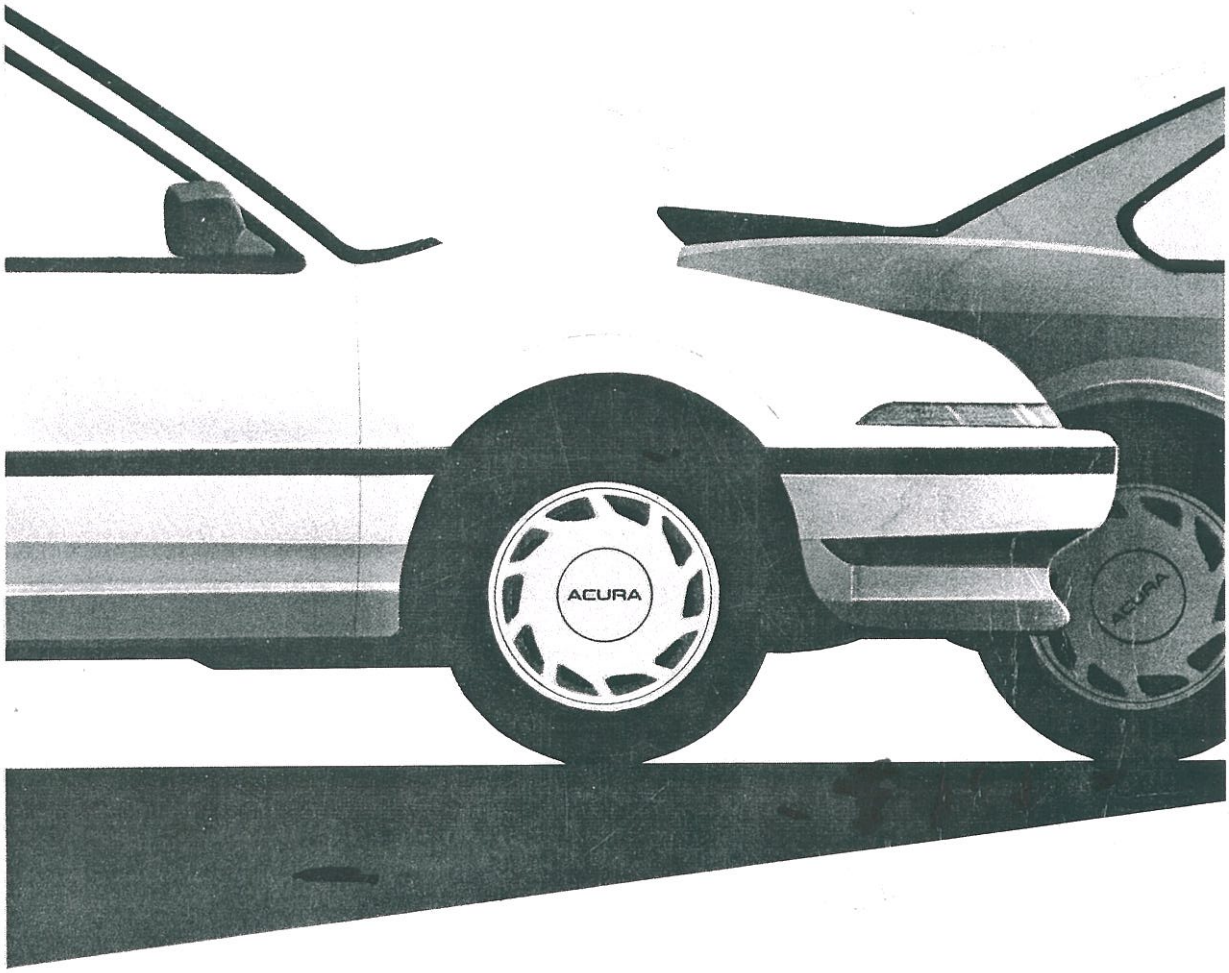
ACURA



INTEGRA

Service Manual 1986

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 one of the thumb index tabs on the front and back covers. 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.

Integra Owners

This Service Manual is distributed to new owners to assist in emergency repair situations, and to give background information about the mechanisms of the car. It contains many complex procedures best left to a skilled technician with the proper tools.

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 does contain warnings and cautions against some specific service methods which could cause PERSONAL INJURY, or could 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 American Honda, might be done, or of the possible hazardous consequences of each conceivable way, nor could American Honda investigate all such ways. Anyone using service procedures or tools, whether or not recommended by American Honda, *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
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Engine
Cooling
Fuel and Emissions
Transaxle
Steering
Suspension
Brakes
Body
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Electrical

General Information

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Chassis and Paint Codes

Vehicle Identification Number

JH 4 DA1 34*GS000001

Manufacturer Code
J: Japan
Vehicle Type
H4: Acura Passenger Car
Body Type and Engine Type
DA1: Integra 5Door D16A1
DA3: Integra 3Door D16A1
Transmission and Body Types
3: 5-speed 3D-Hatchback
4: Automatic 3D-Hatchback
7: 5-speed 5D-Hatchback
8: Automatic 5D-Hatchback
Grade
4: RS
5: LS
Check Digit
Model Year
G: 1986
Factory Code
S: Suzuka Factory
Serial Number

Transmission Number

CG–5100001

Transmission Type
CG: Manual 5-speed
CA: Automatic
Model Year
51: 1986 with CG
10: 1986 with CA
Serial Number

Paint Color Codes

Color code	Color
5D-Hatchback	
NH-92M	Gothic Gray Metallic
R-57M	Lisbon Red Metallic
NH-94M	Quartz Silver Metallic
B-39M	Riviera Blue Metallic
YR-60M	Champagne Beige Metallic
B-26MZ	Avignon Blue Metallic
3D-Hatchback	
B38	Capital Blue
NH-94M	Quartz Silver Metallic
B-39M	Riviera Blue Metallic
R-39	Victoria Red
R-57M	Lisbon Red Metallic
GY-13M	Toledo Green Metallic

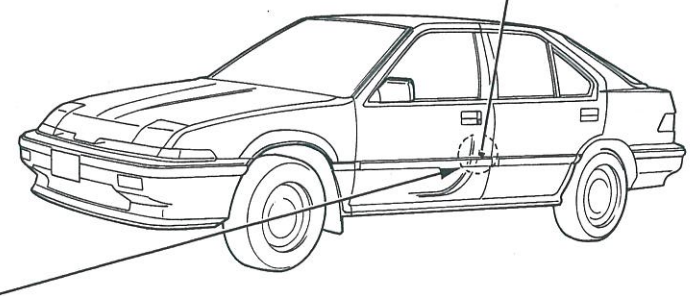
Engine Serial Number

D16A1-1000001

Engine Type
Model Year
1: 1986
Emission Group
0: California (CAL)
5: 49ST and HI ALT
Serial Number

Paint Code

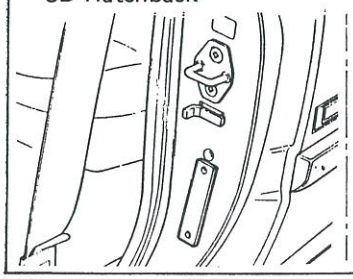
COLOR
NH-92M



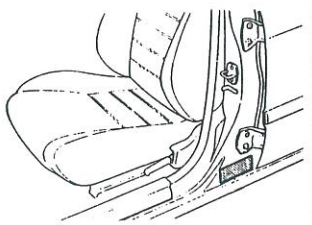
Chassis Number

and Federal Motor Vehicle
Safety Standard Certification.

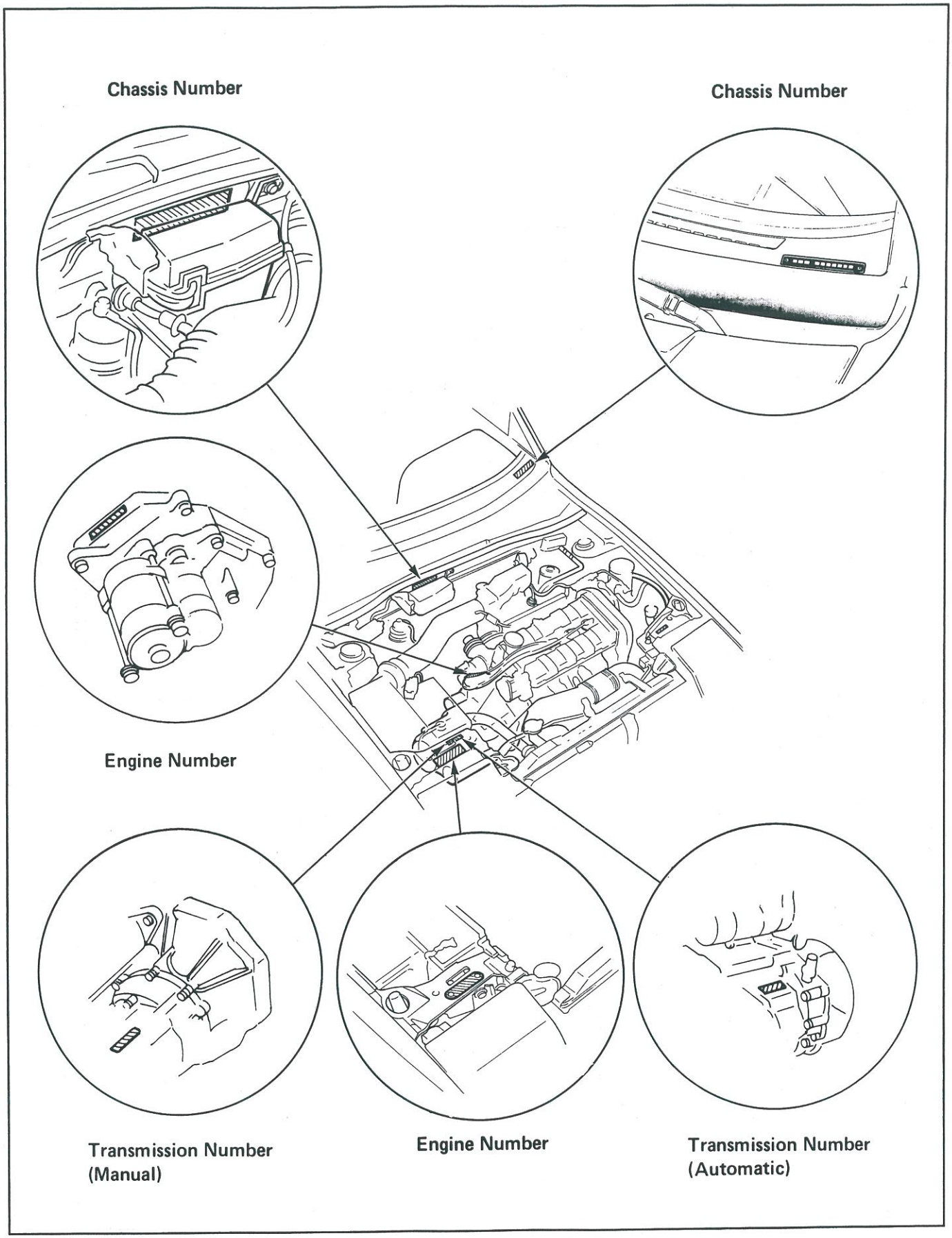
3D-Hatchback



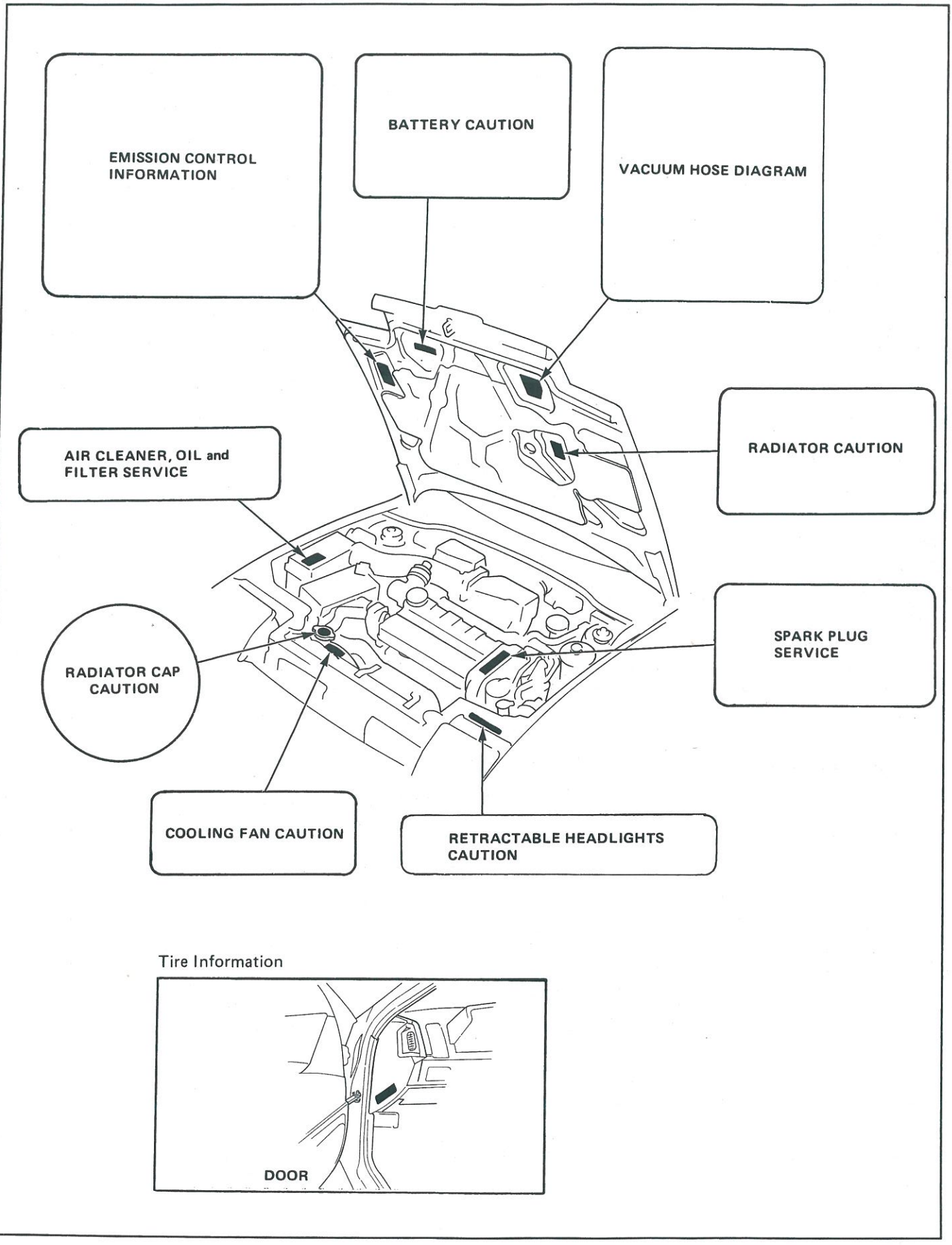
5D-Hatchback



Identification Number Locations



Label Locations

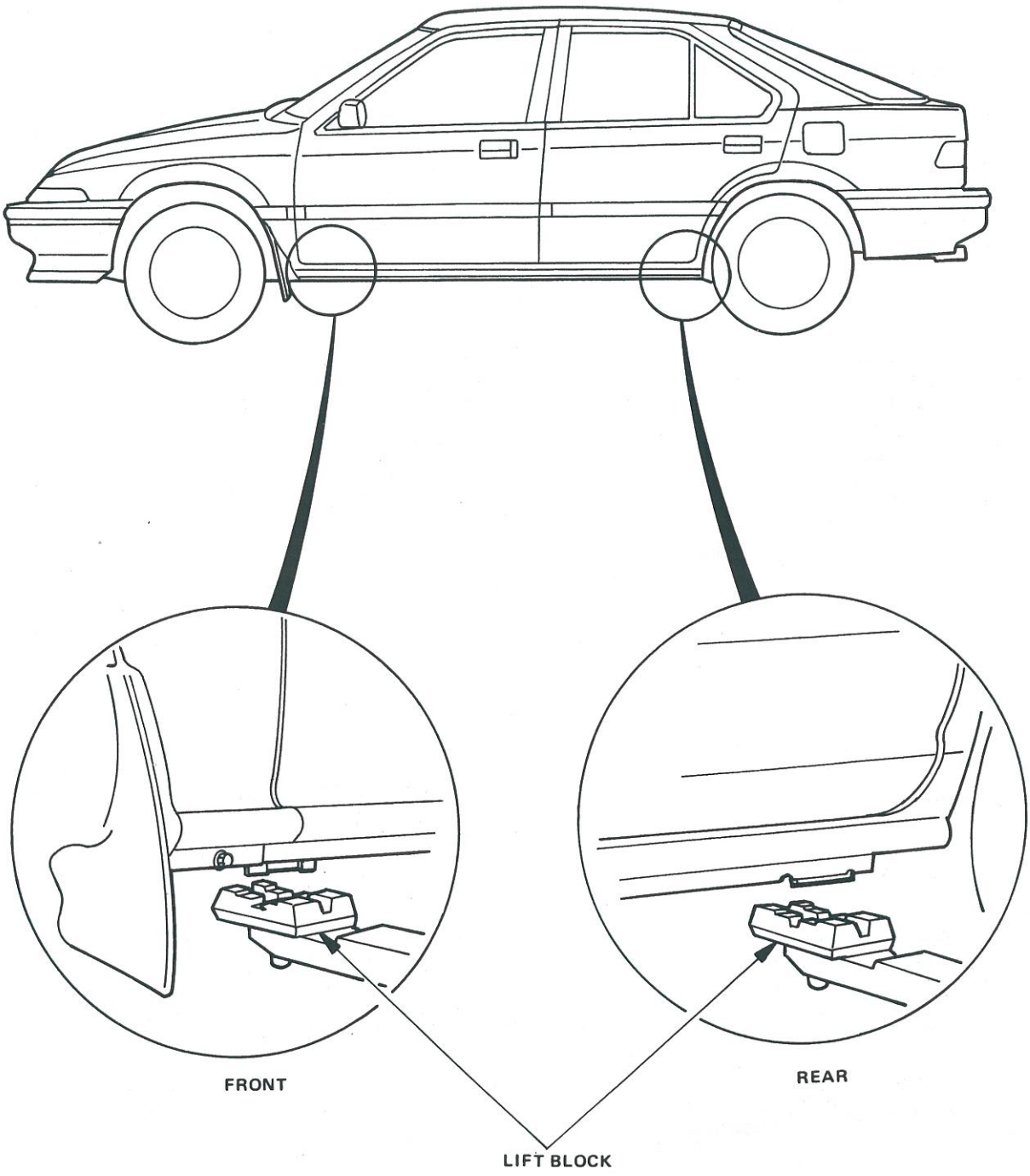


Tire Information

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.



(cont'd)

Lift and Support Points (cont'd)

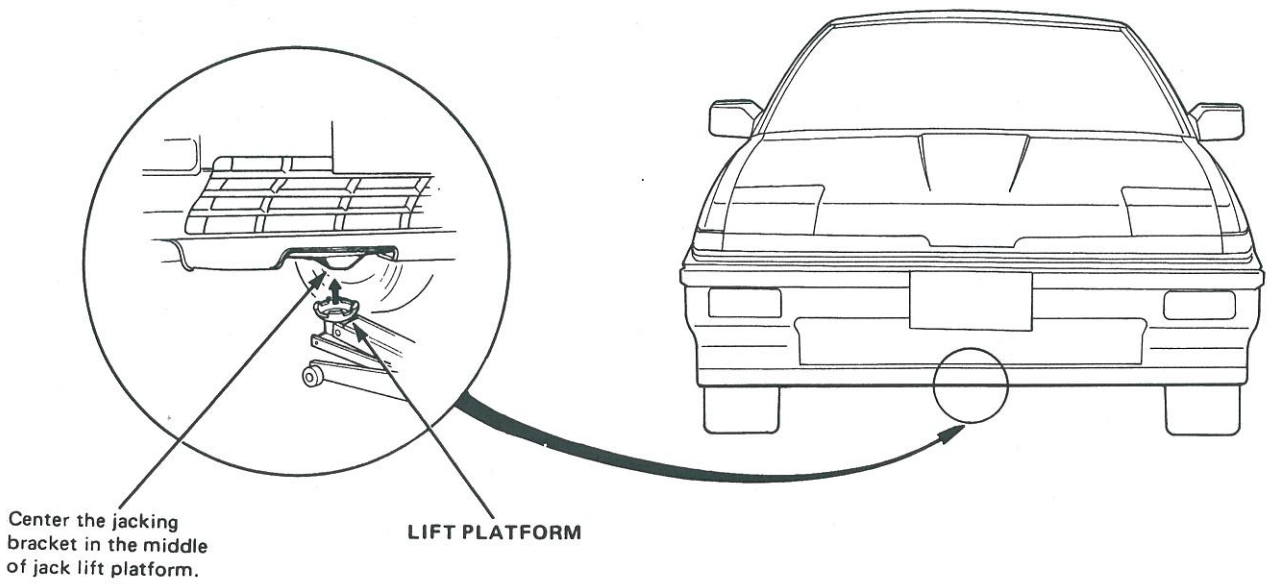
Floor Jack

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 1-7 so the car will be approximately level, then lower the car onto them.

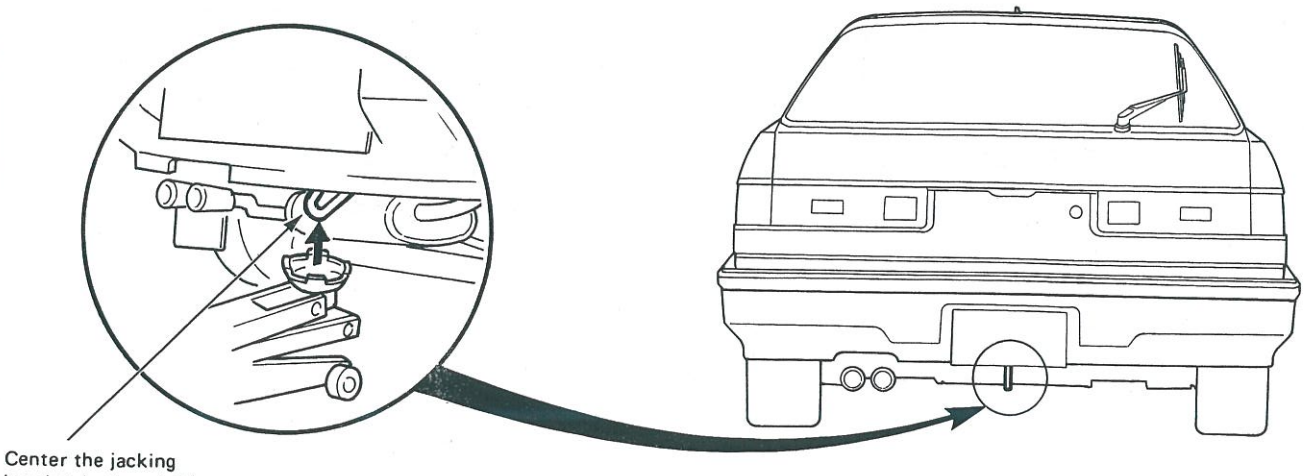
WARNING

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

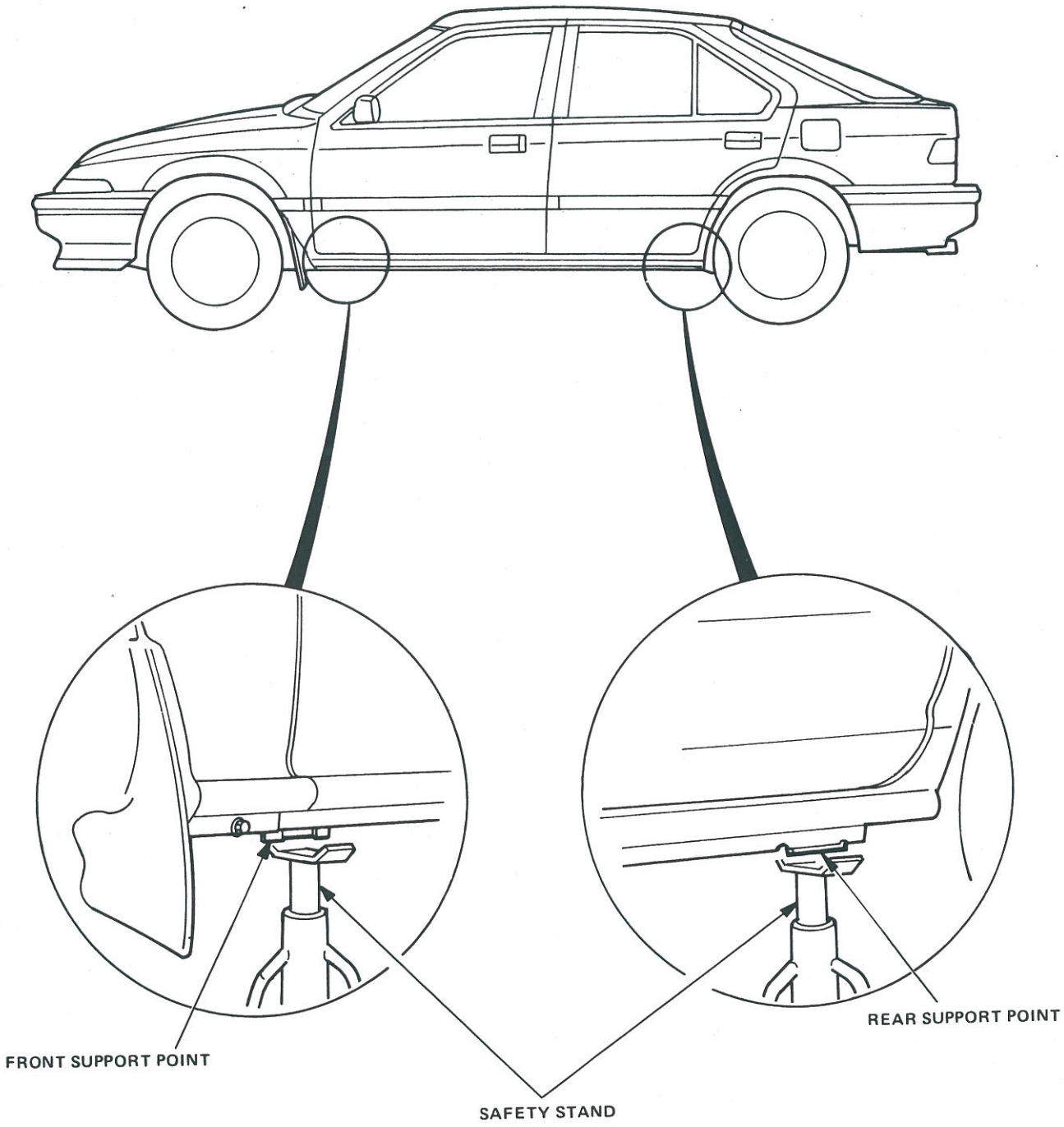
Front



Rear

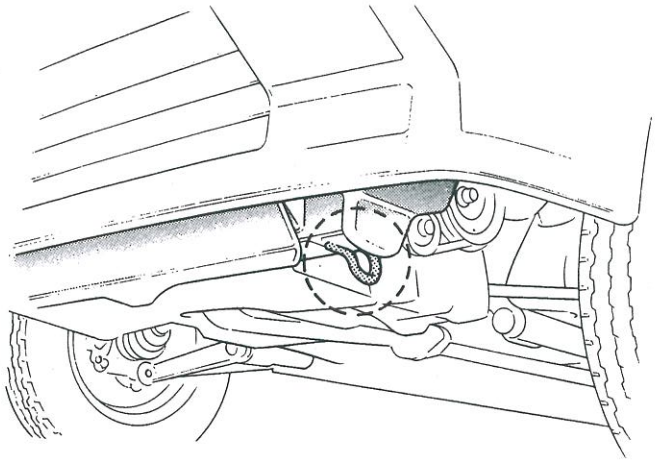


Safety Stands



Towing

If possible, always tow the car with the front wheels off the ground. Do not use the bumpers to lift the car or to support the car's weight while towing. Check local regulations for towing with a chain or frame-mounted tow bar. A chain may be attached to the hook shown in the illustration. Do not attach a tow bar to either bumper.



If the car is to be towed with four wheels on the ground, observe the following precautions:

1. Wheels and axle must not be touching the body or frame.
2. Turn the ignition key to the "I" position and make sure the steering wheel turns freely.
3. Place the transmission in NEUTRAL.
4. Release the parking brake.
5. DO NOT exceed 55 KPH (35 MPH) for distances of more than 80 km (50 miles).

Special Tools

Engine 2-2
Fuel/Emissions 2-2
Transaxle 2-2
Steering 2-3
Suspension 2-4
Brakes 2-4
Electrical 2-4

Special Tools

NOTE: Some tools may appear in more than one section of this list if they are used for more than one job.

Engine

TOOL NUMBER	DESCRIPTION	PAGE REFERENCE
K-D383&380 (Jaw), or Snap-on CF 711	Valve Spring Compressor	6-8
07757-PJ1010A	Valve Spring Compressor Attachment	6-8
07942—6570100or 07942—6110000	Valve Guide Driver,6.6mm	6-11
07743—0020000	Adjustable Valve Guide Driver	6-11
07984—6570100	Valve Guide Reamer,6.6mm	6-12
07947—SB00100	Oil Seal Driver	6-15
07973—6570002	Piston Pin Dis/Assembly Tool Set	7-11
07973—6570500	*Piston Base	7-11
07973—6570600	*Piston Base Spring	7-11
07973—SB00100	Piston Base Head	7-11
07973—PE00200	Piston Pin Collar	7-11
07973—PE00301	Adj. Piston Pin Driver	7-11
07973—PE00400	Piston Pin Base Insert	7-11
07749—0010000	Driver	7-16
07948—SB00101	Seal Driver Attachment	7-16
07947—6340000	Seal Driver	8-7

NOTE: (*) Included in Piston Pin Dis/Assembly Tool Set

Fuel/Emissions

07999—PD6000A	System Checker Harness	11-15
KS-AHM-32-003	Digital Multimeter	11-19
07GMJ-ML80100	Inspection Adapter	11-20
A973X-041-XXXXX or ST-AH-260-MC7	Vacuum Pump/Gauge, 0—30 in Hg	11-22
07406—0040000	Fuel Pressure Gauge Set	11-51
07920—SB20000	Fuel Sending Wrench	11-62
A9295-237-81167	Vacuum/Pressure Gauge, 0—4 in Hg	11-77

Transaxle

07924—PD20002	Ring Gear Holder	12-5
07974—6890101	Clutch Disc Alignment Tool	12-5
07923—6890101	Mainshaft Holder.Manual	13-6
07936—6340000	Bearing/Transmission Case Puller	13-7and14-54
07749—0010000	Driver	13-10and14-53
07947—6340500	Driver Attachment E	13-10and14-53
07936—A01000A	Adjustable Bearing Remover, 25 x 40 mm	13-10
07947—6340000	Seal Driver	13-11
07746—0010400	Attachment,52×55mm	13-11and16-7
07947—6110500	Seal Driver Attachment	13-30and14-53
07406—0020003	Oil Pressure Gauge Set	14-14
07406—0070000	Low Pressure Gauge	14-14
07923—6890202	Mainshaft Holder	14-20
07GAC—PF40100	Housing Puller	14-23
07GAE—PG40000	Clutch Spring Compressor Set	14-44
07960—6120100	*Clutch Spring Compressor Attachment	14-44
07GAE—PG40100	*Clutch Spring Compressor Attachment	14-44
07GAE—PG40200	*Clutch Spring Compressor Bolt Assembly	14-44

NOTE: (*) Included in Clutch Spring Compressor Set

Transaxle (cont'd)

TOOL NUMBER	DESCRIPTION	PAGE REFERENCE
07947—6340201	Driver Attachment	14-54
07GAC—PF40210	Bearing Remover Attachment	14-54
07746—0010500	Attachment, 62 × 68mm	14-54and16-8
07746—0030100	Driver	15-4
07941—6920002	Ball Joint Remover	16-2
07965—SD90100	Support Base	16-6
07746—0040900	Pilot, 40mm	16-6
07GAD—SE00100	Oil Seal Driver Attachment	16-8
07965—SD90200	Support Collar	16-8
07947—SD90200	Oil Seal Driver Attachment	16-9

Steering

07973—6920001	P/S Column Ajustment Guide	17-13
07916—SA50001	Steering Gear Box Lock Nut Wrench, 40mm	17-15
07406—0010101	P/S Pressure Gauge Set	17-16
07406—0010300	Oil Pressure Valve (Included with Pressure Gauge Set)	17-16
07406—0010400	Pressure Gauge (Included with Pressure Gauge Set)	17-16
07GAK—SE00110	P/S Adapter Joint(Pump)	17-16
07GAK—SE00120	P/S Adapter Joint(Hose)	17-16
07725—0030000	Universal Holder	17-19
07953—7190000	Collar Driver	17-24
07941—6920002	Ball Joint Remover	17-26
07947—6340300	Driver Attachment	17-33
07749—0010000	Driver	17-33
07746—0010300	Attachment, 42 × 47mm	17-38
07900—SA50000	P/S Seal Replacement Kit	(not shown)
07974—SA50100	*Piston Seal-Ring Guide	17-40
07974—SA50200	*Piston Seal-Ring Sizing Tool	17-41
07974—SA50300	*Cylinder End Packing Slider	17-42
07974—SA50400	*End Seal Guide	17-44
07974—SA50500	*End Cover Seal Guide	17-24
07974—SA50600	*Dust Seal Guide	17-33
07974—SA50900	*P/S Tool Kit Case	(not shown)
07908—6920000	Steering Gearbox Adjusting Wrench	17-47
07974—SA50800	Ball Joint Boot Clip Installation Guide	(not shown)

NOTE (*) Included in P/S Seal Replacement kit

Special Tools

Suspension

TOOL NUMBER	DESCRIPTION	PAGE REFERENCE
07410—0010200	Wheel Alignment Gauge Attachment B	18-3
07941—6920002	Ball Joint Remover	18-9
07965—6340100	Front Hub Dis/Assembly Tool Pin A	18-10
07GAF—SD40700	Hub Dis/Assembly Tool	18-10
07947—6340000	Seal Driver	18-11
07749—0010000	Driver	18-11
07965—SA00600	Front Hub Dis/Assembly Tool F	18-11
07746—0010600	Attachment, 72 × 75 mm	18-11
07965—6920101	Front Hub Dis/Assembly Tool A	18-11
07965—6920500	Front Hub Dis/Assembly Tool E	18-11
07965—6920200	Front Hub Dis/Assembly Tool B	18-11
07974—SA50700	Ball Joint Boot Clip Installation Guide	18-12
07965—SB2000A	Lower Control Arm R&R Set	
07965—SB2070A	*Engine Mount Spacer	18-16
07GAF—PH0010A	Transmission Support Bracket	18-17
07965—SB2020A	*Collets	18-17
07965—SB2010A	*Remover Shaft	18-17
07965—SB2030A	*Receiver	18-17
07965—SB2050A	*Bolt Assembly	18-17
07965—SB2080A	*Thrust Bearing	18-17
07965—SB2090A	*Nut	18-17
07965—SB2040A	*Assembly Pilot	18-18
07965—SB2060A	*Installer	18-18
07746—0030300	Inner Driver	18-25
07746—0030100	Driver	18-25

NOTE: (*) Included in Lower Control Arm R & R Set

Brakes

07749—0010000	Driver	19-21
07947—6890300	Driver Attachment C	19-21
07GAG—SE00100	Adjustable Bolt Gauge	19-24
07960—SA50002	Brake Spring Compressor	19-30
07914—SA50001	Snap Ring Pliers	19-30
07973—SA50000	Rear Caliper Guide	19-32

Electrical

07920—SB20000	Fuel Sender Wrench	23-70

Specifications

Standards and Service Limits 3–2
Design Specifications 3–9
Body Specifications 3–11

Standards and Service Limits

Cylinder Head/Valve Train — Section 6

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Compression	300 rpm and wide-open throttle		Nominal Minimum Maximum variation	1,323 kPa (13.5 kg/cm², 192 psi) 1,127 kPa (11.5 kg/cm², 164 psi) 196 kPa (2 kg/cm², 28 psi)
Cylinder head	Warpage Height		— 132.0(5.20)	0.05 (0.002) 131.8(5.19)
Camshaft	End play Oil clearance Runout Cam lobe height	 IN EX	0.05—0.15 (0.002—0.006) 0.050—0.089 (0.002—0.004) 0.03 (0.001) max. 32.568 (1.2822) 32.348(1.2733)	0.5 (0.02) 0.15 (0.006) 0.06 (0.002) — —
Valve	Valve clearance Valve stem O.D. Stem-to-guide clearance Stem installed height	IN EX IN EX IN EX IN EX	*0.13—0.17 (0.0051—0.0067) *0.15—0.19 (0.0059—0.0075) 6.58—6.59 (0.2591—0.2594) 6.55—6.56 (0.2579—0.2583) 0.02—0.05 (0.001—0.002) 0.05—0.08 (0.002—0.003) 45.78 (1.802) 44.97 (1.770)	— — 6.55 (0.258) 6.52 (0.257) 0.08 (0.003) 0.11 (0.004) 46.57 (1.833) 45.76 (1.802)
Valve seat	Width	IN and EX	1.25—1.55 (0.049—0.061)	2.0 (0.08)
Valve spring	Free length Squareness	IN EX Inner and Outer	45.8 (1.80) 47.1 (1.85) —	44.8 (1.76) 46.1 (1.81) 1.6 (0.063)
Valve guide	I.D.	IN and EX	6.61—6.63 (0.260—0.261)	6.65 (0.262)

* Setting point between camshaft and rocker arm.

Engine Block — Section 7

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Cylinder block	Warpage of deck surface Bore diameter Bore taper Reboring limit		0.07 (0.003) max. 75.00—75.02 (2.9528—2.9535) 0.07—0.012 (0.0003—0.0005) —	0.10 (0.004) 75.07 (2.9555) 0.05 (0.002) 0.5 (0.02)
Piston	Skirt O.D. Clearance in cylinder Piston-to-ring clearance	At 16 mm (0.63 in) from bottom of skirt (Top) (Second)	74.98—74.99 (2.9520—2.9524) 0.01—0.06 (0.0004—0.0024) 0.03—0.06 (0.0012—0.0024) 0.030—0.055 (0.0012—0.0022)	74.97 (2.9516) 0.07 (0.003) 0.13 (0.005) 0.13 (0.005)
Piston ring	Ring end gap (top and second) Ring end gap (oil)		0.15—0.35 (0.006—0.014) 0.20—0.70 (0.008—0.028)	0.6 (0.02) 0.8 (0.03)
Connecting rod	Pin-to-rod interference Large end bore diameter End play installed on crankshaft		0.014—0.040 (0.0006—0.0016) Nominal 48.0 (1.89) 0.15—0.30 (0.006—0.012)	— — 0.40 (0.016)
Crankshaft	Main Journal diameter Taper/out-of-round, main journal Rod Journal diameter Taper/out-of-round, rod Journal End play Runout		54.976—55.000 (2.1644—2.1654) 0.005 (0.0002) max. 44.976—45.000 (1.7707—1.7717) 0.005 (0.0002) max. 0.10—0.35 (0.004—0.014) 0.03 (0.0012) max.	— 0.010 (0.0004) — 0.010 (0.0004) 0.45 (0.018) 0.06 (0.002)
Bearings	Main bearing-to-journal oil clearance Rod bearing-to-journal oil clearance		0.024—0.042 (0.0009—0.0017) 0.020—0.038 (0.0008—0.0015)	0.05 (0.002) 0.05 (0.002)

Engine Lubrication — Section 8

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Engine oil	Capacity ℓ (US.qt., Imp.qt.)		4.0 (4.2, 3.5) After engine.disassembly 3.5 (3.7, 3.1) After oil change, including oil filter 3.0 (3.2, 2.6) After oil change, without oil filter	
Oil pump	Displacement Inner-to-outer rotor radial clearance Pump body-to-motor radial clearance Pump body-to-rotor side clearance		46 ℓ (9.7 US gal., 8.1 Imp gal.) 5,000 rpm 0.14 (0.006) max. 0.10—0.175 (0.004—0.007) 0.03—0.08 (0.001—0.003)	 0.2 (0.008) 0.2 (0.008) 0.15 (0.006)
Relief valve	Pressure setting	80°C (176°F) Idle 3,000 rpm	147 kPa (1.5 kg/cm², 21 psi) 412—539 kPa (4.2—5.5 kg/cm², 60—78 psi)	

Unit : mm(in.)

Cooling — Section 10

	MEASUREMENT	STANDARD (NEW)
Radiator	Capacity (incl.heater) ℓ (US.Gal.,Imp.Gal.)	Manual:5.6 (1.5,1.2) Includes reservoir tank 0.4 (0.11,0.09) Automatic:5.5 (1.5,1.2) Includes reservoir tank 0.4 (0.11,0.09)
	Pressure cap opening pressure	74—103 kPa (0.75—1.05 kg/cm²,11—15psi)
Thermostat	Starts to open Full open Valve lift at full open	76—78°C (169—173°F) 91°C (196°F) 8 (0.31) max.
Cooling fan	Fan-to-core clearance Thermoswitch "ON" temperature Thermoswitch "OFF" temperature	50 (1.97) 88.5—91.5°C (191—197°F) 85.5—86.5°C (186—188°F)

Fuel and Emissions — Section 11

	MEASUREMENT	STANDARD (NEW)
Fuel pump	Delivery pressure Displacement Relief valve opening pressure	250 kPa (2.5 kg/cm²,36 psi) 230 cc/min in 10 seconds 441—588 kPa (4.5—6.0 kg/cm²,64—85 psi)
Pressure Regulator	Pressure	230—270 kPa (2.35—2.75 kg/cm²,33—39 psi)
Fuel tank	Capacity	50 ℓ (13.2 US.Gal.,11.0 Imp.Gal.)
Idle	Fast idle	1,250—2,250 rpm
	Idle speed (rpm) with headlights and cooling fan off	Manual: 800±50 Automatic:800±50 (N-position)
	Idle CO	0.1%

Clutch — Section 12

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Clutch pedal	Pedal height Stroke Pedal play Disengagement height	144 (5.67) to carpet 135—140 (5.3—5.5) 16—21 (0.63—0.83) 56 (2.2) min.to carpet	— — — —
Clutch arm	Release arm adjustment	4.0—5.0 (0.16—0.20)	—
Flywheel	Clutch surface runout	0.05 (0.002) max.	0.15 (0.006)
Clutch plate	Rivet head depth Surface runout Thickness	1.3 (0.05) min. 0.8 (0.03) max. 8.1—8.8 (0.32—0.35)	0.2 (0.008) 1.0 (0.04) 5.7 (0.22)
Clutch release bearing holder	I.D. Holder-to-guide sleeve clearance	31.00—31.059 (1.220—1.223) 0.05—0.15 (0.002—0.006)	31.09 (1.224) 0.22 (0.009)
Clutch cover	Uneveness of diaphragm spring	0.6 (0.02) max.	1.0 (0.04)

Manual Transmission — Section 13

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission oil	Capacity ℓ (US.qt.,Imp.qt)	2.4 (2.5,2.1) at assembly 2.3 (2.4,2.0) at oil change	
Mainshaft	End play Diameter of needle bearing contact area Diameter of third gear contact area Diameter of ball bearing contact area Runout	0.10—0.35 (0.004—0.014) 27.920—27.980 (1.099—1.102) 31.984—32.000 (1.2592—1.2598) 24.980—24.993 (0.9835—0.9840) 0.04 (0.0016) max.	0.5 (0.02) 27.87 (1.097) 31.93 (1.2571) 24.93 (0.981) 0.10 (0.004)
Mainshaft third and fourth gears	I.D. End Play Thickness	37.009—37.025 (1.4570—1.4577) 0.03—0.18 (0.0012—0.0071) 31.42—31.47 (1.237—1.239)	37.07 (1.459) 0.3 (0.012) 31.3 (1.232)
Mainshaft fifth gear	I.D. End play Thickness	37.009—37.025 (1.4570—1.4577) 0.03—0.13 (0.0012—0.0051) 32.42—32.47 (1.276—1.278)	37.07 (1.459) 0.25 (0.01) 32.3 (1.272)
Countershaft	End play Diameter of needle bearing contact area Diameter of ball bearing contact area Diameter of low gear contact area Runout	0.10—0.35 (0.004—0.014) 33.000—33.015 (1.2992—1.2998) 24.980—24.993 (0.9835—0.9840) 33.984—34.000 (1.3380—1.3386) 0.04 (0.0016)	0.5 (0.02) 32.95 (1.297) 24.93 (0.981) 33.93 (1.336) 0.10 (0.004)

(cont'd)

Standards and Service Limits (cont'd)

Manual Transmission (cont'd) — Section 13

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Countershaft low gear	I.D. End play	39.008—39.025 (1.5357—1.5364) 0.03—0.08 (0.0012—0.0031)	39.07 (1.538) 0.18 (0.007)
Countershaft second gear	I.D. End play Thickness	43.008—43.025 (1.6932—1.6939) 0.03—0.10 (0.0012—0.0039) 30.42—30.47 (1.1976—1.1996)	43.07 (1.696) 0.18 (0.007) 30.3 (1.193)
Spacer collar (Countershaft second gear)	I.D. O.D. Length	30.98—30.99 (1.2197—1.2201) 37.989—38.000 (1.4956—1.4961) 30.53—30.55 (1.2020—1.2028)	31.4 (1.236) 37.93 (1.493) 30.51 (1.201)
Spacer collar (Mainshaft fourth and fifth gears)	I.D. O.D. Length	25.002—25.012 (0.9843—0.9847) 31.989—32.000 (1.2594—1.2598) 27.03—27.08 (1.0642—1.0661)	25.06 (0.987) 31.93 (1.257) 27.01 (1.063)
Reverse idler gear	I.D. Gear-to-reverse gear shaft clearance	17.016—17.043 (0.6699—0.6710) 0.032—0.077 (0.0013—0.0030)	17.09 (0.673) 0.15 (0.006)
Synchrosizer ring	Ring-to-gear clearance (ring pushed against gear)	0.73—1.18 (0.029—0.046)	0.4 (0.016)
Shift fork	Synchronizer sleeve gear Fork-to-synchrosizer sleeve clearance	6.75—6.85 (0.266—0.270) 0.35—0.65 (0.014—0.026)	6.0 (0.24) 1.0 (0.04)
Reverse shift fork	End gap Fork-to-reverse idler gear clearance Groove width Fork-to-fifth/reverse shift shaft clearance	11.8—12.1 (0.46—0.48) 0.2—1.0 (0.008—0.039) 7.05—7.25 (0.278—0.285) 0.05—0.35 (0.002—0.014)	— 1.7 (0.07) — 0.5 (0.02)
Shift arm	Width of groove in shift rod guide Shift arm-to-shift rod guide Width in shift guide Shift arm-to-shift guide clearance	11.8—12.0 (0.46—0.47) 0.05—0.35 (0.002—0.014) 7.9—8.0 (0.311—0.315) 0.1—0.3 (0.004—0.012)	— 0.8 (0.03) — 0.6 (0.02)
Shift rod guide	I.D. Guide-to-shaft clearance O.D. Guide-to-fifth/reverse shift shaft clearance	14.000—14.068 (0.5512—0.5539) 0.011—0.092 (0.0004—0.0036) 11.9—12.0 (0.469—0.472) 0.2—0.5 (0.008—0.020)	— 0.15 (0.006) — 0.8 (0.03)
Selector arm	Width Arm-to-shift rod guide clearance End gap Arm-to-interlock clearance Arm-to-holder clearance	11.9—12.0 (0.469—0.472) 0.05—0.25 (0.002—0.010) 10.05—10.15 (0.396—0.400) 0.05—0.25 (0.002—0.010) 0.01—0.20 (0.004—0.0079)	— 0.5 (0.02) — 0.7 (0.03) Selection with 5 types of shims

Automatic Transmission — Section 14

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission oil	Capacityl (US.qt.,Imp.qt.)	2.4 (2.5,2.1) at oil change 5.4 (5.7,4.8) at assembly	
Hydraulic pressure	Line pressure at 2,000 rpm 4th,3rd,2nd clutch pressure at 2,000 rpm 1st clutch pressure at 2,000 rpm Governor pressure at 60 km/h Throttle pressure A Throttle pressure B	834—883 kPa (8.5—9.0 kg/cm²,121—128 psi) 441—883 kPa (4.5—9.0 kg/cm²,64—128 psi) 834—883 kPa (8.5—9.0 kg/cm²,121—128 psi) 213—223kPa (2.17—2.27 kg/cm²,31—32 psi) 544—559 kPa (5.55—5.7 kg/cm²,79—81 psi) 834—883 kPa (8.5—9.0 kg/cm²,121—128 psi)	785 kPa (8.0 kg/cm²,114 psi) 392 kPa (4.0 kg/cm²,57 psi) with lever released 785 kPa (8.0 kg/cm²,114 psi) with throttle more than 3/8 OPEN 785 kPa (8.0 kg/cm²,114 psi) 208 kPa (2.12 kg/cm²,30 psi) 539 kPa (5.5 kg/cm²,78 psi) 785kPa (8.0 kg/cm²,114 psi)
Stall speed	Check with car on level ground	2,750 rpm	2,300—2,900rpm
Clutch	Clutch initial clearance 1st 2nd 3rd and 4th Clutch return spring free length 1st Except 1st Clutch disc thickness Clutch plate thickness Clutch end plate thickness Mark1 Mark2 Mark3 Mark4 Mark5 Mark6 Mark7 Mark8 Mark9 Mark10	0.65—0.85 (0.026—0.034) 0.65—0.80 (0.026—0.031) 0.4—0.6 (0.016—0.024) 31.0 (1.22) 30.5 (1.20) 1.88—2.0 (0.074—0.079) 1.55—1.65 (0.061—0.065) 2.3—2.4 (0.091—0.094) 2.4—2.5 (0.094—0.098) 2.5—2.6 (0.098—0.102) 2.6—2.7 (0.102—0.106) 2.7—2.8 (0.106—0.110) 2.8—2.9 (0.110—0.114) 2.9—3.0 (0.114—0.118) 3.0—3.1 (0.118—0.122) 3.1—3.2 (0.122—0.126) 3.2—3.3 (0.126—0.130)	— — — 29.0 (1.14) 28.5 (1.12) Until grooves worn out Discoloration ↕ Discoloration
Transmission	Diameter of needle bearing contact area on main and stator shaft Diameter of needle bearing contact area on mainshaft 2nd gear collar Diameter of needle bearing contact area on main 4th gear collar Diameter of needle bearing contact area on mainshaft 1st gear collar	19.980—19.993 (0.7866—0.7871) 35.975—35.991 (1.4163—1.4169) 31.975—31.991 (1.2588—1.2594) 27.975—27.991 (1.1014—1.1020)	Wear or damage ↕ Wear or damage

Automatic Transmission (cont'd) — Section 14

Unit : mm (in.)

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Transmissin (cont'd)	Diameter of needle bearing contact area on countershaft (L side)		36.004—36.017 (1.4175—1.4180)	Wear or damage
	Diameter of needle bearing contact area on countershaft 3rd gear		31.975—31.991 (1.2589—1.2595)	
	Diameter of needle bearing contact area on countershaft 4th gear collar		27.980—27.993 (1.1016—1.1021)	
	Diameter of needle bearing contact area on countershaft reverse gear cdllar		29.980—29.993 (1.1803—1.1808)	
	Diameter of needle bearing contact area on countershaft L gear collar		29.980—29.993 (1.1803—1.1808)	
	Diameter of needle bearing contact area on reverse Idle gear		13.990—14.000 (0.5508—0.5512)	
	Diameter of needle bearing contact area on main and stator shaft (stator side)		19.980—19.993 (0.7866—0.7871)	
	Reverse idler shaft holder diameter		14.416—14.434 (0.5676—0.5683)	
	Mainshaft 1st gear I.D.		33.000—33.016 (1.2992—1.2998)	
	Mainshaft 2nd gear I.D.		41.000—41.016 (1.6141—1.6148)	
	Mainshaft 4th gear I.D.		38.000—38.016 (1.4961—1.4966)	
	Countershaft 1st gear I.D.		35.000—35.016 (1.3780—1.3786)	
	Countershaft 3rd gear I.D.		38.000—38.016 (1.4961—1.4966)	
	Countershaft 4th gear I.D.		33.000—33.016 (1.2992—1.2998)	
	Countershaft reverse gear I.D.		36.000—36.016 (1.4173—1.4179)	
	Reverse Idle gear I.D.		18.007—18.020 (0.7086—0.7094)	
	Stator camshaft needle bearing bore I.D. (R.side)		26.000—26.013 (1.0236—1.0241)	
	Stator camshaft needle bearing contact and I.D. (Stator side)		24.000—24.021 (0.9449—0.9457)	Wear or damage
	Mainshaft 4th gear end play		0.10—0.22 (0.004—0.009)	—
	Mainshaft 2nd gear end play		0.07—0.15 (0.003—0.006)	—
	Mainshaft 1st gear end play		0.08—0.24 (0.0031—0.0094)	—
	Countershaft 1st gear end play		0.05—0.20 (0.002—0.008)	—
	Countershaft 3rd gear end play		0.07--0.15 (0.003—0.006)	—
	Countershaft 4th gear end play		0.07—0.15 (0.003—0.006)	—
	Reverse idle gear end play		0.05—0.18 (0.0020—0.0071)	—
	Countershaft reverse gear end play		0.05—0.20 (0.002—0.008)	—
	Reverse gear hub O.D.		51.87—51.90 (2.0421—2.0433)	Weam or damage
	Thrust washer thickness Mainshaft 2nd gear	A	3.47—3.50 (0.137—0.138)	—
		B	3.52—3.55 (0.139—0.140)	—
		C	3.57—3.60 (0.141—0.142)	—
		D	3.62—3.65 (0.143—0.144)	—
		E	3.67—3.70 (0.145—0.146)	—
		F	3.72—3.75 (0.147—0.148)	—
		G	3.77—3.80 (0.149—0.150)	—
		H	3.82—3.85 (0.151—0.152)	—
		I	3.87—3.90 (0.152—0.154)	—
	Thrust washer thickness Countershaft 3rd gear	A	2.97—3.00 (0.1169—0.1181)	—
		B	3.02—3.05 (0.1189—0.1201)	—
		C	3.07—3.10 (0.1209—0.1220)	—
		D	3.12—3.15 (0.1228—0.1240)	—
		E	3.17—3.20 (0.1248—0.1260)	—
		F	3.22—3.25 (0.1268—0.1280)	—
		G	3.27—3.30 (0.1287—0.1299)	—
		H	3.32—3.35 (0.1307—0.1319)	—
		I	3.37—3.40 (0.1327—0.1339)	—
	Countershaft distance collar length	A	33.97—34.00 (1.337—1.339)	—
		B	34.02—34.05 (1.339—1.341)	—
		C	34.07—34.10 (1.341—1.343)	—
		D	34.12—34.15 (1.343—1.344)	—
		E	34.17—34.20 (1.345—1.346)	—
		F	34.22—34.25 (1.347—1.348)	—
		G	34.27—34.30 (1.349—1.350)	—
	Mainshlft L side bearing		2.95—3.05 (0.1161—0.1201)	Wear or damage
	Mainshlft 1st gear R side		2.43—2.50 (0.0957—0.0984)	Wear or damage
	Thrust washer thickness (mainshaft 1st gear L side)		1.45—1.50 (0.057—0.059)	Wear or damage
	Mainshaft 4th gear collar length		40.00—40.05 (1.5748—1.5768)	—
	Mainshaft 1st gear collar length		25.0—25.15 (0.984—0.0990)	—
	Mainshaft 1st gear collar flange thickness		2.5—2.6 (0.098—0.102)	Wear or damage
	Countershaft reverse gear collar length		14.50—14.55 (0.531—0.535)	—
	Countershaft reverse gear collar flange thickness		2.45—2.55 (0.096—0.100)	Wear or damage
	Countershaft 1st gear collar length		13.5—13.6 (0.0020—0.0035)	—
	Countershaft 1st gear collar flange thickness		2.4—2.6 (0.0095—0.102)	Wear or damage
	Diameter of countershaft one-way clutch contact area		74.414—74.440 (2.9297—2.9307)	Wear or damage
	Diameter of parking gear one-way clutch contact area		57.755—57.768 (2.2738—2.2743)	Wear or damage
	Mainshaft feed pipe A: O.D. (at 15mm from end)		8.970—8.980 (0.353—0.354)	8.95 (0.352)
	Mainshaft feed pipe B: O.D. (at 12mm from end)		5.97—5.98 (0.2350—0.2354)	5.95 (0.234)
	Countershaft feed pipe O.D. (at 20mm from end)		7.97—7.98 (0.3138—0.3142)	7.95 (0.31)
	Mainshaft seallng ring 32 mm thickness		1.980—1.995 (0.0780—0.0785)	1.8 (0.071)
	Mainshaft bushing I.D.		6.018—6.030 (0.2369—0.2374)	6.045 (0.238)
	Mainshaft bushing I.D.		9.000—9.015 (0.3543—0.3549)	9.03 (0.356)
	Countershaft bushing I.D.		8.000—8.015 (0.3150—0.3156)	8.03 (0.316)
	Mainshaft sealing ring groove width		2.025—2.060 (0.0797—0.0811)	2.08 (0.082)

(cont'd)

Standard and Servise Limits (cont'd)

Automatic Transmission (cont'd) — Section 14

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Regulator valve body	Sealing ring contact area diameter	32.000—32.025 (1.2598—1.2608)	32.05 (1.26)
Shifting device and parking brake control	Reverse shift fork thickness	5.9—6.0 (0.232—0.236)	5.4 (0.21)
	Parking brake ratchet pawl	—	Wear or other defect
	Parking gear	—	Wear or other defect
	Throttle cam stopper	18.5—18.6 (0.7283—0.7323)	—
Servo body	Shift fork shaft bore I.D. A	14.000—14.005 (0.5512—0.5514)	—
	B	14.006—14.010 (0.5514—0.5516)	—
	C	14.011—14.015 (0.5516—0.5518)	—
	Shift fork shaft valve bore I.D.	37.000—37.039 (1.4567—1.4582)	37.045 (1.4585)
Valve body	Oil pump gear side clearance	0.03—0.05 (0.0012—0.0020)	0.07 (0.0028)
	Oil pump gear-to-body clearance	Drive: 0.210—0.266 (0.0083—0.0105)	—
		Driven: 0.05—0.088 (0.002—0.0035)	—
	Oil Pump driven gear I.D.	14.016—14.034 (0.5518—0.5525)	Wear or damage
	Oil Pump shaft O.D.	13.980—13.990 (0.5504—0.5508)	Wear or damage

Springs		Wire Dia	O.D.	No. of Coils	Free Length
	Regulator valve spring A	1.8 (0.07)	14.7 (0.58)	17	88.6 (3.49)
	Regulator valve spring B	1.8 (0.07)	6.0 (0.24)	7.5	44.0 (1.73)
	Stator reaction spring	6.0 (0.24)	26.4 (1.04)	2	30.3 (1.19)
	Torque converter check valve spring	1.1 (0.04)	8.4 (0.33)	12	36.4 (1.43)
	Relief valve spring	0.8 (0.03)	8.4 (0.33)	15	47.7 (1.88)
	2nd orifice control valve spring	0.8 (0.03)	6.6 (0.26)	27.6	46.3 (1.82)
	Servo orifice control valve spring	0.8 (0.03)	6.1 (0.24)	20.7	39.4 (1.55)
	Throttle control valve A spring	1.1 (0.04)	8.5 (0.33)	8.1	22.3 (0.88)
	Throttle control valve A adjuster spring	0.8 (0.03)	6.2 (0.24)	8.5 or 8.0	27.0 (1.06) or 30.0 (1.18)
	Throttle control valve B spring	1.4 (0.06)	8.5 (0.33)	8.4	41.4 (1.63)
	1—2 shift spring	0.5 (0.02)	4.4 (0.17)	38	47.2 (1.86)
	1—2 shift ball spring	0.45 (0.02)	4.5 (0.18)	11	12.7 (0.50)
	2—3 shift spring	0.9 (0.04)	7.6 (0.30)	27	63.0 (2.48)
	2—3 shift ball spring	0.5 (0.02)	4.5 (0.18)	10	12.3 (0.48)
	3—4 shift spring	0.9 (0.04)	9.6 (0.38)	10	32.8 (1.29)
	3—4 shift ball spring	0.5 (0.02)	4.5 (0.18)	7	11.6 (0.46)
	Low accumulator A spring	2.74×2.96 (0.11×0.12)	26.8 (1.06)	4.4	38.8 (1.53)
	Low accumulator B spring	2.6 (0.10)	12.0 (0.47)	3.2	24.6 (0.97)
	4th accumulator spring	2.9 (0.11)	18.6 (0.73)	17	100.4 (3.95)
	2nd accumulator spring	3.5 (0.14)	20.2 (0.80)	11	76.8 (3.02)
	3rd accumulator spring	2.0×3.3 (0.08×0.13)	15.5 (0.61)	20	81.4 (3.20)
	LC control spring	1.4 (0.06)	8.6 (0.34)	25	58.3 (2.26)
	LC timing valve A spring	1.2 (0.04)	8.6 (0.34)	20	51.6 (2.03)
	LC timing valve B spring	1.1 (0.04)	7.6 (0.30)	29.4	61.2 (2.41)
	CPC valve spring	1.4 (0.06)	9.4 (0.32)	10.9	31.6 (1.24)
	Servo return spring	2.6 (0.10)	23.6 (0.93)	3.3	40.3 (1.59)
	Governor spring A	1.0 (0.04)	18.8 (0.74)	4	38.1 (1.50)
	Governor spring B	0.9 (0.04)	11.8 (0.46)	6	27.8 (1.09)
	LC shift valve spring	1.1 (0.04)	8.1 (0.32)	22.3	51.8 (2.04)
	LC cut valve spring	0.7 (0.03)	7.6 (0.30)	18	29.0 (1.14)
	Kick down valve spring	1.0 (0.04)	6.6 (0.26)	33.4	58.5 (2.3)
	REV control spring	0.8 (0.03)	7.6 (0.30)	17.2	36.1 (1.4)
	Accumulator control spring	1.4 (0.06)	7.7 (0.30)	17	38.7 (1.52)
	Timing accumulator spring	1.1 (0.04)	11.7 (0.46)	6.6	28.2 (1.11)

Differential — Section 15

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Ring gear	Backlash	0.14—0.20 (0.006—0.008)	0.25 (0.010)
Differential carrier	Pinion shaft bore diameter	18.000—18.018 (0.7087—0.7094)	18.1 (0.71)
	Carrier-to-pinion shaft clearance	0.016—0.052 (0.0006—0.0020)	0.1 (0.004)
	Driveshaft bore diameter	28.00—28.021 (1.1024—1.1032)	—
	Carrier-to-driveshaft clearance	0.020—0.066 (0.0010—0.0026)	0.12 (0.005)
	Side clearance	0.10—0.20 (0.004—0.008)	0.15 (0.006)
Differential pinion gear	Backlash	0.05—0.15 (0.002—0.006)	0.2 (0.008)
	Pinion gear bore diameter	18.041—18.061 (0.7103—0.7111)	—
	Pinion gear-to-pinion shaft clearance	0.057—0.095 (0.0022—0.0037)	0.15 (0.006)

Driveshaft—Section 16

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Driveshaft	Right boot	As installed	477.2—482.2 (18.79—18.98)	—
	Left boot	As installed	477.2—482.2 (18.79—18.98)	—

Unit : mm (in.)

Power Steering—Section 17

	MEASUREMENT	STANDARD(NEW)	SERVICE LIMIT
Steering wheel	Play	10.0(0.39)Max	—
	Pinion-starting torque N-m(kg-m, lb-ft)	1.2(0.12, 0.87)Max,	—
	Pump pressure with valve closed(Oil temp./speed: 40°C(104°F)min/idle. Do not run for more than 5 seconds) kPa(kg/cm², psi)	7,845—8,826 (80—90, 1,138—1,280)	
	Fluid capacity Reservoir	0.25 ℓ (0.26 US. qt.,0.22Imp.qt.)	
	At change	1.2 ℓ (1.3 US. qt.,1.1Imp.qt.)	
Power steering Pump belt	Deflection midway between pulleys/load	18—22(0.7—0.9)/98N(10kg, 22lb) for used belt 18—20(0.7—0.8)/98N(10kg, 22lb) after replacement of belt	

Suspension—Section 18

	MEASUREMENT		STANDARD(NEW)		SERVICE LIMIT
Wheel alignment	Camber		Front −0°30′±1°	Rear −0°45′±15′	
	Caster		2°10′±1°		
	Toe-in		−1±3 (−0.039±0.118)	2±2 (0.079±0.079)	
	Kingpin inclination		13°±1/2°		
	Steering angle R/L	Inside	40°00′±2°		
		Outside	33°00′±2°		
Wheel	Rim runout Steel.	Axial	0—1.0(0—0.039)		—
		Radial	0—1.0(0—0.039)		—
	Alumium	Axial	0—0.7(0—0.028)		—
		Radial	0—0.7(0—0.028)		—
Front spring	Clearance btween wheel arch and ground		653 (25.7)		638—668(25.1—26.3)

Brake—Section 19

	MEASUREMENT		STANDARD(NEW)	SERVICE LIMIT
Parking brake lever	Play stroke 200N(20kg, 44 lbs)		To be locked when pulled 4—8notches	
Foot brake pedal	Pedal height		174(6.8)to floor	—
	Free play		1—5(0.04—0.20)	5(0.20)
Master cylinder	Piston-to-push rod clearance		0—0.4(0—0.016)	—
Disc brake	Disc thickness	Front	19.0(0.75)	17.0(0.67)
		Rear	10.0(0.39)	8.0 (0.31)
	Disc runout	Front/Rear	0—0.1(0.004) 10—0.15(0.006)	0.10(0.004)/0.15 (0.006)
	Disc parallellism		0.007(0.0003)	0.015(0.0006)
	Pad thickness	Front	9.5(0.37)	3.0(0.12)
		Rear	8.0(0.31)	1.6(0.06)

		Vacuum(mmHg)	Pedal Pressure kg(lbs)	Line Pressure kg/cm²(psi)
Brake Booster	Characteristic	0	20(44)	13 (185)min
		300	20(44)	54 (768)min
		500	20(44)	73 (1,038)min

Standards and Service Limits (cont'd)

Engine Electrical — Section 23

Unit : mm (in.)

	MEASUREMENT	STANDARD (NEW)			
Ignition coil	Rated voltage Perfomance winding resistance Secondary winding resistance	12 Volts 1.215—1.485 ohms 9.040—13.560 ohms			
Ignition wire	Resistance	25.000 ohms max			
Spark plug	Type Standard	NGK : BCPR6EY-11, BCPR6EY-N11, ND : Q20PR-U11			
	Gap	1.0—1.1(0.039—0.043)			
Ignition timing	At idling	12±2° BTDC			
Battery	Lighting capacity (20-hour radio) Starting capacity (5-second ratio)	47 Ampere Hours 8.4 V minimum at 300 Ampere draw			
Alternator		ND			
	Output	13.5V/65 A at 6,000rpm		55A at 5,000rpm	
		STANDARD (NEW)		SERVICE LIMIT	
	Coil resistance (rotor) Slip ring O.D. Brush length Brush spring tension	2.9 ohm 14.4 (0.57) 10.5 (0.41) 330g (11.6oz)		2.8—3.0 ohms 13.5 (0.53) 5.5 (0.22) 200g (7.05oz)	
Alternator belt	Deflection midway between pulleys/load	6—9 (0.24—0.35/98N (10kg. 22lb) for used belt 4—6 (0.16—0.24)/98N (10kg. 22lb) after replacement of belt			
Starting motor		ND 1.4kW		MITSUBA 1.4kW	
	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT	STANDARD (NEW)	SERVICE LIMIT
	Mica depth	0.5—0.8 (0.020—0.031)	0.2 (0.008)	0.4—0.5 (0.016—0.020)	0.15 (0.006)
	Commutator runout	0—0.02 (0.0008)	0.05 (0.002)	0—0.02 (0.0008)	0.05 (0.002)
	Commutator O. D.	30.0 (1.18)	29.0 (1.14)	28.1 (1.11)	27.5 (1.08)
	Brush length	14.5—15.5 (0.57—0.61)	8.5 (0.33)	14.3—14.7 (0.56—0.58)	9.3 (0.37)
	Spring pressure (new)	1.75kg (3.3lb)	——	2.1kg (4.6lb)	——

Design Specifications

Unit : mm (in.)

	ITEMS			METRIC	ENGLISH	NOTES
DIMENSIONS	Overall Length		5D	4,350 mm	171.3 in.	
			3D	4,280mm	168.5 in.	
	Overall Width			1,665 mm	65.6 in.	
	Overall Height			1,345 mm	53.0 in.	
	Wheelbase		5D	2,520 mm	99.2 in.	
			3D	2,450 mm	96.5 in.	
	Track F/R			1,420/1,435 mm	55.9/56.5 in.	
	Ground Clearance			160 mm	6.3 in.	
	Seating Capacity			Five		
WEIGHTS	Curb Weight	5D	5-MT RS	1,084 kg	2,390 lb.	5MT : 5 speed manual Transmission 4AT : 4 speed automatic transmission Curb weight : +A/C−22kg(49 lb.) +Cargo−45kg. (99 lb.) +Passesgers−68 kg ×5 (150 lb. ×5) +Tolerance = G. V. W. R.
			LS	1,096 kg	2,416 lb.	
			4-AT RS	1,100 kg	2,425 lb.	
			LS	1,112 kg	2,452 lb.	
		3D	5-MT RS	1,055 kg	2,326 lb.	
			LS	1,069 kg	2,357 lb.	
			4-AT RS	1,071 kg	2,361 lb.	
			LS	1,085 kg	2,392 lb.	
	Gross Vehicle Weight Rating			1,535 kg	3,385 lb.	
	Carrying (Cargo) Weight Capacity			45 kg	99 lb.	
ENGINE	Type			Water cooled, 4-cycle D.O.H.C 16 valves		
	Cylinder Arrangement			4-cylinder in-line, transverse		
	Bore and Stroke			75.0×90.0 mm	2.95×3.54 in.	
	Displacement			1,590㎤	97cu. in	
	Compression Radio			9.3 : 1		
	Valve Train			Timing belt driven, double overhead camshaft		
	Lubrication System			Trochoid pump		
	Fuel Required			Unleaded grade gasoline with 91 research octane number or higher.		
STARTER	Type			Gear reduction		
	Normal			1.4kW		
	Nominal voltage			12 V		
	Hour rating			30 seconds		
	Direction of rotation			Clockwise as viewed from gear end		
	Weight		ND	4.6kg	101.1 lb.	
			MITSUBA	3.7 kg	82 lb.	
TRANSMISSION	Clutch		4-AT	Torque Converter		
			5-MT	Single plate dry, diapcragm spring		
	Transmisson		4-AT	4 forward speeds reverse with torque coverter		
			5-MT	Synchronized 5 forward 1 reverse		
	Primary Reduction			Direct 1:1		
	Gear Ratio			5-MT	4-AT	
			1 st	3.181	2.705	
			2 nd	1.944	1.560	
			3 rd	1.347	1.031	
			4 th	1.033	0.777	
			5 th	0.848	—	
			Reverse	3.000	1.954	
	Final Reduction		4-AT	Single helical gear, 4.214		
			5-MT	Single helical gear, 4.214		
	Clutch Lining Area			160 cm²	24.8 sq. in.	
AIR CONDITIONER	Cooling capacity			4,130 kcal/h	(16.386 Btu/h)	
	−Conditions :					
	Compressor rpm			1,800 rpm		
	Outside air temperature			27.5°C	81.5°F	
	Outside air humidity			50%		
	Condenser air temperature			35°C	95°F	
	Condenser air velocity			4.5 m/sec.		
	Blower capacity			390 m³/h	13,771 cu. ft/h	
	Compressor	Type		Swash type		
		No of cylinders		10		
		Piston Displacement		153 cc/rev.	9.15 cu. in/rev.	
		Max. rpm		7,000 rpm		
		Lubricant/capacity		70−90 cc	2.4−3.0 US oz	
	Condenser			Corrugated fin type		
	Evaporator			Corrugated fin type		
	Blower	Type		Sirocco fan		
		Motor input		175 W (12 V)		
		Speed control		4 Position		
		Max. capacity		390 m³/h	(13.77 cu. ft/h)	
	Temp. Control			Air-mix type		
	Comp. Clutch	Type		Dry, single plate, V-belt driver		
		Power consumption		40 W max. (12 V)		
	Refrigerant	Type		R-12		
		Quantity		0.85−0.95 kg	(1.87−2.09 lbs.)	

(cont'd)

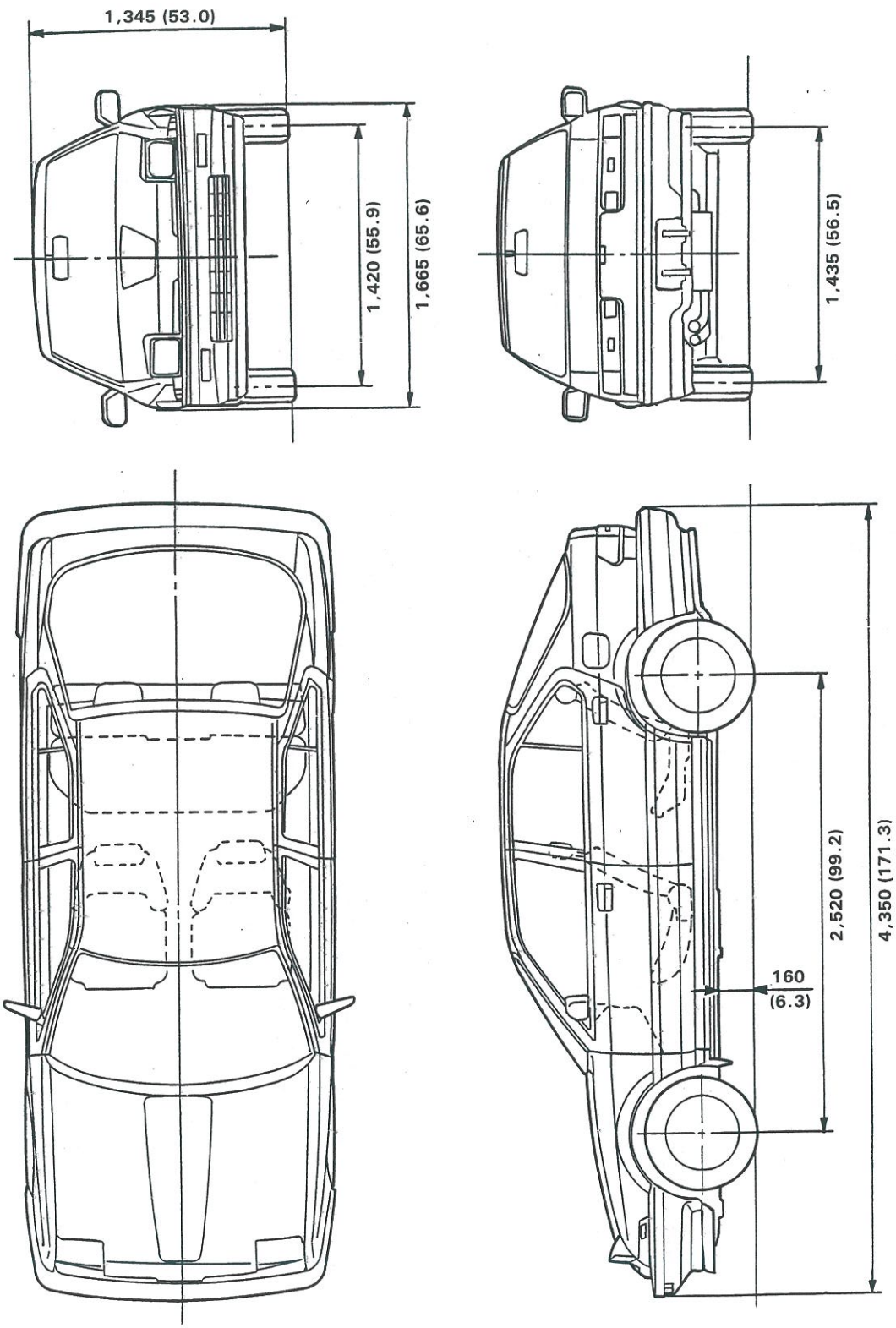
Design Secifications (cont'd)

	ITEMS	METRIC	ENGLISH	NOTES
STEERING	Gear Type	Rack and Pinion		
	Overall Ratio	18.0 : 1		
	Turns, lock-to-lock	3.64		
	Steering Wheel Diameter	377mm	14.8 in.	
	Power Steering Oil capacity	1.2 lit.	1.3 US. qt., 1.1 Imp. qt.	
	Power Steering Oil	Genuine Power Steering Fluid		
SUSPENSION	Front	Independent : Strut with torsion-bar spring		
	Rear	Trailing arm		
WHEEL ALIGNMENT	Camber Front/Rear	−1/2±1°/−3/4±1/4°		
	Caster	2°10'±1°		
	Toe-in Front	−1±3 mm	−0.004±0.118 in	
	Rear	2±2 mm	0.079±0.079 in.	
	Steering Axis Inclination	13°±1/2°		
BRAKES	Type, Front	Self-adjusting power-assisted ventilated disc		
	Type, Rear	Self-adjusting power-assisted sold disc		
	Lining Surface Area Front/Rear	44.7/21.0 cm²	6.9/3.2 sq. in.	
	Effective Disc Diameter Front	239 mm	9.4 in	
	Rear	190 mm	7.5 in.	
	Parking Brake Type	Mechanical expanding, rear two wheel brakes		
TIRES	Size	195/60R14 85H		
ELECTRICAL	Battery	12V—47AH		
	Starter	12V—1.4kW		
	Alternator	12V—55amps		
	Fuses	20A, 15A, 10A, 7.5A		
	Main Fuses	65A (1), 45A (2)		
	Headlights	12V—65/35 W		
	Gauge Lights	12V—3.4W		
	Front Turn Signal Lights	12V—32CP		(SAE 1156)
	Side Marker Lights (front and rear)	12V—3CP/3CP		
	Warning Lights	14V—1.4W		
	Interior Light	12V—5W		
	Rear Turn Signal Lights	12V—32CP		(SAE 1156)
	Stop/Taillights	12V—32/2CP		(SAE 2057)
	Indicator Lights	14V—3W		
	Luggage Area Lights	12V—3.4W		
	Back-up Lights	12V—32CP		(SAE 1156)
	License Lights	12V—4CP		
	High mount brake lamp	12V—32CP		(SAE 1156)

Body Specifications

5D-Hathcback

Unit : mm(in.)

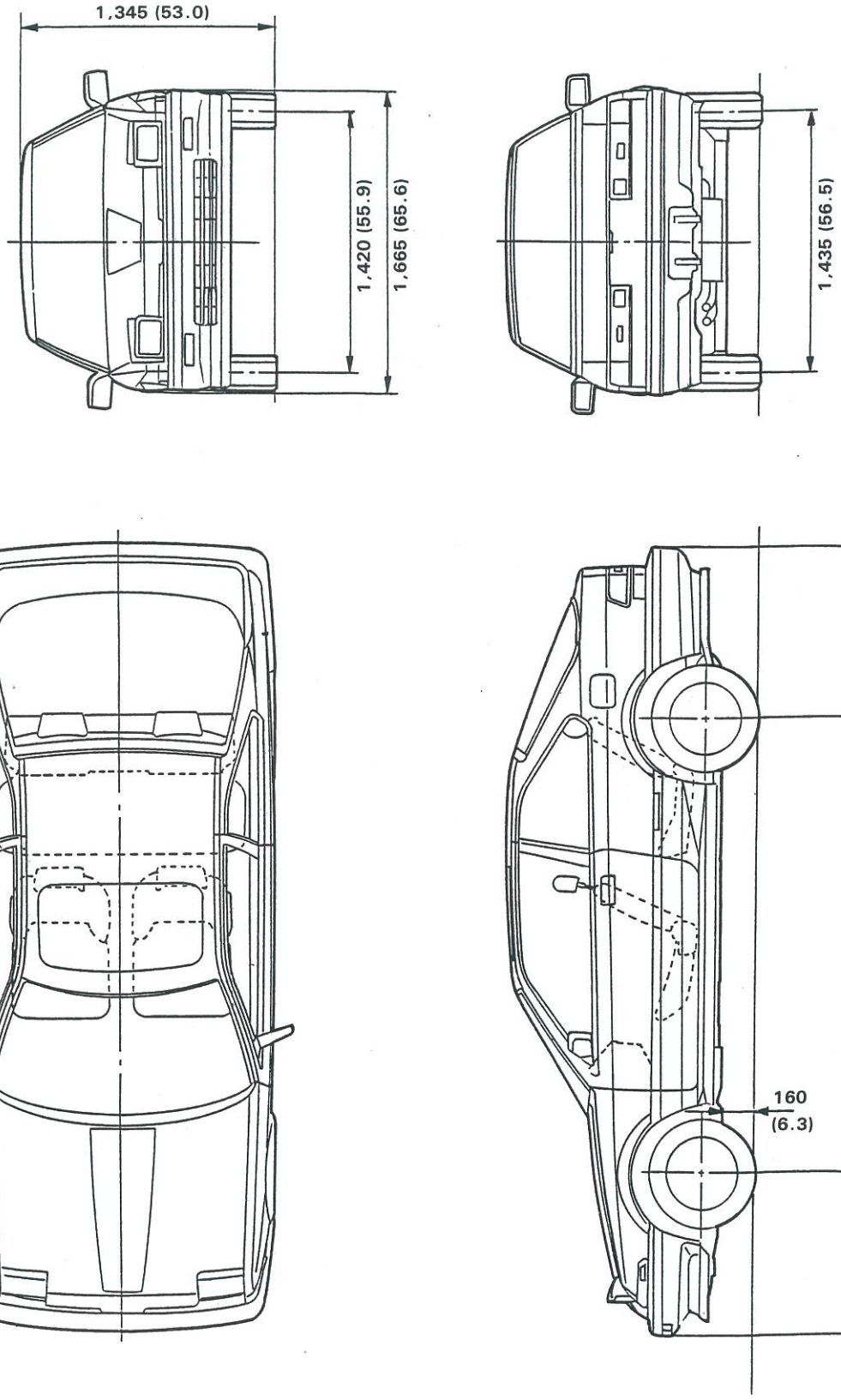


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Body Specifications(cont'd)

3D-Hathcback

Unit : mm(in.)



Maintenance

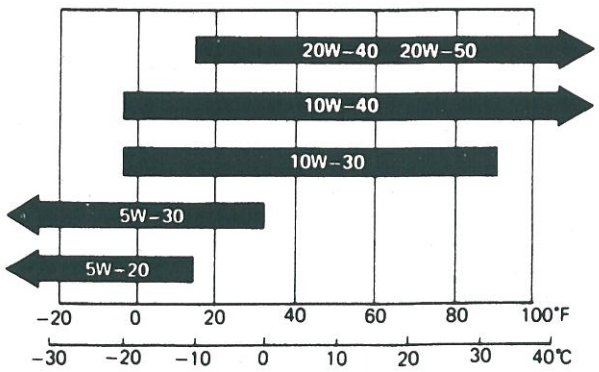
Lubrication Points 4–2
Maintenance Schedule 4–4



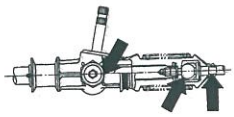
Lubrication Points

No.	LUBRICATION POINTS		LUBRICANT
1	Engine		API Service Grade: "Fuel Efficient" SF SAE Viscosity: See chart below
2	Transmission	Manual Automatic	API Service Grade: SE or SF SAE30, 10W—30, 10W—40or20W—40grade oil DEXRON II® Automatic transmission fluid
3	Brake reservoir		Brake fluid DOT3or DOT4
4	Steering gearbox (Power)		Steering grease P/N 08704—99969
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	Steering ball joint Suspension ball joints Steering Boot Shift lever pivot (Manual) Steering column bushings Battery terminals (2 places) Torsion-bar spring Select lever (Automatic) Pedal linkage Throttle cable end Brake master cylinder push rod Tailgate hinges Height adjuster Door hinges upper and lower Door opening detents Fuel filler lid Hood hinges Engine hood latch Tilt lever Intermediate shaft Parking brake wire end		Multi-purpose Grease
26	Caliper	Piston seal Dust seal Caliper pin Piston	Silicone Grease
27	Power steering reservoir		Power steering fluid P/N 08208—99961

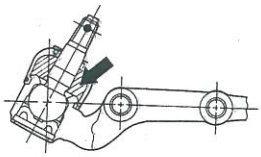
Recommended Engine Oil
("Fuel Efficient" SF grade Only)



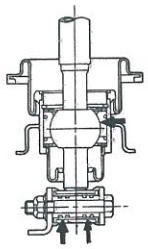
Engine oil viscosity for
ammbient temperature ranges.



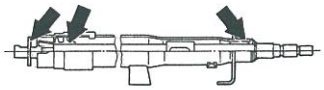
④ STEERING GEARBOX
⑤ STEERING BALL JOINT
⑦ STEERING BOOT



⑥ SUSPENSION BALL JOINTS



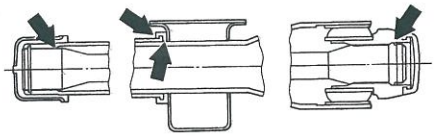
⑧ SHIFT LEVER PIVOT



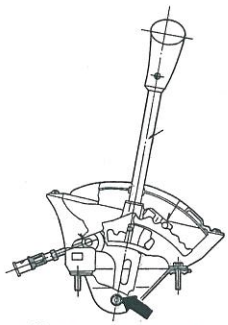
⑨ STEERING COLUMN BUSHING



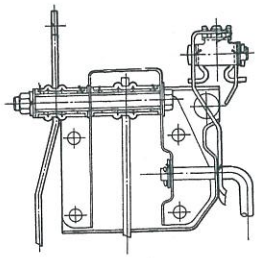
⑩ BATTERY TERMINALS (2 places)



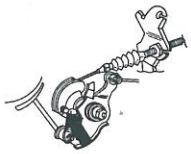
⑪ TORSION-BAR SPRING



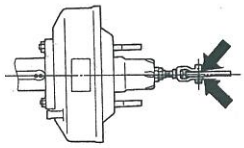
⑫ SELECT LEVER



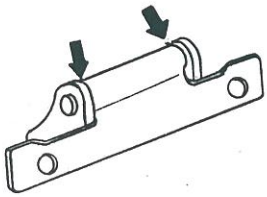
⑬ PEDAL LINKAGE



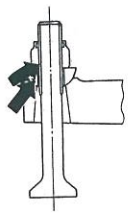
⑭ THROTTLE CABLE END



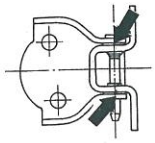
⑮ BRAKE MASTER CYLINDER PUSH ROD



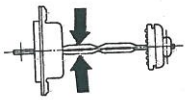
⑯ TAILGATE HINGES



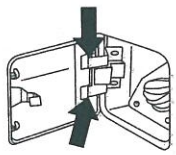
⑰ HEIGHT ADJUSTER



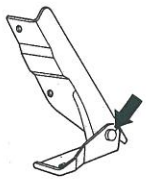
⑱ DOOR HINGES



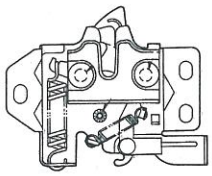
⑲ DOOR OPENING DETENTS



⑳ FUEL FILLER LID



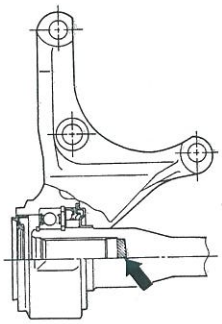
㉑ ENGINE HOOD HINGES



㉒ ENGINE HOOD LATCH



㉓ TILT LEVER



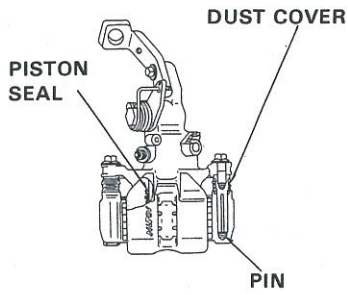
㉔ INTERMEDIATE SHAFT



㉕ PARKING BRAKE WIRE END



㉖ FRONT CALIPER



㉖ REAR CALIPER

Maintenance Schedule

The maintenance listed below must be performed at mileage intervals shown to ensure safe and efficient operating conditions and proper emission levels. This checklist is arranged in hot/cold/hot sequence so you can work on a hot engine while waiting for it to cool, and then run cold and hot emissions checks.

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

MAINTENANCE ITEM	MAINTENANCE INTERVALS					NOTES	SEC & PAGE
×1,000 miles	15	30	45	60	75		
×1,000 km	24	48	72	96	120		
months	12	24	36	48	60		
Engine oil	Replace every 7,500 miles(12,000km) or 6 months					3.5ℓ(3.7 qts.) W/filter change	8-3
Engine oil filter							8-4
Manual transmission oil		R		R		2.3ℓ(2.4qts.)	13-2
Automatic transmission fluid		R		R		2.4(2.5qts.) DEXRON II® A.T.F.	14-7
Parking brake	I	I		I		Fully engaged: 4-8 clicks	19-3
Brake pads	Inspect every, 7,500 miles(12,000km) or 6 months					Min. thickness: Front: 3.0mm(0.12 in.) Pad(lining) Rear : 1.6 mm(0.06 in)	19-6
Brake discs and calipers	I	I	I	I	I	Min. thickness: Front: 17 mm (0.67 in.) Rear : 8 mm (0.31 in.)	19-9
Suspension mounting bolts	I	I	I	I	I	Check tightness of bolts.	18-7 24, 25
Exhaust pipe and muffler	I	I	I	I	I	Check condition and tightness	9-4
Fuel line connections		*** I		I		Check fuel lines for loose connections, cracks and deterioration. Retighten loose connections and replace any damaged or deformed parts.	11-3
Fuel filter and hoses				R		The rubber fuel hoses need periodic replacement since they are subject to cracks and deterioration during a long period of use.	11-3,57
Brake hoses and lines	I	I	I	I	I		19-30
Brake fluid		R		R		Use only DOT 3 or 4 fluid Check that brake fluid level is between the upper and lower marks on the reservoir.	19-10
Steering operation, tie rod ends, steering gearbox and boots	I	I		I		Check rack grease and steering linkage. Check the boot for damage or leaking grease.	17-2,27
Front wheel alignment	I	I	I	I	I		18-3
Power steering system	I	I	I	I	I		17-2
Power steering pump belt		* I		I			17-14

*Tension adjustment only
***Recommended by manufacturer only for sold in California

CAUTION : The following items must be serviced more frequently on cars normally used under severe driving conditions. Refer to the chart below for the appropriate maintenance intervals.

"Severe driving conditions"
A : Repeated short distance driving
B : Driving in dusty conditions
C : Driving in severe cold weather
D : Driving in areas using road salt or other corrosive materials
E : Driving on rough and/or muddy roads

Condition	Maintenance item	Maintenance operation	Interval
A B • • •	Engine oil and oil filter	R	Every 3,000 miles (5,000 km) or 3 months
A B • D E	Front brake discs and calipers	I	Every 7,000 miles (12,000 km) or 6 months
A B C • E	Clutch release-arm travel	I	
• B C • E	Power steering system	I	

MAINTENANCE ITEM	MAINTENANCE INTERVALS					NOTES	SEC & PAGE
×1,000 miles	15	30	45	60	75		
×1,000 km	24	48	72	96	120		
months	12	24	36	48	60		
Clutch release arm travel	I	I	I	I	I	Free play at arm : 16.0-21.0mm (0.63-0.83 in)	12-3
Cooling system hoses and connections		I		I			10-2
Radiator coolant			** R			Cooling system capacity Manual : 4.6ℓ (1.2 US gal), Aoutomatic : 4.5ℓ (1.2 US gal) Check specific gravity for freezing point	10-3
Alternator drive belt		* I		I		6-9 mm(0.24-0.35 in)@10kg(22 lbs.)tenstion	23-60
Crankcase emission control system		*** I		I		If clicking sound is heard as you pinch the PCV hose between the PCV valve and intake manifold, valve is OK.	11-74
Distributor cap and rotor				I			23-20
Ignition wiring				I		Maximum resistance 25,000ohms	23-18
Spark plugs		R		R		NGK :BCPR6EY-11, BCPR6EY-N11 or ND : Q20PR-U11 1.0-1.1 mm (0.039-0.043 in.)	23-43
Valve clearance (engine cold)	I	I	I	I	I	Intake: 0.13-0.17 mm(0.0051-0.0067 in.) Exhaust : 0.15-0.19 mm(0.0059-0.0075 in.)	6-19
Air cleaner element		R		R			11-3
Fast idle				I		1,250 – 2,250 rpm	11-48
Evaporative emission control system (cold)				I			11-76
Warm up the engine to normal operating temperature							
Ignition timing at idle				I		Red mark at idle. See page 23-28 for idle speeds.	23-33
Ignition timing control				I		Vacuum advance at idle	23-32
Idle speed				I		Manual : 800±50 rpm Automatic: 800±50 rpm (in "N" position)	11-49
Idle CO				I		Check with CO meter.	11-72
Evaporative emission control system (hot)				I			11-76 thru 78
Catalytic converter heat shield				I		Check condition and tightness	11-73

*Tension adjustment only.
**Threafter, replace every 2 years 30,000miles (48,000km)whicherer comes first.
***Recommended by manufacturer only for cars sold in California.

Engine

Engine Removal/Installation 5–2
Cylinder Head/Valve Train
Illustrated Index 6–2
Cylinder Head Removal 6–4
Camshaft Pulley 6–5
Camshaft 6–5
Valves 6–7
Valve Seat 6–8
Valve Guide 6–10
Cylinder Head Installation 6–13
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Engine Removal/Installation



WARNING

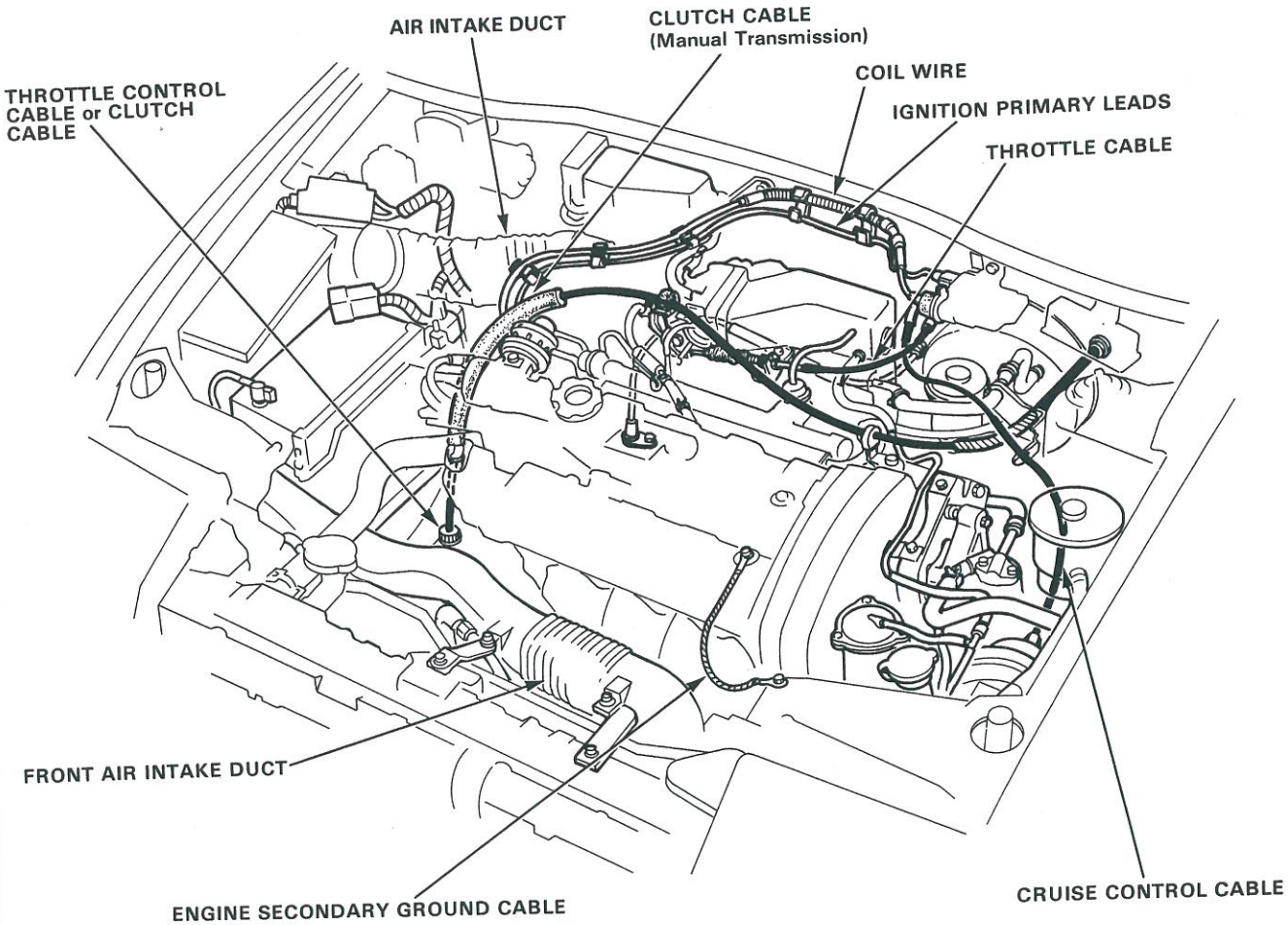
- Make sure jacks and safety stands are placed properly and hoist brackets are attached to correct positions on the engine (pages 5-7 and 8).
- Apply parking brake and block rear wheels, so car will not roll off stands and fall on you while working under it.

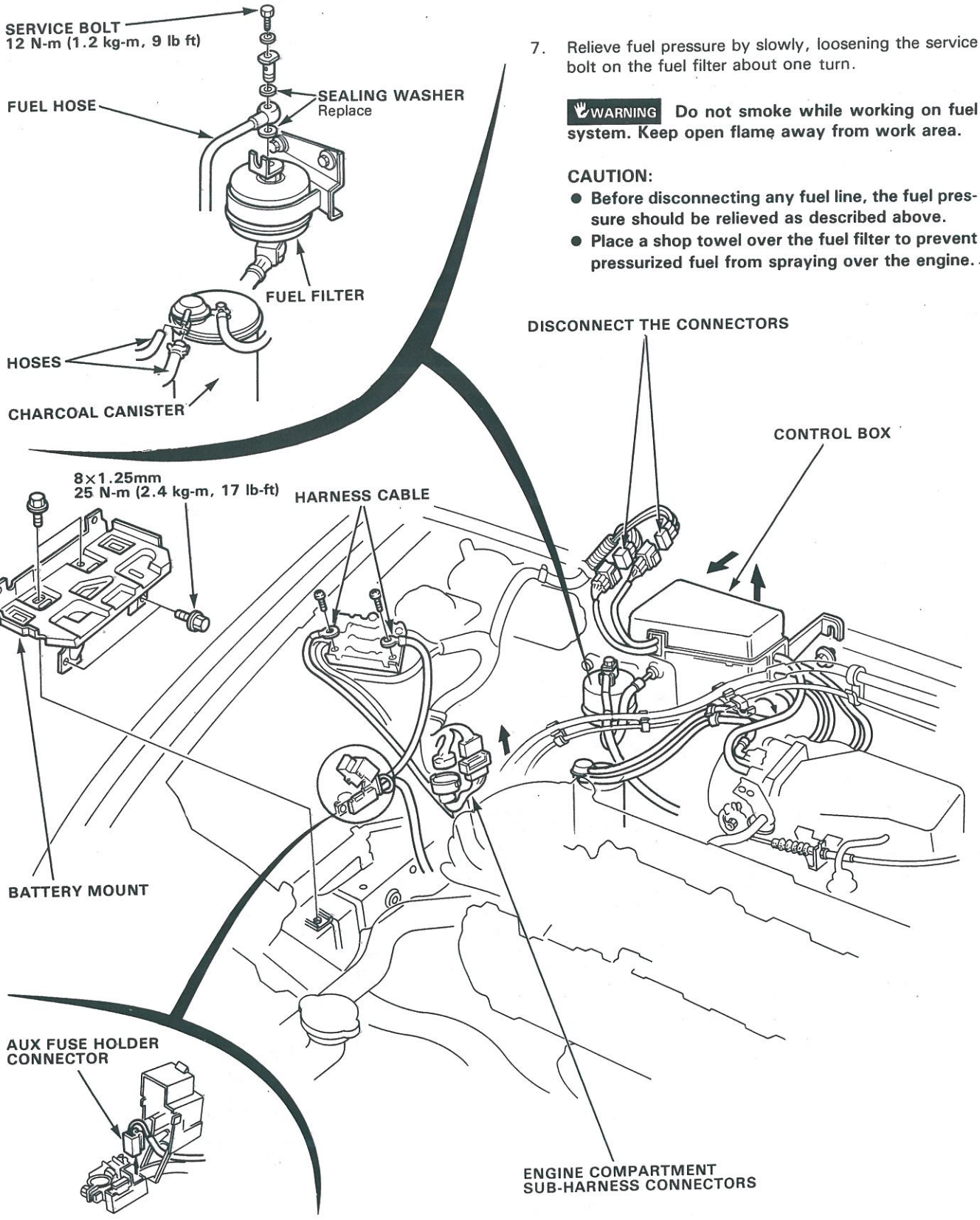
CAUTION: Use fender covers to avoid damaging painted surfaces.

1. Disconnect the battery negative terminal first then the positive terminal.
2. Unbolt the hood brackets and remove the hood.
   - Disconnect the washer fluid tube.

   CAUTION: Use care when storing the hood to avoid damaging the paint.
3. Drain the engine oil. Remove the oil filler cap to speed draining. Reinstall the drain plug with a new washer.
4. Drain the coolant from the radiator into a clean pan so it may be re-used. Remove the radiator cap to speed draining.

   WARNING Use care when removing radiator cap to avoid scalding by hot coolant or steam.
5. Drain transmission oil/fluid. Use a 3/8'' drive socket wrench to remove the drain plug. Remove the oil filler plug to speed draining. Reinstall the drain plug with a new washer.
6. Remove the air intake duct and front air intake duct.





7. Relieve fuel pressure by slowly, loosening the service bolt on the fuel filter about one turn.

WARNING **Do not smoke while working on fuel system. Keep open flame away from work area.**

CAUTION:

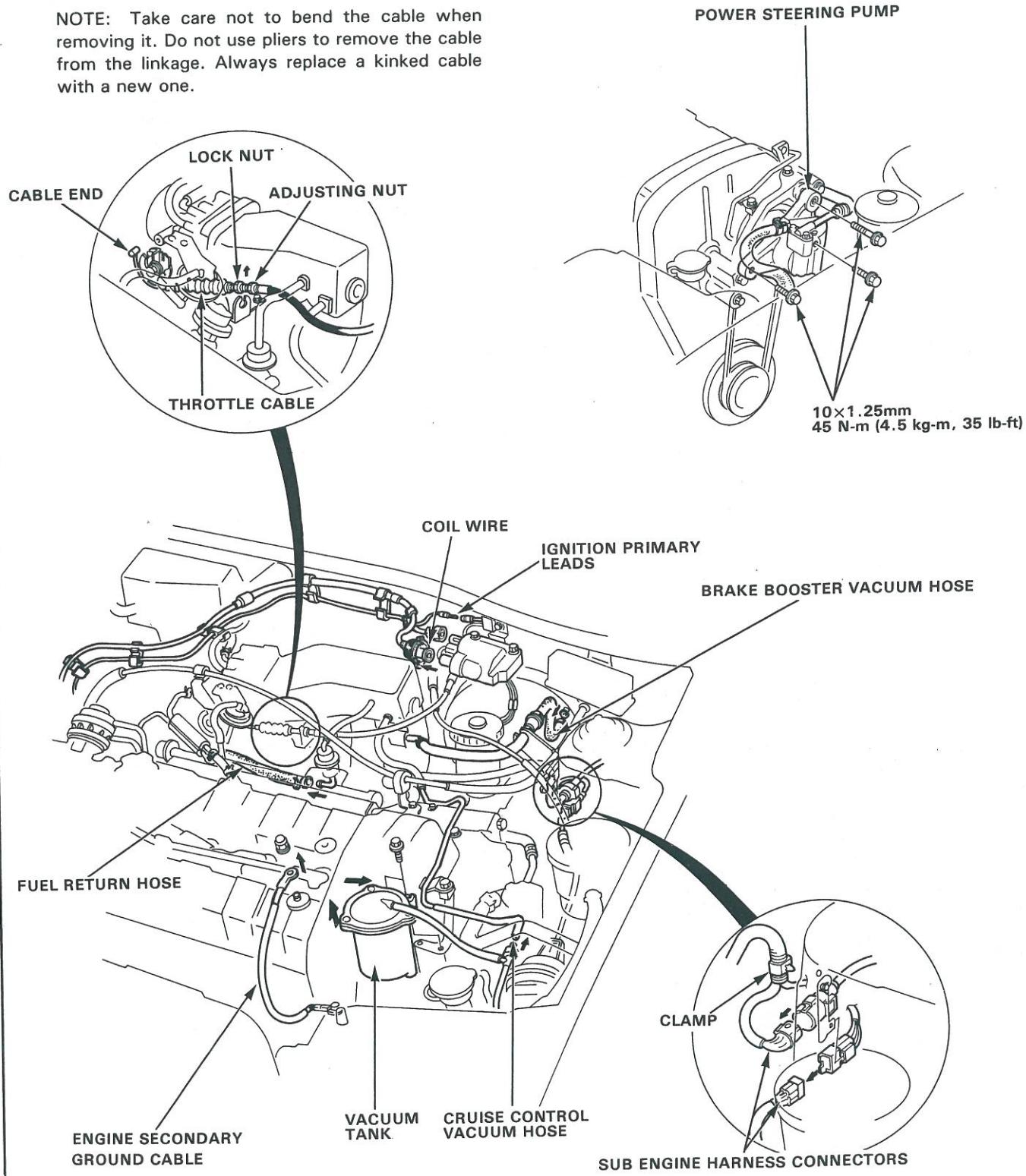
- **Before disconnecting any fuel line, the fuel pressure should be relieved as described above.**
- **Place a shop towel over the fuel filter to prevent pressurized fuel from spraying over the engine.**

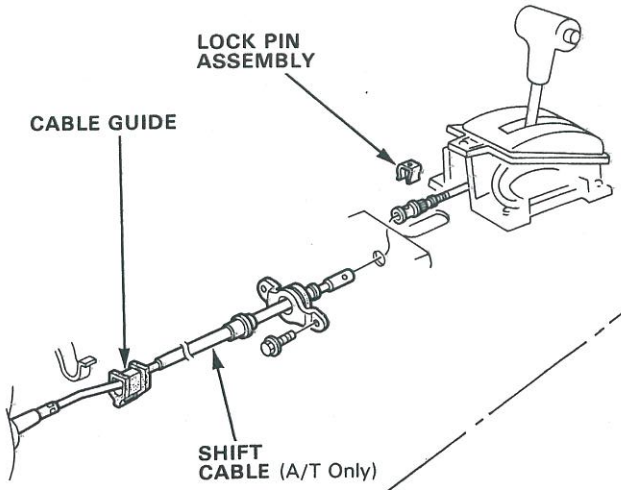
(cont' d)

8. Remove the throttle cable by loosening the lock nut and the throttle cable adjusting nut, then slip the cable end out of the throttle bracket and accelerator linkage.

   NOTE: Take care not to bend the cable when removing it. Do not use pliers to remove the cable from the linkage. Always replace a kinked cable with a new one.

9. Remove the mounting bolts and V-belt for the power steering pump, then without disconnecting the hose, pull the pump away from its mounting bracket.

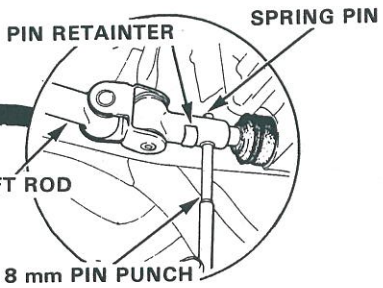


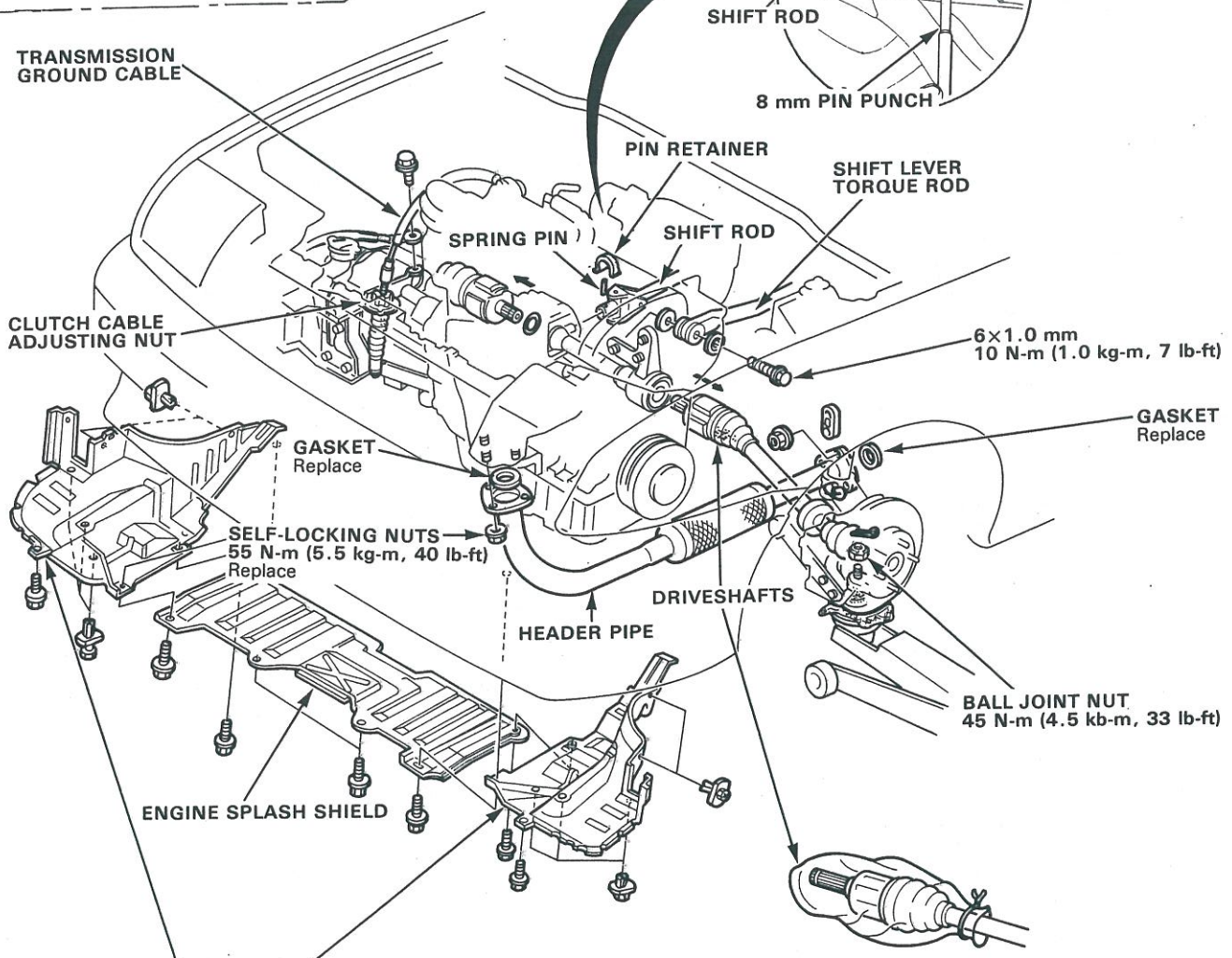


- Remove the center console.
- Place the shift lever in reverse, then remove the lock pin from the end of the shift cable.

NOTE: On reassembly, check the cable adjustment.

NOTE: On reassembly, slide the retainer back into place after driving in the spring pin.

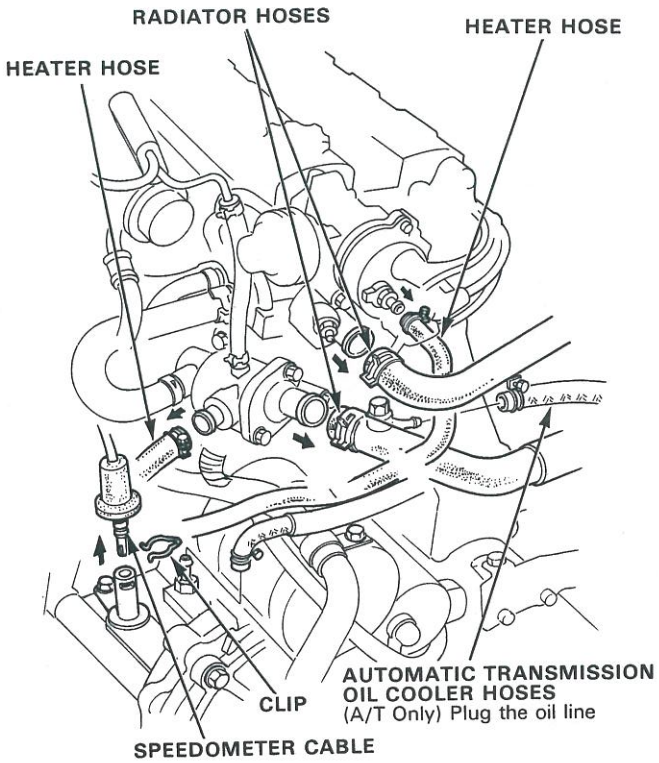




NOTE: Coat all precision finished surfaces with clean engine oil or grease.
Tie plastic bags over the driveshaft ends.

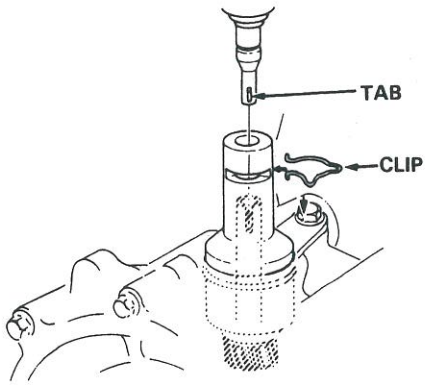
(cont' d)

10. Disconnect the radiator hoses and heater hoses.
11. Disconnect the transmission oil cooler hoses.



12. Remove the speedometer cable.

CAUTION: Do not remove the holder because the speedometer gear may fall into the transmission housing.



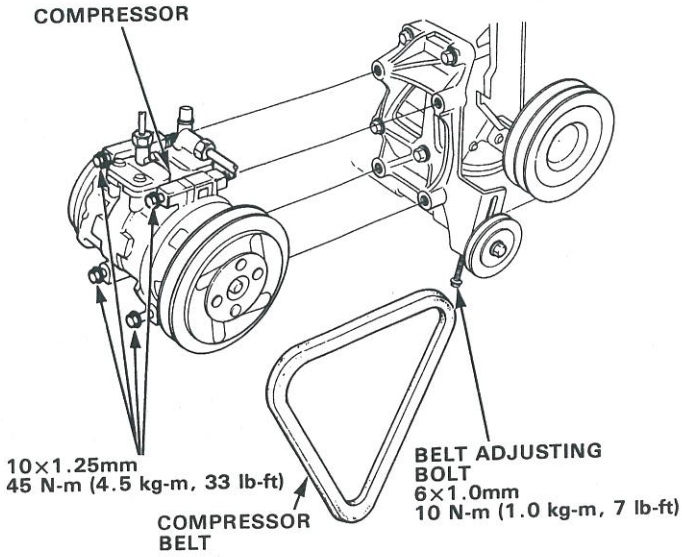
During Installation:

- Align tab on cable end with slot in holder.
- Install clip so bent leg is on groove side. After installing, pull speedometer cable to make sure it is secure.

13. On Cars with A/C:

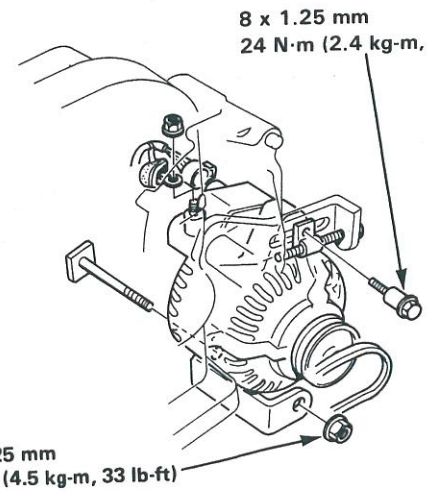
- Loosen the belt adjusting bolt and idler pulley nut.
- Remove the compressor mounting bolts, then lift the compressor out of the bracket with hoses attached, and wire it up to the front beam.

NOTE: The compressor can be moved without discharging the air conditioner system.

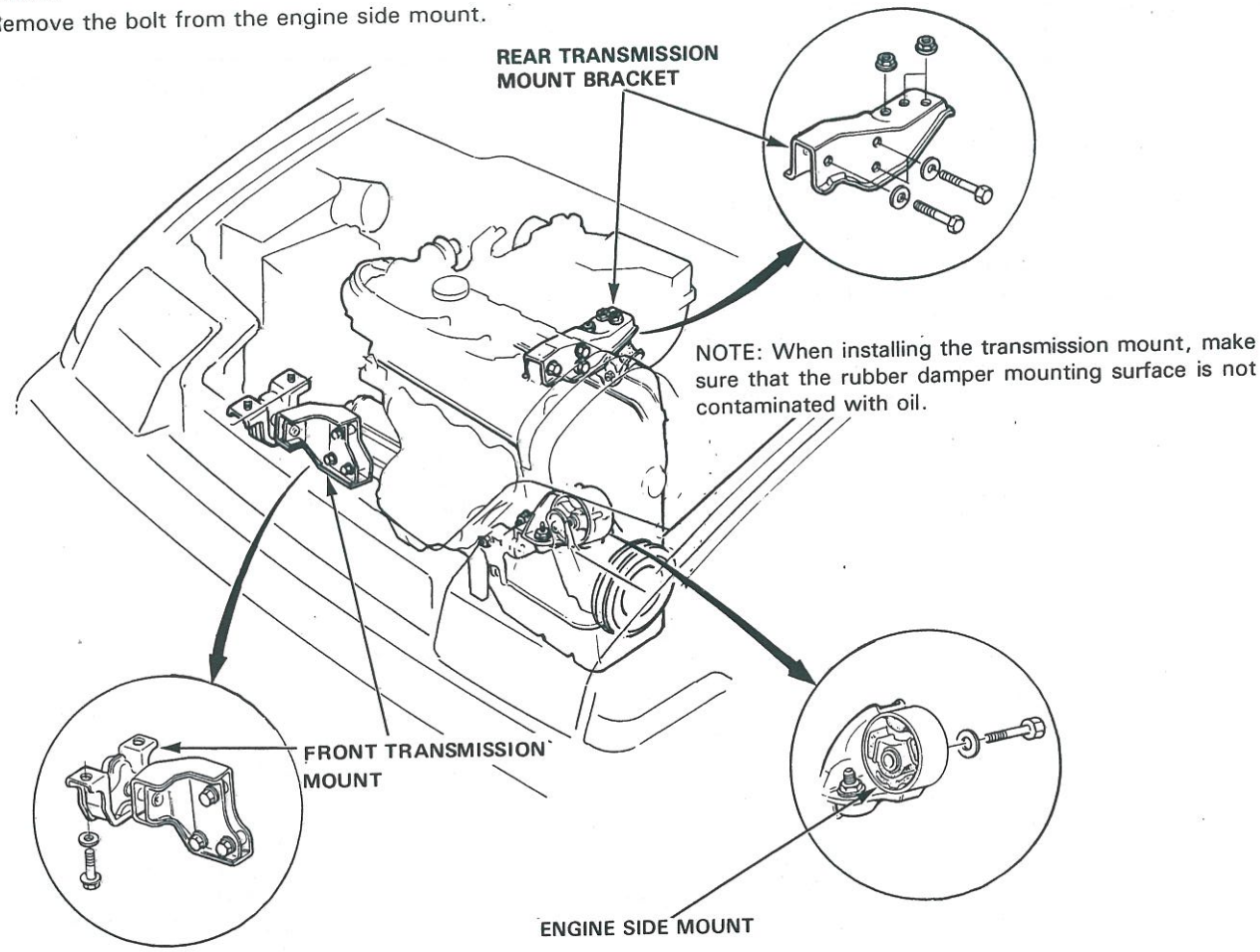


14. Remove the alternator:

- Disconnect the alternator wire harness connectors.
- Remove the belt adjusting bolt and remove the belt.
- Remove the alternator mount bolt and remove the alternator.



15. Attach a hoist chain to the engine block hoist brackets and raise the hoist just enough to remove slack from chain with slight tension.
16. Remove the rear transmission mount bracket.
17. Remove the bolts from the front transmission mount.
18. Remove the bolt from the engine side mount.



NOTE: When installing the transmission mount, make sure that the rubber damper mounting surface is not contaminated with oil.



19. Check that the engine/transaxle is completely free of vacuum, fuel, and coolant hoses, and electrical wires.
20. Slowly raise the engine approximately 6" and stop. Check once again that all wires and hoses have been disconnected from engine/transaxle.
21. Raise engine all the way and remove it from the car.

(cont'd)

22. Install the engine in the reverse order of removal. After the engine is in place:

- Torque engine mount bolts in sequence shown.

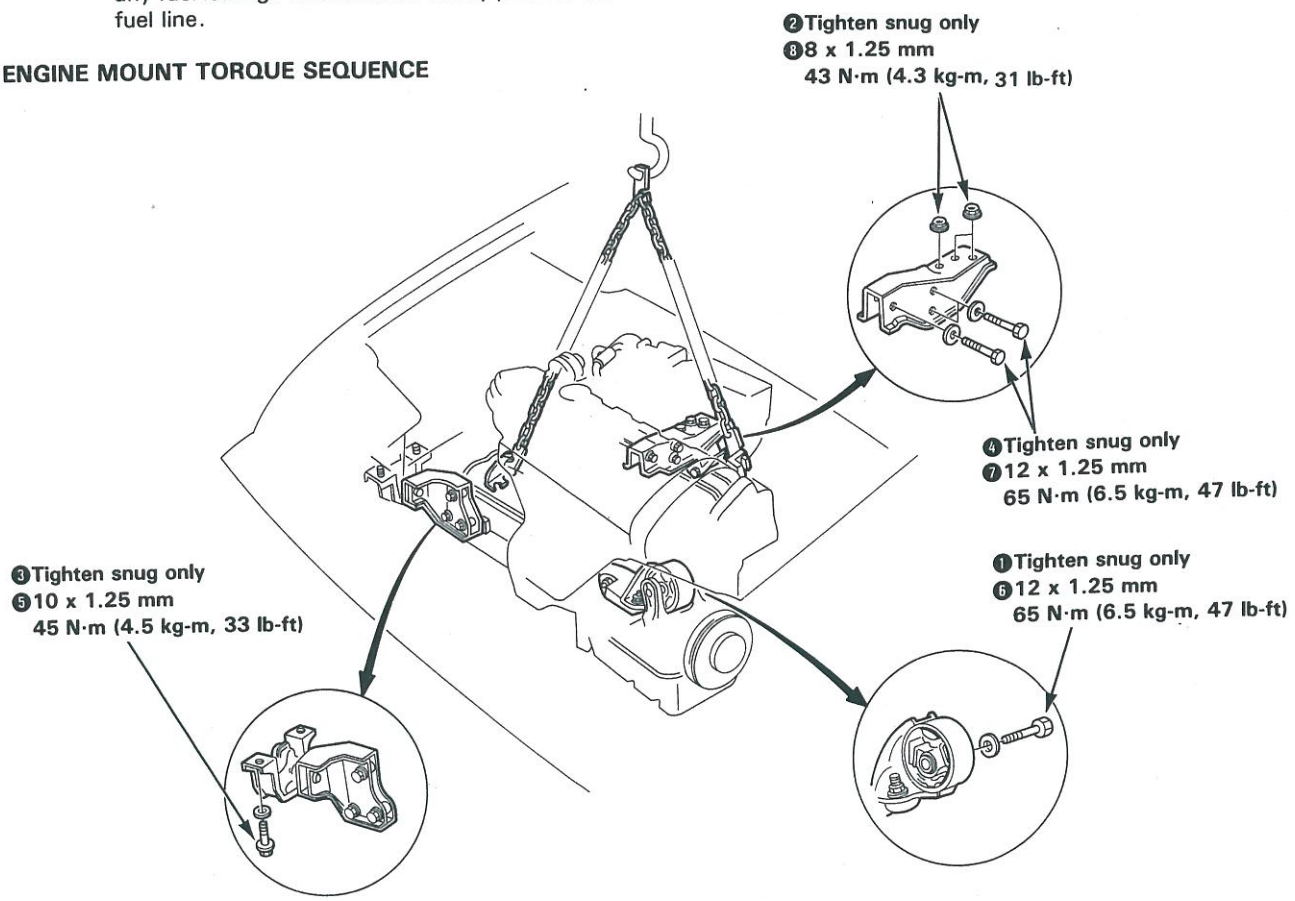
CAUTION: Failure to tighten the bolts in the proper sequence can cause excessive noise and vibration, and reduce bushing life: check that the bushings are not twisted or offset.

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

CAUTION: Use new spring clips on installation.

- Inspection for fuel leakage.
  - After assembing 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.
- Bleed air from the cooling system at the bleed bolt with the heater valve open.
- Adjust the throttle cable tension.
- Adjust the alternator belt tension.
- Check the clutch pedal free play.
- Check that the transmission shifts into gear smoothly.
- Reinstall the A/C compressor and A/C wiring.
- Clean battery posts and cable terminals with sandpaper, assemble, then apply grease to prevent corrosion.

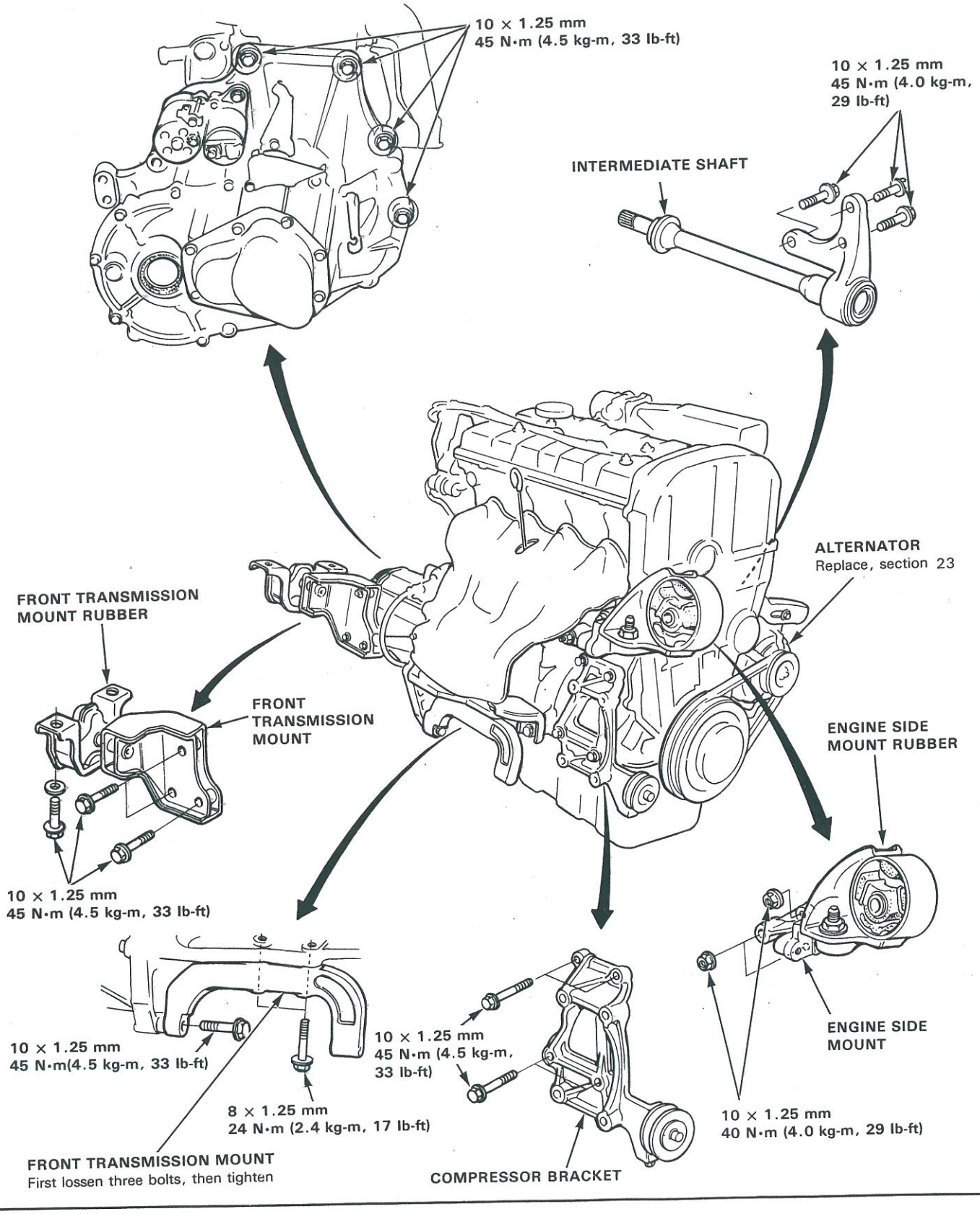
ENGINE MOUNT TORQUE SEQUENCE



NOTE: Check the side mount and bracket for damage.

Index (Engine)

NOTE: For manifold replacement, refer to Section 9.

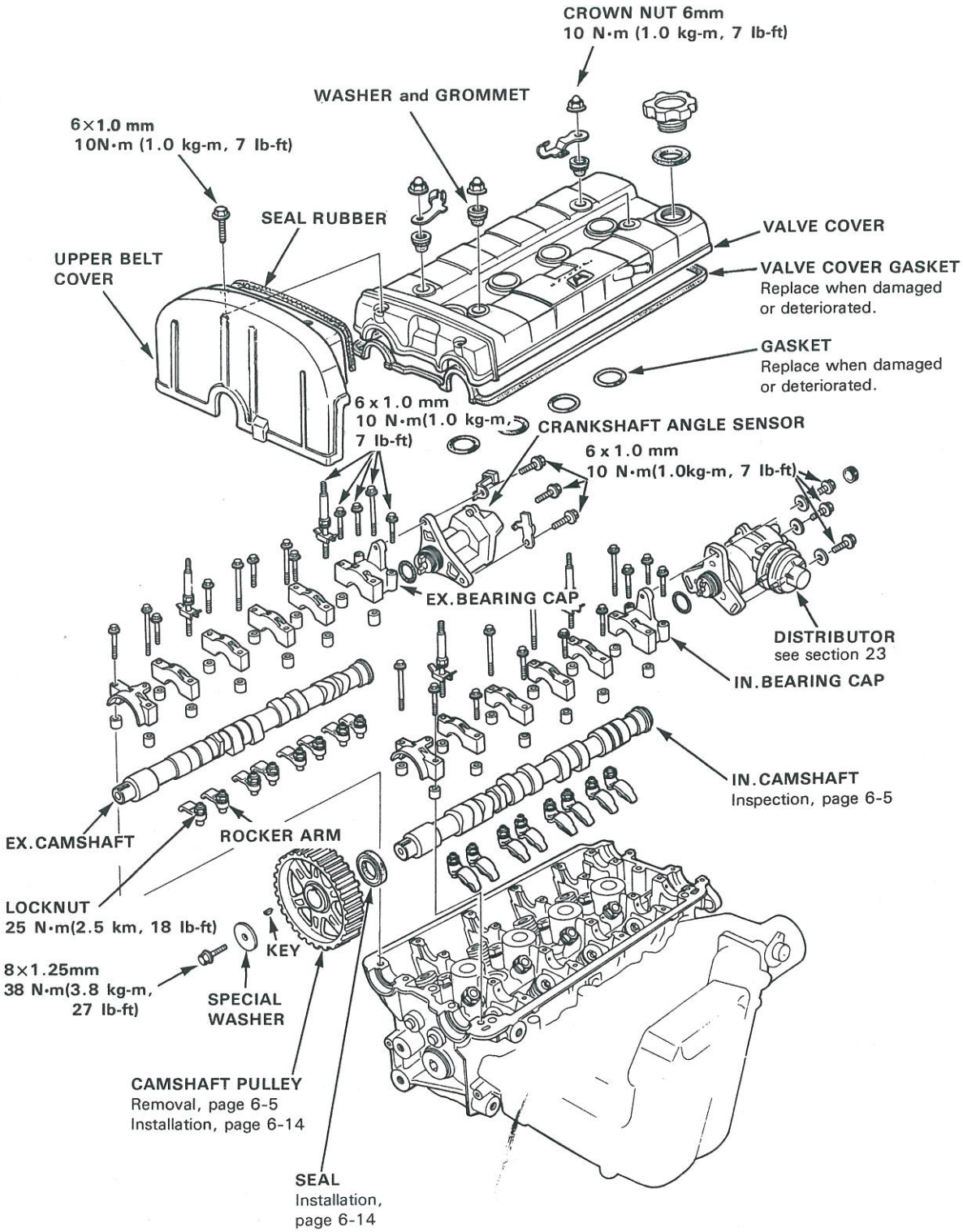


Cylinder Head/Valve Train

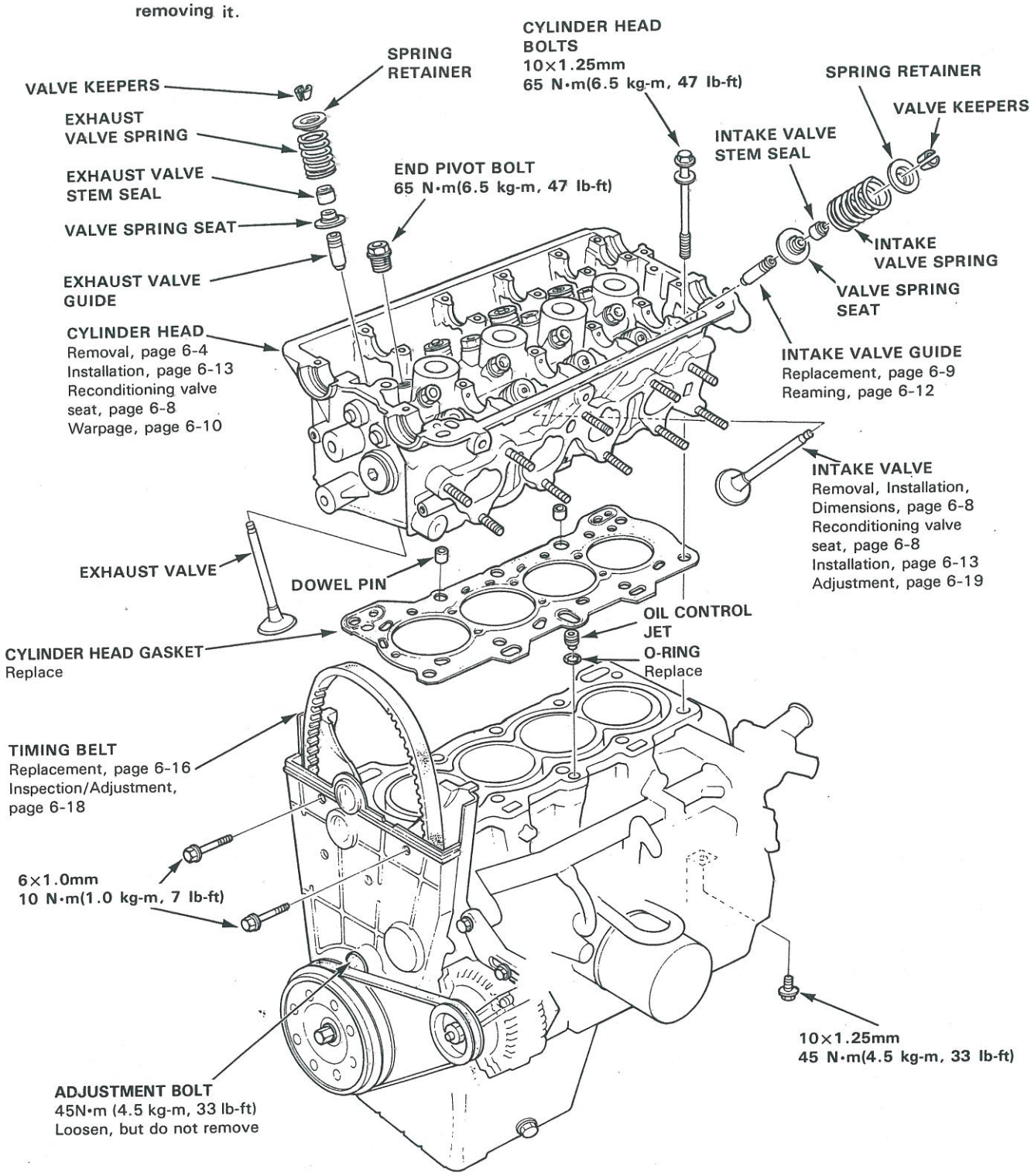


Illustrated Index

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



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



Cylinder Head

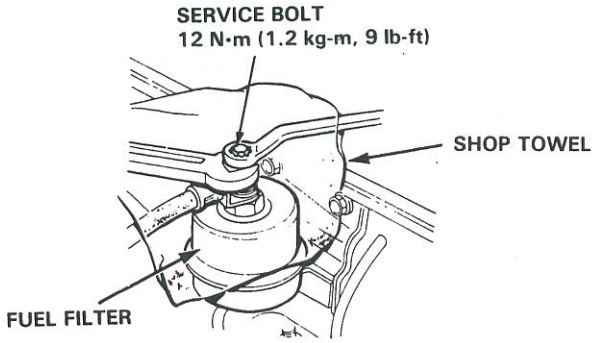
Removal (engine removal not required)

CAUTION: Do not remove the cylinder head until the coolant temperature drops below 38°C (100°F).

NOTE:
- Inspect the timing belt before removing the cylinder head.
- Before removal of the cylinder head, turn the flywheel so that the No.1 cylinder is at top-deadcenter (page 6-17).
- Mark all emissions hoses before disconnecting them.

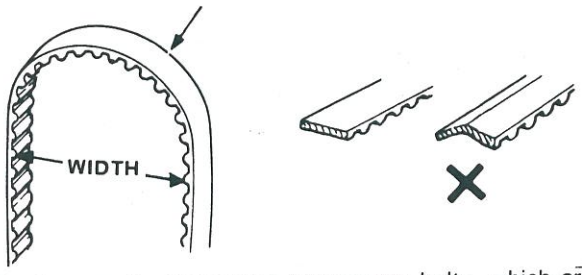
1. Disconnect the negative terminal from the battery.
2. Drain the cooling system.
3. Disconnect the air intake duct and vacuum hose (page 5-2).
4. Remove the air cleaner cover.

WARNING Do not smoke while working on fuel system, keep open flame or spark away from work area.

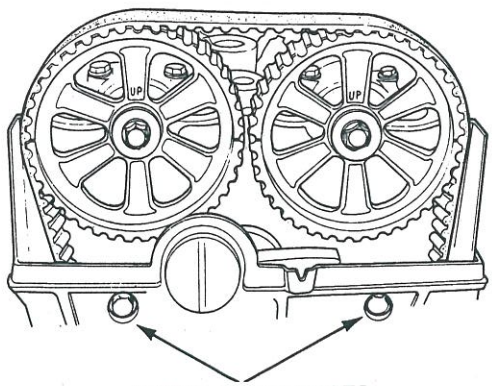


5. Disconnect the fuel hose and fuel return hose (page 5-3).
6. Remove the engine secondary ground cable from the valve cover.
7. Remove the brake booster vacuum tube from the intake manifold.
8. Disconnect the throttle cable at the throttle body (page 5-4).
9. Remove the spark plug caps from the spark plugs, then remove the distributor assembly.
10. Disconnect the hoses from the charcoal canister.
11. Disconnect the No. 1 control box emission hoses from the tubing manifold.
12. On cars equipped with air conditioning, disconnect the idle control solenoid hoses.
13. Disconnect the engine sub harness connectors and couplers from the cylinder head and intake manifold.
    - Four injector couplers
    - TA sensor connector
    - TW sensor connector
    - Ground terminals
    - Throttle sensor connector
    - Crankshaft angle sensor coupler.
14. Disconnect the oxygen sensor coupler.
15. Disconnect the upper radiator hose, heater inlet hose, and bypass inlet hose from the cylinder head (page 5-6).
16. Remove the hose between the thermostat housing and the intake manifold.
17. Remove the bolts attaching the exhaust manifold and bracket; then remove the manifold.
18. Remove the bolts attaching the intaket manifold and bracket.
19. Disconnect the hose from the intake manifold to the breather chamber.
20. Remove the valve cover and the timing belt upper cover.
21. Loosen the tensioner adjustment bolt, then remove the timing belt.

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



22. Remove the timing belt lower cover bolts, which are tightened to the cylinder head.

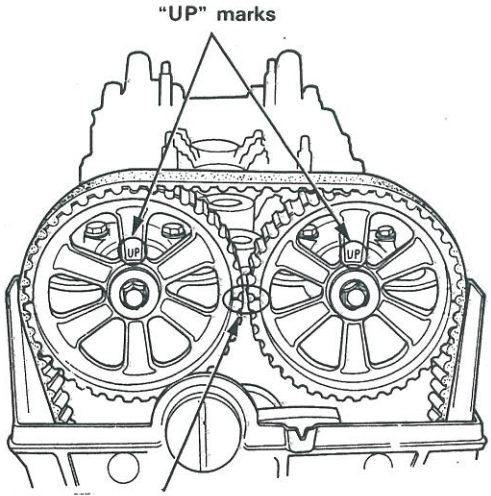


23. Remove the camshaft holder bolts, then remove the camshaft holders and the camshafts and rocker arms.
24. Remove the cylinder head bolts, then remove the cylinder head.
    CAUTION: To prevent warpage, unscrew the bolts 1/3 turn each at a time; repeat the sequence until all bolts are loose.
25. Remove the exhaust manifold and intake manifold from the cylinder head.

Camshaft Pulley

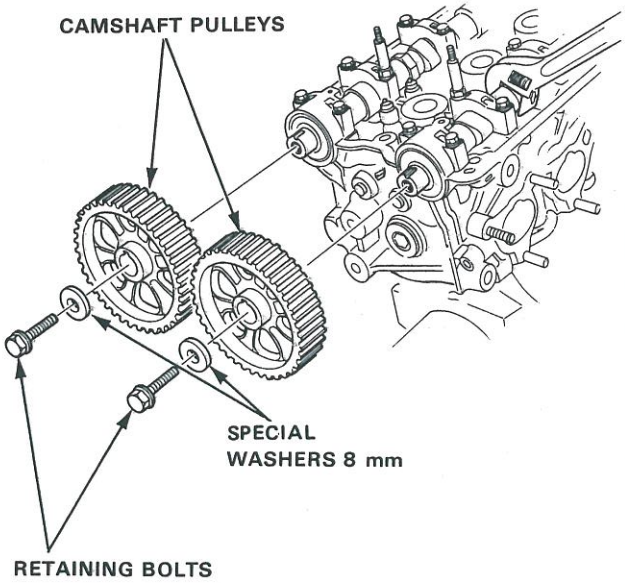
Removal

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



Align the marks on the pulleys

2. Remove the pulley retaining bolts and washers, then remove the pulleys.



NOTE: Before removing camshaft check camshaft end play.

Camshaft

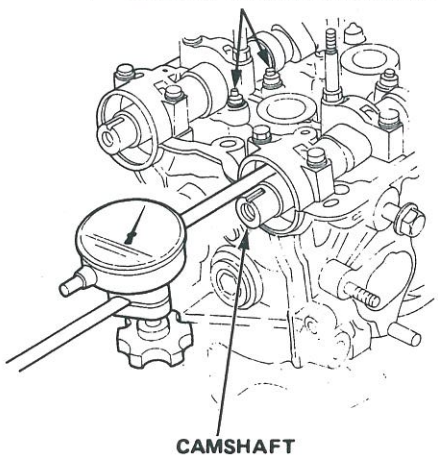
Inspection

NOTE: Do not rotate camshaft during inspection.

1. Loosen the adjusting screws.
2. Seat camshaft by prying it toward distributor end of head with screwdriver.
3. Zero dial indicator against the pulley end of the camshaft, then pry camshaft back toward it, and read 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.)

Unscrew the adjusting screws



4. Remove the bearing cap bolts from the cylinder head.

NOTE: Unscrew the bearing cap bolts, two turns at a time, in a criss-cross pattern, to prevent damaging valves or rocker arms.

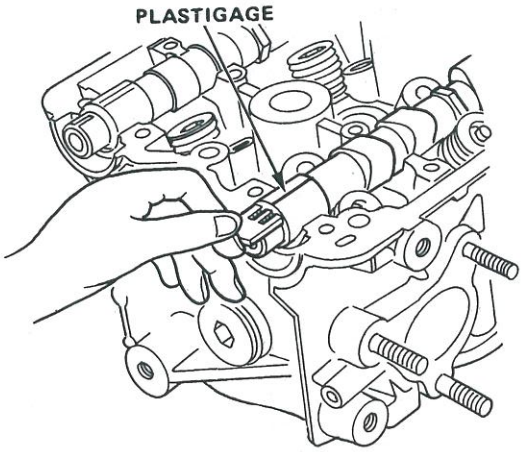
- Lift camshaft out of cylinder head, wipe clean, then inspect lift ramps. Replace camshaft if lobes are pitted, scored, or excessively worn.
- Clean the camshaft bearing surfaces in the cylinder head, then set camshaft back in place.
- Insert plastigage strip across each journal.
- Install the bearing caps and torque bolts to values and in sequence shown on page 6-15.

(cont'd)

Inspection (cont'd)

5. Measure widest portion of plastigage on each journal.

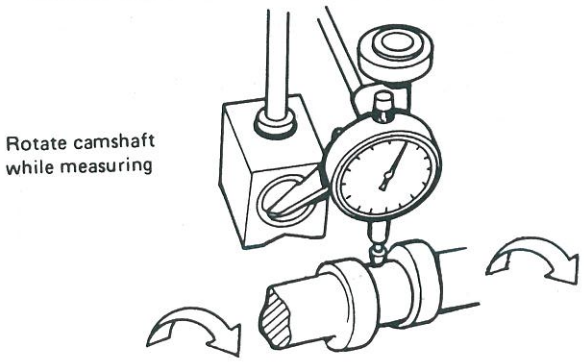
Camshaft Bearing Radial Clearance:
Standard (New): 0.050—0.089 mm (0.002—0.004 in.)
Service Limit: 0.15 mm (0.006 in.)



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

- And 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): 0.03 mm (0.001 in.)
Service Limit: 0.06 mm (0.002 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.

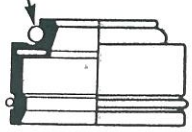
Valve Springs and Valve Seals

Replacement (Cylinder head removal not required)

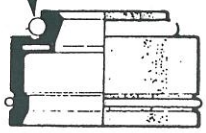
1. Remove the valve cover.
2. Remove the bearing cap bolt.
   NOTE: Unscrew the bearing cap bolts, two turns at a time, in a criss-cross pattarn to prevent damaging valves or rocker arms.
3. Install the valve spring compressor.
4. With the piston at TDC insert a spark plug air hold fitting to keep the valves closed and allow spring compression while you remove the valve keepers.
5. Remove the tool and springs.
6. Remove the valve seal.
7. Install the valve seals and springs in the reverse order of removal.

   NOTE:
   - Exhaust and intake seals are not interchangeable.

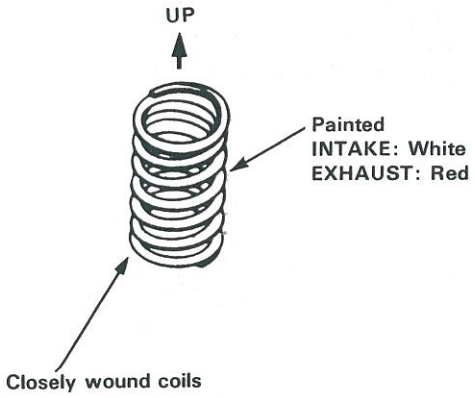
EXHAUST VALVE SEAL
Replace
(BLACK SPRING)



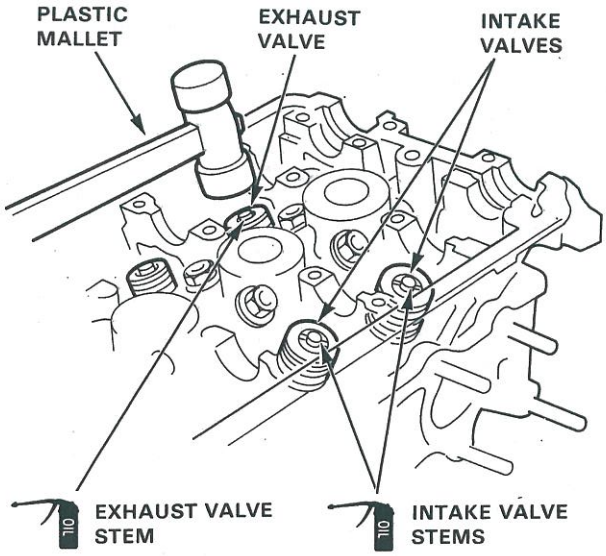
INTAKE VALVE SEAL
Replace
(WHITE SPRING)



- Place the valve springs with closely wound coils or painted part toward the cylinder head.



8. When 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.



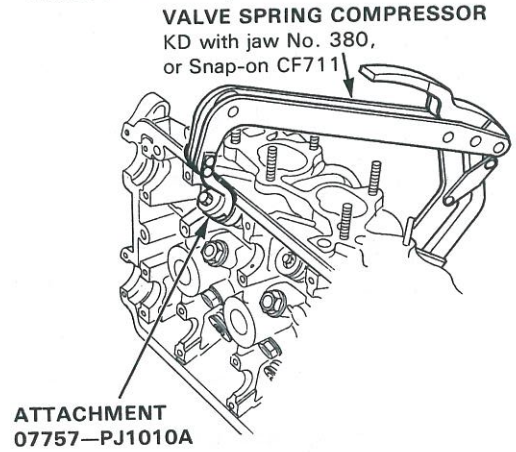
Valves

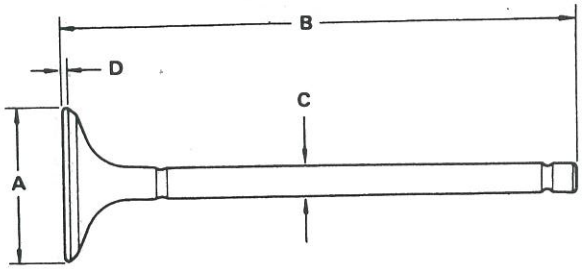
Replacement

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 spring compressor.

2. Install spring compressor. Compress spring and remove valve keepers.





Intake Valve Dimensions

A Standard(New):	29.9—30.1mm (1.177—1.185 in.)
B Standard(New):	105.18—105.48mm (4.141—4.153 in.)
C Standard(New):	6.58—6.59mm (0.2591—0.2594 in.)
C Service Limit:	6.55mm (0.258 in.)
D Standard(New):	1.05—1.35mm (0.041—0.053 in.)
D Service Limit:	1.00mm (0.039 in.)

Exhaust Valve Dimensions

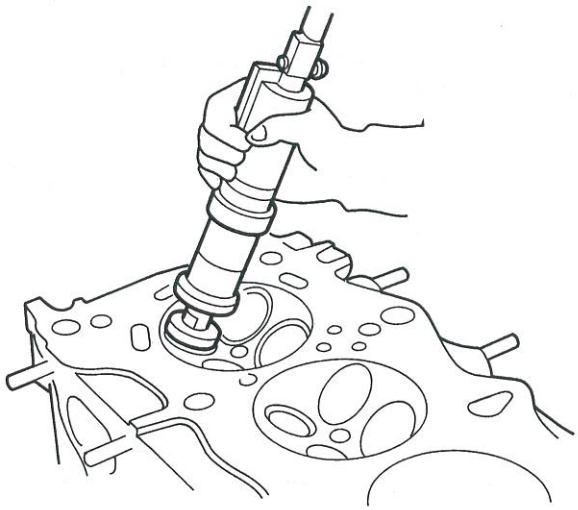
A Standard(New):	26.9—27.1mm (1.059—1.067 in.)
B Standard(New):	104.47—104.77mm (4.113—4.125 in.)
C Standard(New):	6.55—6.56mm (0.2579—0.2583 in.)
C Service Limit:	6.52mm (0.257 in.)
D Standard(New):	1.65—1.95mm (0.065—0.077 in.)
D Service Limit:	1.45mm (0.057 in.)

Valve Seat

Reconditioning

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

NOTE: If guides are worn (page 6-9), replace them (page 6-10) before grinding valve seats.

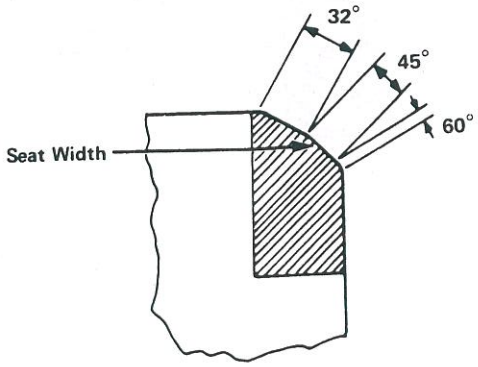


2. Carefully grind a 45° seat, removing only enough material to ensure a smooth and concentric seat.

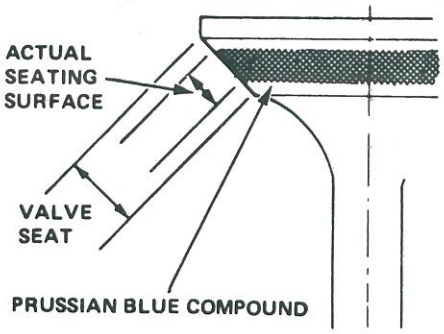
3. Bevel the upper edge of seat with the 32° stone and the lower edge of seat with the 60° stone. Check width of seat and adjust accordingly.

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 (0.08 in.)



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

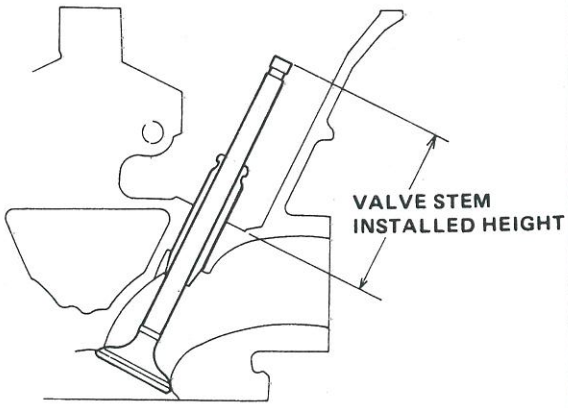


6. The actual valve seating surface, as shown by the blue compound, should be centered on the seat.
   - If it is too high (closer to the valve stem), you must make a second cut with the 60° stone to move it down, then one more cut with the 45° cutter to restore seat width.
   - If it is too low (closer to valve edge), you must make a second cut with the 32° stone to move it up, then one more cut with the 45° stone to restore seat width.

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

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

   Intake Valve Stem Installed Height:
   Standard(New): 45.78mm (1.802 in.)
   Service Limit: 46.57mm (1.833 in.)
   Exhaust Valve Stem Installed Height:
   Standard(New): 44.97mm (1.770 in.)
   Service Limit: 45.76mm (1.802 in.)



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

Valve Guide-to-Valve Stem Clearance

1. 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
   (0.0015—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 (0.008 in.)

Valve extended 10 mm out from seat.



- If measurement exceeds the service limit, recheck using new valve.
- If measurement is now within service limit, reassemble using 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—0.05mm
(0.001—0.002 in.)
Service Limit: 0.08—(0.003 in.)
Exhaust Valve Stem-to-Guide Clearance
Standard(New): 0.05—0.08mm
(0.002—0.003 in.)
Service Limit: 0.011mm (0.004 in.)

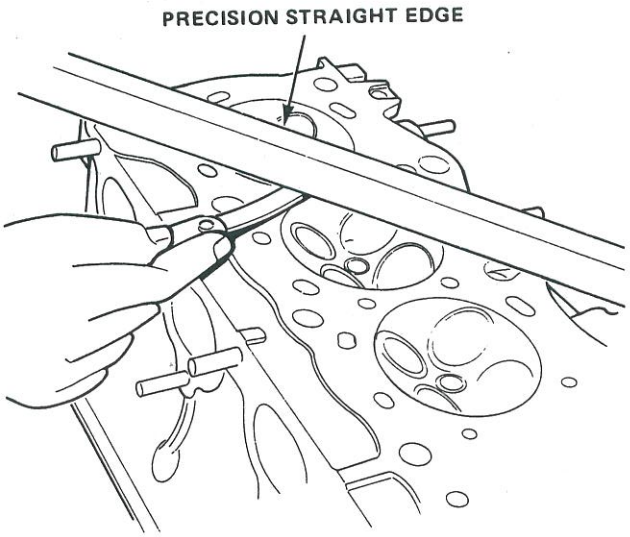
Cylinder Head

Warpage

NOTE: If camshaft bearing clearances (page 6-5) are not within specification, the head cannot be resurfaced.

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

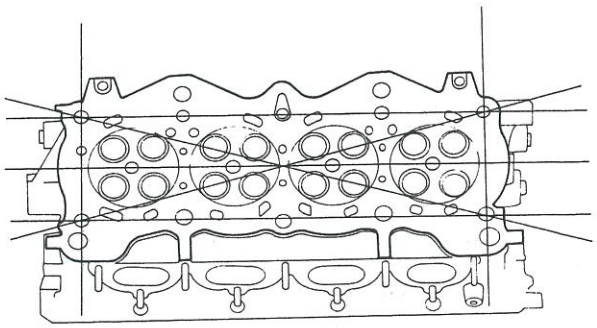
- If warpage is less than 0.05 mm (0.002 in.) cylinder head resurfacing is not required.
- If warpage is between 0.05 mm (0.002 in.) and 0.2 mm (0.008 in.), resurface cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in.) based on height of 132.0 mm(5.20 in.)



Cylinder Head Height:

New:	**132.0 mm (5.20 in.)**
Service Limit:	**131.8 mm (5.19 in.)**

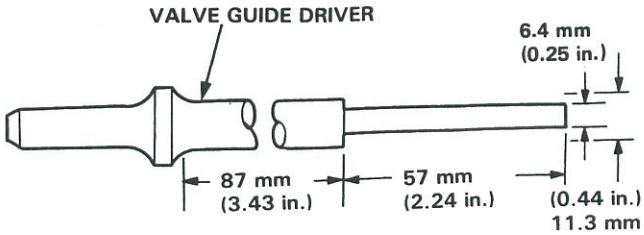
Measure along edges, and 3 ways across center.



Valve Guide

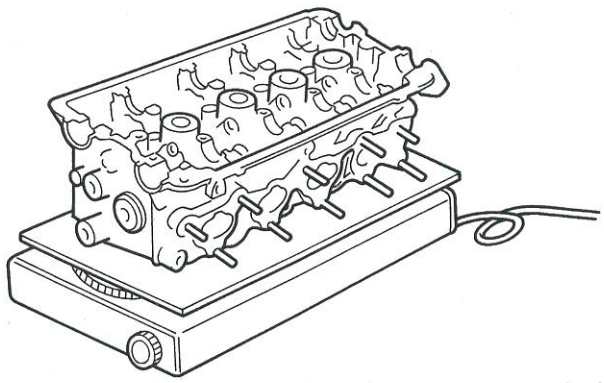
Replacement

1. As illustrated, the removal steps of this procedure use a commercially—available air-impact driver attachment which may need to be modified to fit the diameters of valve guides. In most cases, the same procedure can be done using Valve Guide Drivers and a conventional hammer. See tool numbers at the end of this procedure.



2. Select the proper replacement guides and chill them in the freezer section of a refrigerator for about an hour.

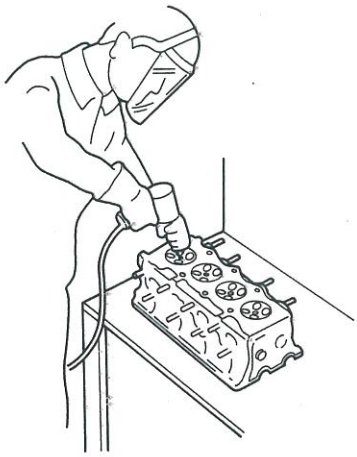
3. Use a hot plate or oven to evenly heat the cylinder head to 150°C (300°F). Check temperature with a cooking thermometer.

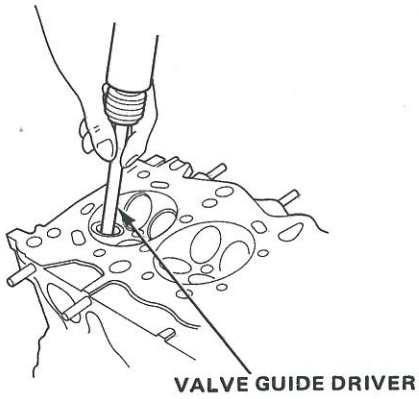


CAUTION:

- **Do not use a torch; it may warp the head.**
- **Do not get the head hotter than 150°C (300°F); excessive heat may loosen the valve seats.**
- **To avoid burns, use heavy gloves when handling the heated cylinder head.**

4. Use the and an air hammer from the camshaft side to drive the guide about 2 mm towards the combustion chamber. This will knock off some of the carbon and make removal easier.





CAUTION:
- **Always wear safety goggles or a face shield when using the air hammer.**
- **Hold the air hammer directly in line with the valve guide to prevent damaging the driver.**

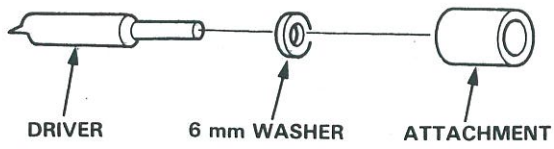
5. Turn the head over and drive out the guide toward the camshaft side of head.

   If a valve guide still won't move, drill it out with a 5/16 inch bit, then try again.

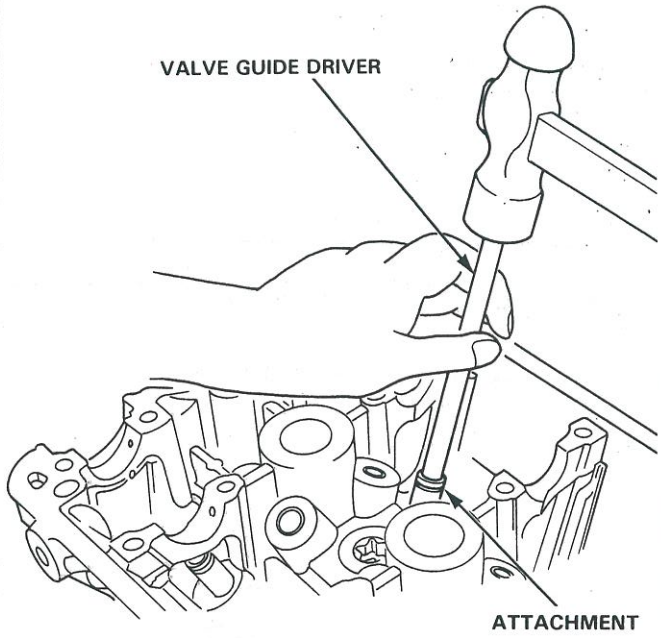
   CAUTION: Drill guides only in extreme cases: you could damage the cylinder head if the guide breaks.

6. Remove the new guide(s) from the refrigerator, one at a time, as you need them.

7. Slip a 6 mm steel washer and the correct driver attachment over the end of the driver (The washer will absorb some of the impact and extend the life of the driver).

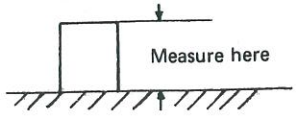


8. Then install the new guide(s) from the camshaft side of the head; drive each one in until the attachment bottoms on the head. If you have all sixteen guides to do, you may have to reheat the head one or two times.



NOTE: Valve guide replacement can be performed with the special tools below.

Removal
VALVE GUIDE DRIVER, 6.6mm
07942—6570100
Installation
ADJUSTABLE VALVE GUIDE DRIVER
07743—0020000
Intake: 20.0mm (0.79 in.)
Exhaust: 19.0mm (0.75 in.)

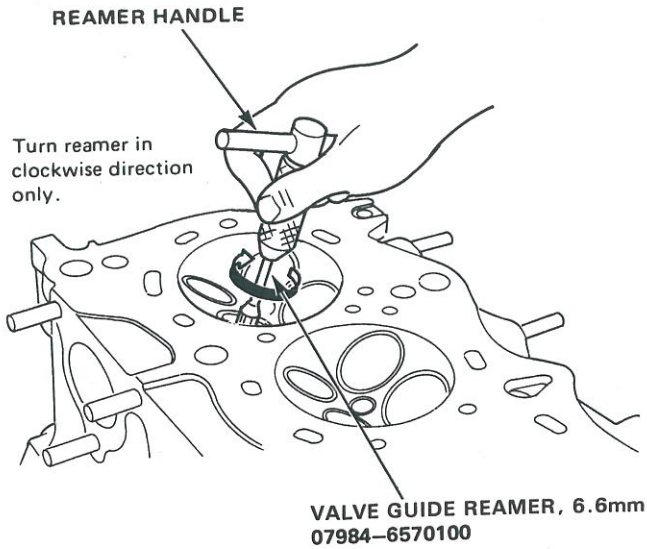


Valve Guide and Valve Spring

Valve Guide Reaming

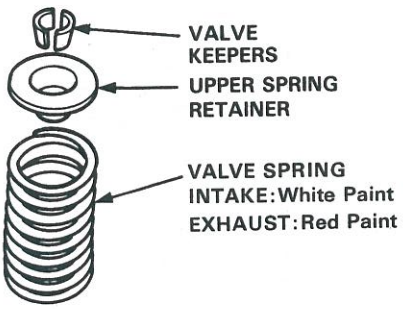
NOTE: For new valve guides only.

1. Coat reamer and valve guide with cutting oil.
2. Rotate reamer clockwise the full length of the valve guide bore.
3. Continue to rotate reamer clockwise while removing.
4. Thoroughly wash the guide in detergent and water to remove any cutting residue.
5. Check clearance with valve (page 6-9).

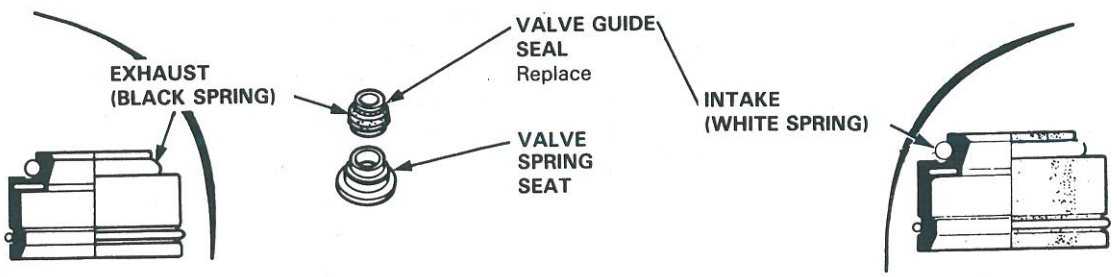


Valve Spring Installation Sequence

NOTE: Exhaust and intake valve guide seals are NOT interchangeable.



CAUTION: Place the valve springs so the closely wound coils are toward the cylinder head.

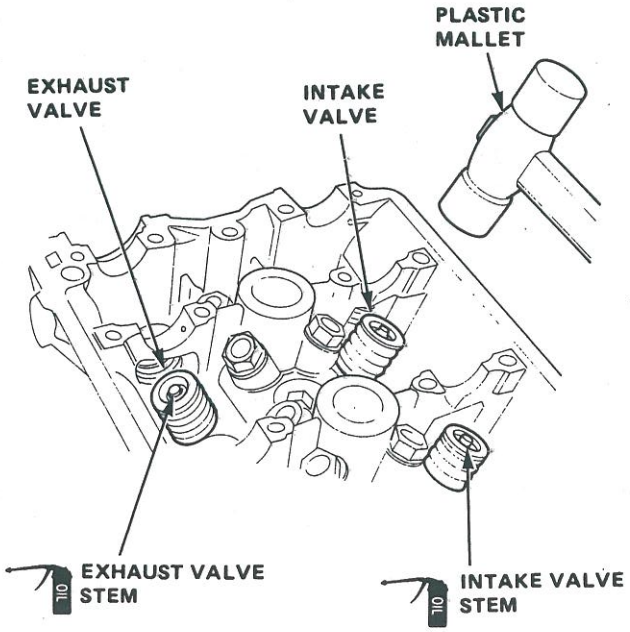


Valves

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 to ensure proper seating of valve and valve keepers (use plastic mallet).



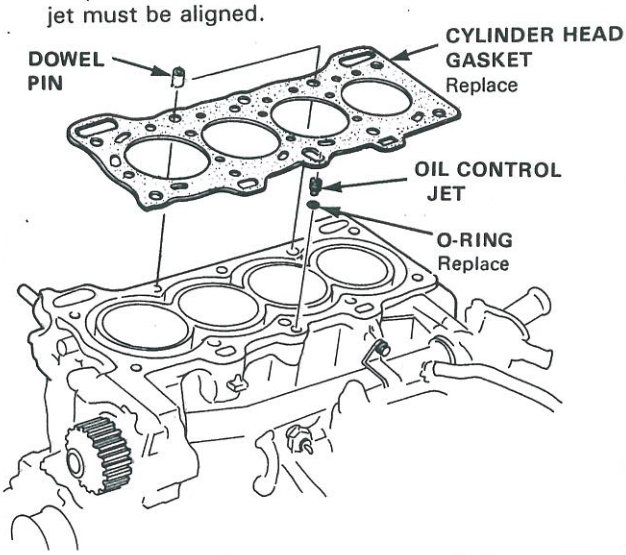
Cylinder Head

Installation

1. Install the cylinder head in reverse order of removal:

   - Always use a new head gasket.
   - Cylinder head and engine block surface must be clean.
   - "UP" mark on timing belt pulley should be at the top.

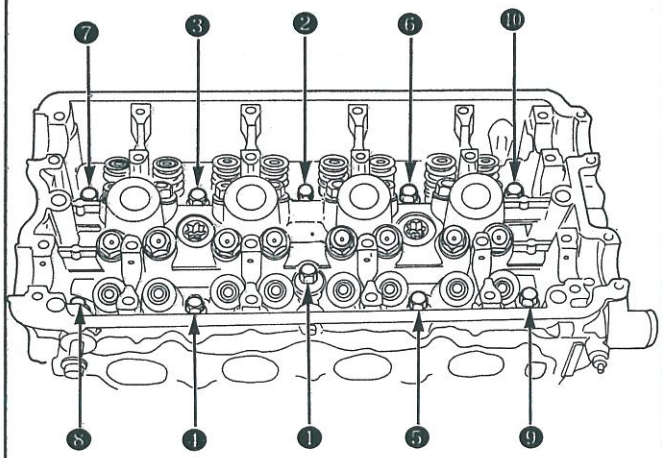
   NOTE: Cylinder head dowel pins and oil control jet must be aligned.



2. Tighten cylinder head bolts and nuts in two steps. In the first step tighten all bolts and nuts, in sequence, to about 30 N·m (3.0 kg-m, 22 lb-ft); in the final step tighten, in same sequence, to 65 N·m (6.5kg-m, 47 lb-ft)

   NOTE:
   - Apply engine oil to the cylinder head bolts and the washers.
   - Use the longer bolt at the position No.8 as shown.

   CYLINDER HEAD BOLTS TORQUE SEQUENCE



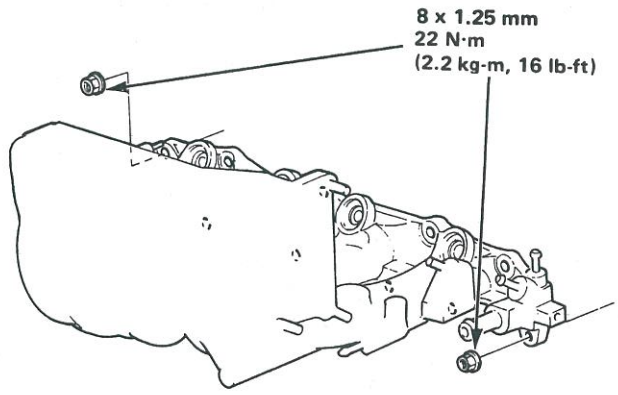
NOTE: Put longer bolt here.

(cont'd)

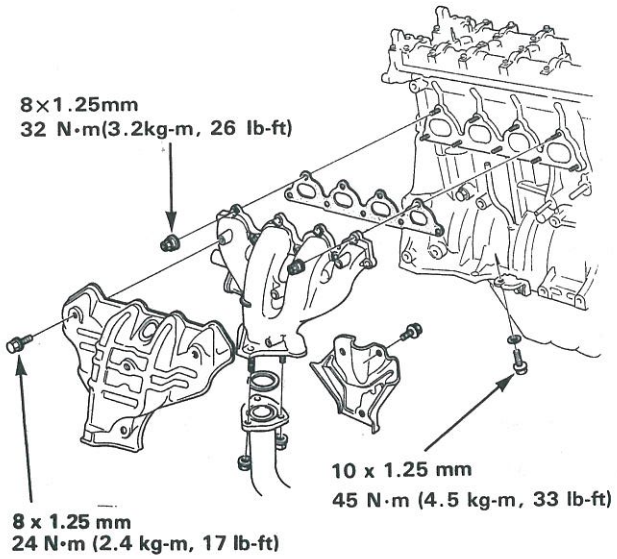
Cylinder Head

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.



4. Install the exhaust manifold and bracket.

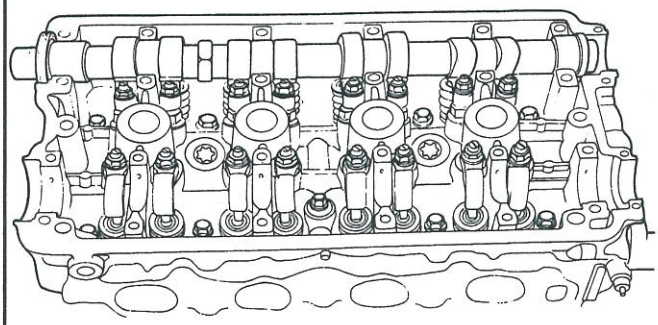


Cam/Rocker Arm and Camshaft Seal/Pulley

Installation

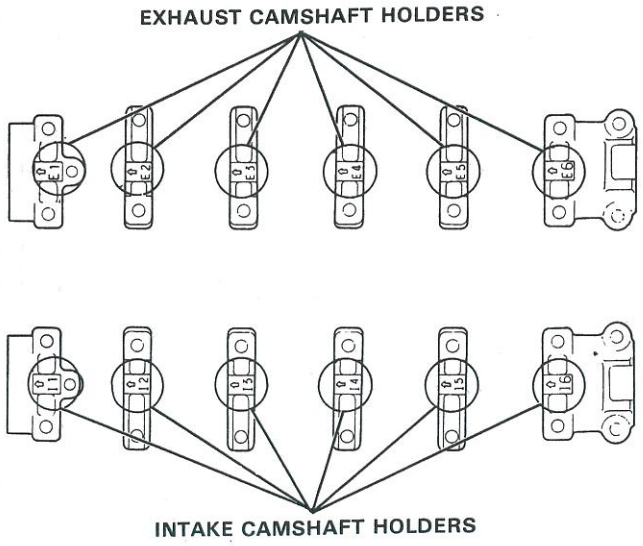
CAUTION:
- **Make sure that the keyways on the camshafts are facing up. (NO.1 cylinder TDC).**
- **Valve locknuts should be loosened and adjusting screws backed off before installation.**
- **Replace the rocker arms in there original positions.**

1. Place the rocker arms on the pivot bolts and the valve stems.

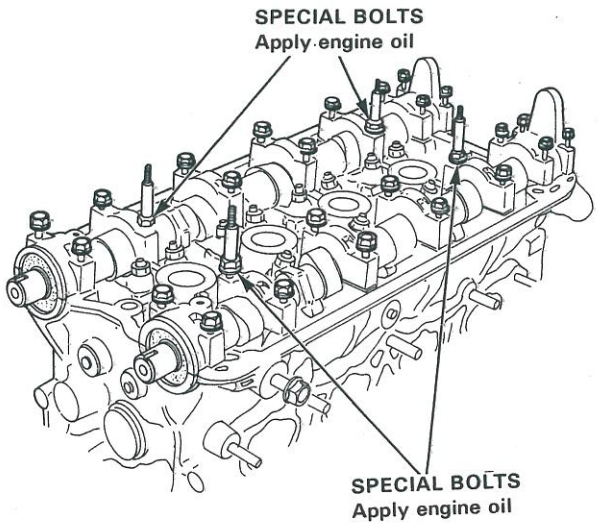


2. Install the camshafts and the camshaft seals with the open side (spring) facing in.

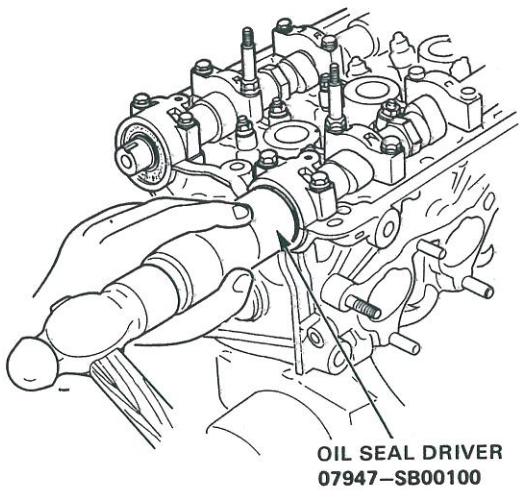
NOTE:
- "I" or "E" marks are stamped on the camshaft holders.
- Do not apply oil to the holder mating surface of camshaft seals.



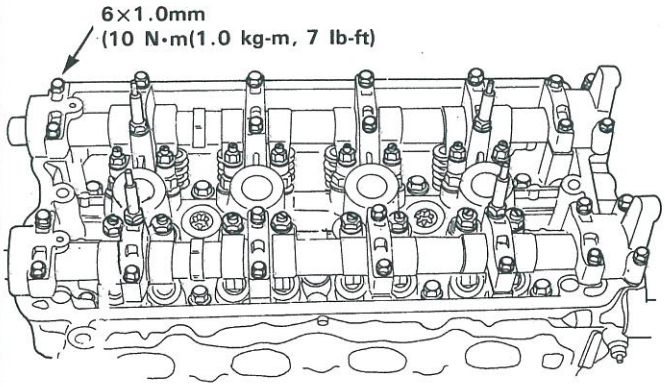
3. Apply liquid gasket to the head mating surfaces of the No.1 and No.6 camshaft holders then install them, along with the No.2. 3. 4 and 5.
4. Tighten the camshaft holders temporarily.
   - Make sure that the rocker arms are properly positioned on the valve stems.



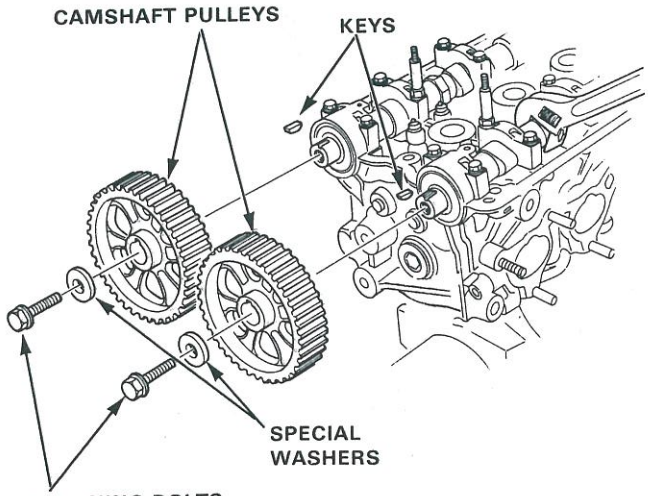
4. Press in the camshaft oil seal securely with the special tool.



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



6. Install keys into grooves in camshafts



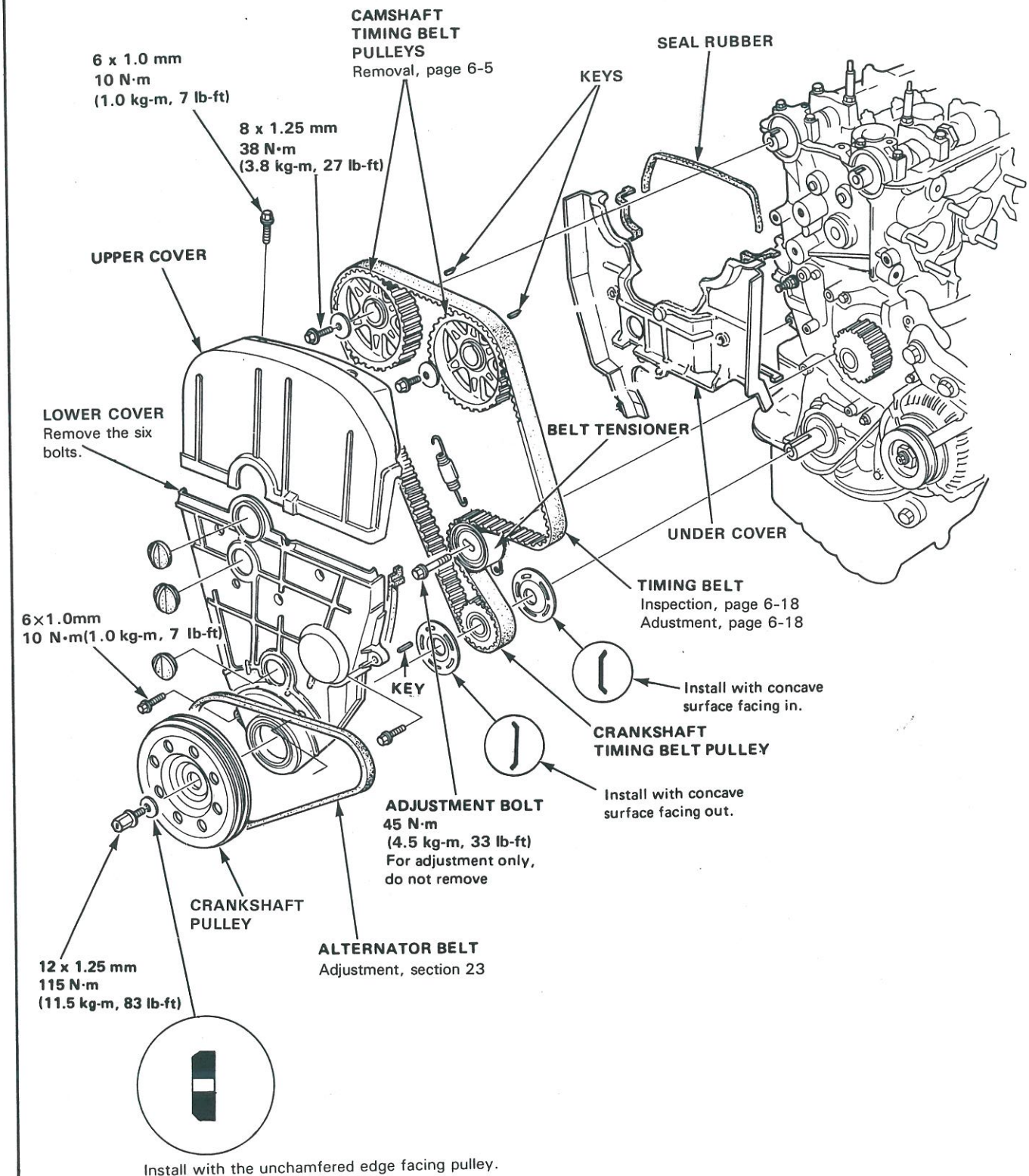
RETAINING BOLTS
8×1.25 mm
38 N·m (3.8 kg-m, 27 lb-ft)

7. Push camshaft pulleys onto camshafts, then tighten retaining bolts to torque shown.
8. Adjust the valve timing (page 6-18).
9. After installation, check that all tubes, hoses and connectors are installed correctly.

Timing Belt

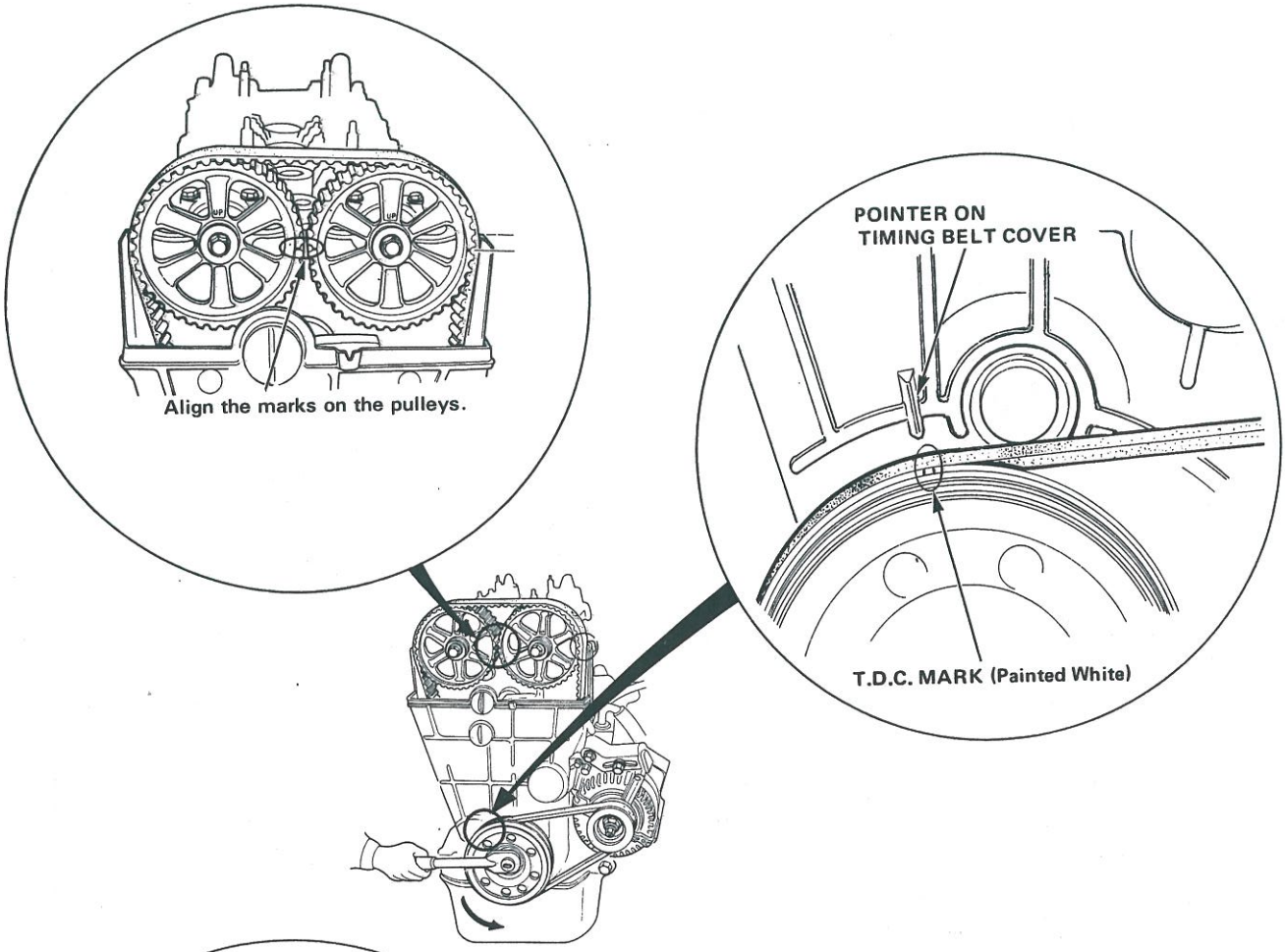
Replacement

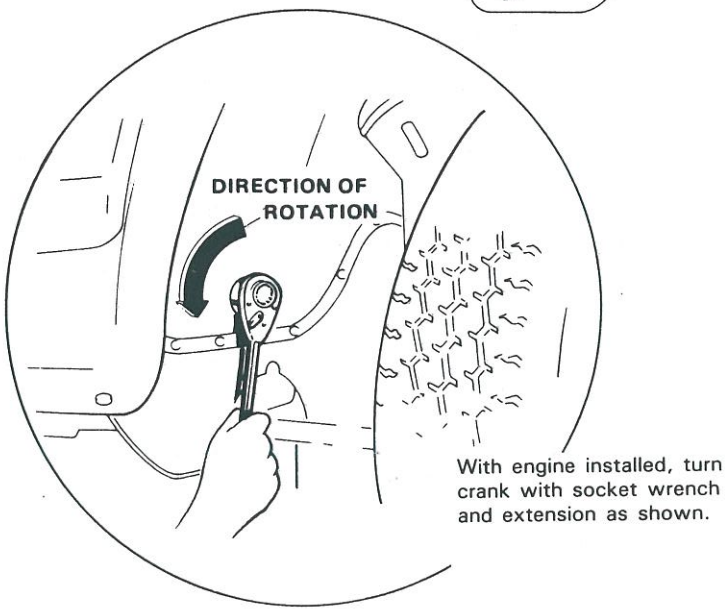
NOTE:
- Refer to next page for positioning crank and pulley before installing belt.
- Mark direction of rotation before removing.



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.



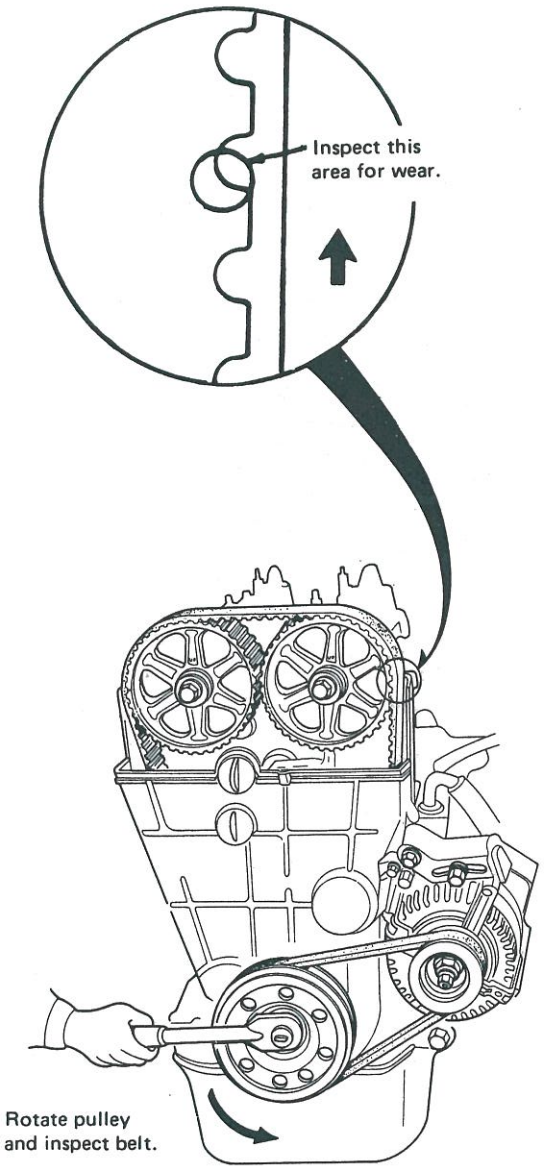


With engine installed, turn crank with socket wrench and extension as shown.

Timing Belt

Inspection

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

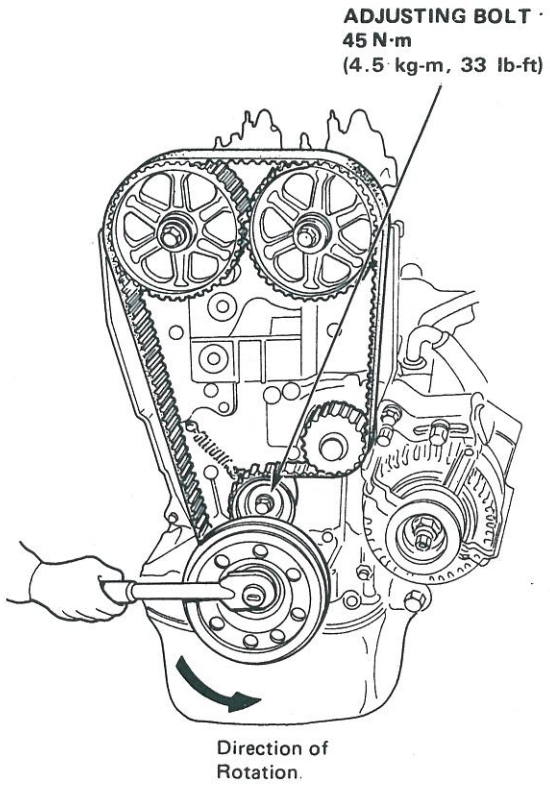


Tension Adjustment

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

NOTE: Tensioner is spring-loaded to apply proper tension to the belt automatically after making the following adjustment:

1. Set the No. 1 piston at TDC.
2. Loosen adjusting bolt.



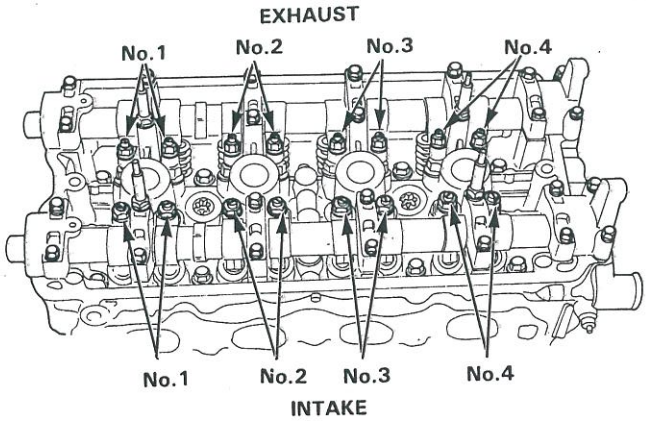
3. Rotate crankshaft counterclockwise 3-teeth on camshaft pulley to create tension on timing belt.
4. Tighten adjusting bolt.
5. If pulley bolt broke loose while turning crank, re-torque it to 115 N·m (11.5 kg-m, 83 lb-ft).

   NOTE: Put transmission in gear and set parking brake before retorquing pulley bolt.

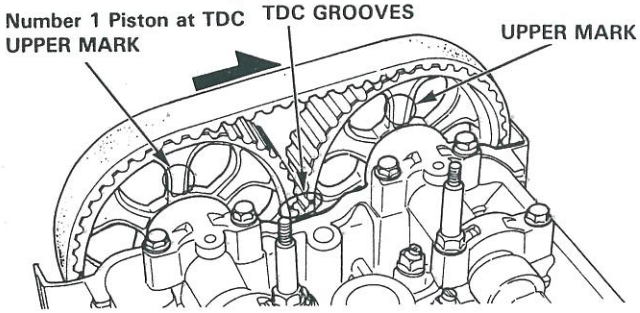
Adjustment

NOTE: Valves should be adjusted cold when the cylinder head temperature is less than 38°C (100 F). Adjustment is the same for intake and exhaust valves. valves.

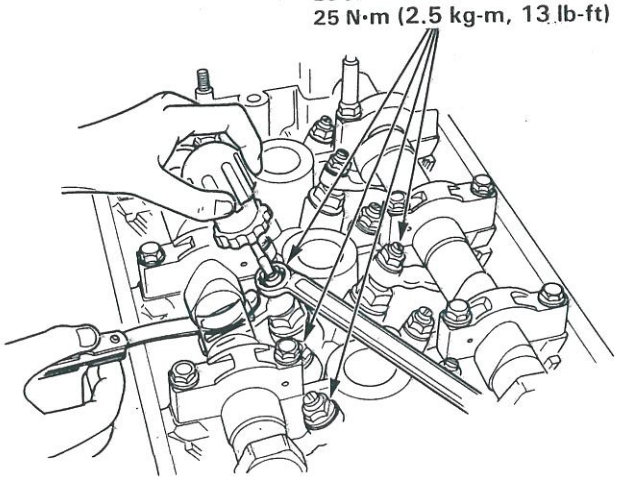
1. Remove the valve cover.



2. Set the No. 1 piston at TDC. "UP" marks in the pulleys should be at top, and the TDC grooves on back side of pulley should align with cylinder head surface. The distributor rotor must be pointing towards No. 1 plug wire.

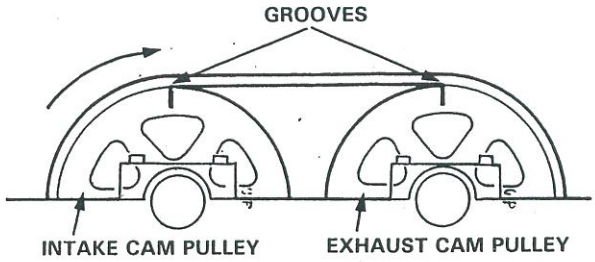


3. Adjust valves on No. 1 cylinder.
   Intake: 0.13 — 0.17mm(0.0051 — 0.0067in.)
   Exhaust: 0.15 — 0.19mm(0.0059 — 0.0075in.)
4. Loosen locknut and turn adjustment screw until feeler gauge slides back and forth with slight amount of drag.



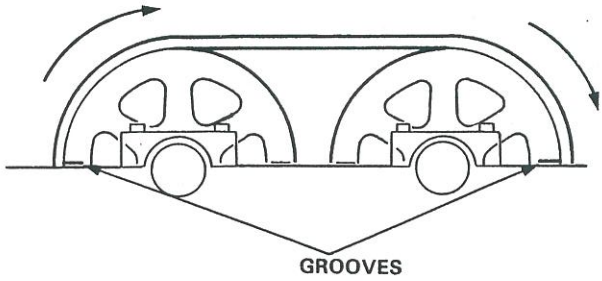
5. Tighten locknut and check clearance again. Repeat adjustment if necessary.
6. Rotate crankshaft 180° counterclockwise (cam pulley turns 90°). The "UP" marks should be at exhaust side. Distributor rotor should point to No. 3 plug wire. Adjust valves on No. 3 cylinder.

Number 3 piston at TDC



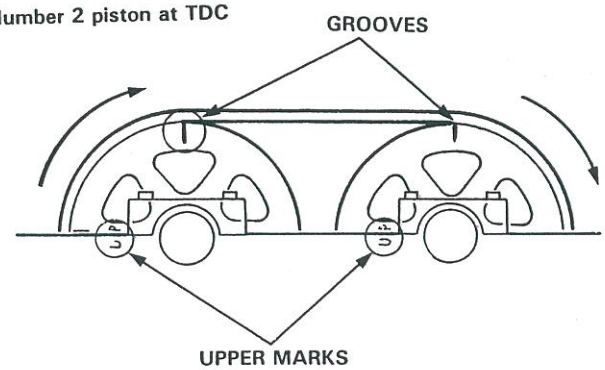
7. Rotate crankshaft 180° counterclockwise to bring No. 4 piston to TDC. Both "UP" marks should be at bottom and distributor rotor points to No. 4 plug wire. Adjust valves on No. 4 cylinder.

Number 4 piston at TDC



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

Number 2 piston at TDC



Engine Block

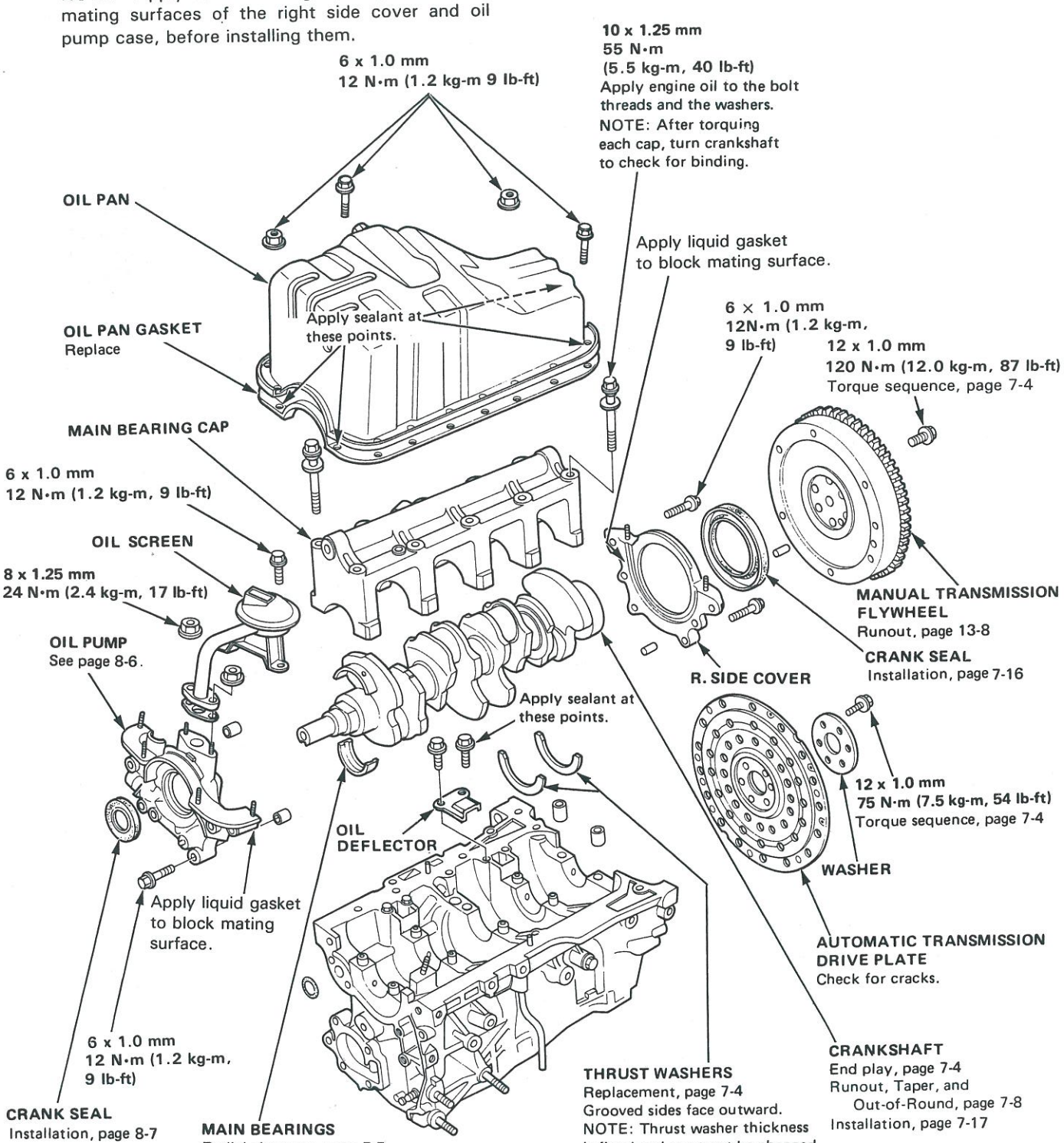


Engine Block

Illustrated Index

Lubricate all internal parts with engine oil during reassembly.

NOTE: Apply non-hardening liquid gasket to the mating surfaces of the right side cover and oil pump case, before installing them.



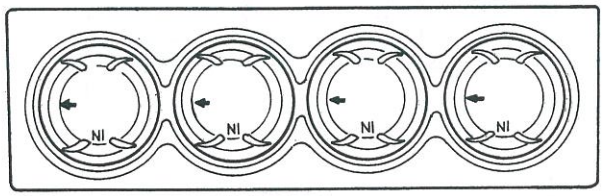
NOTE: New rod bearings must be selected by matching connecting rod and crankshaft identification markings (page 7-6).



PISTON RINGS
Replacement, page 7-14
Measurement, pages 7-14 and 15
Alignment, page 7-15

PISTON INSTALLATION DIRECTION

EXHAUST

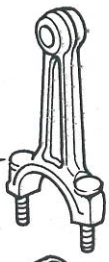


INTAKE



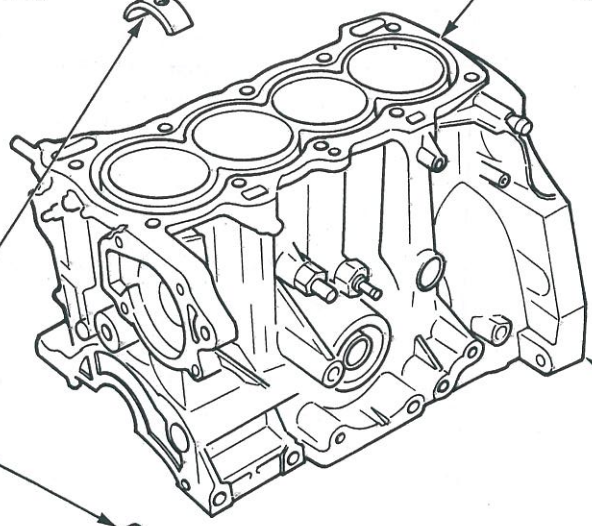
PISTON PIN
Removal, page 7-11
Installation, page 7-12
Inspection, page 7-13

PISTON
Removal, page 7-7
Measurement, pages 7-9



CONNECTING ROD
End play, page 7-4
Selection, page 7-12
Small end measurement, page 7-13

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



CONNECTING ROD BEARINGS
Clearance, page 7-5
Selection, page 7-6



CONNECTING ROD BEARING CAP
Installation, page 7-17
NOTO:Install caps so the bearing recess is on the same side as the recess in the rod.



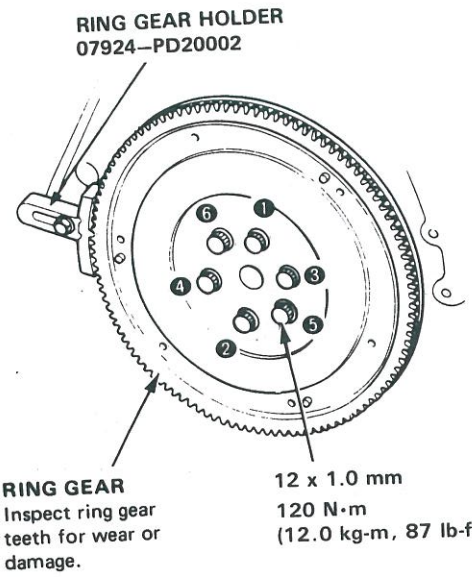
CONNECTING ROD NUT
8 x 0.75mm
32 N·m (3.2 kg-m, 23 lb-ft)
After torquing each bearing cap, rotate crankshaft to check for binding.

ENGINE BLOCK
Cylinder bore inspection, page 7-10
Cylinder bore honing, page 7-11
Warpage inspection, page 7-10

Flywheel and Drive Plate

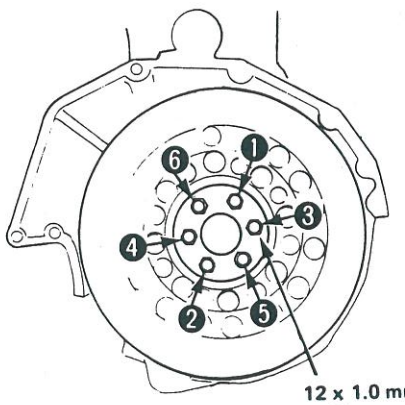
Flywheel Replacement (Manual Transmission)

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



Drive Plate Replacement (Automatic Transmission)

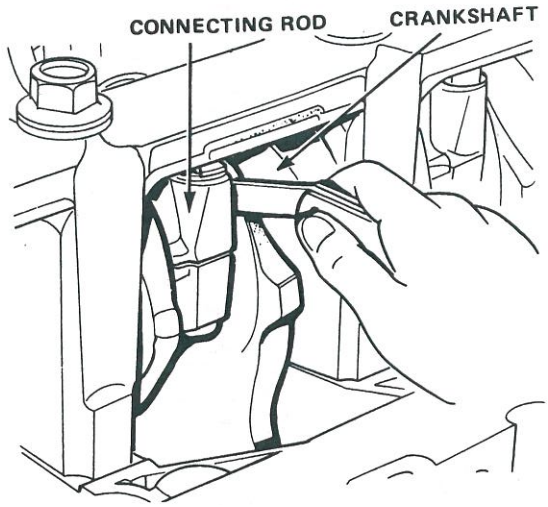
Remove the six drive plate bolts, then separate the drive plate from the crankshaft flange. After installation, tighten the bolts in the sequence shown.



Connecting Rod and Crankshaft

Connecting Rod End Play

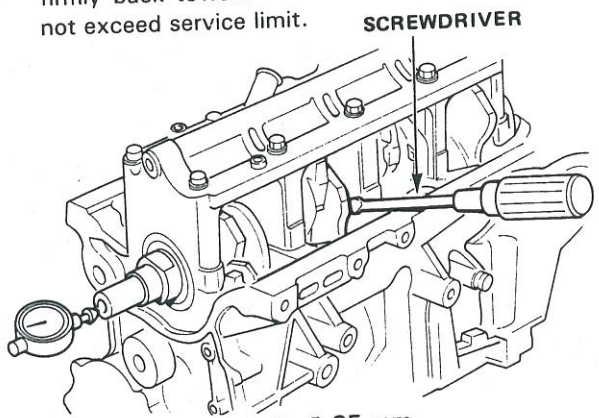
Standard (New): 0.15–0.30 mm (0.006–0.012 in.)
Service Limit: 0.40 mm (0.016 in.)



- If out-of-tolerance, install new connecting rod.
- If still out-of-tolerance, replace crankshaft (pages 7-7 and 7-17).

Crankshaft End Play

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



Standard (New): 0.1–0.35 mm (0.004–0.014 in.)
Service Limit: 0.45 mm (0.018 in.)

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

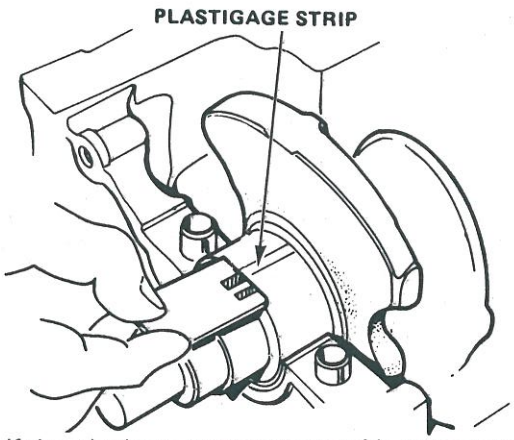
NOTE: Thrust washer thickness is fixed and must not be changed either by grinding or shimming. Thrust washers are installed with grooved sides outward.

Main Bearing

Clearance

1. To check main bearing clearance, remove the main cap 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 bolts, 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 cap, then torque the bolts to 55 N•m (5.5 kg-m, 40 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): 0.024—0.042 mm (0.0009—0.0019 in.)
Service Limit: 0.05 mm (0.002 in.)



6. If the plastigage measures too wide or too narrow, (remove the engine if it's still in the car), remove the crank, remove the upper half of the bearing, then 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.

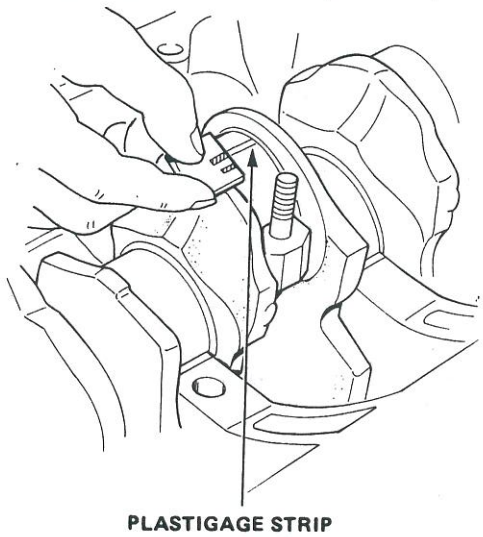
Rod Bearing

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 plastigage across the rod journal.
4. Reinstall the bearing half and cap, and torque the nuts to 32 N•m (3.2 kg-m, 23 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:
Standard (New): 0.020—0.038 mm (0.0008—0.0015 in.)
Service Limit: 0.07 mm (0.003 in.)



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 color as shown on next page), and recheck the clearance.

   CAUTION: Do not file, shim, or scrape the bearing 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.

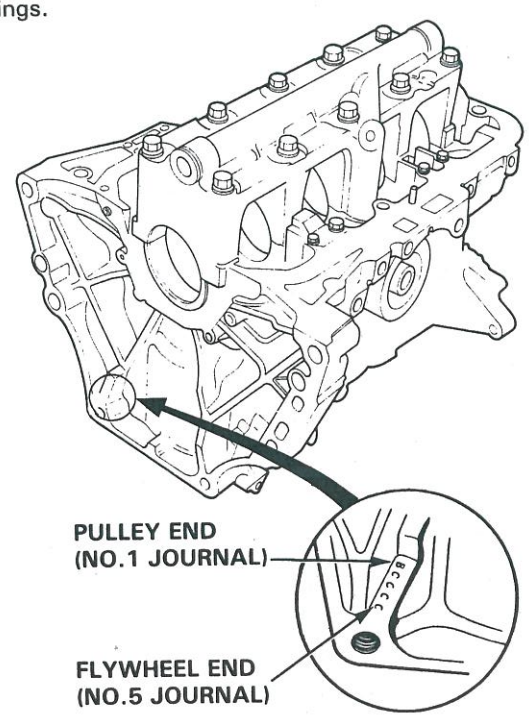
   NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crank and start over.

Main Bearing

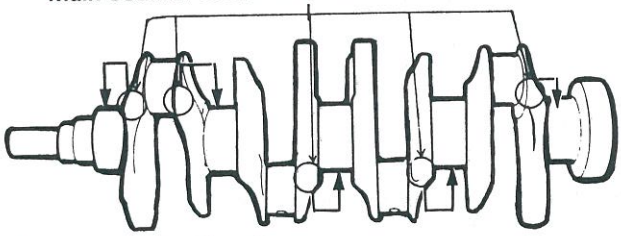
Selection

Crank Bore Code Location (Marks)

Marks 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.



Main Journal Code Locations (Numbers)



Bearing Identification

Color code is on the edge of the bearing.

	Larger crank bore →		
A	B	C	D
↓ Smaller bearing (thicker)			
Red	Pink	Yellow	Green
Pink	Yellow	Green	Brown
Yellow	Green	Brown	Black
Green	Brown	Black	Blue

1
2
3
4

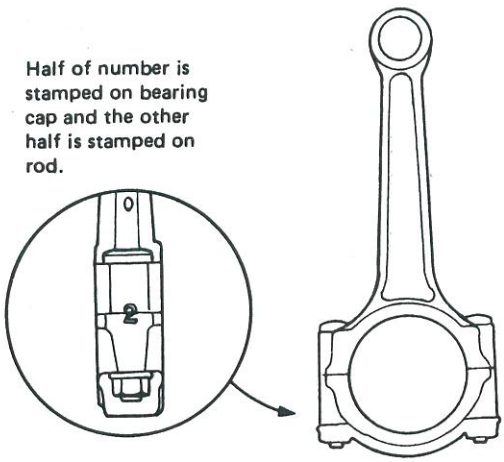
Smaller main journal ↓ Smaller bearing (thicker)

Rod Bearing

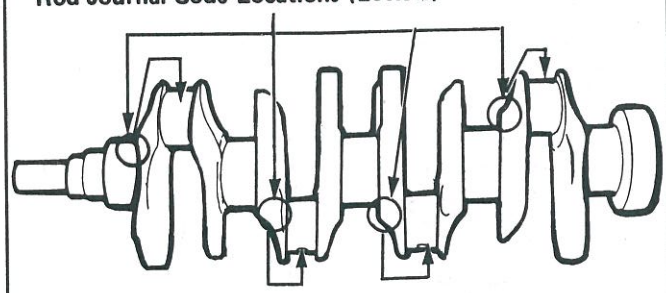
Selection

Rod Code Location (Numbers)

Numbers have been stamped on the side of each connecting rod as a code for the size of the big end. Use them, and the letters stamped on the crank (codes for rod journal size), to choose the correct bearings.



