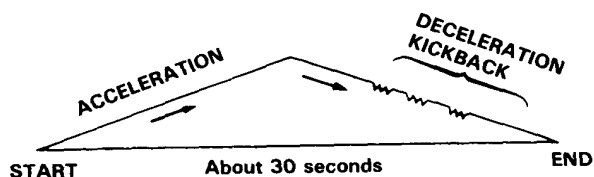
(cont'd)

ALB Checker

Function Test (cont'd)

5. Depress the brake pedal firmly and push the Start Test switch.
The anti-lock brake system indicator light should not go on while the Test in Progress light is ON. There should be kickback on the brake pedal. If not as described, go to troubleshooting, page 19-58.

NOTE: The operation sequence simulated by Modes 2, 3, 4 and 5:



6. Turn the Mode Selector switch to 3, 4 and 5.
Perform step 5 for each of the test mode positions.

Mode 1:

Sends the simulated driving signal 0 km/h (0 mph) → 180 km/h (112.5 mph) → 0 km/h (0 mph) of each wheel to the control unit to check the control unit self-diagnosis circuit. There should be NO kickback.

Mode 2:

Sends the driving signal of each wheel, then sends the lock signal of the left rear wheel to the control unit. There should be kickback.

Mode 3:

Sends the driving signal of each wheel, then sends the lock signal of the right rear wheel to the control unit. There should be kickback.

Mode 4:

Sends the driving signal of each wheel, then sends the lock signal of the left front wheel to the control unit. There should be kickback.

Mode 5:

Sends the driving signal of each wheel, then sends the lock signal of the right front wheel to the control unit. There should be kickback.

Mode 6:

Not used on this model.

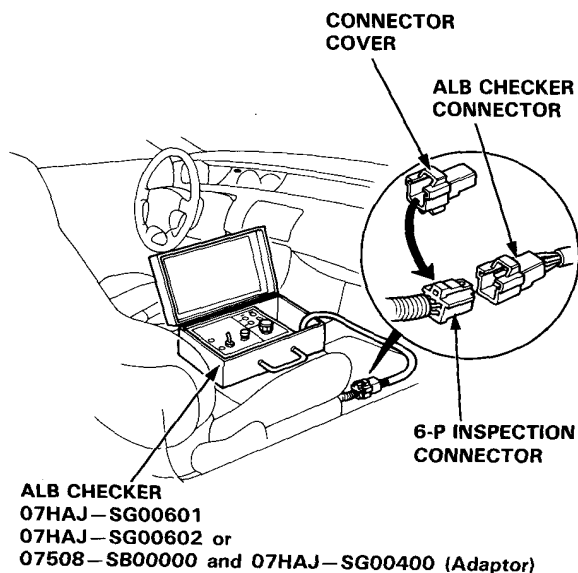
Inspection points:

1. The anti-lock brake system indicator light comes ON in mode 1.
 - Check the wiring.
2. There is no kickback in modes 2 through 5.
 - Shorted wires.
 - Faulty or disconnected pump assembly connector.
 - Faulty pump assembly.

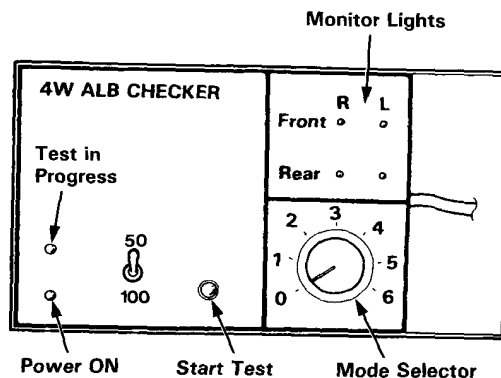
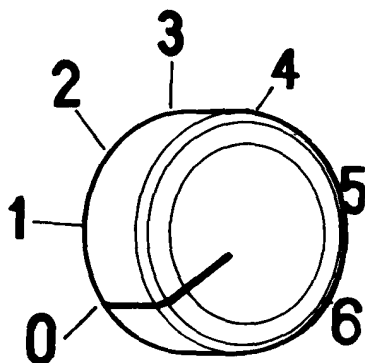
Wheel Sensor Signal Confirmation

NOTE: Use the ALB checker (mode 0) to confirm proper wheel sensor operation.

1. Disconnect the 6-P inspection connector from the connector cover located on the cross-member under the passenger's seat and connect the 6-P inspection connector to the ALB checker.



2. Raise the car so that all four wheels are off the ground and support on safety stands.
3. Turn the ignition switch ON.
4. Turn the Mode Selector switch to "0".



5. With the transmission in neutral, rotate each wheel briskly (one revolution per second) by hand, and confirm that its respective monitor light on the checker blinks as the wheel rotates.

NOTE:

- Rotating a wheel too slowly will produce only a weak blink of its monitor light that may be difficult to see.
- In bright sunlight, the monitor light may be difficult to see. Perform tests in a shaded area.
- In some instances, it may not be possible to spin the front wheels fast enough to get a monitor indication. If necessary, start the engine and slowly accelerate and decelerate the front wheels. The monitor lights should blink, indicating a good wheel sensor signal.

If any monitor light fails to blink, check the suspected sensor, its air gap and its wiring/connectors.

Troubleshooting

Anti-lock Brake System Indicator Light

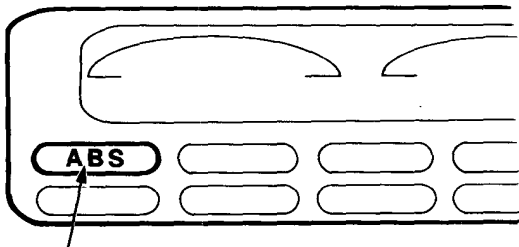
Temporary Driving Conditions:

1. The anti-lock brake system indicator light comes on and the control unit memorizes the problem under certain conditions.

NOTE: Problem codes are explained on page 19-60.

- The tire(s) adhesion is lost due to excessive cornering speed.
Problem codes: 5, 5-4, 5-8.
- The vehicle loses traction when starting from a stuck condition on a muddy, snowy, or sandy road.
Problem code: 4-1, 4-2, 4-4, 4-8.
- When the parking brake is applied for more than 30 seconds while the vehicle is being driven.
Problem code: 2-1.
- The vehicle is driven on an extremely rough road.

2. The anti-lock brake system is OK if the anti-lock brake system indicator light goes off after the engine is restarted.



ANTI-LOCK BRAKE SYSTEM INDICATOR LIGHT

3. If you receive a customer's report that the anti-lock brake system indicator light sometimes comes on, check the system using the ALB checker to confirm whether there is any trouble in the system.
See page 19-55.
4. The anti-lock brake system indicator light will come on and the control unit will memorize a problem code when there is insufficient battery voltage to the control unit. An example would be when the battery is so weak that the car must be jump-started. After the battery is sufficiently recharged, the anti-lock brake system indicator light will work normally after the engine is stopped and restarted.

However, after recharging the battery, the problem code must be cleared from the control unit's memory by disconnecting the ABS B2 (15 A) fuse for at least 3 seconds.

Anti-lock Brake System Indicator Light Circuit:

CAUTION: Use only the digital multimeter to check the system.

1. The indicator light does not go on when the ignition switch is turned on.

Check the following items. If they are OK, check the control unit connectors. If not loose or disconnected, substitute a known-good control unit and recheck:

- Blown anti-lock brake system indicator light bulb.
- Open circuit in YEL wire between the No. 13 METER (10 A) fuse and gauge assembly.
- Open circuit in BLU/RED wire between the gauge assembly and control unit.
- Poor ground connection between the control unit and the body.

2. The anti-lock brake system indicator light remains ON after the engine is started, however the anti-lock brake system indicator light does not blink any code or sub-code. Check the following items:

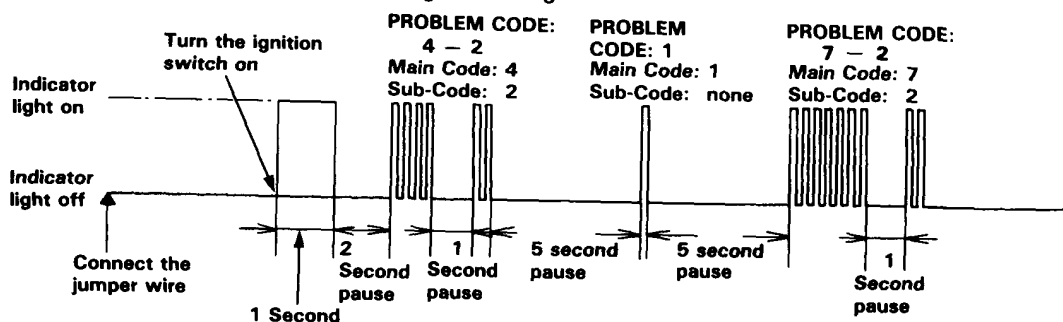
- Loose or poor connection of the wire harness at the control unit.
- Faulty ABS B2 (15 A) fuse.
- Open circuit in WHT wire between the ABS B2 (15 A) fuse and control unit.
- Open circuit in BLK/YEL wire between the No. 9 R/C MIRROR (15 A) fuse and control unit.
- Short circuit in BLU/RED wire between gauge assembly and control unit.
- Open circuit in WHT/BLU wire between alternator and control unit.

If the problem is not found, substitute a known-good control unit and recheck whether the anti-lock brake system indicator light remains ON.

Comes on and remains on while running:

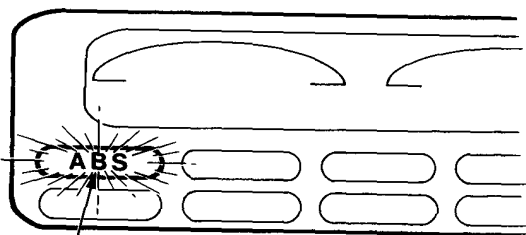
1. Stop the engine.
2. Turn the ignition switch on and make sure that the anti-lock brake system indicator light comes on.
3. Restart the engine and check the anti-lock brake system indicator light.
 - There is no problem in the anti-lock brake system if the anti-lock brake system indicator light goes off.
 - Go to step 4 if the anti-lock brake system indicator light goes off and then comes back on.
4. Stop the engine.
5. Disconnect the service check connector from the connector cover located under the front of the center console. Connect the two terminals of the service check connector with a jumper wire.
6. Turn the ignition switch on, but do not start the engine.
7. Record the blinking frequency of the anti-lock brake system indicator light. The blinking frequency indicates the problem code.

CAUTION: Before starting the engine, disconnect the jumper wire from the service check connector, or else the Check Engine light will stay on with the engine running.

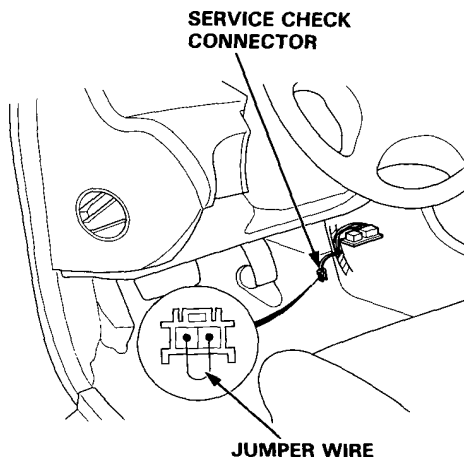


NOTE:

- The control unit can indicate three problem codes (one, two or three problems).
- If the anti-lock brake system indicator light does not light, see Troubleshooting of Anti-lock Brake System Indicator Light Circuit page 19-58.
- If you miscount the blinking frequency, turn the ignition switch off then on to cycle the anti-lock brake system indicator light again.
- After the repair is completed, disconnect the ABS B2 (15 A) fuse for at least 3 seconds to erase the control unit's memory. Then turn the ignition key on again and recheck.
- The memory is erased if the connector is disconnected from the control unit or the control unit is removed from the body.
- After recording the main and sub-code (if applicable), refer to the Symptom-to-System Chart.



ANTI-LOCK BRAKE SYSTEM INDICATOR LIGHT



Troubleshooting

Symptom-to-System Chart

PROBLEM CODE		PROBLEMATIC COMPONENT/ SYSTEM	AFFECTED				See page	OTHER COMPONENT	See page
MAIN CODE	SUB-CODE		FRONT RIGHT	FRONT LEFT	REAR RIGHT	REAR LEFT			
①	—	Pump motor over-run	—	—	—	—	19-61	Pressure switch	
	②	Pump motor circuit problem	—	—	—	—	19-63	Motor relay, Unit fuse, Motor fuse	19-100
	③	High pressure leakage	—	—	—	—	19-66	Solenoid	19-90
	④	Pressure switch	—	—	—	—	19-67		
	⑧	Accumulator gas leakage	—	—	—	—	19-68		
②	①	Parking brake switch-related problem	—	—	—	—	19-68	Brake fluid level switch BRAKE light	
③	①	Pulser(s)	○				19-101		
	②			○					
	④				○	○			
④	①	Speed sensor	○				19-69		
	②			○					
	④				○				
	⑧					○			
⑤	—	Speed sensor(s)			○	○	19-71	Modulator	
	④				○				
	⑧					○			
⑥	—	Fail-safe relay (Open, short)	—	—	—	—	19-73	Front or rear fail-safe relay	19-100
	①		—	—	—	—	(Function Test)	Front fail-safe relay	
	④		—	—	—	—		Rear fail-safe relay	
⑦	①	Solenoid related problem (Open)	○				19-79	ABS B1 fuse Front fail-safe relay	
	②			○					
	④				○	○	19-82	Rear fail-safe relay	

Flowcharts

Problem Code 1: Pump Motor Over-run

CAUTION: Use only the digital multimeter to check the system.

Pre-test step:

- Check for fluid leaks from the functional parts and replace the faulty parts if there is a leak.

Functional parts:

- Modulator
- Pump assembly
- High pressure hose/pipe

- With engine running, ABS indicator light is ON.
- With service check connector jumped (page 19-59), problem code 1 is indicated.

Bleed high pressure fluid from the maintenance bleeder with the Bleeder T-wrench (page 19-85).

Remove the pump motor relay.

Connect the No. 29 and 30 terminals using a jumper wire for about 8 seconds.

Does the pump motor run with an increasingly loud, raspy sound?

NO

Pump runs with a constant soft sound:
Bleed air from anti-lock brake system using the procedure on page 19-95 and check the pump sound again.

YES

Check the accumulator fluid quantity by bleeding the high pressure line with the Bleeder T-wrench.

Is there 40–70 cc?

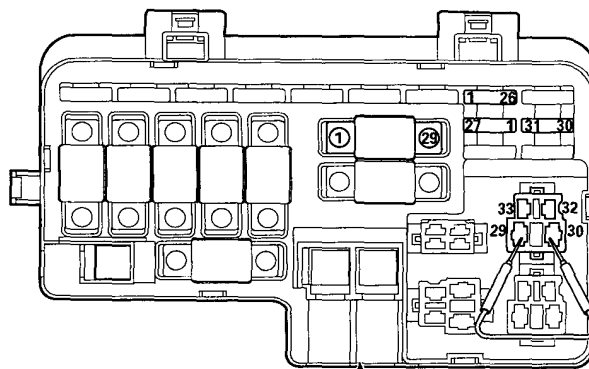
NO

(To page 19-62)

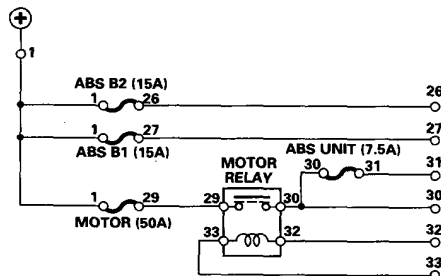
YES

(To page 19-62)

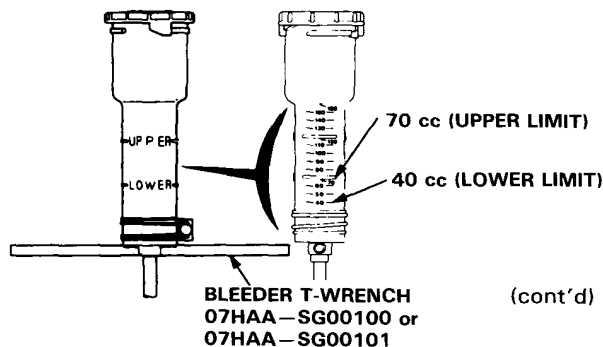
View from under-hood fuse/relay box terminal side.



UNDER-HOOD FUSE/RELAY BOX



UNDER-HOOD FUSE/RELAY BOX CIRCUIT DIAGRAM



(cont'd)

Troubleshooting

Flowcharts (cont'd)

(From page 19-61)

(From page 19-61)

Connect the No. 29 and No. 30 terminals using a jumper wire for about 10 seconds.

Check if there is any change in the fluid level in the reservoir tank.

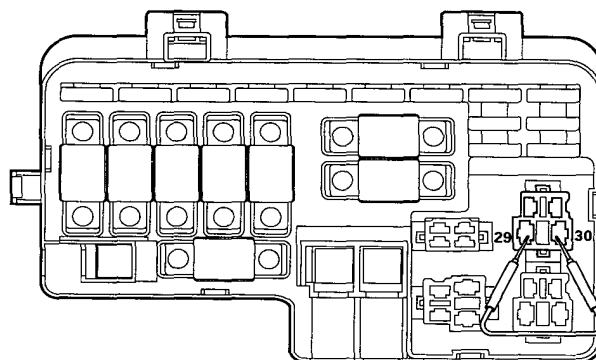
Is there any change?

NO

Faulty pump motor (Relief valve is defective and open).

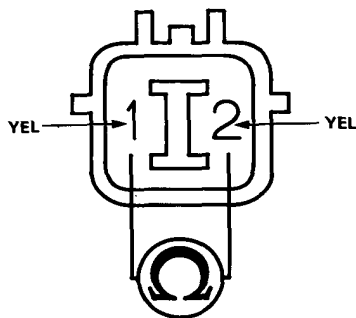
YES

Faulty solenoid (leakage).



UNDER-HOOD
FUSE/RELAY BOX

SWITCH-SIDE CONNECTOR



View from terminal side.

Connect the No. 29 and No. 30 terminals using a jumper wire for about 10 seconds.

Disconnect the pressure switch 2-P connector and check the continuity between the No. 1 (YEL) and No. 2 (YEL) terminals.

Is there continuity?

NO

Faulty pressure switch.

YES

Vehicle is OK at this time.

Problem Code 1-2: Pump Motor Circuit Problem

CAUTION: Use only the digital multimeter to check the system.

NOTE: If a malfunction is detected, this code appears and the fail-safe function is activated. The indicator light comes ON after restarting the engine until the malfunction code is erased (by disconnecting the ABS B2 fuse for 3 seconds).

Pre-test steps:

- Check ABS MOTOR (50 A) FUSE.
- Check ABS UNIT (7.5 A) FUSE.
- Check for loose under-hood fuse/relay box connectors.

- With engine running, ABS indicator light is ON.
- With service check connector jumped (page 19-59), problem code 1-2 is indicated.

Remove and check the pump motor relay (page 19-100).

Does it work properly?

NO

Faulty pump motor relay.

YES

Connect the No. 29 and No. 30 terminals using a jumper wire.

Does the pump motor run?

NO

(To page 19-65)

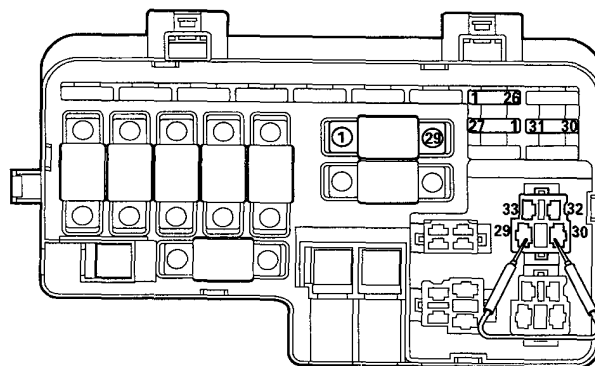
YES

Disconnect the jumper wire.

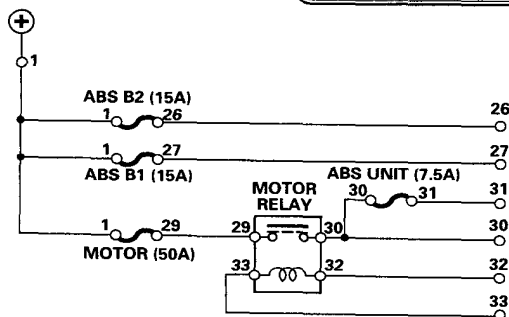
Disconnect the 2-P connector from the pump motor.

(To page 19-64)

View from under-hood fuse/relay box terminal side.



UNDER-HOOD FUSE/RELAY BOX



UNDER-HOOD FUSE/RELAY BOX CIRCUIT DIAGRAM

(cont'd)

Troubleshooting

Flowcharts (cont'd)

(From page 19-63)

Remove the ABS UNIT (7.5 A) fuse from under-hood fuse/relay box.

Turn the ignition switch ON.

Check for voltage between the under-hood fuse/relay box ABS UNIT fuse No. 31 terminal and body ground.

Is there battery voltage?

NO

Repair open in BRN/YEL wire between the ABS UNIT fuse and control unit.

YES

Reinstall the fuse in the under-hood fuse/relay box.

Check for voltage between the pump motor relay No. 30 terminal and body ground.

Is there battery voltage?

NO

Faulty under-hood fuse/relay box.

YES

Check for voltage between the No. 32 terminal and body ground.

Is there battery voltage?

NO

Repair open in BLK/YEL wire between the No. 9 R/C MIRROR (15 A) fuse and pump motor relay.

YES

Reinstall the pump motor relay.

Disconnect the 18-P (4WS: 20-P) connector from the control unit.

Check for voltage between the control unit connector YEL/RED (PMR) terminal and body ground.

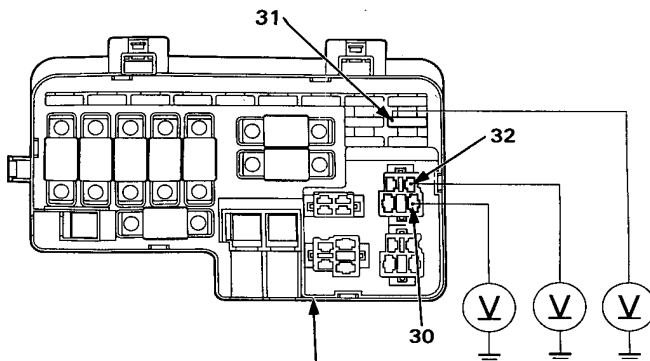
Is there battery voltage?

NO

Repair open in YEL/RED wire between the pump motor relay and control unit.

YES

Check for loose control unit connectors. If necessary, substitute a known-good control unit and recheck.



UNDER-HOOD FUSE/RELAY BOX

18-P CONNECTOR (2WS)

30	29	28	27			26	25	24	23
22	21	20	19	18	17	16	15	14	13



View from control unit terminal side.

20-P CONNECTOR (4WS)

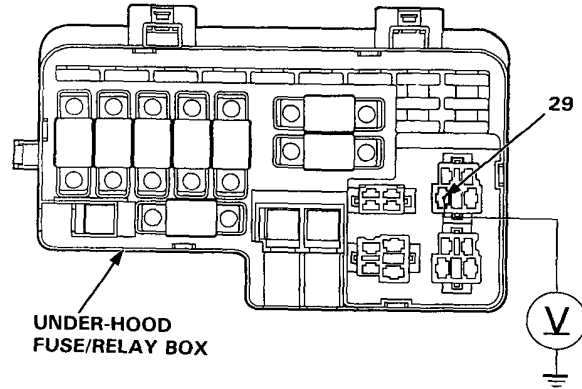
34	33	32	31			30	28	27	26	
25	24	23	22	21	20	19	18	17	16	15



View from control unit terminal side.

(From page 19-63)

Check for voltage between the No. 29 terminal and body ground.



Is there battery voltage?

NO

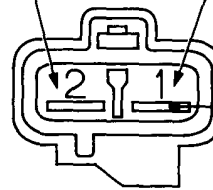
Faulty under-hood fuse/relay box.

YES

Disconnect the 2-P connector from the pump motor.

Check for voltage between the No. 1 (WHT/BLU) terminal and body ground.

HARNESS-SIDE CONNECTOR
BLK (GROUND) WHT/BLU (MOTOR RELAY)



View from terminal side.

Is there battery voltage?

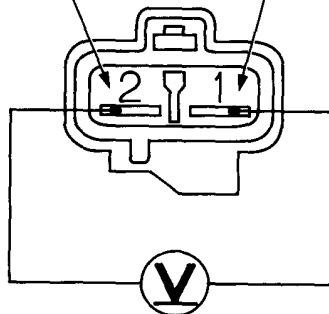
NO

Repair open in WHT/BLU wire between the motor relay and pump motor.

YES

Check for voltage between the No. 1 (WHT/BLU) terminal and No. 2 (BLK) terminal.

HARNESS-SIDE CONNECTOR
BLK (GROUND) WHT/BLU (MOTOR RELAY)



View from terminal side.

Is there battery voltage?

NO

Repair open in BLK wire between the pump motor and ground or poor ground (G403).

YES

Faulty pump motor.

(cont'd)

Troubleshooting

Flowcharts (cont'd)

Problem Code 1-3: High Pressure Leakage

CAUTION: Use only the digital multimeter to check the system.

Pre-test steps:

- Check reservoir fluid level, and if necessary, fill to the MAX level.
- Check for fluid leaks from the functional parts and replace the faulty parts if there is a leak.

Functional parts:

- Modulator
- Pump assembly
- High pressure hose/pipe

- With engine running, ABS indicator light is ON.
- With service check connector jumped (page 19-59), problem code 1-3 is indicated.

Bleed high pressure fluid from the maintenance bleeder with the Bleeder T-wrench (page 19-85).

Remove the pump motor relay.

Connect the No. 29 and No. 30 terminals using a jumper wire for about 10 seconds.

Disconnect the 2-P connector from the pressure switch.

After 30 minutes, check for continuity between the No.1 (YEL) and No.2 (YEL) terminals on the switch side of connector.

Is there continuity?

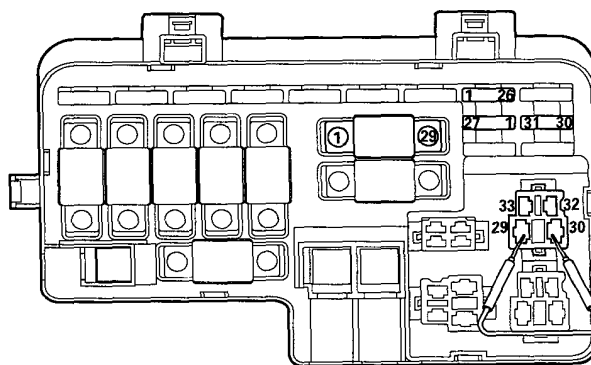
YES

Vehicle is OK at this time.

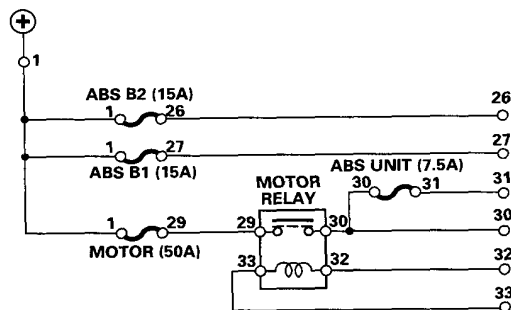
NO

Faulty solenoid (leakage).

View from under-hood fuse/relay box terminal side.

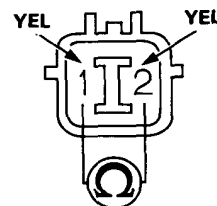


UNDER-HOOD FUSE/RELAY BOX



UNDER-HOOD FUSE/RELAY BOX CIRCUIT DIAGRAM

SWITCH-SIDE CONNECTOR



View from terminal side.

Problem Code 1-4: Pressure Switch Circuit

CAUTION: Use only the digital multimeter to check the system.

- With engine running, ABS indicator light is ON.
- With service check connector jumped (page 19-59), problem code 1-4 is indicated.

Bleed high pressure fluid from the maintenance bleeder with the Bleeder T-wrench (page 19-85).

Disconnect the 2-P connector from the pressure switch.

Check the continuity of pressure switch between the No.1 (YEL) and No.2 (YEL) terminals.

Is there continuity?

YES

Faulty pressure switch (closed).

NO

Check for continuity between the No.1 (YEL) terminal and body ground on the harness-side connector.

Is there continuity?

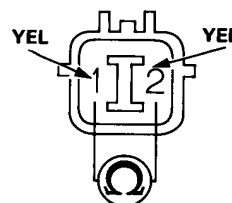
YES

Repair short in YEL wire between the control unit and pressure switch.

NO

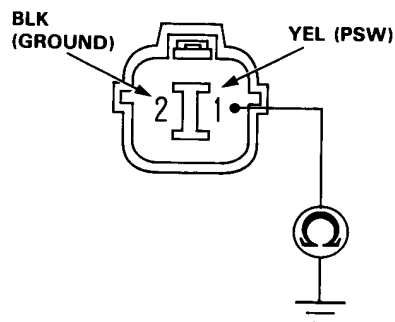
Check for loose control unit connectors. If necessary, substitute a known-good control unit and recheck.

SWITCH-SIDE CONNECTOR



View from terminal side.

HARNESS-SIDE CONNECTOR



View from terminal side.

(cont'd)

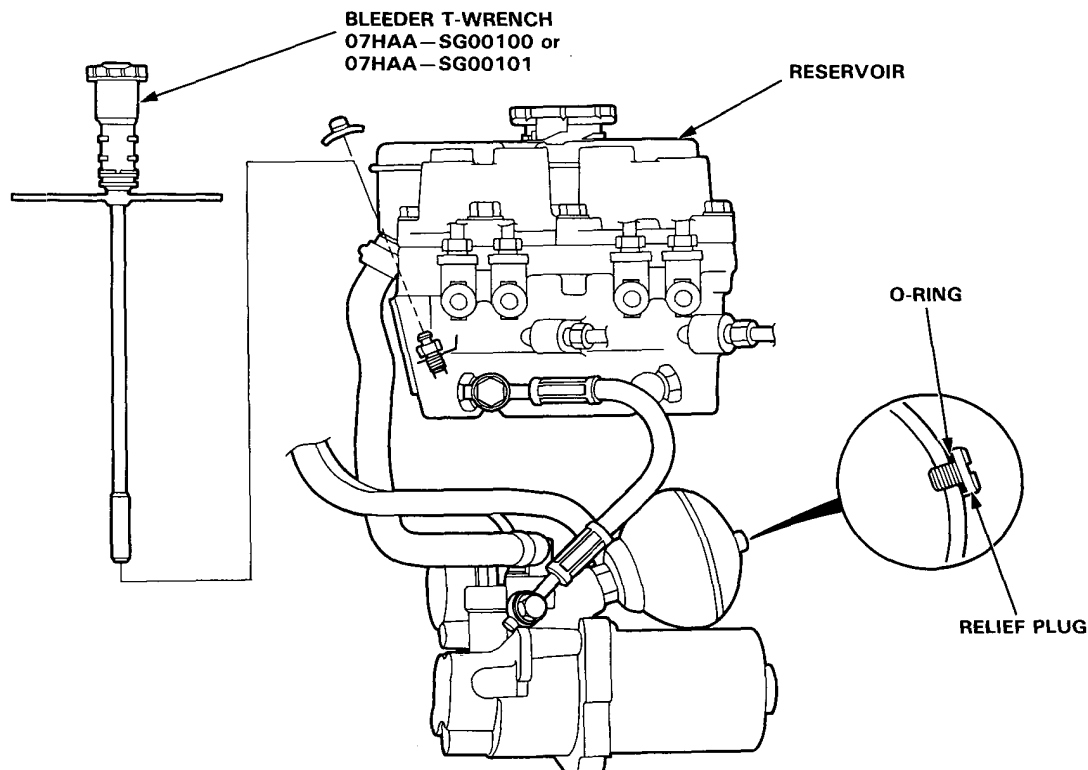
Troubleshooting

Flowcharts (cont'd)

Problem Code 1-8: Accumulator Gas Leakage

Check the following items:

- The relief plug is loose.
- The relief plug O-ring is out of place.
- Bleed the high pressure line with the Bleeder T-wrench. Operate the pump motor for 10 seconds and bleed the high pressure line again with the Bleeder T-wrench. If no fluid or more than 70 cc of fluid come out, it is likely that the gas has leaked out.



Problem Code 2-1: Parking Brake Switch Related Problem

If the parking brake has been released, the following items are possible causes. If they are OK, check the control unit connectors for good connection. If not loose or disconnected, substitute a known-good control unit and recheck.

NOTE: Before Troubleshooting Problem Code 2-1, remove the ABS B2 (15 A) fuse for 3 seconds to clear the control unit's memory, then test drive the car.

If the anti-lock brake system indicator light stays off, the probability is that the car was driven with the parking brake applied.

- The parking brake is applied for more than 30 seconds while driving.
- The brake fluid level in the master cylinder is too low.
- GRN/RED wire is shorted between the **BRAKE** indicator light and parking brake switch.
- GRN/RED wire is shorted between the **BRAKE** indicator light and brake fluid level switch.
- The **BRAKE** indicator light is blown.
- GRN/RED wire has an open between the **BRAKE** indicator light and the control unit.

Problem Code 4-1 to 4-8: Speed Sensor

CAUTION: Use only the digital multimeter to check the system.

NOTE: If a malfunction is detected, this code appears and the fail-safe function is activated. The indicator light may come ON after restarting the engine until the malfunction code is erased (by disconnecting the ABS B2 fuse for 3 seconds).

- With engine running, ABS indicator light is ON.
- With service check connector jumped (page 19-59), problem codes 4-1, 4-2, 4-3 and/or 4-4 are indicated.

Disconnect the 18-P (4WS: 20-P) connector from the control unit.

Check the resistance of each sensor between the positive and negative:

- GRN/BLK: Front Right Positive
GRN: Front Right Negative
- GRN/BLU: Front Left Positive
BRN: Front Left Negative
- GRN/YEL: Rear Right Positive
BLU/YEL: Rear Right Negative
- LT BLU: Rear Left Positive
GRY: Rear Left Negative

Is there
Front: 700–1100 Ω,
Rear : 1000–1600 Ω?

YES

Check each wire for continuity to ground.

Is there continuity?

YES

Repair short in sensor wire or faulty speed sensor.

NO

Check for loose control unit connectors. Check that the sensor is installed properly. If necessary, substitute a known-good control unit and recheck.

Is there
Front: 700–1100 Ω,
Rear : 1000–1600 Ω?

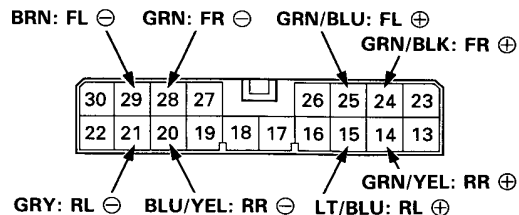
NO

Faulty speed sensor.

YES

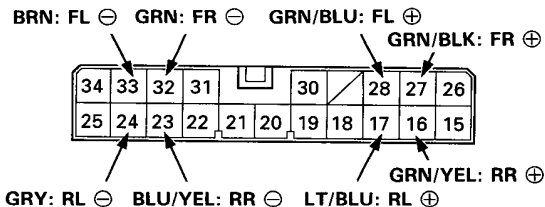
(To page 19-70)

18-P CONNECTOR (2WS)



View from control unit terminal side.

20-P CONNECTOR (4WS)

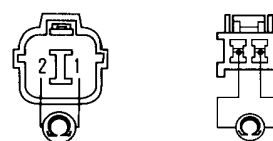


View from control unit terminal side.

SENSOR-SIDE CONNECTOR

FRONT

REAR



View from terminal side.

(cont'd)

Troubleshooting

Flowchart (cont'd)

(From page 19-69)

Reconnect the 18-P (4WS: 20-P) connector to the control unit.

Check each wire for continuity between the speed sensor harness-side terminals and body ground.

Is there continuity?

NO

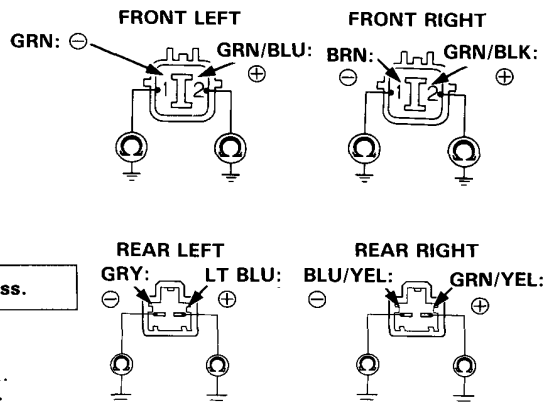
Repair open in wire harness.

YES

Check for loose speed sensor connectors. If necessary, substitute a known-good control unit and recheck.

Positive: $3.3\text{ k}\Omega \pm 15\%$ is OK.
Negative: Less than $1\text{ }\Omega$ is OK.

HARNESS-SIDE CONNECTOR



View from terminal side.

Problem Code 5 to 5-8: Speed Sensor(s)

CAUTION: Use only the digital multimeter to check the system.

NOTE: If a malfunction is detected, this code appears and the fail-safe function is activated. The indicator light may come ON after restarting the engine until the malfunction code is erased (by disconnecting the ABS B2 fuse for 3 seconds.)

- With engine running, ABS indicator light is ON.
- With service check connector jumped (page 19-59), problem code 5, 5-4 or 5-8 is indicated.

Disconnect the 18-P (4WS: 20-P) connector from the control unit.

Check the resistance of each sensor between the positive and negative:

- GRN/YEL: Rear Right Positive
- BLU/YEL: Rear Right Negative
- LT BLU: Rear Left Positive
- GRY: Rear Left Negative

Is there 1000—1600 Ω ?

NO

Disconnect the wire harness from speed sensor.

Check for resistance between the sensor terminals.

Is there 1000—1600 Ω ?

YES

(To page 19-72)

YES

Check each wire for continuity to ground.

Is there continuity?

NO

Reconnect the 18-P (4WS: 20-P) connector to the control unit.

Connect the ALB checker to the inspection connector.

Check for ABS function in MODE 2 and 3.

Does it work properly?

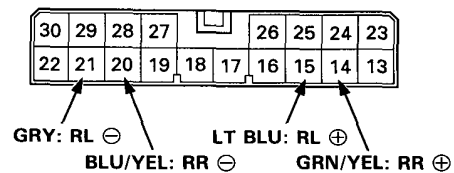
YES

Check for rear brake drag. If OK, substitute a known-good control unit and recheck.

Faulty speed sensor.

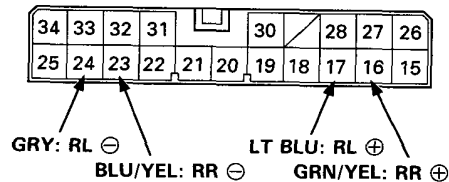
NO

18-P CONNECTOR (2WS)



View from control unit terminal side.

20-P CONNECTOR (4WS)

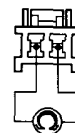


View from control unit terminal side.

Repair short in sensor wire or faulty speed sensor.

Faulty modulator.

SENSOR-SIDE CONNECTOR REAR



View from terminal side.

(cont'd)

Troubleshooting

Flowcharts (cont'd)

(From page 19-71)

Reconnect the 18-P (4WS: 20-P) connector to the control unit.

Check each wire for continuity between the speed sensor harness-side terminals and body ground.

Is there continuity?

NO

Repair open in wire harness.

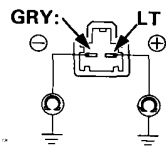
YES

Check for loose speed sensor connectors. If necessary, substitute a known-good control unit and recheck.

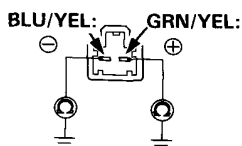
Positive: $3.3\text{ k}\Omega \pm 15\%$ is OK.
Negative: Less than $1\ \Omega$ is OK.

HARNESS-SIDE CONNECTOR

REAR LEFT



REAR RIGHT



View from terminal side.

Problem Code 6-1: Front Fail-Safe Relay Circuit

CAUTION: Use only the digital multimeter to check the system.

Pre-test steps:

- Check ABS B1 (20 A) FUSE
- Check for loose under-hood fuse/relay box connectors.

- With engine running, ABS indicator light is ON.
- With service check connector jumped (page 19-59), problem code 6-1 is indicated.

Remove the front fail-safe relay from under the gauge assembly.

Wire colors of the fail-safe relay connector
Front: BRN/BLK, BLK/YEL, YEL/GRN, BLK
Rear: BLU/BLK, BLK/YEL, YEL/GRN, BLK

Check relay function (page 19-100).

Does it work properly?

NO

Faulty front fail-safe relay.

YES

Turn the ignition switch ON.

Check for voltage between the fail-safe relay connector No. 1 (BLK/YEL) terminal and body ground.

Is there battery voltage?

NO

Repair open in BLK/YEL wire between the No. 9 R/C MIRROR (15 A) fuse and front fail-safe relay.

YES

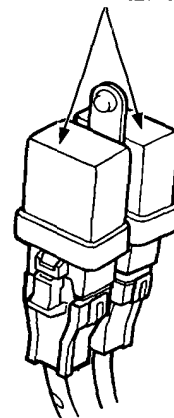
Turn the ignition switch OFF.

Disconnect the 10-P connector from the solenoids.

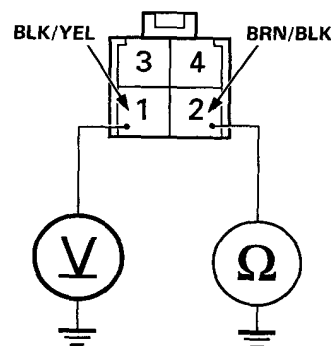
Check for continuity between the fail-safe relay connector No. 2 (BRN/BLK) terminal and body ground.

(To page 19-74)

FAIL-SAFE RELAYS



HARNESS-SIDE CONNECTOR



View from terminal side.

(cont'd)

Troubleshooting

Flowcharts (cont'd)

(From page 19-73)

Is there continuity?

YES

Repair short in BRN/BLK wire between the solenoid and front fail-safe relay.

NO

Check each wire for continuity between the solenoid terminals and body ground
No. 4 (BRN/BLK): Front Right
No. 6 (BRN/BLU): Front Left

Is there continuity?

YES

Faulty solenoid (short).

NO

Disconnect the connectors from the control unit.

Check each wire for continuity between the control unit connector and body ground.
RED/BLK: Front Right Inlet
YEL/BLK: Front Right Outlet
RED/BLU: Front Left Inlet
YEL/BLU: Front Left Outlet

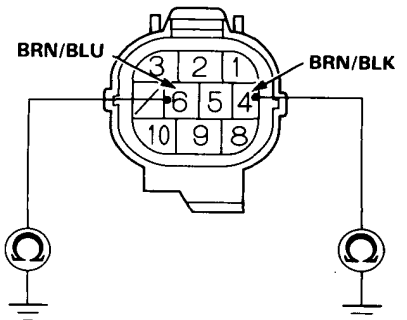
Is there continuity?

YES

Repair short in wire between the solenoid and control unit:
RED/BLK: Front Right Inlet
YEL/BLK: Front Right Outlet
RED/BLU: Front Left Inlet
YEL/BLU: Front Left Outlet

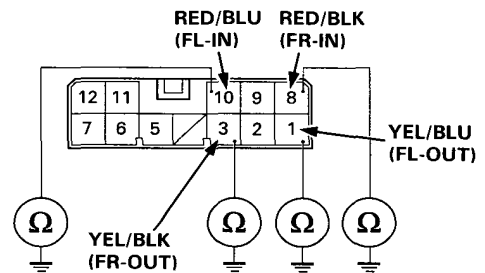
(To page 19-75)

SOLENOID-SIDE CONNECTOR



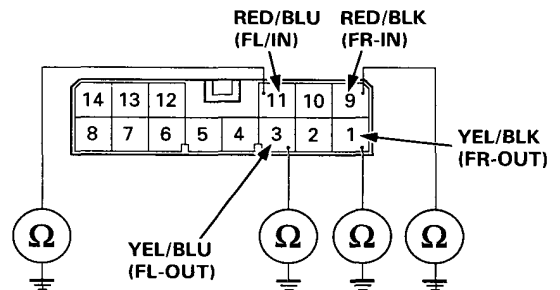
View from terminal side.

12-P CONNECTOR (2WS)



View from control unit terminal side.

14-P CONNECTOR (4WS)



View from control unit terminal side.

(From page 19-74)

Disconnect the rear fail-safe relay connector.

Check for continuity between the YEL/GRN (FSR) terminal and body ground.

Is there continuity?

YES

Repair short in YEL/GRN wire between the control unit and front fail-safe relay.

NO

Reinstall the front fail-safe relay.

Turn the ignition switch ON.

Check for voltage between the control unit connector YEL/GRN (FSR) terminal and body ground.

Is there battery voltage?

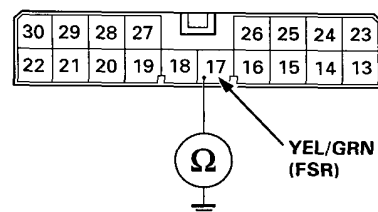
NO

Repair open in YEL/GRN wire between the front fail-safe relay and control unit.

YES

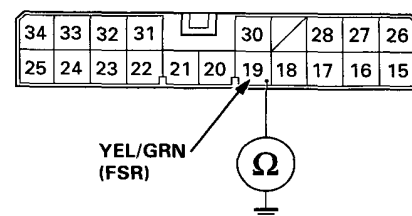
Check for loose control unit connectors. If necessary, substitute a known-good control unit and recheck.

18-P CONNECTOR (2WS)



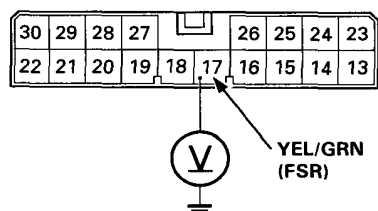
View from control unit terminal side.

20-P CONNECTOR (4WS)



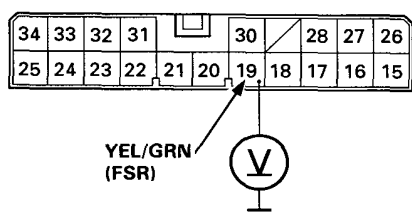
View from control unit terminal side.

18-P CONNECTOR (2WS)



View from control unit terminal side.

20-P CONNECTOR (4WS)



View from control unit terminal side.

(cont'd)

Troubleshooting

Flowcharts (cont'd)

Problem Code 6-4: Rear Fail-Safe Relay Circuit

CAUTION: Use only digital multimeter to check the system.

- With engine running, ABS indicator light is ON.
- With service check connector jumped (page 19-59), problem code 6-4 is indicated.

Remove the rear fail-safe relay from under the gauge assembly.

Wire colors of the fail-safe relay connector
Front: BRN/BLK, BLK/YEL, YEL/GRN, BLK
Rear: BLU/BLK, BLK/YEL, YEL/GRN, BLK

Check relay function (page 19-100).

Does it work properly?

NO

Faulty rear fail-safe relay.

YES

Turn the ignition switch ON.

Check for voltage between the fail-safe relay connector No. 1 (BLK/YEL) terminal and body ground.

Is there battery voltage?

NO

Repair open in BLK/YEL wire between the No. 9 R/C MIRROR (15 A) fuse and front fail-safe relay.

YES

Turn the ignition switch OFF.

Disconnect the 10-P connector from the solenoids.

Check for continuity between the fail-safe relay connector No. 2 (BLU/BLK) terminal and body ground.

Is there continuity?

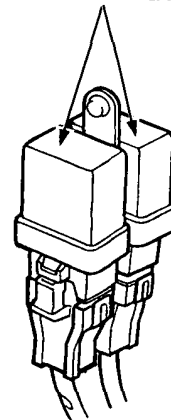
YES

Repair short in BLU/BLK wire between the solenoid and rear fail-safe relay.

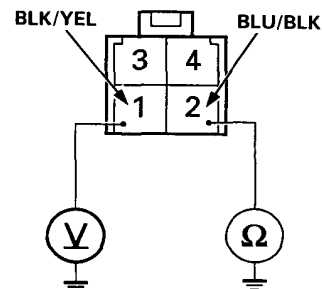
NO

(To page 19-77)

FAIL-SAFE RELAYS



HARNESS-SIDE CONNECTOR



View from terminal side.

(From page 19-76)

Check for continuity between the solenoid No. 5 (BRN/WHT) terminal and body ground.

Is there continuity?

YES

Faulty solenoid (short).

NO

Disconnect the connectors from the control unit.

Check each wire for continuity between the control unit connector and body ground.
RED/WHT: Rear Inlet
YEL/WHT: Rear Outlet

Is there continuity?

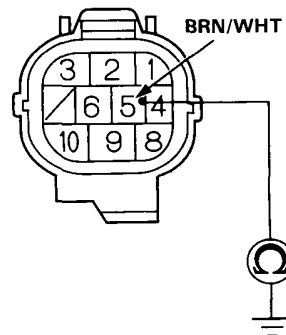
YES

Repair short in wire between the solenoid and control unit:
RED/WHT: Rear Inlet
YEL/WHT: Rear Outlet

NO

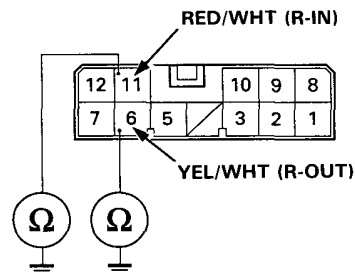
(To page 19-78)

SOLENOID-SIDE CONNECTOR



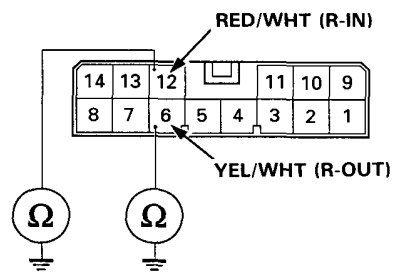
View from terminal side.

12-P CONNECTOR (2WS)



View from control unit terminal side.

14-P CONNECTOR (4WS)



View from control unit terminal side.

(cont'd)

Troubleshooting

Flowcharts (cont'd)

(From page 19-77)

Disconnect the front fail-safe relay connector.

Check for continuity between the YEL/GRN (FSR) terminal and body ground.

Is there continuity?

YES

Repair short in YEL/GRN wire between the control unit and rear fail-safe relay.

NO

Reinstall the rear fail-safe relay.

Turn the ignition switch ON.

Check for voltage between the control unit connector YEL/GRN (FSR) terminal and body ground.

Is there battery voltage?

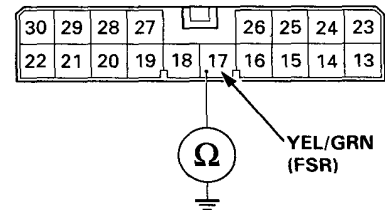
NO

Repair open in YEL/GRN wire between the rear fail-safe relay and control unit.

YES

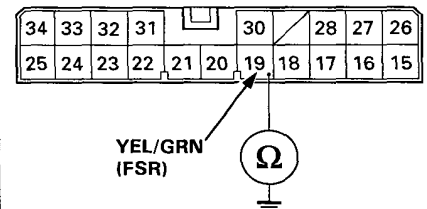
Check for loose control unit connectors. If necessary, substitute a known-good control unit and recheck.

18-P CONNECTOR (2WS)



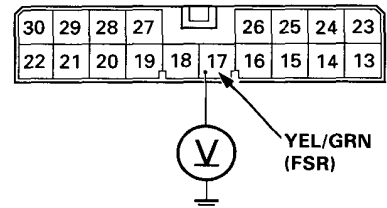
View from control unit terminal side.

20-P CONNECTOR (4WS)



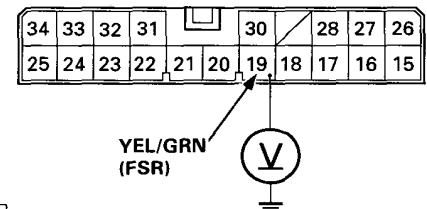
View from control unit terminal side.

18-P CONNECTOR (2WS)



View from control unit terminal side.

20-P CONNECTOR (4WS)



View from control unit terminal side.

Problem Code 7-1 and 7-2: Front Solenoid Related Problem

CAUTION: Use only the digital multimeter to check the system.

Pre-test steps:

- Check ABS B1 (20 A) FUSE
- Check for loose under-hood fuse/relay box connectors.

- With engine running, ABS indicator light is ON.
- With service check connector jumped (page 19-59), problem codes 7-1 and/or 7-2 is indicated.

Disconnect the 10-P connector from the solenoids.

Check for resistance between the solenoid terminal:
No. 1 (RED/BLK) and No. 4 (BRN/BLK): Front Right Inlet
No. 3 (RED/BLU) and No. 6 (BRN/BLU): Front Left Inlet

Is there 1-3Ω?

NO

Faulty solenoid.

YES

Check for resistance between the solenoid terminals:
No. 8 (YEL/BLK) and No. 4 (BRN/BLK): Front Right Outlet
No. 10 (YEL/BLU) and No. 6 (BRN/BLU): Front Left Outlet

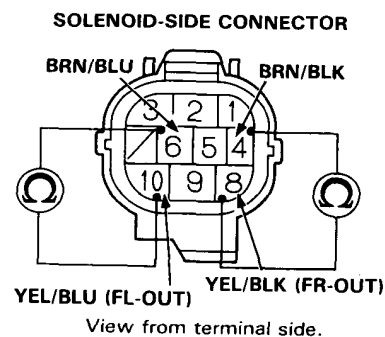
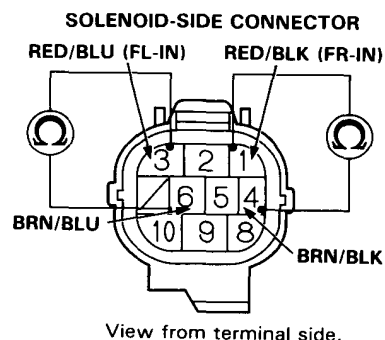
Is there 1-3Ω?

NO

Faulty solenoid.

YES

(To page 19-80)



(cont'd)

Troubleshooting

Flowcharts (cont'd)

(From page 19-79)

Disconnect the 12-P (4WS: 14-P) connector from the control unit.

Check each wire for continuity between the control unit and front solenoid:

RED/BLK: Front Right Inlet
YEL/BLK: Front Right Outlet
RED/BLU: Front Left Inlet
YEL/BLU: Front Left Outlet

Is there continuity?

YES

NO

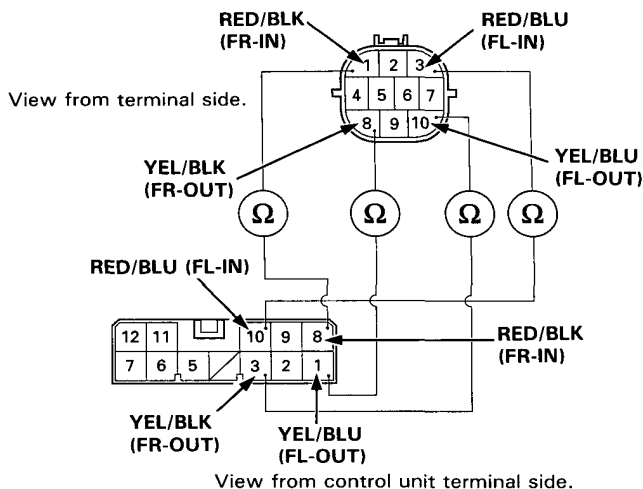
Repair open in wire between the solenoid and control unit:
RED/BLK: Front Right Inlet
YEL/BLK: Front Right Outlet
RED/BLU: Front Left Inlet
YEL/BLU: Front Left Outlet

Check each wire for continuity between the control unit and body ground.

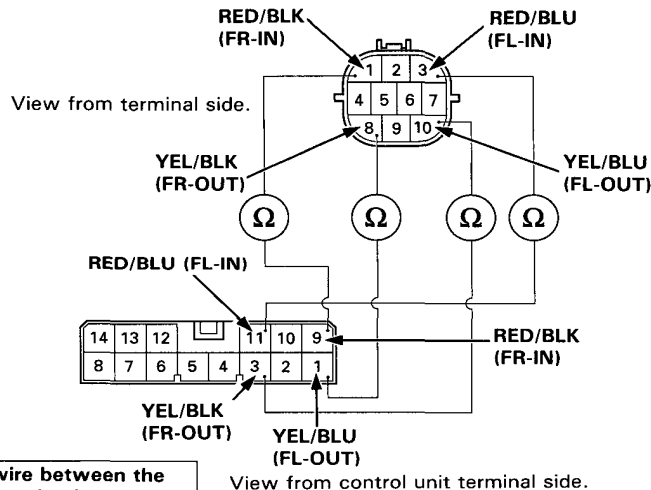
RED/BLK: Front Right Inlet
YEL/BLK: Front Right Outlet
RED/BLU: Front Left Inlet
YEL/BLU: Front Left Outlet

(To page 19-81)

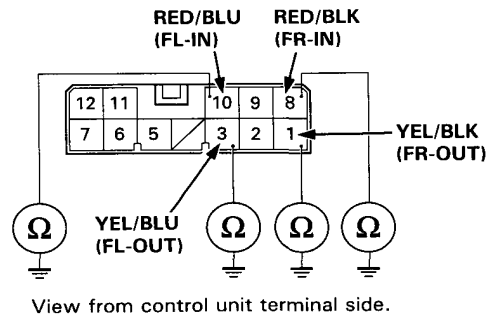
HARNESS-SIDE CONNECTOR (2WS)



HARNESS-SIDE CONNECTOR (4WS)



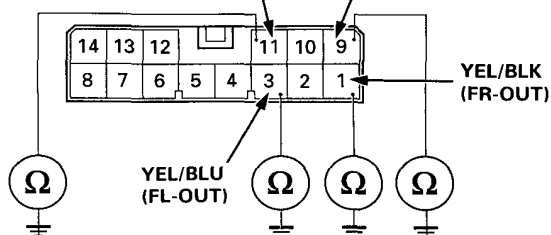
12-P CONNECTOR (2WS)



(From page 19-80)

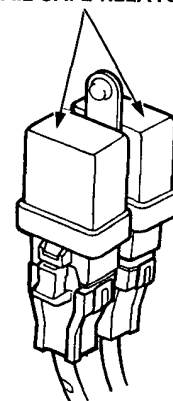
14-P CONNECTOR (4WS)

RED/BLU (FL-IN) RED/BLK (FR-IN)

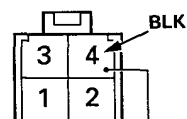


View from control unit terminal side.

FAIL-SAFE RELAYS

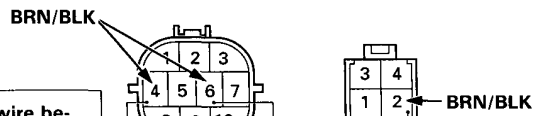


HARNESS-SIDE CONNECTOR



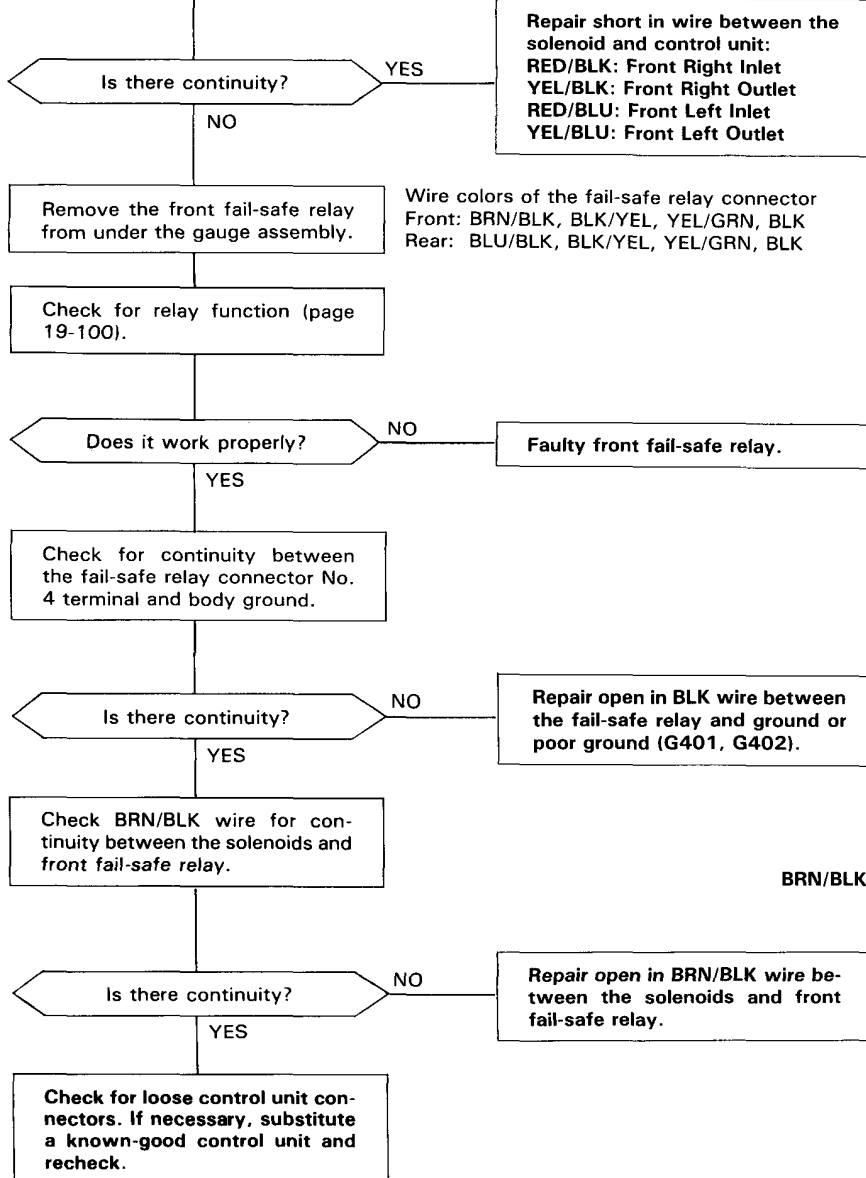
View from terminal side.

HARNESS-SIDE CONNECTOR



View from terminal side.

(cont'd)



Troubleshooting

Flowcharts (cont'd)

Problem Code 7-4: Rear Solenoid Problem

CAUTION: Use only the digital multimeter to check the system.

- With engine running, ABS indicator light is ON.
- With service check connector jumped (page 19-59), problem code 7-4 is indicated.

Disconnect the 10-P connector from the solenoids.

Check for resistance between the solenoid terminals:
No. 2 (RED/WHT) and No. 5 (BRN/WHT): Rear Inlet
No. 9 (YEL/WHT) and No. 5 (BRN/WHT): Rear Outlet

Is there 1-3Ω?

NO

Faulty solenoid.

YES

Disconnect the 12-P (4WS; 14-P) connector from control unit.

Check each wire for continuity between the control unit and rear solenoid:
RED/WHT: Rear Inlet
YEL/WHT: Rear Outlet

Is there continuity?

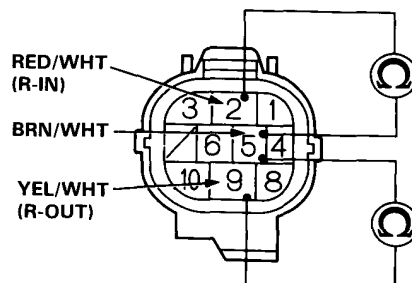
NO

Repair open in wire between the solenoid and control unit:
RED/WHT: Rear Inlet
YEL/WHT: Rear Outlet

YES

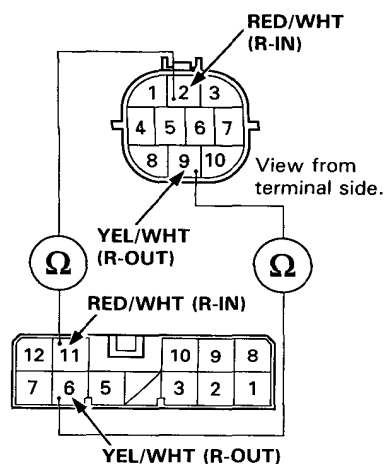
(To page 19-83)

SOLENOID-SIDE CONNECTOR



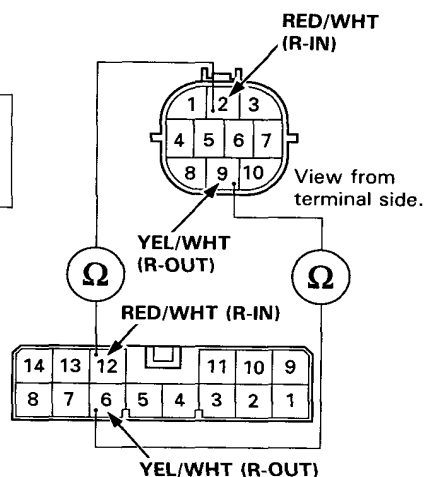
View from terminal side.

HARNESS-SIDE CONNECTOR (2WS)



View from control unit terminal side.

HARNESS-SIDE CONNECTOR (4WS)



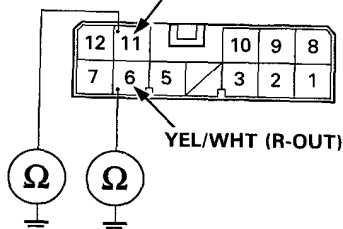
View from control unit terminal side.

(From page 19-82)

Check each wire for continuity between the control unit and body ground:
RED/WHT: Rear Inlet
YEL/WHT: Rear Outlet

12-P CONNECTOR (2WS)

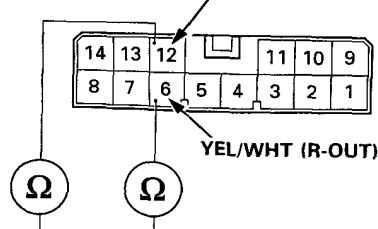
RED/WHT (R-IN)



View from control unit terminal side.

14-P CONNECTOR (4WS)

RED/WHT (R-IN)



View from control unit terminal side.

Is there continuity?

YES

Repair short in wire between the solenoid and control unit:
RED/WHT: Rear Inlet
YEL/WHT: Rear Outlet

NO

Remove the rear fail-safe relay from under the gauge assembly.

Wire colors of the fail-safe relay connector
Front: BRN/BLK, BLK/YEL, YEL/GRN, BLK
Rear: BLU/BLK, BLK/YEL, YEL/GRN, BLK

Check for relay function (page 19-100).

Does it work properly?

NO

Faulty rear fail-safe relay.

YES

Check for continuity between the fail-safe relay connector No. 4 (BLK) terminal and body ground.

Is there continuity?

NO

Repair open in BLK wire between the fail-safe relay and ground or poor ground (G401, G402).

YES

Check BLU/BLK wire for continuity between the solenoid and rear fail-safe relay.

Is there continuity?

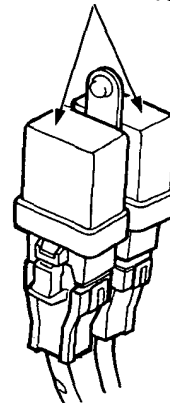
NO

Repair open in BLU/BLK wire between the solenoid and rear fail-safe relay.

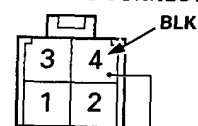
YES

Check for loose control unit connectors. If necessary, substitute a known-good control unit and recheck.

FAIL-SAFE RELAYS



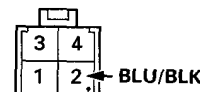
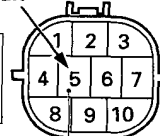
HARNESS-SIDE CONNECTOR



View from terminal side.

HARNESS-SIDE CONNECTOR

BLU/BLK

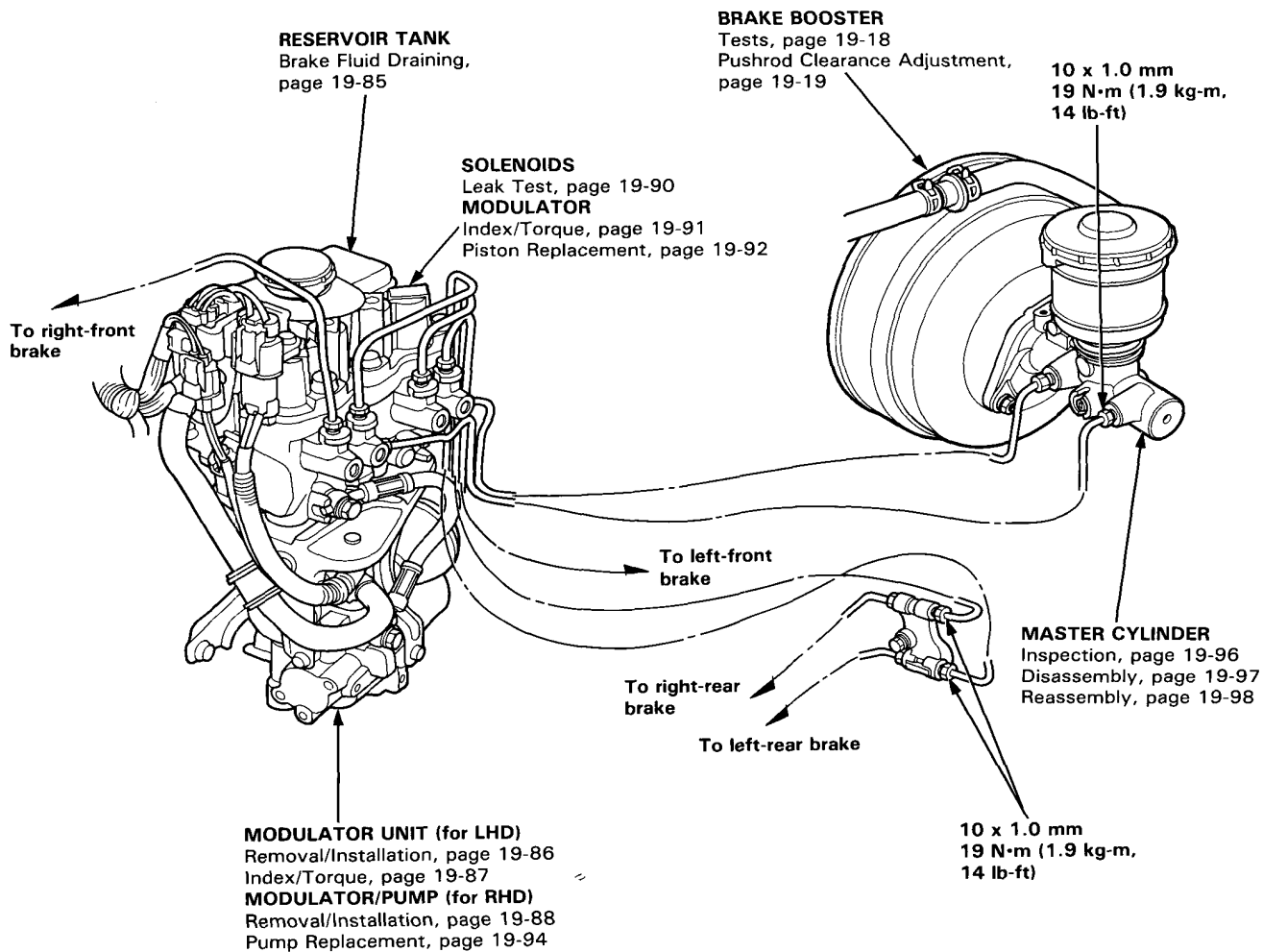


View from terminal side.

Hydraulic System

Index/Hydraulic Connections

CAUTION: Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.



Relieving Accumulator/Line Pressure

⚠ WARNING Use the Bleeder T-wrench before disassembling the parts shaded in the illustration.

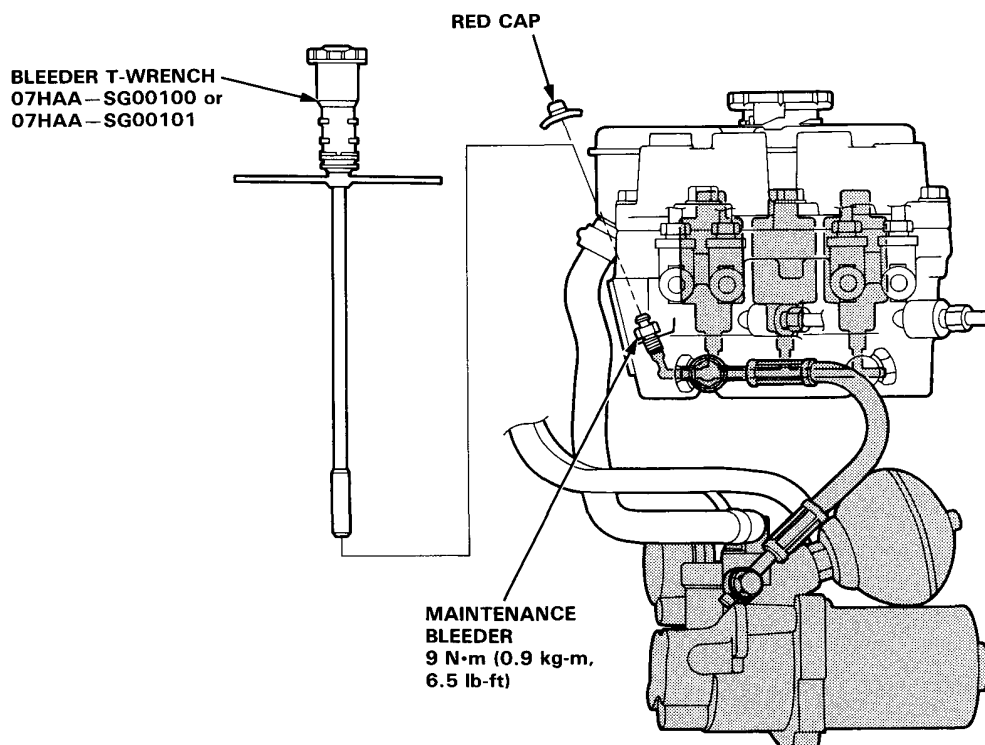
1. Open the hood.
2. Remove the red cap from the bleeder on the modulator body.
3. Install the special tool on the maintenance bleeder and turn it out slowly 90° to collect high-pressure fluid into the reservoir. Turn the special tool out one complete turn to drain the brake fluid thoroughly.
4. Retighten the maintenance bleeder and discard the fluid.
5. Reinstall the red cap.

Reservoir Brake Fluid Draining

1. Draining brake fluid from modulator tank:
The brake fluid may be sucked out through the top of the modulator tank with a syringe. It may also be drained through the pump joint after disconnecting the pump hose.
2. Draining brake fluid from master cylinder:
Loosen the bleed screw and pump the brake pedal to drain the brake fluid from the master cylinder.

⚠ WARNING

- High-pressure fluid will squirt out if the shaded hose and pipe are removed.
- To drain high-pressure brake fluid, follow the procedure on this page.



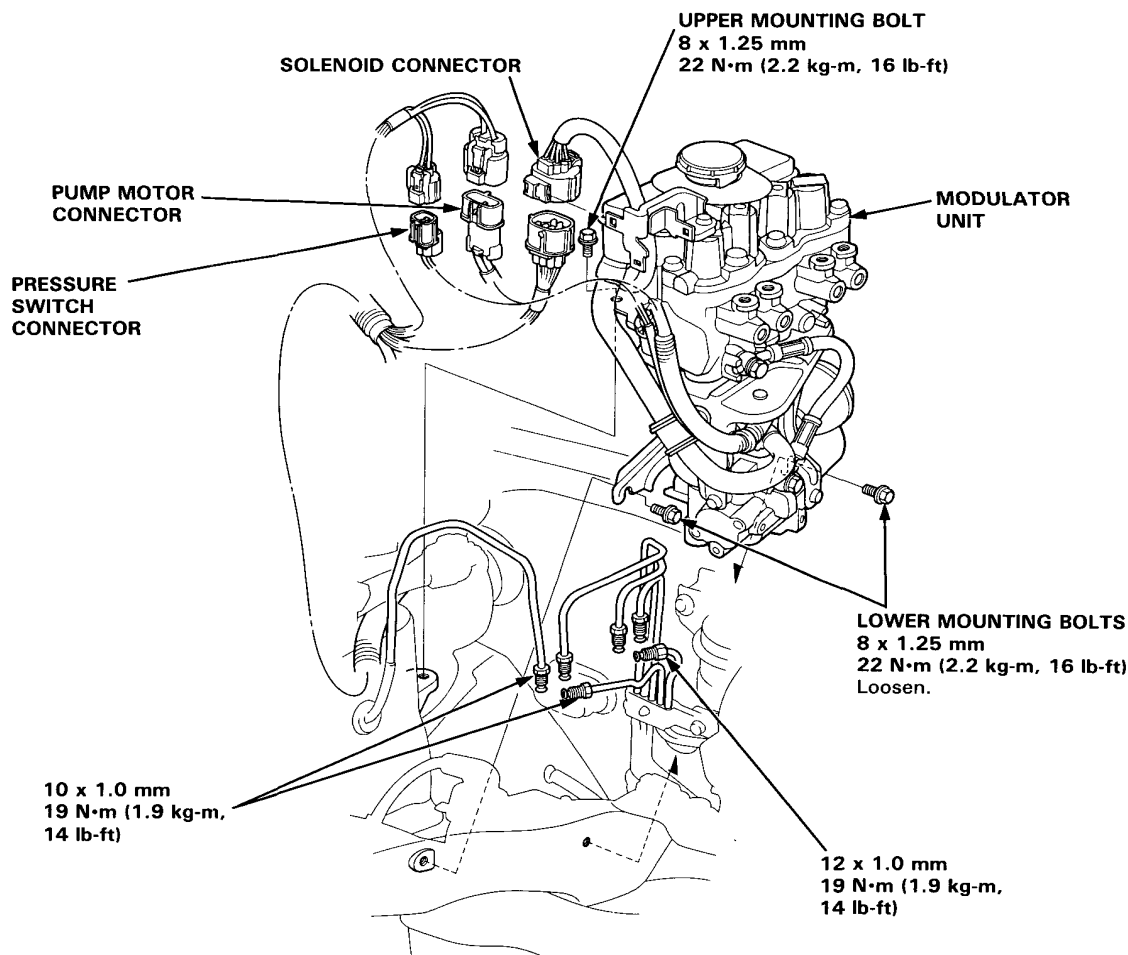
Modulator Unit (for LHD)

Removal/Installation

CAUTION:

- Be careful not to bend or damage the brake pipes when removing the modulator unit.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.
- When connecting the brake pipes, make sure that there is no interference between the brake pipes and other parts.

1. Drain the brake fluid from the master cylinder.
2. Relieve the high pressure fluid (page 19-85) when the high pressure hose is to be disconnected.
3. Remove the intake air duct.
4. Disconnect the solenoid, pump motor and pressure switch connectors.
5. Disconnect the six brake pipes from the modulator.
6. Loosen the two lower mounting bolts, and remove the upper mounting bolt and the modulator unit from the frame.
7. Install the modulator unit in the reverse order of removal.
8. After installation, fill and bleed the hydraulic system.

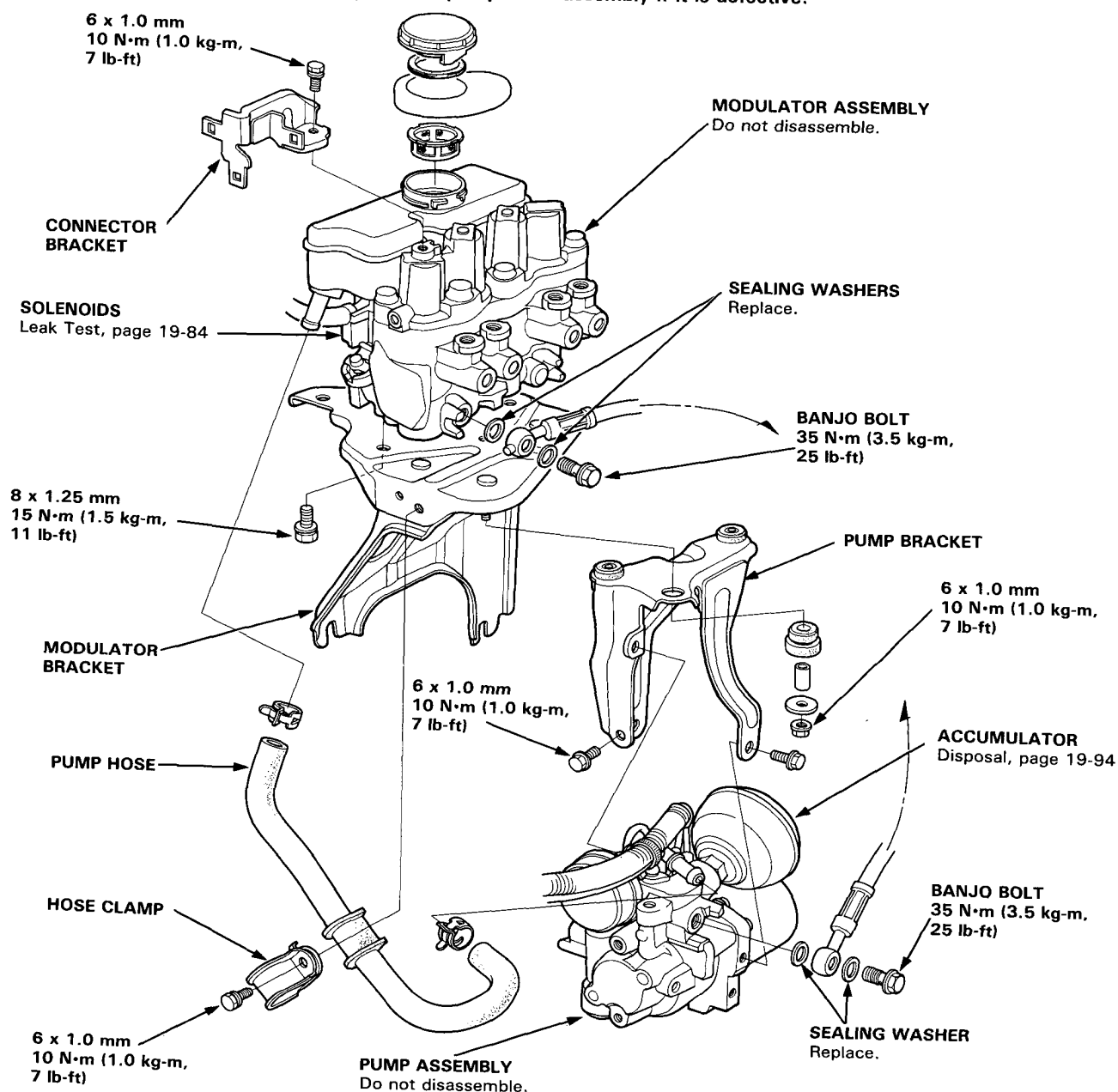


Index/Torque

⚠ WARNING Before removing the modulator-to-pump high-pressure line, be sure to relieve the fluid pressure from the maintenance bleeder (page 19-85).

CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.
- Do not disassemble the modulator. Replace the modulator as an assembly if it is defective.
- Do not disassemble the pump. Replace the pump as an assembly if it is defective.



Modulator/Pump (for RHD)

Removal/Installation

⚠ WARNING Before removing the modulator-to-pump high-pressure line, be sure to relieve the fluid pressure from the maintenance bleeder (page 19-85).

CAUTION:

- Be careful not to bend or damage the brake pipes when removing the modulator and pump.
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- To prevent spills, cover the hose joints with rags or shop towels.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.
- Do not disassemble the pump. Replace the pump as an assembly if it is defective.
- When connecting the brake pipes, make sure that there is no interference between the brake pipes and other parts.

Modulator

1. Drain the brake fluid from the master cylinder.
2. Drain the brake fluid from the modulator reservoir tank.
3. Relieve the high pressure fluid (page 19-85).
4. Disconnect the solenoid connector.
5. Disconnect the seven brake pipes from the modulator.
6. Remove the pressure switch wire and pump motor wire band.
7. Remove the brake pipe from the brake pipe clip.
8. Remove the three 8 mm bolts attaching modulator bracket B.
9. Disconnect the pump hose from the modulator reservoir tank.
10. Remove the modulator with bracket B, then remove bracket B from the modulator.
11. Install the modulator in the reverse order of removal.

NOTE: Use the fixed type torque wrench with the twelve-point head to tighten the 12 x 1.0 mm flare nut to the specified torque.

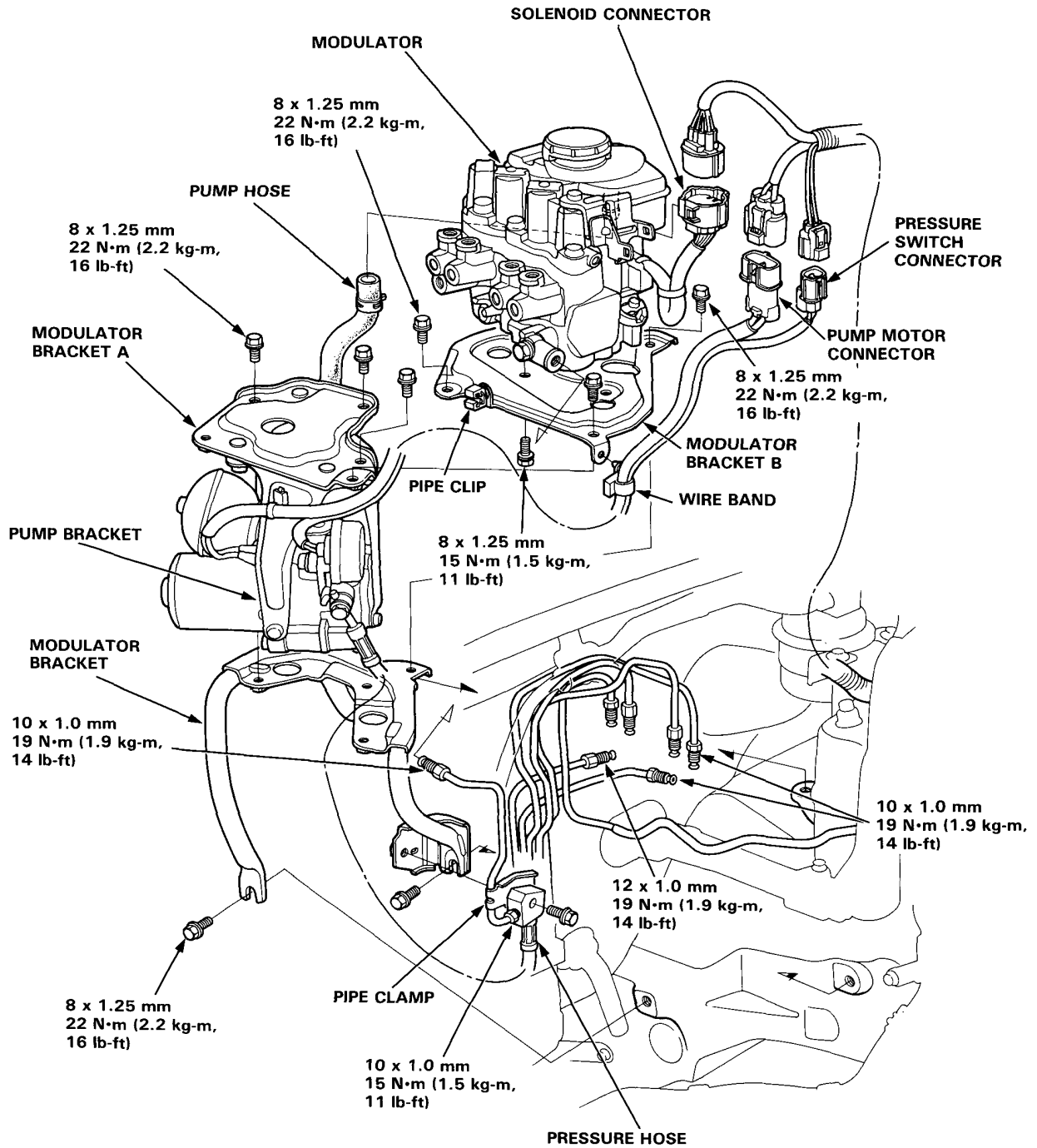
12. After installation, fill and bleed the conventional brake system (page 19-12) and ABS system (page 19-95).

Pump

1. Remove the modulator.
2. Disconnect the pressure switch and pump motor connectors.
3. Disconnect the brake (high pressure) pipe from the pressure hose joint.
4. Remove the pressure hose joint and pipe clamp from the modulator bracket.
5. Remove the three 8 mm bolts and the pump with the pump bracket and modulator bracket A.

NOTE: Refer to page 19-94 for pump replacement.

6. Install the pump in the reverse order of removal.

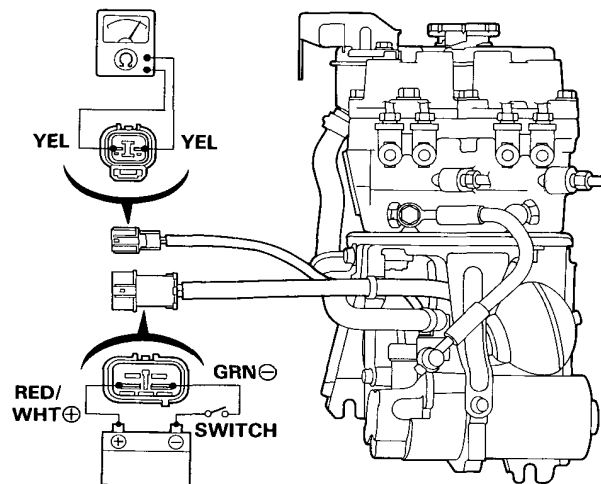


Solenoids

Leak Test

NOTE: If a solenoid leaks excessively, the brake fluid level in the modulator reservoir tank will rise when operating the ABS motor. The modulator reservoir may also overflow.

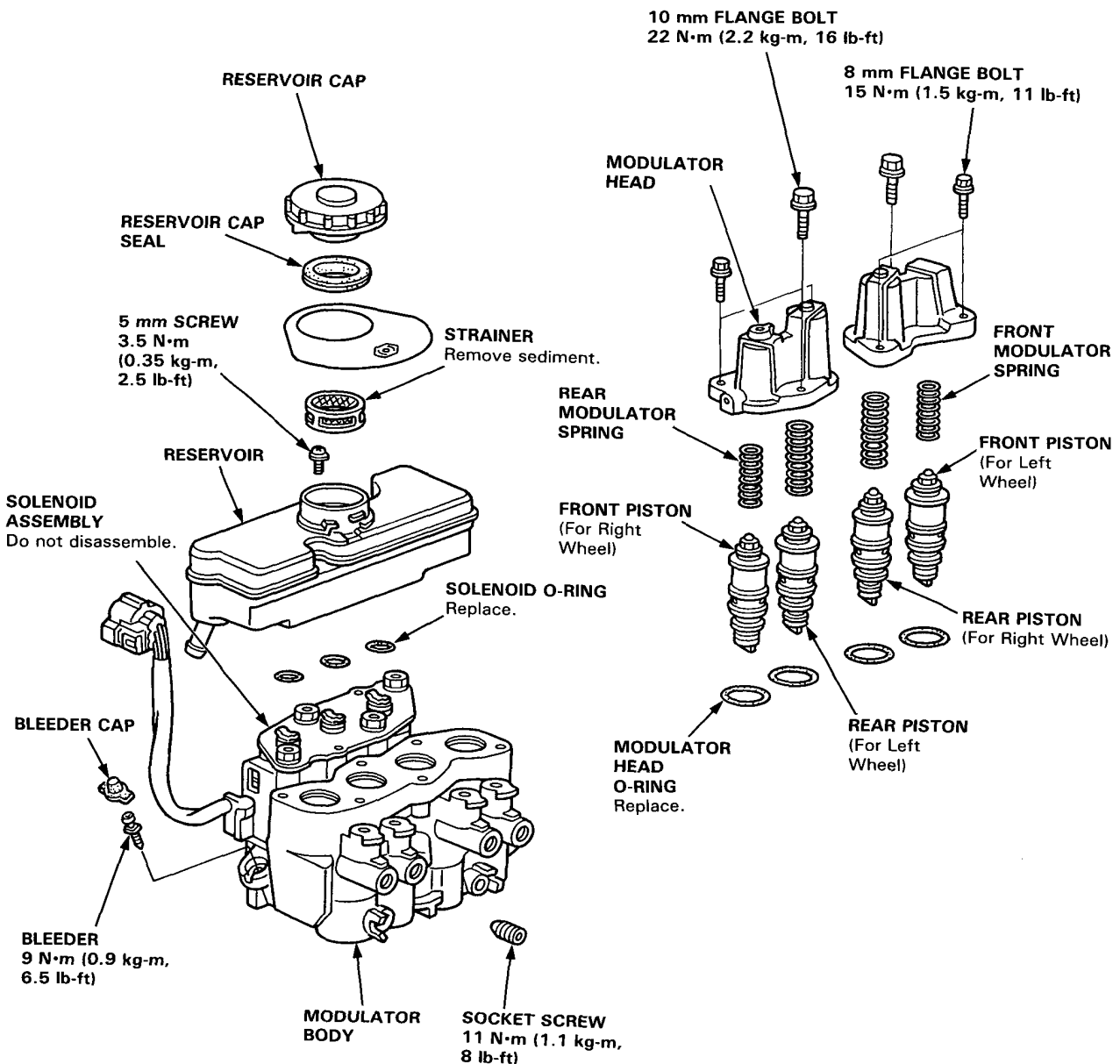
1. Disconnect the pump motor and pressure switch connectors.
2. Connect an ohmmeter between the YEL and YEL terminals of the pressure switch connector.
3. Attach the positive (+) lead of a fully charged 12 V battery to the RED/WHT terminal of the motor connector and negative (-) lead to the GRN terminal, and install a switch between negative lead and GRN terminal as shown.
4. Turn the switch on to allow sufficient pressure to build up within the accumulator and check for continuity. If the ohmmeter shows continuity (pressure switch turned on), run the motor for 10 seconds more, then turn the switch off.



- Check if the solenoid hisses or squeaks. Replace the modulator if the solenoid hisses or squeaks.
- Check the pressure switch for continuity within 30 minutes. It is normal if there is continuity. If there is no continuity, a solenoid is faulty or high-pressure line leaks.

CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.



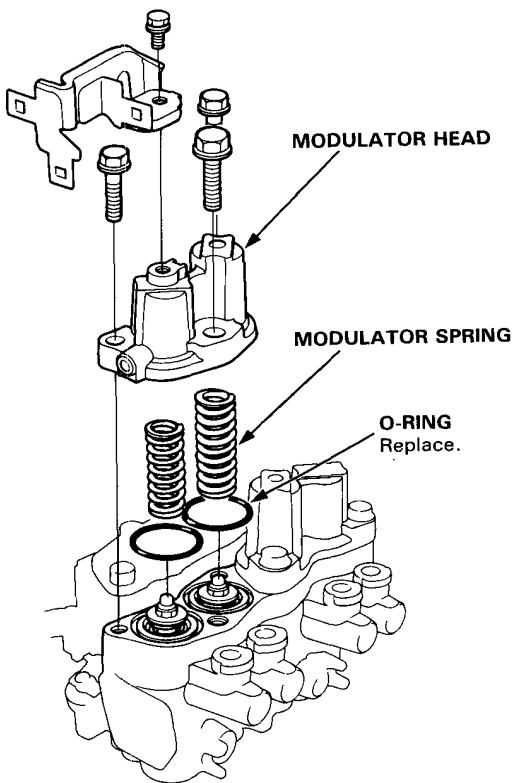
Piston

Replacement

CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.

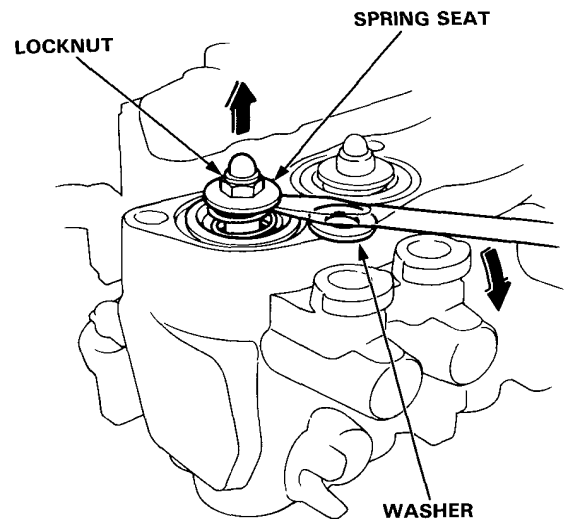
1. Remove the modulator head.
2. Remove the modulator springs and O-rings.



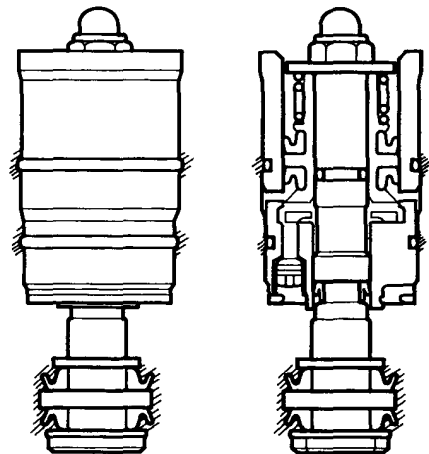
3. Insert the screwdriver under the spring seat, pry the piston assembly off slightly, then pull the piston assembly while grasping the locknut with pliers.

NOTE:

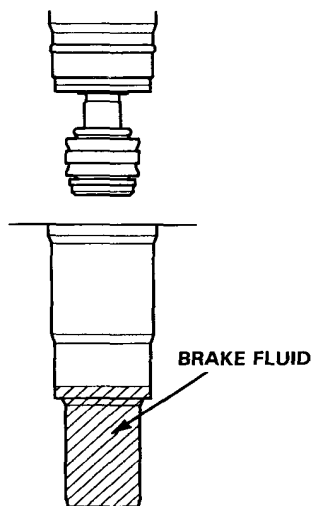
- Place a suitable washer between the screwdriver and modulator body to prevent damage to the modulator body.
- Be careful not to damage the piston sleeve.



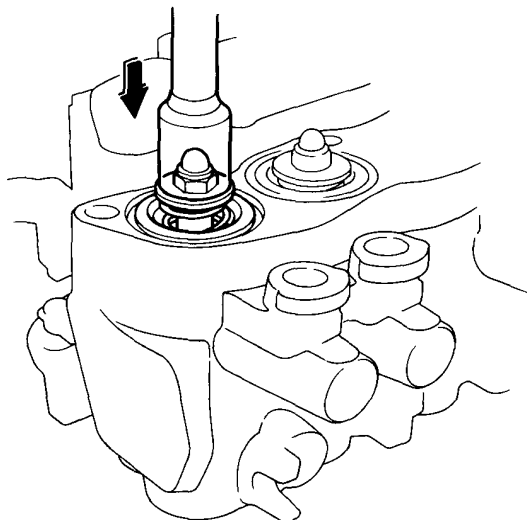
4. Apply rubber grease to the shaded areas of a new piston assembly as shown.



5. Pour brake fluid into the piston hole in the modulator body.
6. Coat the sliding surface of the piston with brake fluid and install the piston assembly into the modulator body.



7. Push down the piston several times until no bubbles come out from the solenoid side.

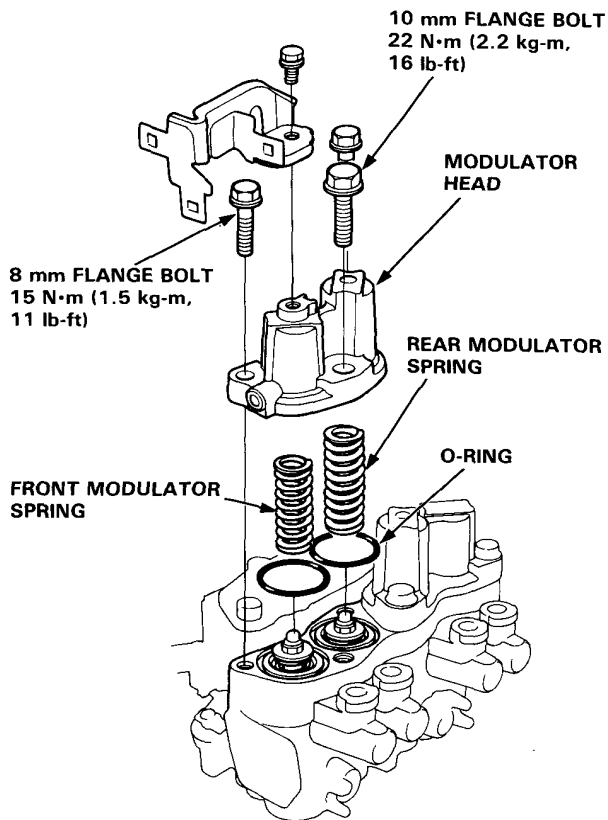


8. Install new O-rings into the grooves in the modulator body.

9. Install the modulator springs.

NOTE: Do not interchange the front and rear modulator springs. The longer spring is the rear modulator spring.

10. Install the modulator head onto the body, being careful not to bind the O-rings.



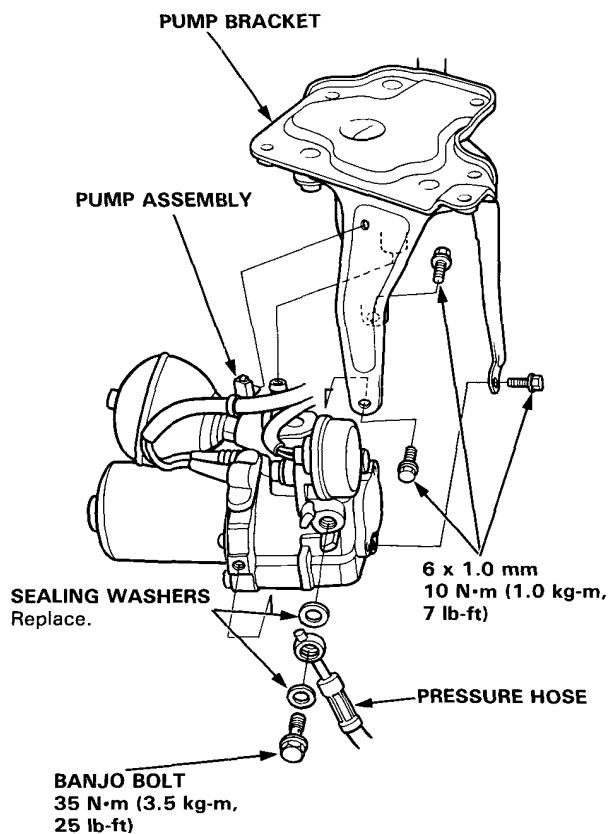
Pump (for RHD)

Replacement

NOTE:

- Replace the pump motor, accumulator and pressure switch as a pump assembly.
- Before disposal of pump assembly, remove the accumulator and relieve the gas from it.

1. Remove the three bolts and the pump assembly from the pump bracket.
2. Remove the banjo bolt and disconnect the pressure hose from the pump assembly.



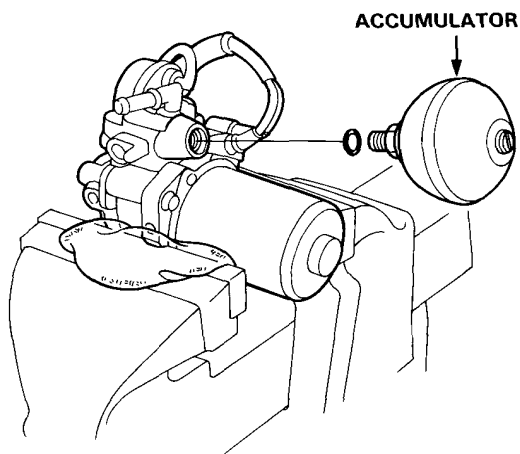
3. Remove the accumulator from the pump assembly and dispose of it.
4. Connect the pressure hose to a new pump assembly with the banjo bolt and new sealing washers.
5. Install the pump assembly to the pump bracket.

Accumulator

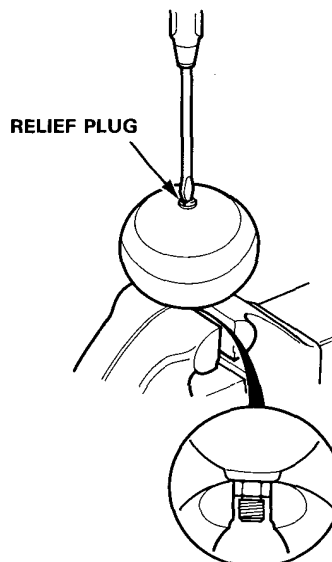
Disposal

⚠ WARNING The accumulator contains high pressure nitrogen gas. Do not puncture, expose to the flame, or attempt to disassemble the accumulator or it may explode and severe personal injury may result.

1. Secure the pump assembly in a vise and remove the accumulator by turning it counterclockwise with a 19 mm open-end wrench.



2. Secure the accumulator in a vise so that the relief plug points straight up.
3. Slowly turn the plug 3-1/2 turns and then wait 3 minutes for all pressure to escape.
4. Remove the plug completely and dispose of the accumulator.



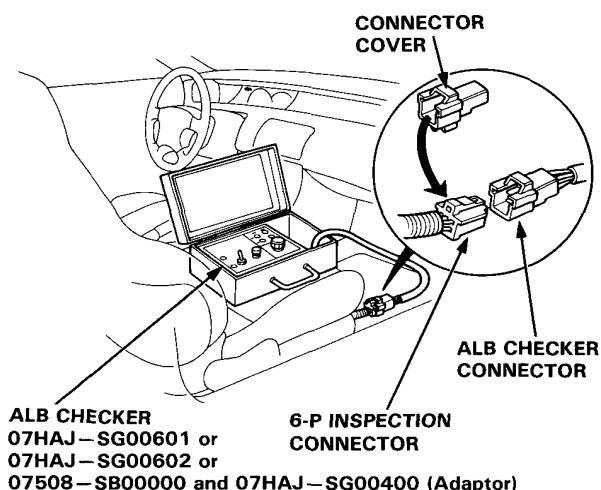
Bleeding

Air Bleeding with ALB Checker

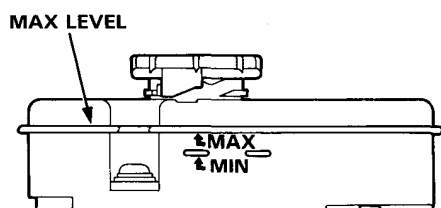
CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.

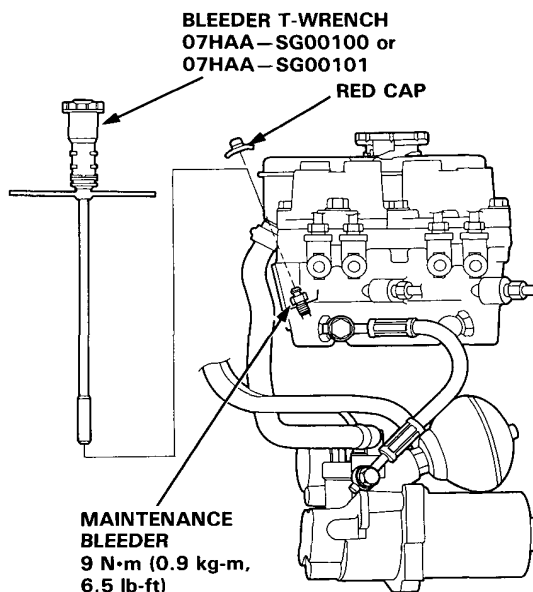
1. Place the vehicle on level ground with the wheels blocked. Put the transmission in neutral for manual transmission models, and in P for automatic transmission models. Release the parking brake.
2. Disconnect the 6-P inspection (orange) connector from the cross-member under the passenger's seat and connect the inspection connector to the ALB checker.



3. Fill the modulator reservoir to the MAX level and install the reservoir cap.



4. Start the engine and allow it to idle for a few minutes, then stop it. Check the fluid level in the modulator reservoir and refill to the MAX level if necessary.
5. Bleed high-pressure fluid from the maintenance bleeder with the special tool.



6. Start the engine and allow it to idle for a few minutes, then stop it. Check the fluid level in the modulator reservoir and refill to the MAX level if necessary.
7. Turn the Mode Selector switch of the checker to 2.
8. While depressing the brake pedal firmly, push the Start Test switch to operate the modulator. There should be kickback on the brake pedal. If not, repeat steps 5 to 8.
9. Turn the Mode Selector to 3, 4, and 5. Perform step 8 for each of the test mode positions.
10. Refill the modulator reservoir to the MAX level and install the reservoir cap.

WARNING Disconnect the ALB Checker before driving the car. A collision can result from a reduction or complete loss of braking ability, causing severe personal injury or death.

Master Cylinder



Inspection

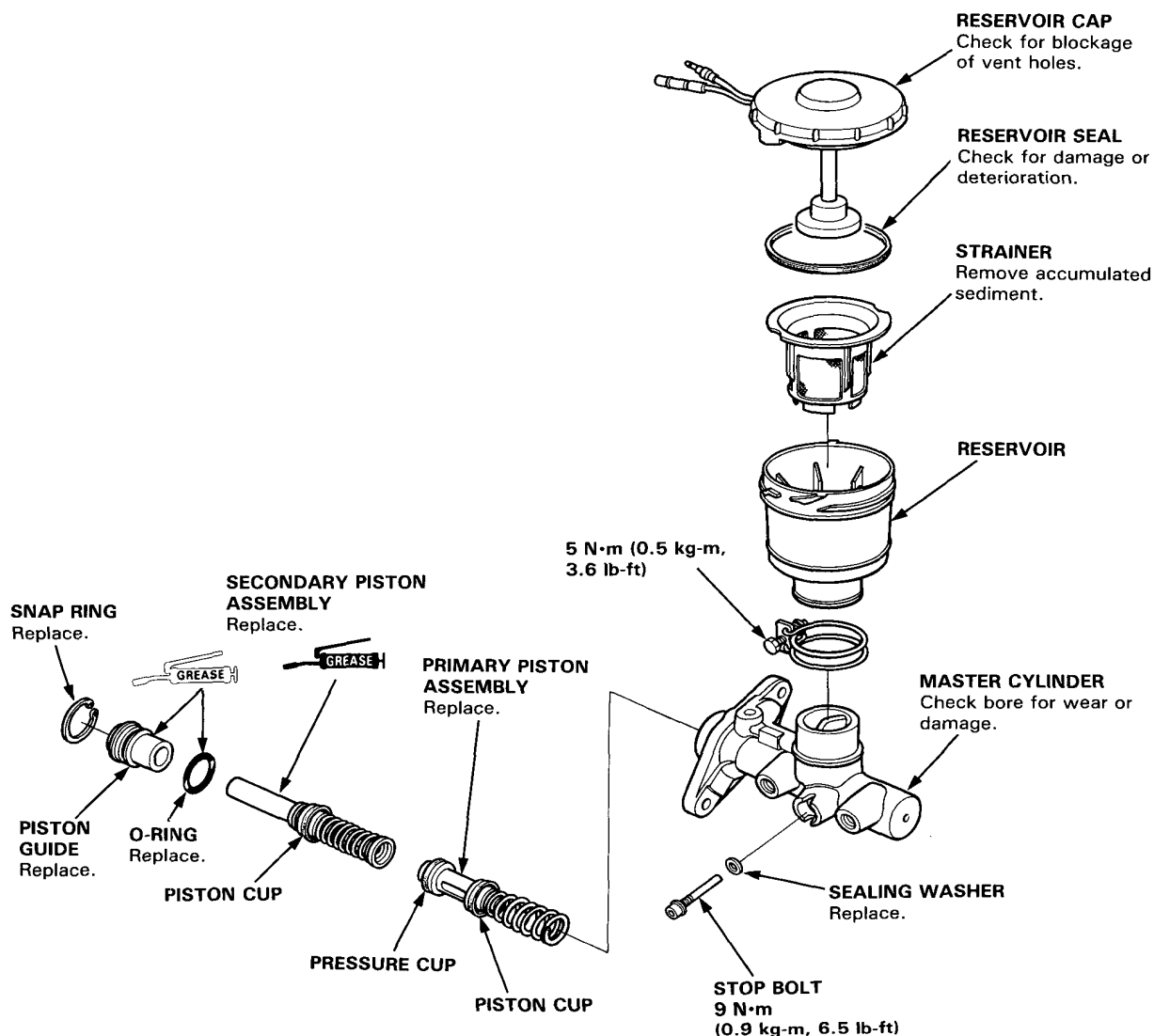
CAUTION:

- Do not spill brake fluid on the car, it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.
- Before reassembling, check that all parts are free of dust and other foreign particles.
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.
- Replace the master cylinder if the bore is damaged or worn. Do not hone or attempt to refinish the bore.

NOTE:

- Coat piston cup, pressure cup and master cylinder bore with clean brake fluid.
- Replace all rubber parts with new ones whenever disassembled.

 GREASE: Brake Cylinder Grease (P/N:08733—B020E) or equivalent rubber grease.  GREASE: Silicone grease.

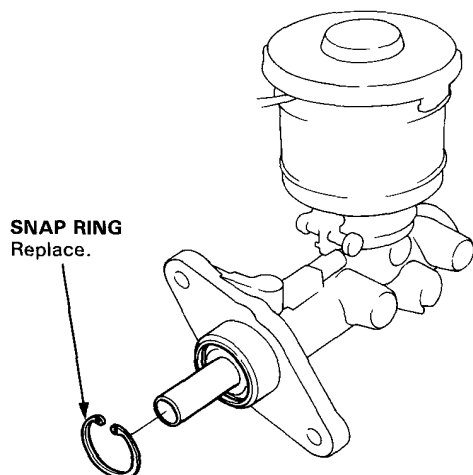


Disassembly

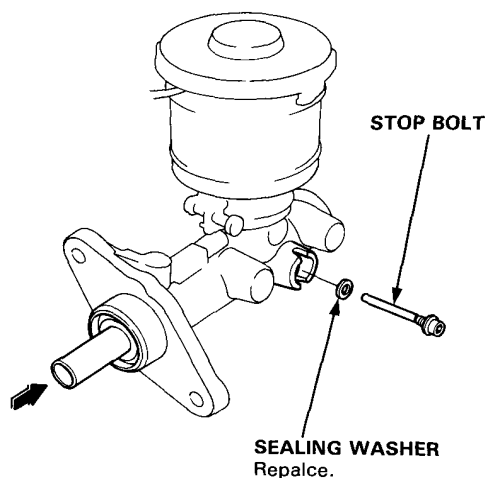
CAUTION:

- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- Clean all parts in brake fluid and air dry; blow out all passages with compressed air.

1. Push the secondary piston, then remove the snap ring.



2. Remove the stop bolt while pushing in the secondary piston.

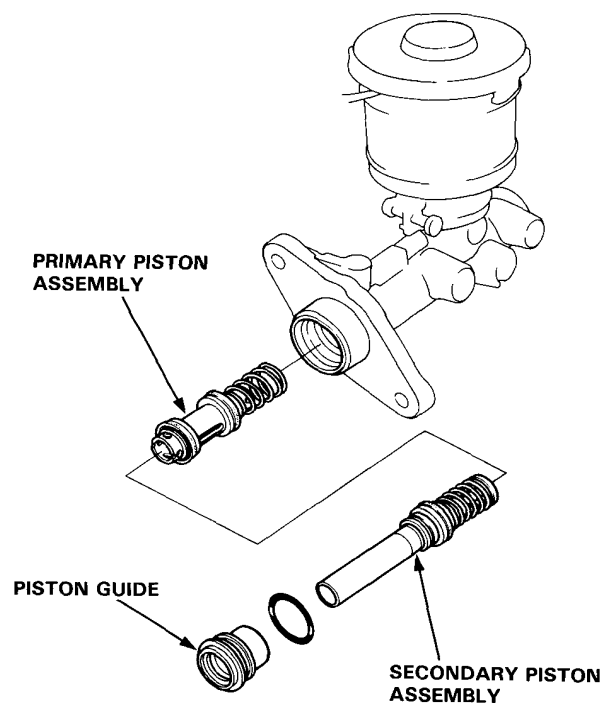


3. Remove the piston guide, secondary piston assembly and primary piston assembly.

NOTE: If the primary piston assembly is difficult to remove, apply compressed air from the primary piston side port.

CAUTION:

- Do not use high pressure air or bring the nozzle too close to the port.
- Place a shop rag over the master cylinder to prevent the primary piston from becoming a projectile.



Master Cylinder

Reassembly

CAUTION:

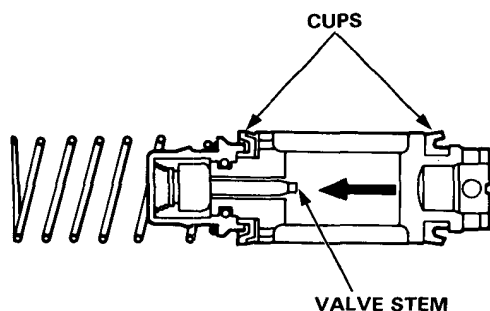
- Do not spill brake fluid on the car; it may damage the paint; if brake fluid does contact the paint, wash it off immediately with water.
- Before reassembling, check that all parts are free of dust and other foreign particles.)
- Replace parts with new ones whenever specified to do so.
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Do not mix different brands of brake fluid as they may not be compatible.
- Do not reuse the drained fluid. Use only clean DOT 3 or 4 brake fluid.

1. Coat the cups of a new primary piston assembly into the master cylinder.

NOTE:

- Before installation, check that the valve stem moves smoothly by lightly pushing it through the slot in the piston.
- Install the piston so that the slot in the piston align with the stop bolt hole in the master cylinder.

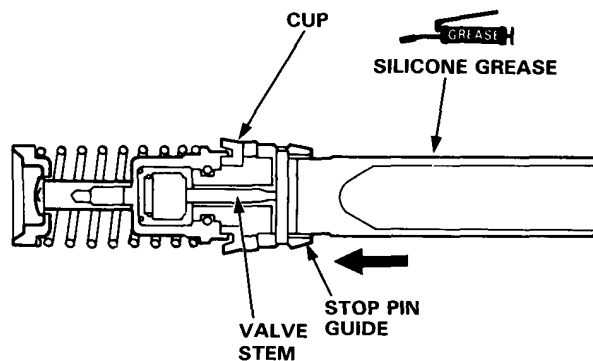
PRIMARY PISTON ASSEMBLY



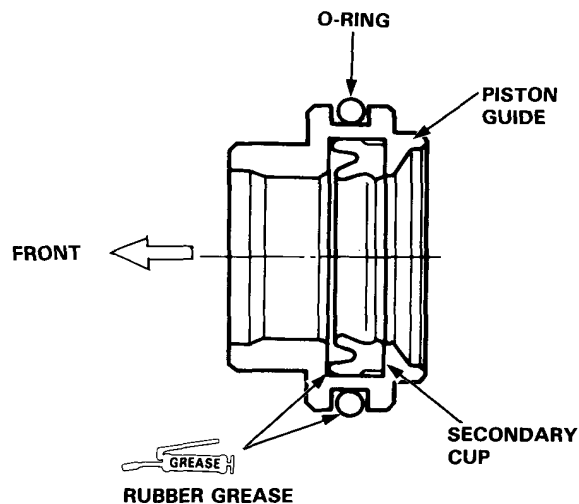
2. Coat the cup of a new secondary piston with brake fluid, apply silicone grease to the piston and install the piston into the master cylinder.

NOTE: Check that the valve stem moves smoothly by pushing the stop pin guide.

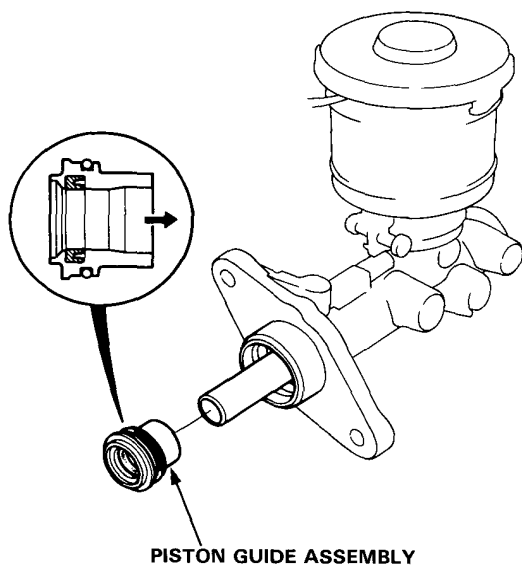
SECONDARY PISTON ASSEMBLY



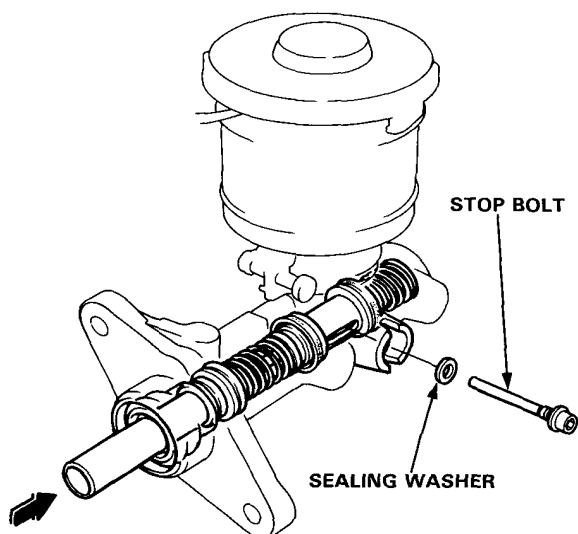
3. Apply Brake Cylinder Grease (P/N: 08733—B020E) or equivalent rubber grease to a new O-ring and the secondary cup in a new piston guide, and install the O-ring onto the piston guide.



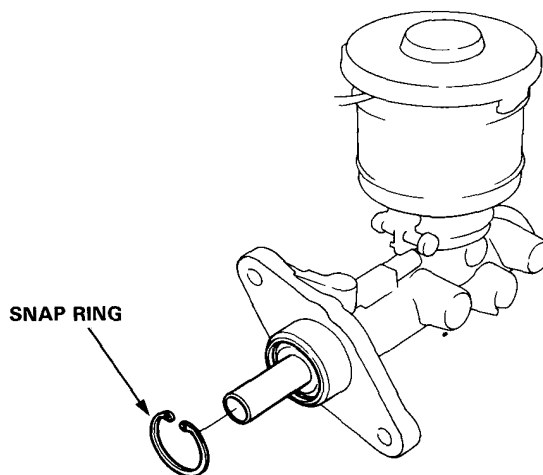
4. Install the piston guide assembly into the master cylinder.



5. Align the slot in the primary piston with the stop bolt hole by pushing the secondary piston in, and install the stop bolt with a new sealing washer.



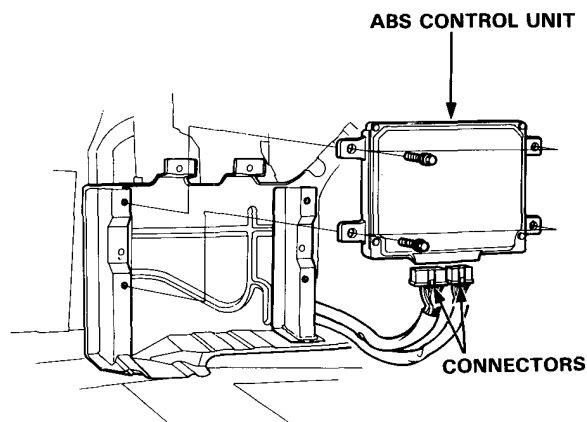
6. Install a new snap ring while pushing in the secondary piston.



Electronic Components

Control Unit Replacement

1. Remove the right quarter trim panel.
2. Disconnect the control unit connectors.
3. Remove the control unit attaching bolts, then remove the control unit.

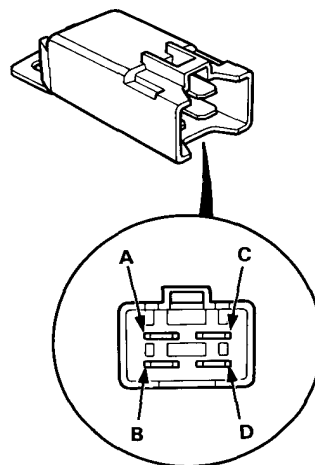


4. Install the control unit in the reverse order of removal.

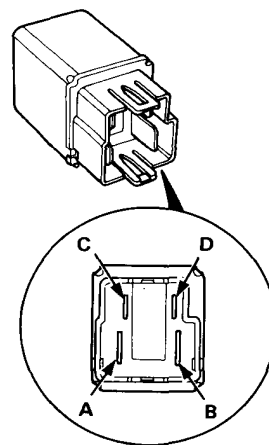
Relay Inspection

1. Remove the fail-safe relays and motor relay (location: page 19-54).
2. Check for continuity between the terminals C and D.
There should be continuity.
3. Check for continuity between the terminals A and B.
There should be continuity when the battery is connected between the terminals C and D.
There should be no continuity when the battery is disconnected.

Fail-safe Relay



Motor Relay



Pulsers/Sensors

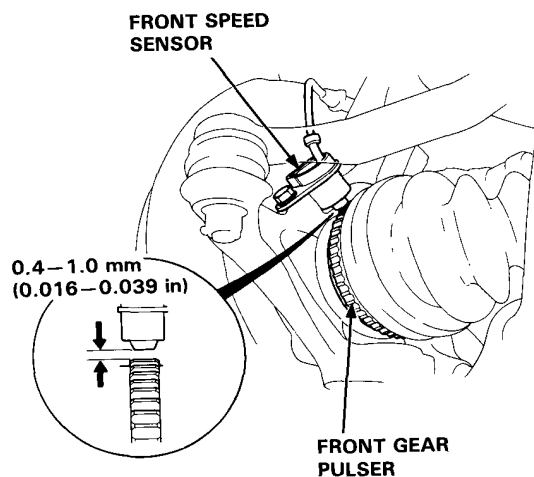
Inspection

Front

1. Check the pulser for chipped or damaged teeth and replace if necessary.
2. Measure the air gap between the sensor and pulser all the way around while rotating the driveshaft by hand.

Standard: 0.4—1.0 mm (0.016—0.039 in)

NOTE: If the gap exceeds 1.0 mm (0.039 in) at any point, the probability is a distorted knuckle, which should be replaced.

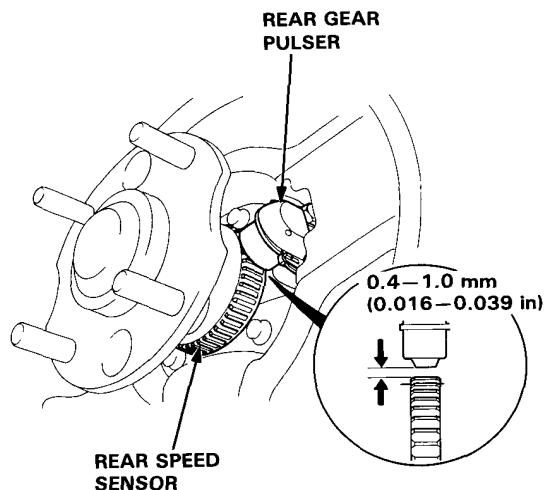


Rear

1. Remove the rear caliper assembly.
2. Remove the rear brake disc.
3. Check the rear pulser for chipped or damaged teeth and replace if necessary.
4. Measure the air gap between the sensor and pulser all the way around while rotating the hub bearing unit by hand.

Standard: 0.4—1.0 mm (0.016—0.039 in)

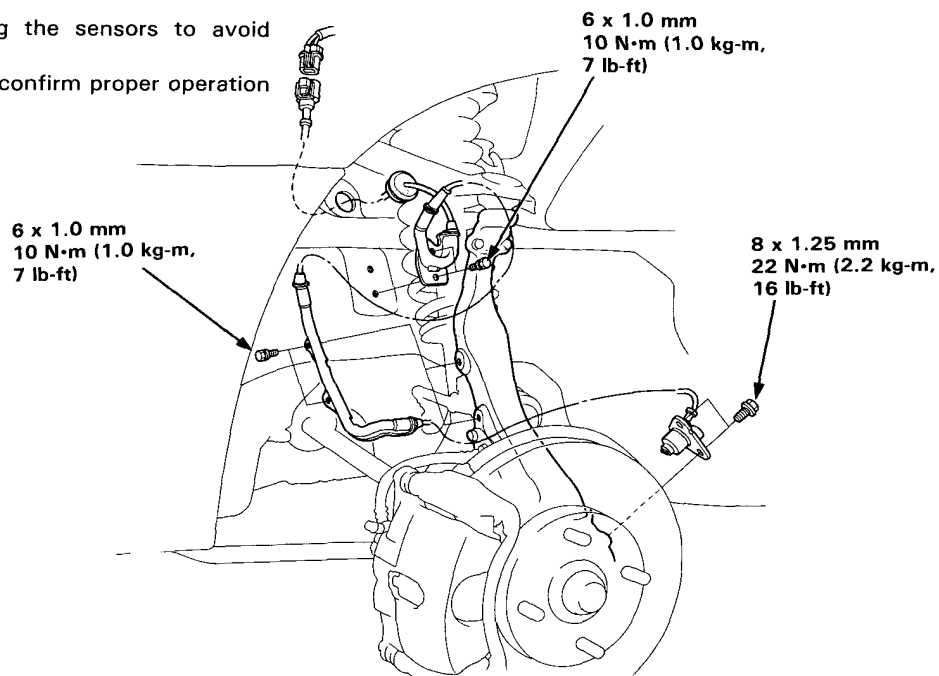
NOTE: If the gap exceeds 1.0 mm (0.039 in) at any point, the probability is a distorted knuckle, which should be replaced.



Front Sensor Replacement

NOTE:

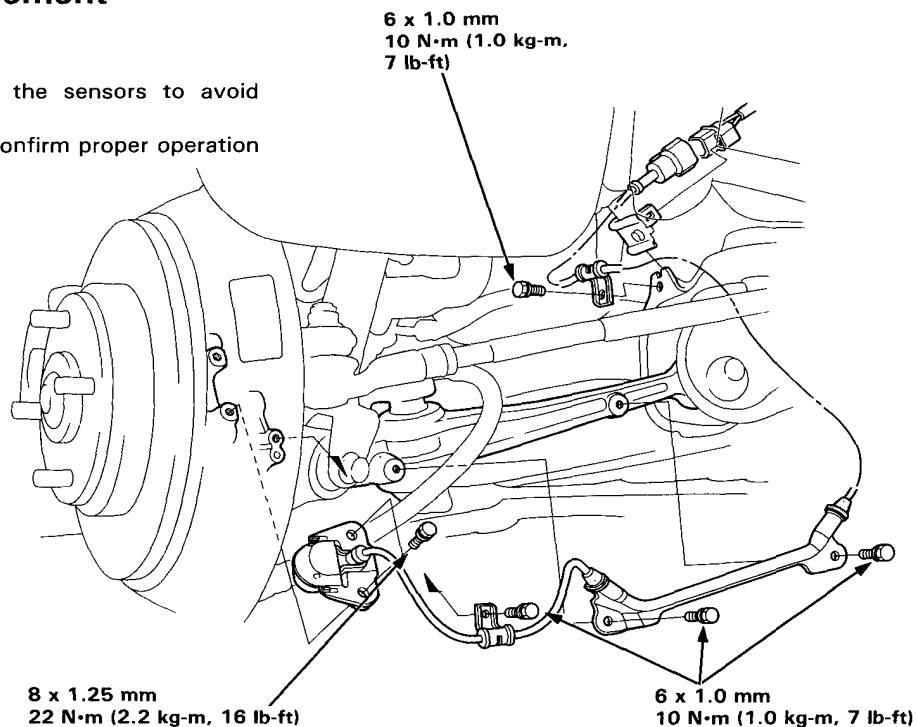
- Be careful when installing the sensors to avoid twisting the wires.
- After sensor replacement, confirm proper operation (page 19-57).



Rear Sensor Replacement

NOTE:

- Be careful when installing the sensors to avoid twisting the wires.
- After sensor replacement, confirm proper operation (page 19-57).



SUPPLEMENTAL RESTRAINT SYSTEM (SRS) (if body maintenance is required)

Some models of the PRELUDE include a driver's side airbag, located in the steering wheel hub, as part of a Supplemental Restraint System (SRS). Information necessary to safely service the SRS is included in this shop manual. Items marked * on the contents page include, or are located near, SRS components. Servicing, disassembling or replacing these items will require special cautions and tools, and should therefore be done only by an authorized Honda dealer.

▲ WARNING

- To avoid rendering the SRS inoperative, which can lead to personal injury or death in the event of a severe frontal collision, all maintenance on this system must be performed by an authorized Honda dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, and replacing with wrong parts, can lead to personal injury caused by unintentional activation of the airbag.
- All SRS electrical wiring harnesses are covered with yellow outer insulation. Related components are located in the steering column, the dashboard, and behind the dashboard lower cover. Do not use electrical test equipment on these circuits.
- Servicing, disassembling or replacing nearby the steering wheel, under the dash, or related to the wire harnesses nearby the under-dash fuse box may affect the SRS and must therefore be performed by an authorized HONDA dealer.

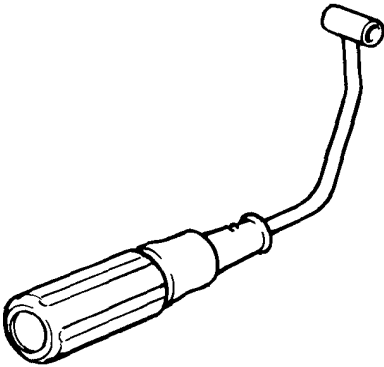
Body

Bumpers		
Front Replacement	20-60	
Disassembly	20-61	
Rear Replacement	20-62	
Disassembly	20-64	
Carpet	20-51	
Center Console/Rear Console Upper		
Trim Panel	20-54	
*Dashboard		
Component Removal/		
Installation	20-55	
Replacement	20-58	
Doors		
Index	20-3	
Panel/Plastic Cover	20-4	
Outside Door Handle	20-6	
Latch	20-7	
Glass/Regulator	20-8	
Outer Molding	20-10	
Weather strip	20-10	
Glass Adjustment	20-11	
Position Adjustment	20-12	
Striker Adjustment	20-13	
Exterior Molding/Panel		
Roof Molding/Side Sill Panel	20-70	
*Frame Repair Chart	20-74	
Front Console	20-53	
Fuel Filler		
Opener	20-69	
Latch	20-69	
Opener Cable	20-68	
Headliner	20-40	
Hood		
Replacement/Adjustment	20-65	
Opener and Latch	20-65	
Hood Edge Protector	20-71	
Interior Trim	20-41	
Mirrors		
Power Door Mirror Removal	20-13	
Mirror Glass Replacement	20-14	
Rearview Mirror	20-14	
Rear Emblem	20-72	
Seats		
Front Replacement	20-42	
Seat Cover	20-44	
Rear Replacement	20-45	
Seat Belts		
Front Replacement	20-46	
Rear Replacement	20-48	
Inspection	20-49	
Child Seat Anchor Plate	20-50	
Special Tool	20-2	
Sub-frame	20-73	
Sunroof		
Index	20-32	
Replacement/Adjustment	20-33	
Trunk Lid		
Replacement/Adjustment	20-66	
Opener	20-69	
Latch	20-67	
Opener Cable	20-68	
Opening Weatherstrip/License		
Plate Trim	20-71	
Windshield/Rear Window Glass/		
Quarter Glass		
Index	20-15	
Windshield	20-18	
Rear Window	20-23	
Quarter Glass	20-28	



Special Tool

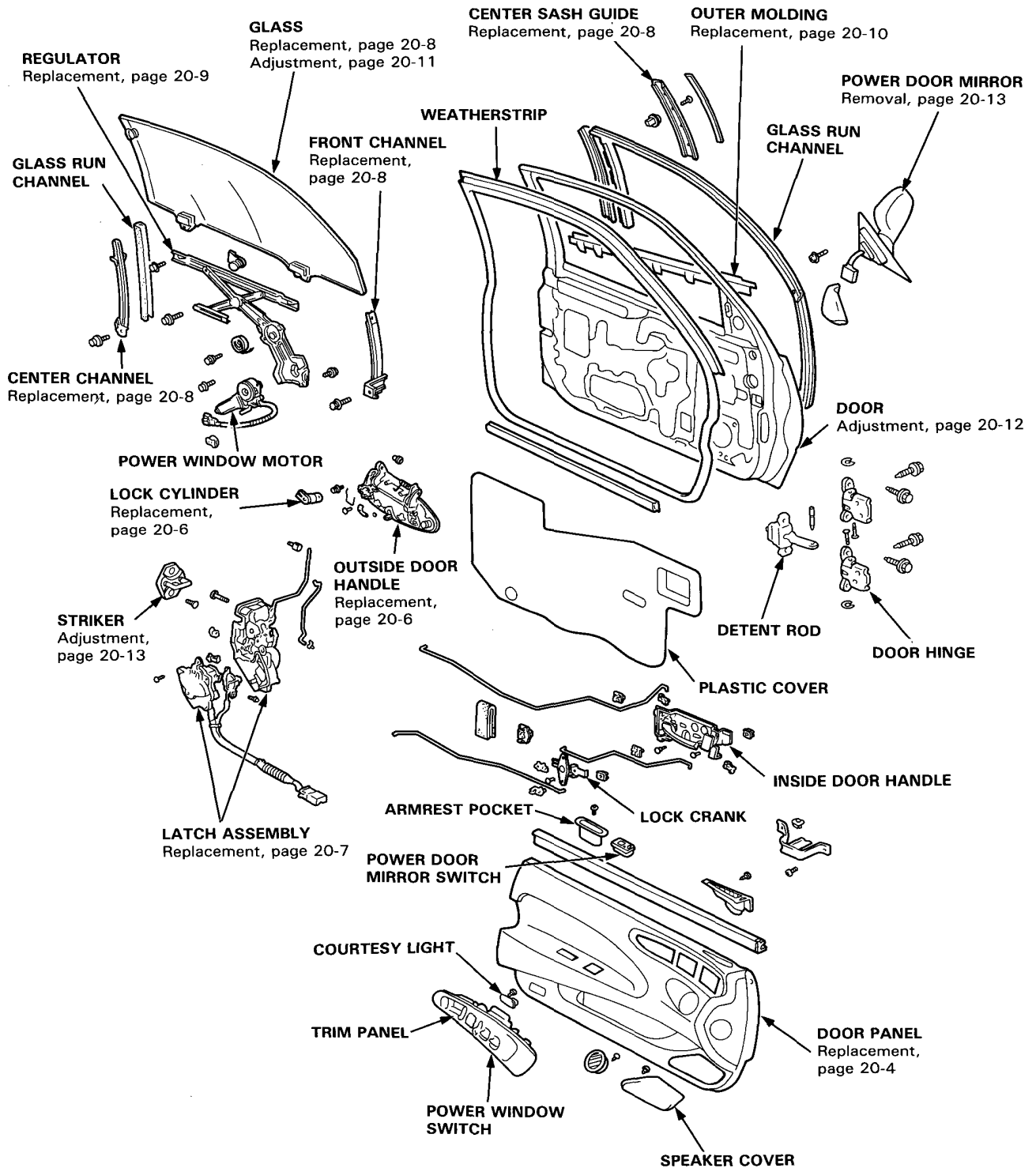
Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07GAZ—SE30100	Torsion Bar Assembly Tool	1	20-66



①

Doors

Index



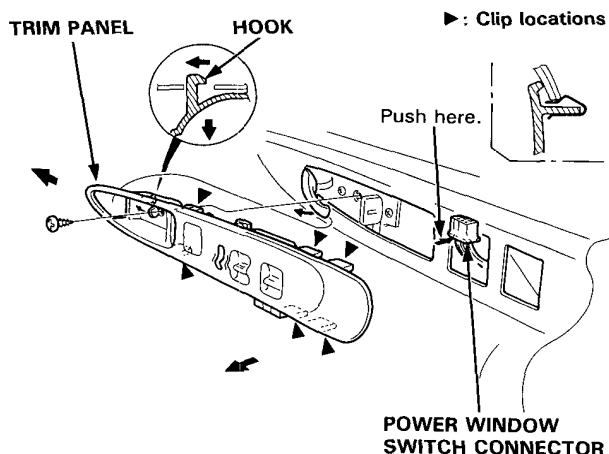
Doors

Door Panel/Plastic Cover Replacement

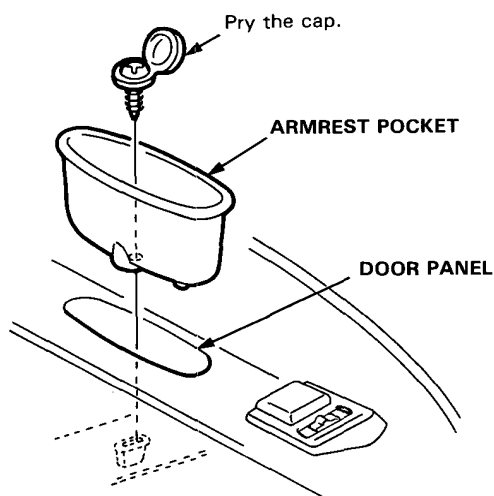
1. Pry the cap, then remove the mounting screw. Remove the clips and disconnect the connector, then remove the trim panel.

NOTE:

- Remove the hook by sliding the trim panel backward while pulling the handle, then remove the trim panel.
- Take care not to scratch the trim panel.

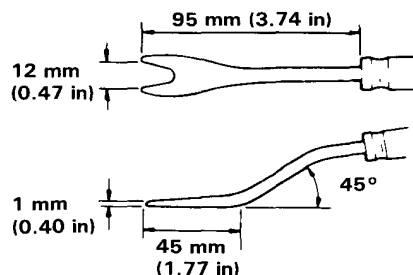


2. Pry the cap and remove the screw, then remove the armrest pocket.



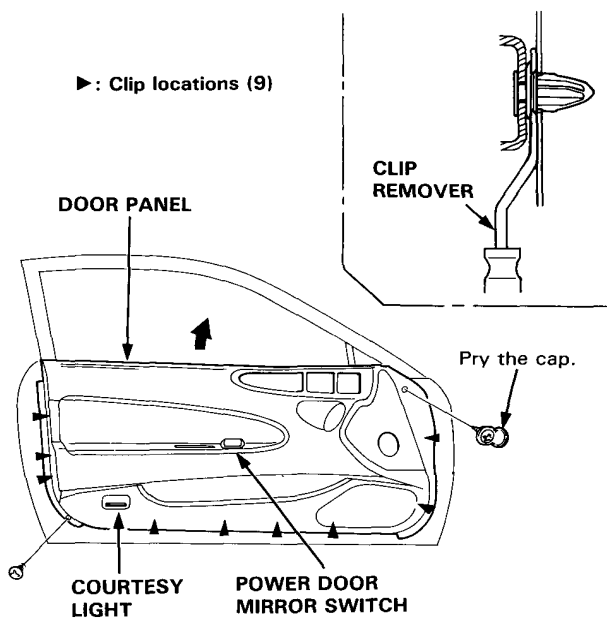
NOTE: Remove the panel with as little bending as possible to avoid creasing or breaking it.

TRIM PAD REMOVER SNAP-ON #A177

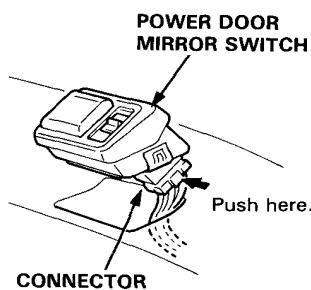
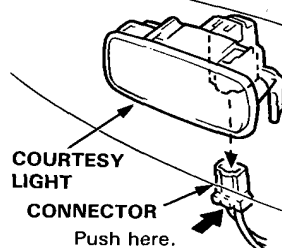


3. Remove the screws and clips (see trim pad remover) attaching the door panel. Remove the door panel by pulling it upward. Disconnect the power door mirror switch and courtesy light (KQ, KY model) connectors.

► : Clip locations (9)

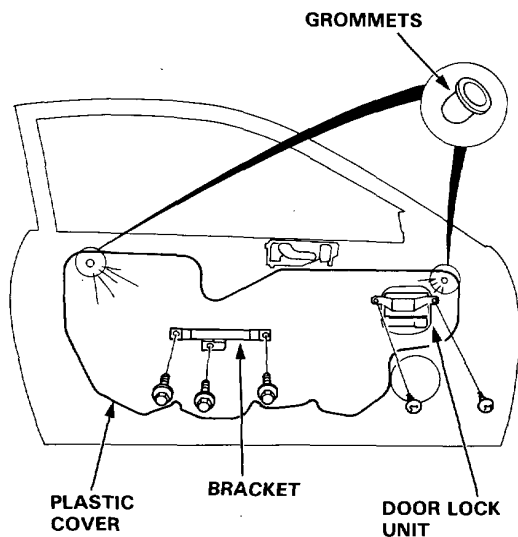


KQ, KY model:





4. Remove the grommets, bracket and door lock unit, then carefully remove the plastic cover.

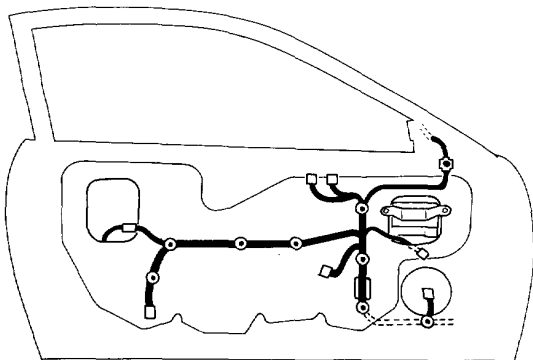


5. Install the door panel and plastic cover in the reverse order of removal.

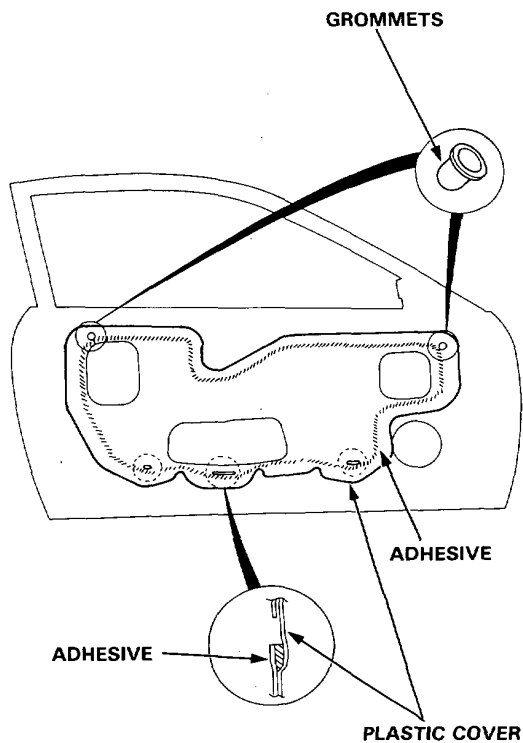
NOTE:

- Make sure the wire harnesses and connectors are fastened correctly on the door.

●: Harness clip locations



- Apply adhesive along the edge where necessary to maintain a continuous seal and prevent air/water leaks.



- Before tightening the door panel mounting screws, make sure the wire harnesses are not pinched.

Doors

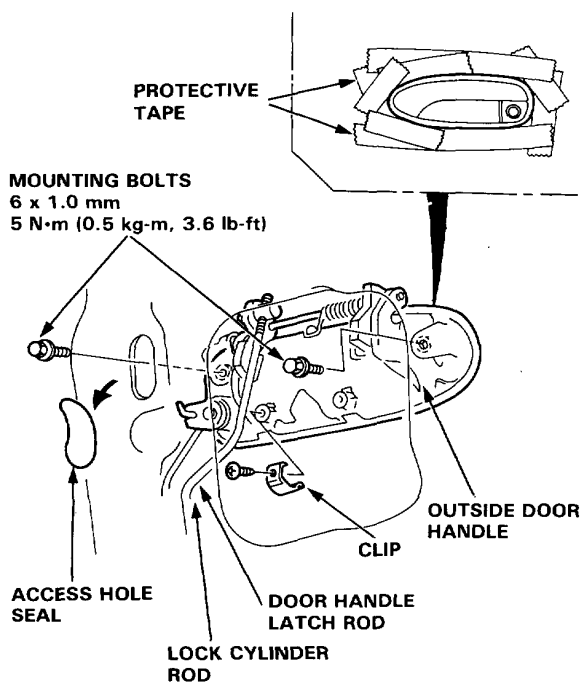
Outside Door Handle Replacement

NOTE: Raise the window fully.

1. Remove:
 - Door panel (page 20-4)
 - Plastic cover (page 20-5)
2. Pry the access hole seal.
3. Remove the mounting bolts and clip, then pull the outside door handle out.

NOTE:

- Use protective tape around the outside door handle to prevent damage.
- Do not drop the bolts and clip inside the door.



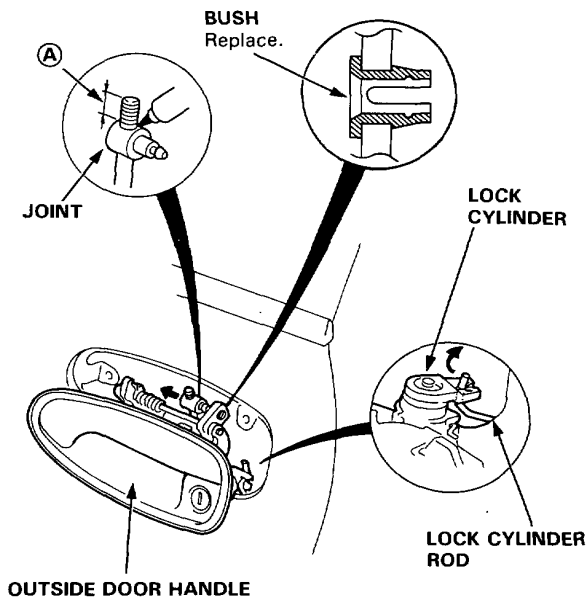
4. Pry the door handle latch rod out of its joint using a flat tip screwdriver.

NOTE:

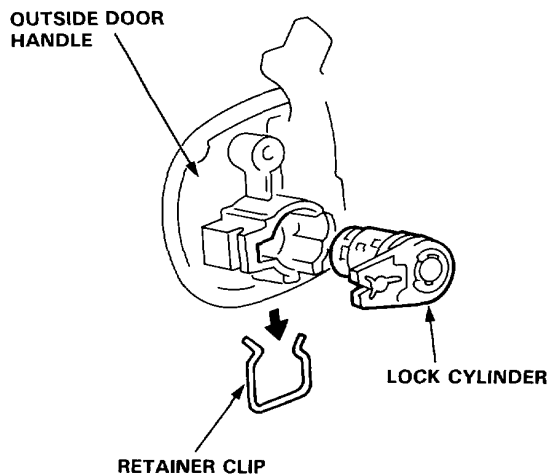
- To ease reassembly, note the location (A) of the rod on the joint before disconnecting it.
- When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.
- Take care not to damage the joint.

5. Pry the lock cylinder rod out, then remove the outside door handle.

NOTE: Take care not to bend the rod.



6. Pull out the retainer clip, then remove the lock cylinder.



7. Installation is the reverse of the removal procedure.

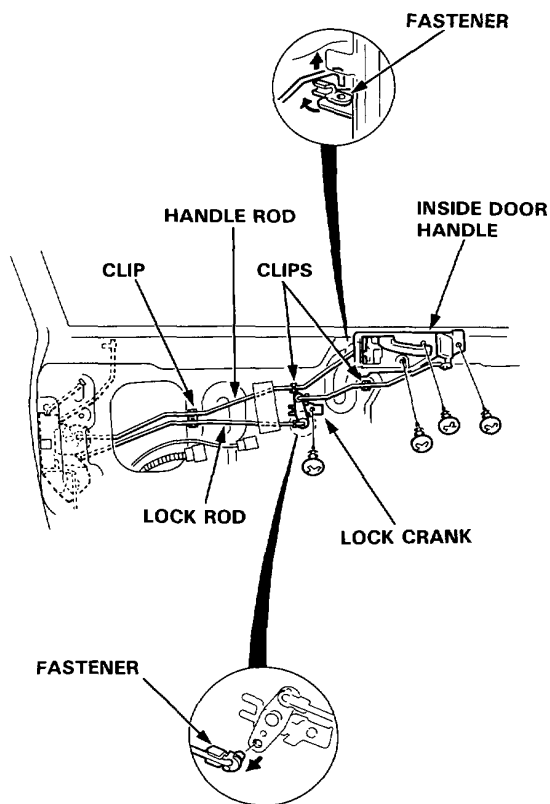


Door Latch Replacement

NOTE: Raise the window fully.

1. Remove:
 - Door panel (page 20-4)
 - Plastic cover (page 20-5)
 - Center sash (page 20-8)
 - Outside door handle (page 20-6)
2. Disconnect the handle rod and lock rod from the inside door handle and lock crank. Remove the screws, then remove the inside door handle and lock crank.

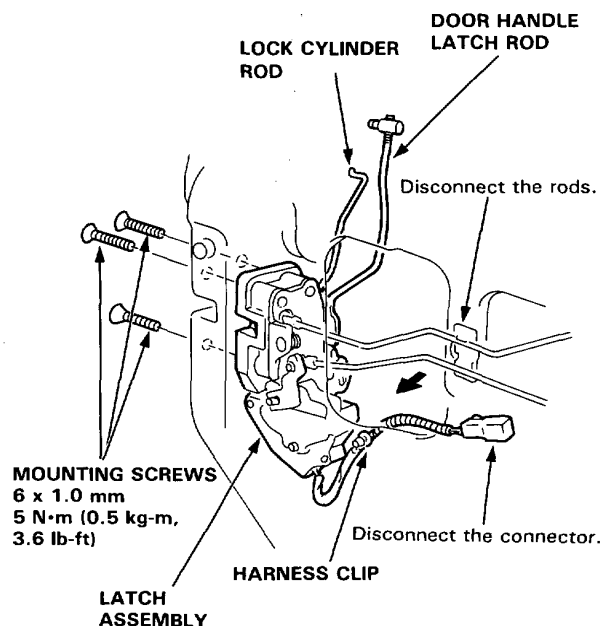
NOTE: Take care not to bend the rods.



NOTE: Make sure the rods are fastened correctly.

3. Disconnect the connector and harness clip from the door. Remove the mounting screws, then remove the latch assembly through the hole in the door.

NOTE: Take care not to bend the rods.



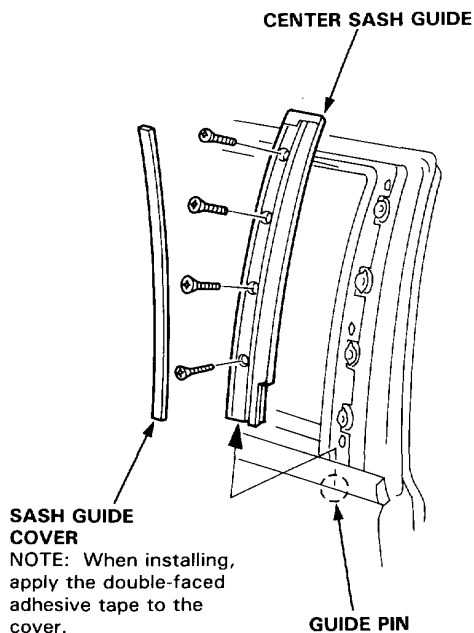
4. Installation is the reverse of the removal procedure.

NOTE: Make sure the rods and connector are fastened correctly.

Doors

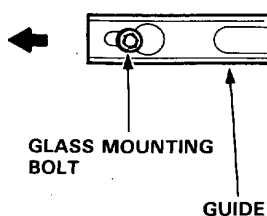
Glass/Regulator Replacement

1. Remove:
 - Door panel (page 20-4)
 - Plastic cover (page 20-5)
2. Lower the window fully.
3. Peel off the sash guide cover and remove the mounting screws, then remove the center sash guide from the door.



4. Carefully move the window until you can see its mounting bolts, then loosen the bolts. Slide the guide to the rear, then remove the glass.

Rear side:

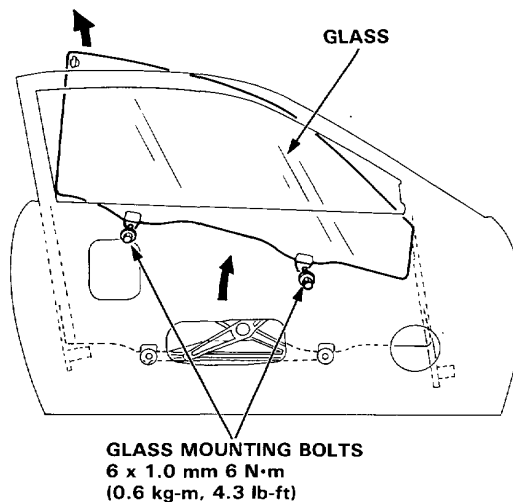


Front side:



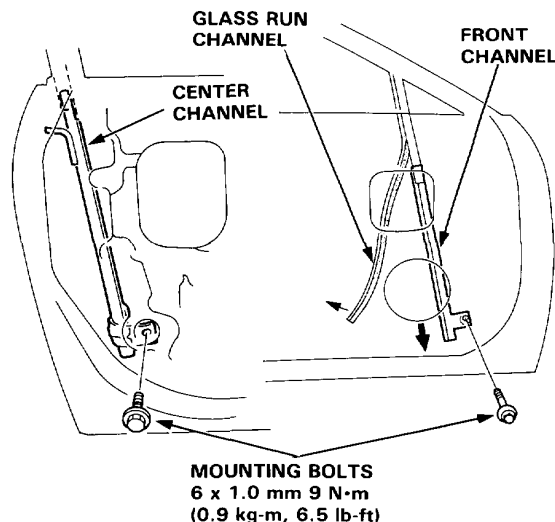
5. Carefully pull the glass out through the window slot.

NOTE: Take care not to drop the glass inside the door.



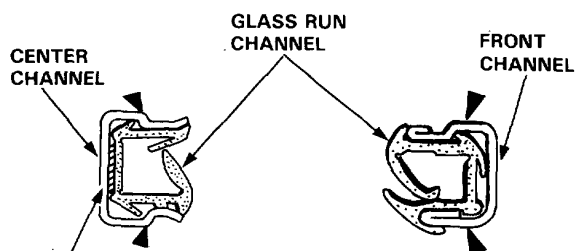
6. Peel the glass run channel out of the front channel.
7. Remove the mounting bolts, then remove the front channel and center channel.

NOTE: After installing, make sure the glass run channel is not twisted.





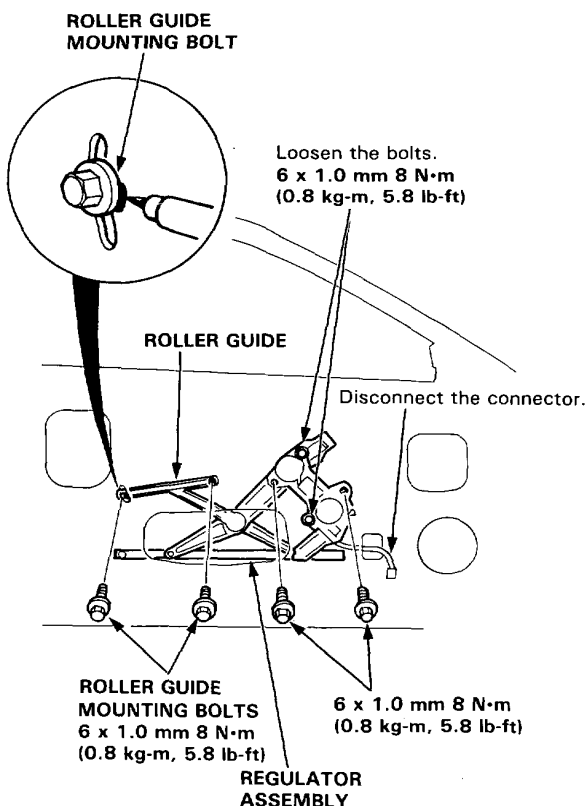
NOTE: To install, fit the glass run channel into the channel as shown.



NOTE: Apply the adhesive to the shadowed area.

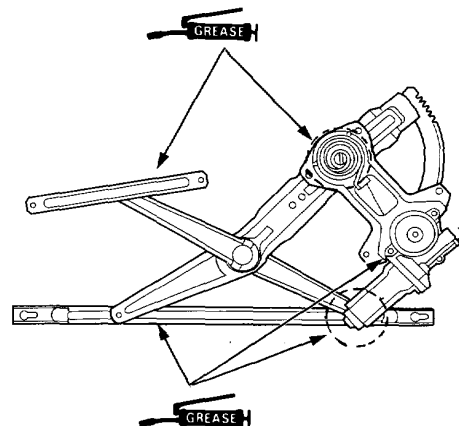
8. Remove the 2 mounting bolts, 2 roller guide bolts and loosen the 2 motor bolts. Disconnect the connector. Take out the regulator assembly through the center hole in the door.

NOTE: Scribe a line around the roller guide mounting bolt to show the original adjustment.



9. Grease all the sliding surfaces of the window regulator where shown.

10. Before removing the motor, mark the location by scribing a line across the sector gear and regulator. Install using the 3 mounting bolts. Move the window regulator to the original position by connecting a 12 V battery to the motor (see Section 23).



11. Installation is the reverse of the removal procedure.
12. Roll the glass up and down to see if it moves freely without binding. Also make sure that there is no clearance between the glass and glass run channel when the glass is closed. Adjust the position of the door glass as necessary (page 20-11).
13. Attach the wire harness to the door correctly (page 20-5).
14. When reinstalling the plastic cover, apply adhesive along the edge where necessary to maintain a continuous seal and prevent air/leaks (page 20-5).

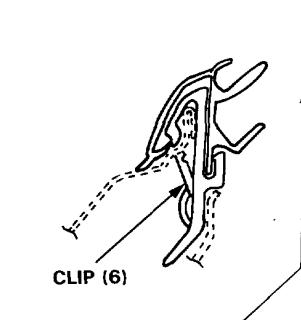
Doors

Outer Molding Replacement

Remove:

- Door panel (page 20-4)
- Plastic cover (page 20-5)
- Door mirror (page 20-13)
- Glass (page 20-8)

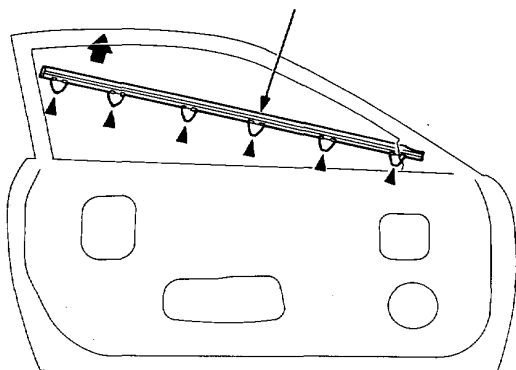
►: Clip locations



NOTE: Take care not to twist or scratch the molding.

OUTER MOLDING

Starting at the rear, pry the molding up and detach the clips, then remove the outer molding.



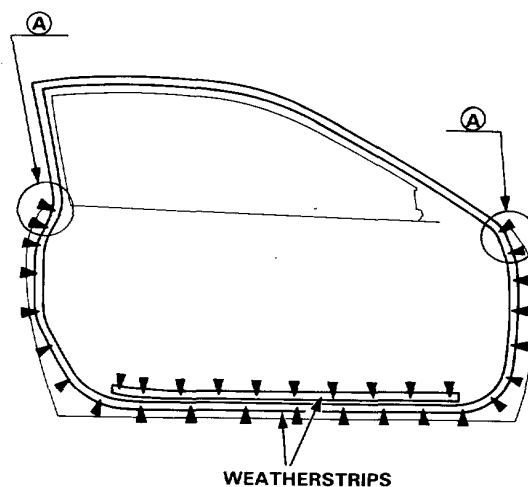
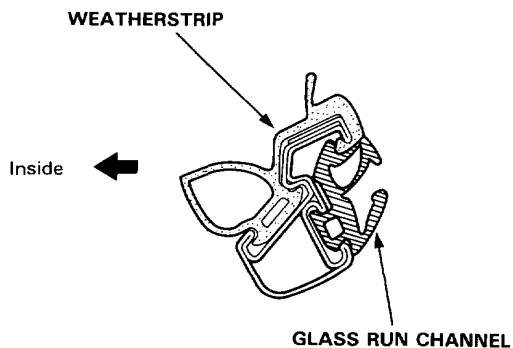
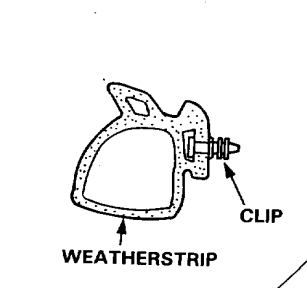
Installation is the reverse of the removal procedure.

NOTE:

- If necessary, replace any damaged clips.
- When installing, align the rear edge of the molding with the rear edge of the door.

Weatherstrip Replacement

►: Clip locations



NOTE:

- Before installing the weatherstrip, apply clear sealant to the (A) areas of the door as shown.
- If necessary, replace any damaged clips.

Sealant: cemedine #8500

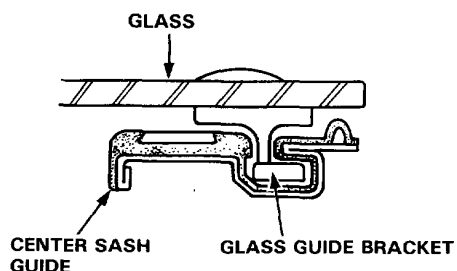


Glass Adjustment

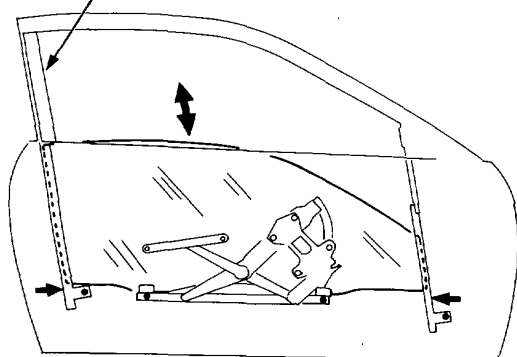
NOTE:

- Place the vehicle on a firm, level surface when adjusting the doors or glass.
- Check the weatherstrip and glass run channel for damage or deterioration and replace if necessary.

1. Remove the door panel and peel off the plastic cover (pages 20-4, 5).
2. Connect the power window switch connector to the door harness.
3. To adjust glass fit in the door, raise the glass as far up as possible and hold it against the door sash. Then tighten the roller guide bolts. Make sure door glass moves smoothly.

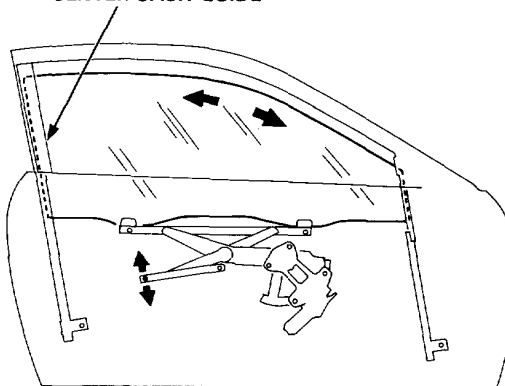


CENTER SASH GUIDE



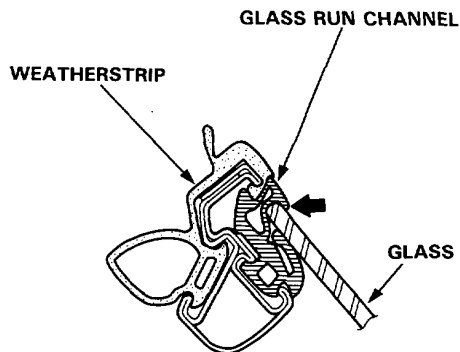
4. If necessary, loosen the roller guide bolt and adjust the window glass so it is parallel with the glass run channel.

CENTER SASH GUIDE



5. Raise the window glass fully and check gap.
6. Check window operation.

NOTE: Check that the glass run channel is not pinched by the glass.



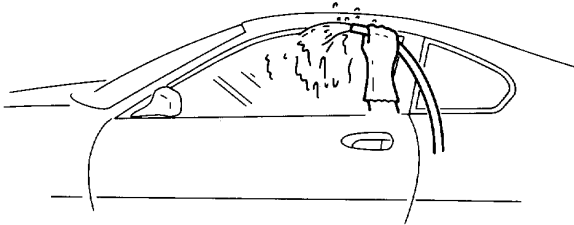
(cont'd)

Doors

Glass Adjustment (cont'd)

7. With the door and glass closed fully, check for water leaks.

NOTE: Do not use high pressure water.



8. Route the wire harness and connectors and fasten them to the door (pages 20-5).
9. Attach the plastic cover, then install the door panel (pages 20-4, 5).
10. Check for air leaks.

Door Position Adjustment

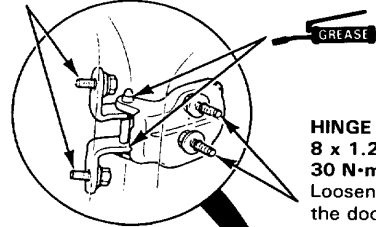
After installing the door, check for a flush fit with the body, then check for equal gaps between the front and rear, and top and bottom door edges and the body. The door and body edges should also be parallel. Adjust at the hinges as shown.

CAUTION: Place a shop towel on the jack to prevent damage to the door when the hinge bolts are loosened for adjustment.

DOOR MOUNTING BOLTS

8 x 1.25 mm 30 N·m (3.0 kg-m, 22 lb-ft)

Loosen the bolts slightly to move the door IN or OUT until it's flush with the body. If necessary, you can install a shim behind one hinge to make the door edges PARALLEL with the body.



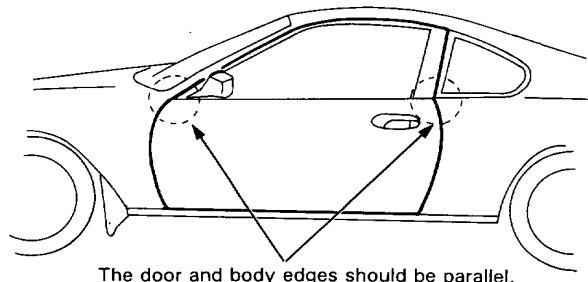
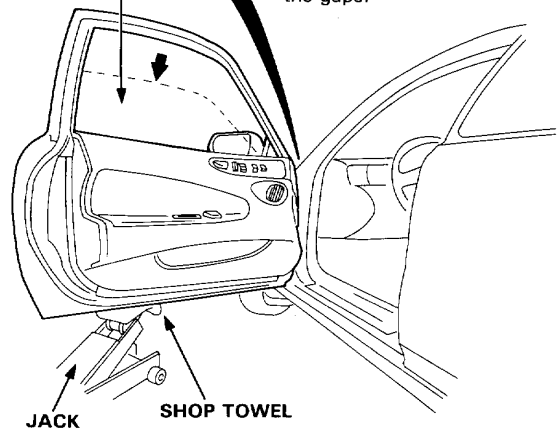
HINGE MOUNTING BOLTS

8 x 1.25 mm

30 N·m (3.0 kg-m, 22 lb-ft)

Loosen the bolts, and move the door BACKWARD or FORWARD, UP or DOWN as necessary to equalize the gaps.

Lower the glass.



The door and body edges should be parallel.

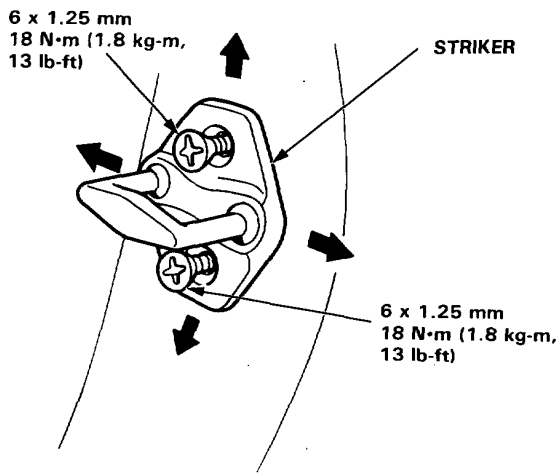
NOTE: Check for water and air leaks.



Door Striker Adjustment

Make sure the door latches securely without slamming. If it needs adjustment:

1. Draw a line around the striker plate for reference.
2. Loosen the striker screws and move the striker IN or OUT to make the latch fit tighter or looser. Move the striker UP or DOWN to align it with the latch opening. Then lightly tighten the screws and recheck.



NOTE:

- Hold the outside handle out and push the door against the body to be sure the striker allows a flush fit.
- Do not tap the striker with a metal hammer to adjust the position.

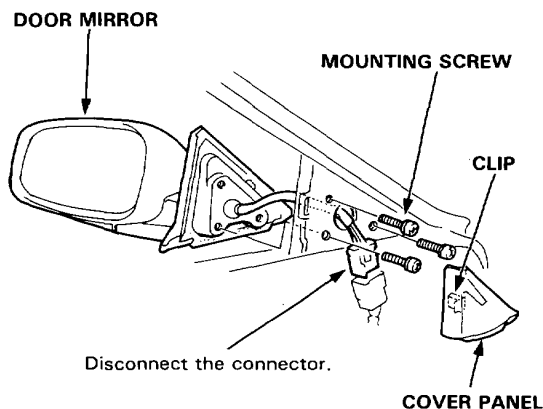
3. If the door latches properly, tighten the screws and recheck.

NOTE: Replace the striker if it is cracked.

Power Door Mirror

Removal

1. Pry out the cover panel with a flat tip screwdriver, then remove the cover panel. Disconnect the power mirror connector.
2. Remove the mirror mounting screws while holding the mirror.



3. Installation is the reverse of the removal procedure.
4. With the door and door glass closed fully, check for water and air leaks.

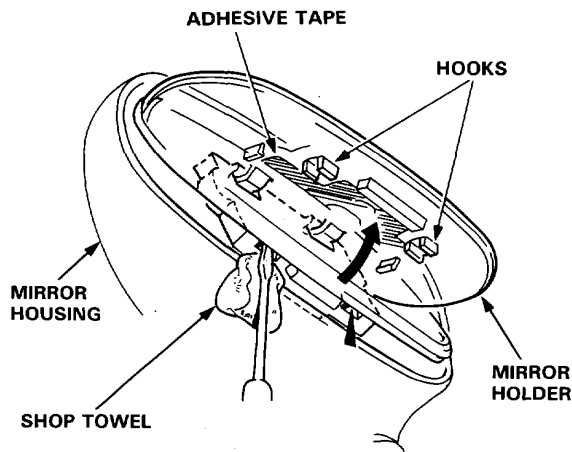
NOTE: Do not use high pressure water.

Power Door Mirror

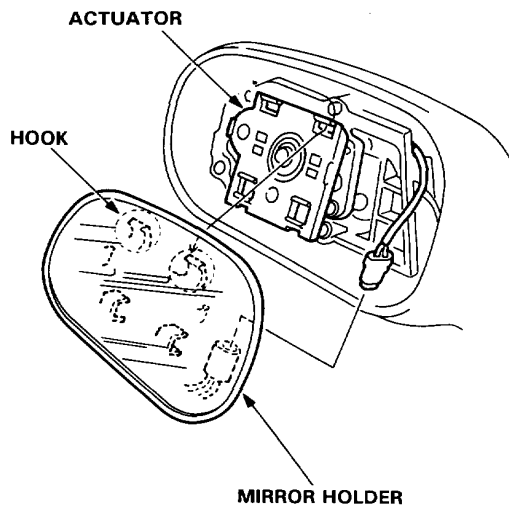
Mirror Glass Replacement

1. Pry the mirror holder from the bottom until you can see the actuator, then disconnect the hooks using a flat tip screwdriver as shown.

NOTE: Take care not to scratch the mirror housing.



2. Disconnect the hooks and connector, then remove the mirror holder from the actuator.

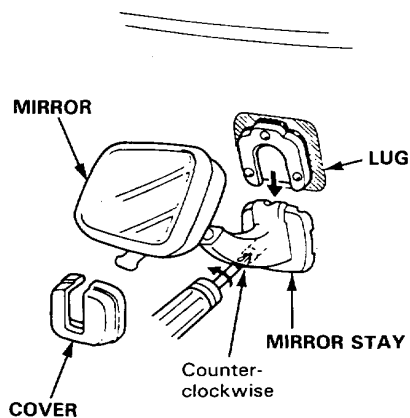


3. Installation is the reverse of the removal procedure.

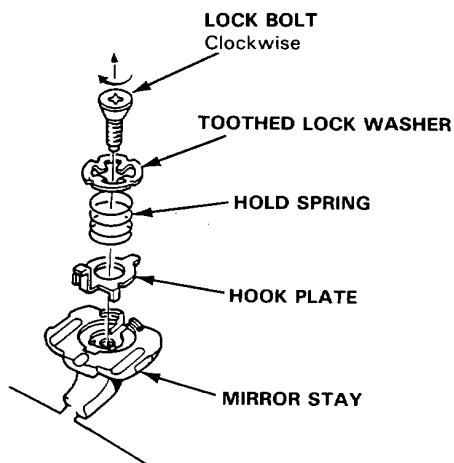
Rearview Mirror

Replacement

1. Carefully remove the cover with a flat tip screwdriver.
2. Loosen the lock bolt, then slide the mirror stay from the lug.



3. Remove the lock bolt, then remove the toothed lock washer and hold spring from the mirror stay.



4. Installation is the reverse of the removal procedure.

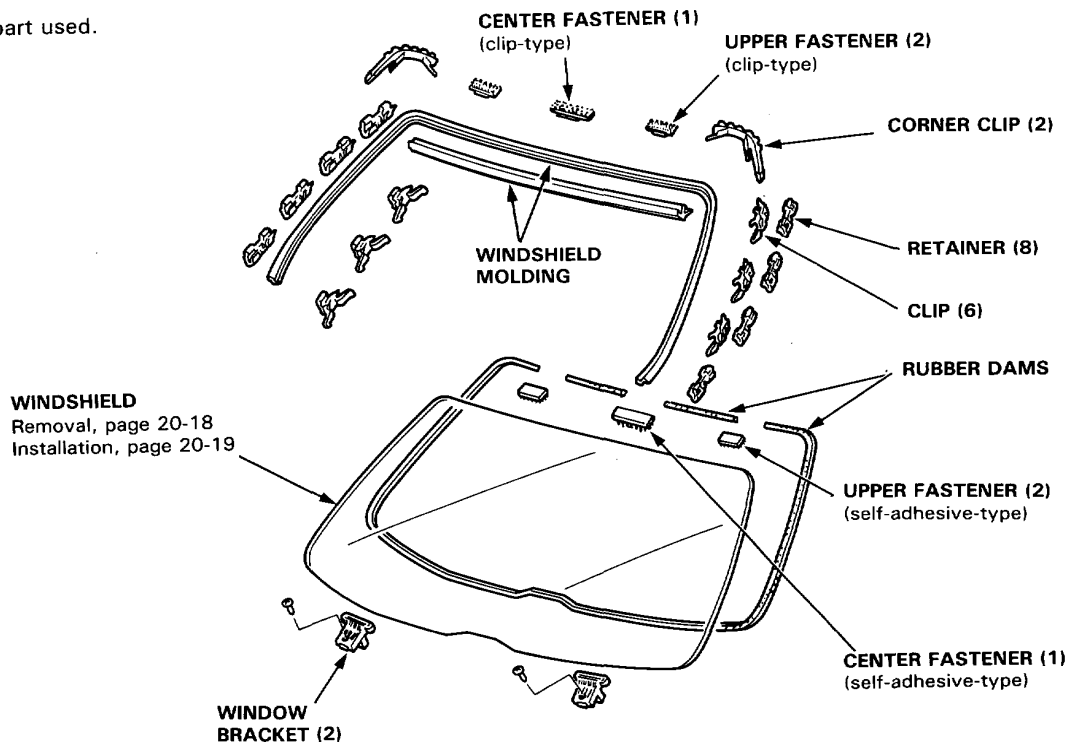


Windshield, Rear Window Glass, Quarter Glass

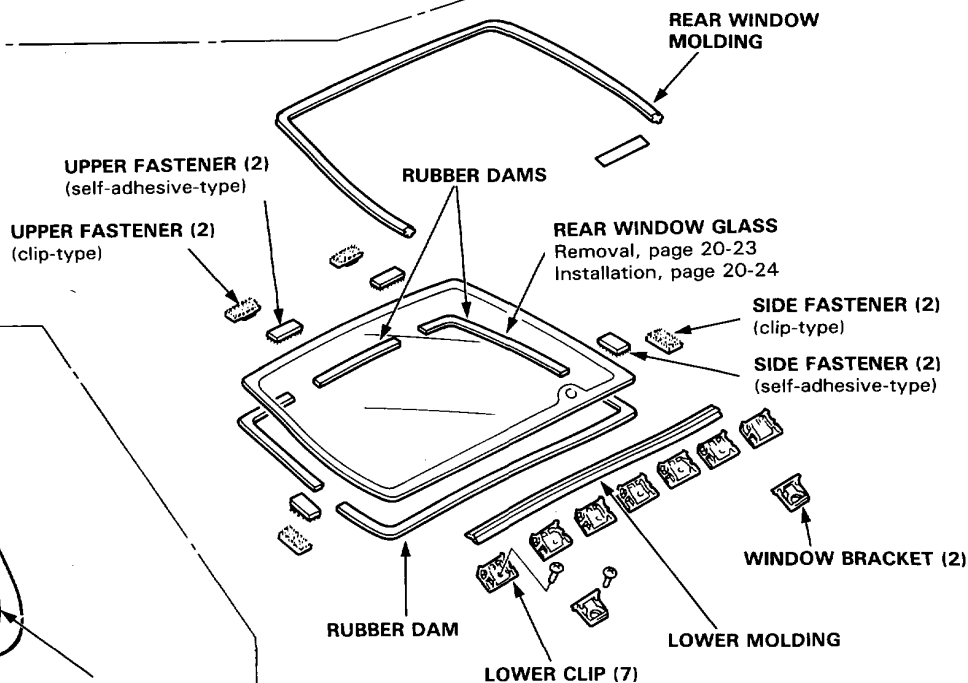
Index

(): Quantity of part used.

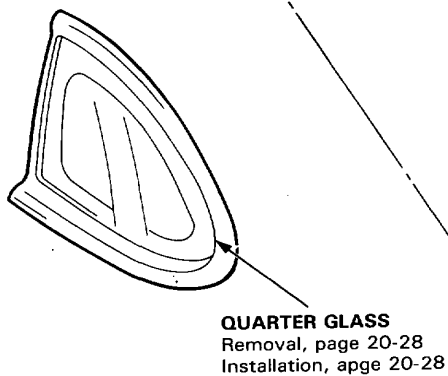
Windshield:



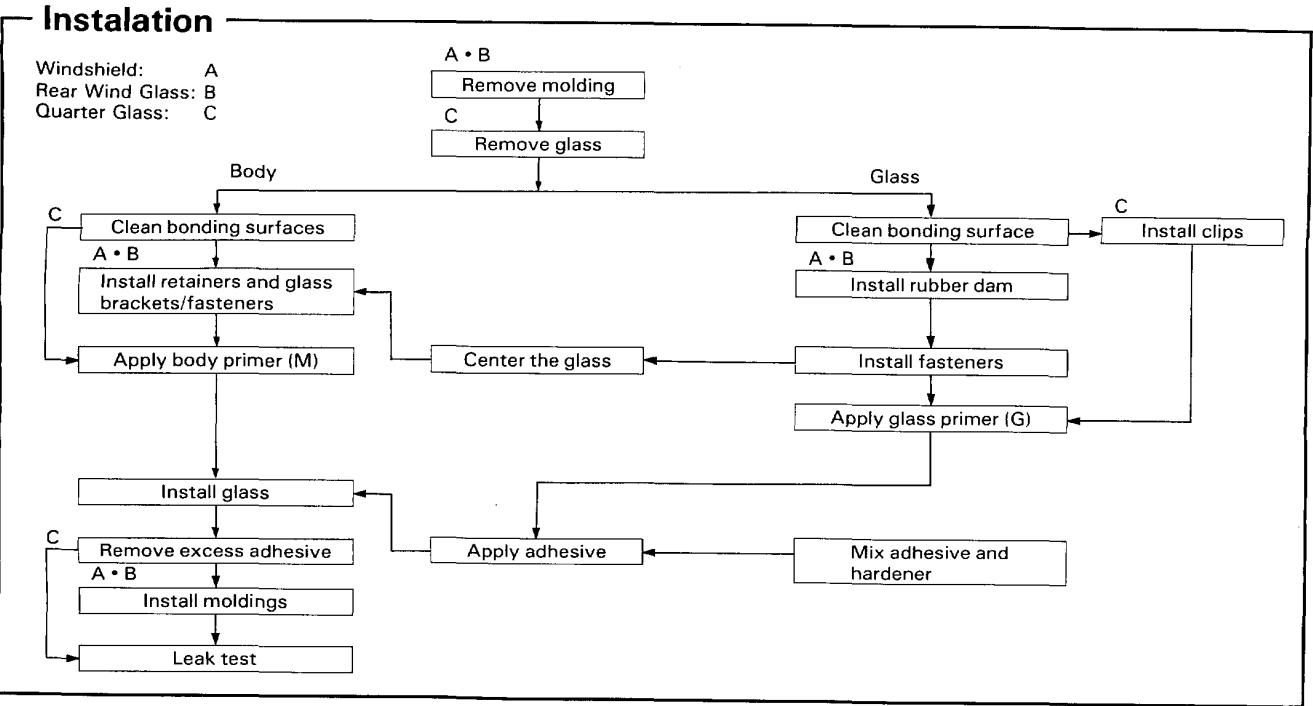
Rear Window Glass:



Quarter Glass:



Windshield, Rear Window Glass, Quarter Glass



Parts			
Part Number	Contents		Comment
Adhesive kit — Low temperature 08718-99960 High temperature 08718-99961	{ Adhesive sealant (500 g) Hardener (75 g) Glass primer G (20 g) Body primer M (20 g) Piano wire (0.6 ø x 1 m (3f)) Gauze Cartridge Sponge		For glass primer (G) For applying primers
NOTE:			
<ul style="list-style-type: none">● Both kits have two types of adhesive primer: one for the body (metal), and one for glass.● Always use new genuine Honda adhesive, or equivalent.● Do not use the adhesive if 6 months have elapsed since date of manufacture.● Store adhesive in a cool, dry place.● Open only immediately before you are going to use it.			

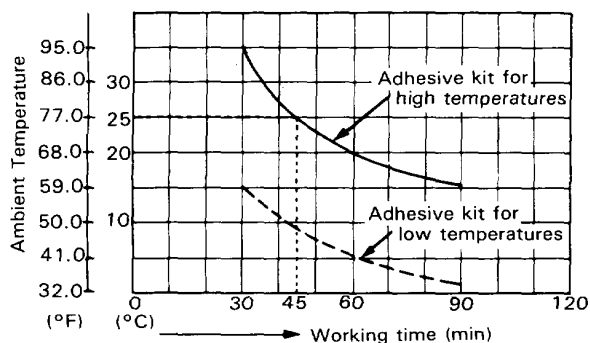
Tools	
Tool/Material	Remarks
Glass or steel plate Putty knife Caulking gun Suction cups	To mix adhesive and hardener on To mix adhesive and remove excess To apply bead of adhesive to windshield To install windshield
Knife Awl Two wood sticks Toluene or alcohol	To scrape bonding surface around window opening To make hole through existing adhesive for piano wire To hold piano wire To clean bonding surfaces



Workable Time

Adhesive workable time varies widely according to temperature, so choose the correct adhesive kit for the temperature range you will be working in. After mixing and applying adhesive, you should install the windshield within the time shown on the chart.

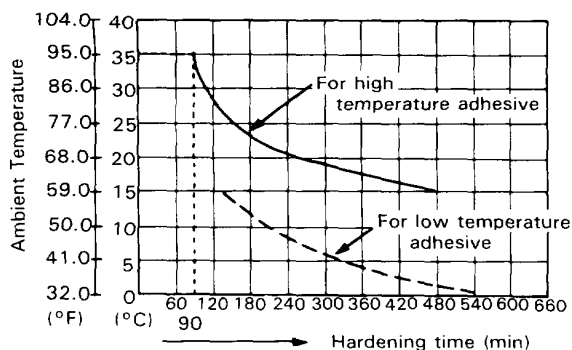
For example, when the ambient temperature is 25°C (77°F), the glass should be installed within 45 minutes using the high temperature type adhesive. Kit part numbers and contents are listed on the page before.



Hardening Time

Hardening time can be shortened by heating with infrared light.

For example, the adhesive will start to harden within 270 minutes mixing at 20°C (63°F). If however, it is heated to 35°C (95°F), it will start to harden within 90 minutes.

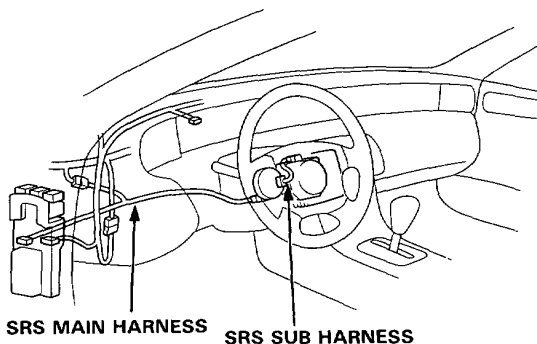


Broken Glass Removal

SRS wire harnesses are routed near the dashboard and steering column.

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



Remove as much broken glass as possible with a vacuum cleaner.

Blow out the glass in the heater and behind the dashboard with low pressure compressed air:

⚠ WARNING Wear eye protection while using the air gun.

1. Set the temperature control lever to COLD.
2. Push the HEAT button on the function panel.
3. Make sure the recirculation button is OFF.
4. Blow compressed air through the defroster center vent outlet.
5. Remove the blower duct, and remove any glass from the air mix chamber.
6. Remove the any glass from the top of the vent/defrost door.
7. Remove any glass from top and bottom of carpet and seats with a vacuum cleaner.

NOTE: It is recommended to remove the seats to shake off any glass (page 20-42).

Windshield

Removal

CAUTION:

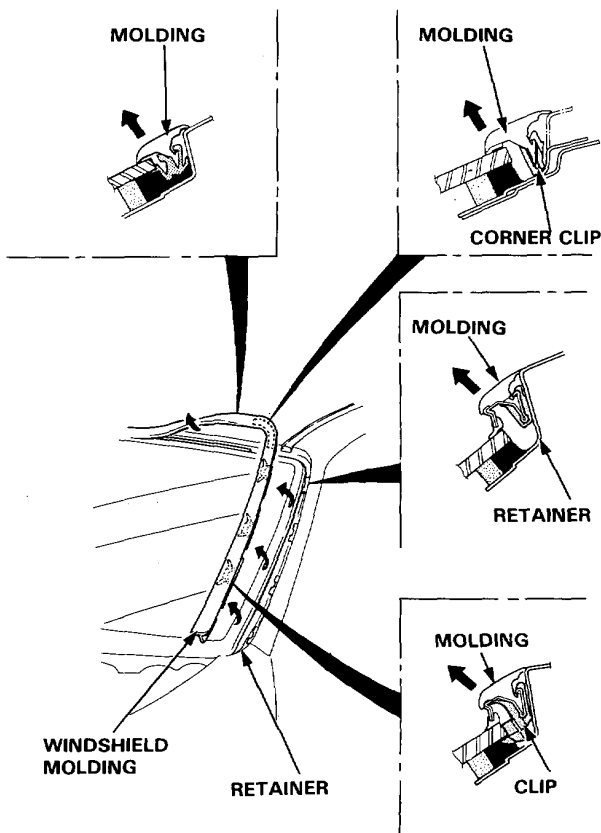
- Wear gloves to remove and install the glass.
- Use seat covers to avoid damaging any surfaces.

1. To remove the windshield, first remove the:
 - Rearview mirror (page 20-14)
 - Sunvisors (page 20-40)
 - Front pillar trim (page 20-41)
 - Front wipers and air scoop (see Section 23)
2. Detach the clips from the retainers, then remove the side windshield molding as shown.

NOTE: If necessary, replace any damaged clips.

3. Peel off the upper windshield molding.

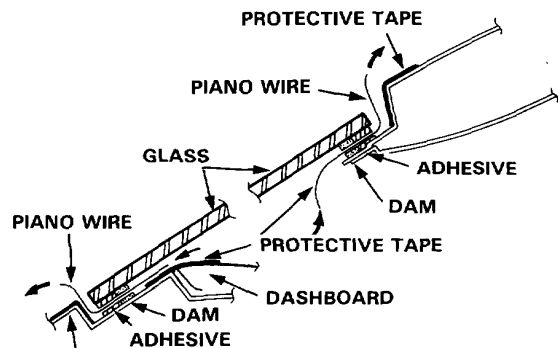
NOTE: When the upper windshield molding removal is difficult, cut off the molding.



4. Pull down the front of headliner (page 20-40).

CAUTION: Take care not to bend the headliner excessively.

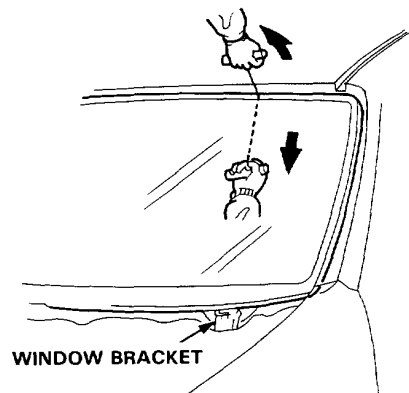
5. Remove the other retainers and clips from the body.
6. Apply protective tape along the edge of the dashboard and body next to the glass as shown. Using an awl, make a hole through the windshield adhesive from inside the car. Push piano wire through the hole and wrap each end around a piece of wood.



PROTECTIVE TAPE

7. With a helper on the outside, pull the wire back and forth in a sawing motion and carefully cut through the adhesive around the entire windshield.

CAUTION: Hold the piano wire as close to the glass as possible to prevent damage to the body and dashboard.



NOTE: If necessary, remove the screw, then replace the window bracket.

8. Cut the rubber dams, fasteners and molding away from the body with a knife; they are cemented in place.



Installation

1. Scrape the old adhesive smooth with a knife, to a thickness of about 2 mm (0.08 in) on the bonding surface around the entire windshield flange.

NOTE:

- Do not scrape down to the painted surface of the body; damaged paint will interfere with proper bonding.
- Remove all traces of the rubber dam and fasteners material from the body.
- Mask off surrounding surfaces before painting.

2. Clean the body bonding surface with a sponge dampened in alcohol.

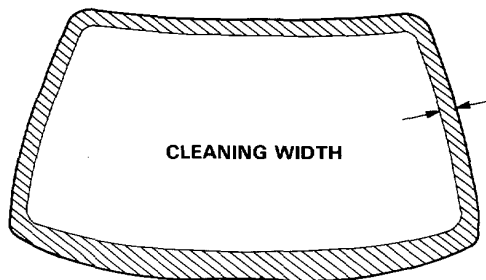
NOTE: After cleaning, keep oil, grease or water from getting on the surface.

3. If the old glass is to be reinstalled, use a putty knife to scrape off all traces of old adhesive, then clean the glass surface with alcohol where new adhesive is to be applied.

NOTE: Make sure the bonding surface is kept free of water, oil and grease.

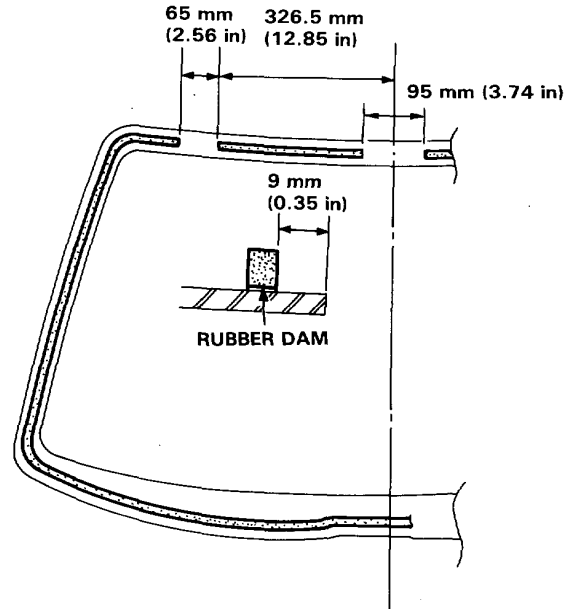
CAUTION: Avoid setting the glass on its edges; small chips may later develop into cracks.

NOTE: Clean the shadowed area.

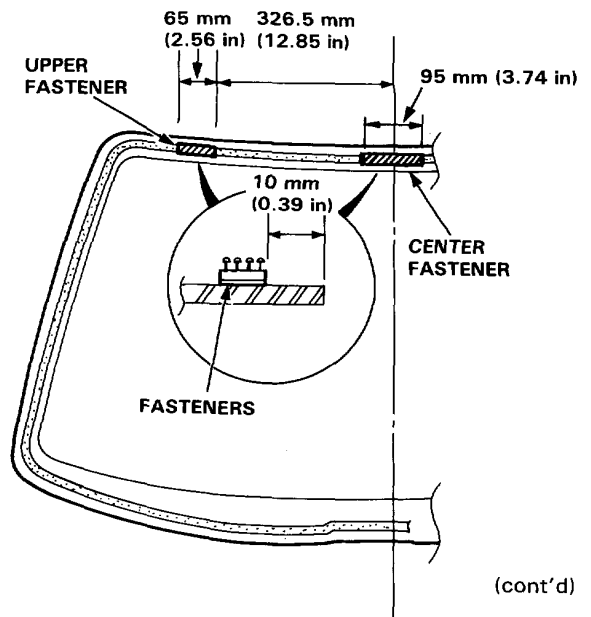


4. Glue the rubber dams to the inside face of the windshield as shown, to contain the adhesive during installation.

NOTE: Be careful not to touch the glass where adhesive will be applied.



5. Glue the center and upper fasteners to the inside face of glass as shown.



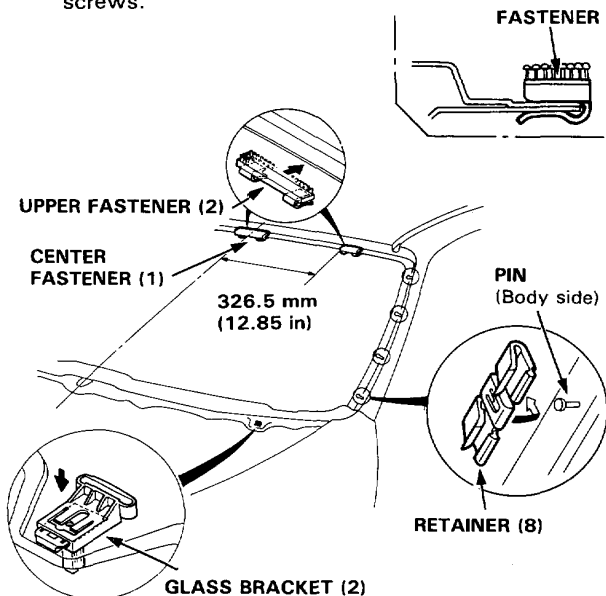
(cont'd)

Windshield-

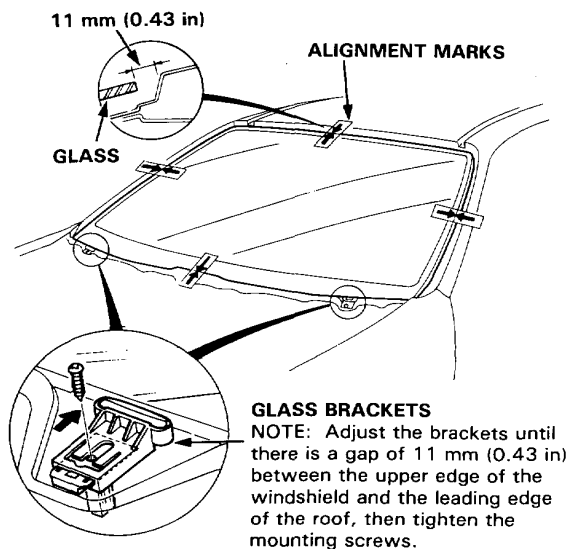
Installation (cont'd)

6. Install the glass brackets, clip retainers and fasteners to the body as shown.

NOTE: Do not tighten the glass bracket mounting screws.



7. Set the windshield upright on the brackets, then center it in the opening. Mark the location by marking lines across the glass and body with a grease pencil at the four points shown.

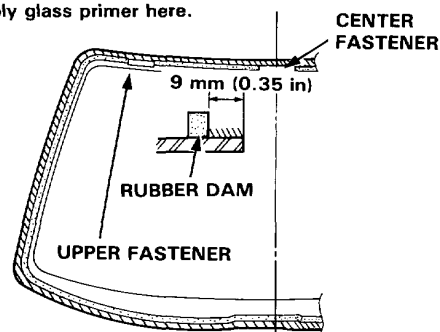


8. With a sponge, apply a light coat of glass primer around the edge of the glass as shown, then lightly wipe it off with gauge or cheesecloth.

NOTE:

- Do not apply body primer to the glass, and do not get body and glass primer sponges mixed up.
- Never touch the primed surfaces with your hands. If you do, the adhesive may not bond to the glass properly, causing a leak after the windshield is installed.
- Keep water, dust, and abrasive materials away from the primed surface.

//// : Apply glass primer here.

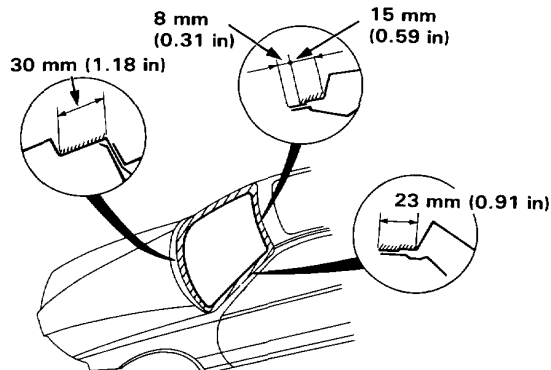


9. With a sponge, apply a light coat of body primer to the original adhesive remaining around the window opening flange. The glass should be installed 10 minutes after you apply the primer.

NOTE:

- Do not apply glass primer to the body, and be careful not to mix up glass and body primer sponges.
- Never touch the primed surfaces with your hands.
- Mask off the dashboard before painting the flange.

//// : Apply body primer here.





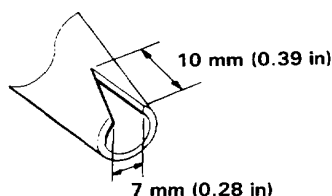
10. Thoroughly mix the adhesive and hardener together on a glass or metal plate with a putty knife.

NOTE:

- Clean the plate with a sponge and alcohol before mixing.
- Follow the instructions that come with the adhesive.

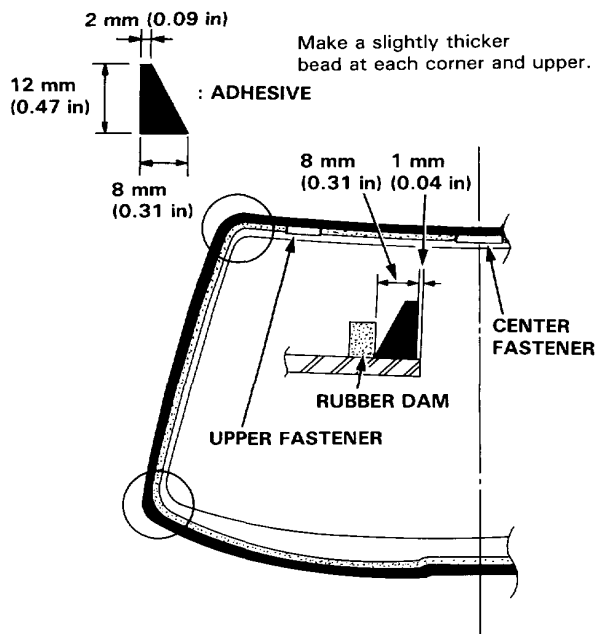
11. Before filling a cartridge, cut the end of the nozzle as shown.

Cut nozzle end as shown.



12. Pack adhesive into the cartridge without air pockets to ensure continuous delivery. Put the cartridge in a caulking gun and run a bead of adhesive around the edge of the glass as shown.

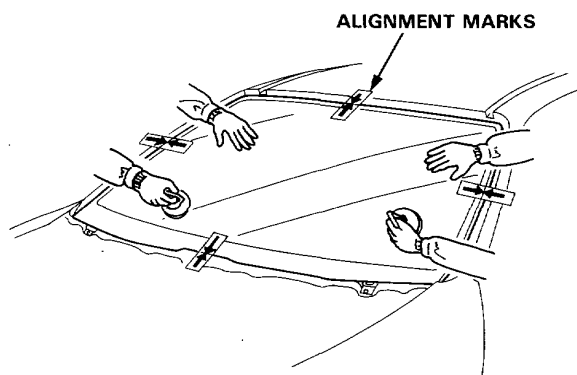
NOTE: Apply the adhesive within 30 minutes after applying the glass primer.



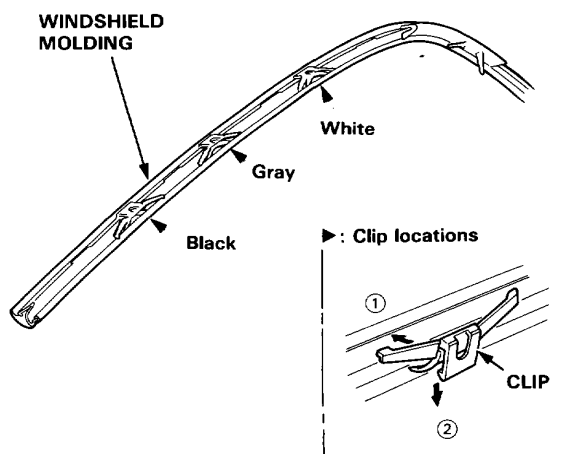
13. Use suction cups to hold the glass over the opening, align it with the marks made in step 7 and set it down on the adhesive. Lightly push on the glass until its edge is fully seated on the adhesive all the way around.

NOTE:

- Do not close or open the doors until adhesive is dry.
- Make sure the fasteners are fastened correctly.



14. Install the clips on the windshield molding.



(cont'd)

Windshield

Installation (cont'd)

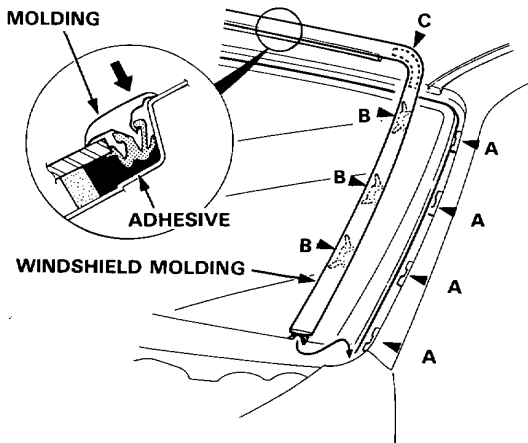
15. Scrape or wipe the excess adhesive off with a putty knife or gauze.

NOTE: To remove adhesive from a painted surface or glass, wipe with a soft shop towel dampened with alcohol.

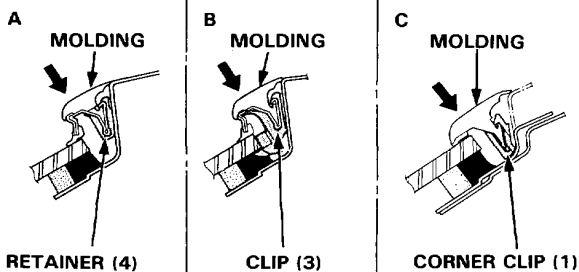
16. Install the windshield molding.

NOTE:

- When installing, make sure there are no twists in the molding.
- Install the molding by starting at the upper corner.
- Glue the upper section with the adhesive.



►: Clip, retainer locations



17. Let the adhesive dry for at least 1 hour, then spray water over the glass and check for leaks. Mark leaking areas and let the glass dry, then seal with urethane windshield adhesive.

NOTE:

- Let the car stand for at least 4 hours after glass installation. If the car has to be used within the first 4 hours, it must be driven slowly.
- Keep the glass dry for the first hour after installation.
- Check that the ends of the molding are set under the air scoop.

18. Reassemble all removed parts.



Rear Window

Removal

CAUTION:

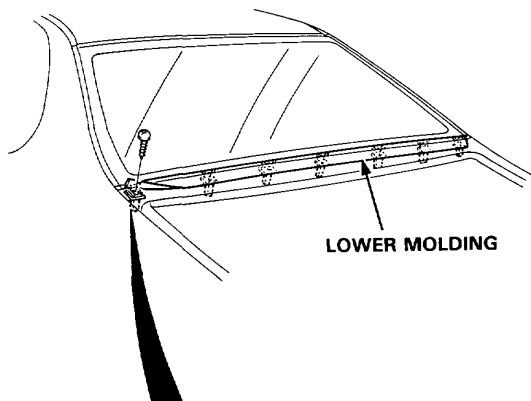
- Wear gloves to remove and install the glass.
- Do not damage the defroster grid lines.

1. To remove the rear glass, first remove:
 - Trunk lid (page 20-66)
 - Rear shelf (page 20-41)
 - Rear pillar trim panel (page 20-41)
 - Rear wiper motor (KE, KT, KG, KF, KS model) (see Section 23)

2. Disconnect the defroster leads, and remove their holders.

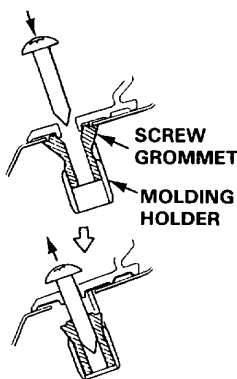
NOTE: Avoid scratching or scoring the glass with the cutter blade.

3. Remove the molding holders, then remove the lower molding.



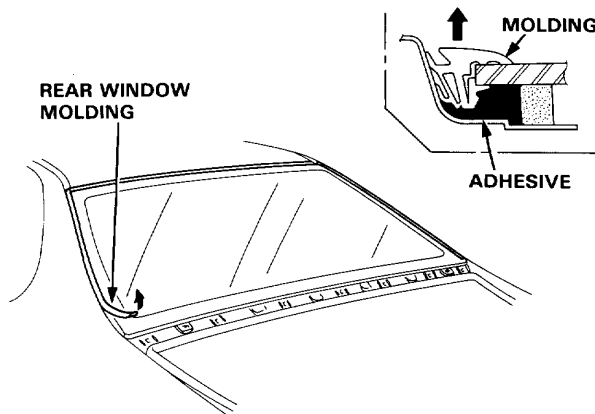
Molding Holder Removal:

- 1) Remove or loosen the screw.
- 2) Place the screw in the grommet again (do not screw it in) and press it down.
- 3) Pull the screw with the molding holder out of the body.



4. Peel off the molding.

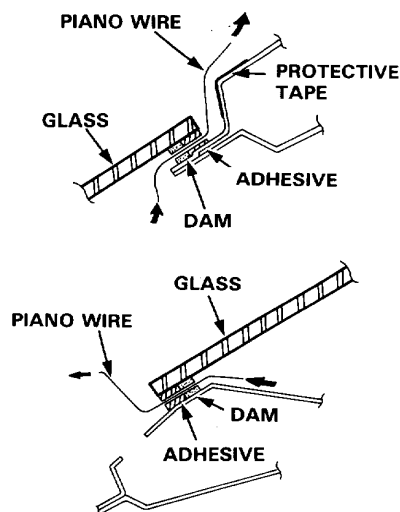
NOTE: When molding removal is difficult, cut the molding with a knife.



5. Remove the rear headliner (page 20-40)

CAUTION: Take care not to bend the headliner excessively.

6. Apply protective tape along the edge of the body next to the glass as shown. Using an awl, make a hole through the glass adhesive from inside the car. Push piano wire through the hole and wrap each end around a piece of wood.



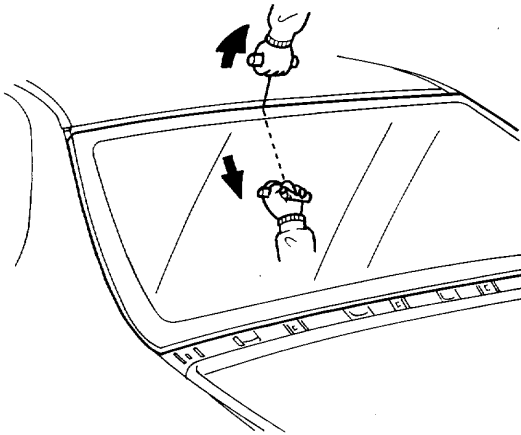
(cont'd)

Rear Window

Removal (cont'd)

7. With a helper on the outside, pull the wire back and forth in a sawing motion and carefully cut through the adhesive around the entire glass.

CAUTION: Hold the piano wire as close to the glass as possible to prevent damage to the body.



8. Cut the rubber dam and fasteners away from the body with a knife; they are cemented in place.

Installation

1. Scrape the old adhesive smooth with a knife, to a thickness of about 2 mm (0.08 in) on the bonding surface around the entire glass flange.

NOTE:

- Do not scrape down to the painted surface of the body; damaged paint will interfere with proper bonding.
- Remove all traces of the rubber dam and fasteners material from the body.
- Mask off surrounding surfaces before applying primer.

2. Clean the body bonding surface with a sponge dampened in alcohol.

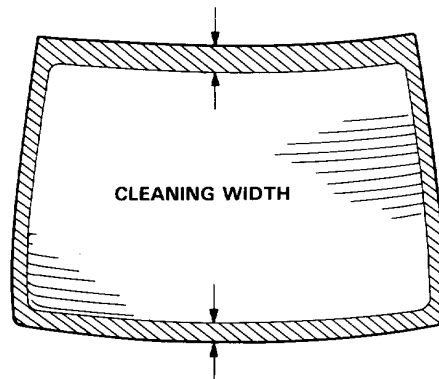
NOTE: After cleaning, keep oil, grease or water from getting on the surface.

3. If the old glass is to be reinstalled, use a putty knife to scrape off all traces of old adhesive, then clean the glass surface with alcohol where new adhesive is to be applied.

NOTE: Make sure the bonding surface is kept free of water, oil and grease.

CAUTION: Avoid setting the glass on its edges; small chips may later develop into cracks.

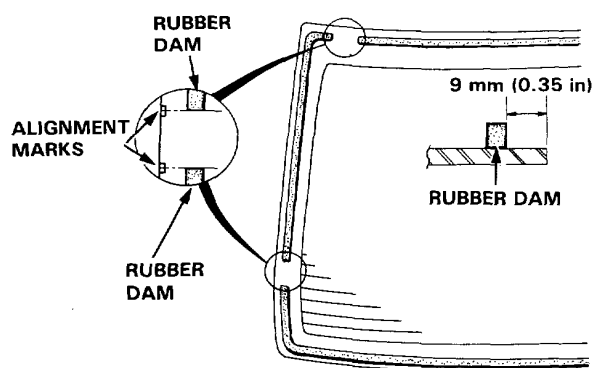
NOTE: Clean the shadowed area.



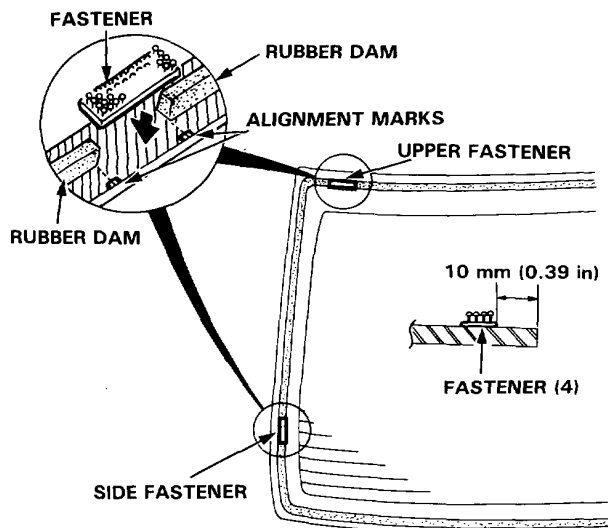


4. Glue the rubber dams to the inside face of the windshield as shown, to contain the adhesive during installation.

NOTE: Be careful not to touch the glass where adhesive will be applied.

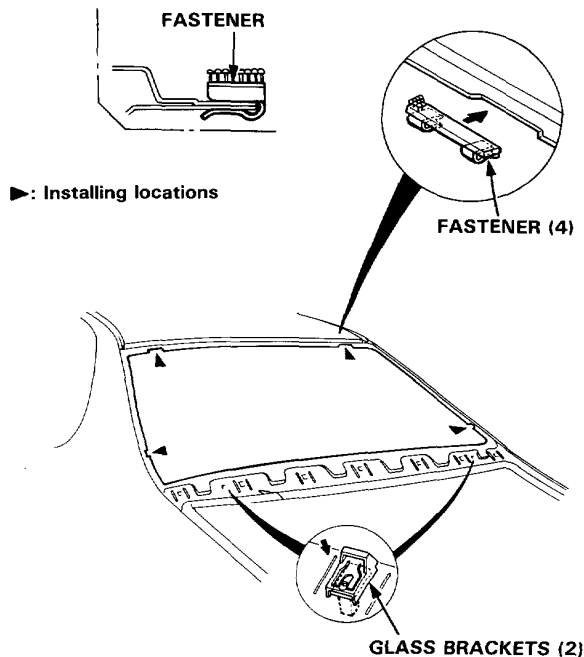


5. Glue the side and upper fasteners to the inside face of glass as shown.

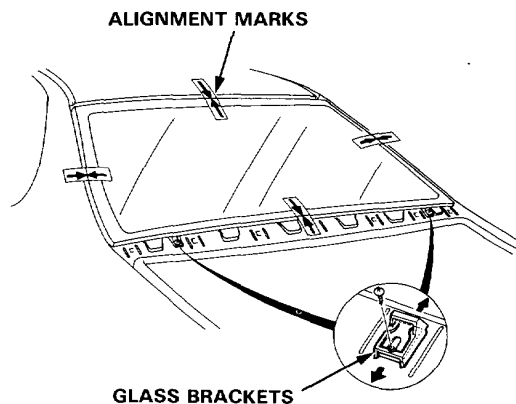


6. Install the glass brackets and fasteners to the body as shown.

NOTE: Do not tighten the glass bracket mounting screws.



7. Set the glass upright on the glass brackets, then center it in the opening. Mark the location by marking lines across the glass and body with a grease pencil at the four points shown.



NOTE: Adjust the brackets to center the glass in the opening, then tighten the mounting screws.

(cont'd)

Rear Window

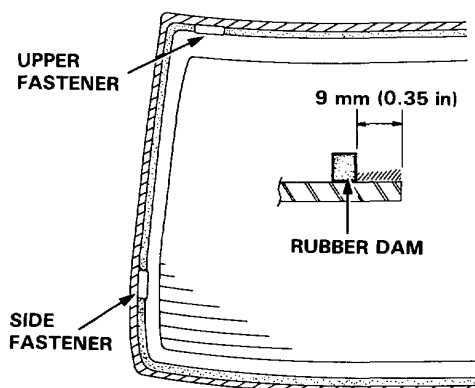
Installation (cont'd)

8. With a sponge, apply a light coat of glass primer around the edge of the glass as shown, then lightly wipe it off with gauze or cheesecloth.

NOTE:

- Do not apply body primer to the glass, and do not get body and glass primer sponges mixed up.
- Never touch the primed surfaces with your hands. If you do, the adhesive may not bond to the glass properly, causing a leak after the glass is installed.
- Keep water, dust, and adrasive materials away from the primed surface.

////// :Apply glass primer here.

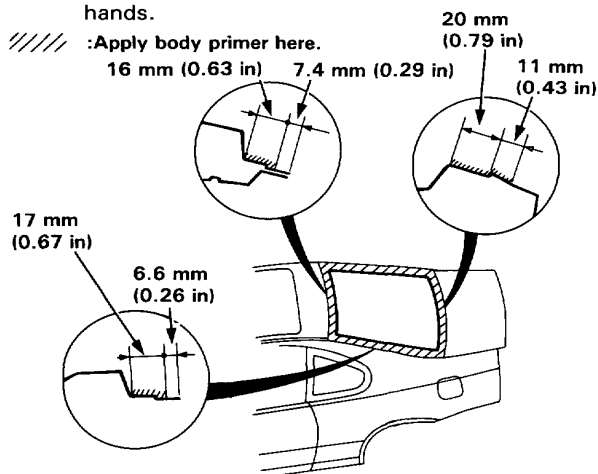


9. With a sponge, apply a light coat of body primer to the original adhesive remaining around the window opening flange.

NOTE:

- Do not apply glass primer to the body, and be careful not to mix up glass and body primer sponges.
- Never touch the primed surfaces with your hands.

////// :Apply body primer here.

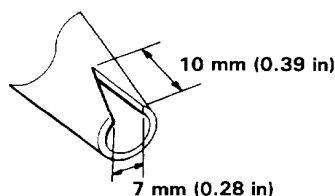


10. Thoroughly mix the adhesive and hardener together on a glass or metal plate with a putty knife. Follow the instructions that came with the adhesive.

NOTE: Clean the plate with a sponge and alcohol before mixing.

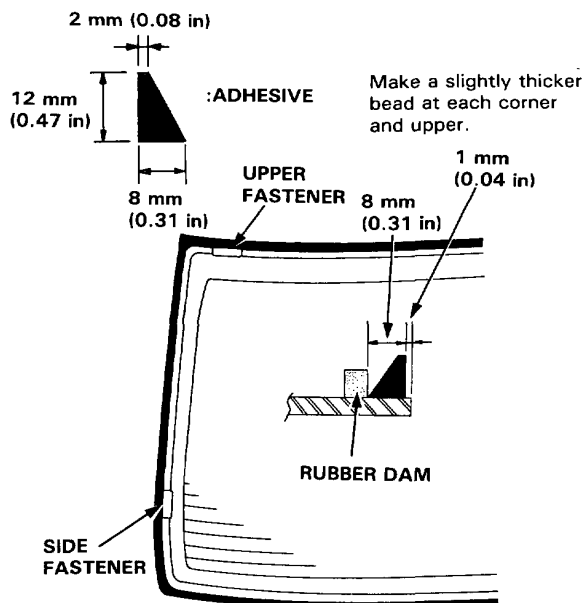
11. Before filling a cartridge, cut the end of the nozzle as shown.

Cut nozzle end as shown.



12. Pack adhesive into the cartridge without air pockets to ensure continuous delivery. Put the cartridge in a caulking gun and run a bead of adhesive around the edge of the glass as shown.

NOTE: Apply the adhesive within 30 minutes after applying the glass primer.