Rod Journal Code Locations (Letters)



Bearing Identification

Color code is on the edge of the bearing.

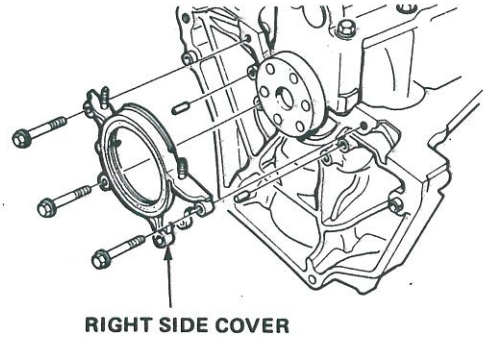
	Larger big end bore →		
1	2	3	4
↓ Smaller bearing (thicker)			
Red	Pink	Yellow	Green
Pink	Yellow	Green	Brown
Yellow	Green	Brown	Black
Green	Brown	Black	Blue

A
B
C
D

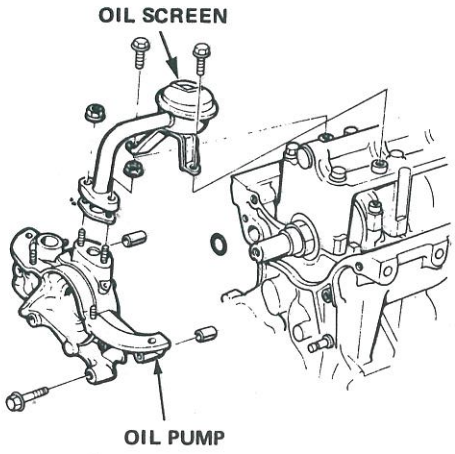
Smaller rod journal ↓ Smaller bearing (thicker)

Removal

1. Remove the right side cover.



2. Remove the oil screen.

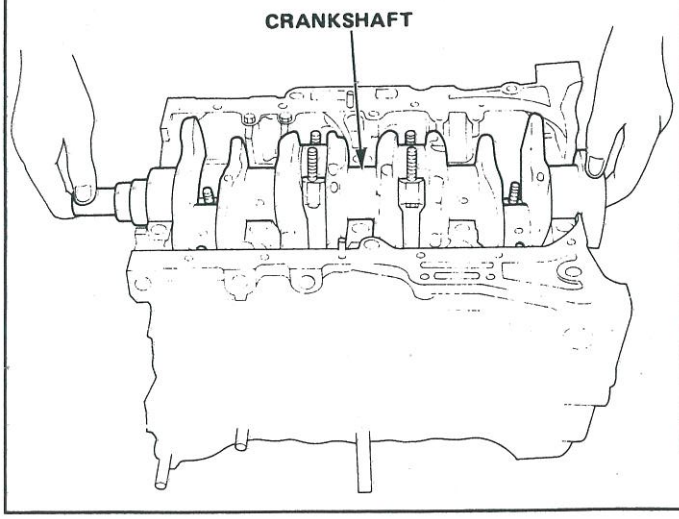


3. Remove the oil pump.

4. Turn the crankshaft so No. 2 and 3 crankpins are at the bottom.

5. Remove the rod caps/bearings and main caps/bearings. Keep all caps/bearings in order.

6. Lift the crankshaft out of engine, being careful not to damage journals.

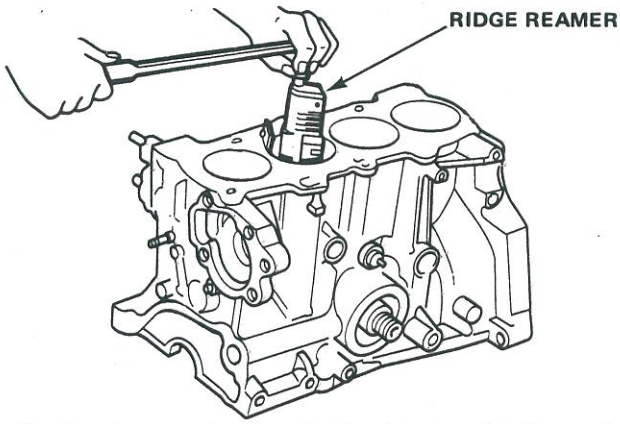


7. Remove upper bearing halves from connecting rods and set aside with their respective caps.

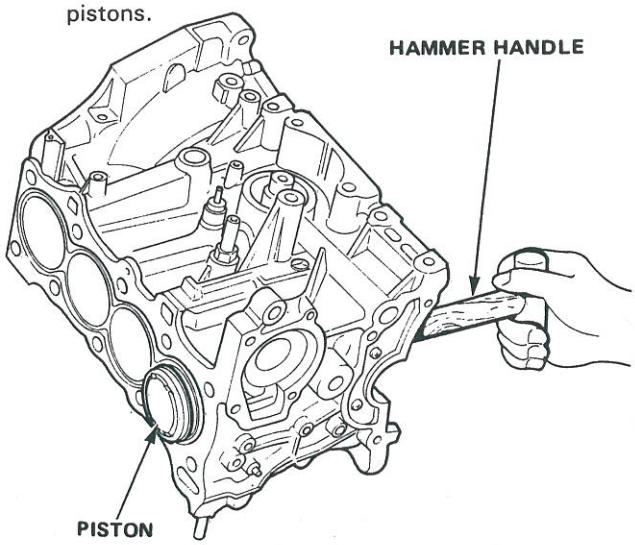
8. Reinstall main cap and bearings on engine in proper order.

9. If you can feel a ridge of metal or hard carbon around the top of each cylinder, remove it with a ridge reamer. Follow reamer manufacturer's instructions.

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



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



11. Reinstall the rod bearings and caps after removing each piston/connecting rod assembly.

12. Mark piston/connecting rod assemblies with cylinder numbers 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

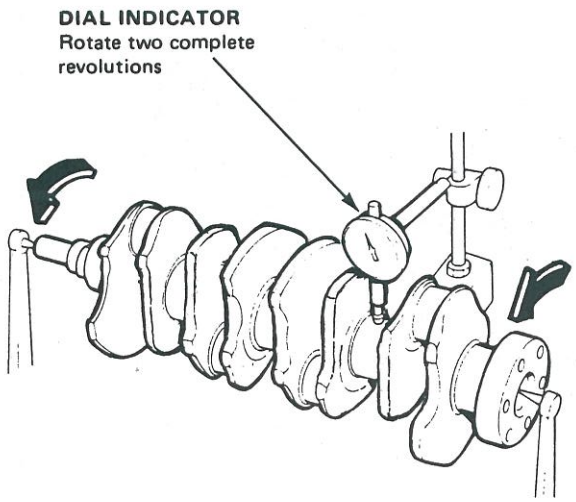
Inspection

- 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.

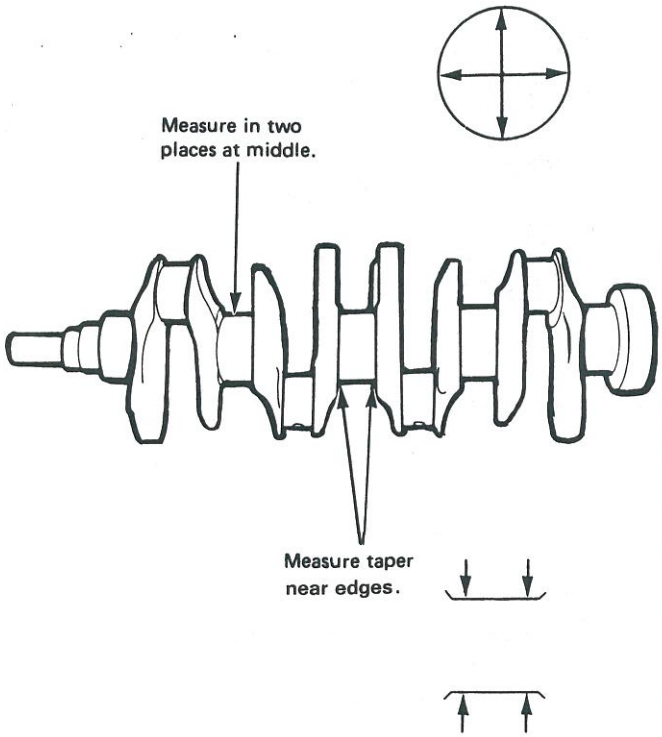
Crankshaft Total Indicated Runout:
Standard (New): 0.03 mm (0.0012 in.)
Service Limit: 0.06 mm (0.0024 in.)



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.)
Service Limit: 0.010 mm (0.0004 in.)



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

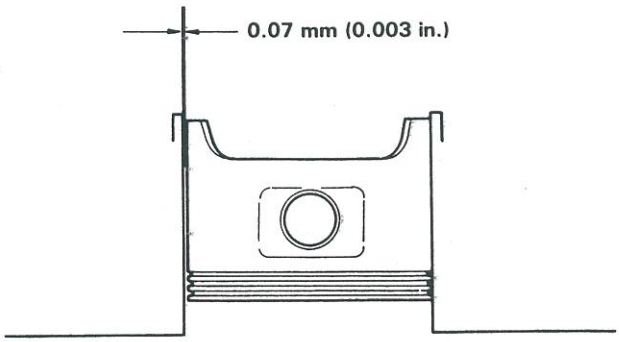
Journal Taper:
Standard (New): 0.005 mm (0.0002 in.)
Service Limit: 0.010 mm (0.0004 in.)

Piston

Piston-to-Block Clearance

1. Make a preliminary piston-to-block clearance check with a feeler gauge:

   Service Limit: 0.07 mm (0.003 in.)



If the clearance is near or exceeds the service limit, inspect the piston and cylinder block for excessive wear.
To confirm the feeler gauge check, further measurement with a micrometer will be necessary.

2. Calculate difference between cylinder bore diameter on page 7-10 and piston diameter.

   Piston-to-Cylinder Clearance:
   Standard (New): 0.01—0.05 mm (0.0004—0.0020 in.)
   Service Limit: 0.07 mm (0.003 in.)

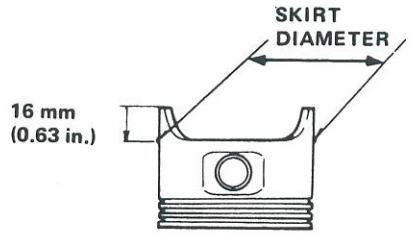
Inspection

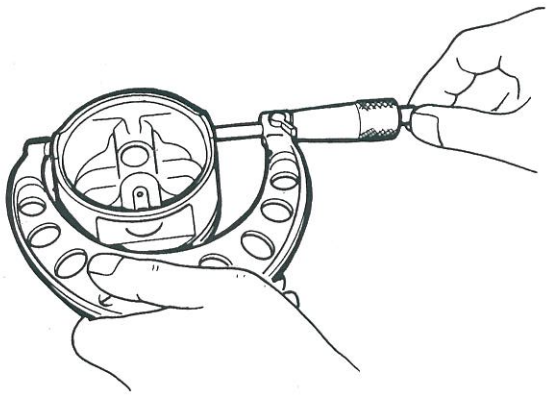
1. Check the piston for distortion or cracks.

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

2. Measure piston diameter at a point 16 mm (0.63 in.) from bottom of skirt.

   Piston Diameter
   Standard (New): 74.98—74.99 mm (2.9520—2.9524 in.)
   Service Limit: 74.97 mm (2.9516 in.)





   Oversize Piston Diameter
   Standard 0.25: 75.23—75.24 mm (2.9618—2.9622 in.)
   Standard 0.5: 75.48—75.49 mm (2.9716—2.9720 in.)

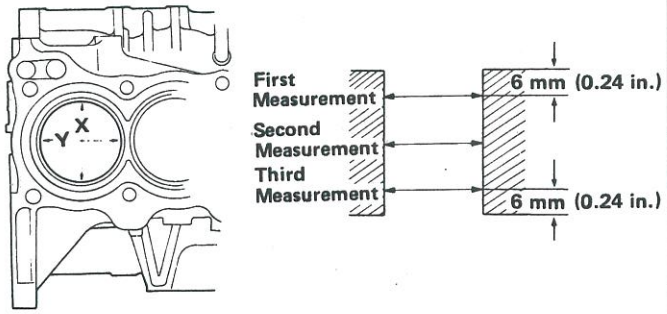
3. Check the piston pin-to-piston clearance. Coat the piston pin with engine oil.
   It should then be possible to push the piston pin into the piston hole with thumb pressure.

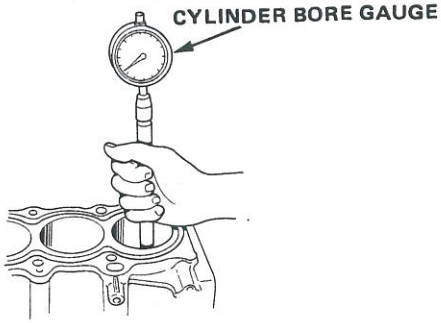
   Piston Pin-to-Piston Clearance:
   Seandard (New): 0.010—0.040 mm (0.0004—0.0016 in.)

Cylinder Block

Inspection

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





Cylinder Bore Size
Standard (New): 75.00—75.02 mm (2.9528—2.9535 in.)
Service Limit: 75.07 mm (2.9555 in.)

Oversize
Standard 0.25 (New): 75.215—75.248 mm (2.9612—2.9625 in.)
Standard 0.5 (New): 75.465—75.498 mm (2.9711—2.9724 in.)

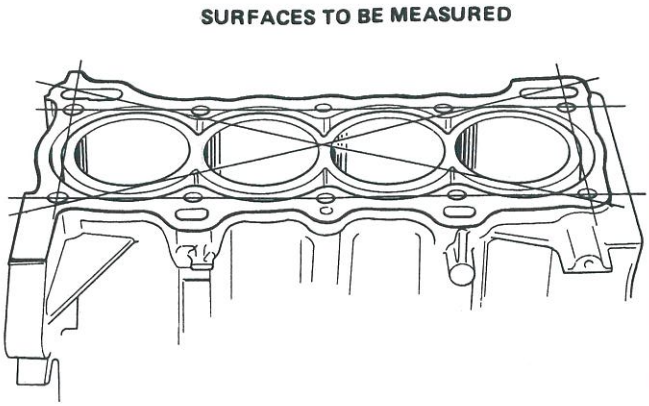
Bore Taper
Limit: (Difference between first and third measurement) 0.05 mm (0.002 in.)

- If measurements in any cylinder is beyond Oversize Bore Service Limit, replace the block.
- If block is to be rebored, refer to Piston Clearance Inspection (page 7-9) after reboring.

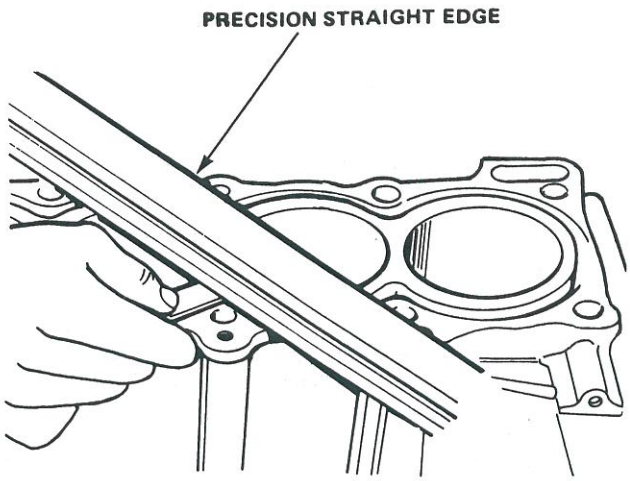
NOTE: Scored or scratched cylinder bores must be honed.

Out-of-Round
Service Limit: 0.05 mm (0.002 in.)

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



Engine Block Warpage:
Standard (New): 0.07 mm (0.003 in.)
Service Limit: 0.10 mm (0.004 in.)

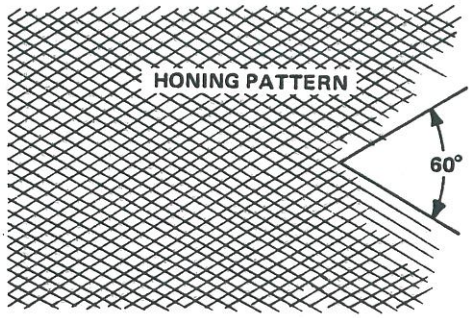


Piston Pin

Cylinder Bore Honing

1. Measure cylinder bores as shown on page 7-10. If the block can be re-used, hone the cylinders, and remeasure the bores.

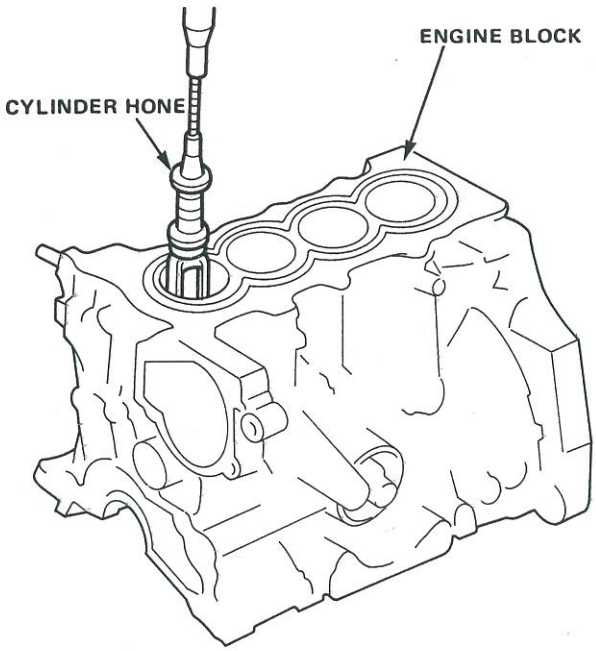
2. Hone cylinder bores with honing oil and medium (220 grit) stone in a 60 degree cross-hatch pattern.



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.

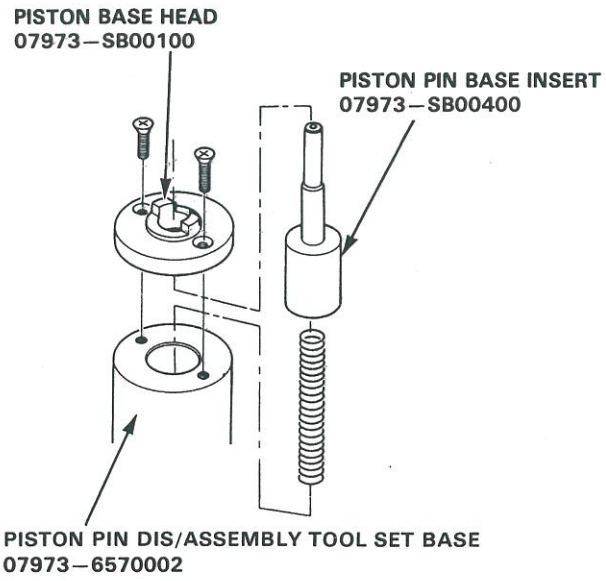
4. If scoring or scratches are still present in cylinder bores after honing to service limit, rebore the engine block.

   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.

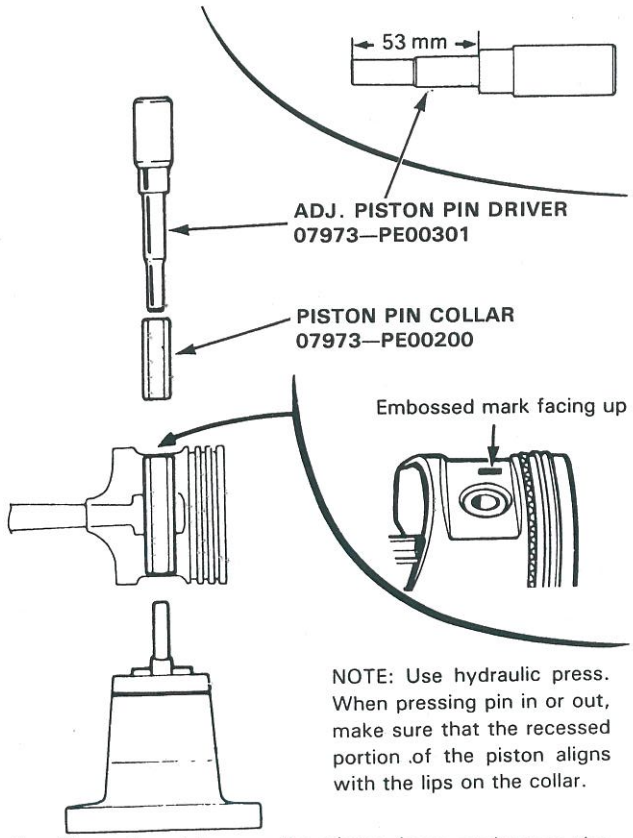


Removal

1. Install the attachment on the piston base.



2. Adjust the length of piston pin driver to 53 mm (2.09 in) as shown.



NOTE: Use 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 Rod

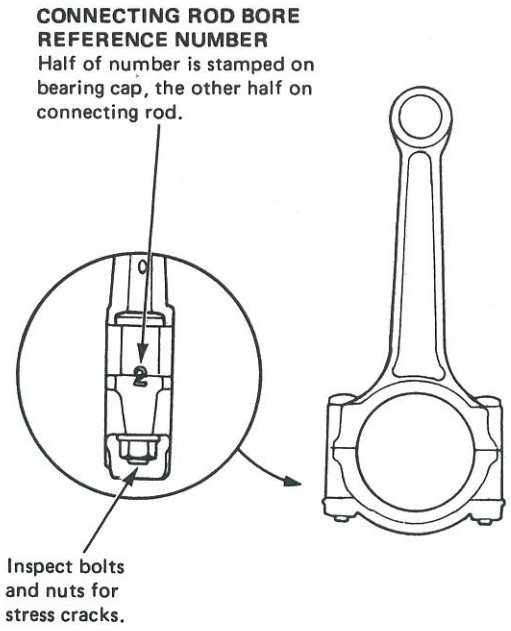
Selection

Each rod is sorted into one of four tolerance ranges (from +0.006 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 (1, 2, 3, or 4) indicating that tolerance. You may find any combination of 1, 2, 3, or 4 in any engine.

Normal Bore Size: 48 mm (1.89 in.)

NOTE:

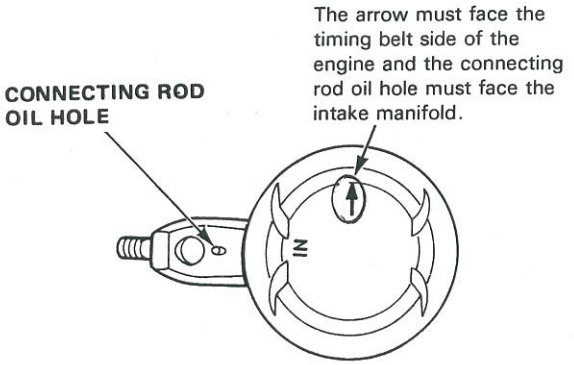
- Reference numbers are for big end bore size and do NOT indicate the position of rod in engine.
- Inspect connecting rod for cracks and heat damage.

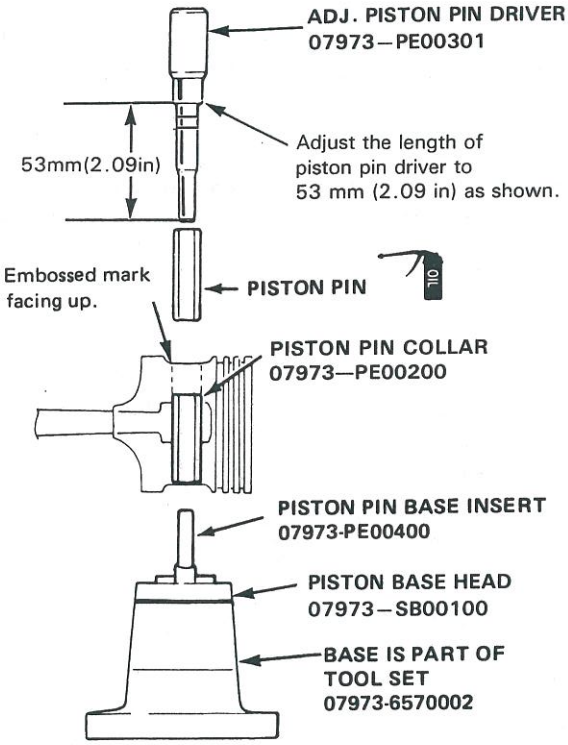


Piston Pin

Installation

1. Use a hydraulic press for installation.
   - When pressing pin in or out, be sure you position the recessed flat on the piston against the lugs on the base attachment.





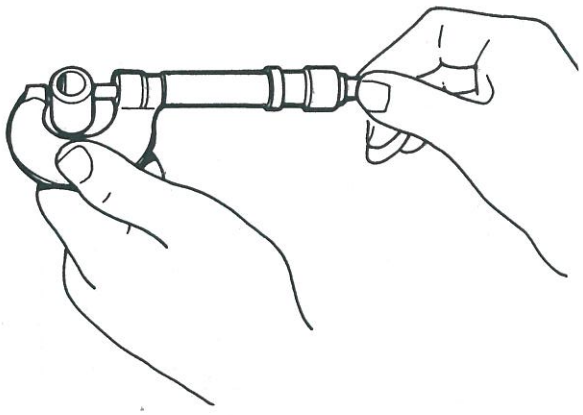
NOTE: Install the assembled piston and rod with the oil hole facing the intake manifold.

Inspection

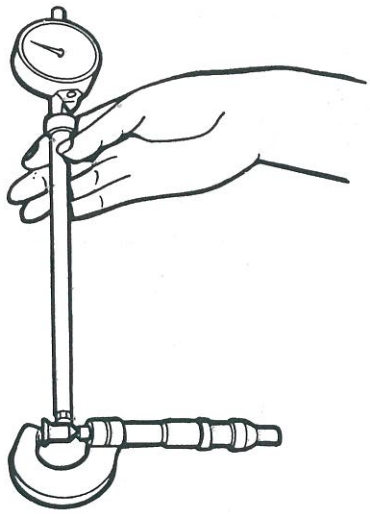
1. Measure the diameter of the piston pin.

Piston Pin Diameter:
Standard (New): 18.994—19.0 mm (0.7478—0.7480 in.)
Oversize: 18.997—19.003 mm (0.7479—0.7481 in.)

NOTE: All replacement piston pins are oversize.



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

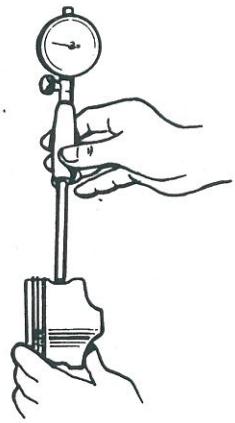


3. Measure the piston pin-to-piston clearance.

NOTE: Check the piston for distortion or cracks.

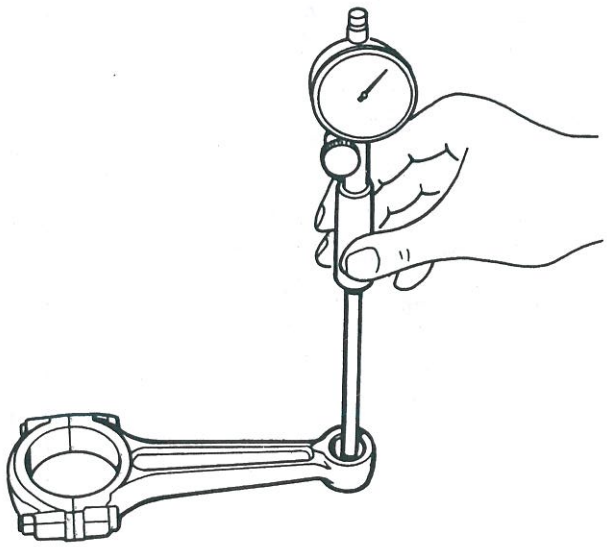
If the piston pin clearance is greater than 0.022 mm (0.0009 in.), re-measure using an oversize piston pin.

Piston Pin-to-Piston Clearance:
Service Limit: 0.010—0.022 mm (0.0004—0.0009 in.)



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

Piston Pin-to-Connecting Rod Interference:
Standard (New): 0.014—0.04 mm (0.0006—0.0016 in.)



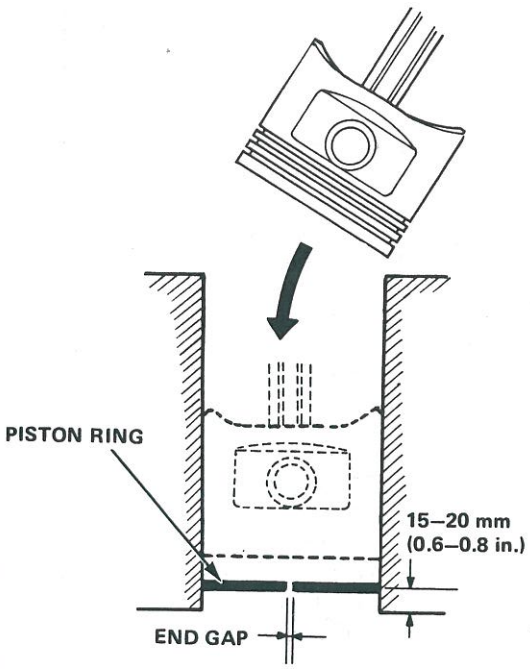
Piston Ring

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, re-check the cylinder bore diameter against the wear limits on page 7-9. If the bore is over limit, the engine block must be rebored.

Piston Ring End-Gap:
Top and Second Ring
Standard (New): 0.15—0.35 mm (0.006—0.014 in.)
Service Limit: 0.6mm (0.024 in.)

Oil Ring
Standard (New) : 0.2—0.7 mm (0.008—0.028 in.)
Service Limit: 0.8 mm (0.032 in.)



Replacement

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

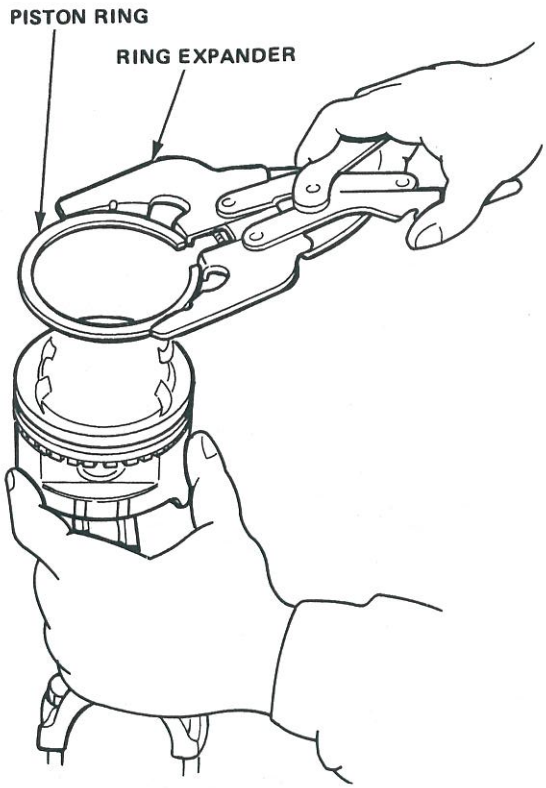
   NOTE: Use squared-off broken ring, or file down blade on ring groove cleaner to fit (Top ring is 1.2 mm wide; 2nd ring is 1.5 mm wide; oil ring is 4.5 mm wide).

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

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

3. Install new rings in proper sequence and position (page 7-15).

   NOTE: Do not re-use old piston rings.

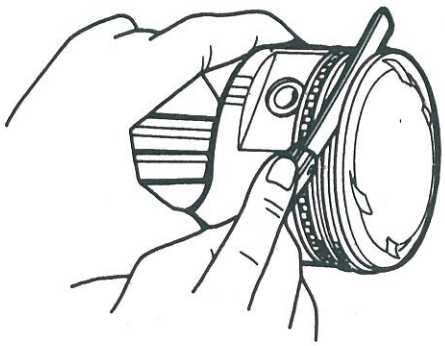


Ring Land Clearances

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

Top Ring Clearance
Standard (New): 0.03—0.06 mm (0.0012—0.0024 in.)
Service Limit: 0.13 mm (0.005 in.)

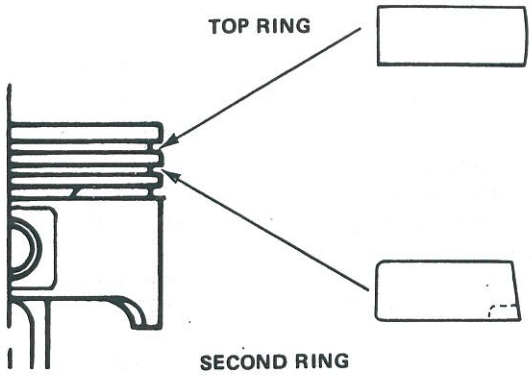
Second Ring Clearance
Standard (New): 0.030—0.055 mm (0.0012—0.0022 in.)
Service Limit: 0.13 mm (0.005 in.)



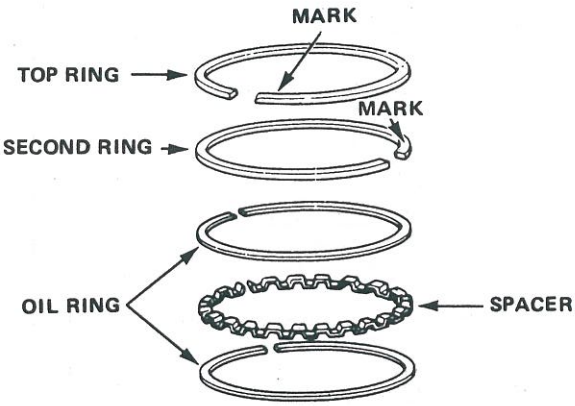
Alignment

1. Install the rings as shown on page 7-14.

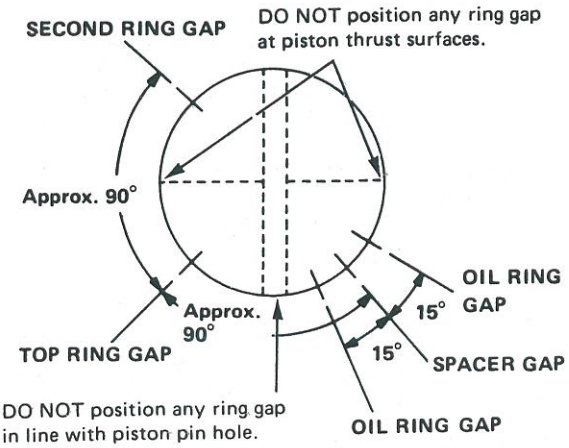
   Identify top and second rings by the chamfer on the edge, and make sure they are in proper grooves on piston.



2. Rotate the rings in grooves to make sure they do not bind.
3. The manufacturing marks must be facing upward.



4. Position the ring end gaps as shown:

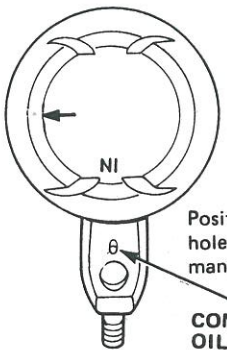


Piston

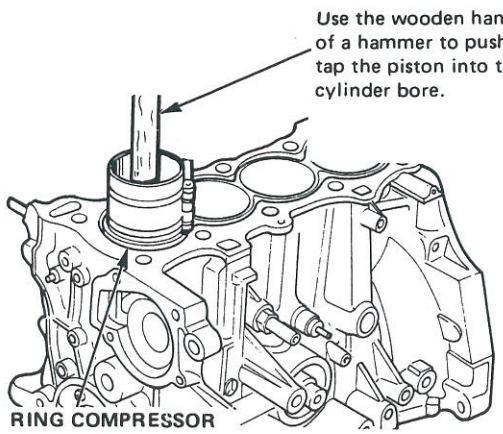
Installation

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, then 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 rod into place.
   - Install the rod caps with bearings, and torque the nuts to 32 N·m (3.2 kg-m, 23 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 ring compressor to prevent rings from expanding before entering the cylinder bore.

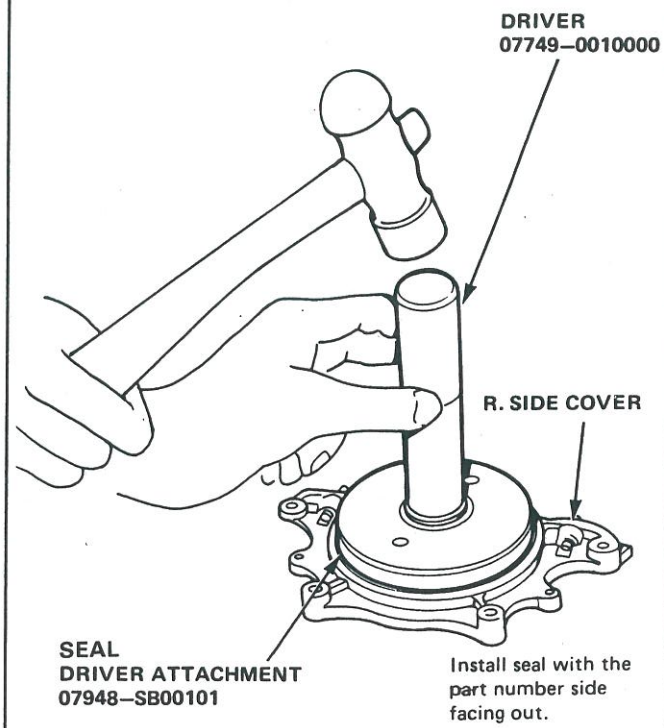


Oil Seal

Installation

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

1. Drive in flywheel-end seal until to bottoms against R. side cover.

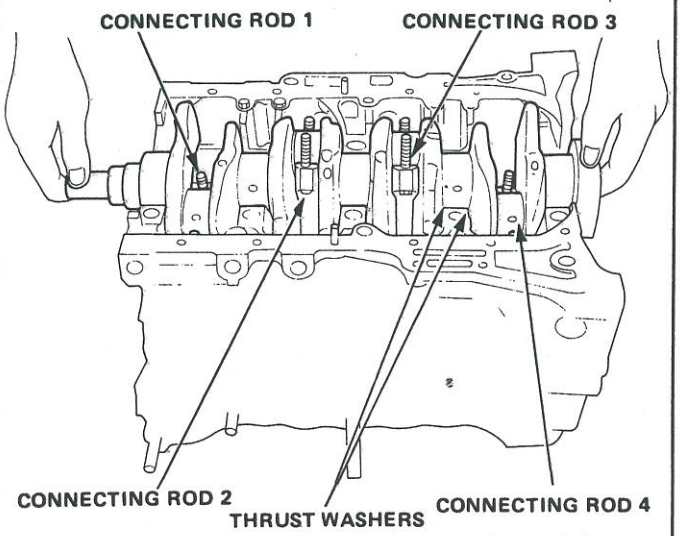


NOTE: Refer to page 8-7 for oil pump side oil seal installation.

Installation

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

1. Insert bearing halves in the engine block and connecting rods.
2. Hold the crankshaft so rod journals for cylinder 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 and install 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.

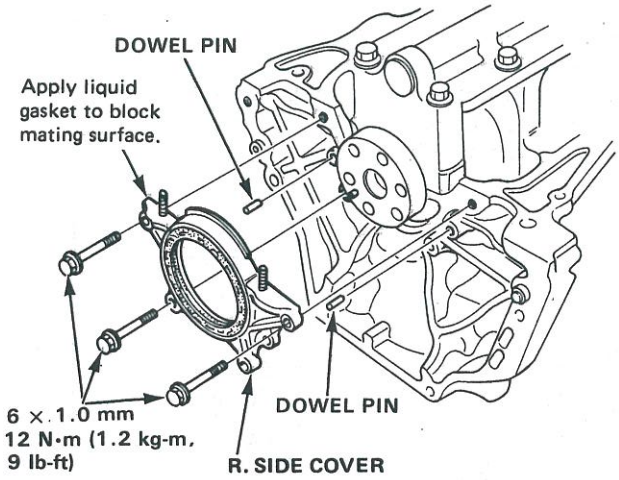
   NOTE: Install caps so the bearing recess is on the same side as the recess in the rod.

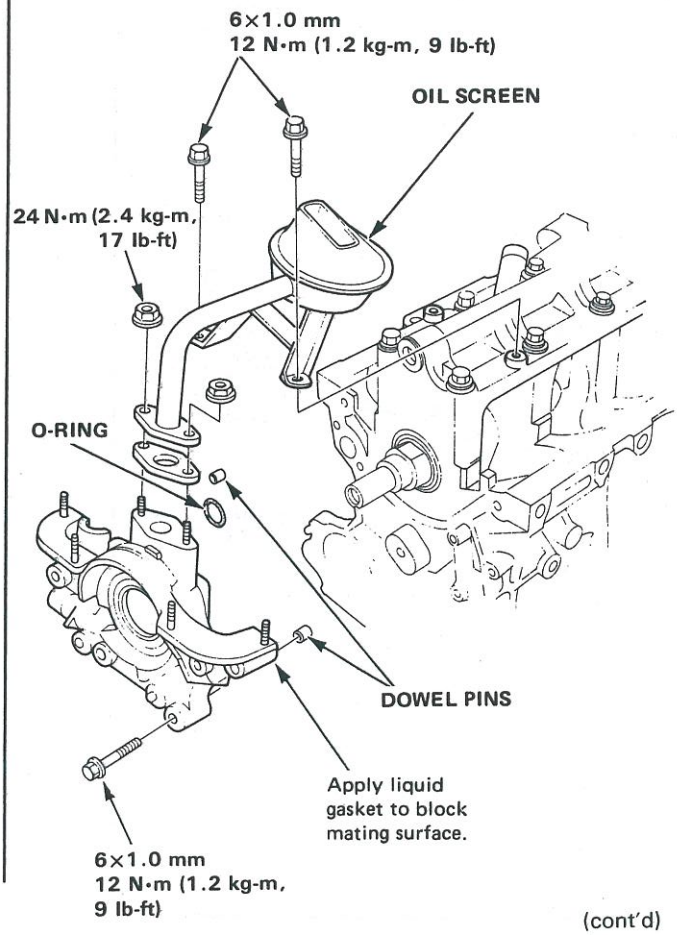
5. Install the thrust washers, main bearing halves and cap, check clearance with plastigage (page 7-5), then torque the nuts to 55 N•m (5.5kg-m, 40 lb-ft). Oil thrust washer surfaces.
6. Check the rod bearing clearance with plastigage (page 7-5), then torque nuts to 32 N•m (3.2 kg-m, 23 lb-ft).

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

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

7. Apply non-hardening liquid gasket to the block mating surface of the right side cover and oil pump case, and install them on the engine block.



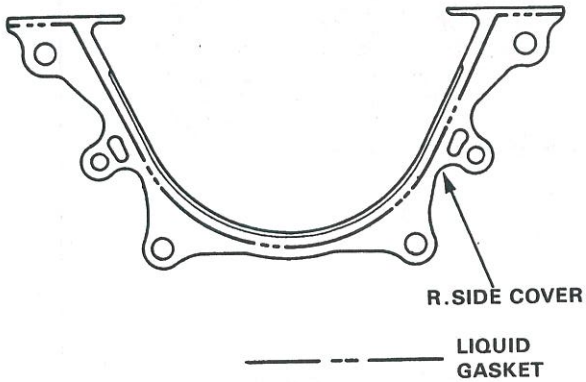


(cont'd)

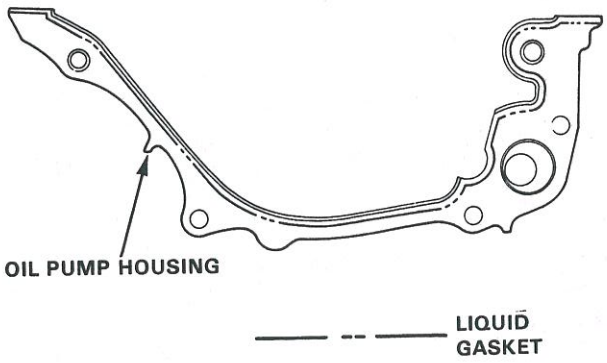
Installation (cont'd)

NOTE:
- Use HONDA PART NO 08740-99986 for the liquid gasket.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket by starting with an even bend, centered between edges of the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.
- Do not allow the sealant to dry before assembly.
- Wait at least 30 minutes after assembly before filling the engine with oil.

R.side cover side:



Oil pump side



8. Install the oil strainer.
9. Install the oil pan.

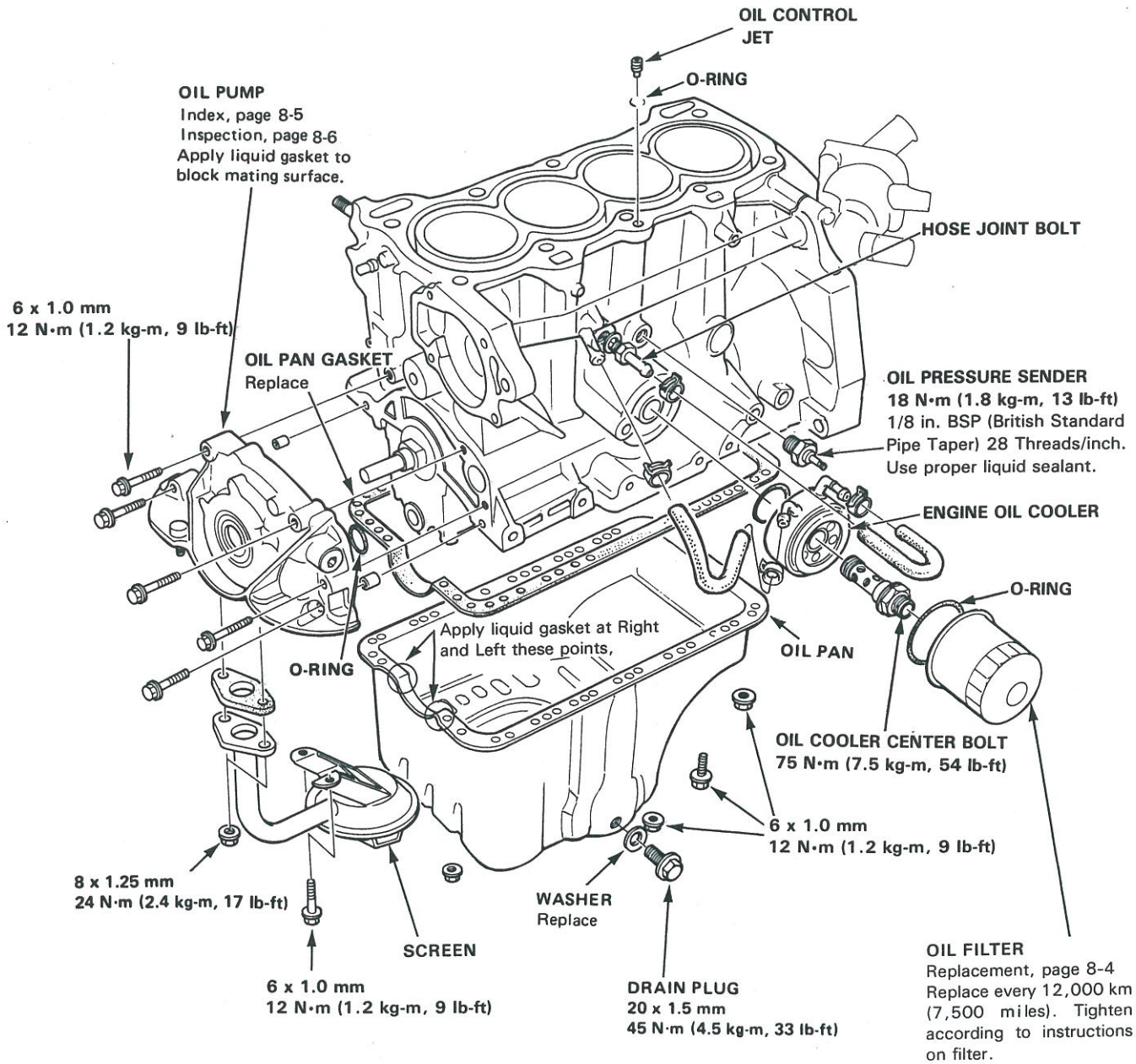
Engine Lubrication



Engine Lubrication

Illustrated Index

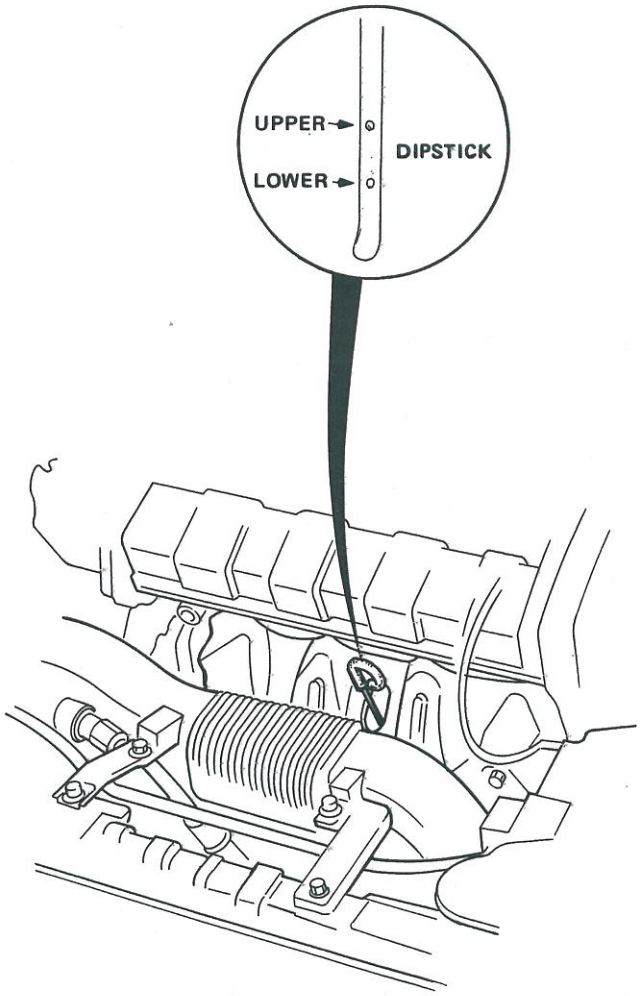
NOTE: Use new O-rings whenever reassembling.



Engine Oil

Level Inspection

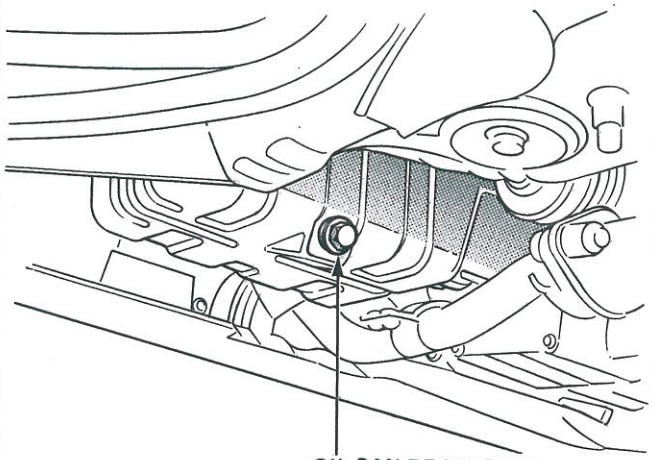
1. Check engine oil with the engine off and the car parked on level ground.
2. Make certain that the oil level indicated on the dipstick is between the upper and lower marks.
3. If the level has dropped close to the lower mark, add oil until it reaches the upper mark.



Replacement

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

   NOTE: Remove the filler cap to speed draining.

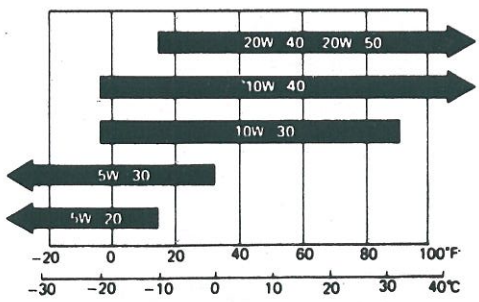


OIL PAN DRAIN PLUG
45 N·m (4.5 kg-m, 33 lb-ft)

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

Requirement	"Fuel Efficient" SF Grade only
Capacity	3.7 U.S. qt (3.5 ℓ) at change, including filter. 4.2 U.S. qt (4.0 ℓ) after engine overhaul.
Change	Every 12,000 km (7,500 miles)

Engine Oil Viscosity for Outside Temperature Ranges.



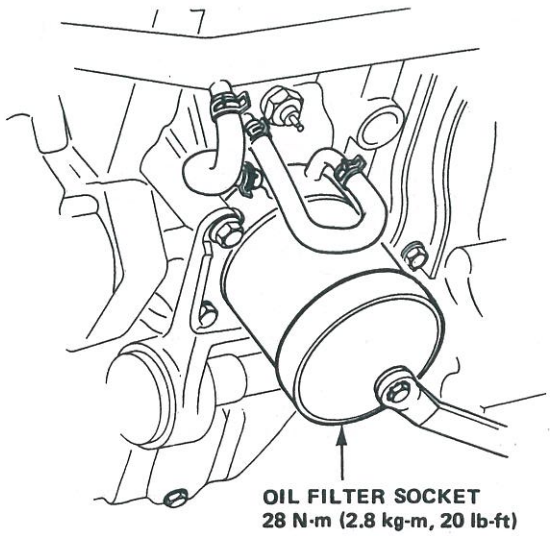
NOTE: Oil filter should be replaced at each oil change.

Oil Filter

Replacement

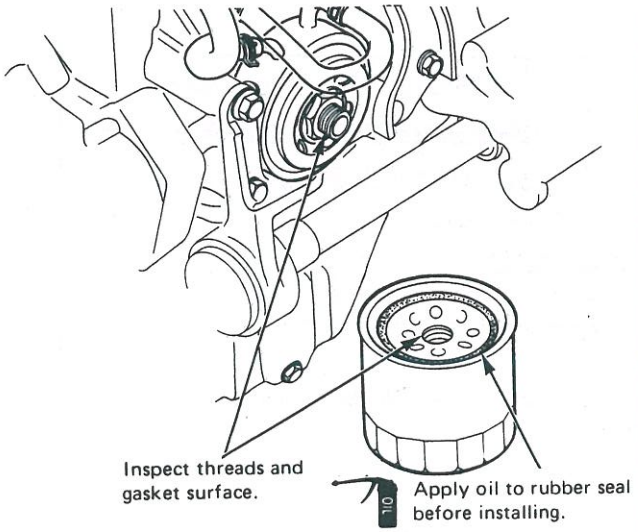
CAUTION: After the engine has been run, the exhaust pipes will be hot; be careful when working around the exhaust manifold.

1. Remove the oil filter with the special oil filter socket.



2. Inspect the threads and gasket on the new filter. Wipe off seat on engine block, then apply a light coat of oil to gasket, and install filter. Tighten according to instructions on, or with, the filter.

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



Oil Pressure

Test

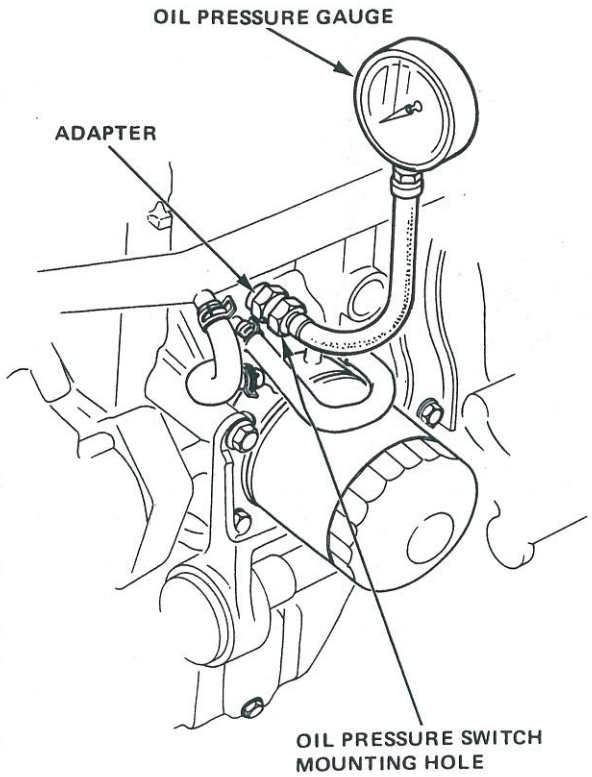
If the oil pressure warning light stays on with the engine running. Check the engine oil level. If the oil level is correct:

1. Remove the oil pressure sender and install an oil pressure gauge.
2. Start the engine and allow to reach operating temperature (fan comes on at least twice).
3. Pressure should be:

   Engine Oil Pressure:

At	**Idle:**	**147 kPa (1.5 kg/cm², 21 psi) minimum**
At	**3,000rpm:**	**412—539 kPa (4.2—5.5 kg/cm² 60—78psi)**

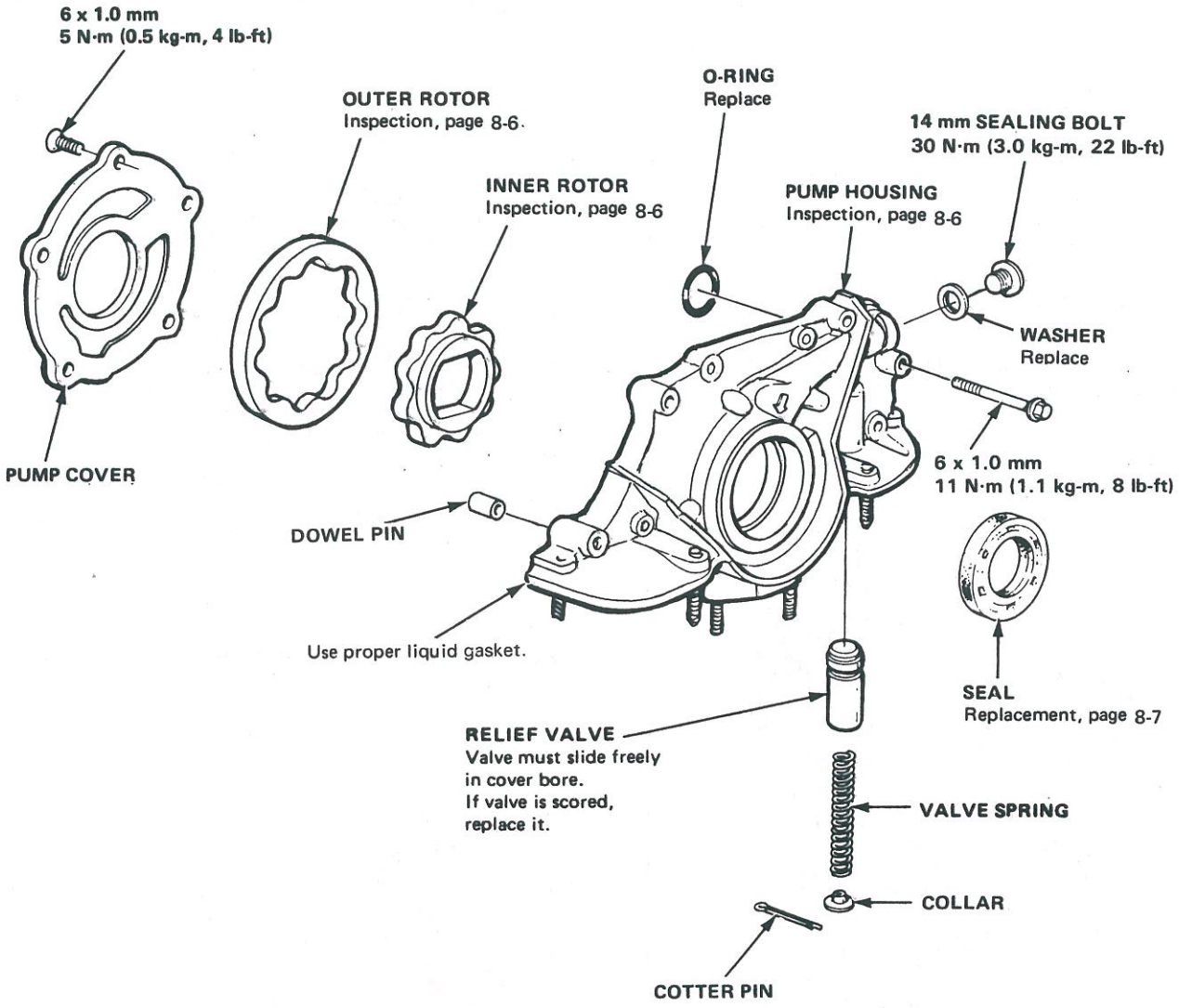
- If oil pressure is within specifications, replace oil pressure sender and recheck.
- If oil pressure is NOT within specifications, inspect oil pump (pages 8-6 and 7).



Oil Pump

Illustrated Index

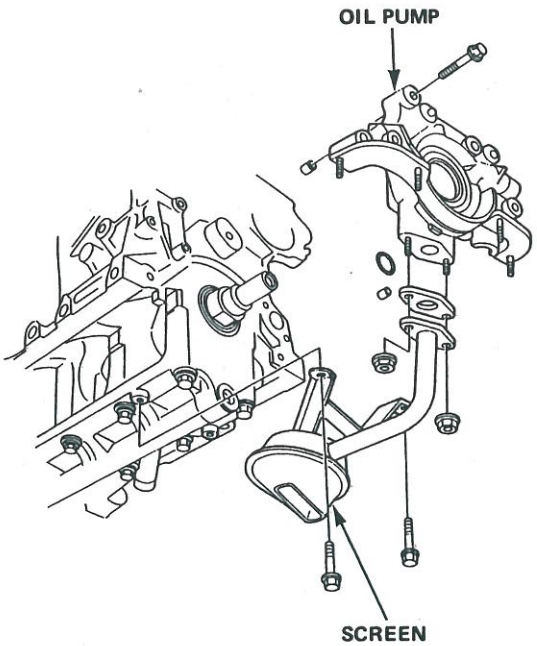
NOTE:
- Note the installation direction of the rotors.
- After assembling, check that the rotors turn smoothly.



Oil Pump

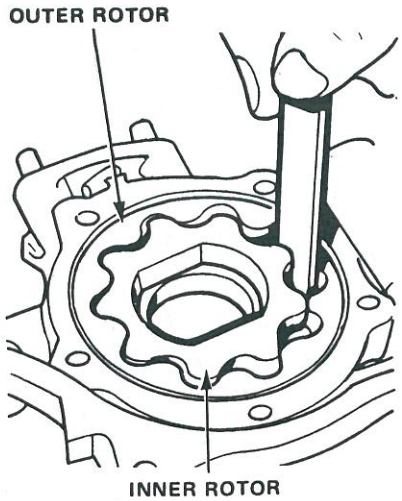
Removal/Inspection

1. Drain the engine oil.
2. Turn the crankshaft and align the "T" mark on the crankshaft pulley with the index mark on the cover.
3. Remove the cylinder head cover and timing belt upper cover.
4. Remove the alternator belt.
5. Remove the crankshaft pulley and remove the timing belt lower cover.
6. Release the belt tensioner, and remove the timing belt and driven pulley.
7. Remove the oil pan.
8. Remove the oil screen.
9. Remove the mounting bolts and the oil pump assembly.



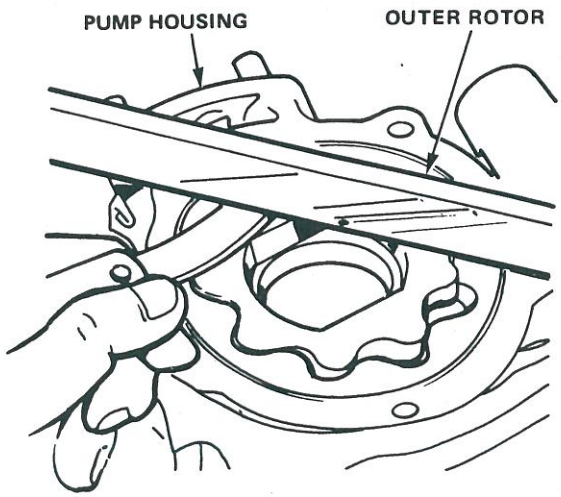
10. Remove the five screws from the pump housing, then separate the housing and cover.
11. Check the radial clearance on the pump rotor.

Rotor Radial Clearance
Standard (New): 0.14 mm (0.006 in.)
Service Limit: 0.2 mm (0.008 in.)



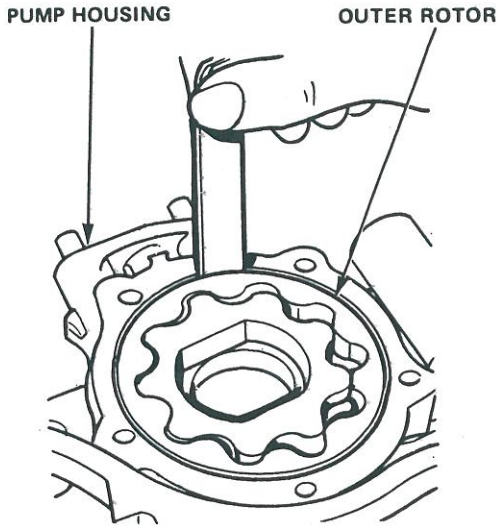
12. Check the axial clearance on the outer pump rotor.

Housing-to-Rotor Axial Clearance
Standard (New): 0.03–0.08 mm (0.001–0.003 in.)
Service Limit: 0.15 mm (0.006 in.)



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

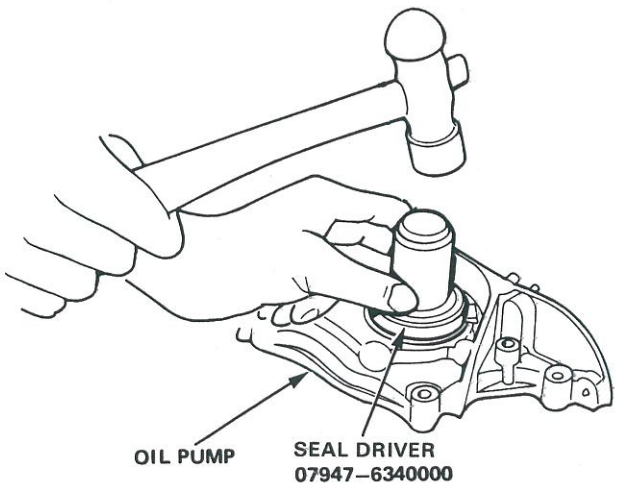
Housing-to-Rotor Radial Clearance
Standard (New): 0.1—0.175 mm (0.004—0.007 in.)
Service Limit: 0.2 mm (0.008 in.)



14. Inspect both rotors and pump housing for scoring or other damage.
Replace parts as necessary.

15. Remove the old oil seal from the oil pump.

16. Gently tap in the new oil seal until the tool bottoms on the pump.



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

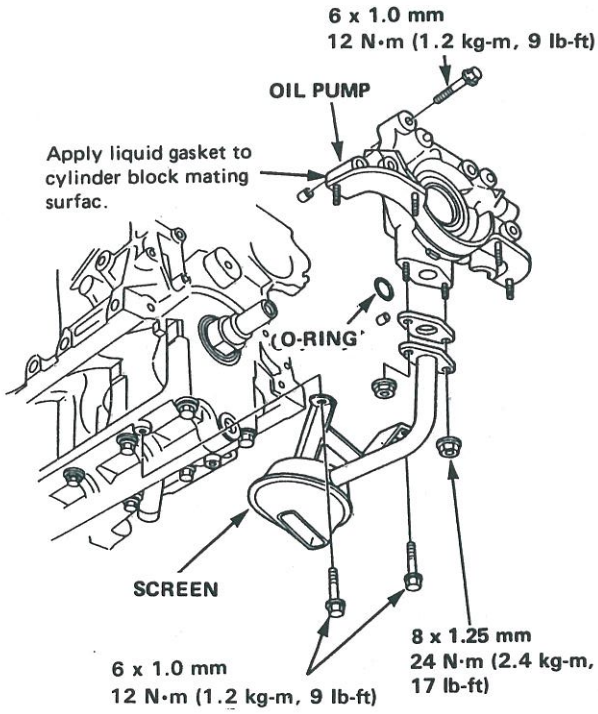
18. Check that the oil pump turns freely.

19. Apply a light coat of oil to the seal lip.

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

21. Apply liquid gasket to the cylinder block mating surface of the oil pump.

NOTE:
- Use HONDA PART NO. 08740—99986 for the liquid gasket.
- 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 sealant to the inner threads of the bolt holes.
- Do not allow the sealant to dry before assembly.
- Wait at least 30 minutes after assembly before filling the engine with oil.



22. Install the oil pump on the cylinder block.

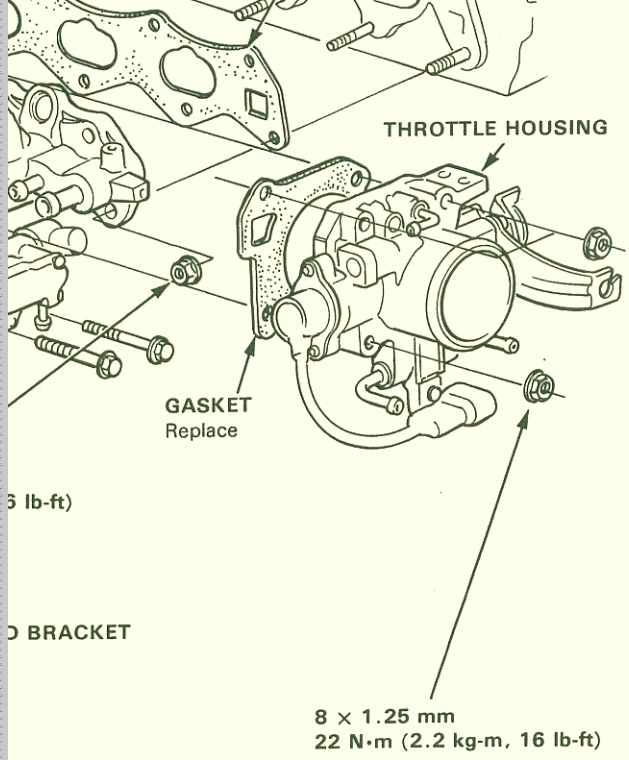
23. Install the oil screen.

Intake Manifold/Exhaust System



Intake Manifold

Illustrated Index

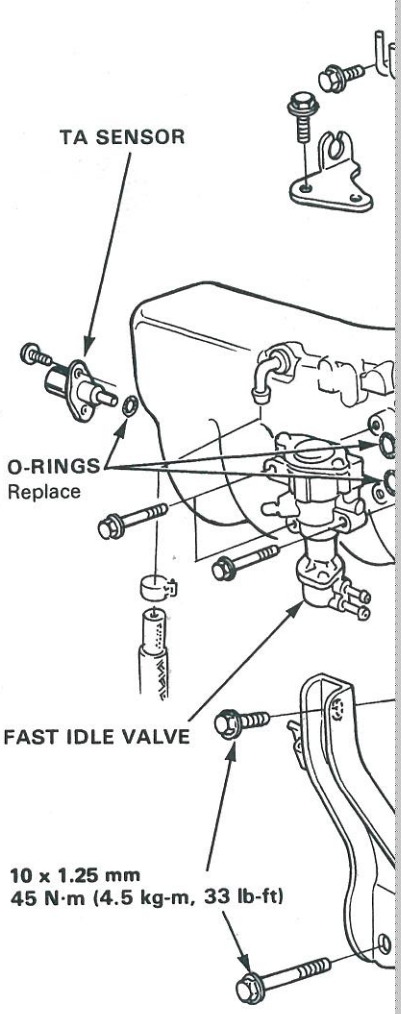


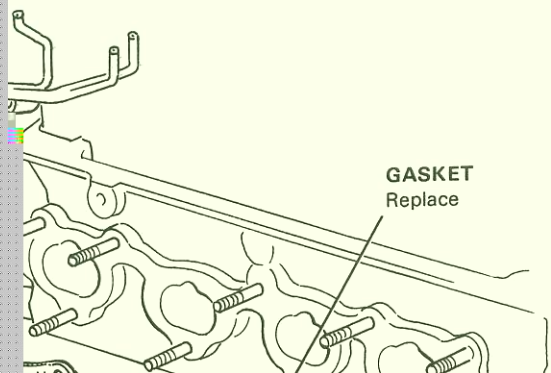
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O BRACKET

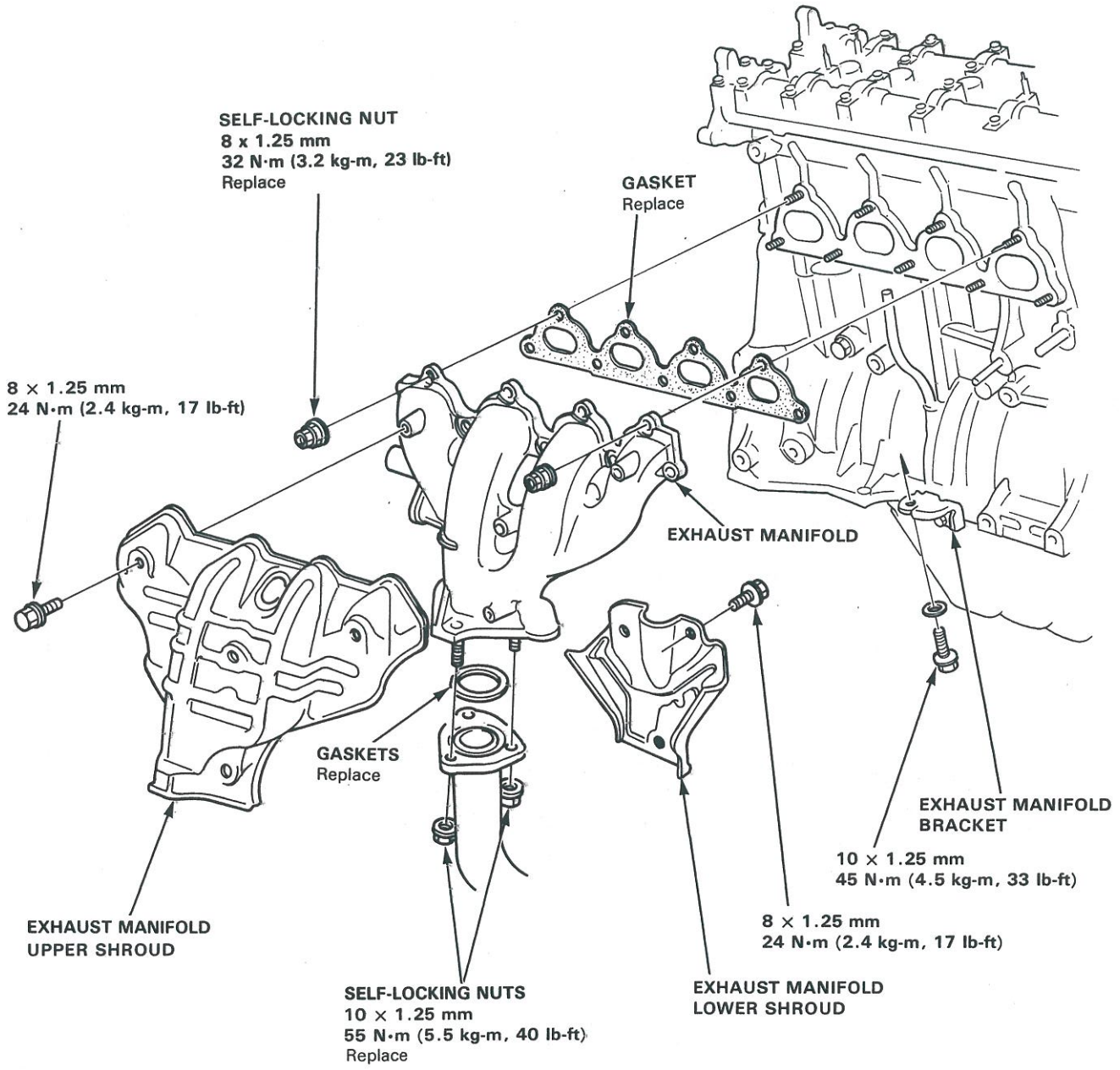
8 × 1.25 mm
22 N·m (2.2 kg-m, 16 lb-ft)





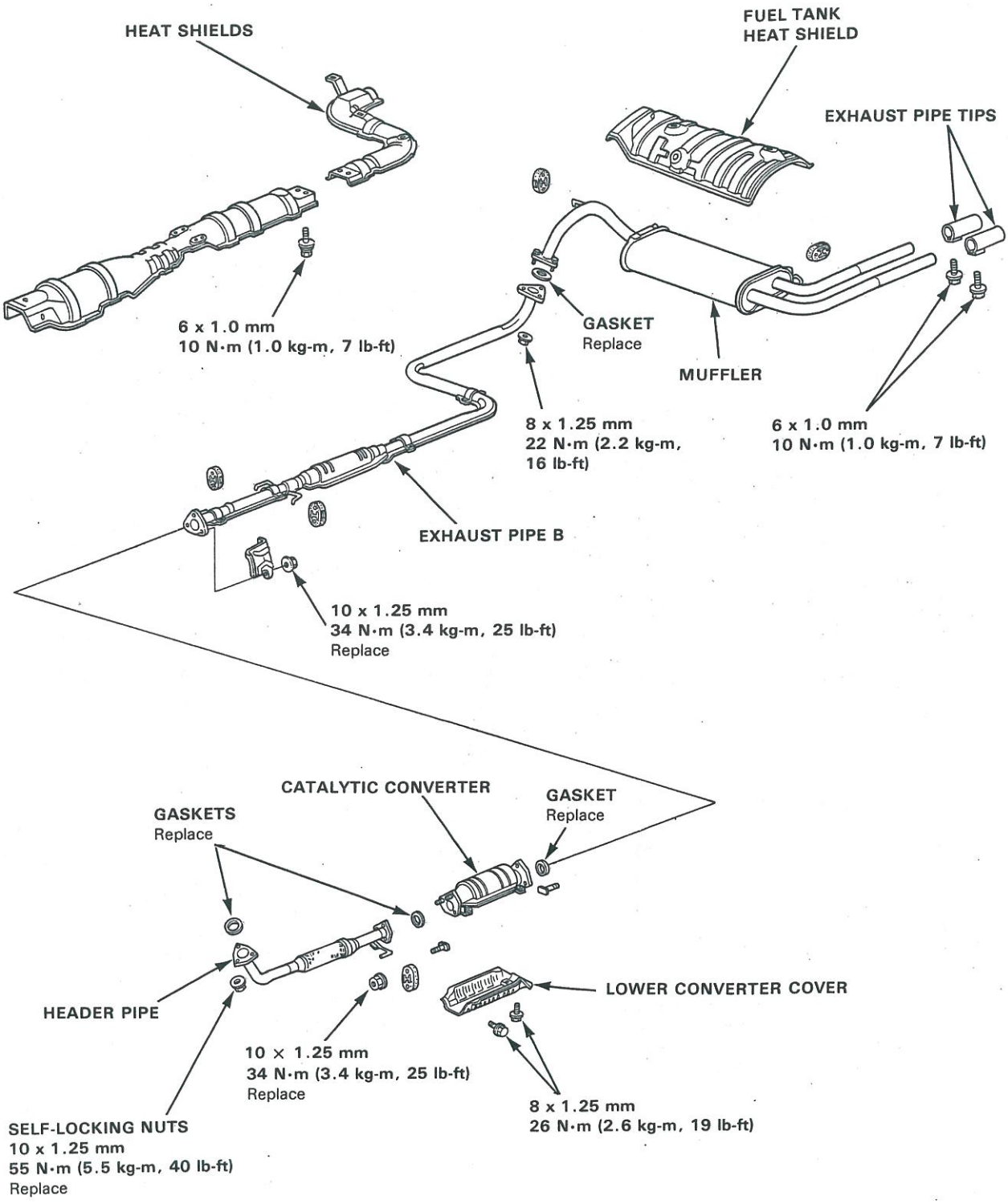
Exhaust Manifold

Illustrated Index



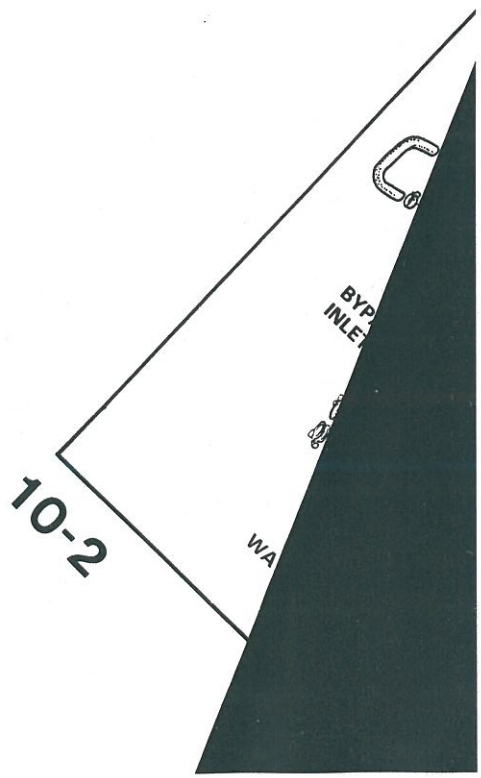
Exhaust Pipe and Muffler

Replacement



Cooling

Radiator 10–2
Thermostat 10–5
Water Pump 10–6



Radiator

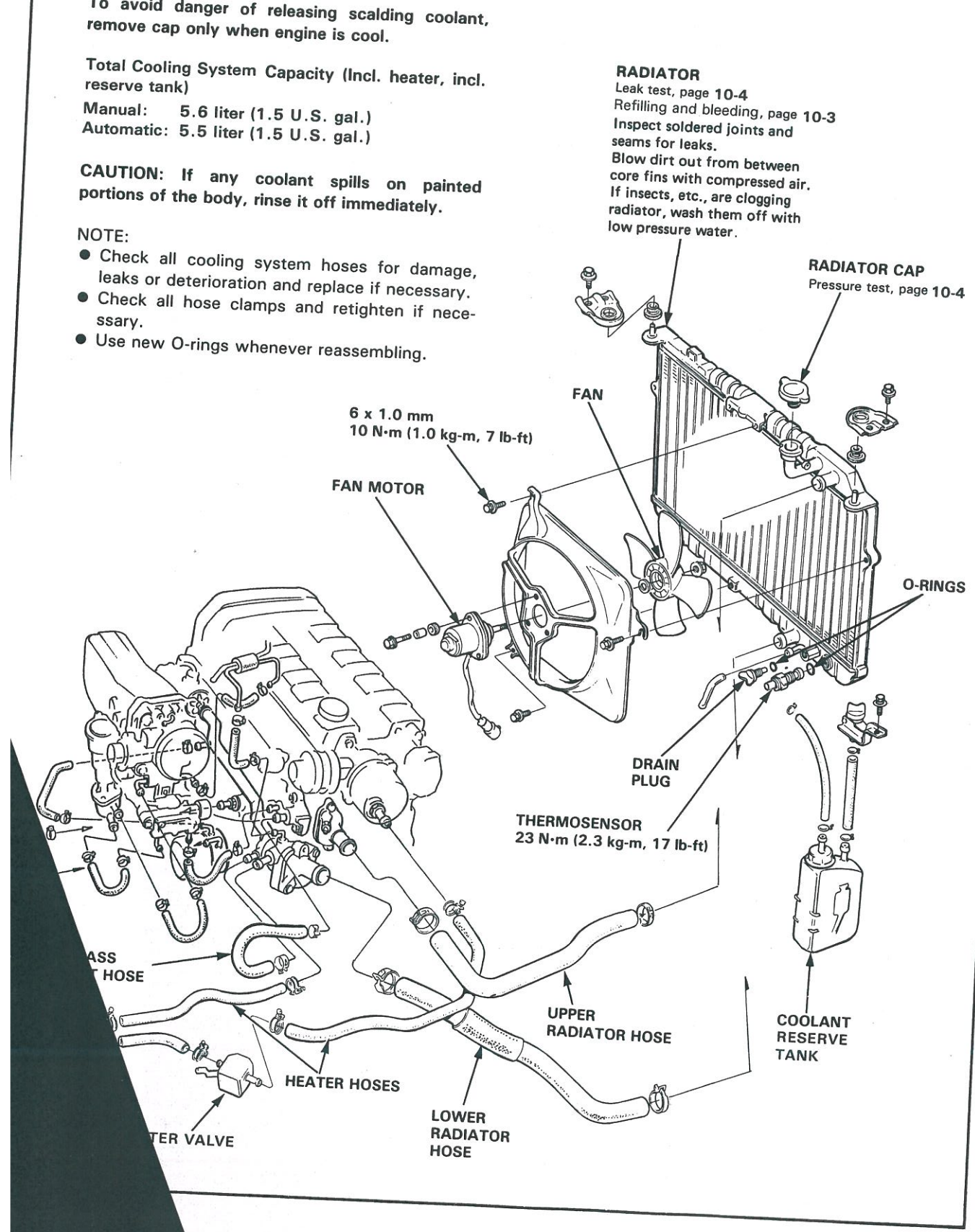
Replacement

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 (Incl. heater, incl. reserve tank)
Manual: 5.6 liter (1.5 U.S. gal.)
Automatic: 5.5 liter (1.5 U.S. gal.)

CAUTION: If any coolant spills on painted portions of the body, 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 whenever reassembling.



Refilling and Bleeding

1. Set the heater temperature lever to maximum heat.
2. When the radiator is cool, remove the radiator cap and drain plug, and drain the radiator.
3. Reinstall the radiator drain plug and tighten it securely.
4. Remove, drain and reinstall the reserve tank. Fill the tank halfway to the MAX mark with water, then up to the MAX mark with coolant.
5. Mix the recommended anti-freeze with an equal amount of water, in a clean container.

NOTE:

- Use only ACURA-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.

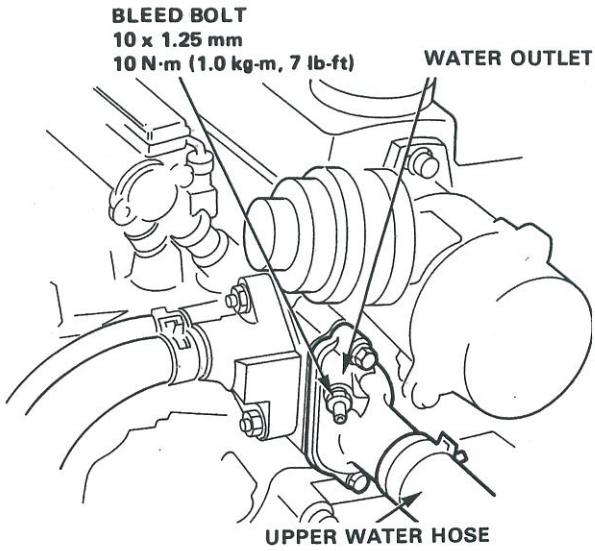
CAUTION:

- **Do not mix different brand 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 (not including reserve tank)

Manual: 4.6 liter (1.2 U.S. gal.)
Automatic: 4.5 liter (1.2 U.S. gal.)

6. Loosen the air bleed bolt in the water outlet, the fill the radiator to the bottom of the filler neck wit the coolant mixture. Tighten the bleed bolt as soo as coolant starts to run out in a steady strear without bubbles.

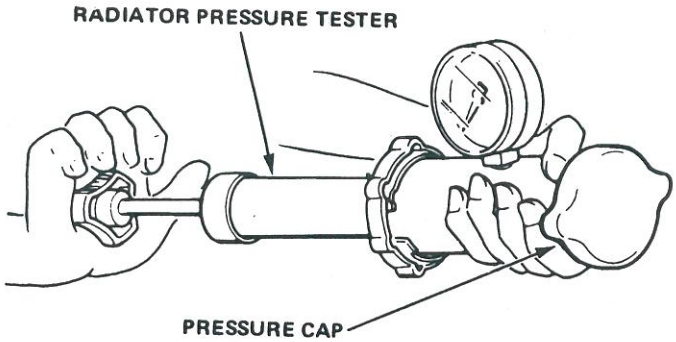


7. With the radiator cap off, start the engine and let i run until warmed up (fan goes on).
   Then, if necessary add more coolant mix to bring the level back up to the bottom of the filler neck.
8. Put the radiator cap on, then run the engine a and check for leaks.

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 0.75—1.05 kg/cm² (78—98 kPa, 11—14 psi).
3. Check for a drop in pressure.
4. Replace if it dose not hold pressure.



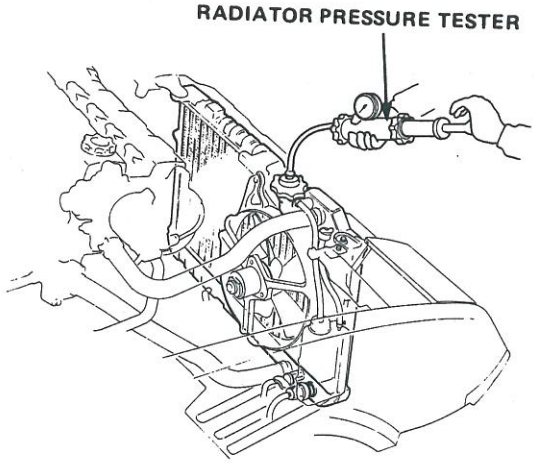
- Testing

1. Wait until the engine is cool, then carefully remove the pressure 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 0.75—1.05 kg/cm² (78—98 kPa, 11— 14 psi).

Inspect for coolant leaks and a drop in pressure.

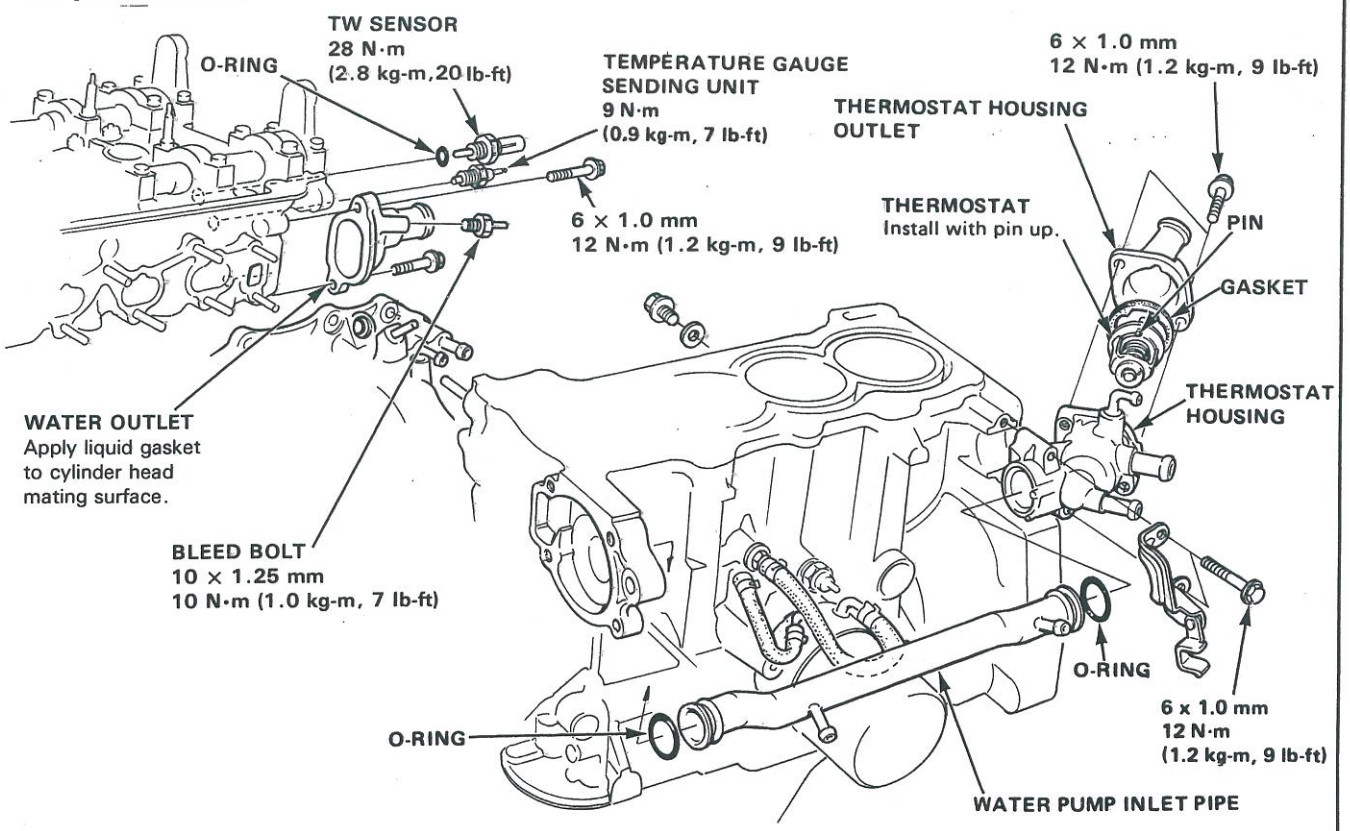
Remove the tester and reinstall the pressure cap.

OTE: Check for engine oil in coolant and/or lant in engine oil.



Thermostat

Replacement



Testing

Replace thermostat if it is open at room temperature.

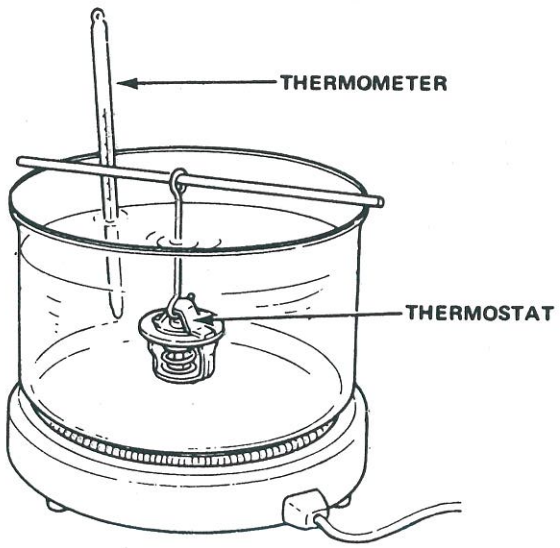
To test a closed thermostat:

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 full lift.

   CAUTION: Do not let thermometer touch bottom of hot container.
3. Measure lift height of thermostat when fully open.

STANDARD THERMOSTAT

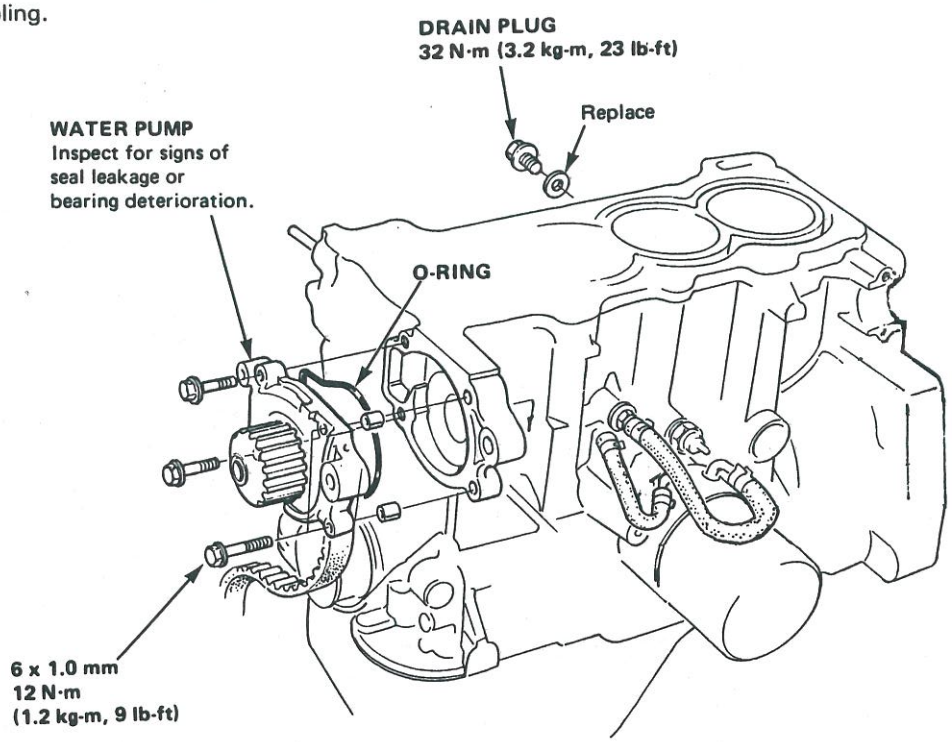
Lift height:	**8 mm (0.32 in.)**
Starts opening:	**76–80°C (169–176°F)**
Fully open:	**91°C (196°F)**



Water Pump

Replacement

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



Fuel and Emissions

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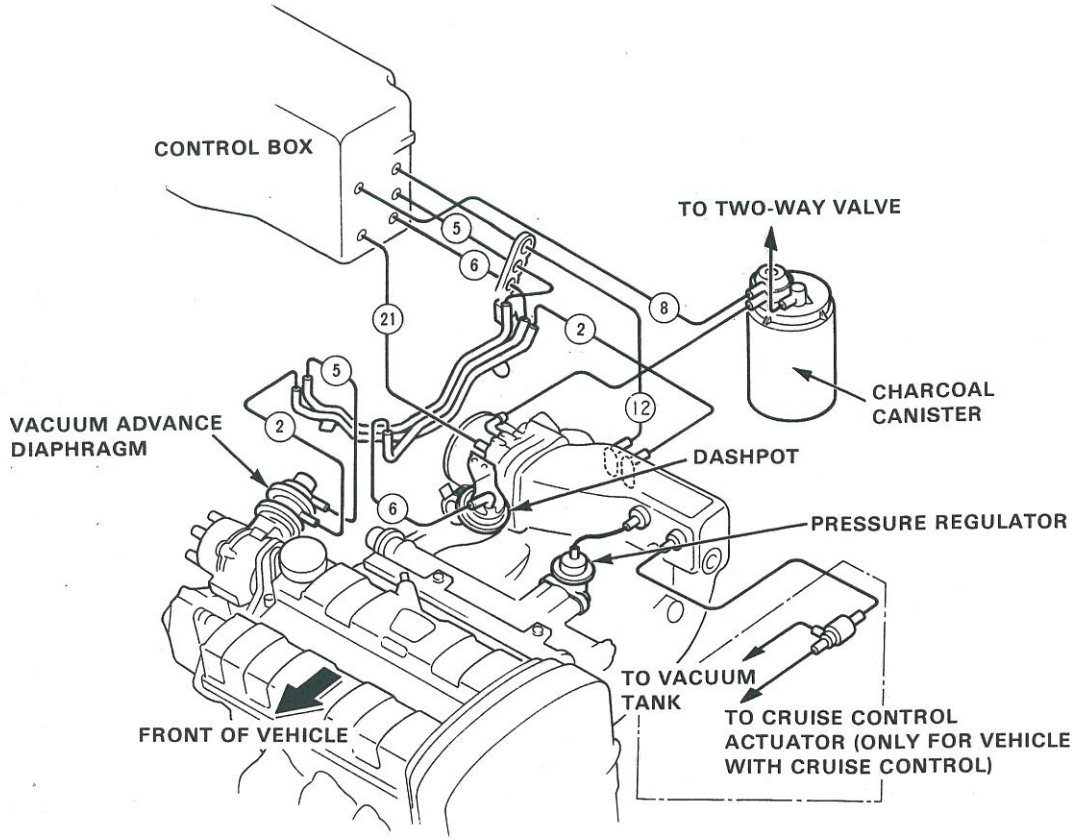
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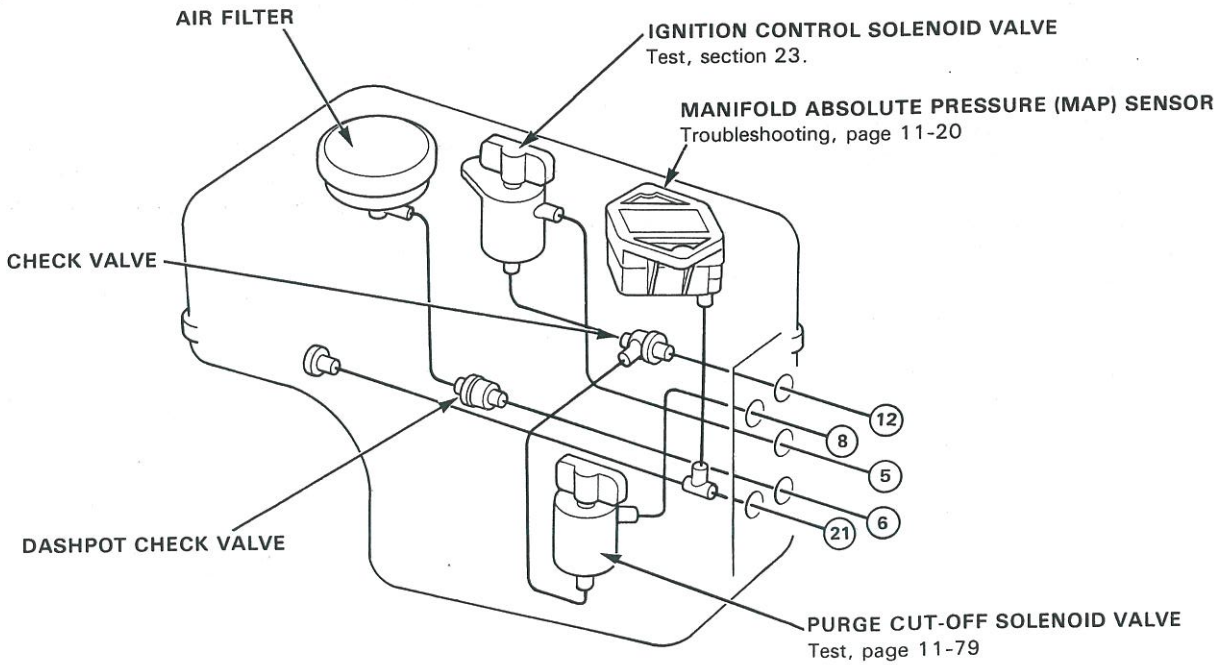


Vacuum Connections

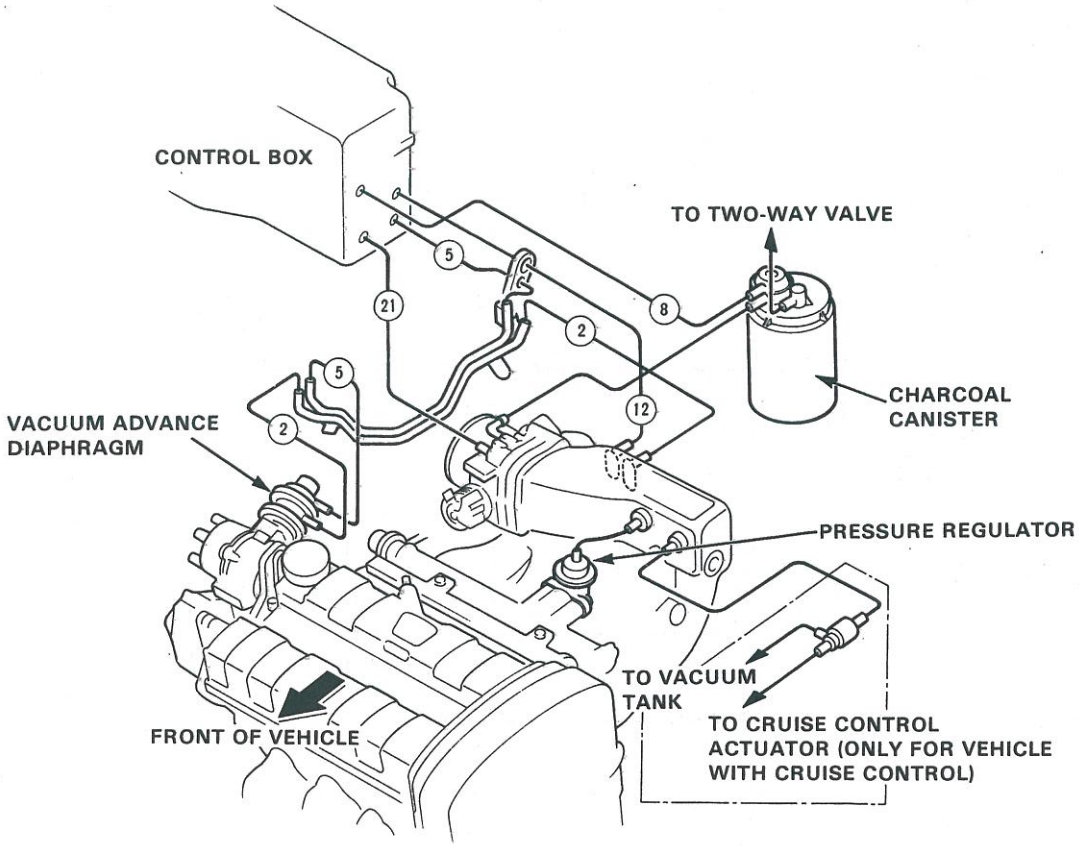
Manual



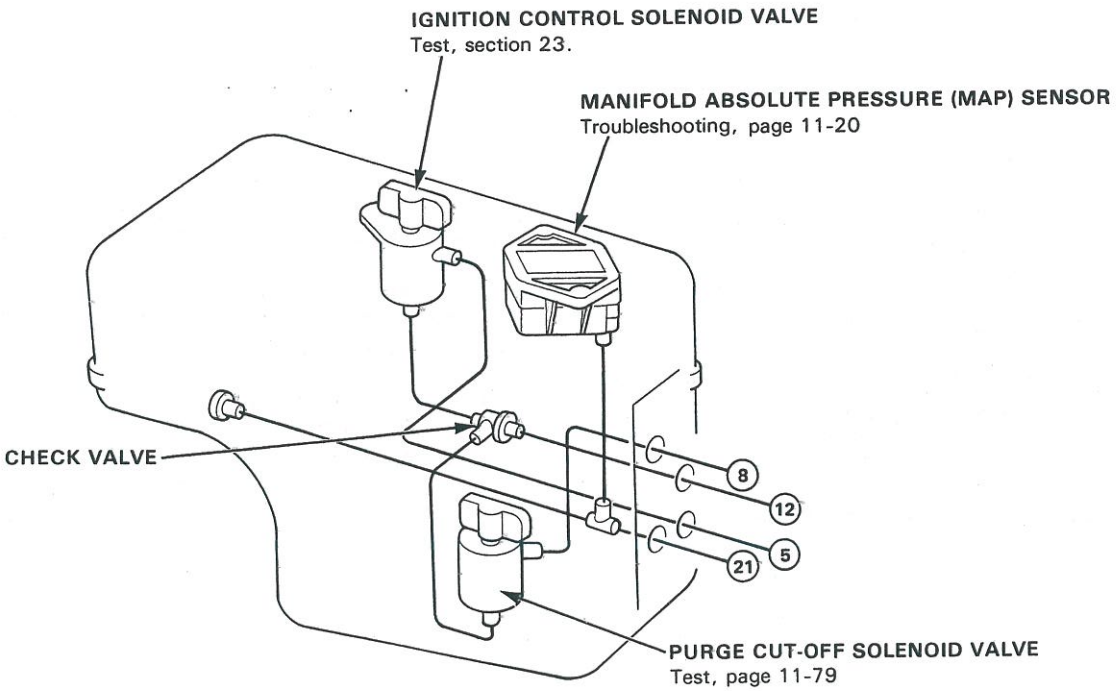
Control Box



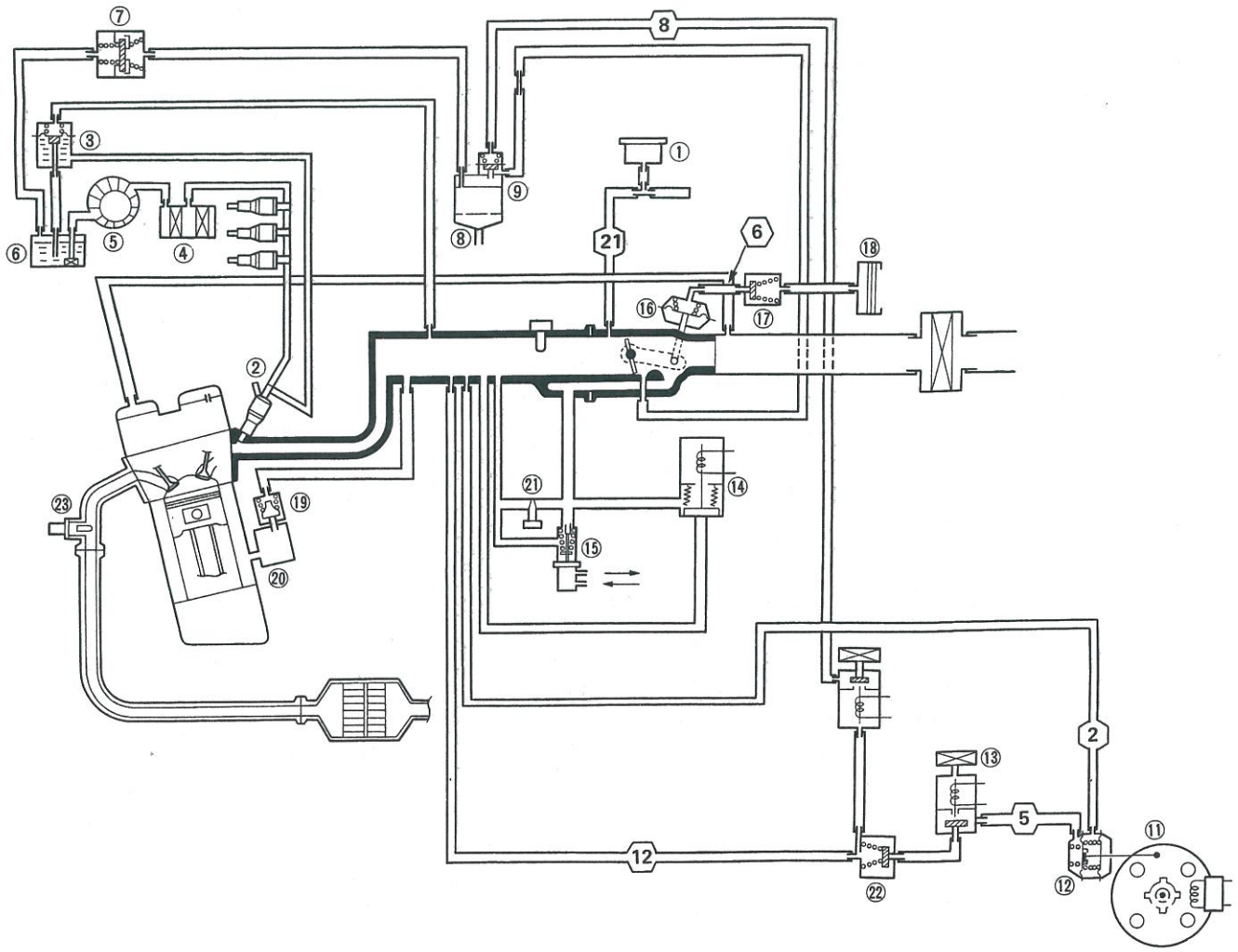
Automatic



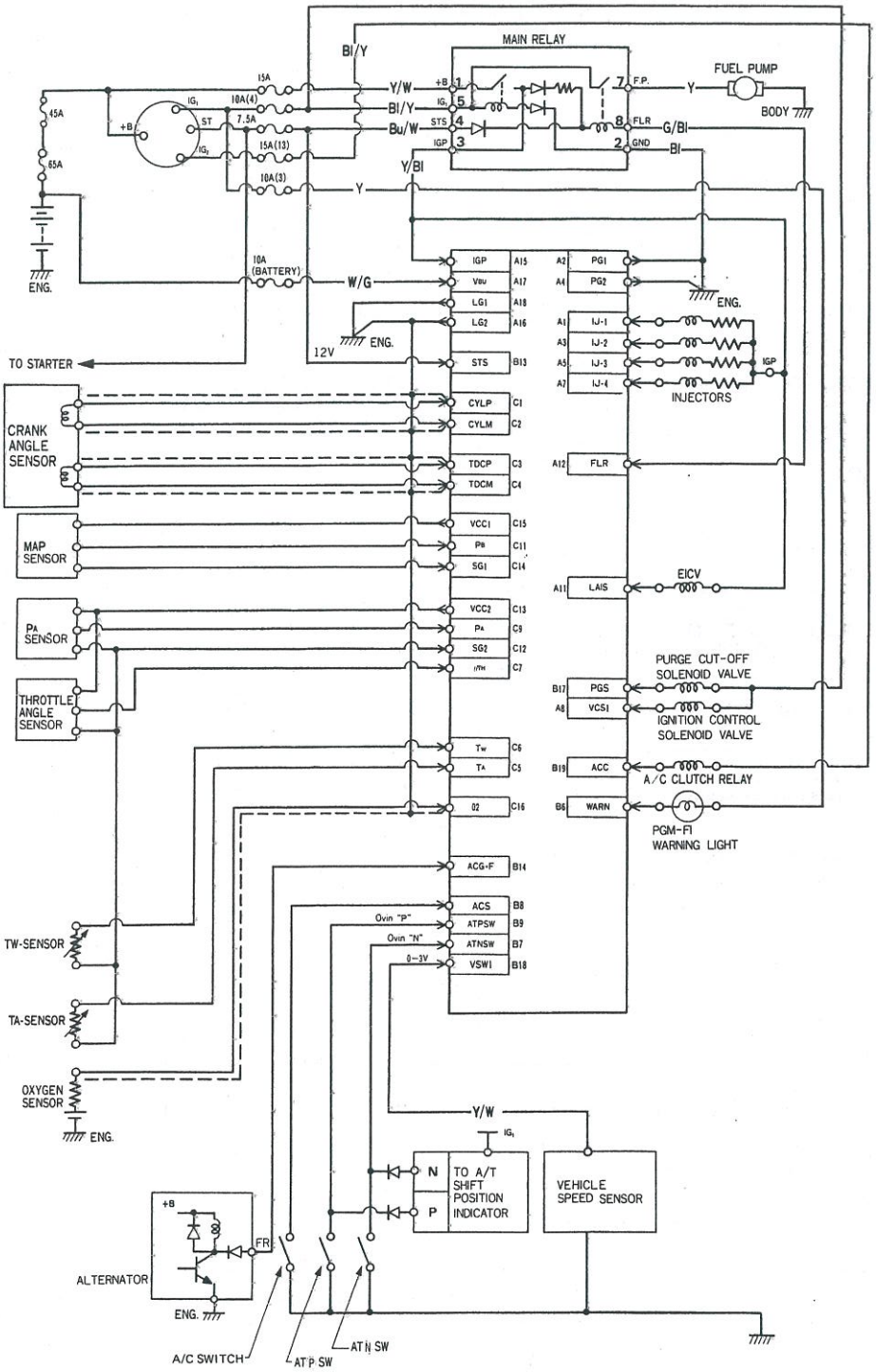
Control Box

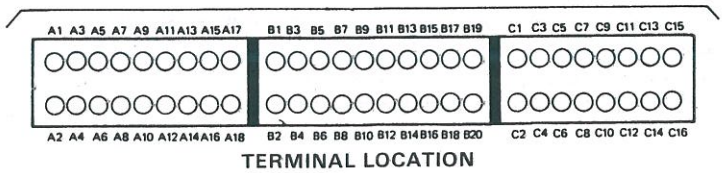


Vacuum Connections



① MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
② FUEL INJECTOR
③ PRESSURE REGULATOR
④ FUEL FILTER
⑤ FUEL PUMP
⑥ FUEL TANK
⑦ TWO-WAY VALVE
⑧ CHARCOAL CANISTER
⑨ PURGE CONTROL VALVE
⑩ PURGE CUT-OFF SOLENOID VALVE
⑪ DISTRIBUTOR
⑫ VACUUM ADVANCE DIAPHRAGM
⑬ IGNITION CONTROL SOLENOID VALVE
⑭ ELECTRONIC IDLE CONTROL VALVE (EICV)
⑮ FAST IDLE VALVE
⑯ DASHPOT (M/T only)
⑰ DASHPOT CHECK VALVE(M/T only)
⑱ AIR FILTER (M/T only)
⑲ PCV VALVE
⑳ BREATHER CHAMBER
㉑ IDLE ADJUSTING SCREW
㉒ CHECK VALVE
㉓ OXYGEN SENSOR





TERMINAL LOCATION

Symptom-to-System Chart

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.

SYMPTOM \ SYSTEM		PGM-FI				
		ELECTRONIC CONTROL UNIT	OXYGEN SENSOR	MANIFOLD ABSOLUTE PRESSURE SENSOR	COOLANT TEMPERATURE SENSOR	THROTTLE ANGLE SENSOR
PAGE		15,16	18	20,22	24	26
PGM-FI WARNING LIGHT TURNS ON		☐ or PGM-FI	PGM-FI	PGM-FI	PGM-FI	PGM-FI
SELF-DIAGNOSIS INDICATOR (LED) BLINKS		⓪ or ✳	①	③ or ⑤	⑥	⑦
ENGINE WON'T START		②				
DIFFICULT TO START ENGINE WHEN COLD		(BU)			①	
IRREGULAR IDLING	WHEN COLD FAST IDLE OUT OF SPECIFIC				②	
	ROUGH IDLE			②		
	WHEN WARM RPM TOO HIGH		(FS)	(FS)	(FS)	(FS)
	WHEN WARM RPM TOO LOW					
FREQUENT STALLING	WHILE WARMING UP	(BU)				
	AFTER WARMING UP	(BU)				
POOR PERFORMANCE	MISFIRE OR ROUGH RUNNING	(BU)	③	②		③
	FAILS EMISSION TEST	(BU)	①			
	LOSS OF POWER	(BU)		③		

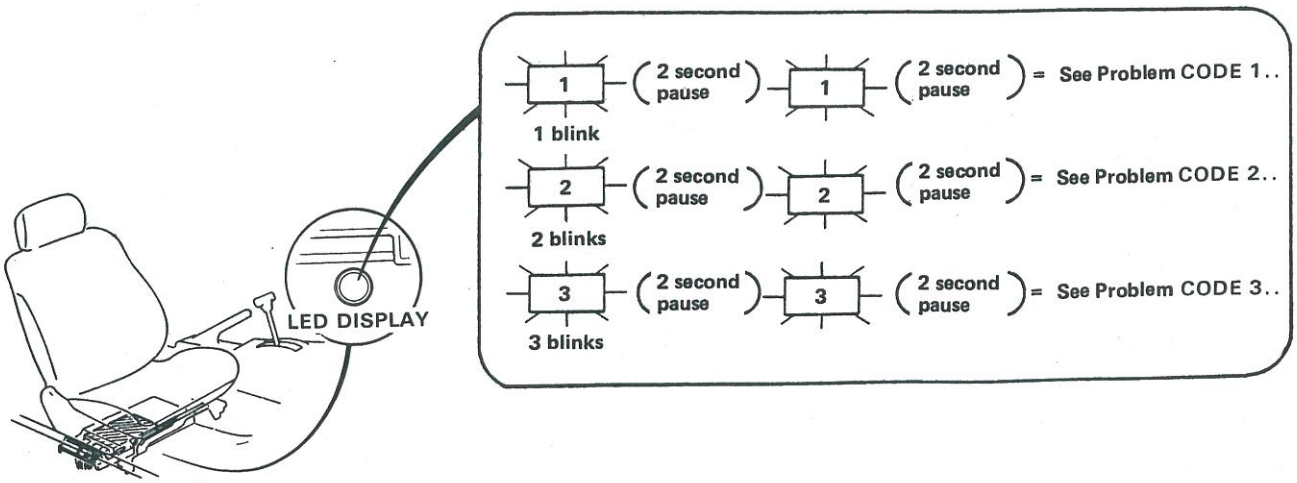
* CODE 2, 4, 11 or exceeds 14: count the number of blinks again. If the indicator is in fact, blinking these codes, substitute a known-good ECU and re-check. If the indication goes away, replace the original ECU.

(FS): When the PGM-FI warning light is on the idle speed will increase due to failsafe operation.

(BU): When the PGM-FI warning light is on with no blinks on the self-diagnosis indicator, the back-up system is in operation.

PGM-FI			IDLE CONTROL				
CRANK ANGLE SENSOR	INTAKE AIR TEMPERATURE SENSOR	ATMOSPHERIC PRESSURE SENSOR	ELECTRONIC IDLE CONTROL VALVE	OTHER IDLE CONTROLS	FUEL SUPPLY	AIR INTAKE	EMISSION COTROL
28	32	34	38	36	50	64	71
PGM-FI	PGM-FI	PGM-FI	PGM-FI				
8 or 9	10	13	14				
3					1		
	3			1			
3			1				
FS	FS	FS		1		2	3
			1			2	
			1				
3					1		
							2
					1		2

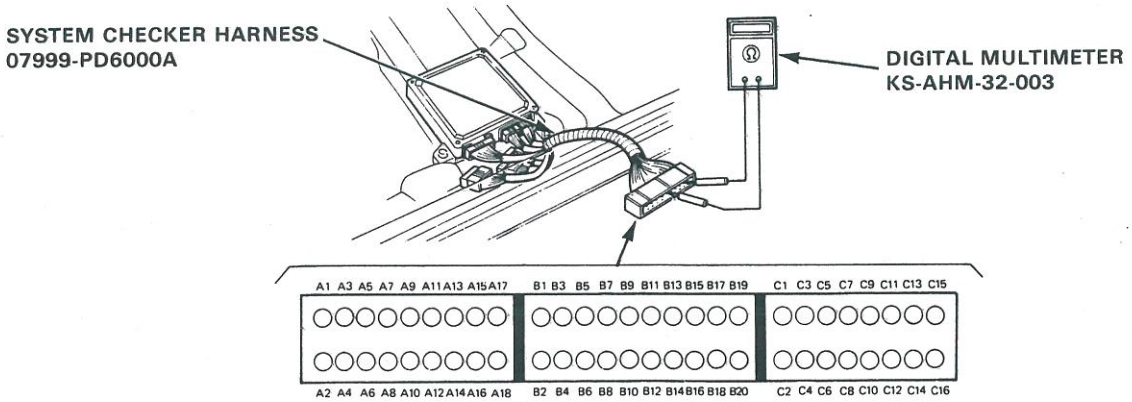
When the PGM-FI warning light has been reported on, turn the ignition on, move the front passenger seat to the rear position and observe the LED on the front of the ECU. The LED indicates a system failure code by blinking frequency.



SELF-DIAGNOSIS INDICATOR BLINKS	SYSTEM INDICATED	PAGE
0	ECU	11-15,16
1	OXYGEN CONTENT	11-18
3	MANIFOLD ABSOLUTE PRESSURE	11-20
5		11-22
6	COOLANT TEMPERATURE	11-24
7	THROTTLE ANGLE	11-26
8	CRANK ANGLE (TDC)	11-28
9	CRANK ANGLE (CYL)	11-30
10	INTAKE AIR TEMPERATURE	11-32
13	ATMOSPHERIC PRESSURE	11-34
14	ELECTRONIC IDLE CONTROL	11-38

CODE 2, 4, 11, or exceeds 14, count the number of blinks again. If the indicator is in fact, blinking these codes, substitute a known-good ECU and re-check. If the indication goes away, replace the original ECU.
The PGM-FI dash warning light and ECU LED 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.

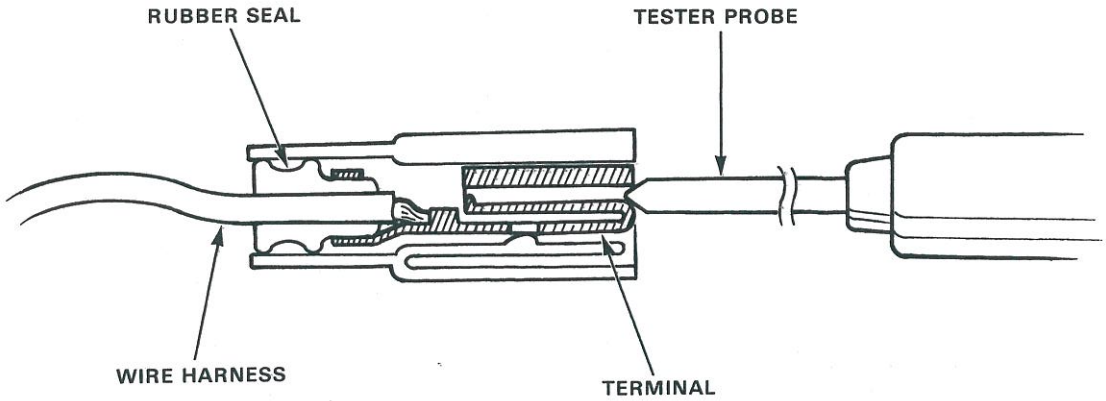
If the inspection for a particular failure code requires the system checker harness, remove the front passenger seat and connect the system checker harness and multimeter as shown. Then check the system according to the procedure described for the appropriate code(s) listed on the following pages.



TERMINAL LOCATION

CAUTION:

- **Puncturing the insulation on a wire can cause poor or intermittent electrical connections.**
- **For testing at connectors other than the system checker 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.**



(cont'd)

Troubleshooting Procedures

A flow chart 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" any where but a "stop" symbol, you can easily get lost.

START	Describes the conditions or situation to start a troubleshooting flow chart.
ACTION	Asks you to do something; perform a test, set up a condition, etc.
DECISION	Asks you about the result of an action by giving an "answer" and asking did you get the same answer : Yes or No.
STOP	The end of a series of actions and decisions, describes a final repair action and sometimes directs you to an earlier part of the flow to confirm your repair.

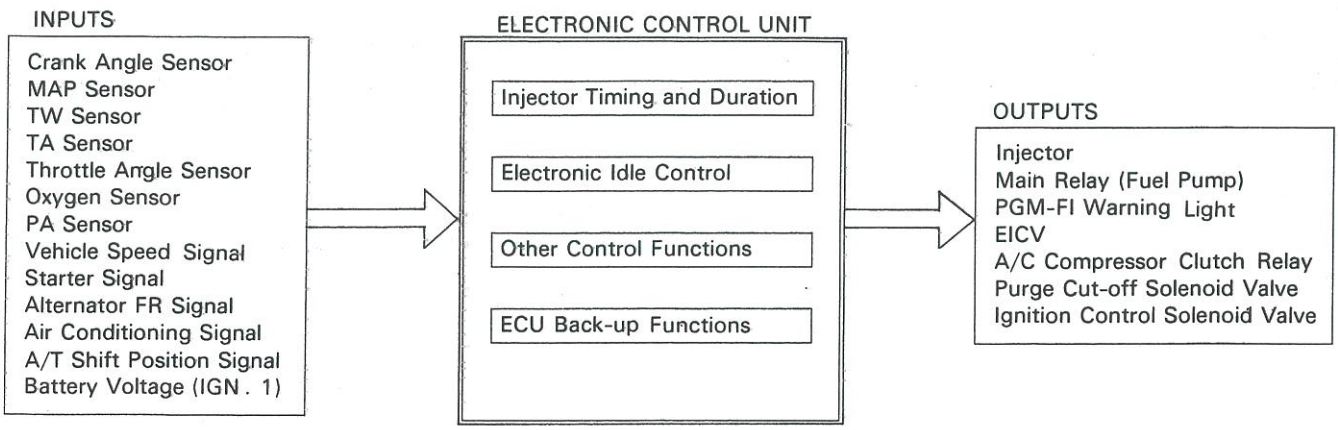
NOTE;

- The term "Intermittent Faiure" is used several times 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.

- "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 electronic control units), this can sometimes mean something works, but not the way it's supposed to.

PGM-FI Control 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 Idle Control
Electronic Idle Control Valve (EICV)
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 EICV to maintain correct idle speed.

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 which supplies current to the fuel pump for 2 seconds to pressurize the fuel system.
   - When the engine is running the ECU supplies ground to main the relay which 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 at speeds over 1,200 rpm, to improve fuel economy.
   - Fuel cut-off action also takes place when engine speed exceeds 7,500 rpm regardless of the position of the throttle valve to protect engine from over running.
4. A/C Compressor Clutch Relay
   When the ECU receives a demand for cooling from the air conditioner switch, it delays the compressor from being energized, and enriches the mixture to assure smooth transition to A/C mode.
5. Ignition Control Solenoid Valve (ICSV)
   When the coolant temperature is above 60°C (140°F) and the manifold vacuum is low, the ECU cuts ground to the ICSV which cuts vacuum to Advance diaphragm B to prevent detonation.
6. Purge Cut-off Solenid Valve
   When the coolant temperature is below 65°C (149°F), the ECU supplies ground to the purge cut-off solenoid valve which cuts vacuum to the purge control valve.

(cont'd)

Description (cont'd)

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 injections are controlled by a back-up circuit independent of the main system in order to permit minimal driving.

3. Self-diagnosis Function (PGM-FI warning light and LED indicator).
   When an abnormality occurs in a signal from a sensor, the ECU lights the PGM-FI warning light, stores the failure code in erasable memory and indicates the code with an LED on the ECU anytime the ignition is on. When the ignition is initially turned on, the ECU supplies ground for the PGM-FI warning light for about 2 seconds.

Troubleshooting Flow Chart — ECU

PGM-FI warning light isn't on for 2 seconds after ignition is first turned on.

Check oil pressure warning light on with ignition switch on.

Is oil pressure warning light on?

NO → Inspect No. 3 fuse.

Is No. 3 fuse OK?

NO → Replace fuse.

YES → Repair open in Yellow wire between No. 3 fuse and combination meter.

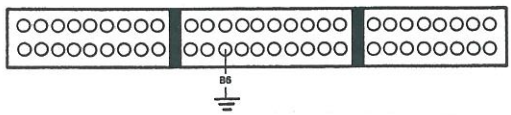
YES

Turn the ignition switch OFF.

Remove and inspect HAZARD fuse at the battery positive terminal for 10 seconds to reset ECU.

Connect the system checker harness between the ECU and connector (page 11-10).

Connect B6 terminal to body ground.



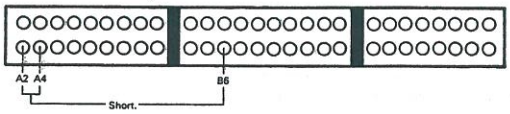
Turn the ignition switch ON.

Is PGM-FI warning light on?

NO →
- –Replace warning light bulb.
- –Repair open in Green/Orange wire between ECU (B6) and combination meter.

YES

Connect the following terminals individually to B6: • A2, • A4.



Is PGM-FI warning light on?

NO → Repair the individual ground connection that did not make the light come on.

YES

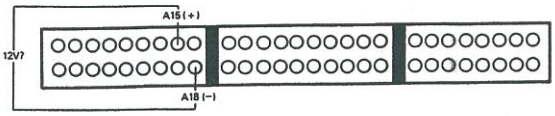
(To page 11-16)

(cont'd)

Troubleshooting Flow Chart — ECU (cont'd)

(From page 11-15)

Measure voltage between A15 (+) terminal and A18 (–) terminal.



Is there battery voltage?

NO

–Repair open in Yellow/Black wire between ECU (A15) and main relay.
–Check main relay and wiring connectors at main relay (page 11-61).

YES

Substitute a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

–PGM-FI warning light is on.
–LED doesn't blink.

Disconnect the 3P connector of each sensor one at a time:
- MAP sensor
- Throttle angle sensor

Does PGM-FI warning light remain on?

NO

Replace the sensor that caused the light to go out upon its disconnection.

YES

Reconnect both connectors.

Disconnect the 3P connector of PA sensor.

Does LED indicate CODE 13?

YES

Replace PA sensor.

NO

Reconnect the connector.

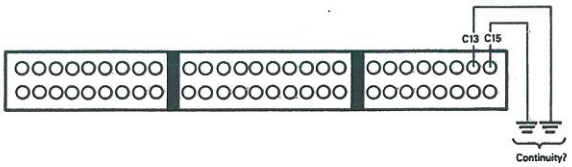
Turn the ignition switch OFF.

(To page 11-17)

(From page 11-16)

Connect the system checker harness between the ECU and connector (page 11-10). But disconnect "C" connector from ECU only, not the main wire harness.

Check for continuity between the body ground and the following terminals individually: • C13, • C15



Does continuity exist?

YES → Repair short to ground in Red wire between ECU (C15) and MAP sensor, or in Yellow/Red wire between ECU (C13) and each sensor.

NO

Reconnect "C" conector to ECU and disconnect "B" connector from the ECU only, not the main wire harness.

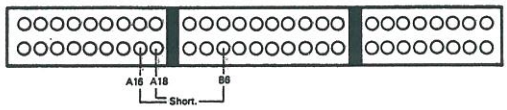
Turn the ignition switch ON.

Is PGM-FI warning light on?

YES → Repair short to ground in Green/Orange wire between ECU (B6) and combination meter.

NO

Connect the following terminals individually to B6: • A16, • A18



Is PGM-FI warning light on?

NO → Repair the individual ground connection that did not make the light come on.

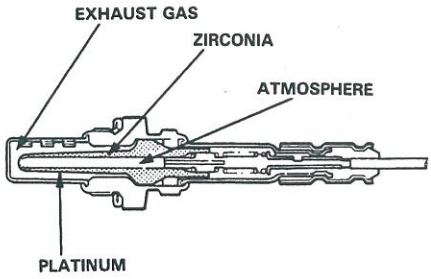
YES

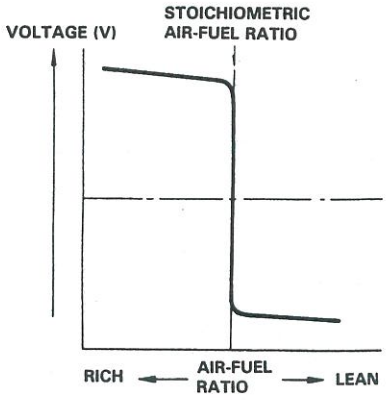
Substitute a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

Troubleshooting Flow Chart —— Oxygen Sensor

PGM-FI (1) Self-diagnosis LED blinks once: A problem in the Oxygen (0^2) Sensor circuit.

The oxygen sensor, detects the oxygen content in the exhaust gas, and inputs the ECU. In operation, the ECU receives the signals from the sensor and varies the duration during which fuel is injected. The oxygen sensor is installed on the exhaust manifold.





PGM-FI (1)

—PGM-F1 warning light has been reported on.
—LED indicates CODE 1.

↓

Turn the ignition switch OFF.

↓

Remove HAZARD fuse at the battery positive terminal for 10 seconds to reset ECU.

↓

Warm up engine to normal operating temperature (cooling fan comes on).

↓

Hold engine at 1500 - 2000 rpm for 10 minutes.
NOTE: Do not close throttle completely during this time.

↓

Is PGM-FI warning light on? —NO→ Intermittent failure (test drive may be neccesary.)

↓ YES

Inspect fuel pressure at the fuel filter (page 11-51).

↓

(To page 11-19)

(From Page 11-18)

Is pressure as specified?

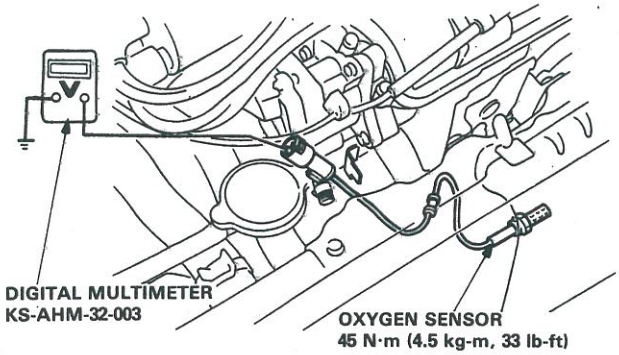
NO → Repair fuel supply system (page 11-56 thru. 11-62).

YES

Disconnect engine wire harness from 0^2 sensor.

Warm up engine to normal operating temperature again.

Measure voltage between the connector terminal and body ground.



Is voltage above 0.6V at wide open throttle and below 0.4 V at idle?

NO → Replace 0^2 sensor.

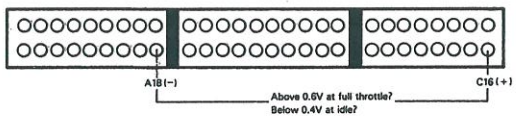
YES

Stop engine.

Connect the system checker harness between the ECU and connector (page 11-10).

Restart and warm up engine to normal operating temperature.

Measure voltage between C16 (+) terminal and A18 (–) terminal.



Is voltage above 0.6 V at wide open throttle and below 0.4 V at idle?

NO → Repair open or short in White wire between ECU (C16) and 0^2 sensor.

YES

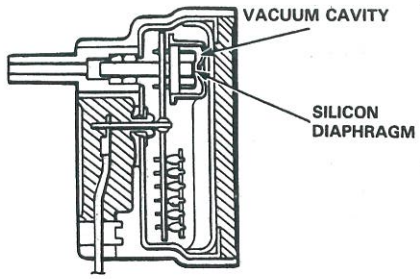
Substitute a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

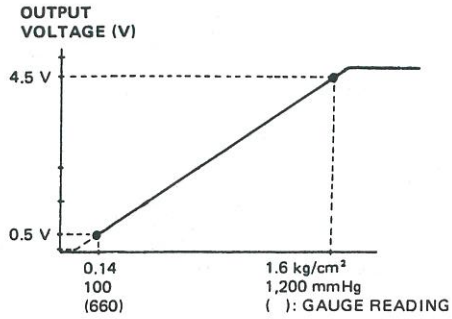
Troubleshooting Flow Chart —— MAP Sensor

PGM-FI ③ Self-diagnosis LED indicator blinks three times: Most likely an electrical problem in the Manifold Absolute Pressure (MAP) Sensor system.

PGM-FI ⑤ Self-diagnosis LED indicator blinks five times: Most likely 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.





PGM-FI ③

—Engine is warm and running.
—PGM-FI warning light is on.
—LED indicates CODE 3.

Turn the ignition switch OFF.

Remove HAZARD fuse at the battery positive terminal for 10 seconds to reset ECU.

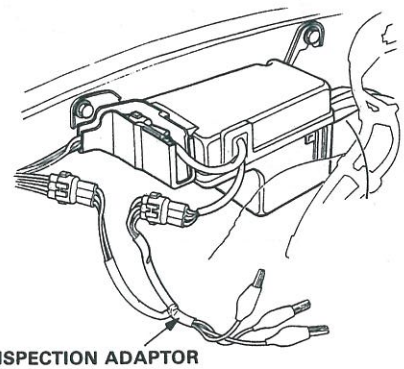
Warm up engine to normal operating temperature (cooling fan comes on).

Is PGM-FI warning light on? NO → Intermittent failure (test drive may be necessary.)

YES

Turn the ignition switch OFF.

Connect the inspection adaptor between the MAP sensor and main wire harness.



Turn the ignition switch ON.

(To page 11-21)

(From page 11-20)

Measure voltage between Red (+) terminal and Green (–) terminal.

Is there approx. 5 V?

NO → Measure voltage between Red (+) terminal and body ground.

Is there approx. 5 V?

YES → Repair open in Brown/White wire between ECU (C14) and MAP sensor.

NO

Turn the ignition switch OFF.

YES

Measure voltage between White (+) terminal and Green (–) terminal.

Is there approx. 3 V?

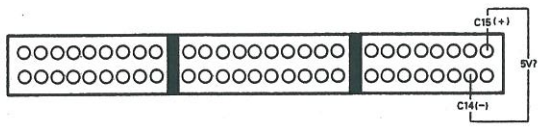
NO → –Replace MAP sensor.
–Repair short in White wire between ECU (C11) and MAP sensor.

YES

Turn the ignition switch OFF.

Connect the system checker harness between the ECU and connector (page 11-10).

Measure voltage between C15 (+) terminal and C14 (–) terminal.



Connect the system checker harness between the ECU and connector (page 11-10).

Turn the ignition switch ON.

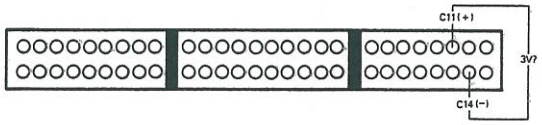
Is there approx. 5 V?

YES → Repair open in Red wire between ECU (C15) and MAP sensor.

NO

Substitute a known-good ECU and re-check. If prescribed voltage is now available, replace the original ECU.

Measure voltage between C11 (+) terminal and C14 (–) terminal.



Is there approx. 3 V?

NO → Repair open in White wire between ECU (C11) and MAP sensor.

YES

Substitute a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

(cont'd)

Troubleshooting Flow Chart —— MAP Sensor (cont'd)

PGM-FI 5

–PGM-FI warning light has been reported on.
–LED indicates CODE 5.

Turn the ignition switch OFF.

Remove HAZARD fuse at the battery positive terminal for 10 seconds to reset ECU.

Start engine and keep engine rpm at idle.

Is PGM-FI warning light on? Does LED indicate CODE 5?

NO → Intermittent failure (test drive may be necessary.)

YES

Remove #21 hose from the throttle body and inspect the port for vacuum.

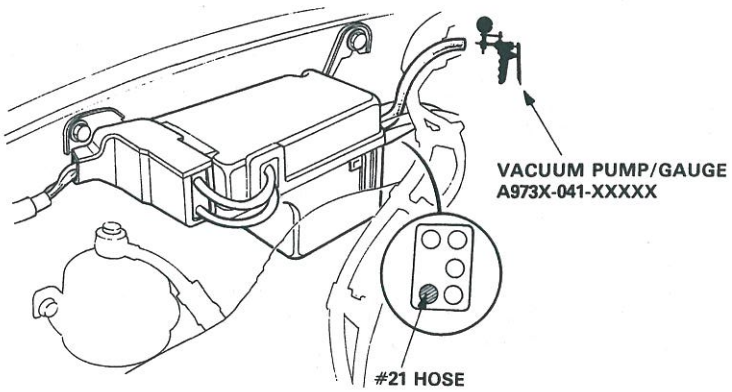
Is there vacuum?

NO → Repair as necessary.

YES

Connect hand vacuum pump to #21 hose

Apply vacuum and check for a leak.



Is vacuum maintained?

NO → Replace #21 hose.

YES

(To page 11-23)

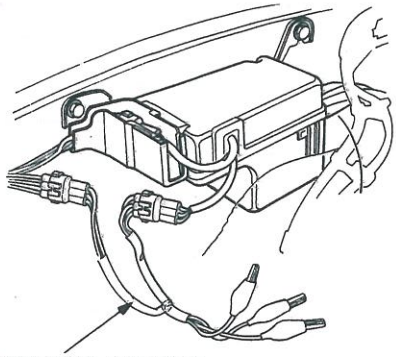
(From page 11-22)

Stop engine.

Connect the inspection adaptor between the MAP sensor and main wire harness.

Turn the ignition switch ON.

Measure voltage between White (+) terminal and Green (–) terminal.



INSPECTION ADAPTOR

Is there approx. 3V? NO → Replace MAP sensor.

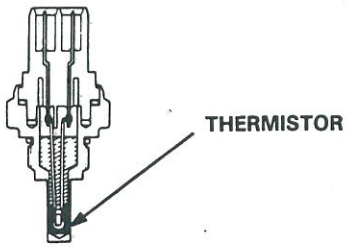
YES

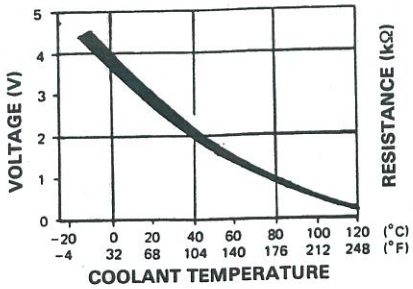
Substitute a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

Troubleshooting Flow Chart —— TW Sensor

PGM-FI (6) Self-diagnosis LED indicator blinks six times: Most likely 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.





PGM-FI (6)

–PGM-FI warning light is on.
–LED indicates CODE 6.

Turn the ignition switch OFF.

Remove HAZARD fuse at the battery positive terminal for 10 seconds to reset ECU.

Turn the ignition switch ON.

Is PGM-FI warning light on? NO → Intermittent failure (test drive may be necessary.)

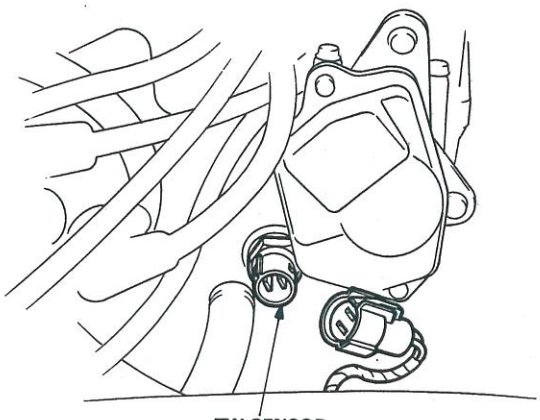
YES

Warm up engine to normal operating temperature (cooling fan comes on).

Disconnect the 2P connector on the TW sensor.

Measure resistance between the 2 terminals on the TW sensor.

(To page 11-25)



(From page 11-24)

Is there 200—400 Ω

NO → Replace TW sensor.

YES

Measure voltage between Red/White (+) terminal and body ground.

Is there approx. 5V?

NO → Turn the ignition switch OFF.

YES

Measure voltage between Red/White (+) terminal and Brown/Black (–) terminal.

Connect the system checker harness between the ECU and connector (page 11-10).

Turn the ignition switch ON.

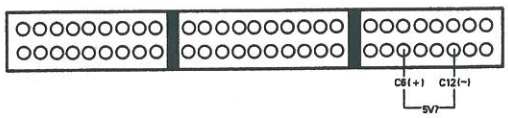
Is there approx. 5V?

NO → Repair open in Brown/Black wire between ECU (C12) and TW sensor.

YES

Substitute a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

Measure voltage between C6 (+) terminal and C12 (–) terminal.



Is there approx. 5V?

YES → Repair open in Red/White wire between ECU (C6) and TW sensor.

NO

Disconnect "C" connector from the main wire harness only, not the ECU.

Measure voltage between C6 (+) terminal and C12 (–) terminal.

Is there approx. 5V?

YES → Repair short in Red/White wire between ECU (C6) and TW sensor.

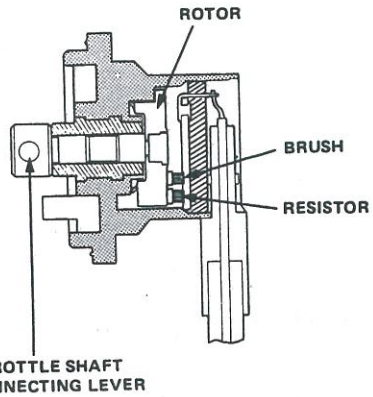
NO

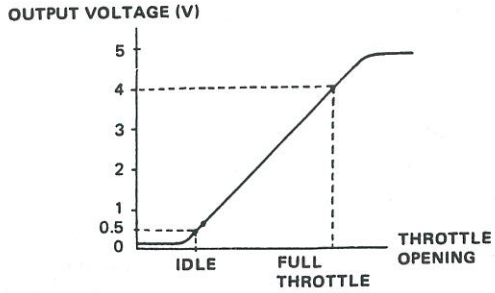
Substitute a known-good ECU and re-check. If prescribed voltage is now available, replace the original ECU.

Troubleshooting Flow Chart —— Throttle Angle Sensor

PGM-FI ⑦ Self-diagnosis LED indicator blinks seven times: Most likely 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.





PGM-FI ⑦

–Engine is running
–PGM-FI warning light is on
–LED indicates CODE 7

Turn the ignition switch OFF.

Remove HAZARD fuse at the battery positive terminal for 10 seconds to reset ECU.

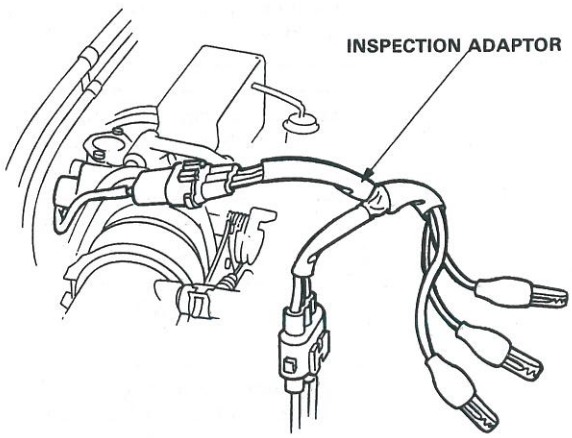
Start engine.

Is PGM-FI warning light on? NO → Intermittent failure (test drive may be necessary.)

YES

Turn the ignition switch OFF.

Connect the inspection adaptor between the throttle angle sensor and engine wire harness.



Turn the ignition switch ON.

(To page 11-27)

(From page 11-26)

Measure voltage between Red (+) terminal and Green (–) terminal.

Is there approx. 5V?

NO → Measure voltage between Red (+) terminal and body ground.

Is there approx. 5V?

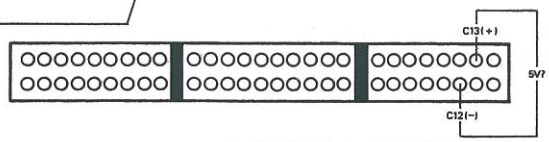
YES → Repair open in Brown/Black wire between ECU (C12) and throttle angle sensor.

NO → Turn the ignition switch OFF.

Connect the system checker harness between the ECU and connector (page 11-10).

Turn the ignition switch ON.

Measure voltage between C13 (+) terminal and C12 (–) terminal.



Is there approx. 5V?

YES → Repair open in Yellow/Red wire between ECU (C13) and throttle angle sensor.

NO → Substitute a known-good ECU and re-check. If prescribed voltage is now available, replace the original ECU.

YES → Measure voltage between White (+) terminal and Green (–) terminal at fully open throttle.

Is there approx. 4 V?

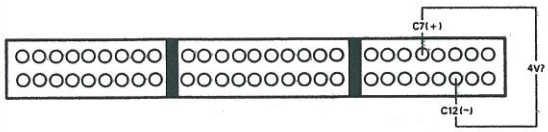
NO → –Replace throttle angle sensor.
–Repair short in Red/Blue wire between ECU (C7) and throttle angle sensor.

YES → Turn the ignition switch OFF.

Connect the system checker harness between the ECU and connector (page 11-10).

Turn the ignition switch ON.

Measure voltage between C7 (+) terminal and C12 (–) terminal at fully open throttle.



Is there approx. 4 V?

YES → Repair open in Red/Blue wire between ECU (C7) and throttle angle sensor.

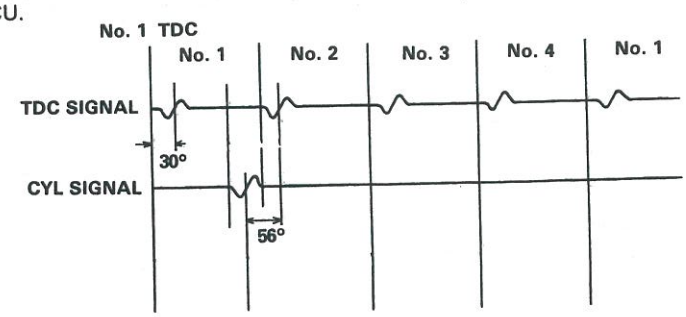
NO → Substitute a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

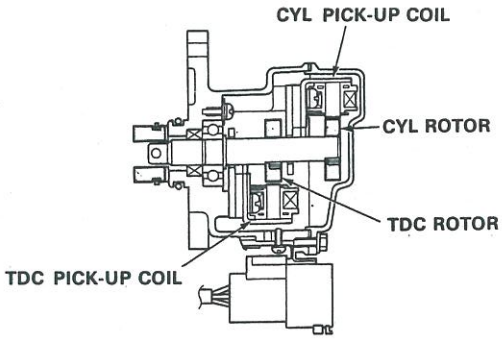
Troubleshooting Flow Chart —— Crank angle sensor

PGM-FI (8) Self-diagnosis LED indicator blinks eight times: A problem in the TDC circuit of the Crank Angle Sensor.

PGM-FI (9) Self-diagnosis LED indicator blinks nine times: A problem in the CYL circuit of the Crank Angle Sensor.

The sensor consists of a pair of rotors, TDC and CYL, and a pickup for each rotor. Since the rotors are coupled to the camshaft, they turn together as a unit as the camshaft rotates. The CYL sensor detects the position of the No. 1 cylinder as the base for the Sequential Injection whereas the TDC sensor serves to determine the injection timing for each cylinder. The TDC sensor also supplies the RPM signal to the ECU.





PGM-FI (8)

–PGM-FI warning light has been reported on.
–LED indicates CODE 8.

Turn the ignition switch OFF.

Remove HAZARD fuse at the battery positive terminal for 10 seconds to reset ECU.

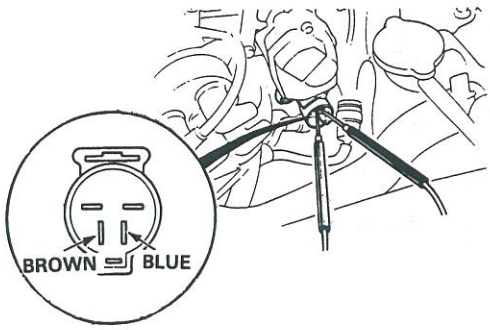
Start engine.

Is PGM-FI warning light on? NO → Intermittent failure (test drive may be necessary.)

YES

Stop engine.

Disconnect the 4P connector on the crank angle sensor.



(To page 11-29)

(From page 11-28)

Measure resistance between Brown terminal and Blue terminal.

Is there 650–850 Ω?

NO → Replace crank angle sensor (page 11-31).

YES

Check for continuity to body ground on Brown terminal and Blue terminal individually.

Does continuity exist?

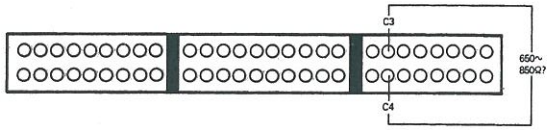
YES → Replace crank angle sensor (page 11-31).

NO

Reconnect the connector.

Connect the system checker harness only to the main wire harness, but not to the ECU (page 11-10).

Measure resistance between C3 terminal and C4 terminal.



Is there 650–850 Ω?.

NO → Repair open in Orange/Blue and/or White/Blue wires.

YES

Substitute a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

(cont'd)

Troubleshooting Flow Chart —— Crank angle sensor (cont'd)

PGM-FI ⑨

–PGM-FI warning light has been reported on.
–LED indicates CODE 9.

Turn the ignition switch OFF.

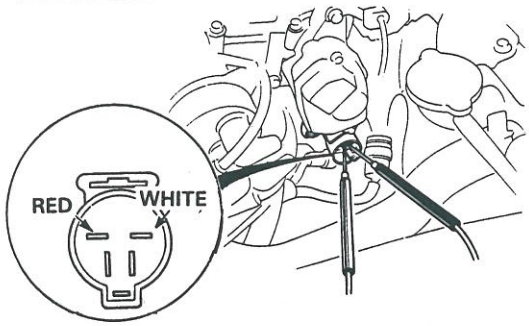
Remove HAZARD fuse at the battery positive terminal for 10 seconds to reset ECU.

Start engine.

Is PGM-FI warning light on?
- NO → Intermittent failure (test drive may be necessary.)
- YES

Stop engine.

Disconnect the 4P connector on the crank angle sensor.



Measure resistance between Red terminal and White terminal.

Is there 650—850 Ω?
- NO → Replace crank angle sensor (page 11-31).
- YES

Check for countinuity to body ground on Red terminal and White terminal individually.

Does continuity exist?
- YES → Replace crank angle sensor (page 11-31).
- NO

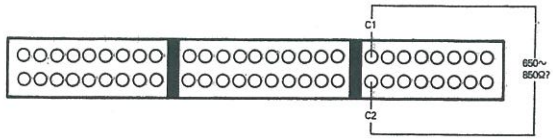
Reconnect the connector.

Connect the system checker harness only to the main wire harness, but not to the ECU (page 11-10).

(To page 11-31)

(From page 11-30)

Measure resistance between C1 terminal and C2 terminal.

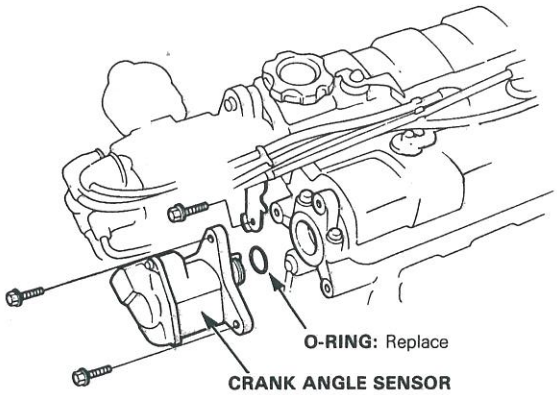


Is there 650–850Ω?

NO → Repair open in Orange and/or White wires.

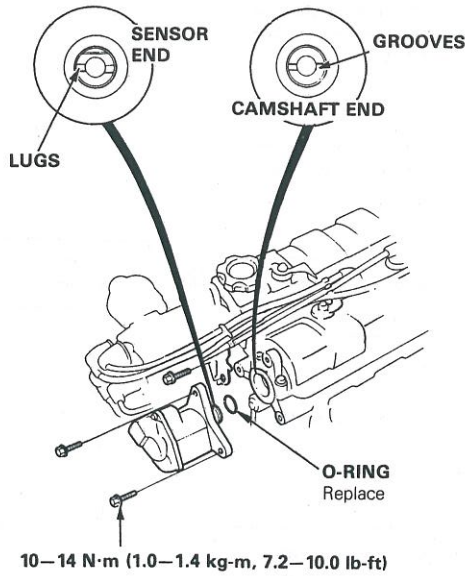
YES → Substitute a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

Removal:
1. Remove the crank angle sensor from the engine.



Installation:
1. Install a new O-ring on the sensor housing.
2. Slip the sensor into the position.

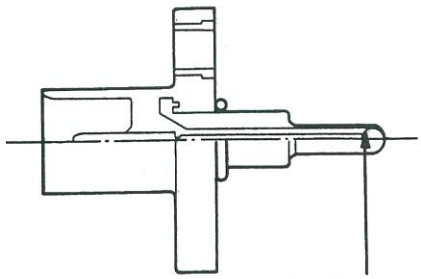
NOTE: The lugs on the end of the sensor and its mating grooves in the camshaft end are both offset to eliminate the possibility of installing the sensor 180° out of time.



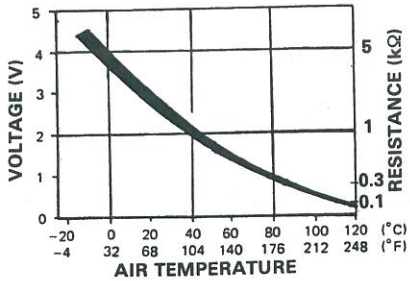
Troubleshooting Flow Chart —— TA Sensor

PGM-FI 10 Self-diagnosis LED indicator blinks ten times: Most likely 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



PGM-FI 10

– PGM-FI warning light is on.
– LED indicates CODE 10

Turn the ignition switch OFF.

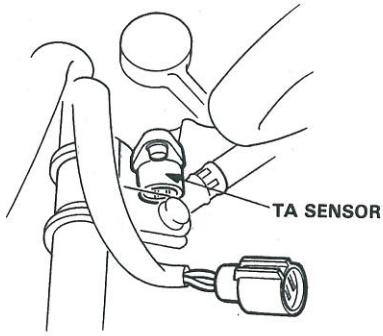
Remove HAZARD fuse at the battery positive terminal for 10 seconds to reset ECU.

Turn the ignition switch ON.

Is PGM-FI warning light on? NO → Intermittent failure (test drive may be necessary.)

YES

Disconnect the 2P connector on the TA sensor.



Measure resistance between the 2 terminals on the TA sensor.

Is there 1–4 kΩ? NO → Replace TA sensor.

YES

(To page 11-33)

(From page 11-32)

Measure voltage between Red/Yellow (+) terminal and body ground.

Is there approx. 5 V?

NO → Turn the ignition switch OFF.

YES

Measure voltage between Red/Yellow (+) terminal and Brown/Black (–) terminal.

Is there approx. 5 V?

NO → Repair open in Brown/Black wire between ECU (C12) and TA sensor.

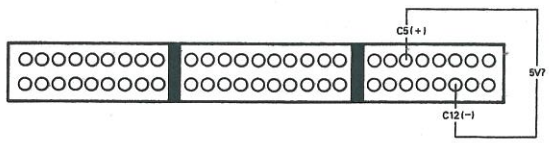
YES

Substitue a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

Connect the system checker harness between the ECU and connector (page 11-10).

Turn the ignition switch ON.

Measure voltage between C5 (+) terminal and C12 (–) terminal.



Is there approx. 5 V?

YES → Repair open in Red/Yellow wire between ECU (C5) and TA sensor.

NO

Disconnect "C" connector from the main wire harness only, not the ECU.

Measure voltage between C5 (+) terminal and C12 (–) terminal.

Is there approx. 5 V?

YES → Repair short in Red/Yellow wire between ECU (C5) and TA sensor.

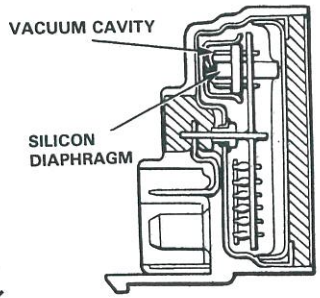
NO

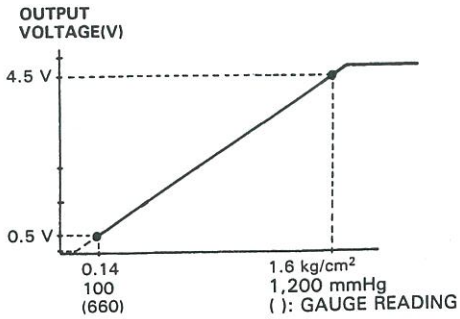
Substitute a known-good ECU and re-check. If prescribed voltage is now available, replace the original ECU.

Troubleshooting Flow Chart —— PA Sensor

PGM-FI (13) Self-diagnosis LED indicator blinks thirteen times: A problem in the Atmospheric Pressure (PA) Sensor circuit.

The PA sensor converts atmospheric pressure into electrical signals and inputs the ECU.





PGM-FI (13)

–PGM-FI warning light is on.
–LED indicates CODE 13.

Turn the ignition switch OFF.

Remove HAZARD fuse at the battery positive terminal for 10 seconds to reset ECU.

Turn the ignition switch ON.

Is PGM-FI warning light on? NO → Intermittent failure (test drive may be necessary.)

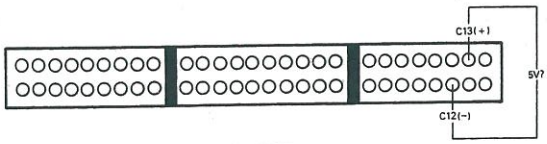
YES

Turn the ignition switch OFF.

Connect the system checker harness between the ECU and connector (page 11-10).

Turn the ignition switch ON.

Measure voltage between C13 (+) terminal and C12 (–) terminal.



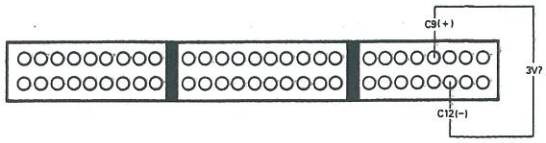
Is there approx. 5V? NO → Substitute a known-good ECU and recheck. If prescribed voltage is now available replace the original ECU.

YES

(To page 11-35)

(From page 11-34)

Measure voltage between C9 (+) terminal and C12 (–) terminal.



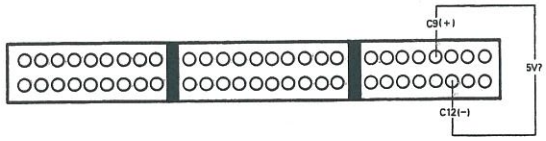
Is there approx. 3V?

YES → Substitute a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

NO

Disconnect the main wire harness from PA sensor.

Measure voltage between C9 (+) terminal and C12 (–) terminal.



Is there approx. 5V?

NO → Repair short in Red wire between ECU (C9) and PA sensor.

YES

Measure voltage between Yellow/Red (+) terminal and Brown/Black (–) terminal.

Is there approx. 5V?

NO → Measure voltage between Yellow/Red (+) terminal and body ground.

Is there approx. 5V?

NO → Repair open in Yellow/Red wire between ECU (C13) and PA sensor.

YES → Repair open in Brown/Black wire between ECU (C12) and the sensor.

YES

Measure voltage between Red (+) terminal and Brown/Black (–) terminal.

Is there approx. 5V?

NO → Repair open in Red wire between ECU (C9) and PA sensor.

YES

Replace PA sensor.

Idle Control System

Symptom-to-Sub System Chart

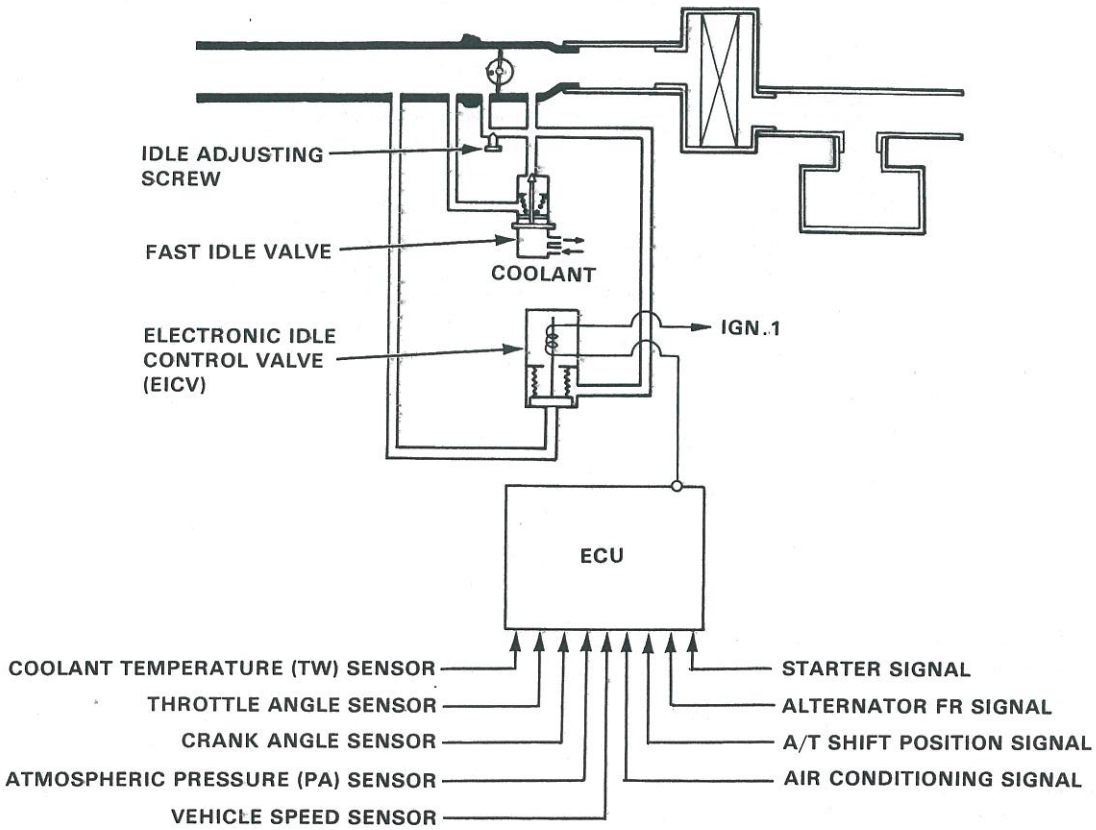
NOTE: Across each row in the chart, the sub systems that could be sources of a symptom are ranked in the order they should be inspected, starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next system ②, etc.

PAGE / SUB SYSTEM / SYMPTOM		IDLE ADJUSTING SCREW	ELECTRONIC IDLE COTROL VALVE	STARTER SIGNAL	ALTERNATOR FR SIGNAL	A/T SHIFT POSITION SIGNAL	AIR CONDITIONING SIGNAL	FAST IDLE VALVE	HOSES AND CONNECTIONS
		49	38	41	42	44	46	48	*
WHEN COLD	Fast idle speed is not as specified (1,250—2,250 rpm)		②					①	
WHEN WARM PRM TOO HIGH	Idle speed is above 850 rpm.		③					②	①
WHEN WARM RPM TOO LOW	Idle speed is below 750rpm.		①						②
	Idle speed does not increase after initial start up.			①					
	Idle speed drops when blipping throttle with electrical load.				①				
	On models with automatic transmission, the idle speed drops in gear.					①			
	Idle speed drops when air conditioner is ON.						①		

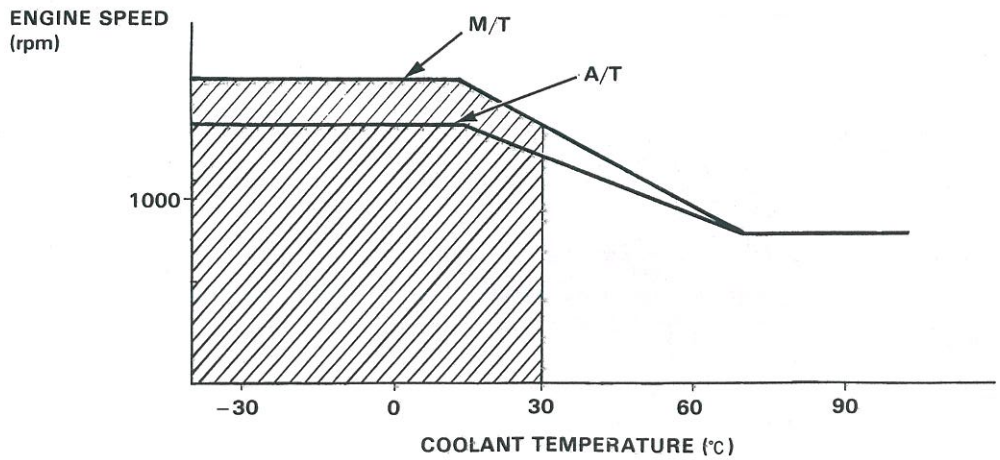
*—If bypass passages are blocked, a low idle speed will result.
—If hoses or bypass passages are leaking, a high idle speed will result.

Description

The idle speed of engine is controlled by the Electronic Idle Control Valve (EICV) and the Fast Idle Valve.
The valve changes the amount of air bypassing into the intake manifold in response to electric current sent from the ECU. When the EICV is activated, the valve opens to maintain the proper idle speed.



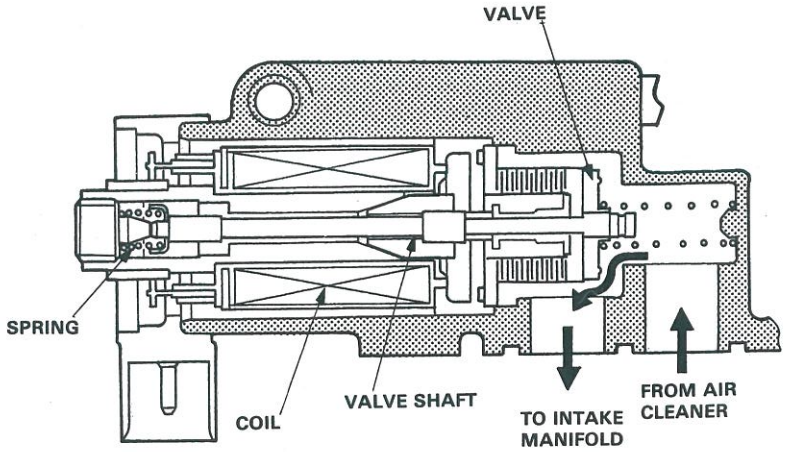
1. After the engine starts, the EICV opens for a certain time. The amount of air is increased to raise the idle speed about 0—150 rpm.
2. When the coolant temperature is low, EICV is opened to obtain the proper fast idle speed. The amount of bypassed air is thus controlled in relation to the coolant temperature.
   When the coolant temperature reaches 30°C (86°F), it also activates the fast idle valve to prevent the idle speed from dropping.



Troubleshooting Flow Chart —— EICV

PGM-FI 14 Self-diagnosis LED indicator blinks fourteen times: A problem in the Electronic Idle Control Valve (EICV) circuit.

The EICV changes the amount of air by-passing the throttle body in response to a current signal from the ECU in order to maintain the proper idle speed.



PGM-FI 14

–Engine is running.
–PGM-FI warning light is on.
–LED indicates CODE 14.

Turn the ignition switch OFF.

Remove HAZARD fuse at the battery positive terminal for 10 seconds to reset ECU.

Start engine.

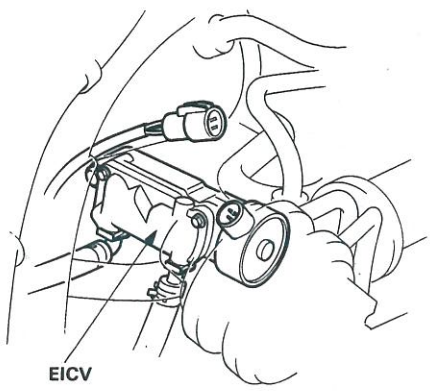
Is PGM-FI warning light on? NO → Intermittent failure (test driving may be necessary.)

YES

Stop engine.

Disconnect the 2P connector on the EICV.

Measure resistance between the 2 terminals on the EICV.



(To page 11-39)

(From page 11-38)

Is there 6—20Ω?
NO → Replace EICV.
YES

Check for continuity to body ground on each terminal on the EICV.

Does continuity exist?
YES → Replace EICV
NO

Turn the ignition switch ON.

Measure voltage between Yellow/Black (+) terminal and White (–) terminal.

Is there battery voltage?
YES → Disconnect the 17P connector from the ECU.
NO

Measure voltage between Yellow/Black (+) terminal and body ground.

Is there battery voltage?
YES → Repair short in White or Green/Red wire between ECU (A11) and EICV.
NO

Is there battery voltage?
NO → Repair open in Yellow/Black wire between the EICV and main relay.
YES

Turn the ignition switch OFF.

Substitute a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

Reconnect the 2P connector to EICV.

Connect the system checker harness "A" connector to the main wire harness only, not the ECU (page 11-10).

(To page 11-40)

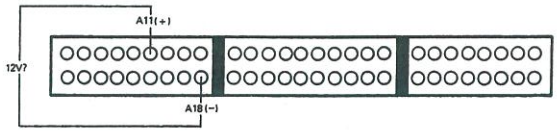
(cont'd)

Troubleshooting Flow Chart —— EICV (cont'd)

(From page 11-39)

Turn the ignition switch ON.

Measure voltage between A11 (+) terminal and A18 (–) terminal.



Is there battery voltage?

NO → Repair open in White or Green/Red wire between ECU (A11) and EICV.

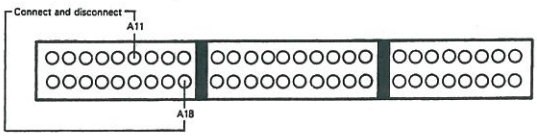
YES

Substitute a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

–Idle isn't as specified.
–PGM-FI warning light isn't on.
–LED doesn't blink.

Turn the ignition switch ON.

Connect and disconnect A11 terminal to A18 terminal.



Does EICV click when the connector is connected and disconnected?

NO → Replace EICV.

YES

Substitute a known-good ECU and re-check. If symptom/indication goes away, replace the original ECU.

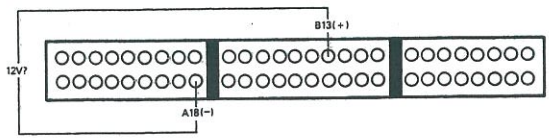
Troubleshooting Flow Chart —— Starter Signal

This signals the PGM-FI ECU when the engine is cranking. The ECU controls the current to the EICV to promote easy starting.

Inspection of Starter Switch Signal

Connect the system checker harness between the ECU and connector (page 11-10).

Measure voltage B13 (+) terminal and A18 (–) terminal with ignition switch in the start position.



Is there battery voltage?

YES → Starter signal is OK.

NO

Inspect fuse (7.5A).

Is fuse (7.5A) OK?

NO → Replace fuse.

YES

Repair open in Blue/White wire between ECU (B13) and fuse (7.5A).

Troubleshooting Flow Chart —— Alternator FR Signal

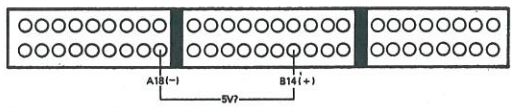
This signals the PGM-FI ECU when the alternator is charging.

Inspection of Alternator FR signal.

Connect the system checker harness between the ECU and connector (page 11-10). But disconnect "B" connector from the main wire harness only, not the ECU.

Turn the ignition switch ON.

Measure voltage between B14 (+) terminal and A18 (–) terminal.



Is there approx. 5V?

NO → Substitute a known-good ECU and recheck. If prescribed voltage is now available, replace the original ECU.

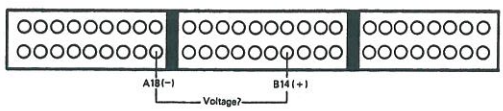
YES

Turn the ignition switch OFF.

Reconnect "B" connector to the main wire harness.

Warm up engine to normal operating temperature (cooling fan comes on).

Measure voltage between B14 (+) terminal and A18 (–) terminal.



Does the voltage decrease when headlight and rear defogger are turned on?

YES → Alternator FR signal is OK?

NO

Stop engine.

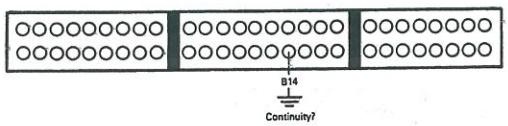
(To page 11-43)

(From page 11-42)

Disconnect "B" connector from ECU only, not the main wire harness.

Disconnect the negative battery cable from the battery.

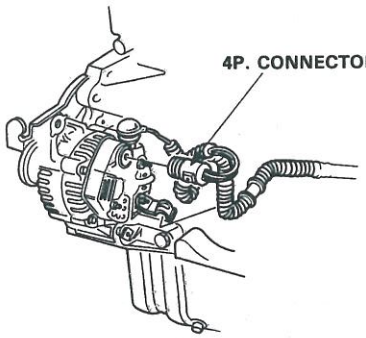
Check for continuity between B14 terminal and body ground.



Does continuity exist?

YES → Disconnect Green connector from the alternator.

NO → Disconnect Green connector from the alternator.



Connect White/Red wire to body ground.

Check for continuity between B14 terminal and body ground.

Does continuity exist?

YES → See Alternator Inspection (section 23).

NO → Repair open in White/Red wire between ECU (B14) and alternator.

Check for continuity between B14 terminal and body ground.

Does continuity exist?

NO → See Alternator Inspection (section 23).

YES → Repair short in White/Red wire between ECU (B14) and alternator.

Troubleshooting Flow Chart —— A/T Shift Position Signal

This signals the PGM-FI ECU when the transmission is in Neutral or Park.

Inspection of A/T Shift Position Signal

Turn the ignition switch ON.

Observe the A/T shift indicator and select each position separetely.

Does the indicator light properly? NO → See A/T shift position Indicator Inspection (section 23).

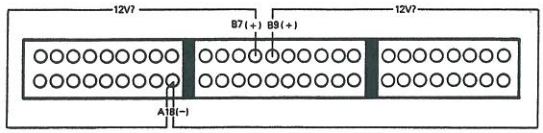
YES

Turn the ignition switch OFF.

Connect the system checker harness between the ECU and connector (page 11-10). But disconnect "B" connector from the main wire harness only, not the ECU.

Turn the ignition switch ON.

Measure voltage between B7 (+) and B9 (+) terminal individually, and A18 (–) terminal.

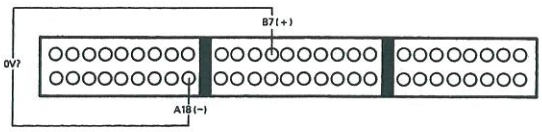


Is there battery voltage? NO → Substitute a known-good ECU and re-check If prescribed voltage is now available, replace the original ECU.

YES

Reconnect "B" connector to the main wire harness.

Measure voltage between B7 (+) terminal and A18 (–) terminal in Neutral position.



(To page 11-45)

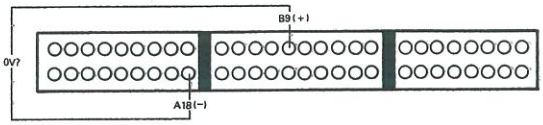
(From page 11-44)

Is there voltage?

YES → Repair open Green wire between ECU (B7) and A/T shift position indicator switch.

NO

Measure voltage between B9 (+) terminal and A18 (–) terminal in Park position.



Is there voltage?

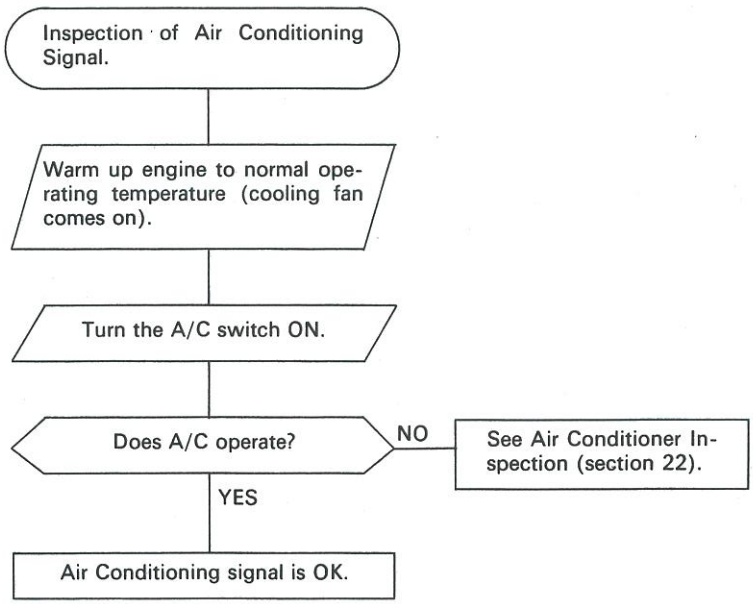
YES → Repair open Green/White wire between ECU (B9) and A/T shift position indicator switch.

NO

A/T shift position signal is OK.

Troubleshooting Flow Chart —— Air Conditioning Signal

This signals the PGM-FI ECU when there is a demand for cooling from the A/C switch.



Troubleshooting Flow Chart —— Vehicle Speed Signal

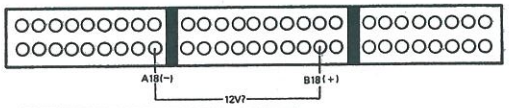
This signals the PGM-FI ECU when the vehicle speed is above 10 mph.

Inspection of Vehicle Speed Signal.

Connect the system checker harness between the ECU and connector (page 11-10). But disconnect "B" connector from the main wire harness only, not the ECU.

Turn the ignition switch ON.

Measure voltage between B18 (+) terminal and A18 (–) terminal.



Is there battery voltage?

NO → Substitute a known-good ECU and recheck. If prescribed, voltage is now available replace the original ECU.

YES

Turn the ignition switch OFF.

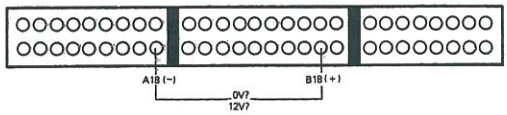
Reconnect "B" connector to the main wire harness.

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.

Start engine, put transmission in 2nd gear, let the clutch out (D_2 position for automatics).

Measure voltage between B18 (+) terminal and A18 (–) terminal.



Is there voltage above 10 mph and no voltage below 10 mph?

NO → Repair open or short in Yellow/White wire between ECU (B18) and speed sensor amplifier. If wire is OK, replace the sensor (section 23).

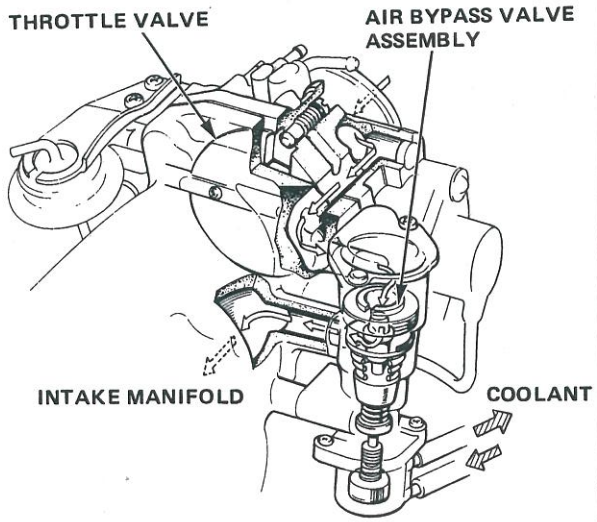
YES

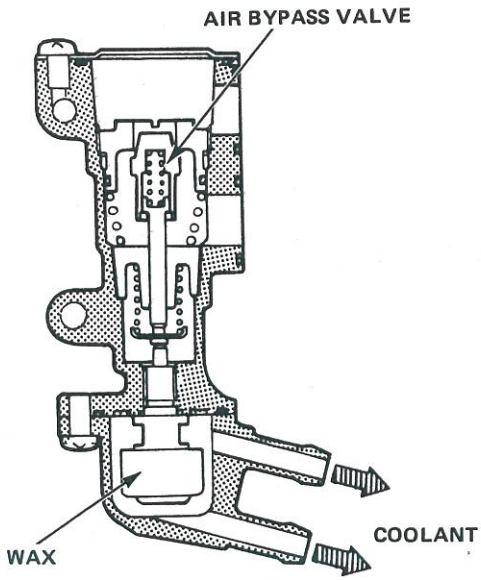
Speed Vehicle Signal is OK.

Fast Idle Control

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.

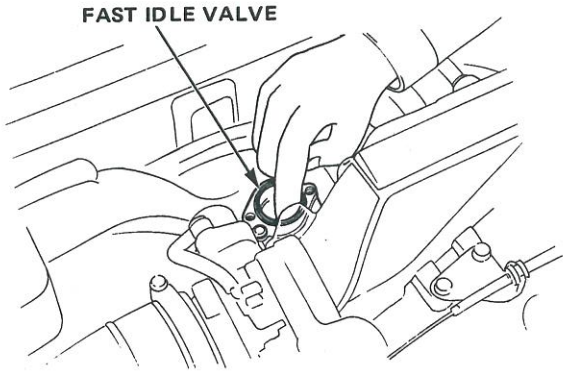




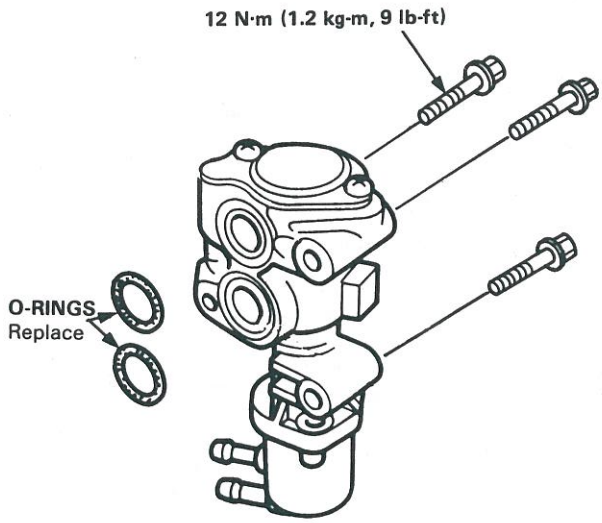
Inspection

NOTE: The fast idle valve is factory adjusted: it should not be disassembled.

1. Start the engine.
2. Remove the cover of the fast idle valve.
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.



- If not, replace the fast idle valve and re-test.

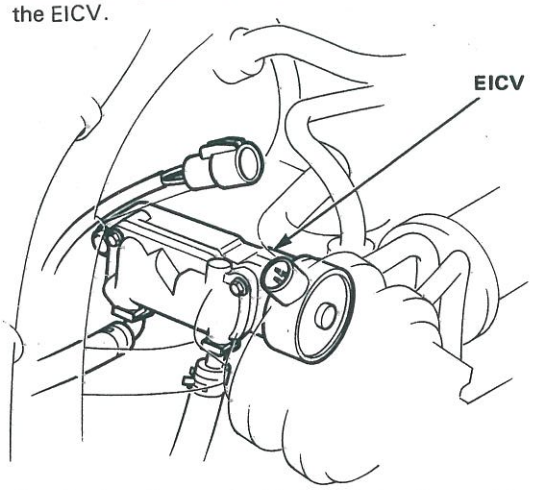


4. Warm up to normal operating temperature (cooling fan comes on).
5. Check that the valve is completely closed. If not, an air suction sound can be heard in the valve seat area.
   - If any suction is heard, the valve is leaking. Replace the fast idle valve and re-check.

Idle Speed

Inspection/Adjustment

1. Start the engine and warm it up to normal operating temperature (the cooling fan comes on)..
2. Connect a tachometer.
3. With the engine idling, disconnect the connector at the EICV.

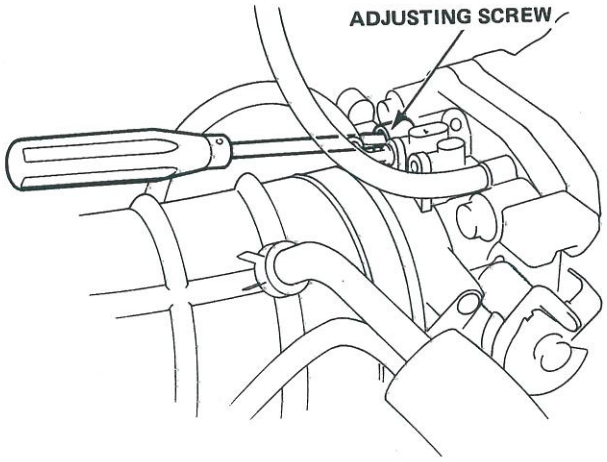


4. Check the idle speed with headlights, heater blower, rear window defogger, cooling fan and air conditioner off.

Idle speed should be:

Manual	550 ± 50 rpm
Automatic	550 ± 50 rpm (in "N" or "P")

Adjust the idle speed, if necessary, by turning the adjusting screw on the top of the throttle body.



5. After adjustment, reconnect the connector at the EICV.
6. Disconnect HAZARD fuse at the battery positive terminal for at least 10 seconds to reset the ECU memory.
7. Start the engine and warm it up to normal operating temperature (cooling fan comes on).
8. Check the idle speed with headlights, heater blower, rear defogger, cooling fan and air conditioner off.

Idle speed should be:

Manual	800 ± 50 rpm
Automatic	800 ± 50 rpm (in "N" or "P")

9. Check the idle speed in the following conditions.
   - With headlights (Hi) and rear window defogger ON.
   - With air conditioner compressor on.
   - If, applicable, with Automatic Transmission model, when shifted in gear (except "P" or "N").

Idle should remain stable at; 800 ± 50 rpm

Fuel Supply System

Symptom-to-Sub System Chart

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.

SUB SYSTEM / PAGE / SYMPTOM	FUEL INJECTOR	INJECTOR RESISTOR	PRESSURE REGULATOR	FUEL FILTER	FUEL PUMP	MAIN RELAY	FUEL PIPE UNIT	FUEL TANK	CONTAMINATED FUEL
	52	55	56	57	58	60	62	63	*
ENGINE WON'T START		②			①	①	③		
MISFIRE	①	②							③
LOSS OF POWER				①					②

*Fuel with dirt, water or a high percentage of alcohol is considered contaminated.

Fuel Pressure

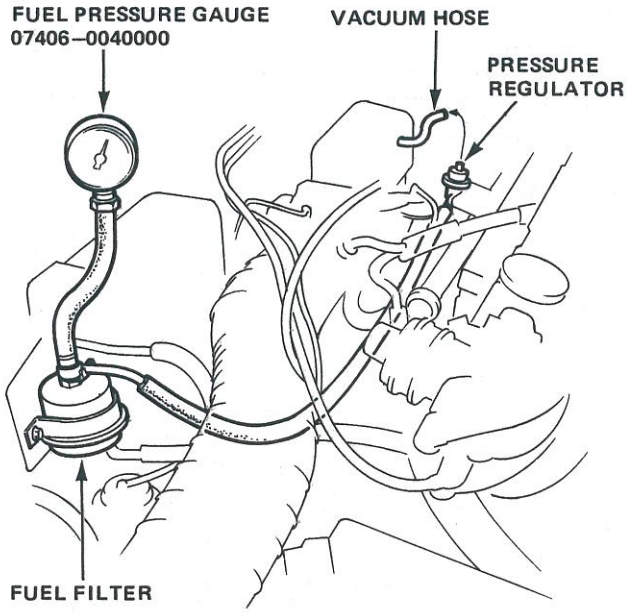
Description

The fuel supply system consists of a fuel tank, high pressure fuel pump, main relay, fuel filter, pressure regulator, injectors and injector resistor.
This system delivers pressure regulated fuel to the injectors and cuts the fuel delivery when the engine is not running.

Inspection

1. Relieve fuel pressure (page, 11-52).
2. Remove the service bolt on the top of the fuel filter while holding the banjo bolt with another wrench and attach the fuel pressure gauge.
3. Start the engine. Measure the fuel pressure with the engine idling and the vacuum hose of the pressure regulator disconnected.

Pressure should be:
250–279 kPa (2.55–2.85 kg/cm^2, 36–41 psi)



- If the fuel pressure is not as specified, first check the fuel pump (page 11-59). 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 11-56).

  – If the pressure is lower than specified, inspect for:
    - Clogged fuel filter.
    - Pinched or clogged fuel hose from the fuel tank to the fuel pump.
    - Pressure regulator failure (page 11-56).
    - Leakage in the fuel line.

Fuel Pressure

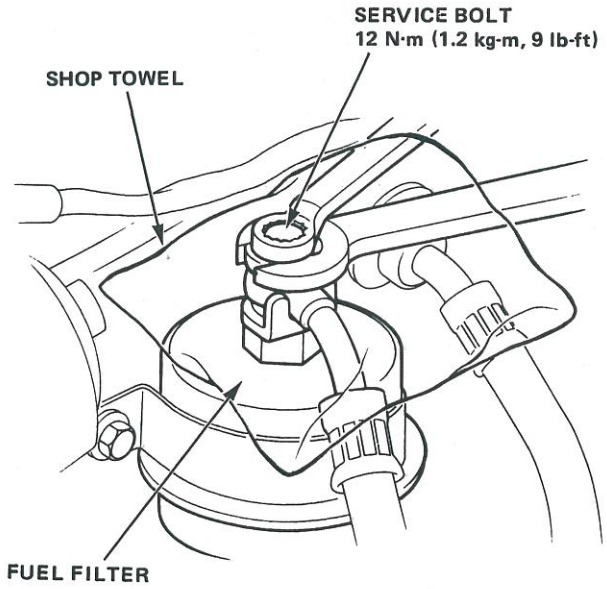
Relieving

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 lines or hoses, release pressure from the system by loosening the 6 mm service bolt at top of the fuel filter.

1. Disconnect the battery negative cable from the battery negative terminal.
2. Use a box end wrench on the 6 mm service bolt on top of the fuel filter, while holding the special banjo bolt with another wrench.
3. Place a rag or shop towel over the 6 mm service bolt.
4. Slowly loosen the 6 mm service bolt one complete turn.



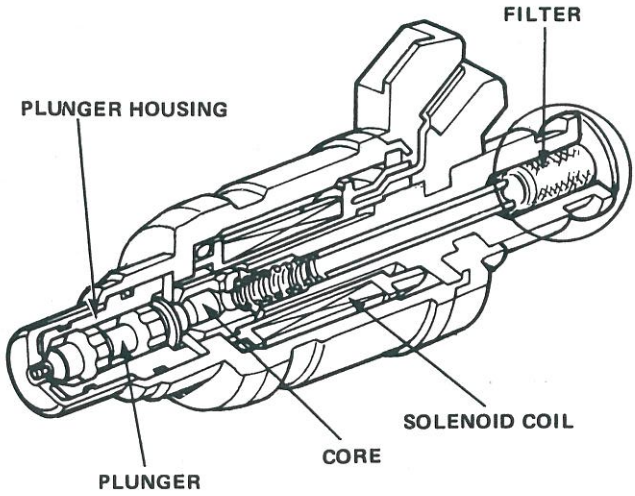
NOTE:

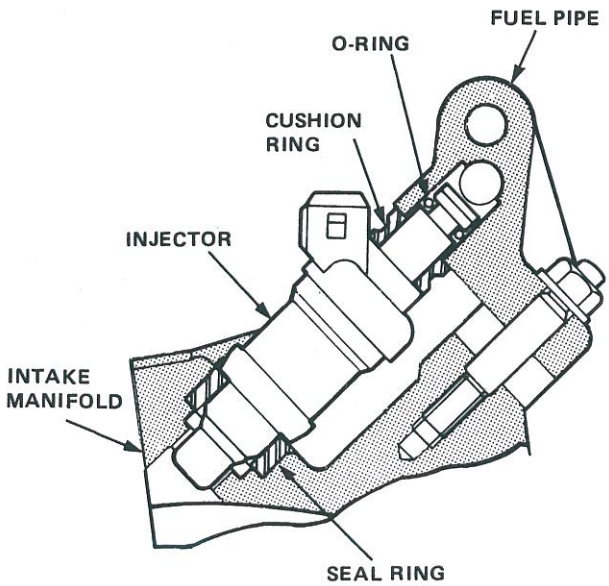
- A fuel pressure gauge can be attached at the 6 mm service bolt hole.
- Always replace the washer between the service bolt and the special banjo bolt, whenever the service bolt is loosened to relieve fuel pressure.
- Replace all washers whenever the bolts are removed to disassemble parts.

Fuel Injectors

Description

The injector is of the solenoid-actuated constant-stroke pintle type consisting of a solenoid, plunger, needle valve and housing. When current is applied to the solenoid coil, the valve lifts up and pressurized fuel is injected close to the intake valve. Because the needle valve lift and the fuel pressure are constant, the injection quantity is determined by the length of time that the valve is open, (i.e., the duration the current is supplied to the solenoid coil). The injector is sealed by an O-ring and seal ring at the top and bottom. These seals also reduce operating noise.





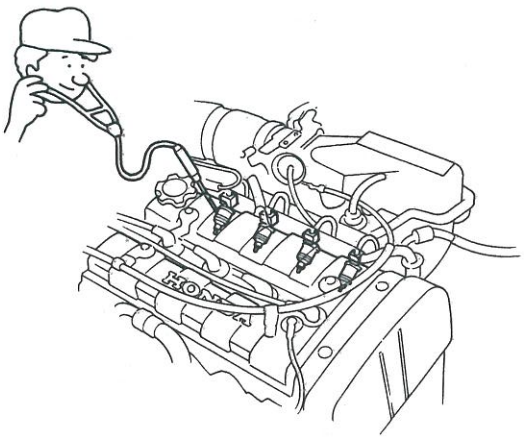
Test

NOTE: Check the following items before testing idle speed, ignition timing, valve clearance 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.



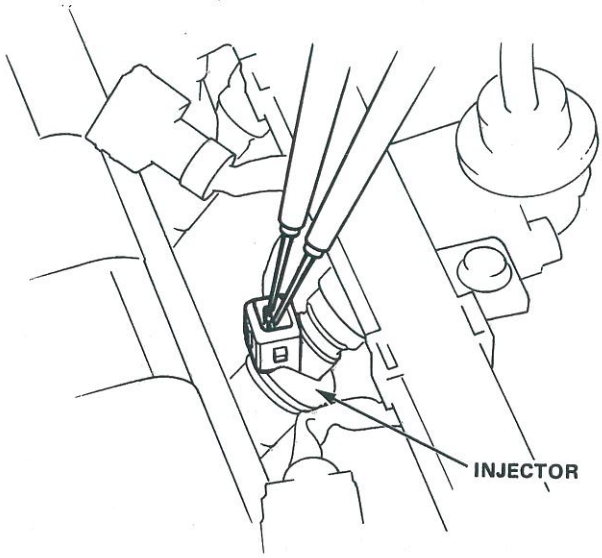
- If any injector fails to make the typical clicking sound, check the sound again after replacing the injector.
  — If clicking sound is still absent, check the following:
  - Whether there is any short-circuiting, wire breakage, or poor connection in the Yellow/Black wire between the resistor and the main relay.
  - Whether the resistor is open or corroded (page 11-55).
  - Whether there is any short-circuiting, wire breakage, or poor connection in the Red/Black 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 are OK, check the ECU (page 11-8).

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



- If resistance is not as specified, replace the injector.
- If the resistance is as specified, check the fuel pressure (page 11-51).
  — If the fuel pressure is as specified, check the following:
  - Whether there is any short-circuiting, wire breakage, or poor connection in the Yellow/Black wire between the resistor and main relay.
  - Whether the resistor is open or corroded (page 11-55).
  - Whether there is any short-circuiting, wire breakage, or poor connection in the Red/Black 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 are OK, check the ECU (page 11-8).

Fuel Injectors

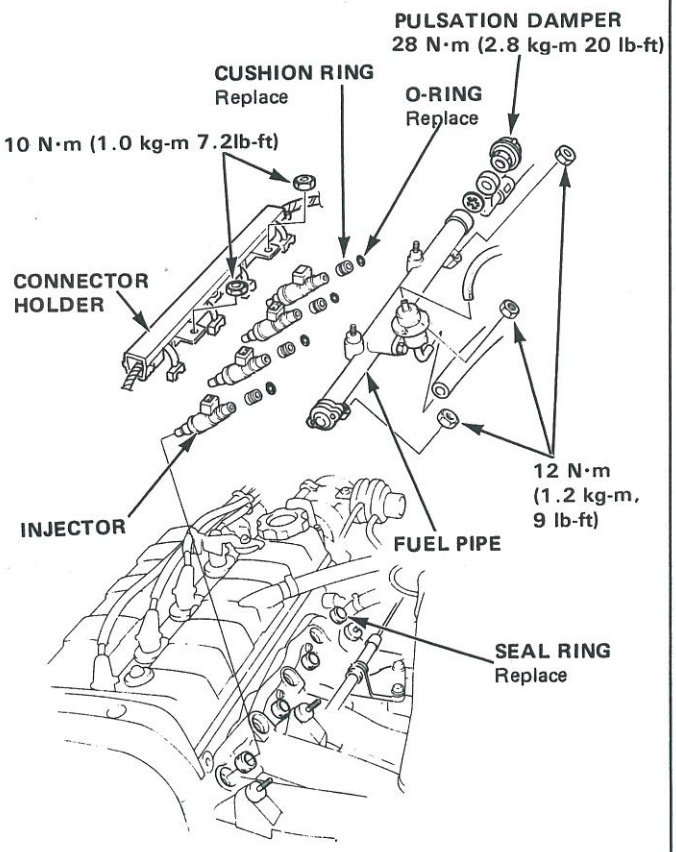
Replacement

WARNING **Do not smoke during the work. Keep open flames away from your work area.**

1. Disconnect the battery negative cable from the battery negative terminal.
2. Relieve fuel pressure (page 11-52).
3. Disconnect the connector of the injectors.
4. Disconnect the vacuum hose and fuel return hose from the pressure regulator.

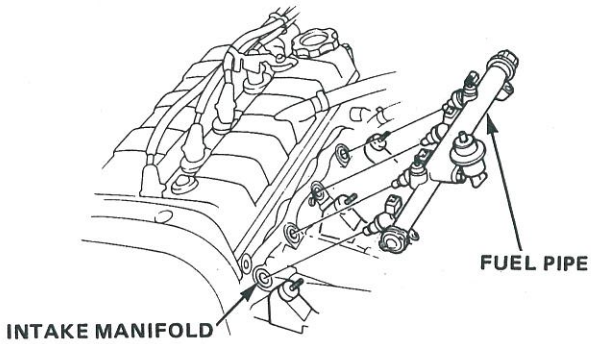
   NOTE: Place a rag or shop towel over the hose and tube before disconnecting them.

5. Remove the pulsation damper.
6. Remove the connector holder.
7. Loosen the retainer nuts on the fuel pipe.
8. Disconnect the fuel pipe.
9. Remove the injectors from the intake manifold.

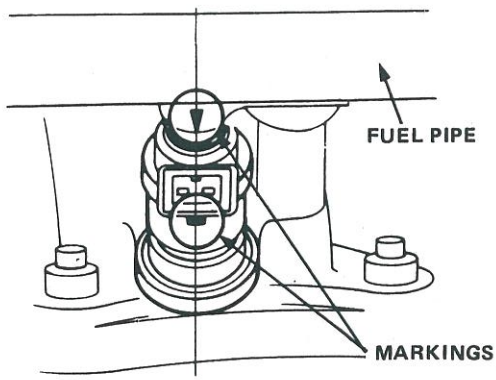


10. Slide new cushion rings onto the injector.
11. Coat new O-rings with clean engine oil and put them on the injectors.
12. Insert the injectors into the fuel pipe first.
13. Coat new seal rings with clean engine oil and press them into the intake manifold.
14. Install the injectors and fuel pipe assembly 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.



15. Align the center line on the connector with the mark on the fuel pipe.

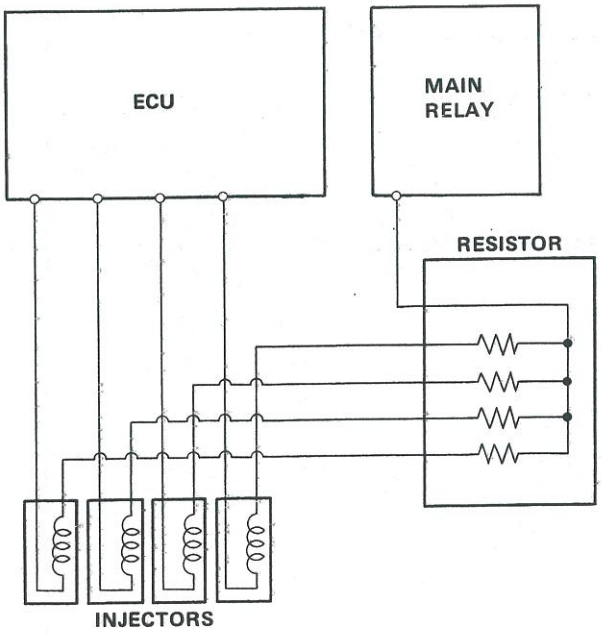


16. Install and tighten the retainer nuts.
17. Install the connector holder.
18. Install the pulsation damper.
19. Connect the vacuum hose and fuel return hose to the pressure regulator.
20. Install the connector on the injectors.
21. Turn the ignition switch ON but do not operate the starter. After 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

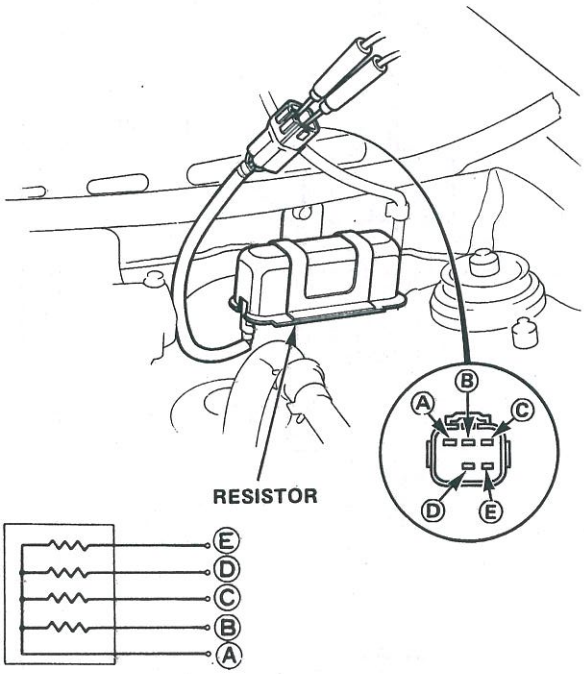
The resistor lowers the current supplied to the injectors to prevent damage to the injector coils. This allows a faster response time of the injectors.



Test

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

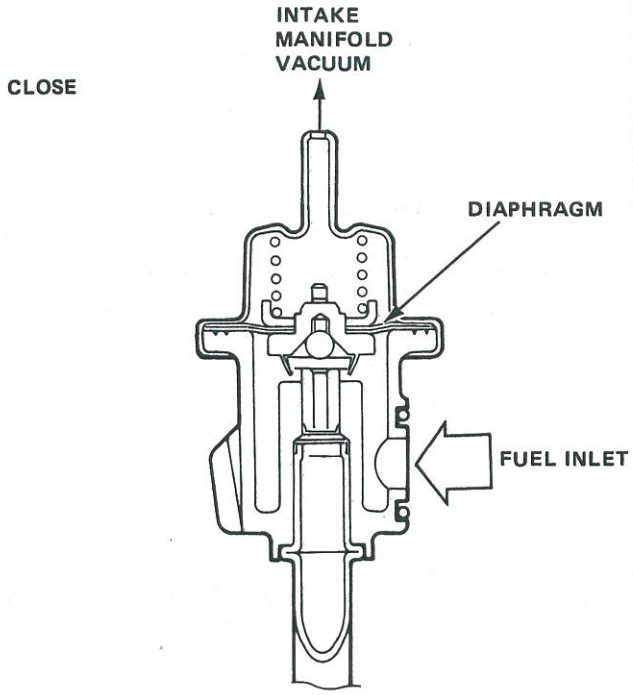


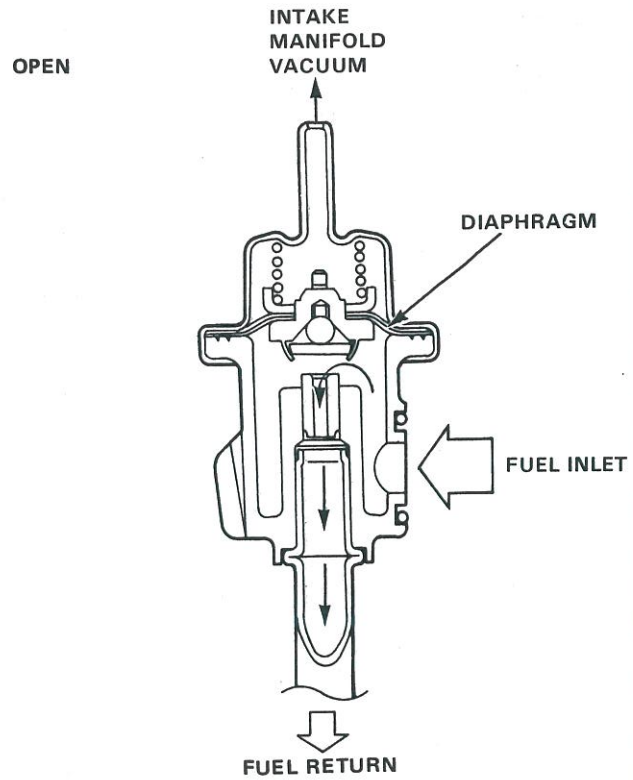
- Replace the resistor with a new one if any of the resistances are outside of the specification.

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 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.



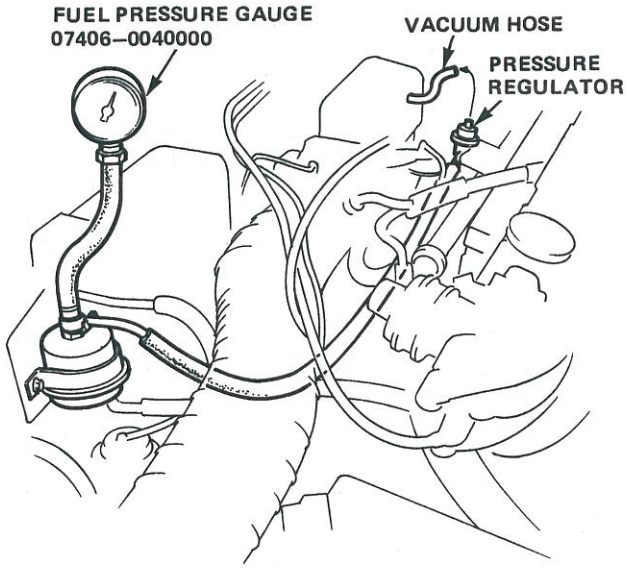


Test

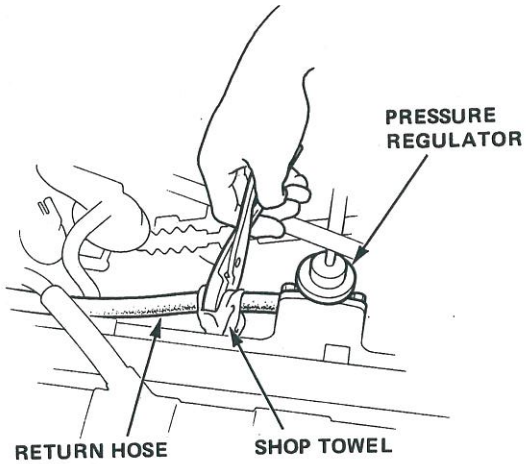
WARNING **Do not smoke during the test. Keep open flames away from your work area.**

1. Attach a pressure gauge to the service port of the fuel filter (page 11-51).

Pressure should be:
250–279kPa (2.55–2.85 kg/cm², 36–41 psi)



2. Check that the fuel pressure rises by disconnecting the vacuum hose from the regulator.
   - If the fuel pressure does not rise, check whether it rises when the return hose is lightly pinched.



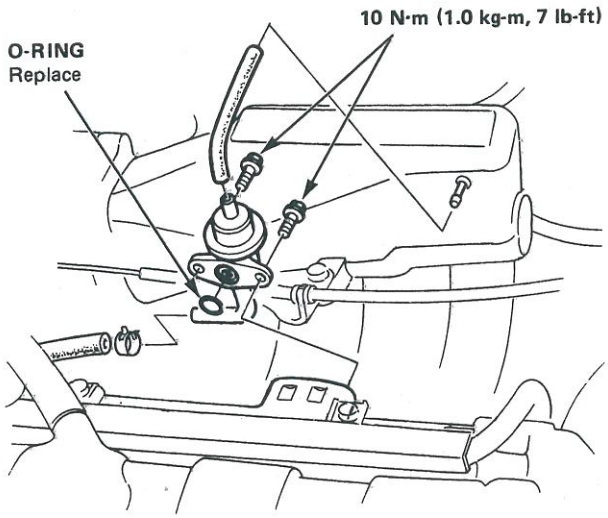
— If the pressure does not rise, replace the regulator and re-test.

Fuel Filter

Replacement

WARNING Do not smoke while working on fuel system. Keep open flame away from work area.

1. Disconnect the negative terminal of the battery.
2. Place a shop towel under the pressure regulator, then relieve fuel pressure (page 11-52).
3. Disconnect the vacuum hose and fuel return hose.
4. Remove the two 6 mm retainer bolts.



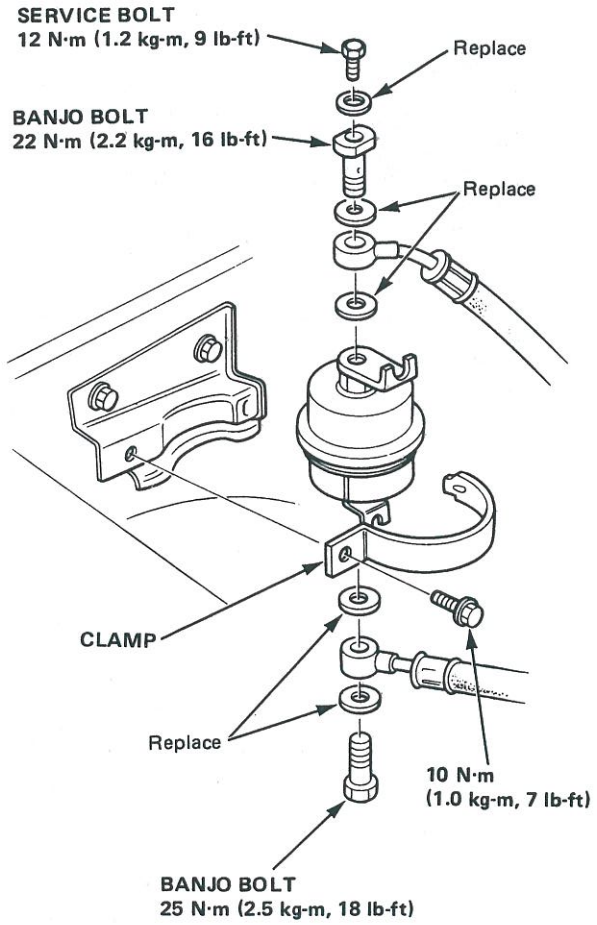
NOTE:
- Replace the O-ring.
- When assembling the regulator, apply clean engine oil to the O-ring and assemble it into its proper position, taking care not to damage the O-ring.

Replacement

WARNING Do not smoke while working on fuel system. Keep open flame away from work area.

The filter should be replaced: every 60,000 miles (96,000 km), or whenever the fuel pressure drops below the specified value (250—279 kPa, 2.55—2.85 kg/cm², 36—41 psi with the vacuum hose disconnected) after making sure that the fuel pump and the pressure regulator are OK.

1. Disconnect the battery cable from the negative terminal.
2. Place a shop towel under and around the fuel filter.
3. Relieve fuel pressure (page 11-52).
4. Remove the two 12 mm banjo bolts from the filter.
5. Remove the fuel filter clamp and fuel filter.
6. When assembling, use new washers, as shown.

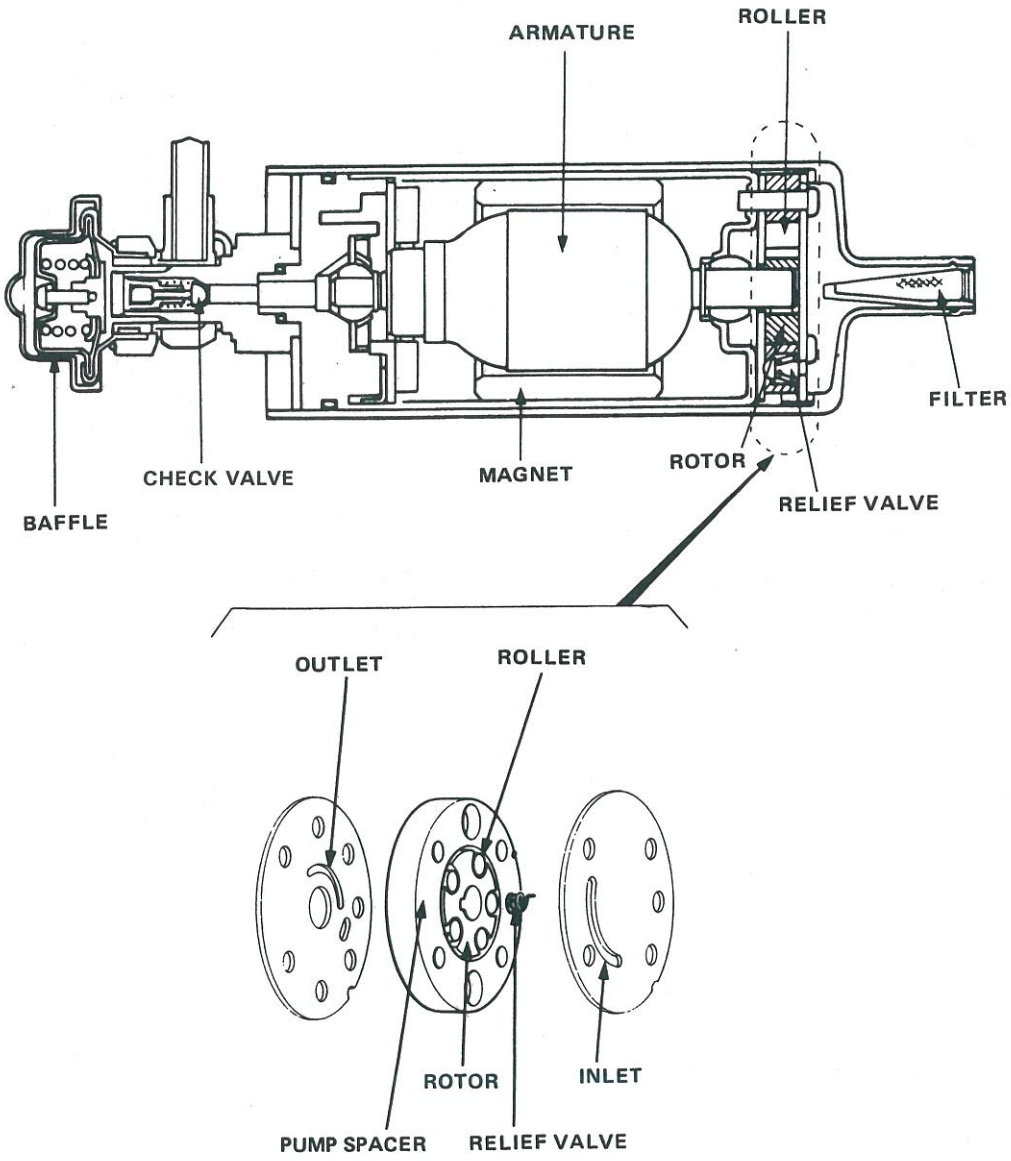


Fuel Pump

Description

The fuel pump is an in-line, direct drive type. Fuel is drawn into the pump through a filter, flows around the armature through the one-way valve and is delivered to the engine compartment. A baffle is provided to prevent fuel pulsation.
The fuel pump has a relief valve to prevent excessive pressure. It opens if there is a blockage in the discharge side. When the relief valve opens, fuel just flows from the high pressure side to the low pressure side.
A check valve is provided to maintain fuel pressure in the line after the pump is stopped. This is to ease re-starting.

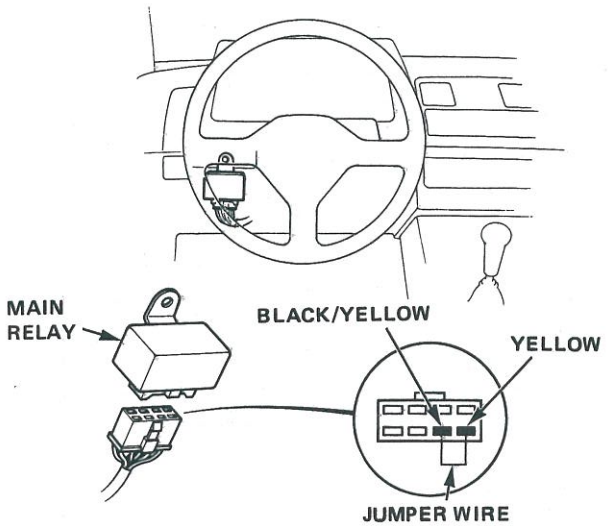
The pump section is composed of a rotor, rollers, and pump spacer as shown.
When the rotor turns, the rollers turn and travel along the inner surface of the pump spacer by centrifugal force.
The volume of the cavity enclosed by these three parts changes, drawing and pressurizing the fuel.



Test

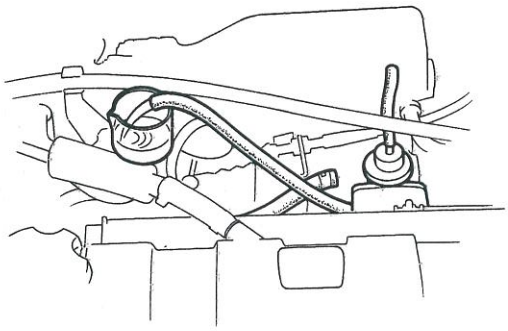
WARNING **Do not smoke during the test. Keep open flame away from your work area.**

1. With the ignition switch OFF, disconnect the connector from the main relay behind the fuse box.
2. Connect the Yellow wire to the Black/Yellow wire with a jumper wire.



3. Relieve fuel pressure as described on page 11-52, then tighten the service bolt.
4. Disconnect the fuel return hose from the regulator.
5. Turn the ignition switch ON for 10 seconds and measure the amount of fuel flow.

Amount should be:
230 cc (7.8 oz) min. in 10 seconds at 12V



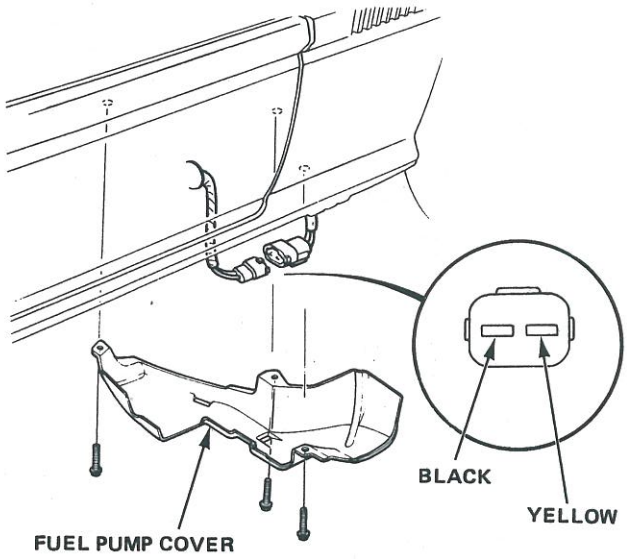
- If fuel flow is less than 230 cc (7.8 oz), or there is no fuel flow, check for:
  - Clogged fuel filter.
  - Clogged fuel line.
  - Pressure regulator failure (page 11-56).

If you suspect a problem with the fuel pump, check that the fuel pump actually runs; it should make noise for 2 seconds when the ignition switch is turned on. If the pump does not make noise, check as follows:

1. Jack up car and place jackstands in proper locations.
2. Remove the fuel pump cover and disconnect the connector.

CAUTION: Be sure to turn the ignition switch OFF before disconnecting the wires.

3. Check that battery voltage is available at the fuel pump wire connector when the ignition switch is turned ON. (Positive probe to the Yellow wire, negative probe to the Black wire)



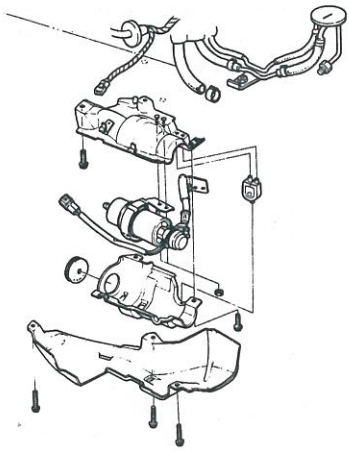
- If battery voltage is available, replace the fuel pump.
- If there is no voltage, check the main relay and wire harness (page 11-61).

Fuel Pump

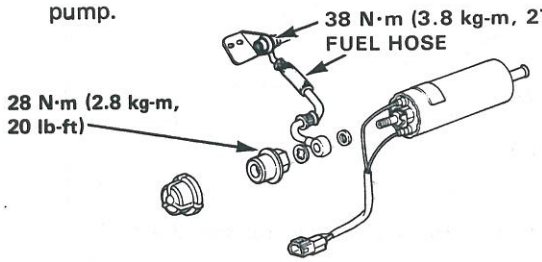
Replacement

WARNING **Do not smoke while working on fuel system. Keep open flames away from your work area.**

1. Relieve fuel pressure (page 11-52).
2. Jack up car and place jack stands in proper locations.
3. Remove left rear wheel.
4. Remove the fuel pump cover.
5. Remove the three bolts, then remove the fuel pump with its mount.
6. Disconnect the fuel lines and electrical wires at the connectors.



7. Remove the clamp and then remove the fuel pump.
8. Remove the fuel line and the silencer from the pump.



CAUTION: Do not disassemble the pump.

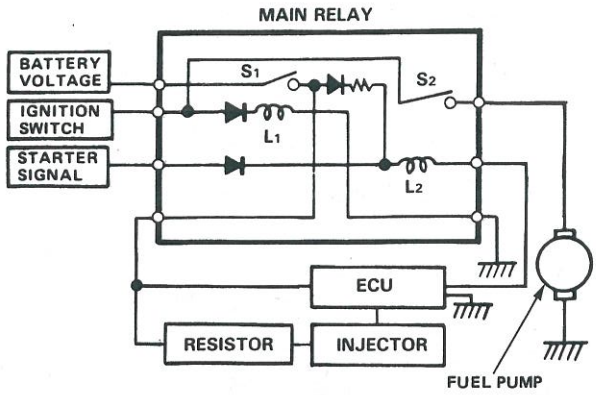
9. Install the new fuel pump on its mount.
10. Carefully clean the sealing surface of the flared fuel line, then install it on the fuel pump and tighten the flare nut. Reinstall the fuel hose and silencer on the front of the fuel pump.
11. Reconnect the electrical wires and reinstall the fuel pump.
12. Check the fuel pump connections for leaks.

CAUTION: Clean the flared joints of high pressure hoses throughly before re-connecting them.

Main Relay

Description

The main relay actually contains two individual relays. This relay is installed at the back of the fuse box. 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.

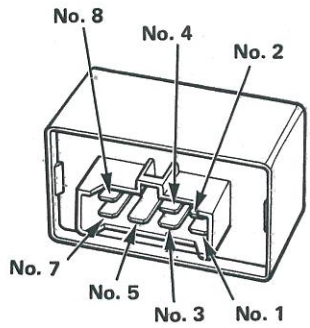


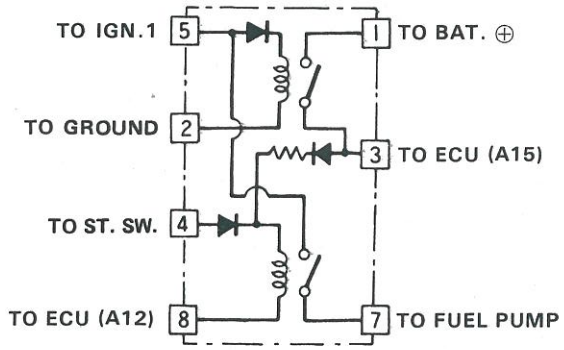
Main Relay

Test

1. Remove the main relay, near the under-dash fuse box.
2. Attach the battery positive terminal to the No. 4 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 re-test.





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.

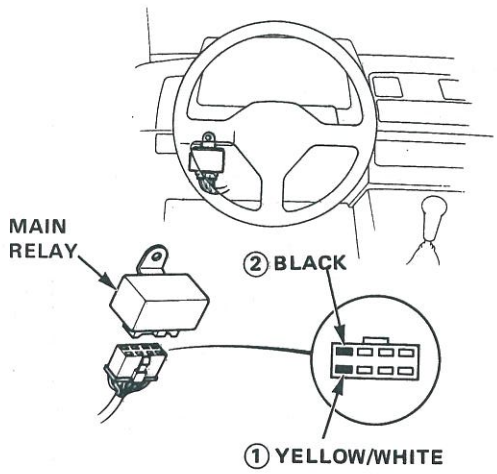
   - If there is continuity, go on to step 4.
   - If there is no continuity, replace the relay and re-test.

4. Attach the battery positive terminal to the No. 3 terminal and 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 the fuel pump still does not work, go to Harness Testing in the next column.
   - If there is no continuity, replace the relay and re-test.

Harness Test

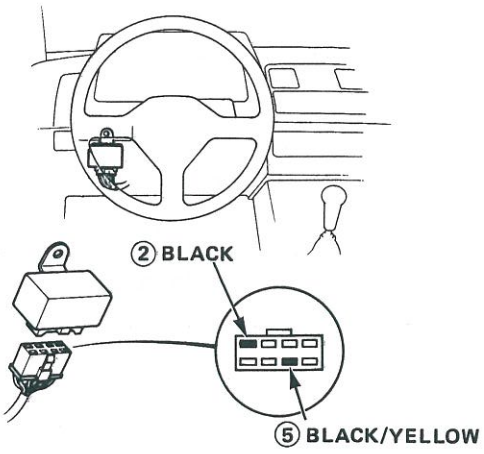
1. Keep the ignition switch in the OFF position.
2. Disconnect the main relay connector.
3. Check for continuity between the Black wire ② in the connector and body ground.
4. Attach positive probe of voltmeter to the Yellow/White wire ① and negative probe to the Black wire ②.



Battery voltage should be available.

- If there is no voltage, check the wiring between the battery and the main relay as well as fuse (15A).

5. Attach positive probe of voltmeter to the Black/Yellow wire ⑤ and negative probe to the Black wire ② .



6. Turn the ignition switch ON.

Battery voltage should be available.

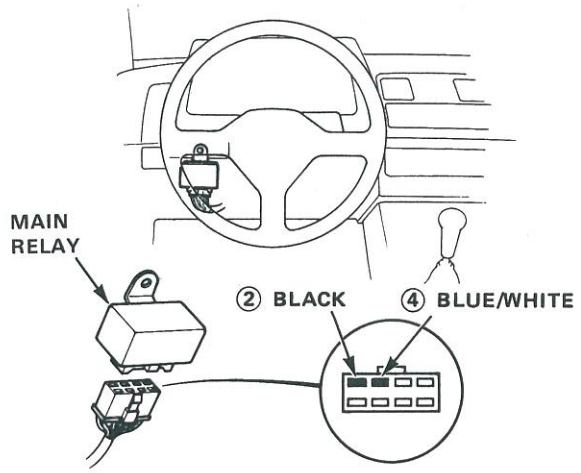
- If there is no voltage, check the wiring between the ignition switch and the main relay as well as No. 4 fuse (10 A).

(cont'd)

Main Relay

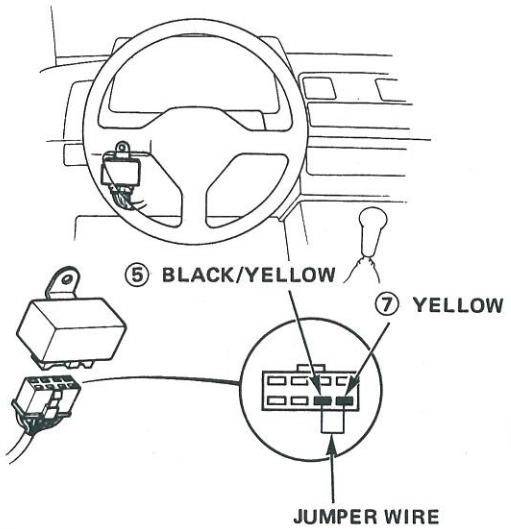
Harness Test (cont'd)

7. Attach positive probe of voltmeter to the Blue/White wire ④ and negative probe to the Black wire ②.



8. Turn the ignition switch to START position.
   The tester should indicate battery voltage.
   - If there is no voltage, check the wiring between the ignition switch and main relay as well as fuse (7.5A).

9. Connect a jumper wire between the Black/Yellow wire ⑤ and Yellow wire ⑦ in the connector.

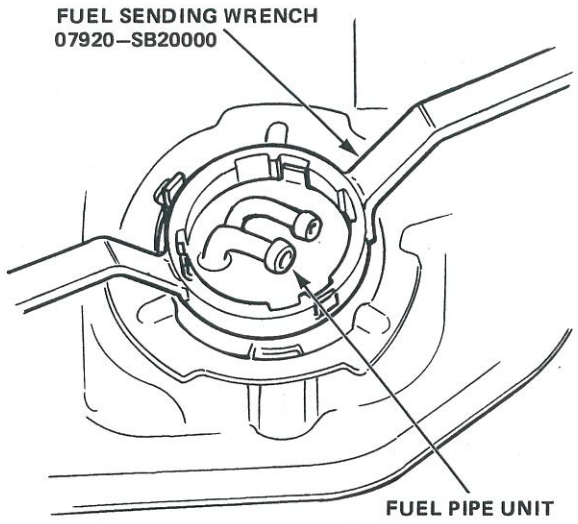


10. Turn the ignition switch ON.
    The fuel pump should work.
    - If the fuel pump does not work, check the wiring between the battery and fuel pump and the wiring from the fuel pump to the ground (Black wire).

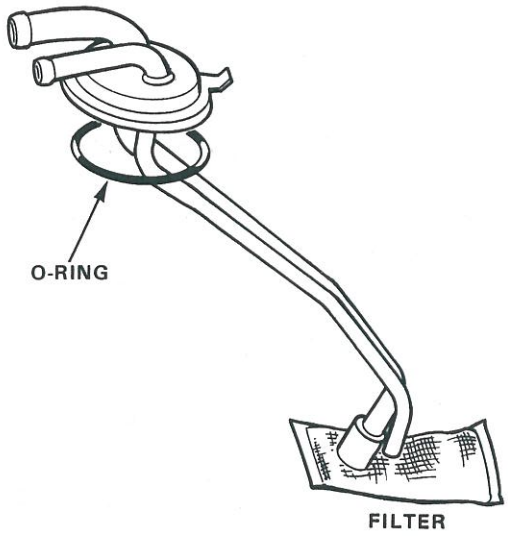
Fuel Pipe Unit

Replacement

1. Remove the fuel tank (page 11-63).
2. Remove the fuel pipe unit.



3. Clean the filter at the end of the pipe unit.
4. Apply a thin layer of white grease to the new o-ring before installation.



Fuel Tank

Replacement

WARNING

- **Do not smoke while working on fuel system. Keep open flame away from work area.**
- **Block front wheels bofore jacking up rear of car.**

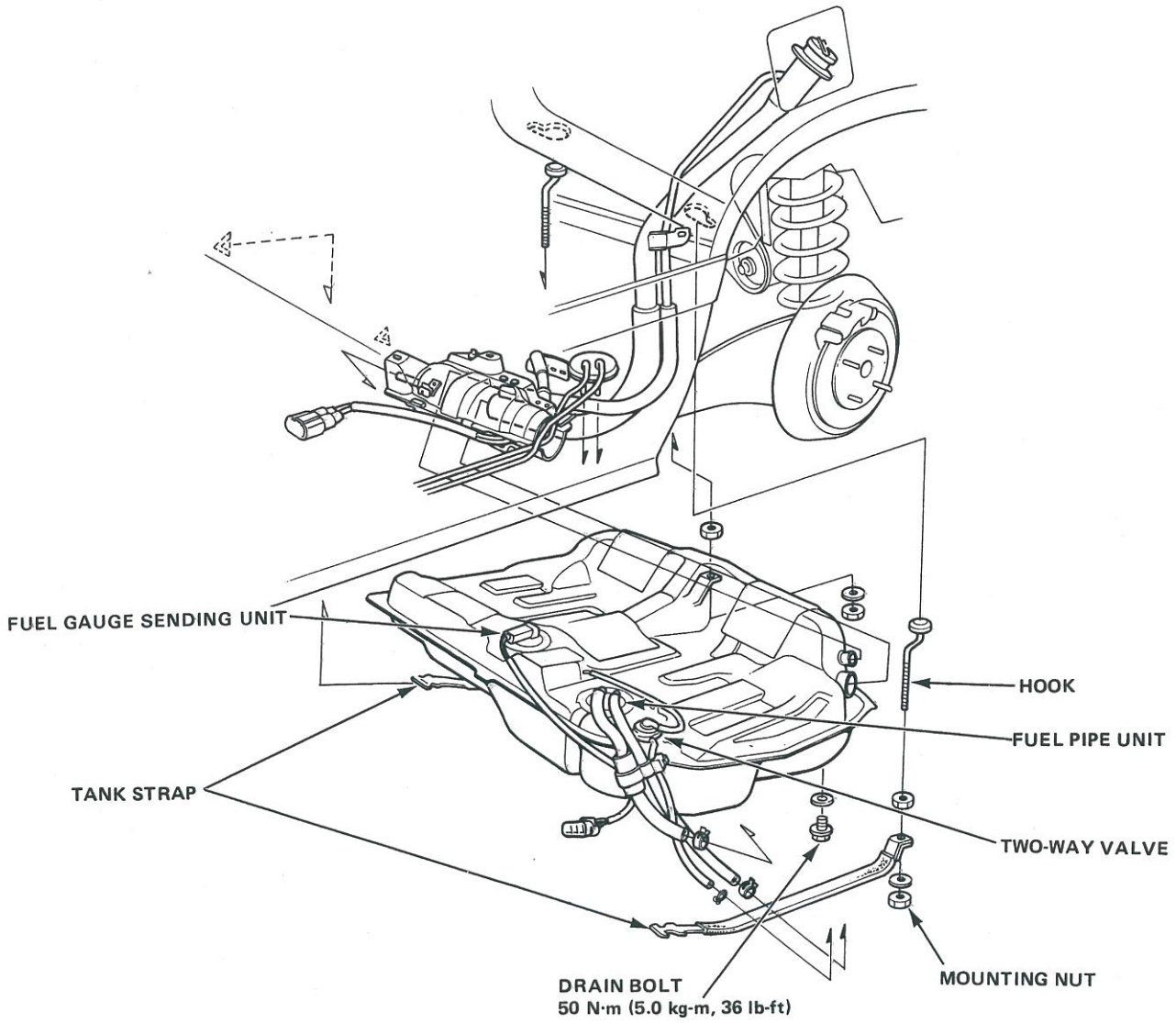
1. Raise rear of the car and place jackstands in the proper locations.
2. Remove the drain bolt and drain the fuel into an approved container.
3. Remove the fuel pump cover.
4. Disconnect the sending unit connectors.
5. Disconnect the hoses.

CAUTION: When disconnecting the hoses, slide back the clamps, then twist hoses as you pull, to avoid damaging them.

6. Place a jack, or other support, under the tank.
7. Remove the strap nuts and let the straps fall free.
8. Remove the fuel tank.

NOTE; The tank may have stack on the undercoat applied to its mount. To remove carefully pry it off the mount.

9. Install a new washer on the drain bolt, then install parts in the reverse order of removal.



Air Intake System

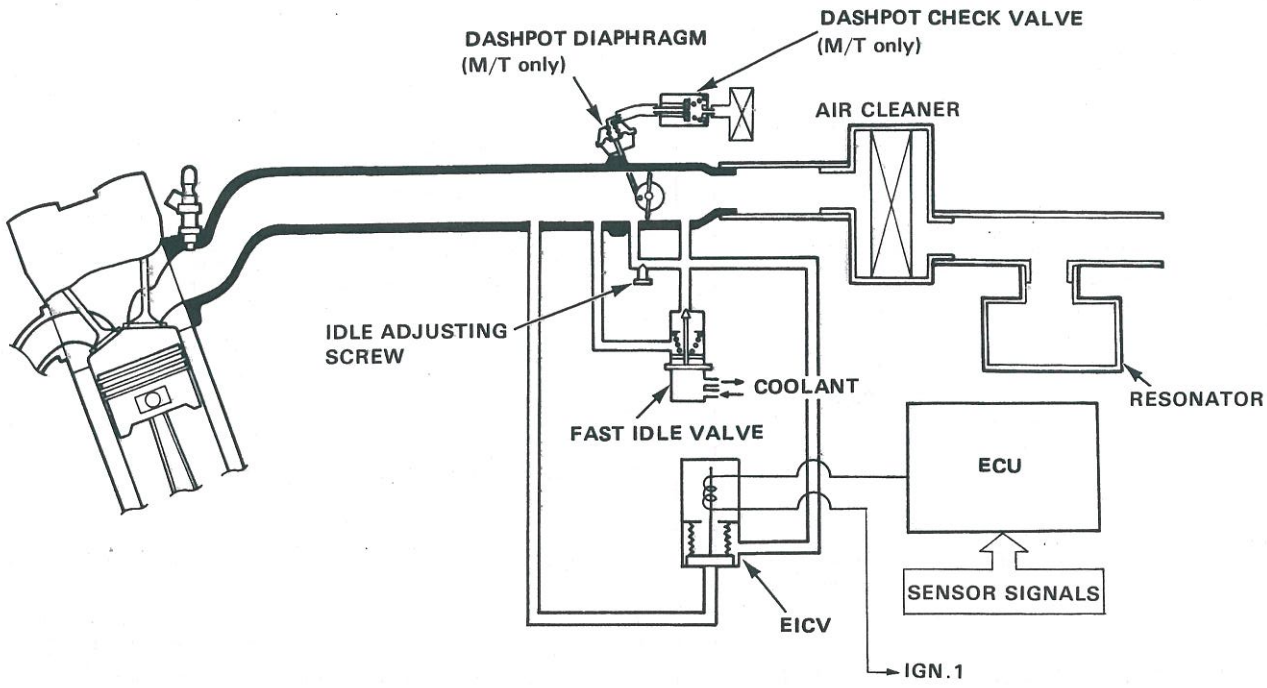
Symptom-to-Sub System Chart

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.

PAGE / SUB SYSTEM / SYMPTOM		THROTTLE CABLE	THROTTLE BODY	DASHPOT SYSTEM (M/T only)
		66	67	69
WARM ENGINE	IDLE SPEED OUT OF SPECIFIED 800±50 rpm	①	②	

Description

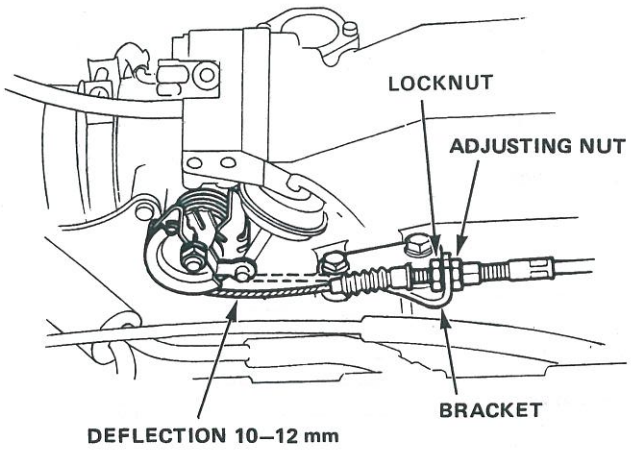
The system supplies air for all engine needs. It consists of the air cleaner, air intake pipe, throttle body, EICV, fast idle mechanism, and intake manifold. A resonator in the air intake pipe provides additional silencing as air is drawn into the system.



Throttle Cable

Inspection/Adjustment

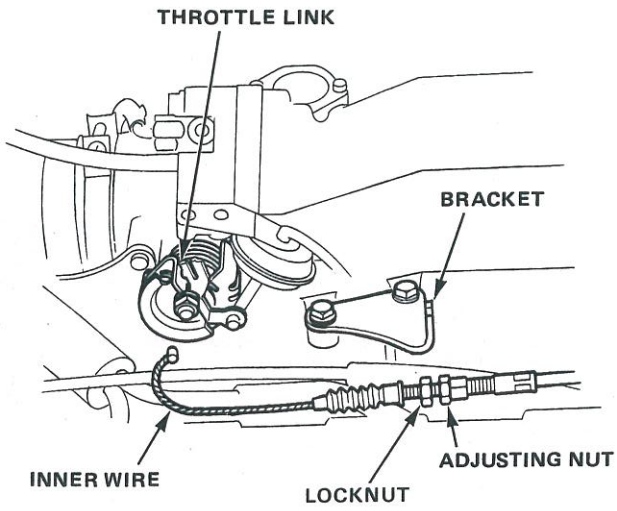
1. Check that the throttle cable operates smoothly with no binding or sticking. Repair as necessary.
2. Check cable free play at the throttle linkage. Cable deflection should be 10–12 mm (0.39–0.47 in.).



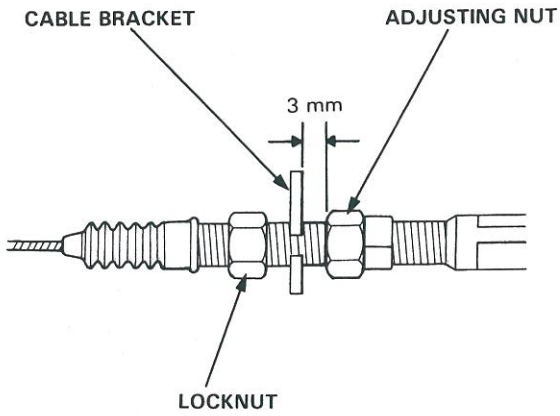
3. If deflection is not within specs, loosen the locknut and turn the adjusting nut until the deflection is as specified.
4. With the cable properly adjusted, check the throttle valve to be sure it opens fully when you push the accelerator pedal to the floor. Also check the throttle valve to be sure it returns to the idle position whenever you release the accelerator.

Replacement

1. Loosen the locknut and remove the throttle cable from the bracket.
2. Remove the cable from the throttle linkage.



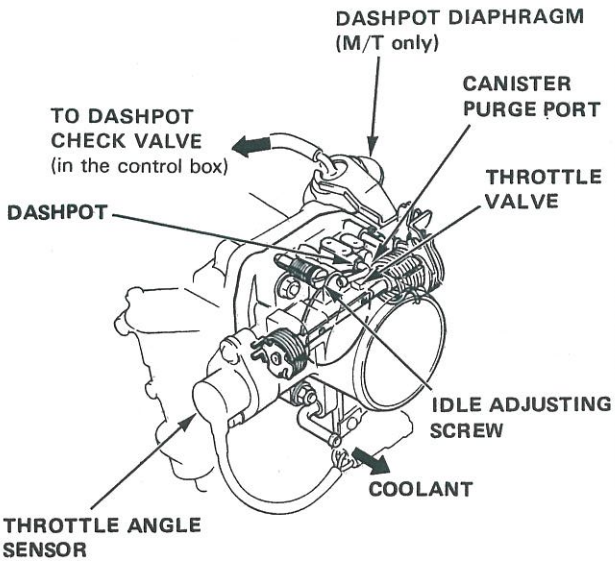
3. Hold the cable sheath, removing all slack from the cable.
4. Turn the adjusting nut until it is 3 mm away from the cable bracket.
5. Tighten the locknut. The cable deflection should now be 10–12 mm. If not, see Inspection/Adjustment.



Throttle Body

Description

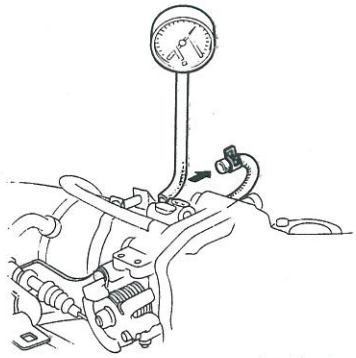
The throttle body is a single-barrel side-draft type. The lower portion of the throttle valve is heated by engine coolant which is led from the cylinder head. The idle adjusting screw which increases/decreases bypass air and the canister/purge port are located on the top of the throttle body. On cars equipped with a manual transmission, a dashpot is used to slow the throttle as it approaches the closed position.



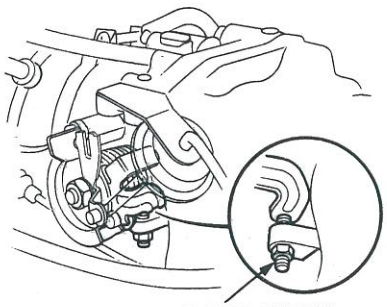
Inspection

CAUTION: Do not adjust the throttle stop screw since it cannot be reset except at the factory.

1. Start the engine and allow 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.



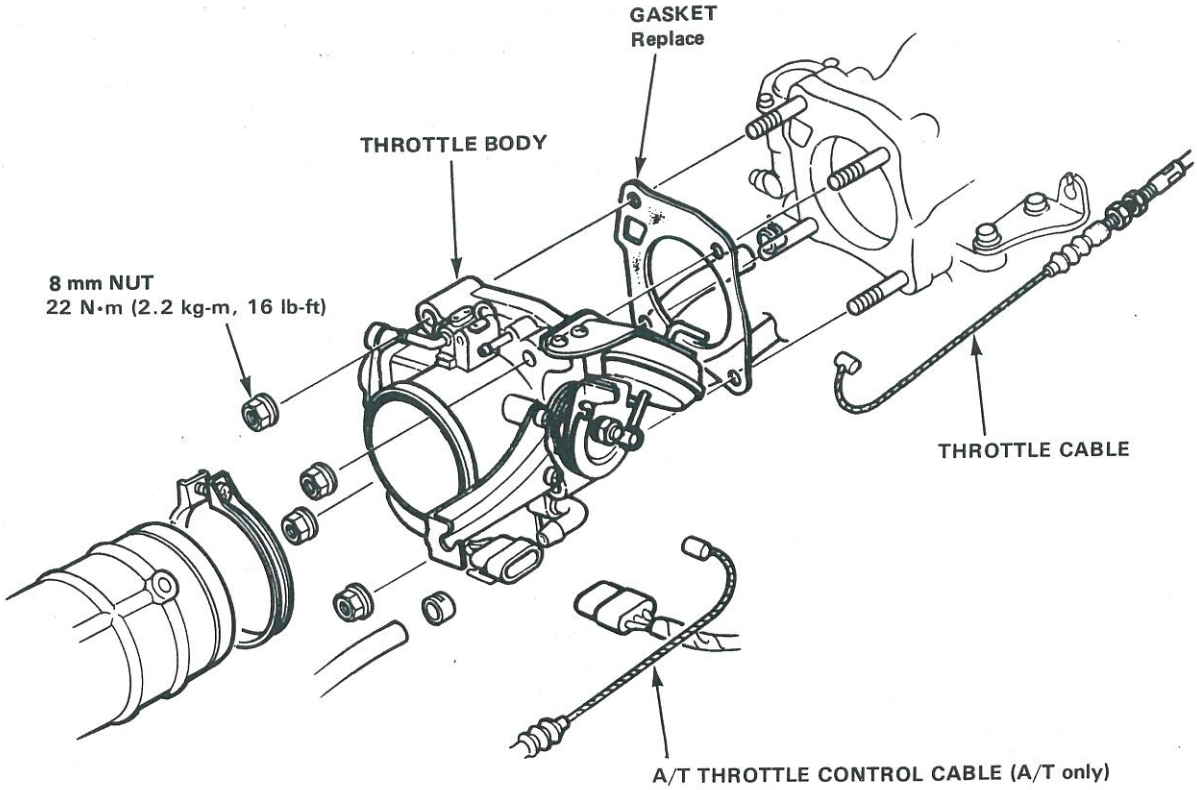
3. Allow the engine to idle and check that the gauge indicates no vacuum.
4. Check that vacuum is indicated on the gauge when the throttle is opened slightly from idle.
   - If the gauge indicates no vacuum, check the canister port. If the canister port is clogged, clean it with carburetor cleaner.
5. 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.



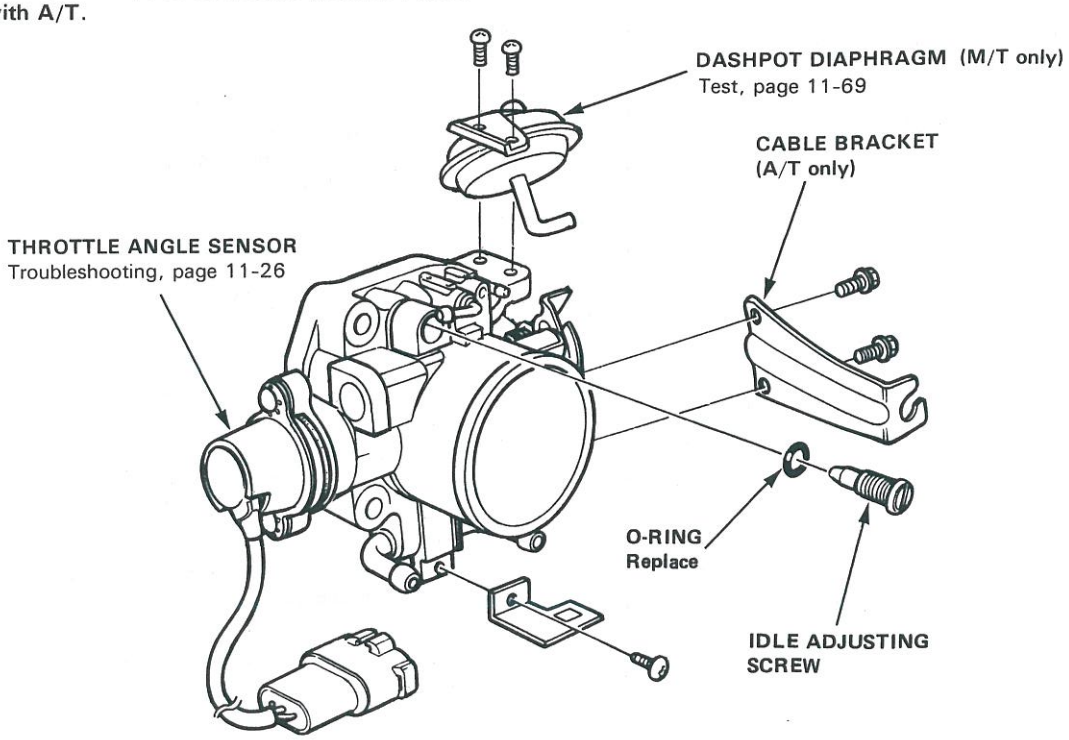
Replace the throttle body if there is excessive play in the throttle valve shaft or if the shaft is binding or sticking.

Throttle Body

Disassembly



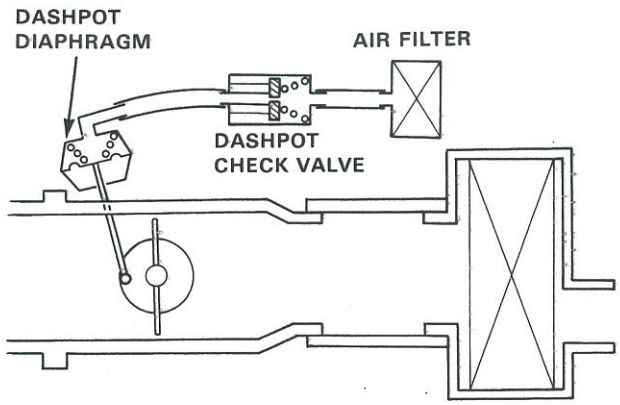
CAUTION:
- The throttle stop screw is non-adjustable.
- After reassembly, adjust the throttle cable (page 11-65), and A/T throttle control cable (section 14) for the car with A/T.



Dashpot System

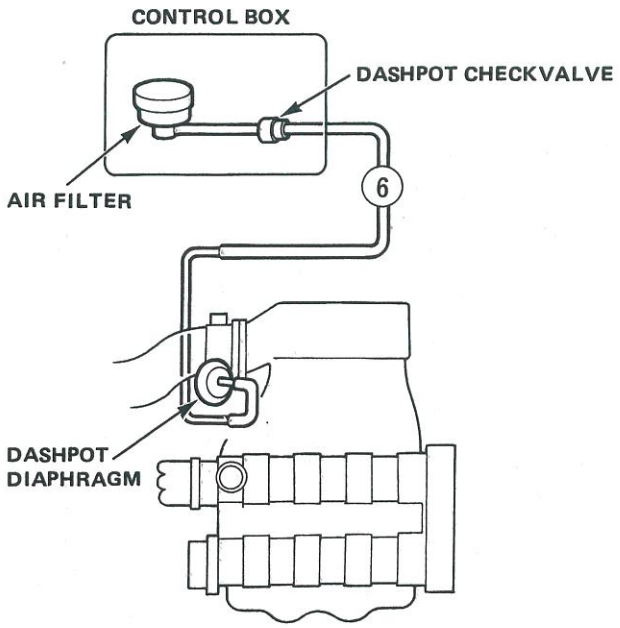
Description

The dashpot is employed to slow the closing of the throttle valve when it is suddenly closed during gear shifting or deceleration.

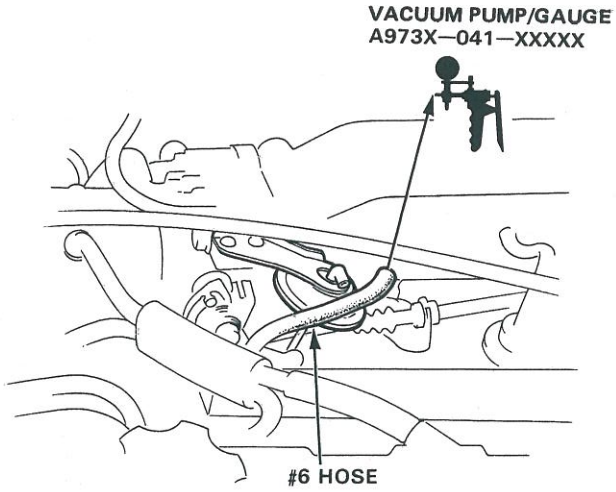


Test

1. Check the vacuum line for proper connection, leaks, crack or clogging.



2. Disconnect #6 vacuum hose from the dashpot diaphragm, and connect vacuum pump to the hose.



3. Apply the vacuum and check the vacuum goes out slowly.

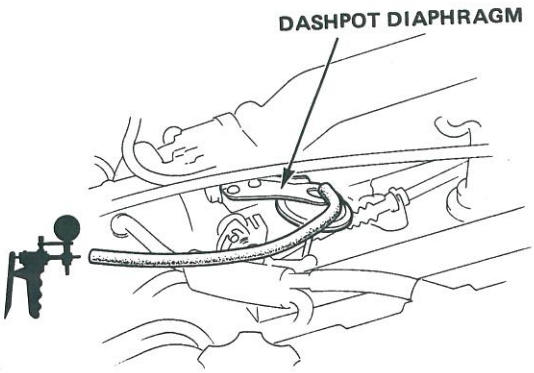
   - If the vacuum holds or goes out quickly, replace the dashpot check valve and re-test.

(cont'd)

Dashpot System

Test (cont'd)

4. Connect a vacuum pump to the dashpot diaphragm.



5. Apply the vacuum and check that the rod pulls in and vacuum holds.

   - If the vacuum does not hold or the rod does not move, replace the dashpot diaphragm, and re-test.

Emission Control System

Symptom-to-Sub System Chart

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 system 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.

SUB SYSTEM / PAGE / SYMPTOM	CATALYTIC CONVERTER	POSITIVE CRANKCASE VENTILATION SYSTEM	EVAPORATIVE EMISSION CONTROLS
	73	74	75
LOSS OF POWER	①		
FAILS EMISSION TEST	①		②
IDLE SPEED ABOVE 850 rpm		①	

Emission Control System

Description

The emission control systems include a three-way catalytic converter, crankcase ventilation system and evaporative control systems, and are designed to meet federal and state emission standerds.

Tailpipe Emission

Inspection

WARNING **Do not smoke during this procedure. Keep any open flame away from your work area.**

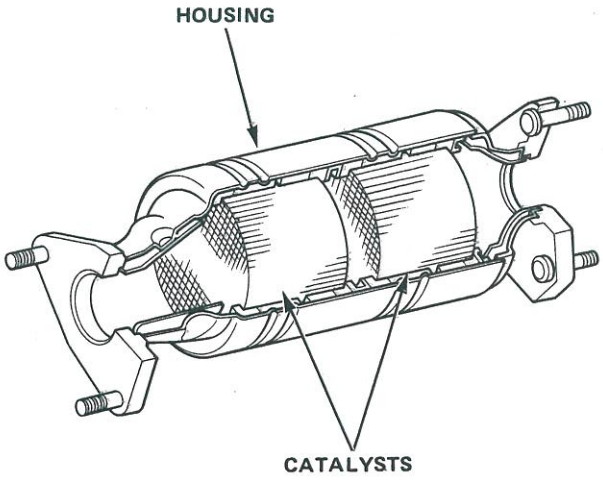
1. Start the engine and warm up to normal operating temperature (cooling fan comes on).
2. Connect tachometer.
3. Check idle speed and adjust the idle speed, if necessary (page 11-49).
4. Warm up and calibrate the CO meter according to the meter manufacturer's instructions.
5. Check idle CO with the headlights, heater blower, rear window defogger, cooling fan, and air conditioner off.

   CO meter should indicate 0.1% maximum.

Catalytic Converter

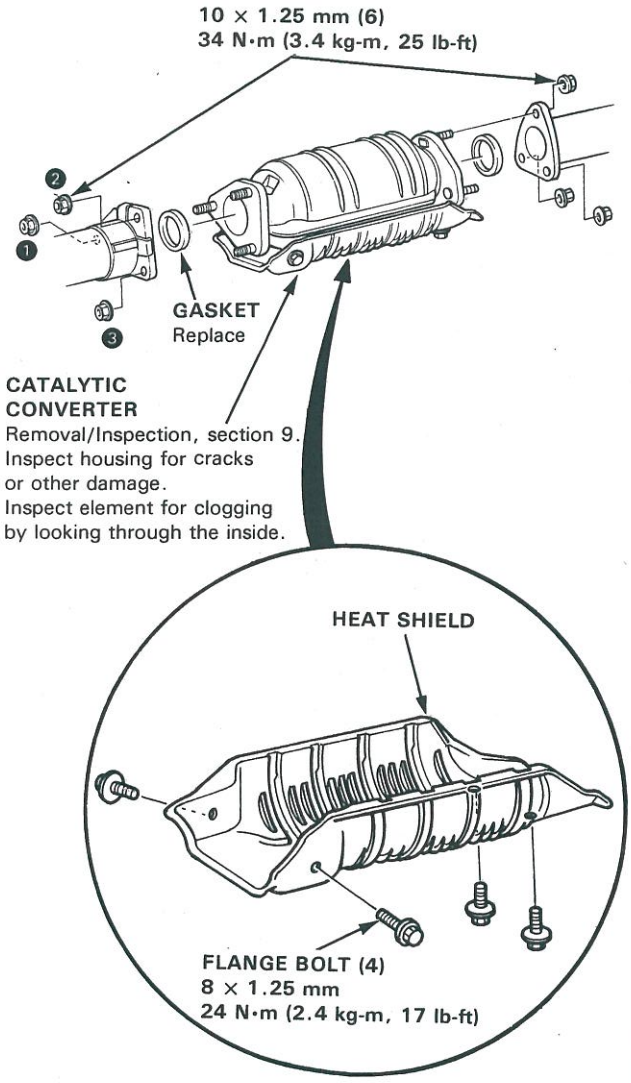
Description

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 (CO_2), dinitrogen (N_2) and water vapor.



Inspection

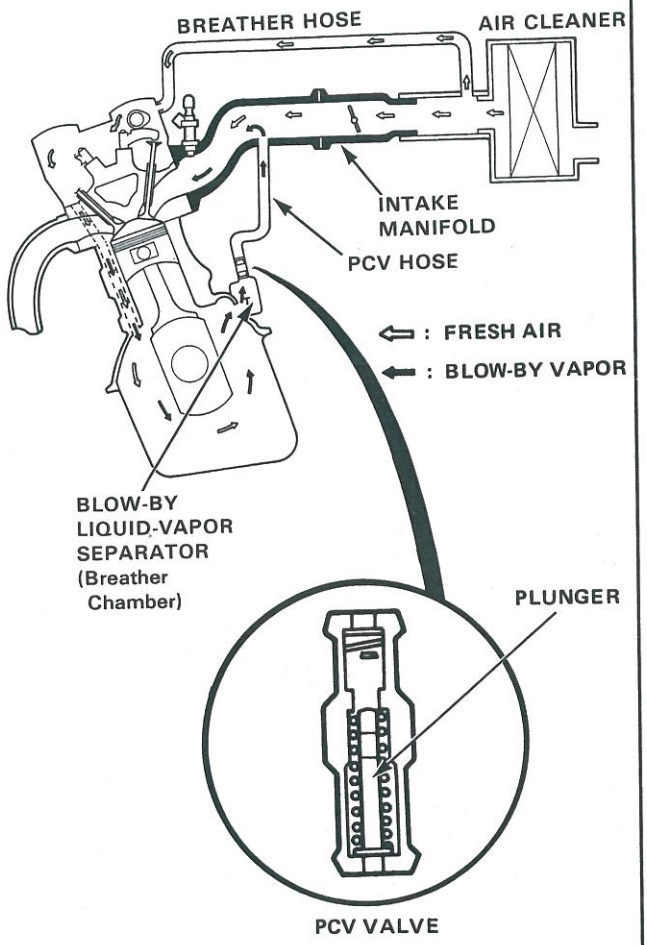
If excessive exhaust system back-pressure is suspected, remove the catalytic converter from the car and make a visual check for plugging, melting or cracking of the catalyst. Replace the catalytic converter if more than 50% of the visible area is damaged or plugged.



Positive Crankcase Ventilation System

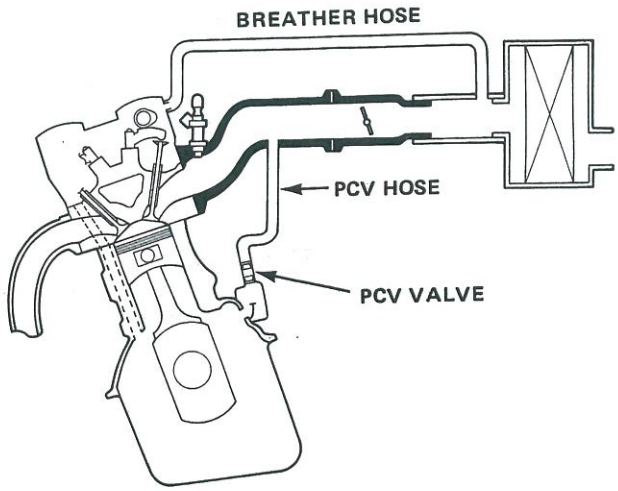
Description

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.

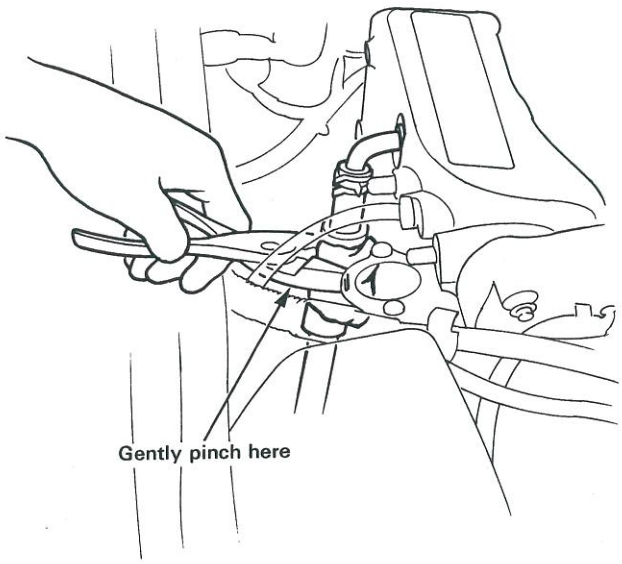


Test

1. Check the crankcase ventilation hoses and connections for leaks and clogging.



2. At idling, 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 re-check.

Evaporative Emission Controls

Description

The evaporative controls are designed to minimize the amount of the fuel vapor escaping to the atmosphere. The system consists of the following components:

A. Charcoal Canister

A canister 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

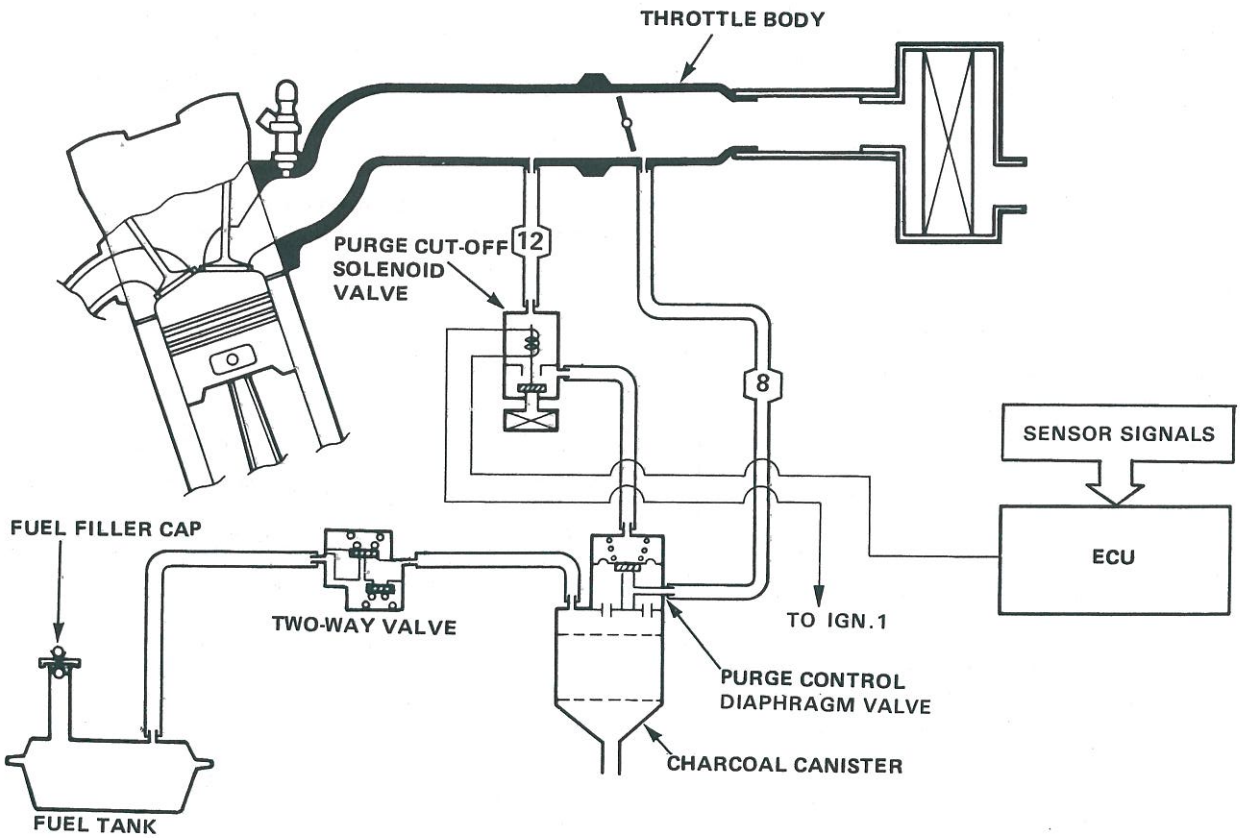
Canister purging is accomplished by drawing flesh air through the canister and into a port on the throttle body. The ported vacuum is controlled by the Purge Control Valve.

When the coolant temperature is above 65°C (149°F), the purge cut-off solenoid valve directs manifold vacuum to the purge control valve.

When the coolant temperature is below 65°C (149°F), the purge cut-off solenoid valve does not provide mainfold vacuum to the purge control valve.

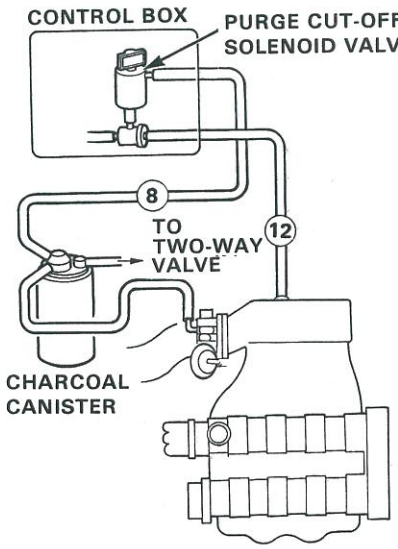
C. Fuel Tank Vapor Control System

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.

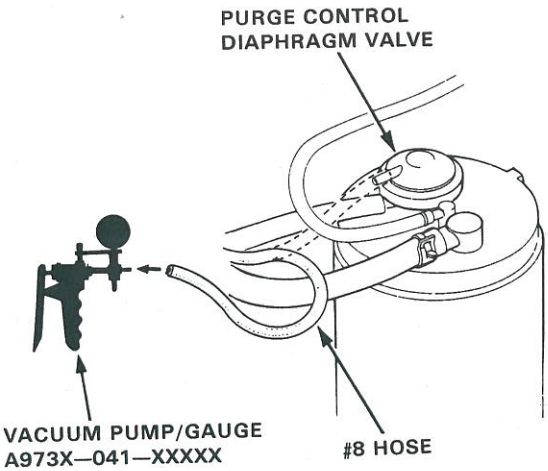


Test

1. Check the vacuum line for proper connection, cracks, blockage, or disconnected hose.



2. Disconnect #8 vacuum hose at the purge control diaphragm valve (on the charcoal canister) and connect vacuum gauge to the hose.



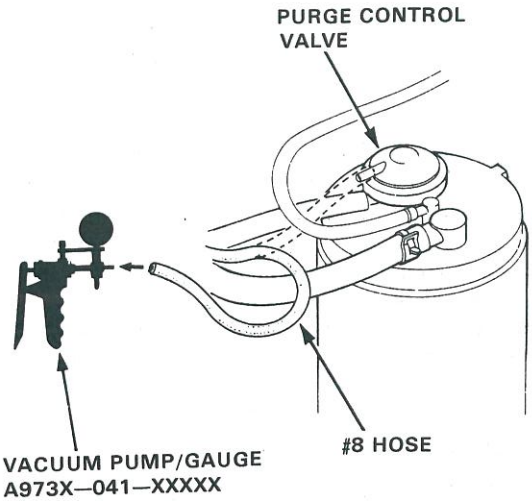
3. Start the engine and allow to idle.

   NOTE: Engine coolant temperature must be below 65°C (149°F).

   There should be no vacuum.

   - If there is vacuum, go to the purge cut-off solenoid valve test I (page 11-79).
   - If there is no vaccum, disconnect the vacuum gauge and reconnect the hose.

4. Warm up the engine to normal operating temperature (the cooling fan comes on).



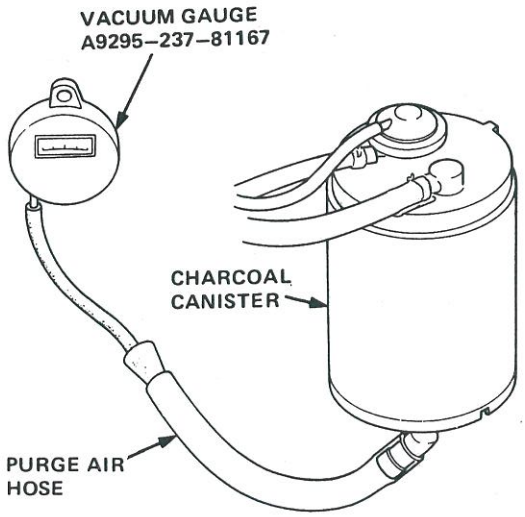
   There should be vacuum at idle, 5 seconds after starting the engine.

   - If there is no vacuum, go to the purge cut-off solenoid valve test II (page 11-79).

5. Disconnect vacuum gauge and reconnect hose.

6. Remove fuel filler cap.

7. Remove canister purge air hose from frame and connect hose to vacuum gauge as shown.



8. Start engine and raise speed to 3,500 rpm. Vacuum should appear on gauge within 1 minute.

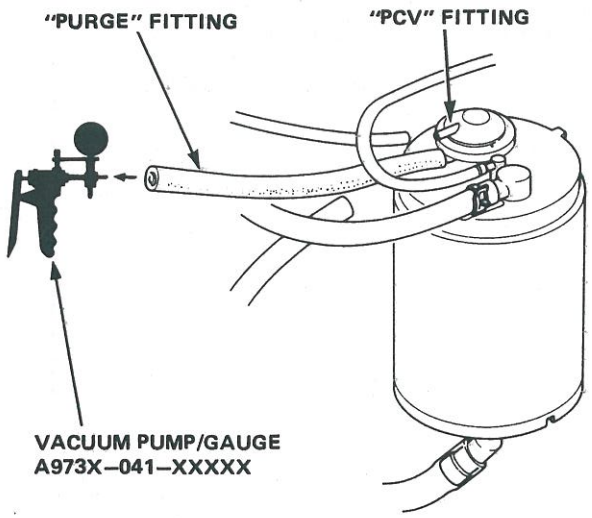
   - If vacuum appears on gauge in 1 minute, remove gauge, test is complete.
   - If no vacuum, disconnect vacuum gauge and re-install fuel filler cap.

9. Remove charcoal canister and check for signs of damage or defects.

   - If defective, replace canister.
   - If OK, go on to Step 10.

10. Stop engine. Disconnect 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 re-test.

11. Restart engine. Reconnect hose to canister "PCV" fitting.

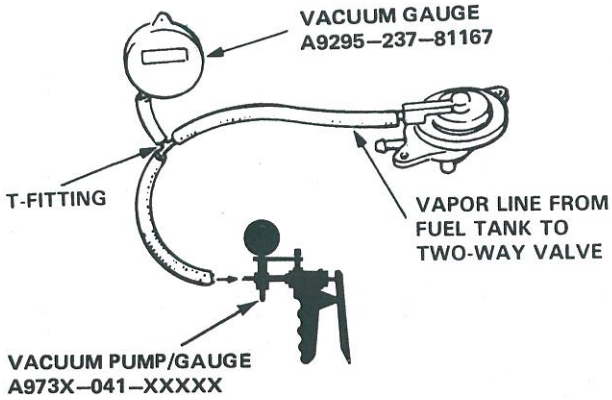
    "PURGE" side vacuum should drop to zero.

   - If "PURGE" side vacuum does not drop to zero, replace the canister.

Two-way Valve

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.

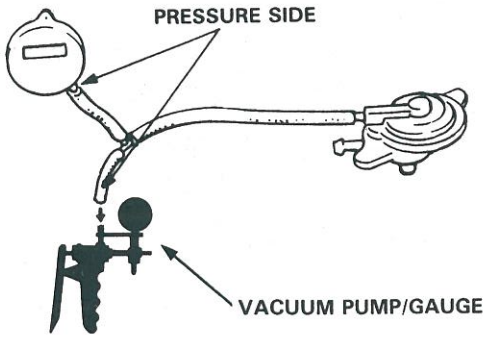


3. Slowly apply a vacuum while watching the gauge.

   Vacuum should stabilize 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 re-test.

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.

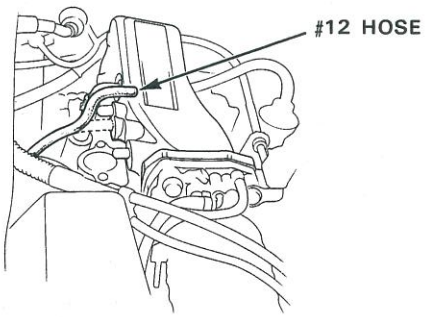
   Pressure should stabilize at 25 to 55 mmHg (1.0 to 2.2 in.Hg).

   - If pressure momentarily stabilizes (valve opens) at 25 to 55 mmHg (1.0 to 2.2 in.Hg), the valve is OK.
   - If pressure stabilizes below 25 mmHg (1.0 in.Hg) or above 55 mmHg (2.2 in.Hg), install a new valve and re-test.

Solenoid Valve Test

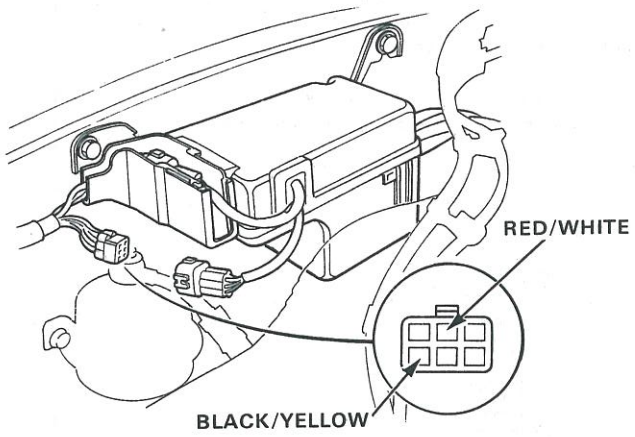
Test I:

1. Start the engine and allow to idle.
   NOTE; Engine coolant temperature must be below 65°C (149°F).
2. Disconnect # 12 vacuum hose from the intake manifold and check the vacuum.



- If there is no vacuum, check the vacuum port.
- If there is vacuum, check the vacuum line for proper connection, cracks, blockage or disconnected hose. If the vacuum line is OK, re-connect the hose.

3. Disconnect the 6-P connector.
4. Attach the positive probe of the voltmeter to Black/Yellow terminal, and the negative probe to Red/White terminal.

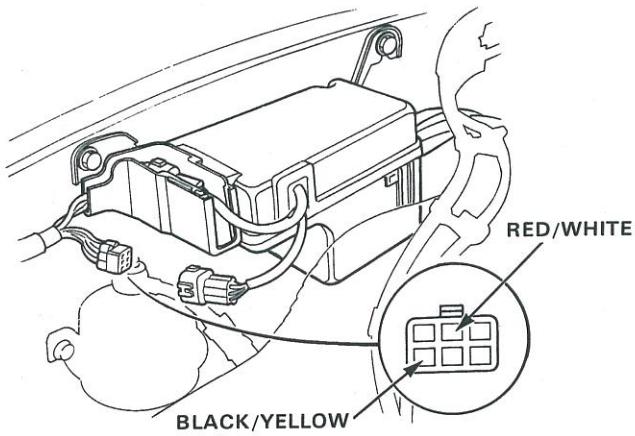


- If there is voltage, replace the solenoid valve and re-test.
- If there is no voltage, attach the positive probe of the voltmeter to Black/Yellow terminal of the connector, and negative probe to body ground. Check the voltage.

— If there is no voltage, repair open in Black/Yellow wire between the solenoid valve and NO.4 fues (10A).
— If there is voltage, inspect open in Red/White wire between the solenoid valve and ECU. If wire is OK, see ECU troubleshooting (page 11-8).

Test II:

1. Start the engine and warm up the engine to normal operating temperature (the cooling fan comes on).
2. Disconnect the 6-P connector.
3. Attach the positive probe of the voltmeter to Black/Yellow terminal, and the negative probe to Red/White terminal. Check for voltage 5 seconds after starting the engine.



- If there is voltage, inspect short in Red/white wire between the solenoid valve and ECU.
  If wire is OK, see ECU troubleshooting (page 11-8).
- If there is no voltage, replace the solenoid valve and re-test.

Transaxle

Clutch

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Transmission

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Driveshafts

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Clutch

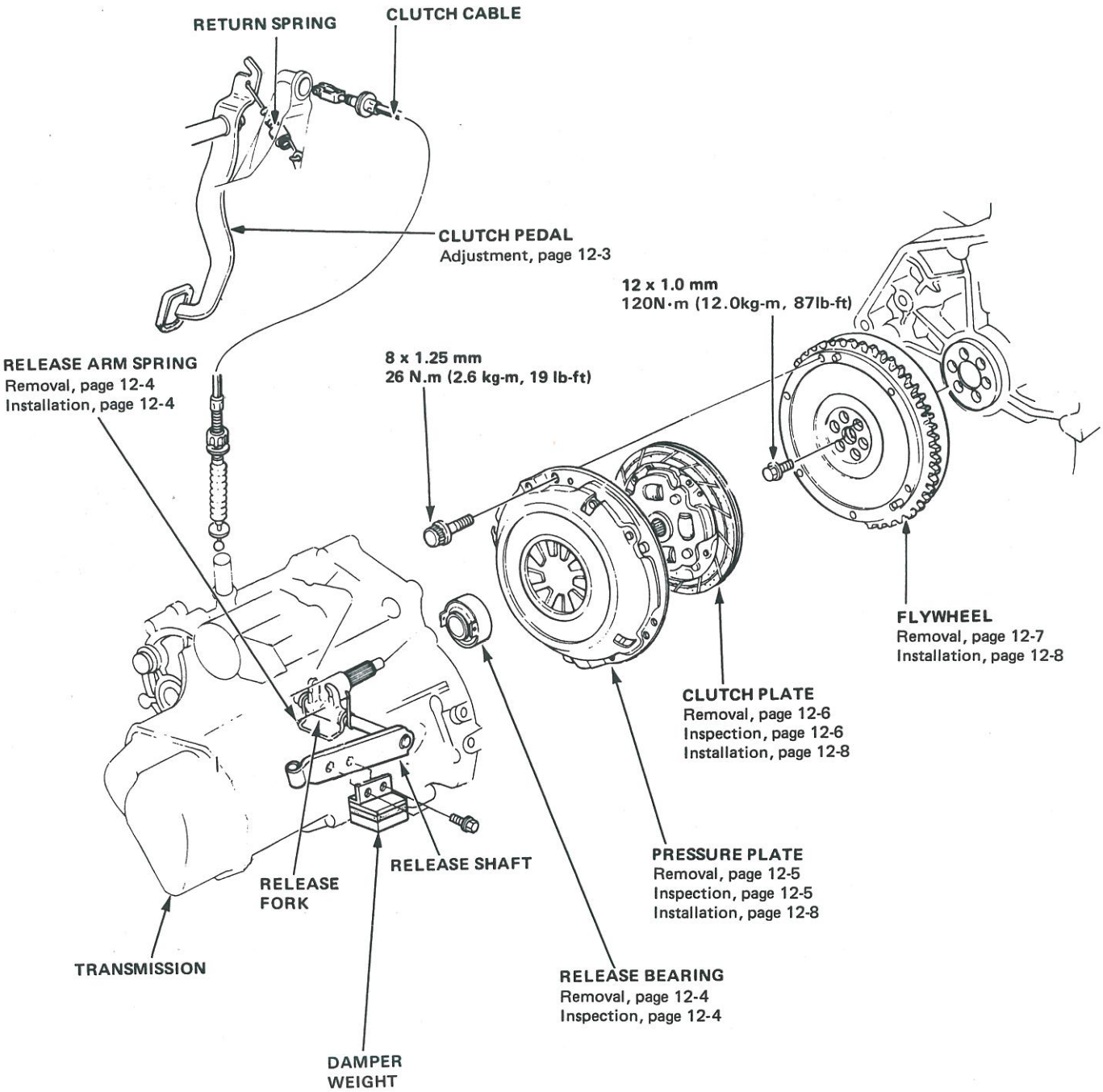
Illustrated Index 12–2
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Clutch

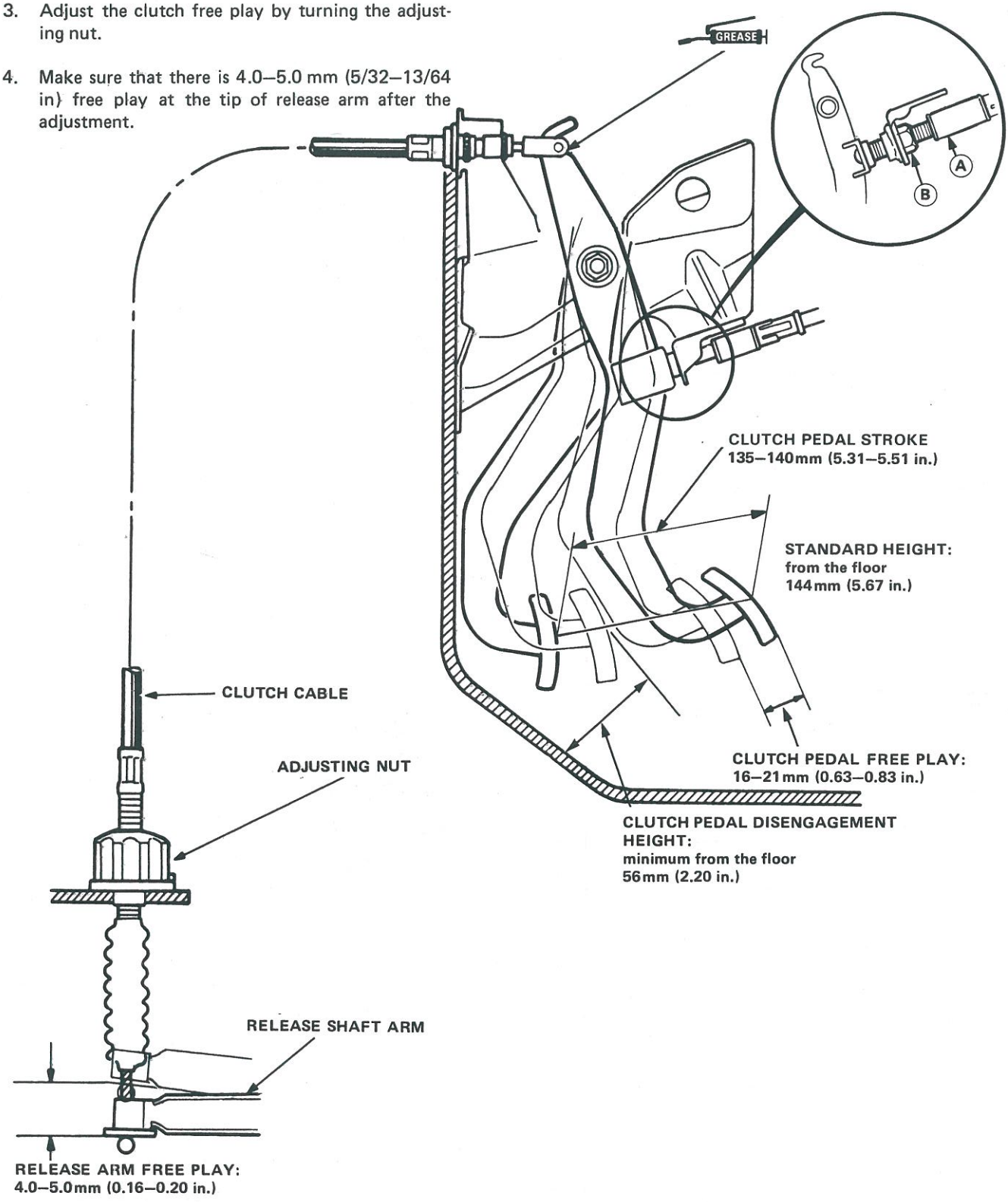
Illustrated Index

NOTE: Whenever the transmission is removed the release bearing sliding surface should be cleaned and greased.



Clutch Adjustment

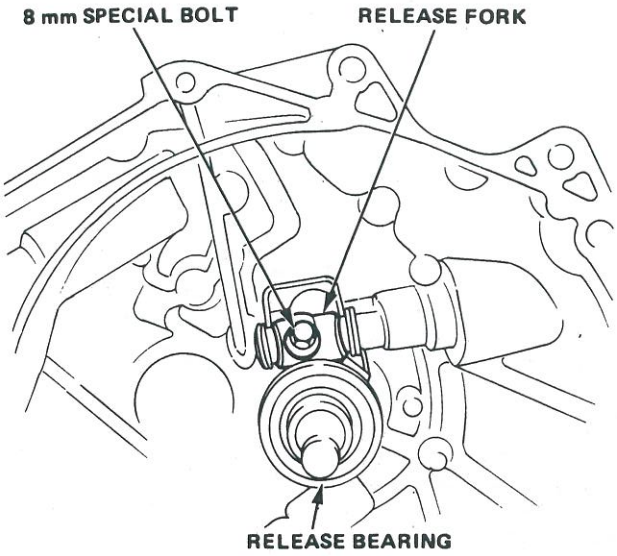
1. Measure the clutch pedal disengagement height.
2. Measure the clutch pedal free play.
3. Adjust the clutch free play by turning the adjusting nut.
4. Make sure that there is 4.0–5.0 mm (5/32–13/64 in) free play at the tip of release arm after the adjustment.
5. Cruise Control equiped car only:
   Turn the adjuster Ⓐ until the clutch pedal stroke is 135 to 140 mm (5.31—5.51 in.), then tighten the lock nut Ⓑ securely.



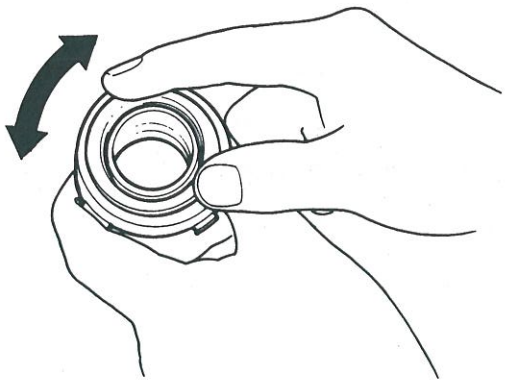
Release Bearing

Removal/Inspection

1. Remove 8 mm special bolt.



2. Remove the clutch release shaft and then remove the release bearing and release fork.
3. Separate the release bearing from the release fork.
4. Check release bearing for excessive play by spinning it by hand.

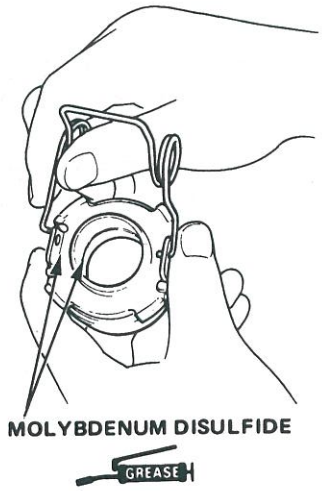


5. Replace bearing with new one if there is excessive play.

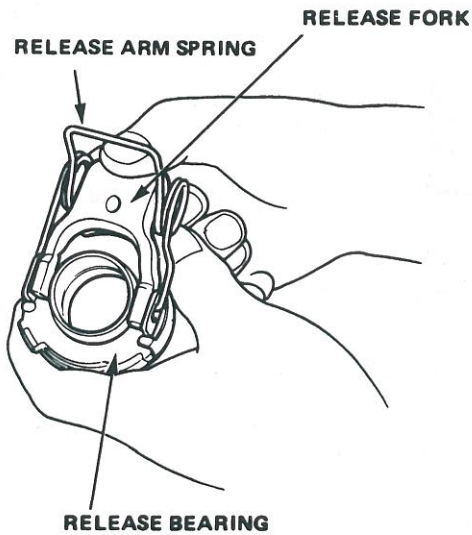
CAUTION: Bearing is packed with grease. Do not wash in solvent.

Installation

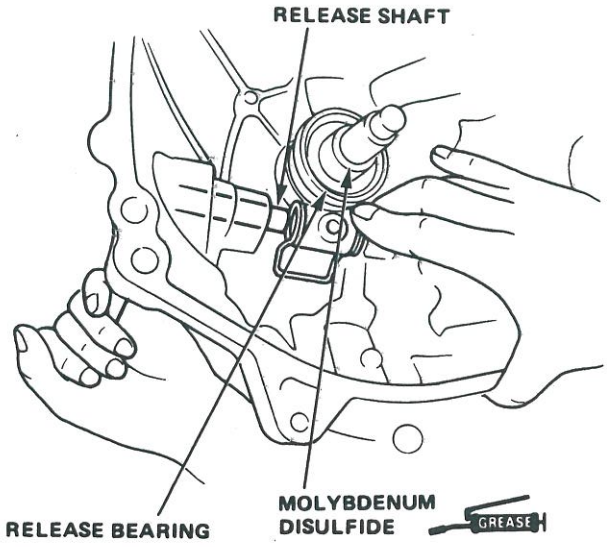
1. Apply grease to the grooves inside of the bearing and to the bearing contact surface with the release fork.



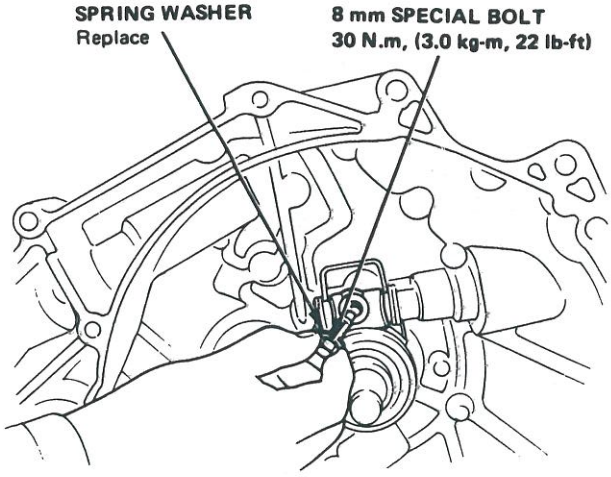
2. Install the release arm spring into the release fork tabs as shown.
3. Install the release fork onto the release bearing with its arms aligned with the tabs.



4. Slip the release bearing over the mainshaft, while holding the release arm spring as shown, then install the release shaft.



5. Align the hole on the release shaft with the one on the release fork then install the 8 mm special bolt and new spring washer.

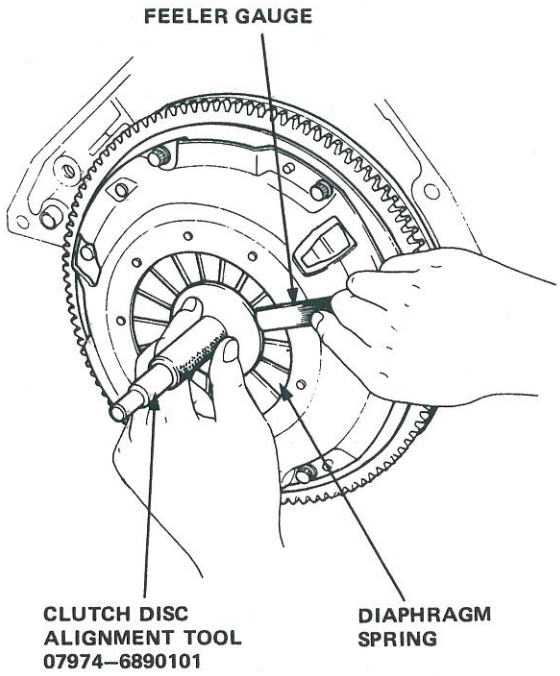


6. After installation, pull release arm up, then let it down, to be sure fork fits against bearing holder properly, and holder slides freely on sleeve.

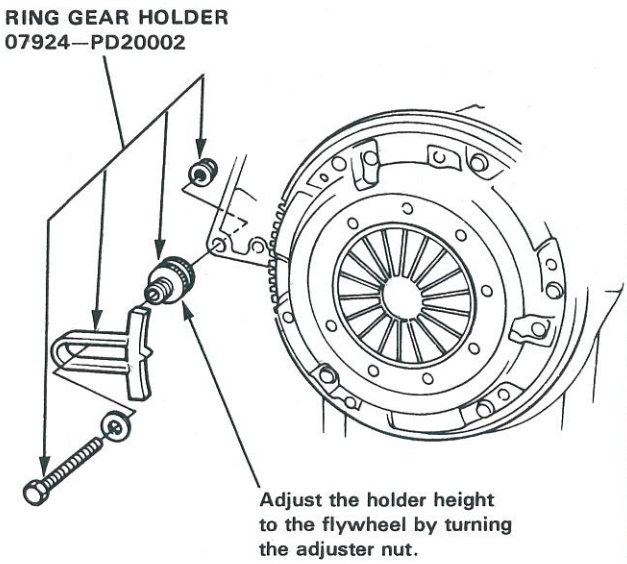
Removal/Inspection

1. Inspect the fingers of diaphragm spring for wear at release bearing contact area.
2. Check diaphragm spring leaves for height using Clutch Disc Alignment Tool and feeler gauge.

Diaphragn spring height:
Standard: 0.6 mm (0.024 in) Max.
Service limit: 1.0 mm (0.039 in)



3. Install Ring Gear Holder.

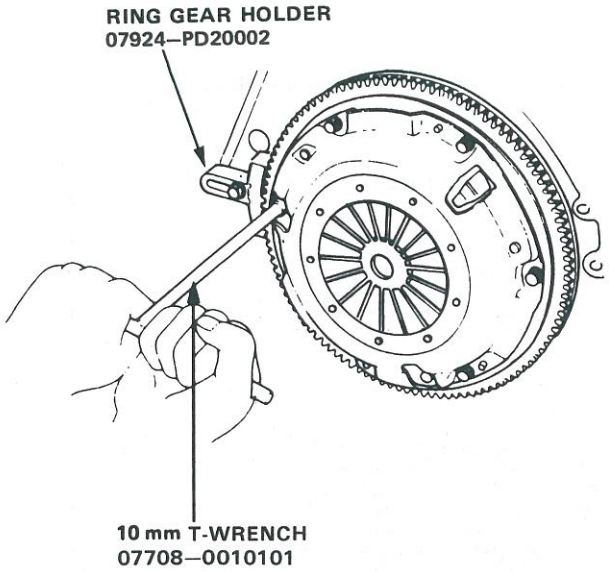


(cont'd)

Pressure Plate

Removal/Inspection(cont'd)

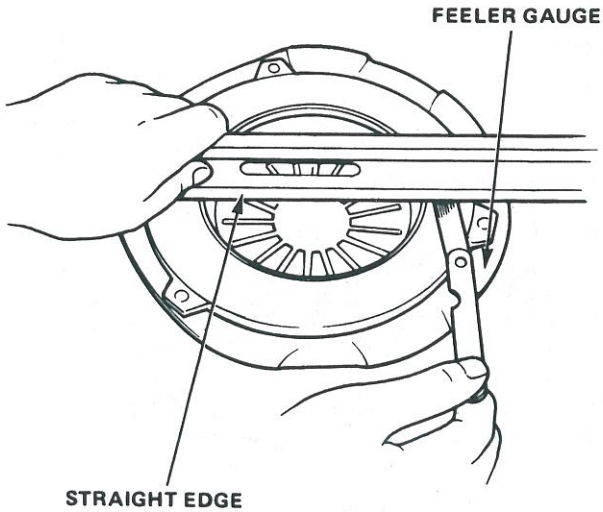
4. To prevent warping, unscrew pressure plate mounting bolts two turns at a time in a criss-cross pattern using a 10 mm T-wrench, then remove pressure plate and clutch plate.



5. Inspect pressure plate surface for wear, cracks, or burning.

6. Inspect for warpage using a straight edge and feeler gauge.

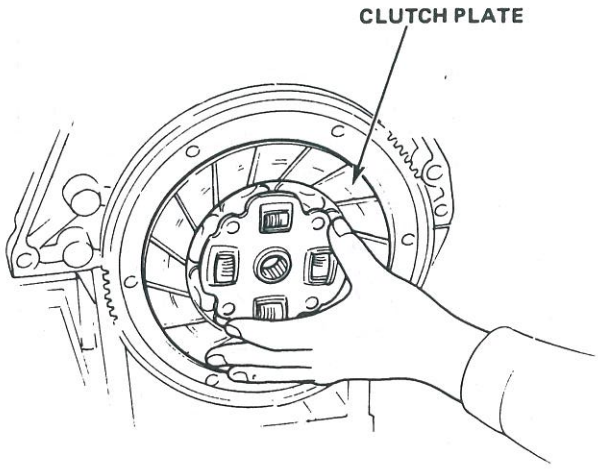
Standard: 0.03 mm (0.001 in.) max.
Service Limit: 0.15 mm (0.006 in.)



Clutch Plate

Removal/Inspection

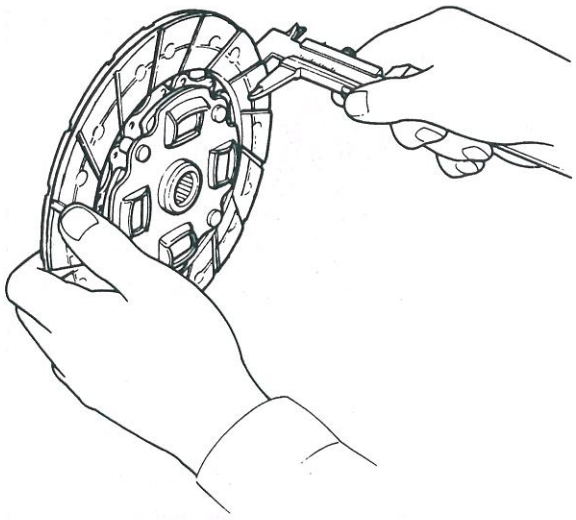
1. Remove clutch plate.



2. Inspect lining for signs of slipping or oil. Replace if burned black or oil soaked.

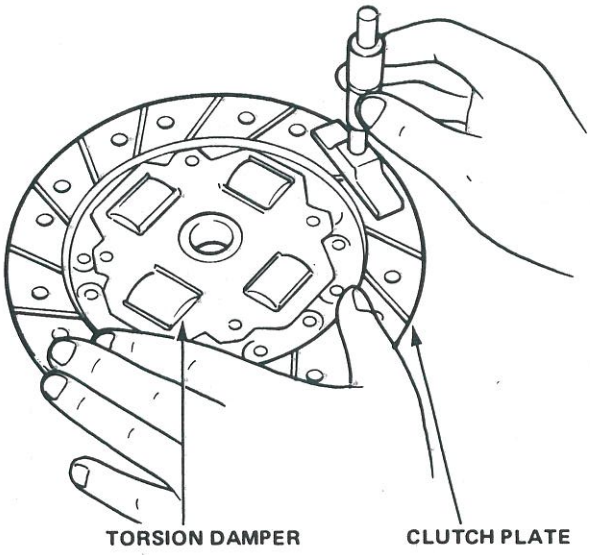
3. Measure clutch plate thickness.

Clutch Plate Thickness:
Standard: 8.1—8.8 mm (0.32—0.35 in.)
Service Limit: 5.7 mm (0.22 in.)



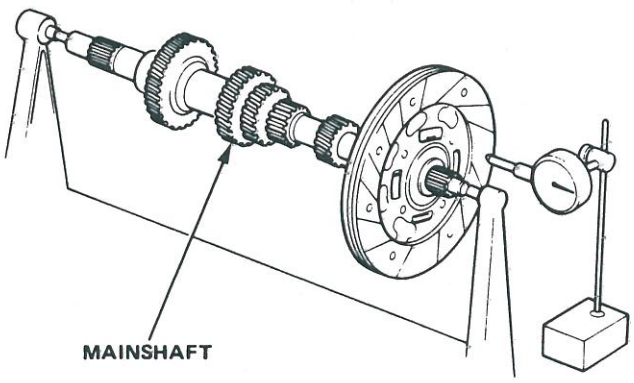
4. Check for loose rubber torsion dampers. Replace clutch plate if any are loose.
5. Measure depth from lining surface to rivets, on both sides.

Rivet Depth:
Standard (New): 1.3 mm (0.051 in.) min.
Service Limit: 0.2 mm (0.008 in.)



6. Measure the clutch plate runout with the mainshaft and a dial indicator.

Clutch plate runout:
Standard: 0.8 mm (0.031 in.) max.
Service Limit: 1.0 mm (0.039 in.)

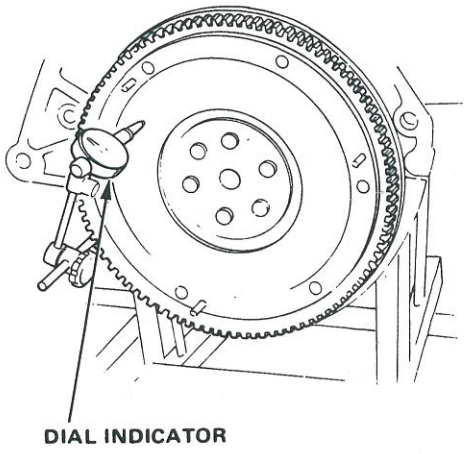


Inspection/Removal

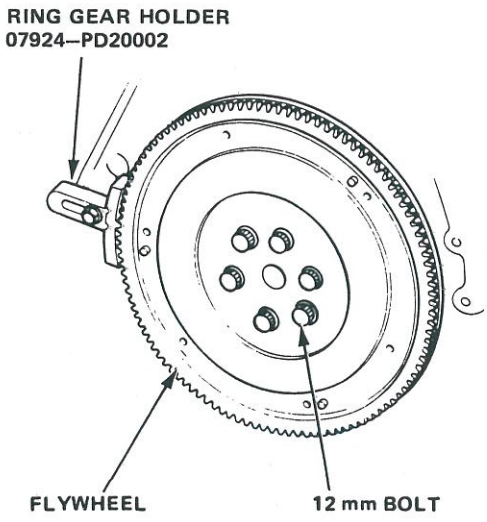
1. Inspect ring gear teeth for wear or damage.
2. Inspect clutch plate mating surface on flywheel for wear, cracks or burning.
3. Measure flywheel runout using dial indicator through at least two full turns. Push against flywheel each time you turn it to take up crankshaft thrust washer clearance.

NOTE: Runout can be measured with engine installed.

Flywheel Runout:
Standard (New): 0.05 mm (0.002 in.) max.
Service Limit: 0.15 mm (0.006 in.)



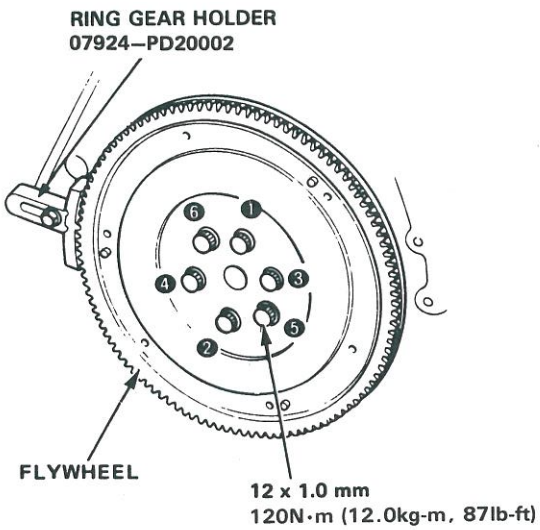
4. Remove six flywheel mounting bolts and flywheel.



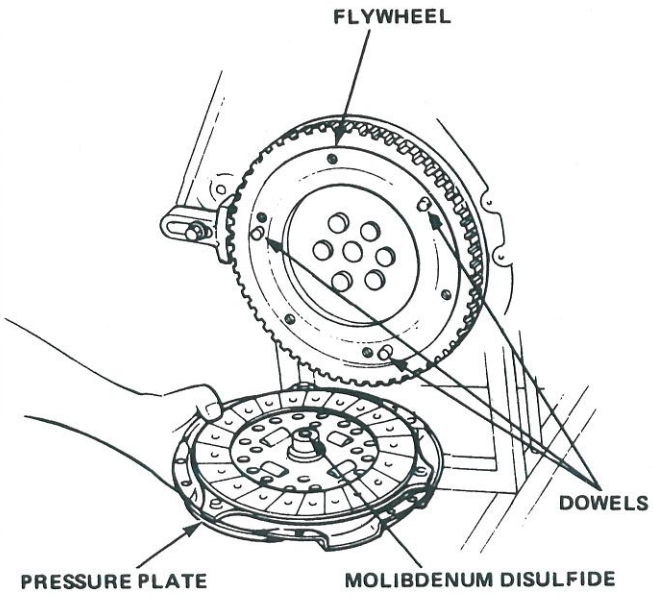
Pressure Plate/Clutch

Installation

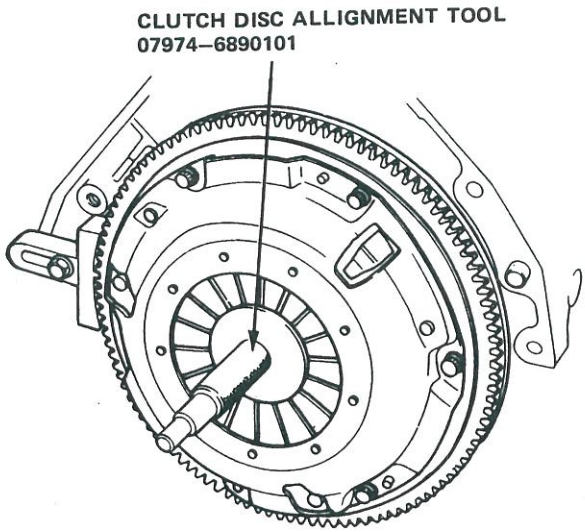
1. Align hole in flywheel with crankshaft dowel pin and assemble. Install bolts only finger tight.
2. Install Ring Gear Holder, then torque flywheel bolts in a criss-cross pattern.



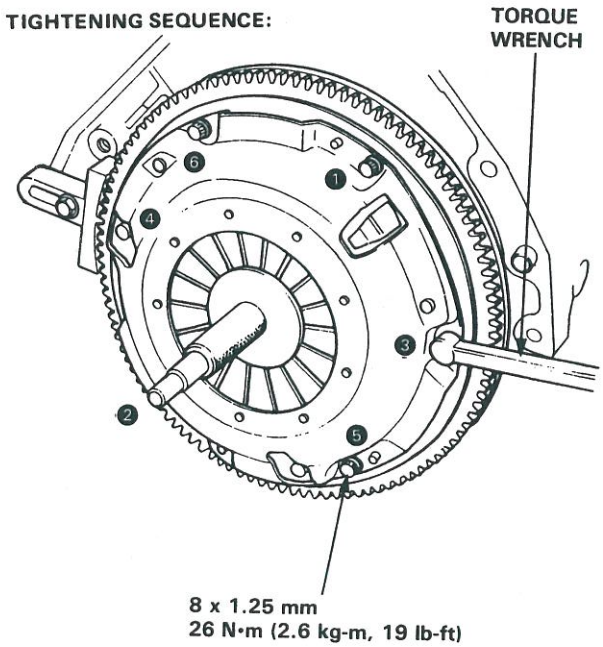
3. Install friction disc and pressure plate by aligning flywheel dowels with dowel holes in clutch cover.



4. Install attaching bolts but do not tighten the bolts at this time.
5. Insert Clutch Alignment Tool in spline hole in friction disc.



6. Torque the bolts in a criss-cross pattern. Tighten them two turns at a time to prevent warping the diaphragm spring.



7. Remove Alignment Tool and Ring Gear Holder.

Manual Transmission

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Maintenance

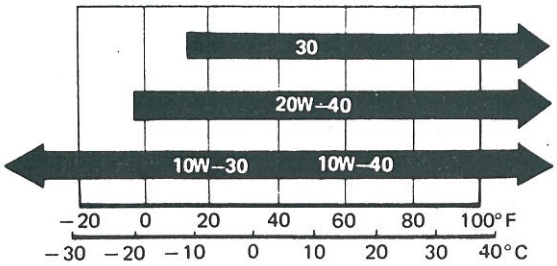
Transmission Oil

Oil Level Inspection

1. Check with oil at operating temperature, engine OFF, and car on level ground.
2. Remove oil filler plug and check level with finger.
3. Oil level must be up to fill hole. If it is below hole, add oil until it runs out, then reinstall plug.

Oil Change

Change oil every 48,000 km (30,000 miles).
Use only SAE30, 10W-30, 10W-40, or 20W-40 weight oil rated SE or SF grade.

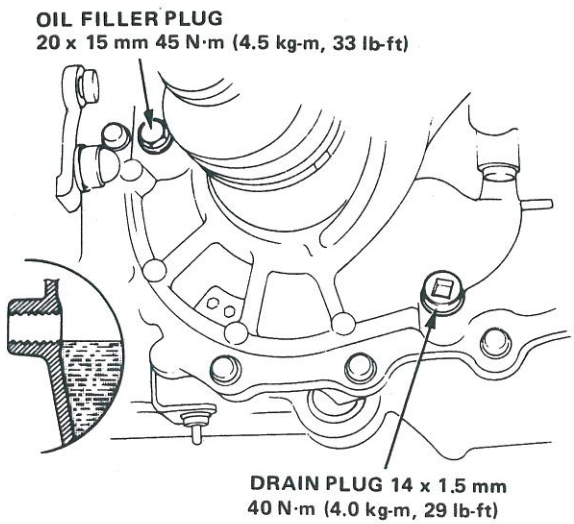


1. With transmission oil at operating temperature, engine OFF, and car on level ground, remove drain plug and drain transmission.
2. Reinstall drain plug with new washer, and refill to proper level.

NOTE: Drain plug washer should be replaced at every oil change.

Oil Capacity

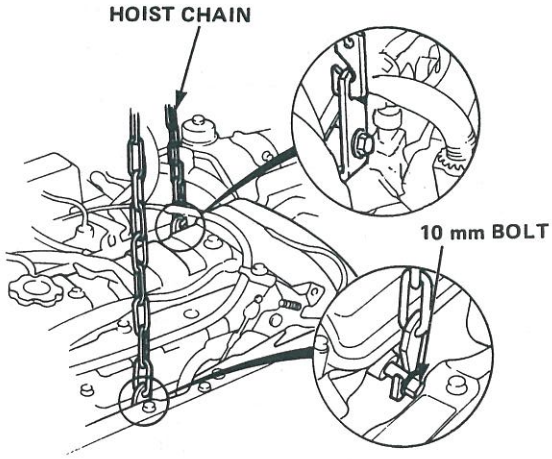
2.3 ℓ (2.4 U.S. qt.) after drain
2.4 ℓ (2.5 U.S. qt.) after overhaul



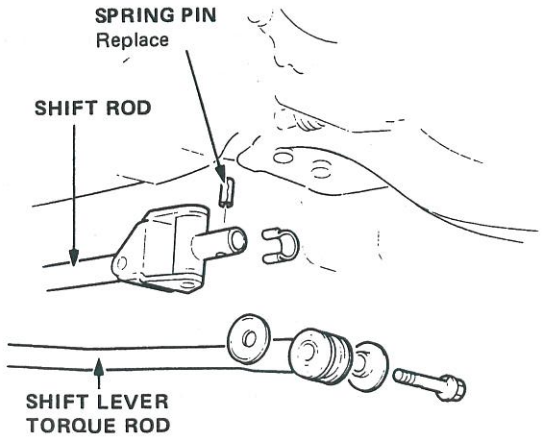
Transmission Assy

Removal

1. Disconnect the ground cable at battery and at transmission.
2. Release the steering lock and put gearshift lever in neutral.
3. Disconnect the engine compartment wiring:
   - Battery positive cable from starter.
   - Black/white wire from starter solenoid.
   - Green/black and yellow wires from back-up light switch.
4. Remove the speedometer cable by removing clip. Do not disassemble speedometer gear holder.
5. Disconnect the clutch cable at release arm.
6. Drain the transmission oil. Reinstall the drain plug and washer.
7. Remove the right and left driveshafts and intermediate shaft (see section 16).
8. Screw a 10 mm bolt at engine block and attach a hoist chain to the bolt; attach the other end of the chain on the opposite side, to the engine hanger plate, then lift the engine slightly to take the weight off the mounts.

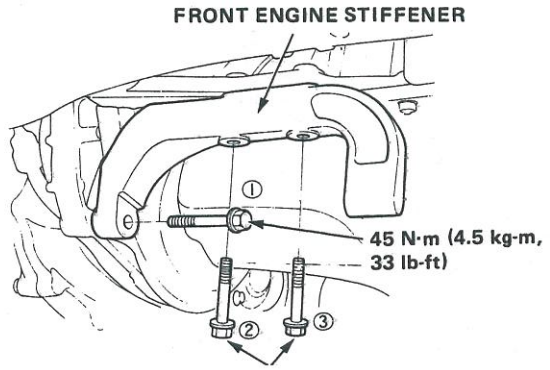


9. Remove the engine under cover and splash shield (see section 5).
10. Disconnect the header pipe at exhaust manifold (see section 5).
11. Disconnect the shift lever torque rod from clutch housing.

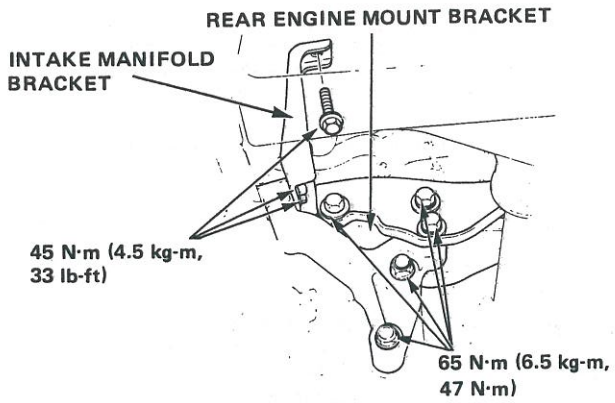


12. Slide pin retainer back, drive out the spring pin using a pin punch, then disconnect shift rod.
13. Place a jack under the transmission and raise transmission just enough to take weight off mounts.
14. Remove the bolts from the front transmission mount at the front engine stiffener.

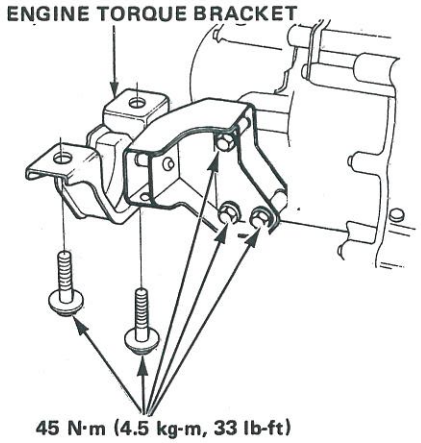
CAUTION: When installing, tighten the bolts in the sequence shown in steps 1-3.



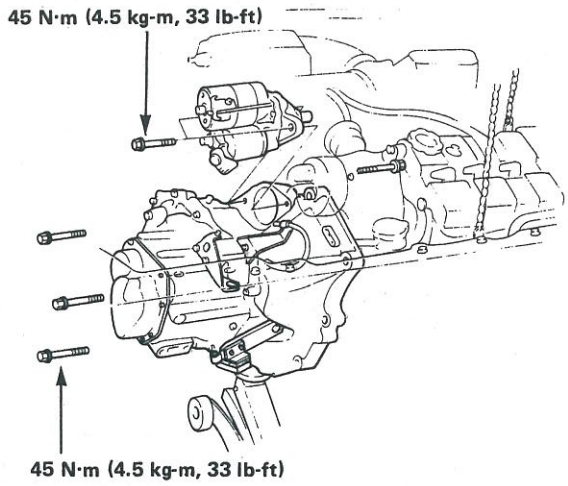
15. Remove the intake manifold bracket and rear engine mount bracket.



16. Remove the transmission housing bolts from engine torque bracket.



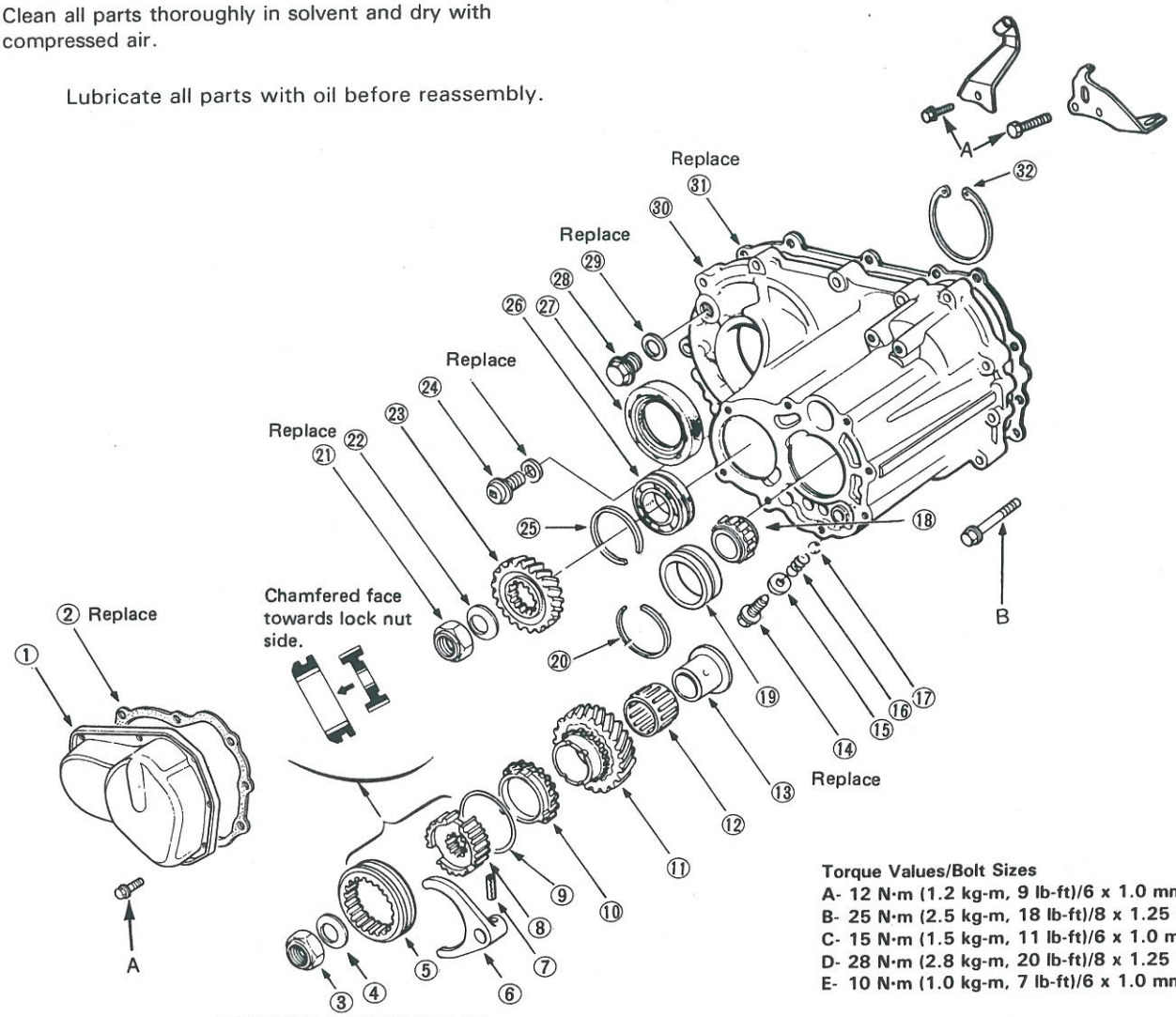
17. Remove the bolts attaching the starter motor, and remove the starter motor.
18. Remove the rest of the transmission mount bolts.



19. Pull the transmission away from the engine until it clears the 14 mm dowel pins, then lower on the transmission jack.
20. Separate the mainshaft from the clutch pressure plate and remove the transmission by lowering the jack.

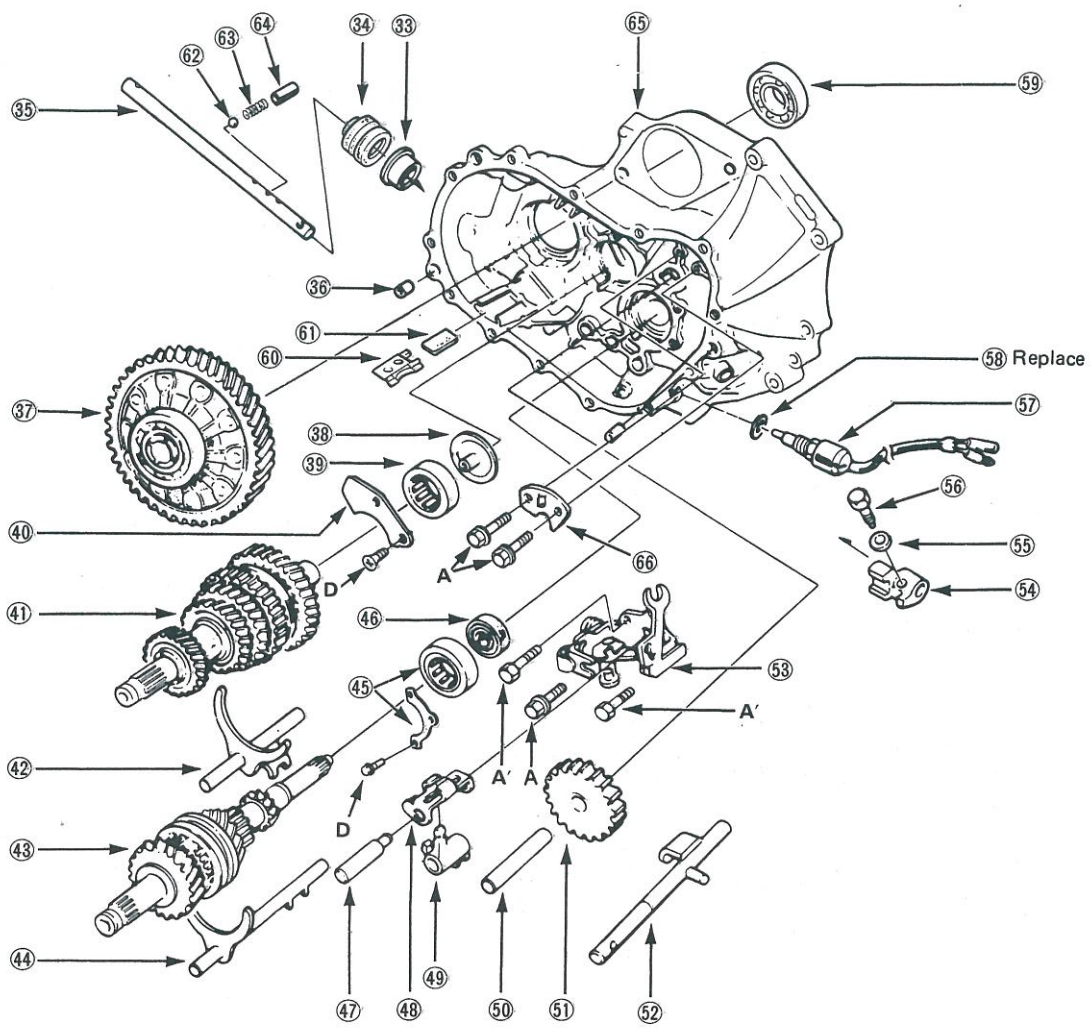
- Clean all parts thoroughly in solvent and dry with compressed air.

Lubricate all parts with oil before reassembly.



Torque Values/Bolt Sizes
A- 12 N·m (1.2 kg-m, 9 lb-ft)/6 x 1.0 mm
B- 25 N·m (2.5 kg-m, 18 lb-ft)/8 x 1.25 mm
C- 15 N·m (1.5 kg-m, 11 lb-ft)/6 x 1.0 mm
D- 28 N·m (2.8 kg-m, 20 lb-ft)/8 x 1.25 mm
E- 10 N·m (1.0 kg-m, 7 lb-ft)/6 x 1.0 mm

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② **GASKET**
③ **LOCKNUT**
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④ **SPRING WASHER**
⑤ **FIFTH GEAR SYNCHRO SLEEVE**
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⑥ **FIFTH GEAR SHIFT FORK**
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⑦ **SPRING PIN**
⑧ **FIFTH GEAR SYNCRO HUB**
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⑨ **SYNCHRO SPRING**
⑩ **FIFTH GEAR SYNCHRO RING**
Inspection, Page 13-15
⑪ **MAINSHAFT FIFTH GEAR**
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Installation, Page 13-28
⑫ **NEEDLE BEARING**
⑬ **SPACER COLLAR**
⑭ **RETAINING SCREW**
22 N·m (2.2 kg-m, 16 lb-ft)
⑮ **WASHER 12 mm**
⑯ **SPRING**
⑰ **DETENT BALL**
⑱ **ROLLER BEARING**
⑲ **BEARING OUTER RACE**
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⑳ **SNAP RING 50 mm**
㉑ **LOCKNUT**
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㉒ **SPRING WASHER**
㉓ **COUNTERSHAFT FIFTH GEAR**
㉔ **DRAIN PLUG**
40 N·m (4.0 kg-m, 29 lb-ft)
㉕ **SNAP RING 71mm**
㉖ **BALL BEARING**
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㉗ **OIL SEAL**
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㉘ **OIL FILLER BOLT**
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㉙ **WASHER 20 mm**
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㉛ **GASKET**
㉜ **SNAP RING 80 mm**



㉝ **OIL SEAL**
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㉟ **SHIFT ROD**
㊱ **DOWEL PIN 14 x 20 mm**
㊲ **DIFFERENTIAL ASSY**
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㊳ **OIL BARRIER PLATE**
㊴ **COUNTERSHAFT BEARING**
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㊵ **BEARING RETAINER PLATE**
㊶ **COUNTERSHAFT ASSY**
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㊷ **FIRST & SECOND GEAR SHIFT SHAFT**

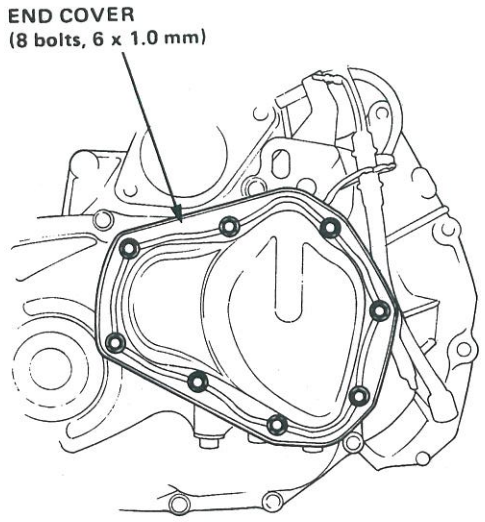
㊸ **MAINSHAFT ASSY**
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㊹ **THIRD & FOURTH GEAR SHIFT SHAFT**
㊺ **MAINSHAFT BEARING AND BEARING RETAINER PLATE**
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㊻ **OIL SEAL**
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(51) **REVERSE IDLER GEAR**
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(52) **FIFTH & REVERSE GEAR SHIFT SHAFT**

(53) **SHIFT ARM HOLDER**
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A 12 N·m (1.2 kg-m, 9 lb-ft)
A' 15 N·m (1.5 kg-m, 11 lb-ft)
(54) **SHIFT ROD GUIDE**
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(55) **WASHER 8 mm**
(56) **BOLT, 8 x 1.25 mm**
30 N·m (3.0 kg-m, 22 lb-ft)
(57) **BACK-UP LIGHT SWITCH**
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(60) **SET PLATE**
(61) **MAGNET**
(62) **DETENT BALL**
(63) **SPRING**
(64) **SPRING COLLAR**
(65) **CLUTCH HOUSING**
(66) **BREATHER CHAMBER PLATE**

Transmission Housing

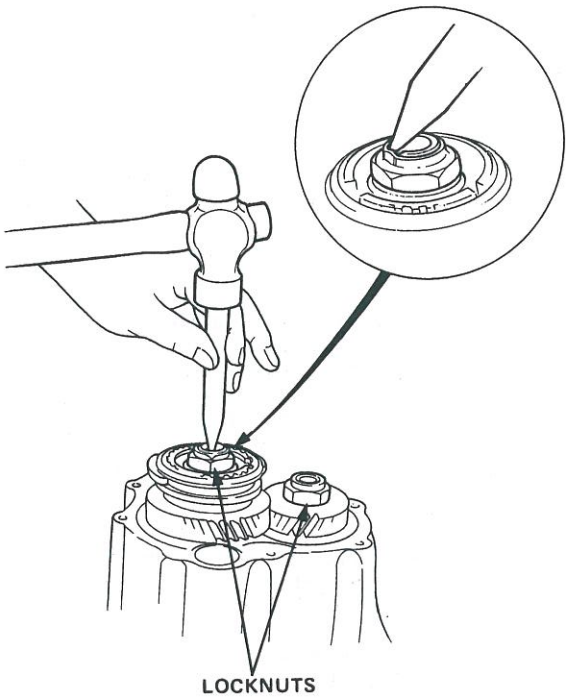
Disassembly

1. Remove transmission end cover.

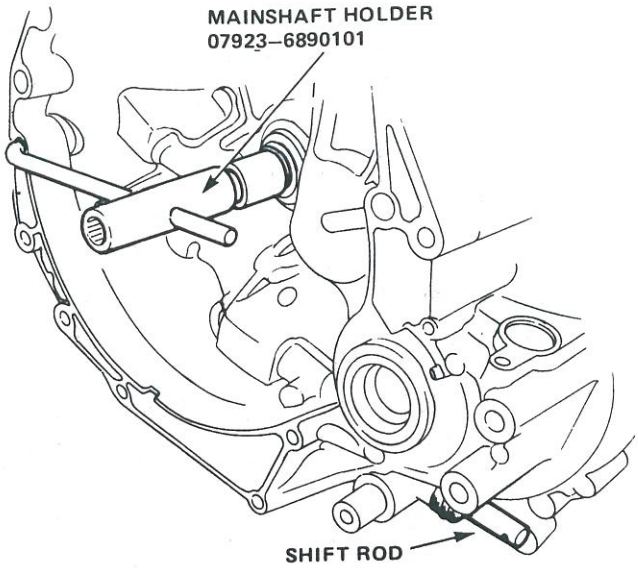


NOTE: Before removing mainshaft/countershaft locknuts, measure clearance between spacer collar and shoulder on fifth gear.

2. Bend locking tab on locknuts out of slots in mainshaft and countershaft.



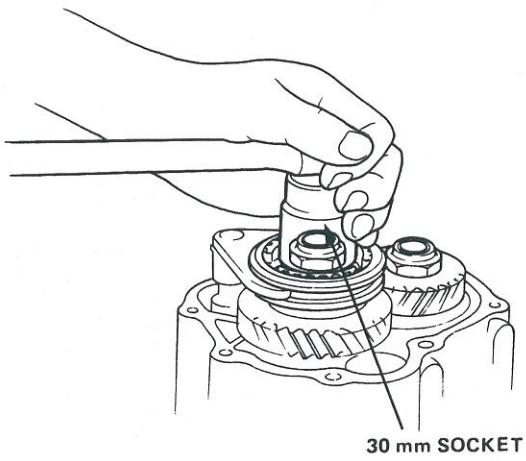
3. Install mainshaft holder.



4. Shift transmission into reverse gear.

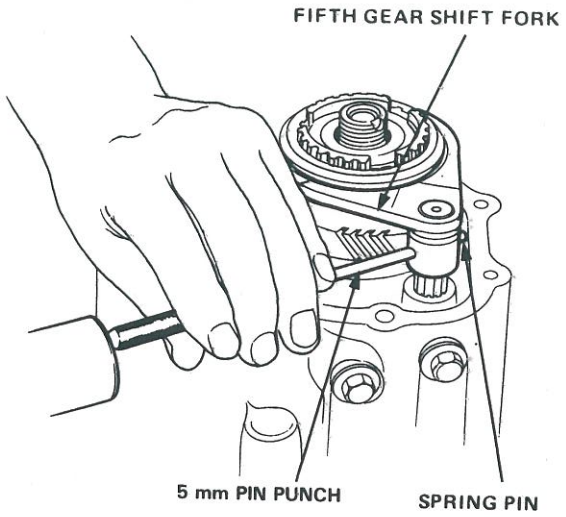
5. Remove locknuts.

CAUTION: The mainshaft locknut has left-hand threads.



6. Remove mainshaft holder.

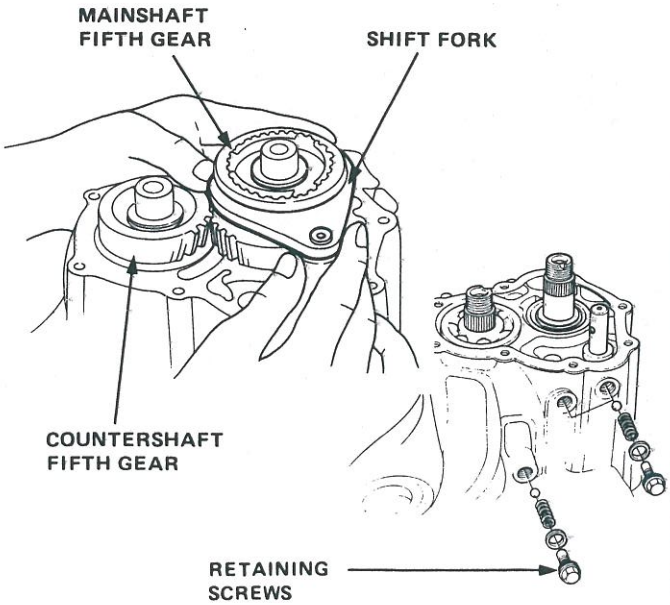
7. Drive out spring pin securing fifth gear shift fork to shaft.



8. Remove mainshaft fifth gear, shift fork, synchronizer sleeve, hub, ring and spring as a unit.

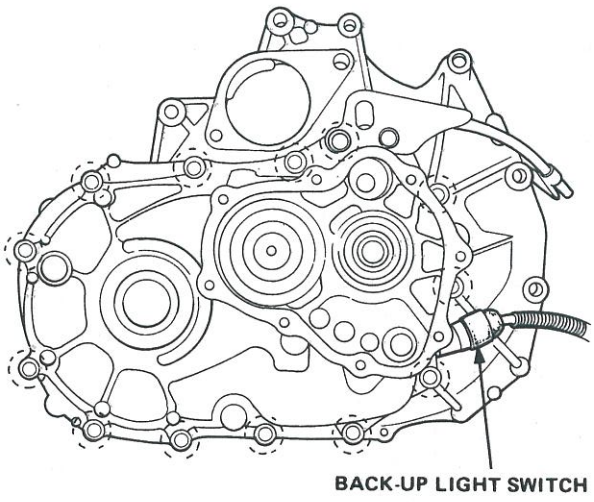
9. Remove countershaft fifth gear.

10. Remove three retaining screws and detent balls.

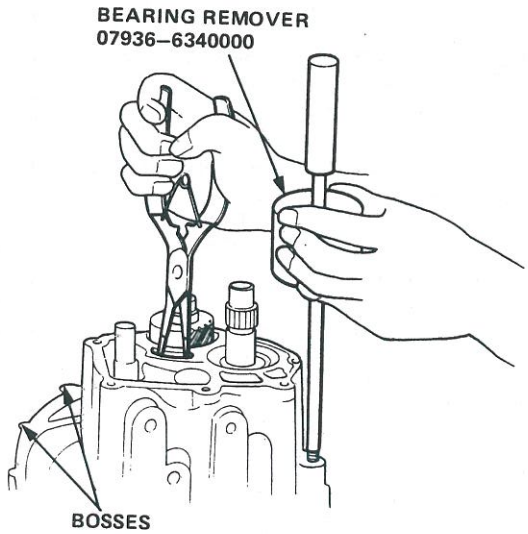


11. Remove back-up light switch.

12. Remove thirteen housing bolts.



13. Loosen the transmission housing by tapping on bosses around its edge with a soft hammer.
Remove any attachments from the remove then screw its threaded end into the hole in the transmission housing as shown. Expand the snap ring while tapping upward on the case using the remover.



Reverse Fork

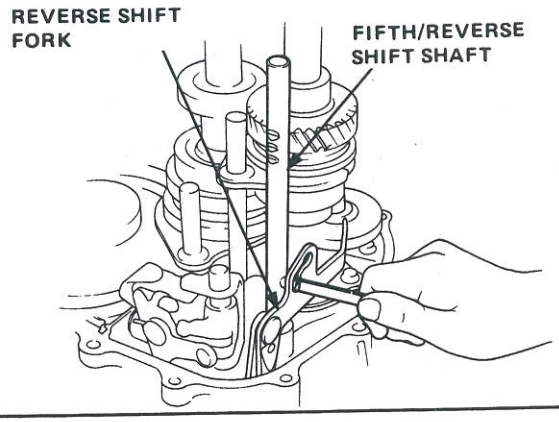
Shift Shaft Clearance

1. Check clearance between fifth/reverse shift shaft pin and reverse shift fork.

   PIN-TO-FORK CLEARANCE
   Standard (New): 0.05—0.35 mm (0.002—0.014 in.)
   Service Limit: 0.5 mm (0.02 in.)

2. If clearance is beyond limit, measure width of slot in reverse shift fork.

   Standard (New): 7.05—7.25 mm (0.278—0.285 in.)



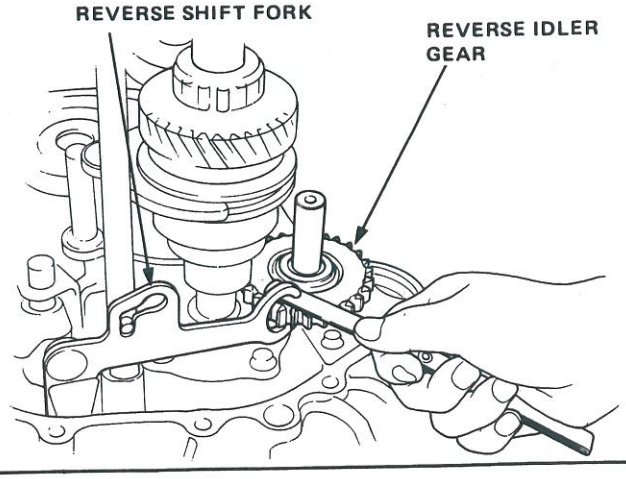
Gear Clearance

1. Check reverse idler gear-to-shift fork clearance.

   GEAR-TO-FORK CLEARANCE
   Standard (New): 0.2—1.0 mm (0.008—0.04 in.)
   Service Limit: 1.7 mm (0.07 in.)

2. Pull out the reverse idler shaft and remove gear. If gear-to fork clearance is beyond limit, measure gap between ends of shift fork fingers.

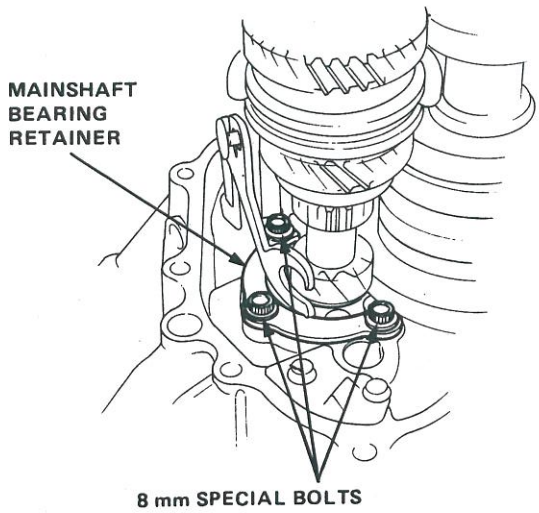
   Standard (New): 11.8—12.1 mm (0.46—0.48 in.)



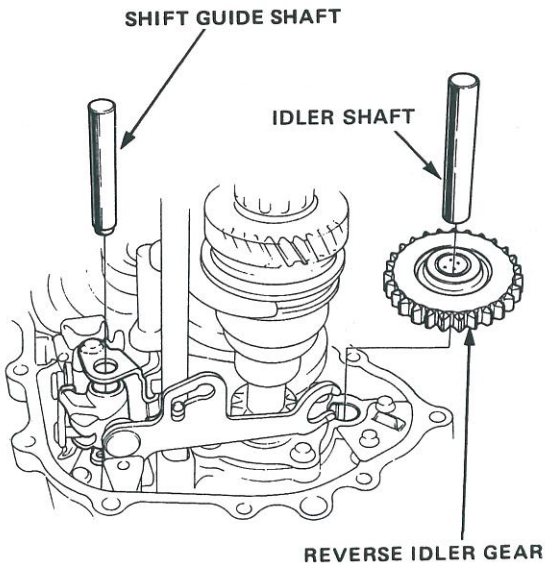
Countershaft/Mainshaft

Removal

1. Shift transmission into neutral.
2. Remove the mainshaft bearing retainer plate.

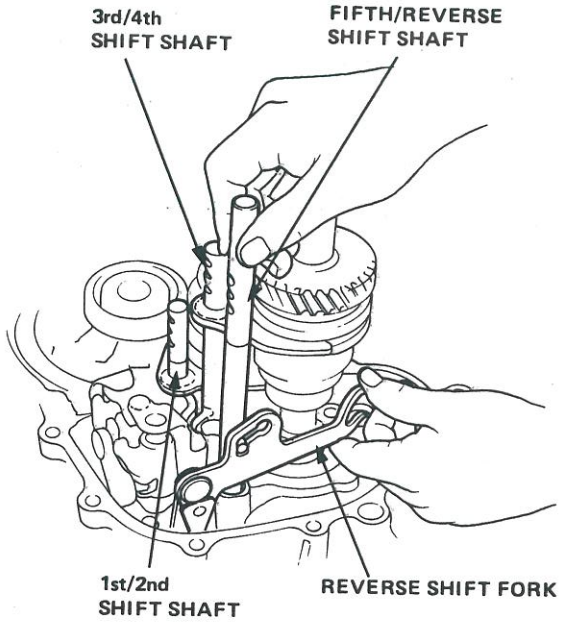


3. Pull out the shift guide shaft.
4. Pull out reverse idler shaft and remove gear.

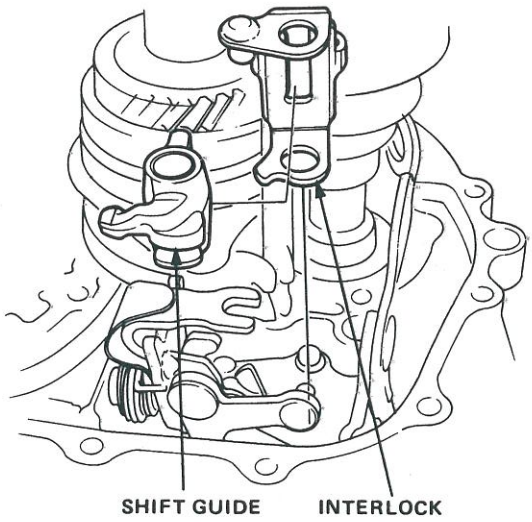


5. Pull the 3rd/4th and 1st/2nd shift shafts up, to shift into fourth and second.

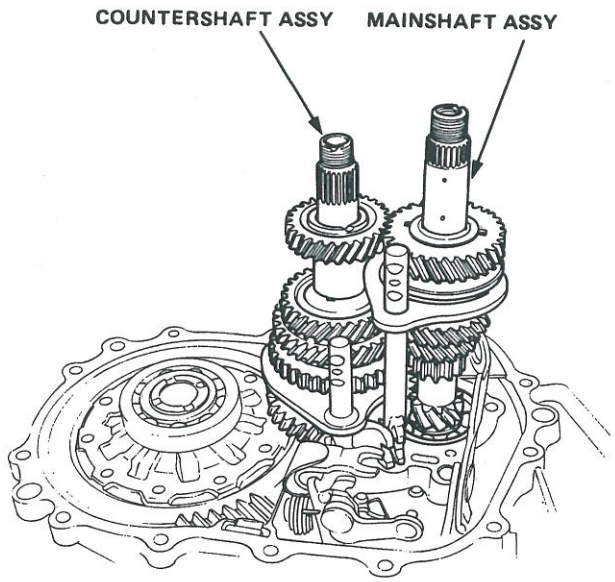
6. Remove the 5th/reverse shift shaft by pulling it up while lifting the reverse shift fork.



7. Tilt interlock and shift guide to the side, then lift them out.



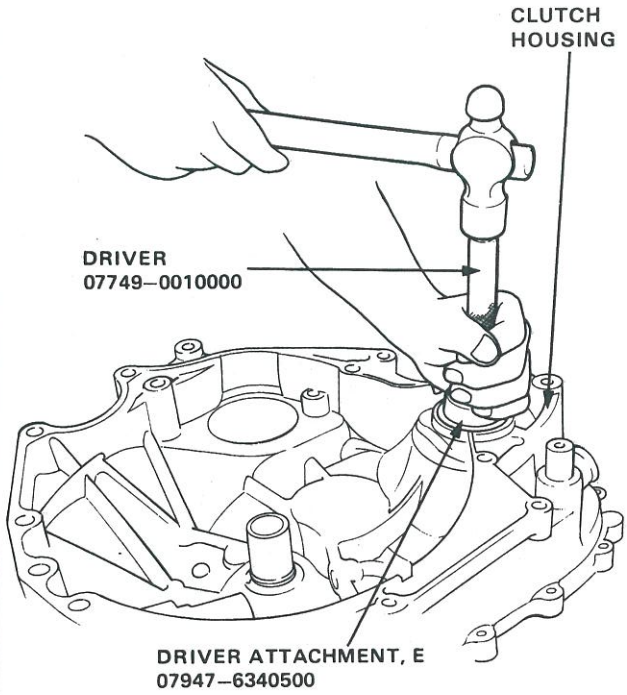
8. Remove countershaft and mainshaft as an assembly, with 1st/2nd & 3rd/4th shift shafts.



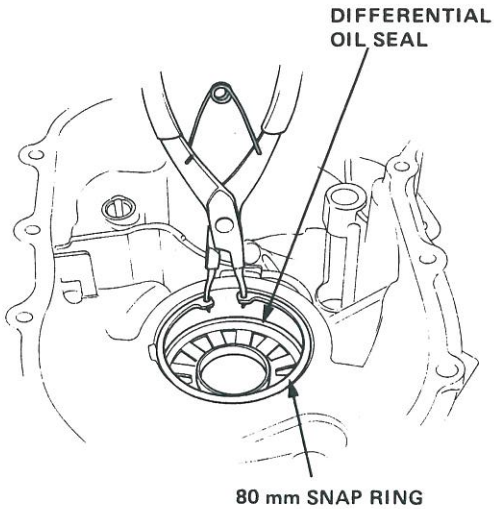
Differential Oil Seals

Removal

1. If seals are to be replaced, or if differential needs repair, remove differential assembly.



2. Drive the differential oil seal out of the clutch housing.
3. Remove 80 mm snap ring in transmission housing.



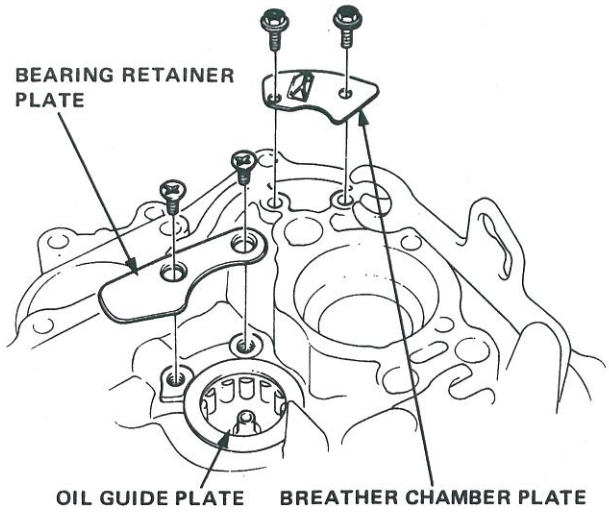
4. Drive the differential oil seal out of the transmission housing.

   NOTE: Replace the differential oil seal in the transmission housing whenever disassembled.

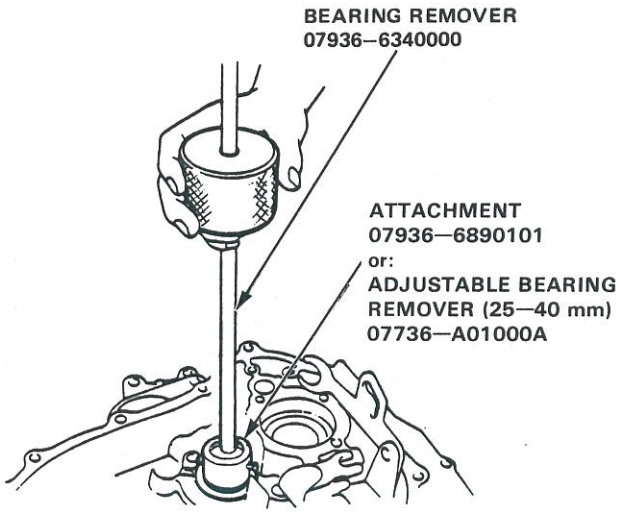
Bearings and Seals

Replacement (Clutch Housing)

1. Remove countershaft bearing retainer plate.
2. Remove the breather chamber plate.

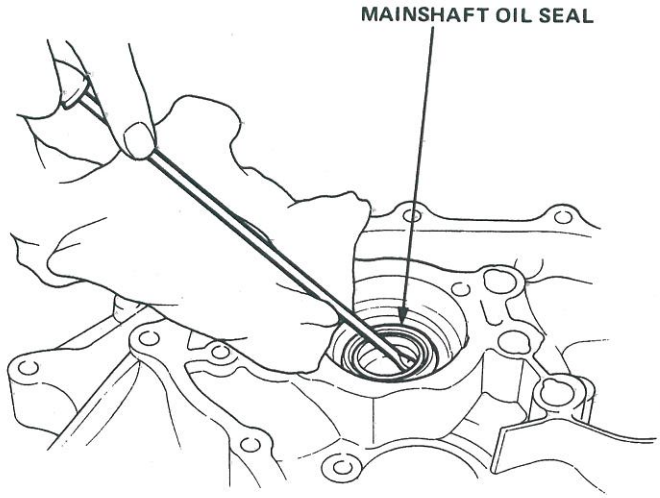


3. Insert Bearing Remover with attachment into countershaft bearing.
4. Raise slide hammer rapidly and strike against handle.
   Repeat several times to remove bearing.



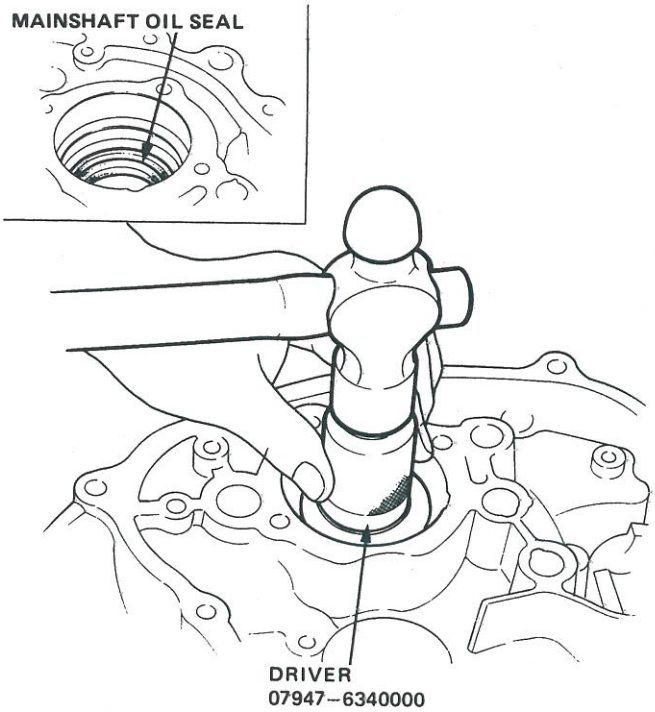
5. Remove mainshaft bearing and oil seal from clutch housing by prying out with a screwdriver.

   NOTE: Always install new oil seal. Do not reinstall old one.

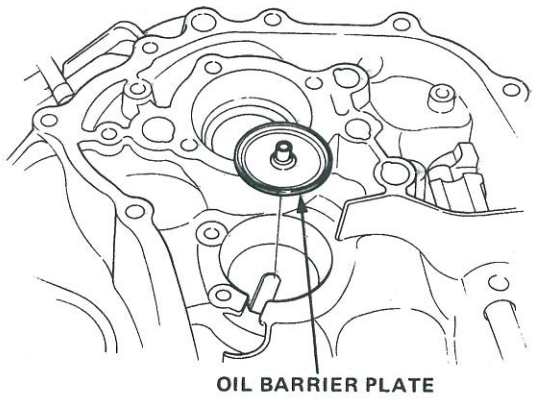


6. Install the mainshaft oil seal.

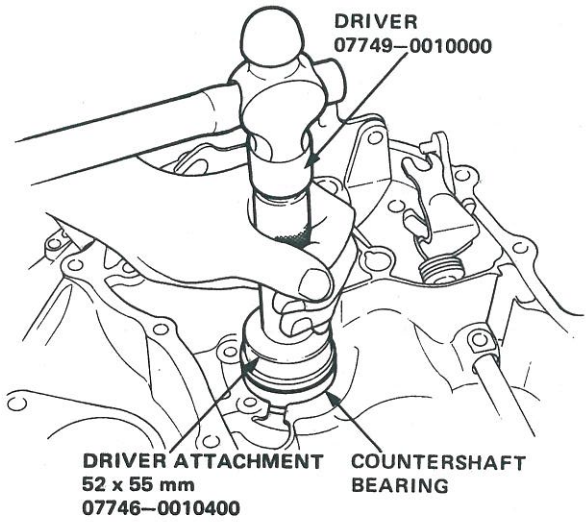
   NOTE: Install the oil seal with the sealing lips facing the mainshaft bearing.



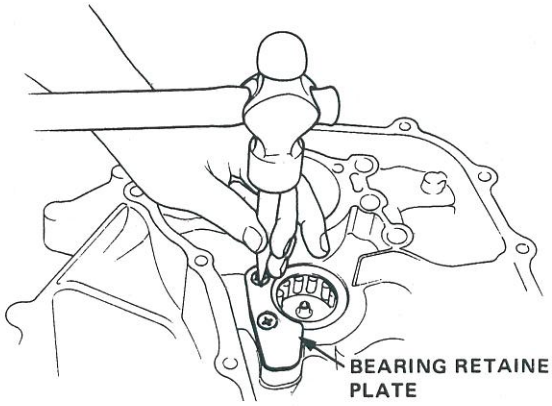
7. Install the countershaft oil barrier plate.



8. Drive in countershaft bearing with support block placed under case to support bearing boss.



9. Reinstall bearing retainer plate. Install screws using impact driver. Stake the screws.



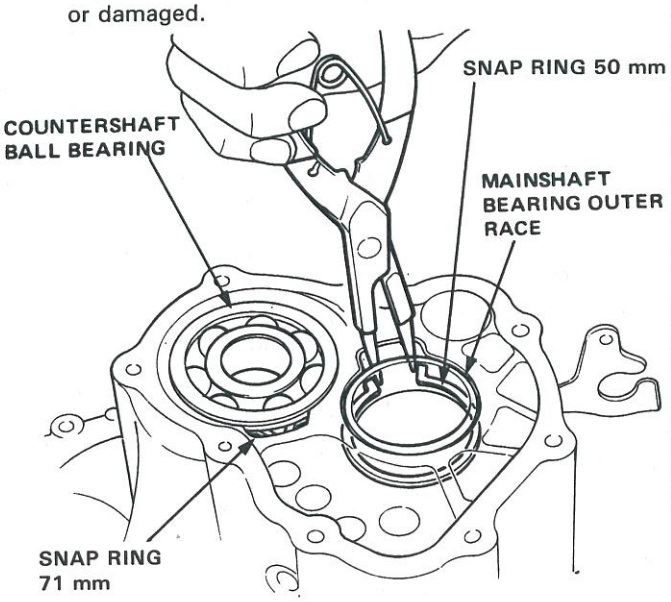
10. Reinstall the breather chamber plate.

Replacement (Transmission Housing)

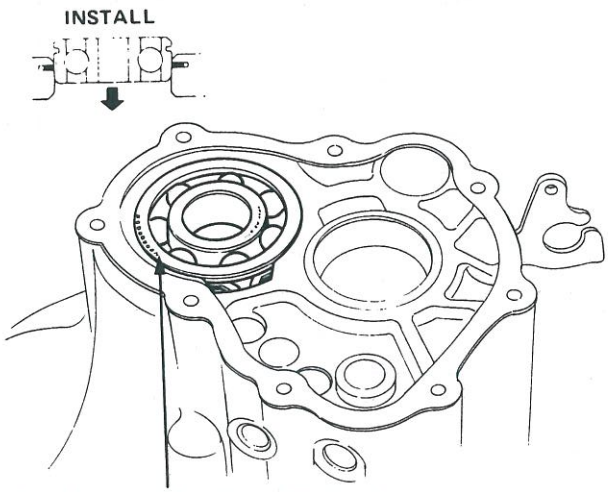
1. Using snap ring pliers, carefully expand the snap ring and press the bearing out into the case.

   CAUTION: Do not expand the ring any wider than to clear the groove in the bearing. Over-expansion or off-angle use of the pliers can damage the snap ring and/or the groove in the trans housing.

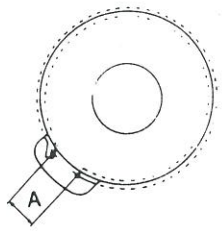
   NOTE: Inspect the snap rings for wear. Replace any snap rings that are worn excessively or damaged.



2. Install the new bearing with the part number facing out. Using snap ring pliers, carefully expand the snap ring, press the bearing into the case, and then seat the snap ring in the bearing groove.
3. After the bearing has entered the snap ring, remove the pliers, and press the bearing into place by hand.



4. Check that the snap ring is securely seated in both the grooves of the bearing and the case.



NOTE: To confirm proper snap ring seating and condition, measure snap ring gap A as installed:

Bearing	Dimension A as installed
Mainshaft	3.0–8.0 mm (0.118–0.314 in)
Countershaft	7.0–7.1 mm (0.276–0.279 in)

Reseat or carefully replace the snap ring if the gap is outside the specification.

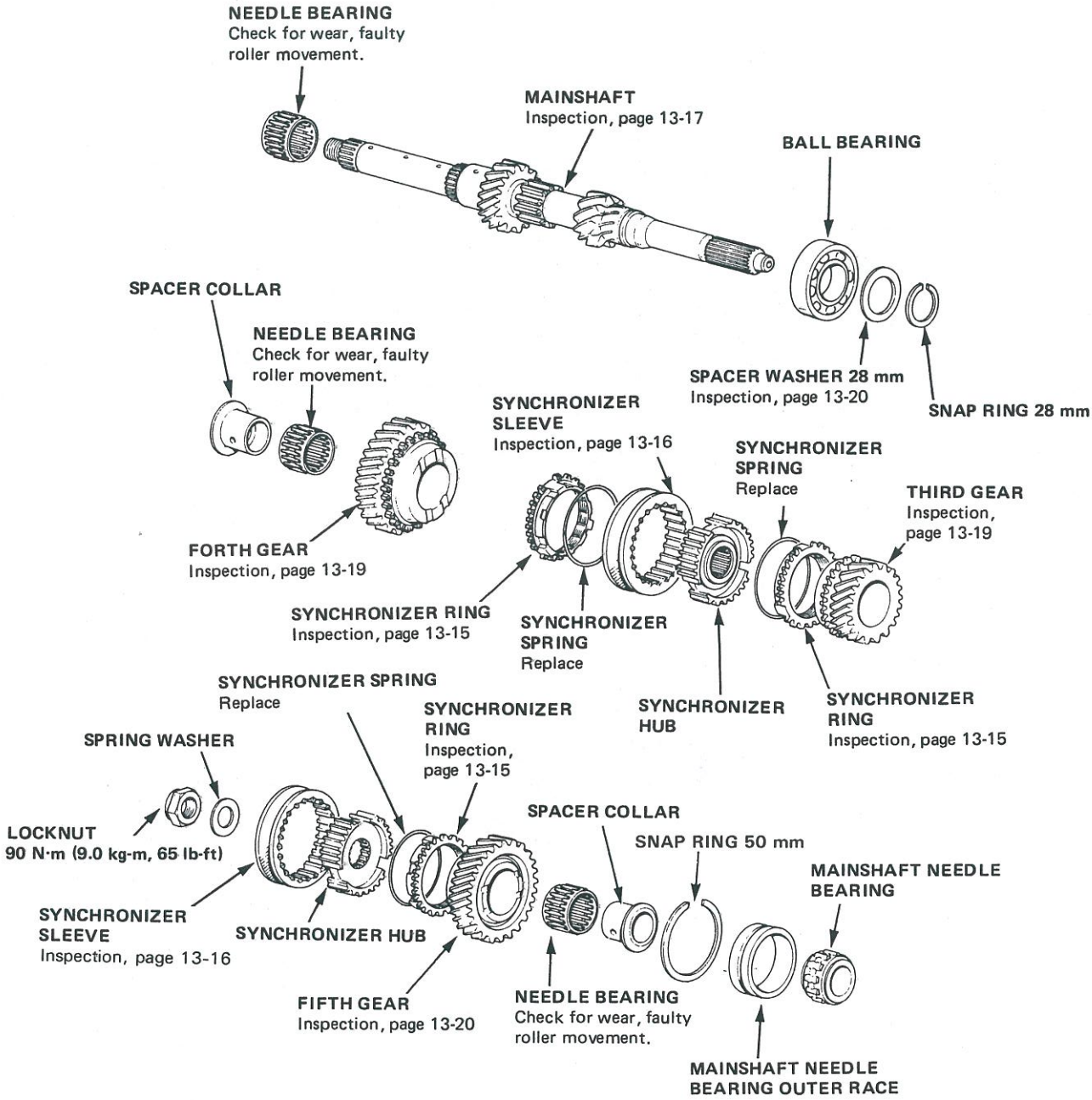
Mainshaft

Index

NOTE:

- Clean all parts thoroughly in solvent and dry with compressed air.
- Third, fourth and fifth gear needle bearings are identical.

Lubricate all parts with oil before reassembly.



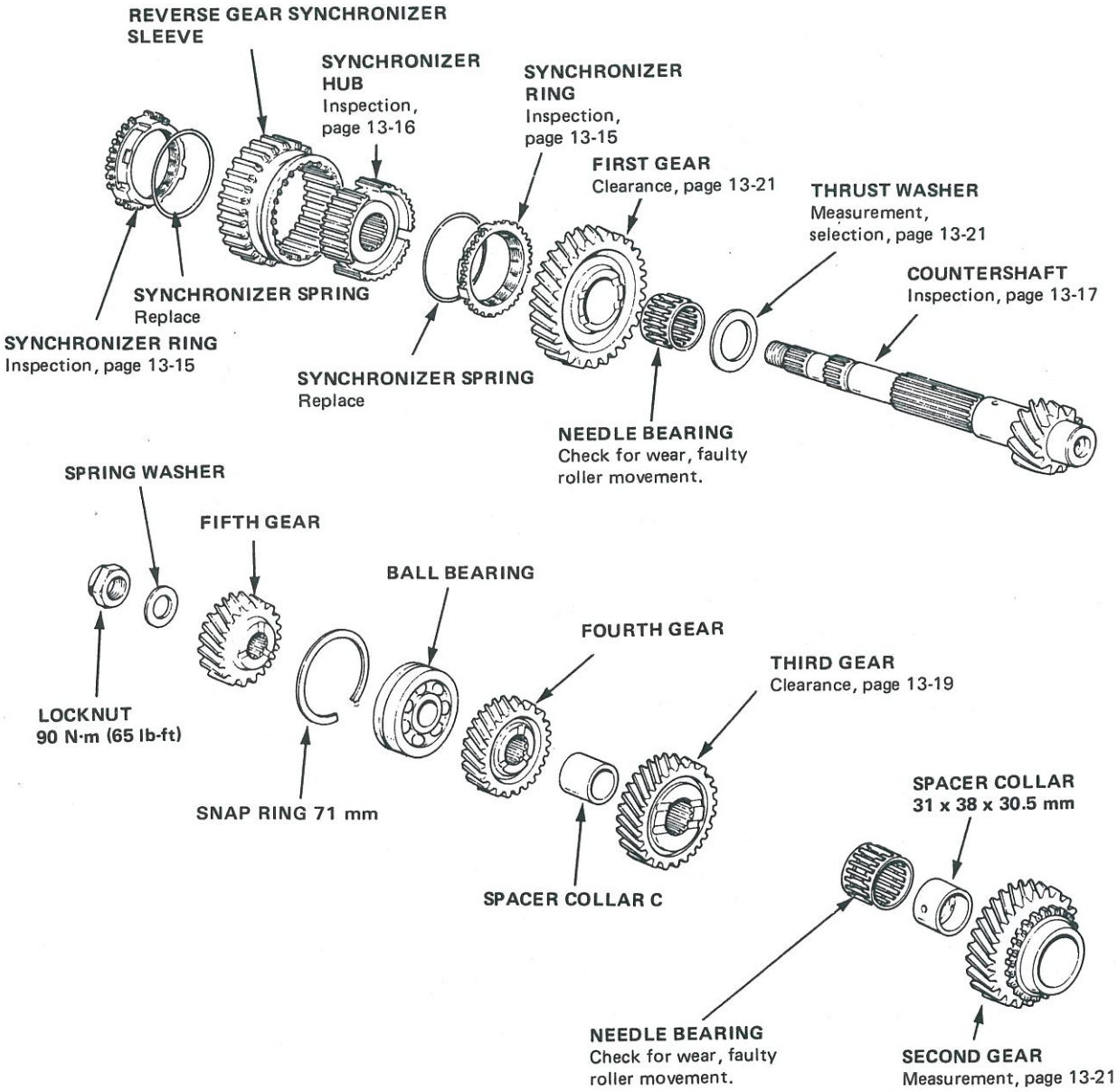
Countershaft

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NOTE:

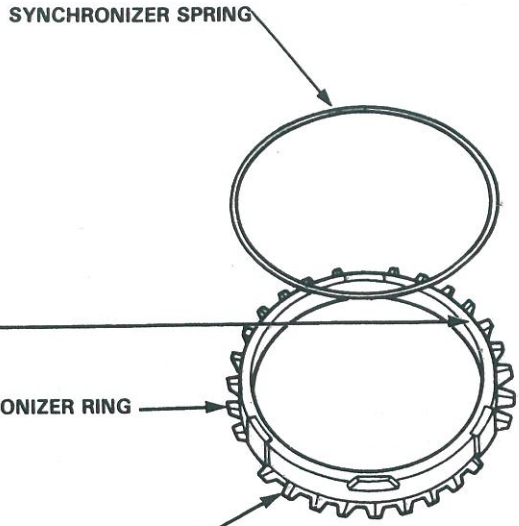
- Clean all parts thoroughly in solvent and dry with compressed air.
- First and second gear needle bearings are not identical.

Lubricate all parts with oil before reassembly.



Gear and Synchronizer Ring

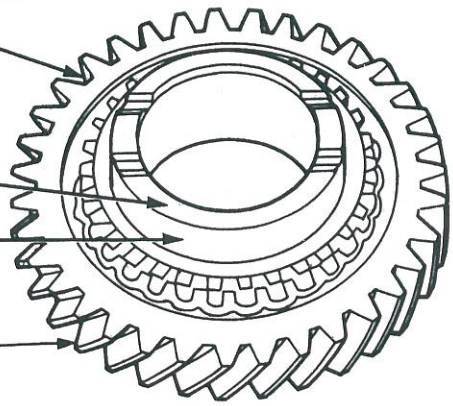
Inspections



1. Inspect the inside of synchronizer ring for wear.

2. Inspect the synchronizer ring teeth and matching teeth on gear for wear (rounded off).





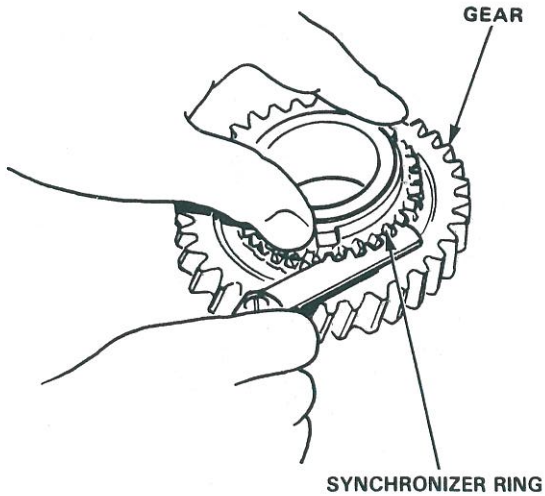
3. Inspect the gear hub thrust surface for wear.

4. Inspect the cone surface for wear on 1st, and 2nd, countershaft gears; 3rd, 4th and 5th mainshaft gears.

5. Inspect the teeth on all gears for uneven wear, scoring, galling, cracks.

6. Place the synchronizer ring on matching gear cone and rotate until it stops (approx. 10 to 20 degrees), then measure the clearance between ring and gear.

   Ring-to-Gear Clearance:
   Standard (New): 0.73—1.18 mm (0.029—0.047 in.)
   Service Limit: 0.4 mm (0.016 in.)



7. Separate the synchronizer ring and gear, and coat them with oil.

8. Install the synchronizer spring on synchronizer ring.

9. Put the synchro ring on gear cone again, rotate until it stops, then set it aside for later reassembly.

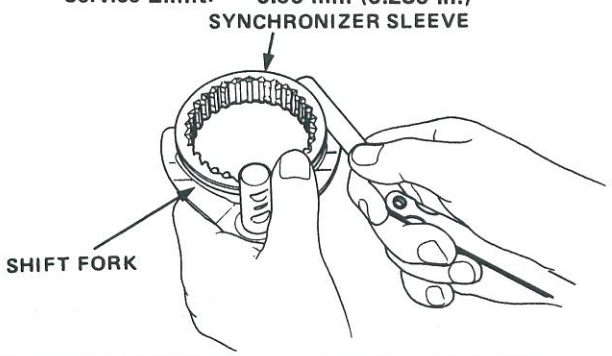
Synchronizer Sleeve, Shift Shaft

Shift Fork to Synchronizer Sleeve Clearance

1. Check clearance between each shift fork and its matching synchronizer sleeve.

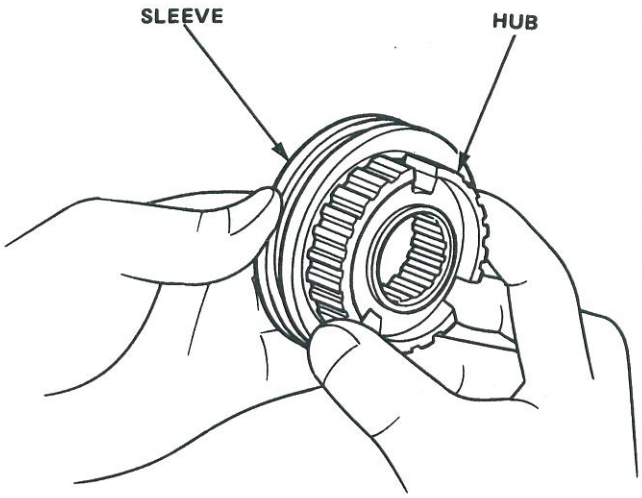
   FORK-TO-SLEEVE CLEARANCE (ALL THREE FORKS & SLEEVES)
   Standard (New): 0.35—0.65 mm (0.014—0.026 in.)
   Service Limit: 1.0 mm (0.039 in.)

2. If fork-to-sleeve clearance is too great, measure width of groove in synchronizer sleeve.
   Standard (New): 6.75—6.85 mm (0.266—0.270 in.)
   Service Limit: 6.00 mm (0.236 in.)



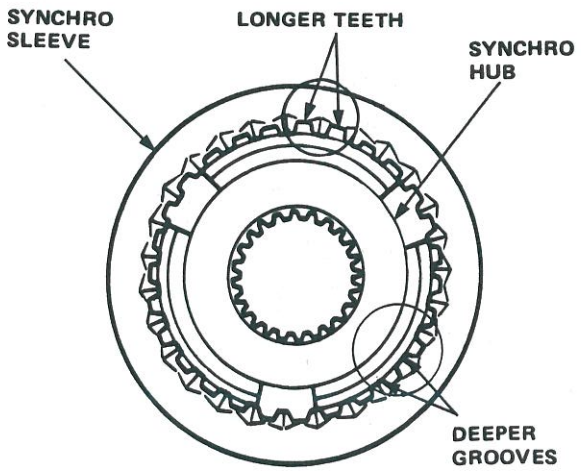
Synchronizer Sleeve and Hub Inspections

1. Inspect gear teeth on all synchro hubs and sleeves for rounded off corners, indicating wear.
2. Install each hub in its mating sleeve and check for freedom of movement.



Installing Synchronizer Hubs in Sleeves

Each synchronizer 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.



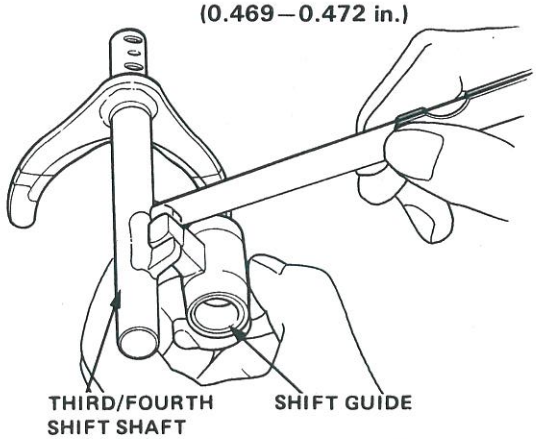
Third/Fourth Shift Shaft to Shift Guide Clearance

1. Check third/fourth shift shaft-to-shift guide clearance as shown.

   SHAFT-TO-GUIDE CLEARANCE
   Standard (New): 0.2—0.5 mm (0.008—0.02 in.)
   Service Limit: 0.8 mm (0.03 in.)

2. If clearance is too great, measure width of shift guide tab.

   Standard (New): 11.9—12.0 mm (0.469—0.472 in.)



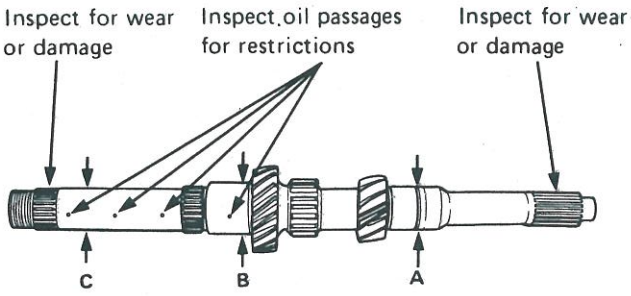
Mainshaft

Inspection

Wear

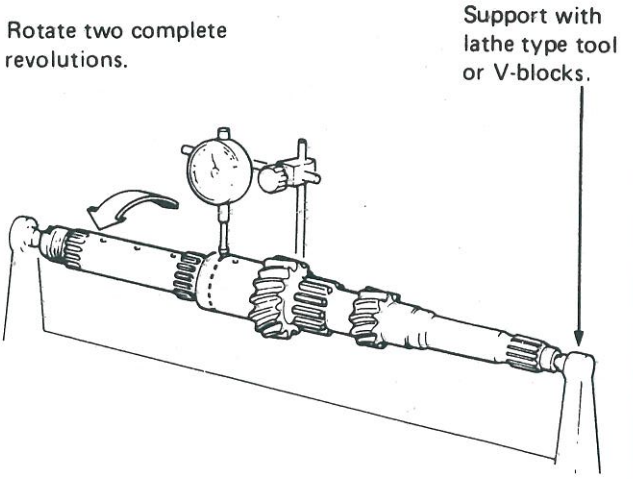
Outside Diameter:

Standard (New):	**A:**	**27.920–27.980 mm (1.0992–1.1016 in.)**
	B:	**31.984–32.000 mm (1.2592–1.2598 in.)**
	C:	**24.980–24.993 mm (0.9835–0.9840 in.)**
Service Limit:	**A:**	**27.87 mm (1.097 in.)**
	B:	**31.93 mm (1.257 in.)**
	C:	**24.93 mm (0.98 in.)**



Runout

Standard (New): 0.04 mm (0.0016 in.)
Service Limit: 0.10 mm (0.004 in.)



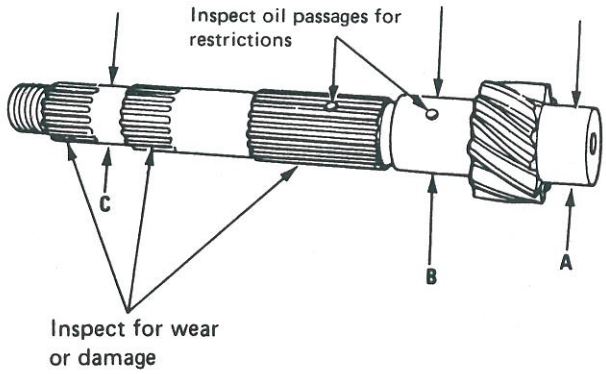
Countershaft

Inspection

Wear

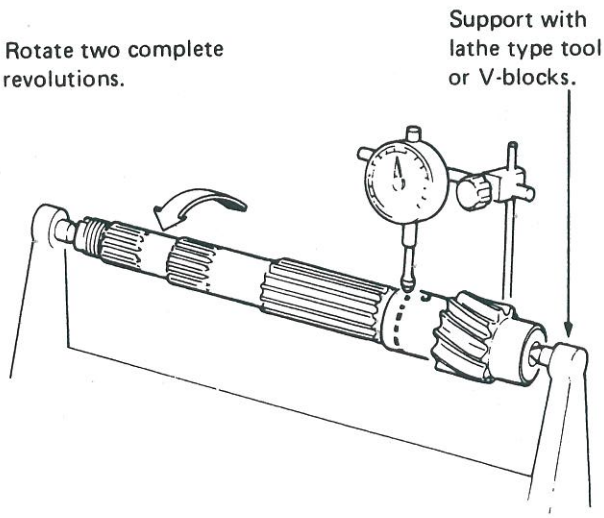
Outside Diameter:

Standard (New):	**A:**	**33.000–33.015 mm (1.2992–1.2998 in.)**
	B:	**33.984–34.000 mm (1.3380–1.3386 in.)**
	C:	**24.980–24.993 mm (0.9835–0.9840 in.)**
Service Limit:	**A:**	**32.95 mm (1.297 in.)**
	B:	**33.93 mm (1.336 in.)**
	C:	**24.93 mm (0.981 in.)**



Runout

Standard (New): 0.04 mm (0.0016 in.)
Service Limit: 0.10 mm (0.004 in.)

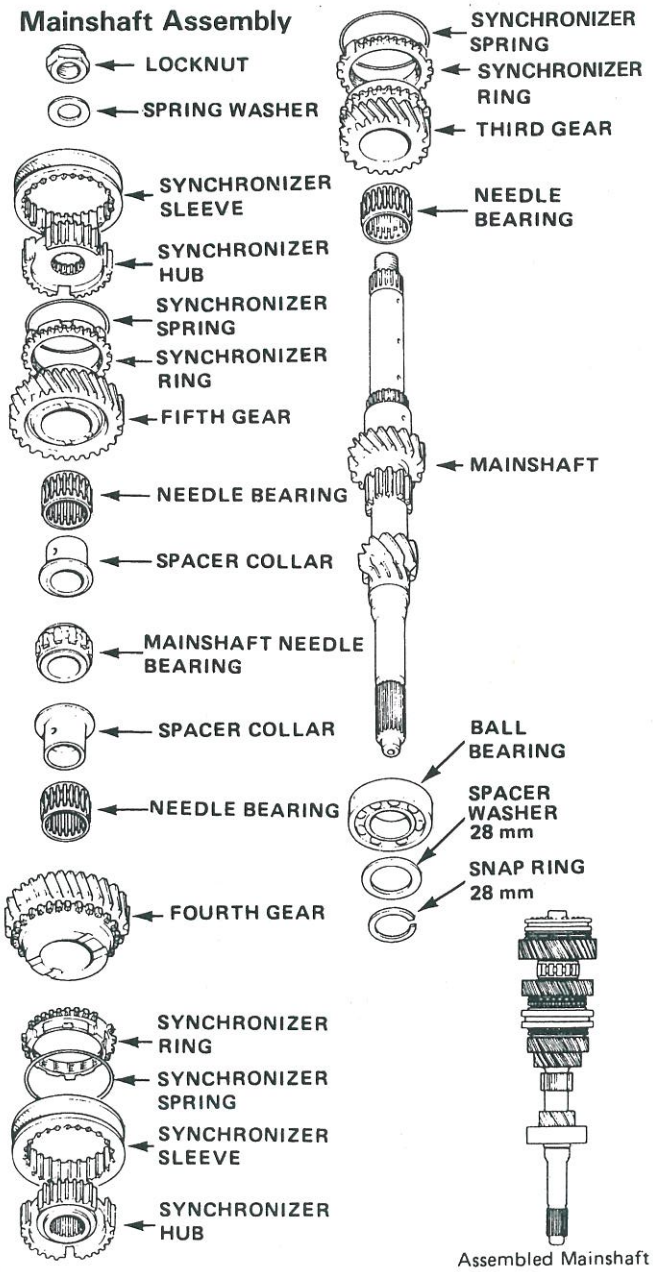


Reassembly and Measurement

1. Remove both mainshaft and countershaft bearings from transmission housing.
2. Assemble mainshaft and countershaft including bearings and fifth gear components, as shown below. Lubricate all parts with oil before final reassembly.
3. Install mainshaft/countershaft assembly into clutch housing.
4. Install the mainshaft holder to prevent shafts from turning, and shift transmission into gear.
5. Torque the countershaft and mainshaft locknuts to 90 N·m (9.0 kg-m, 65 lb-ft) before checking clearances.

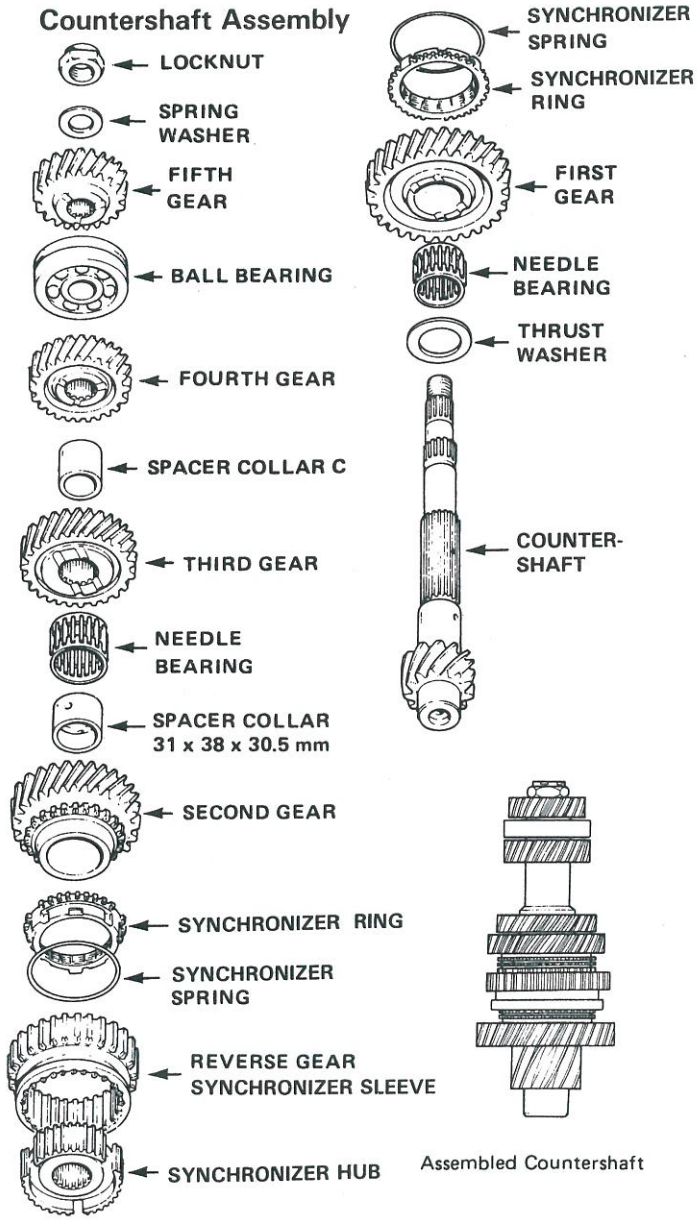
   CAUTION: Incorrect gear clearances can be caused by overtorquing the countershaft or mainshaft locknuts. Whenever locknuts are installed, use an accurately calibrated torque wrench.
6. Remove transmission shafts from clutch housing and measure clearances as described on next two pages.

Mainshaft Assembly



Assembled Mainshaft

Countershaft Assembly

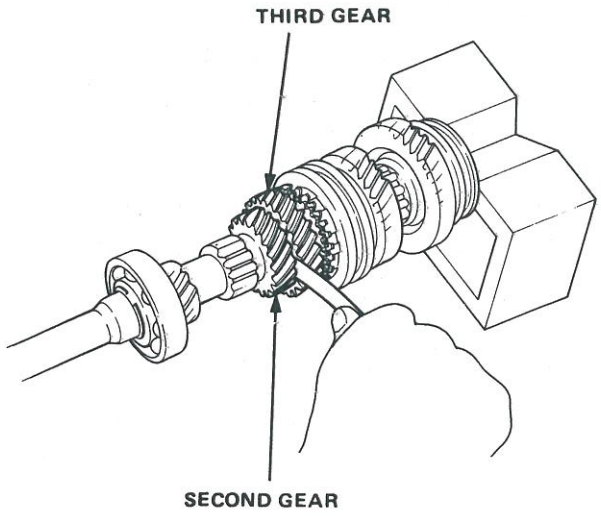


Assembled Countershaft

Mainshaft Measurements

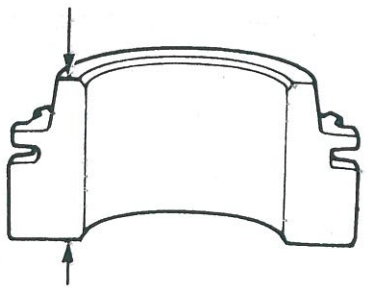
7. Measure clearance between shoulder on third gear and shoulder on second gear.

THIRD GEAR CLEARANCE
Standard (New): 0.03–0.18 mm (0.0012–0.0071 in.)
Service Limit: 0.3 mm (0.012 in.)



8. If out of tolerance, measure thickness of third gear.

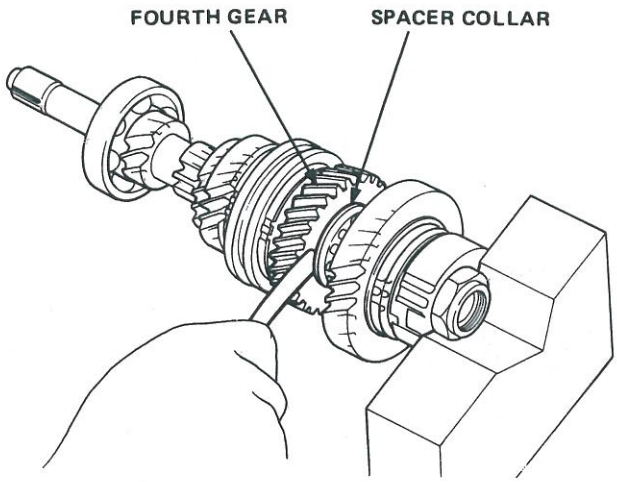
THIRD GEAR THICKNESS
Standard (New): 31.42–31.47 mm (1.237–1.239 in.)
Service Limit: 31.30 mm (1.232 in.)



If third gear is OK, replace synchronizer hub if necessary after all other measurements are complete.

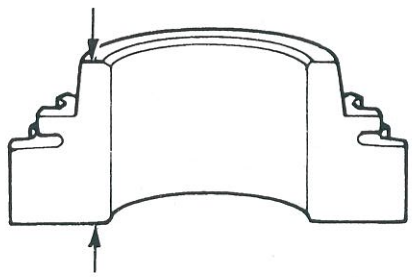
9. Measure clearance between spacer collar and shoulder on fourth gear.

FOURTH GEAR CLEARANCE
Standard (New): 0.03–0.18 mm (0.0012–0.0071 in.)
Service Limit: 0.3 mm (0.012 in.)



10. If out of tolerance, measure thickness of fourth gear.

FOURTH GEAR THICKNESS
Standard (New): 31.42–31.47 mm (1.237–1.239 in.)
Service Limit: 31.30 mm (1.232 in.)



If fourth gear is OK, replace synchronizer hub if necessary after all other measurements are complete.

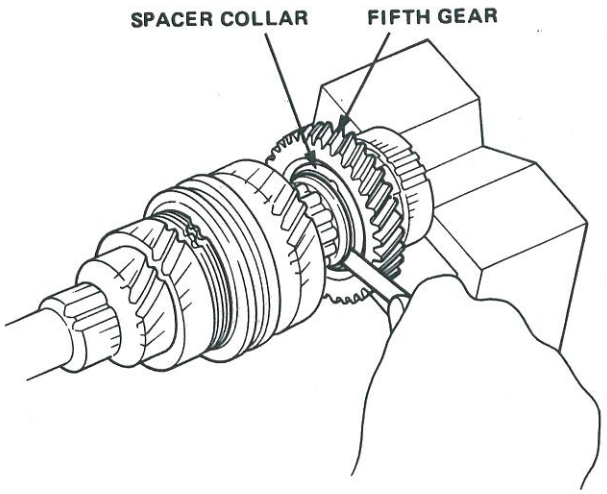
(cont'd)

Reassembly and Measurement (cont'd)

Mainshaft Measurements

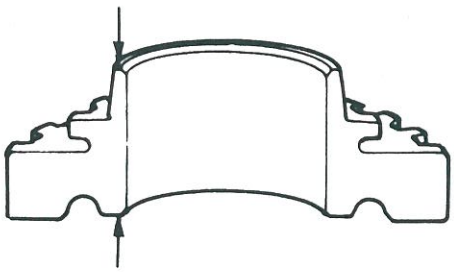
11. Measure clearance between spacer collar and shoulder on fifth gear.

FIFTH GEAR CLEARANCE
Standard (New): 0.03—0.13 mm (0.001—0.005 in.)
Service Limit: 0.25 mm (0.01 in.)



12. If out of tolerance, measure thickness of fifth gear.

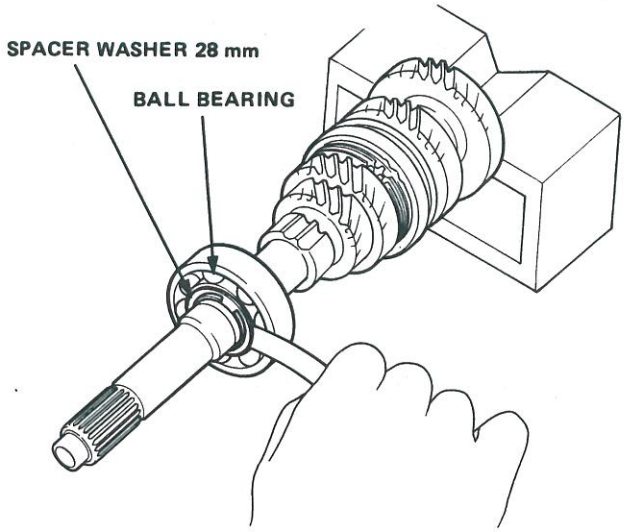
FIFTH GEAR THICKNESS
Standard (New): 32.42—32.47 mm (1.276—1.278 in.)
Service Limit: 32.30 mm (1.272 in.)



If out of limit, replace fifth gear.

13. Measure clearance between 28 mm spacer washer and ball bearing.

BALL BEARING CLEARANCE
Standard (New): 0—0.1 mm (0—0.004 in.)



If out of tolerance, change thickness of 28 mm spacer washer after measuring all other clearances.

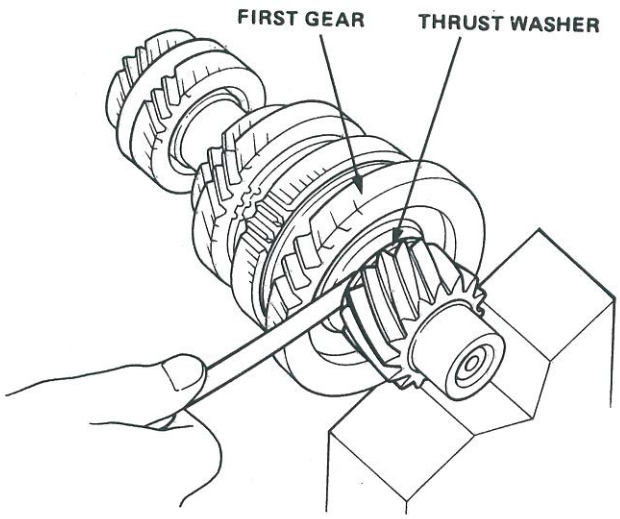
Replacement Spacer Washers

IDENTIFICATION	THICKNESS
A	1.88—1.92 mm (0.074—0.075 in.)
B	1.94—1.98 mm (0.076—0.078 in.)
C	2.00—2.04 mm (0.079—0.080 in.)
D	2.06—2.10 mm (0.081—0.082 in.)
E	2.12—2.16 mm (0.083—0.085 in.)

Countershaft Measurements

14. Measure clearance between first gear thrust washer and shoulder on first gear.

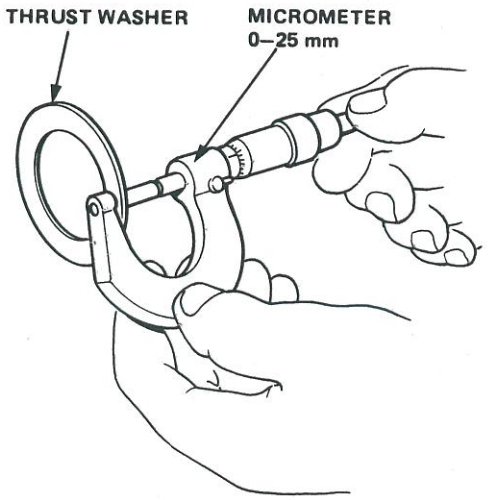
FIRST GEAR CLEARANCE
Standard (New): 0.03—0.08 mm (0.001—0.003 in.)



If out of tolerance, change thickness of first gear thrust washer after measuring all other clearances.

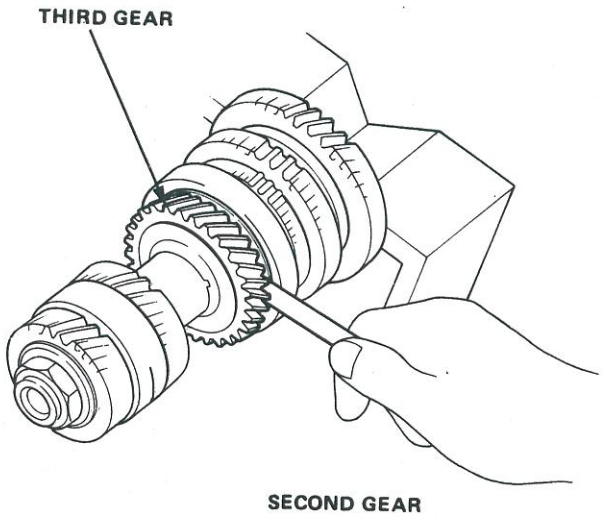
Replacement Thrust Washers

IDENTIFICATION	THICKNESS
A	2.02—2.04 mm (0.080—0.081 in.)
B	2.00—2.02 mm (0.079—0.080 in.)
C	1.98—2.00 mm (0.078—0.079 in.)
D	1.96—1.98 mm (0.077—0.078 in.)



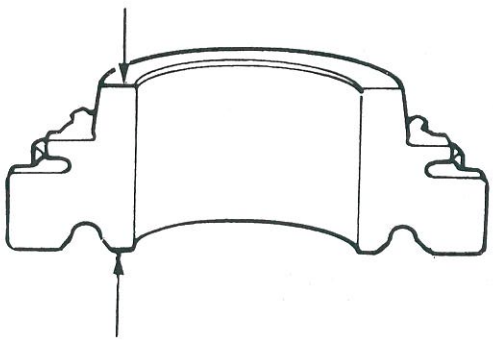
15. Measure clearance between shoulder on third gear and shoulder on second gear.

SECOND GEAR CLEARANCE
Standard (New): 0.03—0.1 mm (0.0012—0.004 in.)
Service Limit: 0.18 mm (0.007 in.)



16. If out of tolerance, measure thickness of second gear.

SECOND GEAR THICKNESS
Standard (New): 30.42—30.47 mm (1.198—1.200 in.)
Service Limit: 30.3 mm (1.192 in.)



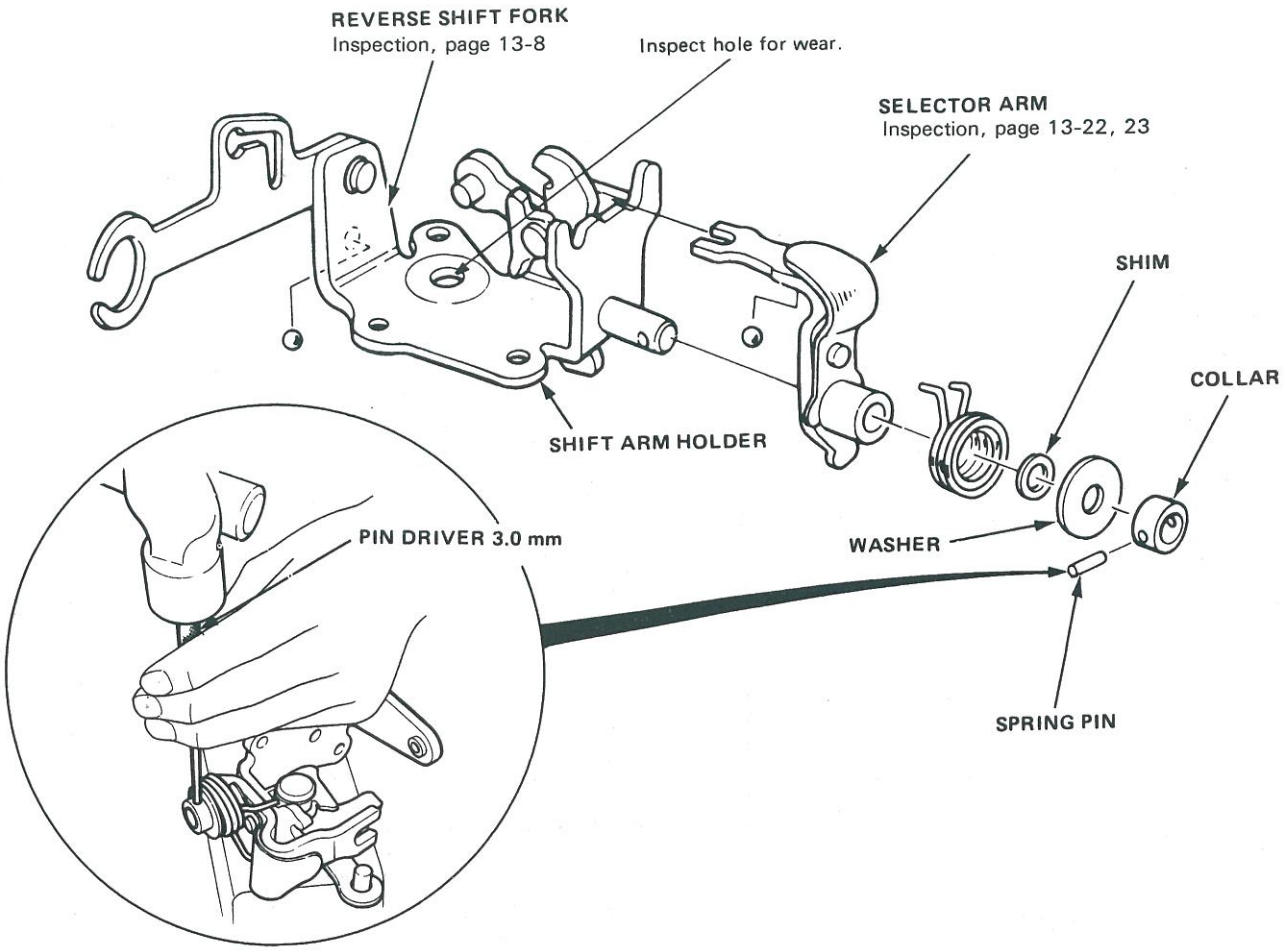
If out of limit, replace second gear.

17. After all clearances have all been checked, and those out of limits corrected, reassemble transmission mainshaft and countershaft and recheck all clearances.
If they are correct, disassemble fifth gear components and reinstall bearings in transmission housing.

Shift Arm Holder

Index

To remove selector arm from holder for shimming or replacement, drive out spring pin with driver.



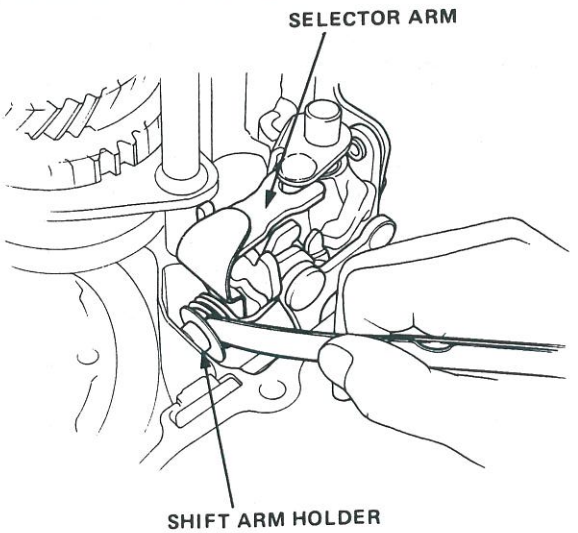
Clearances

1. Measure clearance between collar and shim on shaft of selector arm as shown.
   CLEARANCE
   Standard (New): 0.01—0.2 mm (0.0004—0.008 in.)

2. If out of tolerance, select a new shim from following table:

Collar-to-Selector Arm Shim Clearance:

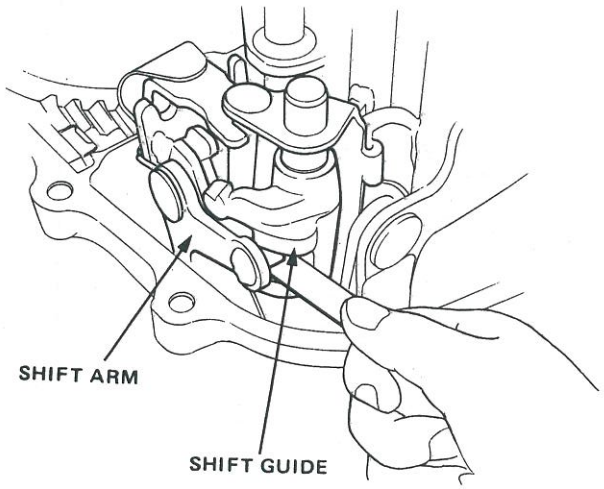
IDENTIFICATION	THICKNESS
A	0.8 mm (0.031 in.)
B	1.0 mm (0.039 in.)
C	1.2 mm (0.047 in.)
D	1.4 mm (0.055 in.)
E	1.6 mm (0.063 in.)



Shift Arm/Selector Arm

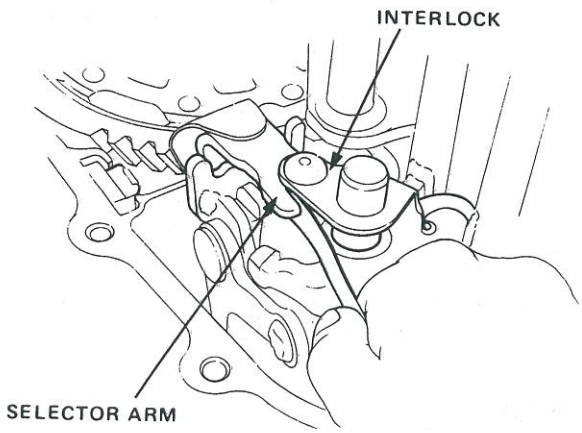
Shift Guide Clearance

1. Check shift arm-to-shift guide clearance.
   Standard (New): 0.1—0.3 mm (0.004—0.012 in.)
   Service Limit: 0.6 mm (0.024 in.)
2. If not within service limit, measure width of slot in shift guide.
   Standard (New): 7.9—8.0 mm (0.311—0.315 in.)
3. If slot is wider than standard, replace shift guide.



Interlock Clearance

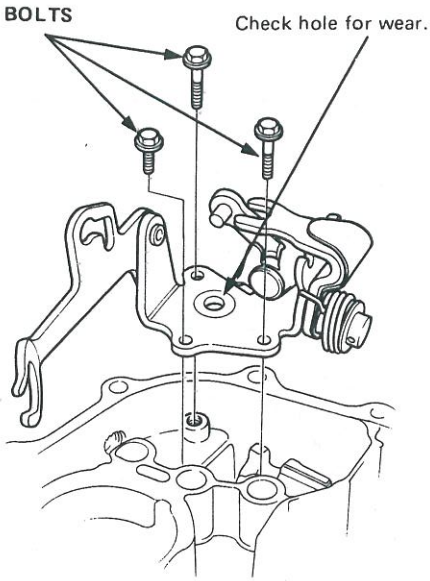
1. Check selector arm-to-interlock clearance.
   Standard (New): 0.05—0.25 mm (0.002—0.01 in.)
   Service Limit: 0.7 mm (0.03 in.)
2. If not within service limit, measure gap between selector arm fingers.
   Standard (New): 10.05—10.15 mm (0.396—0.4 in.)
3. If gap is wider than standard, replace arm.



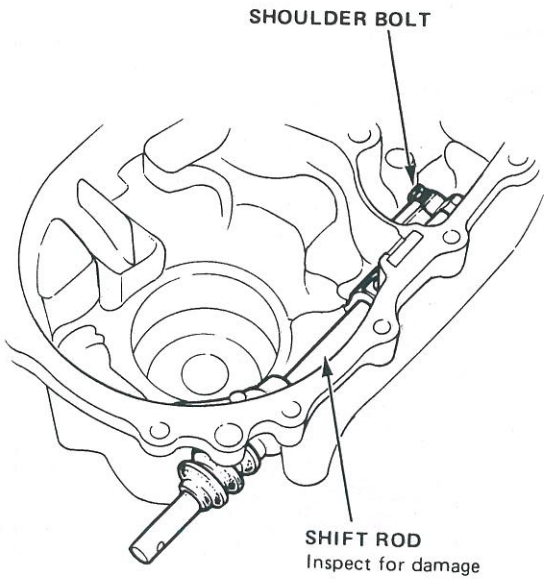
Shift Rod and Shift Arm Holder

Removal

1. Remove shift arm holder (3 bolts).



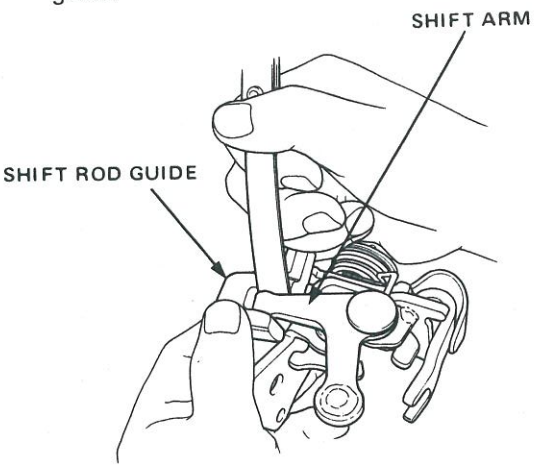
2. Remove shift rod by removing shoulder bolt.



Shift Arm/ Gear Selector Arm

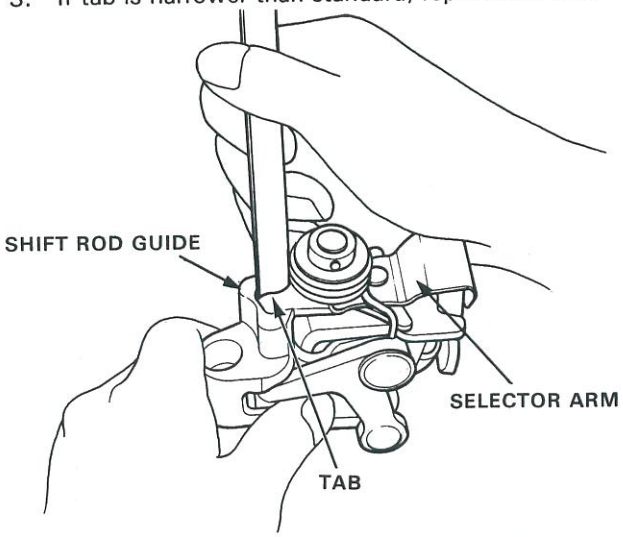
Shift Rod Guide Clearance

1. Check shift arm-to-shift rod guide clearance.
   Standard (New): 0.05—0.35 mm (0.002—0.01 in.)
   Service Limit: 0.8 mm (0.03 in.)
2. If not within service limit, measure width of slot in shift rod guide.
   Standard (New): 11.8—12.0 mm (0.46—0.47 in.)
3. If slot is wider than standard, replace shift rod guide.



Shift Rod Guide Clearance

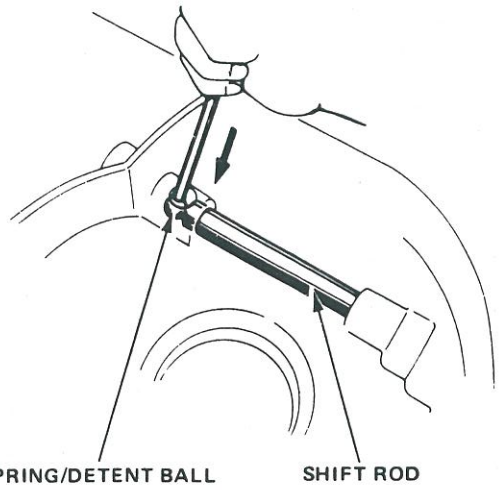
1. Check selector arm-to-shift rod guide clearance.
   Standard (New): 0.05—0.25 mm (0.002—0.01 in.)
   Service Limit: 0.5 mm (0.02 in.)
2. If not within service limit, measure width of tab on selector arm.
   Standard (New): 11.9—12.0 mm (0.469—0.472 in.)
3. If tab is narrower than standard, replace the arm.



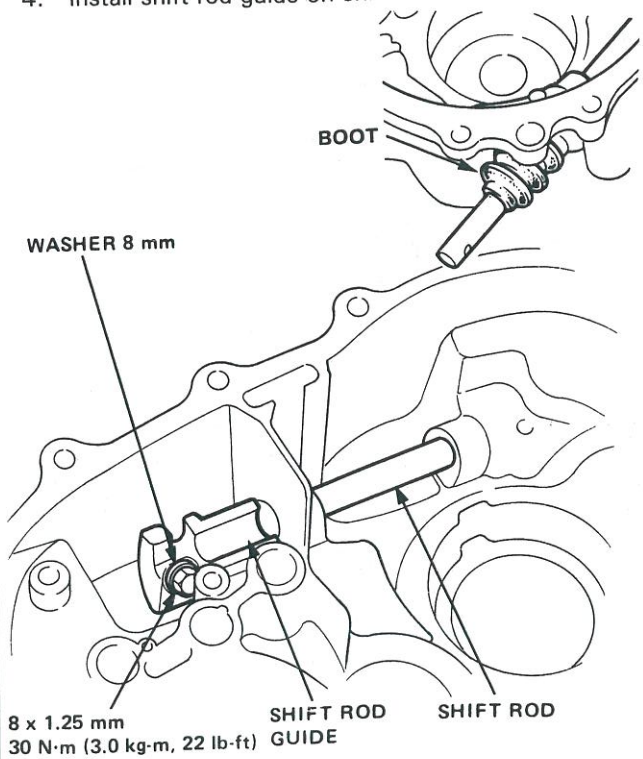
Shift Rod

Installation

1. Install shift rod with detent notches facing downward.
2. Install spring and detent ball. Lubricate spring with molylube.
3. Install shift rod while pushing detent ball in.



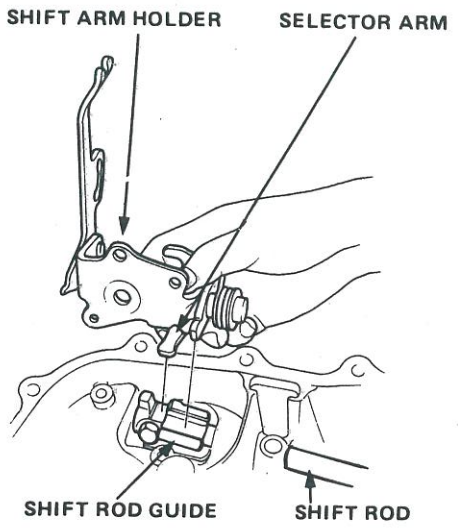
4. Install shift rod guide on shift rod.



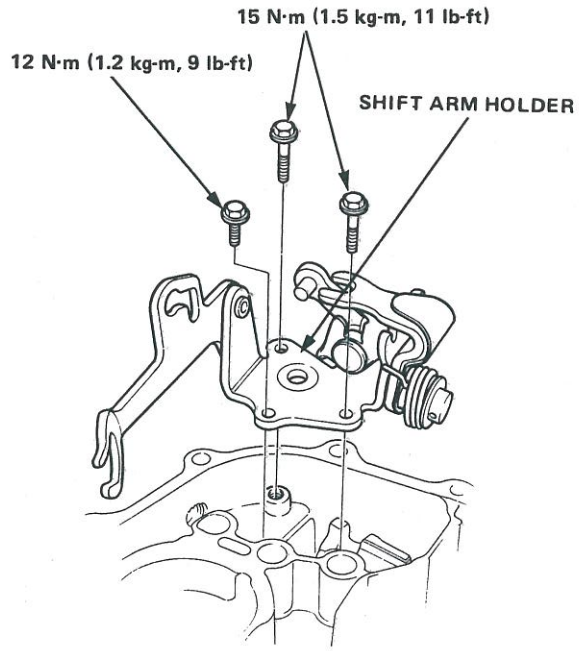
Shift Arm Holder Assy

Installation

1. Hook selector arm and shift arm into shift rod guide.



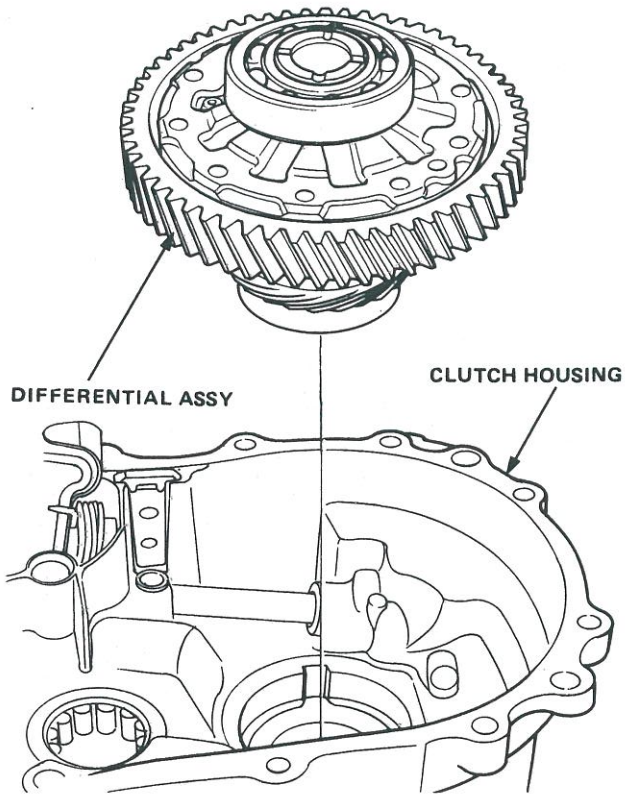
2. Install bolts in shift arm holder.



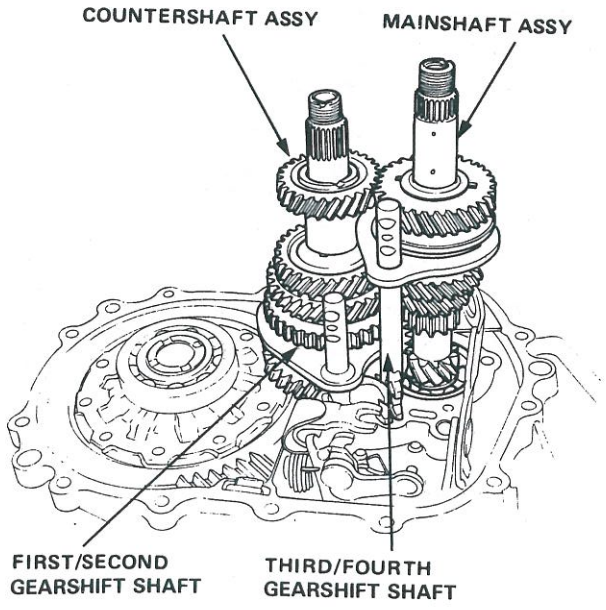
Transmission Assy

Reassembly

1. Install differential assembly in clutch housing.



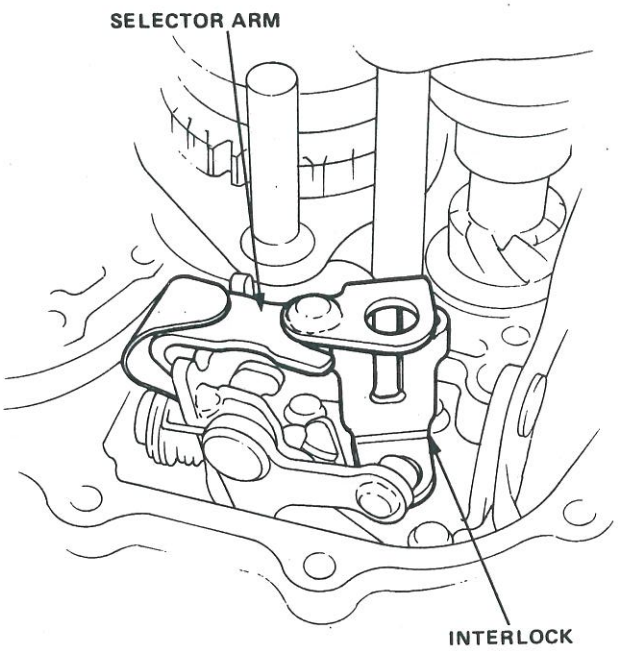
2. Install mainshaft, countershaft, first/second gear shift shaft and third/fourth gear shift shaft together as an assembly. Make sure forks are in fourth and second gear positions to make installation easier.



(cont'd)

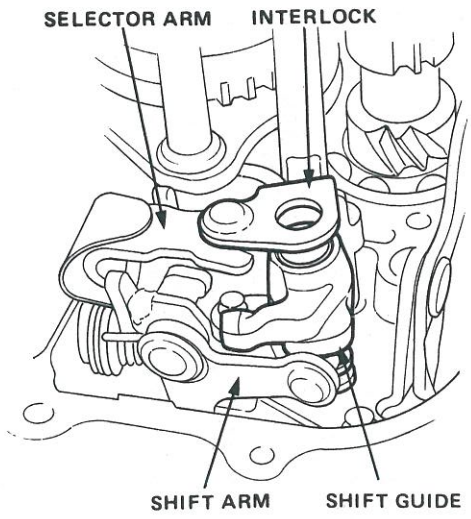
Reassembly (cont'd)

3. Lift mainshaft as shown and install interlock into the selector arm.

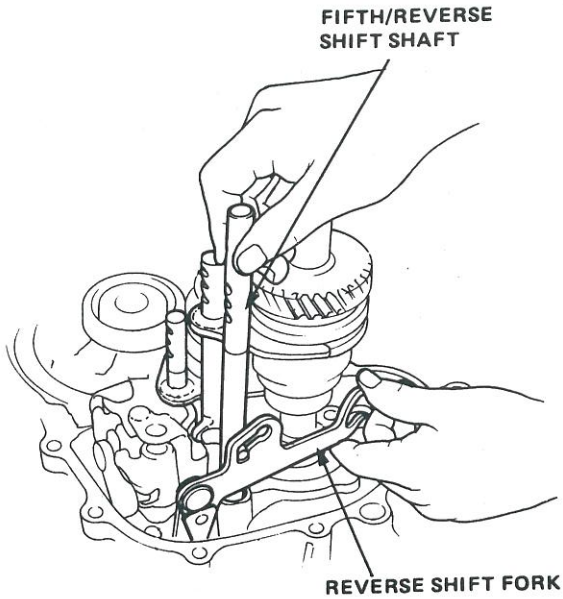


4. Place shift rod in neutral.

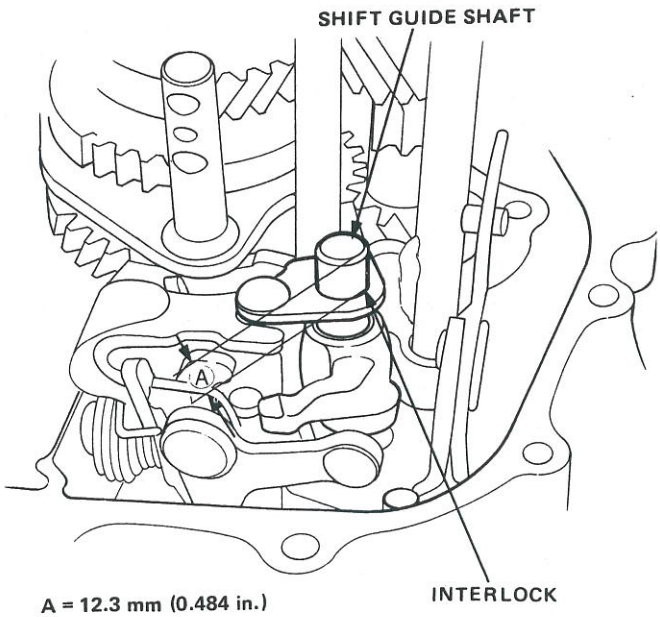
5. Hook interlock into selector arm, first/second gearshift shaft and third/fourth gearshift shaft. Hook shift guide into shift arm.



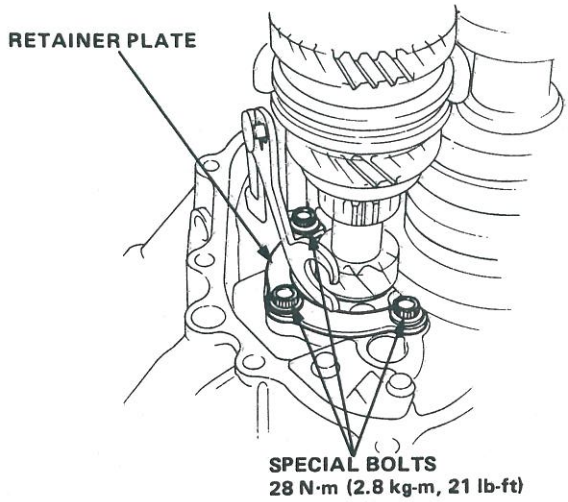
6. Install fifth/reverse shift shaft and hook its pin into reverse shift fork slot.