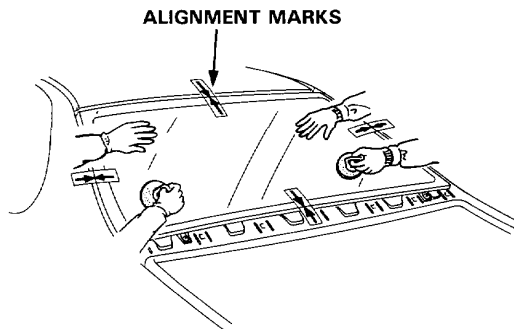




13. Use suction cups to hold the glass over the opening, align it with the marks made in step 7 and set it down on the adhesive. Lightly push on the glass until its edges are fully seated on the adhesive all the way around.

NOTE:

- Do not close or open the doors until adhesive is dry.
- Make sure the fasteners are fastened correctly.



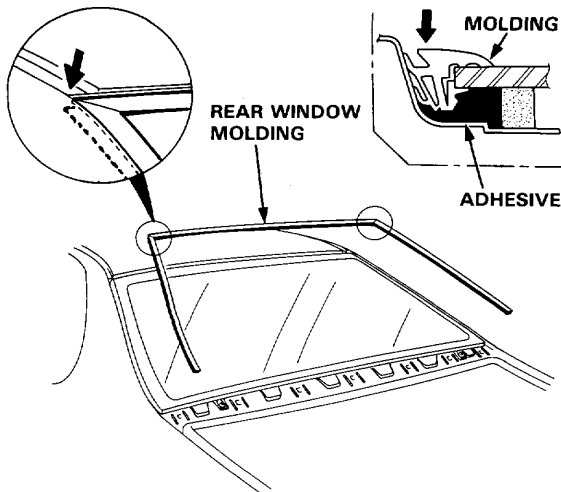
14. Scrape or wipe the excess adhesive off with a putty knife or gauze.

NOTE: To remove adhesive from a painted surface or glass, use a soft shop towel dampened with alcohol.

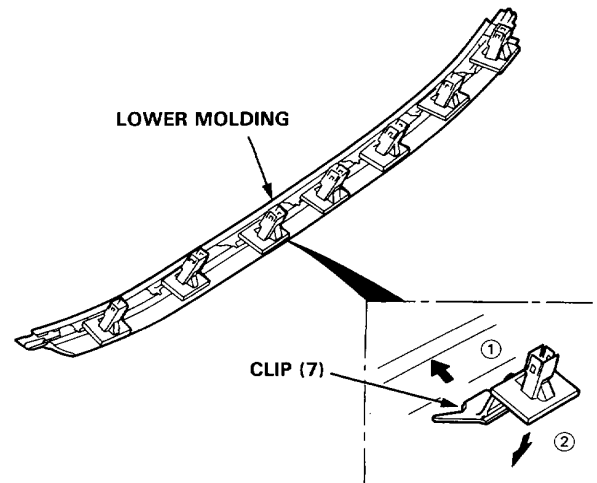
15. Install the rear window molding.

NOTE:

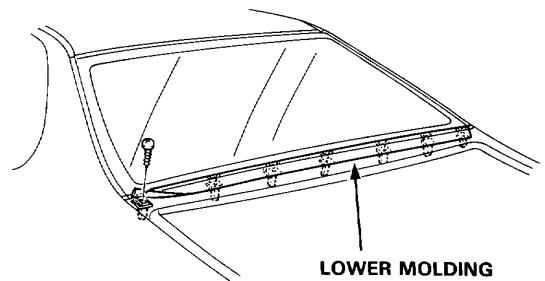
- When installing, make sure there are no twists in the molding.
- First install the upper section, then install the each side.
- Glue the upper section with the adhesive.



16. Install the clips on the lower molding.



17. Install the lower molding, then tighten the mounting screws.



18. After the adhesive is dry, spray water over the glass and check for leaks. Mark leaking areas and let the glass dry, then seal with sealant.

NOTE: Let the car stand for at least 4 hours after glass installation. If the car has to be used within the first 4 hours, it must be driven slowly.

19. Reassemble all removed parts.

Quarter Glass

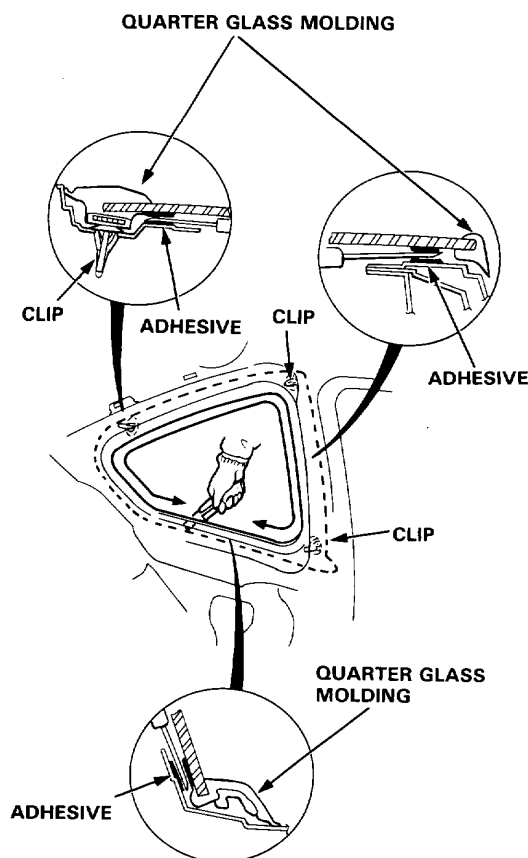
Removal

CAUTION:

- Wear gloves to remove and install the glass.
- Use seat covers to avoid damaging any surfaces.

1. To remove the quarter glass, first remove the:
 - Rear pillar trim panel (page 20-41)
 - Quarter trim (page 20-41)
 - Quarter trim panel (page 20-41)
2. Use a knife to cut through the glass adhesive from inside the car, all the way around.

NOTE: Replace the molding and glass as an assembly. If the old glass is to be reinstalled, take care not to damage the molding.



3. Remove the remaining clips from the body.

Installation

1. Scrape the old adhesive smooth with a knife, to a thickness of about 2 mm (0.08 in) on the bonding surface around the entire window glass flange.

NOTE:

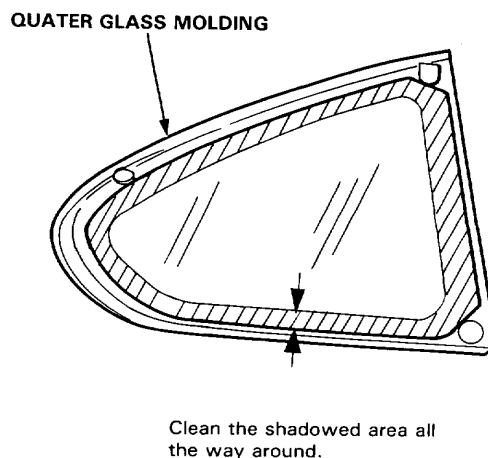
- Do not scrape down to the painted surface of the body; damaged paint will interfere with proper bonding.
- Mask off surrounding surfaces before applying primer.

2. Clean the body bonding surface with a sponge dampened in alcohol.

NOTE: After cleaning, keep oil, grease or water from getting on the surface.

3. If the old glass is to be reinstalled, use a putty knife to scrape off all traces of old adhesive, then clean the glass surface with alcohol where new adhesive is to be applied.

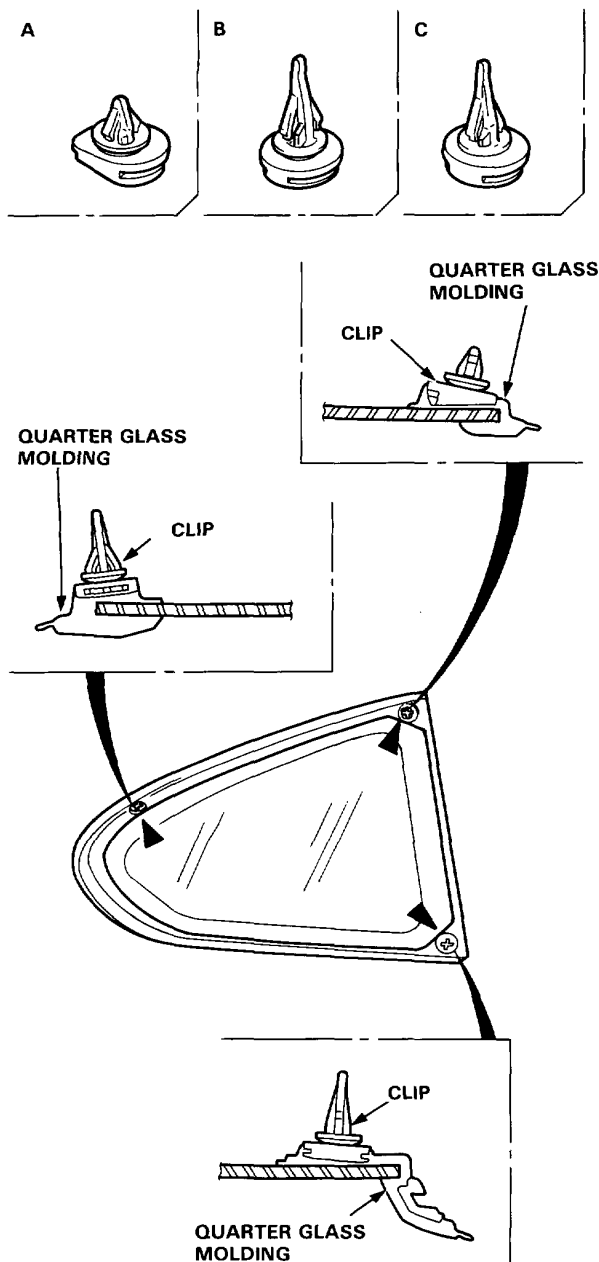
NOTE: Make sure the bonding surface is kept free of water, oil and grease.





4. Install the clips on the inside face of the molding as shown.

►: Clip locations

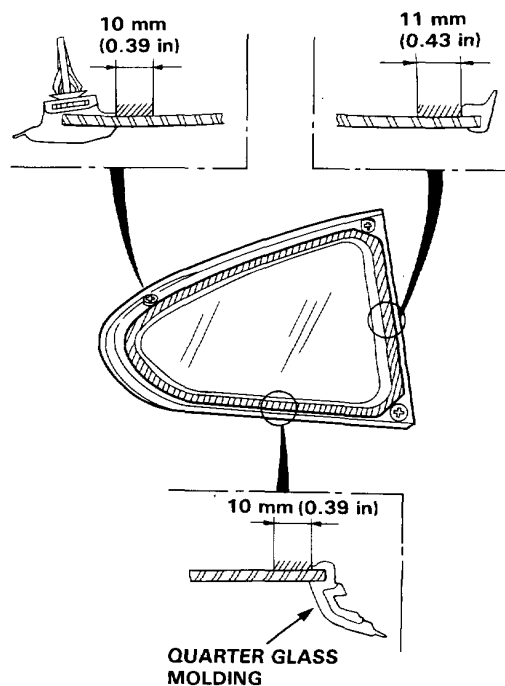


5. With a sponge, apply a light coat of glass primer to the inside face of the glass as shown, then tightly wipe it off with gauze or cheesecloth.

NOTE:

- Do not apply body primer to the glass, and do not get body and glass primer sponges mixed up.
- Never touch the primed surfaces with your hands. If you do, the adhesive may not bond to the glass properly, causing a leak after the glass is installed.
- Keep water, dust, and abrasive materials away from the primed surface.

//// : Apply glass primer here.



(cont'd)

Quarter Glass

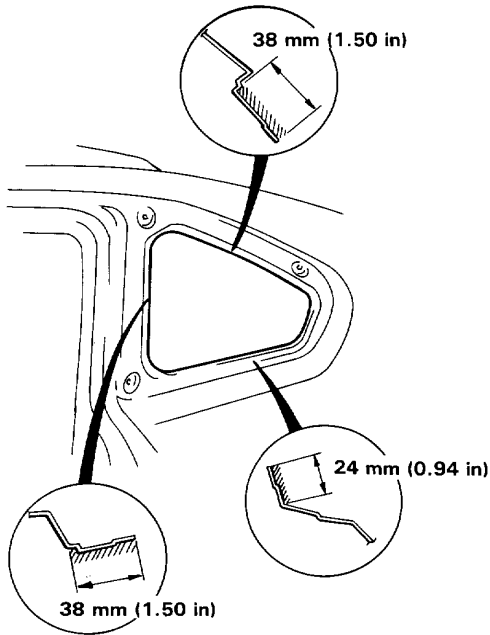
Installation (cont'd)

- With a sponge, apply a light coat of body primer to the original adhesive remaining around the quarter window opening flange.

NOTE:

- Do not apply glass primer to the body, and be careful not to mix up glass and body primer sponges.
- Never touch the primed surfaces with your hands.

 : Apply body primer here.



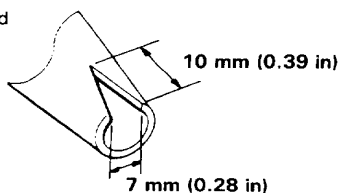
- Thoroughly mix the adhesive and hardener together on a glass or metal plate with a putty knife.

NOTE:

- Clean the plate with a sponge and alcohol before mixing.
- Follow the instructions that came with the adhesive.

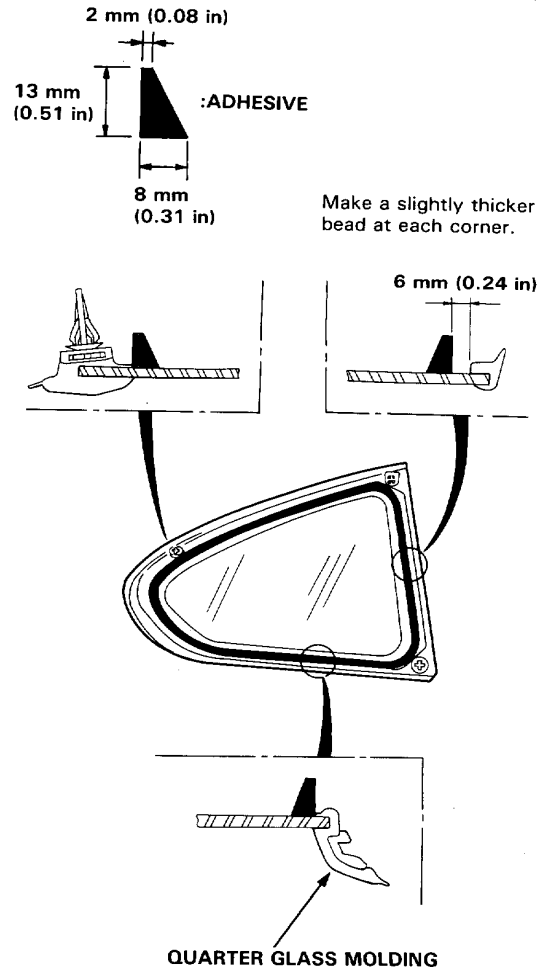
- Before filling a cartridge, cut the end of the nozzle as shown.

Cut nozzle end as shown.



- Pack adhesive into the cartridge without air pockets to ensure continuous delivery. Put the cartridge in a caulking gun and run a bead of adhesive around the edge of the glass as shown.

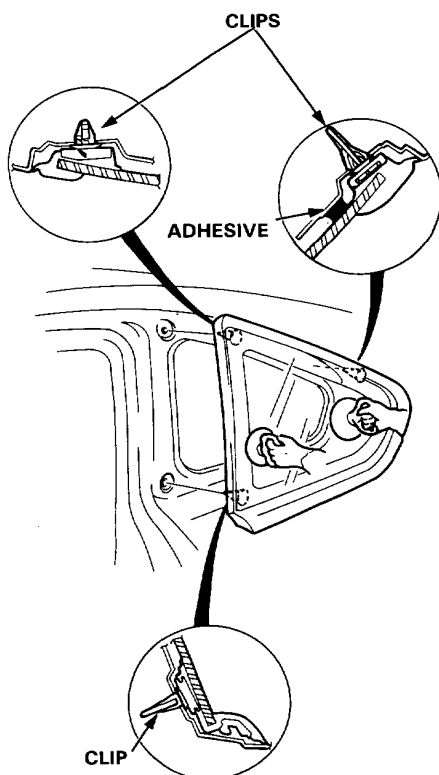
NOTE: Apply the adhesive within 30 minutes after applying the glass primer.





10. Use suction cups to hold the glass over the opening, align it with the clip setting points and set it down on the adhesive. Lightly push on the glass until its edges are fully seated on the adhesive all the way around.

NOTE: Do not open or close the doors until the adhesive is dry.



11. Scrape or wipe the excess adhesive off with a putty knife or gauze.

NOTE: Use a soft shop towel dampened with alcohol to remove adhesive from a painted surface or glass.

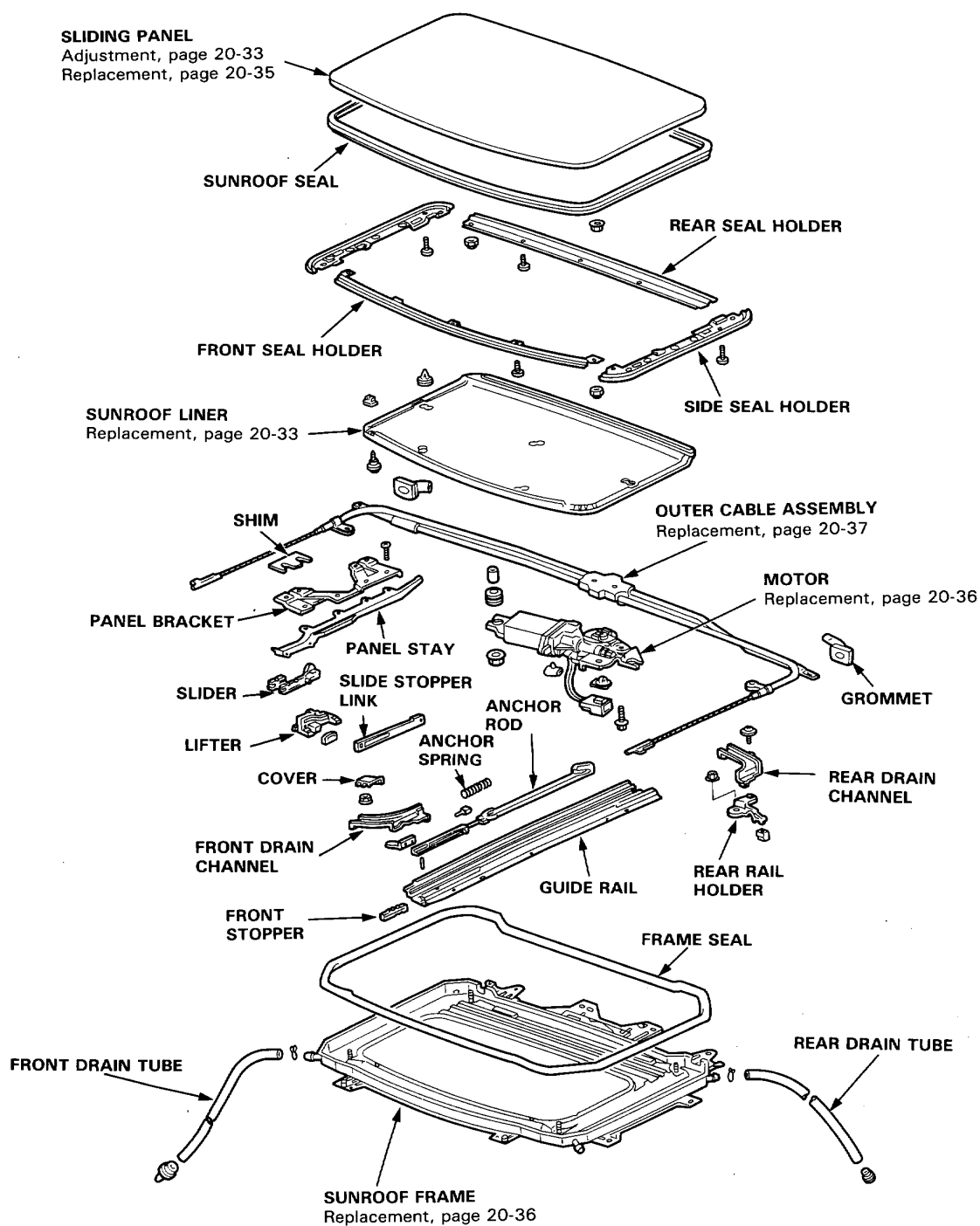
12. After the adhesive is dry, spray water over the glass and check for leaks. Mark leaking areas and let the glass dry, then seal with sealant.

NOTE: Let the car stand for at least 4 hours after glass installation. If the car has to be used within the first 4 hours, it must be driven slowly.

13. Reinstall all remaining removed parts.

Sunroof

Index



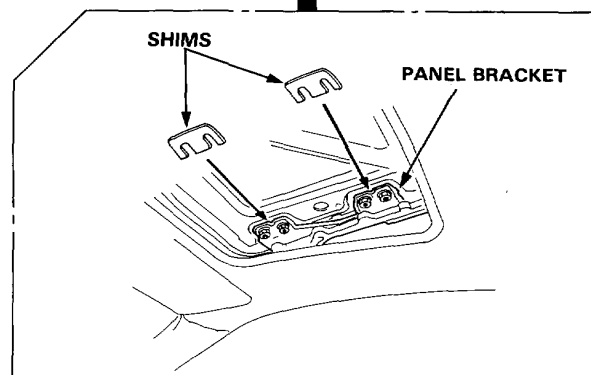
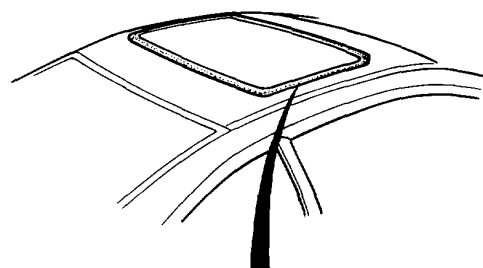
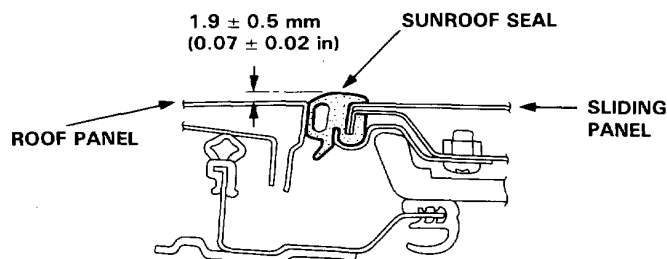


Troubleshooting

Symptom	Probable Cause
Water leak	<ol style="list-style-type: none"> 1. Clogged drain tube. 2. Gap between sunroof seal and roof panel. 3. Defective or improperly installed sunroof seal. 4. Gap between drain seal and roof panel.
Air leak, wind noise	<ol style="list-style-type: none"> 1. Excessive clearance between sunroof seal and roof panel.
Motor noise	<ol style="list-style-type: none"> 1. Loose motor. 2. Worn gear or bearing. 3. Outer cable deformed.
Sliding panel does not move, but motor turns	<ol style="list-style-type: none"> 1. Clutch out of adjustment. 2. Foreign matter stuck between guide rail and slider. 3. Inner cable loose. 4. Outer cable not attached properly.
Sliding panel does not move and motor does not turn (Sliding panel can be moved with sunroof wrench)	<ol style="list-style-type: none"> 1. Blown fuse. 2. Faulty switch. 3. Battery run down. 4. Defective motor. 5. Faulty relay.

Panel Height Adjustment

The roof panel should be even with the sunroof seal to within 1.9 ± 0.5 mm (0.07 ± 0.02 in) all the way around. If not, open the glass fully, and:



1. Remove the roof liner (page 20-34).
2. Loosen the bracket mounting nuts and install shims between sliding panel and bracket as shown.

Shim thickness: 1 mm (0.04 in)

Adjustment: max. 2 mm (0.08 in)

3. Repeat on opposite side if necessary.

Sunroof

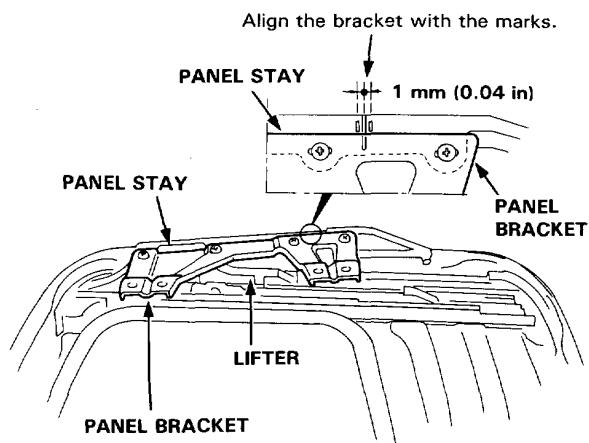
Rear Edge Closing Adjustment

Open the sliding panel about a foot, then close it to check where rear edge begins to rise. If it rises too soon and seats too tightly against the roof panel, or too late and does not seat tightly enough, adjust it.

1. Remove the sunroof liner, then remove the sliding panel.
2. Check that the position of the lifter is the same on each side.

NOTE: If the position differs from side to side, remove the sunroof motor, then adjust the position of the lifter on each side.

3. Loosen the panel bracket mounting screws. Align the panel bracket to the same position on each side.



4. Install the sliding panel. Close the sliding panel, then check the alignment between the roof panel and sliding panel.

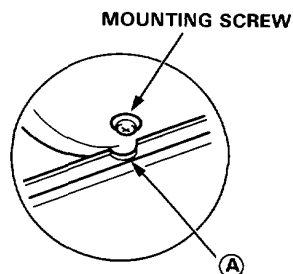
NOTE: Adjust the sliding panel right and left by using the panel bracket mounting holes.

5. With the sliding panel closed fully, check for water and air leaks.

NOTE: Do not use high pressure water.

Roof Liner and Sliding Panel Replacement

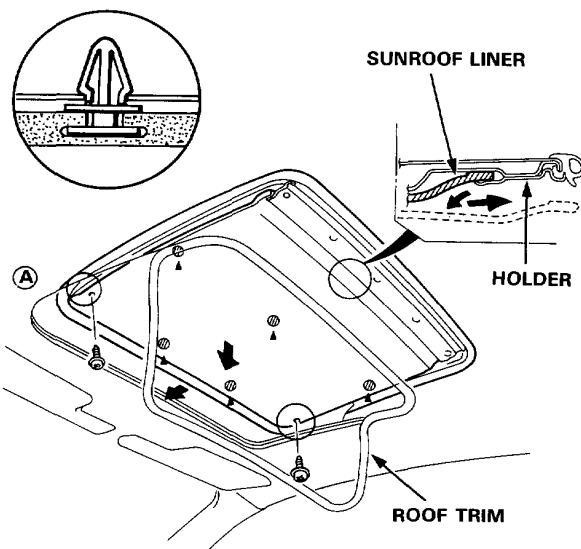
1. Remove the front of the roof trim.
2. Align the location (A) position of the sunroof frame to the sunroof liner mounting screw.



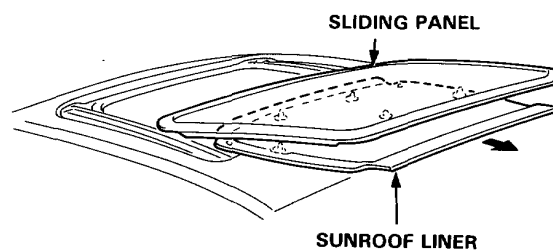
3. Remove the screws and clips, then slide the sunroof liner slightly forward.

NOTE: Take care not to scratch the roof liner.

►: Clip location



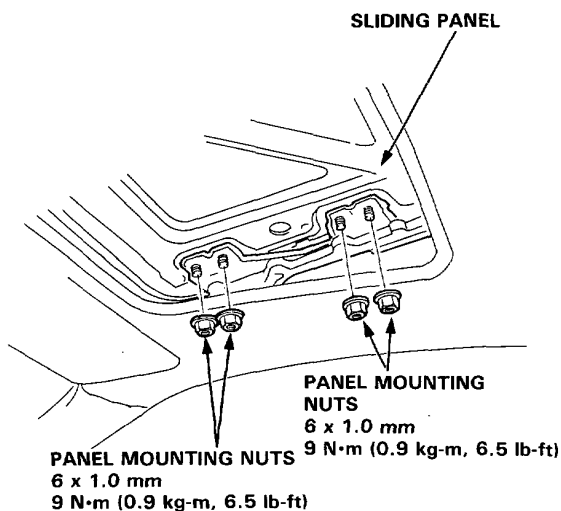
4. Slide the sunroof liner backward, then remove it.





5. Remove the mounting nuts from the panel brackets on both sides, then remove the sliding panel by lifting up.

NOTE: Do not damage the roof panel.



6. Installation is the reverse of the removal procedure.

NOTE:

- Before installing the sunroof liner, close the sliding panel fully, then check for closing alignment. If necessary, adjust the sliding panel alignment (page 20-34).
- When installing the sunroof liner, make sure the sunroof liner is fastened correctly with the clips and holder.

7. Check for water and air leaks.

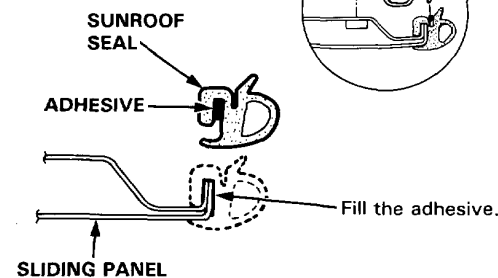
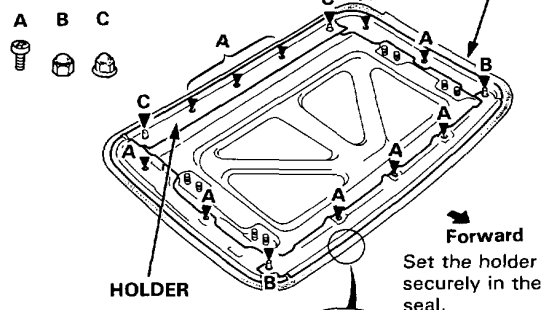
NOTE: Do not use high pressure water.

Seal Repair/Installation

If a seal is leaking, or if it is to be replaced, proceed as follows:

1. Remove the sunroof liner (page 20-34).
2. Remove the sliding panel.
3. Remove the seal holder. Carefully peel the seal off the sliding panel.

►: Screw, nut locations



4. Clean the seal attaching surfaces with a clean cloth dampened in alcohol.

NOTE: After cleaning, keep oil, grease or water from getting on the surface.

5. Fill the seal groove with adhesive. Coat the seal attaching surfaces of the sliding panel with the same adhesive.
6. Fit the seal onto the sliding panel evenly all the way around.
7. Wipe off excess adhesive with a clean cloth dampened with alcohol.
8. Allow the adhesive to cure for at least 4 hours after seal installation and before operating the sunroof.
9. Check for water and air leaks.

NOTE: Do not use high pressure water.

Sunroof

Motor, Drain Tube and Frame Replacement

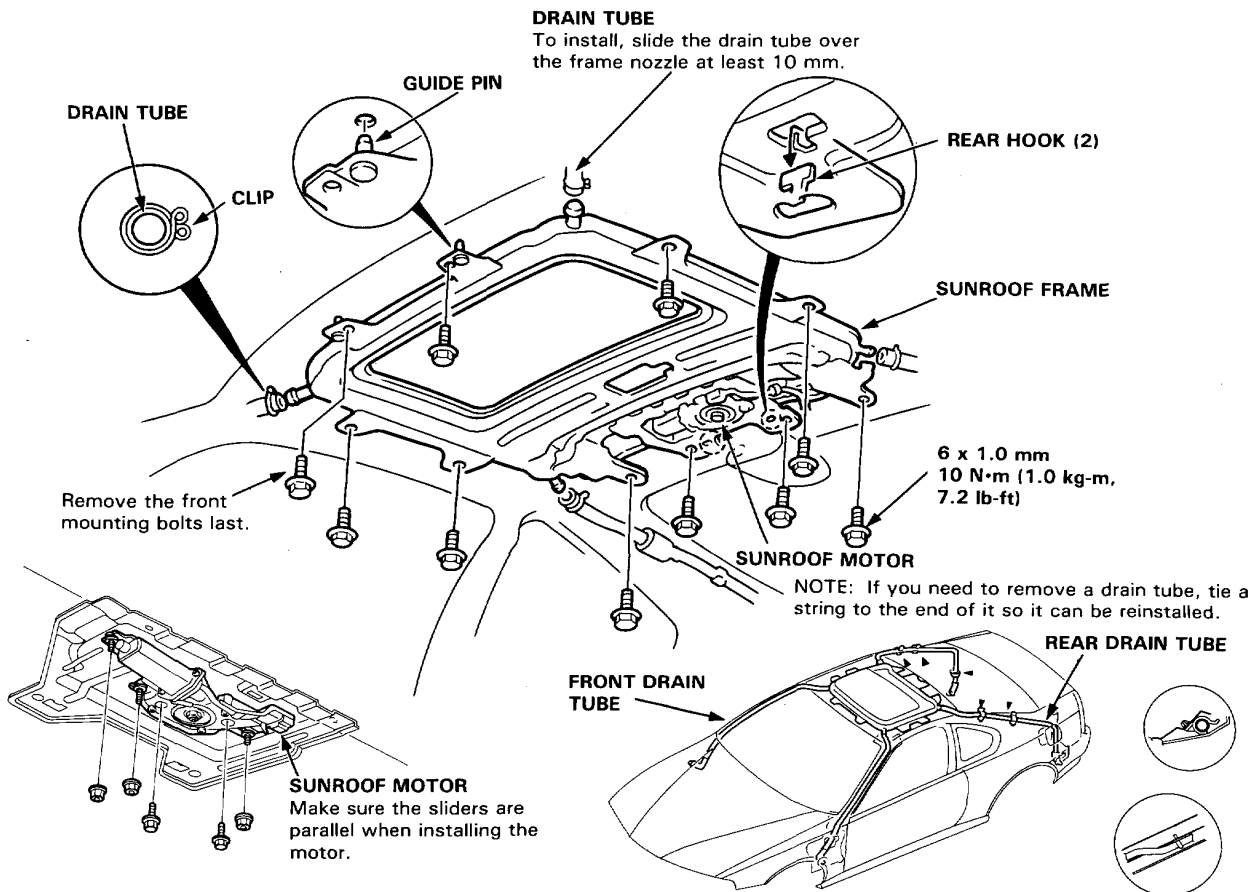
CAUTION: Be careful not to damage the seats, dashboard and other interior trim.

1. Remove the headliner (page 20-40).
2. Disconnect the motor wire harness; remove the clips securing the ceiling light wire harness.

NOTE: When removing the sunroof motor, remove the 2 mounting bolts and 3 nuts.

3. Remove the sliding panel (page 20-35).
4. Disconnect the drain tubes.
5. Remove the 10 mounting bolts and rear hooks, then remove the frame from the car.

NOTE: You may require assistance when removing the frame.



6. To install, insert the frame's rear hooks into the body holes, then install parts in the reverse order of removal.

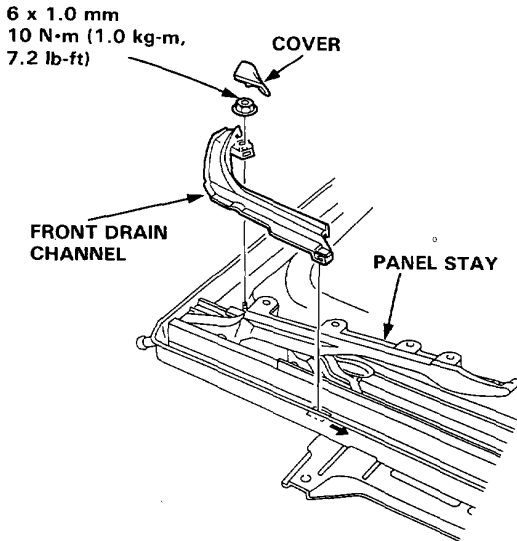
NOTE:

- Install the tube clips with the ends facing to the side to ease installation of the headliner.
- Clean the surface of sunroof frame.
- Check the drain seal assembly.
- Check for water and air leaks.

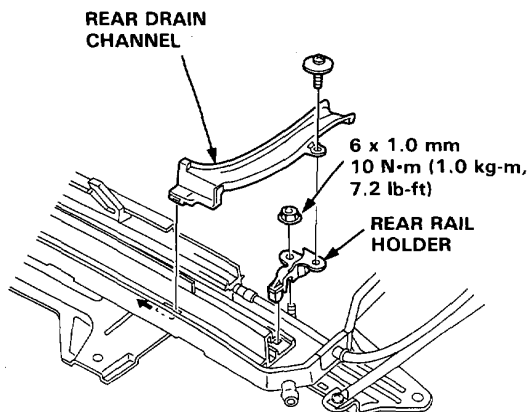


Panel Stay/Slider, Lifter and Guide Rails Replacement

1. Remove the sunroof frame (page 20-36).
2. Remove the front drain channel.

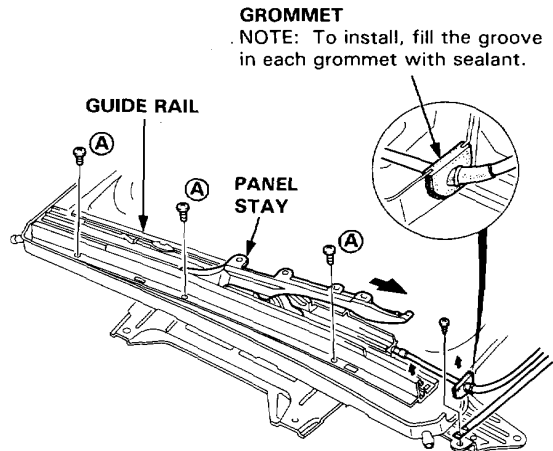


3. Remove the rear drain channel.
4. Remove the rear rail holder.



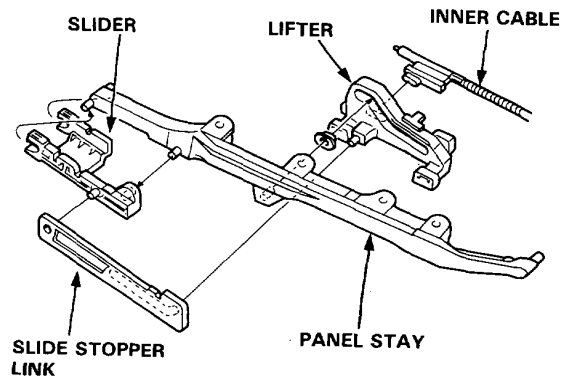
5. Remove the sunroof motor (page 20-36).
6. Remove the guide rail mounting screws (A), then remove the guide rail. Remove the screw, then remove the outer cable assembly.

NOTE: Take care not to bend the cable pipes.



7. Slide the panel stay backward, then remove it from the guide rail.
8. Remove the lifter from the inner cable end, then separate the panel stay, lifter, slide stopper link and slider.

NOTE: To install, apply multi-purpose grease to the lifter and slide stopper link.



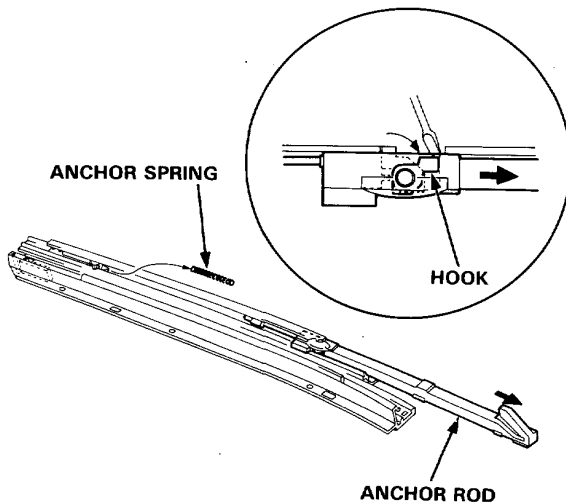
(cont'd)

Sunroof

Panel Stay/Slider, Lifter and Guide Rails Replacement (cont'd)

9. Turn the hook of the anchor rod with a screwdriver, then remove the anchor rod from the guide rail by sliding it backward.

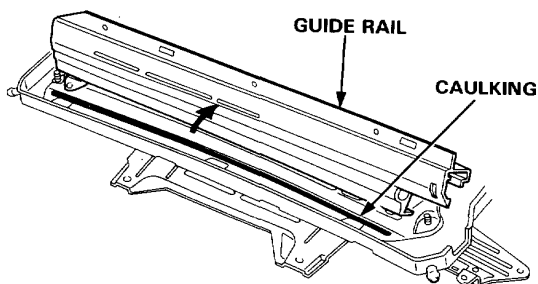
NOTE: To install, apply multi-purpose grease to the hook.



10. Installation is the reverse of the removal procedure.

NOTE:

- Before installing the guide rail, apply the caulking to guide rail mount faces of the sunroof frame.



- Damaged parts should be replaced.
- Apply grease to the sliding portion.
- Before installing the sunroof motor, adjust the lifter to the same position on each side.

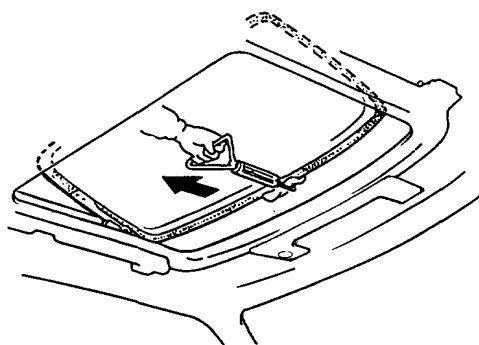


Closing Drag Check (Motor Removed)

Before installing the sunroof motor, measure the effort required to open the sliding panel using a spring scale as shown.

CAUTION: When using the spring scale, protect the leading edge of the sunroof with a shop towel.

If load is over 98 N (10 kg, 22 lb), check side clearance and panel height adjustment (page 20-33).

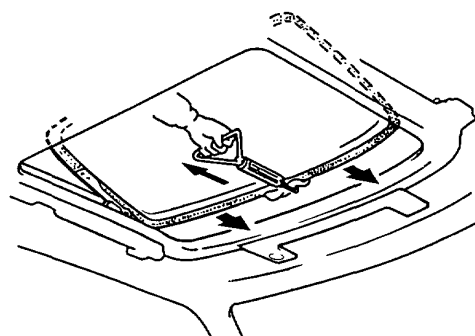


Closing Force Check (Motor Installed)

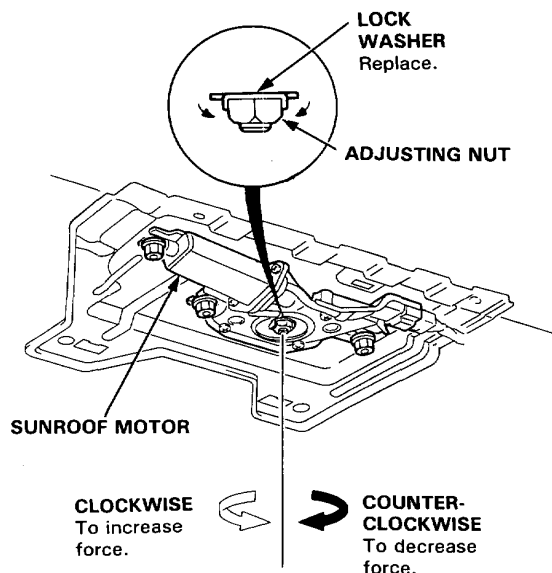
1. After installing all removed parts, have a helper hold the switch to close the sliding panel while you measure force required to stop it. Attach a spring scale as shown. Read the force as soon as the panel stops moving, then immediately release the switch and spring scale.

CAUTION: When using the spring scale, protect the leading edge of the sunroof with a shop towel.

Closing Force: 196–245 N
(20–30 kg, 44–55 lb)



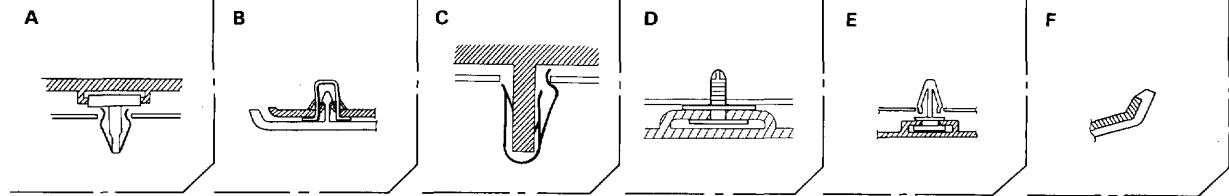
2. If the force is not within specification, install a new lock washer, adjust the tension by turning the sunroof motor clutch adjusting nut, then bend the lock washer against the adjusting nut.



Headliner

Replacement

►: Clip locations

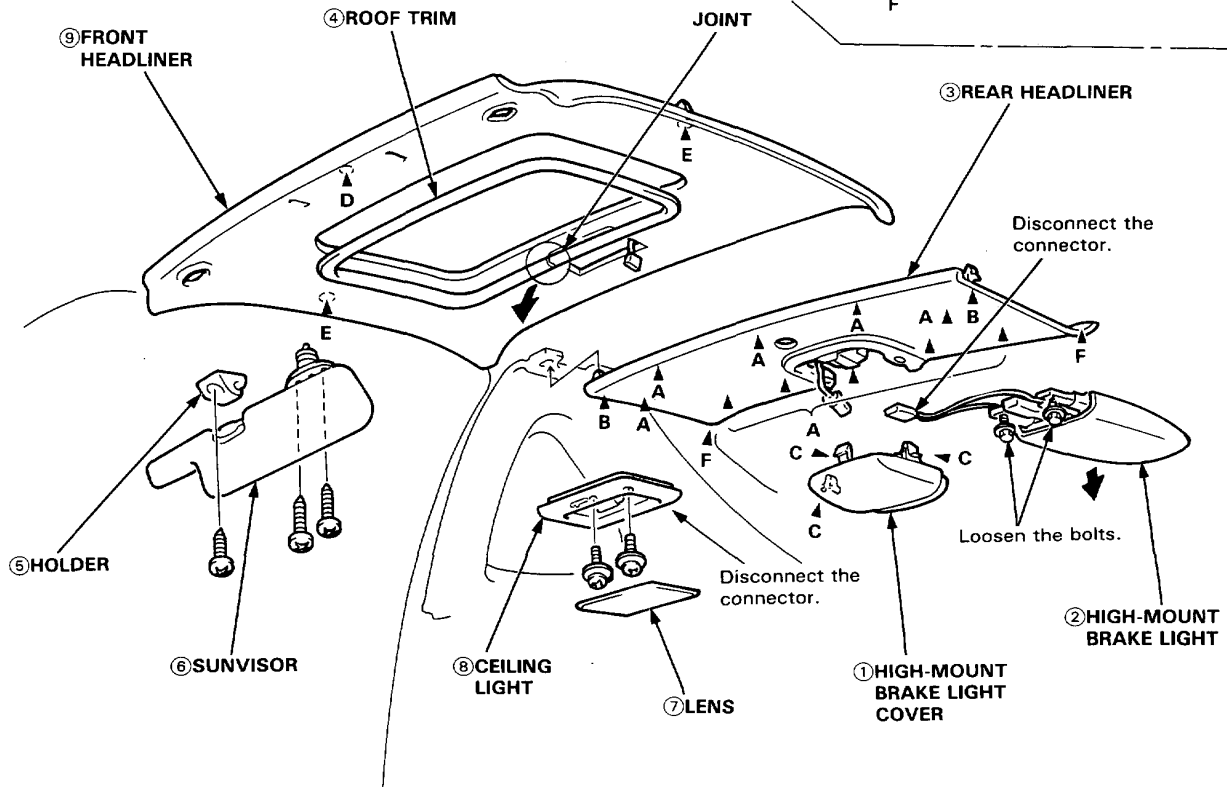
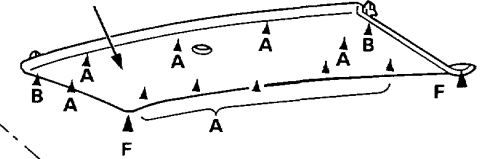


NOTE:

- Remove the front seats (page 20-42).
- Take care not to bend or scratch the headliner.
- Keep water away from the headliner.
- Be careful not to damage the dashboard and other interior trim.

Except high-mount brake light model:

REAR HEADLINER



NOTE: Remove the headliner from the passenger's side door opening.

Installation is the reverse of the removal procedure.

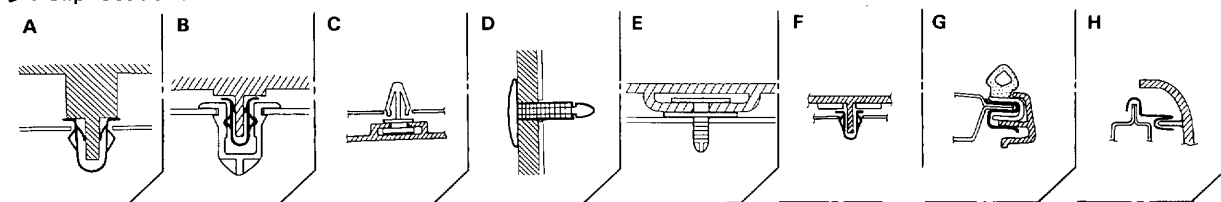
NOTE:

- When installing the headliner, be careful not to fold or bend it. Also, be careful not to scratch the body.
- Check that both sides of the headliner are securely attached to the trim.
- When installing the roof trim, install the joint towards the rear.
- If necessary, replace any damaged clips.



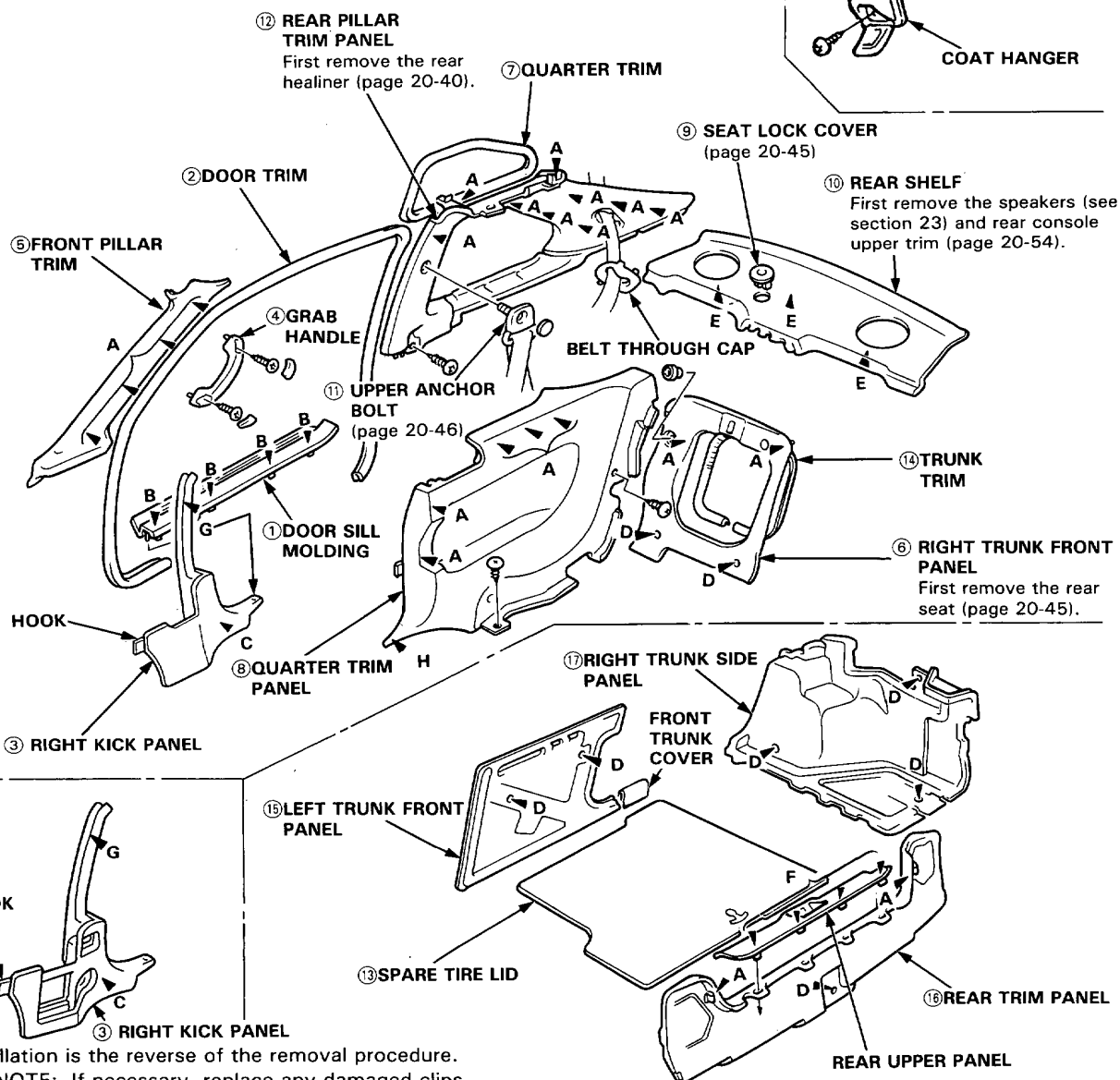
Interior Trim Replacement

►: Clip locations



Disassemble in numbered sequence.

NOTE: Take care not to bend or scratch the trims and panels.



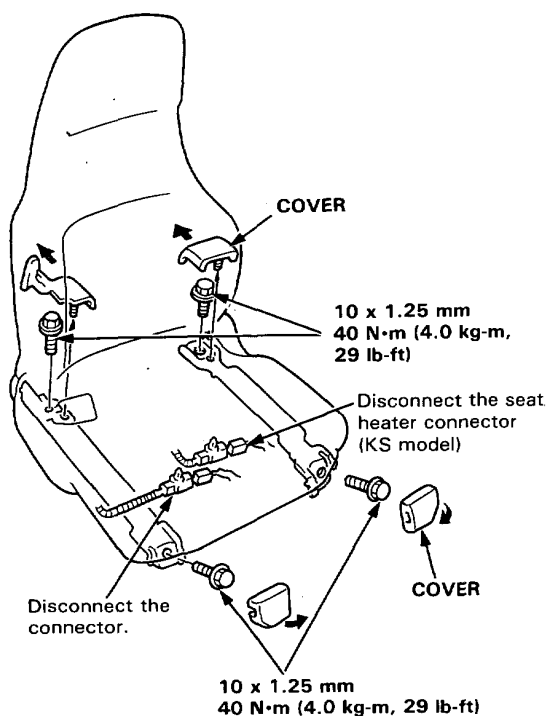
Installation is the reverse of the removal procedure.
NOTE: If necessary, replace any damaged clips.

Front Seats

Removal

NOTE: Take care not to scratch the seat covers and body.

1. Remove the seat track end covers as shown.
2. Remove the mounting bolts and disconnect the connector, then remove the seat assembly.

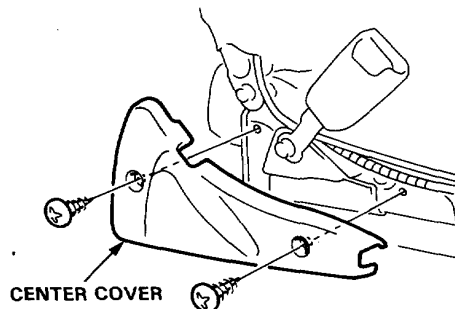
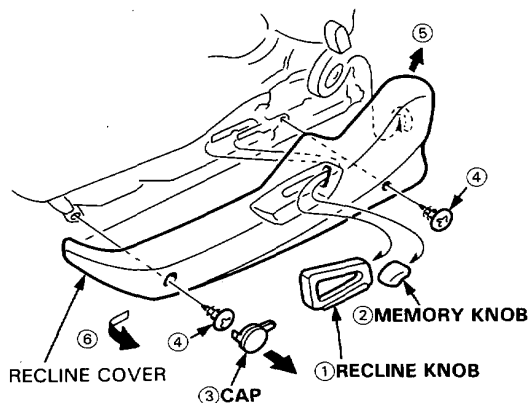


3. Installation is the reverse of the removal procedure.

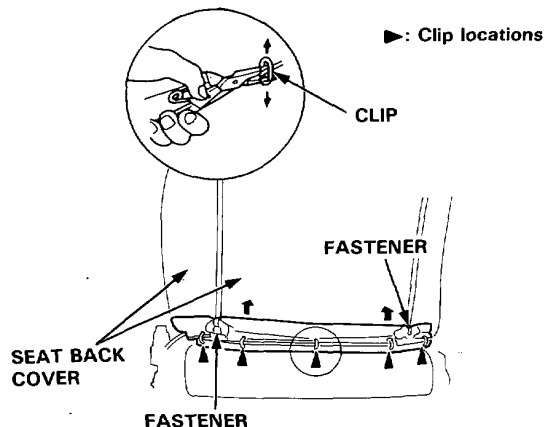
Replacement

NOTE: Take care not to scratch the seat covers and body.

1. Remove the seat assembly, then take it out from the door opening.
2. Remove the screws and knobs, then remove the recline cover. Remove the screws, then remove the center cover.



3. Remove the lower clips from the seat-back, then fold the seat cover back.

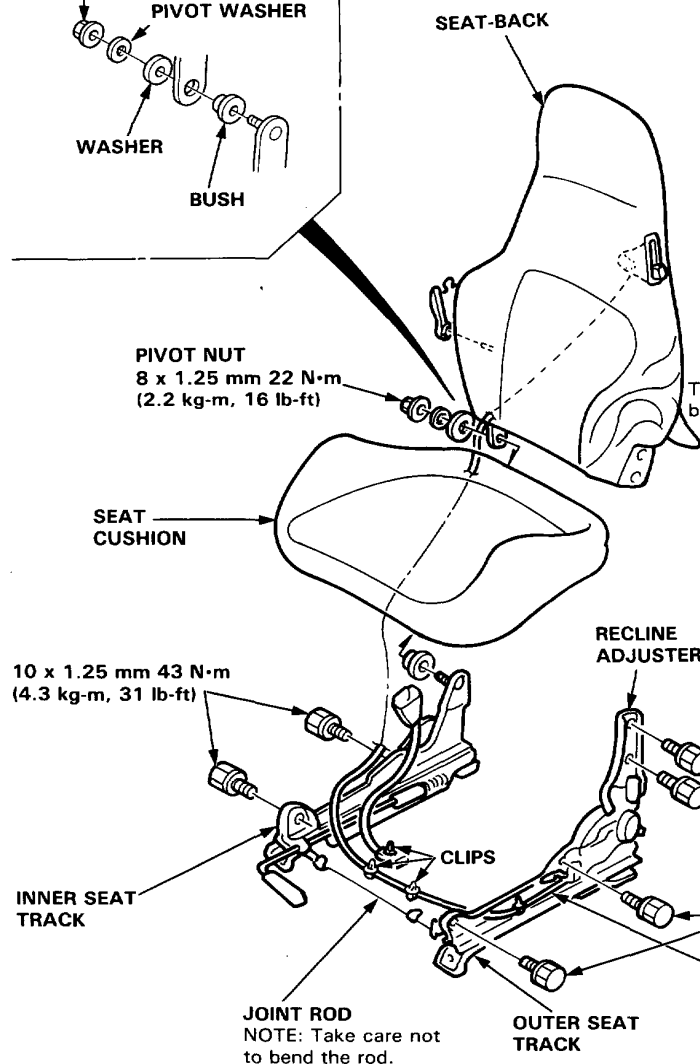
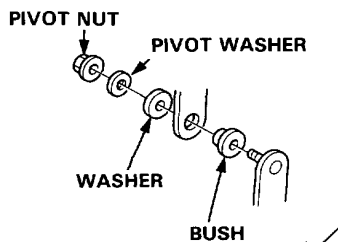




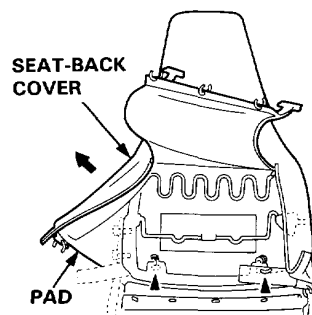
4. Fold the seat cover and pad back until you can see the seat-back mounting bolts.

NOTE: Take care not to damage the pad.

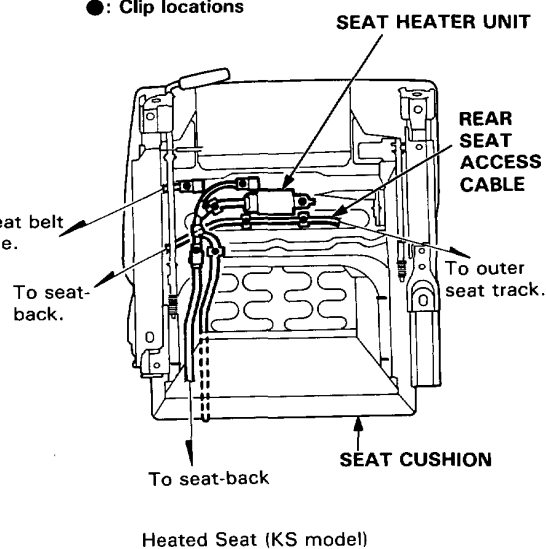
5. Remove the mounting bolts and nut, then remove the seat-back and seat cushion from the seat track.



►: Clip locations



●: Clip locations



6. Installation is the reverse of the removal procedure.

NOTE:

- To prevent wrinkles when installing a seat back cover, make sure the material is stretched evenly over the frame before securing all the clips.
- Apply grease to the moving surfaces.

Front Seats

Seat Cover Replacement

CAUTION: Wear gloves to remove and install the seat cover.

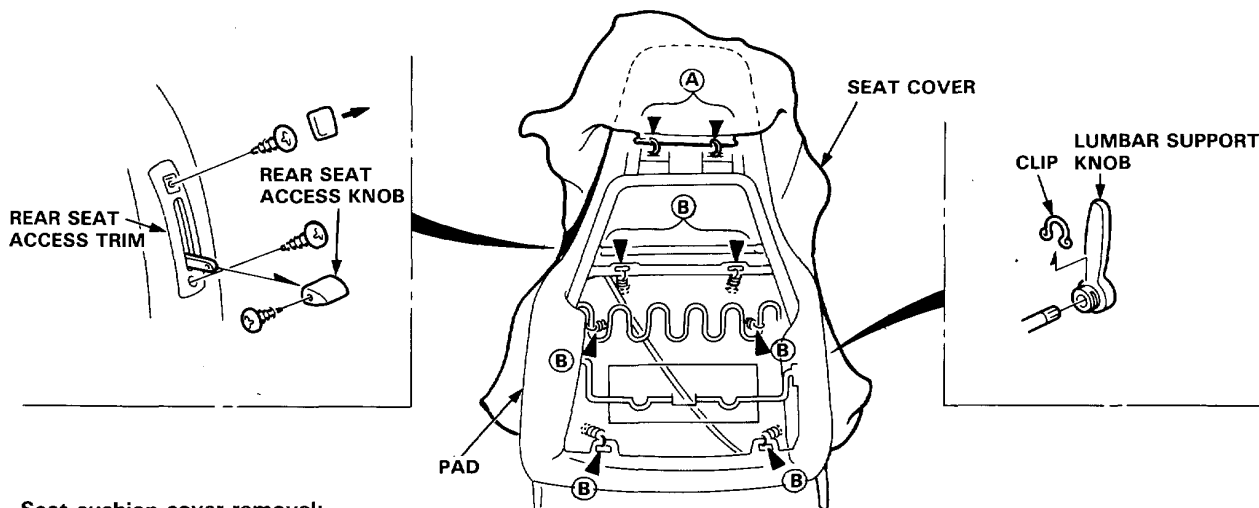
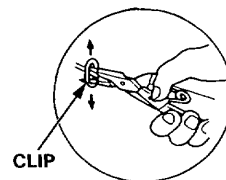
NOTE: Take care not to split the seams or damage the cover.

Seat-back cover removal:

1. Remove the seat-back from the seat track and recline adjuster.
2. Remove the rear seat access trim plate and lumbar support knob (Driver's).
3. Remove the seat cover by releasing all the inside springs.

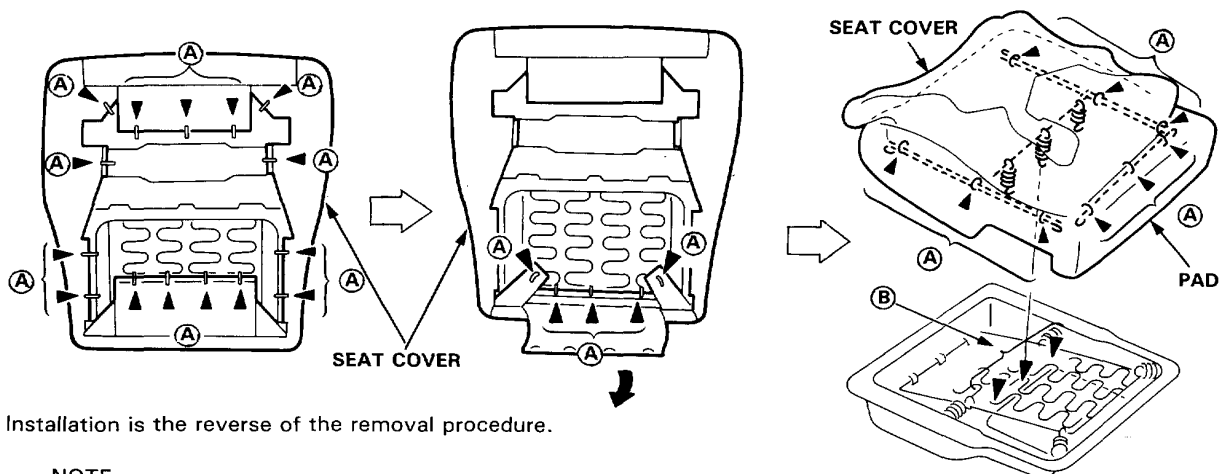
► A : Clip locations
B : Spring locations

Clip removal:



Seat cushion cover removal:

1. Remove the seat cushion from the seat tracks.
2. Remove all clips from under the seat cushion, then loosen the seat cover.
3. Pull back the edge of the cover all the way around, then release the pad clips and springs.



Installation is the reverse of the removal procedure.

NOTE:

- To prevent wrinkles, make sure the material is stretched evenly over the frame before securing all the clips and springs.
- If necessary, replace any damaged clips and springs.

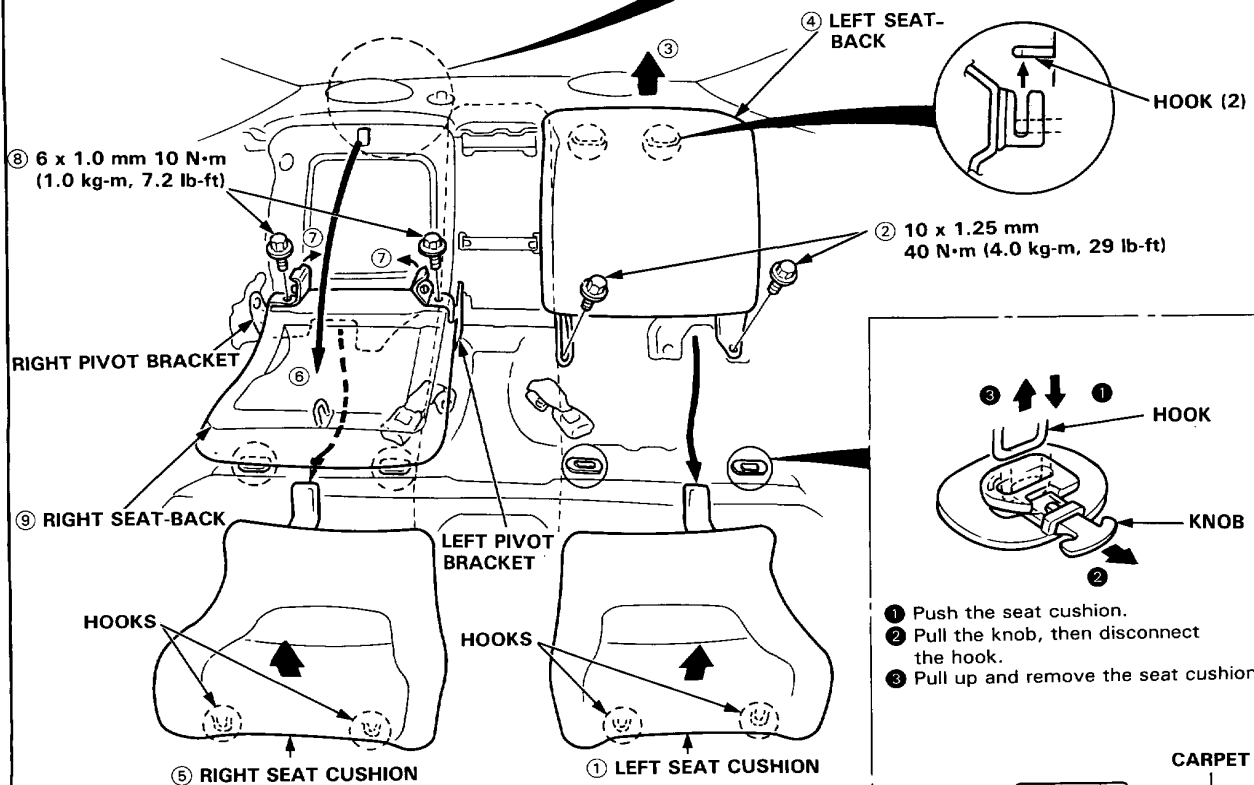
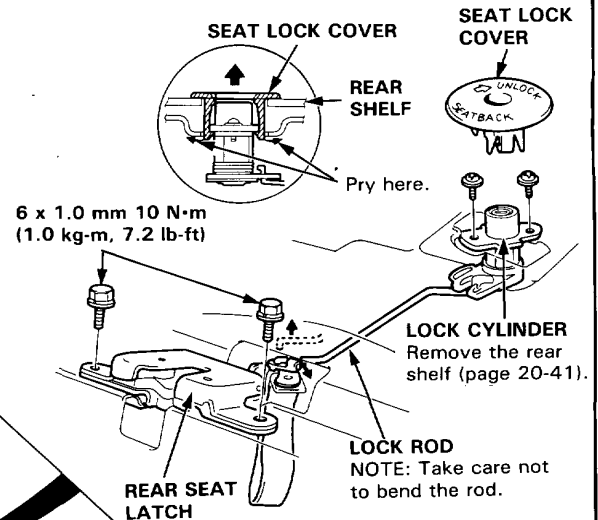
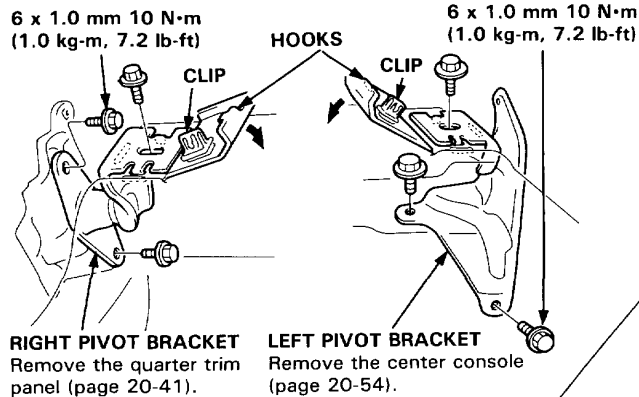


Rear Seats

Replacement

Disassemble in numbered sequence.

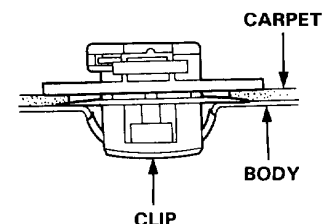
NOTE: Take care not to split the seams or damage the cover.



Installation is the reverse of the removal procedure.

NOTE:

- Before attaching the seat-back and seat cushion, make sure there are no twists in the seat belt.
- When installing the seat cushion, position the seat belts correctly.

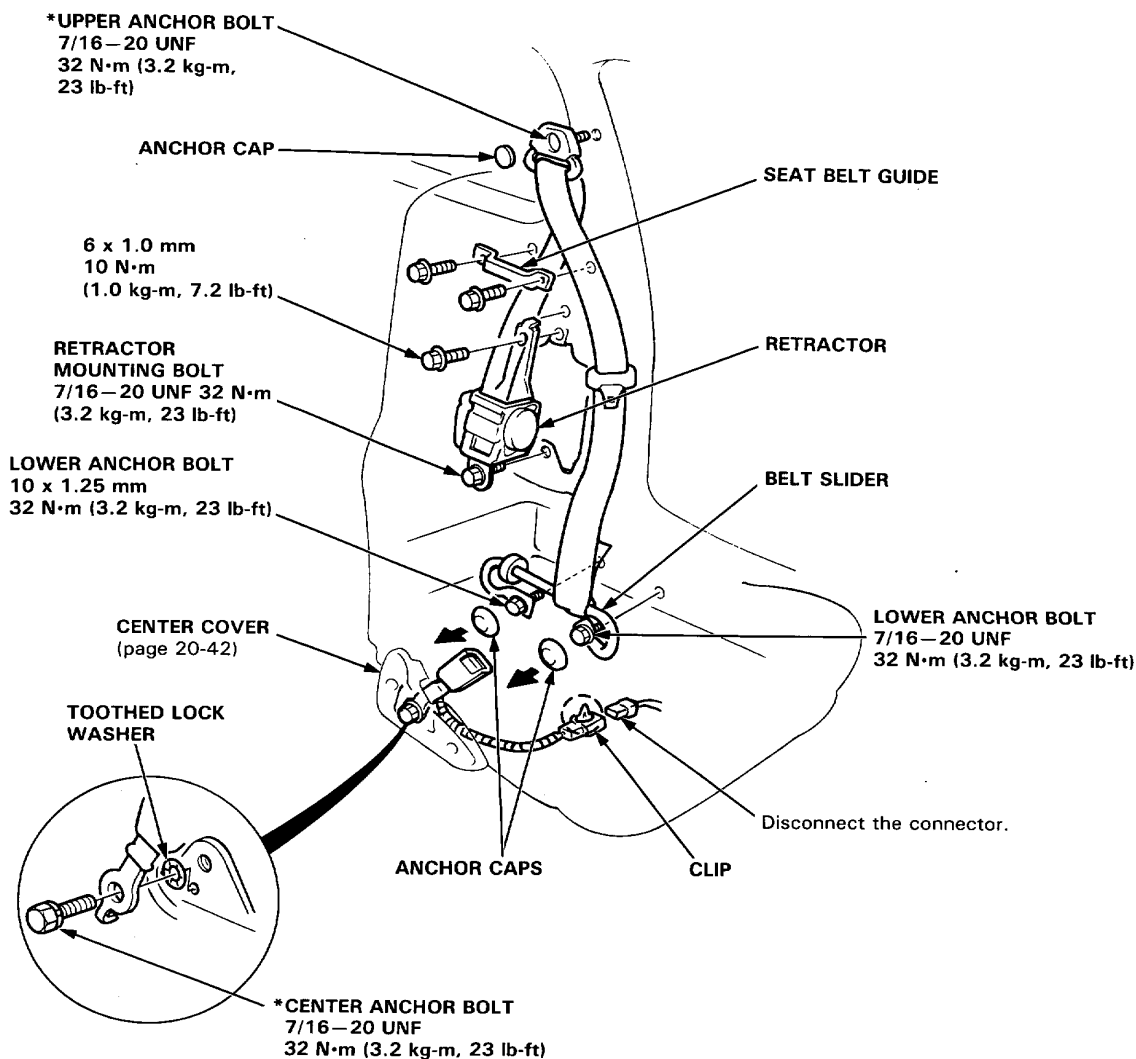


Seat Belts

Front Replacement

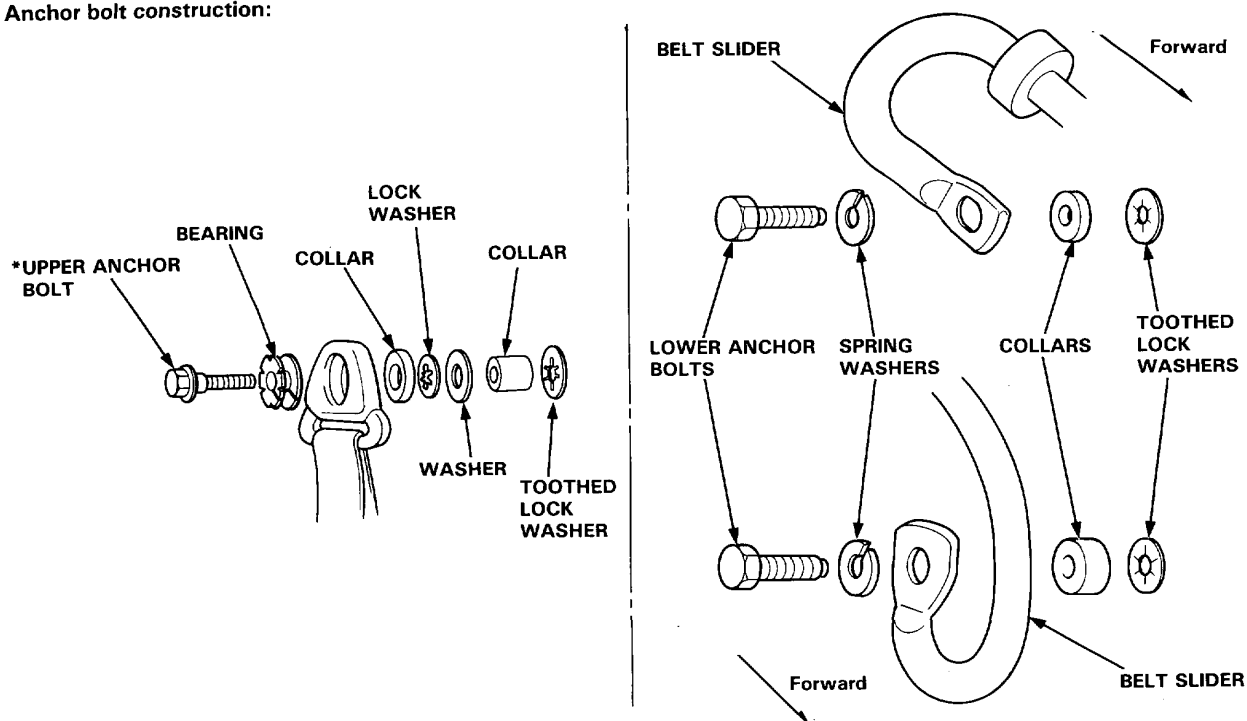
CAUTION: Check the seat belts for damage and replace them if necessary. Be careful not to damage them during removal and installation.

1. Remove:
 - Front seat (page 20-42)
 - Rear seat
 - Door trim (page 20-41)
 - Rear shelf (page 20-41)
 - Right trunk front panel (page 20-41)
 - Quarter trim panel (page 20-41)
2. Remove the upper anchor bolt, lower anchor bolt and retractor bolt with a 17 mm socket or box-end wrench.
3. Remove the center cover, then remove the bolt and the center anchor.





Anchor bolt construction:



4. Check that the retractor locking mechanism functions as described on page 20-49.
5. Installation is the reverse of the removal procedure.

NOTE:

- Make sure you assemble the washers and collars on the upper and lower anchor bolts as shown.
- Before attaching the rear pillar trim panel, make sure there are no twists or kinks in the belts.
- On reassembly, replace the upper anchor bolt and center anchor bolt (*) and use liquid thread lock.

Seat Belts

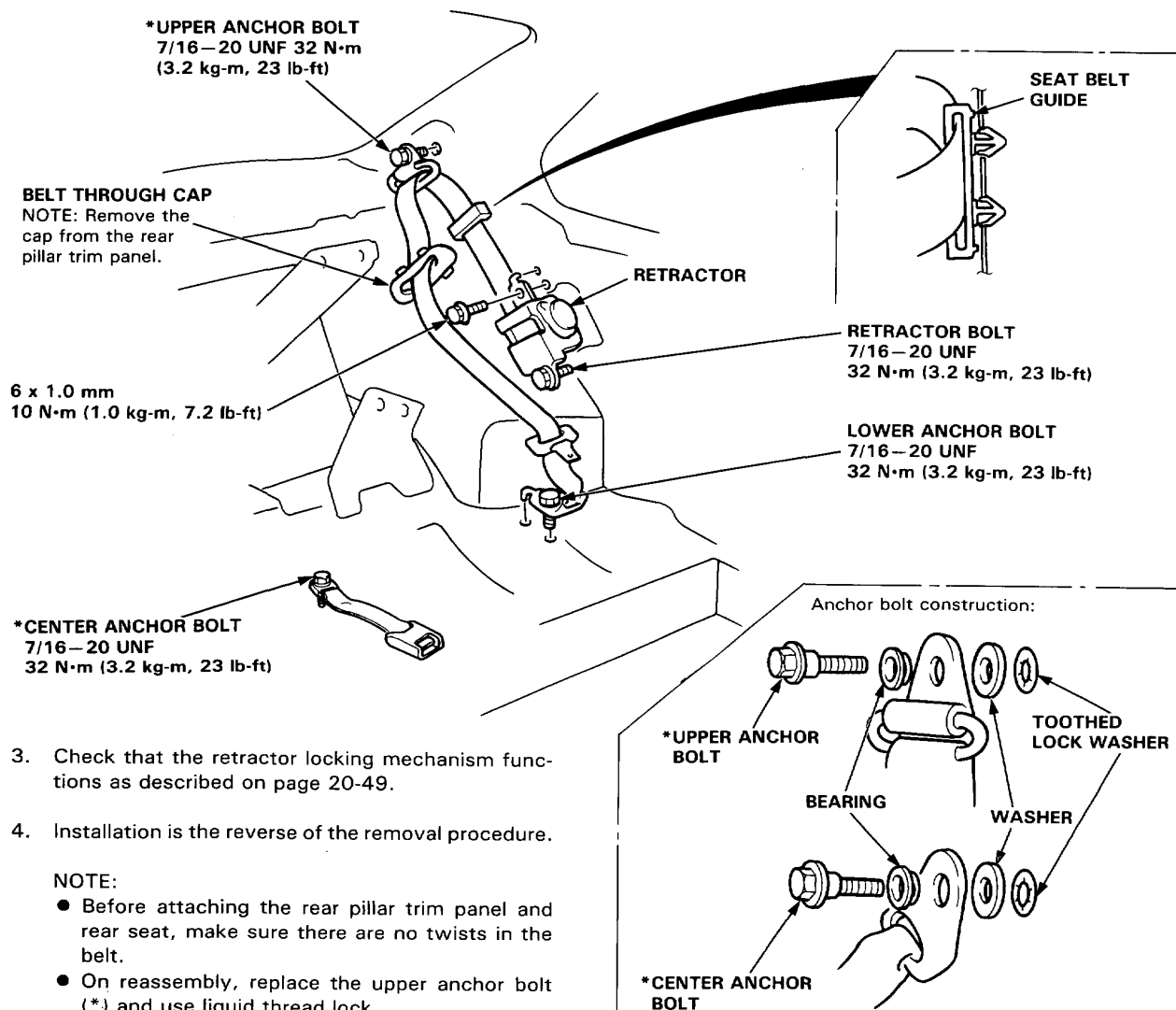
Rear Replacement

CAUTION: Check the seat belts for damage and replace them if necessary. Be careful not to damage them during removal and installation.

1. Remove:

- Front seat (page 20-42)
- Rear seat (page 20-45)
- Rear shelf (page 20-41)
- Center console (page 20-54)
- Door trim (page 20-41)
- Right trunk front panel (page 20-41)
- Quarter trim panel (page 20-41)
- Headliner (page 20-40)
- Rear pillar trim panel (page 20-41)

2. Remove the upper anchor bolt, lower anchor bolt and retractor bolt with a 17 mm socket or box-end wrench.



3. Check that the retractor locking mechanism functions as described on page 20-49.

4. Installation is the reverse of the removal procedure.

NOTE:

- Before attaching the rear pillar trim panel and rear seat, make sure there are no twists in the belt.
- On reassembly, replace the upper anchor bolt (*) and use liquid thread lock.



Inspection

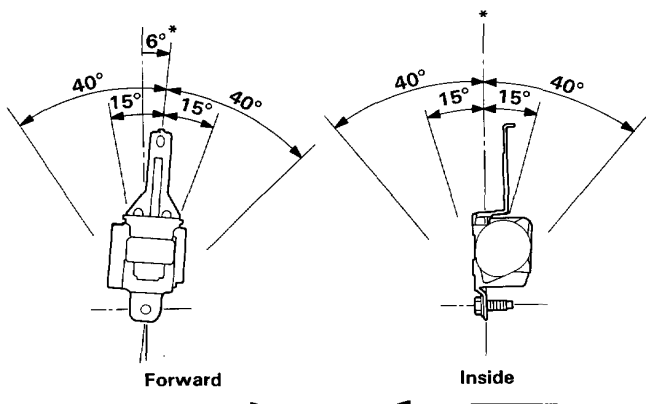
Retractor Inspection

1. With the retractor installed, check that the belt can be pulled out freely.
2. Make sure that the belt does not lock when the retractor is leaned slowly up to 15° from the mounted position. The belt should lock when the retractor is leaned over 40° .

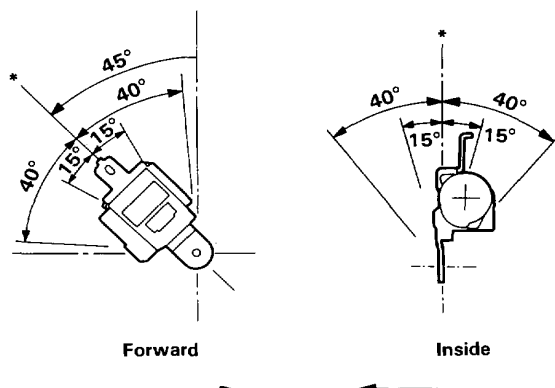
CAUTION: Do not attempt to disassemble the retractor.

*: Mounted Position

Front:



Rear:



3. Replace the belt assembly with a new one if there is any abnormality.

On-the-Car Belt Inspection

1. Check that the belt is not twisted or caught on anything.
2. After installing the anchors, check for free movement on its retaining bolt. If necessary, remove the bolt and check that the washers and other parts are not damaged or improperly installed.
3. Check the belts for damage or discoloration. Clean with a shop towel if necessary.

CAUTION: Use only soap and water to clean.

NOTE: Dirt build-up in the metal loops of the seat belt anchors can cause the belts to retract slowly. Wipe the inside of the loops with a clean cloth dampened in isopropyl alcohol.

4. Check that the belt does not lock when pulled out slowly. The belt is designed to lock only during a sudden stop or impact.
5. Make sure that the belt will retract automatically when released.
6. Replace the belt assembly with a new one if there is any abnormality.

Seat Belts

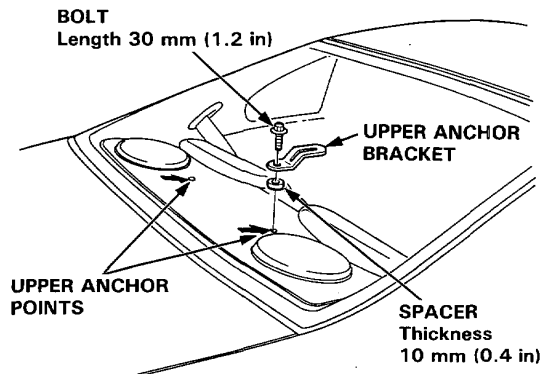
Child Seat Anchor Plate

KQ model:

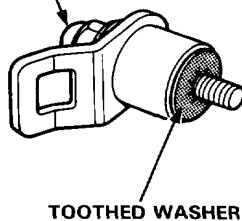
Two tether attachment points are located on the rear shelf. Remove the cap from the attachment point you are going to use. Install the tether bracket. Insert 10 mm (0.4 in) spacers and secure upper anchor brackets with a 5/16-18 UNC-ZA bolt.

When the child restraint system is used, follow the instructions that came with the child restraint system.

⚠ WARNING Child restraint anchorages are designed to withstand only those loads imposed by correctly fitted child restraints. Under no circumstances are they to be used for adult seat belts or harnesses.



8 x 1.25 mm
22 N·m (2.2 kg-m, 16 lb-ft)



NOTE:

- Do not remove the toothed washer from the child seat anchor plate. Use the child seat anchor plate with the toothed washer attached to it.
- When installing a child seat on the rear seat, follow the instructions of the manufacturer of the child seat.
- Additional anchor plates are available.

⚠ WARNING

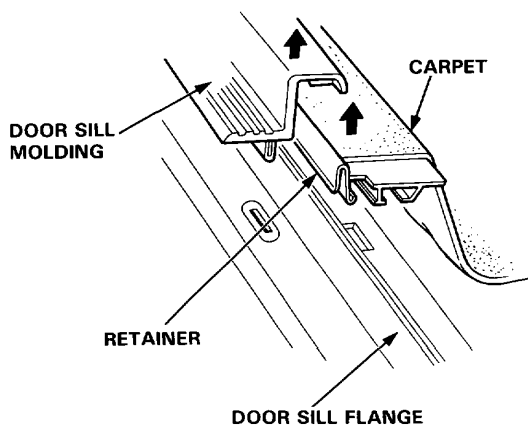
- Do not use the anchor plate for any other purpose, because it is designed exclusively for installation of a child seat.
- Make sure the rear seat-back is locked firmly when installing a child seat.



Carpet

Replacement

1. Remove:
 - Front seats (page 20-42)
 - Front console (page 20-53)
 - Center panel (page 20-55)
 - Dashboard lower cover, knee bolster (page 20-56)
 - Glove box (page 20-56)
 - Rear seat (page 20-45)
 - Opener cover (page 20-69)
 - Front seat belt lower anchor (page 20-46)
 - Center console and rear console upper trim panel (page 20-54)
 - Door sill molding and door trim (page 20-41)
 - Kick panel (page 20-41)
 - Right trunk front panel and quarter trim panel (page 20-41)
 - Footrest
2. Pry out the clips and remove the retainer from the side sill flange.



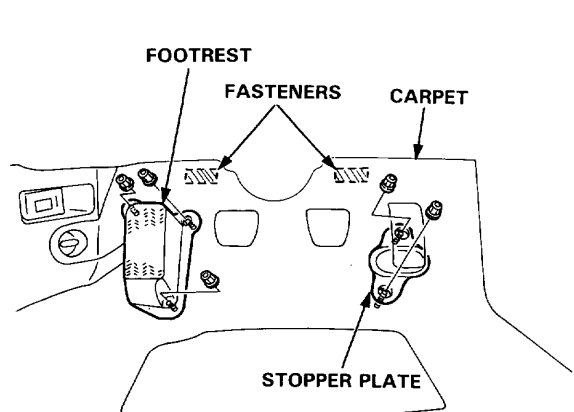
3. Detach the fastener in the driver's side carpet, then pull back the carpet at the bottom of heater.
4. Remove the carpet by sliding it rearward.

NOTE: Take care not to damage, wrinkle or twist the carpet.

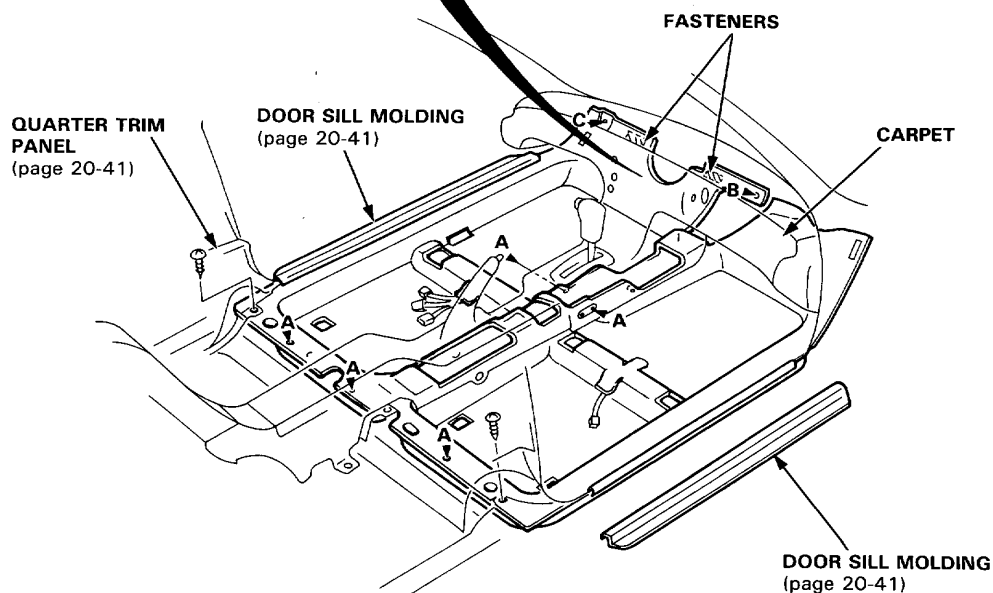
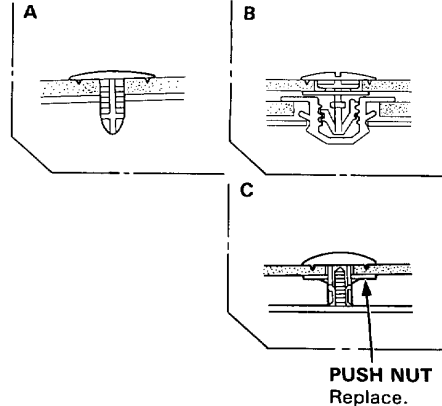
(cont'd)

Carpet

Replacement (cont'd)



Clip locations



5. Install the carpet in the reverse order of removal.

NOTE:

- Take care not to damage, wrinkle or twist the carpet.
- Make sure the seat harnesses are routed correctly.



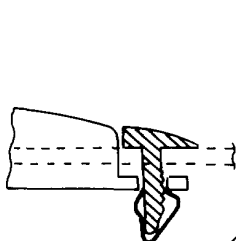
Front Console

Replacement

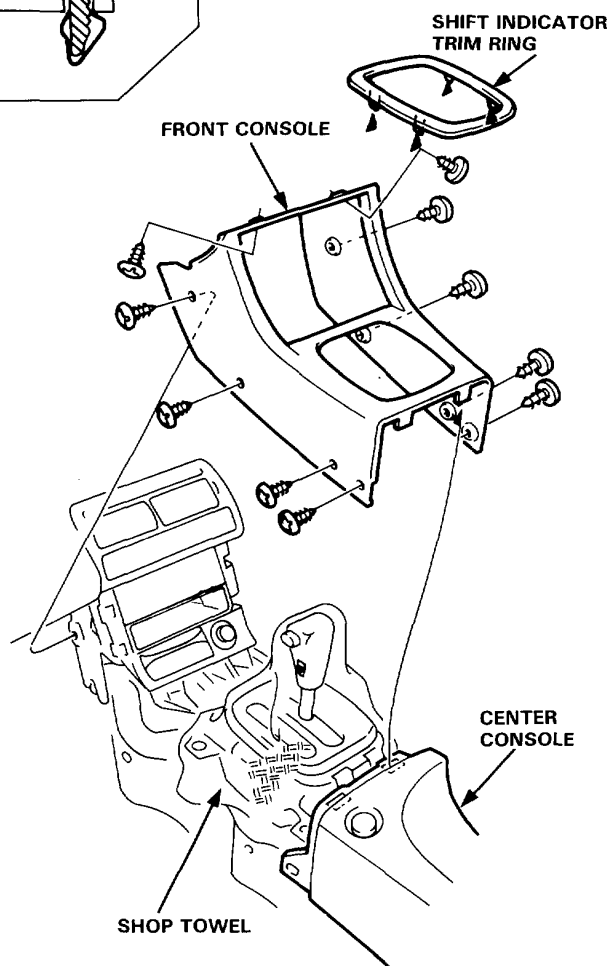
NOTE:

- To prevent damage to the shift lever knob and shift indicator trim ring, wrap them with a shop towel.
- Take care not to scratch the front console and dashboard.
- When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.
- Slide the front seat fully to the rear.

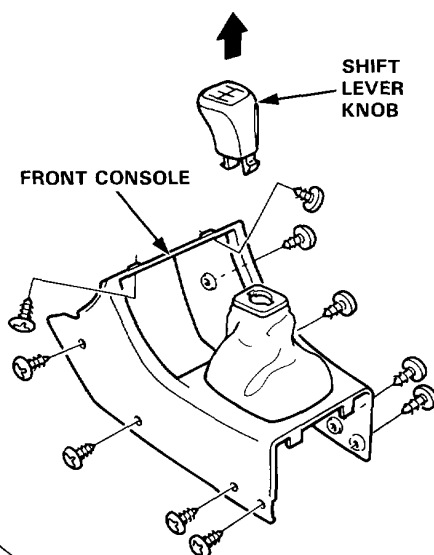
►: Clip locations



Automatic transmission model:



Manual transmission model:



Installation is the reverse of the removal procedure.

Center Console/Rear Console Upper Trim Panel

Replacement

To remove the console, first remove the:

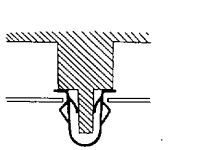
- Front seat (page 20-42)
- Front console
- Rear seat (page 20-45)

NOTE:

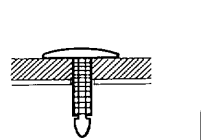
- Take care not to scratch the center console and rear console upper trim panel.
- When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.
- Lift up the parking brake lever.

►: Clip locations

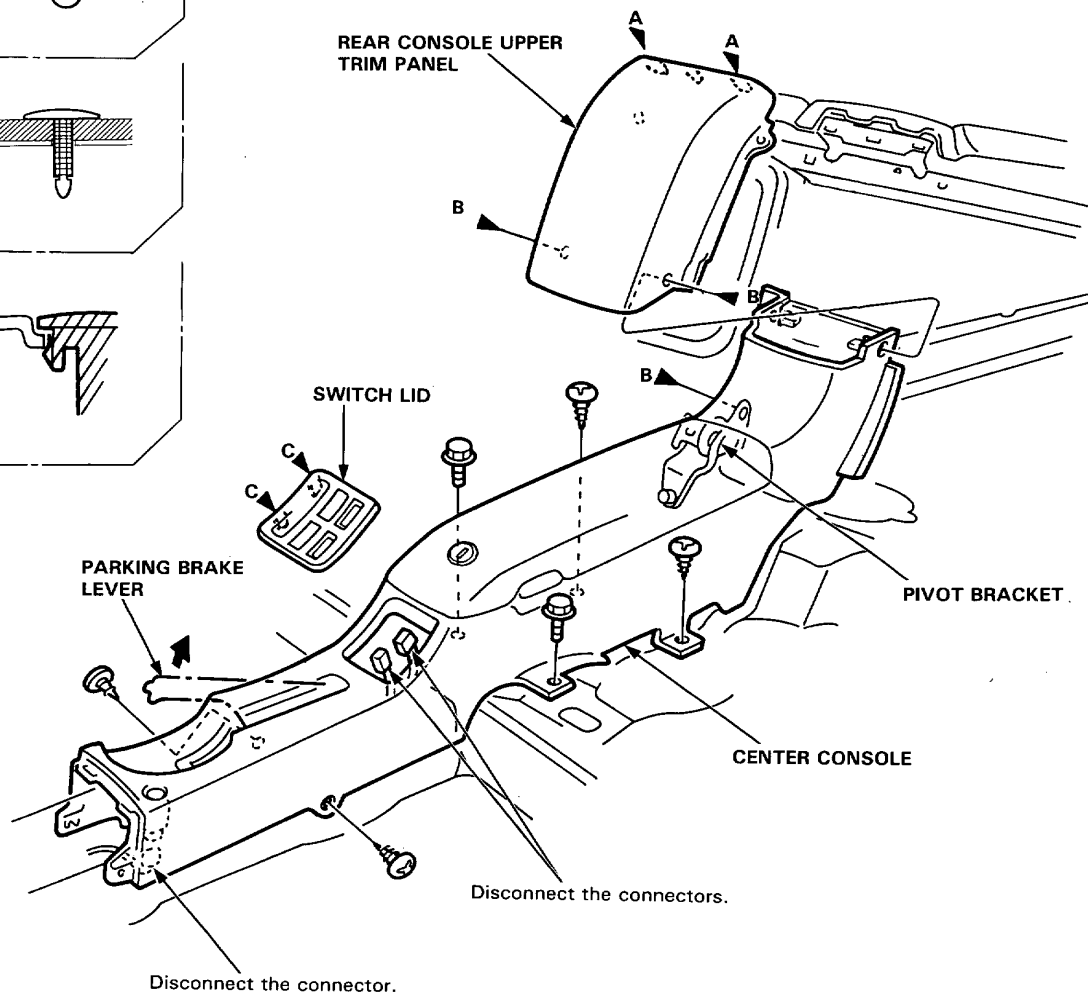
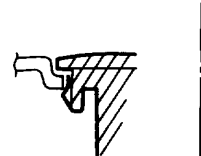
A



B



C



Installation is the reverse of the removal procedure.



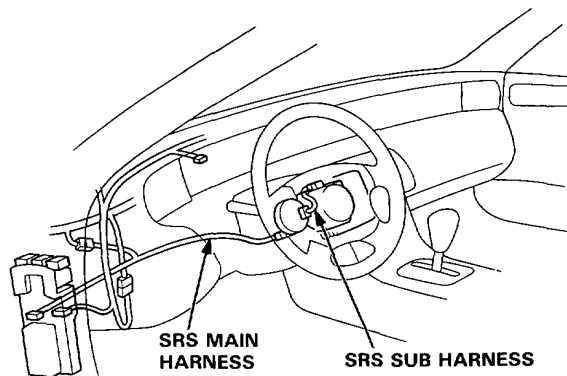
Dashboard

Component Removal/Installation

SRS wire harnesses are routed near the dashboard and steering column.

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



NOTE:

- Take care not to scratch the dashboard and other parts.
- Do not drop the screw inside the dashboard.
- When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

Disconnect the connectors

CENTER PANEL
Remove the front console (page 20-53)

PROTECTIVE TAPE
CLIP (3)

CENTER AIR VENT/HEATER CONTROL PANEL

Remove the front console (page 20-53) and center panel.

CENTER AIR VENT/HEATER CONTROL

CLIP

Disconnect the connectors.

HEATER CONTROL CABLE

STEREO RADIO/CASSETTE

Loosen the bolts.

CENTER AIR VENT

HEATER CONTROL PANEL

To separate the heater control unit, remove the screws.

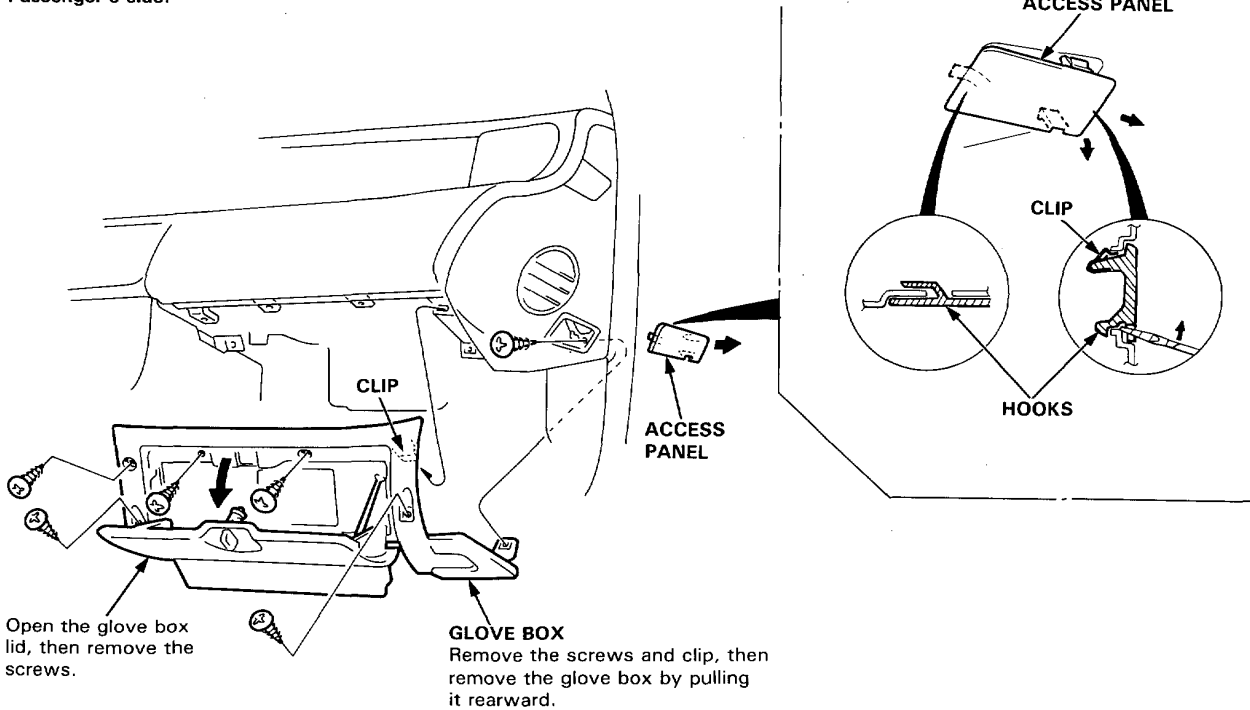
CENTER PANEL

(cont'd)

Dashboard

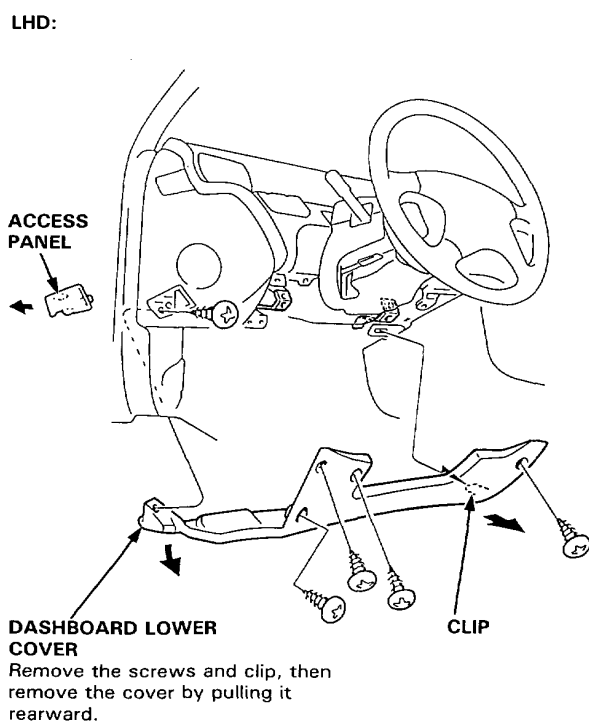
Component Removed/Installation (cont'd)

Passenger's side:

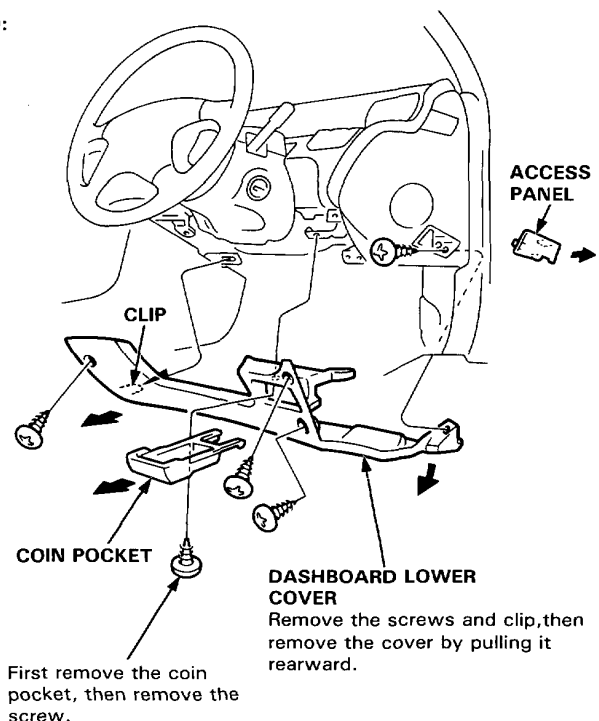


Driver's side:

LHD:



RHD:



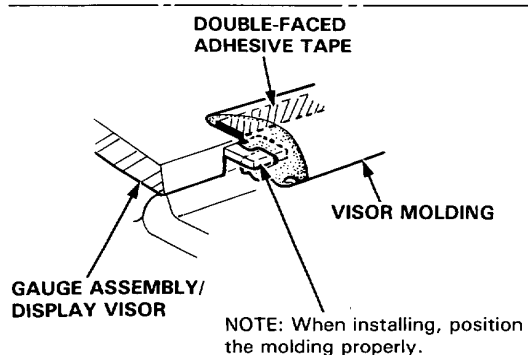
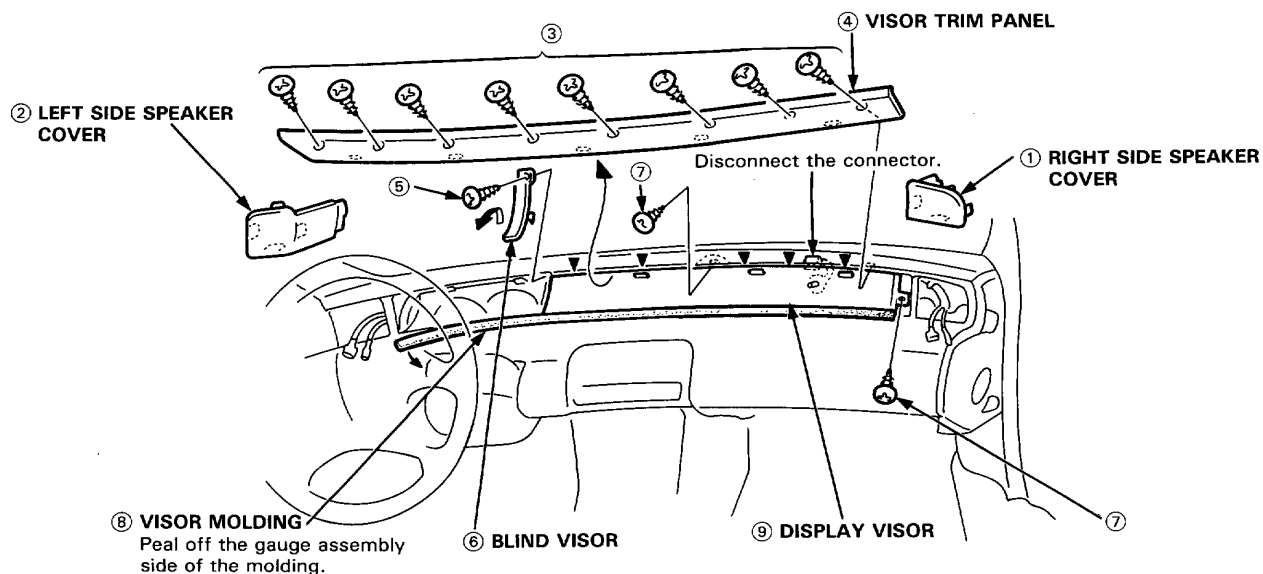
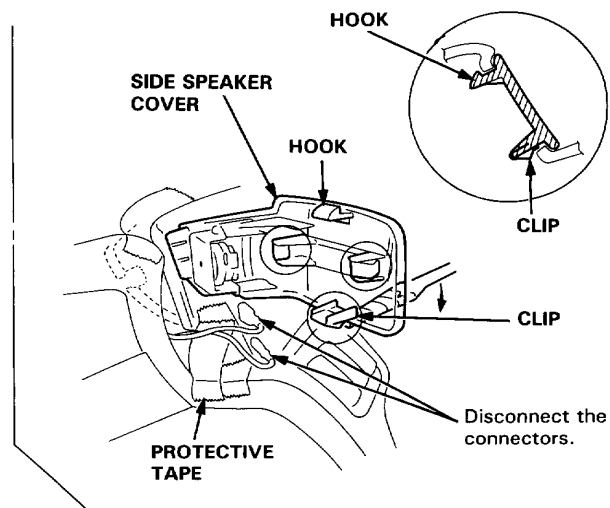
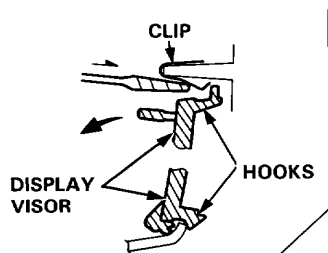


Disassemble in numbered sequence.

NOTE:

- Do not drop the screws inside the dashboard.
- Take care not to scratch the dashboard and other parts.
- When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

►: Clip, hook locations



Installation is the reverse of the removal procedure.

NOTE: Take care not to scratch the dashboard.

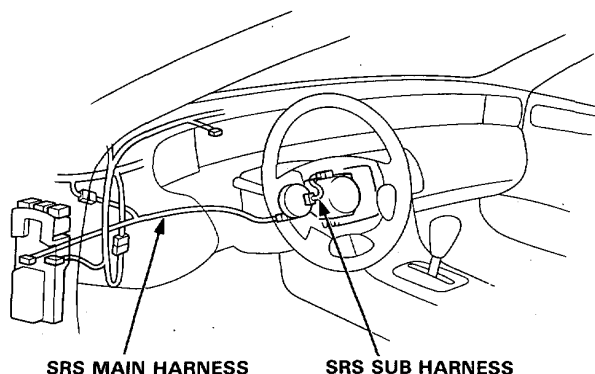
Dashboard

Replacement

SRS wire harnesses are routed near the dashboard and steering column.

CAUTION:

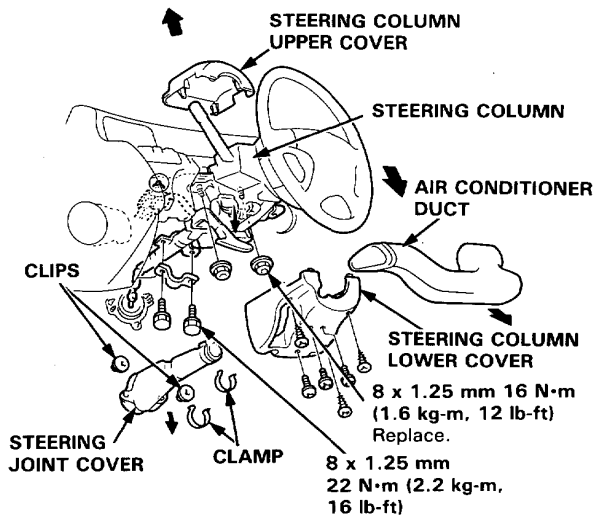
- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



⚠ WARNING Before removing the steering column, first disconnect the connector between the slip ring and the SRS main harness.

1. To remove the dashboard, first remove the:
 - Front seats (page 20-42)
 - Front console (page 20-53)
 - Center panel (page 20-55)
 - Glove box (page 20-56)
 - Dashboard lower cover (page 20-56)
 - Air conditioner duct
2. Lower the steering column (see Section 17).

NOTE: Remove the steering column upper cover pull out the connector lock, then disconnect the SRS main harness connector from the slip ring (see Section 23).



NOTE: To prevent damage to the steering column, wrap it with a shop towel.

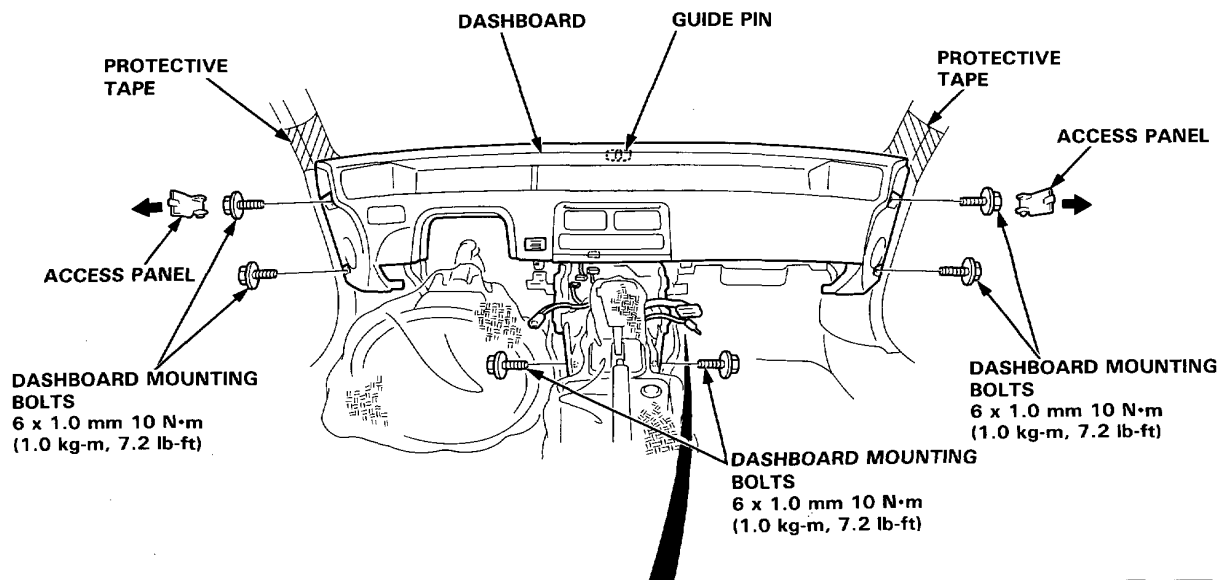
3. Remove the access panel on each end.
4. Disconnect the connectors and heater control cable.



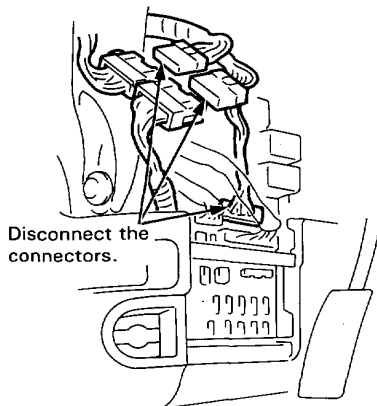
5. Remove the 6 mounting bolts, then lift and remove the dashboard.

NOTE:

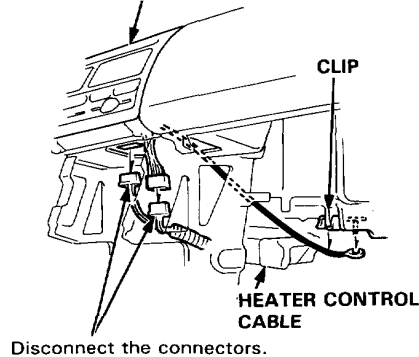
- Use protective tape on the bottom of the front pillar trim.
- Take care not to scratch the dashboard.
- When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.



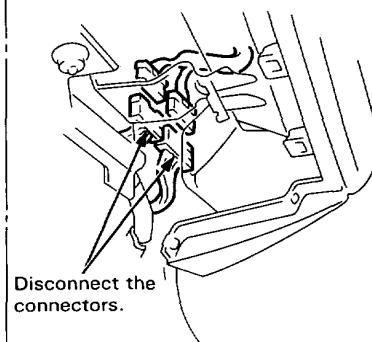
Driver's side:



**CENTER AIR VENT/
HEATER CONTROL PANEL**



Passenger's side:



6. Installation is the reverse of the removal procedure.

NOTE:

- Make sure the dashboard fits onto the guide pin correctly.
- Before tightening the dashboard bolts, make sure the dashboard wires are not pinched, and that the dashboard is not interfering with the heater control cable.

Front Bumper Replacement

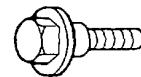
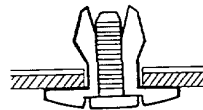
Disassemble in numbered sequence.

NOTE:

- An assistant is helpful when removing the front bumper.
- Take care not to scratch the bumper.
- Open the hood.
- When removing the clips, loosen the screw, then remove the clips with a clip remover.

►: Clip locations

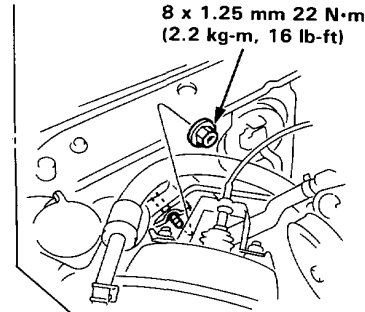
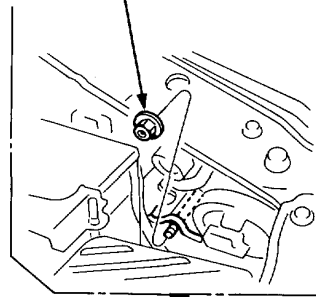
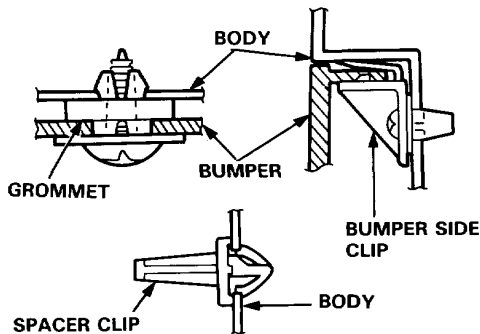
●: Bolt locations



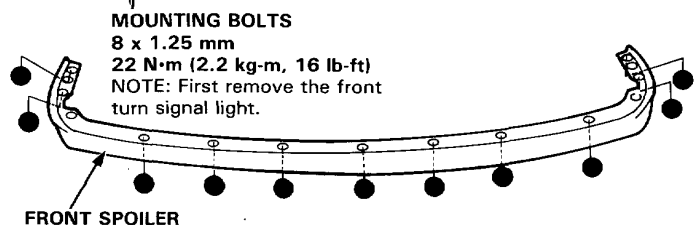
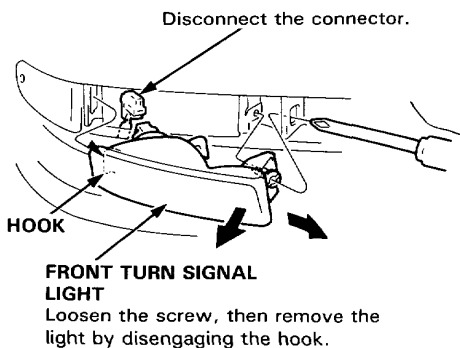
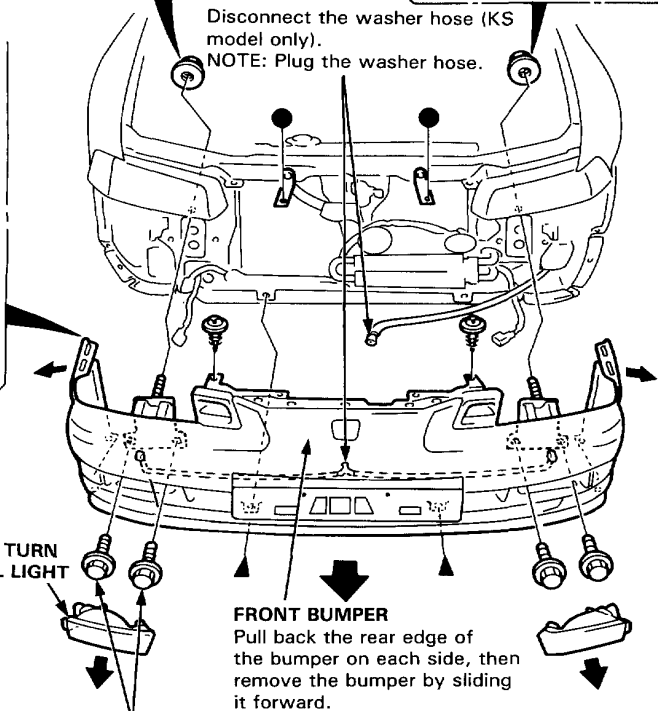
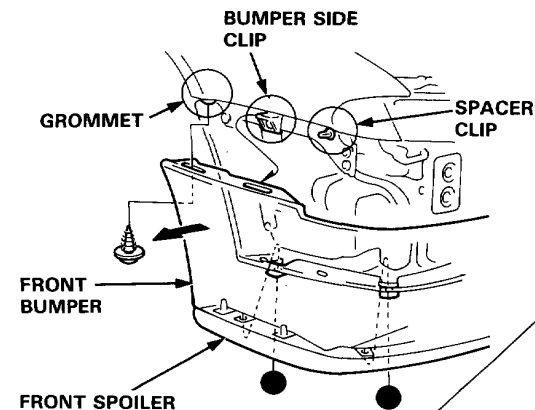
6 x 1.0 mm 10 N·m
(1.0 kg-m, 7.2 lb-ft)

MOUNTING NUT
8 x 1.25 mm 22 N·m
(2.2 kg-m, 16 lb-ft)

MOUNTING NUT
8 x 1.25 mm 22 N·m
(2.2 kg-m, 16 lb-ft)



Disconnect the washer hose (KS model only).
NOTE: Plug the washer hose.



Installation is the reverse of the removal procedure.

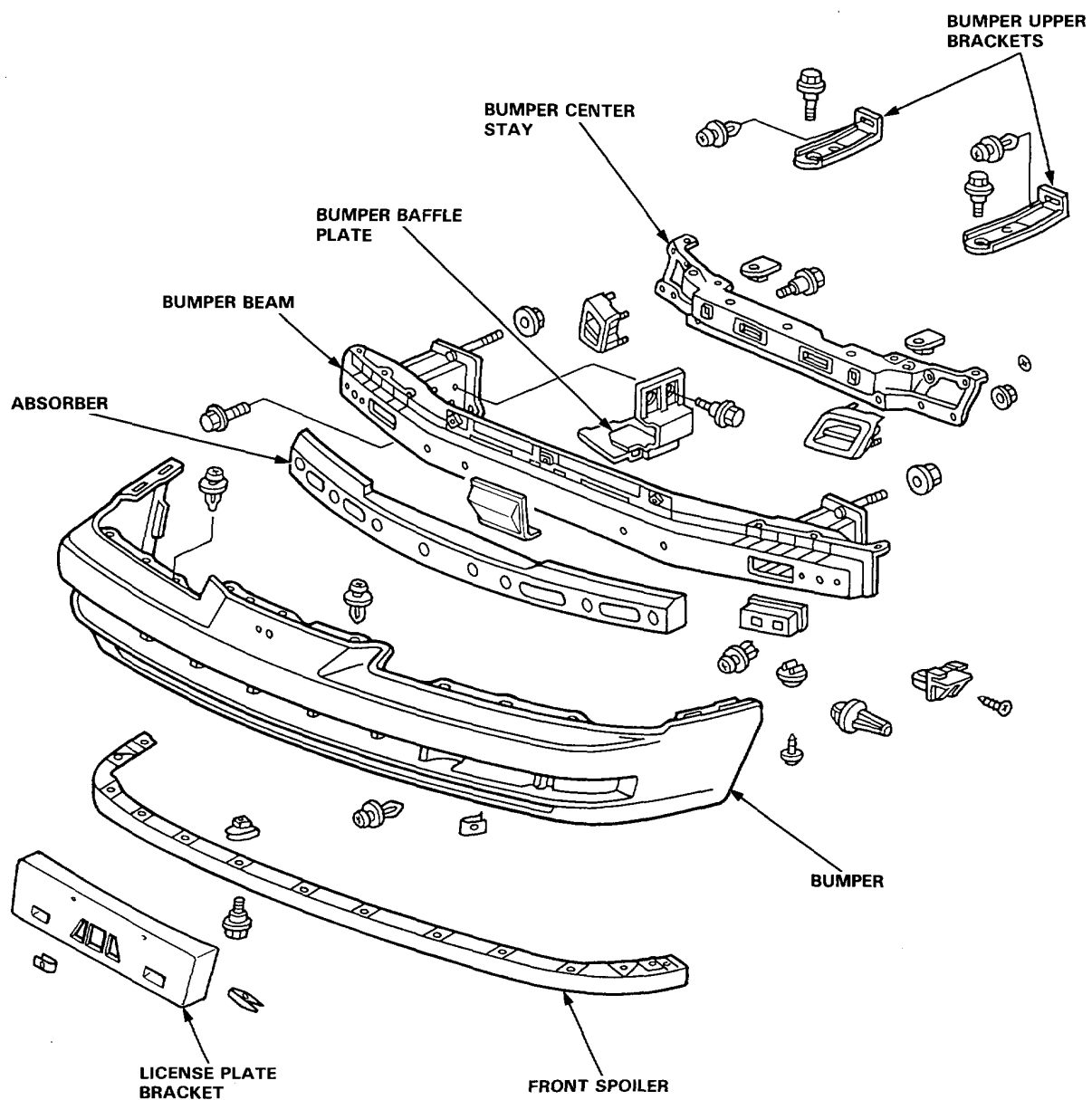
FRONT SPOILER



Disassembly

KY model:

If necessary, separate the bumper, absorber and bumper beam.



Rear Bumper Replacement

NOTE:

- An assistant is helpful when removing the rear bumper.
- Take care not to scratch the bumper.
- Open the trunk lid.

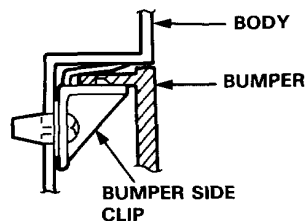
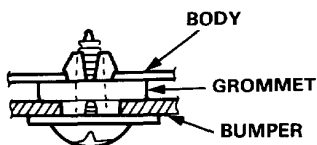
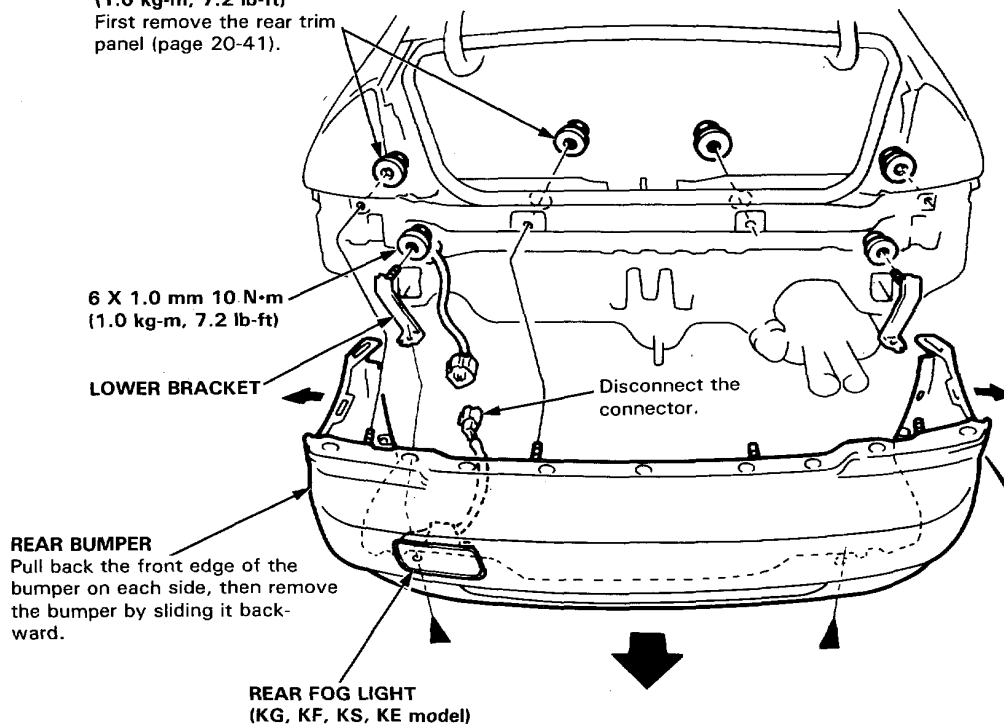
MOUNTING NUTS

6 X 1.0 mm 10 N·m

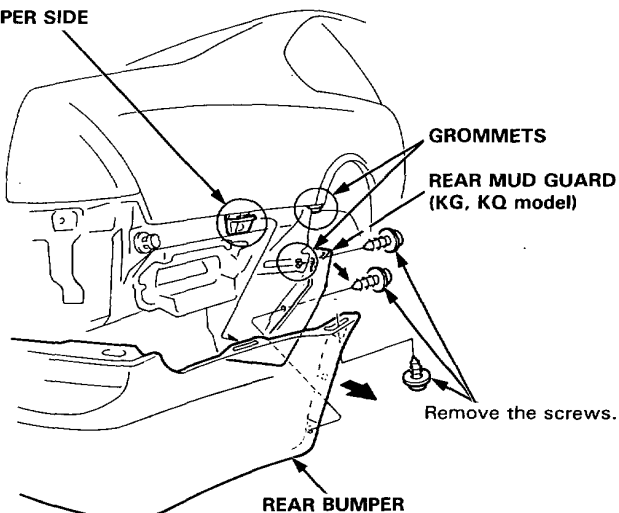
(1.0 kg-m, 7.2 lb-ft)

First remove the rear trim panel (page 20-41).

►: Clip locations



BUMPER SIDE CLIP



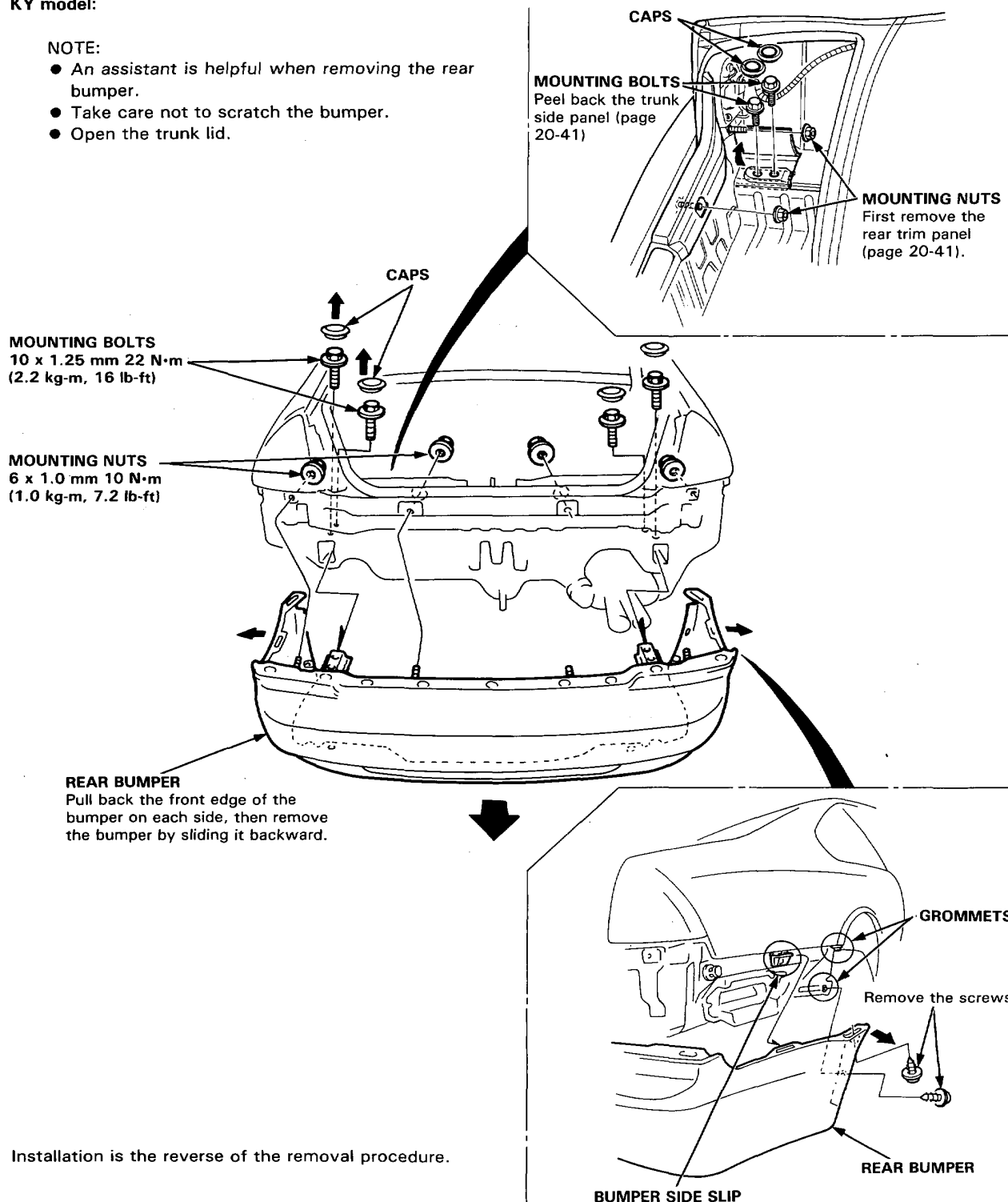
Installation is the reverse of the removal procedure.



KY model:

NOTE:

- An assistant is helpful when removing the rear bumper.
- Take care not to scratch the bumper.
- Open the trunk lid.



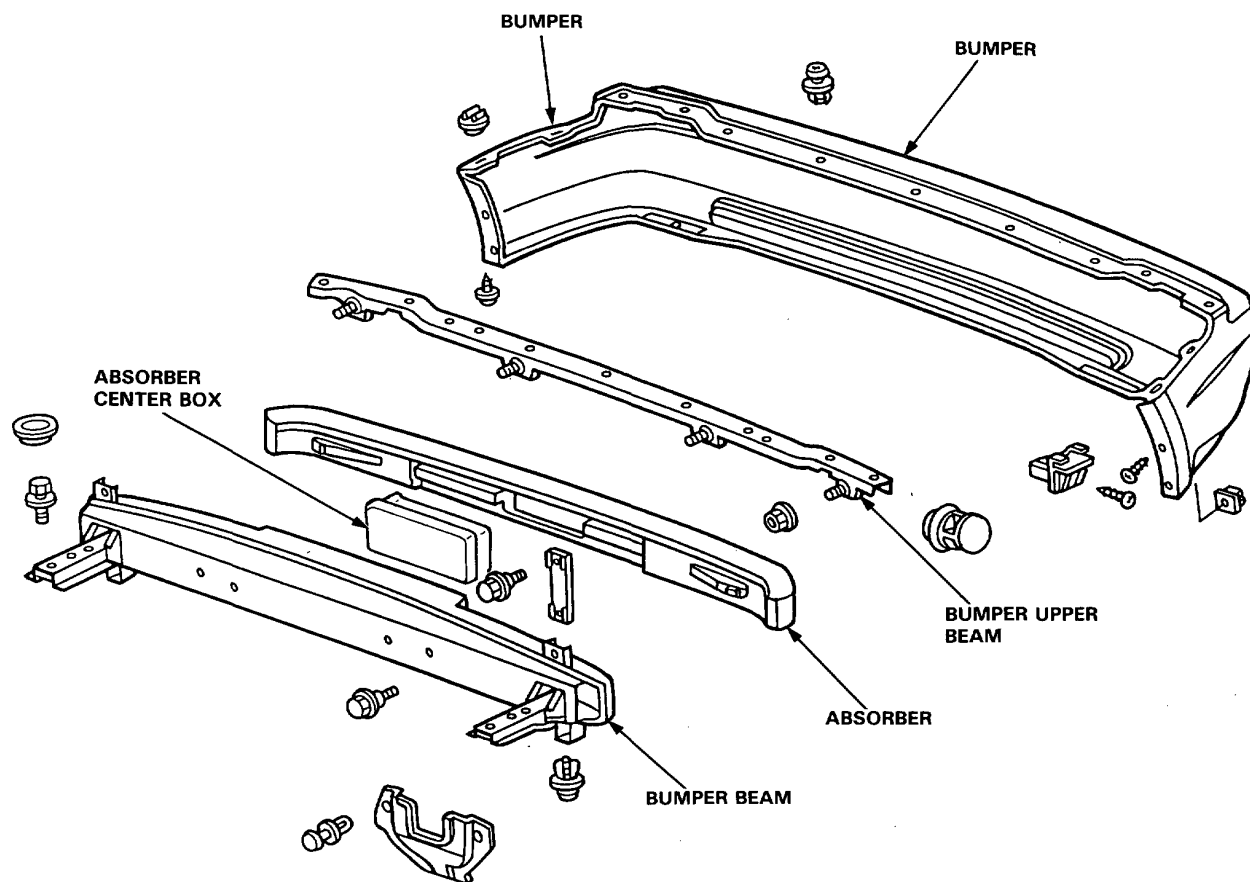
Installation is the reverse of the removal procedure.

Rear Bumper

Disassembly

KY model:

NOTE: If necessary, separate the bumper, absorber and bumper beam.

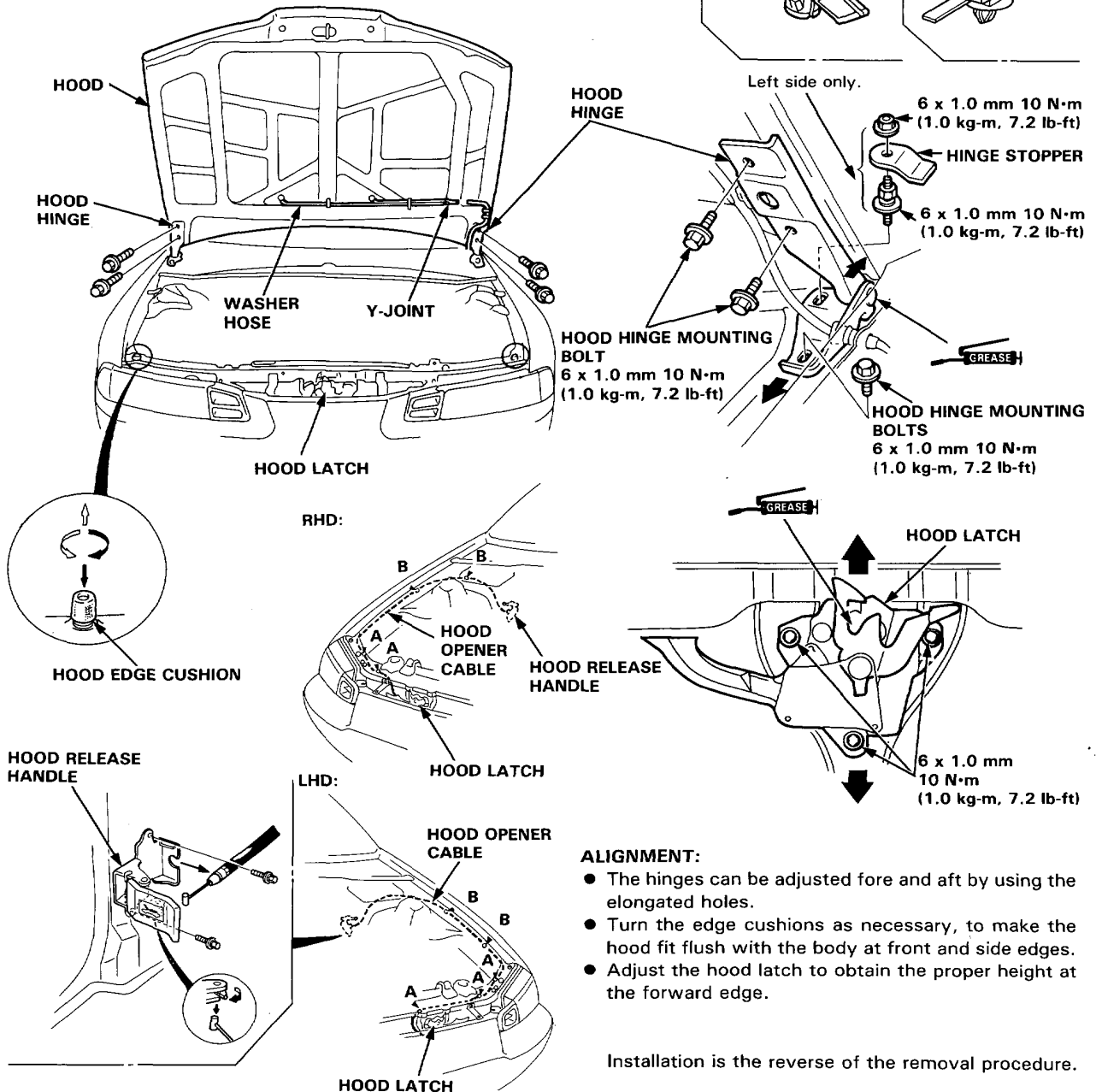




Replacement/Adjustment

NOTE:

- An assistant is helpful when removing the hood.
- Remove the air scoop.



NOTE:

- Before pulling out the opener cable, tie a string to the cable so you can pull it back in later.
- Take care not to bend the opener cable.

ALIGNMENT:

- The hinges can be adjusted fore and aft by using the elongated holes.
- Turn the edge cushions as necessary, to make the hood fit flush with the body at front and side edges.
- Adjust the hood latch to obtain the proper height at the forward edge.

Installation is the reverse of the removal procedure.

NOTE:

- Make sure the opener cable is routed and connected properly.
- Align the hood with the body.

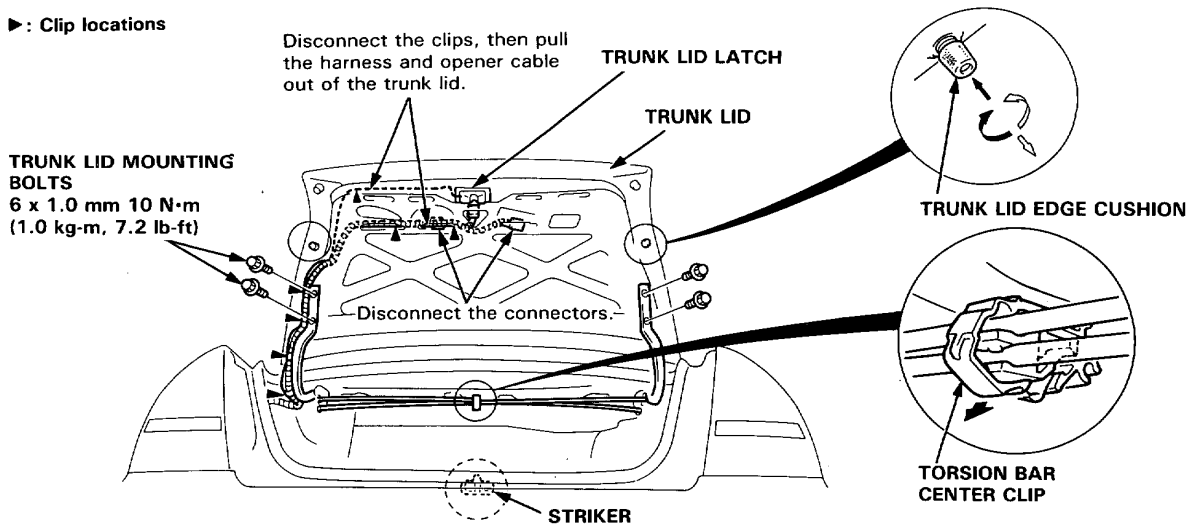
Trunk Lid

Replacement/Adjustment

NOTE:

- An assistant is helpful when removing the trunk lid.
- Before pulling out the wire harness and cable, tie a string to the end of them so you can pull them back in when the trunk lid is reinstalled.

►: Clip locations



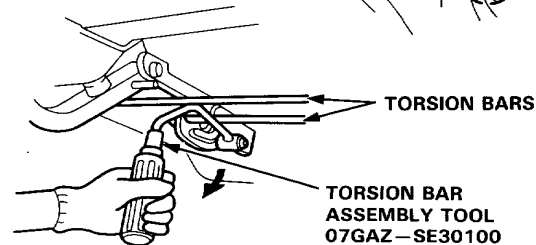
NOTE: Remove the rear shelf (page 20-38).

HINGE BRACKET MOUNTING BOLTS
6 x 1.0 mm 10 N·m
(1.0 kg-m, 7.2 lb-ft)

TRUNK LID HINGE

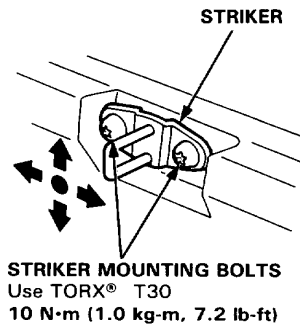
NOTE: Take care not to hit the glass when removing.

TORSION BARS



Adjust the torsion bar front or rear with the assembly tool as shown.

- = Normal position
- = Higher position



ALIGNMENT:

- Adjust the trunk lid fit to the trunk lid opening by moving the striker.
- Turn the edge cushions as necessary, to make the trunk lid fit flush with the body at the rear and side edges.
- The hinges can be adjusted fore and aft by using the elongated holes.

Installation is the reverse of the removal procedure.

NOTE:

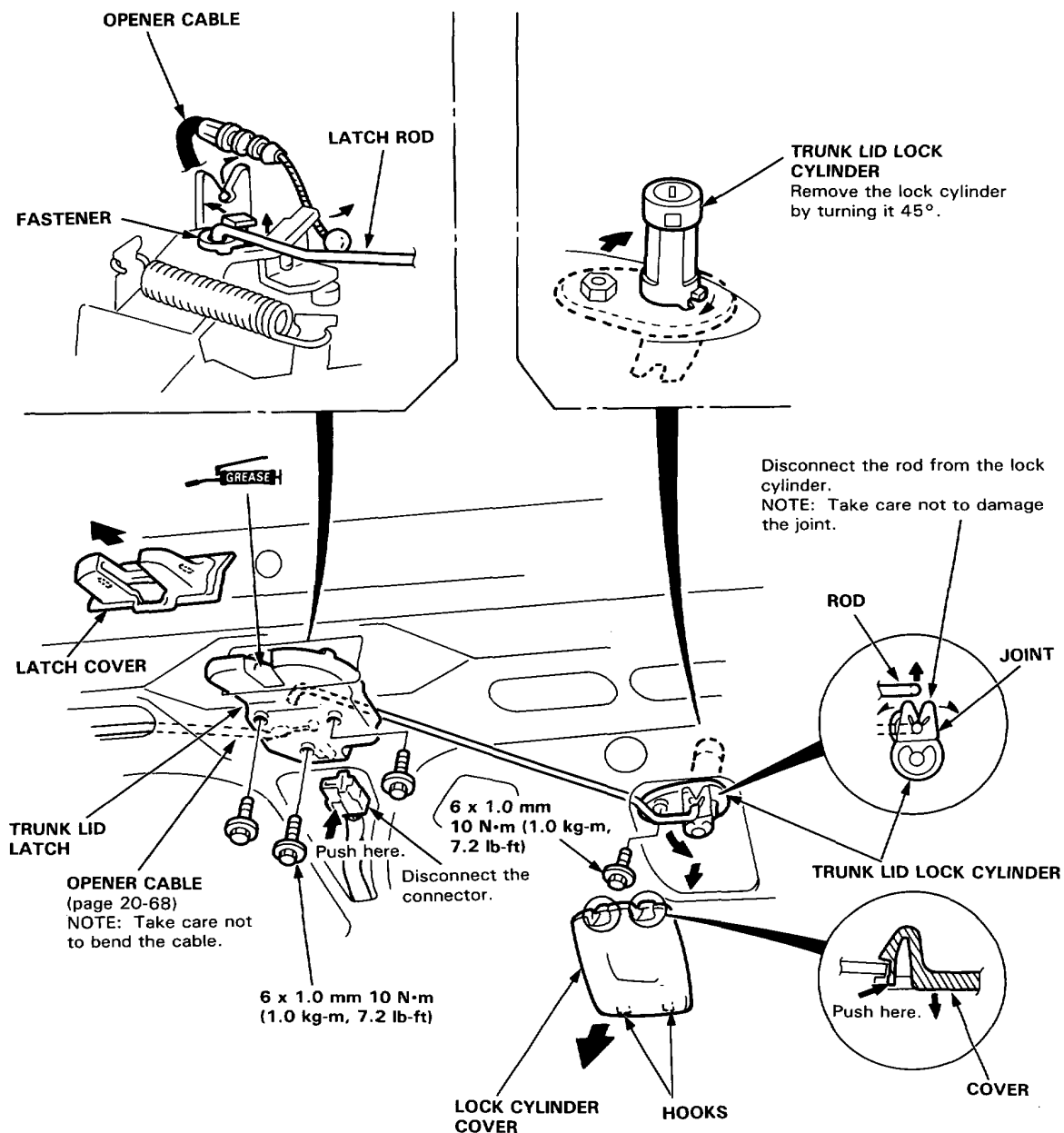
- Make sure the connector is connected properly.
- Align the trunk lid with the body.



Trunk Lid Latch

Replacement

NOTE: When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.



Installation is the reverse of the removal procedure.

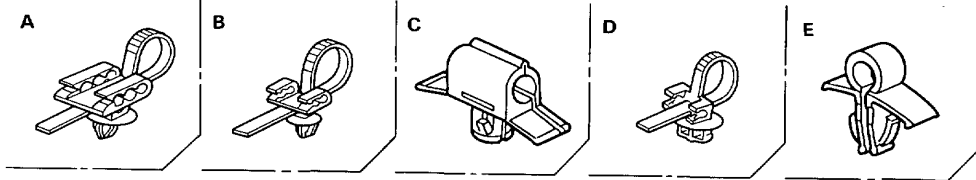
NOTE:

- Make sure the opener cable, latch rod and connector are connected properly.
- After installing, align the trunk lid with the striker (page 20-66).

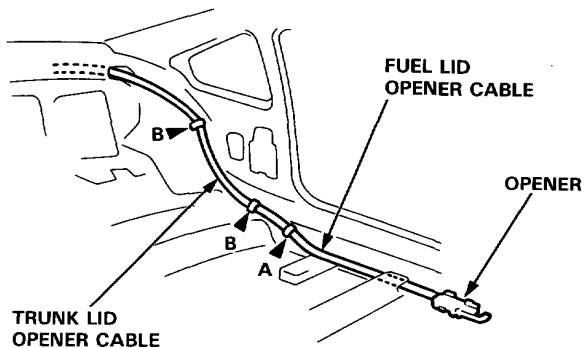
Opener Cables

Replacement

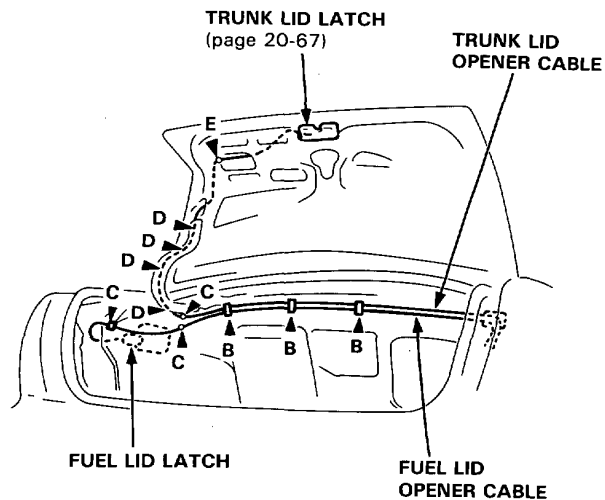
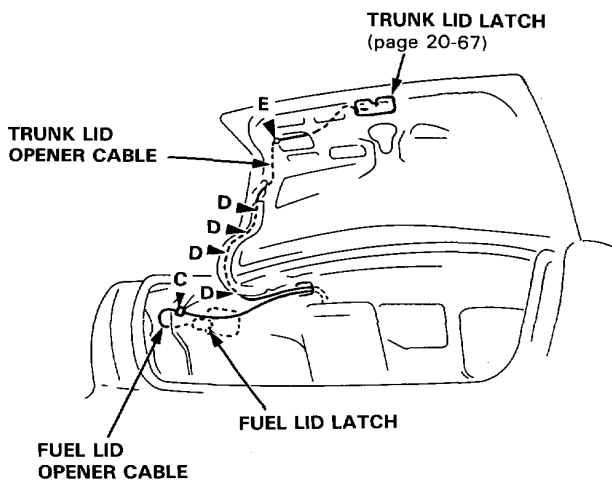
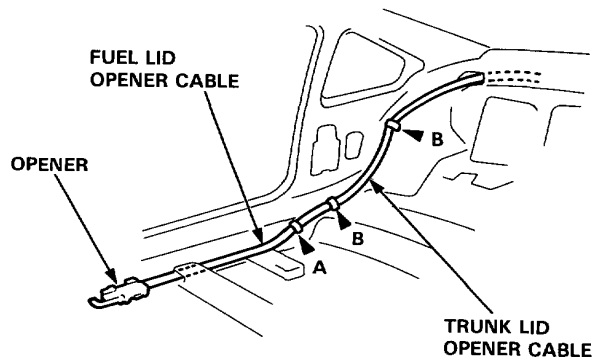
►: Clip locations



LHD:



RHD:



Installation is the reverse of the removal procedure.

NOTE:

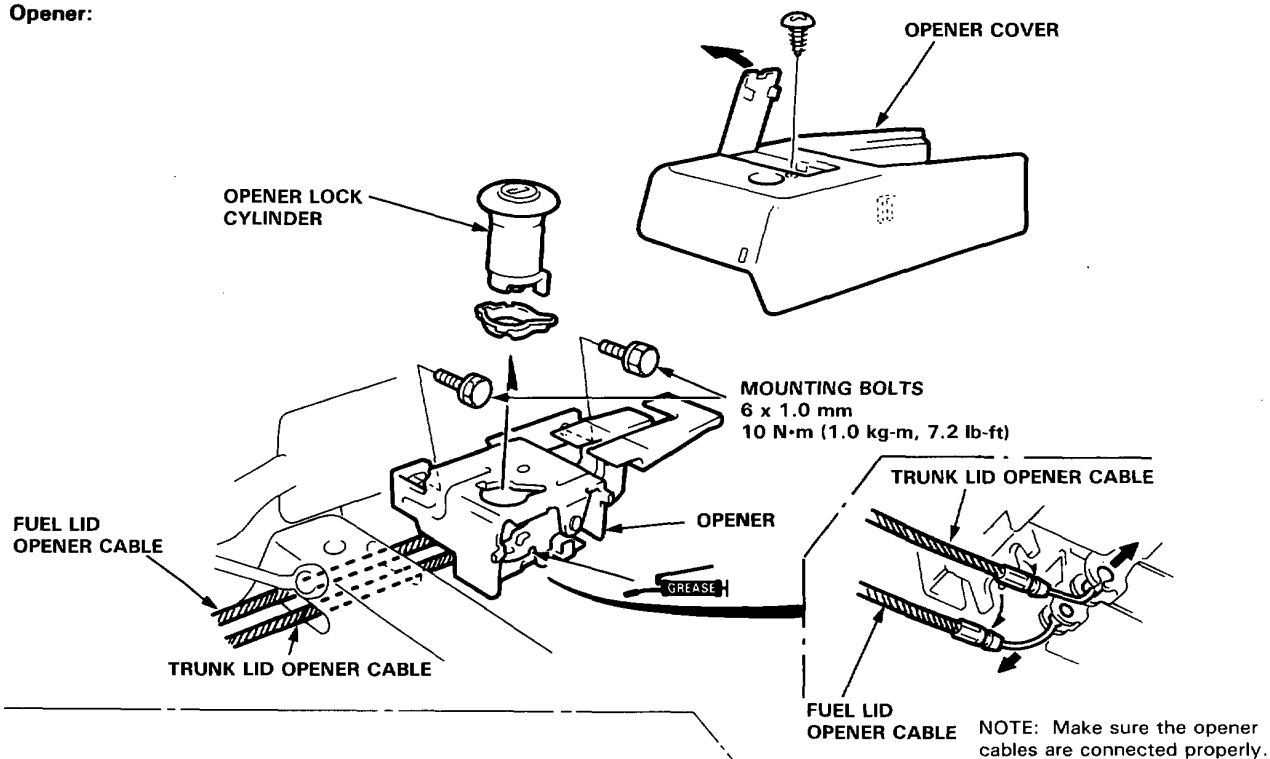
- Take care not to bend the cable.
- Make sure the trunk lid and fuel lid opener cables are routed and connected properly.



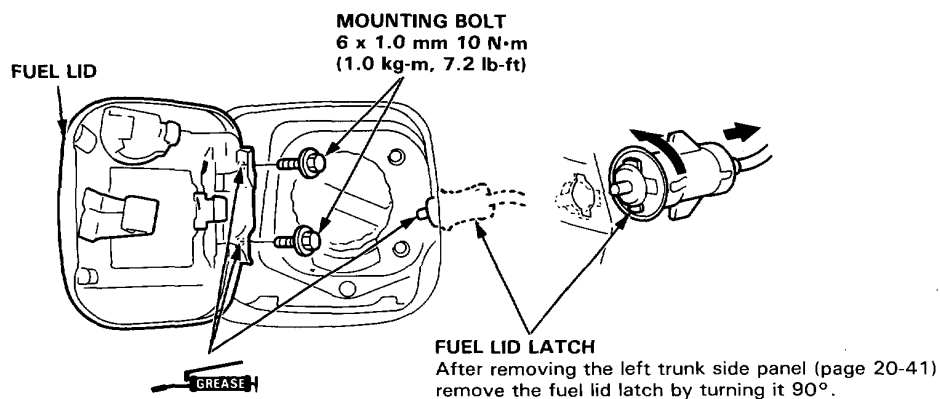
Opener and Fuel Lid Latch

Replacement

Opener:



Fuel Lid Latch:



Installation is the reverse of the removal procedure.

NOTE:

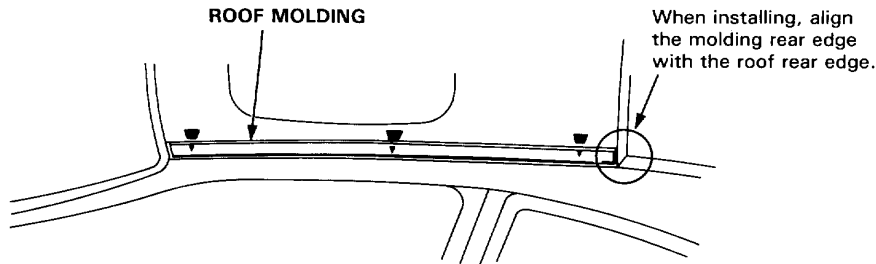
- Take care not to bend the cable.
- Make sure the fuel lid fits flush with the body.

Roof Molding/Side Sill Panel

Roof Molding Replacement

NOTE:

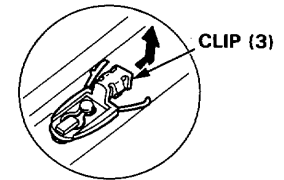
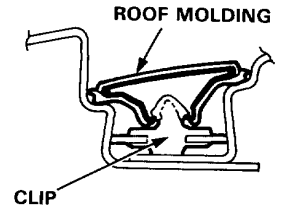
- Take care not to bend the molding.
- When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.



Installation is the reverse of the removal procedure.

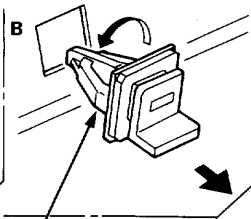
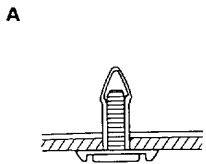
NOTE: If necessary, replace any damaged clips.

►: Clip locations

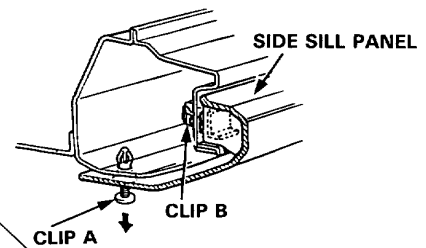


Side Sill Panel Replacement

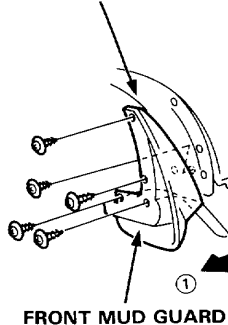
►: Clip locations



CLIP
Remove the clips by turning them 45°.



FRONT INNER FENDER



B

REAR MUD GUARD (KG, KQ model)

SIDE SILL PANEL

Remove the front mud guard. Pull away the front inner fender. Remove the lower clips, then remove the panel by sliding it forward.

Installation is the reverse of the removal procedure.

NOTE:

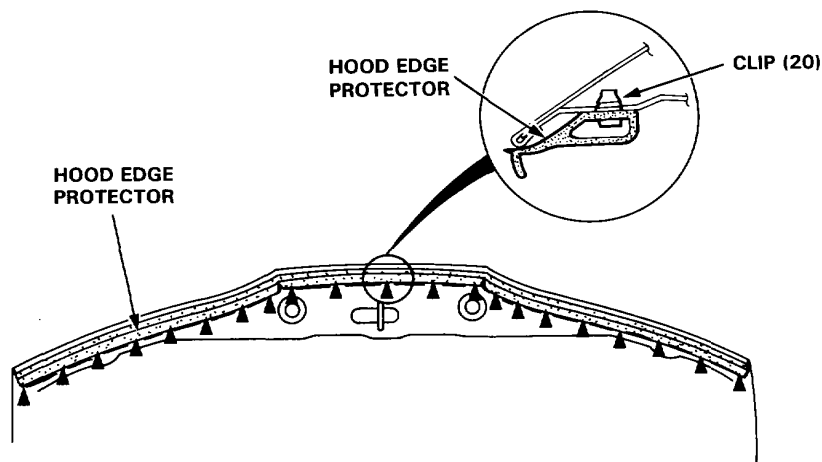
- Take care not to twist the side sill panel.
- If necessary, replace any damaged clips.
- When installing, set the side sill panel on the clips.

Hood Edge Protector/Rear Opening Weatherstrip/ License Plate Trim



Hood Edge Protector Replacement

►: Clip locations

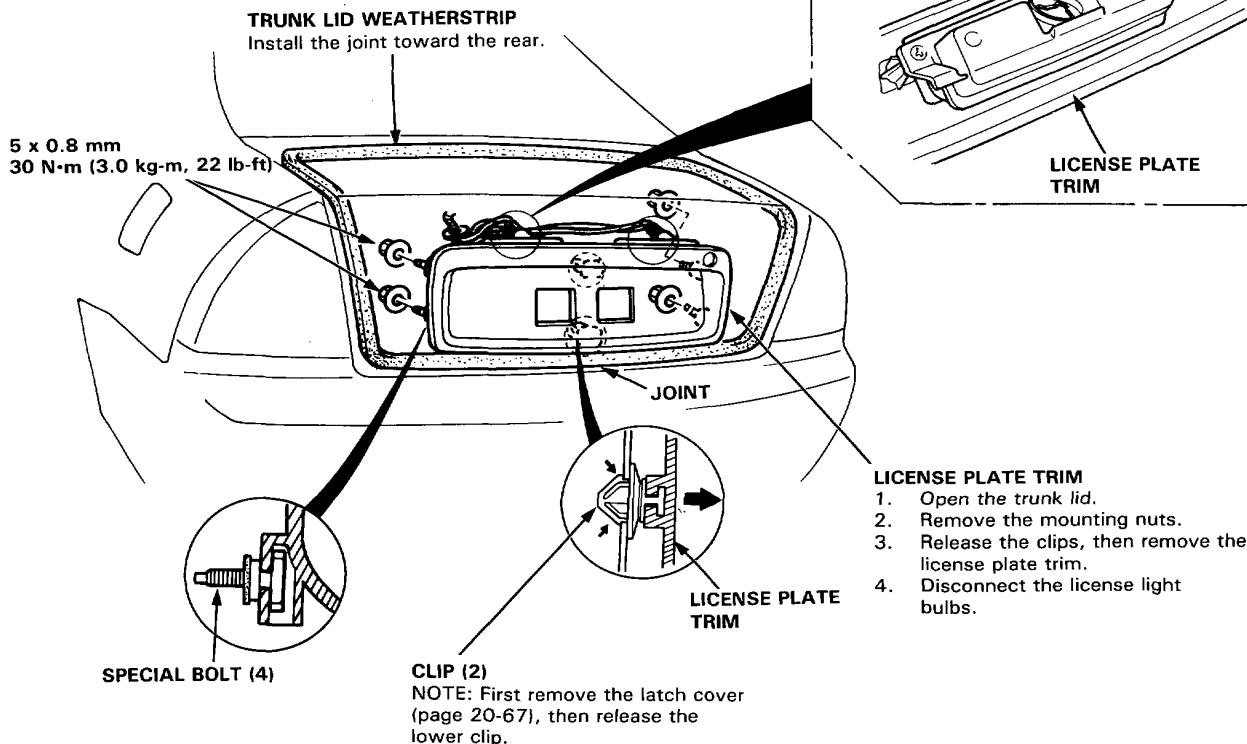


NOTE: If necessary, replace any damaged clips.

Rear Opening Weatherstrip/License Plate Trim Replacement

NOTE:

- Take care not to damage the trim.
- After installing the weatherstrip, close the trunk lid, then check for water leaks.
- Do not use high pressure water.



Rear Emblem

Installation

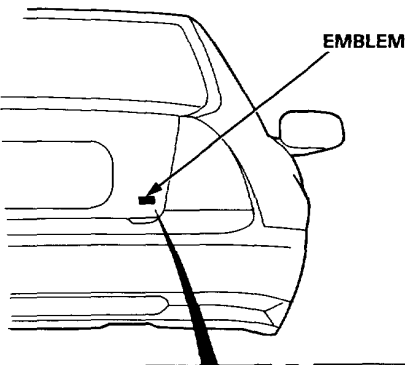
Apply the emblem where shown.

Attachment Point:

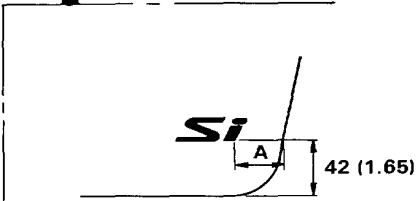
Unit: mm (in)

NOTE:

- Before applying, clean the body surface with a sponge dampened in alcohol.
- After cleaning, keep oil, grease or water from getting on the surface.
- When applying, make sure there are no wrinkles in the emblem.



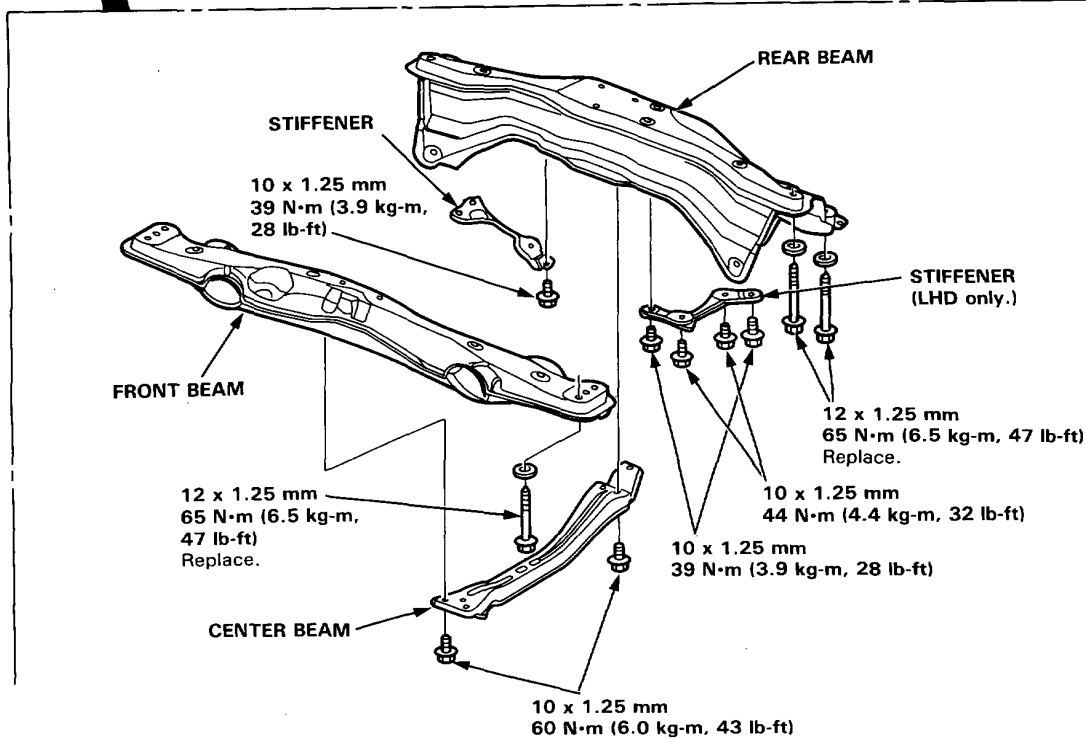
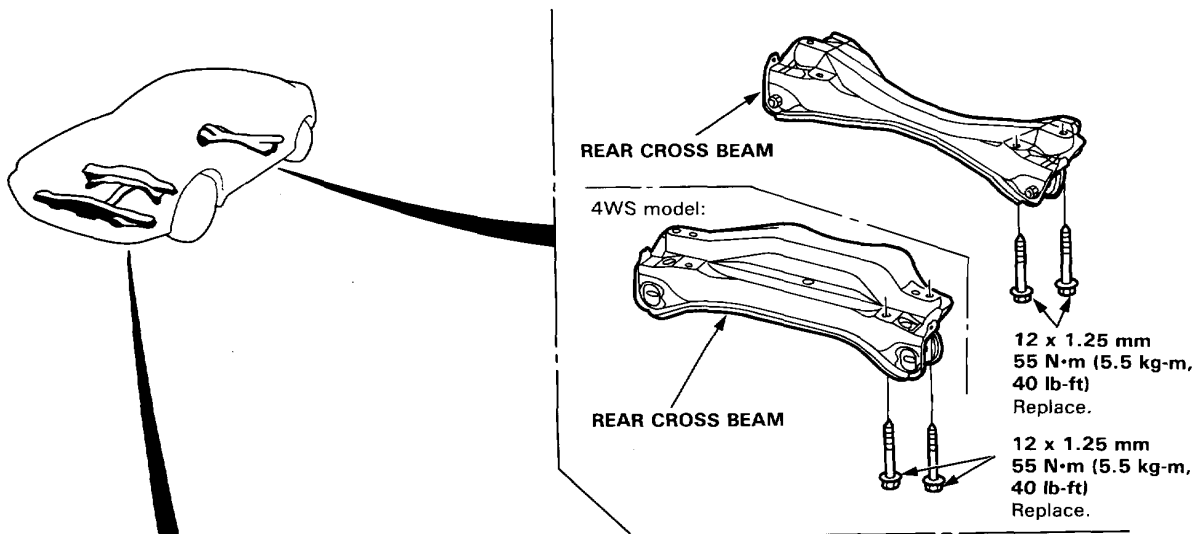
Emblem	KE, KF, KG, KS (2.0i, 2.3i)	KQ (Si)
A	24 (0.94)	32 (1.26)



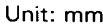
Sub-frame



Sub-frame torque sequence:

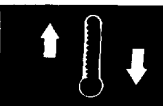


20-74



Heater and Air Conditioner

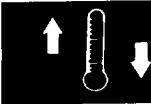
Heater	21-1
Air Conditioner	22-1



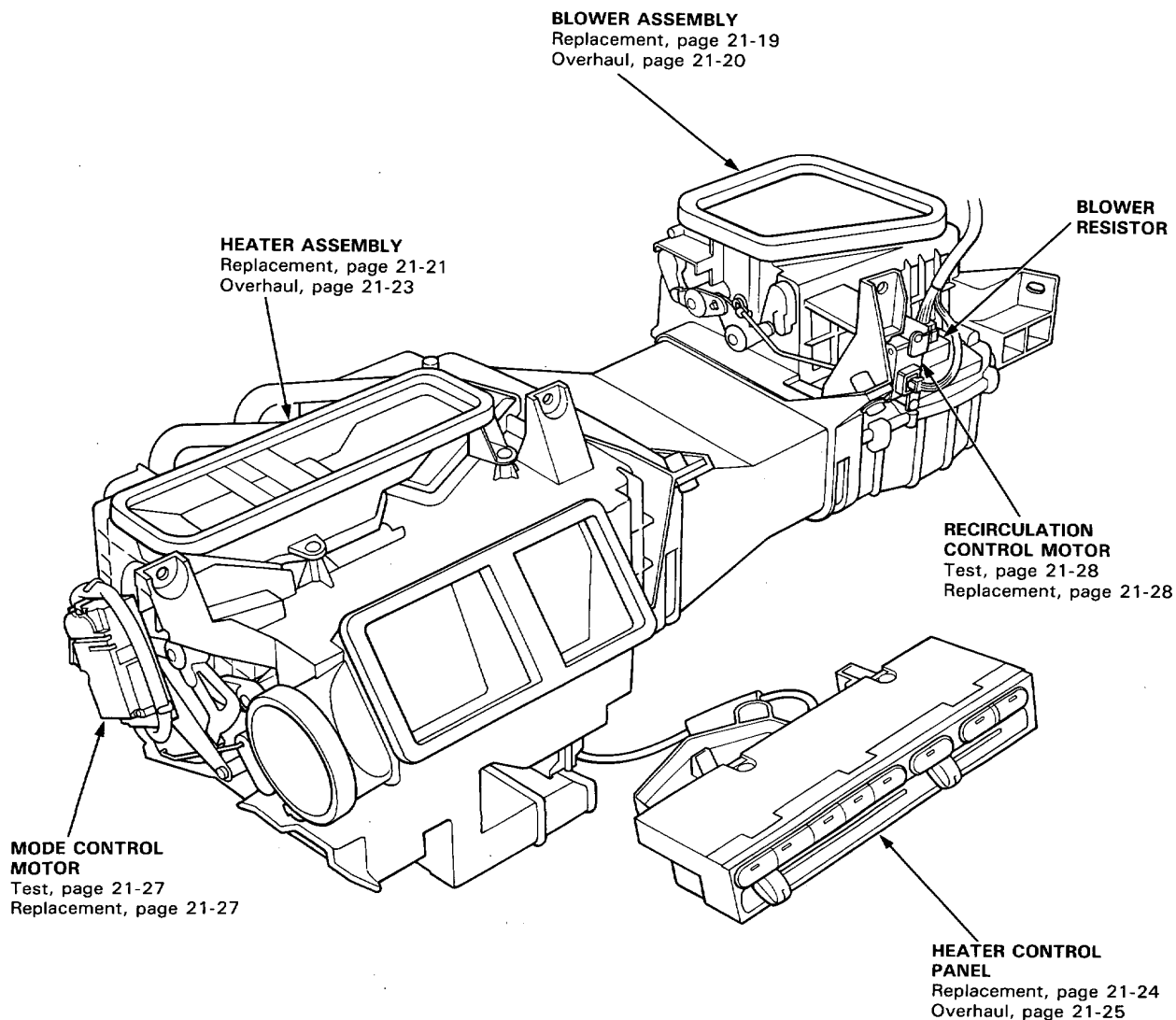
Heater

Illustrated Index	21-2
Heater Door Positions	21-3
Circuit Diagram	21-7
Troubleshooting	
Symptom Chart	21-8
Heater Control Panel Input/ Output signals	21-9
Blower	21-10
Mode Control	21-15
Recirculation Control	21-17
Blower Assembly	
Replacement	21-19
Overhaul	21-20
*Heater Assembly	
Replacement	21-21
Overhaul	21-23
Heater Linkage Adjustment	21-24
Heater Control Panel	
Replacement	21-24
Overhaul	21-25
Heater Control Cables	
Heater Valve Cable Adjustment	21-26
Air Mix Cable Adjustment	21-26
Mode Control Motor	
Test	21-27
Replacement	21-27
Recirculation Control Motor	
Test	21-28
Replacement	21-28
Fan Switch	
Test	21-29
Relay	
Test	21-29
Mode Control Switch	
Test	21-30
Recirculation Control Switch	
Test	21-30

*: Read SRS precautions before working in these areas.



Illustrated Index

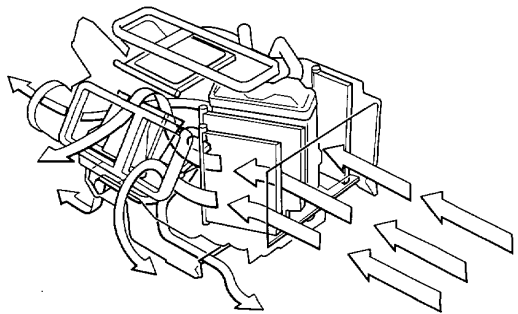
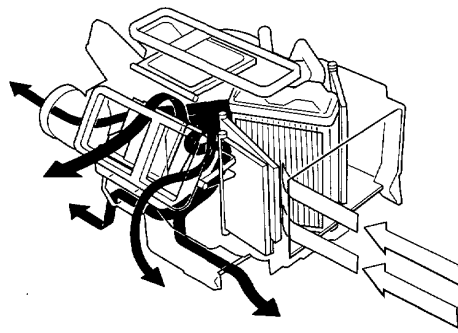
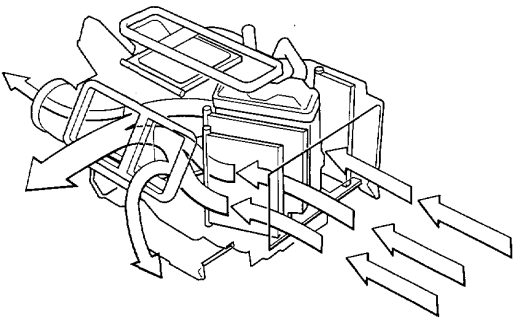
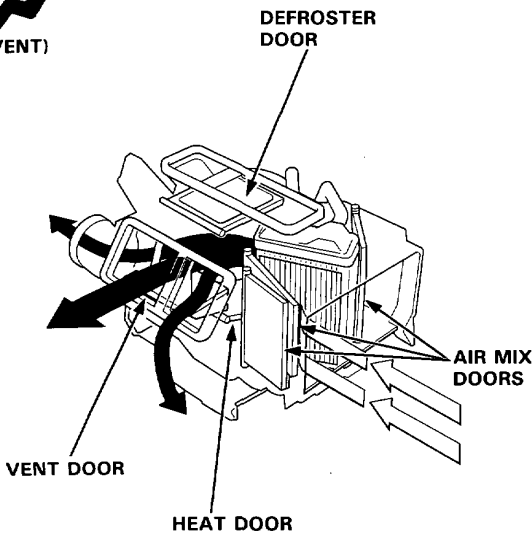




Heater Door Positions

LH Type

HOT
 COLD

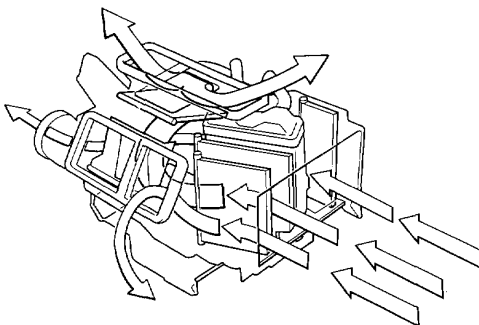
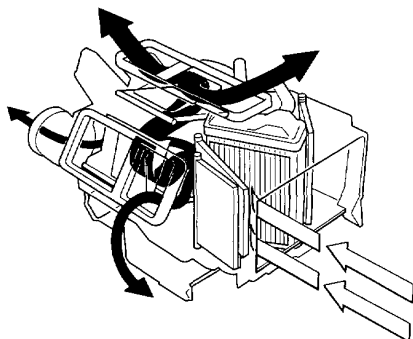
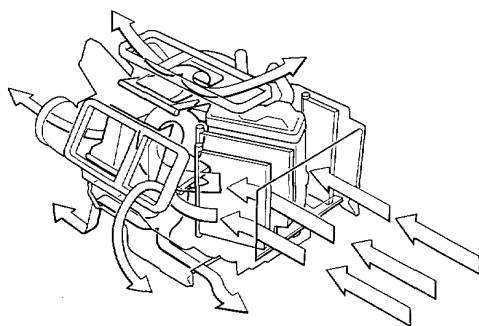
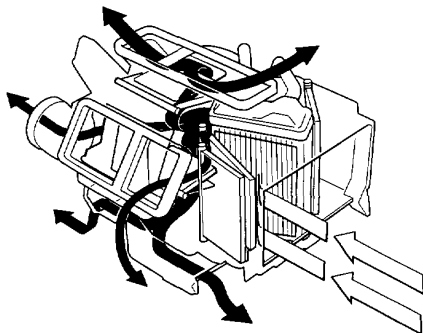
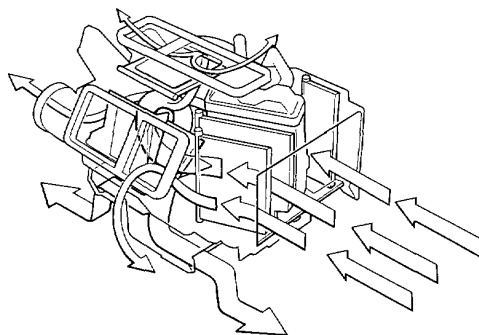
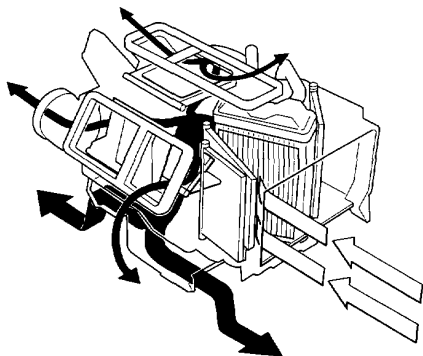


(cont'd)

Heater Door Positions (cont'd)

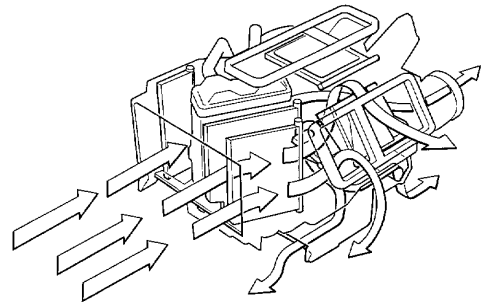
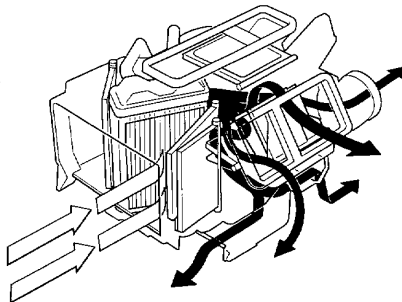
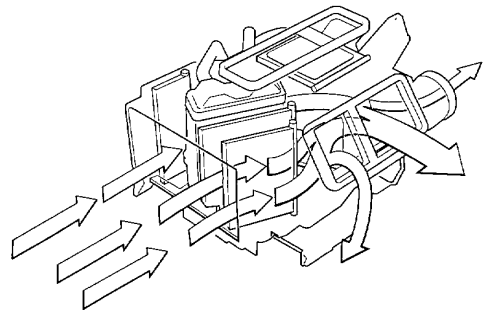
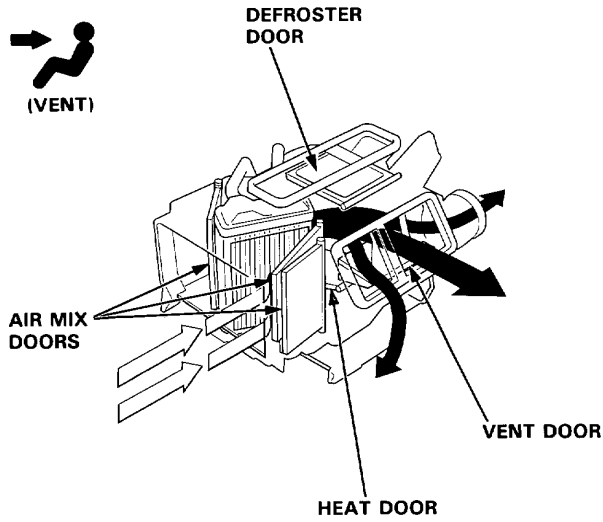
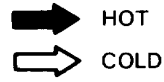
LH Type

➡ HOT
➡ COLD







RH Type

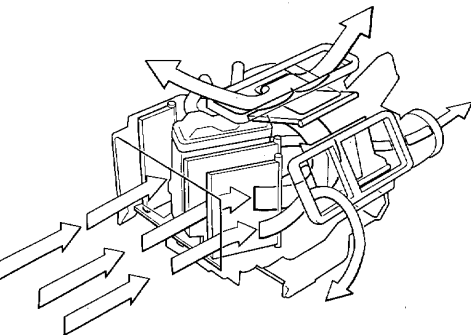
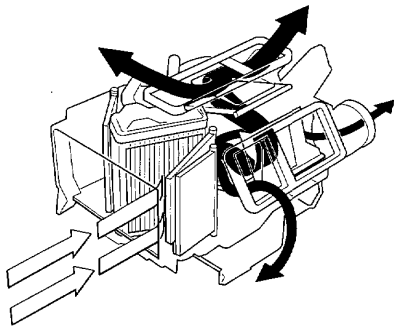
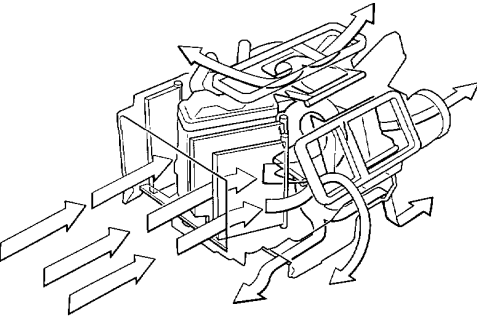
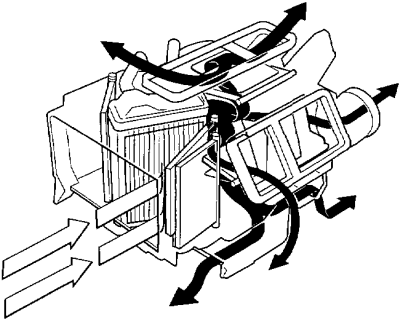
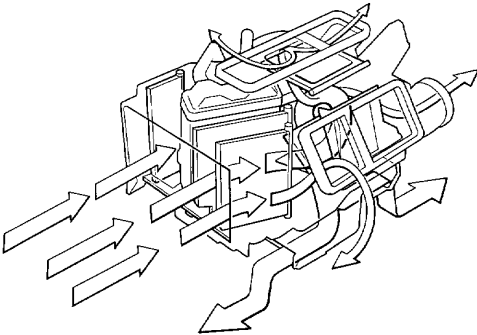
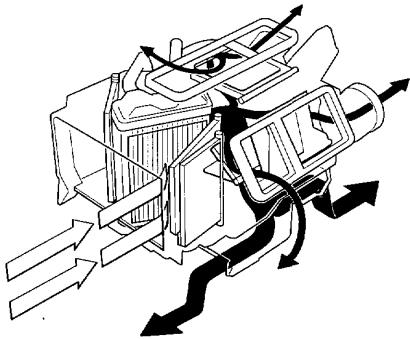


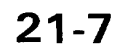
(cont'd)

Heater Door Positions (cont'd)

RH Type

 HOT
 COLD





Troubleshooting

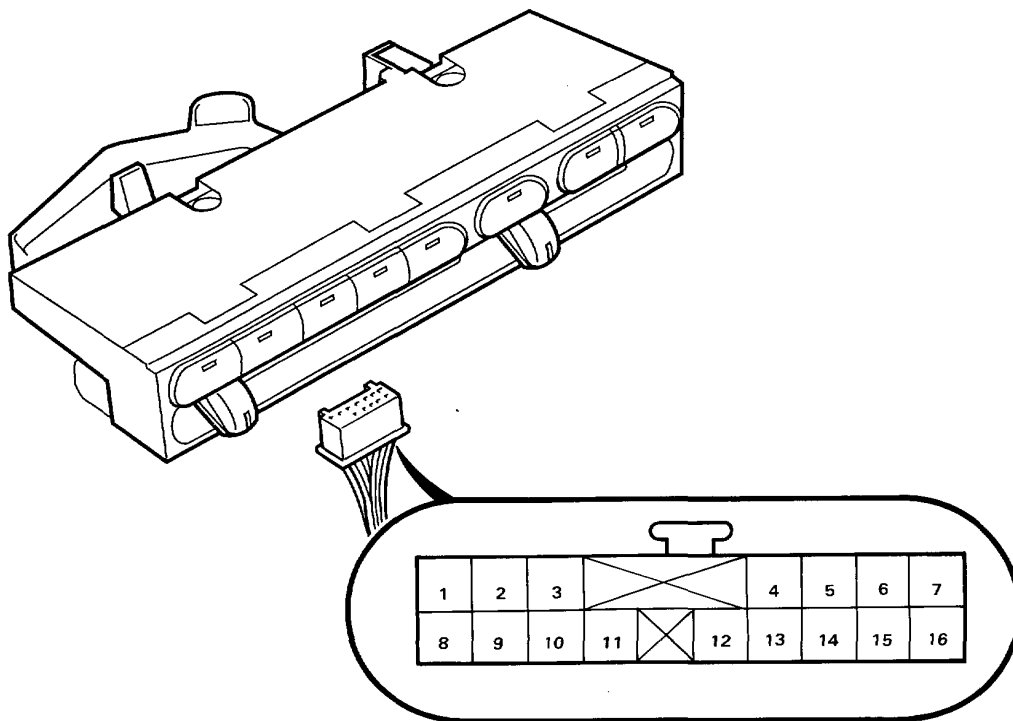
Symptom Chart

NOTE: Check the coolant level and allow the engine to warm up before troubleshooting.

SYMPTOM		REMEDY
No hot air flow.	Blower motor does not run.	Follow the flowchart (page 21-12).
	Blower motor runs.	Check for the following: <ul style="list-style-type: none"> • Clogged heater duct • Clogged blower outlet • Clogged heater valve • Faulty air mix door • Air mix cable adjustment • Faulty thermostat (section 10) • Clogged evaporator (with air conditioner) • Frozen evaporator (with air conditioner)
Hot air flow is low	Blower motor runs, but one or more speeds are inoperative.	Follow the flowchart (page 21-10).
	Blower runs properly.	Check for the following: <ul style="list-style-type: none"> • Clogged heater duct • Clogged heater outlet • Incorrect door position
Mode control motor runs, but one or more modes are inoperative.		Follow the flowchart (page 21-15).
Recirculation control door does not change between FRESH and REC.		Follow the flowchart (page 21-17).



Heater Control Panel Input/Output Signals

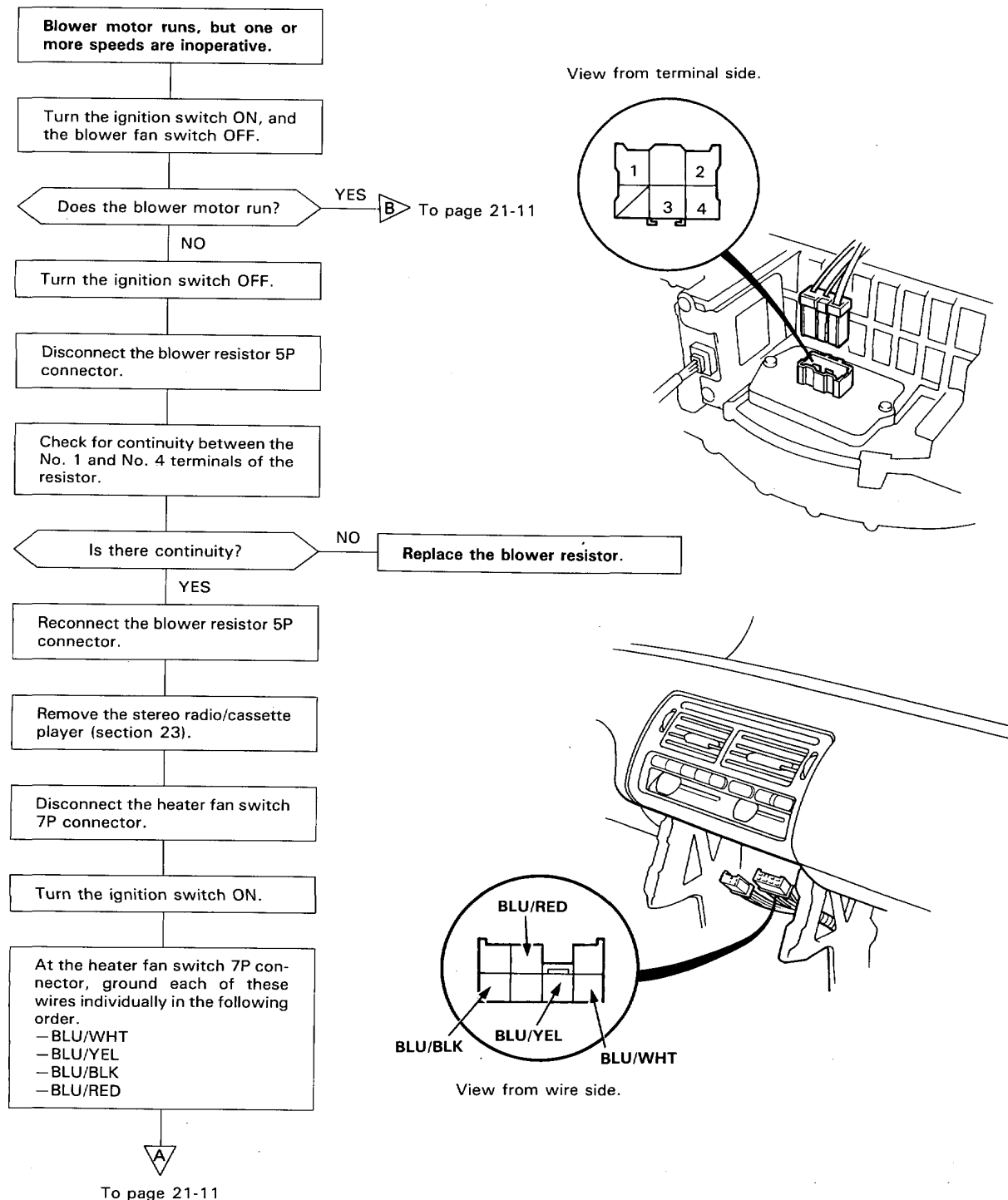


View from wire side

Wire Position		Signal	Wire Position		Signal
1	BLU/RED	THERMOSTAT	9	LT GRN/RED	MODE CONTROL MOTOR (GND)
2	GRN	A/C SWITCH	10	YEL/GRN	REAR WINDOW DEFOGGER SWITCH ⊕
3	BRN/WHT	DEF	11	GRN/WHT	FRESH⊕
4	GRN/RED	RECIRCULATION ⊕	12		
5	RED	ILLUMINATION CONTROL	13	BLK	GROUND
6	RED/BLK	LIGHTING SWITCH	14	BLU	HEAT/DEF
7	LT GRN/WHT	VENT	15	BLU/RED	HEAT
8	BLK/YEL	IG2	16	YEL/GRN	HEAT/VENT

Troubleshooting

Flowchart — Blower Motor Speed





From page 21-10

A

Does the blower motor run at progressively higher speeds?

YES

Replace the heater fan switch.

NO

Repair open, or cause of excessive resistance in the appropriate wire(s) between the heater fan switch and the blower resistor.

From page 21-10

B

Turn the ignition switch OFF.

Remove the stereo radio/cassette player (section 23).

Disconnect the heater fan switch 7P connector.

Disconnect the blower resistor 5P connector.

Check each wire for continuity between the heater fan switch 7P connector and body ground.

- BLU/WHT
- BLU/YEL
- BLU/BLK
- BLU/RED

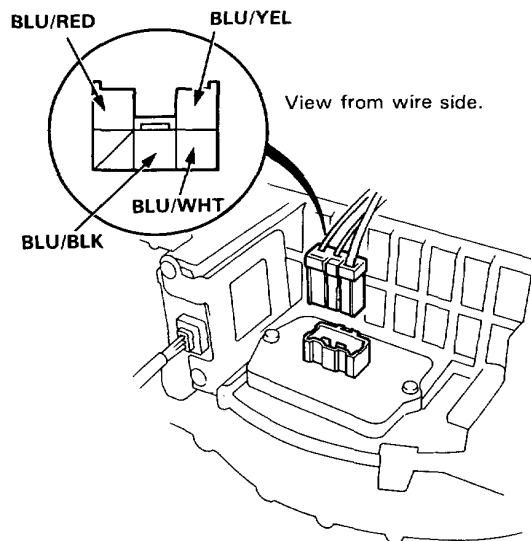
Is there continuity?

NO

Replace the heater fan switch.

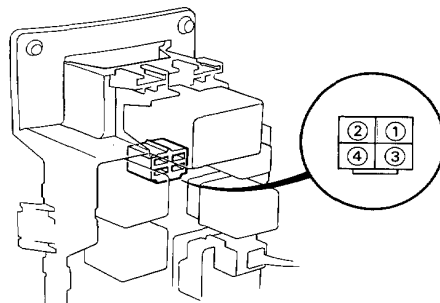
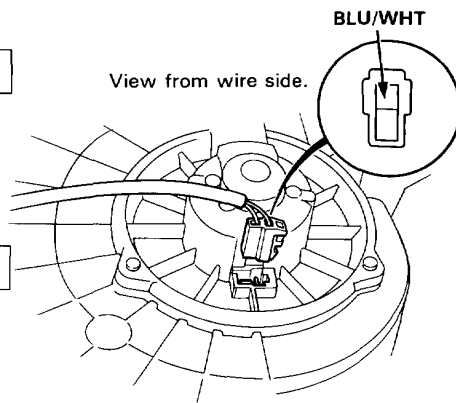
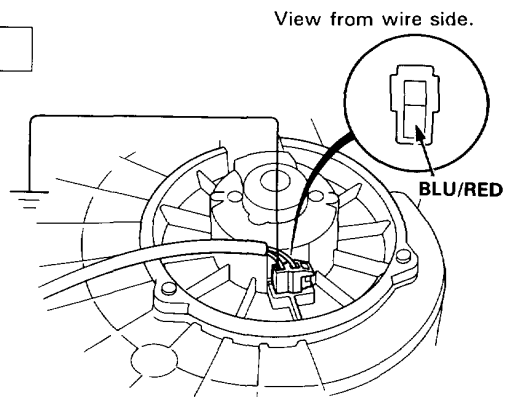
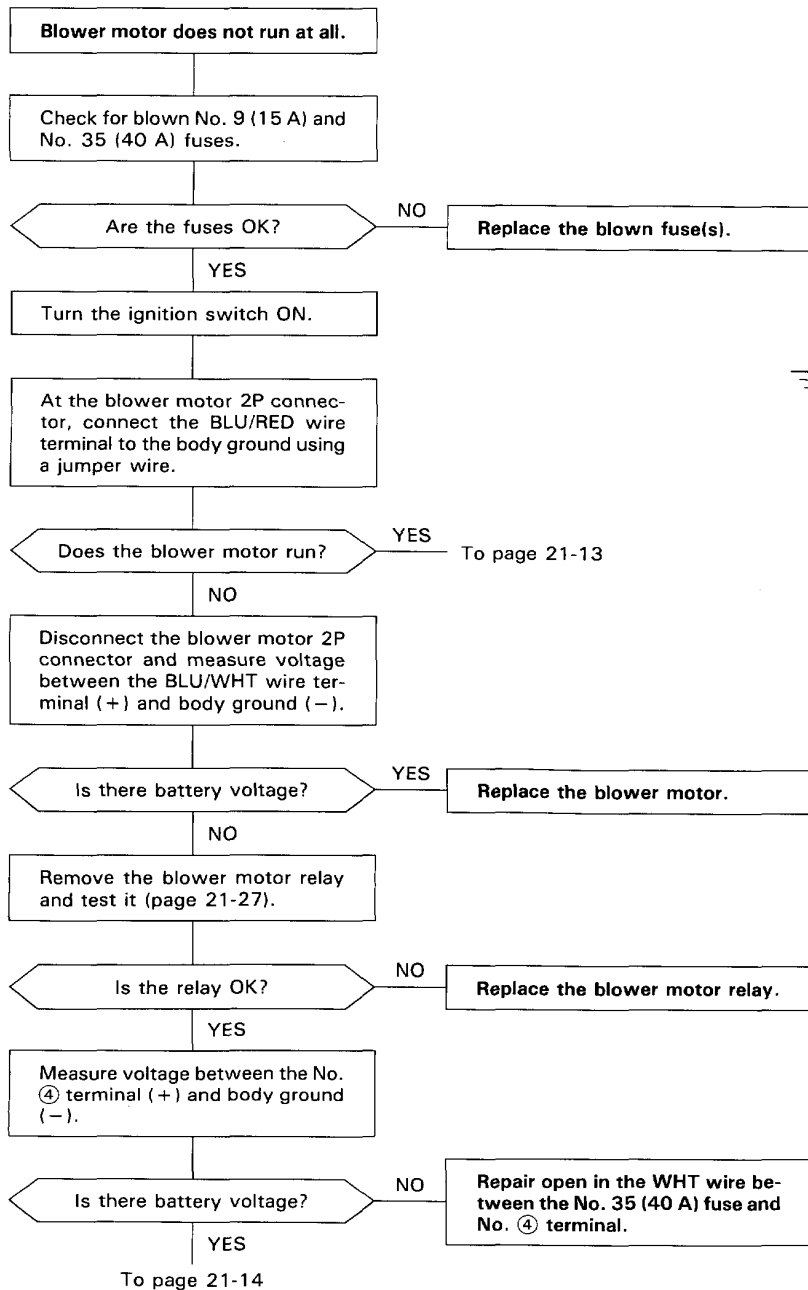
YES

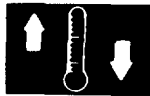
Repair short in wire(s) between the heater fan switch and the blower resistor.



Troubleshooting

Flowchart — Blower Motor





From page 21-12

Turn the ignition switch OFF.

Remove the stereo radio/cassette player (section 23).

Disconnect the heater fan switch 7P connector.

Turn the ignition switch ON.

Measure voltage between the BLU/RED wire terminal (+) and body ground (-).

Is there battery voltage?

NO

Repair open in the BLU/RED wire between the blower motor and heater fan switch.

YES

Turn the ignition switch OFF.

Check for continuity in the BLK wire between the heater fan switch and body ground.

Is there continuity?

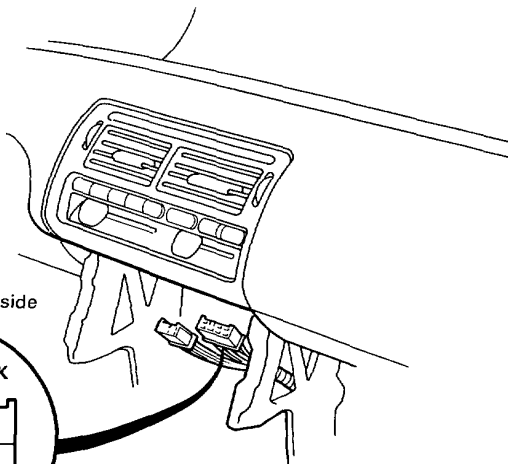
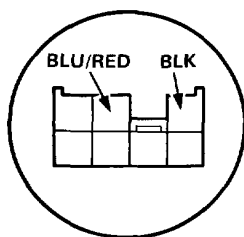
NO

Repair open in the BLK wire between the heater fan switch and body ground. If the wire is OK, check for poor ground at G402 and 403.

YES

Replace the heater fan switch.

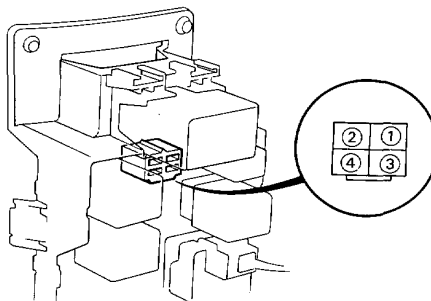
View from wire side



Troubleshooting

Flowchart — Blower Motor (cont'd)

From page 21-12



Measure voltage between the No. ① terminal (+) and body ground (-).

Is there battery voltage?

NO

Replace the under-dash fuse box.

YES

Turn the ignition switch OFF.

Check for continuity between the No. ③ terminal and body ground.

Is there continuity?

NO

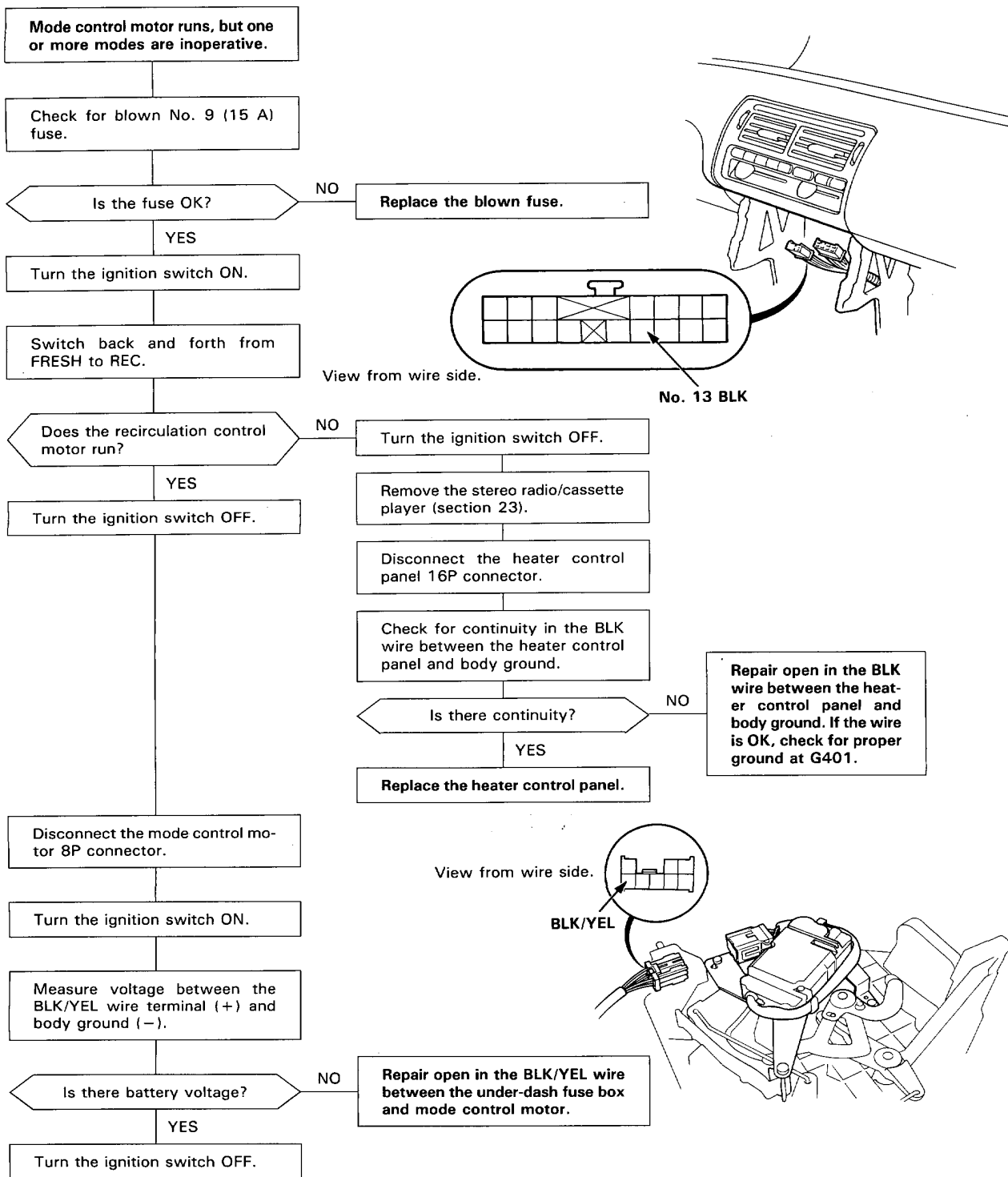
Repair open in the BLK wire between the No. ③ terminal and body ground. If the wire is OK, check for poor ground at G402 and 403.

YES

Repair open in the BLU/WHT wire between the blower motor relay and blower motor.



Flowchart — Mode Control



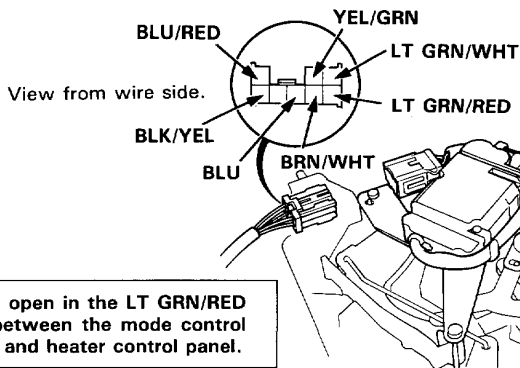
(cont'd)

To page 21-16

Troubleshooting

Flowchart — Mode Control (cont'd)

From page 21-15



Check for continuity in the LT GRN/RED wire between the mode control motor and body ground.

Is there continuity?

NO

Repair open in the LT GRN/RED wire between the mode control motor and heater control panel.

YES

Test the mode control motor (page 21-27).

Is the mode control motor OK?

NO

Remove the mode control motor (page 21-27).

YES

Remove the stereo radio/cassette player (section 23).

Check for mode link and mode doors moves.

Disconnect the heater control panel 16P connector.

Does the mode link and mode doors move?

NO

Repair the mode link or mode doors.

YES

Replace the mode control motor.

Check each wire for continuity and voltage between the mode control motor and body ground.

- BRN/WHT
- BLU
- BLU/RED
- YEL/GRN
- LT GRN/WHT
- LT GRN/RED

Is there continuity or voltage?

YES

Repair any short in the wire(s) between the mode control motor and heater control panel.

NO

Check each wire for continuity between the mode control motor and heater control panel.

- BRN/WHT
- BLU
- BLU/RED
- YEL/GRN
- LT GRN/WHT

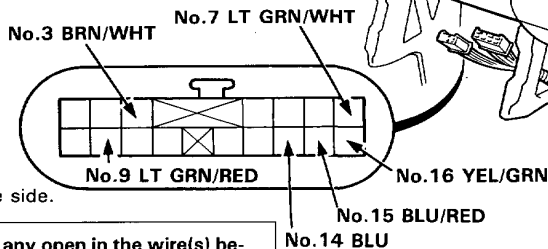
Is there continuity?

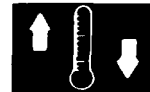
NO

Repair any open in the wire(s) between the mode control motor and heater control panel.

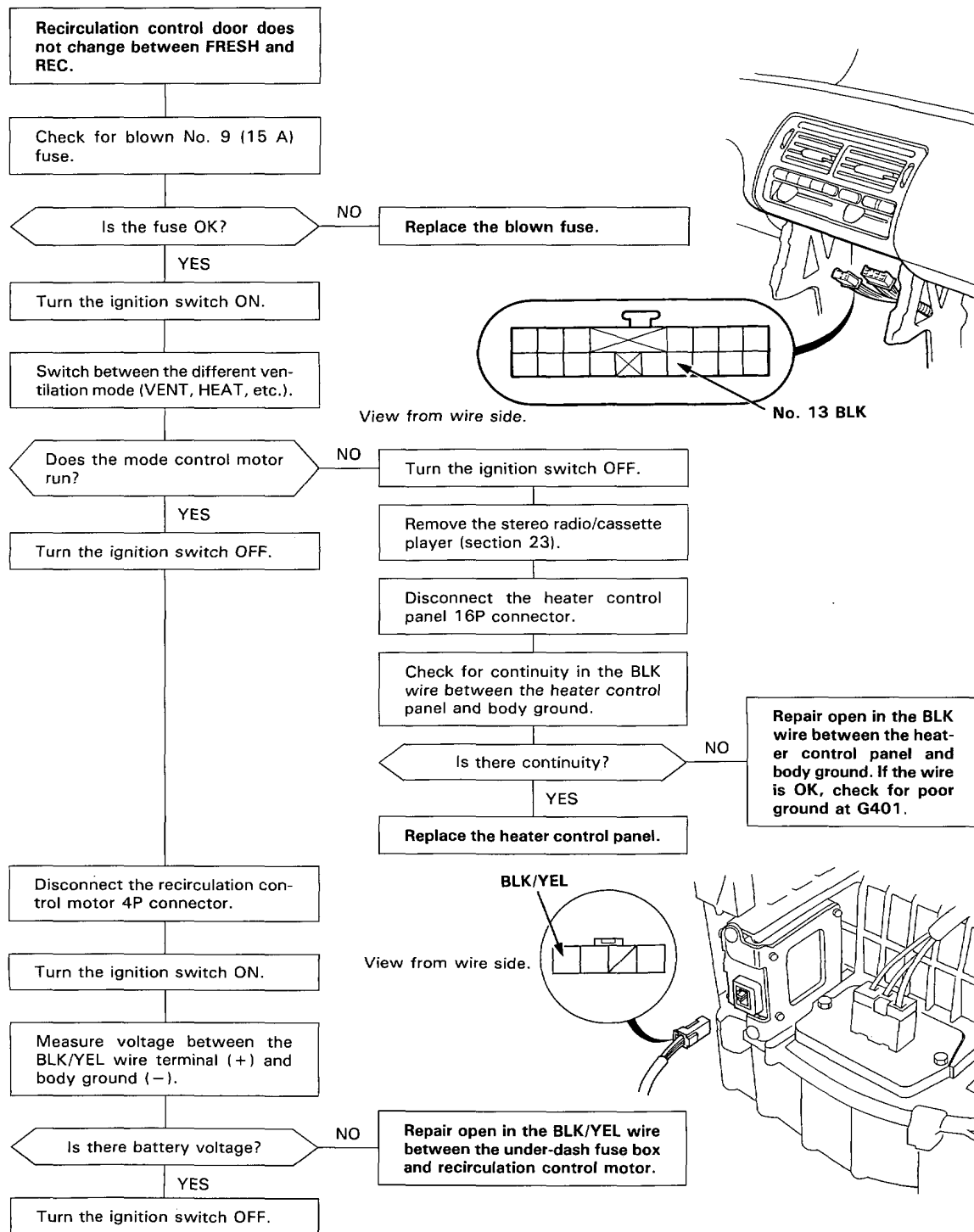
YES

Replace the heater control panel.





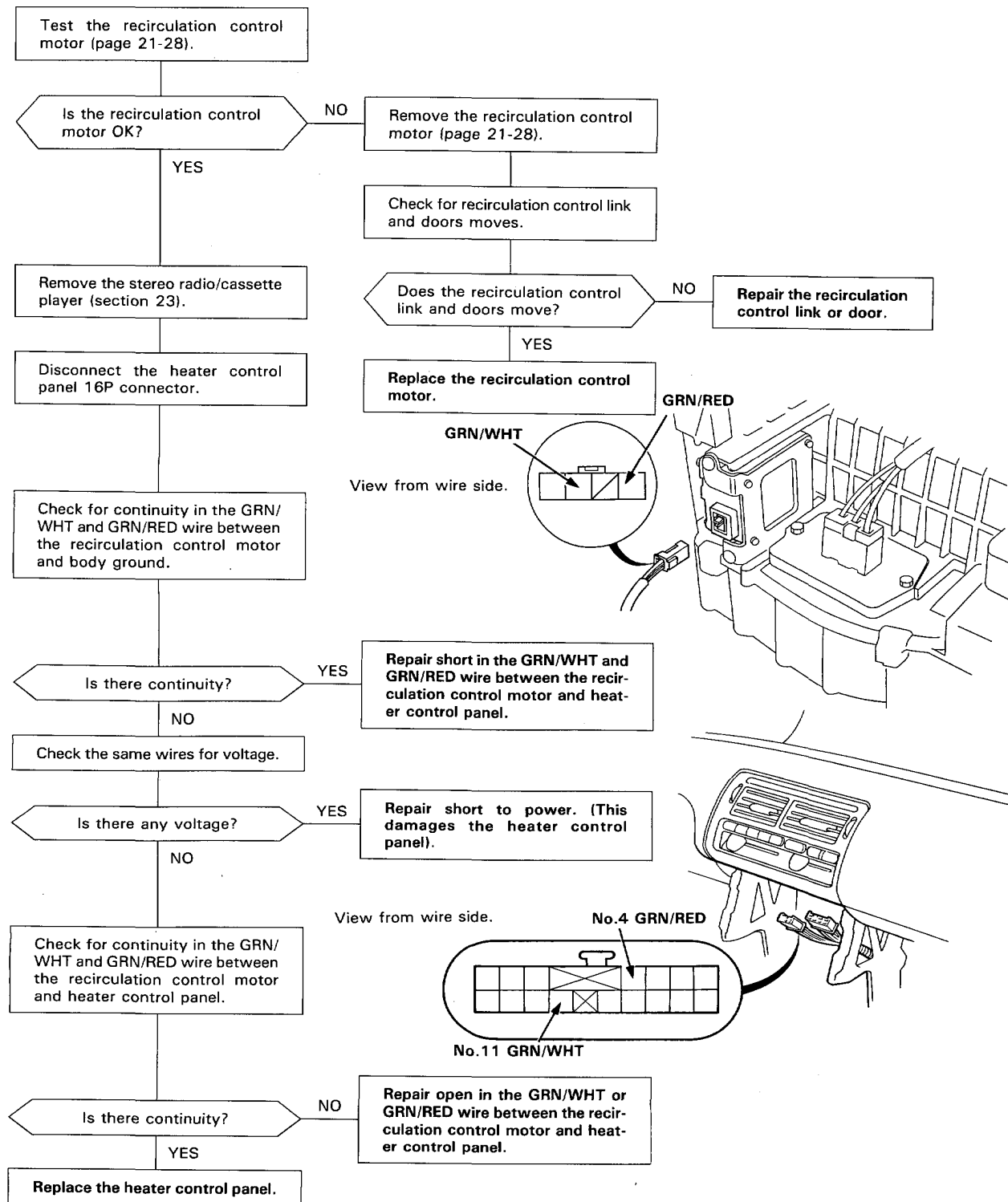
Flowchart — Recirculation Control



(cont'd)

Troubleshooting

Flowchart — Recirculation Control (cont'd)





Blower Assembly

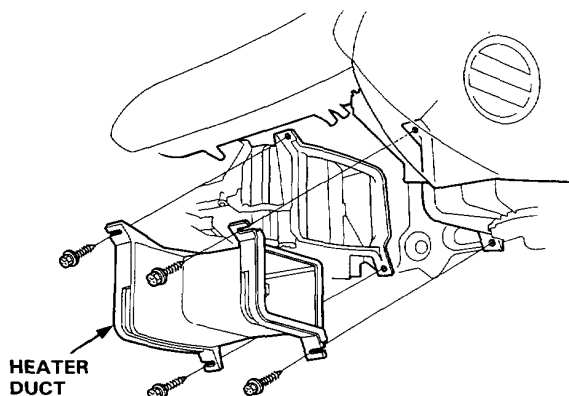
Replacement

NOTE: The blower motor, recirculation control motor, and resistor can be replaced without removing the blower assembly (see page 21-20).

1. Remove the glove box and glove box frame (section 20).

WITHOUT AIR CONDITIONER

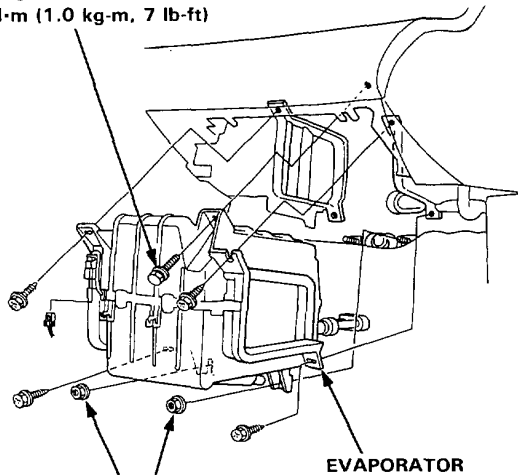
- 2-a. Remove the four self-tapping screws and the heater duct.



WITH AIR CONDITIONER

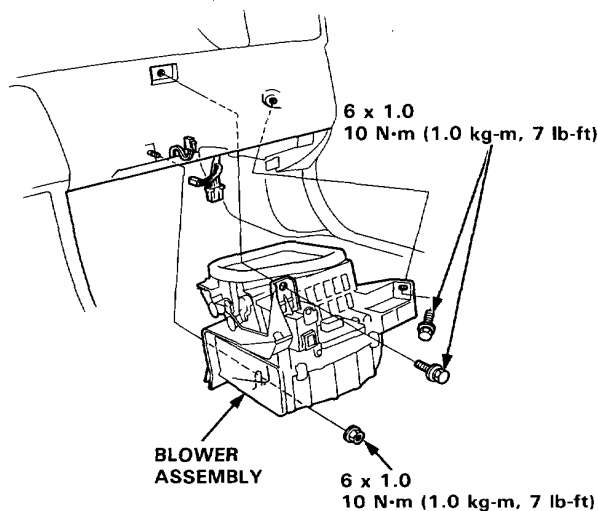
- 2-b. Remove the evaporator (page 22-29).

6 x 1.0
10 N·m (1.0 kg-m, 7 lb-ft)



10 N·m (1.0 kg-m, 7 lb-ft)

3. Disconnect the connectors from the blower motor, resistor and recirculation control motor.
4. Remove the two bolts, nut and blower assembly.



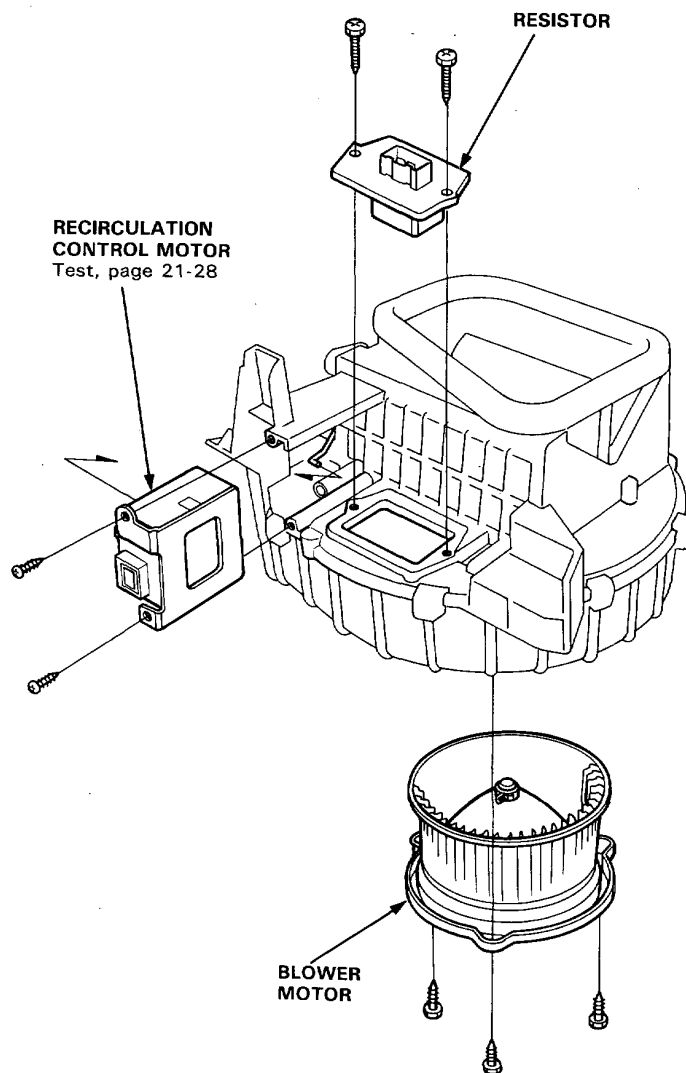
5. Install the blower assembly in the reverse order of removal, and make sure there is no air leakage.

Blower Assembly

Overhaul

NOTE:

- Before reassembly, make sure that the air door and linkage moves smoothly without binding.
- When reattaching the actuator, make sure its positioning will not allow the air door to be pulled too far. Attach the actuator and all linkage, then apply battery voltage and watch the door movement. If necessary, loosen the holding screw and move the actuator up or down.





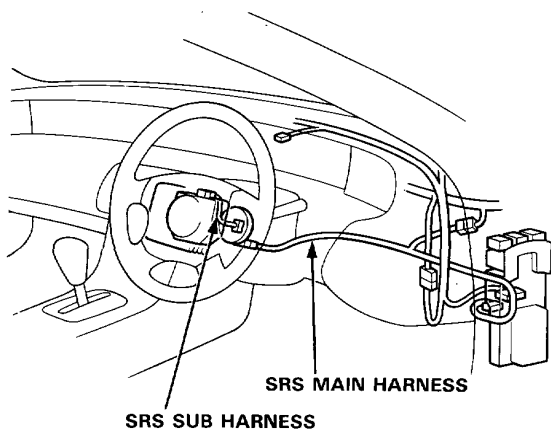
Heater Assembly

Replacement

SRS wire harnesses are routed near the heater.

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

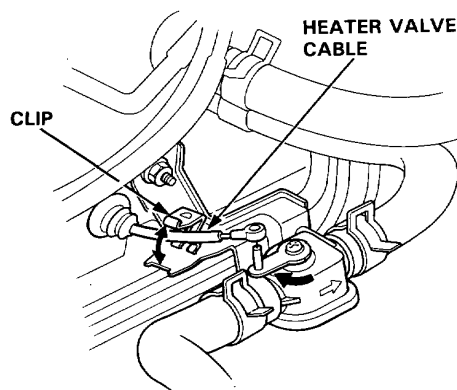


1. When the engine is cool, drain coolant from the radiator (section 10).

⚠ WARNING

- Do not remove the radiator cap when the engine is hot; the coolant is under pressure and could severely scald you.
- Keep hands away from the radiator fan. The fan may start automatically without warning and run for up to 30 minutes even after the engine is turned off.

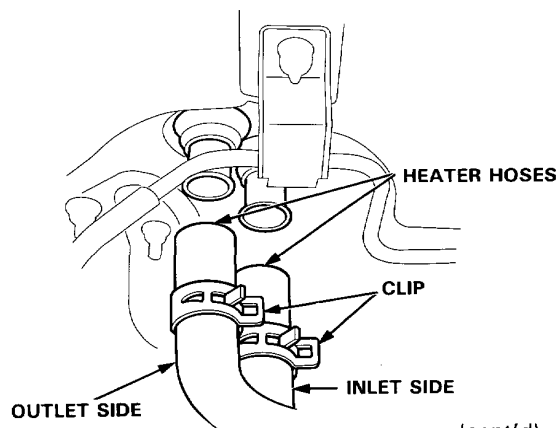
2. Snap open the cable clip and disconnect the heater valve cable from the heater valve.



3. Disconnect the heater hoses at the heater.

CAUTION: Radiator coolant will damage paint. Quickly rinse any spilled coolant from painted surfaces.

NOTE: Coolant will run out when the hoses are disconnected, drain it into a clean drip pan.

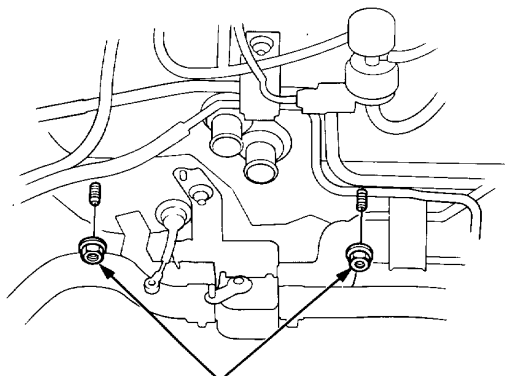


(cont'd)

Heater Assembly

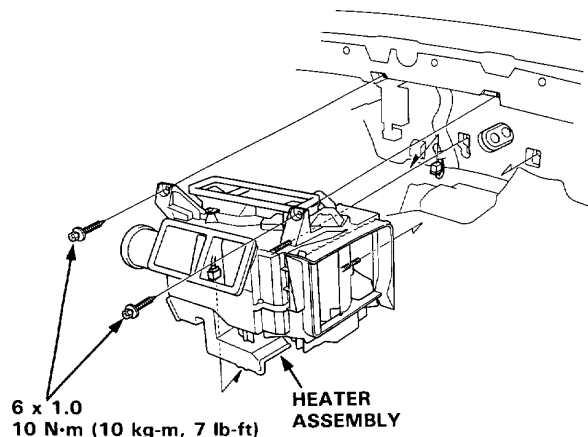
Replacement (cont'd)

4. Remove the two heater unit mounting nuts from the engine compartment side.



8 x 1.25
22 N·m (2.2 kg-m, 16 lb-ft)

5. Remove the dashboard (section 20).
6. Remove the heater duct (page 21-19) or evaporator (page 22-29).
7. Remove the two heater mounting bolts and heater assembly.

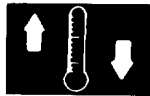


6 x 1.0
10 N·m (10 kg-m, 7 lb-ft)

HEATER
ASSEMBLY

8. Install the removed parts in the reverse order of removal, and:

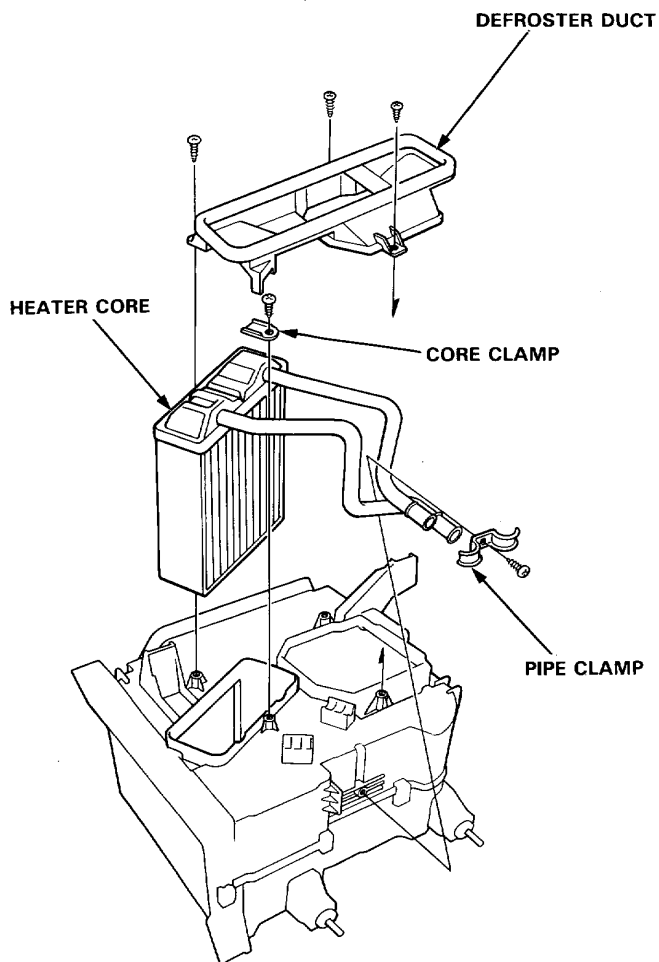
- Do not interchange the inlet and outlet hoses.
- Loosen the bleed bolt on the engine and refill the radiator and reservoir tank with the proper coolant mixture (section 10).
Tighten the bleed bolt when all the trapped air has escaped and coolant begins to flow from it (section 10).
- Connect all cables and make sure they are properly adjusted (page 21-26).



Overhaul

1. Remove the heater assembly (page 21-21).
2. Remove the three screws and defroster duct.
3. Remove the screw and pipe clamp.
4. Remove the screw and core clamp.
5. Pull the heater core from the heater housing.

NOTE: Be careful not to bend the inlet and outlet pipes during heater core removal.



Install the removed parts in the reverse order of removal, and:

Loosen the bleed bolt on the engine and refill the radiator and reservoir tank with the proper coolant mixture. Tighten the bleed bolt when all the trapped air has escaped and coolant begins to flow from it.

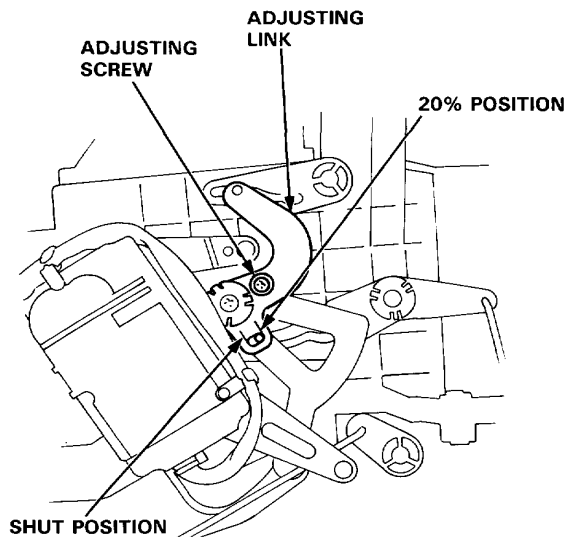
Heater Assembly

Heater Linkage Adjustment

DEF Door Adjustment

Set the heater control switch on HEAT for adjusting DEF leak (shut ~ 20%).

1. Loosen the adjusting screw.
2. Adjust the heater linkage.
3. Tighten the adjusting screw.

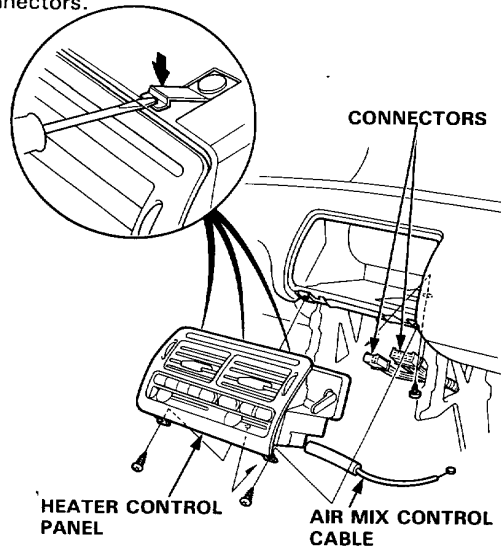


Heater Control Panel

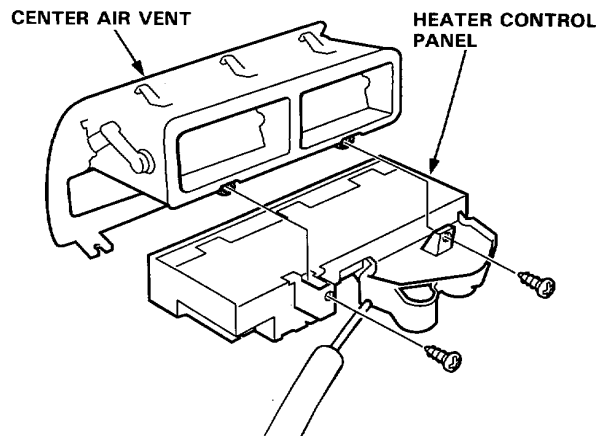
Replacement

1. Remove the front console.
2. Remove the stereo radio/cassette player (section 23).
3. Disconnect the air mix control cable from the heater unit (page 21-25).
4. Remove the three self-tapping screws. Disconnect the connectors and remove the heater control panel/center air vent assembly.

NOTE: The locking tabs are on the bottom of the connectors.



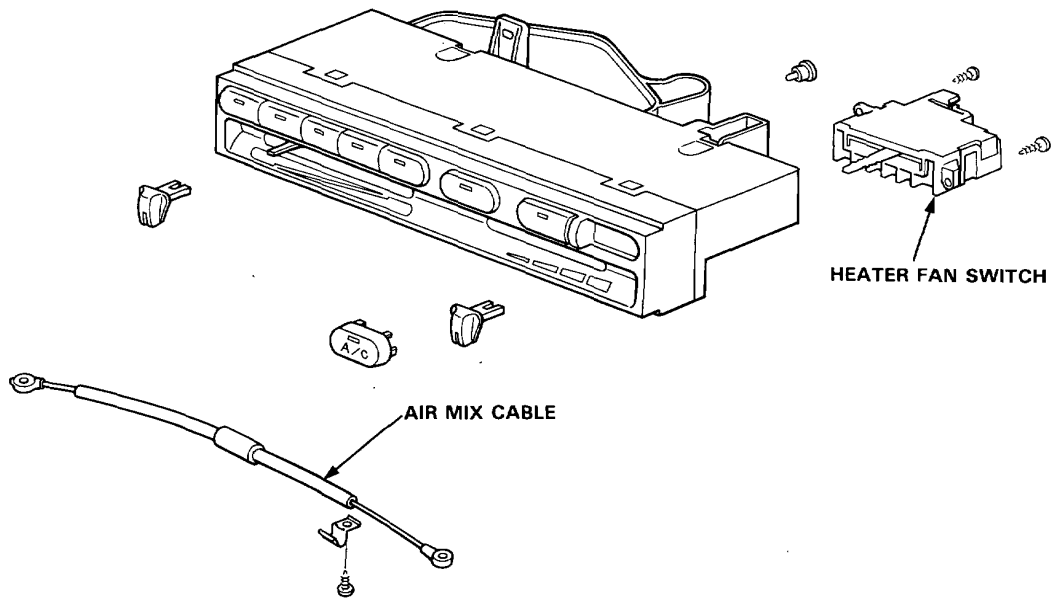
5. Remove the two self-tapping screws and remove the heater control panel from the center air vent.



6. Install the removed parts in the reverse order of removal, and refer to page 21-25 for air mix control cable installation.

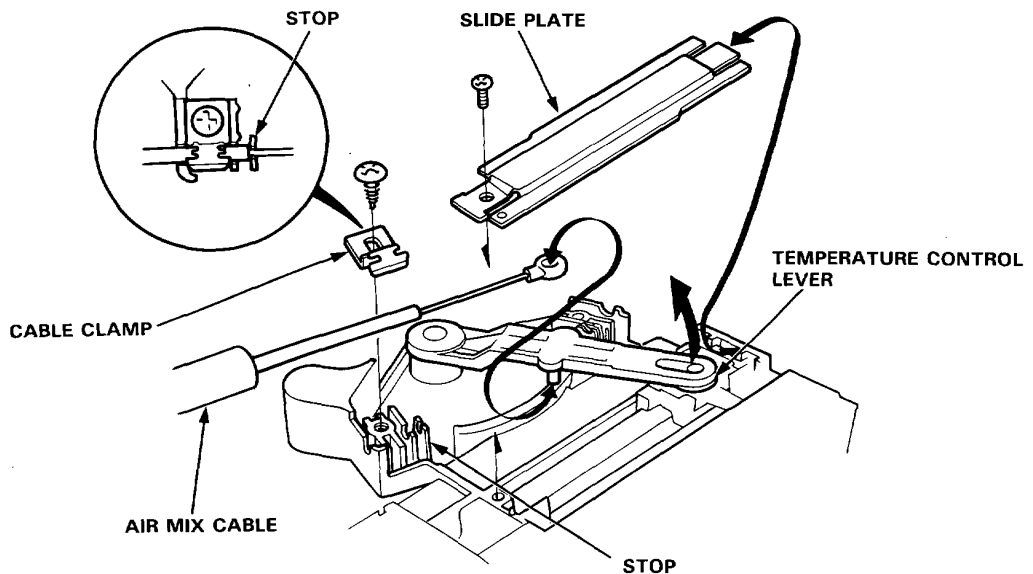


Overhaul



Air Mix Cable Replacement

1. Remove the screw and slide plate.
2. Remove the self-tapping screw and cable clamp.
3. Lift the end of the temperature control lever up and remove the air mix cable.

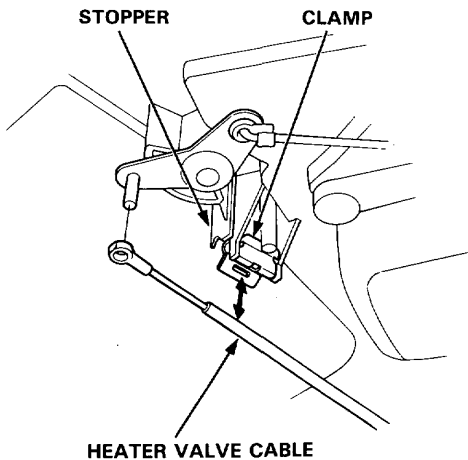


4. Install the removed parts in the reverse order of removal, and:
 - Be sure the end of the cable housing is against the stop before tightening the cable clamp.
 - After assembly check that the temperature control lever slides smoothly through the full stroke from right to left.

Heater Control Cables

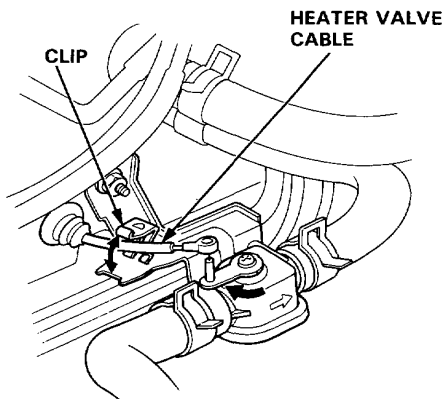
Heater Valve Cable Adjustment

1. Disconnect the cable from the heater valve.
2. Set the temperature control lever on COOL.
3. Connect the end of the cable to the arm.
4. Gently slide the cable outer housing back from the end enough to take up any slack in the cable, but not enough to make the temperature control lever move. Hold the end of the cable housing against stopper, then snap the cable housing into the clamp.



5. Turn the water valve arm to shut and connect the end of the cable to the arm.
6. Gently slide the cable outer housing back from the end enough to take up any slack in the cable, but not enough to make the temperature control lever move, then snap the cable housing into the clamp.

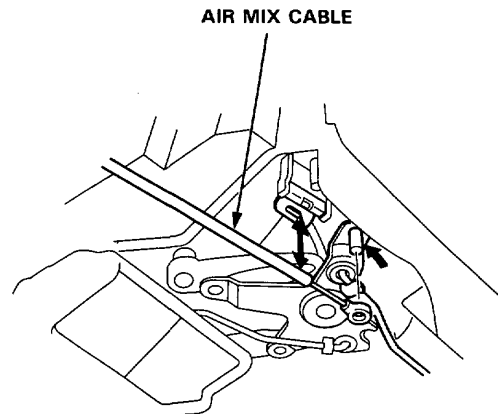
NOTE: The heater valve cable should be adjusted if the air mix cable has been disconnected.



Air Mix Cable Adjustment

1. Set the temperature control lever on COOL.
2. Connect the end of the cable to the arm.
3. Gently slide the cable outer housing back from the end enough to take up any slack in the cable, but not enough to make the temperature control lever move, then snap the cable housing into the clamp.

NOTE: The air mix cable should be adjusted if the heater valve cable has been disconnected.



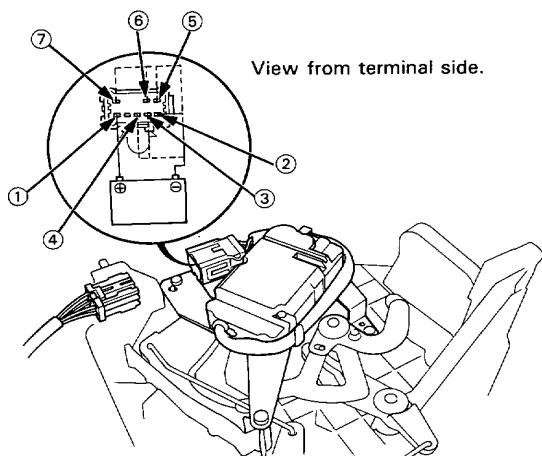


Mode Control Motor

Test

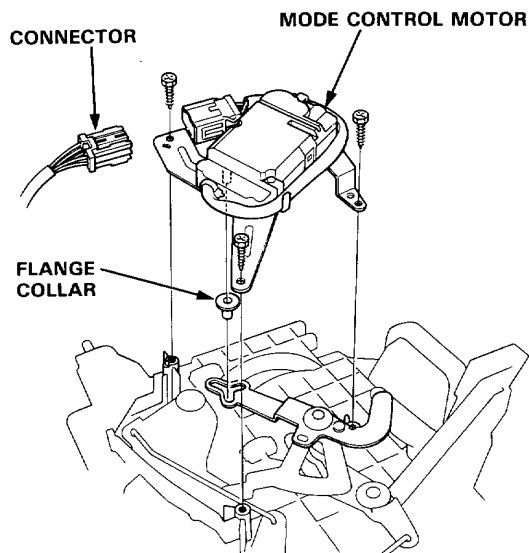
1. Connect the battery positive terminal to the ① terminal of the mode control motor and negative to the ② terminal.
2. Using a jumper wire, short the ② terminal individually to the ③, ④, ⑤, ⑥ and ⑦ terminals, in that order.
 - The motor should run each time the short circuit is made.

NOTE: If the mode control motor does not run when shorting the first terminal, short that terminal again after shorting the other terminals. The mode control motor is normal if it runs when shorting the first terminal again.



Replacement

1. Disconnect the mode control motor 8P connector.
2. Remove the three screws, mode control motor and flange collar.



3. Install in the reverse order of removal. After installation, make sure the mode control motor operates smoothly.

Recirculation Control Motor

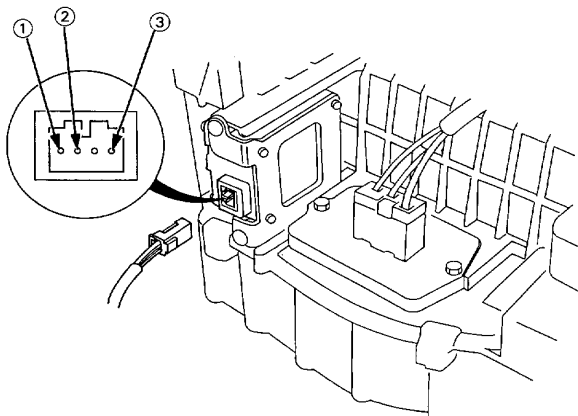
Test

1. Connect the battery positive terminal to the ① terminal of the recirculation control motor connector and negative to the ② and ③ terminals; the recirculation control motor should move smoothly.
2. Disconnect the battery negative terminal from ② or ③; the recirculation control motor should stop at FRESH or REC.

CAUTION: Never connect the battery in the opposite direction.

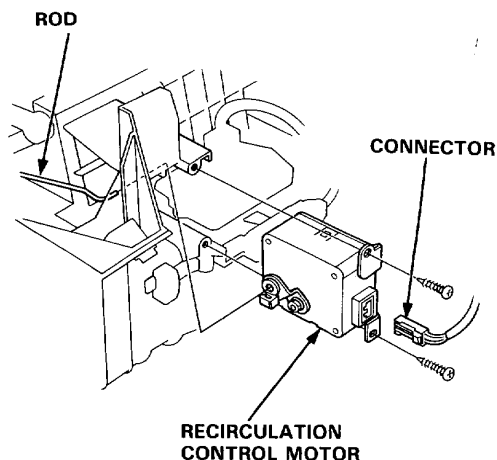
NOTE:

- If the recirculation control motor does not run when shorting the first terminal, short that terminal again after shorting the other terminals. The recirculation control motor is normal if it runs when shorting the first terminal again.
- Don't cycle the recirculation control motor for a long time.
- After adjusting the recirculation control rod, check the recirculation motor on FRESH or REC for two minutes to make sure it operates properly.



Replacement

1. Disconnect the 4P connector from the recirculation control motor.
2. Remove the rod from the recirculation control motor.
3. Remove the screws (2) and recirculation control motor.



4. Install in the reverse order of removal. After installation, make sure the recirculation control motor operates smoothly.

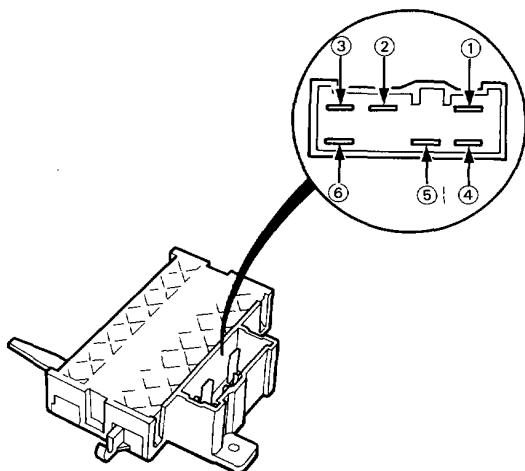
Fan Switch

Test

Check for continuity between the terminals according to the table below.

SWITCH CONNECTION

Terminal Position	1	2	3	4	5	6
OFF						
1	○		○	○		
2	○		○		○	
3	○		○			○
4	○	○	○			

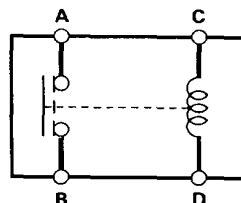
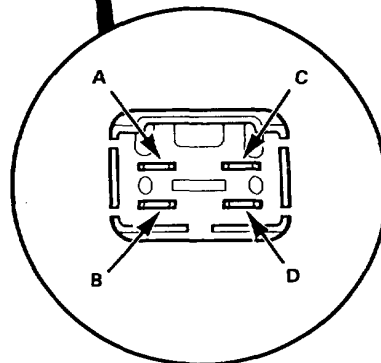
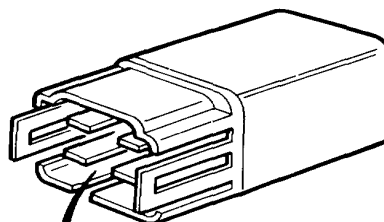


Relay

Test

There should be continuity between the C and D terminals.

There should be continuity between the A and B terminals when the battery is connected to the C and D terminals. There should be no continuity when the battery is disconnected.

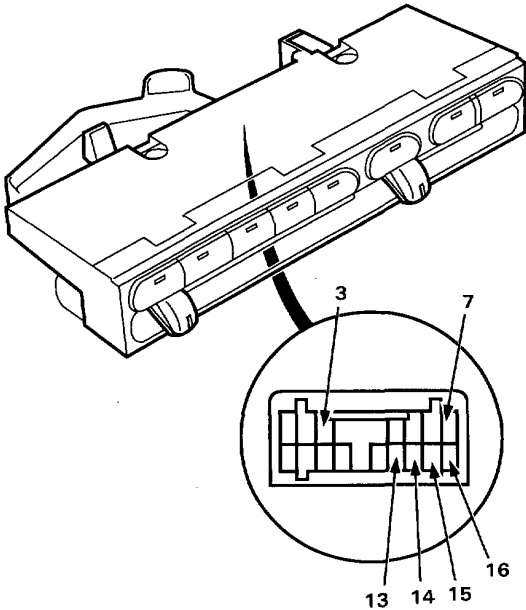


Mode Control Switch

Test

Check for continuity between the terminals according to the table below.

Terminal Position	13	15	14	3	7	16
Heat						
Heat/Def						
Def						
Vent						
Heat/Vent						

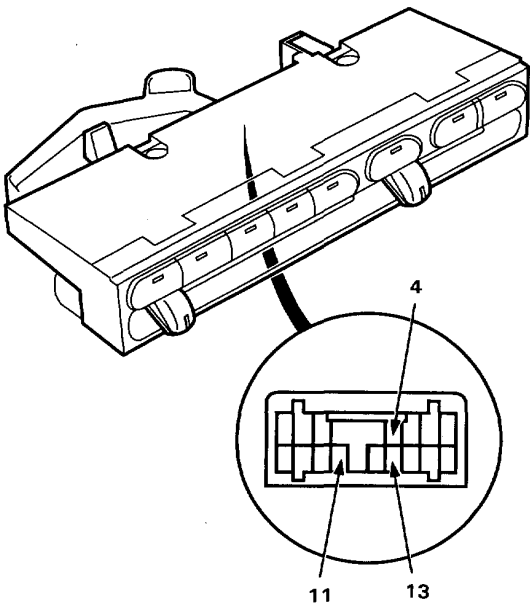


Recirculation Control Switch

Test

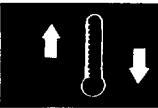
Check for continuity between the terminals according to the table below.

Terminal Position	4	11	13
Fresh			
Rec			



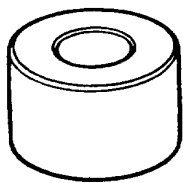
Air Conditioner

Special Tools	22-2
Illustrated Index	22-3
Wiring/Connector Locations	22-4
Circuit Diagram	22-5
Description	22-6
Troubleshooting	
Reference Chart	22-7
Flowchart	
Radiator Fan	22-8
Condenser Fan	22-10
Coolant Temperature Switch A	22-12
Both Fans	22-14
Compressor	22-16
A/C System	22-18
Fan Timer Unit Input Tests	22-21
A/C Thermostat	
Test	22-22
Relay	
Test	22-22
A/C Diode	
Test	22-23
A/C Switch	
Test	22-23
A/C Service Tips and Precautions	22-24
A/C System Service	
Discharge	22-25
Performance Test	22-26
Pressure Test Chart	22-28
Evaporator	
Replacement	22-30
Overhaul	22-31
Compressor	
Description	22-32
Illustrated Index	22-32
Replacement	22-34
Belt Adjustment	22-36
Clutch Inspection	22-37
Clutch Overhaul	22-38
Thermal Protector Replacement	22-40
Condenser	
Replacement	22-41
A/C System Service	
Evacuation	22-42
Charging	22-42
Leak Test	22-43

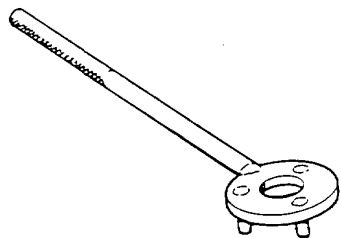


Special Tools

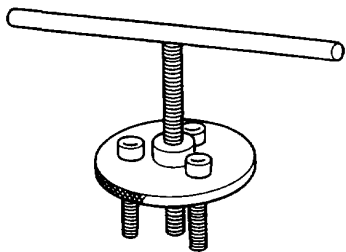
Ref. No.	Tool Number	Description	Qty	Page Reference
①	07965—SA50500	Shaft Ring Remover	1	22-39
②	07925—6920000	A/C Clutch Holder	1	22-38
③	07935—8050004	Flywheel Puller	1	22-38
④	07945—4150200	Seal Driver	1	22-38



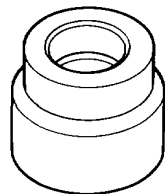
①



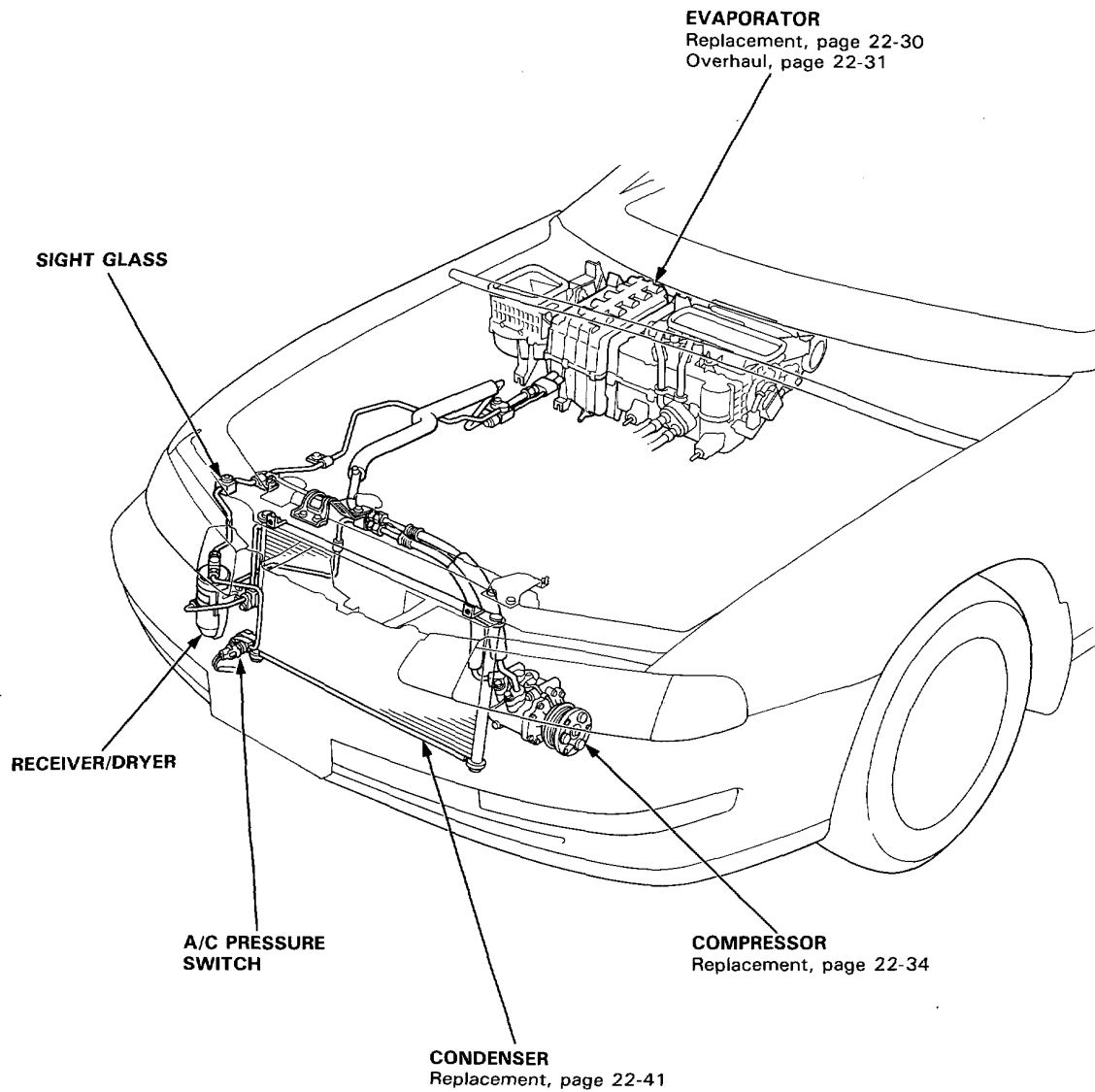
②



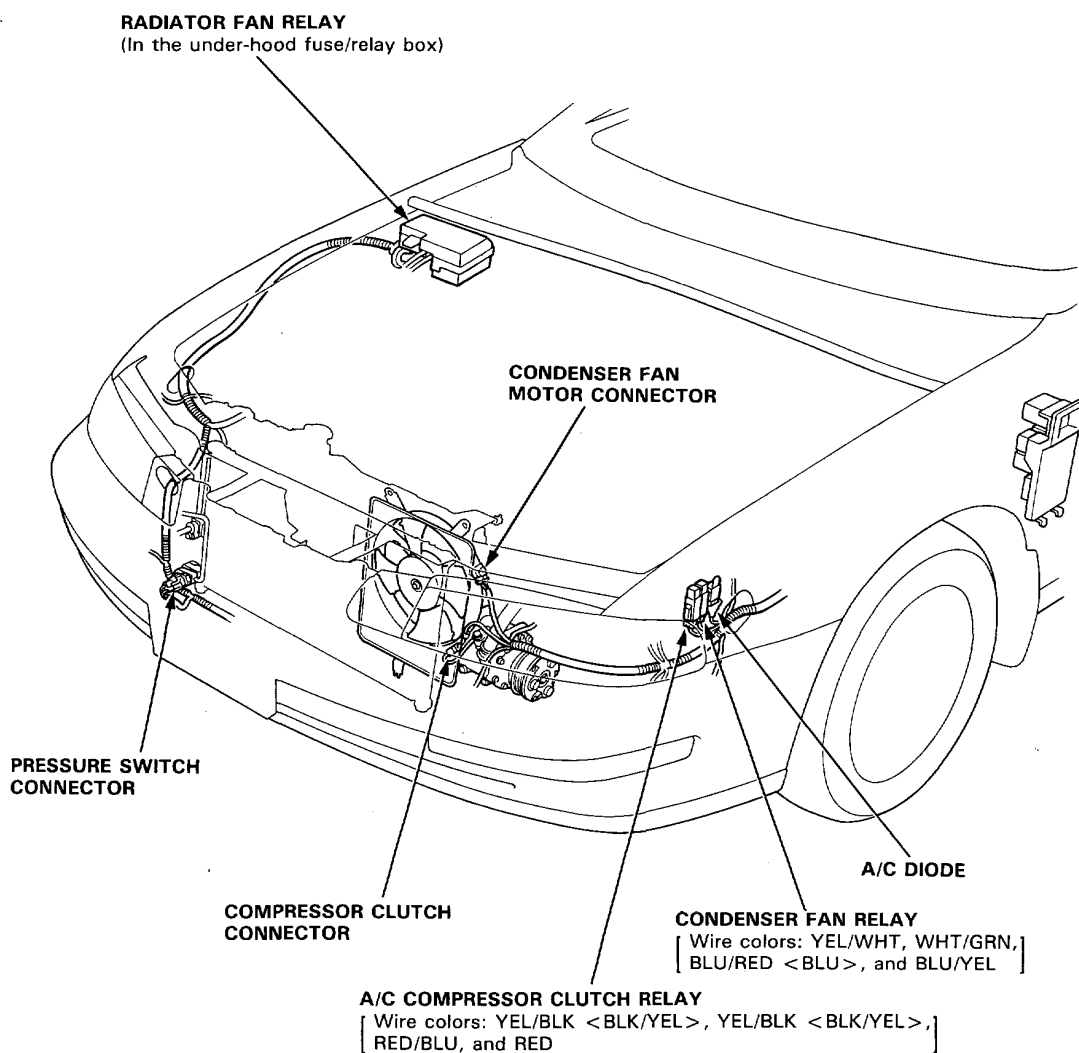
③



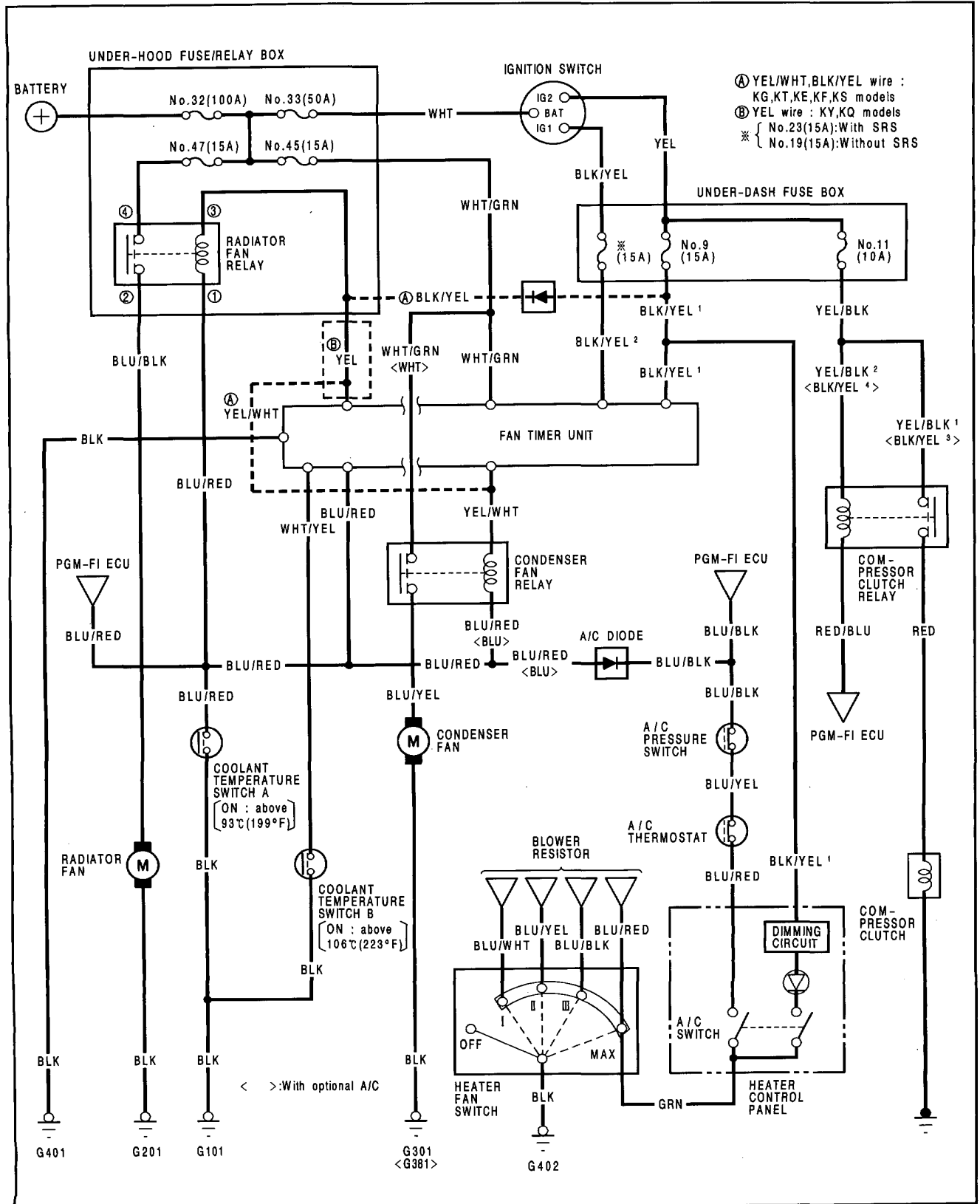
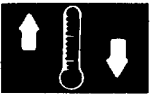
④



Wiring/Connector Locations



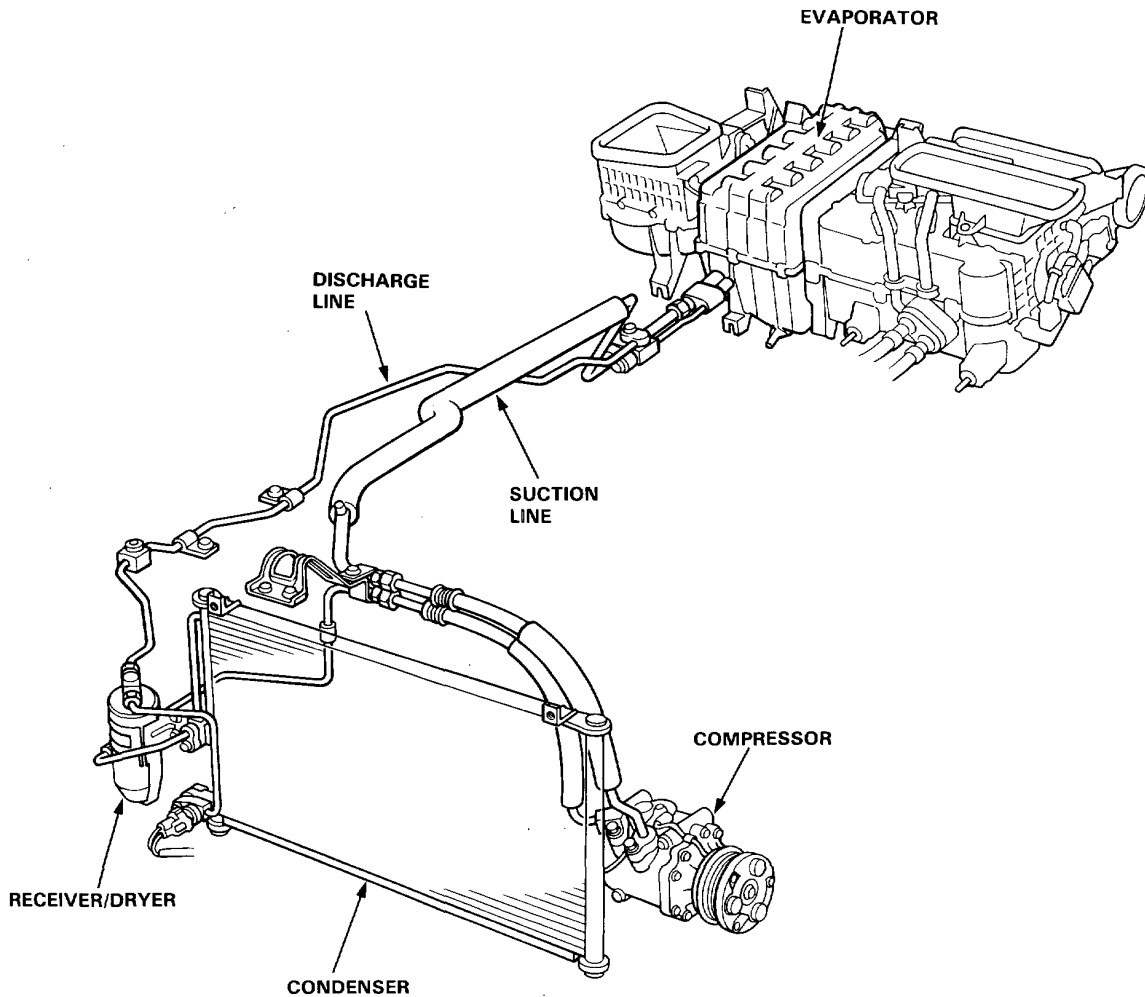
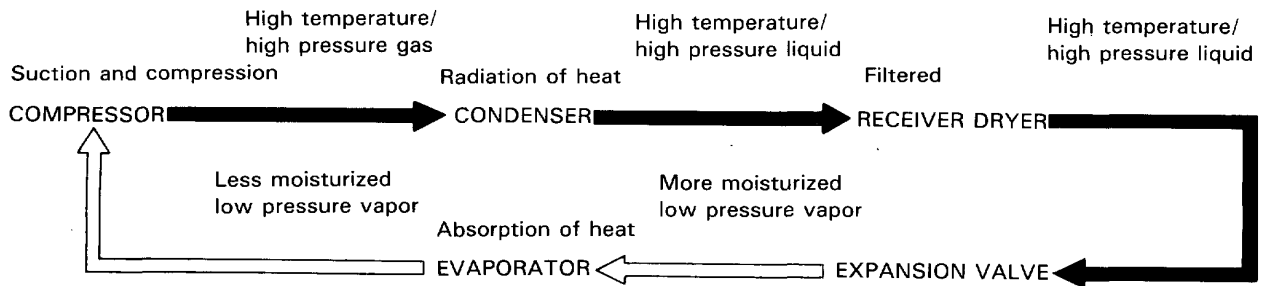
Circuit Diagram



Description

Air Conditioner

The air conditioner delivers cooled air into the passenger compartment by circulating refrigerant through the system as shown below.





Troubleshooting

Reference Chart

- Any abnormality must be corrected before continuing the test.
- Because of the precise measurements needed, use a voltmeter and ammeter when testing.

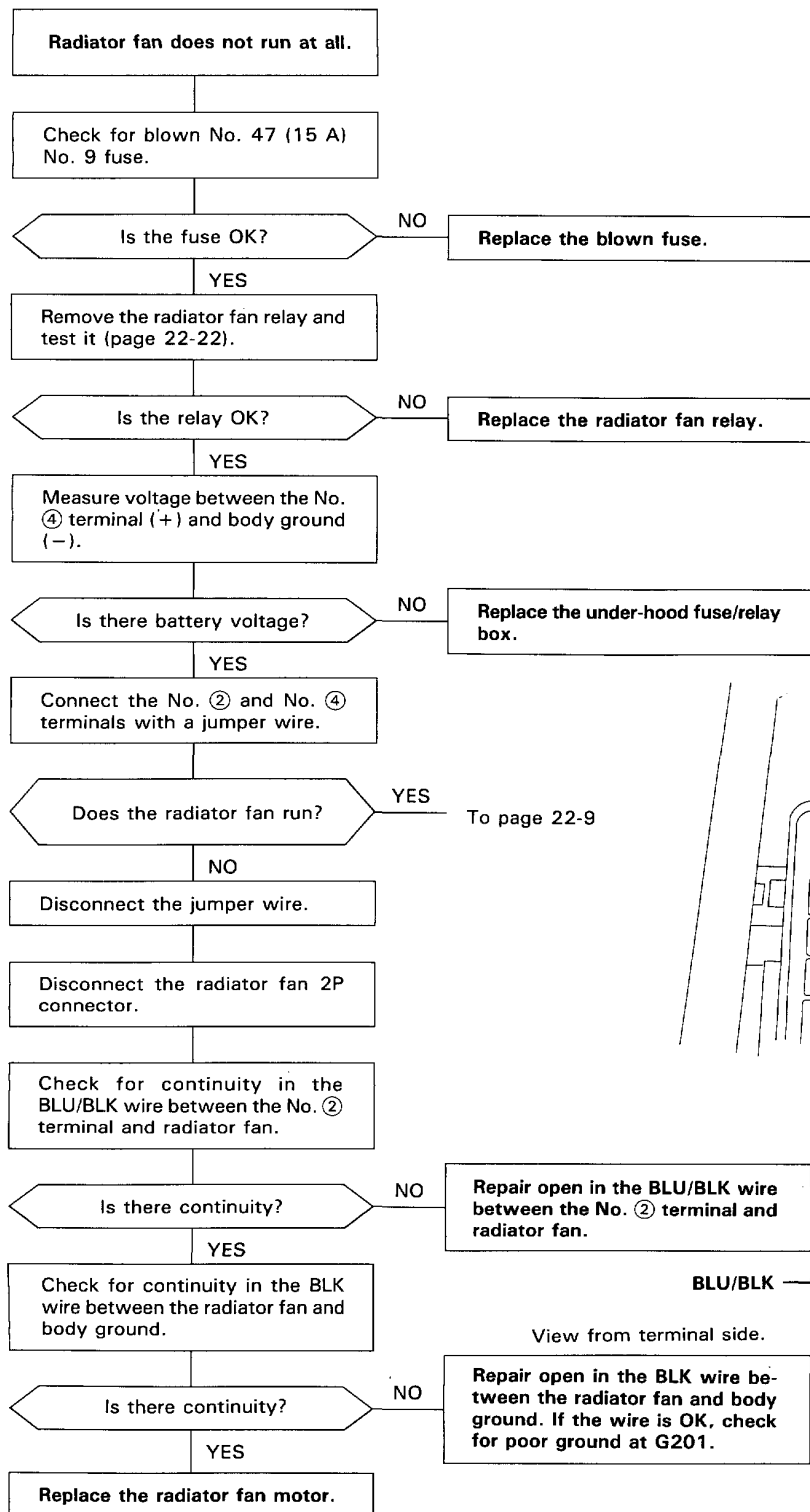
Before performing any troubleshooting procedures check:

- Fuses No. 47 (15 A), No. 45 (15 A), No. 11 (10 A), No. 9 (15 A)
- Grounds No. G402, G301, G201, G101
- All connectors are clean and tight.

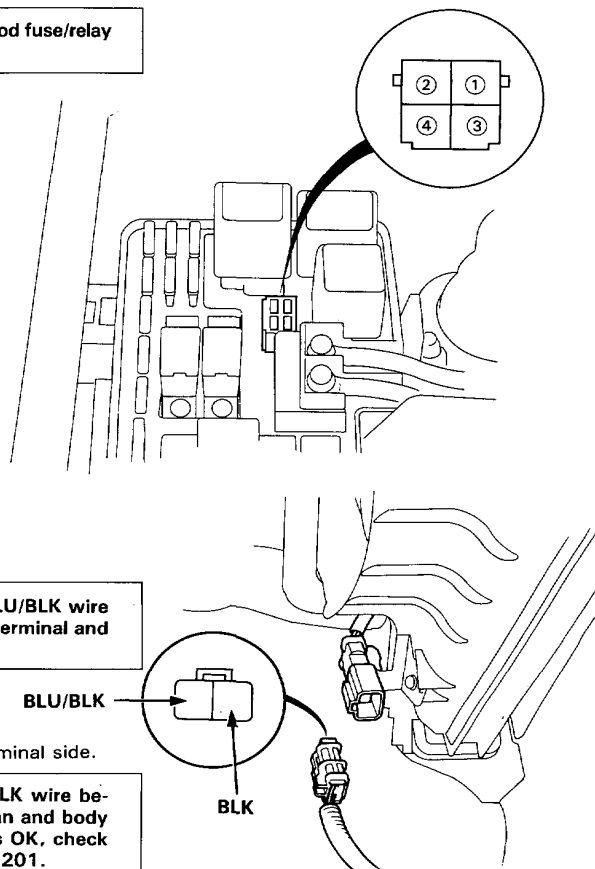
SYMPTOM	REMEDY
Radiator fan does not run at all.	Perform the procedures in the flowchart (page 22-8).
Condenser fan does not run at all.	Perform the procedures in the flowchart (page 22-10).
Both fans (radiator and condenser) do not run for engine cooling, but they both run with the A/C on.	Perform the procedures in the flowchart (page 22-12).
Both fans do not run at all.	Perform the procedures in the flowchart (page 22-14).
Compressor clutch does not engage.	Perform the procedures in the flowchart (page 22-16).
A/C system does not come on (compressor and both fans).	Perform the procedures in the flowchart (page 22-18).

Troubleshooting

Flowchart — Radiator Fan



Under-hood fuse/relay side





From page 22-8

Disconnect the jumper wire and turn the ignition switch ON.

Measure voltage between the No. ③ terminal (+) and body ground (-).

Is there battery voltage?

YES

Repair open in the BLU/RED wire between the No. ① terminal and A/C diode.

NO

KG, KE, KF, KS,KT, Models

Repair open in the BLK/YEL¹ wire between the No. ③ terminal (include the diode) and under-dash fuse box.

KY, KQ, Models

View from wire side.

YEL

Measure voltage between the YEL wire terminal of the fan timer unit (+) and body ground (-).

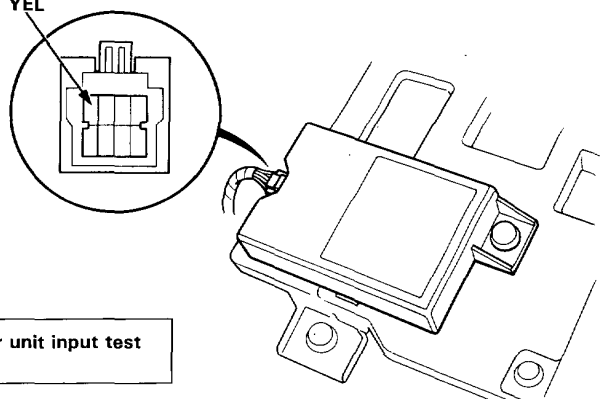
Is there battery voltage?

NO

Perform fan timer unit input test (page 22-21).

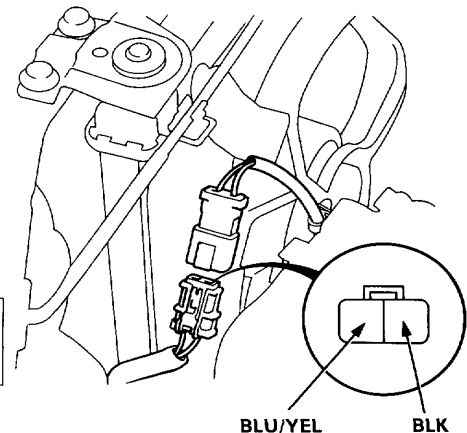
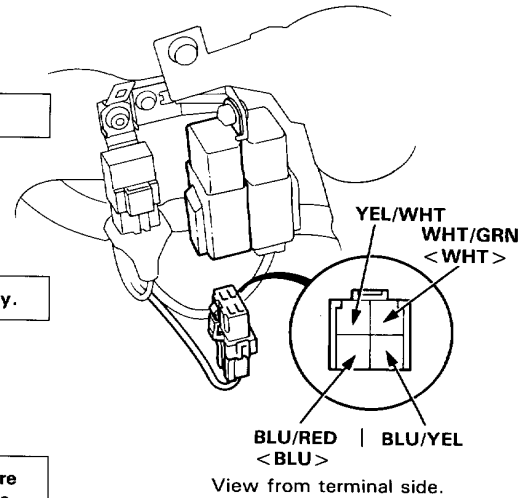
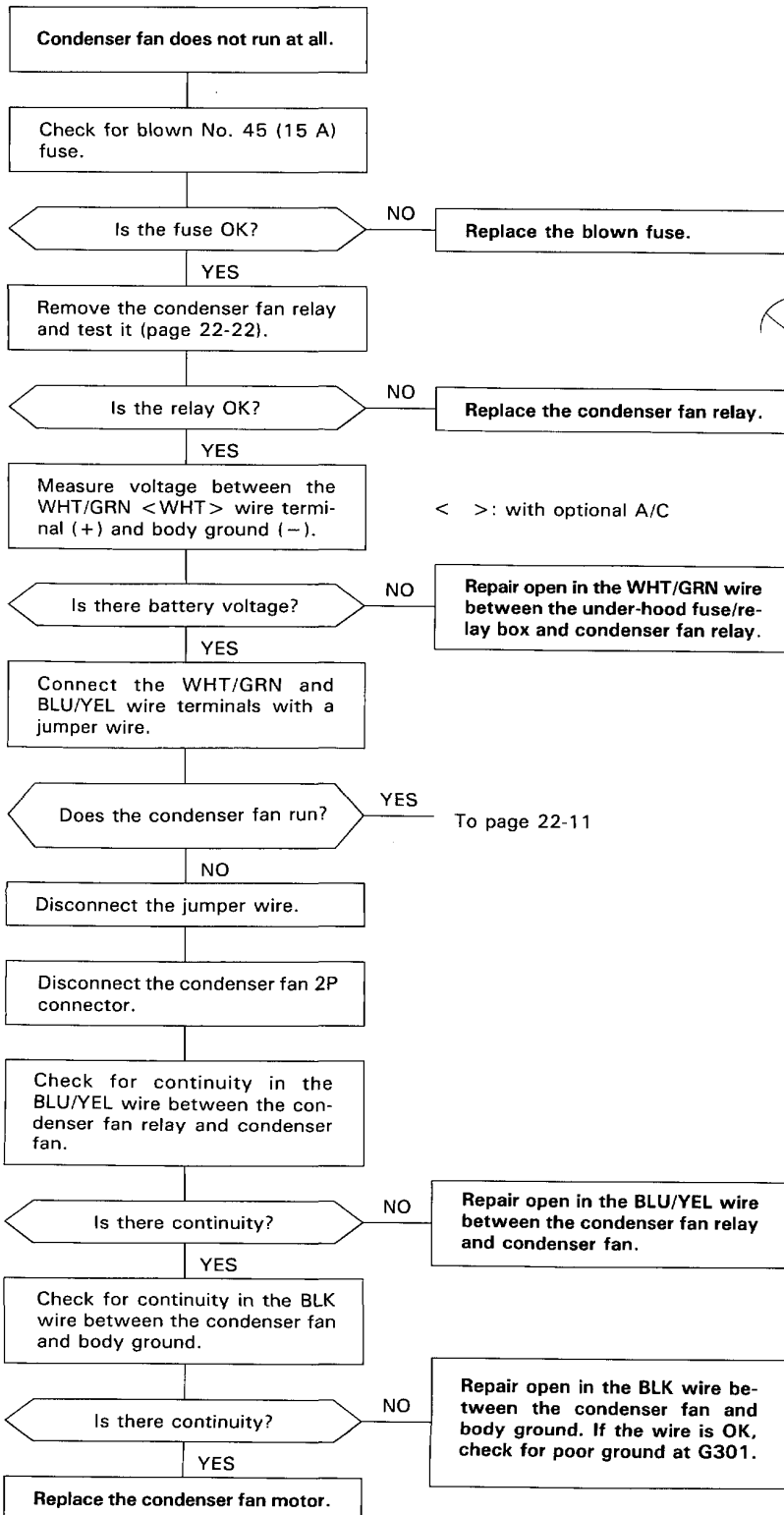
YES

Repair open in the YEL wire between the No. ③ terminal and fan timer unit.



Troubleshooting

Flowchart — Condenser Fan





From page 22-10

Disconnect the jumper wire and turn the ignition switch ON.

Measure voltage between the YEL/WHT wire terminal (+) and body ground (-).

Is there battery voltage?

YES

< >: with optional A/C

Repair open in the BLU/RED <BLU> wire between the condenser fan relay and A/C diode.

NO

Measure voltage between the YEL/WHT wire terminal at fan timer unit (+) and body ground (-).

Is there battery voltage?

NO

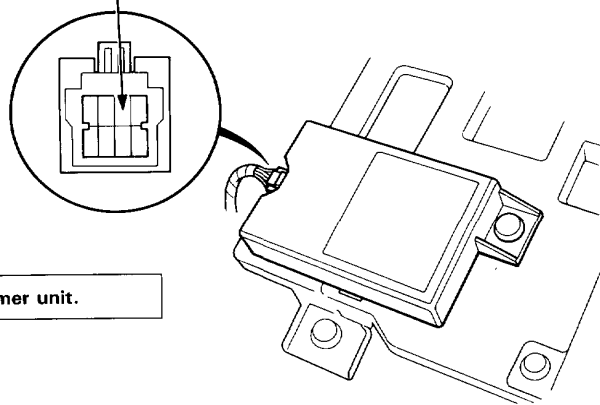
Replace the fan timer unit.

YES

Repair open in the YEL/WHT wire between the condenser fan relay and fan timer unit.

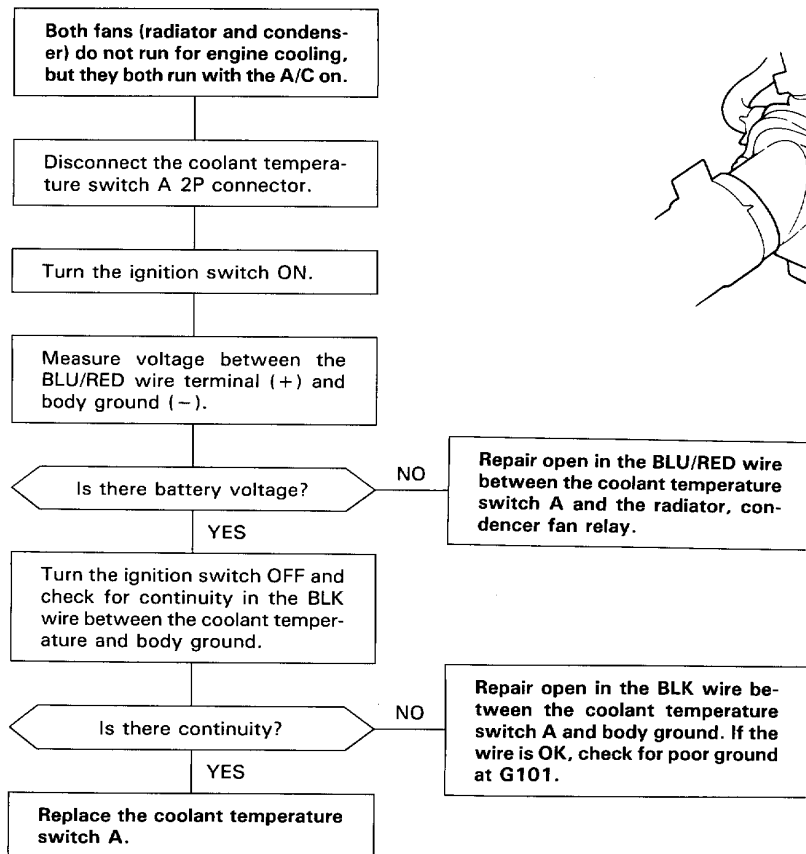
YEL/WHT

View from wire side.

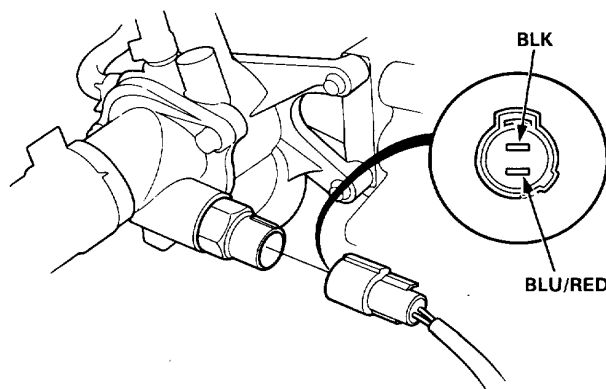


Troubleshooting

Flowchart — Coolant Temperature Switch A



View from terminal side.



Troubleshooting

Flowchart — Both Fans

Both fans do not run at all.

Check for blown No. 9 (15 A), No. 45 (15 A), No. 47 (15 A) fuse.

Is the fuse OK?

NO

Replace the blown fuse.

YES

Disconnect the A/C pressure switch 2P connector and A/C diode 4P connector.

Check for continuity in the BLU/BLK wire between the A/C pressure switch and A/C diode.

Is there continuity?

NO

Repair open in the BLU/BLK wire between the A/C pressure switch and A/C diode.

YES

Test the A/C diode (page 22-23).

Is the A/C diode OK?

NO

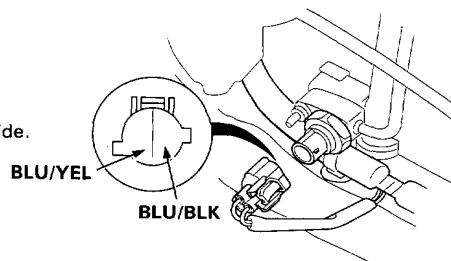
Replace the A/C diode.

YES

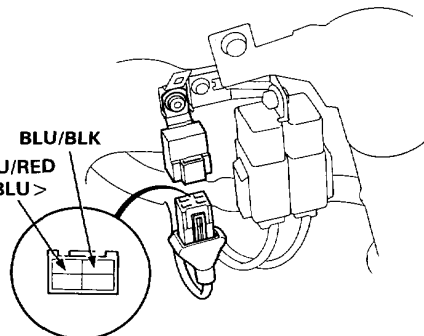
Disconnect the condenser fan relay 4P connector.

To page 22-15

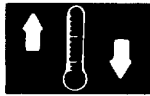
View from terminal side.



BLU/BLK
BLU/RED
<BLU>



View from terminal side.



From page 22-15

Check for continuity in the BLU/RED <BLU> wire between the A/C diode and condenser fan relay.

< >: with optional A/C

Is there continuity?

NO

Repair open in the BLU/RED wire between the A/C diode and condenser fan relay.

YES

Disconnect the fan timer unit 8P connector. Check for continuity in the BLK wire between the fan timer unit and body ground.

Is there continuity?

NO

Repair open in the BLK wire between the fan timer unit and body ground. If the wire is OK, check for poor ground at G401.

YES

Turn the ignition switch ON.

Measure voltage between the BLK/YEL³ wire terminal at fan timer unit (+) and body ground (-).

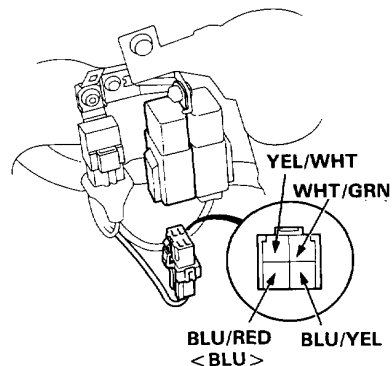
Is there battery voltage?

NO

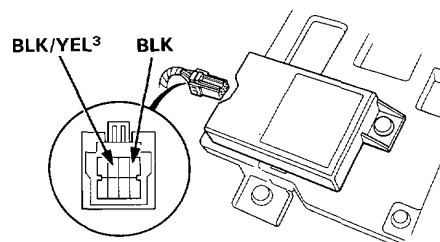
Repair open in the BLK/YEL³ wire between the under-dash fuse box and fan timer unit.

YES

Replace the fan timer unit.



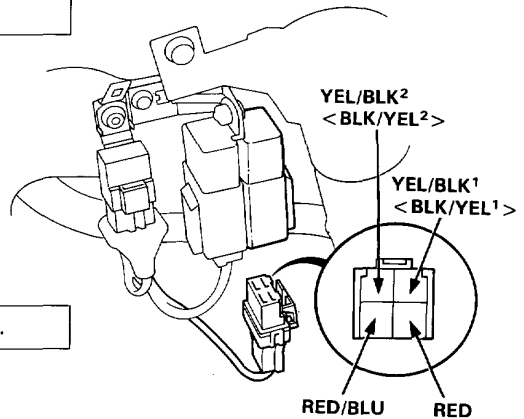
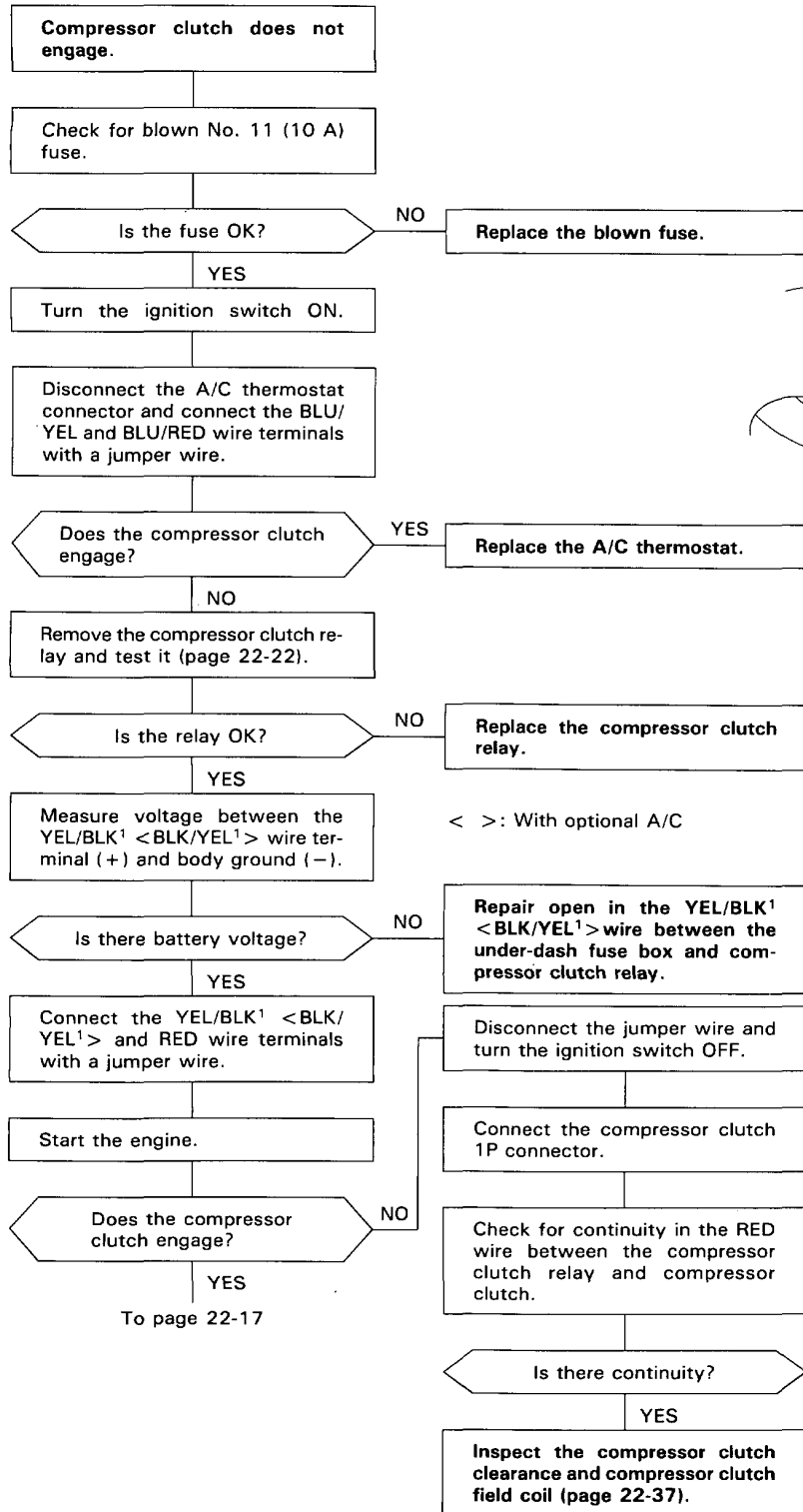
View from terminal side.



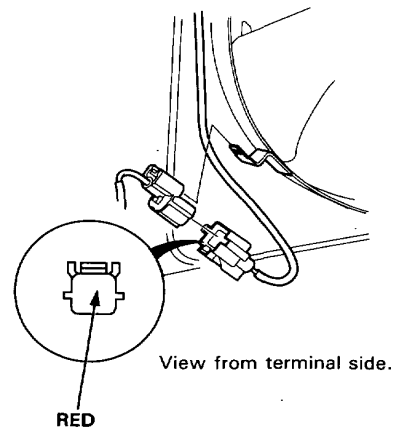
View from wire side.

Troubleshooting

Flowchart — Compressor



View from terminal side.



View from terminal side.



From page 22-16

Disconnect the jumper wire and measure voltage between the YEL/BLK² <BLK/YEL¹> wire terminal (+) and body ground (-).

< >: With optional A/C

Is there battery voltage?

NO

Repair open in the YEL/BLK² <BLK/YEL²> wire between the under-dash fuse box and compressor clutch relay.

YES

Turn the ignition switch OFF and reconnect the compressor clutch relay.

Connect the ECU test harness "A" and "B" connectors to the wire harness only, not to the ECU (section 11).

Turn the ignition switch ON.

Measure voltage between the A 15 terminal (+) and body ground (-).

Is there battery voltage?

NO

Repair open in the RED/BLU wire between the compressor clutch relay and ECU.

YES

Make sure the A/C and heater fan switches are OFF.

Measure voltage between the B 5 terminal (+) and body ground (-).

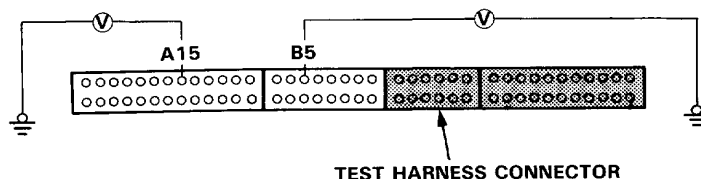
Is there battery voltage?

NO

Repair open in the BLU/BLK wire between the A/C diode and ECU.

YES

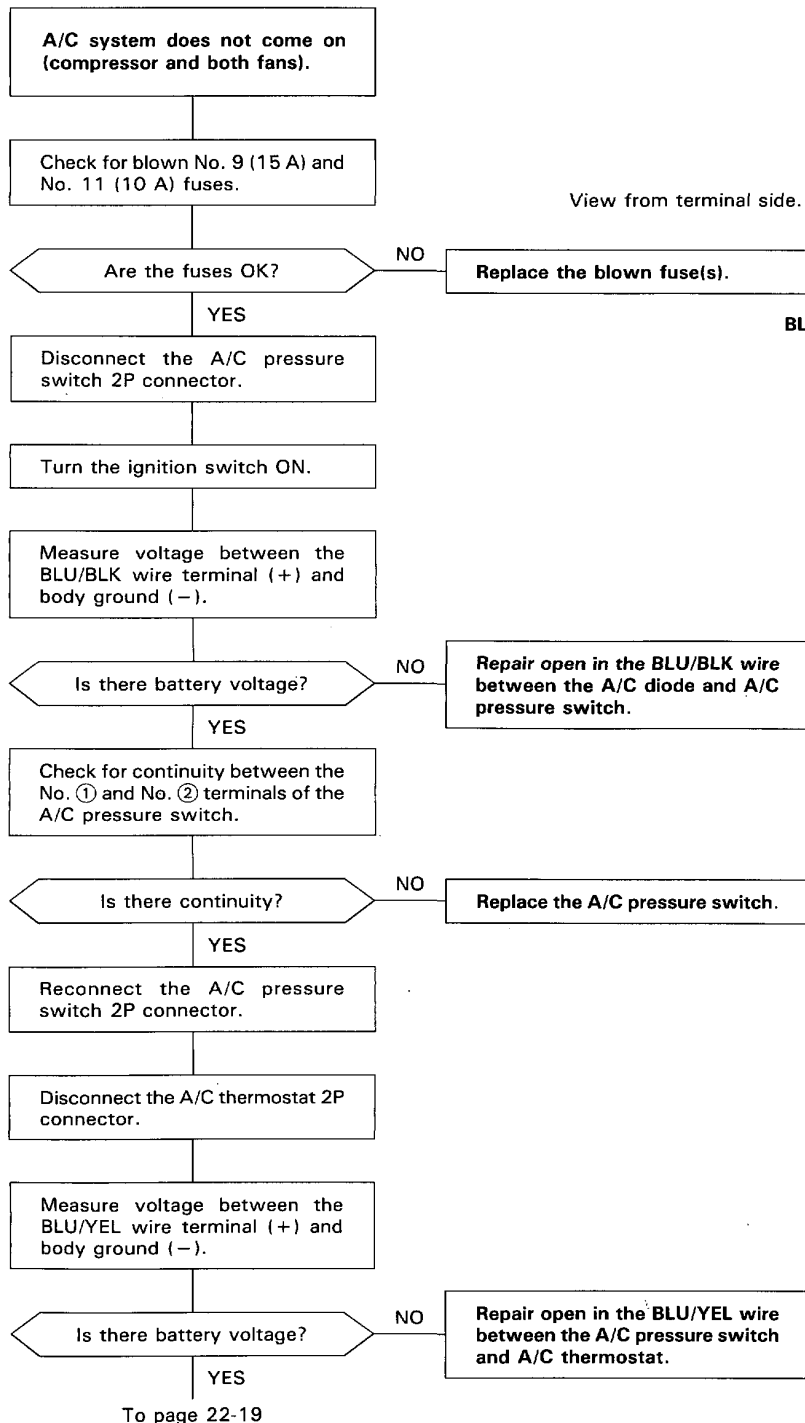
Substitute a known-good ECU and recheck. If symptom/indication goes away, replace the original ECU.



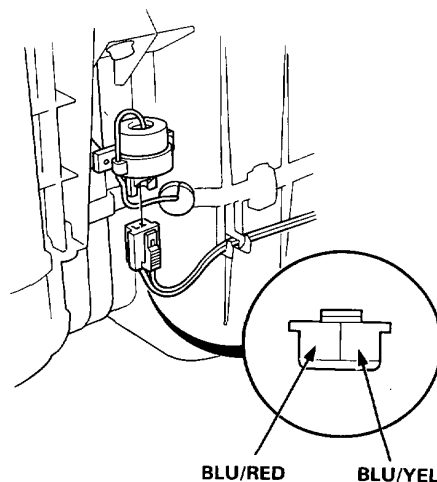
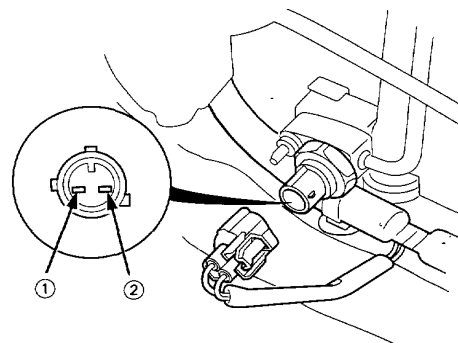
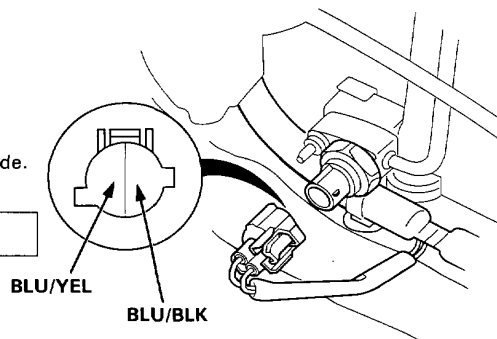
Troubleshooting

Flowchart — A/C System

NOTE: First, check for refrigerant pressure.



View from terminal side.



View from wire side.



From page 22-18

Turn the ignition switch OFF.

Check for continuity between the No. ① and No. ② terminals of the A/C thermostat.

Is there continuity?

NO

Replace the A/C thermostat.

YES

Remove the stereo radio/cassette player (Section 23).

Disconnect the heater control panel 16P connector.

Check for continuity in the BLU/RED wire between the A/C thermostat and heater control panel.

Is there continuity?

NO

Repair open in the BLU/RED wire between the A/C thermostat and heater control panel.

YES

Test the A/C switch (page 22-22).

Is the A/C switch OK?

NO

Replace the A/C switch.

YES

Disconnect the heater fan switch 7P connector.

Check for continuity in the GRN wire between the heater control panel and heater fan switch.

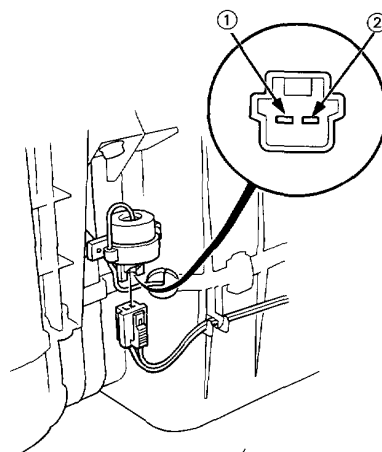
Is there continuity?

NO

Repair open in the GRN wire between the heater control panel and heater fan switch.

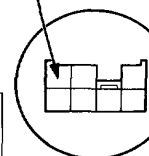
YES

To page 22-20



View from wire side.

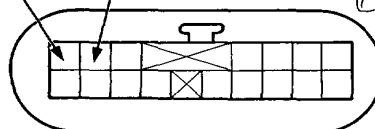
GRN



View from wire side.

BLU/RED

GRN



(cont'd)

Troubleshooting

Flowchart — A/C System (cont'd)

From page 22-19

Check for continuity in the BLK wire between the heater fan switch and body ground.

Is there continuity?

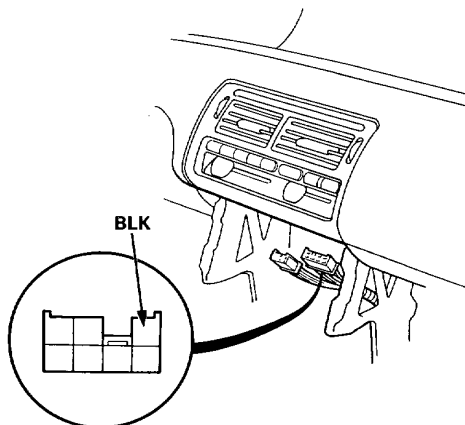
YES

Replace the heater fan switch.

NO

Repair open in the BLK wire between the heater fan switch and body ground. If the wire is OK, check for poor ground at G402.

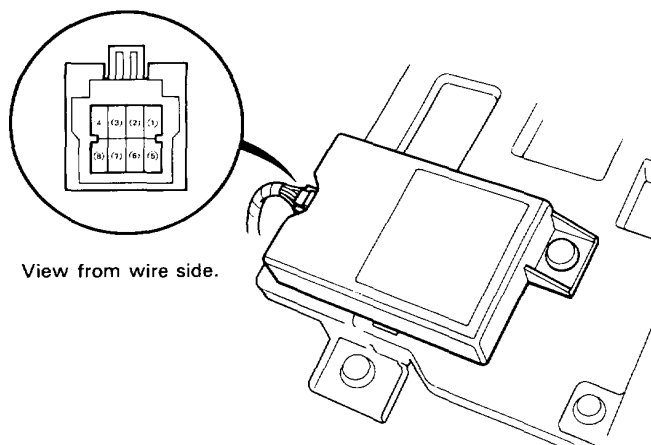
View from wire side.





Fan Timer Unit Input Tests

NOTE: Perform the following tests with the fan timer connected and the ignition switch ON. If you find the cause of a problem, correct it before you continue.



View from wire side.

WIRE POSITION	TEST CONDITION	DESIRED RESULTS	CORRECTIVE ACTION IF DESIRED RESULTS ARE NOT OBTAINED
① BLK	Check for voltage to body ground.	Should have less than 1 volt.	Repair open to body ground.
⑦ WHT/GRN	Check for battery voltage.	Should have battery voltage.	Check No. 45 fuse; if OK, repair open in WHT/GRN wire.
⑥ BLK/YEL ⁴	Check for battery voltage. (Ignition switch—ON)	Should have battery voltage.	Check No. 23 (with SRS) or No. 19 (without SRS) fuse; if OK, repair open in BLK/YEL ⁴ wire.
③ BLK/YEL ³	Check for battery voltage. (Ignition switch—ON)		Check No. 9 fuse; if OK, repair open in BLK/YEL ³ wire.
② YEL/WHT	Check for battery voltage. (Ignition switch—ON)		Replace fan timer unit. Before you connect the new timer, disconnect both fan relay. Check for continuity between the YEL/WHT (or YEL) wire and ground, using the 20 k scale on your ohmmeter. There should be no continuity. If there is continuity, the new timer will be damaged when you connect it.
④ YEL	Check for battery voltage. (Ignition switch—ON)		
⑤ BLU/RED	Connect to body ground.	Condenser fan and radiator fan should come on.	Check for an open in the BLU/RED wire between fan timer and condenser fan relay or radiator fan relay. If OK, check for an open in the YEL/WHT wire between fan timer and condenser fan relay or the YEL wire between fan timer and radiator fan relay. If OK, test condenser fan relay or radiator fan relay.
⑧ WHT/YEL	Check for voltage.	Approx 11 V (water temperature below 106°C)	Faulty coolant temperature switch B, short to body ground or faulty fan timer unit.

A/C Thermostat

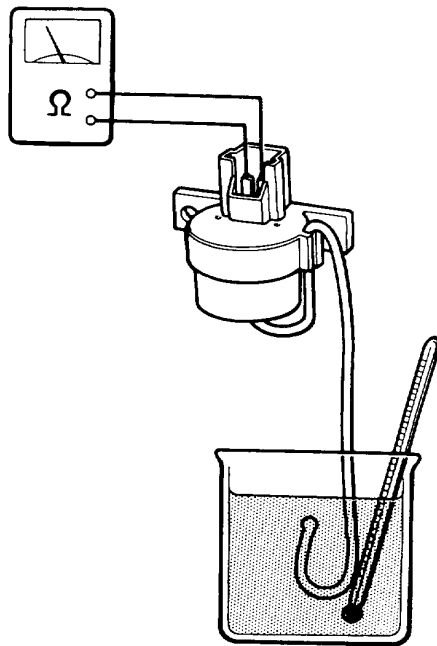
Test

Dip the A/C thermostat into a pan filled with ice water, and check for continuity between the terminals.

Cut off 1.5—−0.5°C (35—31°F)

Cut in 2.5—5°C (36—41°F)

If cut off or cut in temperature is too low or too high, replace the A/C thermostat.



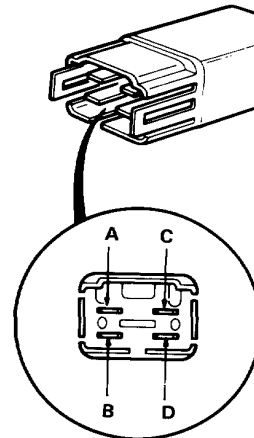
Relay

Test

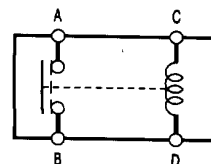
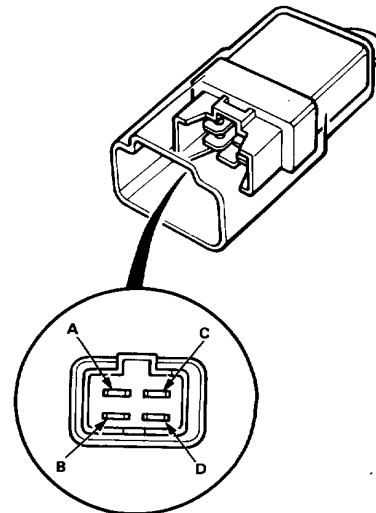
There should be continuity between the C and D terminals.

There should be continuity between the A and B terminals when the battery is connected to the C and D terminals. There should be no continuity when the battery is disconnected.

- Radiator fan relay



- Condenser fan relay
- Compressor clutch relay



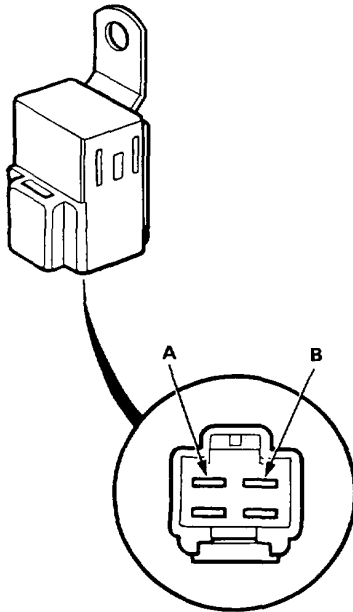


A/C Diode

Test

NOTE: The diodes are designed to pass current in one direction while blocking it in the opposite direction. Most ohmmeters, unless equipped with a diode tester, should not be used to test diodes.



Check for continuity in both directions between the A and B terminals. There should be continuity in only one direction.

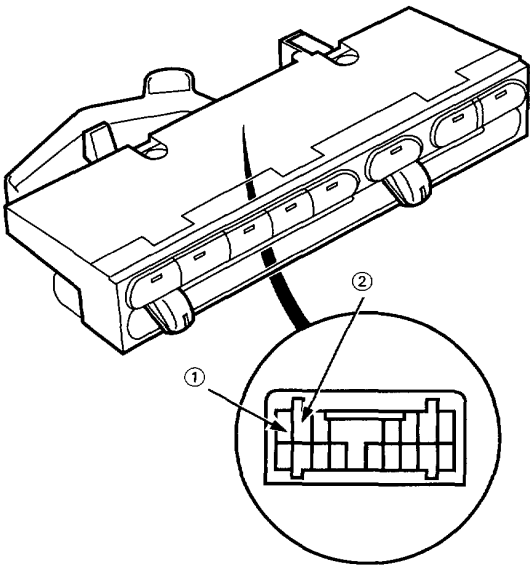


A/C Switch

Test

Check for continuity between the terminals according to the table below.

Terminal No.	①	②
Position		
ON		
OFF		



A/C Service Tips and Precautions

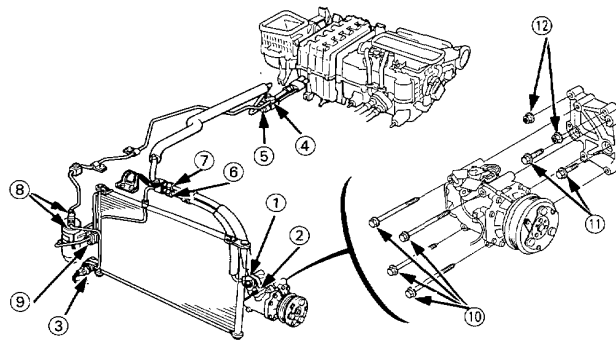
⚠ WARNING When handling refrigerant (R-12):

- Always wear eye protection.
- Do not let refrigerant get on your skin or your eyes; if it does:
 - Do not rub your eyes or skin.
 - Splash large quantities of cool water in your eyes or on your skin.
 - Rush to a physician or hospital for immediate treatment. Do not attempt to treat it yourself.
- Keep refrigerant containers (cans of R-12) stored below 40°C (100°F).
- Do not handle or discharge refrigerant in an enclosed area near an open flame; it may ignite and produce poisonous gas.
- Chlorine from chemicals called chlorofluorocarbons (CFCs) destroy the ozone in the stratosphere. Automotive air conditioning systems currently use chlorofluorocarbons as the refrigerant. Auto air conditioning service equipment has been developed to minimize the release of CFCs to the atmosphere. All service procedures should be performed using this equipment and the manufacturer's instructions.

1. Always disconnect the negative cable from the battery whenever replacing air conditioner parts.
2. Keep moisture and dust out of the system. When disconnecting any lines, plug or cap the fittings immediately; don't remove the caps or plugs until just before the lines are reconnected.
3. Before connecting any hose or line, apply a few drops of refrigerant oil to the seat of the O-ring or flare nut.
4. When tightening or loosening a fitting, use a second wrench to support the matching fitting.
5. When discharging the system, use a refrigerant recovery system; don't release refrigerant into the atmosphere.
6. Add refrigerant oil after replacing the following parts;

Condenser	10 cc (1/3 fl oz)
Evaporator	30 cc (1/2 fl oz)
Line or hose	10 cc (1/3 fl oz)
Receiver	10 cc (1/3 fl oz)
Compressor	On compressor replacement, subtract the volume of oil drained from the removed compressor from 120 cc (4 fl oz), and drain the calculated volume of oil from the new compressor.

120 cc (4 fl oz) – Volume of removed compressor = Draining volume.



① Discharge hose nut (8 x 1.25)	22 N·m (2.2 kg-m, 16 lb-ft)
② Suction hose bolt (8 x 1.25)	22 N·m (2.2 kg-m, 16 lb-ft)
③ Condenser pipe nut (6 x 1.0)	10 N·m (1.0 kg-m, 7 lb-ft)
④ Receiver pipe bolts (6 x 1.0)	10 N·m (1.0 kg-m, 7 lb-ft)
⑤ Suction pipe nut (6 x 1.0)	10 N·m (1.0 kg-m, 7 lb-ft)
⑥ Discharge pipe joint nut	23 N·m (2.3 kg-m, 17 lb-ft)
⑦ Suction pipe joint nut	33 N·m (3.3 kg-m, 24 lb-ft)
⑧ Receiver/dryer	13 N·m (1.3 kg-m, 9 lb-ft)
⑨ Discharge pipe nut (6 x 1.0)	10 N·m (1.0 kg-m, 7 lb-ft)
⑩ Compressor mounting bolts	22 N·m (2.2 kg-m, 16 lb-ft)
⑪ Compressor bracket mounting bolts	50 N·m (5.0 kg-m, 36 lb-ft)
⑫ Compressor bracket mounting nuts	50 N·m (5.0 kg-m, 36 lb-ft)



A/C System Service

Discharge

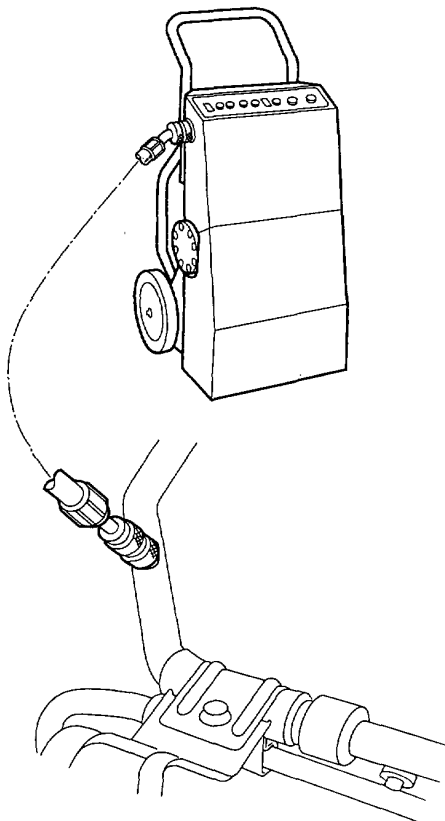
⚠ WARNING

- Keep away from open flames. The refrigerant, although nonflammable, will produce a poisonous gas if burned.
- Work in a well-ventilated area. Refrigerant evaporates quickly, and can force all the air out of a small enclosed area.

1. Connect a Refrigerant Recovery System to the A/C system.
2. Operate the Refrigerant Recovery System according to the manufacturer's instructions.

IMPORTANT: Do not vent refrigerant to the atmosphere. The chlorofluorocarbons (CFCs) used in conventional refrigerant (R-12) may damage the earth's ozone layer. Always use UL-listed, refrigerant recovery/recycling equipment to extract the refrigerant before you open an A/C system to make repairs. Follow the equipment manufacturer's instructions.

REFRIGERANT RECOVERY/ RECYCLING SYSTEM



A/C System Service

Performance Test

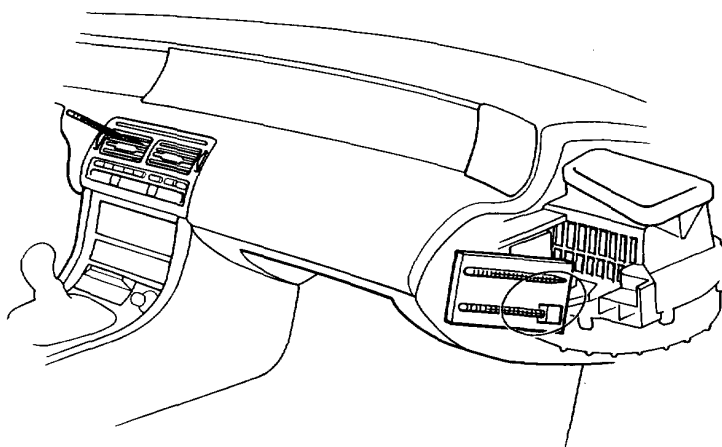
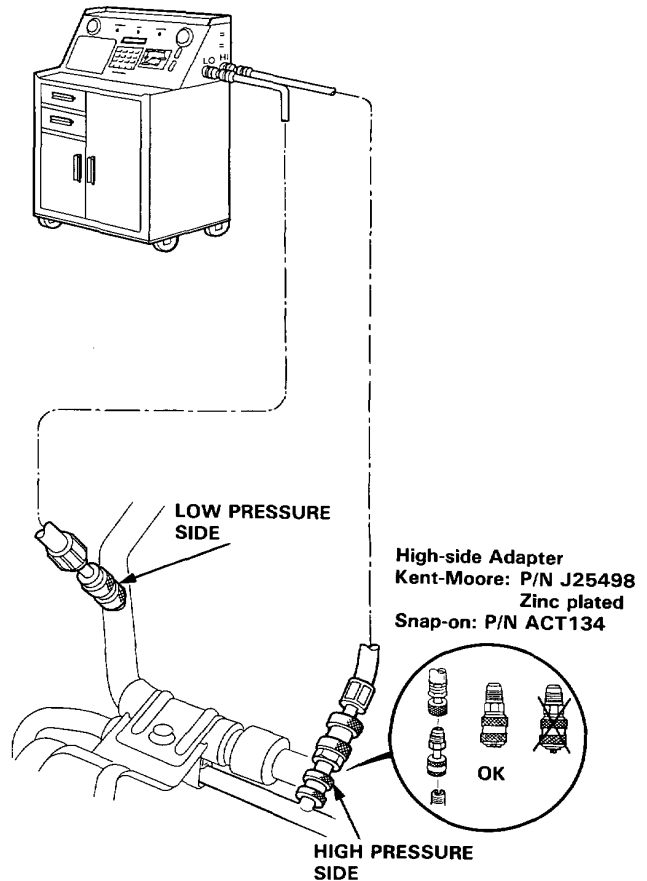
The performance test will help to determine if the air conditioning system is operating within specifications.

1. Connect the Air Conditioning Service Station as shown.

NOTE: Connect the adapter to the high pressure hose first, then connect the hoses to the car as shown. When testing is completed, disconnect the hose adapter from the high-side fitting; do not disconnect the hose from the adapter, or refrigerant may escape from the system.

2. Insert a thermometer in the center vent outlet. Determine the relative humidity and ambient air temperature by calling the local weather station.
3. Test conditions:
 - Avoid direct sunlight.
 - Open engine hood.
 - Open front doors.
 - Set the temperature control dial to COLD and push the mode control button to VENT position and recirculation control button to REC position.
 - Slide the fan switch to the highest position.
 - Run the engine at 1,500 rpm.
 - No driver or passengers in vehicle.
4. After running the air conditioning for 10 minutes under the above test conditions, read the delivery temperature from the thermometer in the dash vent and the high and low system pressure from the Air Conditioning Service Station.

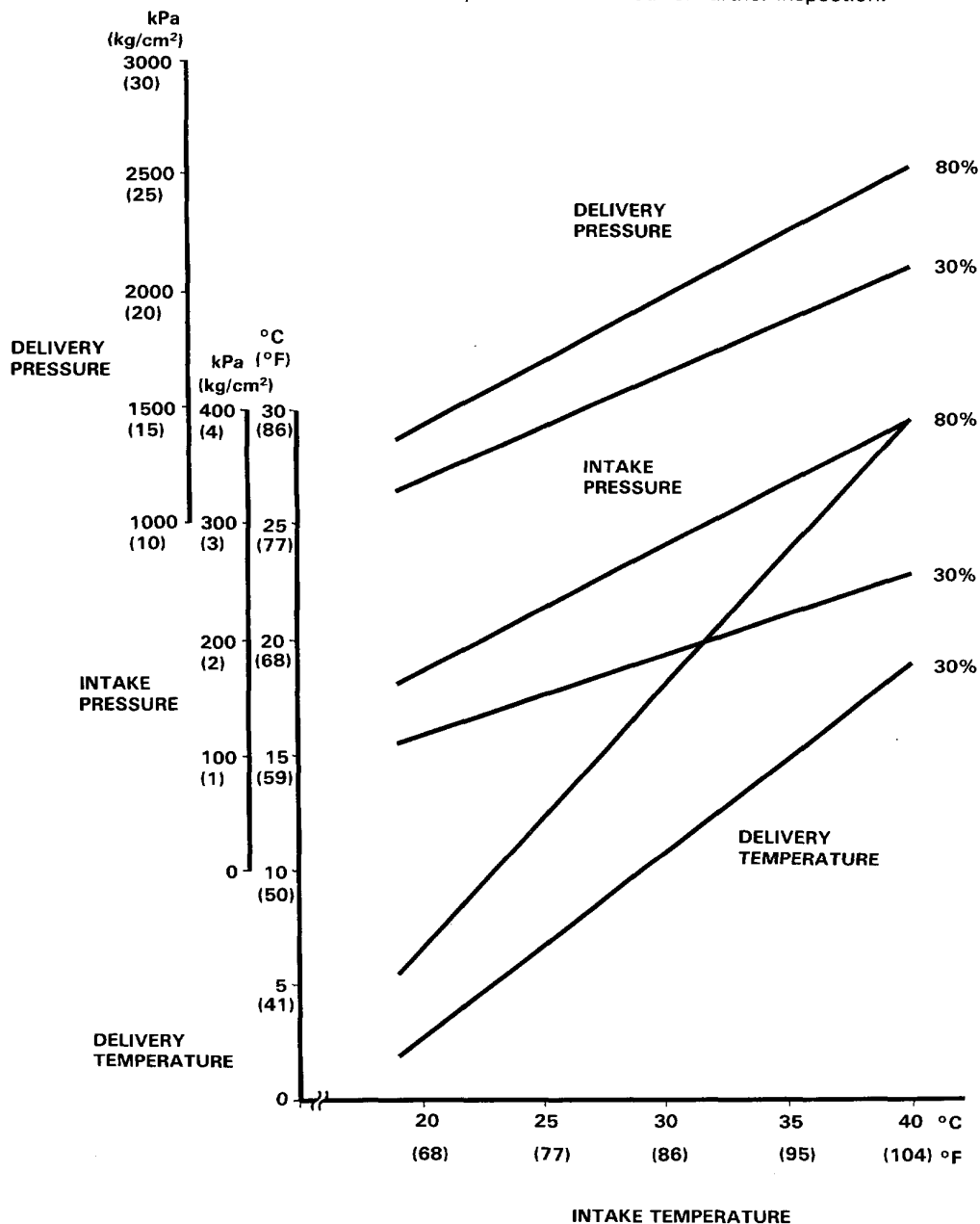
**AIR CONDITIONING
SERVICE STATION**





5. To complete the charts:

- Mark the delivery temperature along the vertical line.
- Mark the intake temperature (ambient air temperature) along the bottom line.
- Draw a line straight up from the air temperature to the humidity.
- Mark a point one line above and one line below the humidity level. (10% above and 10% below the humidity level)
- From each point, draw a horizontal line across the delivery temperature.
- The delivery temperature should fall between the two lines.
- Complete the low side pressure test and high side pressure test in the same way.
- Any measurements outside the line may indicate the need for further inspection.



A/C System Service

Pressure Test Chart

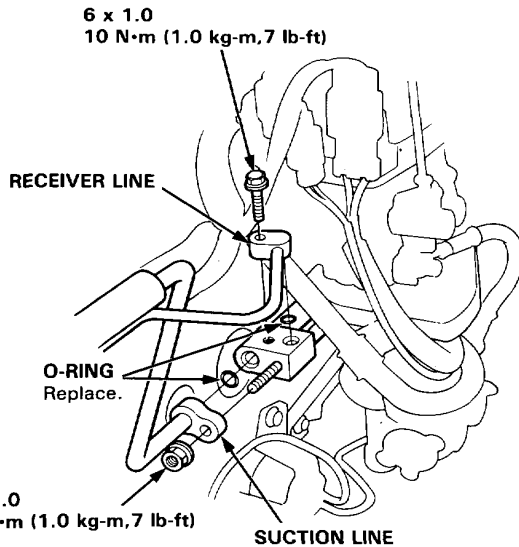
TEST RESULTS	RELATED SYMPTOMS	PROBABLE CAUSE	REMEDY
Discharge (high) pressure abnormally high	After stopping compressor, pressure drops to about 196 kPa (28 psi) quickly, and then falls gradually	Air in system	Evacuate system; then recharge Evacuation: page 22-42 Recharging: page 22-43
	No bubbles in sight glass when condenser is cooled by water	Excessive refrigerant in system	Discharge refrigerant as necessary
	Reduced or no air flow through condenser	<ul style="list-style-type: none"> • Clogged condenser or radiator fins • Condenser or radiator fan not working properly 	<ul style="list-style-type: none"> • Clean • Check voltage and fan rpm • Check fan direction
	Line to condenser is excessively hot	Restricted flow of refrigerant in system	<ul style="list-style-type: none"> • Expansion valve • Restricted lines
Discharge pressure abnormally low	Excessive bubbles in sight glass; condenser is not hot	Insufficient refrigerant in system	<ul style="list-style-type: none"> • Check for leak • Charge system
	High and low pressures are balanced soon after stopping compressor	<ul style="list-style-type: none"> • Faulty compressor discharge or inlet valve • Faulty compressor seal 	Replace
	Outlet of expansion valve is not frosted, low pressure gauge indicates vacuum	<ul style="list-style-type: none"> • Faulty expansion valve • Moisture in system 	<ul style="list-style-type: none"> • Replace • Flush and evacuate
Suction (low) pressure abnormally low	Excessive bubbles in sight glass; condenser is not hot	Insufficient refrigerant	Check for leaks. Charge as required.
	Expansion valve is not frosted and low pressure line is not cold. Low pressure gauge indicates vacuum	<ul style="list-style-type: none"> • Frozen expansion valve • Faulty expansion valve 	Replace expansion valve
	Discharge temperature is low and the air flow from vents is restricted	Frozen evaporator	Run the fan with compressor off then check capillary tube.
	Expansion valve frosted	Clogged expansion valve	Clean or Replace
	Receiver dryer is cool (should be warm during operation)	Clogged receiver dryer	Replace
Suction pressure abnormally high	Low pressure hose and check joint are cooler than around evaporator	<ul style="list-style-type: none"> • Expansion valve open too long • Loose expansion valve 	Repair or Replace.
	Suction pressure is lowered when condenser is cooled by water	Excessive refrigerant in system	Discharge refrigerant as necessary
	High and low pressure are equalized as soon as the compressor is stopped and both gauges fluctuate while running	<ul style="list-style-type: none"> • Faulty gasket • Faulty high pressure valve • Foreign particle stuck in high pressure valve 	Replace compressor
Suction and discharge pressures abnormally high	Reduced air flow through condenser	<ul style="list-style-type: none"> • Clogged condenser or radiator fins • Condenser or radiator fan not working properly 	<ul style="list-style-type: none"> • Clean condenser and radiator • Check voltage and fan rpm • Check fan direction
	No bubbles in sight glass when condenser is cooled by water	Excessive refrigerant in system	Evacuate and recharge
Suction and discharge pressure abnormally low	Low pressure hose and metal end areas are cooler than evaporator	Clogged or kinked low pressure hose parts	Repair or Replace
	Temperature around expansion valve is too low compared with that around receiver dryer	Clogged high pressure line	Repair or Replace
Refrigerant leaks	Compressor clutch is dirty	Compressor shaft seal leaking	Replace compressor
	Compressor bolt(s) are dirty	Leaking around bolt(s)	Tighten bolt(s) or replace compressor
	Compressor gasket is wet with oil	Gasket leaking	Replace compressor
Compressor heat damage	Black soot inside compressor and hoses.	Restriction or leak in system.	Flush entire system, replace rubber lines or hoses.



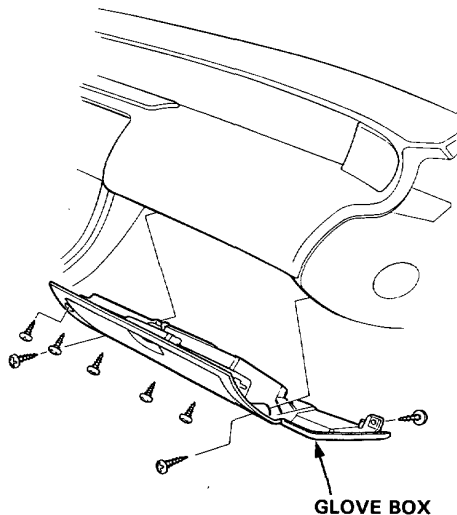
Evaporator Replacement

1. Discharge the refrigerant (page 22-25).
2. Remove the bolt and disconnect the receiver line from the evaporator.
3. Remove the nut and disconnect the suction line from the evaporator.

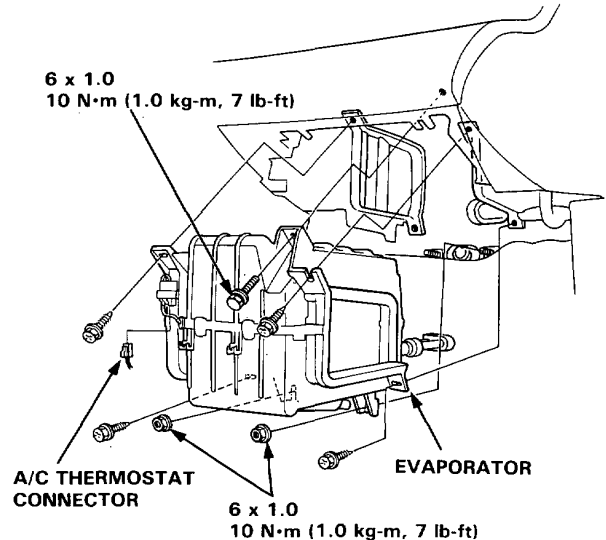
CAUTION: Cap the open fittings immediately to keep moisture out of the system.



4. Remove the seven self-tapping screws then remove the glove box.



5. Disconnect the connector from the A/C thermostat.
6. Remove the four self-tapping screws, bolt, and two nuts, then remove the evaporator.



7. Install in the reverse order of remove, and:
 - Replace all O-rings with new ones.
 - Apply a sealant to the grommets.
 - Make sure that there is no air leakage.
 - Charge the system (page 22-42) and test performance (page 22-26).



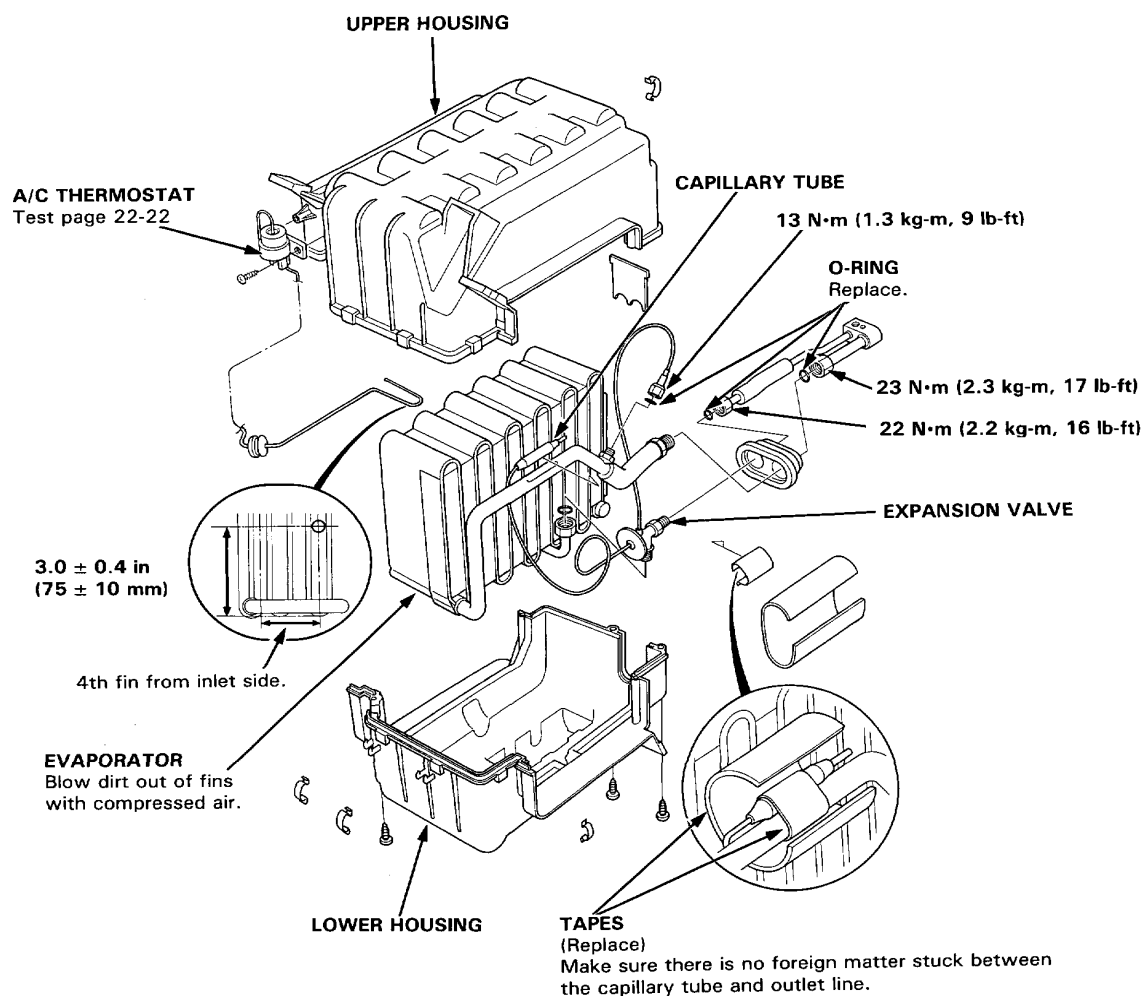
Overhaul

1. Pull the evaporator sensor out of the evaporator fins.
2. Remove the self-tapping screws and clips from the housing.
3. Carefully separate the housings and remove the evaporator covers.
4. Remove the expansion valve if necessary.

NOTE: When loosening the expansion valve nuts, use a second wrench to hold the valve or evaporator pipe or they can be cracked.

Assemble the evaporator in the reverse order of disassembly, and:

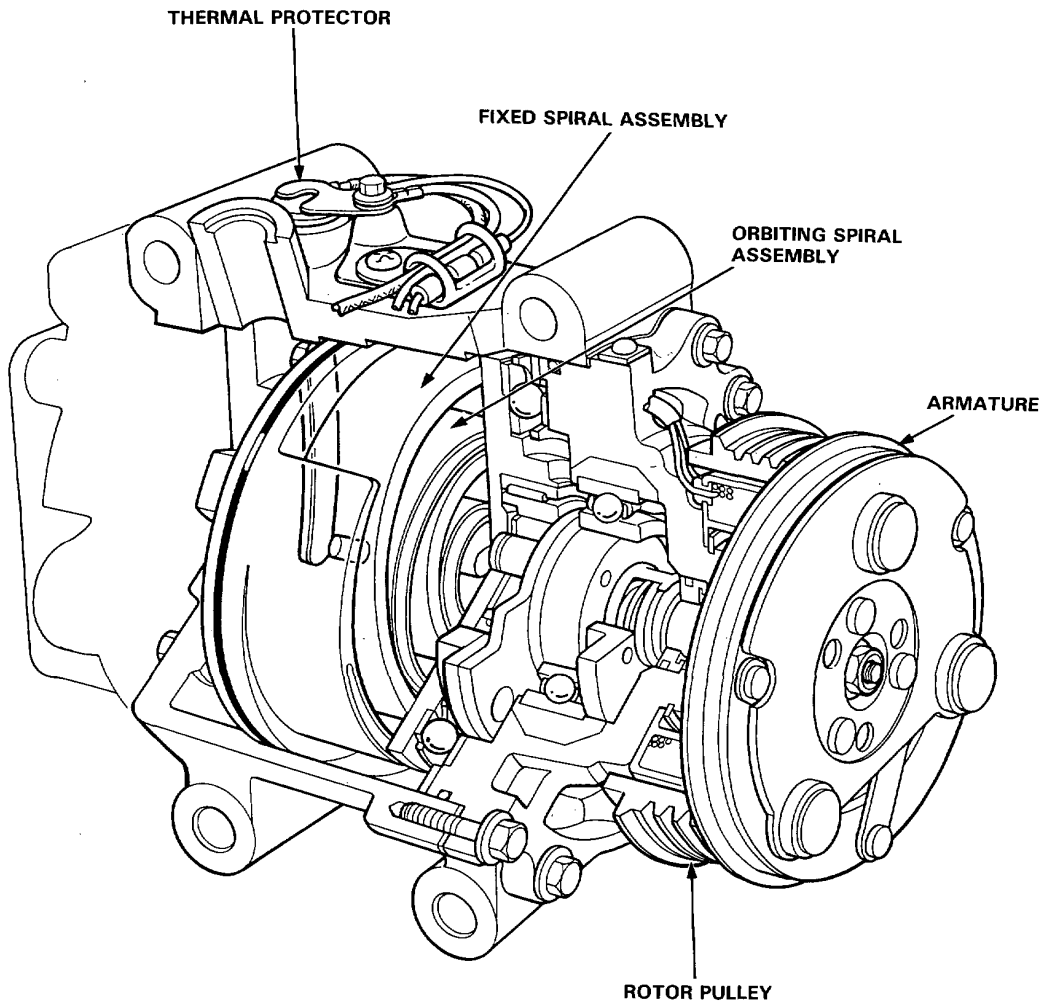
- Replace all O-rings with new ones.
- Apply a thin coat of refrigerant oil to the new O-rings at joint nuts.
- Install the expansion valve capillary tube with the capillary tube in contact with the suction line directly, and wrap it with tape.
- Reinstall the evaporator sensor in its original location.



Compressor

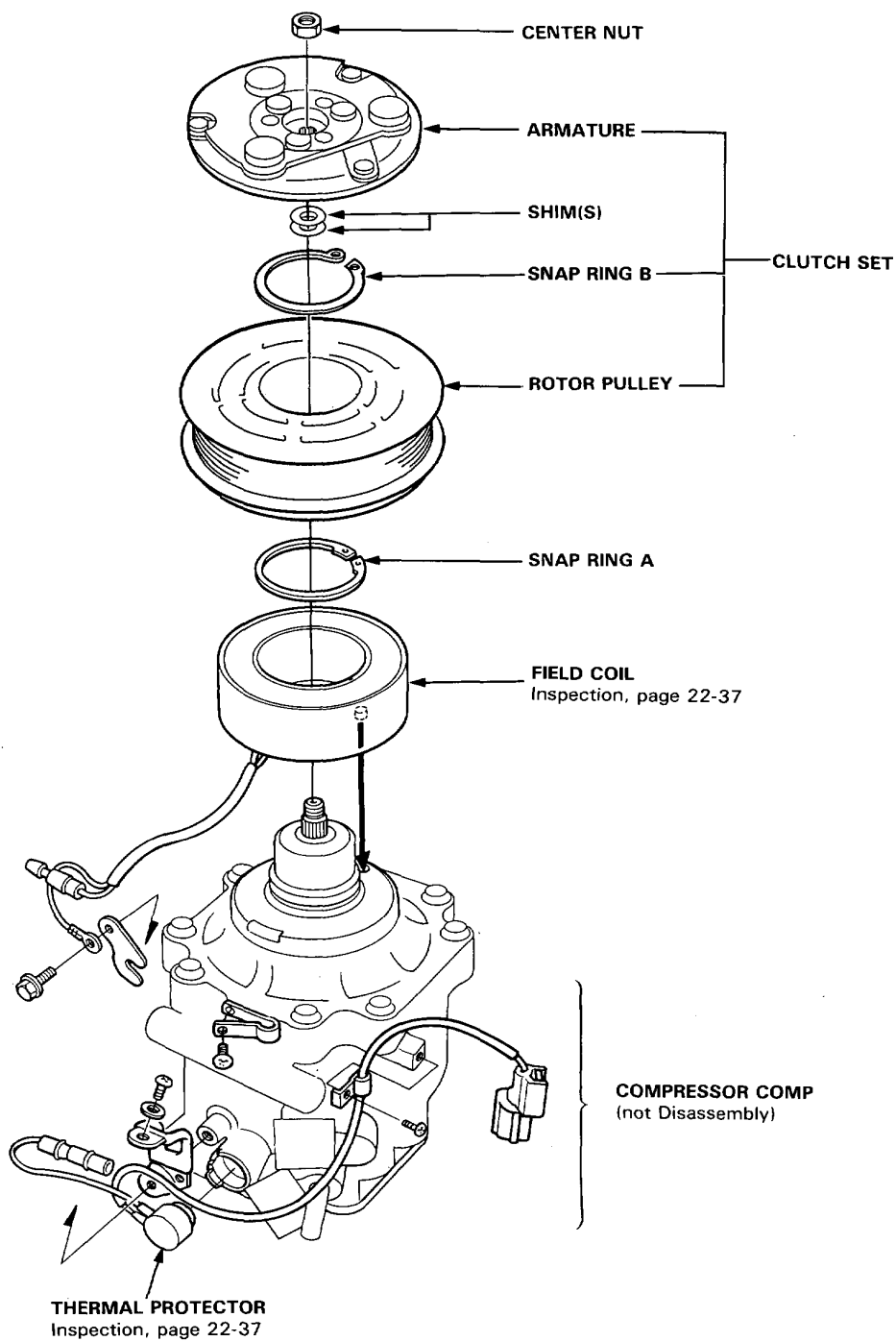
Description

This compressor is the spiral type. Refrigerant is compressed between a fixed spiral assembly and an orbiting spiral assembly. A thermal protector is installed on this compressor.



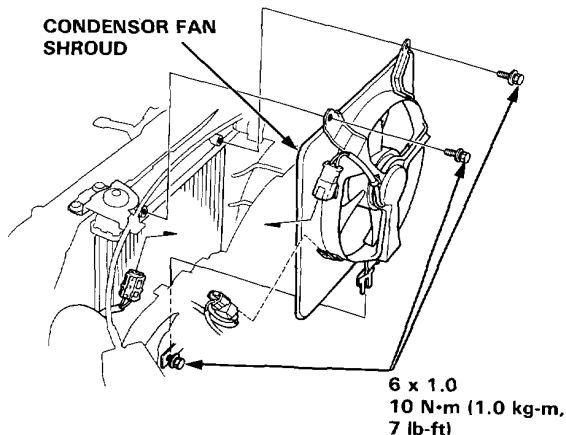


Illustrated Index



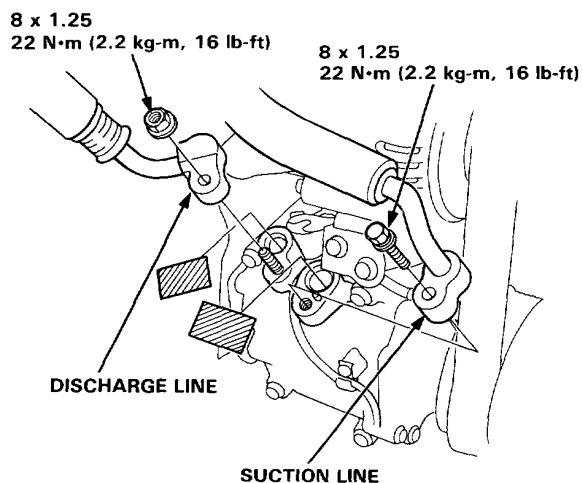
Compressor Replacement

1. If the compressor is marginally operable, run the engine at idle speed and turn the air conditioner fan for a few minutes, then shut the engine off and disconnect the battery negative terminal.
2. Discharge the refrigerant (page 22-25).
3. Disconnect the condensor fan 2P connector.
4. Loosen the under mounting bolt, and remove the two upper mounting bolts and condensor fan shroud.

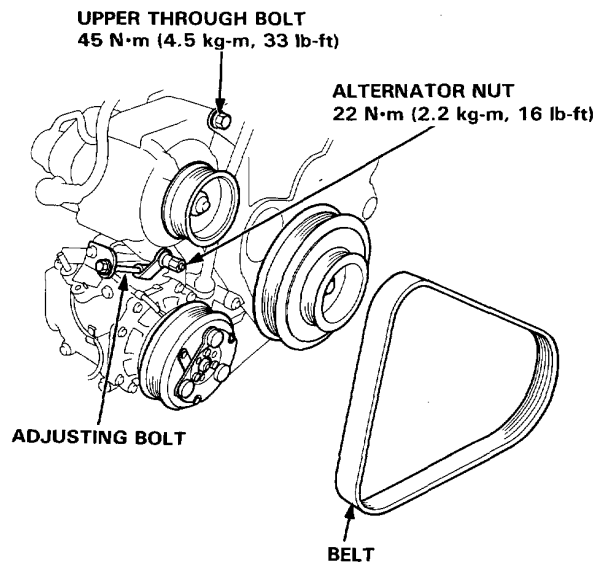


5. Remove the two bolt, and disconnect the suction line and discharge line from the compressor.

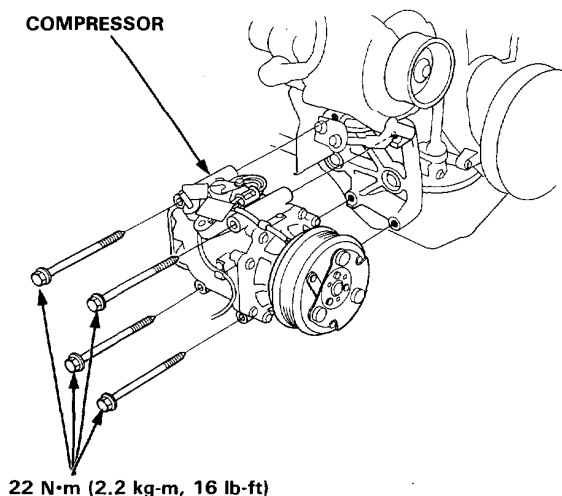
CAUTION: Cap the open fittings immediately to keep moisture out of the system.



6. Remove the power steering pump belt (section 17).
7. Loosen the upper through bolt and alternator nut, then turn the adjusting bolt and remove the belt.



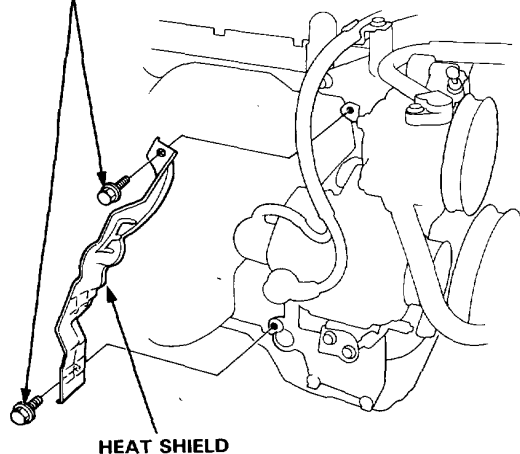
8. Disconnect the compressor clutch 1P connector.
9. Remove the four compressor mounting bolts and compressor.





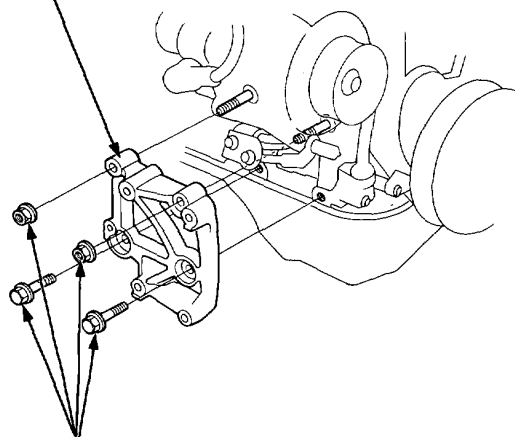
10. Remove the two mounting bolts and the heat shield.

6 x 1.0
10 N·m (1.0 kg-m, 7 lb-ft)



11. If necessary, remove the two compressor bracket mounting bolts, two nuts and compressor bracket.

COMPRESSOR
BRACKET



50 N·m (5.5 kg-m, 37 lb-ft)

12. Install the removed parts in the reverse order of removal, and:

- If a new compressor is installed, calculate the refrigerant oil as below and drain through the suction fitting on the compressor:
120—140 cc (4—4-2/3 fl-oz) minus contents of old compressor, equals amount to drain from new compressor.
- Do not damage the condenser fins when removing/installing the compressor.
- Adjust compressor belt tension (page 22-36).
- Adjust the power steering pump belt (section 17).
- Charge the A/C system (page 22-42).
- Test the A/C system performance (page 22-26).

Compressor

Belt Adjustment

1. Apply a force of 98 N (10 kg, 22 lb) and measure the deflection between the alternator and crankshaft pulley.

Compressor Belt

Deflection:

Used Belt: 10.0–12.0 mm (0.39–0.47 in)

New Belt: 4.5–7.0 mm (0.18–0.28 in)

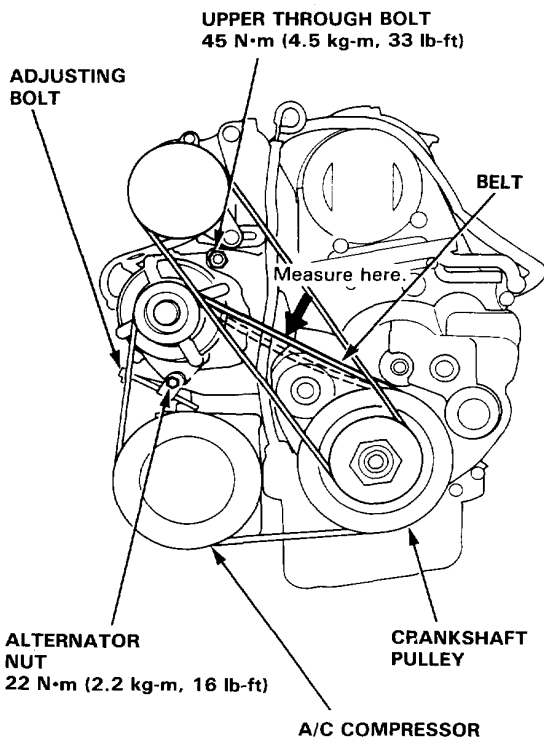
P/S Belt

Used Belt: 13.5–16.5 mm (0.52–0.65 in)

New Belt: 9.5–11.5 mm (0.33–0.45 in)

NOTE:

- If there are cracks or any damage evident on the belt, replace it with a new one.
- "Used belt" means a belt which has been used for five minutes or more.
- "New belt" means a belt which has been used for less than five minutes.



Measure with Belt Tension Gauge:

Attach the belt tension gauge to the belt and measure the tension of the belt.

Compressor Belt

Tension:

Used Belt: 450–600 N (45–60 kg, 99–132 lb)

New Belt: 950–1150 N

(95–115 kg, 209–254 lb)

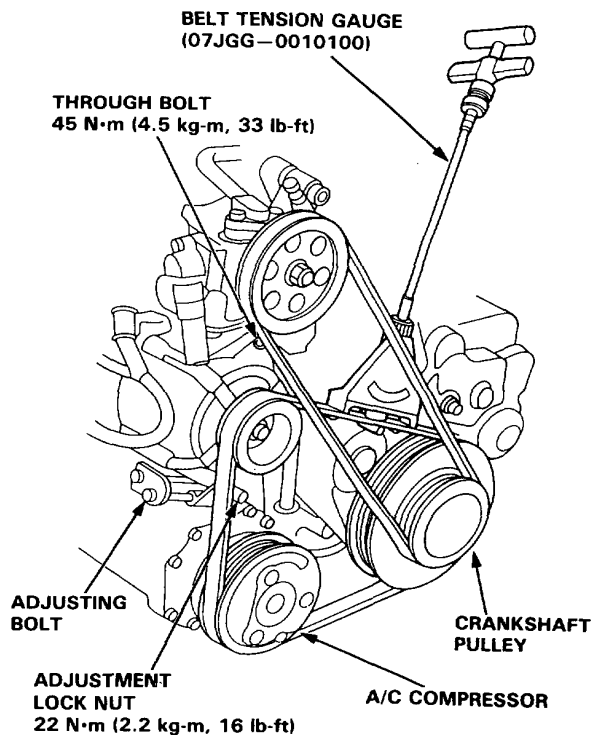
P/S Belt

Used Belt: 530–500 N (35–50 kg, 77–110 lb)

New Belt: 700–900 N (70–90 kg, 154–198 lb)

NOTE:

- If there are cracks or any damage evident on the belt, replace it with a new one.
- See the instructions for the tension gauge.

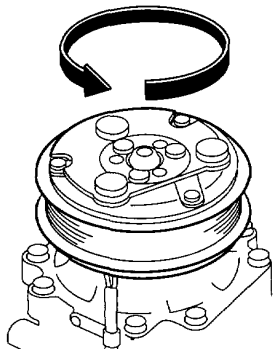


2. Loosen the upper through bolt and alternator nut.
3. Turn the adjusting bolt to obtain the proper belt tension, then retighten the alternator nut and upper through bolt.
4. Recheck the deflection of the belt.



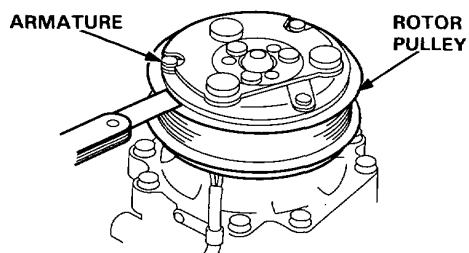
Clutch Inspection

- Check the rotor pulley bearing play and drag by rotating the rotor pulley by hand. Replace the clutch set with a new one if it is noisy or has excessive play/drag.

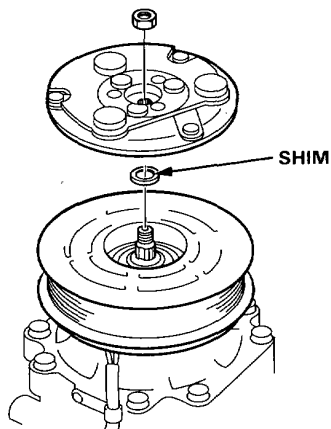


- Turn the rotor pulley by hand and measure the clearance between the rotor pulley and armature all the way around. If the clearance is not within specified limits, the armature must be removed and shims added or removed as required.

CLEARANCE: 0.35—0.65 (0.014—0.026 in)

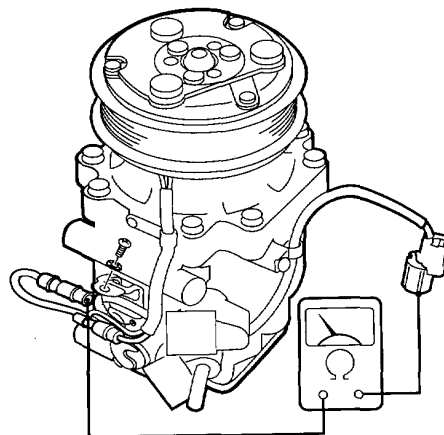


NOTE: The shims are available in four sizes: 0.1 mm, 0.2 mm, 0.4 mm and 0.5 mm of thickness.



- Release the compressor clutch connector from the connector holder.

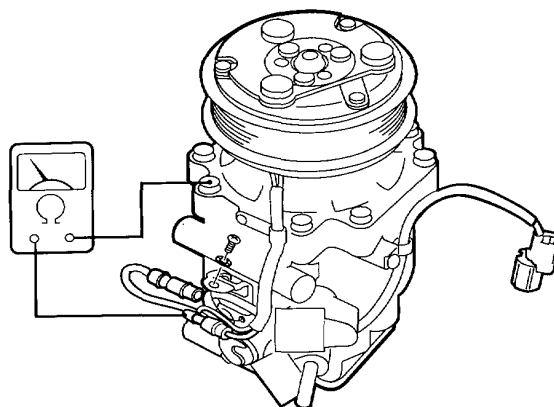
Check the thermal protector for continuity.



Check the field coil for resistance.

Field Coil resistance:
 3.2 ± 0.15 ohm at 20°C (68°F)

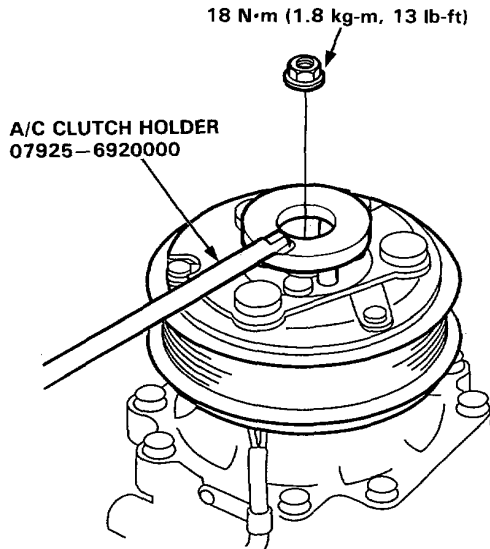
If resistance is not within specifications, replace the field coil.



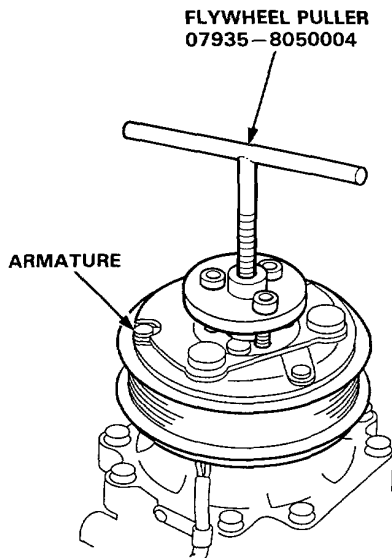
Compressor

Clutch Overhaul

1. Remove the center nut while holding the pressure plate.



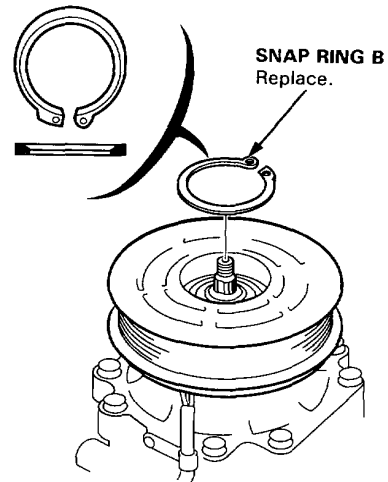
2. Remove the armature by pulling it up by hand. If you cannot remove it by hand, attach the puller to the armature, screw the bolt in the center and remove the armature.



3. Remove the snap ring B with a snap ring pliers.

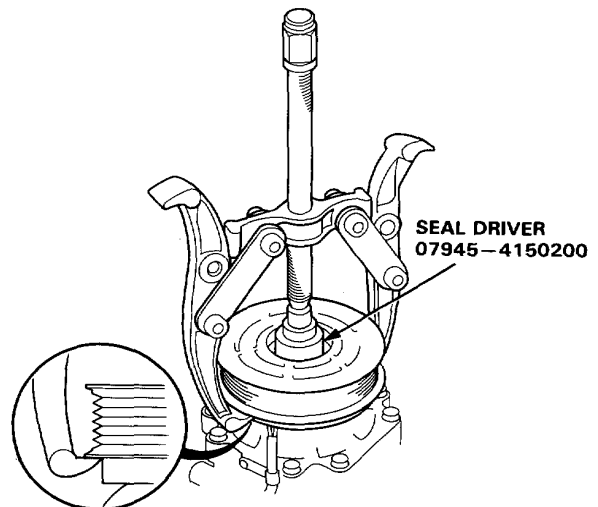
NOTE:

- Once the snap ring B is removed, replace it with a new one.
- Do not damage the compressor body and rotor pulley.



4. Remove the pulley from the shaft with a puller and the special tool.

NOTE: Put the claws of the puller on the back of the pulley, not the belt area, or the pulley can be damaged.

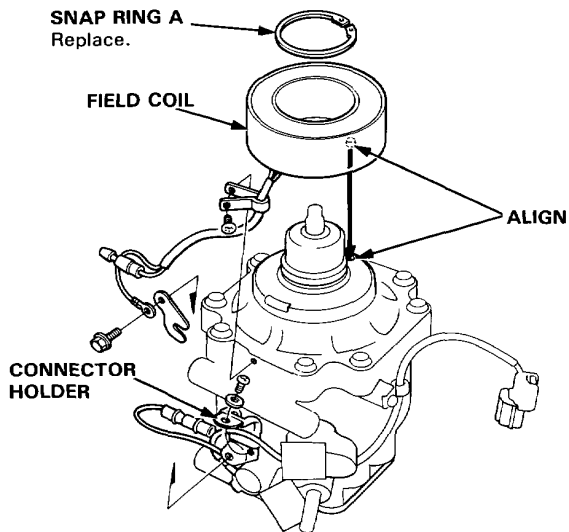




5. Remove the snap ring A with a snap ring pliers. Release the field coil connector from the connector holder and disconnect the connector and field coil ground terminal. Remove the field coil from the compressor cover.

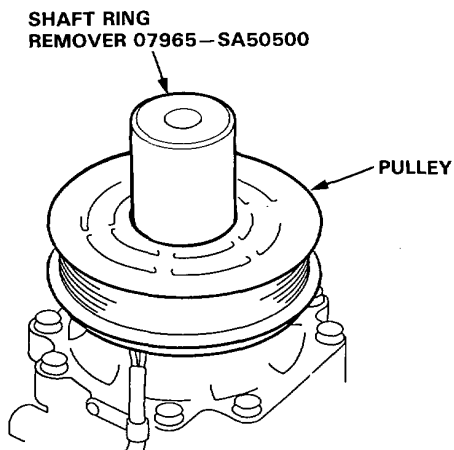
NOTE:

- Once the snap ring A is removed, replace it with a new one.
- When installing the field coil, align the boss on the field coil with the hole in the compressor.



6. Press the rotor pulley onto the field coil with a shaft ring remover. If the rotor pulley is not set square, remove it once and push it in again checking the boss position.

CAUTION: Maximum press load: 0.4 tons.



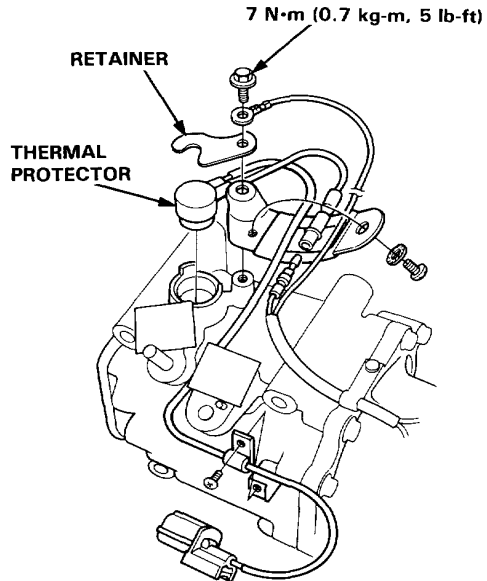
7. Install the removed parts in the reverse order of removal, and:

- Clean the pulley and compressor sliding surfaces with non-petroleum solvent.
- Install the snap rings with the chamfered side facing out and make sure the snap rings are in the groove completely.
- After installing, make sure that the pulley turns smoothly.
- Route and clamp the wires properly or they can be damaged by the rotor pulley.

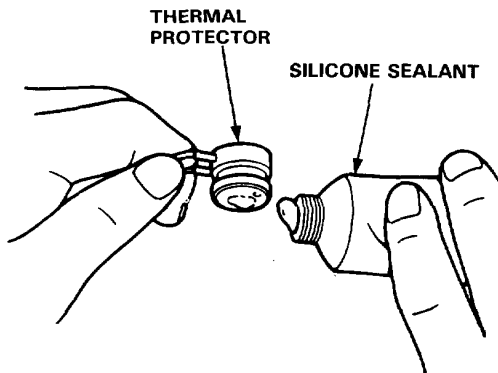
Compressor

Thermal Protector Replacement

1. Remove the bolt, field coil terminal and thermal protector retainer.
2. Remove the thermal protector.
Remove the residue of silicone sealant from the cup of thermal protector.



3. Apply silicone sealant to the top of the thermal protector.



4. Install in the reverse order of removal.

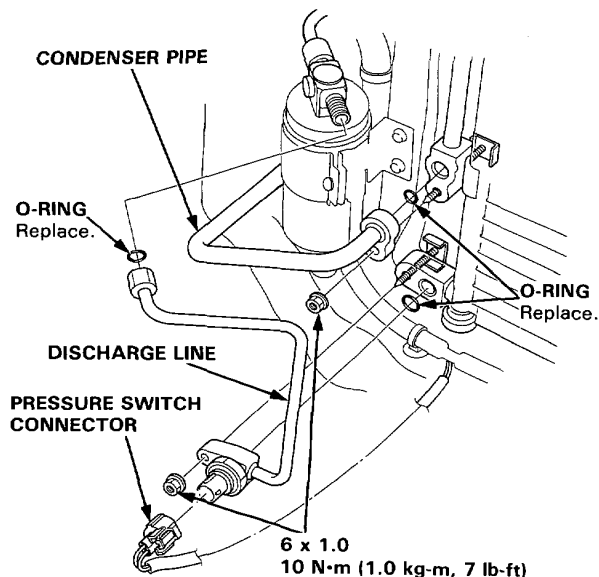
Condenser

Replacement

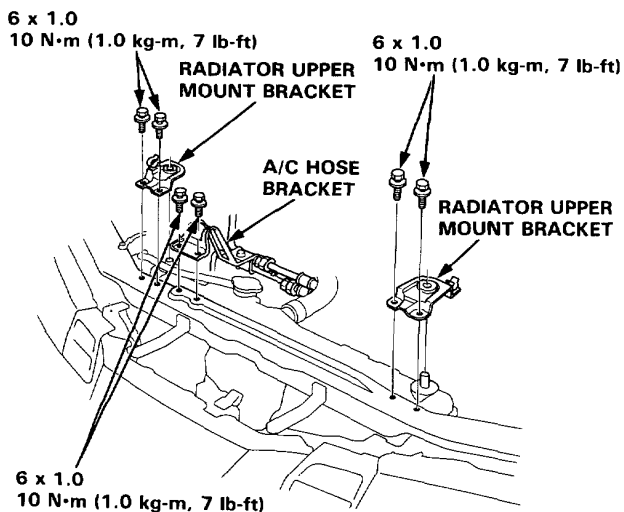


1. Discharge refrigerant (page 22-25).
2. Disconnect the A/C pressure switch 2P connector, then remove the condenser pipe.
3. Disconnect the discharge line from the condenser.

CAUTION: Cap the open fittings immediately to keep moisture and dirt out of the system.

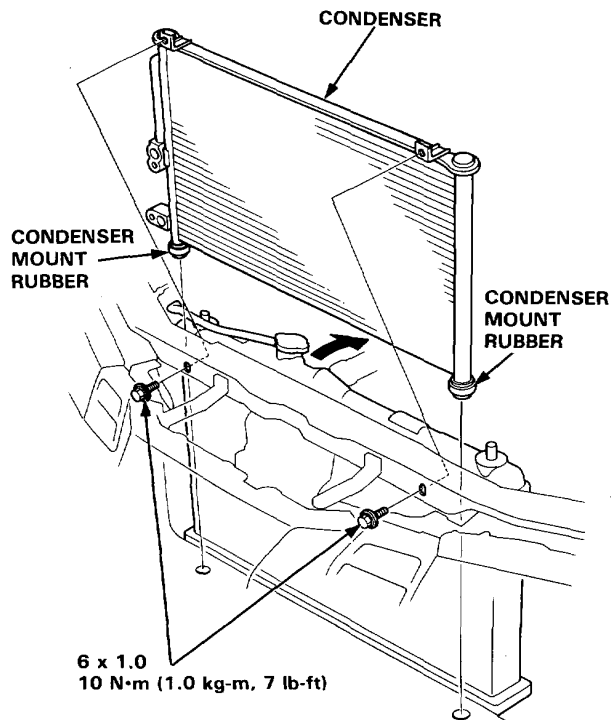


4. Remove the two bolts and A/C hose bracket.
5. Remove the four bolts (4) and radiator upper mount brackets.



6. Remove the two condenser mounting bolts, then lift out the condenser as shown.

CAUTION: Do not damage the radiator and condenser fins when removing the condenser.



7. Install the condenser in reverse order of removal, and:
 - Be sure to install the condenser mount rubbers securely into the holes.
 - Replace all O-rings with new ones.
 - Charge the system (page 22-40) and test its performance (page 22-24).

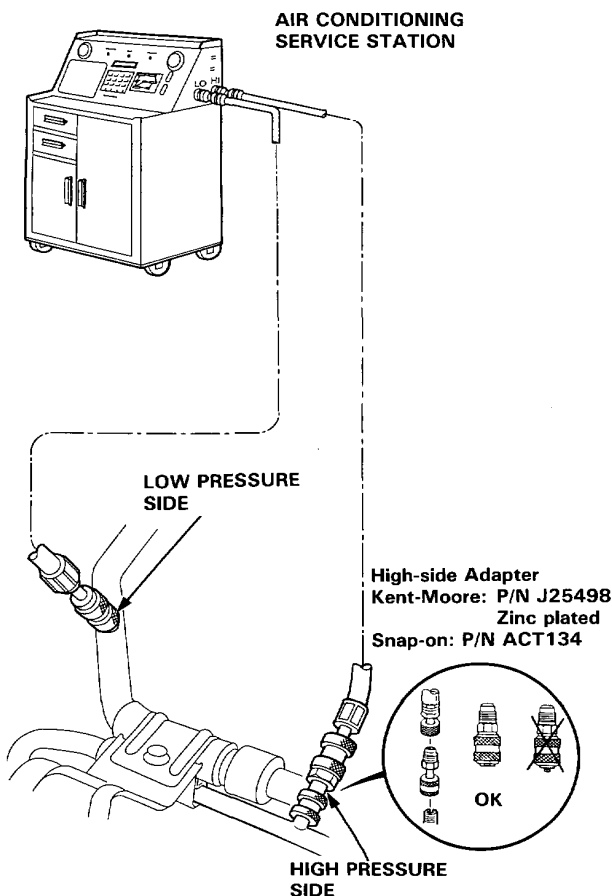
A/C System Service

Evacuation

1. When an A/C System has been opened to the atmosphere, such as during installation or repair, it must be evacuated using a vacuum pump. (If the system has been open for several days, the receiver/dryer should be replaced).
2. Attach an Air Conditioning Service Station as shown.
Follow the equipment manufacturer's instructions.

NOTE:

- Connect the adapter to the high pressure hose first, then connect the hoses to the car as shown. When testing is completed, disconnect the hose adapter from the high-side fitting; do not disconnect the hose from the adapter, or refrigerant may escape from the system.
- If low pressure does not reach more than 700 mmHg (27 in-Hg) in 15 minutes, there is probably a leak in the system. Partially charge the system and check for leaks (see page 22-41 for leak test).



Charging

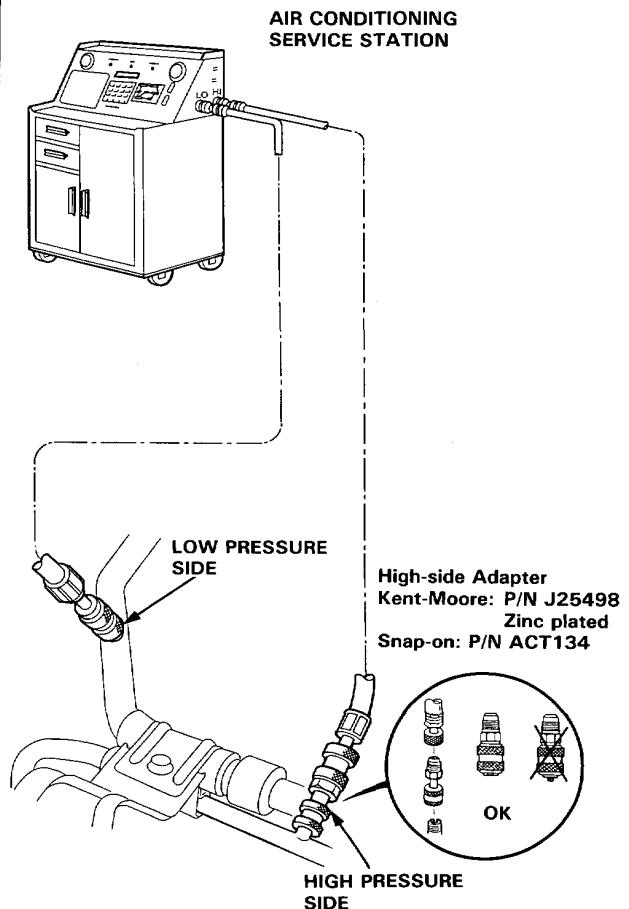
Refrigerant capacity: 750—800 g (26—28 oz)

⚠ WARNING Always wear eye protection when charging the system.

CAUTION: Do not overcharge the system; the compressor will be damaged.

Attach an Air Conditioning Service Station as shown.
Follow the equipment manufacturer's instructions.

NOTE: Connect the adapter to the high pressure hose first, then connect the hoses to the car as shown. When testing is completed, disconnect the hose adapter from the high-side fitting; do not disconnect the hose from the adapter, or refrigerant may escape from the system.



A/C System Service



Leak Test

⚠ WARNING When handling refrigerant (R-12):

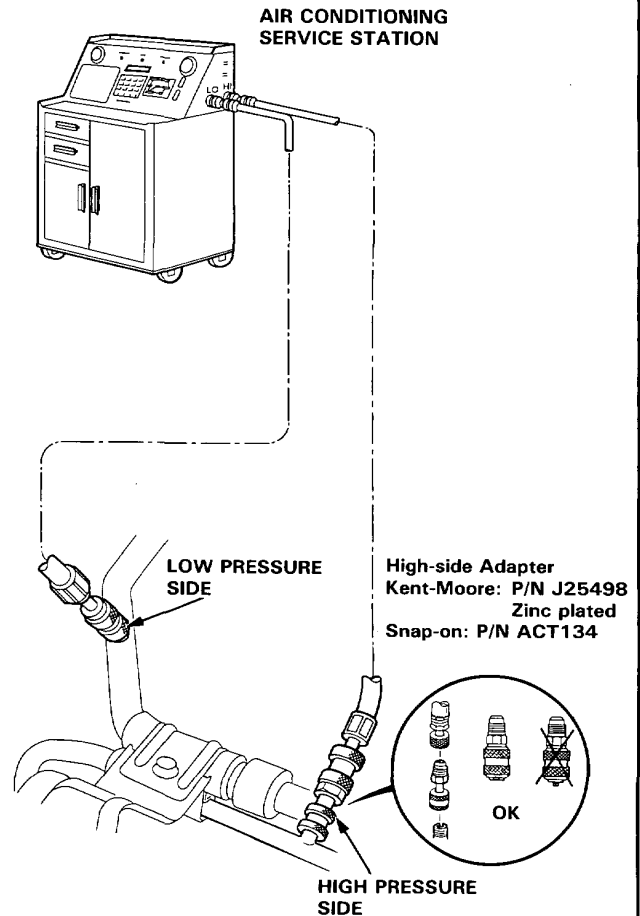
- Always wear eye protection.
- Do not let refrigerant get on your skin or in your eyes. If it does:
 - Do not rub your eyes or skin.
 - Splash large quantities of cool water in your eyes or on your skin.
 - Rush to a physician or hospital for immediate treatment. Do not attempt to treat it yourself.
- Keep refrigerant containers (cans of R-12) stored below 40°C (100°F).
- Keep away from open flame. Refrigerant, although non-flammable, will produce poisonous gas if burned.
- Work in a well-ventilated area. Refrigerant evaporates quickly, and can force all the air out of a small, enclosed area.

IMPORTANT: Do not vent refrigerant to the atmosphere. The chlorofluorocarbons (CFCs) used in conventional refrigerant (R-12) damage the earth's ozone layer. Always use UL-listed, refrigerant recovery/recycling equipment to extract the refrigerant before you open an A/C system to make repairs. Follow the equipment manufacturer's instructions.

1. Attach an Air Conditioning Service Station as shown.

NOTE: Connect the adapter to the high pressure hose first, then connect the hoses to the car as shown. When testing is completed, disconnect the hose adapter from the high-side fitting; do not disconnect the hose from the adapter, or refrigerant may escape from the system.

2. Open the high pressure valve to charge the system to about 100 kPa (14 psi), then close the supply valve.
3. Check the system for leaks using an electronic leak tester. Follow the manufacturer's instructions.
4. If you find leaks that require the system to be opened (to repair or replace hoses, fittings, etc.), release any charge in the system according to the Discharge Procedure on page 22-25.
5. After checking and repairing leaks, the system must be evacuated (see System Evacuation on page 22-42).



SUPPLEMENTAL RESTRAINT SYSTEM (SRS) (if electrical maintenance is required)

Some models of the PRELUDE include a driver's side airbag, located in the steering wheel hub, as part of a supplemental restraint system (SRS). Information necessary to safely service the SRS is included in this shop manual. Items marked * on the contents page include, or are located near, SRS components. Servicing, disassembling or replacing these items will require special precautions and tools, and should therefore be done only by an authorized HONDA dealer.

⚠ WARNING

- To avoid rendering the SRS inoperative, which can lead to personal injury or death in the event of a severe frontal collision, all maintenance on this system must be performed by an authorized HONDA dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, and replacing with wrong parts, can lead to personal injury caused by unintentional activation of the airbag.
- All SRS electrical wiring harnesses are covered with yellow outer insulation. Related components are located in the steering column, the dashboard, and behind the dashboard lower cover. Do not use electrical test equipment on these circuits.
- Servicing, disassembling or replacing nearby the steering wheel, under the dash, or related to the wire harnesses nearby the under-dash fuse box may affect the SRS and must therefore be performed by an authorized HONDA dealer.

Electrical

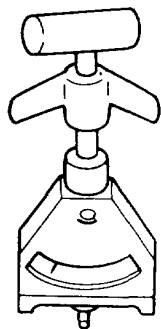
Special Tools	23-2	Lights, Exterior	
How to Use This Section		Back-up Lights	23-253
Tips and Precautions	23-3	Brake/High Mount Brake Light	23-255
Five-step Troubleshooting	23-5	Daytime Running Lights	23-230
Schematic Symbols	23-6	Dim-Dip Headlights	23-231
Wire Color Codes	23-6	Fog Light, Rear (Europe models)	23-247
Relays and Control Unit Locations		Hazard Lights	23-264
Engine Compartment	23-8	Headlights-Adjustment	23-241
Dashboard	23-10	License Plate Lights	23-245
Floor	23-16	Parking Lights, Front	23-245
Index to Circuits and Systems		Taillights	23-246
Air Conditioner	Section 21	Turn Signal Lights	23-244
Alternator	23-122	Lights, Interior	
Anti-Lock Brake System (ABS)	Section 19	Ceiling Light	23-251
Automatic Transmission		Courtesy Lights (KQ and KY models)	23-250
Control System	Section 14	*Dash Lights Brightness Control	23-266
Battery	23-81	Entry Light Timer System	23-220
Blower Controls	Section 21	Trunk Light	23-252
Brake Indicator System	23-173	Light-on Reminder System	23-221
Charging System	23-117	*Lighting System	23-224
Cigarette Lighter	23-287	*Locks, Power	23-327
Clock	23-284	*Mirrors, Power	23-313
Cruise Control	23-355	Power Distribution	23-50
Defogger, Rear Window	23-298	Power Relay Inspection	23-84
Distributor	23-107	Radiator and Condenser Fan Controls	23-133
Fuel Pump	Section 11	Relay Locations	23-8
Fuel Injection System	Section 11	Seat Belt Reminder System (KY model)	23-221
Fuses	23-40	Seats, Heater	23-303
Fuse Box	23-44	Spark Plugs	23-116
Fuse/Relay Box	23-42	Speed Alarm System (KY model)	23-174
*Gauges		Starting System	23-90
Circuit Diagram	23-148	*Stereo Sound System	23-274
Coolant Temperature Gauge	23-172	*Sunroof	23-308
Fuel Gauge	23-169	Supplemental Restraint System (SRS)	23-376
Speedometer	23-166	*Turn Signal/Hazard Flasher System	23-260
Tachometer	23-166	*Under-dash Fuse Box	23-82
Grounds		Windows, Power	23-319
Distribution	23-67	*Wipers/Washers	23-337
Locations	23-18	Wires, Harness and Connectors	
Heater Controls	Section 21	Wire Color Codes	23-6
Horns	23-290	Wire Harness Routing	23-18
*Ignition Switch	23-87	Wiring Diagrams	23-404
*Ignition System	23-101		
Indicators			
*Safety Indicator	23-188		
*Shift Lever Position Indicator	23-177		
*Integrated Control Unit	23-200		

* Before working in these areas, read the SRS precautions on page 23-382.

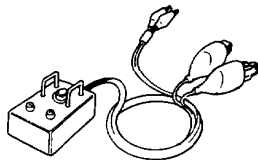


Special Tools

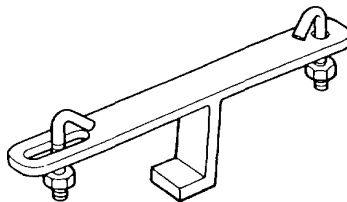
Ref. No.	Tool Number	Description	Q ty	Page Reference
①	07JGG—0010100	Belt Tension Gauge	1	23-131, 132
②	07HAZ—SG00500	Deployment Tool	1	23-401
③	07MAZ—SS10100	SRS Disposal Bracket	1	23-400



①



②



③

Troubleshooting

Tips and Precautions



Before Troubleshooting

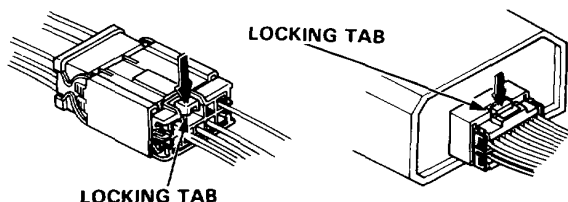
- Check applicable fuses in the appropriate fuse box.
- Check the battery for damage, state of charge, and clean and tight connections.
- Check the alternator belt tension.

CAUTION:

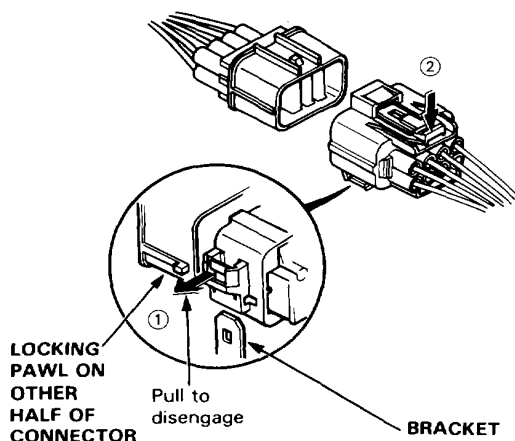
- Do not quick-charge a battery unless the battery ground cable has been disconnected. Otherwise you will damage the alternator diodes.
- Do not attempt to crank the engine with the battery ground cable loosely connected or you will severely damage the wiring.

Handling Connectors

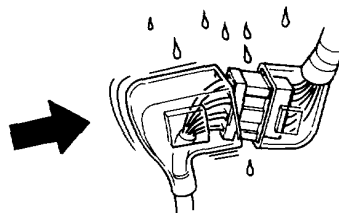
- Make sure the connectors are clean and have no loose wire terminals.
- Make sure multiple cavity connectors are packed with grease (except watertight connectors).
- All connectors have push-down release type locks.



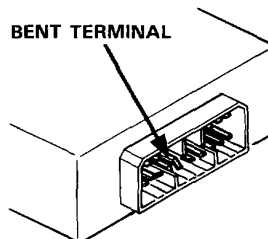
- Some connectors have a clip on their side used to attach them to a mount bracket on the body or on another component. This clip has a pull type lock.
- Some mounted connectors cannot be disconnected unless you first release the lock and remove the connector from its mount.



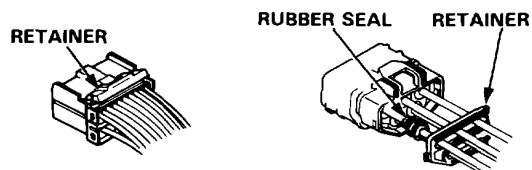
- Never try to disconnect connectors by pulling on their wires; pull on the connector halves instead.
- Always reinstall plastic covers.



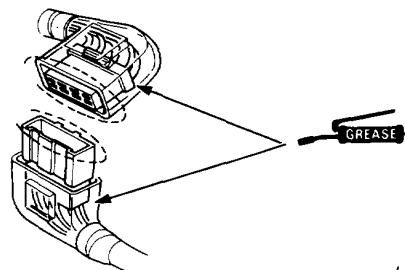
- Before connecting connectors, make sure the terminals are in place and not bent.



- Check for loose retainer and rubber seals.



- The backs of some connectors are packed with grease. Add grease if necessary. If the grease is contaminated, replace it.

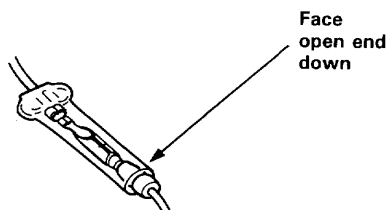


(cont'd)

Troubleshooting

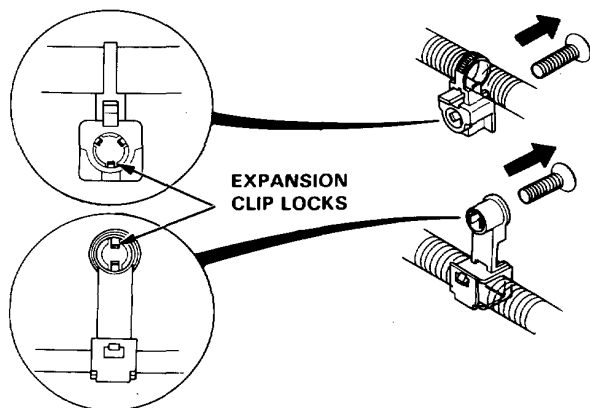
Tips and Precautions (cont'd)

- Insert the connector all the way and make sure it is securely locked.
- Position wires so that the open end of the cover faces down.

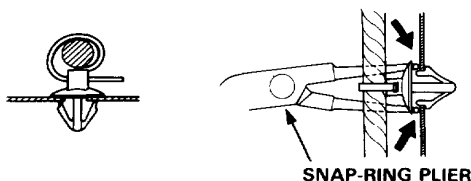


Handling Wires and Harnesses

- Secure wires and wire harnesses to the frame with their respective wire ties at the designated locations.
- Remove clips carefully; don't damage their locks.

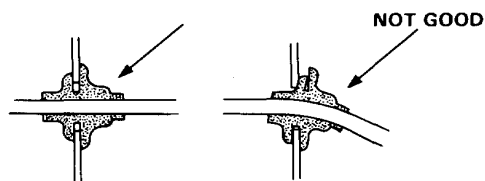


Slip pliers under the clip base and through the hole at an angle, then squeeze the expansion tabs to release the clip.



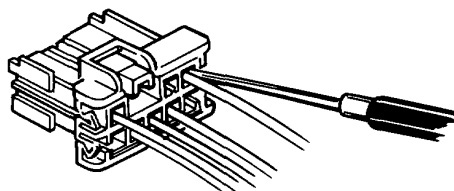
- After installing harness clips, make sure the harness doesn't interfere with any moving parts.
- Keep wire harnesses away from exhaust pipes and other hot parts, from sharp edges of brackets and holes, and from exposed screws and bolts.

- Seat grommets in their grooves properly.

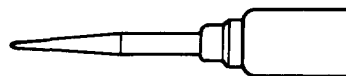


Testing and Repairs

- Do not use wires or harnesses with broken insulation. Replace them or repair them by wrapping the break with electrical tape.
- After installing parts, make sure that no wires are pinched under them.
- When using electrical test equipment, follow the manufacturer's instructions and those described in this manual.
- If possible, insert the probe of the tester from the wire side (except waterproof connector).



- Use a probe with a tapered tip.



- Refer to the instructions in the Honda Terminal Kit for identification and replacement of connector terminals.



Five-Step Troubleshooting

1. Verify The Complaint

Turn on all the components in the problem circuit to verify the customer complaint. Note the symptoms. Do not begin disassembly or testing until you have narrowed down the problem area.

2. Analyze The Schematic

Look up the schematic for the problem circuit. Determine how the circuit is supposed to work by tracing the current paths from the power feed through the circuit components to ground. If several circuits fail at the same time, the fuse or ground is a likely cause.

Based on the symptoms and your understanding of the circuit operation, identify one or more possible causes of the problem.

3. Isolate The Problem By Testing The Circuit

Make circuit tests to check the diagnosis you made in step 2. Keep in mind that a logical, simple procedure is the key to efficient troubleshooting. Test for the most likely cause of failure first. Try to make tests at points that are easily accessible.

4. Fix The Problem

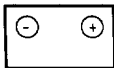







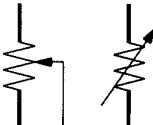

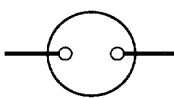







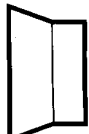

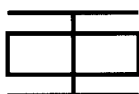
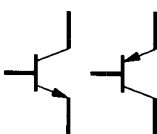
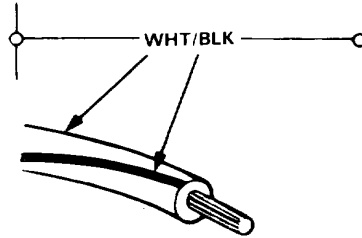
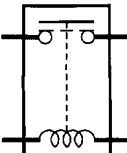
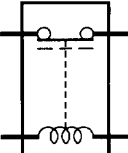



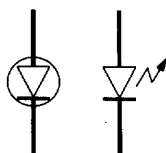


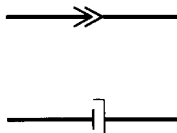

Once the specific problem is identified, make the repair. Be sure to use proper tools and safe procedures.

5. Make Sure The Circuit Works

Turn on all components in the repaired circuit in all modes to make sure you've fixed the entire problem. If the problem was a blown fuse, be sure to test all of the circuits on that fuse. Make sure no new problems turn up and the original problem does not recur.

How to Use This Section

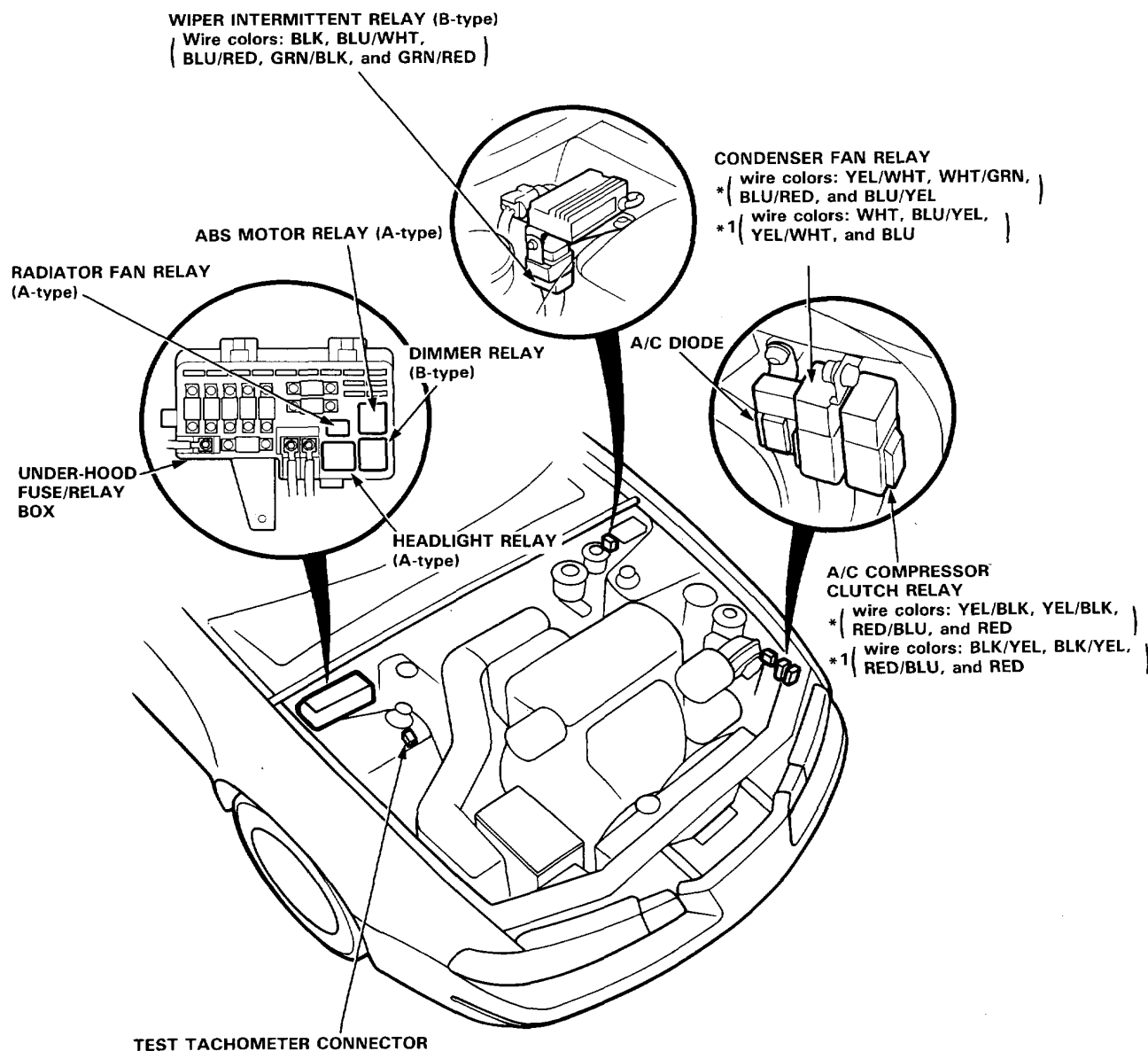
Schematic Symbols

BATTERY  		GROUND Ground terminal  Component ground 		FUSE 	COIL, SOLENOID 	CIGARETTE LIGHTER 																																						
RESISTOR 	VARIABLE RESISTOR 	THERMISTOR 	IGNITION SWITCH 	BULB 	HEATER 																																							
MOTOR 	PUMP 	CIRCUIT BREAKER 	HORN 	DIODE 	SPEAKER, BUZZER 																																							
ANTENNA Mast  Window 		TRANSISTOR (Tr) 		Wire Color Codes <p>The following abbreviations are used to identify wire colors in the circuit schematics:</p> <table><tr><td>WHT</td><td>.....</td><td>White</td></tr><tr><td>YEL</td><td>.....</td><td>Yellow</td></tr><tr><td>BLK</td><td>.....</td><td>Black</td></tr><tr><td>BLU</td><td>.....</td><td>Blue</td></tr><tr><td>GRN</td><td>.....</td><td>Green</td></tr><tr><td>RED</td><td>.....</td><td>Red</td></tr><tr><td>ORN</td><td>.....</td><td>Orange</td></tr><tr><td>PNK</td><td>.....</td><td>Pink</td></tr><tr><td>BRN</td><td>.....</td><td>Brown</td></tr><tr><td>GRY</td><td>.....</td><td>Gray</td></tr><tr><td>PUR</td><td>.....</td><td>Purple</td></tr><tr><td>LT BLU</td><td>.....</td><td>Light Blue</td></tr><tr><td>LT GRN</td><td>.....</td><td>Light Green</td></tr></table> <p>The wire insulator has one color or one color with another color stripe. The second color is the stripe.</p> 		WHT	White	YEL	Yellow	BLK	Black	BLU	Blue	GRN	Green	RED	Red	ORN	Orange	PNK	Pink	BRN	Brown	GRY	Gray	PUR	Purple	LT BLU	Light Blue	LT GRN	Light Green
WHT	White																																										
YEL	Yellow																																										
BLK	Black																																										
BLU	Blue																																										
GRN	Green																																										
RED	Red																																										
ORN	Orange																																										
PNK	Pink																																										
BRN	Brown																																										
GRY	Gray																																										
PUR	Purple																																										
LT BLU	Light Blue																																										
LT GRN	Light Green																																										
RELAY (In normal position) Normally open relay  Normally closed relay 		CONDENSER 																																										
SWITCH (In normal position) Normally open switch  Normally closed switch 		LUMINOUS DIODE (LED) 																																										
CONNECTION Input  Output 	CONNECTOR 	REED SWITCH 																																										



Relay and Control Unit Locations

Engine Compartment (LHD)

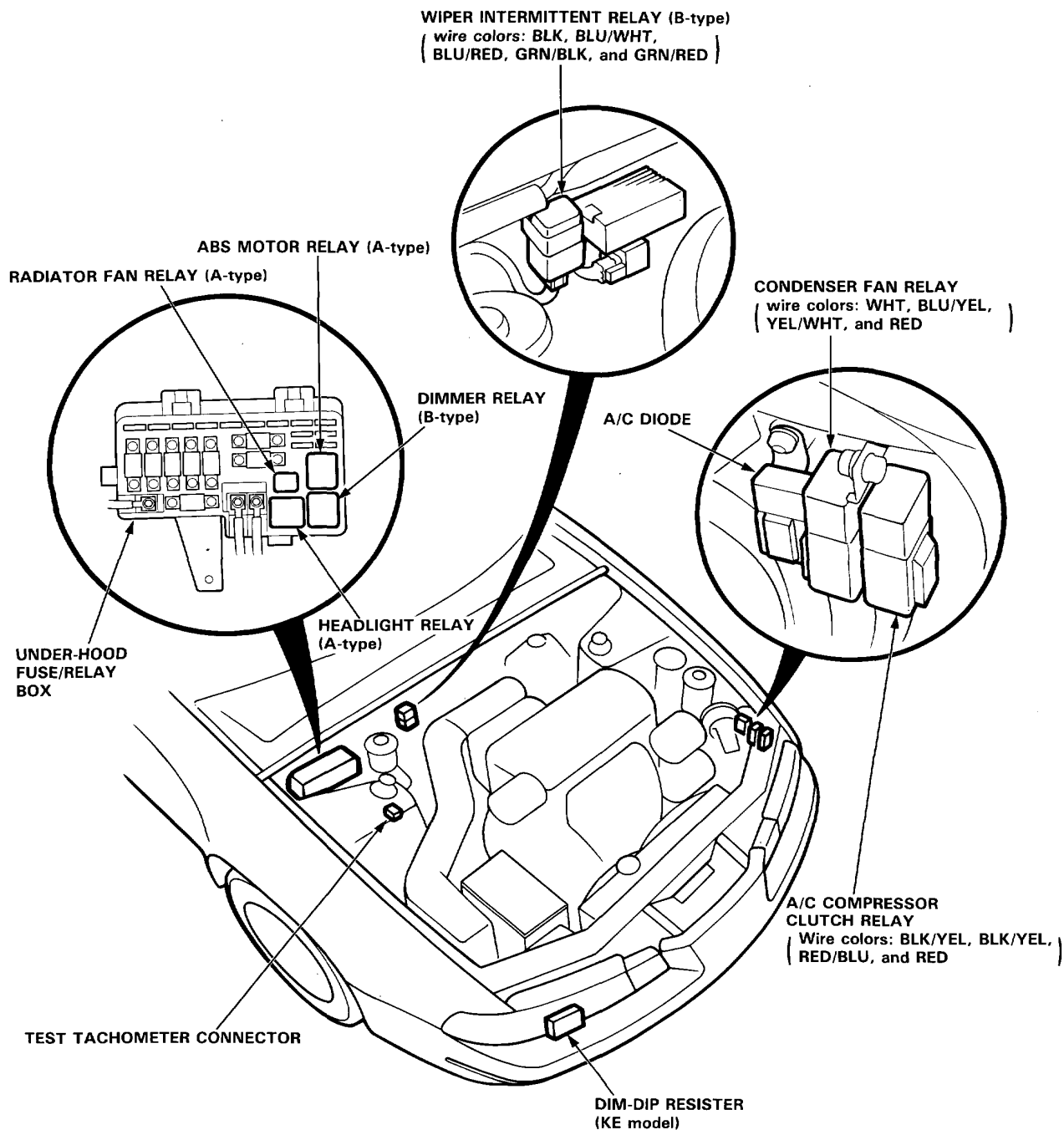


*: KY

*1: Except KY (Optional A/C)

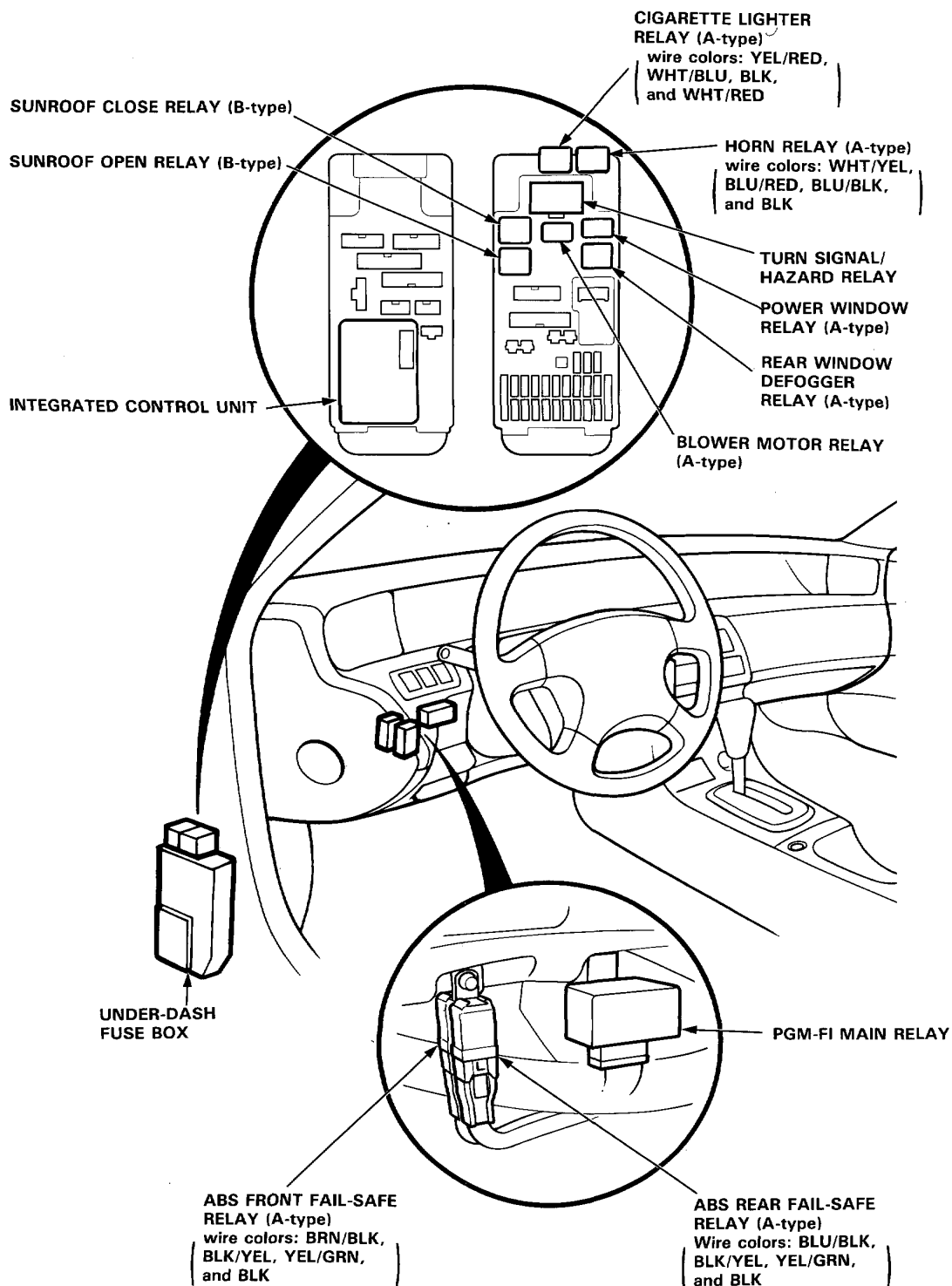


Engine Compartment (RHD)



Relay and Control Unit Locations

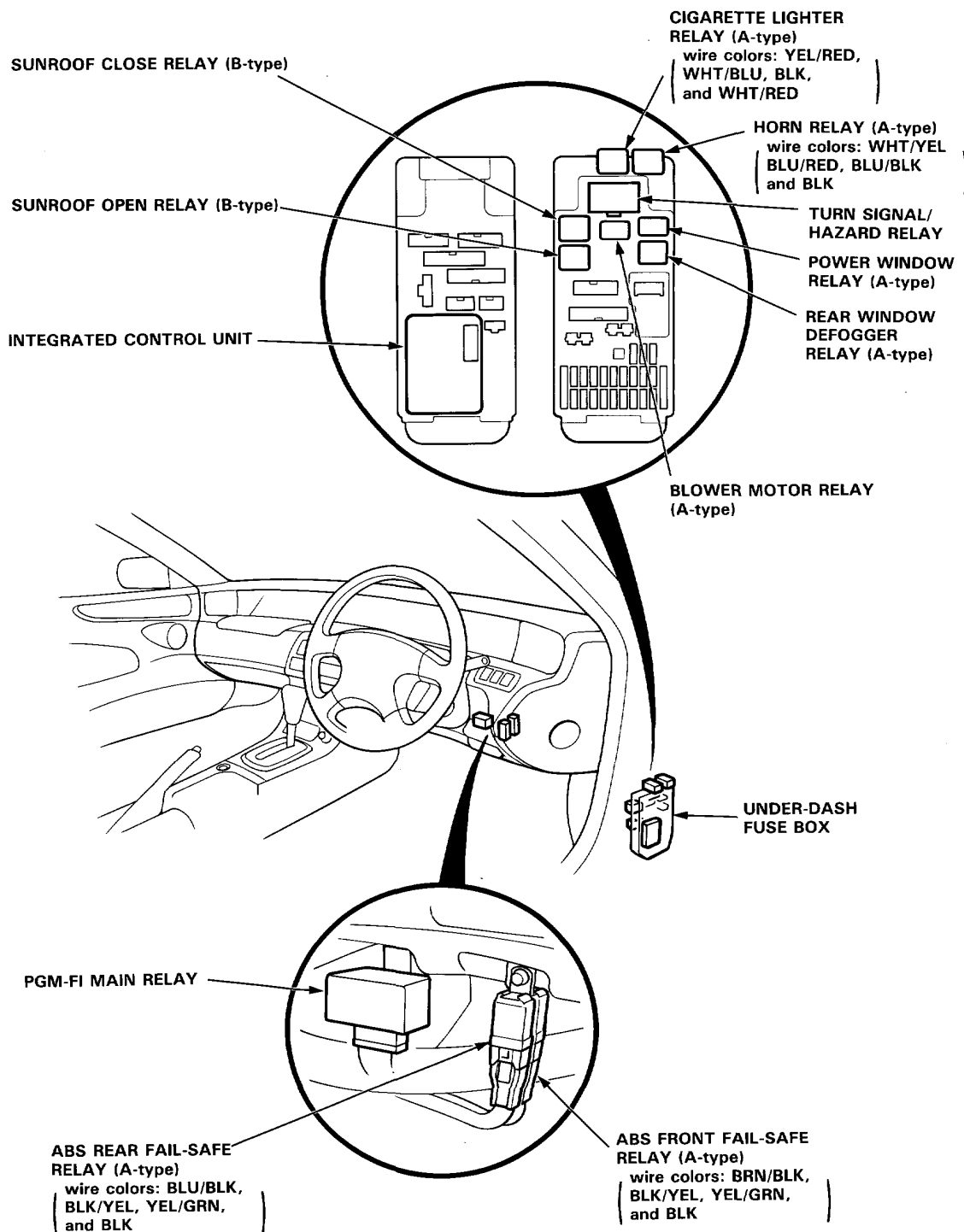
Dashboard (LHD)



(cont'd)



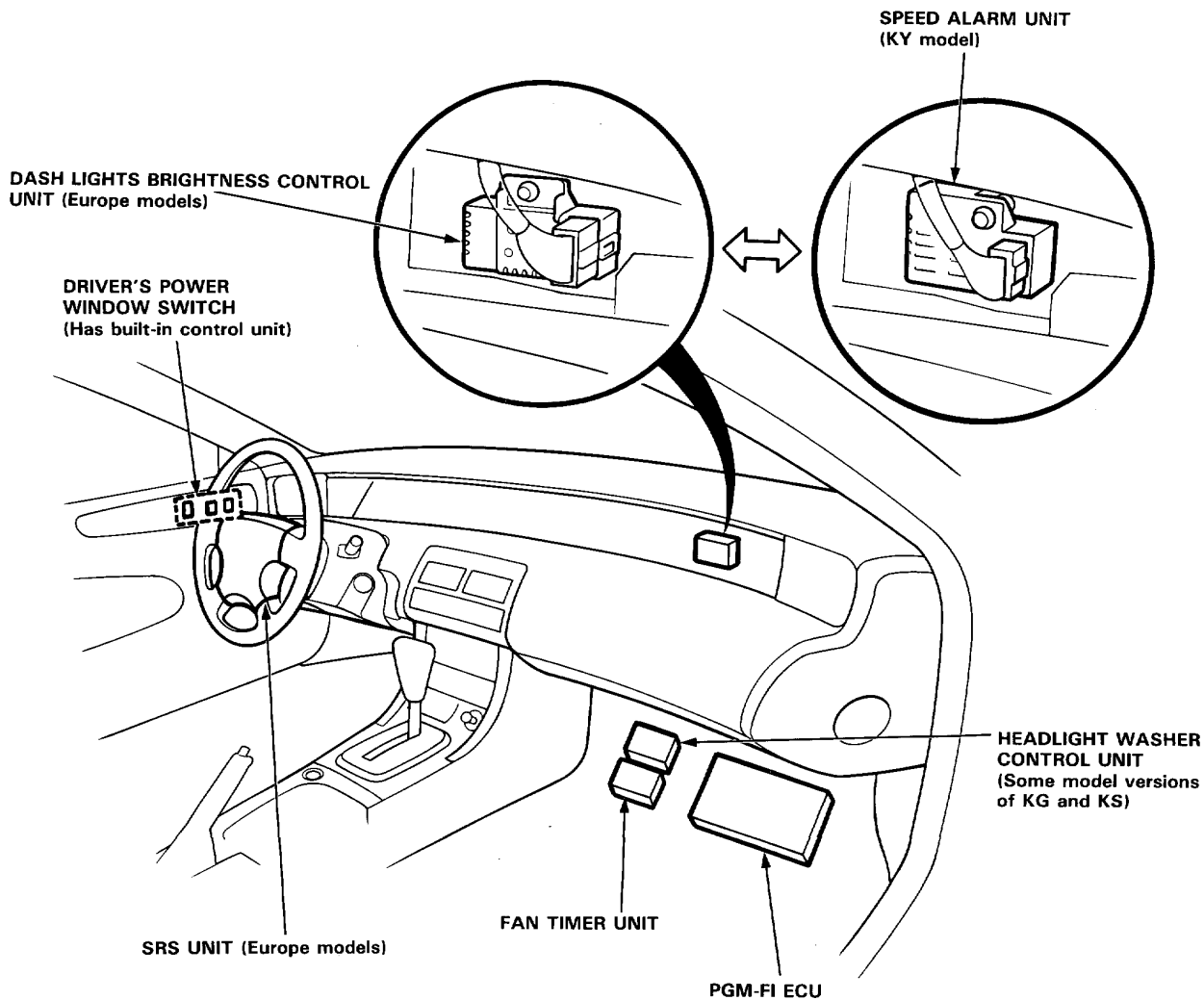
Dashboard (RHD)



(cont'd)

Relay and Control Unit Locations

Dashboard (LHD cont'd)

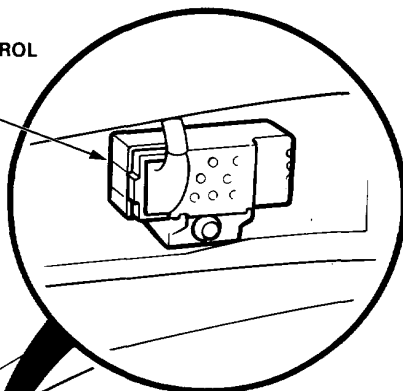


(cont'd)



Dashboard (RHD cont'd)

DASH LIGHTS BRIGHTNESS CONTROL
UNIT (Europe model)

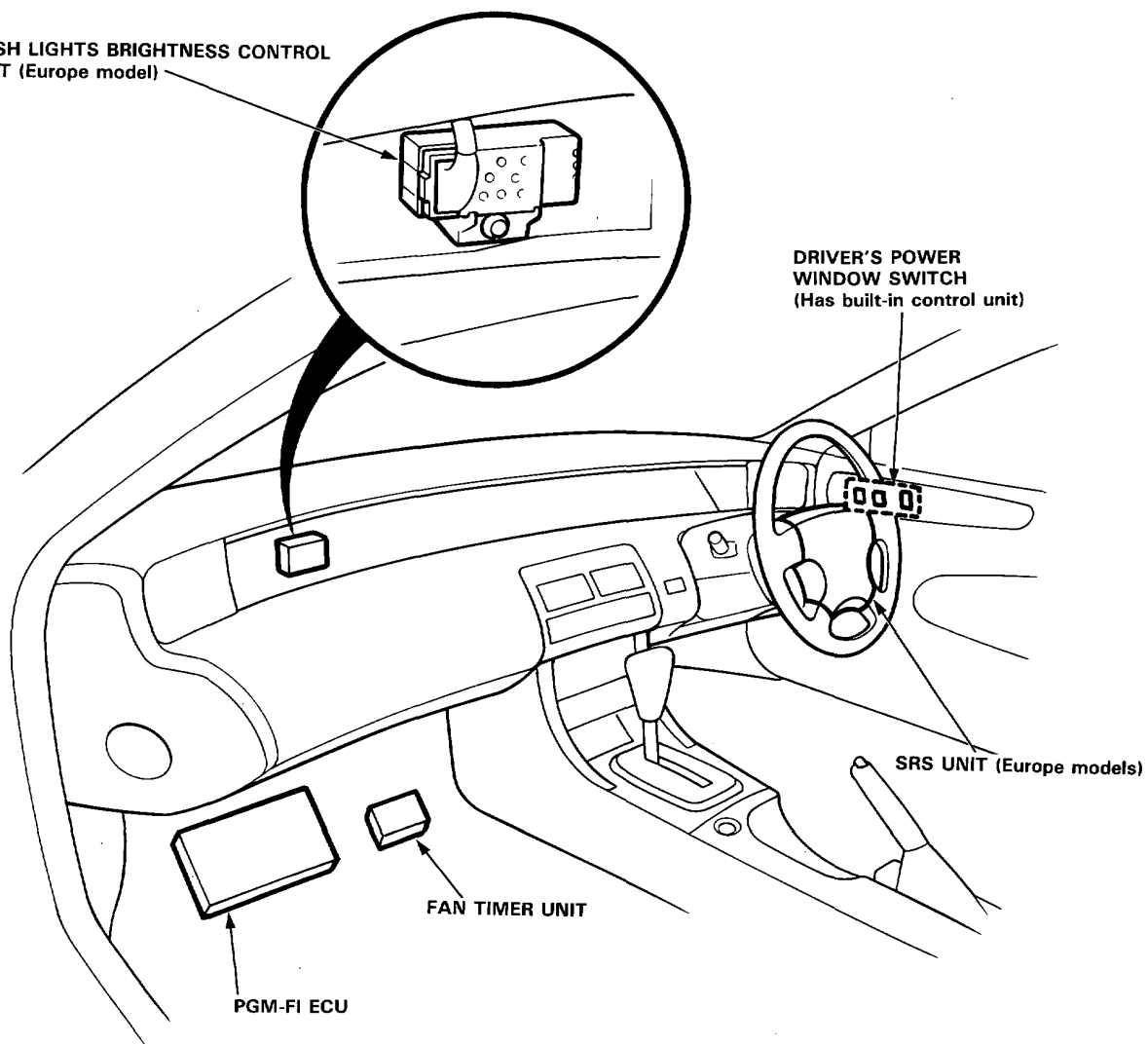


DRIVER'S POWER
WINDOW SWITCH
(Has built-in control unit)

SRS UNIT (Europe models)

FAN TIMER UNIT

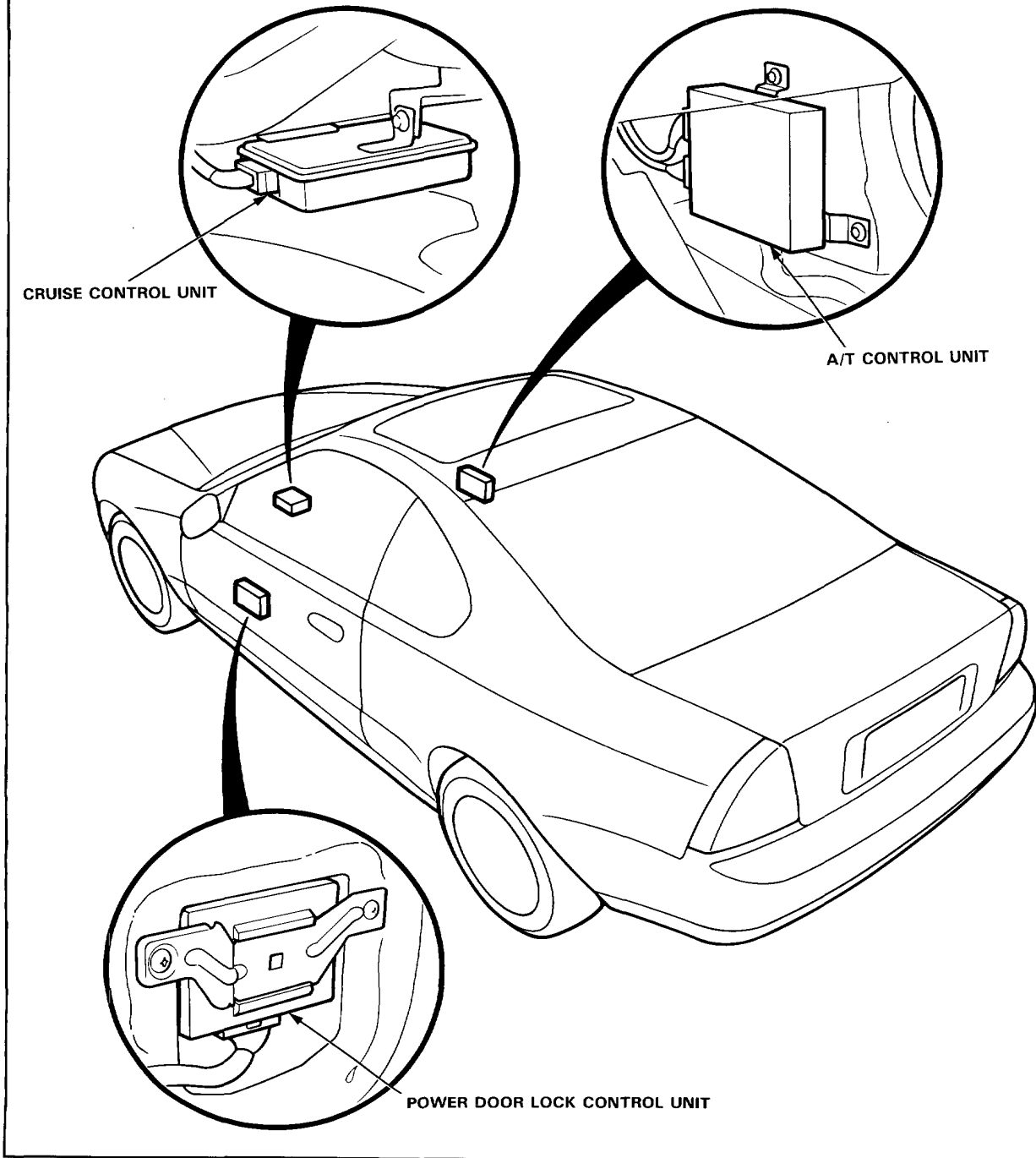
PGM-FI ECU



(cont'd)

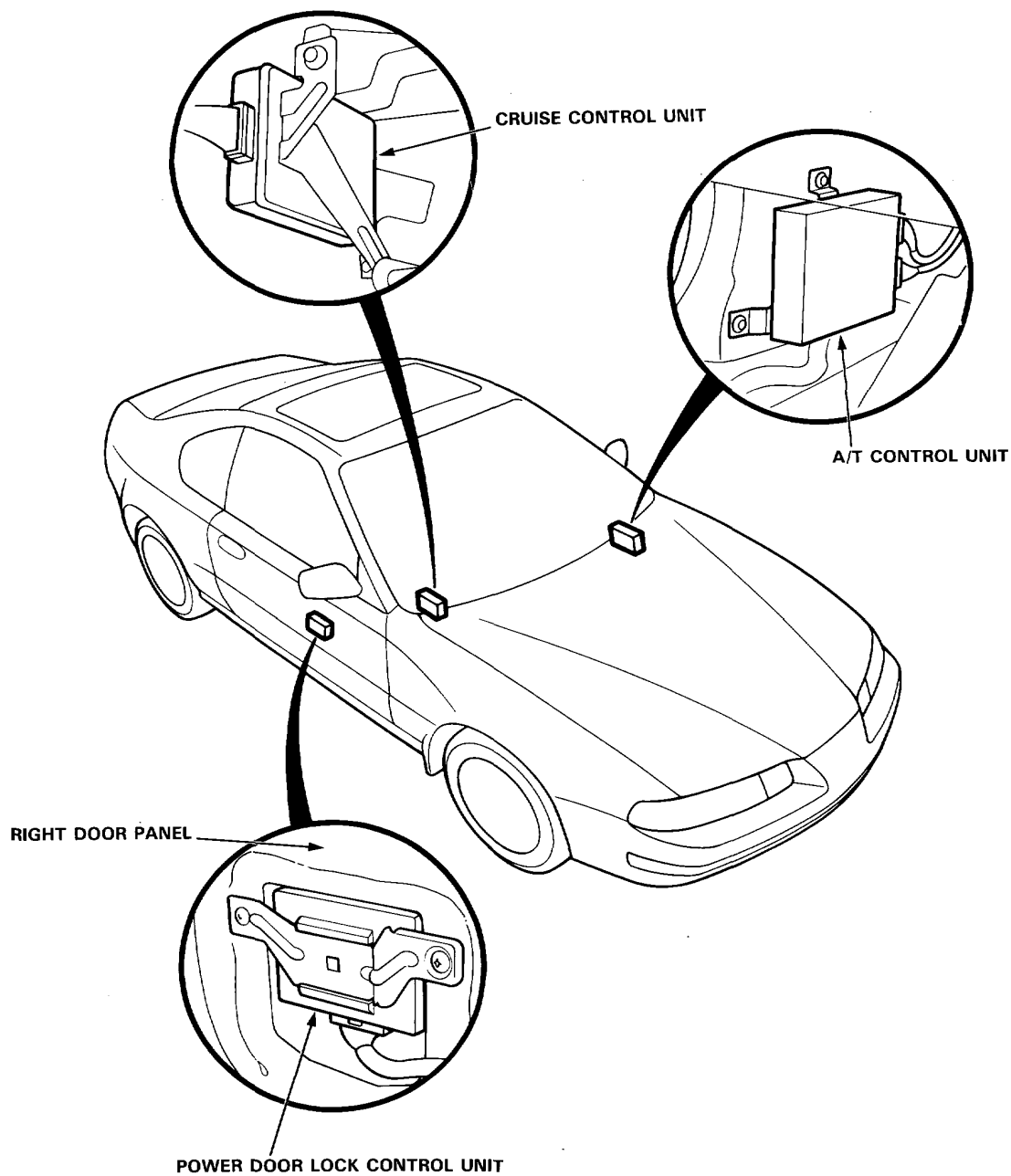
Relay and Control Unit Locations

Dashboard (LHD cont'd)



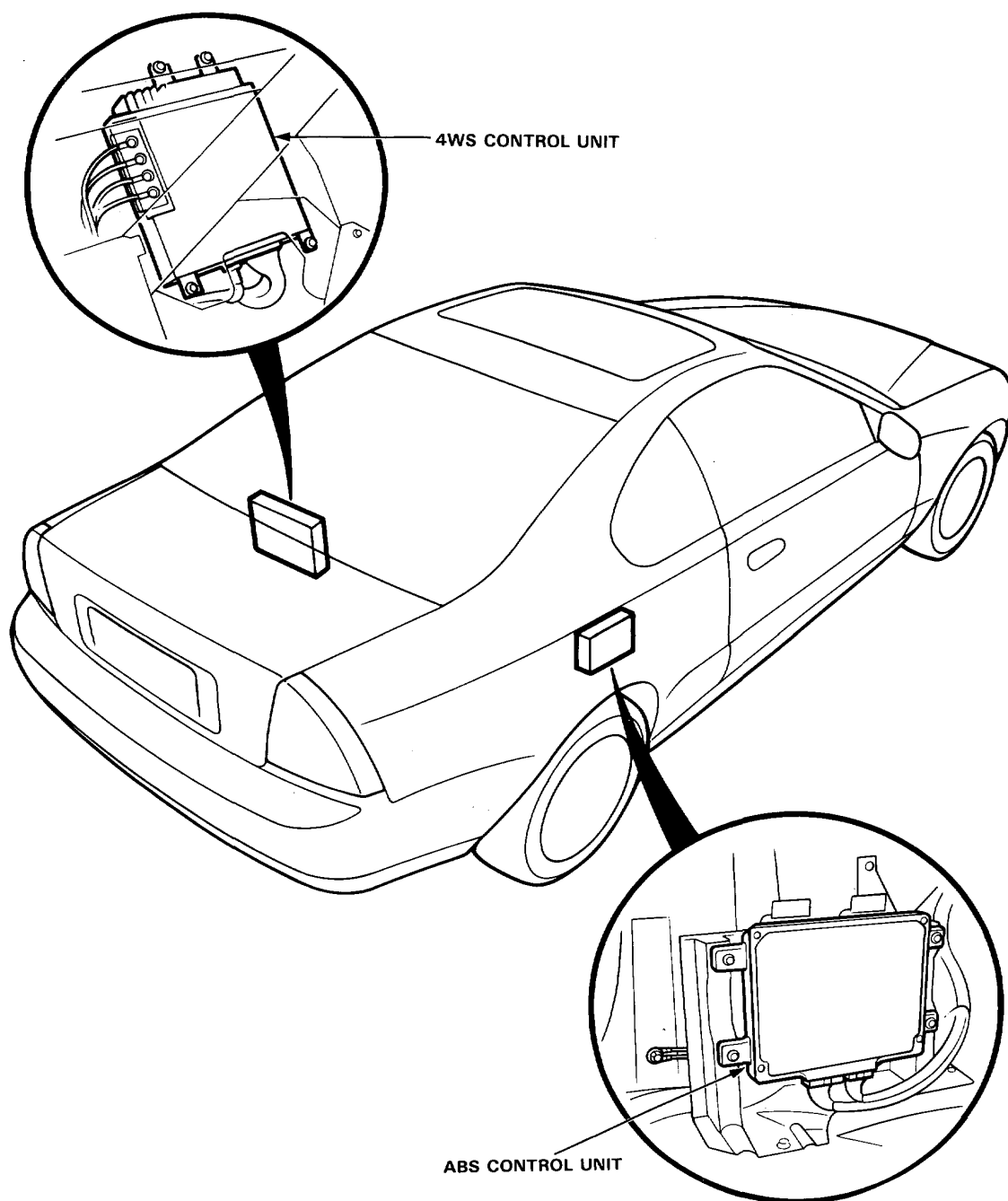


Dashboard (RHD cont'd)



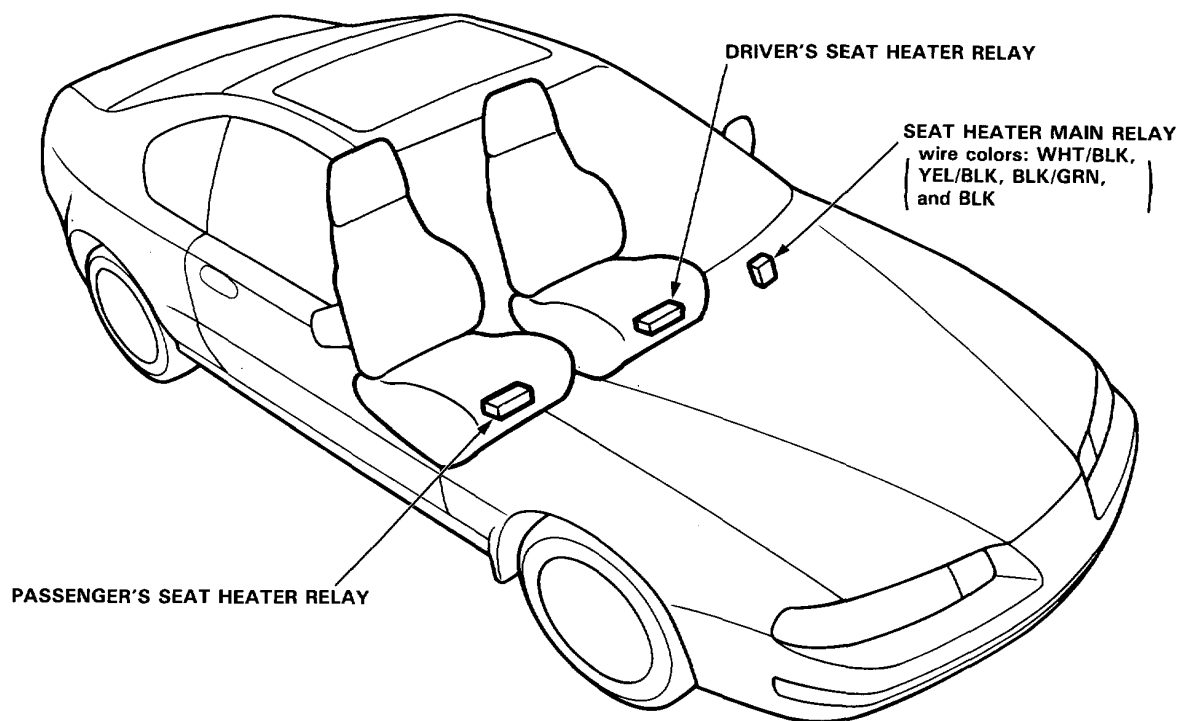
Relay and Control Unit Locations

Floor





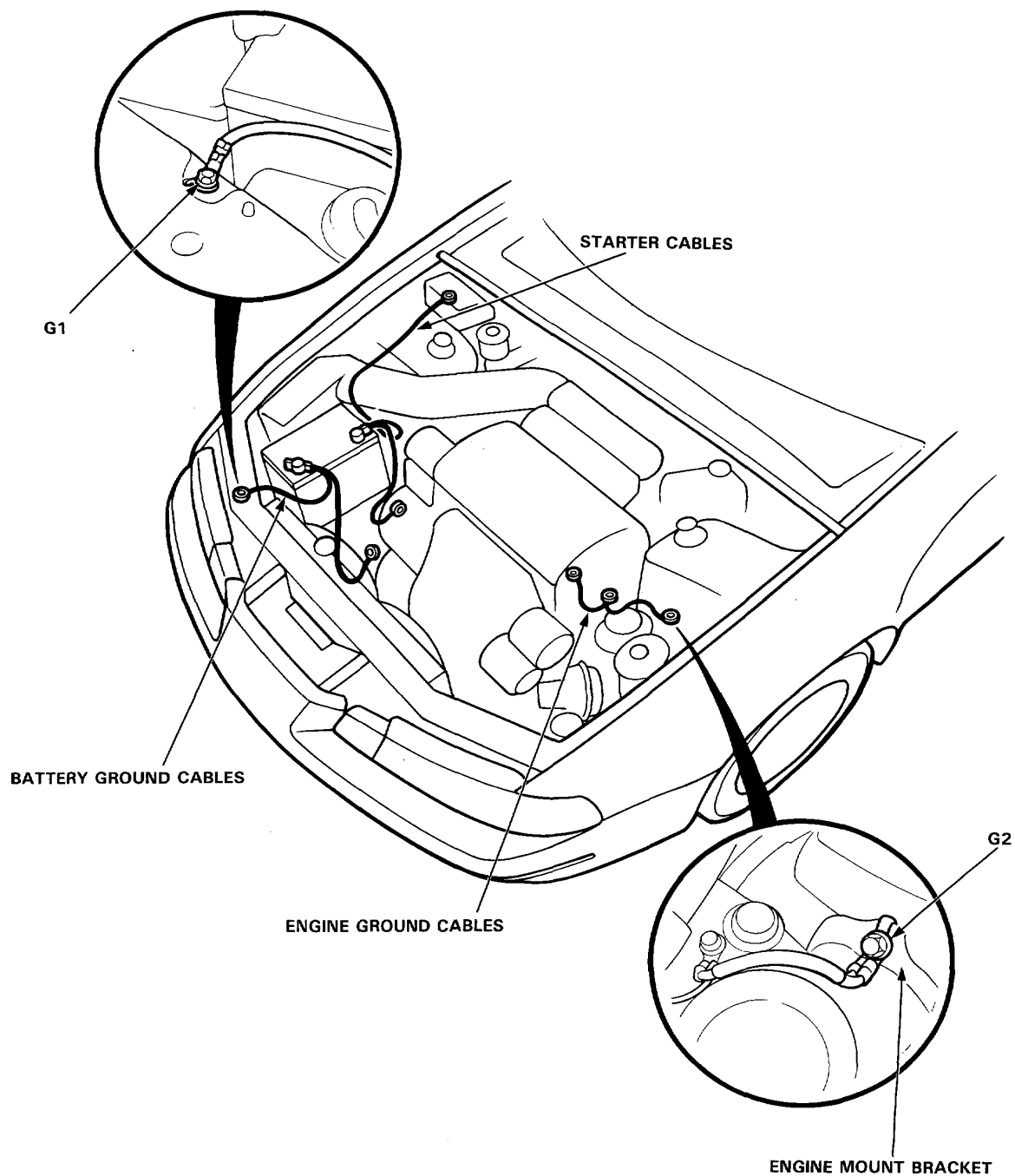
Dashboard/Seat (KS model)



Wire Harness Ground Locations

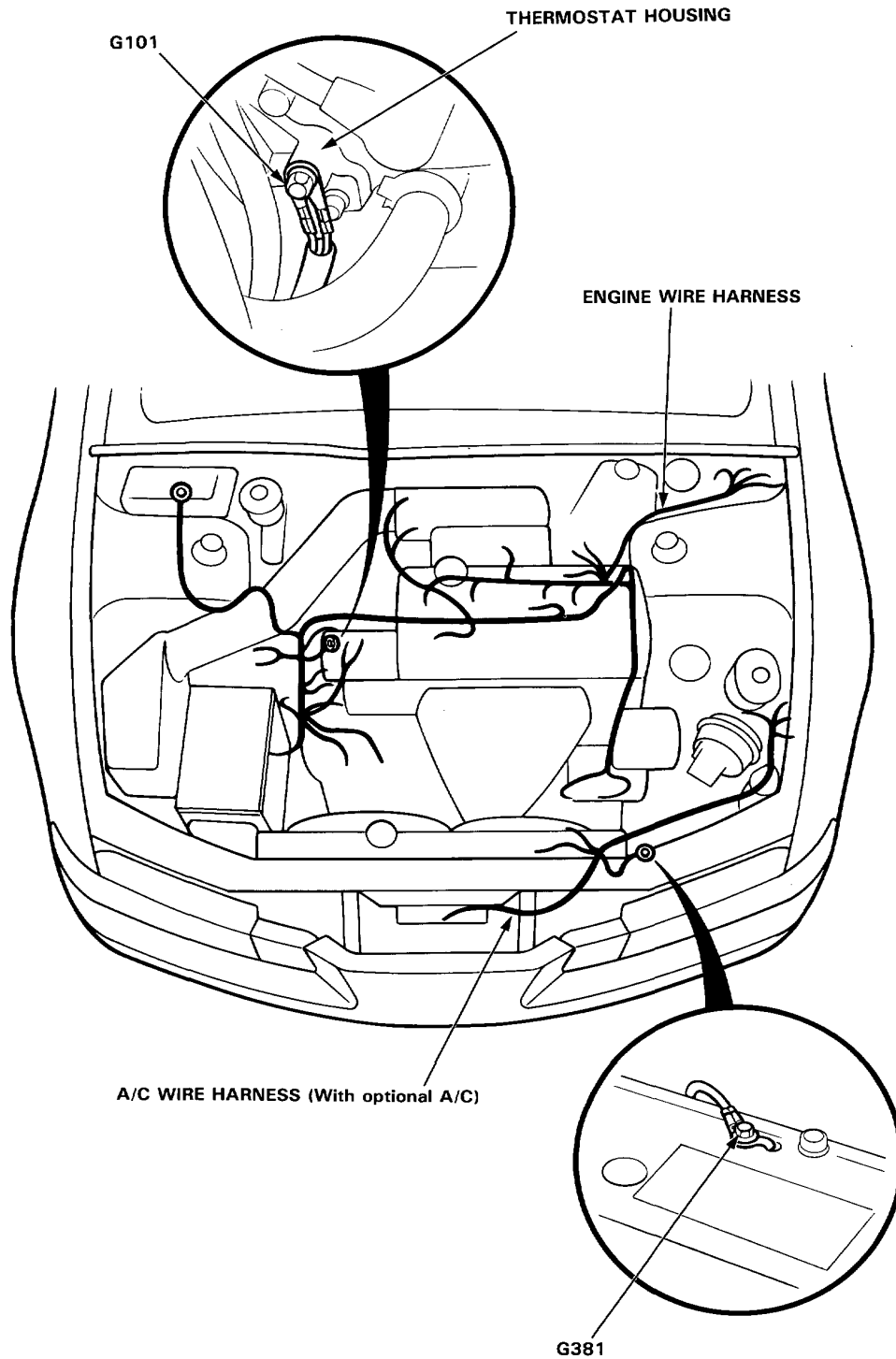
Engine Compartment

NOTE: RHD type is shown. LHD type is similar.