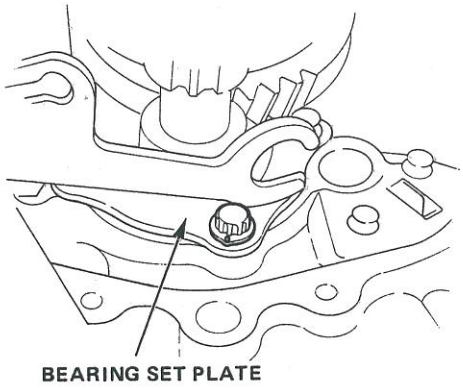
7. Install shift guide shaft so it bottoms securely in clutch housing hole. End of shaft should extend no more than 12.3 mm (0.484 in.) above interlock as shown.
If not, check installation.



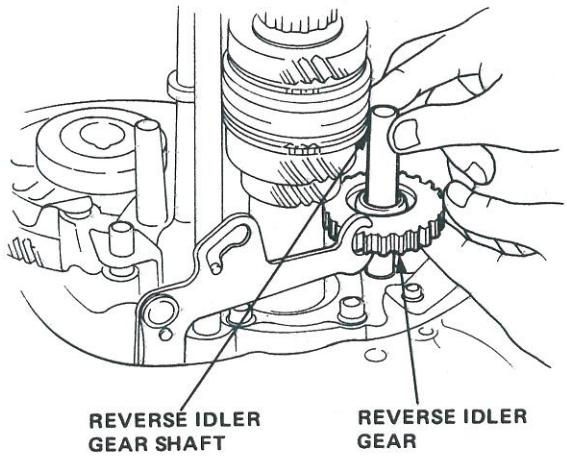
8. Install mainshaft bearing retainer plate.



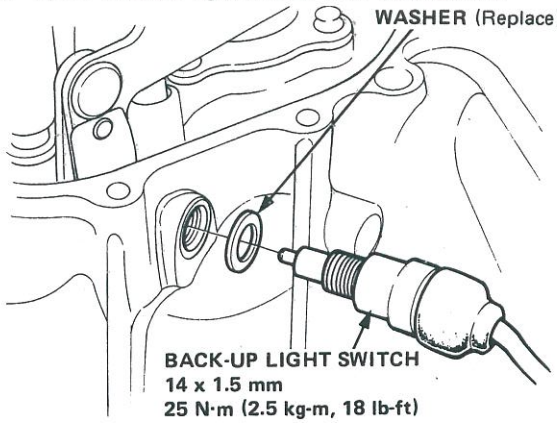
9. Stake the head of the bolt by aligning with the groove in the bearing set plate.



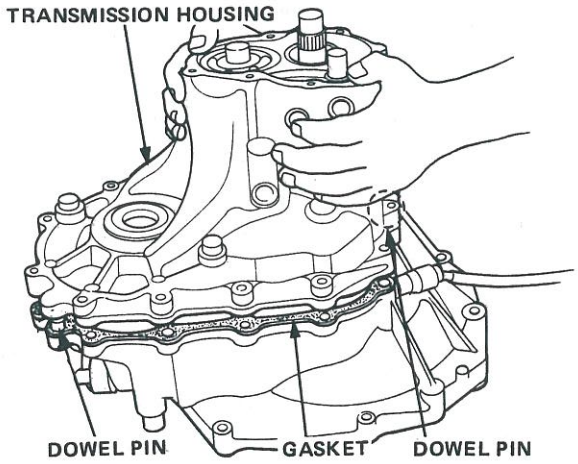
10. Install reverse idler gear and shaft.



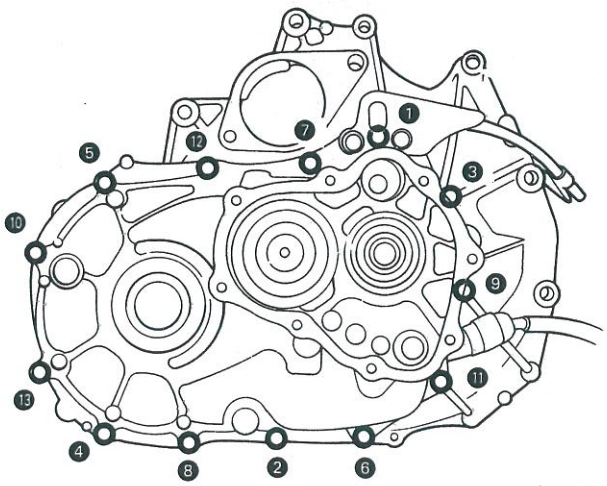
11. Install back-up light switch with new washer.



12. Place new gasket on clutch housing.
13. Install dowel pins.
14. Shift transmission into third gear to position shift guide shaft for reassembly. Install transmission housing being careful to line up shafts. Shift guide shaft must seat in blind hole in transmission housing. Do not force installation of housing.



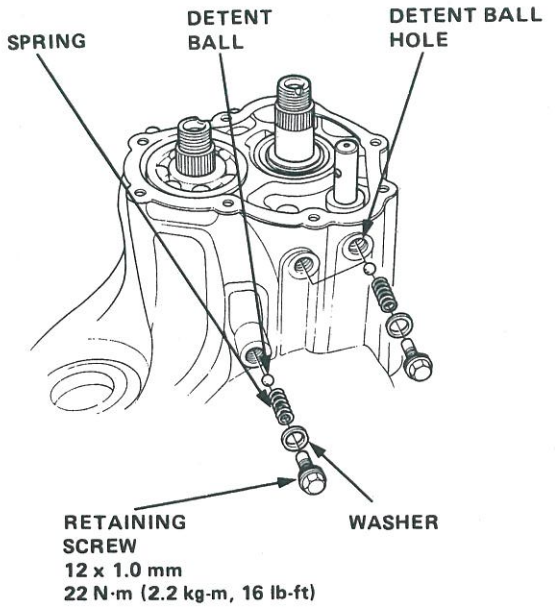
15. Torque bolts (8 x 1.25 mm) in sequence shown, to 28 N·m (2.8 kg-m, 21 lb-ft).



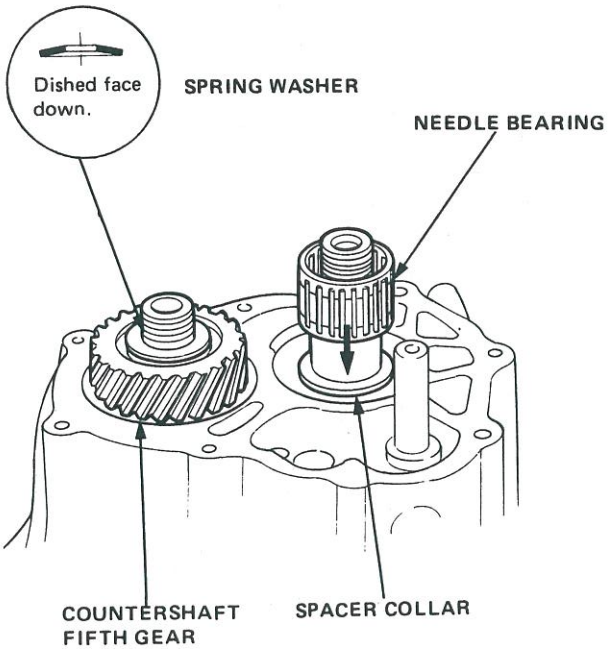
(cont'd)

Reassembly (cont'd)

16. Install three detent balls, washers, and retaining screws.

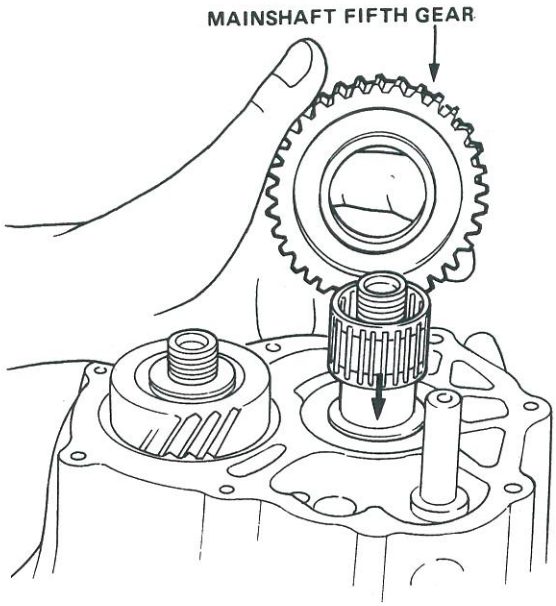


17. Install countershaft fifth gear with high side facing down. Then install spring washer with dished surface facing fifth gear.

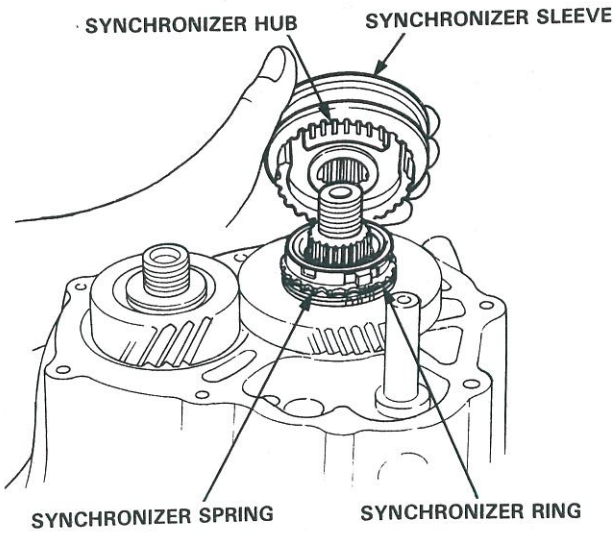


18. Install spacer collar and needle bearing on the mainshaft.

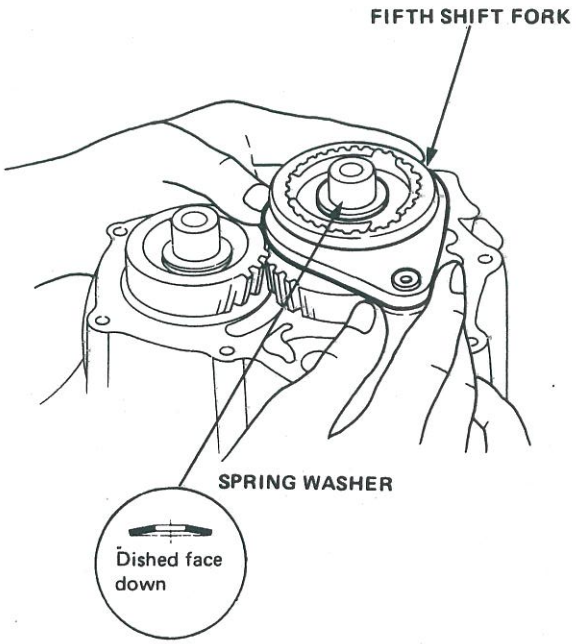
19. Install mainshaft fifth gear.



20. Install synchronizer ring, synchronizer spring, synchronizer hub and synchronizer sleeve on the mainshaft.

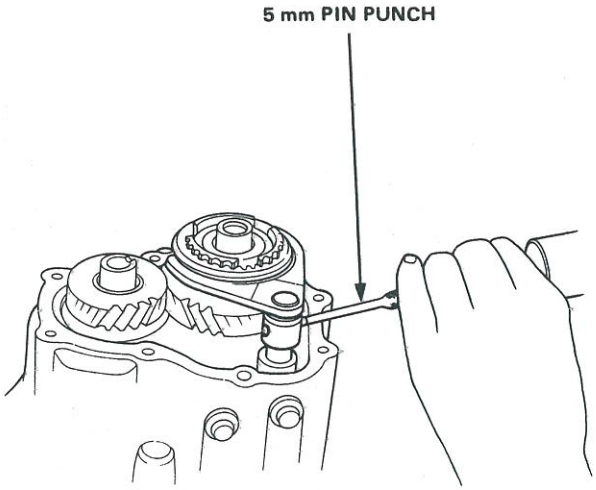


21. Install fifth shift fork into synchronizer sleeve.



22. Install spring washer with dished (concave) surface facing synchronizer hub.

23. Drive spring pin into fifth gear shift fork.

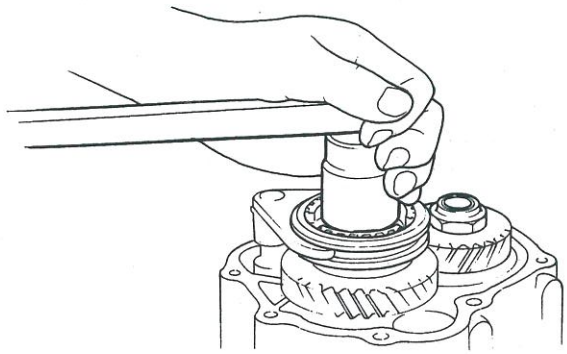


24. Install mainshaft holder 07923—6890101 to prevent shaft from rotating, then shift transmission into reverse gear.

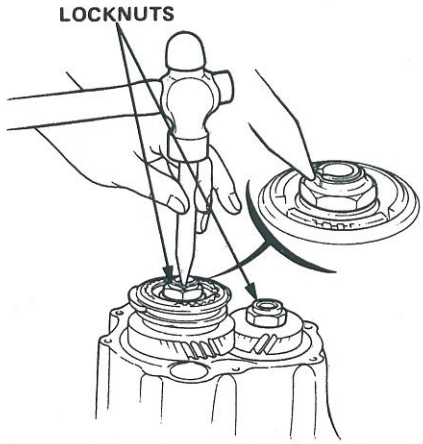
25. Torque mainshaft and countershaft locknuts. Tighten to specified torque, then loosen and retighten to same torque.

    90 N•m (9.0 kg-m, 65 lb-ft) → 0 → 90 N•m (9.0 kg-m, 65 lb-ft)

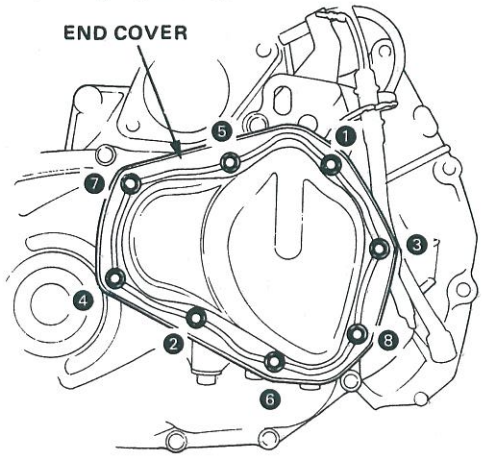
    CAUTION: The mainshaft locknut has left-hand threads.



26. Stake shoulders on locknuts into slots in mainshaft and countershaft.



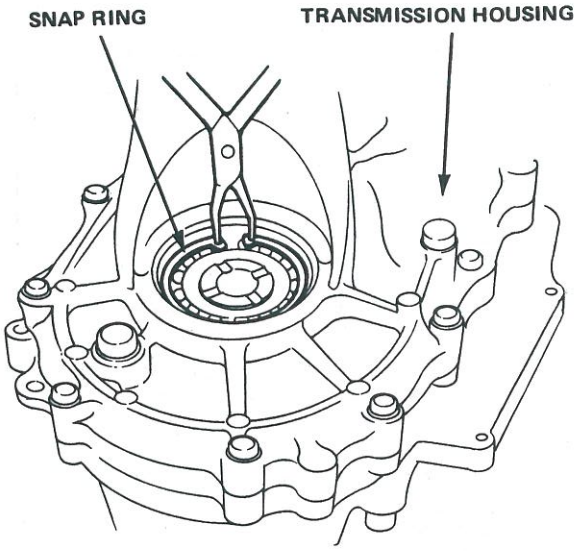
27. Install end cover on transmission housing with new gasket.
28. Torque bolts (6 × 1.0 mm) in sequence shown to 12 N•m (1.2 kg-m, 9 lb-ft).



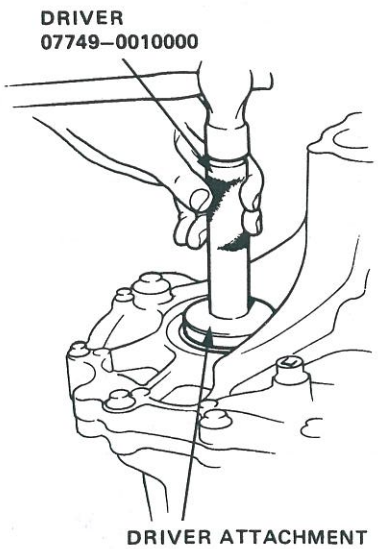
Differential Oil Seal

Installation

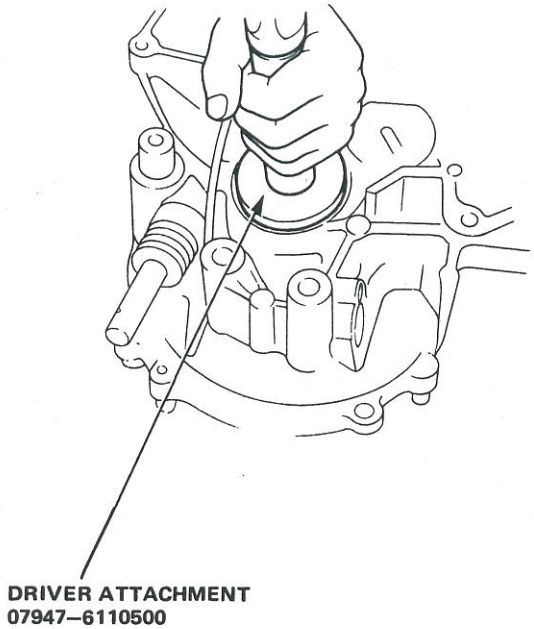
1. Install 80 mm snap ring in transmission housing. If differential bearings or carrier were replaced, select snap ring of correct thickness as shown on page 15-8.



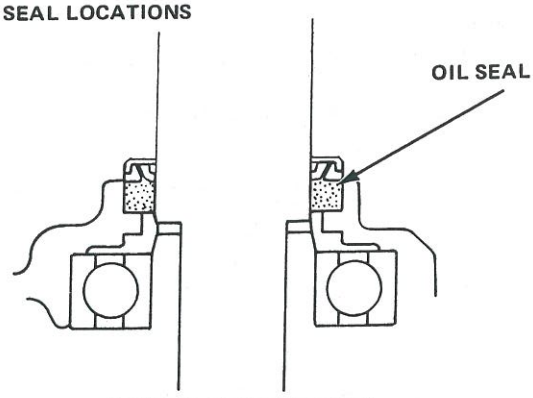
2. Drive oil seal into transmission housing with part number side facing away from snap ring.

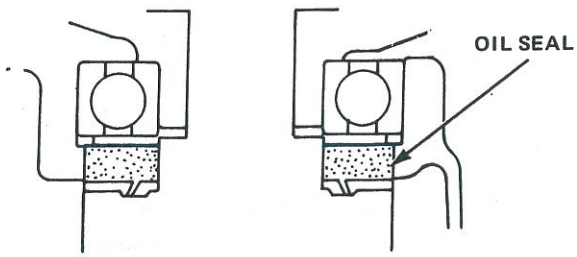


3. Drive differential oil seal into clutch housing with part number side facing away from bearing.



OIL SEAL LOCATIONS

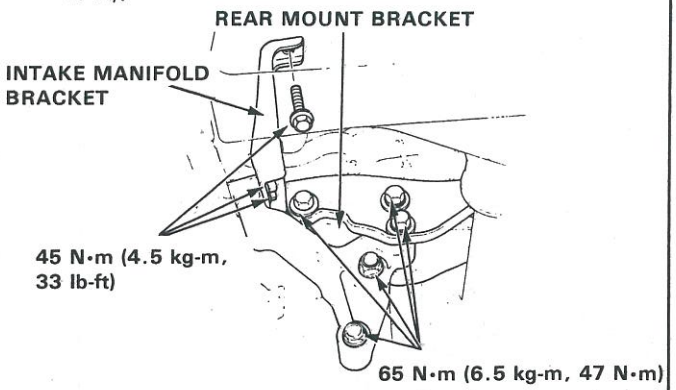




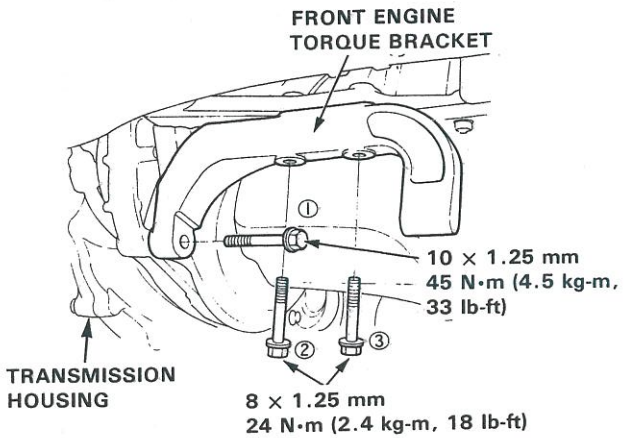
Transmission Assy

Installation

1. Place the transmission on transmission jack.
   NOTE: Clean and grease release bearing sliding surfaces.
2. Check that two 14 mm dowel pins are installed in the clutch housing.
3. Raise the transmission far enough to align dowel pins with matching holes in block.
4. Roll the transmission toward engine and fit mainshaft into clutch disc splines. If driver's side suspension was left in place, install new spring clips on both axles, then carefully insert left axle into differential as you install transmission.
   NOTE: New 26 mm spring clips must be used on both axles.
   CAUTION: Make sure that axles fully bottom. Slide axle in until you feel spring clips engage differential.
5. Push and wiggle the transmission until it fits flush with engine flange.
6. Secure transmission to engine with mounting bolts from the engine side (12 x 1.25 x 70 mm). Torque to 68 N·m (6.8 kg-m, 50 lb-ft).
7. Install the rear mount bracket on the transmission housing. Torque its bolts to 65 N·m (6.5 kg-m, 47 lb-ft).



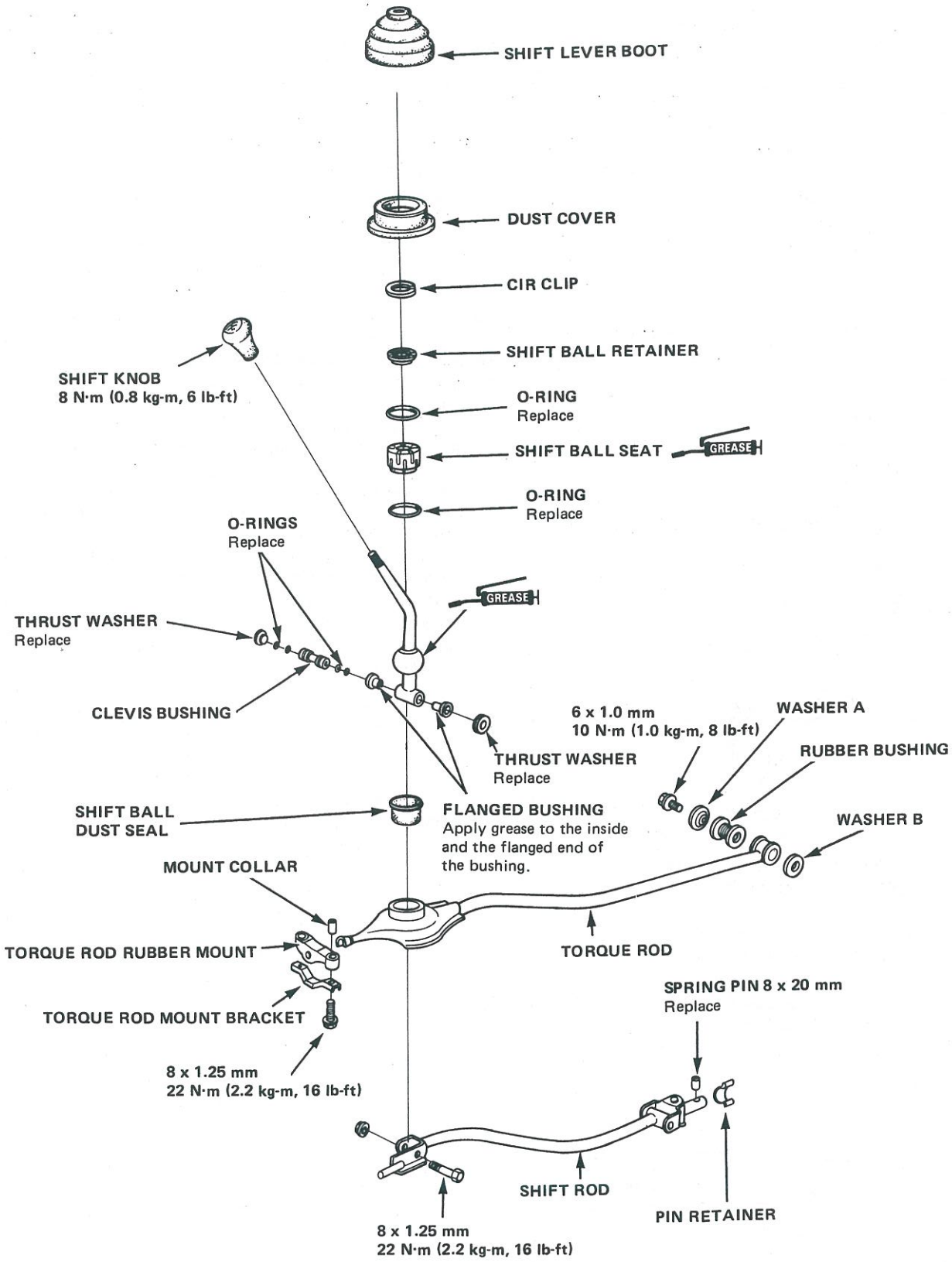
8. Install the engine torque bracket on the transmission housing. Torque its bolts to 45 N·m (4.5 kg-m, 33 lb-ft).
9. Loosely install the bolts for the front transmission mount, then torque them in the sequence shown.



10. Install the starter mounting bolts and torque to 45 N·m (4.5 kg·m, 33 lb-ft).
11. Install the intermediate shaft and, right and left driveshafts (see section 16).
12. Turn right steering knuckle/axle assembly outward far enough to insert free end of axle into transmission. Repeat on opposite side.
    CAUTION: Make sure that axles fully bottom. Slide axle in until you feel spring clips engage differential.
13. Reconnect the shift rod and shift lever torque rod.
14. Reconnect the lower arm ball joints and torque to 45 N·m (4.5 kg-m, 33 lb-ft).
15. Reconnect the tie-rod end ball joints and torque to 45 N·m (4.5 kg-m, 33 lb-ft).
16. Install the engine and wheelwell splash shields.
17. Reconnect the exhaust header pipe.
18. Install the front wheels, lower car to ground, and torque lug nuts to 110 N·m (11 kg-m, 80 lb-ft).
19. Remove the hoist chain from the 10 mm bolt on the cylinder head and engine hanger plate.
20. Install the speedometer cable.
21. Install the transmission hausing bolts and torque to 45 N·m (4.5 kg-m, 33 lb-ft).
22. Connect the clutch cable to release arm, then attach cable housing end to transmission bracket.
23. Connect the engine compartment wiring:
    - Battery positive cable to starter.
    - Black/white wire to starter solenoid.
    - Green/black and yellow wires to back-up light switch.
    - Transmission ground cable.
24. With ignition key OFF, connect ground cable to battery and transmission.
25. Refill the transmission and adjust clutch free play. (see section 12)
26. Check the transmission for smooth operation.

Gearshift Mechanism

Overhaul



Automatic Transmission

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Description

The Automatic Transmission is a combination of a 3-element torque converter and dual-shaft 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 two parallel shafts, the mainshaft and countershaft. The mainshaft is in line with the engine crankshaft.
The mainshaft includes the clutches for 1st, and 2nd/4th, and gears for 3rd, 2nd, 4th, Reverse and 1st (3rd gear is integral with the mainshaft, while reverse gear is integral with 4th gear).
The countershaft includes 3rd clutch and gears for 3rd, and 4th, Reverse and 1st.
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. When certain combinations of gears in the transmission are engaged by the clutches, power is transmitted from the mainshaft to the countershaft to provide [D3], [D4], [2] and [R].

HYDRAULIC CONTROL

The valve assembly includes the main valve body, secondary valve body, serve valve body, modulator valve body, regulator valve body and lock-up shift valve body, through the respective separator plates.
They are bolted to the torque converter case as an assembly.
The main valve body contains the manual valve, 1-2 shift valve, 2-3 shift valve, 3-4 shait valve, pressure relief valve, 2nd orifice control valve, and oil pump gear.
The secondary valve body includes the CPC valve, REV control valve, lock-up cut valve, kickdown valve, accumulator control valve and shift timing valves.

The serve valve body contains the accumulator pistons, 3rd orifice control valve, throttle A and B valves, and the modulator valve.
The regulator valve body contains the lock-up timing valves, pressure regulator valve and lock-up control valve. Fluid from the regulator passes through the manual valve to the various control valves.

The lock-up shift valve body contains a lock-up timing valve and lock-up shift valve. The 1st, 3rd and 4th cluches receive oil from their respective feed pipes.

LOCK-UP MECHANISM

In [D4], pressurized fluid is drained from the back of the torque converter through an oil passage, causing the lock-up piston to be held against the torque converter cover. As this takes place, the mainshaft rotates at the same speed as the engine crankshaft. Togehter with hydraulic control, an electronic control unit optimizes the timing of the lock-up mechanism.

The lock-up shift valve body controls the range of lock-up according to vehicle speed and throttle pressure. The lock-up timing valve controls the flow of oil to the lock-up shift valve in 3rd and 4th gear (in [D4] range).

The lock-up cut valve is housed in the secondary valve body and prevents lock-up from taking place when the throttle is not opened sufficiently.

GEAR SELECTION

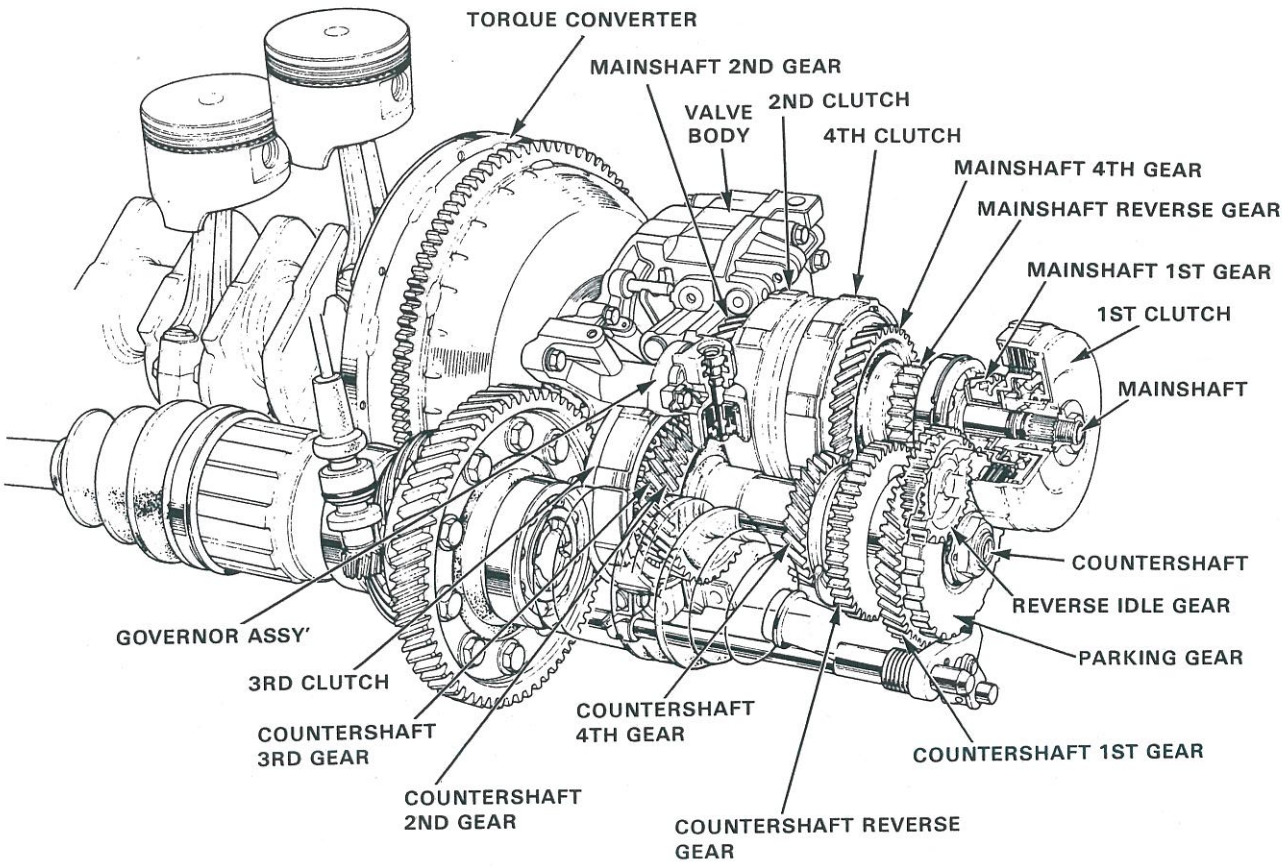
The selector lever has six positions: [P] PARK, [R] REVERSE, [N] NEUTRAL, [D4] 1st through 4th gear ranges, [D3] 1st through 3rd gear ranges, and [2] 2nd gear.

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 automaticaly to 2nd, 3rd, then 4th, depending on vehicle speed and throttle position. Downshift through 3rd, 2nd and 1st on deceleration to stop. The lock-up mechanism comes into operation in [D4]
[D3] DRIVE (1 through 3)	For rapid acceleration at highway speeds and general 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.
[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.

Starting is possible only in [P] and [N] trough use of a slide-type, neutral-safety switch.

POSITION INDICATOR

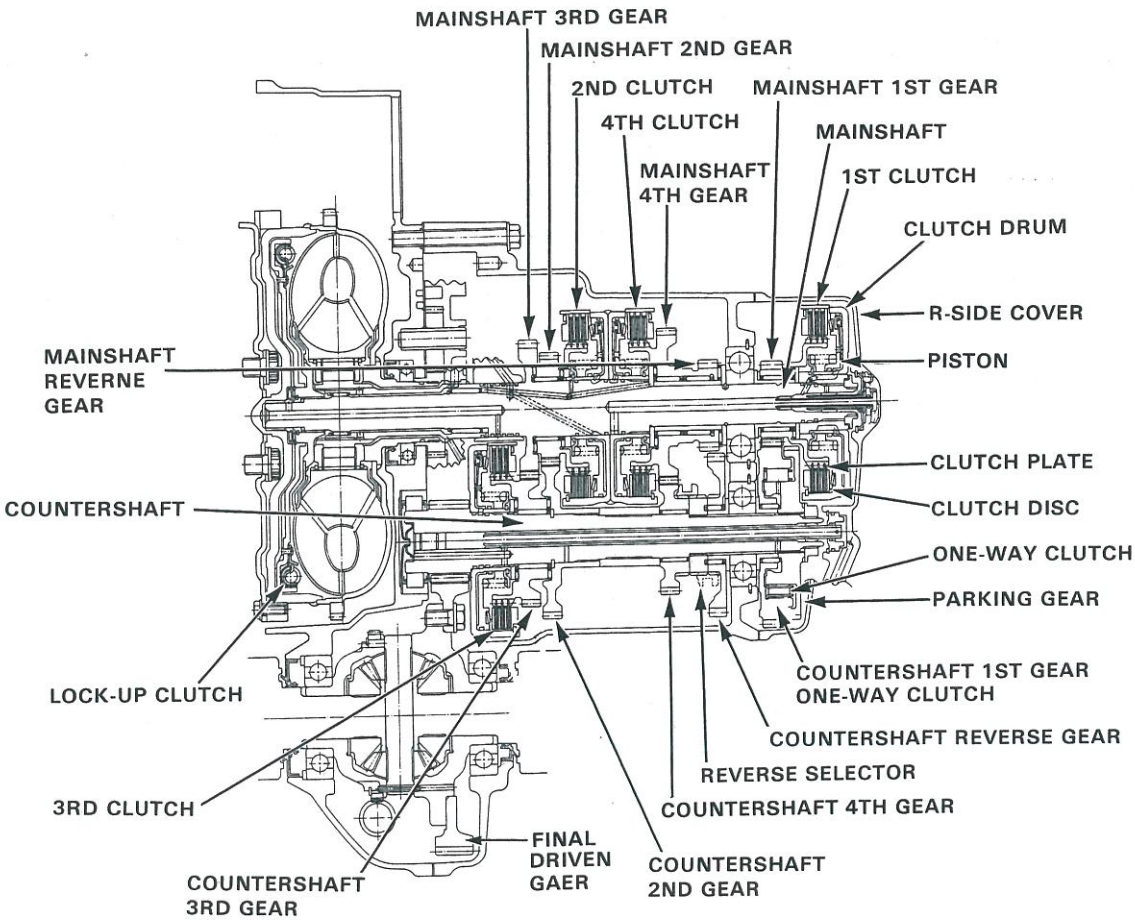
A position indicator in the instrument panel shows what gear has been selected without having to look down at the console.

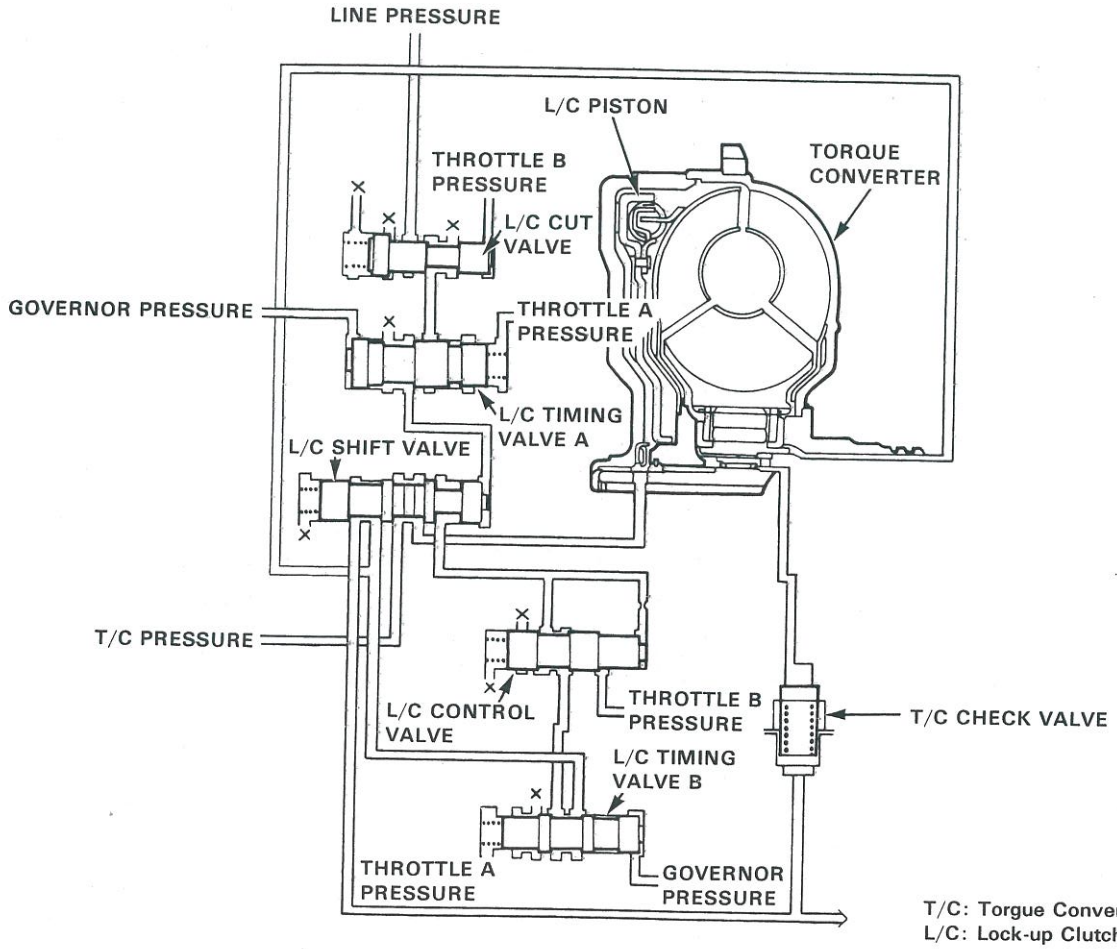


Description

Clutches

[1st Clutch]
The 1st clutch is on the right end of the mainshaft. In the D3 or D4 range, constant hydraulic pressure is applied to the mainshaft through the 1st clutch to the mainshaft 1st gear.
The clutch plate is mounted on the clutch drum, while the clutch disc is fitted to the mainshaft 1st gear.
The 1st gears are attached to the mainshaft and countershaft through needle bearings, one for each gear.
When select lever is placed in the D3 or D4 range, hydraulic pressure is applied from the right side cover through the mainshaft, and thus to the clutch drum; as the pressure rises, the clutch piston presses the clutch plate and clutch disc, thus causing the clutch to engage.
Power is transmitted from the mainshaft 1st gear, through the countershaft 1st gear, to the one-way clutch, parking gear, and finally to the countershaft. The one-way clutch locks in the forward direction when in 1st gear. In the D3 or D4 range, all others beside 1st gear are not engaged, thus transmitting no power.
[2nd Clutch]
The 2nd clutch is left of center on the mainshaft, and is the same construction as the 1st clutch;
The 2nd clutch is joined back-to-back to the 4th clutch, The mainshaft 2nd gear uses a needle bearing. The countershaft 2nd gear is splined on the countershaft.
In 2nd gear of 2, D3 , or D4, hydraulic pressure is applied to the clutch drum from the mainshaft, thus transmitting power from the mainshaft 2nd gear to the countershaft 2nd gear.
[3rd Clutch]
The 3rd clutch is on the left end of the countershaft.
The clutch hub is joined to the countershaft 3rd gear, on the countershaft, supported by a single needle bearing.
In 3rd gear of D3 or D4, hybraulic pressure is applied to the 3rd clutch on the countershaft, thus causing the clutch to engage, and transmitting power.
[4th Clutch]
The 4th clutch is identical to the 2nd clutch, to which it is joined on the mainshaft. The clutch hub is joined to the mainshaft 4th gear and reverse gear, supported by two needle bearings.
In 4th gear of D4, hydraulic pressure is generated within the mainshaft, applying pressure to the 4th clutch on the mainshaft.



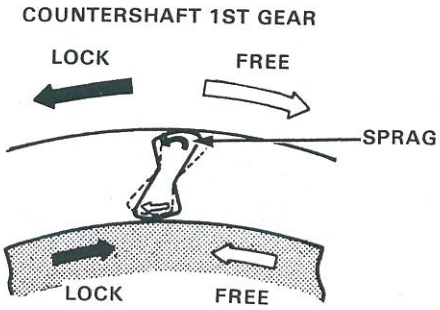


T/C: Torgue Converter
L/C: Lock-up Clutch

[One-way Clutch]

A one-way sprag clutch disengages 1st gear when in the 2nd and 3rd gear ranges. The clutch is splined to the countershaft between the 1st gear and the parking gear. It is composed of sprag elements and the retainer which supports the central section of the sprags. When the respective gaers move in the ➞ directions, the sprags incline to the left, with the result that they lock the gears together.

When shifting from 1st to 2nd in the [D3] or [D4] range, the different ratio of the two gears causes the countersaft to rotate (via 2nd gear) at a speed greater than that of 1st gear. As a result, the parking gear is rotated in the ⇨ direction, and the sprags move away from their locking position. In the 3rd gear of [D3] or [D4] the same difference of ratio keeps the sprags from locking and keeps 1st gear disengaged.



PARKING GEAR

(cont'd)

Description

Clutches (cont'd)

[Lock-up Clutch]

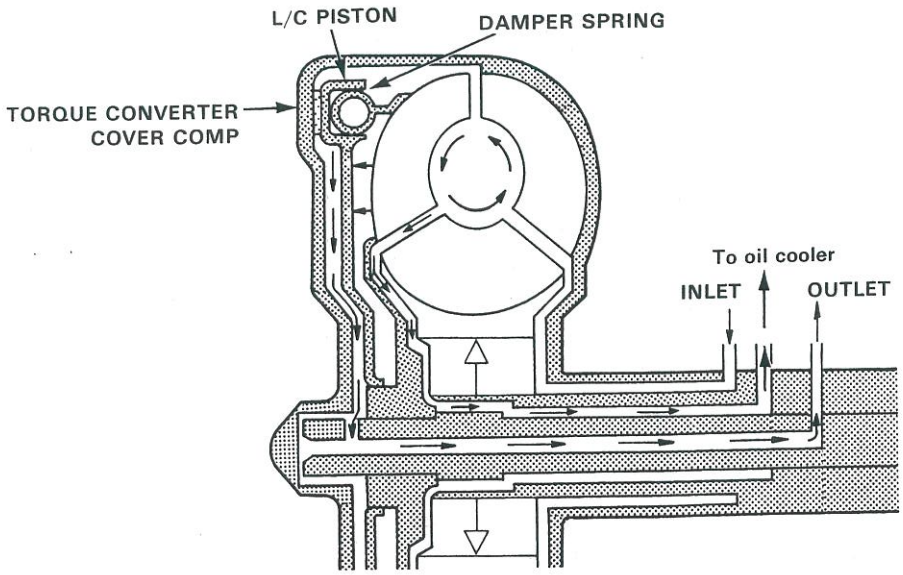
Operation (clutch on)

With the lock-up clutch on, the oil in the chamber between the converter cover and lock-up piston is discharged, and the converter oil exerts pressure through the piston against the converter cover. As a result, the converter turbine is locked on the converter cover firmly. 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
↓
Lock-up piston
↓
Damper spring
↓
Turbine
↓
Mainshaft

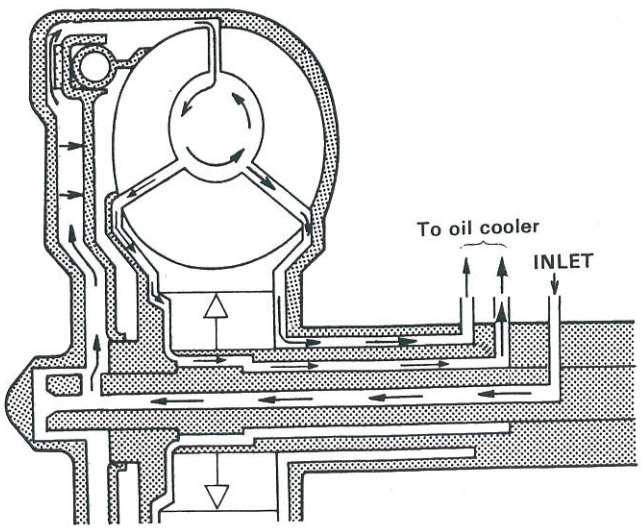


Operation (clutch off)

With the lock-up clutch off, the oil flows in the reverse of CLUTCH ON. As a result, the lock-up psiton is moved away from the converter cover; that is, the torque converter lock-up is released.

Power flow

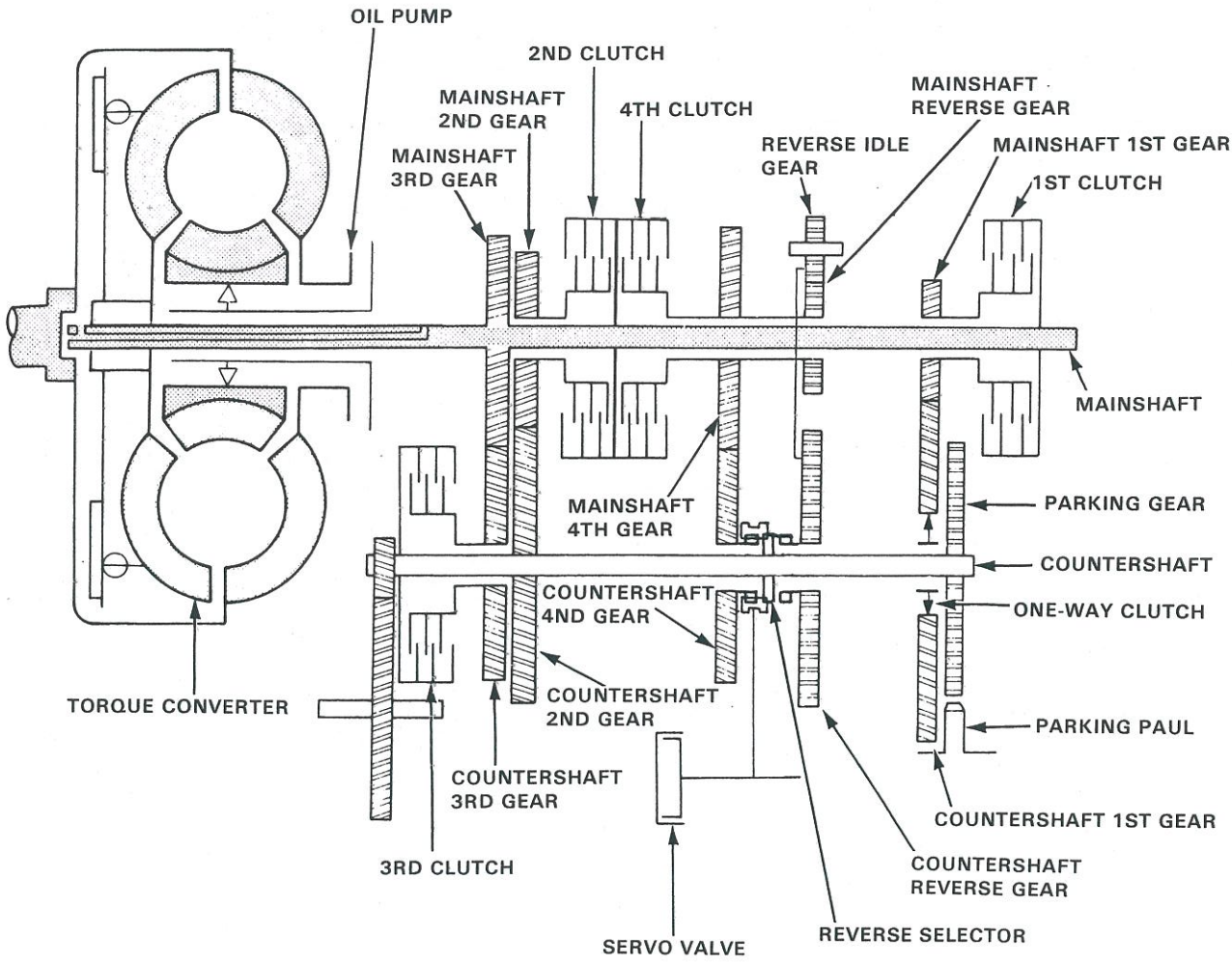
Engine
↓
Drive plate
↓
Torque converter cover
↓
Pump
↓
Turbine
↓
Mainshaft



Power Flow

RANGE \ PART		TORQUE CONVERTER	1ST GEAR 1ST CLUTCH	1ST GEAR ONE-WAY CLUTCH	2ND GEAR 2ND CLUTCH	3RD GEAR 3RD CLUTCH	4TH GEAR	4TH CLUTCH	REVERSE GEAR	PARKING GEAR
P		○	×	×	×	×	×	×	×	○
R		○	×	×	×	×	×	○	○	×
N		○	×	×	×	×	×	×	×	×
D3	1ST	○	○	○	×	×	×	×	×	×
	2ND	○	※○	×	○	×	×	×	×	×
	3RD	○	※○	×	×	○	×	×	×	×
D4	1ST	○	○	○	×	×	×	×	×	×
	2ND	○	※○	×	○	×	×	×	×	×
	3RD	○	※○	×	×	○	×	×	×	×
	4TH	○	※○	×	×	×	○	○	×	×
2	2ND	○	×	×	○	×	×	×	×	×

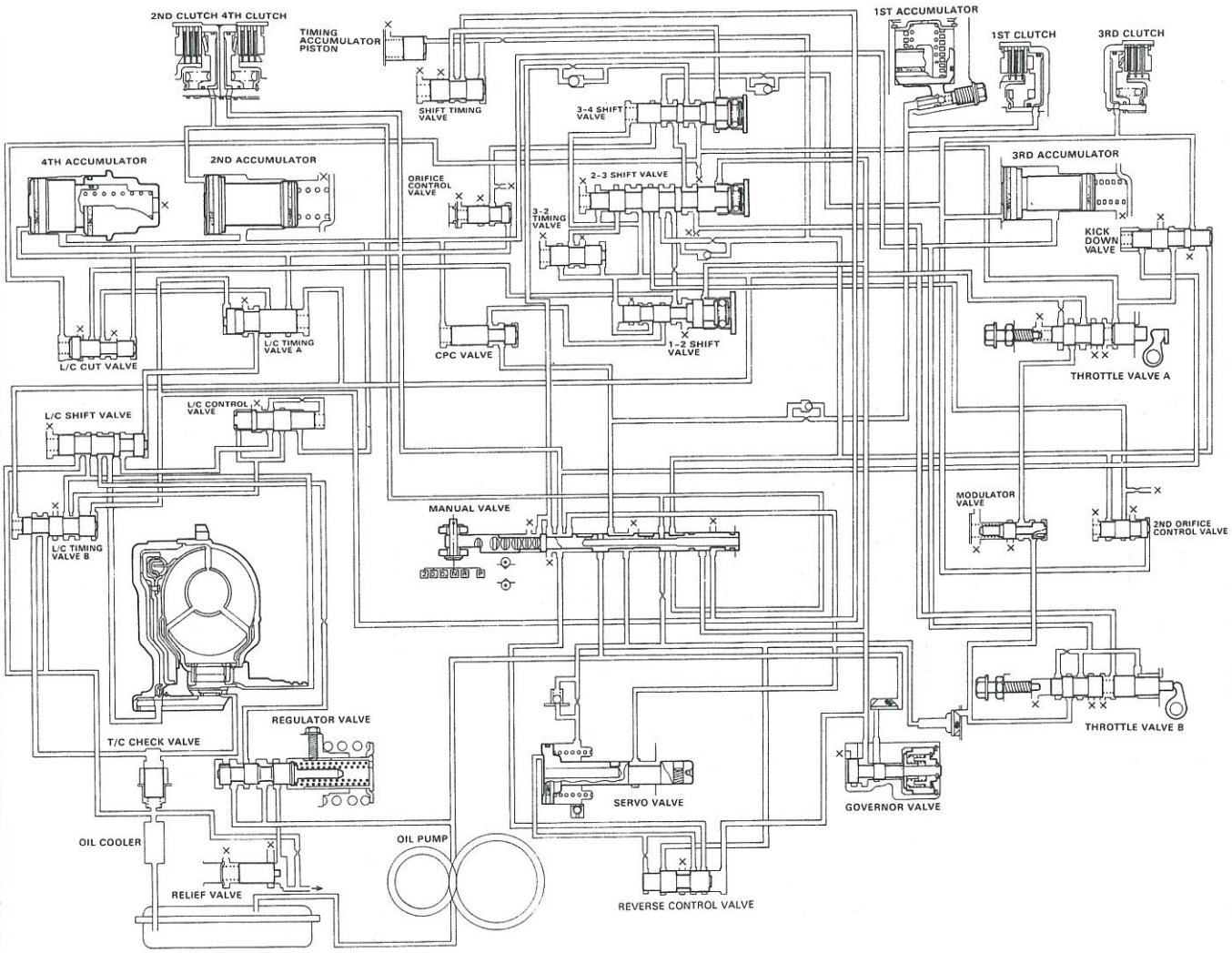
○: Engaged ×: Not Engaged ※: Although the 1st clutch engages, driving power in not transmitted as the one-way clutch races.



Descriptiom

Hydraulic Flow

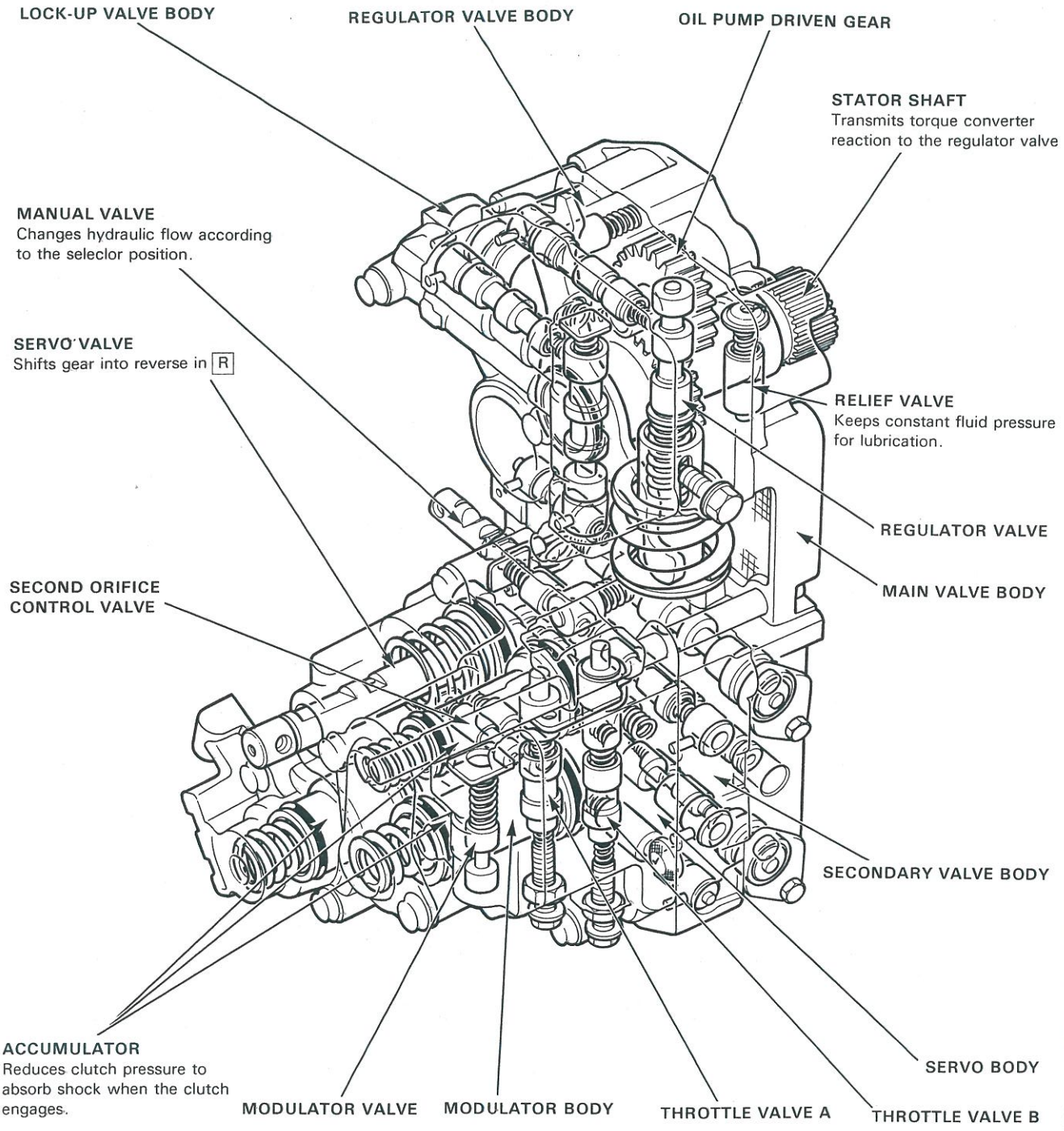
No.	DESCRIPTION OF PRESSURE	No.	DESCRIPTION OF PRESSURE	No.	DESCRIPTION OF PRESSURE	No.	DESCRIPTION OF PRESSURE
1	LINE	10	1ST CLUTCH	40	4TH CLUTCH	90	TORQUE CONVERTER
2	↑	11	↑	41	↑	91	↑
3	↑	20	2ND CLUTCH	42	↑	92	↑
3'	↑	21	↑	50	THROTTLE A	93	OIL COOLER
3"	↑	22	↑	51	↑	94	TORQUE CONVERTER
4	↑	23	↑	55	THROTTEL B	95	LUBRICATION
4'	↑	24	↑	56	↑	96	TORQUE CONVERTER
5	↑	30	3RD CLUTCH	60	GOVERNOR	97	↑
6	MODULATOR	31	↑	61	↑	99	SUCTION



X: BLEED

Hydraulic Control

In the hydraulic control unit, the regulator valve, manual valve and oil pump connected to the torque converter are unified and contained inside the valve body. The valve body includes the main valve body, the regulator valve body, the secondary valve body, the servo body, and the lock-up valve body.
The oil pump is driven by splines on the left 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, governor lalve, and servo body, directing pressure to each of the clutches.



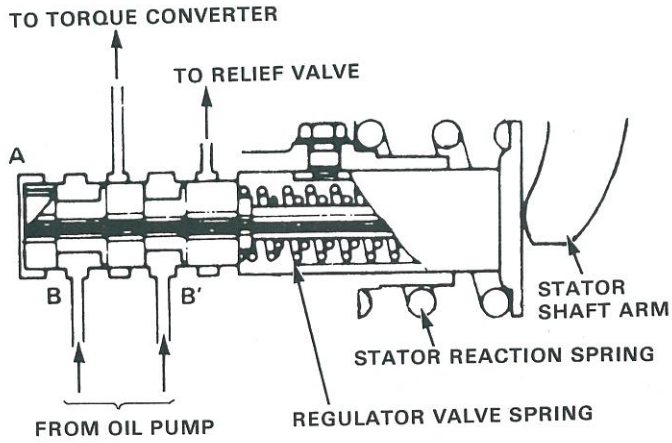
(cont'd)

Description

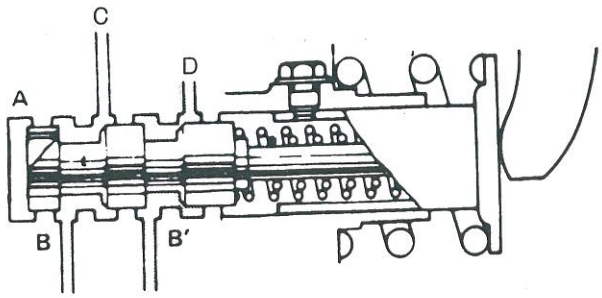
Hydraulic Control (cont'd)

[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.

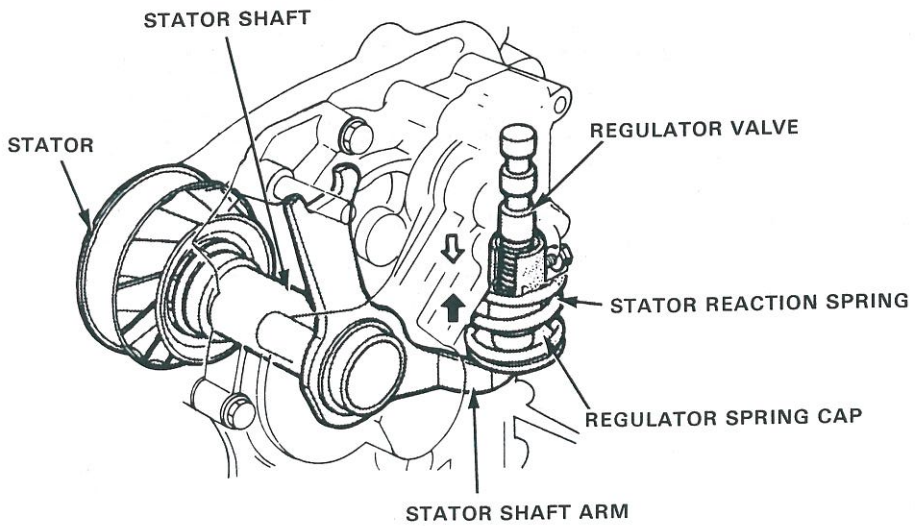
(ENGINE NOT RUNNING)



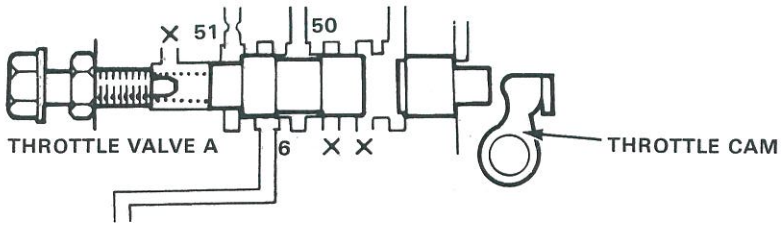
(ENGINE RUNNING)



(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 → 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.

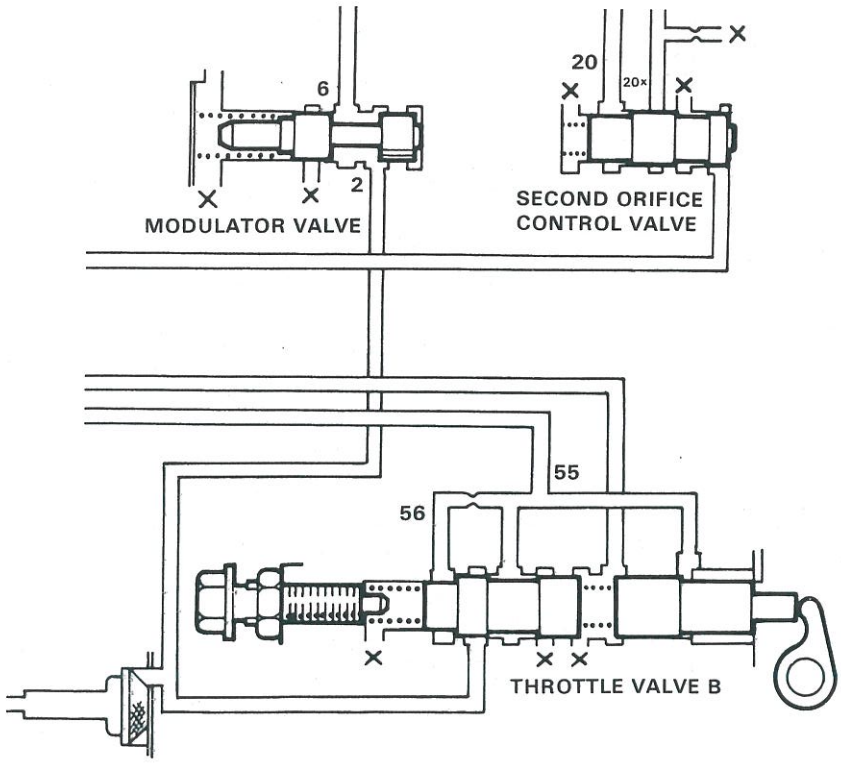


[**Throttle Valve A**]
Throttle Valve A converts changes in the throttle opening to changes in transmission hydraulic pressure, to determine transmission shift timing. The end of the valve contacts the throttle cam which is connected by a cable to the throttle body. The cable pulls the cam, which, in turn moves the valve. The valve-to-cam engagement is adjustable to allow setting of specifeid shift speeds.



[**Throttle Valve B, Mdulator Valve**]
Throttle valve B is similar to valve A, except that it operates on accumulator back pressure, to make smooth changes from one gear to another. An assist function is used to lessen the throttle load. The modulator valve maintains line pressure from the regulator, after which the pressure to throttle valve A, thus maintaining accurate shift characteristics.

[**Second Orifice Control Valve**]
For smooth shifing between second to third, the open pressure on the second gear side is relieved through a fixed orifice. The valve also moves to equalize pressure differences between second and third gears.



Symptom-to-System

SYMPTOM	Check these items on PROBABLE CAUSE LIST	Check these items on NOTES PAGE
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 D3 or D4.	8, 29, 44, 48	C, M, O
Car moves in D3, D4 and R, but not in 2.	9, 30, 49	C, L
Car moves in D3, D4 and 2, but not in R.	1, 11, 12, 22, 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
Slips in low gear.	8, 29, 44, 45, 48	C, N, O, U
Slips in 2nd gear.	9, 20, 23, 30, 45, 49	C, L, U
Slips in 3rd gear.	10, 21, 23, 31, 44, 45	C, L, U
Slips in 4th gear.	11, 23, 32, 45	C, L, U
Slips in reverse gear.	11, 32	C
Slips on 2–3 upshift.	3, 15, 24	E, L, V
Slips on 3–4 upshift.	3, 15, 25	E, L, V
No upshift; trans stays in low gear.	12, 13, 14, 19, 23	E, F, G, L
No downshift to low gear.	12, 19	G, L
Late upshift.	2, 12, 13, 14	E, F, L, V
Early upshift.	3, 13, 14	E, F, L, V
Erratic shifting.	2, 14, 26	E, F, V
Harsh shift (up & down shifts).	2, 4, 15, 23, 24, 25, 27, 47	A, E, H, I, L, V
Harsh shift (1–2).	2, 9	C, D, V
Harsh shift (2–3).	2, 10, 23, 24	C, D, H, L, V
Harsh shift (3–4).	2, 11, 23, 25	C, D, I, L, V
Harsh kickdown shifts.	2, 23, 27	L, V, Q
Harsh kickdown shift (2–1).	48	O
Harsh downshift (3–2) at closed throttle.	15	E, T
Axle(s) slips out of trans on turns.	43, 50	L, P, Q
Axle(s) stuck in trans.	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, 51	K, L, Q
Noise from trans in all selector lever positions.	6, 17	K, L, Q
Noise from trans only when wheels rolling.	39, 42	L, Q
Gear whine, rpm related (pitch changes with shifts).	6, 41	K, L, Q
Gear whine, speed related (pitch changes with speed).	39, 42	L, Q
Trans will not shift into 4th gear in D4.	1, 21, 28	L
Engine stalls on emergency stops (shift lever in D4 only).	2, 33	L, V
Lockup clutch does not lock up smoothly.	35, 37, 17	L
Lockup clutch does not operate properly.	2, 3, 12, 15, 18, 33, 34, 35, 36, 37	E, L, V
Transmission has multitude of problems shifting, at disassembly large deposits of metal found on magnet.	43	L, Q

The following symptoms can be caused by improper repair or assembly.	Check these items on PROBABLE CAUSE DUE TO IM-PROPER REPAIR	Check these ITEMS ON NOTES PAGE
Car creeps in N.	R1, R2	
Car does not move in D3 or D4.	R5	
Trans lock up in R.	R4	
Trans has no park.	R3	
Excessive drag in trans.	R8	RK
Excessive vibration, rpm related.	R9	
Noise with wheels moving only.	R7	
Main seal pops out.	R10	S
Various shifting problems.	R11, R12	
Harsh upshifts.	R13	
In D3 or D4 trans starts in 2nd gear.	R6	

	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 seized
7.	Pressure regulator stuck
8.	Low clutch defective
9.	2nd clutch defective
10.	3rd clutch defective
11.	4th clutch defective
12.	Governor valve stuck
13.	Throttle A valve stuck
14.	Modulator valve stuck
15.	Throttle B valve stuck
16.	Oil screen clogged
17.	Torque convertor defective
18.	Torque governor check valve stuck
19.	1–2 shift valve stuck
20.	2–3 shift valve stuck
21.	3–4 shift valve stuck
22.	Reverse control valve stuck
23.	Clutch pressure control valve stuck
24.	2nd orifice control valve stuck
25.	3rd orifice control valve stuck
26.	3–2 timing valve stuck
27.	Kickdown valve stuck
28.	Shift timing valve/accur stuck
29.	Low clutch accumulator defective
30.	2nd clutch accumulator defective
31.	3rd clutch accumulator defective
32.	4th/reverse accumulator defective
33.	Lockup clutch cut valve stuck
34.	Lockup clutch timing valve A stuck
35.	Lockup clutch timing valve B 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 gear 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

PROBABLE CAUSE	
45.	Servo valve check valve loose
46.	Gear clearance incorrect
47.	Clutch clearance incorrect
48.	Sprag clutch defective
49.	Sealing rings/guide worn
50.	Axle-inboard joint clip missing
51.	4th gears worn/damaged (2 gears)

PROBABLE CAUSES DUE TO IMPROPER REPAIR	
R1	Improper clutch clearance
R2	Improper gear clearance
R3	Parking pawl installed upside down
R4	Parking shift arm installled upside down
R5	Sprag clutch installed upside down
R6	Feed pipe missing in governor shaft
R7	Reverse hub installed upside down
R8	Oil pump binding
R9	Torque converter not fully seated in oil pump
R10	Main seal improperly installed
R11	Springs improperly installed
R12	Valves improperly installed
R13	Ball check valves not installed
R14	Shift fork bolt not installed

NOTES	
A	Flushing procedure (repeat 3 times): 1. Drain the trans. 2. Refill with 3 qts. of Dexron recommended type ATF. 3. Start engine and shift trans to D4. 4. Let trans shift through gears at least 5 times. 5. Shift to reverse and neutral at least 5 times. 6. Drain and refill.
B	Set idle rpm in gear to specified idle speed. If still no good, adjust the motor mounts as outlined in engine section of service 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.
F	If the modulator valve is stuck open (does not modulate line pressure), the trans will shift normally with less than 5/8 throttle but will shift up very late over 5/8 throttle. If the modulator valve is stuck closed, throttle valve A pressure will be zero and result in early upshifts and no forced downshifts.
G	If the 1–2 valve is stuck closed, the transmission will not upshift. If stuck open, the transmission has no low gear.
H	If the 2nd orifice control valve is stuck, inspect the 2nd and 3rd clutch packs for wear.
I	If the 3rd 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 low gear.

NOTES	
K	Improper alignment of main valve body and torque converter case may cause oil pump seizure. The symptoms are mostly an rpm related—ticking noise high pitched squeak. In severe instances, it may stall the engine. Follow instruction procedure on page 14-58.
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 low 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 broken.
N	Replace the mainshaft if the bushings for the low-and 4th feedpipe are loose or damaged. If the low 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 trans 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. Governor shaft woodruff key 2. Reverse selector gear teeth chamfers 3. Engagement teeth chamfers of countershaft 4th & reverse gear 4. Shift fork, for scuff marks in center 5. Differential pinion shaft for wear under pinion gears 6. Bottom of 3rd clutch for swirl marks Replace items 1, 2, 3 and 4 if worn or damaged. If trans makes clicking, grinding or whirring noise, also replace mainshaft 4th gear and reverse idler gear and counter 4th gear in addition to 1, 2, 3, or 4. If differential pinion shaft is worn, overhaul differential assy and replace oil screen and thoroughly clean trans flush torque converter and cooler and lines. If bottom of 3rd clutch is swirled and trans makes gear noise, replace countershaft and ring gear.
R	Be very careful not to damage the torque converter case 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 case. When pushing it into the torque converter case 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, check this adjustment, too. See page 14-75.
U	Check if servo valve check 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.

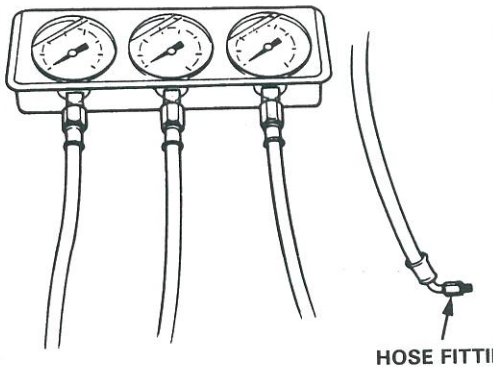
Pressure

Testing

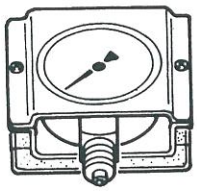
NOTE:

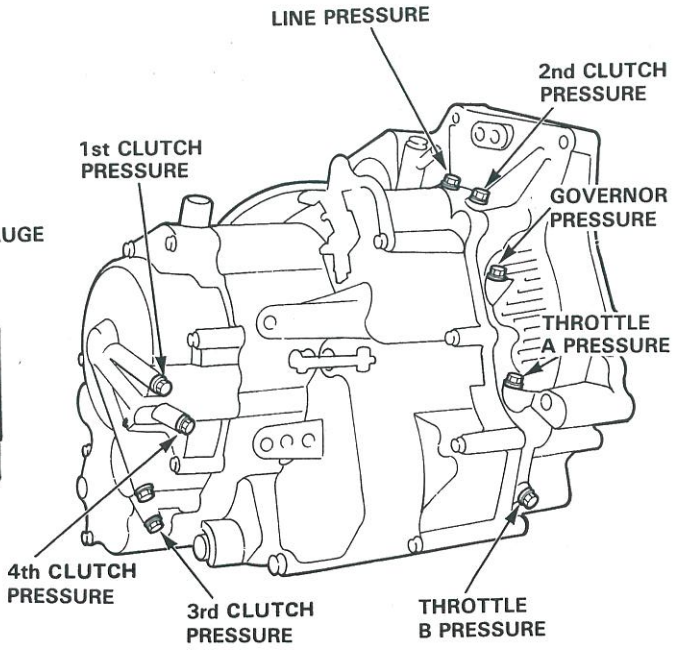
- Stop engine when attaching hoses for pressure tests.
  Torque hose fitting to 18 N·m (1.8 kg-m, 12 lb-ft).
- Do not reuse aluminum washers.
- For throttle and governor test, use Low Pressure Gauge, 07406—0070000.

GAUGE SET 07406—00200002
(includes pressure hose set 07406—0020201)



LOW PRESSURE GAUGE
(07406—0070000)





CAUTION: Before checking, be sure transmission is filled to proper level.

PRESSURE	SELECTOR POSITION	MEASUREMENT	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
					Standard	Service Limit
LINE	N or P	• With parking brake applied. • Run engine at 2,000 rpm.	No (or low) LINE pressure	Torque converter, oil pump pressure regulator, torque governor check valve, oil pump	834—883 kpa (8.5—9.0 kg/cm², 121—128 psi)	785 kpa (8.0 kg/cm², 114 psi)
1st	D3 or D4	MEASUREMENTS • With parking brake applied raise front wheels off ground and support with safety stands. • Run engine at 2,000 rpm.	No (or low) FIRST pressure	1st clutch O-ring	834—883 kpa (8.5—9.0kg/cm², 121—128psi)	785 kpa (8.0 kg/cm², 114 psi)
2nd	2		No (or low) SECOND pressure	2nd clutch O-ring	441—883 kpa (4.5—9.0 kg/cm², 64—128 psi) varies with throttle open.	392 kpa (4.0 kg/cm² 57 psi) with lever released. 785 kPa (8.0 kg/cm², 114 psi) with lever in full throttle position
3rd	D3		No (or low) THIRD pressure	3rd clutch		
4th	D4		No (or low) FOURTH pressure	4th clutch		
	R			Servo valve		
THROTTLE	D3 or D4	• With parking brake applied raise front wheels off ground and support with safety stands. • Run engine at 1,000 rpm. • Disconnect throttle control cable at throttle lever. • Read pressure with lever released. • Manually push lever up simulating full throttle. • Read pressure with lever in full throttl position.	No (or low) THROTTLE pressure	Throttle valve A Throttle modulator valve	0kPa (0 kg/cm², 0 psi) with lever is released. 544—559 kPa (5.55—5.70 kg/cm², 79—81 psi) with lever in full throttle position.	539 kPa (5.50 kg/cm², 78 psi) with lever in full throttle position.
				Throttle valve B	0kPa (0 kg/cm², 0 psi) with lever is released. 834—883 kPa (8.5—9.0 kg/cm², 121—128 psi) with lever in full throttle position.	785 kPa (8.0 kg/cm², 114 psi)
GOVERNOR	D3 or D4	• Place vehicle on chassis dynamometer, or jack up front of car, support with safety stands, block rear wheels, and set hand brake. • Run vehicle at 38 mph.	No (or low) GOVERNOR pressure	Governor valve	213—223 kPa (2.17—2.27 kg/cm², 31—32 psi)	208 kPa (2.12kg/cm², 30 psi)

Stall Speed

Test

1. Engage parking brake and block front wheels.
2. Connect safety chains to both front tow hooks and attach, with minimum slack, to some strong stationary object.
3. Connect tachometer, and start engine.
4. After engine has warmed up to normal operating temperature, shift into [D3].
5. Fully depress brake pedal and accelerator for 6 to 8 seconds, and note engine speed.

   CAUTION: To prevent transmission damage, do not test stall speed for more than 10 seconds at a time.

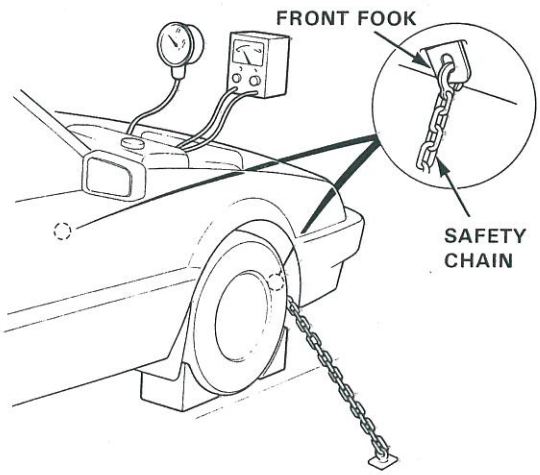
6. Allow 2 minutes for cooling, then repeat same test in [D4], [2] and [R]

   Stall speed in [D3], [D4], [2], and [R] must be the same, and must also be within limits:

Stall Speed RPM:

Specification:	2,750 rpm
Service Limit:	2,300 – 2,900 rpm

TROUBLE	PROBABLE CAUSE
Stall rpm high in [2], [D3], [D4] & [R].	Low fluid level or oil pump output, clogged oil strainer, pressure regulator valve stuck closed. Slipping clutch.
Stall rpm high in [D3], [D4] only.	Slippage of 1st clutch
Stall rpm low in [2], [D3], [D4] & [R].	• Engine output low, throttle cable misadjusted at carburetor. • Oil pump seized. • Torque converter one-way clutch slipping.



Fluid Level

Checking/Changing

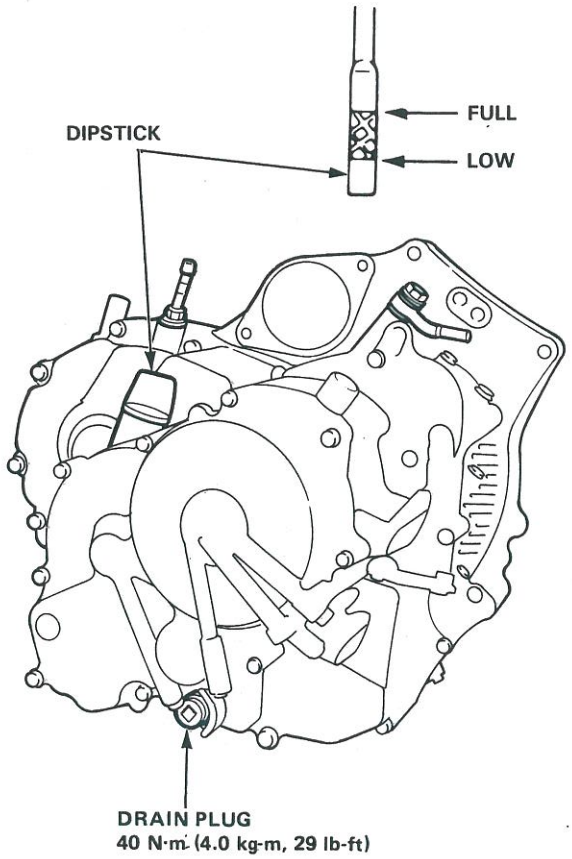
Checking

With the car on level ground, unscrew the transmission dipstick and check the level of fluid immediately after the engine is shut off (within one minute). The fluid level should be between the full and low marks. Do not screw dipstick in to check the fluid level. If the level is at, or below, the low mark, add DEXRON-type automatic transmission fluid.

Changing

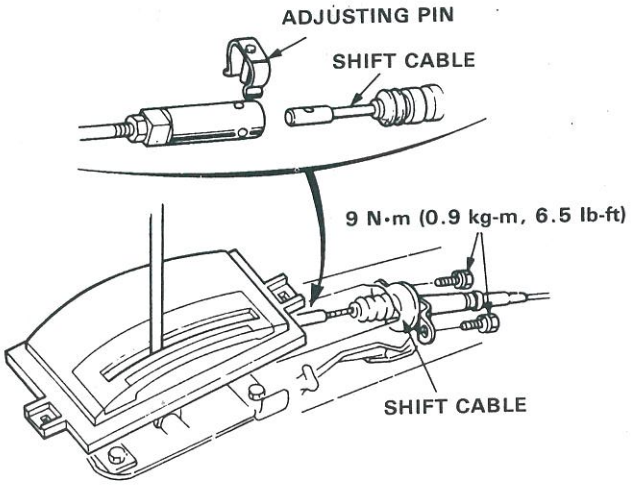
1. Bring the transmission up to operating temperature by driving the car. Park the car on level ground, turn the engine off, then remove drain plug.
2. Reinstall the drain plug with a new washer, then refill the transmission to the full mark on the dipstick.

   Automatic transmission Capacity:
   2.4 ℓ (2.5 U.S. qts., 2.1 Imp. qt.) at change
   5.4 ℓ (5.7 U.S. qts., 4.8 Imp. qt.) after overhaul

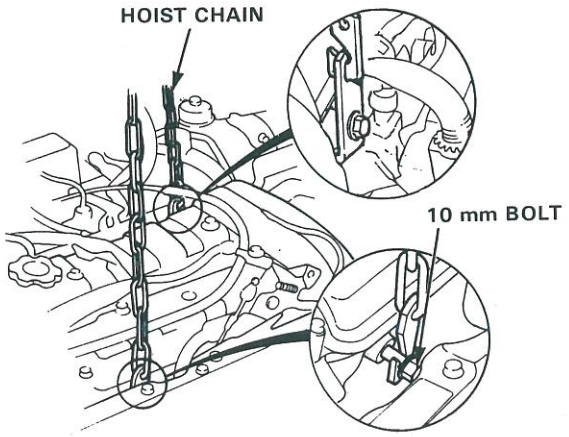


Removal

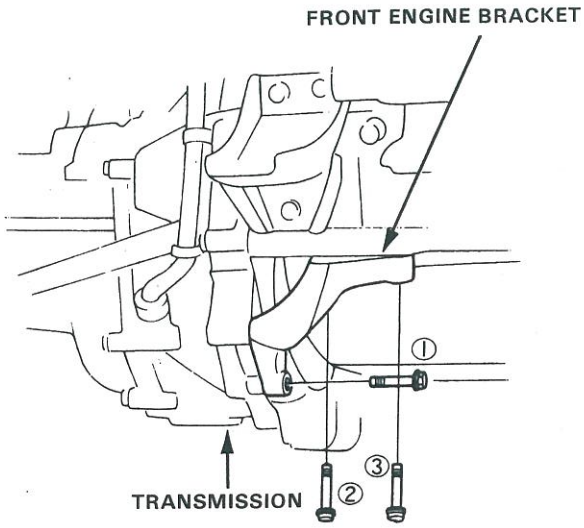
1. Disconnect the ground cable at battery and transmission.
2. Release the steering lock, and shift gear selector to N.
3. Disconnect the wiring:
   - Battery positive cable from starter.
   - Black/white wire from starter solenoid.
4. Drain transmission fluid. Reinstall drain plug and washer.
5. Disconnect the speedometer cable.
6. Disconnect the cooler hoses, and wire them up next to radiator so ATF won't drain out.
7. Remove the center console, then disconnect the shift cable by removing the adjusting pin.



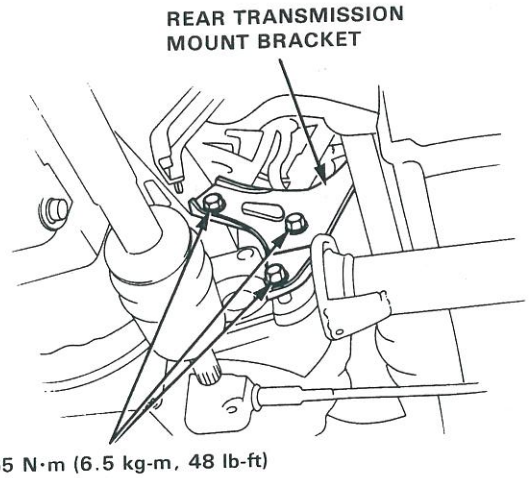
8. Unscrew the cable guide bolt, and pull the throttle control cable out of the cabin.
9. Remove the right and left driveshafts and intermediate shaft (see section 16).
10. Screw a 10 mm bolt at the cylinder head and attatch a hoist chain to the bolt and the other end to the engine hanger plate, then lift the engine slightly to unload the mounts.



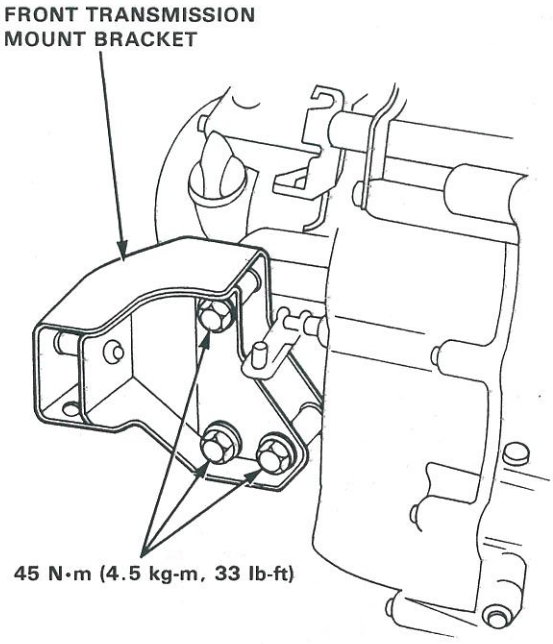
11. Remove the engine under cover and splash shield. (see section, 5).
12. Disconnet the header pipe at exhaust manifold. (see section, 5)
13. Place a jack under the transmission and raise transmission just enough to take weight off mounts.
14. Remove the bolts from the front mount at the front engine bracket.



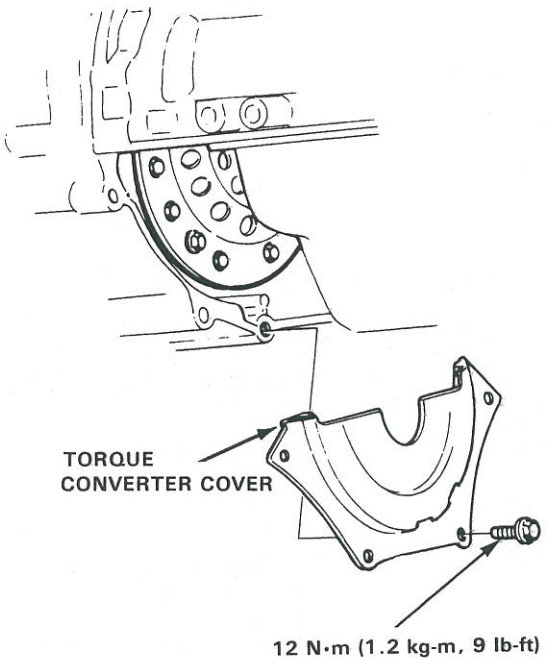
15. Remove the rear transmission mount bracket by removing the mounting bolts.



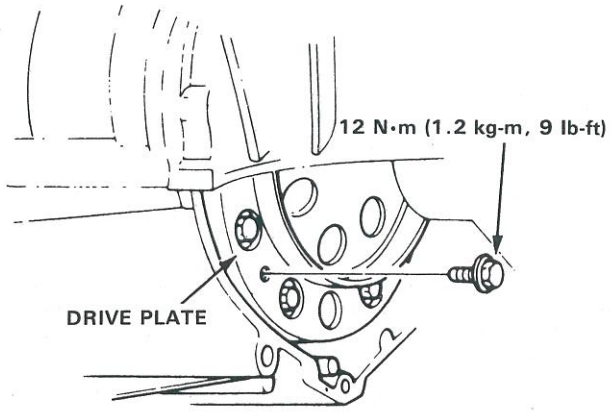
16. Remove the transmission housing bolts from front transmission mount bracket.



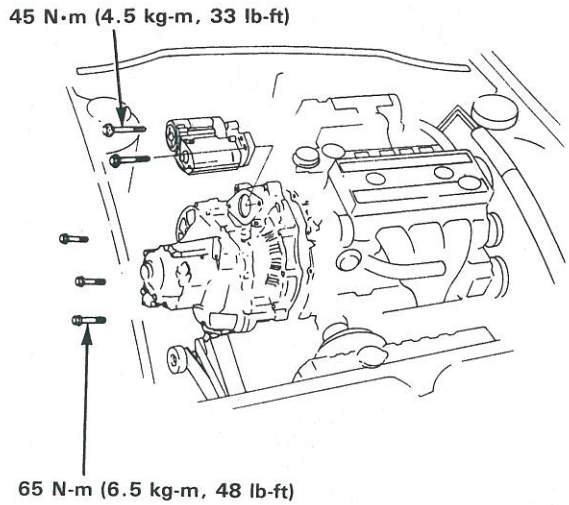
17. Remove the torque converter cover.



18. Remove the drive plate tightening bolts by rotating the engine crankshaft pulley.
CAUTION: The pulley bolt is a right-hand thread, and may occasionally be loosened when the pulley is turned counterclockwise. After removing the drive plate, check that the bolt is tightned securely.

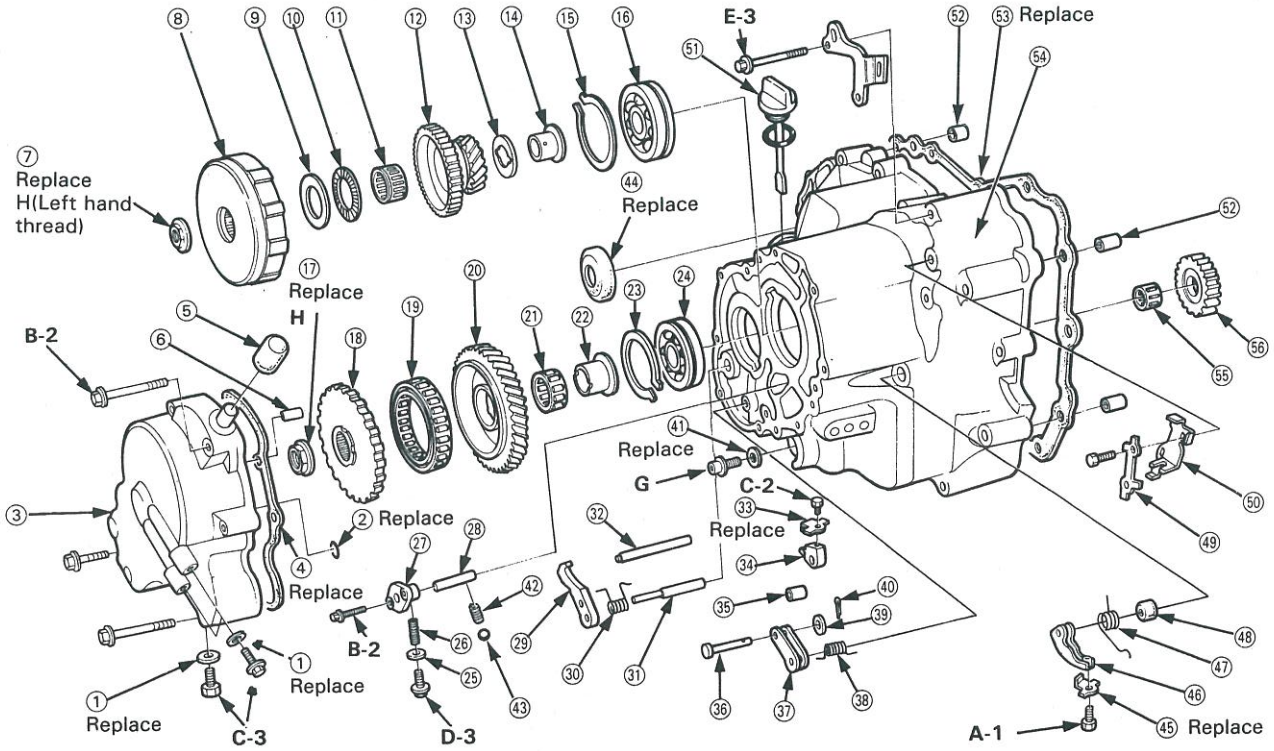


19. Remove the bolts attaching the starter motor, and remove the starter motor.
20. Remove the rest of the transmission mount bolts.

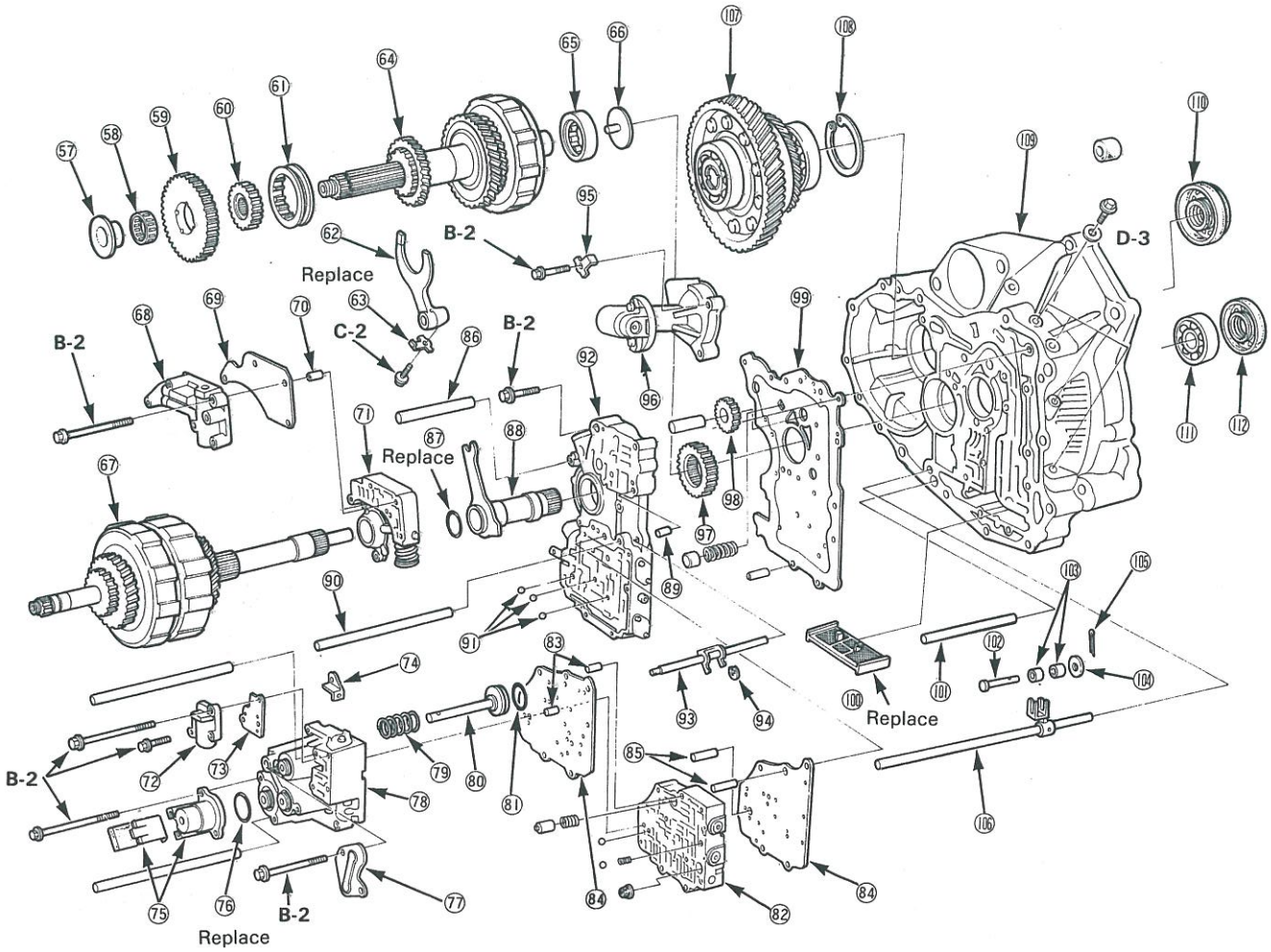


21. Pull the transmission away from the engine until it clears the 14 mm dowel pins, then lower on the transmission jack.

Torque	Bolt size
A— 8 N·m (0.8 kg-m, 6 lb-ft) B—12 N·m (1.2 kg-m, 9 lb-ft) C—14 N·m (1.4 kg-m, 10 lb-ft) D—18 N·m (1.8 kg-m, 12 lb-ft) E—27 N·m (2.7 kg-m, 20 lb-ft) F—29 N·m (2.9 kg-m, 21 lb-ft) G—40 N·m (4.0 kg-m, 29 lb-ft) H—95 N·m (9.5 kg-m, 70 lb-ft)	1—5 x 0.8 mm 2—6 x 1.0 mm 3—8 x 1.25 mm



① WASHER 8 mm
② O-RING 6 x 2.3 mm
③ END COVER
Disassembly/Inspection, page 14-56
④ GASKET
⑤ BREATHER CAP
⑥ DOWEL PIN 8 x 14 mm
⑦ LOCK NUT
Removal, page 14-20
Installation, page 14-67
⑧ 1st CLUTCH
Removal, page 14-21
Disassembly, page 14-44
Reassembly, page 14-49
⑨ THRUST WASHER 23 mm
⑩ THRUST NEEDLE BEARING 31 x 47 x 2 mm
⑪ NEEDLE BEARING 28 x 33 x 16.8 mm
⑫ MAINSHAFT 1st GEAR
⑬ THRUST WASHER
⑭ COLLAR 23 mm
⑮ SNAP RING 70 mm
⑯ MAINSHAFT BEARING
Replacement, page 14-55
⑰ LOCKNUT
Removal, page 14-21
Installation, page 14-66
⑱ PARKING GEAR
⑲ ONE-WAY CLUTCH
⑳ COUNTERSHAFT 1st GEAR
Disassembly/Inspection, page 14-29
㉑ NEEDLE BEARING
㉒ 1st GEAR COLLAR
㉓ SNAP RING 64 mm
㉔ COUNTERSHAFT BEARING
㉕ WASHER 8 mm
㉖ SPRING
㉗ REVERSE IDLER BEARING HOLDER
Removal, page 14-22
㉘ REVERSE GEAR SHAFT
㉙ PARKING PAWL
㉚ PARKING PAWL SPRING
㉛ PARKING PAWL SHAFT
㉜ STOP PIN
㉝ LOCK PLATE
㉞ PARKING LEVER
㉟ PARKING PAWL ROLLER
㊱ ROLLER PIN
㊲ PARKING SHIFT ARM
㊳ RETURN SPRING
㊴ WASHER 5 mm
㊵ COTTER PIN
㊶ WASHER 14 mm
㊷ SPRING
㊸ STEEL BALL
㊹ DIFFERENTIAL OIL SEAL
Installation, page 14-53
㊺ LOCK PLATE
㊻ THROTTLE CONTROL LEVER
㊼ THROTTLE CONTROL SHAFT SPRING
Removal, page 14-22
Installation, page 14-65
㊽ THROTTLE CONTROL SHAFT SEAL
㊾ LOCK PLATE
㊿ THROTTLE CONTROL CABLE BRACKET
(51) DIPSTICK
(52) DOWEL PIN 14 x 25 mm
(53) GASKET
(54) TRANSMISSION HOUSING
(55) NEEDLE BEARING
(56) REVERSE IDLER GEAR
Replacement, page 14-64

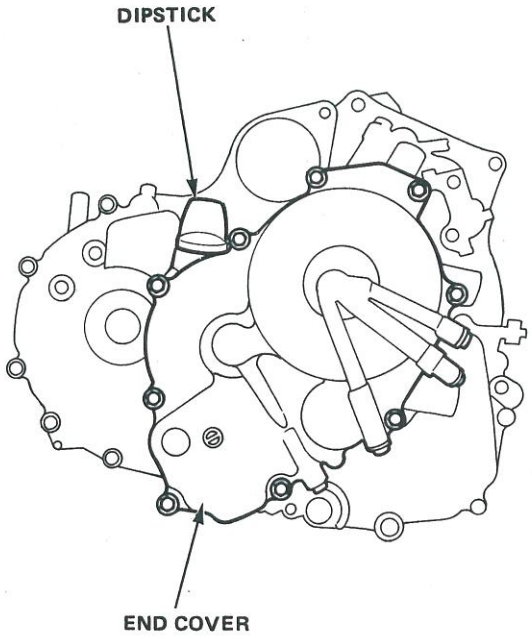


⑤⑦ **REVERSE GEAR COLLAR**
⑤⑧ **NEEDLE BEARING**
⑤⑨ **COUNTERSHAFT REVERSE GEAR**
⑥⓪ **SELECTOR HUB**
⑥① **REVERSE GEAR SELECTOR**
⑥② **REVERSE SHIFT FORK**
⑥③ **LOCK PLATE**
⑥④ **COUNTERSHAFT ASSY**
Disassembly/Inspection, page 14-40
⑥⑤ **COUNTERSHAFT NEEDLE BEARING**
⑥⑥ **OIL GUIDE PLATE**
⑥⑦ **MAINSHAFT ASSY**
Disassembly/Inspection page 14-39
⑥⑧ **LOCK UP SHIFT VALVE BODY**
Removal, page 14-26
Disassembly, page 14-36
⑥⑨ **SEPARATOR PLATE**
⑦⓪ **DOWEL PIN**
⑦① **REGULATOR VALVE BODY**
Removal, page 14-26
Repair, page 14-32
Disassembly, page 14-35
⑦② **MODULATOR VALVE BODY**
Removal, page 14-25
⑦③ **SEPARATOR PLATE**
⑦④ **CHECK VALVE STOP PLATE**
⑦⑤ **4th ACCUMULATOR COVER**
⑦⑥ **O-RING**
⑦⑦ **2nd/3rd ACCUMULATOR COVER**
⑦⑧ **SERVO VALVE BODY ASSY**
Removal, 14-25
Disassembly, 14-37
⑦⑨ **RETURN SPRING**
⑧⓪ **SERVO VALVE**
⑧① **O-RING 31 x 2.7 mm**
⑧② **SECONDARY VALVE BODY ASSY**
Removal, 14-25
Disassembly/Inspect, 14-31
⑧③ **DOWEL PINS**
⑧④ **SEPARATOR PLATE**
⑧⑤ **DOWEL PIN**
⑧⑥ **STOP PIN**
⑧⑦ **O-RING**
⑧⑧ **STATOR SHAFT**
⑧⑨ **DOWEL PIN**
⑨⓪ **1st CLUTCH PIPE**
⑨① **STEEL BALLS**
⑨② **MAIN VALVE BODY ASSY**
Remove, 14-27
Disassembly, 14-30
⑨③ **THROTTLE CONTROL SHAFT**
⑨④ **E-CLIP**
⑨⑤ **LOCK PLATE**
⑨⑥ **GOVERNOR VALVE**
Removal, 14-24
Disassembly/Inspection, 14-38
⑨⑦ **PUMP DRIVE GEAR**
⑨⑧ **PUMP DRIVEN GEAR**
⑨⑨ **MAIN VALVE SEPARATOR PLATE**
⑩⓪ **FILTER SCREEN**
⑩① **SUCTION PIPE**
⑩② **MANUAL VALVE PIN**
⑩③ **ROLLER**
⑩④ **WASHER 5 mm**
⑩⑤ **COTTER PIN**
⑩⑥ **CONTROL SHAFT**
⑩⑦ **DIFFERENTIAL**
⑩⑧ **SNAP RING 80 mm**
⑩⑨ **TORQUE CONVERTER HOUSING**
⑪⓪ **DIFFERENTIAL OIL SEAL**
⑪① **MAINSHAFT BEARING**
⑪② **MAINSHAFT OIL SEAL**

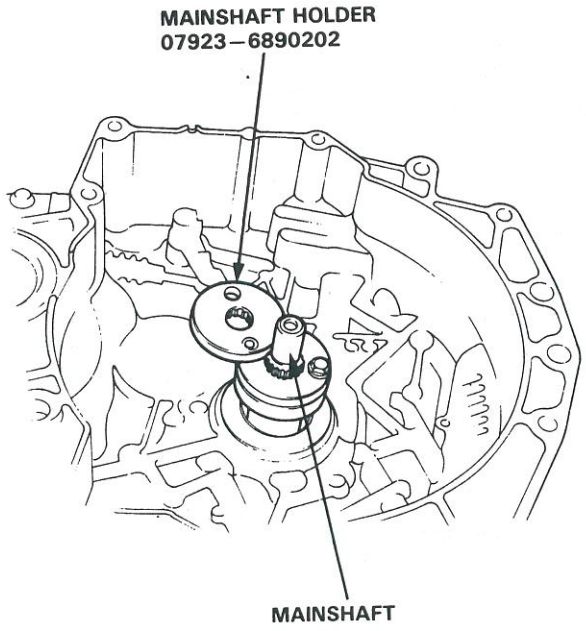
Transmission Housing

Removal

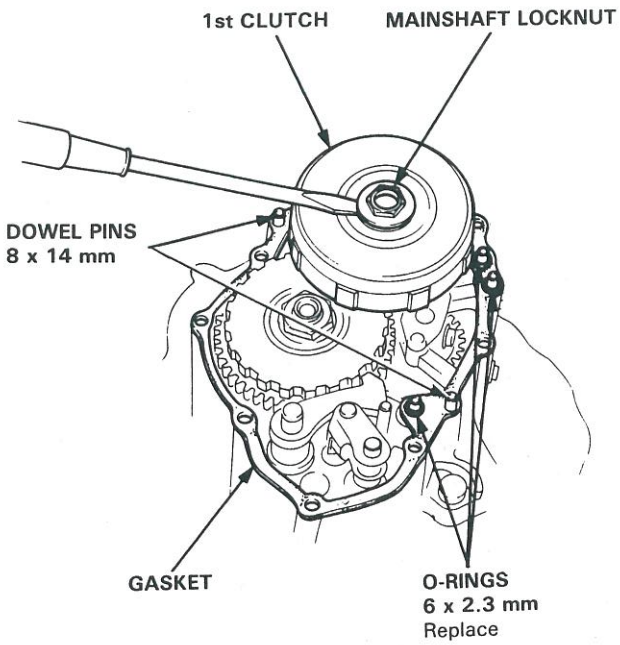
1. Remove the dipstick.
2. Remove the nine bolts from the end cover, then remove the cover.



3. Shift the transmission to PARK.
4. Lock the mainshaft using the mainshaft holder.

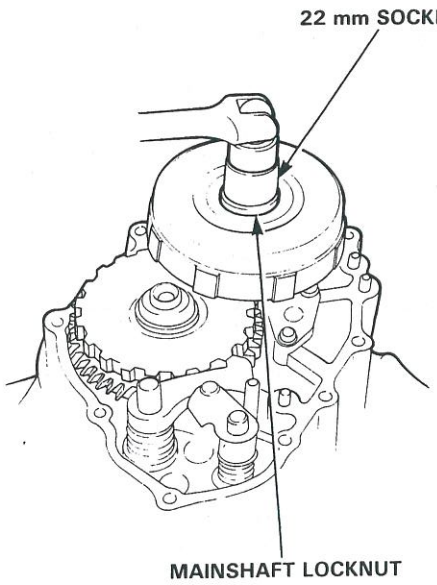


5. Remove the end cover gasket, dowel pins, and O-rings.
6. Pry the staked edge of the locknut flange out of the notch in the 1st clutch.



7. Remove the mainshaft locknut.

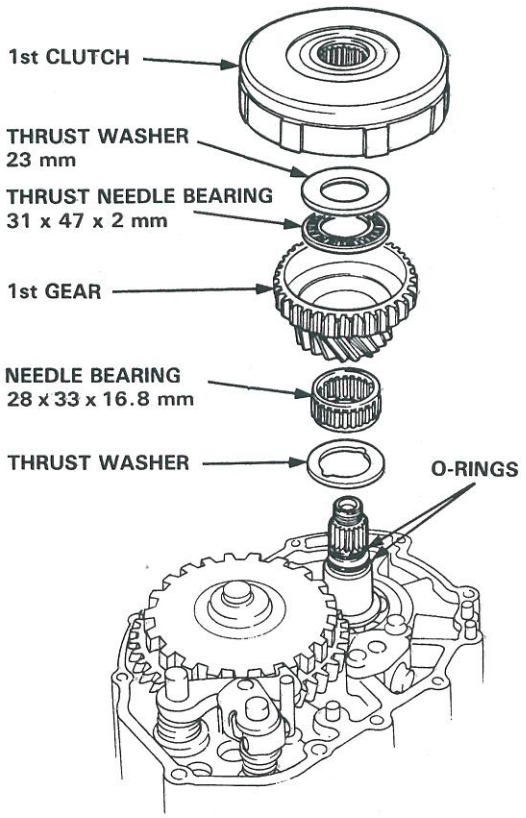
CAUTION: The mainshaft locknut has left-hand threads.



8. Remove the 1st clutch.

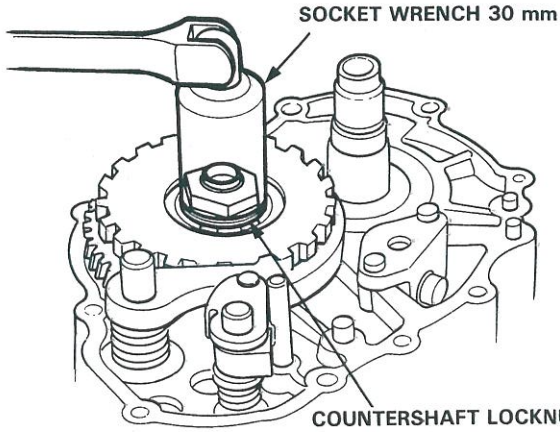
9. Remove the needle bearing and thrust washer from the mainshaft.

10 Remove the O-rings and first gear from the mainshaft.

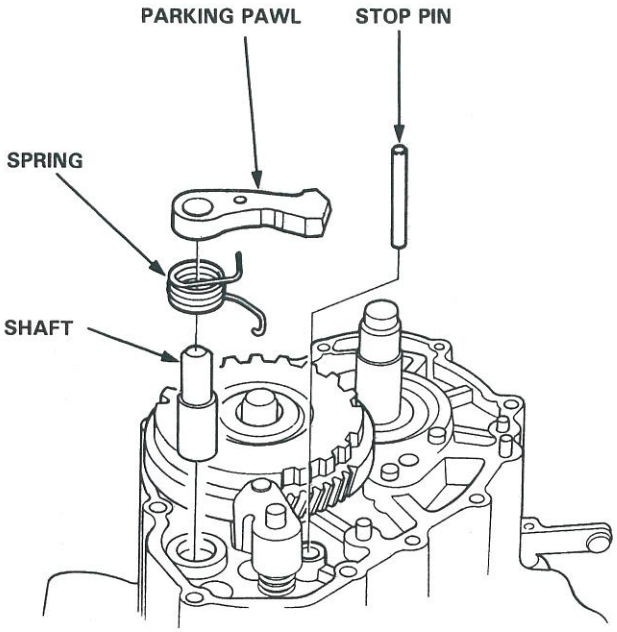


11. Pry the staked edge of the locknut out of the notch in the parking gear.

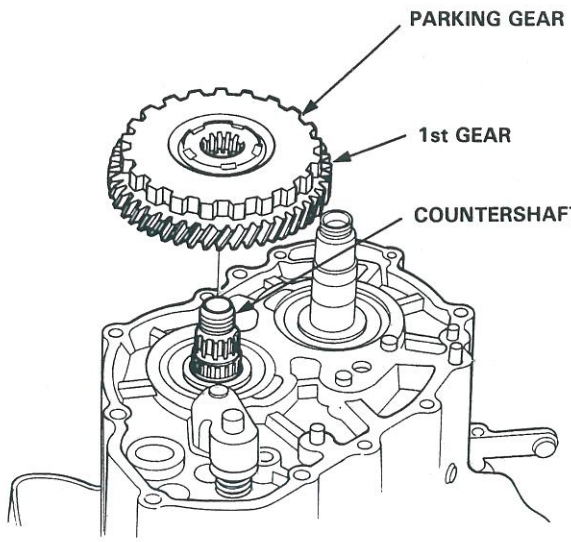
12. Remove the countershaft locknut.



13. Remove the parking pawl, shaft, stop pin and spring.



14. Remove the parking gear and countershaft 1st gear as a unit.

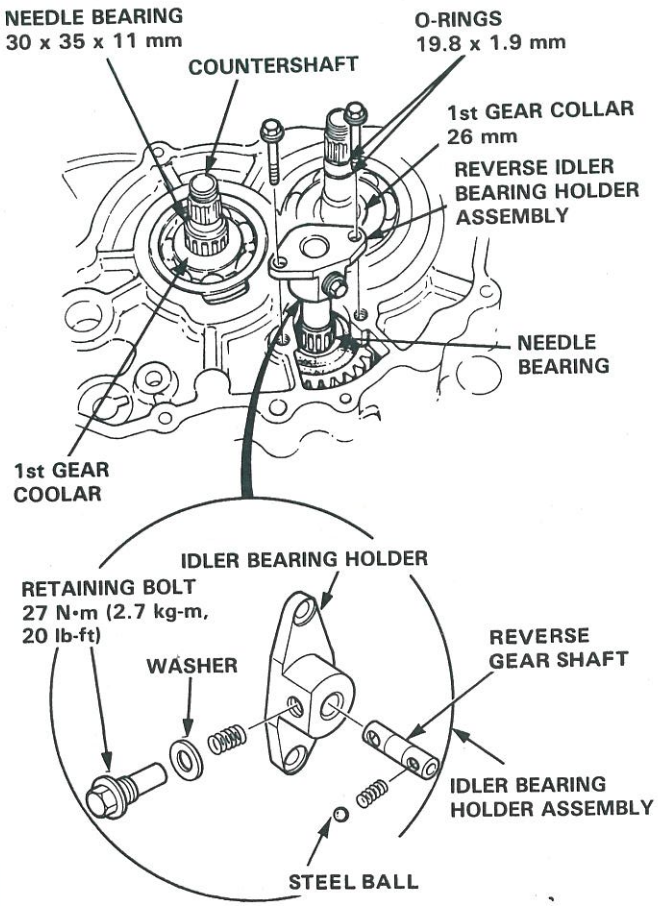


(cont'd)

Removal (cont'd)

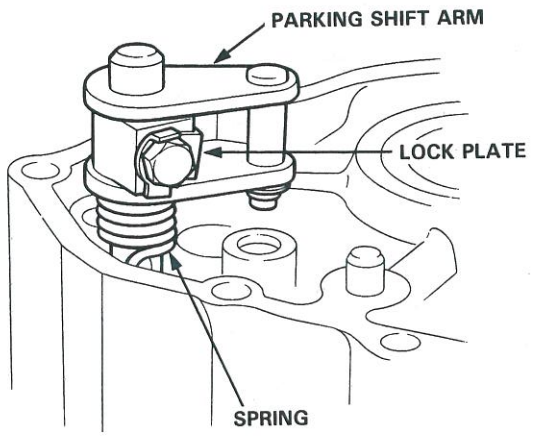
15. From the countershaft, remove the needle bearing and 1st gear collar. From the mainshaft, remove the 1st gear collar.

16. Remove the reverse idler bearing holder assembly.

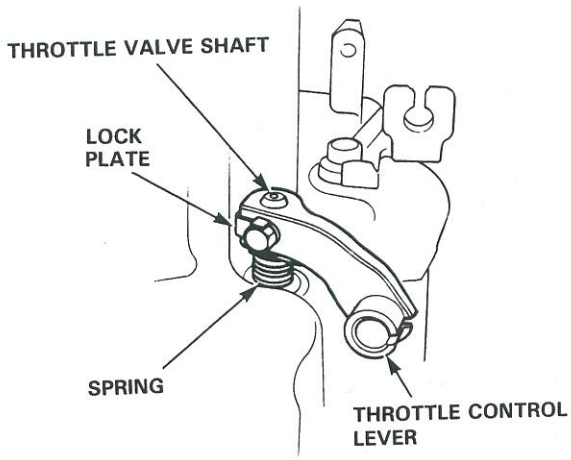


17. Bend down the tab on the lock plate under the parking shift arm bolt.

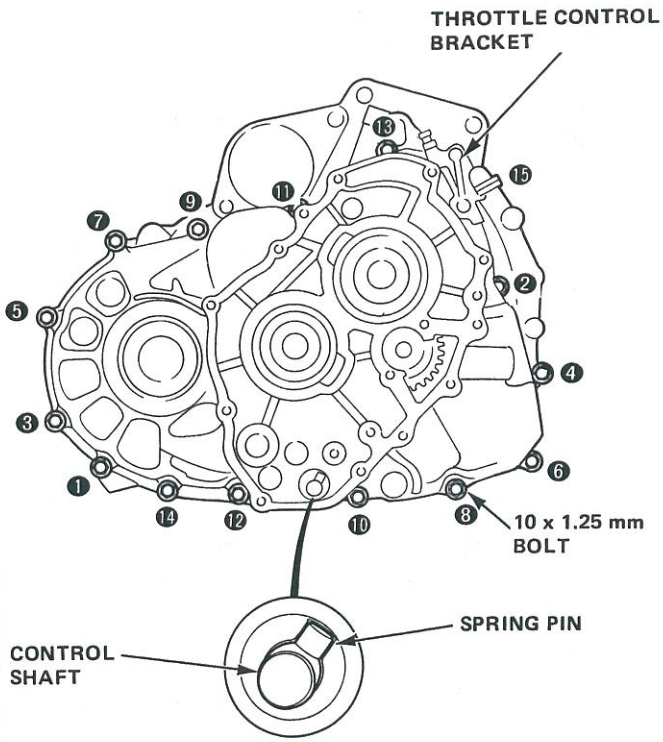
18. Remove the bolt, then remove the parking shift arm.



19. Bend down the tab on the throttle control lever bolt lock plate, then remove the bolt. Now, remove the throttle control lever and spring from the throttle valve shaft.

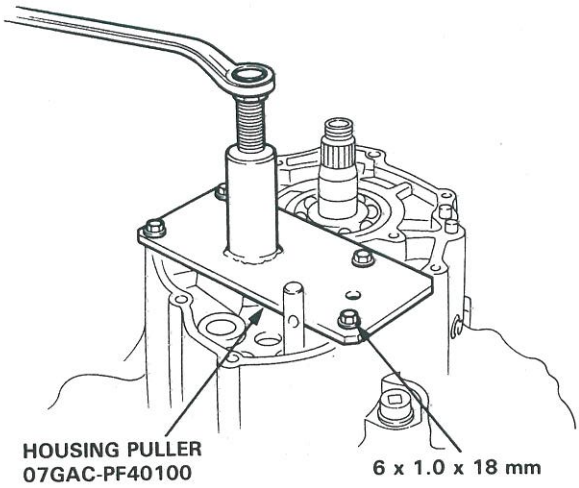


20. Remove the 8 x 1.25 mm bolts and 10 x 1.25 mm bolt, (1) thru (15), in the sequence shown.



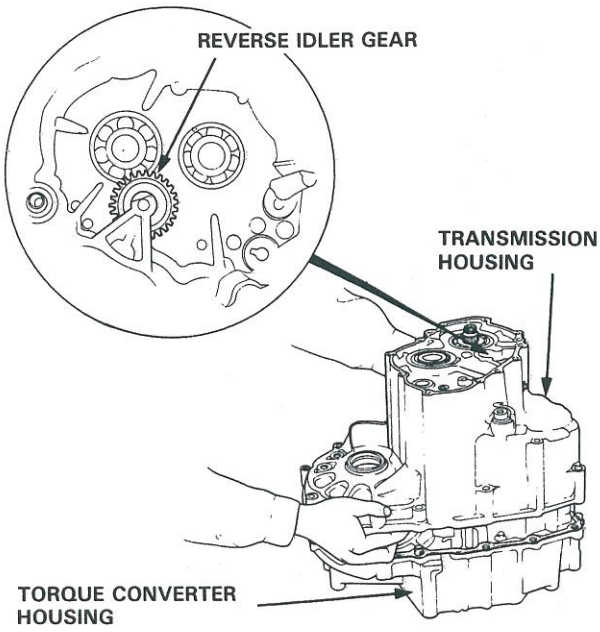
21. Align the control shaft spring pin with the cutout in the transmission housing.

22. Install the transmission housing puller over the countershaft with four bolts and tighten securely. Then screw in the puller bolt against the end of the countershaft until the transmission housing comes loose.



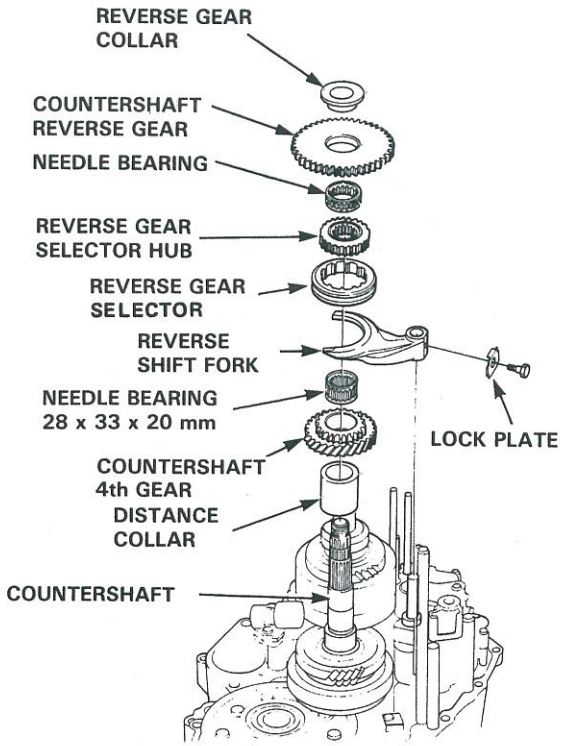
23. Remove the puller and separate the housings. Remove the reverse idler gear and needle bearing from the transmission housing.

24. Remove the gasket and the dowel pins.

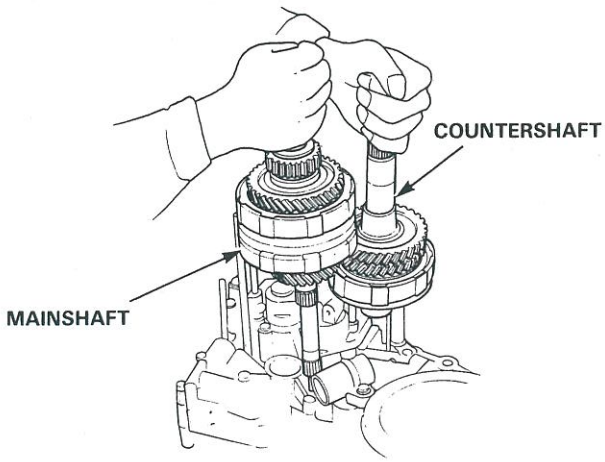


Removal

1. Remove the reverse gear collar, countershaft reverse gear and needle bearing.



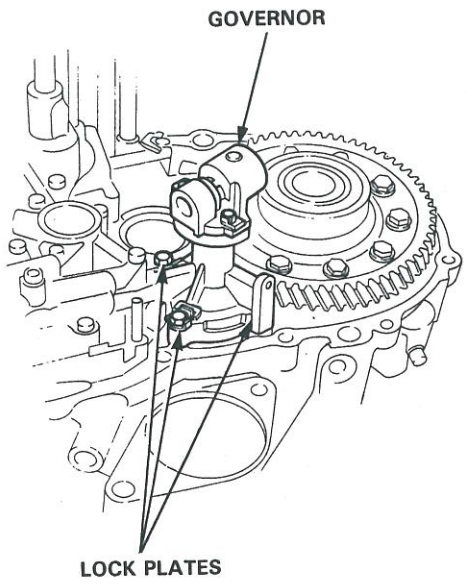
2. Bend down the tab on the lock plate and remove the bolt from the reverse shift fork.
3. Remove the reverse shift fork and reverse gear selector as a unit.
4. Remove the selector hub, countershaft 4th gear, needle bearing and distance collar.
5. Remove the mainshaft and countershaft together. NOTE: It will be necessary to pull up the countershaft at a slight angle to clear the governor.



Governor Valve

Removal

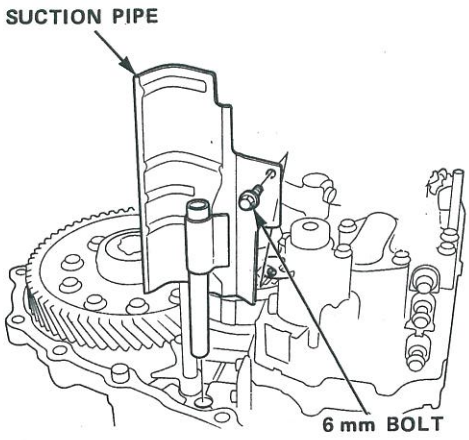
1. Bend down the tabs on the lock plates, remove the bolts holding the governor to the torque converter housing, and remove the governor.



Main Valve Body

Removal

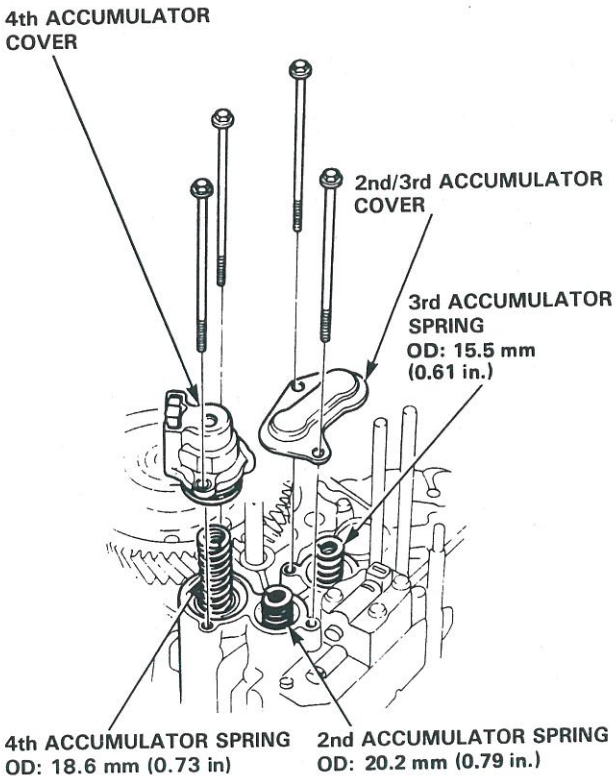
1. Remove the suction pipe.



2. Remove the accumulator covers.

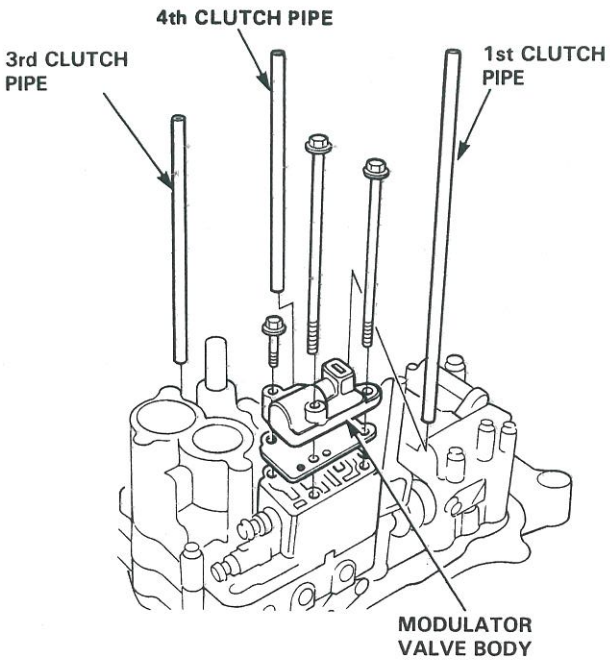
CAUTION: Accumulator covers are spring loaded; to prevent stripping the threads in the torque converter housing, press down on the accumulator covers while unscrewing the bolts in a criss-cross pattern.

3. Remove the accumulator springs.



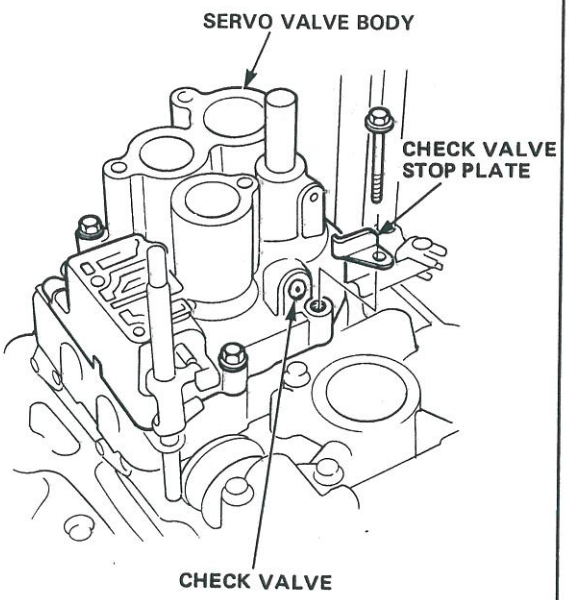
4. Remove the three bolts attaching the modulalor valve body.

5. Remove the 1st, 4th and 3rd clutch pipes.



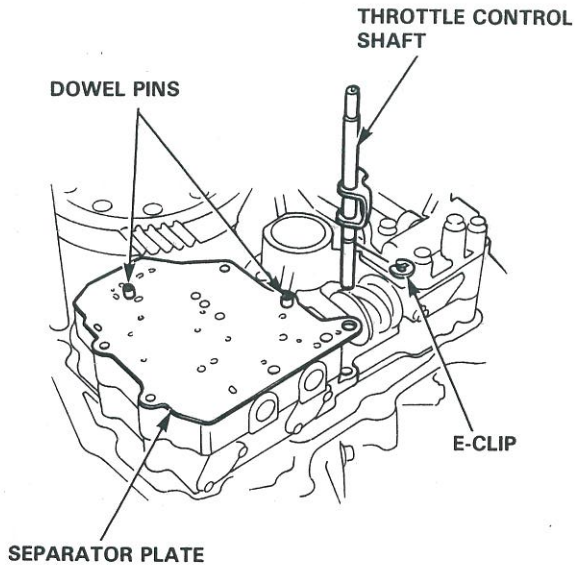
6. Remove the servo valve body (3 bolts).

7. Remove the check valve stop plate.



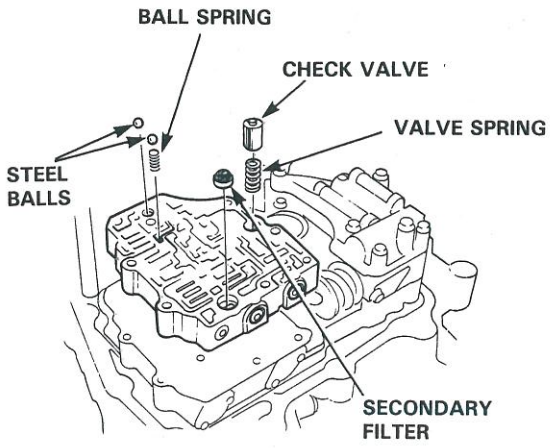
8. Remove the E-clip. Then remove the thottle control shaft from the separator plate.

9. Remove the separator plate and dowel pins.



10. Remove the secondary valve body, being careful not to lose the 2 steel balls, ball spring, check valve and spring, secondary filter.

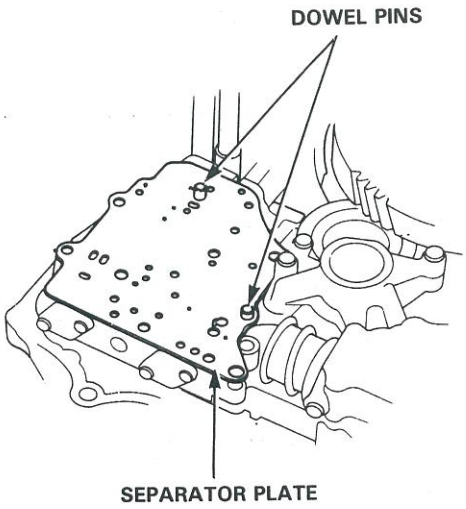
CAUTION: Do not use a magnet to remove the steel balls; it may magnetize the balls.



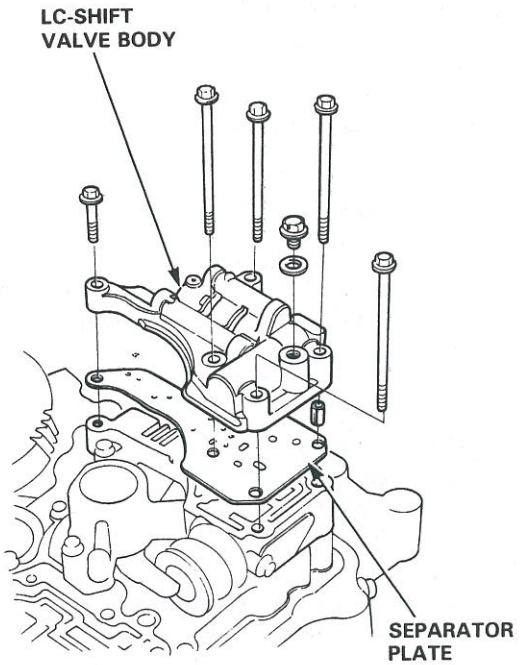
(cont'd)

Removal (cont'd)

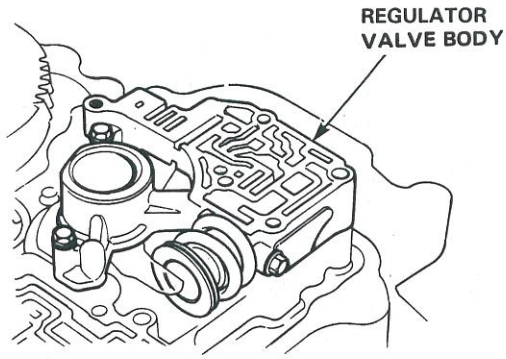
11. Remove the separator plate and dowel pins.



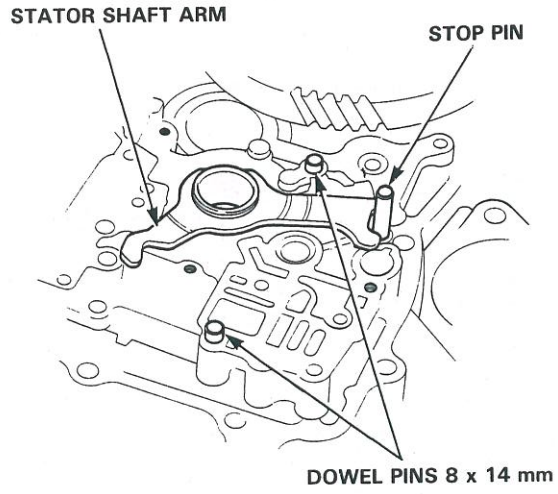
12. Remove the LC-Shift valve body and separator plate (5 bolts).



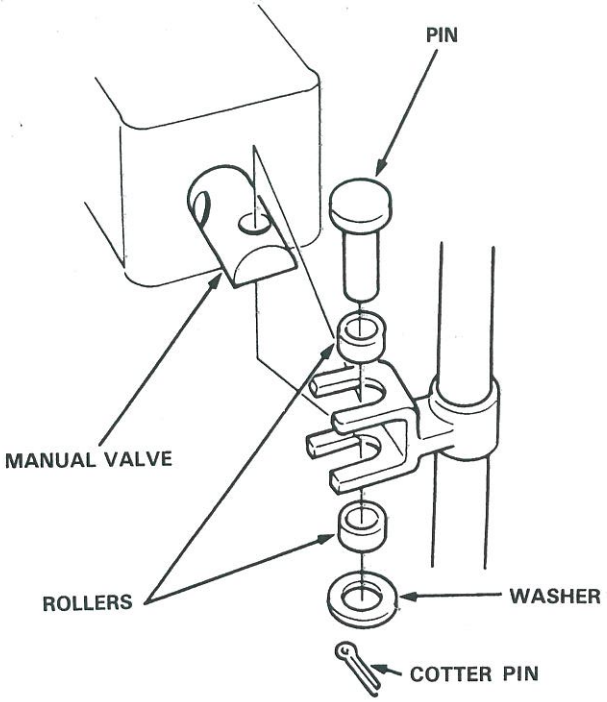
13. Remove the regulator valve body.



14. Remove the stator shaft arm, dowel pins and stop pin.



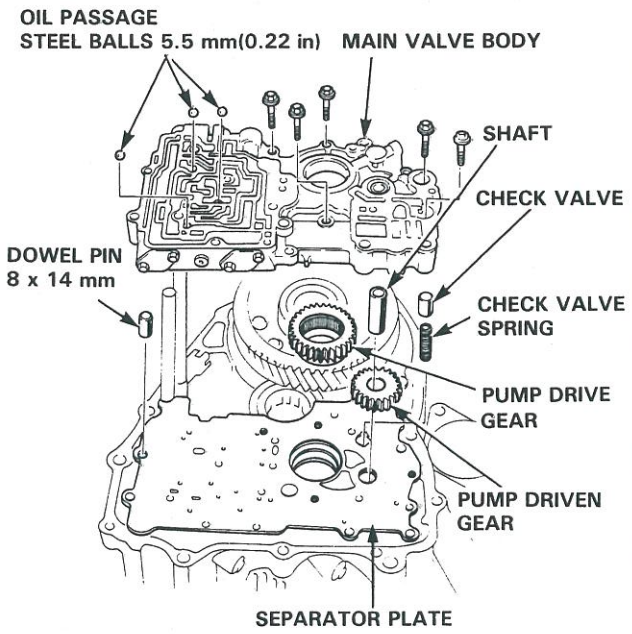
15. Remove the cotter pin , washer, rollers, and pin from the manual valve.



16. Remove the main valve body being careful not to lose the 3 steel balls, check ball spring, torque converter check valve and spring.

CAUTION: Do not use a magnet to remove the steel balls; it may magnetize the balls.

NOTE: Top oil passage steel ball in this drawing has a spring beneath it.

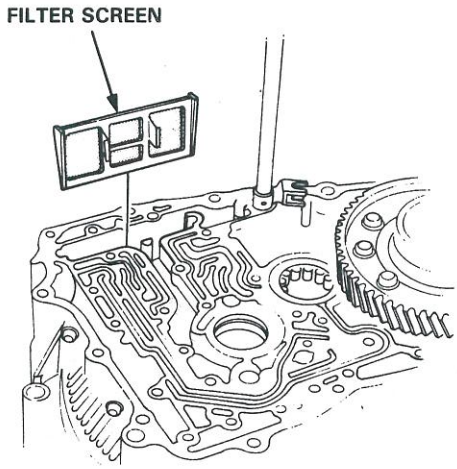


17. Remove the pump gears and shaft.

18. Remove the separator plate, dowel pins, check valve, and spring.

19. Remove the filter screen.

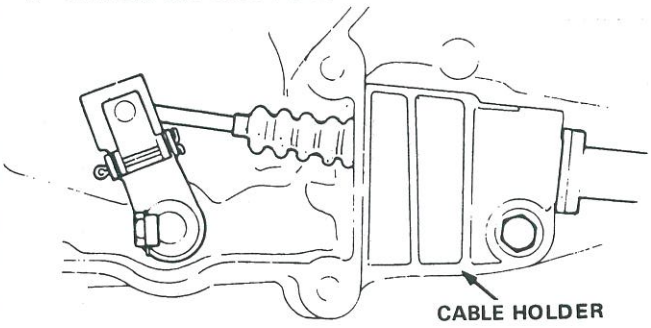
NOTE: Do not reuse filter screen; install a new one on reassembly.



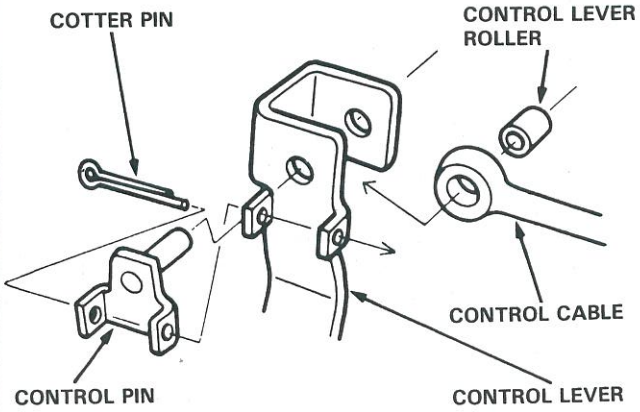
Control Shaft

Removal

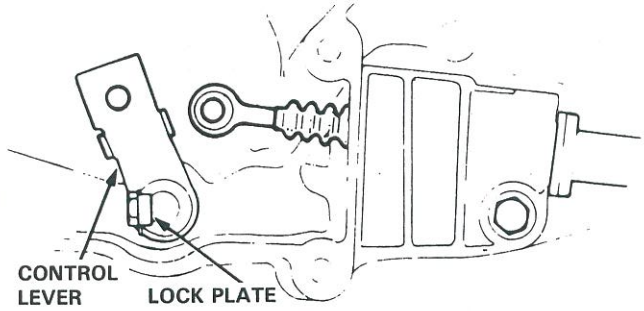
1. Remove the cable holder.



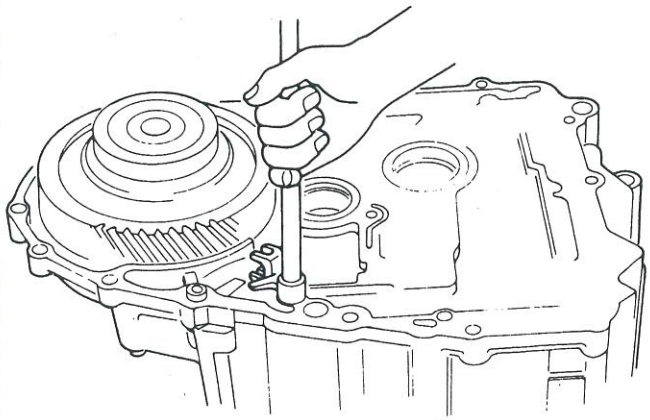
2. Remove the cotter pin, control pin, and control lever roller from the control lever.



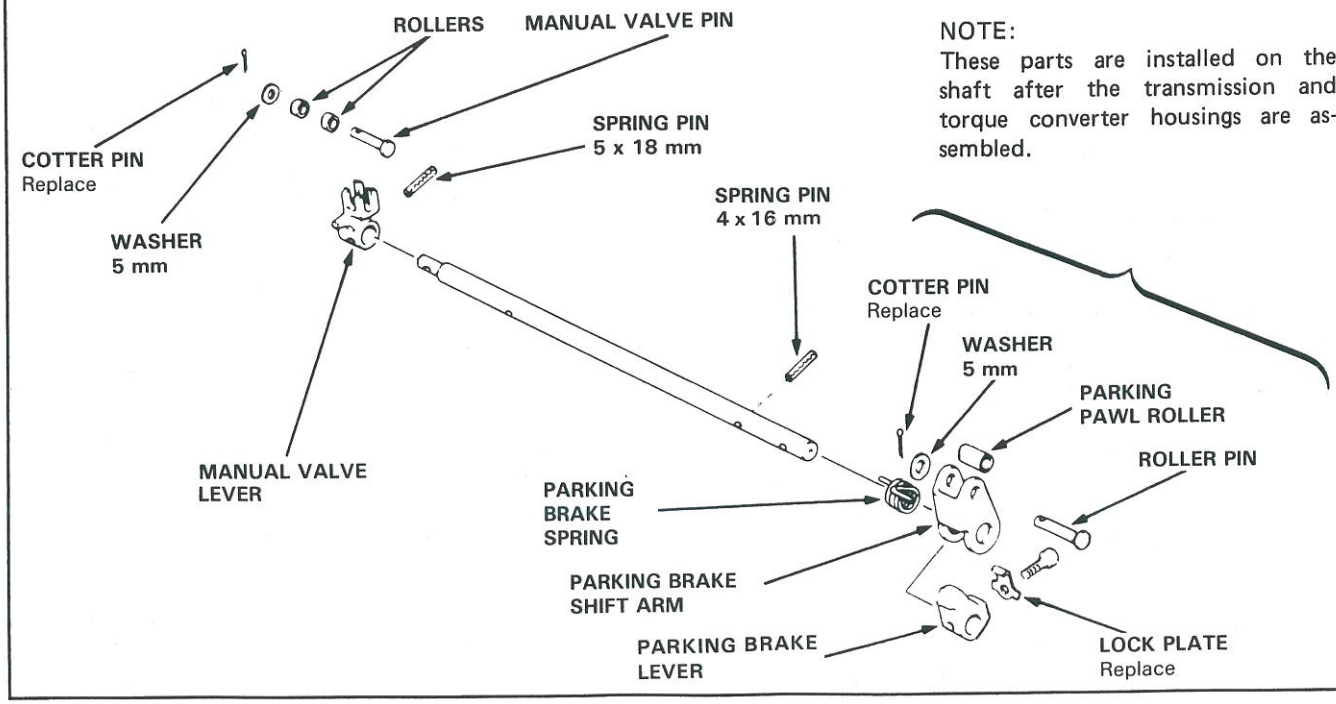
3. Bend down the tab on the lock plate under the bolt in the control lever. Then remove the bolt and lever.



4. Turn the torque converter housing over and remove the control shaft.



Disassembly/Reassembly

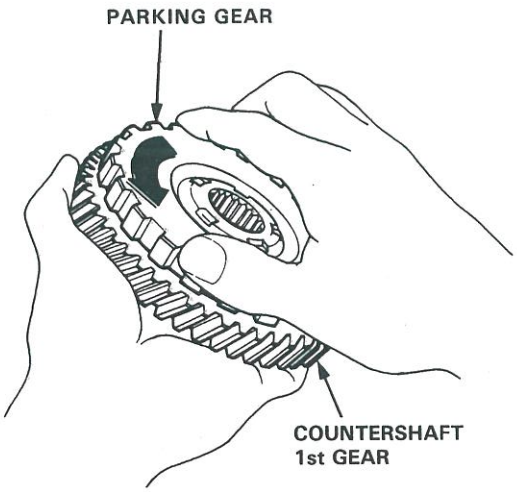


NOTE:
These parts are installed on the shaft after the transmission and torque converter housings are assembled.

One-Way Clutch/Parking Gear

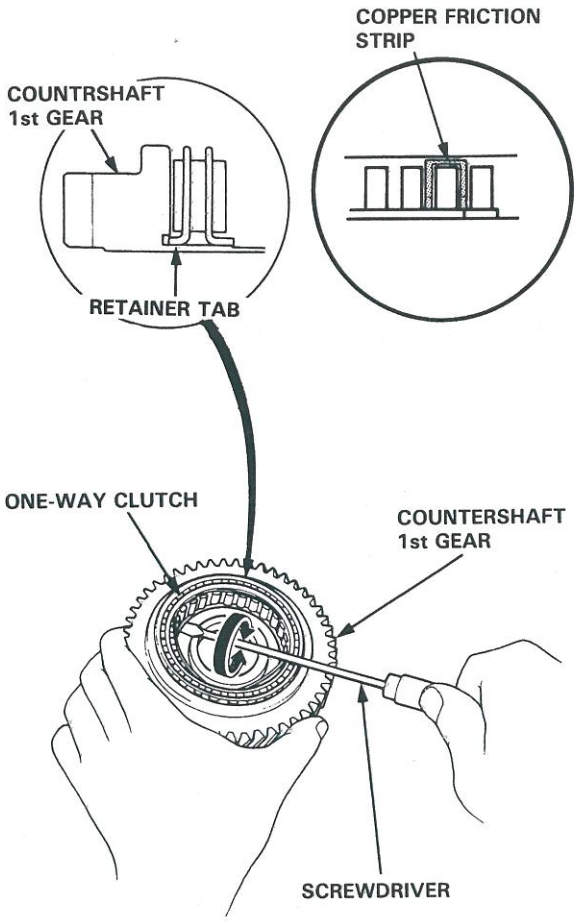
Disassembly and Inspection

1. Separate the countershaft 1st gear from the parking gear by turning the parking gear in the direction shown.



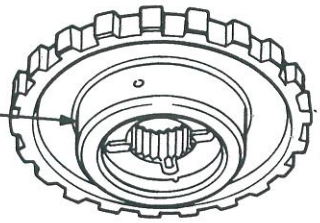
2. Remove the one-way clutch by prying it up with the end of a screwdriver.

CAUTION: Do not pry on the three copper friction strips; if you break a strip, the clutch will not work properly.

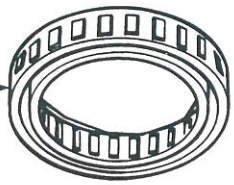


Inspect the parts as follows:

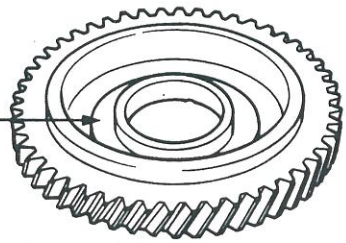
Inspect the parking gear for wear or scoring



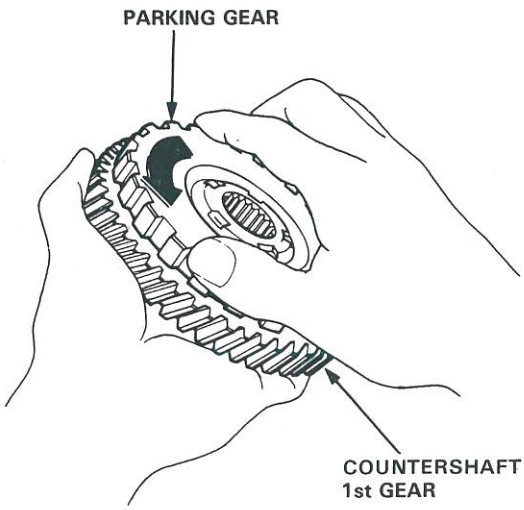
Inspect the one-way clutch for damage or faulty movement



Inspect the countershaft 1st gear for wear or scoring



After the parts are assembled, hold the countershaft 1st gear and turn the parking gear in direction shown to be sure it turns freely.

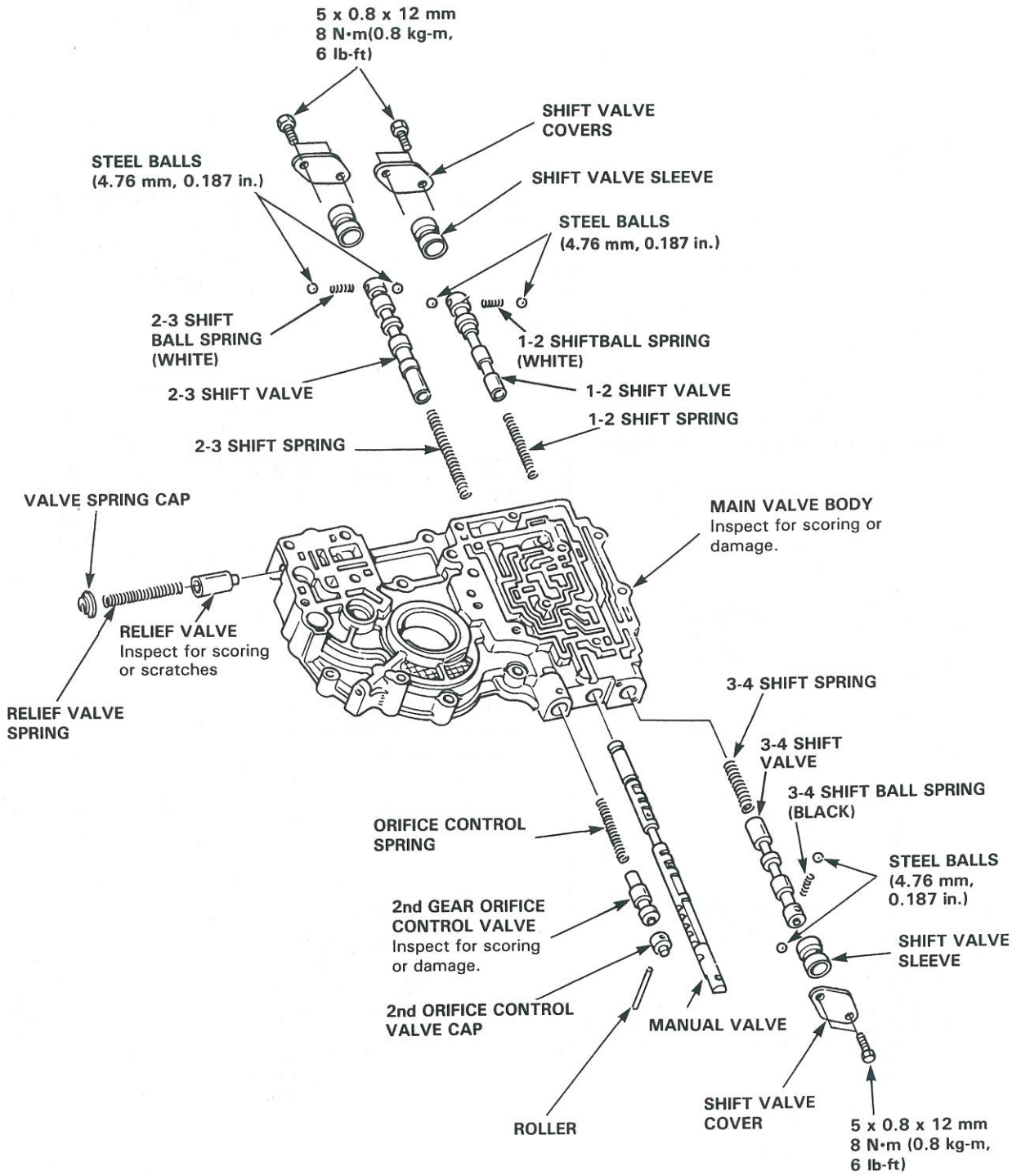


Main Valve Body

Disassembly

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 14-32.
- See page 3-6 for spring specifications.
- Coat all parts with ATF before reassembly.

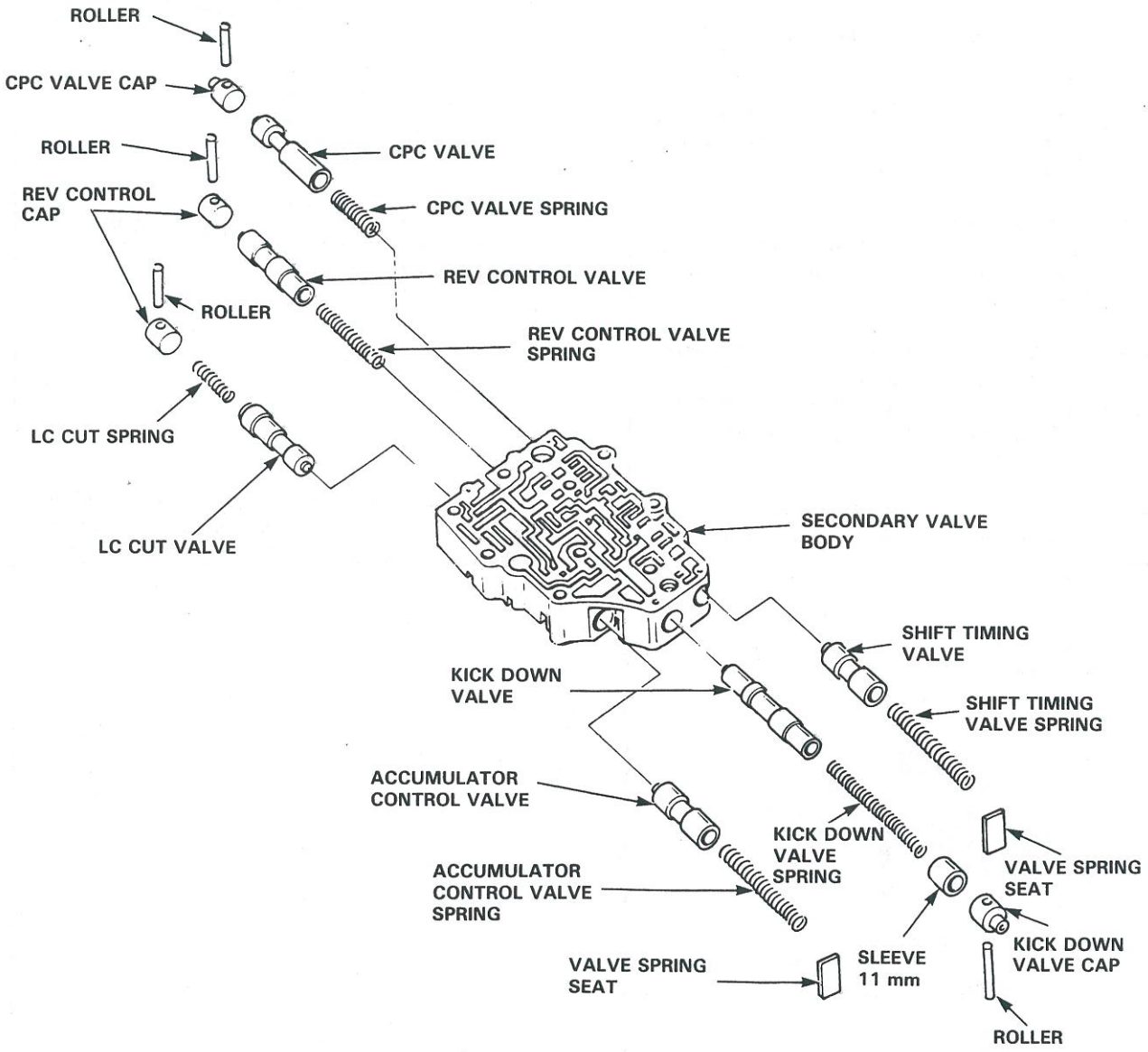


Secondary Valve

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 14-32.
- See page 3-6 for spring specifications.



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 main valve body, regulator valve body, lock-up shift valve body, and servo valve body. DO NOT use this procedure to free the valves in the governor; if any governor valves are stuck, the governor must be replaced as an assembly.

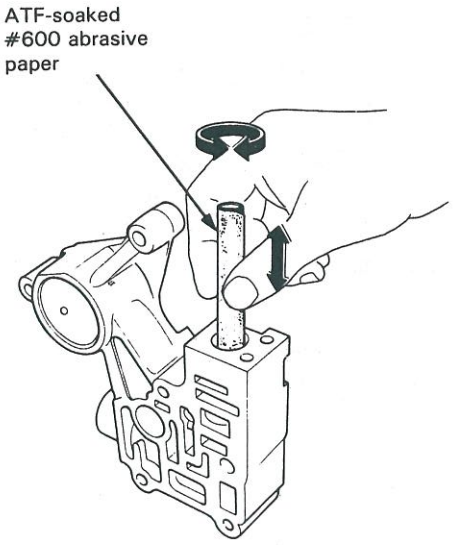
1. Soak a sheet of #600 abrasive paper in ATF for about 30-minutes.
2. Carefully tap the valve body so the sticking valve drops out of its bore.

   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.

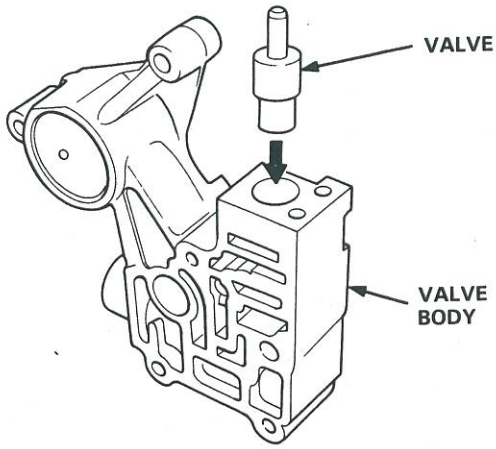
4. Roll up half a sheet of ATF-soaked paper and insert it in the valve bore of the sticking valve. Twist the paper slightly, so that it unrolls and fits the bore tightly, then polish the bore by twisting the paper as you push it in and out.

   CAUTION: The valve body is aluminum and doesn't require much polishing to remove any burrs.



5. Remove the #600 paper and 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.



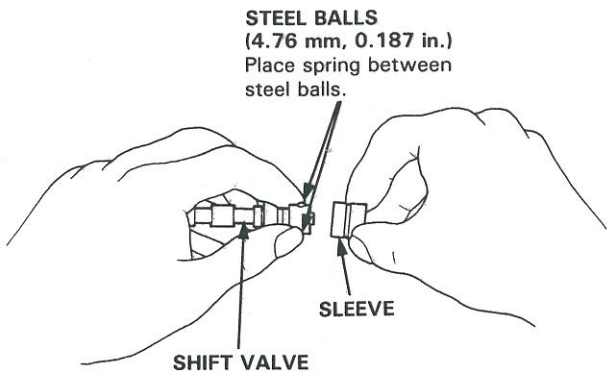
7. Remove the valve and thoroughly clean it and the valve body with solvent. Dry all parts with compressed air, then reassemble using ATF as a lubricant.

Main Valve Body

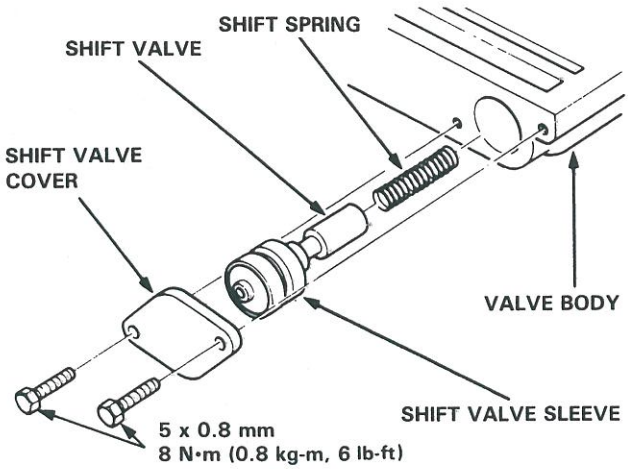
Reassembly

NOTE: Coat all parts with ATF before assembling.

1. Slide the spring into the hole in the big end of the shift valve.
   While holding the steel balls with the tips of your fingers, put the sleeve over valve.

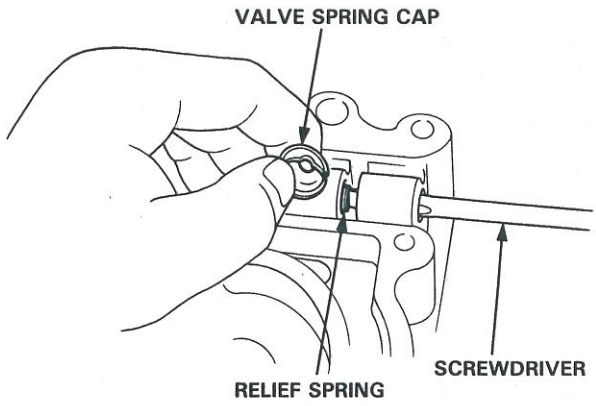


2. Place the shift spring in the valve, then slip it into the valve body and install the valve cover.

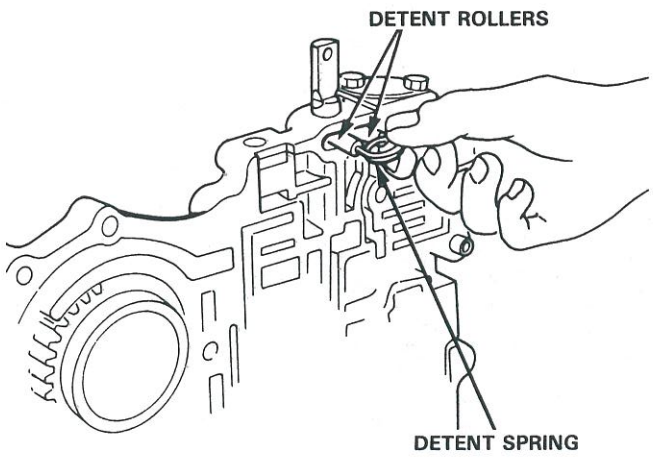


3. Set the relief spring in the relief valve and install it in the main valve body.

4. Install the spring with a screwdriver, then install the check valve cap with the cutout aligned with the screwdriver.



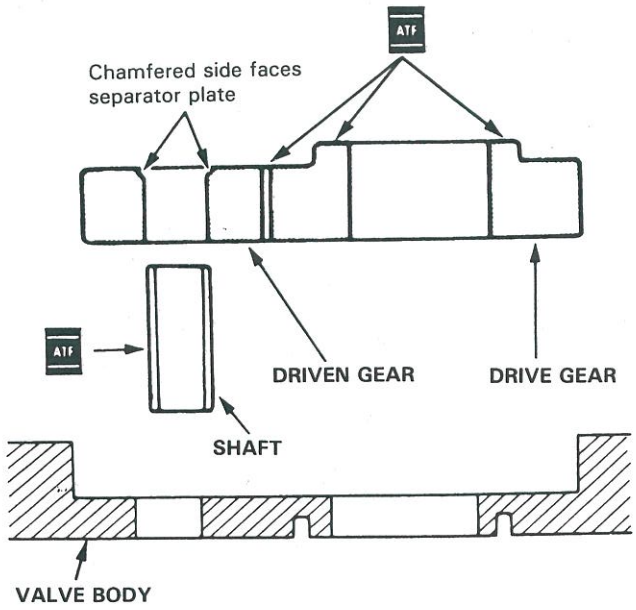
5. Install the manual valve, detent rollers and spring.



(cont'd)

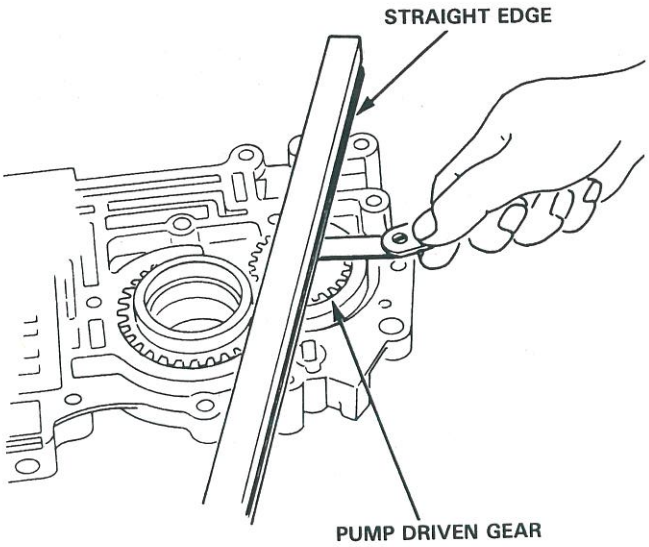
Reassembly (cont'd)

6. Install the pump gears and shaft in the main valve body.



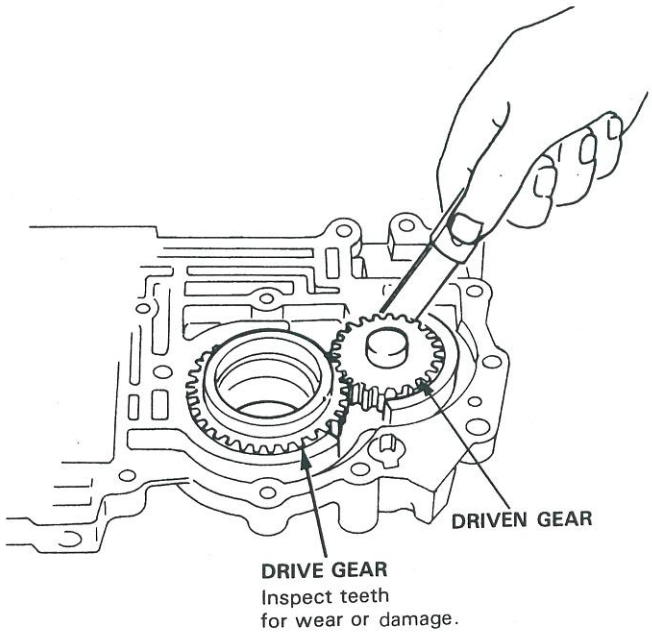
7. Measure the thrust clearance of the driven gear-to-valve body.

Drive/Driven Gear Thrust (Axial) Clearance:
Standard (New): 0.03—0.05 mm (0.001—0.002 in.)
Service Limit: 0.07 mm (0.0028 in.)



8. Install the oil pump shaft and measure the side clearance of the drive and driven gears.

Pump Gears Side (Radial) Clearance:
Standard (New): Drive gear 0.210—0.266 mm (0.0083—0.0105 in.)
Driven gear 0.05—0.088 mm (0.0020—0.0035 in.)

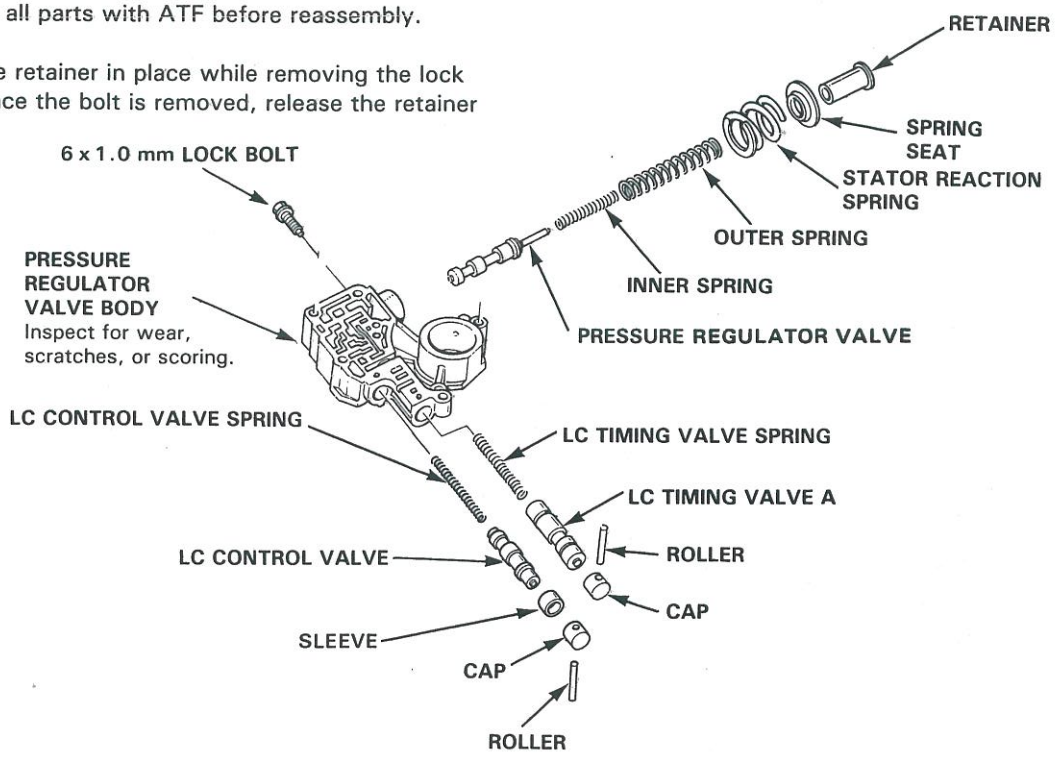


Regulator Valve Body

Disassembly/Inspection

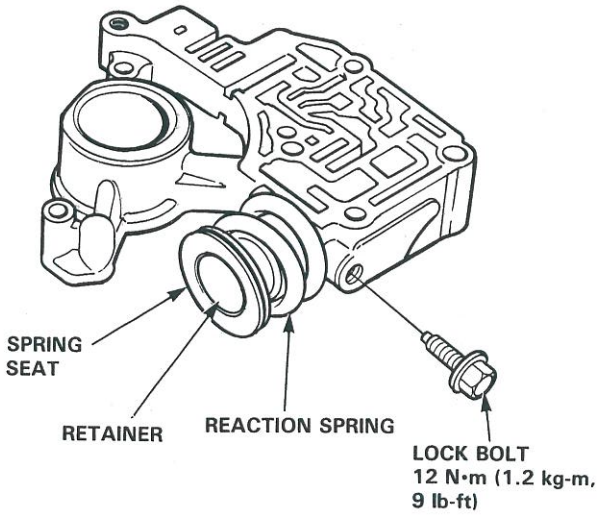
NOTE:
- Clean all parts thoroughly in solvent or carburetor cleaner.
- Replace valve body as an assembly if any parts are worn or damaged.
- Check all valves for free movement, if any fail to slide freely, see Valve Body Repair on page 14-32.
- See page 3-6 for spring specifications.
- Coat all parts with ATF before reassembly.

1. Hold the retainer in place while removing the lock bolt. Once the bolt is removed, release the retainer slowly.



Reassembly

1. Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
2. Coat all valves with ATF.
3. Install the pressure regulator valve, and the inner and outer springs.
4. Install the reaction spring, spring seat, and retainer. Align the hole in the retainer with the hole in the valve body, then press the retainer into the valve body and tighten the lock bolt.

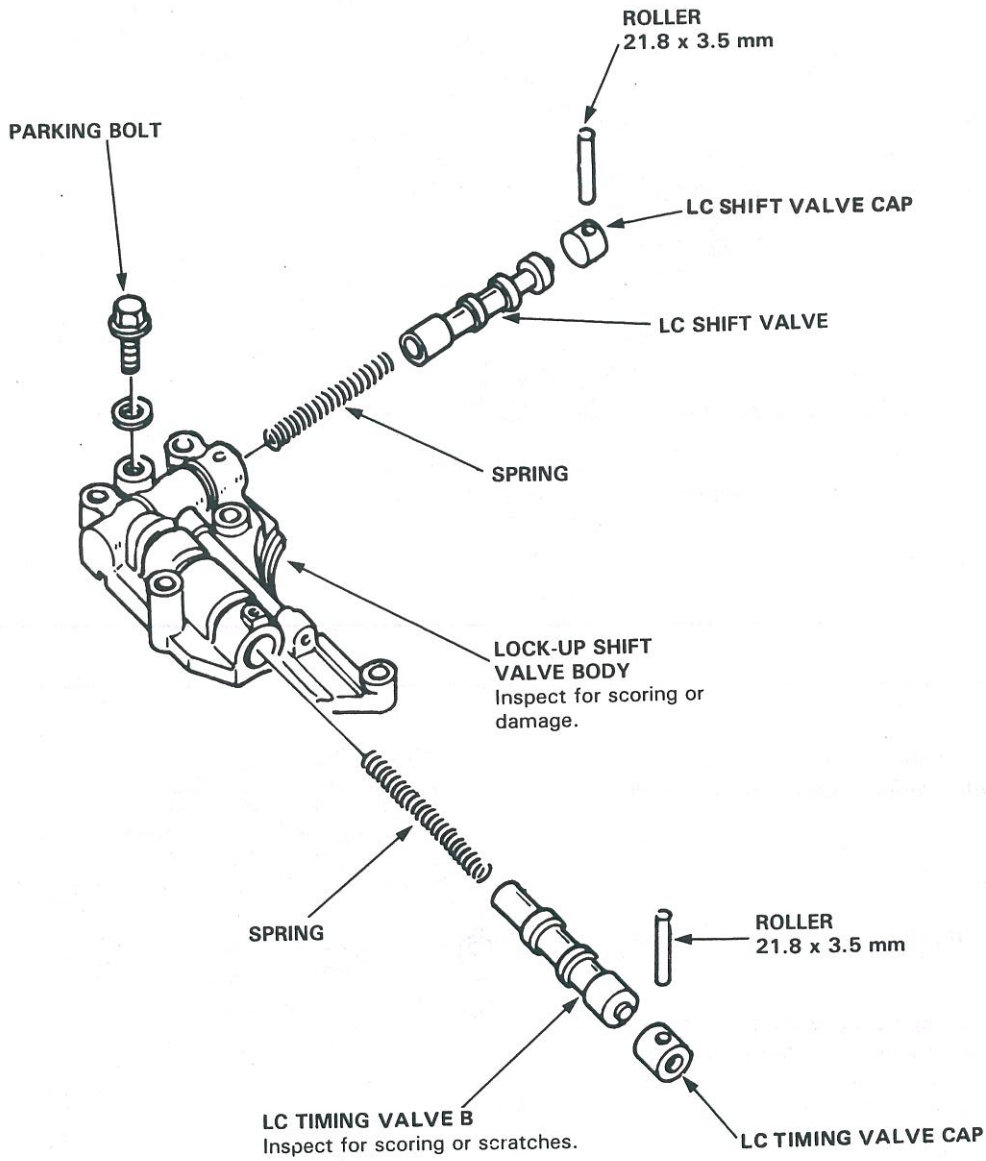


Lock-Up Shift Valve Body

Disassembly/Inspection

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner.
- 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 14-32.
- See page 3-6 for spring specifications.
- Coat all parts with ATF before reassembly.

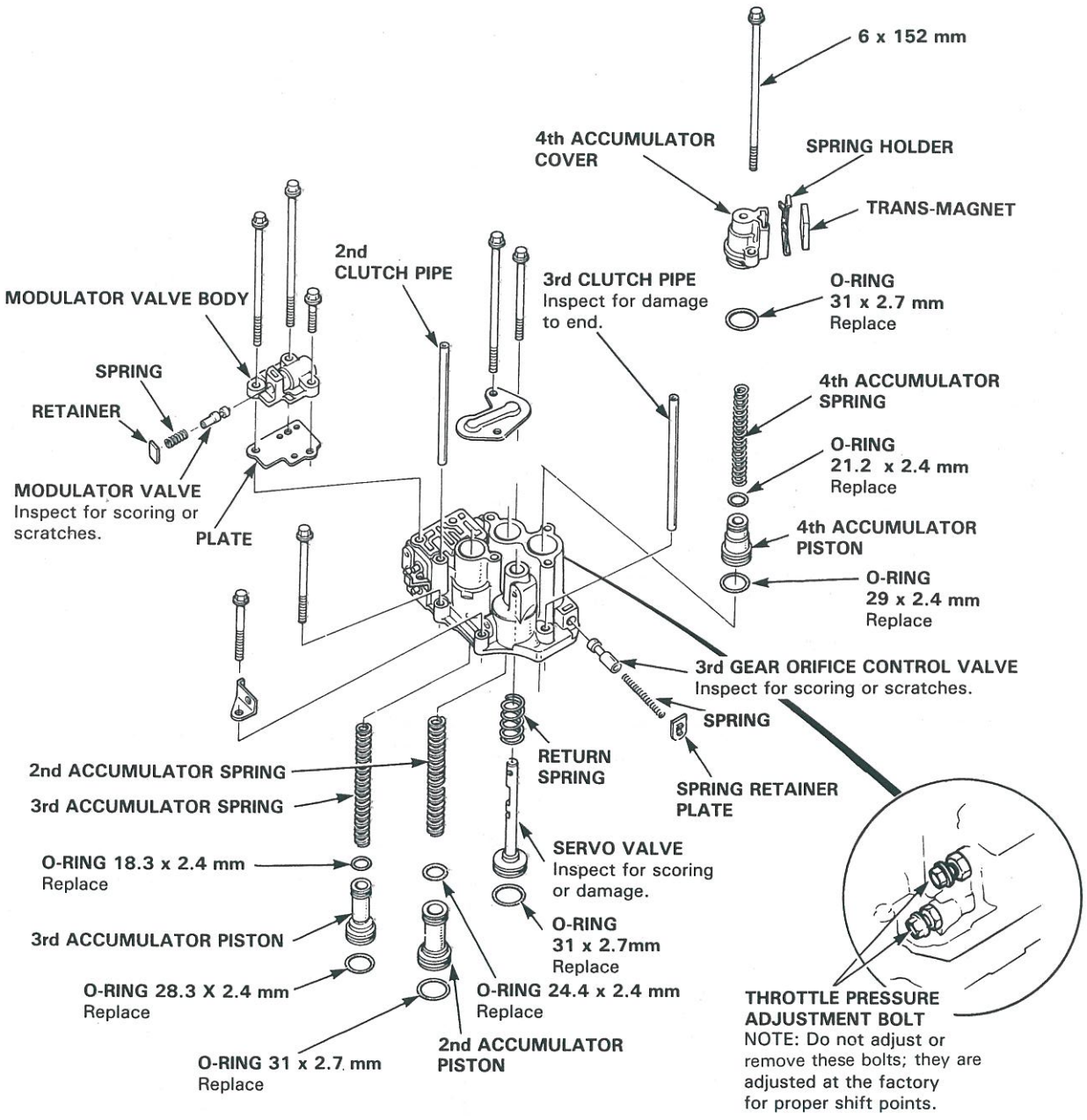


Servo Valve Body

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 14-32.
- See page 3-6 for spring specifications.

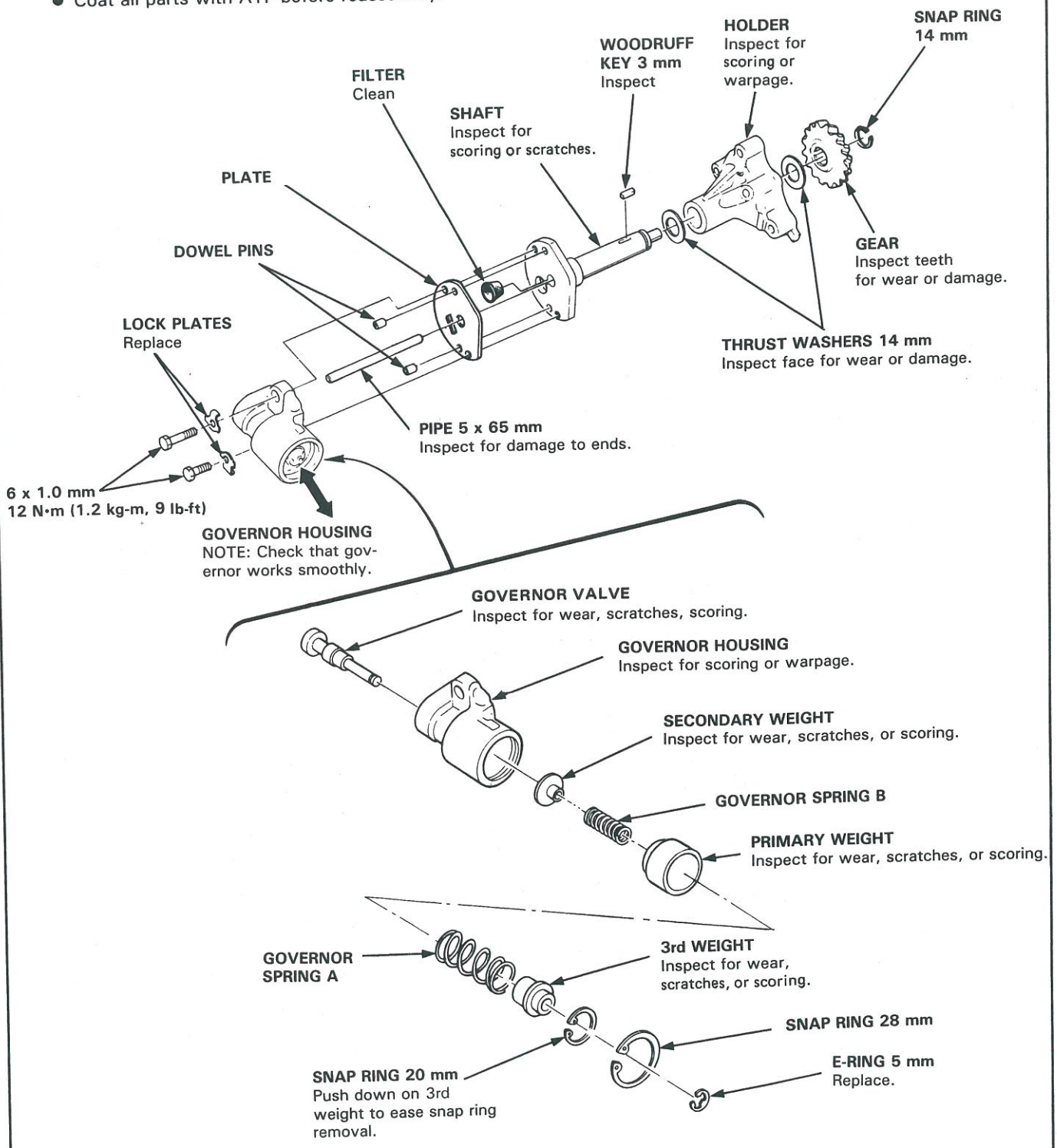


Governor Valve

Disassembly/Inspection/Reassembly

NOTE:

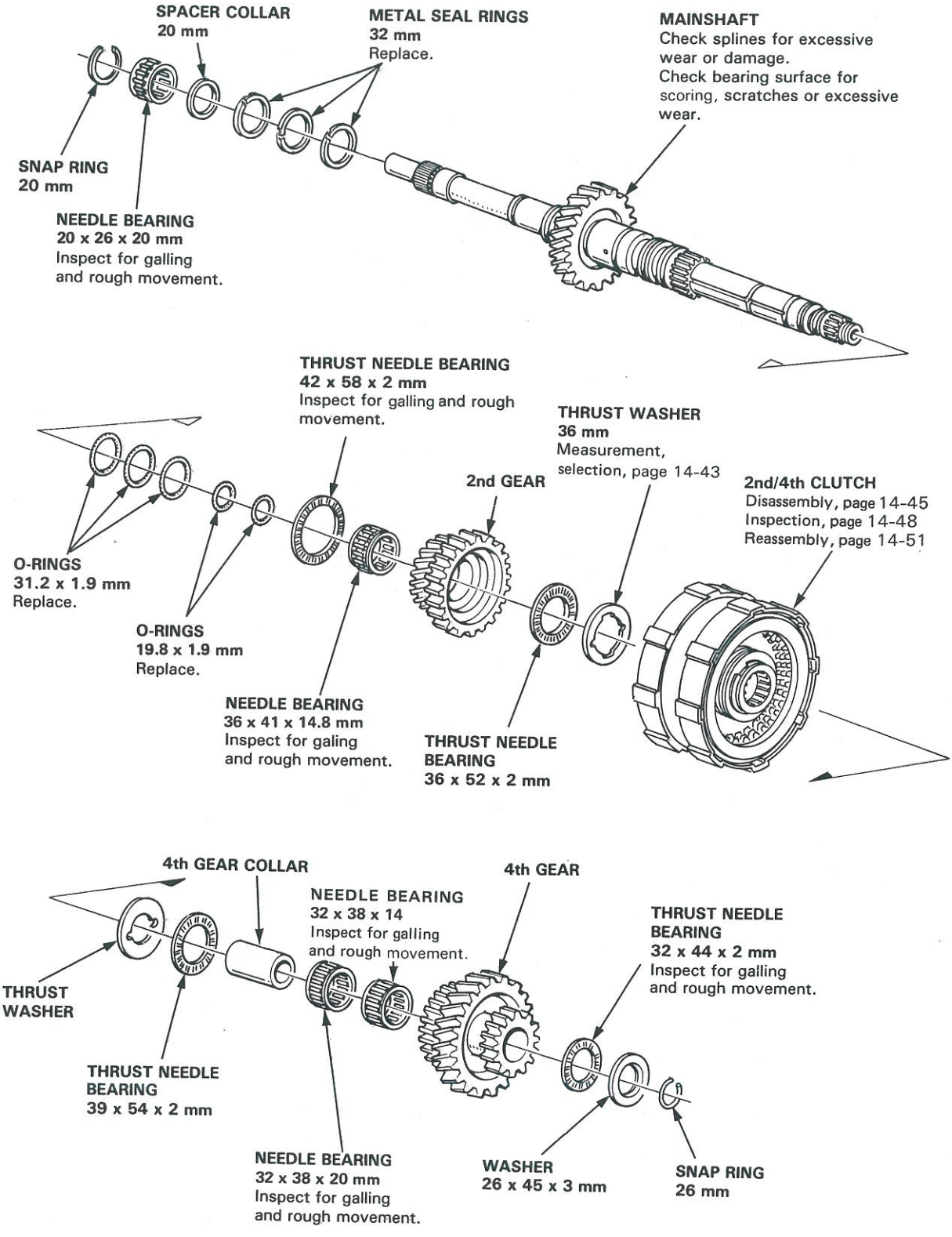
- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Check that the governor works smoothly; replace it if it does not.
- See page 3-6 for spring specifications.
- Coat all parts with ATF before reassembly.



Mainshaft

Disassembly/Inspection/Reassembly

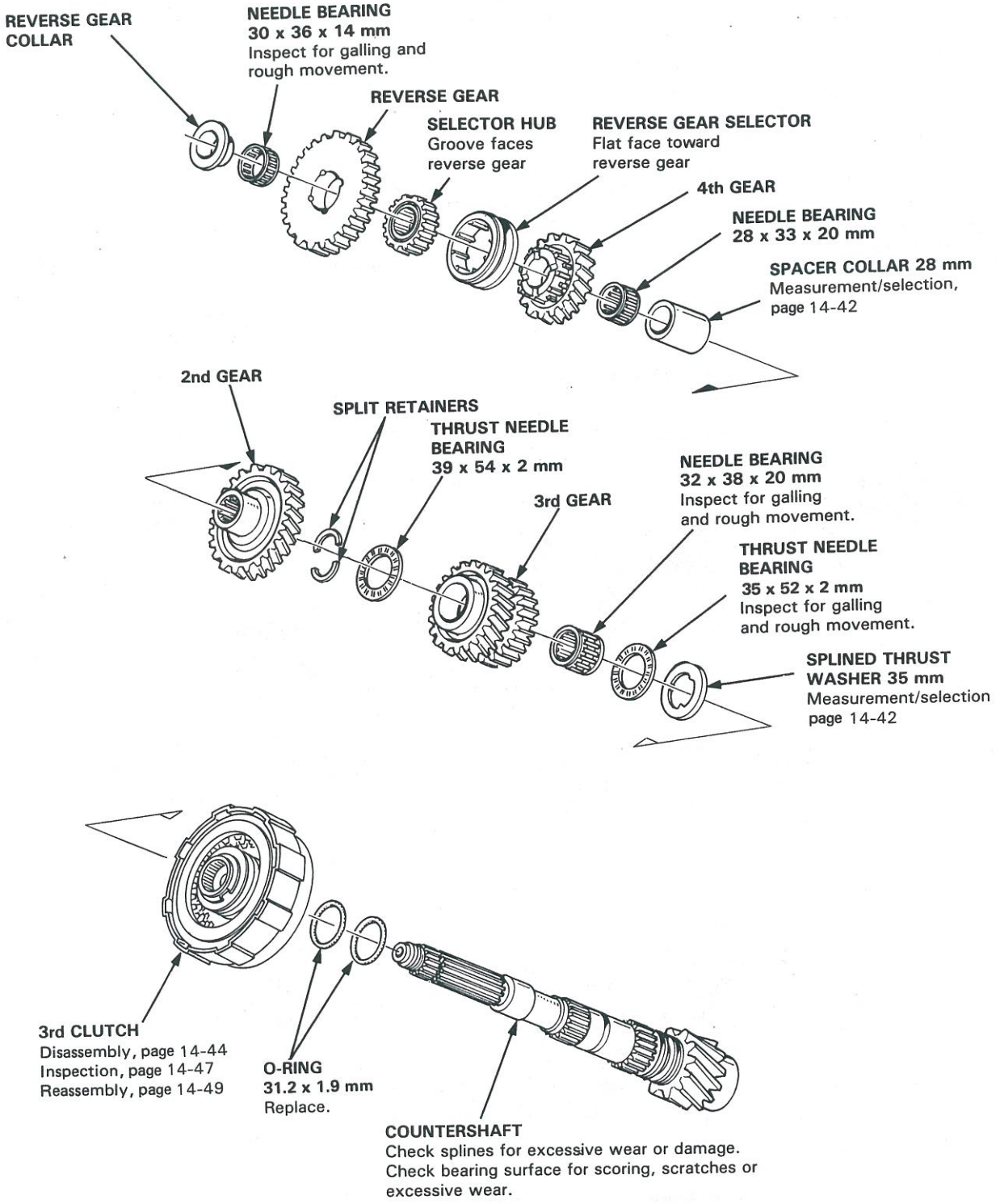
NOTE:
- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearings with unrolled edge of bearing retainer facing washer.



Countershaft

Disassembly/Inspection/Reassembly

NOTE:
- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearing with unrolled edge of bearing retainer facing washer.



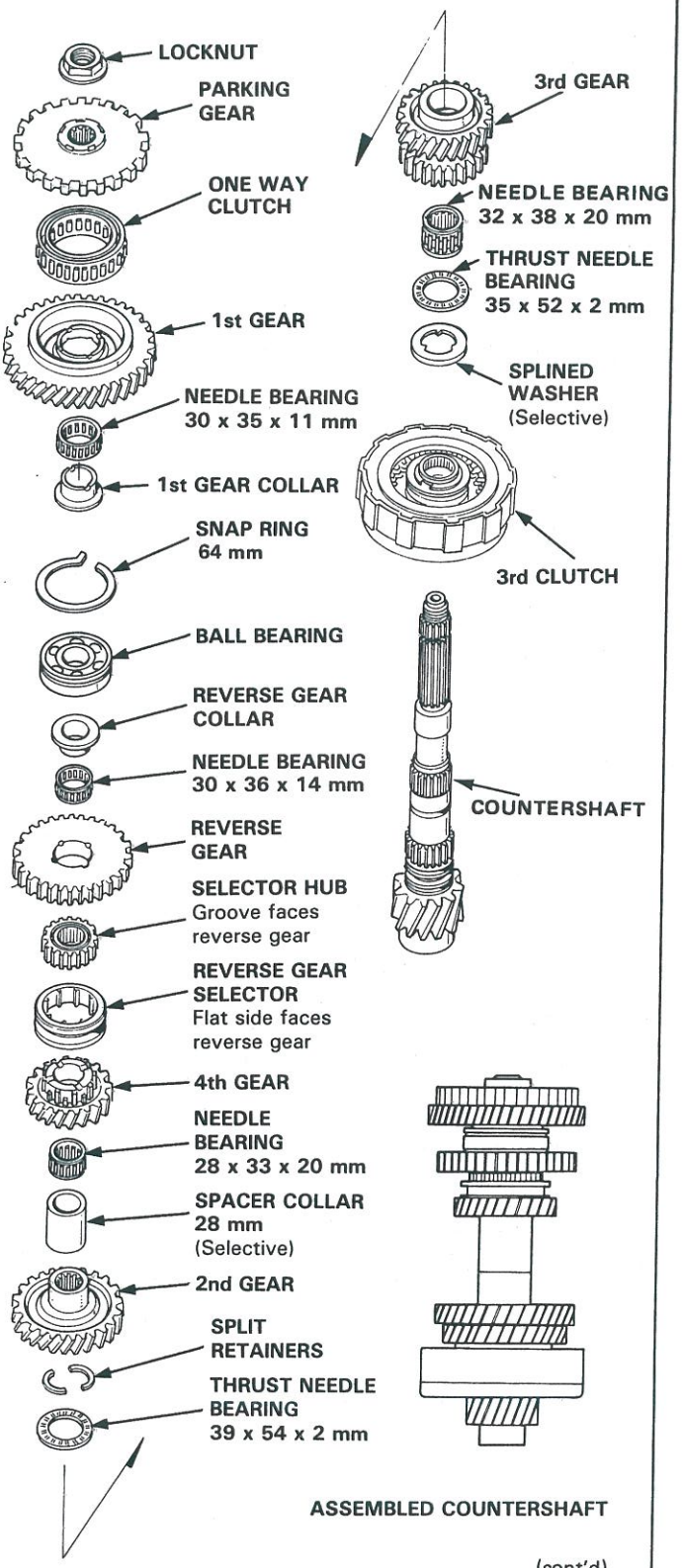
Countershaft/Mainshaft

Clearance Measurements

1. Remove both the mainshaft and countershaft bearings from the transmission housing.
2. Assemble the mainshaft and the countershaft including bearings and all parts shown below.
3. Install the mainshaft and countershaft assemblies into the torque converter housing.
4. Install the mainshaft holder to prevent the shafts from turning.
5. Torque the mainshaft locknut to 35 N·m (3.5 kg-m, 25 lb-ft). (Left-hand threads.)
6. Hold the parking gear on the countershaft with your hand and torque the countershaft locknut to 35 N·m (3.5 kg-m, 25 lb-ft).
7. Measure clearances as described on the next page.

ATF Lubricate all parts with ATF before final reassembly.

Countershaft Assembly

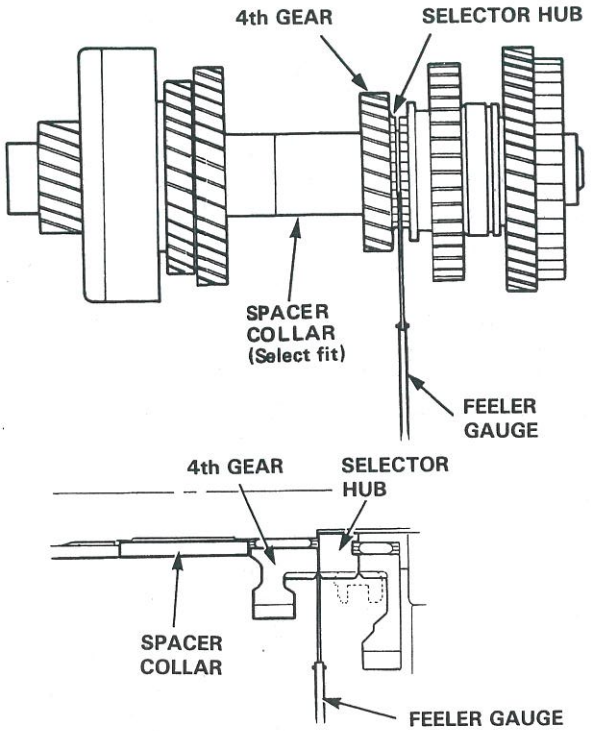


(cont'd)

Clearance Measurements (cont'd)

8. On the countershaft, measure the clearance between the shoulder on the selector hub and the shoulder on 4th gear.

Countershaft 4th Gear Clearance:
Standard: 0.07—0.15 mm (0.003—0.006 in.)



If clearance exceeds the service limit, measure the thickness of the spacer collar and select one which gives correct clearance.

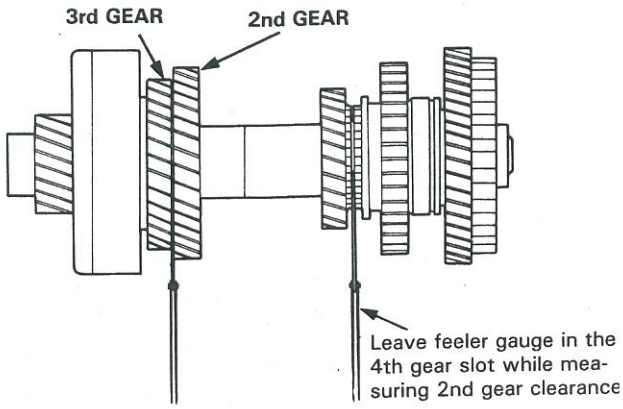
Replacement spacer collars:

CLASS	P/N	THICKNESS
1	90511-PH0-000	34.00 mm (1.339 in.)
2	90512-PH0-000	34.05 mm (1.341 in.)
3	90513-PH0-000	34.10 mm (1.342 in.)
4	90514-PH0-000	34.15 mm (1.344 in.)
5	90515-PH0-000	34.20 mm (1.346 in.)
6	90516-PH0-000	34.25 mm (1.348 in.)
7	90517-PH0-000	34.30 mm (1.350 in.)

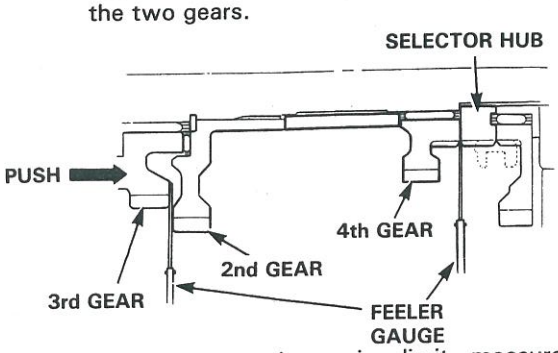
NOTE: Leave feeler gauge in place (4th gear) while measuring 2nd gear clearance.

Countershaft 2nd Gear Clearance:
Standard: 0.07—0.15 mm (0.003—0.006 in.)

9. Slide the 3rd gear out fully. Measure and record the clearance between the 2nd and 3rd gears with a feeler gauge.



- Slide the 3rd gear in fully and again measure the clearance between the 2nd and 3rd gears with another feeler gauge.
- Calculate the difference between the two readings to determine the actual clearance between the two gears.

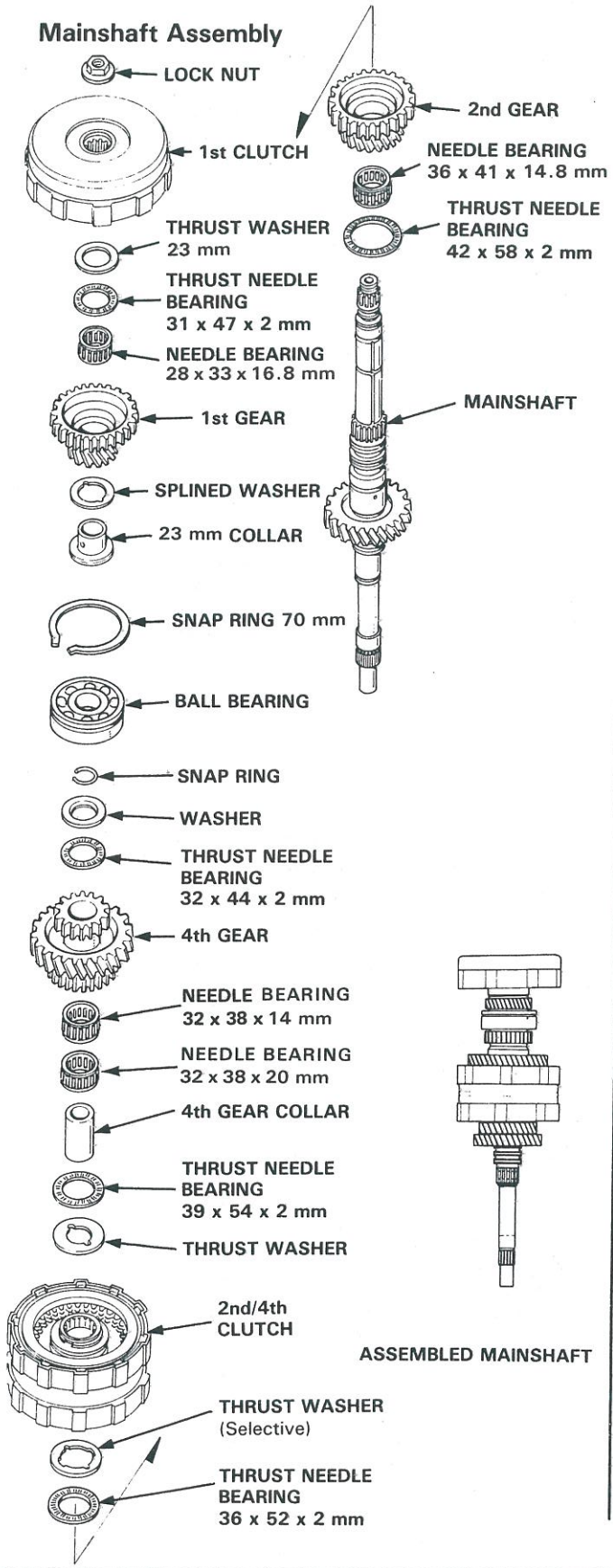


If clearance exceeds service limit, measure the thickness of the splined thrust washer (35 mm I.D.) and select one which gives the proper clearance.

Replacement splined thrust washers:

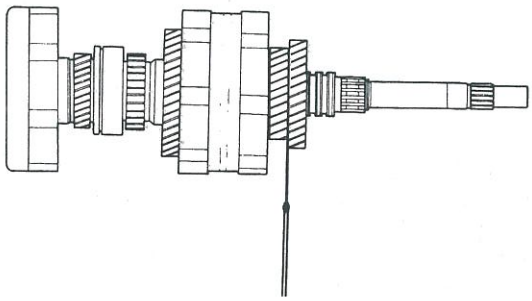
P/N	THICKNESS
90411—PA9—010	2.97—3.00 mm (0.117—0.118 in.)
90412—PA9—010	3.02—3.05 mm (0.119—0.120 in.)
90413—PA9—010	3.07—3.10 mm (0.121—0.122 in.)
90414—PA9—010	3.12—3.15 mm (0.123—0.124 in.)
90415—PA9—010	3.17—3.20 mm (0.125—0.126 in.)
90418—PA9—000	3.22—3.25 mm (0.127—0.128 in.)
90419—PA9—000	3.27—3.30 mm (0.129—0.130 in.)
90420—PA9—000	3.32—3.35 mm (0.131—0.132 in.)
90421—PA9—000	3.37—3.40 mm (0.133—0.134in.)

Mainshaft Assembly

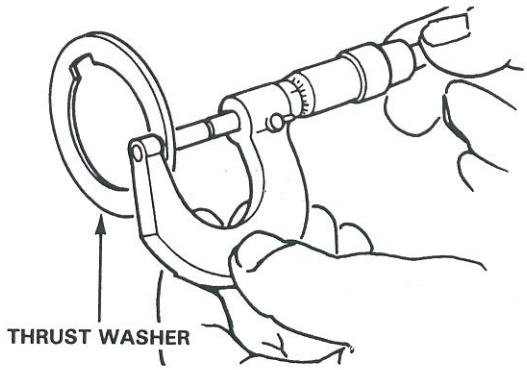


NOTE: Make all measurements before changing the thrust washers. Recheck after making the adjustments.

10. On the mainshaft measure the clearance between the shoulder of 2nd gear and main 3rd gear, the same way you did on the countershaft in step 9.
Mainshaft 2nd Gear Clearance:
Standard (New): 0.07–0.15 mm (0.003–0.006 in.)



If the clearance exceeds the service limit, measure the thickness of the 2nd clutch thrust washer (36 mm I.D.) and select one which gives the correct clearance.



Replacement washer (36 mm I.D.)

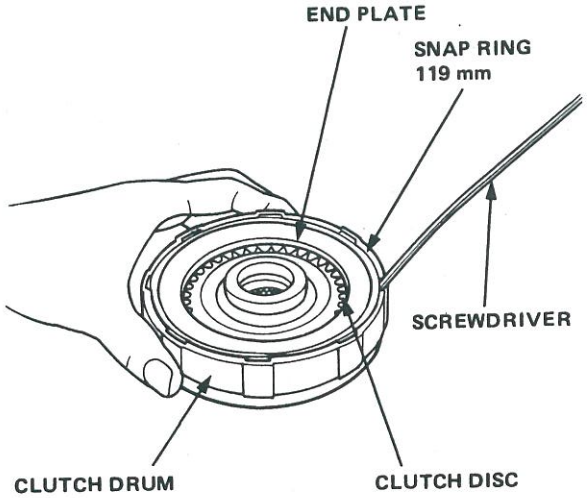
CLASS	P/N	THICKNESS
A	90441–PC9–010	3.47–3.50 mm (0.137–0.138 in.)
B	90442–PC9–010	3.52–3.55 mm (0.139–0.140 in.)
C	90443–PC9–010	3.57–3.60 mm (0.141–0.142 in.)
D	90444–PC9–010	3.62–3.65 mm (0.143–0.144 in.)
E	90445–PC9–010	3.67–3.70 mm (0.145–0.146 in.)
F	90446–PC9–010	3.72–3.75 mm (0.147–0.148 in.)
G	90447–PC9–010	3.77–3.80 mm (0.149–0.150 in.)
H	90448–PC9–010	3.82–3.85 mm (0.151–0.152 in.)
I	90449–PC9–010	3.87–3.90 mm (0.153–0.154 in.)

Disassembly

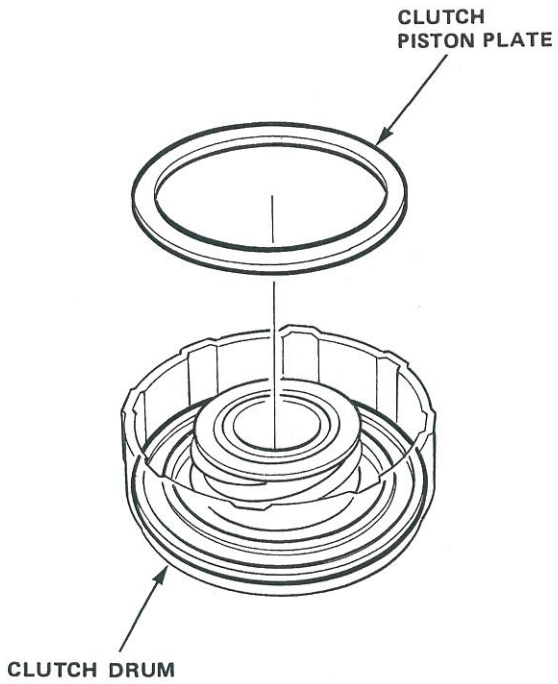
NOTE:

- The 1st and 3rd clutches are identical except for the piston plate installed in the 1st clutch.
- To disassemble the 2nd/4th clutch, use the special tool in Step 3 in the same manner as for the 1st and 3rd clutches.

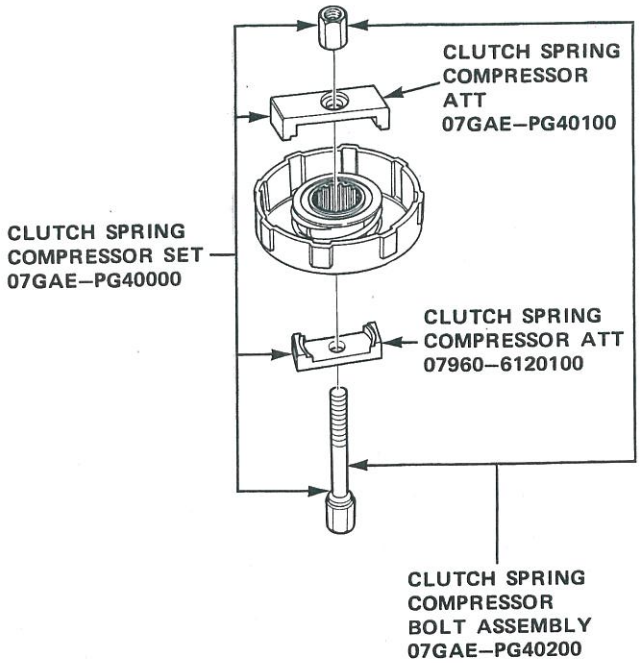
1. Remove the snap ring.



2. Remove the end plate, clutch discs and plates.
   1st clutch only: Also remove the clutch piston plate.

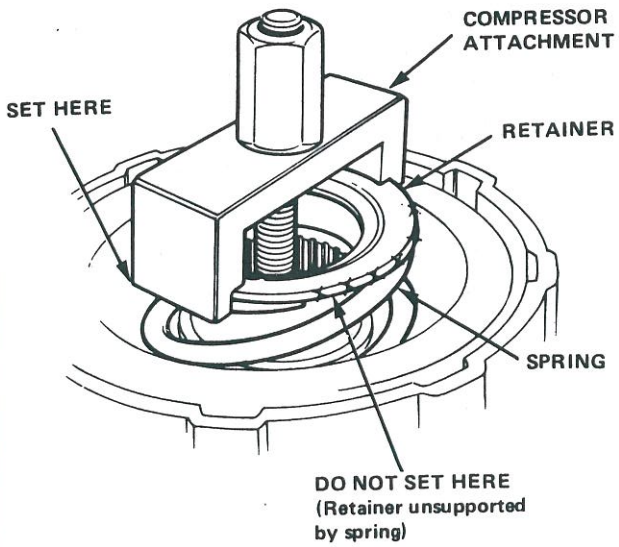


3. Install the clutch spring compressor as shown.

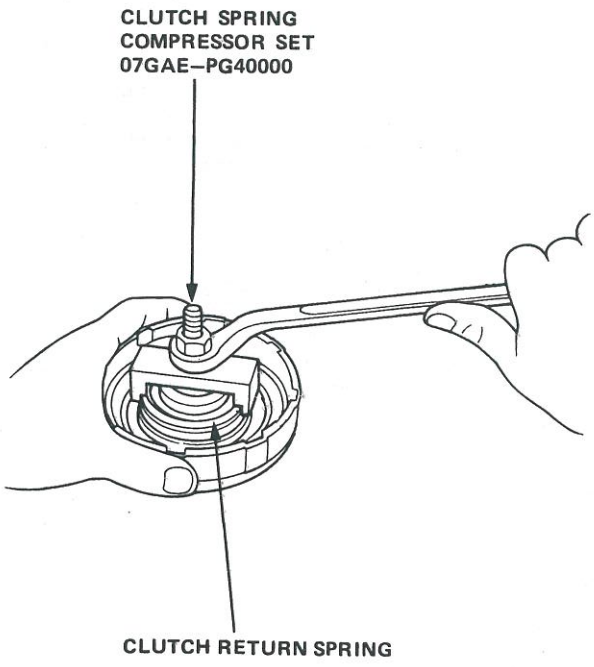


1st and 3rd Clutches

CAUTION: If either end of the compressor attachment is set over an area of the retainer which is unsupported by the spring, the retainer may be damaged.