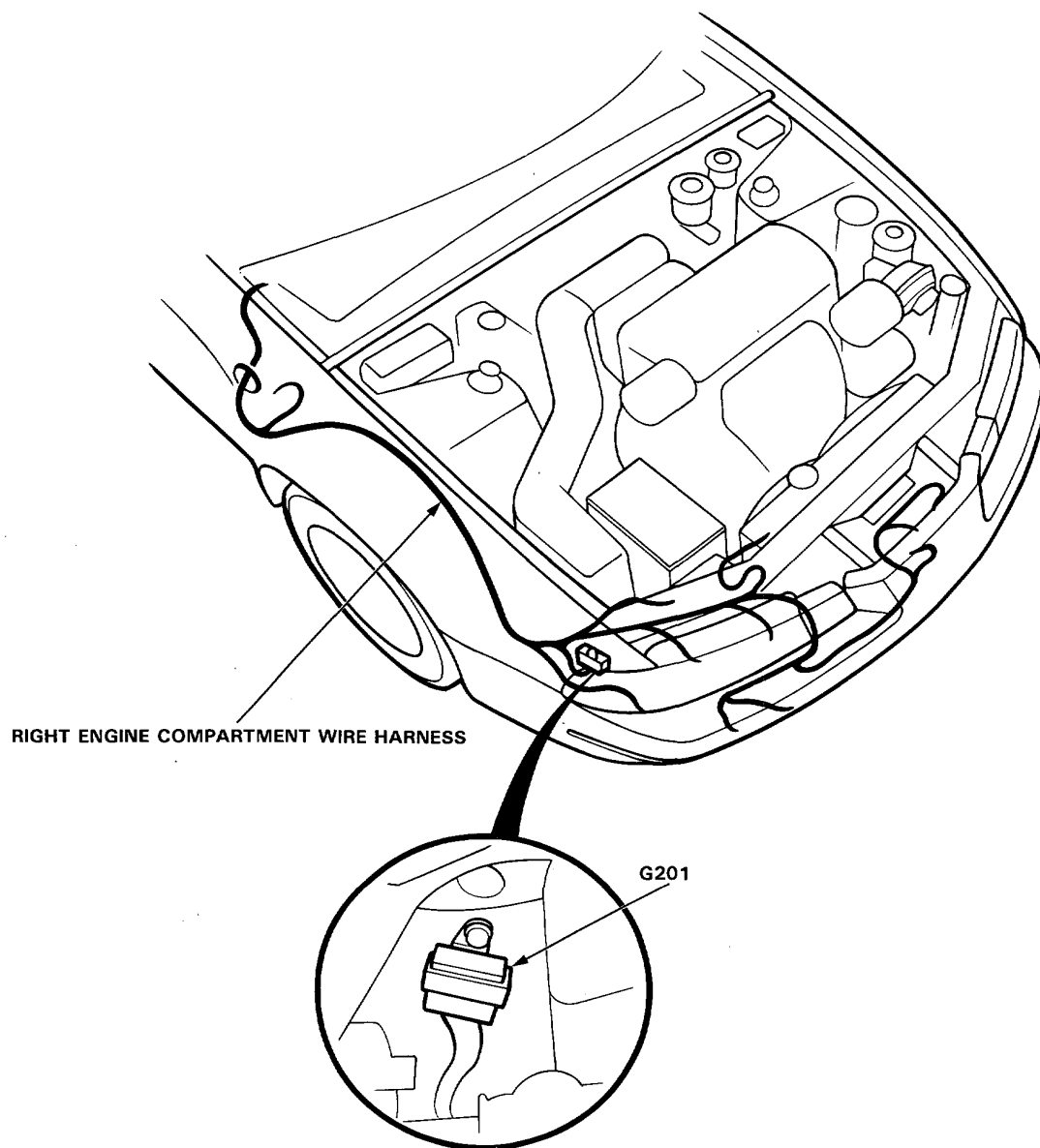


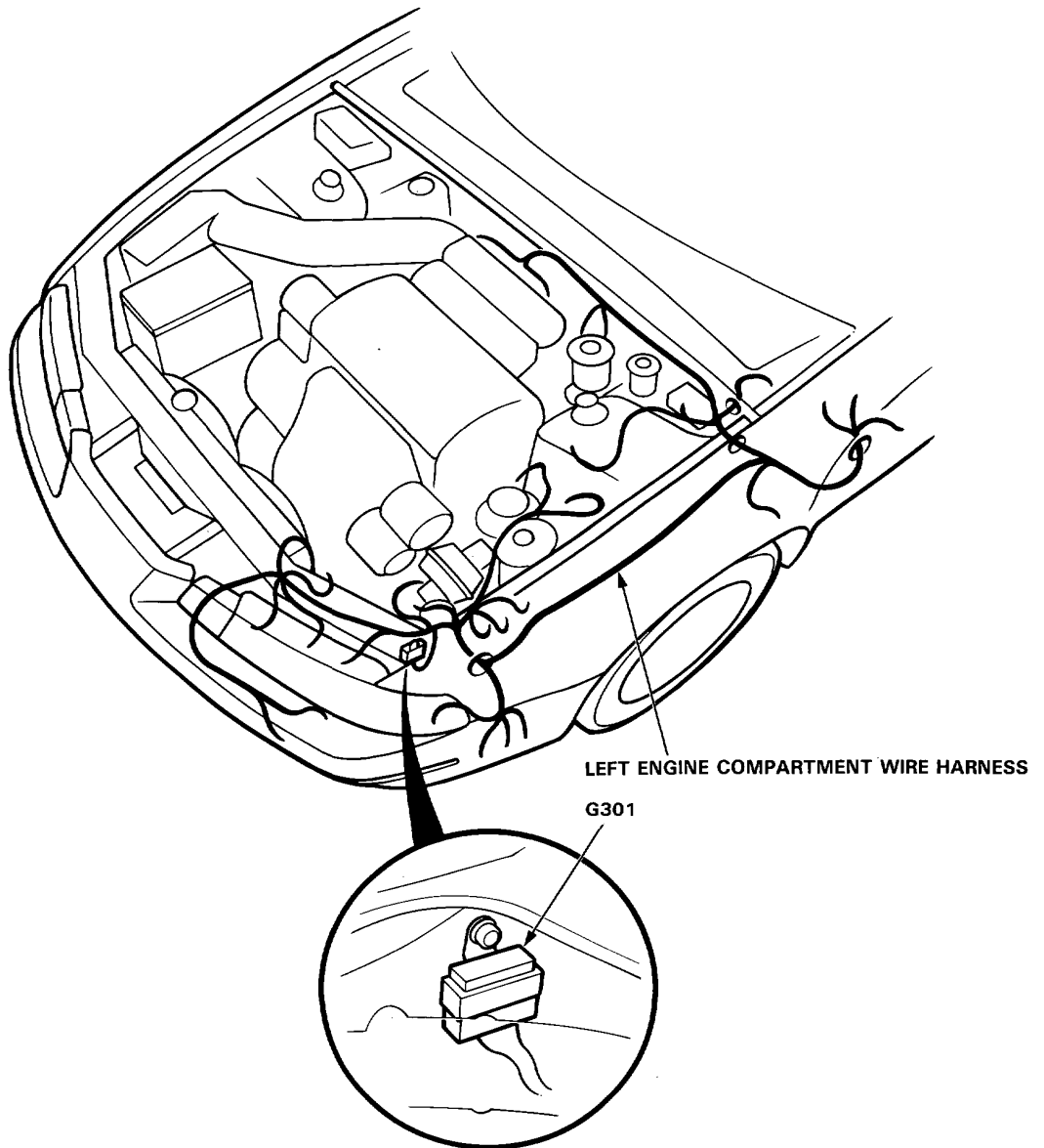
NOTE: RHD type is shown. LHD type is similar.



Wire Harness and Ground Locations

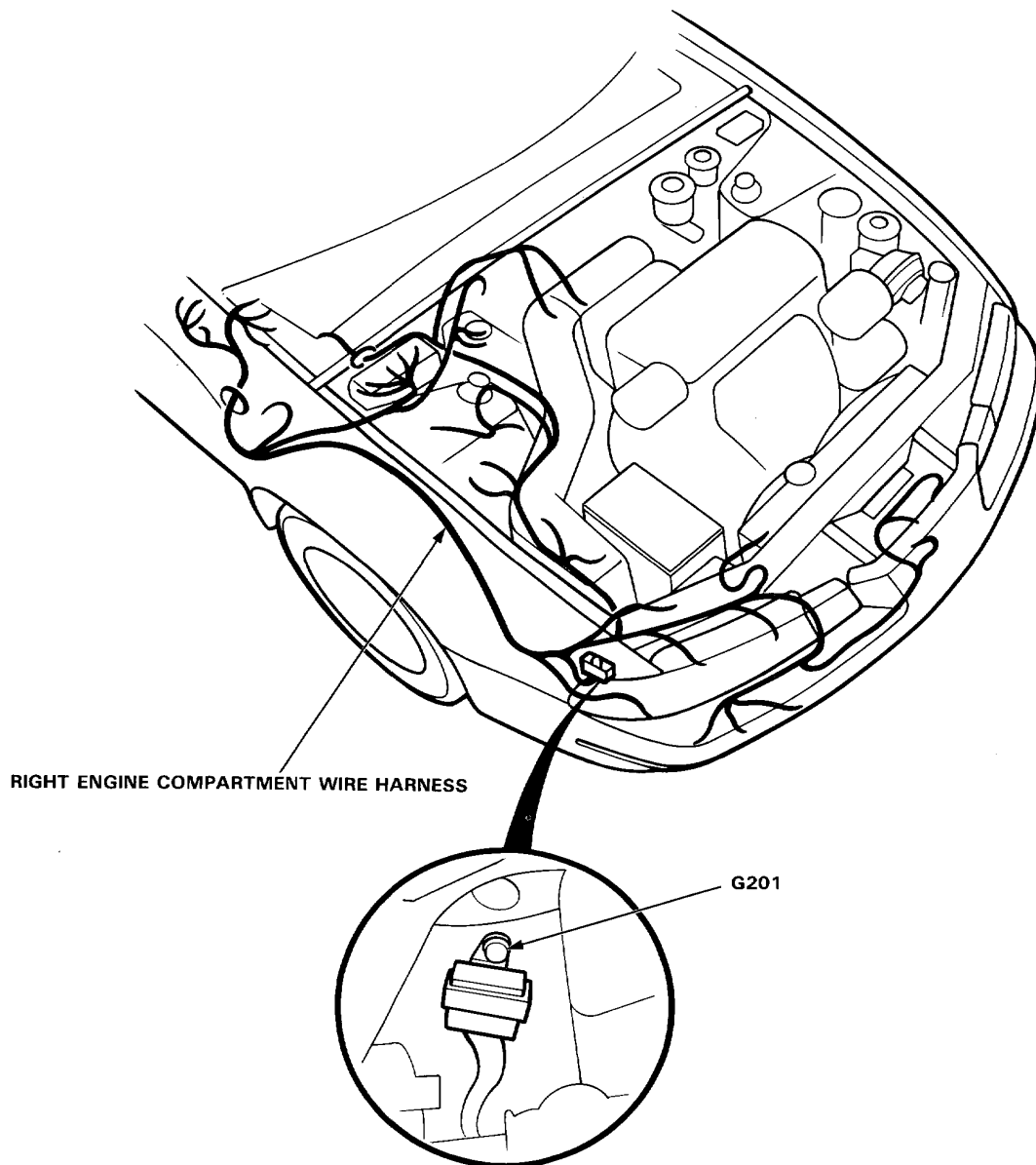
Engine Compartment (LHD)

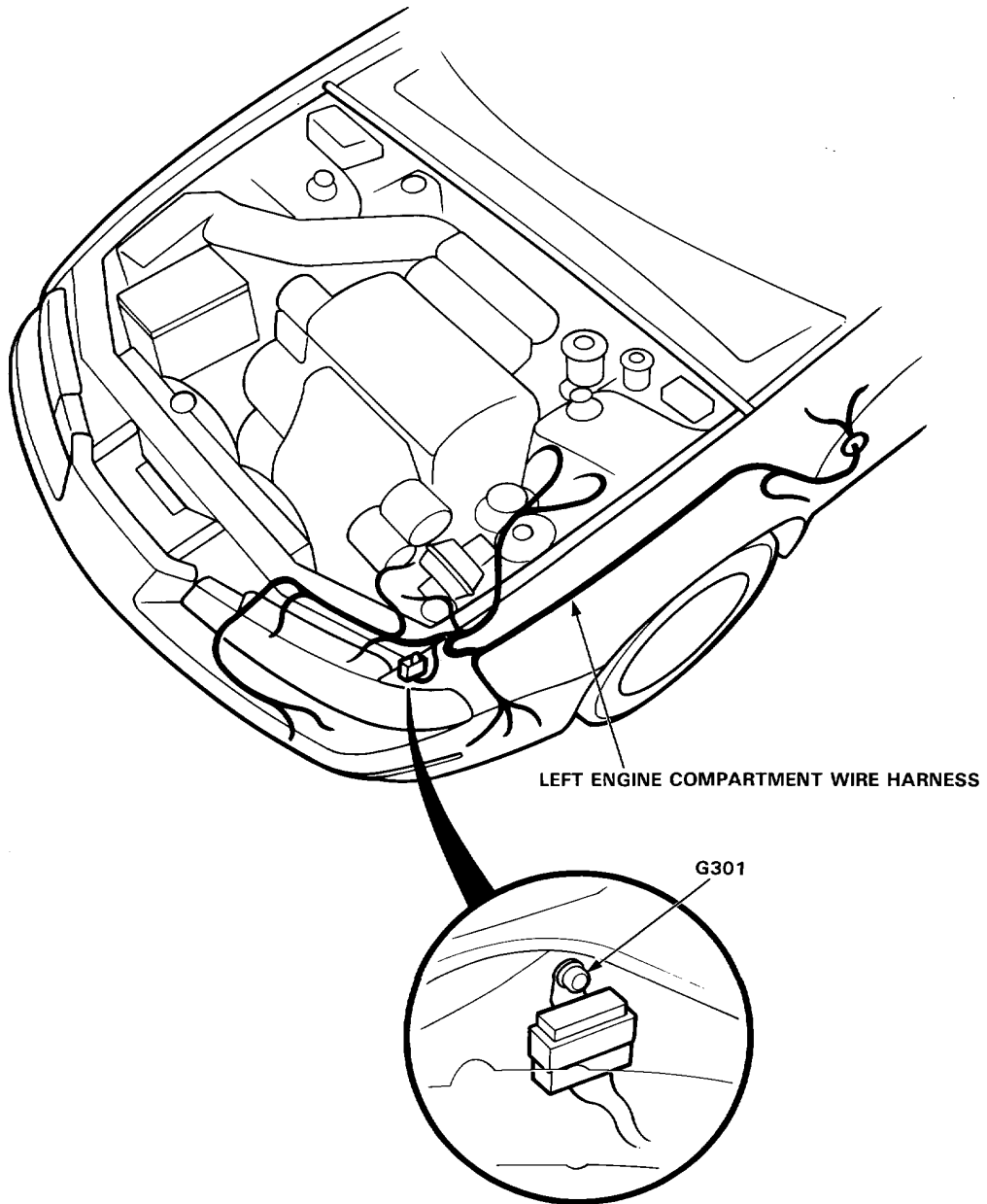




Wire Harness and Ground Locations

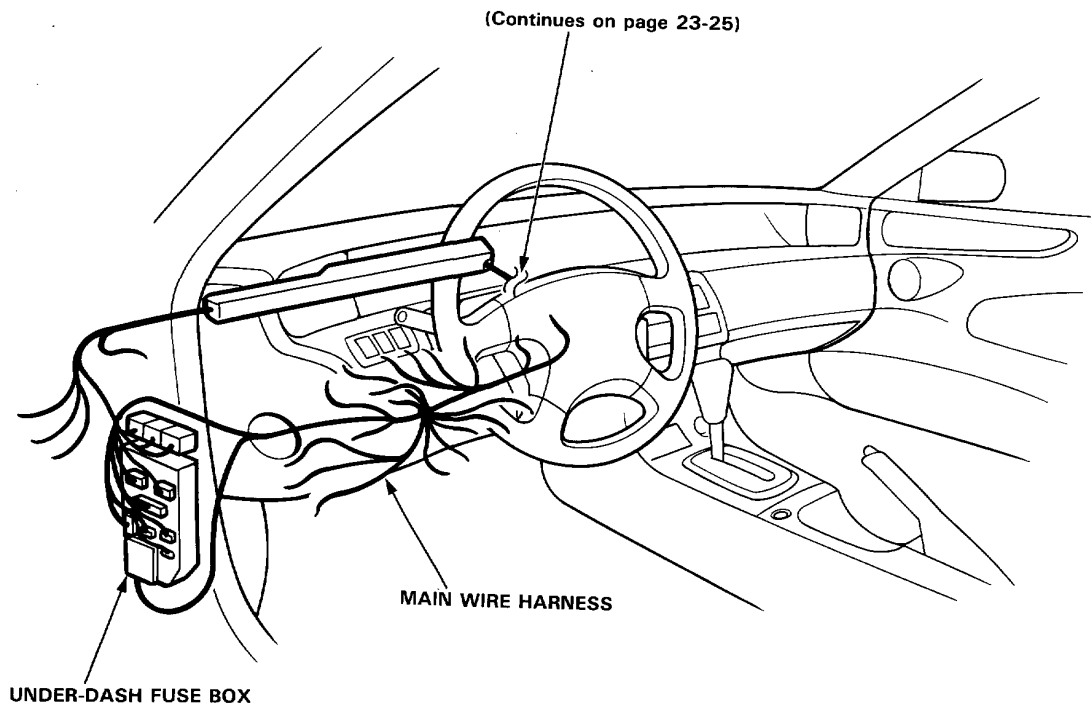
Engine Compartment (RHD)

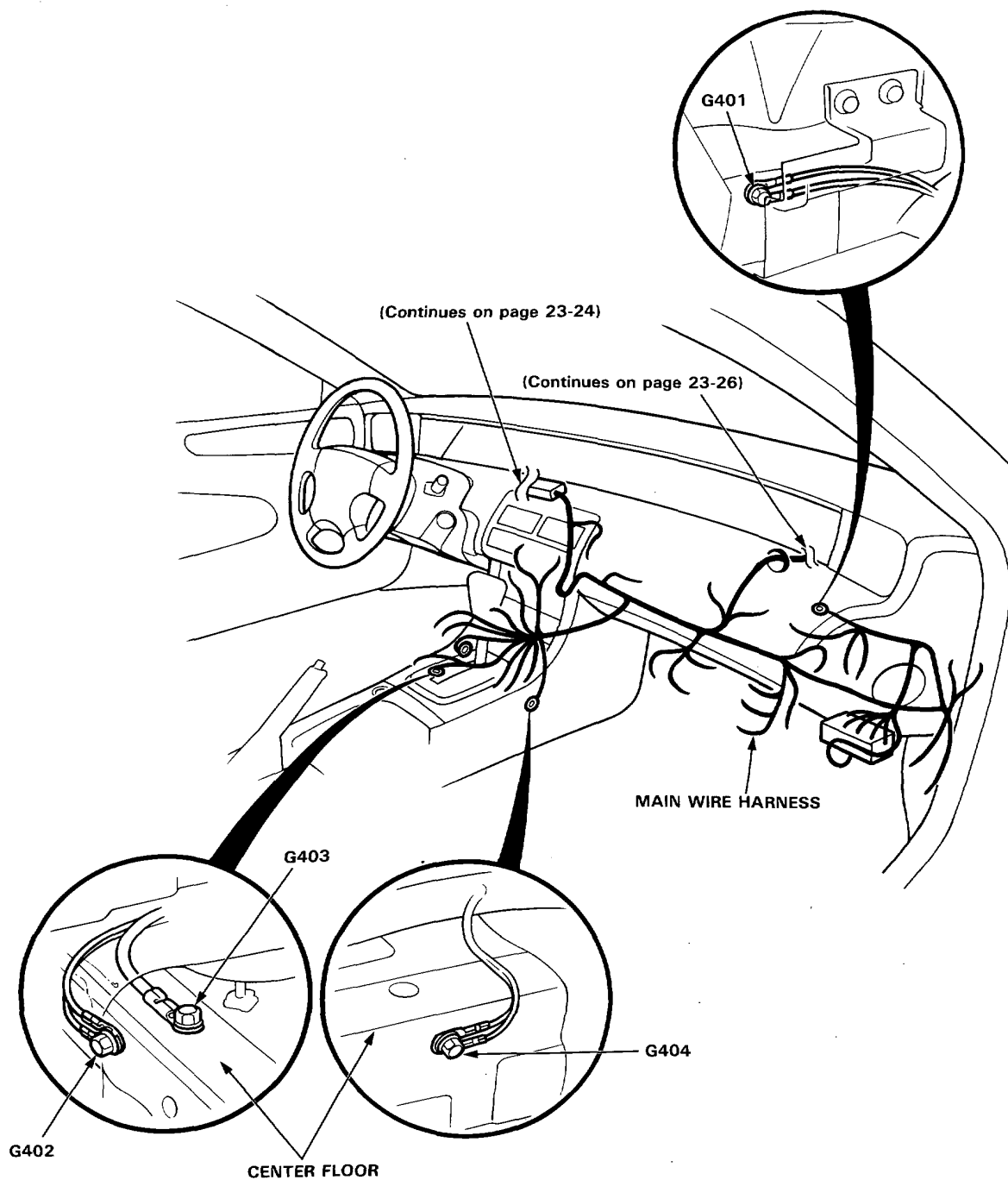




Wire Harness and Ground Locations

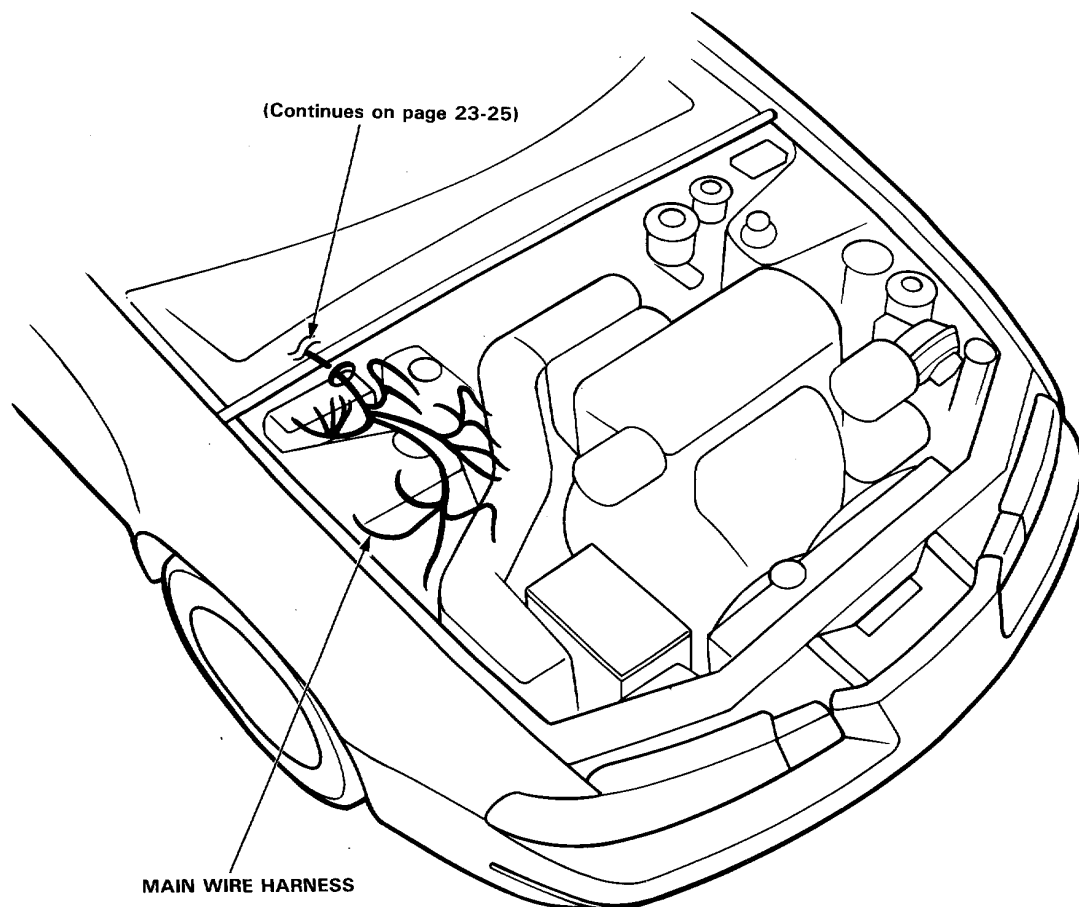
Dashboard and Floor (LHD)





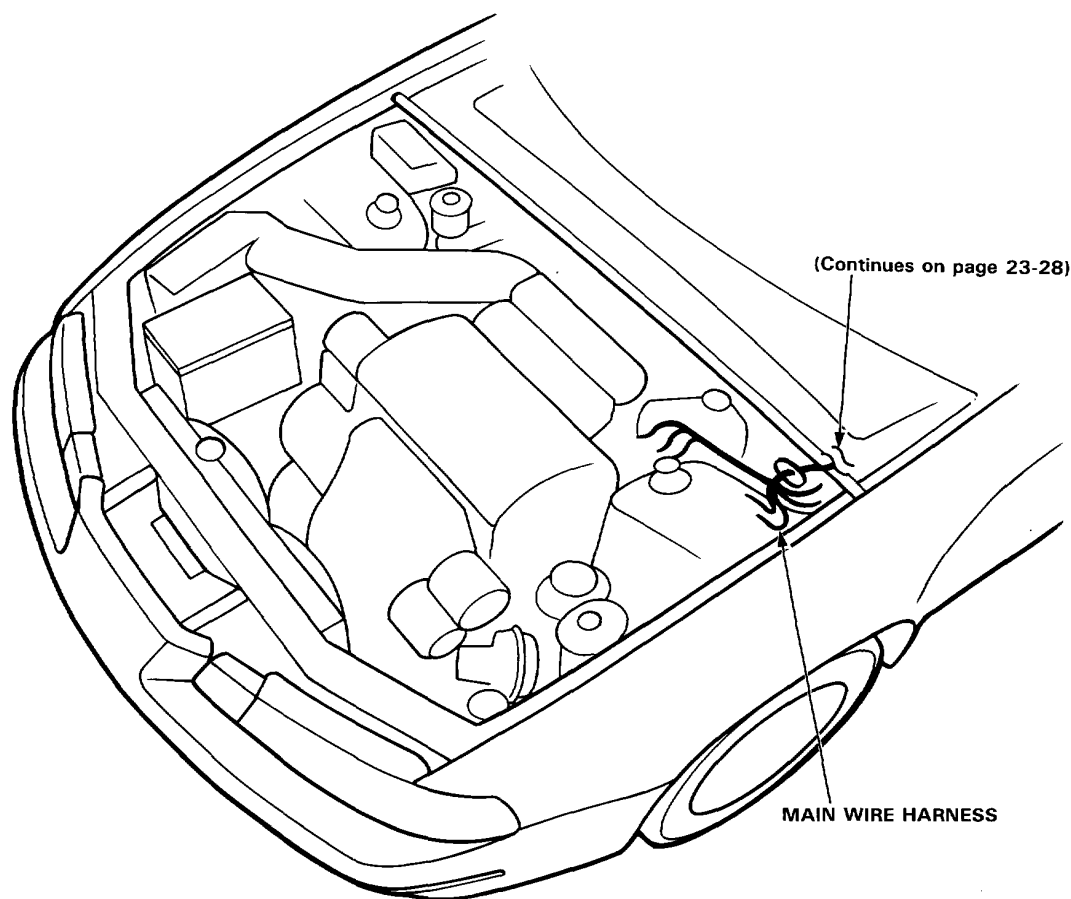
Wire Harness and Ground Locations

Dashboard and Floor (LHD)



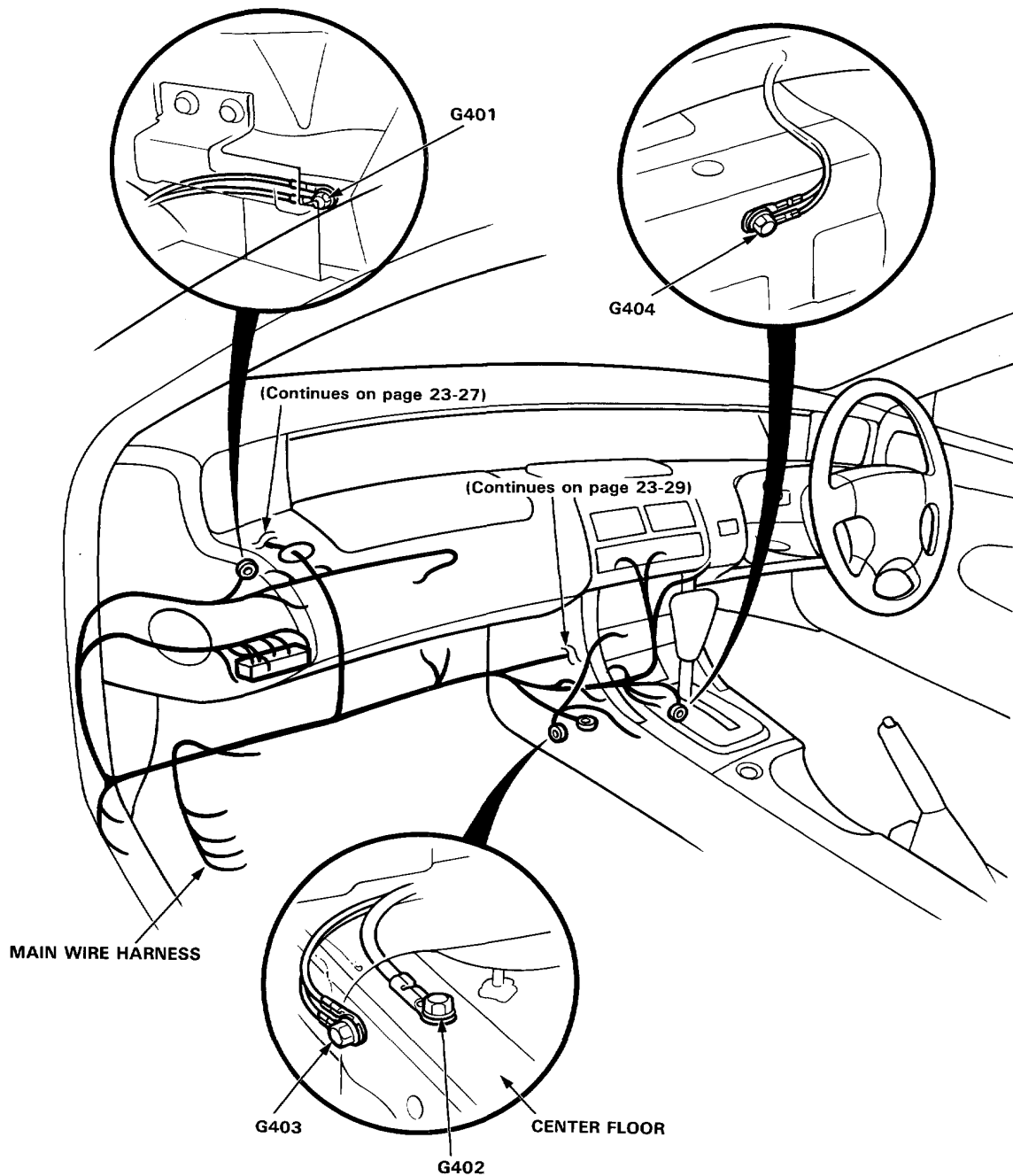


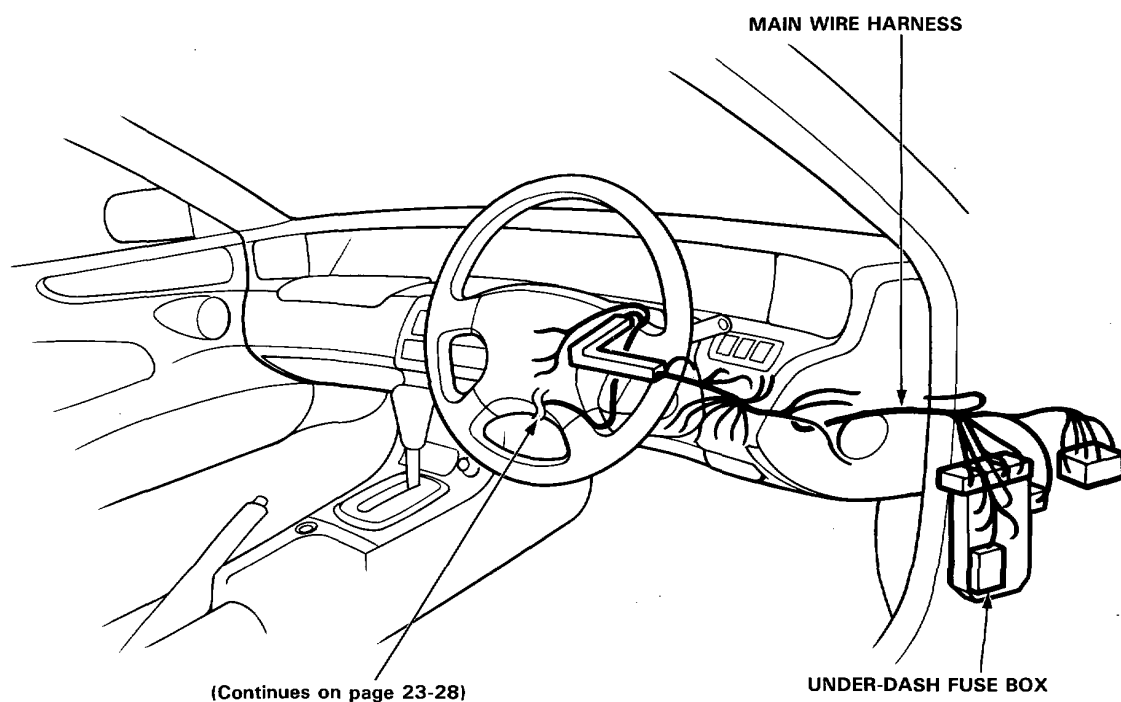
Dashboard and Floor (RHD)



Wire Harness and Ground Locations

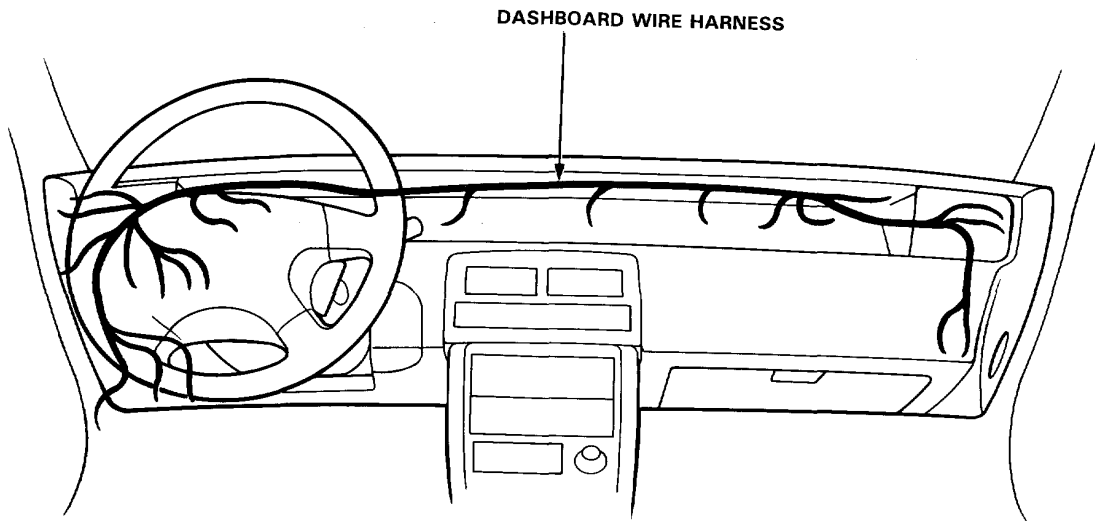
Dashboard and Floor (RHD)





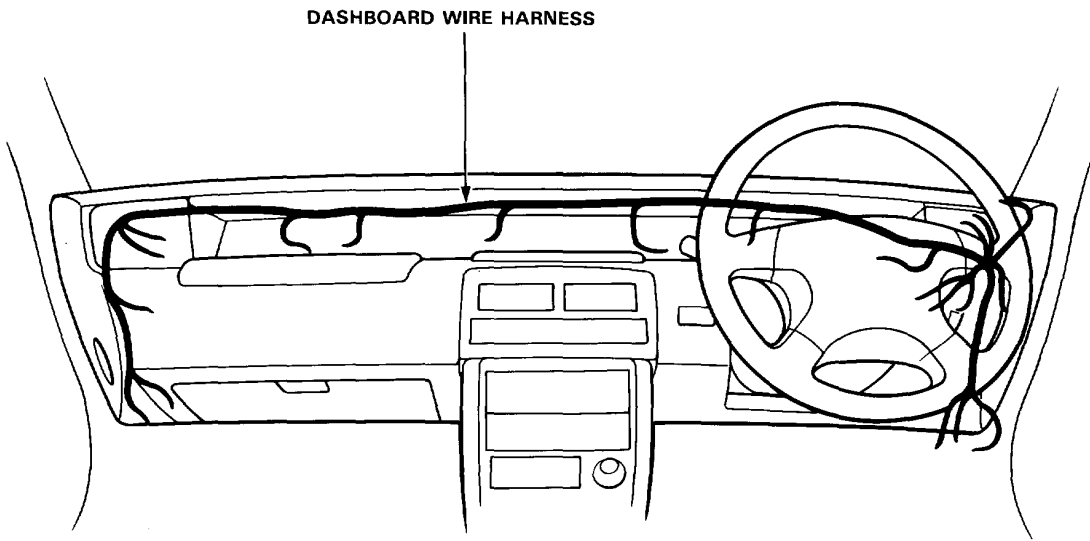
Wire Harness and Ground Locations

Dashboard (LHD)



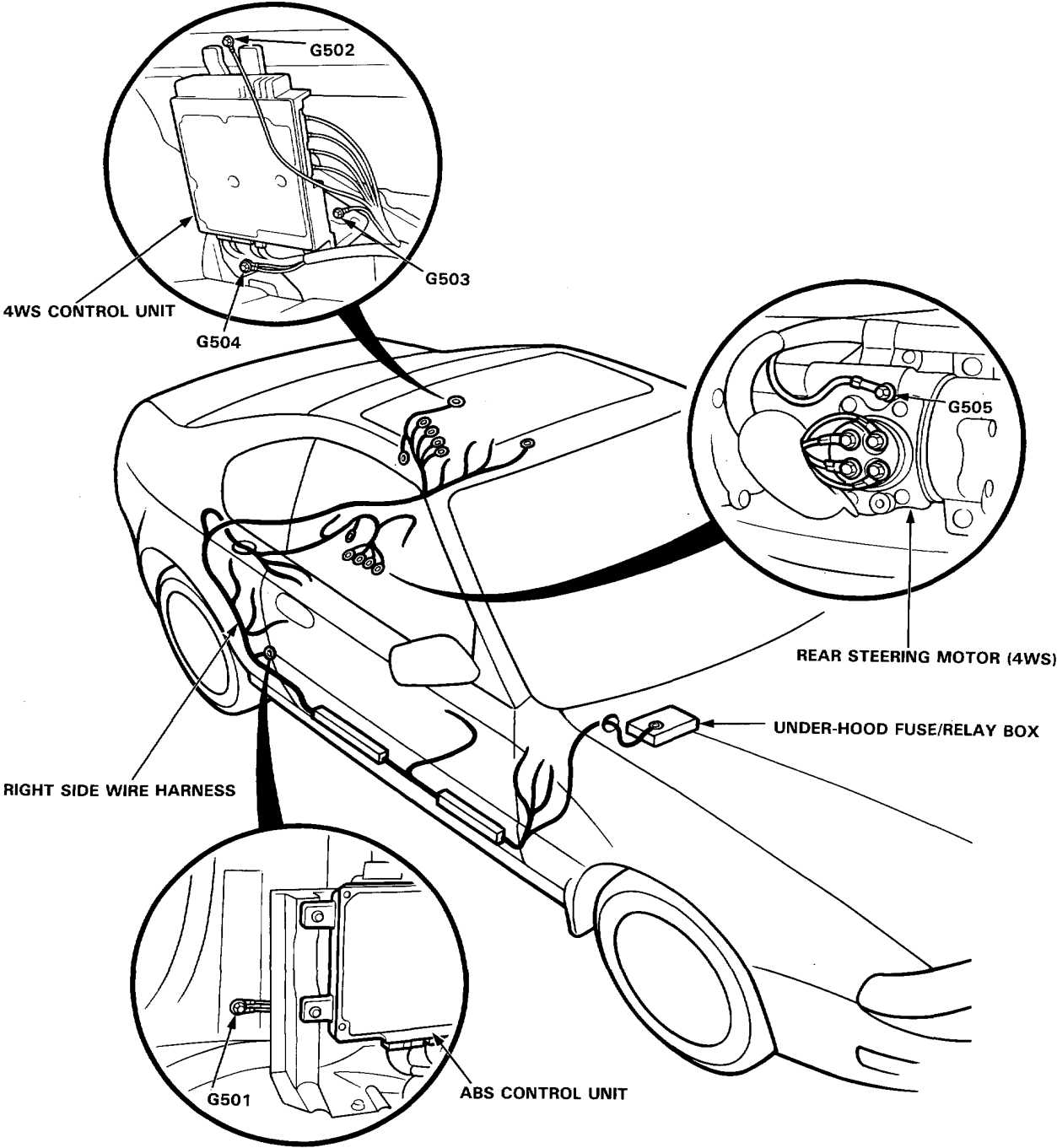


Dashboard (RHD)



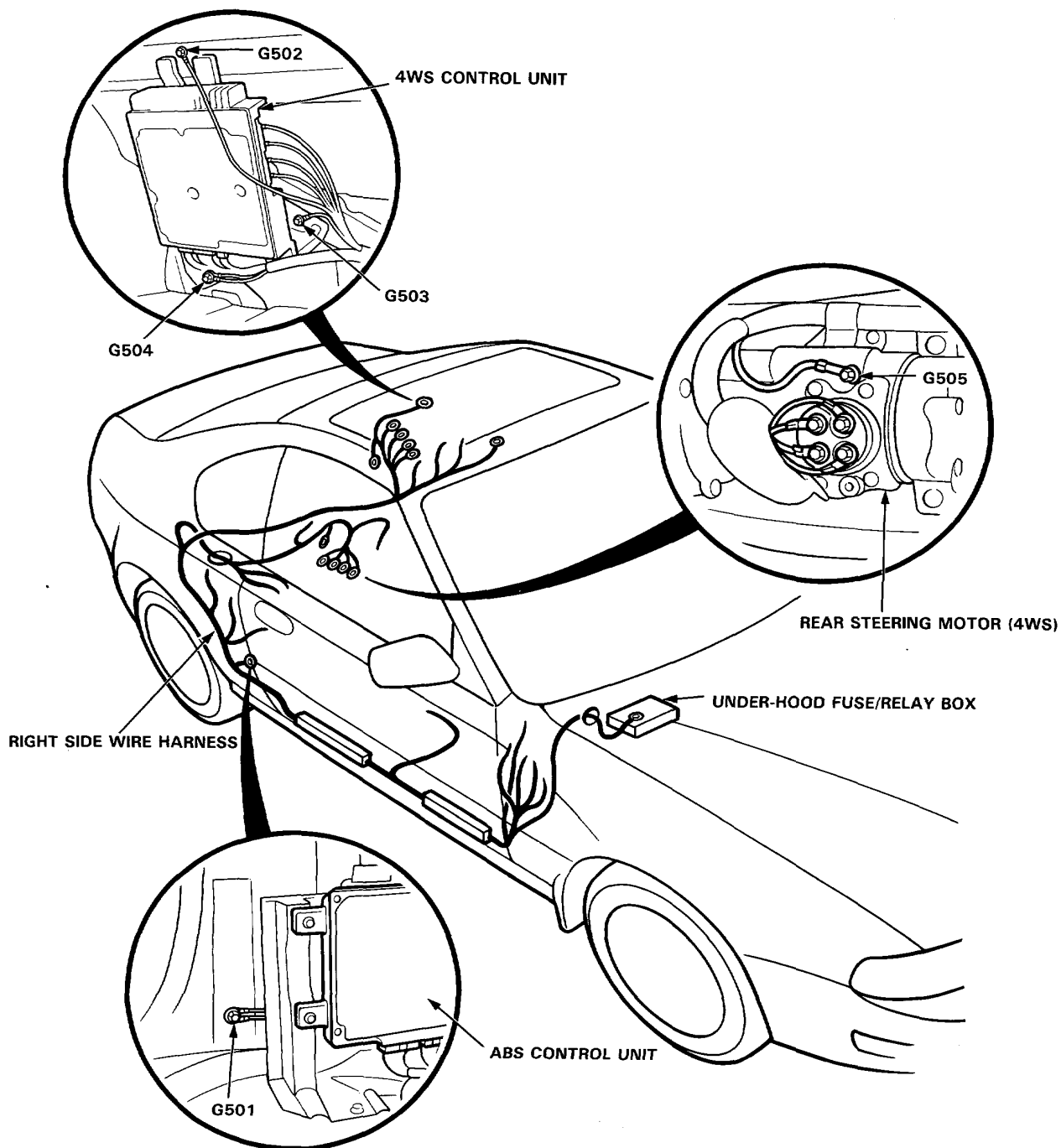
Wire Harness and Ground Locations

Floor (LHD)



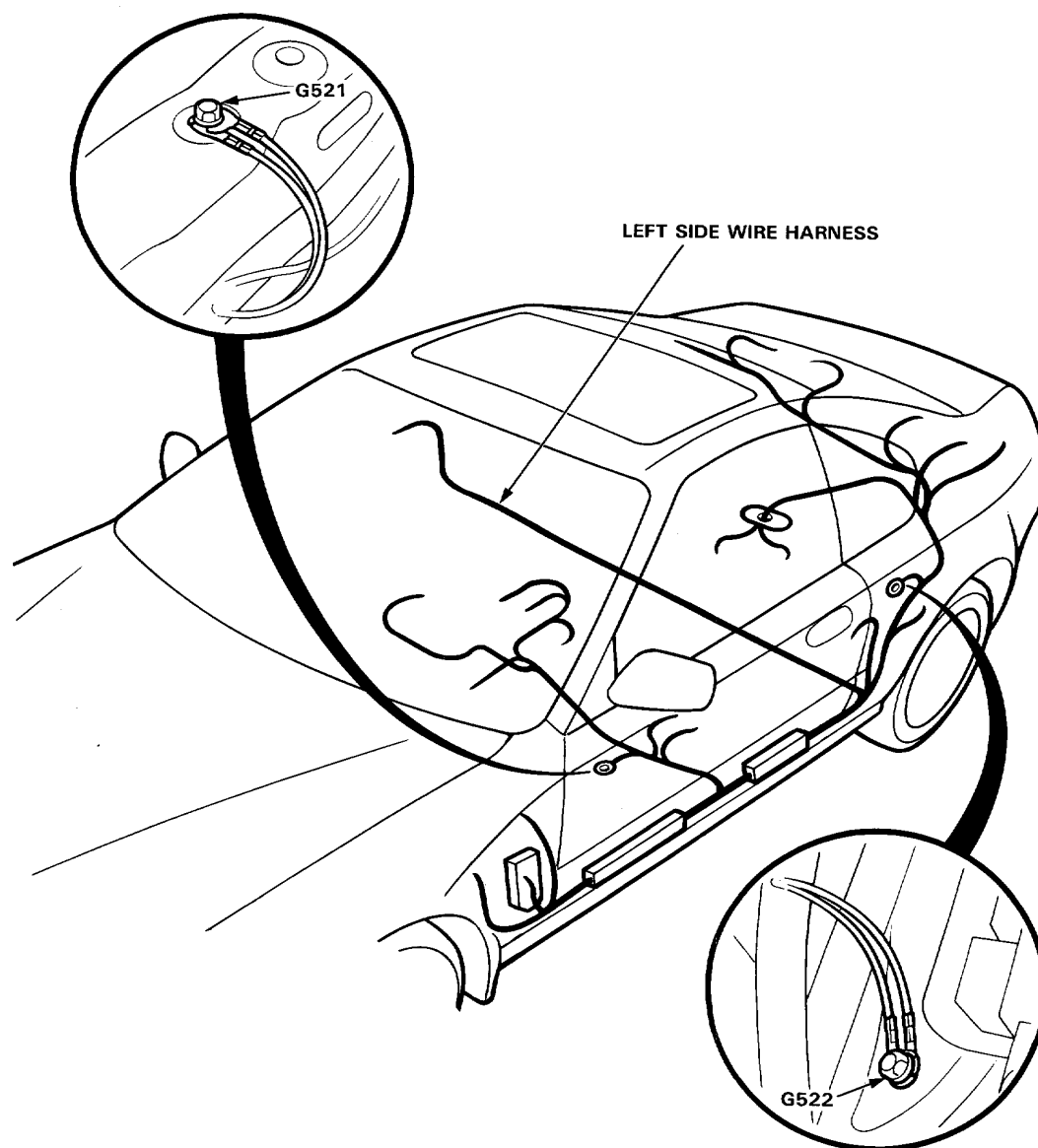


Floor (RHD)



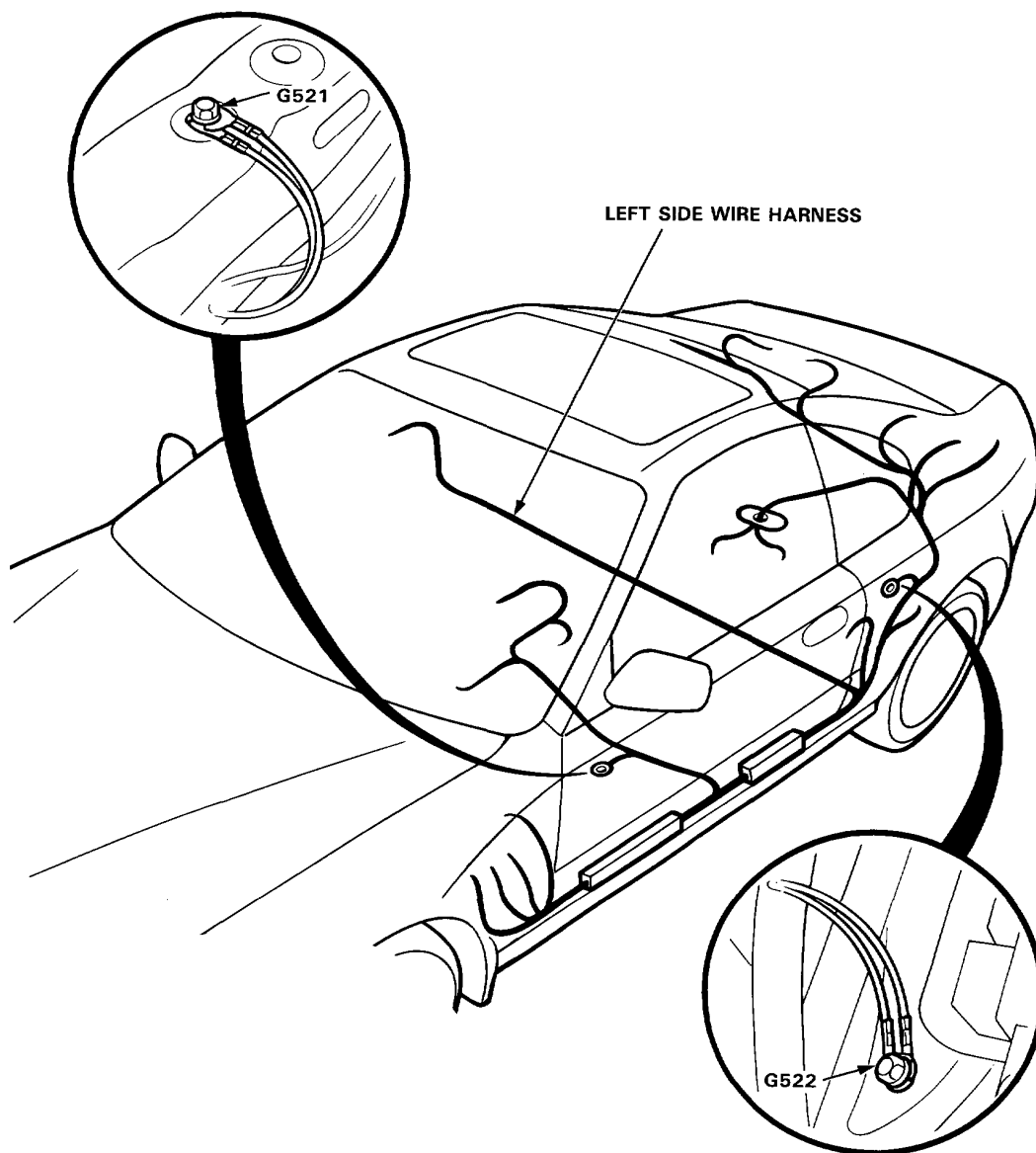
Wire Harness and Ground Locations

Floor (LHD)



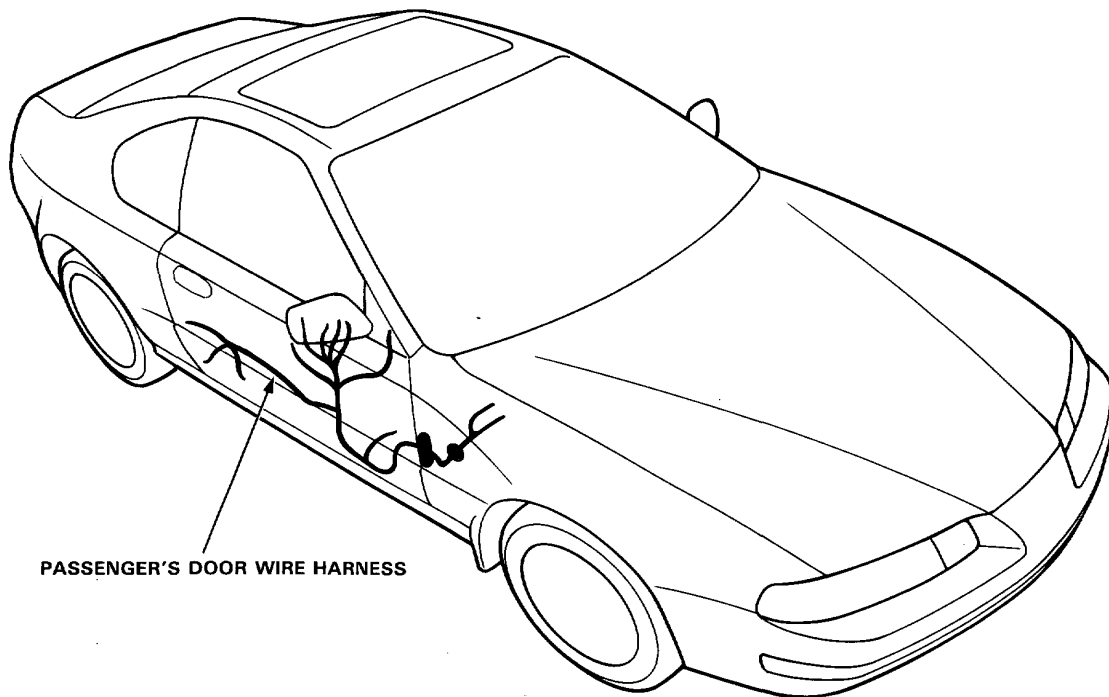


Floor (RHD)

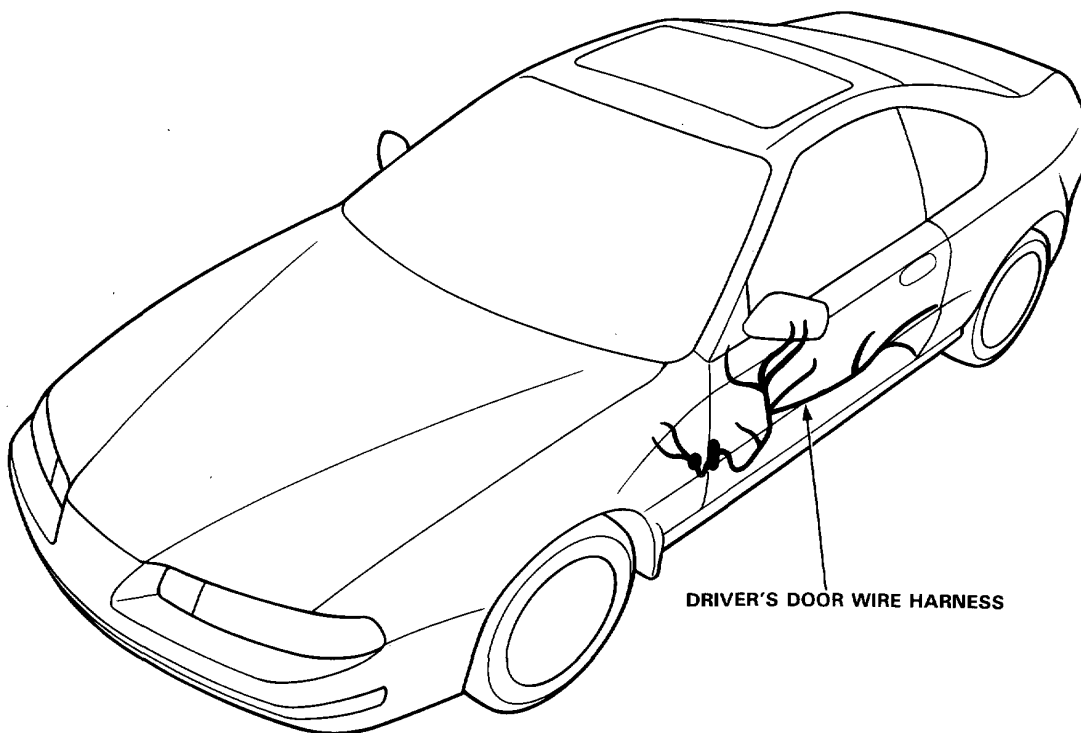


Wire Harness and Ground Locations

Door (LHD)



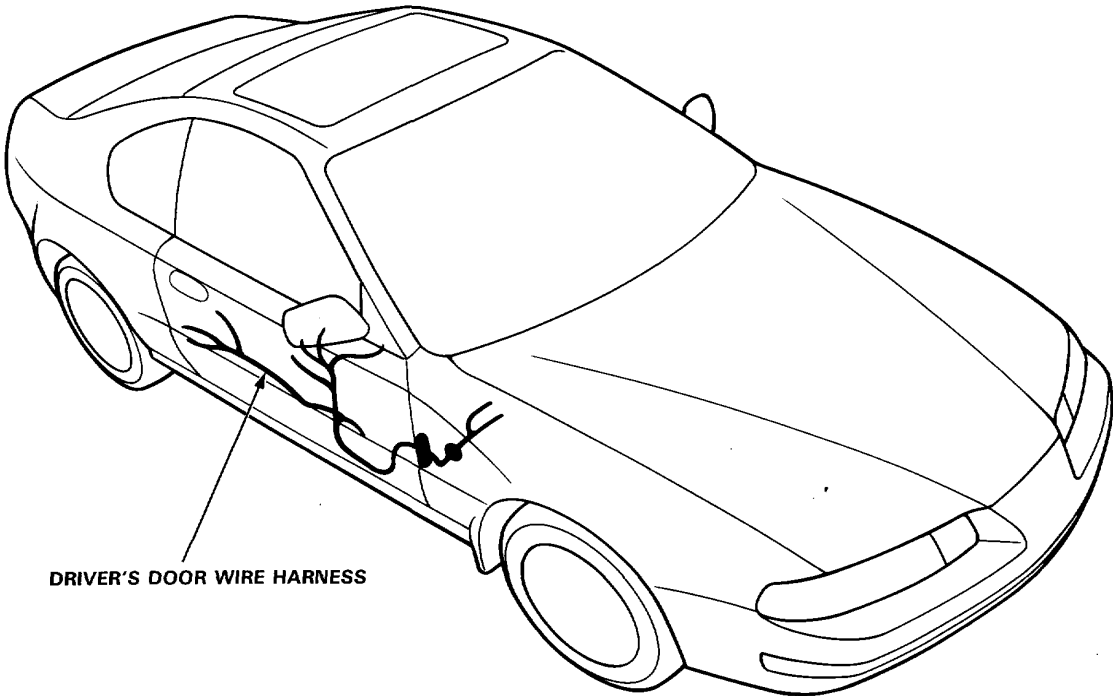
PASSENGER'S DOOR WIRE HARNESS



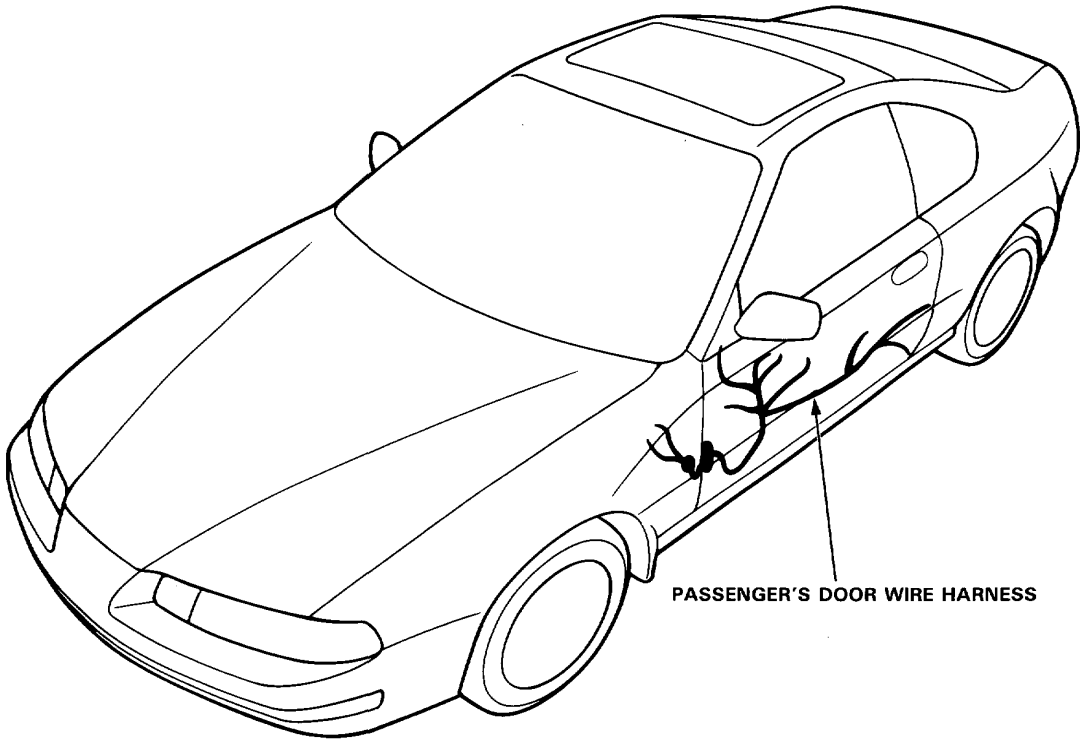
DRIVER'S DOOR WIRE HARNESS



Door (RHD)



DRIVER'S DOOR WIRE HARNESS

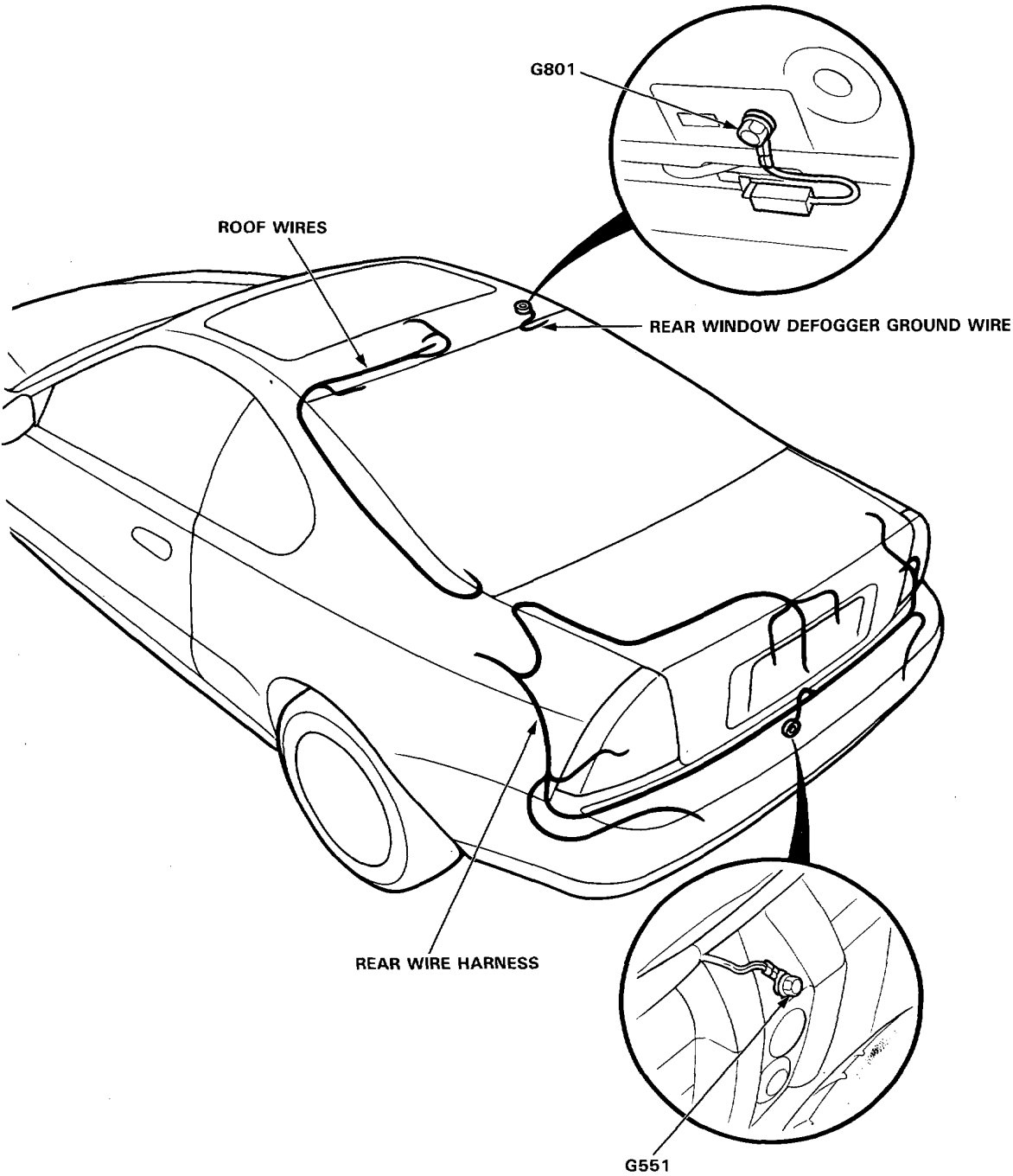


PASSENGER'S DOOR WIRE HARNESS

Wire Harness and Ground Locations

Roof/Trunk

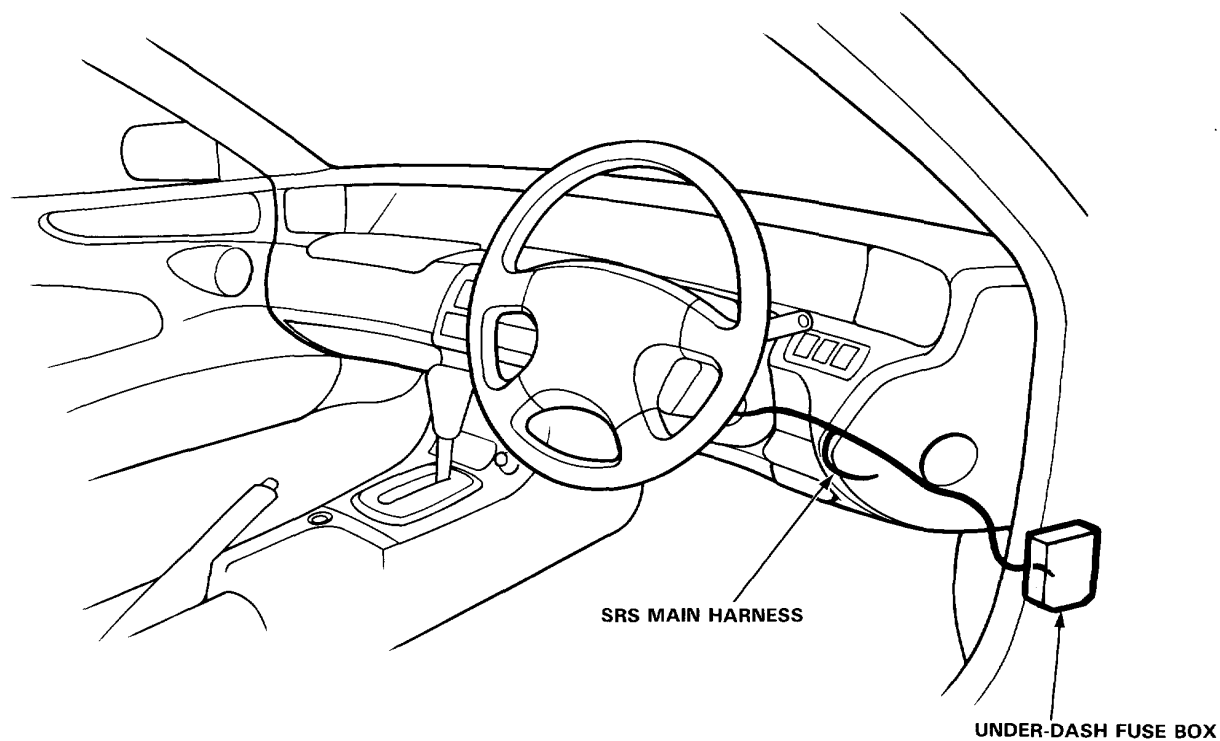
NOTE: LHD type is shown. RHD type is similar.



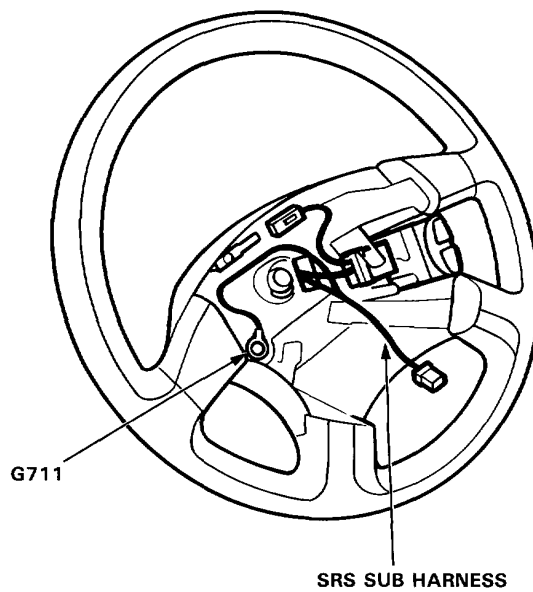


Dashboard

NOTE: RHD type is shown. LHD type is similar.

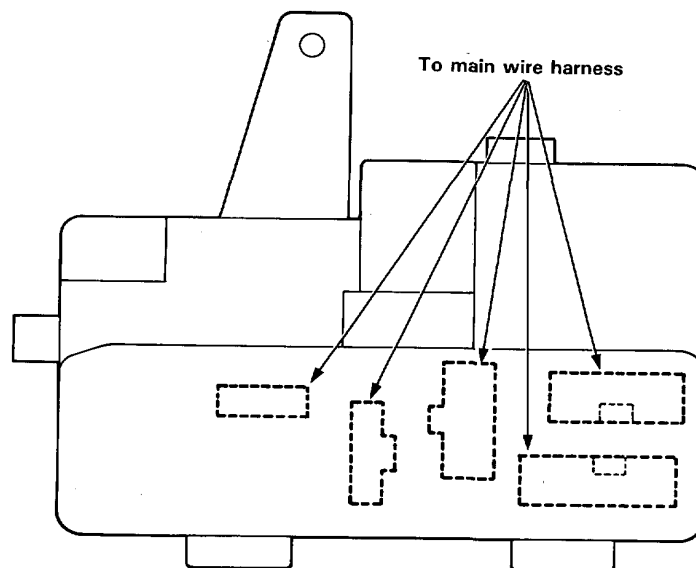
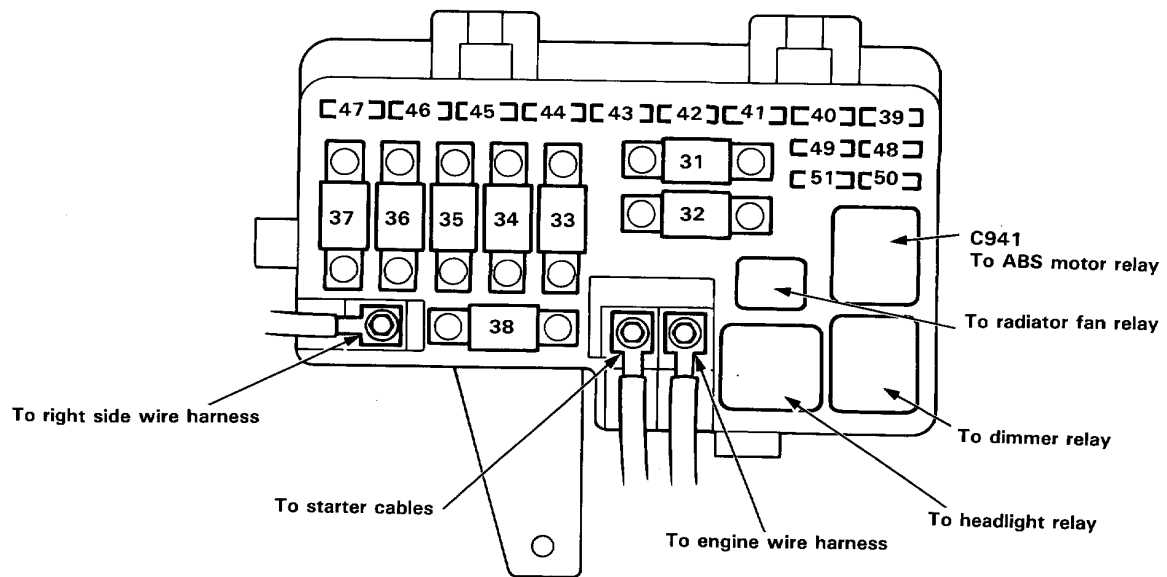


NOTE: RHD type is shown. LHD type is similar.



Fuses

Under-Hood Fuse/Relay Box (LHD)

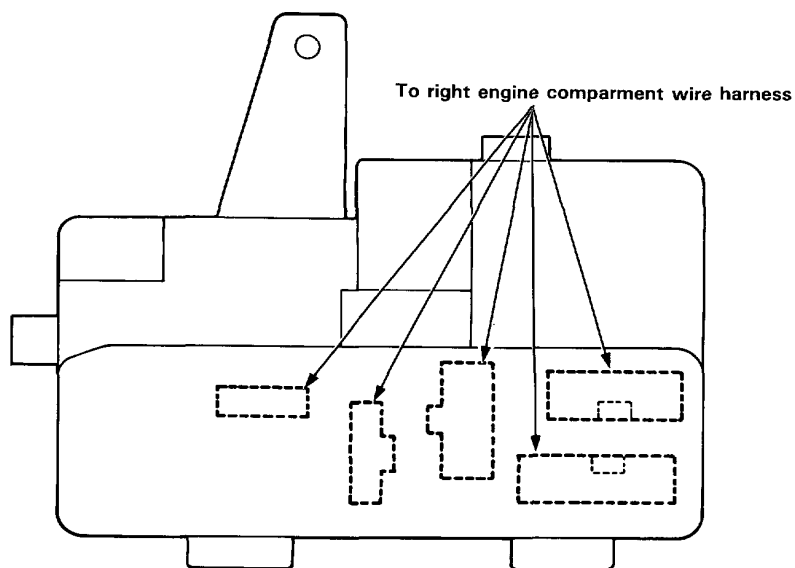
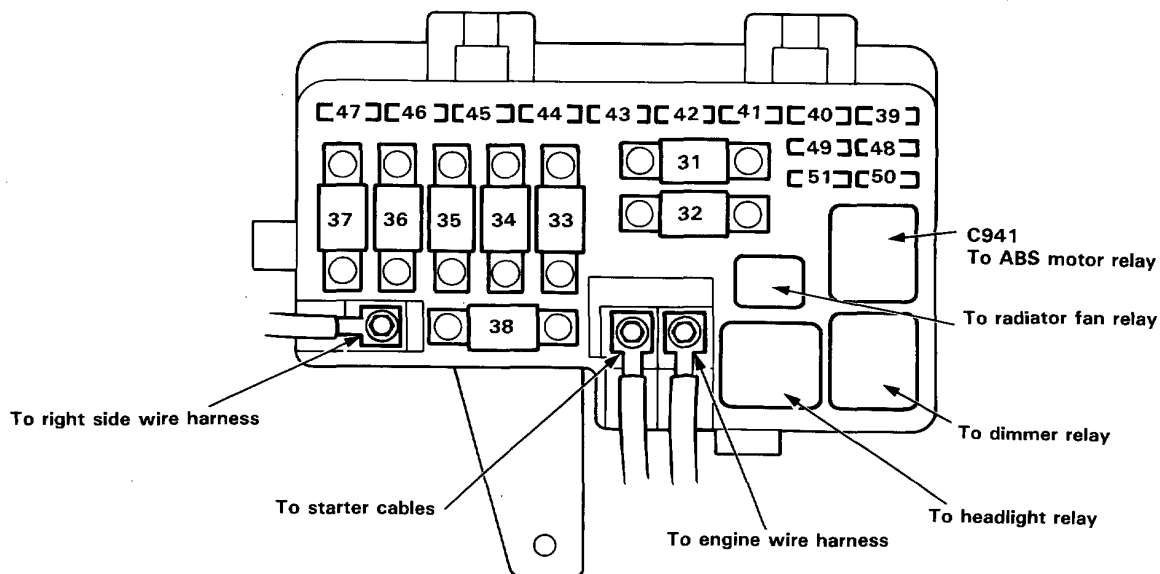




Fuse Number	Amps	Wire Color	Description
31	50 A	—	ABS motor relay
32	100 A	—	Power distribution
33	50 A	WHT	Ignition switch (BAT)
34	40 A	BLK/GRN	Rear window defogger relay
35	40 A	WHT	Blower motor relay
36	50 A	WHT/RED	Seat heaters (KS), PGM-FI main relay
37	40 A	WHT/BLU	Sunroof system, Power window system
38	60 A	WHT	4WS control unit
39	15 A	WHT/YEL	Turn signal/hazard relay, Hazard lights
40	15 A	WHT	ABS control unit (B2)
41	15 A	WHT/YEL	Horns, Horn relay (With SRS), Brake lights, Brake light signal
42	20 A	RED/GRN	Parking lights, Dash lights
43	10 A	WHT/YEL	Clock (+ B), Stereo sound system, 4WS control unit, ECU, A/T control unit
44	15 A	WHT	Power door lock control unit
45	15 A	WHT/GRN	Condenser fan motor, Fan timer unit
46	15 A	WHT/BLU	Ceiling light, Cigarette lighter relay, Trunk light, Ignition key light
47	15 A	—	Radiator fan motor
48	7.5 A	WHT/BLK	ABS control unit
49	20 A	WHT/GRN	ABS control unit (B1), (B3)
50	20 A	RED/GRN	Right headlight
51	20 A	RED/YEL	Left headlight, High beam indicator light

Fuses

Under-Hood Fuse/Relay Box (RHD)

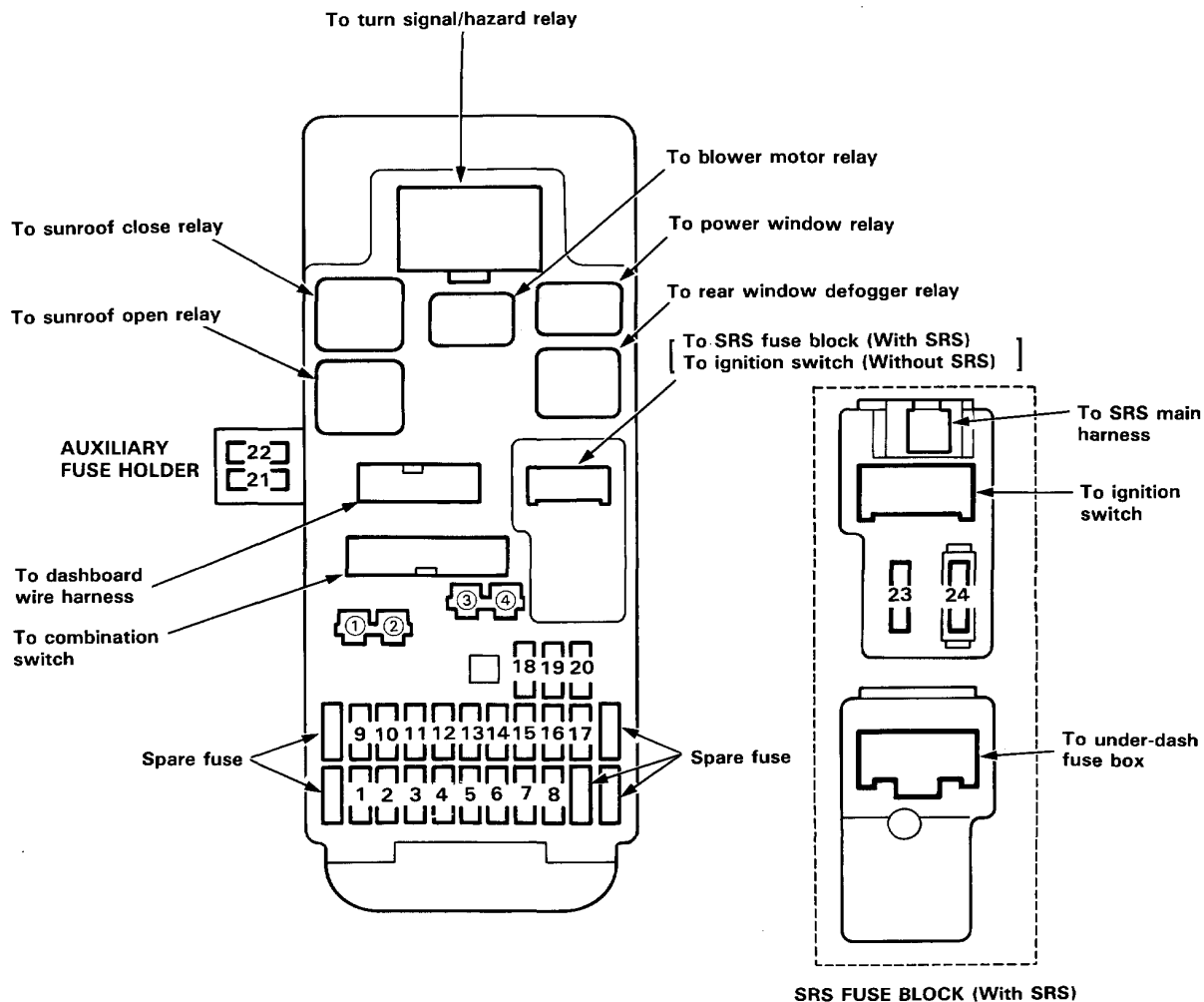




Fuse Number	Amps	Wire Color	Description
31	50 A	—	ABS motor relay
32	100 A	—	Power distribution
33	50 A	WHT	Ignition switch (BAT)
34	40 A	BLK/GRN	Rear window defogger relay
35	40 A	WHT	Blower motor relay
36	50 A	WHT/RED	PGM-FI main relay, Integrated control unit (DIM-DIP)
37	40 A	WHT/BLU	Sunroof system, Power window system
38	60 A	WHT	4WS control unit
39	15 A	WHT/YEL	Turn signal/hazard relay, Hazard lights
40	15 A	WHT	ABS control unit (B2)
41	15 A	WHT/YEL	Horns, Horn relay (With SRS), Brake lights, Brake light signal
42	20 A	RED/GRN	Parking lights, Dash lights
43	10 A	WHT/YEL	Clock (+ B), Stereo sound system, 4WS control unit, ECU, A/T control unit
44	15 A	WHT	Power door lock control unit
45	15 A	WHT/GRN	Condenser fan motor, Fan timer unit
46	15 A	WHT/BLU	Ceiling light, Cigarette lighter relay, Trunk light, Ignition key light
47	15 A	—	Radiator fan motor
48	7.5 A	WHT/BLK	ABS control unit
49	20 A	WHT/GRN	ABS control unit (B1), (B3)
50	20 A	RED/GRN	Right headlight
51	20 A	RED/YEL	Left headlight, High beam indicator light

Fuses

Under-Dash Fuse Box (LHD)



- ①: Option (+ B)
- ②: Option (IG2)
- ③: Option (DASH LIGHTS)
- ④: Option (ACC)



Fuse Number	Amps	Wire Color	Description
1	30 A	WHT/BLK	Headlight washer control unit (KS and KG models)
2	7.5 A	BLU/RED	PGM-FI ECU, PGM-FI main relay, Sub gauge (brake check circuit: KY model)
3	15 A	BLU/RED	Front fog lights (option)
4	10 A	YEL/BLU	PGM-FI main relay
5	10 A	WHT/GRN	Voltage regulator (s)
6	15 A	WHT/BLK	Seat heater system (KS model)
7	30 A	Internal connection	Sunroof open relay, Sunroof close relay
9	15 A	Internal connection	Option ② connector, Blower motor relay
		BLK/YEL	Heater control panel, Power mirror system, ABS control unit, 4WS control unit, Fan timer unit, Mode/recirculation control motor
10	7.5 A	RED/YEL	Left taillight (KG and KF models)
11	10 A	Internal connection	Rear window defogger relay
		YEL/BLK	Seat heater main relay, A/C compressor clutch relay, PGM-FI ECU
12	7.5 A	YEL/RED	Integrated control unit (Daytime running lights) (KS model)
13	10 A	YEL	Gauge and indicator lights, Clock, Back-up lights
14	7.5 A	BLK/RED	Cruise control system
15	20 A	WHT/BLK	Driver's power window system
16	20 A	BLU/BLK	Passenger's power window system
17	30 A	GRN/BLK	Windshield wiper system
18	10 A	Internal connection	Option ④ connector
		YEL/RED	Stereo radio/cassette player, Cigarette lighter
*19	15 A	BLK/YEL	A/T control unit, Speed sensor, Fan timer unit
20	15 A	RED/BLK	Right taillight, Dash lights (KG and KF models)
*21	10 A	YEL/GRN	Headlight washer unit, Headlight adjuster, Rear wiper system
*22	10 A	YEL/RED	4WS control unit
*23	15 A	BLK/YEL	PGM-FI ECU, PGM-FI main relay
*24	10 A	RED	SRS unit

*19: UNDER-DASH FUSE BOX (Without SRS)

*21: AUXILIARY FUSE HOLDER

*22: AUXILIARY FUSE HOLDER

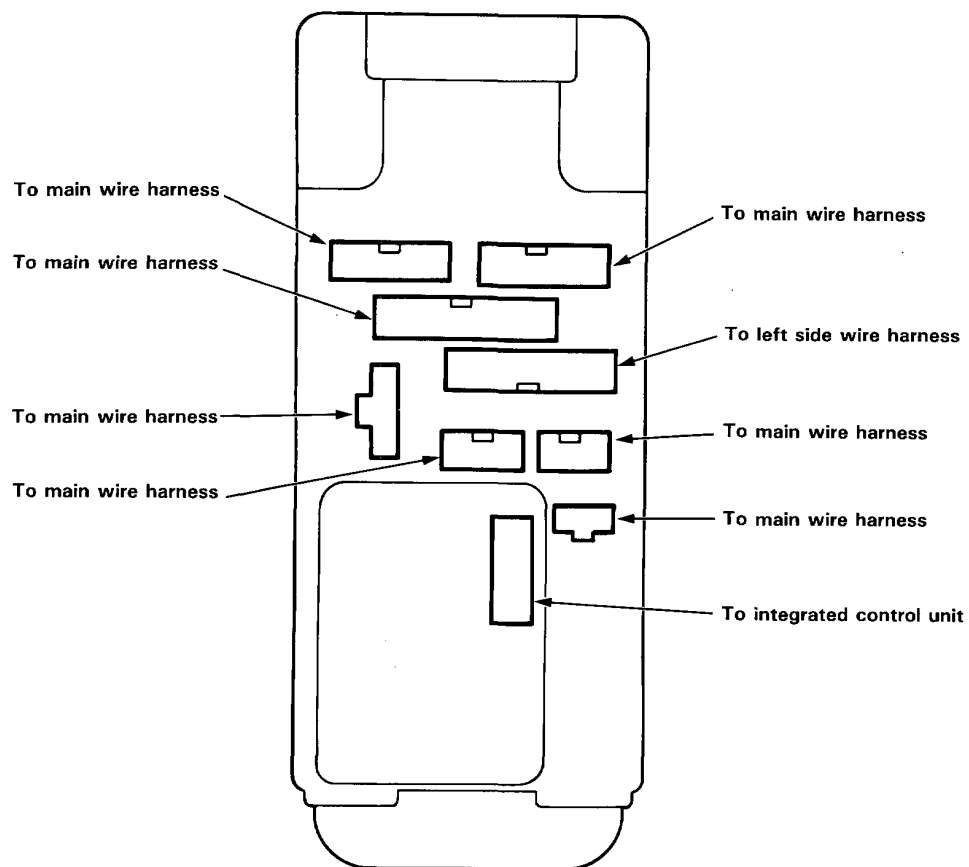
*23: SRS FUSE BLOCK (With SRS)

*24: SRS FUSE BLOCK (With SRS)

(cont'd)

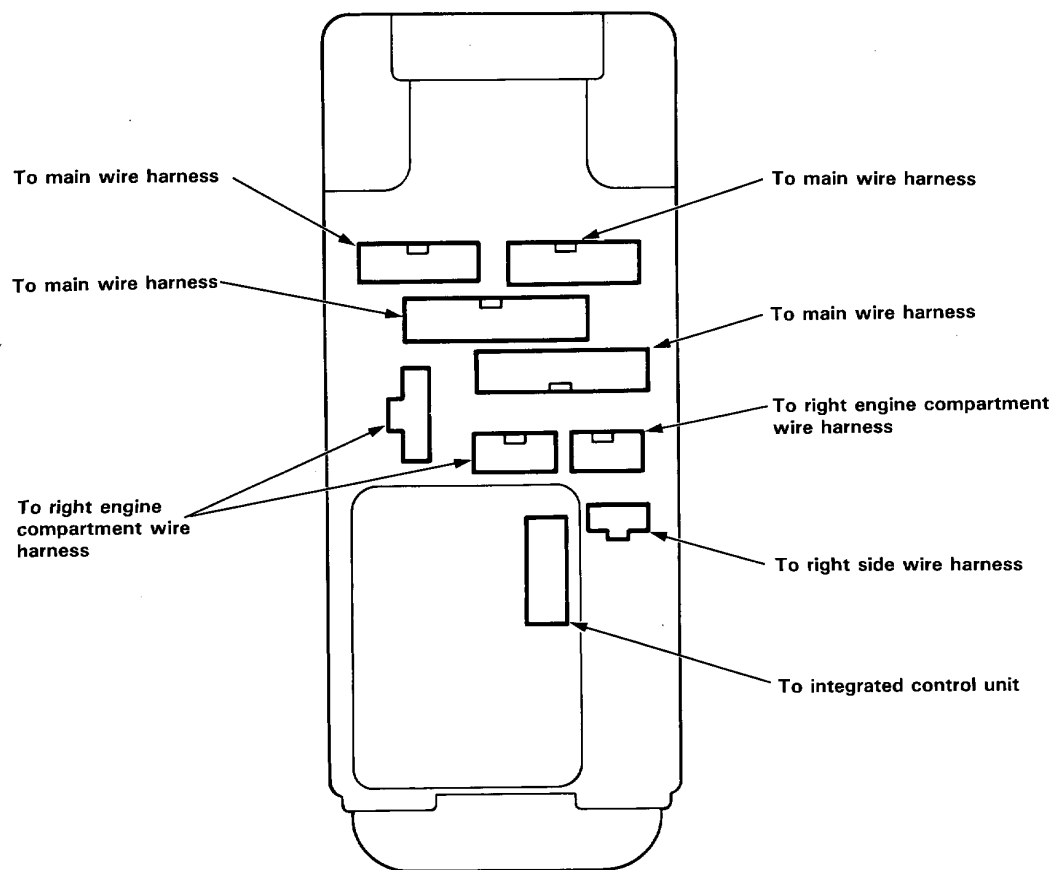
Fuses

Under-Dash Fuse Box (LHD cont'd)





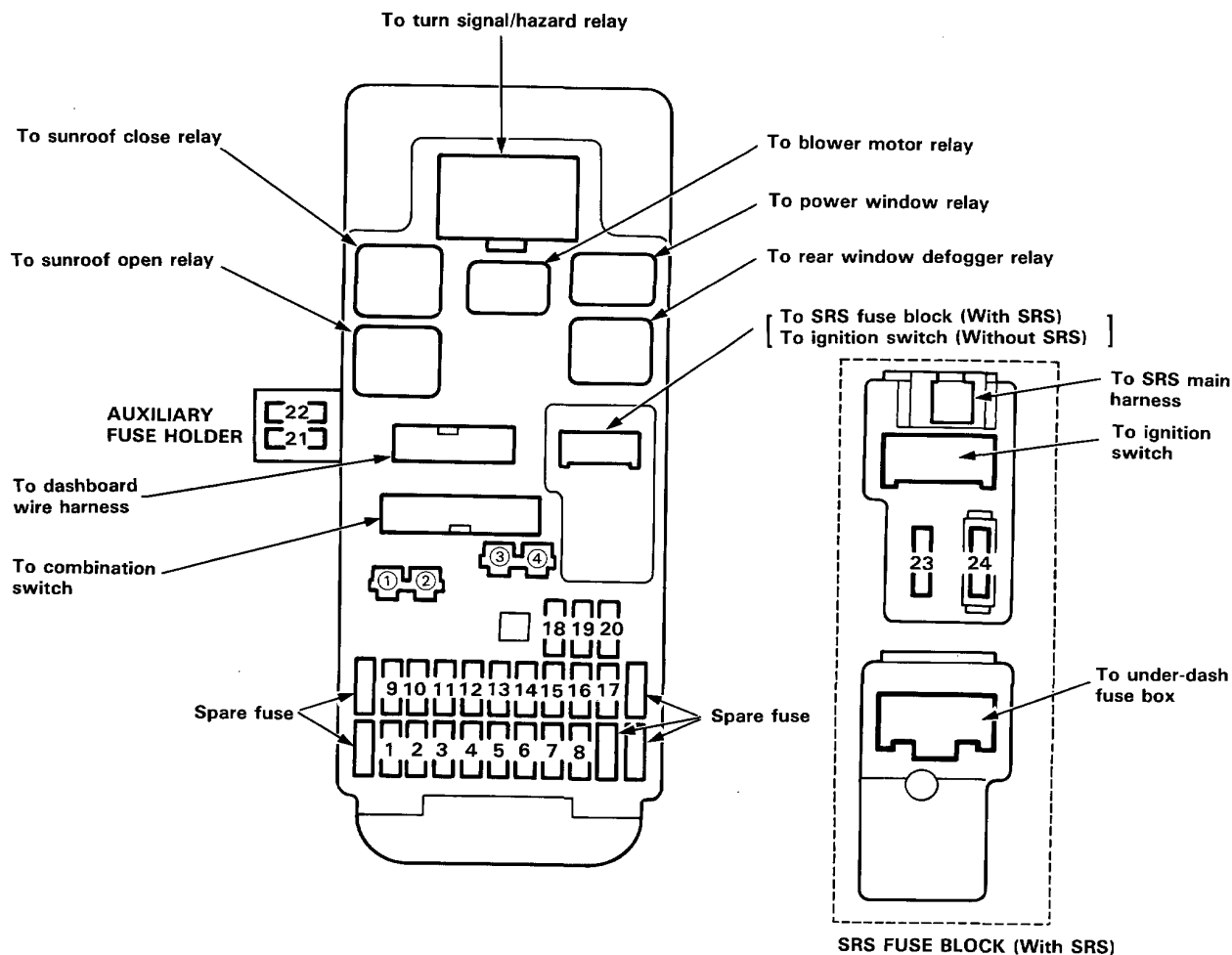
Under-Dash Fuse Box (RHD)



(cont'd)

Fuses

Under-Dash Fuse Box (RHD cont'd)



- ①: Option (+ B)
- ②: Option (IG2)
- ③: Option (DASH LIGHTS)
- ④: Option (ACC)



Fuse Number	Amps	Wire Color	Description
2	7.5 A	BLU/RED	PGM-FI ECU, PGM-FI main relay, Sub gauge (brake check circuit: KQ model)
3	15 A	BLU/RED	Front fog lights (option)
4	10 A	YEL/BLU	PGM-FI main relay
5	10 A	WHT/GRN	Voltage regulator (s) (Except KQ)
6	15 A	WHT/BLK	Integrated control unit (KE model)
7	30 A	Internal connection	Sunroof open relay, Sunroof close relay
9	15 A	Internal connection	Option ② connector, Blower motor relay
		BLK/YEL	Heater control panel, Power mirror system, ABS control unit, 4WS control unit, Fan timer unit, Mode/recirculation control motor
11	10 A	Internal connection	Rear window defogger relay
		YEL/BLK	A/C compressor clutch relay, PGM-FI ECU
12	7.5 A	YEL/RED	Integrated control unit (KE model)
13	10 A	YEL	Gauge and indicator lights, Clock, Back-up lights
14	7.5 A	BLK/RED	Cruise control system
15	20 A	WHT/BLK	Driver's power window system
16	20 A	BLU/BLK	Passenger's power window system
17	30 A	GRN/BLK	Windshield wiper system
18	10 A	Internal connection	Option ④ connector
		YEL/RED	Stereo radio/cassette player, Cigarette lighter
*19	15 A	BLK/YEL	A/T control unit, Speed sensor, Fan timer unit, ELD unit (KQ model)
*21	10 A	YEL/GRN	Rear wiper system (Except KQ)
*22	10 A	YEL/RED	4WS control unit
*23	15 A	BLK/YEL	PGM-FI ECU, PGM-FI main relay, Speed sensor
*24	10 A	RED	SRS unit

*19: UNDER-DASH FUSE BOX (Without SRS)

*21: AUXILIARY FUSE HOLDER

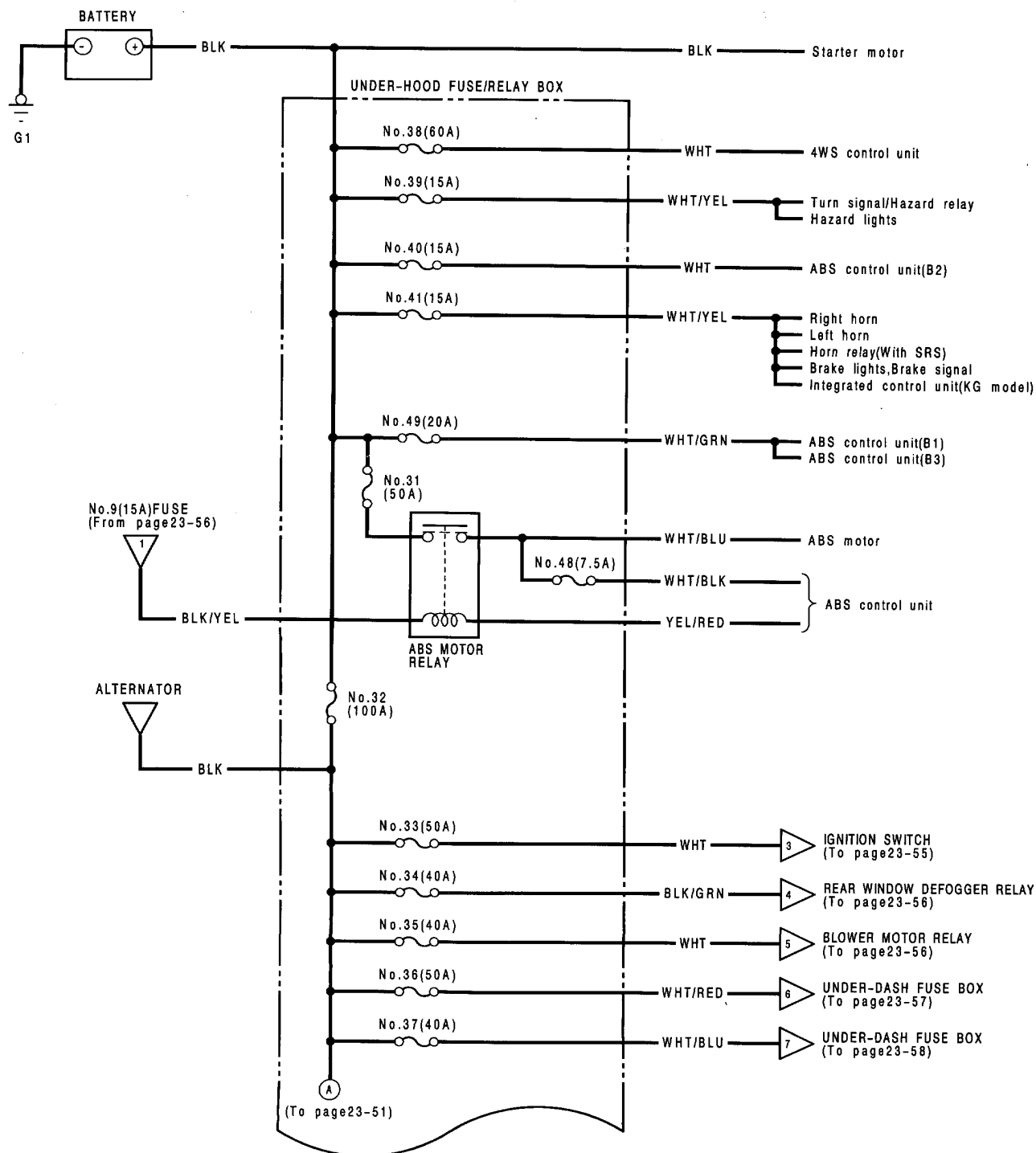
*22: AUXILIARY FUSE HOLDER

*23: SRS FUSE BLOCK (With SRS)

*24: SRS FUSE BLOCK (With SRS)

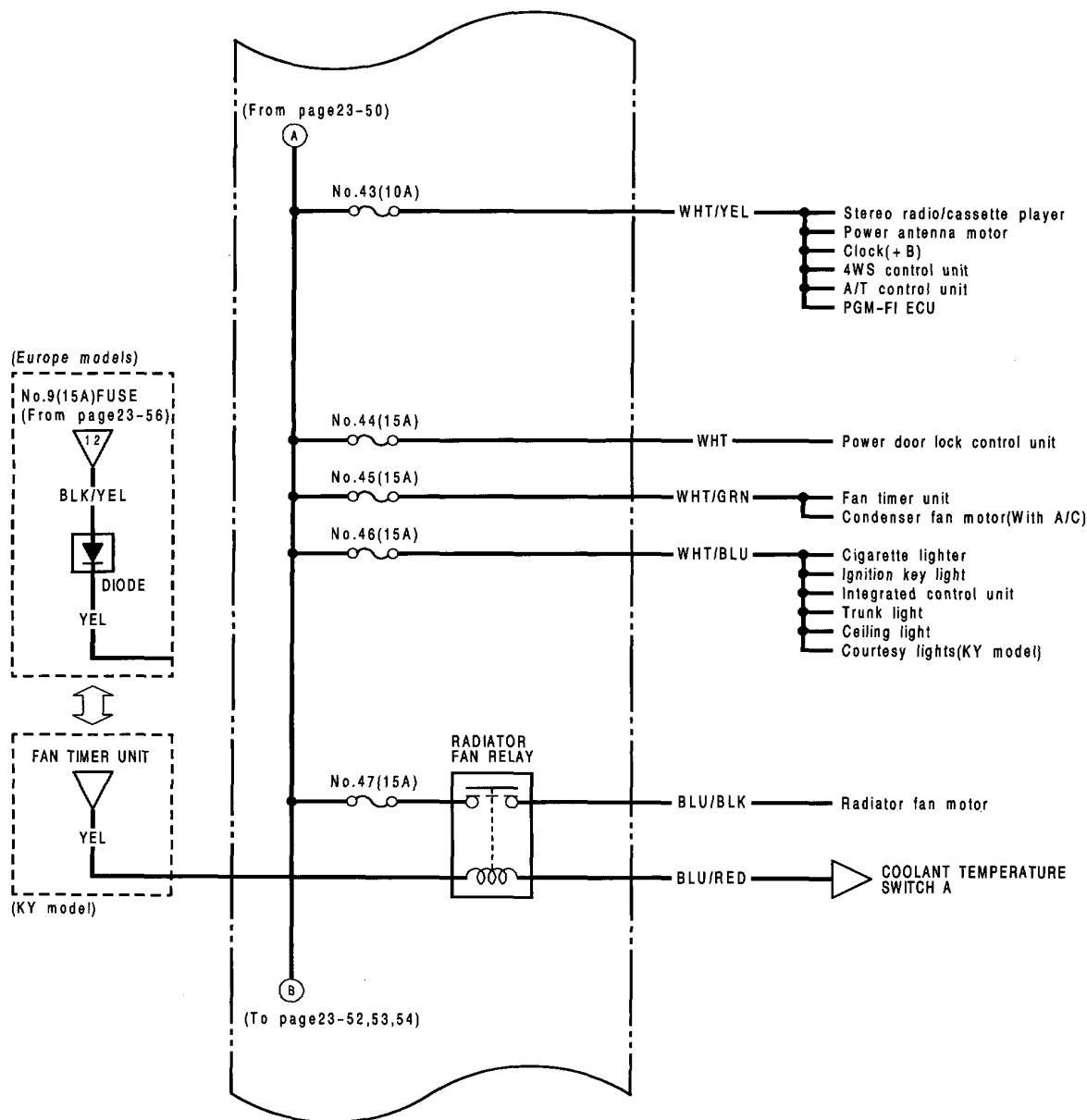
Power Distribution

Circuit Identification (LHD)





UNDER-HOOD FUSE/RELAY BOX

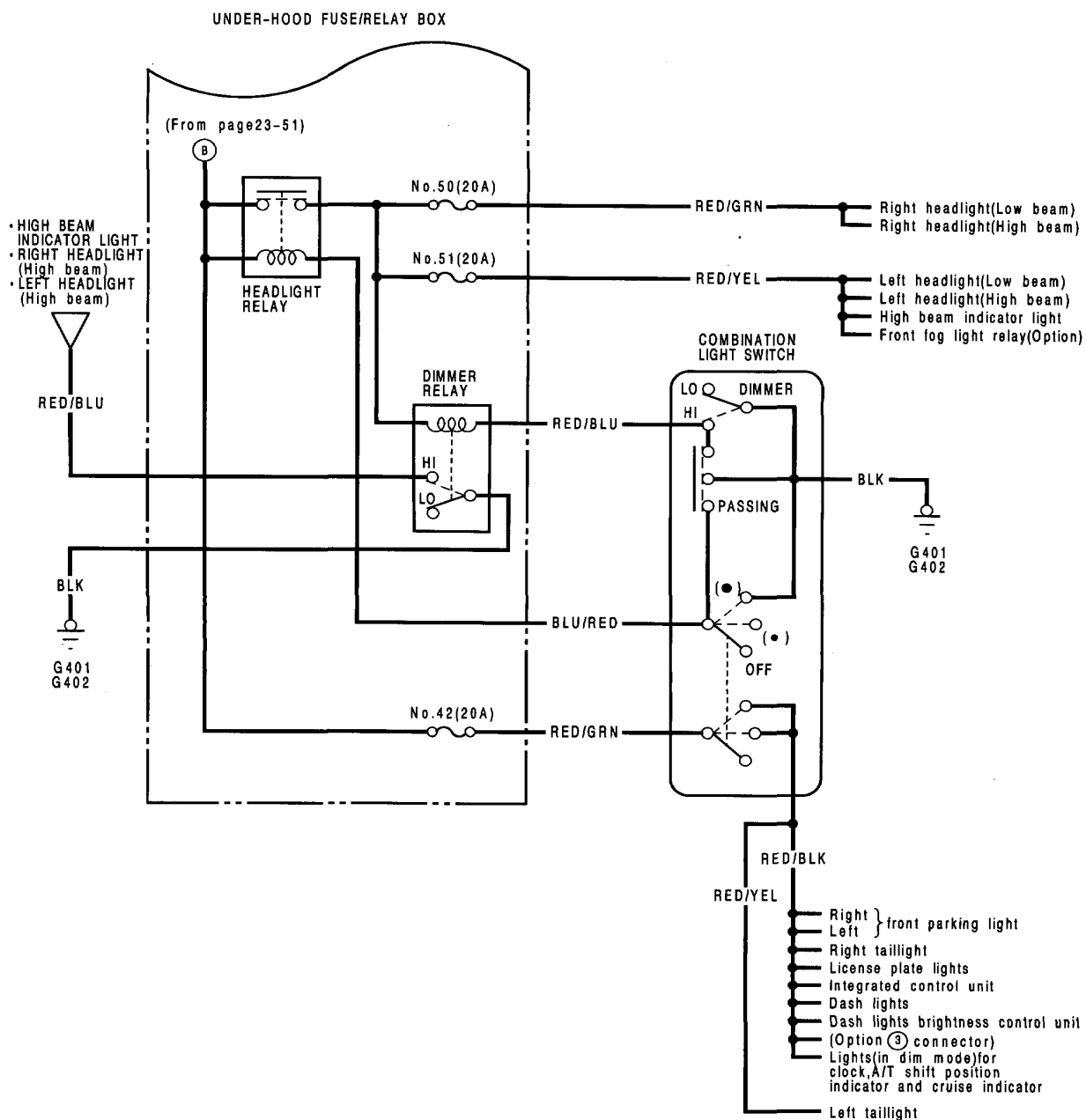


(cont'd)

Power Distribution

Circuit Identification (LHD cont'd)

KY model:



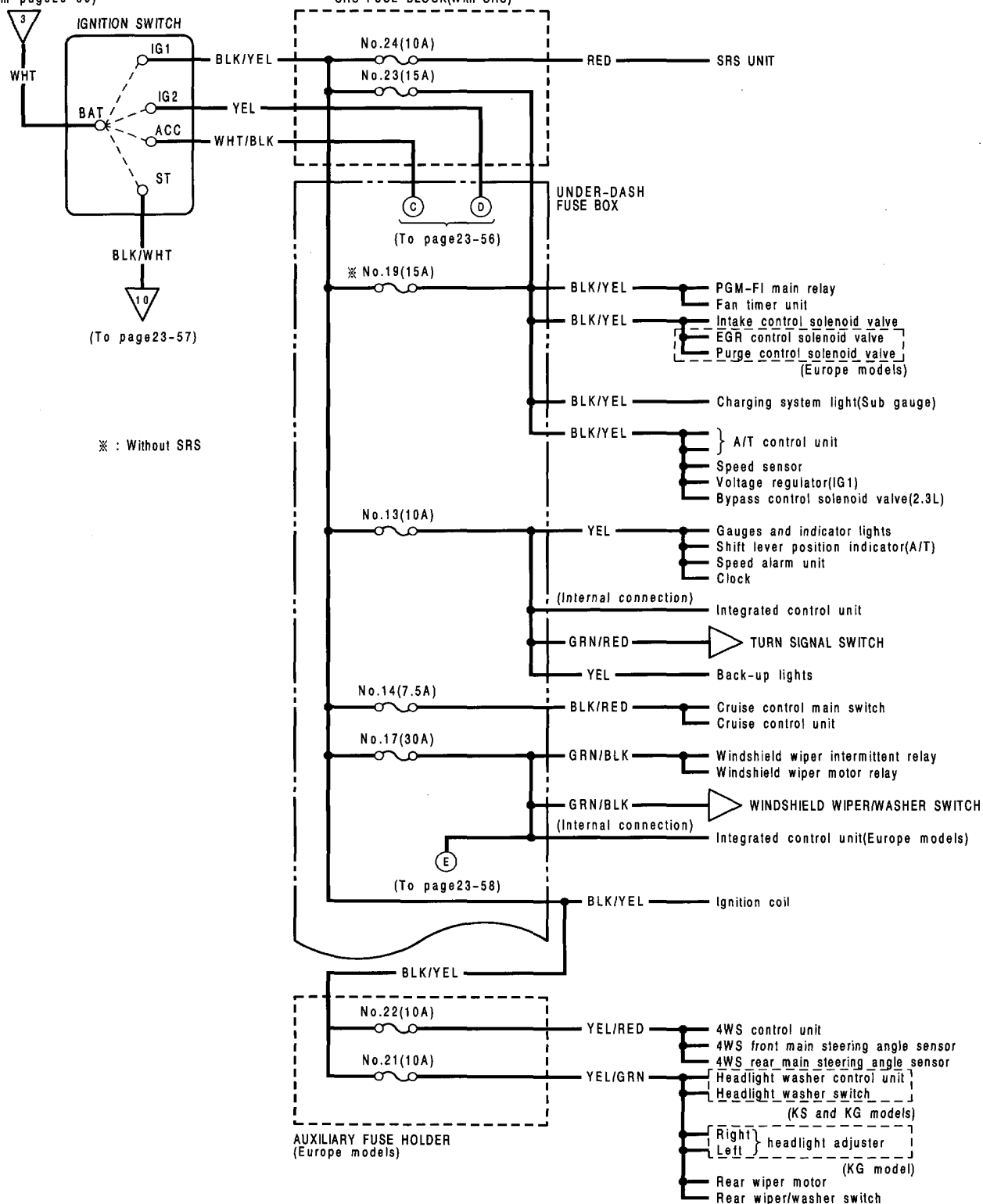
Circuit Identification (LHD cont'd)

UNDER-HOOD FUSE/RELAY BOX





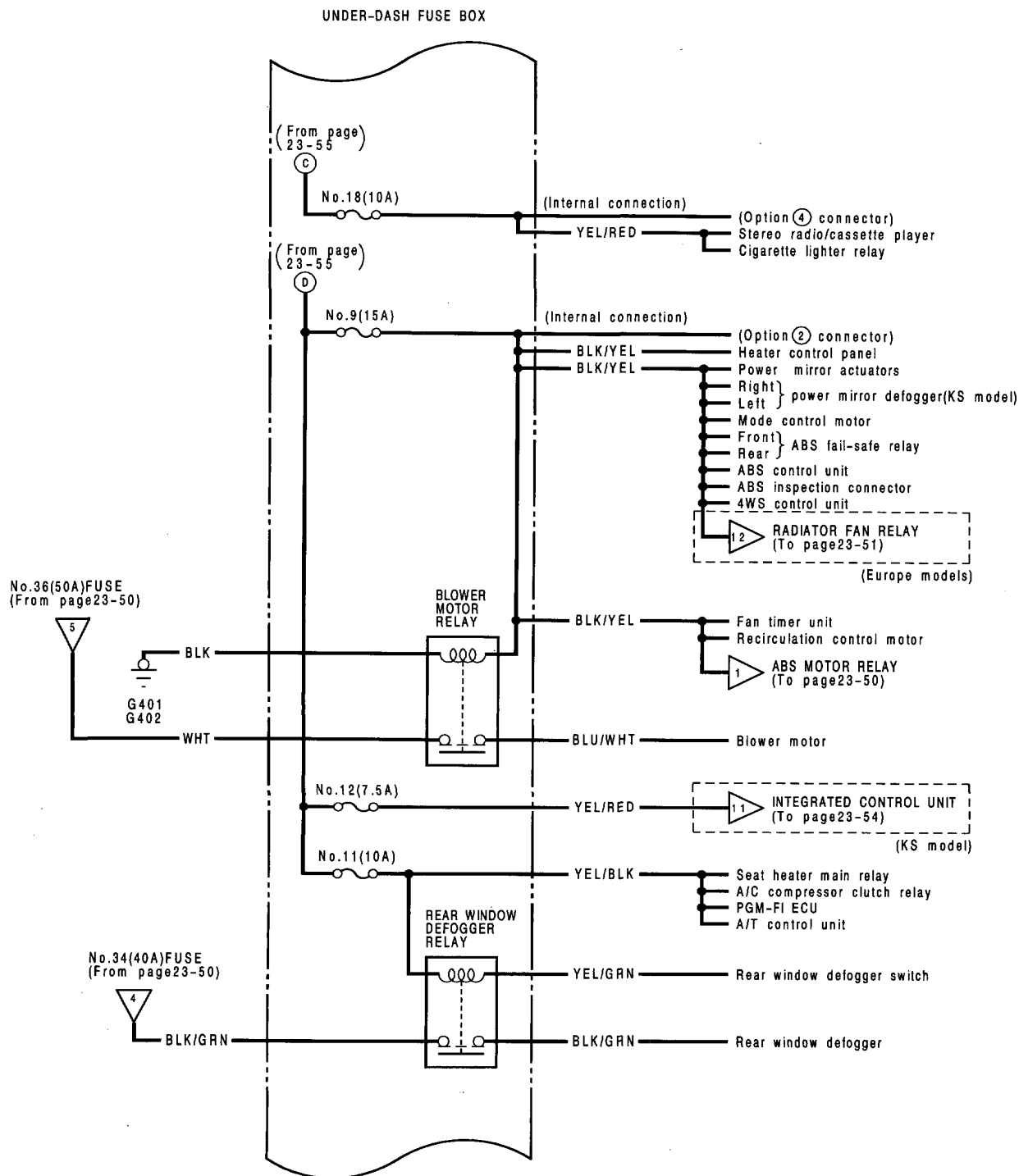
No.33(50A)FUSE
(From page23-50)

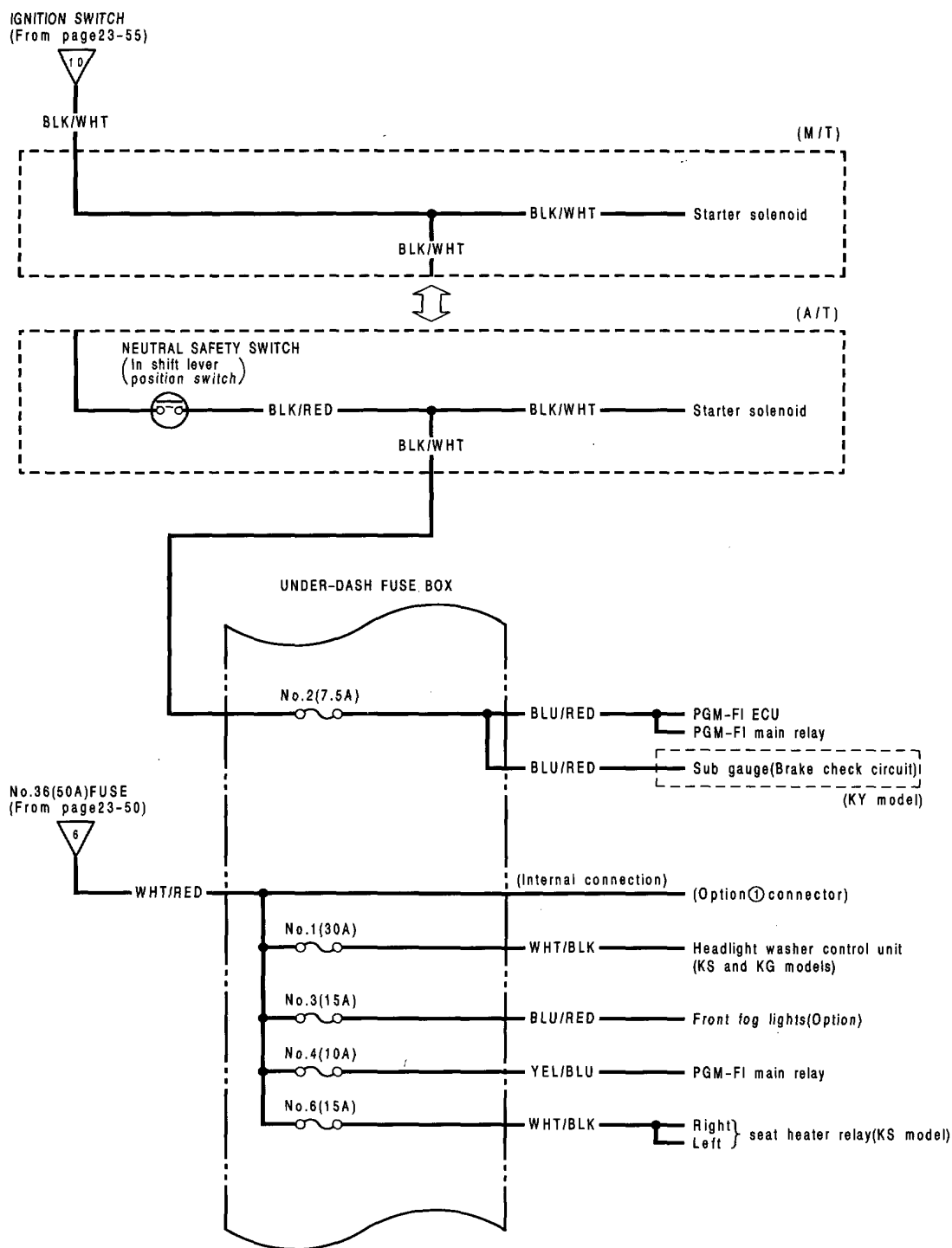


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Power Distribution

Circuit Identification (LHD cont'd)

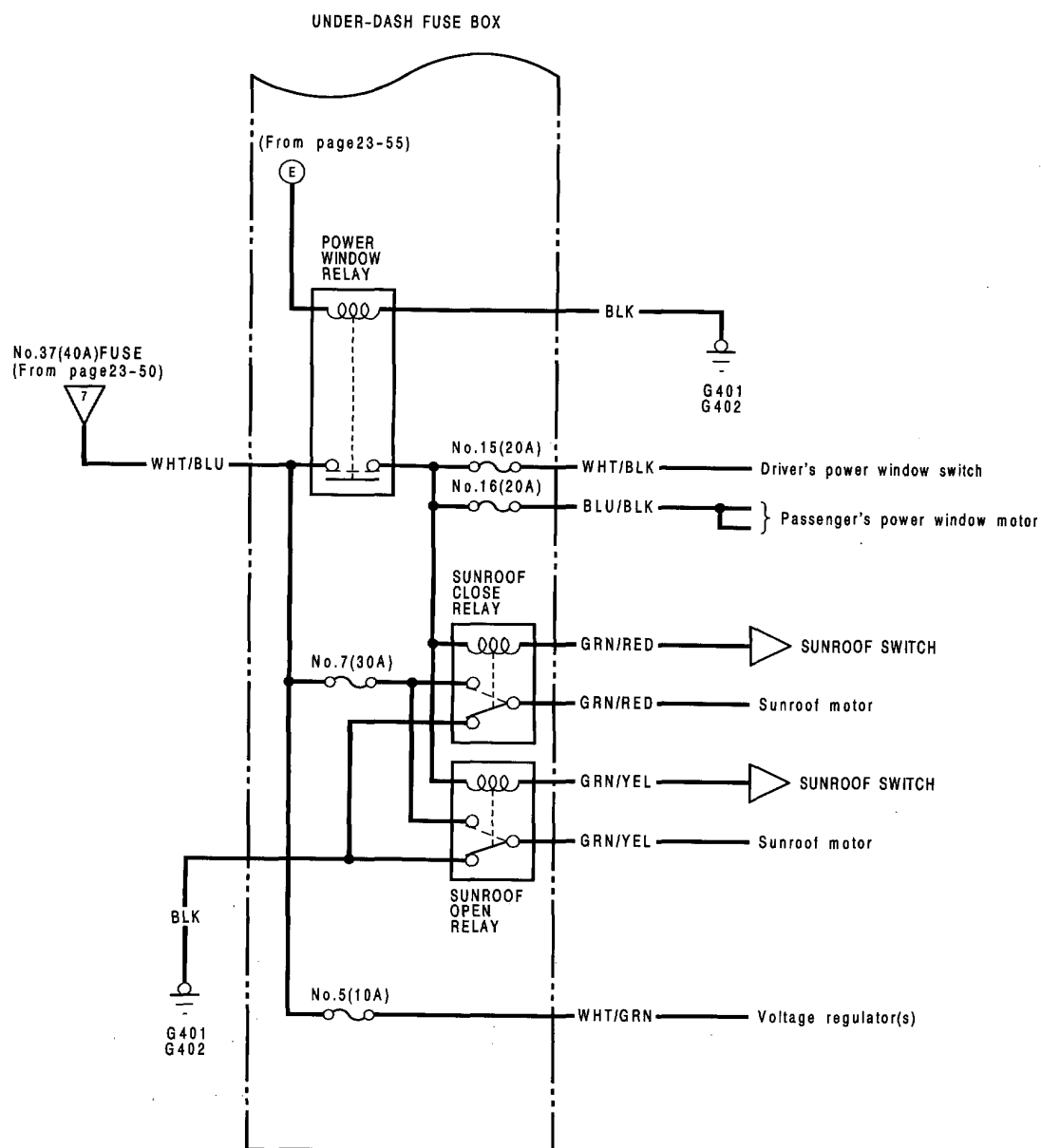




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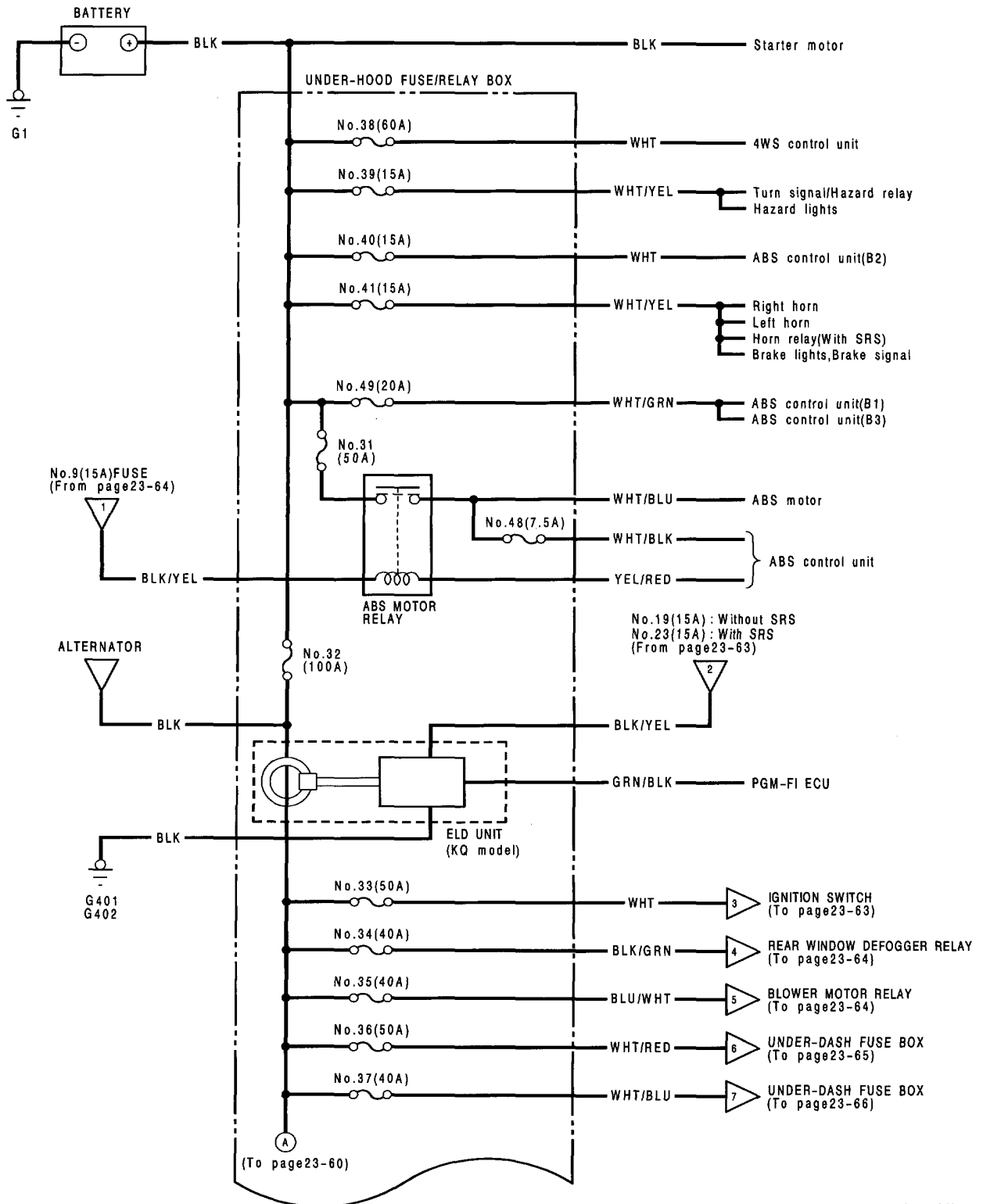
Power Distribution

Circuit Identification (LHD cont'd)





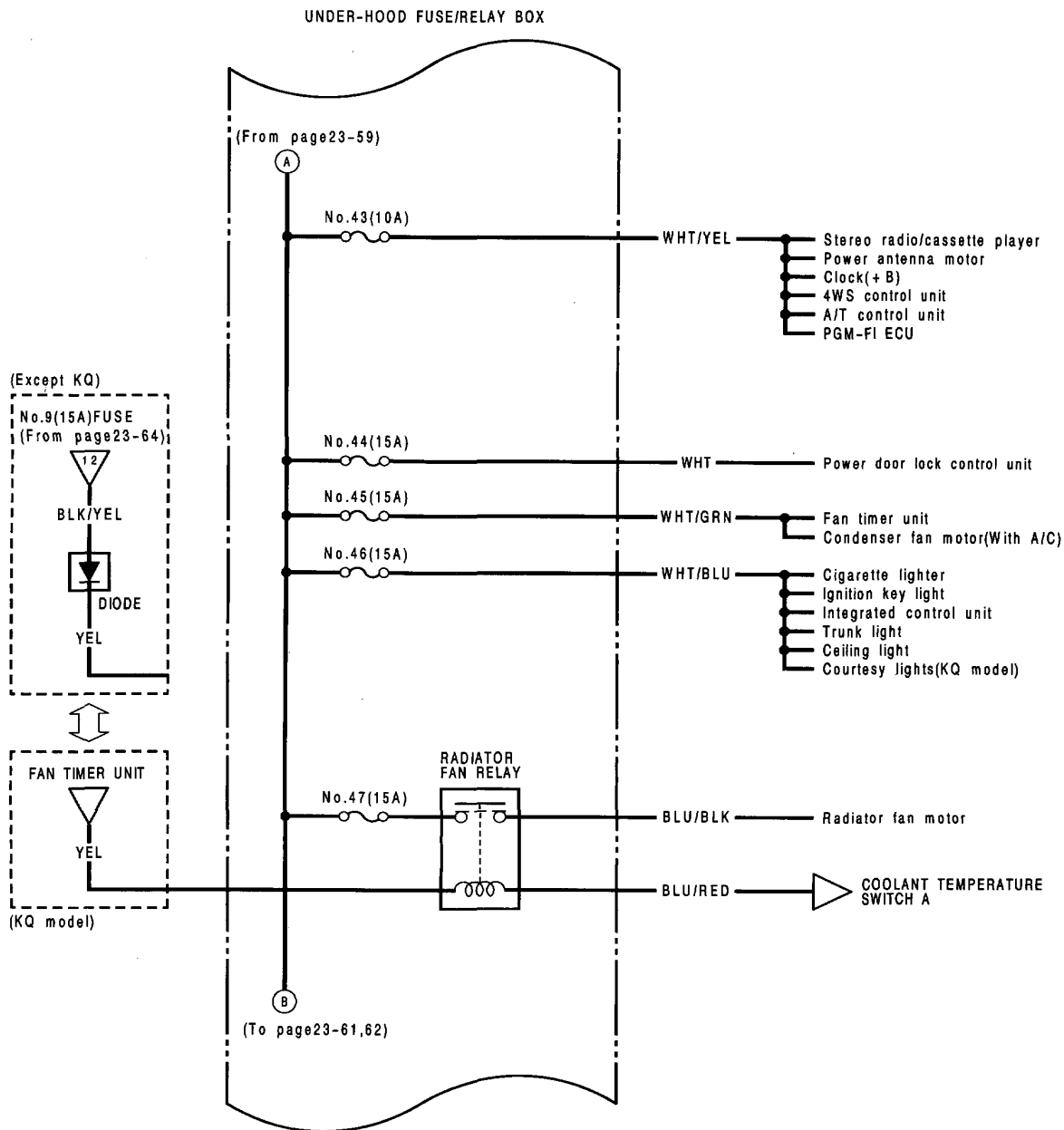
Circuit Identification (RHD)



(cont'd)

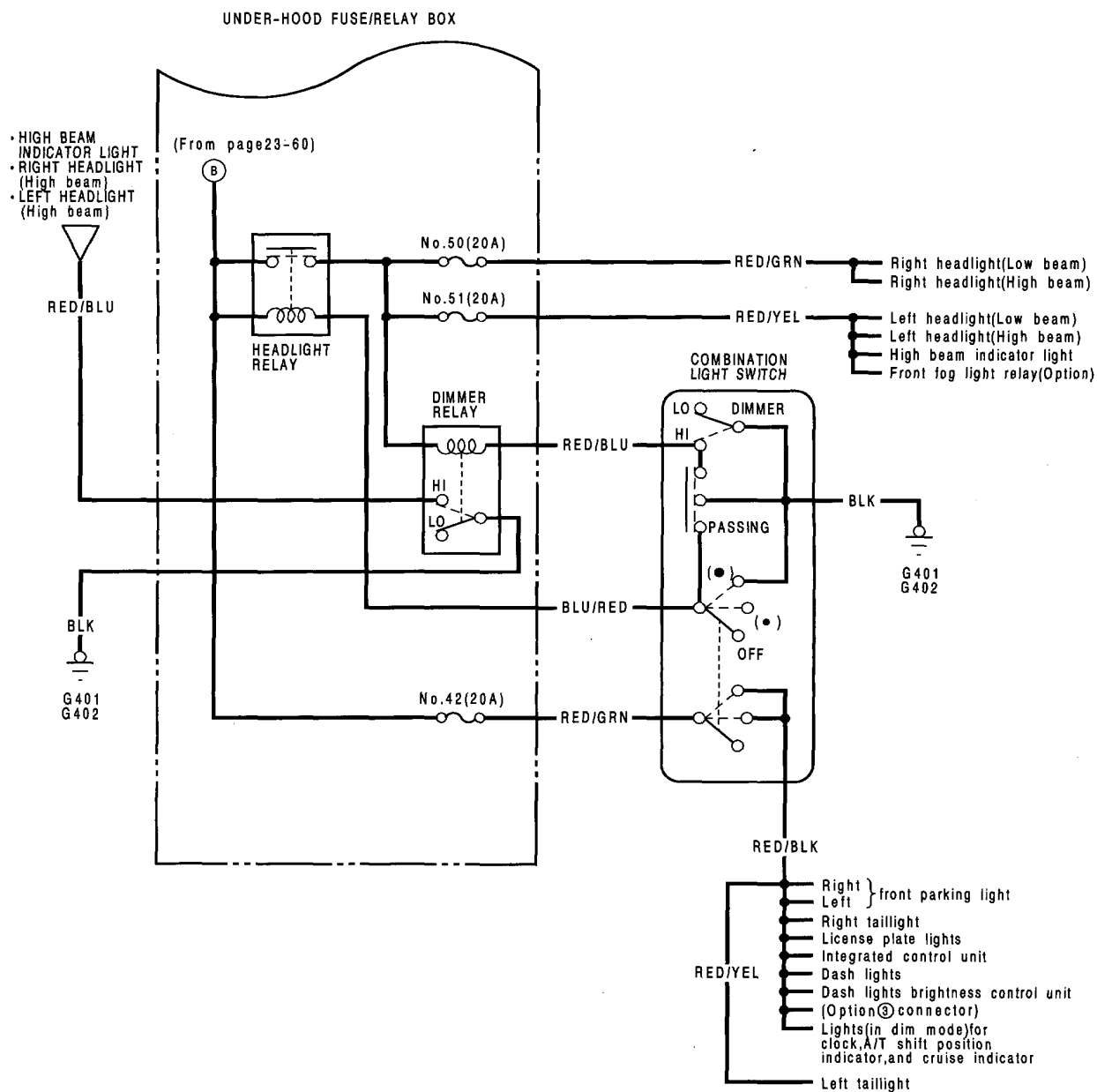
Power Distribution

Circuit Identification (RHD cont'd)





Except KE :



(cont'd)

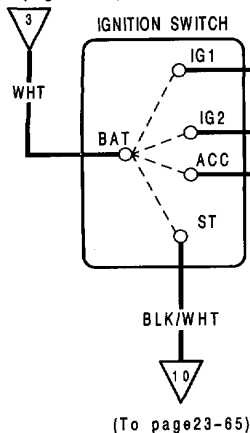
Circuit Identification (RHD cont'd)

UNDER-HOOD FUSE/RELAY BOX



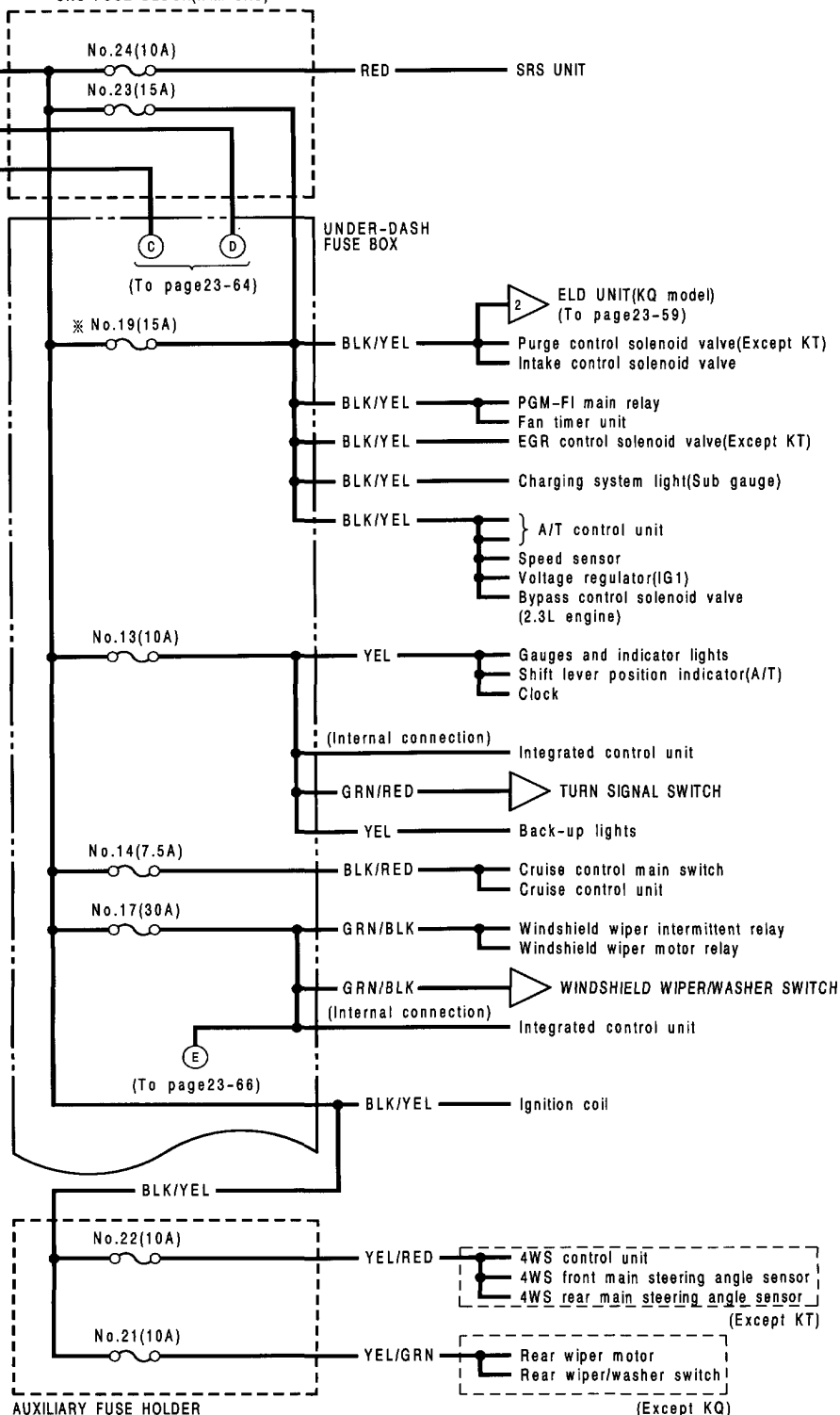


No.33(50A)FUSE
(From page23-59)



※ : Without SRS

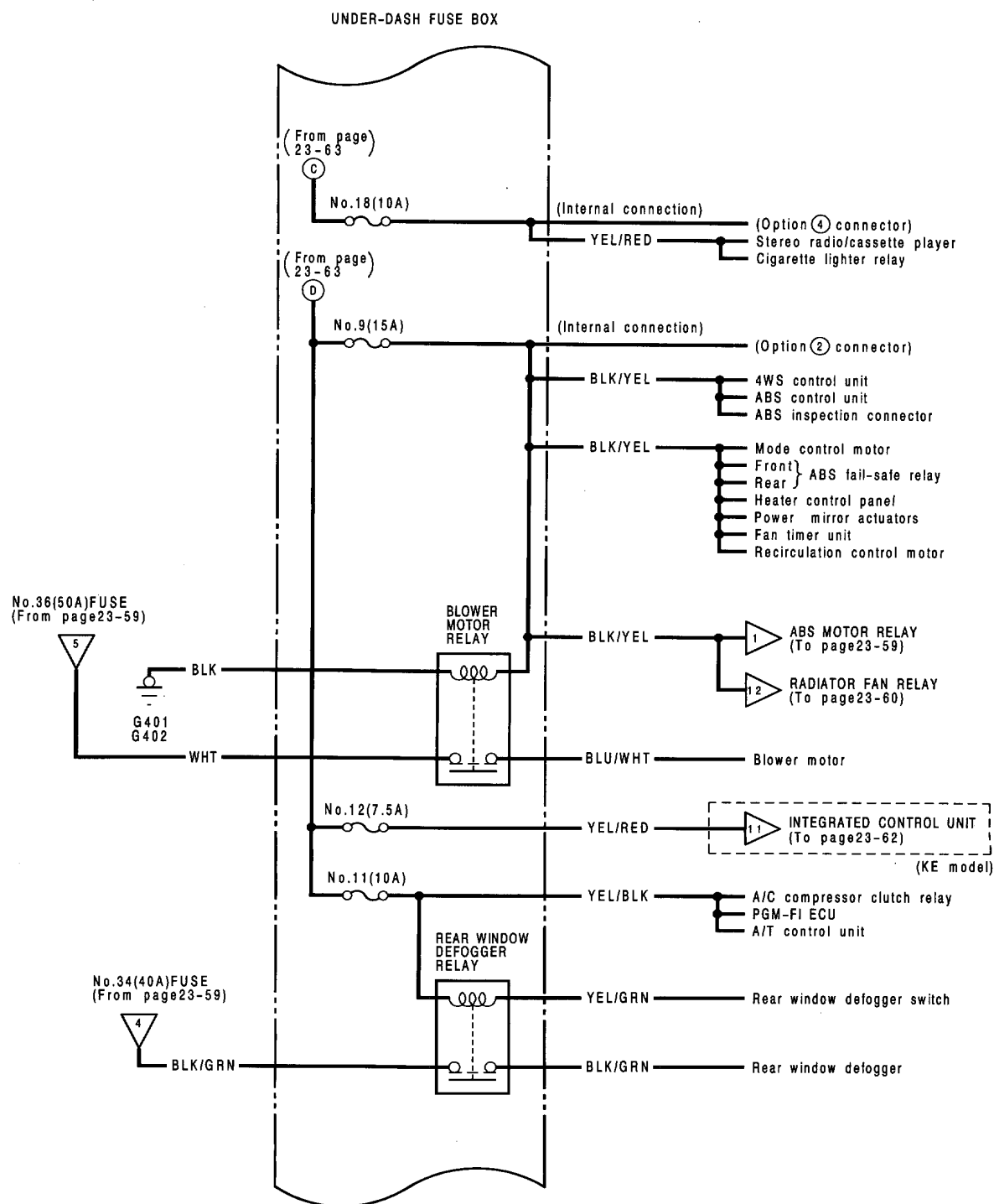
SRS FUSE BLOCK(With SRS)

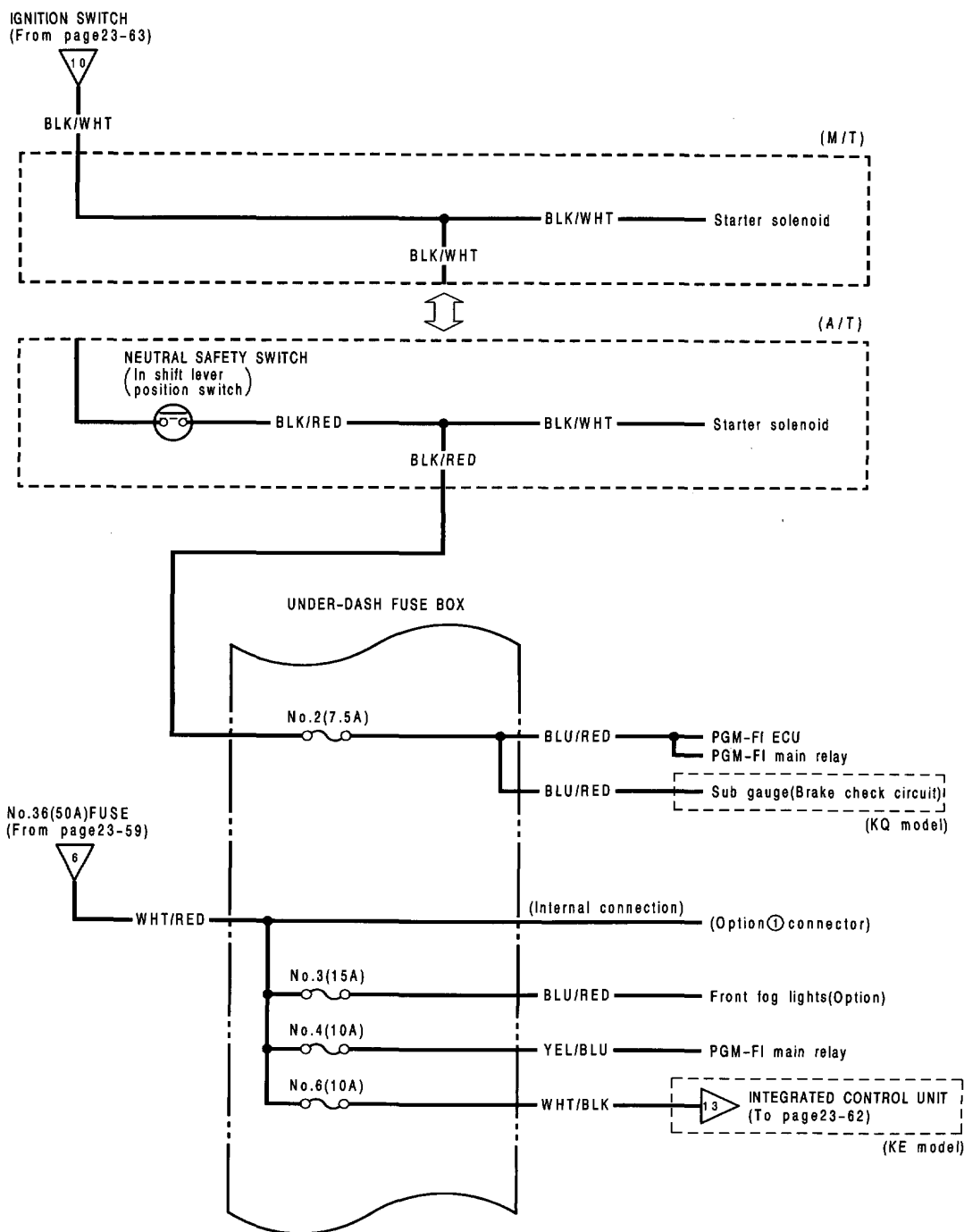


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Power Distribution

Circuit Identification (RHD cont'd)

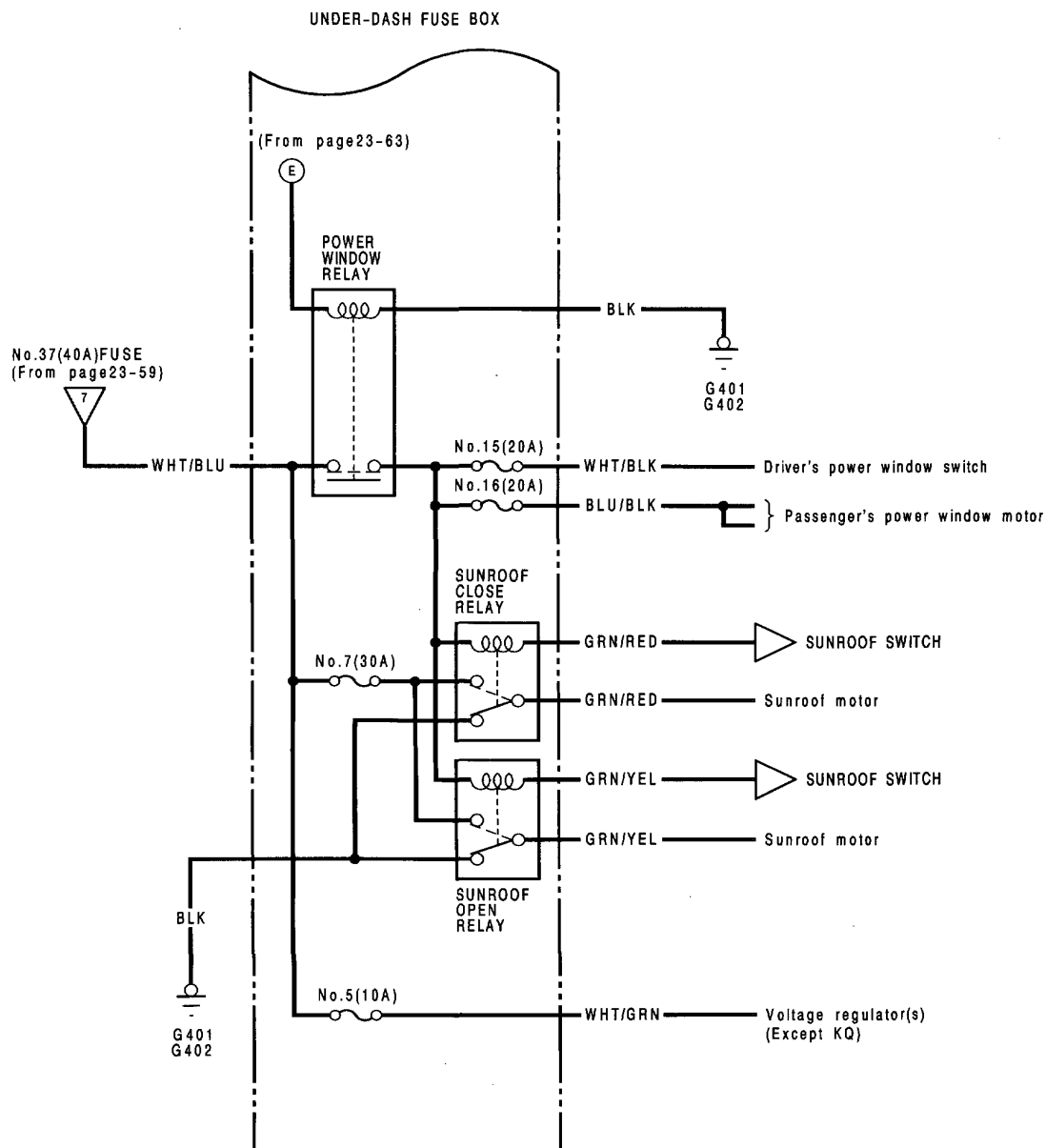




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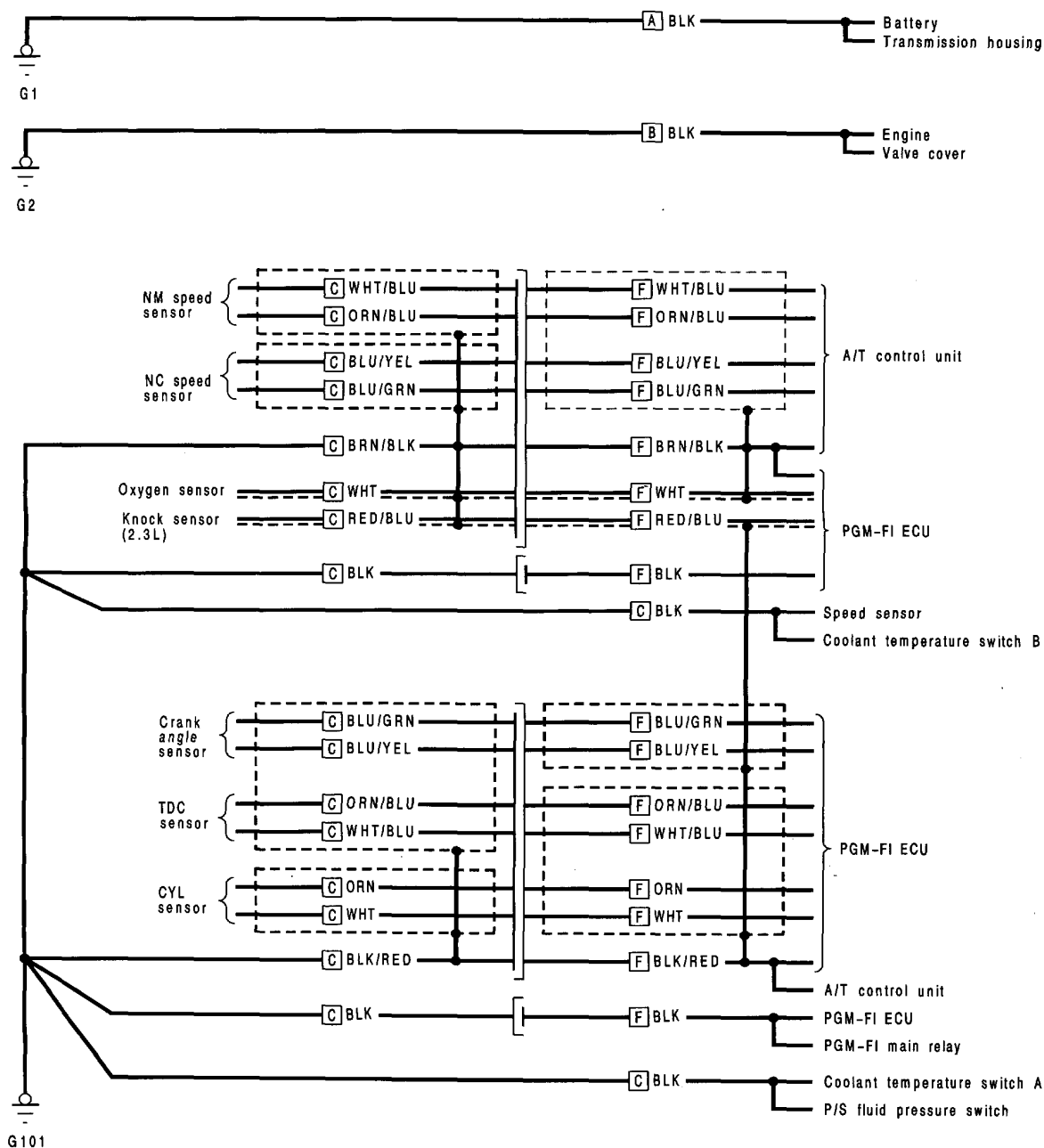
Power Distribution

Circuit Identification (RHD cont'd)



Ground Distribution

Circuit Identification (LHD)

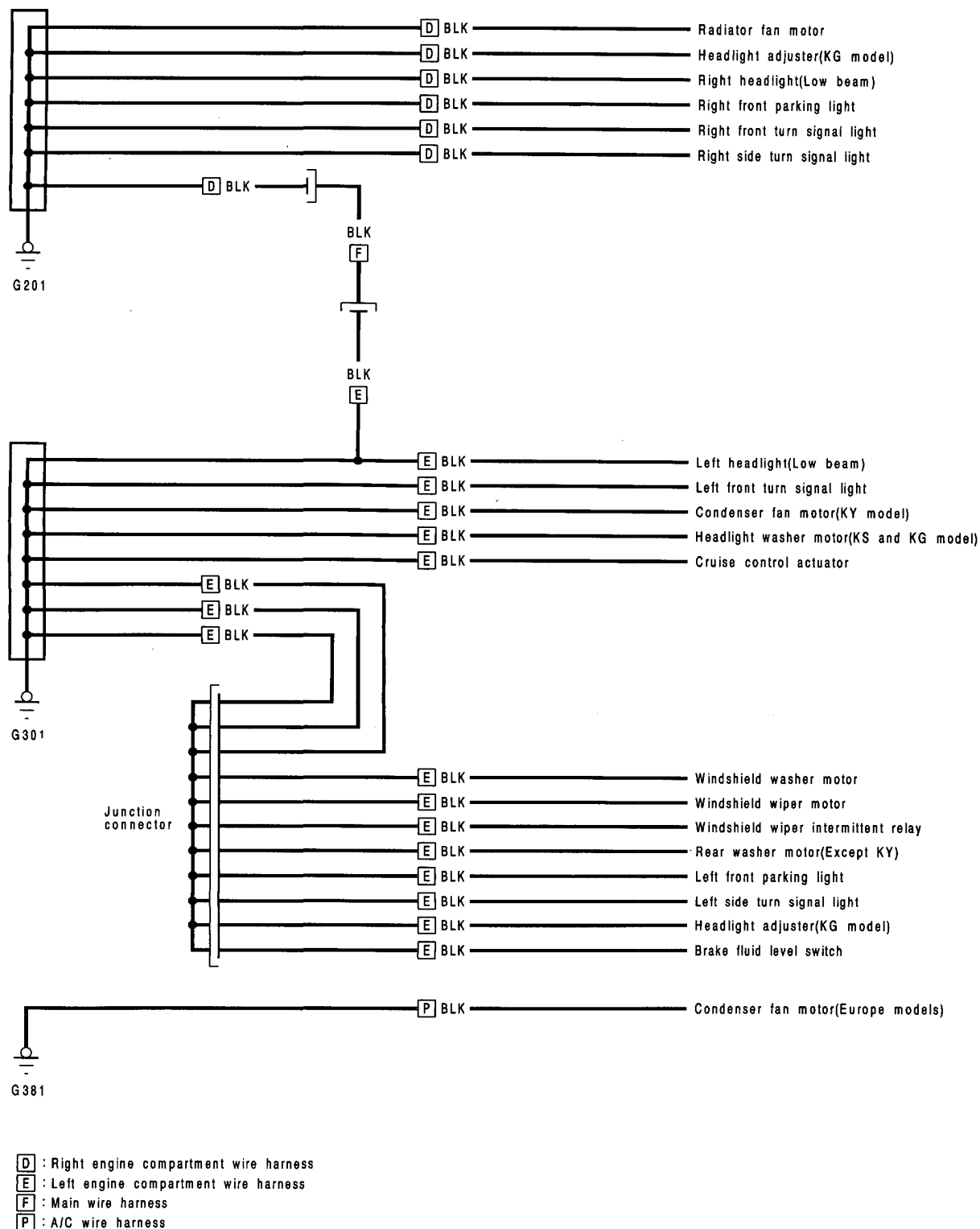


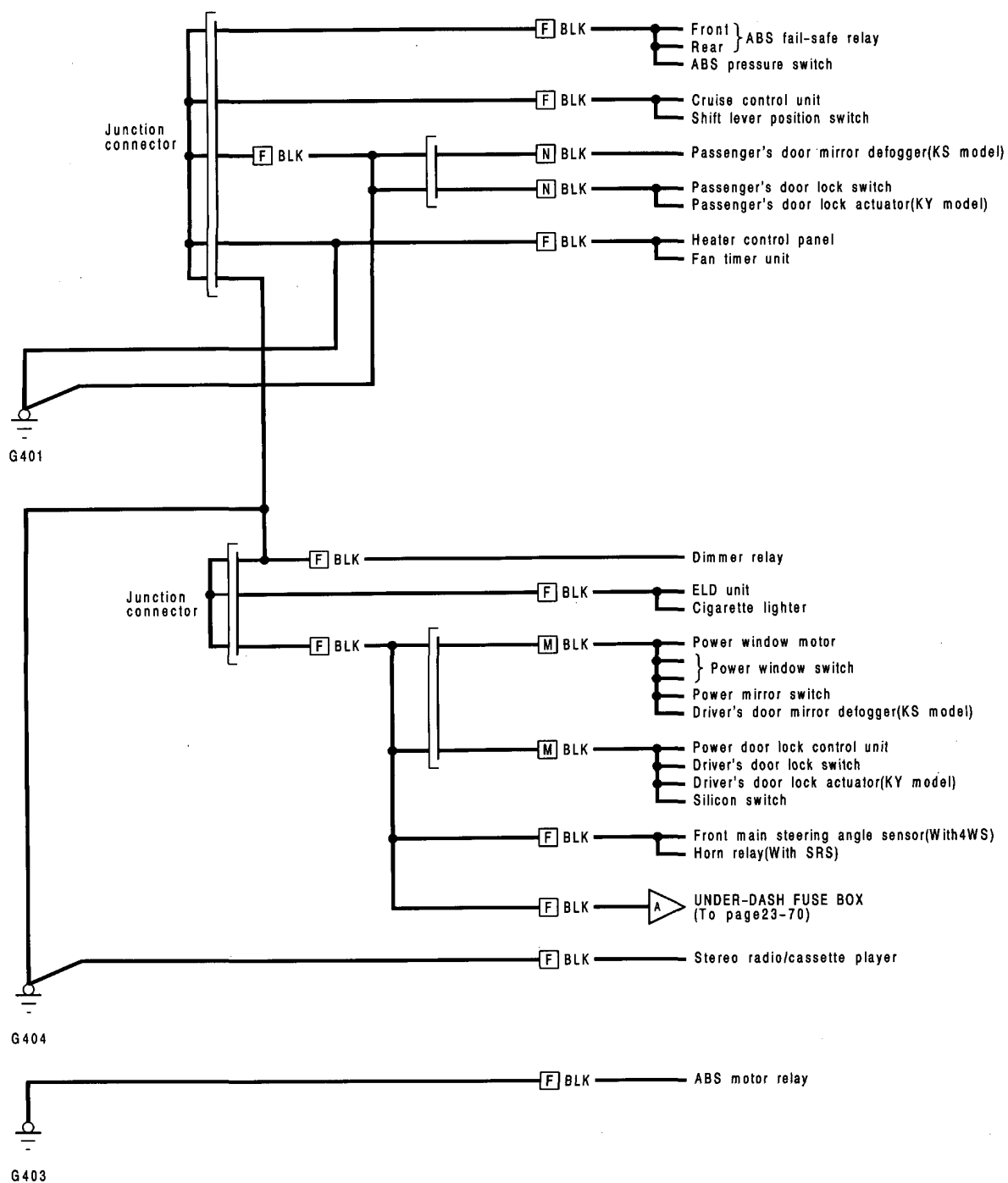
- A** : Battery ground cables
- B** : Engine ground cables
- C** : Engine wire harness
- F** : Main wire harness
- Shield wire

(cont'd)

Ground Distribution

Circuit Identification (LHD cont'd)





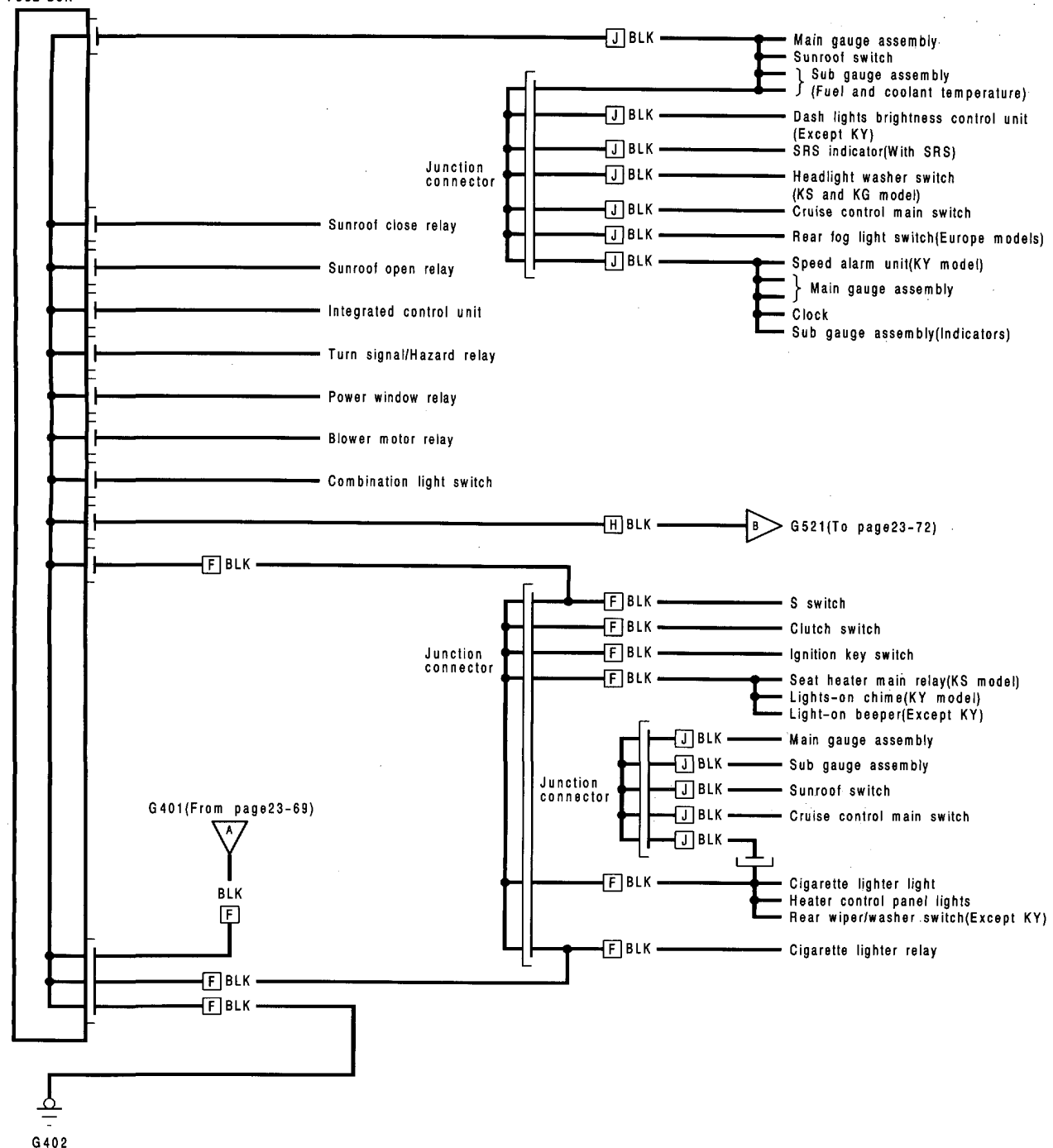
[F] : Main wire harness
[M] : Driver's door wire harness
[N] : Passenger's door wire harness

(cont'd)

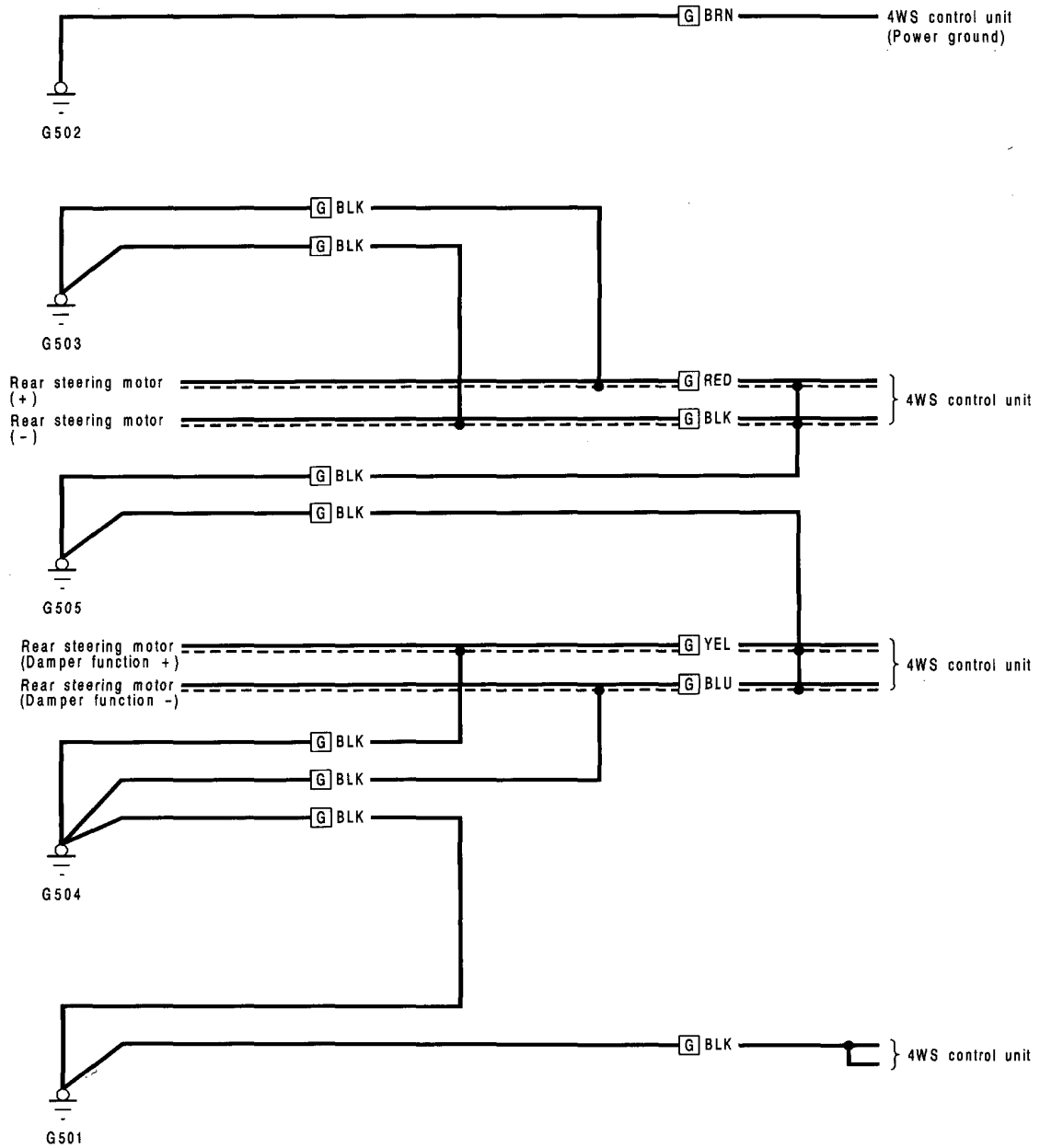
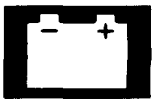
Ground Distribution

Circuit Identification (LHD cont'd)

UNDER-DASH
FUSE BOX



[F] : Main wire harness
[H] : Left side wire harness
[J] : Dashboard wire harness

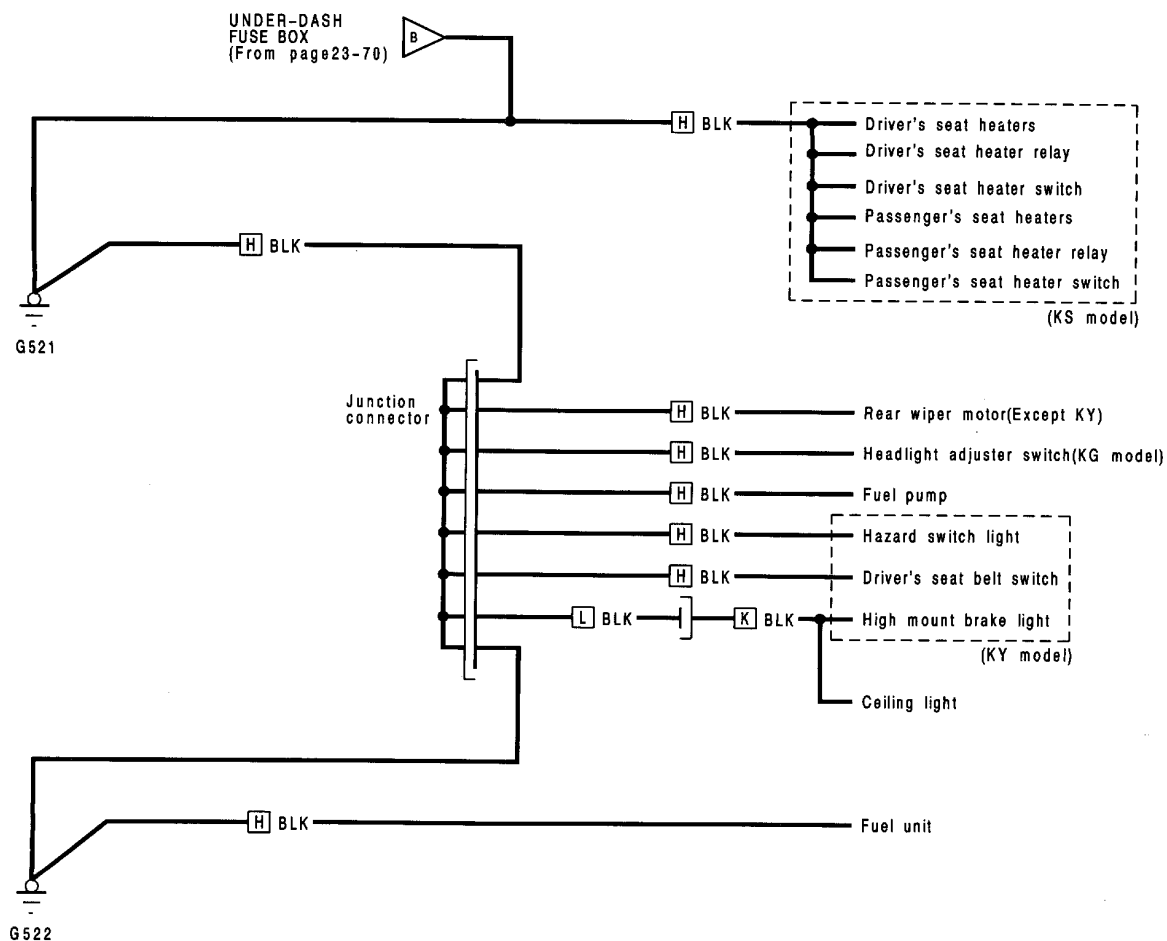


[G] : Right side wire harness

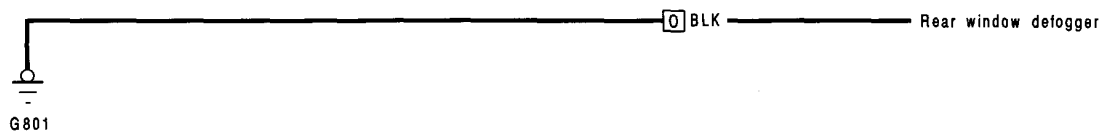
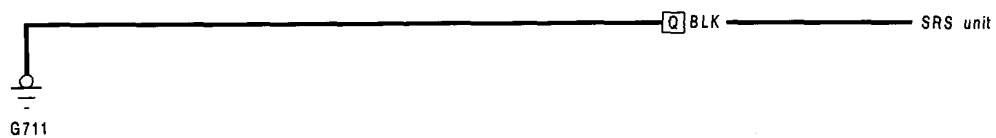
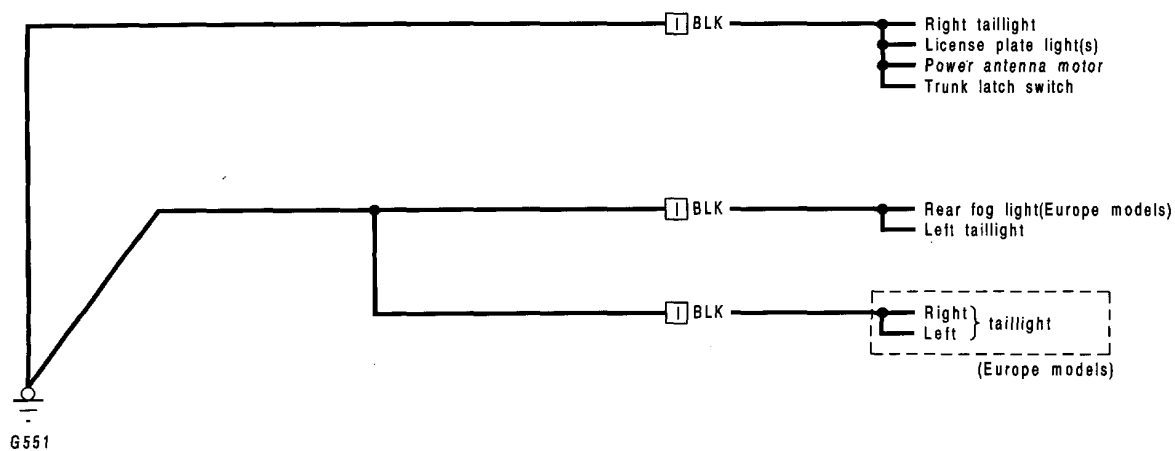
(cont'd)

Ground Distribution

Circuit Identification (LHD cont'd)



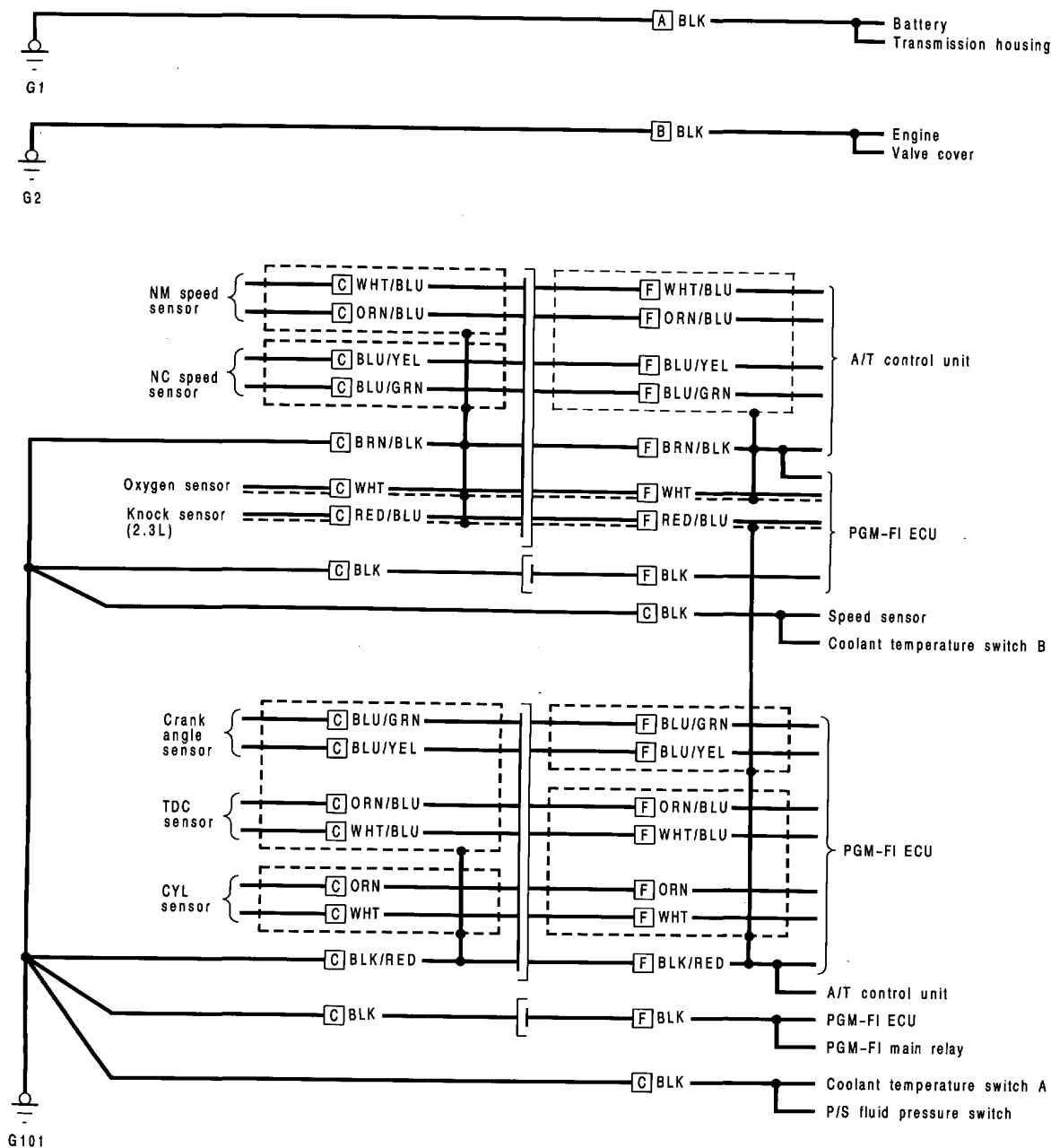
H : Left side wire harness
K : Roof wires



- 1 : Rear wire harness
Q : SRS sub harness
0 : Rear window defogger ground wire

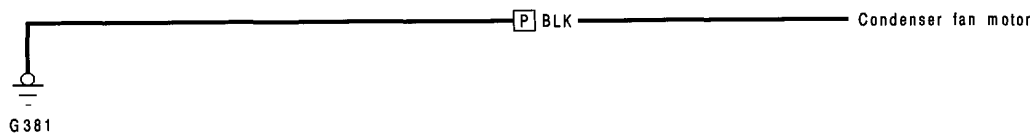
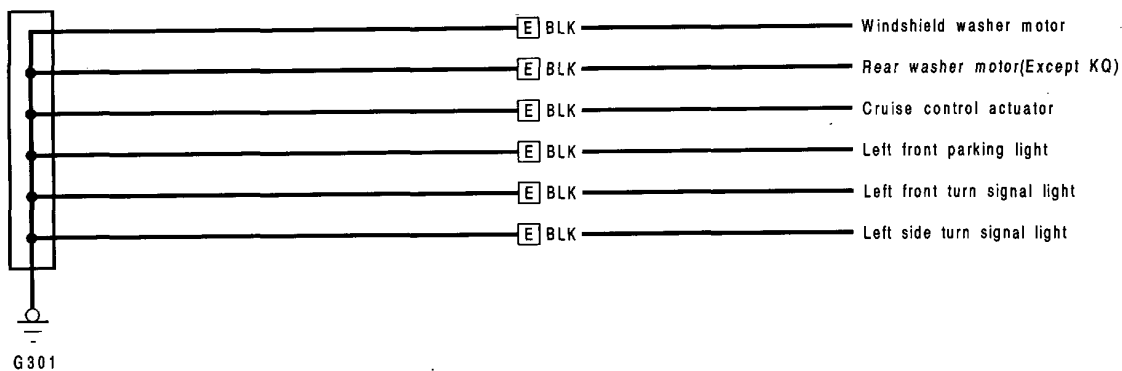
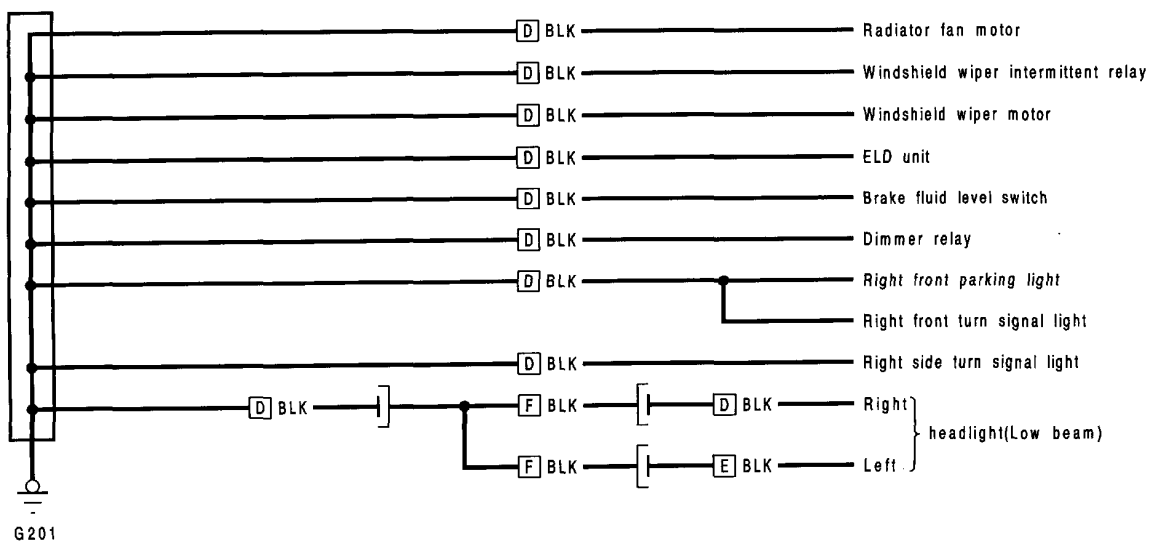
Ground Distribution

Circuit Identification (RHD)



[A] : Battery ground cables
 [B] : Engine ground cables
 [C] : Engine wire harness

[F] : Main wire harness
 ----- Shield wire

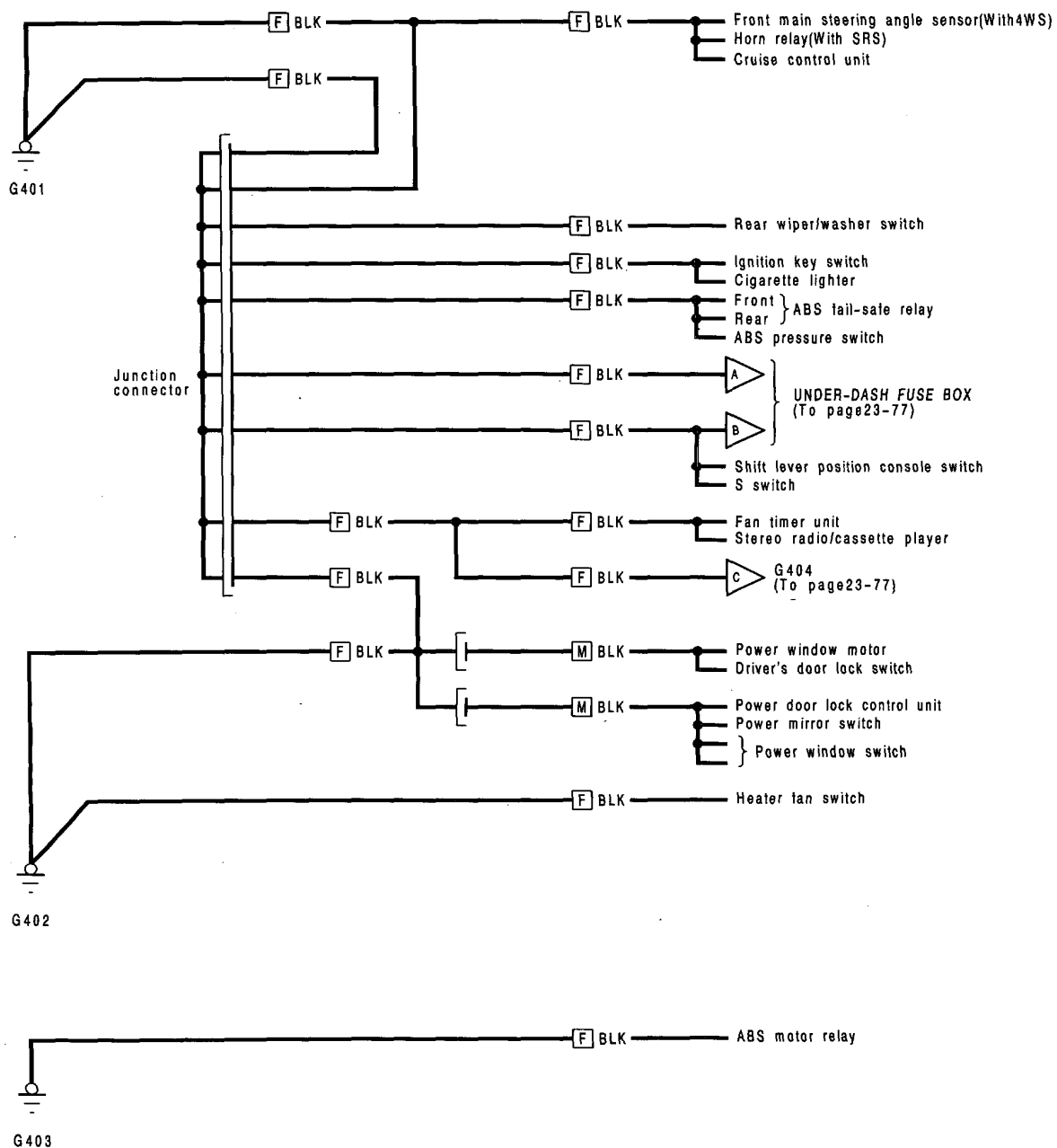


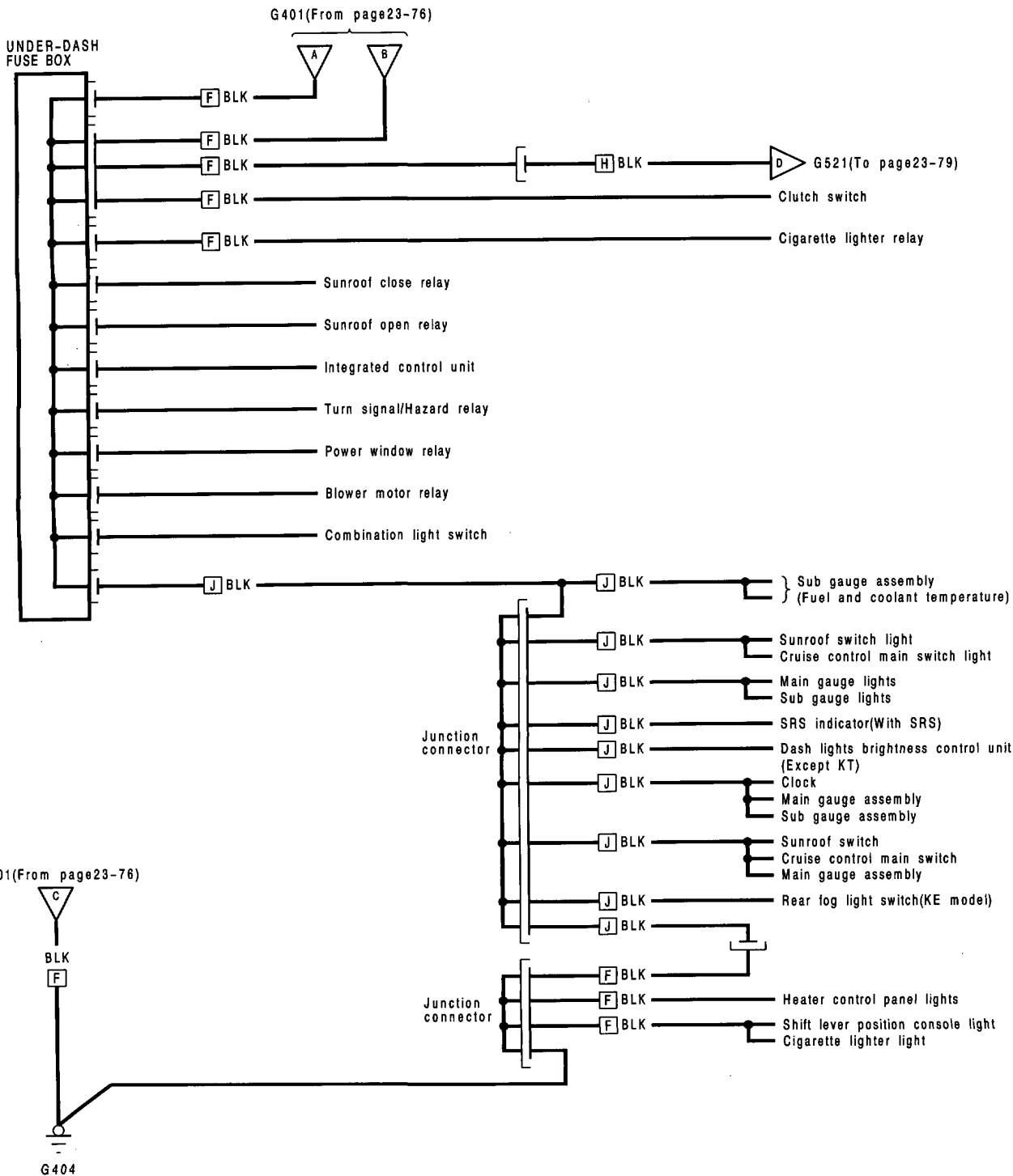
D : Right engine compartment wire harness
E : Left engine compartment wire harness
F : Main wire harness
P : A/C wire harness

(cont'd)

Ground Distribution

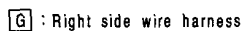
Circuit Identification (RHD cont'd)

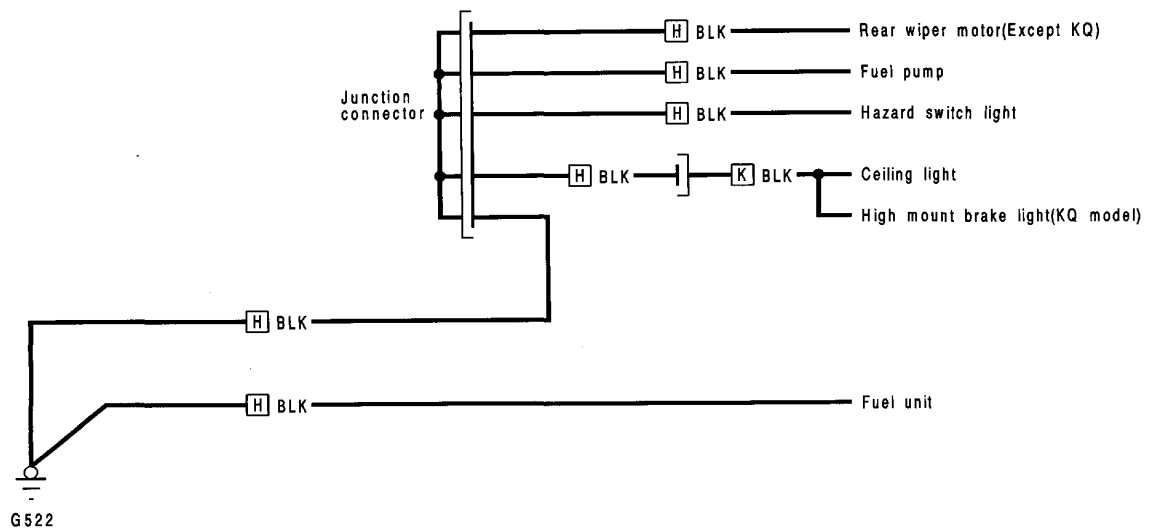
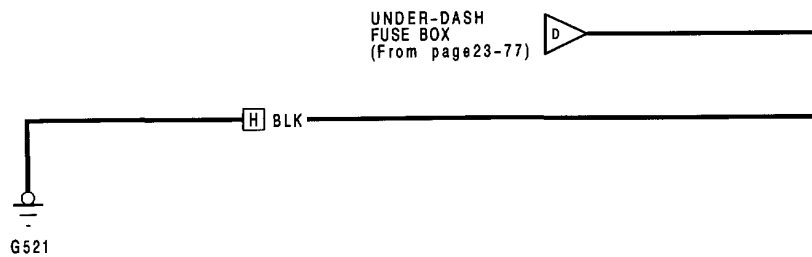




(cont'd)

Circuit Identification (RHD cont'd)



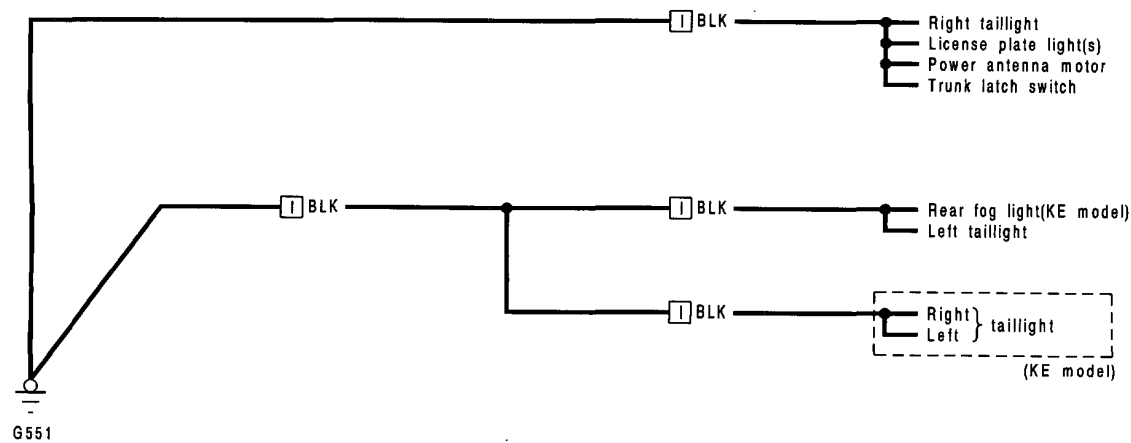


[H] : Left side wire harness
[K] : Roof wires

(cont'd)

Ground Distribution

Circuit Identification (RHD cont'd)



- I : Rear wire harness
- Q : SRS sub harness
- O : Rear window defogger ground wire

Battery



Test

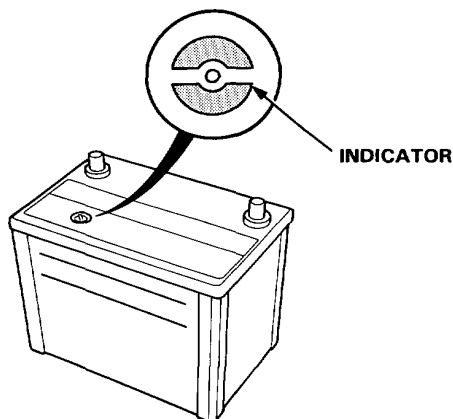
⚠ WARNING

- **Battery fluid (electrolyte) contains sulfuric acid. It may cause severe burns if it gets on your skin or in your eyes.**
Wear protective clothing and a face shield.
 - If electrolyte gets on your skin or clothes, rinse it off with water immediately.
 - If electrolyte gets in your eyes, flush it out by splashing water in your eyes for at least 15 minutes; call a physician immediately.
- **A battery gives off hydrogen gas. If ignited, the hydrogen will explode and could crack the battery case and splatter acid on you. Keep sparks, flames, and cigarettes away from the battery.**
- **Overcharging will raise the temperature of the electrolyte. This may force electrolyte to spray out of the battery vents. Follow the charger manufacturer's instructions and charge the battery at a proper rate.**

NOTE: To get accurate results, the temperature of the electrolyte must be between 15 and 38°C (59 and 100°F) before testing.

Test Equipment Required:

- **Battery tester with:**
Voltmeter with 0–18 V scale, Ammeter with 0–100 A and 0–500 A scales, and a carbon pile with 0–300 W.
- **12 V Battery Charger:**
Fast charge capability of 50 A and slow charge capability of 5 A.



Test Procedure:

1. **Check for damage:** If the case is cracked or the posts are loose, replace the battery.
2. **Check indicator (for basic charge condition):** Blue or Green is OK. If the indicator is red, peel the tape off, remove the caps, and add distilled water; then reinstall the caps and tape. If the indicator is clear, go to step 3.
3. **Test battery load capacity** by connecting a battery tester, and applying a load of 3 times the battery ampere hour rating.
When the load has been applied for exactly 15 seconds, the battery voltage reading should stay above 9.6 V.
 - If the reading stays above 9.6 V, the battery is OK; clean its terminals and case, and reinstall it.
 - If the reading is between 6.5 and 9.6 V, fast charge the battery by connecting a battery charger, for 3 minutes at an initial rate of 40 amps.

CAUTION: Amperage will drop as voltage increases; do not increase the amperage to compensate or you may damage the battery.

Watch the battery voltage during the entire 3 minutes; the highest reading should stay below 15.5 V.

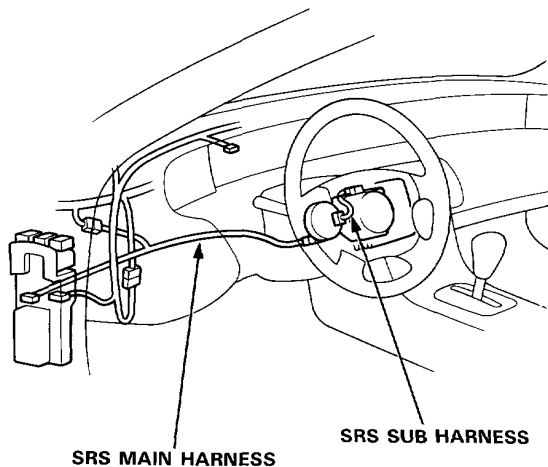
- If the reading stays below 15.5 V, the battery is OK; clean its terminals and case, and reinstall it.
- If the reading exceeds 15.5 V any time during the 3 minutes of fast charge, the battery is not good; replace it.
- If the reading drops below 6.5 V, slow charge the battery by connecting a battery and charge, at 5 amps for no more than 24 hours, (or until the indicator shows full charge, or the specific gravity of the electrolyte is at least 1.250). Then test load capacity again.
 - If the voltage stays above 9.6 V, the battery is OK; clean its terminals and case, and reinstall it.
 - If the voltage still drops below 6.5 V, the battery is not good; replace it.

Under-dash Fuse Box

Removal/Installation

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wire harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



Removal:

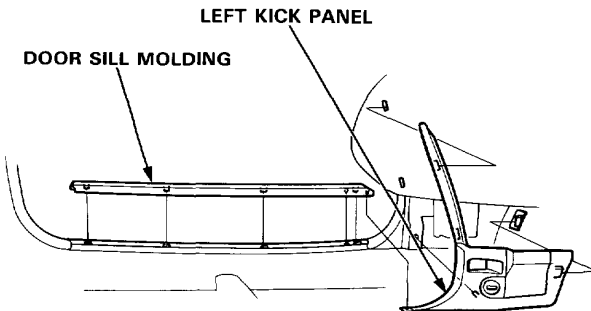
1. Disconnect both the negative cable and positive cable from the battery.
2. Remove the driver's foot rest.

3. Remove the dashboard lower cover.

NOTE: LHD type is shown. RHD type is symmetrical to LHD type.

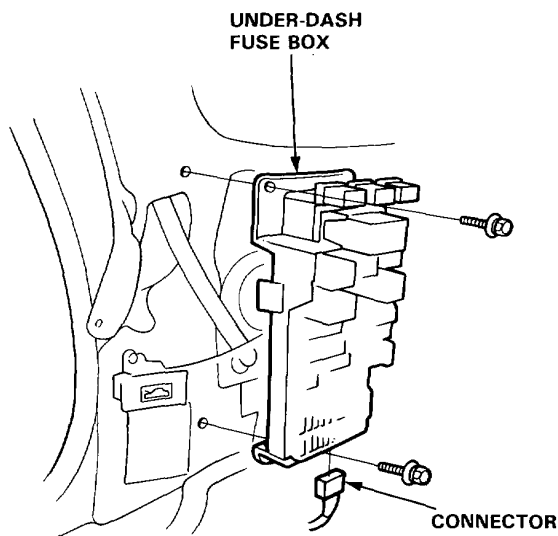


4. Remove the door sill molding and left kick panel.

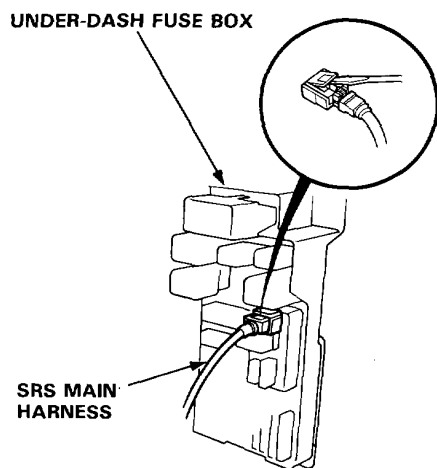




5. Disconnect the connector from the integrated control unit.
6. Remove the mounting bolts and pull the fuse box away from the kick panel.



7. Disconnect the fuse box connectors and take out the fuse box.



NOTE: The SRS main wire harness connector is double-locked. To remove it, first lift the connector lid, then press the connector tab down and pull the connector out.

Installation:

1. Reconnect the connectors to the fuse box.

NOTE: To reinstall the SRS main wire harness connector, push it into position until it clicks, then close the connector lid.

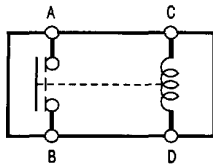
2. Install the under-dash fuse box.
3. Reinstall the kick panel trim piece and door sill molding.
4. Reinstall the dashboard lower cover.
5. Connect both the negative cable and positive cable to the battery.
6. Confirm that all systems work properly.

Power Relays

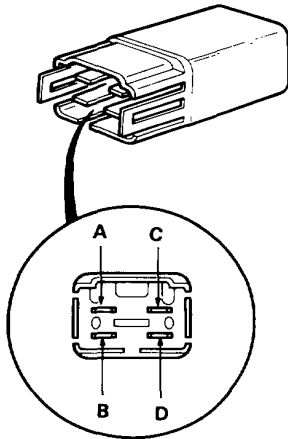
Relay Test (A-type)

NOTE: See page 23-262 for the turn signal/hazard relay input test and see page 23-307 for the seat heater relay test.

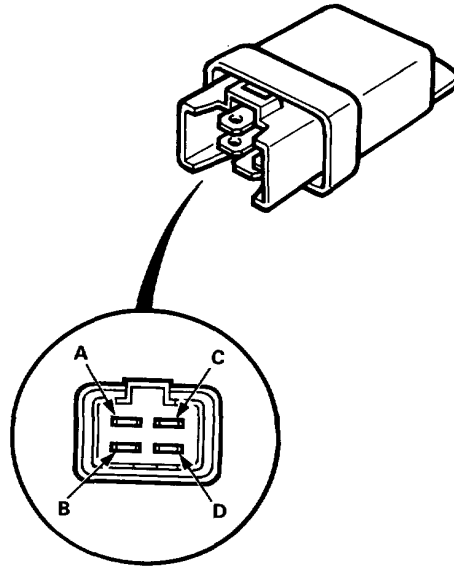
1. Remove the power relay from its socket.
2. There should be continuity between the C and D terminals.
3. There should be continuity between the A and B terminals when the power and ground are connected to the C and D terminals. There should be no continuity when power is disconnected.



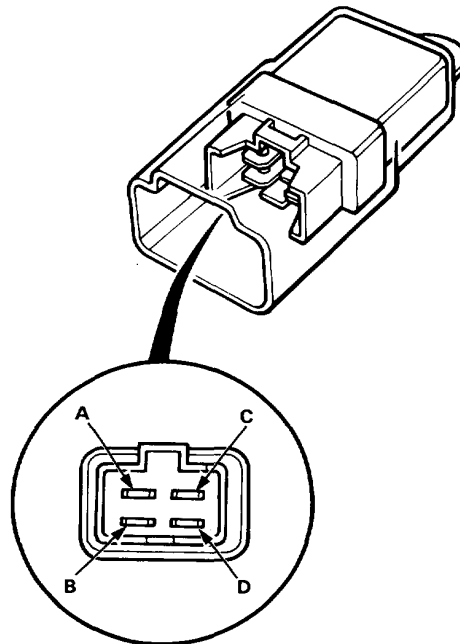
- Horn relay (With SRS)
- Cigarette lighter relay
- Power window relay
- Blower motor relay
- Radiator fan relay



- Seat heater main relay
- ABS front fail-safe relay
- ABS rear fail-safe relay
- Radiator fan relay

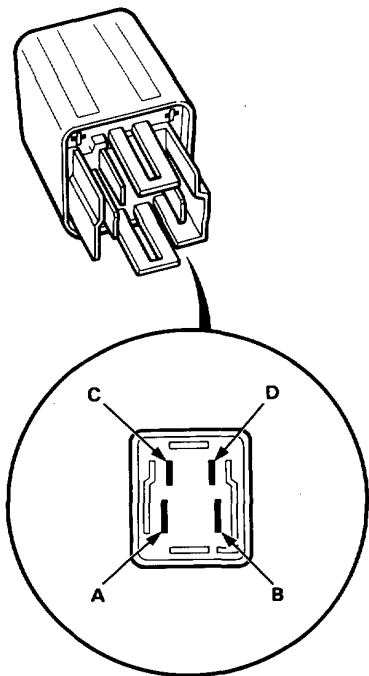


- Condenser fan relay
- A/C compressor clutch relay





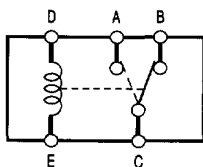
- Headlight relay
- Rear window defogger relay
- ABS motor relay



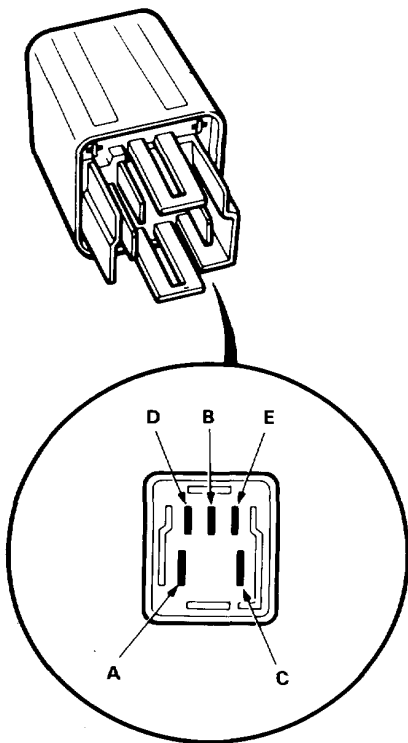
Power Relays

Relay Test (B-type)

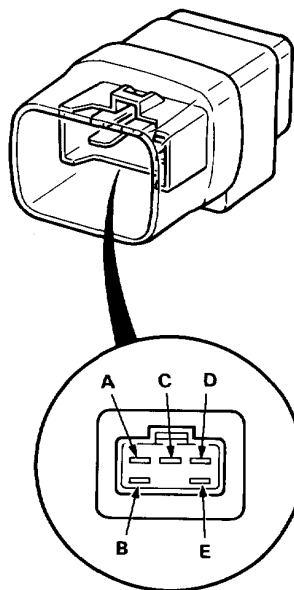
1. Remove the power relay from its socket.
2. There should be continuity between the A and C terminals when power and ground are connected to the D and E terminals.
There should be continuity between the B and C terminals when power is disconnected.



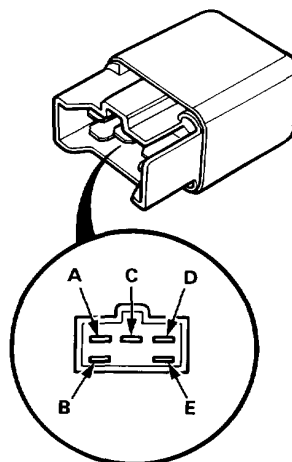
● Dimmer relay



● Windshield wiper intermittent relay



- Sunroof open relay
- Sunroof close relay



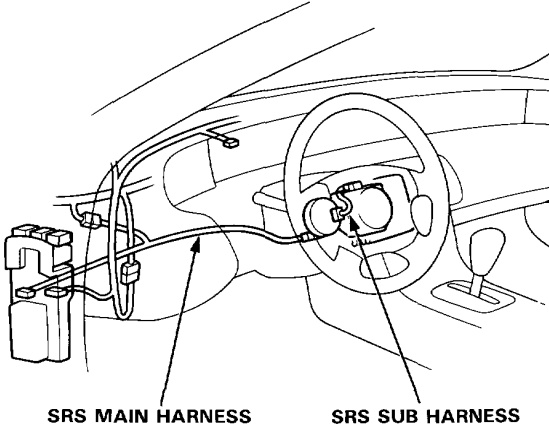


Ignition Switch

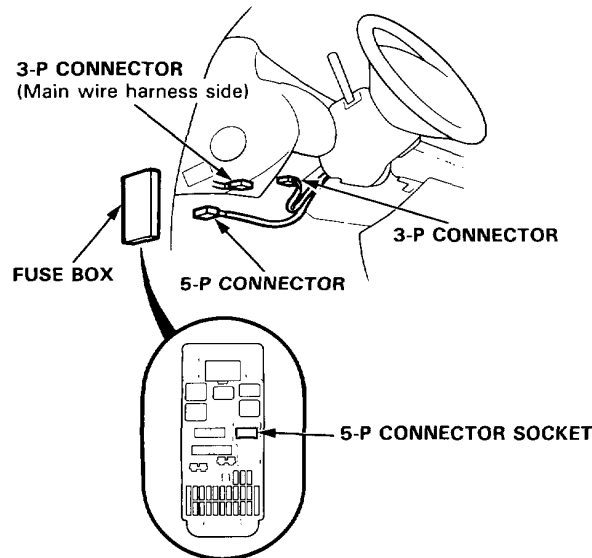
Test

CAUTION:

- All SRS electrical wiring harnesses are covered with **yellow outer insulation**.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

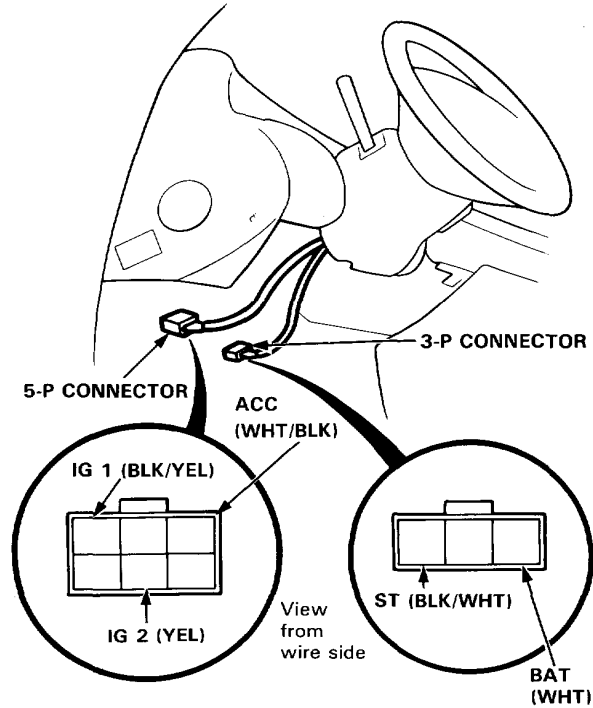


1. Remove the dashboard lower cover, and left kick panel.
2. Disconnect the 5-P connector from the under-dash fuse box and disconnect the 3-P connector from the main wire harness.



3. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	WHT/BLK (ACC)	WHT (BAT)	BLK/YEL (IG1)	YEL (IG2)	BLK/WHT (ST)
0					
I	○	○			
II	○	○	○	○	
III		○	○		○

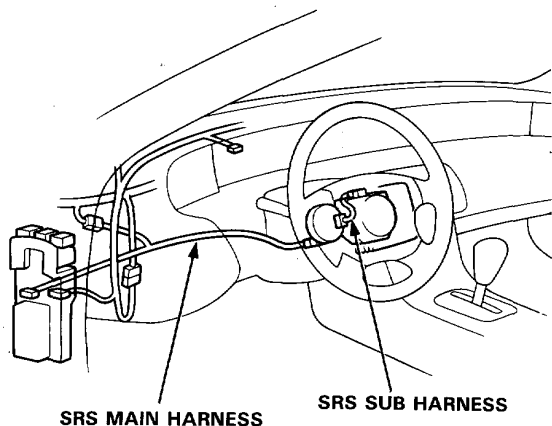


Ignition Switch

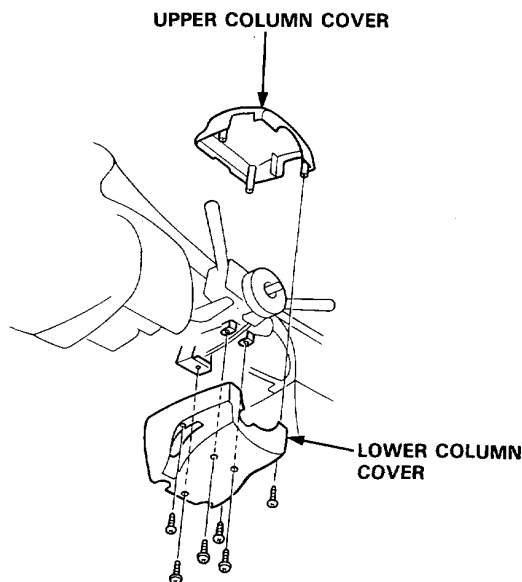
Electrical Switch Replacement

CAUTION:

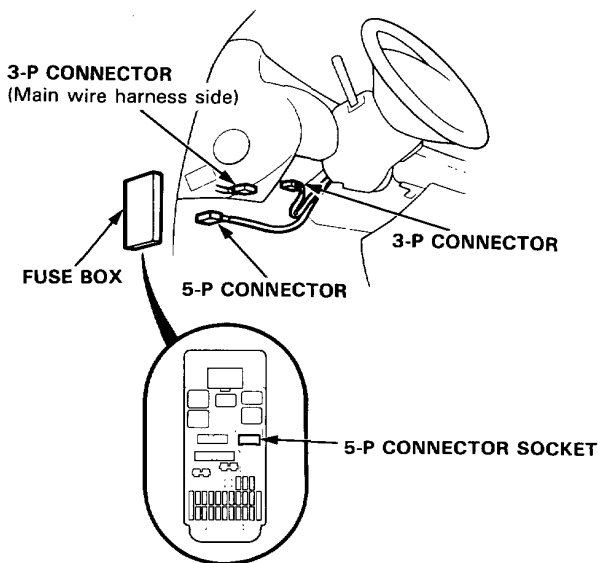
- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



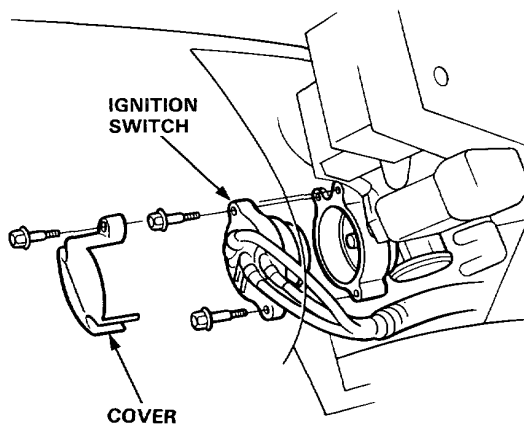
1. Remove the dashboard lower cover.
2. Remove the steering column covers.



3. Disconnect the 5-P connector from the under-dash fuse box and disconnect the 3-P connector from the main wire harness.



4. Insert the key and turn it to "O".
5. Remove the two screws and replace the switch.

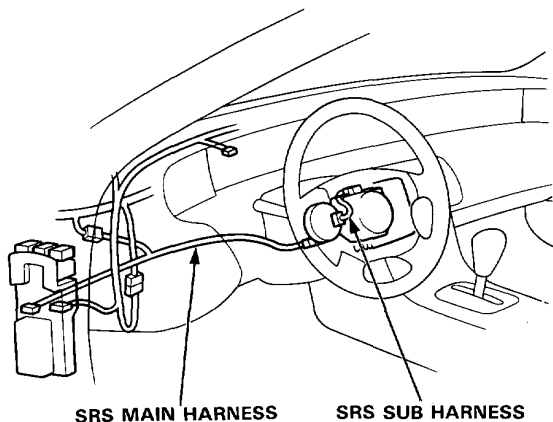




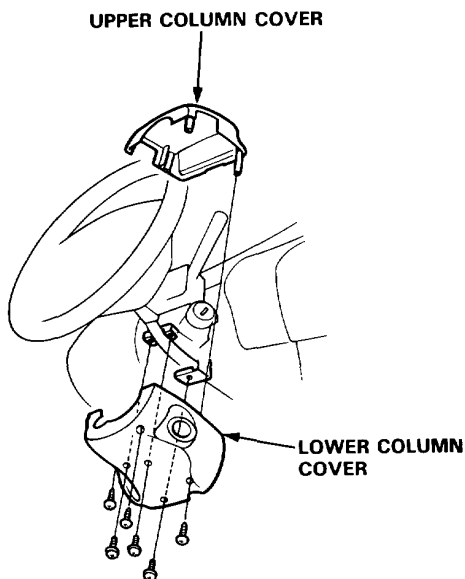
Steering Lock Replacement

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

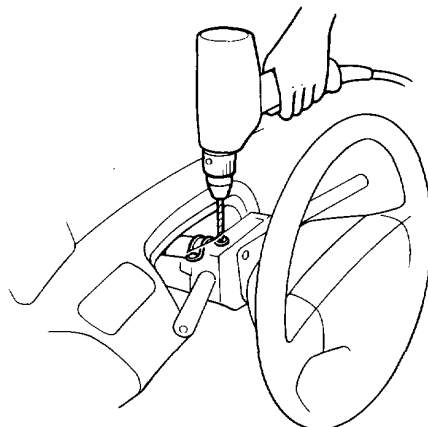


1. Remove the dashboard lower cover and left kick panel (see page 23-82).
2. Disconnect the 5-P connector from the under-dash fuse box and the 3-P connector from the main wire harness.
3. Remove the steering column covers.

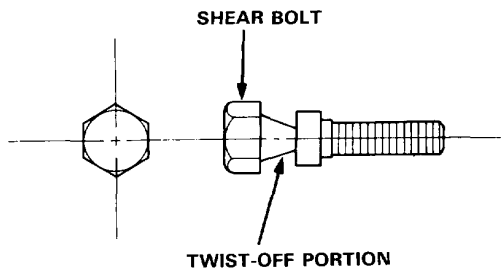


4. Center punch each of the two shear bolts and drill their heads off with a 3/16 in. drill bit.

CAUTION: Do not damage the switch body when removing the shear bolts.



5. Remove the shear bolts from the switch body.
6. Install the new ignition switch without the key inserted.
7. Loosely tighten the new shear bolts.
8. Insert the ignition key and check for proper operation of the steering wheel lock and that the ignition key turns freely.
9. Tighten the shear bolts until the hex heads twist off.