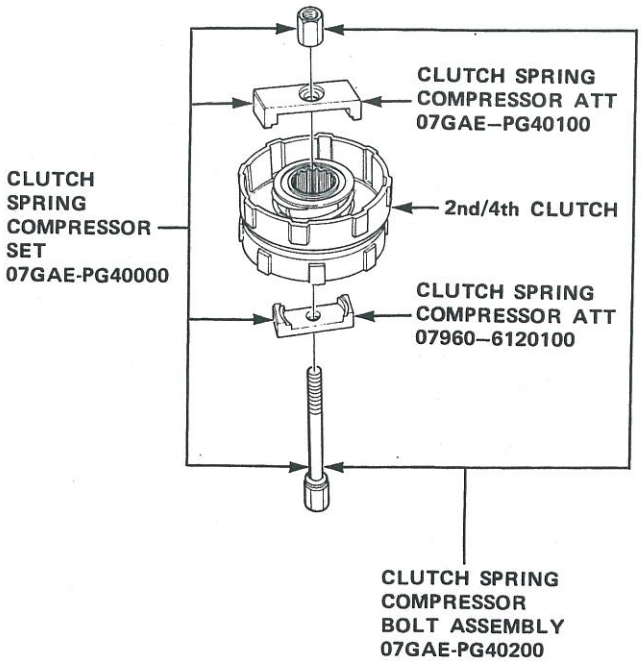


- Compress the clutch return spring.

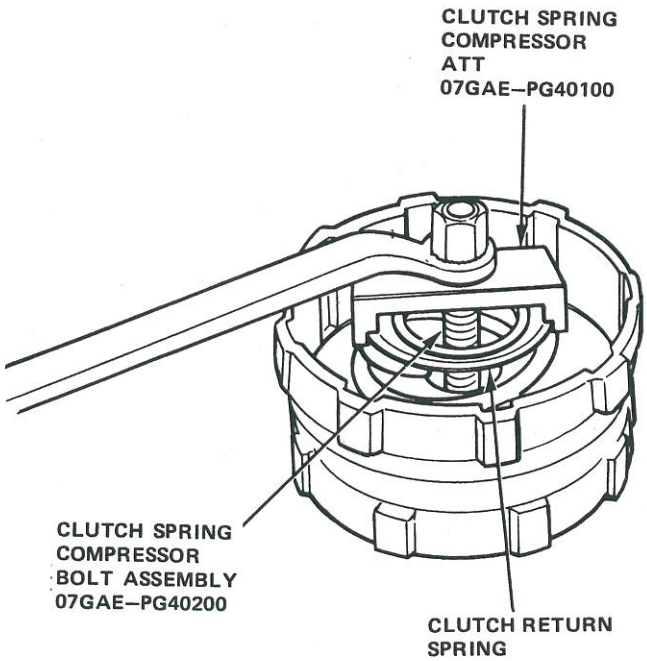


2nd/4th Clutch

- Assemble the spring compressor on the clutch dram.



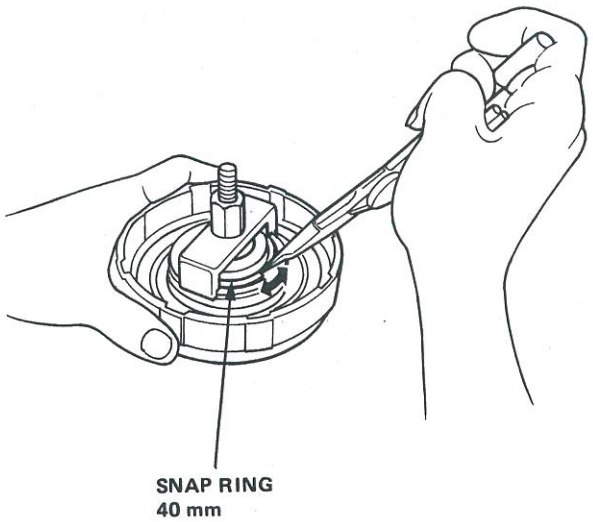
- Compress the clutch return spring.



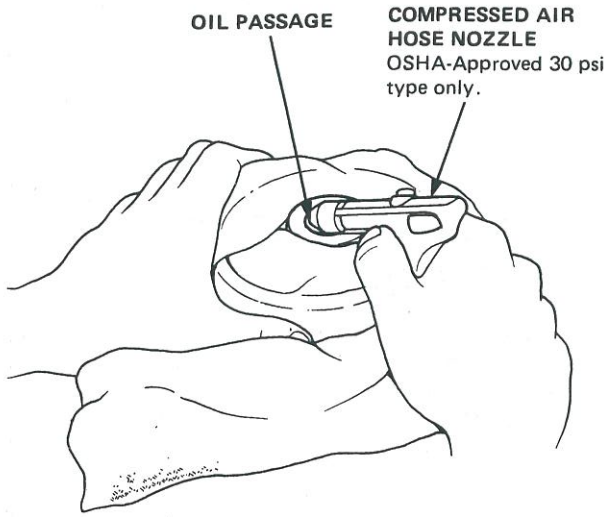
(cont'd)

Disassembly (cont'd)

4. Remove the snap ring. Then remove the clutch spring compressor, spring retainer and spring.



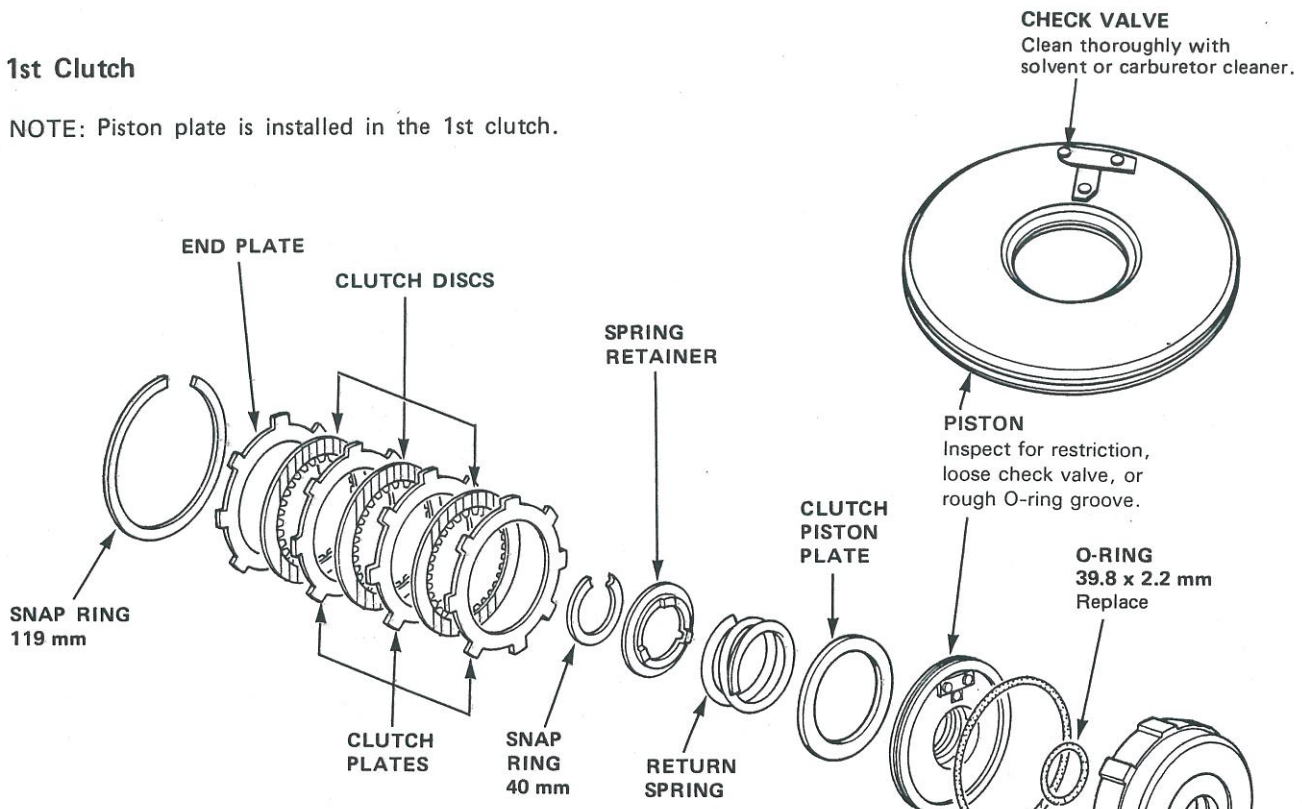
5. Wrap a shop rag around the clutch drum and apply air pressure to the oil passage to remove the piston. Place a finger tip on the other end while applying air pressure.



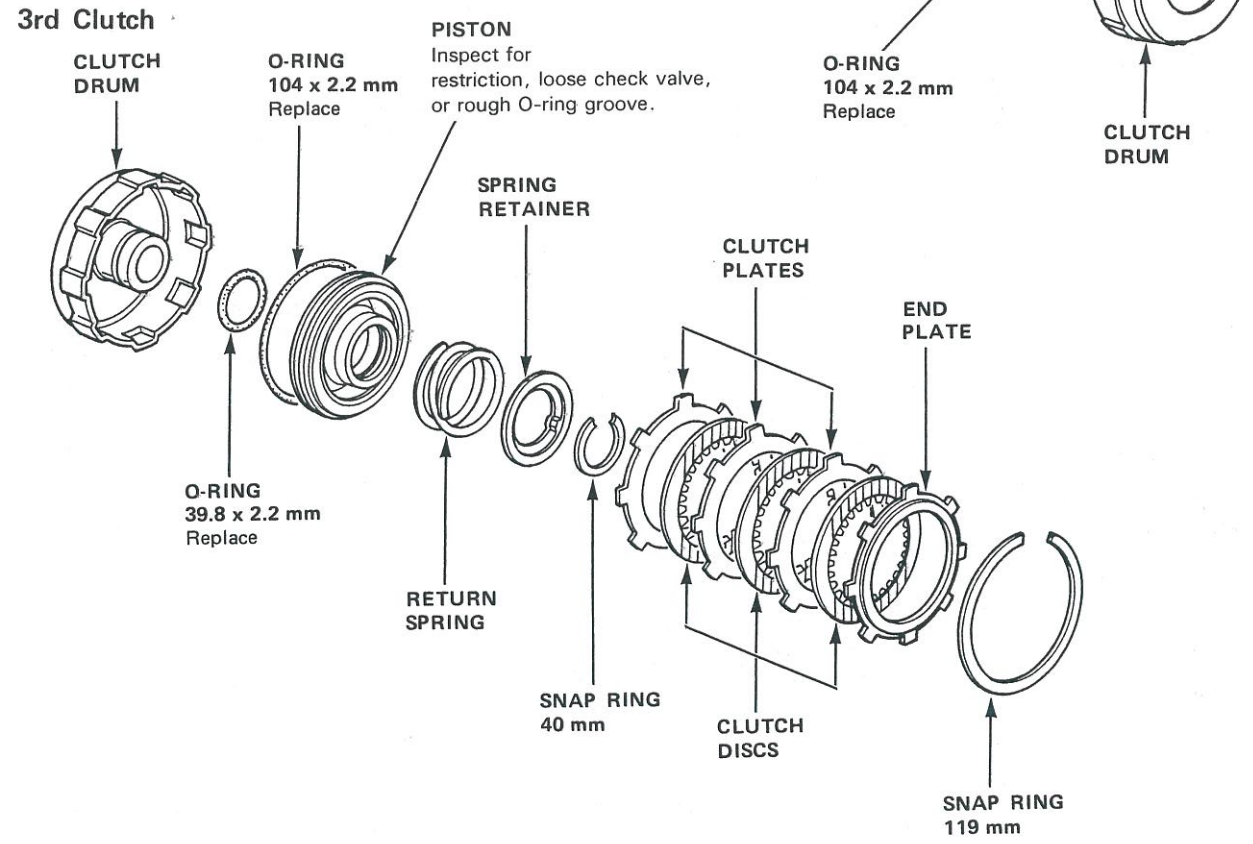
Disassembly/Inspection

1st Clutch

NOTE: Piston plate is installed in the 1st clutch.

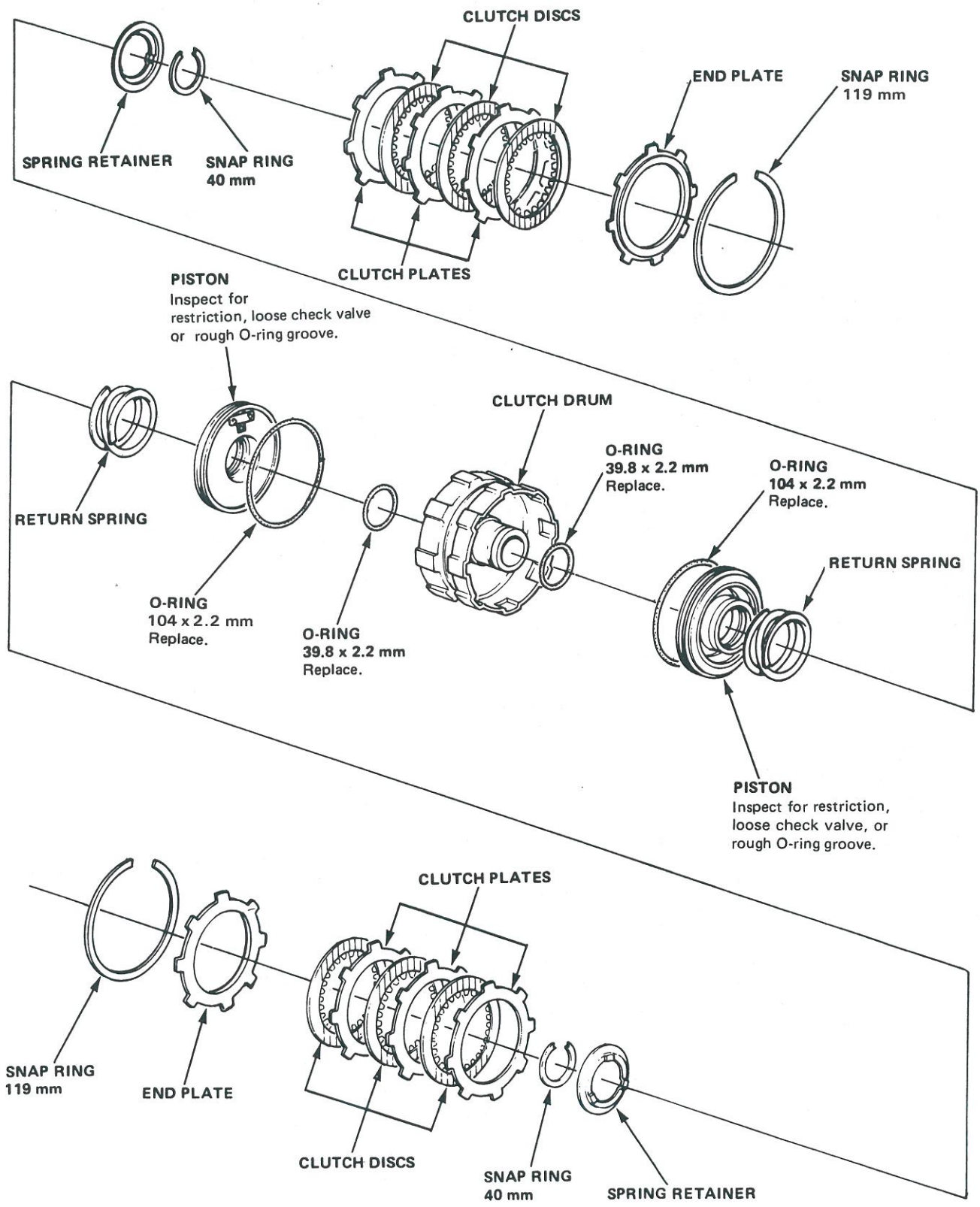


3rd Clutch



Disassembly/Inspection (cont'd)

2nd/4th Clutch

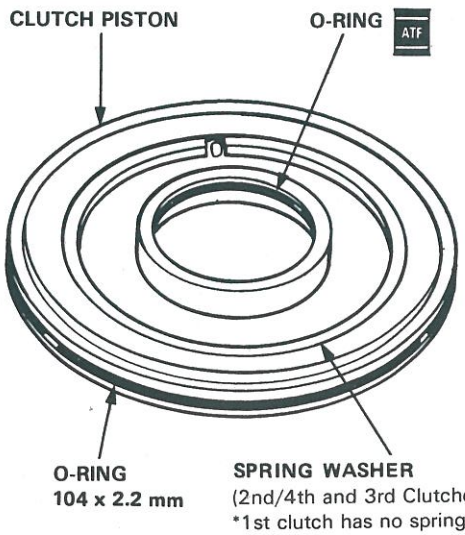


Reassembly

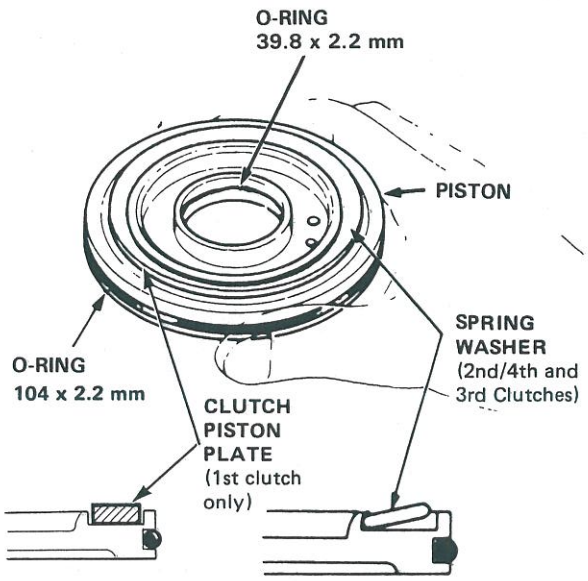
NOTE:

- The 1st and 3rd clutch assemblies are identical except installing the clutch piston plate in the 1st clutch.
- To reassemble the 2nd/4th clutch, use the special tool in Step 7 in the same manner as for the 1st and 3rd clutches.

1. Clean all parts thoroughly in solvent, and dry with compressed air. Blow out all passages.
2. Lubricate all parts with ATF before reassembly.



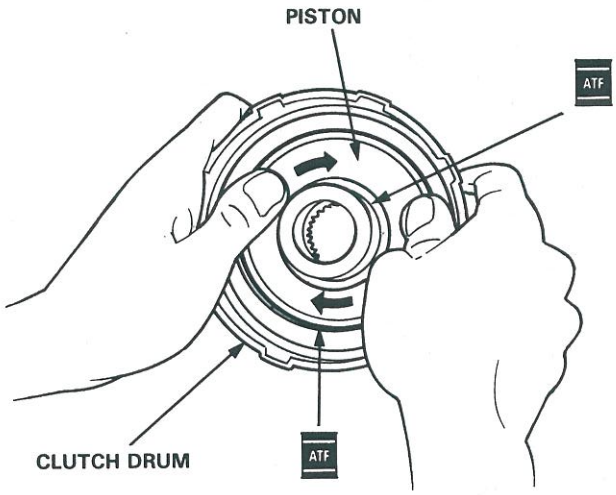
3. Install new O-ring on clutch piston.
   2nd/4th and 3rd Clutches:
   Make sure the spring washer is properly positioned as shown.



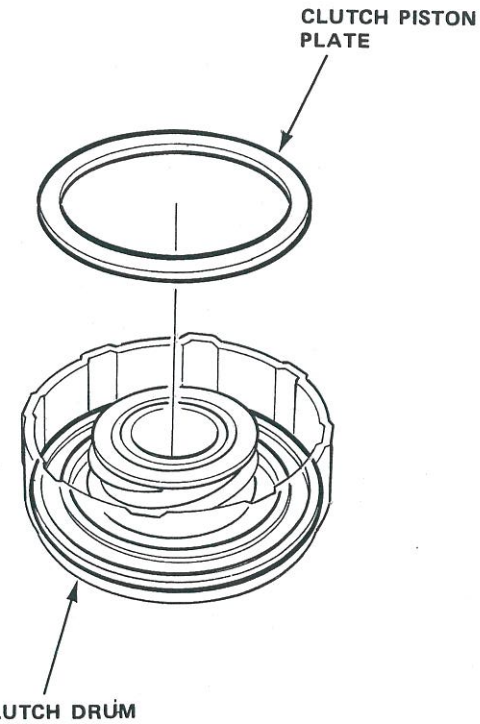
4. Install the piston in the clutch drum. Apply pressure and rotate to ensure proper seating.

   NOTE: Lubricate the piston O-ring with ATF before installing.

   CAUTION: Do not pinch O-ring by forcing piston installation.



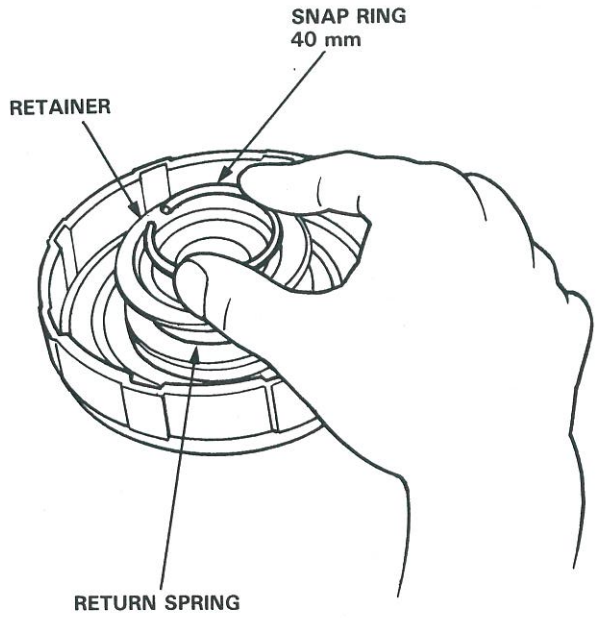
- 1st clutch only:
  Install the clutch piston plate.



(cont'd)

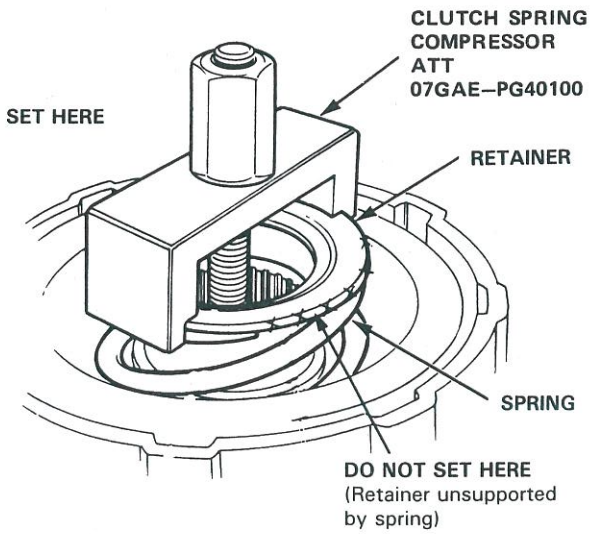
Reassembly (cont'd)

5. Install the return spring and retainer.
6. Position the 40 mm snap ring on the spring retainer.



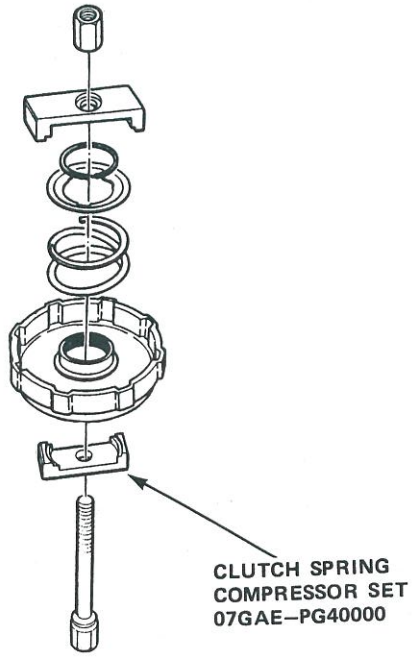
7. Assemble the spring compressor on the clutch drum.

CAUTION: If either end of the compressor attachment is set over an area of the retainer which is unsupported by the spring, the retainer may be damaged.

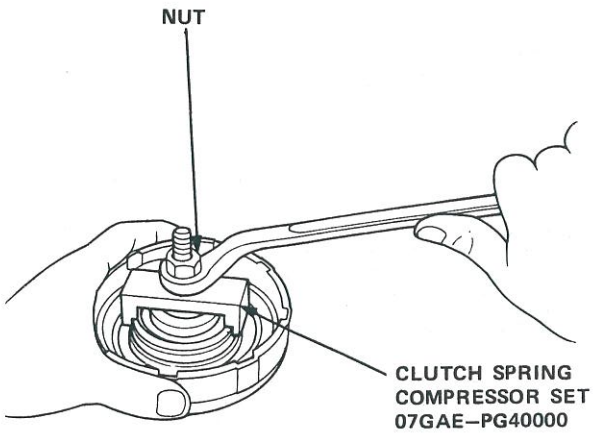


1st and 3rd clutches

- Assemble the spring compressor on the clutch drum.

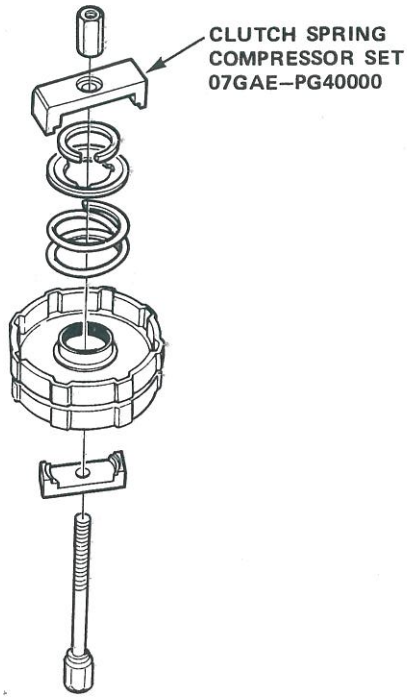


8. Compress the spring until the retainer is below the snap ring groove in the hub.

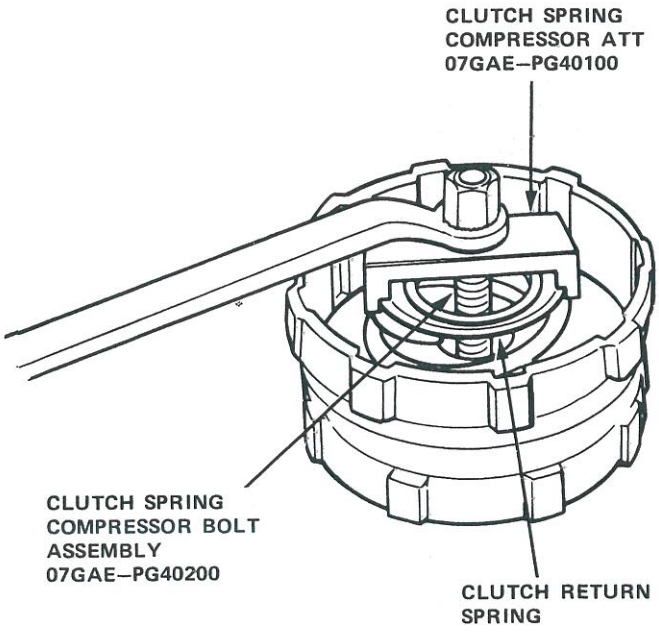


2nd/4th Clutch

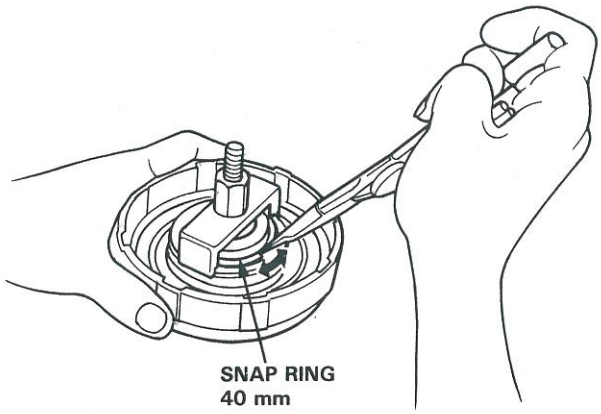
- Assemble the spring compressor on the clutch drum.



- Compress the clutch return spring.



9. Then install the snap ring (with its rounded edge facing in) in the hub groove and remove the spring compressor.

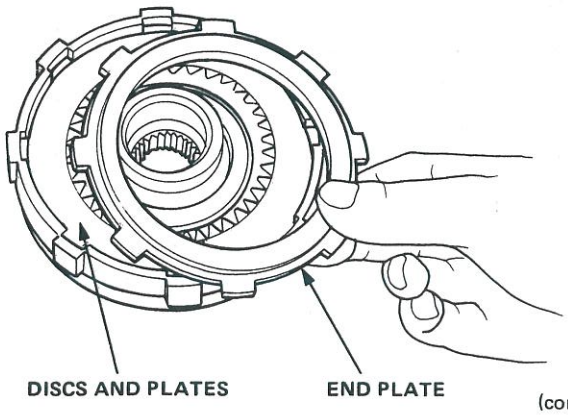


10. Soak the clutch discs thoroughly in automatic transmission fluid for a minimum of 30 minutes.

    NOTE:
    Clutch piston plate is installed only in the 1st clutch.

11. Starting with a clutch plate, alternately install the clutch plates and discs. Install the clutch end plate with flat side toward the disc.

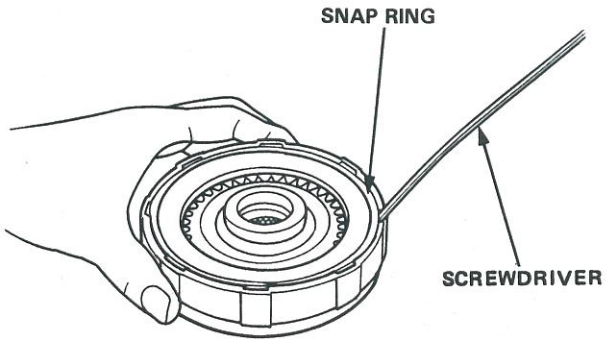
    NOTE: Before installing the plates and discs, make sure the inside of the clutch drum is free of grit or other foreign matter.



(cont'd)

Reassembly (cont'd)

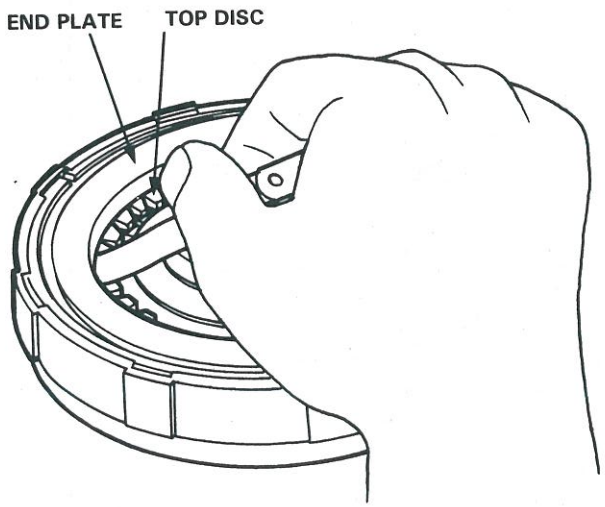
12. Install the 119 mm snap ring.



13. Using bent feeler gauges, carefully measure the clearance between the clutch end plate and the top disc. Do not damage the disc.

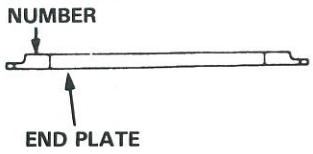
End Plate-to-Top Disc Clearance:

	Service Limit	
LOW	0.65 – 0.85 mm	(0.026–0.033 in.)
2ND	0.65–0.8 mm	(0.026–0.031 in.)
3RD	0.4–0.6 mm	(0.016–0.023 in.)
4TH	0.4–0.6 mm	(0.016–0.023 in.)

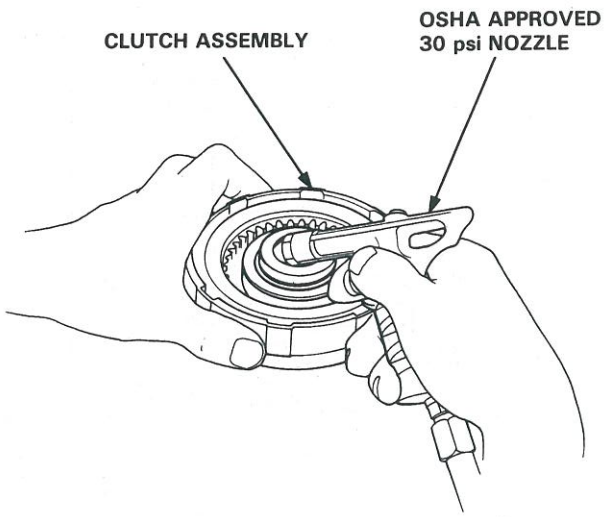


14. If not within service limit, select a new clutch end plate from following table.

P/N	PLATE NO.	THICKNESS
22551–PC9–000	1	2.4 mm (0.094 in.)
22552–PC9–000	2	2.5 mm (0.098 in.)
22553–PC9–000	3	2.6 mm (0.102 in.)
22554–PC9–000	4	2.7 mm (0.106 in.)
22555–PC9–000	5	2.8 mm (0.110 in.)
22556–PC9–000	6	2.9 mm (0.114 in.)
22557–PC9–000	7	3.0 mm (0.118 in.)
22558–PC9–000	8	3.1 mm (0.122 in.)
22559–PC9–000	9	3.2 mm (0.126 in.)
22560–PC9–000	10	3.3 mm (0.130 in.)

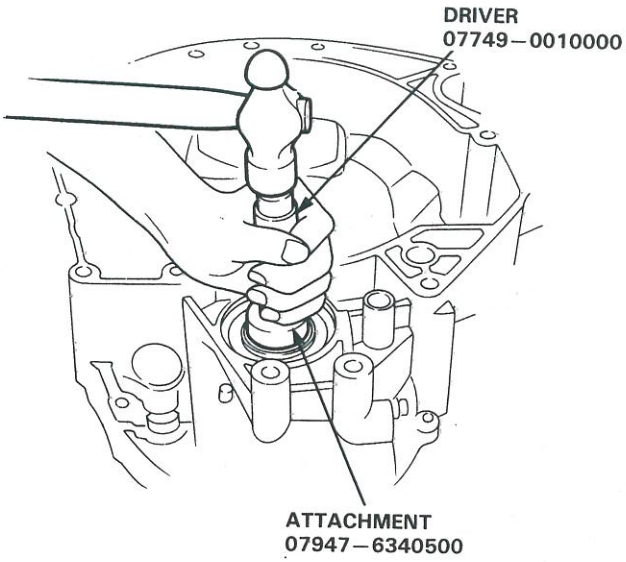


15. Check the clutch engagement by blowing air into the oil passage in the clutch drum hub. Remove the air pressure and check that the clutch releases.

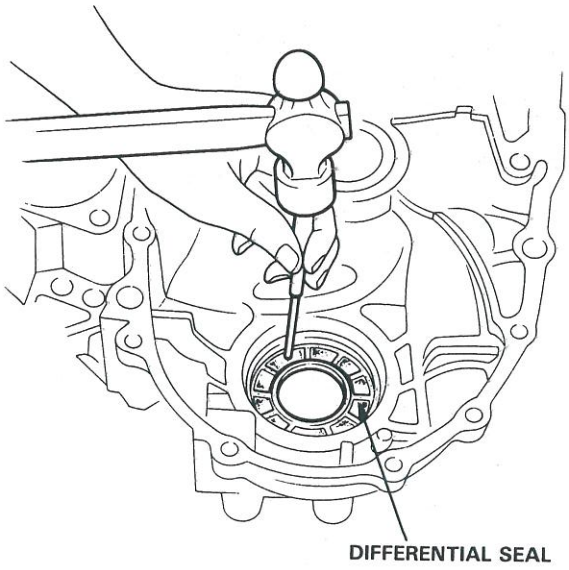


Replacement

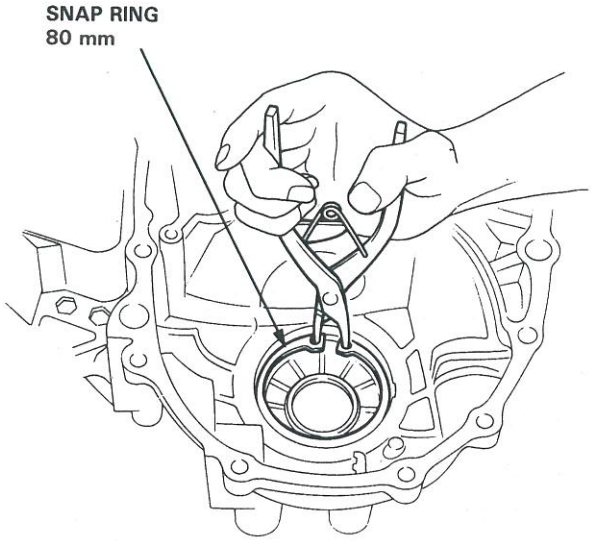
1. If seals are to be replaced, or if differential needs repair, remove the differential.



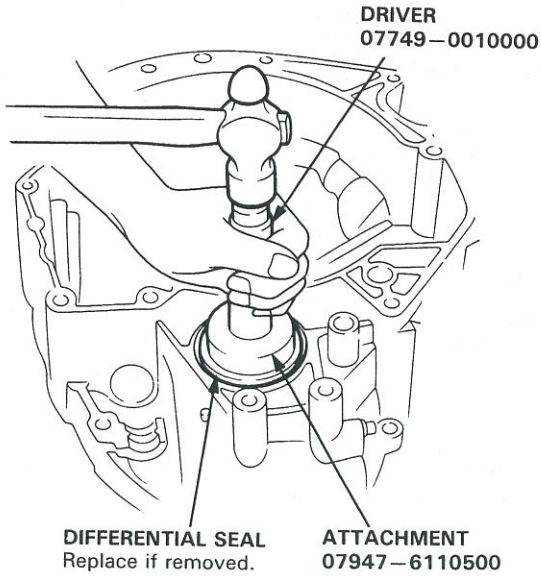
2. On the torque converter housing, remove the 80 mm snap ring, then drive out the seal as shown.
3. Remove the differential seal from the transmission housing in the same way.



4. On the torque converter housing, install the differential 80 mm snap ring if removed.



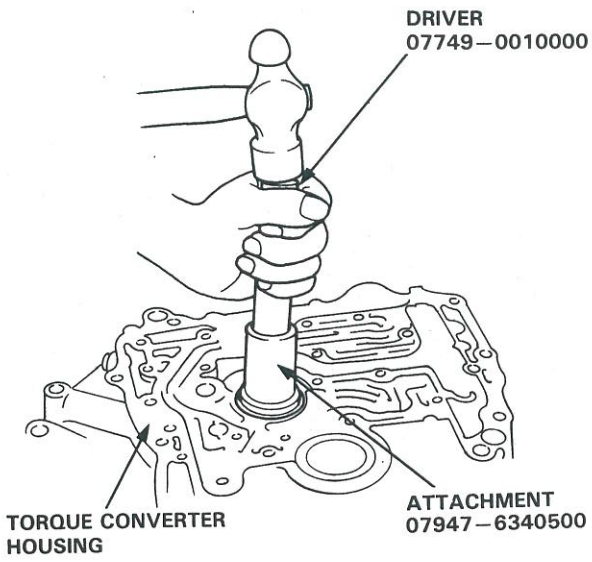
5. Install the differential seals into the torque converter housing and transmission housing.



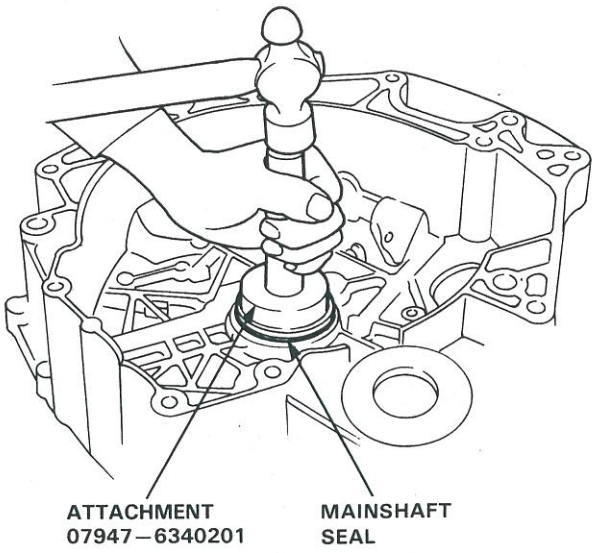
Replacement

Torque converter housing

1. Remove the mainshaft bearing and seal from the torque converter housing.

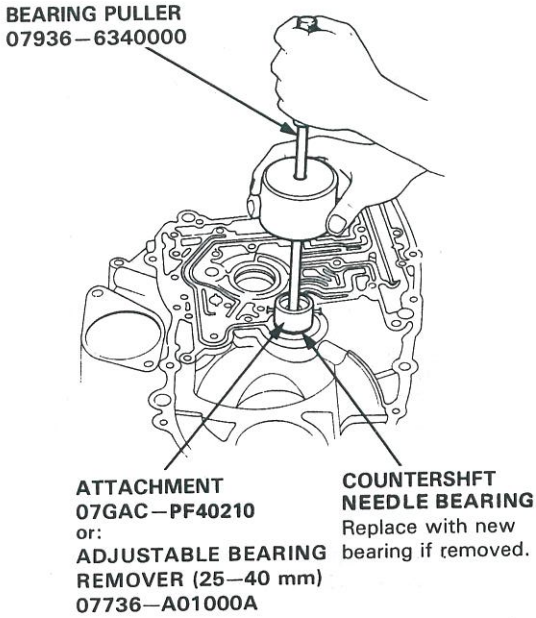


2. Drive in the new mainshaft bearing until it bottoms in housing.

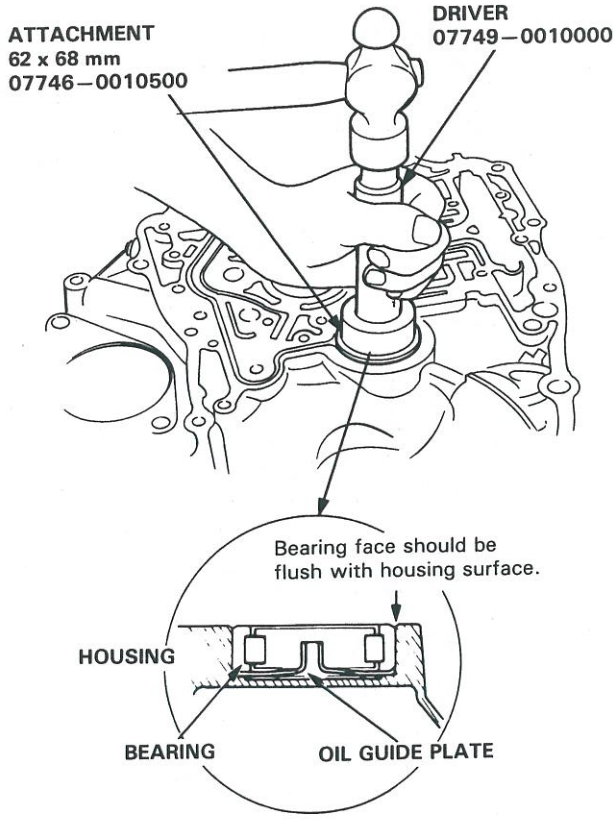


3. Then install the new mainshaft seal flush with the housing, using attachment 07947–6340201.

4. Turn the torque converter housing over and remove the countershaft bearing.



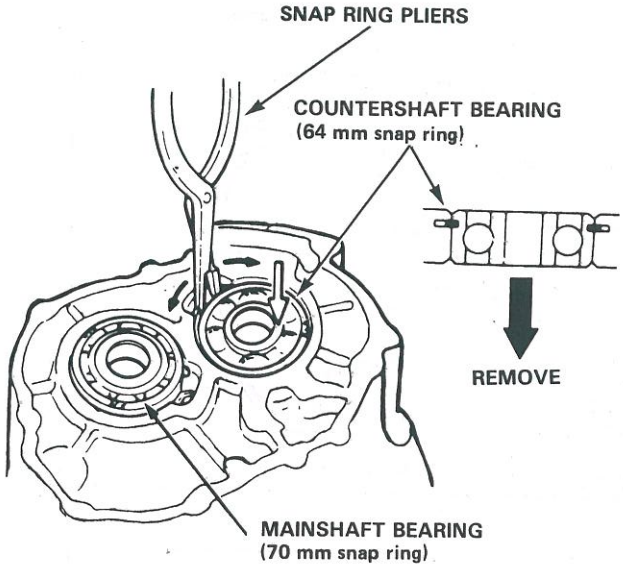
5. Make sure the oil guide plate is installed in the bearing hole, then install a new countershaft bearing flush with the housing.



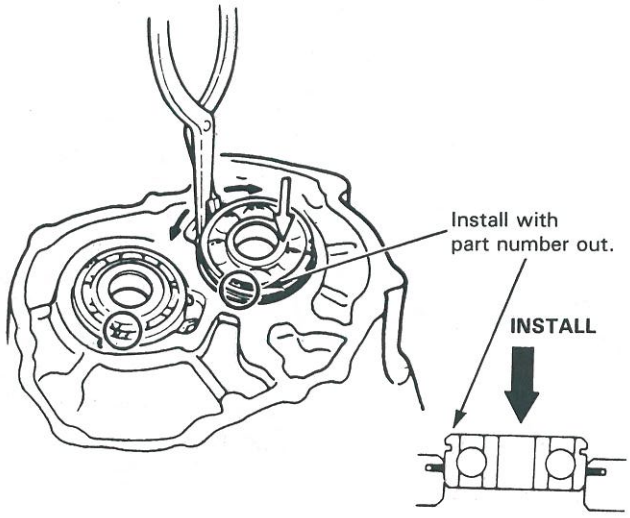
Transmission housing

1. To remove the mainshaft and countershaft bearings from the transmission housing, expand each snap ring with snap ring pliers, then push the bearing out by hand.

   NOTE: Do not remove the snap rings unless it's necessary to clean the grooves in the housing.



2. Expand each snap ring with snap ring pliers, insert the new bearing part-way into it, then release the pliers. Push the bearing down into the transmission until the ring snaps in place around it.

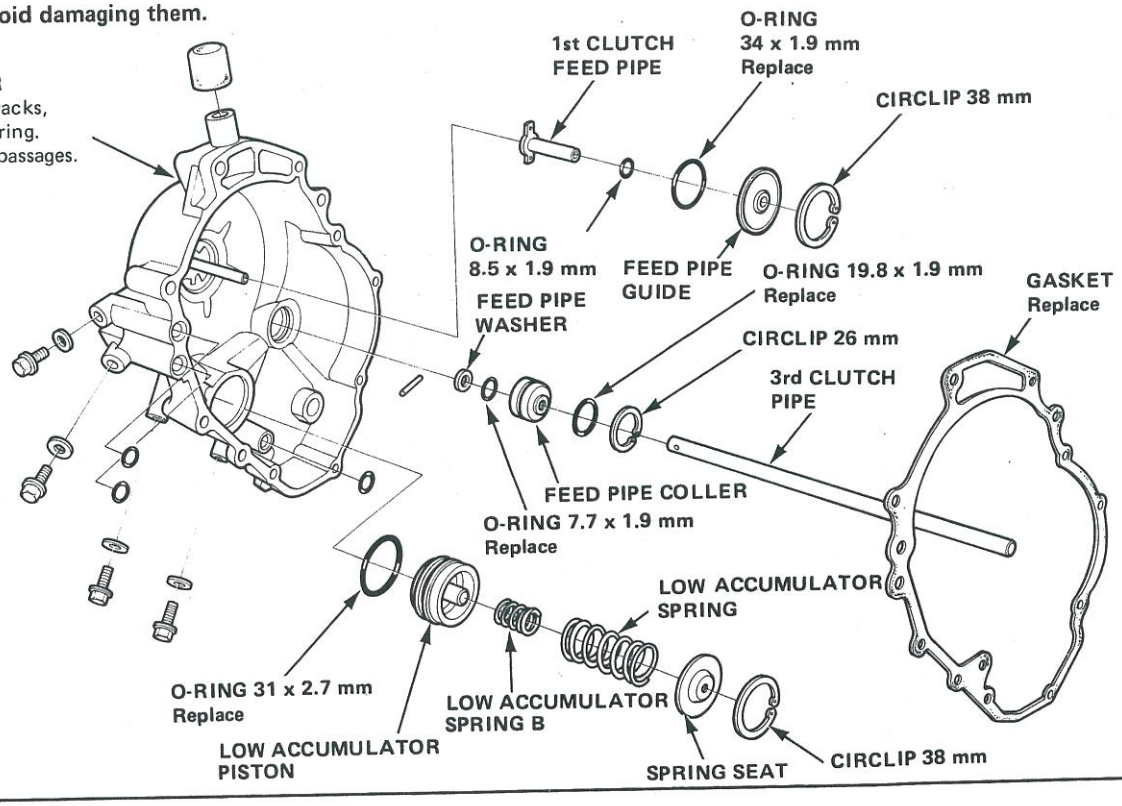


3. Make sure the snap rings are seated in the bearing and housing grooves.

End Cover

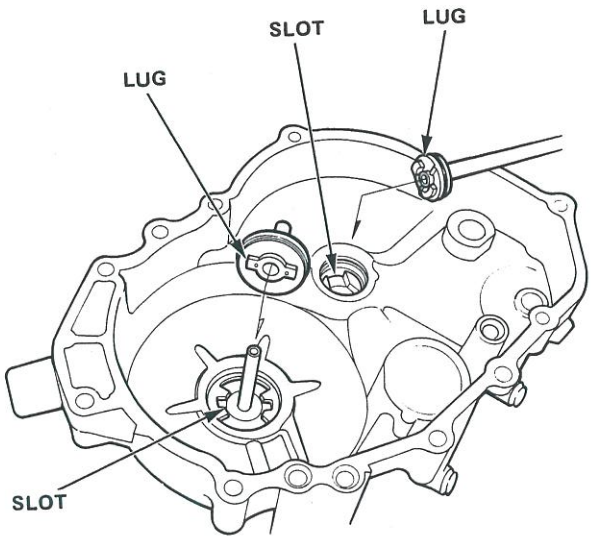
Disassembly/Inspection

CAUTION: Remove and install the parts carefully to avoid damaging them.

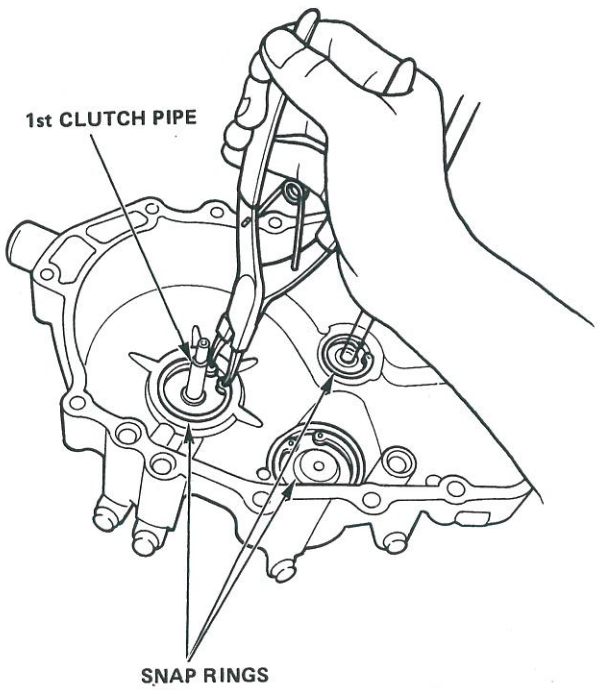


Reassembly

1. With feed pipes assembled, align the lugs on collars with the slots in end cover.

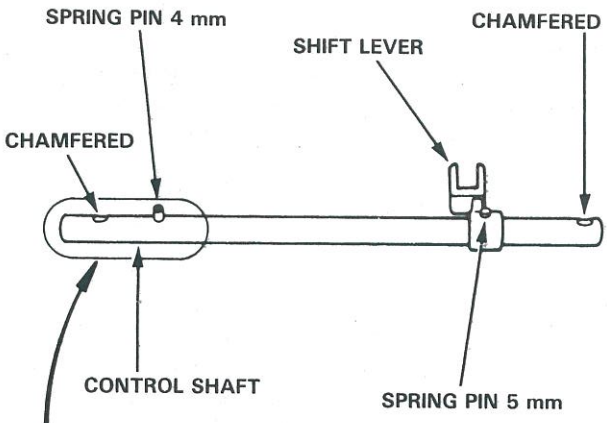


2. Install the feed pipes and low accumulator in the end cover with the snap rings.

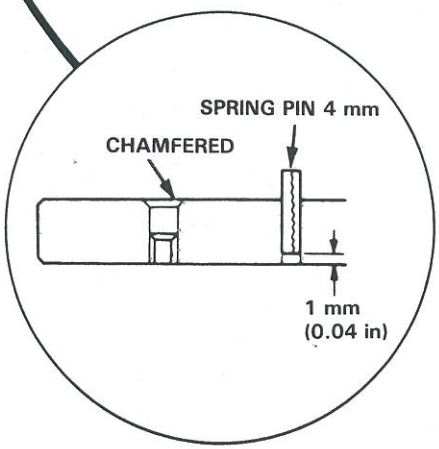


Throttle Control Shaft

Installation



Drive the 4 mm spring pin to a depth 1 mm in from the side that is opposite the chamfer in the threaded hole.

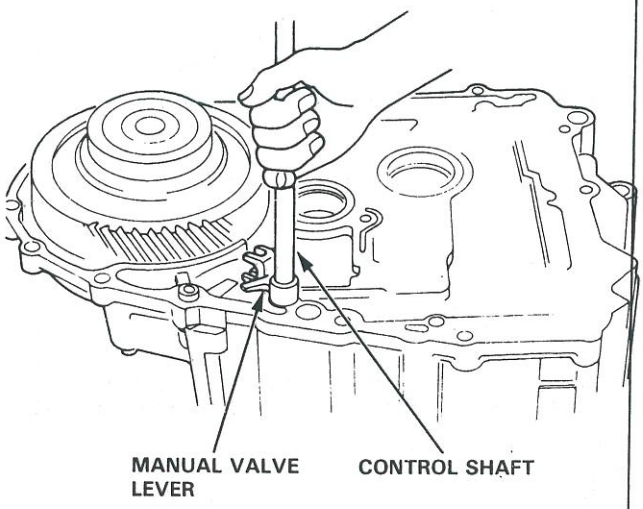


Transmission

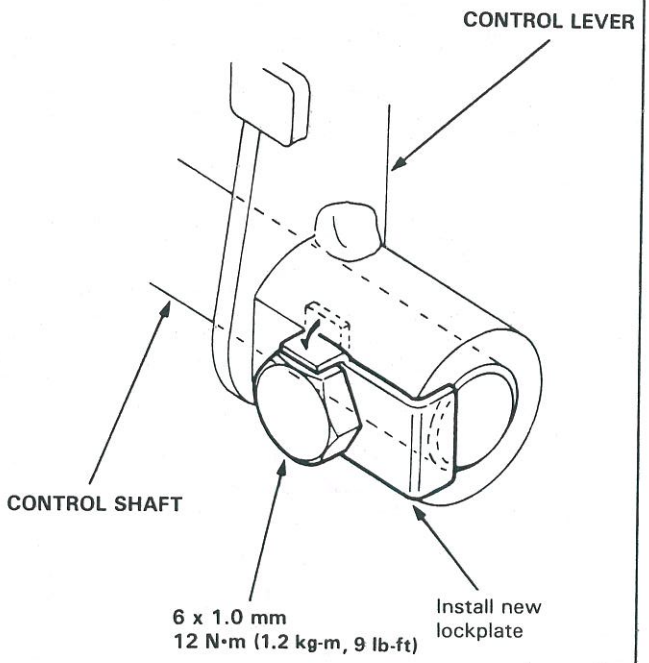
Reassembly

NOTE: Lubricate all parts with ATF during reassembly.

1. Install the differential assembly. If the torque converter housing, transmission housing and/or differential side bearings were replaced, the differential side clearance must be checked as shown in section 15.
2. Assemble the manual valve lever on the control shaft, then install in the torque converter housing as shown.



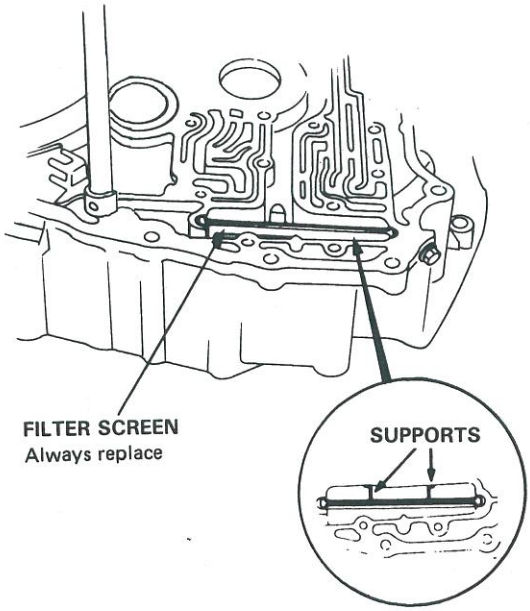
3. Install the control lever and new lock plate on the other end of the shaft. Tighten the bolt to the torque shown, then bend the tab over against the bolt head.



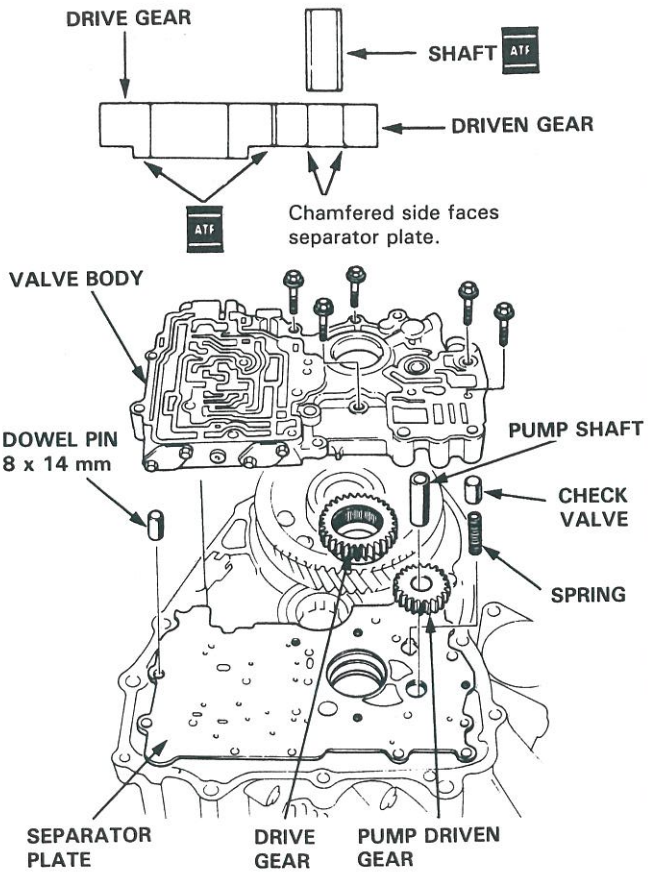
(cont'd)

Reassembly (cont'd)

4. Install the new filter screen.



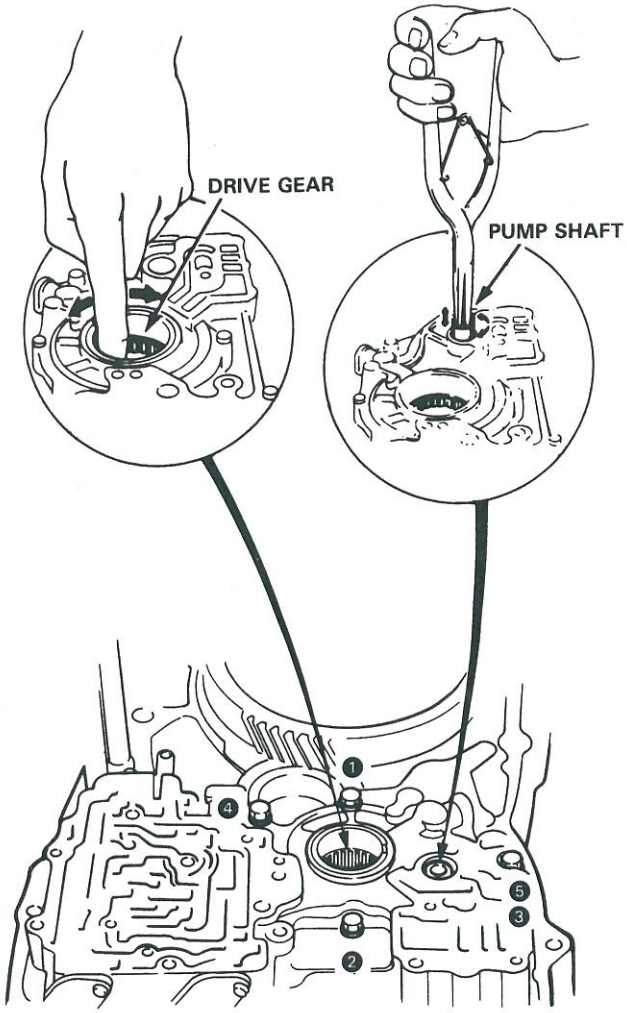
5. Install the separator plate, dowel pin, pump gears, and shaft.
6. Install the check valve and spring, then install the main valve body on the torque converter housing.



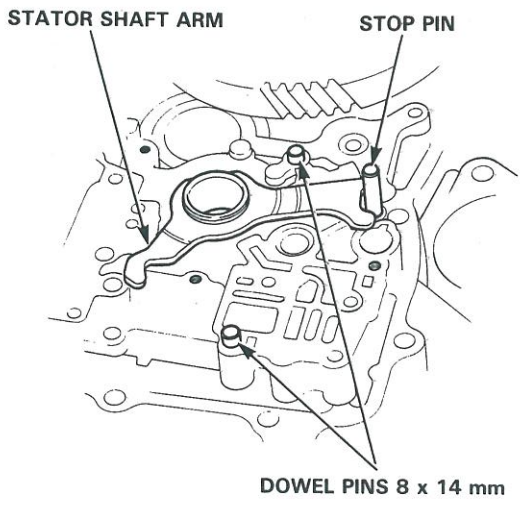
7. Tighten the 4 valve body bolts in the sequence shown. Make sure the pump drive gear rotates smoothly in the normal operating direction and the pump shaft moves smoothly in both the axial and normal operating directions.

8. Torque the valve body bolts to 12 N·m (1.2 kg-m, 9 lb-ft), and again check that the pump gear and pump shaft move freely.

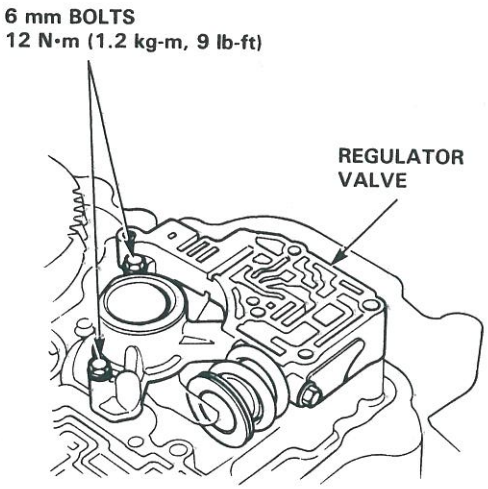
CAUTION: If the pump gear and pump shaft do not move freely, Loosen the valve body bolts, realign the shaft, and then retighten to the specified torque. Failure to align the pump shaft correctly will result in seized pump gear or pump shaft.



9. Install the stator shaft arm, stop pin and dowel pins.

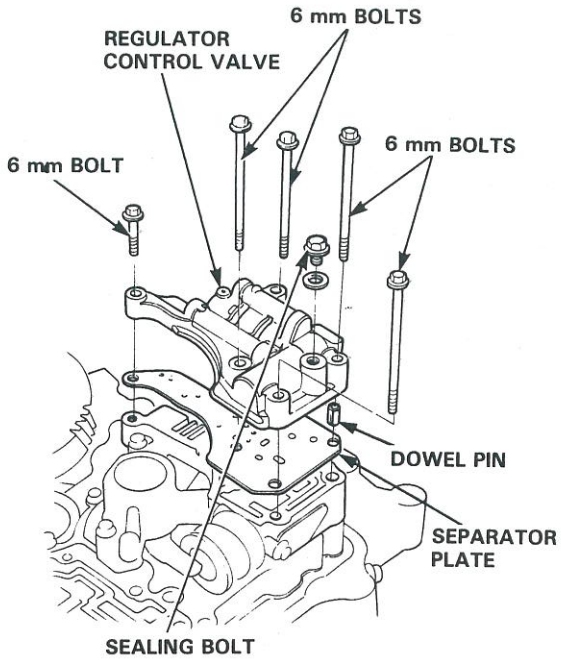


10. Install the regulator valve and torque its 2 bolts to 12 N•m (1.2 kg-m, 9 lb-ft).



11. Install the dowel pin, and separator plate.

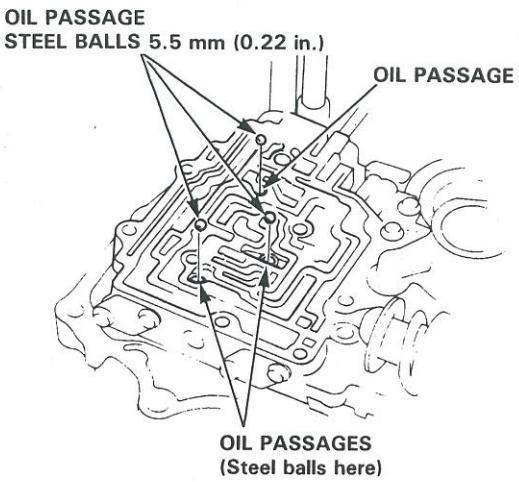
12. Install the regulator control valve body bolts as shown, and torque to 12 N•m (1.2 kg-m, 9 lb-ft).



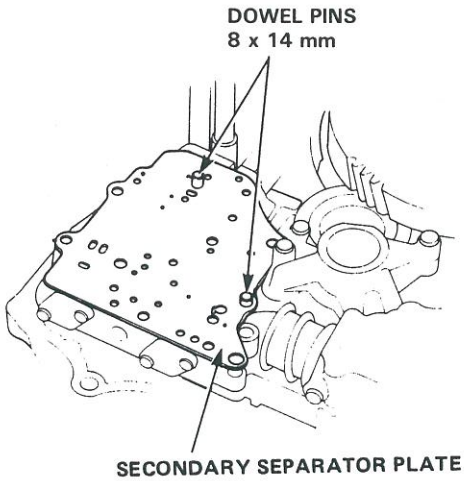
(cont'd)

Reassembly (cont'd)

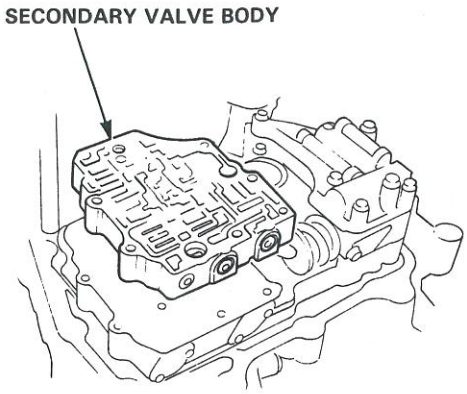
13. Install the 3 steel balls in main valve body oil passages.



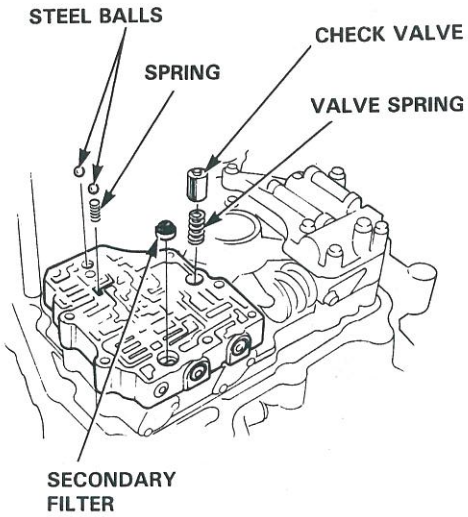
14. Install the separator plate and dowel pins.



15. Install the secondary valve body.

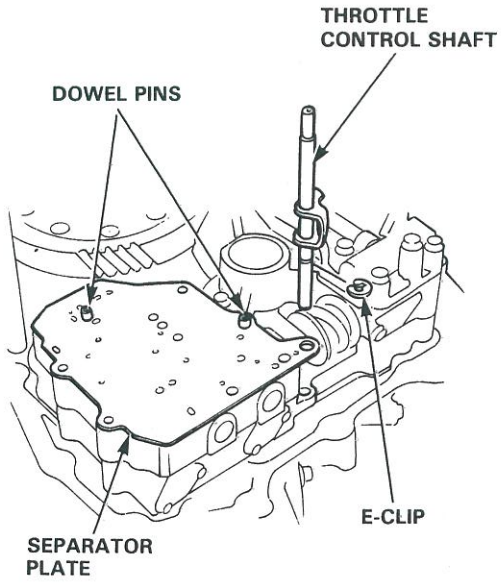


16. Install the steel balls, ball spring, check valve, valve spring and secondary filter in the secondary valve body.

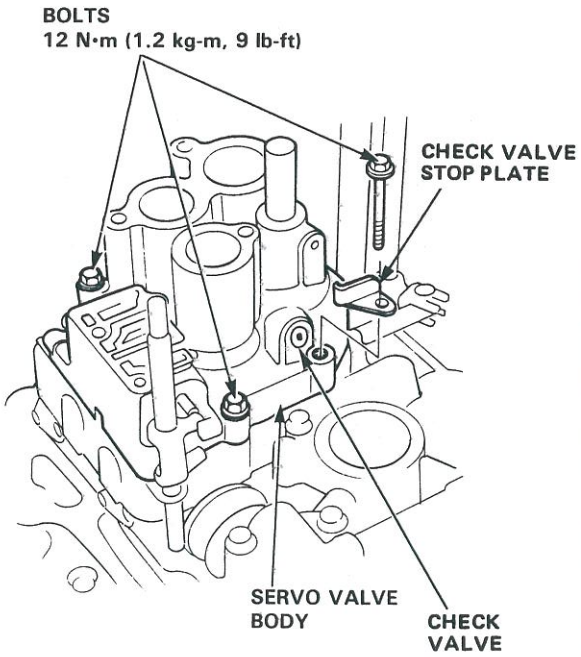


NOTE: The ball for the top oil passage has a spring to press the ball against the separator plate.

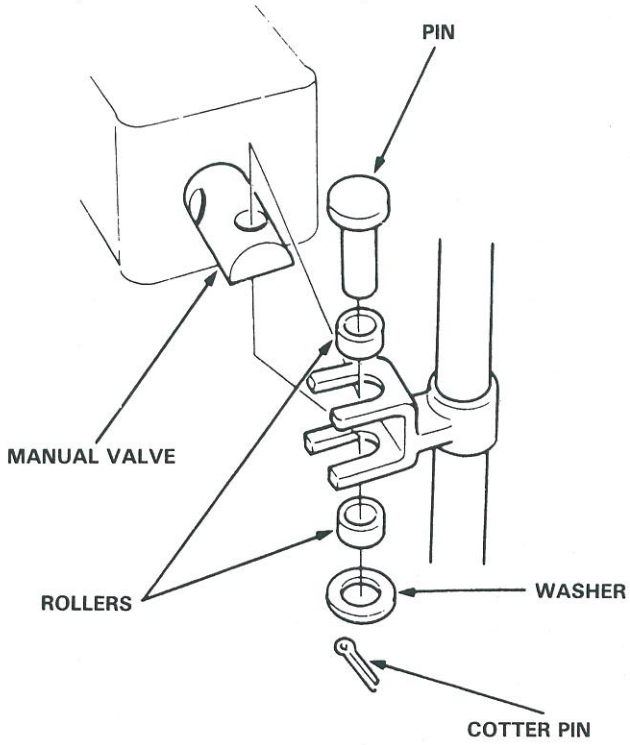
17. Install the separator plate and dowel pins, then install the throttle control shaft.



18. Install the servo valve body (2 bolts) and check valve stop plate (1 bolt) as shown.

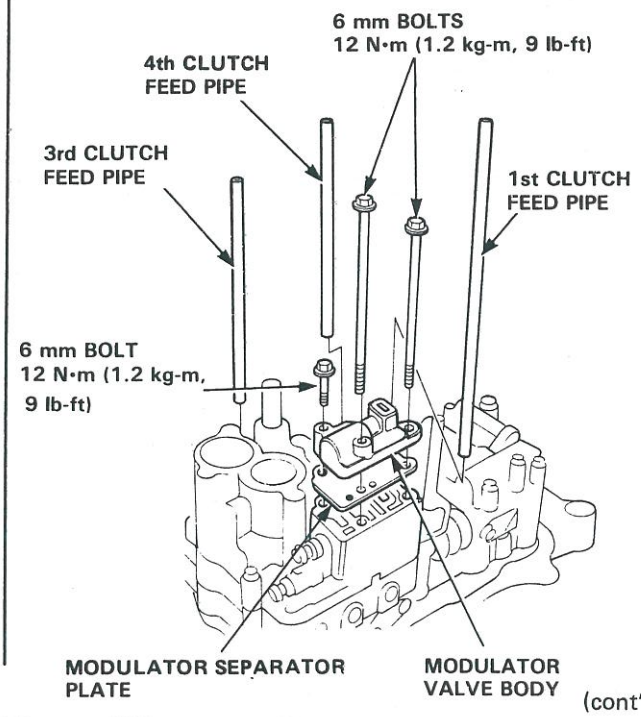


19. Put the rollers on each side of the manual valve stem, then attach the valve to the lever with the pin. Secure with the lock pin.



20. Install the separator plate.

21. Install the 1st, 3rd and 4th clutch feed pipes.



(cont'd)

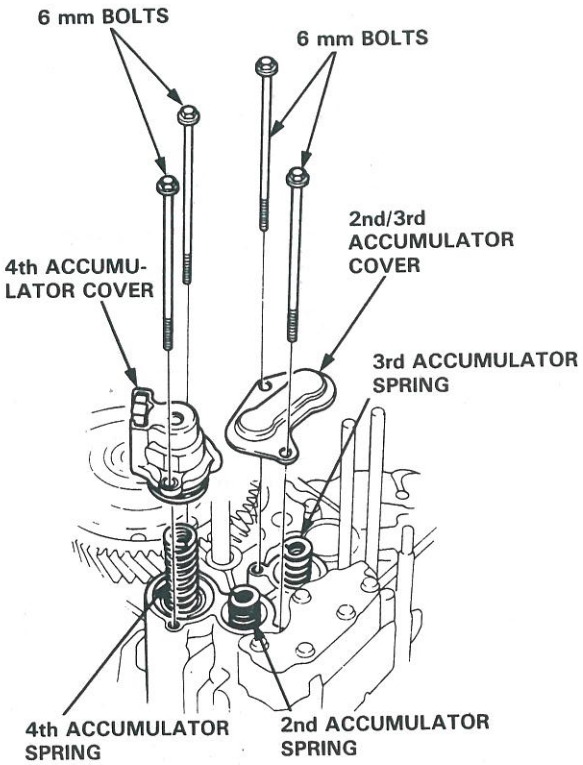
Reassembly (cont'd)

22. Install the accumulator springs.

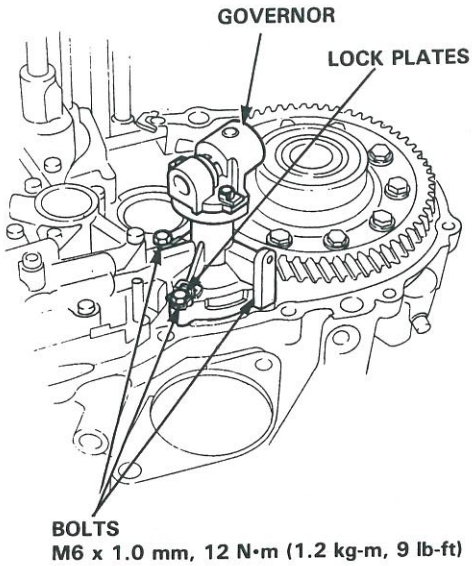
23. Install the 2nd/3rd accumulator cover, and torque the bolts to 12 N•m (1.2 kg-m, 9 lb-ft) in a criss-cross pattern.

24. Install the 4th accumulator cover, and torque the bolts to 12 N•m (1.2 kg-m, 9 lb-ft) in a criss-cross pattern.

CAUTION: To prevent stripping the threads, press down on accumulator cover, then install the bolts.

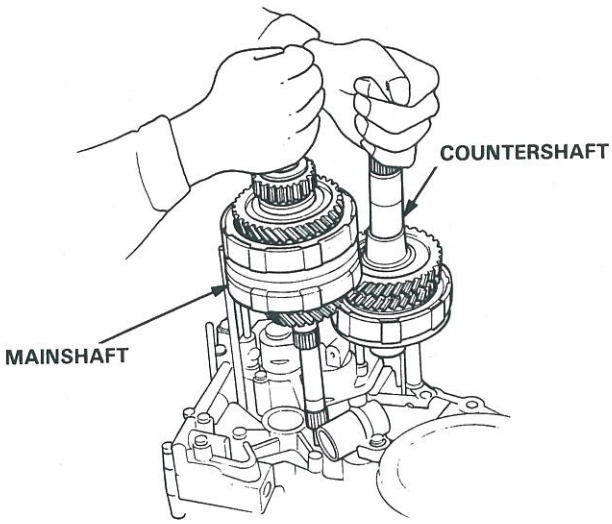


25. Install the governor valve using new lock plates, and the three 6 mm bolts.



26. Set the countershaft and mainshaft in place as an assembly.

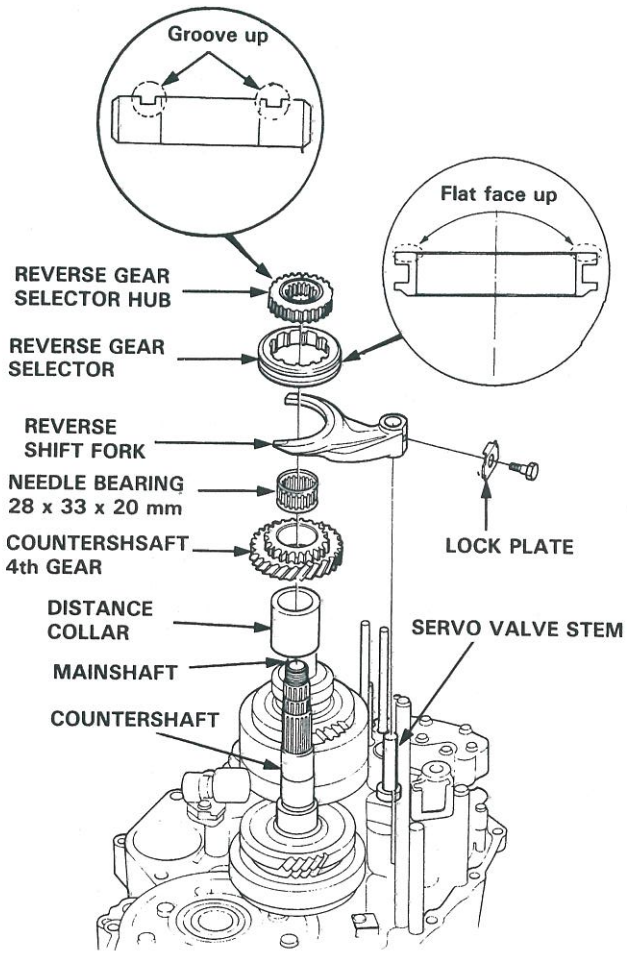
NOTE: Do not tap on the shafts with a hammer to drive in.



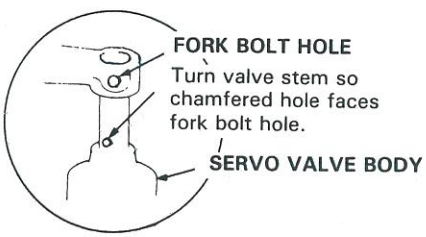
27. Install 4th gear and its needle bearing, and the countershaft 4th gear and its selector hub.

28. Assemble the reverse shift fork and selector sleeve, then install them as an assembly on the countershaft.

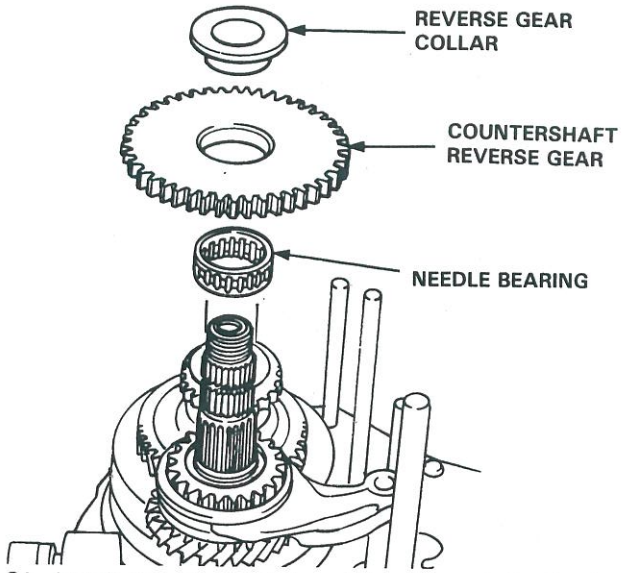
NOTE:
- Install the sleeve with its flat face up.
- Install the reverse gear selector hub with the groove facing up.



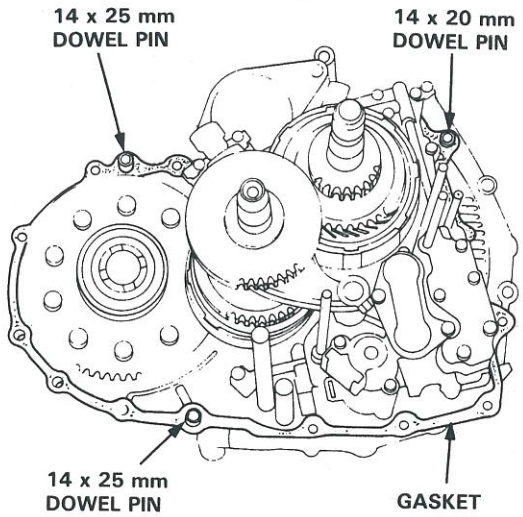
29. Install the reverse shift fork over the servo valve stem. Align the hole in the stem with hole in fork as shown, and install the bolt and new lock plate. Bend the lock tab against the bolt head.



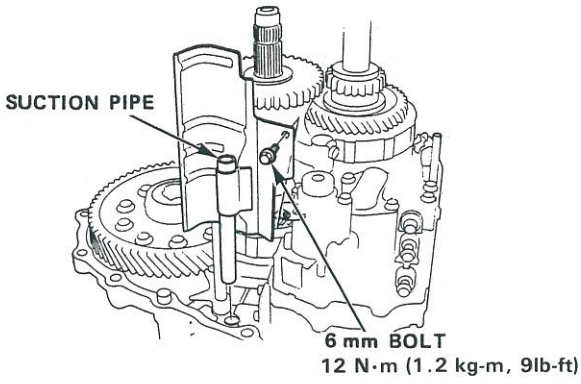
30. Install the countershaft reverse gear, needle bearing, and reverse gear collar.



31. Install the new gasket and three dowel pins in the torque converter housing.



32. Install the suction pipe.

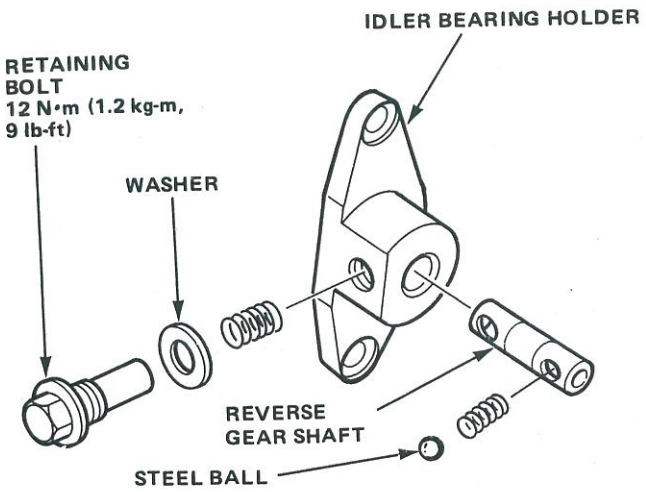


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Reassembly (cont'd)

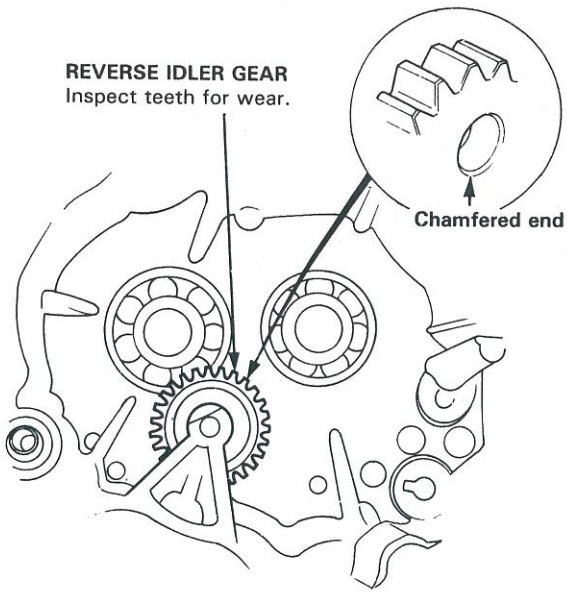
33. Assemble the idler bearing holder.

    NOTE: Align the hole in the shaft with the spring.



34. Install the reverse idler gear.

    NOTE: Install the reverse idler gear so that the larger chamfer on the shaft bore faces the torque converter housing.

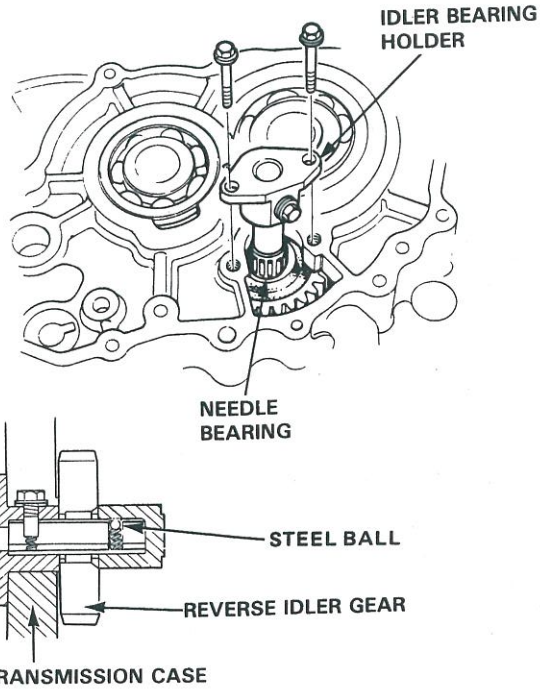


35. Install the needle bearing into the idler gear.

36. Install the idler bearing holder into the transmission housing.

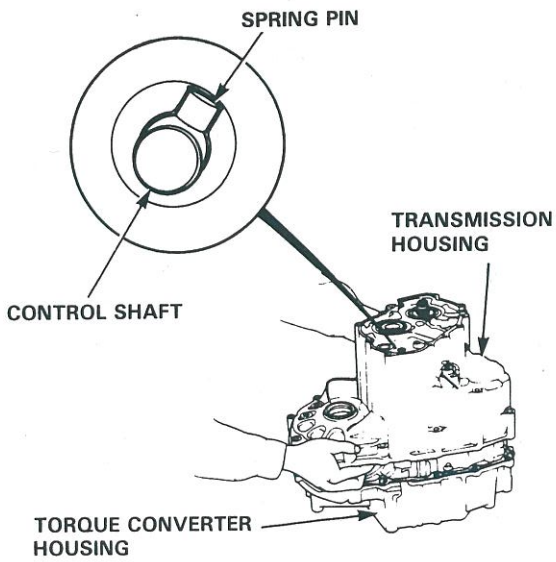
37. Tighten the reverse idler bearing holder bolts.

38. Install the spring and then tighten the retaining bolt and washer.



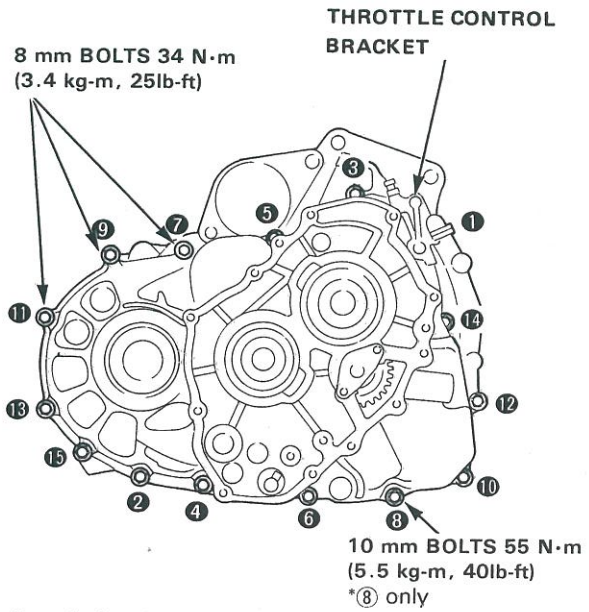
39. Place the transmission housing on the torque converter housing.

    NOTE: Be sure the main valve control shaft lines up with the hole in the housing and that the reverse idler gear meshes with the mainshaft and countershaft, or the housing will not go on.



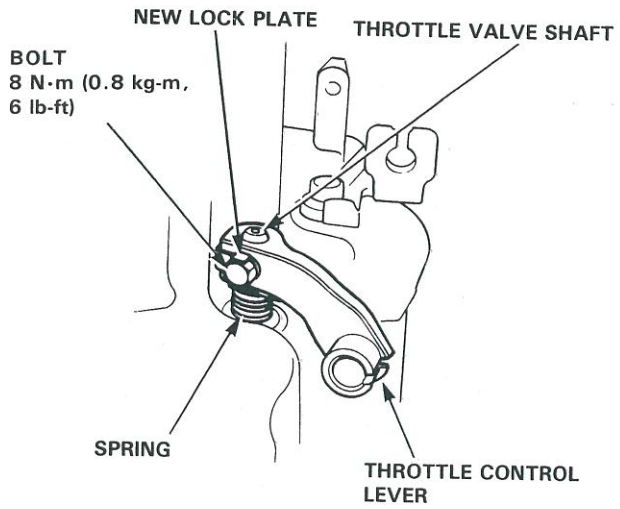
40. Install the bolts in the locations shown. Tighten the bolts in sequence shown; tighten in two or three steps to prevent distortion:

NOTE: When tightening the transmission housing bolts, take care that you do not distort or damage the throttle control bracket; distortion or damage to the bracket will change transmission shift points.



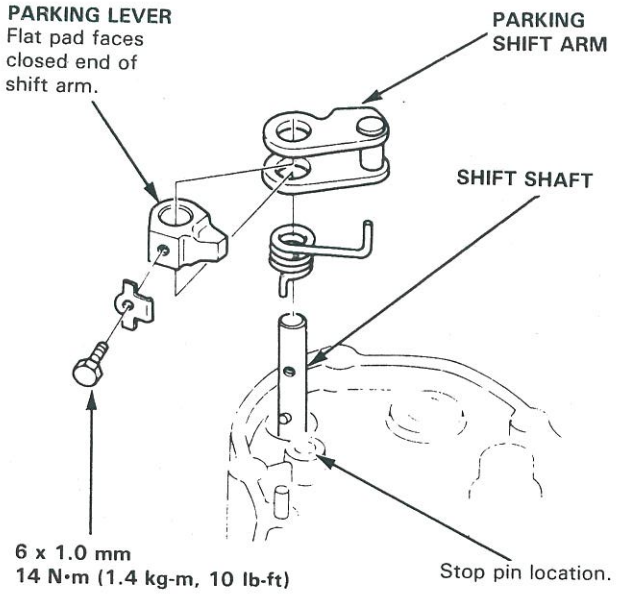
41. Install the throttle control lever and spring on the throttle control shaft.

42. Install the bolt and new lock plate. Bend the lock tab against the bolt head.



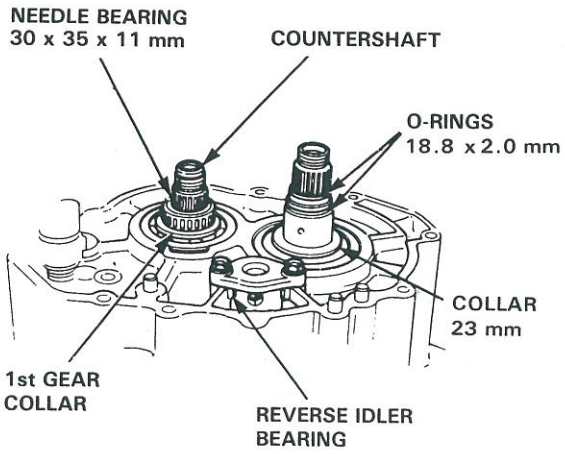
43. Install the parking shift arm and spring on the shift shaft with the bolt and a new lock plate. Bend the lock tab against the bolt head.

NOTE: The spring should put clockwise tension on the shift arm, forcing it against the stop pin.



44. Install the 1st gear collar and needle bearing on the countershaft. Install the 26 mm collar on the mainshaft.

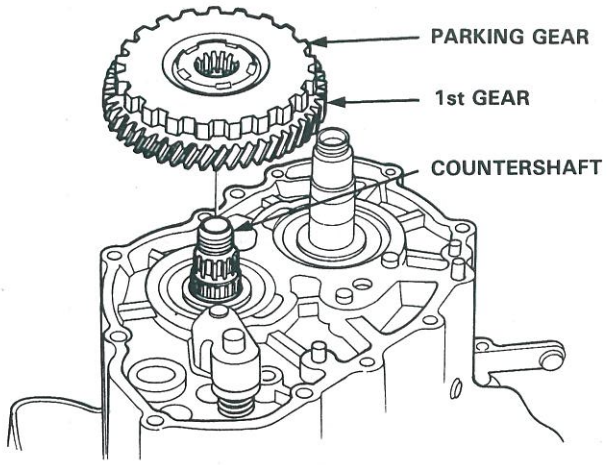
45. Install new 18.8 x 2.0 mm O-rings on the mainshaft.



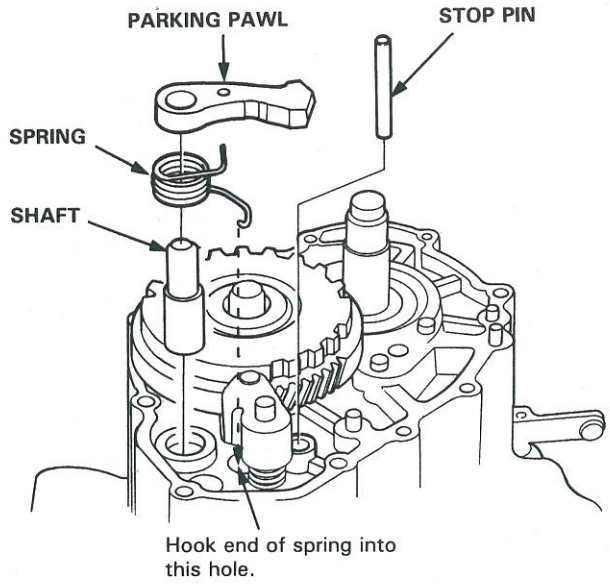
(cont'd)

Reassembly (cont'd)

46. Install the countershaft 1st gear and parking gear on the countershaft.



47. Install the stop pin, parking pawl shaft, parking pawl, and pawl release spring.

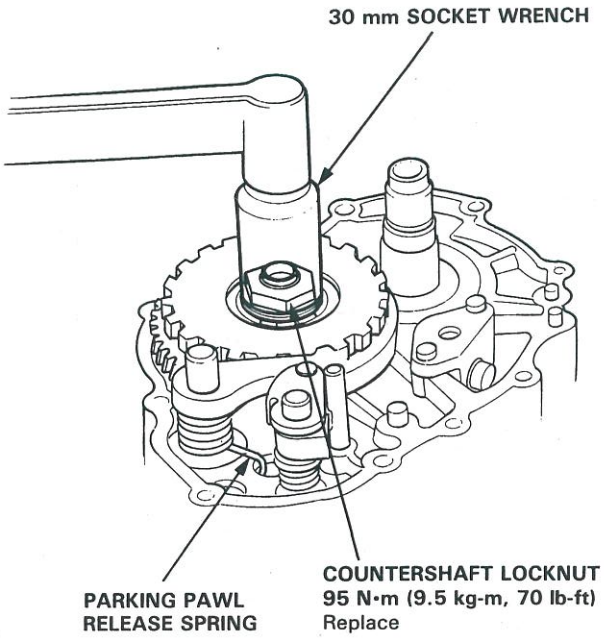


NOTE:

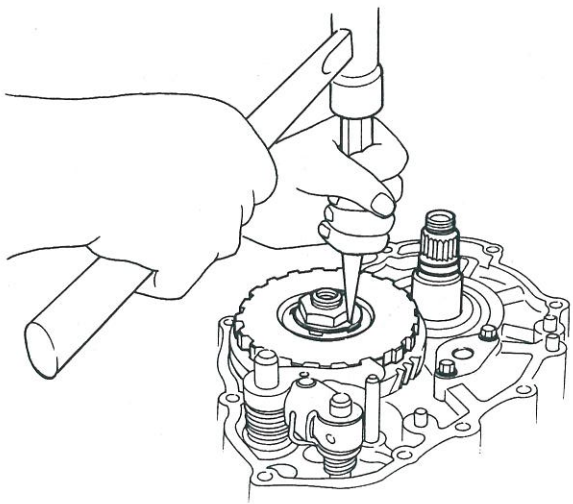
- One end of the parking pawl release spring fits into the hole in the parking pawl, the other end into the hole in the transmission housing as shown.
- The release spring should put clockwise tension on the pawl, forcing it away from the parking gear.

48. Shift to PARK and install the mainshaft holder.

49. Install and torque the new countershaft locknut.

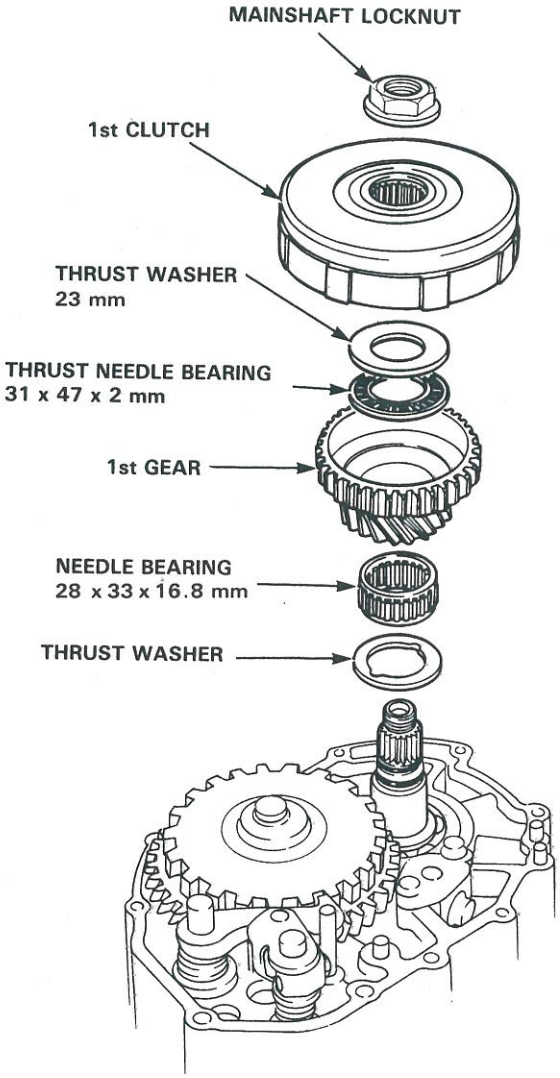


50. Stake the locknut flange into the gear groove.



51. Install 31 x 36 x 18.5 mm needle bearing and thrust washer on the mainshaft.

52. Install 1st gear, thrust needle bearing, and the thrust washer on the mainshaft.

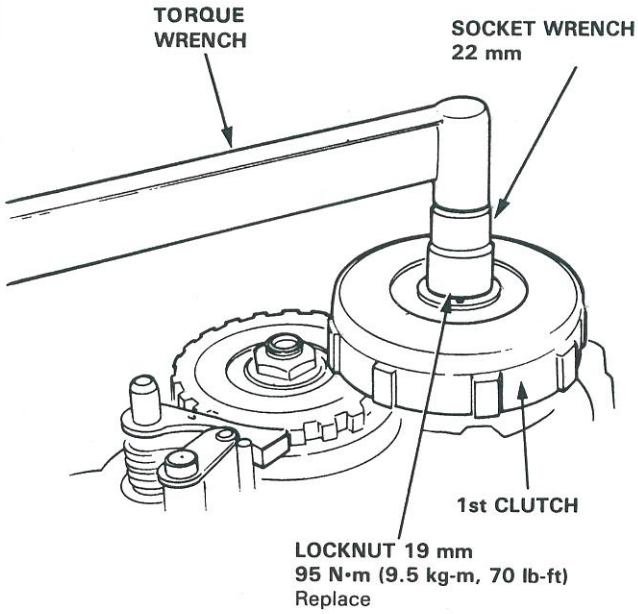


53. Install the 1st clutch on the mainshaft.

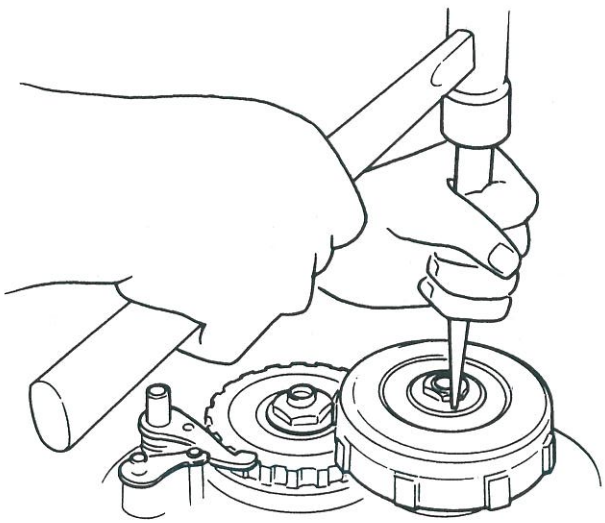
54. Attach the mainshaft holder 07932—6890202 from the underside of the torque converter case.

55. Install and torque the new mainshaft locknut.

CAUTION: Locknut has left-hand threads.



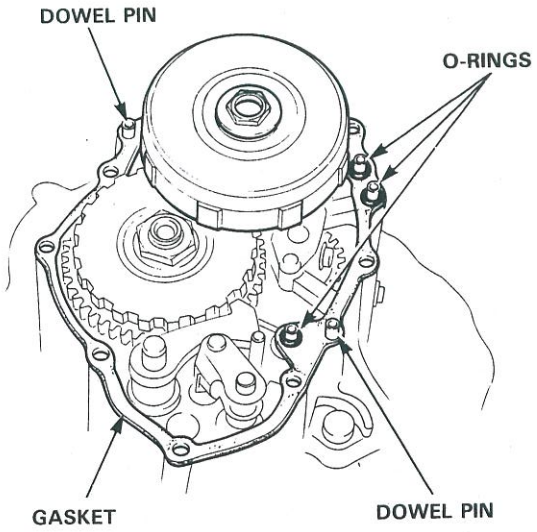
56. Stake the locknut flange into the groove in the 1st clutch.



(cont'd)

Reassembly (cont'd)

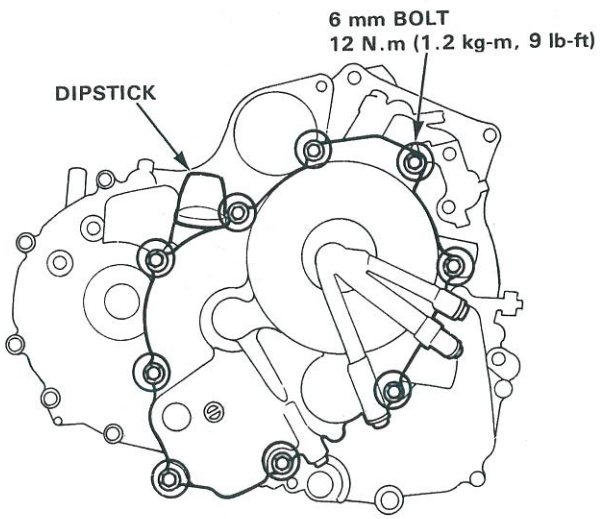
57. Install the gasket, dowel pins, and O-rings on the transmission housing.



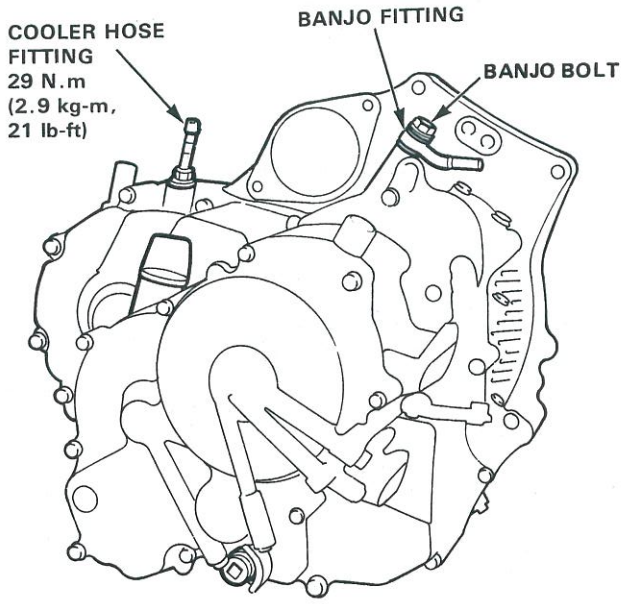
58. Install the end cover and torque all bolts (9) to 12 N·m (1.2 kg-m. 9 lb-ft).

59. Install the dipstick.

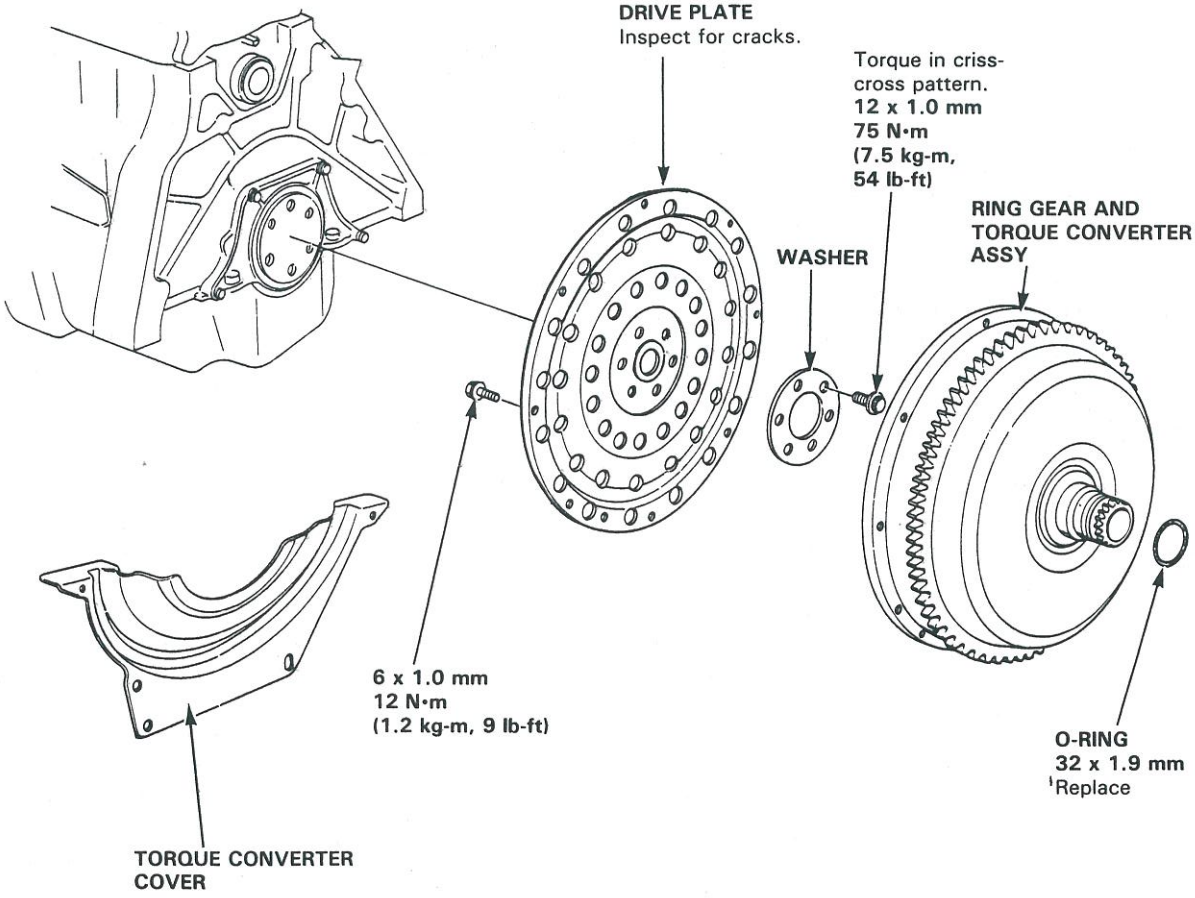
60. Install the transmission cooler banjo fitting, but do not tighten until the transmission is installed in the car and the hose is positioned properly.



61. Install the transmission cooler hose fitting and torque to 29 N·m (2.9 kg-m, 21b-ft).



Disassembly

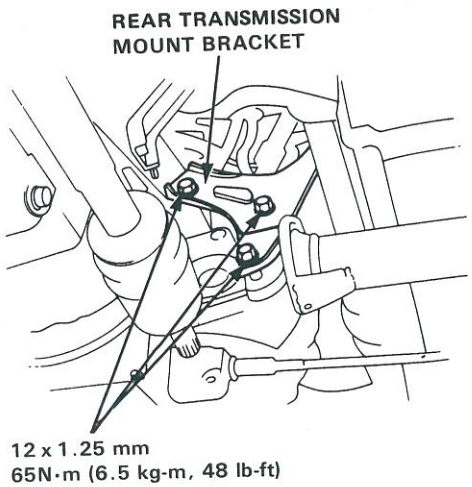


Installation

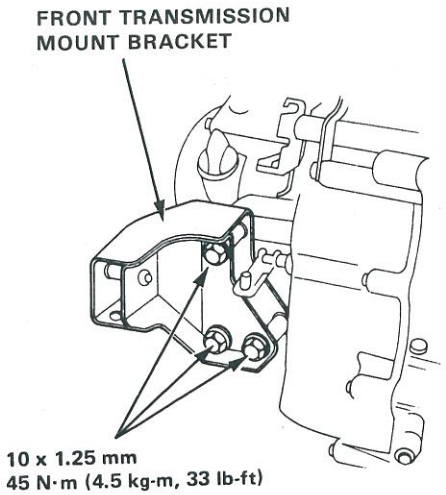
1. Place the transmission on the transmission jack, and raise to the engine level.
2. Check that the two 14 mm dowel pins are installed in the torque converter housing.
3. Align the dowel pins with holes in block; align the torque converter bolt heads with holes in drive plate.
4. If you left the front end connected on driver's side, insert the left axle (with new spring clip on the end) into the differential as you roll the transmission up to the engine.

   CAUTION: New 26 mm spring clips must be used on both axles.

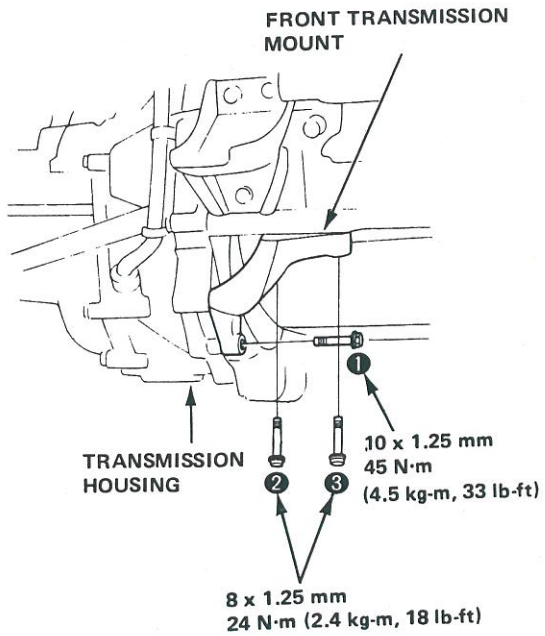
5. Secure the transmission to engine with the engine side mounting bolt (12 x 1.25 x 70 mm) and torque to 68 N·m (6.8 kg-m, 50 lb-ft).
6. Attach the torque converter to the drive plate with eight (6 x 10 x 12 mm) bolts, and torque to 12 N·m (9 lb-ft). Rotate the crank as necessary to tighten bolts to 1/2 torque, then final torque, in a criss-cross pattern. Check for free rotation after tightening the last bolt.
7. Install the shift cable. (page 14-74)
8. Remove the transmission jack.
9. Install the torque converter cover plate.
10. Install the rear transmission mount bracket; torque its bolts to 65 N·m (6.5 kg-m, 48 lb-ft)



11. Install the front transmission mount bracket and torque its bolts to 45 N·m (4.5 kg-m, 33lb-ft).



12. Loosely install the front transmission mount bolts, then torque in the sequence shown.



13. Install the starter mounting bolts and torque to 45 N·m (4.5 kg-m, 33 lb-ft).

14. Install the intermediate shaft and right and left driveshafts (See section 16).

15. Install a new 26 mm spring clip on the end of each axle.

16. Turn the right steering knuckle fully outward, and slide axle into the differential until you feel its spring clip engage side gear. Repeat on the left side or, if the left axle is already in (step 5), check to be sure the spring clip has engaged side gear.

17. Reconnect the lower arm ball joints and torque to 45 N·m (4.5 kg-m, 33 lb-ft).

18. Reconnect the tie-rod end ball joints and torque to 45 N·m (4.5 kg-m, 33 lb-ft).

19. Install the splash shields and exhaust header pipe.

20. Install the front wheels, lower car to ground, and torque lug nuts to 110 N·m (11.0 kg-m, 80 lb-ft).

21. Remove the hoist chain from the 10 mm bolt on the cylinder head and engine hanger plate.

22. Insert the speedometer cable into gear holder, then secure the cable with clip and install the boot.

23. Install the top three transmission mounting bolts (12 x 1.25 x 60 mm) and torque to 65 N·m (6.5 kg-m, 48 lb-ft).

24. Connect the cooler hoses, and torque the banjo bolts to 29 N·m (2.9 kg-m, 21 lb-ft).

25. Attach the shift control cable to shaft lever with pin and clip, if removed. Check the cable adjustment (page 14-74)

26. Reinstall the center console.

27. Connecting wiring:

- Battery positive cable to starter.
- Black/white wire to starter solenoid.
- Transmission ground cable.

28. With the ignition key OFF, connect the ground cable to the battery and transmission.

29. Unscrew the dipstick from the top of transmission housing and add 2.5 quarts Dexron®ATF through the hole. Reinstall the disptick.

    NOTE: If the torque converter was replaced, the ATF fill quantity is 5.7 quarts.

30. Start the engine, set the parking brake, and shift the transmission through all gears three times. Check for proper control cable adjustment.

31. Let the engine reach operating temperature with the transmission in Neutral or Park, then turn it off and check the fluid level.

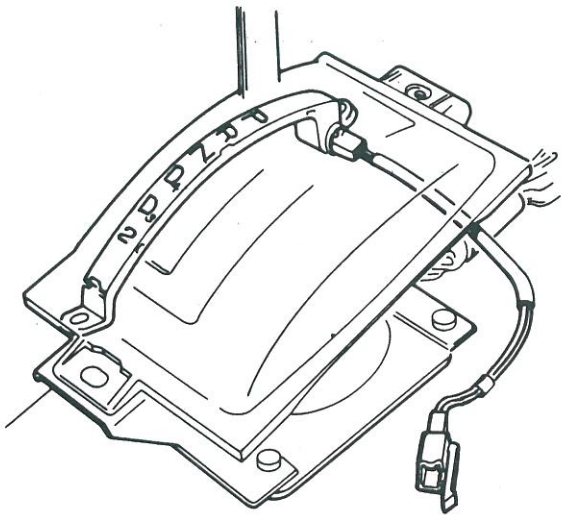
32. Install the throttle control cable and adjust (page 14.75).

33. Road test as described on page 14-76.

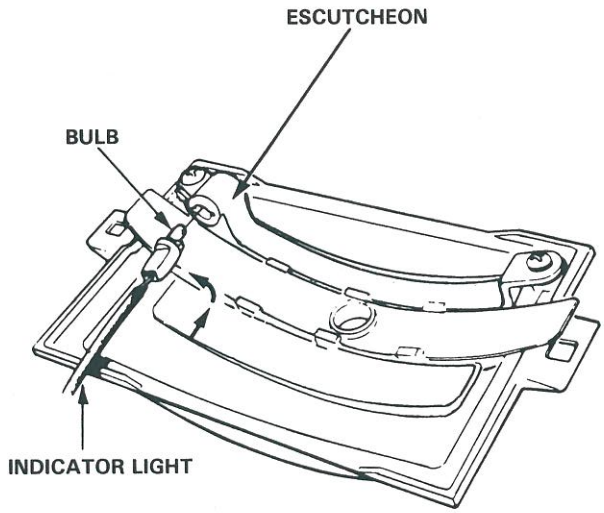
Shift Indicator Light

Check and Installation

1. Check for continuity between indicator light connector terminals as shown. If there is no continuity, check for burned out bulb or open circuit.



2. Install the indicator bulb in the bulb housing. Insert the bulb housing into slot in escutcheon, then turn 90° to bulb housing.



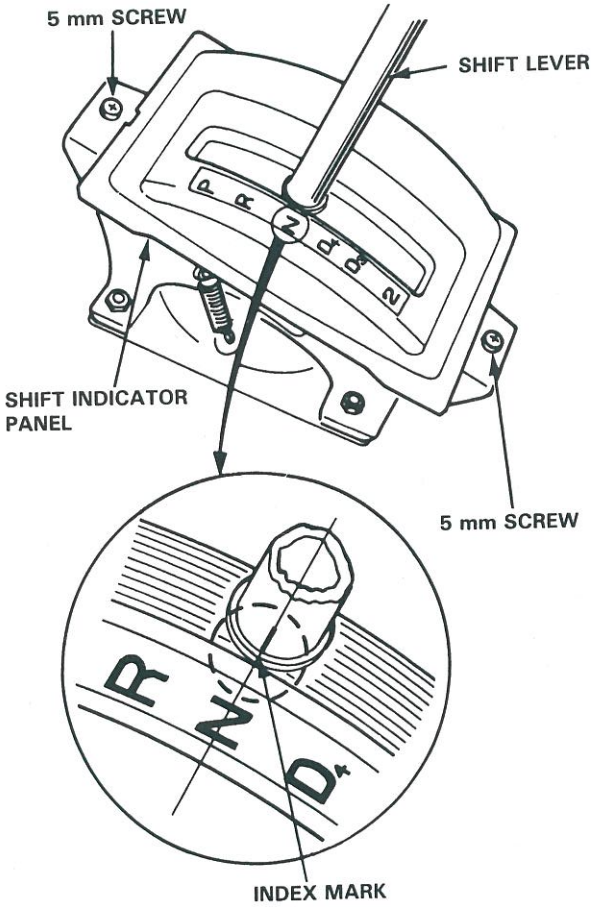
Shift Indicator Panel

Adjustment

1. Check that the index mark of the indicator aligns with the N mark of the shift indicator panel with the transmission in NEUTRAL.

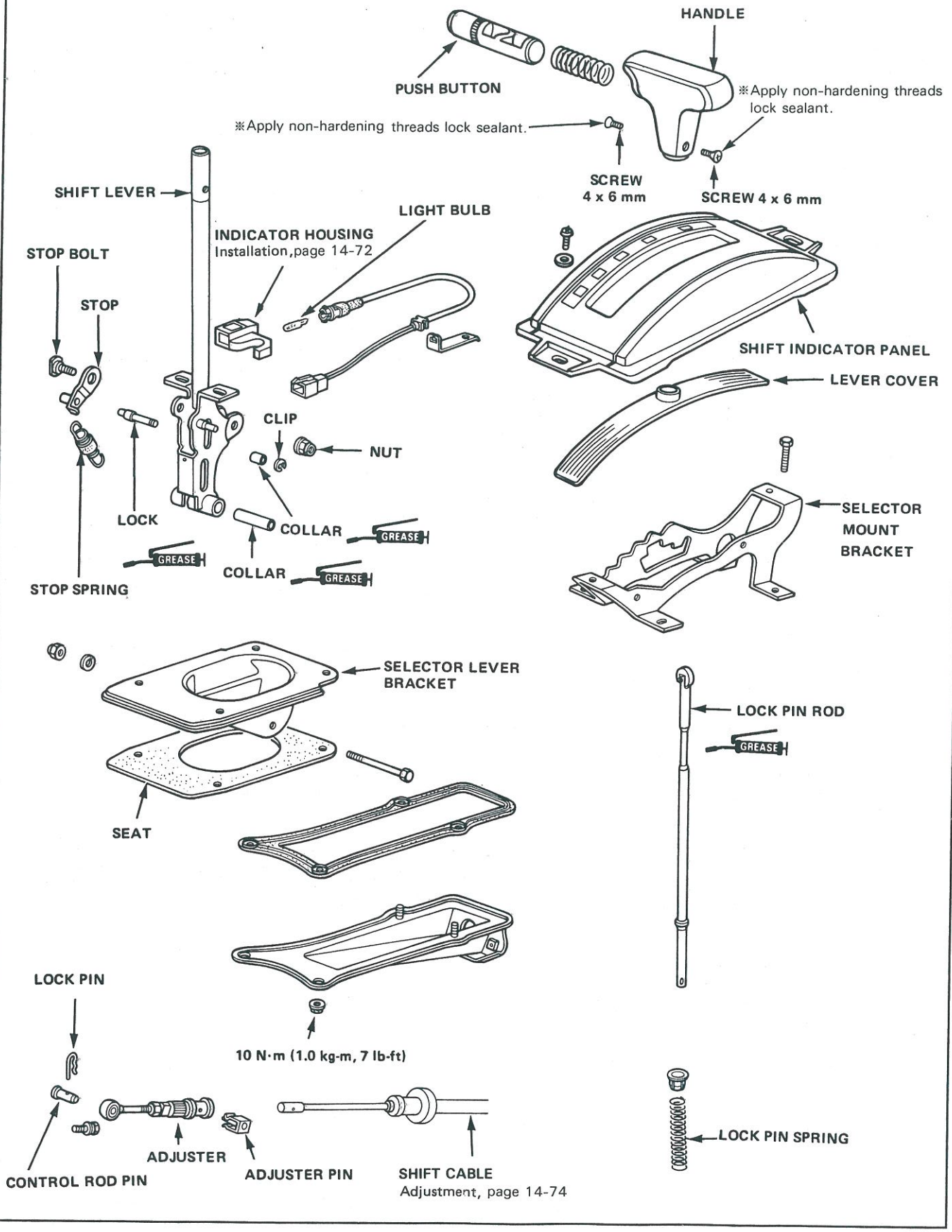
2. If not aligned, remove the panel mounting screws and adjust by moving panel.

   NOTE: Whenever escutcheon is removed for indicator bulb replacement etc., adjust the panel as described above.



Gear Shift Selector

Overhaul

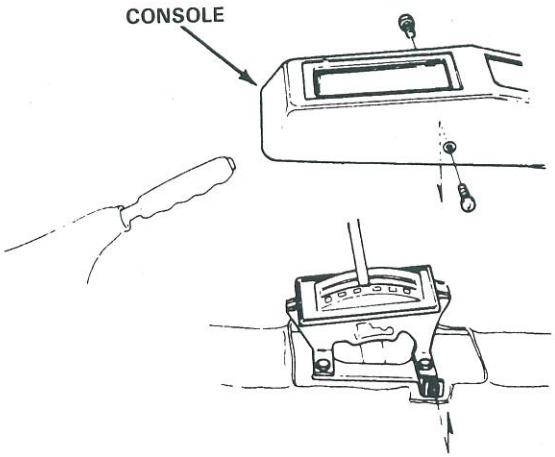


Shift Cable

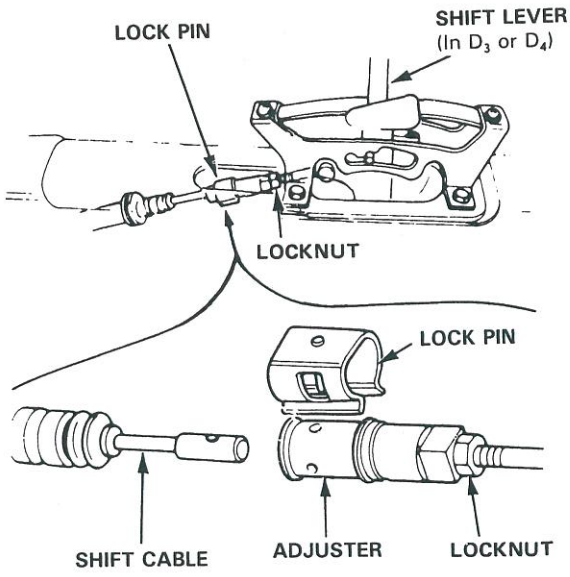
Adjustment

1. Start the engine. Shift to reverse to see if the reverse gear engages.If not, refer to troubleshooting on page 14-12.

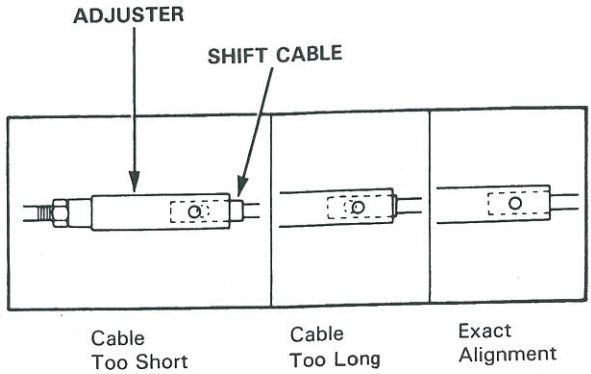
2. With the engine off, remove the console.



3. Shift to Drive, 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 shift cable and adjust as required.

6. Tighten the locknut.

7. Install the lock pin on the adjuster.

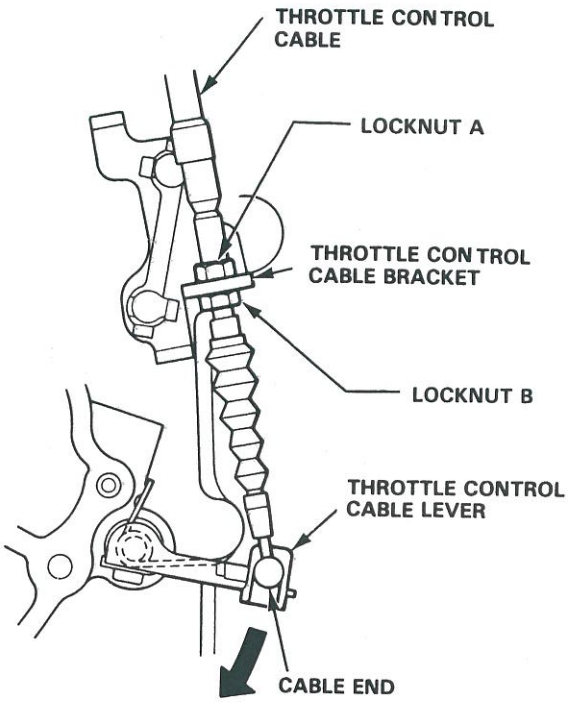
NOTE: If you feel the lock pin binding as you reinstall it, the cable is still out of adjustment and must be readjusted.

8. Start the engine and check the shift lever in all gears. If any gear does not work properly, refer to troubleshooting on page 14-12.

Throttle Control Cable

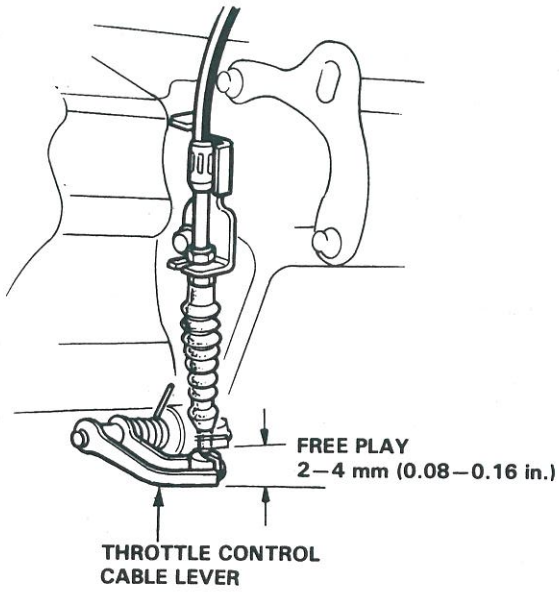
Adjustment/Inspection

1. Loosen locknuts (A) and (B) on the throttle control cable.
2. Press down as shown on the throttle control lever until it stops.
   Turn the locknut in until it lightly seats on the throttle control cable bracket.
3. While holding locknut (A), tighten locknut (B).



NOTE: Be sure to hold locknut (A) while tightening locknut (B) to prevent it from being turned with locknut (B).

4. Check the following items before starting the engine:
   - Check that there is play in the throttle control lever by depressing the accelerator to floor.



   - Check that the cable moves freely by depressing the accelerator.
5. Start the engine and check the following:
   - With the shift lever in N or P , check that the throttle control lever is synchronized with the engine speed by gradually depressing the accelerator.

NOTE: Readjust if necessary by turning locknut (A).

NOTE: After transmission is installed;
- Make sure the floor mat does not interfere with accelerator pedal travel. Fully depress accelerator pedal and check carburetor to make sure the throttle lever is fully opened.
- Release the accelerator pedal and check both inner control cables to be sure they have slight play.

Warm up the engine to operating temperature.

D3 and D4 Range

1. Apply parking brake and block the wheels. Start the engine, then move the selector to D4 while depressing the brake pedal. Depress the accelerator pedal, and release it suddenly. Engine should not stall.
2. Check that shift points occur at approximate speeds shown. Also check for abnormal noise and clutch slippage.

- **Upshift**

	1st → 2nd	2nd → 3rd	3rd → 4th	LC. ON
Full-throttle Acceleration from a stop	35–39 mph	61–67 mph	93–98 mph	94–100 mph
Half-throttle Acceleration from a stop	20–23 mph	39–44 mph	53–61 mph	54–63 mph
Closed-throttle Coasting down-hill from a stop	11–13 mph	20–23 mph	28–31 mph	28–32 mph

- **Downshift**

	4th → 3rd	3rd → 2nd	2nd → 1st
Full-throttle When car is slowed by increased grade, wind, etc.	76–82 mph	54–58 mph	22–26 mph

	4th → 2nd	2nd → 1st
Closed-throttle Coasting or braking to a stop	15–17 mph	5–7 mph

3. Accelerate to about 35 mph so the transmission is in 4th, then shift from D4 to 2. The car should immediately begin slowing down from engine braking.

CAUTION: Do not shift from D4 or D3 to 2 at speeds over 60 mph; you may damage the transmission.

2 (2nd Gear)

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 range.

R (Reverse)

Accelerate from a stop at full throttle, and check for abnormal noise and clutch slippage.

P (Park)

Park car on a slope (approx. 16°), apply the parking brake, and shift into Park. Then release the brake; the car should not move.

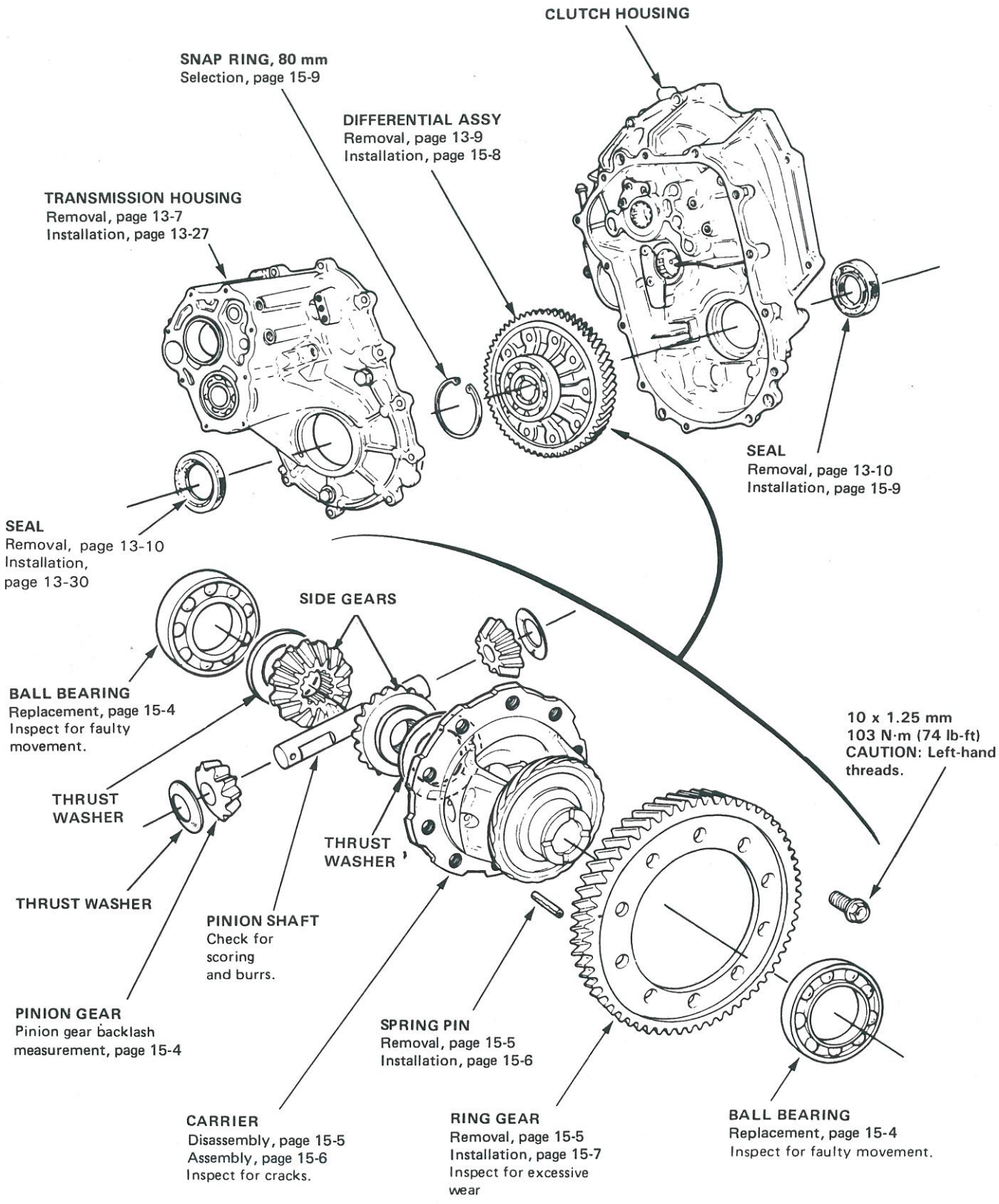
Differential

Illustrated Index 15–2
Backlash Inspection 15–4
Bearing Replacement 15–4
Inspection/Disassembly 15–5
Reassembly 15–6
Installation 15–8



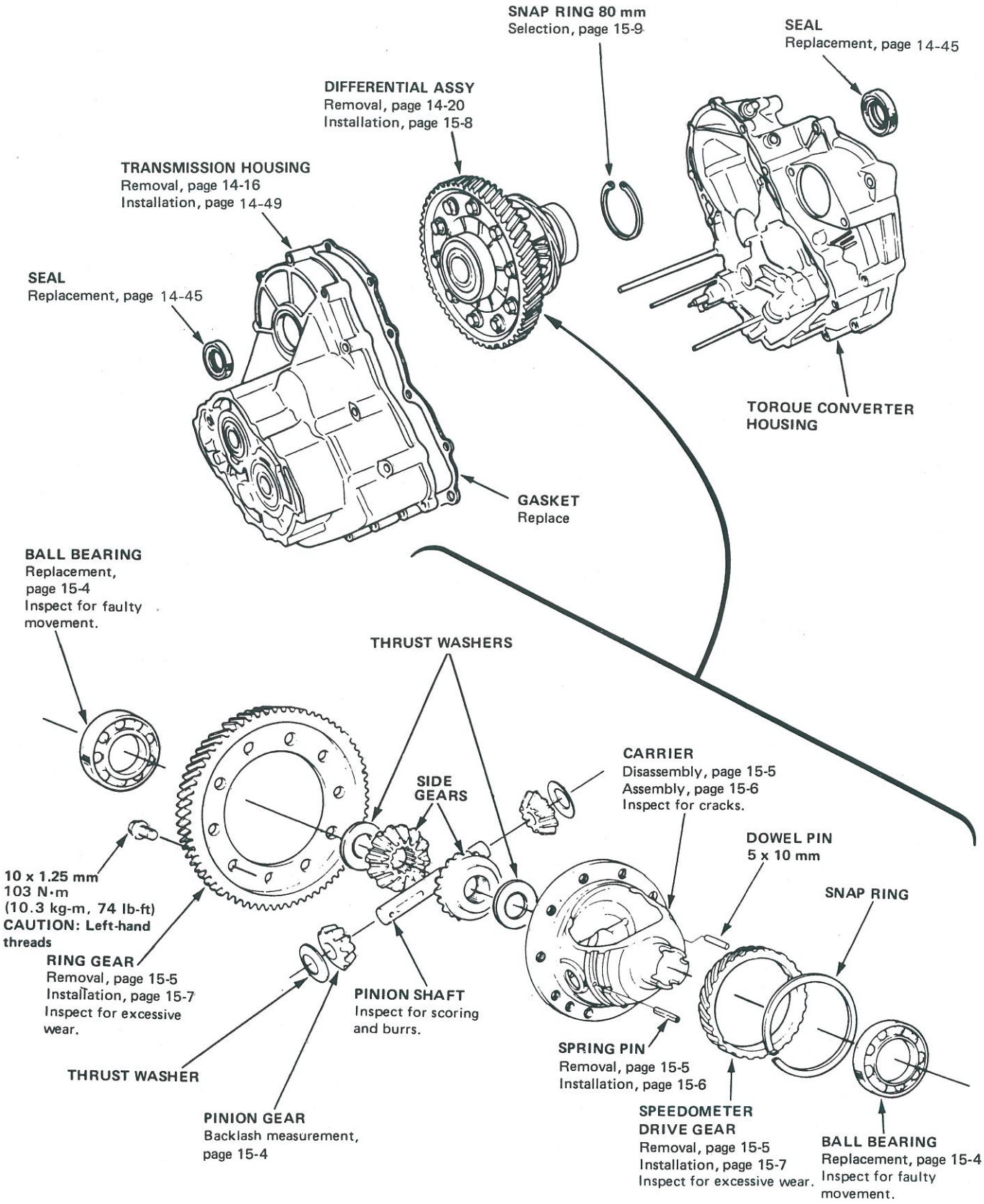
Differential (Manual Transmission)

Index



Differential (Automatic Transmission)

Index

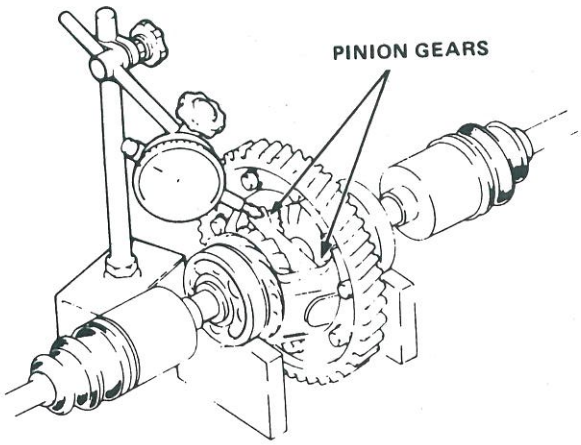


Differential

Backlash Inspection

1. Place the 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.)

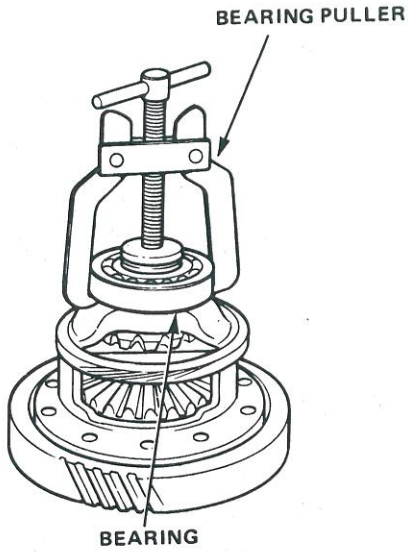


3. If out of tolerance, disassemble the differential and select new thrust washers according to the chart on page 15-6.

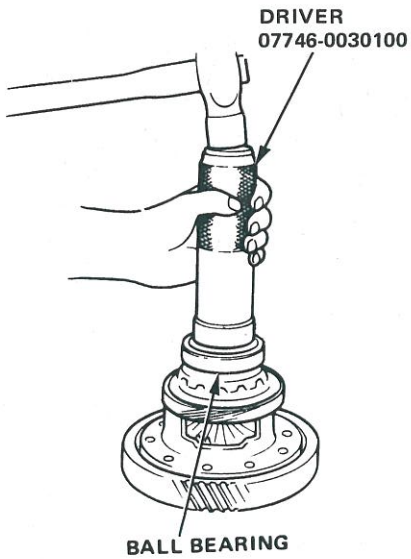
Bearing Replacement

NOTE: Check bearings for wear and rough rotation. If bearings are OK, removal is not necessary.

1. Remove the bearings using a standard bearing puller.



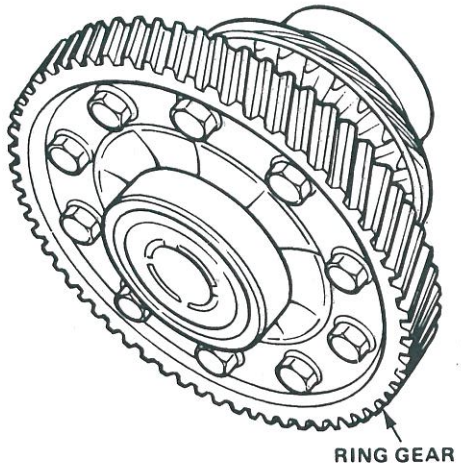
2. Install the new bearings.



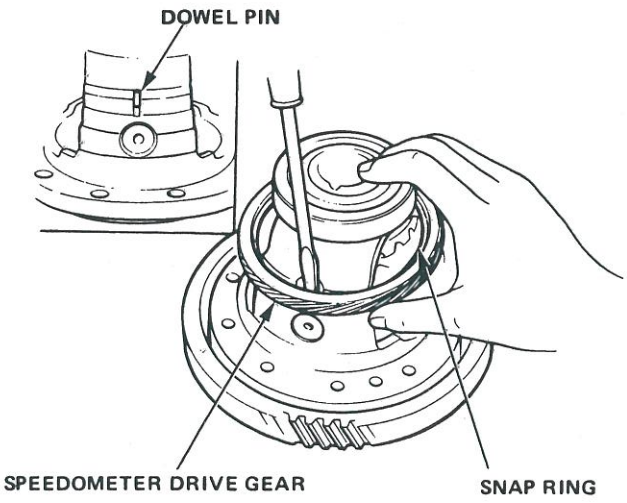
Inspection/Disassembly

1. Remove the ring gear and inspect teeth for excessive wear.

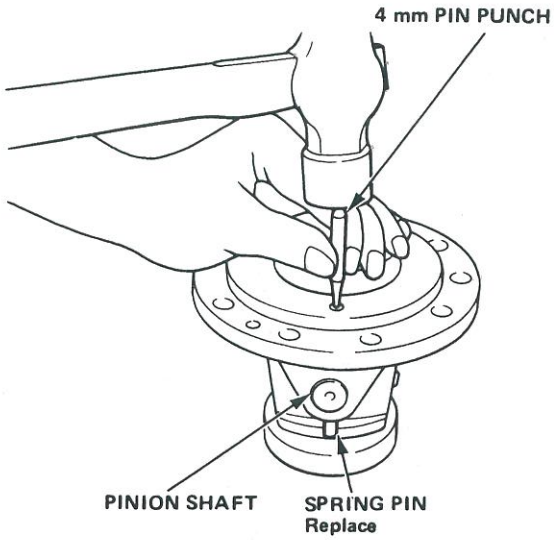
   CAUTION: The ring gear bolts have left-hand threads.



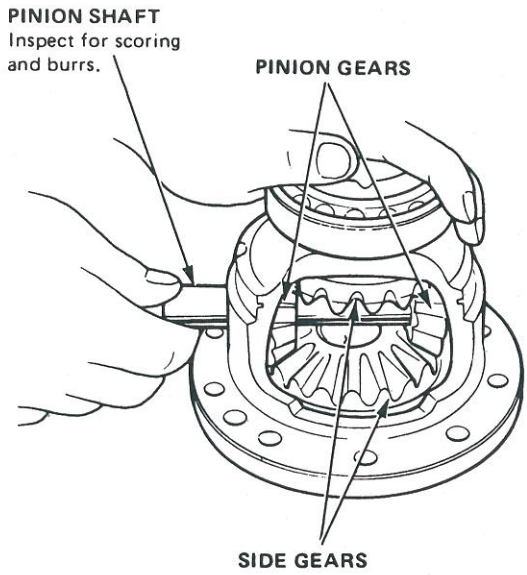
2. Automatic Only:
   Pry the snap ring off carrier, then remove the speedometer gear and dowel pin.



3. Drive out the spring pin with pin punch.



4. Remove the pinion shaft, pinion gears and the thrust washers.

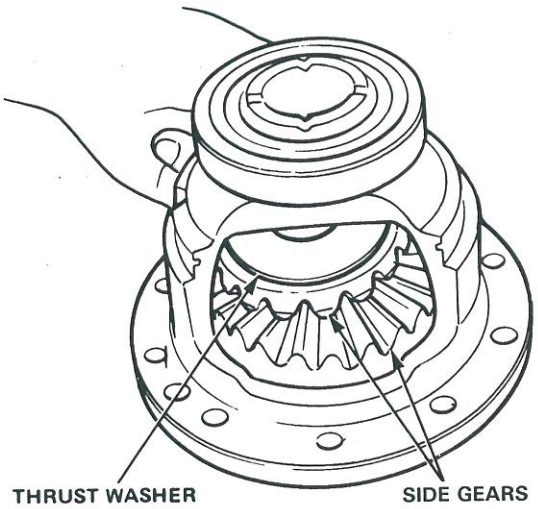


5. Wash parts thoroughly in solvent and dry with compressed air. Inspect all parts for wear or damage and replace any that are defective.

Reassembly

1. Install the side gears in differential carrier. Install a thrust washer between each side gear and carrier.

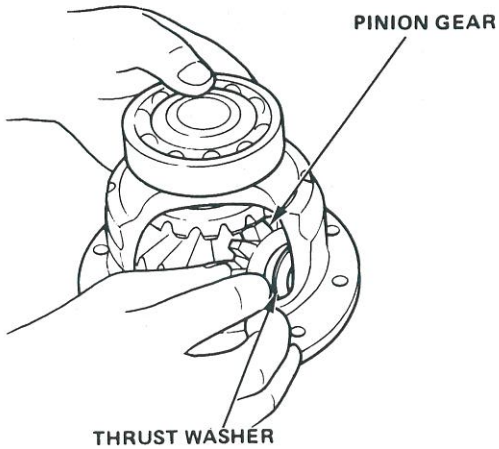
CAUTION: Coat all gears with molybdenum disulfide grease on all sides.



2. Set pinion gears in place exactly opposite each other in mesh with side gears, then install a thrust washer behind each one. Washers must be of equal thickness.

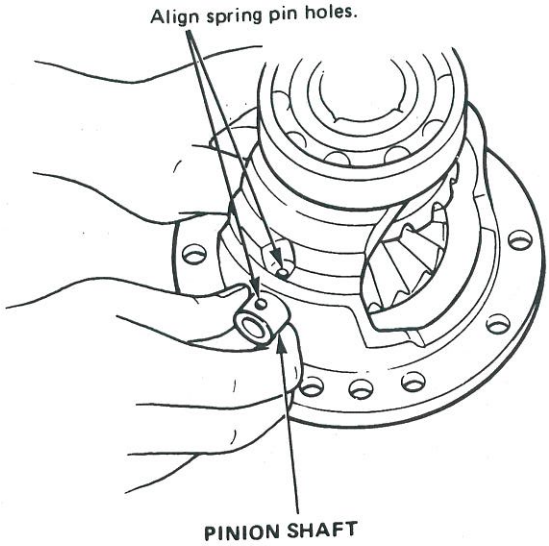
Thrust Washers

PART NUMBER	THICKNESS
41351-689-000	0.7 mm (0.028 in.)
41352-689-000	0.8 mm (0.031 in.)
41353-689-000	0.9 mm (0.035 in.)
41354-689-000	1.0 mm (0.039 in.)
41355-PC8-000	0.75 mm (0.030 in.)
41356-PC8-000	0.85 mm (0.033 in.)
41357-PC8-000	0.95 mm (0.037 in.)

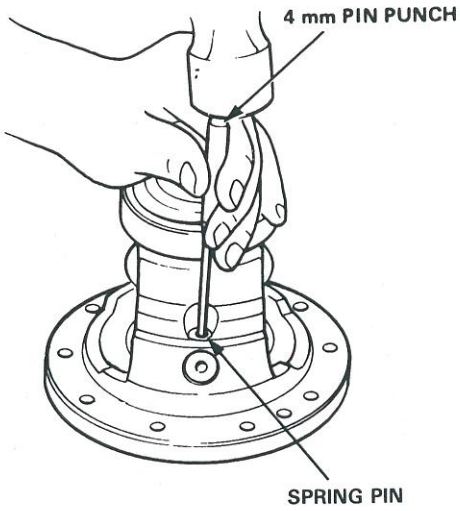


3. Rotate gears as shown until shaft holes in pinion gears line up with shaft holes in carrier.

4. Insert pinion shaft and align spring pin hole in one end with matching hole in carrier.



5. Drive in a new spring pin with pin punch.

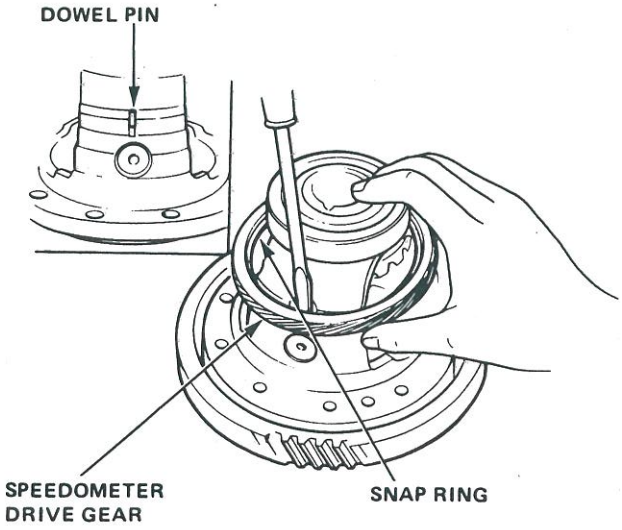


6. Check backlash of both pinion gears again.

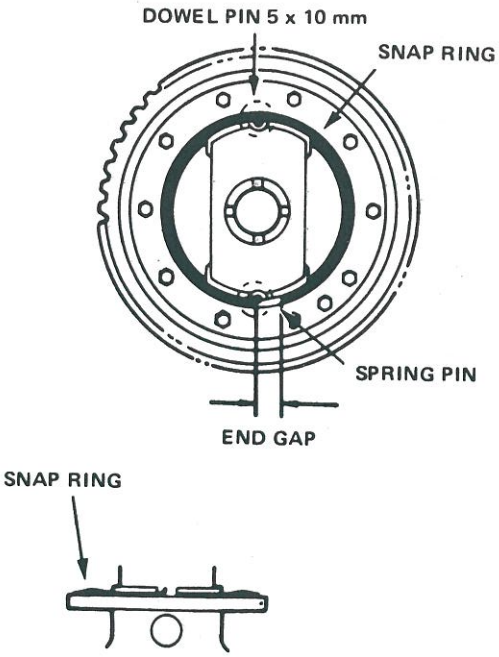
Standard (New): 0.05–0.15 mm (0.002–0.006 in.)

- If out of tolerance, replace both pinion gears, then recheck backlash.
- If still out of tolerance, replace side gears, and re-check backlash.
- If still out of tolerance, replace carrier assembly.

7. Automatic Only:
Install the dowel pin and then the speedometer drive gear with its chamfer (on inside diameter) facing carrier. Secure with snap ring.

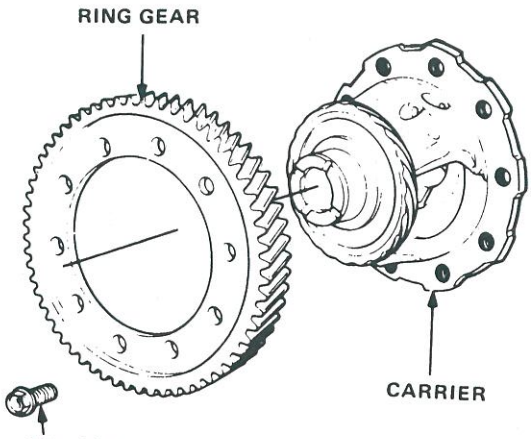


8. Automatic Only:
Align snap ring on carrier as shown.



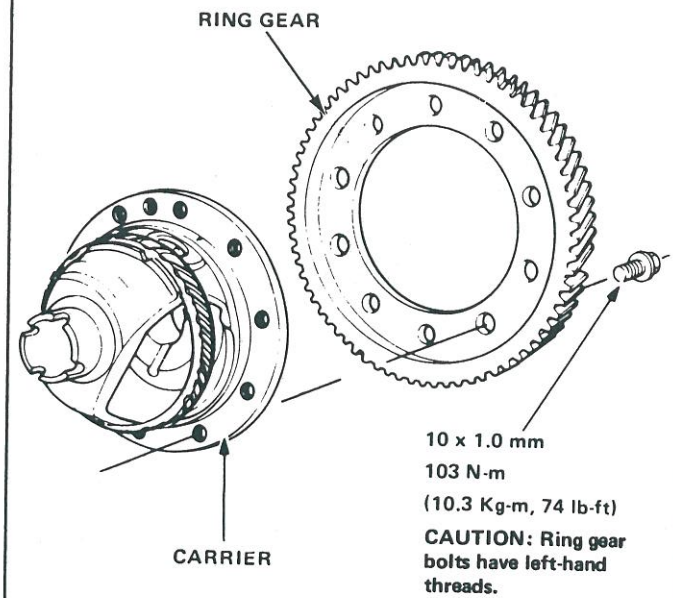
9. Install the ring gear with the chamfer on inside diameter facing the carrier.

Manual Transmission



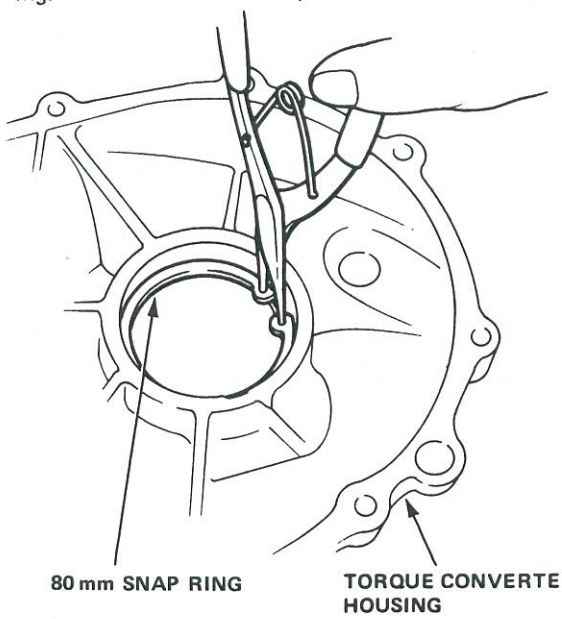
CAUTION: Ring gear bolts have left-hand threads.

Automatic Transmission



Installation

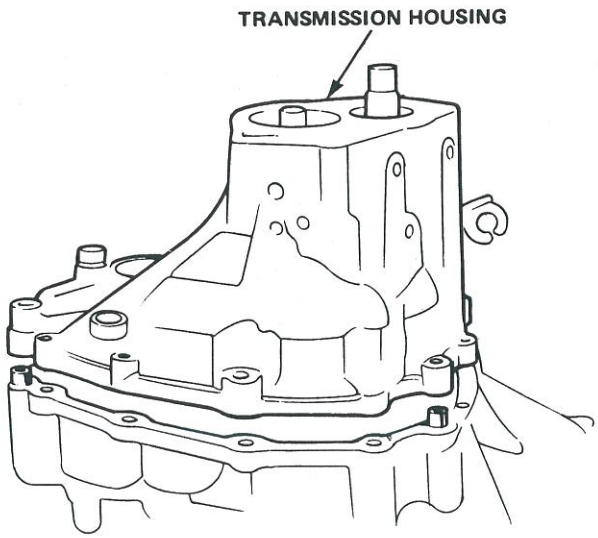
1. Automatic Only:
   Install 80 mm snap ring in torque converter housing. Do not install oil seal yet.



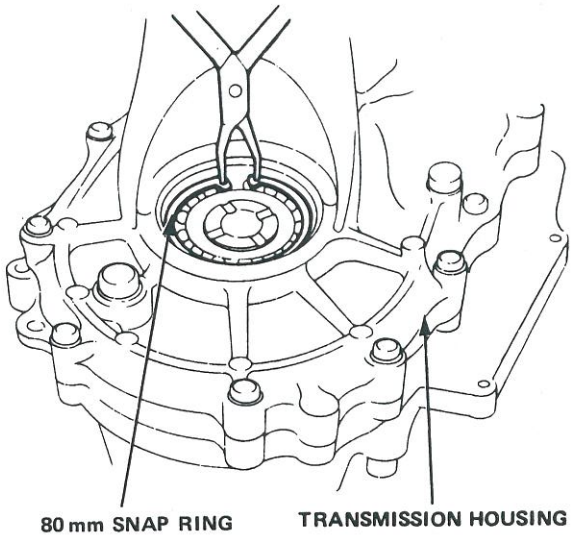
2. Install differential assembly and all transmission gear assemblies in clutch/torque converter housing. Refer to page 13-27 (Manual) or page 14-64 (Automatic).

3. Install dowel pins in clutch/torque converter housing then carefully lower the transmission housing into place.

   NOTE: (Automatic only) Place a new gasket on torque converter housing before installing transmission housing.



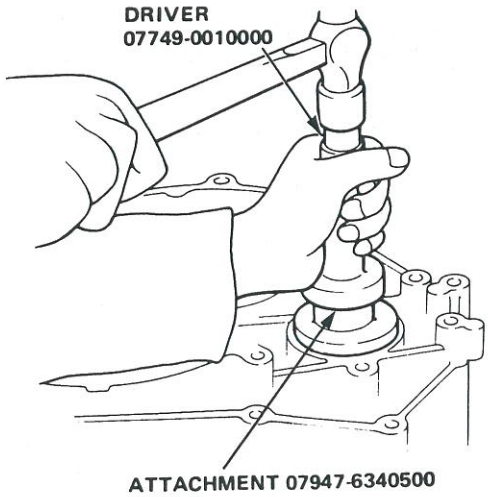
4. Manual Only:
   Install 80 mm snap ring in transmission housing.



Side Clearance Measurement

NOTE: If clutch/torque converter housing, transmission housing, differential carrier, or differential bearings were replaced, the differential side clearance must be measured.

5. Seat the snap ring.
   Automatic: Tap on transmission housing side of differential assembly with driver and attachment to seat 80 mm snap ring ring in torque converter housing.
   Manual: Tap on clutch housing side of differential assembly with driver and attachment to seat 80 mm snap ring in transmission housing.



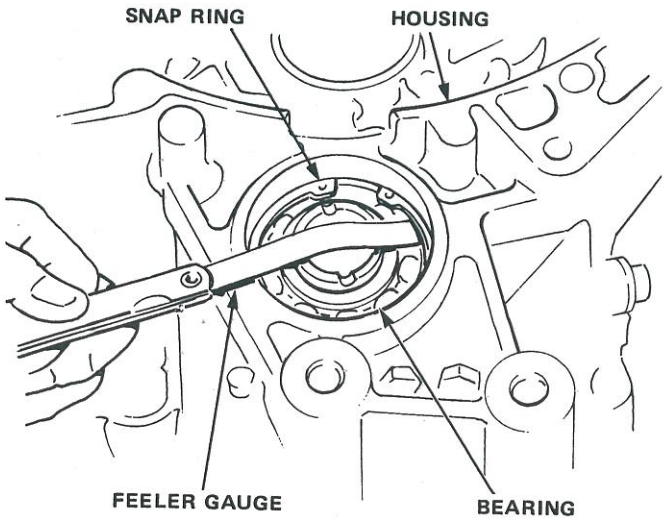
6. Turn the transmission over and seat the differential assembly.

   Automatic: Tap on torque converter housing side of differential assembly with driver and attachment to seat the assembly in transmission housing.

   Manual: Tap on transmission housing side of differential assembly with driver and attachment to seat the assembly in the clutch housing.

7. Measure clearance between snap ring and outer race of bearing in transmission housing (Manual), or torque converter housing (Automatic).

   Side Clearance: 0.15 mm (0.006 in.) Max.



8. If out of limits, select new snap ring from following table and install. Repeat Steps 6~8.

Manual:

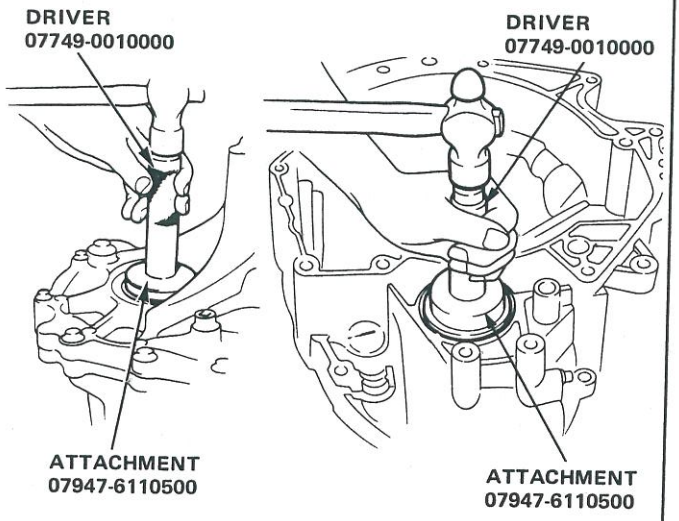
Part Number	Thickness
90414-PC8-000	2.5 mm (0.098 in.)
90415-PC8-000	2.6 mm (0.102 in.)
90416-PC8-000	2.7 mm (0.106 in.)
90417-PC8-000	2.8 mm (0.110 in.)
90418-PC8-000	2.9 mm (0.114 in.)

Automatic:

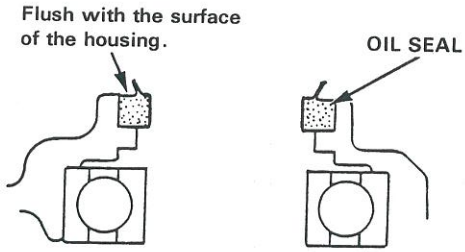
Part Number	Thickness
90414-689-000	2.5 mm (0.098 in.)
90415-689-000	2.6 mm (0.102 in.)
90416-689-000	2.7 mm (0.106 in.)
90417-689-000	2.8 mm (0.110 in.)
90418-689-000	2.9 mm (0.114 in.)

9. Apply oil to new differential seals and install them in clutch/torque converter housing and transmission housing with special tools as shown.

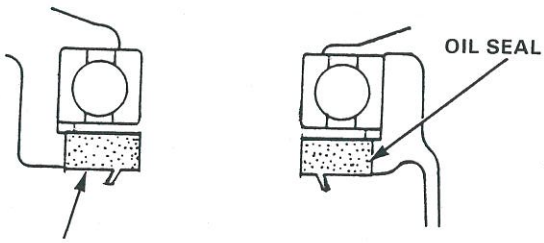
   CAUTION: If the seal is driven too far in, it will be damaged. Stop when its outer surface is flush with the surface of the housing.



Manual: Clutch housing side.
Automatic: Transmission housing side.



Manual: Transmission housing side.
Automatic: Torque converter housing side.



10. Refer to page 13-30 (Manual) or page 14-53 (Automatic) for assembly of remaining parts.

Driveshafts

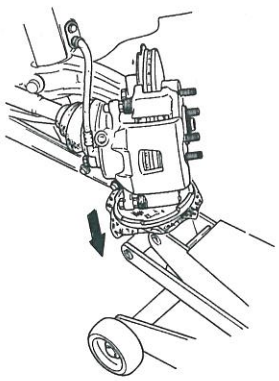
Driveshafts 16–2
Intermediate Shaft 16–6



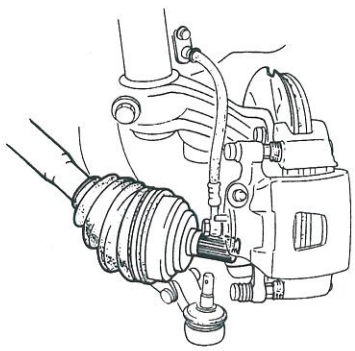
Removal

1. Loosen the front wheel spindle nut with a 32 mm socket wrench.
2. Raise the front end of the car and support it with safety stands (see page 1-7 for the proper locations for the stands).
3. Drain the transmission (page 13-2).
4. Remove the front wheel and the spindle nut.
5. Use a floor jack to support the lower control arm, then remove the ball joint cotter pin and nut.

   CAUTION: Make sure that the floor jack is positioned securely under the lower control arm, at the ball joint. Otherwise, torsion bar tension on the lower control arm will cause the arm to jump or spring suddenly away from the hub as the ball joint puller is being used.
6. Separate the ball joint from the front hub with the ball joint puller.
7. Slowly, lower the floor jack to lower the control arm.

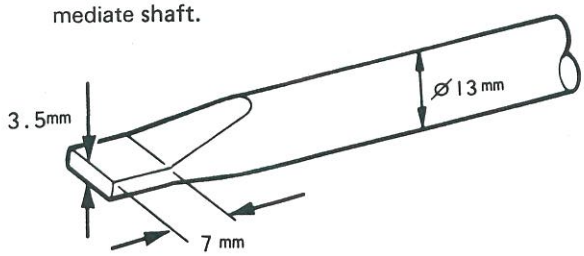


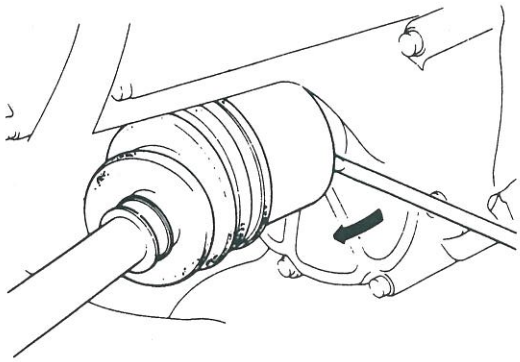
8. Pull the front hub outward, all the way off the driveshaft.

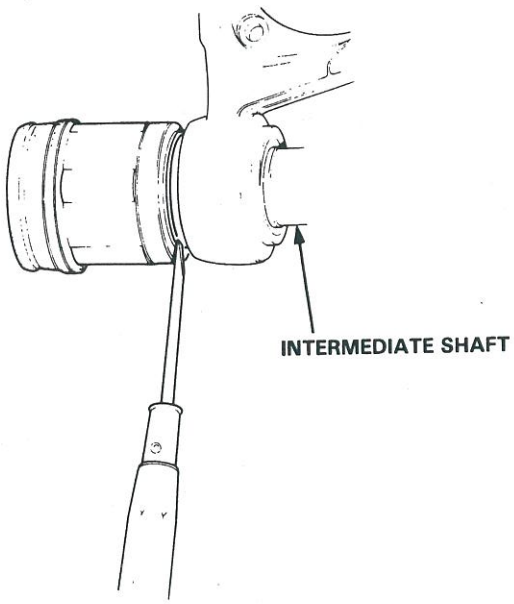


9. Using a tool like the one shown below, pry out the inboard CV joint approximately 12 mm (1/2 in) in order to force the spring clip out of the groove in the differential side gears.

   CAUTION:
   - **Pry carefully to avoid damaging the oil seal.**
   - **Do not pull on the inboard CV joint; it may come apart.**
10. Pull the driveshaft out of the differential or intermediate shaft.





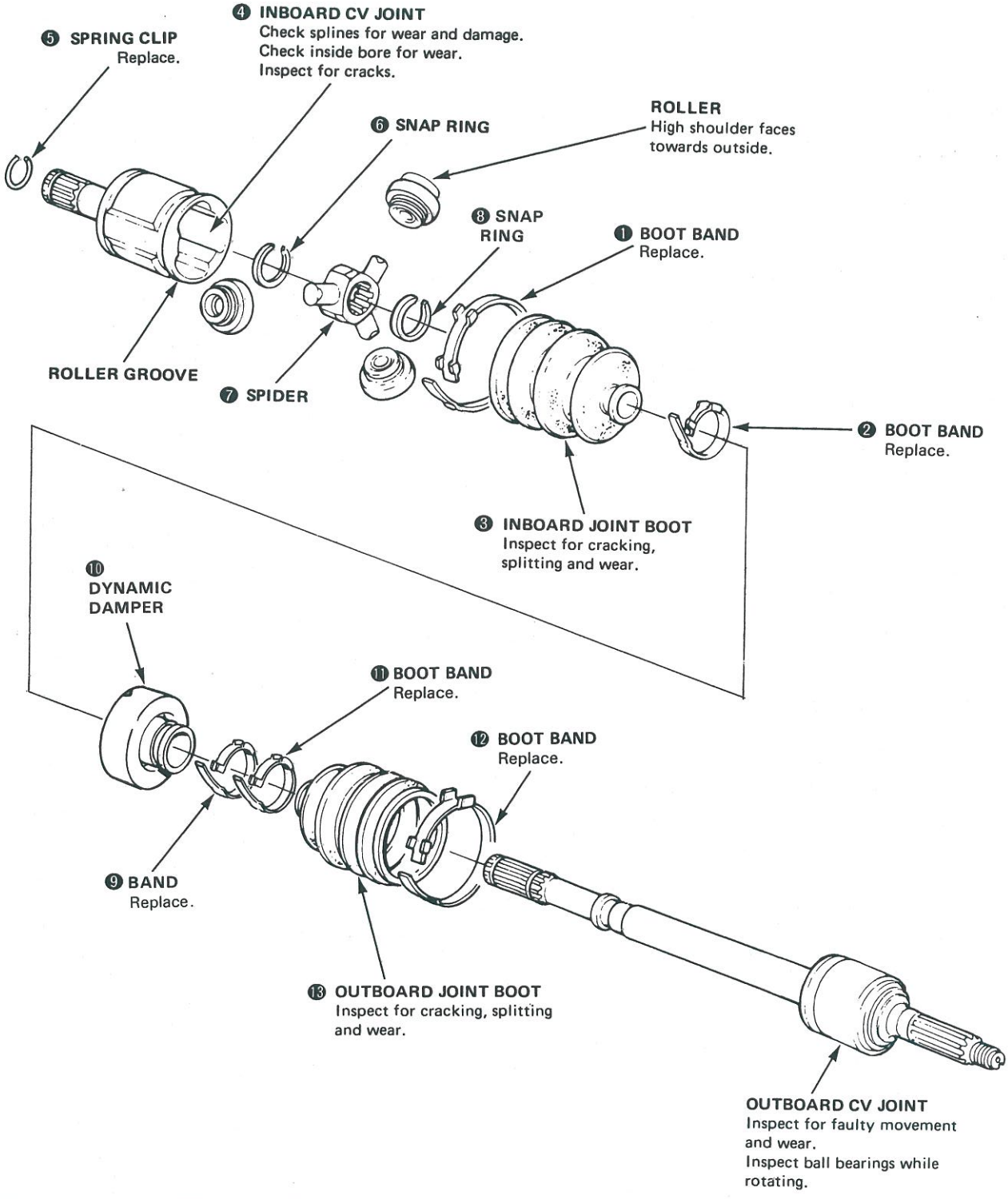


CAUTION: To prevent damage to the differential oil seal or intermediate shaft seal, hold the inboard joint horizontal until the driveshaft is clear of the differential or intermediate shaft.

Disassembly/Inspection

Disassemble in numbered sequence

NOTE: Mark the rollers and roller grooves during disassembly to ensure proper positioning during reassembly.



Reassembly

1. Reassemble the driveshafts in reverse order of disassembly.

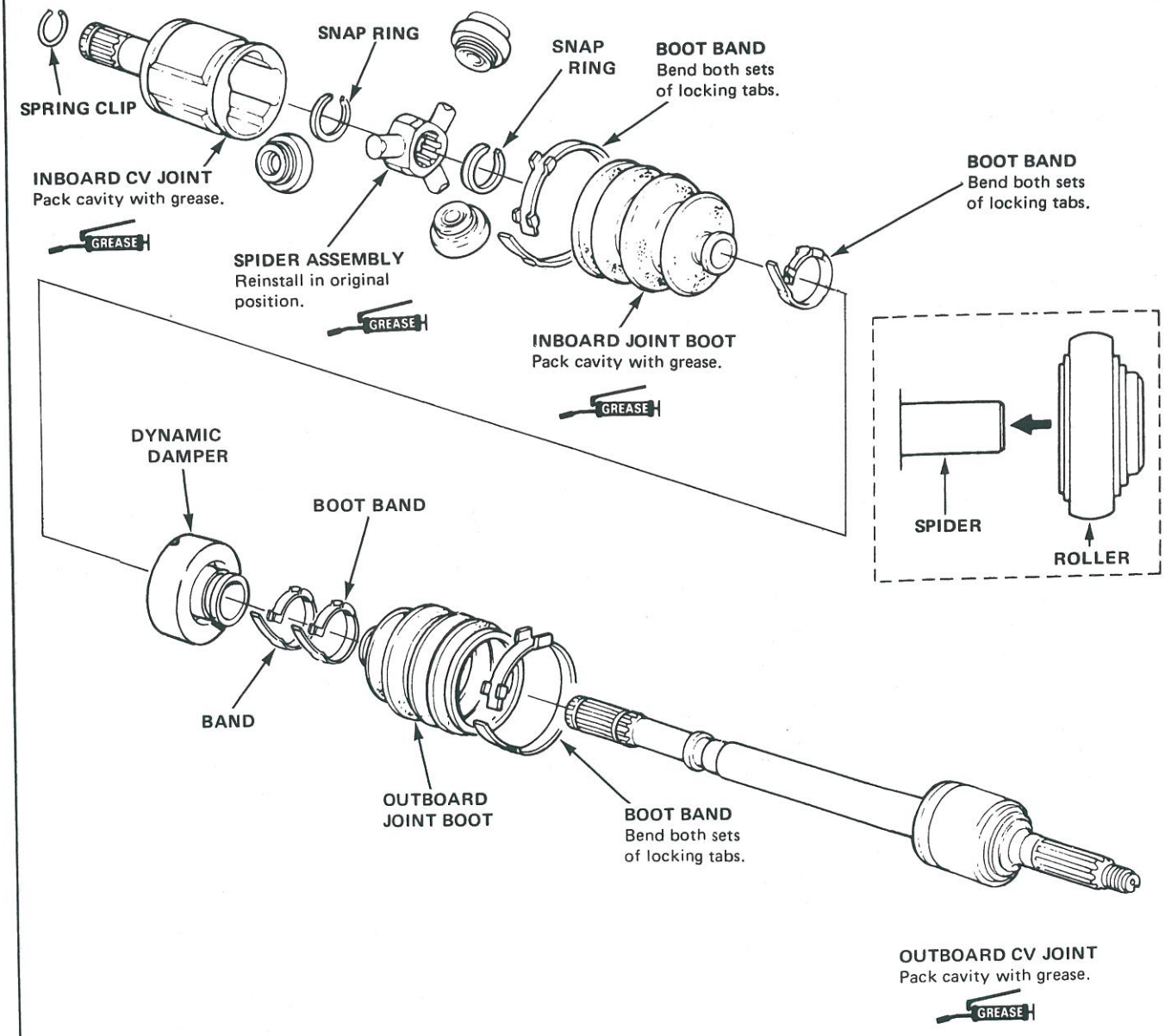
GREASE Thoroughly pack the bearings and both the inboard and outboard CV joints with high quality molybdenum disulfide grease when reassembling the driveshaft.

2. Install the rollers and bearing races on the spider shafts, then slide the spider assembly into the inboard CV joint.

CAUTION: Avoid getting oil or grease on the rubber parts.

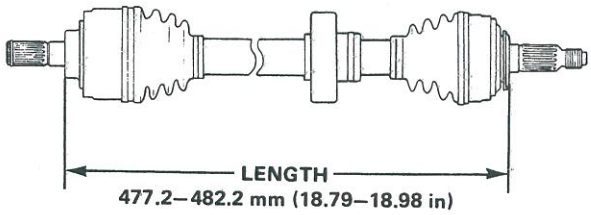
3. Slide the boots into place and install new boot bands on the small ends. Position the bands so they are centered between the locating humps at each end of the driveshaft. Expand and compress the boots until they return to their normal shape and length.

4. Remove the inboard joint when replacing the joint boots.



Installation

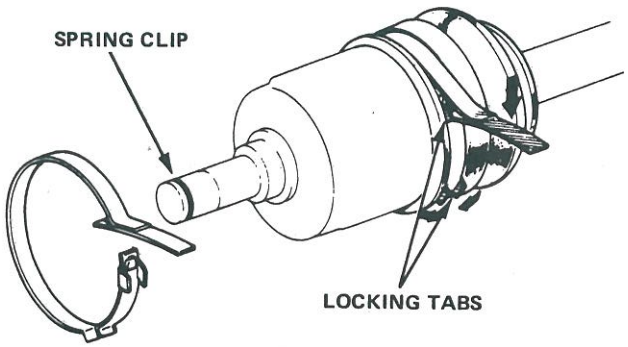
1. Adjust the length of the driveshafts to the figures given below.



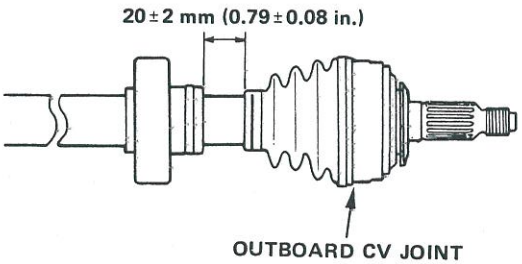
2. Install the new boot bands on the boots.

NOTE:
- Be sure to bend both sets of the locking tabs.
- Lightly tap on the doubled-over portions to reduce their height.

CAUTION: Do not strike the boot.

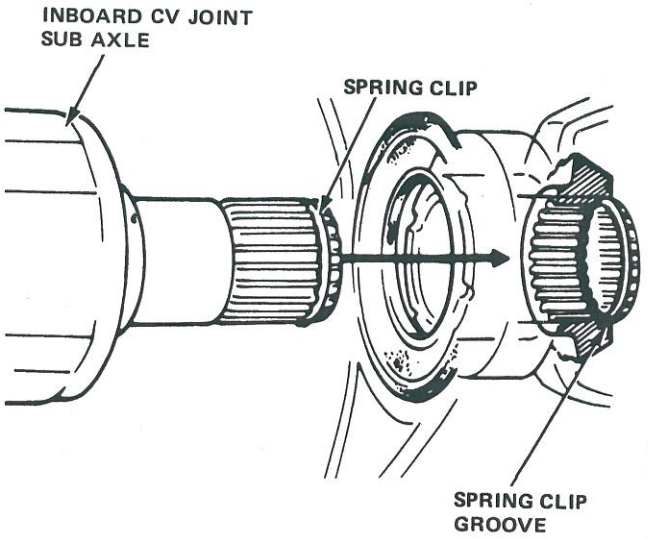


3. Install the dynamic damper in the position as shown below.



4. Install the spring clip on the groove of the CV joint sub-axle.

CAUTION:
- **Replace the spring clip with a new one whenever the driveshaft is replaced.**
- **When reinstalling, make sure that the spring clip locks in the differential/intermediate shaft groove.**

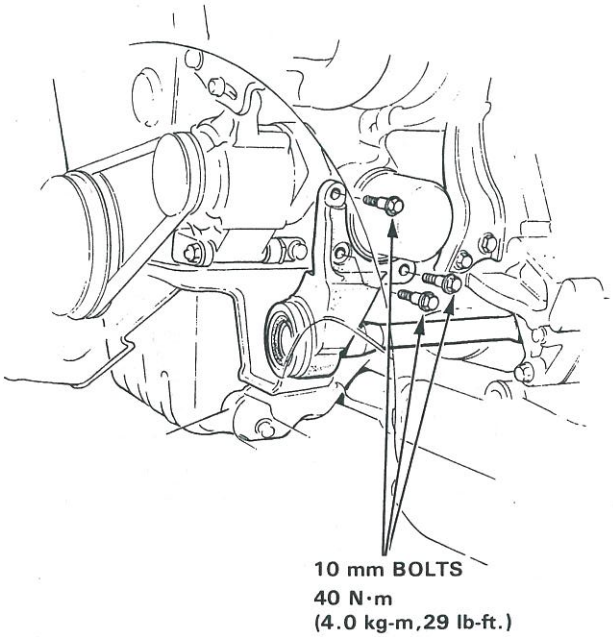


5. Refill the transmission to the prescribed level.

Intermediate Shaft

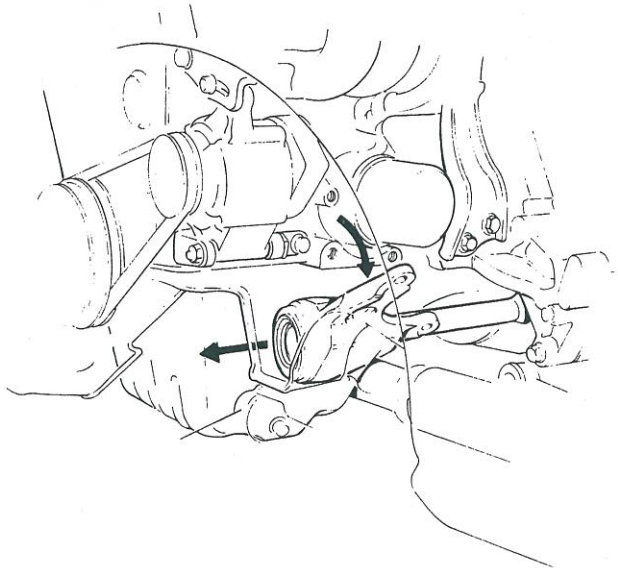
Replacement

1. Drain oil from the transmission.
2. Remove the three 10 mm bolts.



3. Lower the bearing support close to the steering gearbox and remove the intermediate shaft from the differential.

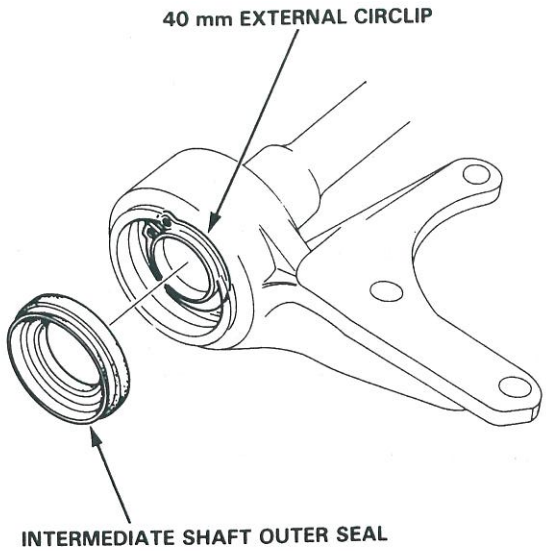
CAUTION: To prevent damage to the differential oil seal, hold the intermediate shaft horizontal until it is clear of the differential.



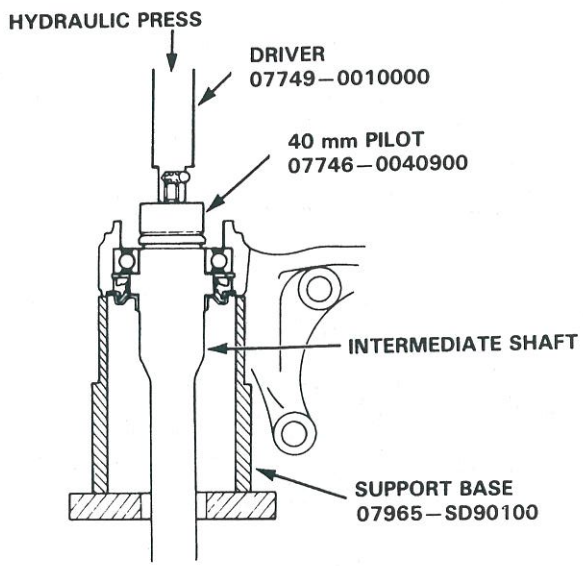
Installation is the reverse of removal.

Disassembly

1. Remove the intermediate shaft outer seal.
2. Remove the 40 mm external circlip.



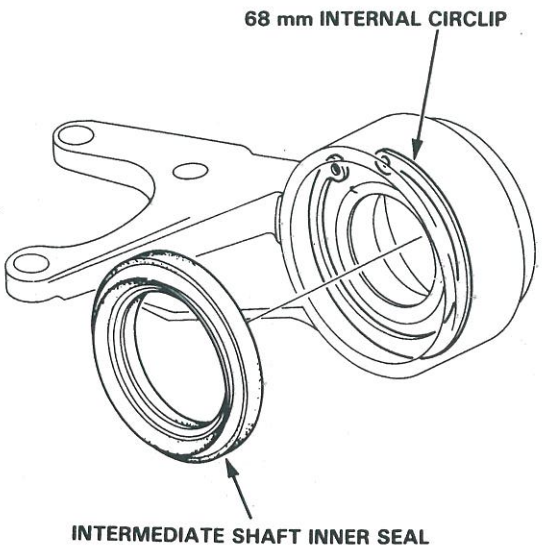
3. Press the intermediate shaft out of the shaft bearing.



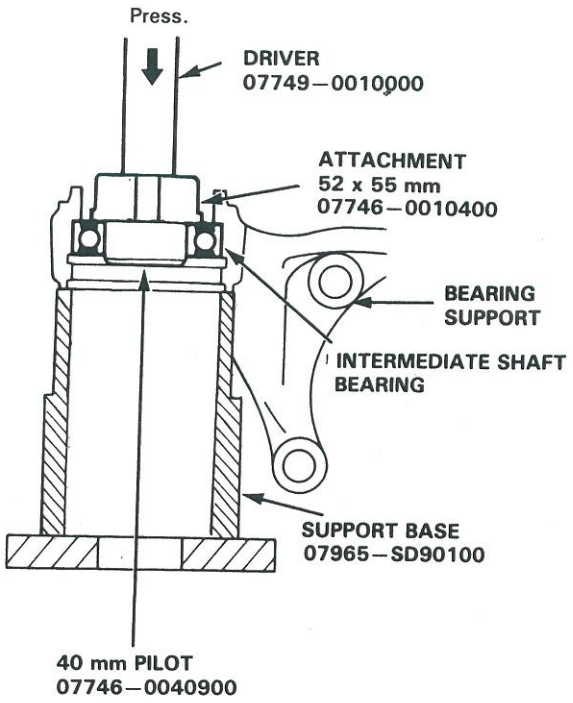
(cont'd)

Disassembly (cont'd)

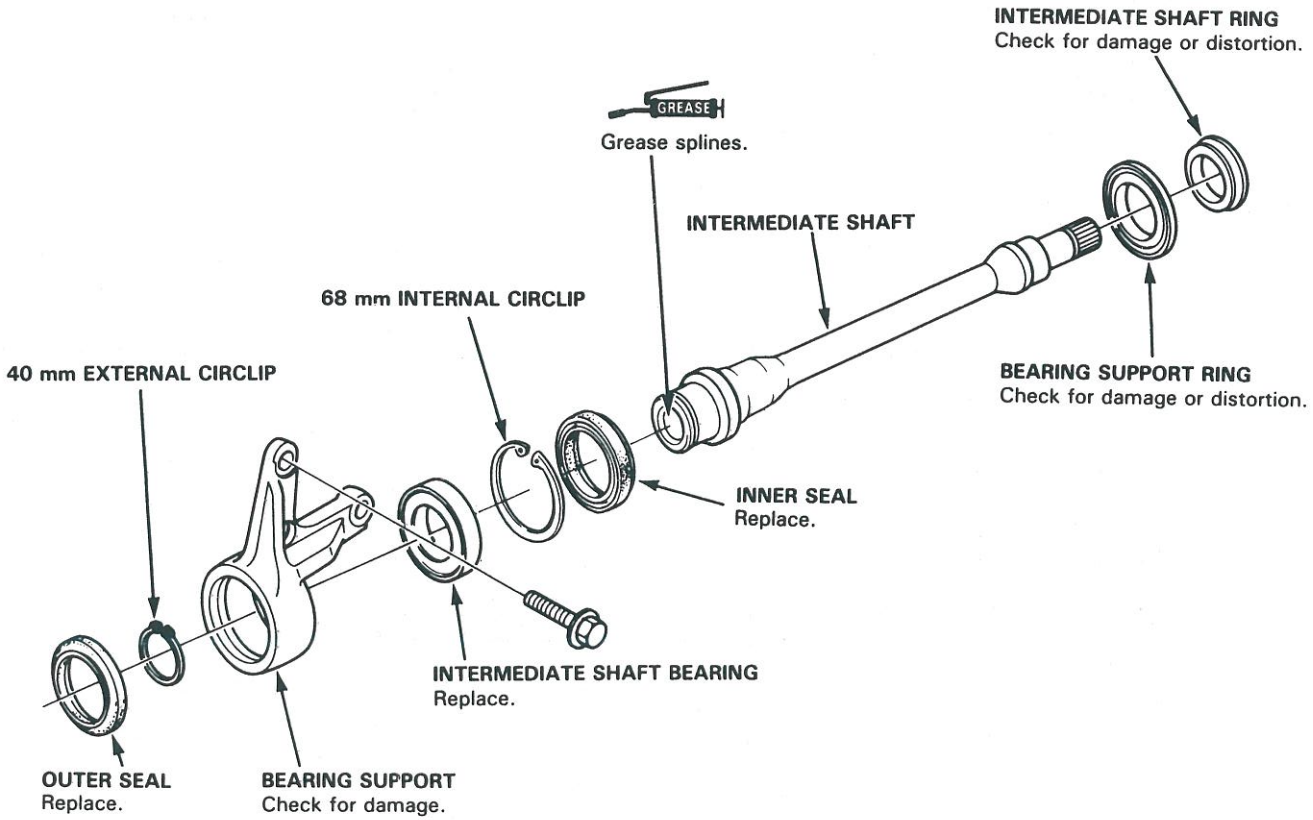
4. Remove the intermediate shaft inner seal.
5. Remove the 68 mm internal circlip.



6. Press the intermediate shaft bearing out of the bearing support.

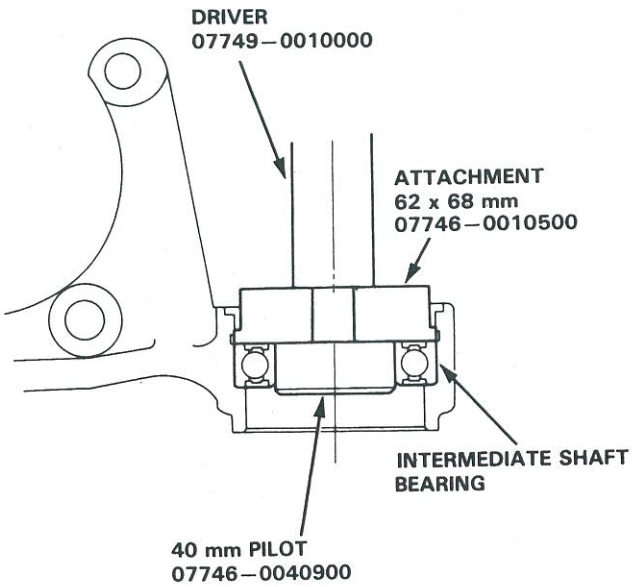


Index/Inspection



Reassembly

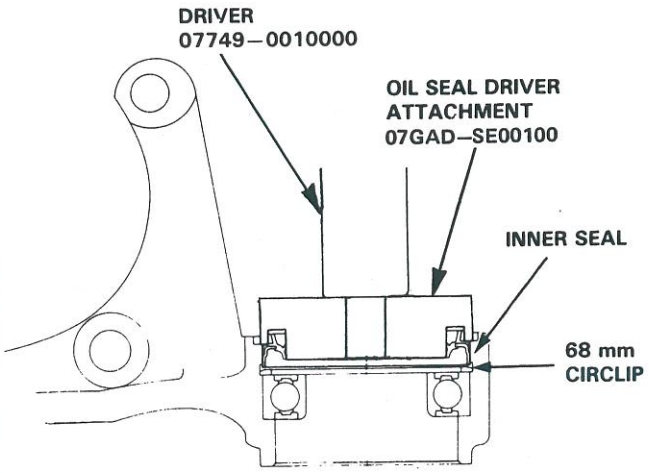
1. Press the intermediate shaft bearing into the bearing support.



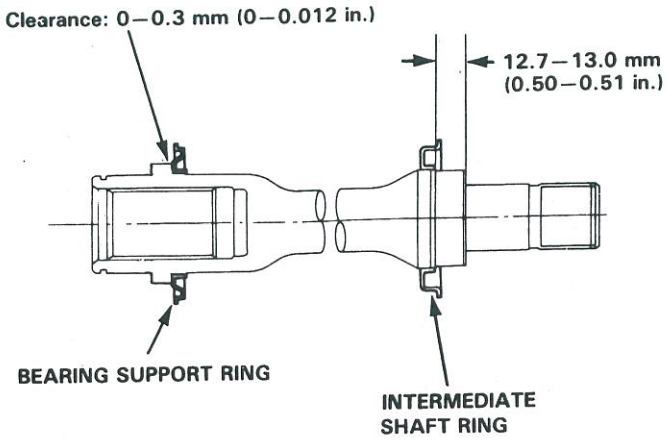
2. Seat the 68 mm circlip in the groove of the bearing support.

   CAUTION: Install the circlip with the tapered end facing out.

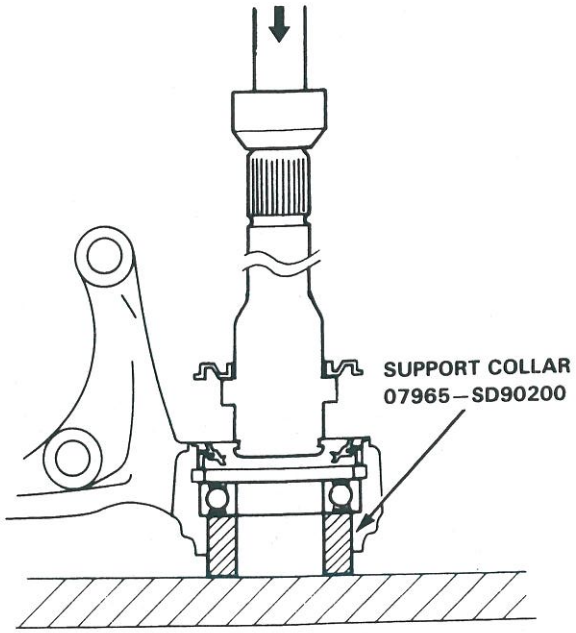
3. Press the intermediate shaft inner seal into the bearing support.



4. Install the intermediate shaft ring and bearing support ring on the intermediate shaft and position as shown using a soft hammer.



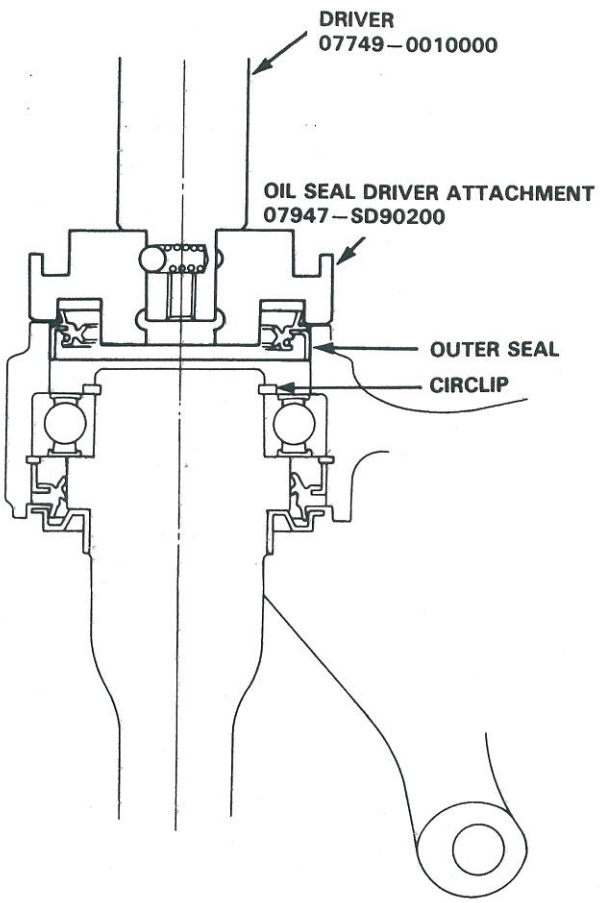
5. Press the intermediate shaft into the shaft bearing.



6. Seat the 40 mm external circlip in the groove of the intermediate shaft.

   CAUTION: Install the circlip with the tapered end facing out.

7. Press the outer seal into the bearing support.

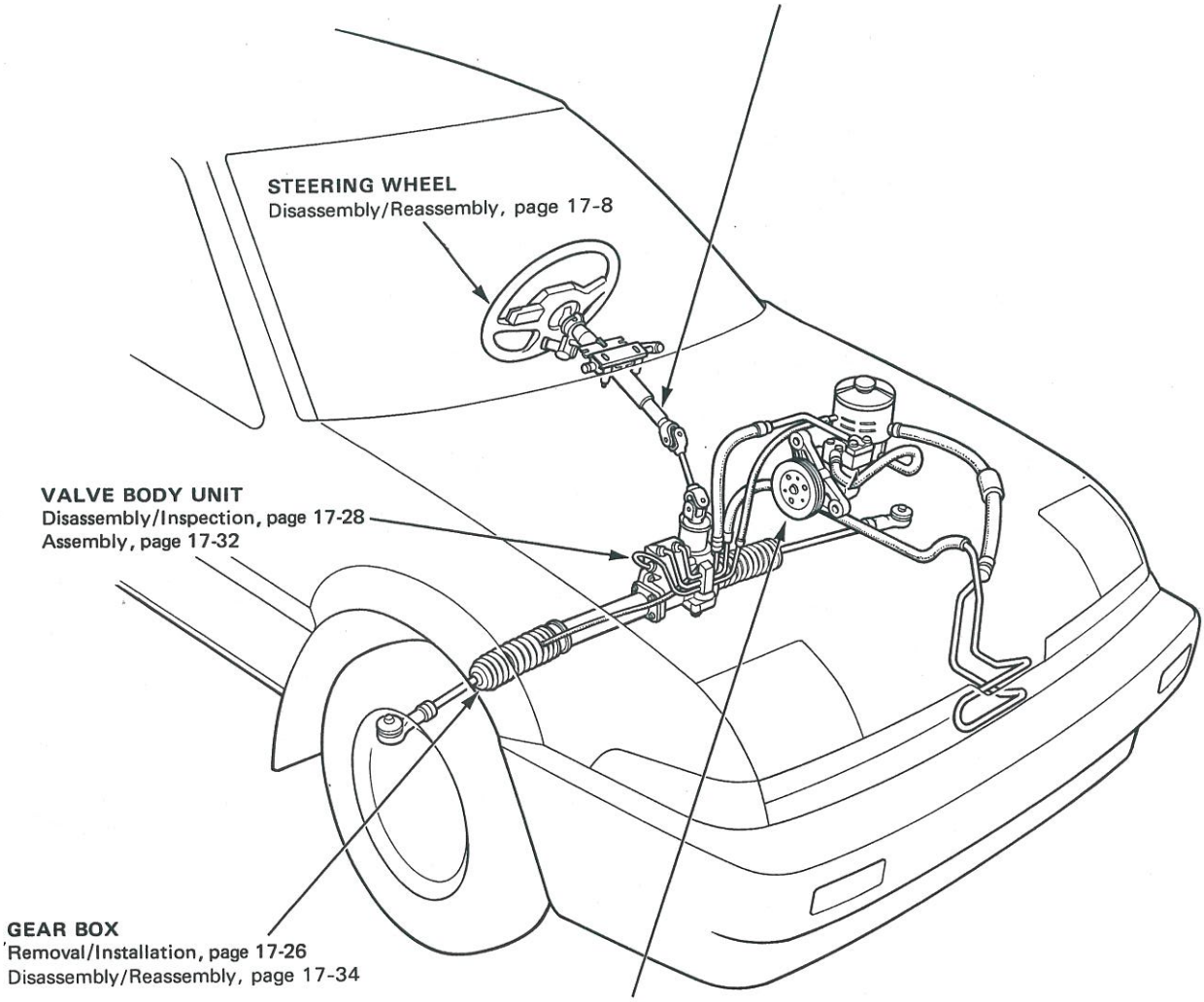


Power Steering

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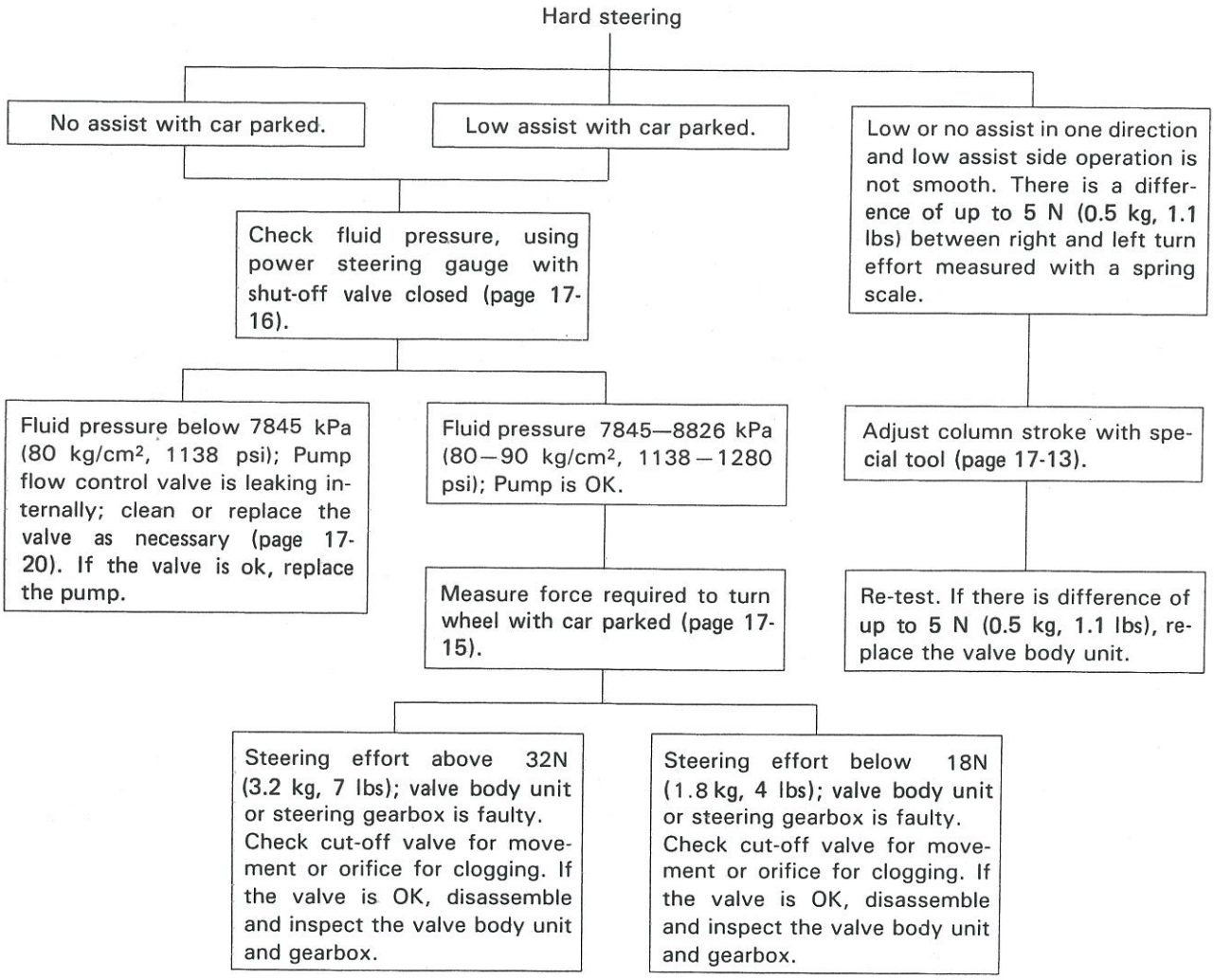

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Troubleshooting

General

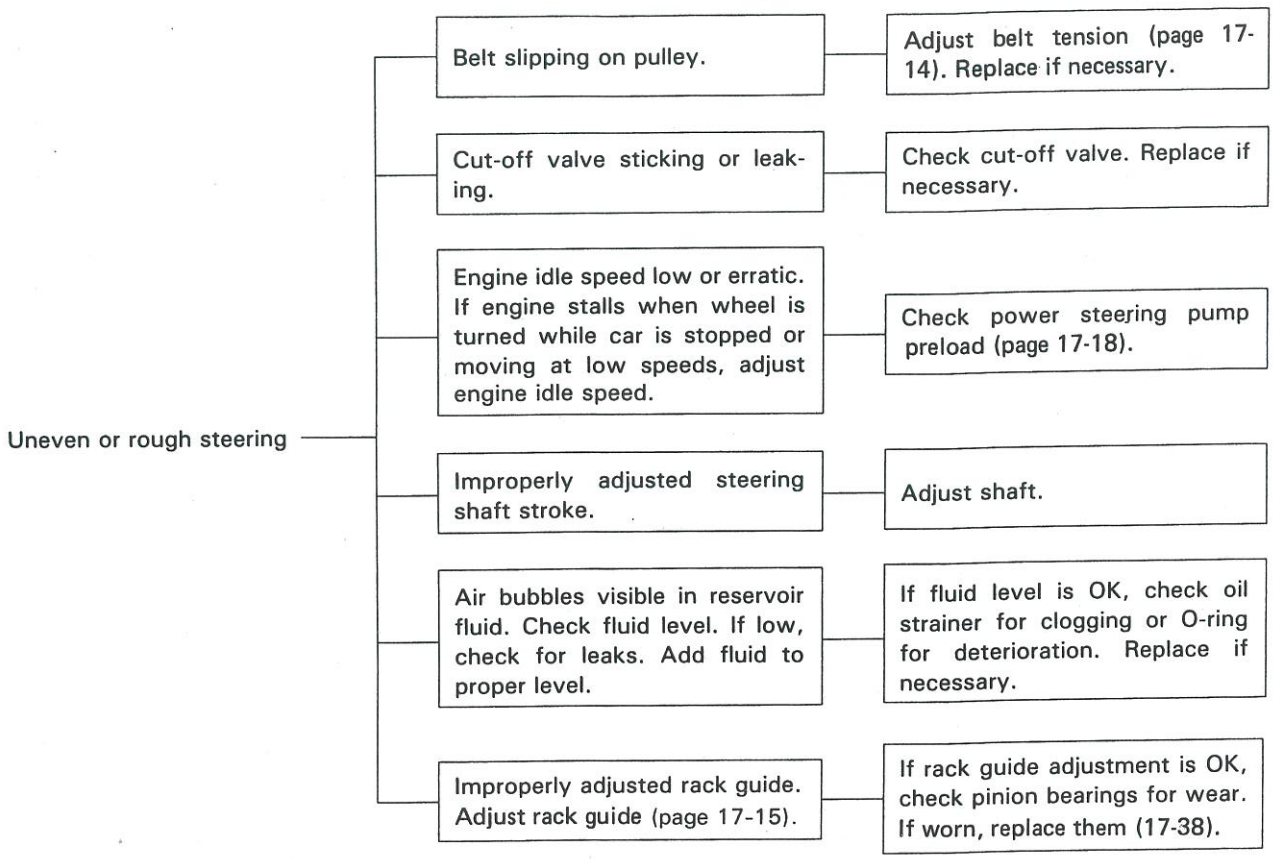
Check the following before you begin:

- Has the suspension been modified in a way that might affect steering?
- Are tire sizes and air pressures 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?
- Does the steering fluid contain bubbles?
- Is the engine idle speed correct and steady?



(cont'd)

General (cont'd)



Shock or vibration when steering wheel is turned fully.	Belt slipping on pulley (pump stops momentarily).	Adjust belt tension or replace belt if necessary.
	Sticking relief valves; pulsation exceeds 980 kPa (10 kg/cm², 142 psi) during pump pressure test (page 17-21).	Check flow control valve. If OK, replace pump.
Excessively light steering at high speed.	Measure force, required to turn wheel with car parked on dry, paved surface.	If below 18 N (1.7 kg, 4 lbs), check cut-off valve and valve body unit.
	Improperly adjusted tire air pressure.	Adjust.
	Improperly adjusted wheel alignment.	Adjust or replace.
	Check rack guide adjustment.	Adjust if necessary.
Vehicle steers to one side.	Pump belt slipping on pulley.	Adjust belt tension or replace belt if necessary.
	Check cut-off valve for movement and valve body unit.	Replace if necessary.
	Rack guide adjusted too loose.	Adjust.
	Improperly adjusted wheel alignment.	Adjust or replace.
	Improperly adjusted tire air pressure.	Adjust.
Wheel will not return smoothly.	Tire air pressure too low.	Inflate to correct pressure.
	Improperly adjusted wheel alignment.	Adjust or replace.
	Improperly adjusted rack guide.	Adjust or replace.
	Improperly adjusted column stroke.	Adjust.

Noise and Vibration

NOTE: Pump noise within 2—3 minutes after starting in cold weather (−20°F or colder) is normal.

Humming
- Humming, due to pulsation of fluid, is normal, particularly when wheel is turned with car stopped.
- Hum could be torque converter noise; confirm by temporarily removing pump belt.
- High pressure line touching the frame. Reposition the line.

Squeaking
- Belt slipping. Tighten or replace belt.
- Pinion shaft seal not lubricated. Grease it.
- Horn contact not lubricated, or under too much pressure. Grease the contact, or bend it to reduce the pressure.
- Burrs on the pinion gear. Remove pinion and file burrs smooth.

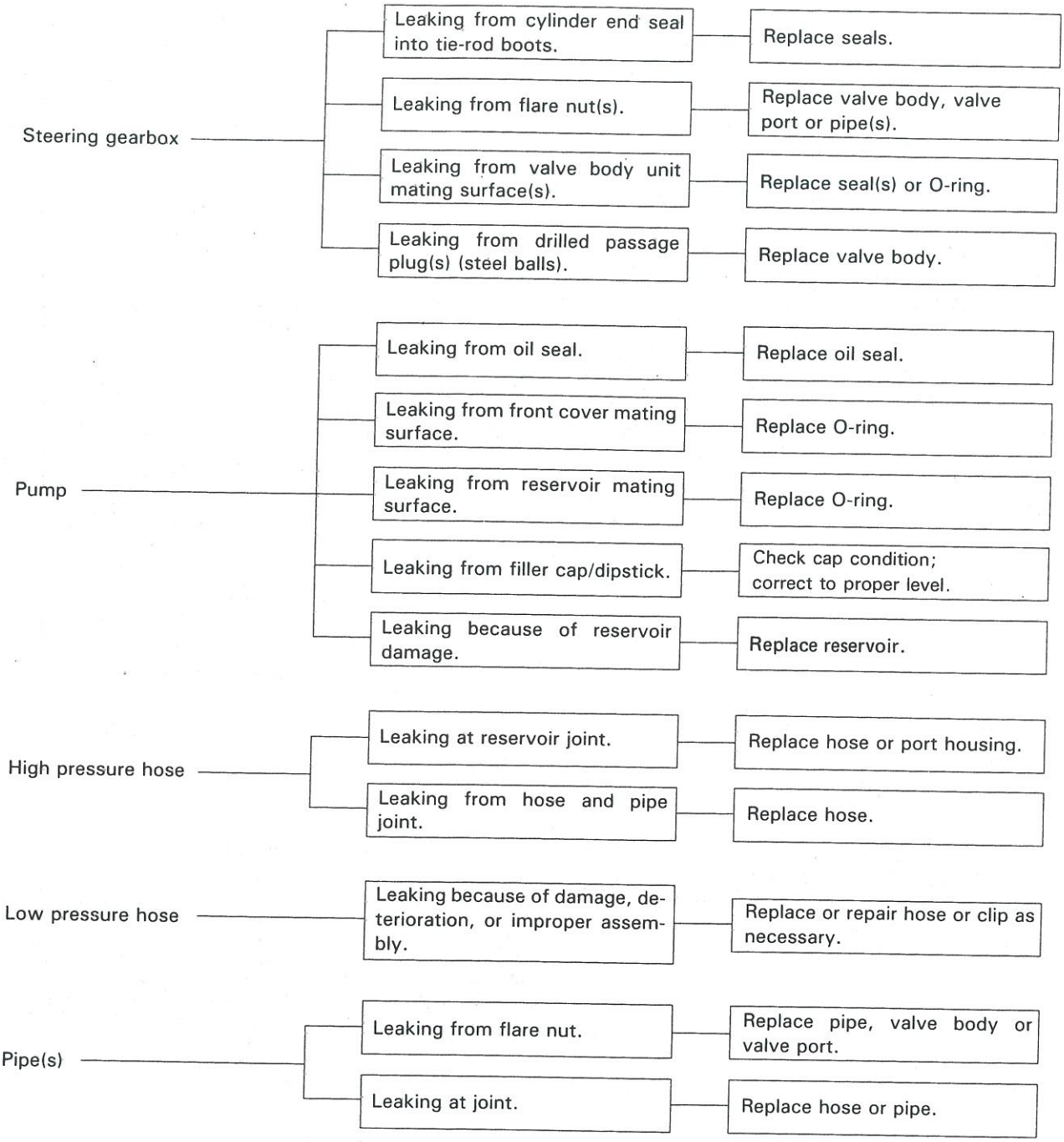
Rattling or chattering
- Normal "clunk" of linkage taking up clearance when wheel is turned with engine off.
- Loose pump pulley. Tighten or replace it. If shaft is loose, replace the pump.
- Loose steering shaft connector, tie-rod, or ball joint. Check and tighten, or replace parts.
- Lower column hanger bushing damaged. Replace column assembly.