Starting System

Component Location Index

BATTERY

Test, page 23-81

SHIFT POSITION CONSOLE SWITCH (A/T)

Test, page 23-184

Replacement, page 23-186

STARTER

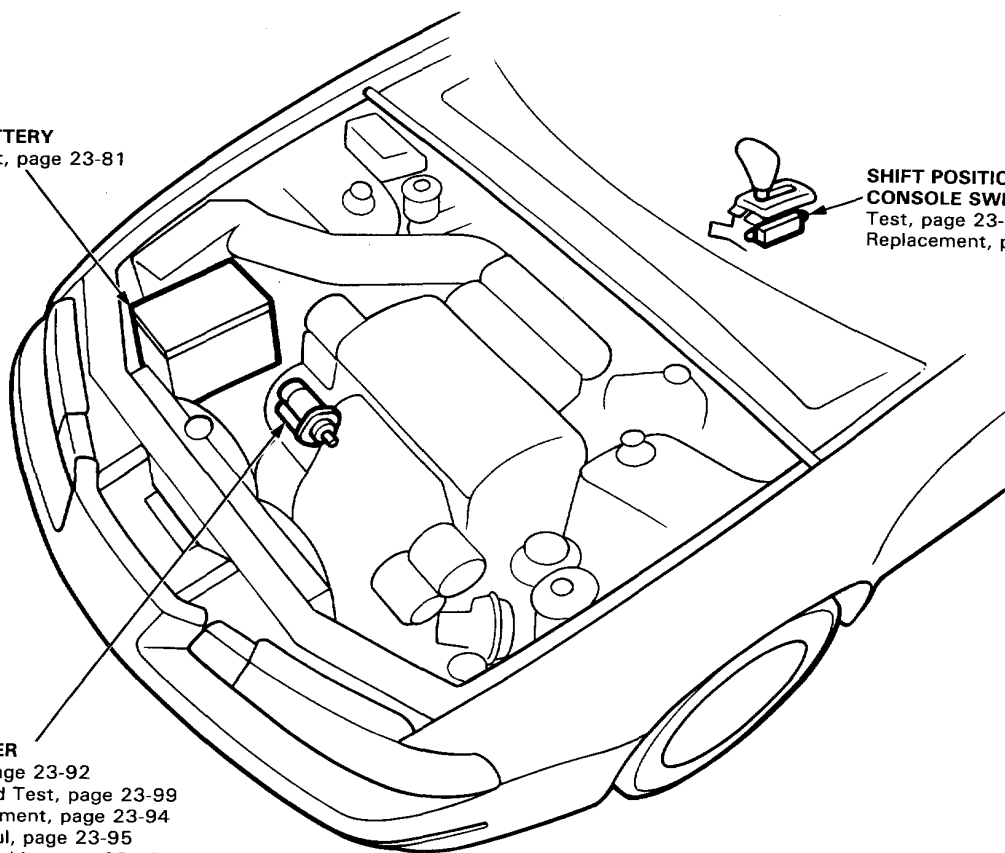
Test, page 23-92

Solenoid Test, page 23-99

Replacement, page 23-94

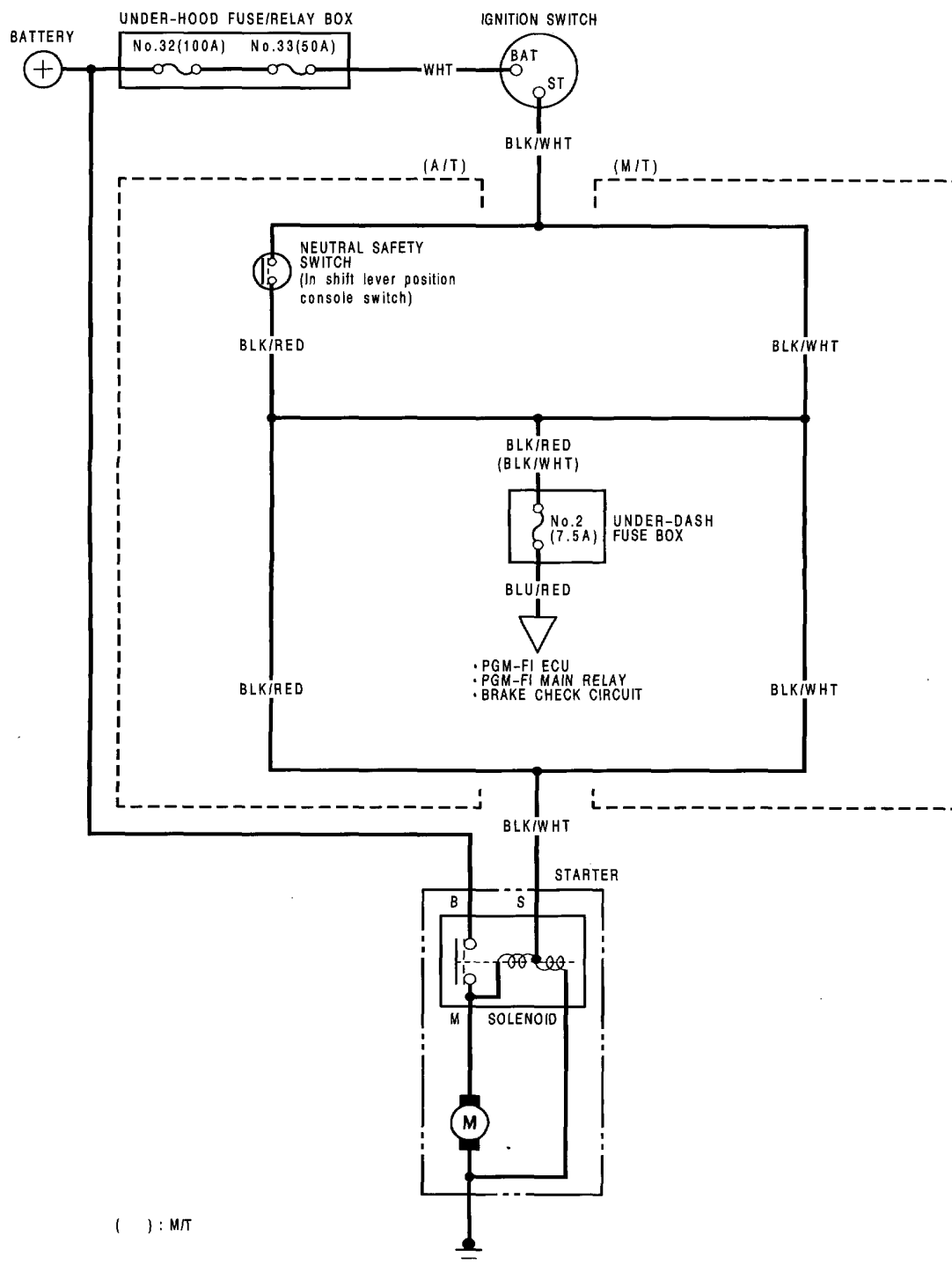
Overhaul, page 23-95

Reassembly, page 23-100





Circuit Diagram



Starting System

Starter Test

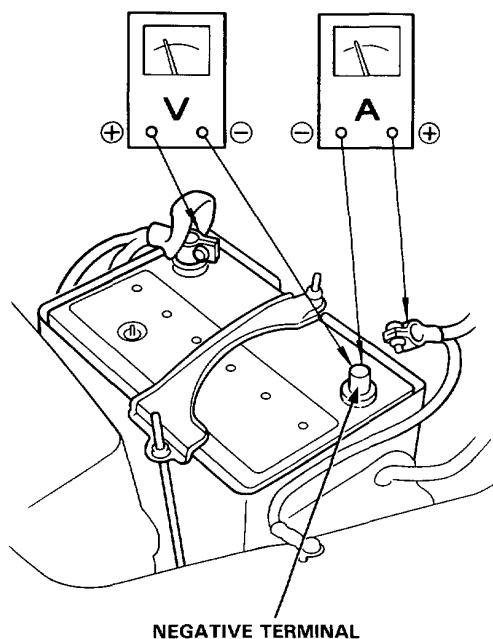
NOTE: The air temperature must be between 15 and 38°C (59 and 100°F) before testing.

Recommended Procedure:

- Use a starter system tester.
- Connect and operate the equipment in accordance with manufacturer's instructions.
- Test and troubleshoot as described.

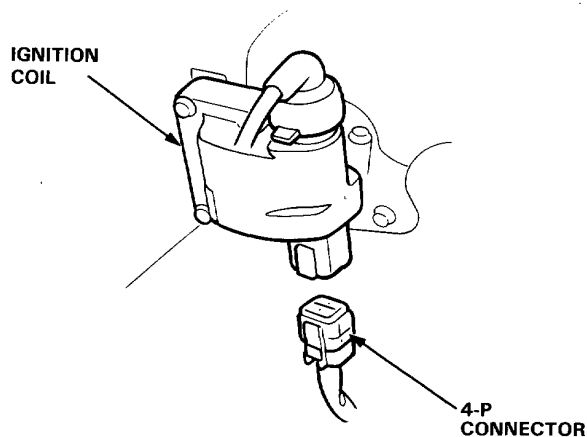
Alternate Procedure:

- Use the following equipment:
 - Ammeter, 0–400 A
 - Voltmeter, 0–20 V (accurate within 0.1 volt)
 - Tachometer, 0–1200 rpm
- Hook up voltmeter and ammeter as shown.

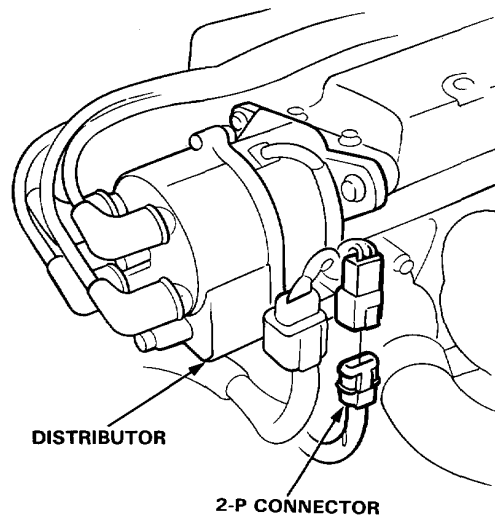


1. Disconnect the 4-P (2-P) connector from the ignition coil (distributor).

KQ model:



Except KQ:

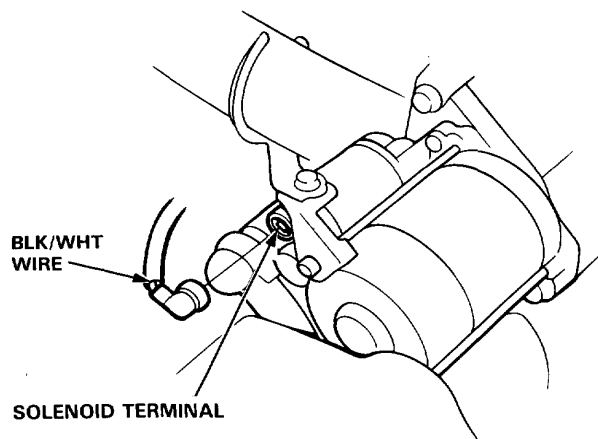




2. Check the starter engagement:

Turn the ignition switch to "Start". The starter should crank the engine.

- If the starter does not crank the engine, check the battery, battery positive cable, ground and the wire connections for looseness and corrosion.
- Test again.
If the starter still does not crank the engine, bypass the ignition switch circuit as follows: Unplug the connector (BLK/WHT wire and solenoid terminal wire) from the starter. Connect a jumper wire from the battery positive (+) terminal to the solenoid terminal. The starter should crank the engine.



- If the starter still does not crank the engine, remove the starter and diagnose its internal problems.
- If the starter cranks the engine, check for an open in the BLK/WHT wire circuit between the starter and ignition switch. Check the ignition switch. On cars with automatic transmission, check the shift lever position switch (neutral safety switch) and connector.

NOTE: Check the No. 33 (50 A) fuse.

3. Check for wear or damage:

The starter should crank the engine smoothly and steadily.

If the starter engages, but cranks the engine erratically, remove the starter motor. Inspect the starter, drive gear and flywheel ring gear for damage.

Check the drive gear overrunning clutch for binding or slipping when the armature is rotated with the drive gear held. Replace the gears if damaged.

4. Check cranking voltage and current draw:

Voltage should be no less than 8.5 volts.

Current should be no more than 380 amperes.

If voltage is too low, or current draw too high, check for:

- Fully charged battery.
- Open circuit in starter armature commutator segments.
- Starter armature dragging.
- Shorted armature winding.
- Excessive drag in engine.

5. Check cranking rpm:

Engine speed during cranking should be above 100 rpm.

If speed is too low, check for:

- Loose battery or starter terminals.
- Excessively worn starter brushes.
- Open circuit in commutator segments.
- Dirty or damaged helical spline or drive gear.
- Defective drive gear overrunning clutch.

6. Check the starter disengagement:

Press the clutch pedal all the way in (M/T), turn the ignition switch to "III" and release to "II". The starter drive gear should disengage from the flywheel ring gear.

If the drive gear hangs up on the flywheel ring gear, check for:

- Solenoid plunger and switch malfunction.
- Dirty drive gear assembly or damaged overrunning clutch.

Starting System

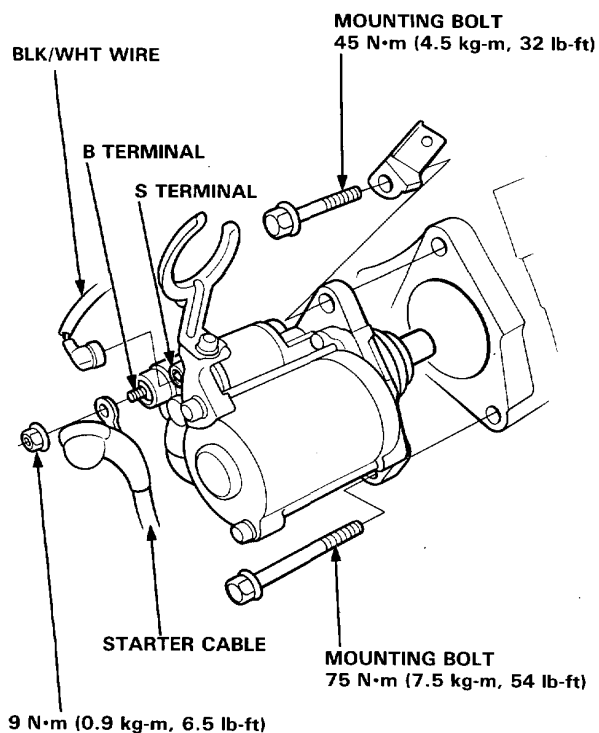
Starter Replacement

1. Disconnect the negative cable from the battery.
2. Remove the engine wire harness from the harness clip on the starter motor.
3. Disconnect the starter cable from the B terminal on the solenoid, and the BLK/WHT wire from the S terminal.

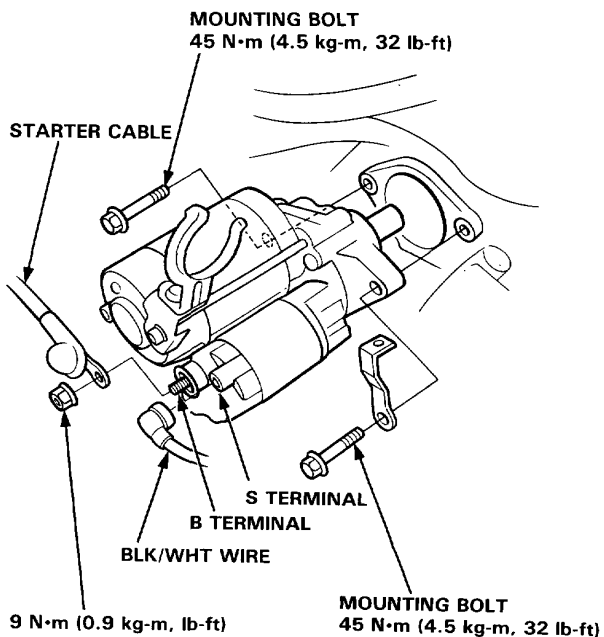
NOTE: In case of an A/T model, the starter cable also has to be removed from the bracket on the transmission housing.

4. Remove the two bolts holding the starter, and then remove the starter.

M/T:

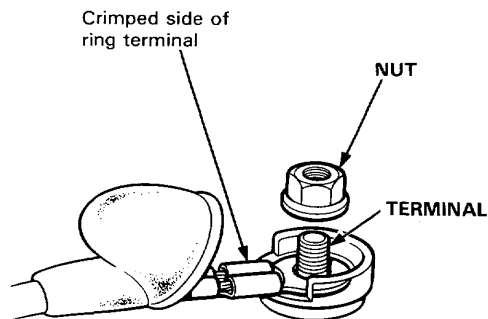


A/T:



5. Install in the reverse order of removal.

NOTE: When installing the starter cable, make sure that the crimped side of the ring terminal is facing out.

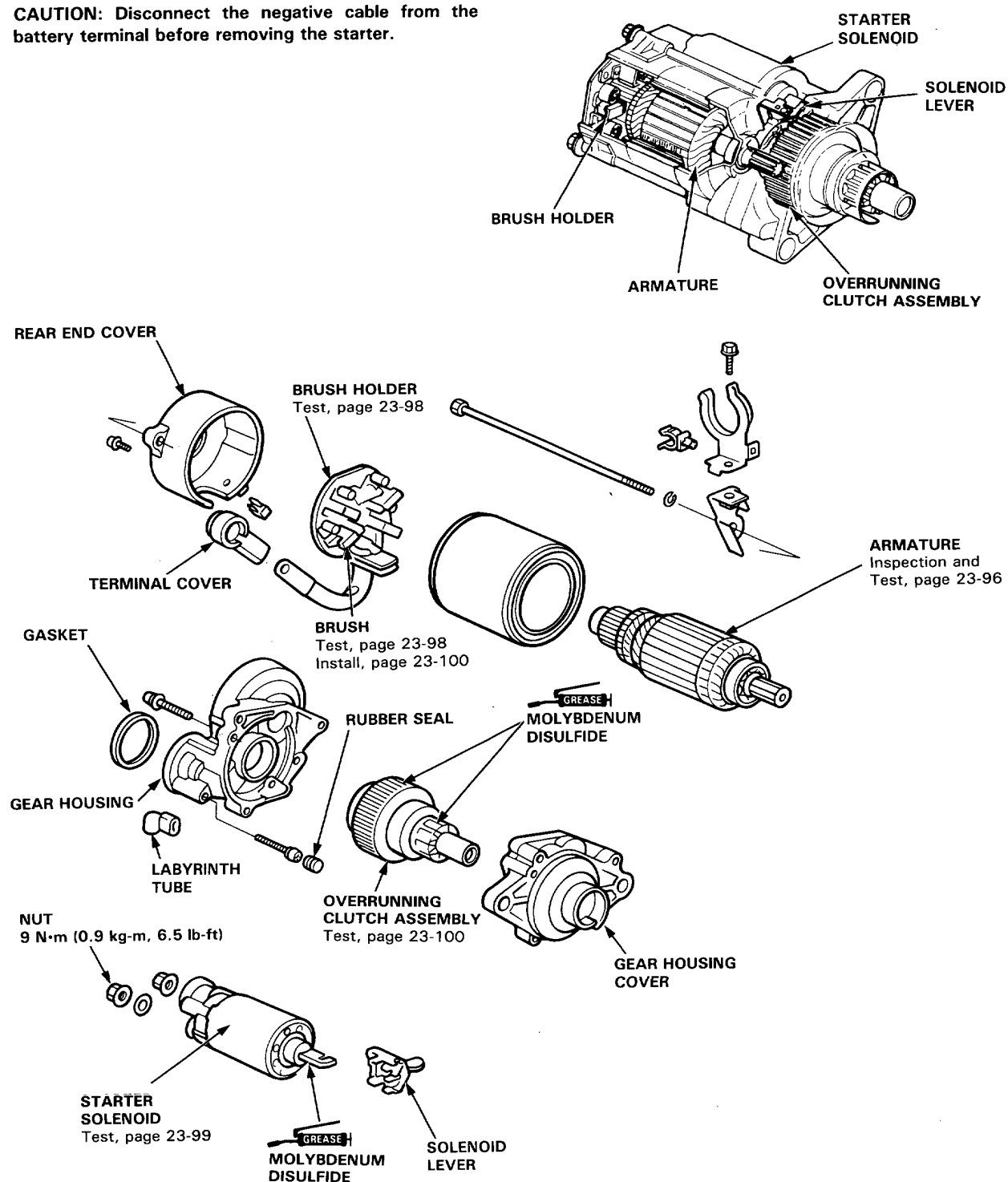


Starting System

Starting Overhaul



CAUTION: Disconnect the negative cable from the battery terminal before removing the starter.

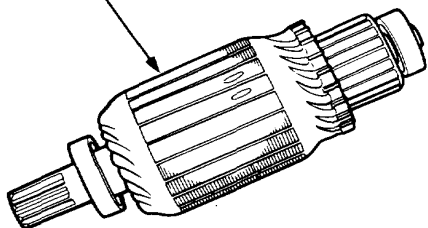


Starting System

Armature Inspection and Test

1. Inspect the armature for wear or damage due to contact with the field coil magnets.

Inspect for
damage.



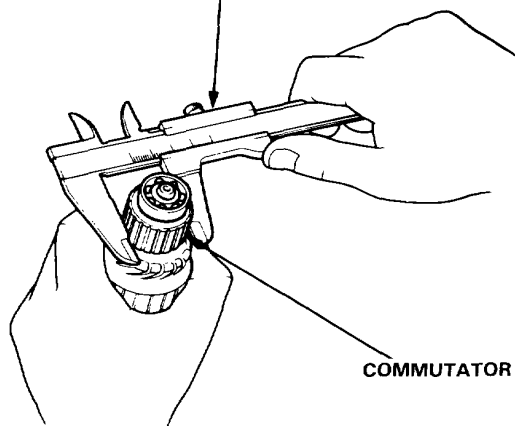
2. A dirty or burnt commutator surface may be resurfaced with emery cloth or a lathe within the following specifications.

Commutator Diameter

Standard (New): 28.0–28.1 mm
(1.102–1.106 in)

Service Limit : 27.5 mm (1.08 in)

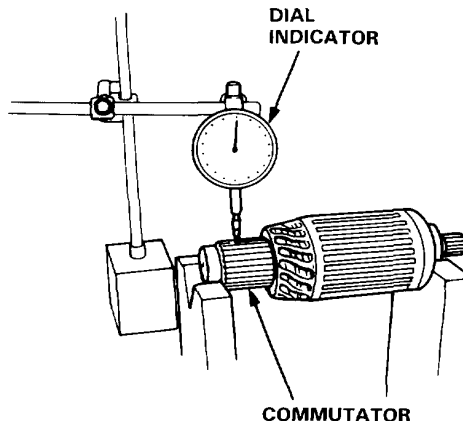
VERNIER CALIPER



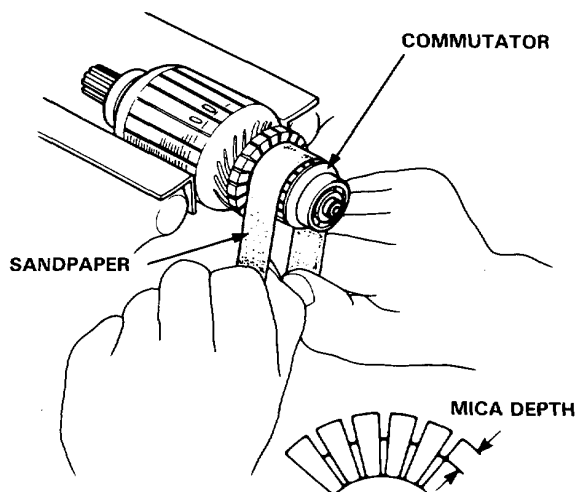
Commutator Runout

Standard (New): 0–0.02 mm (0–0.0008 in)

Service Limit : 0.05 mm (0.002 in)



3. If the commutator runout and diameter are within limits, check the commutator for damage or for carbon dust or brass chips between the segments.
4. If the surface is dirty, recondition it with a #500 or #600 sandpaper. Then, check mica depth. If necessary, undercut the mica with a hacksaw blade to achieve proper depth.



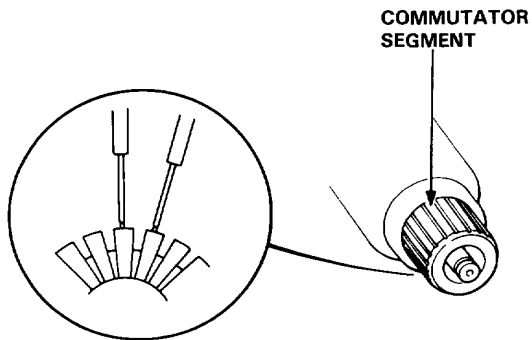
Commutator Mica Depth

Standard (New): 0.4–0.5 mm (0.016–0.020 in)

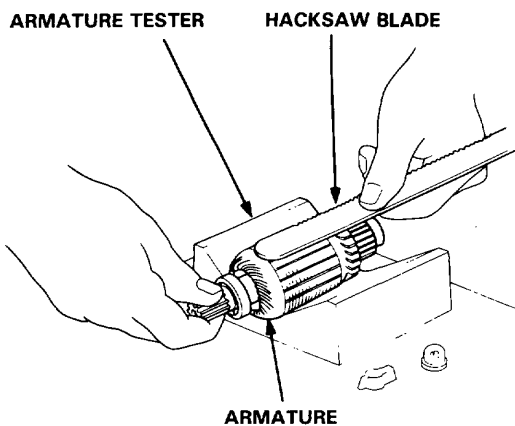
Service Limit : 0.15 mm (0.006 in)



5. Check for continuity between the segments of the commutator. If an open circuit exists between any segments, replace the armature.

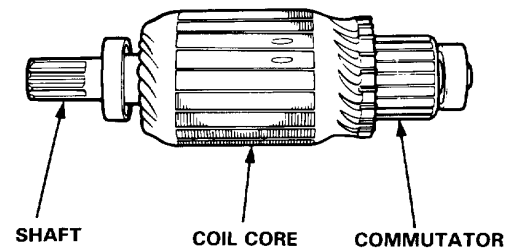


6. Place the armature on an armature tester. Hold a hacksaw blade on the armature core.



If the blade is attracted to the core or vibrates while the core is turned, the armature is shorted. Replace the armature.

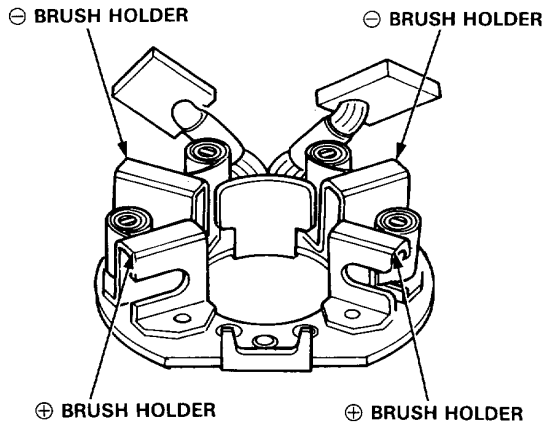
7. With an ohmmeter, check that no continuity exists between the commutator and armature coil core, and between the commutator and armature shaft. If continuity exists, replace the armature.



Starting System

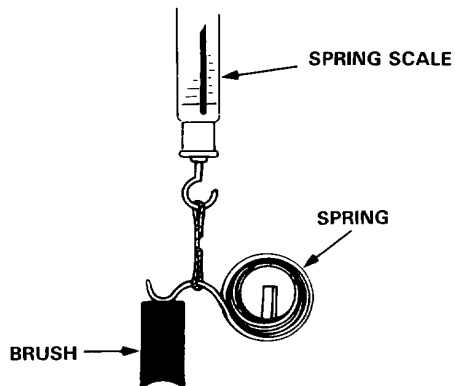
Starter Brush Holder Test

1. Check that there is no continuity between the ⊕ and ⊖ brush holders.
If continuity exists, replace the brush holder assembly.



2. Insert the brush into the brush holder, and bring the brush into contact with the commutator, then attach a spring scale to the spring. Measure the spring tension at the moment the spring lifts off the brush.

Spring Tension: 16–18 N (1.6–1.8 kg, 3.5–4.0 lb)



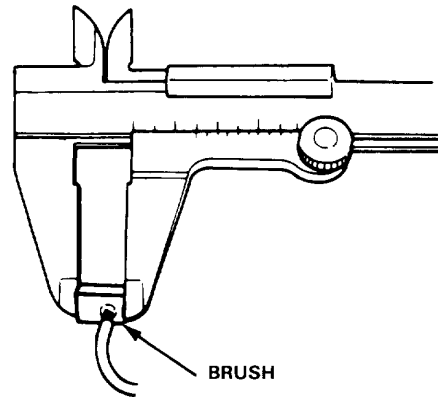
Starter Brush Inspection

Measure brush length. If not within the service limit, replace the armature housing and brush holder assembly.

Brush Length

Standard (New): 15.8–16.2 mm (0.62–0.64 in)

Service Limit : 10.0 mm (0.39 in)



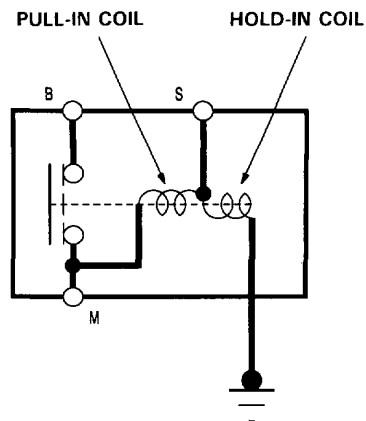
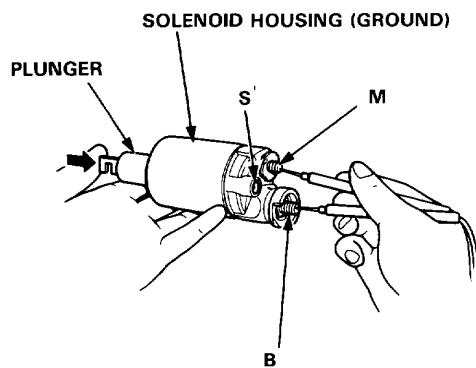
NOTE: To seat new brushes after installing them in their holders, slip a strip of #500 or #600 sandpaper, with the grit side up, over the commutator, and smoothly rotate the armature. The contact surface of the brushes will be sanded to the same contour as the commutator.



Starter Solenoid Test

1. Remove the starter solenoid.
2. Check for continuity between the terminals in each solenoid plunger position according to the table.

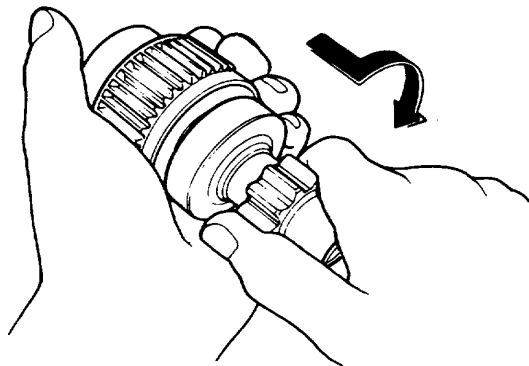
Terminal	B	M	S	GROUND
Position				
RELEASED		○	○	○
PUSHED	○	○	○	○



Starting System

Overrunning Clutch Check

1. Check if the overrunning clutch moves along the shaft freely. If not, replace the overrunning clutch assembly.
2. Check if the overrunning clutch locks in one direction and rotates smoothly in reverse. If it does not lock in either direction or it locks in both directions, replace the overrunning clutch assembly.



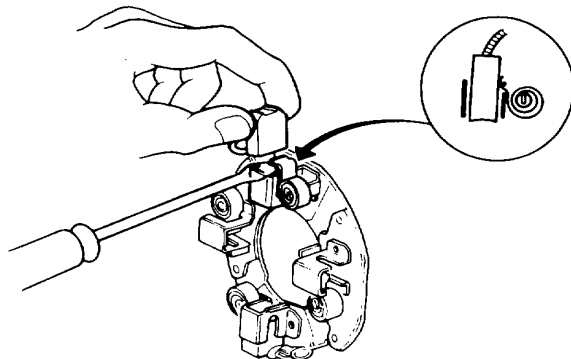
3. Check if the starter drive gear is worn or damaged. If the gear is worn or damaged, replace the overrunning clutch assembly; the gear is not available separately.

NOTE: Check the condition of the flywheel or torque converter ring gear if the starter drive gear teeth are damaged.

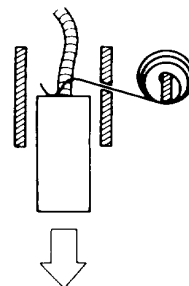
Starter Reassembly

Reassemble the starter in the reverse order of disassembly.

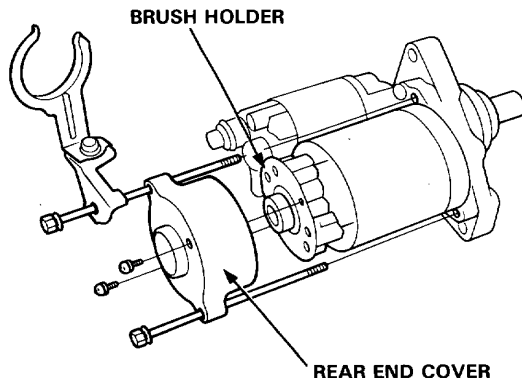
1. Pry back each brush spring with a screwdriver, then position the brush about halfway out of its holder, and release the spring to hold it there.



2. Install the armature in the housing. Next pry back each brush spring again and push the brush down until it seats against the commutator, then release the spring against the end of the brush.



3. Install the end cover on the brush holder.





Ignition System

Component Location Index

IGNITION TIMING CONTROL SYSTEM

- Description, page 23-102
- Troubleshooting, section 11
- Inspection and Setting, page 23-105

DISTRIBUTOR

- Top End Inspection, page 23-107
- Removal/Installation, page 23-107, 110
- Overhaul, page 23-108
- Reassembly, page 23-112
- Igniter Unit Troubleshooting, section 11
- Igniter Input Test, page 23-111

TEST TACHOMETER CONNECTOR

IGNITION COIL Test, page 23-113

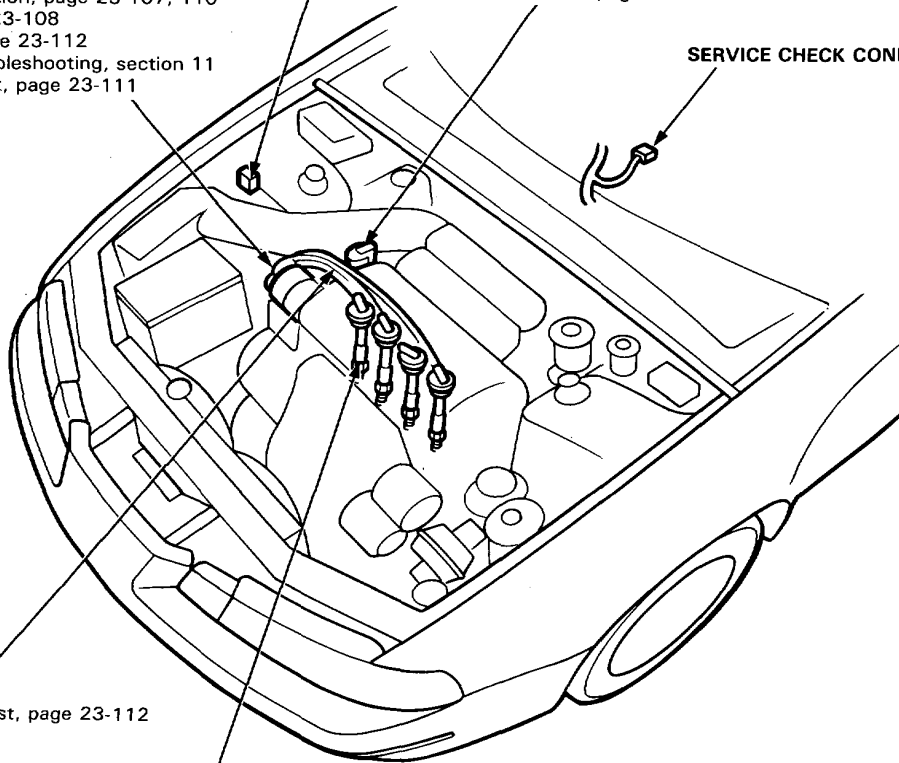
SERVICE CHECK CONNECTOR

IGNITION WIRES

- Inspection and Test, page 23-112

SPARK PLUG

- Inspection, page 23-116

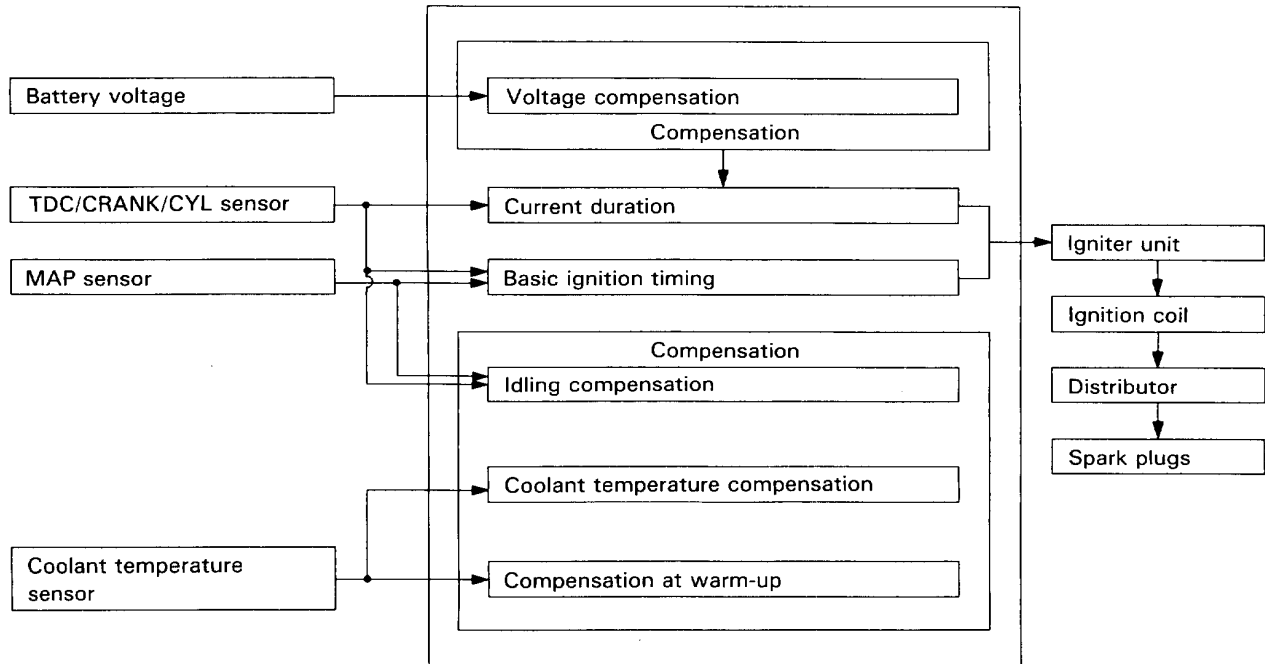


Ignition System

Description

Ignition Timing Control (KQ model):

The programmed ignition (PGM-IG) used in this engine provides optimum control of ignition timing. A microcomputer determines the timing in response to engine speed and manifold vacuum pressure. The input signals are transmitted by the TDC/CRANK/CYL sensor, throttle angle sensor, coolant temperature sensor, and MAP sensor. This system, not dependent on a governor or vacuum diaphragm, is capable of setting lead angles with complicated characteristics which cannot be provided by conventional governors or diaphragms.



Basic Control

Determination of ignition timing/current duration:

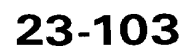
The control unit has stored within it the optimum basic ignition timing for operating conditions based upon engine speed and intake manifold pressure. With compensating signals from sensors, the system determines optimum timing for ambient conditions and sends voltage pulses to the igniter unit.

Compensation of ignition timing:

Compensation Item	Related Sensor and Information	Description
Idling	TDC/CRANK/CYL sensor MAP sensor	Ignition timing is controlled to the target speed with compensation according to the idle speed.
Compensation at warm-up	Coolant temperature sensor	Lag angle is adjusted according to warm-up conditions to bring about a good balance between operating performance and exhaust gas level.
Coolant temperature compensation	Coolant temperature sensor	Compensation for lead angle at low coolant temperature and lag angle at high coolant temperature.

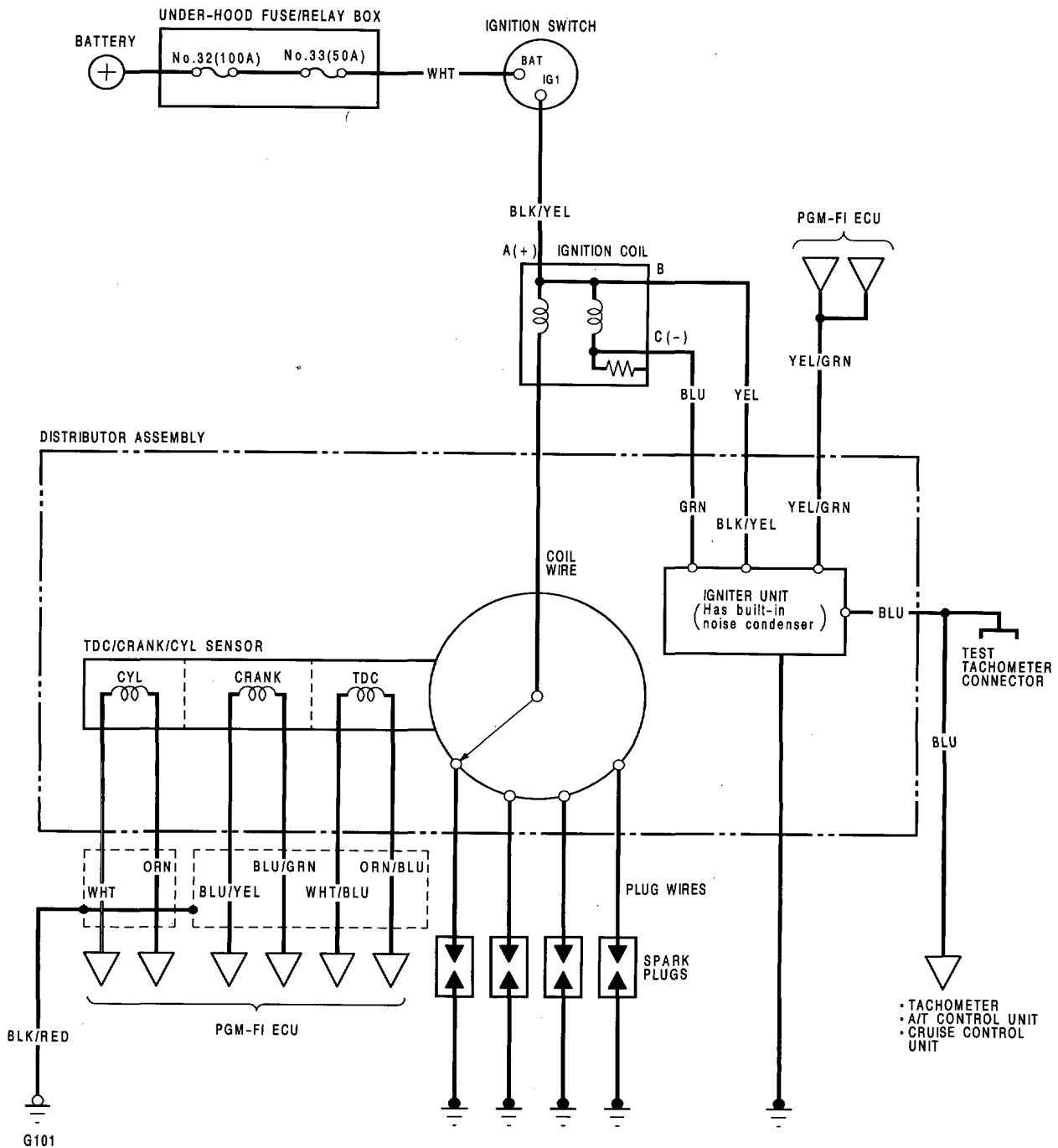
Control at Start

Ignition timing is fixed at 7° BTDC for cranking. The cranking is detected by the TDC sensor (cranking rpm) and starter signal.



Ignition System

Circuit Diagram (KQ model)

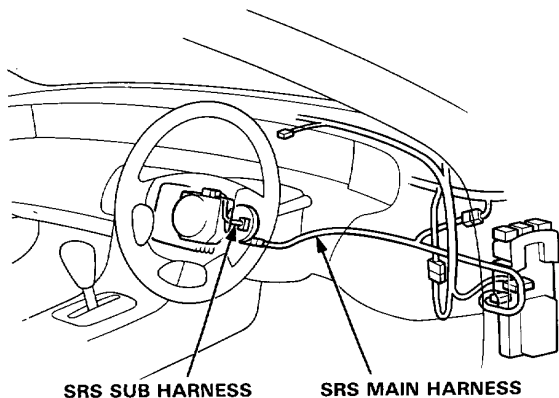




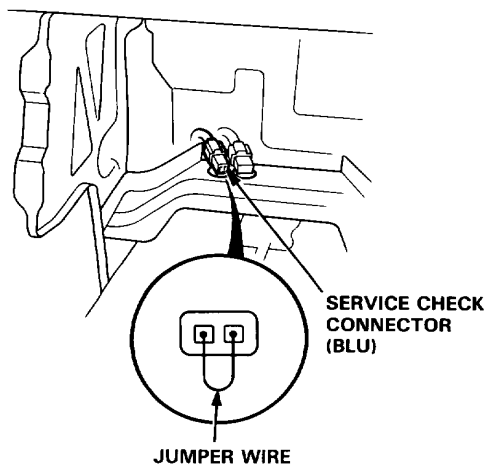
Ignition Timing Inspection and Setting

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

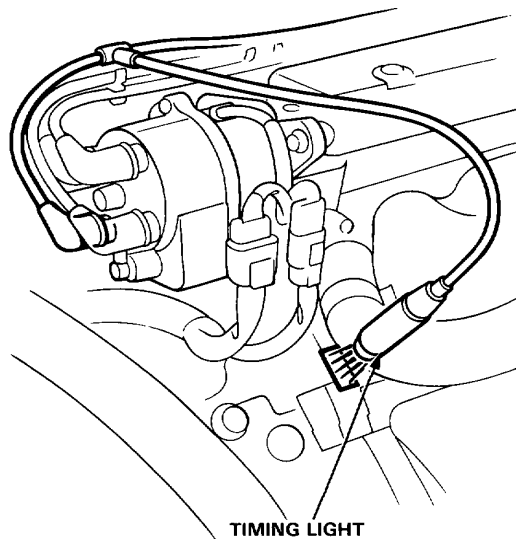


1. Start the engine and allow it to warm-up (cooling fan comes on).
2. Pull out the service check connector located under the middle of the dash. Connect the BLU/WHT and BRN/WHT terminals with a jumper wire.



3. Check the idle speed (see page 23-106).

4. Connect a timing light to the No. 1 ignition wire. Remove the rubber plug from the "window" in the flywheel/drive plate housing. While the engine idles, point the light toward the pointer on the flywheel (for M/T), or on the drive plate (for A/T).



5. Adjust ignition timing, if necessary, to the following specifications:

Ignition Timing

All models: $15 \pm 2^\circ$ BTDC (RED)

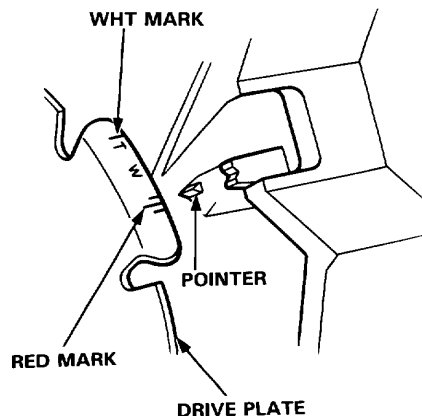
at ± 50 rpm in neutral

*: 700 (KQ P14), (KQ P12)

780 (Except KQ P14)

770 (Except KQ P11, P12)

NOTE: The illustration shows A/T.

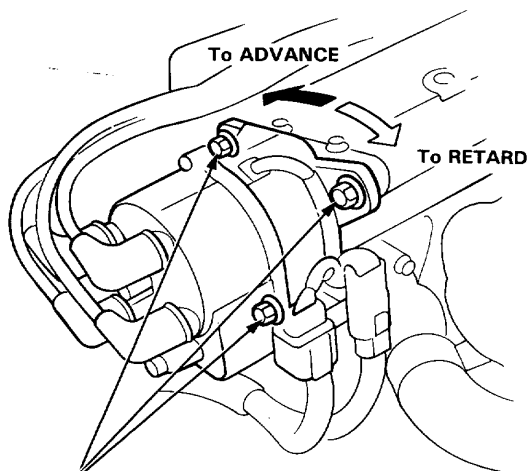


(cont'd)

Ignition System

Ignition Timing Inspection and Setting (cont'd)

6. If it is necessary to adjust the ignition timing, loosen the distributor mounting bolts, and turn the distributor housing counterclockwise to advance the timing, or clockwise to retard the timing.



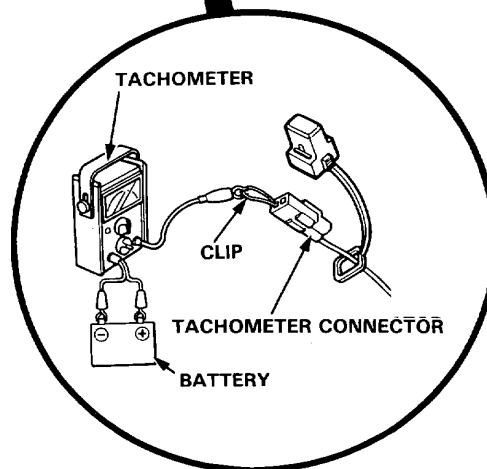
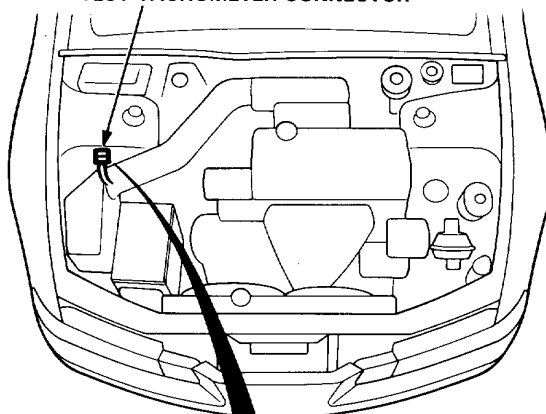
MOUNTING BOLTS
18 N·m (1.8 kg-m, 13 lb-ft)

7. Tighten the mounting bolts and recheck timing.
8. Remove the jumper wire from the service check connector (BLU) and reinstall the rubber plug in the inspection window.

Idle Speed Inspection

1. Start the engine and allow it to warm-up (cooling fan comes on).
2. Connect a tachometer to the test tachometer connector.

TEST TACHOMETER CONNECTOR



Idle speed:

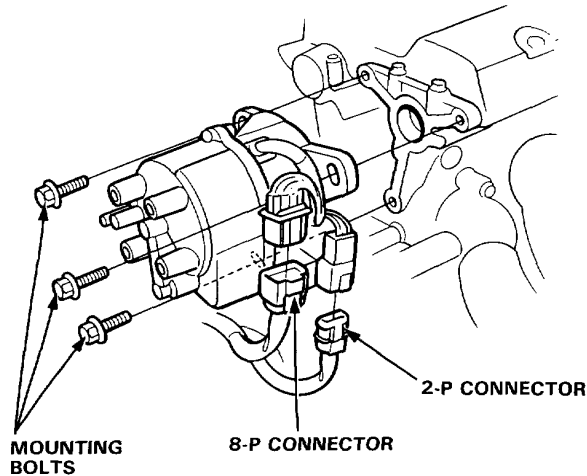
(KQ: P14, P12): 700 ± 50 rpm in neutral
(Except KQ: P14): 780 ± 50 rpm in neutral
(Except KQ: P11, P12): 770 ± 50 rpm in neutral

3. Adjust the idle speed, if necessary (see section 11).



Distributor Removal

1. Disconnect the 2-P and 8-P connectors from the distributor.
2. Disconnect the ignition wires from the distributor cap.

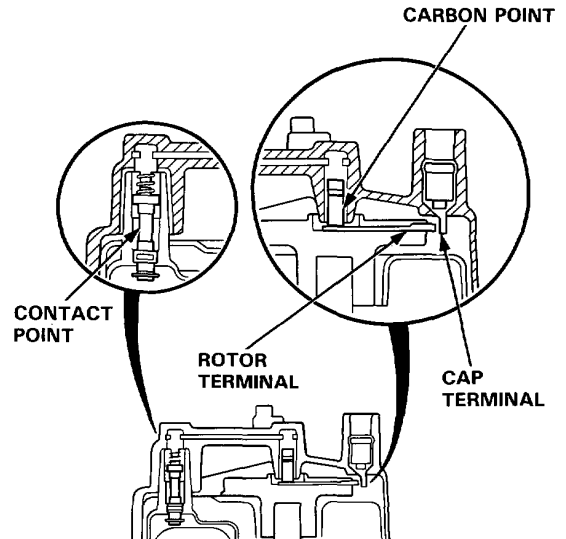


3. Remove the distributor mounting bolts, then remove the distributor from the cylinder head.

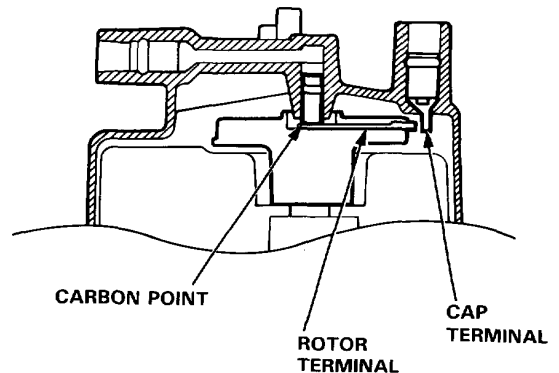
Distributor Top End Inspection

1. Check for rough or pitted rotor and cap terminals.
2. Scrape or file off the carbon deposits and smooth with an oil stone or #600 sandpaper.

Except KQ:



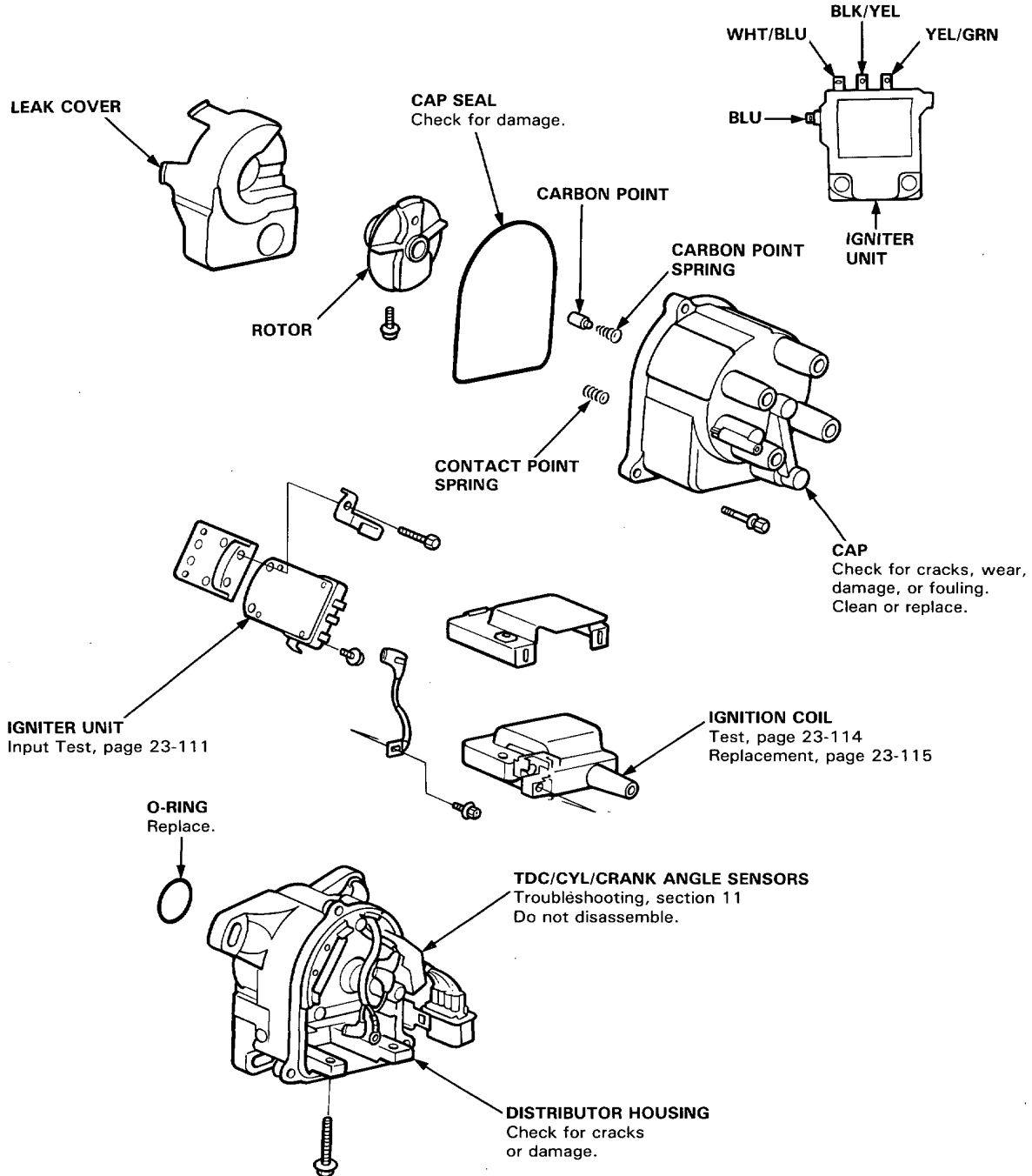
KQ model:



3. Check the distributor cap for cracks, wear and damage. If necessary, clean or replace it.

Ignition System

Distributor Overhaul (Except KQ)



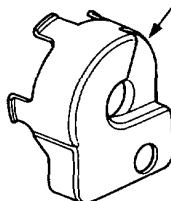


Distributor Overhaul (KQ model)

CAP SEAL
Check for damage.



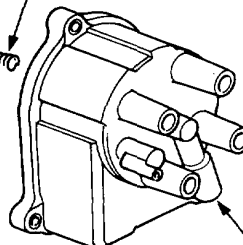
LEAK COVER



CARBON POINT



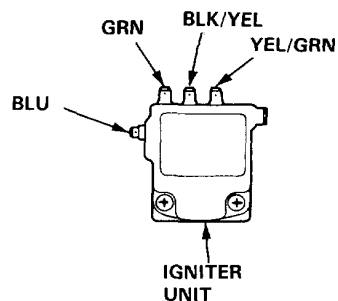
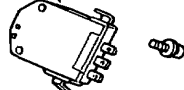
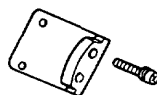
CARBON POINT SPRING



ROTOR



IGNITER UNIT
Input test, page 23-111



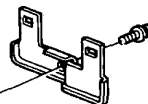
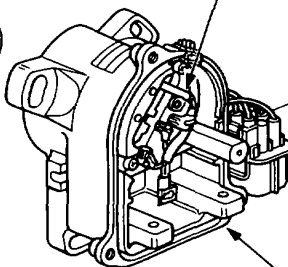
CAP
Check for cracks, wear, damage, or fouling.
Clean or replace.



O-RING
Replace.



TDC/CYL/CRANK ANGLE SENSORS
Troubleshooting, section 11
Do not disassemble.



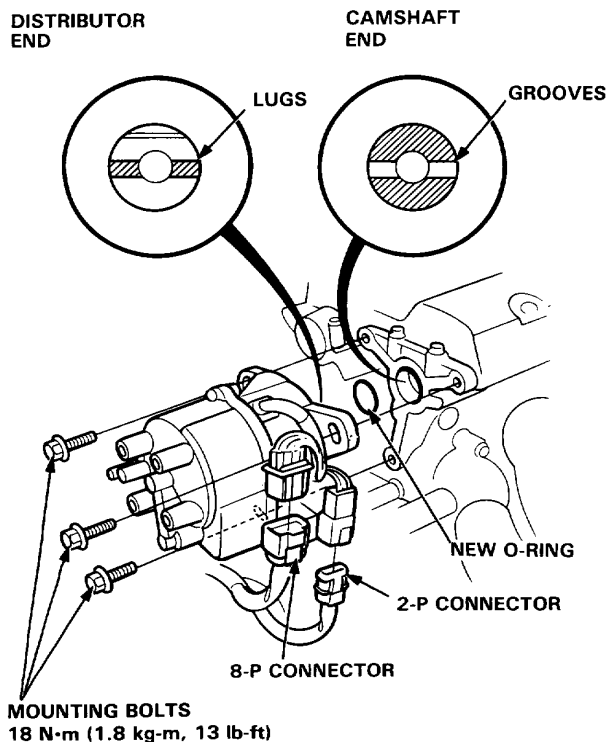
DISTRIBUTOR HOUSING
Check for cracks or damage.

Ignition System

Distributor Installation

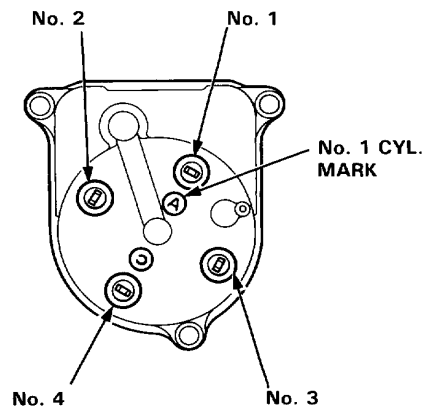
1. Coat a new O-ring with engine oil, then install it.
2. Slip the distributor into position.

NOTE: The lugs on the end of the distributor, and the mating grooves in the camshaft end are both offset to eliminate the possibility of installing the distributor 180° out of time.



3. Install the mounting bolts and tighten them temporarily.
4. Connect the 2-P and 8-P connectors to the distributor.

5. Connect the ignition wires as shown.



6. Set the timing with a timing light as shown on page 23-105.
7. After setting the timing, tighten the mounting bolts.

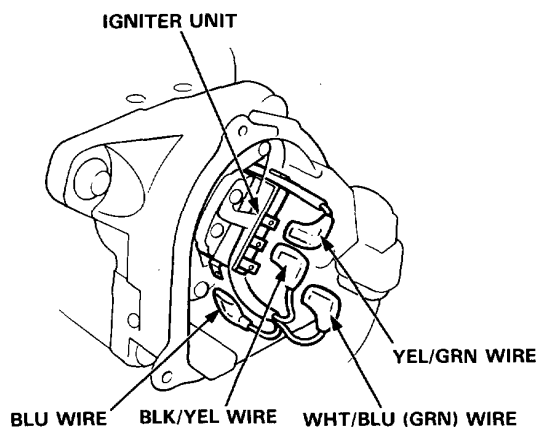


Igniter Unit Input Test

NOTE:

- See section 11 when the self-diagnostic indicator blinks.
- Perform an input test for the igniter unit after finishing the fundamental tests for the ignition system and the fuel and emissions system.
- The tachometer should operate normally.

1. Remove the distributor cap, the rotor, and the inner cover.
2. Disconnect the BLK/YEL, WHT/BLU (GRN), YEL/GRN, and BLU wires from the igniter unit.



(): KQ model

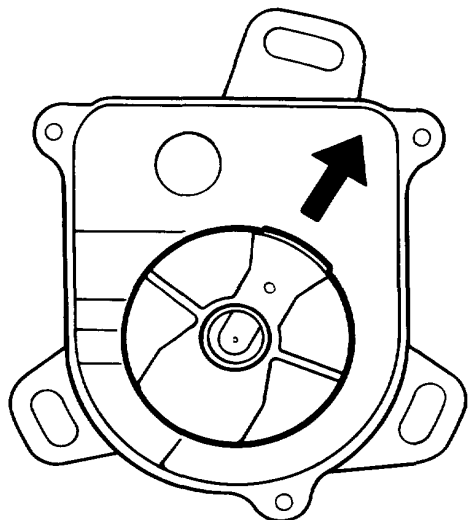
3. Turn the ignition switch ON. Check for voltage between the BLK/YEL wire and body ground. There should be battery voltage.
 - If there is no battery voltage, check the BLK/YEL (YEL) wire between the ignition coil and the igniter unit.
 - If there is battery voltage, go to step 4.
4. Turn the ignition switch ON. Check for voltage between the WHT/BLU (GRN) wire and body ground. There should be battery voltage.
 - If there is no battery voltage, check the:
 - Ignition coil.
 - WHT/BLU (GRN) wire between the ignition coil and the igniter unit.
 - If there is battery voltage, go to step 5.
5. Check the YEL/GRN wire between the PGM-FI ECU and the igniter unit (see section 11).
6. Check the BLU wire between the tachometer and the igniter unit.
7. If all tests are normal, replace the igniter unit.

Ignition System

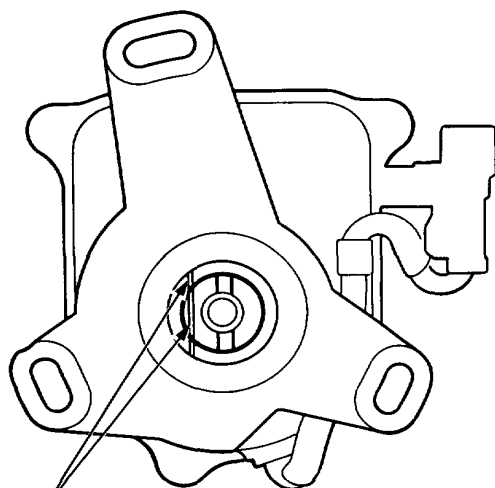
Distributor Reassembly

Reassemble the distributor in the reverse order of disassembly.

1. Install the rotor, then turn it so that it faces in the direction shown (toward the No. 1 cylinder).



2. Set the thrust washer and coupling on the shaft.
3. Check that the rotor is still pointing toward the No. 1 cylinder, then align the index mark on the housing with the index mark on the coupling.

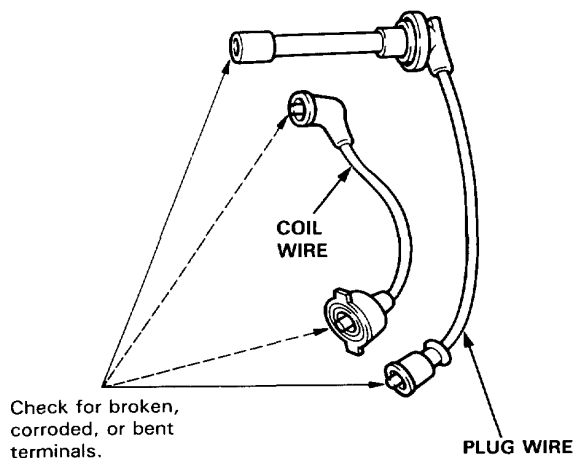


4. Drive in the pin and secure it with the pin retainer.

Ignition Wire Inspection and Test

CAUTION: Carefully remove the ignition wires by pulling on the rubber boots. Do not bend the wires; you might break them inside.

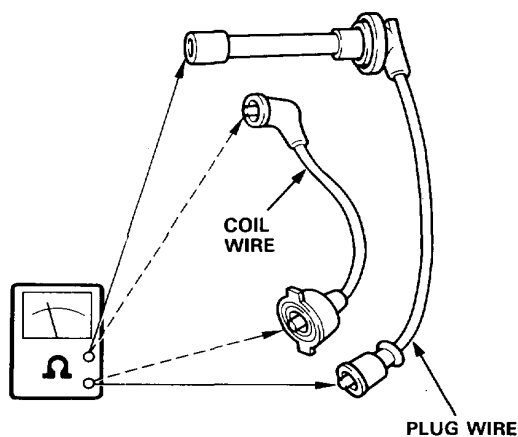
1. Check the condition of the wire terminals. If any terminal is corroded, clean it, and if it is broken or distorted, replace the wire.



2. Connect ohmmeter probes and measure resistance.

Ignition Wire Resistance:

25,000 ohms max. at 20°C (70°F)

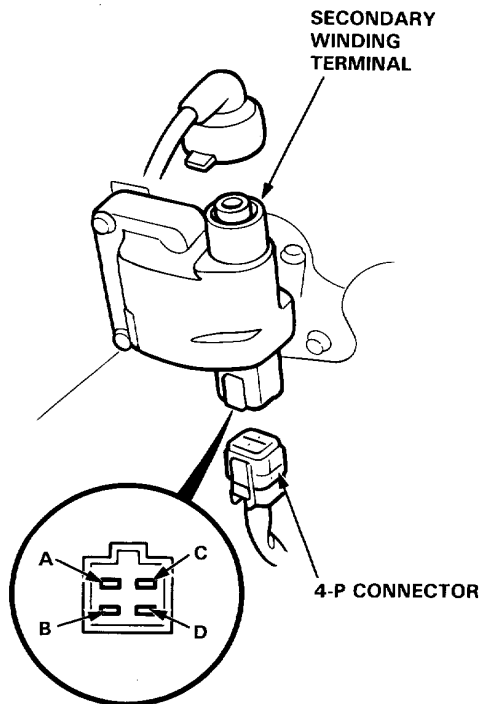


3. If resistance exceeds 25,000 ohms, replace the ignition wire.



Ignition Coil Test (KQ model)

1. Turn the ignition switch OFF.
2. Disconnect the 4-P connector and ignition coil wire.



3. Using an ohmmeter, measure resistance between the terminals. Replace the coil if the resistance is not within specifications.

NOTE: Resistance will vary with the coil temperature; specifications are at 20°C (68°F).

Primary Winding Resistance

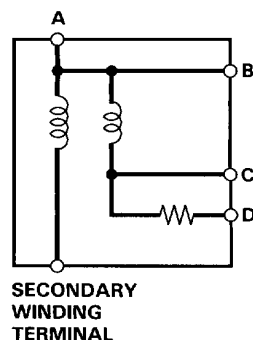
(Between the A and C terminals):

0.64–0.78 ohms

Secondary Winding Resistance

(Between the A and secondary winding terminals):

14,400–21,600 ohms



4. Check for continuity between the A and B terminals. Replace the coil if there is no continuity.

Ignition System

Ignition Coil Test (Except KQ)

1. With the ignition switch OFF, remove the distributor cap.
2. Remove the two screws to disconnect the BLK/YEL and WHT/BLU wires from the terminals A (+) and B (-) respectively.

3. Using an ohmmeter, measure resistance between the terminals. Replace the coil if the resistance is not within specifications.

NOTE: Resistance will vary with coil temperature; specifications are at 20°C (68°F)

Primary Winding Resistance

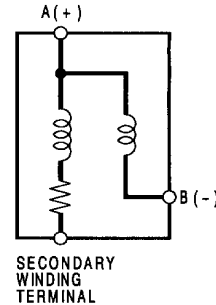
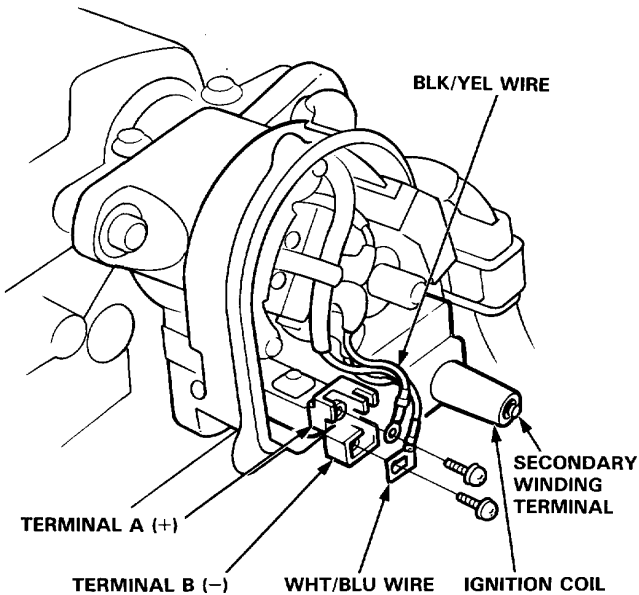
(between the A and B terminals):

0.63 – 0.77 ohms

Secondary Winding Resistance

(between the A and secondary winding terminals):

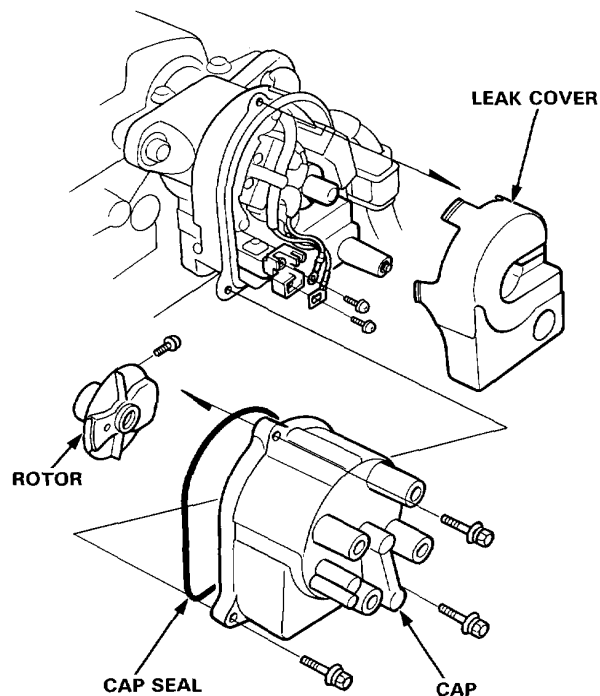
12,800 – 19,200 ohms



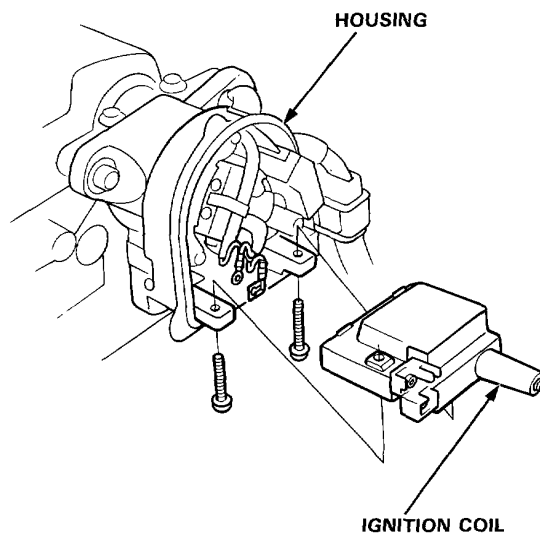


Ignition Coil Replacement

1. With ignition switch OFF, remove the distributor cap, rotor and cap seal, then remove the leak cover.
2. Remove the two screws to disconnect the BLK/YEL and WHT/BLU wires from the terminals A and B respectively.



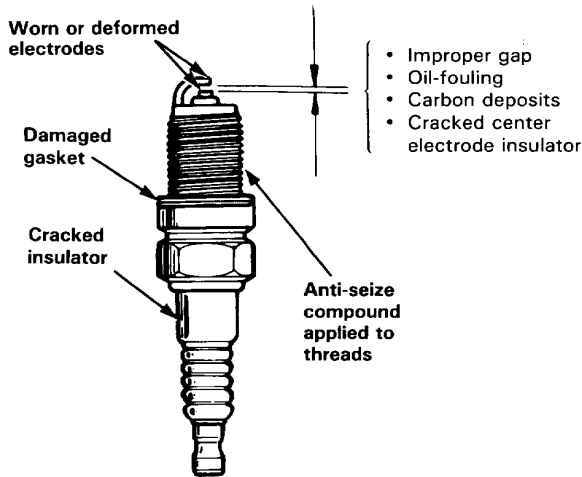
3. Remove the two screws and slide the ignition coil out of the distributor housing.



Ignition System

Spark Plug Inspection

1. Inspect the electrodes and ceramic insulator for:



Burned or worn electrodes may be caused by:

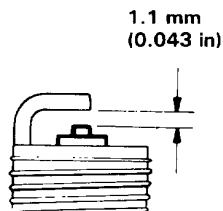
- Advanced ignition timing
- Loose spark plug
- Plug heat range too low
- Insufficient cooling

Fouled plug may be caused by:

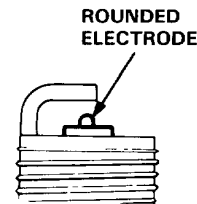
- Retarded ignition timing
- Oil in combustion chamber
- Incorrect spark plug gap
- Plug heat range too high
- Excessive idling/low speed running
- Clogged air cleaner element
- Deteriorated ignition coil or ignition wires

2. Adjust the gap with a suitable gapping tool.

Electrode Gap: 1.1 mm (0.043 in)



3. Replace the plug if the center electrode is rounded as shown below:



NOTE: Do not use spark plugs other than those listed below; these plugs are a new type (ISO standard).



These marks are sealed on the air cleaner cover.

Spark Plug: SOHC Engine

ZFR6F-11 (NGK) KJ20CR-L11 *(ND)	For all normal driving.
ZFR5F-11 (NGK) ZFR7F-11 (NGK) KJ16CR-L11 *(ND) KJ22CR-L11 *(ND)	Optional

DOHC Engine

ZFR6F-11 (NGK) KJ20CR-L11 *(ND)	For all normal driving.
ZFR7F-11 (NGK) KJ22CR-L11 *(ND)	For hot climates or continuous high speed driving.

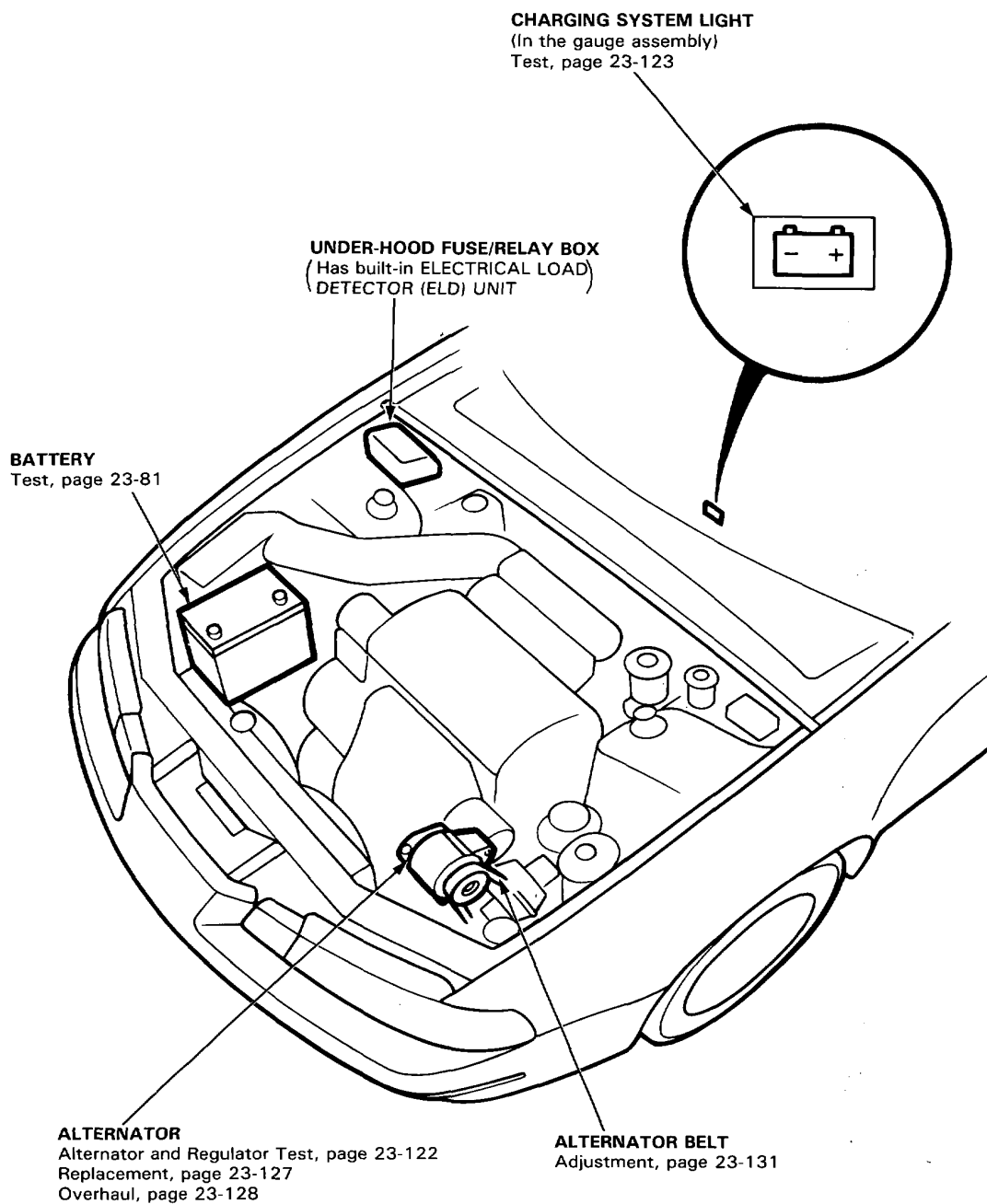
*ND: NIPPONDENSO

4. Screw the plugs into the cylinder head finger-tight, then torque them to 18 N·m (1.8 kg-m, 13 lb-ft).

NOTE: Apply a small quantity of anti-seize compound to the plug threads before installing the plugs.

Charging System

Component Location Index

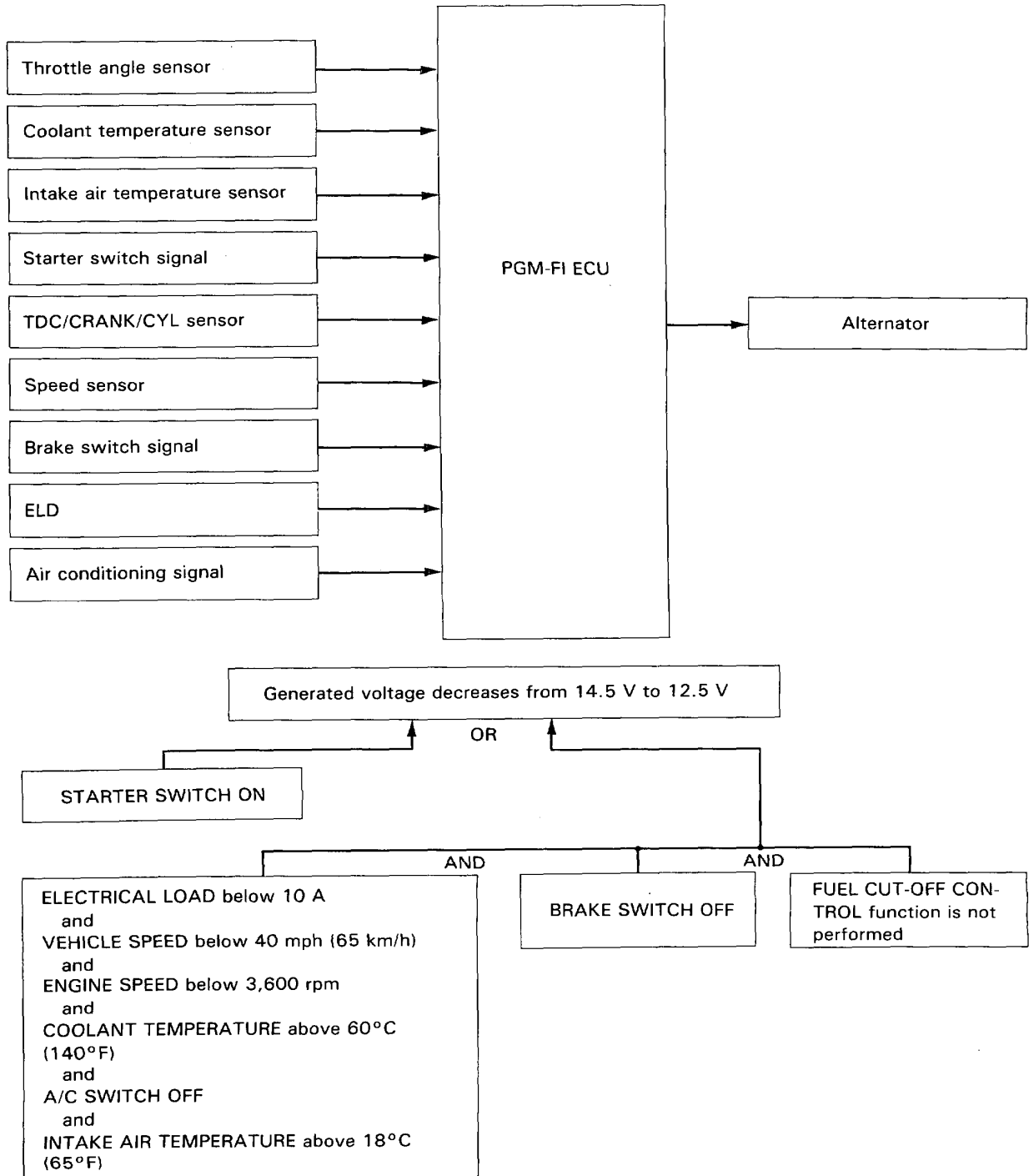


Charging System

Description

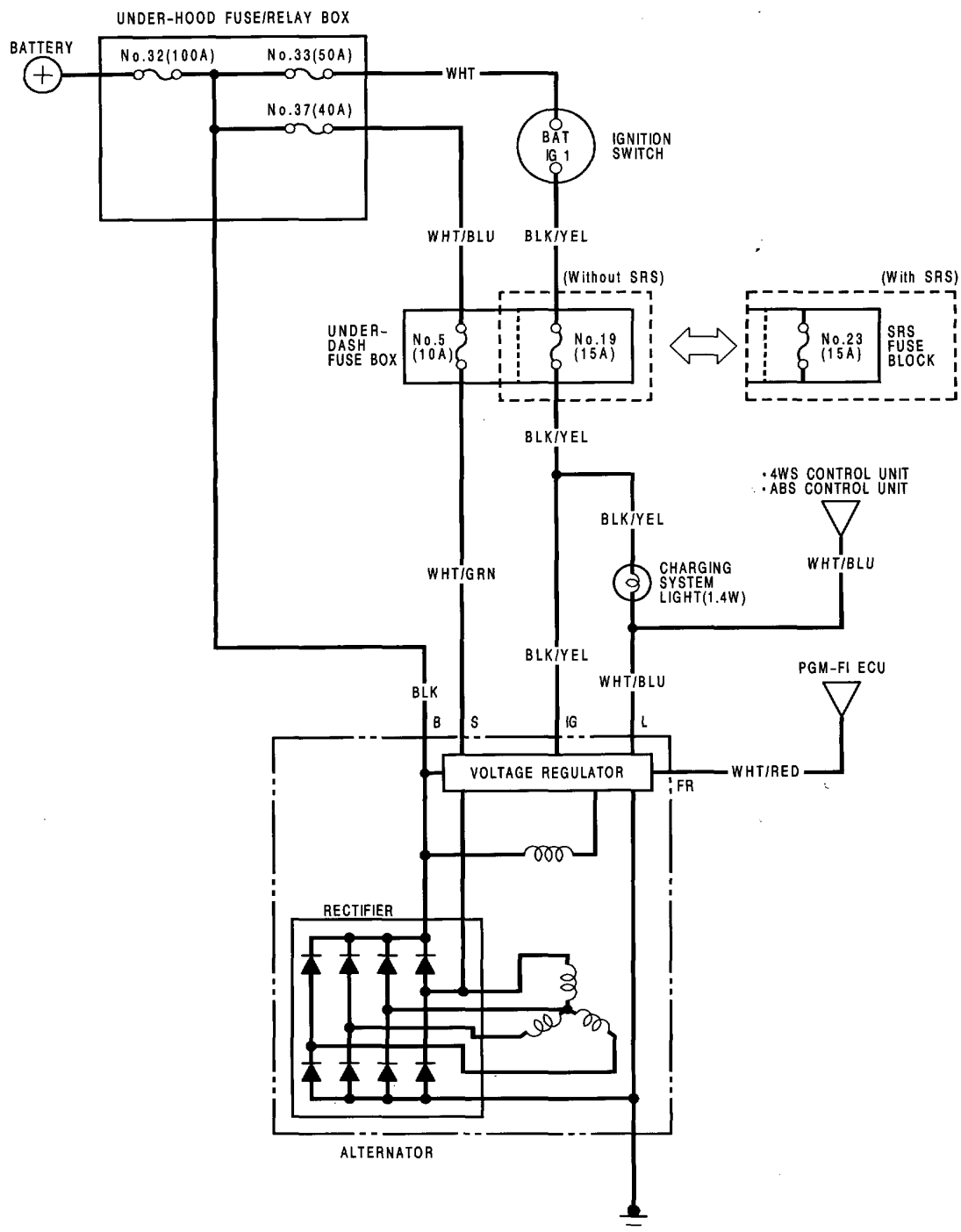
Alternator Control System (KQ model):

To improve fuel economy, the alternator control system within the PGM-FI ECU changes the voltage generated at the alternator in accordance with the driving conditions.

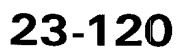




Circuit Diagram (Except KQ)



Circuit Diagram (KQ model)



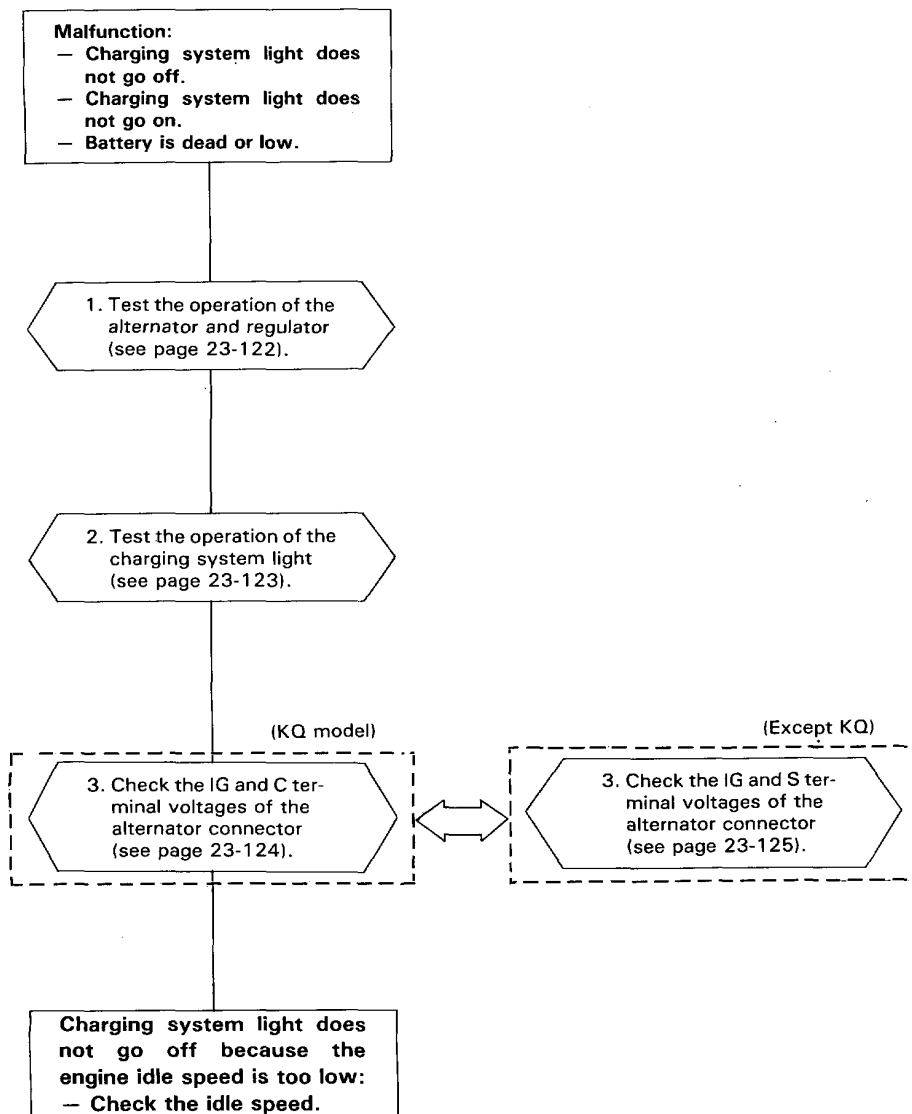


Charging System

Troubleshooting

NOTE:

- Before troubleshooting check:
 - Tightness of the alternator belt (see page 23-131).
 - That the self-diagnosis indicator light of the PGM-FI ECU does not blink. If it blinks (20 times), refer to section 11.
- Troubleshoot by performing following tests in the order listed below.



(cont'd)

Charging System

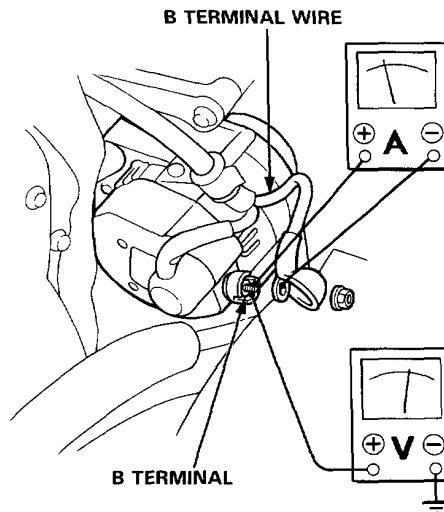
Troubleshooting (cont'd)

Alternator/Regulator Operation Test

CAUTION: Be careful during testing as the cooling fan comes on suddenly while the engine is running.

Be sure to use a good battery (see page 23-81). Disconnect the B terminal, then connect an ammeter, and a voltmeter as shown.

NOTE: Be sure to use an ammeter capable of measuring amperages higher than 120 A.



Start the engine, and let it idle until it reaches normal operating temperature (cooling fan comes on two times).

Raise the engine speed to 2000 rpm and hold it there. Turn the headlights (HI) on and check the voltage at the battery terminals.

CAUTION: As the headlights warm up considerably, do not cover them.

Is the voltage between 13.9 and 15.1 V?

NO

Test the alternator (see page 23-126).

YES

Turn the blower motor and the rear window defogger on, and check the battery voltage.

NOTE (4WS models): The wheels have to be turned straight ahead.

Is the battery voltage less than 13.5 V?

NO

Turn also the fog lights, brake lights, etc. on)

YES

Read the amperage.

Are there more than *A?

NO

Test the alternator (see page 23-126).

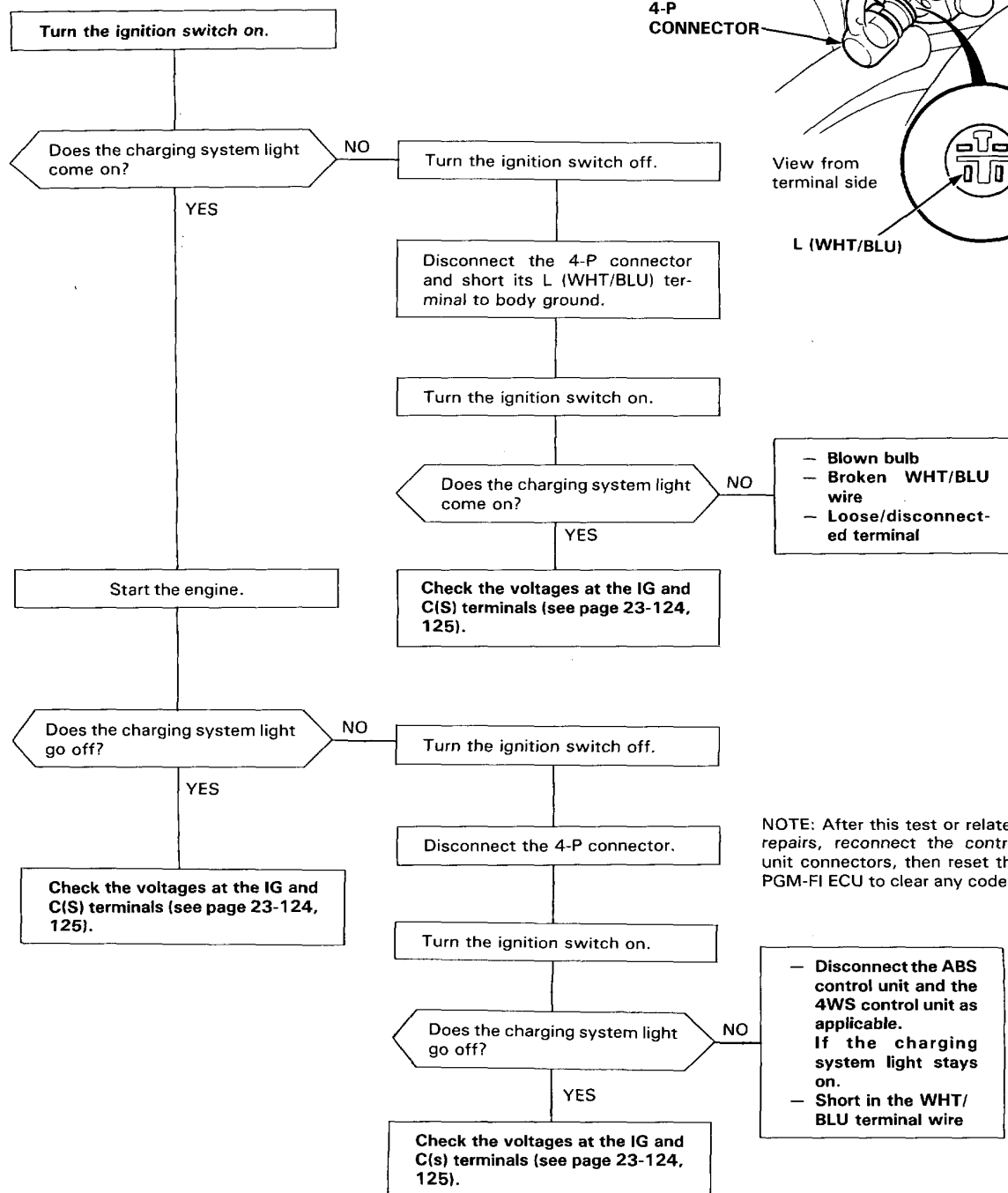
YES

Alternator/Regulator operation is OK. Test the charging system light operation (see page 23-123).

*A: 2.0 l 65 A
2.2 l 65 A
2.3 l 70 A (KQ model)
2.3 l 70 A (Except KQ)



Charging System Light Test:



(cont'd)

Charging System

Troubleshooting (cont'd)

Voltage Checks at IG and C Terminals (KQ model):

Turn the ignition switch off.

Are the B terminal, the 4-P connector and under-hood fuse/relay box terminals securely tightened?

NO

Tighten or reconnect the terminals securely.

YES

Disconnect the 4-P connector and turn the ignition switch on.

Measure the voltage between body ground and the IG terminal of the 4-P connector.

Is there battery voltage?

NO

- Without SRS: Blown No. 19 (15 A) fuse
- With SRS: Blown No. 23 (15 A) fuse
- An open in the BLK/YEL wire

YES

Start the engine and turn the headlights (HI) on. Measure the voltage between the C terminal of the 4-P connector and the positive terminal of the battery.

Is voltage 1 V or less?

NO

Stop the engine and connect the ECU test harness (see section 11).

YES

Check the battery (see page 23-81).

Check for continuity between the C terminal of the 4-P connector and the A16 terminal of the test harness.

Is there continuity?

NO

An open in the WHT/GRN wire

YES

Check for continuity between the C terminal and body ground, and between the A16 terminal and body ground.

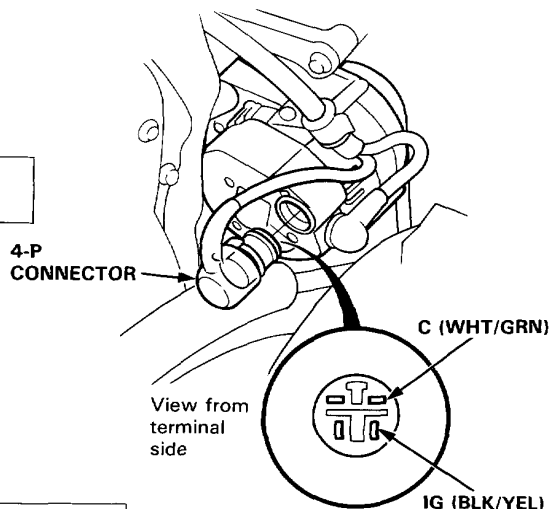
Is there continuity?

NO

Faulty PGM-FI ECU

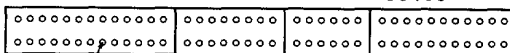
YES

Short in the WHT/GRN wire



CAUTION: Be sure to use a voltmeter with its plus terminal connected to battery plus and its minus terminal to the C terminal of the 4-P connector.

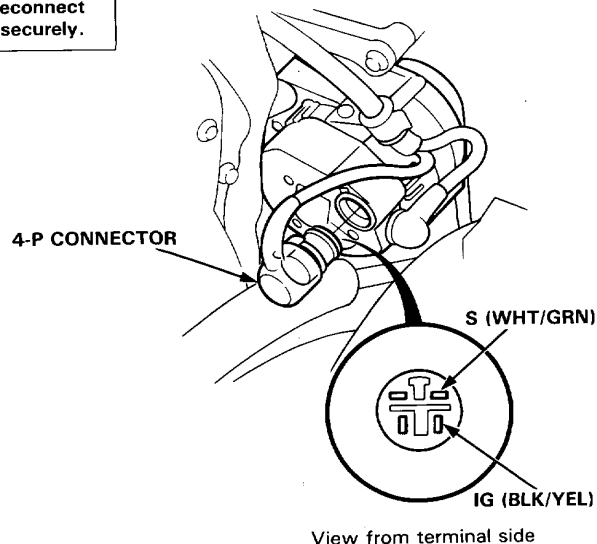
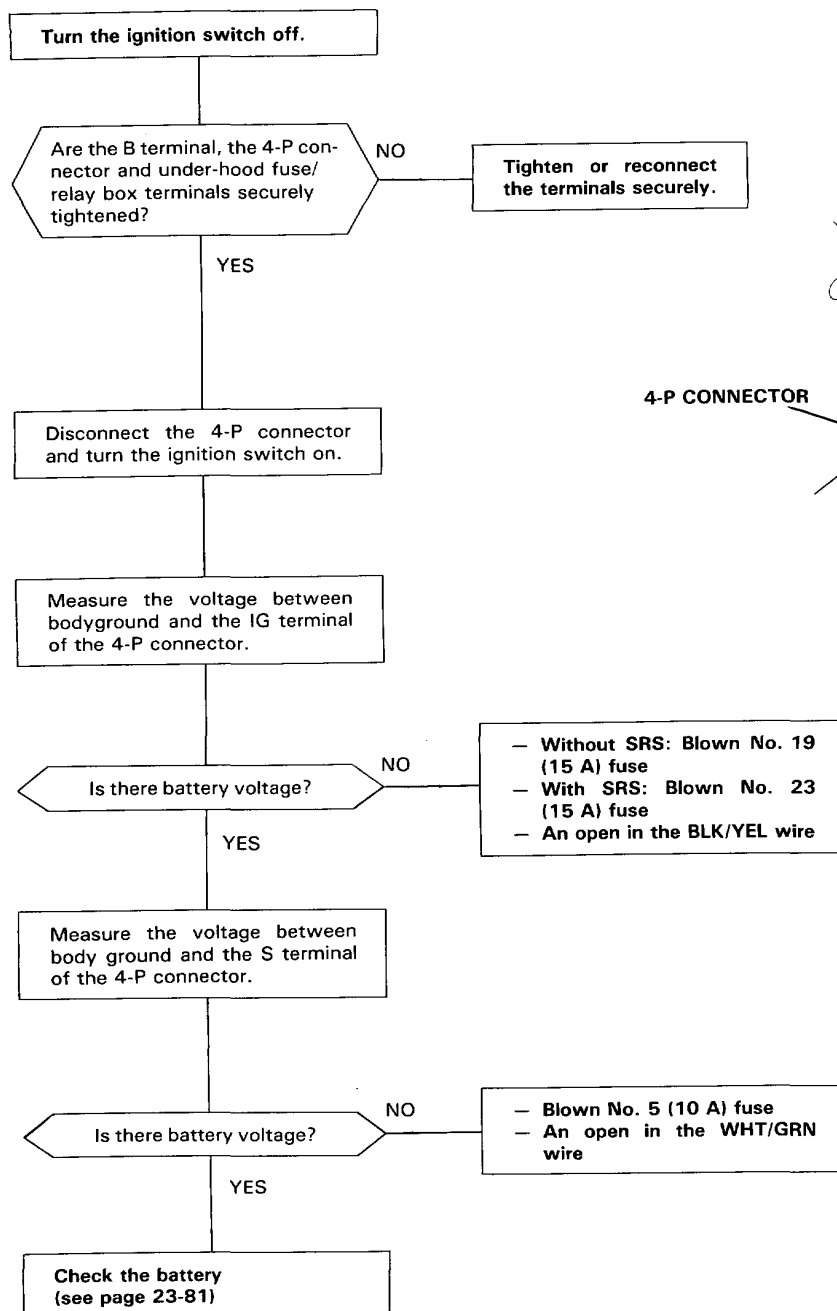
ECU TEST HARNESS 07LAJ-PT30100



CAUTION: The ECU test harness must not touch the PGM-FI ECU.



Voltage Checks at IG and S Terminals (Except KQ):



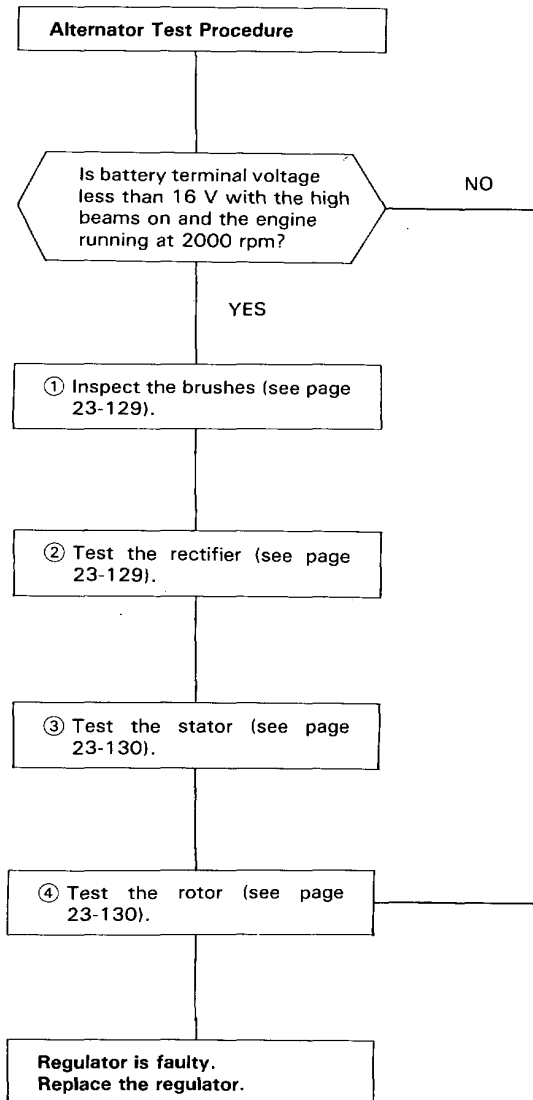
(cont'd)

Charging System

Troubleshooting (cont'd)

Alternator Test:

NOTE: Because an overall check is necessary to avoid misleading conclusions, test the alternator in the order described below.



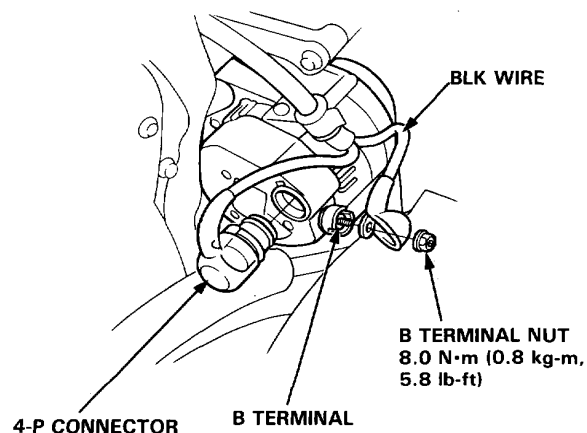


Alternator Replacement

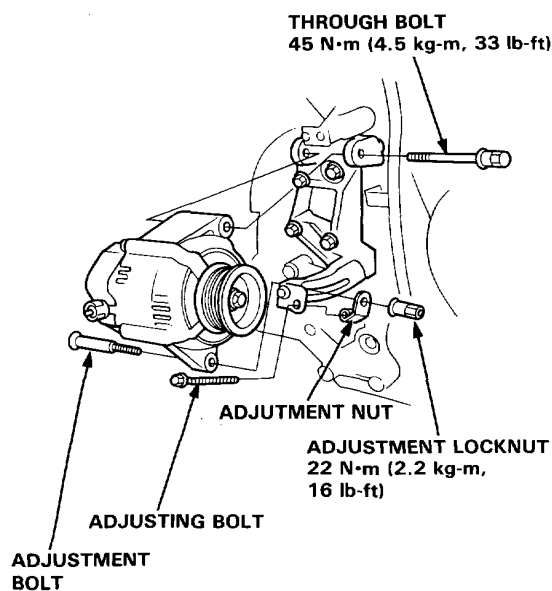
1. Disconnect both the negative cable and positive cable from the battery.
2. Remove the power steering pump (see section 17) and the cruise control actuator (see page 23-281).

NOTE: Do not disconnect the actuator cable.

3. Disconnect the 4-P connector from the alternator.
4. Remove the terminal nut and the BLK wire from the B terminal.



5. Loosen the through bolt, then loosen the adjustment locknut and then the adjusting bolt.
6. Remove the belt from the alternator.
7. Remove the adjustment bolt and nut.
8. Remove the through bolt, then remove the alternator.



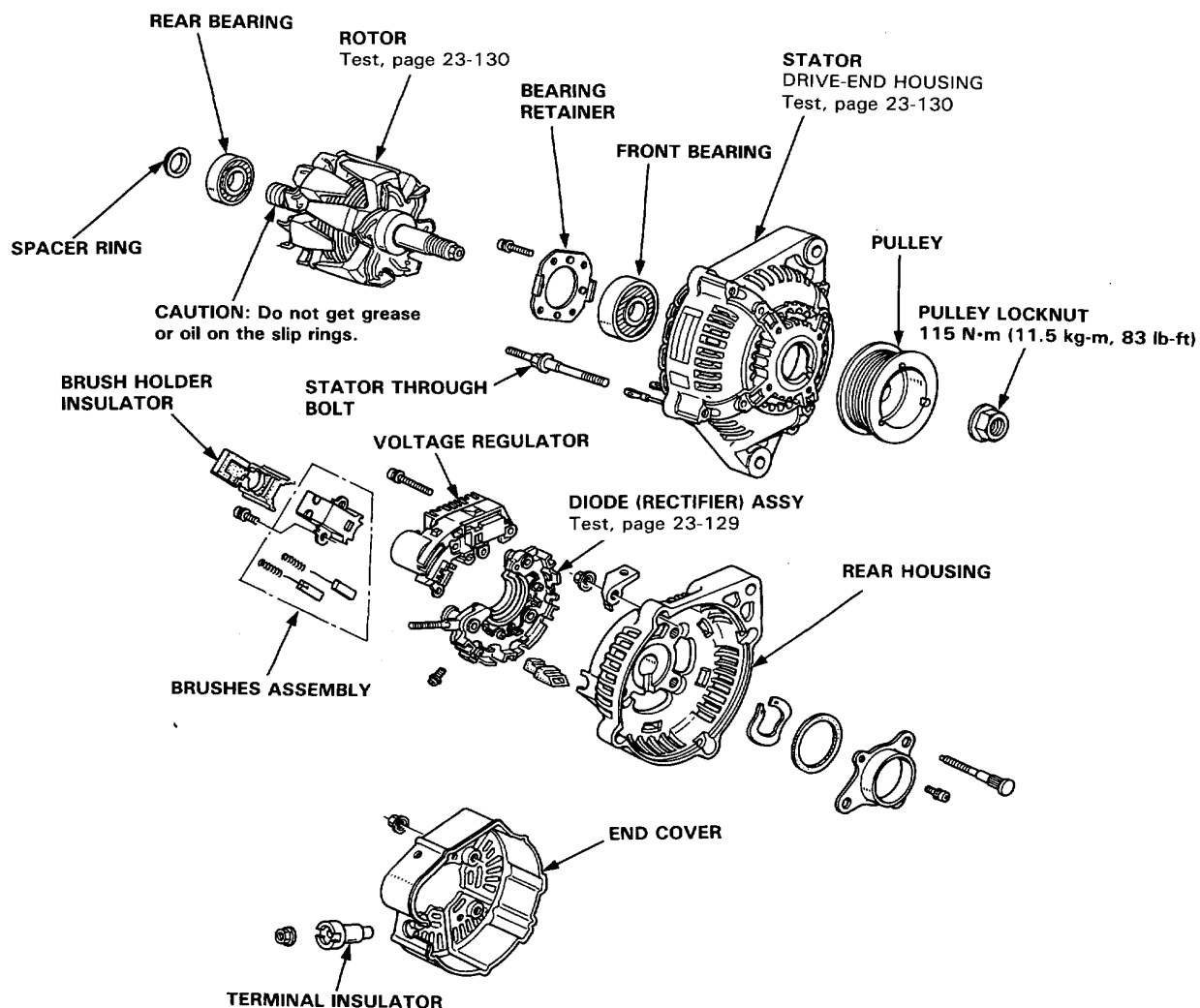
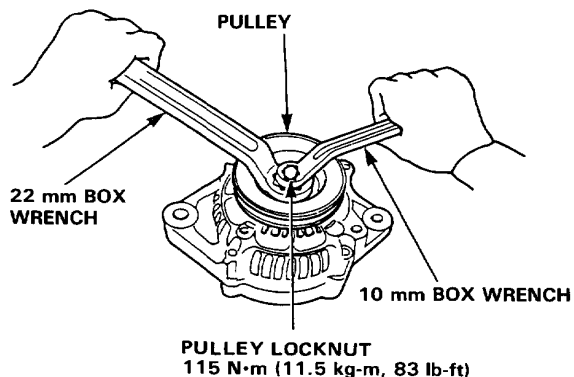
9. Adjust the alternator belt tension after installation (see page 23-131).

Charging System

Alternator Overhaul

NOTE: It is only necessary to separate the pulley, drive end housing and rotor when the front bearing needs replacement.

Loosen the locknut with 10 mm and 22 mm wrenches to remove the pulley from the rotor. If necessary, use an impact wrench.

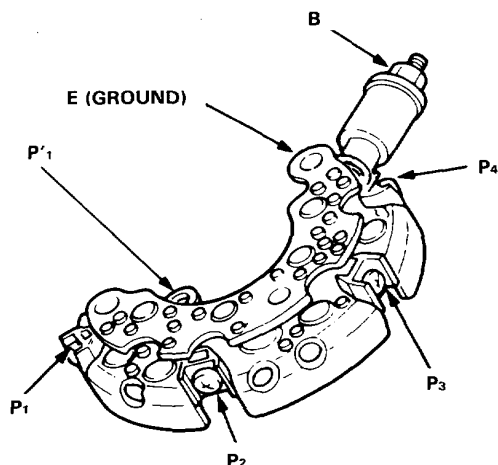




Rectifier Test

NOTE: The diodes are designed to allow current to pass in one direction while blocking it in the opposite direction. Since the alternator rectifier is made up of eight diodes (4 pairs), each diode must be tested for continuity in both direction with an ohmmeter that has diode checking capability; a total of 16 checks.

1. Check for continuity in each direction, between the B and P, and between the E (ground) and P terminals of each diode pair. All diodes should have continuity in only one direction.



2. If any of the 8 diodes fails, replace the rectifier assembly. (Diodes are not available separately).

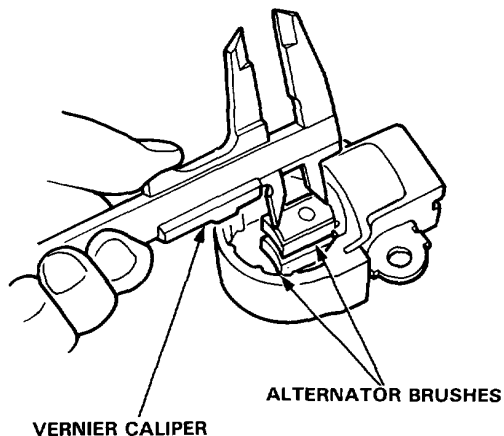
Alternator Brush Inspection

1. Remove the end cover, then take out the brush holder by removing its 2 screws.
2. Measure the length of the brushes with a vernier caliper.

Alternator Brush Length:

Standard: 10.5 mm (0.41 in)

Service Limit: 1.5 mm (0.06 in)

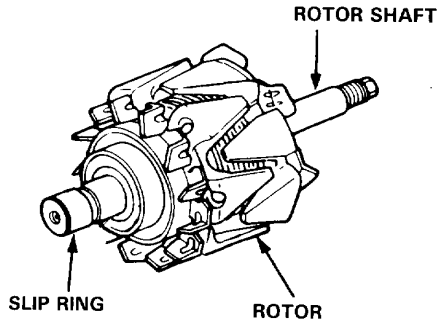


If the brushes are not within the service limit, replace the assembly.

Charging System

Rotor Slip Ring Test

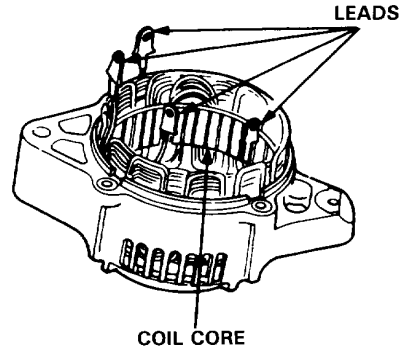
1. Check that there is continuity between the slip rings.



2. Check that there is no continuity between the slip rings and the rotor or rotor shaft.
3. If the rotor fails either continuity check, replace the alternator.

Stator Test

1. Check that there is continuity between each pair of leads.



2. Check that there is no continuity between each lead and the coil core.
3. If the coil fails either continuity check, replace the alternator.



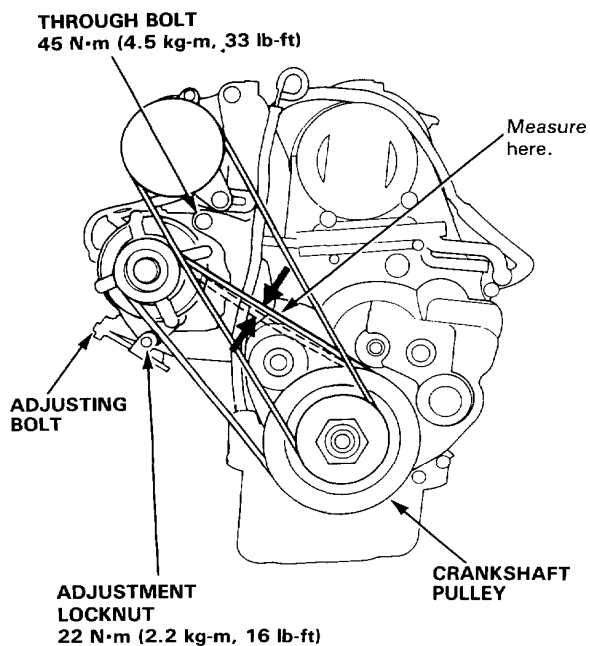
Alternator Belt Adjustment (Without A/C)

Deflection Method:

1. Apply a force of 98 N (10 kg, 22 lb) and measure the deflection between the alternator and crankshaft pulley.

Deflection: 10–12 mm (0.39–0.47 in)

NOTE: On a brand-new belt (one that has been run for less than five minutes), the deflection should be 8.5–11 mm (0.33–0.43 in) when first measured.



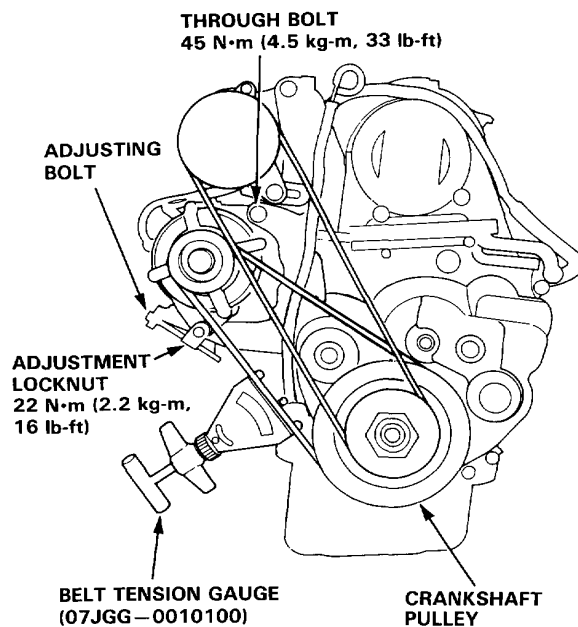
2. Loosen the through bolt and adjustment locknut.
3. Turn the adjusting belt to obtain the proper belt tension, then retighten the nut and through bolt.
4. Recheck the belt deflection.

Tension Gauge Method:

1. Attach the belt tension gauge to the belt and measure the tension.

Tension: 294–441 N (30–45 kg, 66–99 lb)

NOTE: On a brand-new belt (one that has been run for less than five minutes), the tension should be 490–686 N (50–70 kg, 110–154 lb) when first measured.



2. Loosen the through bolt and adjustment locknut.
3. Turn the adjusting bolt to obtain the proper belt tension, then retighten the nut and through bolt.
4. Recheck the tension of the belt.

Charging System

Alternator Belt Adjustment (With A/C)

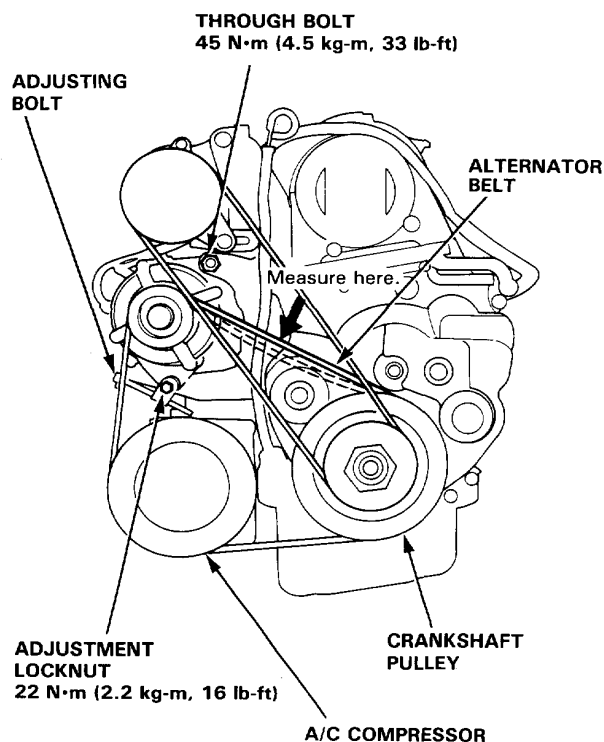
Deflection Method:

1. Apply a force of 98 N (10 kg, 22 lb) and measure the deflection between the alternator and crankshaft pulley.

Deflection: 10–12 mm (0.39–0.47 in)

NOTE:

- On a brand-new belt, the deflection should be 4.5–7 mm (0.18–0.28 in) when first measured.
- If there are cracks or any damage evident on the belt, replace it with a new one.



2. Loosen the through bolt and adjustment locknut.
3. Turn the adjusting bolt to obtain the proper belt tension, then retighten the nut and through bolt.
4. Recheck the belt deflection.

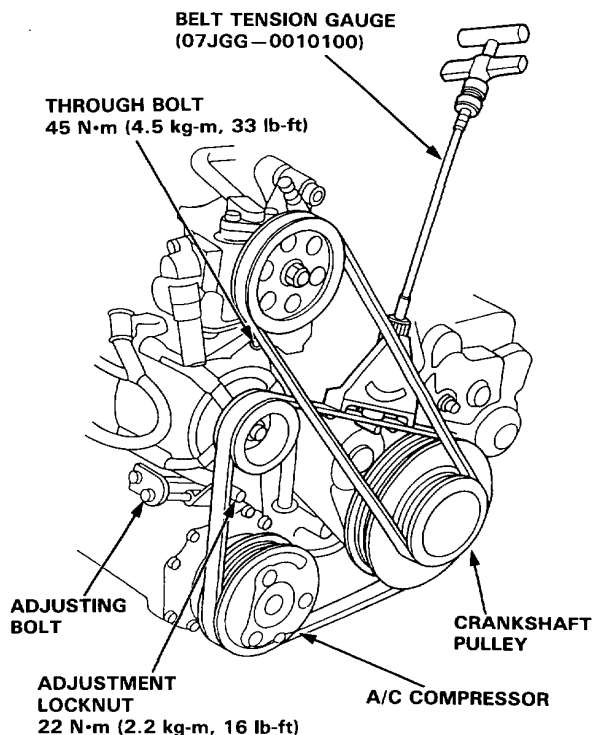
Tension Gauge Method:

1. Attach the belt tension gauge to the belt and measure the tension of the belt.

Tension: 450–600 N (45–60 kg, 99–132 lb)

NOTE:

- On a brand-new belt, the tension should be 950–1150 N (95–115 kg, 209–253 lb) when first measured.
- See the instruction for the belt tension gauge.
- Follow the manufacturer's instructions for the belt tension gauge.
- Move the gauge main body from between the P/S belts (under the P/S pump) to the alternator belt, and attach it there at the measuring point. Then connect the gauge handle to its main body.
- If there are cracks or any damage evident on the belt, replace it with a new one.

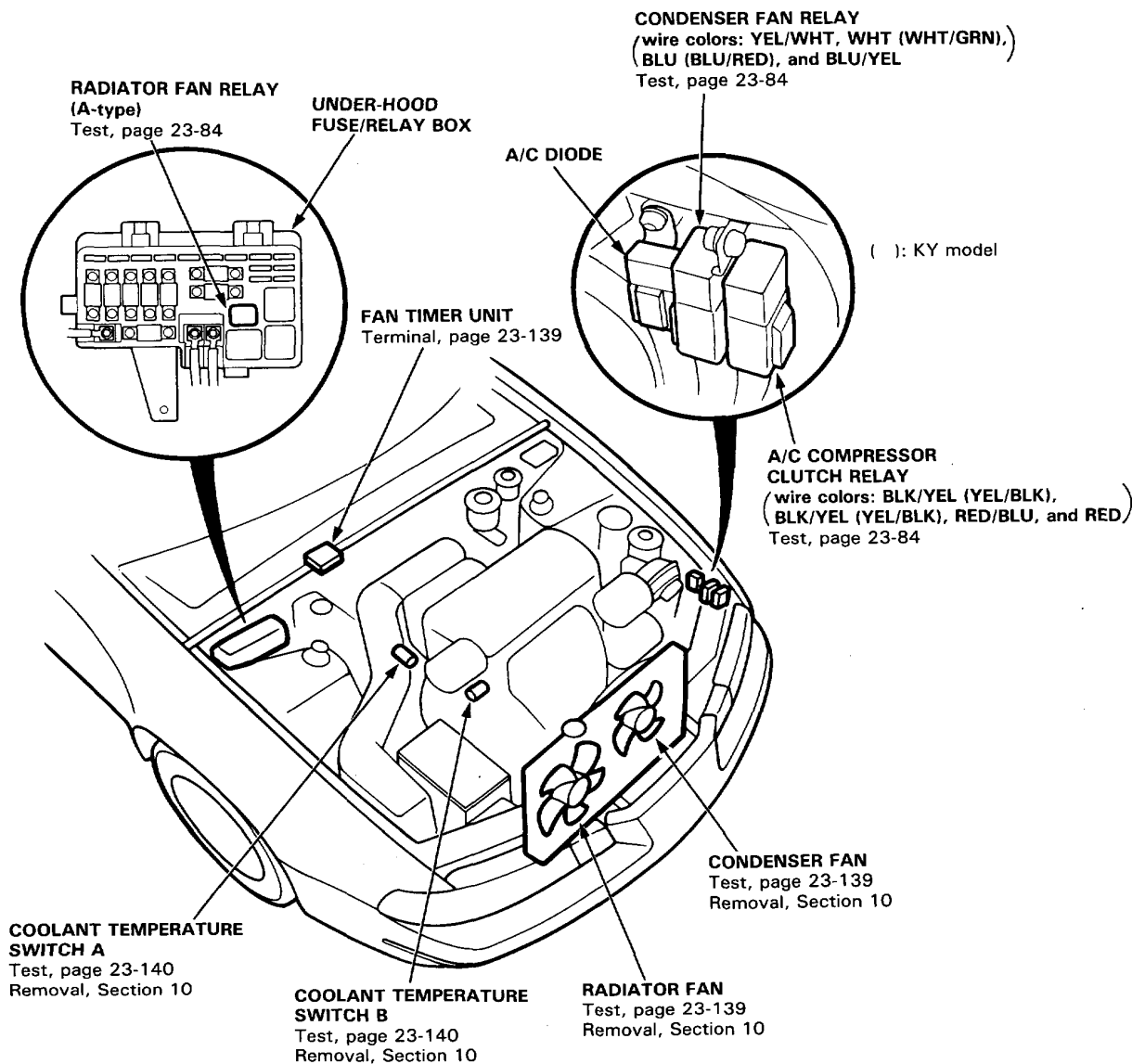


2. Loosen the through bolt and adjustment locknut.
3. Turn the adjusting bolt to obtain the proper belt tension, then retighten the nut and through bolt.
4. Recheck the tension of the belt.



Radiator and Condenser Fan Controls

Component Location Index



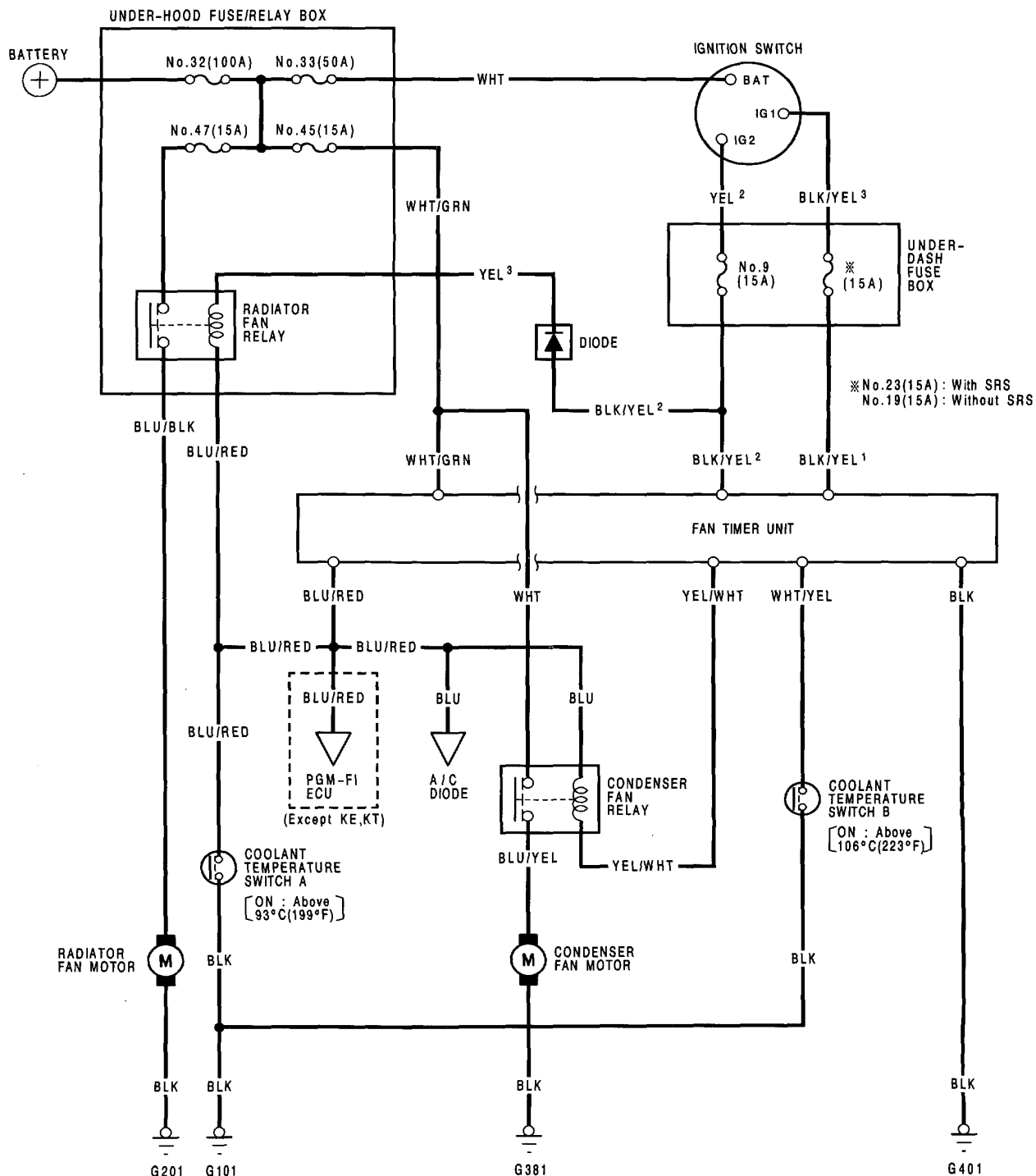
Fan Timer System Operation:

When the coolant temperature is above approximately 106°C (223°F) after the engine has stopped, the radiator fan will run for about 15 minutes. Coolant temperature switch A is in the thermostat housing.

Coolant temperature switch B is located behind the water outlet housing. The fan timer unit is located on the right front of floor, below carpet.

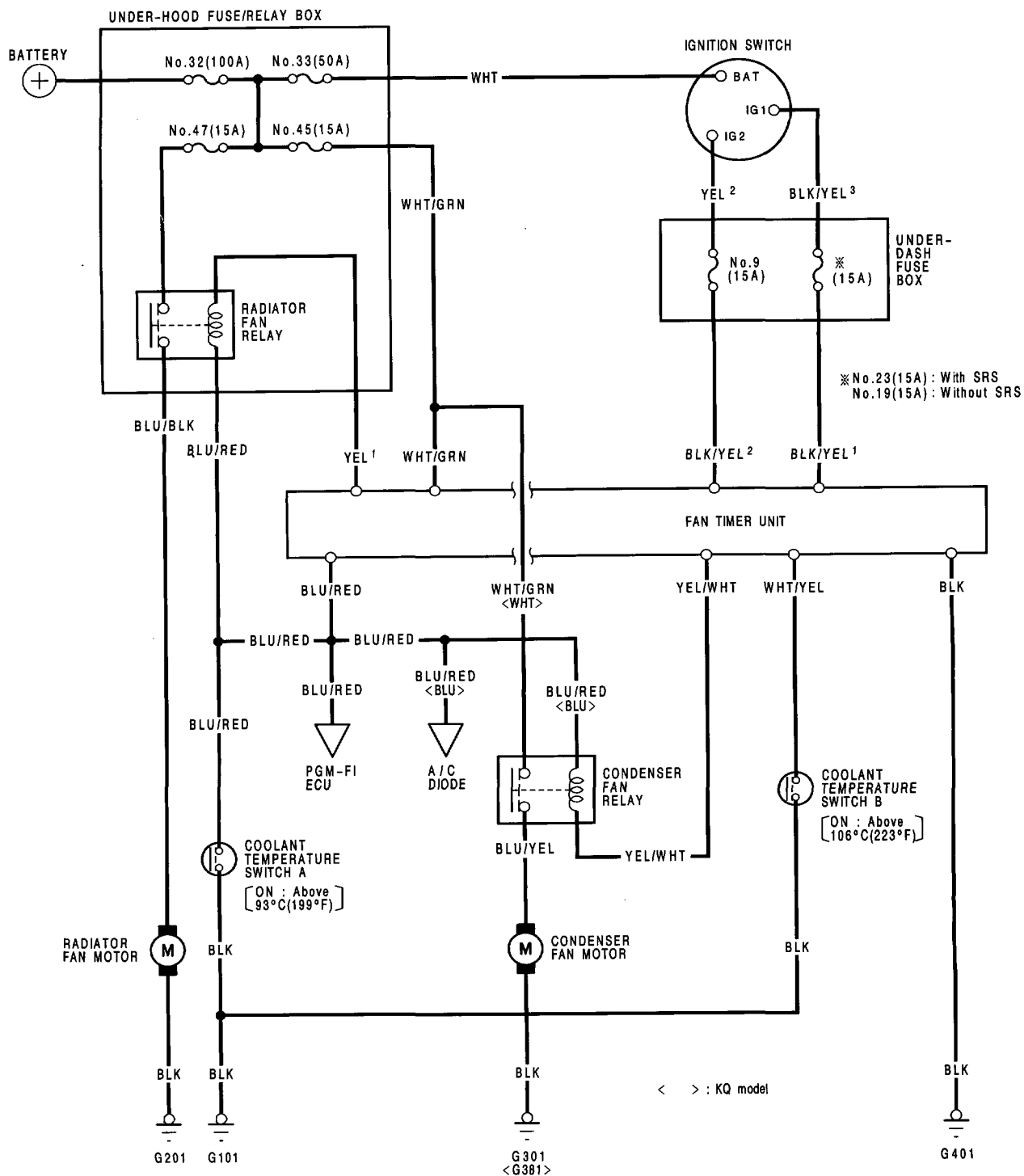
Radiator and Condenser Fan Controls

Circuit Diagram (With A/C: Except KQ, KT, KY)



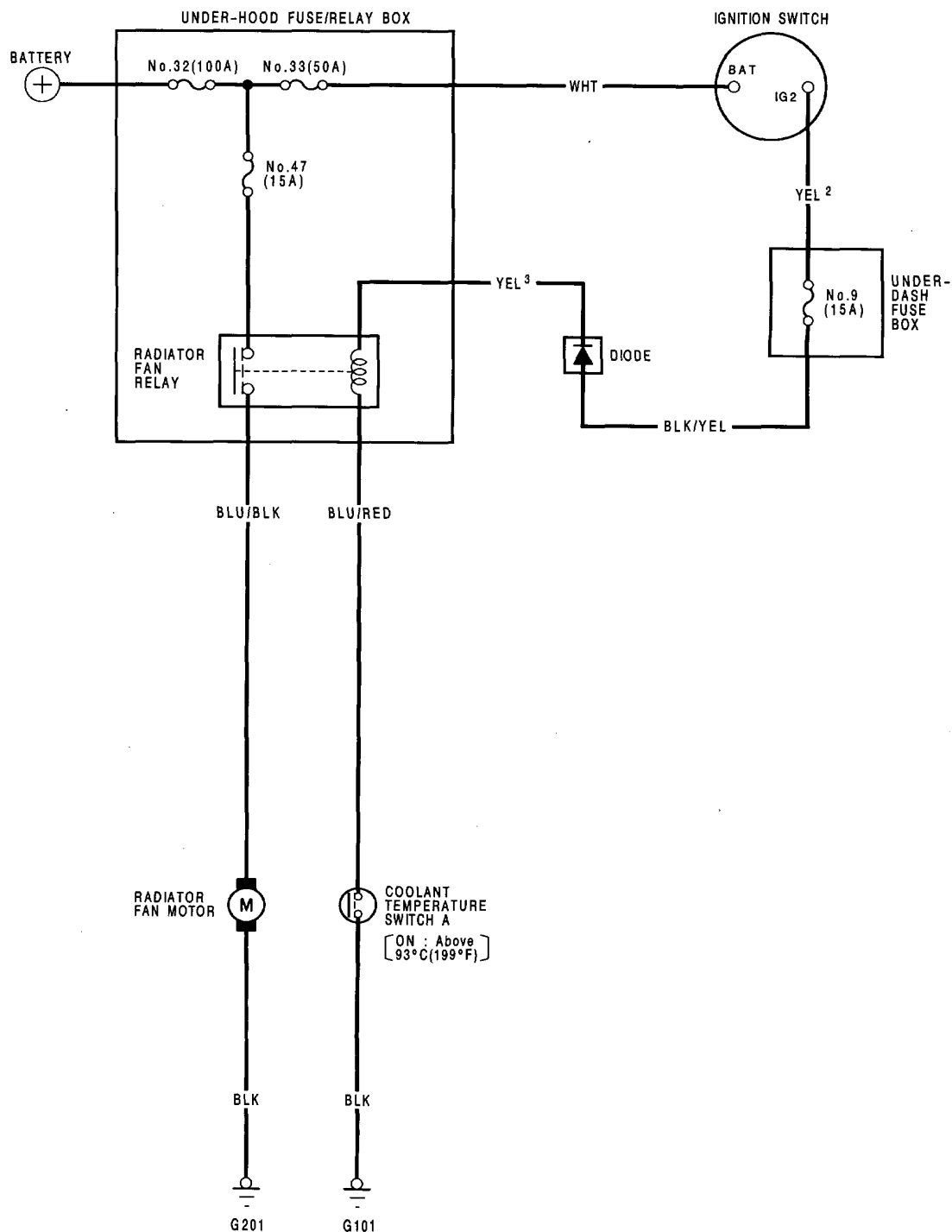


Circuit Diagram (With A/C: KQ, KT, and KY model)



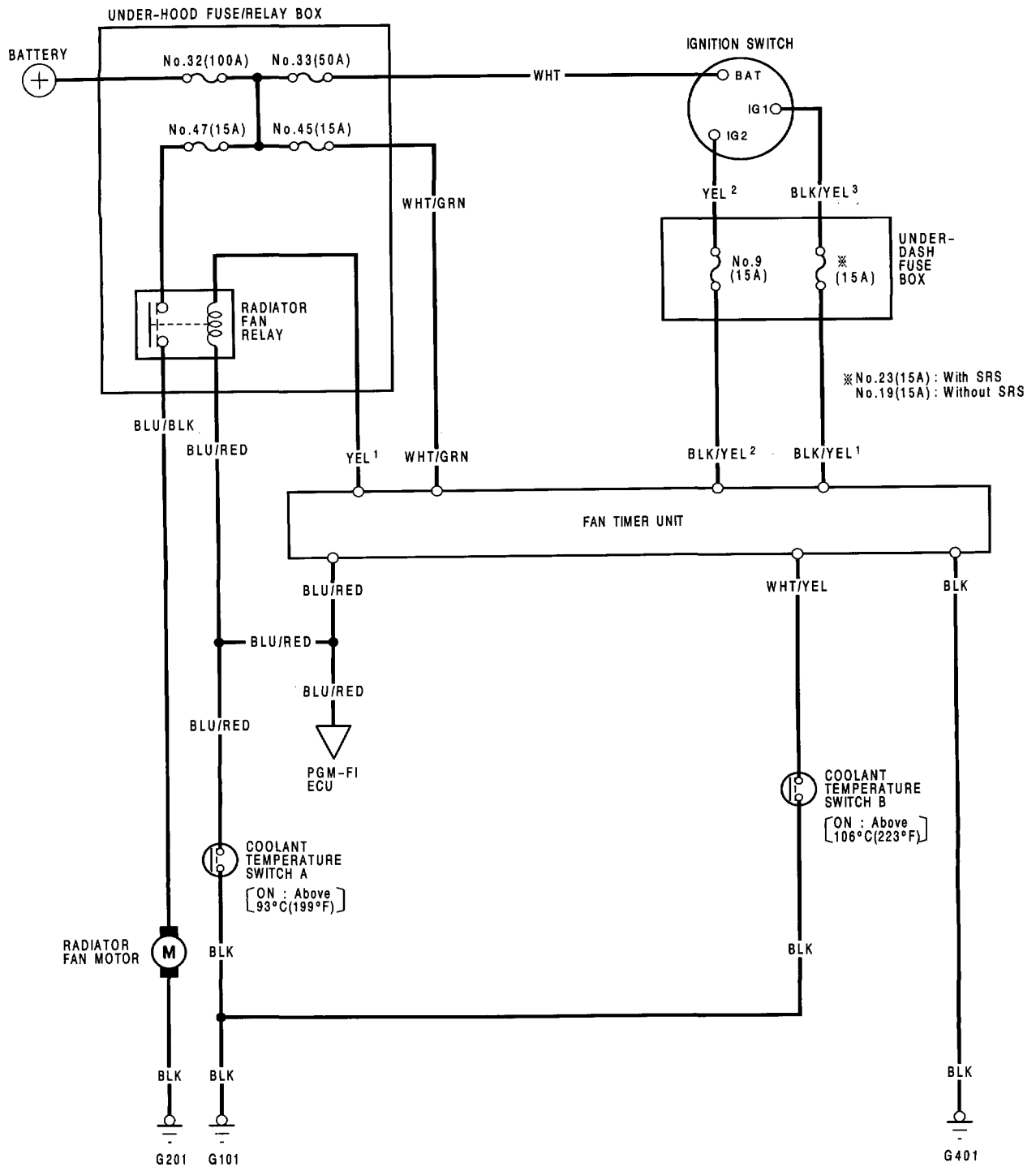
Radiator and Condenser Fan Controls

Circuit Diagram (Without A/C: Except KQ)





Circuit Diagram (Without A/C: KQ model)



Radiator and Condenser Fan Controls

Troubleshooting

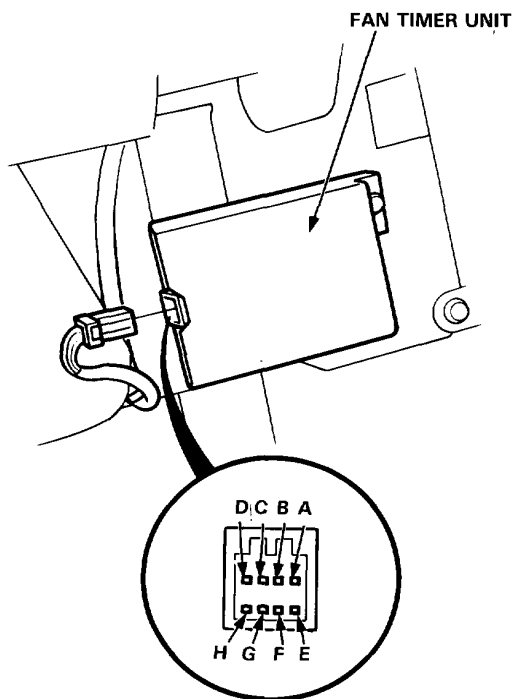
NOTE: The numbers in the table show the troubleshooting sequence.

Symptom		Item to be inspected										Open circuit, loose or disconnected terminals
		Blown No. 47 (15 A) (In the under-hood fuse/relay box)	Blown No. 45 (15 A) fuse (In the under-hood fuse/relay box)	Blown No. 23 (15 A) fuse: with SRS Blown No. 19 (15 A) fuse: without SRS (In the under-dash fuse box)	Blown No. 9 (15 A) fuse (In the under-dash fuse box)	Radiator fan or condenser fan relay	Radiator fan or condenser fan motor	Coolant temperature switch A	Coolant temperature switch B	Faulty fan timer unit	A/C system	
Only one fan operates (with engine and A/C ON).		1			(1)	2	3				G201 G301 (G381)	WHT/GRN (WHT), BLU/BLK, BLU/YEL, YEL ¹ (YEL ³), YEL/WHT or BLU/RED (BLU)
Fans do not operate.	Under all conditions.				1			2	3	4	G101 G401 G402	BLK/YEL ² , BLU/RED or WHT/YEL
	A/C ON									1		
Fan timer unit fails to function properly.			1	2					3	4	G101 G401 G402	WHT/GRN, BLK/YEL ¹ , WHT/YEL or YEL ¹

(¹): With optional A/C



Timer Unit Terminals



NOTE: See A/C Section 22 for the input test.

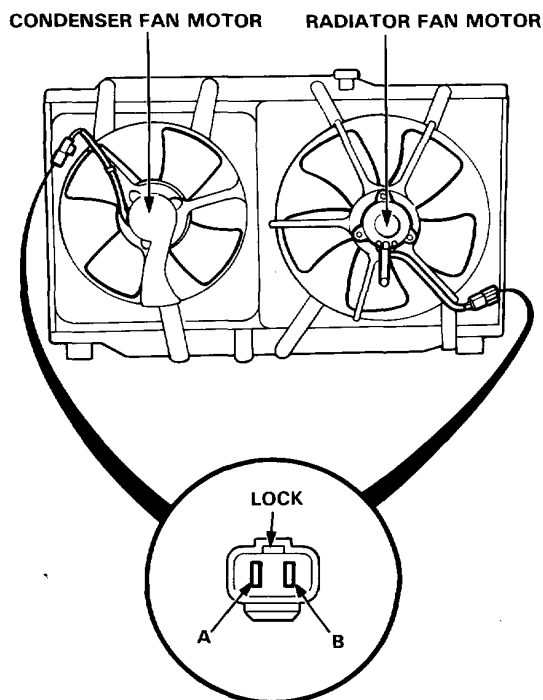
Terminal	Wire	Destination
A	BLK	Ground (G401, G402)
B	*YEL/WHT	Condenser fan relay (Coil ⊕)
C	BLK/YEL	Power supply (For radiator fan and condenser fan relays by way of timer unit with ignition switch ON)
D	*YEL	Radiator fan relay (Coil ⊕)
	*1 YEL/WHT	Condenser fan relay (Coil ⊕)
E	BLU/RED	Radiator fan and condenser fan relays (Coil ⊖)
F	BLK/YEL	IG1 (Timer reset signal)
G	WHT/GRN	Power supply (For fan timer unit with ignition switch OFF)
H	WHT/YEL	Coolant temperature switch B

*: KQ and KY model

*1: Except KQ, KY

Fan Motor Test

1. Disconnect the 2-P connector from each fan motor.



View from terminal side

2. Test motor operation by connecting battery power to the A terminal, and ground to the B terminal.
3. If the motor fails to run or does not run smoothly, replace it.

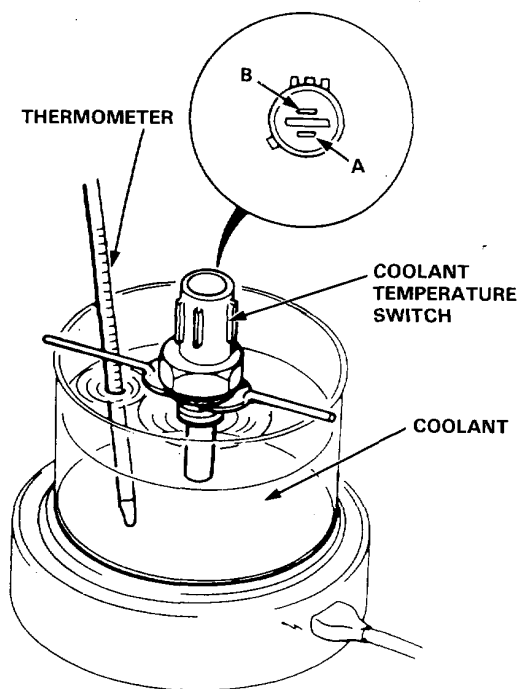
Radiator and Condenser Fan Controls

Coolant Temperature Switch Test

NOTE: Bleed air from the cooling system after installing the coolant temperature switch (see section 10).

1. Remove coolant temperature switch A from the thermostat housing, or switch B from the water outlet housing.
2. Suspend each switch in a container of coolant as shown.

NOTE: The illustration shows coolant temperature switch A.



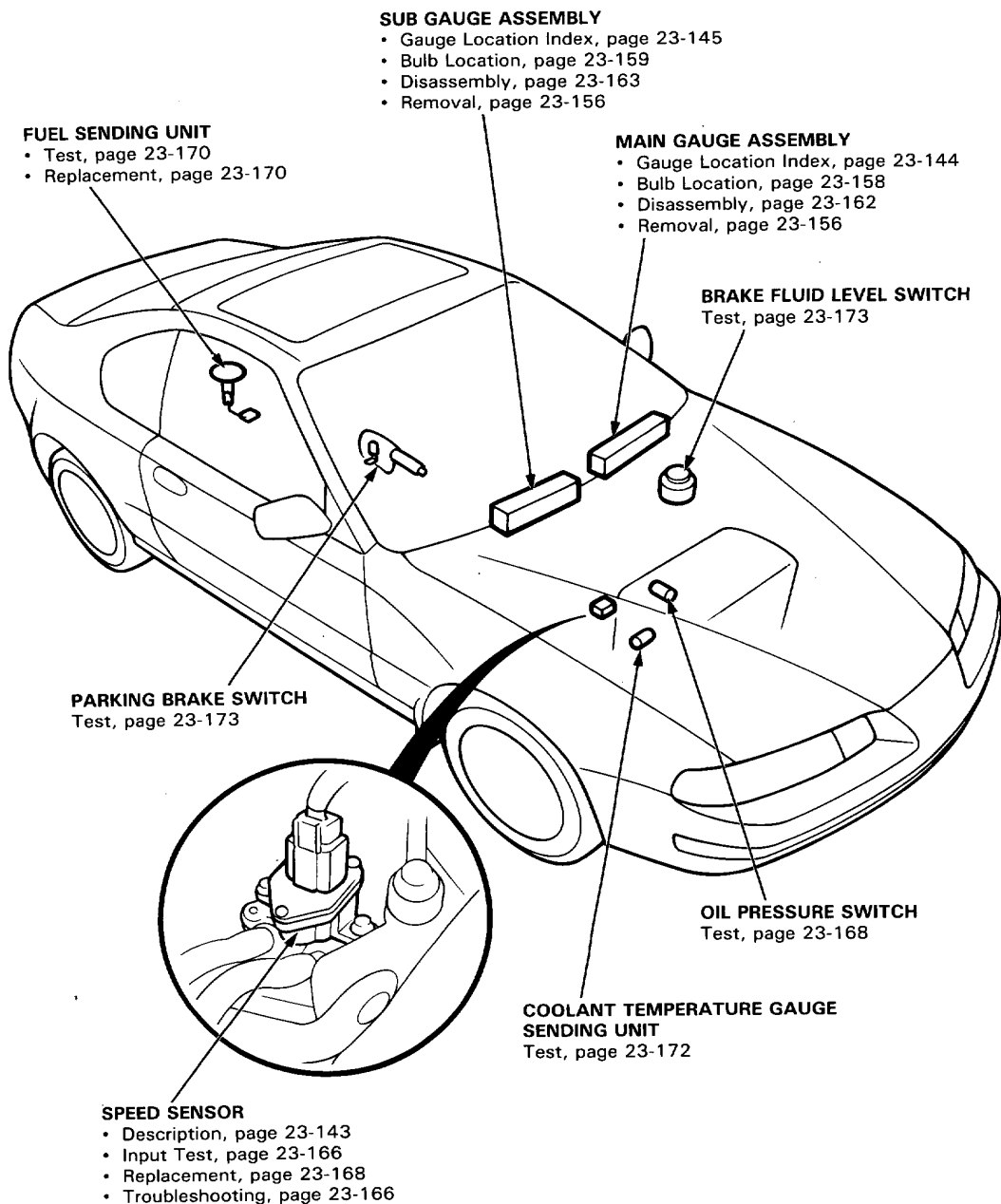
3. Heat the coolant and check coolant temperature with a thermometer.
4. Check each switch for continuity between the A and B terminals according to the table.

		Terminal	
		A	B
SWITCH A	ON	90°–96°C (194°–199°F)	
	OFF	2°–7°C (35.6°–44.6°F) lower than the temperature when it goes on.	
SWITCH B	ON	103°–109°C (217°–228°F)	
	OFF	4°–9°C (39.2°–44.2°F) lower than the temperature when it goes on.	



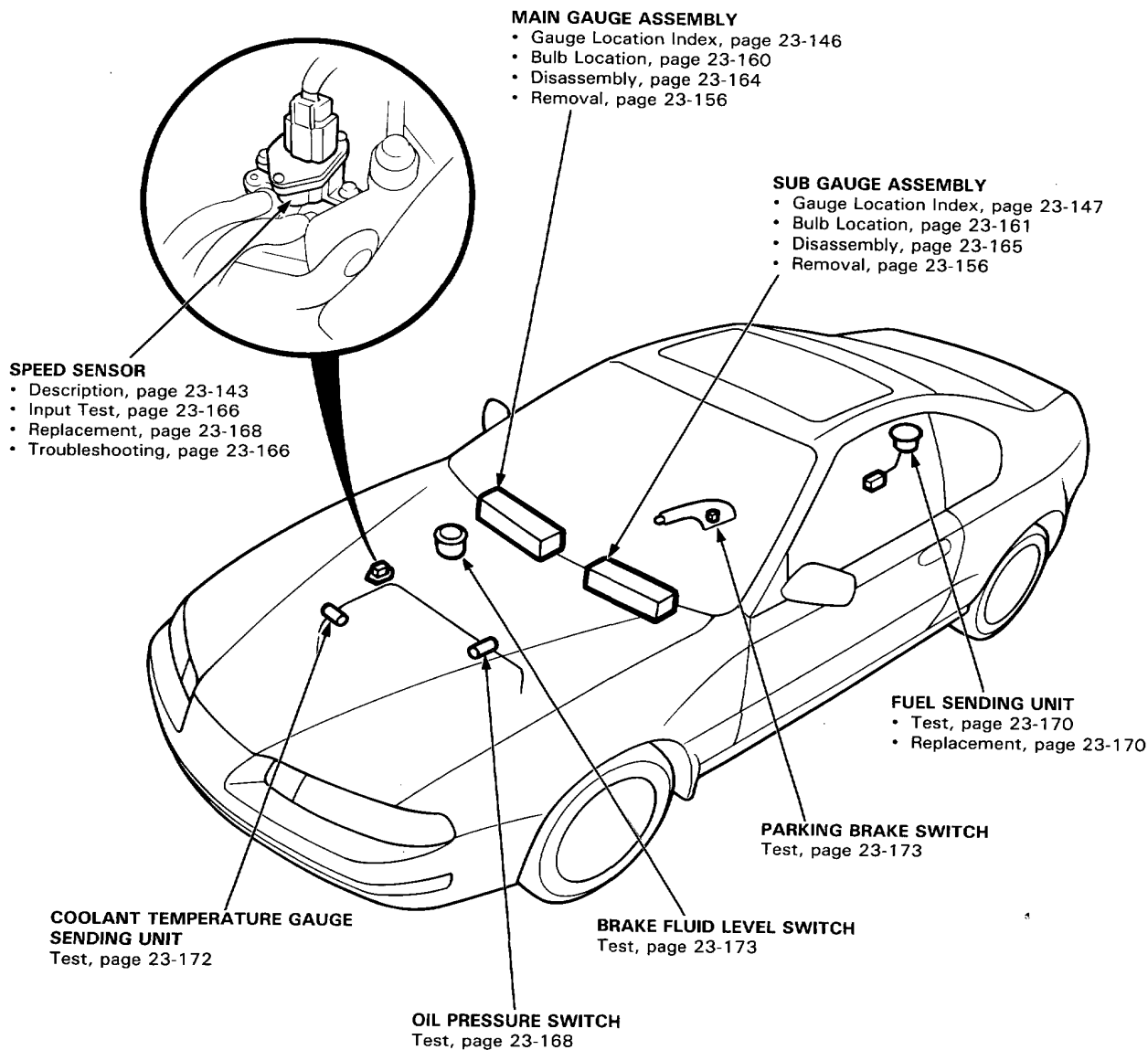
Gauge Assembly

Component Location Index (LHD)



Gauge Assembly

Component Location Index (RHD)

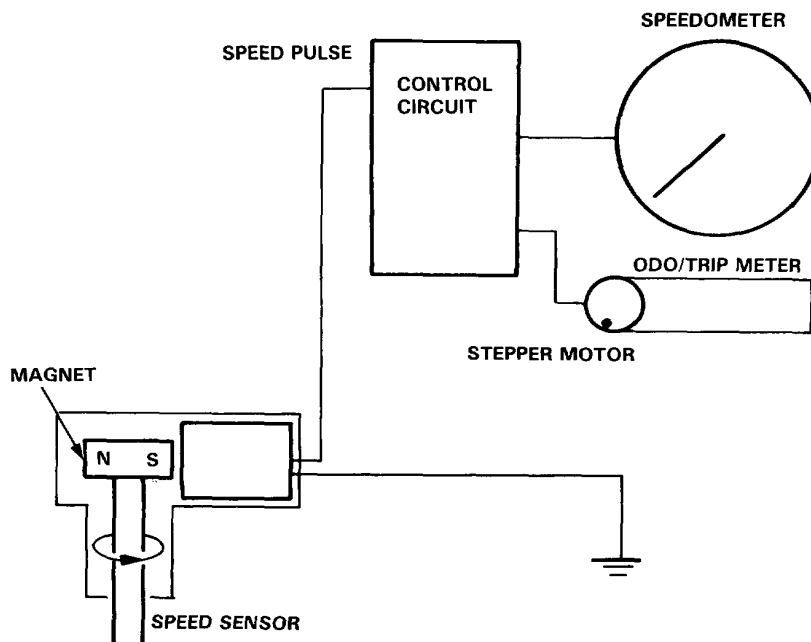




Description

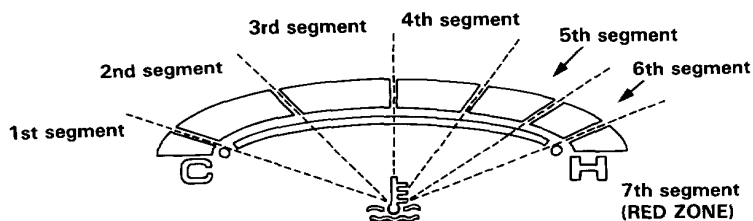
Cableless Speedometer:

This consists of a newly developed electrical speed sensor, a control circuit, and bobbin type movements to eliminate the engine noise transmitted by a cable, and the speed needle vibration caused by cable failure. This design is ideal for the limited space available.



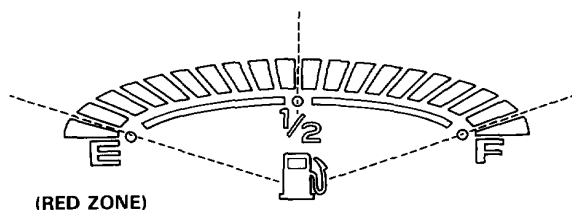
Coolant Temperature Gauge:

The gauge is divided into 7 segments which light up in response to signals from the coolant temperature gauge unit.



Fuel Gauge:

The gauge is divided into 20 segments which light up in response to signals from the fuel gauge unit.

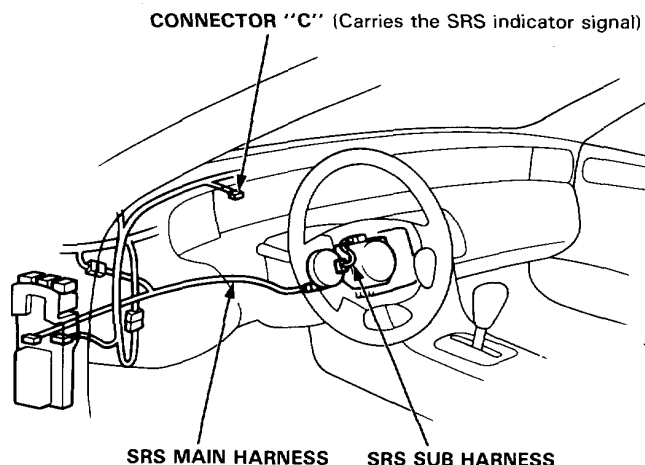


Gauge Assembly

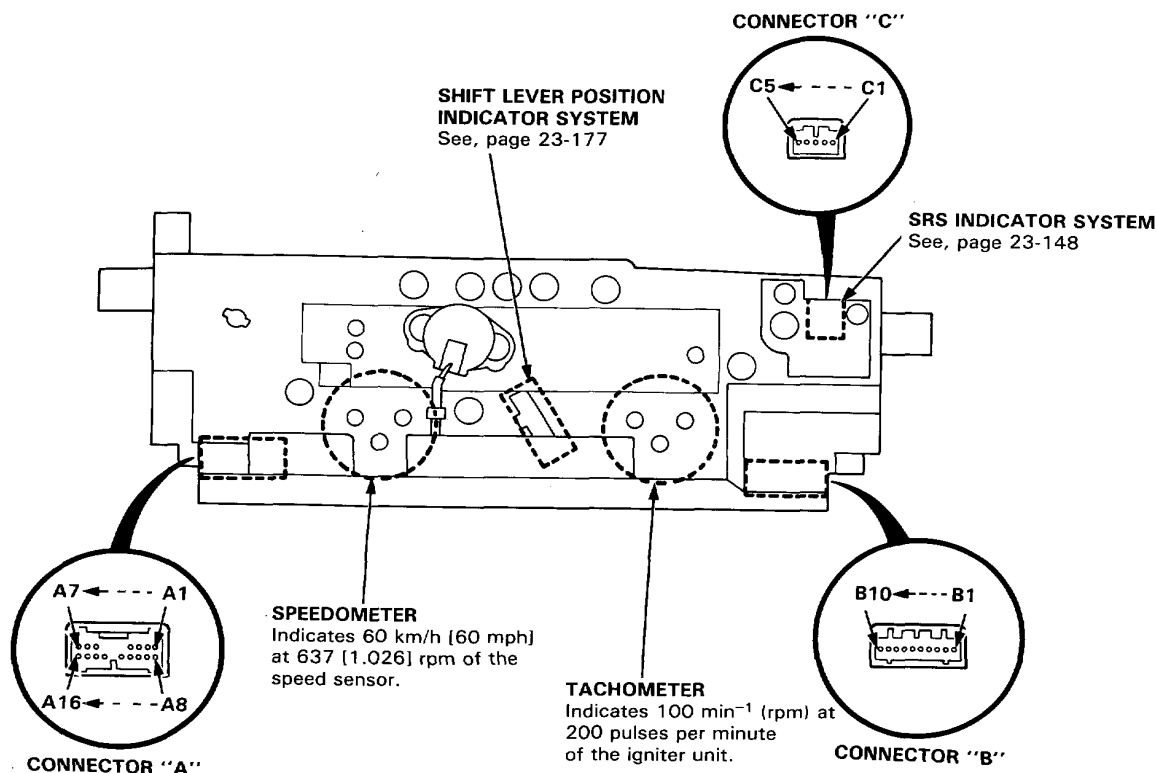
Gauge/Terminal Locations Index (LHD)

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

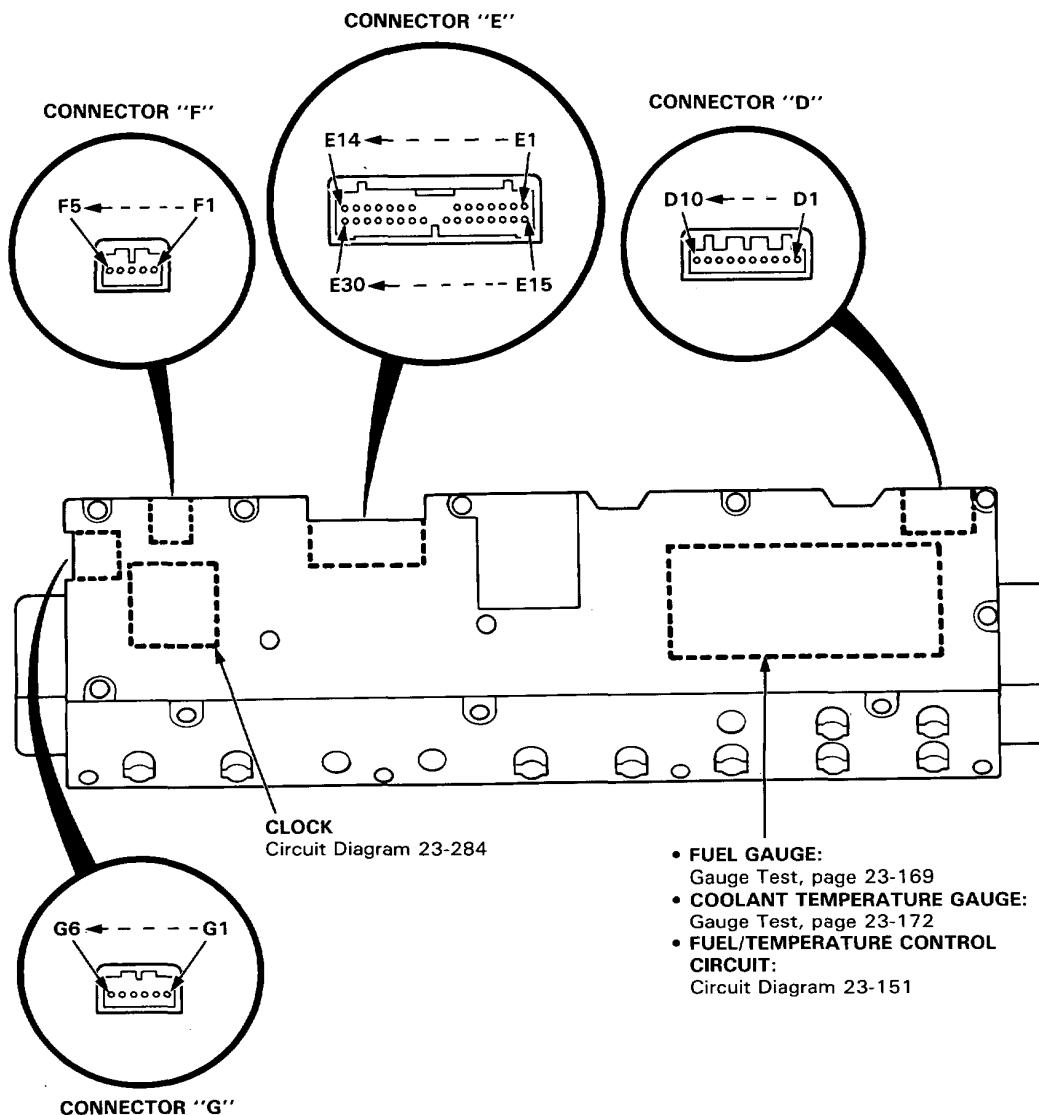


Main Gauge Assembly:





Sub Gauge Assembly:

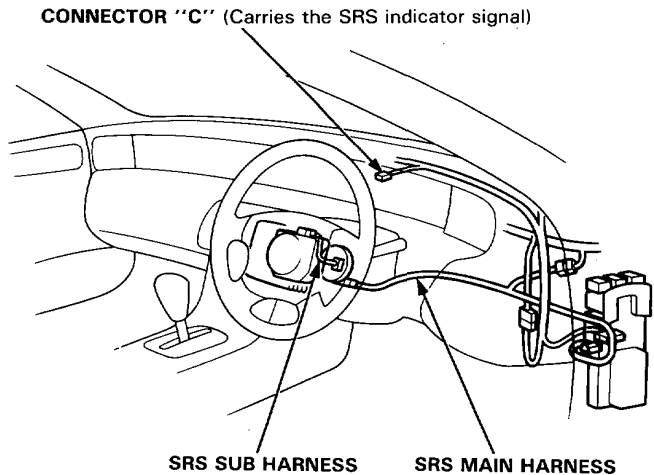


Gauge Assembly

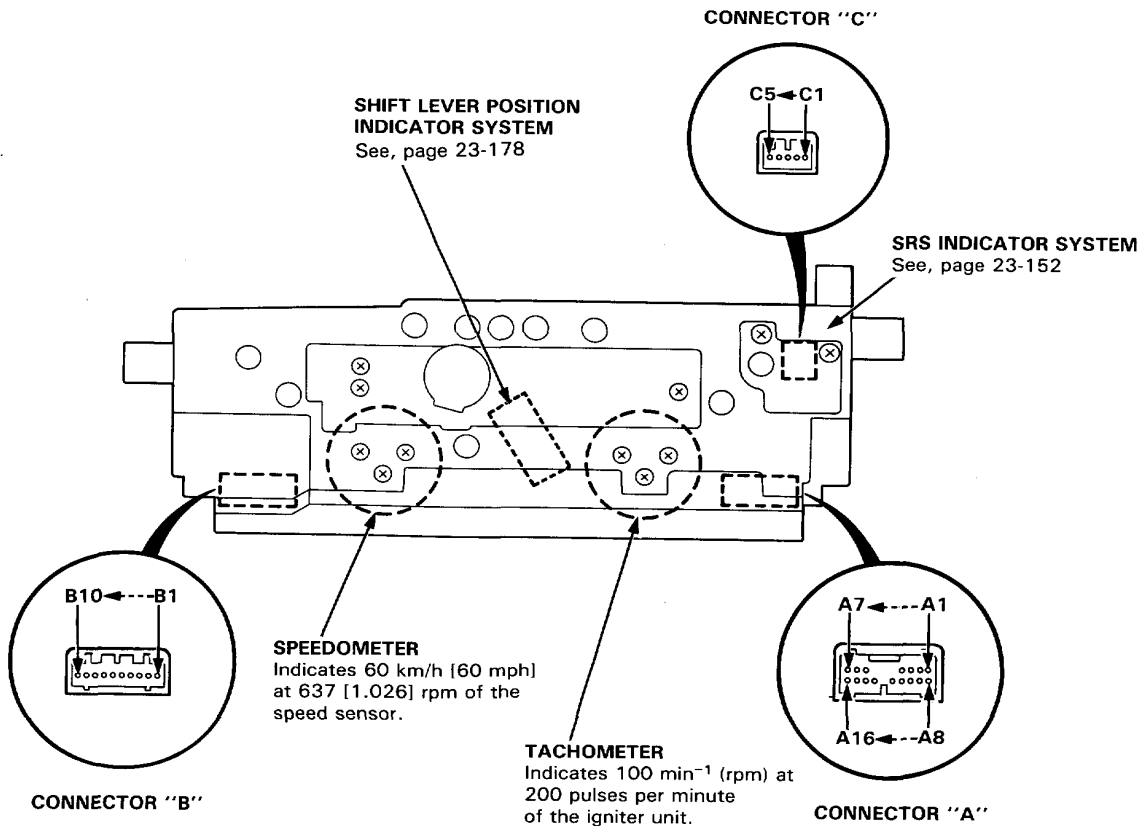
Gauge/Terminal Locations Index (RHD)

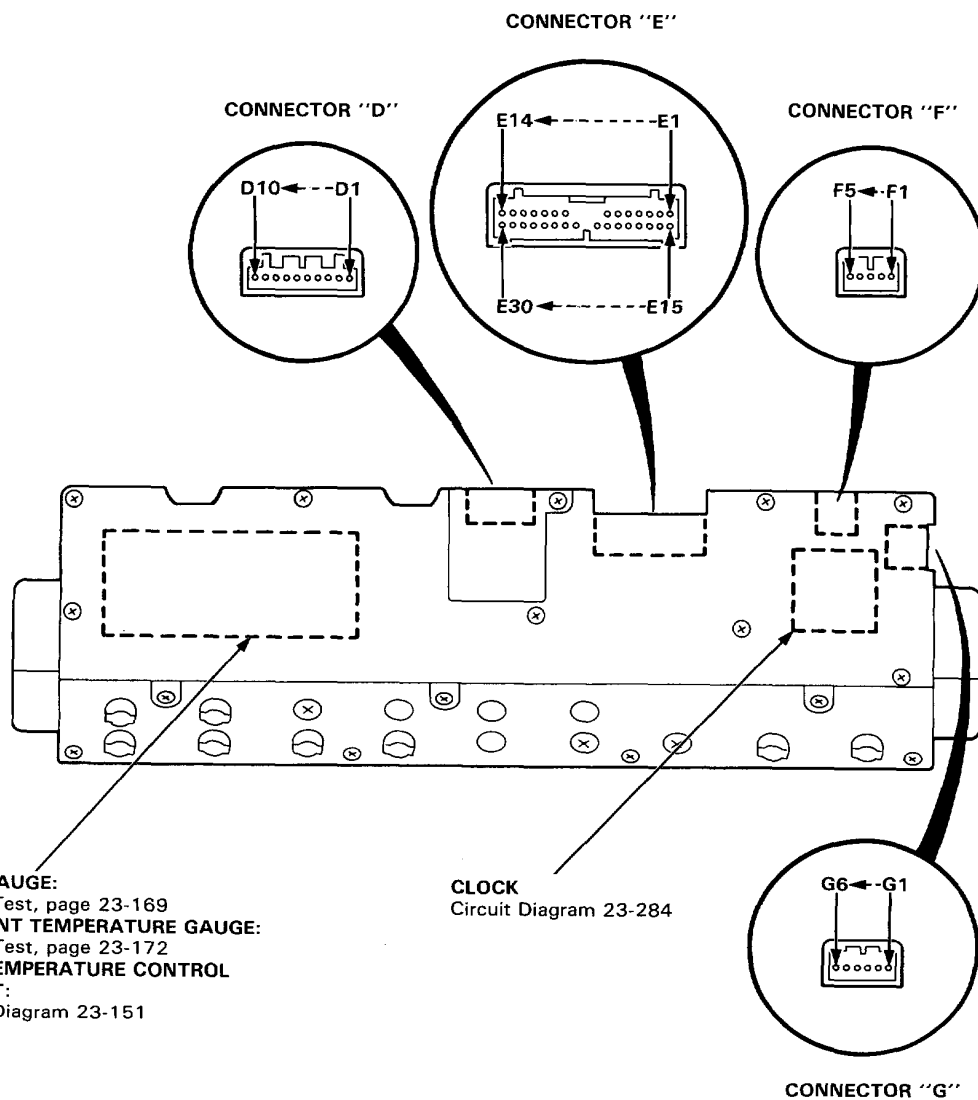
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



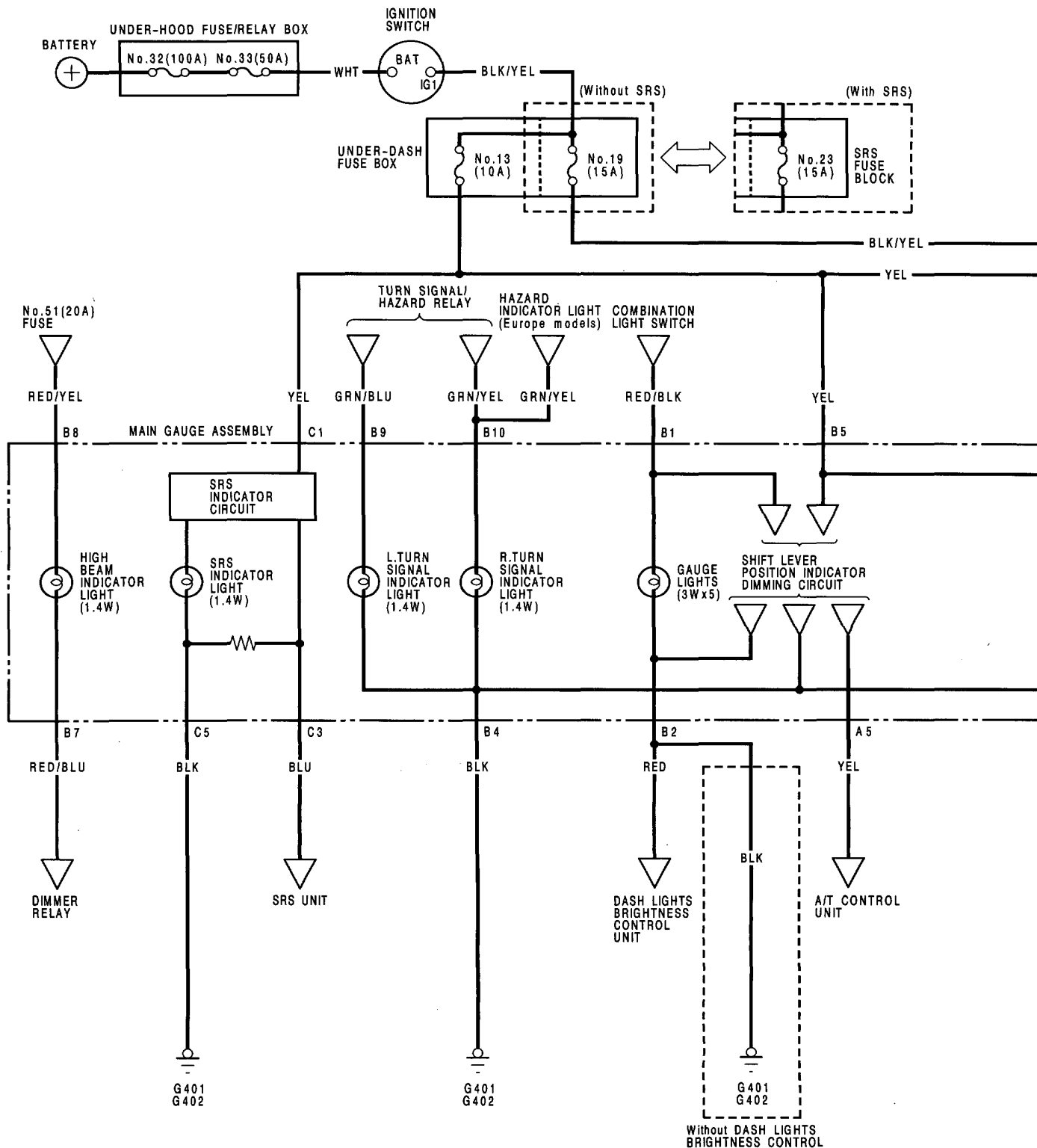
Main Gauge Assembly:

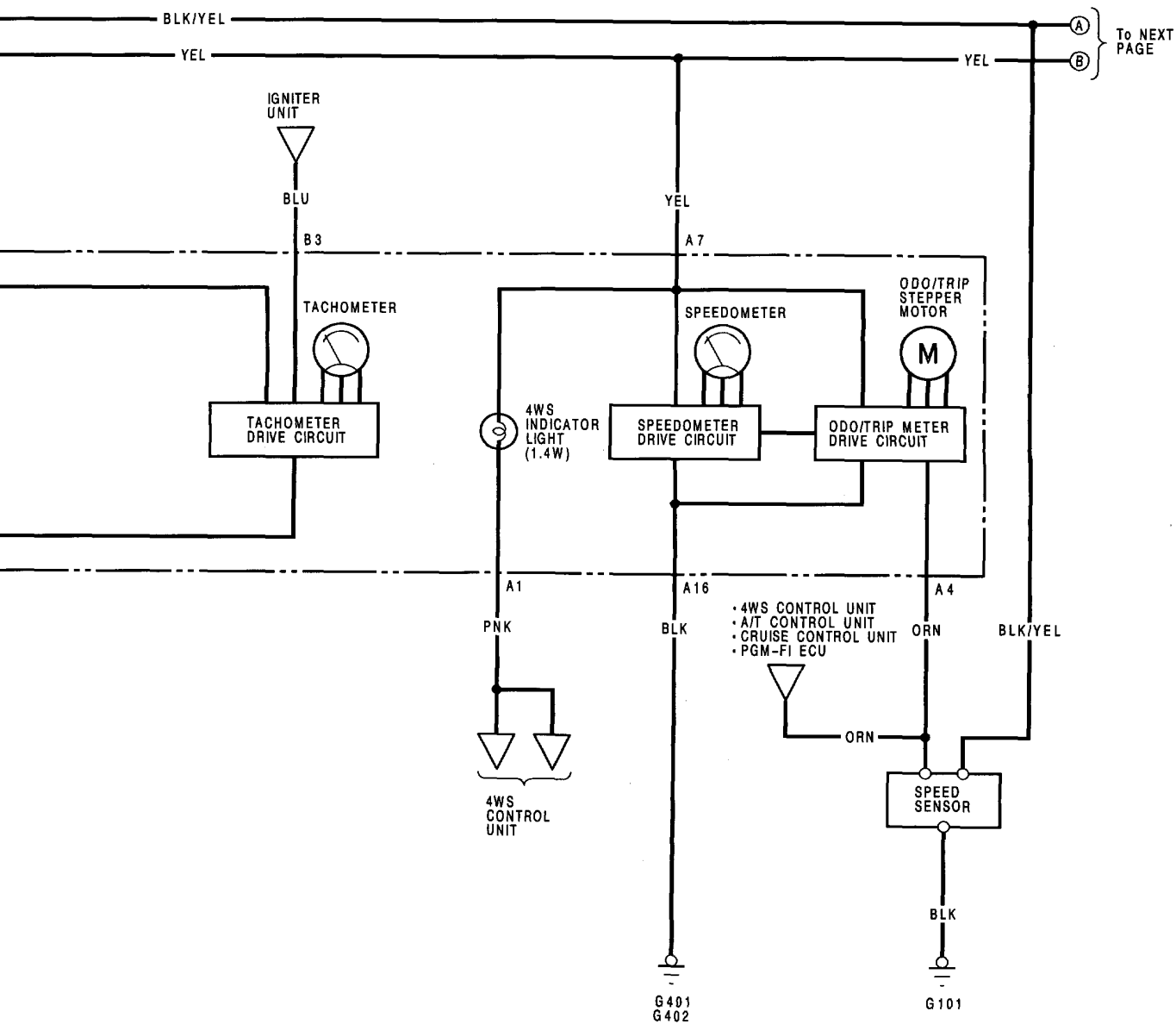




Gauge Assembly

Circuit Diagram (LHD)

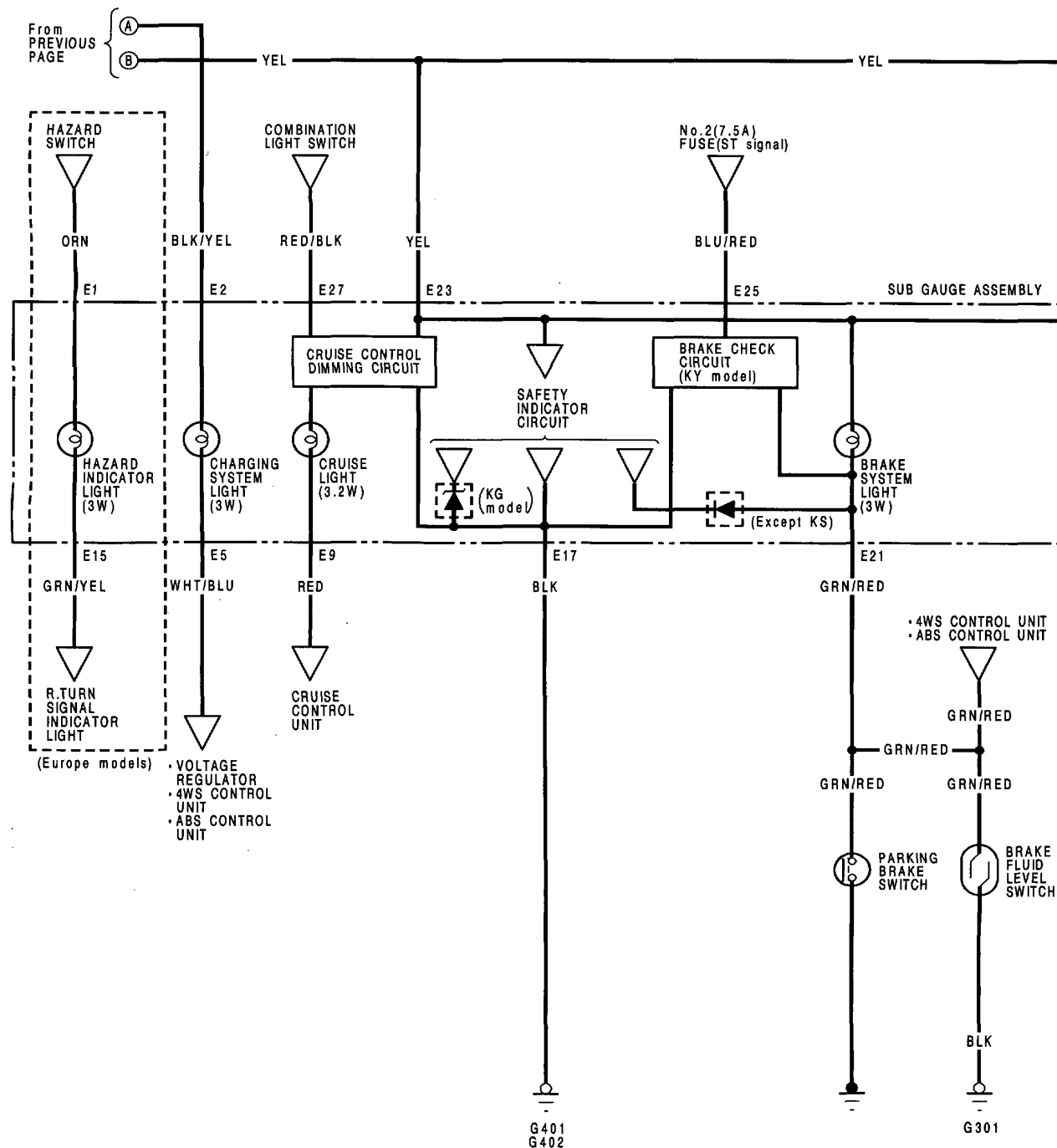


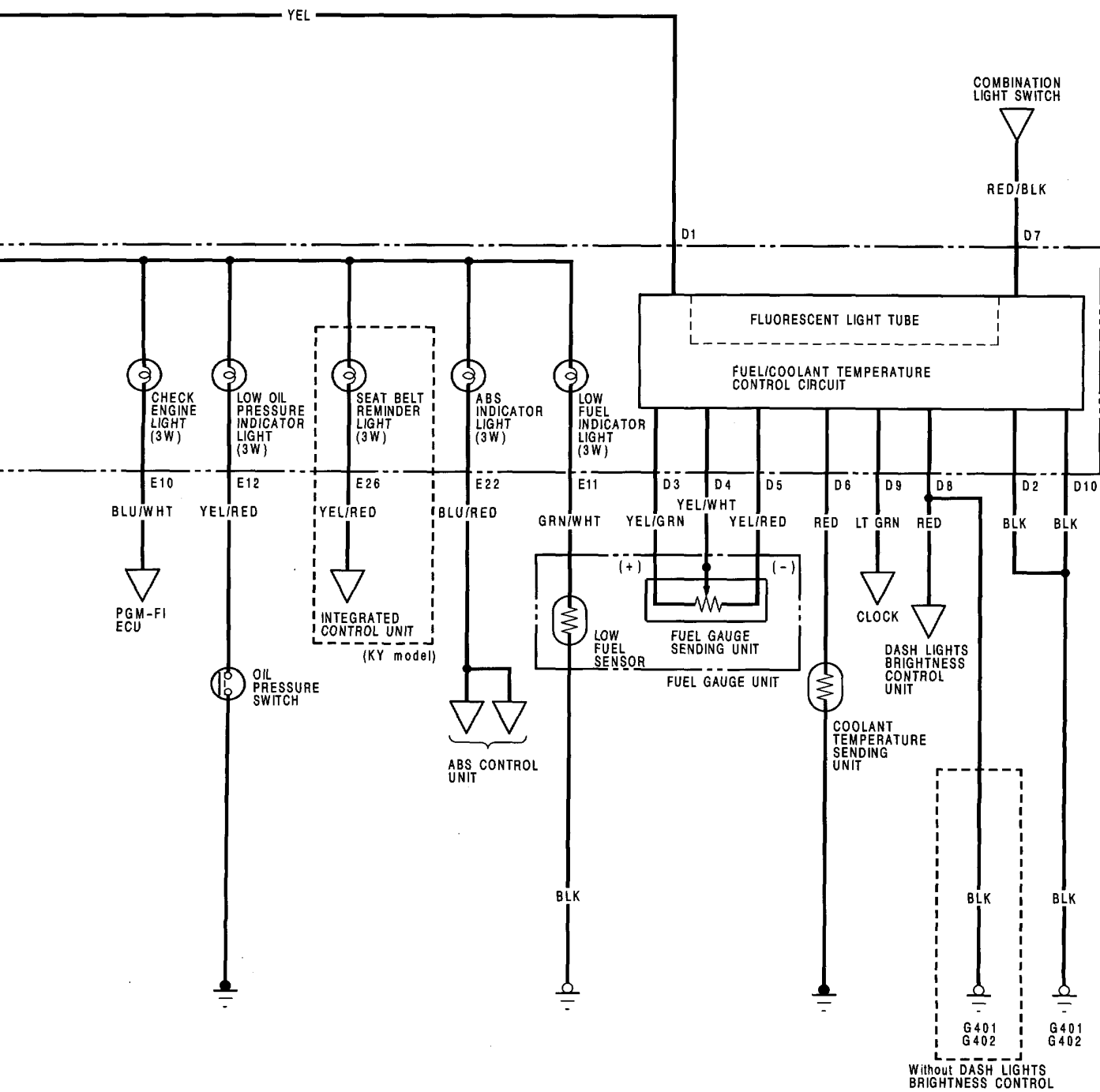


(cont'd)

Gauge Assembly

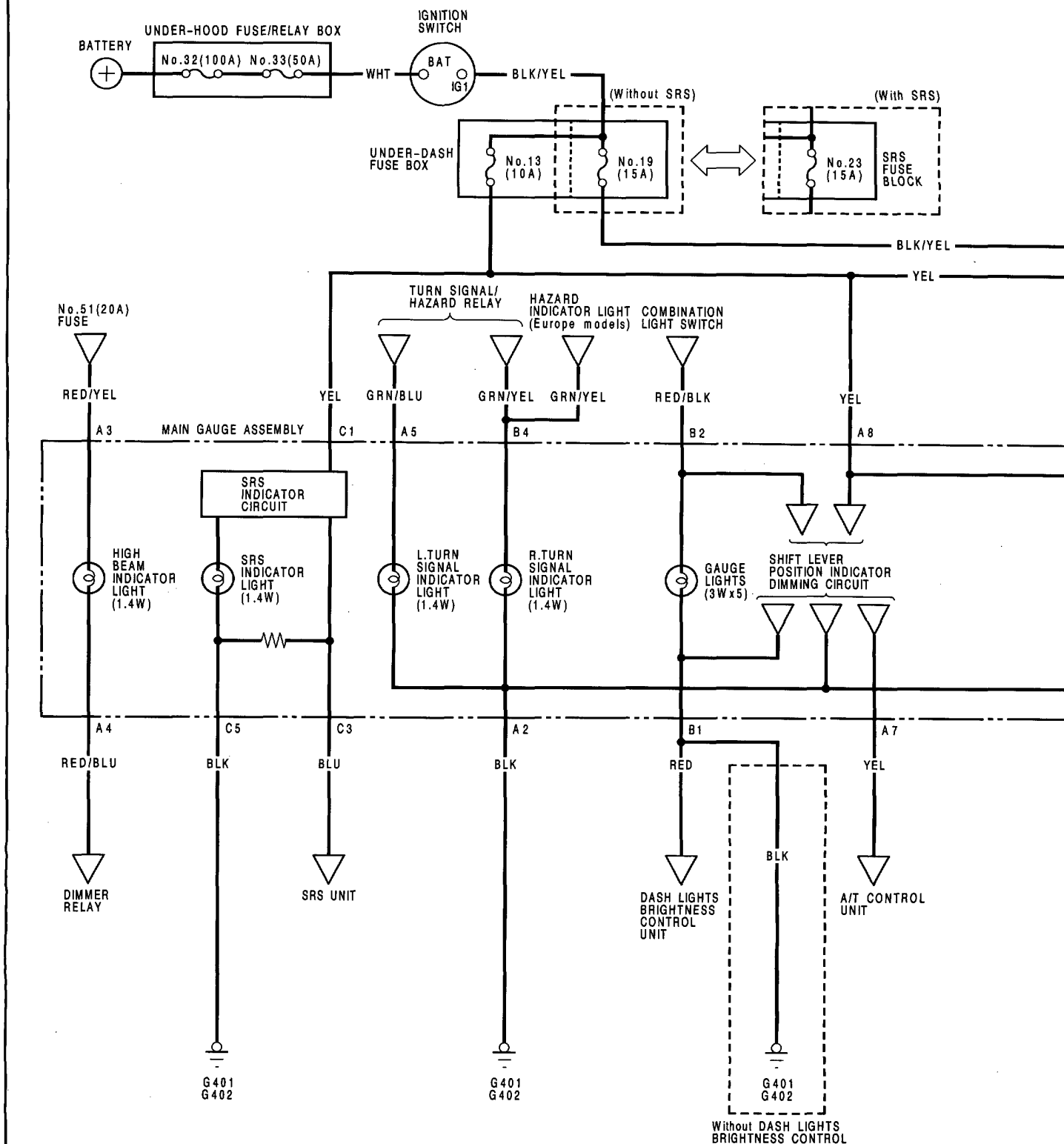
Circuit Diagram (LHD cont'd)

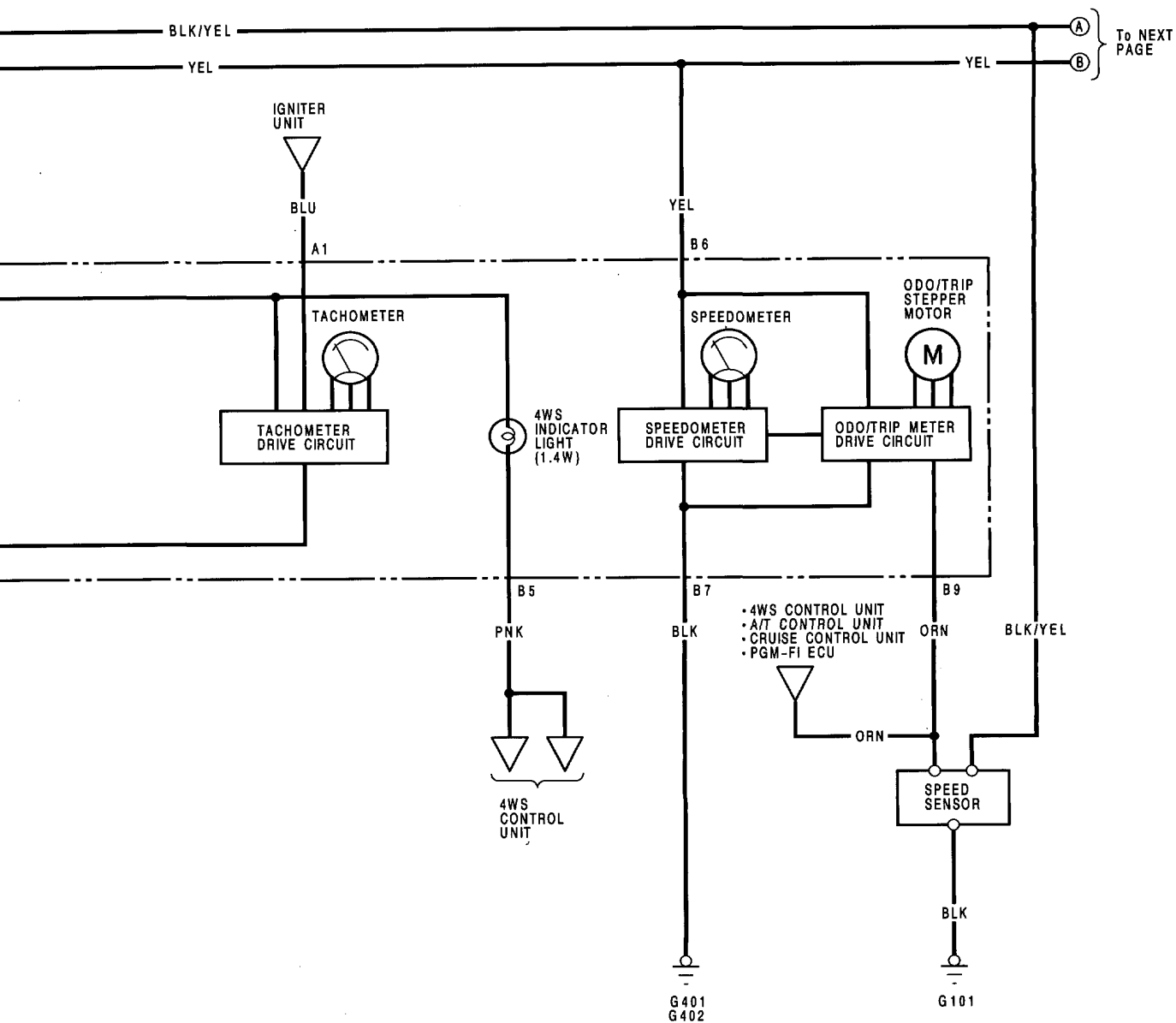




Gauge Assembly

Circuit Diagram (RHD)

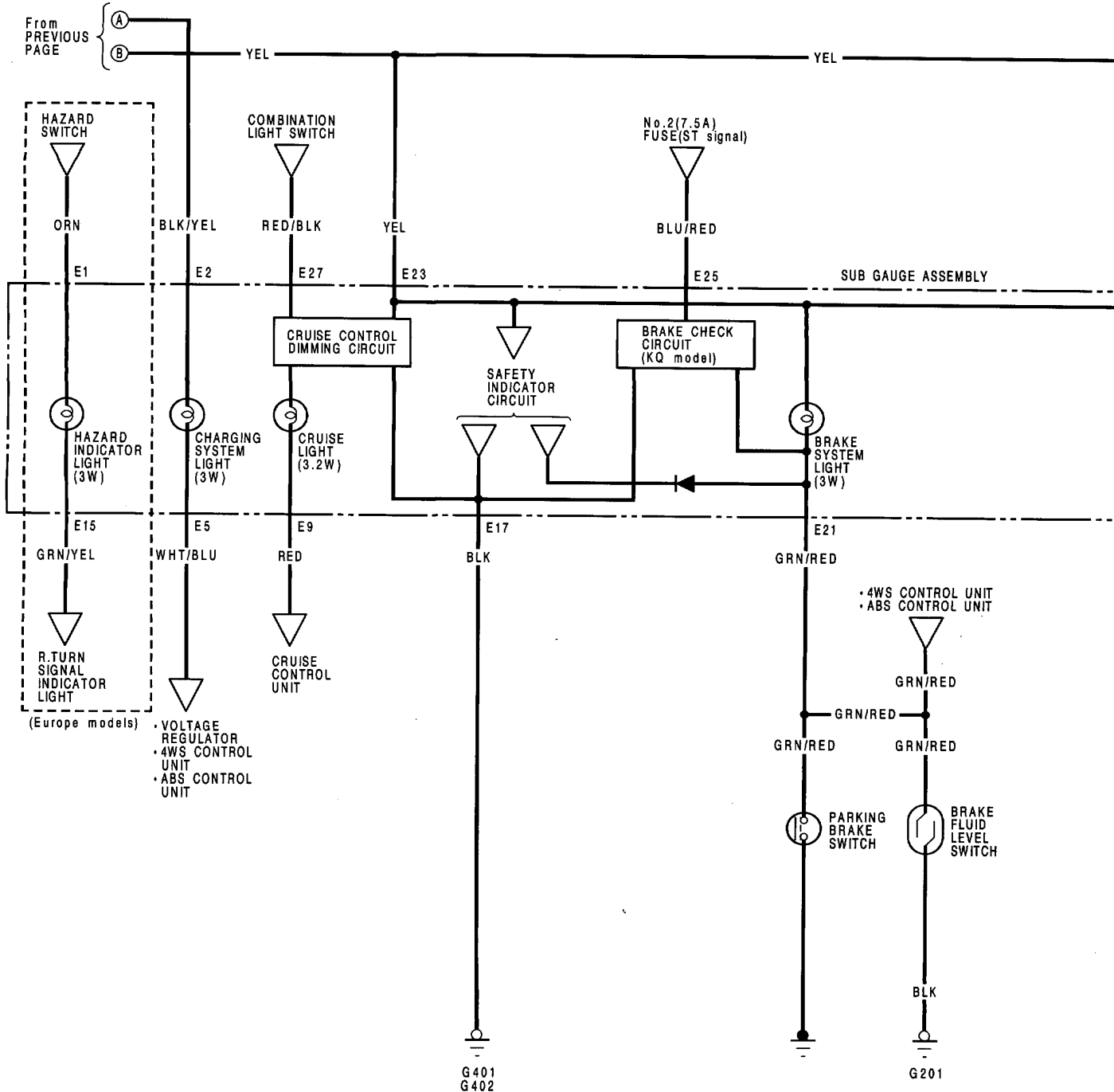


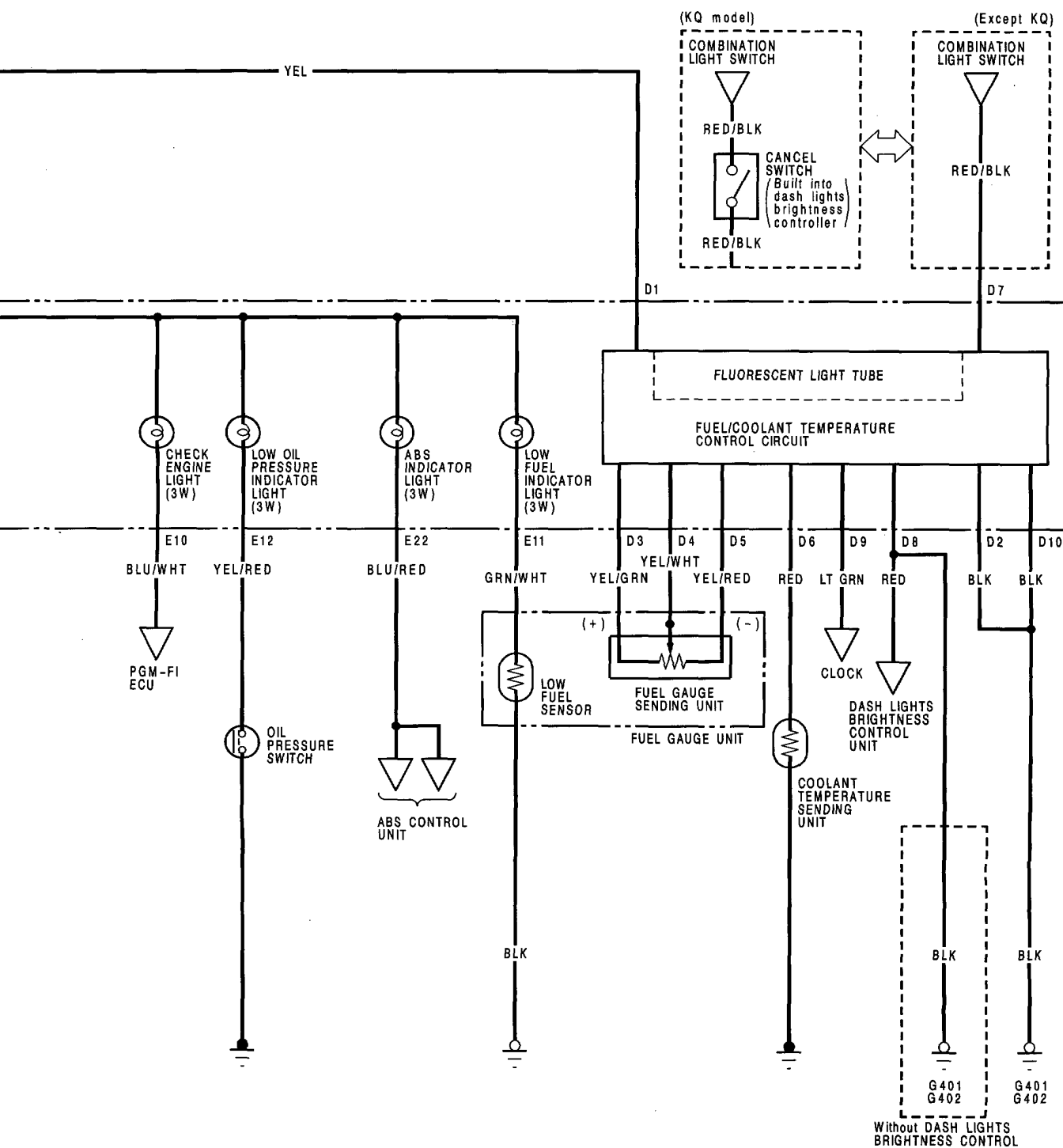


(cont'd)

Gauge Assembly

Circuit Diagram (RHD cont'd)



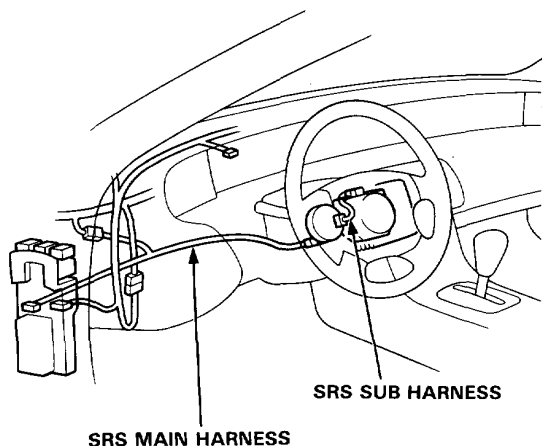


Gauge Assembly

Removal

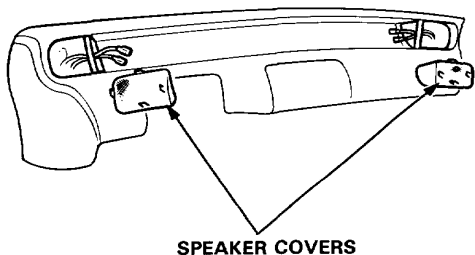
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

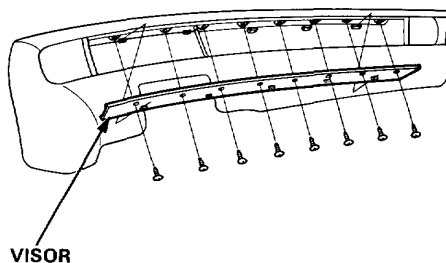


NOTE: The illustration shows LHD type.
RHD type is symmetrical to LHD type.

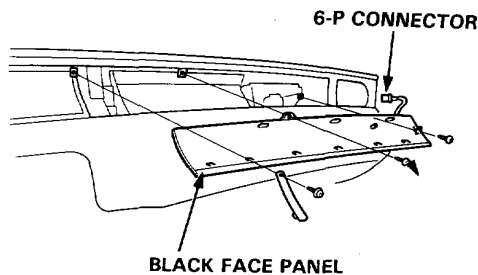
1. Remove the speaker covers from the dashboard.



2. Remove the visor.



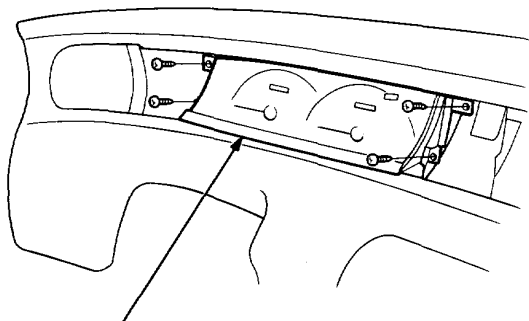
3. Remove the black face panel, then disconnect the 6-P connector from the clock reset switch.





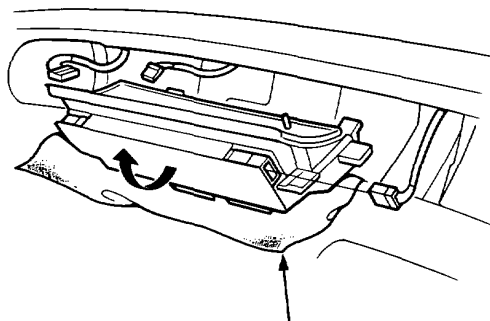
Main Gauge Assembly:

4. Remove the four screws from the main gauge assembly.



MAIN GAUGE ASSEMBLY

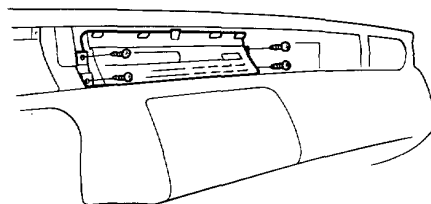
5. Place a cloth over the dashboard to protect the main gauge assembly, then pull the assembly out and disconnect its connectors.



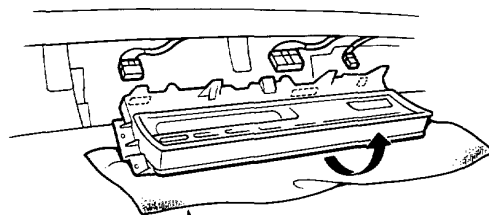
PROTECTIVE CLOTH

Sub Gauge Assembly:

6. Remove the four screws from the sub gauge assembly.



7. Place a cloth over the dashboard to protect the sub gauge assembly, then pull the assembly out and disconnect its connectors.

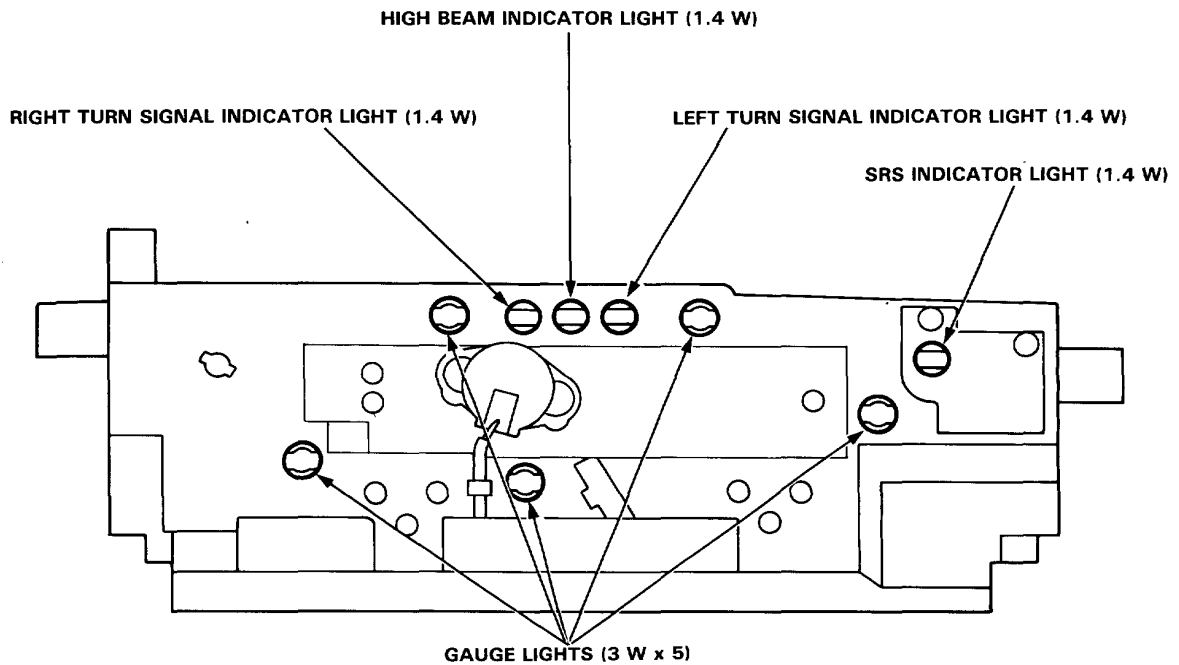


PROTECTIVE CLOTH

Gauge Assembly

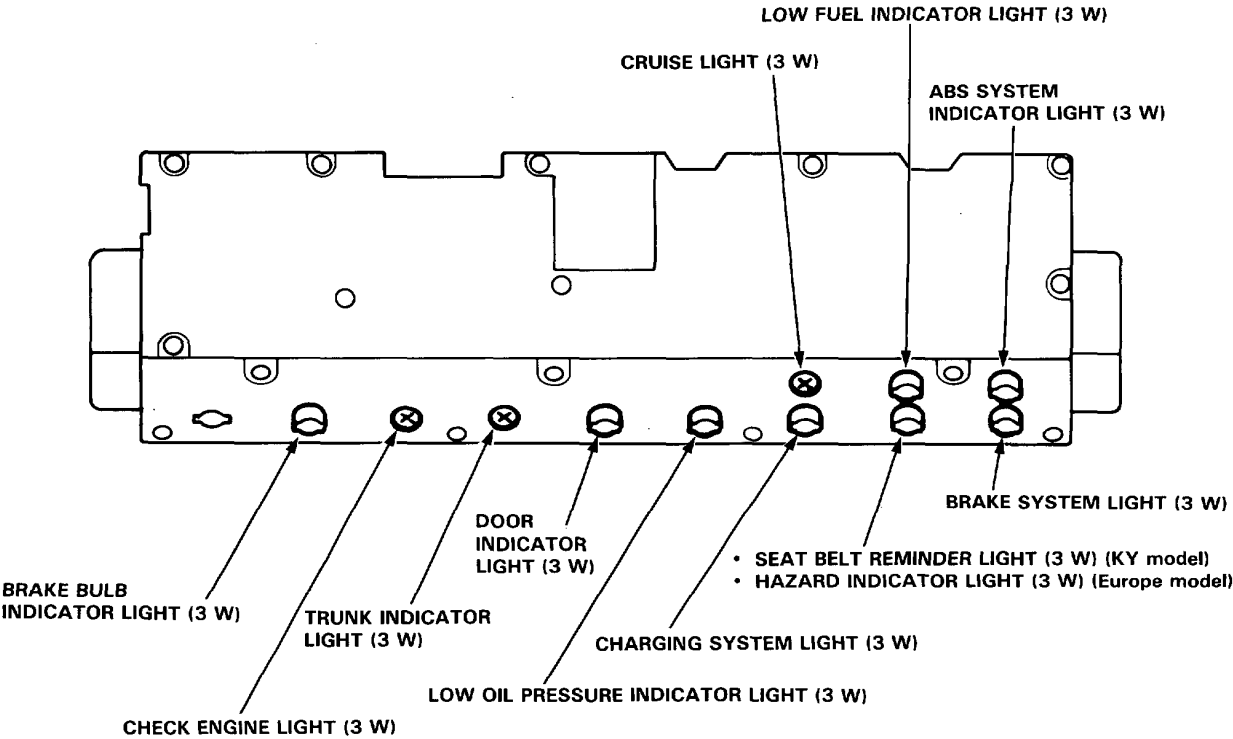
Bulb Locations (LHD)

Main Gauge Assembly:





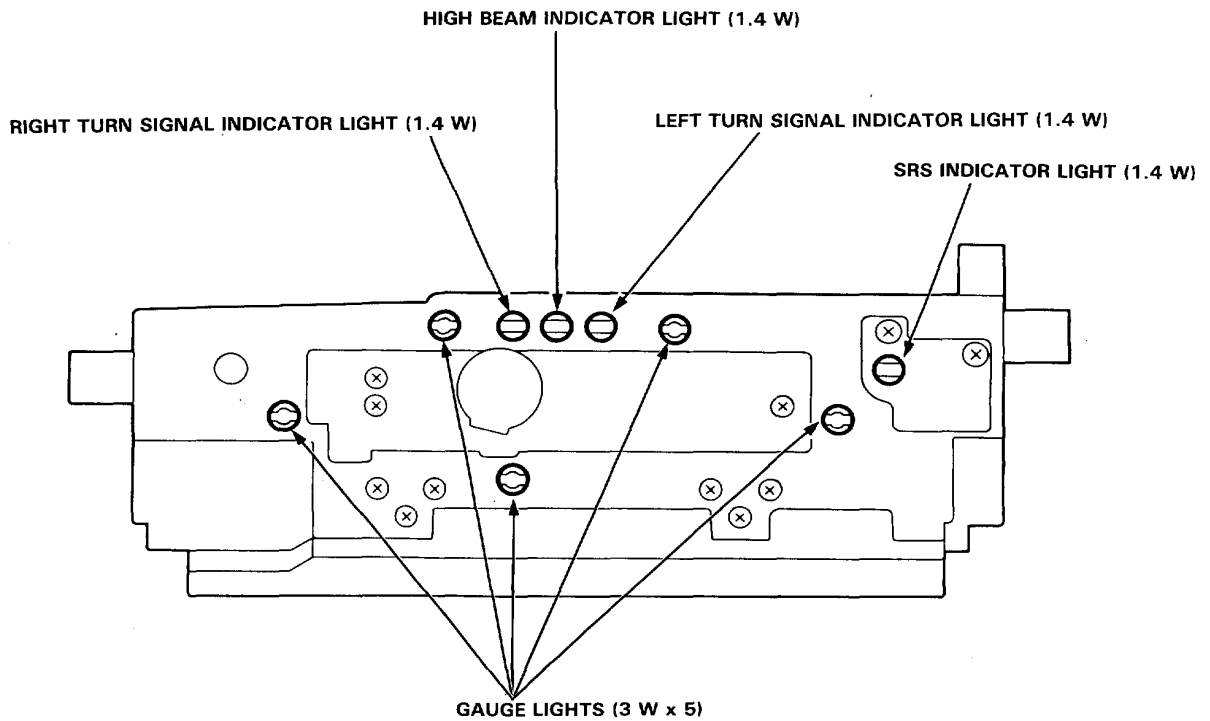
Sub Gauge Assembly:



Gauge Assembly

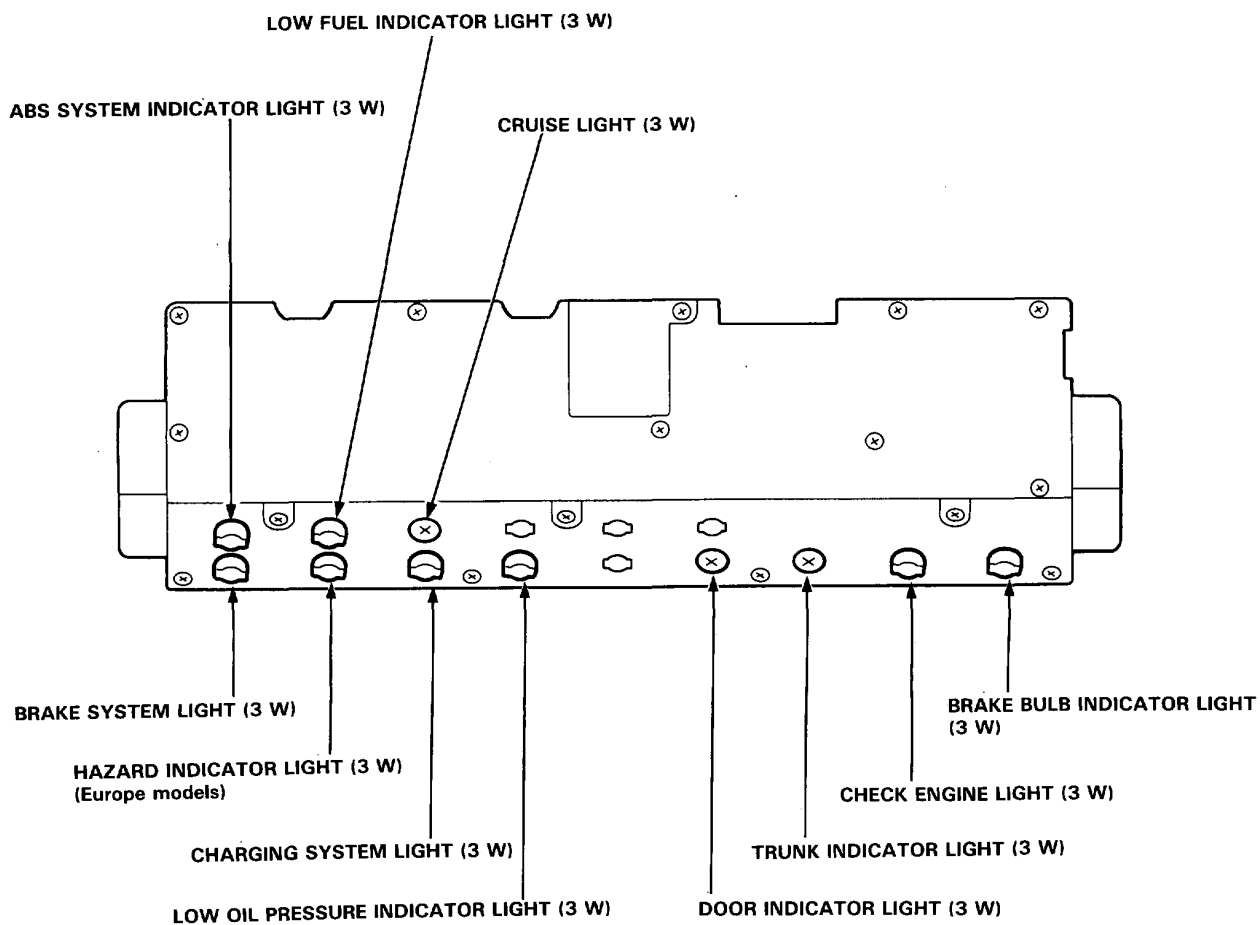
Bulb Locations (RHD)

Main Gauge Assembly:





Sub Gauge Assembly:



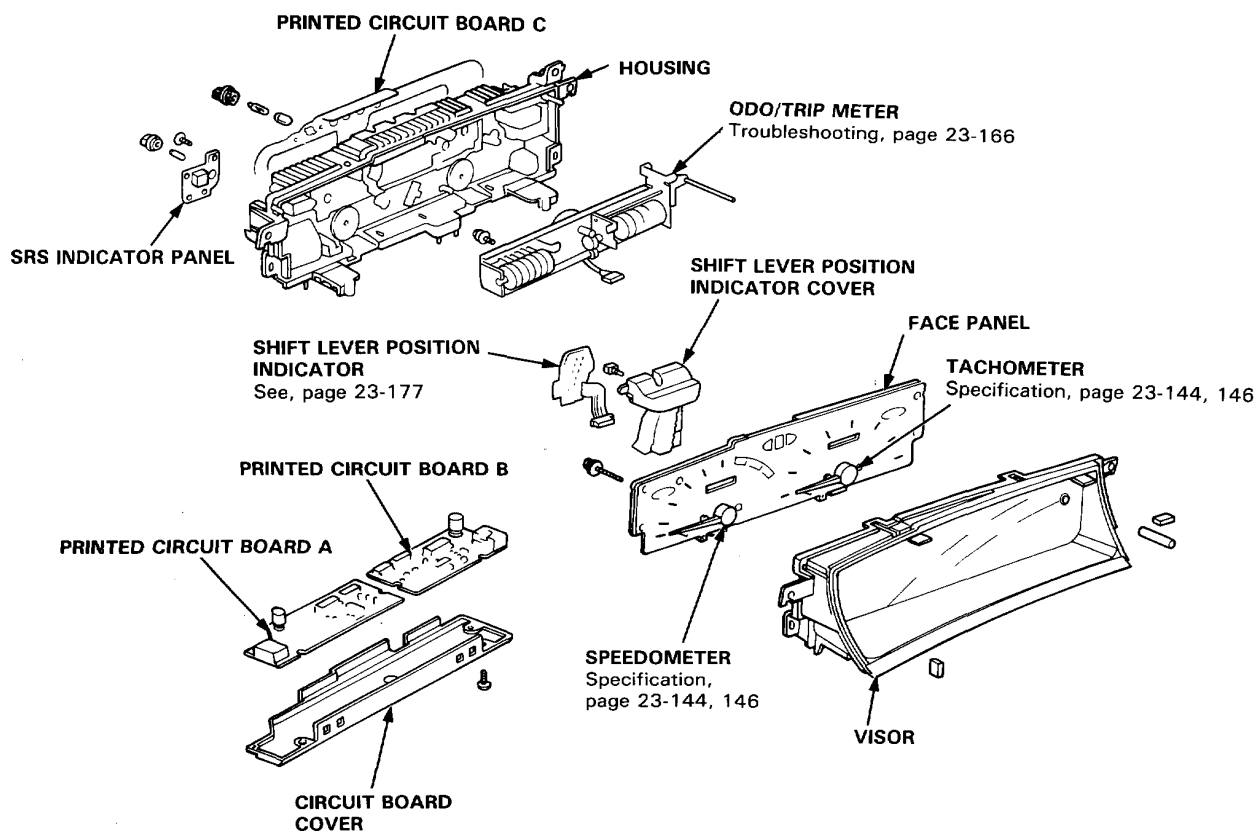
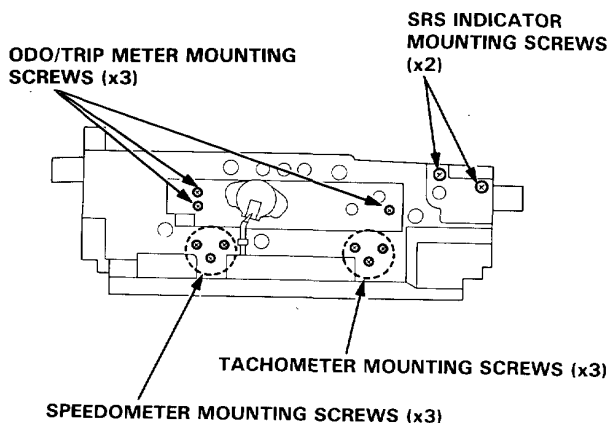
Gauge Assembly

Disassembly (LHD)

Main Gauge Assembly:

NOTE:

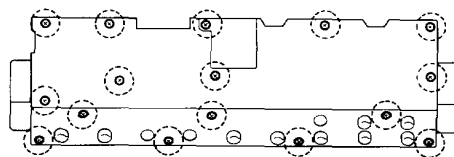
- Handle the terminals and printed circuit boards carefully to avoid damaging them.
- If either the speedometer or the tachometer is faulty, replace them both as a unit.



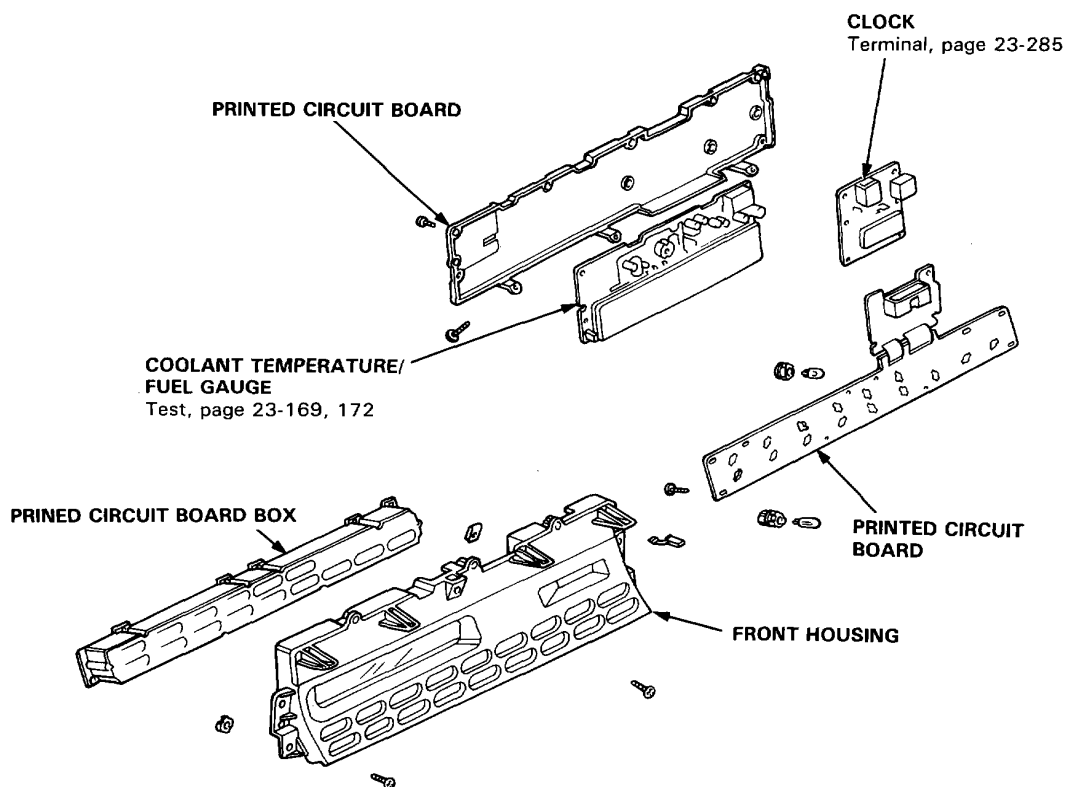


Sub Gauge Assembly:

NOTE: Handle the terminals and printed circuit boards carefully to avoid damaging them.



PRINT PANEL/PANEL COVER MOUNTING
SCREWS (x 16)



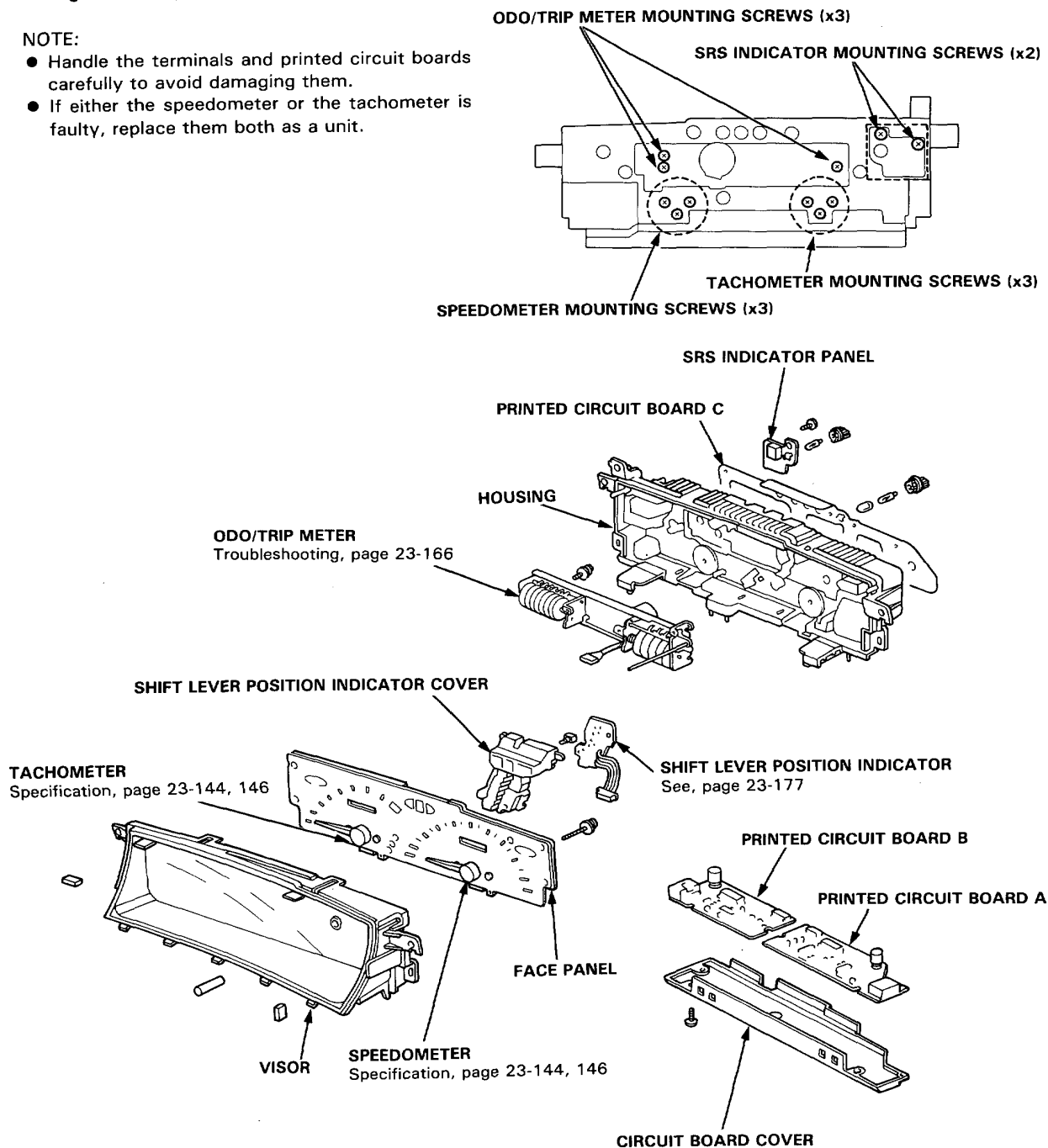
Gauge Assembly

Disassembly (RHD)

Main Gauge Assembly:

NOTE:

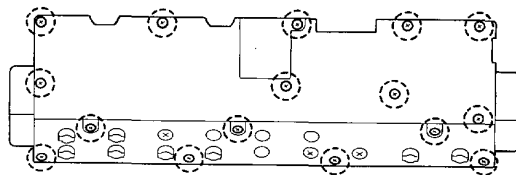
- Handle the terminals and printed circuit boards carefully to avoid damaging them.
- If either the speedometer or the tachometer is faulty, replace them both as a unit.



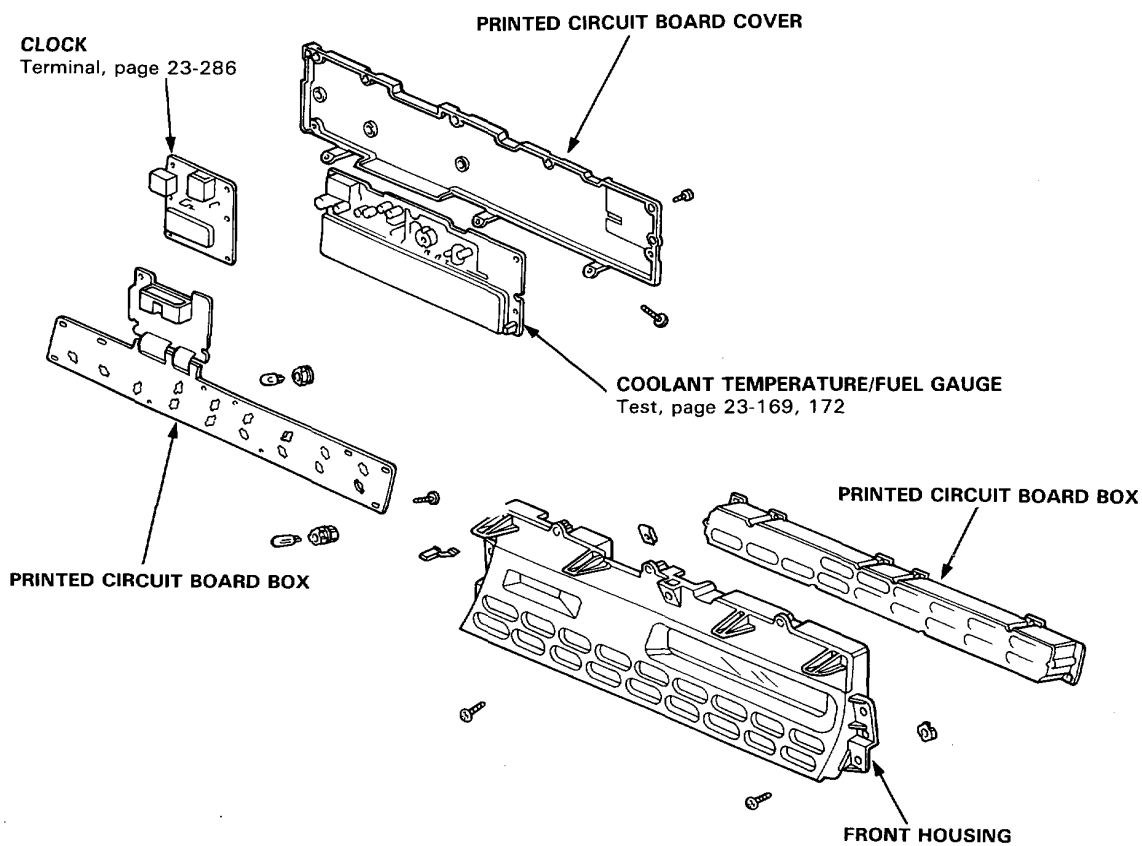


Sub Gauge Assembly:

NOTE: Handle the terminals and printed circuit boards carefully to avoid damaging them.



PRINTED PANEL/PANEL COVER MOUNTING SCREWS (x16)



Speedometer/Tripmeter/Odometer

Troubleshooting

NOTE: The numbers in the table show the troubleshooting sequence.

Item to be inspected Symptom	Blown No. * (15 A) fuse (In the under-dash fuse box)	Speedometer	Odo/Trip meter	Printed circuit board A	Speed sensor input test	Odometer connector at printed circuit board	Speed sensor test flow chart
Odometer and trip meter operate, but speedometer does not work.		1		2			
Speedometer works, but odometer and trip meter do not operate.			1	2		3	
Speedometer odometer, and trip meter do not work.	1				2		3

NOTE: Speed sensor ground is via ECU (G101).

* No. 19: without SRS
No. 23: with SRS

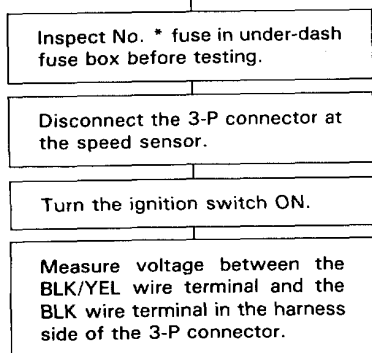
Speed Sensor Input Test (At harness side of 3-P connector)

Test No.	Wire	Test Condition	Test: Desired result	Possible cause (If result is not obtained)
1	BLK	Under all conditions	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Open wire • Poor ground (G101)
2	BLK/YEL	Ignition switch ON	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. * (15 A) fuse • Short to ground
3	ORN	Ignition switch ON	Check for voltage to ground: There should be about 5V.	<ul style="list-style-type: none"> • Short to ground • Open in the wire

NOTE: A short to ground in the ORN wire can be caused by a short in any component connected to it.

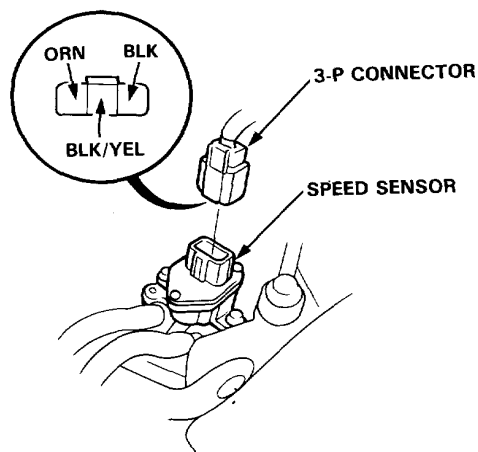
Speed Sensor Test

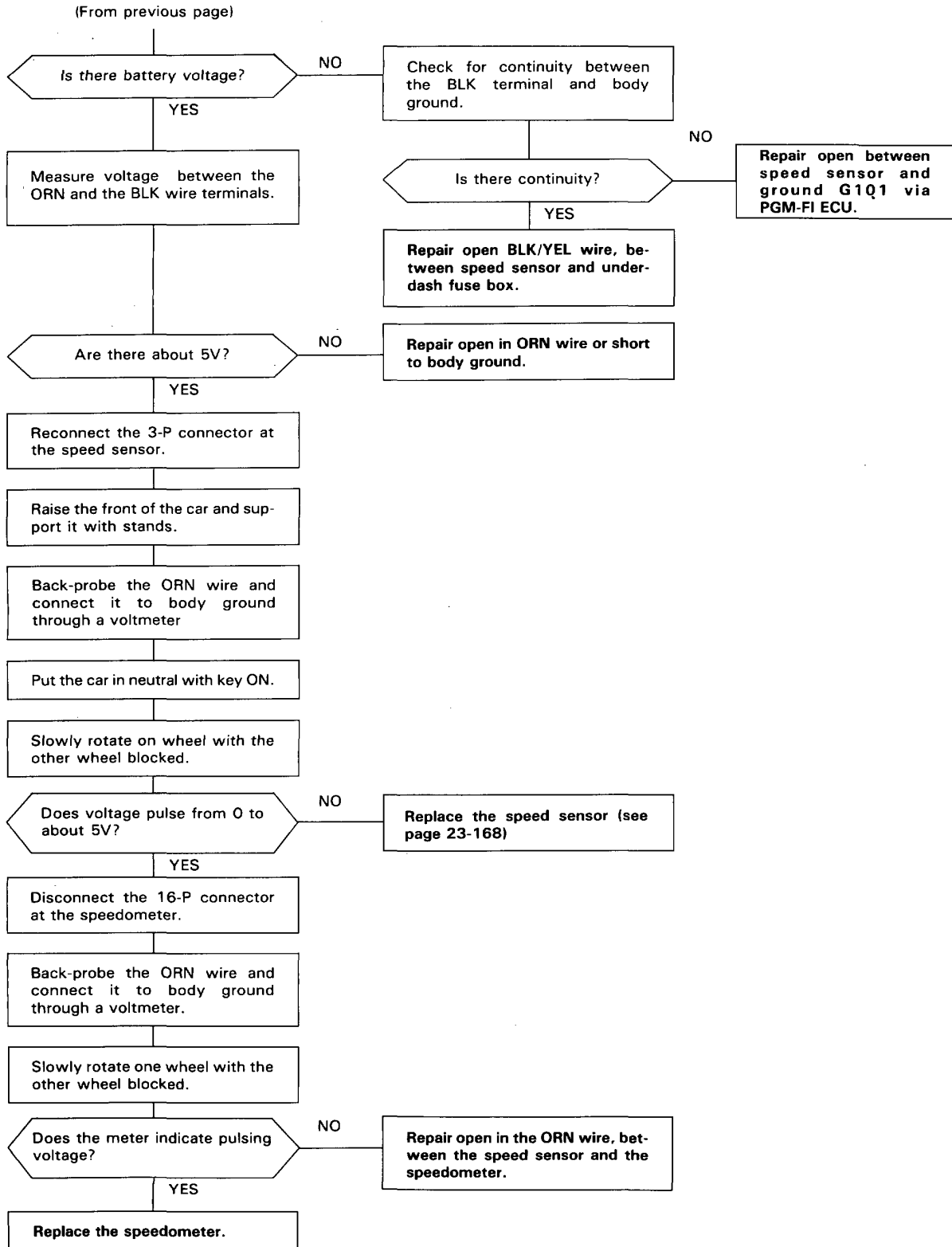
Speedometer does not work.



(To next page)

View from terminal side



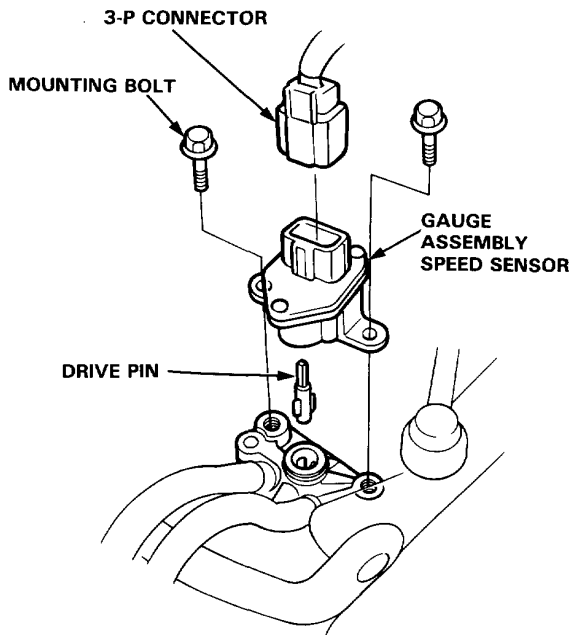


Speed Sensor

Replacement

1. Disconnect the 3-P connector from the speed sensor.
2. Remove the mounting bolts and the gauge assembly speed sensor from the power steering speed sensor.

NOTE: The speed sensor drive pin is a very small part, be careful not to lose it.

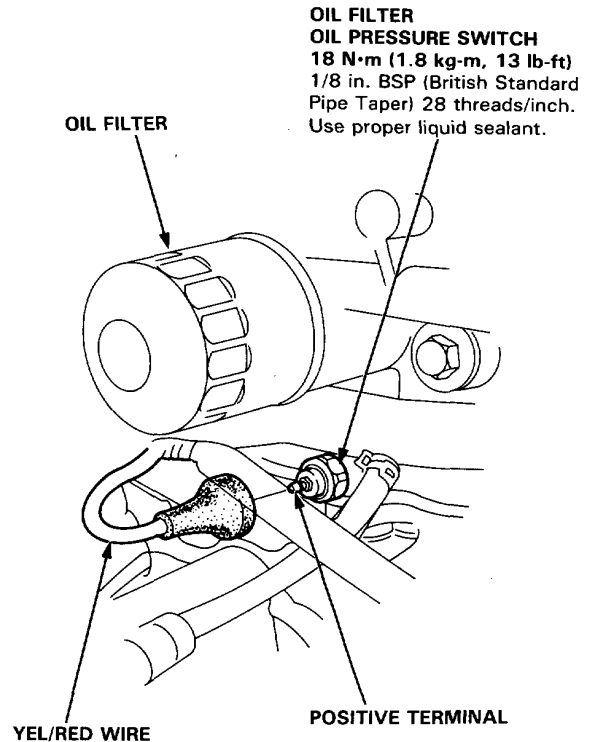


3. Install in the reverse order of removal.

Oil Pressure Warning System

Oil Pressure Switch Test

1. Remove the YEL/RED wire from the oil pressure switch.
2. There should be continuity between the positive terminal and the engine (ground) with the engine stopped. There should be no continuity when the engine runs.



3. If the switch fails to operate, check the engine oil level. If the oil level is OK, check the oil pressure and, if necessary, inspect the oil pump (see section 8).

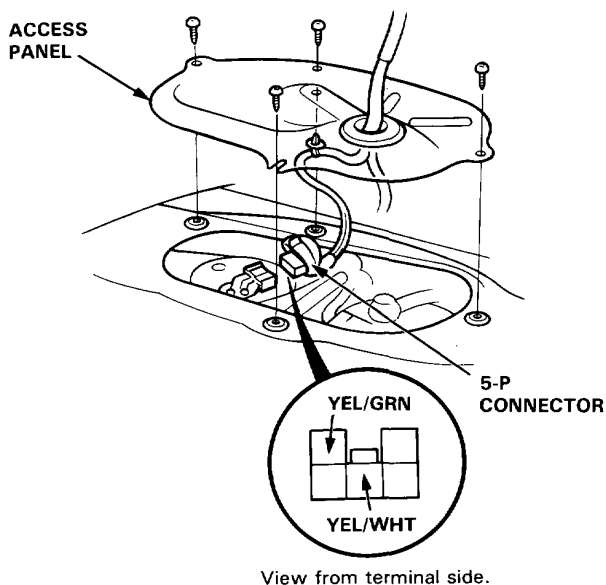


Fuel Gauge

Gauge Test

NOTE: Refer to page 23-151 for the diagram of the fuel gauge circuit.

1. Check the No. 13 (10 A) fuse in the under-dash fuse box before testing.
2. If the fuel is OK, remove the rear seat (see section 21).
3. Remove the access panel.
4. Disconnect the 5-P connector from the fuel gauge sending unit.



5. Connect the voltmeter positive probe to the YEL/GRN terminal and the negative probe to body ground, then turn the ignition switch ON. There should be between 5 and 8 V.

- If the voltage is as specified, go to step 5.
- If the voltage is not as specified, check for:
 - An open in the YEL or YEL/GRN wire.
 - Loose or disconnected terminals.
 - Faulty fuel gauge.

6. Turn the ignition OFF. Connect a jumper wire between the YEL/GRN and YEL/WHT terminals.

CAUTION: Do not apply battery voltage to the terminals; it will damage the fuel gauge.

7. Turn the ignition switch ON. Check if the gauge indicates "F".

CAUTION: Disconnect the jumper wire as soon as the gauge reaches "F", or you will damage the gauge.

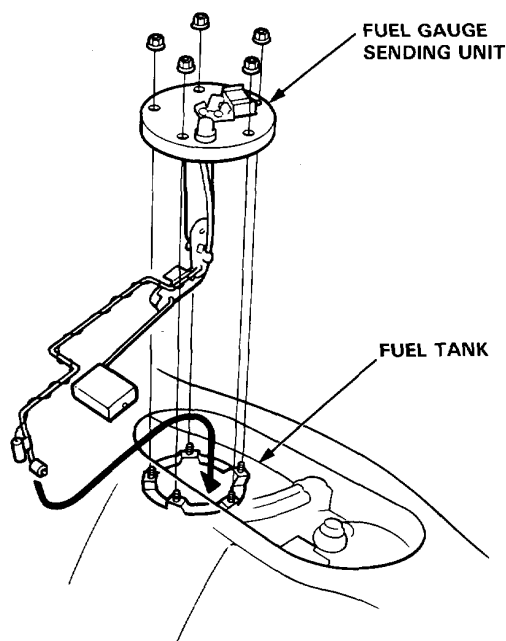
- If the fuel gauge does not work at all, replace it.
- If the fuel gauge is OK, inspect the sending unit.

Fuel Gauge

Sending Unit Test

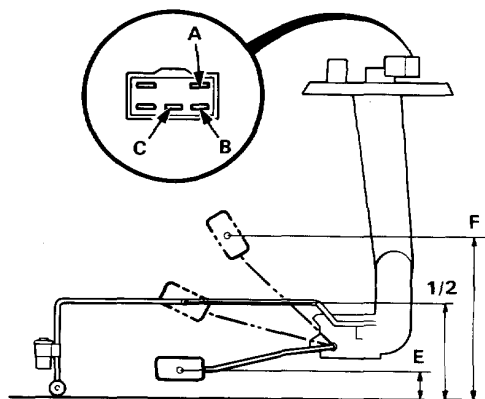
⚠ WARNING Do not smoke while working on the fuel system. Keep open flame away from the work area.

1. Open the trunk.
2. Remove the fuel tank access panel.
3. With the ignition switch OFF, disconnect the 5-P connector from the fuel gauge sending unit.
4. Remove the 5 nuts, then take the sending unit assembly out of the fuel tank.



5. Measure the resistance between the A and B terminals.
 - If it is more than about 270–330 Ω , replace the fuel sending unit.
 - If it is within about 270–330 Ω , go to step 6.

6. Check if the resistance between the B and C terminals changes evenly as the position of the float changes.
 - If it does not change evenly, replace the fuel sending unit.
 - If it changes evenly, go to step 7.
7. Support the sending unit on a workbench in the position shown.



Top of the workbench (Bottom of the fuel tank)

8. Measure the resistance between the B and C terminals by moving the float to the heights listed for E (EMPTY), 1/2 (HALF FULL) and F (FULL).

Float Position	E	1/2	F
Resistance (Ω)	16–32	116–188	239–314

E	1/2	F
20.5 mm (0.80 in)	73.6 mm (2.90 in)	126 mm (4.96 in)

9. If unable to obtain the above readings, replace the fuel gauge sending unit.

Low Fuel Indicator System

Indicator Light Test

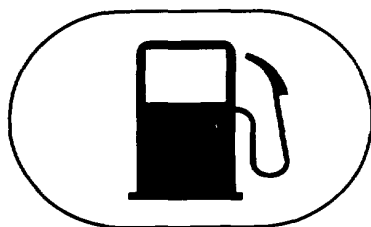


NOTE: Refer to page 23-151 for the diagram of the low fuel indicator circuit.

1. Park the car on level ground.

⚠ WARNING Do not smoke while working on the fuel system. Keep open flame away from the work area. Drain fuel only into an approved container.

2. Drain the fuel tank into an approved container. Then install the drain bolt with a new washer.
3. Add less than 9.0 ℓ (2.4 U.S. Gal, 2.0 Imp. Gal) of fuel and turn the ignition switch on. The low fuel indicator light should come on within 4 minutes.



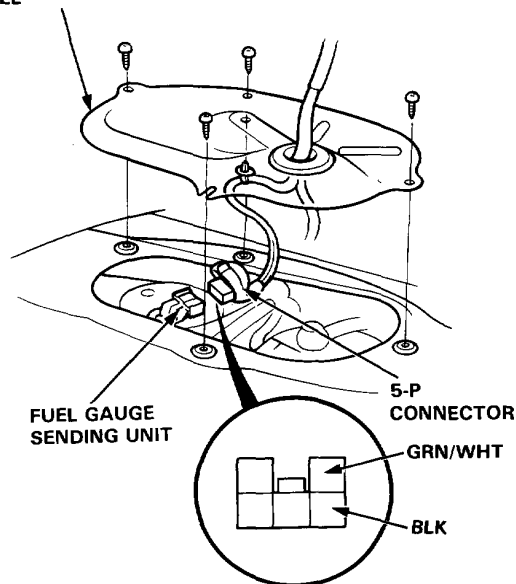
LOW FUEL INDICATOR LIGHT

4. Then add one more gallon of fuel [approx. 4 ℓ (1.1 U.S. Gal, 0.9 Imp. Gal)]. The light should go off within 4 minutes.

- If the indicator light did not come on in step 3, remove the fuel tank access panel and disconnect the 5-P connector from the fuel gauge sending unit. Connect the GRN/WHT terminal to the BLK terminal with a jumper wire.

- If the light comes on, the problem is the sending unit.
- If the light does not come on, the problem is an open in the GRN/WHT wire to the gauge assembly, no power to the gauge, a bad bulb, or poor ground.

FUEL TANK ACCESS PANEL



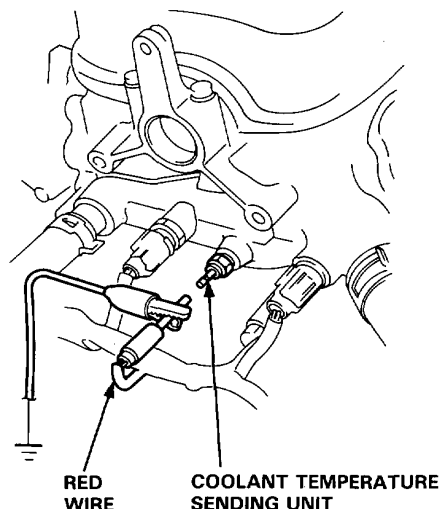
View from terminal side.

Coolant Temperature Gauge

Gauge Test

NOTE: Refer to page 23-151 for the diagram of the coolant temperature gauge circuit.

1. Check the No. 13 (10 A) fuse in the under-dash fuse box before testing.
2. Make sure the ignition switch is OFF, then disconnect the RED wire from the coolant temperature sending unit and ground it with a jumper wire.



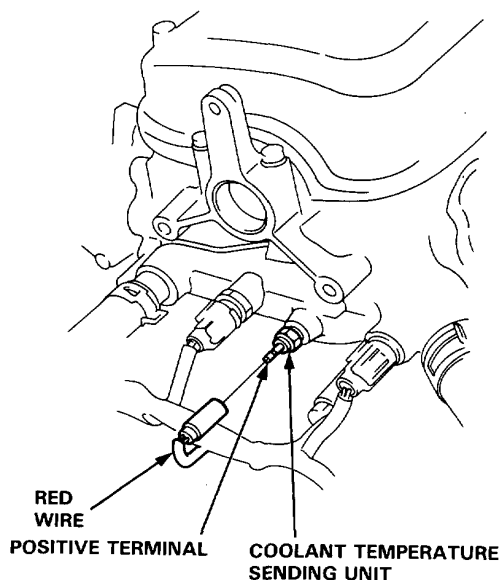
3. Turn the ignition switch ON. Check that the segments of the coolant temperature gauge light up.

CAUTION: Turn the ignition switch OFF immediately after the segments light up. Failure to do so may damage the gauge.

- If the segments do not light up, check for an open in the YEL or RED wire. If the wire is OK, replace the coolant temperature gauge.
- If the segments light up, check the sending unit.

Sending Unit Test

1. Disconnect the RED wire from the sender.
2. With the engine cold, use an ohmmeter to measure resistance between the positive terminal and the engine (ground).



3. Check the temperature of the coolant.
4. Run the engine and measure the change in resistance with the engine at operating temperature (radiator fan comes on).

Temperature	56°C (133°F) (Engine cold)	85°C (185°F) – 100°C (212°F)
Resistance (Ω)	142	49 – 32

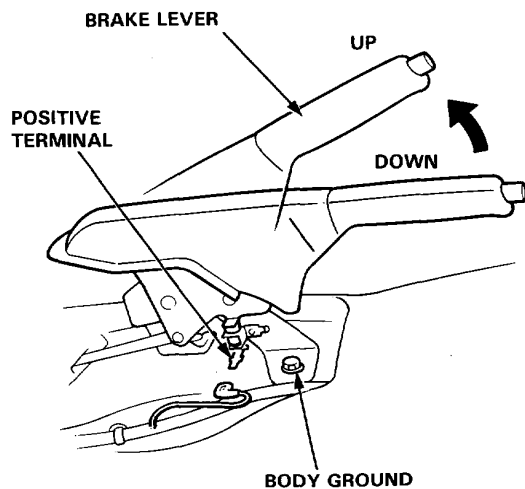
5. If the readings yet get are substantially different from the specifications above, replace the coolant temperature sending unit.



Brake Warning System

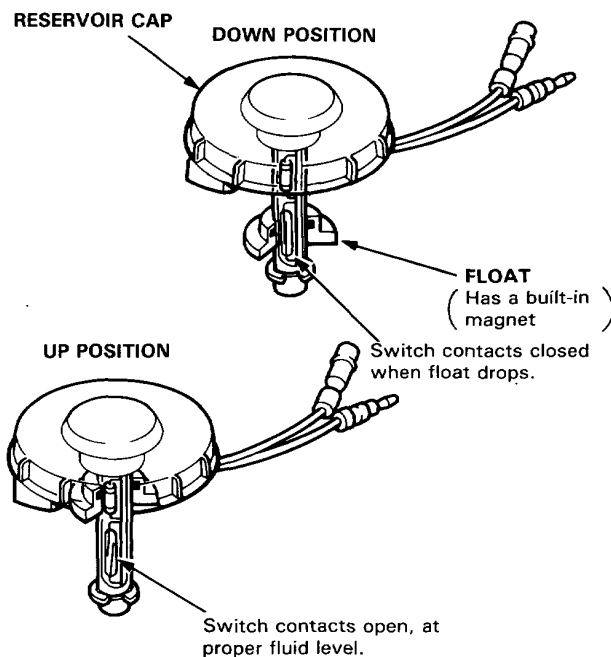
Parking Brake Switch Test

1. Remove the floor console and disconnect the connector from the switch.
2. There should be continuity between the positive terminal and body ground with the brake lever up. There should be no continuity with the brake lever down.



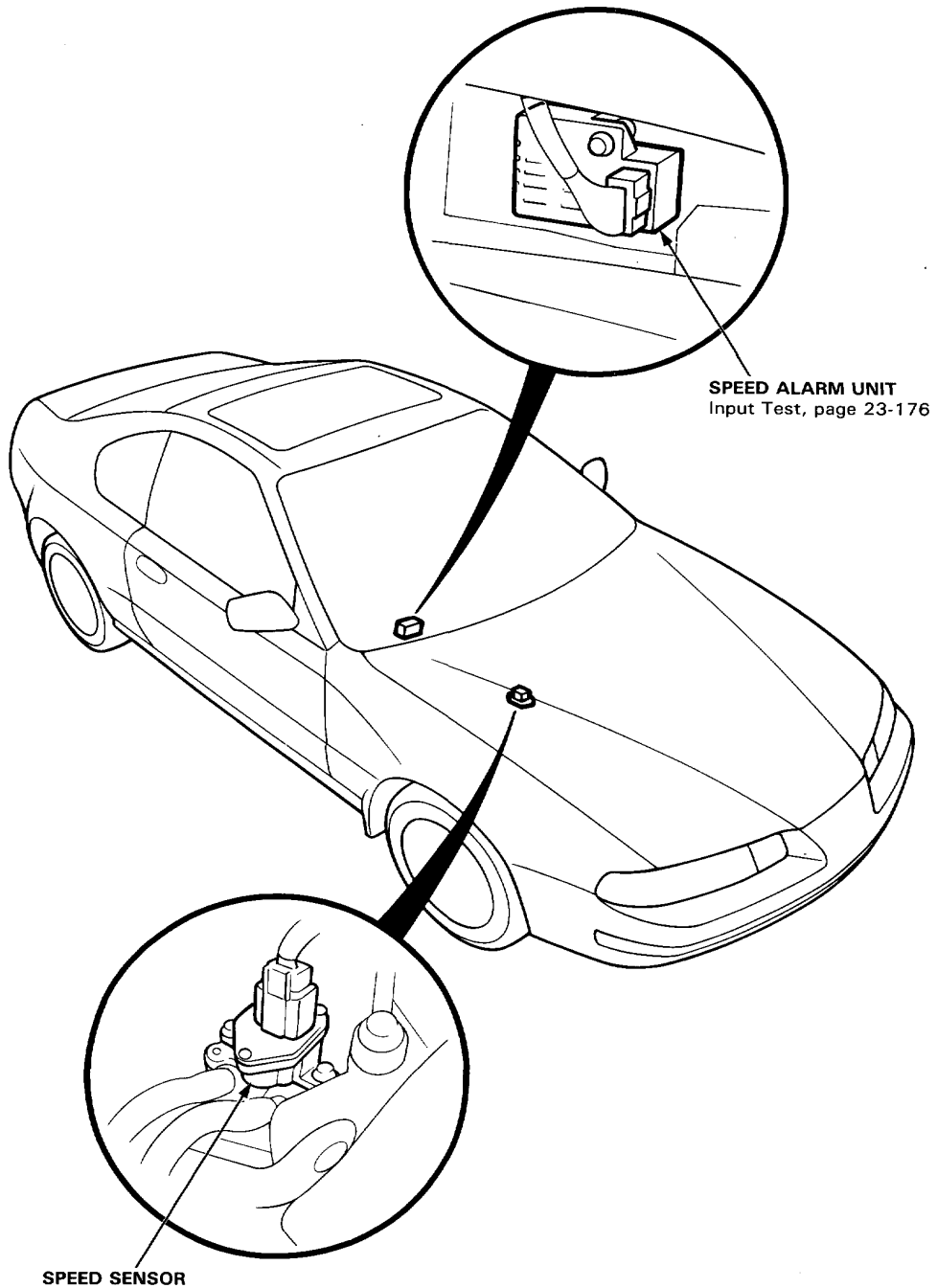
Brake Fluid Level Switch Test

1. Remove the reservoir cap. Check that the float moves up and down freely. Replace the reservoir cap assembly if the float does not move freely.
2. Check for continuity between the terminals with the float up and down. There should be continuity with the float down and no continuity with the float up. Replace the reservoir cap assembly if necessary.



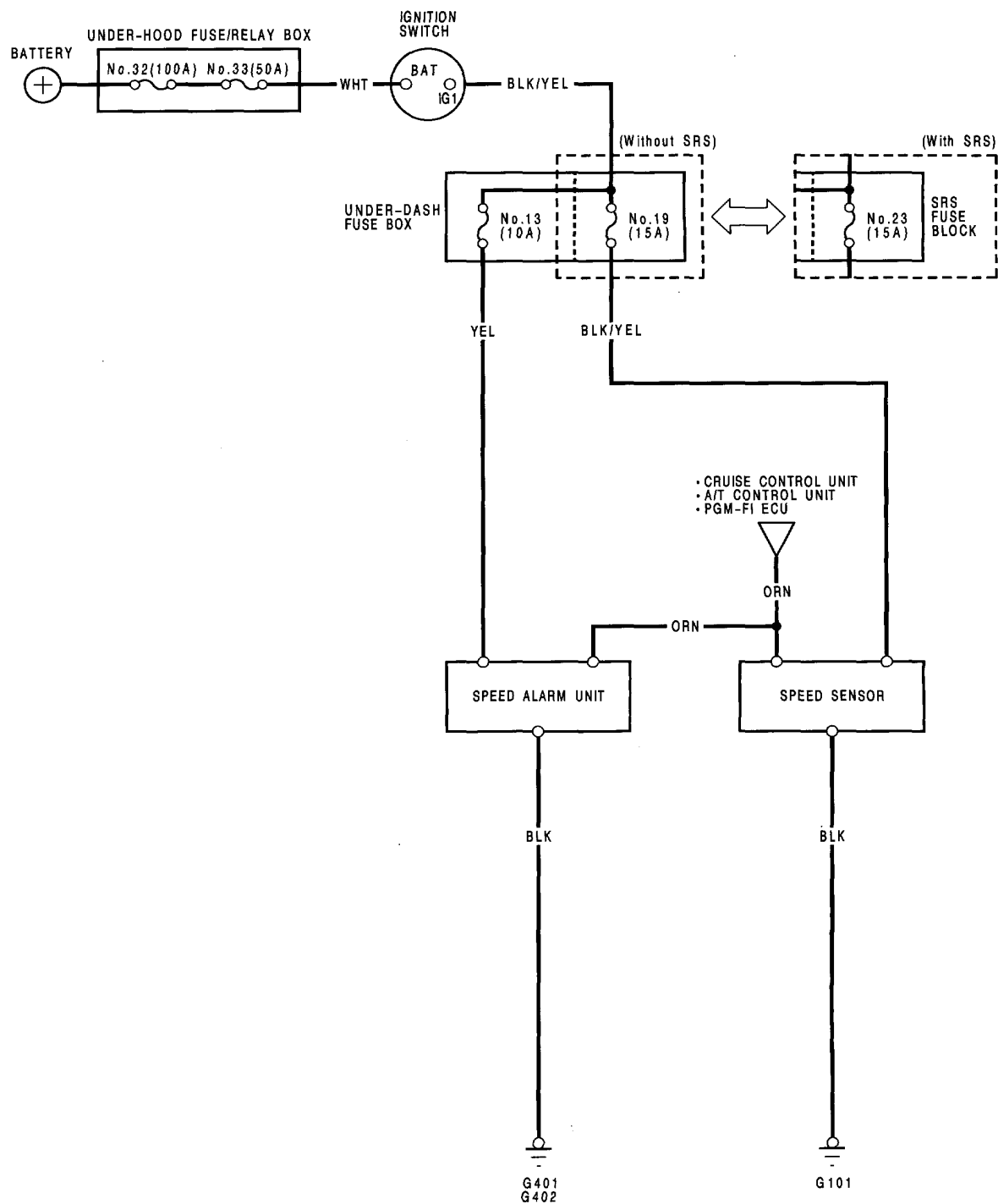
Speed Alarm System (KY model)

Component Location Index





Circuit Diagram

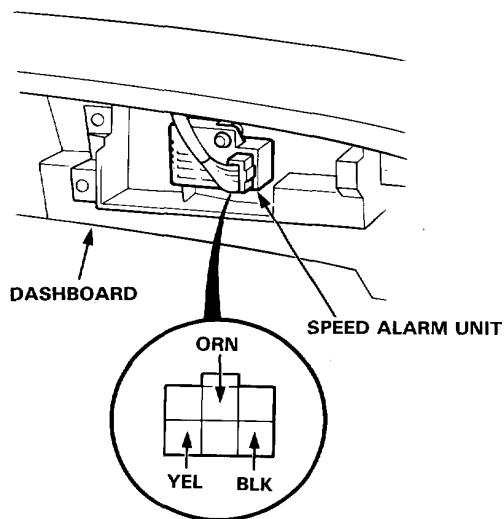


Speed Alarm System (KY model)

Speed Alarm Unit Test

NOTE: Check for the No. 13 (10A) fuse in the under-dash fuse box, before testing.

1. Remove the right speaker cover.
2. Remove the meter visor.
3. Remove the meter black face panel.



View from wire side.

6. Ignition switch OFF, reconnect the 6-P connector to the speed alarm unit, and connect the voltmeter to the ORN wire terminal.
7. Raise the car and place safety stands in the proper locations (see section 1).
8. Turn the ignition switch on again and rotate the front wheel slowly, then check to see the voltmeter indicator moves from 0 V to 5 V and then from 5 V to 0 V alternately.
 - If there is no voltage, check for:
 - Defective speed sensor (see page 23-166).
 - An open in the ORN wire.
9. Replace the speed alarm unit if the speed sensor is normal.

4. Check for continuity between the BLK terminal and the body ground.

There should be continuity.

 - If there is no continuity, check for:
 - An open in the BLK wire.
 - Poor ground (G401, G402).
 - If there is continuity, go to step 5.
5. Check for voltage between the YEL terminal and the body ground with the ignition switch ON.

There should be battery voltage.

 - If there is no voltage, check for an open in the YEL wire.
 - If there is battery voltage, go to step 6.



Shift Lever Position Indicator

Component Location Index (LHD)

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

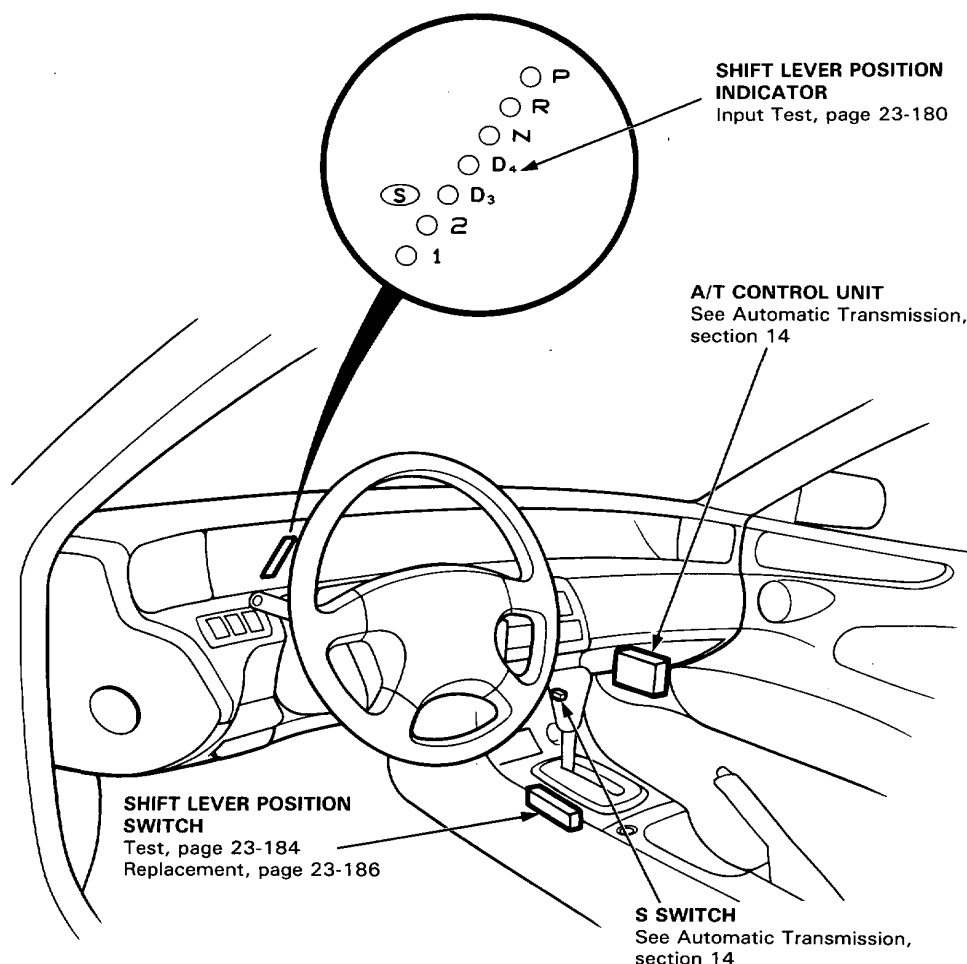
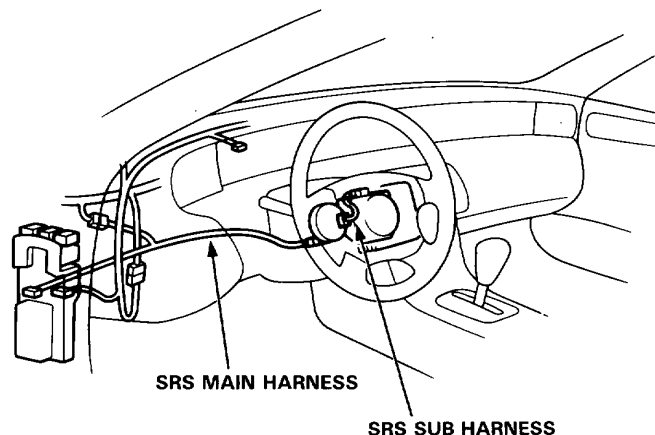
MAIN GAUGE ASSEMBLY

Removal, page 23-156

Disassembly, page 23-162

A/T CONTROL SYSTEM

See Automatic Transmission, section 14

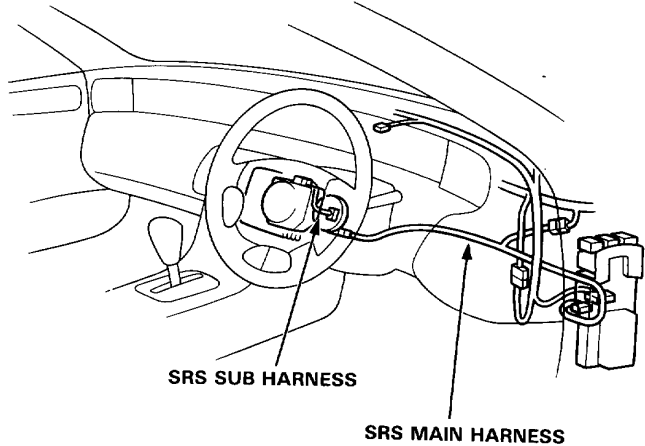


Shift Lever Position Indicator

Component Location Index (RHD)

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



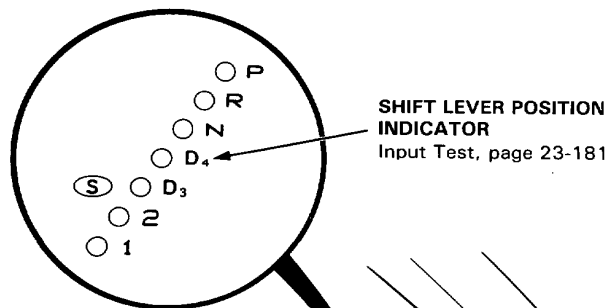
MAIN GAUGE ASSEMBLY

Removal, page 23-156

Disassembly, page 23-164

A/T CONTROL SYSTEM

See Automatic Transmission, section 14

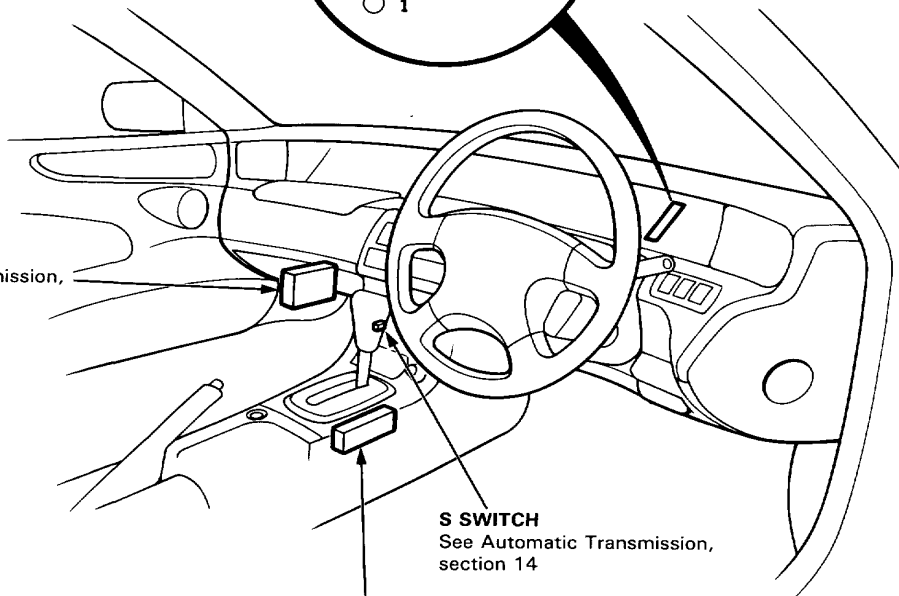


SHIFT LEVER POSITION INDICATOR

Input Test, page 23-181

A/T CONTROL UNIT

See Automatic Transmission, section 14



S SWITCH

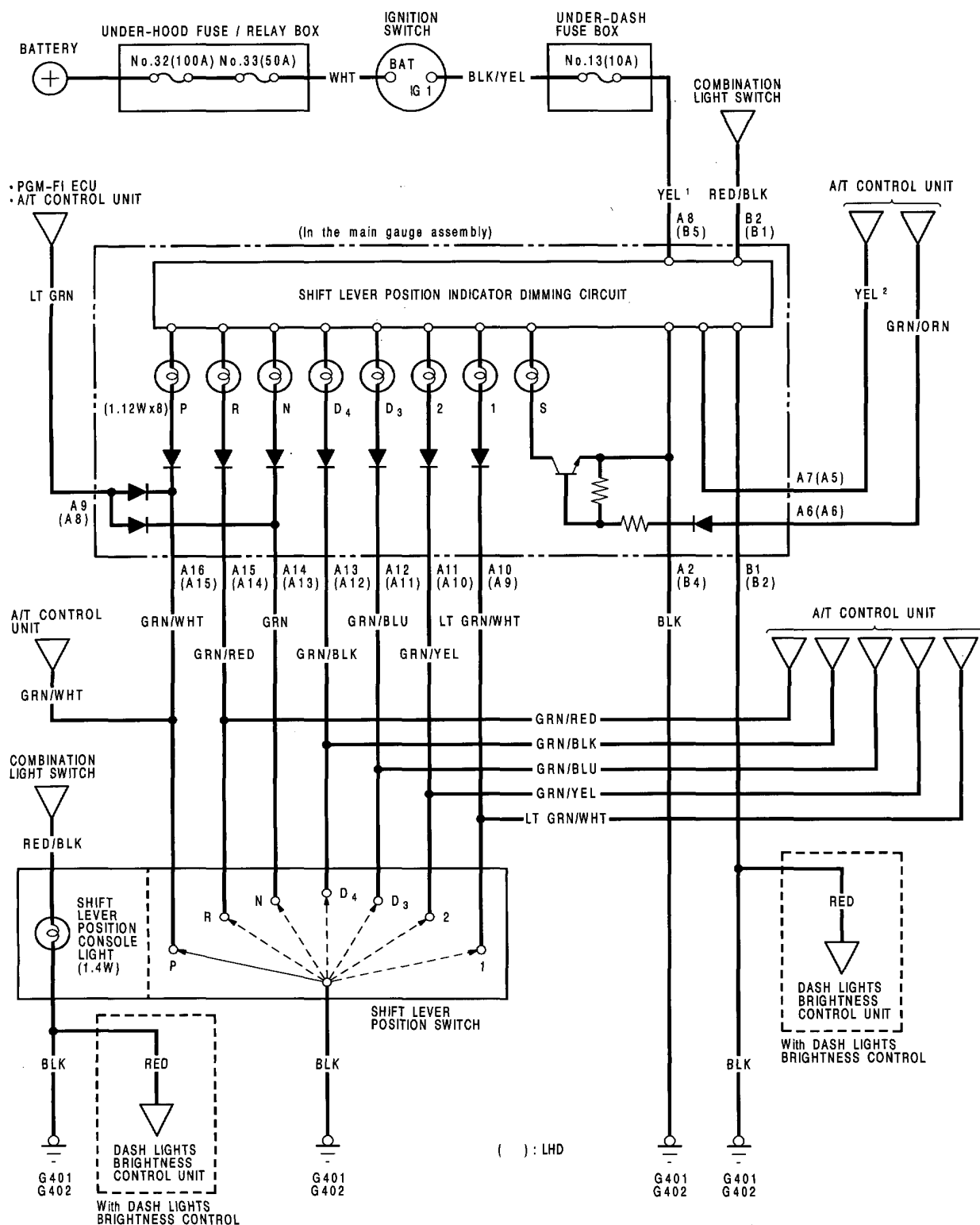
See Automatic Transmission, section 14

SHIFT LEVER POSITION SWITCH

Test, page 23-185

Replacement, page 23-186

Circuit Diagram



Shift Lever Position Indicator

Indicator Input Test (LHD)

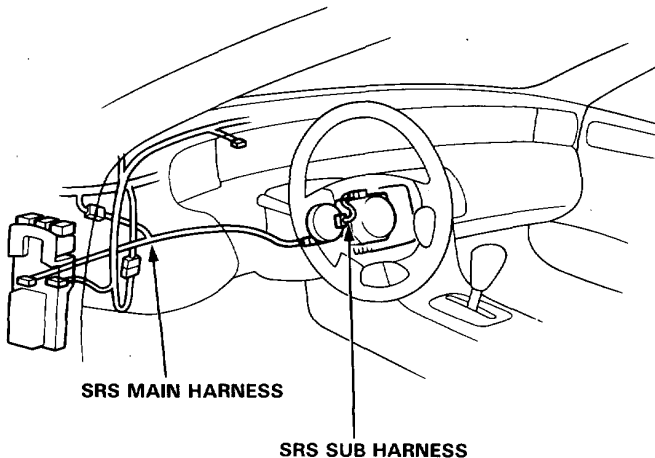
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

Remove the main gauge assembly from the dashboard (see page 23-156), and disconnect the 16-P and 10-P connectors from it.

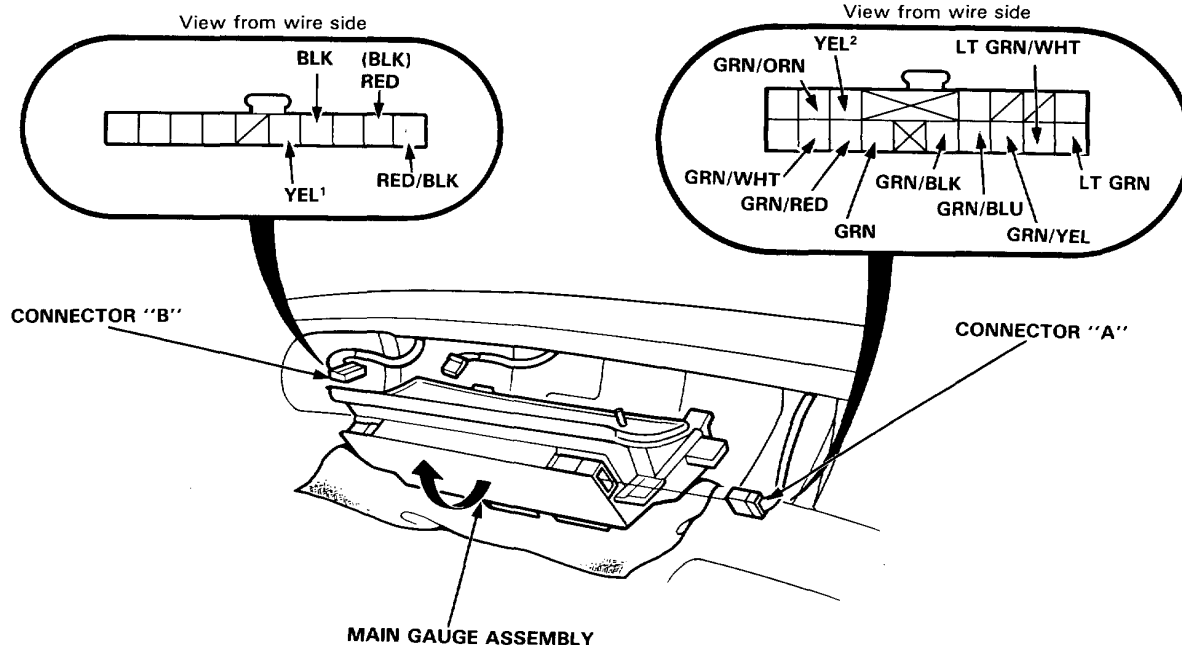
Inspect the connector terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector terminals.
 - If a test indicates a problem, find and correct the cause, then recheck the system.
 - If all the input tests prove OK, the indicator must be faulty; replace the gauge assembly.



NOTE: Several different wires have the same color. They have been given a number suffix to distinguish them (for example YEL¹ and YEL² are not the same).

(): Without DASH LIGHTS
BRIGHTNESS CONTROL





No.	Wire	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	YEL ¹	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 13 (10 A) fuse. • An open in the wire.
3	GRN/WHT	Shift lever in position P.	Check for continuity to ground: There should be continuity. NOTE: There should be no continuity in any other position.	<ul style="list-style-type: none"> • Faulty shift lever position switch. • Poor ground (G401, G402). • An open in the wire.
	GRN/RED	Shift lever in position R.		
	GRN	Shift lever in position N.		
	GRN/BLU	Shift lever in position D ₃ .		
	GRN/YEL	Shift lever in position 2.		
	LT GRN/WHT	Shift lever in position 1.		
4	RED/BLK and RED	Combination light switch ON and dash lights brightness control dial on full bright.	Check for voltage between RED/BLK and RED terminals: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty dash lights brightness control system. • An open in the wire.
5	GRN/ORN	Ignition switch ON and shift lever in position D ₃ or D ₄ and S switch ON.	Check for voltage to ground: There should be about 5 V.	<ul style="list-style-type: none"> • Faulty A/T control unit. • An open in the wire. • Faulty S switch. • Faulty shift lever position switch.
6	YEL ²	Ignition switch ON and shift lever in position D ₃ or D ₄ and S switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty A/T control unit. • An open in the wire. • Faulty S switch. • Faulty shift lever position switch.
7	LT GRN	Ignition switch ON.	Check for voltage to ground: There should be more than 5 V.	<ul style="list-style-type: none"> • Faulty A/T control unit or PGM-FI ECU. • An open in the wire.

Shift Lever Position Indicator

Indicator Input Test (RHD)

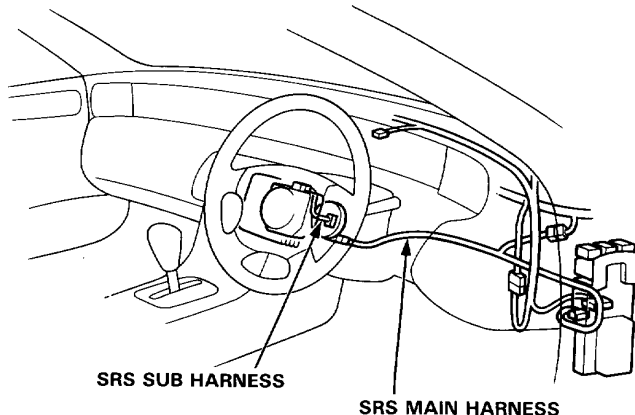
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

Remove the main gauge assembly from the dashboard (see page 23-156), and disconnect the 16-P and 10-P connectors from it.

Inspect the connector terminals to be sure they are all making good contact.

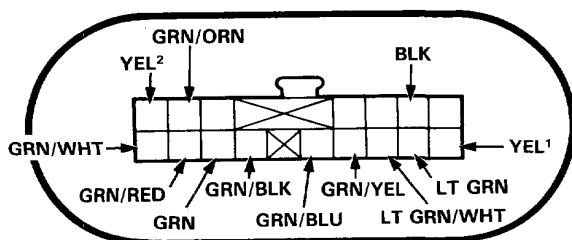
- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector terminals.
 - If a test indicates a problem, find and correct the cause, then recheck the system.
 - If all the input tests prove OK, the indicator must be faulty; replace it



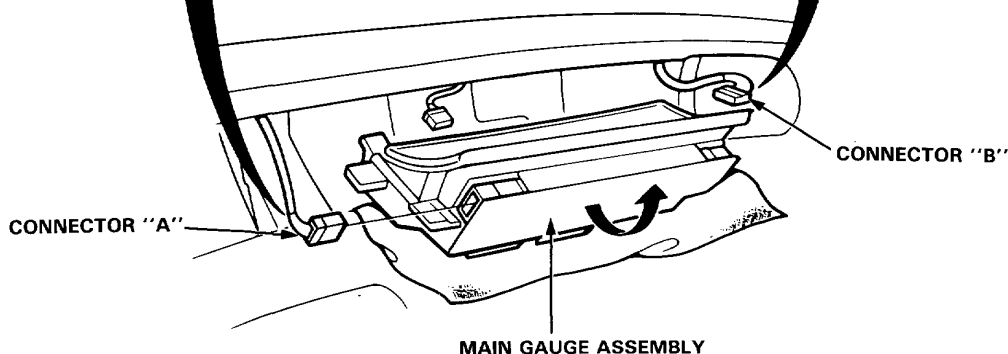
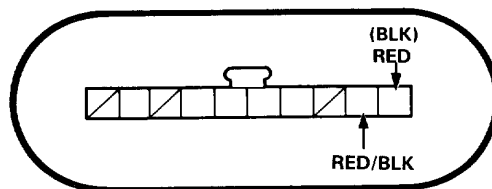
NOTE: Several different wires have the same color. They have been given a number suffix to distinguish them (for example YEL¹ and YEL² are not the same).

(): Without DASH LIGHTS BRIGHTNESS CONTROL

View from wire side



View from wire side



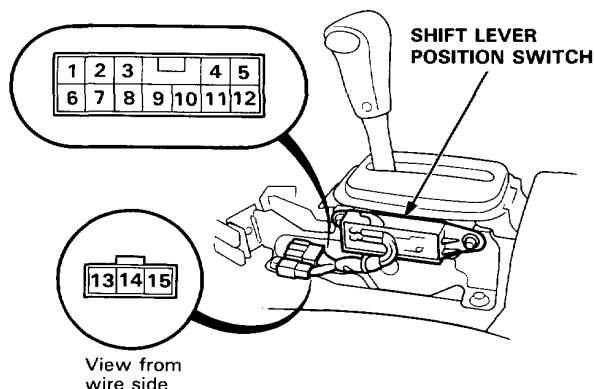


No.	Wire	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	YEL ¹	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 13 (10 A) fuse. • An open in the wire.
3	GRN/WHT	Shift lever in position P.	Check for continuity to ground: There should be continuity. NOTE: There should be no continuity in any other position.	<ul style="list-style-type: none"> • Faulty shift lever position switch. • Poor ground (G401, G402). • An open in the wire.
	GRN/RED	Shift lever in position R.		
	GRN	Shift lever in position N.		
	GRN/BLU	Shift lever in position D ₃ .		
	GRN/YEL	Shift lever in position 2.		
	LT GRN/WHT	Shift lever in position 1.		
4	RED/BLK and RED	Combination light switch ON and dash lights brightness control dial on full bright.	Check for voltage between RED/BLK and RED terminals: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty dash lights brightness control system. • An open in the wire.
5	GRN/ORN	Ignition switch ON and shift lever in position D ₃ or D ₄ and S switch ON.	Check for voltage to ground: There should be about 5 V.	<ul style="list-style-type: none"> • Faulty A/T control unit. • An open in the wire. • Faulty S switch. • Faulty shift lever position switch.
6	YEL ²	Ignition switch ON and shift lever in position D ₃ or D ₄ and S switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty A/T control unit. • An open in the wire. • Faulty S switch. • Faulty shift lever position switch.
7	LT GRN	Ignition switch ON.	Check for voltage to ground: There should be more than 5 V.	<ul style="list-style-type: none"> • Faulty A/T control unit or PGM-FI ECU. • An open in the wire.

Shift Lever Position Indicator

Shift Lever Position Switch Test (LHD)

1. Remove the console, then disconnect the 12-P and 3-P connectors from the switch.
2. Check for continuity between the terminals in each switch position according to the table.
 - Move the lever back and forth at each position without touching the push button, and check for continuity within the range of free play.
 - If there is no continuity within the range of free play, adjust the installed position of the switch as described below.



Shift Lever Position Switch

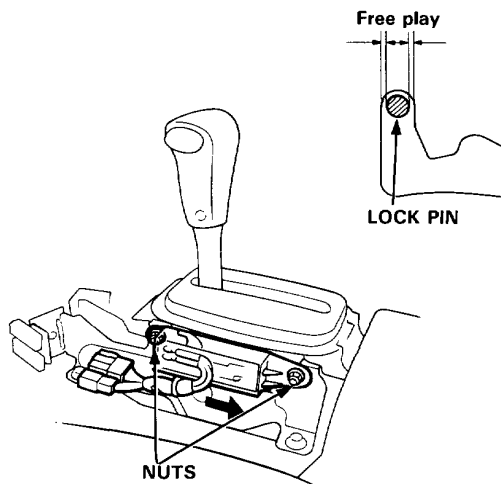
Terminal	8	1	2	3	4	5	6	7	11	Back-up Light Switch 9	10	Neutral Safety Switch 13	15
Positon													
1	○				○								
2	○			○		○							
D ₃	○		○			○							
D ₄	○	○				○							
N	○						○					○	○
R	○							○		○	○		
P	○								○			○	○

Adjustment:

1. Shift to the "P" position, and loosen the nuts.
2. Slide the switch in the direction of P position [within 2.0 mm (0.079 in)] until there is continuity between No. 8 and No. 11 terminals in the range of free play of the shift lever.
3. Recheck for continuity between each of the terminals.

NOTE:

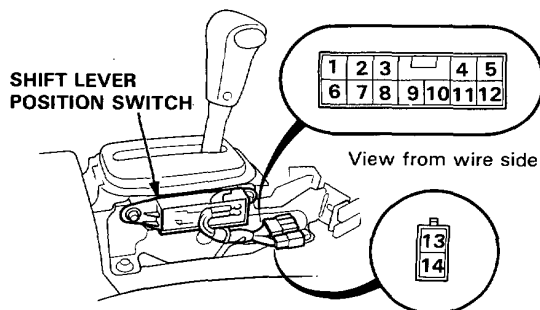
- If adjustment is not possible, check for damage to the shift lever detent and/or bracket. If there is no damage, replace the shift lever position switch.
- The engine should start when the shift lever is in position N in the range of free play.





Shift Lever Position Switch Test (RHD)

1. Remove the console, then disconnect the 12-P and 3-P connectors from the switch.
2. Check for continuity between the terminals in each switch position according to the table.
 - Move the lever back and forth at each position without touching the push button, and check for continuity within the range of free play.
 - If there is no continuity within the range of free play, adjust the position of the switch as described below.



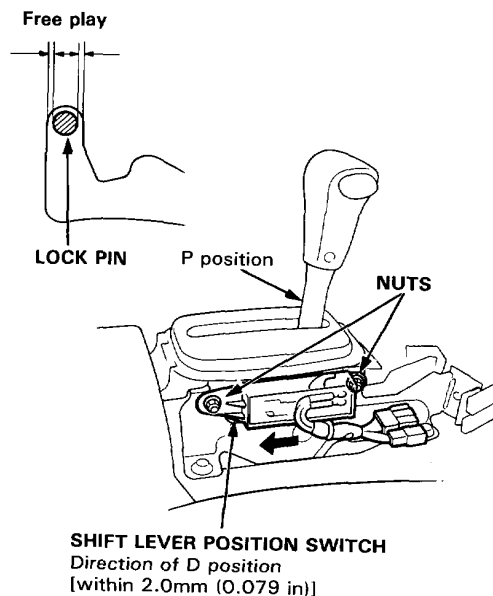
Shift Lever Position Switch										Back-up Light Switch		Neutral Safety Switch	
<div>Terminal</div> <div>Position</div>	8	1	2	3	4	5	6	7	11	9	10	13	14
1	<div><div></div></div>				<div><div></div></div>								
2	<div><div></div></div>			<div><div></div></div>									
D ₃	<div><div></div></div>		<div><div></div></div>			<div><div></div></div>							
D ₄	<div><div></div></div>	<div><div></div></div>				<div><div></div></div>							
N	<div><div></div></div>						<div><div></div></div>					<div><div></div></div>	<div><div></div></div>
R	<div><div></div></div>							<div><div></div></div>		<div><div></div></div>	<div><div></div></div>		
P	<div><div></div></div>								<div><div></div></div>			<div><div></div></div>	<div><div></div></div>

Adjustment:

1. Shift to the "P" position, and loosen the nuts.
2. Slide the switch in the direction of P position [within 2.0 mm (0.079 in)] until there is continuity between No. 8 and No. 11 terminals in the range of free play of the shift lever.
3. Recheck for continuity between each of the terminals.

NOTE:

- If adjustment is not possible, check for damage to the shift lever detent and/or bracket. If there is no damage, replace the shift lever position switch.
- The engine should start when the shift lever is in position N in the range of free play.



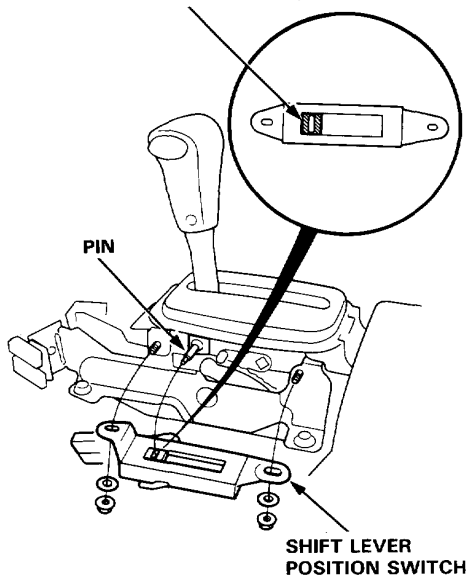
Shift Lever Position Indicator

Shift Lever Position Switch Replacement

NOTE: RHD type is symmetrical to LHD type.

1. Remove the console, then disconnect the 12-P and 3-P (2-P) connectors from the switch.
2. Remove the two console switch mounting nuts, and remove the switch.

SWITCH SLIDER (in NEUTRAL)



3. Position the slider on the new switch to "Neutral" as shown above.
4. Shift the select lever to "Neutral", then slip the switch into position.
5. Attach the switch with the two nuts.
6. Test the switch in the P and N positions.

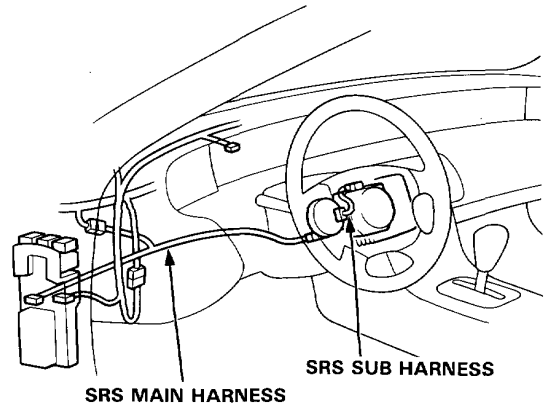
NOTE: The engine should start when the shift lever is in position N anywhere in the range of free play.

7. Connect the 12-P and 3-P connectors, clamp the harness and install the console.

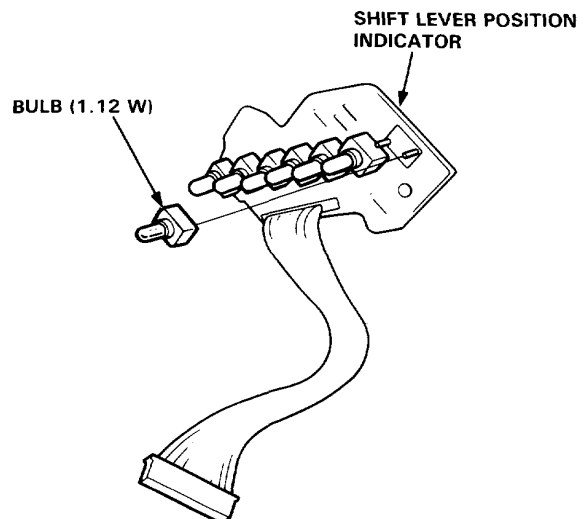
Bulb Replacement

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



1. Remove the main gauge assembly (see page 23-156).
2. Disassemble the main gauge assembly (see page 23-162, 164).
3. Remove the bulb from the shift lever position indicator circuit board.



4. Install the indicator in the reverse order of removal.

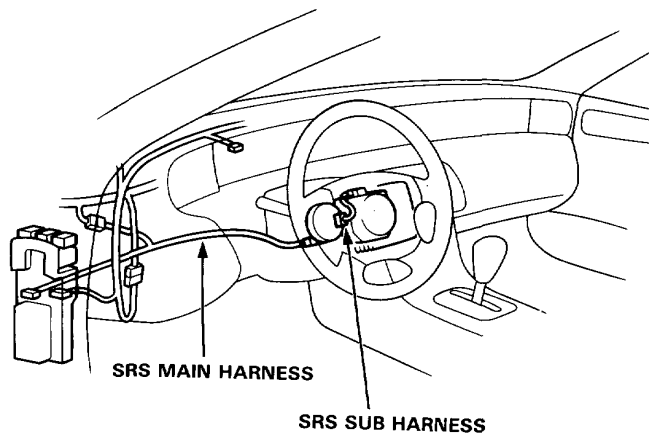


Safety Indicator

Component Location Index (LHD)

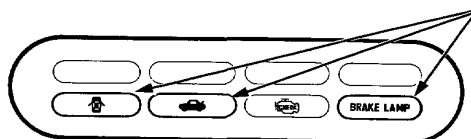
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



SAFETY INDICATOR (In the sub gauge assembly)

- Troubleshooting, page 23-195
- Removal, page 23-156
- Input Test, page 23-196
- Bulb Replacement, page 23-163



CEILING LIGHT

Test/Replacement, page 23-251

HIGH MOUNT BRAKE LIGHT

Replacement, page 23-259

RIGHT COURTESY LIGHT

Replacement, page 23-250
(KY model)

PASSENGER'S DOOR SWITCH

Test, page 23-250

TRUNK LIGHT

Test, page 23-252

BRAKE LIGHT SWITCH

Test, page 23-259

LEFT COURTESY LIGHT

Replacement, page 23-250
(KY model)

DRIVER'S DOOR SWITCH

Test, page 23-250

LEFT BRAKE LIGHT FAILURE SENSOR

Test, page 23-198, 199

RIGHT BRAKE LIGHT FAILURE SENSOR

Test, page 23-198, 199

TRUNK LATCH SWITCH

Test/Replacement, page 23-252

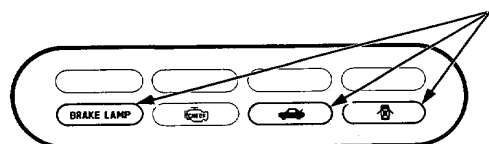
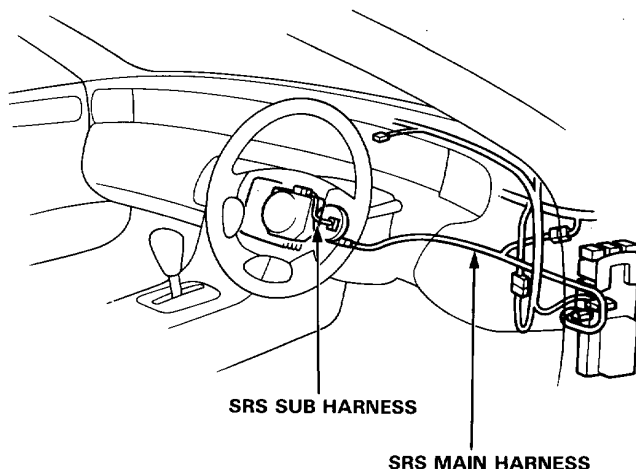


Safety Indicator

Component Location Index (RHD)

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



SAFETY INDICATOR (In the sub gauge assembly)

- Troubleshooting, page 23-195
- Removal, page 23-156
- Input Test, page 23-196
- Bulb Replacement, page 23-165

CEILING LIGHT

Test/Replacement, page 23-251

HIGH MOUNT BRAKE LIGHT

Replacement, page 23-259

RIGHT COURTESY LIGHT

Replacement, page 23-250
(KQ model)

DRIVER'S DOOR SWITCH

Test, page 23-250

TRUNK LIGHT

Test, page 23-252

BRAKE LIGHT SWITCH

Test, page 23-259

LEFT COURTESY LIGHT

Replacement, page 23-250
(KQ model)

PASSENGER'S DOOR SWITCH

Test, page 23-250

RIGHT BRAKE LIGHT

FAILURE SENSOR
Test, page 23-198, 199

TRUNK LATCH SWITCH

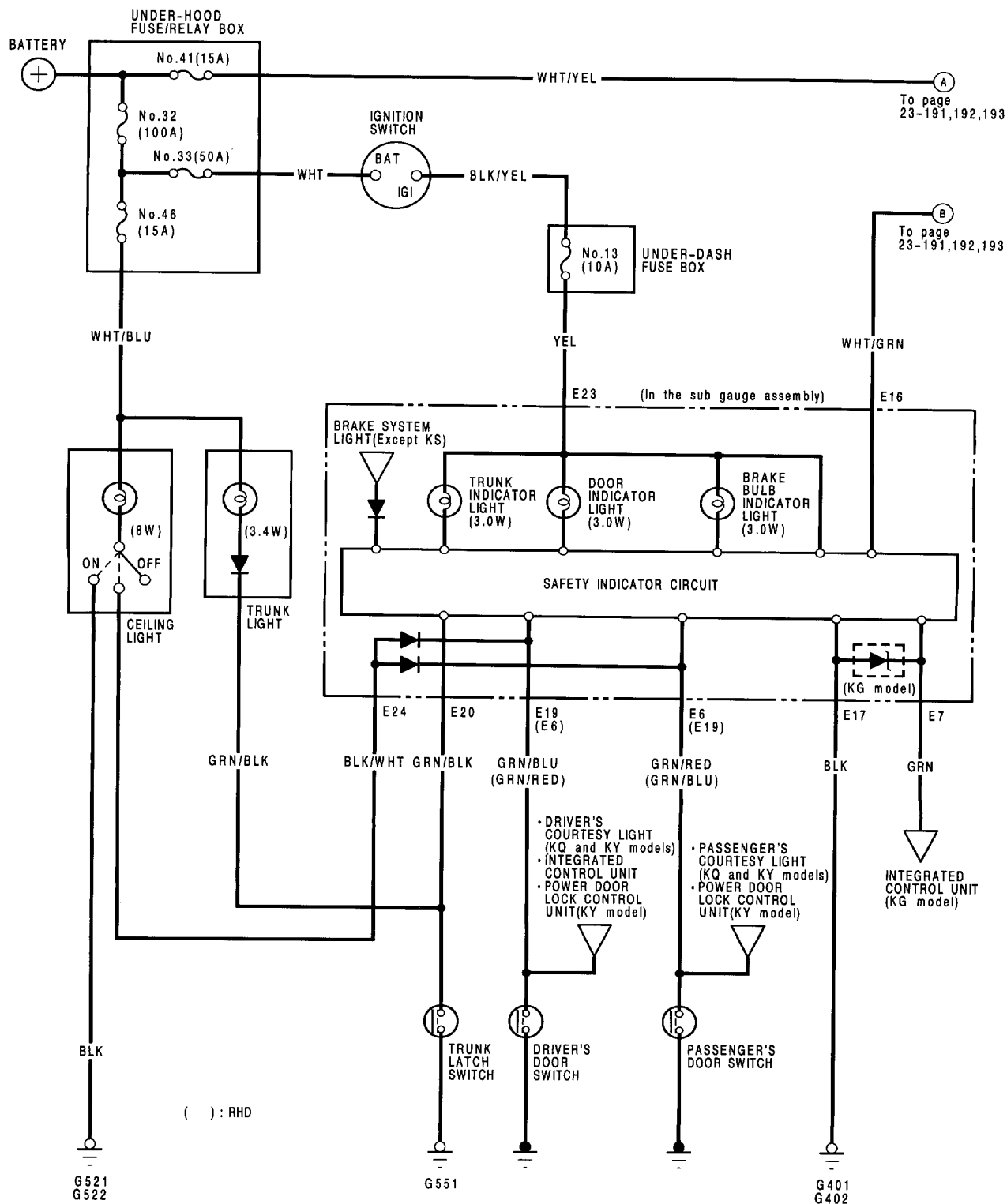
Test/Replacement, page 23-252

LEFT BRAKE LIGHT

FAILURE SENSOR
Test, page 23-198, 199

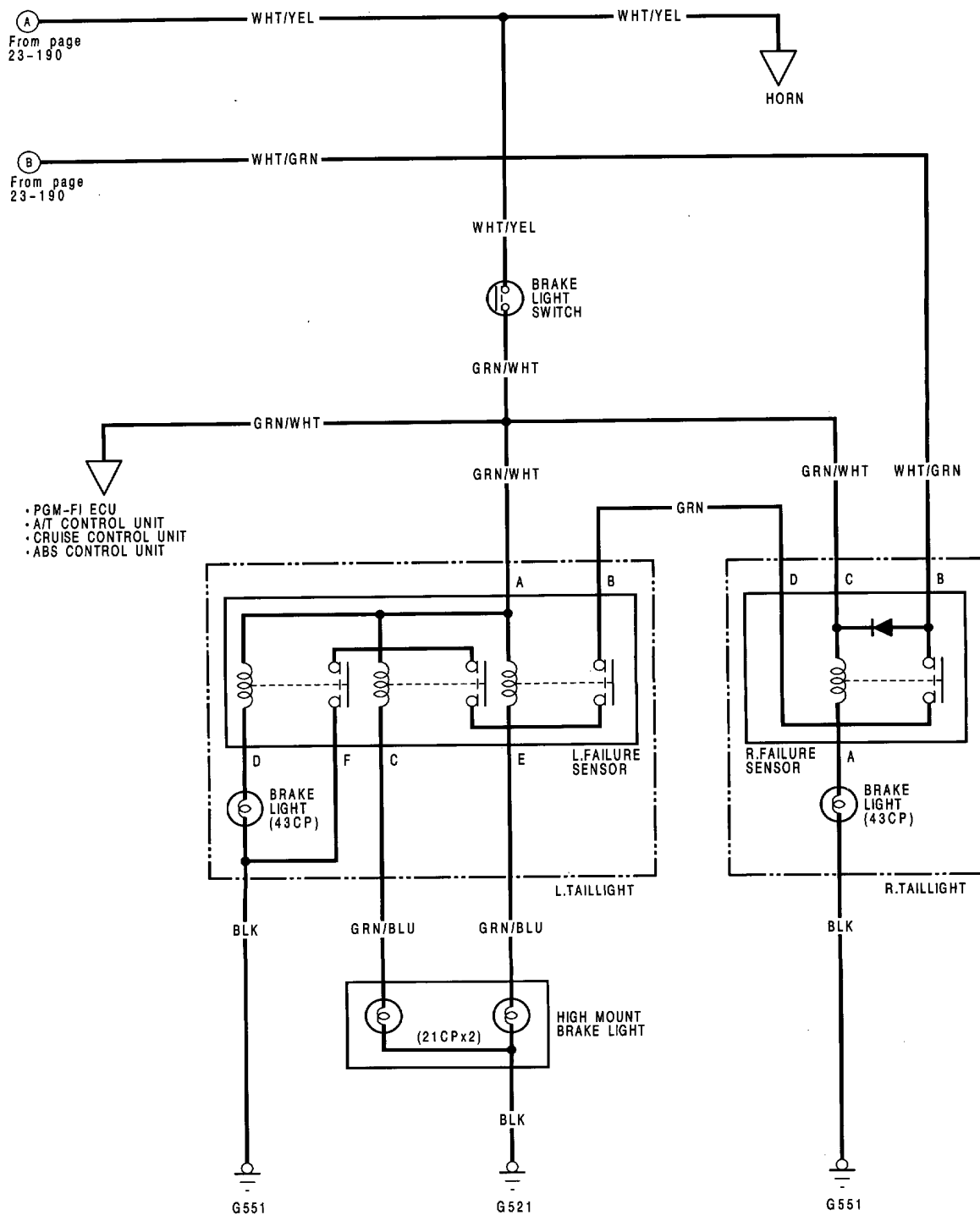
Safety Indicator

Circuit Diagram





KQ and KY models :

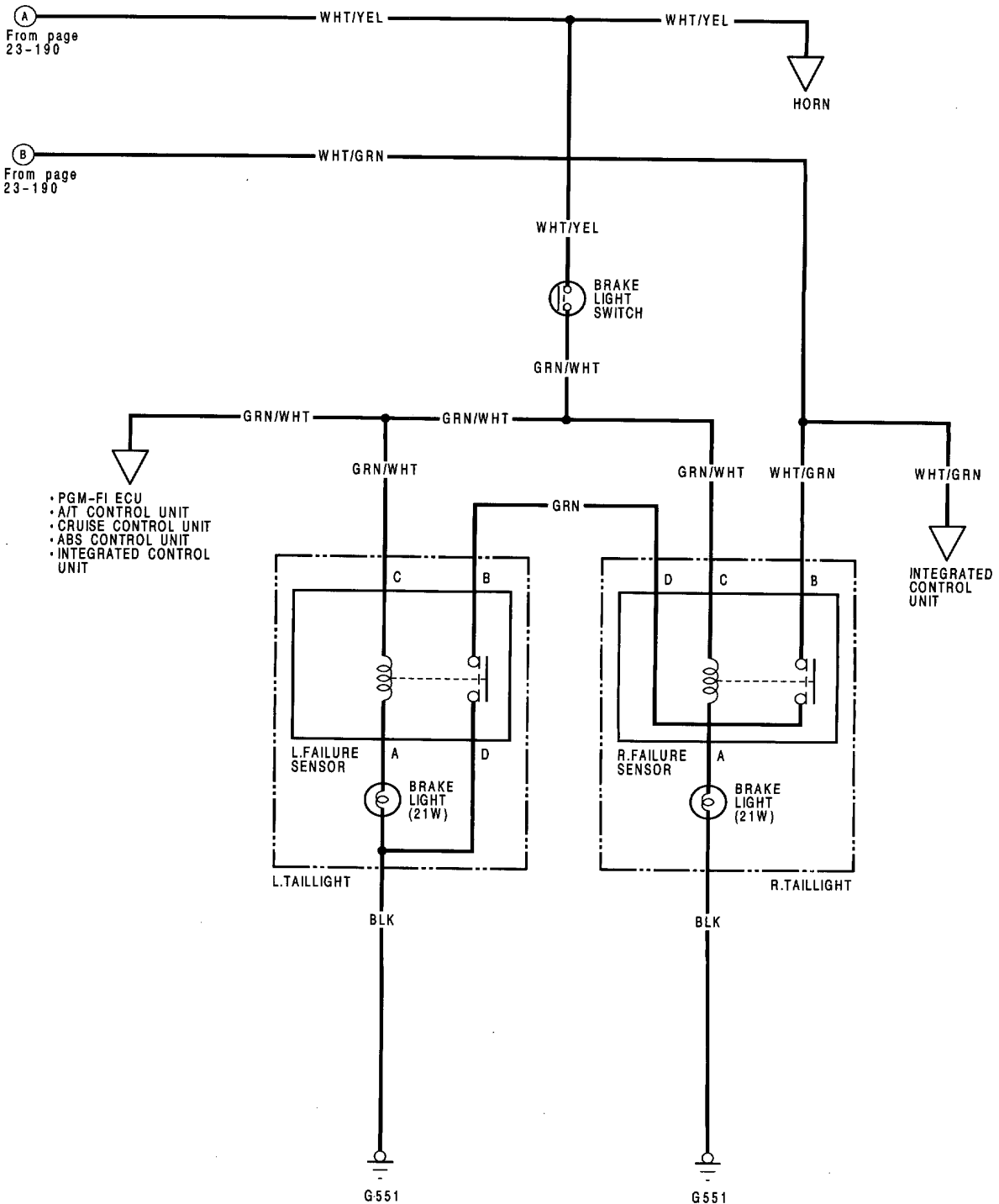


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Safety Indicator

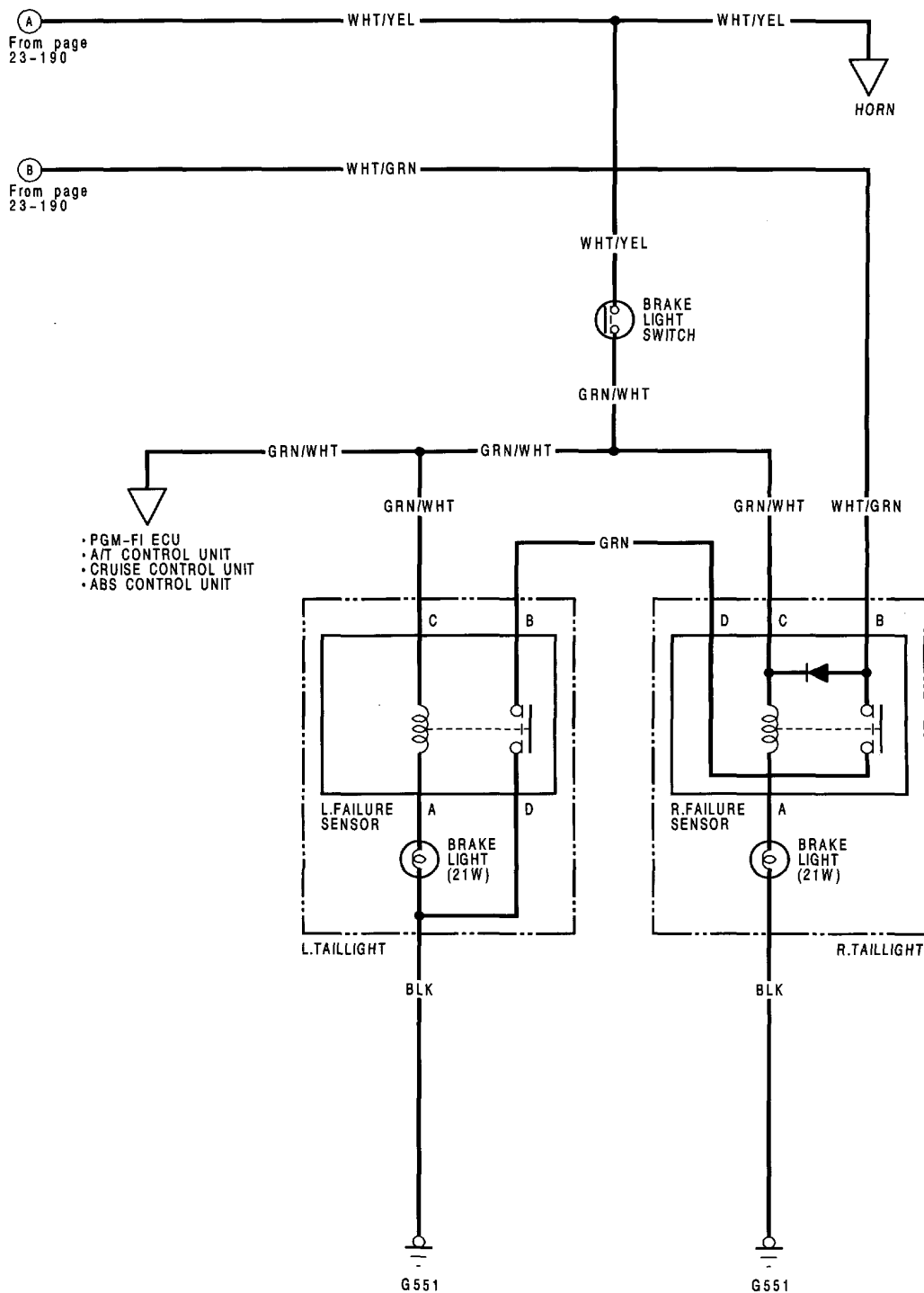
Circuit Diagram

KG model :





Except KG,KQ,KY :



Safety Indicator

Description

Safety Indicator System:

Bulbs are used to indicator when the trunk lid or a door is not fully closed, or when a brake lights is faulty, the bulbs will remain ON for about 2 seconds after the ignition switch has been turned ON to show that the system circuit is functioning.

Brake Light Bulb Failure Indicator: European and KT models

If all brake light bulbs are OK, the indicator light stays off because the WHT/GRN wire is constantly being grounded by the two brake light failure sensors connected in series. With the brake light off, the ground is provided through the diode, the failure sensor relay coil, and the bulb filaments to ground. With the brake light on, all 2 relays (1 in the left sensor, 1 in the right sensor) connected in series, supply ground. If either of the 4 bulbs is not working, the chain is broken and the WHT/GRN wire is not being grounded. The indicator light comes on.

Brake Light Bulb Failure Indicator: KQ and KY models

If all brake light bulbs are OK, the indicator light stays off because the WHT/GRN wire is constantly being grounded by the two brake light failure sensors connected in series. With the brake light off, the ground is provided through the diode, the failure sensor relay coil, and the bulb filaments to ground. With the brake light on, all 3 relays (2 in the left sensor, 1 in the right sensor) connected in series, supply ground. If either of the 4 bulbs is not working, the chain is broken and the WHT/GRN wire is not being grounded. The indicator light comes on.

Brake Light Circuit Failure Indicator: KG model

When the ignition switch is turned ON, the brake system light stays on.

When the brake pedal is depressed once, the brake system light should go out. If there id defect in the brake system (blown fuse, faulty brake light switch, open or short circuit and blown bulbs), the brake system light stays on with the brake pedal operated.



Troubleshooting

NOTE: The numbers in the table show the troubleshooting sequence.

Symptom	Item to be inspected								
	Blown No. 13 (10 A) fuse (In the under-dash fuse box)	Blown No. 46 (15 A) fuse (In the under-hood fuse/relay box)	Safety indicator input test	Blown bulb	Brake light failure sensor	Door switch	Trunk latch switch	Poor ground	Open circuit, loose or disconnected terminals
No indicators operate.	1		2					G401 G402	YEL
Indicator lights fail to come on when ignition switch is turned to ON.			1						
Door indicator lights not on with doors open.			2			1			GRN/BLU GRN/RED
Trunk indicator light not on with trunk lid open.			2				1	G521	GRN/BLK
Brake indicator light not on with blown brake light bulb.			1						WHT/GRN or GRN
Brake indicator light remains on with good brake light bulbs.			2		1			G551	
Ceiling light not on with door open. (With switch in MIDDLE position)		1	2						BLK/WHT

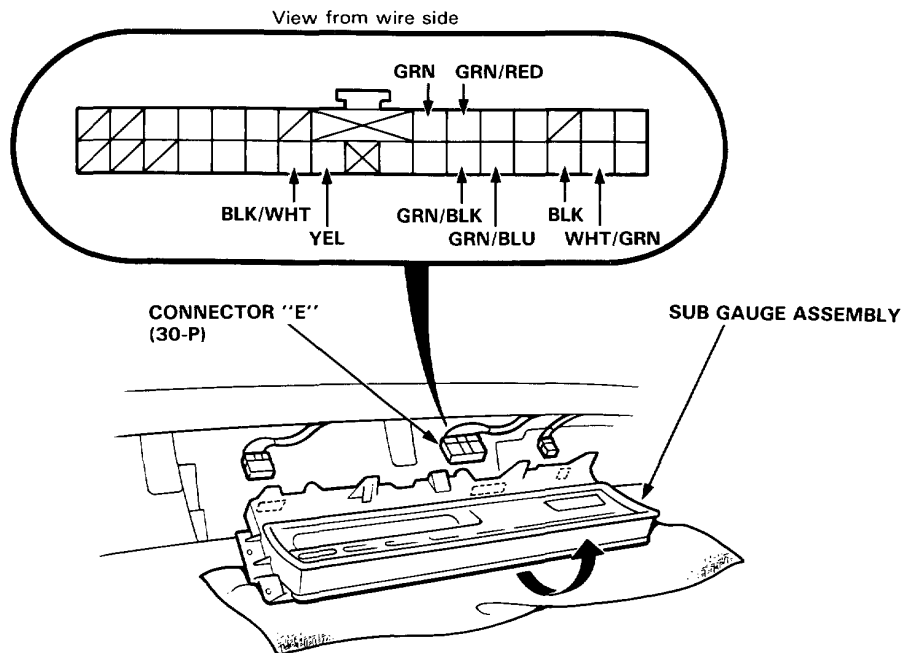
Safety Indicator

Indicator Input Test

Remove the sub gauge assembly from the dashboard (see page 23-156), and disconnect the 30-P connector from the sub gauge assembly.

Inspect the connector terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector terminals.
 - If a test indicates a problem, find and correct the cause, then recheck the system.
 - If all the input tests prove OK, the printed circuit board must be faulty; replace it.





No.	Wire	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	YEL	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 13 (10 A) fuse. • An open in the wire.
3	WHT/GRN	Brake pedal pushed.	Check for continuity to ground: There should be less than 4 K ohms with the pedal pushed.	<ul style="list-style-type: none"> • Blown No. 41 (15 A) fuse. • Faulty brake light switch. • Blown brake light bulbs. • Faulty brake light failure sensors. • Poor ground (G521, G551). • An open in the WHT/GRN or GRN/WHT wire.
4	GRN/BLK	Trunk lid open.	Check for continuity to ground: There should be continuity. NOTE: Before testing, remove No. 46 (15 A) fuse.	<ul style="list-style-type: none"> • Faulty trunk latch switch. • Poor ground (G521). • An open in the wire.
5	BLK/WHT	Ceiling light switch in MIDDLE position.	Connect to ground: Ceiling light should come on.	<ul style="list-style-type: none"> • Blown No. 46 (15 A) fuse. • Faulty ceiling light. • An open in the WHT/BLU or BLK/WHT wire.
6	GRN/BLU (GRN/RED)	Driver's door open.	Check for continuity to ground: There should be continuity. NOTE: Before testing, remove No. 46 (15 A) fuse. (KQ and KY model)	<ul style="list-style-type: none"> • Faulty door switch. • An open in the wire.
	GRN/RED (GRN/BLU)	Passenger's door open.		

(): RHD

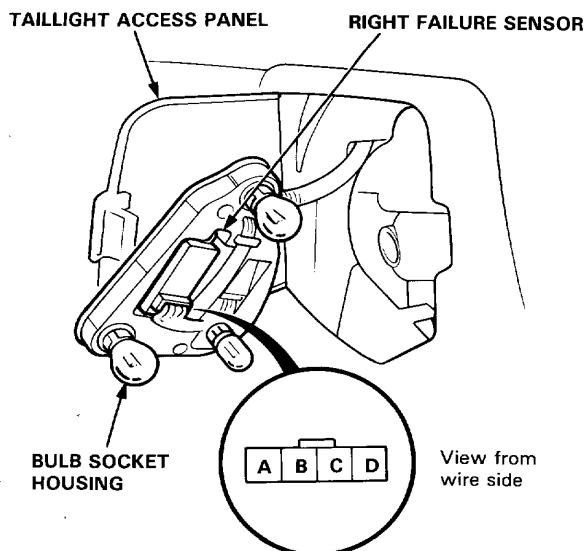
KG model:

No.	Wire	Test condition	Test: Desired result	Possible cause (If result is not obtained)
7	GRN	With brake pedal released, ignition switch OFF to ON.	Check for continuity in both directions between the GRN and BLK terminals: There should be continuity in only one direction as the ignition switch is turned ON, then no continuity in both directions with brake pedal pushed.	<ul style="list-style-type: none"> • Faulty brake light circuit failure sensor.

Safety Indicator

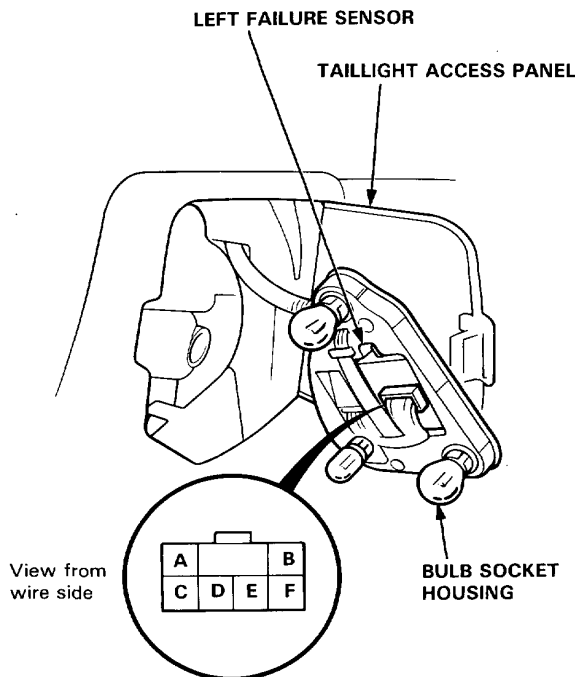
Brake Light Failure Sensor Test (KQ and KY models)

- First make sure the brake lights come on when the brake pedal is pressed.
 - If all the brake lights come on, go to step 2.
 - If one of the brake lights does not come on, check whether the bulb is blown. If the bulb is OK, go to step 2.
 - If none of the brake lights come on, check the brake light circuit (see page 23-190).
- Open the trunk lid and the taillight access panel to the right taillight. Remove the bulb socket housing. Watch the **BRAKE LAMP** light in the safety indicator when the **B** (WHT/GRN) wire of the 4-P connector is grounded and the ignition switch is turned from OFF to ON.



- If the **BRAKE LAMP** light comes on and stays on, check for an open in the **B** (WHT/GRN) wire between the safety indicator and the right failure sensor.
 - If the **BRAKE LAMP** light does not stay on, go to step 3.
- Watch the **BRAKE LAMP** light when the ignition switch is turned from OFF to ON with the **D** (GRN) wire of the 4-P connector grounded and the brake pedal pressed.
 - If the **BRAKE LAMP** light comes on and stays on, replace the right failure sensor.
 - If the **BRAKE LAMP** light does not stay on, go to step 4.

- Open the taillight access panel to the left taillight. Remove the bulb socket housing. Watch the **BRAKE LAMP** light when the ignition switch is turned from OFF to ON with the **B** (GRN) wire of the 6-P connector grounded and the brake pedal pressed.



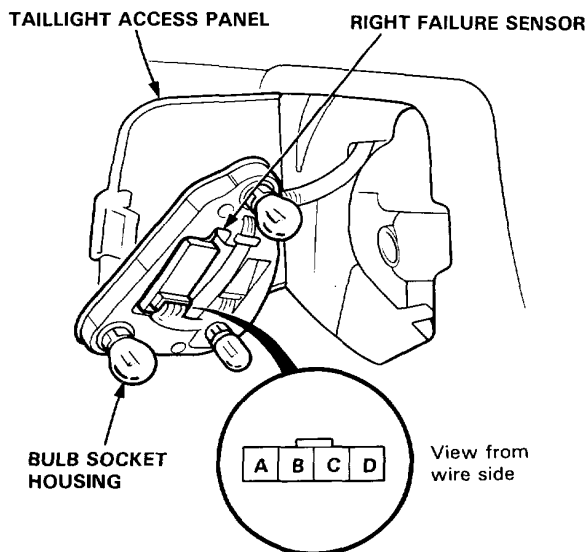
- If the **BRAKE LAMP** light comes on and stays on, there is an open in the **B** (GRN) wire between the left failure sensor and the right failure sensor.
 - If the **BRAKE LAMP** light does not stay on, go to step 5.
- Watch the **BRAKE LAMP** light when the ignition switch is turned from OFF to ON with the **F** (BLK) wire of the 6-P connector grounded and the brake pedal pressed.
 - If the **BRAKE LAMP** light comes on and stays on, replace the left failure sensor.
 - If the **BRAKE LAMP** light does not stay on, check for an open in the **F** (BLK) wire between the left failure sensor and ground, and check for a poor ground at G551.



Brake Light Failure Sensor Test (Except KQ, KY)

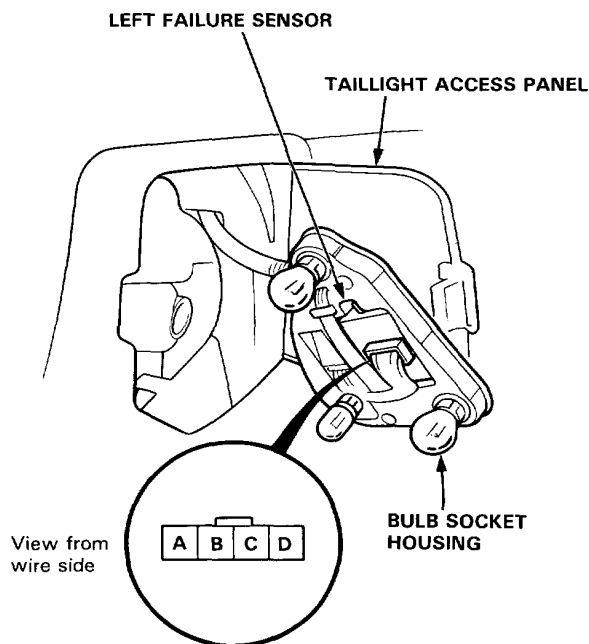
1. First make sure the brake lights come on when the brake pedal is pressed.
 - If all the brake lights come on, go to step 2.
 - If one of the brake lights does not come on, check whether the bulb is blown. If the bulb is OK, go to step 2.
 - If none of the brake lights come on, check the brake light circuit (see page 23-190).

2. Open the trunk lid and the taillight access panel to the right taillight. Remove the bulb socket housing. Watch the **BRAKE LAMP** light in the safety indicator when the **B** (WHT/GRN) wire of the 4-P connector is grounded and the ignition switch is turned from OFF to ON.



3. Watch the **BRAKE LAMP** light when the ignition switch is turned from OFF to ON with the **D** (GRN) wire of the 4-P connector grounded and the brake pedal pressed.
 - If the **BRAKE LAMP** light comes on and stays on, replace the right failure sensor.
 - If the **BRAKE LAMP** light does not stay on, go to step 4.

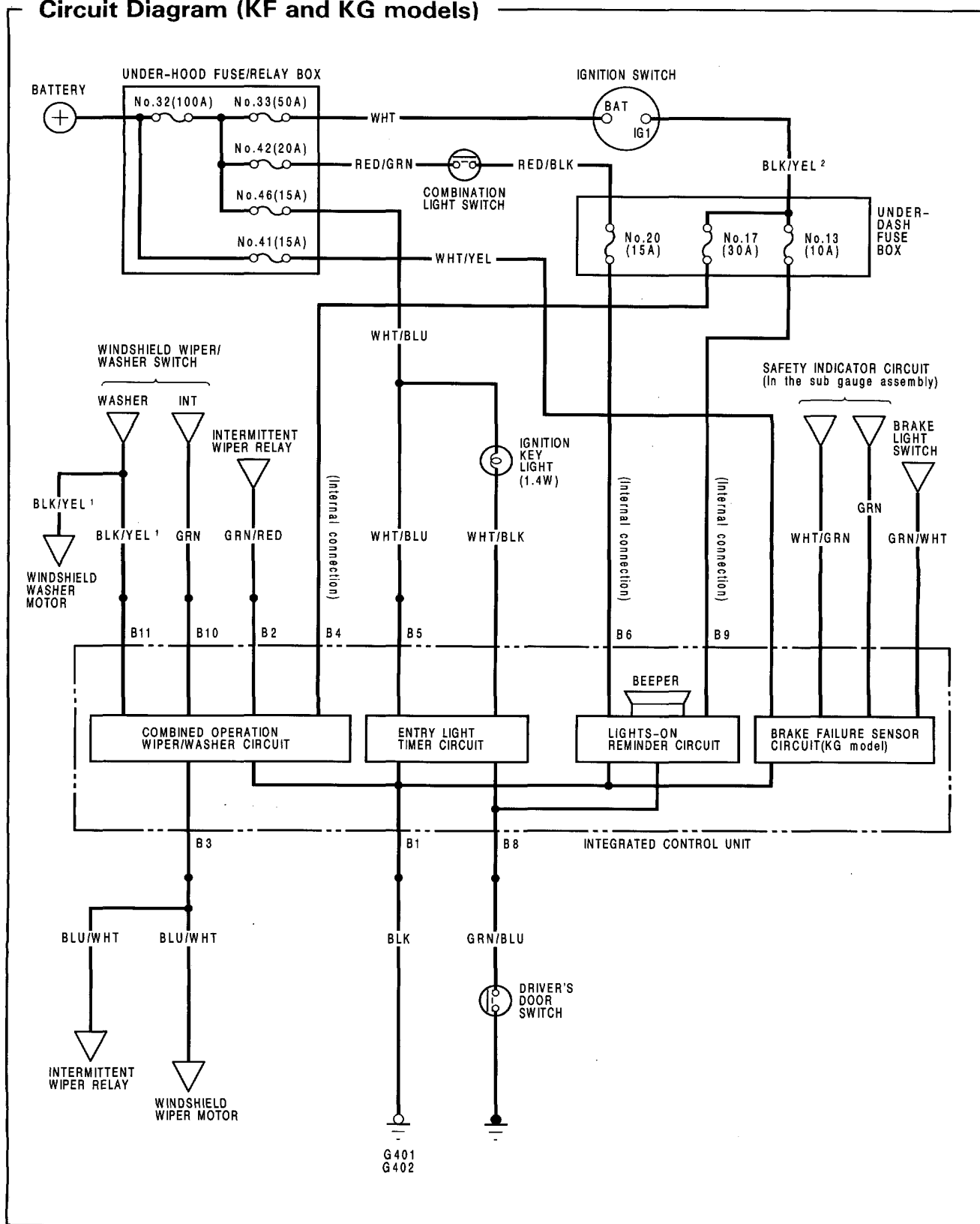
4. Open the taillight access panel to the left taillight. Remove the bulb socket housing. Watch the **BRAKE LAMP** light when the ignition switch is turned from OFF to ON with the **B** (GRN) wire of the 4-P connector grounded and the brake pedal pressed.



- If the **BRAKE LAMP** light comes on and stays on, there is an open in the **B** (GRN) wire between the left failure sensor and the right failure sensor.
 - If the **BRAKE LAMP** light does not stay on, go to step 5.
5. Watch the **BRAKE LAMP** light when the ignition switch is turned from OFF to ON with the **D** (BLK) wire of the 4-P connector grounded and the brake pedal pressed.
 - If the **BRAKE LAMP** light comes on and stays on, replace the left failure sensor.
 - If the **BRAKE LAMP** light does not stay on, check for an open in the **D** (BLK) wire between the left failure sensor and ground, and check for a poor ground at G551.

Integrated Control Unit

Circuit Diagram (KF and KG models)





Input Test (KF and KG models)

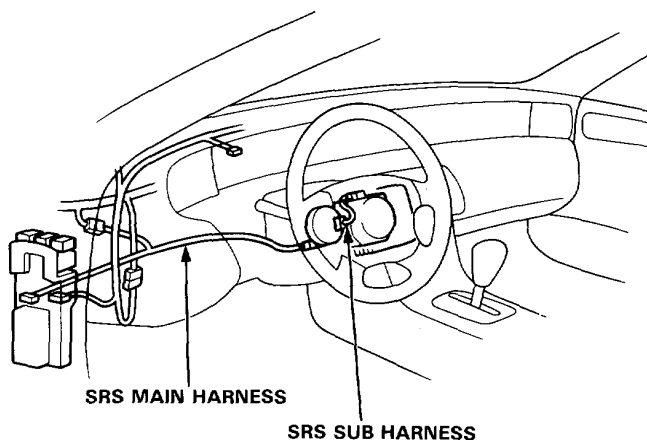
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

Remove the left kick panel, then disconnect the 8-P connector from the integrated control unit. Remove the under-dash fuse box, then remove the integrated control unit.

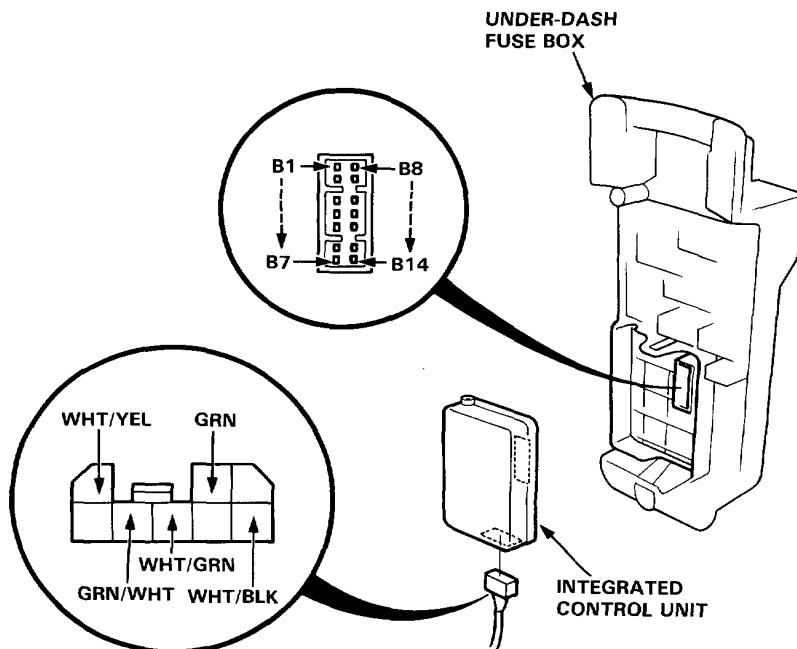
Inspect the connector and the socket terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector and the socket.
 - If a test indicates a problem, find and correct the cause, then recheck the system.
 - If all the input tests prove OK, the control unit must be faulty; replace it.



NOTE:

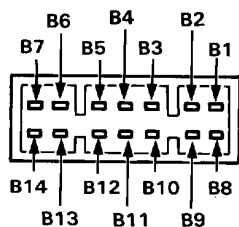
- Several different wires have the same color. They have been given a number suffix to distinguish them (for example, GRN/RED¹ and GRN/RED² are not the same).
- Do not disconnect any of the connectors on the under-dash fuse box except those for the integrated control unit.



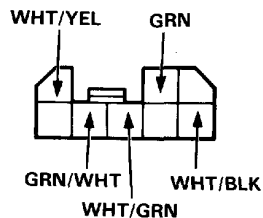
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Integrated Control Unit

Input Test (KF and KG models cont'd)



View from terminal side



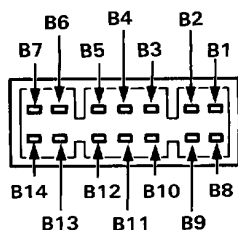
View from terminal side

Entry Light Timer System:

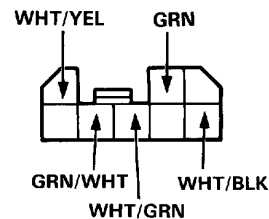
No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B5	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 46 (15 A) fuse. • An open in the wire.
3	WHT/BLK	Under all conditions.	Attach to ground: Ignition key light should come on.	<ul style="list-style-type: none"> • Blown bulb. • An open in the wire.
4	B8	Driver's door open.	Check for voltage to ground: It should be 1 V or less.	<ul style="list-style-type: none"> • Faulty driver's door switch. • An open in the wire.

Lights-on Reminder System:

No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B6	Headlight switch ON (Second position).	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 20 (15 A) fuse. • Faulty combination light switch. • An open in the wire.
3	B9	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 13 (10 A) fuse. • An open in the wire.
4	B8	Driver's door open.	Check for voltage to ground: It should be 1 V or less.	<ul style="list-style-type: none"> • Faulty driver's door switch. • An open in the wire.



View from terminal side



View from terminal side

Wiper System:

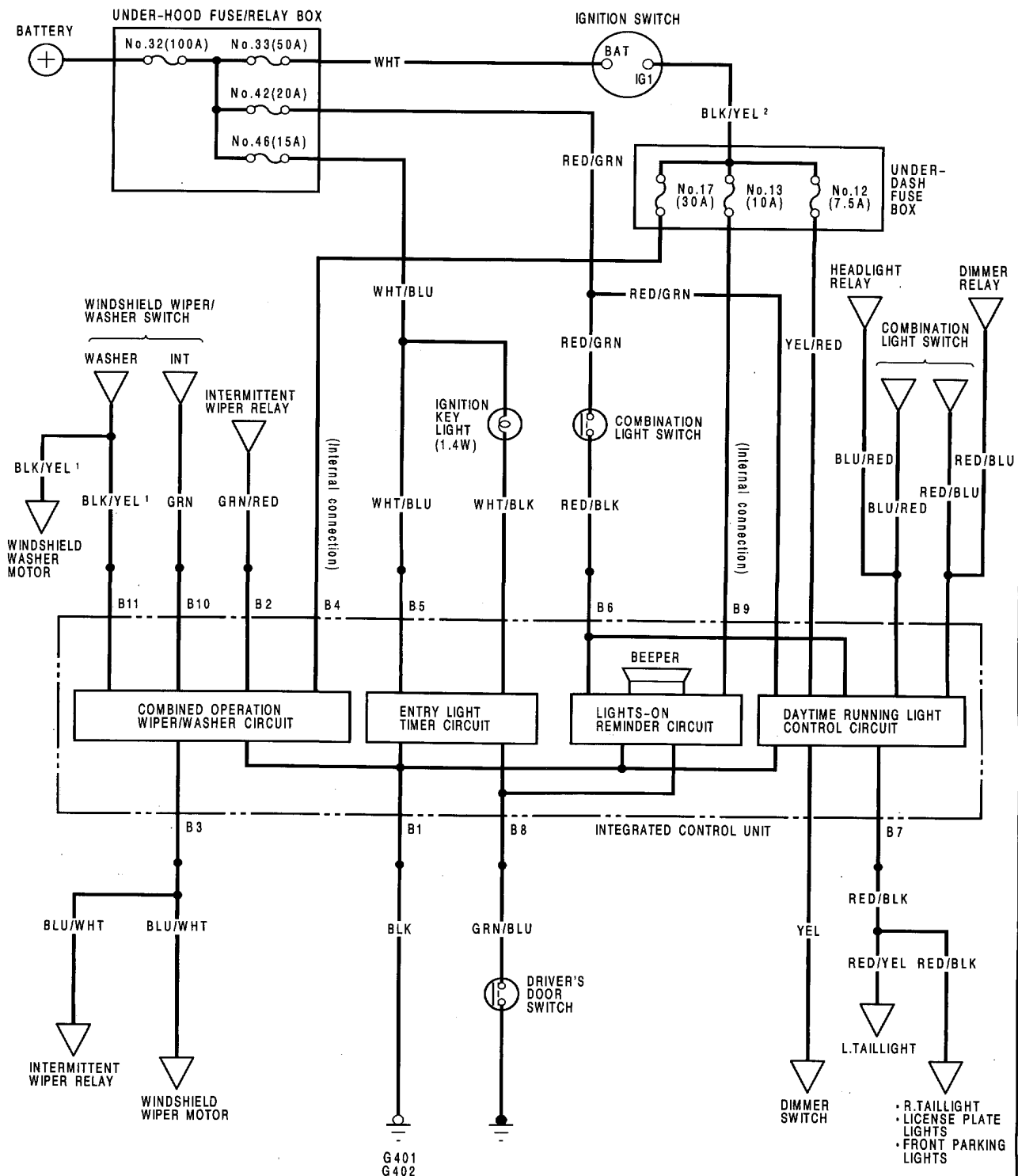
No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B2	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty intermittent wiper relay. • An open in the wire.
3	B10	Ignition switch ON and wiper switch in INT position.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty wiper switch. • An open in the wire.
4	B11	Ignition switch ON and washer switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty wiper switch. • An open in the wire.
5	B3	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty intermittent wiper relay. • Faulty windshield wiper motor. • An open in the wire.
6	B4	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • An open in the wire.

Brake Light System (KG model)

No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	WHT/YEL	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 41 (15 A) fuse. • An open in the wire.
3	WHT/GRN	Brake pedal pushed.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Faulty failure sensor. • An open in the wire. • Poor ground (G551).
4	GRN	Ignition switch ON.	Attach to ground: Brake indicator light in the safety indicator should come on.	<ul style="list-style-type: none"> • Faulty safety indicator (in the sub gauge assembly). • An open in the wire.
5	GRN/WHT	Brake pedal pushed.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty brake light switch. • An open in the wire.
		Brake pedal released.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G551). • An open in the wire.

Integrated Control Unit

Circuit Diagram (KS model)





Input Test (KS model)

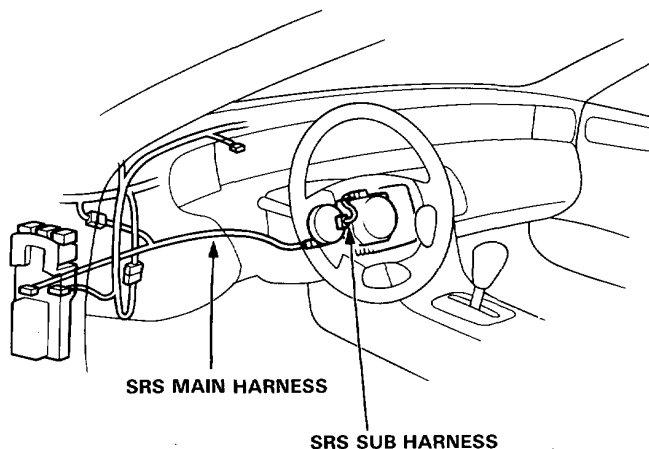
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

Remove the left kick panel, then disconnect the 8-P connector from the integrated control unit. Remove the under-dash fuse box, then remove the integrated control unit.

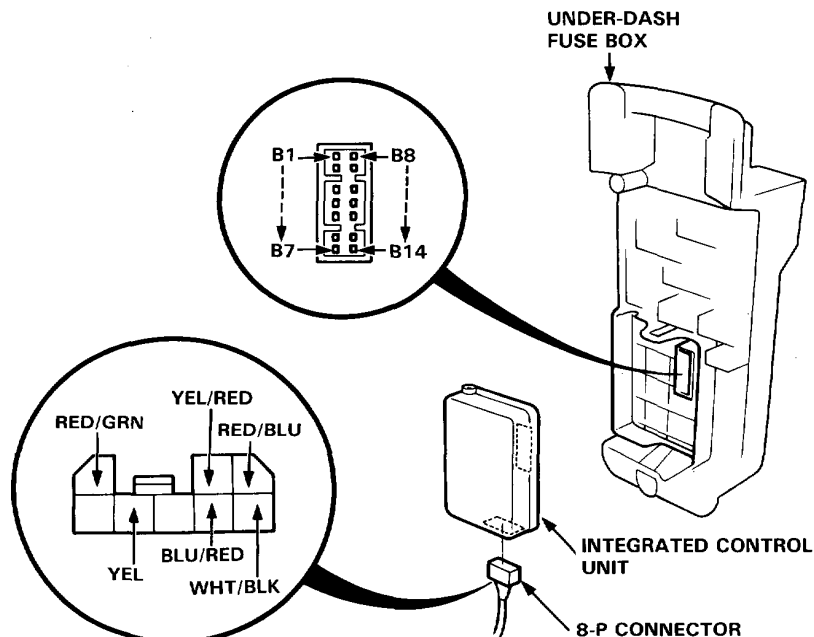
Inspect the connector and the socket terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector and the socket.
 - If a test indicates a problem, find and correct the cause, then recheck the system.
 - If all the input tests prove OK, the control unit must be faulty; replace it.



NOTE:

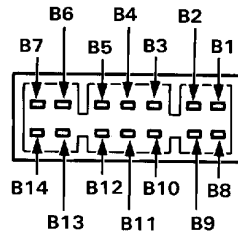
- Several different wires have the same color. They have been given a number suffix to distinguish them (for example, GRN/RED¹ and GRN/RED² are not the same).
- Do not disconnect any of the connectors on the under-dash fuse box except those for the integrated control unit.



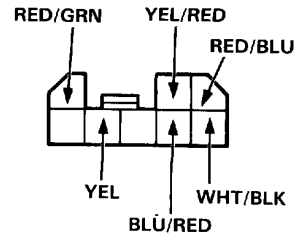
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Integrated Control Unit

Input Test (KS model cont'd)



View from terminal side



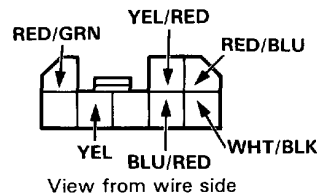
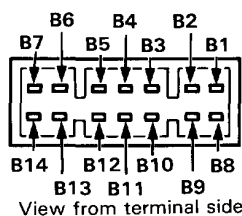
View from wire side

Entry Light Timer System:

No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B5	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 46 (15 A) fuse. • An open in the wire.
3	WHT/BLK	Under all conditions.	Attach to ground: Ignition key light should come on.	<ul style="list-style-type: none"> • Blown bulb. • An open in the wire.
4	B8	Driver's door open.	Check for voltage to ground: It should be 1 V or less.	<ul style="list-style-type: none"> • Faulty driver's door switch. • An open in the wire.

Lights-on Reminder System:

No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B6	Headlight switch ON (second position).	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 42 (20 A) fuse. • Faulty combination light switch. • An open in the wire.
3	B9	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 13 (10 A) fuse. • An open in the wire.
4	B8	Driver's door open.	Check for voltage to ground: It should be 1 V or less.	<ul style="list-style-type: none"> • Faulty driver's door switch. • An open in the wire.



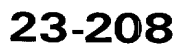
Wiper System:

No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B2	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty intermittent wiper relay. • An open in the wire.
3	B10	Ignition switch ON and wiper switch in INT position.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty wiper switch. • An open in the wire.
4	B11	Ignition switch ON and washer switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty wiper switch. • An open in the wire.
5	B3	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty intermittent wiper relay. • Faulty windshield wiper motor. • An open in the wire.
6	B4	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • An open in the wire.

Daytime Running Light System:

No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	RED/GRN	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 42 (20 A) fuse. • An open in the wire.
3	BLU/RED and B6	Headlight switch ON (second position).	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty combination light switch. • Faulty headlight relay. • An open in the wire.
4	RED/BLU	Passing switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty combination light switch. • Faulty headlight relay. • Faulty dimmer relay. • An open in the wire.
5	YEL/RED	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 12 (7.5 A) fuse. • An open in the wire.
6	B7	Connect the RED/GRN terminal to the B7 terminal.	Front position lights, taillights and license plate lights should come on.	<ul style="list-style-type: none"> • Blown bulbs. • An open in the wire.
7	YEL	Dimmer switch HI.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Faulty lighting switch. • Poor ground (G401, G402).

Circuit Diagram (KY model)





Input Test (KY model)

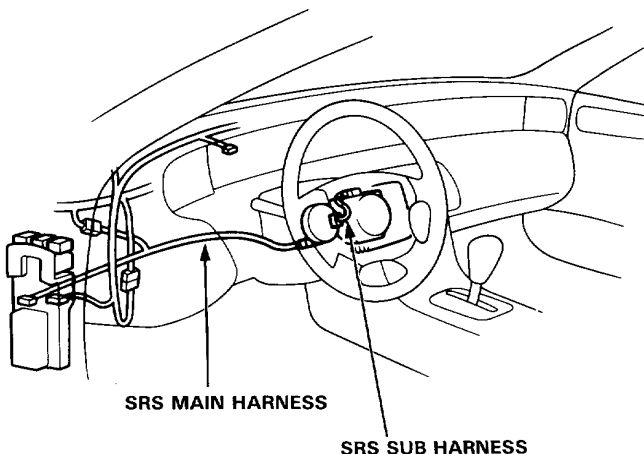
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

Remove the left kick panel, then disconnect the 16-P connector from the integrated control unit. Remove the under-dash fuse box, then remove the integrated control unit.

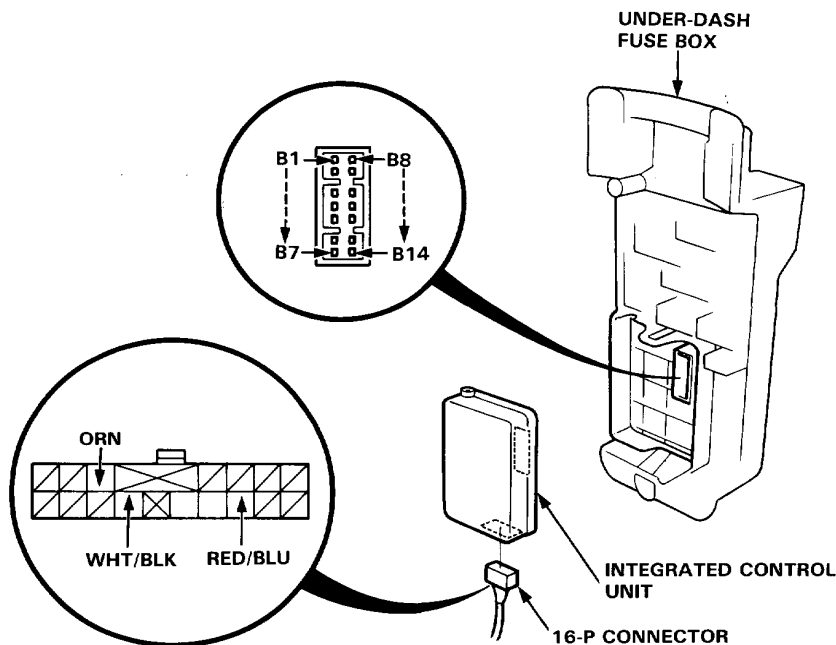
Inspect the connector and the socket terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector and the socket.
 - If a test indicates a problem, find and correct the cause, then recheck the system.
 - If all the input tests prove OK, the control unit must be faulty; replace it.



NOTE:

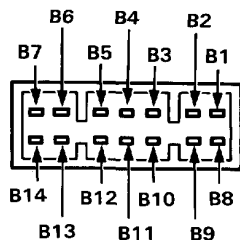
- Several different wires have the same color. They have been given a number suffix to distinguish them (for example, GRN/RED¹ and GRN/RED² are not the same).
- Do not disconnect any of the connectors on the under-dash fuse box except those for the integrated control unit.



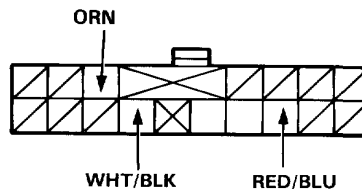
(cont'd)

Integrated Control Unit

Input Test (KY model cont'd)



View from terminal side



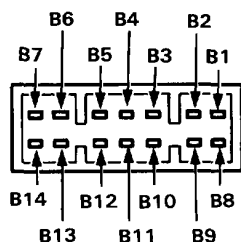
View from wire side

Entry Light Timer System:

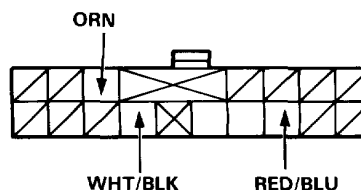
No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B5	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 46 (15 A) fuse. • An open in the wire.
3	WHT/BLK	Under all conditions.	Attach to ground: Ignition key light should come on.	<ul style="list-style-type: none"> • Blown bulb. • An open in the wire.
4	B8	Driver's door open.	Check for voltage to ground: It should be 1 V or less.	<ul style="list-style-type: none"> • Faulty driver's door switch. • An open in the wire.

Lights-on Reminder System:

No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B6	Headlight switch ON (Second position).	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 42 (20 A) fuse. • Faulty combination light switch. • An open in the wire.
3	B9	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 13 (10 A) fuse. • An open in the wire.
4	B8	Driver's door open.	Check for voltage to ground: It should be 1 V or less.	<ul style="list-style-type: none"> • Faulty driver's door switch. • An open in the wire.
5	ORN	Ignition switch ON and connect the B9 terminal to the ORN terminal.	Check chime operation: Chime should activate each time the battery is connected.	<ul style="list-style-type: none"> • Faulty chime. • An open in the wire.



View from terminal side



View from wire side

Wiper System:

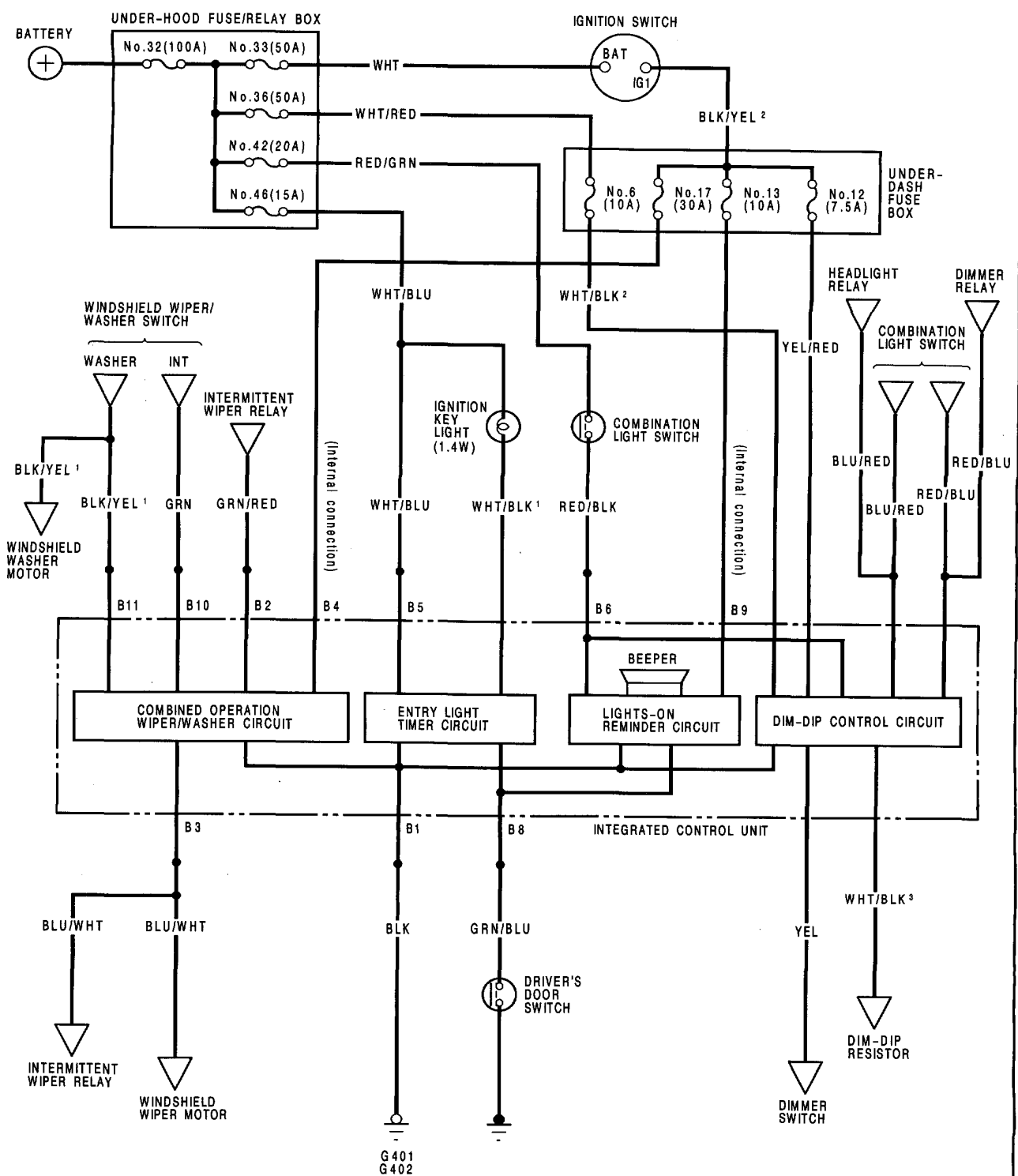
No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B2	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty intermittent wiper relay. • An open in the wire.
3	B10	Ignition switch ON and wiper switch in INT. Position	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty wiper switch. • An open in the wire.
4	B11	Ignition switch ON and washer switch ON	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty wiper switch. • An open in the wire.
5	B3	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty intermittent wiper relay. • Faulty windshield wiper motor. • An open in the wire.

Seat Belt Reminder System:

No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B9	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 13 (10 A) fuse. • An open in the wire.
3	ORN	Ignition switch ON and connect the B9 terminal to the ORN terminal.	Check chime operation: Chime should activate each time the battery is connected.	<ul style="list-style-type: none"> • Faulty chime. • An open in the wire.
4	RED/BLU	Driver's seat belt is not buckled.	Check for voltage to ground: It should be 1 V or less.	<ul style="list-style-type: none"> • Faulty driver's seat belt switch. • An open in the wire. • Poor ground (G521, G522). • Blown bulb.
		Driver's seat belt is buckled.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty driver's seat belt switch. • An open in the wire. • Blown bulb. • Blown No. 13 (10 A) fuse.

Integrated Control Unit

Circuit Diagram (KE model)





Integrated Control Unit

Input Test (KE model)

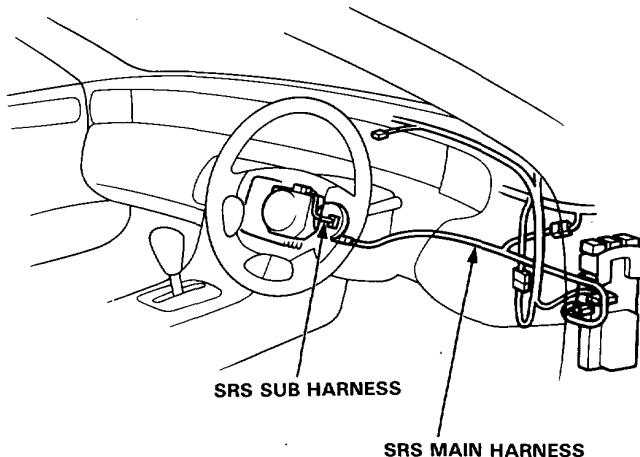
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

Remove the left kick panel, then disconnect the 8-P connector from the integrated control unit. Remove the under-dash fuse box, then remove the integrated control unit.

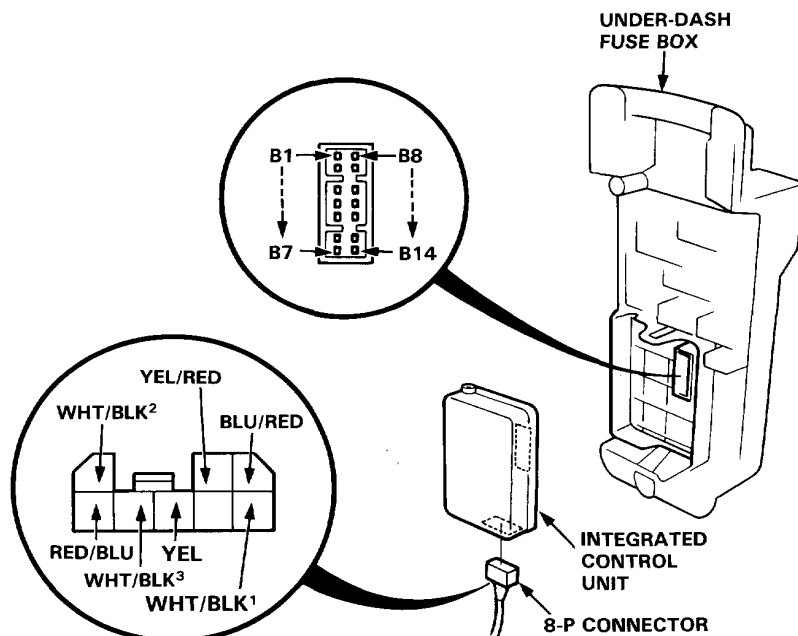
Inspect the connector and the socket terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
 - If the terminals look OK, make the following input tests at the connector and the socket.
- If a test indicates a problem, find and correct the cause, then recheck the system.
- If all the input tests prove OK, the control unit must be faulty; replace it.



NOTE:

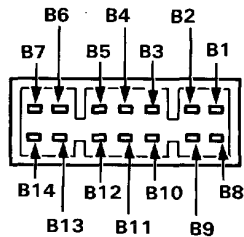
- Several different wires have the same color. They have been given a number suffix to distinguish them (for example, GRN/RED¹ and GRN/RED² are not the same).
- Do not disconnect any of the connectors on the under-dash fuse box except those for the integrated control unit.



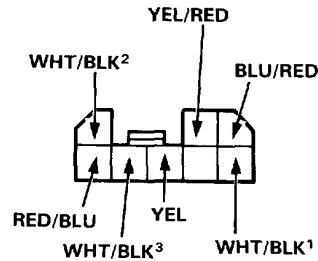
(cont'd)

Integrated Control Unit

Input Test (KE model cont'd)



View from terminal side



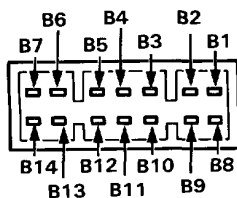
View from wire side

Entry Light Timer System:

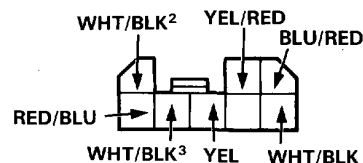
No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B5	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 46 (15 A) fuse. • An open in the wire.
3	WHT/BLK¹	Under all conditions.	Attach to ground: Ignition key light should come on.	<ul style="list-style-type: none"> • Blown bulb. • An open in the wire.
4	B8	Driver's door open.	Check for voltage to ground: It should be 1 V or less.	<ul style="list-style-type: none"> • Faulty wiper switch. • An open in the wire.

Lights-on Reminder System:

No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B6	Headlight switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 42 (20 A) fuse. • Faulty combination light switch. • An open in the wire.
3	B9	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 13 (10 A) fuse. • An open in the wire.
4	B8	Driver's door open.	Check for voltage to ground: It should be 1 V or less.	<ul style="list-style-type: none"> • Faulty driver's door switch. • An open in the wire.



View from terminal side



View from wire side

Wiper System:

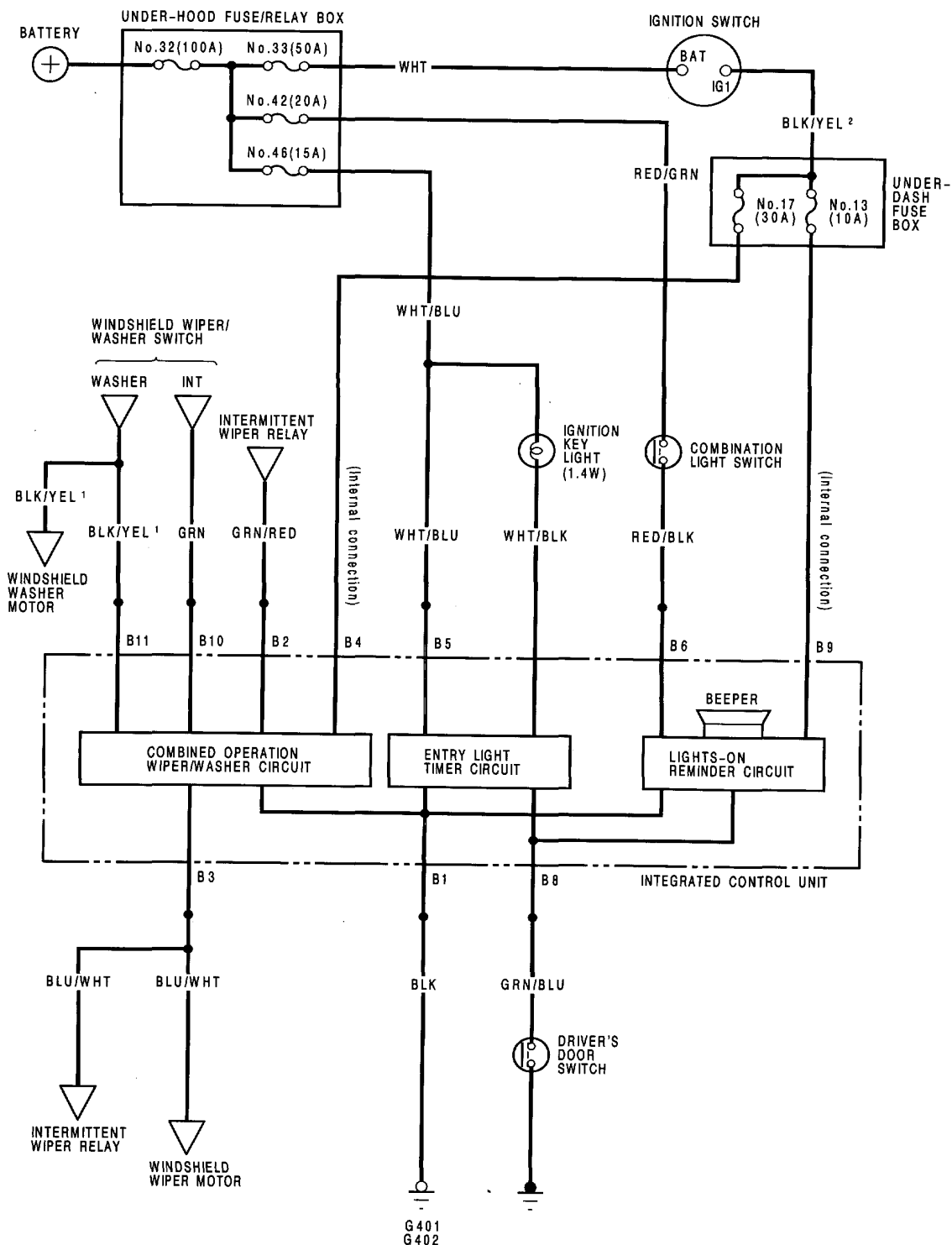
No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B2	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty intermittent wiper relay. • An open in the wire.
3	B10	Ignition switch ON and wiper switch in INT position.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty wiper switch. • An open in the wire.
4	B11	Ignition switch ON and washer switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty wiper switch. • An open in the wire.
5	B3	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty intermittent wiper relay. • Faulty windshield wiper motor. • An open in the wire.
6	B4	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • An open in the wire.

Dim-Dip Headlight System:

No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	WHT/BLK ²	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 6 (10 A) fuse. • An open in the wire.
3	YEL/RED	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 12 (7.5 A) fuse. • An open in the wire.
4	BLU/RED and B6	Headlight switch ON (second position).	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty combination light switch. • Faulty headlight relay. • Blown No. 42 (20 A) fuse. • An open in the wire.
5	WHT/BLK ³	Headlight switch ON. (second position).	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty Dim-Dip resistor. • Blown No. 50 (20 A) fuse. • Blown No. 51 (20 A) fuse. • An open in the wire.
6	RED/BLU	Passing switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty combination light switch. • Faulty headlight relay. • Faulty dimmer relay. • An open in the wire.
7	YEL	Dimmer switch HI.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Faulty combination light switch. • Poor ground (G401, G402).

Integrated Control Unit

Circuit Diagram (KQ and KT models)





Input Test (KQ and KT models)

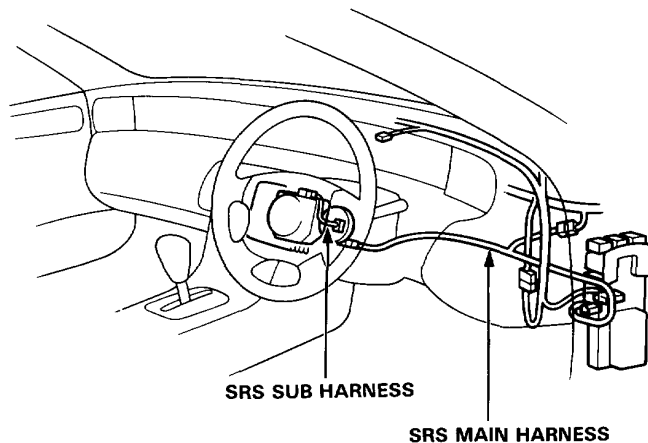
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harnesses, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

Remove the left kick panel, then disconnect the 8-P connector from the integrated control unit. Remove the under-dash fuse box, then remove the integrated control unit.

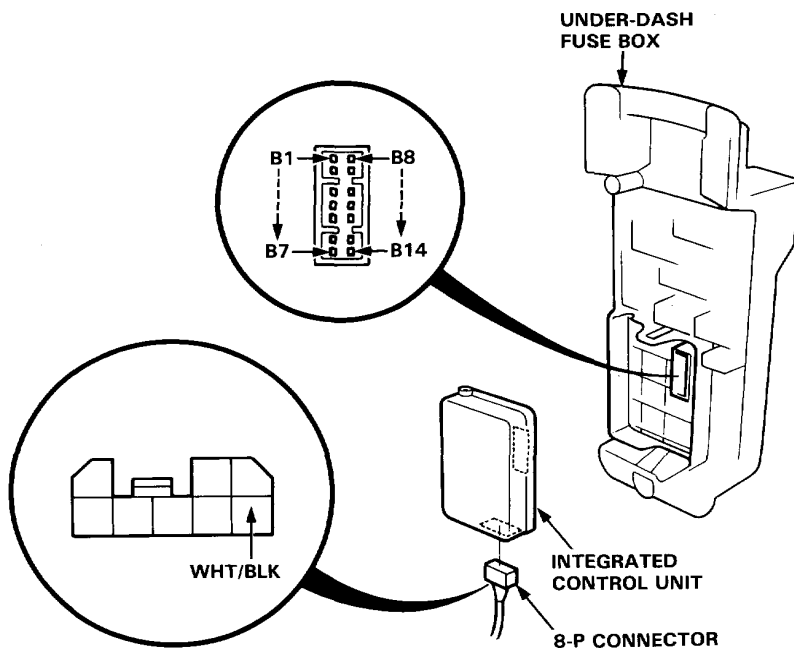
Inspect the connector and the socket terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector and the socket.
- If a test indicates a problem, find and correct the cause, then recheck the system.
- If all the input tests prove OK, the control unit must be faulty; replace it.



NOTE:

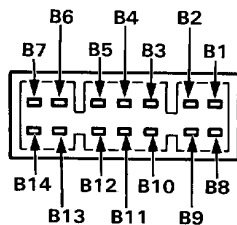
- Several different wires have the same color. They have been given a number suffix to distinguish them (for example, GRN/RED¹ and GRN/RED² are not the same).
- Do not disconnect any of the connectors on the under-dash fuse box except those for the integrated control unit.



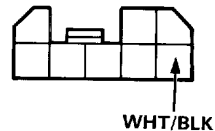
(cont'd)

Integrated Control Unit

Input Test (KQ and KT models cont'd)



View from terminal side



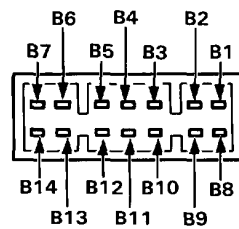
View from wire side

Entry Light Timer System:

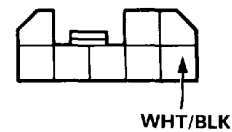
No.	Terminal	Test condition	Test: desired result	Possible cause (if result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B5	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 46 (15 A) fuse. • An open in the wire.
3	WHT/BLK	Under all conditions.	Attach to ground: Ignition key light should come on.	<ul style="list-style-type: none"> • Blown bulb. • An open in the wire.
4	B8	Driver's door open.	Check for voltage to ground: It should be 1 V or less.	<ul style="list-style-type: none"> • Faulty driver's door switch. • An open in the wire.

Lights-on Reminder System:

No.	Terminal	Test condition	Test: desired result	Possible cause (if result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B6	Headlight switch ON (second position).	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 42 (20 A) fuse. • Faulty combination light switch. • An open in the wire.
3	B9	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 13 (10 A) fuse. • An open in the wire.
4	B8	Driver's door open.	Check for voltage to ground: It should be 1 V or less.	<ul style="list-style-type: none"> • Faulty driver's door switch. • An open in the wire.



View from terminal side



View from wire side

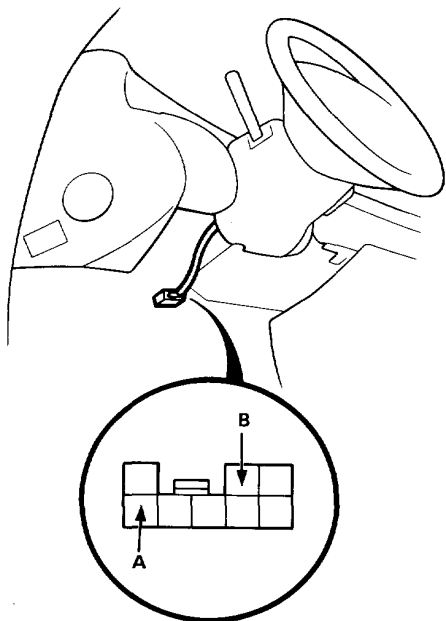
Wiper System:

No.	Terminal	Test condition	Test: desired result	Possible cause (if result is not obtained)
1	B1	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	B2	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty intermittent wiper relay. • An open in the wire.
3	B10	Ignition switch ON and wiper switch in INT position.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty wiper switch. • An open in the wire.
4	B11	Ignition switch ON and washer switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty wiper switch. • An open in the wire.
5	B3	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • Faulty wiper intermittent relay. • Faulty windshield wiper motor. • An open in the wire.
6	B4	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 17 (30 A) fuse. • An open in the wire.

Entry Light Timer System

Ignition Key Light Test

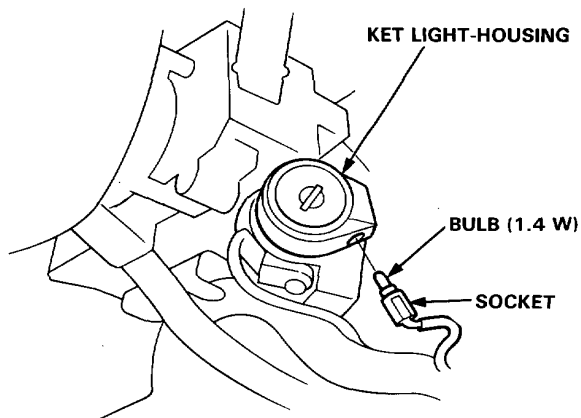
1. Remove the dashboard lower cover.
2. Disconnect the 8-P connector from the main wire harness.



3. There should be continuity between A and B terminals.
If there is no continuity, replace the light.

Ignition Key Light Replacement

1. Remove the steering column covers (see page 23-88).
2. Remove the bulb/socket from the key light housing by turning the socket 45°.



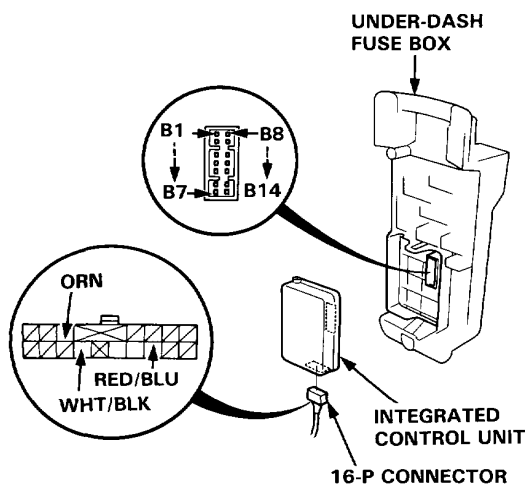
Lights-on Reminder System (KY model)

Chime Test

NOTE: Refer to page 23-200, 204, 208, 212, 216 for a diagram of the lights-on reminder circuit, and page 23-202, 206, 210, 214, 218 for the input test of the circuit.

When the ignition key is turned to "O" position and removed, with the lights on, voltage is applied to the reminder circuit on the integrated control unit. When you open the driver's door, the circuit senses ground through the closed door switch.

With voltage at the "B6" terminal, ground at the "B8" terminal and no voltage at the "B9" terminal, the chime sounds to remind the driver to turn off the lights.

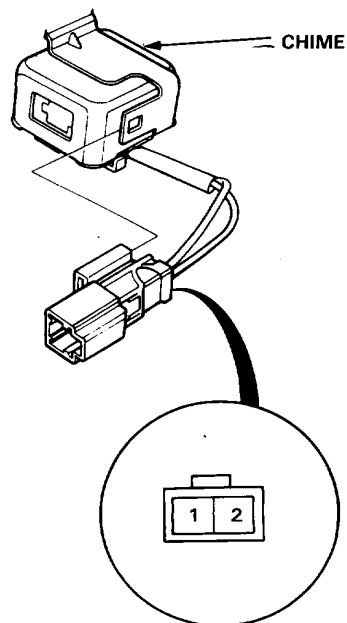


Seat Belt Reminder System (KY model)



Chime Test

1. Remove the dashboard lower cover.
2. Disconnect the 2-P connector from the main wire harness.



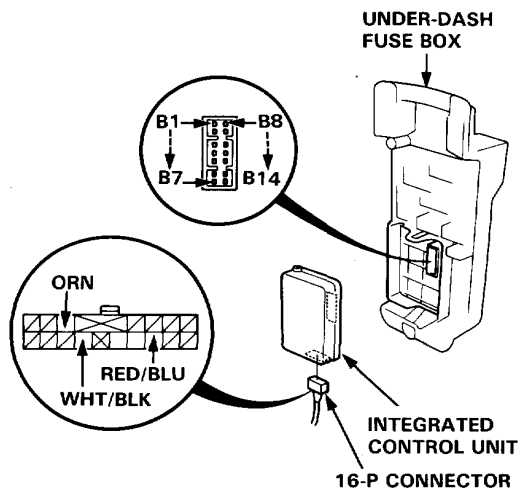
3. Test chime operation by connecting battery power to No. 1 terminal, grounding No. 2 terminal, and cycling the power on-off repeatedly.
4. If the chime fails to sound every time power is cycled, replace it.

Seat Belt Reminder System (KY model)

Description

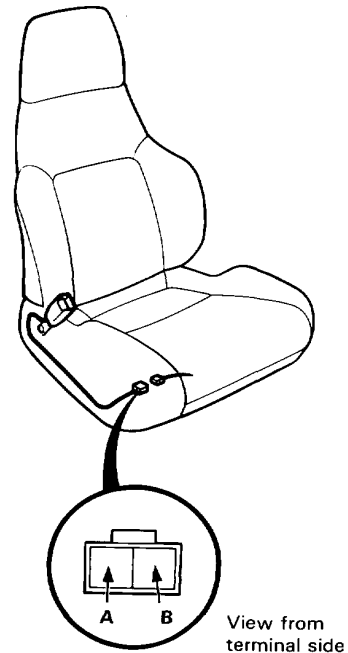
NOTE: Refer to page 23-208 for a diagram of the seat belt beeper/timer circuit.

With the ignition switch in "Run" or "Start", voltage is applied to the beeper/timer of the integrated control unit. When you unbuckle the driver's seat belt, the beeper/timer circuit senses ground. With voltage at the "B9" terminal and ground at the "RED/BLU" terminal, the seat belt beeper sounds and the timer contacts close and open. This causes the seat belt reminder light to flash on and off. After 5 seconds the alarm stops and the contacts remain open.



Seat Belt Switch Test

1. Slide the front seat all the way forward then disconnect the 2-P. connector from the seat belt switch.



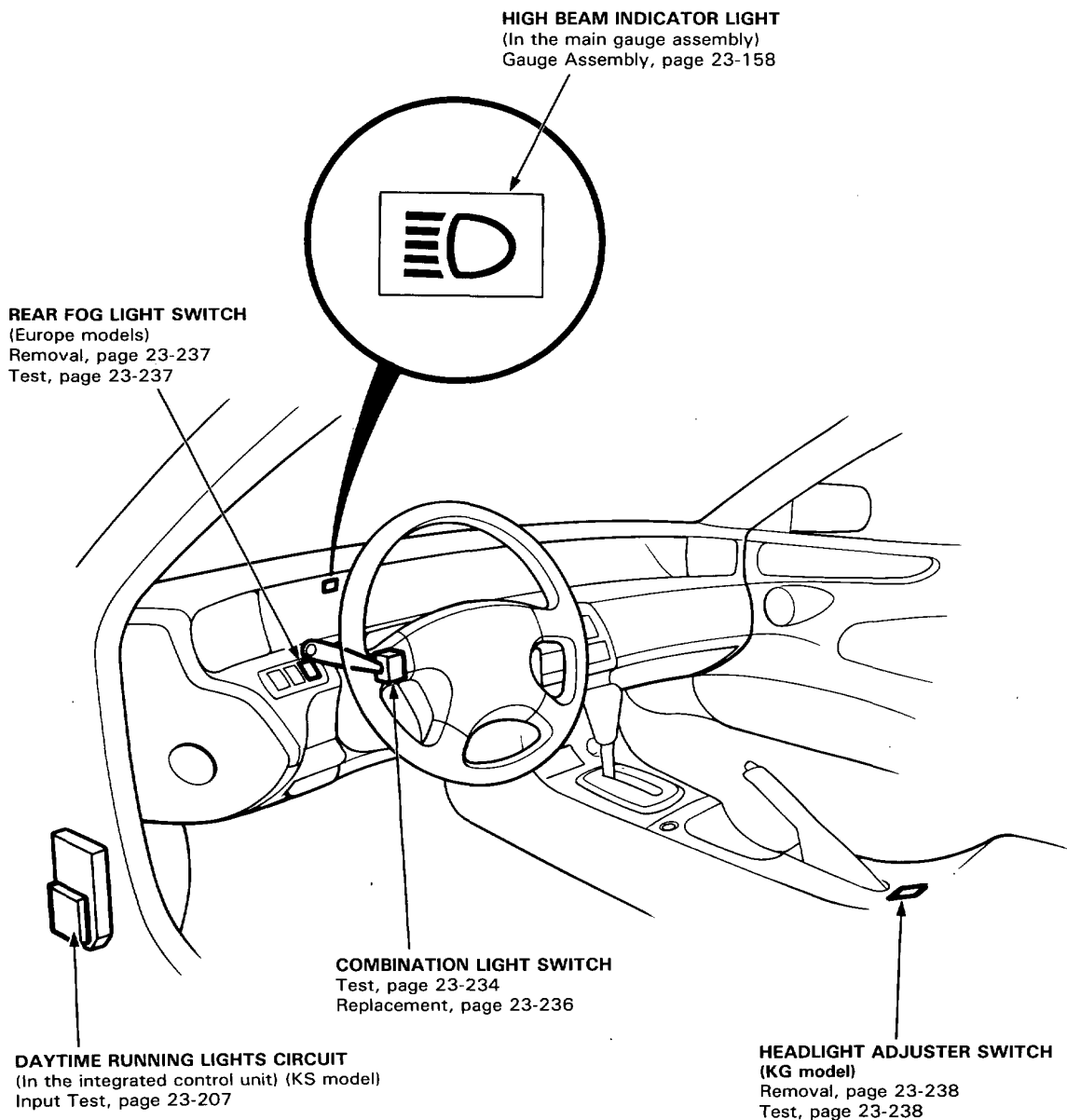
2. There should be continuity between the A and B terminals when the seat belt is not buckled. There should be no continuity when the seat belt is buckled.



Lighting System

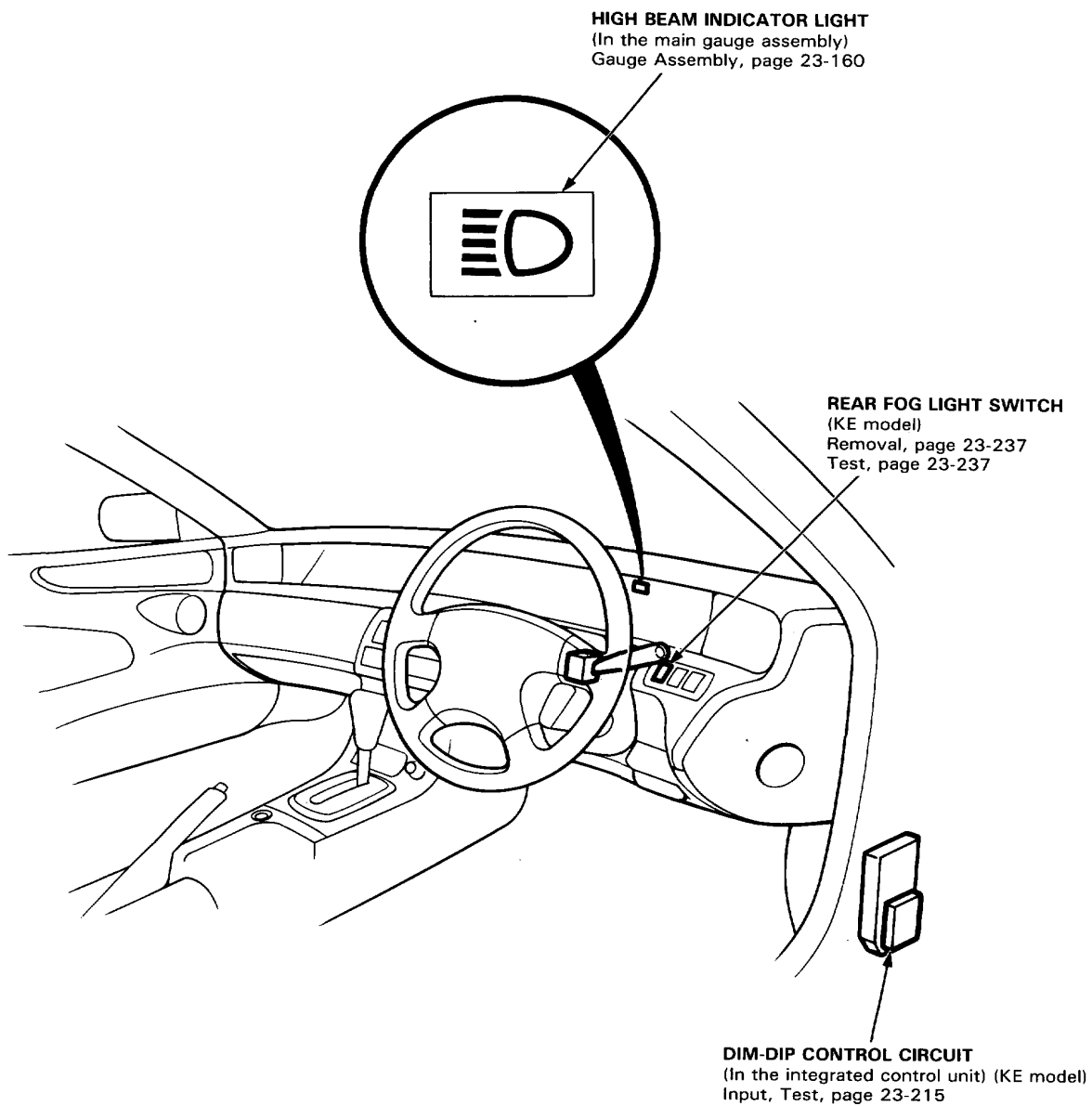
Component Location Index

LHD:





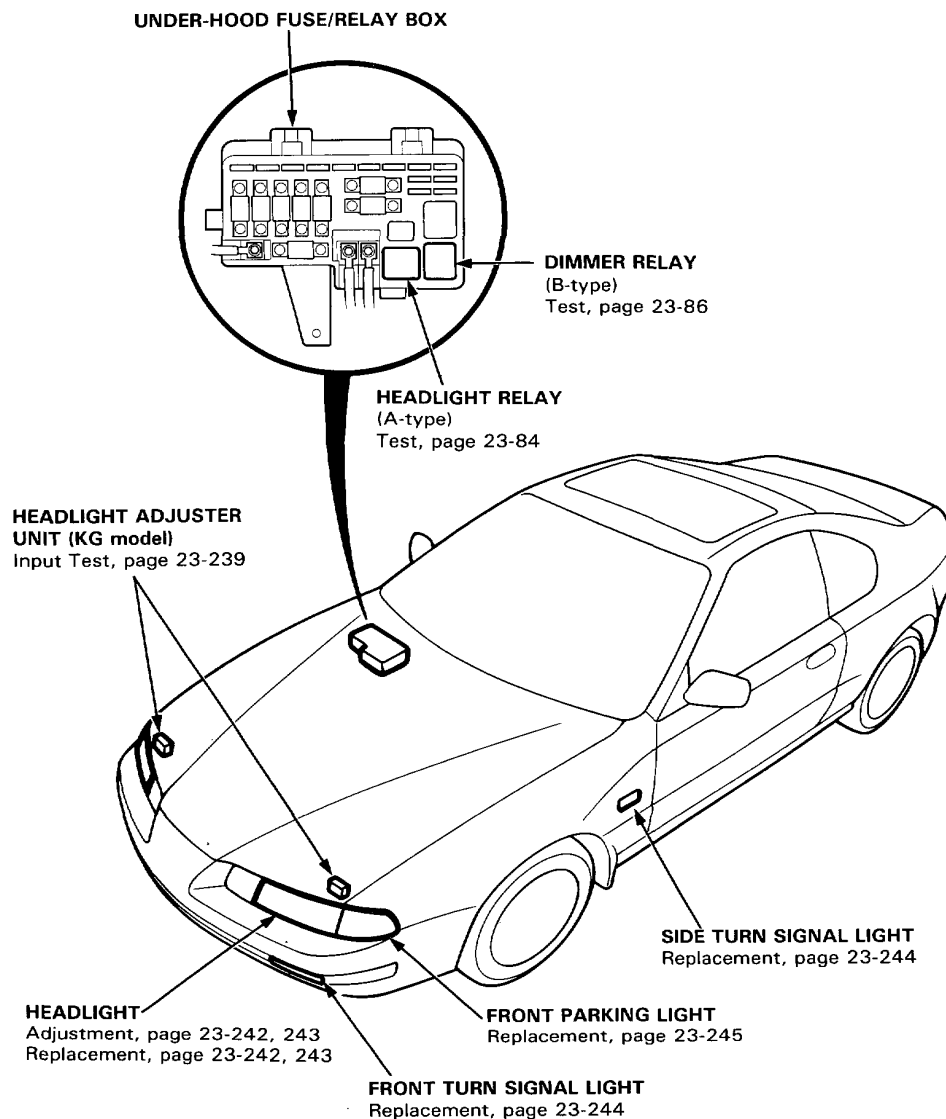
RHD:



Lighting System

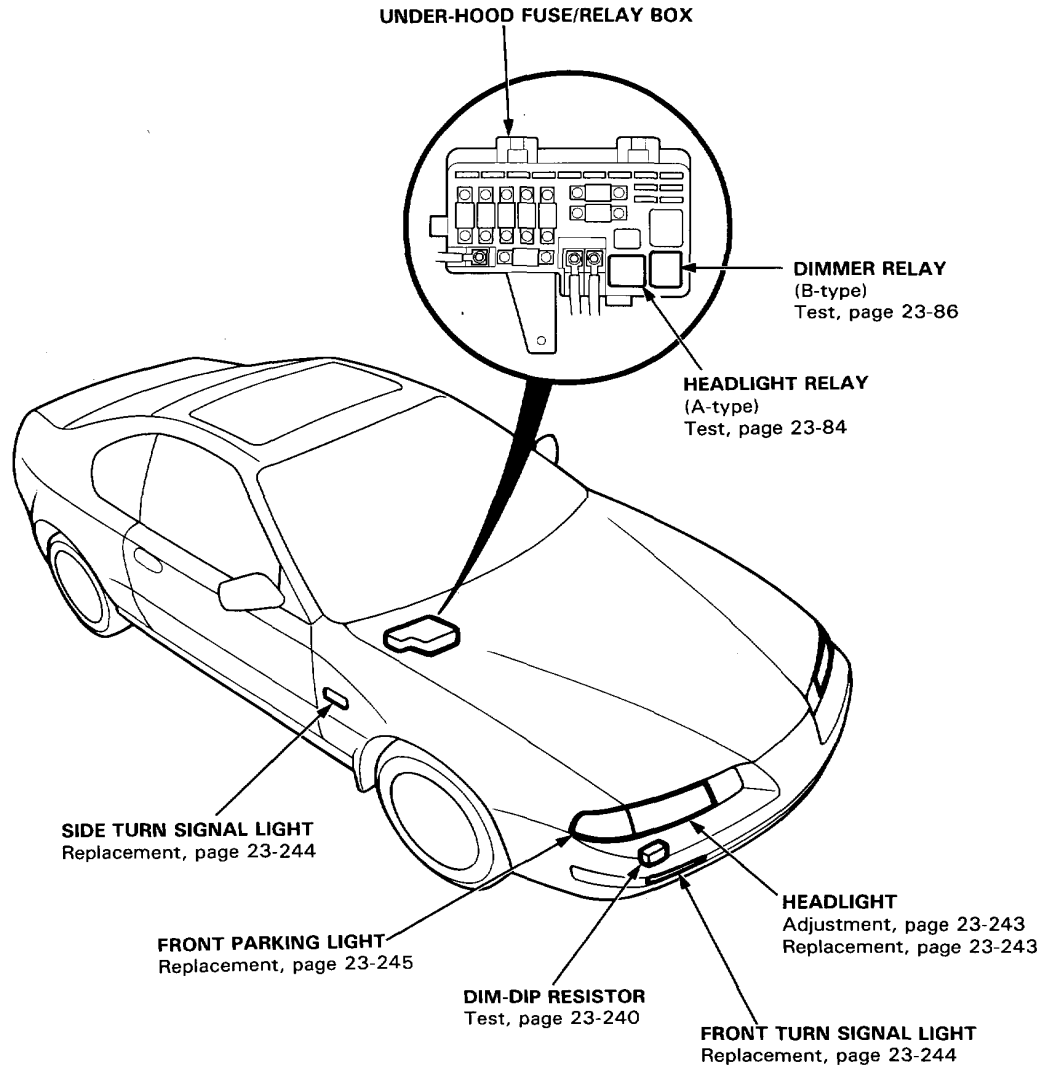
Component Location Index

LHD:



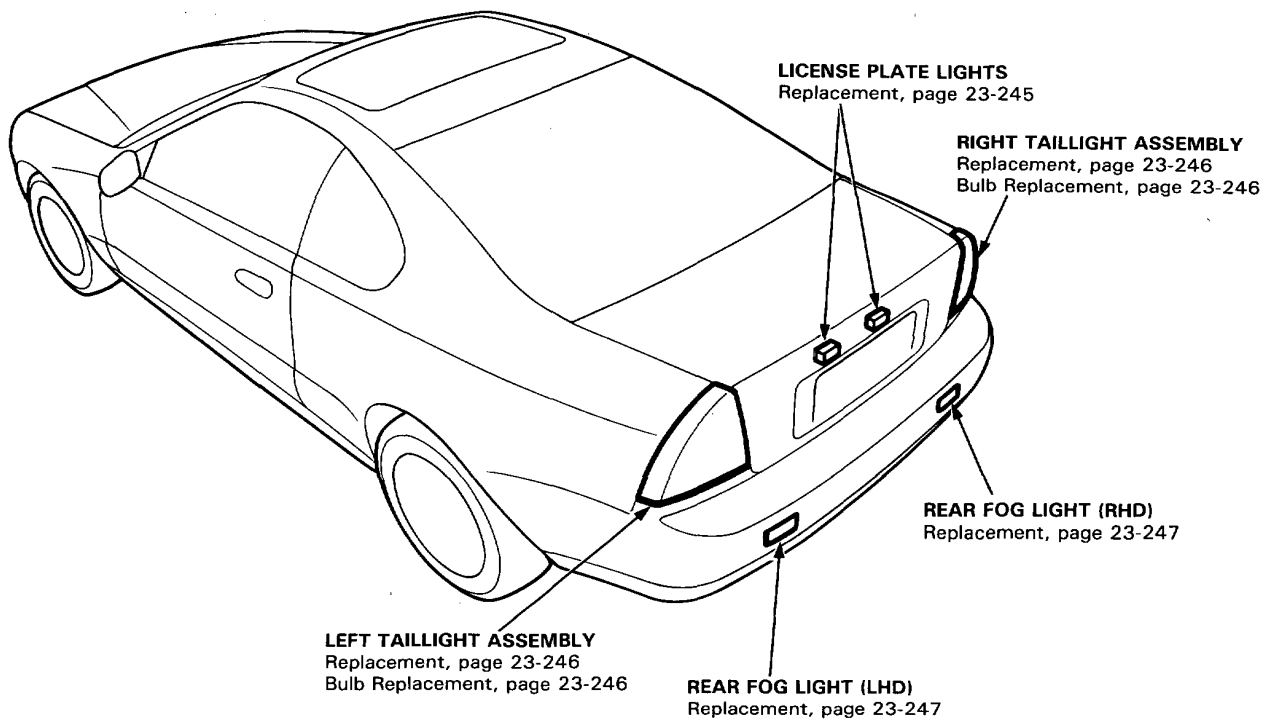


RHD:



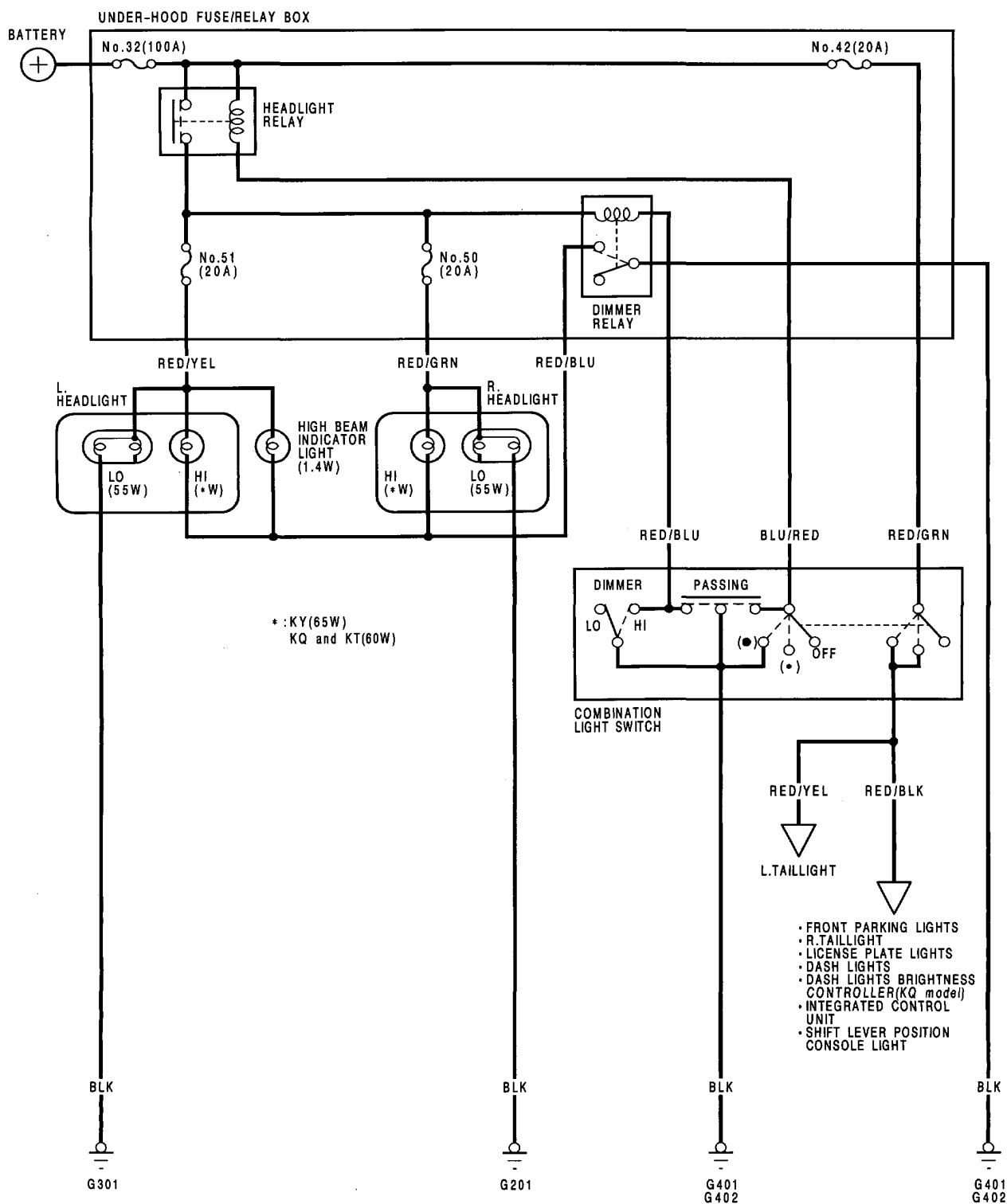
Lighting System

Component Location Index



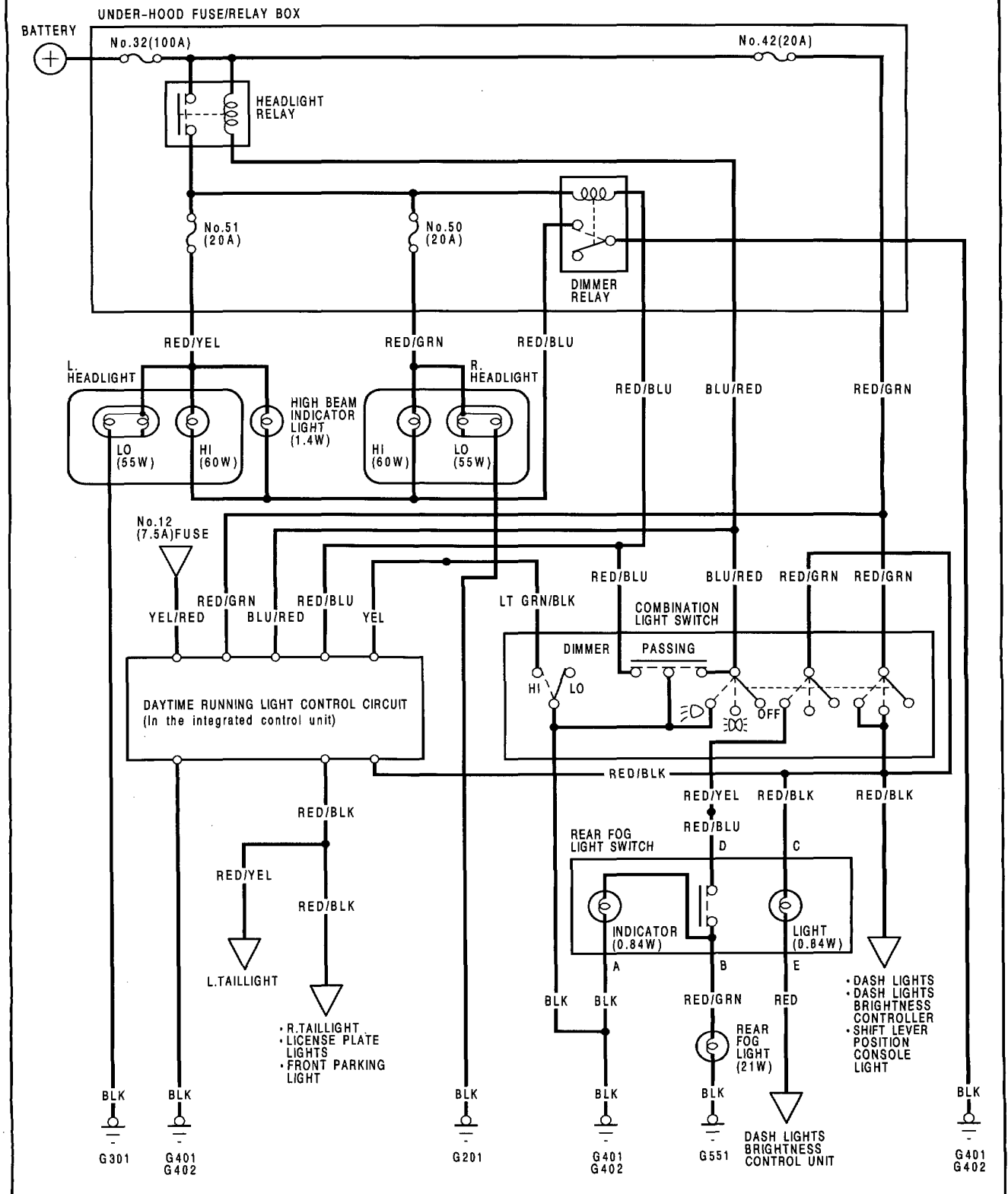


Circuit Diagram (KY, KQ, and KT models)



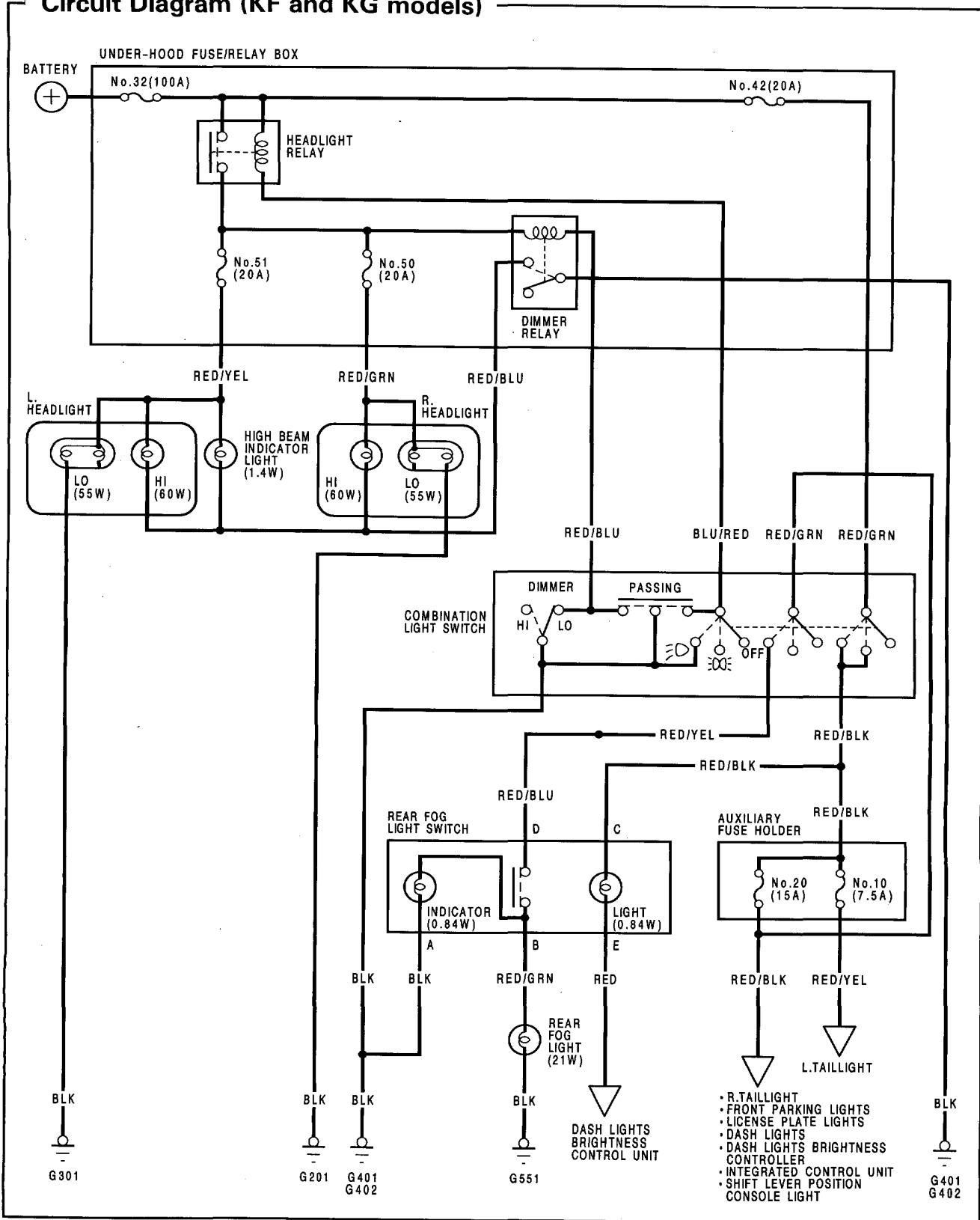
Lighting System

Circuit Diagram (With Daytime Light)



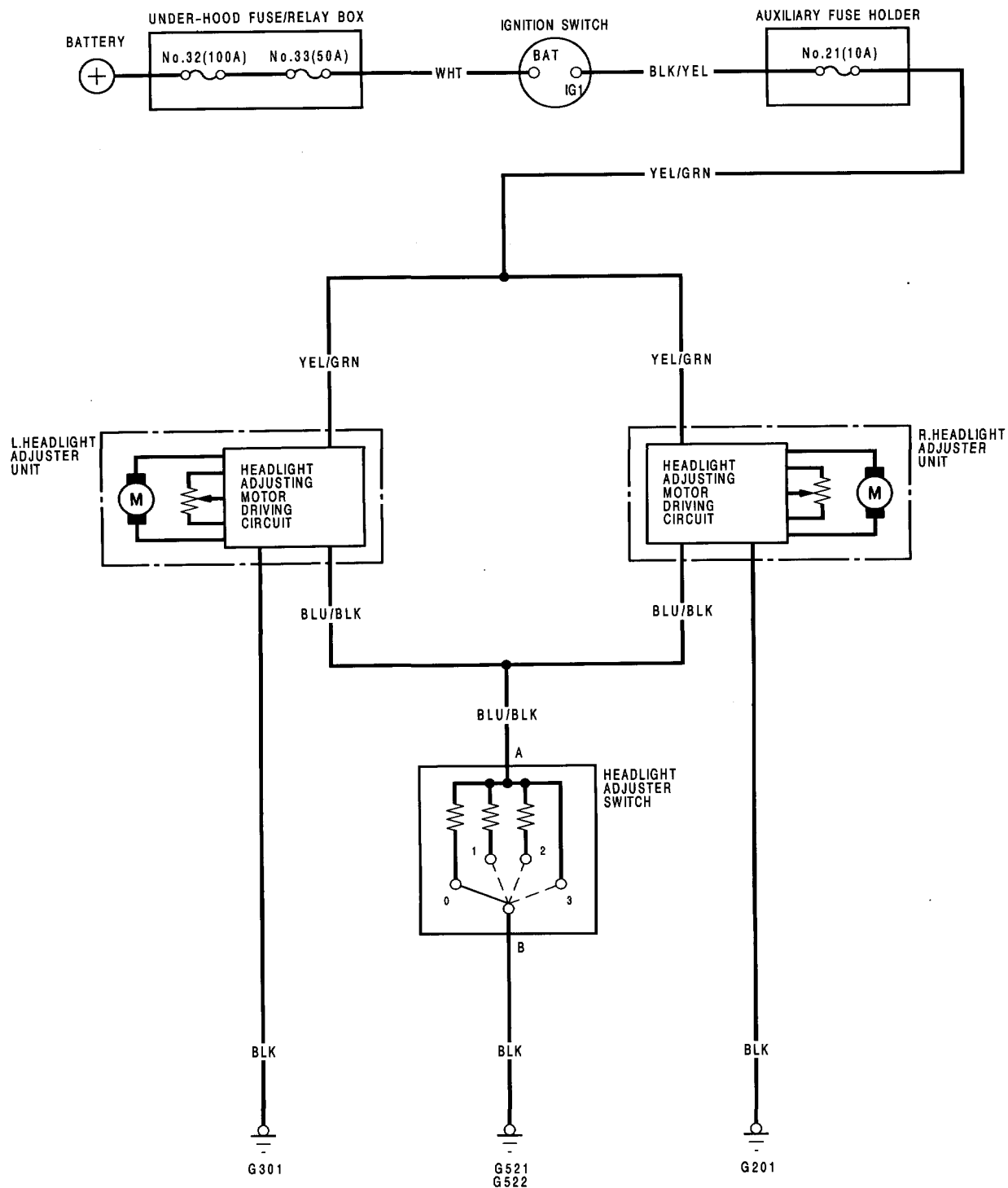
Lighting System

Circuit Diagram (KF and KG models)





Circuit Diagram (KG model)



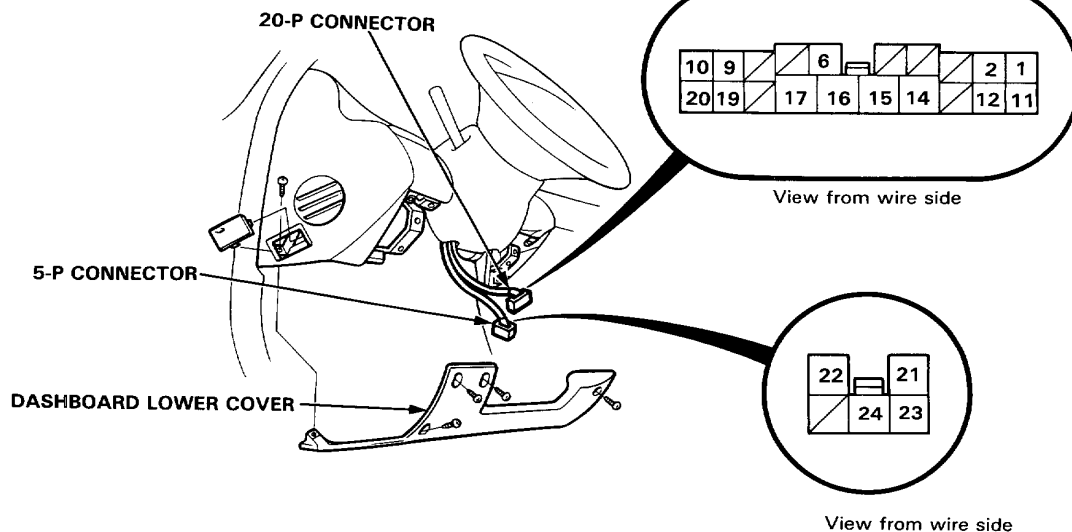
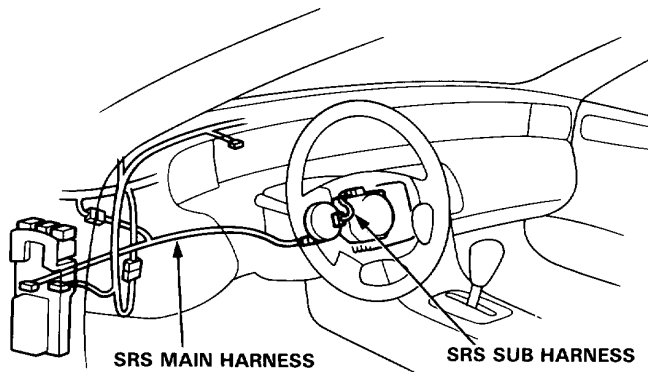
Lighting System

Combination Light Switch Test

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

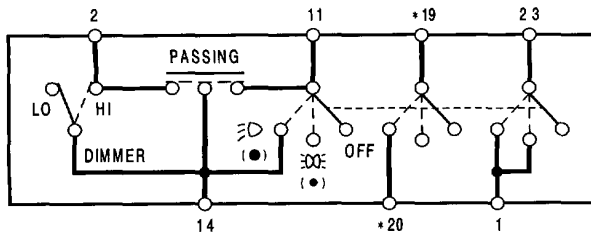
1. Remove the dashboard lower cover.
2. Disconnect the connectors from the main wire harness.
3. Inspect the connector terminals to be sure they are all making good contact.
 - If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
4. Check for continuity between them in each switch position according to the table.



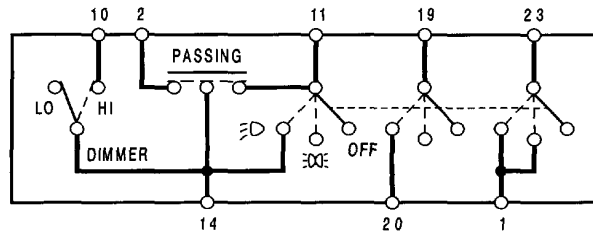


COMBINATION LIGHT SWITCH :

(Except KS,KE)



(KS and KE models)



Headlight/Dimmer/Passing Switch(Except KS,KE) :

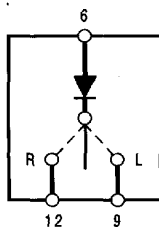
* : Europe models

Terminal		1	2	11	14	*19	*20	23
Position								
Headlight switch	OFF							
	300E (●)	○						○
	30D (●)	○		○	○		○	○
Dimmer switch	LOW							
	HIGH		○		○			
Passing switch	OFF							
	ON		○	○	○			

Headlight/Dimmer/Passing Switch(KS and KE models) :

Terminal		1	2	10	11	14	19	20	23
Position									
Headlight switch	OFF								
	300E	○							○
	30D	○			○	○		○	○
Dimmer switch	LOW								
	HIGH			○		○			
Passing switch	OFF								
	ON		○		○	○			

TURN SIGNAL SWITCH :



Turn Signal Switch :

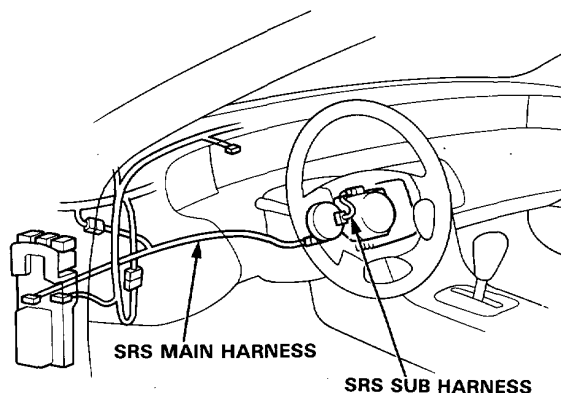
Terminal		6		9	12
Position					
R		○	→		○
NEUTRAL					
L		○	→	○	

Lighting System

Combination Light Switch Replacement

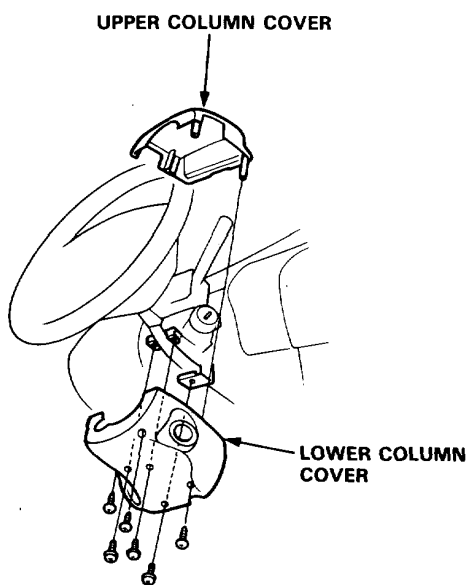
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

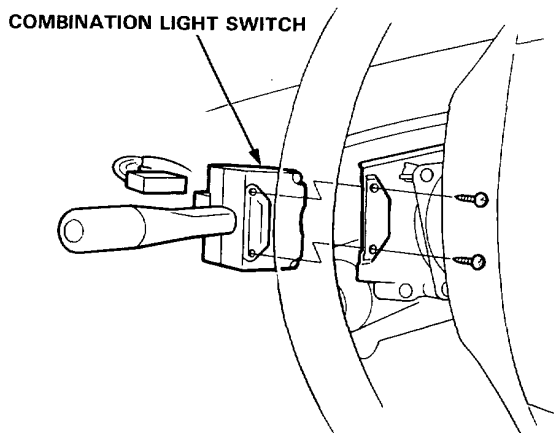


NOTE: These illustration show LHD type, RHD type is similar.

1. Remove the steering column covers.

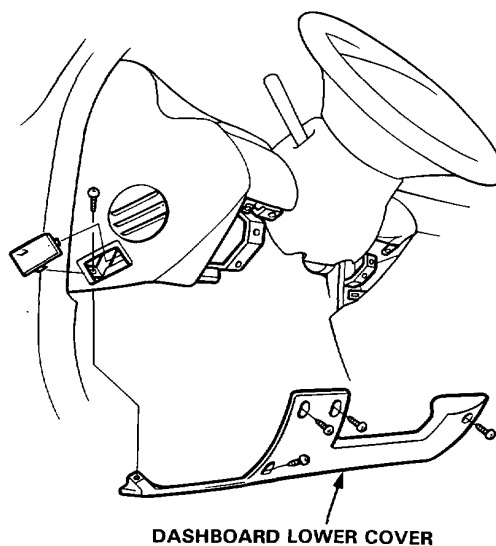


2. Disconnect the connector from the combination light switch assembly, then remove the two screws and the switch.



In case of the switch harness removal:

3. Disconnect the connector from the wiper/washer switch.
4. Remove the dashboard lower cover.



5. Disconnect the 20-P connector from the underdash fuse box and disconnect the 8-P and 10-P connectors from the main wire harness.
6. Remove the switch harness assembly from the steering column.



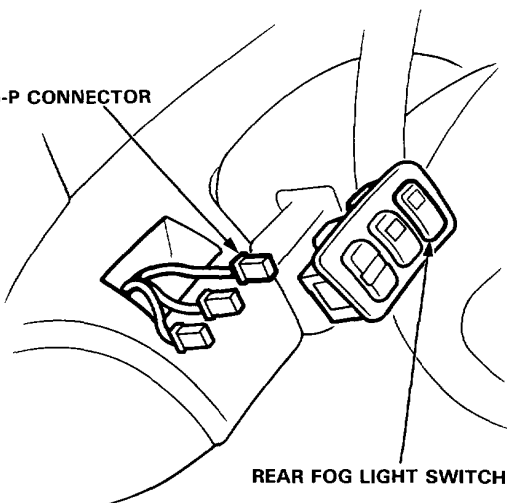
Rear Fog Light Switch Removal (Europe models)

1. Carefully pry the switches out of the dashboard.
2. Disconnect the connectors from the switches.

NOTE:

- When removing the switches, be careful not to damage them or the dashboard.
- LHD type is shown, RHD type is similar.

5-P CONNECTOR

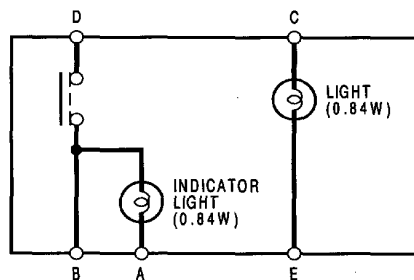
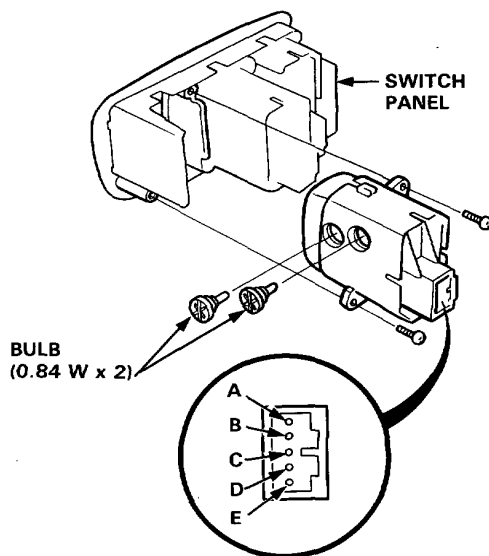


REAR FOG LIGHT SWITCH

Rear Fog Light Switch Test (Europe models)

1. Carefully pry the switches out of the dashboard.
2. Remove the switch from the switch panel.
3. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	A	B	C	D	E
OFF	○	○	○	○	○
ON	○	○	○	○	○

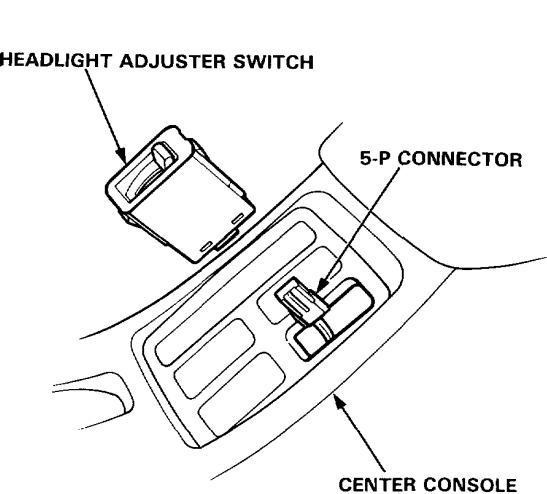


Lighting System

Headlight Adjuster Switch Removal (KG model)

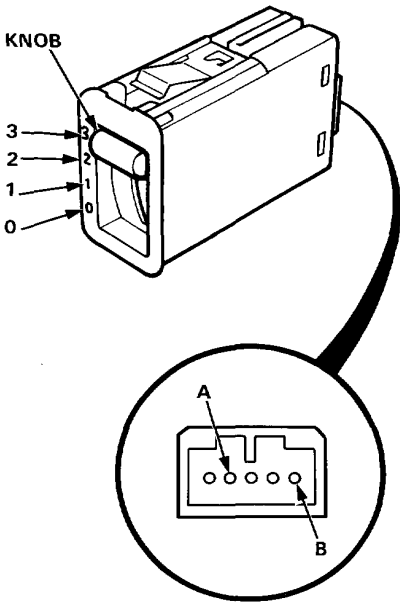
1. Carefully pry the headlight adjuster switch out of the center console.

NOTE: Be careful not to damage the switch and center console when prying the switch out.
2. Disconnect the 5-P connector from the switch.

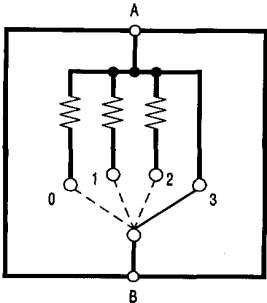


Headlight Adjuster Switch Test (KG model)

1. Remove the switch from the center console.
2. Measure the resistance between the A and B terminals at 0, 1, 2, and 3 positions by moving the knob.
Replace the switch if the resistance is not within specifications.



Knob Position	0	1	2	3
Resistance [Approx. (Ω)]	365	200	102	0



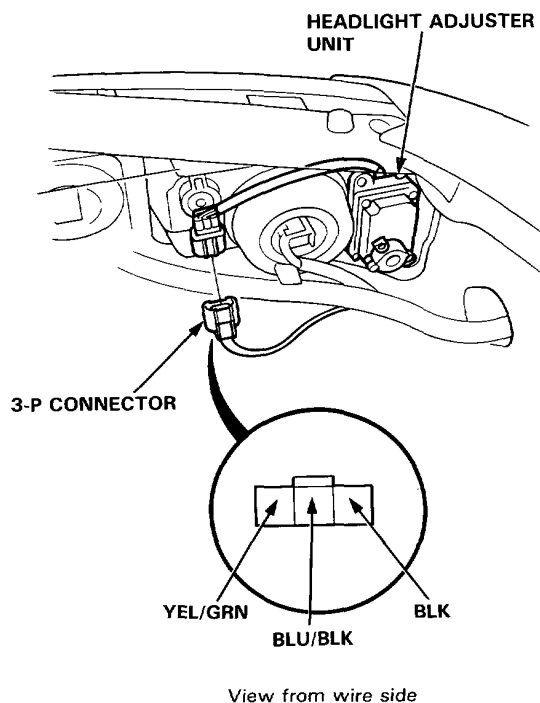


Headlight Adjuster Input Test (KG model)

NOTE: Before testing, check for:

- Blown No. 21 (10 A) fuse in the auxiliary fuse holder.
- Bent, loose, or corroded terminals.

1. Disconnect the 3-P connectors from the each headlight adjuster units.



2. Check for continuity between the BLK terminal and body ground.

There should be continuity.

- If there is no continuity, check for:
 - An open in the BLK wire.
 - Poor ground (G201, G301).
- If there is continuity, go to step 3.

3. Check for voltage between the YEL/GRN terminal and body ground with the ignition switch ON. There should be battery voltage.
 - If there is no voltage, check for an open in the YEL/GRN wire.
 - If there is battery voltage, go to step 4.
4. Using an ohmmeter, measure resistance between the BLU/BLK terminal and body ground in "O" position of headlight adjuster switch. There should be approximately 365 Ω .
 - If resistance is not within specification, check for:
 - An open in the BLU/BLK wire.
 - Faulty headlight adjuster switch.
 - If resistance is within specification, go to step 5.
5. If all tests normal, but the headlight adjuster unit does not operate. Check for frozen, stuck or improperly installed the headlight adjuster unit. If mechanical check is OK, replace the headlight adjuster unit.
6. After installing, recheck the system.

Lighting System

Dim-Dip Resistor Test

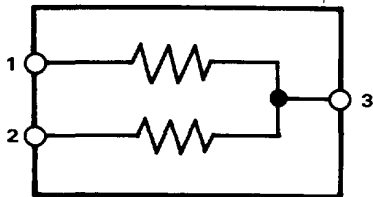
CAUTION: Dim-Dip resistor becomes very hot in use of Dim-Dip headlights; do not touch it or the attaching hardware immediately after they have been turned off.

1. Disconnect the 3-P connector from the resistor.
2. Using an ohmmeter, measure resistance between the terminals. Replace the resistor if the resistance is not within specifications.

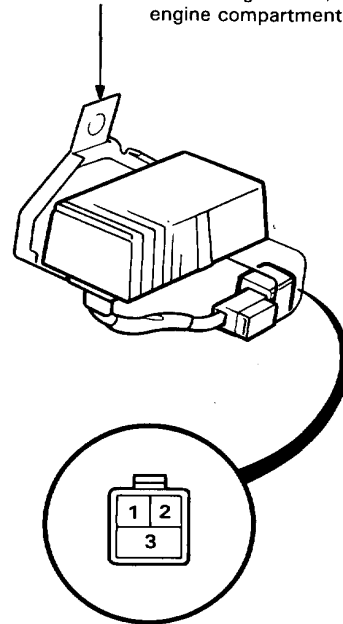
NOTE: Resistance will vary with the resistor temperature; specifications are at 20°C (70°F).

L. Headlight Resistance
(between the 1 and 3 terminals):
1.3—1.5 ohms

R. Headlight Resistance
(between the 2 and 3 terminals):
1.3—1.5 ohms



RESISTOR Located right front, engine compartment



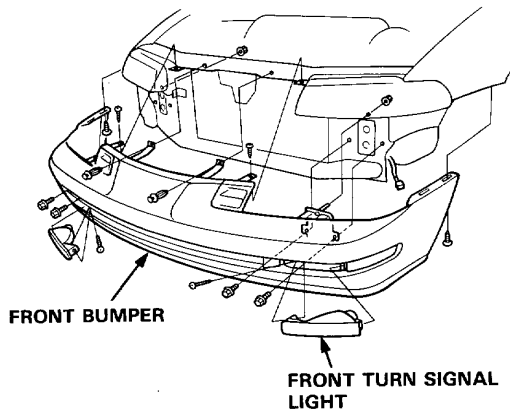


Headlights Replacement

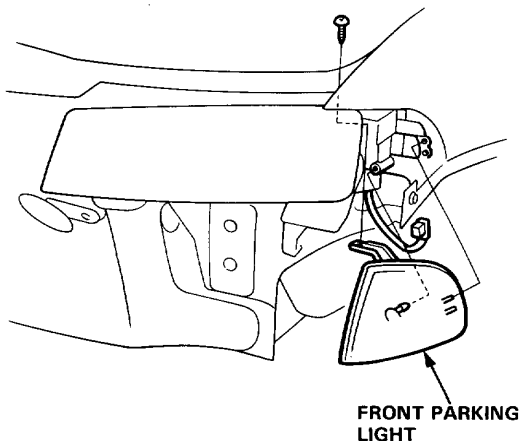
CAUTION:

- Halogen headlights can become very hot in use; do not touch them or the attaching hardware immediately after they have been turned off.
- Do not try to replace or clean the headlights with the lights on.

1. Remove a screw, and then remove the front turn signal light.
2. Disconnect the connectors from the turn signal lights, and then remove the front bumper.



3. Disconnect the connector from the front parking light, and then remove the light by removing the mounting screws.

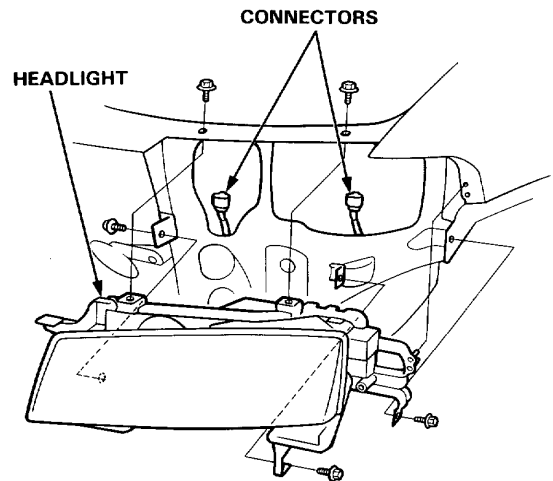


4. Disconnect the connectors from the each bulb and the headlight adjuster unit (KG model).

NOTE:

- Before disconnecting the left side connectors, remove the washer filter by removing a bolt.
- Before disconnecting the right side connectors, remove the coolant reservoir tank.

5. Remove the volts, and then remove the headlight assembly.



6. After installing the headlights, adjust the headlights to local requirements.

Headlights

Bulb Replacement

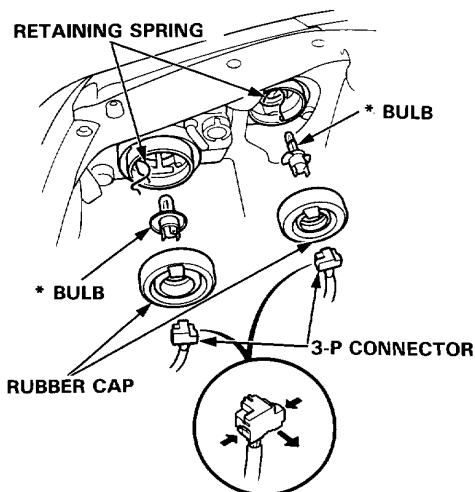
CAUTION:

- Halogen headlights can become very hot in use: do not touch them attaching hardware immediately after they have been turned off.
- Do not try to replace or clean the headlights with the lights on.
- Do not touch the glass of halogen bulb.

NOTE:

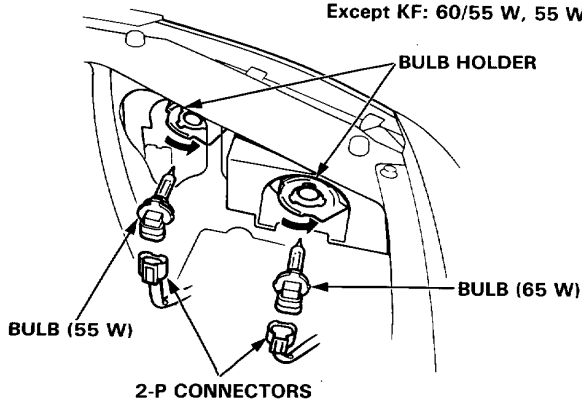
- Before disconnecting the left side connectors, remove the washer filler assembly by removing a bolt.
 - Before disconnecting the right side connectors, remove the coolant reservoir tank.
1. Turn the retaining spring out (except KY), or turn the bulb holder to open position (KY model), and then remove the each bulb.

Except KY:



KY model:

* BULB
KF model: 60/55 W x 2
Except KF: 60/55 W, 55 W



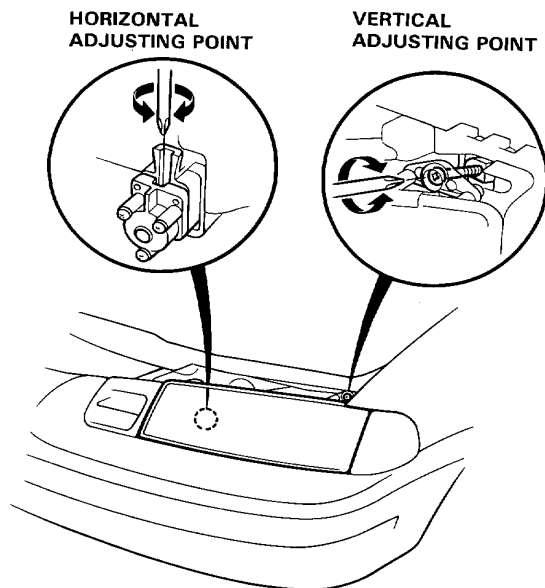
Adjustment (KY model)

CAUTION:

- Halogen headlights can become very hot in use: do not touch them attaching hardware immediately after they have been turned off.
- Do not try to replace or clean the headlights with the lights on.