Hissing
- Lines or hoses from the valve body unit touching each other. Reposition lines so they don't touch.
- If the valve body unit lines are not touching, and noise is from valve body unit, replace the valve body unit.

Pump gear noise
- Normal. Check pump noise on a car you know is OK, then compare.

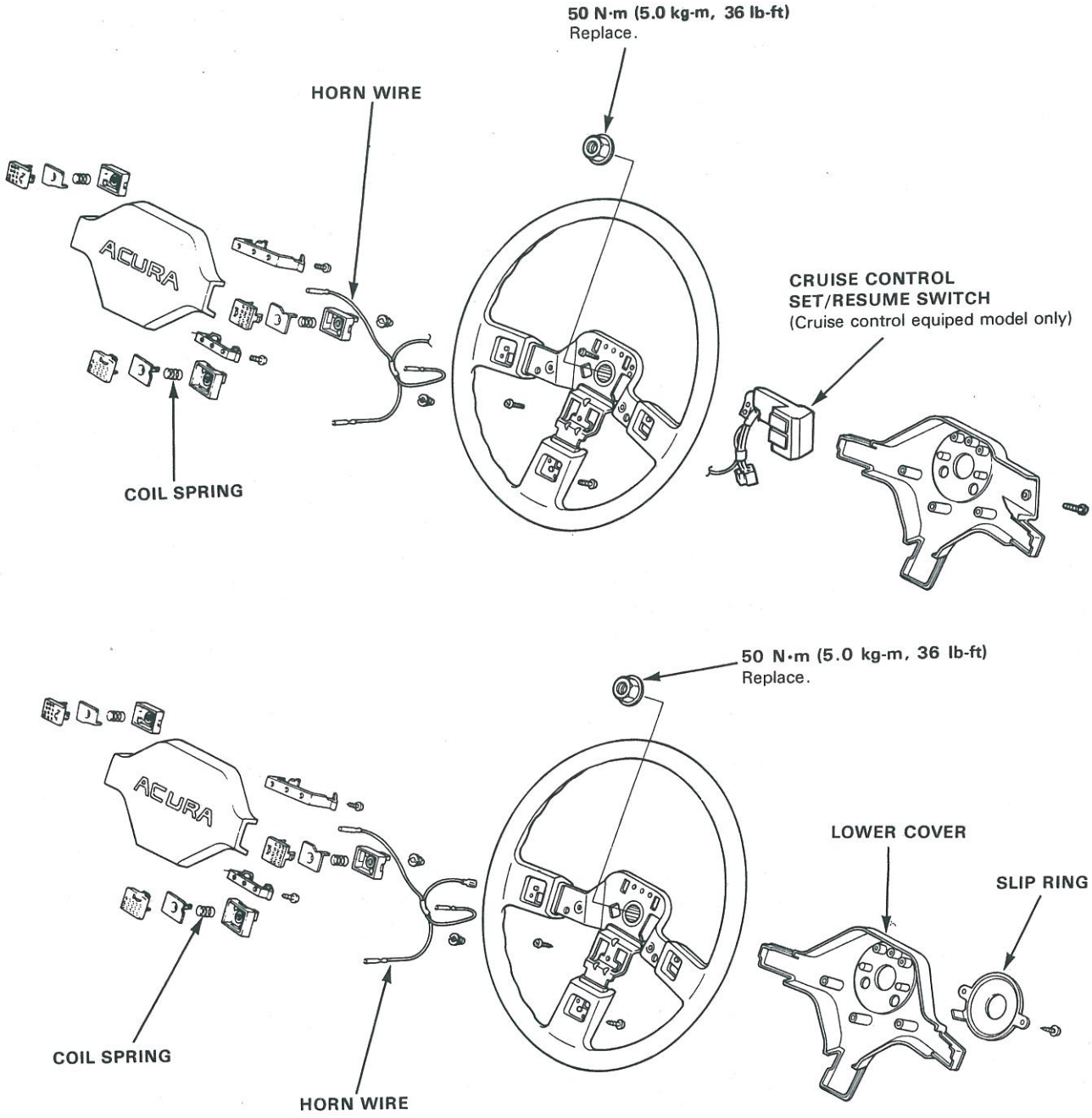
Grating noise from pump (cavitation caused by air bubbles in fluid.)
- Check fluid level. If low, fill reservoir to proper level, and check for leaks. Tighten or replace parts.
- Check for crushed suction hose or loose hose clamp allowing air into the system. Tighten or replace parts.

Fluid Leaks


Steering gearbox
Leaking from cylinder end seal into tie-rod boots.
Replace seals.
Leaking from flare nut(s).
Replace valve body, valve port or pipe(s).
Leaking from valve body unit mating surface(s).
Replace seal(s) or O-ring.
Leaking from drilled passage plug(s) (steel balls).
Replace valve body.
Pump
Leaking from oil seal.
Replace oil seal.
Leaking from front cover mating surface.
Replace O-ring.
Leaking from reservoir mating surface.
Replace O-ring.
Leaking from filler cap/dipstick.
Check cap condition; correct to proper level.
Leaking because of reservoir damage.
Replace reservoir.
High pressure hose
Leaking at reservoir joint.
Replace hose or port housing.
Leaking from hose and pipe joint.
Replace hose.
Low pressure hose
Leaking because of damage, deterioration, or improper assembly.
Replace or repair hose or clip as necessary.
Pipe(s)
Leaking from flare nut.
Replace pipe, valve body or valve port.
Leaking at joint.
Replace hose or pipe.

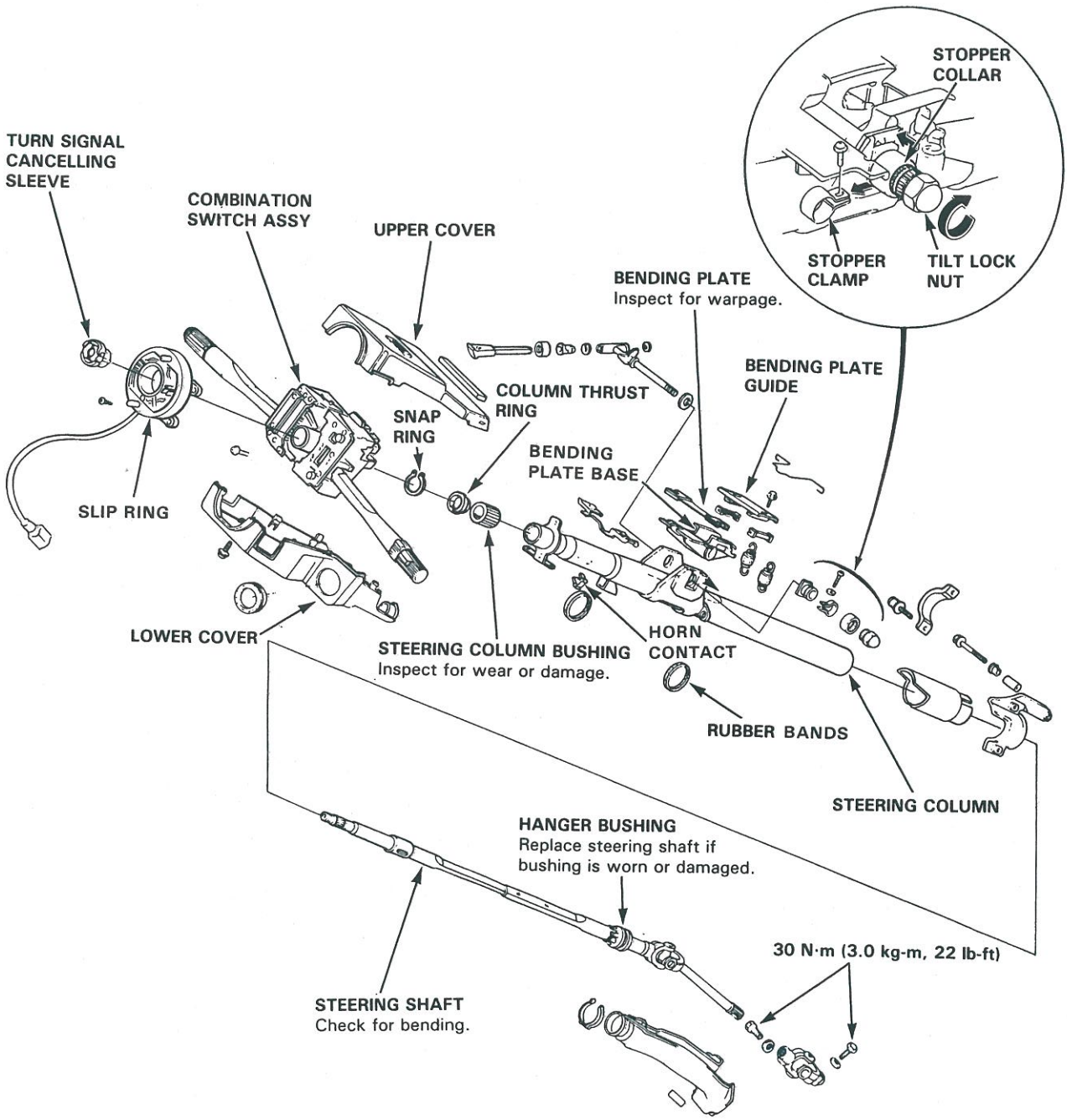
Steering Wheel

Disassembly/Reassembly



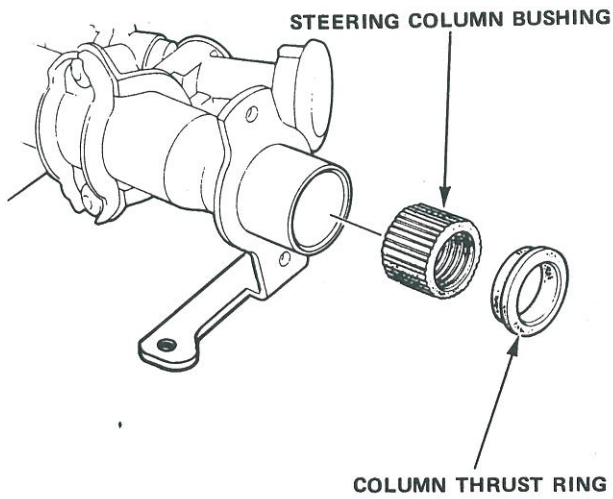
Disassembly/Inspection

1. Remove the turn signal cancelling sleeve.
2. Remove the rubber bands, then remove the upper column holder, bending plate, and bending plate base.
3. Remove the bending plate guide.
4. Remove the combination switch.
   On cruise control equiped model: Remove the slip ring then remove the combination switch.
5. Turn the ignition switch to the "I" position.
6. Remove the horn contact.
7. Pry off the snap ring and pull down the steering shaft.

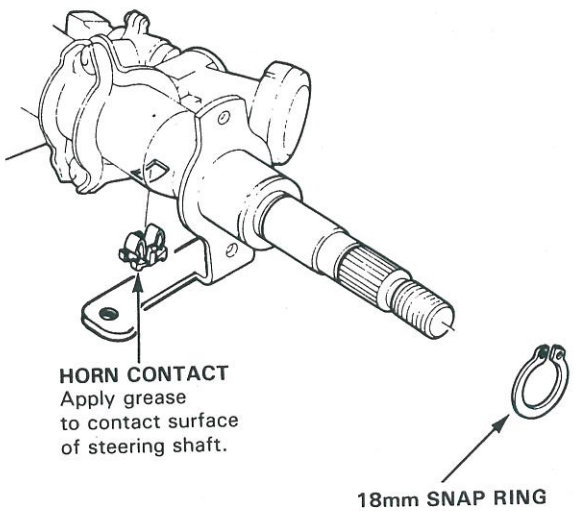


Assembly

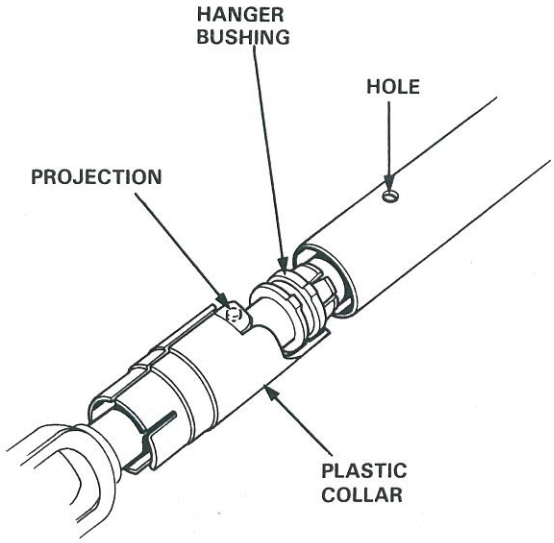
1. Insert the column bushing.
2. Set the column thrust ring in position.



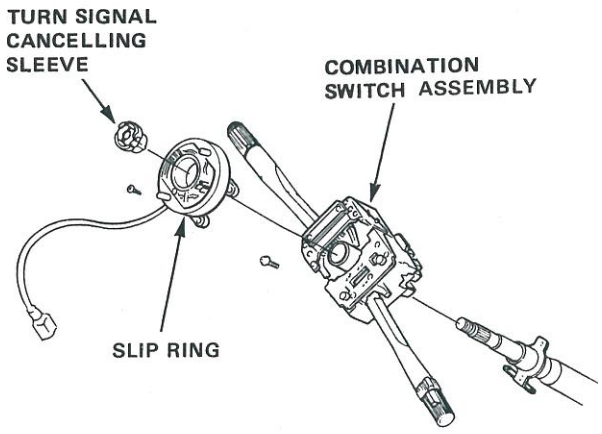
3. Insert the steering shaft in the steering column from the bottom.
4. Install the snap ring on the steering shaft.
5. Insert the horn contact in the hole in the steering column.



6. Apply grease to the lower end of the steering shaft and inside the column.
7. Push the hanger bushing into the bottom end of the column as far as it will go.
8. Install the plastic collar over the bottom end of the steering column by aligning the round projection inside the collar with the hole in the column.



9. Install the combination switch assembly.
   On cruise control equiped model: install the slip ring after the combination switch is installed.
10. Install the turn signal cancelling sleeve.



11. Install the 10 mm washer on the tilt lever assembly.

12. Install the bending plate base on the steering column.

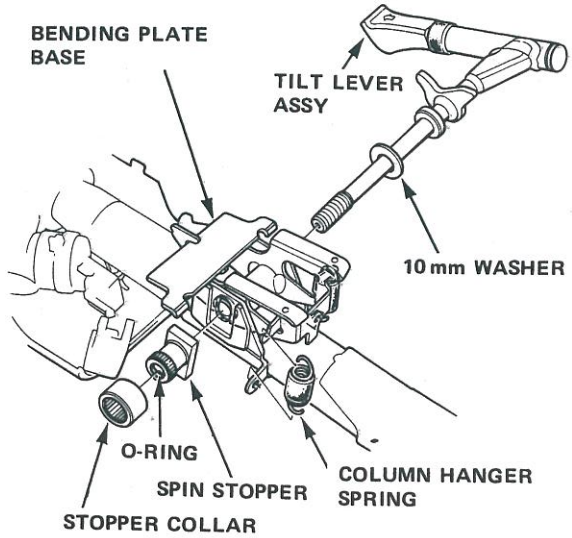
13. Insert the tilt lever assembly shaft into the hole in the bending plate base.

14. Install the spin stopper on the shaft.

    NOTE: Apply grease to each sliding surface.

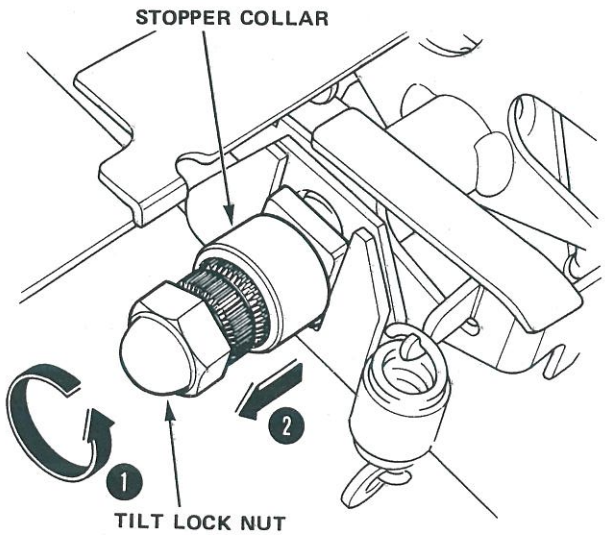
15. Install the stopper collar over the spin stopper.

16. Install the column hanger spring as shown.



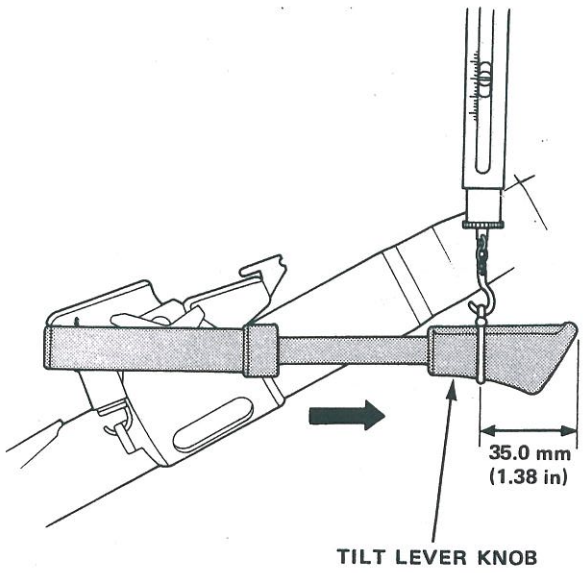
17. Torque the tilt lock nut to 7 N.m (0.7 kg-m, 5 lb-ft) and slide the stopper collar to the tilt lock nut side.

    NOTE:
    - The tilt lock nut has left hand threads.
    - If the stopper collar cannot be moved, turn the tilt lock nut counterclockwise.

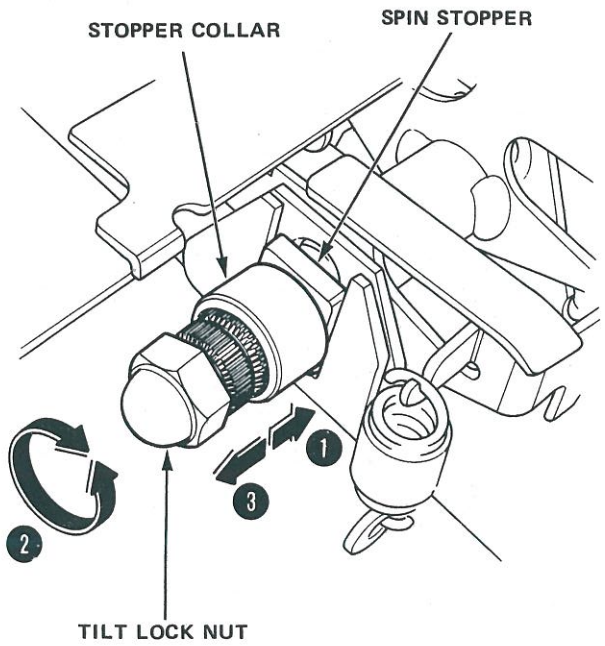


18. Pull out the tilt lever knob toward you and measure the lever preload at 35.0 mm (1.38 in) from the tip of the knob.

    Lever Preload: 50-90 N (5.0-9.0 kg, 11.0-19.8 lb)



19. If the preload is out of the specification, adjust by sliding the stopper collar to the spin stopper side and turning the tilt lock nut one turn right or left.

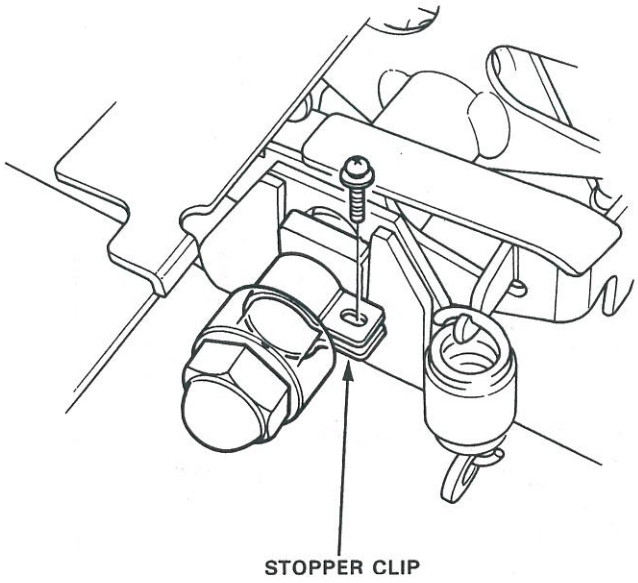


(cont'd)

Assembly (cont'd)

20. Slide the stopper collar to the tilt lock nut side.

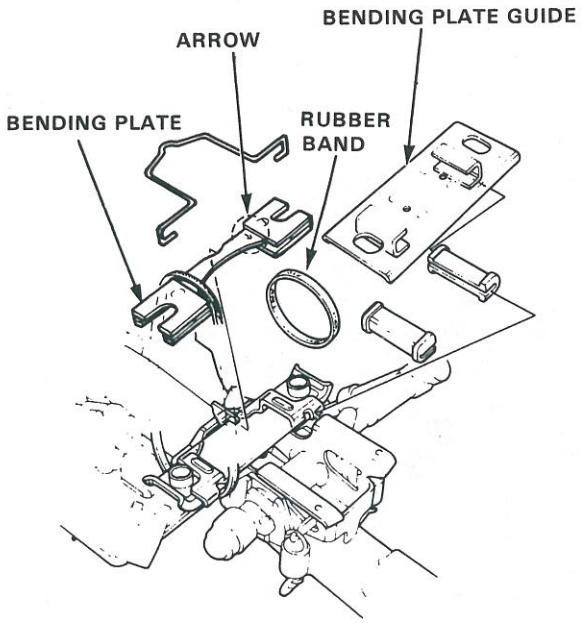
21. Install the stopper clip between the spin stopper and stopper collar and tighten with 3 mm screw.



22. Install the upper column holder and bending plate on the steering column with the rubber bands.

    NOTE: Install the bending plate with the arrow toward the gear box.

23. Install the bending plate guide on the steering column.



Adjustment

NOTE: A special tool (adjustment guide) is required to position the steering column during installation.

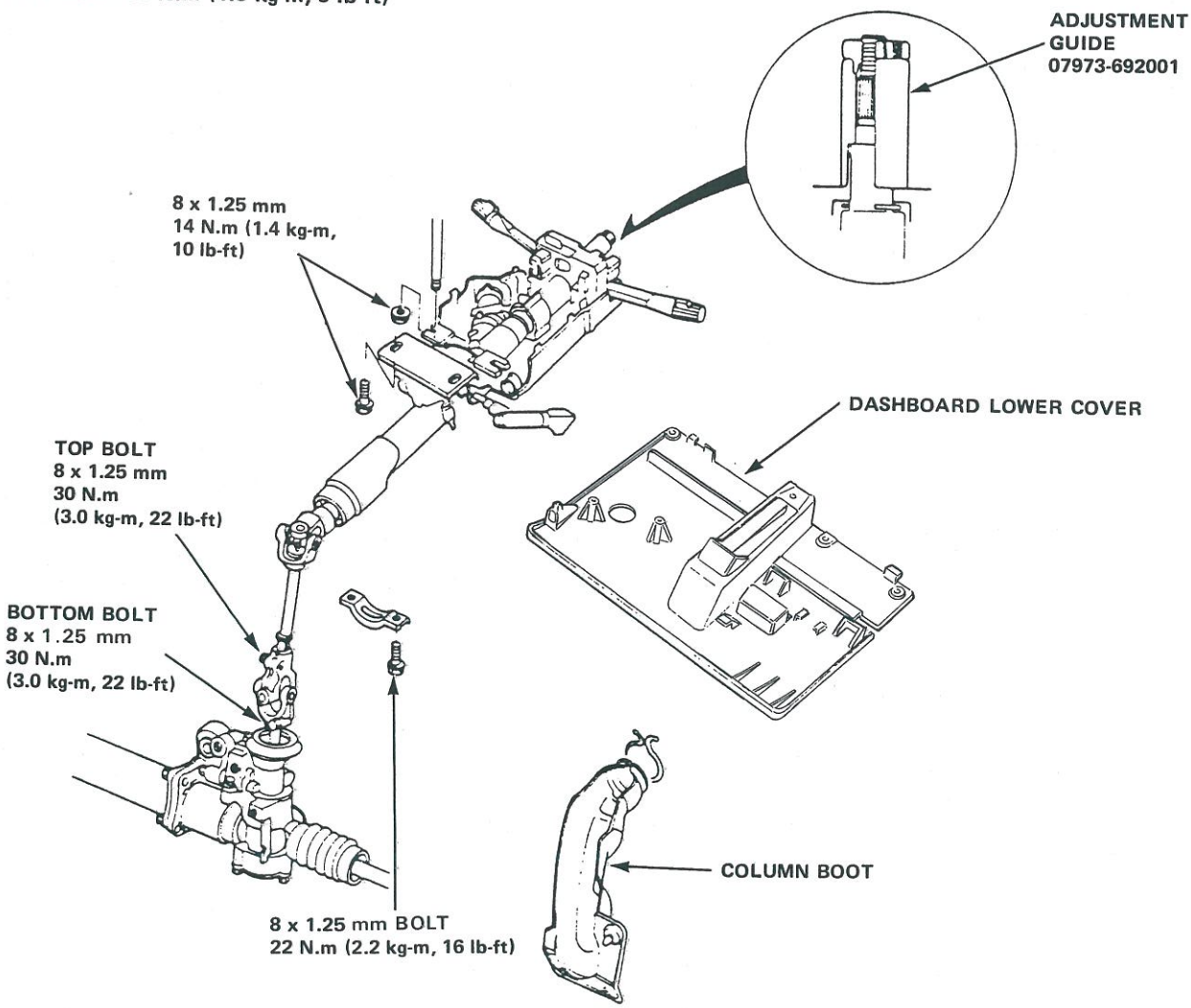
1. Install the adjustment guide on the top end of the steering shaft and turn it as far as it will go.
2. Loosely install the upper column holder and bending plate guide attaching bolts and pull the column down to be sure the bending plate is seated snugly against the hook.
3. Loosely install the lower bracket and pull the column down so that there is no clearance between the bending plate and hook.
4. Tighten the upper column holder and bending plate guide bolts to the specified torque.

   TORQUE: 13 N.m (1.3 kg-m, 9 lb-ft)
5. Tighten the lower bracket bolts to the specified torque.

   TORQUE: 13 N.m (1.3 kg-m, 9 lb-ft)
6. Connect the steering joint to the pinion and install and hand tighten the steering joint bolts.
7. Pull the steering joint down and tighten the steering joint bolts.

   TORQUE: 30 N.m (3.0 kg-m, 22 lb-ft)

   NOTE: Make sure the end of the adjustment guide bottoms against the turn signal switch as shown.
8. Install the column cover, column boot, and dashboard lower panel.



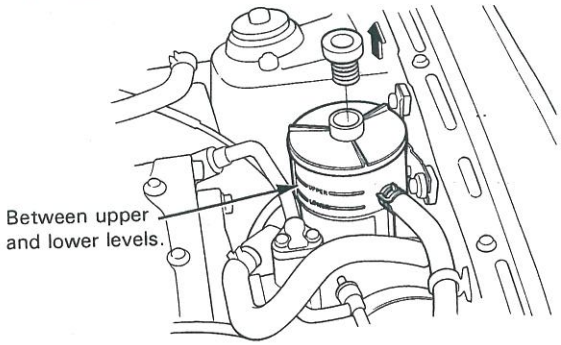
Power Steering Fluid

Replacement

Check the reservoir level at regular intervals, and add fluid as necessary.

CAUTION: Use only GENUINE HONDA Power Steering Fluid. Use of fluids such as ATF or other manufacturers' power steering fluid will damage the system.

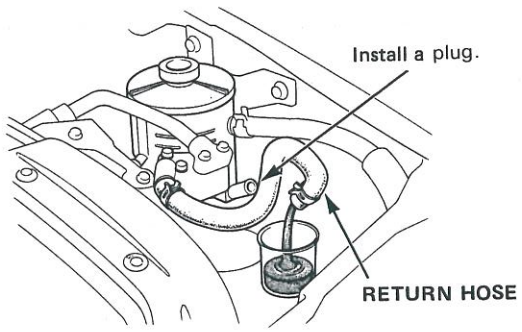
Fluid Level



Fluid Replacement

CAPACITY: 1.2 ℓ (1.3 US qt) at change.

1. Raise the front end of the car and place safety stands in the proper locations.
2. Disconnect the return hose from the gearbox at the reservoir, and the put the end in a suitable container.
3. Start the engine and 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.



3. Refit the return hose to the reservoir.
4. Fill the reservoir to the upper level mark.
5. Start the engine and run it at idle, then turn the steering wheel from lock-to-lock several times to bleed the air from the system.
6. Recheck the fluid level and add fluid if necessary.

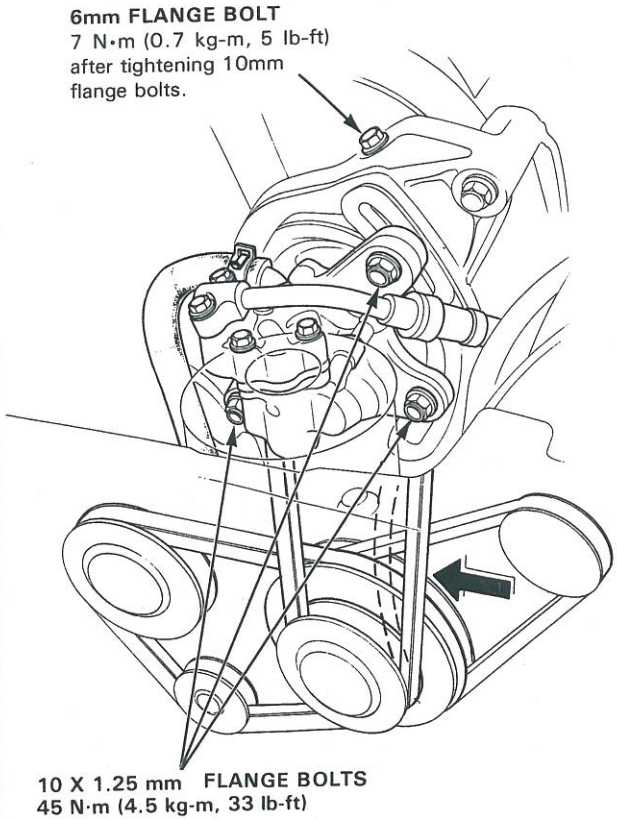
CAUTION: Do not fill the reservoir beyond the upper level mark.

On-Car Checks

Belt Tension Adjustment

A properly adjusted belt should deflect about 18—22 mm (3/4—7/8 in.) when you push on it mid-way between the pulleys with a force of about 100N (10kg, 22 lbs).

1. Adjustment should be made by loosening three 10mm flange bolts and turning 6mm flange bolt.
2. Start the engine and let it idle, and turn the steering wheel from lock-to-lock several times.
3. Stop the engine. Check and readjust belt deflection if necessary.



Assist Check With Car Parked

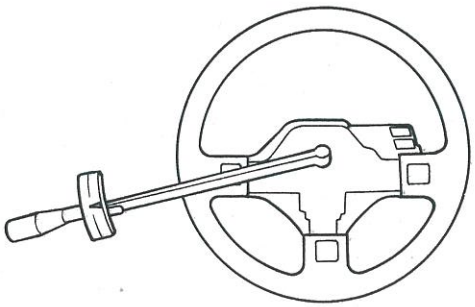
1. Check the power steering fluid level and pump belt tension.
2. Start the engine, allow to idle, and turn the steering wheel from lock-to-lock several times to warm up the fluid.

Measuring Fluid Temperature: 40–50°C (104–122°F)

Check With Torque Wrench

Attach a torque wrench to the steering wheel nut. With the engine idling and the car on a clean, dry floor, turn the wrench as shown and read the torque as soon as the tires begin to turn.

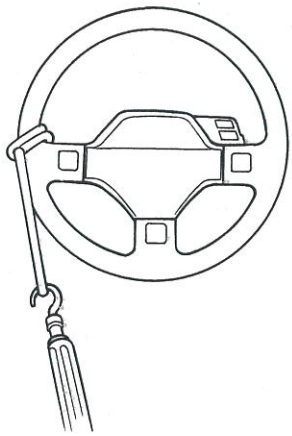
TORQUE: 6.2 N·m (0.62 kg-m, 4.4 lb-ft)



Check With Spring Scale

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.

FORCE: 32 N (3.2 kg, 7.1 lb.) MAX.

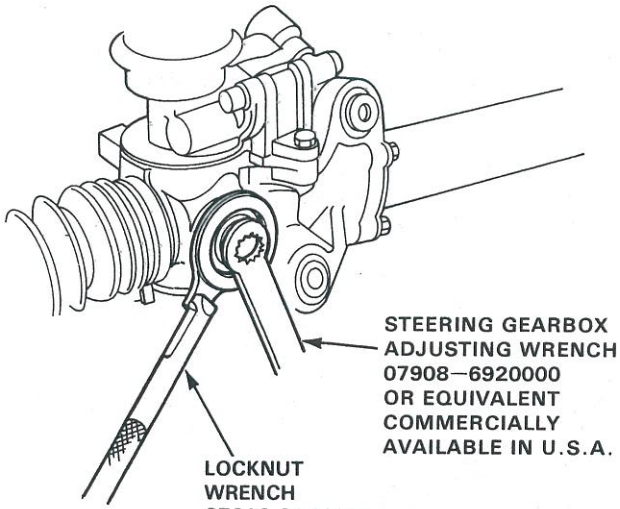


If values are not within the specification, test the pump pressure.

Rack Guide Adjustment

1. Loosen the locknut on the rack guide screw with the special tool as shown.

   NOTE: Apply locking agent to the rack guide screw threads.

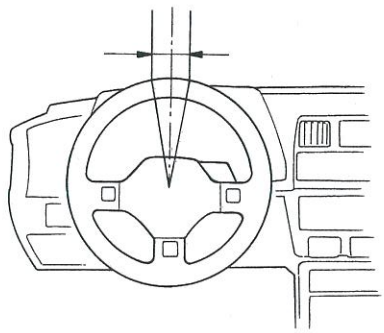


2. Tighten the guide screw until it compresses the spring against the guide; then loosen it, and tighten it to about 4 N·m (0.4 kg-m, 3 lb-ft) and back it off about 25°. Tighten the locknut to about 25 N·m (2.5 kg-m, 18 lb-ft) while preventing the guide screw from moving.

Steering Wheel Rotational Play

1. Place the front wheel 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.

Service Limit: 10 mm (0.4 in.)

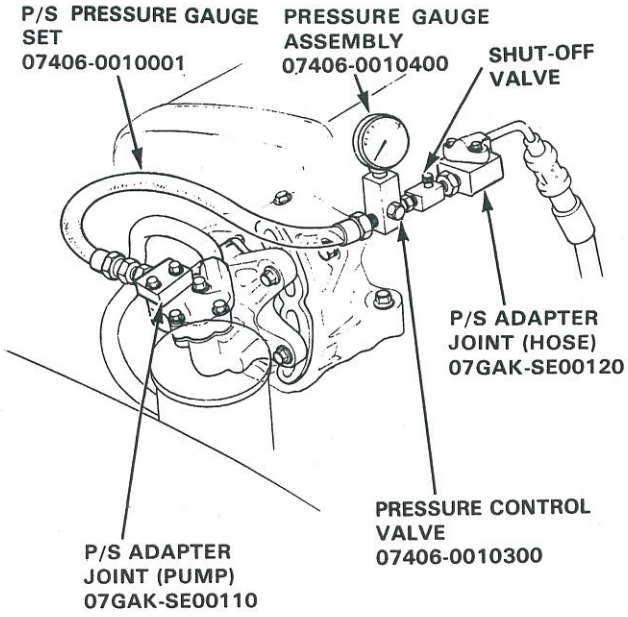


Pump Pressure Test

Check 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.

1. Disconnect the outlet hose from the pump outlet fitting, and install the pressure gauge and the adaptors between the hose and pump as shown.



2. Open the shut-off valve fully.
3. Open the pressure control valve fully.
4. Start the engine and let it idle.
5. Turn the steering wheel from lock-to-lock several times to get the fluid up to operating temperature.

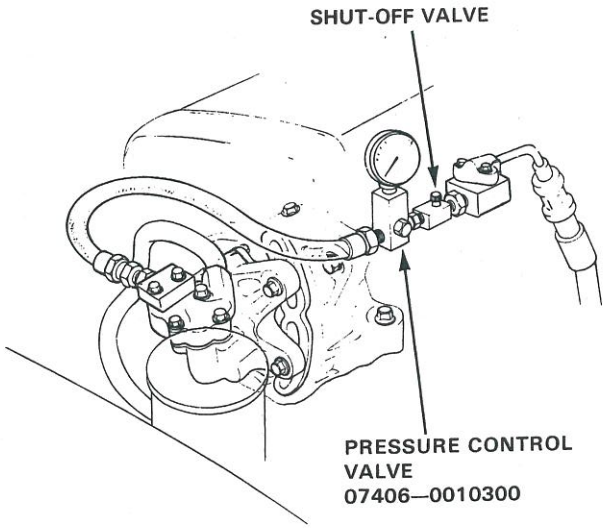
Measuring Fluid Temperature: 40—50°C (104—120°F)

6. Close the shut-off valve, then close the pressure control valve gradually until the pressure gauge needle is stable, then read pressure.

CAUTION: Do not keep the shut-off valve closed more then 5 seconds or the pump could be damaged by overheating.

7. Open the shut-off valve fully.

If the pump is OK, the gauge should read at between 7845—8826 kPa (80—90 kg/cm²; 1138—1280 psi). A low reading means pump output is too low for full assist. Repair or replace the pump.

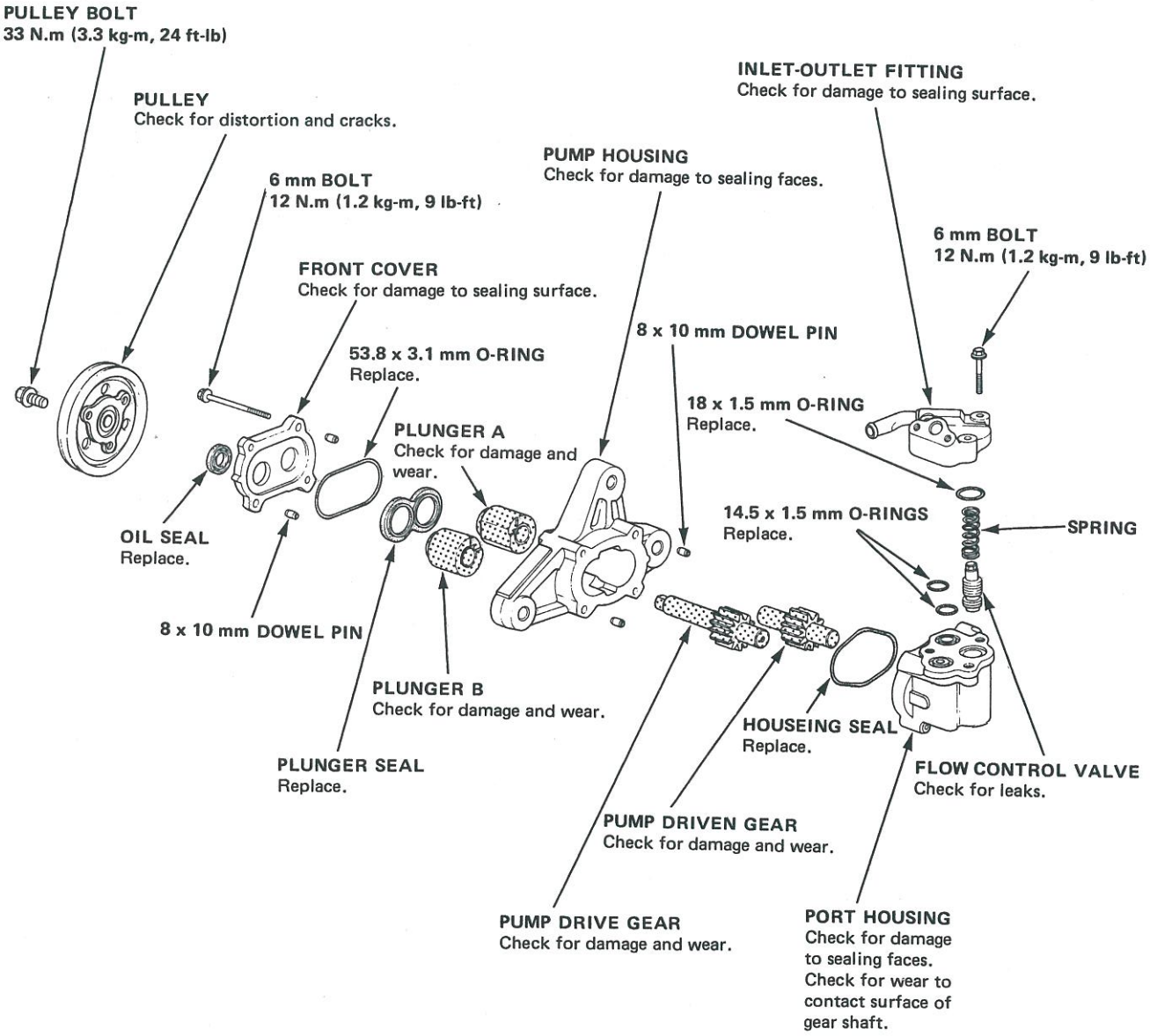


Pump

Index/Inspection

CAUTION: Pump components are made of aluminum. Be careful not to damage them when servicing.

- Clean all 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 grease before installation, and make sure they stay in place during reassembly.
- The dotted parts are selectively fitted, and should not be disassembled except to replace seals. If any one of them is faulty, replace the whole pump as an assembly.



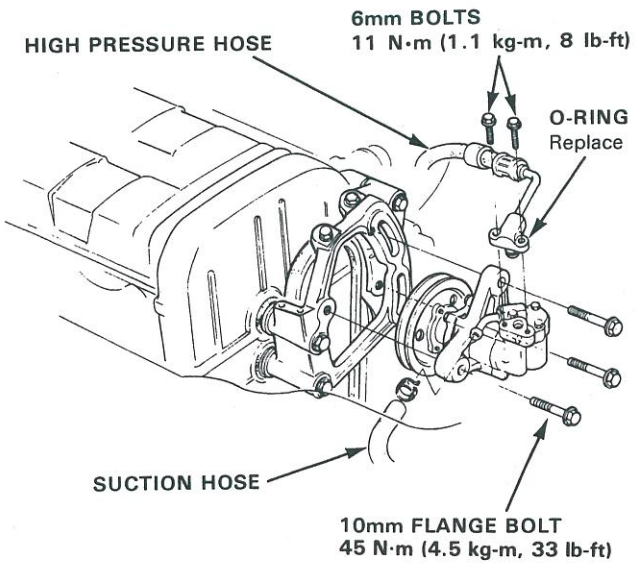
Pump

Replacement

1. Disconnect the hoses from the reservoir.

   NOTE: Cap the open fitting to keep dirt out of the system.

2. Remove the three 10 mm flange bolts, remove the belt from the pulley, and remove the pump.



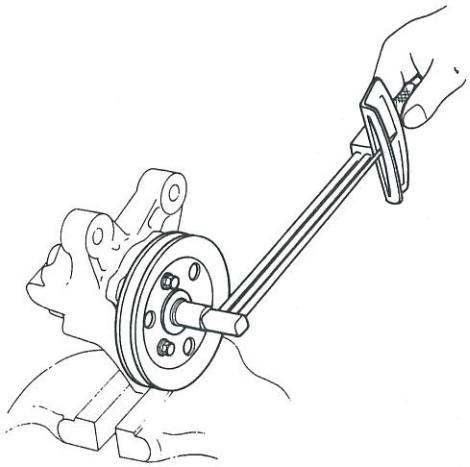
Install in the reverse order, and:

- Temporarily install the pump on the bracket.
- Connect hoses securely.
- Adjust the belt tension.
- Check fluid level and add if necessary.
- Bleed the air from the system.

Preload Check

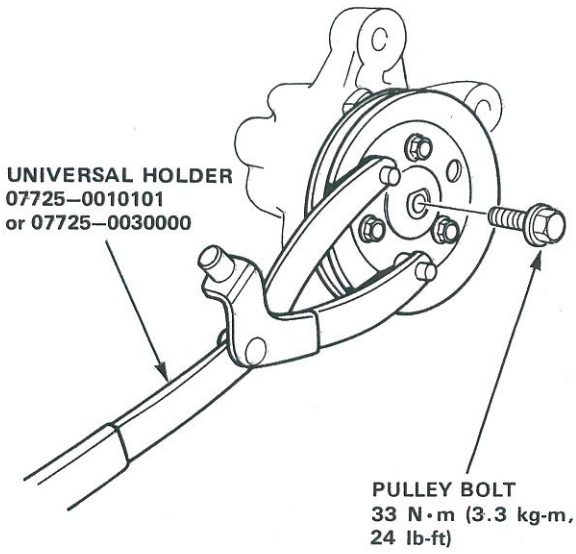
Check pump preload with a torque wrench.

PRELOAD: 4 N·m (0.4 kg-m, 3 lb-ft) max.

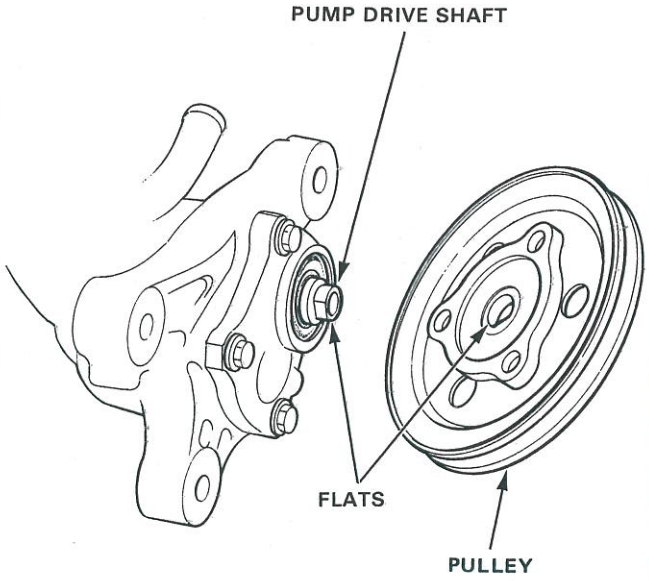


Pulley Replacement

1. Remove the pulley nut using the special tool, then remove the pulley.

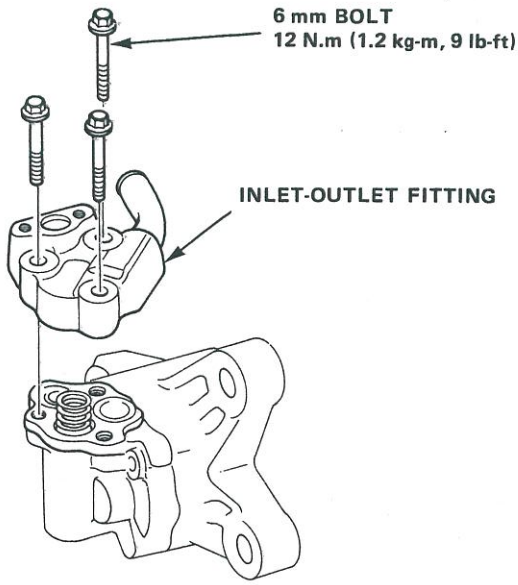


2. Install the pulley with the flat surface of the pump drive shaft aligned with the corresponding flat surface of the pulley.



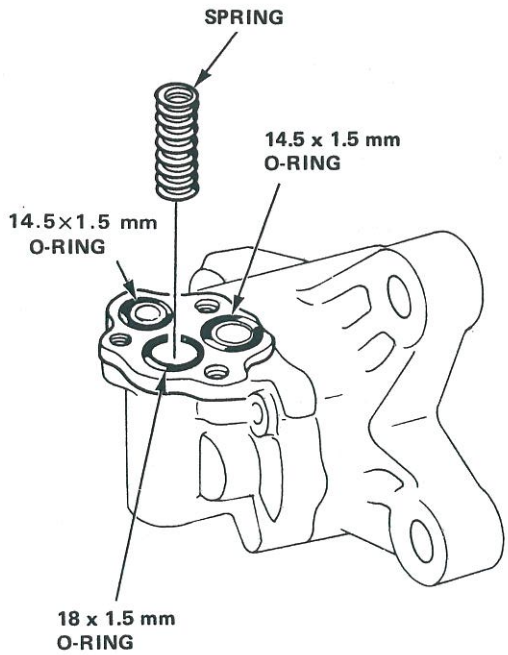
Flow Control Valve Inspection and Replacement

1. Remove the three 6 mm bolts and inlet-outlet fitting.



2. Remove the two 14.5 x 1.5 mm O-rings and one 18 x 1.5 mm O-ring.

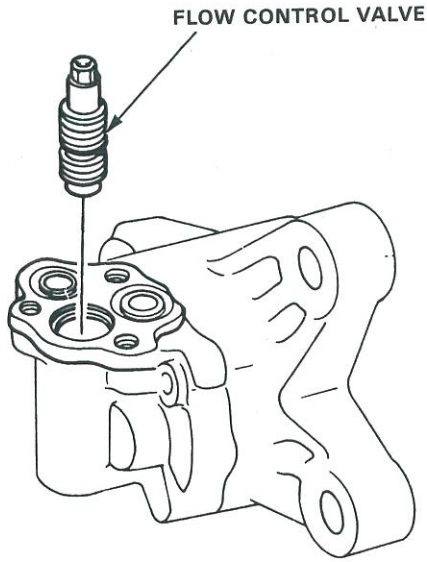
3. Remove the spring.



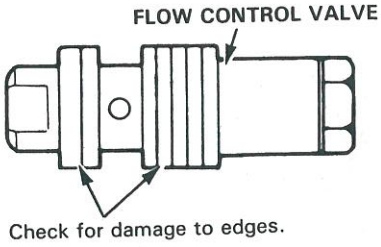
(cont'd)

Flow Control Valve Inspection and Replacement (cont'd)

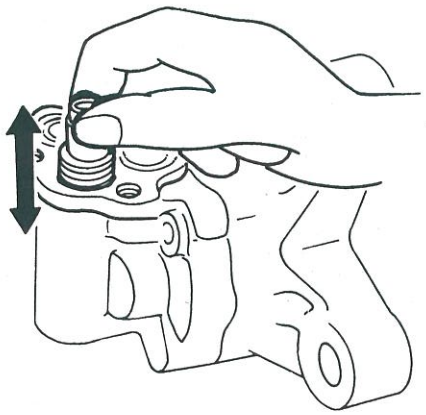
4. Remove the flow control valve.



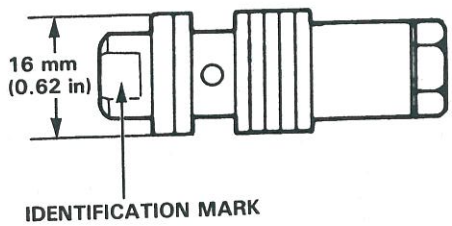
5. Check for wear, burrs, and other damage to the edges of the grooves in the valve.



6. Slip the valve back in the pump and check that it moves up and down smoothly.

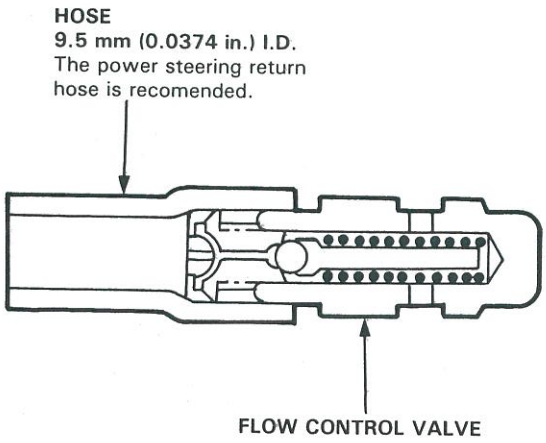


If OK, go to step 7. If not, replace the valve: The original valve was selected for a precise fit in the port housing bore; make sure the new one has the same identification mark.

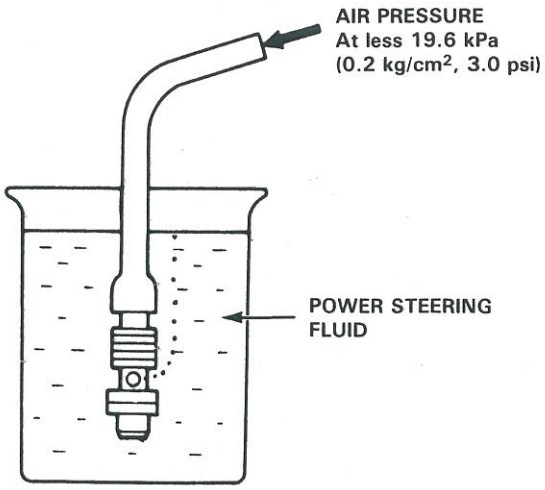


Mark	Part No.	Part Name	Outside Diameter mm (in)
A	56350–PC1–010	Flow Control Valve Assembly A	15.995–16.000 (0.6297–0.6299)
Without mark	56360–PC1–010	Flow Control Valve Assembly B	16.000–16.006 (0.6299–0.6302)

7. Attach a hose to the end of the valve.

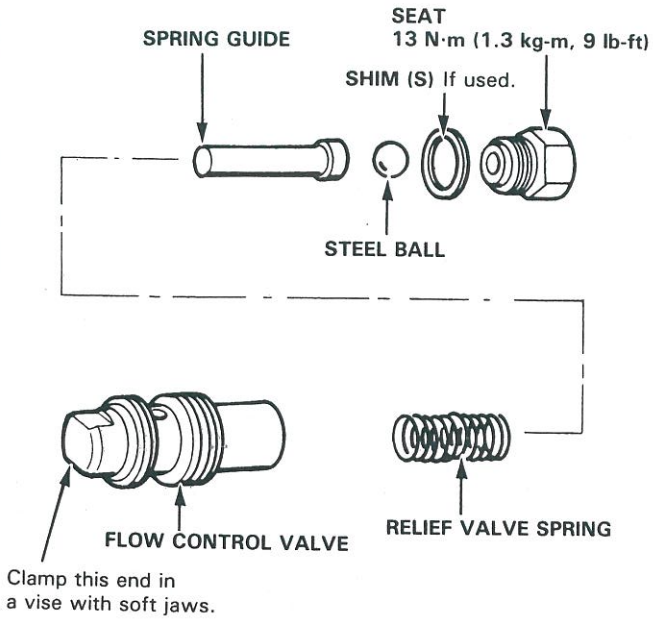


8. Then submerge the valve in a container of power steering fluid, and blow on the hose. Replace the valve or repair it (next step) if you see air bubbles in the fluid.



9. If the valve leaks, clamp the bottom end of it in a vise that has soft jaws.

10. Unscrew the seat in the top end of the valve, and remove any shims, the steel ball, the spring guide and its spring.



11. Clean all the parts in solvent, dry them off, then reassemble and re-test the valve.

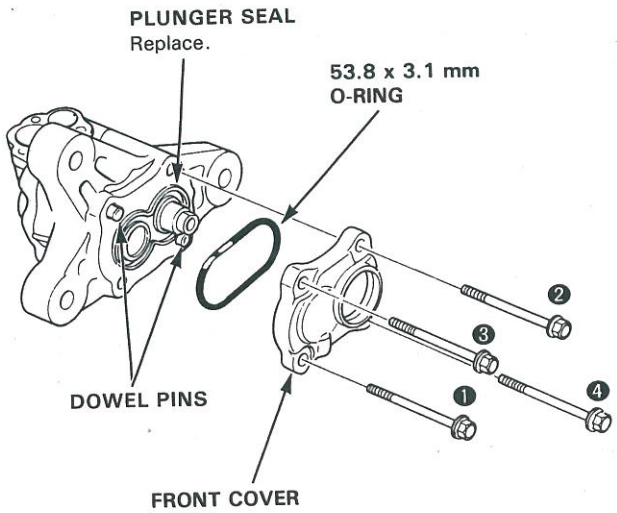
NOTE: Shims are used to adjust the relief pressure spring. Be sure to reinstall the shims in the same quantity as were removed.

12. Install in the reverse order of removal. Also:
- Coat the new O-rings with steering grease to hold them.
- Coat the flow control valve with power steering fluid.

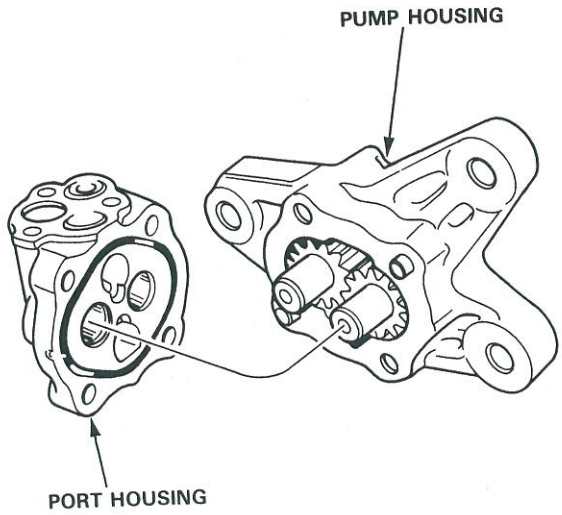
Housing Disassembly

CAUTION: Pump components are made of aluminum. Be careful not to drop or damage them.

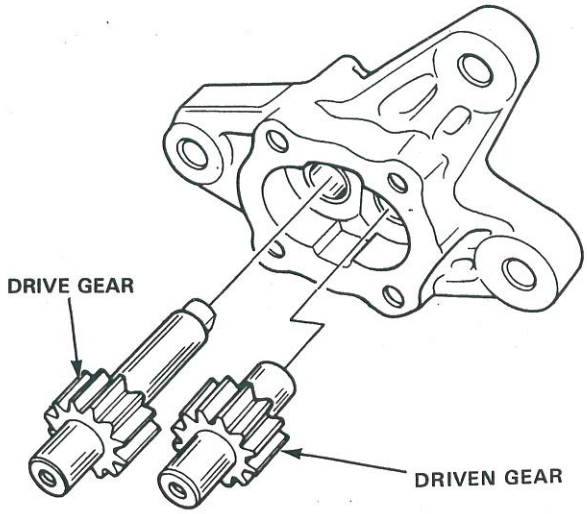
1. Remove the flow control valve if necessary (page 17-19).
2. Loosen the four 6 mm bolts in the sequence shown, then remove them and the front cover.
3. Remove the 53.8 x 3.1 mm O-ring from the front cover.
4. Remove the plunger seal.



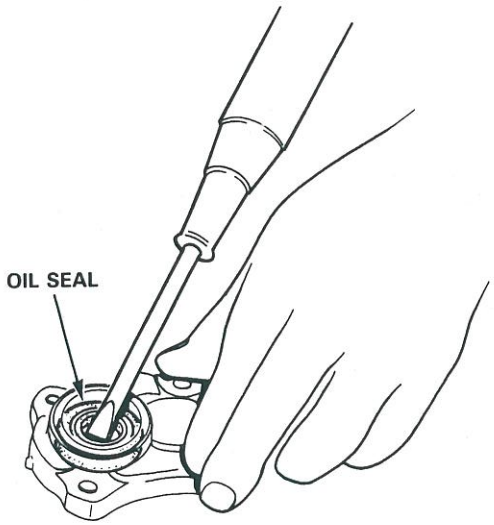
5. Separate the port housing from the pump housing.



6. Remove the drive and driven gears from the pump housing.



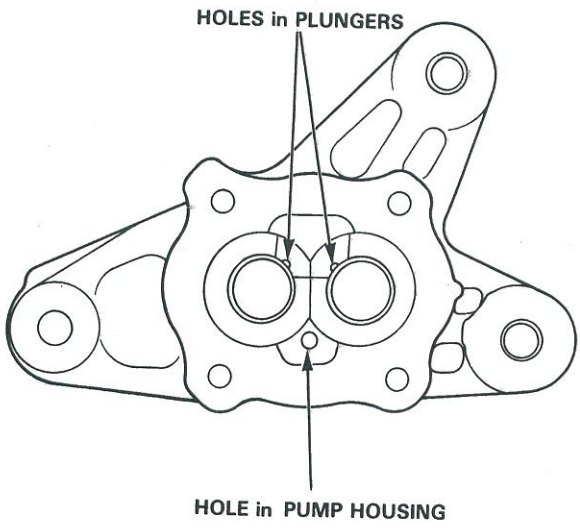
7. Remove the housing seal.
8. Remove the plungers if necessary.
9. Pry the oil seal out from the front cover.



Housing Assembly

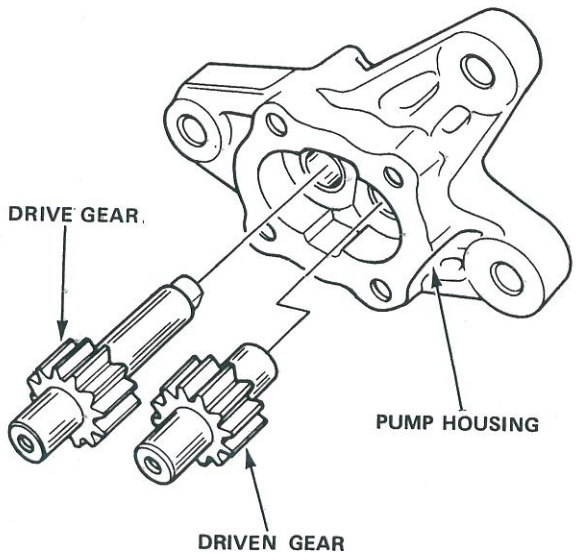
1. If the plungers are removed, be sure to position them correctly, as shown.

   NOTE: Lubricate the plunger housing with power steering fluid before installing the plungers.



2. Lubricate the inside surface of the plungers and gears with power steering fluid.

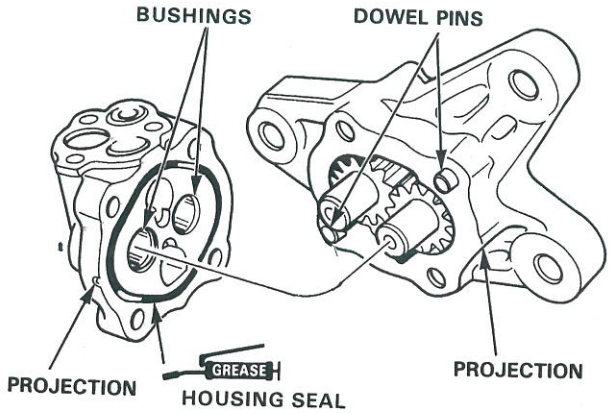
3. Install the gears in the pump housing with the drive gear toward the projection on the housing.



4. Lubricate the gear bushings of the port housing.

5. Install the two dowel pins and housing seal.

6. Install the port housing on the pump housing with the projections on the housings aligned.



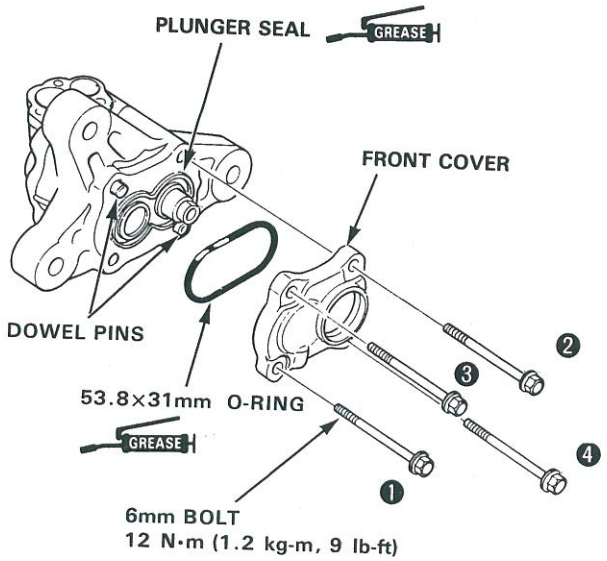
7. Grease the plunger seal, then install it over the plungers.

8. Install the dowel pins in the pump housing.

9. Put grease in the groove of the front cover first, then position the 53.8 x 3.1 mm O-ring on the cover.

10. Install the front cover on the pump housing with the projections aligned.

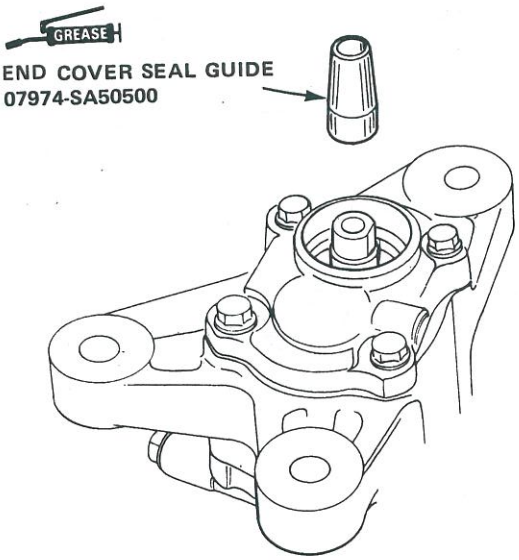
11. Install the four 6 mm bolts. Torque them to the specified torque in the sequence shown.



(cont'd)

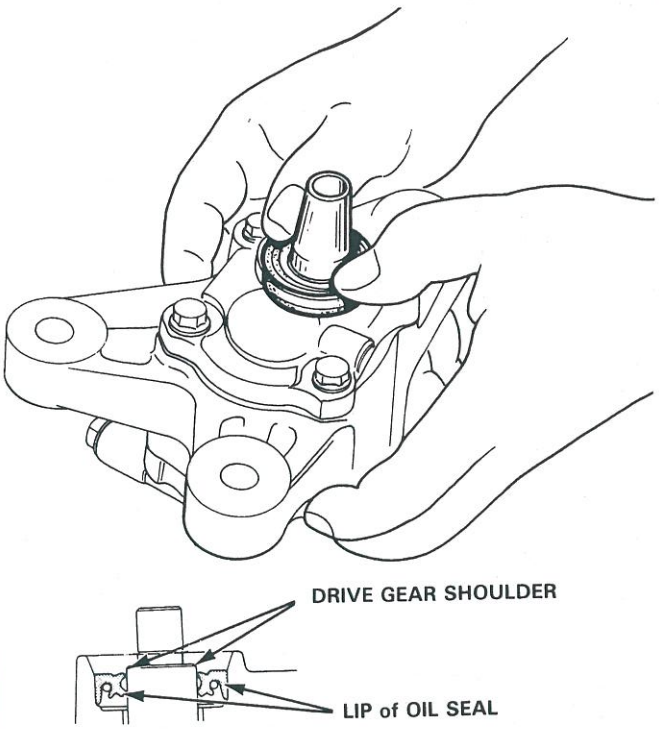
Housing Assembly (cont'd)

12. Grease the end cover seal guide then install it over the drive gear.

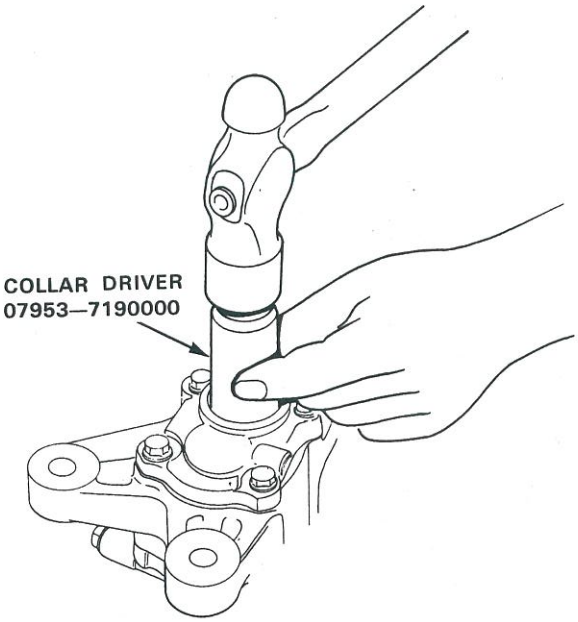


13. Install the oil seal by hand.

NOTE: Remove the special tool if the lip of the oil seal is over the drive gear shoulder.



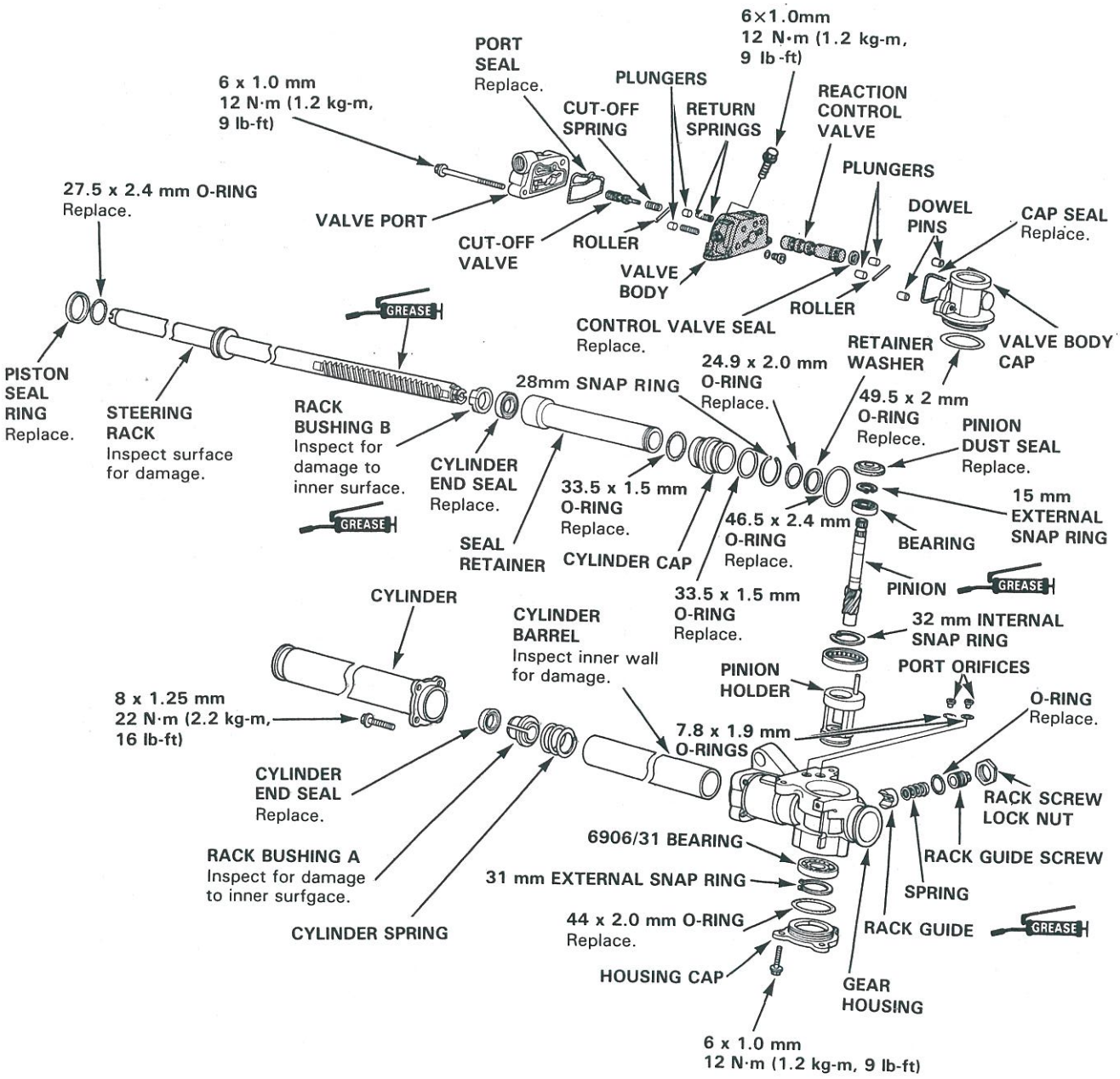
14. Drive in the oil seal with special tool.



Index

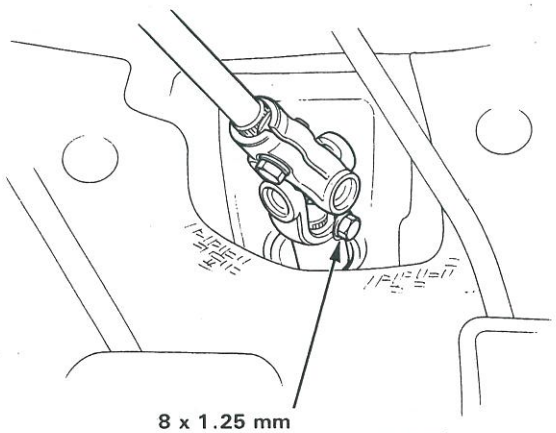
CAUTION:

- Before disassembling the gearbox, wash it off with solvent.
- 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, and make sure they stay in position during reassembly.
- The shaded parts (valve body, reaction control valve, cut-off valve) are a matched set; if the valve body is faulty, replace the complete valve body unit.
- GREASE STEERING GREASE. . . Part Number 08740-99969



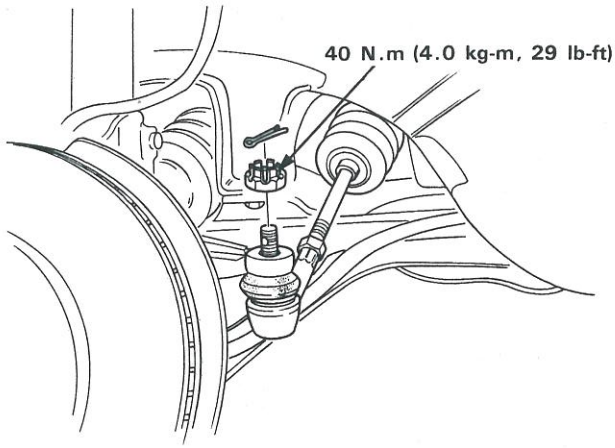
Removal/Installation

1. Remove the steering joint cover, remove the bolts in the steering shaft connector, and pull the connector up off the pinion shaft.



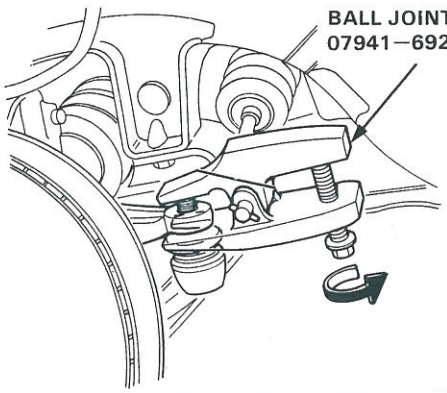
2. Raise the front of car on jack stands and remove the front wheels.

3. Remove the cotter pins, and unscrew the tie-rod end ball joint nuts halfway.



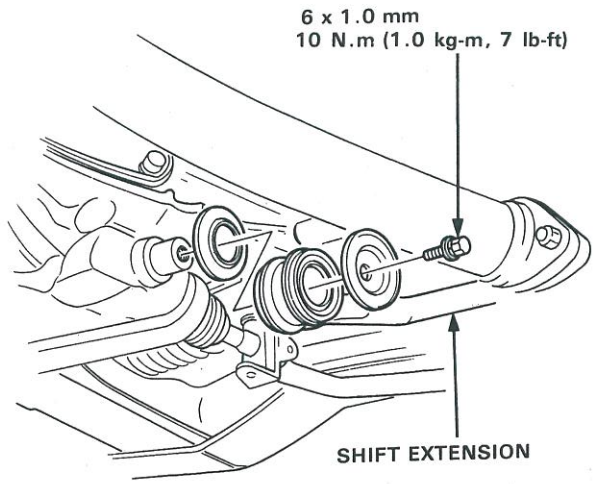
4. Break the ball joints loose using the Ball Joint Remover.

5. Then, remove the nuts, and lift the tie-rod ends out of steering knuckles.

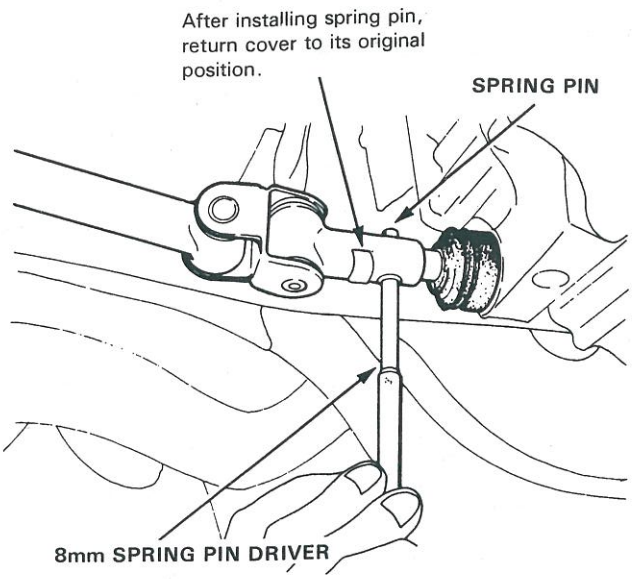


6-1 Manual Transmission Model Only:

- Remove the shift extension from the transmission case.



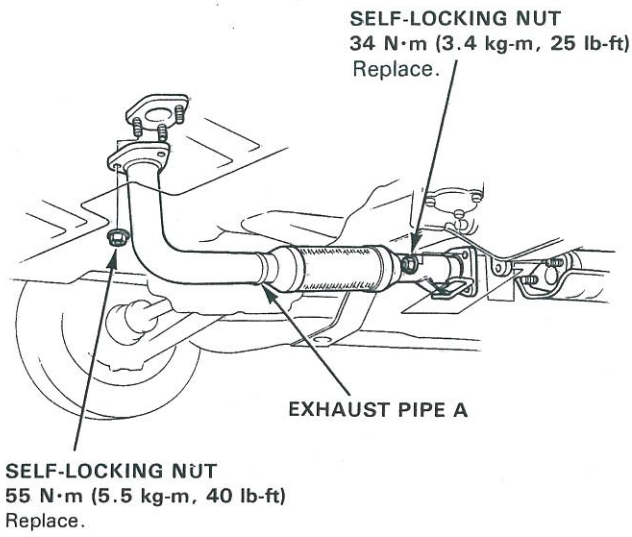
- Slide pin retainer out of way, drive out spring pin with punch, then disconnect shift rod.



6-2 Automatic Transmission Model Only:
Remove the shift cable guide from the floor and pull the shift cable down by hand.

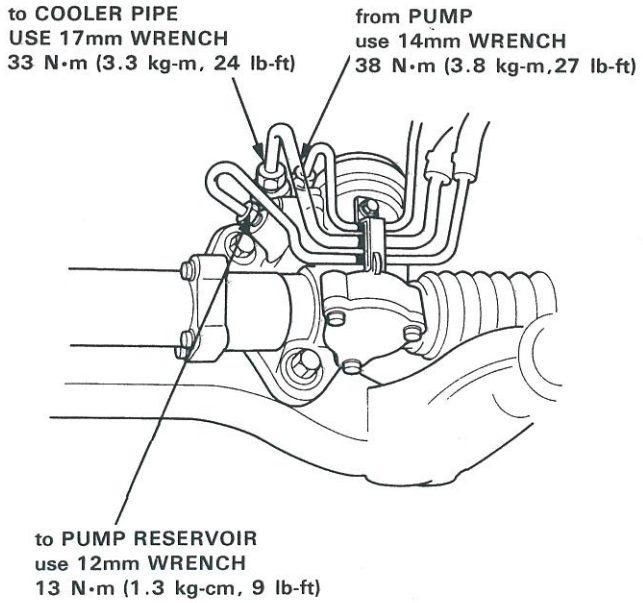
7. Drain the power steering fluid as described on page 17-14.

8. Remove the exhaust pipe A.

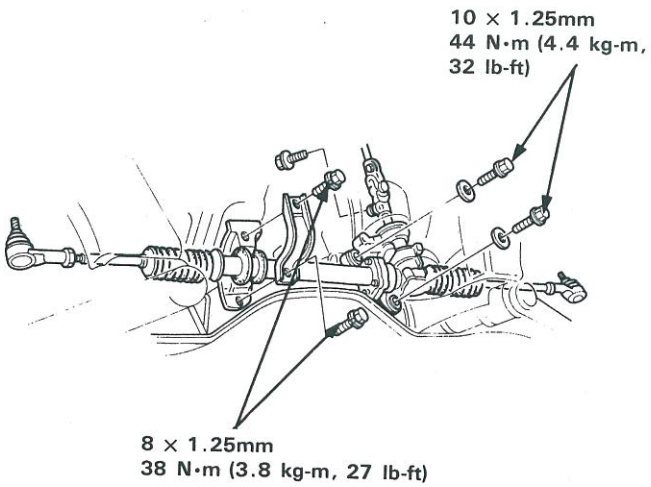


9. Clean the gearbox and surrounding area throughly.

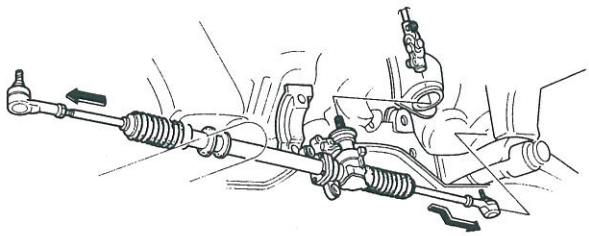
10. Disconnect the three fluid lines from the valve body unit.



11. Remove the gearbox mounting bolts.



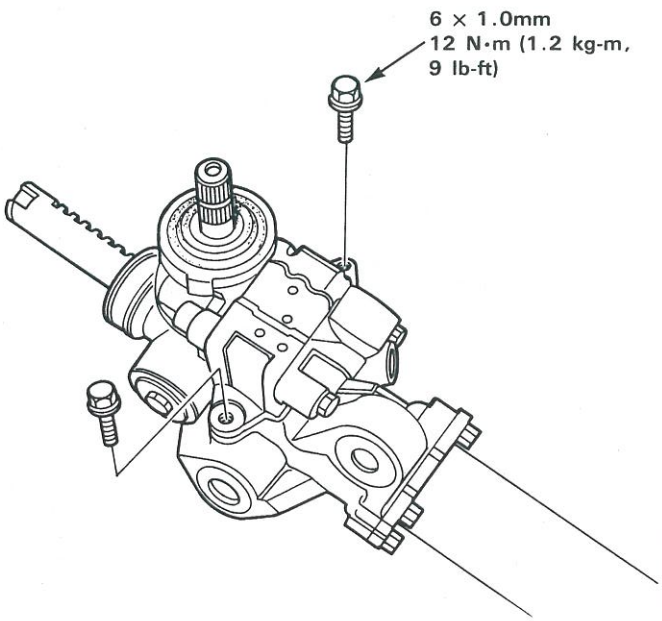
12. Drop the gearbox far enough so the end of the pinion shaft comes out of its hole in the frame channel, then rotate it forward until the shaft is pointing to the rear. Slide the gearbox to the right until the tie-rod clears the rear beam, then drop it down and out of the car to the left.



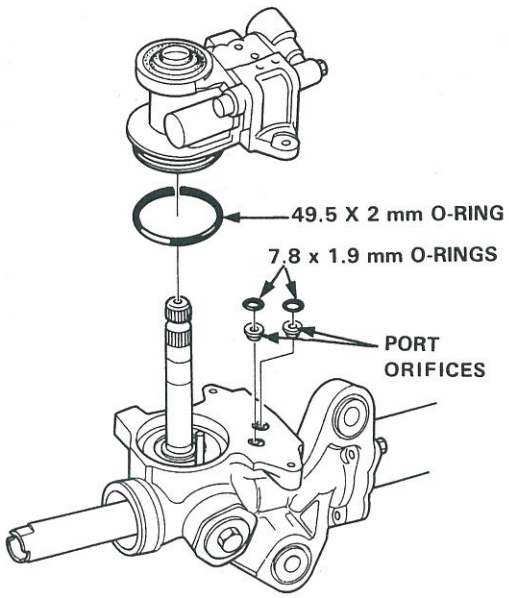
13. Gearbox installation is in the reverse order of removal.

Valve Body Unit Disassembly

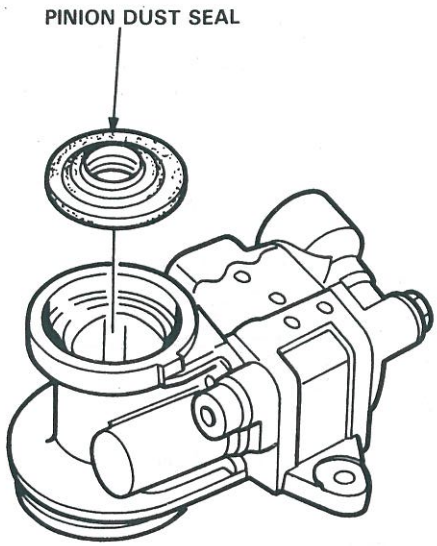
1. Remove the two 6 mm bolts holding the valve body unit to the gear housing.



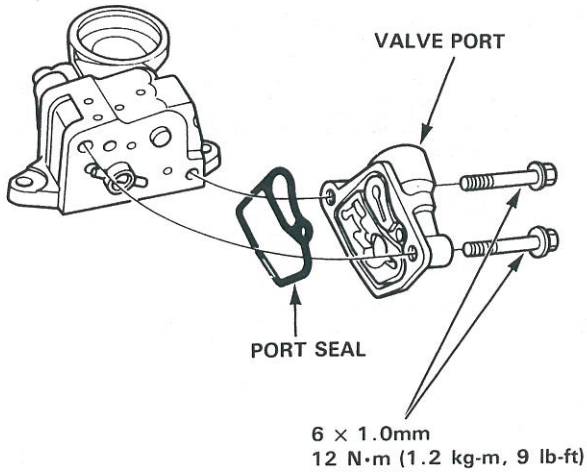
2. Remove the 7.8 x 1.9 mm O-rings and port orifices from the gear housing.
3. Remove the 49.5 x 2 mm O-ring from the valve body unit.



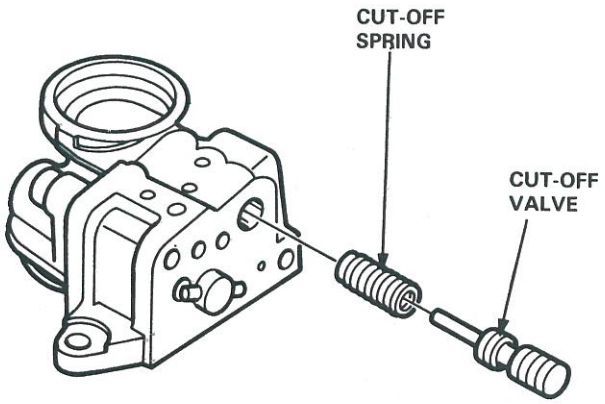
4. Remove the pinion dust seal from the valve body unit.



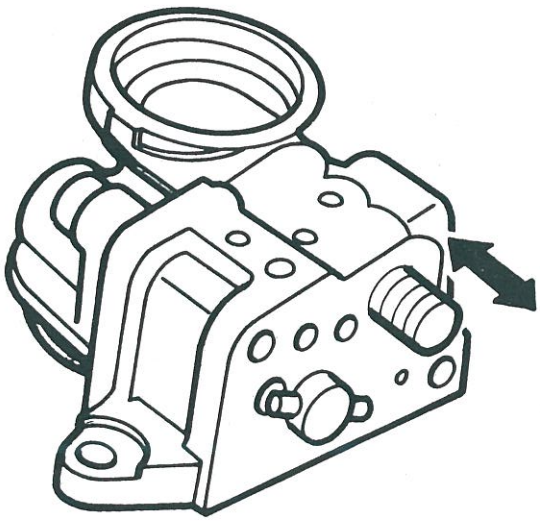
5. Remove the two 6 mm bolts and remove the valve port from the valve body.
6. Remove the port seal.



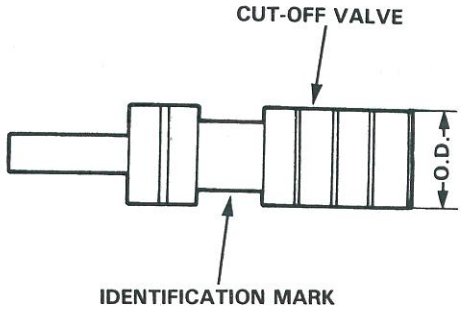
7. Remove the cut-off valve and spring from the valve body.



8. Check the cut-off 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.

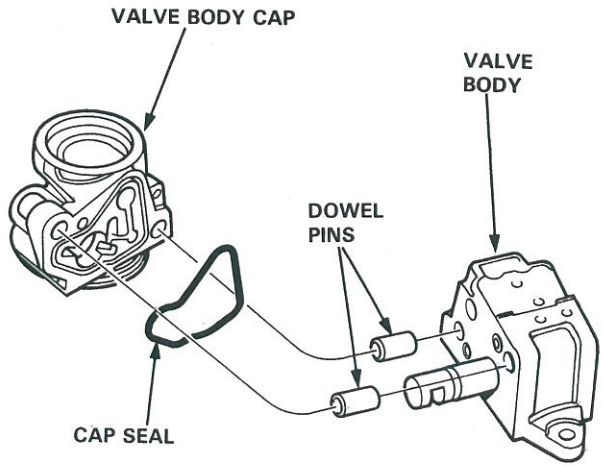


NOTE:
- The cut-off valve is sized to fit the valve body, so if you replace it, make sure the new valve has the same identification mark on it.
- If the valve body is damaged, replace the valve body unit as a set.



Identification Mark	Outside Diameter	Part Number
A	10.000–10.005 mm (0.3937–0.3939 in.)	53650–SB4–950
B	9.995–10.000 mm (0.3935–0.3937 in.)	53651–SB4–950
C	9.990–9.995 mm (0.3933–0.3935 in.)	53652–SB4–950

9. Remove the valve body cap from the valve body.
10. Remove the cap seal.
11. Remove the dowel pins.



(cont'd)

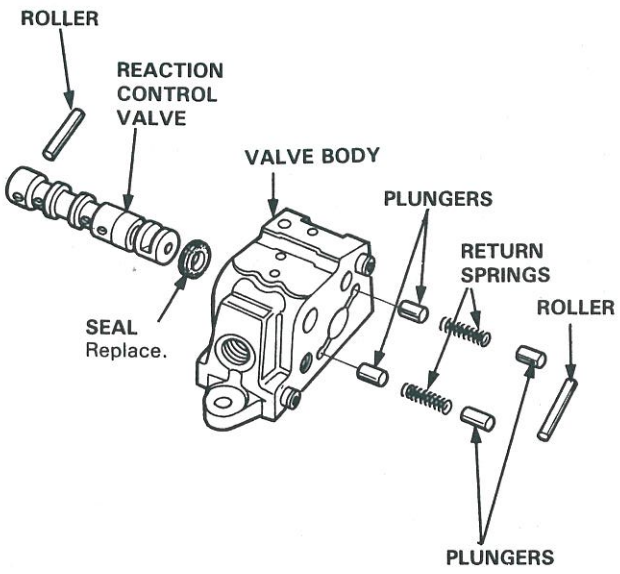
Valve Body Unit Disassembly (cont'd)

12. Remove the rollers from the valve body 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.

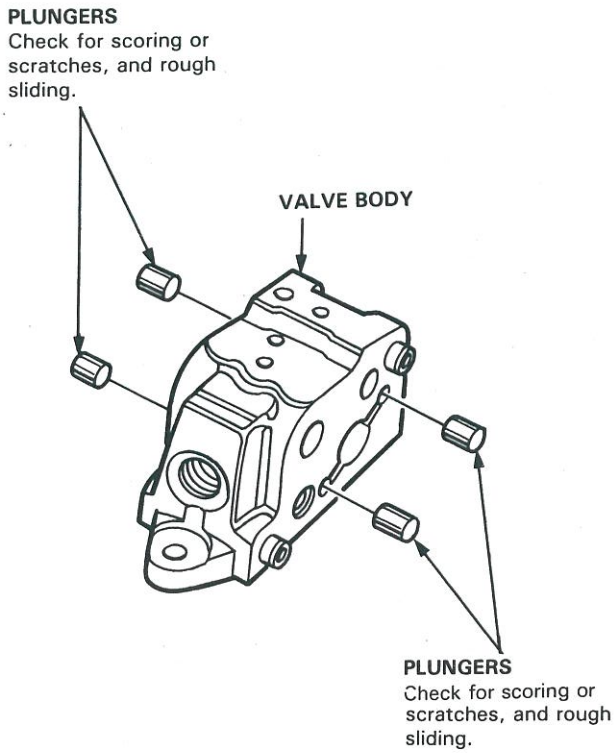
13. Remove the plungers, return springs and reaction control valve.

14. Remove the control valve seal from the reaction control valve.

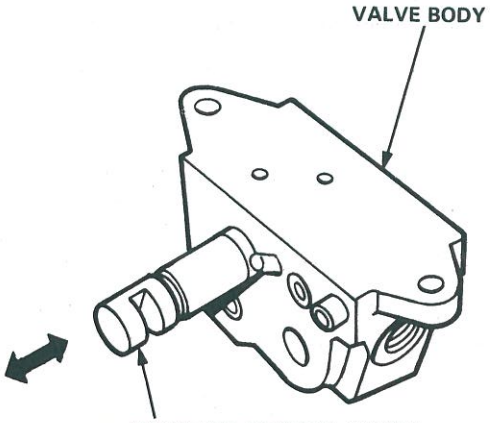


15. Check the plungers.
    - Inspect their surface for scoring or scratches.
    - Slip each plunger into the valve body, and make sure it slides smoothly, without drag or side play. If any plunger is damaged, replace it.

    NOTE: If the valve body is damaged, replace the valve body unit as a set.

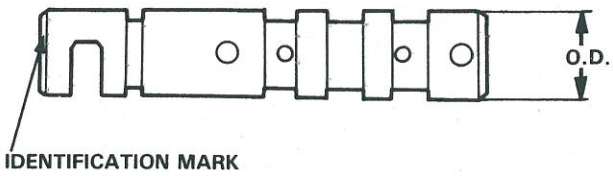


16. Check the reaction control valve.
    - Inspect its surface for scoring or scratches.
    - Slip it into the valve body, and make sure it slides smoothly, without drag or side play.



REACTION CONTROL VALVE
Check for smooth operation.

NOTE:
- The reaction control valve is sized to fit the valve body, so if you replace it, make sure the new valve has the same identification mark on it.
- If the valve body is damaged, replace the valve body unit as a set.



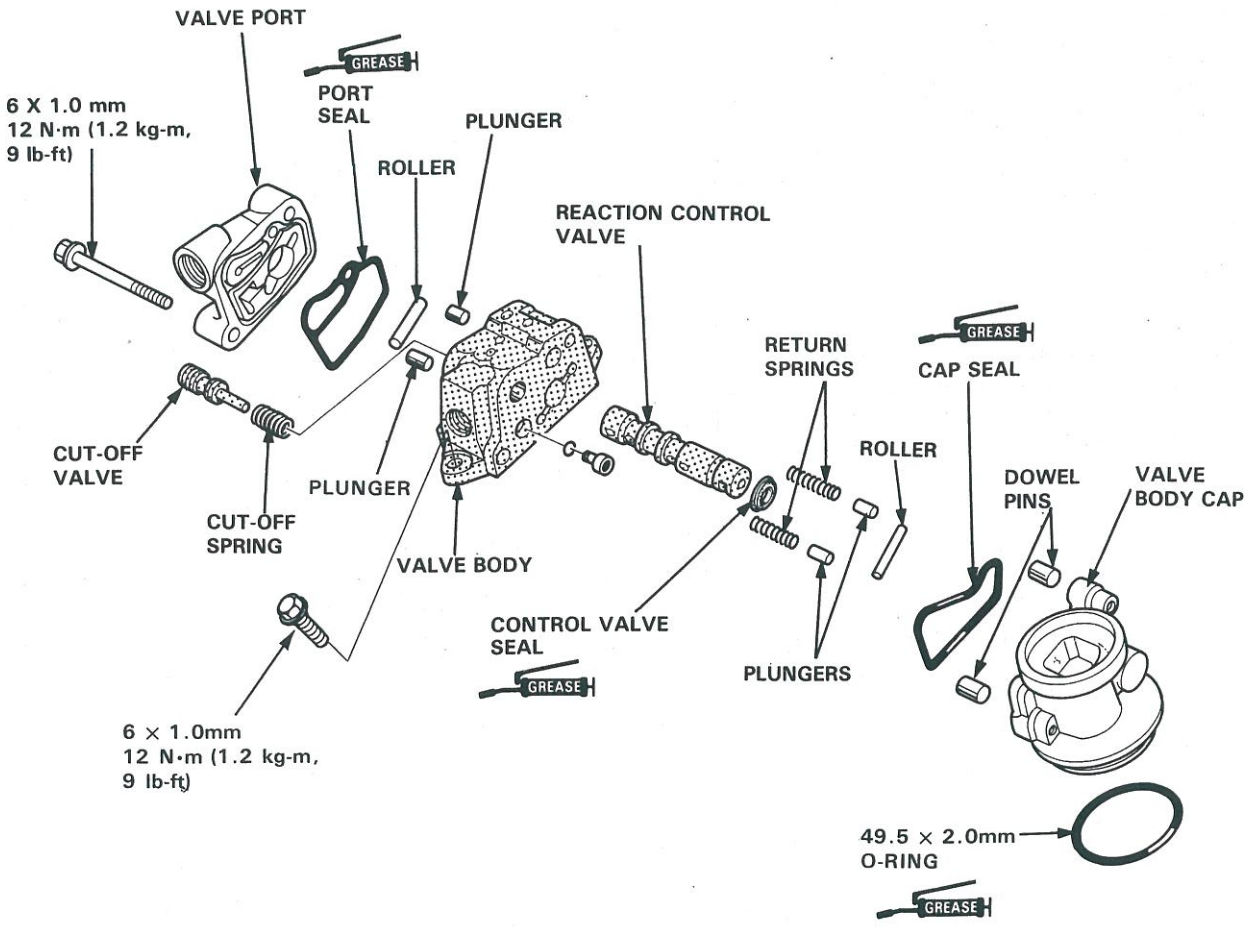
Identification Mark	Outside Diameter	Part Number
X	13.998–14.003 mm (0.5511–0.5513 in.)	53646–SB4–951
Y	13.993–13.998 mm (0.5509–0.5511 in.)	53647–SB4–951
Z	13.988–13.993 mm (0.5507–0.5509 in.)	53648–SB4–951

Valve Body Unit Assembly

1. Thoroughly clean the disassembled parts shown below.
2. Coat the plungers, cut-off valve and reaction control valve surfaces with power steering fluid.
3. Reassemble the parts in the reverse order of disassembly.

CAUTION:

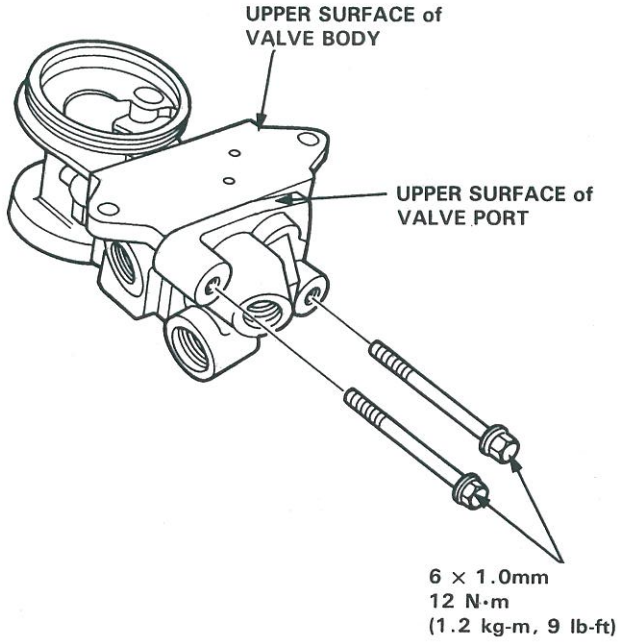
- **Replace the O-rings and seals with new ones.**
- **Do not dip the O-rings and seals in solvent.**
- **Apply grease in the cap seal and port seal grooves to keep the seals in place.**
- **Apply grease to the 49.5 × 2.0mm O-ring for valve body cap and reaction control valve seal to keep them in place.**



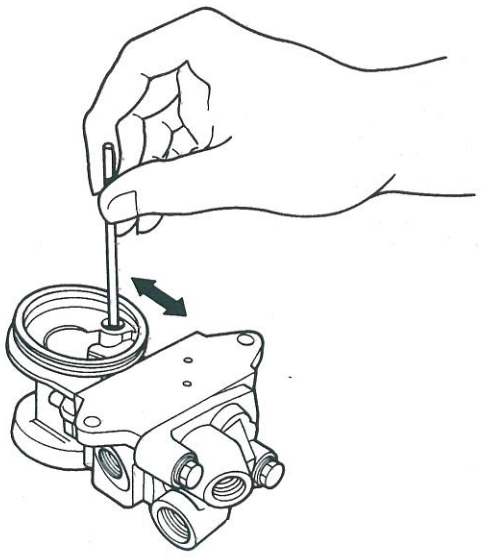
NOTE: If the Valve Body is damaged, it must be replaced as a set, with the Cut-off Valve and Reaction Control Valve (shaded parts).

4. Tighten the 6 mm bolts in the valve body unit.

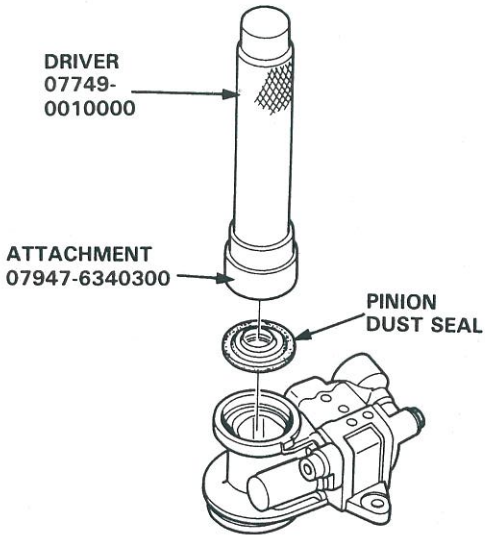
CAUTION: Make sure that the upper surface of the valve port does not exceed the upper surface of the valve body.



5. Make sure the reaction control valve moves smoothly, and returns to a neutral position.



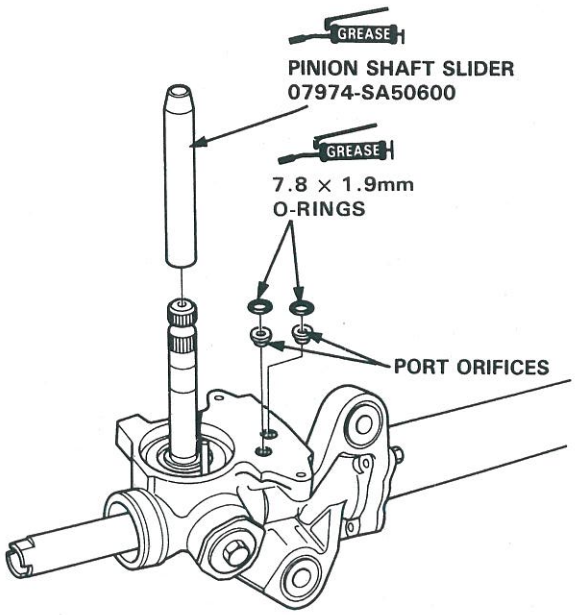
6. Install the pinion dust seal with the special tool.



7. Apply grease in the 7.8 × 1.9mm O-ring grooves of the gear housing.

8. Install the port orifices and 7.8 × 1.9mm O-rings.

9. Apply grease to surface of special tool and install the special tool on the pinion.

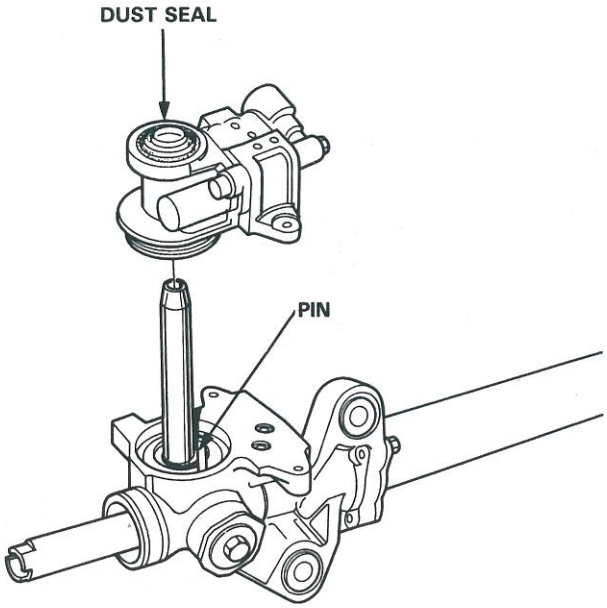


(cont'd)

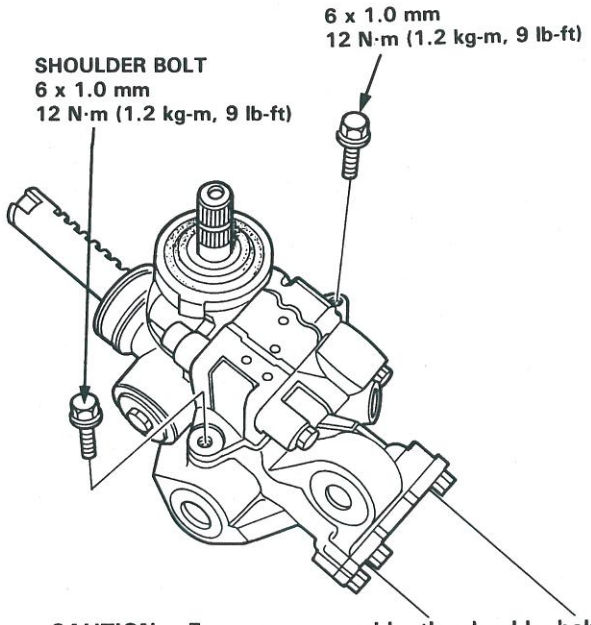
Valve Body Unit Assembly (cont'd)

10. Install the valve body unit on the gearbox housing.

CAUTION:
- **Be careful not to damage or distort the lip of dust seal, or it may be dislodged.**
- **Install the valve body unit carefully to avoid damaging the pin in the pinion holder**
- **Make sure the 49.5 x 2.0 mm O-ring is positioned properly and is not pinched when installing the valve body unit.**



11. Tighten the 6 mm bolts.



CAUTION: For proper assembly, the shoulder bolt must be installed in the hole toward the rear of the car.

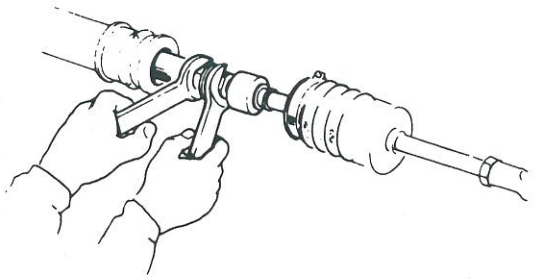
Disassembly/Reassembly

1. Remove the gearbox assembly from the rear beam (page 17—26).

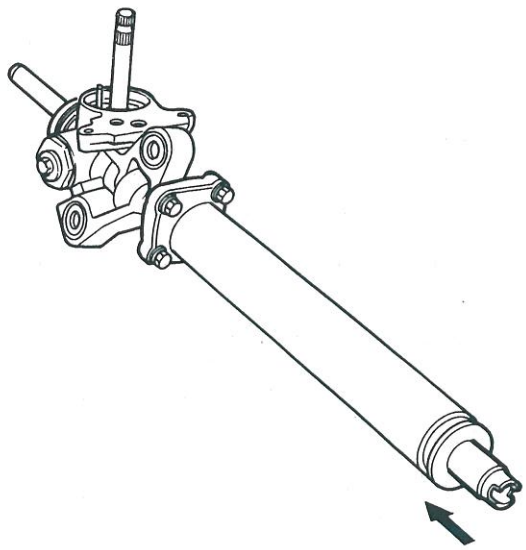
2. Remove the valve body unit from the gearbox housing (page 17—28).

3. Bend back the tie-rod lock washers.

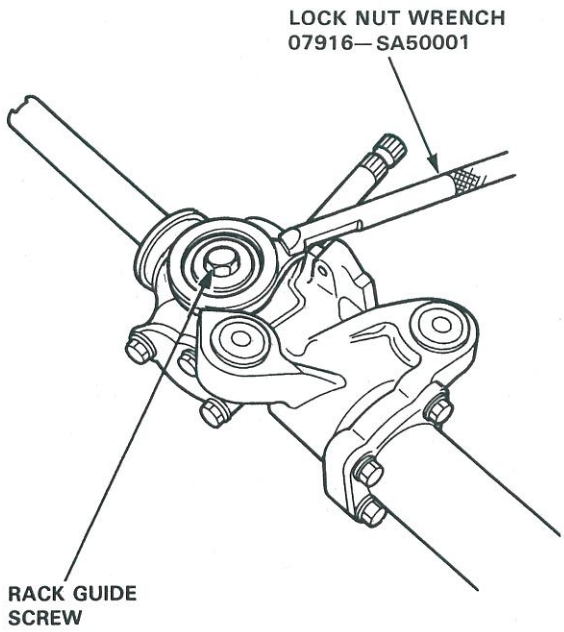
4. Hold the rack with a 19 mm wrench and unscrew the tie-rods with a 17 mm wrench.



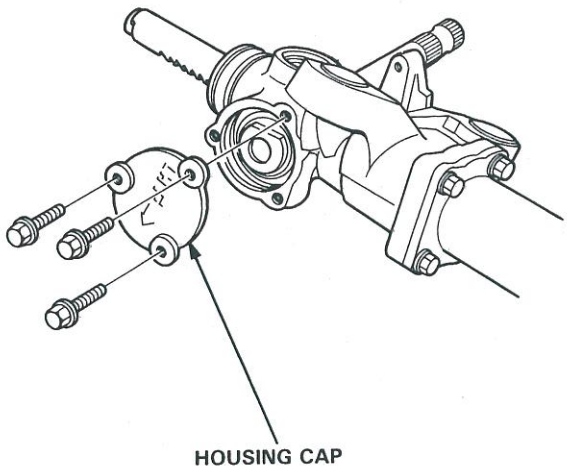
5. To prevent damage to the sealing surface of the steering rack, push the rack into its cylinder.



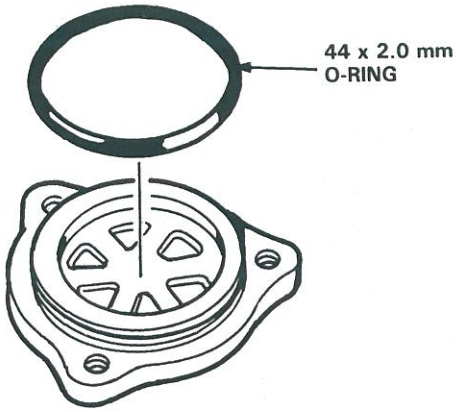
6. Loosen the rack screw locknut and remove the rack guide screw, spring and rack guide.



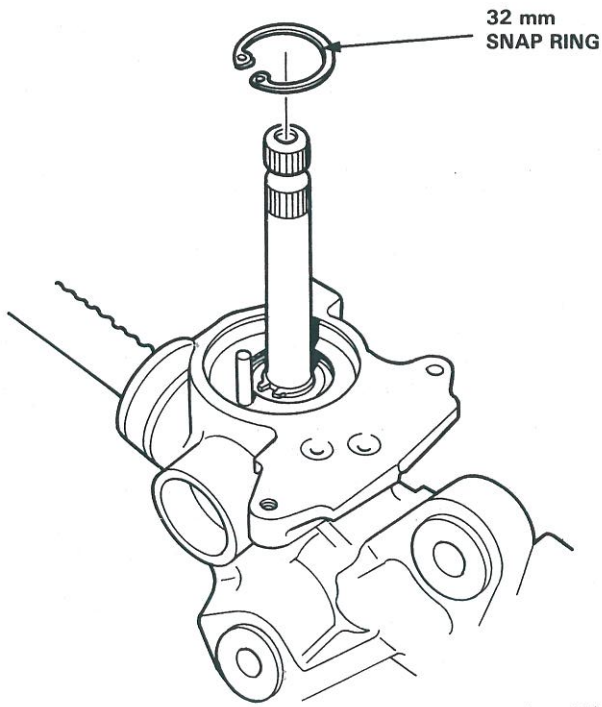
7. Remove the three 6 mm bolts and housing cap.



8. Remove the 44 x 2.0 mm O-ring from the housing cap.



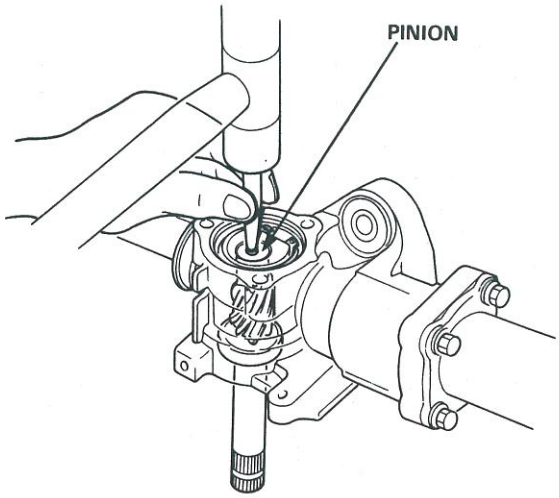
9. Remove the 32 mm snap ring.



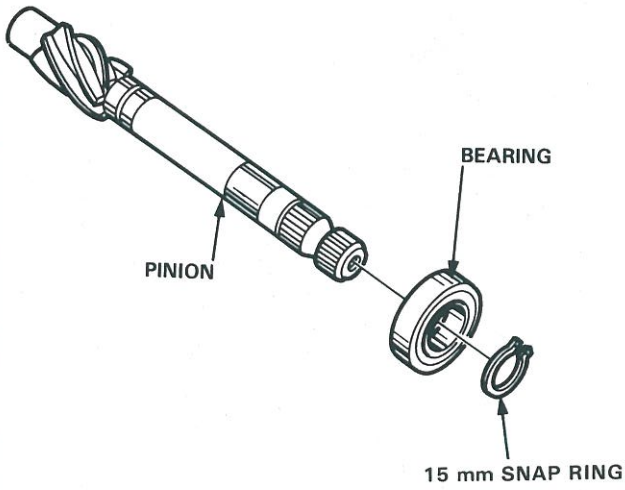
(cont'd)

Disassembly/Reassembly (cont'd)

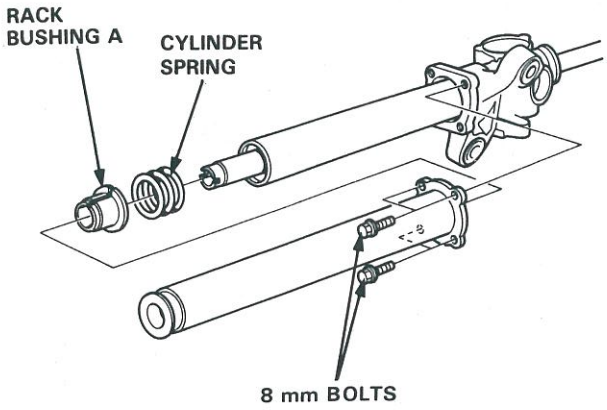
10. Remove the pinion from the gear housing by tapping it lightly.



11. Remove the 15 mm snap ring and bearing if necessary.

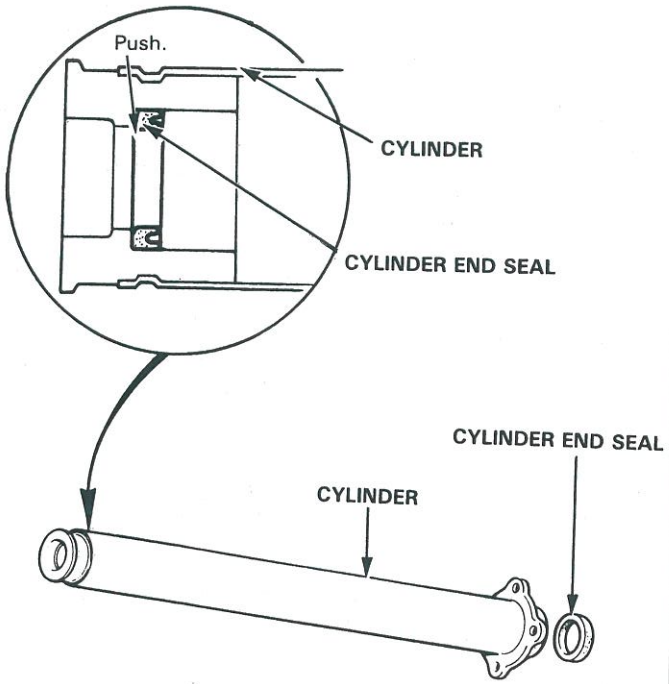


12. Remove the four 8 mm bolts.
13. Remove the cylinder.
14. Remove the rack bushing A and cylinder spring.

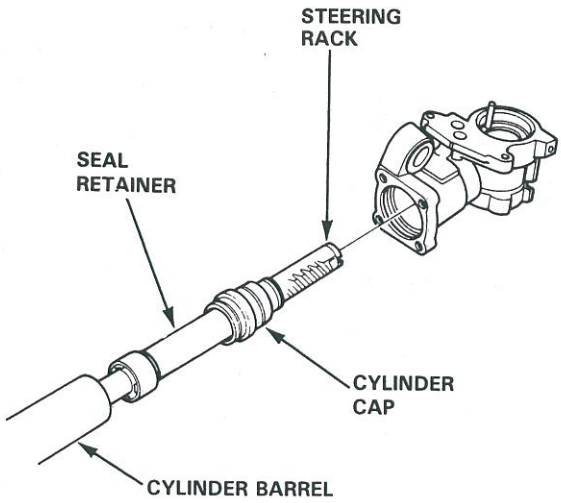


15. Remove the cylinder end seal from the cylinder.

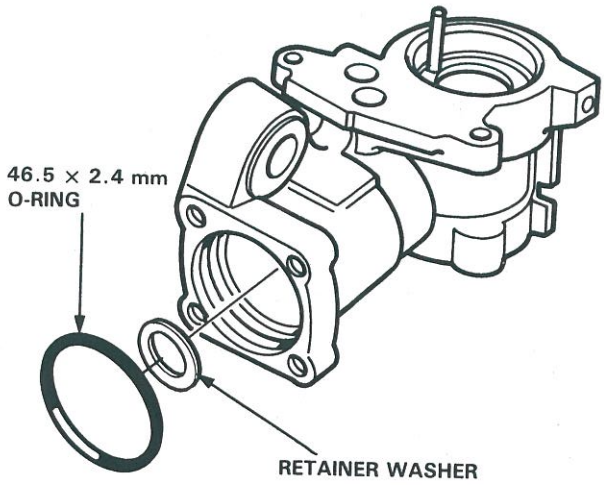
CAUTION: Do so by hand to avoid damaging the housing.



16. Remove the cylinder barrel, seal retainer, cylinder cap and steering rack from the gear housing.

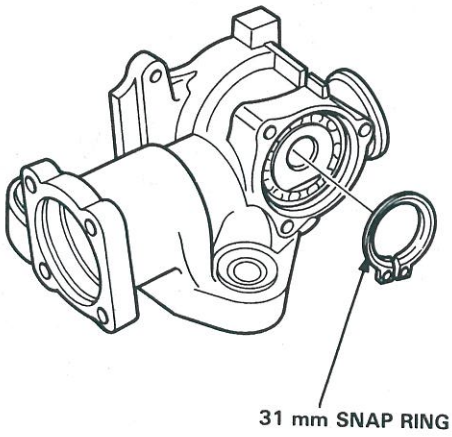


17. Remove 46.5 x 2.4 mm O-ring and retainer washer from the gear housing.



18. Check the bearing and pinion holder for faulty movement and excessive play. If they are OK and the grease in the bearing is clean, go on step 19. If they are damaged, or if there is dirt in the grease, proceed as follows:

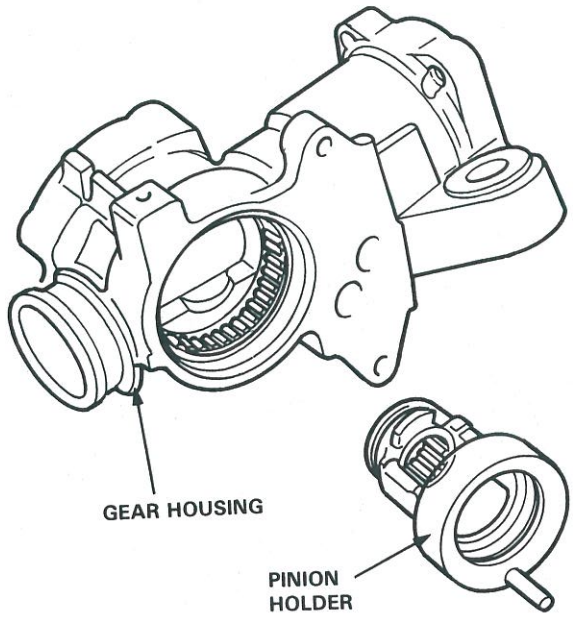
- Remove the 31 mm snap ring.



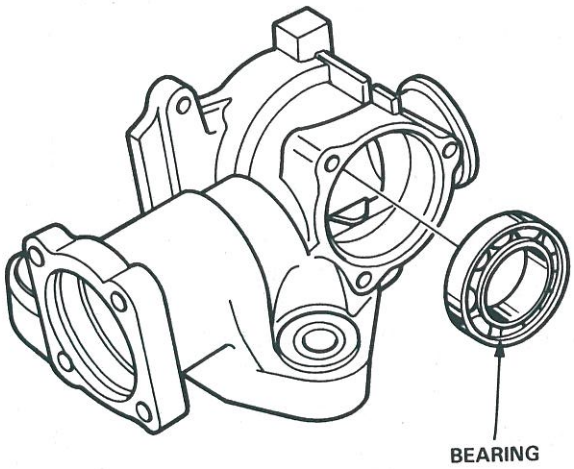
(cont'd)

Disassembly/Reassembly (cont'd)

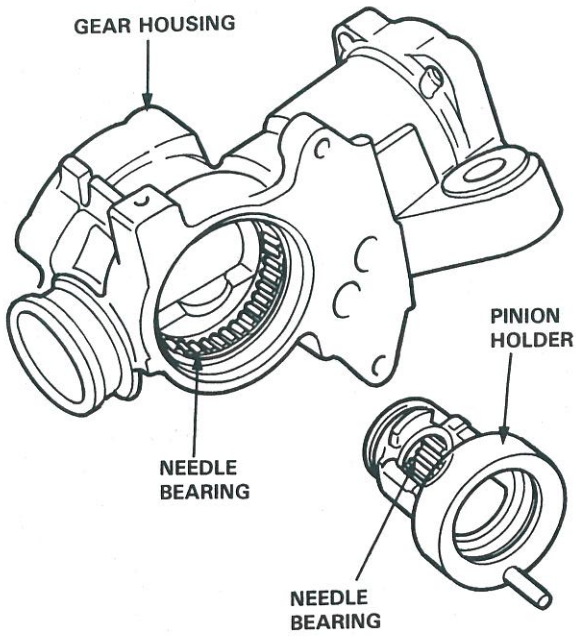
- Remove the pinion holder from the gear housing.



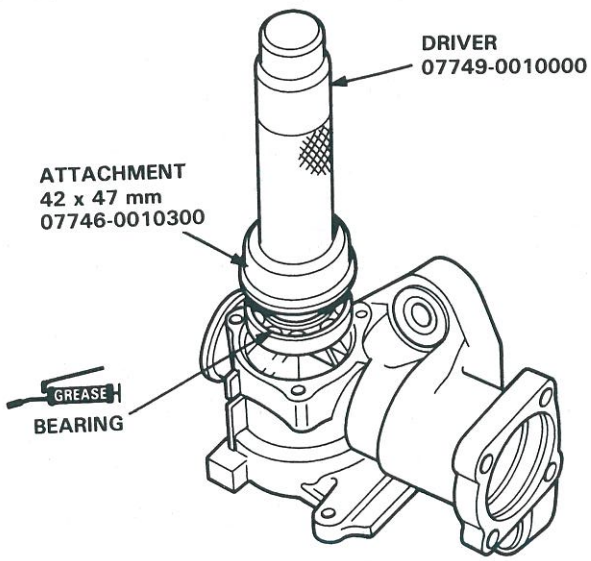
- Remove the bearing from the gear housing.



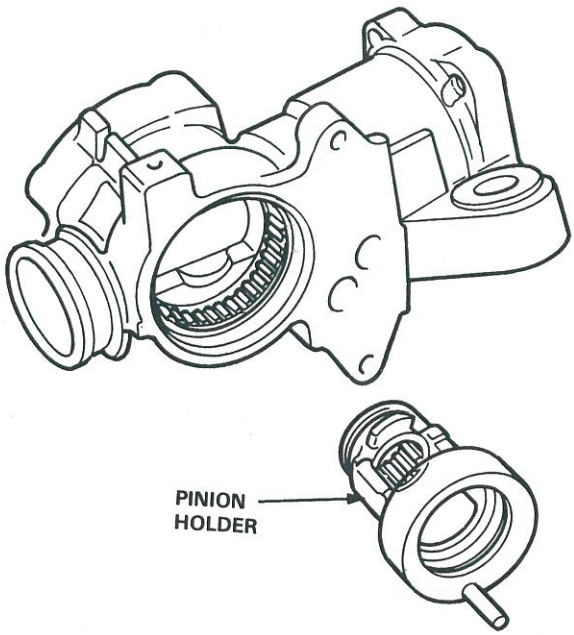
- Check the needle bearings in the pinion holder and in the gear housing for damage. If they are OK, pack with grease. If the bearings are damaged replace the gearbox assembly as a set.



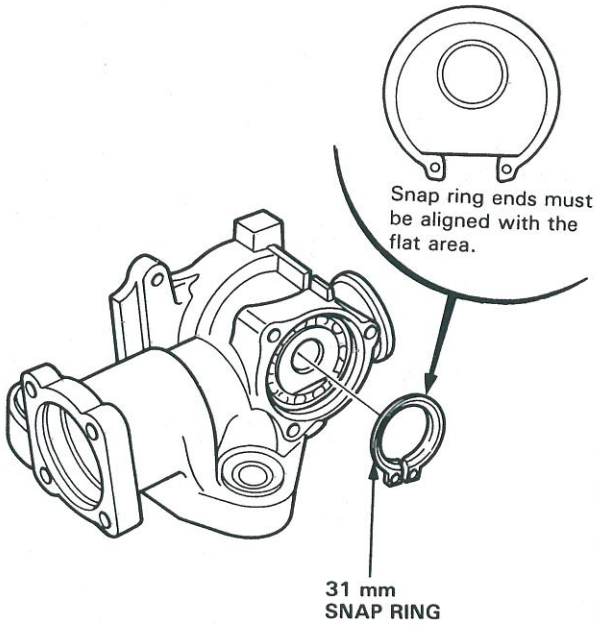
- Pack a new bearing with grease, then install with special tool, as shown.



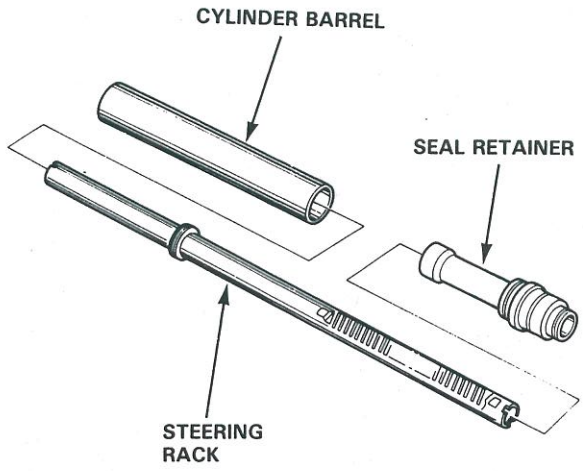
- Install the pinion holder in the gear housing.



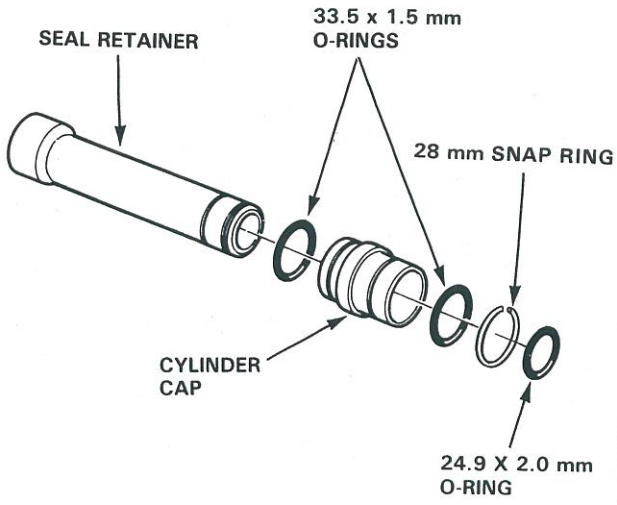
- Install the 31 mm snap ring with the taper side facing out.



19. Remove the cylinder barrel and seal retainer from the steering rack.



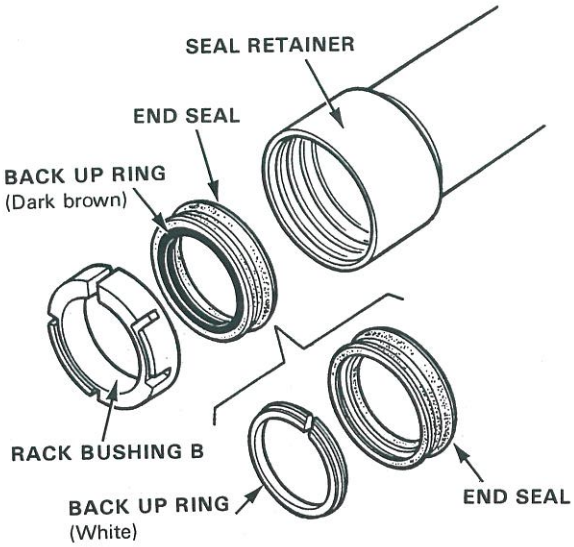
20. Remove the 24.9 x 2.0 mm O-ring, the 28 mm snap ring, and the cylinder cap from the seal retainer. Remove 33.5 x 1.5 mm O-rings from the cylinder cap.



(cont'd)

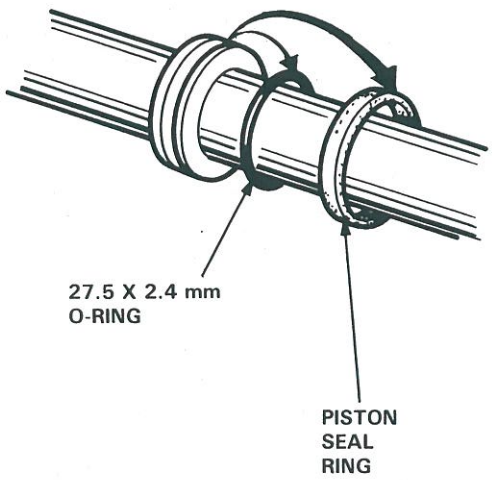
Disassembly/Reassembly (cont'd)

21. Remove rack bushing B from the seal retainer. Then remove the cylinder end seal.

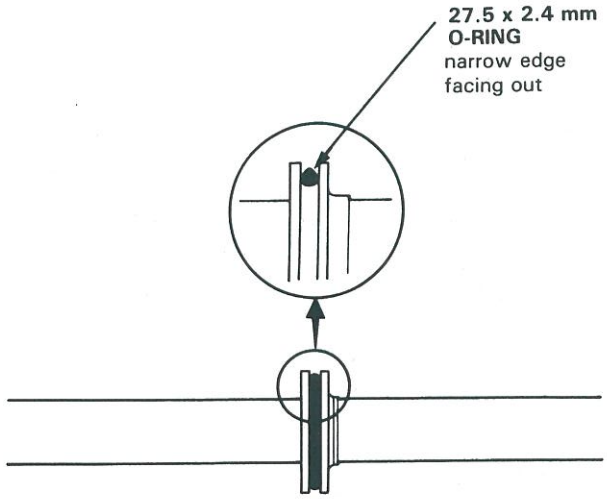


NOTE: There are two types of back up ring for the cylinder end seal.
The white type has a slit; the dark brown type has no slit.

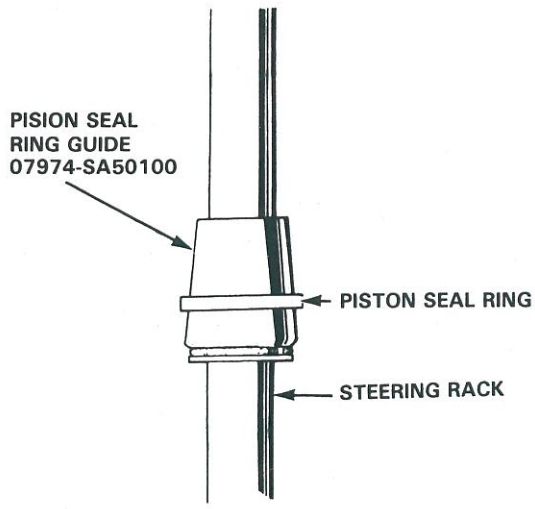
22. Carefully pry off the piston seal ring with a small screwdriver, then remove the 27.5 x 2.4 mm O-ring.



23. Install a new 27.5 ×2.4 mm O-ring on the rack.

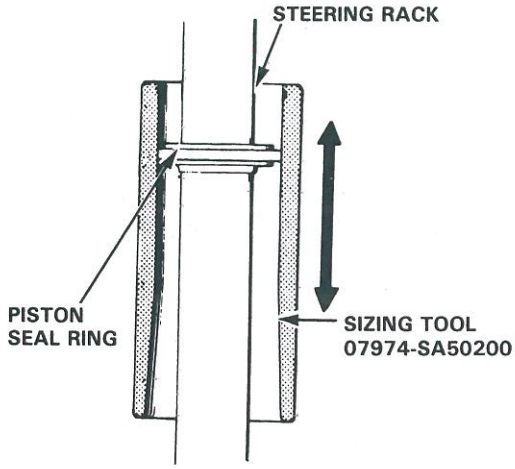


24. Install a new piston seal ring.
- Coat the piston seal ring guide tool with power steering fluid, and slide it onto the rack, big end first.

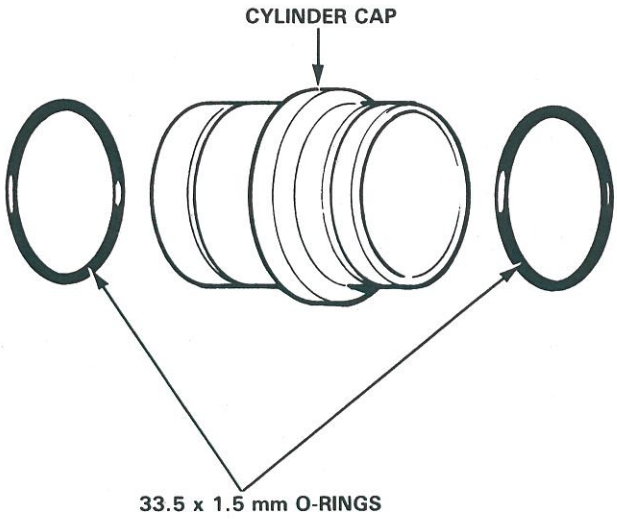


- Slide the new piston seal ring onto the guide tool, work it down to the big end of the tool, and then pull it off into the piston groove, on top of the O-ring.

25. Coat the piston seal ring and the inside of the sizing tool with power steering fluid. Carefully slide the tool onto the rack and over the piston seal ring, then rotate the tool as you move it up and down to break-in the piston ring.



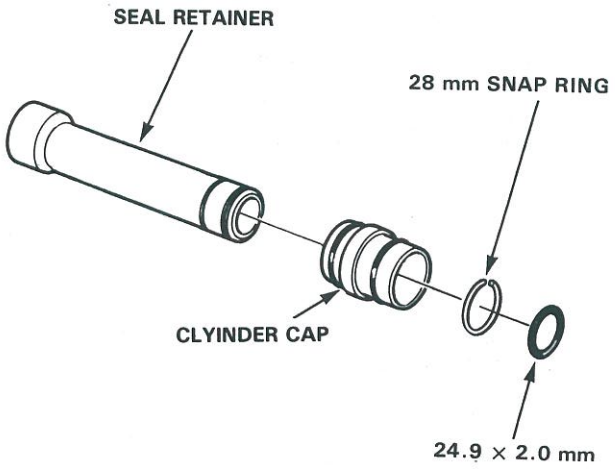
26. Coat new O-rings with grease and install them on the cylinder cap.



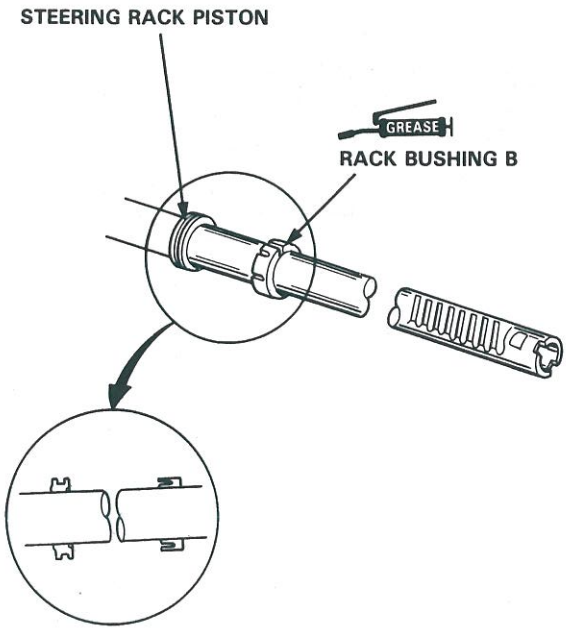
27. Slide the cylinder cap onto the seal retainer.

28. Install the 28 mm snap ring on the seal retainer.

29. Install a new 24.9 × 2.0 mm O-ring on the seal retainer.



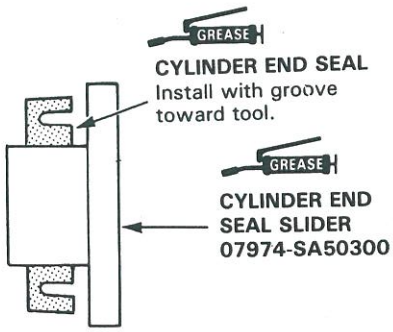
30. Install the rack bushing B with the groove toward the steering rack piston.



(cont'd)

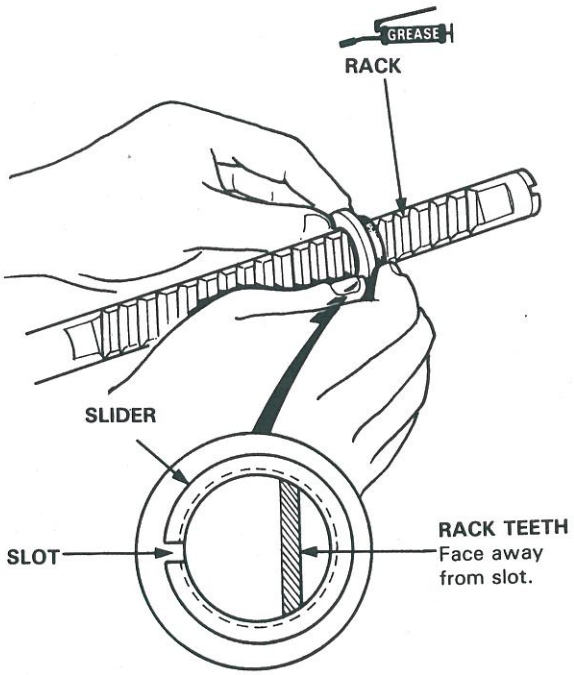
Valve Body Unit Disassembly (cont'd)

31. Coat the end seal slider tool and cylinder end seal with grease, and install the cylinder end seal on the seal slider tool with the groove toward the tool.

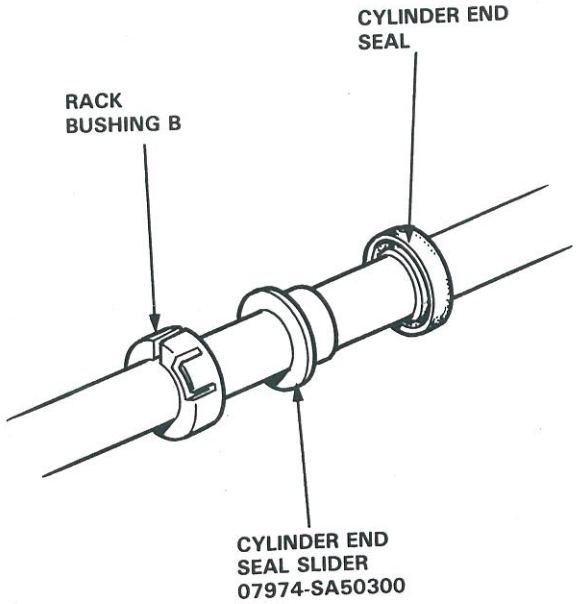


32. Coat the rack and fill its teeth with grease then slide the tool onto the steering rack.

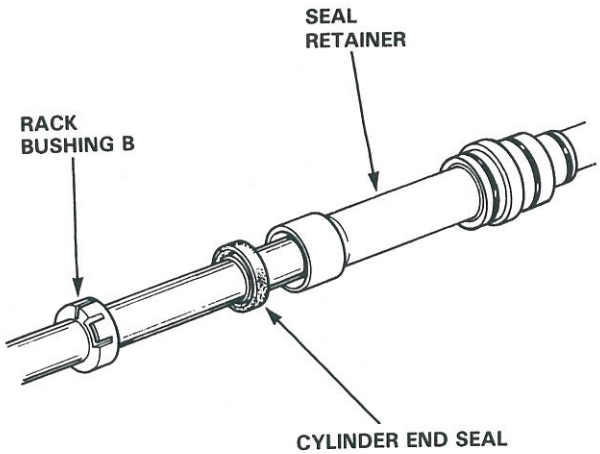
CAUTION: Make sure the rack teeth do not face the slot in the slider tool.



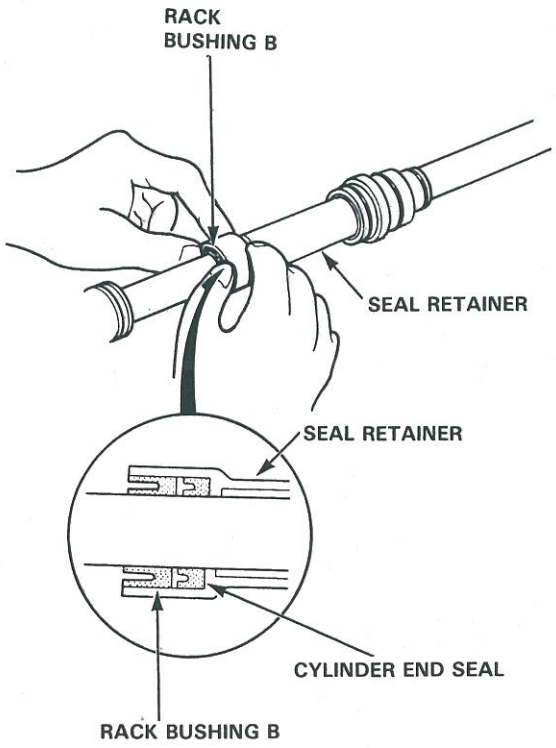
33. Remove the cylinder end seal slider from the steering rack.



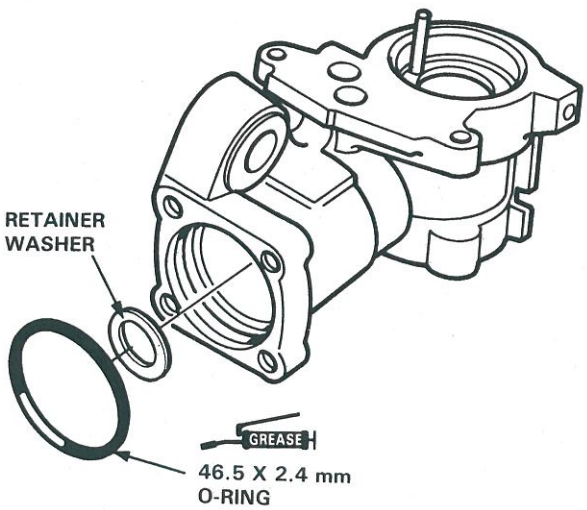
34. Slide the seal retainer onto the steering rack.



35. Push the rack bushing B into the seal retainer so as to contact the cylinder end seal with the seal retainer.

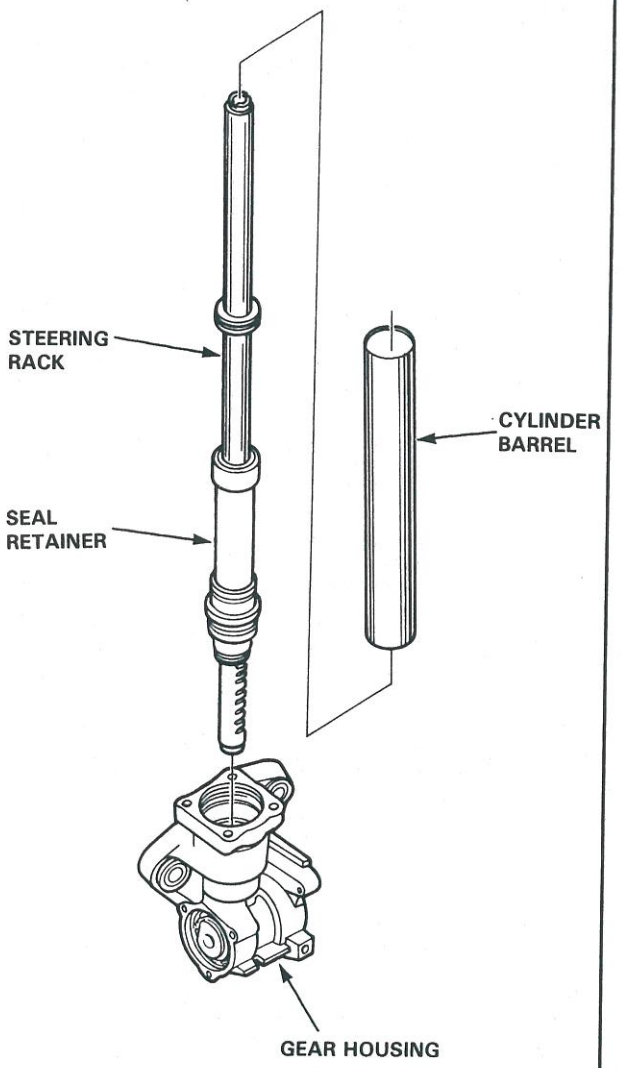


36. Install the 46.5 x 2.4 mm O-ring and retainer washer into the gear housing.



37. Stand the gear housing on the work bench and press the seal retainer and steering rack into the gear housing.

38. Coat the inside surface of the cylinder barrel with power steering fluid, slide it over the rack and into the gear housing; press it into the housing until it seats.

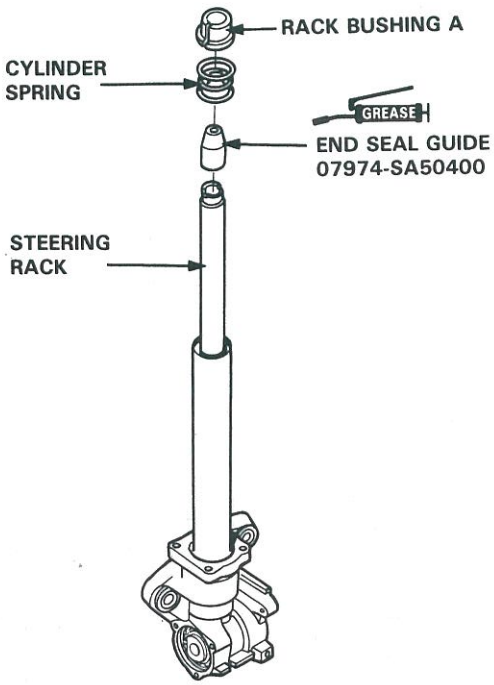


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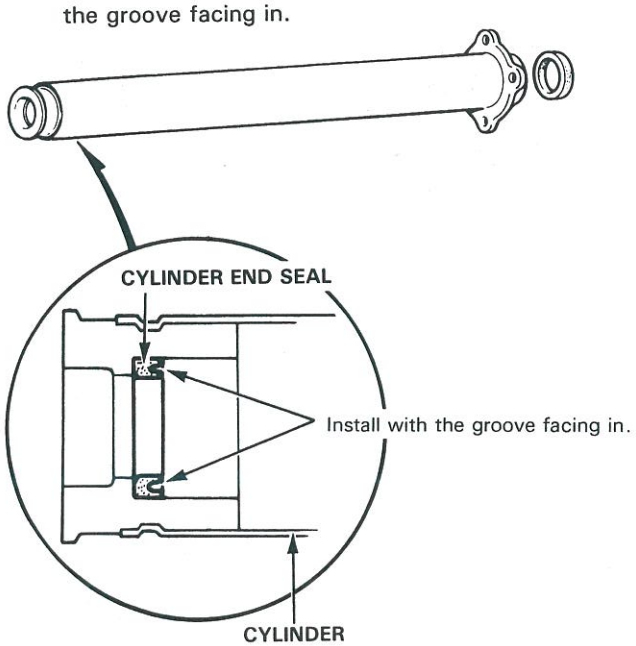
Disassembly/Reassembly (cont'd)

39. Install the end seal guide tool on the steering rack.

40. Install the cylinder spring over the rack, then coat the rack bushing A with power steering fluid, and install it on the spring.



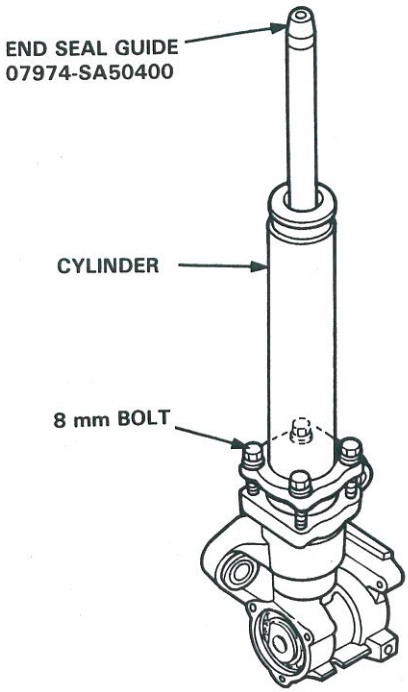
41. Coat the inside surface of the cylinder with power steering fluid and install the cylinder end seal with the groove facing in.



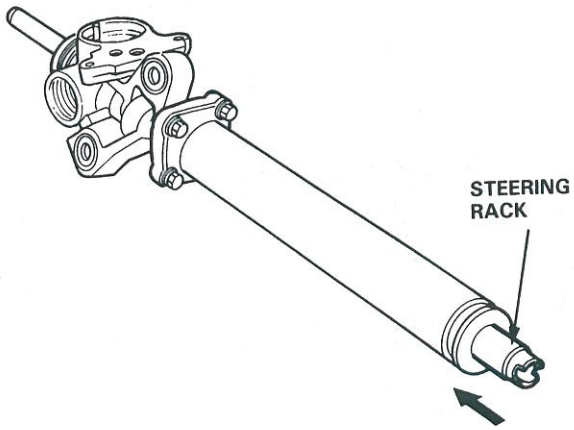
42. Coat the end seal guide tool with grease.

43. Carefully slide the cylinder over the rack and install it on the gear housing.

CAUTION: Be carefull not to damage the cylinder end seal in the cylinder.

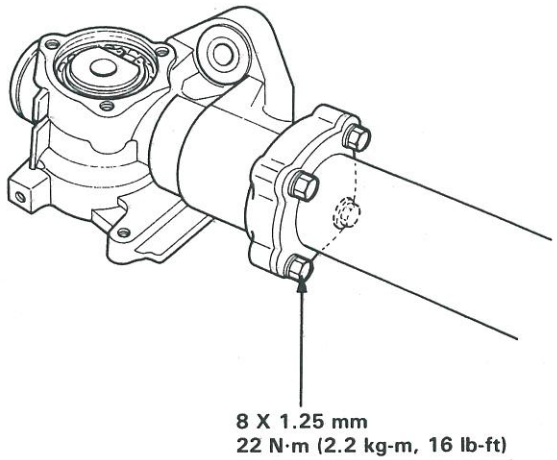


44. Push the steering rack until the rack is in the cylinder to prevent damage to the sliding surface of the steering rack.

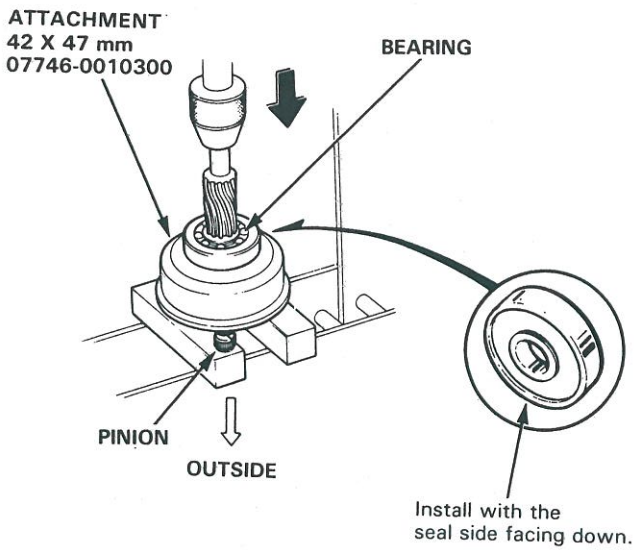


45. Secure the cylinder to the gear housing with the four 8 mm bolts.

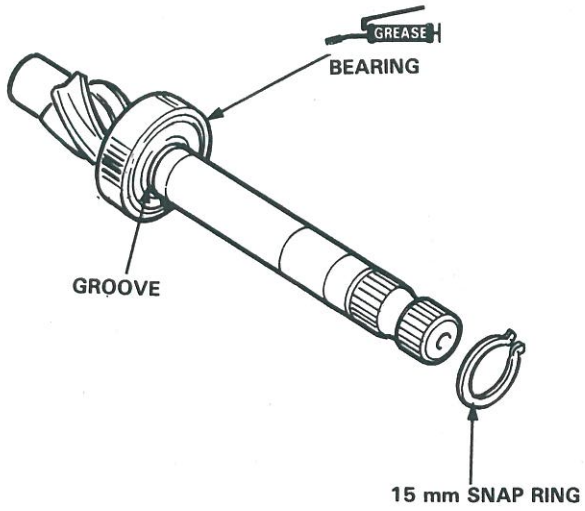
NOTE: Before tightening, make sure the mating surface of the cylinder and gear housing fit properly. Push and hold them together while you tighten the bolts.



46. Using a press, install the bearing on the pinion, with its seal side facing down (out).

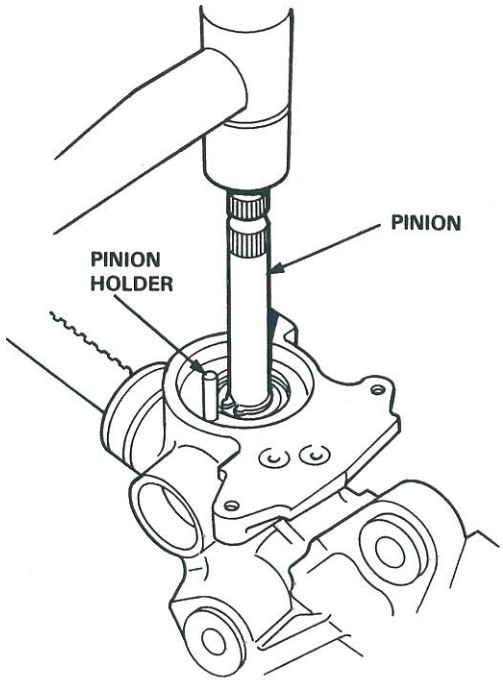


47. Install the 15 mm snap ring on the pinion.



48. Grease the bearing and make sure that it turns smoothly.

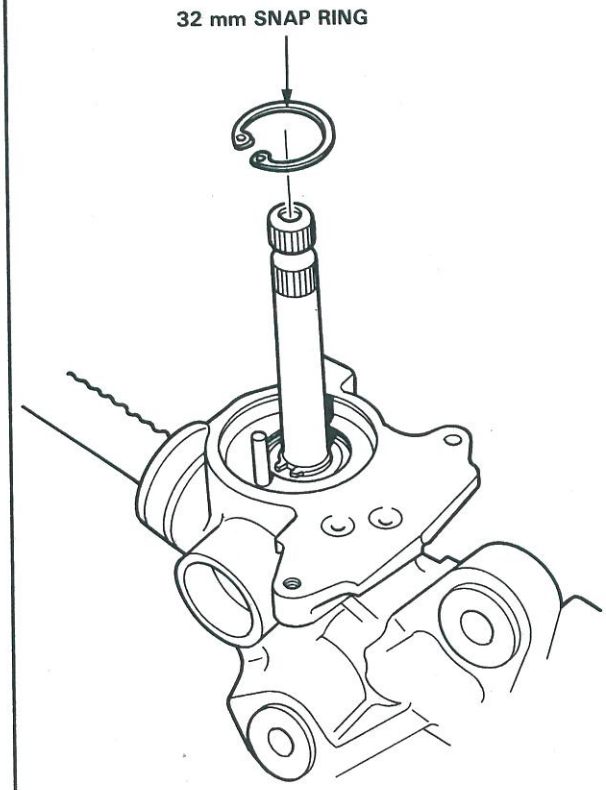
49. Insert the pinion into the pinion holder in the gear housing.



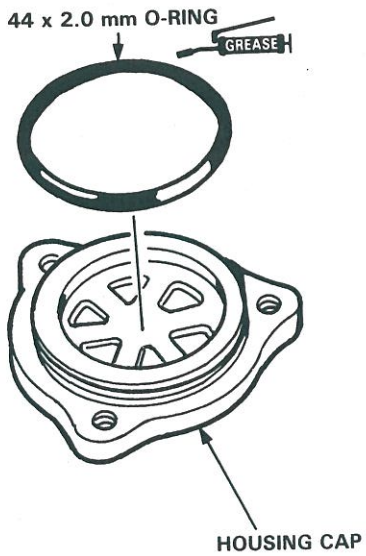
(cont'd)

Disassembly/Reassembly (cont'd)

50. Install 32 mm snap ring in the groove in the pinion holder, with its taper side facing out.

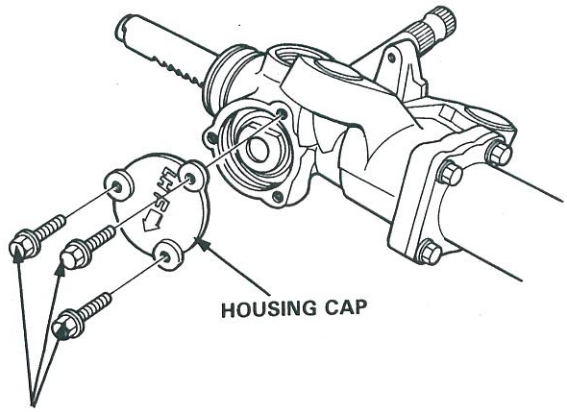


51. Coat the 44 x 2.0 mm O-ring with grease and install it in the groove in the housing cap.



52. Tighten the three 6 mm bolts to secure the housing cap to the gear housing.

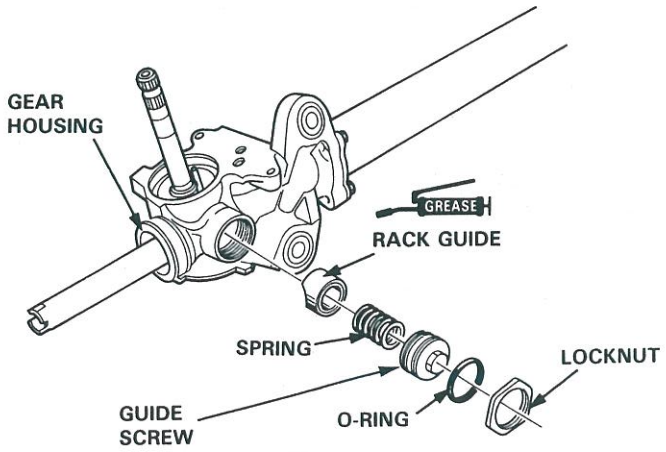
NOTE: The arrow on the housing cap must face toward the front of the car when the gearbox is installed.



53. Coat the rack guide with grease.

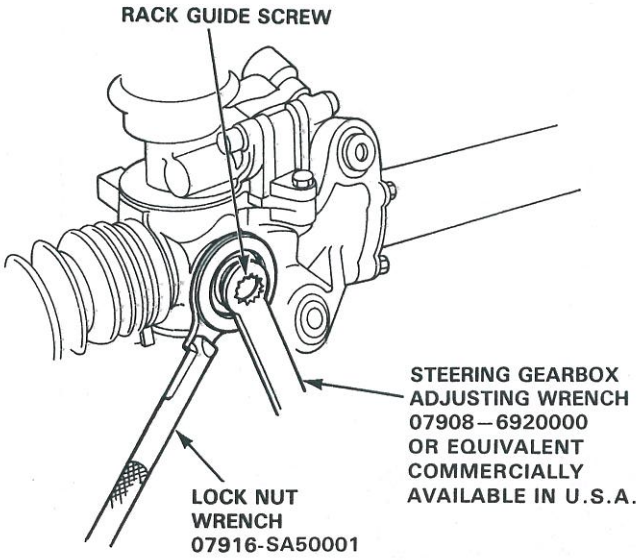
54. Install the rack guide, spring, O-ring and rack guide screw in the gear housing.

55. Install the locknut on the rack guide screw, finger tight.

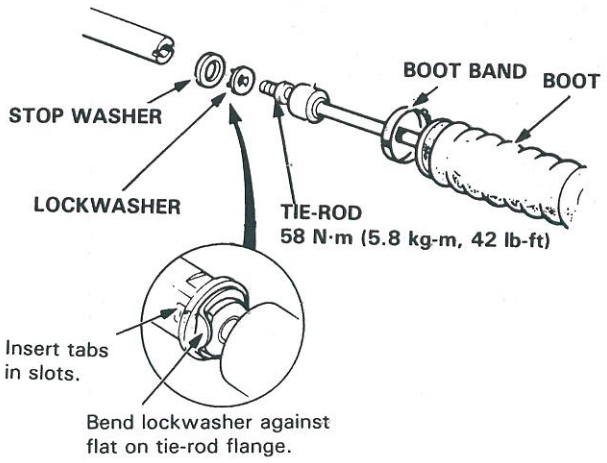


56. Tighten the guide screw until it compresses the spring and seats against the guide, then loosen it. Retighten it to 4 N·m (0.4 kg-m, 3 lb-ft) and back off about 25° (about 1/14 of a turn).

    While hoding the guide screw in its position, tighten the locknut to 25 N·m (2.5 kg-m, 18 lb-ft) with the locknut wrench.



57. Screw each tie-rod into the rack while holding the lockwasher so its tabs are in the slots in the rack end. Tighten the tie-rod securely, then bend the lockwasher back against the flat on the flange as shown. Install the boots and bands.

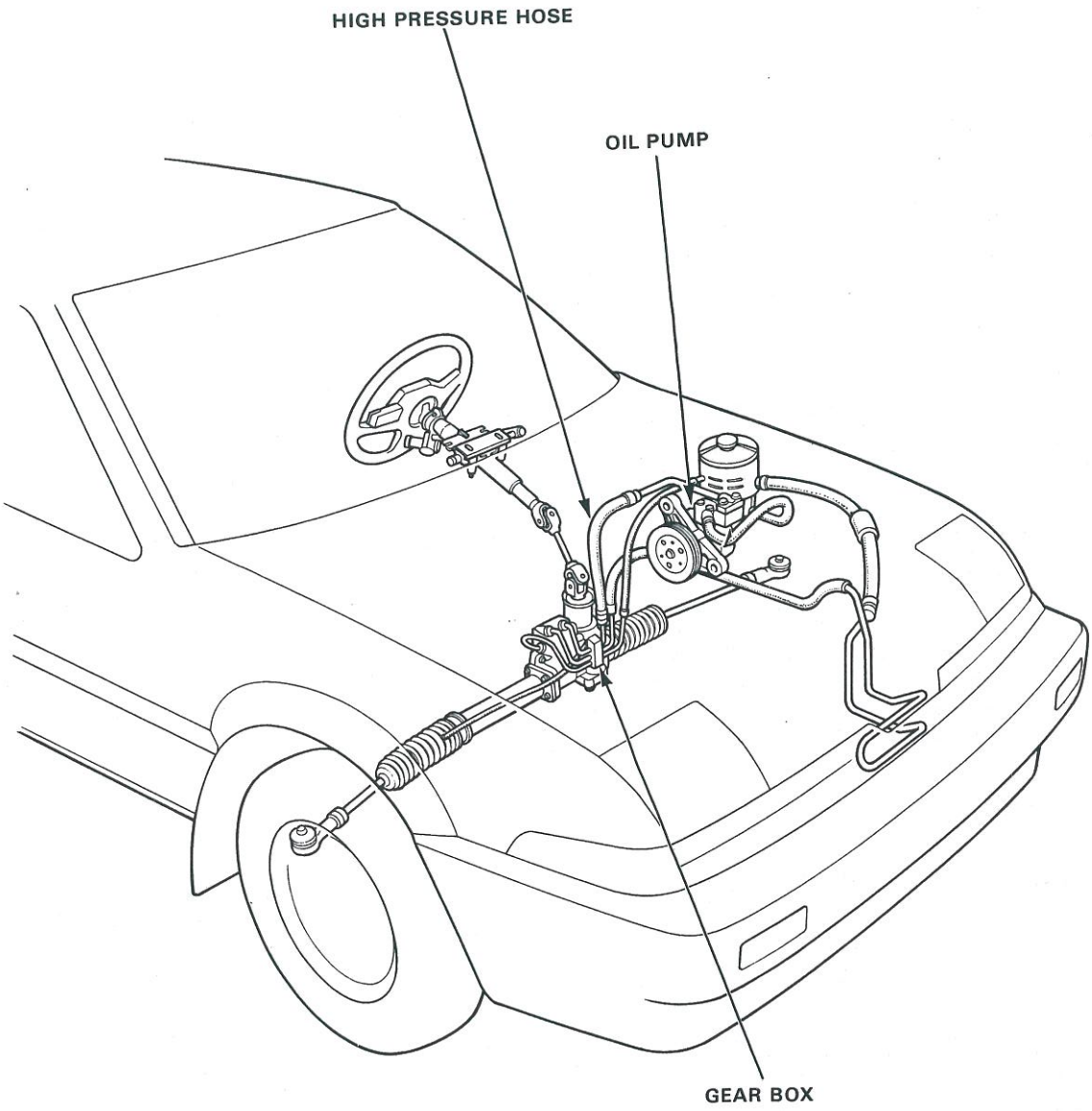


58. Make sure that the boots move smoothly while sliding the steering rack.

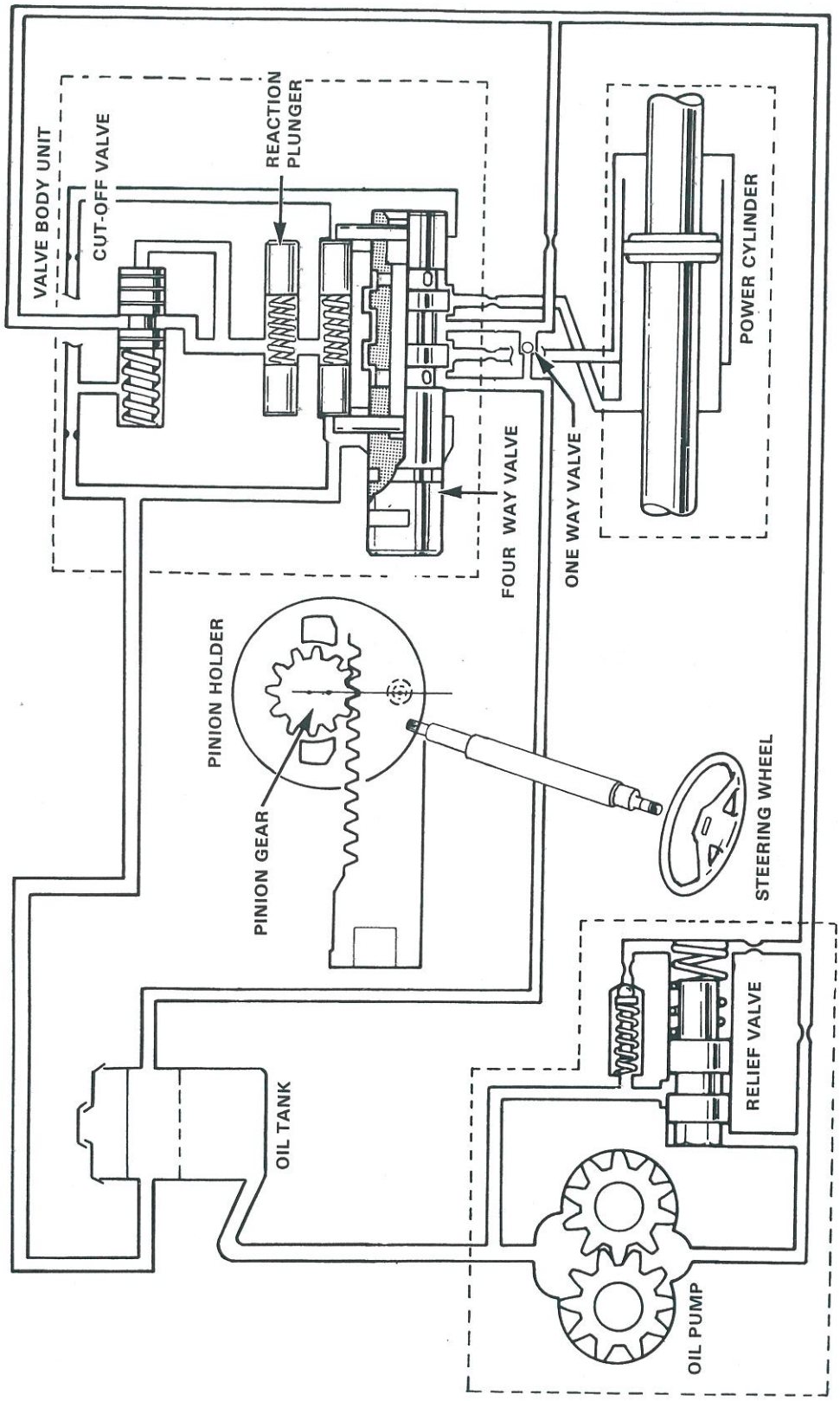
Operation

Description

The power steering is rack and pinion type. The power operating assembly is integral with the steering gear. Road feel is maintained throughout the entire speed range of the vehicle.



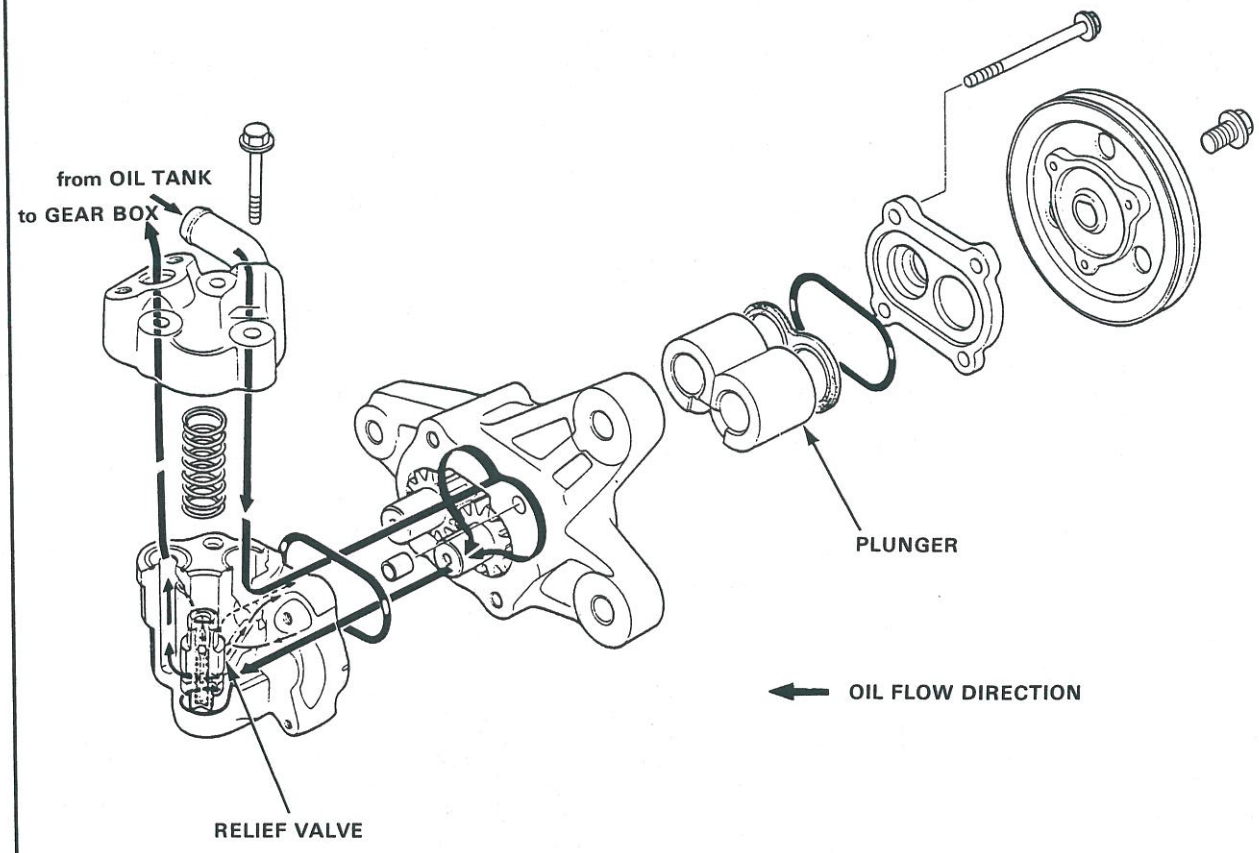
Flow Circuit



Operation

Pump

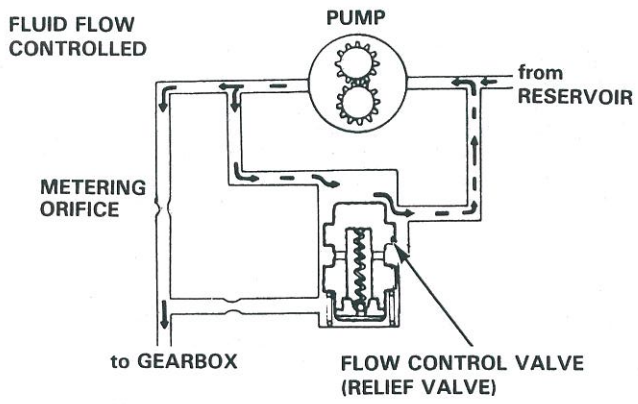
The pump is located at the left side of the engine cylinder head. It is a constant displacement spur gear type, and driven by the crankshaft through a V-belt. A relief valve in the pump housing returns excess fluid to the pump inlet. The pump housing is made of aluminum for light-weight construction.



Flow Control

Fluid from the pump runs through a metering orifice to the valve body. This creates a pressure differential between the pump and valve body 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.

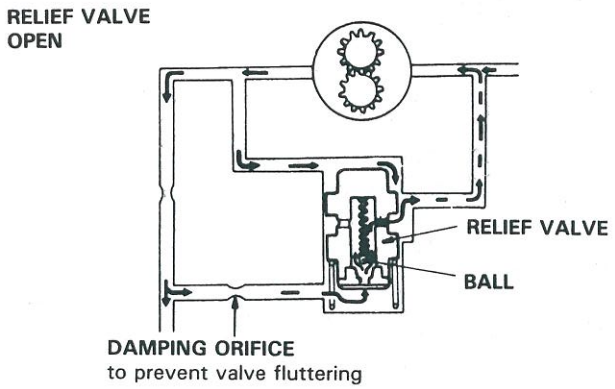


Pressure Relief

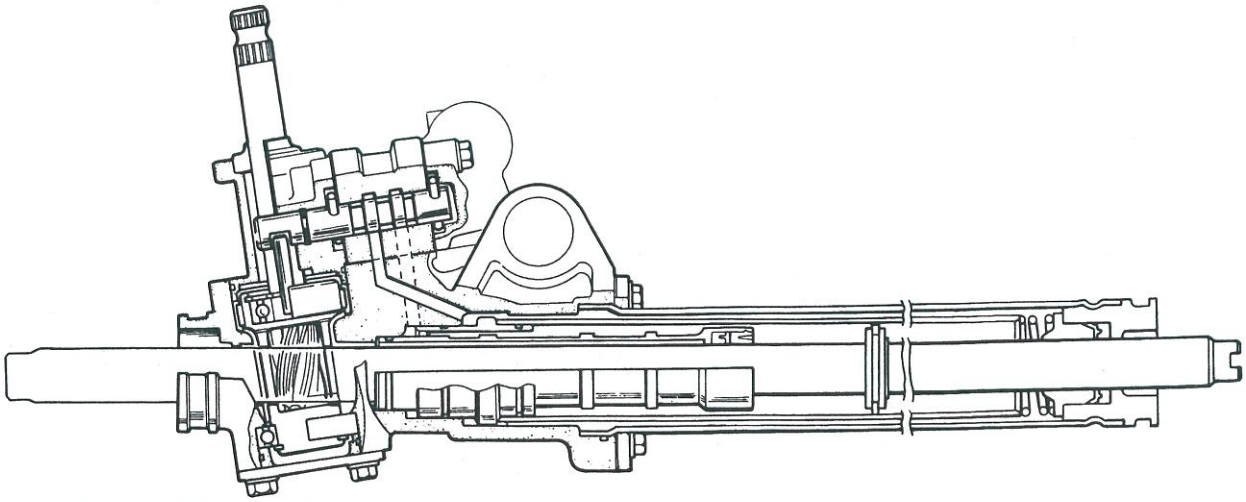
As pressure on the valve body side builds up, it pushes the relief valve ball (inside the flow control valve) up against its spring.

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 7845—8826 KPa(80—90 kg/cm^2,1138—1280 psi).



The steering gear is a self-contained rack and pinion type with the power cylinder placed in line with the steering rack. The power cylinder has an outer wall which serves as a fluid passage to eliminate external piping. The control valve is located at the top of the steering gearbox.



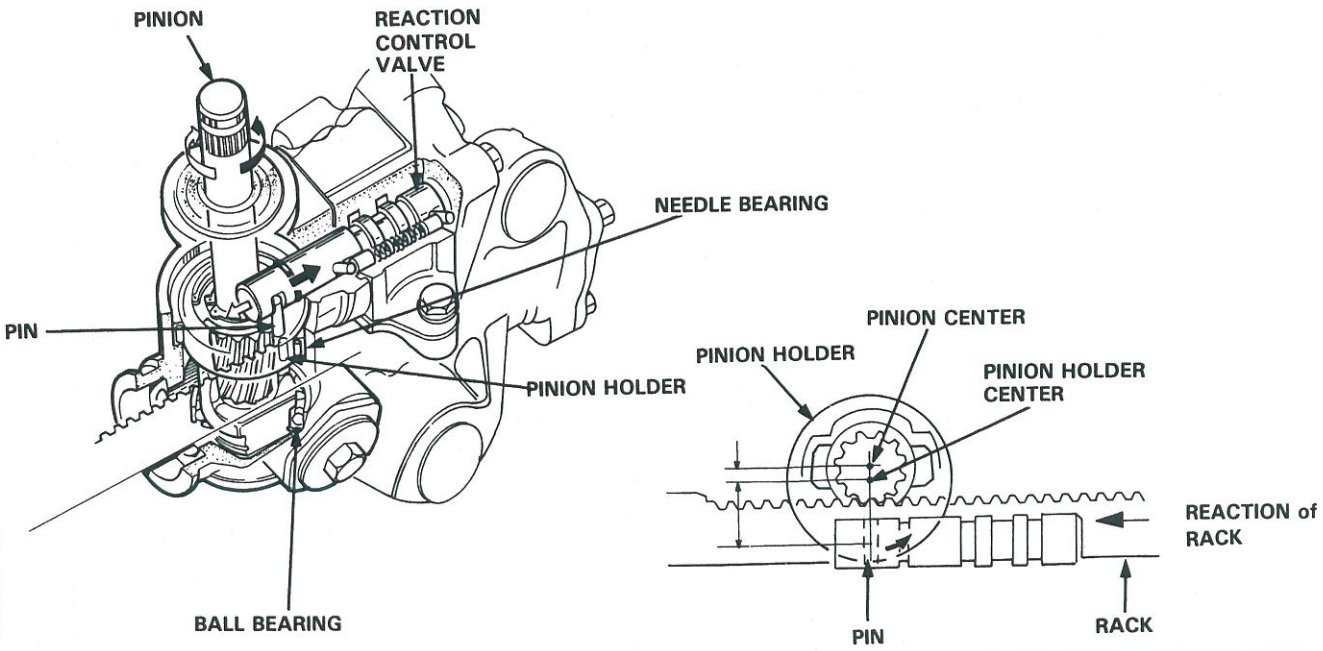
Valve Body Unit

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 control 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 control valve.

As the pinion is turned (to turn left or right), because it is off-centered it also moves slightly along the rack. This movement is transferred to the holder. The pin in the holder then moves the control valve, to direct fluid pressure to either side of the rack power cylinder.

The back edges of the pinion holder hit stops cast into both sides of the gear housing to avoid pushing the control valve too far in either direction. The front edge of the pinion holder cuts off assist at full lock.



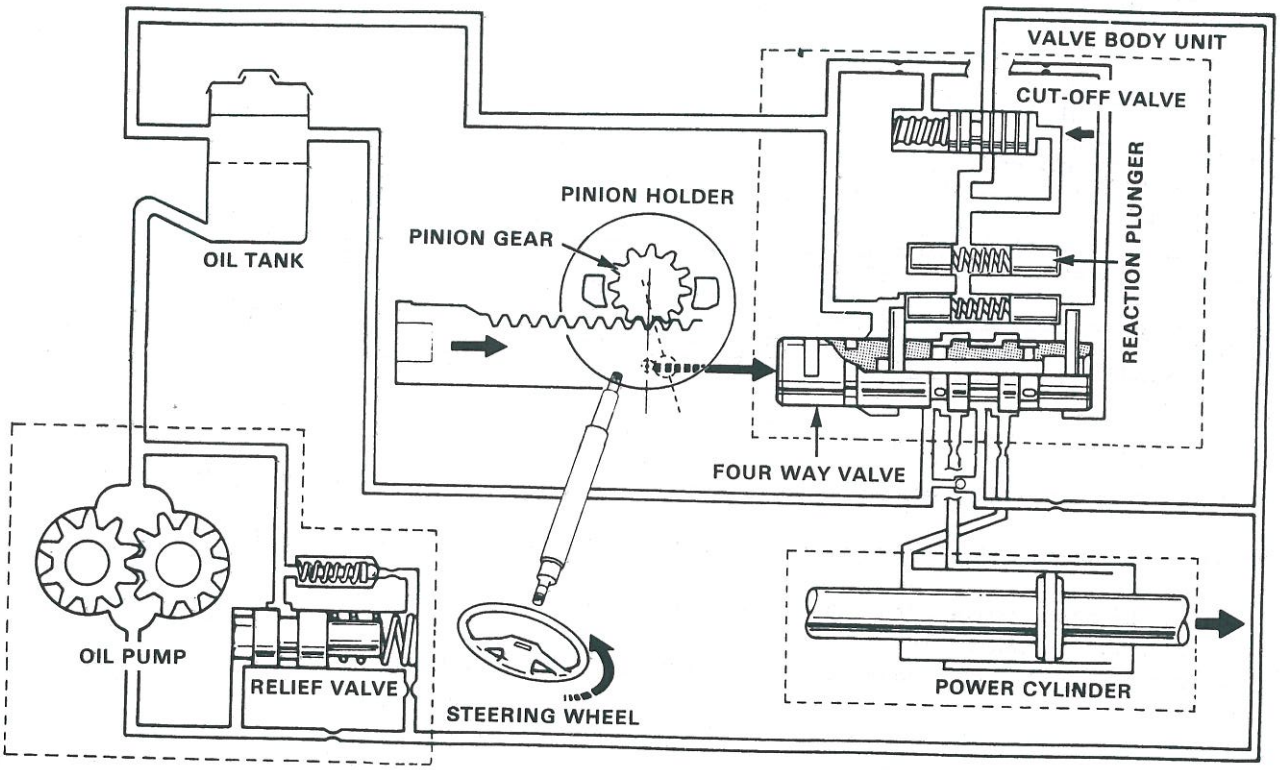
Hydraulic Reaction Sensing Mechanism

Turn at Parked or Slow Speed

A reaction chamber with a pair of plungers and springs is provided on each side of the reaction control valve. A hydraulic pressure sensing cut-off valve is located in the circuit leading to the reaction chambers.

When the steering wheel is turned while the car is parked or moving at low speed, fluid pressure increases. As the pressure reaches a prescribed value, it forces the cut-off valve down. When this happens, the fluid passage from the pump to the reaction chambers is closed off, keeping the fluid pressure in the reaction chambers from rising too high.

The damping orifice prevents "fluttering" of the reaction control valve during operation. The main orifice causes higher pressure on its left side than on the right side, ensuring stability in straight-ahead driving at high speeds.



Turns at Medium or High Speed

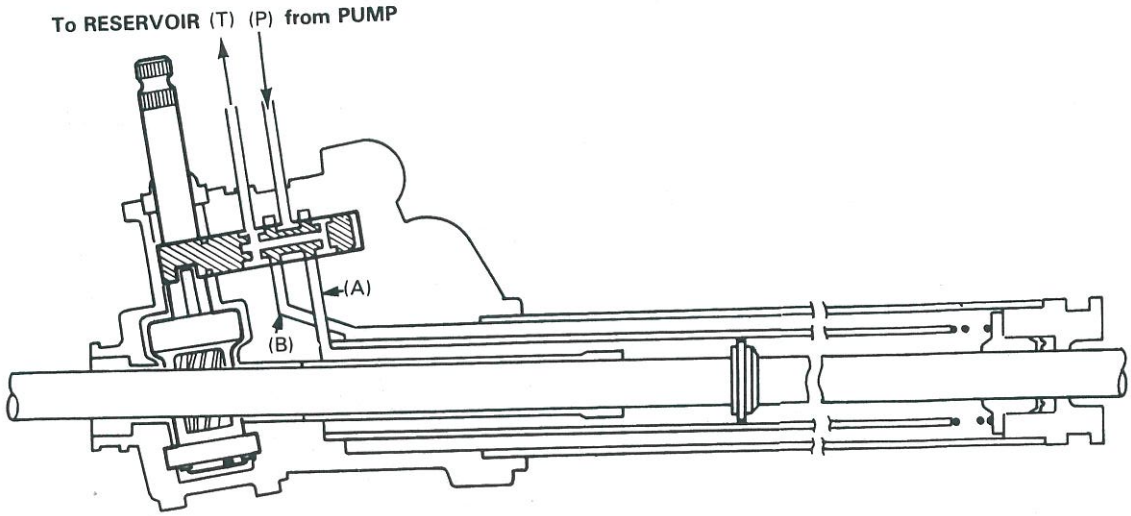
At medium or high speed, pump pressure is not high enough to force the cut-off valve to rise. Fluid from the pump will then work its way around the cut-off valve and flow directly into the reaction chambers. This gives essential "road feel."

(cont'd)

Power Cylinder

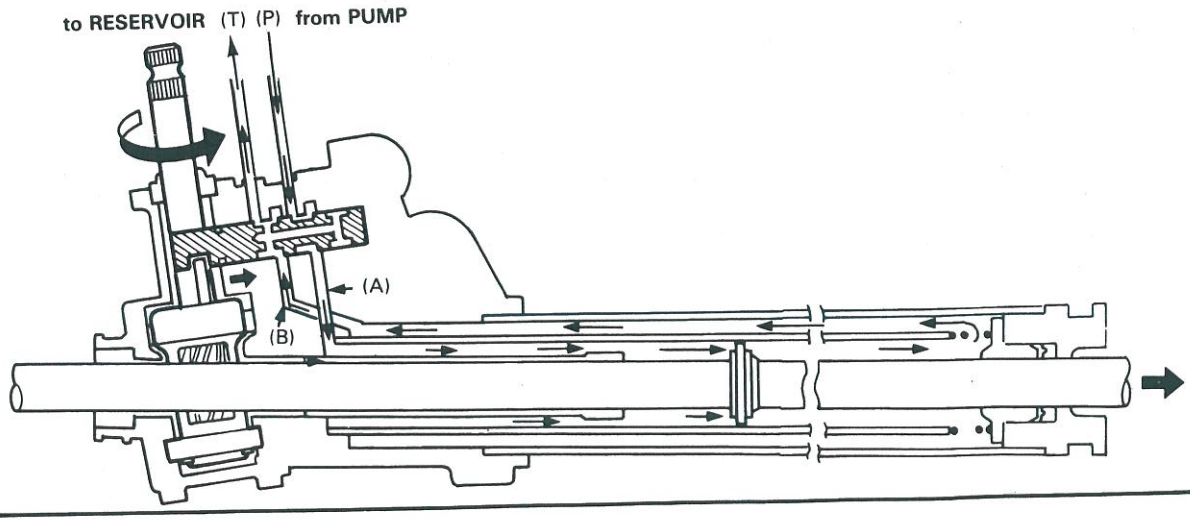
Straight Ahead (Steering Wheel not Turned)

When the car is stationary, or when it is moving straight ahead, fluid from the pump will expand the reaction plungers, assisted by the plunger springs, allowing the reaction control valve to remain in the neutral position.
When the reaction control valve is in neutral, it opens the ports, connecting the pump passage (P) to the reservoir through the right and left turn passages (A and B) of the power cylinder.
In this position, the only pressure built up in the pump passage is that produced by the main orifice.



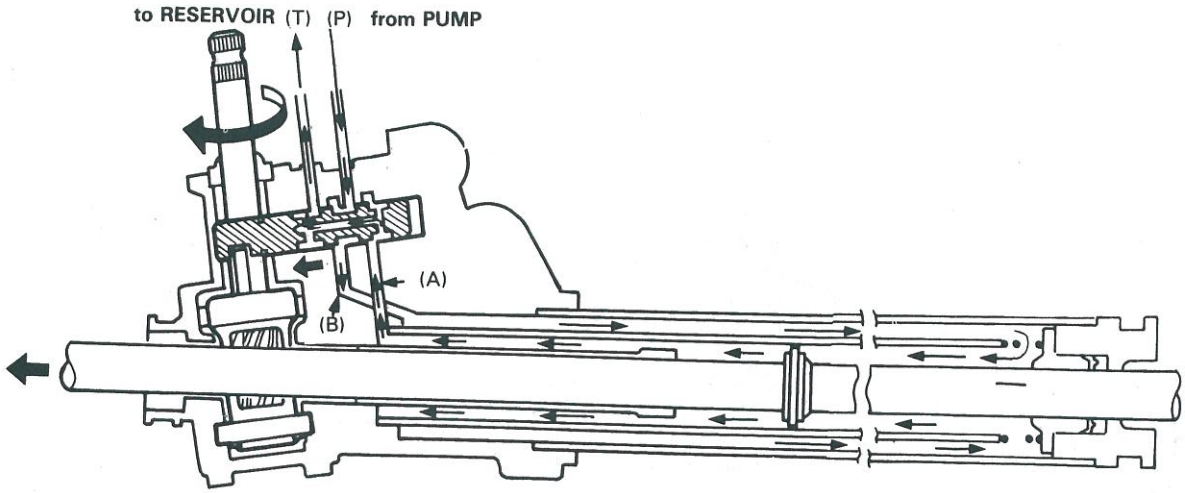
Left Turn

When the steering wheel is turned to the left, the reaction control valve is moved to the right, compressing the reaction plungers.
This connects the left turn passage (A) of the power cylinder to the pump passage (P), and connects the right turn passage (B) of the power cylinder to the reservoir passage (T).
Fluid now flows into the power cylinder. Thus, the hydraulic pressure developed by the pump is applied to the left turn side of the piston in the cylinder.
As the piston is moved to the right, the fluid in the right side of the piston is returned to the reservoir.



Right Turn

A right turn will produce the same action using the right turn chamber of the power cylinder.



Return to Straight Ahead

When the steering wheel is returned to the straight ahead position, the reaction control valve returns to its neutral position, and the reaction plungers are expanded by the power steering fluid and the tension of the plunger springs.

(cont'd)

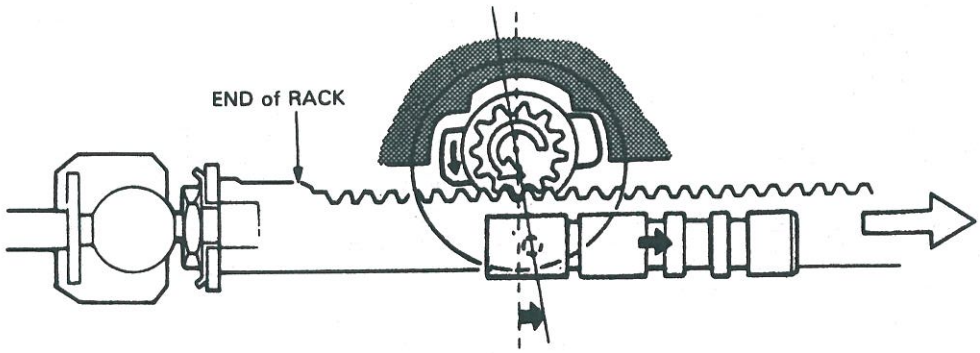
Gearbox (cont'd)

Unloader System

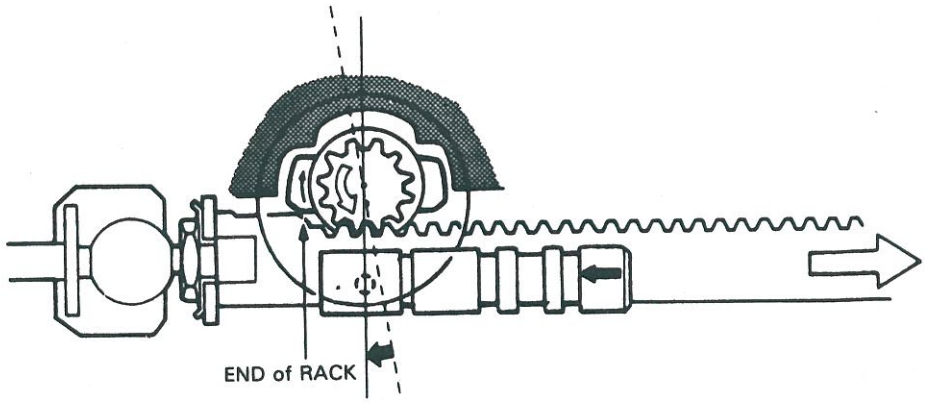
The control valve shifts the direction of fluid flow when the steering wheel is turned right or left.

However, when the wheel is turned to right or left lock when parked, the edge of the pinion holder rides up on the end of the rack, moving the pin in the opposite direction which pulls the control valve back to neutral.

This keeps pump pressure from building up (which could cause idle speed to drop).



Steering rack moved to Right



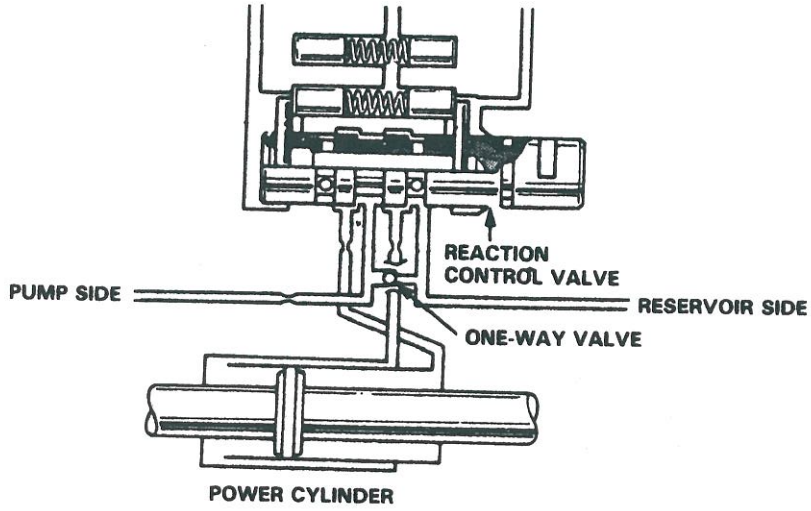
Pin on pinion holder moved back to Neutral

One-way Valve (Vacuum Check Valve)

When the wheel is turned with the pump stopped (engine not running), negative pressure develops in the pump circuit. To compensate for this, a one-way check valve is provided in the circuit between the pump and low pressure side of the control valve.

As the wheel is turned, the valve lets the oil recirculate through the control valve and power cylinder without returning to the reservoir.

This prevents fluid in the reservoir from rising and allows adequate steering.



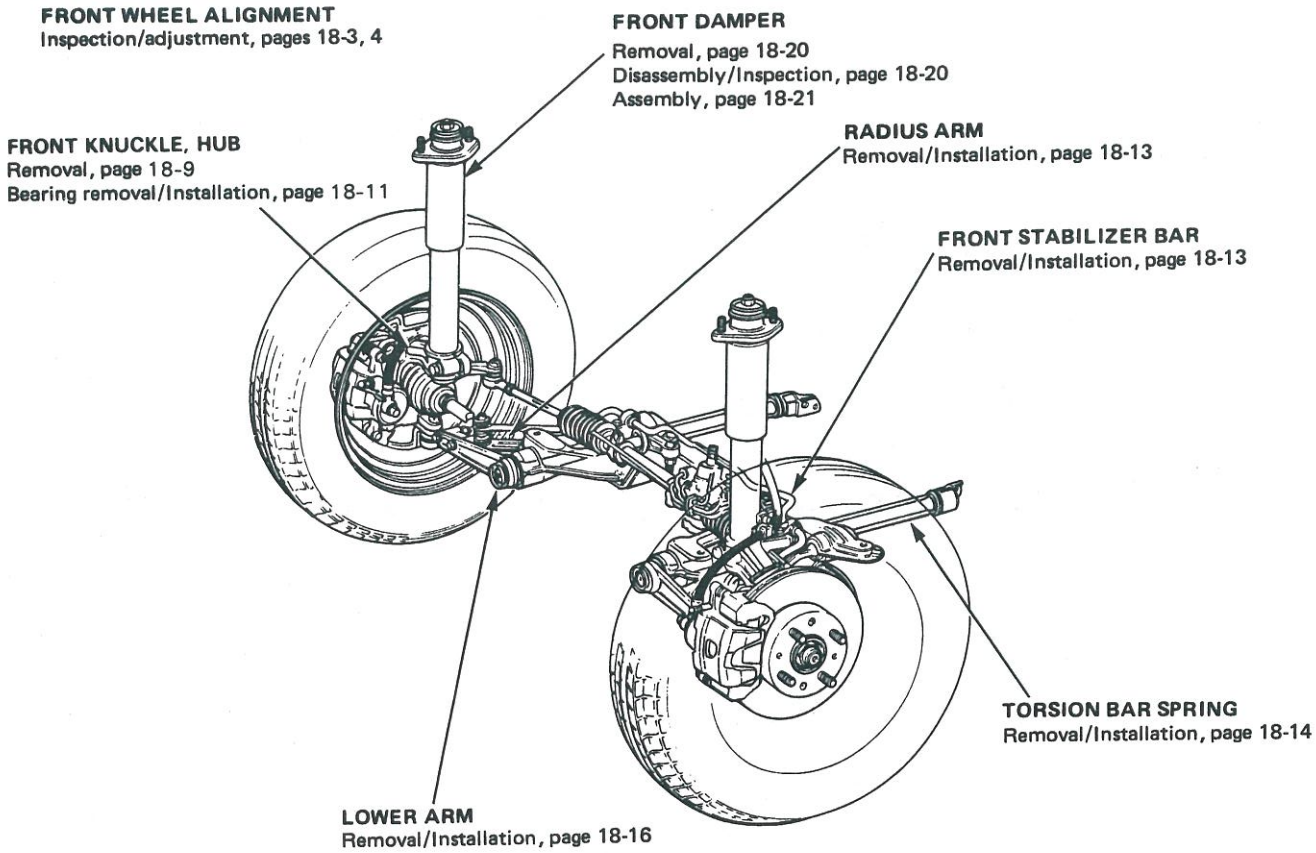
Suspension

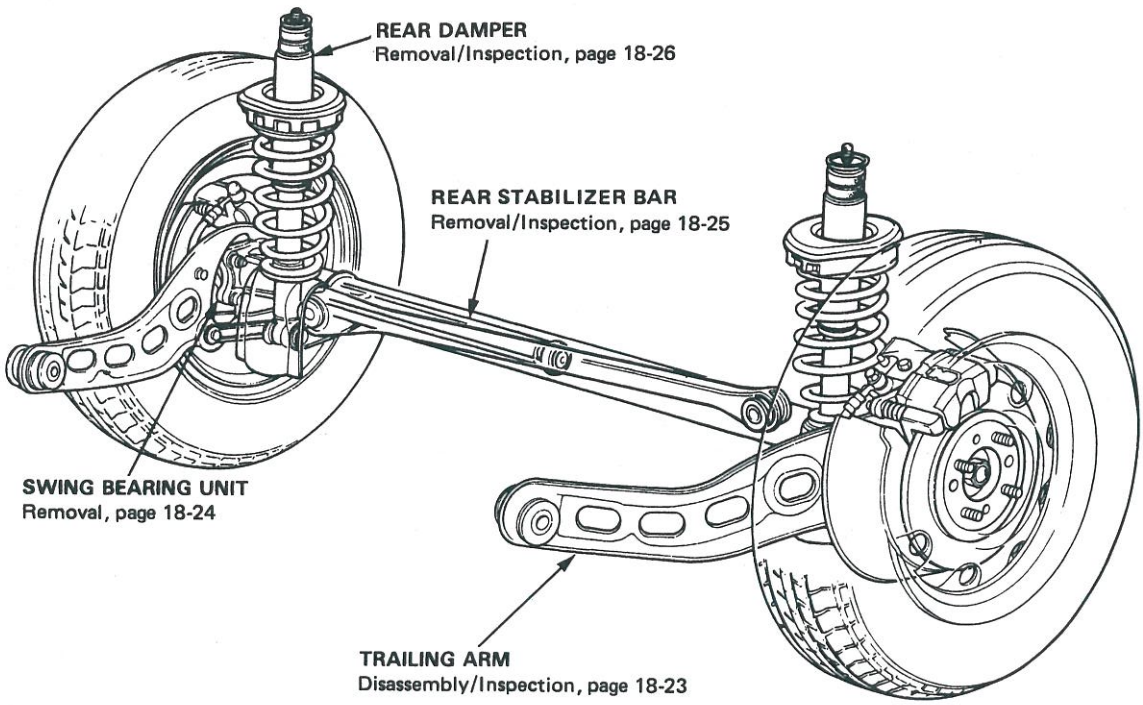
Illustrated Index 18–2
Wheel Alignment 18–3
Front Suspension 18–7
Rear Suspension 18–22



Suspension

Index





Wheel Alignment

Front Toe Adjustment

1. Center steering wheel spokes.

   NOTE: Measure difference in toe measurements with the wheels pointed straight ahead.

   Front Toe in: −1±3mm (−0.039±0.118 in)

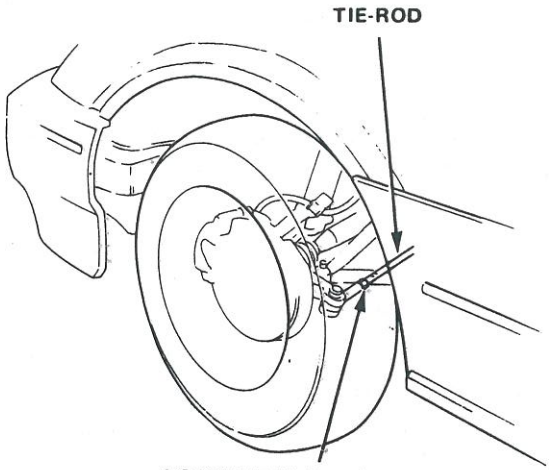
   — If adjustment is required, go on to step 2.
   — If no adjustment is required, remove alignment equipment.

2. Loosen the tie-rod locknuts and turn both tie-rods in the same direction until the front wheels are in straight ahead position.

3. Turn both tie-rods equally until the toe reading is correct.

4. After adjusting, tighten the tie-rod locknuts.

   NOTE: Make sure the tie-rod boots are not twisted or otherwise displaced after adjustment.



Rear Toe Inspection

1. Release parking brake.

   NOTE: If the parking brake is engaged, you may get an incorrect reading.

   Rear toe in: 2±2mm (0.079±0.079 in)

   NOTE: Rear wheel toe is not adjustable. If out of specification, check suspension for damage and replace parts as necessary, then recheck alignment.

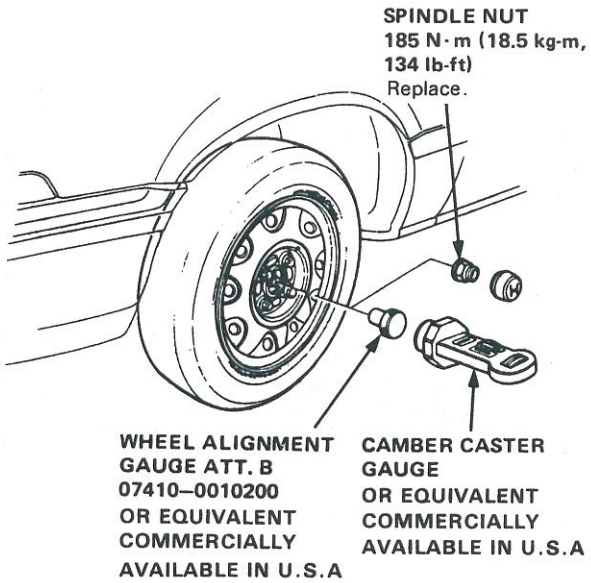
Camber Inspection

1. With the wheels in a straight ahead position, remove the spindle nut and install the special tool on the spindle as shown.

2. Set up the camber/caster gauge.

3. Read the camber on the gauge with the bubble at the center of the gauge.

   Front Camber : −1/2±1°
   Rear Camber : −3/4±1/4°



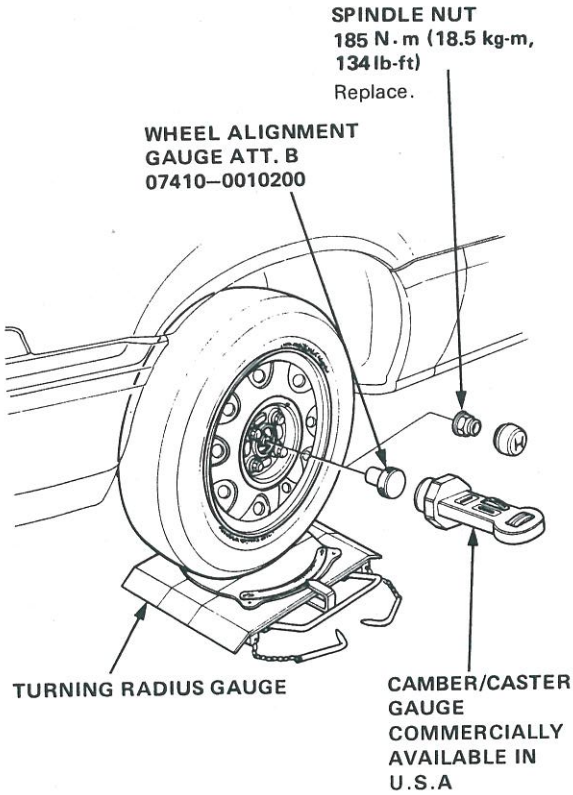
NOTE:
- If your alignment equipment must be mounted at axle centerline, use Honda front and rear wheel alignment attachments as shown.
- Camber is not adjustable. If out of specification, check suspension for damage and replace parts as necessary, then recheck alignment.

Wheel Alignment

Caster Inspection

1. Jack up the front of the car and set the turning radius gauges beneath the front wheels, then lower the car.
2. Remove the spindle nut and install Wheel Alignment Gauge Attachment.
3. Install Camber/Caster Gauge on the Attachment and apply the front brake. Turn the wheel 20° inward.
4. Turn the adjust screw so that the bubble in the caster gauge is at 0°. Return the wheel to the straight ahead position.

Caster angle:
Caster angle: 2-1/4° ± 1°



NOTE:
- If your alignment equipment must be mounted at axle centerline, use Honda front and rear wheel alignment attachments as shown.
- Caster is not adjustable. If out of specification, check suspension for damage and replace parts as necessary, then recheck alignment.

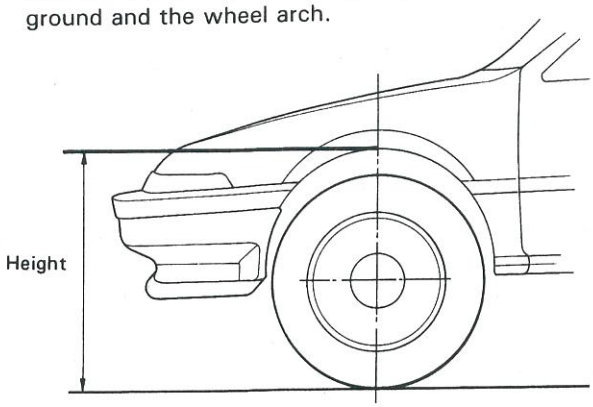
Spring Height

Inspection

NOTE:
- The car must not be occupied; the tires must be properly inflated and in good condition (i.e., the tread wear indicators must not be showing); and the fuel tank must be full.
- Bounce the front or rear of the car up and down several times before measuring.

Front

1. Measure the torsion bar spring height between the ground and the wheel arch.



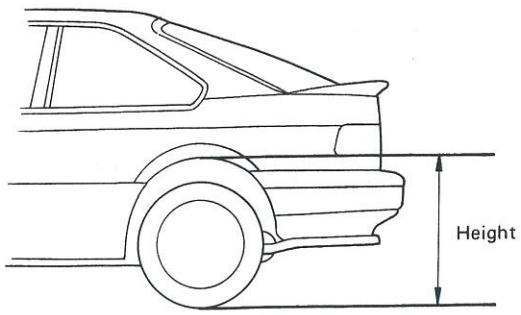
Standard: 653 ± 15 mm (25.71 ± 0.59 in)

2. Adjust the height if the reading is not within specifications. (Page 18-5)

Rear

1. Measure the rear coil spring height between the ground and the wheel arch.

	Standard (New)	Service Limit
3Door	667 mm (26.26 in.)	652 mm (25.67 in.)
5Door	670 mm (26.38 in.)	655 mm (25.79 in.)



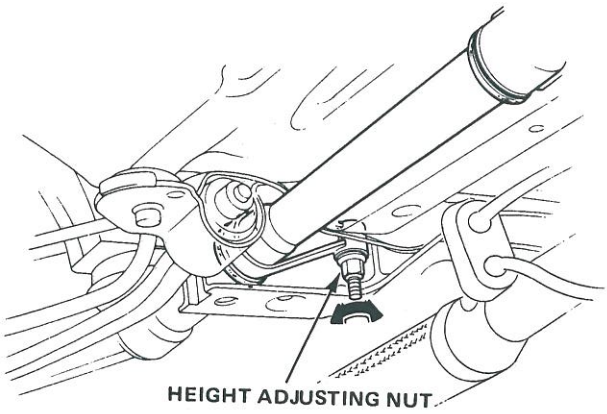
2. Rear spring height is not adjustable. If out of specification replace coil spring.

Torsion Bar Adjustment

1. Raise the front wheels off the ground.
2. Adjust the height by turning the height adjusting nut.

Height adjusting nut	Height
Tighten (Turned right) Loosen (Turned left)	Up Down

Height varies 5 mm (0.20 in) per turn of the adjusting nut.

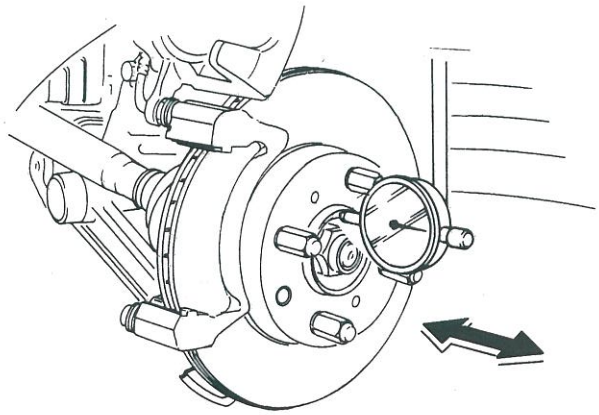


3. Lower the front wheels to the ground, push the car up and down and back and forth several times, then confirm that the spring height is within specifications.

Bearing End Play

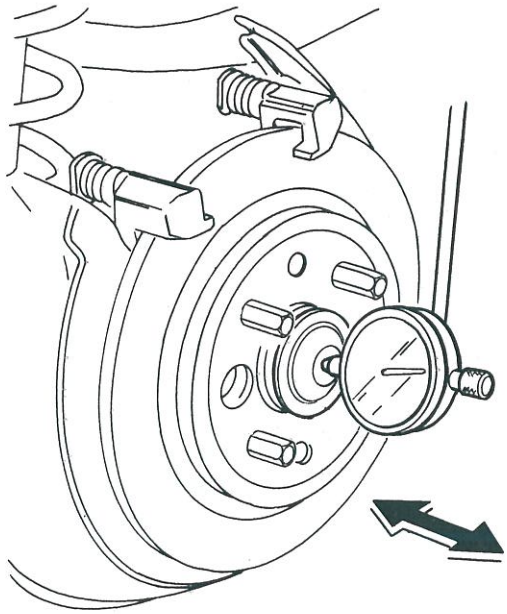
Front Wheel End Play

Standard: 0—0.05 mm (0—0.002 in.)