NOTE: Adjust the headlights to local requirements.

1. Adjusting is by turning the adjusting point.





Adjustment (Except KY)

CAUTION:

- Halogen headlights can become very hot in use: do not touch them attaching hardware immediately after they have been turned off.
- Do not try to replace or clean the headlights with the lights on.

Outside Headlight Adjustment:

Adjust the points A and B.

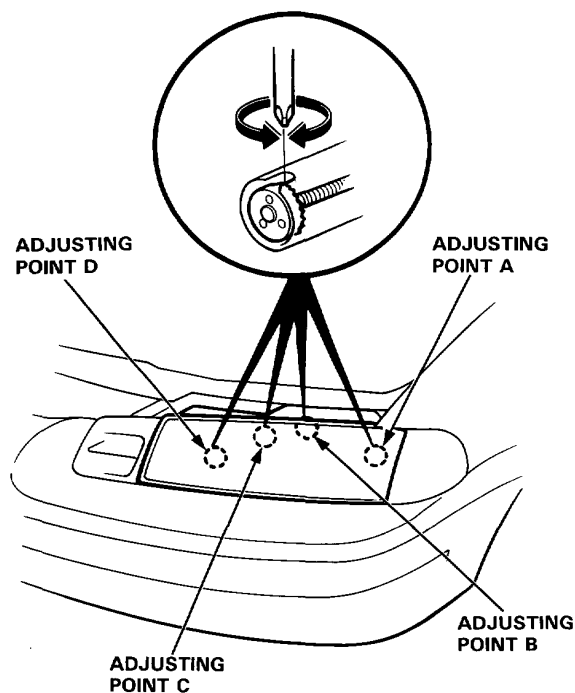
KG model:

1. Adjust the outside headlight with "O" position of headlight adjuster switch.
2. Check the dip of beam in each position of the headlight adjuster switch, after outside headlight adjustment.

Inside Headlight Adjustment:

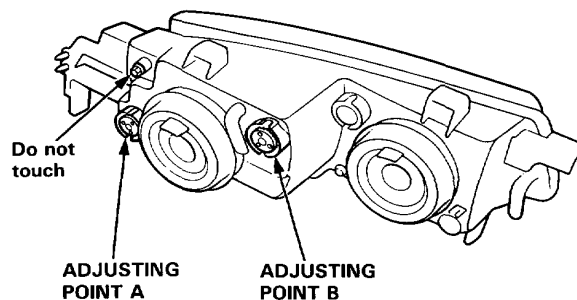
Adjust the points C and D.

NOTE: Adjust the headlights to local requirements.

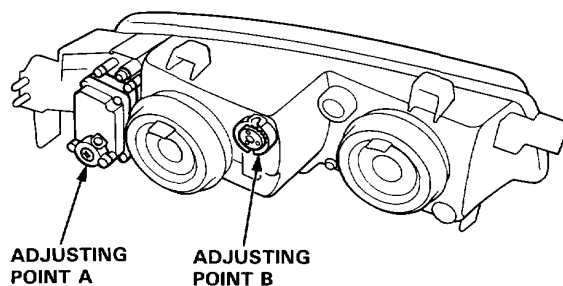


Outside headlight:

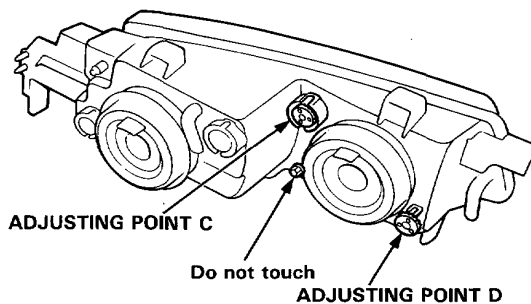
(Except KG)



(KG model)



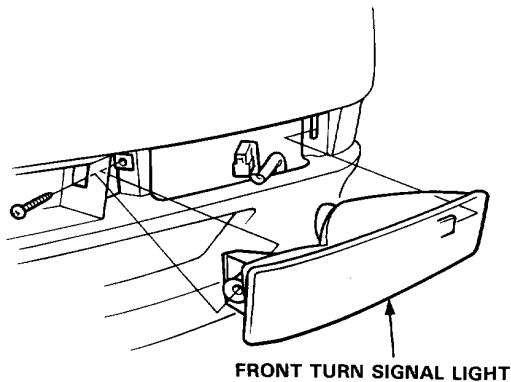
Inside headlight:



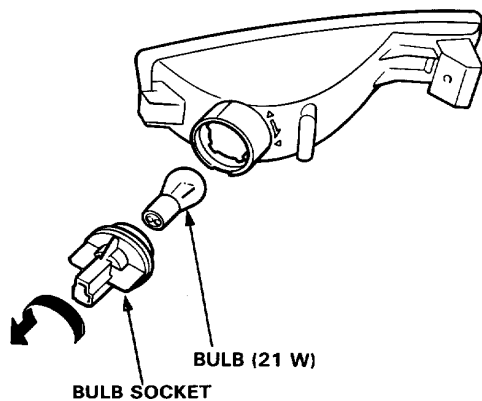
Front Turn Signal Lights

Replacement

1. Remove the screw and pull the light assembly out of the front bumper.
2. Disconnect the 2-P connector from the light assembly.



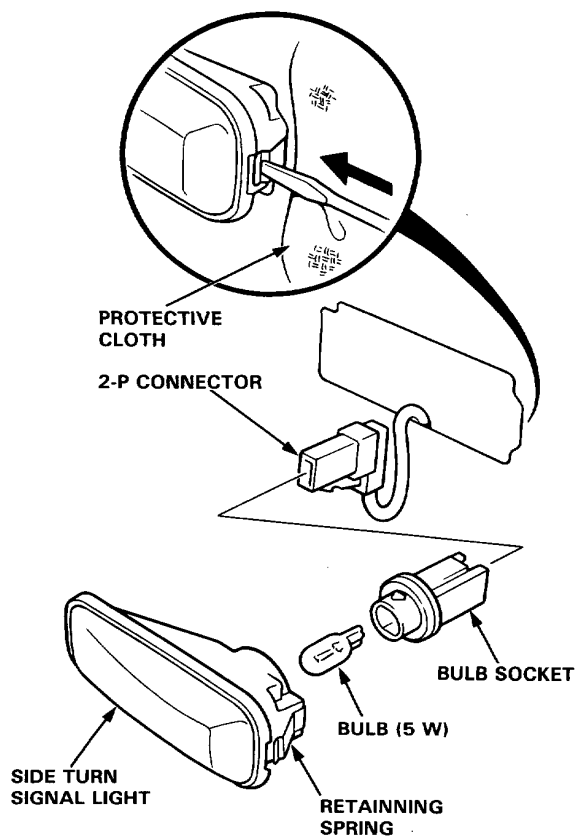
3. Turn the bulb socket 45° counterclockwise to remove it from the housing.



Side Turn Signal Lights

Replacement

1. Push the retaining spring and remove the side turn signal light.
2. Remove the bulb socket from the light housing, then replace the bulb.



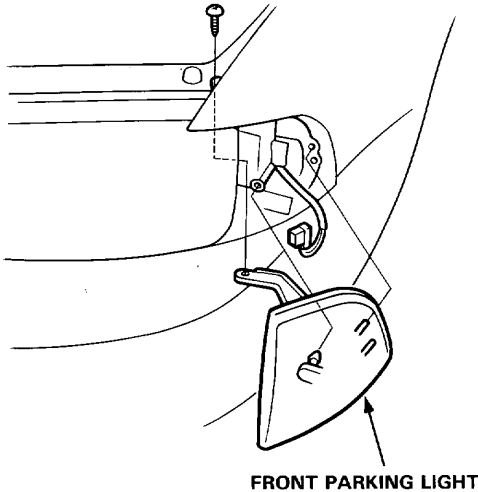


Front Parking Lights

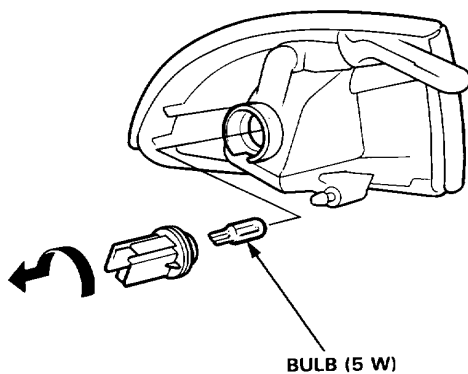
Replacement

NOTE: Be careful not to damage the headlight and the front fender.

1. Remove the screw and separate the light from the headlight assembly.
2. Disconnect the 2-P connector from the front parking light.



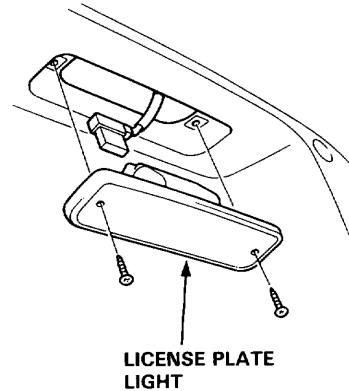
3. Turn the bulb socket 45° counterclockwise to remove it from the housing.



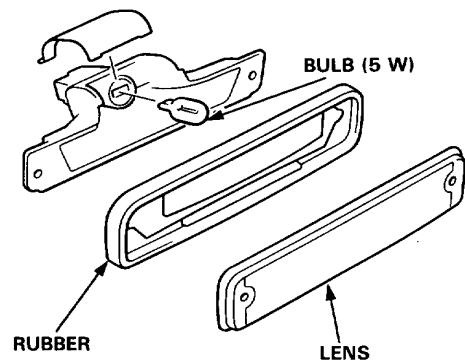
License Plate Lights

Replacement

1. Remove the two screws from the license plate light.
2. Pull the light out, and then disconnect the 2-P connector from the light.



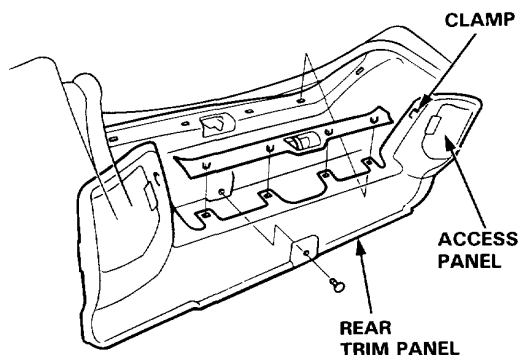
3. Take the lens off, then remove the bulb.



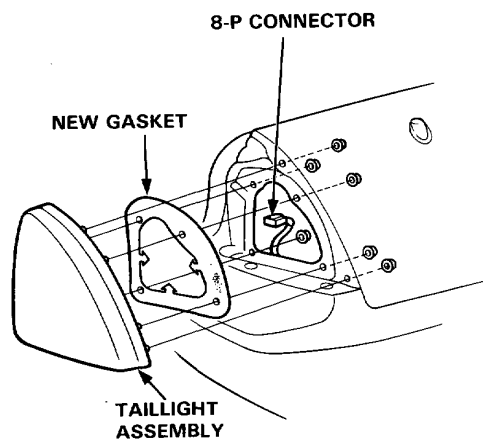
Taillights

Replacement

1. Open the trunk-lid and remove the rear trim panel.



2. Disconnect the 8-P connector from the taillight.
3. Remove the 6 mounting nuts and then the taillight assembly.

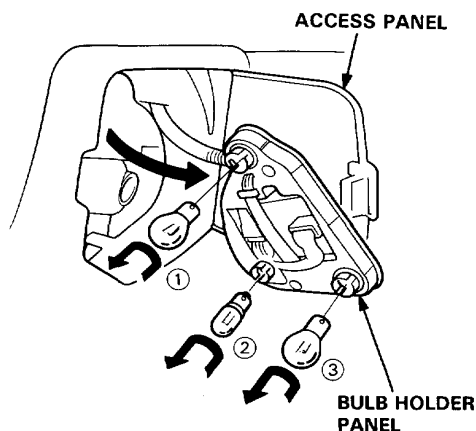


NOTE:

- Inspect the gasket; replace it if it is distorted or stays compressed.
- After installation, run water over the lights to make sure they don't leak.

Bulb Replacement

1. Open the trunk-lid and then the taillight access panel.



- ① BRAKE LIGHT/TAILLIGHT BULB (43/3 CP)
- ② TURN SIGNAL LIGHT BULB (45 CP)
- ③ BACK-UP LIGHT BULB (32 CP)

2. Remove the screws and the bulb holder panel.
3. Turn the bulb to remove it from the holder panel.

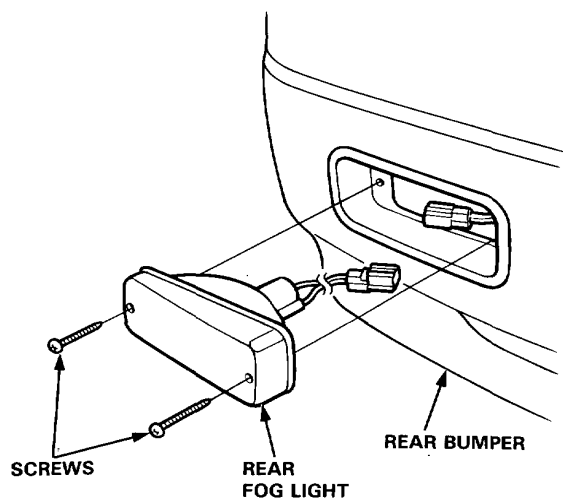


Rear Fog Light

Replacement

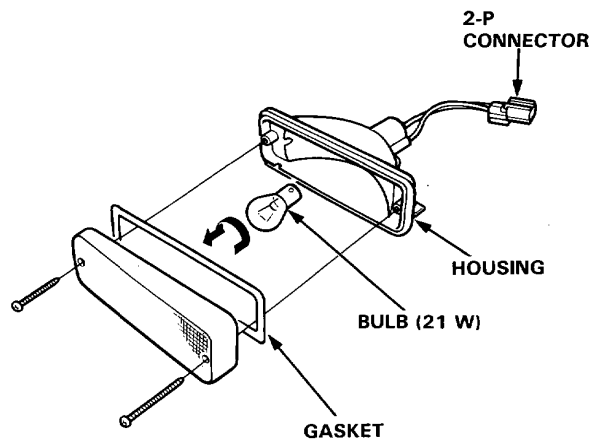
1. Remove the two screws from the rear fog light and then pull the light out of the rear bumper.
2. Disconnect the 2-P connector from the light.

NOTE: LHD type is shown, RHD type is symmetrical.



Bulb Replacement

1. Remove the lens from the rear fog light housing.
2. Push and turn the bulb, and then take the bulb out of the housing.

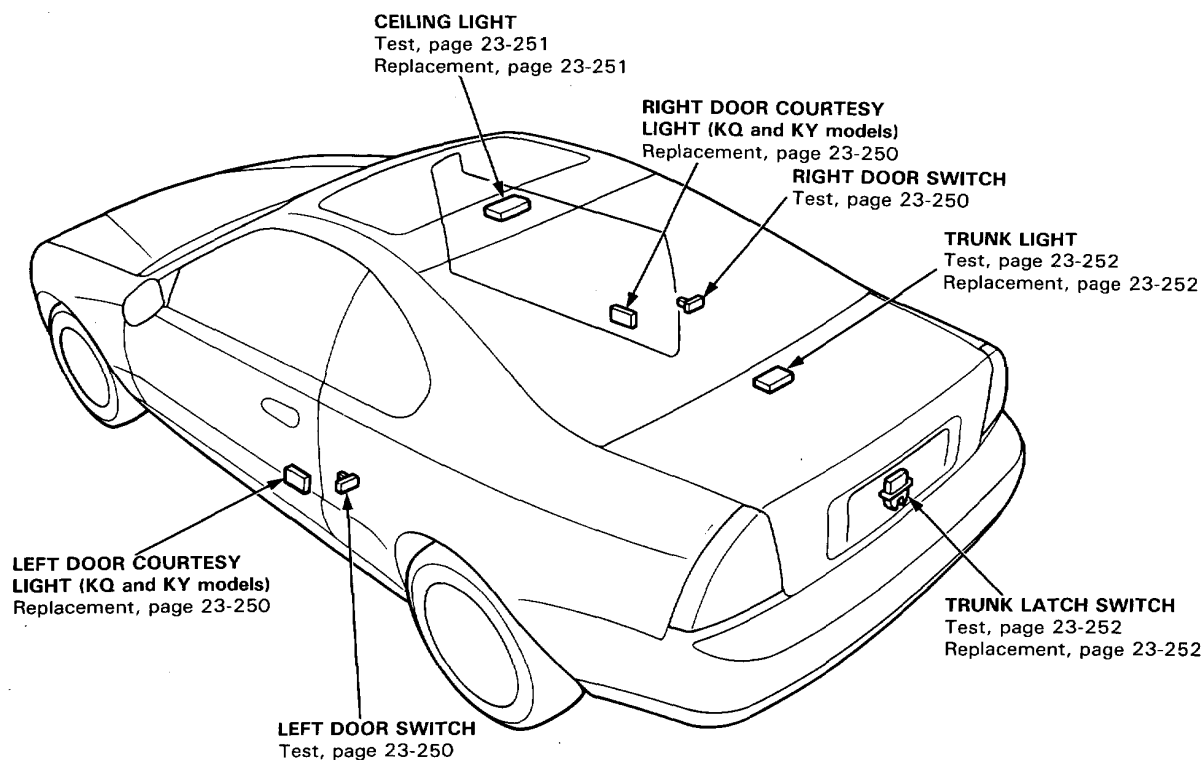


NOTE:

- Inspect the gasket; replace if it is distorted or stays compressed.
- After installataion, run water over the lights to make sure they do not leak.

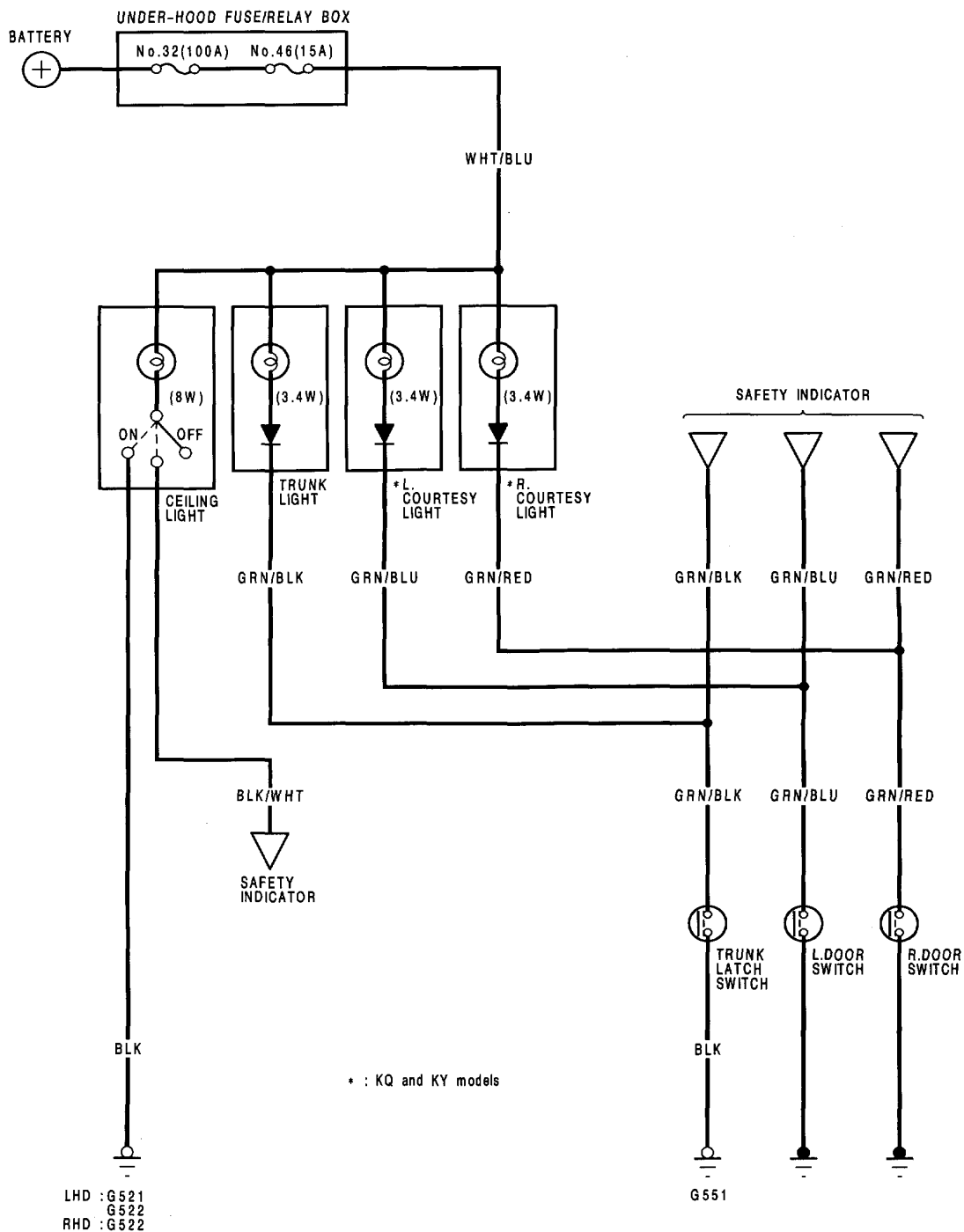
Ceiling/Courtesy/Trunk Lights

Component Location Index





Circuit Diagram

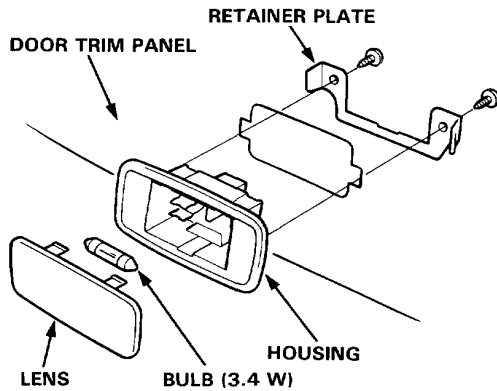


Ceiling/Courtesy/Trunk Lights

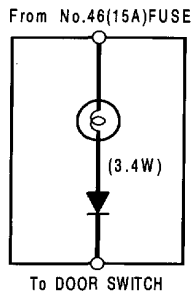
Courtesy Light Replacement

NOTE: The bulb or lens alone can be replaced without removing the door trim panel.

1. Remove the door trim panel.
2. Remove the two screws and the retainer plate to remove the light from the door trim panel.



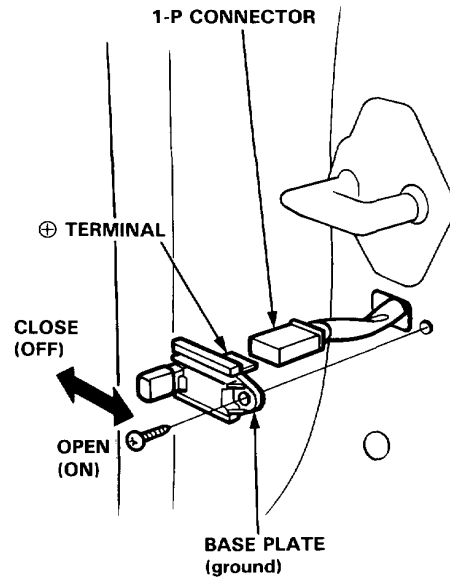
3. Install in the reverse order of removal.



Door Switch Test

1. Remove the screw, and pull the switch out.
2. Disconnect the 1-P connector and remove the switch.
3. Check for continuity between the terminals in each switch position according to the table.

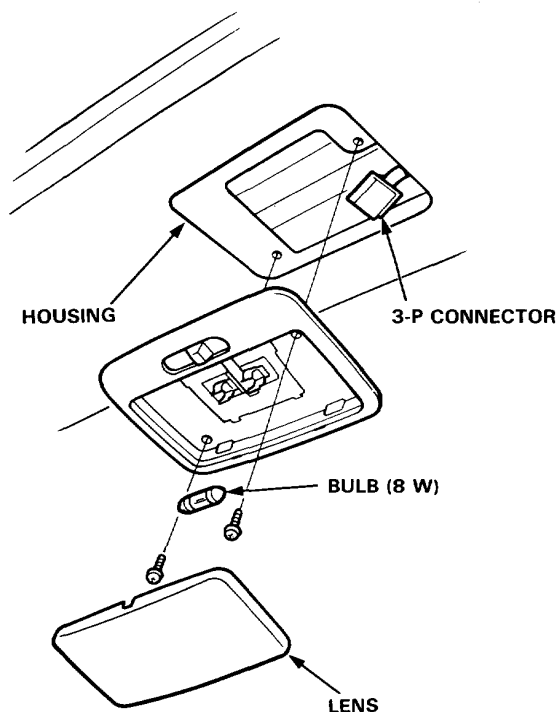
Terminal Position	⊕ TERMINAL	BASE PLATE
CLOSE		
OPEN		





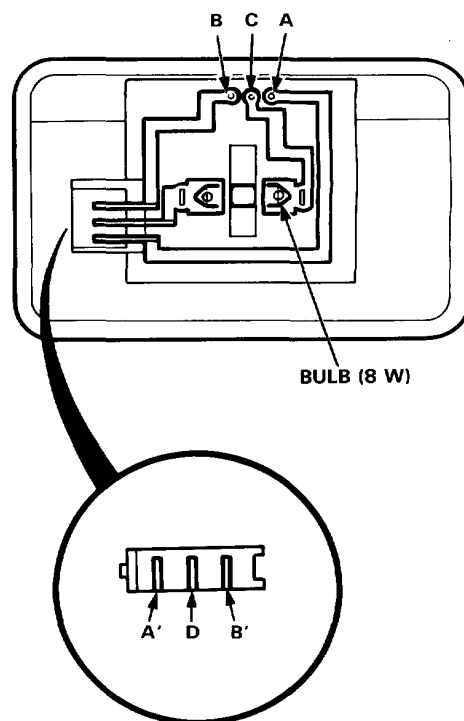
Test/Replacement

1. Turn the light switch OFF.
2. Pry the lens off.

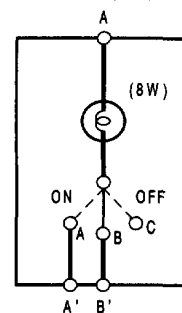


3. Remove the screws, and then the housing.
4. Disconnect the 3-P connector from the housing.
5. Remove the ceiling light.
6. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	A or A'	B or B'	C		D
OFF			○	⊖	○
MIDDLE		○		⊖	○
ON	○			⊖	○



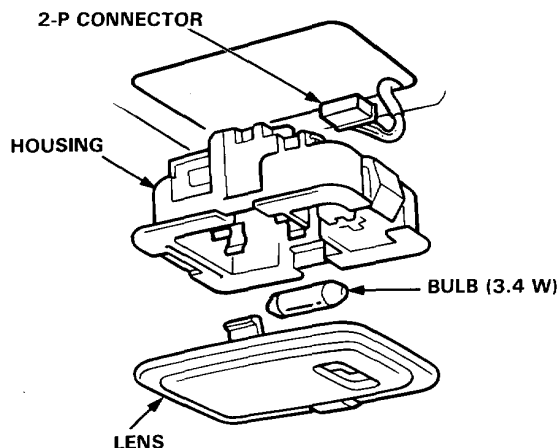
From No.46(15A)FUSE



Ceiling/Courtesy/Trunk Lights

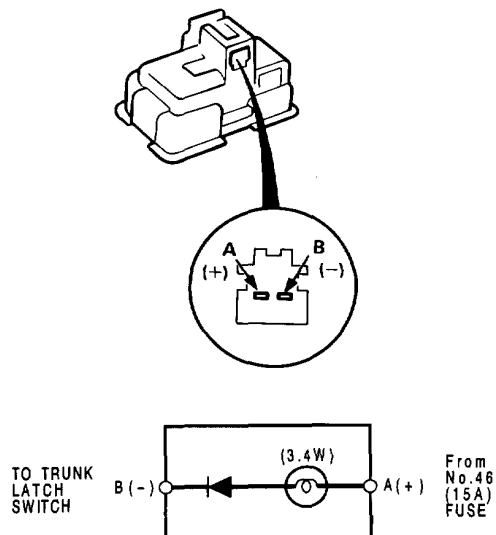
Trunk Light Test/Replacement

1. Pry the trunk light lens off from the housing.
2. Pry the light assembly off.
3. Disconnect the 2-P connector from the housing.



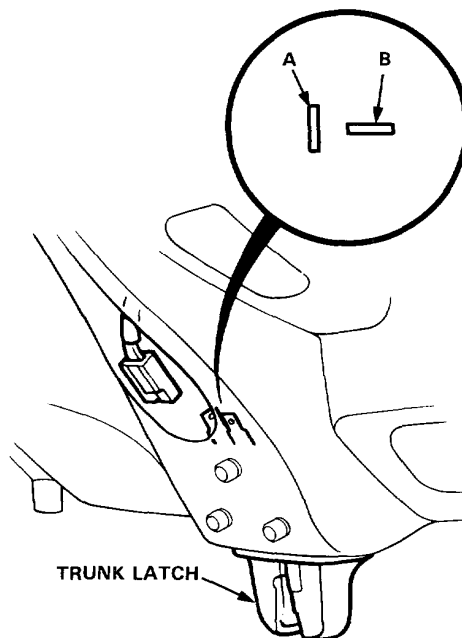
4. Make sure that the bulb is OK. Check for continuity between A (+) and B (-) terminals.

NOTE: This light has a diode in it. To get an accurate reading, either test it with a volt-ohmmeter that compensates for diodes, or make sure you connect your test leads to match the polarity shown.

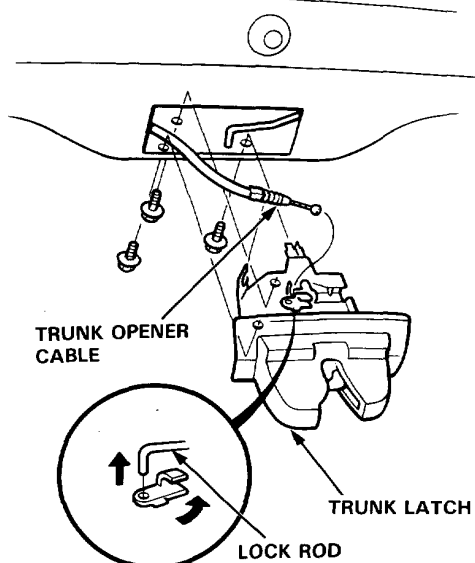


Latch Switch Test/Replacement

1. Open the trunk lid and disconnect the 2-P connector from the trunk latch.
2. There should be continuity between the A and B terminals.



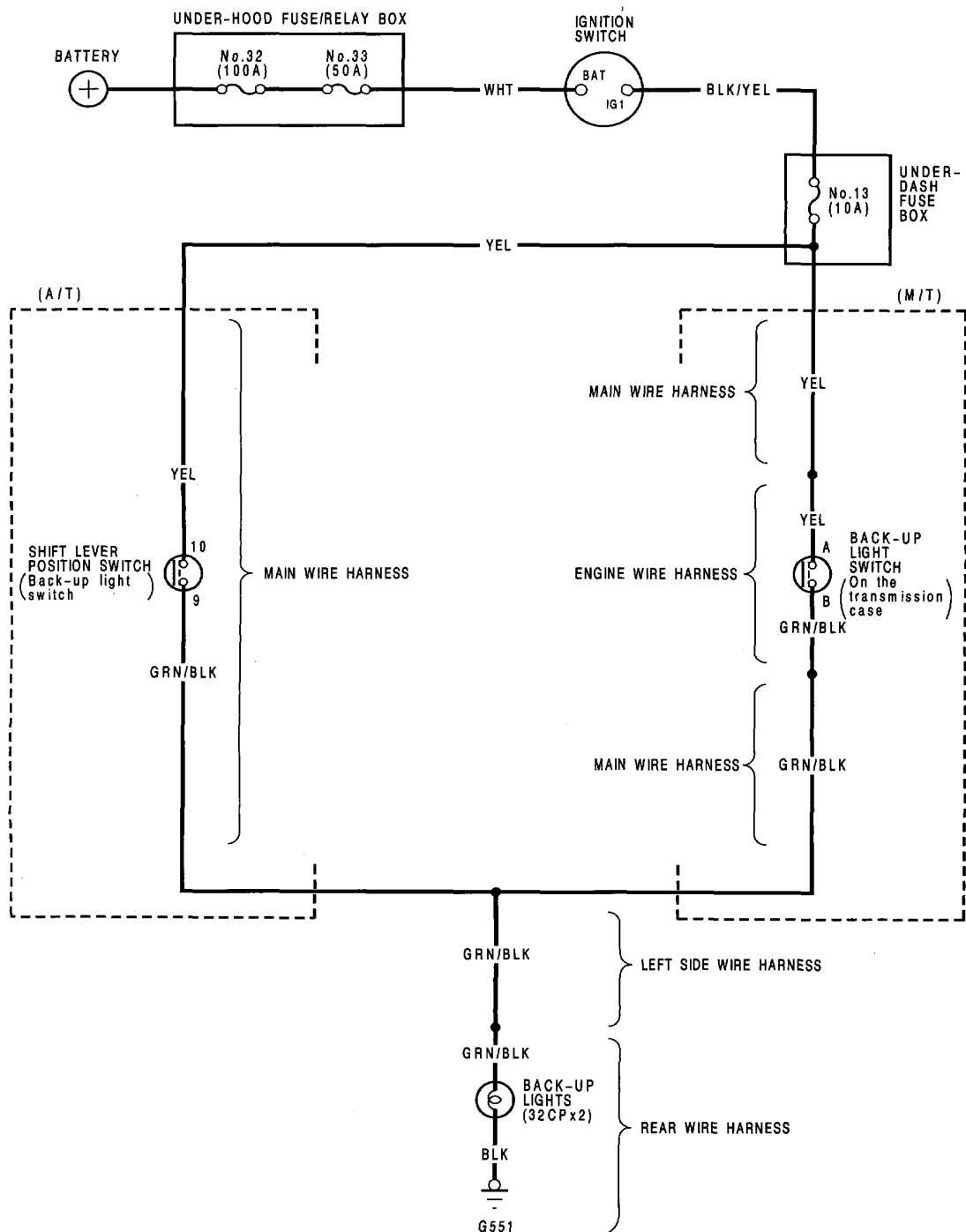
3. If necessary, remove the three bolts and pull the latch out of the trunk lid, then disconnect the lock rod from the latch.
4. Disconnect the trunk opener cable from the latch.





Back-up Lights

Circuit Diagram

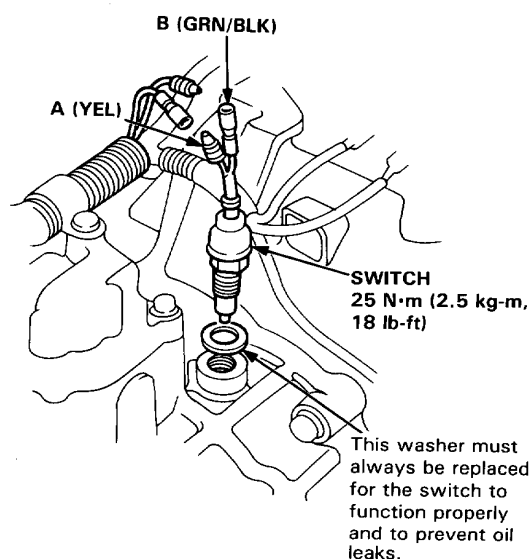


Back-up Lights

Test

Manual Transmission:

1. If only one back-up light does not go on, check that bulb in the taillight.
2. If neither back-up light goes on, check the No. 13 (10 A) fuse in the under-dash fuse box.
3. If the fuse and bulbs are OK, disconnect the connectors from the back-up light switch at the transmission.

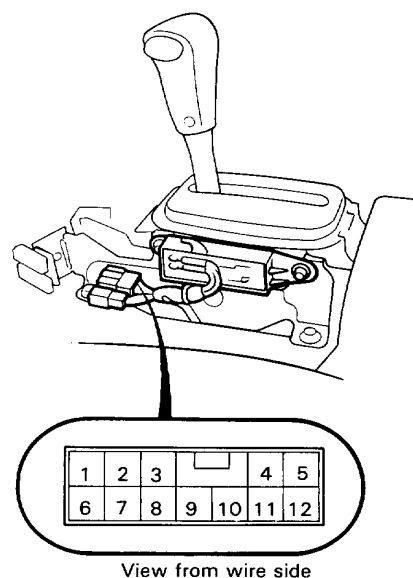


4. Check for continuity between the A and B wires with the switch installed. There should be continuity with the shift lever in reverse.

- If there is no continuity, replace the switch.
- If there is continuity, but the back-up lights do not go on, check for:
 - Poor ground (G551).
 - An open in the YEL or GRN/BLK wire.

Automatic Transmission:

1. If only one back-up light does not go on, check that bulb in the taillight.
2. If neither back-up light goes on, check the No. 13 (10 A) fuse in the under-dash fuse box.
3. If the fuse and bulbs are OK, disconnect the 12-P connector from the shift lever position switch (back-up light switch).



4. Check for continuity between the No. 9 and No. 10 terminals. Move the lever back and forth at the "R" position without touching the push button, and check for continuity within the range of free play.

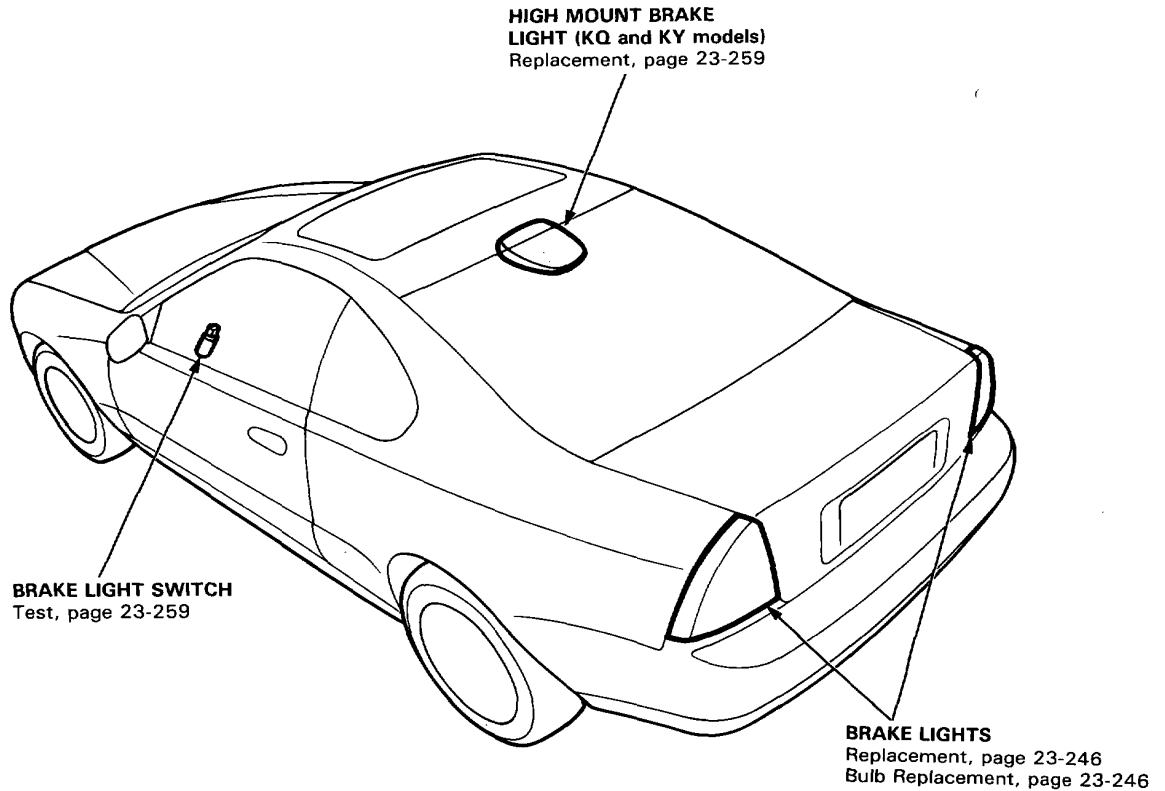
- If there is no continuity within the range of free play, adjust the position of the shift lever position switch (see page 23-184).
- If there is continuity, but the back-up lights do not go on, check for:
 - Poor ground (G551).
 - An open in the YEL or GRN/BLK wire.



Brake/High Mount Brake Light

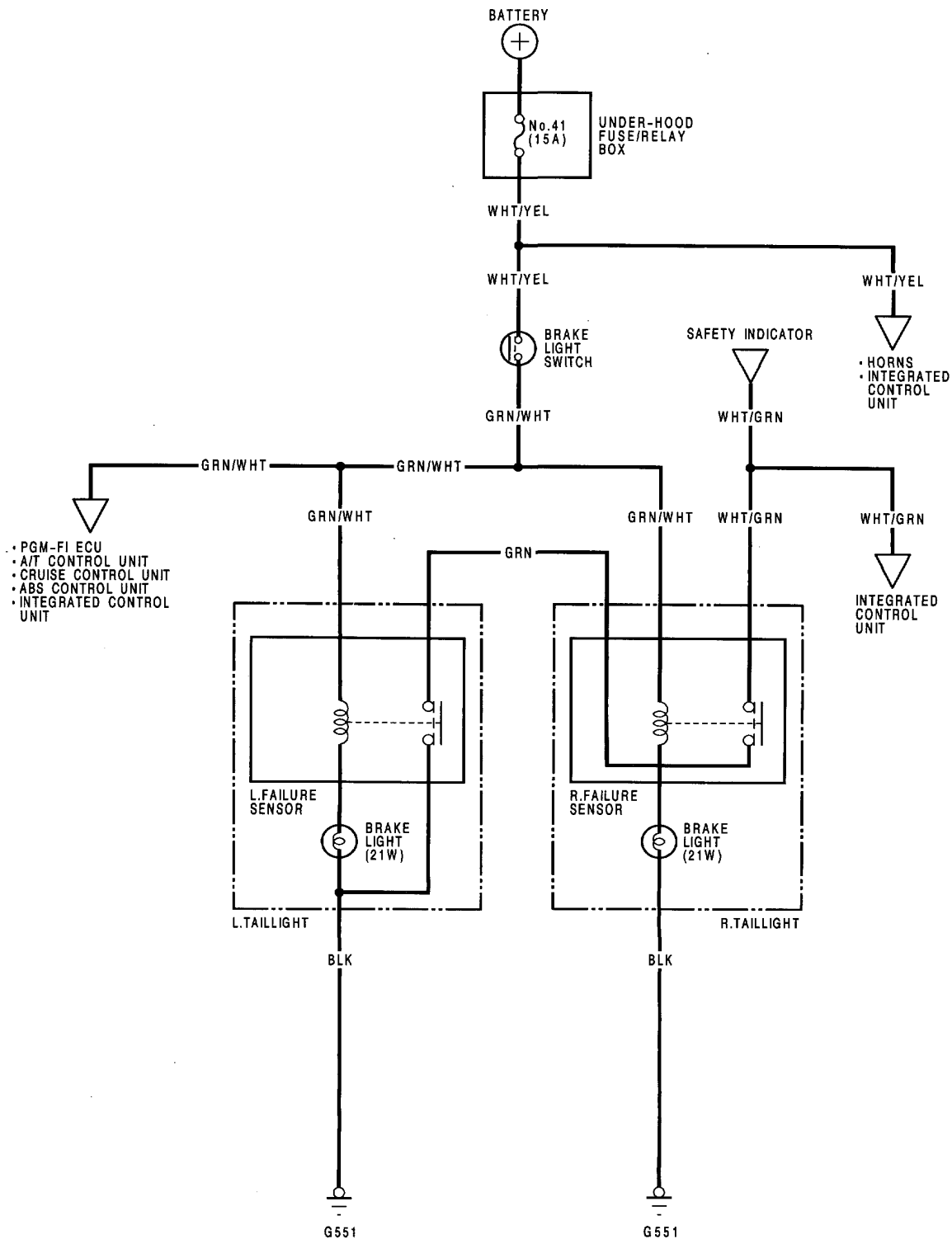
Component Location Index

NOTE: LHD type is shown, RHD type is similar.



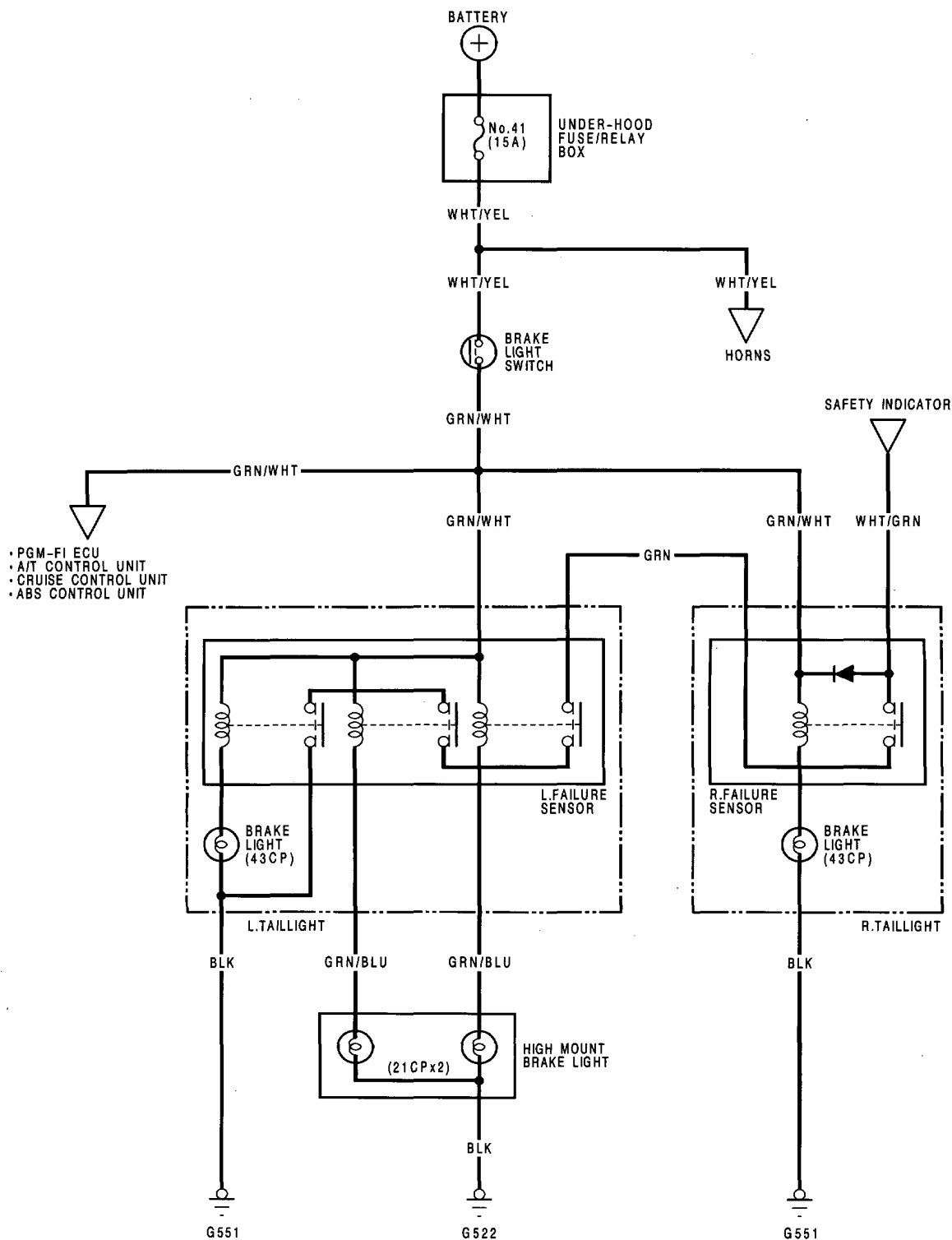
Brake/High Mount Brake Light

Circuit Diagram (KG model)



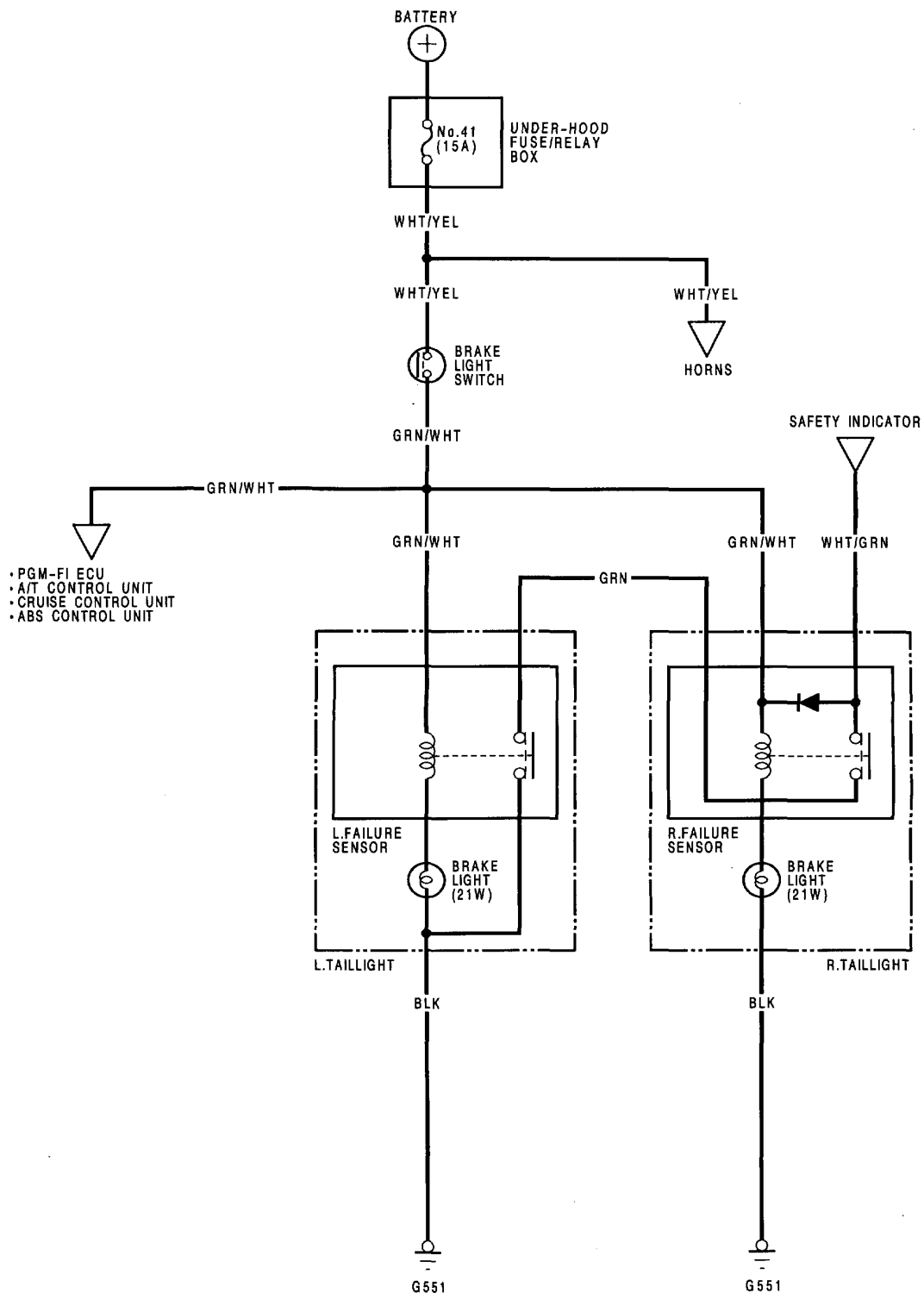


Circuit Diagram (KQ and KY models)



Brake/High Mount Brake Light

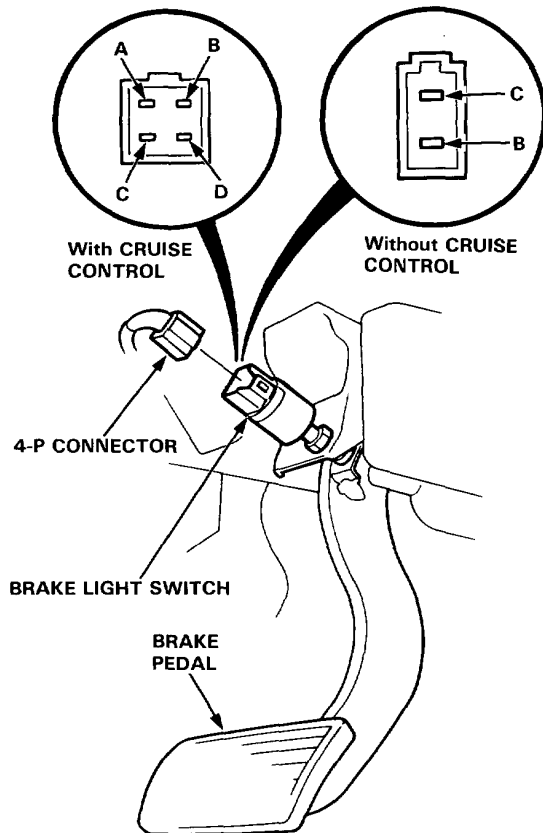
Circuit Diagram (Except KG, KQ, KY)





Brake Light Switch Test

1. If the brake lights do not go on, check the No. 41 (15 A) fuse in the under-hood fuse/relay box, the brake light bulb in the taillight assembly, and the high mount brake light bulbs.
2. If the fuse and bulbs are OK, disconnect the 2-P or 4-P connector from the brake light switch.



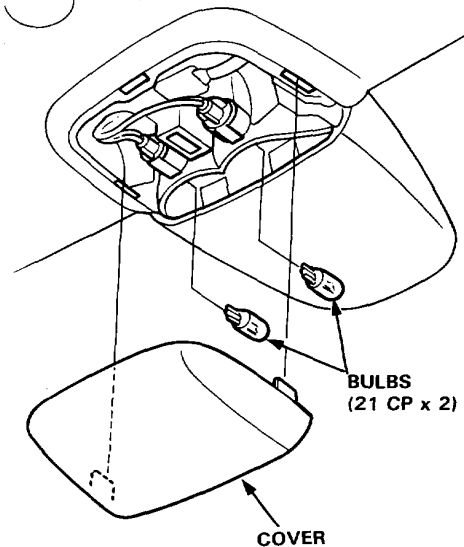
3. Check for continuity between the B and C terminals. There should be continuity with the brake pedal pushed.

- If there is no continuity, replace the switch or adjust pedal height (see section 19).
- If there is continuity, but the brake lights do not go on, inspect for:
 - Poor ground (G551).
 - An open in the WHT/YEL or GRN/WHT wire.
 - Faulty brake light failure sensors (see page 23-198).

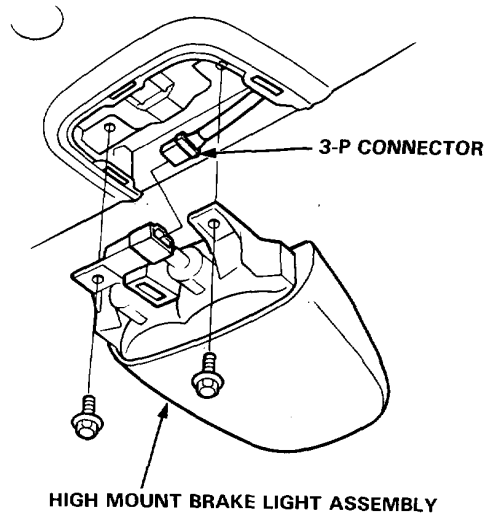
High Mount Brake Light Replacement (KQ and KY models)

1. Remove the cover.

NOTE: The bulb alone can be replaced without removing the high mount brake light assembly.



2. Remove the two mounting bolts.
3. Remove the high mount brake light assembly, then disconnect the 3-P connector.



4. Install the high mount brake light in the reverse order of removal. Clean the rear window glass first. Make sure the rubber seal on the light is touching the glass all the way around.

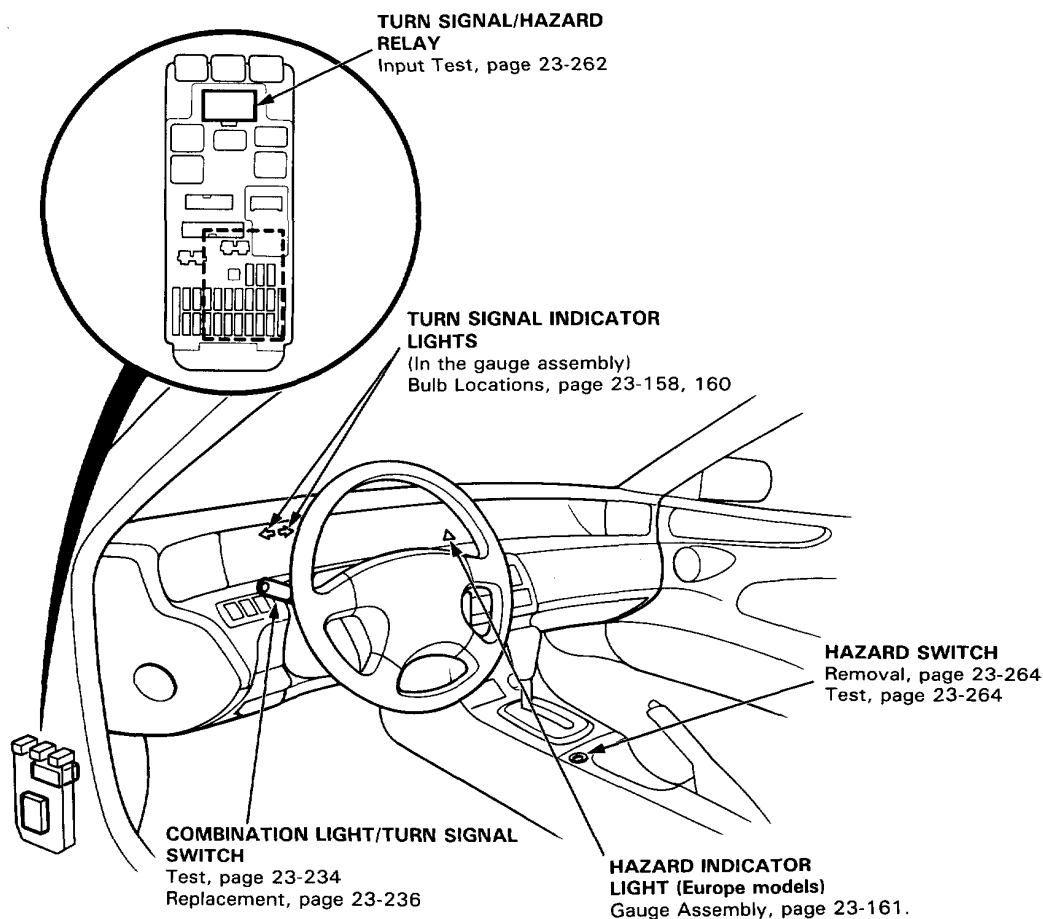
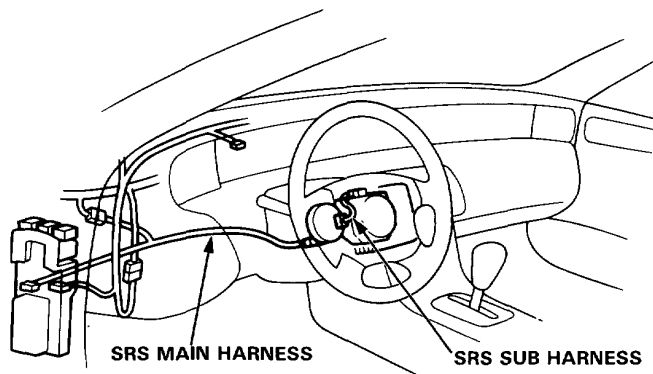
Turn Signal/Hazard Flasher System

Component Location

CAUTION:

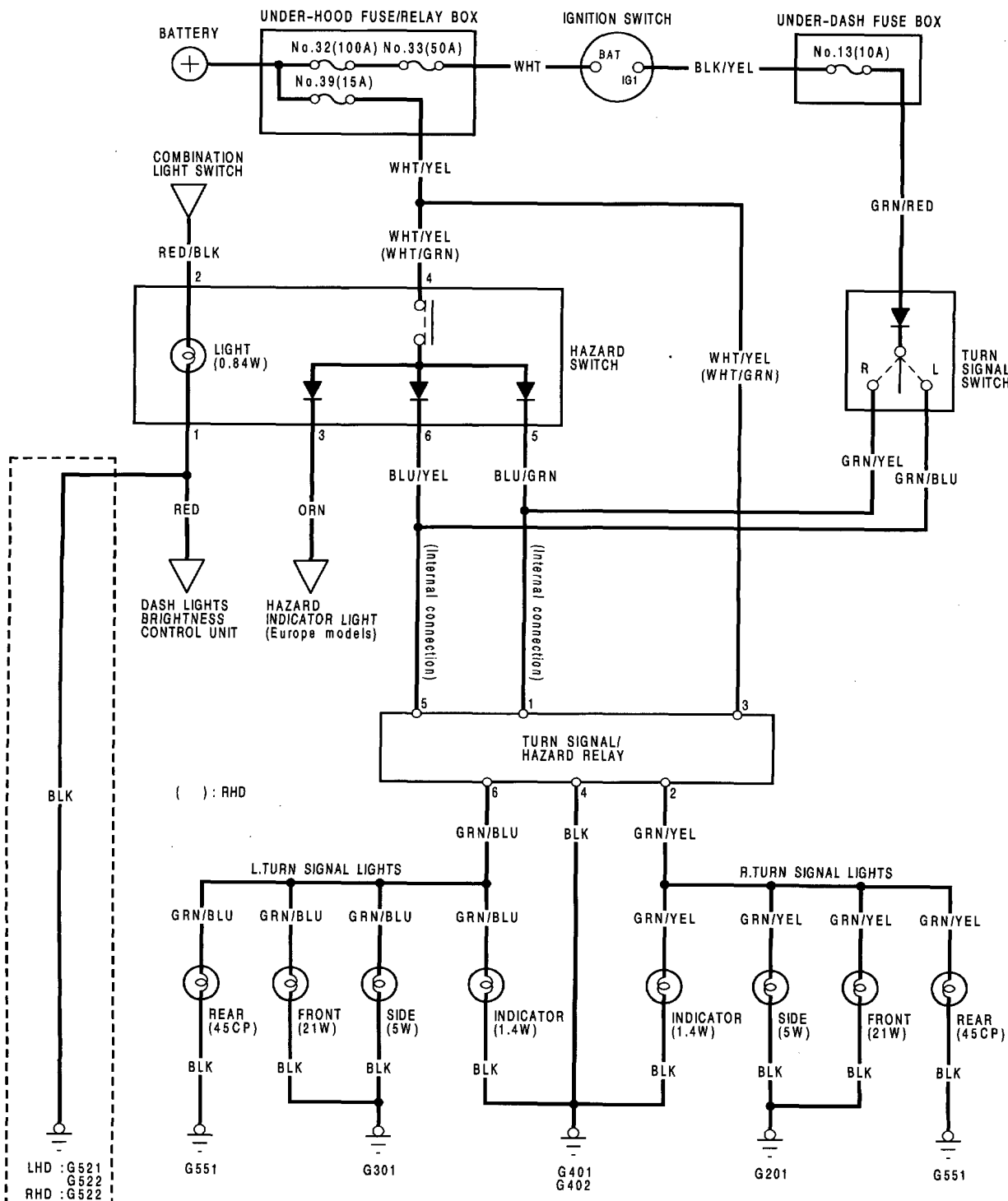
- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

NOTE: RHD type is similar to LHD type.





Circuit Diagram



Without DASH LIGHTS
BRIGHTNESS CONTROL

Turn Signal/Hazard Flasher System

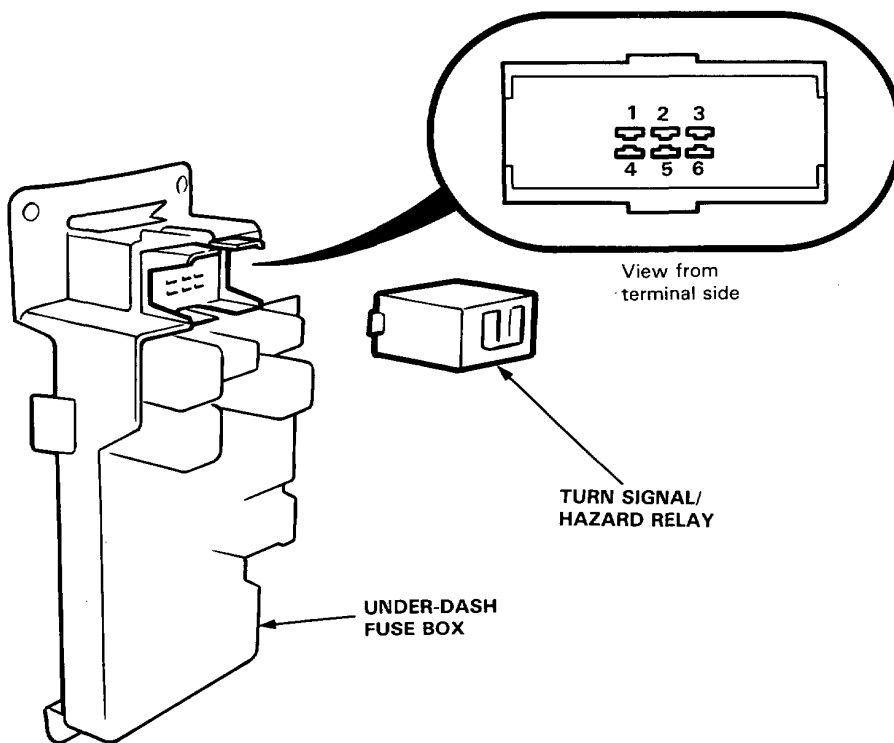
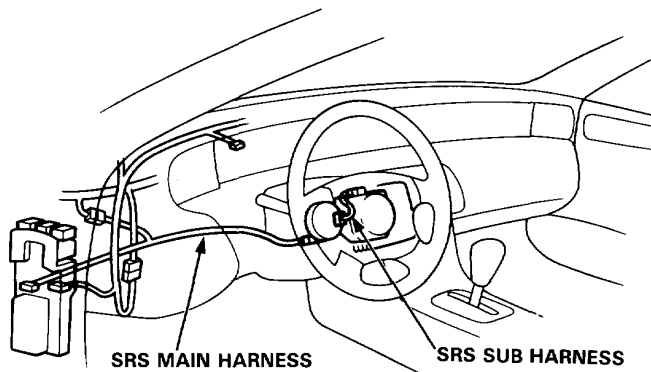
Turn Signal/Hazard Relay Input Test

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

Remove the driver's side kick panel, then remove the turn signal/hazard relay from the under-dash fuse box. Inspect the socket terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the socket.
 - If a test indicates a problem, find and correct the cause, then recheck the system.
 - If all the input tests prove OK, the turn signal/hazard relay must be faulty; replace it.





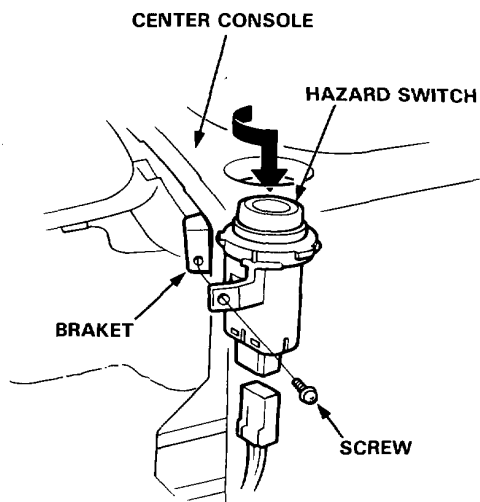
No.	Terminal	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	4	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, 402). • An open in the BLK wire.
2	3	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 39 (15 A) fuse. • An open in the WHT/YEL wire (LHD) or WHT/GRN wire (RHD).
3	1	Hazard switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty hazard switch. • An open in the BLU/GRN wire.
		Ignition switch ON and turn signal switch in Right position.		<ul style="list-style-type: none"> • Faulty turn signal switch. • An open in the GRN/YEL wire.
4	5	Hazard switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty hazard switch. • An open in the BLU/YEL wire.
		Ignition switch ON and turn signal switch in Left position.		<ul style="list-style-type: none"> • Faulty turn signal switch. • An open in the GRN/BLU wire.
5	3 • 6	Connect the No. 3 terminal to the No. 6 terminal.	Left turn signal lights should come on as the battery is connected.	<ul style="list-style-type: none"> • Blown bulb. • Poor ground (G201, G301, G401, G402, G551). • An open in the GRN/BLU wire.
6	3 • 2	Connect the No. 3 terminal to the No. 2 terminal.	Right turn signal lights should come on as the battery is connected.	<ul style="list-style-type: none"> • Blown bulb. • Poor ground (G201, G301, G401, G402, G551). • An open in the GRN/YEL wire.

Turn Signal/Hazard Flasher System

Hazard Switch Removal

CAUTION: Be careful not to damage the console panel.

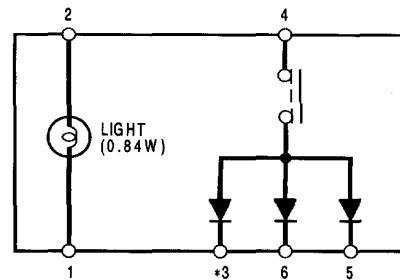
1. Remove the front console panel (see section 20).
2. Remove the screw and turn the hazard switch slowly in the direction shown and remove it from the center console.
3. Disconnect the 6-P connector from the hazard switch.



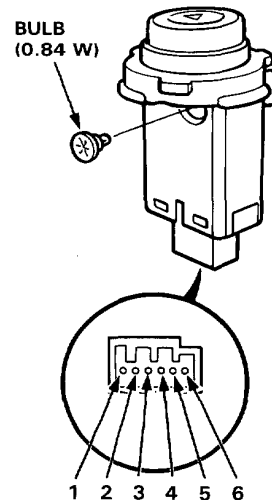
Hazard Switch Test

1. Remove the hazard switch from the center console panel.
2. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	1	2	4		*3	5	6
ON	○	○	○	○	○	○	○
OFF	○	○	○				



* : Europe model





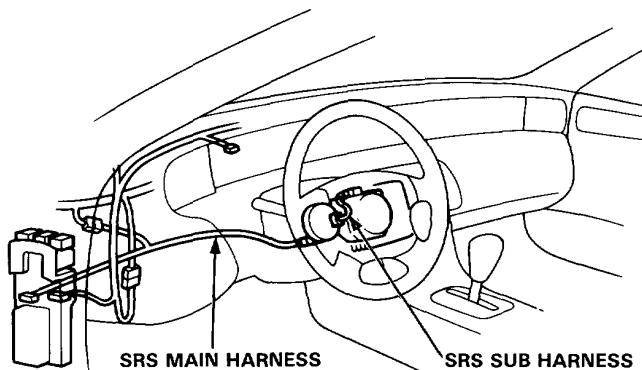
Dash Lights Brightness Control Unit

Component Location Index (Except KQ)

CAUTION:

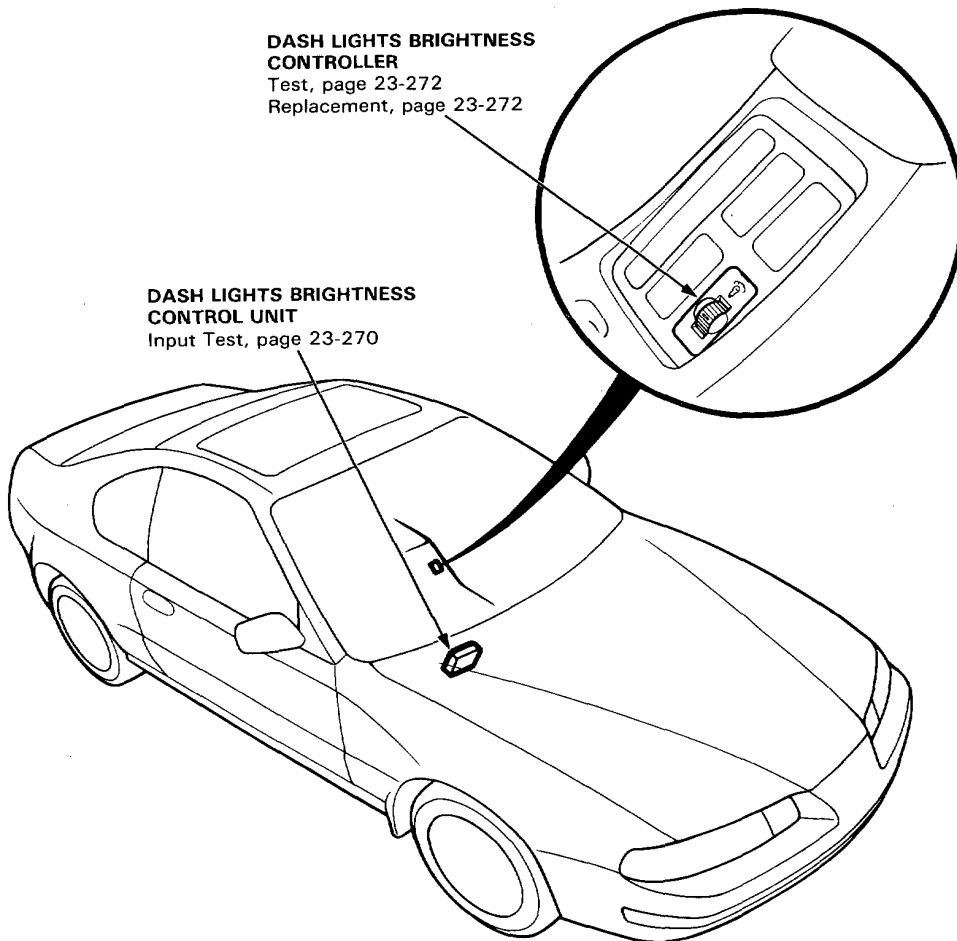
- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait, at least three minutes.

NOTE: LHD type is shown, RHD type is similar.



**DASH LIGHTS BRIGHTNESS
CONTROLLER**
Test, page 23-272
Replacement, page 23-272

**DASH LIGHTS BRIGHTNESS
CONTROL UNIT**
Input Test, page 23-270

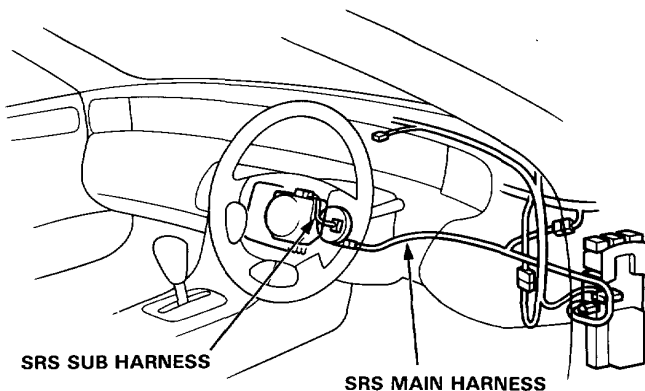




Component Location Index (KQ model)

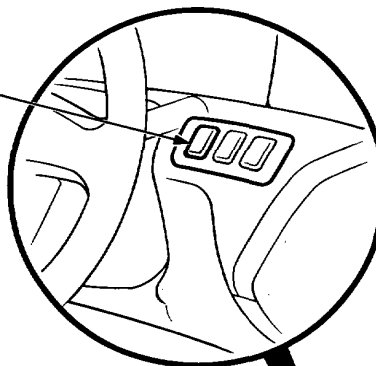
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait, at least three minutes.



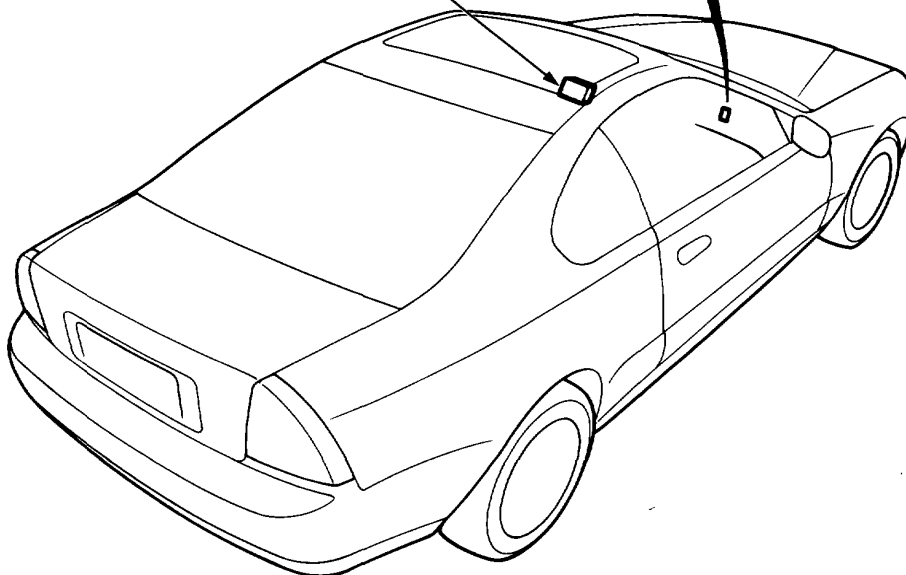
DASH LIGHTS BRIGHTNESS CONTROLLER

Test, page 23-273
Replacement, page 23-273



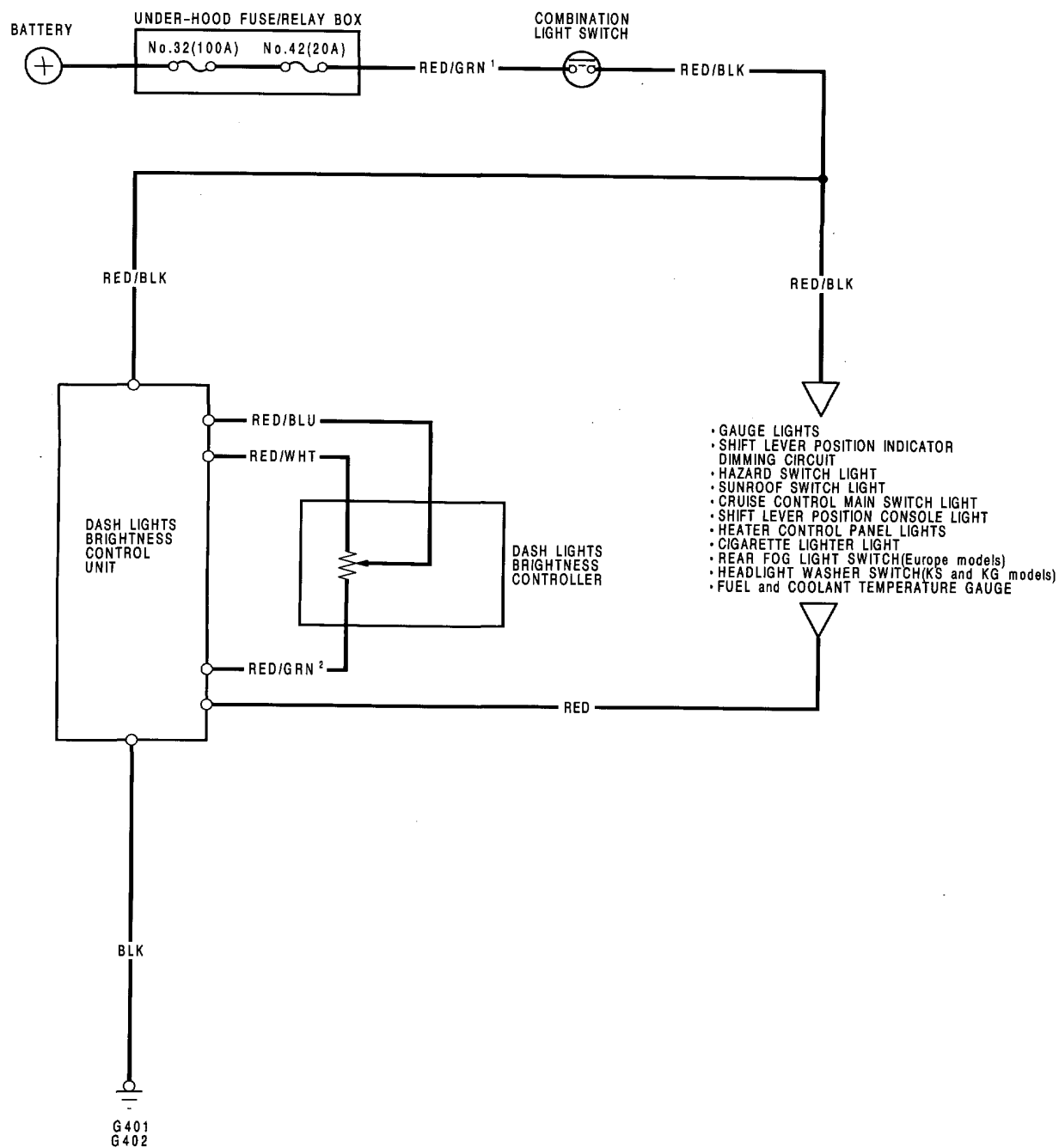
DASH LIGHTS BRIGHTNESS CONTROL UNIT

Input Test, page 23-270



Dash Lights Brightness Control Unit

Circuit Diagram (Except KQ)



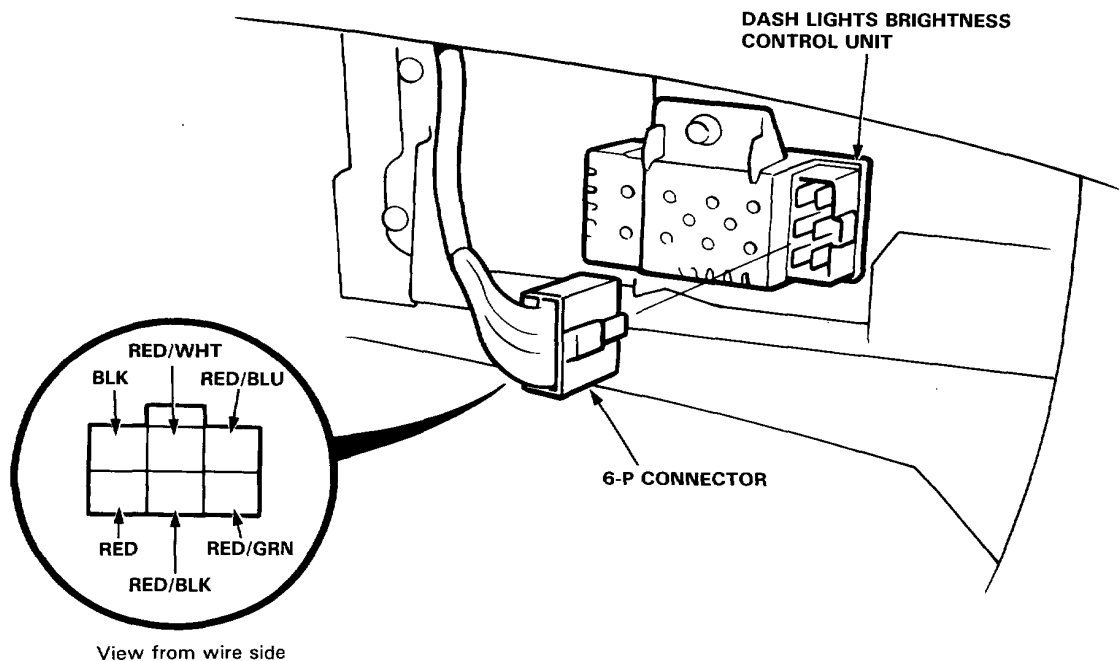


Dash Lights Brightness Control Unit

Control Unit Input Test

NOTE: LHD type is shown, RHD type is similar.

1. Remove the sub gauge assembly (see page 23-156).
2. Disconnect the 6-P connector from the control unit.
3. Inspect the connector terminals to be sure they are all making good contact.
 - If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
 - If the terminals look OK, make the following input tests at the connector terminals.
 - If a test indicates a problem, find and correct the cause, then recheck the system.
 - If all the input tests prove OK, the control unit must be faulty; replace it.



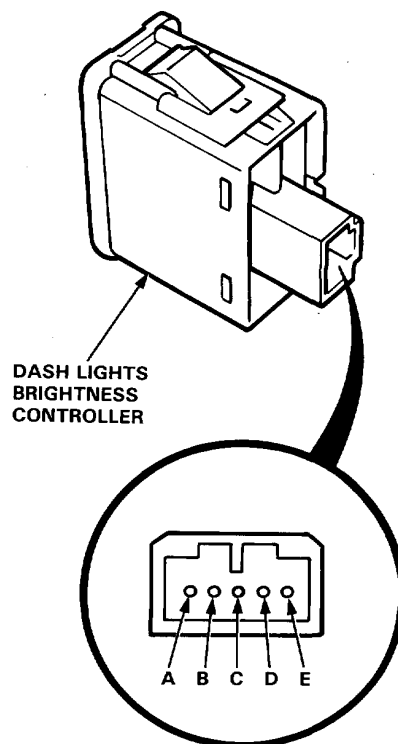
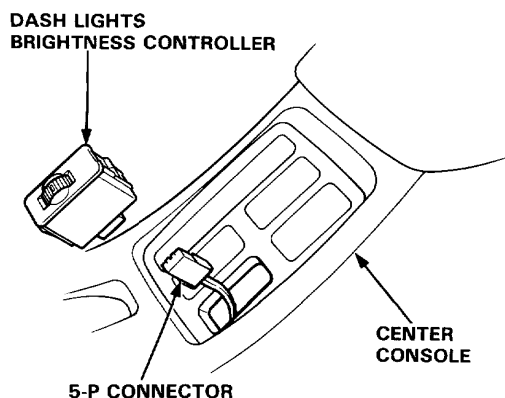


No.	Wire	Test condition	Test: desired result	Possible cause (if result is not obtained)
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none">• Poor ground (G401, G402).• An open in the wire.
2	RED/BLK	Combination light switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none">• Blown No. 42 (20 A) fuse.• Faulty combination light switch.• An open in the wire.
3	RED	Combination light switch ON.	Attach to ground: Dash lights should come on full bright.	<ul style="list-style-type: none">• An open in the RED/BLK or RED wire.
4	RED/GRN or RED/WHT	Adjusting dial rotating.	Check for resistance between the RED/GRN and RED/WHT terminals: There should be 8—12 k Ω at all time.	<ul style="list-style-type: none">• Faulty controller.• An open in the wires.
5	RED/BLU and RED/WHT	Adjusting dial rotating.	Check for resistance between the RED/BLU and RED/WHT terminals: It should vary from 0 to 10,000 ohms as the dial is rotated.	

Dash Lights Brightness Control Unit

Controller Test/Replacement (Except KQ)

1. Carefully pry the switches out of the center console, then disconnect the 5-P connector from the controller.

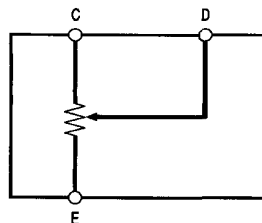


2. Measure resistance between the C and E terminals.

Resistance: 8,000 – 12,000 ohms

NOTE: Resistance will vary slightly with temperature.

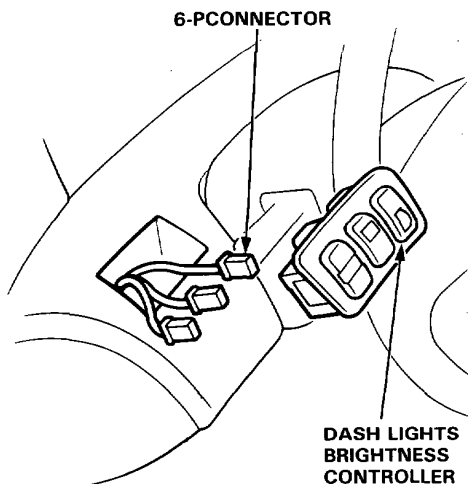
3. Measure resistance between the D and E terminals while rotating the adjusting dial. Resistance should vary from 0 to 10,000 ohms as the dial is rotated.





Controller Test/Replacement (KQ model)

1. Carefully pry the switches out of the dashboard, then disconnect the 6-P connector from the controller.



2. Measure resistance between the C and E terminals.

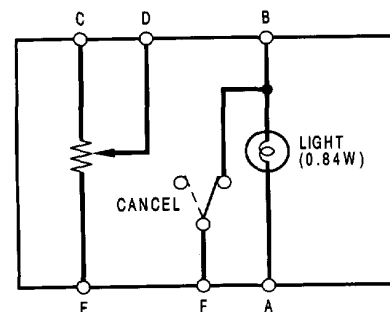
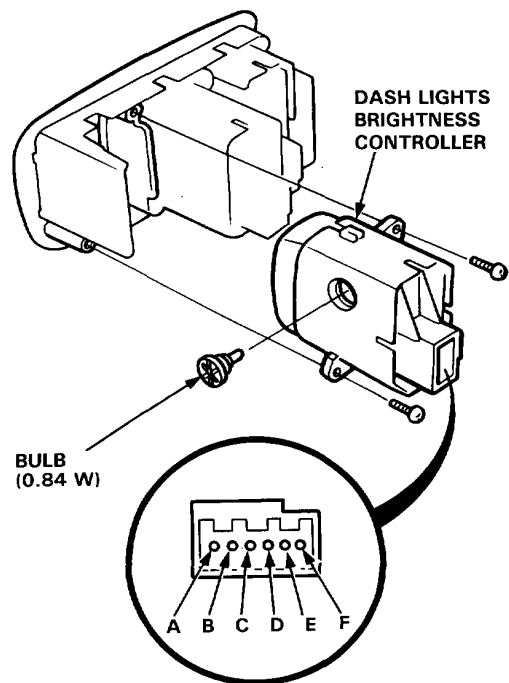
Resistance: 8,000—12,000 ohms

NOTE: Resistance will vary slightly with temperature.

3. Measure resistance between the D and E terminals while rotating the adjusting dial. Resistance should vary from 0 to 10,000 ohms as the dial is rotated.

4. OFF the CANCEL switch by rotating the adjusting dial beyond its end position (clicking sound). There should be no continuity between the B and F terminals.

NOTE: The cancel switch is closed with the adjusting dial between the maximal and minimal end positions.

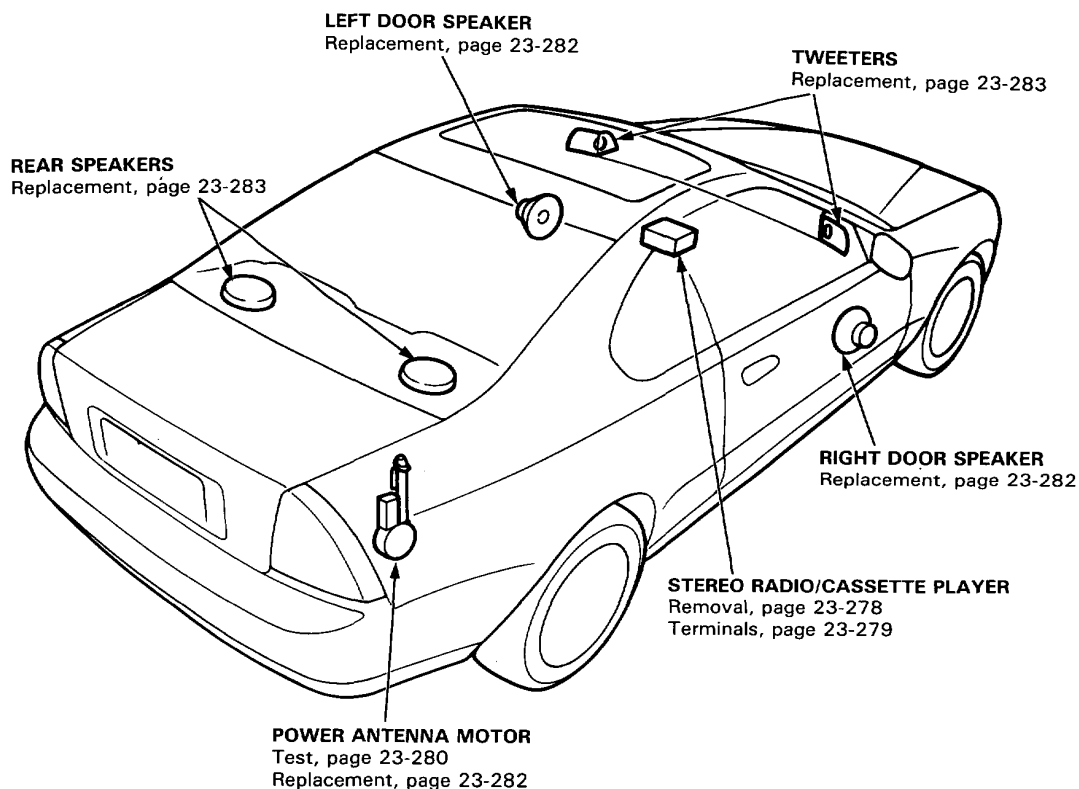
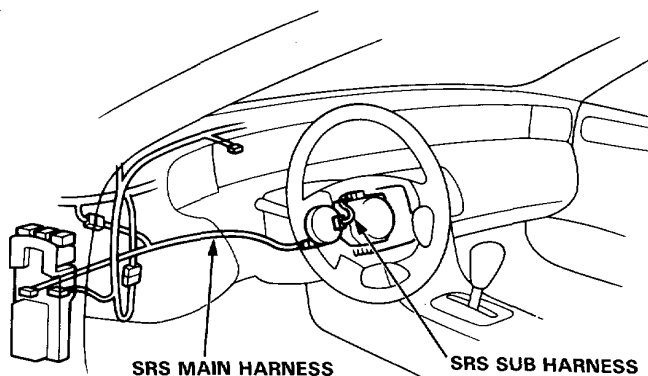


Stereo Sound System

Component Location Index

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



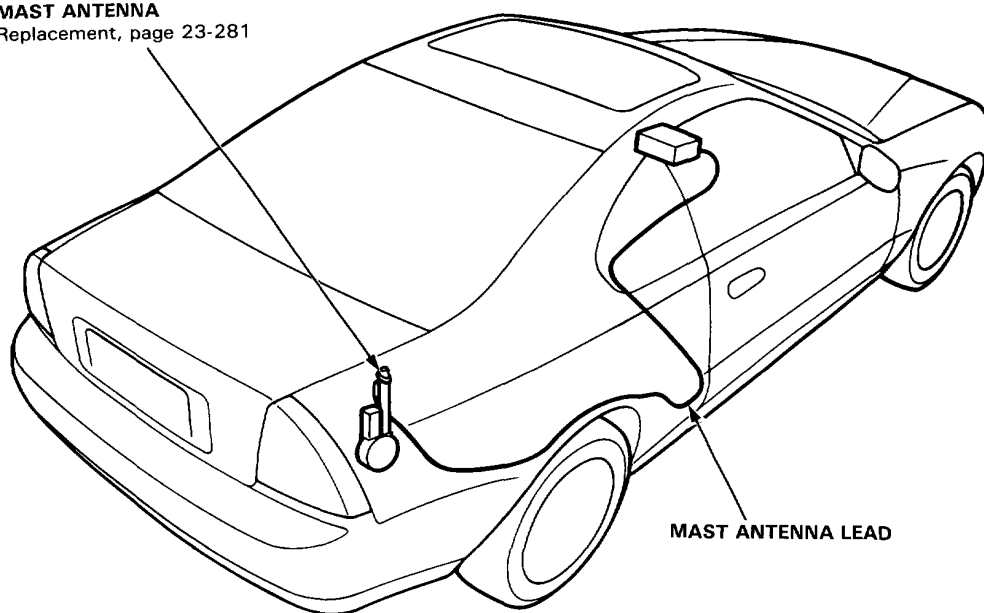


Description:

For the stereo radio/cassette player description, please see the owner's manual.

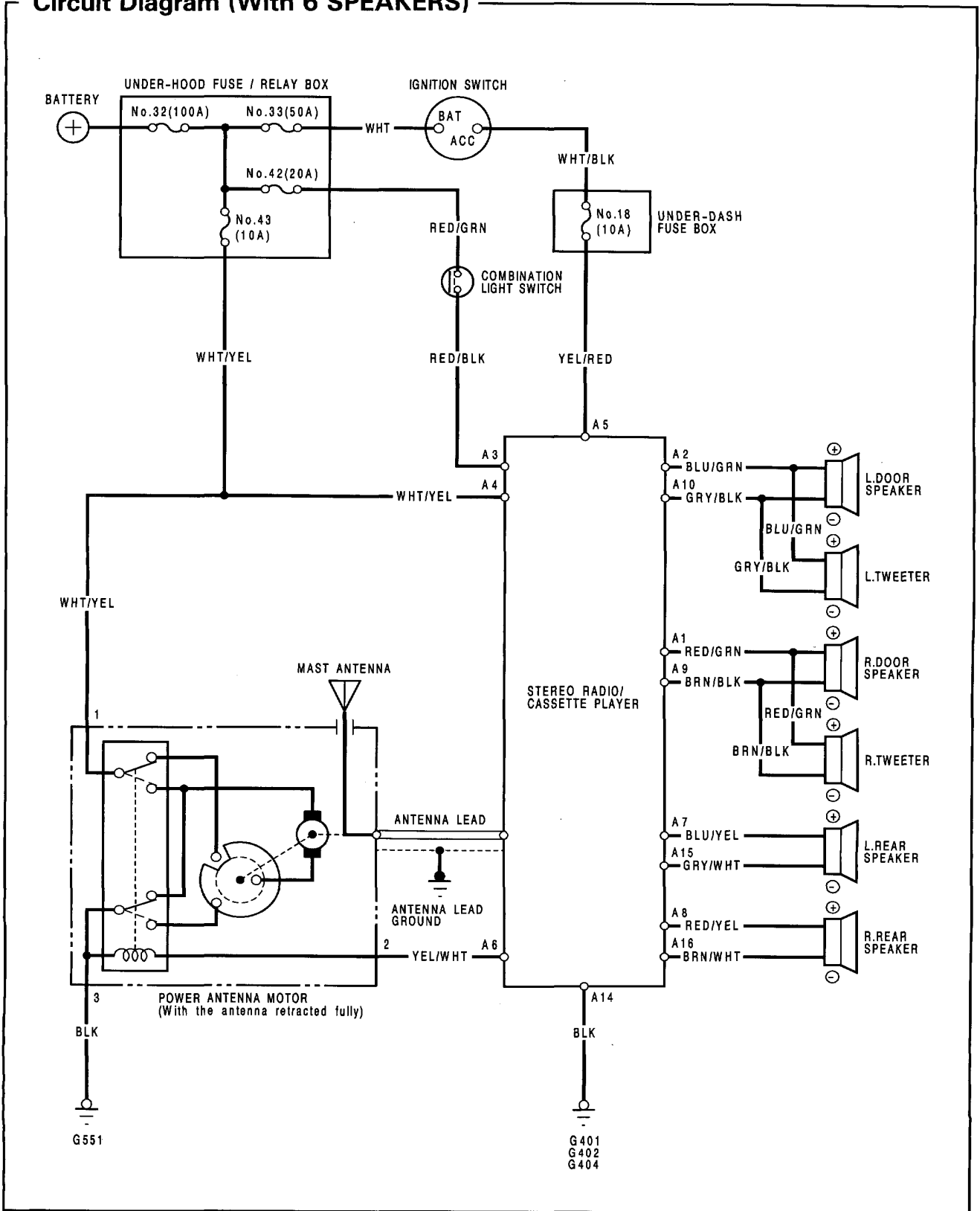
The power antenna mast is controlled by the radio ON/OFF switch. It will extend fully whenever the radio switch and the ignition switch are on at the same time. When the radio or the ignition is shut off, the antenna retracts fully. The antenna motor has a built-in relay together with a limit switch for this function.

MAST ANTENNA
Replacement, page 23-281



Stereo Sound System

Circuit Diagram (With 6 SPEAKERS)

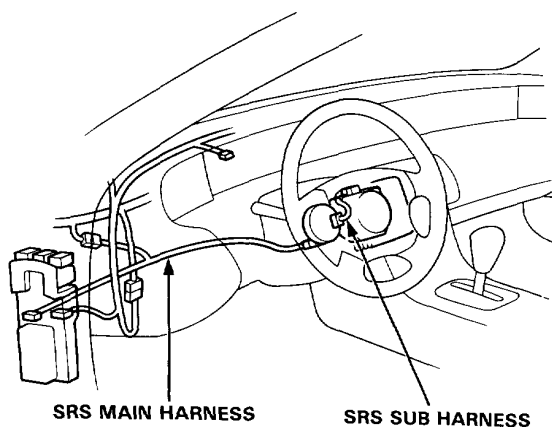


Stereo Sound System

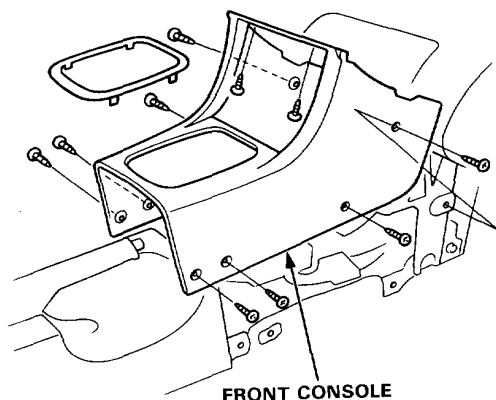
Unit Removal

CAUTION:

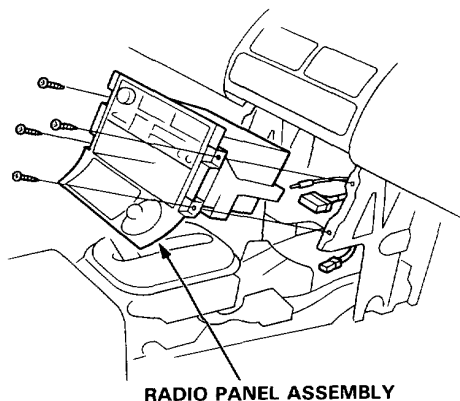
- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



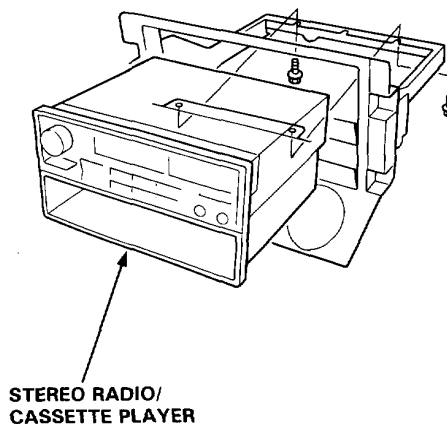
1. Remove the 10 mounting screws, then remove the front console.



2. Remove the four mounting screws.
Pull the radio panel assembly out part of the way.

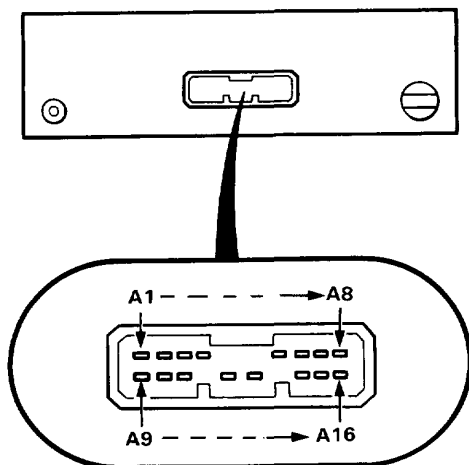


3. Disconnect the connectors and antenna lead, then take out the assembly.
4. Remove the mounting screws, then remove the stereo radio/cassette player from the panel assembly.





Stereo Radio/Cassette Player Terminals



Terminal (Wire color)	Destination
A1 (RED/GRN)	Right front speaker ⊕
A2 (BLU/GRN)	Left front speaker ⊕
A3 (RED/BLK)	Lights-on signal
A4 (WHT/YEL)	Constant power (Tuning memory)
A5 (YEL/RED)	ACC (Main stereo power supply)
A6 (YEL/WHT)	Radio switched power (To antenna)
A7 (BLU/YEL)	Left rear speaker ⊕
A8 (RED/YEL)	Right rear speaker ⊕
A9 (BRN/BLK)	Right front speaker ⊖
A10 (GRY/BLK)	Left front speaker ⊖
A11 (—)	(Not used)
A12 (—)	(Not used)
A13 (—)	(Not used)
A14 (BLK)	Ground (G401, G402, G404)
A15 (GRY/WHT)	Left rear speaker ⊖
A16 (BRN/WHT)	Right rear speaker ⊖

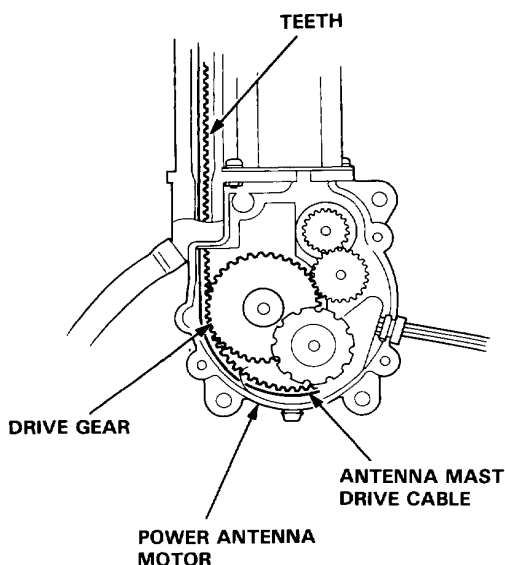
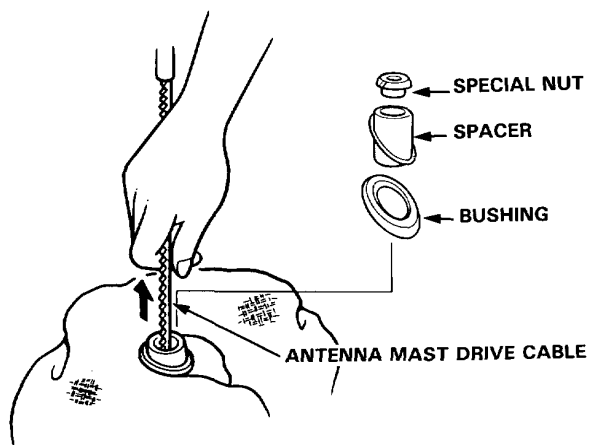


Antenna Mast Replacement

Removal:

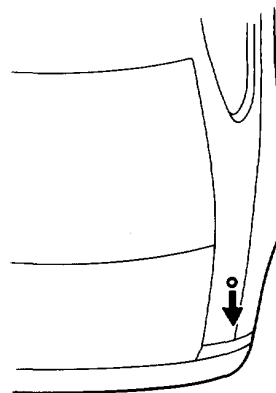
NOTE: The antenna mast alone can be replaced without having to remove the power antenna motor.

1. Remove the special nut, spacer, and bushing.
2. Carefully withdraw the antenna mast while extending it by turning the radio switch ON.



Installation:

1. Hold the antenna so the teeth on the drive cable face in the direction shown, and insert the drive cable into the antenna housing.



2. Check for engagement of the cable teeth to the drive gear by carefully moving the cable up and down.
3. Turn the radio switch "OFF", and let the motor pull the drive cable inside the antenna housing.
4. Clean the threads on the antenna mast housing. Insert the antenna mast into the antenna housing. Install the bushing and spacer, and tighten the special nut to 2.3 N·m (0.23 kg·m, 1.7 lb·ft).

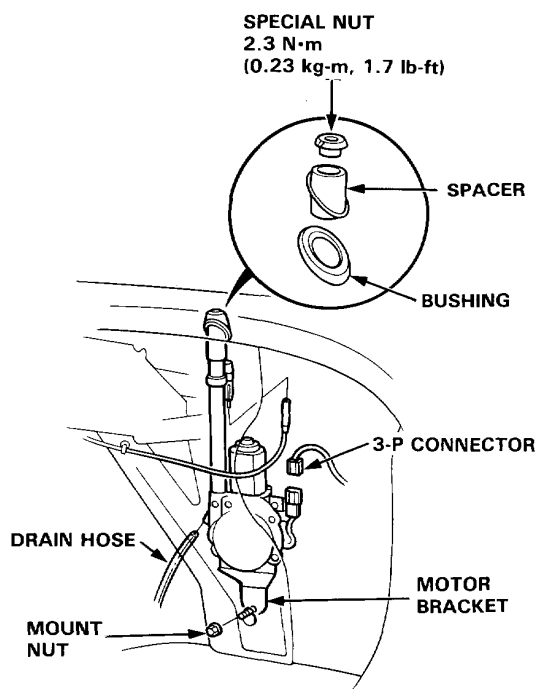
NOTE: If the special nut is overtorqued, the antenna may stick. If sticking occurs, back the nut off until the antenna moves freely.

5. Check that the antenna mast retracts and extends fully when the radio switch is turned ON and OFF repeatedly.

Stereo Sound System

Power Antenna Motor Replacement

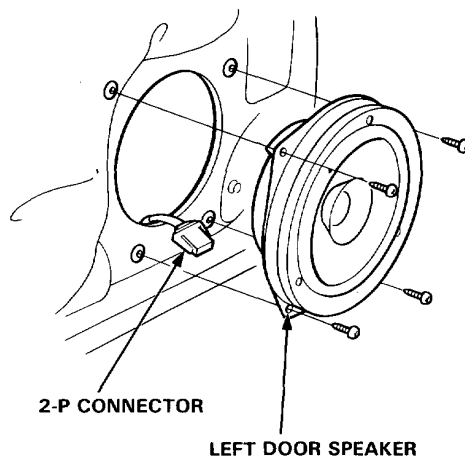
1. Remove the trunk right side trim panel.
2. Disconnect the 3-P connector and antenna lead from the motor, then remove the special nut and mounting nut to take out the motor with the antenna mast.



3. During installation, tighten the special nut, then tighten the mounting nut on the motor bracket.

Door Speaker Replacement

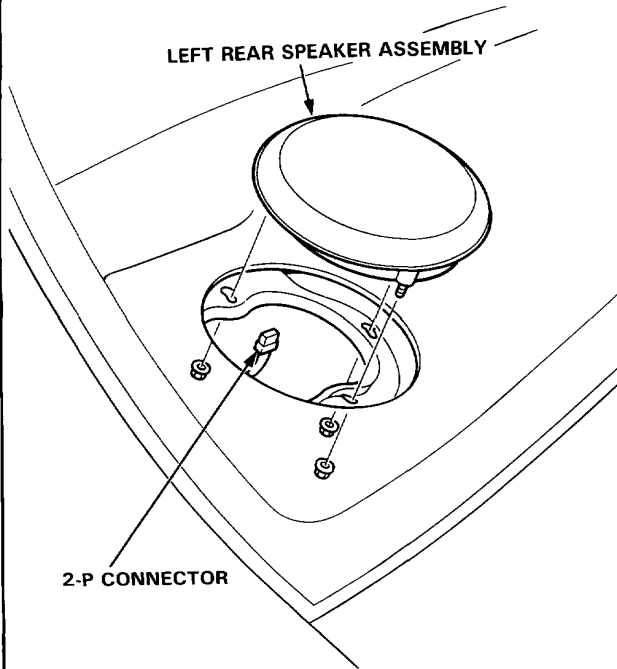
1. Remove the door panel.
2. Remove the four screws, then disconnect the connector from the speaker and remove the speaker.



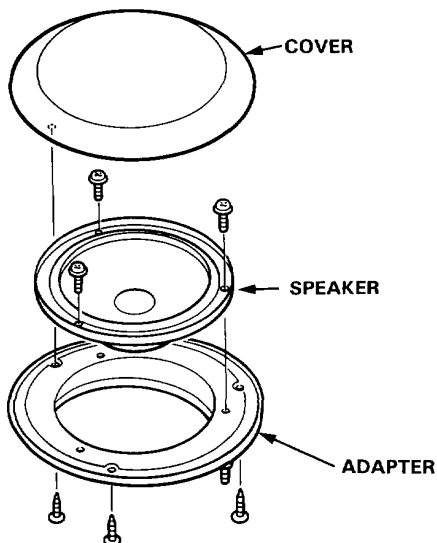


Rear Speaker Replacement

1. Remove the three nuts from inside the trunk, then disconnect the connector and remove the speaker assembly.

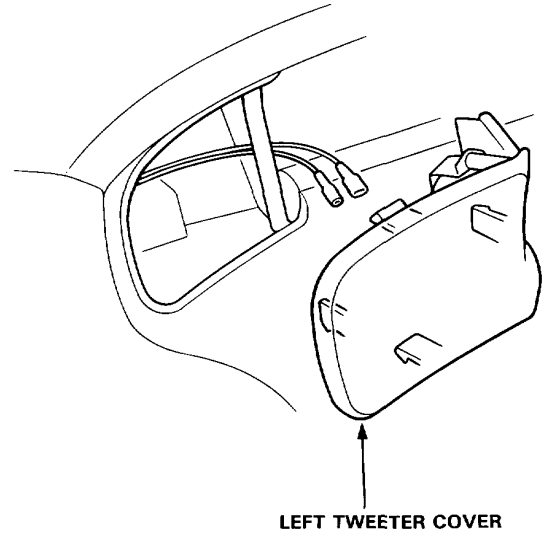


2. Remove the three screws from the adapter, then remove the speaker cover.
3. Remove the three screws, then remove the speaker from the adapter.

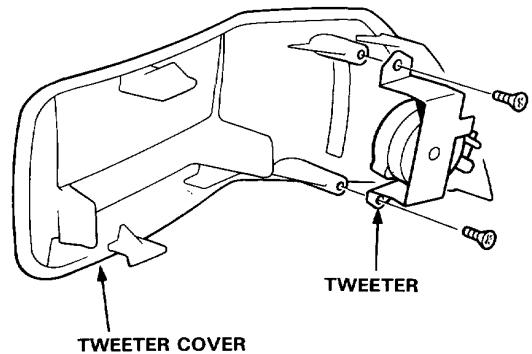


Tweeter Replacement

1. Carefully pry the tweeter cover out of the dashboard.
2. Disconnect the connectors from the speaker.
3. Disconnect the connectors from the headlight washer switch (KG and KS models).

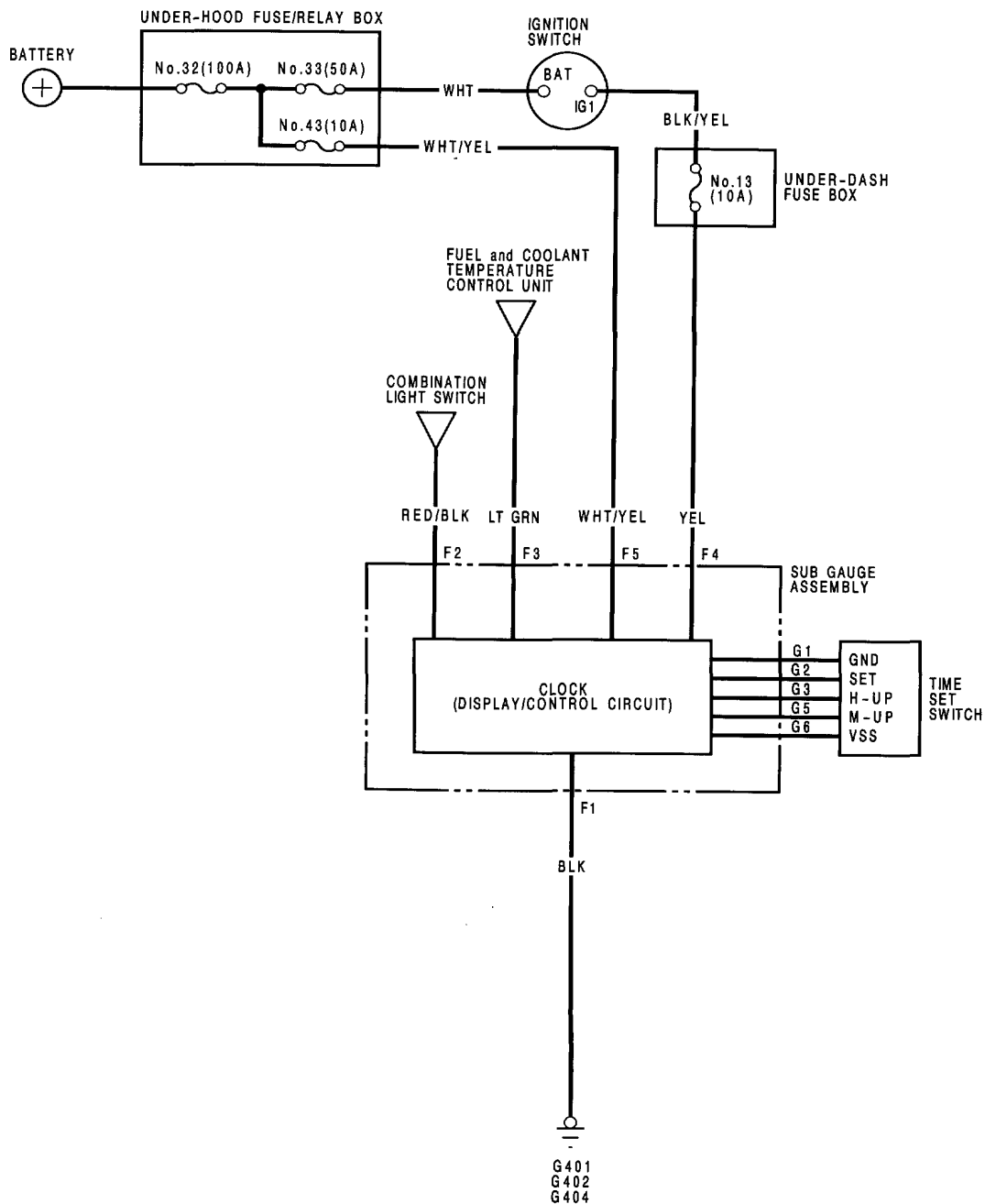


4. Remove the two screws and remove the tweeter from the cover.



Clock

Circuit Diagram





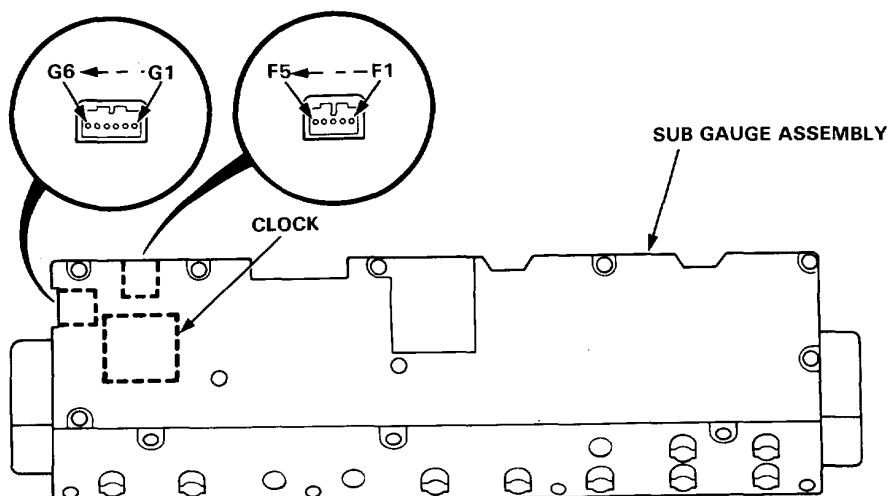
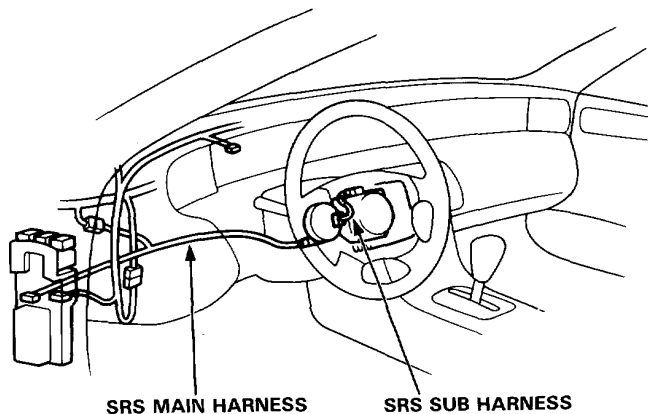
Removal/Terminals (LHD)

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

Removal:

1. Remove the right tweeter cover (see page 23-283).
2. Remove the visor (see page 23-156).
3. Remove the black face panel (see page 23-156).
4. Remove the sub gauge assembly (see page 23-156).



Terminals:

Terminal	Wire	Destination
F1	BLK	Ground
F2	RED/BLK	Combination light switch
F3	LT GRN	Display control circuit
F4	YEL	IG1 (Main clock power supply)
F5	WHT/YEL	Constant power (Time memory)

Terminal	Destination
G1	Ground
G2	"00" SET
G3	"H" UP
G4	
G5	"M" UP
G6	VSS

Clock

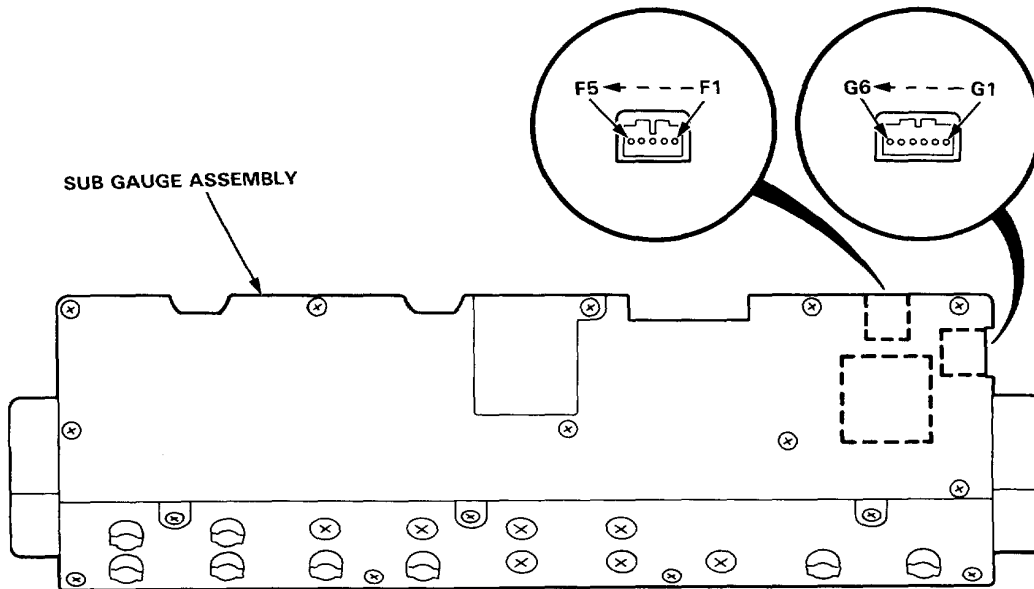
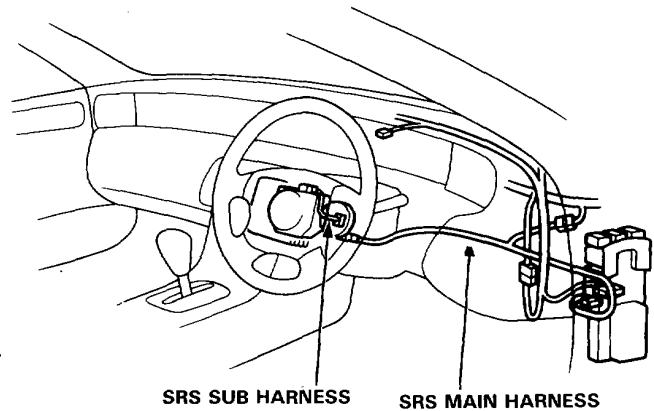
Removal/Terminals (RHD)

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

Removal:

1. Remove the left tweeter cover (see page 23-283).
2. Remove the visor (see page 23-156).
3. Remove the black face panel (see page 23-156).
4. Remove the sub gauge assembly (see page 23-156).



Terminals:

Terminal	Wire	Destination
F1	BLK	Ground
F2	RED/BLK	Combination light switch
F3	LT GRN	Display control circuit
F4	YEL	IG1 (Main clock power supply)
F5	WHT/YEL	Constant power (Time memory)

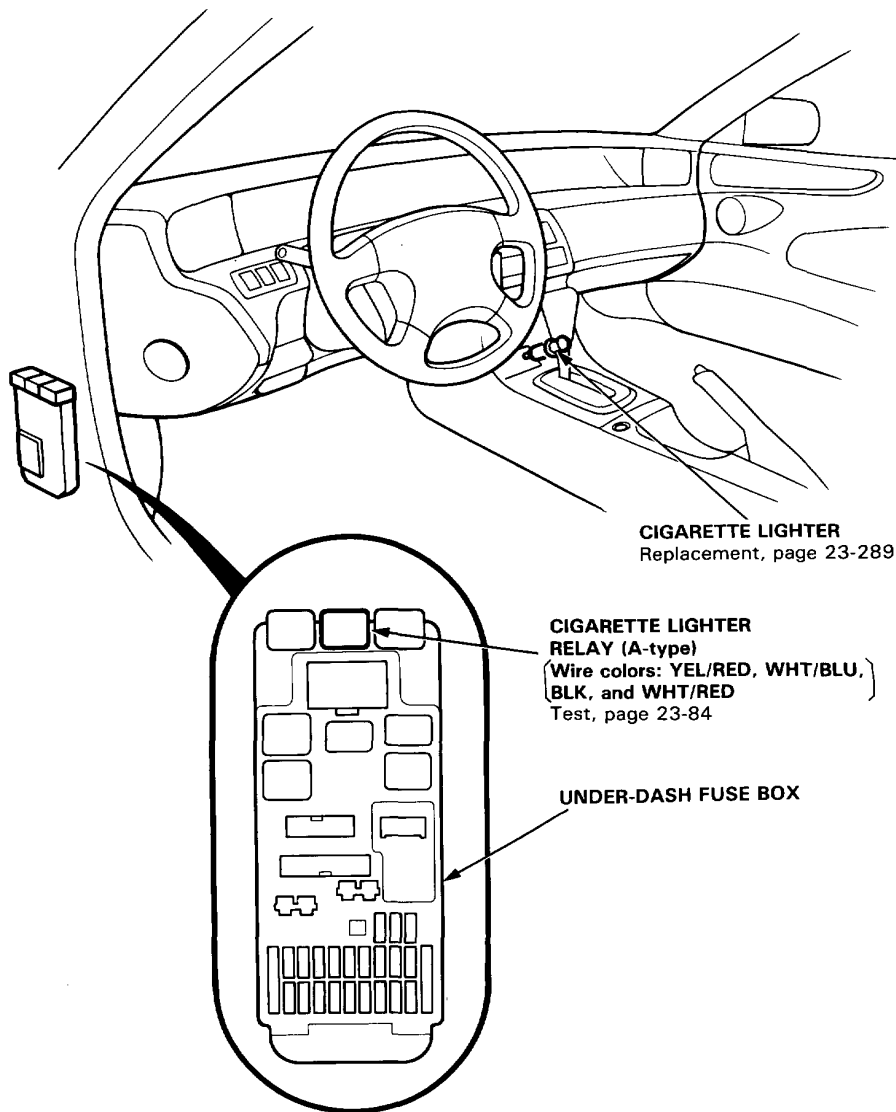
Terminal	Destination
G1	Ground
G2	"00" SET
G3	"H" UP
G4	
G5	"M" UP
G6	VSS



Cigarette Lighter

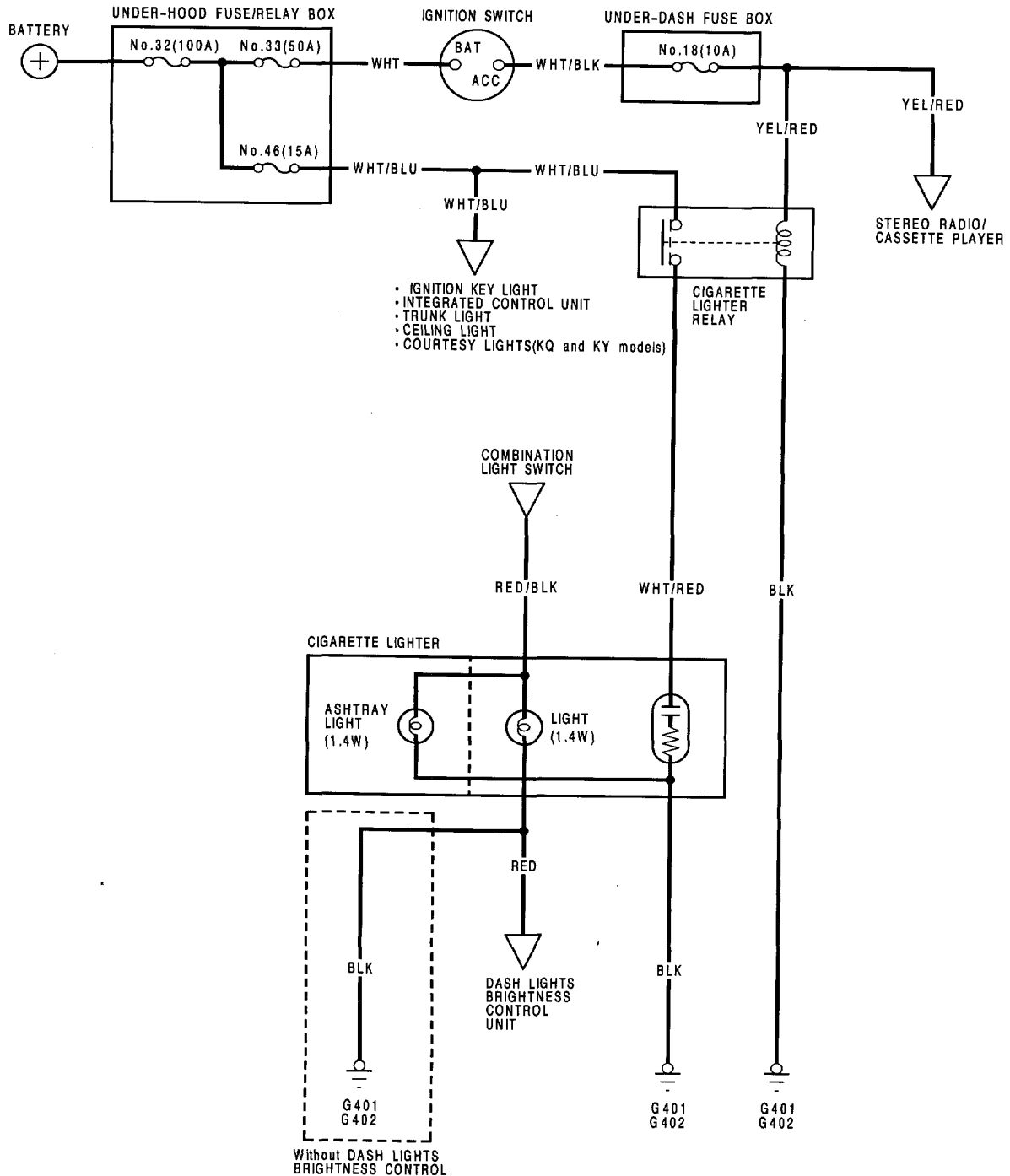
Component Location Index

NOTE: LHD type is shown, RHD type is similar.



Cigarette Lighter

Circuit Diagram

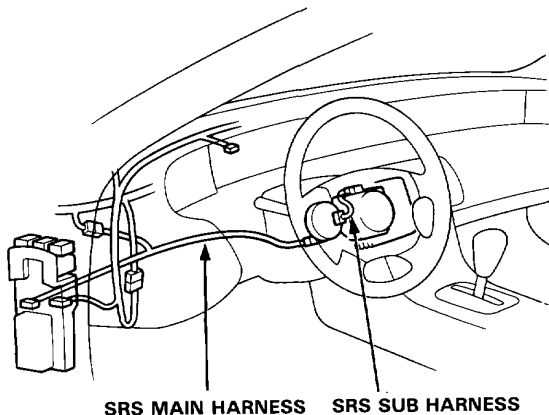




Replacement

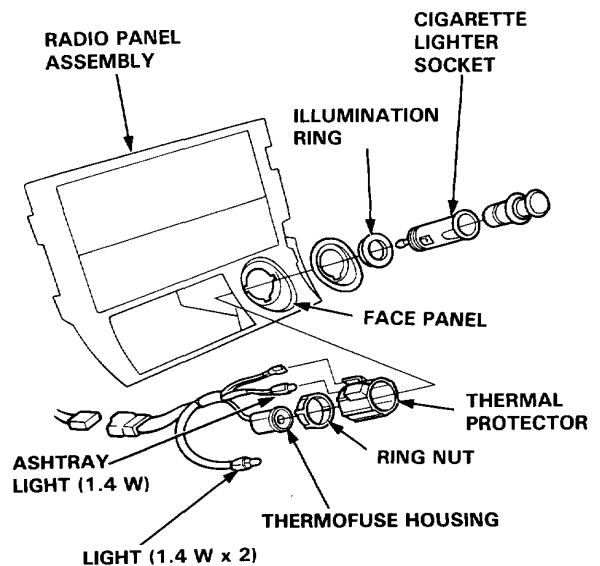
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



1. Remove the front console (see section 20).
2. Remove the radio panel assembly (see page 23-278).

3. Disconnect the thermofuse housing from the socket.



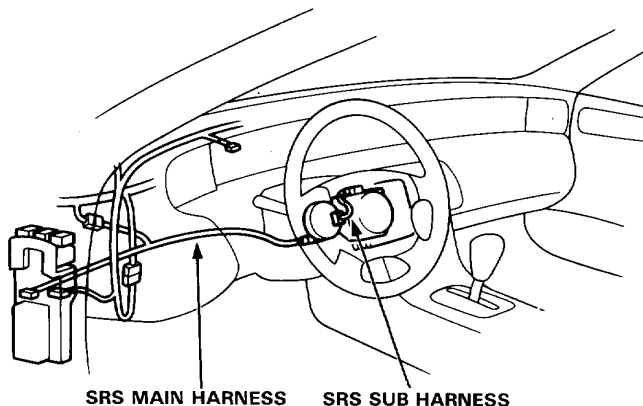
4. Remove the ring nut and separate the cigarette lighter socket from the thermal protector.
5. When installing the cigarette lighter, align each lug on the face panel, illumination ring, and cigarette lighter socket with the groove in the hole, then position the bulb housing on the thermal protector between the stops in the radio panel.
6. Make sure that the ground wire, bulb socket, and thermofuse housing are seated against the cigarette lighter assembly.

Horns

Component Location Index

CAUTION:

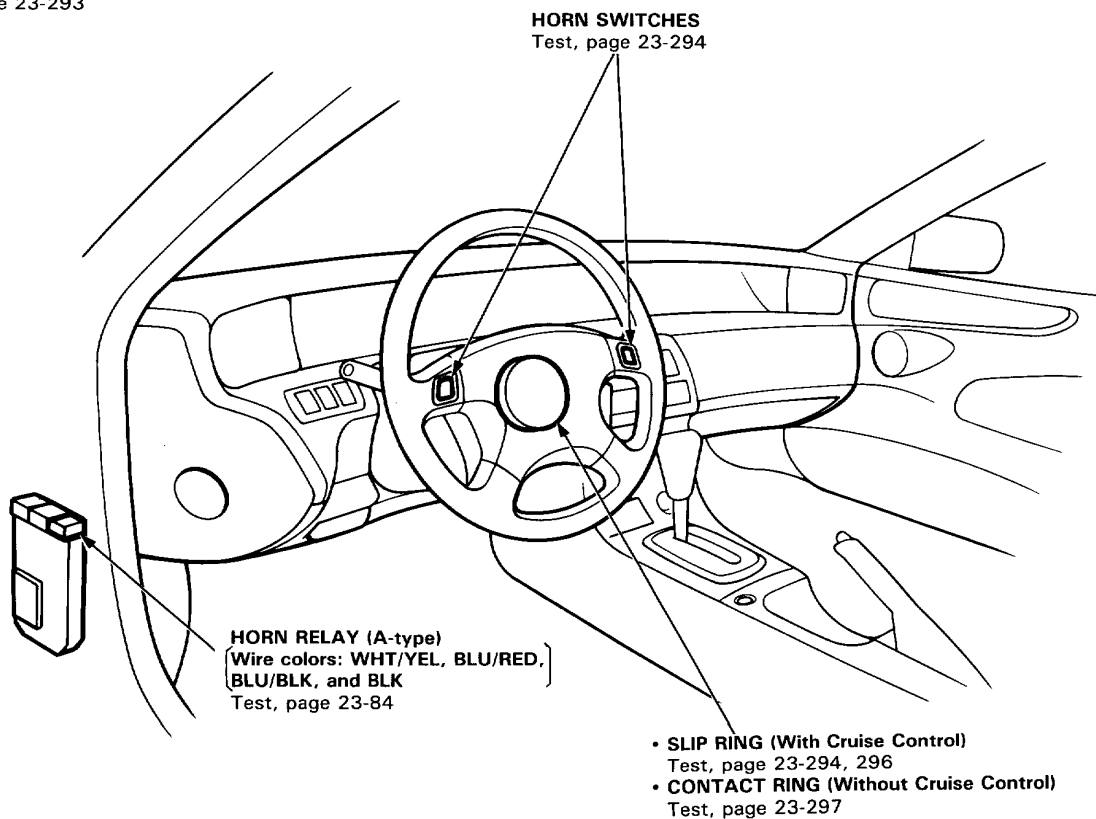
- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

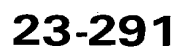


NOTE: LHD type is shown, RHD type is similar.

• HORNS

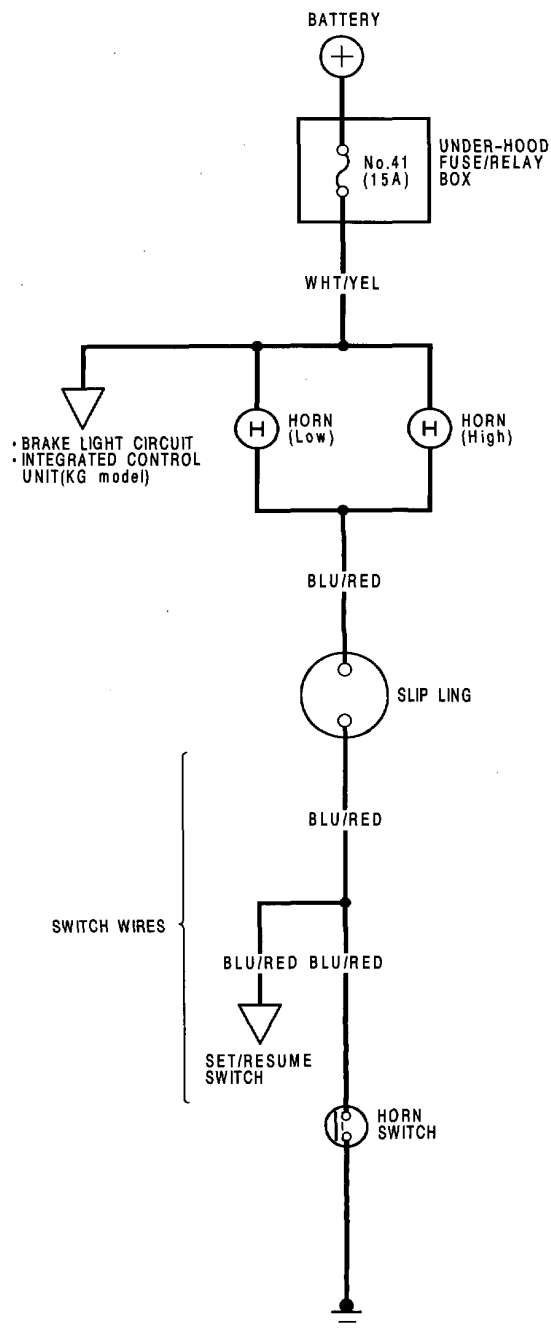
Test, page 23-293



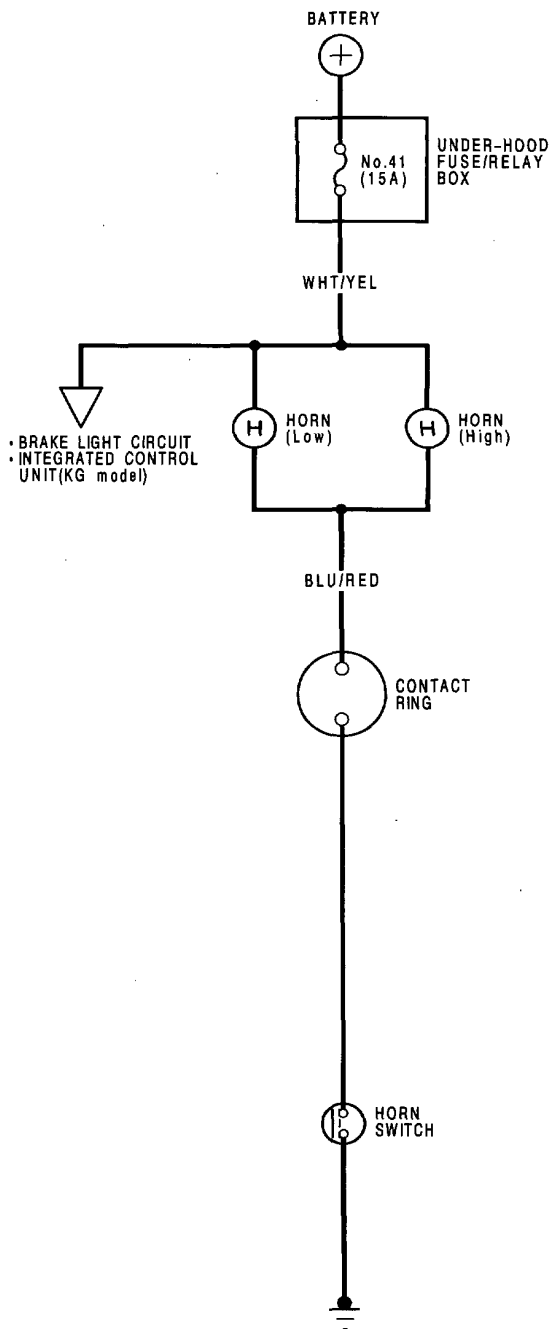


Horns

Circuit Diagram (With Cruise Control)



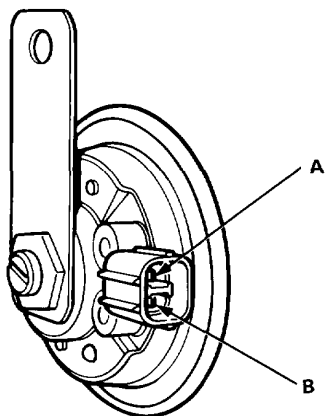
Circuit Diagram (Without Cruise Control)





Test

1. Disconnect the 2-P connector from the horn.
2. Remove the low and high horns.
3. Test the horn by connecting battery power to one terminal and grounding another. The horn should sound.



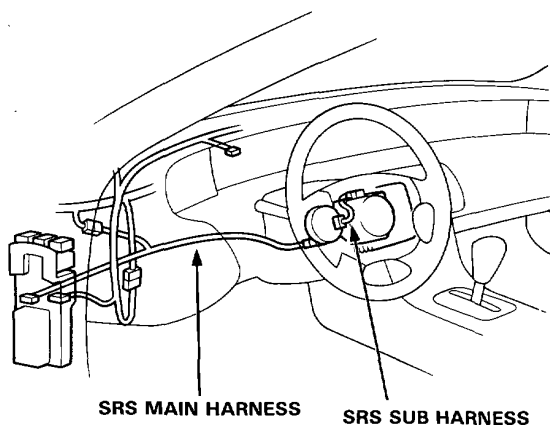
4. Replace the horn if it fails to sound.

Horns

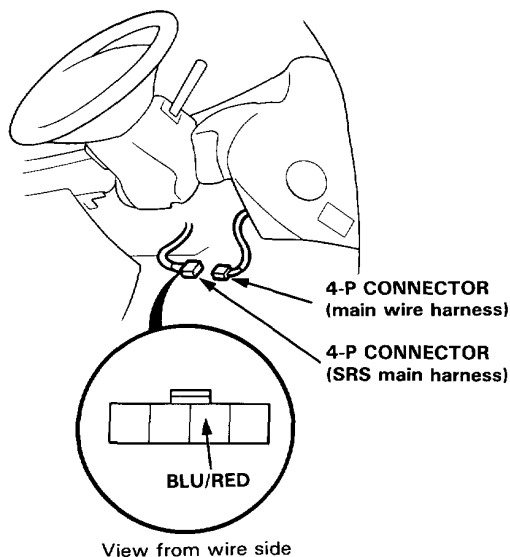
Switch Test (With SRS and Cruise Control)

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

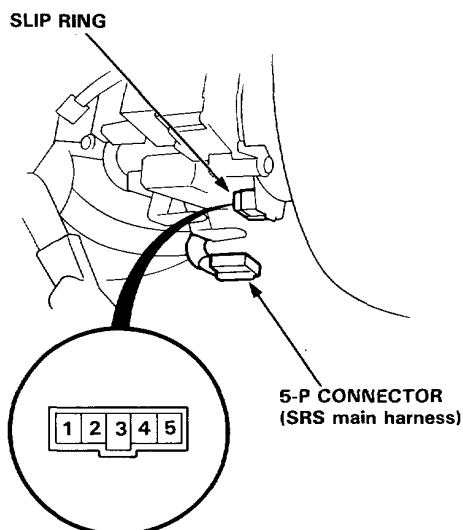


1. Remove the dashboard lower cover (see page 23-82).
2. Disconnect the SRS main harness 4-P connector from the main wire harness.



3. Check for continuity between the BLU/RED (SRS main harness side) terminal and body ground with the horn button pushed.
 - If there is continuity, the horn switch is OK.
 - If there is no continuity, go to step 4.
4. Remove the column lower cover, and then disconnect the 5-P connector from the slip ring.

NOTE: See page 23-384 before removing the connector for locked with the connector lock pin.



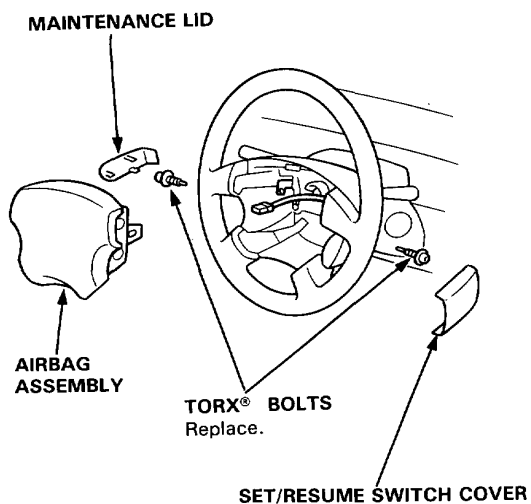


5. Check for continuity between No. 3 terminal and body ground with the horn button pushed.

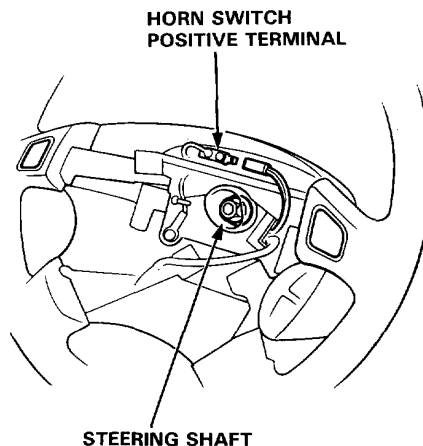
- If there is continuity, check for bent, loose or corroded terminal, or open the BLU/RED wire between the SRS main harness.
- If there is no continuity, go to step 6.

6. Remove the maintenance lid and the SET/RESUME switch from the steering wheel.

7. Remove the two TORX® bolts using a TORX® T30 bit, then remove the airbag assembly.



8. Check for continuity between the horn switch positive terminal and the steering shaft with the horn button pushed.



- If there is continuity, check for:
 - Faulty slip ring
(see test page 23-368: With SRS)
(see test page 23-369: Without SRS).
 - Faulty SET/RESUME switch
(see test page 23-363, 365).
 - A bent, loose or corroded terminal, or an open in the BLU/RED wire (between the SRS sub harness).
- If there is no continuity, repair or replace the horn switch.

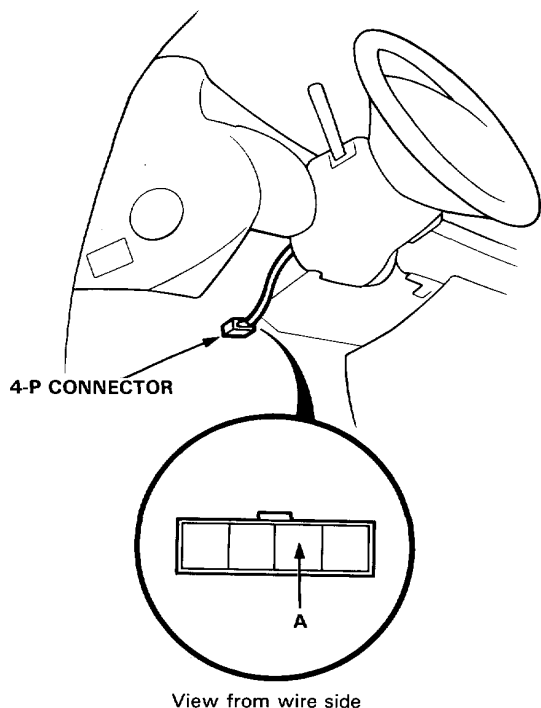
9. Install the steering wheel (see section 17).

10. After installing, make sure the correct working of the:
- Horn switch.
 - SRS system.

Horns

Switch Test (With Cruise Control)

1. Remove the dashboard lower cover (see page 23-82).
2. Disconnect the combination light switch 4-P connector from the main wire harness.



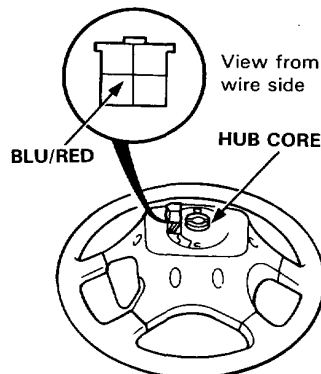
3. Check for continuity between the A (BLU/RED) terminal and body ground in each switch position according to the table.

Terminal	A	Ground
Horn switch		
PUSH		
RELEASE		

- If there is continuity, the horn switch is OK.
- If there is no continuity, go to step 4.

4. Disconnect the 5-P connector from the combination light switch wire harness.

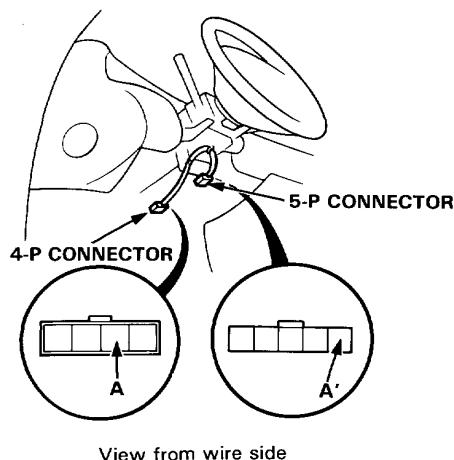
5. Remove the steering wheel, then turn it over.



6. Check for continuity between the BLU/RED terminal and hub core in each switch position according to the table.

Terminal	BLU/RED	Hub core
Horn switch		
PUSH		
RELEASE		

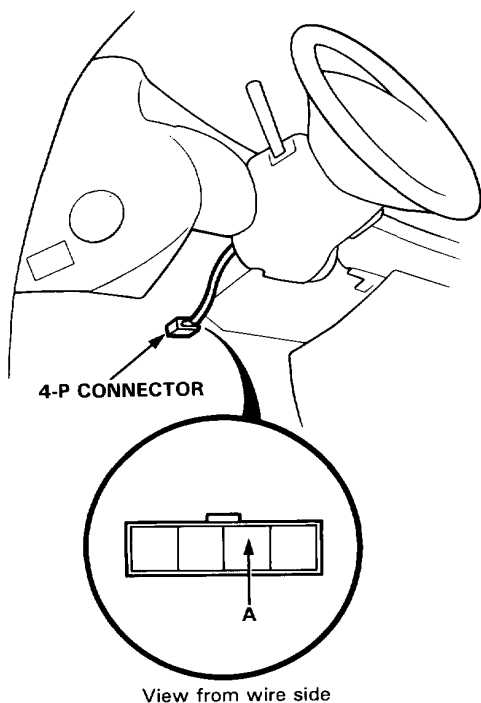
- If there is no continuity, check for:
 - Faulty horn switch.
 - An open in the BLU/RED wire (between the slip ring and the horn switch).
 - If there is continuity, go to step 7.
7. Check for continuity between the A and A' terminal.
 - If there is no continuity, replace the combination light switch wire harness assembly.
 - If there is continuity, check for the slip ring (see test page 23-368: With SRS) (see test page 23-369: Without SRS).





Switch Test (Without Cruise Control)

1. Remove the dashboard lower cover (see page 23-82).
2. Disconnect the combination light switch 4-P connector from the main wire harness.



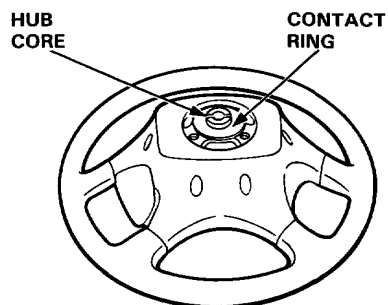
3. Check for continuity between the A (BLU/RED) terminal and body ground in each switch position according to the table.

Terminal	A	Ground
Horn switch		
PUSH	○	○
RELEASE		

- If there is continuity, the horn switch is OK.
- If there is no continuity, go to step 4.

4. Disconnect the 5-P connector from the combination light switch wire harness.

5. Remove the steering wheel, then turn it over.



6. Check for continuity between the contact ring and hub core in each switch position according to the table.

Terminal	Hub core	Contact ring
Horn switch		
PUSH	○	○
RELEASE		

- If there is no continuity, check for the horn switch
- If there is continuity, go to step 7.

7. Check for continuity between the A terminal and contact point.

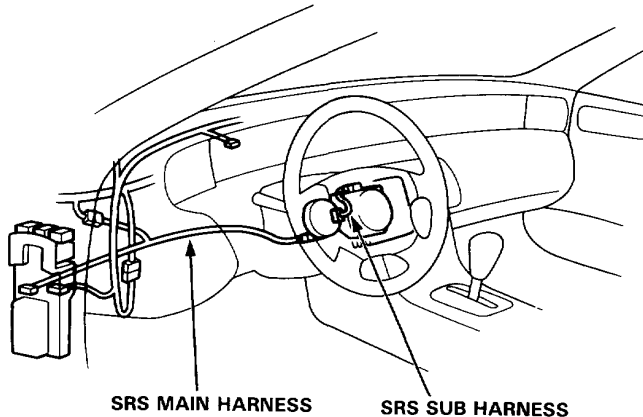
- If there is no continuity, replace the combination light switch wire harness assembly.
- If there is continuity, check for the continuity between the contact point and contact ring.

Rear Window Defogger

Component Location Index

CAUTION:

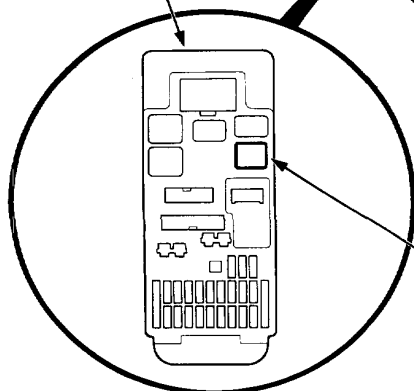
- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



NOTE: LHD type is shown, RHD type is similar.

**REAR WINDOW
DEFOGGER SWITCH**
Test, page 23-301
Replacement, page 23-301

UNDER-DASH FUSE BOX

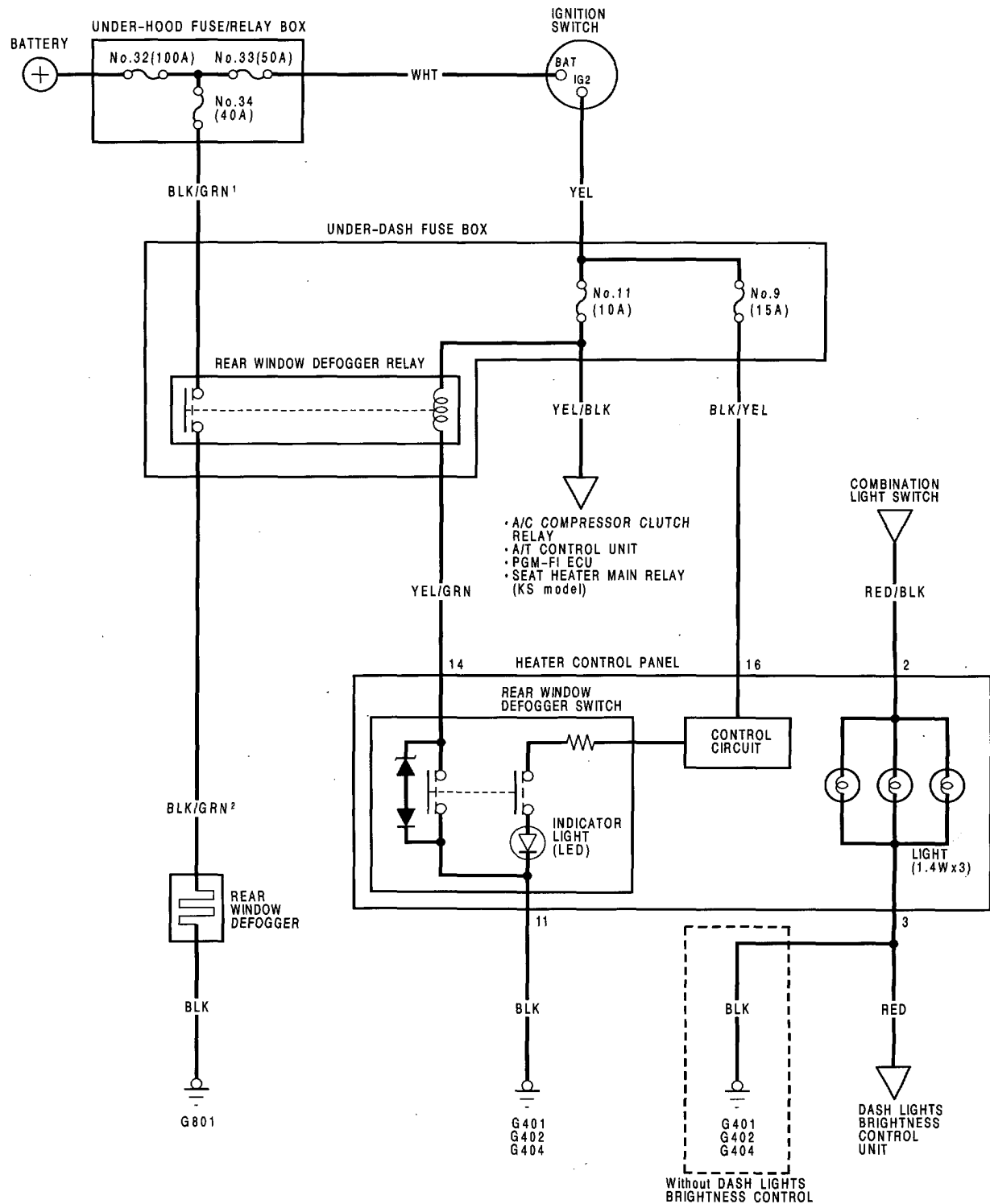


**REAR WINDOW
DEFOGGER RELAY
(A-type)**
Test, page 23-84

REAR WINDOW DEFOGGER
Function Test, page 23-302



Circuit Diagram



Rear Window Defogger

Troubleshooting

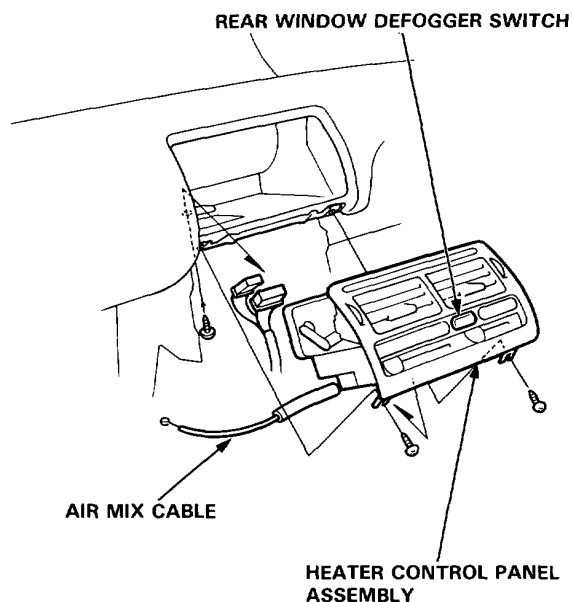
NOTE: The numbers in the table show the troubleshooting sequence.

Symptom	Item to be inspected										Open circuit in wires, loose or disconnected terminals
	Blown indicator light bulb	Blown No. 9 (15 A) fuse (In the under-dash fuse box)	Blown No. 11 (10 A) fuse (In the under-dash fuse box)	Rear window defogger switch (In the heater control panel)	Control circuit (In the heater control panel)	Blown No. 34 (40 A) fuse (In the under-hood fuse/relay box)	Function test	Defogger relay	Broken defogger wire	Poor ground	
Defogger works, but indicator light does not go on.	1	2			3						BLK/YEL
Defogger does not work and indicator light does not go on.				2			1				YEL
Defogger does not work, but indicator light goes on.			2			1	5	3	4	G401 G403 G801	BLK/GRN ¹ , YEL/WHT BLK/GRN ²



Switch Replacement

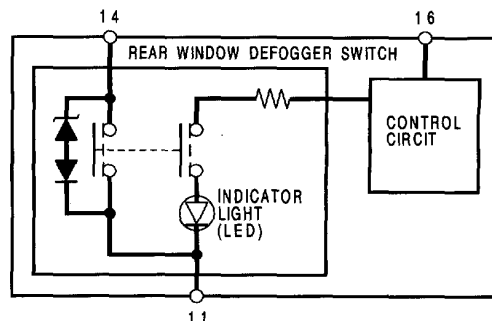
1. Remove the front console (see section 22).
2. Remove the stereo radio/cassette player (see page 23-278).
3. Disconnect the air mix cable from the heater.



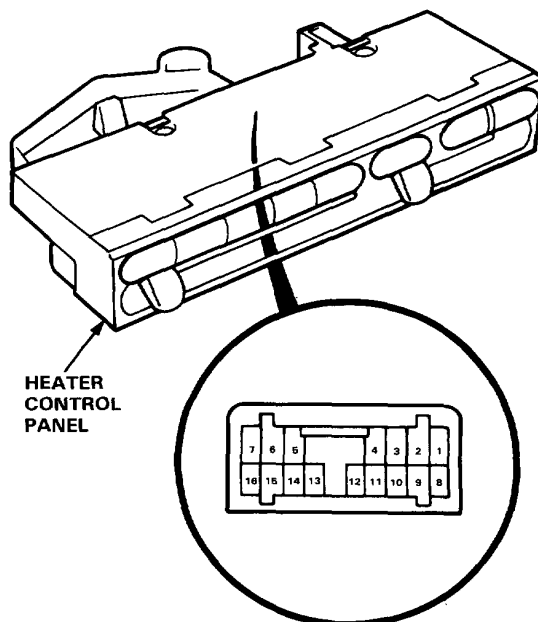
4. Remove the two mounting screws and disconnect the connector, then remove the heater control panel.
5. Install in the reverse order of removal.
6. After reinstalling the control panel, reconnect the air mix cable (see section 22), and make sure the temperature control function works correctly.

Switch Test

1. Remove the heater control panel.
2. Check for continuity between the terminals according to the table.



Terminal	14			11		16
Position						
ON	○	●	●	○	●	○
OFF						



Rear Window Defogger

Function Test

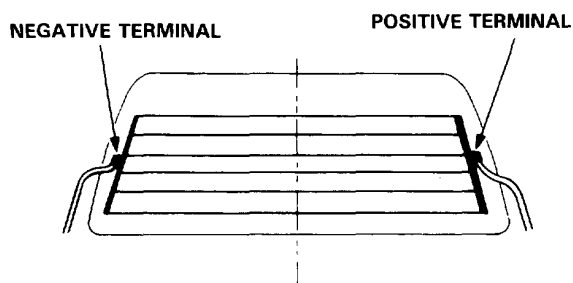
CAUTION: Be careful not to scratch or damage the defogger wires with the tester probe.

1. Check for voltage between the positive terminal and body ground with the ignition switch and the defogger switch ON.

There should be battery voltage.

- If there is no voltage, check for:
 - Faulty defogger relay.
 - Faulty defogger switch.
 - Faulty integrated control unit.
 - An open in the GRN/BLK wire.

- If there is battery voltage, go to step 2.



2. Check for continuity between the negative terminal and body ground.
If there is no continuity, check for an open in the defogger ground wire.

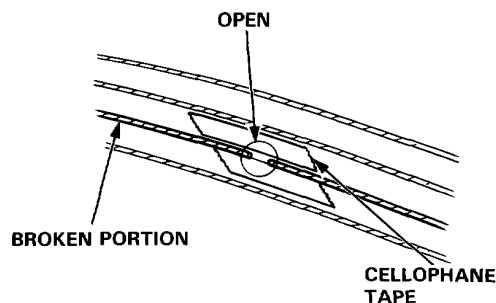
3. Touch the voltmeter positive probe to the halfway point on each defogger wire, and the negative probe to the negative terminal.
There should be approximately 6 V with the ignition switch and the defogger switch ON.

- If the voltage is as specified, the defogger wire is OK.
- If there is battery voltage, the defogger wire is broken on the negative side.
- If there is no voltage, the defogger wire is broken on the positive side.

Defogger Wires Repair

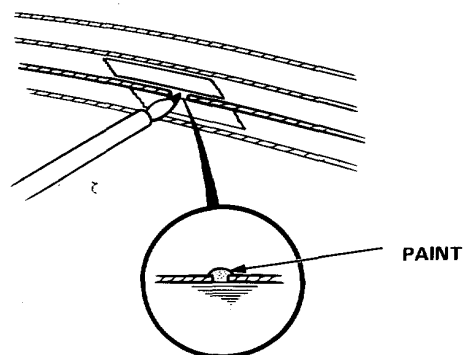
NOTE: To make an effective repair, the broken section must be no longer than one inch.

1. Lightly rub the area around the break with fine steel wool, then clean it with alcohol.
2. Carefully mask above and below the broken portion of the defogger wire with cellophane tape.



3. Using a small brush, apply a heavy coat of silver conductive paint extending about 1/8" on both sides of the break. Allow 30 minutes to dry.

NOTE: Thoroughly mix the paint before use.

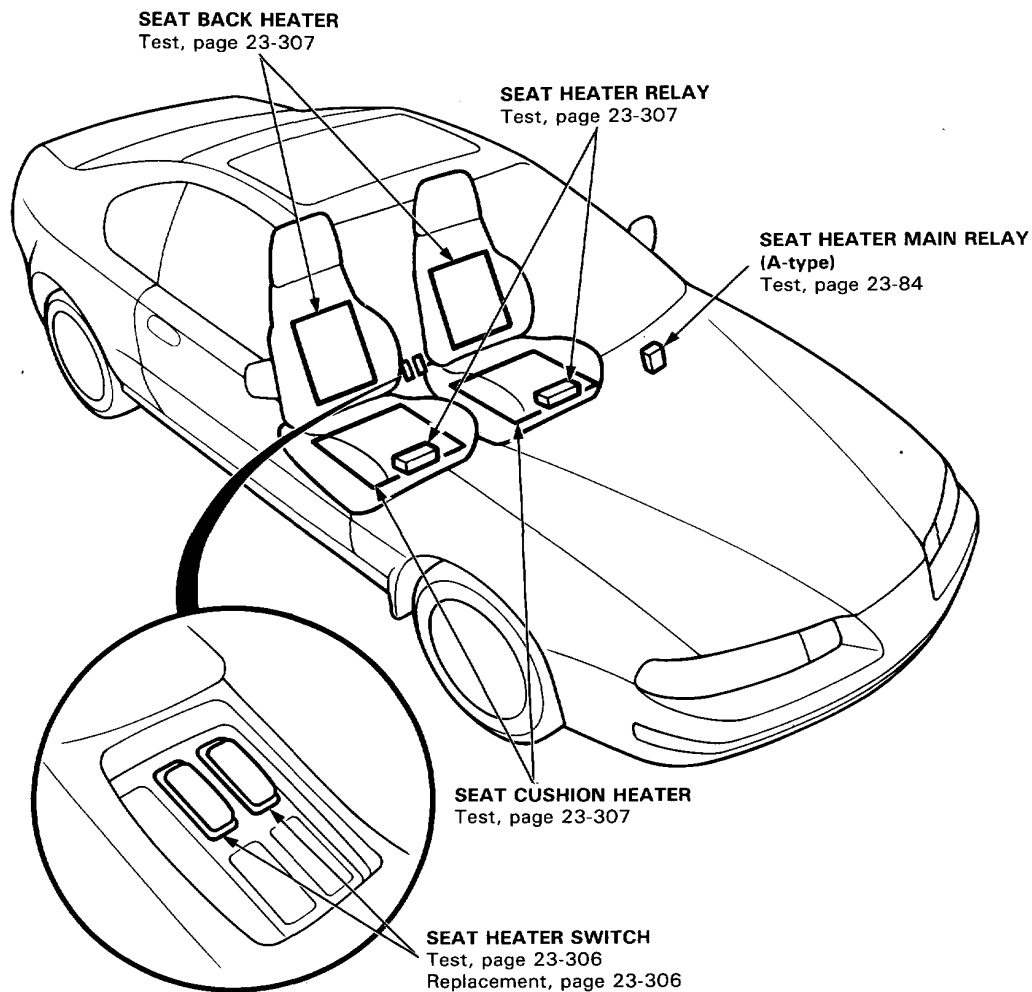


4. Check for proper operation with a voltmeter (half of battery voltage at the halfway-point).
5. Apply a second coat of paint in the same way. Let it dry three hours before removing the tape.



Seat Heaters (KS model)

Component Location Index



Description

Two heaters are provided in each front seat; one in the seat cushion and another in the seat back. In normal use, temperature is automatically controlled by the thermostat [OFF above 40°C (104°F)] built into each seat cushion heater. Breaker 1 [OFF above 50°C (122°F)] and breaker 2 [OFF above 70°C (158°F)] cut off the circuit to prevent abnormal temperature rise.

Circuit Diagram





Troubleshooting

NOTE: The numbers in the table show the troubleshooting sequence.

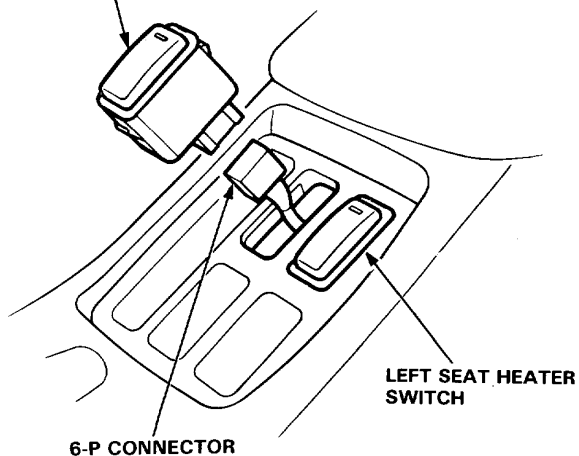
Symptom		Item to be inspected	Blown No. 36 (50 A) fuse (In the under-hood fuse/relay box)	Blown No. 6 (15 A) fuse (In the under-dash fuse box)	Blown No. 11 (10 A) fuse (In the under-dash fuse box)	Blown indicator light bulb	Seat heater switch	Seat heater	Seat heater main relay input	Seat heater relay input	Poor ground	Open circuit in wires, loose or disconnected terminals
Seat heaters work, but indicator light does not go on.						1						BLK
Seat heaters do not work and indicator light does not go on.			1				2		3		G401 G402 G521 G522	YEL/BLK, WHT/BLK BLK/GRN
Seat heaters do not work, but indicator light goes on.	Left or right seat							2		1		GRN/WHT, WHT/GRN, BLU, WHT/RED, WHT/BLU, GRN
Seat cushion heater or seat back heater does not work, but indicator light goes on.								1		2		BLU, GRN

Seat Heaters (KS model)

Switch Replacement

1. Pry the switch out of the center console.
2. Disconnect the 6-P connector from the switch.

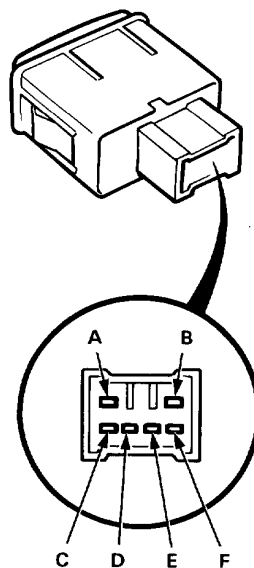
RIGHT SEAT HEATER SWITCH



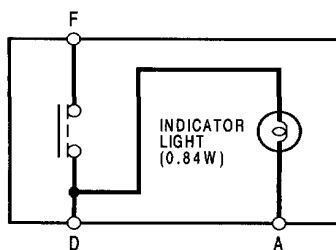
Switch Test

1. Remove the seat heater switch from the center console.
2. Check for continuity between the terminals in each position according to the table.

Terminal	A		D	F
Position				
ON	○	⊗	○	○
OFF	○	⊗	○	



NOTE: Left seat heater switch is shown, the right is the same.

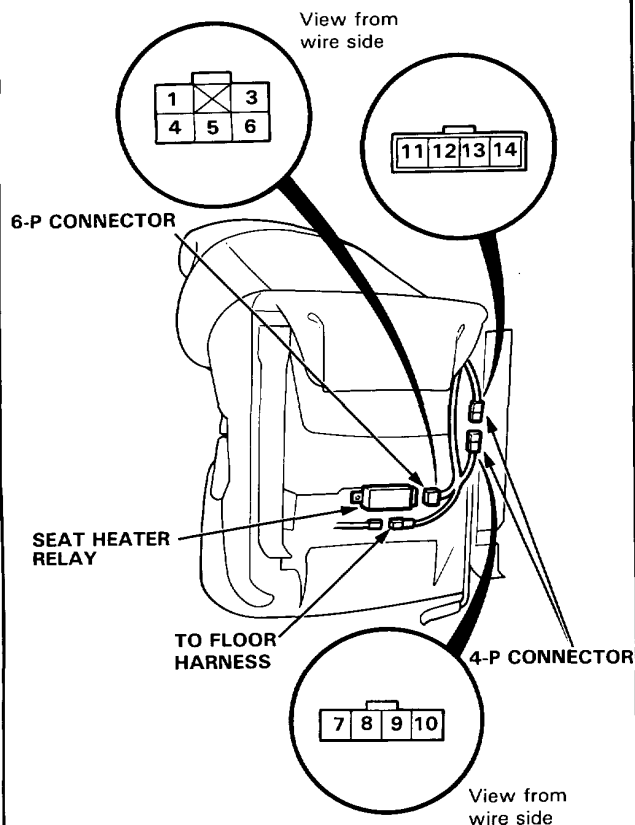




Heater Test

1. Disconnect the 6-P connector and 4-P connector as shown below.

NOTE: Left front seat is shown. Right front seat is similar.

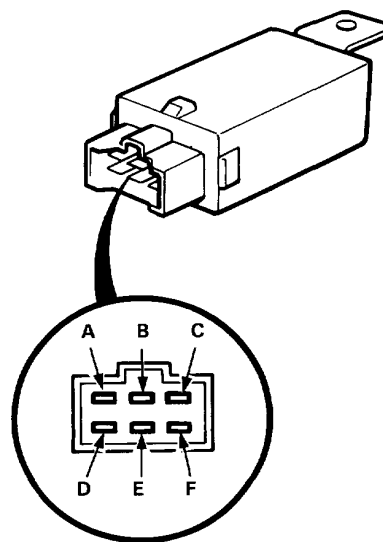


2. **Seat cushion heater:**
Check for continuity between the No. 12 and No. 13 terminals ($R \times 10^3$ scale).
There should be continuity.
3. **Seat back heater:**
Check for continuity between the No. 4 and No. 10 terminals ($R \times 10^3$ scale).
There should be continuity.

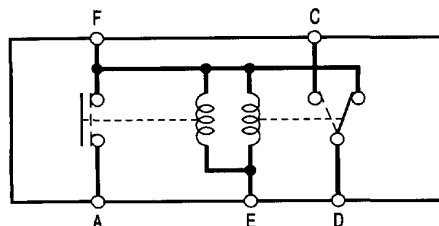
Relay Test

Seat heater relay:

1. Remove the seat, then remove the relay from the bottom of the seat.
2. When power and ground are connected to terminals F and E, there should be continuity between terminals C and D.
3. When power is disconnected from F and E, there should be continuity between terminals F and D.



NOTE: Left seat heater relay is shown, the right is the same.

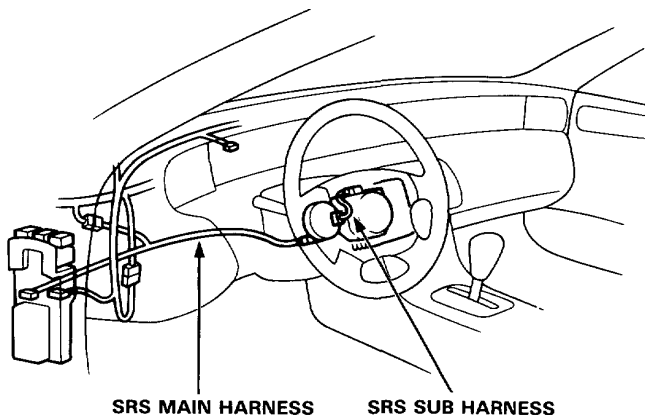


Sunroof

Component Location Index

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



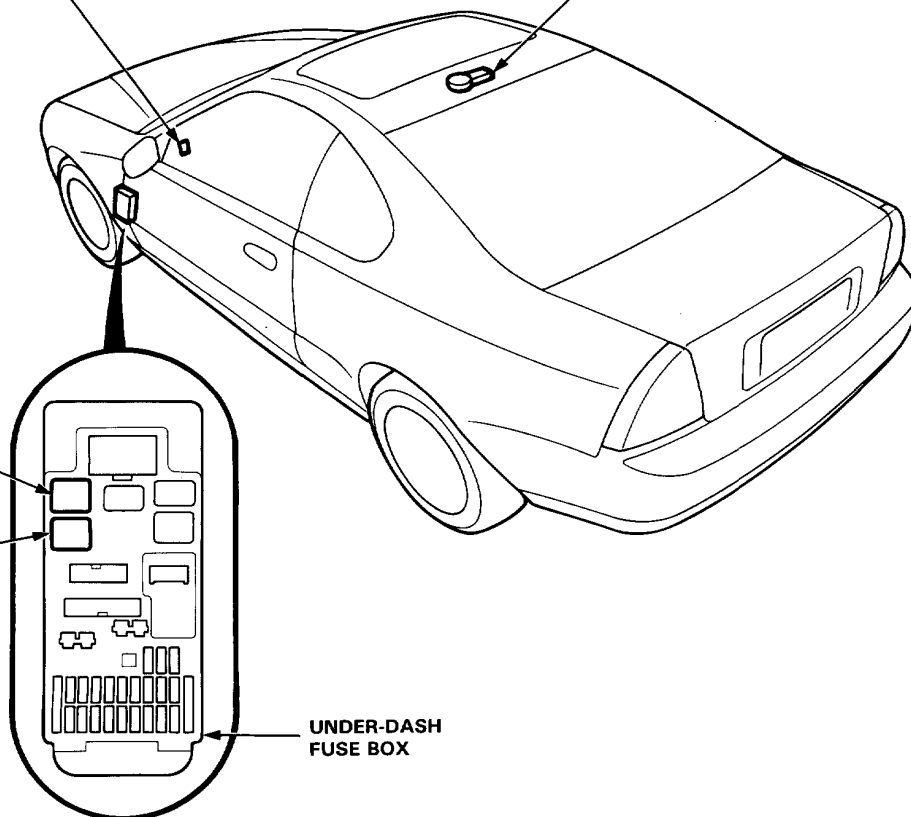
NOTE: LHD type is shown, RHD type is similar.

SUNROOF SWITCH
Test, page 23-311
Removal, page 23-311

SUNROOF MOTOR
Test, page 23-312
Replacement, section 20

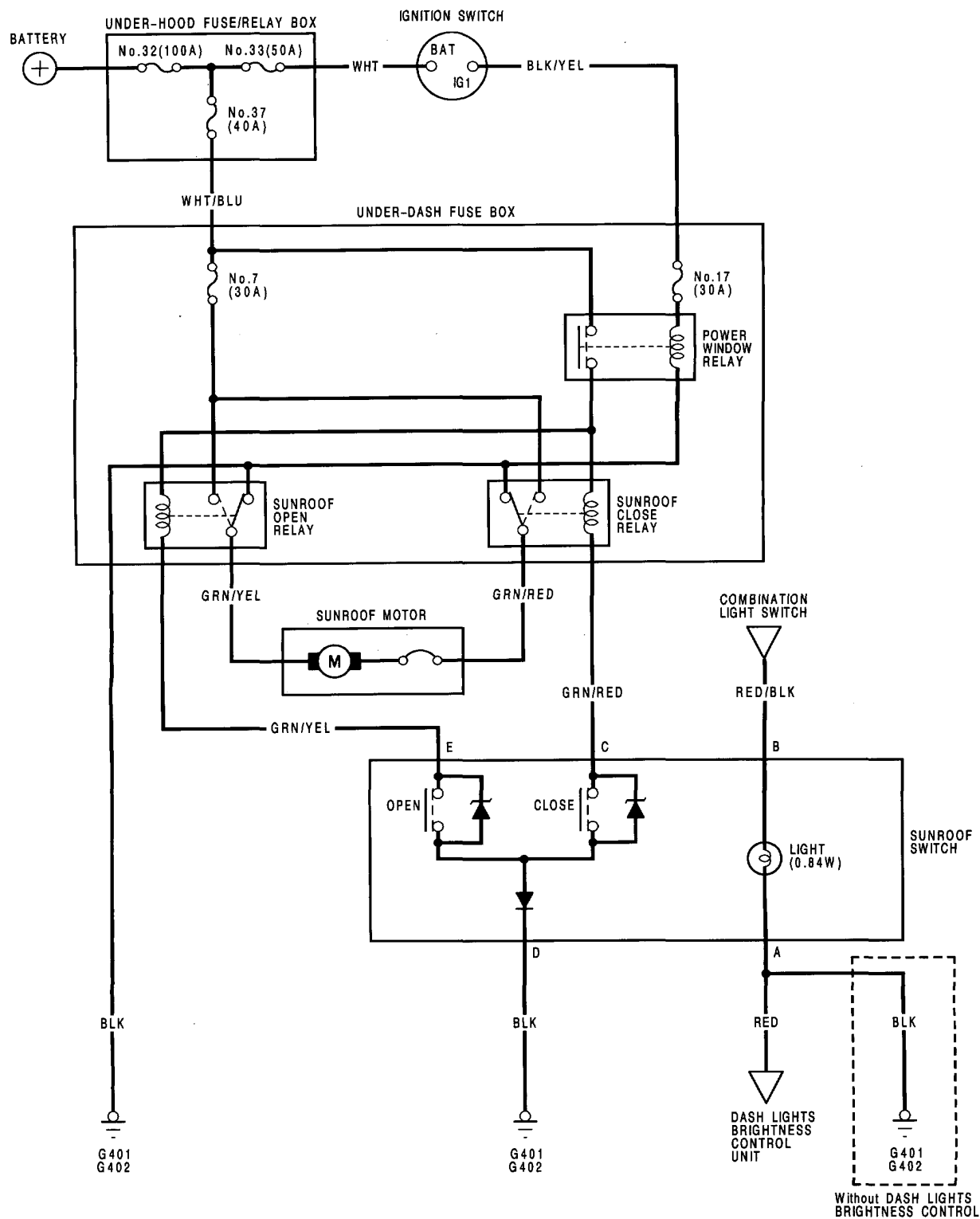
SUNROOF CLOSE RELAY (B-type)
Test, page 23-86
SUNROOF OPEN RELAY (B-type)
Test, page 23-86

UNDER-DASH FUSE BOX





Circuit Diagram



Sunroof

Troubleshooting

NOTE: The numbers in the table show the troubleshooting sequence.

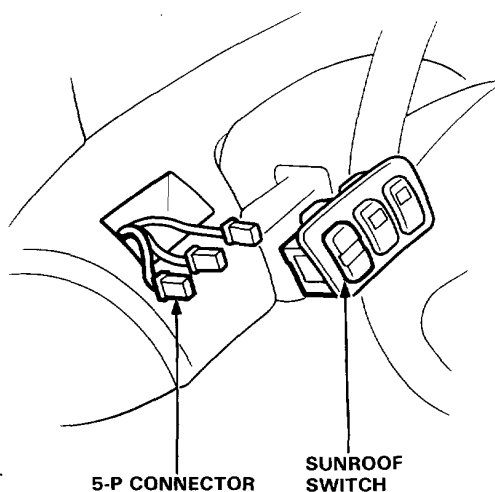
Symptom		Item to be inspected	Item to be inspected										
			Clutch out of adjustment, foreign matter stuck between guide rail and sunroof, or outer cable not attached properly.	Blown No. 37 (40 A) fuse (in the under-hood fuse/relay box)	Blown No. 7 (30 A) fuse (in the under-dash fuse box)	Blown No. 17 (30 A) fuse (in the under-dash fuse box)	Power window relay	Function Test	Open relay	Close relay	Sunroof motor	Sunroof switch	Poor ground
Sunroof does not move, but motor turns.		1											
Sunroof does not move and motor does not turn (sunroof can be moved with sunroof wrench).	With either switch.		1	2	3	4	5			6		G401 G402	WHT/BLU, BLK/YEL, GRN/YEL or GRN/RED
	With OPEN switch.							1	2		3		GRN/YEL or GRN/RED
	With CLOSE switch.							2	1		3		GRN/RED or GRN/YEL



Switch Removal

1. Carefully pry the switches out of the dashboard.
2. Disconnect the connectors from the switches.

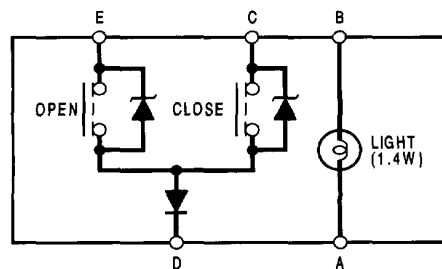
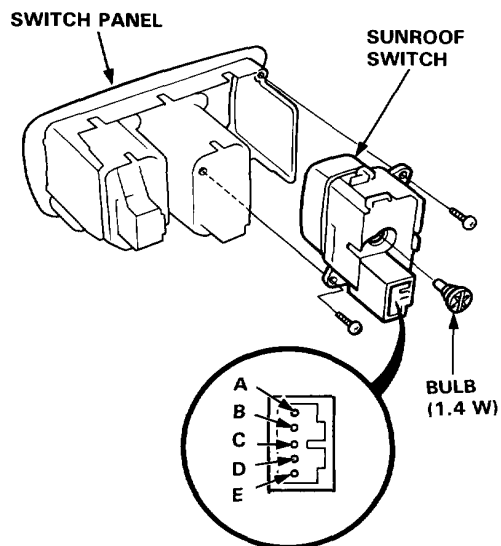
NOTE: When removing the switches, be careful not to damage them or the dashboard.



Switch Test

1. Carefully remove the switches from the dashboard.
2. Remove the switch from the switch panel.
3. Check for continuity between the terminals in each switch position according to the table.

Terminal	A	B	C	E	D
Position					
OFF	○	○	○	○	○
OPEN	○	○	○	○	○
CLOSE	○	○	○	○	○



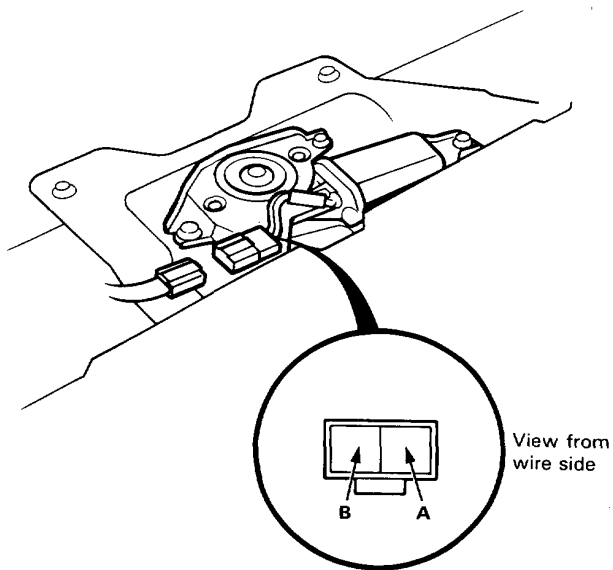
Sunroof

Motor Test

1. Remove the high mount brake light cover.
2. Remove the headliner, then disconnect the 2-P connector.
3. Test the motor by connecting power and ground to the A and B terminals according to the table. The motor should run smoothly.

NOTE: Motor clutch test is in section 20.

OPEN ROOF	A-terminal to the positive B-terminal to the negative
CLOSE ROOF	A-terminal to the negative B-terminal to the positive



4. If the motor does not run smoothly, replace it.



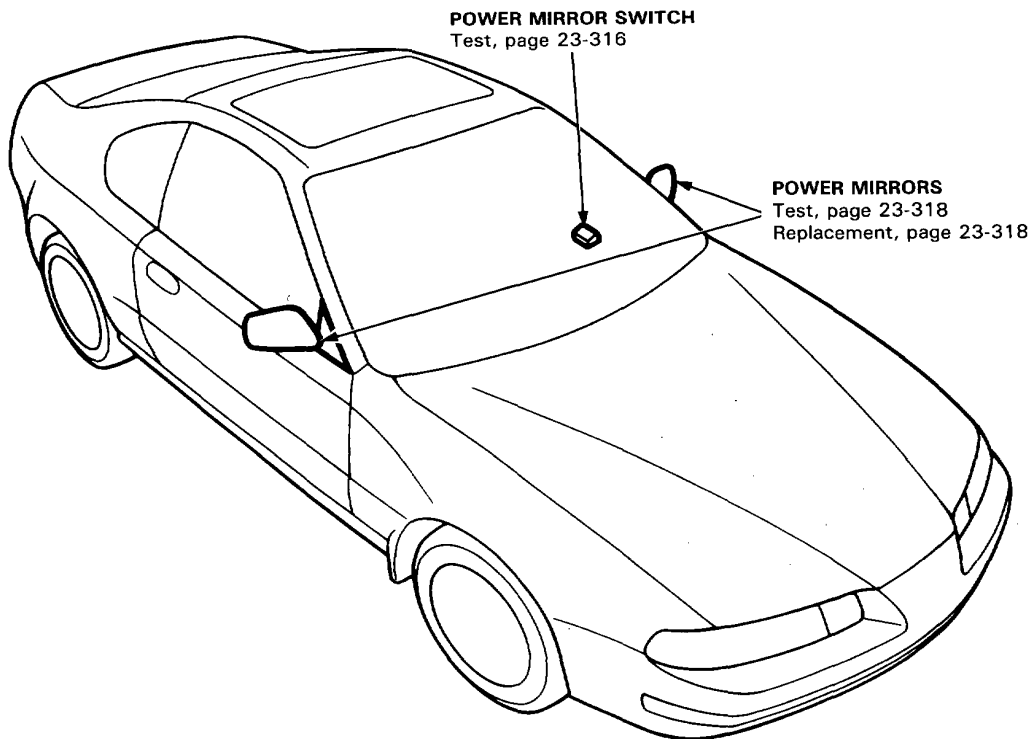
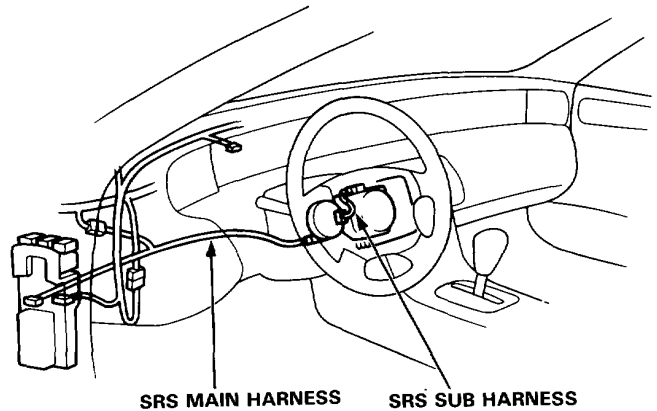
Power Mirrors

Component Location Index

CAUTION:

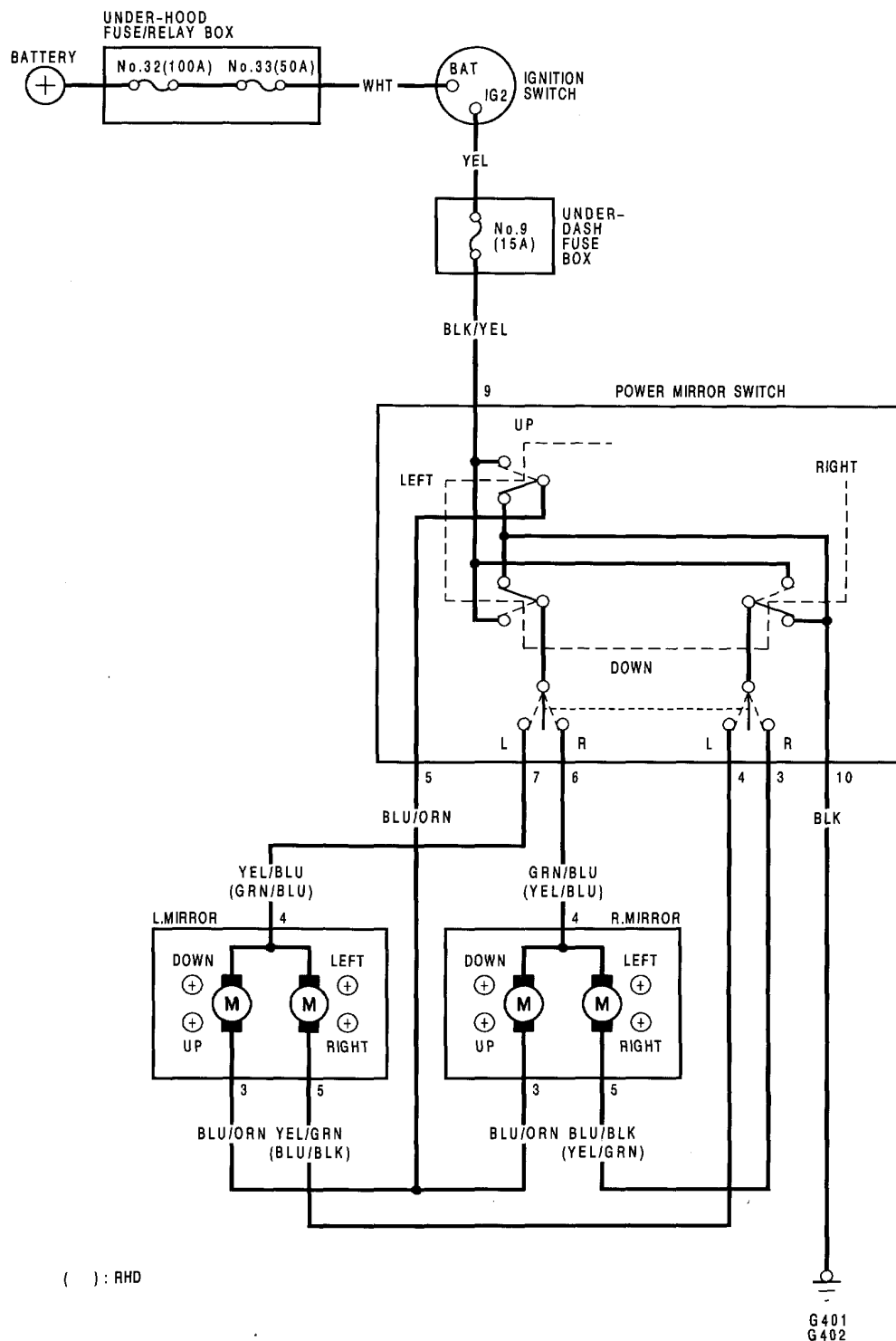
- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

NOTE: LHD type is shown. RHD type is similar.



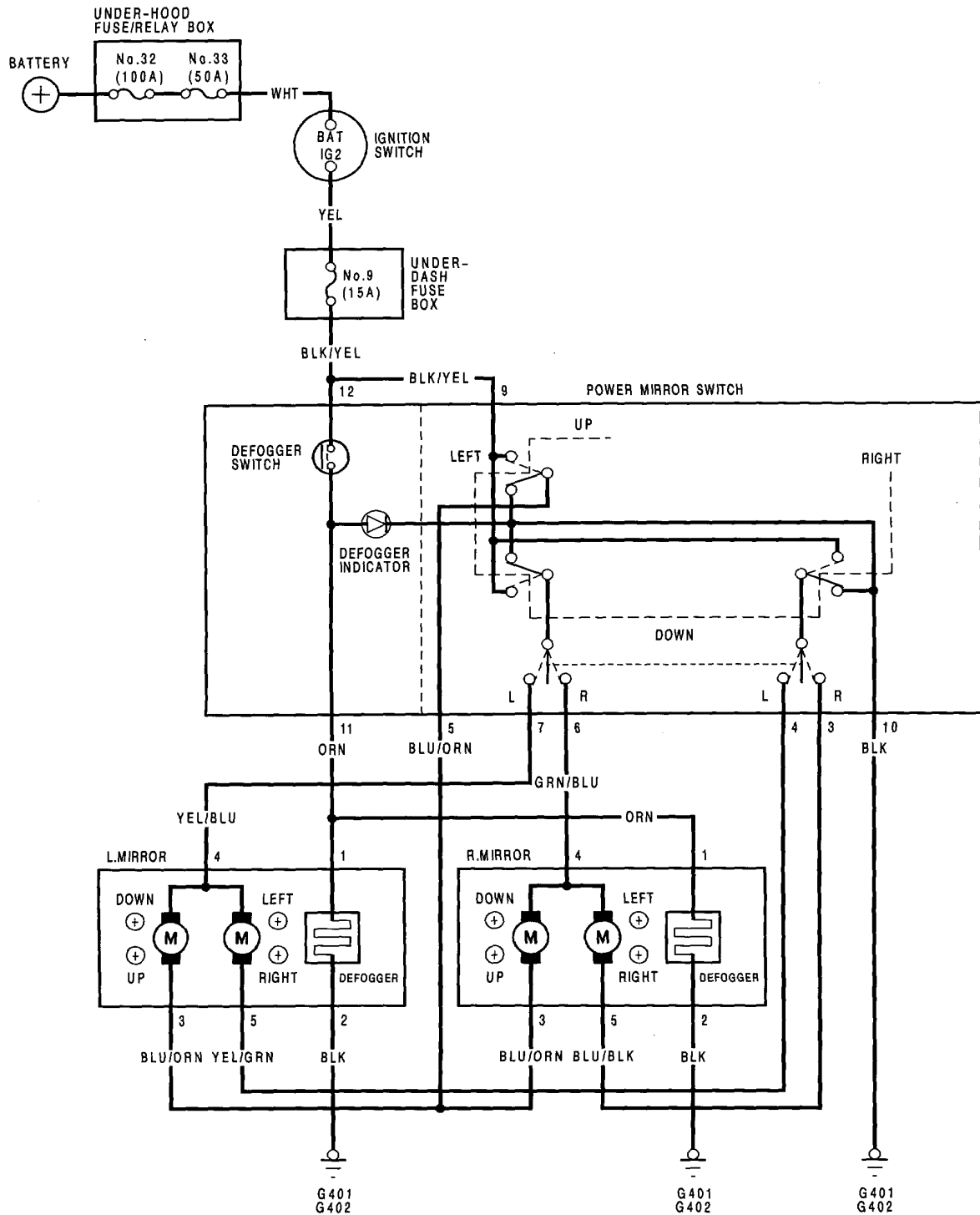
Power Mirrors

Circuit Diagram (Except KS)





Circuit Diagram (KS model)



Power Mirrors

Switch Test

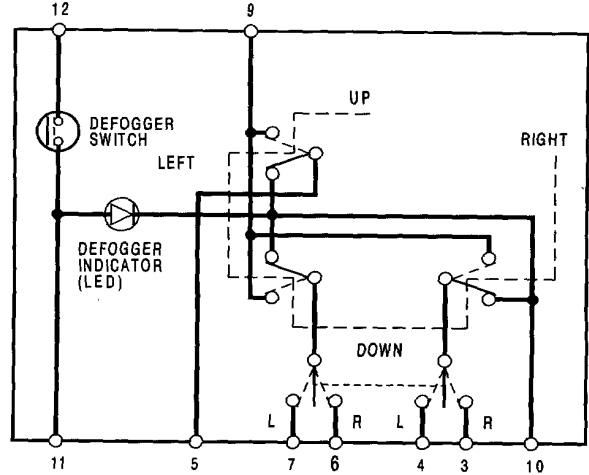
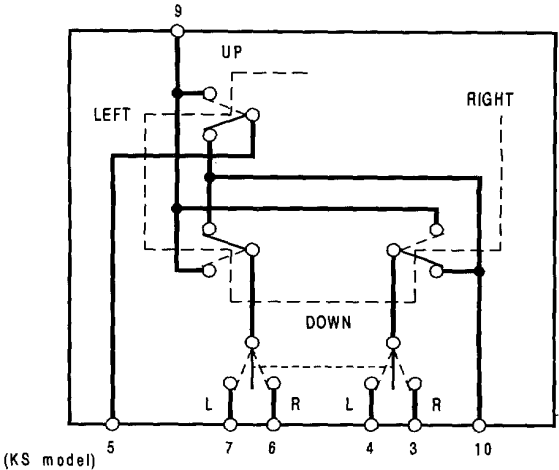
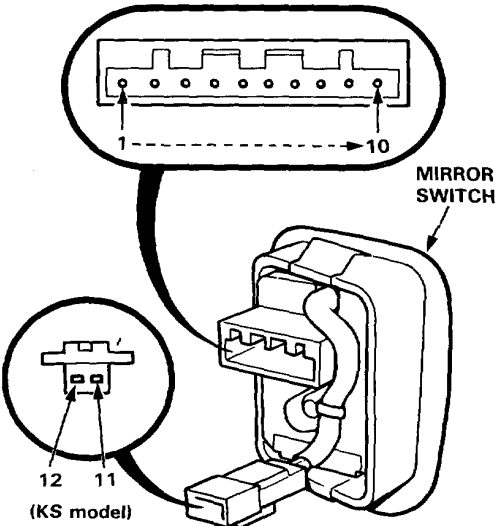
- 1. Remove the switch as described in section "FUNCTION TEST".
- 2. Check for continuity between the terminals in each switch position according to the table.

Mirror Switch

Terminal		3	4	5	6	7	9	10
Position								
R	OFF	○		○	○			○
	UP	○			○		○	○
	DOWN	○		○	○		○	○
	LEFT	○	○	○			○	○
	RIGHT	○					○	○
L	OFF		○	○		○		○
	UP		○	○		○	○	○
	DOWN		○	○		○	○	○
	LEFT		○	○	○	○	○	○
	RIGHT		○	○		○	○	○

Defogger Switch(KS model)

Terminal		10		11	12
Position					
ON		○	○	○	○
OFF		○	○	○	

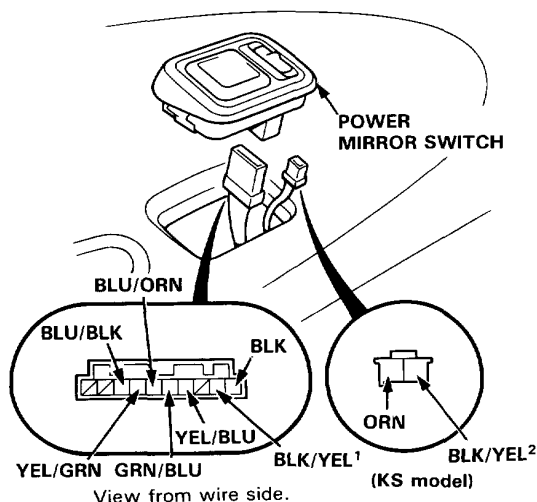




Function Test

NOTE: Be careful not to damage the switch and the door panel.

1. Carefully pry the switch out of the door panel.
2. Disconnect the connectors from the switch.



Mirror Test one or both inoperative:

1. Check for voltage between the BLK/YEL¹ terminal and body ground with the ignition switch ON. There should be battery voltage.
 - If there is no voltage, check for:
 - Blown No. 9 (15 A) fuse in the under-dash fuse box.
 - An open in the BLK/YEL wire.
 - If there is battery voltage, go to step 2.
2. Check for continuity between the BLK terminal and body ground. There should be continuity.
 - If there is no continuity, check for:
 - An open in the BLK wire.
 - Poor ground (G401, G402).

Left Mirror Inoperative:

1. Connect the BLK/YEL¹ terminal of the 10-P connector to the YEL/BLU (GRN/BLU) terminal, the BLU/ORN terminal to body ground and the YEL/GRN (BLU/BLK) terminal to body ground with jumper wires. The left mirror should tilt down (or swing left) when the ignition switch is turned ON.
 - If the mirror does not tilt down (or swing left), remove the left door trim panel and check for an open in the BLU/ORN or YEL/GRN (BLU/BLK) wire between the left mirror and the switch.

- If the wire is OK, check the left mirror actuator.
- If the mirror neither tilt down nor swing left, repair the YEL/BLU (GRN/BLU) wire.
- If the mirror operates properly, check the mirror switch.

Right Mirror Inoperative:

1. Connect the BLK/YEL¹ terminal of the 10-P connector to the GRN/BLU (YEL/BLU) terminal, the BLU/ORN terminal to body ground and the BLU/BLK (YEL/GRN) terminal to body ground with jumper wires. The right mirror should tilt down (or swing left) when the ignition switch is turned ON.
 - If the mirror does not tilt down (or swing left), remove the right door trim panel and check for an open in the BLU/ORN or BLU/BLK (YEL/GRN) wire between the right mirror and the switch.
 - If the wire is OK, check the right mirror actuator.
 - If the mirror neither tilt down nor swing left, repair the GRN/BLU (YEL/BLU) wire.
 - If the mirror operates properly, check the mirror switch.

(): RHD

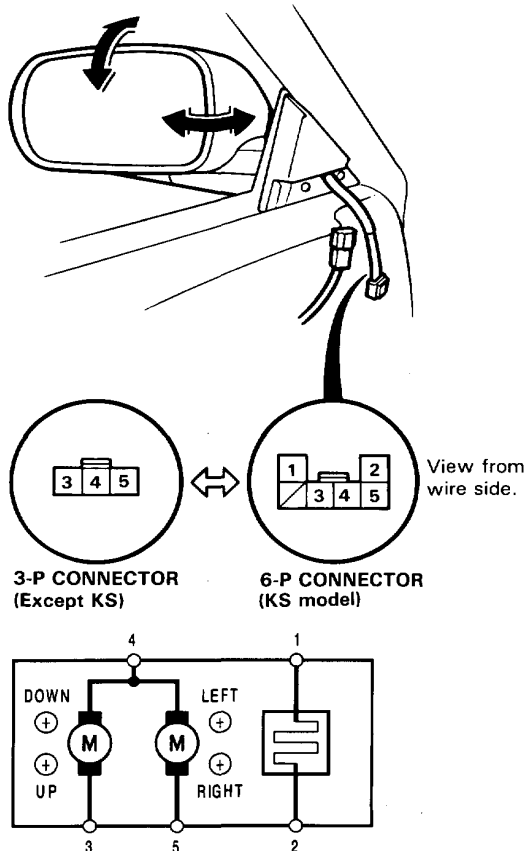
Defogger Test (KS model)

1. Ignition switch is turned ON.
2. Check for voltage between the BLK/YEL² terminal and body ground. There should be battery voltage.
 - If there is no voltage, check for:
 - An open in the BLK/YEL wire.
 - Blown the No. 9 (15 A) fuse.
 - If there is battery voltage, go to step 3.
3. Connect the BLK/YEL² and ORN terminal with a jumper wire. The mirror should warm up.
 - If the one fails to warm up, check for:
 - A break of the defogger
 - If the both mirrors fail to warm up, check for:
 - An open in the ORN wire.
 - If the both mirrors warm up, check for:
 - A break of the defogger switch.

Power Mirrors

Power Mirror Motor Test

1. Carefully pry out the window corner panel with a flat tip screwdriver.
2. Remove the door panel.
3. Disconnect the 3-P or 6-P connector from the mirror.

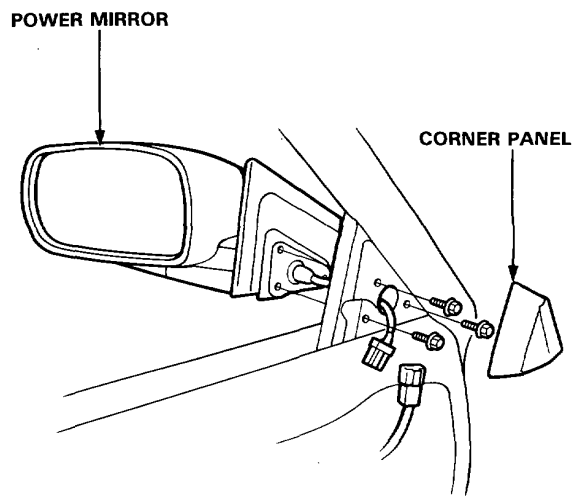


4. Test actuator operation:
 TILT UP: Connect battery power to the No. 3 terminal and ground to the No. 4 terminal.
 TILT DOWN: Connect battery power to the No. 4 terminal and ground to the No. 3 terminal.
 SWING LEFT: Connect battery power to the No. 4 terminal and ground to the No. 5 terminal.
 SWING RIGHT: Connect battery power to the No. 5 terminal and ground to the No. 4 terminal.
5. Check for continuity between the No. 1 and No. 2 terminals (RX 10^3 scale).
 There should be continuity.

Power Mirror Replacement

NOTE: Before removing the mirror, lower the window fully.

1. Carefully pry out the window corner panel with a flat tip screwdriver.
2. Remove the door panel.
3. Disconnect the 3-P or 6-P connector from the mirror.
4. While holding the mirror with one hand, remove the three mounting screws with the other.

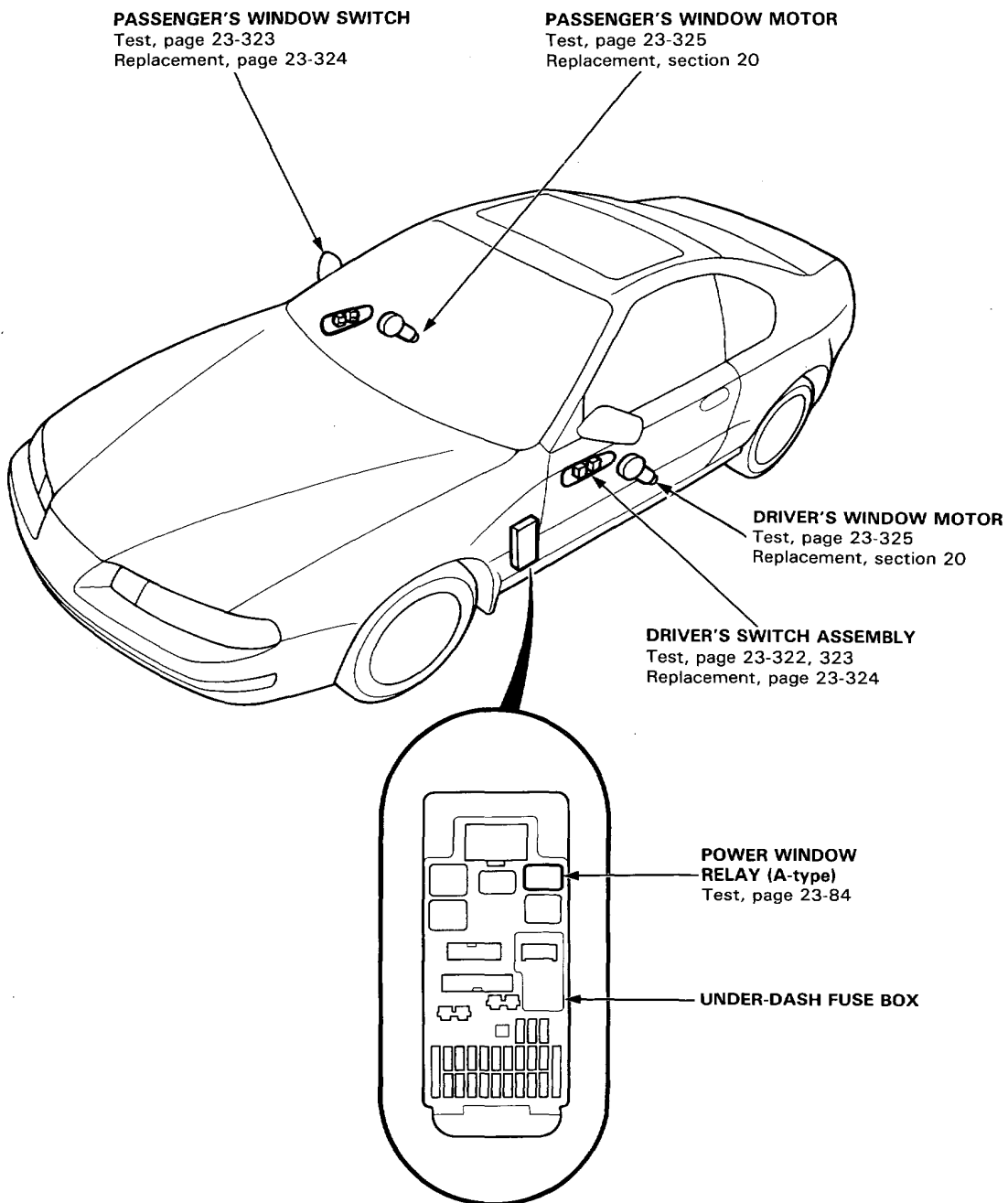




Power Windows

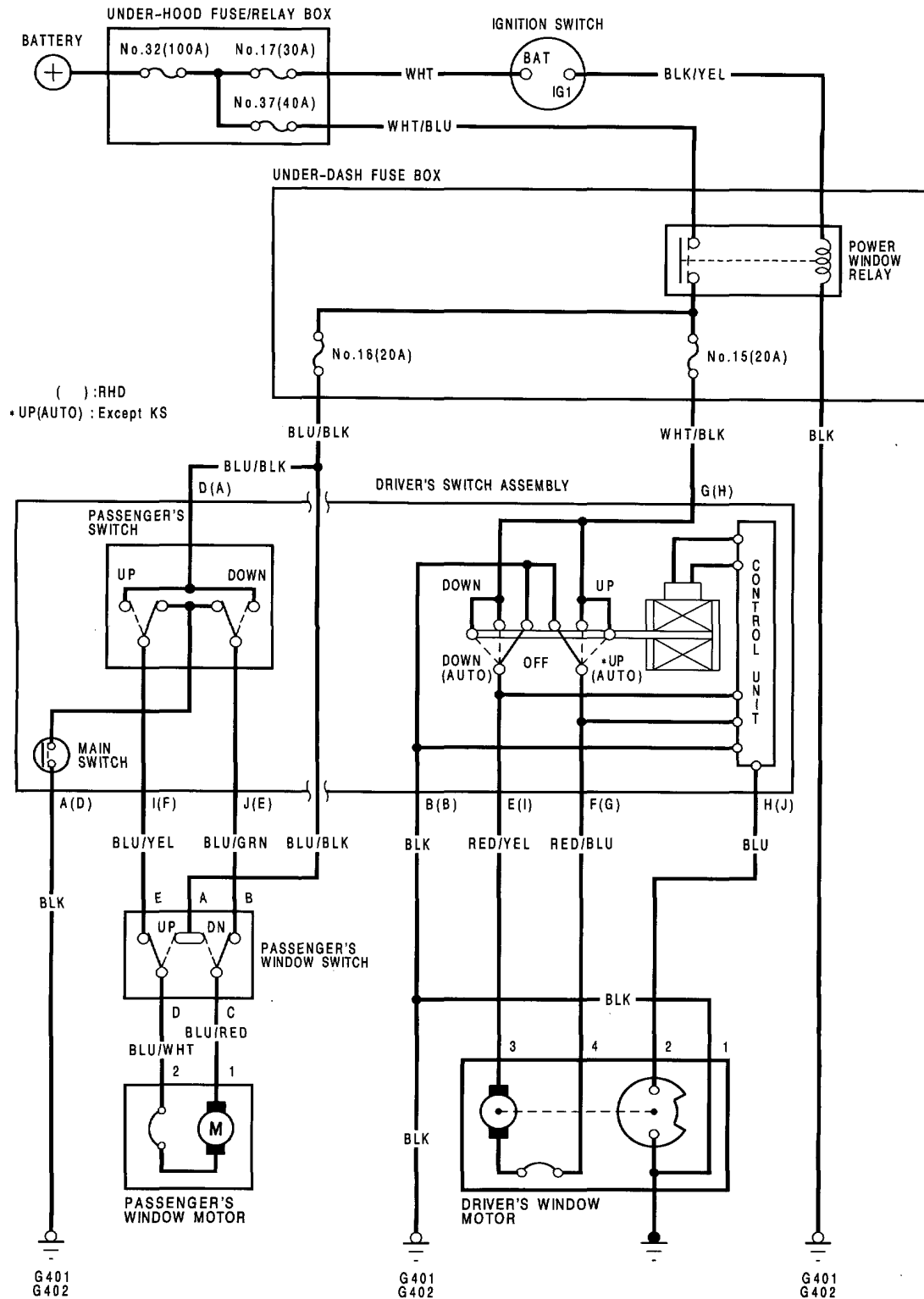
Component Location Index

NOTE: LHD type is shown, RHD type is similar.



Power Windows

Circuit Diagram





Troubleshooting

NOTE: The numbers in the table show the troubleshooting sequence.

Symptom	Item to be inspected														
	Blown No. 17 (30 A) fuse (In the under-hood fuse/relay box)	Blown No. 37 (40 A) fuse (In the under-hood fuse/relay box)	Blown No. 15 (20 A) fuse (In the under-dash fuse box)	Blown No. 16 (20 A) fuse (In the under-dash fuse box)	Power window relay	Control unit input	Main switch	Driver's window switch	Passenger's window switch	Driver's window motor	Passenger's window motor	Pulser (In drive's window motor)	Window regulator	Poor ground	Open circuit in wires, loose or disconnected terminals
Both window do not work.	1	2			3									G401 G402	WHT/BLU
Driver's window does not work in any position.			1			4		2		3			5	G401 G402	WHT/BLK, RED/YEL RED/BLU
Driver's window does not work in AUTO.						3		1				2			BLU
Passenger's window does not work.				1			2		3		4		5	G401 G402	BLU/BLK, BLU/YEL, BLU/GRN, BLU/RED, BLU/WHT

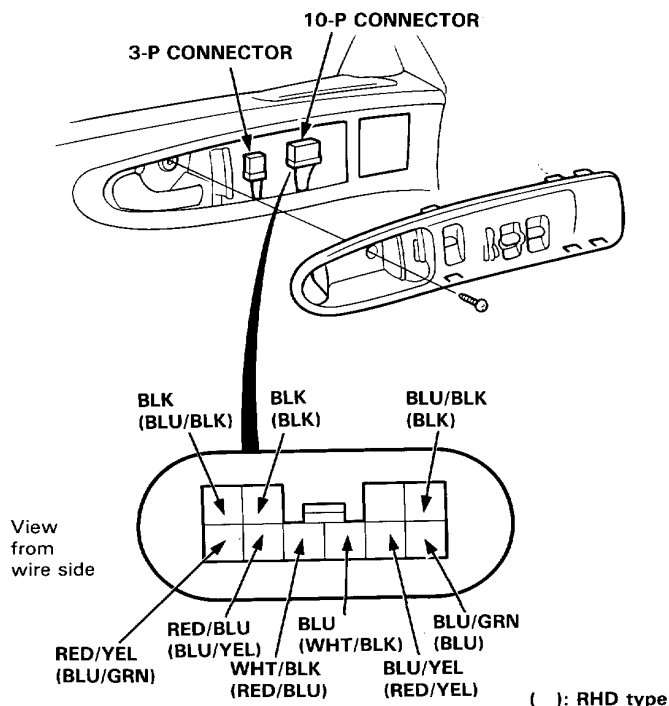
Power Windows

Driver's Switch Assembly Input Test

NOTE: The control unit is built into the driver's switch assembly, and only controls the driver's door operation.

Inspect the connector terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector terminals.
- If a test indicates a problem, find and correct the cause, then recheck the system.
- If all the input tests prove OK, the control unit must be faulty; replace it.



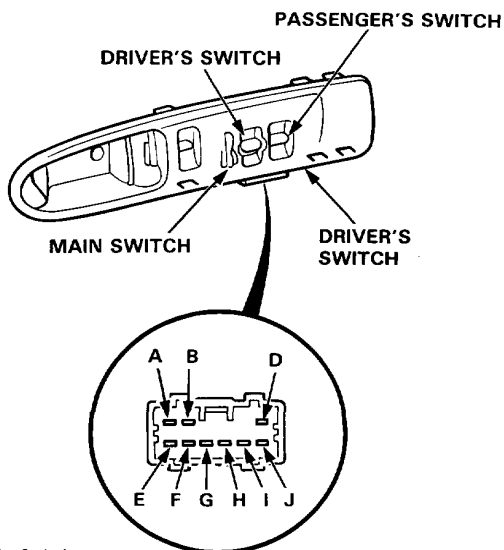
No.	Terminal	Test condition	Test: desired result	Possible cause (if result is not obtained)
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	WHT/BLK BLU/BLK	Ignition switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 15 or 16 (20 A) fuse. • Faulty power window relay. • An open in the wire.
3	RED/BLU and RED/YEL	Connect the WHT/BLK terminal to the RED/BLU terminal, and the RED/YEL terminal to the BLK terminal, then ignition switch ON.	Check the driver's window motor operation: There should run.	<ul style="list-style-type: none"> • Faulty driver's window motor. • An open in the wire.
4	BLU/YEL and BLU/GRN	Connect the BLU/BLK terminal to the BLU/GRN terminal, and the BLU/YEL terminal to the BLK terminal, then ignition switch ON.	Check the passenger's window motor operation: There should run.	<ul style="list-style-type: none"> • Faulty passenger's window motor. • Faulty passenger's window switch. • An open in the wire.
5	BLU and BLK	Connect the WHT/BLK terminal to the RED/YEL terminal, and the BLK terminal to the RED/BLU terminal, then ignition switch ON.	Check for needle of analog ohmmeter movement connecting the BLU and BLK terminals: There should move back and forth alternately as the driver's window motor runs.	<ul style="list-style-type: none"> • Faulty pulser. • Faulty driver's window motor. • An open in the wire.