Rear Wheel End Play

Standard: 0—0.05 mm (0.002 in)

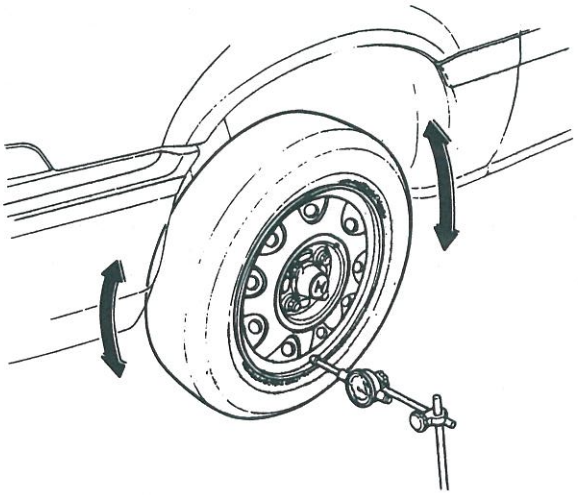


Wheel Measurement

Runout

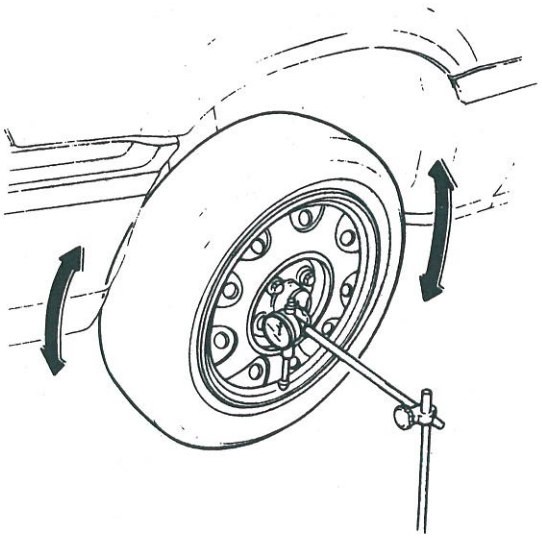
Front and Rear Wheel Axial Runout

Standard: Steel— 0—1.0 mm (0.04 in.)
Aluminum— 0—0.7 mm (0.028 in.)



Front and Rear Wheel Radial Runout

Standard: Steel— 0—1.0 mm (0.039 in.)
Aluminum— 0—0.7 mm (0.028 in.)

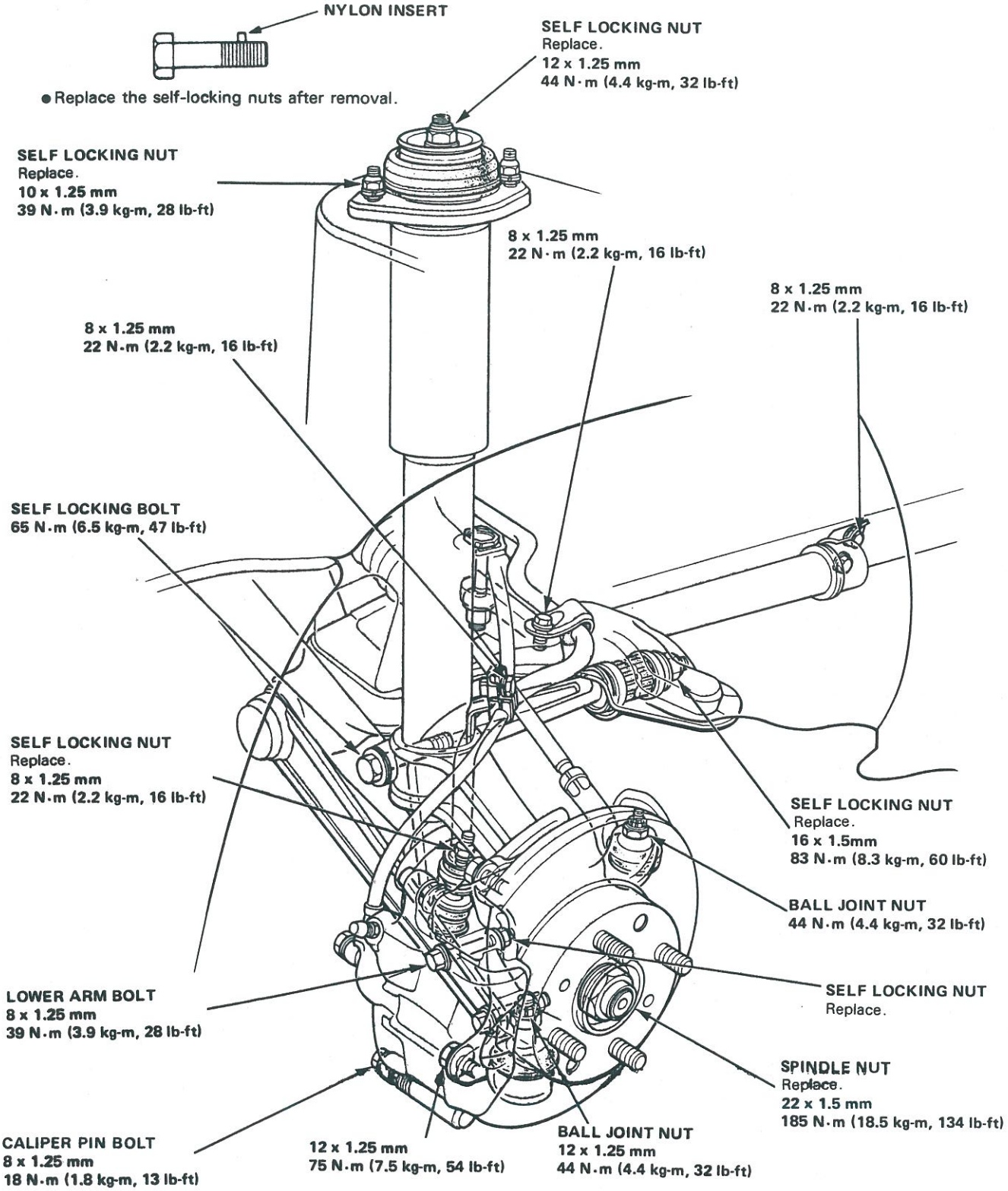


Index

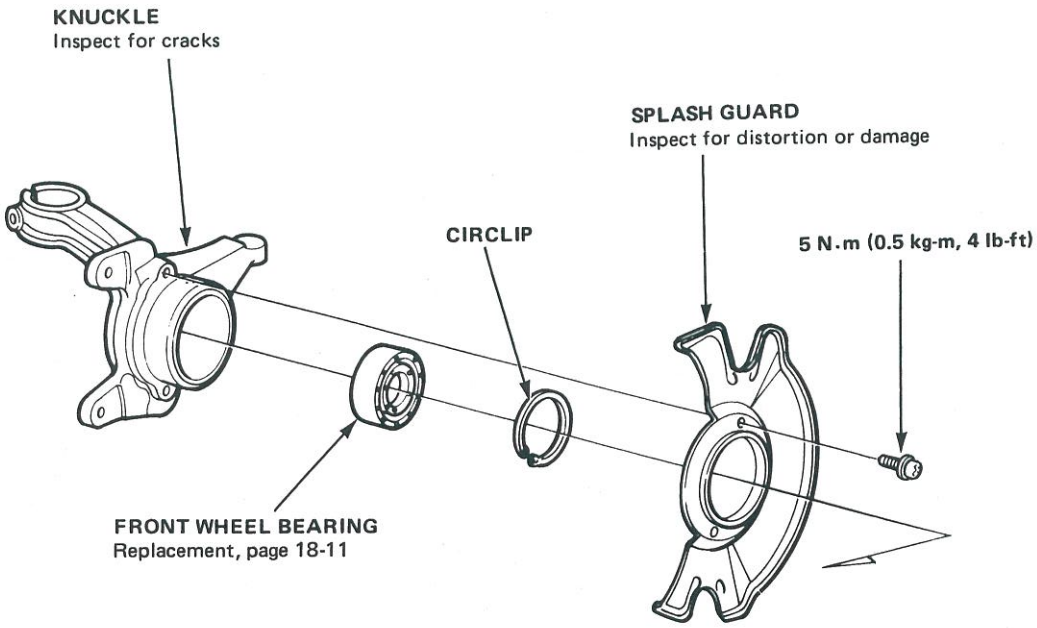
NOTE:

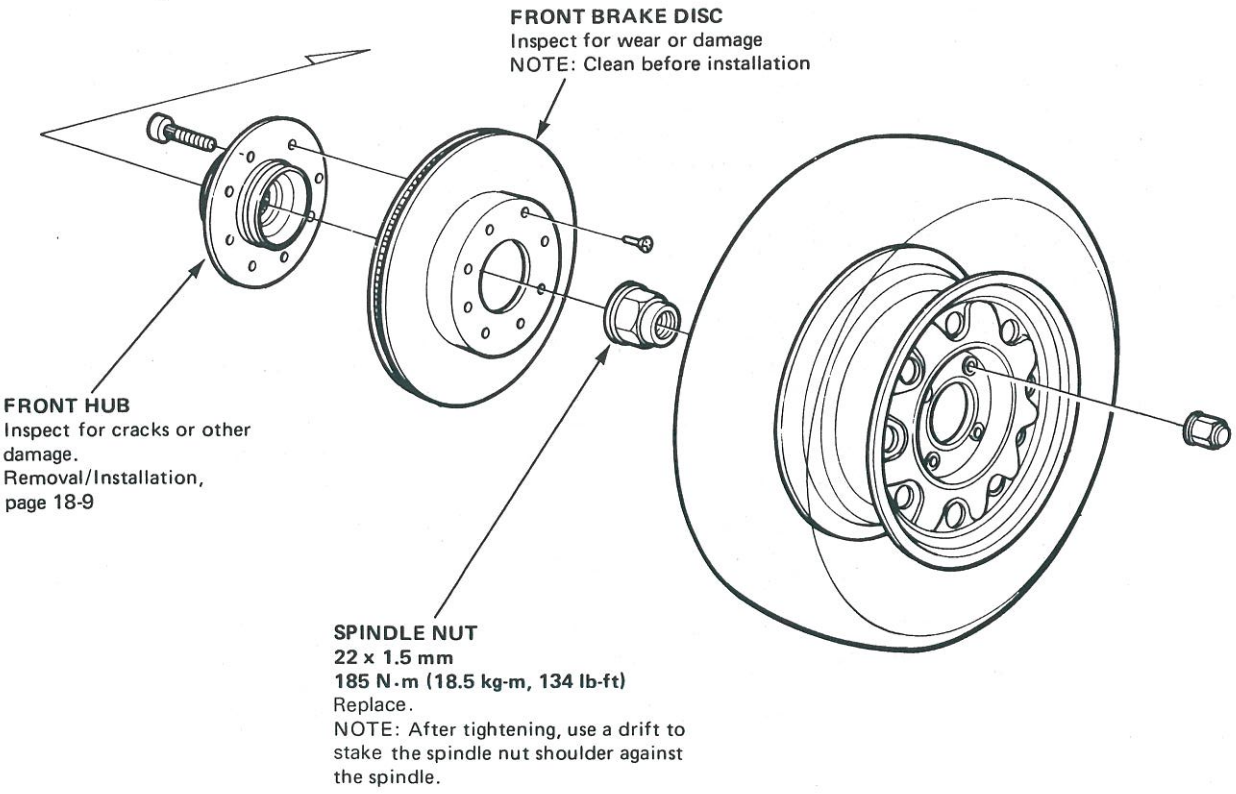
- Replace the self-locking bolts if you can easily thread a nut past their nylon locking inserts.

- Replace the self-locking nuts after removal.



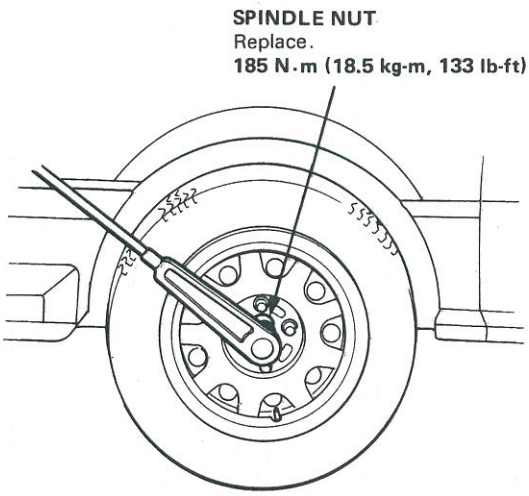
CAUTION: Before tightening the bolts or nuts connected to rubber mounts or busings, the vehicle should be on the ground.


KNUCKLE
Inspect for cracks
SPLASH GUARD
Inspect for distortion or damage
CIRCLIP
5 N.m (0.5 kg-m, 4 lb-ft)
FRONT WHEEL BEARING
Replacement, page 18-11


FRONT BRAKE DISC
Inspect for wear or damage
NOTE: Clean before installation
FRONT HUB
Inspect for cracks or other damage.
Removal/Installation, page 18-9
SPINDLE NUT
22 x 1.5 mm
185 N.m (18.5 kg-m, 134 lb-ft)
Replace.
NOTE: After tightening, use a drift to stake the spindle nut shoulder against the spindle.

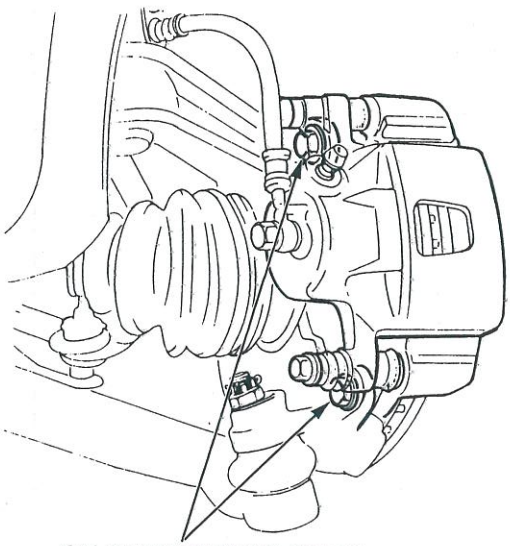
Replacement

1. Pry the spindle nut lock tab away from the spindle, then loosen the nut using a 32 mm socket.



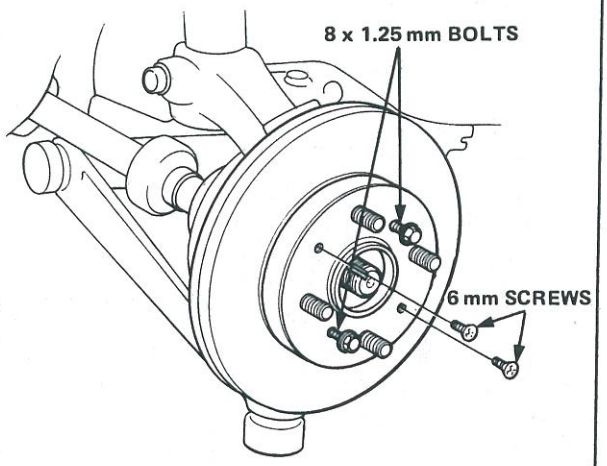
2. Loosen the lug nuts slightly.
3. Raise the front of car and support with safety stands in the proper locations.
4. Remove the lug nuts, wheel, and spindle nut.
5. Remove the caliper mounting bolts and hang the caliper assembly to one side.

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 under-carriage.

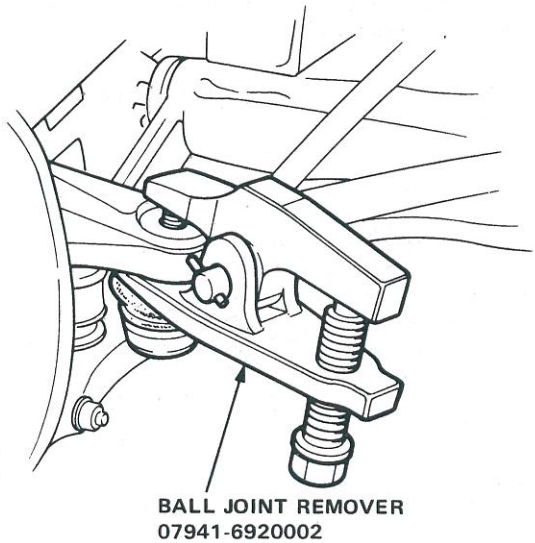


6. Remove the 6 mm brake disc retaining screws.
7. Screw two 8 x 1.25 x 12 mm bolts into the disc to push it away from the hub.

NOTE: Turn each bolt two turns at a time to ensure smooth removal.



8. Remove the cotter pin from the tie-rod castle nut then remove the nut.
9. Break loose the tie-rod ball joint using a Ball Joint Remover, then lift the tie-rod out of the knuckle.



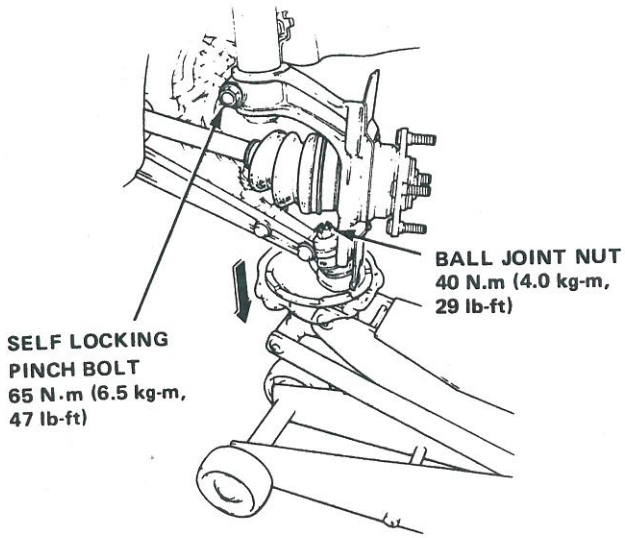
(cont'd)

Replacement (cont'd)

10. Use a floor jack to support the lower control arm, then remove the ball joint cotter pin and nut.

    CAUTION: Make sure the floor jack is positioned securely under the lower control arm, at the ball joint. Otherwise, torsion bar tension on the lower control arm may cause the arm to "jump" suddenly away from the steering knuckle as the ball joint is being removed.

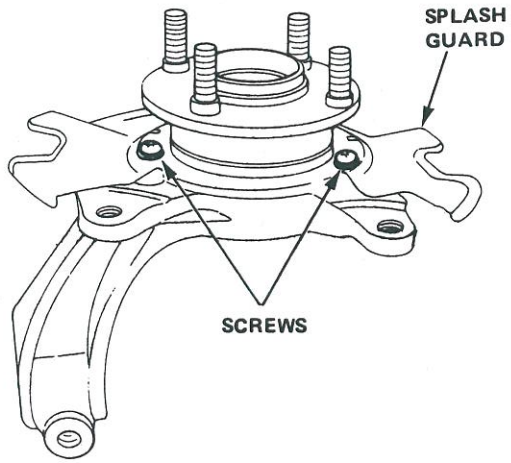
11. Pry the ball joint out of the steering knuckle. If necessary use the ball joint remover.



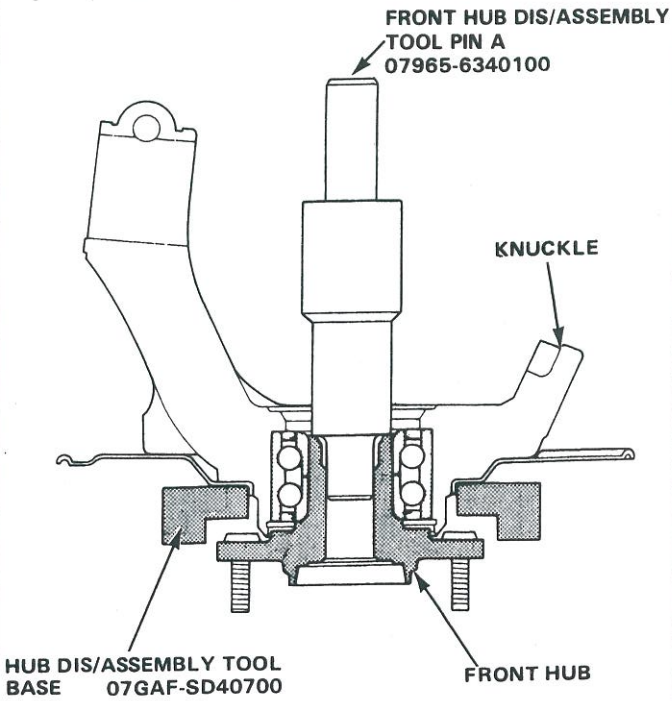
12. Remove the self-locking pinch bolt, then use a brass or lead hammer to tap the knuckle down until it clears the damper.

13. Pull the driveshaft out of the knuckle, then remove the hub/knuckle assembly.

14. Remove the two screws holding the splash guard on the steering knuckle.



15. Remove the hub from the knuckle with a hydraulic press and the special tools shown below.

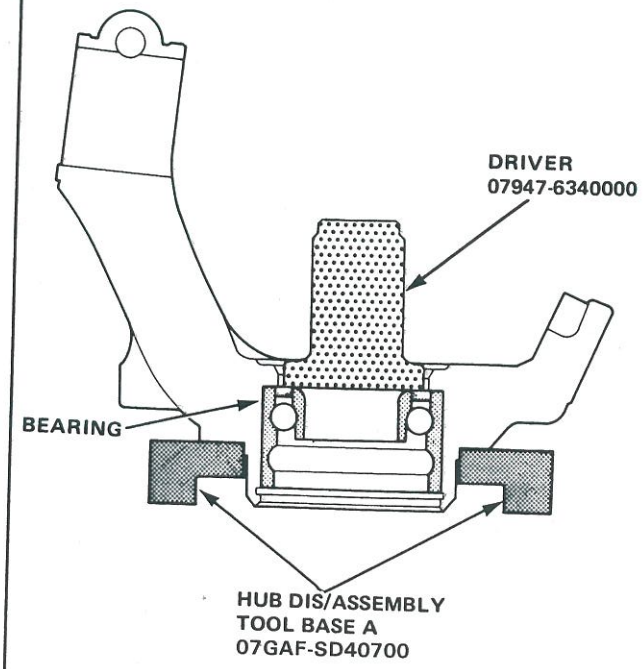


CAUTION:

- **Make sure the knuckle is securely mounted on the base.**
- **Take care not to distort the splash guard.**
- **Support the hub by hand to prevent it from falling.**

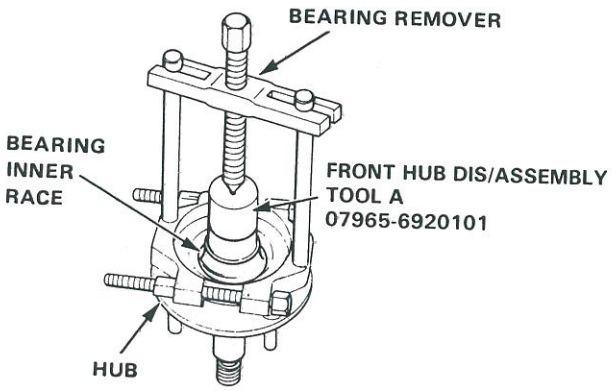
Bearing Removal

1. Remove the circlip.
2. Remove the bearing from the steering knuckle with the hydraulic press and special tools shown below.



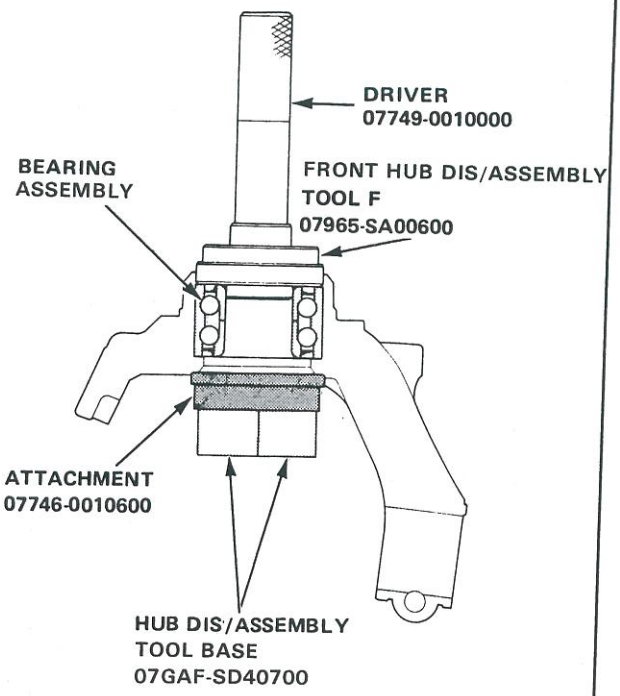
3. Remove the outboard bearing inner race from the hub with the special tool and a bearing remover.

   NOTE: Wash the knuckle and hub thoroughly before reassembly.



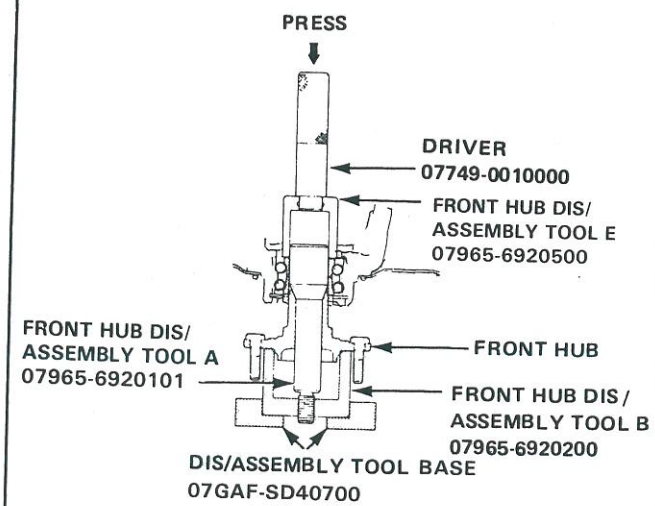
Knuckle/Hub Reassembly

1. Press the bearing assembly into the knuckle using a hydraulic press and the special tools shown below.



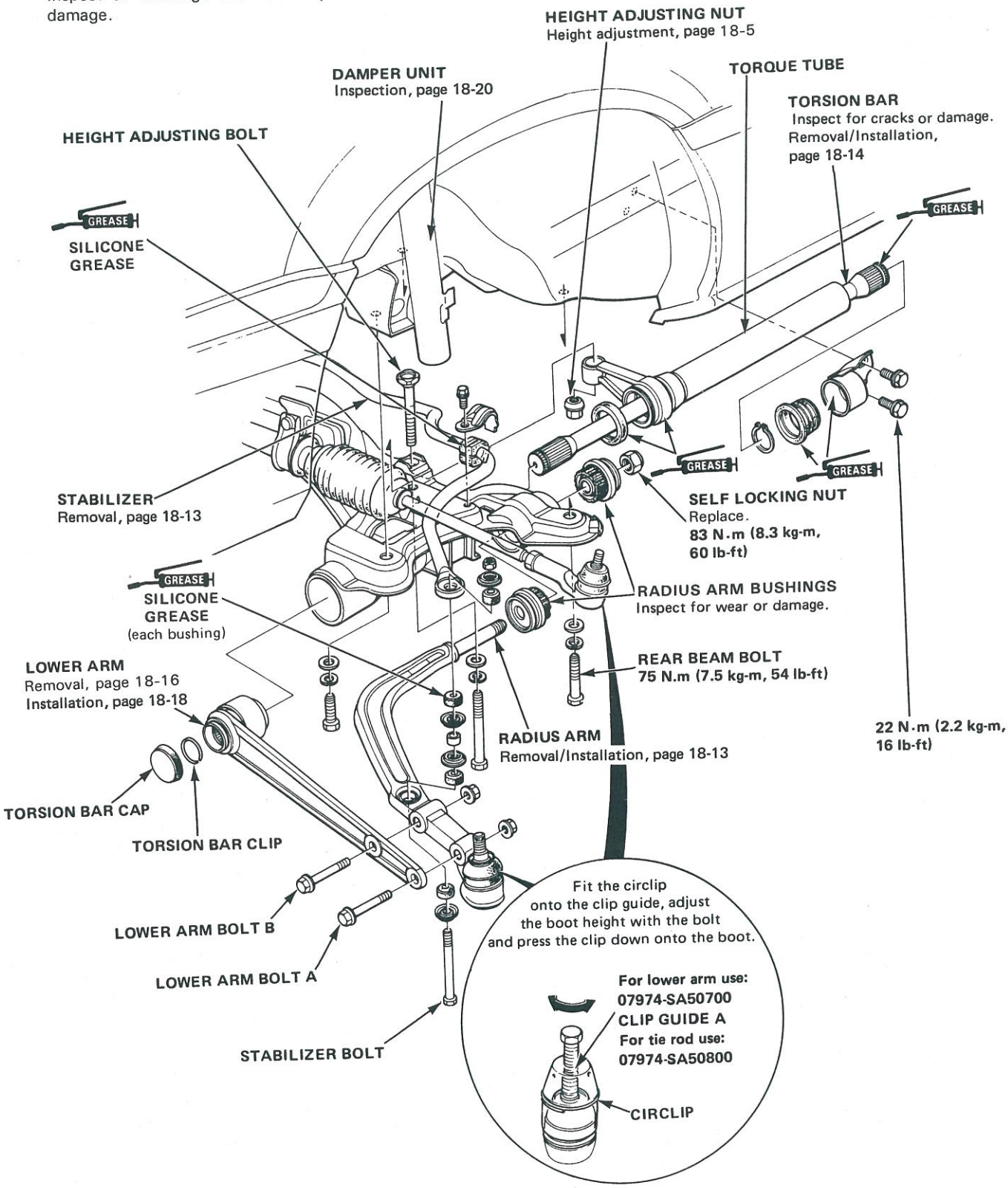
2. Install the circlip.
3. Install the splash guard.
4. Press the front hub into the knuckle with a hydraulic press and the special tools shown below.

   CAUTION: Maximum press load: 2.0 tons



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NOTE: Replace self-locking nuts after removal. Inspect all bushings and rubber parts for wear or damage.



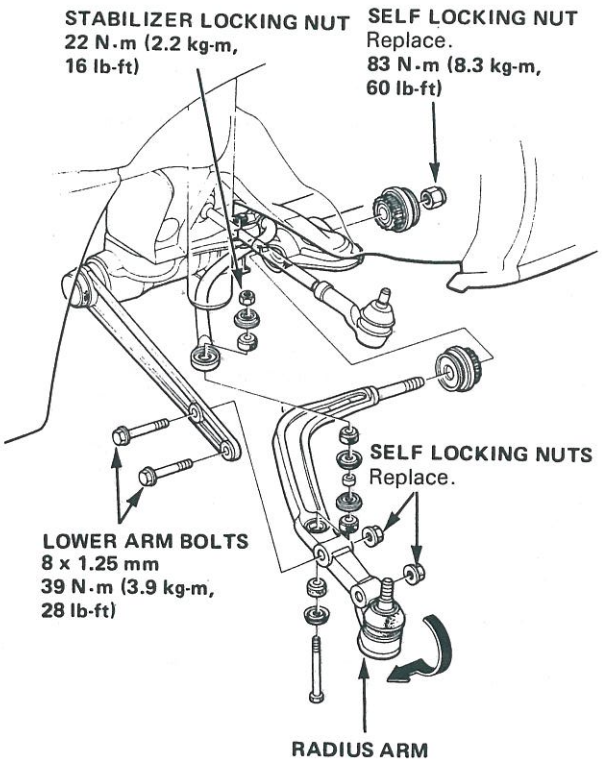
Radius Arm

Removal/Installation

1. Raise the front of the car off the ground and support it with safety stands (see page 1-7 for the proper location of the safety stands).
2. Remove the front wheels.
3. Remove the radius arm ball joint from the knuckle (page 18-10).

CAUTION: Make sure the floor jack is positioned securely under the lower control arm at the ball joint. Otherwise, torsion bar tension on the lower control arm may cause the arm to "jump" suddenly away from the steering knuckle as the ball joint is being removed.

4. Remove the radius arm self-locking nuts.



5. Remove the stabilizer locking nut and separate the radius arm from the stabilizer spring.
6. Remove the lower arm bolts.
7. Remove the radius arm by pulling it down and then forward.
8. Installation is the reverse order of removal.

CAUTION: Tighten all bushings and rubber dampered parts only after the car is back on the ground.

Stabilizer

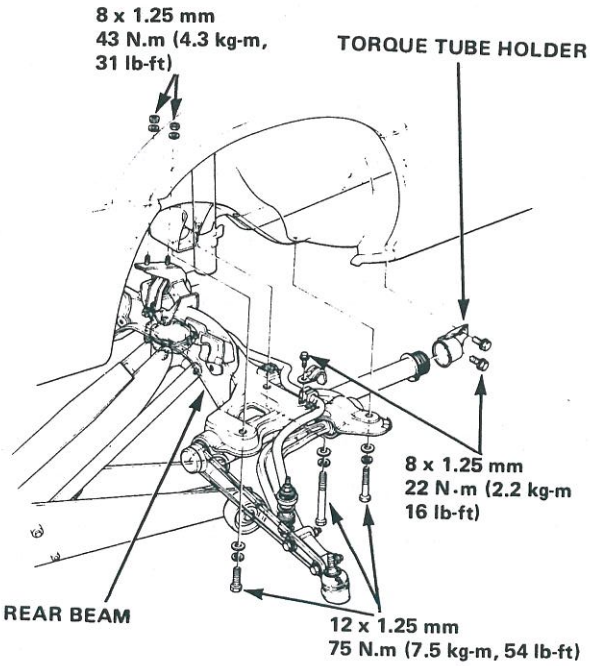
Removal

1. Raise the front of the car off the ground and support it with safety stands (see page 1-7 for the proper location of the safety stands).
2. Remove the front wheels.
3. Support the weight of the engine with a chain hoist or similar device.
4. Remove the steering gearbox (page 17-26).
5. Separate the radius arm ball joint from the knuckle (page 18-10).

CAUTION: Make sure the floor jack is positioned securely under the lower control arm at the ball joint. Otherwise, torsion bar tension on the lower control arm may cause the arm to "jump" suddenly away from the steering knuckle as the ball joint is being removed.

6. Remove the torque tube holder.
7. Remove exhaust pipes A and B.
8. Manual Transmission:
   Disconnect the shift rod and extension from the transmission.
   Automatic Transmission:
   Remove the shift cable guide from the floor and pull the shift cable down by hand.
9. Remove the engine mount bracket nuts.
10. Pry off the rear beam by placing a jack at the center and removing the six 12 mm bolts.

CAUTION: Take care not to drop the rear beam assembly.



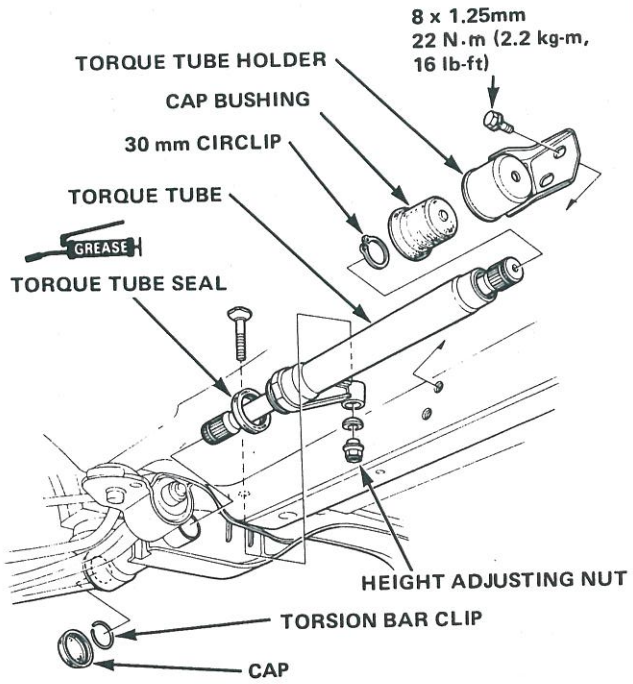
11. Remove the stabilizer bracket and bolt, and then remove the stabilizer spring.
12. Remove the rear mounting bracket.

Torsion Bar Assembly

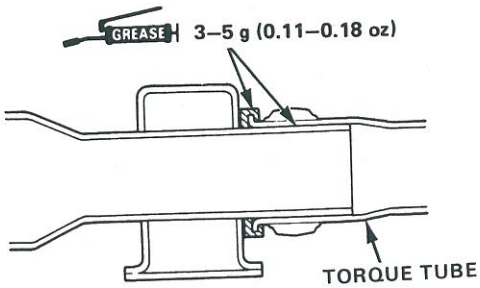
Removal/Installation

1. Jack up the front of the car and support it with safety stands (see page 1-7 for the proper location of safety stands).
2. Remove the height adjusting nut.
3. Remove the torque tube holder.
4. Remove the 30 mm circlip.
5. Remove the torsion bar cap and then remove the torsion bar clip by tapping the torsion bar forward out of the torque tube.

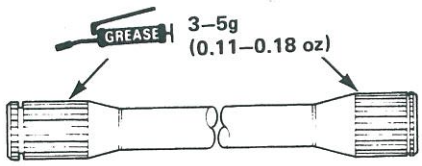
NOTE: Move the lower arm up and down to make the torsion bar slide easier.



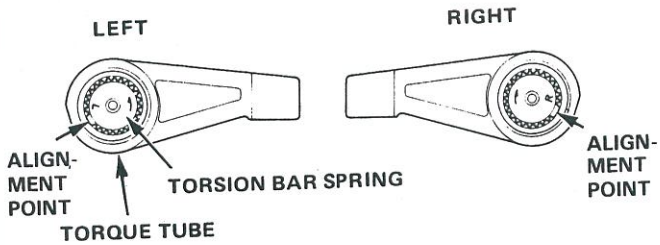
6. Tap the torsion bar backward, out of the torque tube.
7. Remove the torque tube.
8. Inspect the torsion bar for cracks or damage.
9. Install a new torque tube seal onto the torque tube.
10. Coat the torque tube seal and the torque tube sliding surface with grease, then install the torque tube on the rear beam.



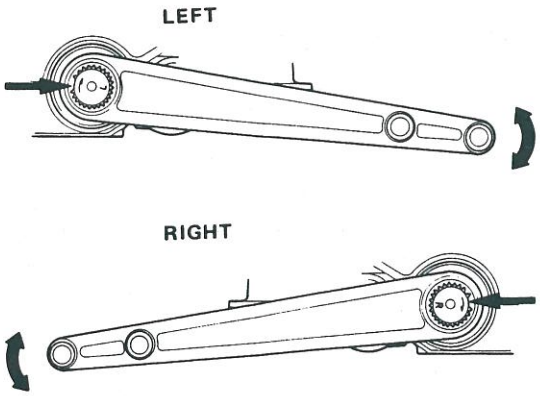
11. Grease the splines at each end of the torsion bar.



12. Insert the torsion bar into the torque tube from the back.
13. Align the projection or punch mark on the torque tube splines with the cutout or paint mark in the torsion bar splines and insert the torsion bar approximately 10 mm (0.394 in).

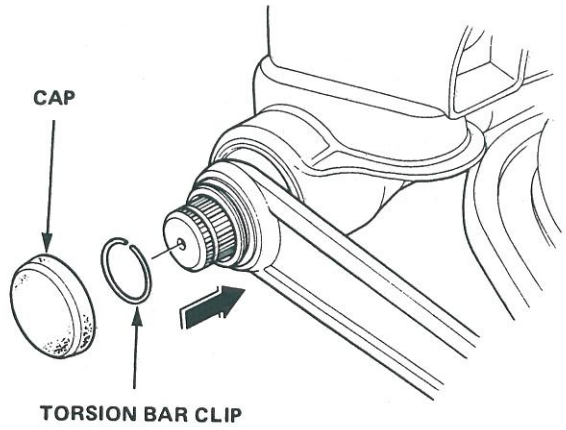


NOTE:
- Move the lower arm up and down for easier installation.
- There are two types of torsion bars and torque tube; torque tubes with and without raised lugs and torsion bars with and without lug reliefs. The torque tube with the raised lug will not fit over a torsion bar without a lug relief. All other combinations of torque tube and torsion bar will fit together and work properly.



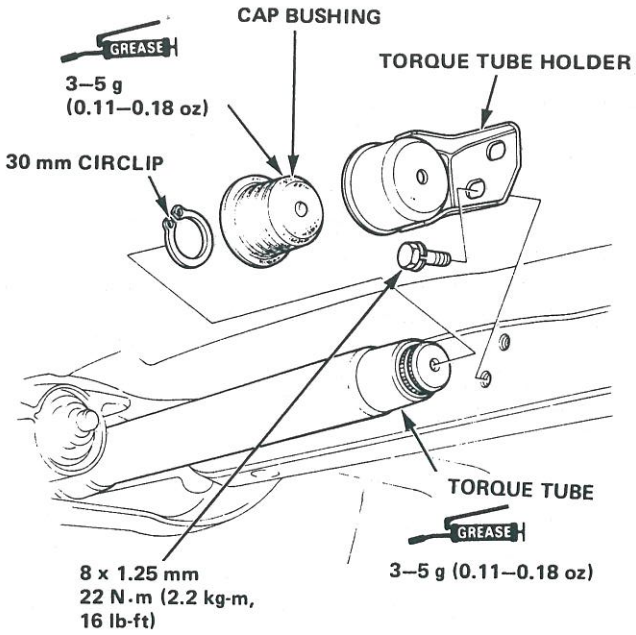
14. Align the projection in the lower arm splines with the cutout in the torsion bar splines and push the torsion bar in until the torsion bar clip can be installed.

15. Install the clip on the torsion bar, and the cap over it.



16. Install the 30 mm circlip on the back of torsion bar.

    NOTE: Push the torsion bar forward so that there is no clearance between the 30 mm circlip and the torque tube.



17. Coat the cap bushing with grease and install it on the torque tube.

18. Install the torque tube holder.

19. Tighten the height adjusting nut temporarily.

    NOTE: Coat the height adjusting nut and the torque tube sliding surface with grease.

20. Set the car on the ground and adjust the torsion bar spring height (page 18-5).

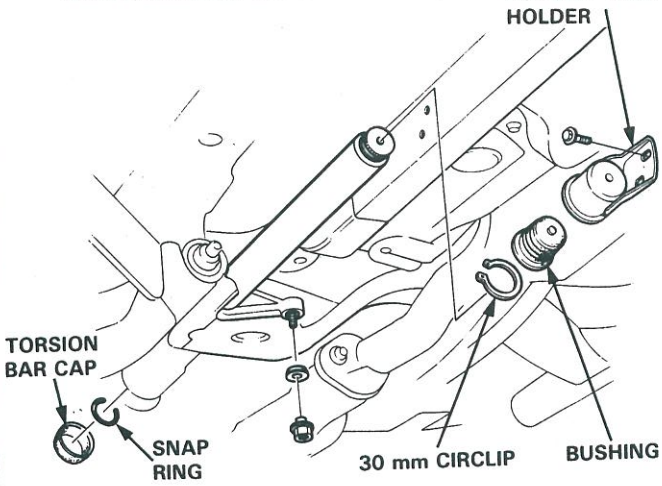
Lower Arm

Removal

1. Jack up the front of the car and support it with safety stands in the proper locations (see Page 1-7).

2. Remove the front fender splash shields and engine under cover.

3. Remove the height adjusting nut, torque tube holder, bushing, and 30 mm circlip.

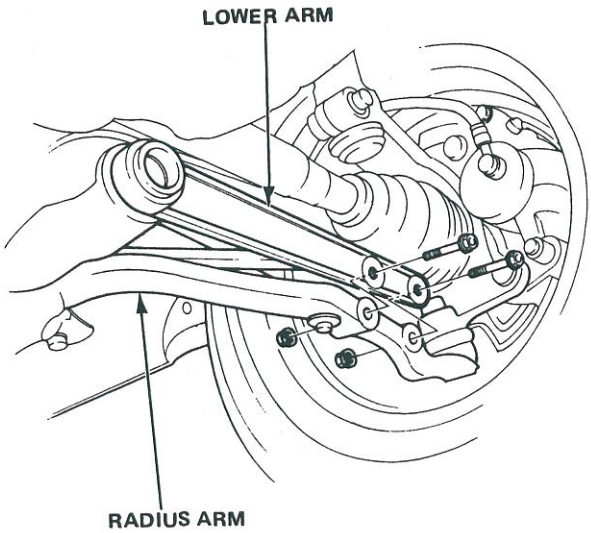


4. Remove the torsion bar cap, then tap the torsion bar forward to gain access to its snap ring. Remove the snap ring.

5. Remove the torsion bar by tapping it backwards out of the torque tube.

6. Remove the torque tube.

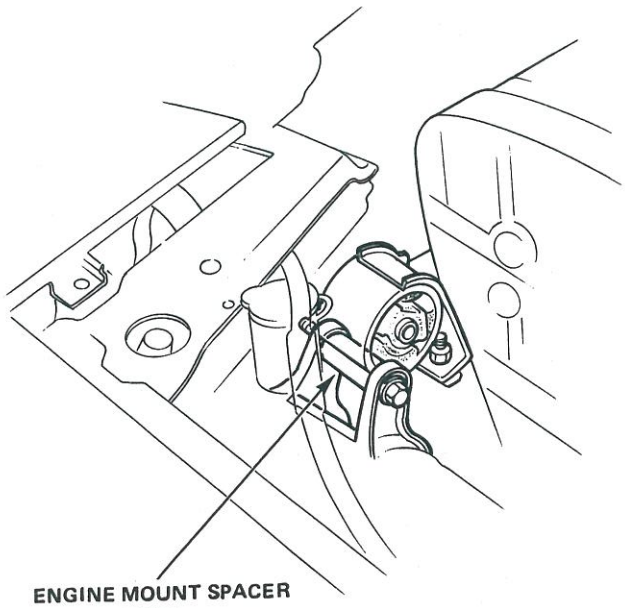
7. Remove the bolts and nuts that secure the lower arm to the radius arm.



8. Raise the engine, as necessary, for access to the lower arm.

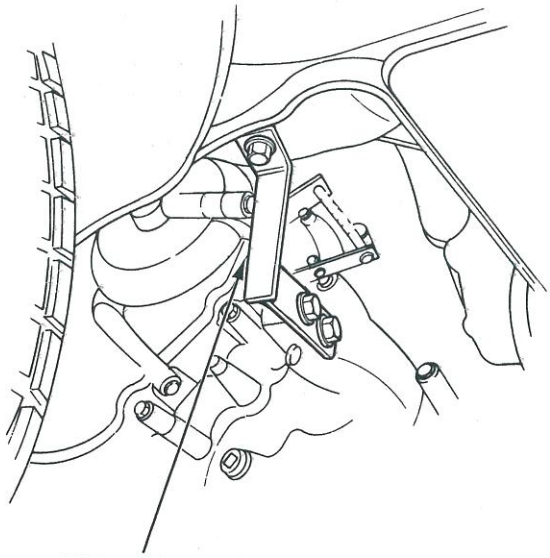
9. Remove the power steering pump bracket and cruise control actuator (cruise control equipped model only).

- If you're replacing the left side, you'll need to remove the alternator adjustor bolt, then push the alternator up against the block. Now, raise the engine and insert the engine mount spacer into the mount; this will raise the oil pan clear of the left lower arm.



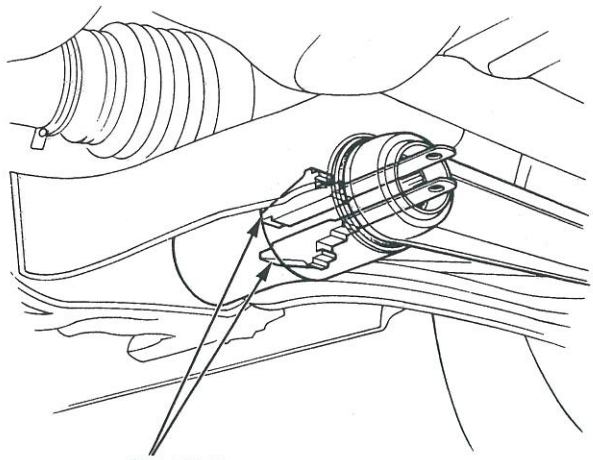
ENGINE MOUNT SPACER
07965-SB2070A

- If you're replacing the right side and the car has a manual transmission, the engine can stay in place. But if the car has an automatic transmission, you'll need to install the transmission support bracket. In that case, remove the battery and its tray. Raise the transmission slightly and remove the transmission mount. Install the transmission support bracket as shown on the next page.



TRANSMISSION SUPPORT BRACKET
07GAF-PH0010A

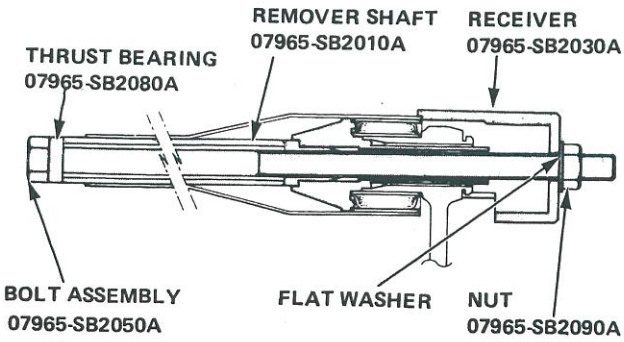
10. Insert the collets into the lower arm so they are directly opposite each other (180° apart), then slide the remover shaft into the bushing from the rear.

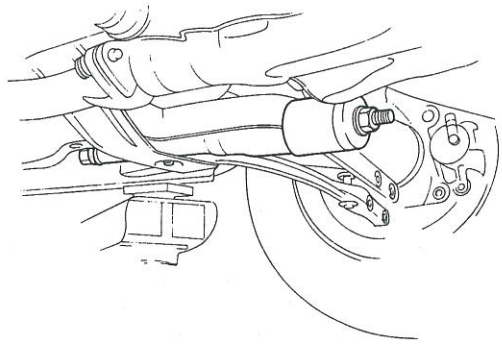


COLLETS
07965-SB20200

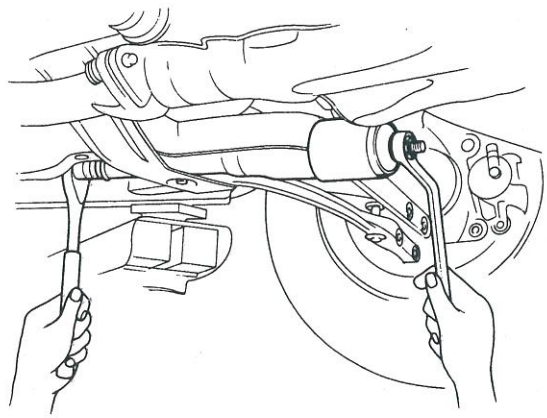
11. Slide the thrust bearing onto the remover shaft's bolt, then slide the bolt through the remover shaft.

12. Fit the receiver over the bolt and lower arm and install the flat washer and nut.





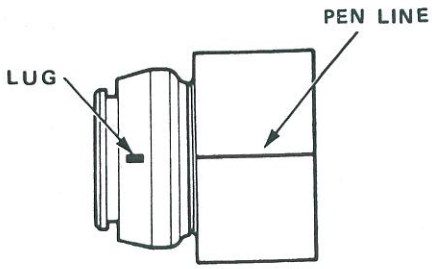
13. Hold the nut with a wrench while turning the bolt clockwise; this will pull the lower arm bushing free of the beam end.



14. Remove the special tools from the beam.

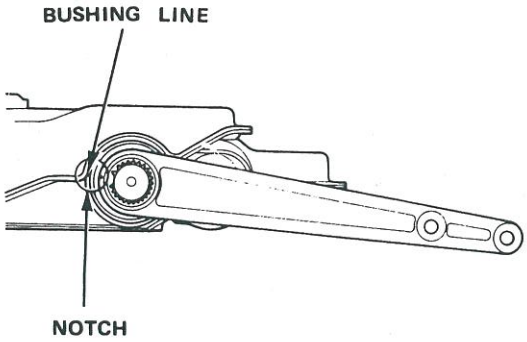
Installation

1. There is an alignment lug cast onto the lower arm. Use a felt tip pen to draw a line directly through the center of the lug and onto the bushing.



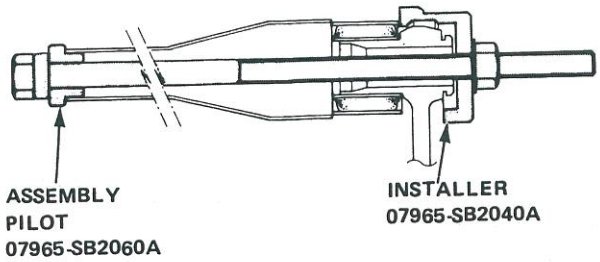
2. With the flat washer and thrust bearing still on the bolt, slide the assembly pilot onto it, then insert them into the back of the bushing hole in the beam.

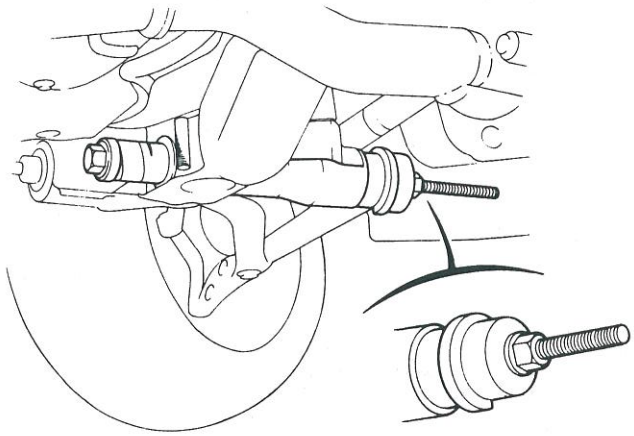
3. Slip the lower arm onto the bolt and align the bushing line (felt tip pen) with the notch on the beam's bushing mount.

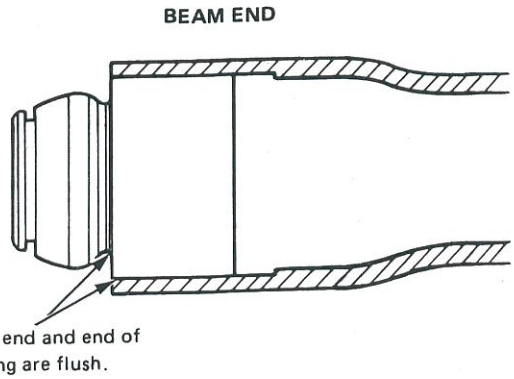


4. Fit the installer, flat washer and nut onto the bolt.

5. Hold the nut with a wrench as you turn the bolt clockwise; this will pull the new lower arm/bushing into place. When the edge of the bushing's steel outer sleeve is flush with the beam end, the bushing is installed to the correct depth.







6. Remove the special tools from the beam end.

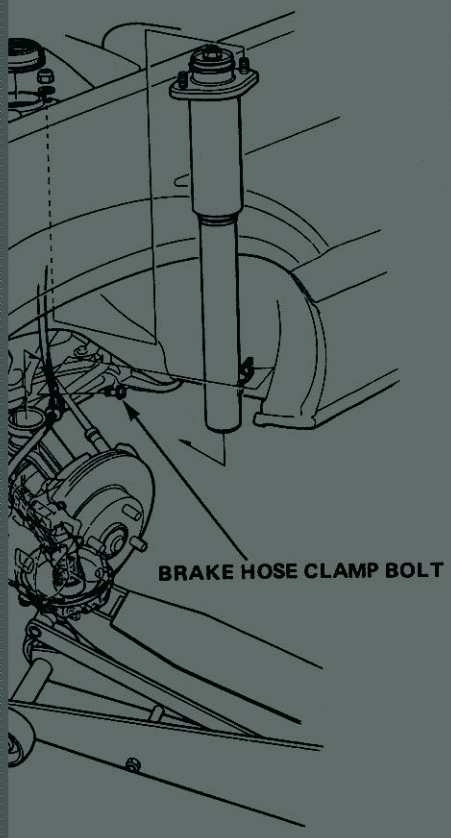
7. Remove any special tools used to hold the engine or transmission elevated, and reinstall any parts that were removed.

   - On the left side, remove the engine mount spacer, then reinstall the engine mount bolt. Reinstall alternator adjuster bolt, adjust belt tension and tighten bolt.
   - On the right side for cars with automatic transmission, remove the transmission support bracket and reinstall the transmission mount. Then reinstall the battery tray and battery. Connect the battery cables.

8. Reinstall the front fender splash shields, engine under cover, power steering bracket, and cruise control actuator.

9. Adjust the power steering belt tension as necessary.

10. Reinstall the torsion bar and torque tube following the instructions detailed on page 18-14.

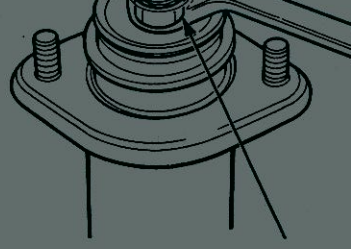


OLT

elf-locking bolt, then lower the jack gradu-
ve it from the knuckle.

**Make sure the floor jack is positioned
der the lower control arm at the ball
wise, torsion bar tension on the control
use the knuckle to "jump" suddenly
he front shock absorber as the pinch
removed.**

self-locking nut and then remove the
he frame by compressing the shock absorb-

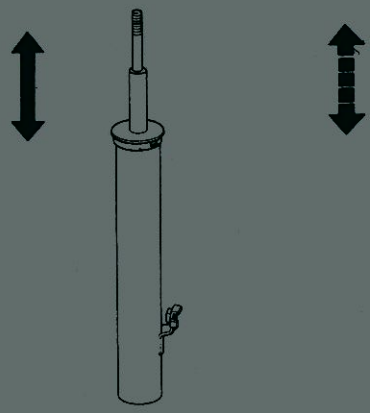


SELF-LOCKIN
Replace.

2. Disassemble the damper assembly.
3. Slowly move the damper piston roc
and check for smooth operation.
4. Move the piston rod back and forth 5
in.) to check for smooth operation.
5. Inspect for oil leaks or cracks in the pi
6. Listen for abnormal noises.

Operation smooth: damper is good.

Op
no
da
de



NOTE: The damper cannot be disa
does not operate smoothly, or if
abnormal noises during operation, re

per

ront of the car, support it with safety
move the front wheels.

rake hose clamp bolt.

ck to support the lower control arm.

Disassembly/Inspection

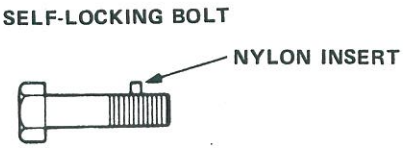
1. Remove the self-locking nut while hol
rod.



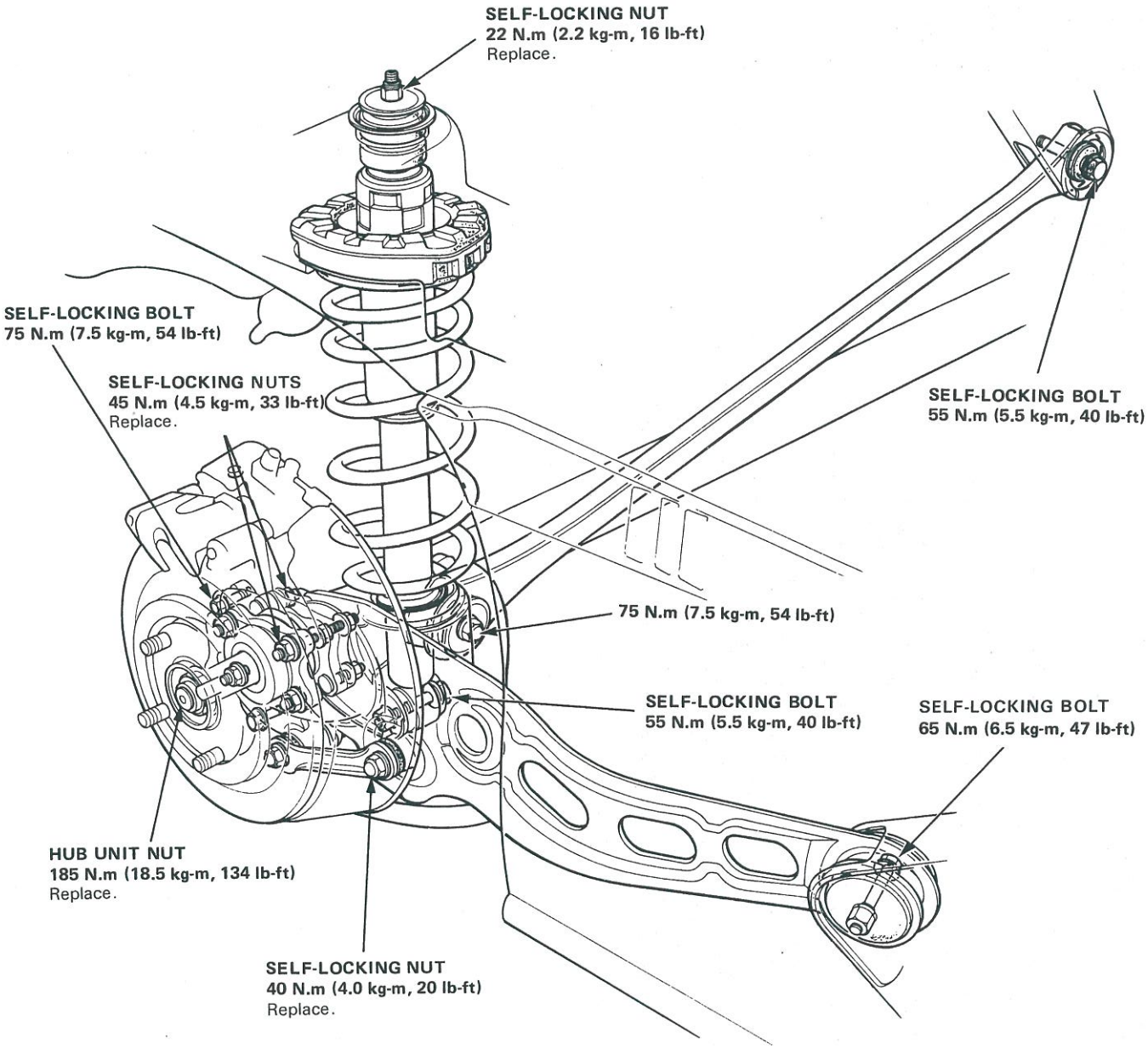
Index

NOTE:

- Replace self-locking bolts if you can easily thread a nut past their nylon locking inserts.



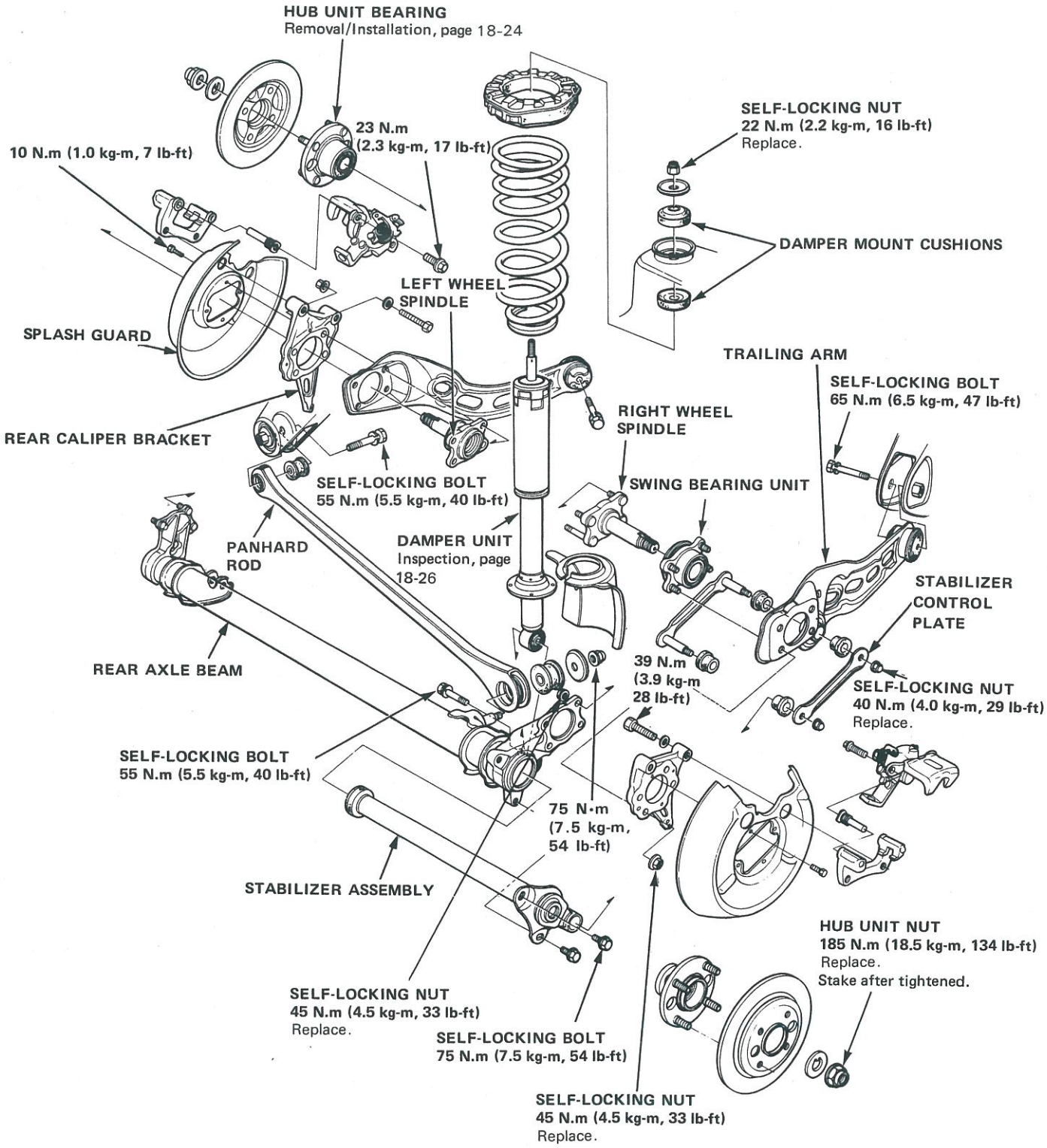
- Replace all self-locking nuts at disassembly.
- Inspect all bushings and rubber parts for wear and damage.



CAUTION: Before tightening the bolts and nuts connected to rubber mounts or bushings, the vehicle should be on the ground.

Disassembly/Inspection

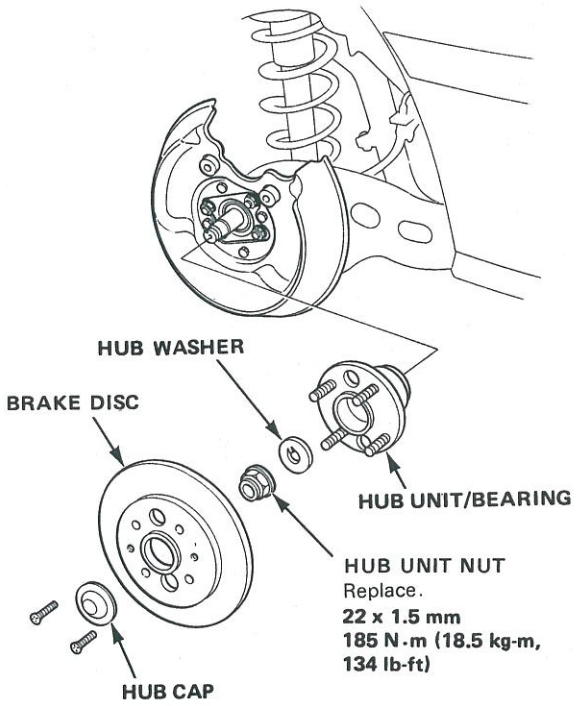
NOTE:
- Replace self-locking bolts if you can easily thread a nut past their nylon locking inserts.
- Replace all self-locking nuts at disassembly.
- Inspect all bushings and rubber parts for wear and damage.



Hub Unit

Removal/Installation

1. Raise the rear of the car and support it with safety stands (see page 1-7 for the proper locations for the safety stands).
2. Remove the rear wheels.
3. Remove the brake caliper and inspect the wheel bearing end play (page 18-5).
4. Remove the brake disc.
5. Remove the hub cap and nut.



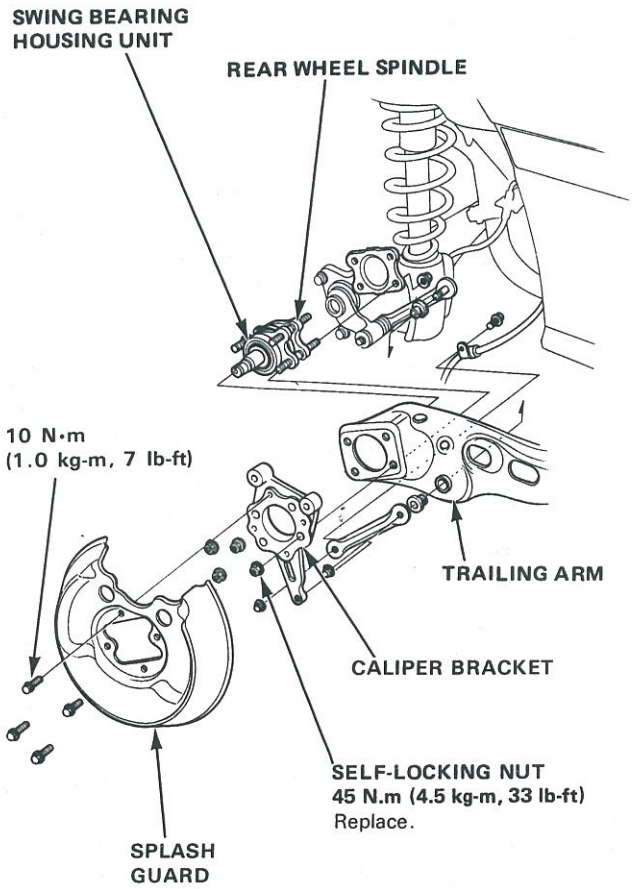
5. Remove the hub unit.
6. Installation is the reverse order of removal.

NOTE: Stake the shoulder of the hub unit nut against the groove in the spindle after tightening.

Swing Bearing

Removal

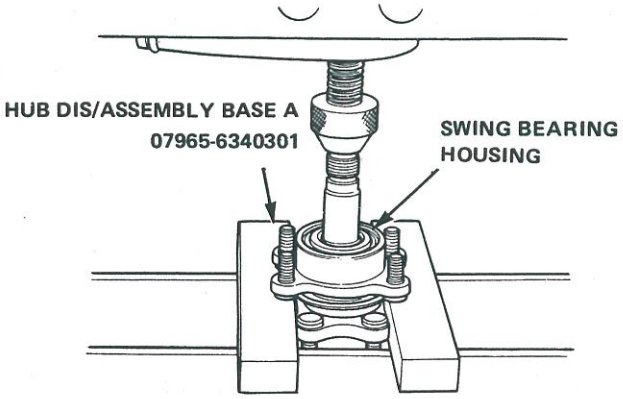
1. Remove splash guard.
2. Remove the caliper bracket.
3. Remove the stabilizer control plate, then remove the trailing arm from the swing bearing housing unit.



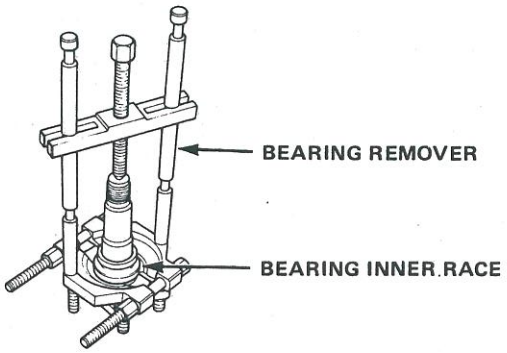
3. Remove the rear wheel spindle from the axle beam.

Replacement

4. Separate the rear wheel spindle from the swing bearing housing with a hydraulic press.



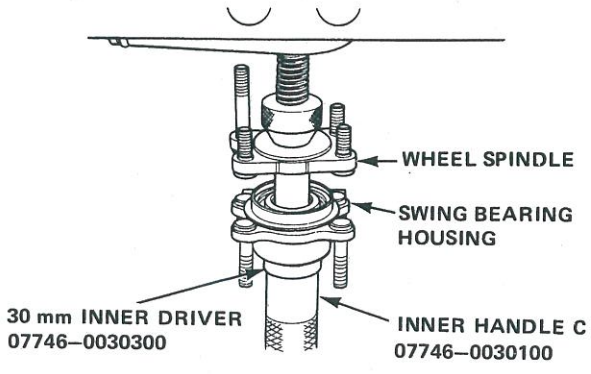
5. Remove the inner race with a bearing remover.



6. Install a new swing bearing when reassembling.

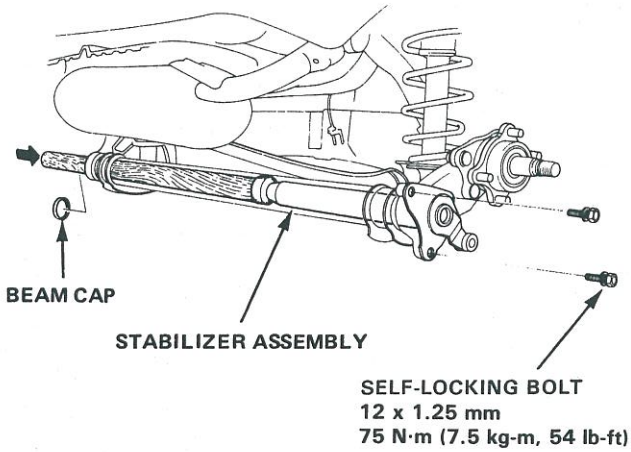
7. Install the wheel spindle into the swing bearing housing with the special tool and hydraulic press.

NOTE: Set the 30 mm inner driver and inner handle C at the inner race of the swing bearing housing.



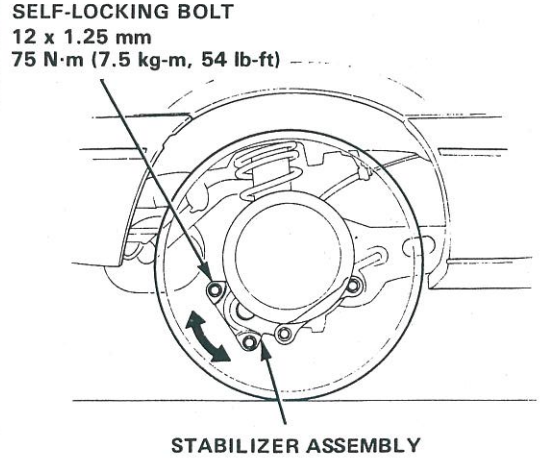
Removal/Installation

1. Raise the rear of the car and support with safety stands (see page 1-7 for the proper locations for the safety stands).
2. Remove the rear wheels.
3. Remove both right and left caliper brackets (page 19-23).
4. Remove the stabilizer control arm (page 18-23).
5. Remove the stabilizer assembly mounting bolt.



6. Remove the right beam cap.
7. Remove the stabilizer assembly by tapping it with a mallet.
8. Stabilizer reassembly is in the reverse order of removal.

NOTE: When fitting the stabilizer assembly into the axle beam, tighten the two self-locking bolts last.

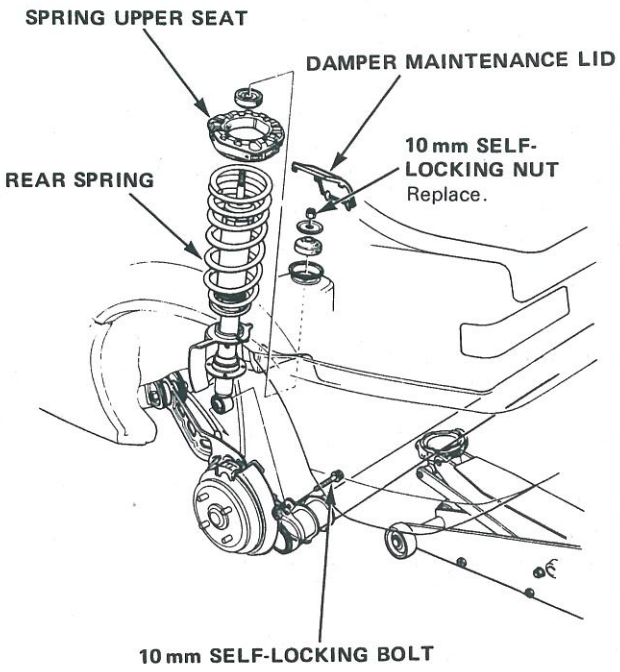


9. Tighten all bushings and rubber dampened parts after the car is back on the ground.

Rear Damper Assembly

Removal

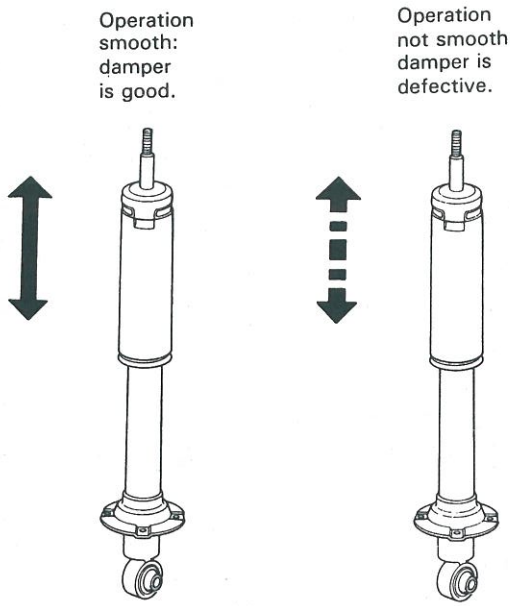
1. Raise the rear of the car and support it with safety stands (see page 1-7 for the proper locations for the safety stands).
2. Remove the rear wheels.
3. Place a jack under the rear axle beam.
4. Remove the damper maintenance lid and the self-locking nut.



5. Lower the jack gradually and remove the self-locking bolt, rear spring, and spring seat.

Inspection

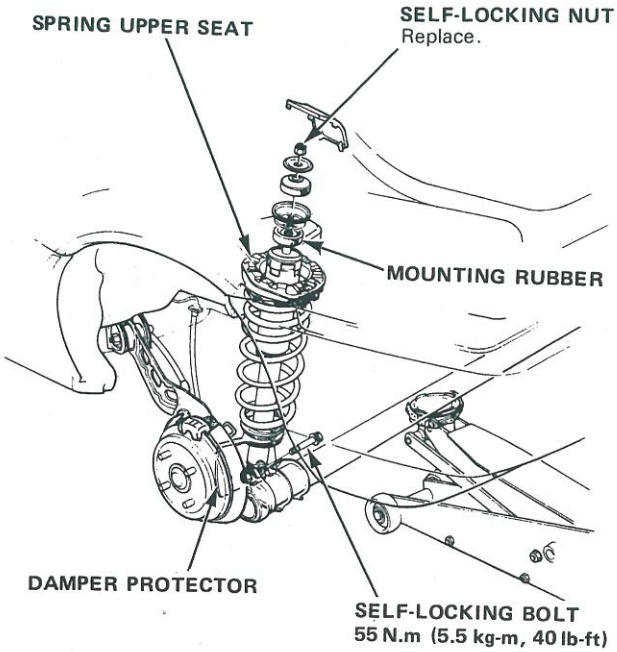
1. Slowly move the damper piston rod a full stroke and check for smooth operation.
2. Move the piston rod back and forth 5—10 mm (2—4 in.) and check for smooth operation.
3. Inspect for an oil leak or cracks in the piston rod.
4. Listen for abnormal noises.



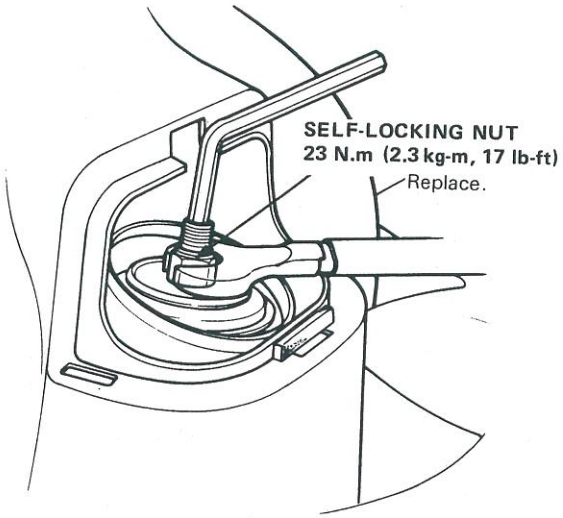
NOTE: The damper cannot be disassembled. If it does not operate smoothly, or if it makes any abnormal noises during operation, replace it.

Installation

1. Fit the upper spring seat into the frame.
2. Install the damper protector on the damper unit, and install the dust cover, damper mounting collar, and rear spring, then temporarily tighten the damper at the axle beam.



3. Fit the inner damper mount rubber into the frame.
4. Jack up the axle beam so that the damper shaft fits into the hole in the frame.
5. Install the outer damper mount rubber and washer and then tighten the self-locking nut.



6. Install the damper maintenance lid.
7. Tighten the damper on the rear axle beam.

   NOTE: Tighten the rubber and bushing with the vehicle placed on the ground.

Brakes

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Illustrated Index

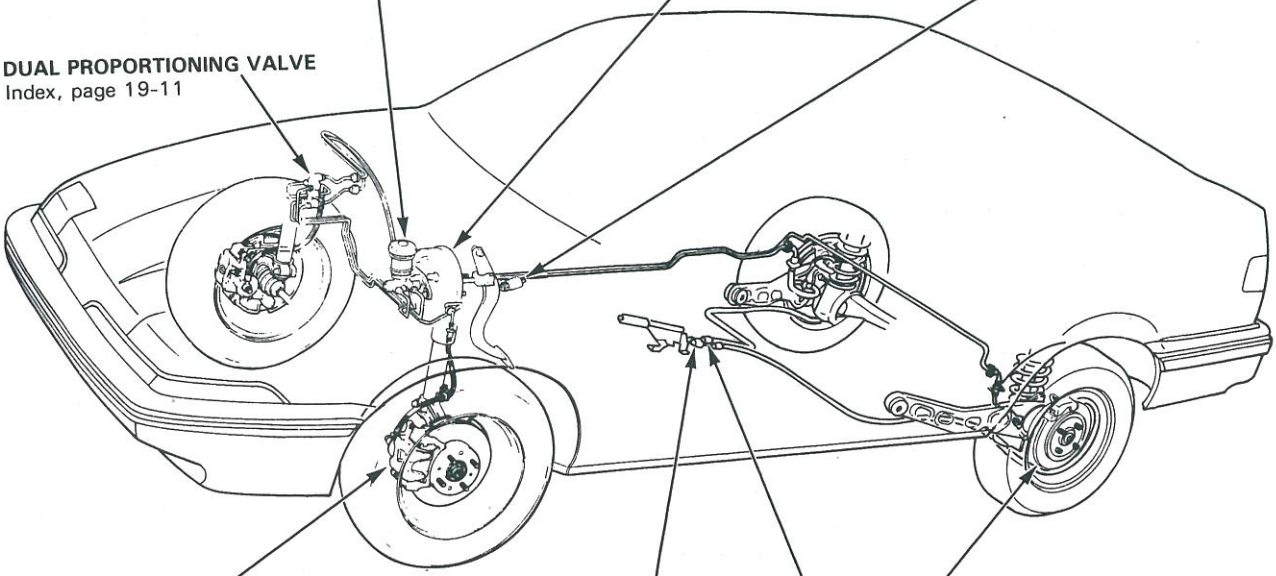
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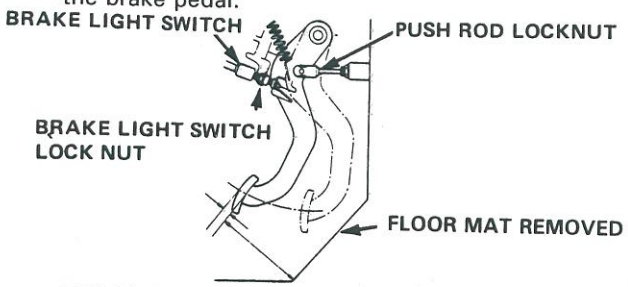
RARKING BRAKE SWITCH
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PARKING BRAKE
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Pedal Height

Adjustment

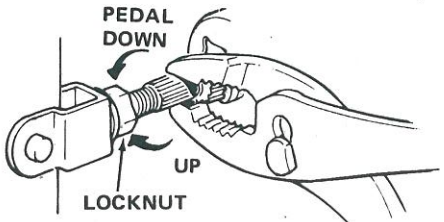
1. Loosen the brake light switch locknut and back off the brake light switch until it is no longer touching the brake pedal.



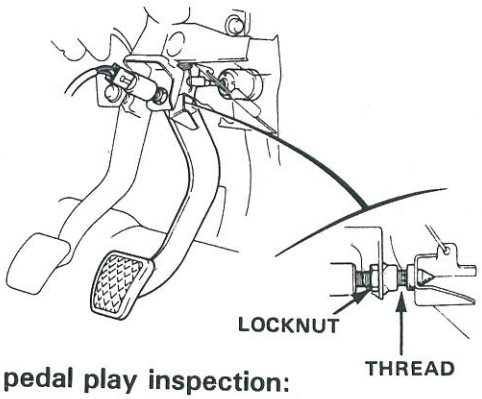
PEDAL PLAY: 1—5 mm (1/16—13/64 in.)
PEDAL HEIGHT: 174 mm (6-7/8 in.)

2. Loosen the pushrod locknut and screw the pushrod in or out with pliers until the pedal height from the floor is 174mm (6-7/8 in.).

After adjustment, tighten the lock nut firmly.



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 1/2 turn and tighten the locknut firmly.



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 play with the pushrod pushed.

CAUTION: Check that the brake lights go off when the pedal is released.

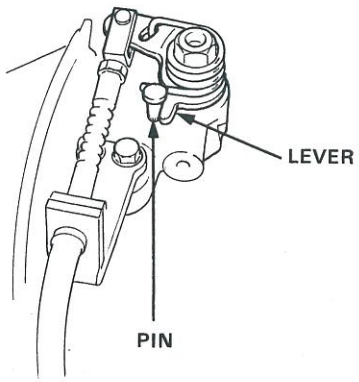
Parking Brake

Adjustment

NOTE: After rear caliper servicing, depress the brake pedal several times to set the self-adjusting brakes before adjusting brake cable.

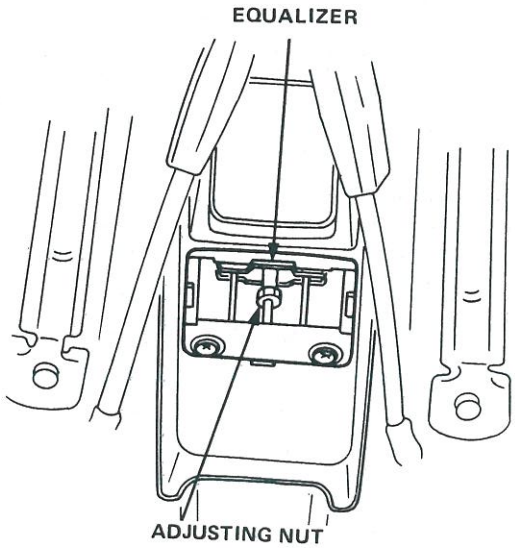
WARNING Block the front wheels before jacking up the rear of the car.

1. Raise the rear wheels off the ground.
2. Make sure that the rear caliper lever is in contact with the pin.



3. Pull the parking brake lever up one notch.
4. Tighten the equalizer adjusting nut until the rear wheels drag slightly when turned.
5. Release the brake lever and check that the rear wheels do not drag when turned. Readjust if necessary.

NOTE: With the equalizer properly adjusted, the rear brakes should be fully applied when the parking brake lever is pulled up 4 to 8 clicks.

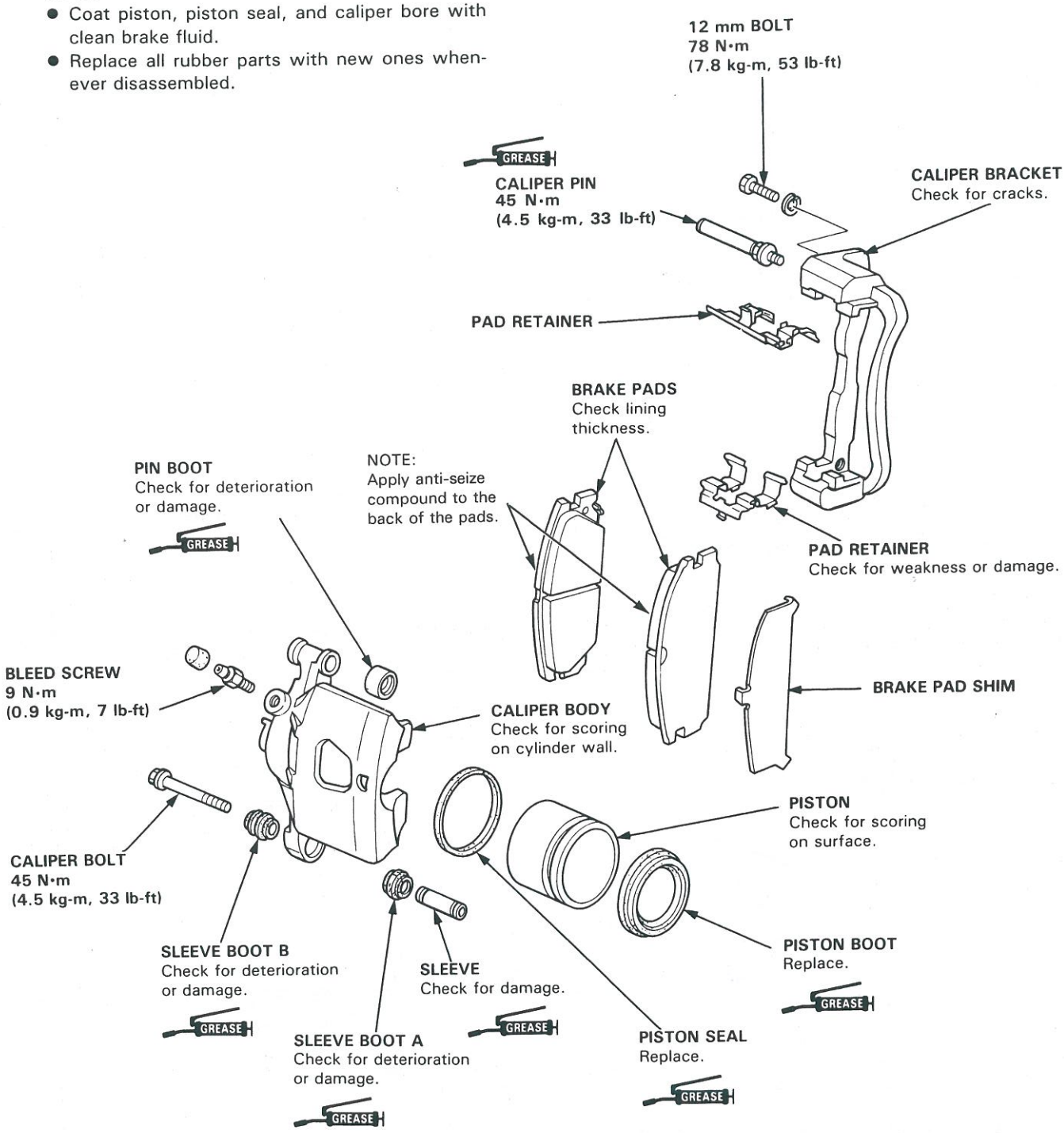


Front Brakes

Inspection

WARNING **Do not use an air hose to blow the brake assembly clean. Use an OSHA-approved vacuum cleaner, to avoid breathing brake dust.**

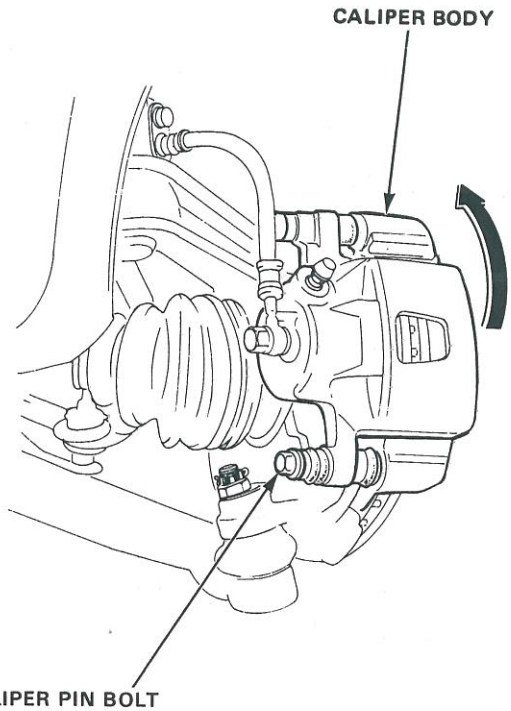
NOTE:
- Coat piston, piston seal, and caliper bore with clean brake fluid.
- Replace all rubber parts with new ones whenever disassembled.



Brake Pad

Inspection/Replacement

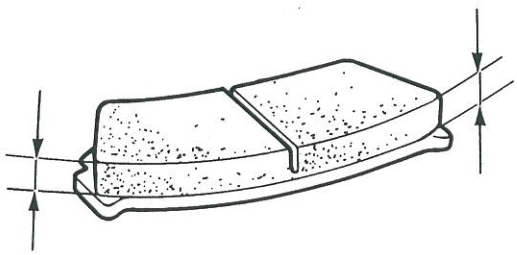
1. Remove the front wheels and support the front of car on safety stands.
2. Remove caliper pin bolt and pivot caliper up out of the way.



3. Remove the pad shim and pads.
4. Using a vernier caliper, measure the thickness of each brake pad lining.

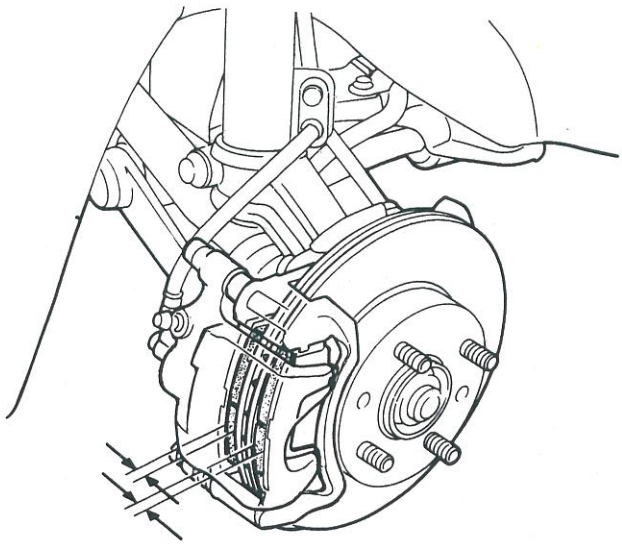
Brake Pad Thickness

Standard:	**9.5 mm (0.38 in.)**
Service Limit:	**3 mm (0.12 in.)**

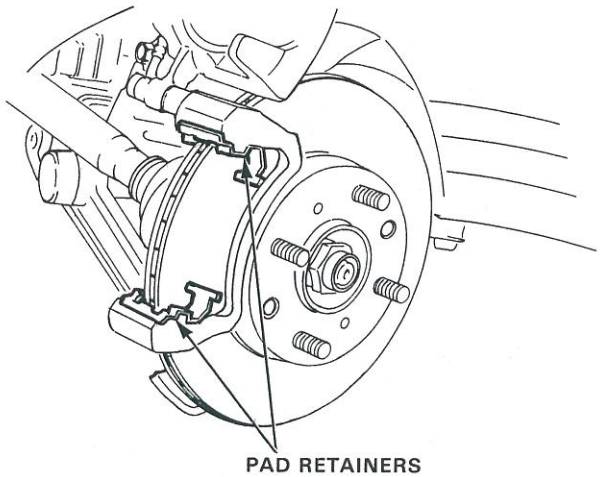


5. If lining thickness is less than service limit, replace both pads as a set.

   NOTE: Before replacing or installing new brake pads, coat the backs of the pads and shims with anti-seize compound.



6. Clean the caliper thoroughly; remove any rust, and check for grooves or cracks.
7. Install the pad retainers.

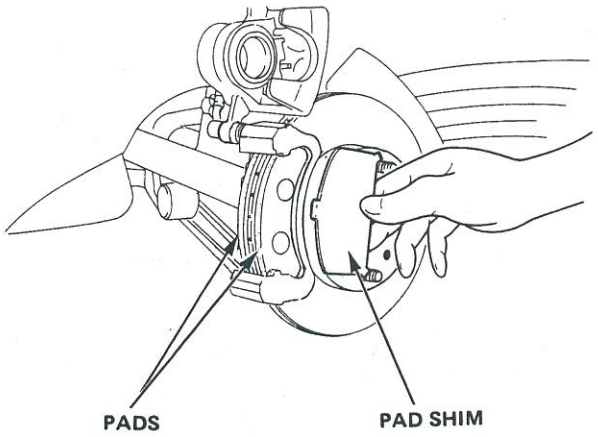


(cont'd)

Brake Pad

Inspection/Replacement (cont'd)

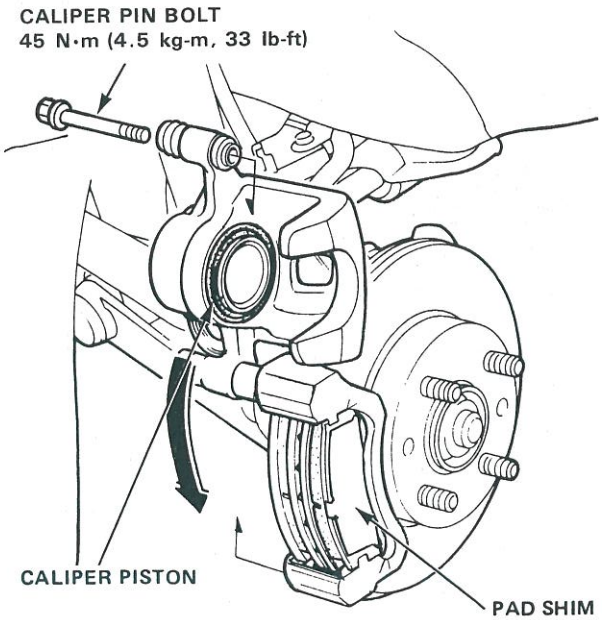
8. Apply a thin coat of high temperature brake grease between the shim and the pad, then install them with the shim on the outside.



9. Loosen the bleed screw slightly and push in the piston so the caliper will fit over the pads. Tighten the bleed screw.

10. Pivot the caliper down into position, then reinstall the caliper pin bolt and tighten to 45 N·m (4.5 kg-m, 33 lb-ft).

NOTE: Install the inner pad with the pad wear indicator on the inside.



Depress the brake pedal several times to make sure the brakes are working, then road test.

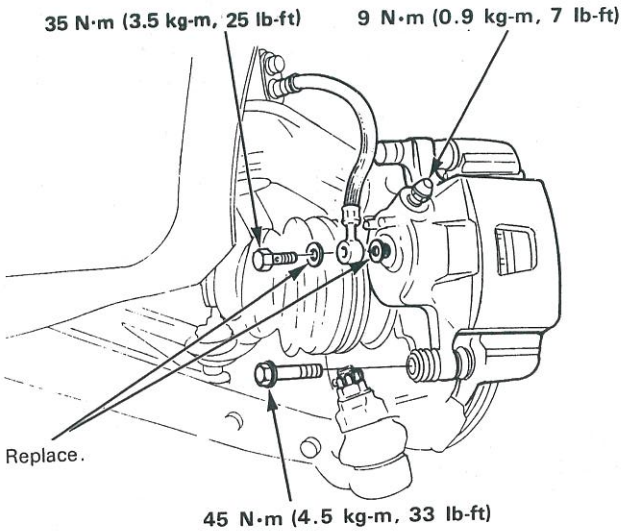
Brake Caliper

Disassembly

1. Unscrew the banjo bolt and remove the brake line.
2. Remove the caliper pin bolt, then remove the caliper.

NOTE: Avoid damaging the splash guard at the upper part of the caliper.

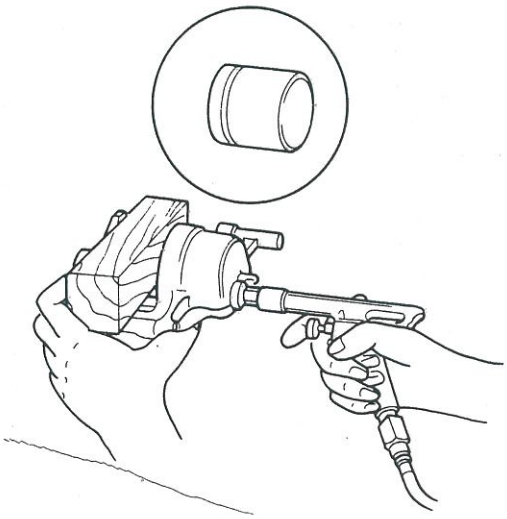
CAUTION:
- **Avoid spilling brake fluid on paint as it may damage the finish.**
- **Plug the end of the brake hose with a shop rag to prevent brake fluid from flowing out of the brake hose after disconnecting.**



3. Place a wooden block or shop rag in the caliper opposite the piston, then carefully remove the piston from the caliper by applying air pressure through the brake line hole.

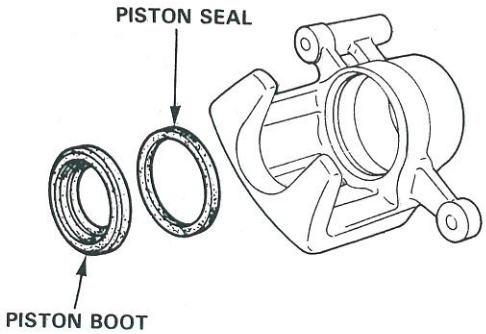
WARNING

- **Do not place your fingers in front of the piston.**
- **Do not use high air pressure.**



4. Remove the piston boot and piston seal.

CAUTION: Take care not to damage the cylinder.



Reassembly

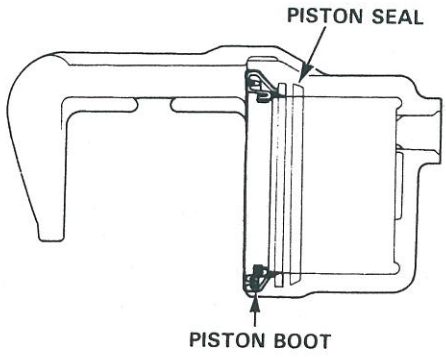
CAUTION:

- **Make sure all parts are clean before reassembly.**
- **Use only new replacement parts.**
- **Use only celan brake fluid.**
- **Do not allow dirt or other foreign matters to contaminate the brake fluid.**
- **Do not mixture different brands of brake fluid.**
- **Avoid spilling brake fluid on painted, plastic or rubber surfaces as it can damage the finish.**
- **Wash spilling brake fluid off immediately with clean water.**

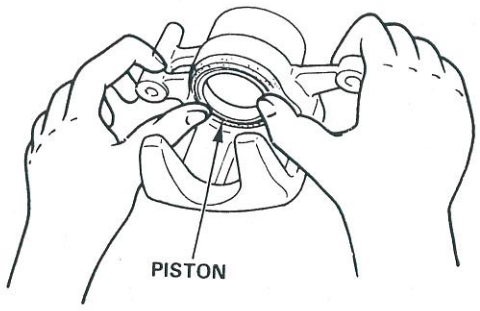
1. Clean the piston and caliper bore with brake fluid and inspect for wear or damgage.

2. Apply brake cylinder grease to a new piston seal, then install the piston seal in the cylinder groove.

3. Install the piston boot.



4. Lubricate the caliper cylinder and piston with brake fluid, then install the piston in the cylinder with the dished end facing in .



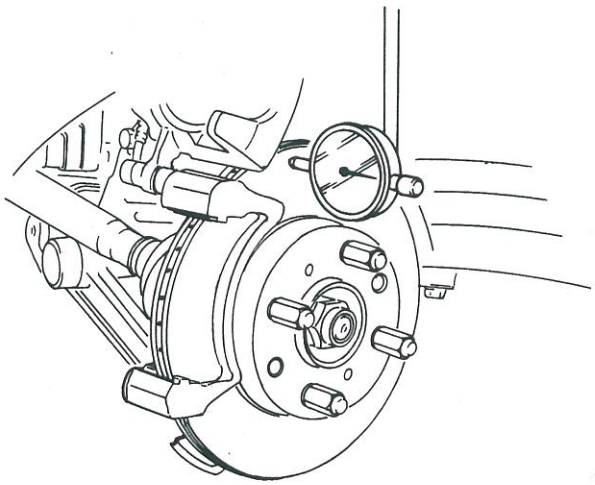
5. Reinstall the caliper in the reverse order of removal.

6. Fill the brake reservoir up and bleed the brake system (page 19-9).

Front Brake Disc

Run-Out

1. Remove the front wheels and support the front of car with safety stands.
2. Remove caliper pin bolt, then pivot the caliper up out of the way on the upper guide pin bolt, and remove the pads and pad retainers (page 19-5).

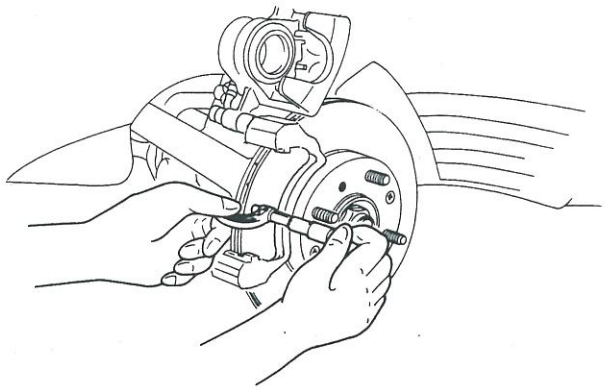


3. Inspect the disc surface for grooves, cracks, and rust. Clean the disc thoroughly and remove all rust.
4. Use the lug nuts to hold the disc securely against the hub, then mount a dial indicator 10 mm (0.39 in.) in from the outer edge.
   - Check the runout while turning the disc slowly by hand.

   Brake Disc Runout:
   Service Limit: 0.10 mm (0.004 in.)
5. If the disc is beyond the service limit, refer to the Honda Brake Disc Grinder Manual to see if it can be ground. If it can't be ground, remove it and install a new one. Then, reinstall the caliper bracket and torque the bolts to 78 N·m (7.8 kg-m, 56 lb-ft).

Thickness and Parallelism

1. Remove the front wheels and support the front of car with safety stands.
2. Move the caliper and pads out of the way as described in the preceding column.
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:	**19 mm (0.75 in)**
Max. Refinishing Limit:	**17 mm (0.67 in)**

NOTE: If the refinishing limit stamped on the disc does not match the one listed above, use the one on the disc.

Brake Disc Parallelism:

The difference between any thickness measurements should not be more than 0.015 mm (0.0006 in.).

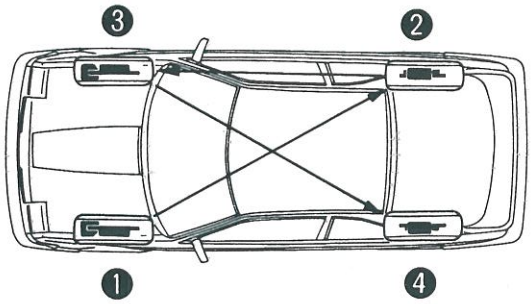
4. If the disc is beyond the limits for parallelism, refer to the Honda Brake Disc Grinder Manual to see if it can be ground. If it can't be ground, remove it and install a new one. Then, reinstall the caliper bracket and torque the bolts to 78 N·m (7.8 kg-m, 56 lb-ft).

   NOTE: A new disc should be ground if its runout is greater than 0.10 mm (0.004 in.).

NOTE: The reservoir on the master cylinder must be full at the start of bleeding procedure and checked after bleeding each wheel cylinder. Add fluid as required. Use only DOT 3 or 4 brake fluid.

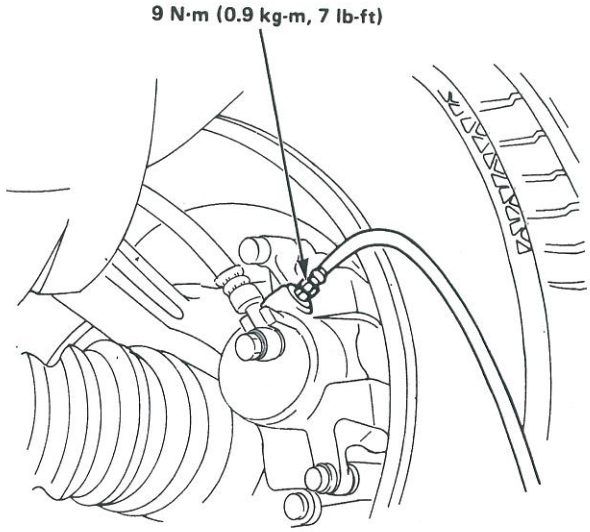
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Avoid spilling brake fluid on painted surfaces as it can damage the finish. Wash spilled brake fluid off immediately with clean water.

Bleeding Sequence

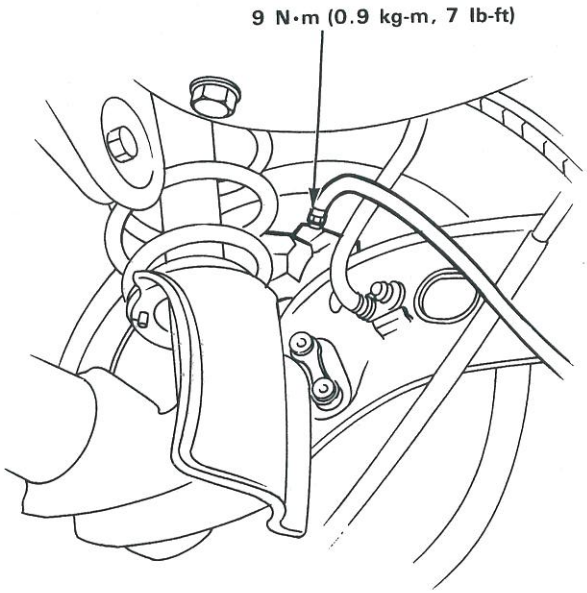


1. Have someone slowly pump the brake pedal several times, then apply steady pressure.
2. Loosen the brake bleed screw to allow air to escape from the system.

FRONT



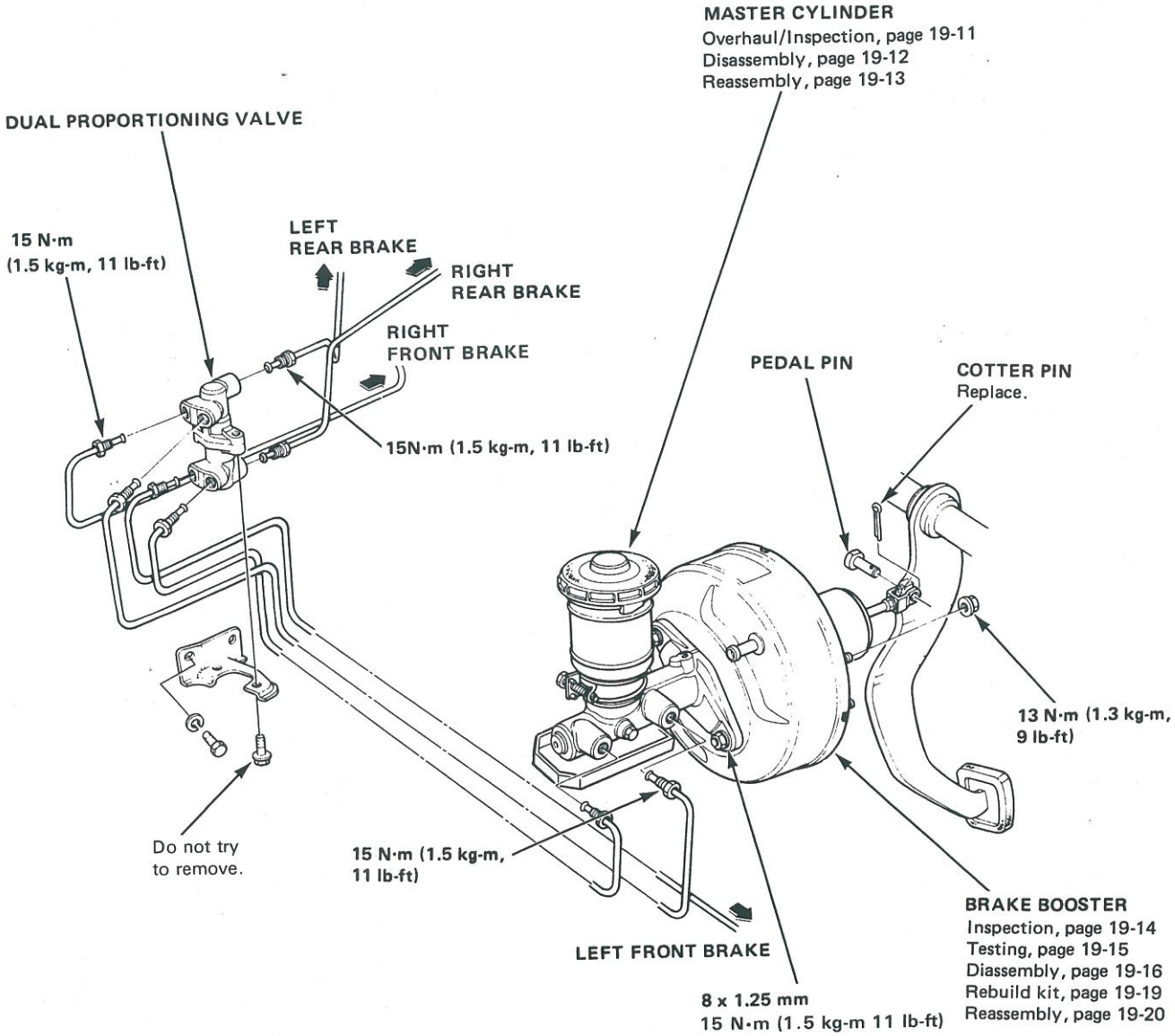
REAR



3. Repeat the procedure for each wheel in the sequence shown. When air bubbles no longer appear in the fluid, tighten the bleed screw securely.

Brake Booster, Master Cylinder, Proportioning Valve

Index



Master Cylinder

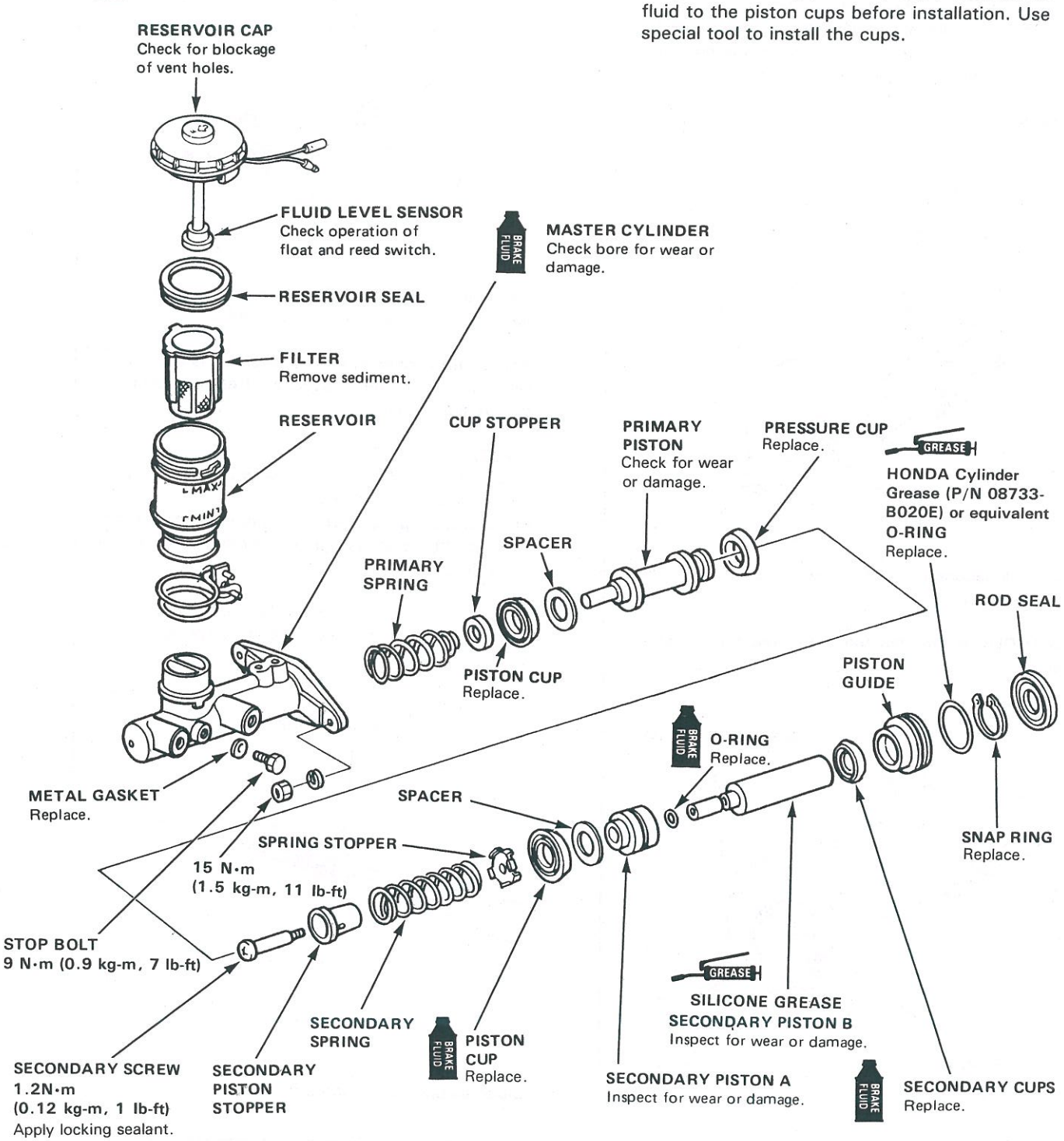
Overhaul/Inspection

CAUTION:

- **Avoid spilling brake fluid on painted surfaces as severe damage can result. Wipe up spilled fluid at once and rinse well with clean water.**
- **BRAKE FLUID This symbol represents brake fluid. Use only DOT 3 or 4 brake fluid.**

NOTE:

- Wash all removed parts in brake fluid and blow dry with compressed air. Blow open all passages and fluid ports.
- Replace all rubber parts with new ones whenever the cylinder is disassembled.
- To prevent damage, liberally apply clean brake fluid to the piston cups before installation. Use special tool to install the cups.

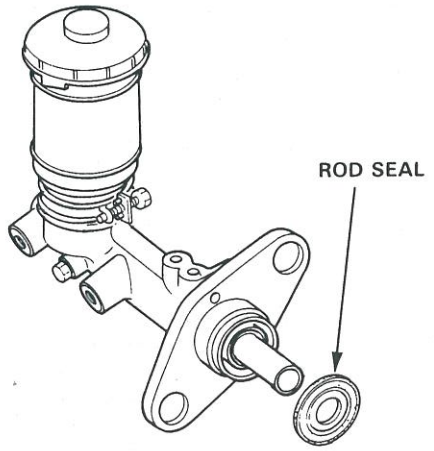


Master Cylinder

Disassembly

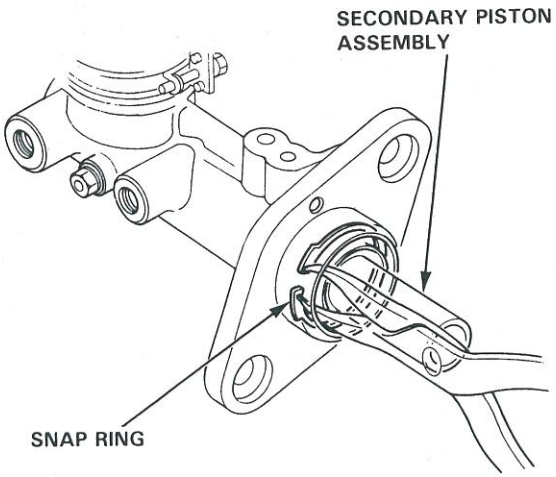
CAUTION:
- **Avoid spilling fluid on painted, plastic or rubber parts as it may damage the finish.**
- **Plug the end of the brake hose with a shop rag to prevent brake fluid from flowing out of the brake hose after disconnecting.**
- **Use only new clean brake fluid.**
- **Clean all parts thoroughly with brake fluid. Blow out all passages with compressed air.**
- **Do not allow foreign matter to enter the system.**
- **Be careful not to bend or damage the brake pipe when removing the master cylinder.**

1. Remove the rod seal.

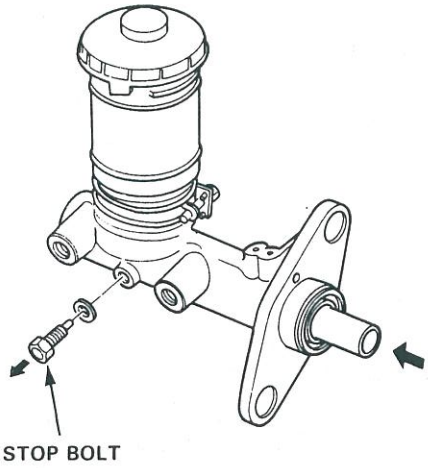


2. Push the secondary piston assembly, then remove the snap ring.

   CAUTION: Avoid damaging the master cylinder wall.



3. Remove the stop bolt while pushing in the secondary piston assembly.

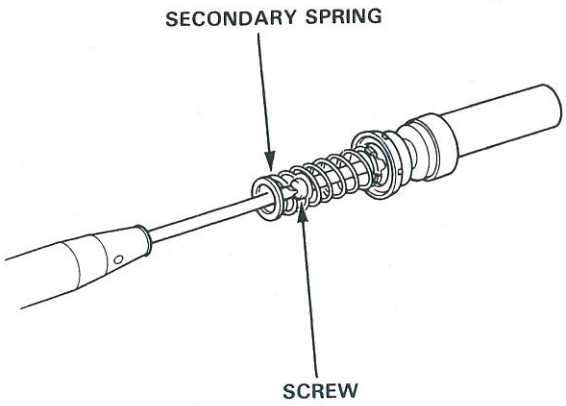


4. Remove the piston guide, secondary piston assembly and primary piston assembly.

   NOTE: If the primary piston assembly is difficult to remove, apply compressed air from the primary piston side outlet.

   CAUTION:
   - **Do not use high pressure air or bring the nozzle too close to the inlet.**
   - **Place a shop rag over the master cylinder to prevent the primary piston from becoming a projectile.**

5. Remove the screw from the secondary piston assembly, then remove the secondary spring.



6. Clean all parts with brake fluid.

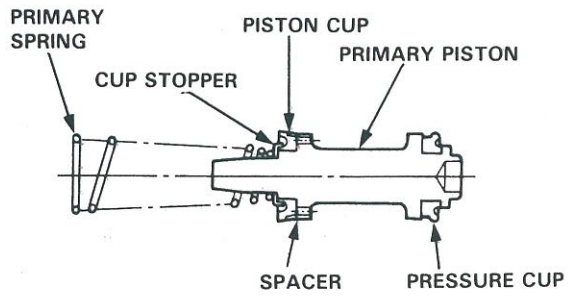
Reassembly

CAUTION:

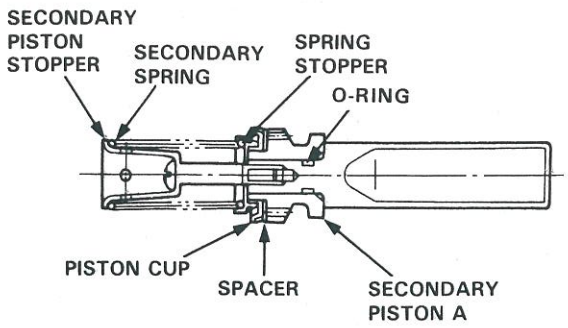
- **Make sure all parts are clean before reassembly.**
- **Use only new replacement parts.**
- **Use only clean brake fluid.**
- **Do not allow dirt or other foreign matter to contaminate the brake fluid.**
- **Do not mix different brands of brake fluid.**
- **Avoid spilling brake fluid on painted, plastic or rubber surfaces as it can damage the finish. Wash spilled brake fluid off immediately with clean water.**

1. Lubricate new piston assemblies with brake fluid, then fit them together.

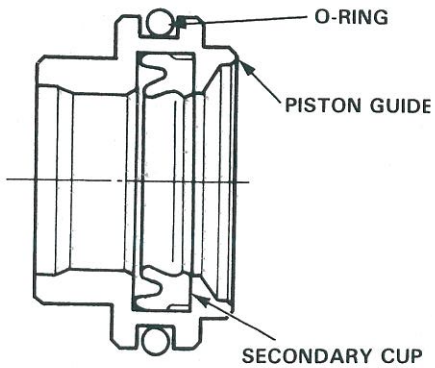
PRIMARY PISTON ASSEMBLY



SECONDARY PISTON ASSEMBLY



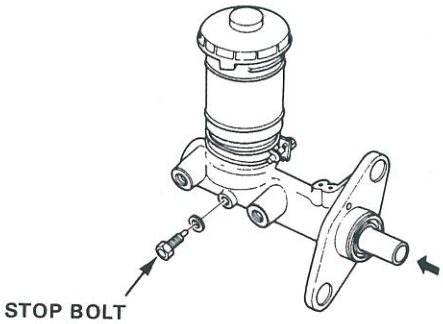
PISTON GUIDE ASSEMBLY



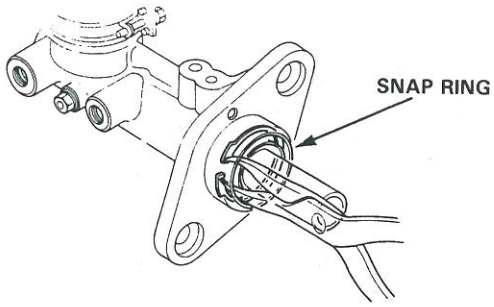
2. Install the piston assemblies in the master cylinder.

   NOTE: To ease assembly, rotate the pistons while inserting.

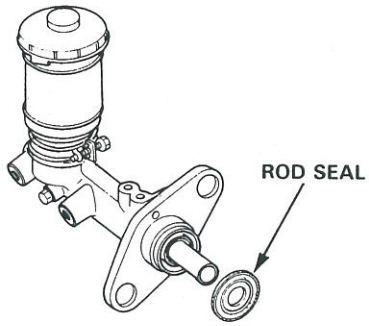
3. Install the stop bolt and new sealing washer while pushing in the secondary piston assembly, then tighten the stop bolt.



4. Install the snap ring after pushing in the secondary piston assembly.



5. Install a new rod seal.



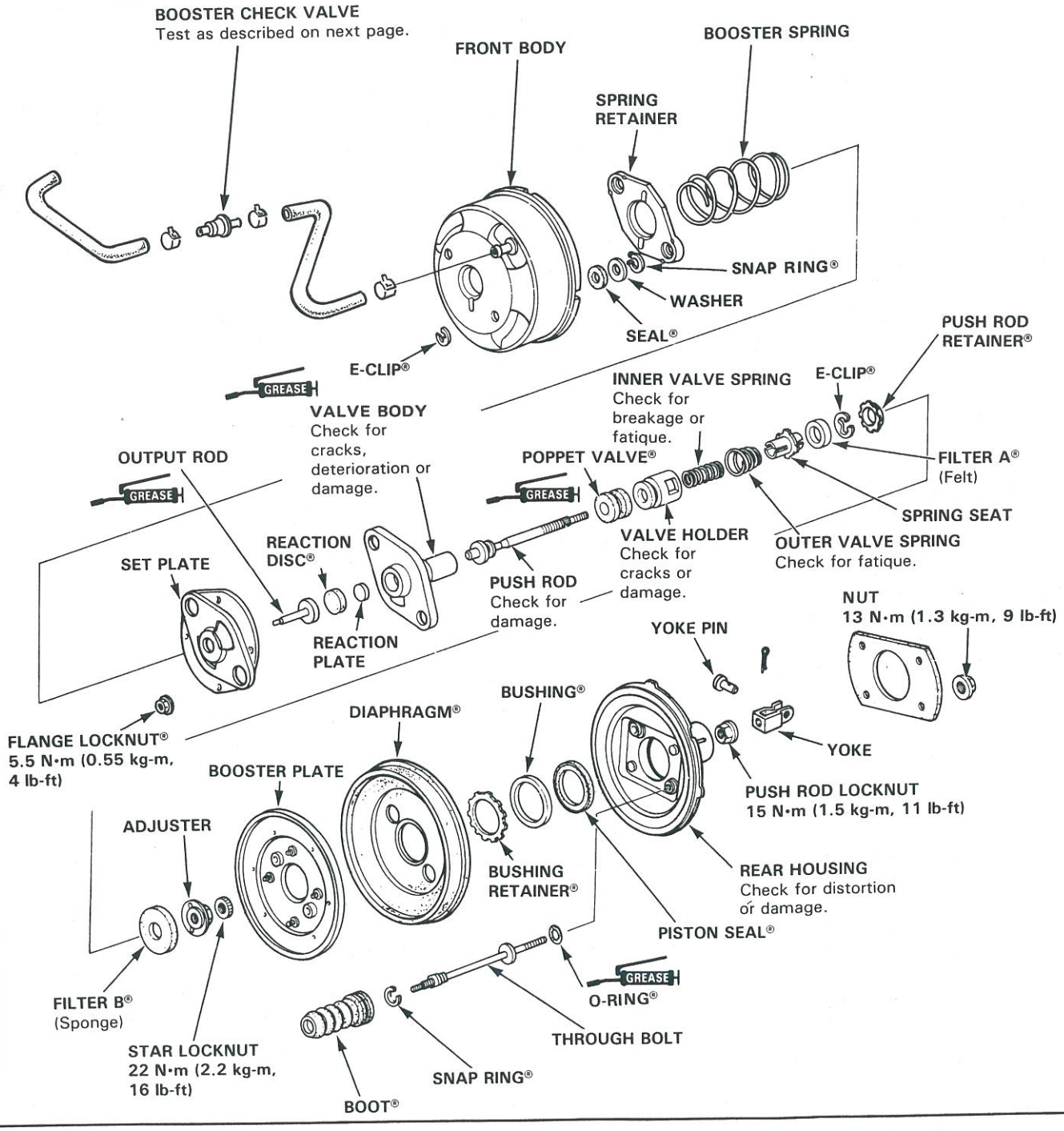
Brake Booster

Index and Inspection

Booster testing is on next page.

NOTE:

- Parts marked ® are available with rebuild kit and must be replaced whenever disassembled.
- GREASE on this page refers to silicone grease.
- Scribe an aligning mark across the front and rear housings so you can reassemble in their original positions (page 19-15).
- Remove the master cylinder and left engine mount bolt and lift the engine 70 mm (2.8 in) up to remove the brake booster.



Tests

Functional Test

1. With the engine stopped, depress the brake pedal several times, then depress the pedal hard and hold that pressure for 15 seconds. If the pedal sinks, the master cylinder, brake line or a wheel cylinder is faulty.

2. Start the engine with the pedal depressed. If the pedal sinks slightly, the vacuum booster is working. If the pedal height does not vary, the booster or check valve is faulty.

Leak Test

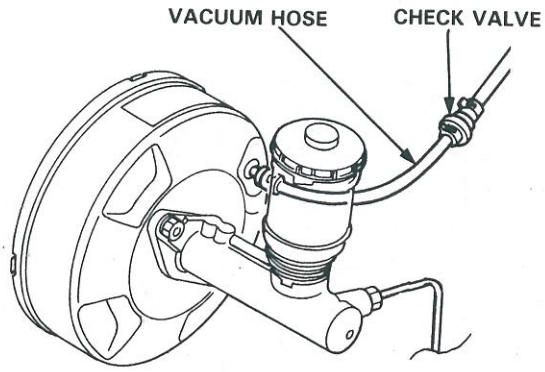
1. Depress the brake pedal with the engine running, then stop the engine. If the pedal height does not vary while depressed for 30 seconds, the vacuum booster is OK. If the pedal rises, the booster is faulty.

2. With the engine stopped, depress the brake pedal several times using normal pressure. When the pedal is first depressed, it should be low. On consecutive applications, pedal height should gradually rise. If the pedal position does not vary, check the booster check valve.

Check Valve Test

1. Disconnect the brake booster vacuum hose at the booster.

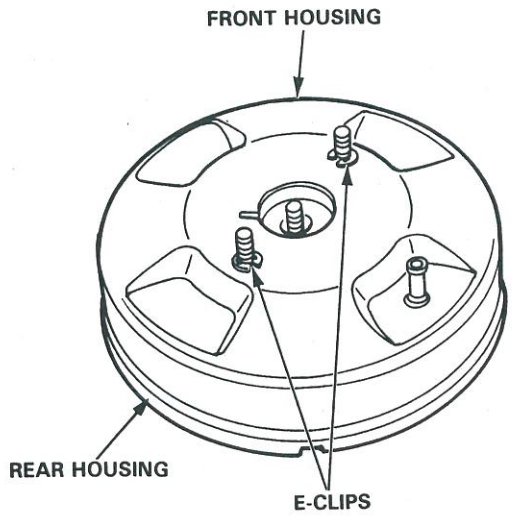
2. Start the engine and let it idle. There should be vacuum available. If no vacuum is available, the check valve is not working correctly.
   Replace the check valve and retest.



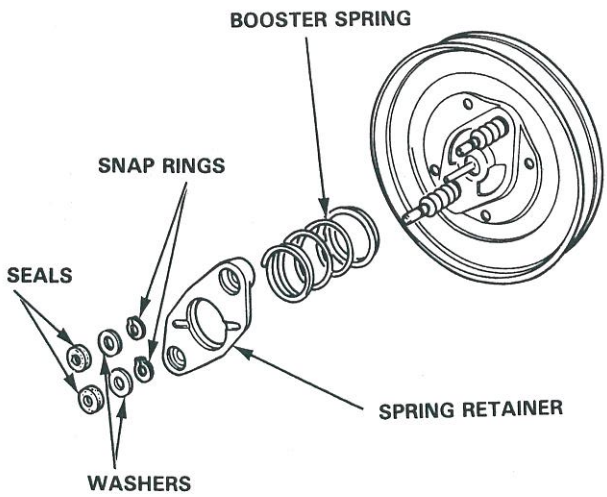
Brake Booster

Disassembly

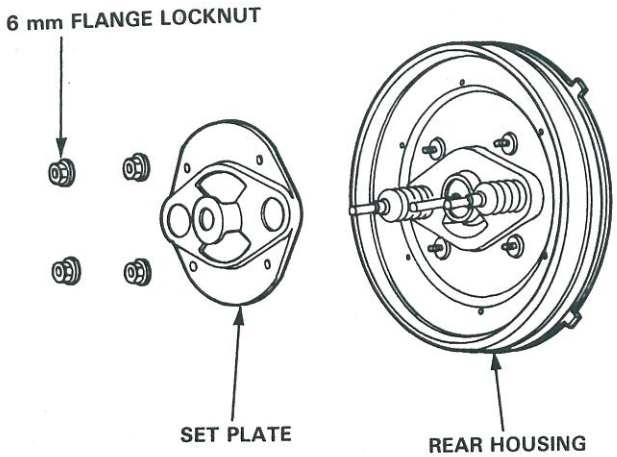
1. Scribe an aligning mark across the front and rear booster housings to ensure proper positioning of parts on reassembly.
2. Remove the E-clips, and separate the front booster housing and the rear booster housing.



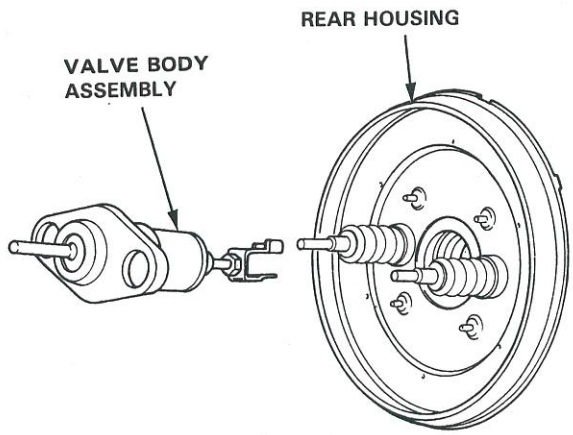
3. Remove the seals and washers from the spring retainer then remove the snap rings.



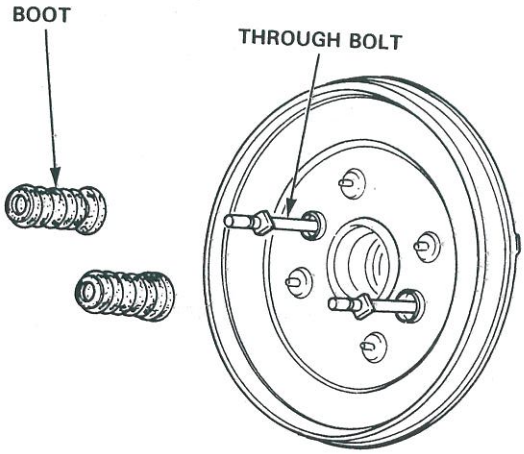
4. Remove the spring retainer and booster spring.
5. Remove the 6 mm flange locknuts and set plate.



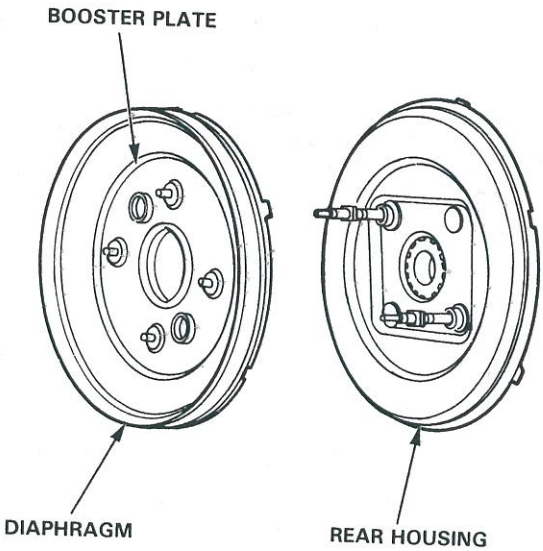
6. Remove the valve body assembly from the rear housing.



7. Remove the boots from the through bolts.

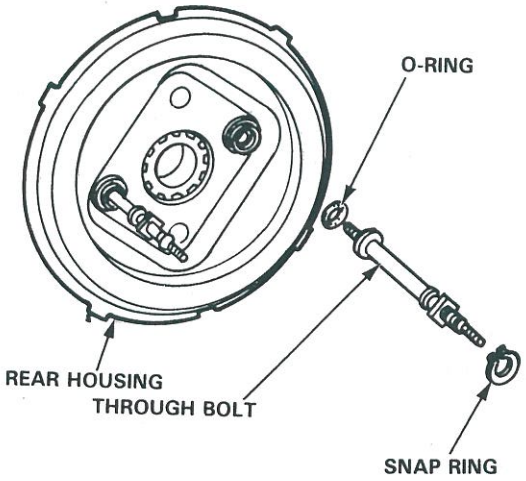


8. Remove the booster plate and diaphragm together from the rear housing.

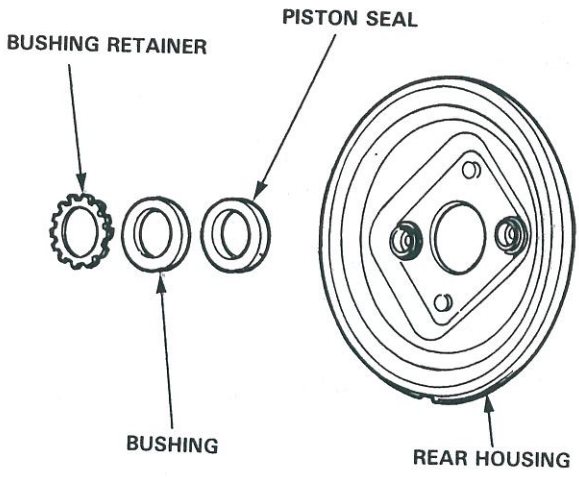


9. Remove the diaphragm from the booster plate.

10. Remove the snap rings, then remove the through bolts and O-rings from the rear housing.



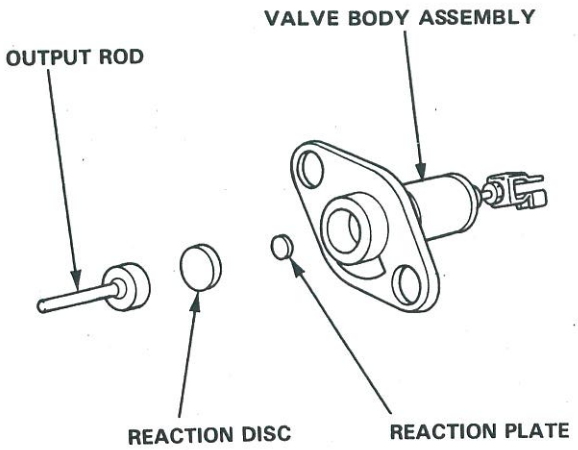
11. Remove the bushing retainer, bushing and piston seal from the rear housing.



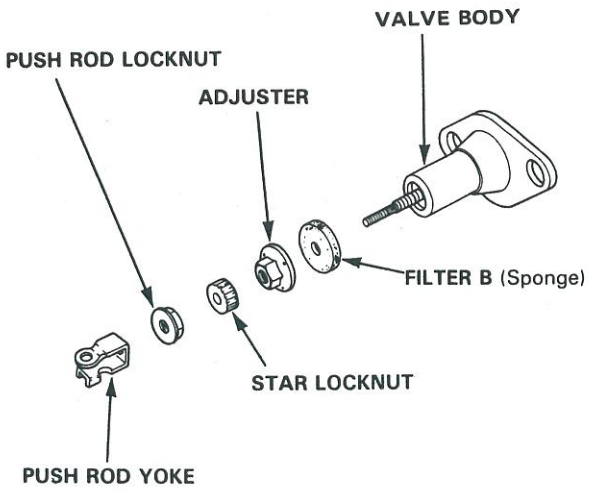
(cont'd)

Disassembly (cont'd)

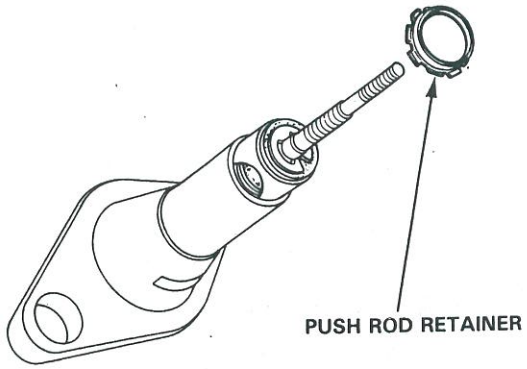
12. Remove the output rod, reaction disc and reaction plate from the valve body assembly.



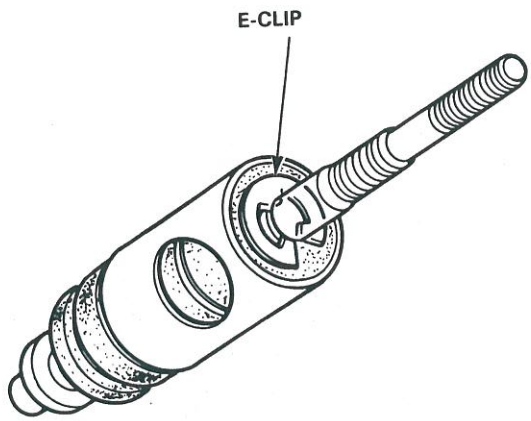
13. Remove the push rod yoke, locknut, star locknut, adjuster and filter B from the valve body.



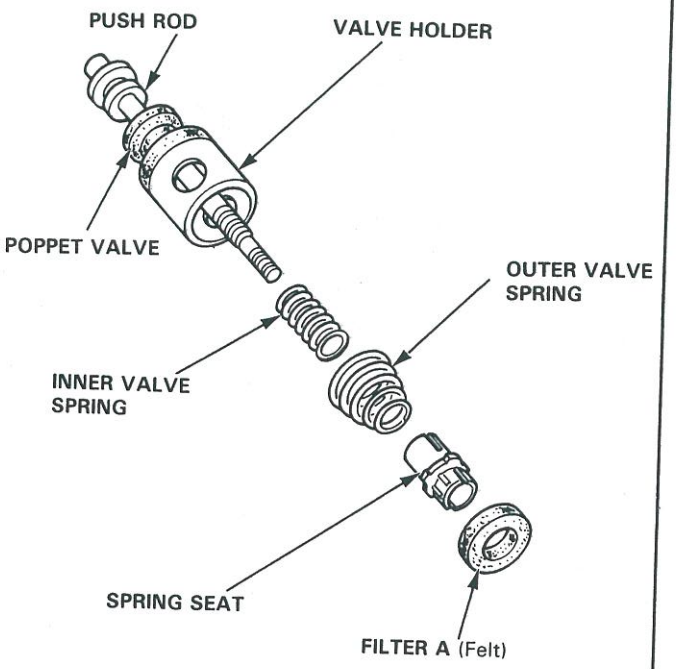
14. Remove the push rod retainer, then remove the push rod from the valve body assembly.



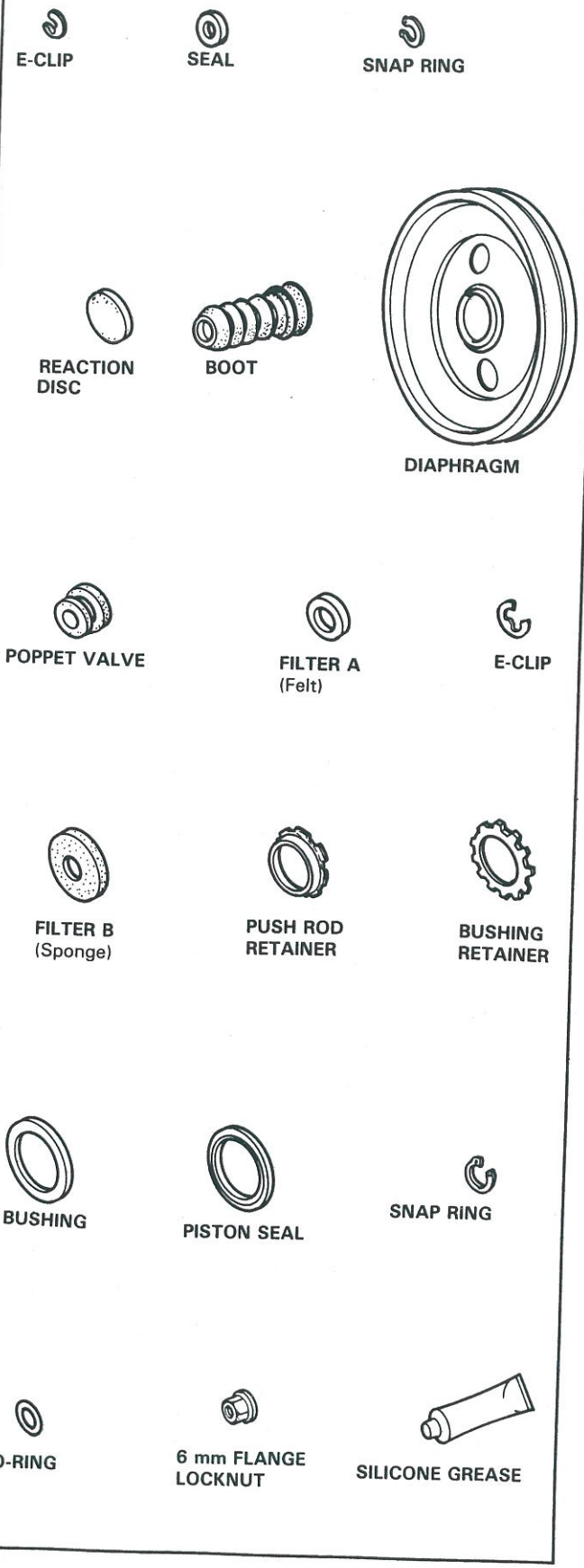
15. Remove the E-clip from the push rod.



16. Remove filter A, the spring seat, valve springs, valve holder and poppet valve from the push rod.

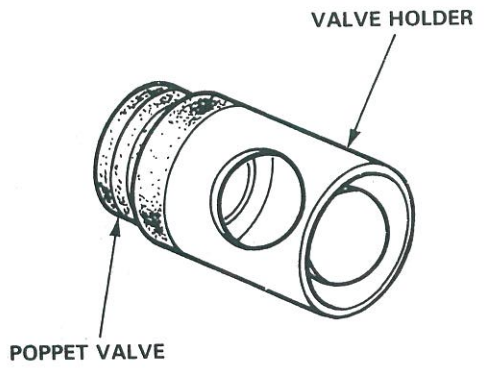


Rebuild Kit

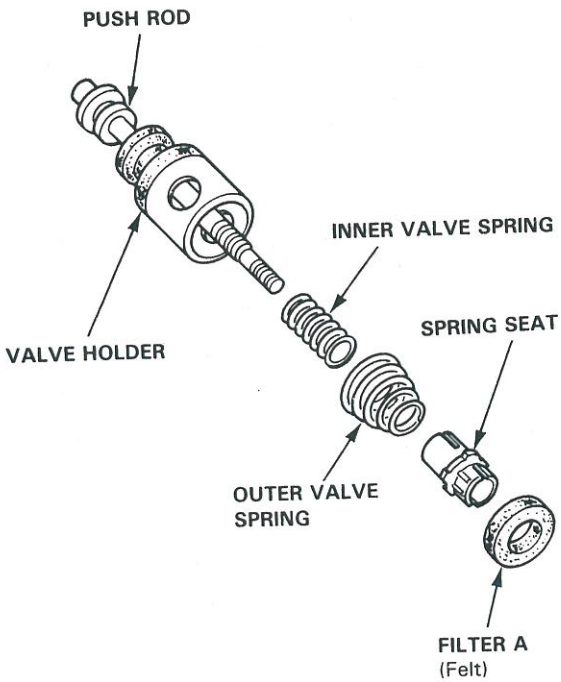


Reassembly

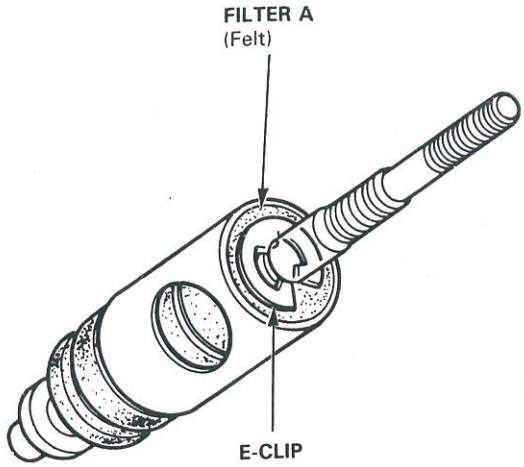
1. Install the poppet valve on the valve holder.



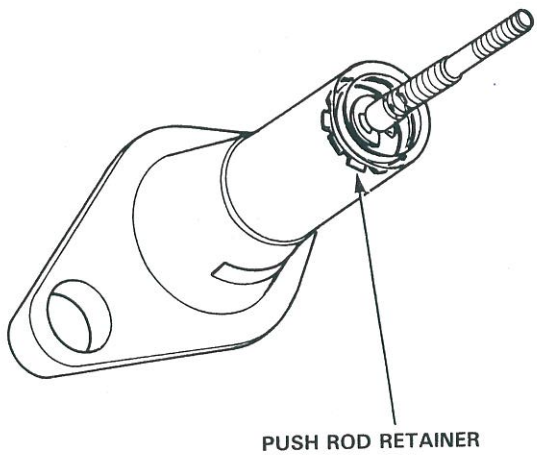
2. Install the valve holder, inner valve spring, outer valve spring and spring seat on the push rod.



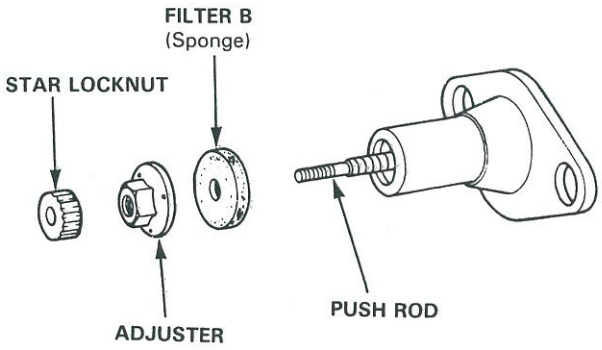
3. Install filter A and the E-clip on the push rod.



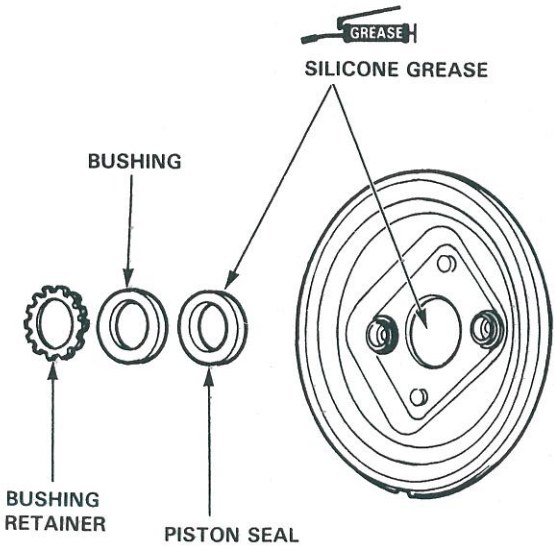
4. Apply silicone grease to the inner and outer surfaces of the valve body tube. Press the push rod assembly into the valve body tube, and install the push rod retainer.



5. Slip filter B (sponge) over the end of the push rod. Thread the adjuster and star locknut onto the push rod but do not tighten.



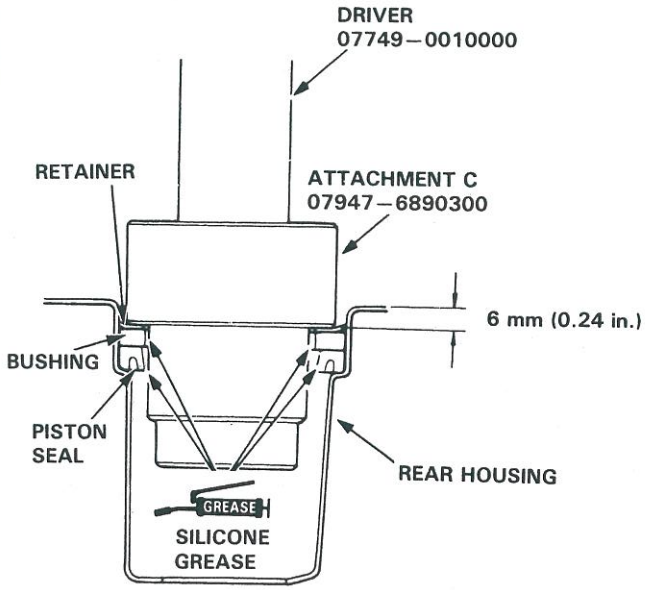
6. Apply silicone grease to the piston seal, then set the seal in position on the housing.



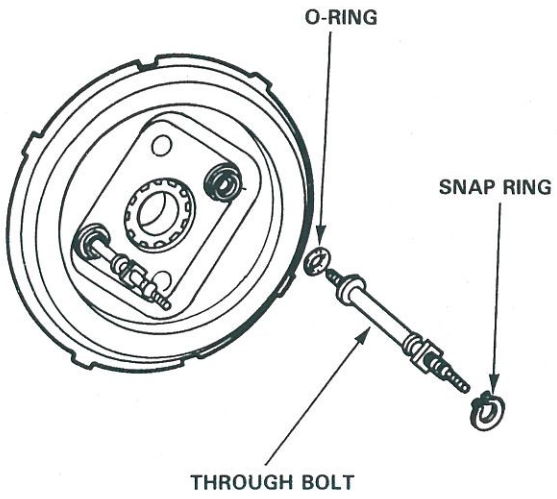
NOTE: Make sure the lip of the seal is facing in, as shown in drawing below.

7. Install the piston seal and bushing in the rear housing, and gently drive the retainer in until it is 6 mm below the edge of the rear housing.

CAUTION: If you drive in the retainer more than 6 mm, you may distort the piston seal.



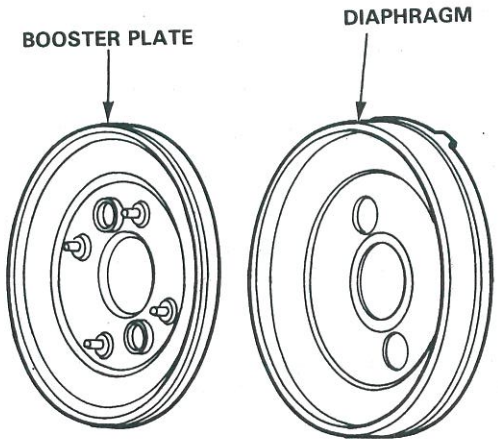
8. Install both through bolts, using the O-rings and snap rings.



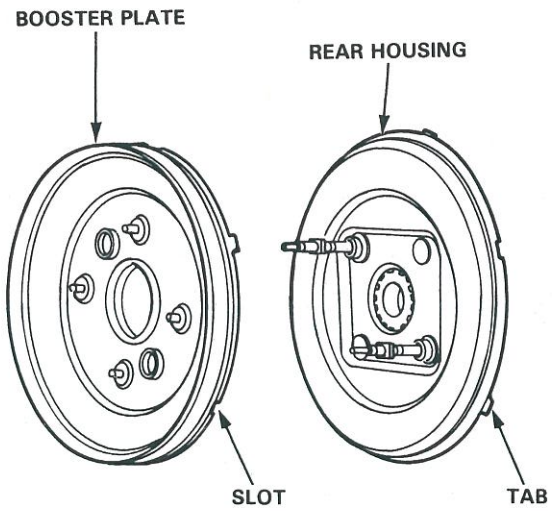
(cont'd)

Reassembly (cont'd)

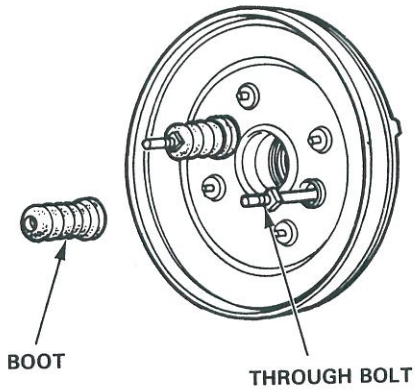
9. Install the diaphragm on the booster plate.



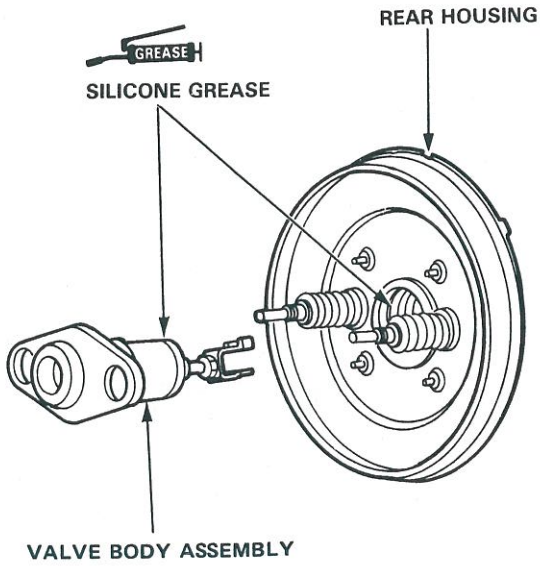
10. Attach the booster plate to the rear housing, aligning their tabs and slots.



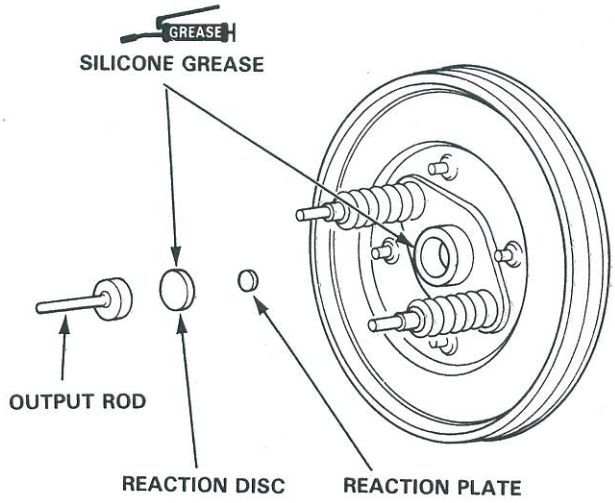
11. Install the boots on the through bolts.



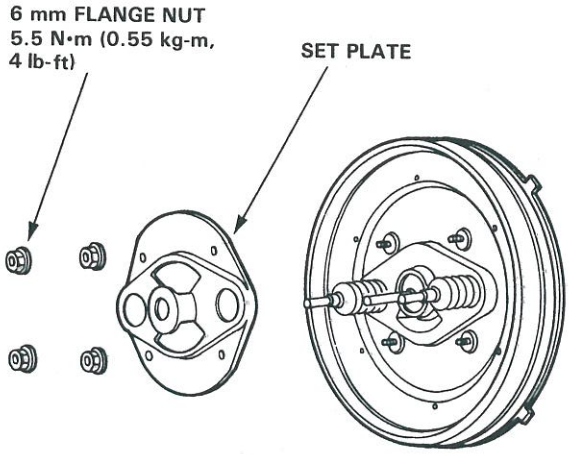
12. Apply silicone grease to the bore of the rear housing and the outer surface of the valve body assembly. Install the valve body assembly in the rear housing.



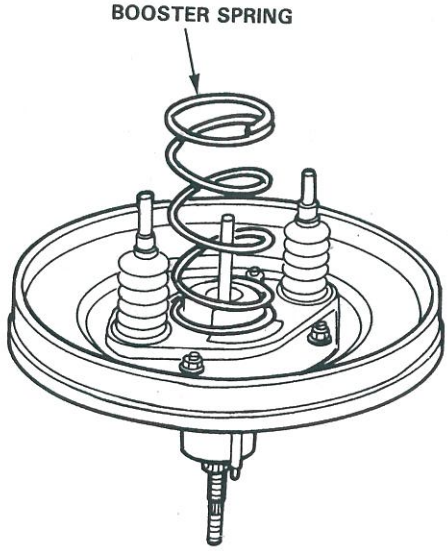
13. Apply silicone grease to the bore of the valve body, then install the reaction plate, reaction disc and output rod.



14. Install the set plate, and tighten the four 6 mm flange nuts.

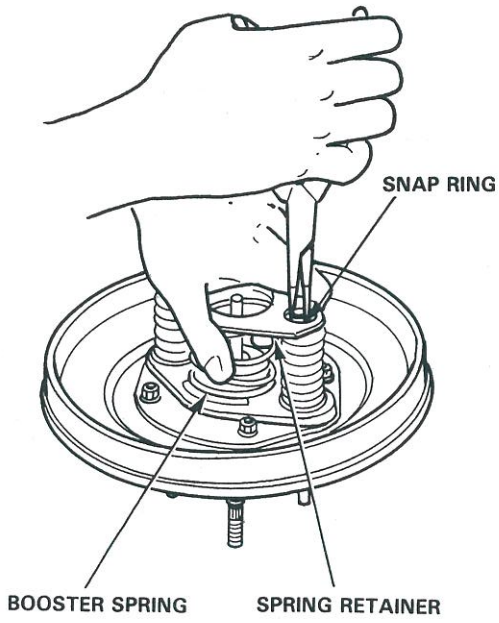


15. Install the booster spring.



16. Install the spring retainer on the through bolts, aligning the square portions of the bolts and retainer.

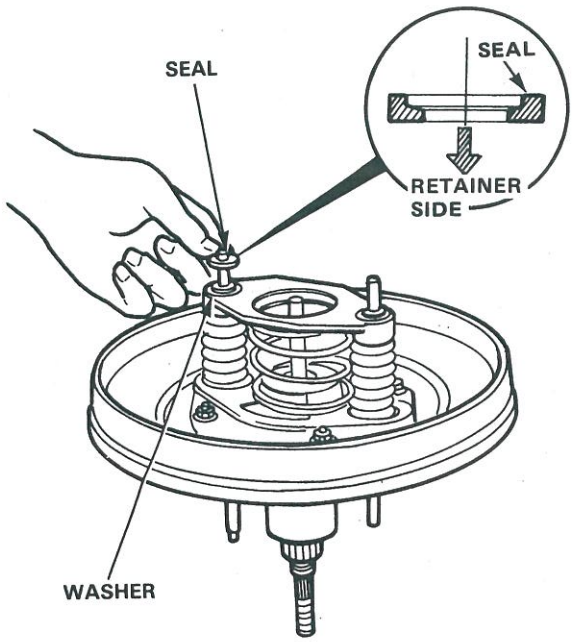
17. Secure the spring retainer by compressing the booster spring, and installing the snap rings on the through bolts.



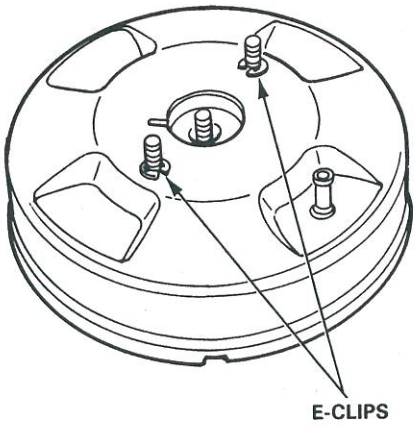
(cont'd)

Reassembly (cont'd)

18. Install the washers and seals.



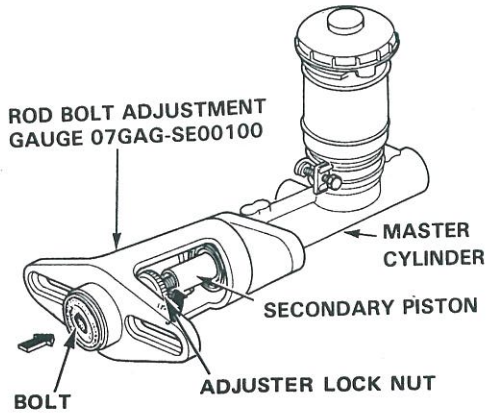
19. Assemble the front and rear housings. Press down on the front housing, then install the E-clips on the through bolts.



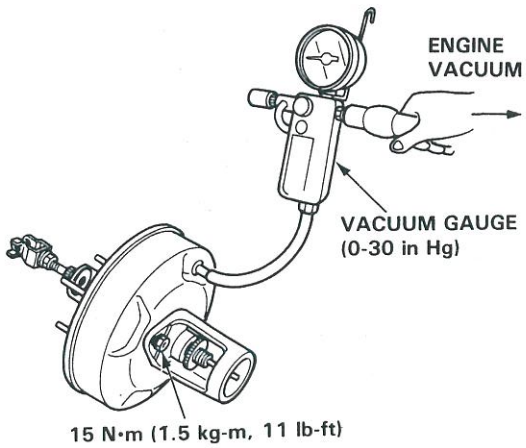
Pushrod Clearance Adjustment

NOTE: Master cylinder pushrod-to-piston clearance must be checked and adjustments made, if necessary, before installing master cylinder.

1. Using the Rod Bolt Adjustment Gauge, adjust bolt so the top of it is flush with end of master cylinder piston.



2. Install the rod seal of the master cylinder between the brake booster and rod bolt adjustment gauge.
3. Without disturbing the adjusting bolt's position, put the gauge upside down on the booster.
4. Install the master cylinder nuts and tighten to the specified torque.
5. Connect the booster in-line with a vacuum gauge (0—30 in Hg) to the booster's engine vacuum supply, and maintain an engine speed that will deliver 500 mm Hg (20 in Hg) vacuum.

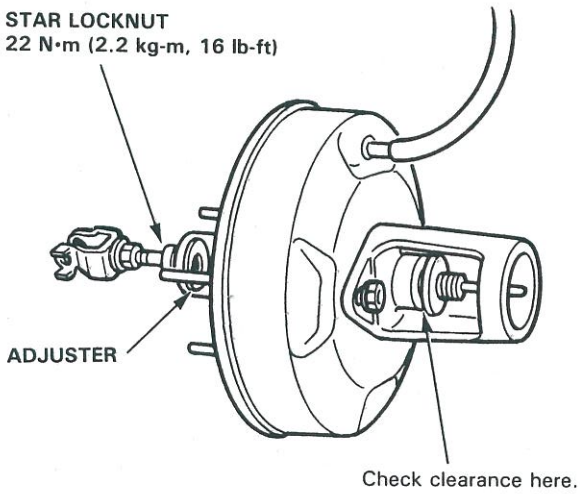


6. With a feeler gauge, measure the clearance between the gauge body and the adjuster locknut as shown.

   Clearance: 0–0.4 mm (0–0.016 in)

7. If clearance is incorrect, loosen the star locknut and turn the adjuster in or out to adjust.

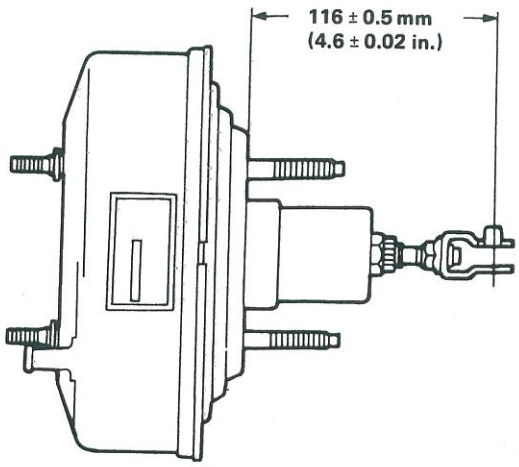
8. Tighten the star locknut securely.



NOTE: If the clearance between the gauge body and adjuster locknut is 0 mm, the pushrod-to-piston clearance is 0.4 mm (0.016 in). If the clearance between the gauge body and adjuster locknut is 0.4 mm (0.016 in), the pushrod-to-piston clearance is 0 mm.

Pushrod Adjustment

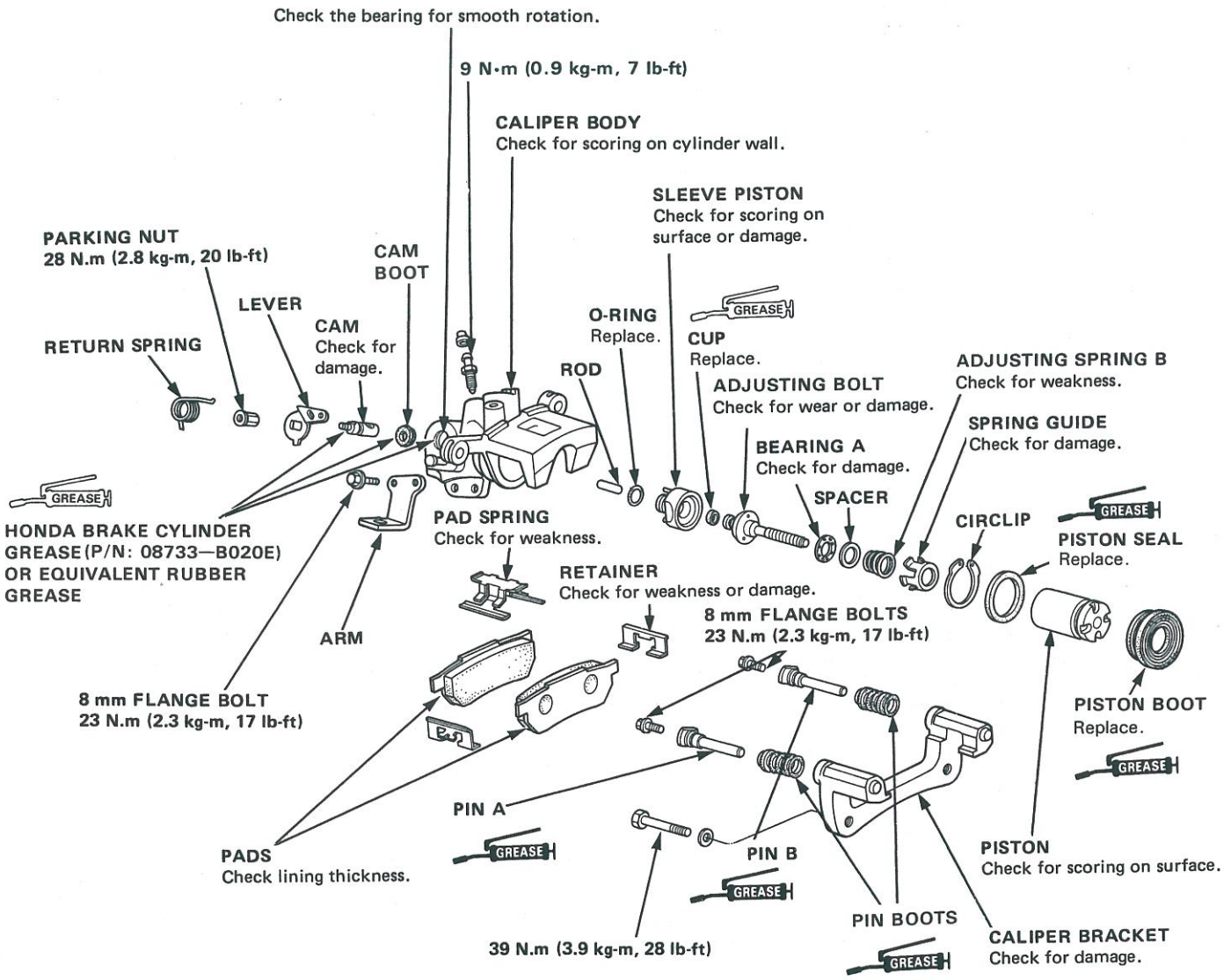
Install the locknut and pushrod yoke on the pushrod; adjust the pushrod length as shown.



Inspection

GREASE : RUBBER GREASE

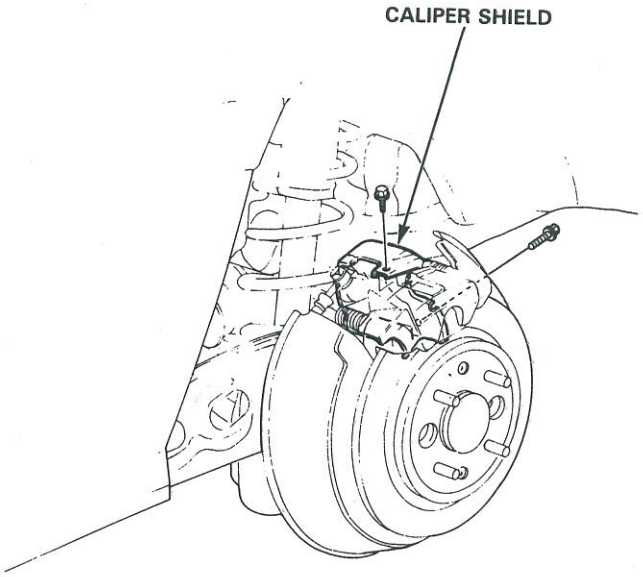
GREASE : SILICONE GREASE



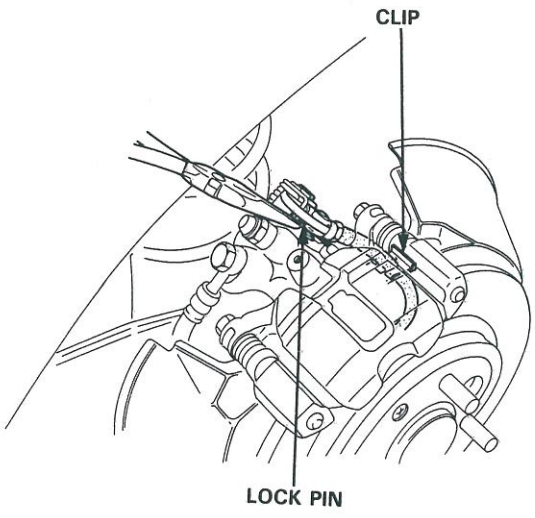
Brake Pad

Inspection/Replacement

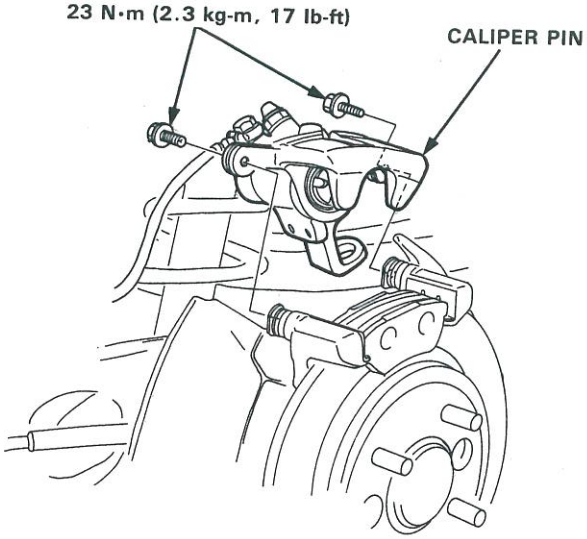
1. Remove the caliper shield.



2. Remove the parking brake cable from the caliper.



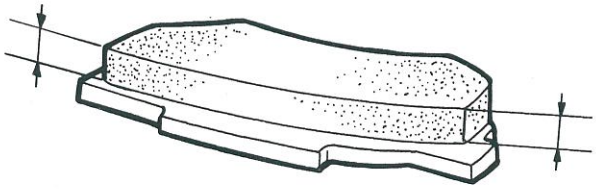
3. Remove the caliper mounting bolts, then remove the caliper.



4. Remove the pads and, using a vernier caliper, measure the thickness of each brake pad lining.

NOTE: Measurement does not include shoe thickness.

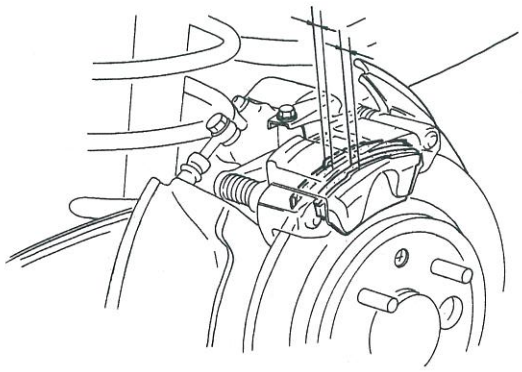
Brake Pad Thickness:
Standard: 8.0 mm (0.315 in.)
Service Limit: 1.6 mm (0.063 in.)



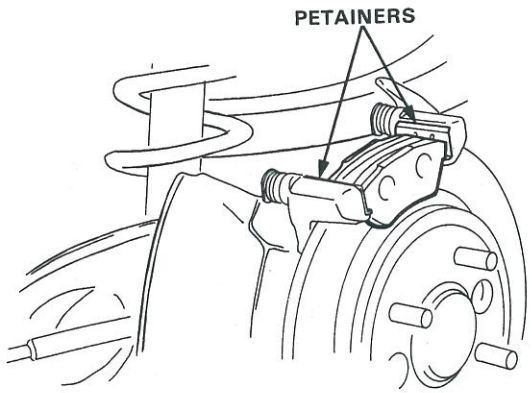
(cont'd)

Inspection/Replacement (cont'd)

5. If lining thickness is less than the service limit, replace both pads as a set.



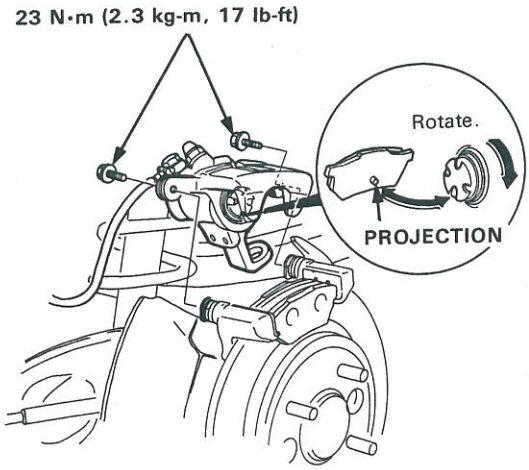
6. Remove the pads and pad guides.
7. Inspect the disc surface for grooves, cracks and rust.
8. Clean the caliper thoroughly and remove all rust. Install the pad retainers.



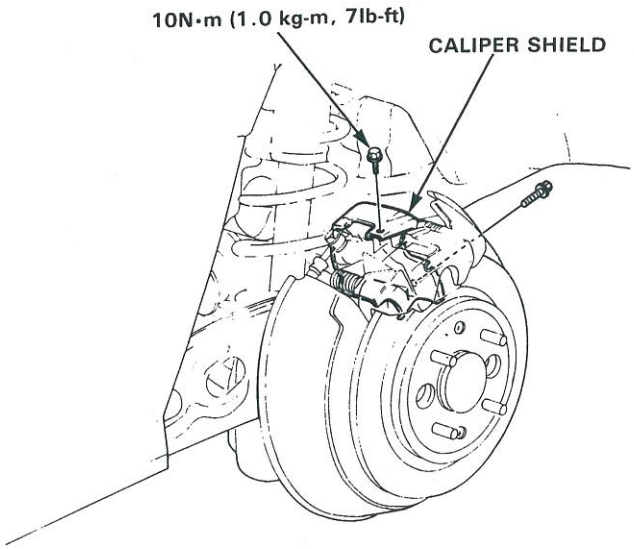
9. Install new brake pads.
10. Rotate the caliper piston clockwise into place in the cylinder, then align the cutout in the piston with the projection on the inner pad by turning back the piston.

CAUTION: Avoid twisting the piston boot. If the piston boot is twisted, back it out so it sits properly.

11. Install the brake caliper.



12. Install the parking brake cable.
13. Install the caliper shield.



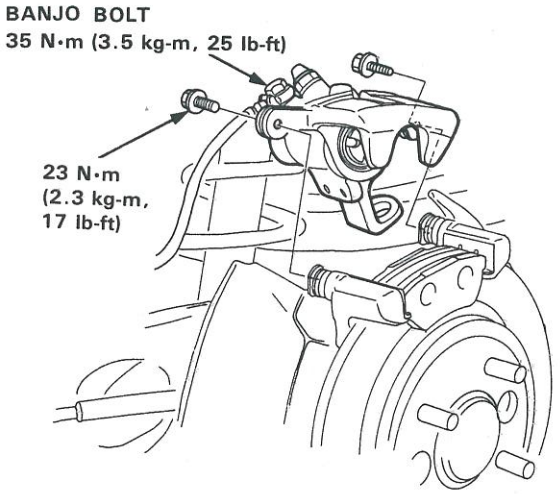
Brake Caliper

Disassembly

CAUTION:
- **Make sure all parts are clean before reassembly.**
- **Use only new replacement parts.**
- **Use only new clean brake fluid.**
- **Do not allow dirt or other foreign matter to contaminate the brake fluid.**
- **Do not mix different brands of brake fluid.**
- **Avoid spilling brake fluid on painted, plastic or rubber surfaces as it can damage the finish. Wash spilling brake fluid off immediately with clean water.**

1. Remove the caliper shield and disconnect the parking brake cable.
2. Remove the banjo bolt and remove the brake hose from the caliper.
   CAUTION: The sealing washers must be replaced whenever disassembled.
3. Remove the caliper mounting bolts, and remove the caliper from the caliper bracket.

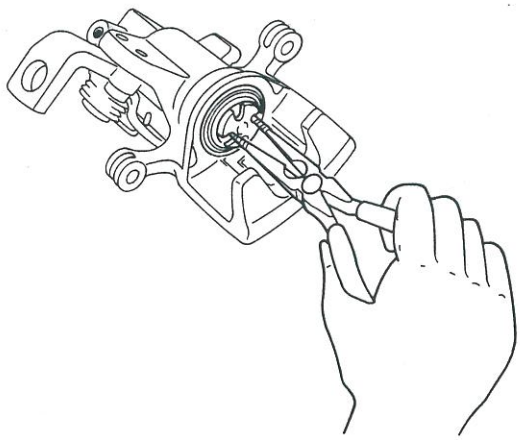
CAUTION: Thoroughly clean the outside of the caliper to prevent dust and dirt from entering.



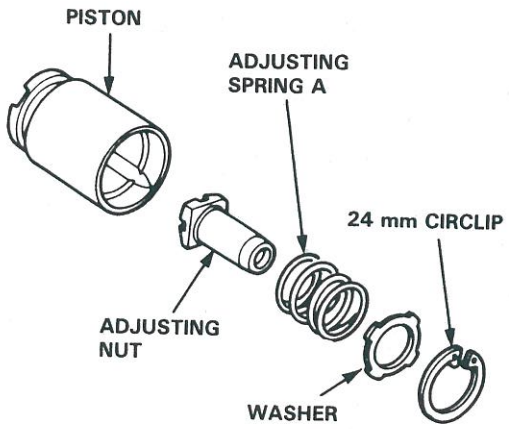
4. Remove the pad spring from the caliper.

5. Remove the piston and piston boot while rotating the piston.

   CAUTION: Avoid damaging the piston and piston boot.



6. Remove the circlip, then washer, adjusting spring A, and the adjusting nut from the piston.



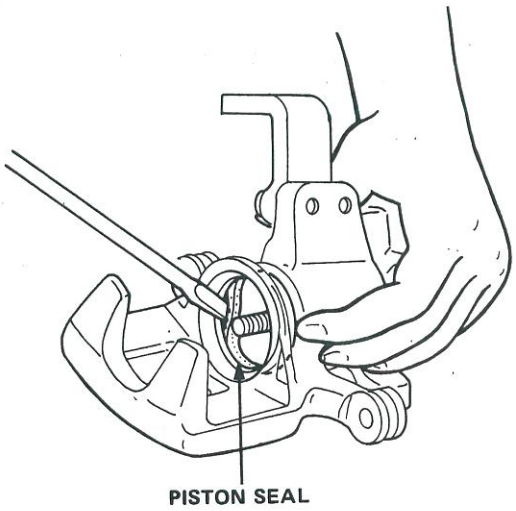
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Brake Caliper

Disassemdly (cont'd)

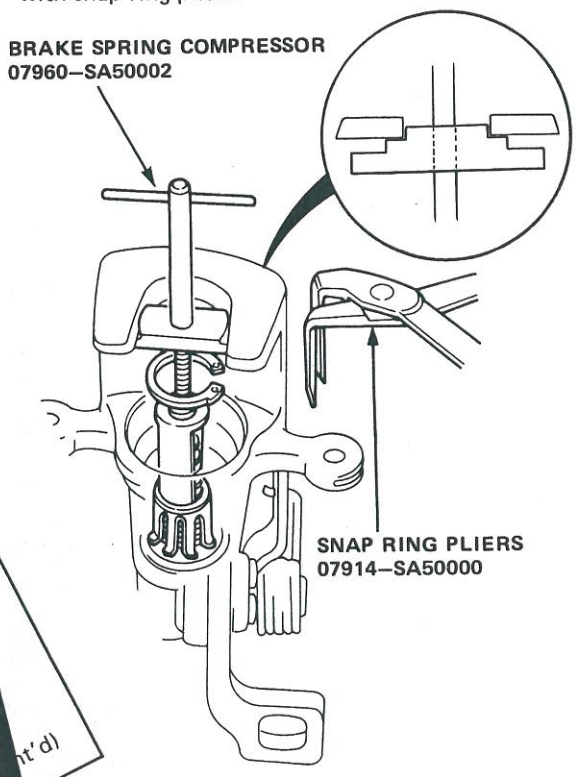
7. Remove the piston seal.

   CAUTION: Take care not to damage the cylinder bore.

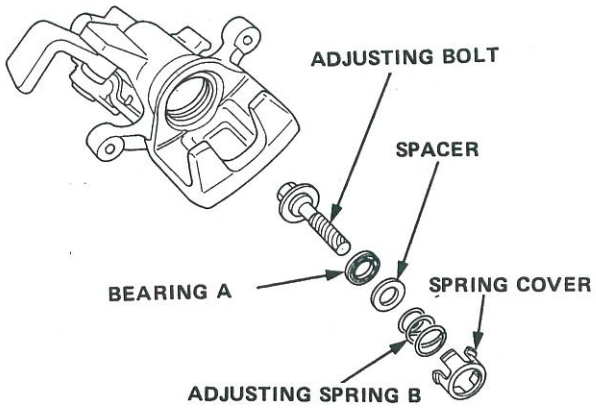


8. Install the special tool between the caliper body and spring cover as shown.

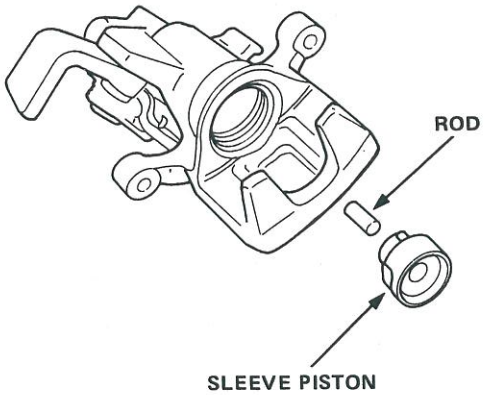
9. Compress the adjusting spring B by turning the shaft of the special tool, then remoe the circlip with snap ring pliers.



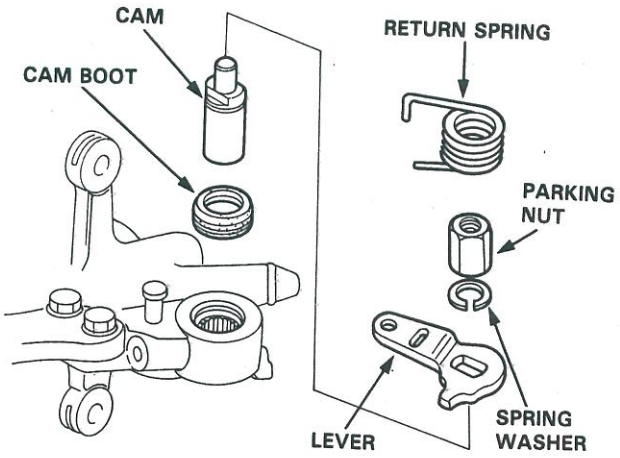
10. Remove the spring cover, adjusting spring B, spacer, bearing A and adjusting bolt.



11. Remove the sleeve piston, and remove the rod from the cam.



12. Remove the return spring, parking nut, spring washer, lever, cam and cam boot.



Reassembly

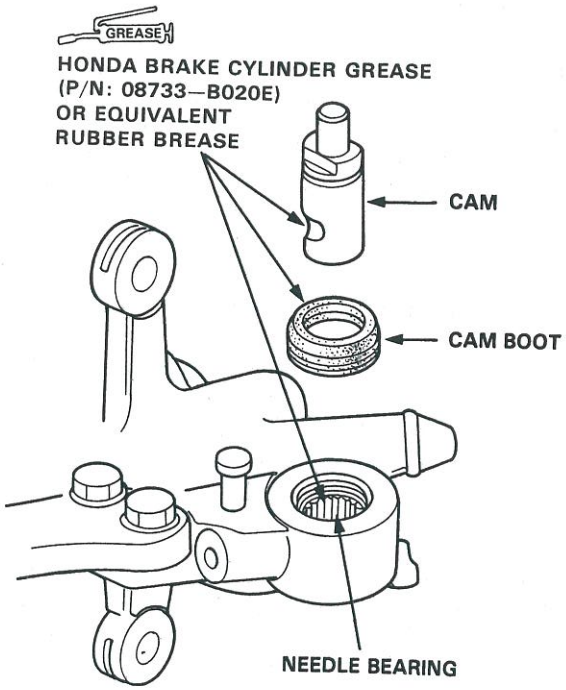
CAUTION:
- **Make sure all parts are clean before reassembly.**
- **Use only new replacement parts.**
- **Use only new clean brake fluid.**
- **Do not allow dirt or other foreign matter to contaminate the brake fluid.**
- **Do not mix different brands of brake fluid.**
- **Avoid spilling brake fluid on painted, plastic or rubber surfaces as its can damage the finish. Wash spilling brake fluid off immediatery with clean water.**

1. Pack all cavities of the needle bearing with HONDA Brake Cylinder Grease (P/N: 08733—BO20E), or equivalent rubber grease.

2. Coat the new cam boot with HONDA Brake Cylinder Grease (P/N: 08733—BO20E), or equivalent rubber grease and install in the caliper.

3. Install the cam with the hole facing cylinder.

CAUTION: Avoid damaging the cam boot since it must be installed before the cam.

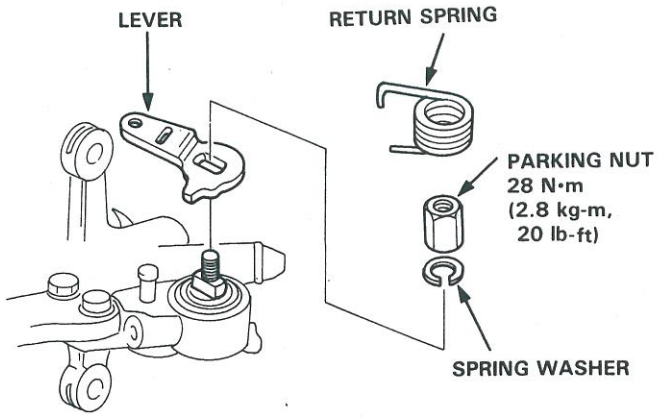


(cont'd)

Reassembly (cont'd)

4. Install the lever, spring washer and parking nut, then tighten the parking nut.

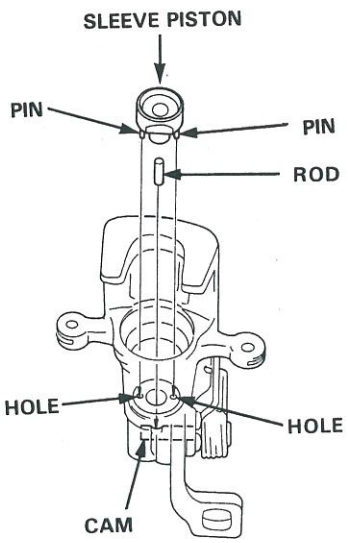
5. Install the return spring.



6. Install the rod in the cam.

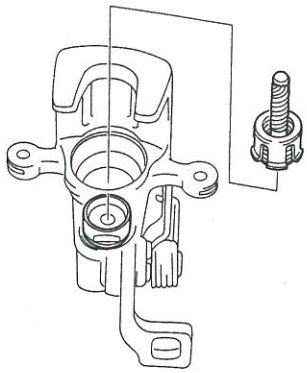
7. Install the new O-ring on the sleeve piston.

8. Install the sleeve piston so the hole in the bottom of the piston is aligned with the rod in the cam, and the two pins on the piston are aligned with the holes in the caliper.

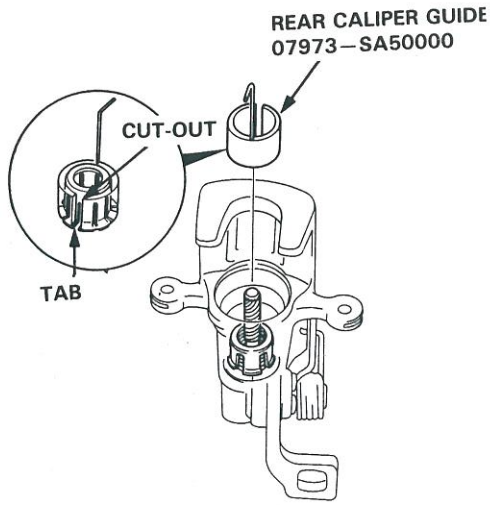


9. Install the new cup with its groove facing the bearing A side on the adjusting bolt.

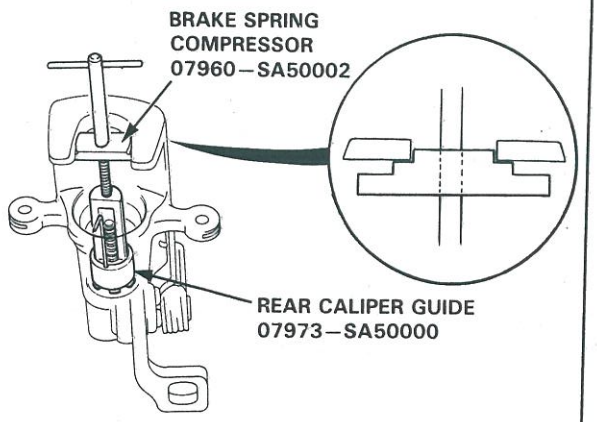
10. Fit bearing A, the spacer, adjusting spring B and spring cover on the adjusting bolt, and install in the caliper cylinder.



11. Install the rear caliper guide in the cylinder, aligning the cutout on the tool with the tab on the spring cover.



12. Install the brake spring compressor as shown.



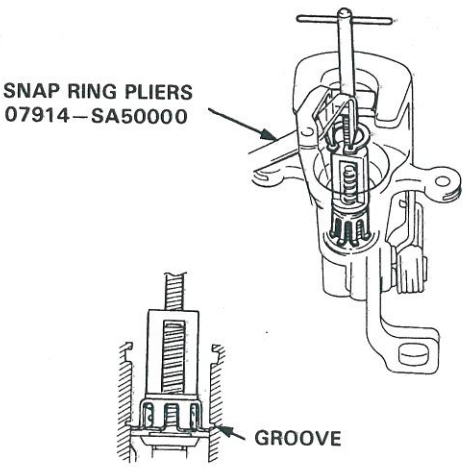
13. Compress the spring until it bottom out.

    NOTE: Check that the rear caliper guide doesn't hang up while the spring is being compressed.

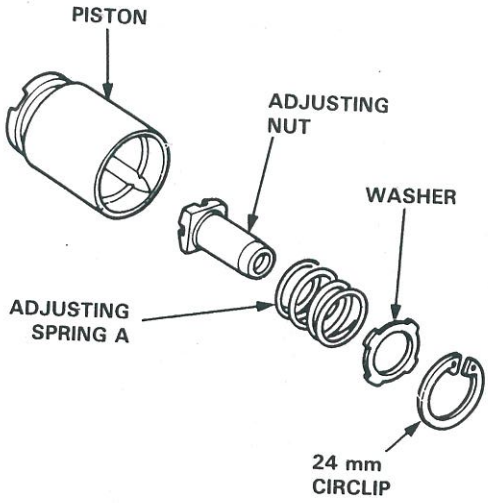
14. Remove the rear caliper guide. Check that the flared end of the spring cover is below the circlip groove.

15. Install the circlip then remove the brake spring compressor.

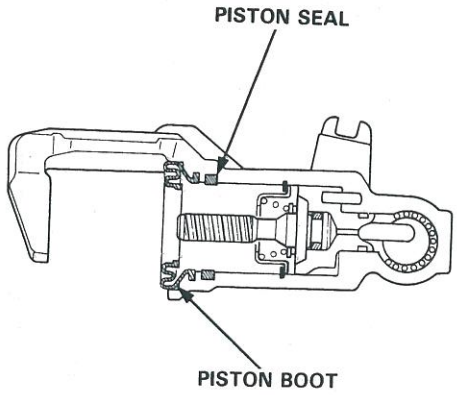
    NOTE: Check that the circlip is seated in the groove properly.



16. Install the adjusting nut, adjusting spring A, and washer, and secure with the circlip.



17. Coat the new piston seal and piston boot with silicone grease and install them in the caliper.

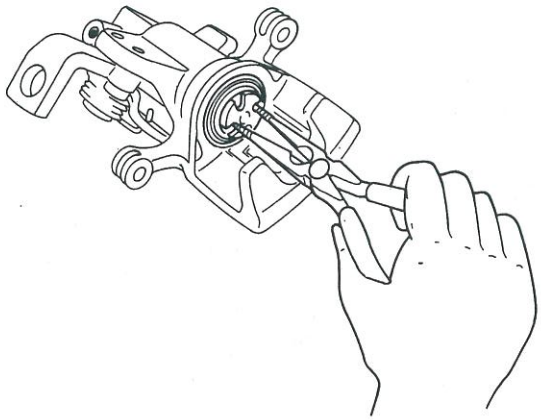


(cont'd)

Reassembly (cont'd)

18. Coat the outside of the piston with silicone grease, and install it on the adjusting bolt while rotating it clockwise.

    CAUTION: Avoid damaging the piston boot.



19. Install the brake pad retainers and brake pads.

20. Install the pad springs on the caliper.

21. Install the caliper on the caliper bracket and tighten the caliper mounting bolts.

22. Connect the brake hose to the caliper with new sealing washers and tighten the banjo bolt.

23. Fill the brake reservoir up and bleed the brake system (page 19-9).

24. Connect the parking brake cable to the arm on the caliper.

25. Operate the brake pedal several times, then adjust the sparking brake lever (page 19-3).

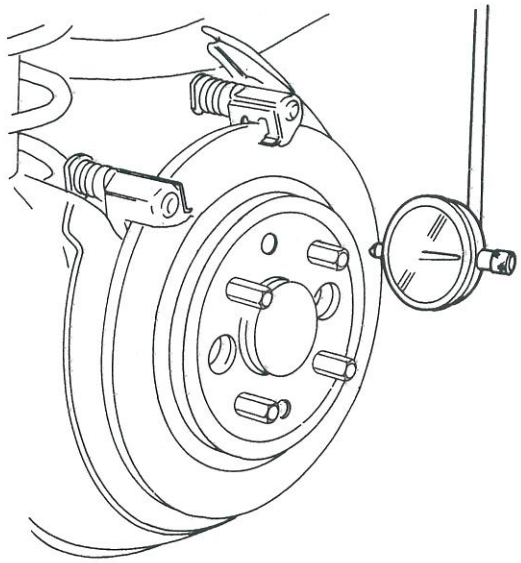
    NOTE: Before adjustments, make sure the parking brake arm on the caliper touches the pin.

26. Install the caliper shield and tighten the bolts.

Rear Brake Disc

Run-Out

1. Block the flont wheels, support the rear of the car on safety stands, then remove the rear wheels.
2. Remove the caliper bolts, lift the caliper up out of the way, then remove the pads and pad guides



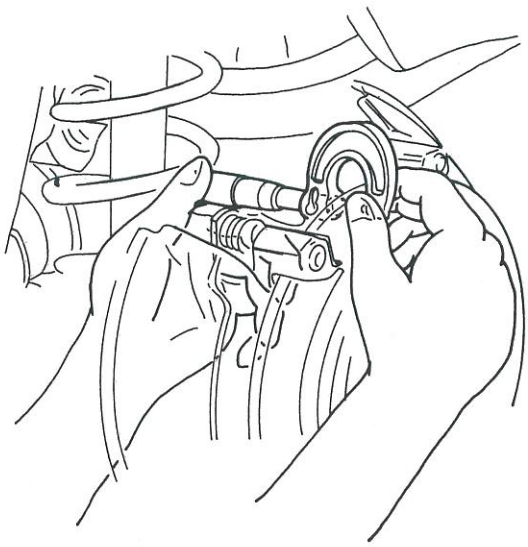
3. Inspect the disc surface for grooves, cracks, and rust. Clean disc thoroughly and remove all rust.
4. Use the lug nuts to hold the disc securely against the hub, then mount a dial indicator 10 mm (0.39 in.) in from the outer edge. Check the runout while turning the disc slowly by hand.

Brake Disc Runout:
Service Limit: 0.15 mm (0.006 in.)

5. Replace the disc if beyond the service limit. Remove the caliper bracket and the old disc, then install a new one.

Thickness and Parallelism

1. Block the flont wheels, support the rear of the car on safety stands, then remove the rear wheels.
2. Move the caliper and pads out of the way as described in the preceding column.
3. Using a micrometer, measure the disc thickness at eight points, approximately 45° apart and 10 mm (0.39 in.) from the outer edge of the disc.



Replace the disc if it exceeds the following service limits:

Brake Disc Thickness:

Standard	**10.0 mm (0.39 in.)**
Max. Refinishing Limit:	**8.0 mm (0.31 in.)**

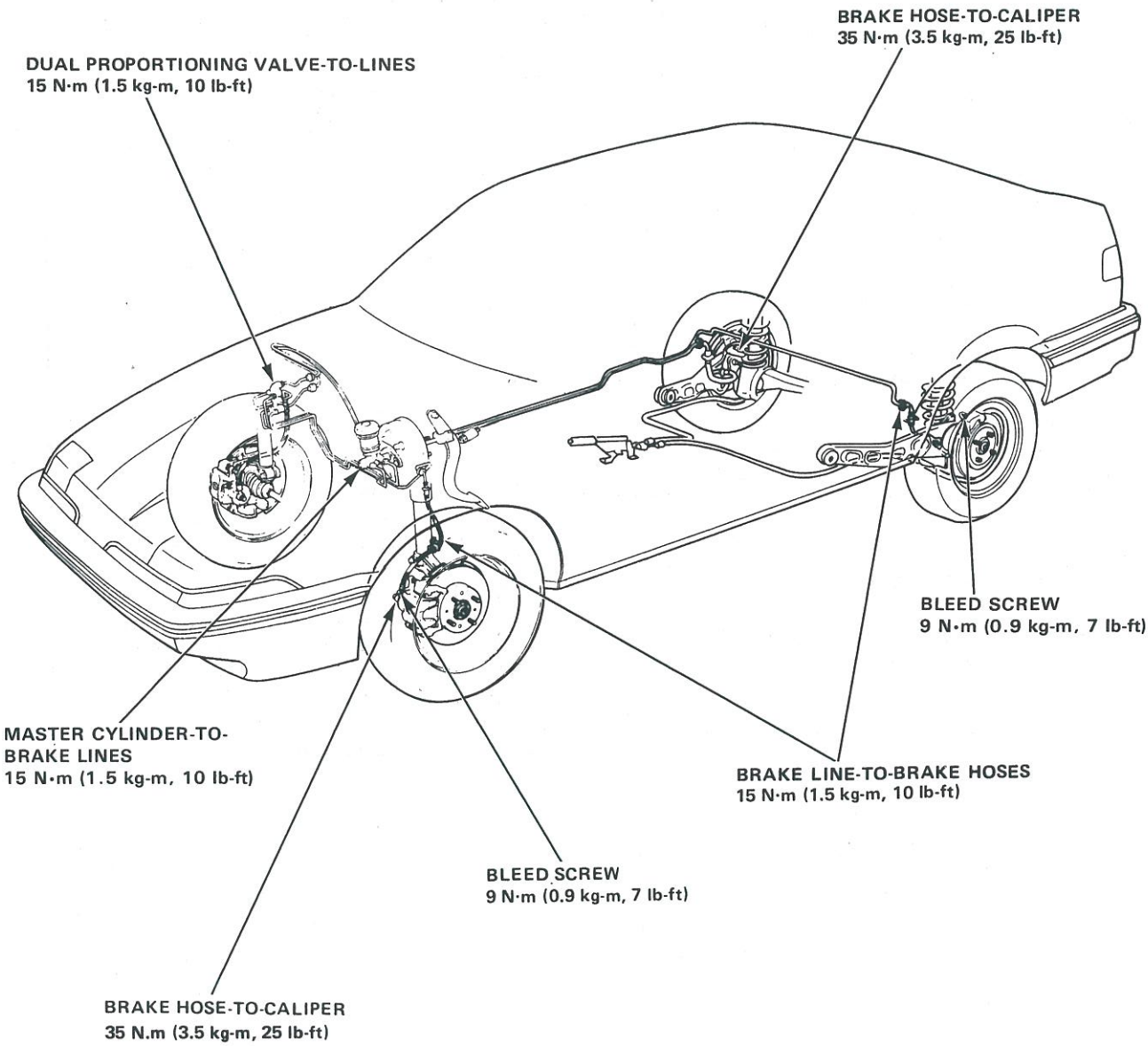
Brake Disc Parallelism:
The difference between any thickness measurements should not be more than 0.015 mm (0.0006 in.)

4. Replace the disc if beyond the limits. Remove the caliper mount and the oild disc, then install a new one.

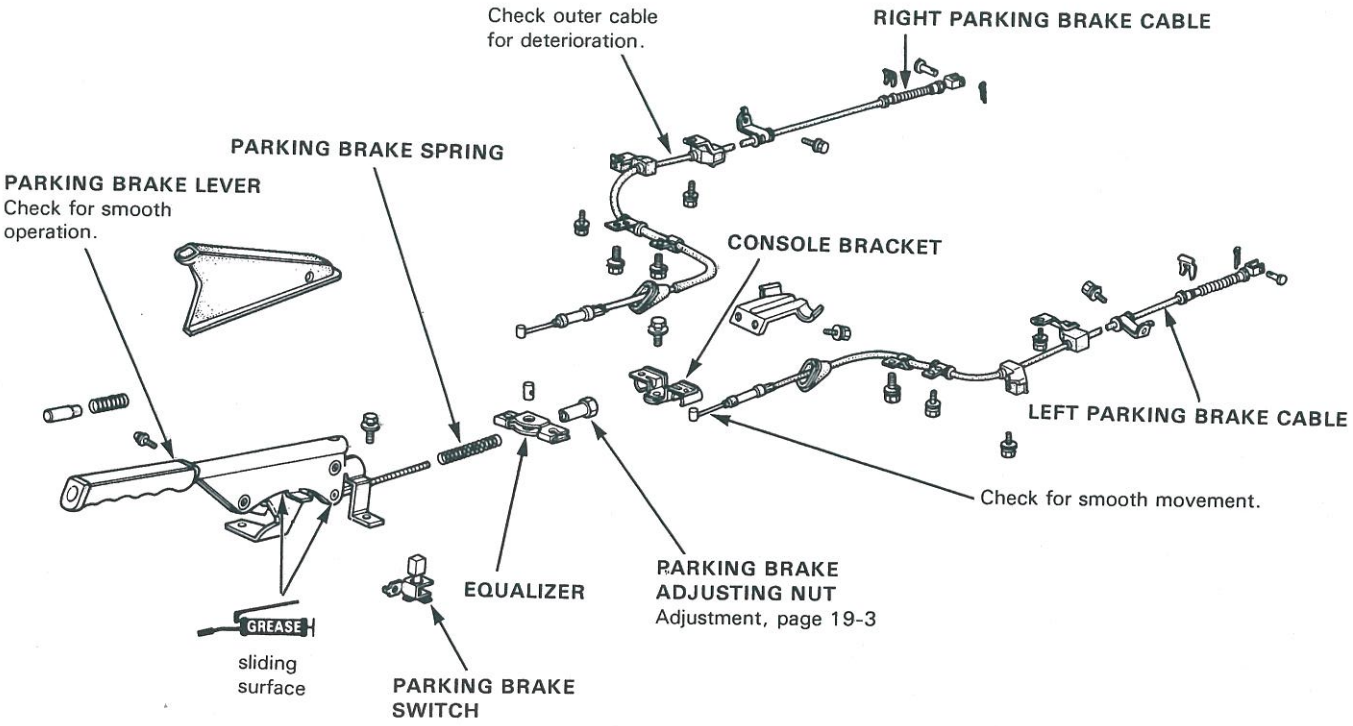
Brake Hoses/Pipes

Inspection

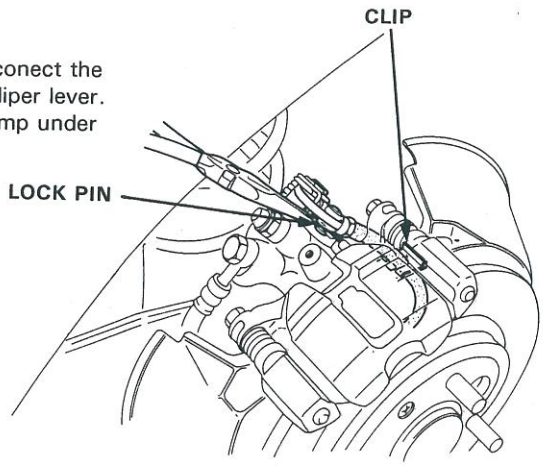
1. Inspect the brake hoses for damage, leaks, interference or twisting.
2. Check the brake lines for damage, rusting or leakage. Also check for bent brake lines.
3. Check for leaks at hose and line joints or connections, and retighten if necessary.



Disassembly/Reassembly



Remove the lock pin and disconect the parking brake cable at the caliper lever. Then remove the clip and clamp under the caliper bracket.