Driver's Switch Assembly Test

1. Remove the driver's switch assembly from the door trim panel discripted in section "Replacement".
2. Check for continuity between the terminals in each switch position according to the tables.

NOTE: LHD type is shown, RHD type is similar.



Driver's Switch

Terminal	B (B)	E (I)	F (G)	G (H)
Position				
OFF	○	○	○	
UP			○	○
DOWN		○		○
* UP(AUTO)			○	○
DOWN(AUTO)		○		○

* UP(AUTO) : Except KS model
() : RHD

Passenger's Switch

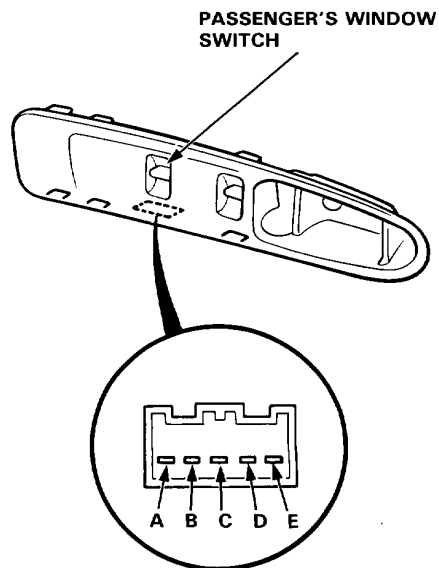
Terminal	A (D)	D (A)	I (F)	J (E)
Position				
OFF	ON	○	○	○
	OFF		○	○
UP	ON	○	○	
	OFF	○	○	
DOWN	ON	○		○
	OFF	○		○

() : RHD

Passenger's Window Switch Test

1. Remove the passenger's switch assembly from the door trim panel discripted in section "Replacement".
2. Check for continuity between the terminals in each switch position according to the table.

NOTE: LHD type is shown, RHD type is similar.



Passenger's Window Switch

Terminal	A	B	C	D	E
Position					
UP	○			○	
OFF		○	○	○	○
DOWN	○		○		

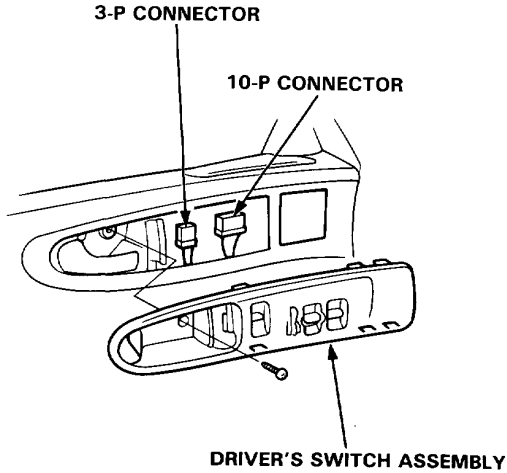
Power Windows

Switch Replacement

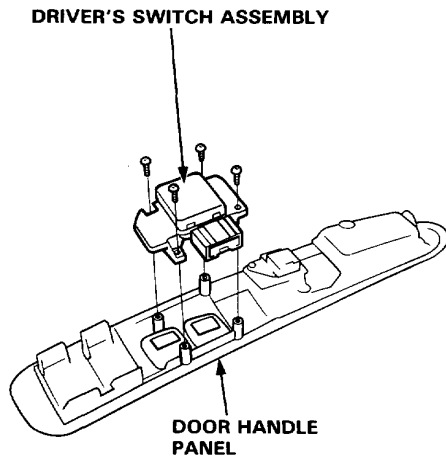
NOTE: LHD type is shown, RHD type is similar.

Driver's switch assembly:

1. Remove the driver's switch assembly from the door by removing the mounting screw, then disconnect the connectors from the switches.



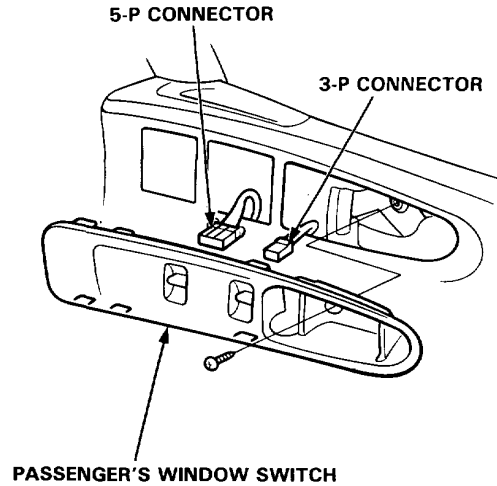
2. Remove the driver's switch assembly from the door handle panel by removing the four mounting screws.



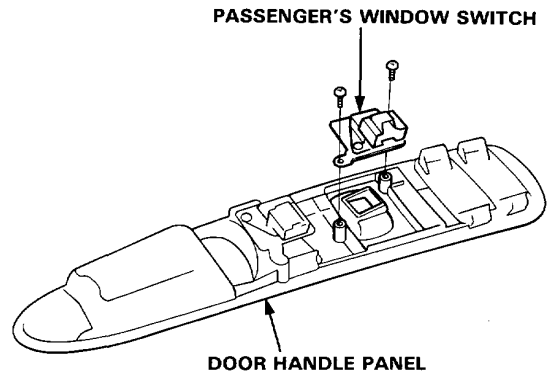
NOTE: LHD type is shown, RHD type is similar.

Passenger's window switch:

1. Remove the window from the door by removing the mounting screw, then disconnect the connectors from the switches.



2. Remove the passenger's window switch from the door handle panel by removing the two mounting screws.



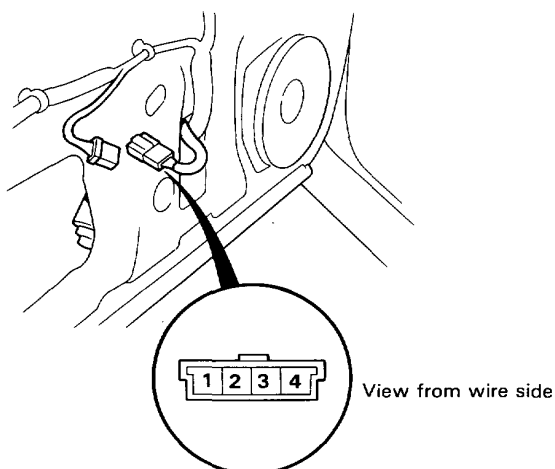


Driver's Window Motor Test

NOTE: RHD type is symmetrical to LHD type.

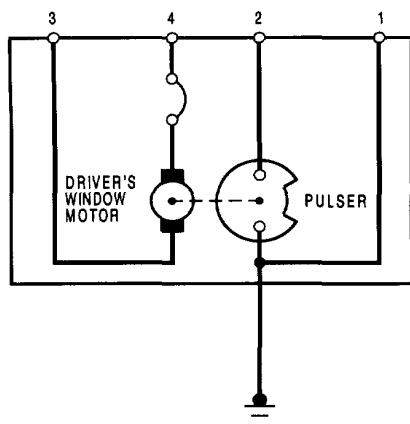
Motor Test:

1. Remove the door panel.
2. Disconnect the 4-P connector from the motor.
3. Test motor operation by connecting battery power to the No. 3 terminal and grounding the No. 4 terminal.
Test the motor in each direction by switching the leads.
4. If the motor does not run, replace it.



Pulser Test:

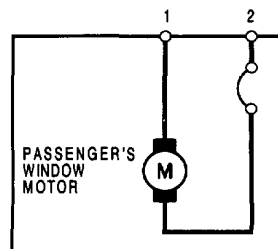
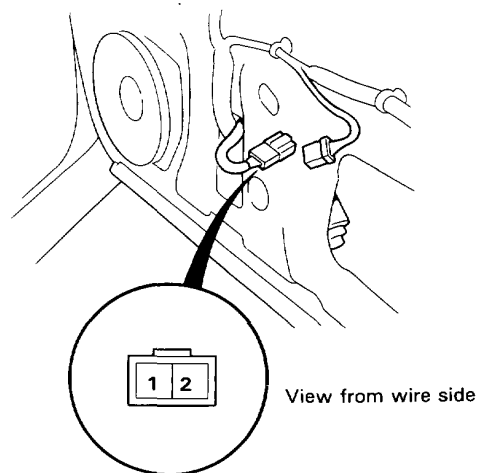
Connect the test leads of an analog ohmmeter to the No. 1 and No. 2 terminals.
Run the motor by connecting power and ground to the No. 3 and No. 4 terminals.
The ohmmeter needle should move back and forth alternately.



Passenger's Window Motor Test

NOTE: RHD type is symmetrical to LHD type.

1. Remove the door panel.
2. Disconnect the 2-P connector from the motor.
3. Test motor operation by connecting power and ground to the No. 1 and No. 2 terminals.
Test the motor in each direction by switching the leads.
4. If the motor does not run, replace it.





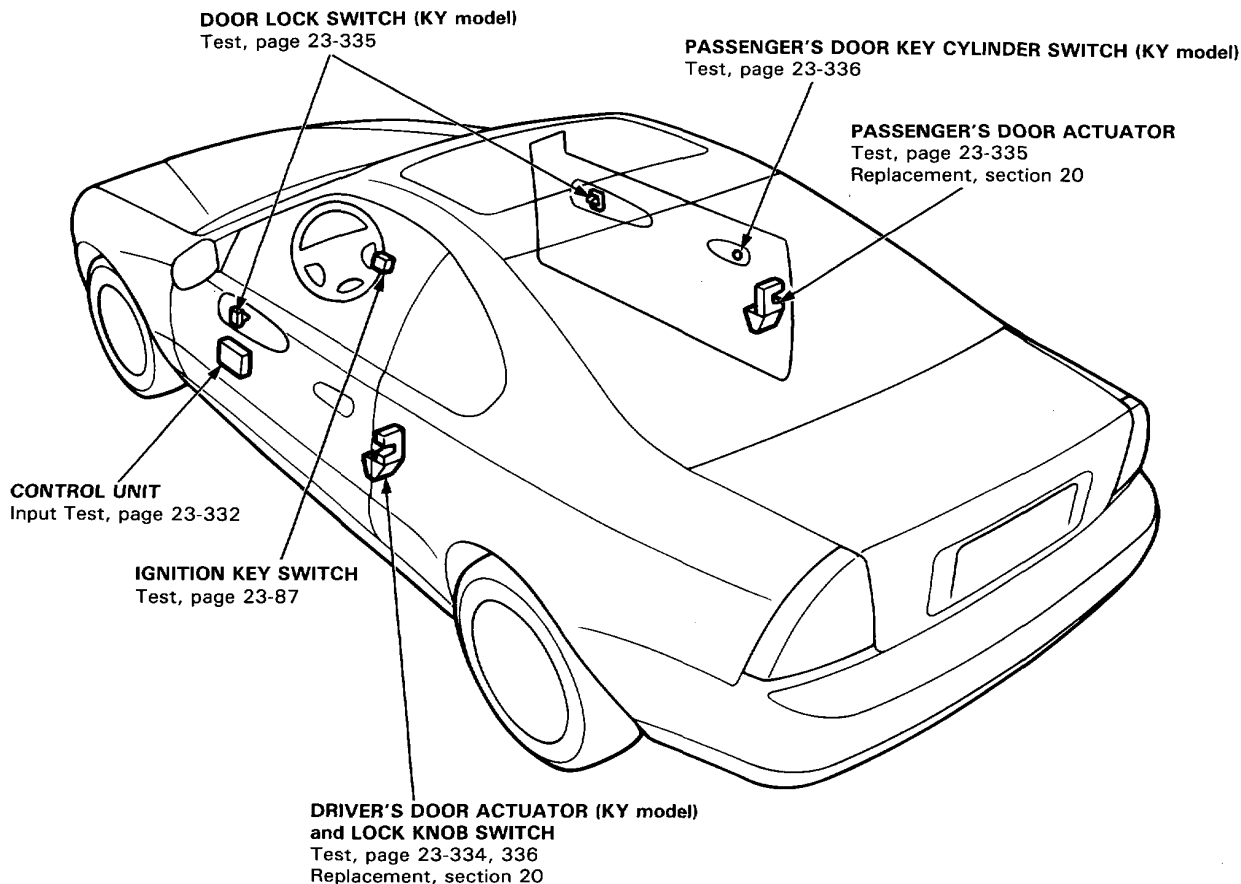
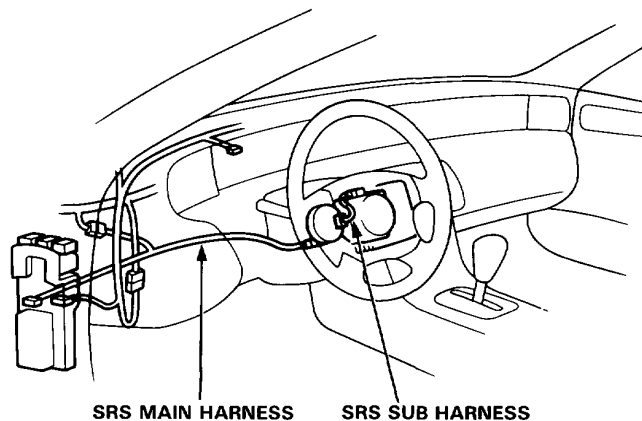
Power Door Locks

Component Location Index

CAUTION:

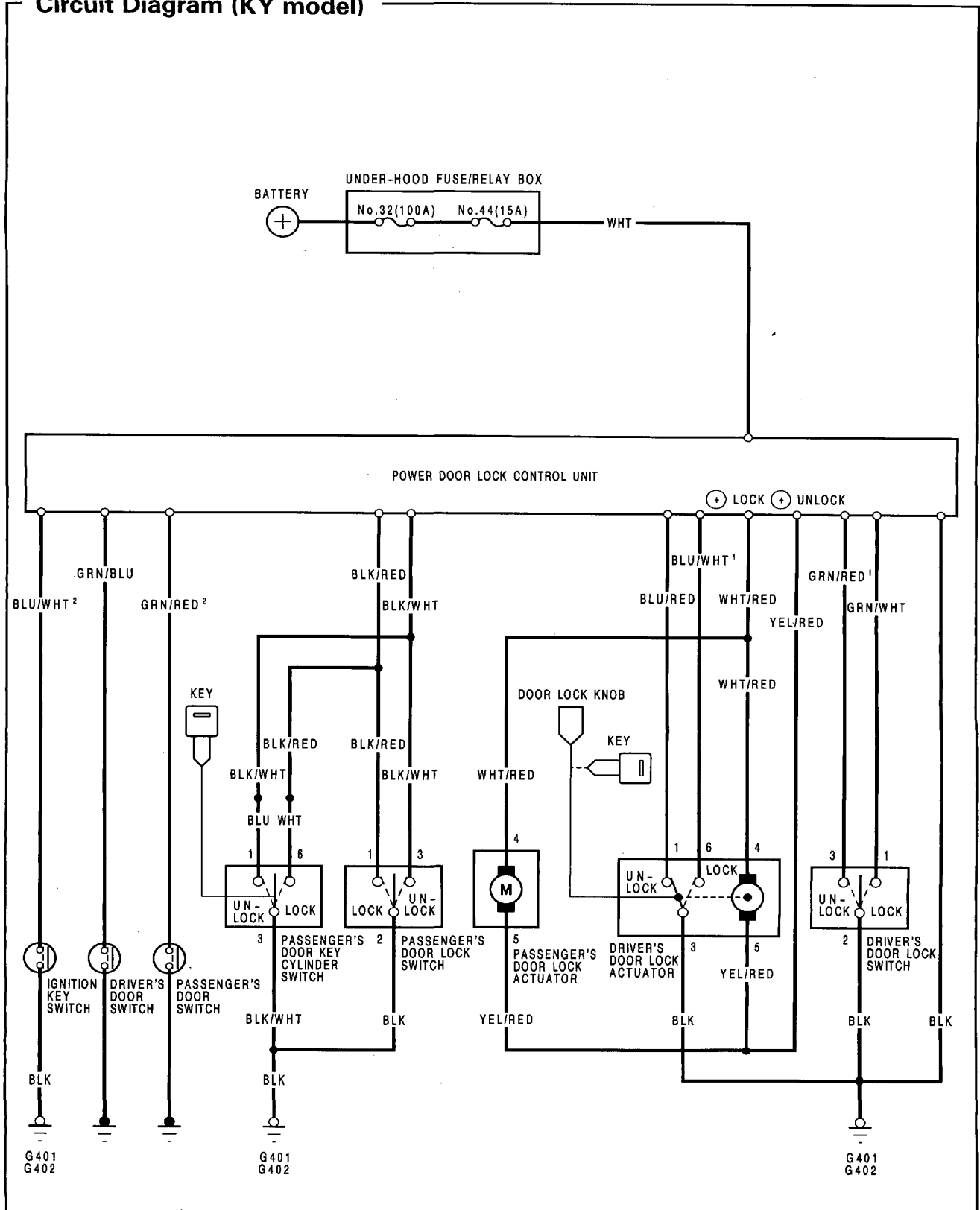
- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

NOTE: LHD type is shown, RHD type is similar.



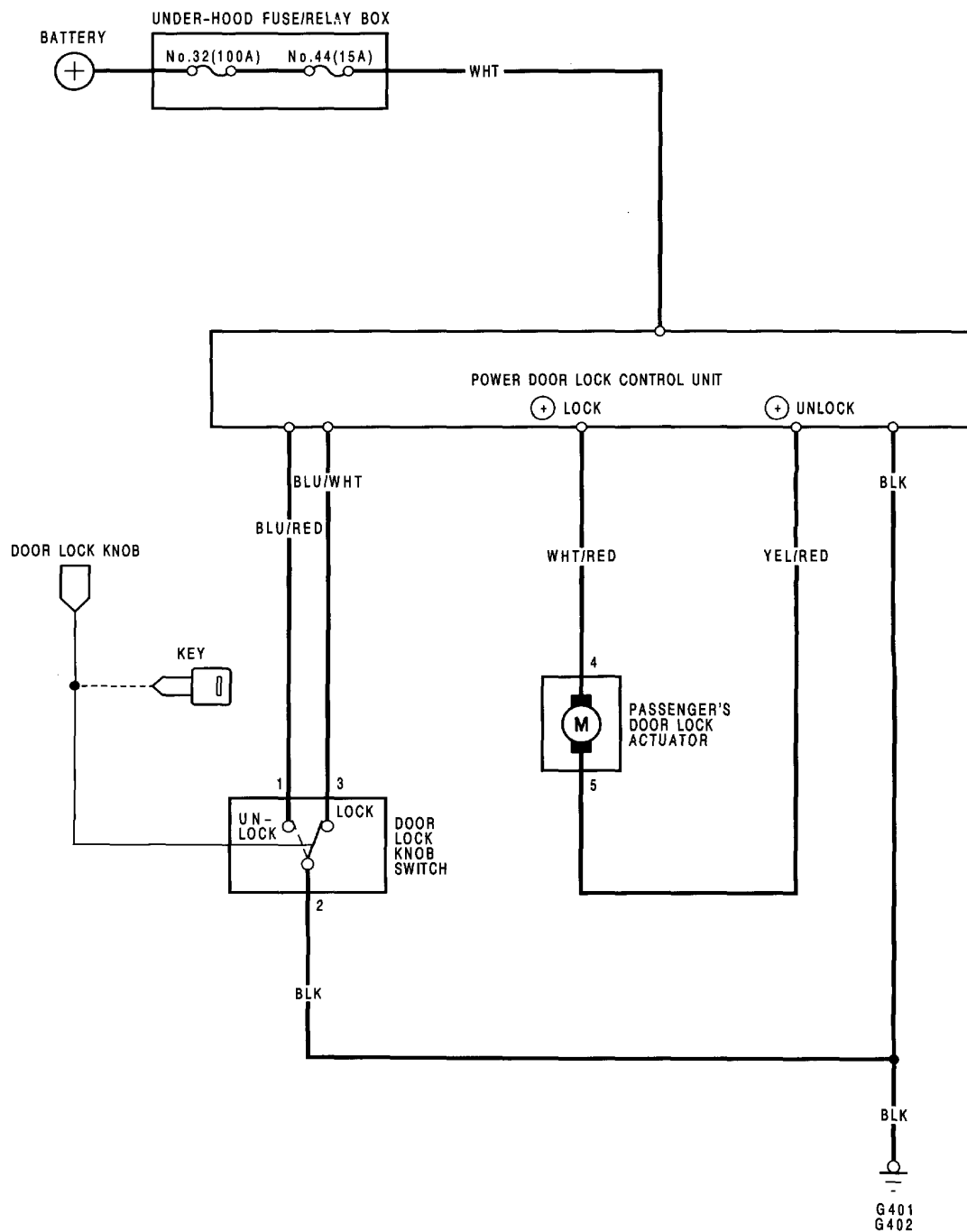
Power Door Locks

Circuit Diagram (KY model)





Circuit Diagram (Except KY)



Power Door Locks

Troubleshooting (Except KY)

NOTE: The numbers in the table show the troubleshooting sequence.

Symptom		Item to be inspected	Blown No. 44 (15 A) fuse (In the under-hood fuse/relay box)	Door lock knob switch.	Control unit input	Passenger door actuators	Disconnected or obstructed door lock rod/linkage	Poor ground	Open circuit in wires, loose or disconnected terminals
Power door lock system doesn't operate at all.			1		2			G401 G402	WHT
Doors don't lock or unlock with driver's door lock knob switch.	Both doors.		1	2	3		4	G401 G402	BLU/WHT, YEL/RED, WHT/RED or BLK/RED
	One door.					1			YEL/RED or WHT/RED

CAUTION: To prevent damage to the motor,
apply battery voltage only momentarily.



Troubleshooting (KY model)

NOTE: The numbers in the table show the troubleshooting sequence.

Item to be inspected		Blown No. 44 (15A) fuse (In the under-hood fuse/relay box)	Disconnected or obstructed door lock rod/linkage	Driver's door lock knob switch (In the driver's door lock actuator)	Ignition key switch	Driver's door switch	Passenger's door switch	Driver's door lock actuator	Passenger's door lock actuator	Driver's door lock switch	Passenger's door lock switch	Control unit input	Passenger's door key cylinder	Poor ground	Open circuit in wires, loose or disconnected terminals
Symptom															
Power door lock system doesn't work at all.		1										2		G401 G402	WHT
Doors don't lock or unlock with the driver's power door lock switch.	Both doors									1		2		G401 G402	GRN/WHT or GRN/RED ¹
	One door		1					2				3			YEL/RED or WHT/RED
Doors don't lock or unlock with the passenger's power door lock switch.	Both doors										1	2		G401 G402	BLK/WHT or BLK/RED
	One door		1					2				3			YEL/RED or WHT/RED
Doors don't lock with the driver's door lock knob. (Ignition key not inserted and doors closed.)	Both doors			1								2		G401 G402	BLU/RED or BLU/WHT ¹
	One door		1					2				3			YEL/RED or WHT/RED
Doors don't lock or unlock with the passenger's door key cylinder switch.	Both doors											2	1	G401 G402	BLK/RED or BLK/WHT
	One door		1					2				3			YEL/RED or WHT/RED
Doors will lock when the key is still in the ignition switch and the driver's door is open.					1	2	3					4		G401 G402	BLU/WHT ² GRN/RED ² or GRN/BLU

Power Door Locks

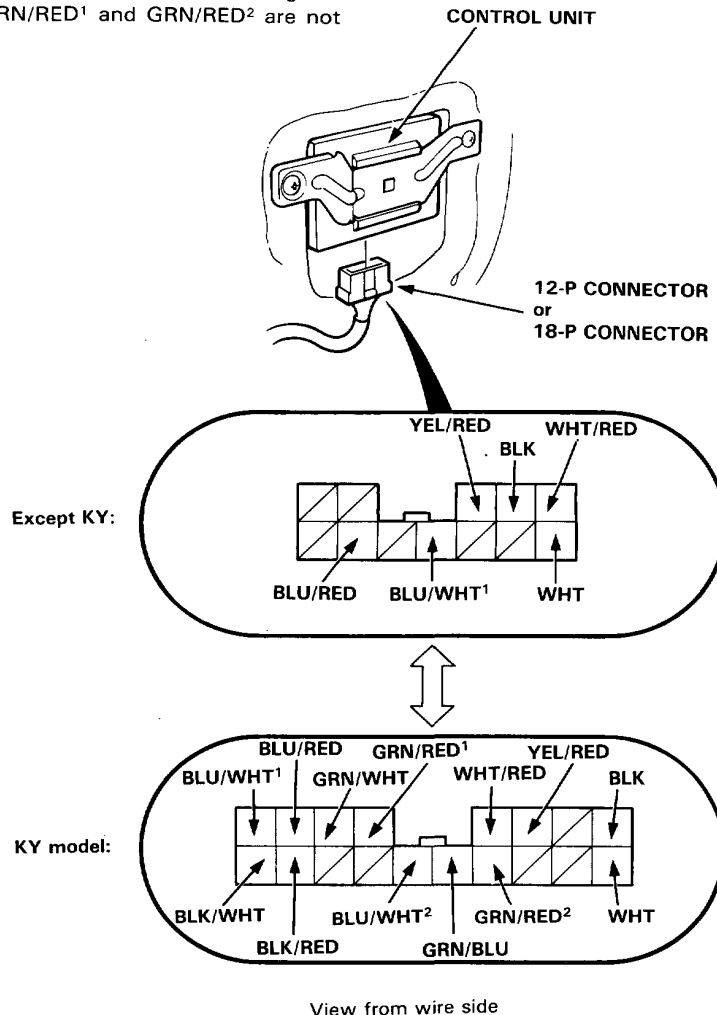
Control Unit Input Test

Remove the driver's door trim panel, then disconnect the 12-P or 18-P connector from the control unit.

Inspect the connector terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector terminals.
 - If a test indicates a problem, find and correct the cause, then recheck the system.
 - If all the input tests prove OK, the control unit must be faulty; replace it.

NOTE: Several different wires have the same color. They have been given a number suffix to distinguish them (for example, GRN/RED¹ and GRN/RED² are not the same).





Disconnect the 12-P [18-P] connector from the control unit.

No.	Wire	Test condition	Test: desired result	Possible cause (if result is not obtained)
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402). • An open in the wire.
2	WHT/RED and YEL/RED	Connect the YEL/RED terminal to the WHT terminal, and the WHT/RED terminal to the BLK terminal momentarily.	Check door lock operation: All doors should unlock.	<ul style="list-style-type: none"> • Faulty actuator. • An open in the wire.
		Connect the WHT/RED terminal to the WHT terminal, and the YEL/RED terminal to the BLK terminal momentarily.	Check door lock operation: All doors should lock.	

Reconnect the 12-P [18-P] connector to the control unit.

No.	Wire	Test condition	Test: desired result	Possible cause (if result is not obtained)
3	WHT	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 44 (15 A) fuse. • An open in the wire.
[4]	GRN/WHT	Driver's door lock switch in LOCK.	Check for voltage to ground: There should be 1 V or less.	<ul style="list-style-type: none"> • Faulty driver's door lock switch. • Poor ground (G401, G402). • An open in the wire.
	GRN/RED ¹	Driver's door lock switch in UNLOCK.		
[5]	BLK/RED	Passenger's door lock switch in LOCK.	Check for voltage to ground: There should be 1 V or less.	<ul style="list-style-type: none"> • Faulty passenger's door lock switch. • Poor ground (G401, G402). • An open in the wire.
	BLK/WHT	Passenger's door lock switch in UNLOCK.		
6	BLU/WHT ¹	Driver's door lock knob in LOCK.	Check for voltage to ground: There should be 1 V or less.	<ul style="list-style-type: none"> • Faulty driver's door lock actuator. • Poor ground (G401, G402). • An open in the wire.
	BLU/RED	Driver's door lock knob in UNLOCK.		
[7]	GRN/BLU	Driver's door open.	Check for voltage to ground: There should be 1 V or less. NOTE: Before testing, remove No. 46 (15 A) fuse.	<ul style="list-style-type: none"> • Faulty door switch. • Poor ground. • An open in the wire.
	GRN/RED ²	Passenger's door open.		
[8]	BLU/WHT ²	Ignition key is inserted into the ignition switch.	Check for voltage to ground: There should be 1 V or less.	<ul style="list-style-type: none"> • Faulty ignition key switch. • Poor ground (G401, G402). • An open in the wire.
[9]	BLK/RED	Passenger's door key cylinder in LOCK.	Check for voltage to ground: There should be 1 V or less as the switch is turned.	<ul style="list-style-type: none"> • Faulty passenger's door cylinder. • Poor ground (G401, G402). • An open in the wire.
	BLK/WHT	Passenger's door key cylinder in UNLOCK.		

CAUTION: To prevent damage to the motor, apply battery voltage only momentarily.

[]: KY model

Power Door Locks

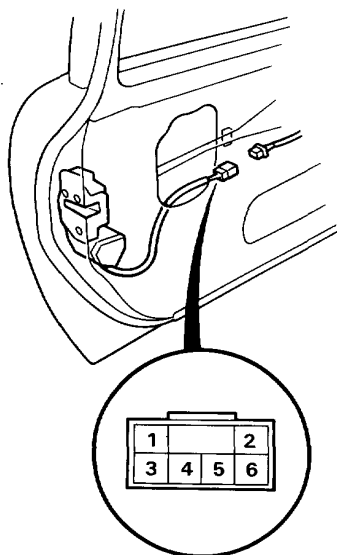
Driver's Door Actuator Test (KY model)

1. Remove the door trim panel.
2. Disconnect the 6-P connector from the actuator.
3. Test actuator operation:

LOCK: With battery power connected to the No. 4 terminal, ground the No. 5 terminal momentarily.

UNLOCK: With battery power connected to the No. 5 terminal, ground the No. 4 terminal momentarily.

CAUTION: To prevent damage to the motor, connect power only momentarily.

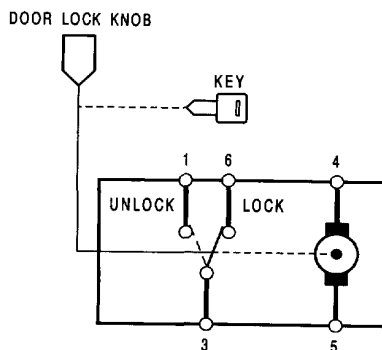


View from wire side

4. If the actuator fails to operate properly, replace it.

5. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	1	3	6
LOCK		○	○
UNLOCK	○	○	





Passenger's Door Actuator Test

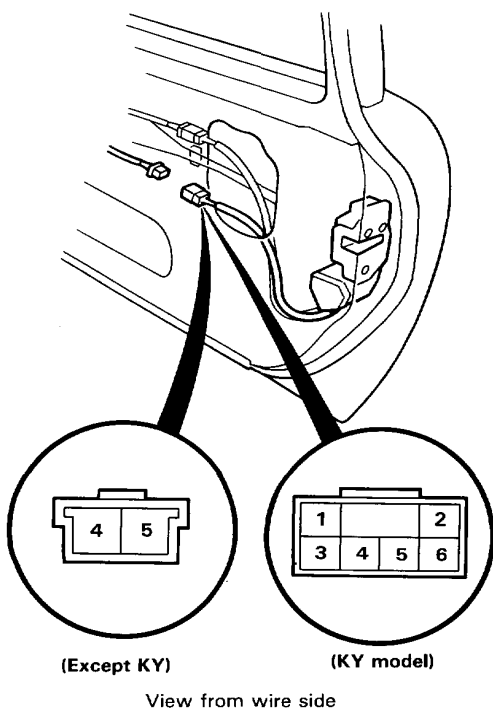
1. Remove the door trim panel.
2. Disconnect the 2-P or 6-P connector from the actuator.
3. Test actuator operation:

LOCK: With battery power connected to the No. 4 terminal, ground the No. 5 terminal momentarily.

UNLOCK: With battery power connected to the No. 5 terminal, ground the No. 4 terminal momentarily.

CAUTION: To prevent damage to the motor, connect power only momentarily.

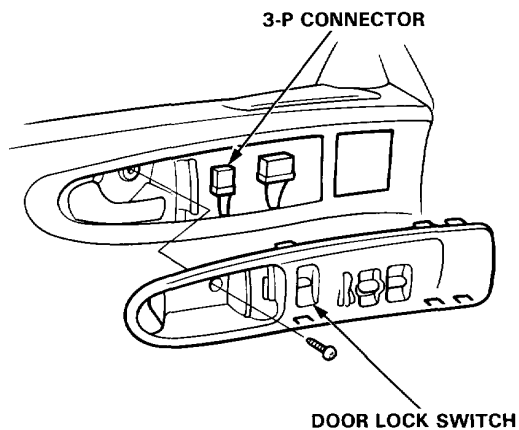
NOTE: LHD type is shown, RHD type is similar.



4. If the actuator fails to operate properly, replace it.

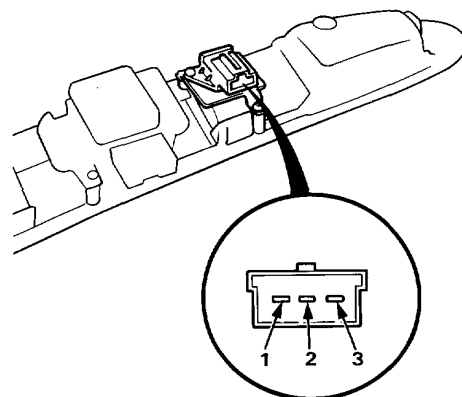
Door Lock Switch Test (KY model)

1. Remove the screw.
2. Remove the inside handle trim plate with switches.
3. Disconnect the connectors from the switches.



4. Check for continuity between the terminals in each switch position according to the table.

Terminal	1	2	3
Position			
LOCK	○	○	
UNLOCK		○	○

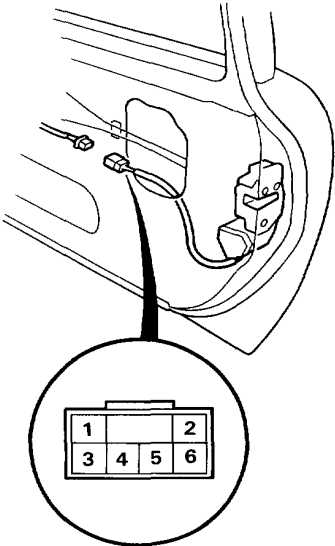


Power Door Locks

Key Cylinder Switch Test (KY model)

- 1. Remove the passenger's door trim panel.
- 2. Disconnect the 6-P connector from the actuator.
- 3. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	1	3	6
UNLOCK			
LOCK			

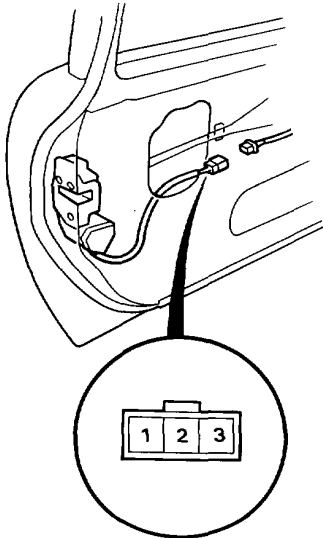


View from wire side

Door Lock Knob Switch Test (Except KY)

- 1. Remove the driver's door trim panel.
- 2. Disconnect the 3-P connector from the switch.
- 3. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	1	2	3
UNLOCK			
LOCK			

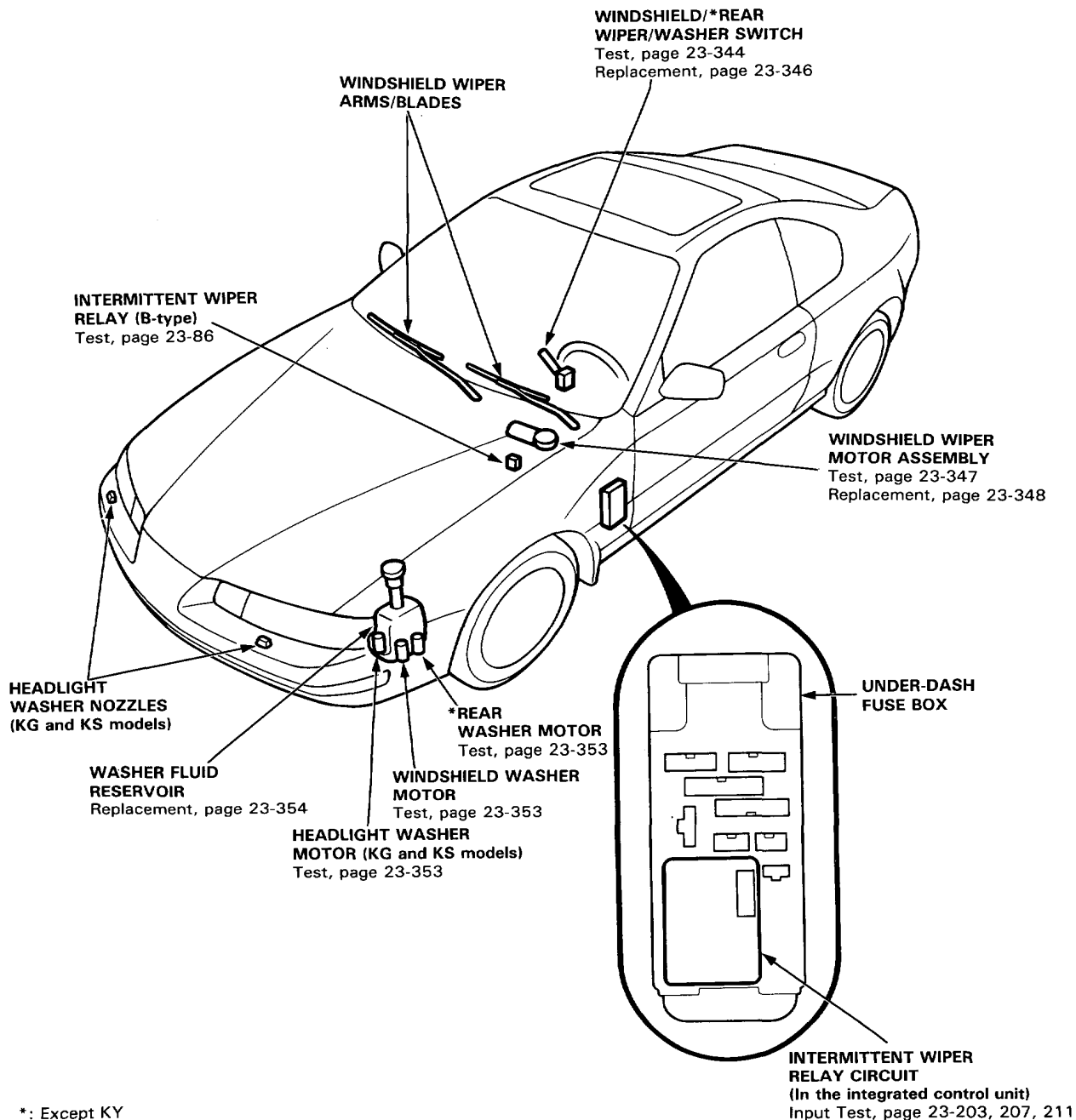


View from wire side



Wipers/Washers

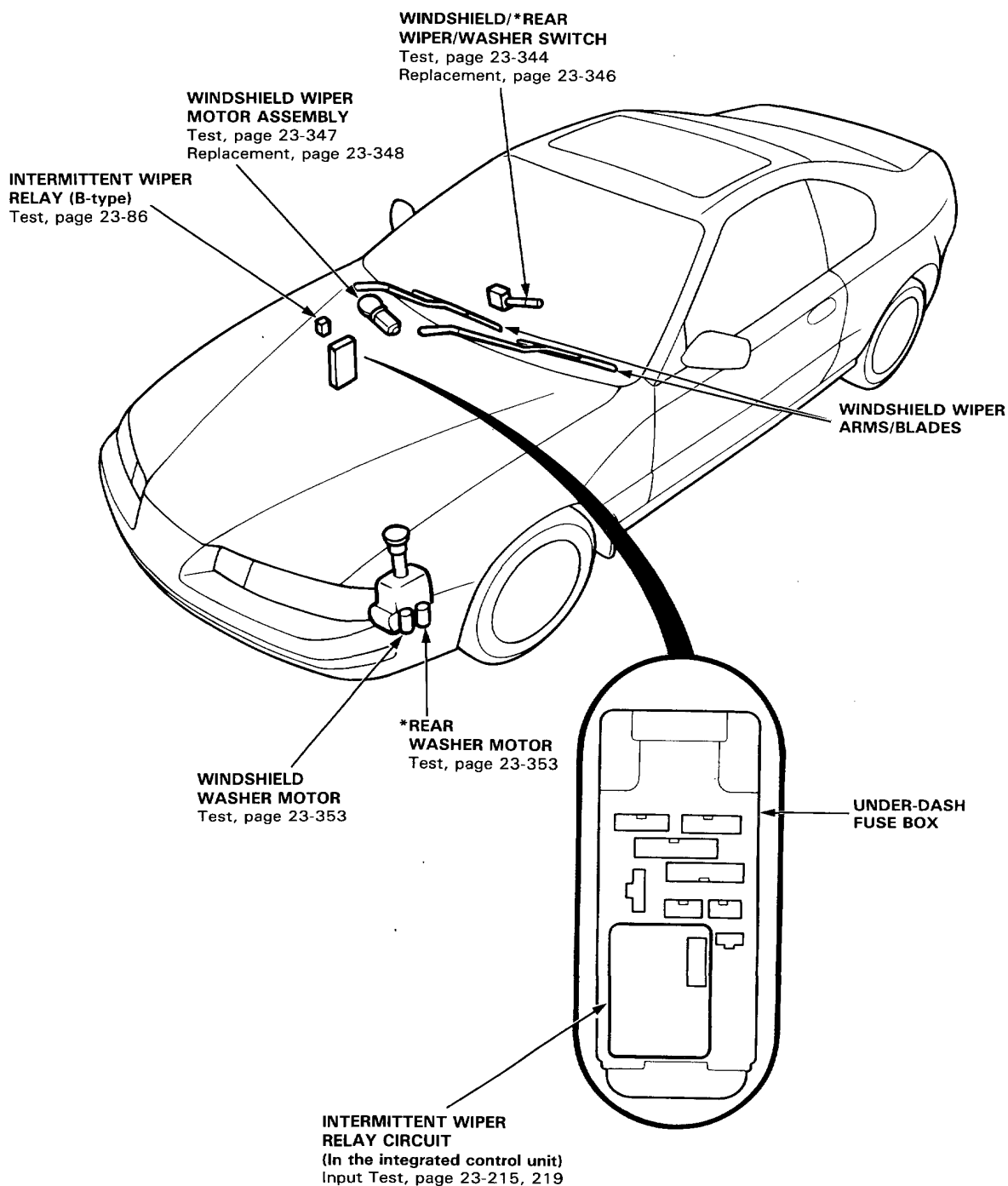
Component Location Index (LHD)



*: Except KY

Wipers/Washers

Component Location Index (RHD)

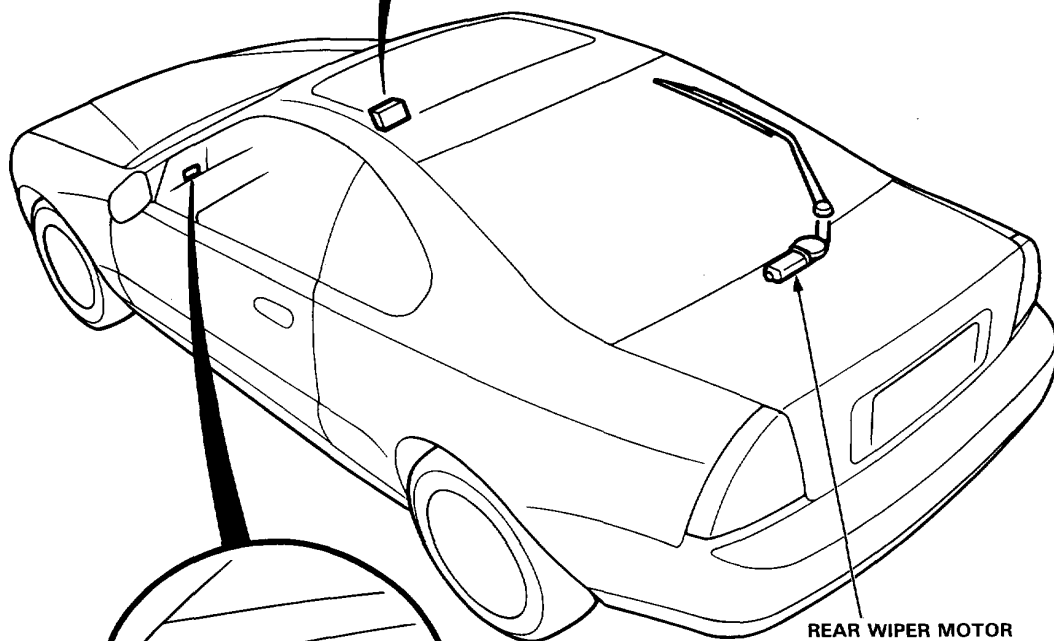
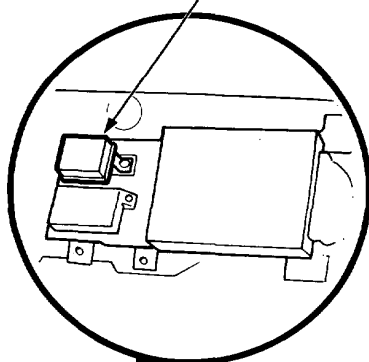


*: Except KQ

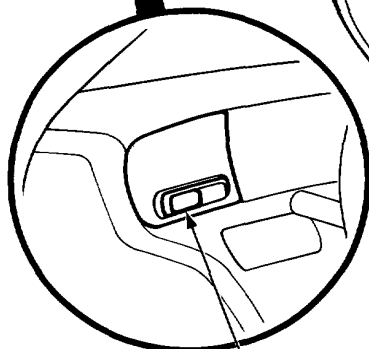


Component Location Index

**HEADLIGHT WASHER CONTROL
UNIT (KG and KS models)**
Input Test, page 23-352



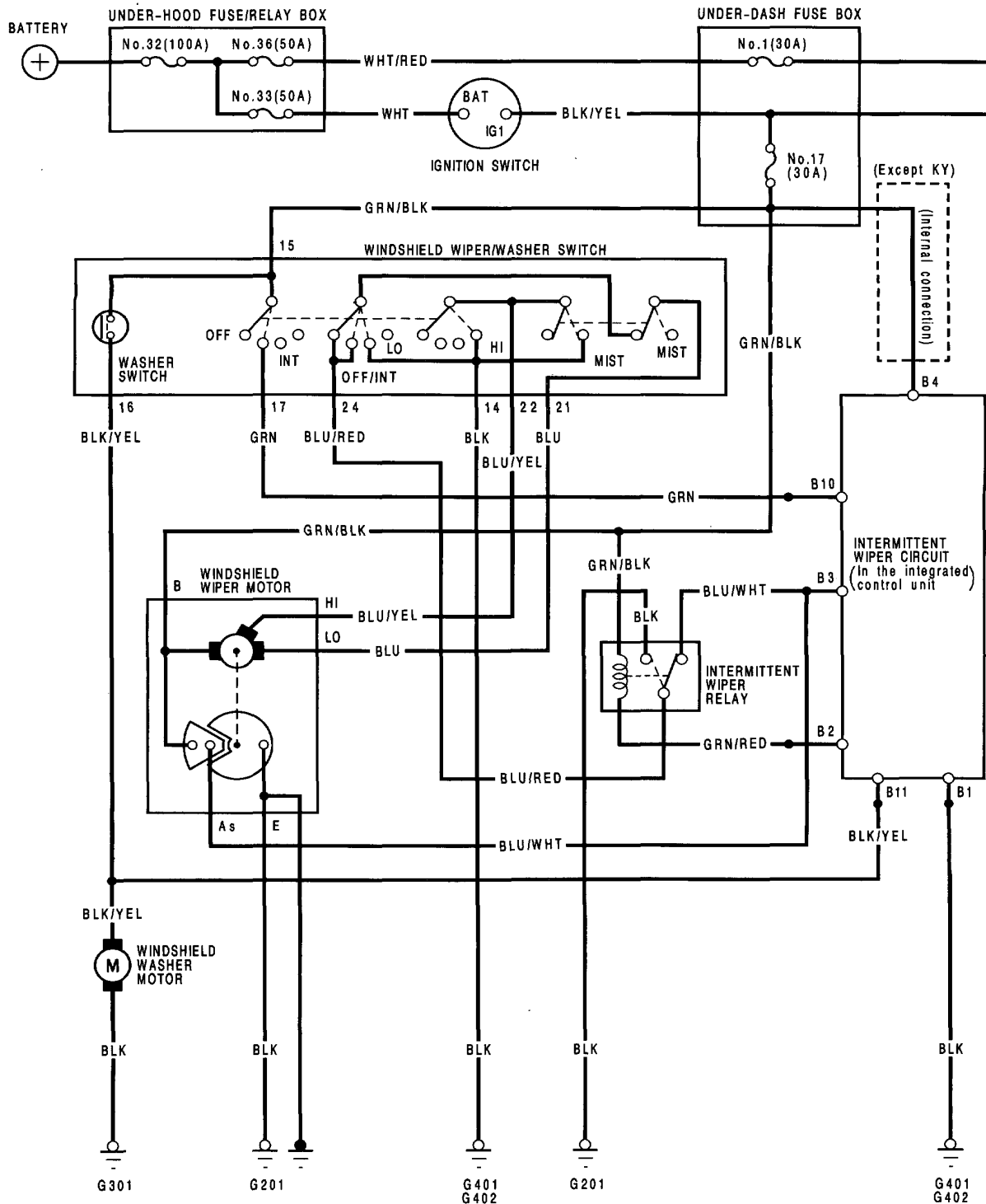
REAR WIPER MOTOR
(Except KQ, KY)
Test, page 23-349
Replacement, page 23-350

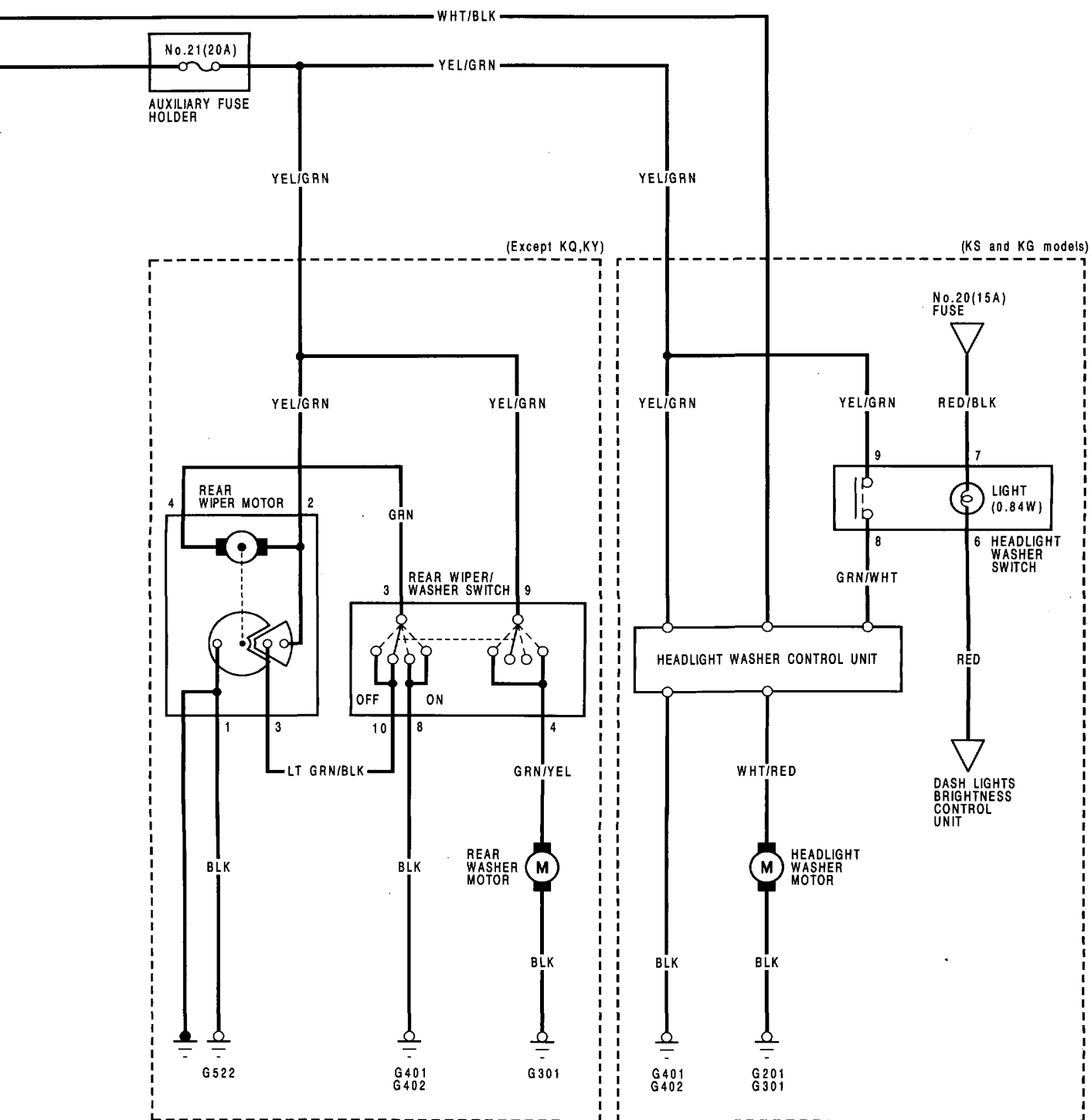


HEADLIGHT WASHER SWITCH
(KG and KS models)
Test, page 23-351
Replacement, page 23-351

Wipers/Washers

Circuit Diagram





Wipers/Washers

Troubleshooting (Windshield Wiper/Washer)

NOTE: The numbers in the table show the troubleshooting sequence.

Item to be inspected		Blown No. 17 (30 A) fuse (in the under-dash fuse box)	Wiper switch	Mist switch	Wiper motor assembly	Washer switch	Washer motor	Intermittent wiper relay	Combined operation of wiper/washer (in the integrated control unit)	Not enough washer fluid in reservoir	Disconnected or blocked washer hose or clogged outlet	Disconnected wiper linkage	Poor ground	Open circuit in wires, loose or disconnected terminals
Symptom														
Wipers do not work.	In all positions	1	4		2							3	G201 G301	GRN/BLK
	In INT		1					2						GRN or BLU/WHT
	In LO or HI		1		2								G401	BLU/YEL or BLU
	In MIST			1										GRN/BLK,
Blades do not return to park position when wipers are turned OFF.			2		1								G201 G301	BLU/WHT
Erratic intermittent cycle or wipers do not work operate intermittently.								1					G201 G301	GRN/BLK, GRN, BLU/WHT or GRN/RED
Little or no washer fluid is pumped.						4	3			1	2		G201 G301	BLK/YEL
Wiper and washer do not work at same time.									1					BLK/YEL



Troubleshooting (Headlight Washer and Rear Wiper/Washer)

NOTE: The numbers in the table show the troubleshooting sequence.

Symptom \ Item to be inspected		Blown No. 1 (30 A) fuse (In the Under-dash fuse box)	Blown No. 21 (20 A) fuse (On the auxiliary fuse holder)	Headlight washer control unit	Wiper switch	Washer switch	Wiper motor assembly	Washer motor	Insufficient washer fluid in reservoir	Disconnected blocked washer hose or clogged outlet	Disconnected wiper linkages	Poor ground	Open circuit in wires, loose or disconnected terminals
Wiper does not operate.			1		2		3				4	G401 G402 G521 G522	YEL/GRN, GRN LT GRN/BLK
Blades do not return to park position when wipers are turned OFF.					2		1					G521 G522	YEL/GRN, LT GRN/BLK
Little or no washer fluid is pumped.	Rear Washer		1			4		3	2	5		G201 G301	YEL/GRN GRN/YEL
	Headlight washer	1		5		4		3	2	6		G201 G301 G401 G402	YEL/GRN, WHT/BLK, GRN/WHT, WHT/RED
Wiper and washer do not work at same time.					1		2					G401 G402 G521 G522	YEL/GRN, GRN

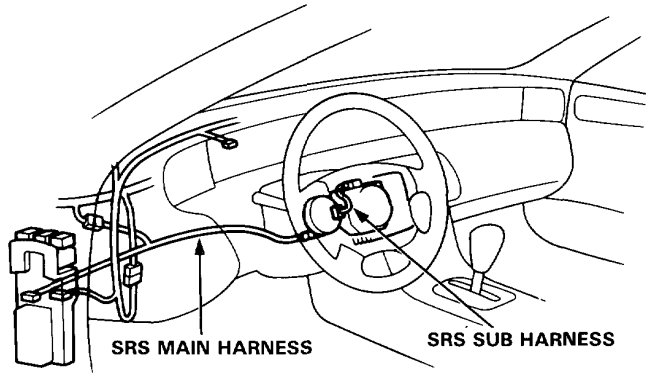
Wipers/Washers

Wiper/Washer Switch Test

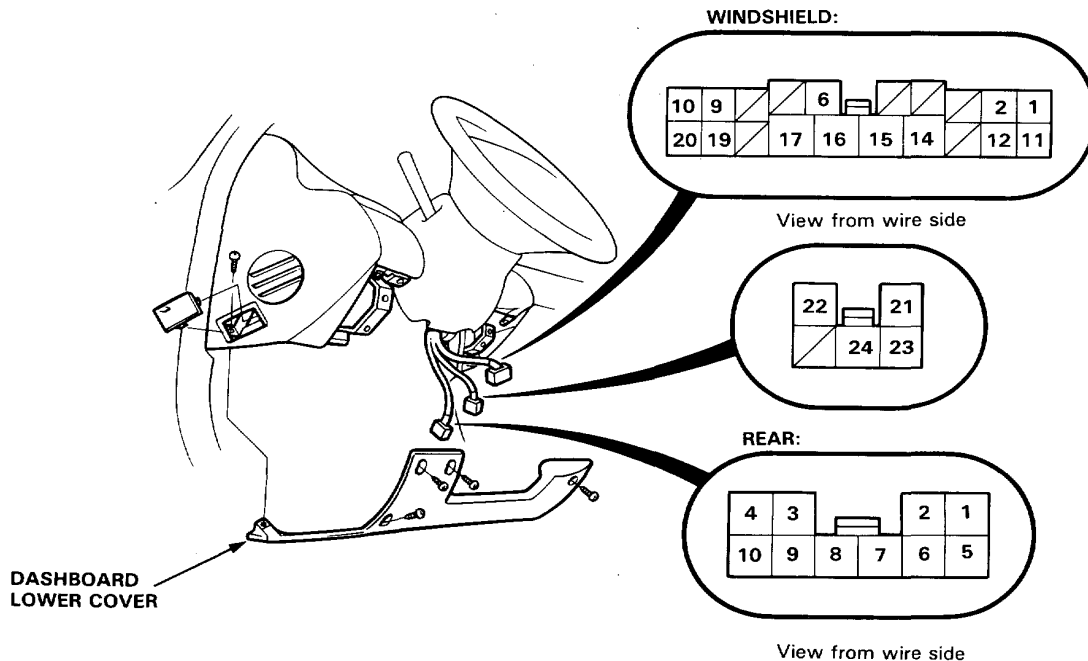
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

NOTE: LHD type is shown, RHD type is similar.

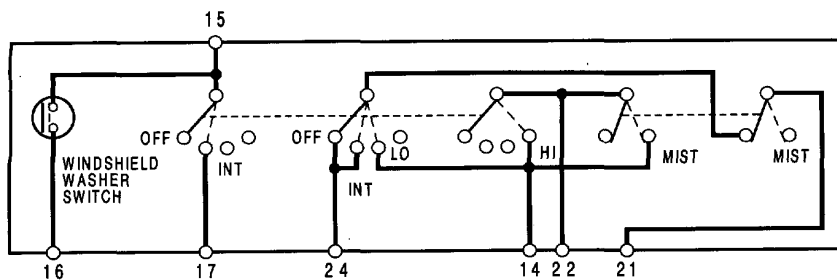


1. Remove the dashboard lower cover.
2. Disconnect the connectors from the main wire harness.
3. Check for continuity between the terminals in each switch position according to the table.
4. If there is no continuity, check for the harness between the main wire harness and the switch assembly.

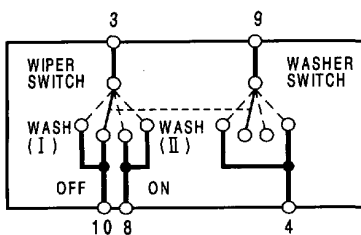




Windshield Wiper/Washer Switch



Rear Wiper/Washer Switch



Windshield Wiper/Washer Switch

Terminal	14	15	16	17	21	22	24
Position							
OFF							
INT							
LO							
HI							
Mist switch "ON"							
Washer switch "ON"							

Rear Wiper/Washer Switch

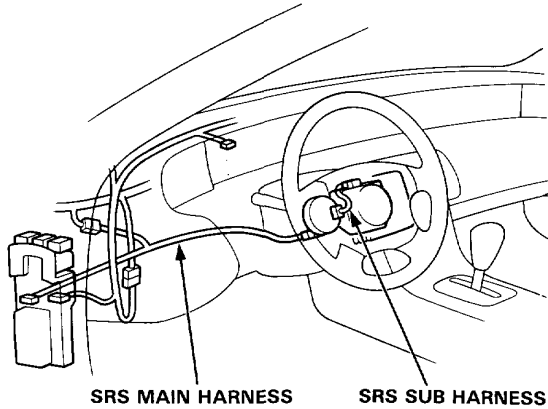
Terminal	3	4	8	9	10
Position					
Wiper switch "OFF"					
Wiper switch "ON"					
Washer switch "ON" (I)					
Washer switch "ON" (II)					

Wipers/Washers

Wiper/Washer Switch Replacement

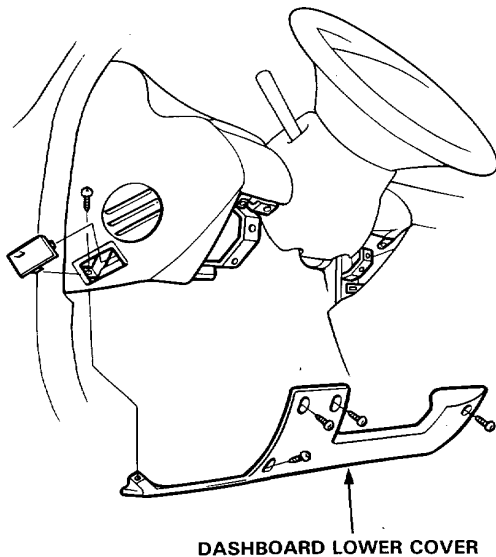
CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

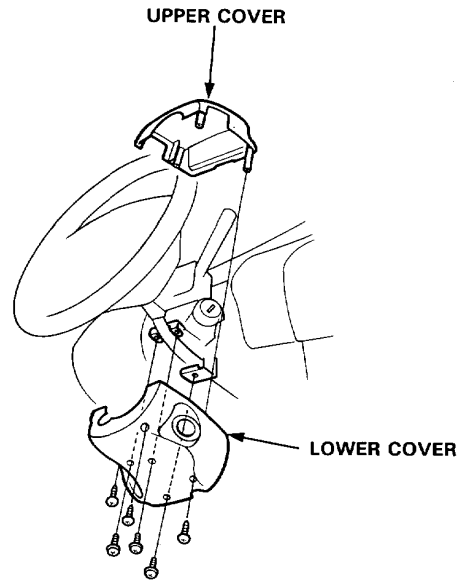


NOTE: LHD type is shown, RHD type is similar.

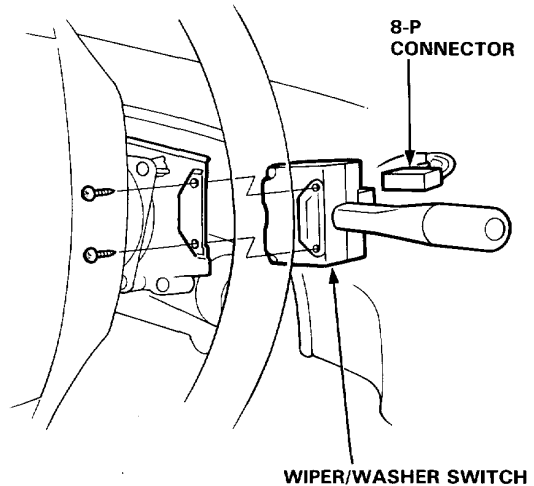
1. Remove the dashboard lower cover.



2. Remove the steering column covers.



3. Disconnect the 8-P connector, then remove the wiper/washer switch.



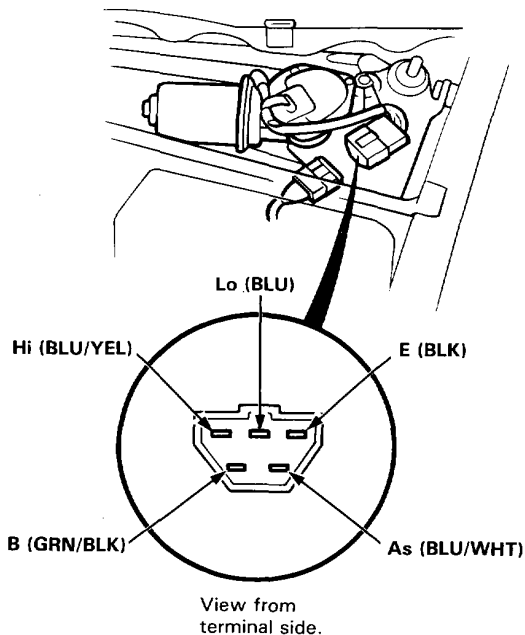


Windshield Wiper Motor Test

1. Open the hood and remove the cap nuts and the wiper arms.
NOTE: Be careful not to damage the hood when removing the wiper arms.

2. Disconnect the 5-P connector from the wiper motor assembly.

NOTE: LHD type is shown, RHD type is symmetrical.

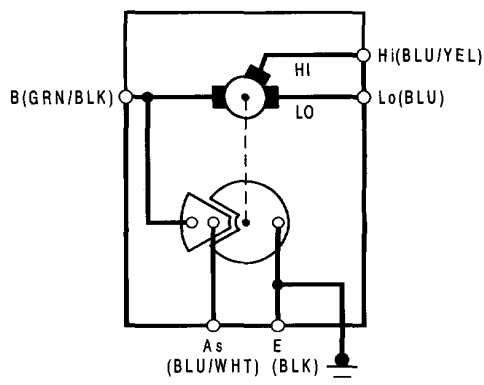


3. Test motor operation:

LOW SPEED: Connect battery power to the B (GRN/BLK) terminal and ground to the Lo (BLU) terminal.

HIGH SPEED: Connect battery power to the B (GRN/BLK) terminal and ground to the Hi (BLU/YEL) terminal.

4. If the motor does not run, or fails to run smoothly, replace it.



5. Reconnect the 5-P connector to the wiper motor assembly.
6. Connect an analog voltmeter between the As (BLU/WHT) and the E (BLK) terminals. Run the motor by turning the wiper switch ON (Lo or Hi position).
The voltmeter should alternately indicate 0 V and more than 4 V.

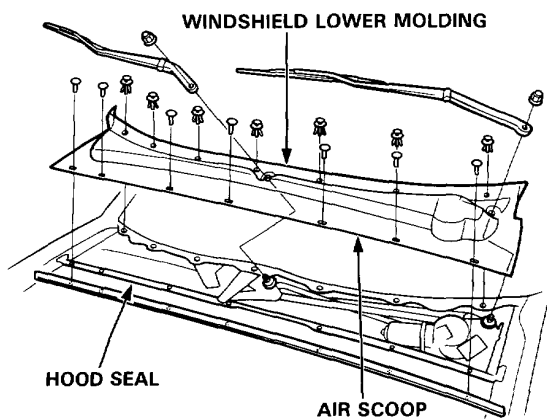
Wipers/Washers

Windshield Wiper Motor Replacement

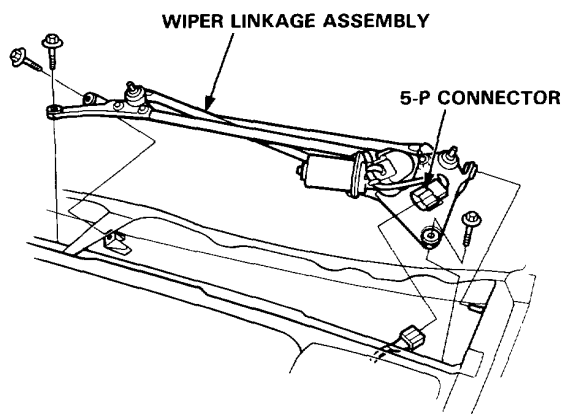
1. Open the hood and remove the cap nuts and the wiper arms.
2. Remove the windshield lower molding, hood seal and air scoop by prying out the trim clips and removing the screws.

NOTE:

- LHD type is shown, RHD type is symmetrical.
- Carefully remove the wiper arms so that they will not damage the hood.

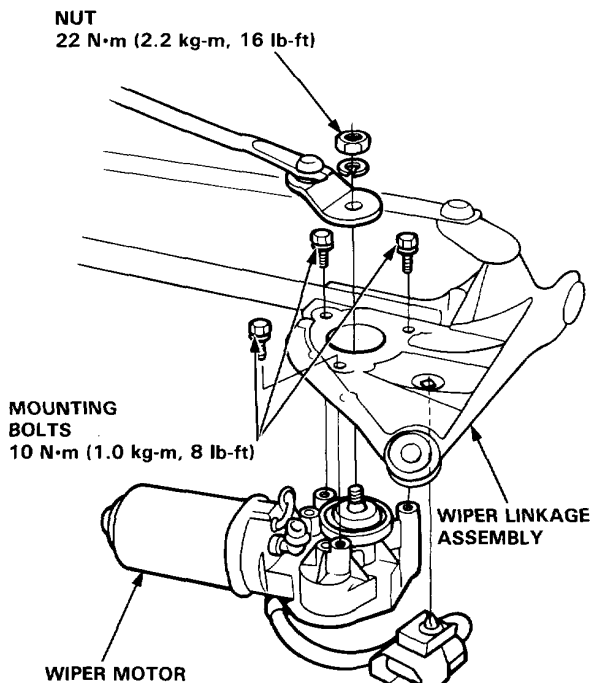


3. Disconnect the 5-P connector from the wiper motor, then remove the wiper harness from the wiper linkage.



4. Remove the wiper linkage assembly by removing the three mounting bolts.

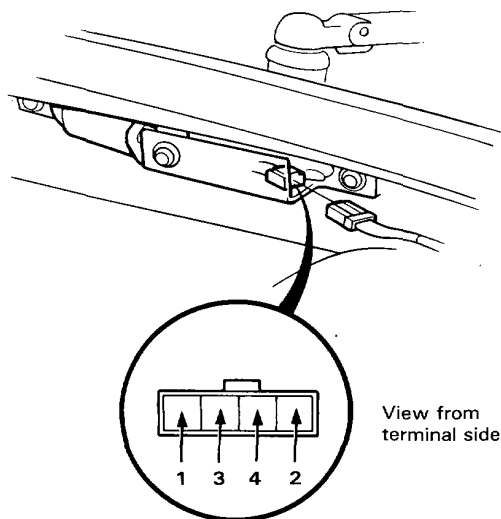
5. Remove the three mounting bolts and a nut from the wiper linkage to remove the wiper motor.





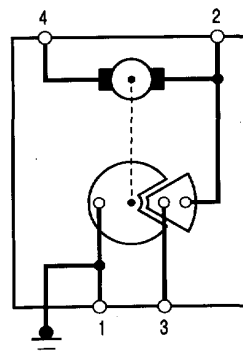
Rear Wiper Motor Test (Except KQ, KY)

1. Open the trunk lid and disconnect the 4-P connector.
2. Test motor operation by connecting battery power to the No. 2 terminal and ground to the No. 4 terminal.



3. If the motor fails to run smoothly, replace it.

4. Reconnect the 4-P connector to the rear wiper motor assembly.
5. Connect an analog voltmeter between the No. 3 terminal and the No. 1 terminal. Run the motor by turning the wiper switch ON.

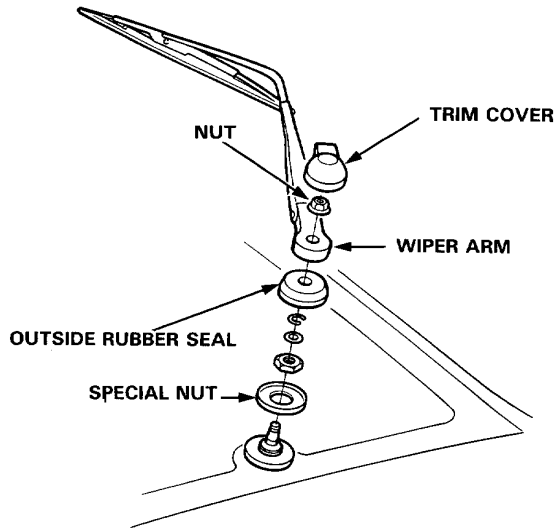


6. The voltmeter should alternately indicate 0 V and more than 4 V.

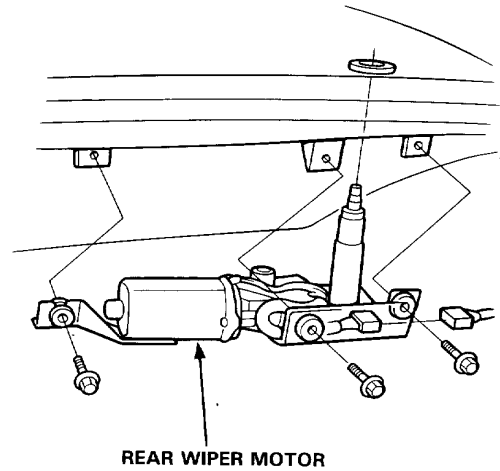
Wipers/Washers

Rear Wiper Motor Replacement (Except KQ, KY)

1. Open the trunk lid and disconnect the 4-P connector.
2. Remove the trim cover, nut, and rear wiper arm.
3. Remove the outside rubber seal, special nut, and washer.



4. While holding the wiper motor with one hand, remove its three mounting bolts with the other.



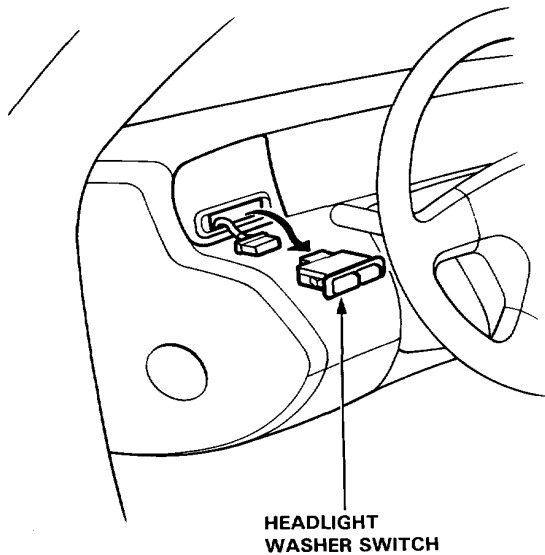
5. Install in the reverse order of removal.



Headlight Washer Switch Test/Replacement (KG and KS models)

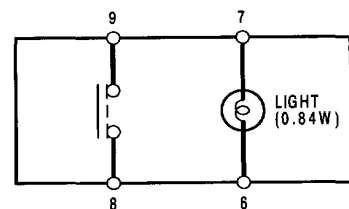
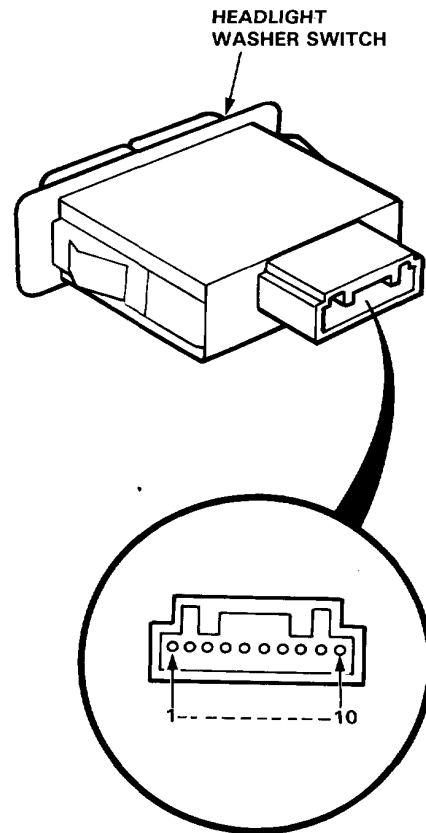
NOTE: Be careful not to damage the tweeter cover when prying the switch out.

1. Pry the switch out from the driver's side tweeter cover, then disconnect the connector.



2. Check for continuity between the terminals according to the table.

Terminal Position	6		7	8	9
OFF	○	○	○		
ON	○	○	○	○	○



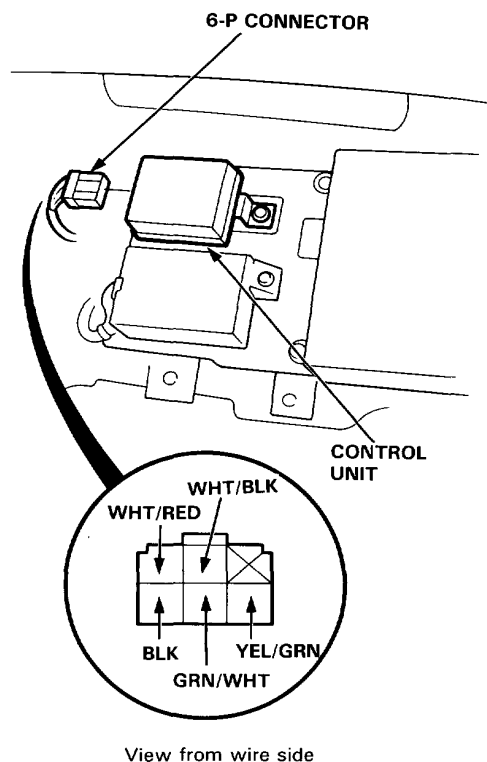
Wipers/Washers

Headlight Washer Control Unit Input Test (KG and KS models)

1. Disconnect the 6-P connector from the control unit.

Inspect the connector terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector terminals.
 - If a test indicates a problem, find and correct the cause, then recheck the system.
 - If all the input tests prove OK, the control unit must be faulty; replace it.



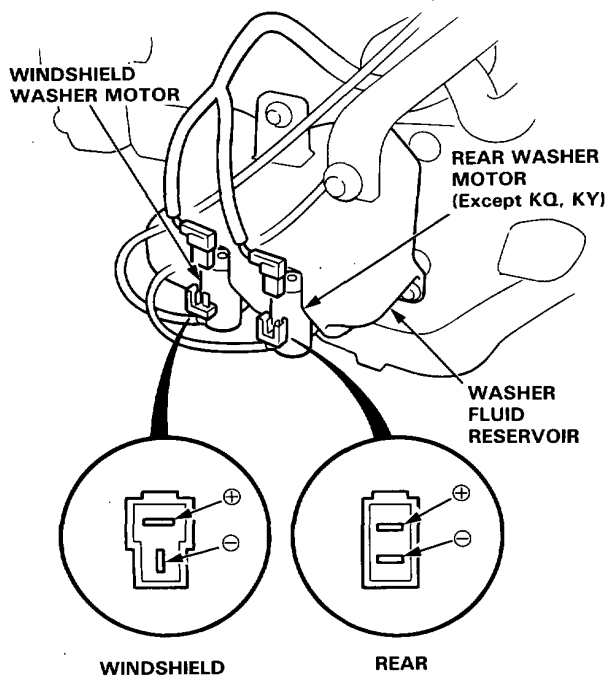
No.	Wire	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G201, G301, G401, G402). • An open in the wire.
2	WHT/BLK	Under all conditions.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 1 (30 A) fuse. • An open in the wire.
3	YEL/GRN	Ignition switch and headlight washer switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 21 (20 A) fuse. • An open in the wire.
4	GRN/WHT			
5	WHT/RED	Connect the WHT/BLK terminal to the WHT/RED terminal with jumper wire.	Check washer motor operation: Washer motor should work.	<ul style="list-style-type: none"> • Faulty headlight washer motor. • Poor ground (G201, G301). • An open in the wire.



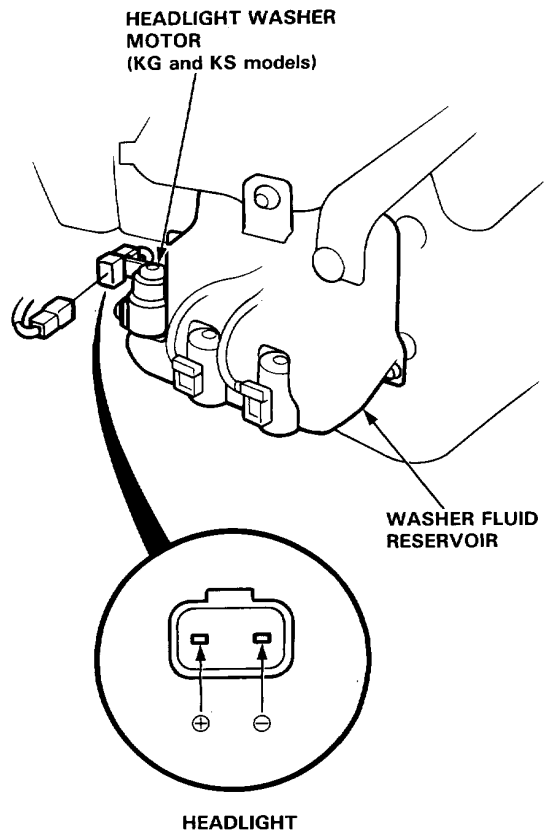
Washer Motor Test

1. Remove the left inner fender.
2. Disconnect the 2-P connector from the washer motor.
3. Test the washer motor by connecting battery power to the \oplus terminal and grounding the \ominus terminal.
 - If the motor fails to run smoothly, replace it.
 - If the motor runs smoothly, but little or no washer fluid is pumped, check for a disconnected, blocked washer hose, or a clogged pump outlet in the motor.

Except KG, KS:



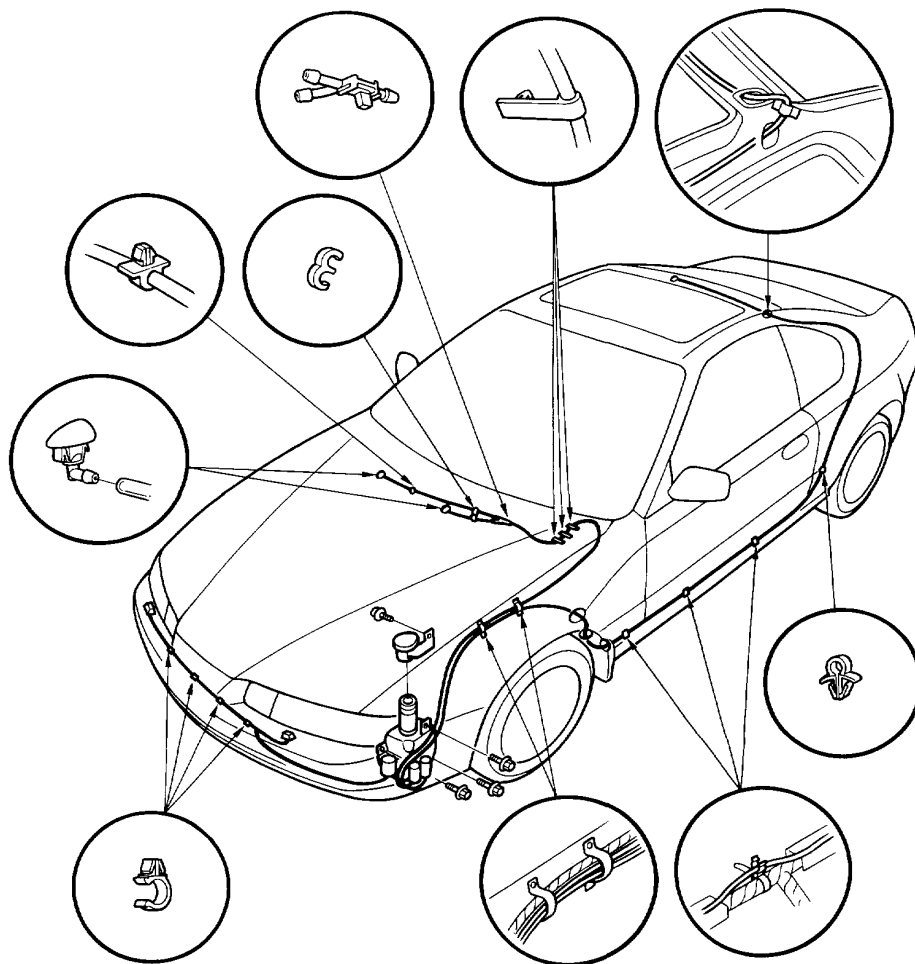
KG and KS models:



Wipers/Washers

Washer Replacement

1. Remove the washer filler neck.
2. Remove the inner fender.
3. Disconnect the hose and the 2-P connector from the each washer motor.
4. Remove the three mounting bolts and pull out the washer reservoir.
5. Remove the washer motor from the reservoir.
6. Remove the washer nozzles and washer hose.
7. During washer system installation, take care not to pinch and hoses. Install the hose clips firmly.
8. After installing, check and adjust the aim of the washer nozzles.





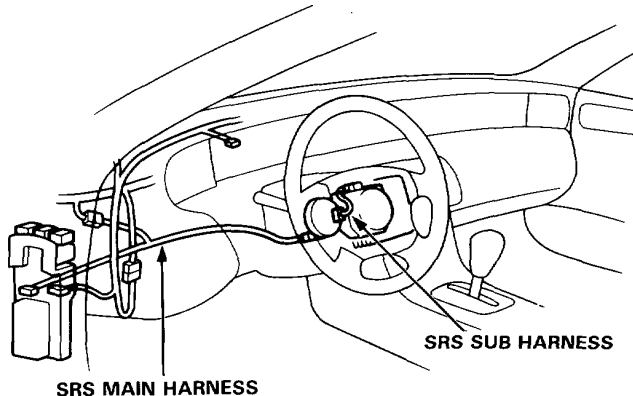
Cruise Control

Component Location Index

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

NOTE: LHD type is shown, RHD type is similar.



CRUISE CONTROL MAIN SWITCH

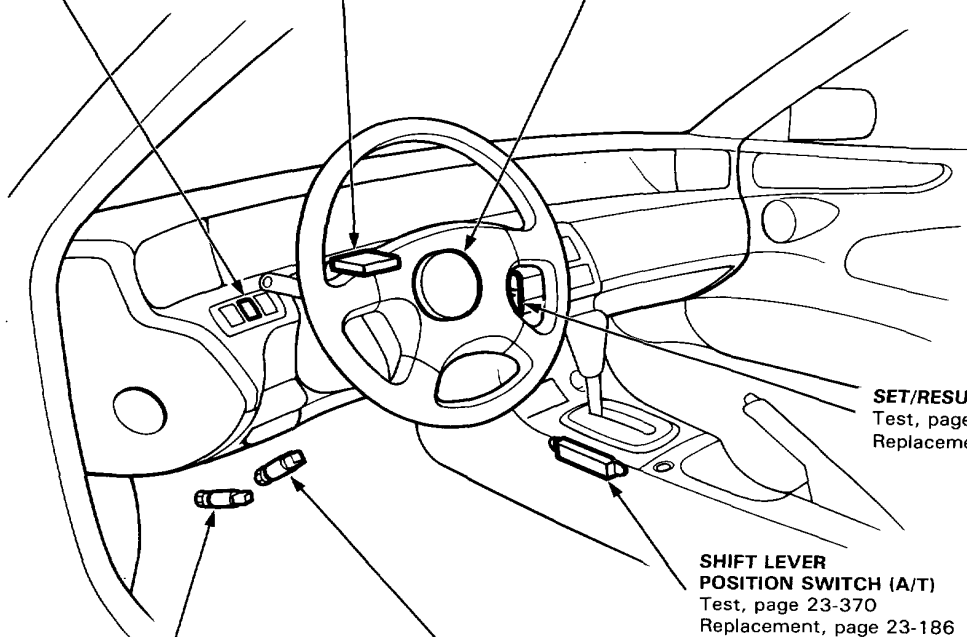
Removal, page 23-362
Test, page 23-362

CONTROL UNIT

Input Test, page 23-360

SLIP RING

Test, page 23-368, 369
Replacement, page 23-368, 369



SET/RESUME SWITCH

Test, page 23-363
Replacement, page 23-367

SHIFT LEVER POSITION SWITCH (A/T)

Test, page 23-370
Replacement, page 23-186

BRAKE LIGHT SWITCH

Test, page 23-371
Pedal Height Adjustment, section 19

CLUTCH SWITCH (M/T)

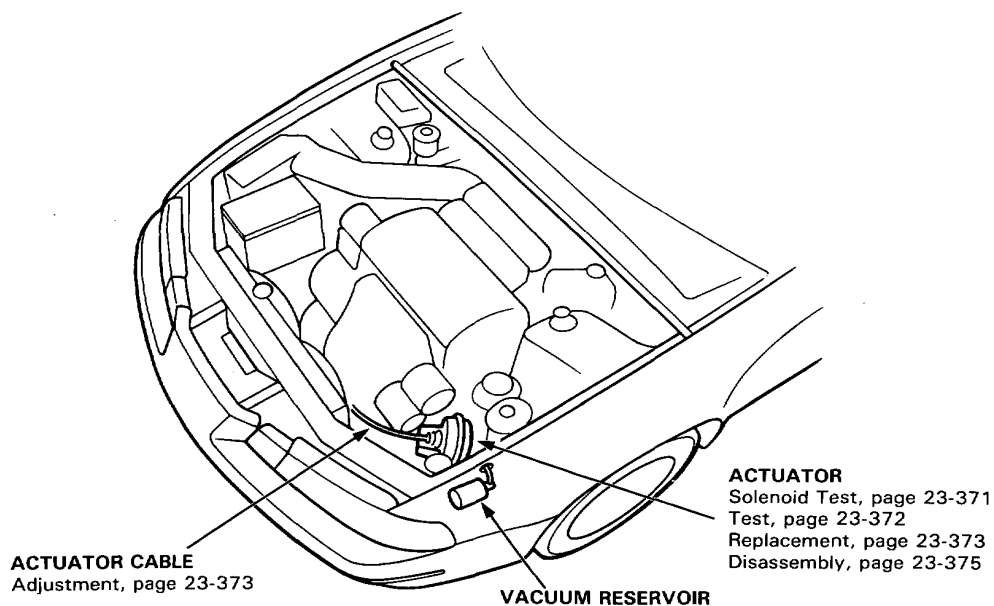
Test, page 23-370
Pedal Height Adjustment, section 12

(cont'd)

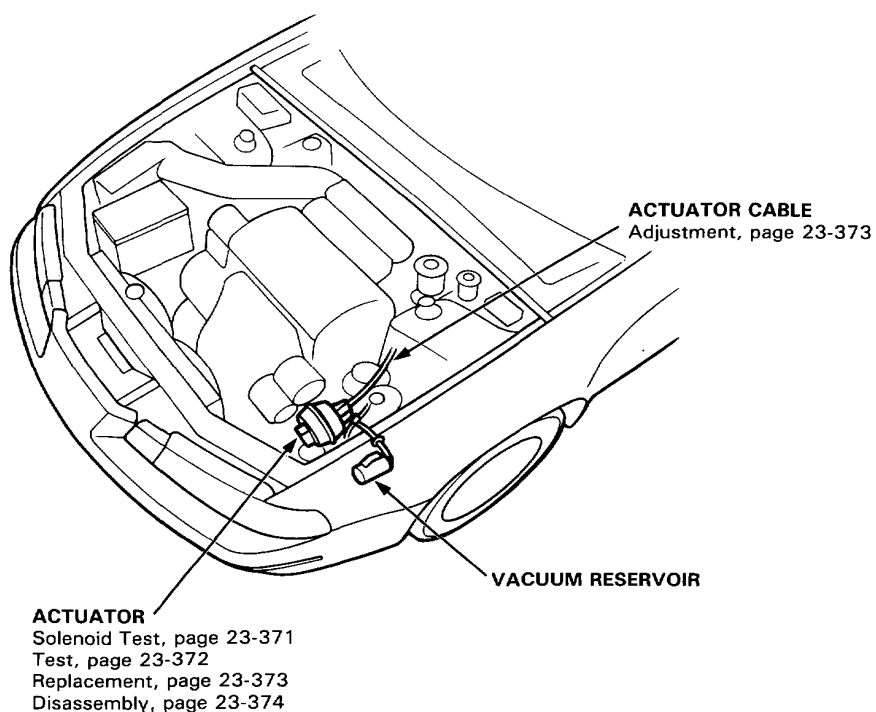
Cruise Control

Component Location Index (cont'd)

RHD type:

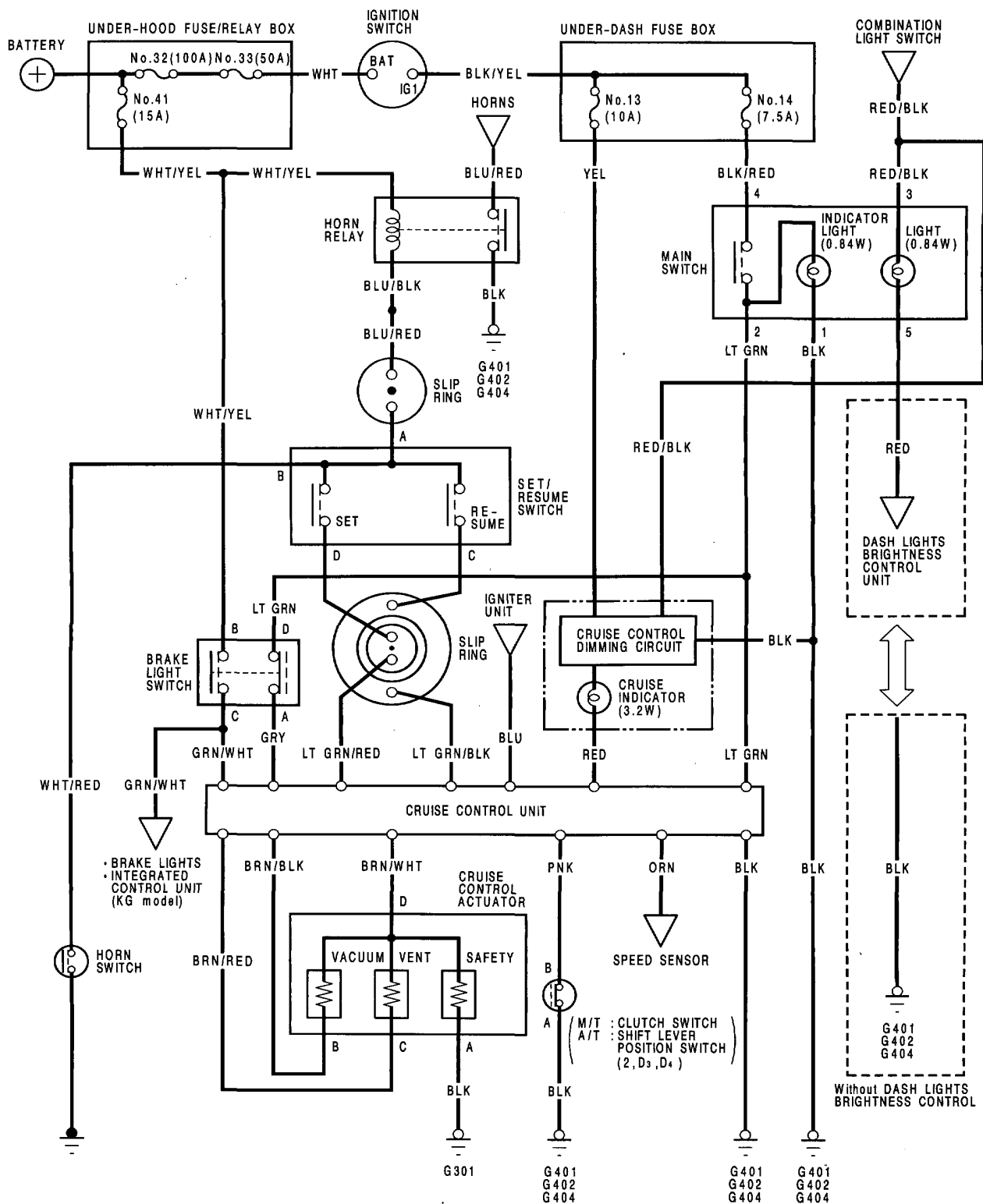


LHD type:



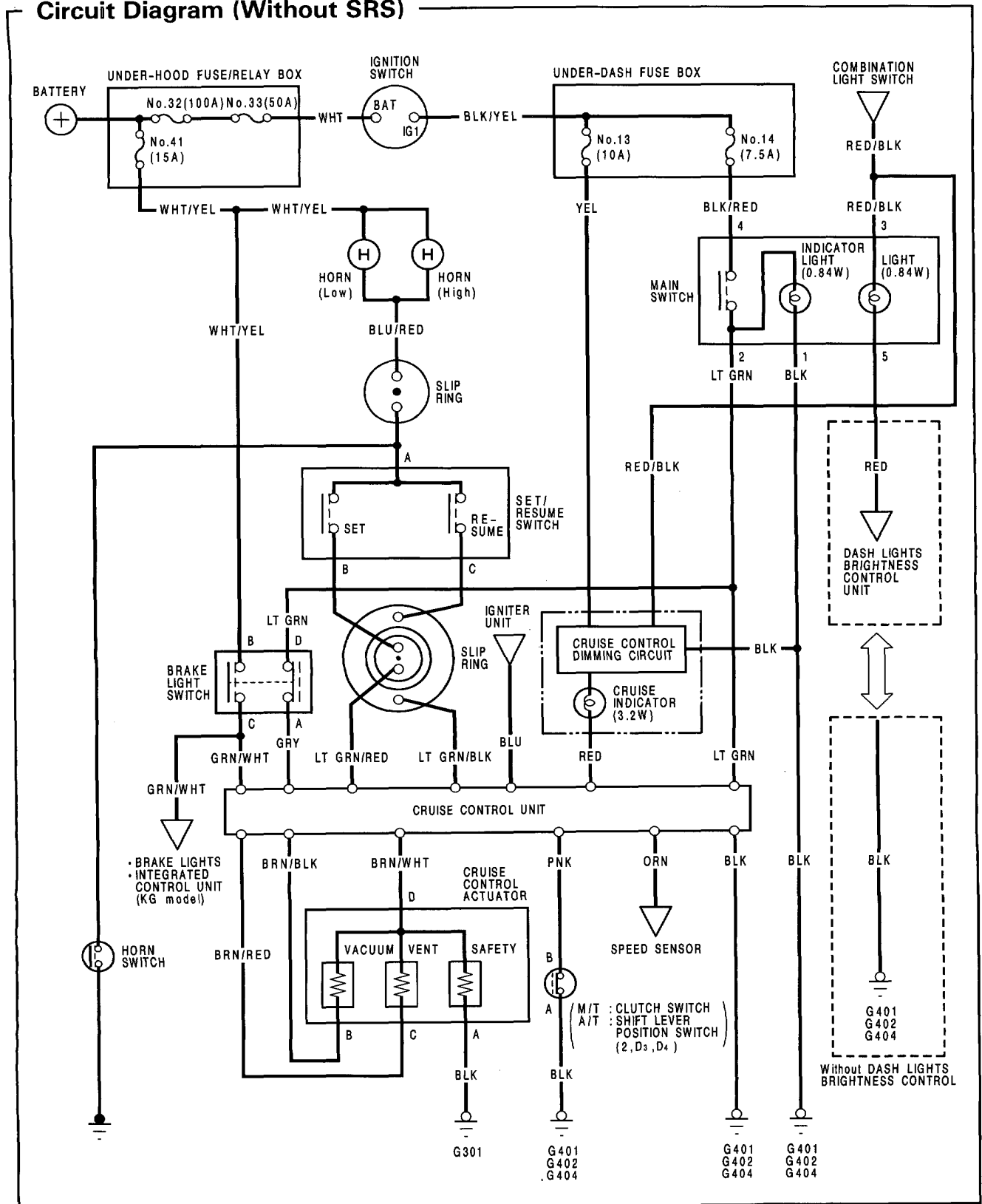


Circuit Diagram (With SRS)



Cruise Control

Circuit Diagram (Without SRS)





Troubleshooting

NOTE:

- The numbers in the table show the troubleshooting sequence.
- Before troubleshooting.
 - Check the No. 13 (10 A), No. 14 (7.5 A) fuse in the under-dash fuse box, and the No. 41 (15 A) fuse in the under-hood fuse/relay box.
 - Check that the horns sound.
 - Check the tachometer for proper operation.

Items to be inspected. Symptom	Main switch	SET/RESUME switch	Brake light switch/adjustment	Clutch switch/adjustment (M/T)	Shift lever position switch (A/T)	Dimming circuit in gauges	Actuator and cable free play	Disconnected, clogged or restricted vacuum lines/stuck check valve/leaky vacuum reservoir	Control unit input	Poor ground	Open circuit in wires, loose or disconnected terminals
Cruise control can not be set.	1	2							3	G401 G402 G404	BLK/RED or LT GRN
Cruise control can be set, but indicator light does not go on.						1					YEL or RED
Cruise speed noticeably higher or lower than what was set.							1		2		
Excessive overshooting and/or undershooting when trying to set speed.							1		2		
Steady speed not held, even on a flat road with cruise control set.							1	2	3		
Car does not decelerate or accelerate accordingly when SET or RESUME button is pushed.		1							2		
Set speed not cancelled when clutch pedal is pushed (M/T).				1					2		
Set speed not cancelled when shift lever is moved to 1 (A/T).					1				2		
Set speed not cancelled when brake pedal is pushed.			1						2		
Set speed not cancelled when main switch is pushed OFF.	1								2		
Set speed not resumed when RESUME button is pushed (with main switch on, but set speed temporarily cancelled).		1							2		

Cruise Control

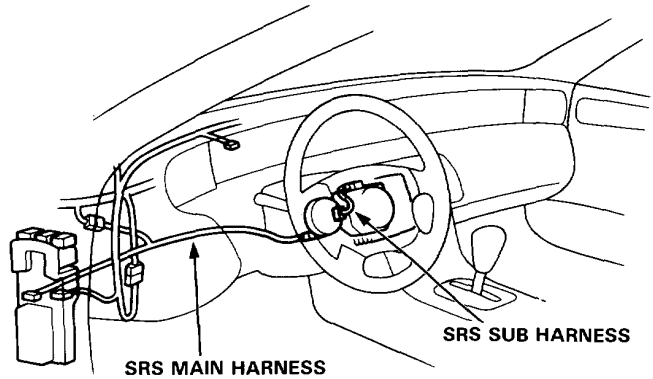
Control Unit Input Test

CAUTION:

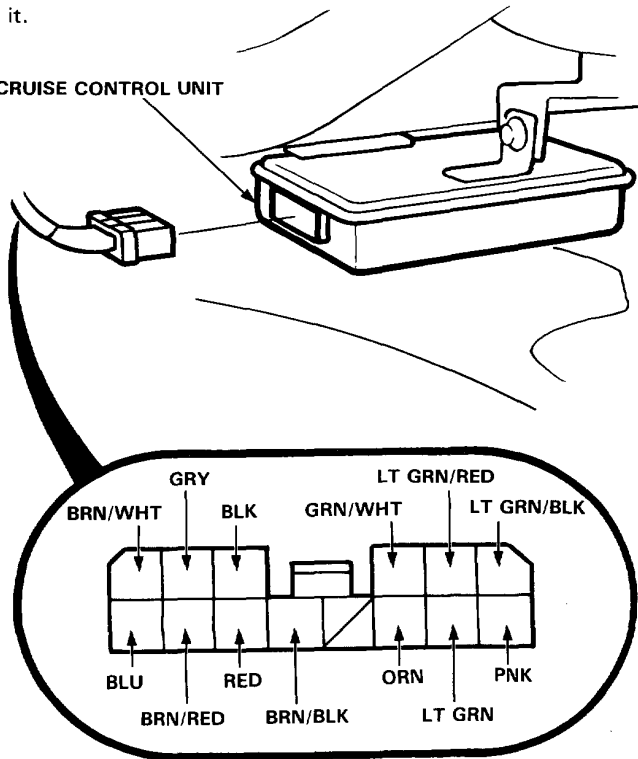
- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.

1. Disconnect the 14-P connector from the control unit.
2. Inspect the connector and terminals to be sure they are all making good contact.

- If the terminals are bent, loose, or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector terminals.
 - If a test indicates a problem, find and correct the cause, then recheck the system.
 - If all the input tests prove OK, the control unit must be faulty; replace it.



CRUISE CONTROL UNIT



View from wire side

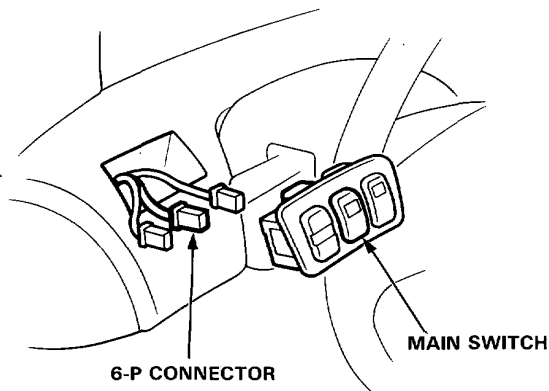


No.	Wire	Test condition	Test: Desired result	Possible cause (If result is not obtained)
1	BLK	Under all conditions.	Check for continuity to ground: There should be continuity.	<ul style="list-style-type: none"> • Poor ground (G401, G402, G403). • An open circuit in the wire.
2	LT GRN	Ignition switch ON and main switch ON.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Blown No. 14 (7.5 A) fuse. • Faulty main switch. • An open circuit in the LT GRN or BLK/RED wire.
3	LT GRN/ BLK	RESUME button pushed.	Ground each terminal: Horns should sound as the switch is pushed.	<ul style="list-style-type: none"> • Blown No. 41 (15 A) fuse. • Faulty SET/RESUME switch. • Faulty slip ring. • An open circuit in the WHT/YEL, BLU/RED, LT GRN/BLK or LT GRN/RED wire.
4	LT GRN/ RED	SET button pushed.		
5	PNK	M/T: Clutch pedal pushed. A/T: Shift lever in 2, D ₃ , or D ₄ .	Check for continuity to ground: There should be continuity. NOTE: There should be no continuity when the clutch pedal is released or when the A/T shift lever is in other posi- tions.	<ul style="list-style-type: none"> • Faulty or misadjusted clutch switch (M/T). • Faulty shift position sensor (A/T). • Poor ground (G401, G402, G404). • An open circuit in the wire.
6	BLU	Start the engine.	Check for voltage to ground: There should be battery voltage.	<ul style="list-style-type: none"> • Faulty ignition system. • An open circuit in the wire.
7	ORN	Ignition switch ON and main switch ON. Raise the front of the car, rotate one wheel slowly.	Check for voltage between the ORN \oplus and BLK \ominus terminals: It should be 0–5–0–5 V repeatedly.	<ul style="list-style-type: none"> • Faulty speed sensor. • An open circuit in the wire. • Short to ground.
8	GRY	Ignition switch ON, main switch ON and brake pedal pushed, then released.	Check for voltage to ground: There should be 0 V with the pedal pushed, and battery voltage with the pedal released.	<ul style="list-style-type: none"> • Faulty brake light switch. • An open circuit in the GRY or LT GRN wire.
9	GRN/WHT	Brake pedal pushed, then released.	Check for voltage to ground: There should be battery voltage with the pedal pushed, and 0 V with the pedal released.	<ul style="list-style-type: none"> • Faulty brake light switch. • An open circuit in the wire.
10	RED	Ignition switch ON.	Connect to ground: Cruise in- dicator in the gauge assembly comes on.	<ul style="list-style-type: none"> • Blown bulb. • Blown No. 13 (10 A) fuse. • Faulty dimming circuit in the gauge assembly. • An open circuit in the wire.
11	BRN/RED	Under all conditions.	Check for resistance to ground: There should be 80–120 Ω .	<ul style="list-style-type: none"> • Faulty actuator solenoid. • Open or short in the wire.
12	BRN/BLK	Under all conditions.	Check for resistance to ground: There should be 70–110 Ω .	
13	BRN/WHT	Under all conditions.	Check for resistance to ground: There should be 40–60 Ω .	

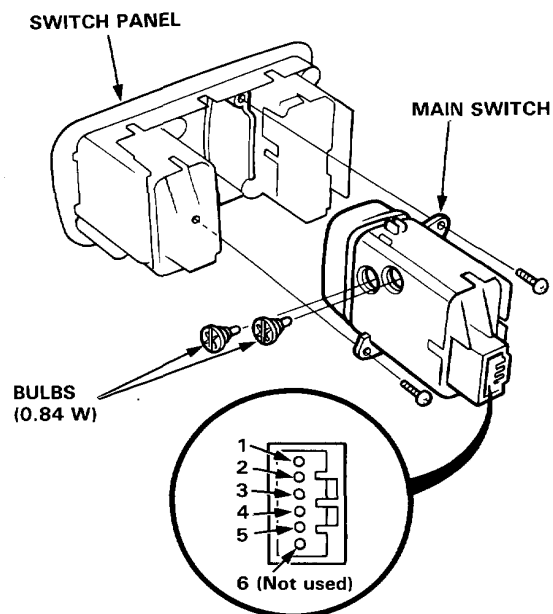
Cruise Control

Main Switch Test/Replacement

1. Carefully pry the switches out of the instrument panel and disconnect their connectors.

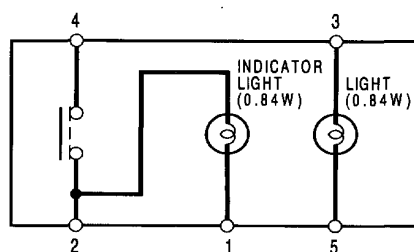


2. Remove the cruise control main switch from the switch panel.



3. Check for continuity between the terminals in each switch position according to the table.

Terminal	1	2	4	3	5
Position					
OFF	○	○	○	○	○
ON	○	○	○	○	○



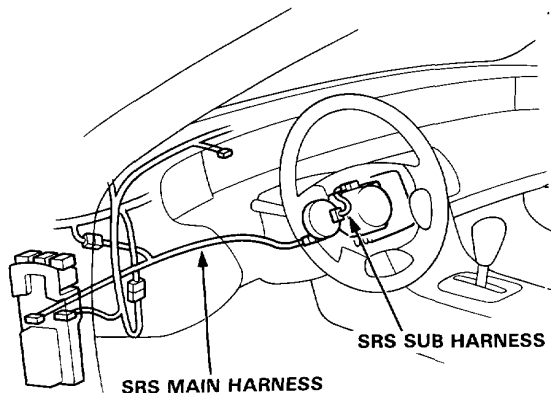
- If there is no continuity, replace the switch.



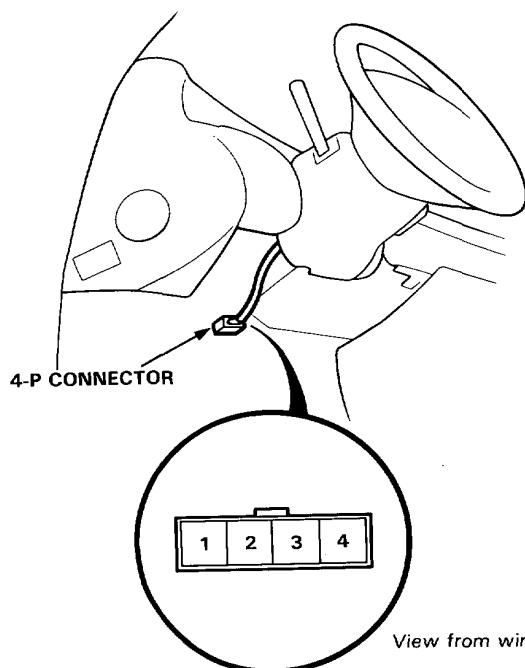
SET/RESUME Switch Test (With SRS)

CAUTION:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



1. Remove the dashboard lower cover (see page 23-82).
2. Disconnect the 4-P connector from the SRS main harness.



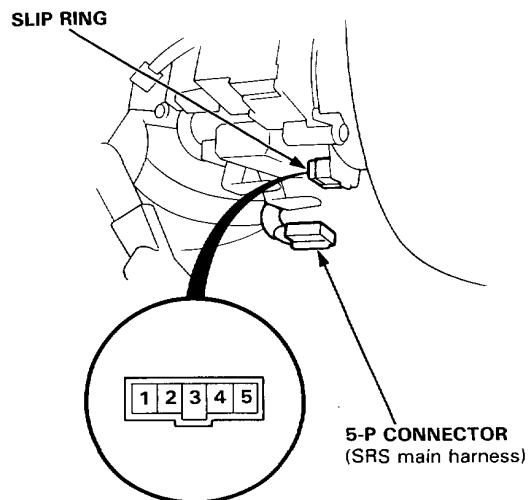
3. Check for continuity between the terminals in each switch position according to the table.

Terminal	1	2	3	4
Position				
SET(ON)		○	○	
RESUME(ON)	○		○	

- If there is continuity, the switch is OK.
- If there is no continuity in any position, go to step 4.

4. Remove the column lower cover, and then disconnect the 5-P connector from the slip ring.

NOTE: See page 23-384 before removing the connector for locked with the connector lock pin.



(cont'd)

Cruise Control

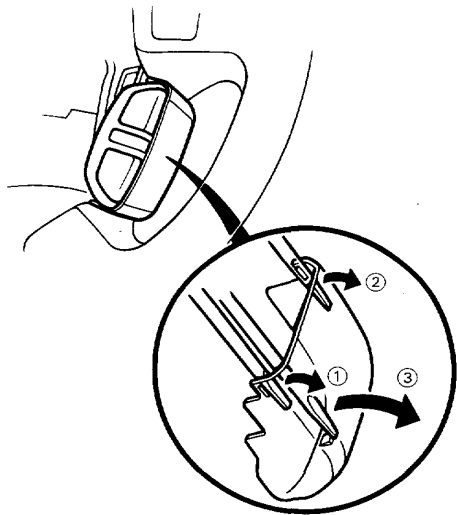
SET/RESUME Switch Test (With SRS cont'd)

5. Check for continuity between the terminals in each switch position at the slip ring side according to the table.

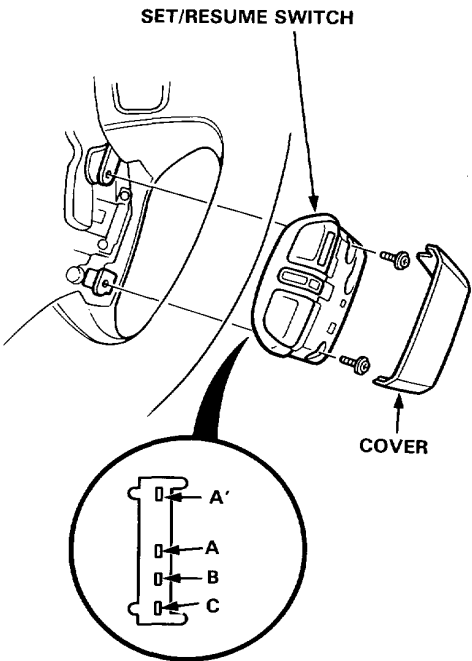
Terminal	1	2	3	4	5
Position					
SET(ON)			○	○	
RESUME(ON)			○		○

- If there is continuity, an open in the SRS main harness.
- If there is no continuity in any position, go to step 6.

6. Remove the cover by carefully prying between the cover and the switch in the sequence shown.



7. Check for continuity between the terminals in each switch position according to the table.



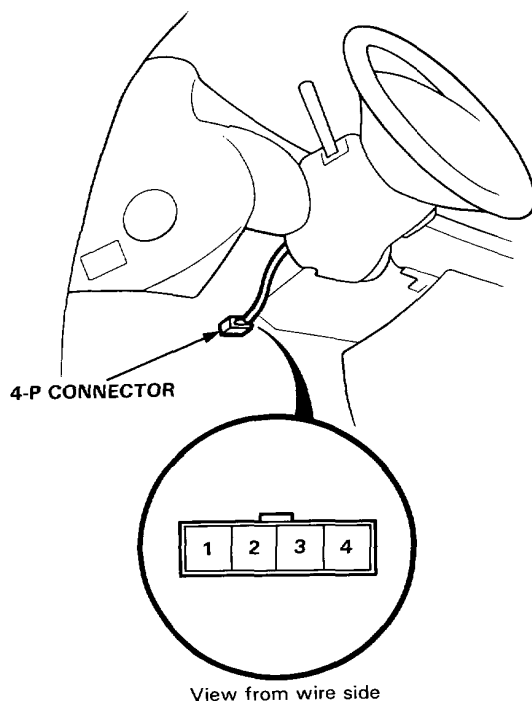
Terminal	A'	A	B	C
Position				
SET(ON)	○	○		○
RESUME(ON)	○	○	○	

- If there is continuity, check for:
 - Faulty slip ring (see page 23-368).
 - A bent, loose or corroded terminal, or an open in the SRS sub harness.
- If there is no continuity in any position, replace the switch.



Set/Resume Switch Test (Without SRS)

1. Remove the dashboard lower cover (see page 23-82).
2. Disconnect the combination light switch 4-P connector from the main wire harness.

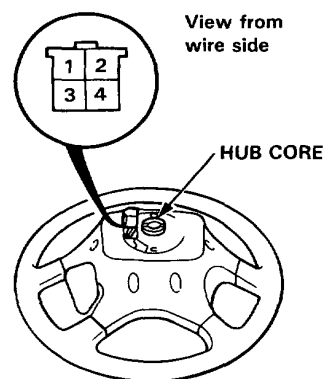


3. Check for continuity between the terminals in each switch position according to the table.

Terminal	1	2	3	4
Position				
SET(ON)		○ — ○		
RESUME(ON)	○ —		○	

- If there is continuity, the switch is OK.
- If there is no continuity in any position, go to step 4.

4. Remove the steering wheel, then turn it over.



5. Check for continuity between the terminals in each switch position at the slip ring side according to the table.

Terminal	1	2	3	4
Position				
SET(ON)			○ — ○	
RESUME(ON)		○ —	○	

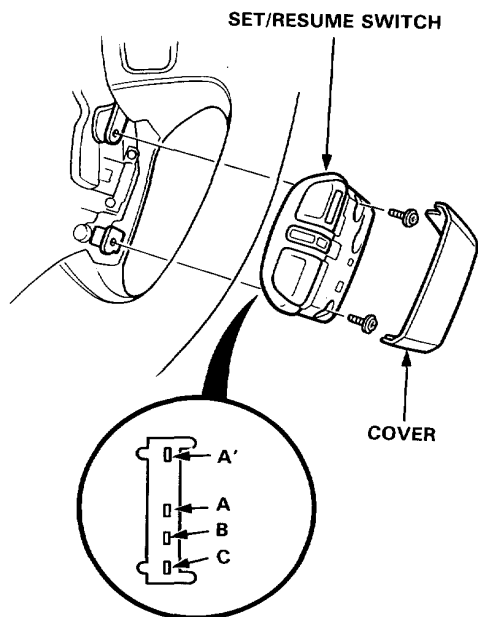
- If there is continuity, an open in the combination light switch wire harness.
- If there is no continuity in any position, go to step 6.

(cont'd)








Cruise Control

SET/RESUME Switch Test (Without SRS cont'd)

6. Remove the SET/RESUME switch cover (see page 23-367)
7. Remove the SET/RESUME switch by removing the two screws.



8. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	A'	A	B	C
SET(ON)				
RESUME(ON)				

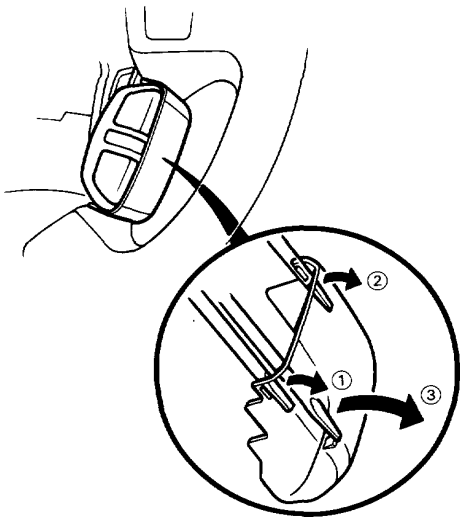
- If there is continuity, check for:
 - Faulty slip ring (see page 23-369).
 - A bent, loose or corroded terminal, or an open in the combination light switch wire harness.
- If there is no continuity in any position, replace the switch.



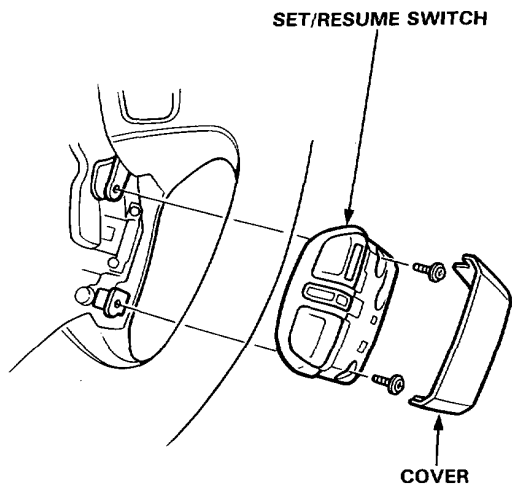
SET/RESUME Switch Replacement (With SRS)

1. Remove the cover by carefully prying between the cover and the switch in the sequence shown.

NOTE: LHD type is shown, RHD type is similar.



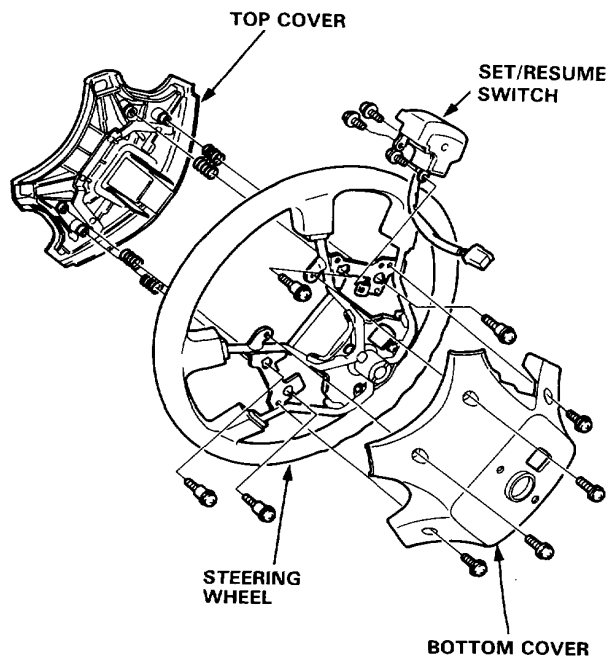
2. Remove the two screws from the switch.



3. Install in the reverse order of removal.

SET/RESUME Switch Replacement (Without SRS)

1. Remove the steering wheel.
2. Remove the body covers.
3. Remove the three screws and the SET/RESUME switch from the steering wheel.

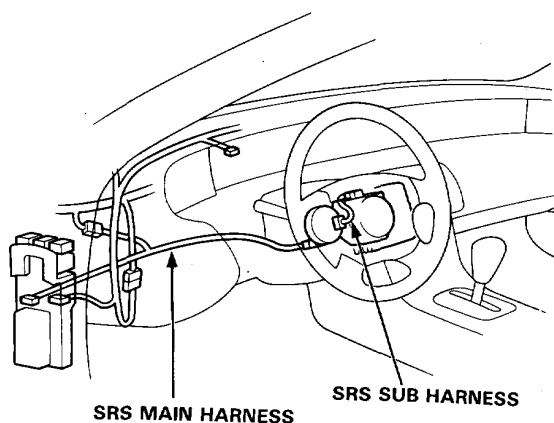


Cruise Control

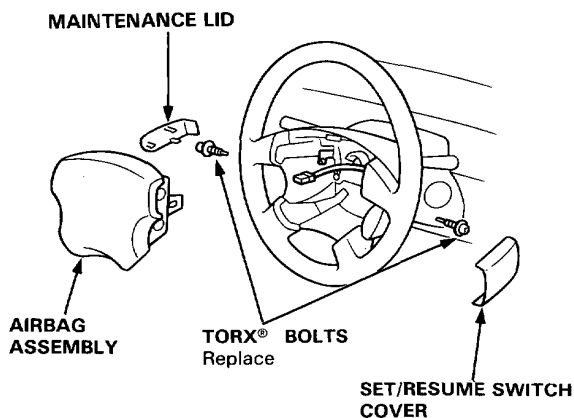
Slip Ring Replacement/Test (With SRS)

CAUTION:

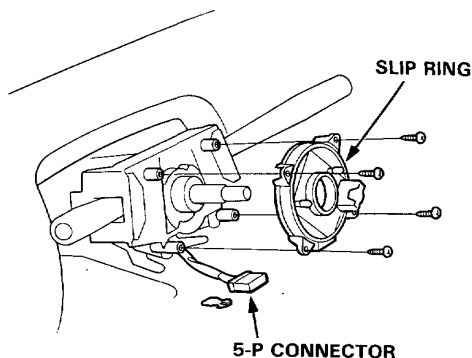
- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- Before disconnecting the SRS wiring harness, turn the ignition switch off, disconnect the negative and positive battery cables, and wait at least three minutes.



1. Remove the steering column covers (see page 23-88).
2. Remove the maintenance lid and the SET/RESUME switch from the steering wheel.
3. Remove the two TORX® bolts using a TORX® T30 bit, then remove the airbag assembly.

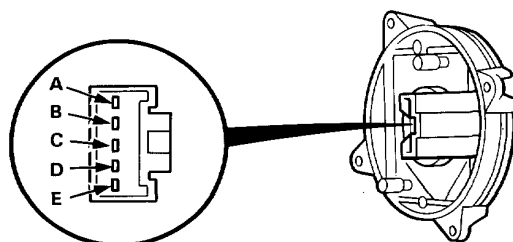


4. Disconnect the 5-P connector from the SRS main harness.
5. Remove the four screws, and then remove the slip ring.

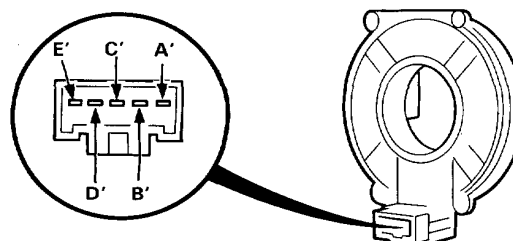


6. Check for continuity between the A and A', B and B', C and C', D and D', E and E' terminals with turning the slip ring.

UPPER SIDE:



LOWER SIDE:

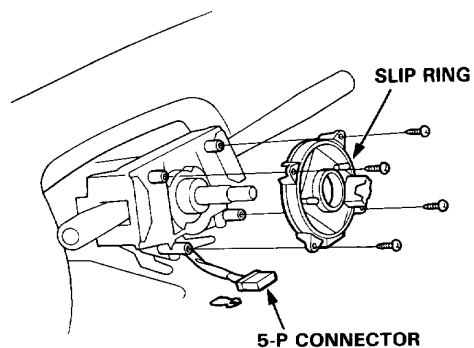


7. If even a terminal do not continue, replace the slip ring assembly.



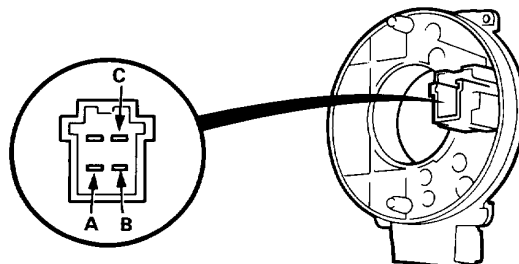
Slip Ring Replacement/Test (Without SRS)

1. Remove the steering wheel, and then disconnect the 5-P connector from the combination light switch.
2. Remove the four screws, and then remove the slip ring.

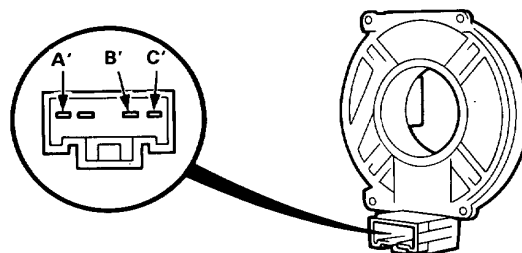


3. Check for continuity between the A and A', B and B', C and C' terminals with turning the slip ring.

UPPER SIDE:



LOWER SIDE:



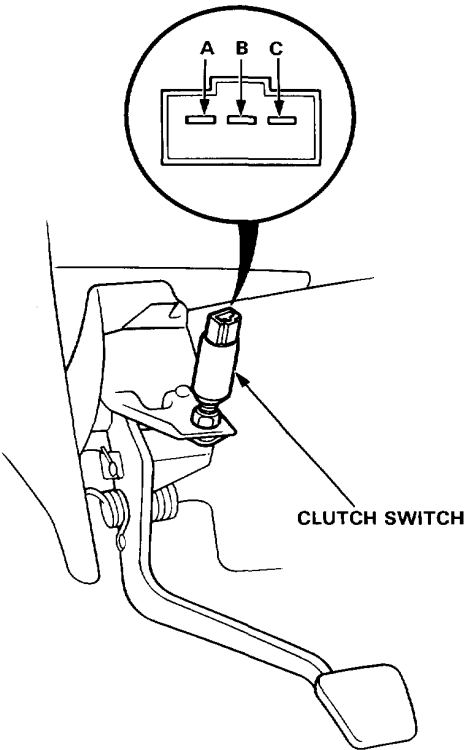
4. If even a terminal do not continue, replace the slip ring assembly.

Cruise Control

Clutch Switch Test

- 1. Disconnect the 3-P connector from the switch.
- 2. Check for continuity between the terminals according to the table.

Terminal	B	C
Clutch Pedal		
PUSHED		
RELEASED	○	○

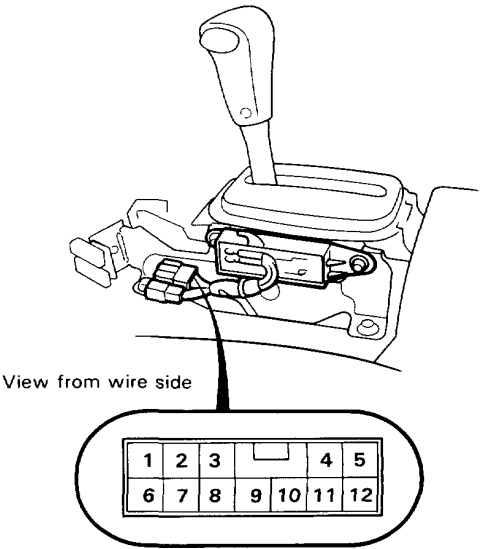


- 3. If it is necessary, replace the switch or adjust pedal height (see section 12).

Shift Lever Position Switch Test

- 1. Remove the front console, then disconnect the 12-P connector from the switch.
- 2. Check for continuity between the terminals in each switch position according to the table.

Terminal	5	8
Position		
1		
2		
D ₃	○	○
D ₄	○	○
N		
R		
P		



- 3. If it is necessary, replace the switch (see page 23-186).

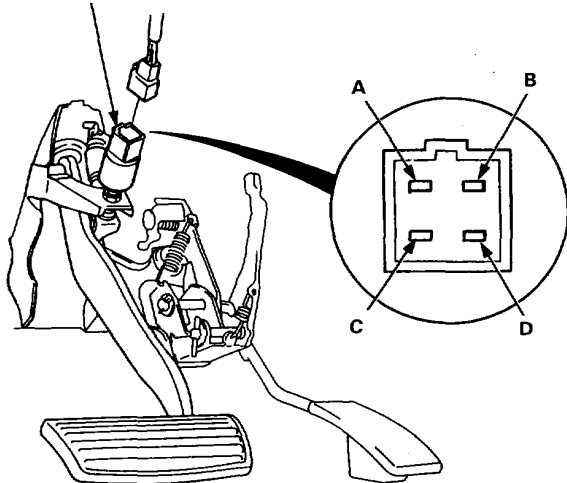


Brake Light Switch Test

1. Disconnect the 4-P connector from the switch.
2. Check for continuity between the terminals according to the table.

Terminal Position	A	B	C	D
PUSHED	○	○		
RELEASED			○	○

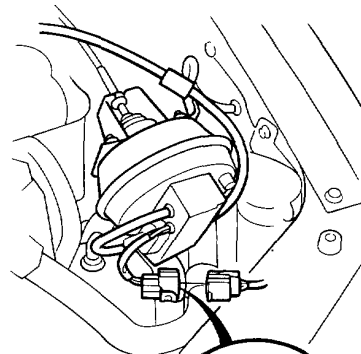
BRAKE LIGHT SWITCH



3. If it is necessary, replace the switch or adjust pedal height (see section 19).

Actuator Solenoid Test

1. Disconnect the 4-P connector from the actuator.



View from terminal side

2. Measure resistance between the terminals.

Resistance

VACUUM SOLENOID (between B and D):

30–50 Ω

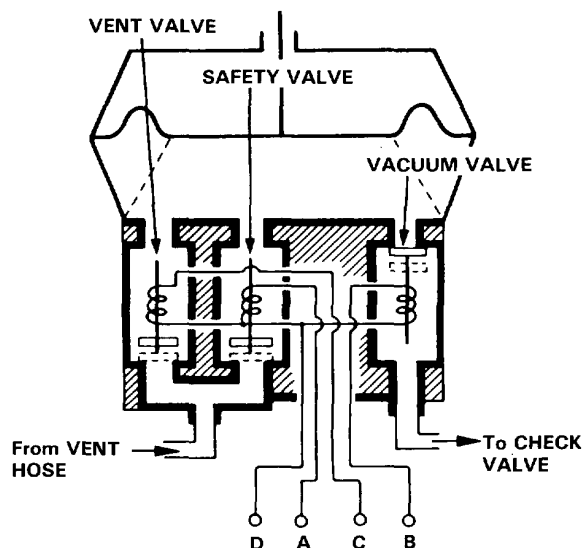
VENT SOLENOID (between C and D):

40–60 Ω

SAFETY SOLENOID (between A and D):

40–60 Ω

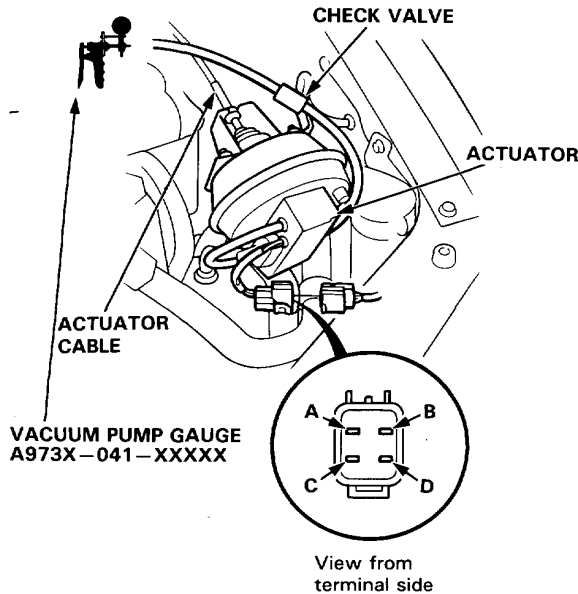
NOTE: Resistance will vary slightly with temperature; specified resistance is at 20°C (70°F).



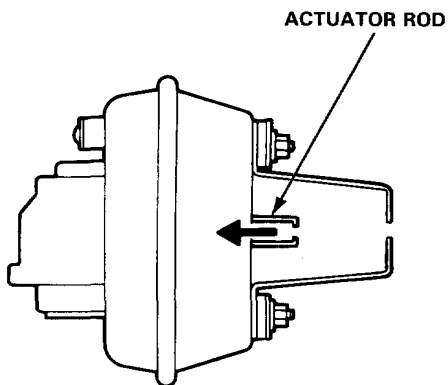
Cruise Control

Actuator Test

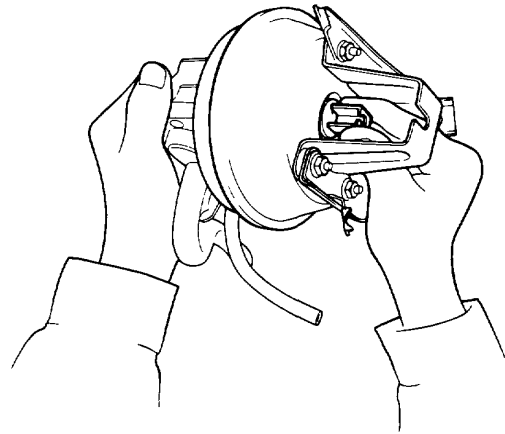
1. Disconnect the actuator cable from the actuator rod and the 4-P connector.
2. Connect battery power to the D terminal and ground to the A, B, and C terminals.
3. Connect a vacuum pump to the check valve. Then apply vacuum to the actuator.



4. The actuator rod should pull in completely. If the rod pulls in only part-way or not at all, check for a leaking vacuum line or defective solenoid.



5. With voltage and vacuum still applied, try to pull the actuator rod out by hand. You should not be able to pull it. If you can, it is defective.

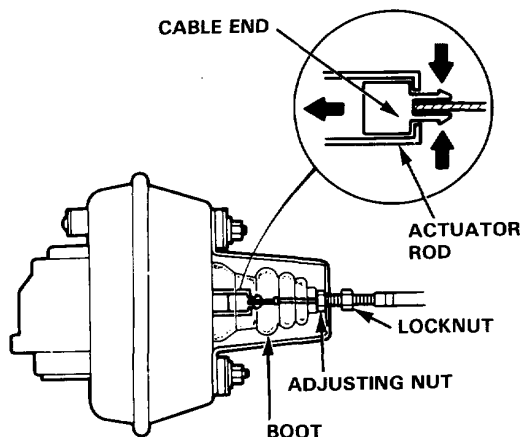


6. Disconnect battery power from the C terminal. The actuator rod should return. If the actuator rod does not return, and the vent hose and filter are not plugged, the solenoid valve assembly is defective.
7. Repeat steps 2 – 6, but this time disconnect ground from the A terminal. The actuator rod should return. If it does not return, and the vent hose and filter are not plugged, the solenoid valve assembly is defective.
8. If the solenoid valve assembly is replaced, be sure to use new O-rings on each solenoid.

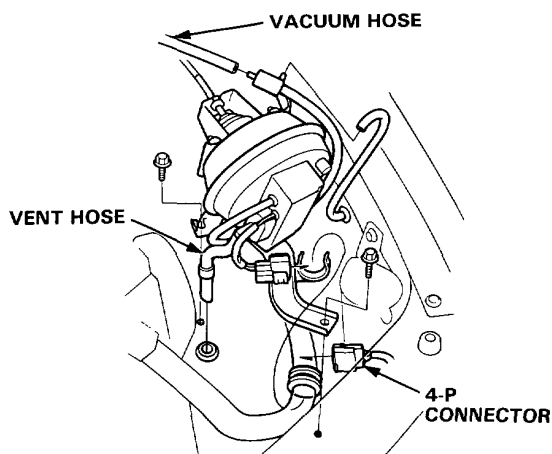


Actuator/Cable Replacement

1. Pull back the boot and loosen the locknut, then disconnect the cable from the bracket.



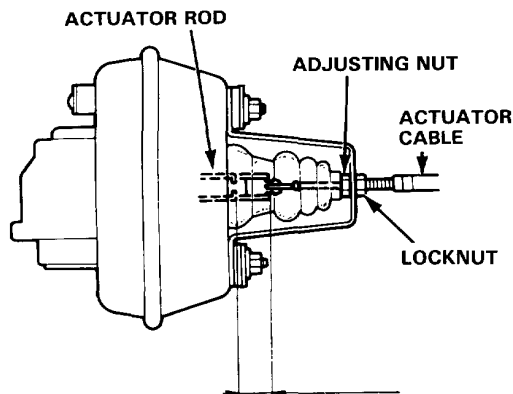
2. Disconnect the cable end from the actuator rod.
3. Disconnect the 4-P connector from the actuator.



4. Pull the vent hose out of its grommet.
5. Remove the two mounting bolts and the actuator with the bracket and reservoir.
6. Disconnect the vacuum hose from the check valve.
7. If it is necessary, disconnect the cable end from the linkage over the accelerator pedal, then turn the grommet 90° in the bulkhead and remove the cable.
8. Install in the reverse order of removal, and adjust free-play at the actuator rod after connecting the cable (see next column).

Actuator Cable Adjustment

1. Check that the actuator cable operates smoothly with no binding or sticking.
2. Start the engine.
3. Measure the amount of movement of the actuator rod until the cable pulls on the accelerator lever (engine speed starts to increase). Free play should be 11 ± 1.5 mm (0.43 ± 0.06 in).



LOCKNUT FREE PLAY: 11 ± 1.5 mm
(0.43 ± 0.06 in)

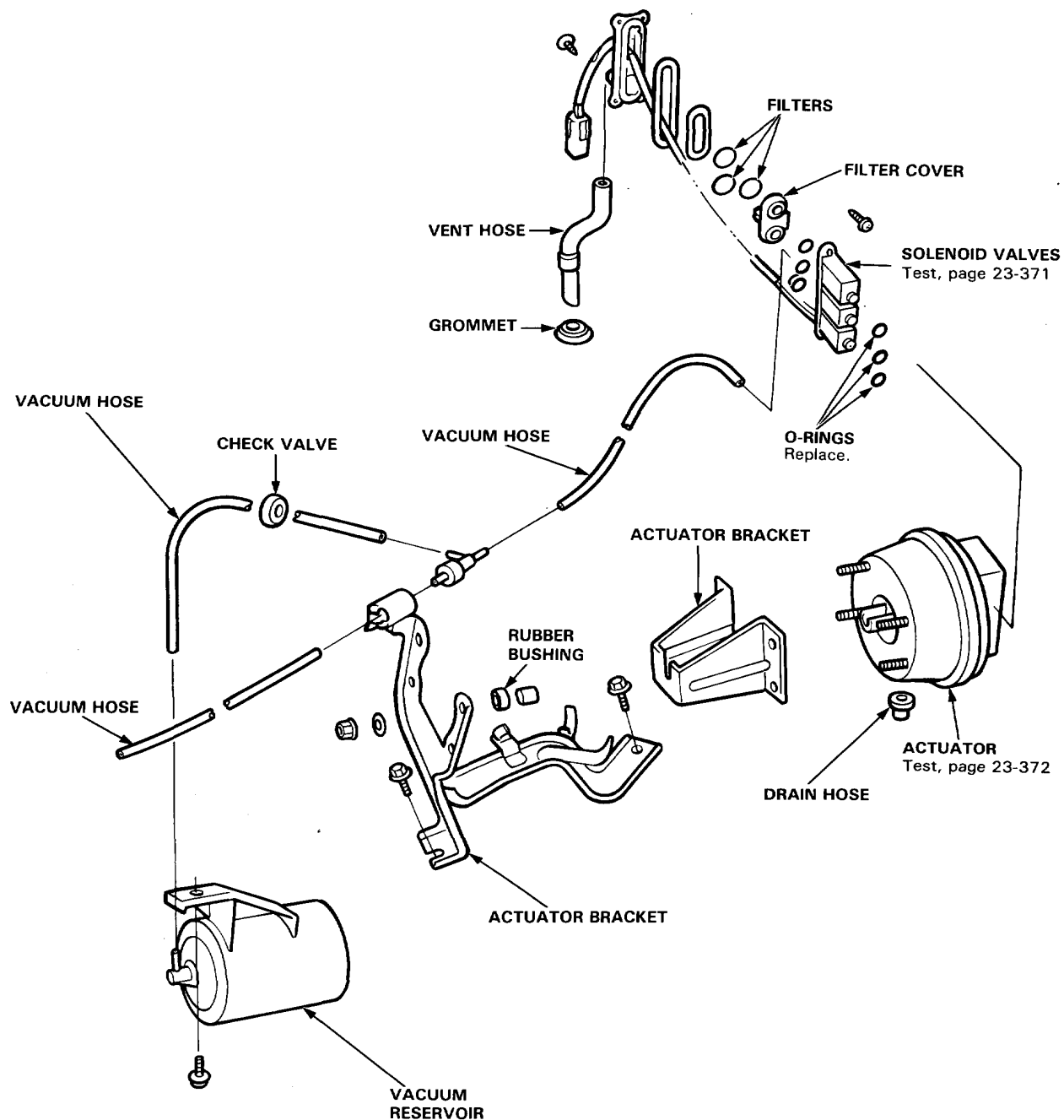
4. If free play is not within specs, loosen the locknut and turn the adjusting nut as required.

NOTE: If it is necessary, check the throttle cable free play (see section 11), then recheck the actuator rod free play.

5. Retighten the locknut and recheck the free play.

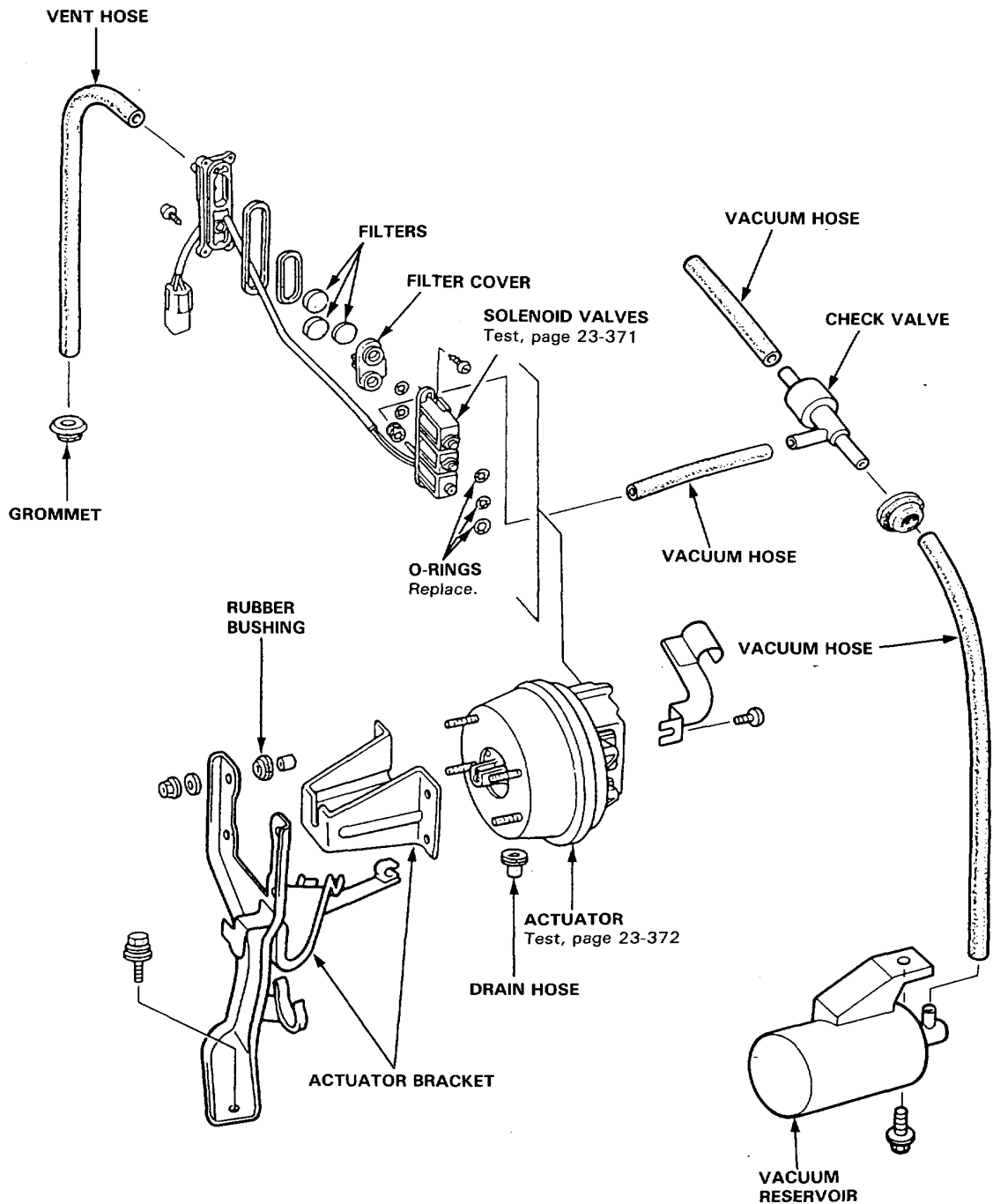
Cruise Control

Actuator Disassembly (LHD)



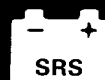


Actuator Disassembly (RHD)



Supplemental Restraint System (SRS)

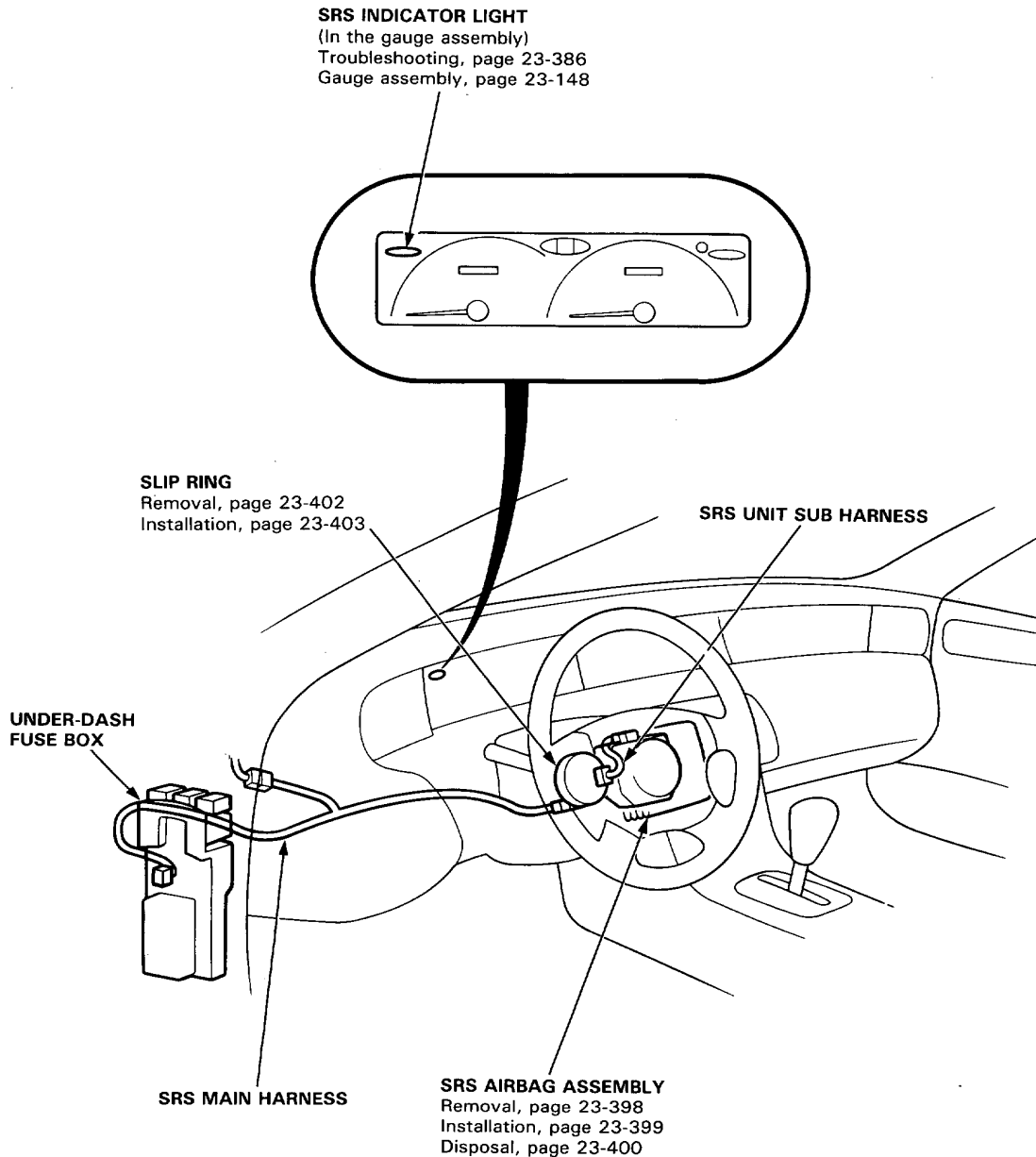
Component Location Index	23-378
Description	23-379
Circuit Diagram	23-380
Wiring Locations	23-381
Precautions/Procedures	23-382
Troubleshooting	
Self-diagnosis system	23-386
Failure code table	23-387
Airbag Assembly	
Removal	23-398
Installation	23-399
Disposal	23-400
Slip Ring	
Removal	23-402
Installation	23-403



Supplemental Restraint System (SRS)

Component Location Index

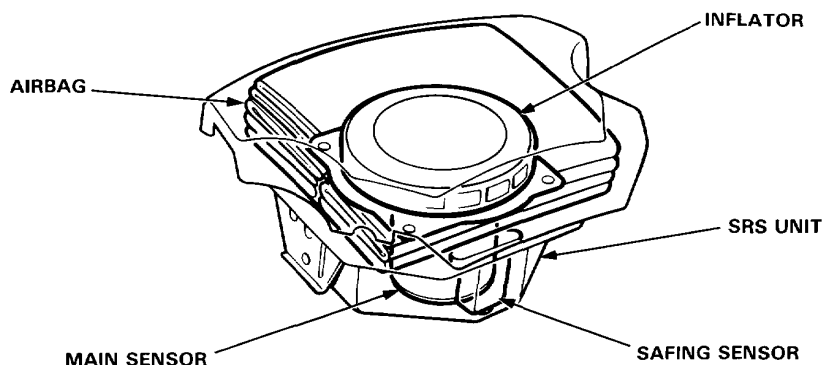
NOTE: RHD type is symmetrical to LHD type.



Description

The SRS is a safety device which, as a supplement to the seat belt, is designed to protect the driver by operating when the car receives a frontal impact exceeding a certain set limit.

The system is comprised of the airbag assembly (which in turn consists of the SRS unit, inflator, and airbag) and the slip ring.



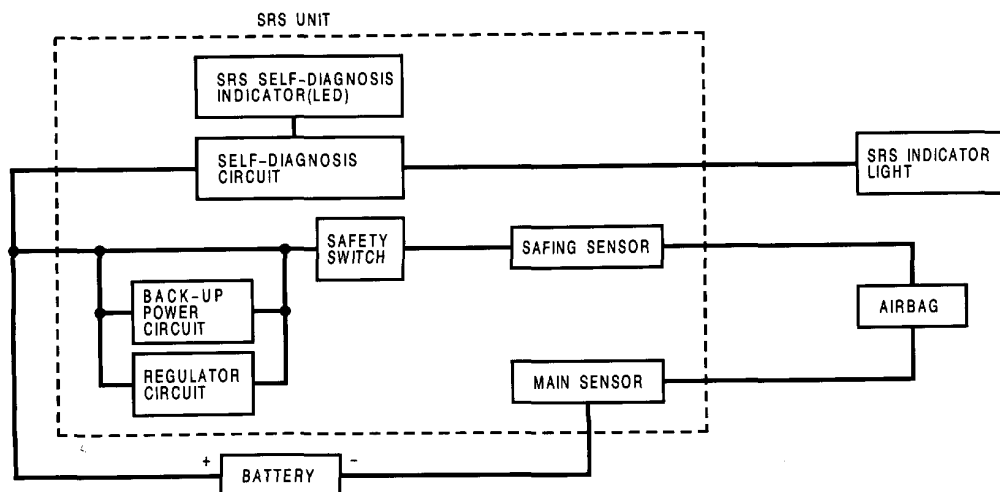
Operation

As shown in the diagram below, the main and safing sensors, and the safety switch are connected in series to the airbag inflator and the battery. A regulator circuit (increasing the reliability of the SRS system by raising the voltage when battery voltage drops) and a back-up power circuit are connected in parallel with the battery. The sensors, the safety switch, regulator and back-up circuits, and a self-diagnosis circuit (see description on next page) are all built into the SRS unit.

Sequence of operation:

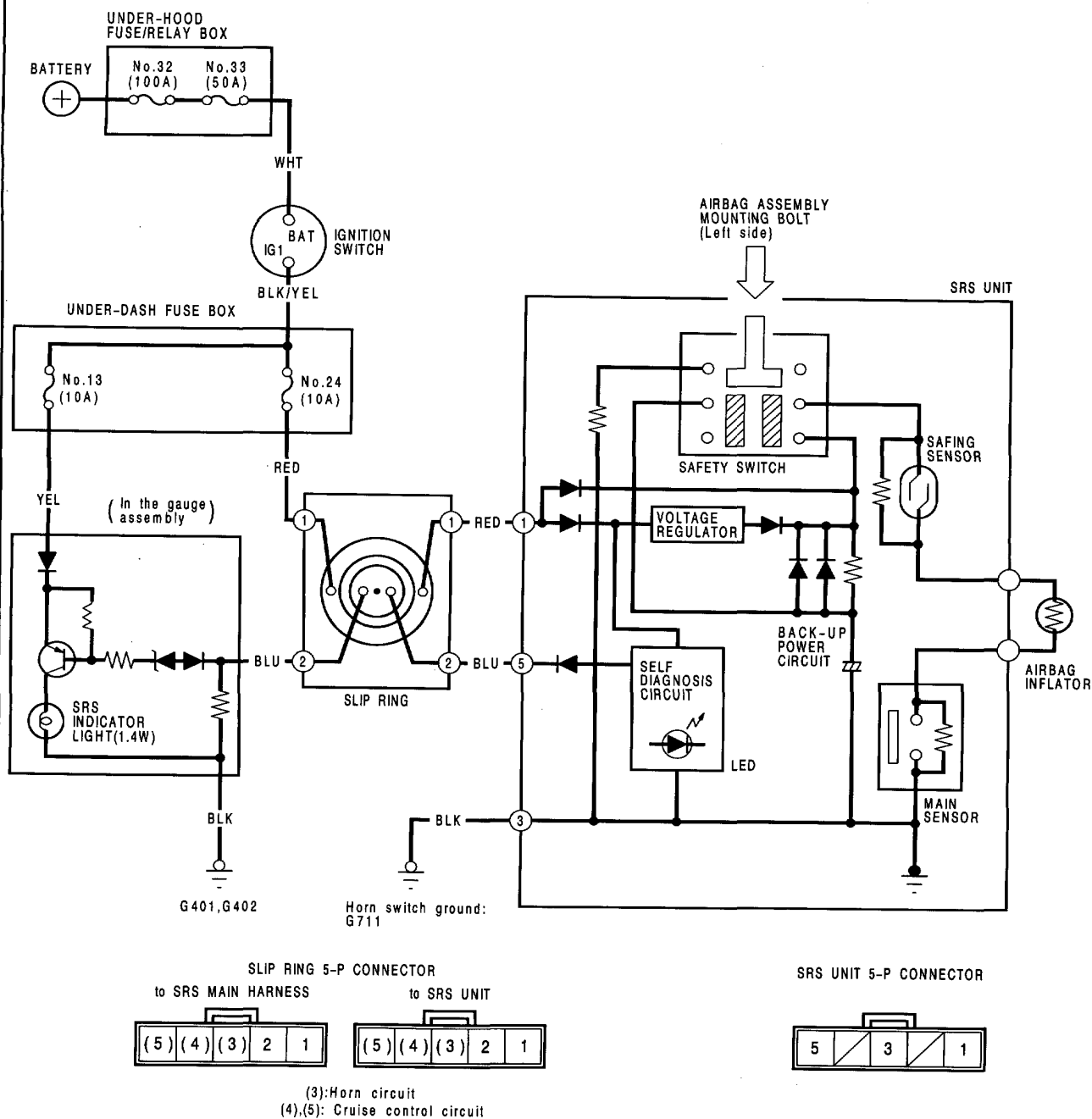
- (1) The main sensor and the safing-sensor activate.
- (2) Power is supplied to the airbag inflator by the battery or the back-up power circuit if the battery is disconnected due to the impact.
- (3) The airbag deploys.

It takes about 0.1 seconds from the beginning of the airbag deployment until it is completely deflated (frontal collision against a fixed wall at a speed of 50 km/h [30 mph])



Supplemental Restraint System (SRS)

Circuit Diagram

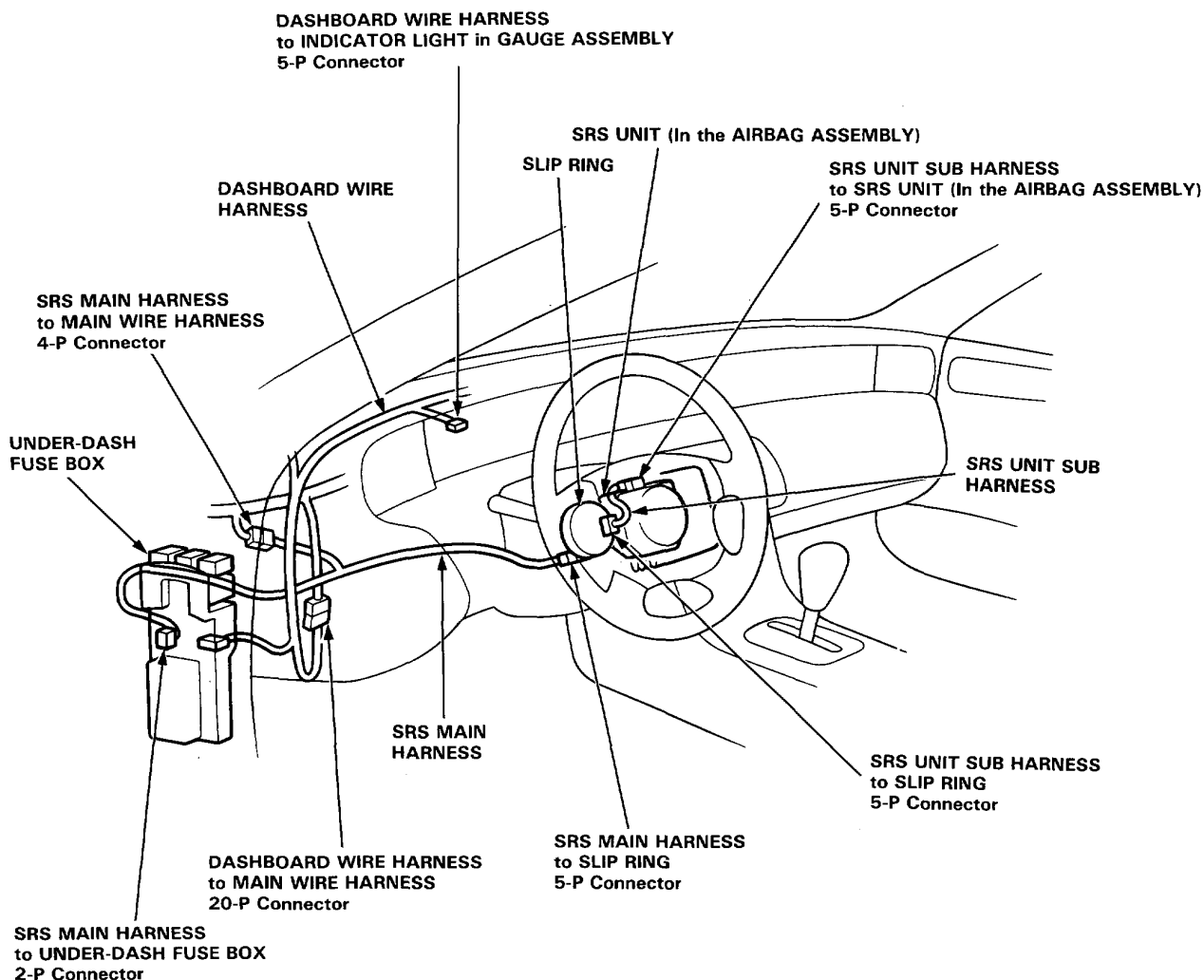


Wiring Locations

CAUTION: Make sure all SRS ground locations are clean and grounds are securely attached.

NOTE:

- All SRS electrical wiring harnesses are covered with yellow outer insulation.
- Replace the entire affected SRS harness assembly if it has an open circuit or damaged wiring.
- RHD type is symmetrical to LHD type.

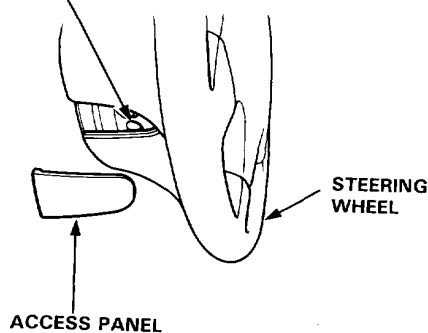


Supplemental Restraint System (SRS)

General Precautions

- Carefully inspect any SRS part before you install it. Do not install any part that shows signs of being dropped or improperly handled, such as dents, cracks or deformation:
 - Airbag assembly.
 - Slip ring.
 - Steering wheel.
- Use only a digital circuit tester to check the system. Using an analog circuit tester may cause an accidental deployment and possible injury.
- Do not install used SRS parts from another car. When repairing an SRS, use only new parts.
- Before beginning work related to the SRS system, turn the ignition switch off, disconnect the negative and positive battery cables, and wait three minutes.
- Replacement of the combination light and wiper/washer switches and cruise control switch can be done without removing the steering wheel:
 - Combination light and wiper/washer switch replacement (see page 23-236).
 - Cruise control switch replacement (see page 23-367).
- After completed work, check that the connectors are installed tightly:
 - the SRS indicator light should go off 6 sec after the ignition switch has been turned on.
 - with the ignition switch turned on, the LED of the SRS unit should blink one time.

LED
(in the SRS unit)

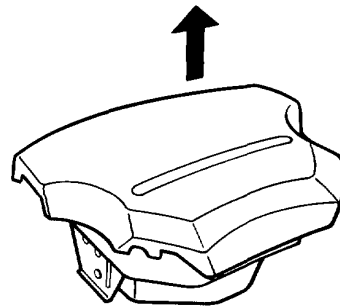


Airbag Handling and Storage

- Do not try to disassemble the airbag assembly. It has no serviceable parts. Once an airbag has been deployed, it cannot be repaired or reused.
- Be careful that the airbag assembly receives no strong shocks; it could deploy.
- Special bolts are necessary for installing the airbag assembly. Do not use other bolts.

For temporary storage of the airbag assembly during service, observe the following precautions:

- Store the removed airbag assembly with the pad surface up.



WARNING If the airbag is improperly stored face down, accidental deployment could propel the unit with enough force to cause serious injury

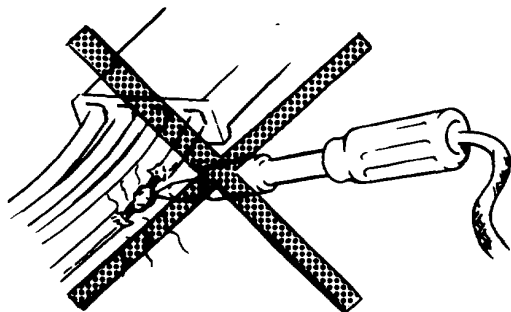
- Store the removed airbag assembly on a secure flat surface away from any high heat source (exceeding 85°C/185°F) and free of any oil, grease, detergent or water.

CAUTION: Improper handling or storage can internally damage the airbag assembly, making it inoperative. You suspect the airbag assembly has been damaged, install a new unit and refer to the Deployment/Disposal Procedures for scrapping of the damaged airbag.

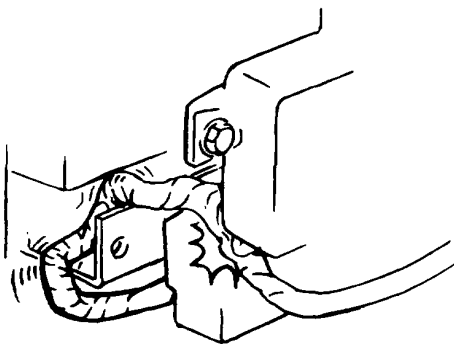
Wiring-related Precautions

- Never attempt to modify, splice or repair SRS wiring.

NOTE: SRS wiring can be identified by special yellow outer protective covering.



- Be sure to install the harness wires so that they are not pinched or interfering with other car parts.

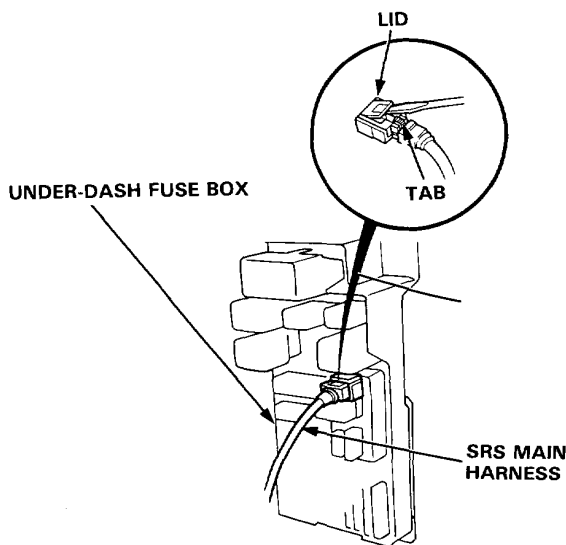


- Make sure all SRS ground locations are clean and grounds are securely fastened for optimum metal-to-metal contact. Poor grounding can cause intermittent problems that are difficult to diagnose.

- Disconnecting the SRS Connector at the Fuse Box:

CAUTION: Avoid breaking the connector; it's double-locked.

First lift the connector lid with a thin screwdriver, then press the connector tab down and pull the connector out.



To reinstall the connector, push it into position until it clicks, then close its lid.

(cont'd)

Supplemental Restraint System (SRS)

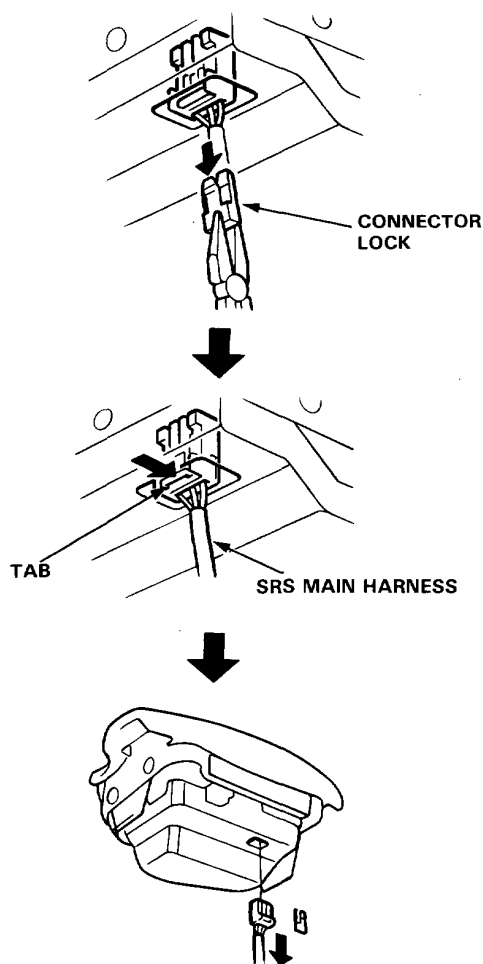
Wiring-related Precautions (cont'd)

- Disconnecting the SRS Connector at the SRS Unit and Slip ring:

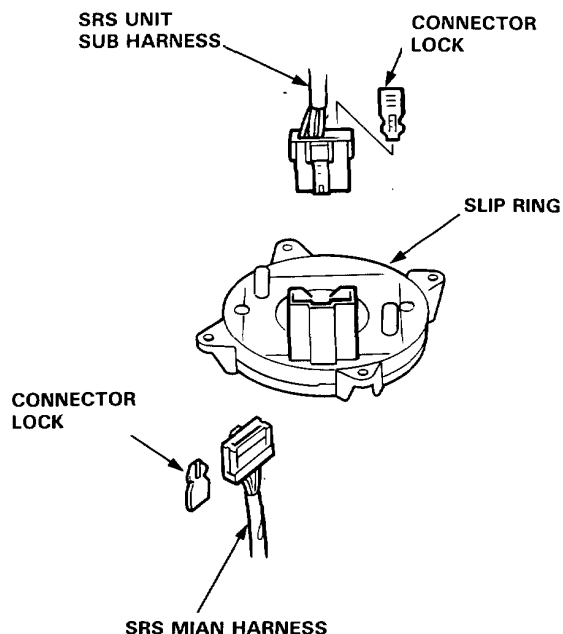
NOTE: Dispose of the connector lock; not reuse it.

1. Pull the connector lock out with pliers.
2. Depress the connector tab and pull the connector out.

SRS UNIT:



SLIP RING:

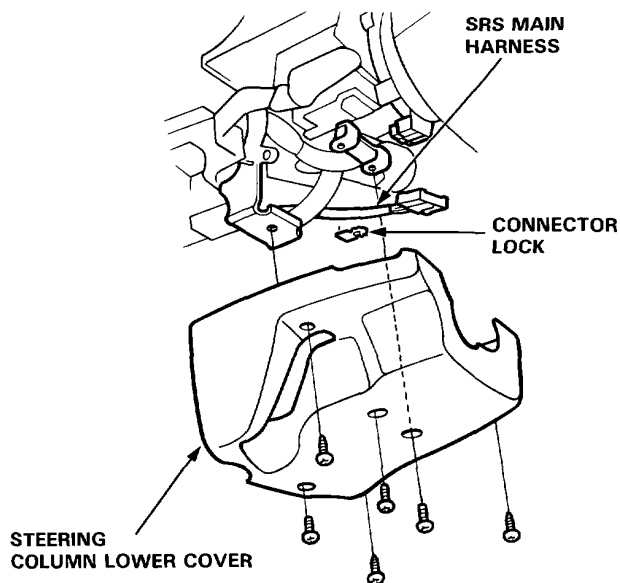


Steering-related Precautions

● Steering Column Removal:

CAUTION:

- Turn the ignition switch off, disconnect the negative and positive battery cables, and wait three minutes.
- Be careful that the steering wheel receives no strong shocks.
- Before removing the steering column, first disconnect the connector between the slip ring and the SRS main harness.
- If the steering column is going to be removed without dismounting the steering wheel, lock the steering by turning the ignition key to 0-LOCK position or remove the key from the ignition so that the steering wheel will not turn.



● Steering Wheel:

Do not replace the original steering wheel with any other design, since it will make it impossible to properly install the airbag (only use genuine HONDA replacement parts).

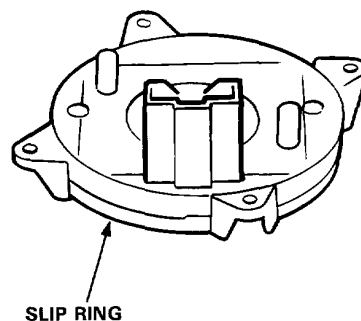
NOTE: Models with 4WS

Test and adjust the 4WS system (see section 17).

● Slip Ring

CAUTION:

- Do not grease the slip ring.
- Do not disassemble the slip ring. It has no serviceable parts and has to be replaced as a whole.
- The slip ring is a special part of models equipped with SRS. When replacing, be sure to use only a genuine HONDA spare part.



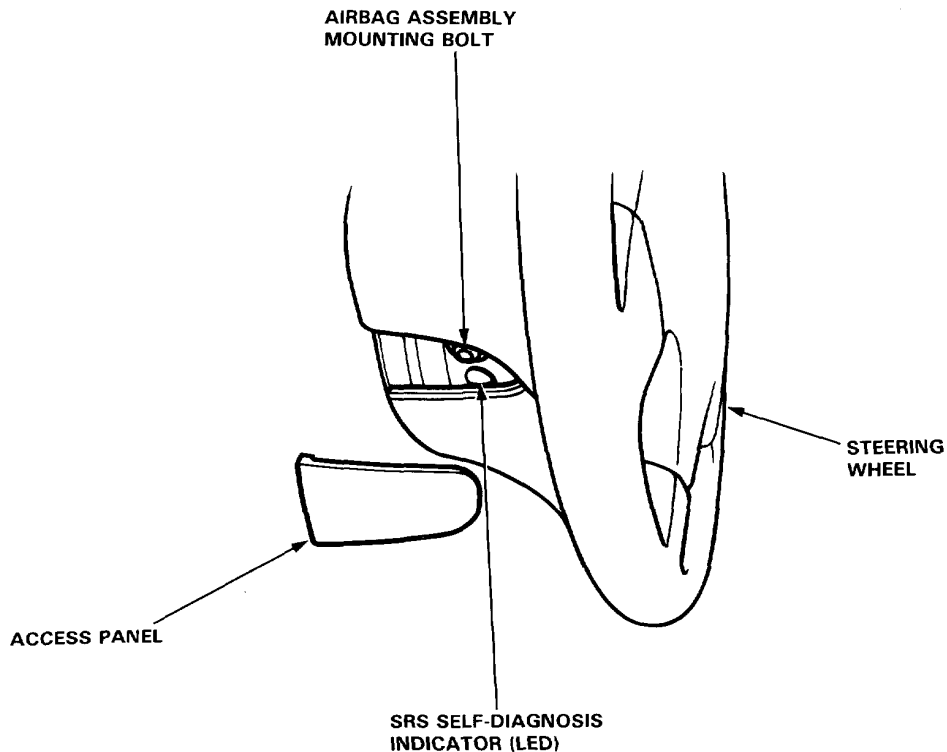
Supplemental Restraint System (SRS)

Troubleshooting

Self-diagnosis system

When the ignition switch is turned ON, the SRS indicator light comes on and goes off after about 6 seconds, and the self-diagnosis indicator (LED) blinks one time, if the system is operating normally. If there is an abnormality in the SRS, the SRS indicator light will stay on while the LED in the SRS unit will indicate the system problem by blinking a failure code (see the table on next page).

- If the SRS indicator light does not come on, or does not go off after 6 seconds, or if it comes on while driving, the system must be inspected and repaired as soon as possible.
- To see the indicated failure code, remove the access panel at the left side of the steering wheel.
- If there is a failure in the system, the LED will first blink one time (OK signal), then it will indicate the failure code.
- If simultaneous system problems occur, the LED will indicate only the problem with the higher priority. The problem with the highest priority is that on top of the failure code table, the problem with the lowest priority is that at the bottom of the table (see page 23-387).





Failure Code Table

Self-diagnosis indicator (LED) blinks	SRS indicator light	Cause
1	doesn't come on (with the ignition switch turn ON)	<ul style="list-style-type: none">● Blown No. 13 (10 A) fuse.● Blown SRS indicator light bulb.● Poor ground.
0	doesn't go off	<ul style="list-style-type: none">● Faulty SRS unit.● Poor ground.
1		<ul style="list-style-type: none">● Short (or open) in SRS indicator wire harness.
stay on continuously		<ul style="list-style-type: none">● Faulty SRS self-diagnosis circuit.
2		<ul style="list-style-type: none">● Faulty safety switch.
3		<ul style="list-style-type: none">● Faulty back-up power circuit.
4		<ul style="list-style-type: none">● Faulty safety switch.
5		<ul style="list-style-type: none">● Open in airbag inflator.
6		<ul style="list-style-type: none">● Open in main sensor.● Short in safing sensor.
7		<ul style="list-style-type: none">● Short in main sensor.● Open in safing sensor.

(cont'd)

Supplemental Restraint System (SRS)

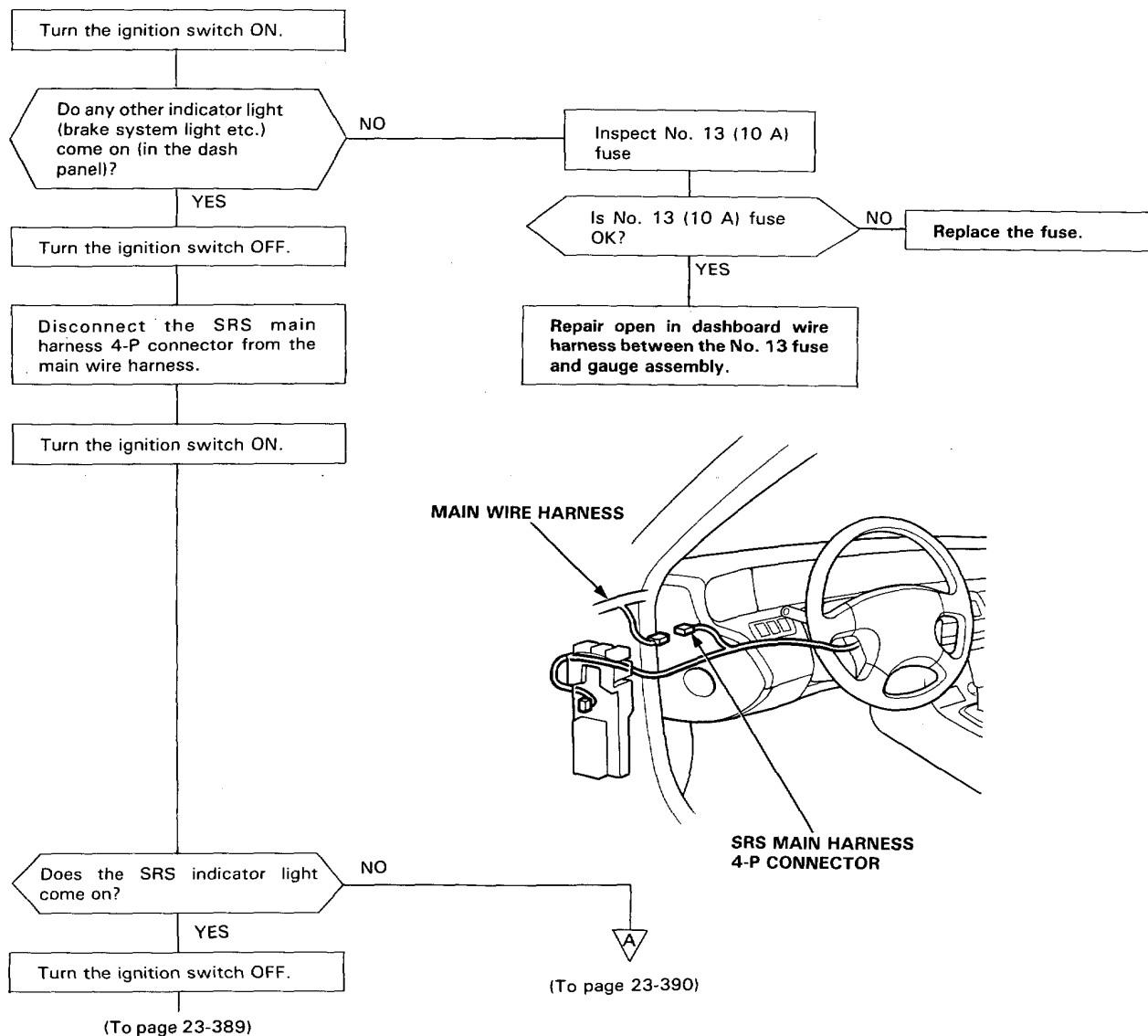
Troubleshooting (cont'd)

The SRS Indicator Does Not Light

- The SRS indicator light will not come on until 6 seconds after the ignition switch has been turned on.
- The LED of the SRS unit should blink one time.

CAUTION:

- Use only a digital circuit tester to check the system.



(From page 23-388)

Reconnect the SRS main harness 4-P connector to the main wire harness.

Disconnect the negative and positive battery cables, and wait three minutes.

Remove the airbag assembly from the steering wheel (see page 23-398).

Disconnect the SRS unit sub harness 5-P connector from the SRS unit (In the airbag assembly).

Reconnect the positive and negative battery cables, then turn the ignition switch ON.

Does the SRS indicator light come on?

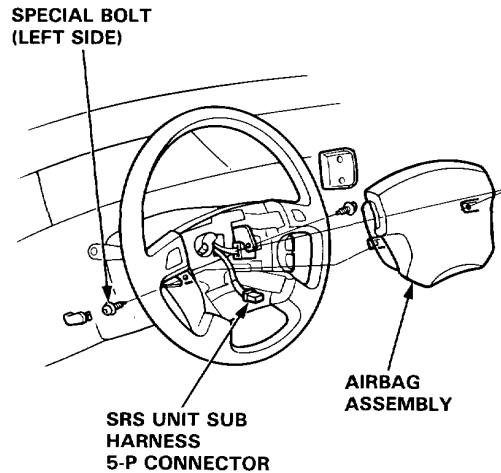
NO

Short in the BLU wire of SRS unit sub harness, SRS main harness or the slip ring. Replace faulty component.

YES

SRS unit is faulty. Replace the airbag assembly.

CAUTION: Make sure the wheels are aligned straight ahead. Remove the left airbag assembly mounting special bolt first (the safety switch will automatically turn off).

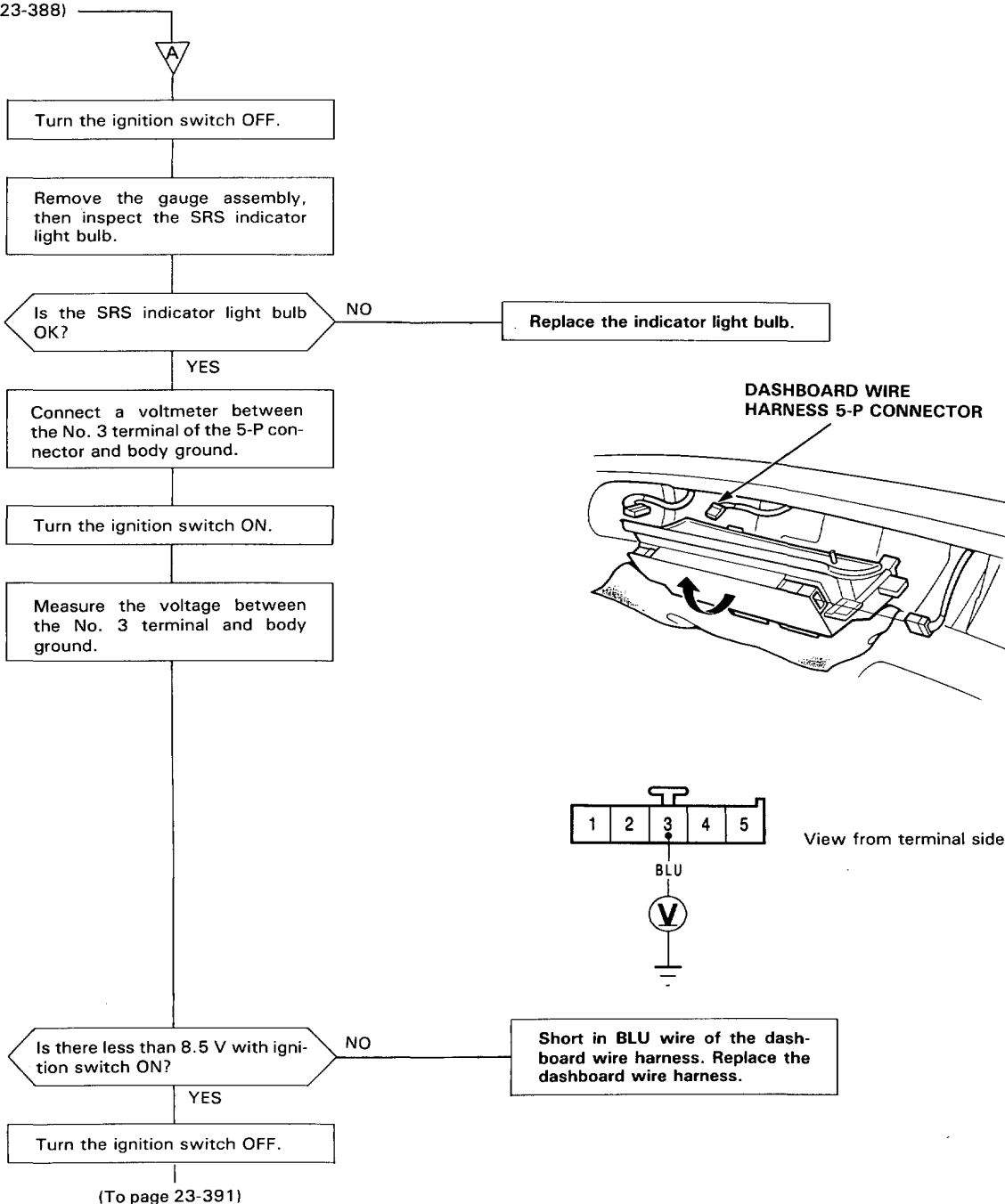


(cont'd)

Supplemental Restraint System (SRS)

Troubleshooting (cont'd)

(From page 23-388)



(From page 23-390)

Connect the voltmeter between the No. 1 terminal (+) and the No. 5 terminal (-) of the dashboard wire harness 5-P connector.

Turn the ignition switch ON.

Measure the voltage between the No. 1 terminal and the No. 5 terminal.

Is there battery voltage?

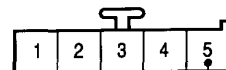
NO

YES

The SRS indicator circuit in the gauge assembly is faulty.

Check for continuity between the No. 5 terminal and body ground.

**DASHBOARD WIRE HARNESS
5-P CONNECTOR**



BLK

View from terminal side



Does continuity exist?

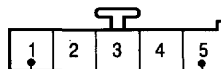
NO

YES

Repair open in the YEL wire (No. 1 terminal) of the dashboard wire harness between the gauge assembly and the No. 13 fuse.

Repair open in the BLK wire (No. 5 terminal) between the gauge assembly and body ground or look for a poor ground (G201, 401).

**DASHBOARD WIRE HARNESS
5-P CONNECTOR**



YEL

BLK

View from terminal side



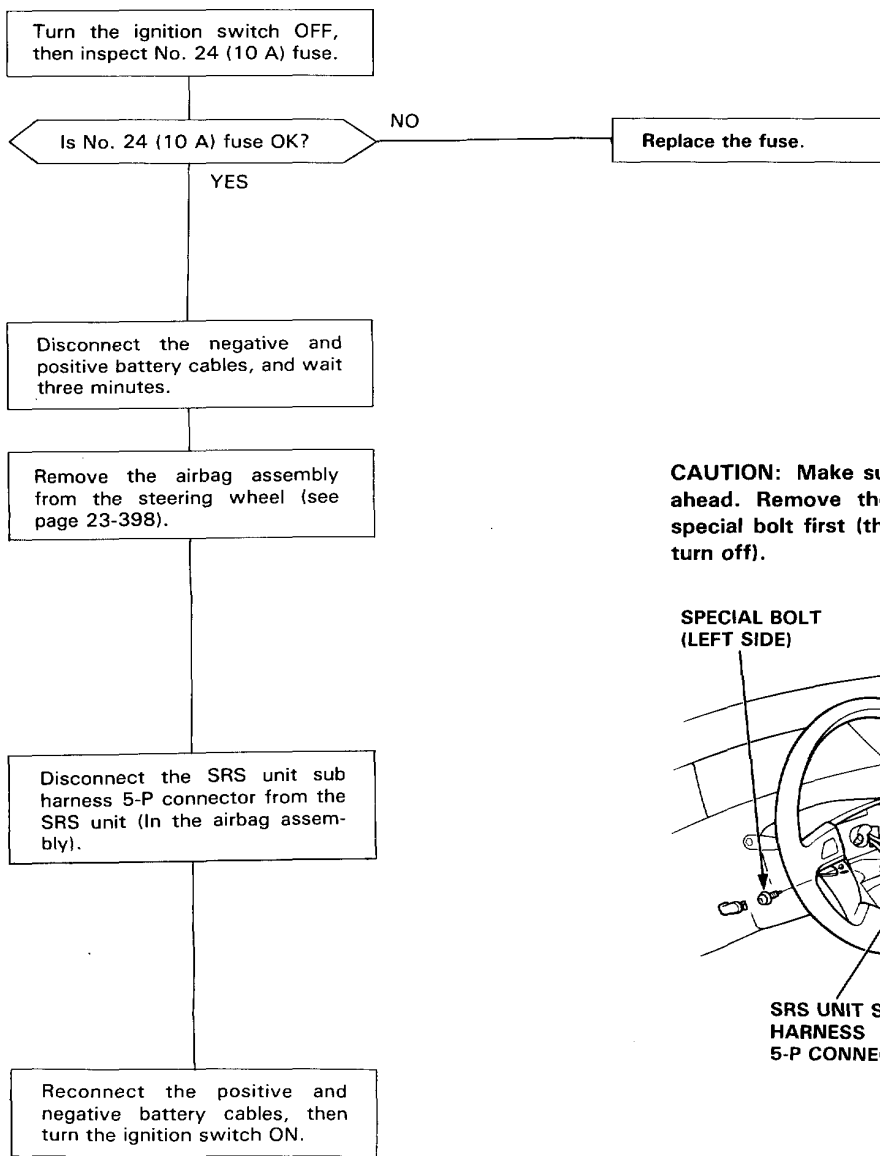
(cont'd)

Supplemental Restraint System (SRS)

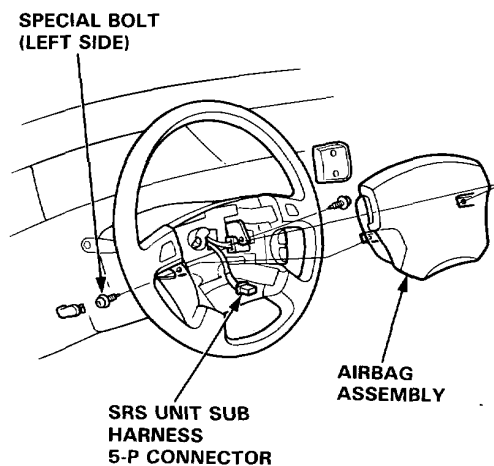
Troubleshooting (cont'd)

The SRS Indicator Light Stays on Continuously

- The LED of the SRS unit does not light.



CAUTION: Make sure the wheels are aligned straight ahead. Remove the left airbag assembly mounting special bolt first (the safety switch will automatically turn off).

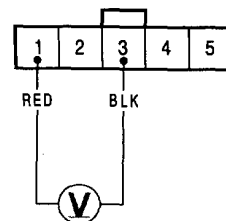
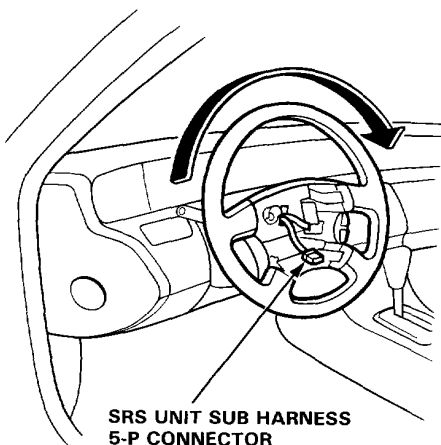


(To page 23-393)

(From page 23-392)

NOTE: Rotate the steering wheel slowly to check that there is good contact to the slip ring.

Measure the voltage between the No. 1 terminal and the No. 3 terminal of the SRS unit sub harness 5-P connector.



Is there battery voltage?

YES

**SRS unit is faulty.
Replace the airbag assembly.**

NO

Check for continuity between the No. 3 terminal and body ground.

Open in the BLK wire (No. 3 terminal) of the SRS unit sub harness between the SRS unit and body ground or look for poor ground (G711).

Does continuity exist?

NO

YES

Disconnect the SRS main harness 5-P connector from the slip ring.



Measure the voltage between the No. 1 terminal of the SRS main harness 5-P connector and body ground.

STEERING COLUMN LOWER COVER

Is there battery voltage?

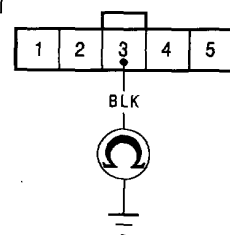
NO

Open in the RED wire of the SRS main harness between the fuse box and the slip ring. Replace the harness.

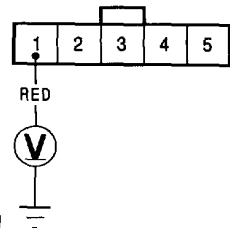
YES

Open in the RED wire of the SRS unit sub harness or the slip ring. Replace the faulty component.

View from terminal side



View from terminal side



(cont'd)

Supplemental Restraint System (SRS)

Troubleshooting (cont'd)

The SRS Indicator Light Stays on Continuously

- The LED of the SRS unit blinks one time.

Turn the ignition switch OFF, then disconnect the SRS main harness 4-P connector from the main wire harness.

Measure the voltage between the No. 1 terminal of the SRS main harness 4-P connector and body ground.

Is there more than 8.5 V until 6 seconds after the ignition switch has been turned on.

YES

NO

Turn the ignition switch OFF.

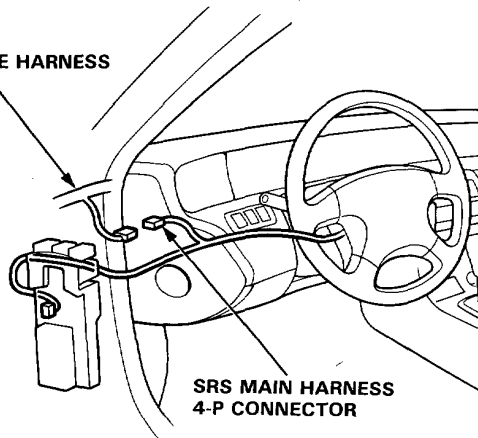
Disconnect the negative and positive battery cables, and wait three minutes.

Remove the airbag assembly from the steering wheel (see page 23-398).

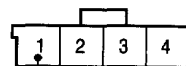
Disconnect the SRS unit sub harness 5-P connector from the SRS unit (In the airbag assembly).

(To page 23-395)

MAIN WIRE HARNESS



SRS MAIN HARNESS 4-P CONNECTOR



BLU

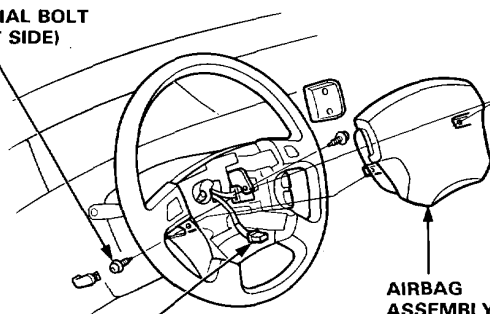


View from terminal side

(To page 23-396)

CAUTION: Make sure the wheels are aligned straight ahead. Remove the left airbag assembly mounting special bolt first (the safety switch will automatically turn off).

SPECIAL BOLT (LEFT SIDE)



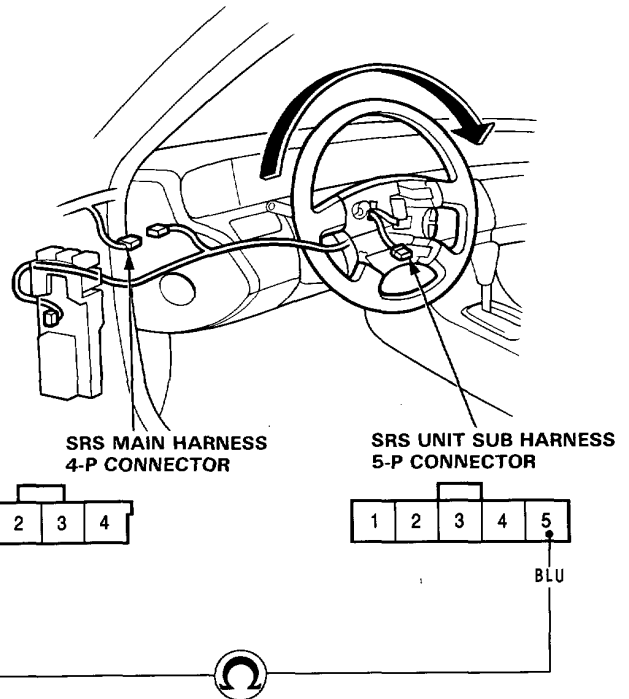
SRS UNIT SUB HARNESS 5-P CONNECTOR

AIRBAG ASSEMBLY

(From page 23-346)

Check for continuity between the No. 1 terminal of the SRS main harness 4-P connector and No. 5 terminal of the SRS unit sub harness 5-P connector.

NOTE: Rotate the steering wheel slowly to check that there is good contact to the slip ring.



Does continuity exist?

NO

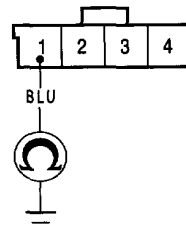
Open in the BLU wire of the SRS main harness, SRS unit sub harness or the slip ring. Replace the faulty component.

YES

Check for continuity between the No. 1 terminal of the SRS main harness 4-P connector and body ground.

NOTE: Rotate the steering wheel slowly to check that there is good contact to the slip ring.

SRS MAIN HARNESS 4-P CONNECTOR



Does continuity exist?

YES

Short in the BLU wire of the SRS main harness, SRS unit sub harness or the slip ring. Replace the faulty component.

NO

SRS unit is faulty. Replace the airbag assembly.

(cont'd)

Supplemental Restraint System (SRS)

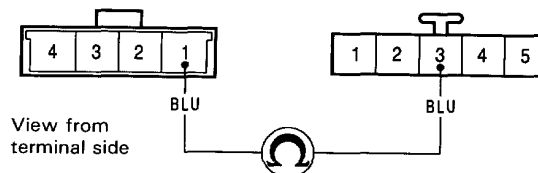
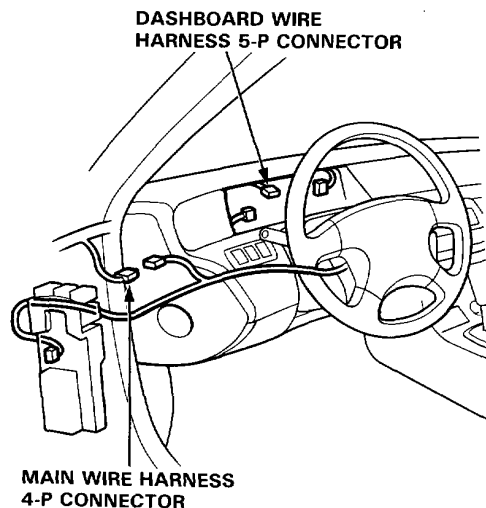
Troubleshooting (cont'd)

(From page 23-394)



Turn the ignition switch OFF, then remove the gauge assembly.

Check for continuity between the No. 1 terminal of the main wire harness and the No. 3 terminal of the dashboard wire harness.



Does continuity exist?

NO

Open in the BLU wire of the dashboard wire harness or the main wire harness. Replace the faulty component.

YES

The SRS indicator circuit in the gauge assembly is faulty. Replace it.



The SRS Indicator Light Stays on Continuously

- The LED of the SRS unit doesn't go off or blinks 2, 3, 4, 5, 6 or 7 times.

Replace the SRS airbag assembly.

Supplemental Restraint System (SRS)

Airbag Assembly Removal

⚠ WARNING Store a removed airbag assembly with the pad surface up, if the airbag is improperly stored face down, accidental deployment could propel the unit with enough force to cause serious injury.

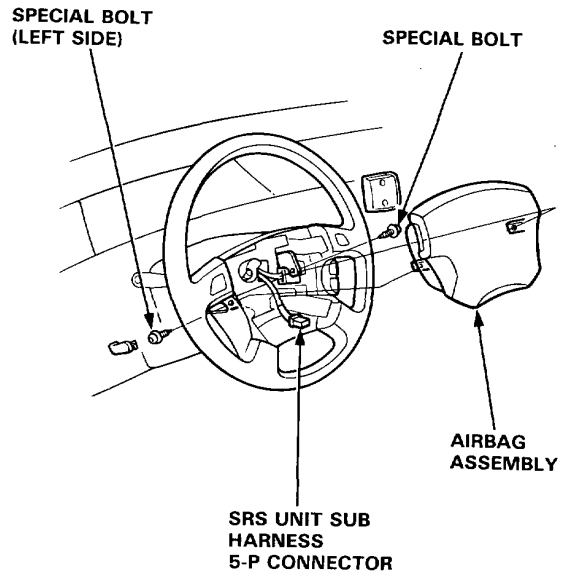
CAUTION:

- Before beginning work related to the SRS system, turn the ignition switch off, disconnect the negative and positive battery cables, and wait three minutes.
- Do not install used SRS parts from another car. When repairing an SRS, use only new parts.
- Carefully inspect the airbag assembly before installing it. Do not install an airbag assembly that shows signs of being dropped or improperly handled, such as dents, cracks or deformation.
- Do not disassemble or tamper with the airbag assembly.
- Special bolts are necessary for installing the airbag assembly. Do not use other bolts.
- Make sure the wheels are aligned straight ahead. Remove the left airbag assembly mounting special bolt first (the safety switch will automatically turn off).

1. Turn the ignition switch off, then disconnect the negative and positive battery cables, and wait three minutes.

2. Remove the special bolts using a TORX® T30 bit, then remove the airbag assembly.
3. Pull out the connector lock, then disconnect the SRS unit sub harness 5-P connector from the SRS unit, then remove the airbag assembly from the steering wheel.

NOTE: Dispose of the connector lock, it is not to be reused.





Airbag Assembly Installation

CAUTION:

- Be sure to install the SRS wiring so that it is not pinched or interfering with other car parts.
- Be sure the battery cables are disconnected.

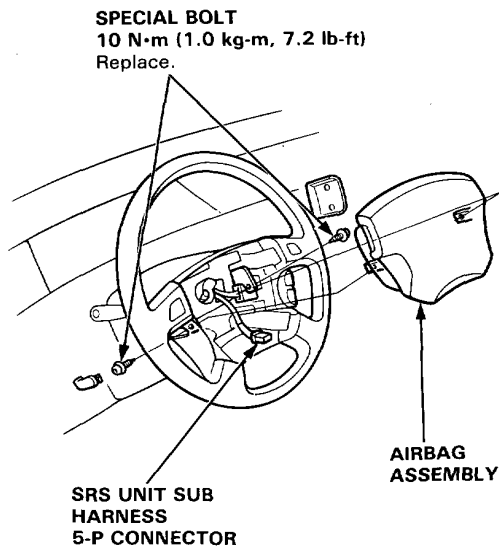
1. Reconnect the SRS unit sub harness 5-P connector to the SRS unit.
2. Place the airbag assembly in the steering wheel, and secure it with new special bolts.

NOTE: Be sure to torque the bolts as specified.

3. Reconnect the battery positive and negative cables.

4. After installing the airbag assembly, confirm proper system operation:

- Turn the ignition to ON: the instrument panel SRS indicator light should go on for about 6 seconds and then go off.
- The SRS self diagnosis indicator (LED) should blink one time with the ignition switch ON.



Supplemental Restraint System (SRS)

Airbag Disposal

Before scrapping any airbag (including one in a whole car to be scrapped) the airbag must be deployed. If the car is still within the warranty period, before deploying the airbag, the HONDA District Service Manager must give approval and/or special instruction.

Only after an airbag is already deployed (as the result of vehicle collision, for example), can the normal scrapping procedure be done.

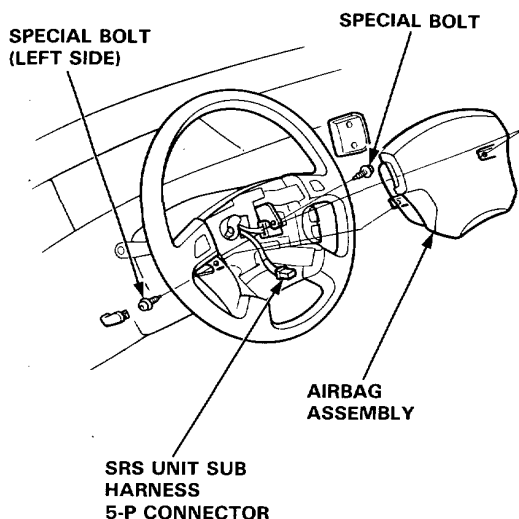
If the airbag appears, intact (not deployed), it should be treated with extreme caution.

Follow the procedure, described below.

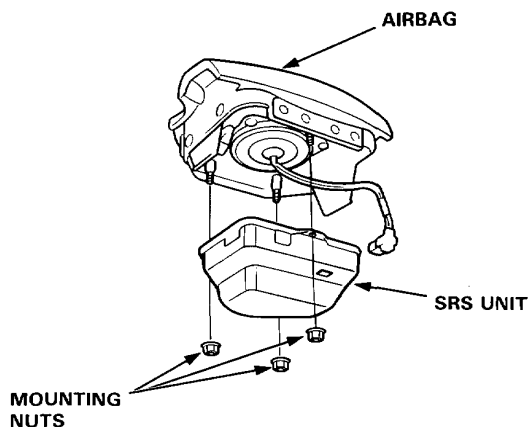
1. Turn the ignition switch off, then disconnect the negative and positive battery cables, and wait three minutes.
2. Remove the special bolts using a TORX® T30 bit, then remove the airbag assembly (see page 23-398).

CAUTION: Make sure the wheels are aligned straight ahead. Remove the left airbag assembly mounting special bolt first (the safety switch will automatically turn off).

3. Disconnect the SRS unit sub harness 5-P connector from the SRS unit, then remove the airbag assembly from the steering wheel.



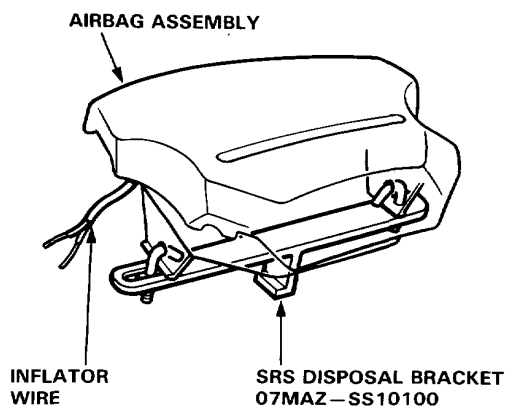
4. Remove the 3 SRS unit mounting nuts from the airbag assembly, then remove the SRS unit.



5. Install the SRS Disposal Bracket on the airbag assembly, and clamp it firmly into a vice.

WARNING Confirm that the airbag assembly is securely clamped or mounted; otherwise, severe personal injury could be caused by the deployment.

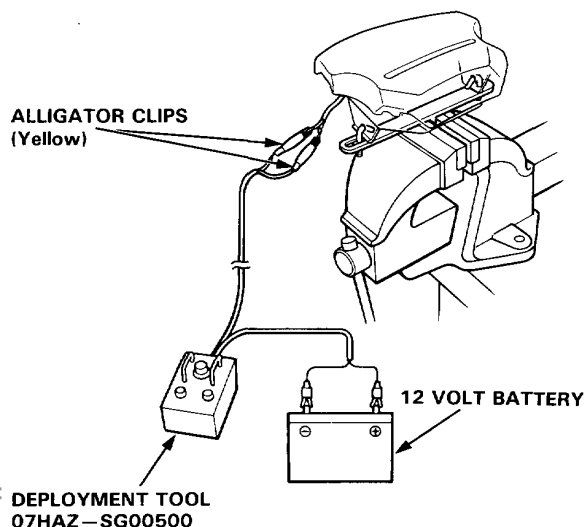
NOTE: Instead of using the SRS Disposal Bracket, the airbag assembly may be reinstalled to the steering wheel.



6. Cut off the airbag connector, then strip the wire ends.

7. Confirm that the Deployment Tool is functioning properly (see check procedure on this page).
8. Connect the alligator clips to the inflator wire ends.

⚠ WARNING The distance between deployment tool and airbag assembly has to be at least 10 meters (30 ft).



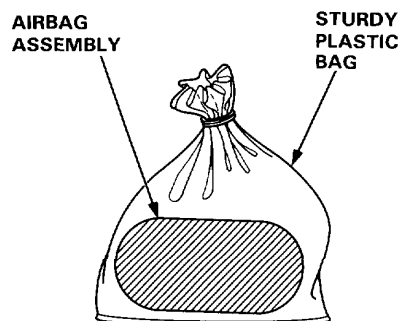
9. Connect a 12 volt battery to the tool:
 - If the green light on the tool goes on, the airbag igniter circuit is defective and cannot deploy the bag. Go to Damaged Airbag Special Procedure.
 - If the red light on the tool goes on, the airbag is ready to be deployed.
10. Push the tool's deployment switch. The airbag should deploy (deployment is both highly audible and visible—a loud noise and rapid inflation of the bag, followed by slow deflation).
 - If audible / visible deployment happens and the green light on the tool goes on, continue with this procedure.
 - If the airbag doesn't deploy, yet the green light goes on, it's igniter is defective. Go to Damaged Airbag Special Procedure.

⚠ WARNING During deployment, the airbag assembly can become hot enough to burn you. Wait thirty minutes after deployment before touching the assembly.

11. Dispose of the complete airbag assembly. No part of it can be reused. Place it in a sturdy plastic bag and seal it securely.

CAUTION:

- Wear a face shield and gloves when handling a deployed airbag.
- Wash your hands and rinse them well with water after handling a deployed airbag.



Damaged Airbag Special Procedure.

⚠ WARNING If an airbag cannot be deployed, it should not be treated as normal scrap; it should still be considered a potentially explosive device that can cause serious injury.

1. If installed in a car, follow the removal procedure on page 23-398.
2. Package the airbag in exactly the same packaging that the new replacement part came in.
3. Mark the outside of the box "DAMAGED AIRBAG NOT DEPLOYED" so it does not get confused with your parts stock.
4. Contact your HONDA District Service Manager for how and where to return it for disposal.

Deployment Tool: Check Procedure.

1. Connect the yellow clips to both switch protector handles on the tool; connect the tool to a battery.
2. Push the operation switch: green means tool is OK; red means tool is faulty.
3. Disconnect the battery and the yellow clips.

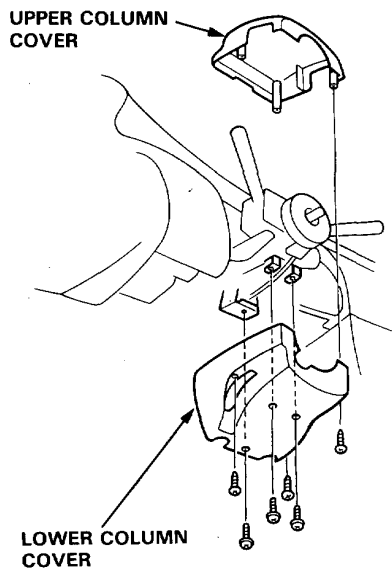
Supplemental Restraint System (SRS)

Slip Ring Removal

⚠ WARNING Store a removed airbag assembly with the pad surface up, if the airbag is improperly stored face down, accidental deployment could propel the unit with enough force to cause serious injury.

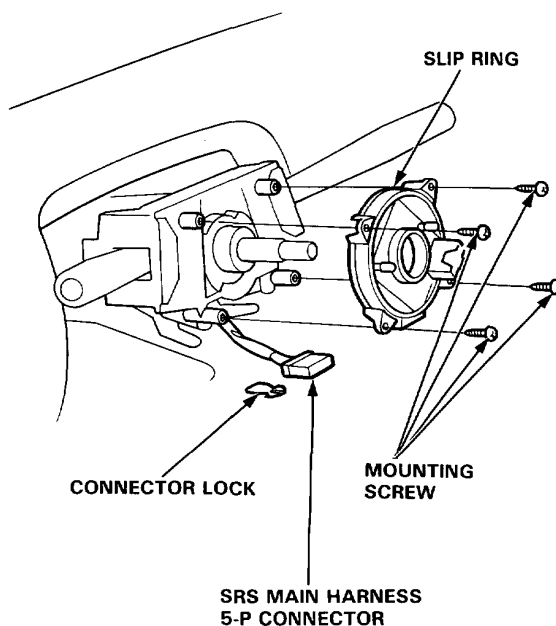
CAUTION:

- Before beginning work related to the SRS system, turn the ignition switch off, disconnect the negative and positive battery cables, and wait three minutes.
 - Do not install used SRS parts from another car. When repairing an SRS, use only new parts.
 - Do not disassemble the slip ring. It has no serviceable parts and has to be replaced as a whole.
 - The slip ring is a special part of models equippe with SRS. When replacing, be sure to use only a genuine HONDA spare part.
 - Make sure the wheels are aligned straight ahead. Remove the left airbag assembly mounting special bolt first (the safety switch will automatically turn off).
1. Turn the ignition switch off, then disconnect the negative and positive battery cables, and wait three minutes.
 2. Remove the airbag assembly (see page 23-398).
 3. Remove the steering wheel, then remove the upper and lower steering column covers.



4. Pull out the connector lock, then disconnect the SRS main harness 5-P connector from the slip ring.

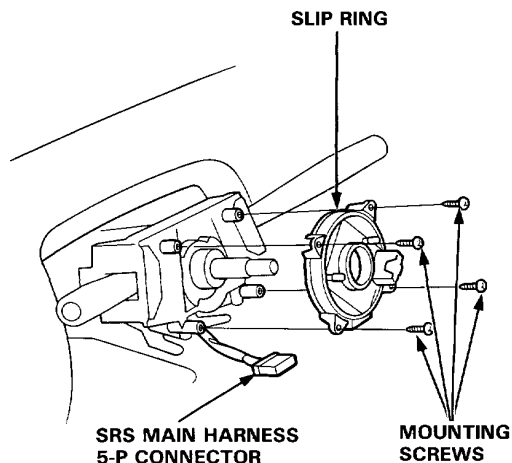
NOTE: Dispose of the connector lock, it is not to be reused.



5. Remove the 4 mounting screws, then remove the slip ring.

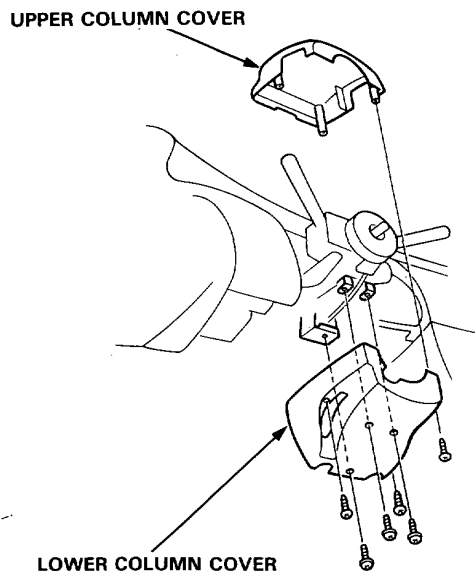
Slip Ring Installation

1. 2WS: Install the slip ring on the steering column, then connect the SRS main harness 5-P connector to the slip ring.

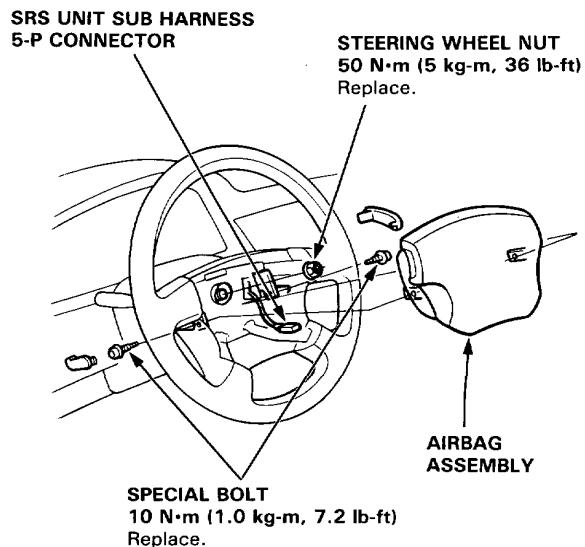


4WS: Be sure that the yellow mark on the front main steering angle sensor rotor faces downwards. If it doesn't, turn the rotor till it is in the neutral lock position (see section 17).

2. Install the steering column upper and lower covers.



3. Install the steering wheel.



4. Connect the SRS unit sub harness 5-P connector to the SRS unit.
NOTE: Model with 4WS
Check that the 4WS system is neutral (see section 17).
5. Place the airbag assembly into the steering wheel, and secure it with new special bolts.
NOTE: Be sure to torque the bolts as specified.
6. Reconnect the battery positive and negative cables.
7. After installing the slip ring, confirm proper system operation:
 - Turn the ignition to ON: the instrument panel SRS indicator light should go on for about 6 seconds and then go off.
 - The SRS self diagnosis indicator (LED) should blink one time with the ignition switch ON.

Wiring Diagrams

Index

Air Conditioner	23
Anti-lock Brake System	22
Automatic Transmission Control System	20
Battery	1
Blower Controls	23
Charging System	1
Cigarette Lighter	13
Clock	14
Cruise Control	19
Defogger, Rear Window	16
Fan Control	23
Fuel Injection System	24, 25
Gauges	3, 4
Heater Control	23
Horns	13
Ignition Switch	1
Ignition System	1
Indicator	
Brake System Light	4
Hazard Indicator Light	
(European models)	4
Lights-on Reminder	7
Low Fuel Indicator	4
Safety Indicator	6
Seat Belt Reminder (KY model)	7
Shift Lever Position Indicator	5
Integrated Control Unit	7
Lights, Exterior	
Back-up Lights	9
Brake Lights	6
Daytime Running Lights (KS model)	11
Dim-dip Headlights (KE model)	10
Hazard Lights	12
Headlights	8, 9, 10, 11
License Plate Lights	8, 9, 10, 11
Taillights	8, 9, 10, 11
Turn Signal Lights	12

Lights Interior	
Ashtray Light	13
Dash Lights Brightness Control	8, 9, 10, 11
Ceiling Lights	6
Courtesy Lights	6
Ignition Key Light	7
Trunk Light	6
Lighting System	8, 9, 10, 11
Locks, Power	17
Mirrors, Power	16
Seats, Heater (KS model)	19
Speed Alarm Unit	5
Starting System	1
Stereo Sound System	14
Sunroof	15
Supplemental Restraint System (SRS)	20
Side Marker/Turn Signal/Hazard	
Flasher System	12
Washer, Windshield	18
Washer, Headlights (KG and KS models)	18
Washer, Rear	18
Windows, Power	15
Wipers, Windshield	18
Wipers, Rear	18
4WS Control System	21
Fuel-Injection System Diagram (LHD)	
Fuel-Injection System Connectors (LHD)	
Fuel-Injection System Diagram (RHD)	
Fuel-Injection System Connectors (RHD)	