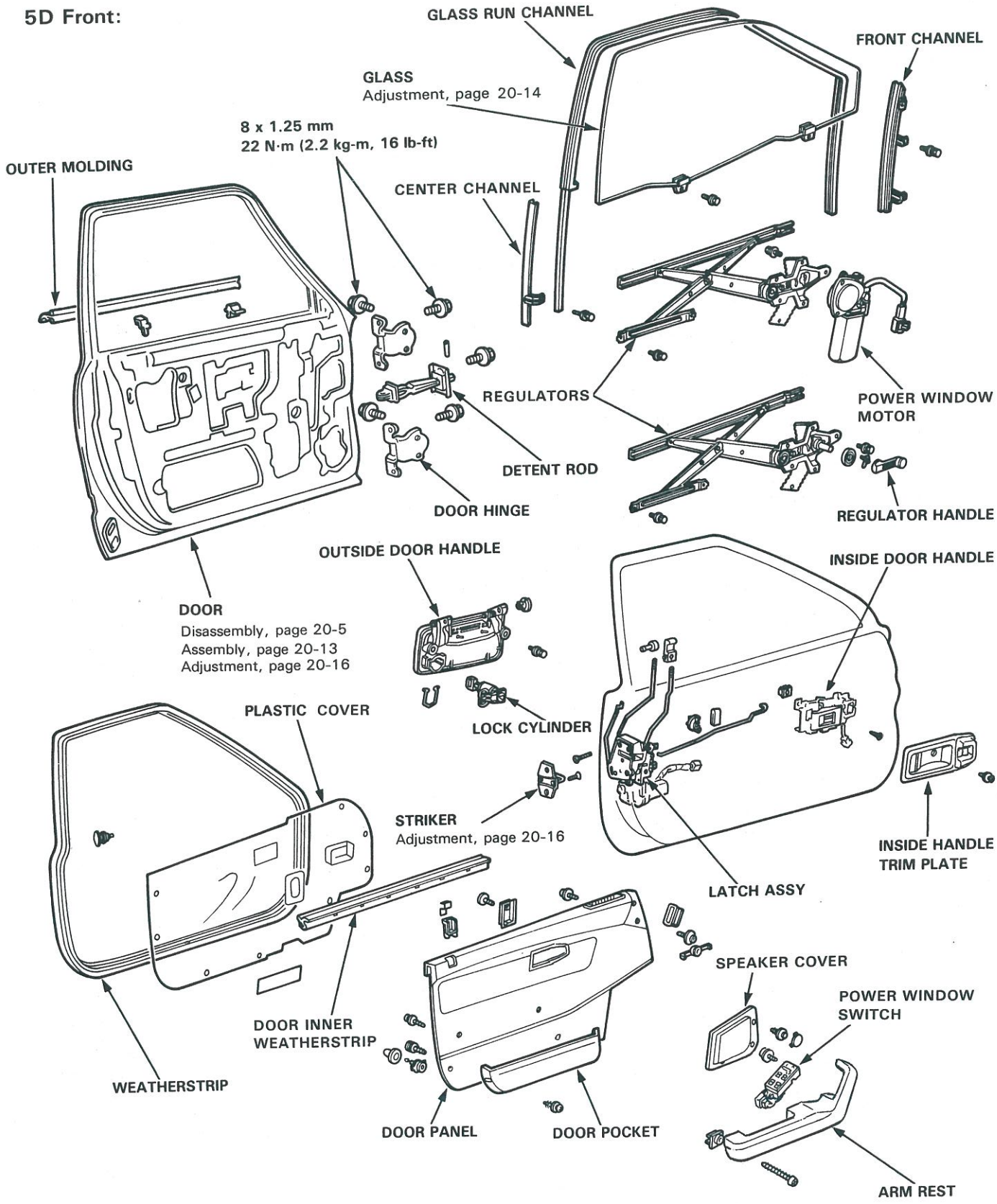
Body

Doors 20–2
Windshield and Rear Windows 20–18
Sunroof 20–35
Interior Trim 20–38
Seats 20–40
Rear View Mirror 20–45
Console 20–46
Carpet 20–47
Headliner 20–48
Instrument Panel and Gauges 20–49
Bumpers 20–54
Hood 20–56
Tailgate 20–57
Opener and Latch 20–58
Windshield Washer 20–59
Frame Repair Chart 20–60

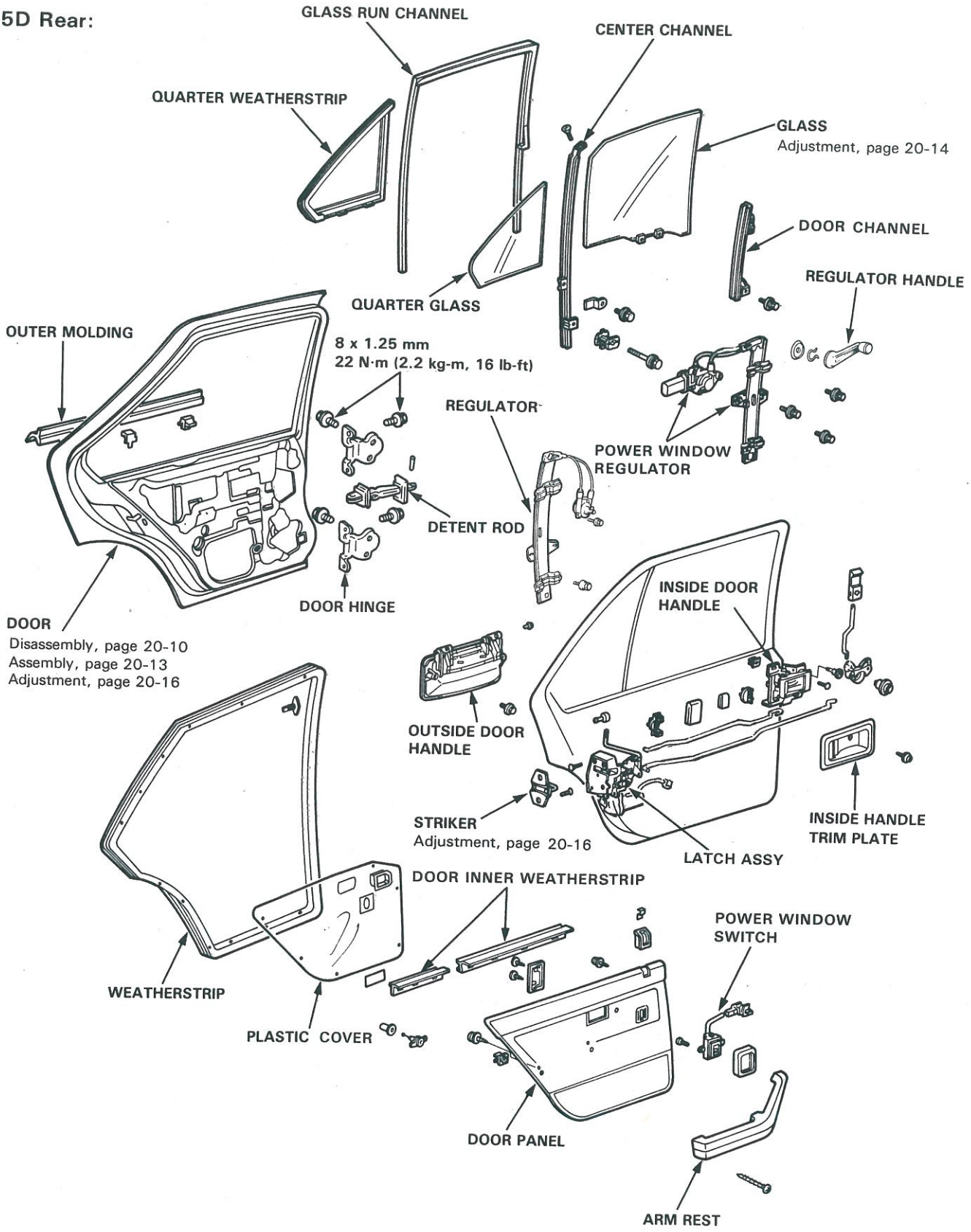


Illustrated Index

5D Front:



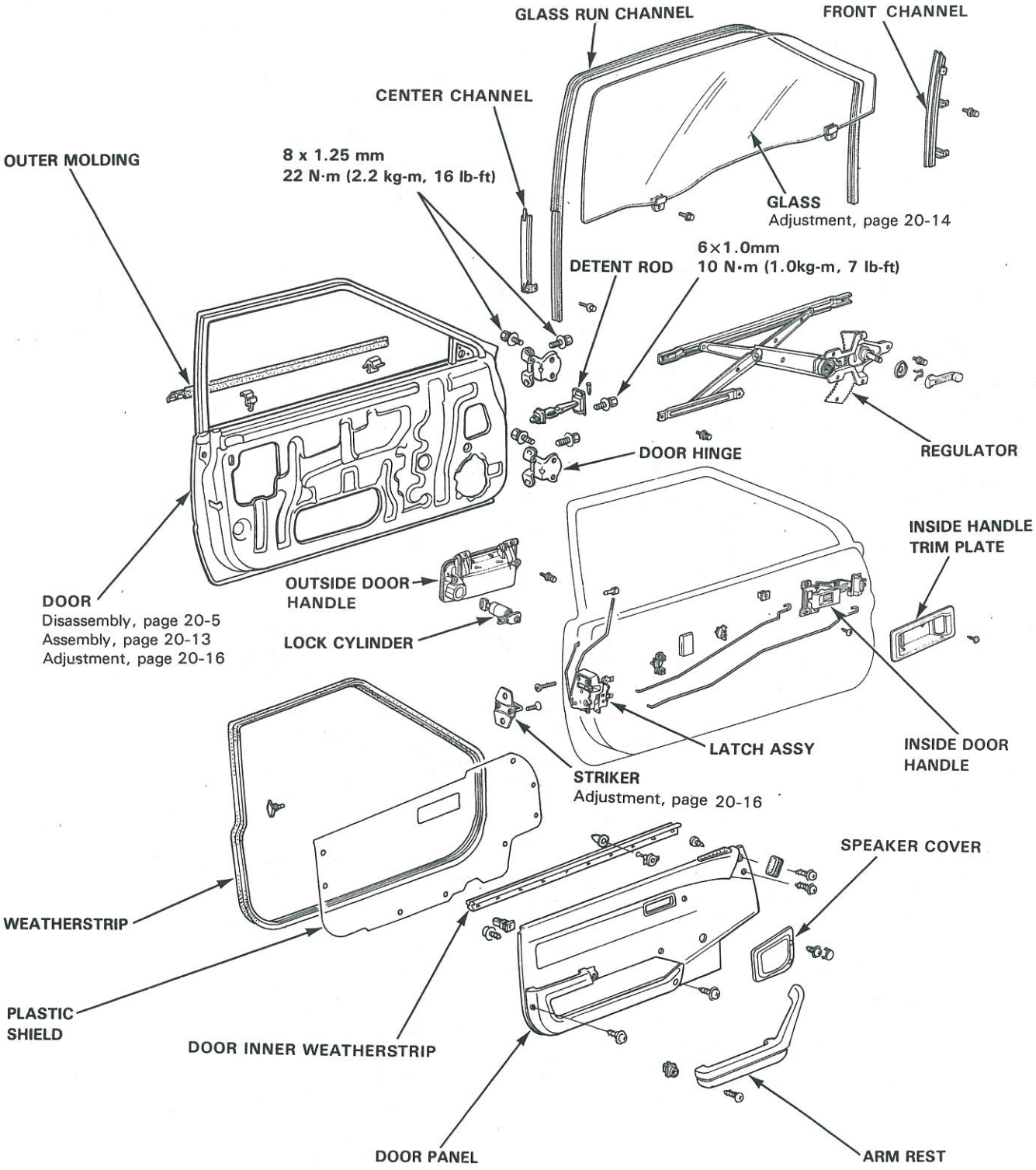
5D Rear:



(cont'd)

Illustrated Index (cont'd)

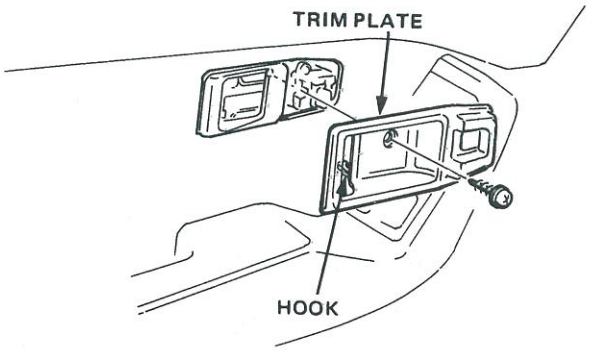
3D Front:



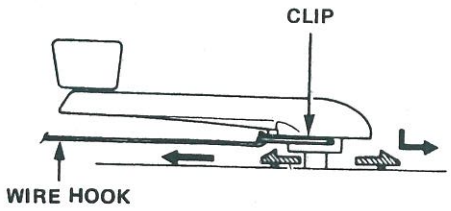
Front Door

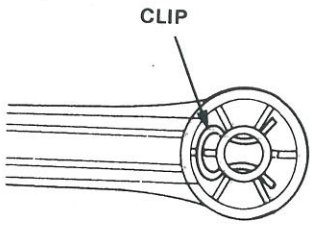
Disassembly

1. Remove the screw, then carefully remove the trim plate.

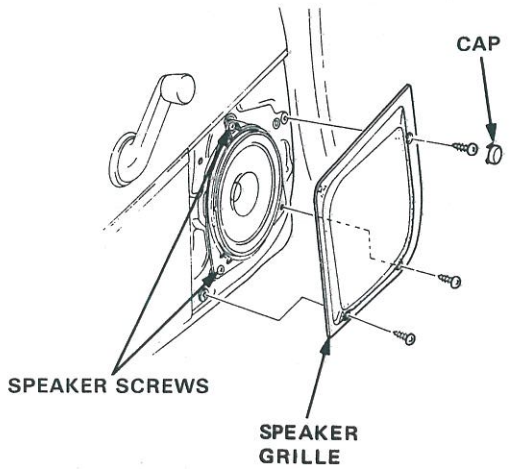


2. If applicable, remove the regulator handle by pulling the clip out with a wire hook.



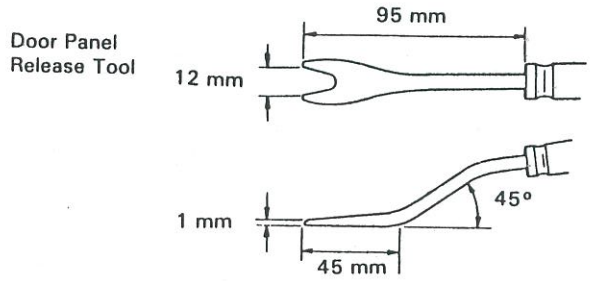


3. Remove the speaker screws and speaker.
NOTE: The speaker cables are soldered to the terminals on the speaker.

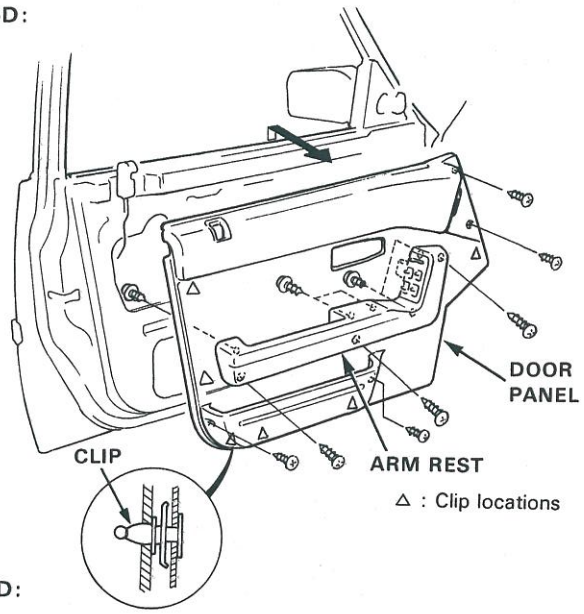


4. Remove the three screws attaching the arm rest. Remove the four screws attaching the door lining. Remove the door panel by removing the six clips and pulling it upward. Disconnect the power window harnesses. Remove the five screws, then remove the arm rest (Driver side).

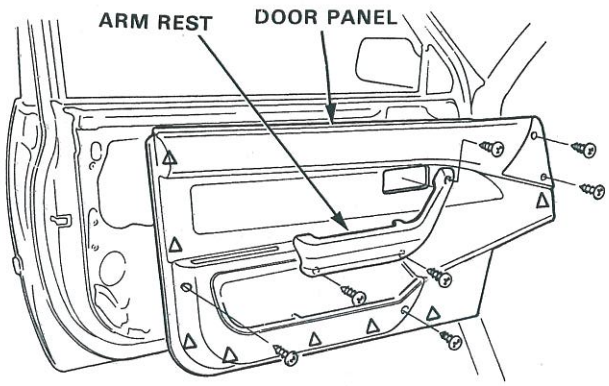
NOTE: Remove the panel with as little bending as possible to avoid creasing or breaking it.



5D:



3D:

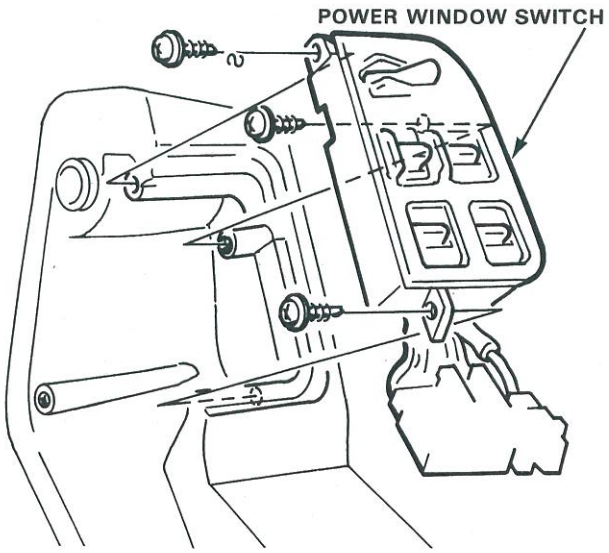


5. Peel off the plastic shield cover without tearing it.

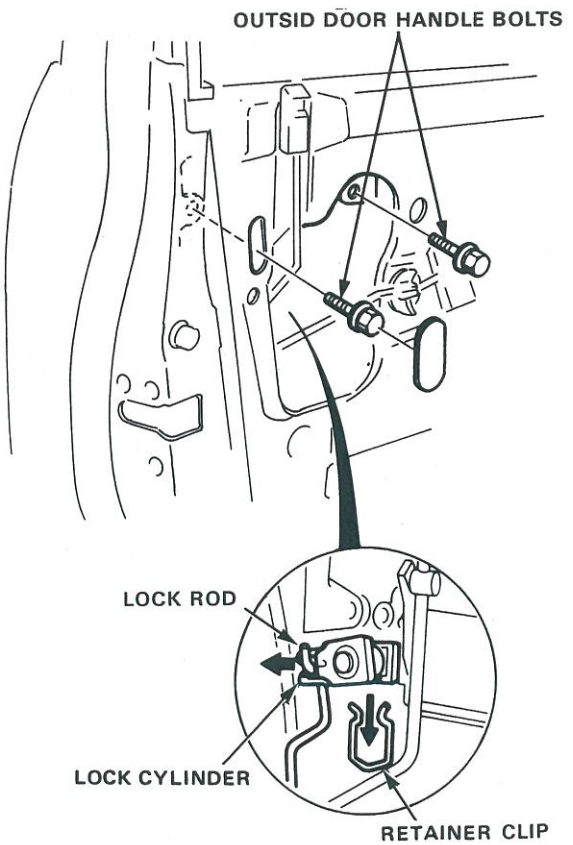
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Disassembly (cont'd)

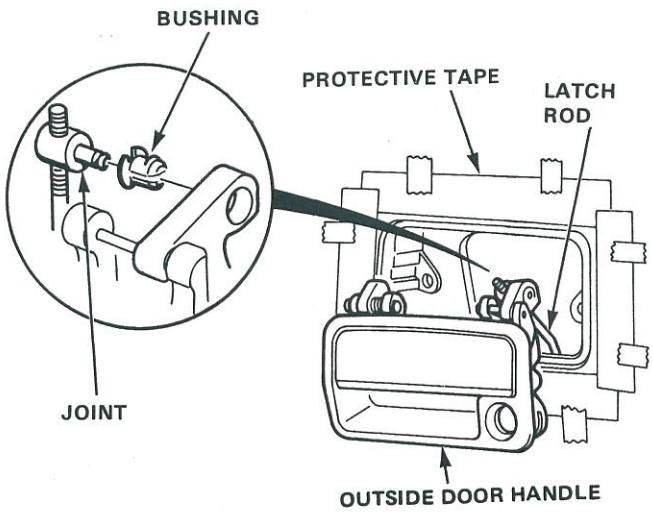
6. Remove the power window switch, if equipped, from the arm rest by removing the three screws.



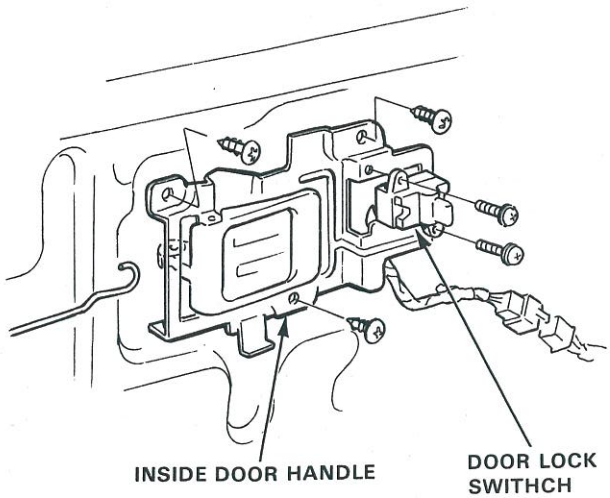
7. Remove the mounting bolts for the outside door handle.
8. Pull out the retainer clip, and take out the lock cylinder, then disconnect the lock rod.



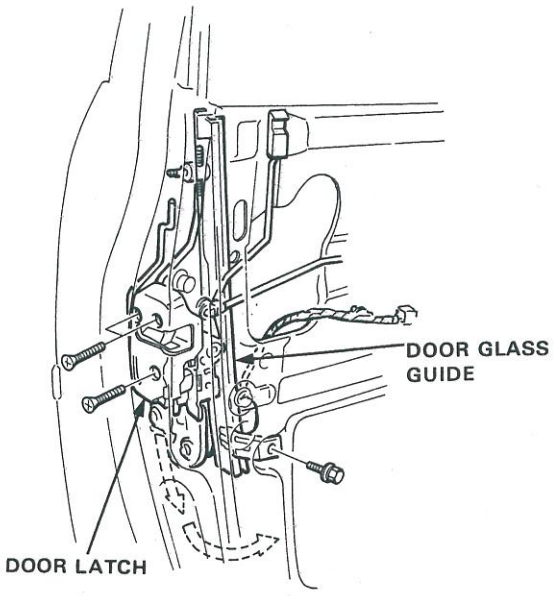
9. Pull the outside door handle out, and pry the joint off the handle with a flat screwdriver. Remove the handle from the rod.
   NOTE: Use protective tape around the edge of the door handle to prevent scratching the paint.



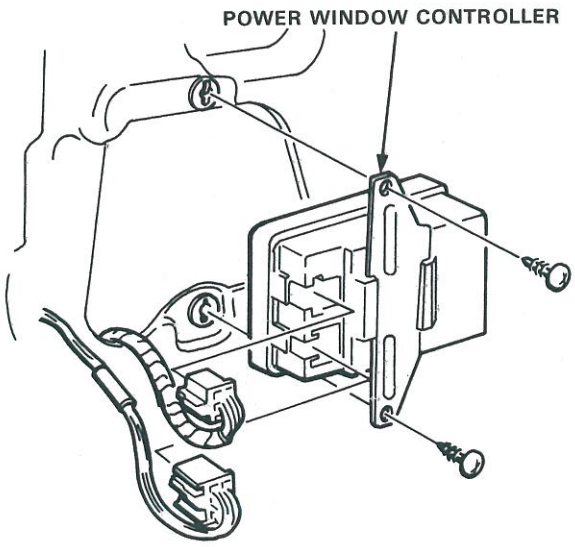
10. Disconnect the wire harness and remove the three screws, then remove the inside door handle.
    Remove the screws, then remove the door lock switch.



11. Remove the lower bolt of the door glass guide and slide the door glass guide toward the end of the door. Remove the screws and take the door latch off the door, then push the door latch and rod inside the door.

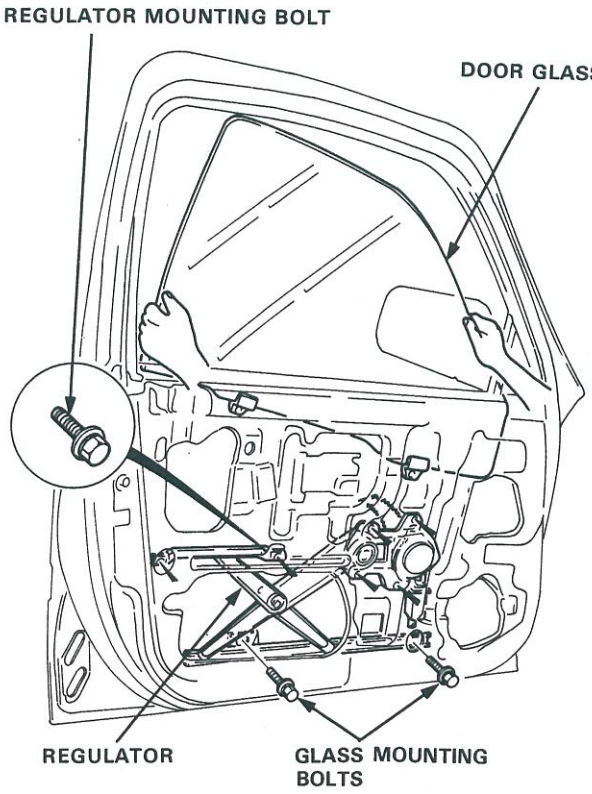


12. Disconnect the wire harness and remove the 2 screws, then remove the power window controller.

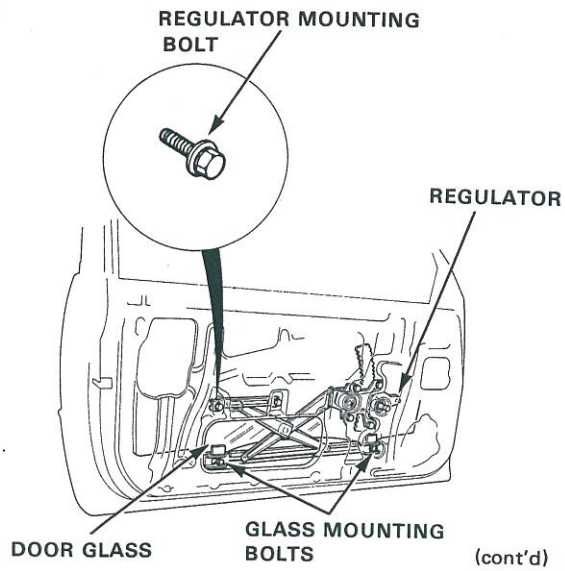


13. Carefully lower the door glass until you can see its mounting bolts. Remove the bolts and pull the door glass out through the window slot.
Remove the regulator mounting bolts, then take out the regulator assembly through the lower hole in the door.

5D:



3D:

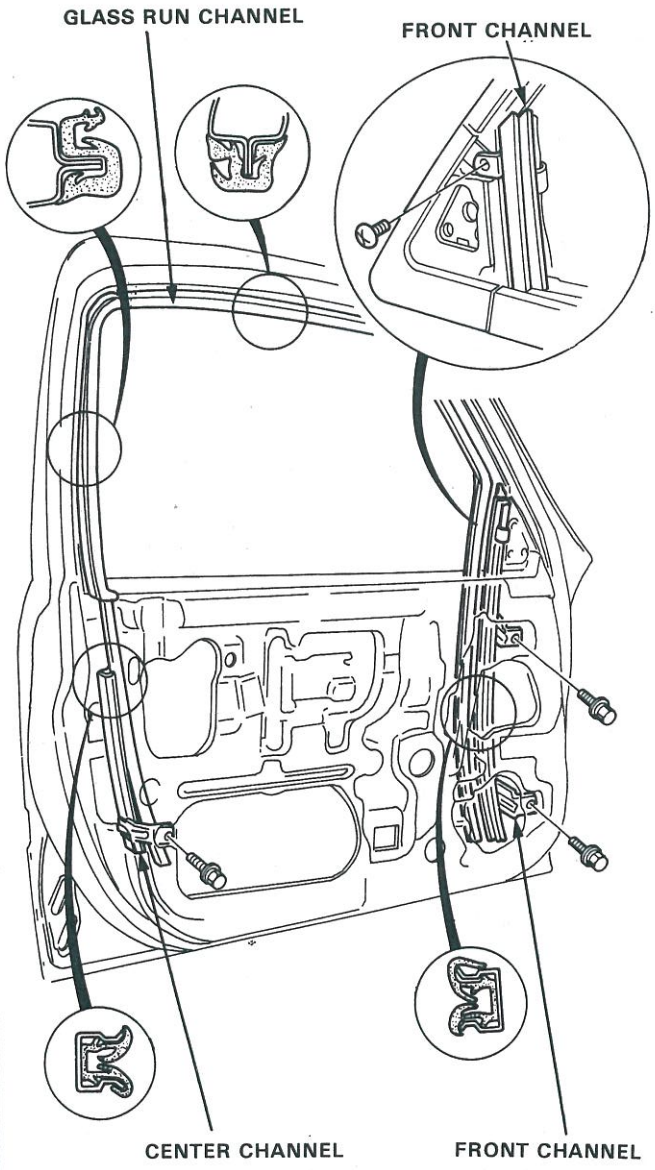


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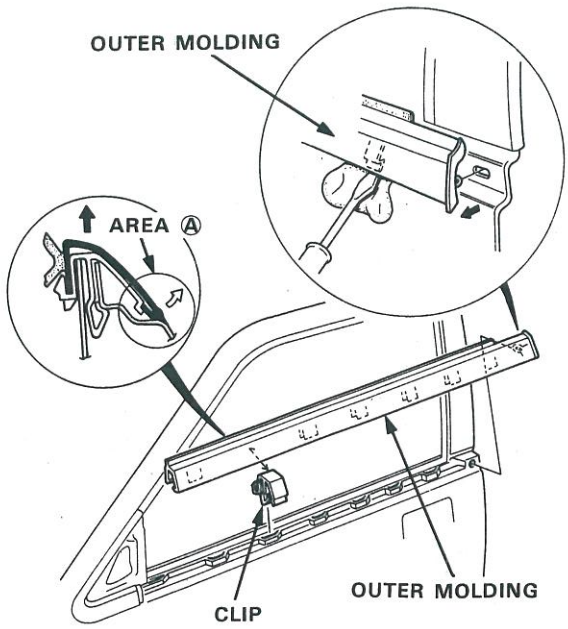
Disassembly (cont'd)

14. Remove the glass run channel.
15. Remove the front channel by removing the 2 bolts and the screw.
16. Remove the bolt then remove the center channel.

NOTE: Before installation insert the glass run channel into the front and the center channel.



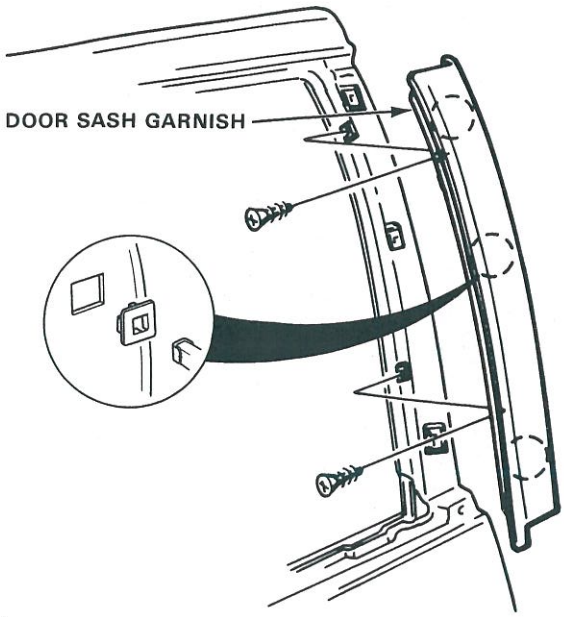
17. Pry out the clip at the rear of the outer molding.



18. Remove the seven clips from the door molding (area Ⓐ), and take out the molding, being careful not to bend it.

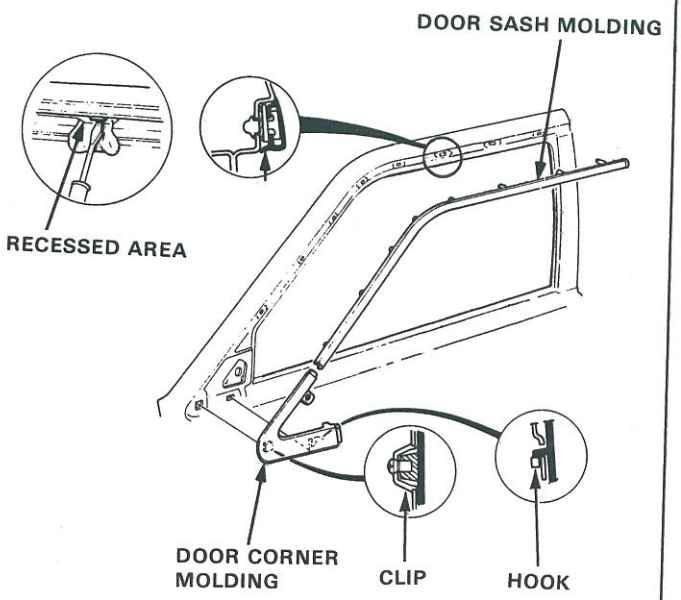
NOTE: Set the clips on the molding first when installing it on the door.

19. Remove the 2 screws and the 3 clips, then remove the door sash garnish by prying, starting of the top.



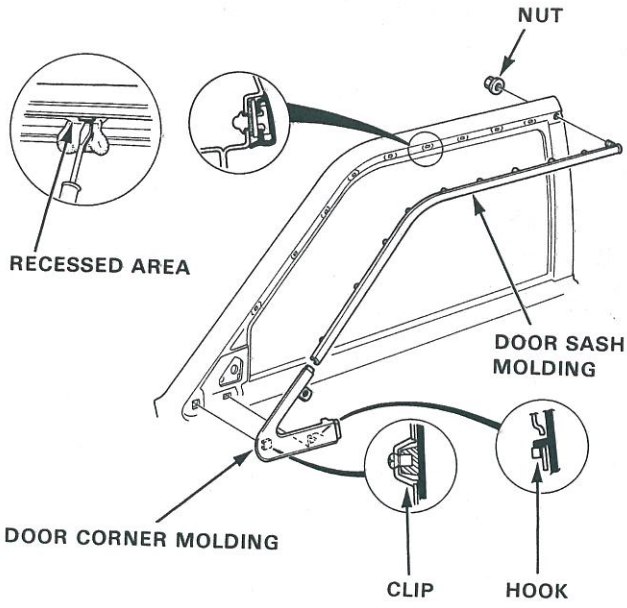
20. Remove the door mirrors (page 20-17).
21. Remove the eight clips from the recess of the door sash, then remove the door sash molding.

5D:



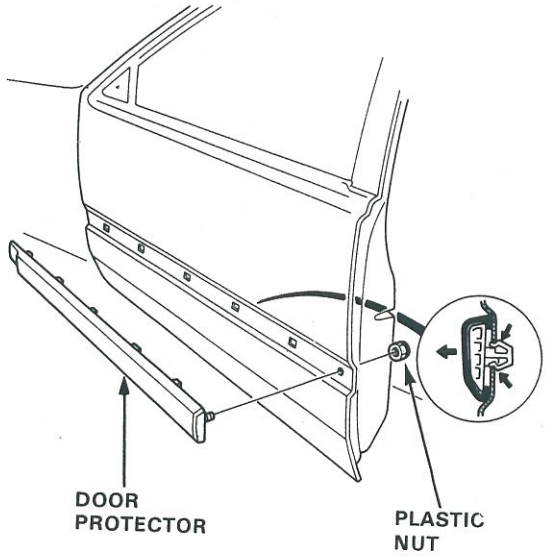
3D:

Remove the end nut and nine clips.



22. Remove a clip, release the hook, and remove the door corner molding.

23. Remove the door protector by removing the nut and clips from the inside.

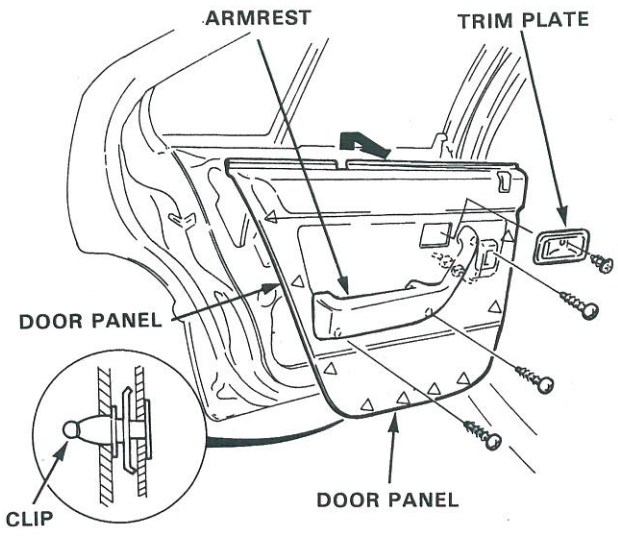


Rear Door

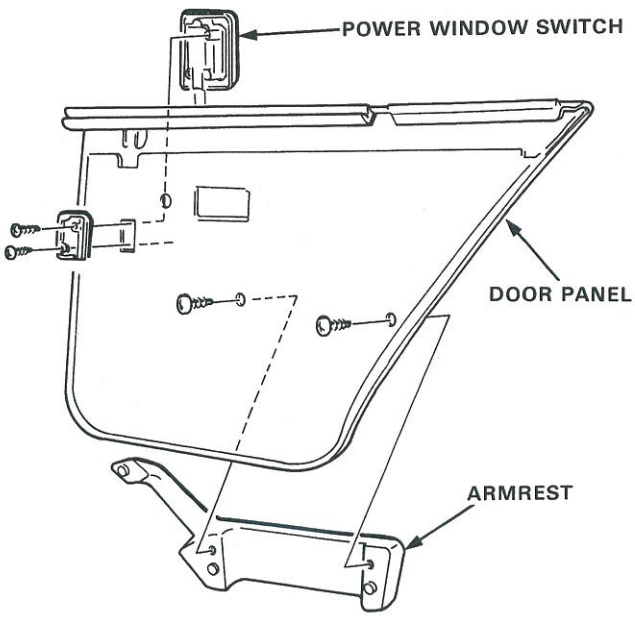
Disassembly

1. Remove the trim plate by removing the screw and remove the screws of armrest.

   NOTE: The armrest on the door panel.

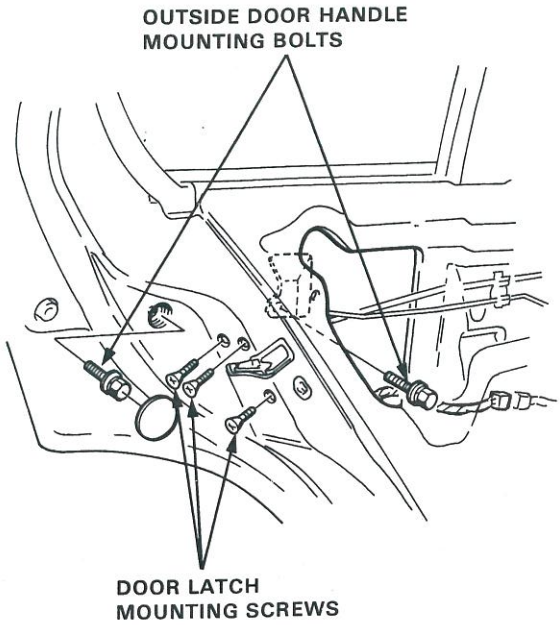


2. Pry apart the 9 clips and lift the door panel straight up off the window sill. Disconnect the wire connector of the power window.
3. Remove the screws from inside, and remove the armrest and power window switch.



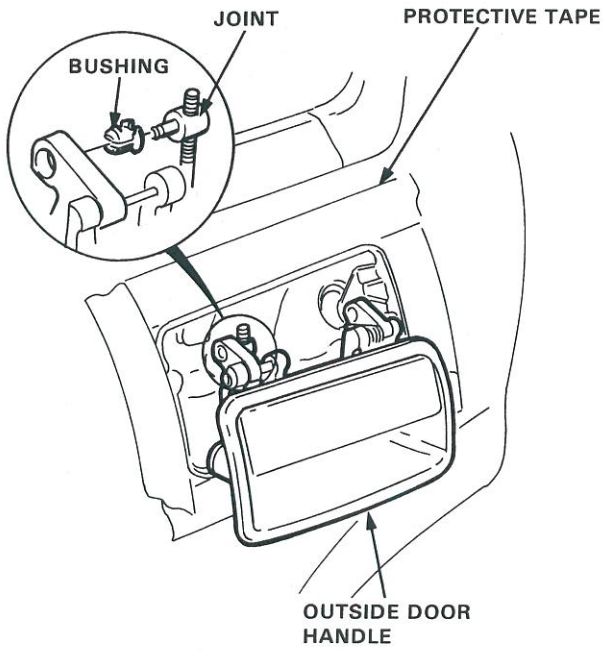
4. Peel off the plastic cover without tearing it.

5. Remove the 3 screws of the door latch, and remove the 2 bolts of the outside door handle.

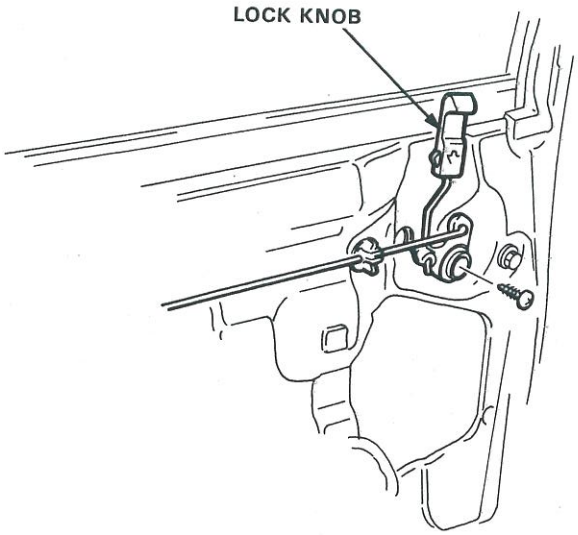


6. Pull the outside door handle out, and pry the joint off the handle with a flat screwdriver. Remove the handle from the rod.

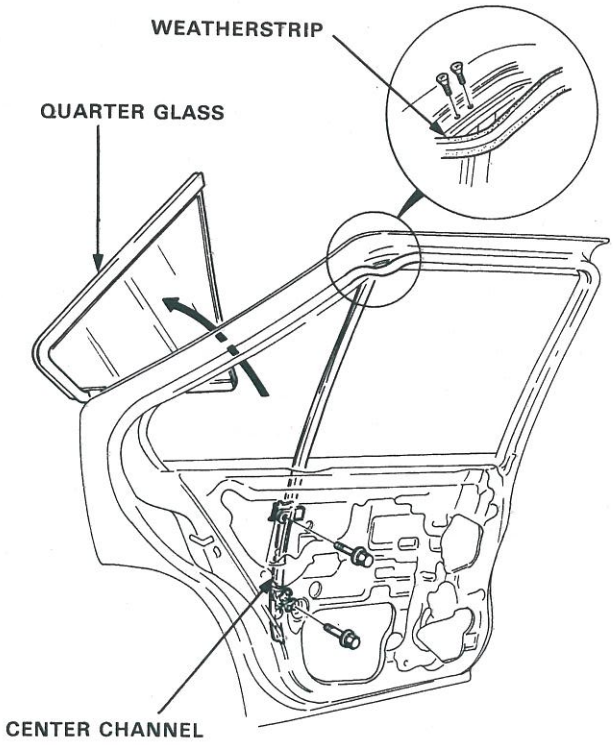
   NOTE; Use protective tape around the edge of the door handle to prevent scratching the paint.



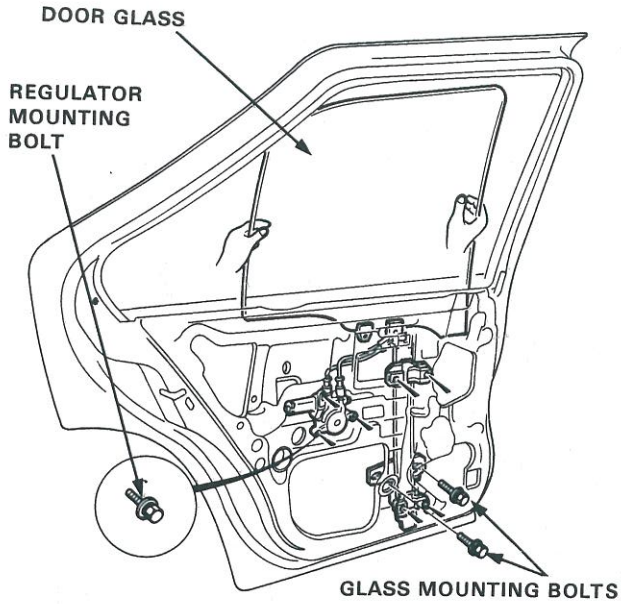
7. Remove the 2 screws of the inside door handle and the screw of the lock knob, then remove it from the door.



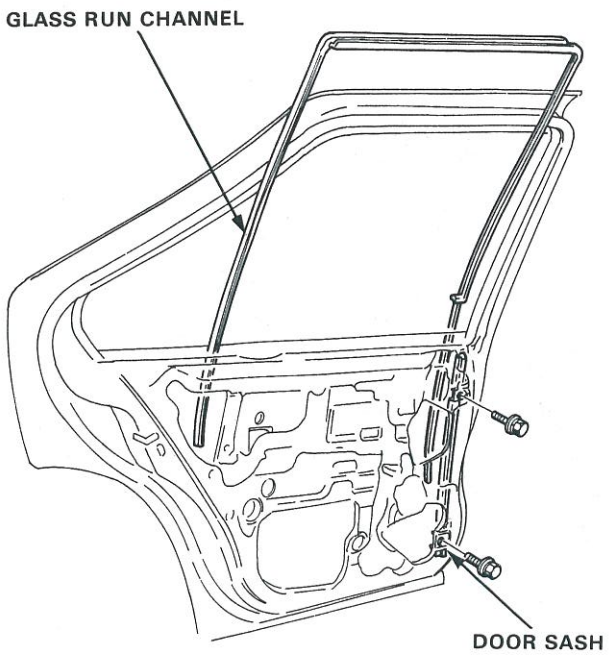
8. Peel the weatherstrip off and remove the 2 screws as shown. Remove the 2 channel bolts, then remove the center channel. Remove the quarter glass.



9. Carefully lower the door glass until you can see its mounting bolts, then loosen the bolts. Pull the door glass out through the window slot. Remove the 4 bolts attaching the regulator and remove the regulator.



10. Remove the glass run channel and the 2 bolts, then remove the rear channel.

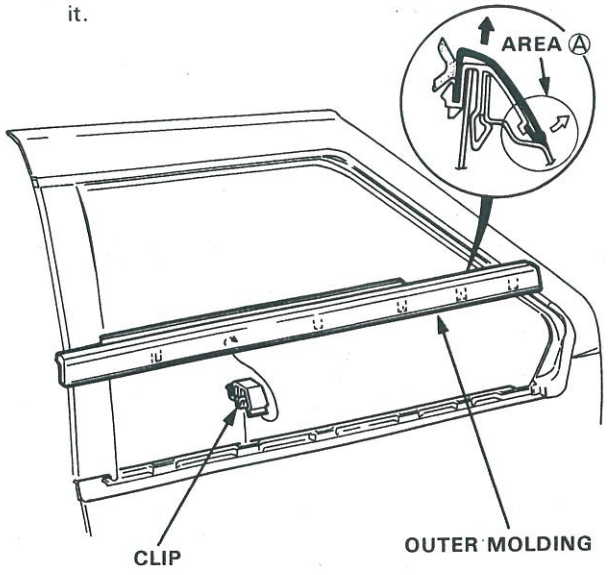


(cont'd)

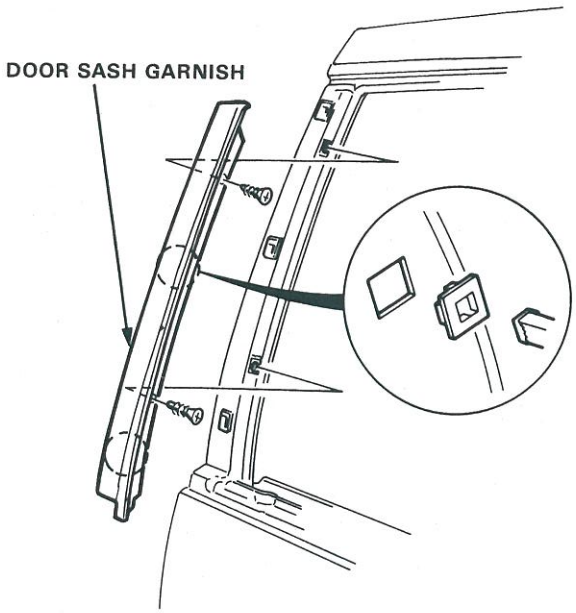
Disassembly (cont'd)

11. Carefully pry off the outer molding at the 6 clip locations Ⓐ.

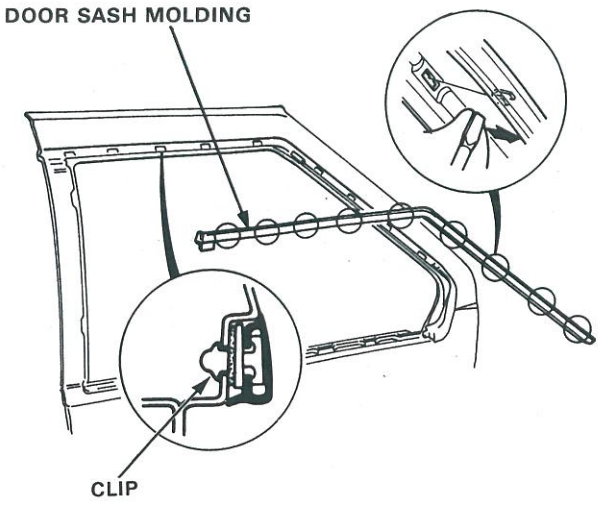
NOTE:
- Remove the molding with as little bending as possible.
- Set the clips on the door molding before installing it.



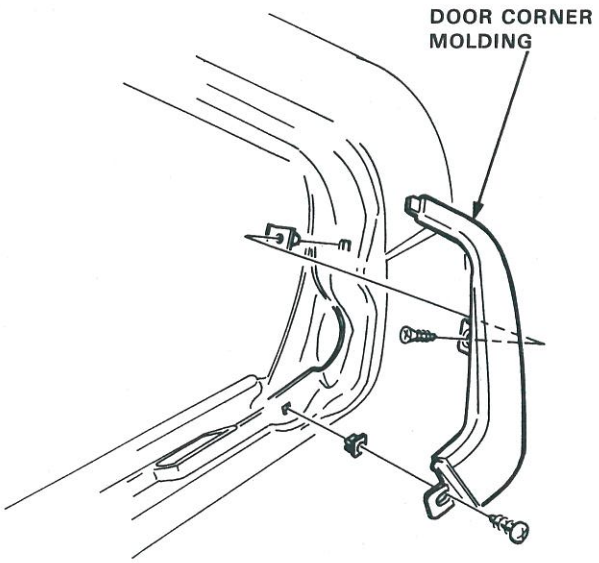
12. Remove the door sash garnish by removing the 2 screws and 3 clips.



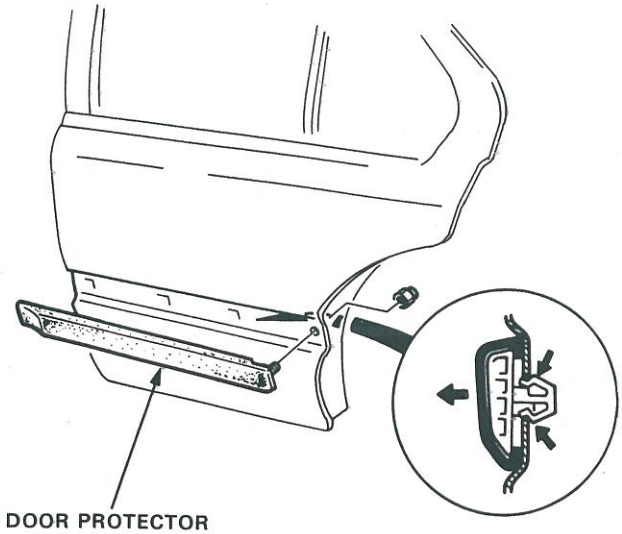
13. Remove the door sash molding by removing the 9 clips.



14. Remove the door corner molding by removing the screw.



15. Remove the door protector by removing the nut and clips from the inside.

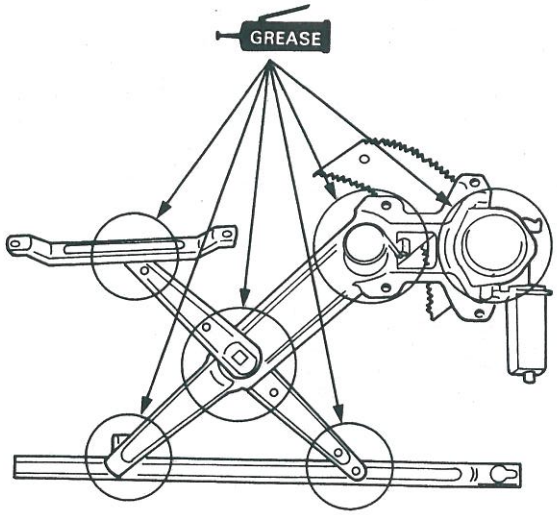


Assembly

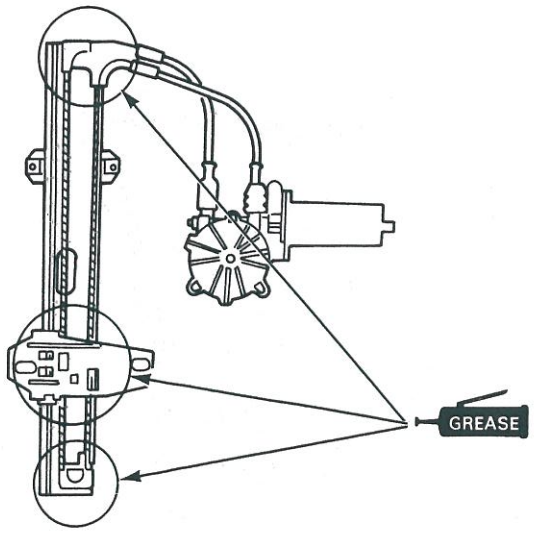
Assemble the door in the reverse order of disassembly, and also:

1. Grease all the sliding surfaces of the window regulator where shown.

Front:



Rear:

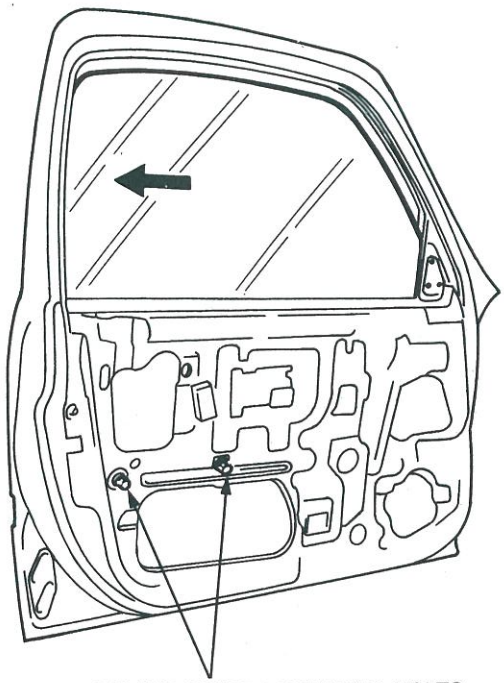


(cont'd)

Assembly (cont'd)

2. 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 or motor mount bolts.

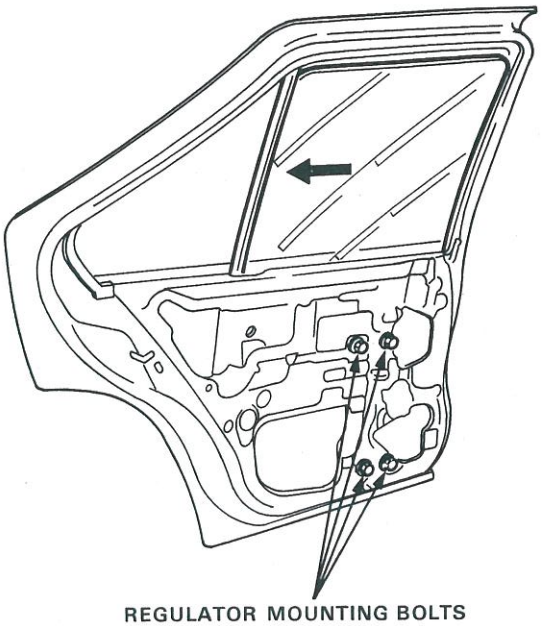
5D Front :



ROLLER GUIDE MOUNTING BOLTS

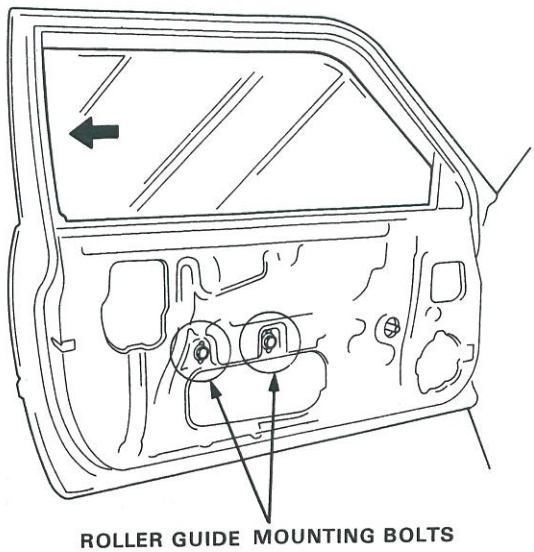
5D Rear:

3. Raise the glass as far up as possible and hold it against the door sash then tighten the regulator mounting bolts.



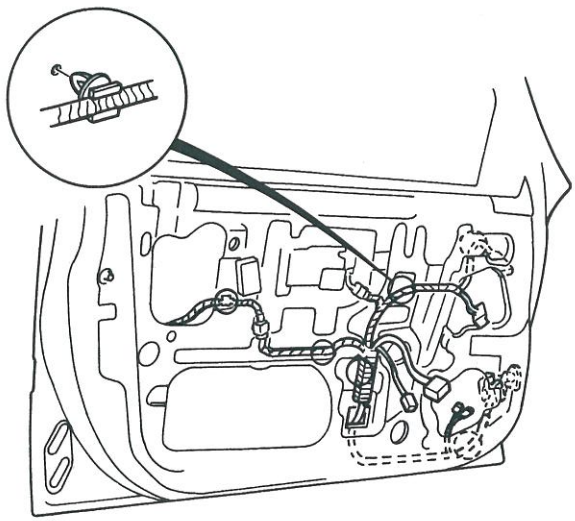
REGULATOR MOUNTING BOLTS

3D Front:

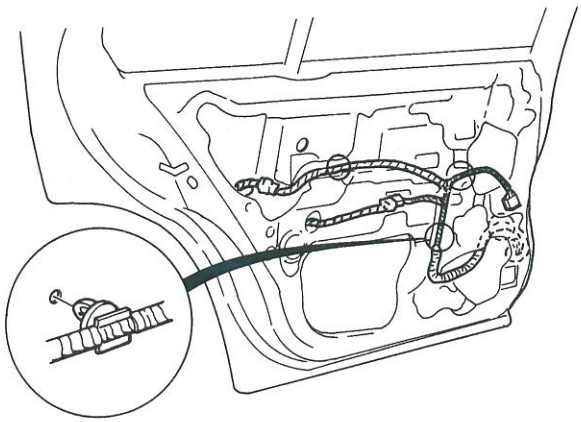


ROLLER GUIDE MOUNTING BOLTS

5D Front:

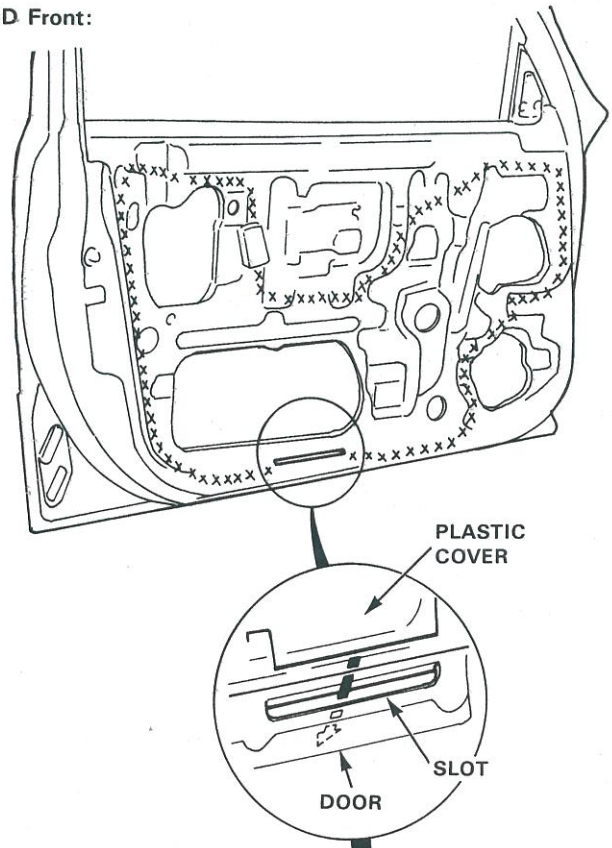


5D Rear:

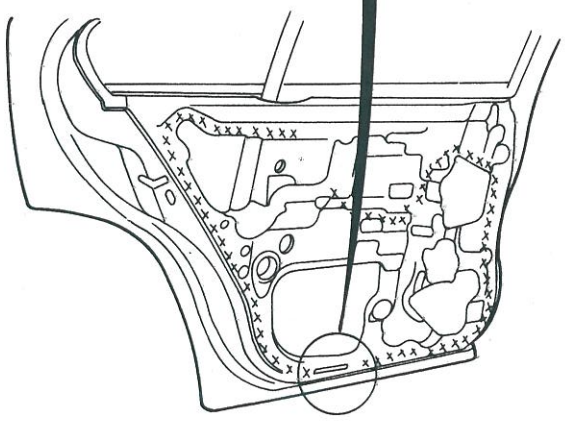


4. When reinstalling the plastic cover, apply adhesive along the edge where necessary to maintain a continuous seal and prevent air/water leaks.

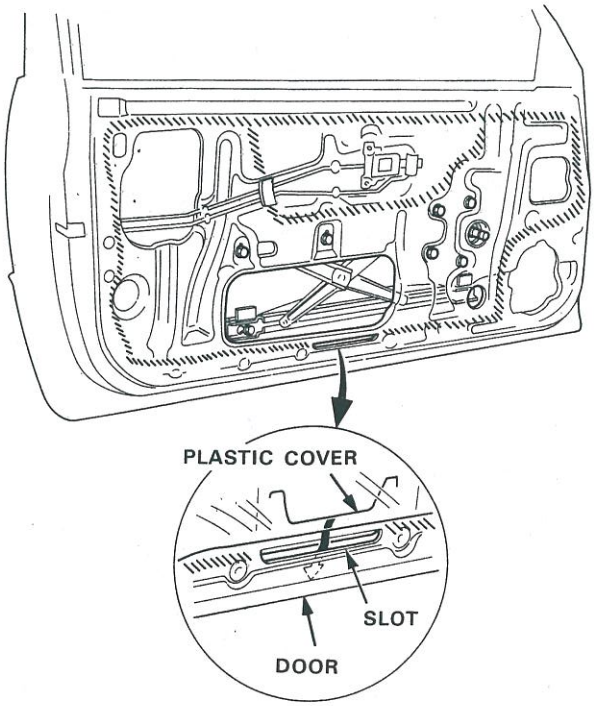
5D Front:



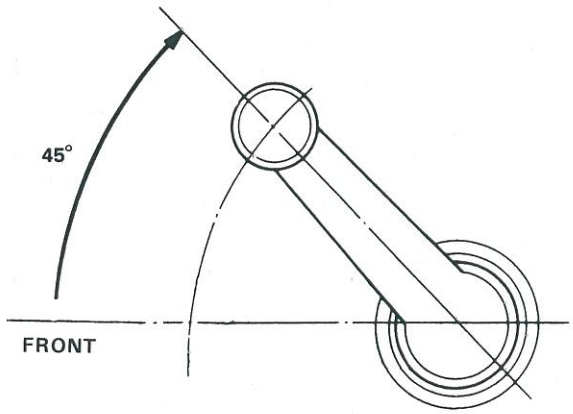
5D Rear:



3D Front:



5. Install the regulator handle so it points forward, and up at a 45 degree angle with the window closed.

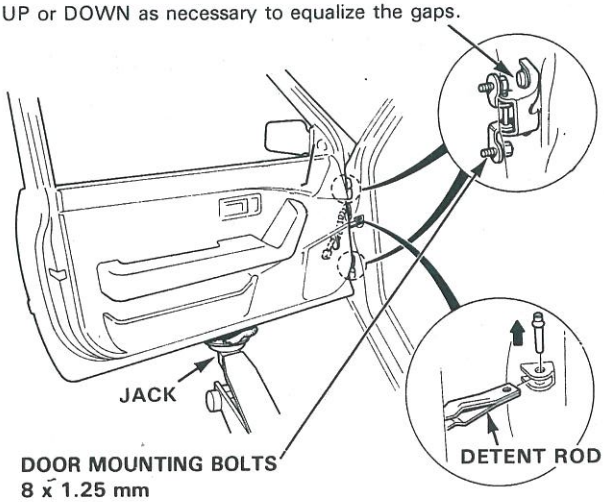


Door Position Adjustment

After installing the door, check for a flush fit with the body, then check for equal gap 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.

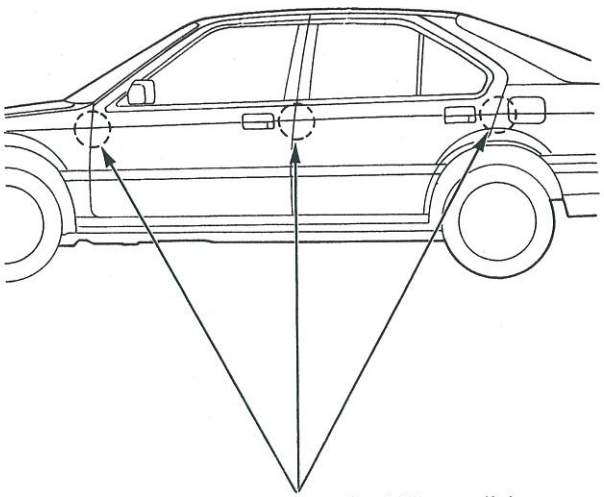
CAUTION: Place a rag or shop towel on the jack to prevent damage to the door when the hinge bolts are loosened for adjustment.

HINGE MOUNTING BOLTS
8 x 1.25 mm
22 N·m (2.2 kg-m, 16 lb-ft)
Loosen the bolts, and move the door BACKWARD or FORWARD, UP or DOWN as necessary to equalize the gaps.



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

Loosen the bolts slightly to move the door IN or OUT until flushwith the body. If necessary, you can install a shim behind one hinge to make the door edges PARALLEL with the body.

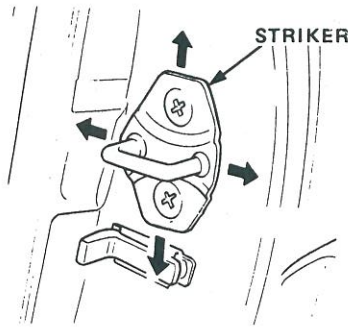


The door and body edges should be parallel.

Door Striker Adjustment

Make sure the door is not loose, and 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.



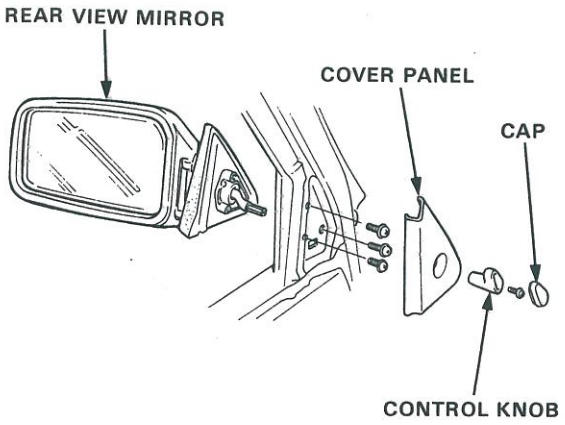
NOTE: Hold the outside handle out and push the door against the body to be sure the striker allows a flush fit.

3. If the door latches properly, tighten the screws and recheck.

Door Mirror

Removal

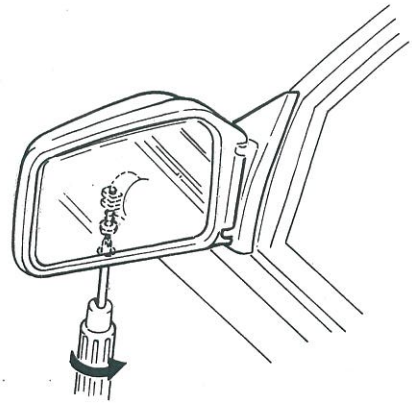
1. Remove the cap and the screw, then remove the control knob.



2. Remove the cover panel.
3. Remove the mirror mounting screws while holding the mirror.

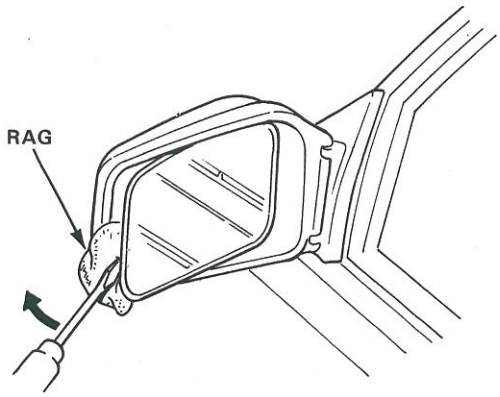
Mirror Glass Replacement

1. Insert a screwdriver in the mirror through the service hole, and loosen the glass retaining screw.

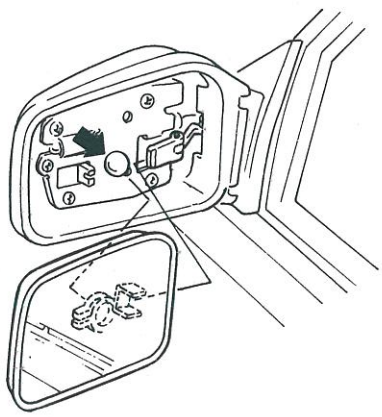


2. Carefully pry out the mirror with a screwdriver as shown.

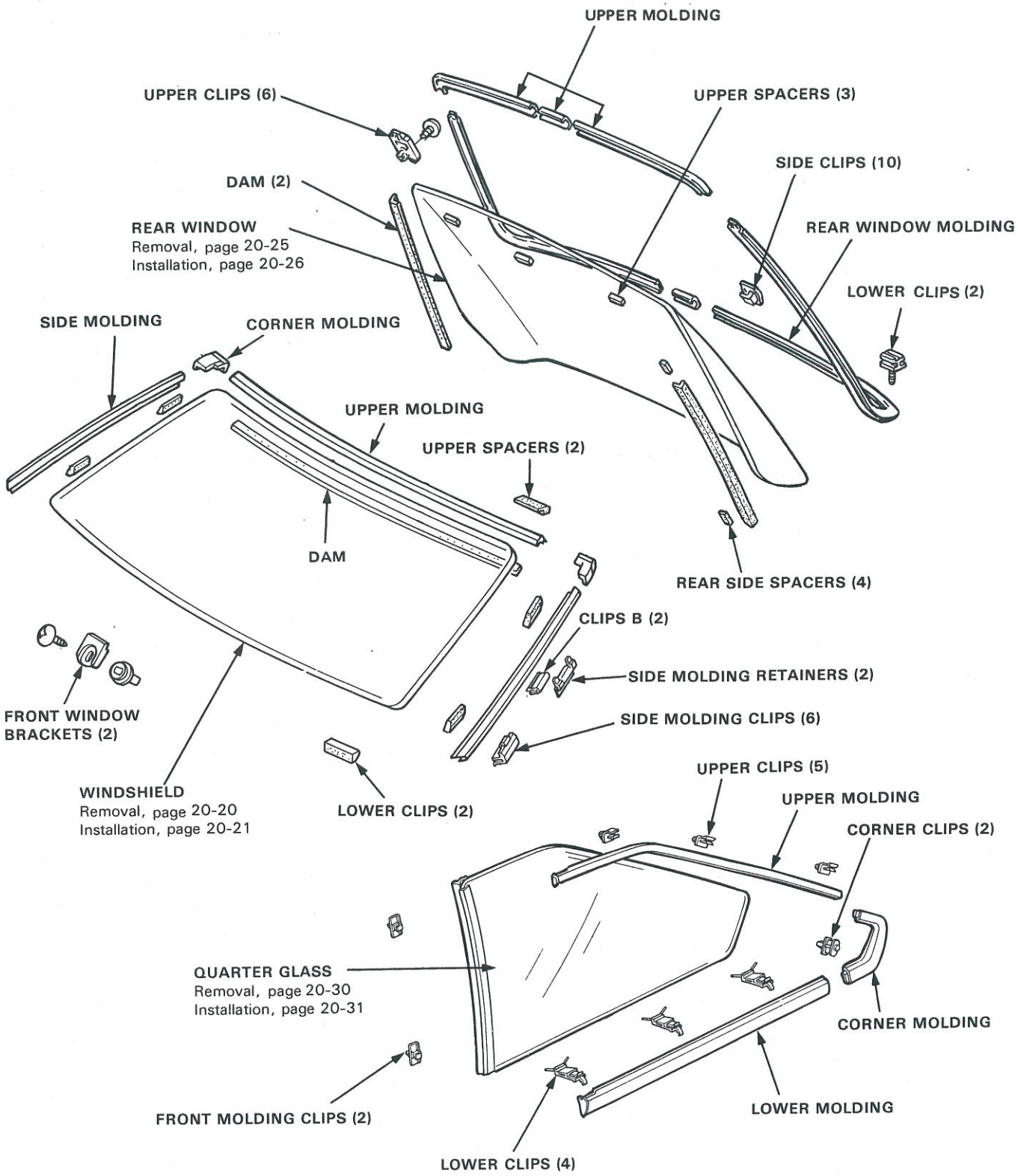
CAUTION: To prevent damage to the mirror, wrap the end of the screwdriver with a rag or shop towel.



3. Install the mirror in the reverse order of removal, and also apply grease to the location indicated by the arrow.



Illustrated Index



Windshield

Broken Glass Removal

Windshield:

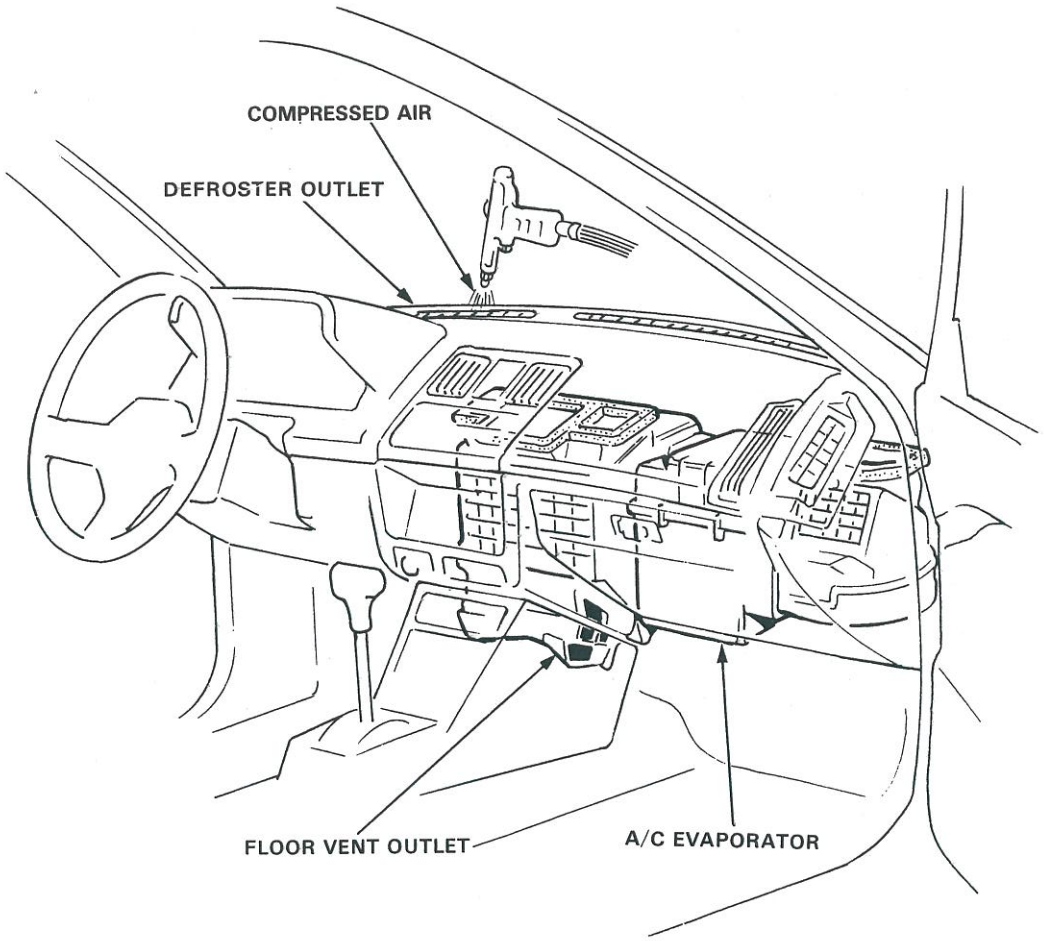
Remove as much broken glass as possible with a vacuum cleaner.
Use a cutter to remove broken glass which is cemented to the body.
Blow out the glass in the heater and behind the dashboard with low pressure compressed air.

WARNING **Wear eye protection while using the air gun.**

1. Set the FRESH/REC Lever to REC.
2. Press the MODE Button " H/DEF" on (HEAT/DEF).
3. Blow compressed air through the defroster vent outlets.
4. Remove the blower duct (on A/C equipped models, A/C evaporator), and remove any glass from the air mix chamber.

   NOTE: Refer to Section 22 to remove the A/C evaporator.
5. Remove any glass from the floor vent outlets.
6. Remove any glass from the top and bottom of the carpet and seats with a vacuum cleaner.

   NOTE: You should remove the seats and shake them to remove any glass.



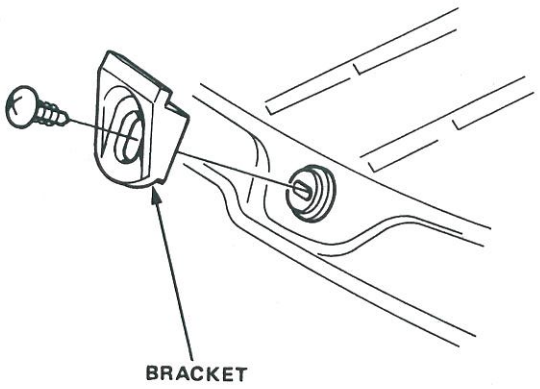
Windshield

Removal

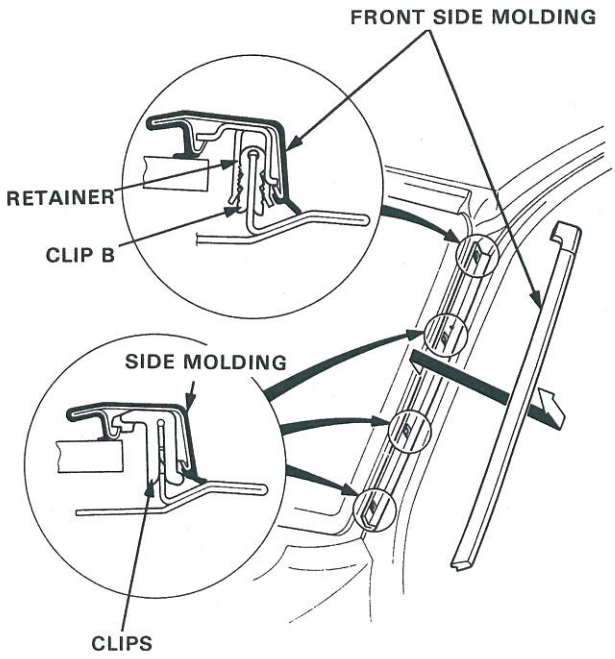
1. To remove the windshield, first remove the:

   - Inside rear view mirror (page 20-45).
   - Sun visor.
   - Front pillar trim (pages 20-38 to 39).
   - Front wiper and air scoop (refer to section 23).

2. Remove the right and left brackets.

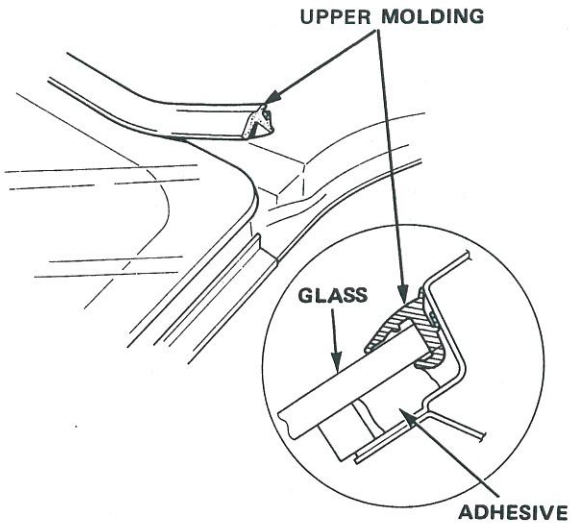


3. Remove the front side molding.
   NOTE: Take care not to damage the molding.

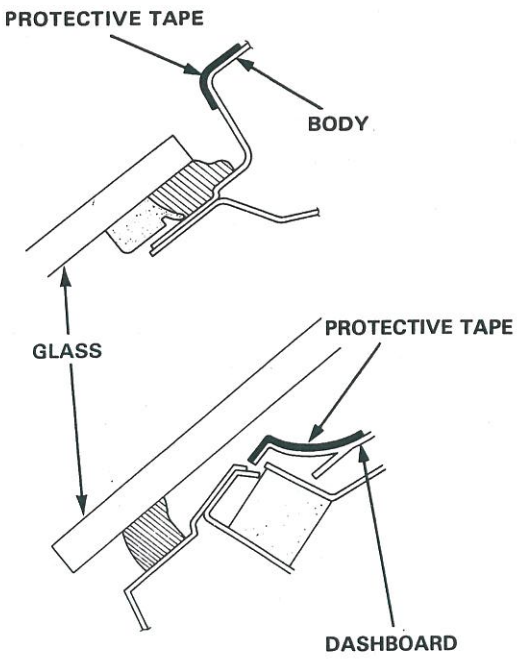


4. Peel off the upper molding, then pull down the front edge of the headliner so it will not interfere with the glass removal.

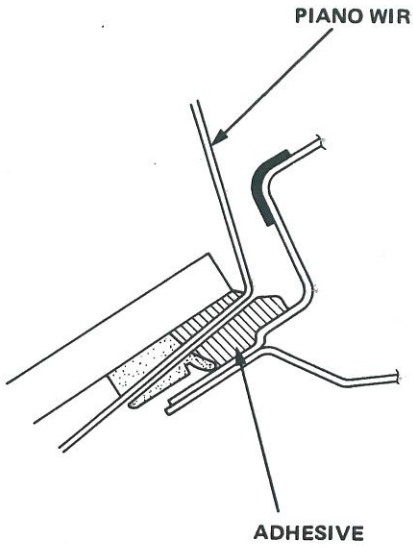
   NOTE: Take care not to bend the headliner excessively.



5. Apply protective tape along the edge of the dashboard and body next to the windshield as shown.

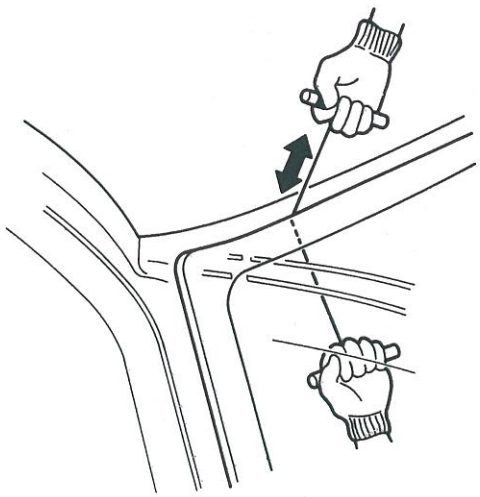


6. Using an awl, make a hole through the windshield adhesive from inside the car. Push piano wire through the hole and wrap each end around a piece of wood.



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.



8. Cut the rubber spacers away from the body with a knife; they are cemented in place.

NOTE: Replace the rubber spacers with new ones whenever the windshield has been removed.

Installation

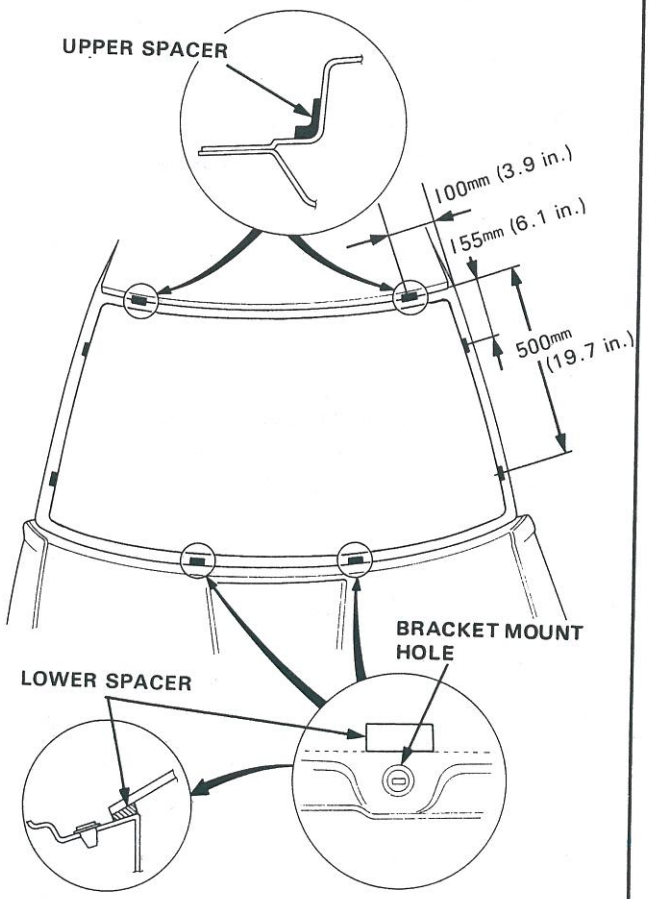
1. Scrape the old adhesive smooth with a knife, to a thickness of about 2 mm (0.08 in.) on the bonding surface around the entire windshield flange.

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 spacer 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. Peel the lining off each spacer, then install the spacers by pressing them firmly into place at the locations shown.

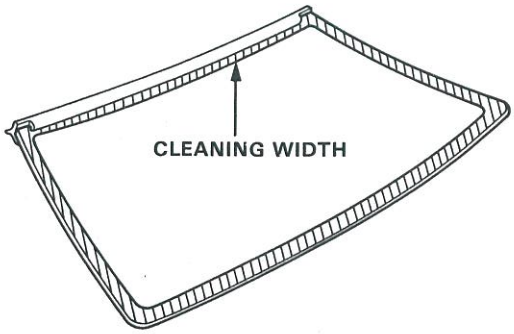


(cont'd)

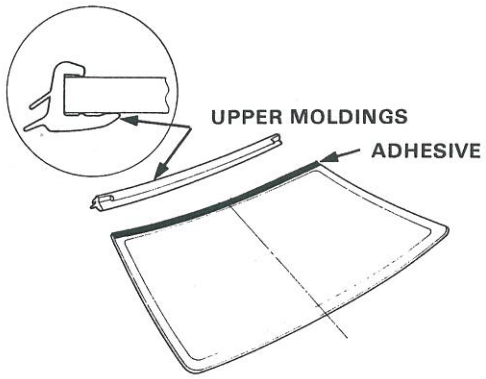
Installation (cont'd)

5. If the 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.

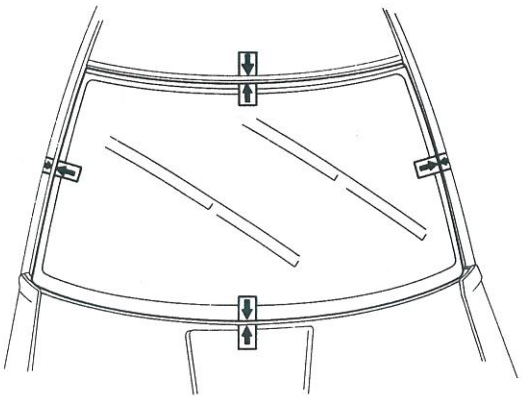
   NOTE: Make sure the bonding surface is kept free of water, oil and grease.



6. Center and glue the upper molding to the upper edge of the windshield.

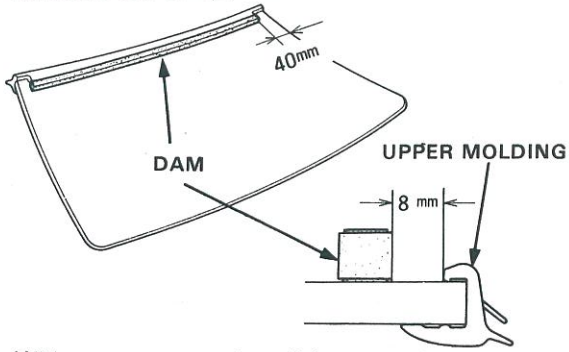


7. Set the windshield upright on the spacers, and center it in the opening. Mark the location by marking lines across the glass and body with a grease pencil at the four points shown.



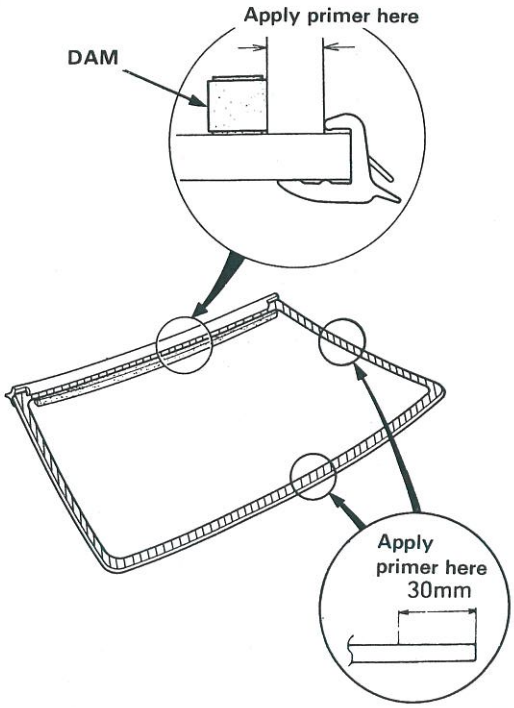
8. Glue the rubber dam to the inside face of the windshield as shown, to contain the adhesive during installation.

   NOTE: Be careful not to touch the glass where adhesive will be applied.



9. 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.

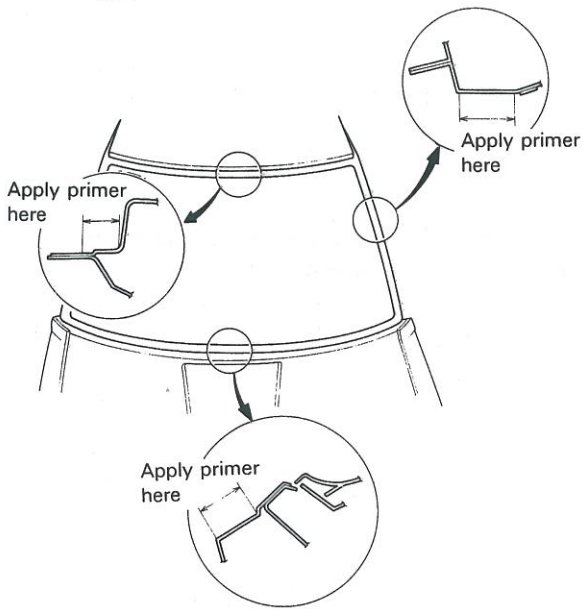
   NOTE:
   - Do not apply body primer to the glass, and do not get body and glass primer sponges mixed up.
   - Never touch the primed surfaces with your hands. If you do, the adhesive may not bond to the glass properly, causing a leak after the windshield is installed.
   - Keep water, dust, and abrasive materials away from the primed surface.



10. 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.

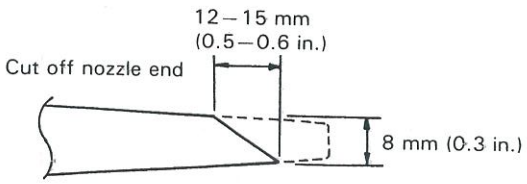


11. Thoroughly mix all the adhesive and hardener together on a glass or metal plate with a putty knife.

NOTE:

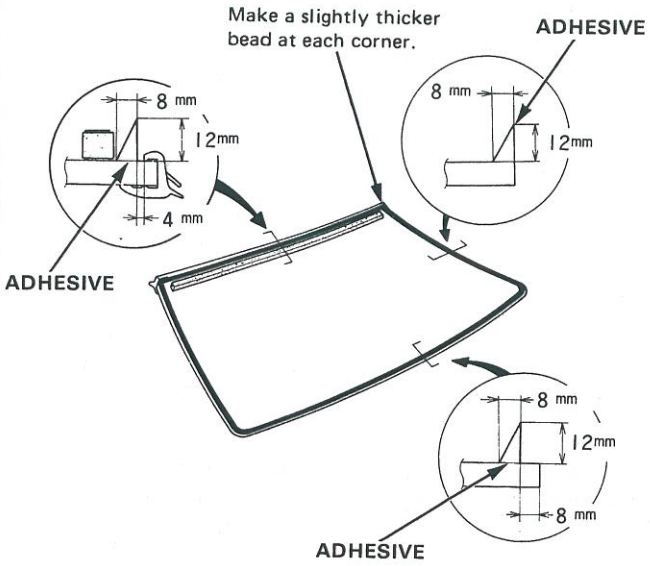
- Clean the plate with a sponge and alcohol before mixing.
- Follow the instructions that come with the adhesive.

12. Before filling a cartridge, cut off the end of the nozzle at the angle shown.

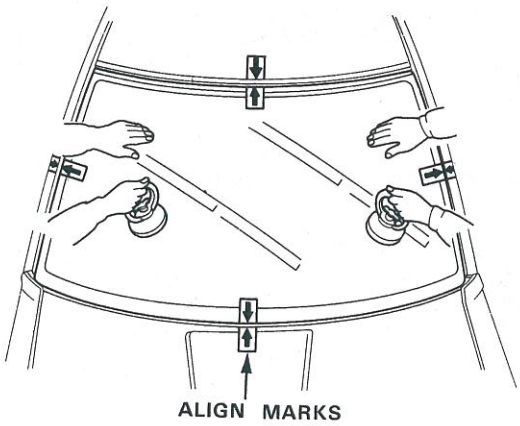


13. Pack adhesive into the cartridge without air pockets, to ensure continuous delivery. Put the cartridge in a caulking gun, and run a bead of adhesive around the edge of the glass as shown.

NOTE: Apply the adhesive within 30 minutes after applying the glass primer.



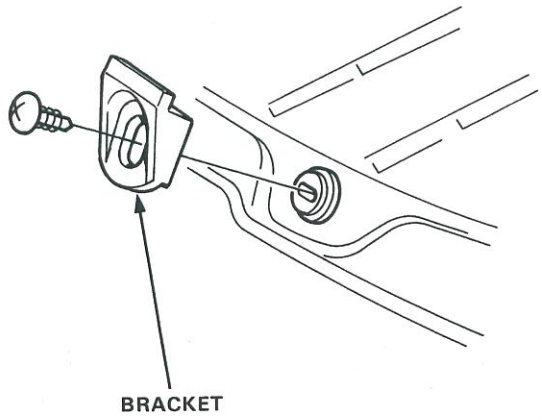
14. Use suction cups to hold the glass over the opening, align it with the marks made in step 4 and set it down on the adhesive. Lightly push on the glass until its edge is fully seated on the adhesive all the way around.



(cont'd)

Installation (cont'd)

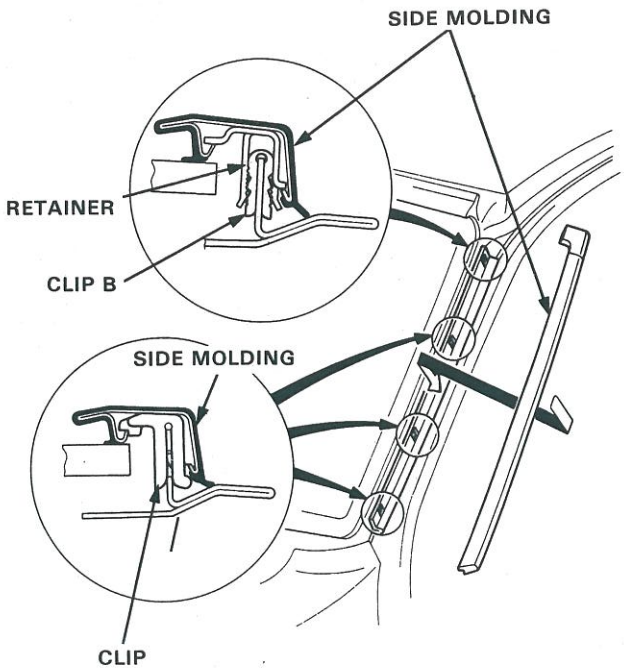
15. Install the bracket to prevent the glass from falling.



16. Scrape or wipe the excess adhesive off with a putty knife or gauze.

    NOTE: Wipe with a soft rag or towel dampened with alcohol to remove adhesive from a painted surface or glass.

17. Install the clips and retainers on the side molding.



18. Install the front side molding.

19. Let the adhesive for dry 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 sealant.

    NOTE:
    - Let the car stand for dry 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 within the first 1 hour after installation.
    - Check that the ends of the molding are set under the air scoop.

20. Reassemble all removed parts.

    NOTE: Install the interior mirror rubber damper after the adhesive has dryed thoroughly.

    CAUTION: Do not drive the car on rough or uneven surfaces for at least 4 hours.

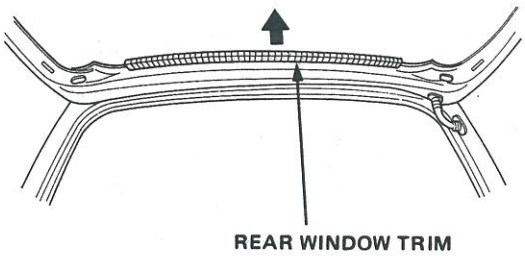
Rear Window

Removal

CAUTION:
- **Wear gloves to remove and install the glass.**
- **Do not damage the defroster printed circuit.**

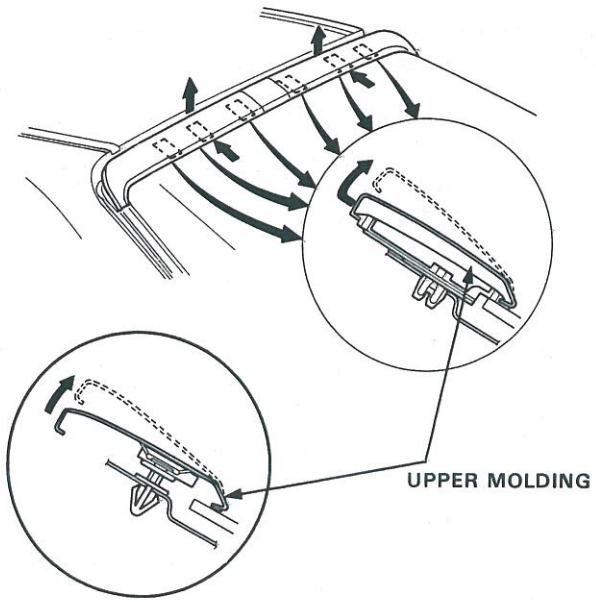
1. To remove the rear window glass, first remove the:
   - Rear end shelf, frame garnish and tailgate lining (pages 20-38 and 57).
   - Rear wiper (refer to section 23).

2. Remove the rear window trim .

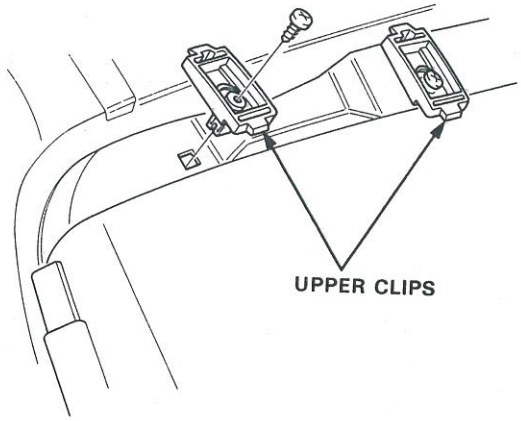


NOTE: Take care not scratch or score the glass.

3. Remove the upper molding by sliding it upward.

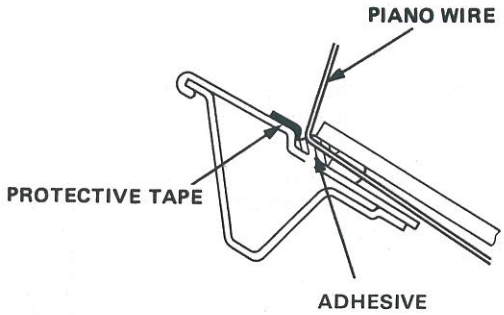


4. Remove the upper clips.

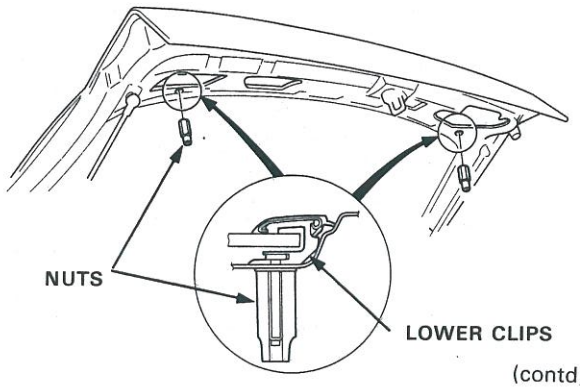


5. Apply protective tape along the edge of the body next to the glass.

6. 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.



7. Remove the rear window lower molding by removing the 2 nuts.



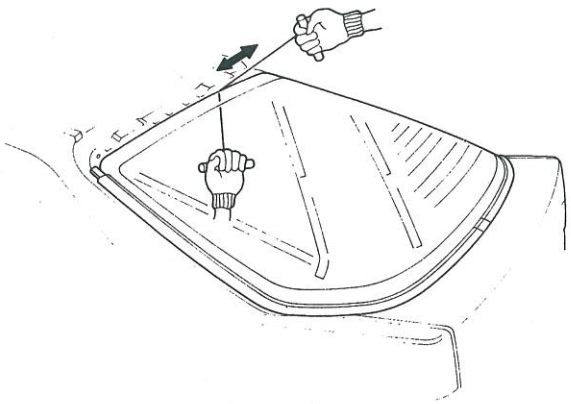
(contd)

Rear Window

Removal (cont'd)

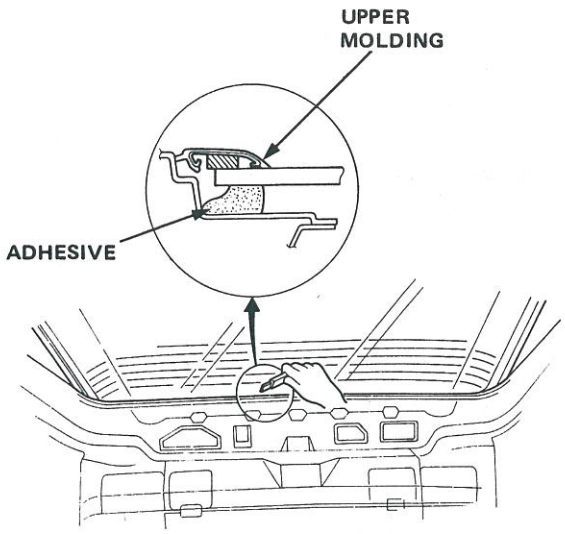
8. With a helper on the outside, pull the wire back and forth in a sawing motion and carefully cut through the adhesive around the entire glass.

   CAUTION: Hold the piano wire as close to the glass as possible to prevent damage to the body.



9. Cut the rubber spacers away from body with a knife; they are cemented in place.

   NOTE: Replace the rubber spacers with new ones whenever the glass has been removed.



10. Remove the rear window molding when the glass is reused.

Installation

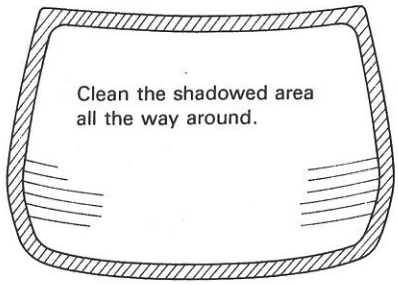
1. Scrape the old adhesive smooth with a knife, to a thickness of about 2 mm (0.08 in) on the bonding surface around the entire window flange.

   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 spacer material from the body.
   - Mask off surrounding surfaces before painting.

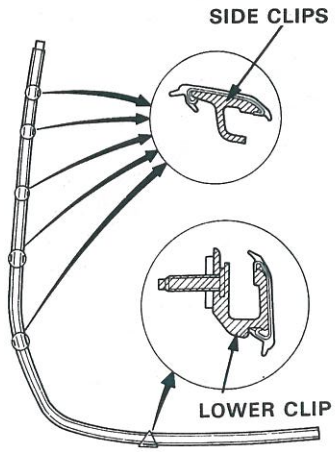
2. Clean the body bonding surface with a sponge dampened in alcohol.

   NOTE: After cleaning, keep oil, grease or water from getting on the surface.

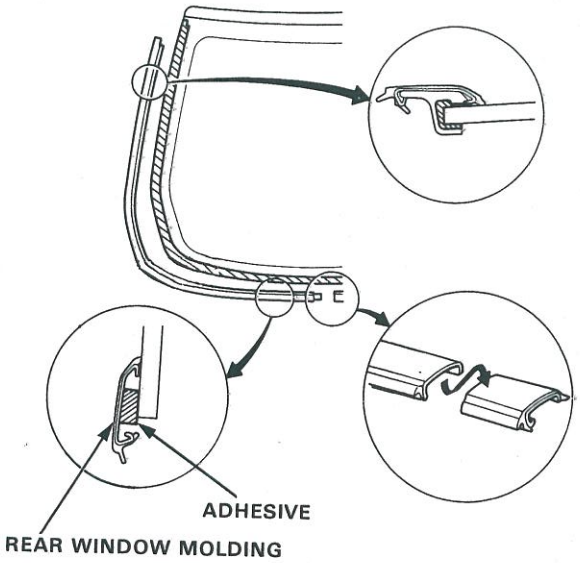
3. If the glass is to be reinstalled, use a putty knife to scrape off all traces of old adhesive, then clean the glass surface with alcohol where new adhesive is to be applied.
   NOTE: Make sure the bonding surface is kept free of water, oil and grease.



4. Install the 10 side clips and two lower clips on the rear window molding when the glass is reused.

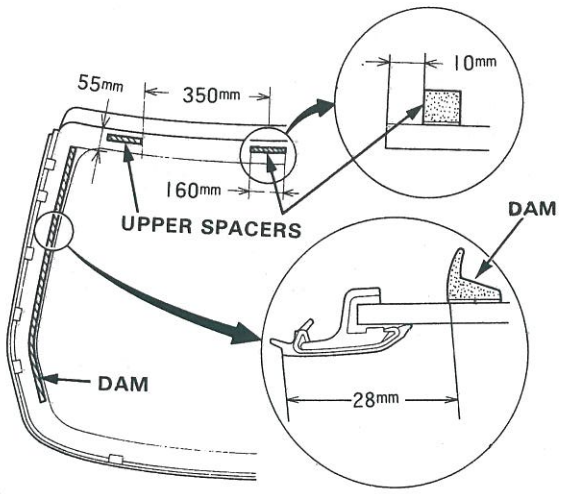


5. When the glass is reused, cement the rear window molding to the glass using adhesive.
NOTE: Be careful not to touch the glass where adhesive will be applied.



6. Remove the lining from the upper spacer, and attach the spacer to the glass as shown.

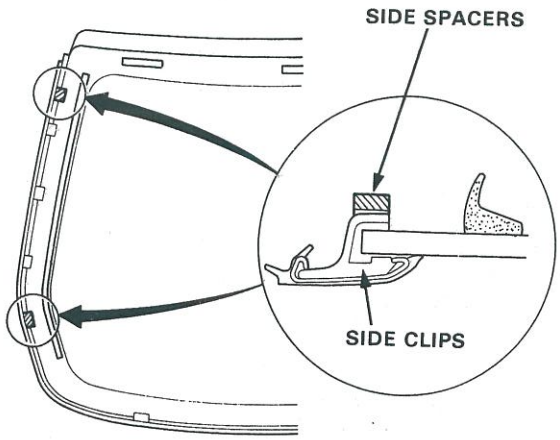
NOTE: Be careful not to touch the glass where the spacer will be attached.



7. Glue the rubber dam to the inside face of the windshield as shown, to contain the adhesive during installation.

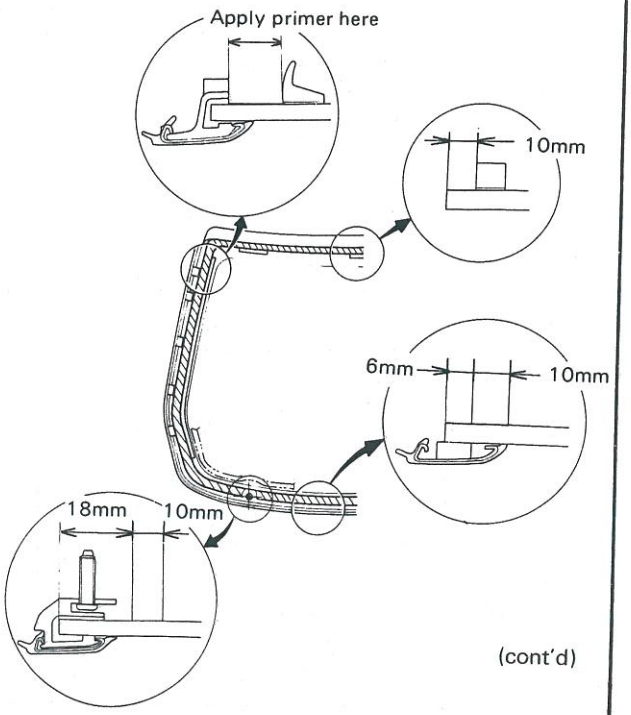
NOTE: Be careful not to touch the glass where adhesive will be applied.

8. Glue the side spacers to the four side clips.



9. With a sponge, apply a light coat of glass primer around the edge of the glass as shown, then lightly wipe 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.

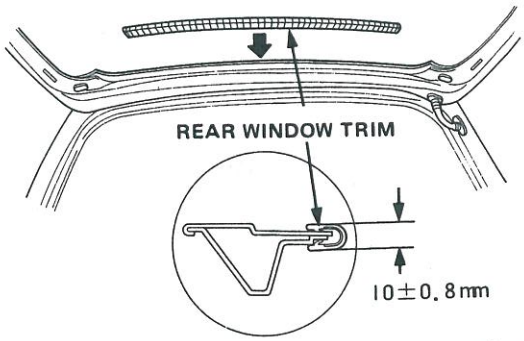


(cont'd)

Installation (cont'd)

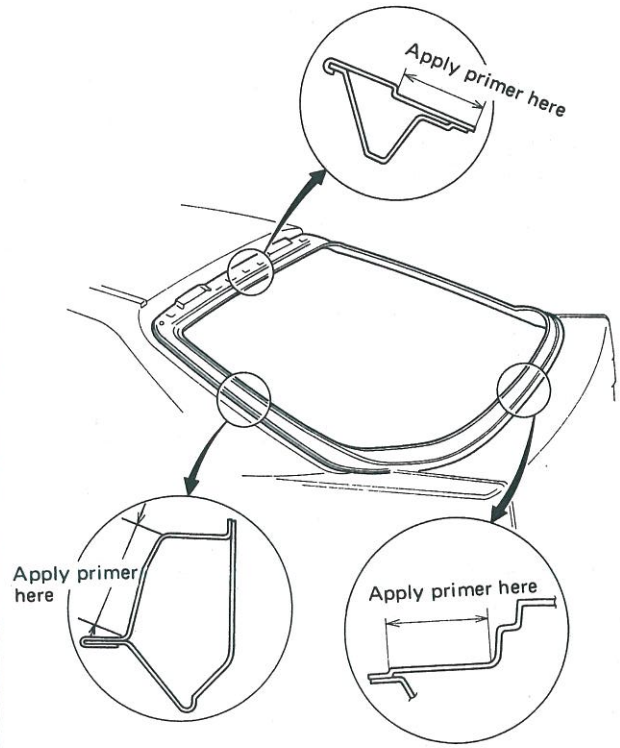
10. Install the rear window trim in the frame.

    NOTE:
    - Install the rear window trim with the wide end on the interior side.
    - When attaching the rear window trim, make sure the thickness is even all the way around.



11. 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.

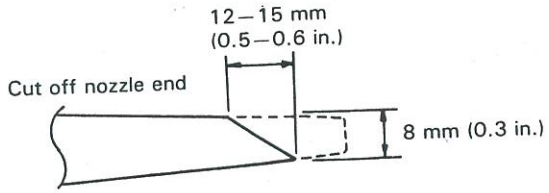
    NOTE:
    - Do not apply glass primer to the body, and be careful not to mix up glass and body primer sponges.
    - Never touch the primed surfaces with your hands.



12. Thoroughly mix all the adhesive and hardener together on a glass or metal plate with a putty knife.

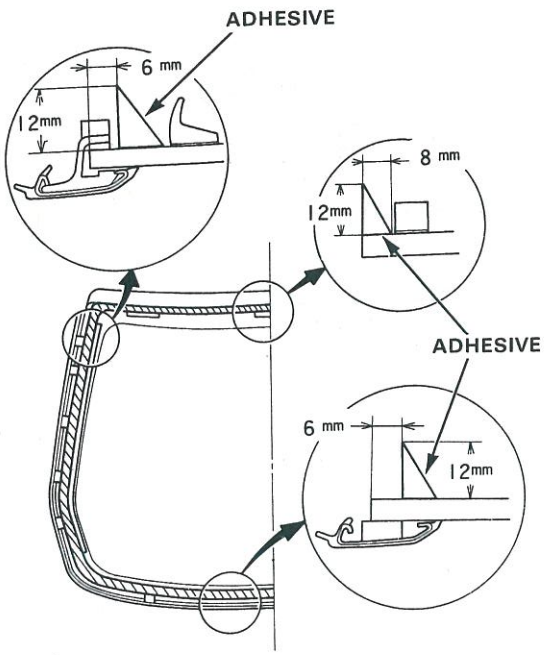
    NOTE:
    - Clean the plate with a sponge and alcohol before mixing.
    - Follow the instructions that come with the adhesive.

13. Before filling a cartridge, cut off the end of the nozzle at the angle shown.



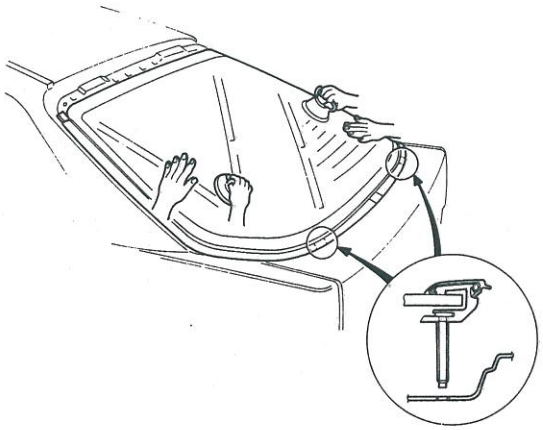
14. Pack adhesive into the cartridge without air pockets, to ensure continuous delivery. Put the cartridge in a caulking gun, and run a bead of adhesive around the edge of the glass as shown.

    NOTE: Apply the adhesive within 30 minutes after applying the glass primer.



15. Holding the glass with rubber suckers as shown, install it on the tailgate while inserting the three bolts on the lower molding into the holes in the tailgate.
After making sure that the center upper clip is aligned properly, apply light pressure to the glass all the way around.

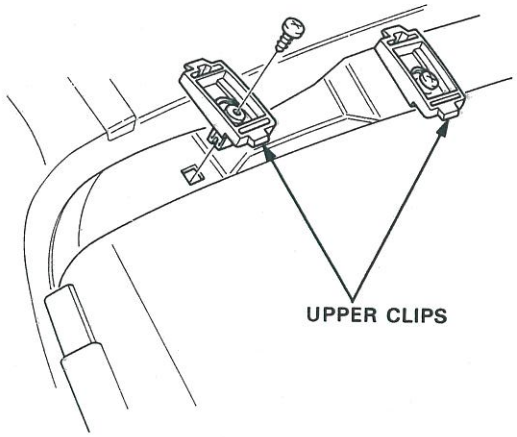
NOTE: Do not open and close the tailgate or doors until the adhesive has dried thoroughly.



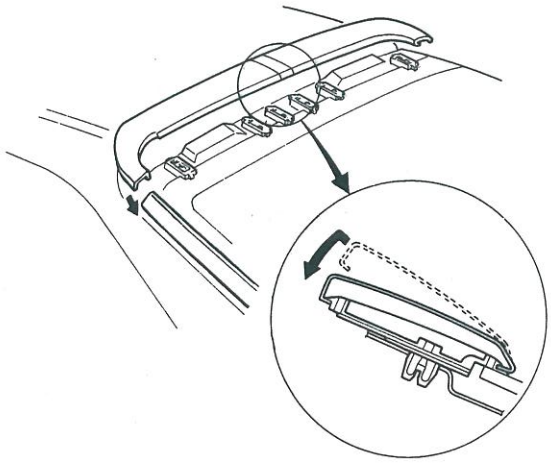
16. Tighten the lower clip mounting nuts and the upper clip A moulding screw.
17. Scrape or wipe the excess adhesive off with a putty knife or gauze.

NOTE: Wipe with a soft rag or towel dampened with alcohol to remove adhesive from a painted surface or glass.

18. Install the upper clips.



19. Insert the lower edge of the upper molding into the recess under the upper clips, and install the molding by pressing down on the upper edge as shown.



20. Let the sdhesive cure for at least 1 hour, then spray water over the glass and check for leaks. Mark leaking areas.
When the glass is dry, 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.
- Keep the glass dry within the first hour after installation.

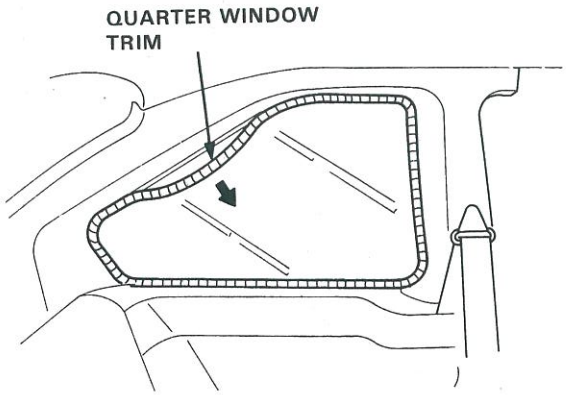
21. Reassemble all removed parts.

CAUTION: Do not drive the car on rough or uneven surfaces for at least 4 hours.

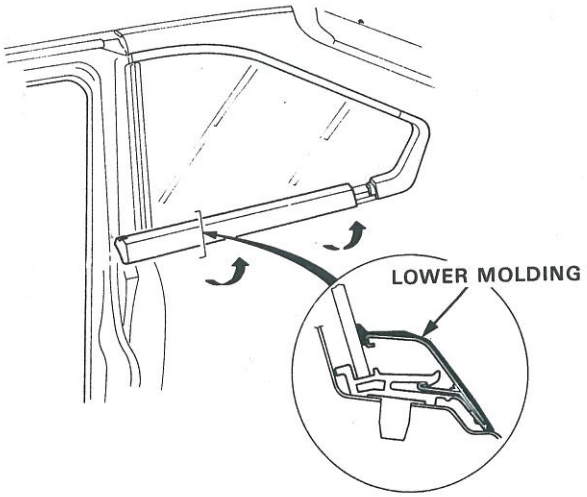
Quarter Glass

Removal

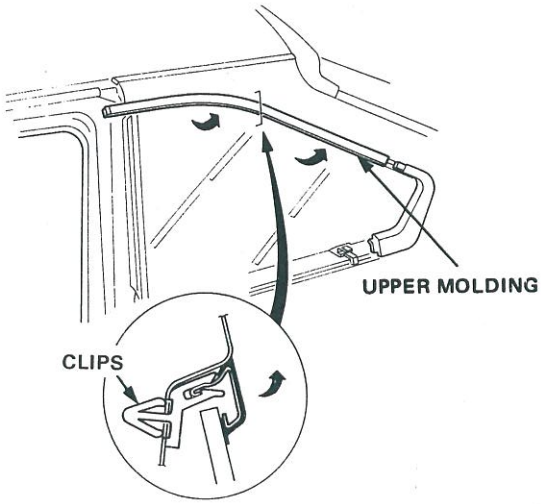
1. To remove the quarter glass, first remove the quarter window trim.



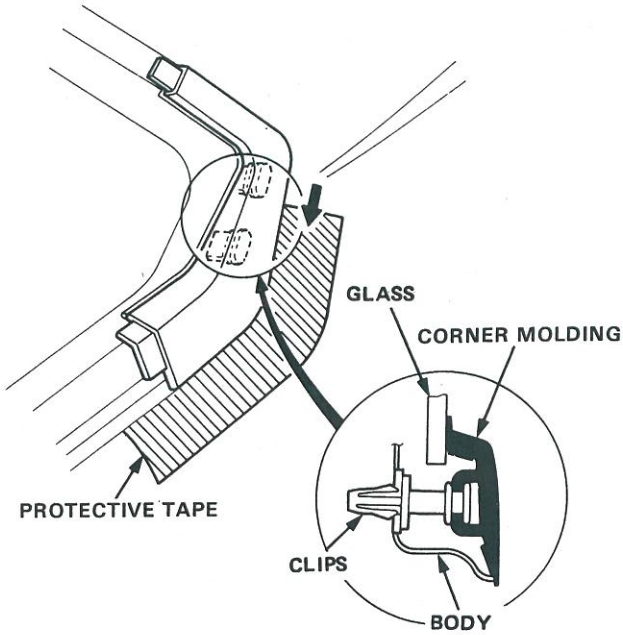
2. Remove the lower molding by turning it as shown.



3. Remove the upper molding by turning it as shown.

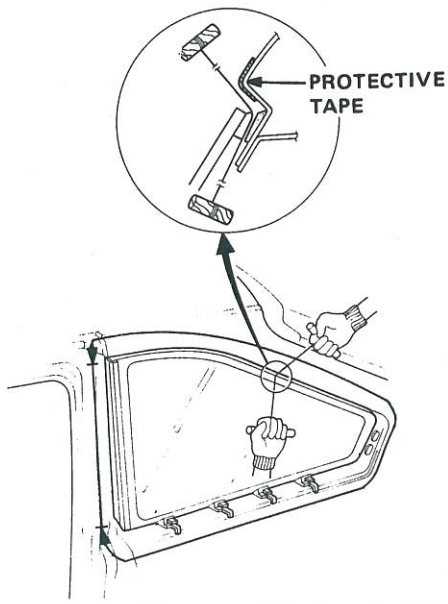


4. Attach protective tape along the edge of the body next to the corner molding, remove the molding by sliding it down.



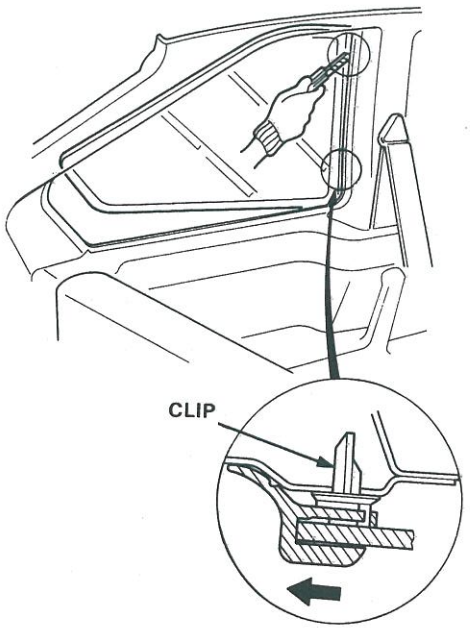
5. Apply protective tape along the edge of the body next to the glass as shown.
6. Using an awl, make a hole through the glass adhesive from inside the car. Push piano wire through the hole and wrap each end around a piece of wood.
7. With a helper on the outside, pull the wire back and forth in a sawing 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.

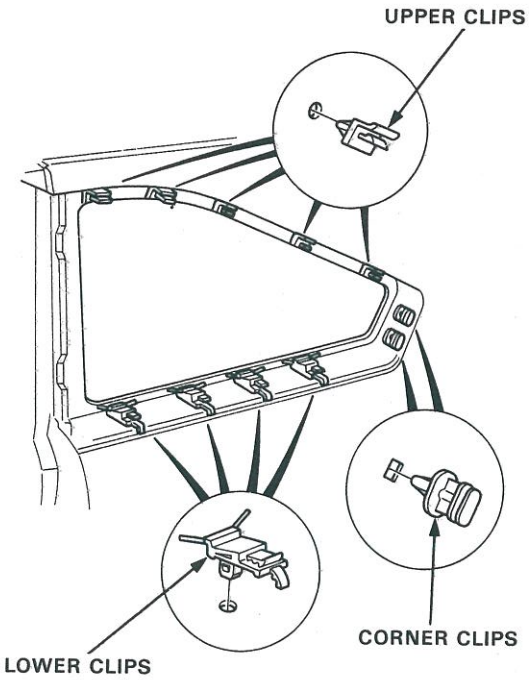


8. Cut the rubber spacers away from body with a knife.

NOTE: Replace the rubber spacers with new ones whenever the glass has been removed.



9. Remove the clips, being careful not to let them fall into the body.



Installation

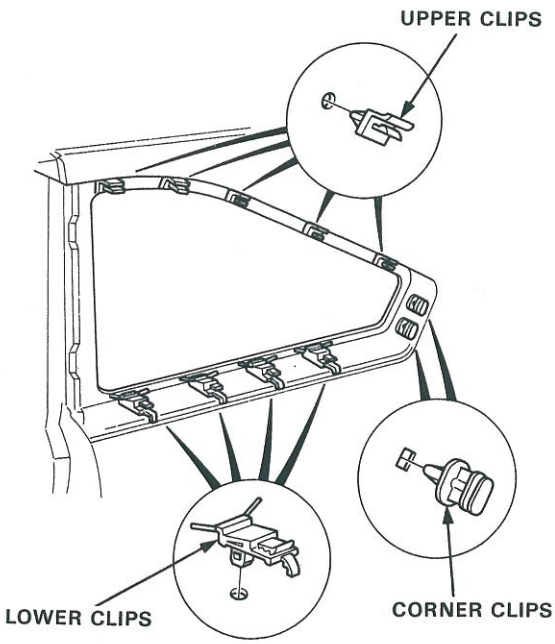
1. Scrape the old adhesive smooth with a knife, to a thickness of about 2 mm (0.08 in.) on the bonding surface around the entire window glass flange.

NOTE:
- Do not scrape down to the painted surface of the body; damaged paint will interfere with proper bonding.
- Remove all traces of the rubber spacer 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. Install the upper, lower and corner clips as shown.

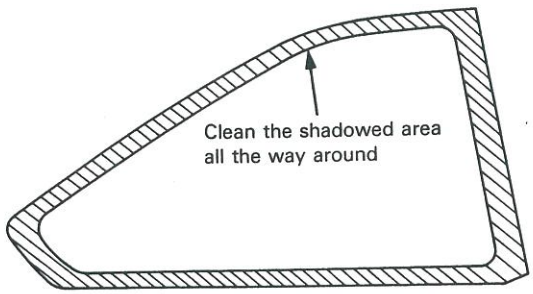


(cont'd)

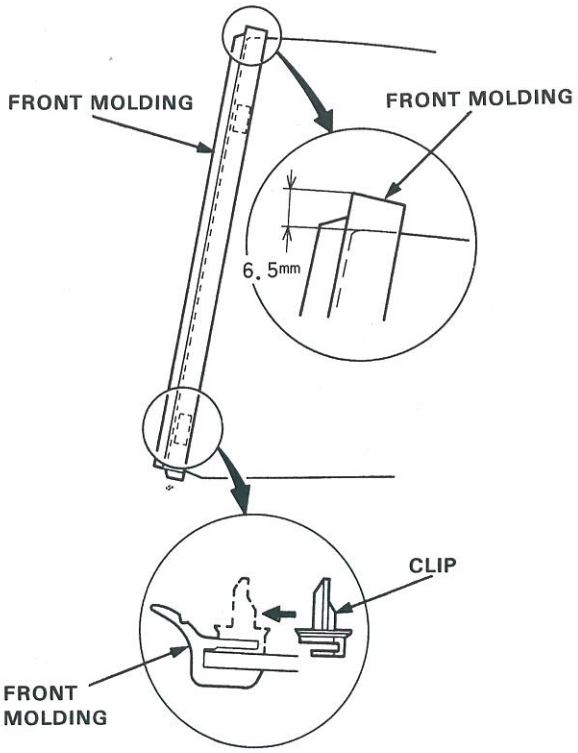
Installation (cont'd)

4. If the 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.



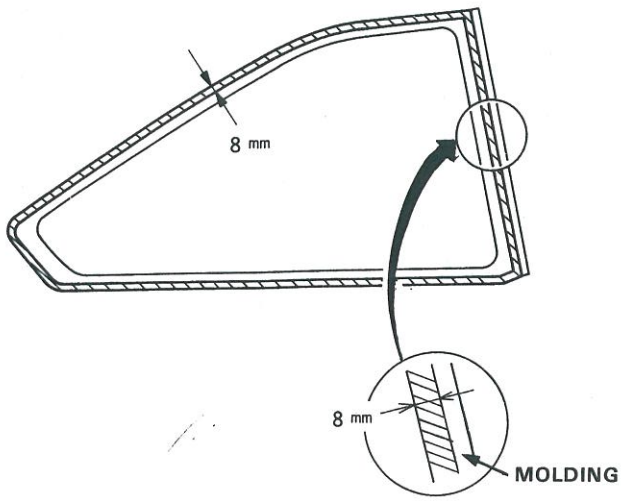
5. Adhere the front molding to the front edge of the quarter glass as shown.



6. Install the clips on the front molding.

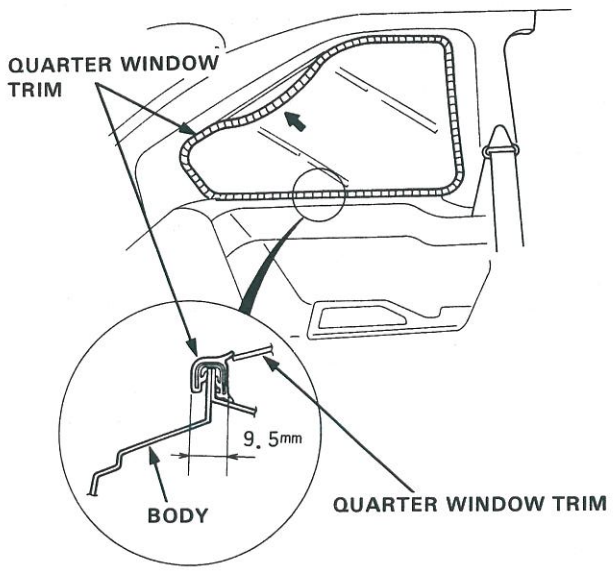
7. With a sponge, apply a light coat of glass primer around the edge of glass as shown, then lightly wipe it off with gauze or cheesecloth.

   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 abrasive materials away from the primed surface.



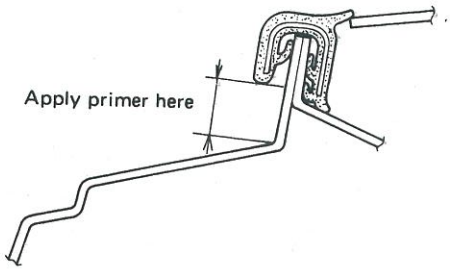
8. Install the quarter window trim.

   NOTE:
   - When attaching the trim, make sure the thickness is 9.5 mm (0.37 in.) all the way around.
   - Check that the feather of the trim on the cabin side is placed over the quarter lining.



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.

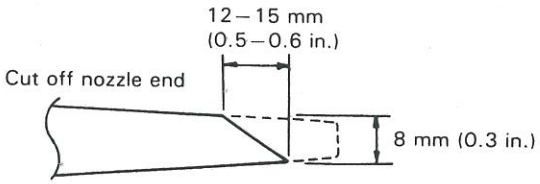
   NOTE:
   - Do not apply glass primer to the body, and be careful not to mix up glass and body primer sponges.
   - Never touch the primed surfaces with your hands.



10. Thoroughly mix all the adhesive and hardener together on a glass or metal plate with a putty knife.

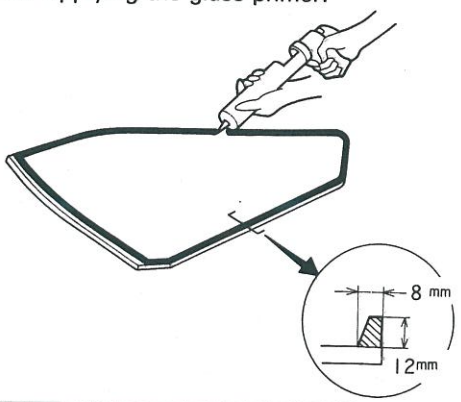
    NOTE:
    - Clean the plate with a sponge and alcohol before mixing.
    - Follow the instructions that come with the adhesive.

11. Before filling a cartridge, cut off the end of the nozzle at the angle shown.



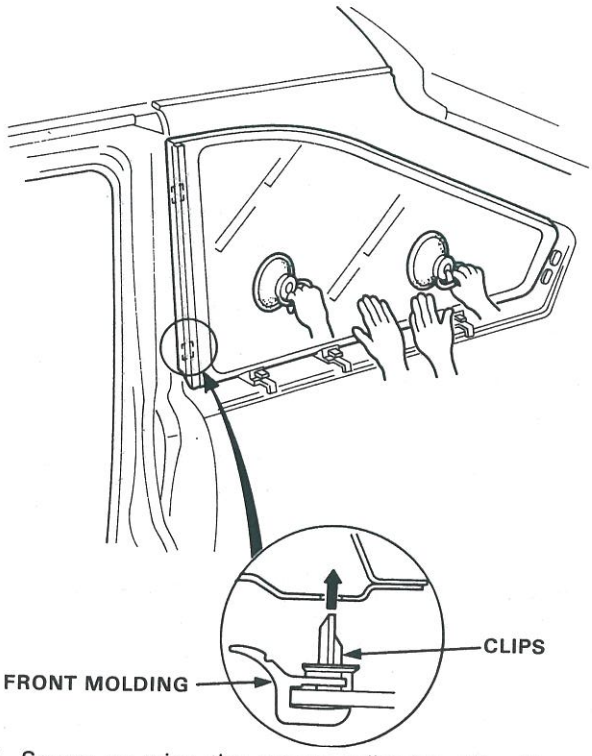
12. Pack adhesive into the cartridge without air pockets, to ensure continuous delivery. Put the cartridge in a caulking gun, and run a bead of adhesive around the edge of the glass as shown.

    NOTE: Apply the adhesive within 30 minutes after applying the glass primer.



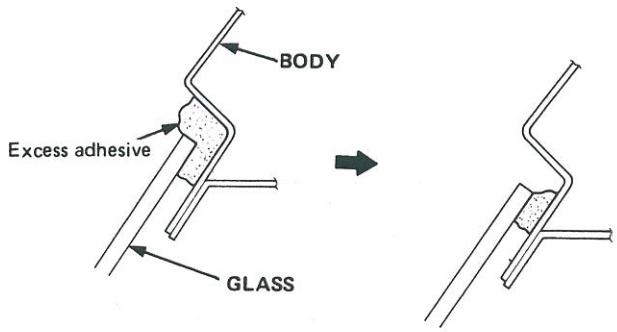
13. Use suction cups to hold the glass over the opening, then set it down on the adhesive. Lightly push on the glass untill its edge is fully seated on the adhesive all the way around.

    NOTE: Do not open and close the rear window and other doors once the glass has been glued.



14. Scrape or wipe the excess adhesive off with a putty knife or gauze.

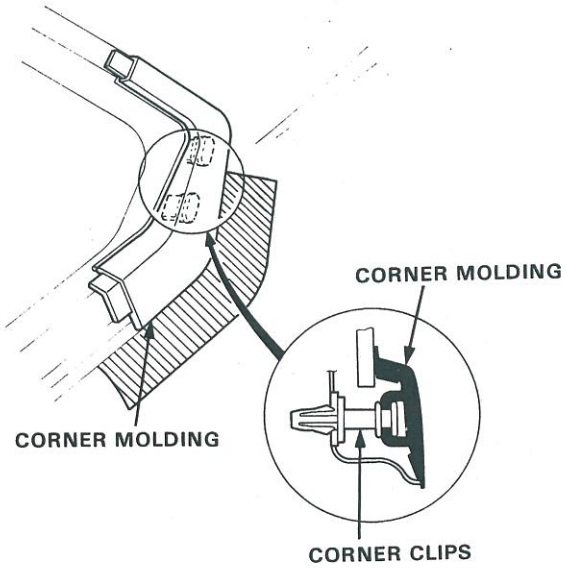
    NOTE: Wipe with a soft rag or towel dampened with unleaded gasoline to remove adhesive from a painted surface or glass.



(cont'd)

Installation (cont'd)

15. Install the clips on the corner molding, then install the molding.

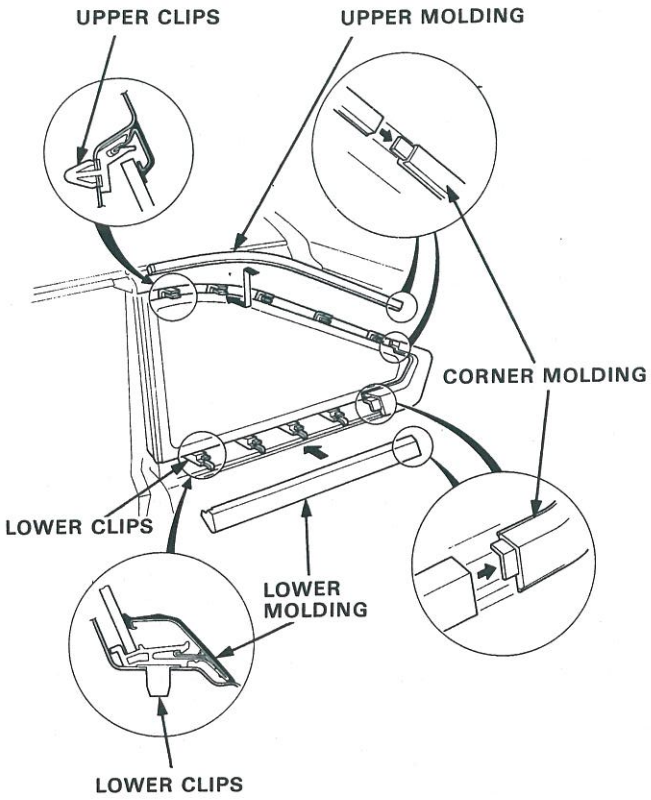


16. Spray water on the quarter glass 1—2 hours after installing the glass. Mark any leaks and let the windshield dry, then seal leaking area with sealant.

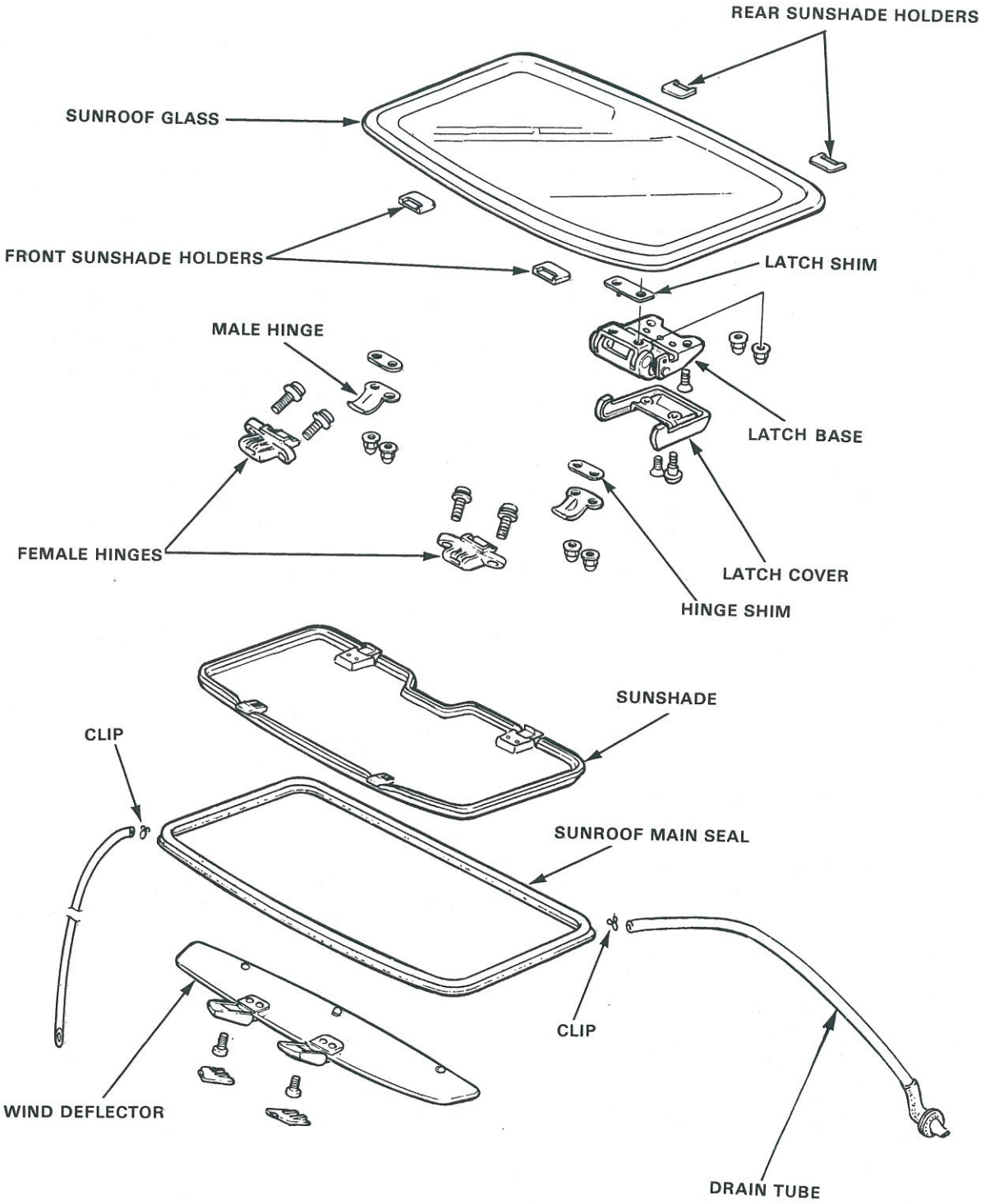
NOTE:
- Avoid getting water on freshly applied adhesive.
- Drive the car slowly if it must be driven during the first 4 hours after the quarter glass has been installed.

CAUTION: Do not drive the car on rough or uneven surfaces for at least 4 hours.

17. Press on the upper and lower moldings, and install the upper and corner clips. Align the ends of the moldings.



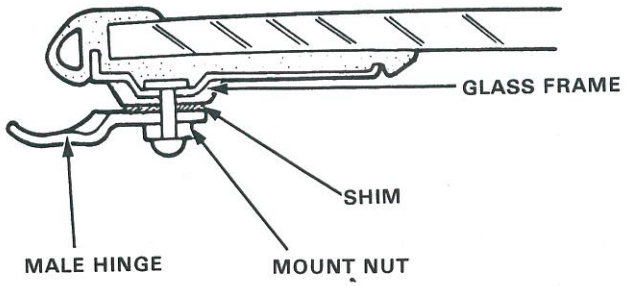
Disassembly



Sunroof

Height Adjustment

The roof panel should be even with the glass weatherstrip, to within $0 \pm {}^{2}_{1}$mm ($0 \pm {}^{0.08}_{0.04}$ in.) all the way around. If not, remove the sunroof glass, then remove the male hinge mount nuts and add or remove shims between the glass frame and the male hinge as shown. Repeat on opposite side if necessary.

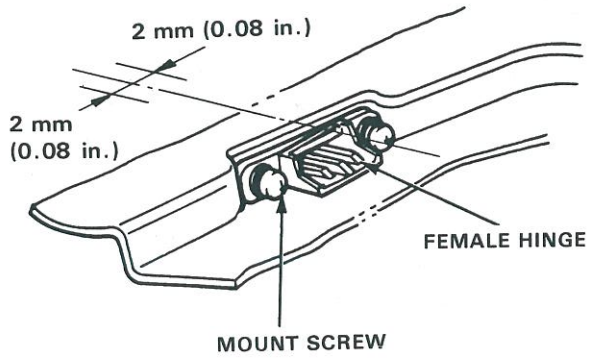


Glass Side Clearance Adjustment

If the glass weatherstrip fits too tight against the roof panel on one side when closed, remove the sunroof glass, then:

1. Loosen all female hinge mount screws.

2. Move the female hinges right or left as necessary, then tighten the screws and install the sunroof glass to re-check roof closing.
   The female hinges can be adjusted 2 mm (0.08 in.) right or left.



Closing Fit

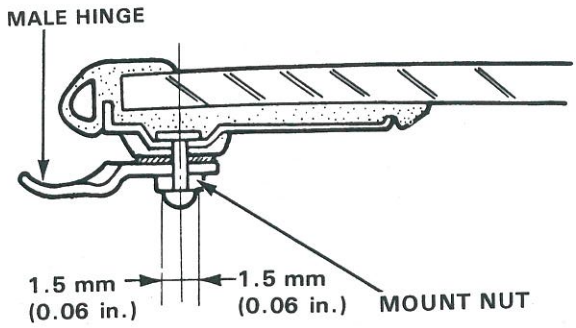
If the fit of the glass weatherstrip is too tight at the front or rear when closed, remove the sunroof glass, then:

1. Loosen all male hinge mount nuts and the latch lever bracket mount nuts.

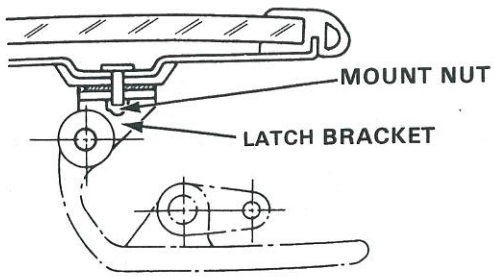
2. Equally move the male hinges and the latch bracket front or back as necessary, then tighten the mount nuts and install the sunroof glass to re-check roof closing.

   NOTE: The male hinges and the latch bracket can be adjusted 1.5 mm (0.06 in.) front or back.

Front Edge:

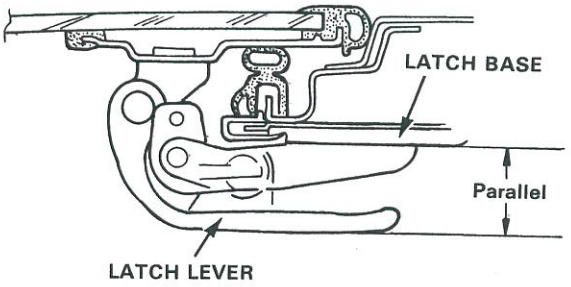


Rear Edge:

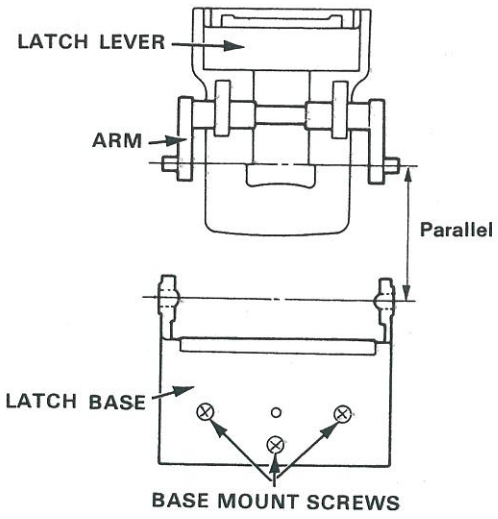


Latch Base Installation/ Adjustment

1. Check that the latch lever is parallel with the latch base when the sunroof is closed. To adjust, remove the latch cover, loosen the base mount screw, and move the latch base back or forth as required.

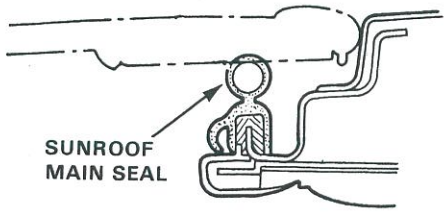


2. If the latch lever arms do not fit the latch base holes, loosen the base mount screws and move the latch base until correct alignment is reached.

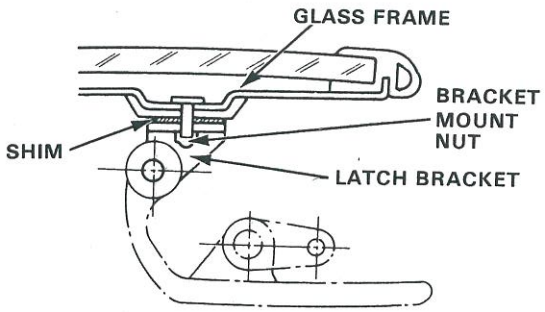


Latch Lever Operation/Adjustment

1. First check to be certain that the sunroof main seal is properly in plase.



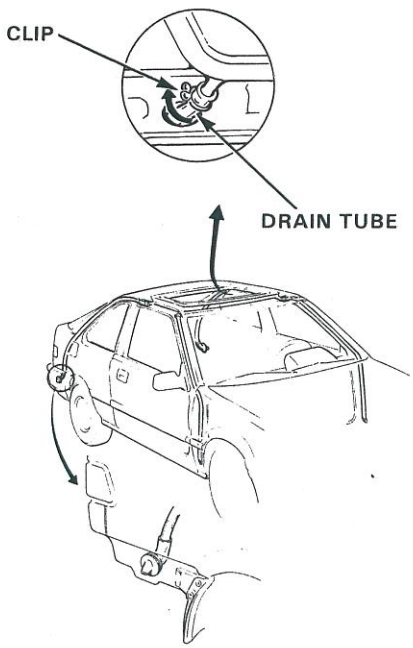
2. Check the operation of the latch lever; if it's too loose or tight, add or remove shims as required.



Drain Tube Replacement

To replace the drain tube, it is necessary to remove the headliner. To facilitate removal of the rear drain tubes, remove the quarter trim panel.

NOTE: Install the tube clips with the ends facing the side to ease installation of the headliner.

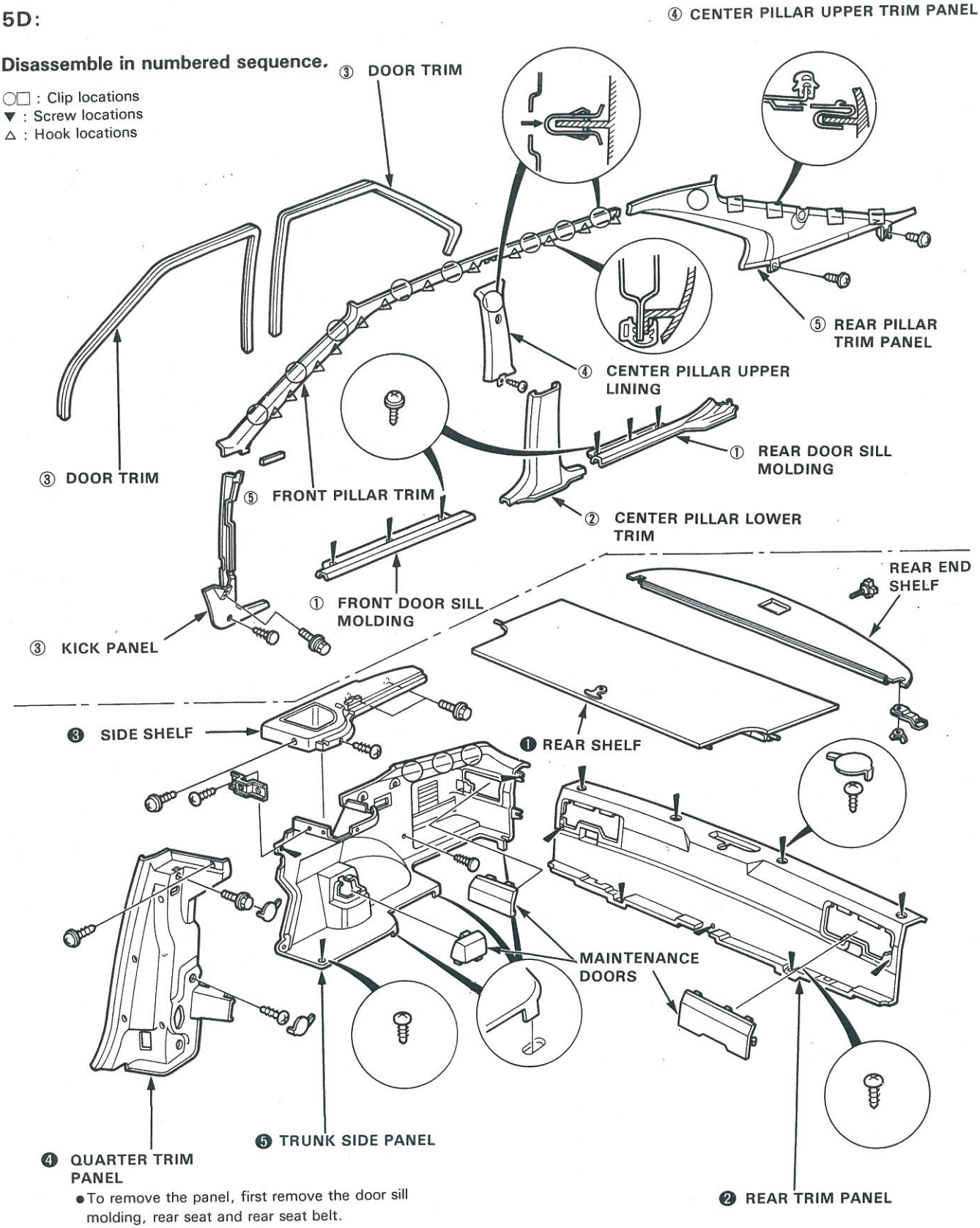


Replacement

5D:

Disassemble in numbered sequence.

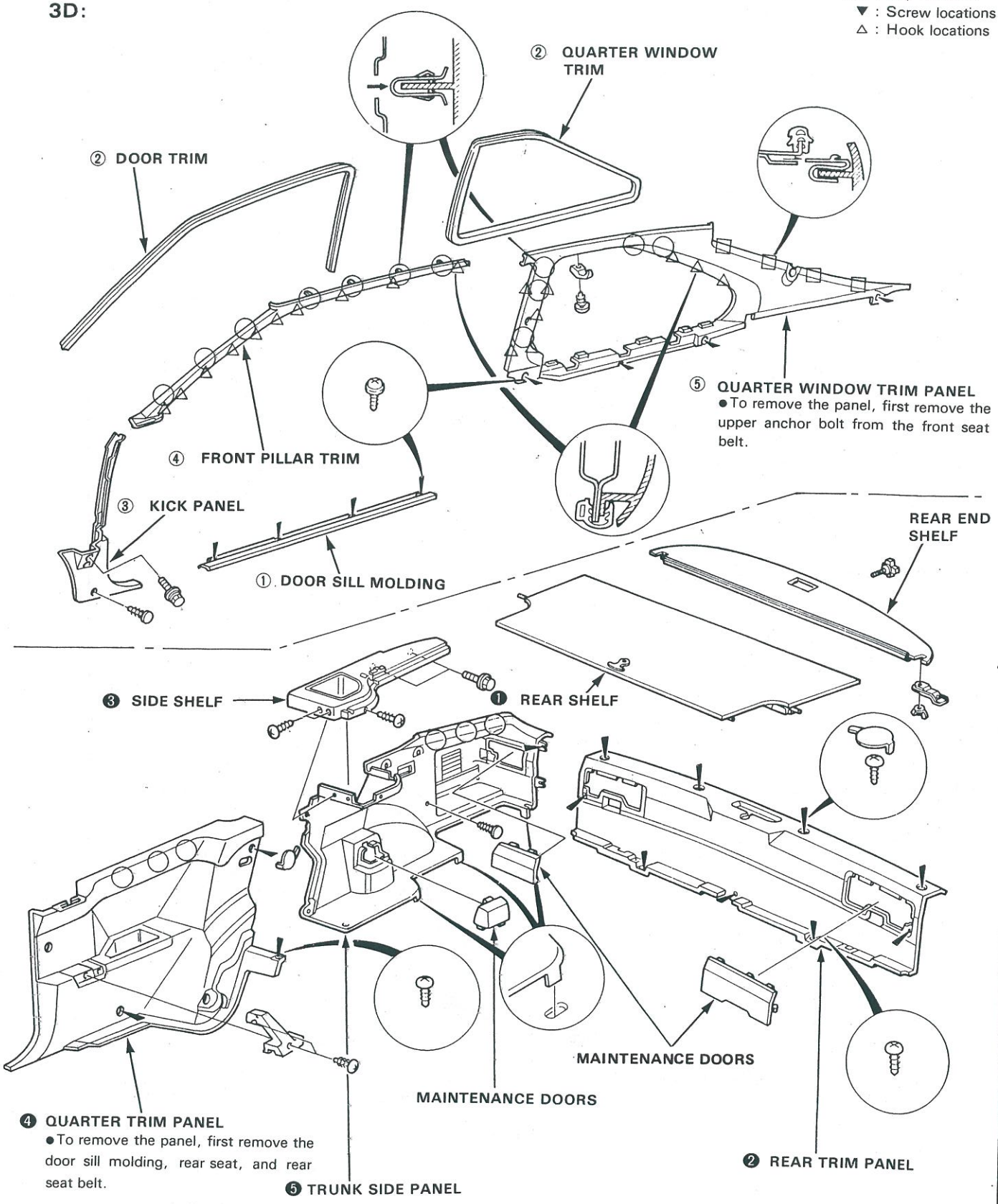
○□ : Clip locations
▼ : Screw locations
△ : Hook locations



● To remove the panel, first remove the door sill molding, rear seat and rear seat belt.

3D:

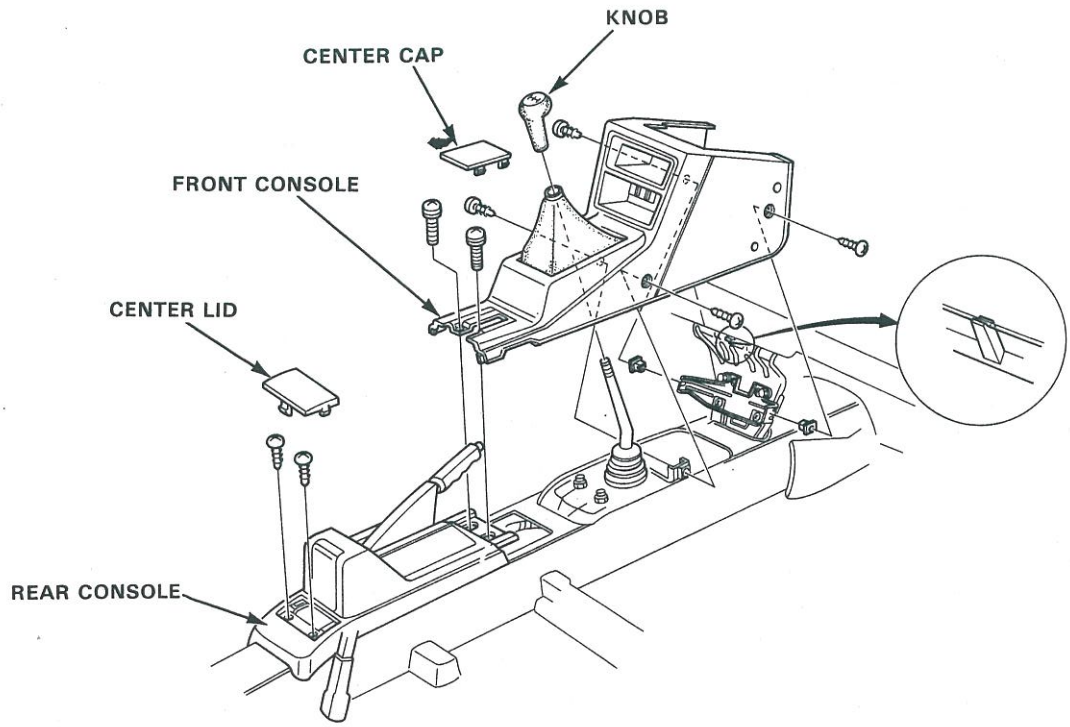
○□ : Clip locations
▼ : Screw locations
△ : Hook locations



Console

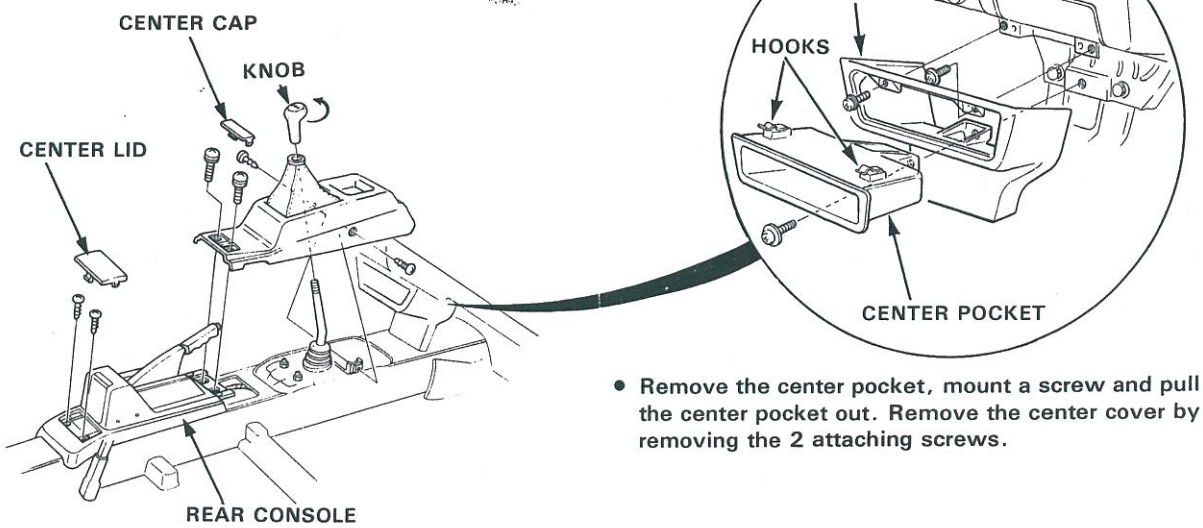
Large Console Replacement

1. Remove the shift lever knob (Manual transmission model only).
2. Lift up the paking brake lever.
3. Remove the center cap and center lid.
4. Remove the console by removing the attaching screws.
5. Install the console in the reverse order of removal.



Console Replacement

1. Follow the steps in the same manner as for large console.

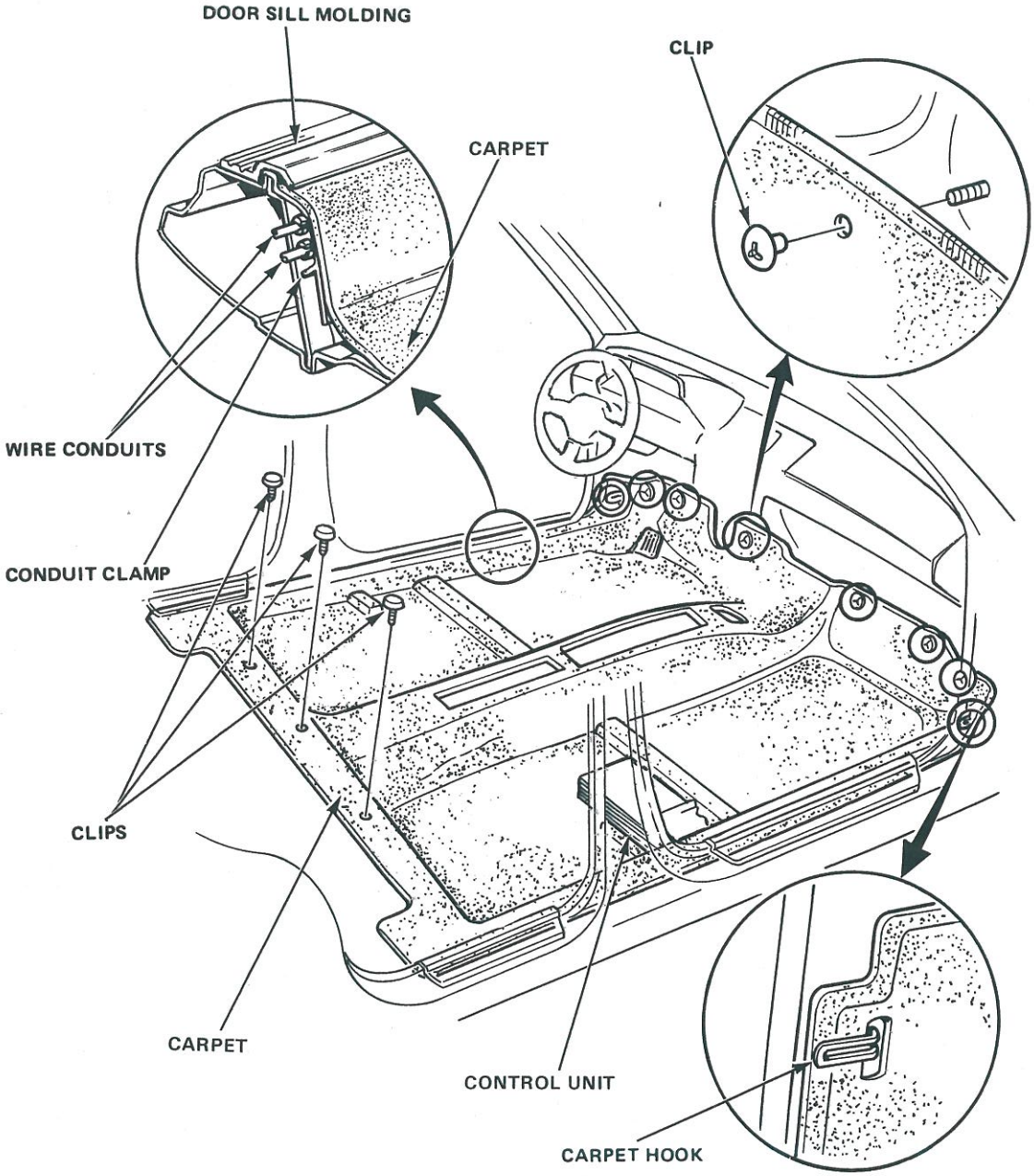


- Remove the center pocket, mount a screw and pull the center pocket out. Remove the center cover by removing the 2 attaching screws.

Carpet

Replacement

1. Remove
   - Front seats and control unit under the seat
   - Seat belt lower and center anchor bolts (page 20-43)
   - Center console (page 20-46)
   - Trunk lid opener
   - Door sill molding, kick trim, lower trim panel.
   - Rear seat cushion
2. Pry out the clips and retainers at the forward edge, pry off and remove the clips and screws at the rear edge, then remove the floor carpet.



3. Install the carpet in the reverse order of removal. being careful that the carpet hools are not piched in the pipes.

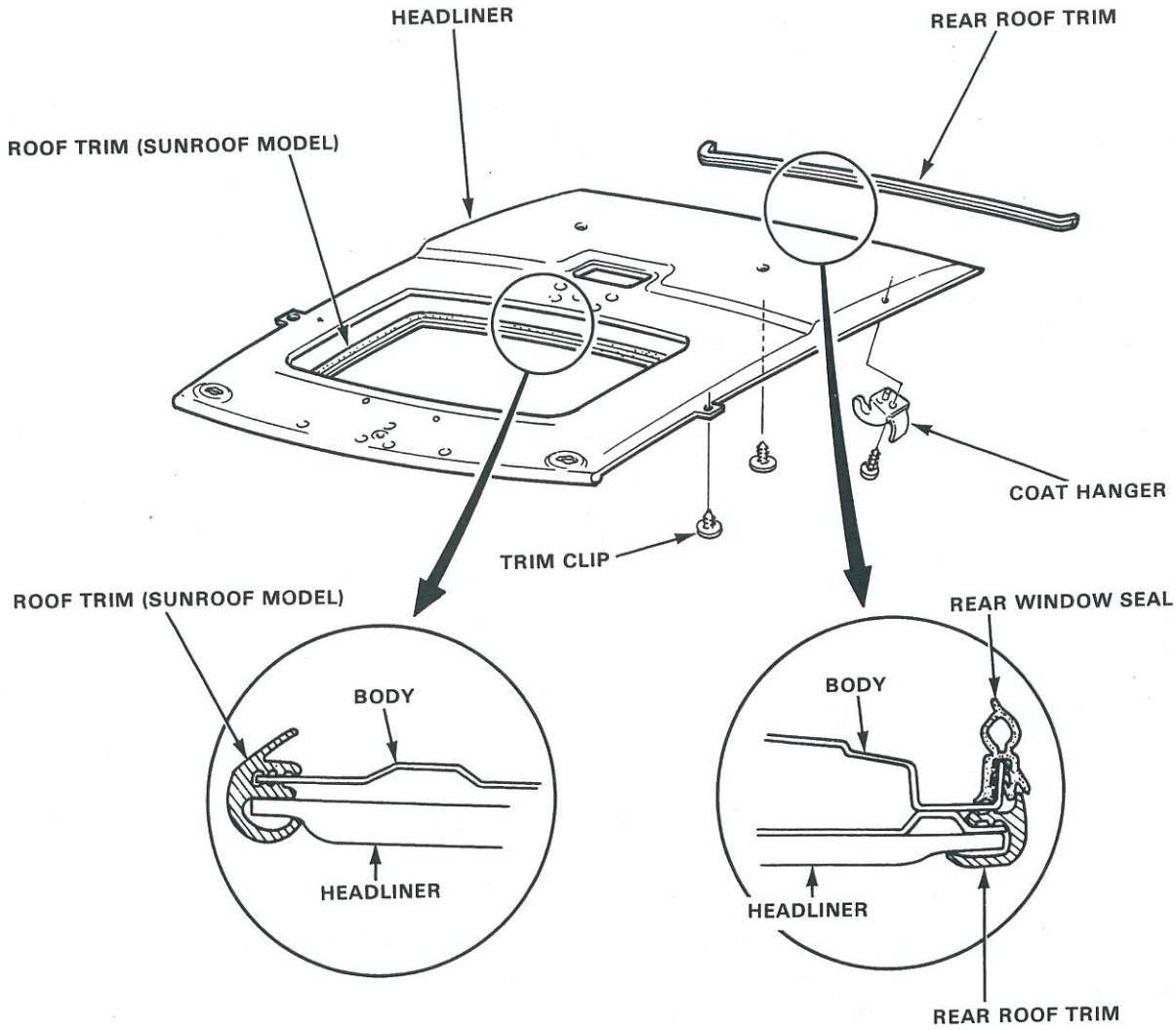
Headliner

Replacement

1. Remove
   - Sunvisors and holders
   - Rear view mirror
   - Quarter linings
   - Front pillar trim.

   NOTE: It's not necessary to remove front pillar trim from the dash board.

   - Room lamp
   - Rear roof trim
   - Roof trim (Sunroof model only)
2. Remove the trim clips, then remove the headliner.

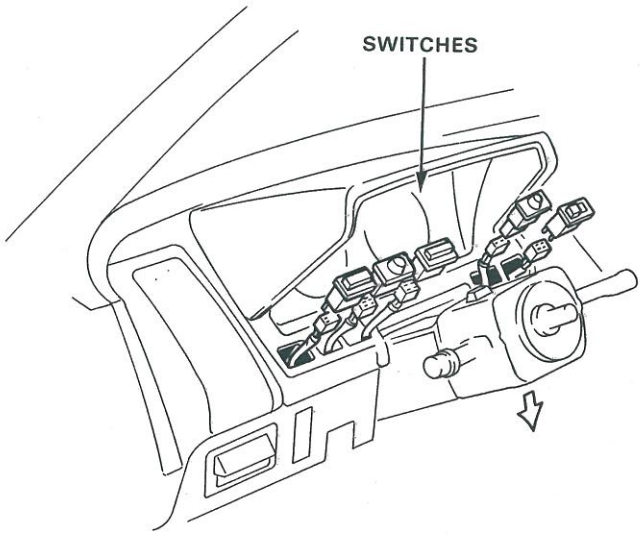


3. Install the headliner in the reverse order of removal. Remove the rear window seal when installing the rear trim.

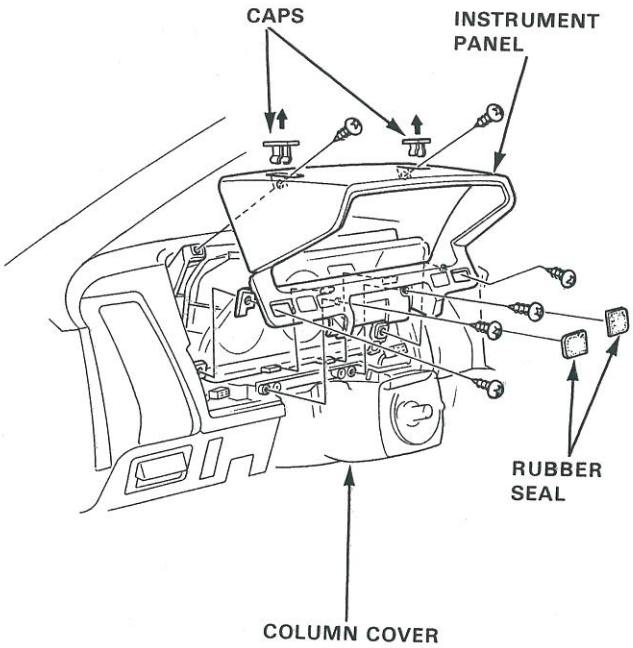
Instrument Panel

Replacement

1. Remove the right and left switches from the instrument panel then disconnect the wire couplers from the switches.

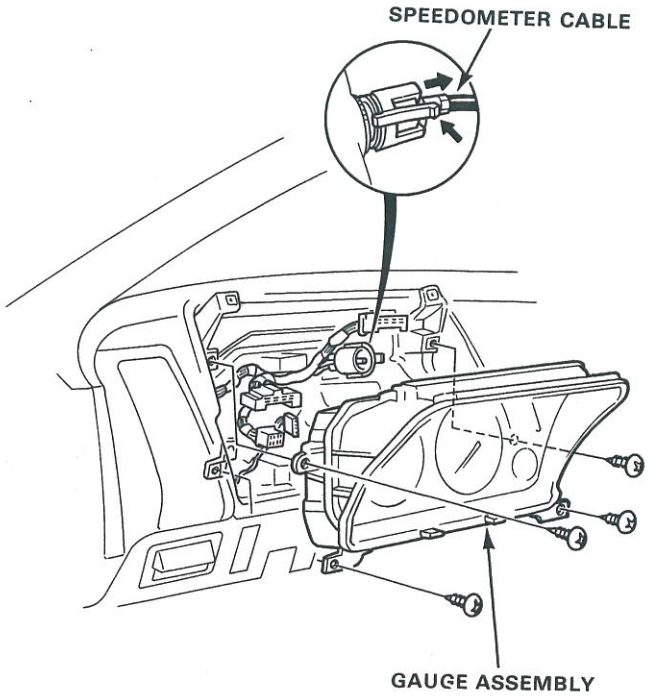


2. Remove the caps and two instrument panel attaching screws.
3. Remove the screws under the holes made by removing the switches.
4. Remove the rubber seal, loosen off the two screws in the column cover, then remove the instrument panel.



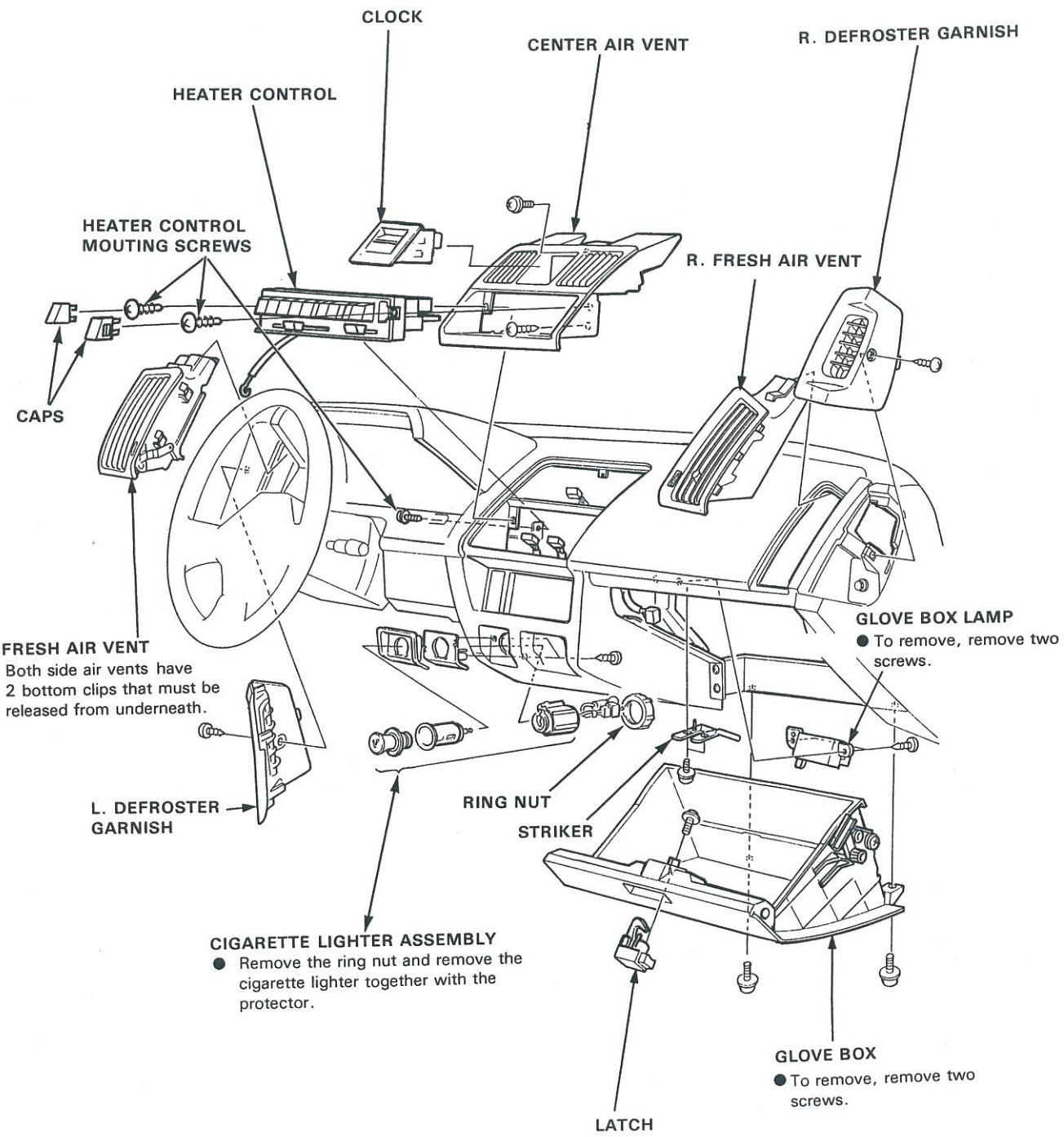
5. Remove the four screws, lift the gauge assembly, and disconnect the speedometer and wire harness cables.

NOTE: To disconnect the speedometer cable and wire harness couplers, release the locking tabs.



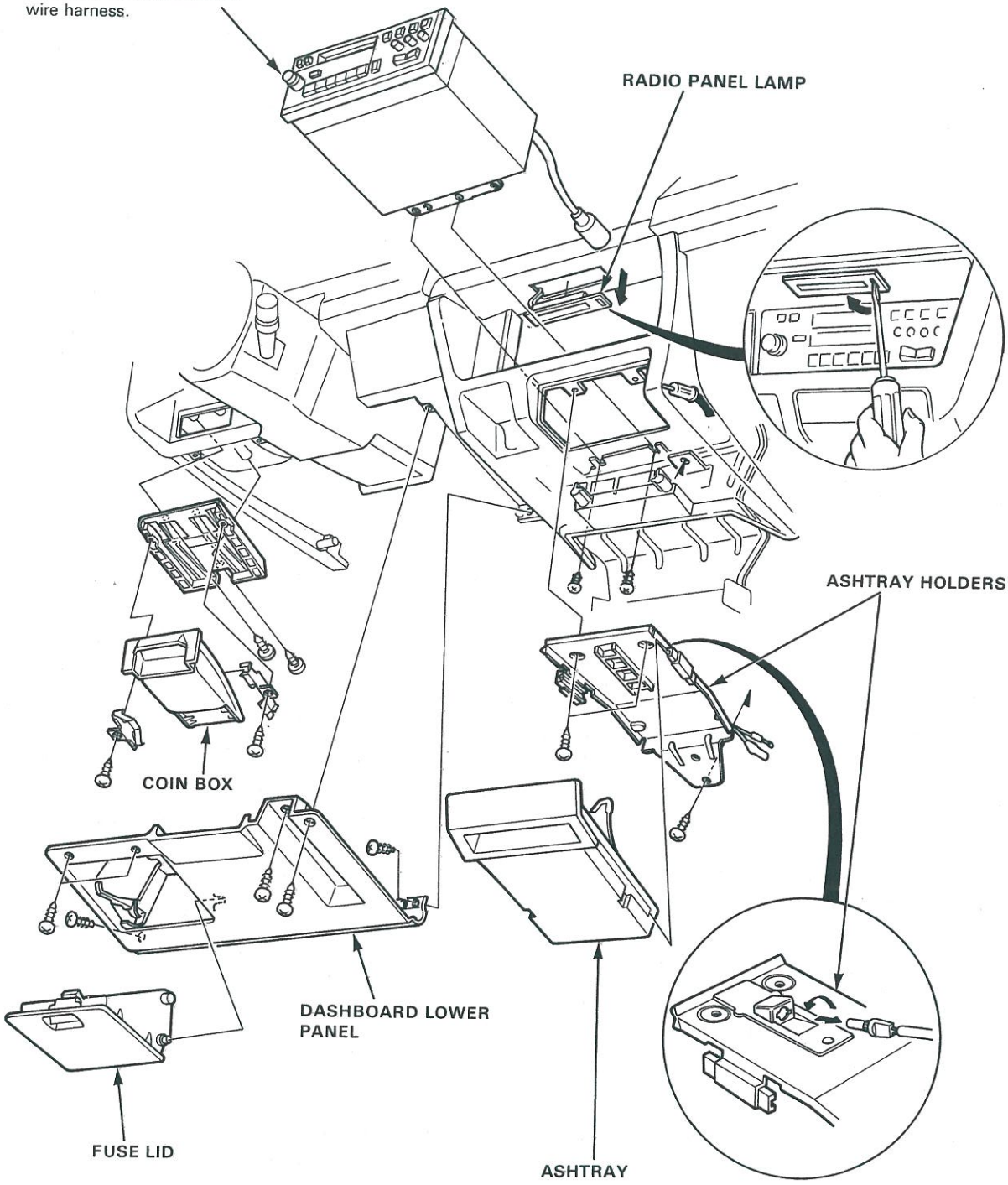
Dashboard Accessory

Replacement



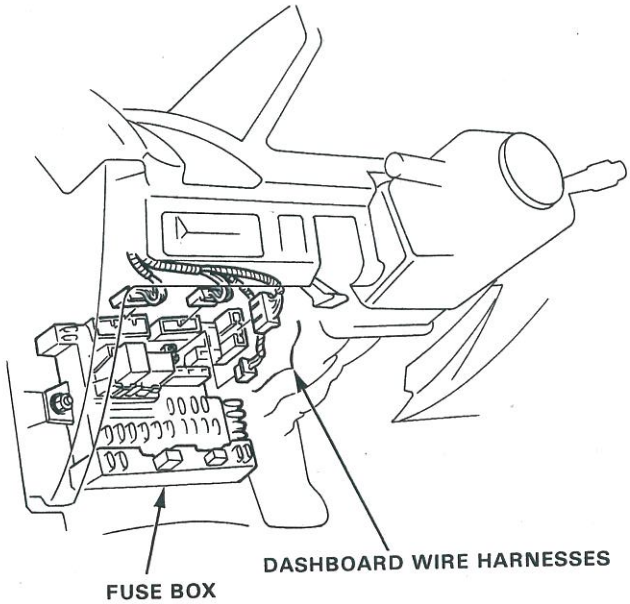
STEREO CASSETTE

- Remove ashtray holder
- Remove two screws from underneath and disconnect wire harness.

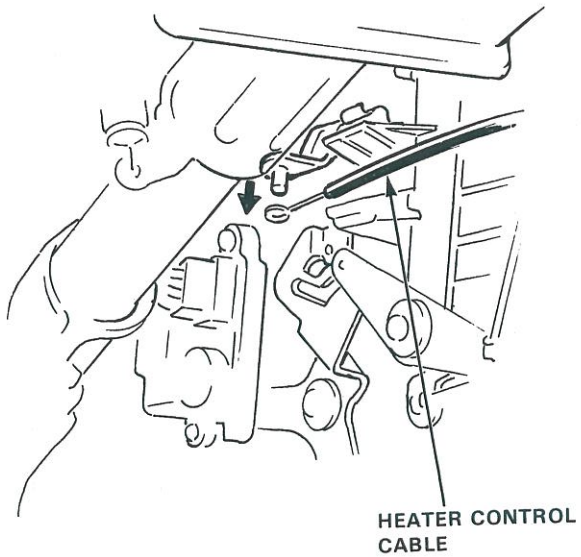


Replacement

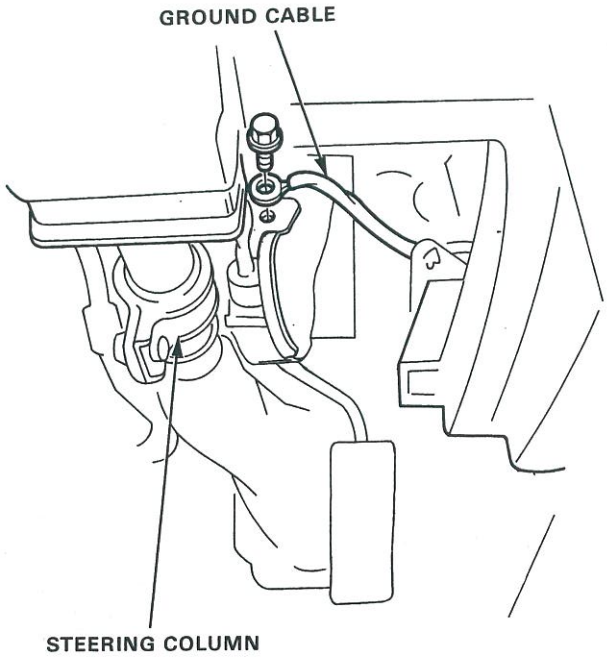
1. Remove the steering wheel.
2. Remove the center console.
3. Remove the fuse lid, then remove the dashboard lower panel.
4. Disconnect the wire harnesses from the fuse area.



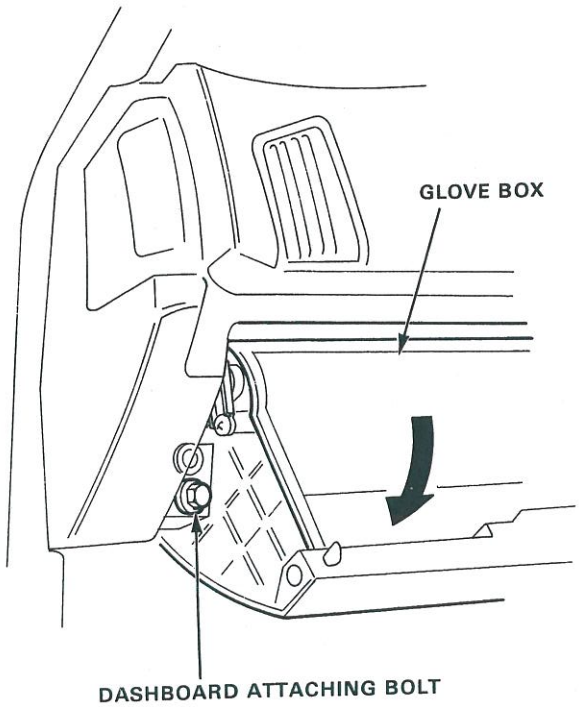
5. Disconnect the heater control cable and antenna cable.
6. Lower steering column.



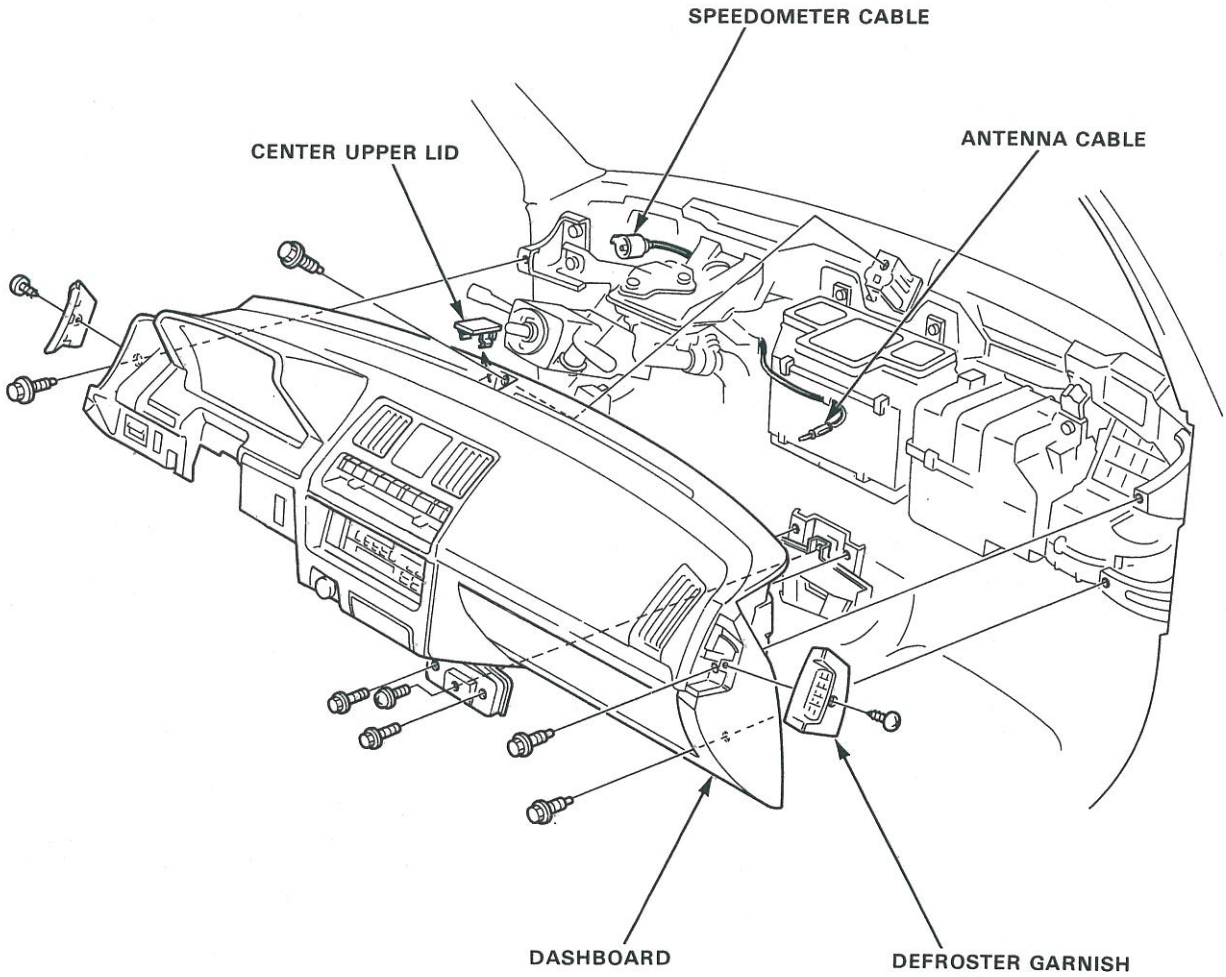
7. Disconnect the ground cable at right of the steering column.



8. Open the glove box, and remove the bolt at the right side.



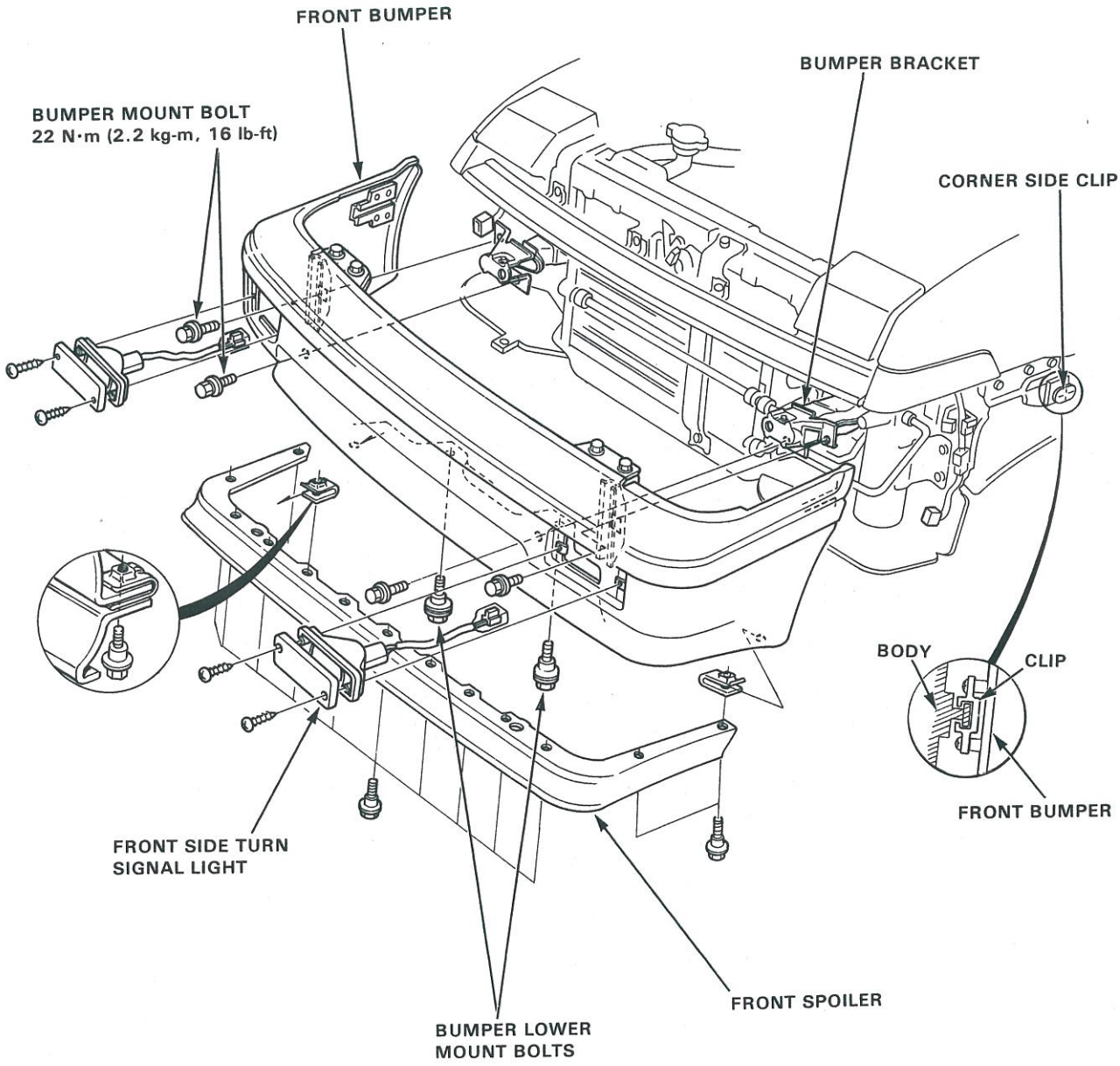
9. Remove the 2 nuts for the hood release handle.
10. Remove the center upper lid from top of the dashboard.
11. Remove the defroster garnishes from both ends of the dashboard.
12. Remove the six bolts and one screw. Lift the dashboard, and disconnect the speedometer cable.
    NOTE:
    - Before tightening the dashboard bolts, make sure that the dashboard is not interfering with the heater control lever or cable.
    - Also check that the instrument wires are not pinched before tightening the dashboard bolts.



Front Bumper

Replacement

1. Remove the front side turn signal lights, then disconnect the wire harness.
2. Remove the 2 bumper lower mount bolts.
3. Remove the 4 bumper mount bolts, then remove the bumper by sliding it forward.
4. To remove the bumper brackets and remove the bumper bracket mount bolts.

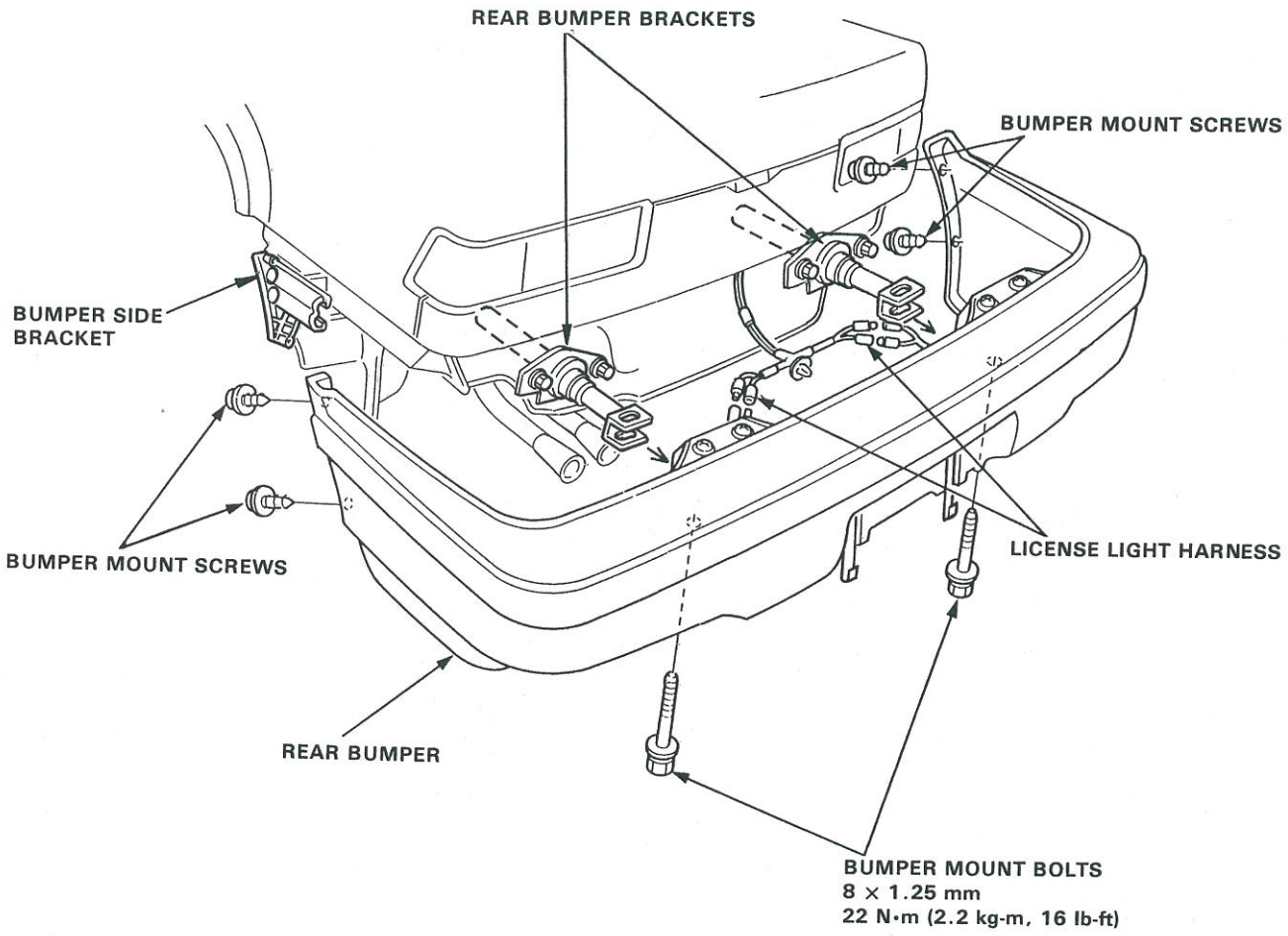


5. Installation sequence is essentially the reverse order of removal. After installing, check that the corner slide crips on the body engage the grooves of the retainers at the rear edge of the bumper.

Rear Bumper

Replacement

1. Remove the 2 bumper mount screws on each side at the rear edge of the bumper.
2. Remove the 2 bumper mount bolts.
3. Pull the bumper toward you, then disconnect the wire harness.
4. Remove the bumper by sliding it to the rear, clear of the bumper brackets.

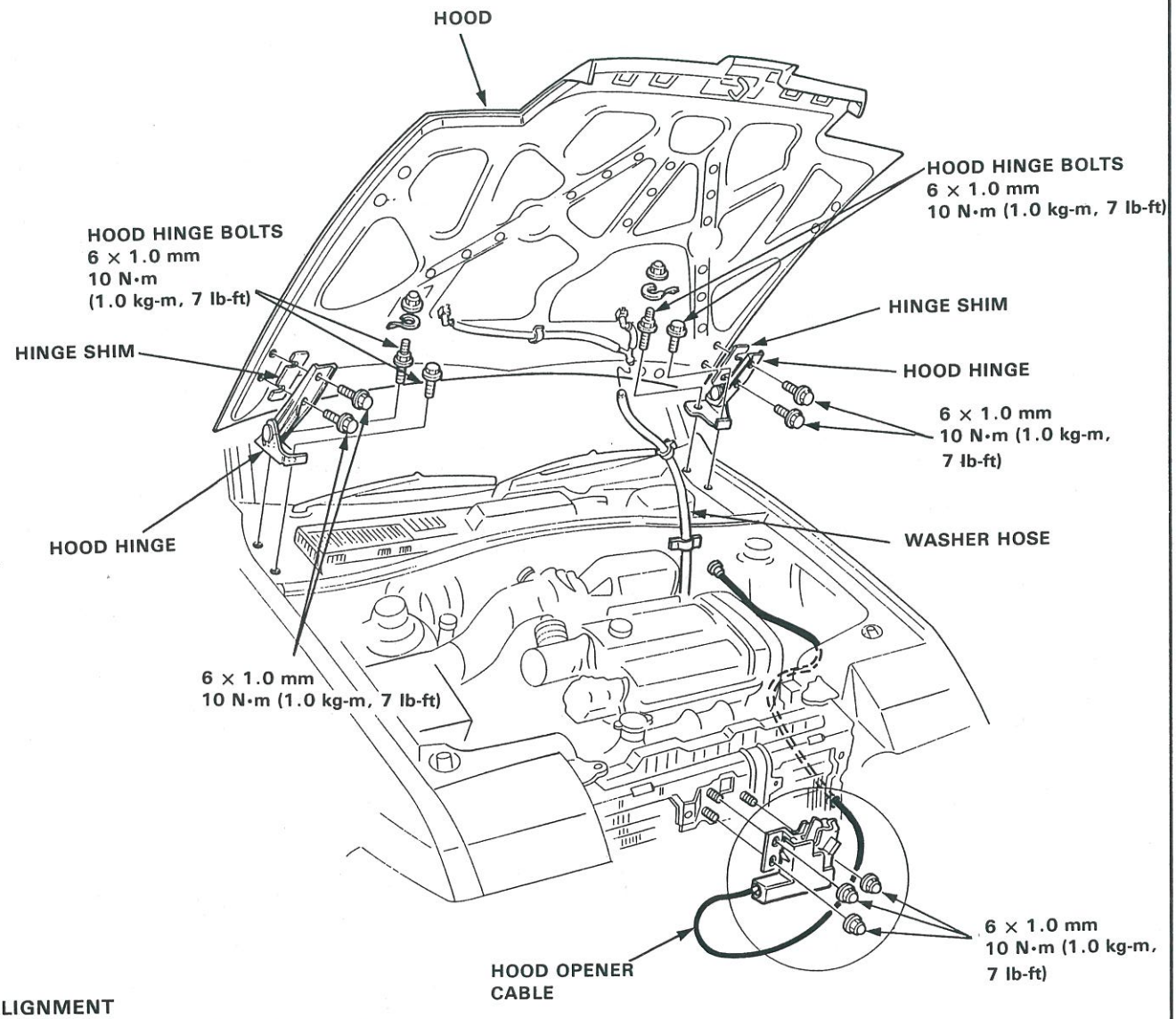


5. Install the new bumper in the reverse order of removal. After installing, check that the rear edge of the bumper is secured to the bumper side brackets.

Hood

Replacement

1. Disconnect the windshield washer hose at the Y-joint, then pull it out of the hood.
2. Remove the hood by removing the 2 hood hinge bolts on each side.
3. To remove the hood hinges, remove the front windshield wiper and air scoop.



ALIGNMENT

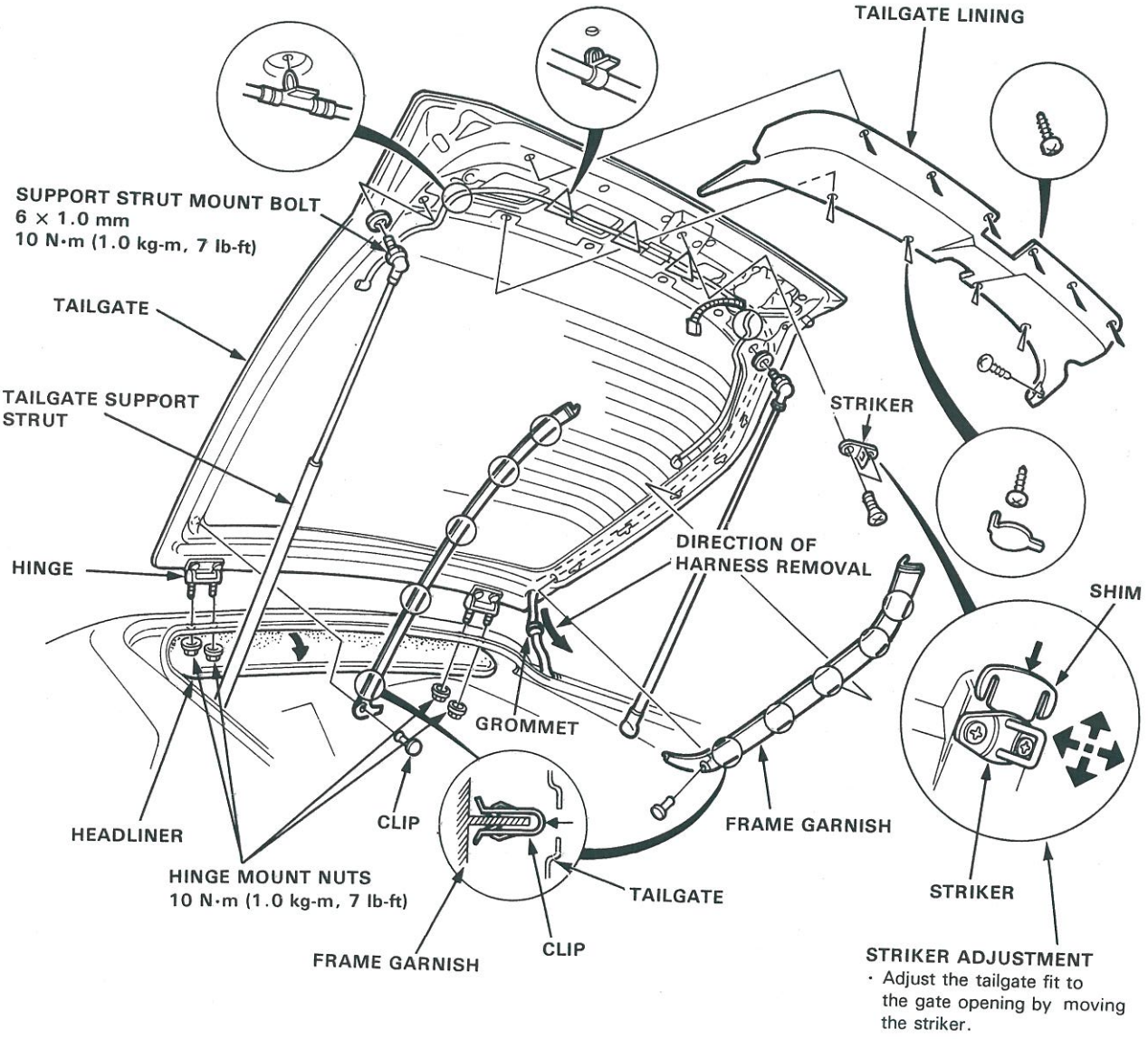
- The hinges can be adjusted right and left as well as fore and aft by using the elongated holes.
- The hinges should be shimmed to adjust the height of the hood at the rear edge.
- Relocate the hood lock to obtain the proper height at the forward edge. Also adjust the height of the stopper by turning it.

4. Install the new hood. After installing, adjust the hood fit to the opening.

Tailgate

Replacement

1. Remove the rear shelf, then remove the caps and screws. Remove the tailgate lining.
2. Remove the tailgate frame garnishes by removing the clips.
3. Pull the wire harness out of the tailgate.
   NOTE: Before pulling out the wire harnesses, tie a string to the end of it so you can pull it back in when the tailgate is reinstalled.
4. Remove the tailgate support struts.
   NOTE: Let an assistant hold the tailgate when removing the struts.
5. Lower the rear of the headliner just enough to gain access to the hinge nuts, then remove the tailgate by removing the hinge nuts.
   NOTE: Take care not to damage the roof panel.

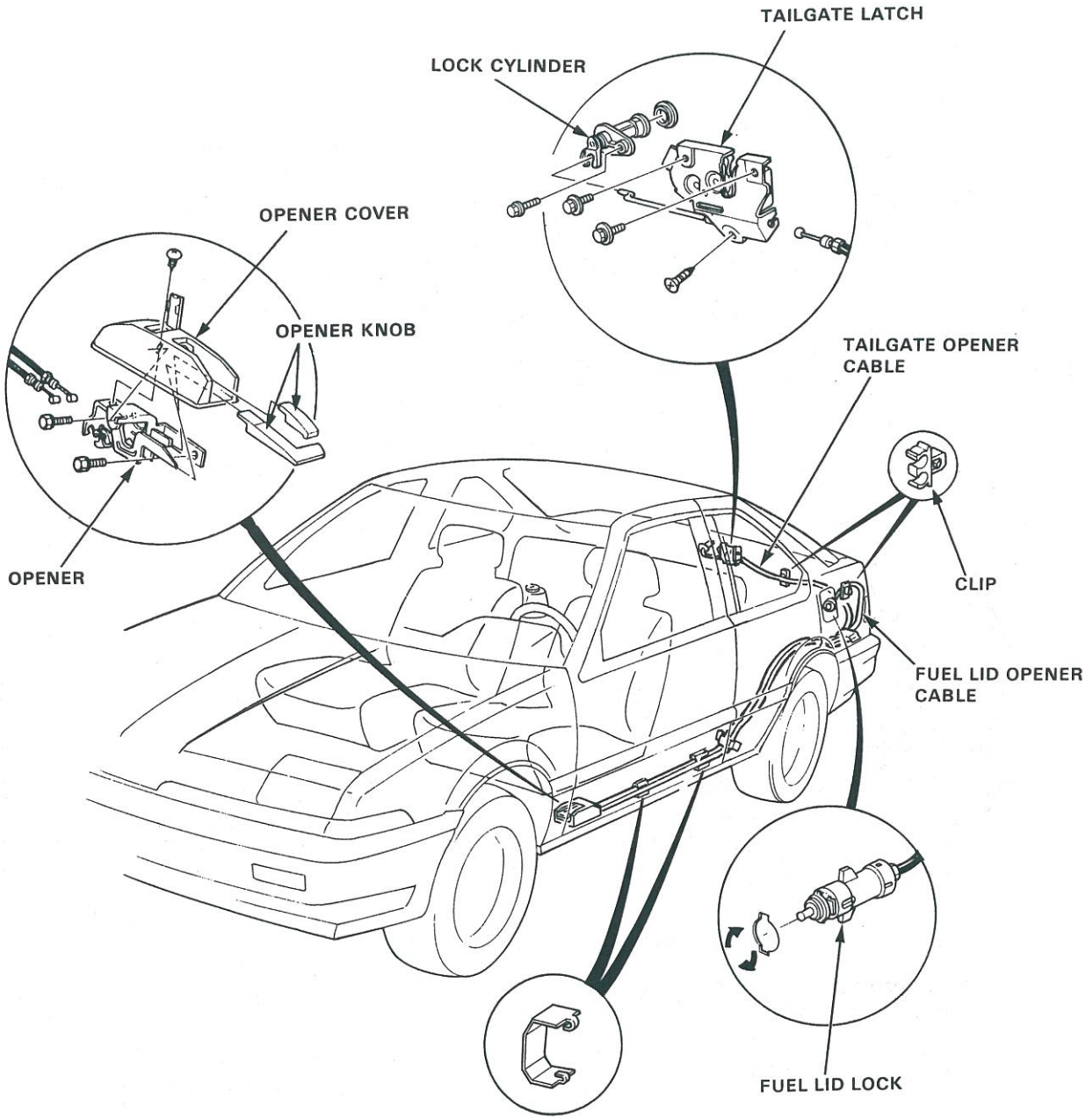


6. Installation sequence is essentially the reverse order of removal. However, observe the following:
   - Before tightening the hinge nuts, adjust the tailgate fit and striker.
   - Use care when pulling the wire harness back in to avoid damaging the body.
   - Coat the inside and outside of the grommet with sealer.

Opener and Latch

Replacement

1. Remove the rear trim panel (page 20-38)
2. Disconnect the rod and the opener cable, then remove the latch by removing the 3 bolts.
3. Remove the bolt, then remove the lock cylinder.
4. Remove the screw and release levers, then remove the opener cover. Remove the opener by removing the 2 bolts.
5. To remove the tailgate and fuel lid opener cables, remove the following parts:
   - Left side trim, right half of floor mat, right quarter trim panel.
   - Left rear side trim panel.
6. Remove the fuel lid lock by turning it 90°.

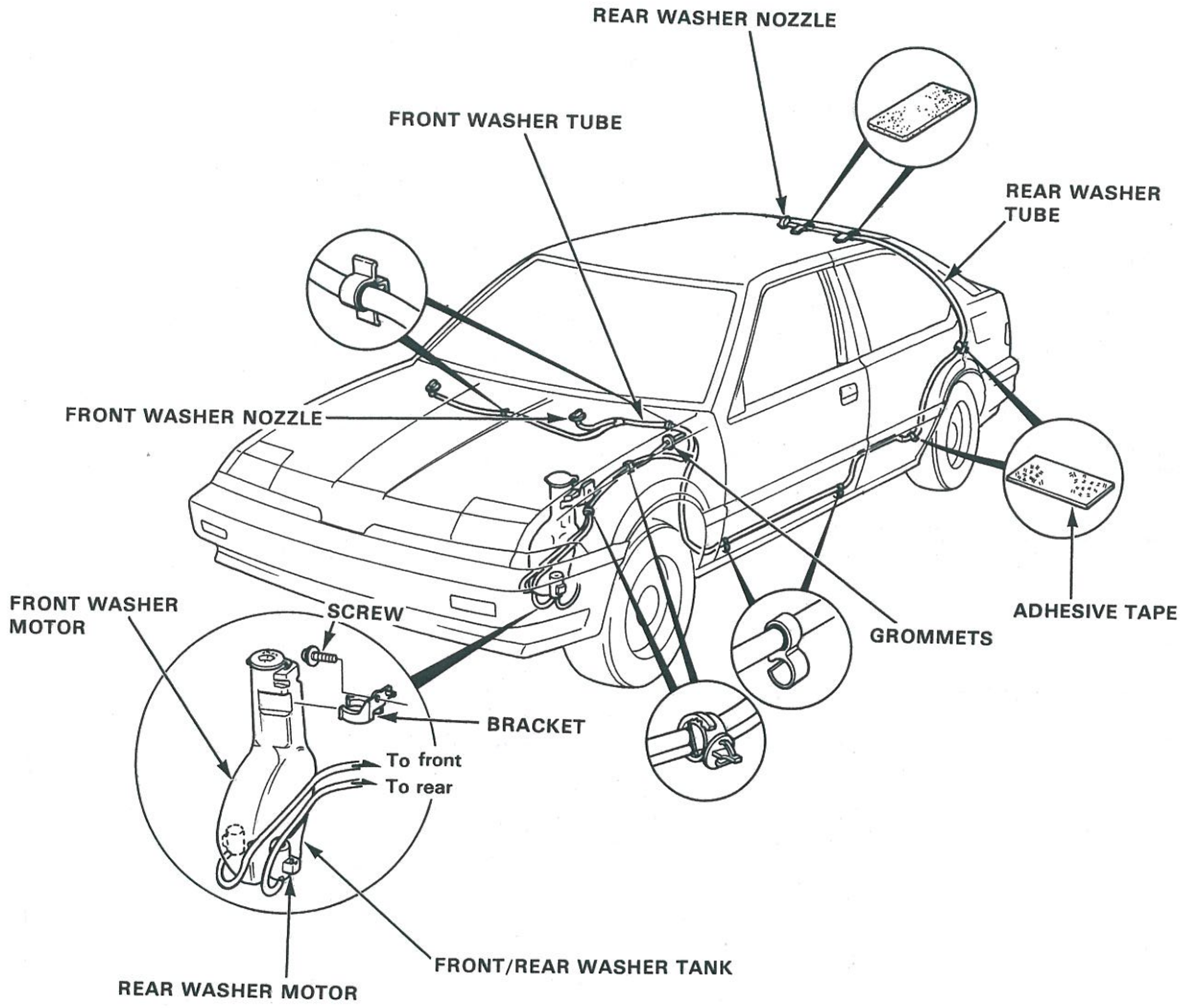


7. To install, reverse the removal procedure. Check that the tailgate and fuel lid opener cables are routed and connected properly.

Windshield Washer

Replacement

1. Remove the washer tank by removing the screw and bracket.
2. Disconnect the hoses and wire harness from the front and rear windshield washer motors.
3. Remove the front washer nozzles by releasing the pawls and pushing them out from the underside of the hood. To remove the rear washer nozzle, twist and pull it out from the outside.
4. To remove the rear washer hose, first remove the:
   - Door sill molding, quarter trim panel, rear pillar trim panel and rear half of head liner.
   - Left half of floor carpet.

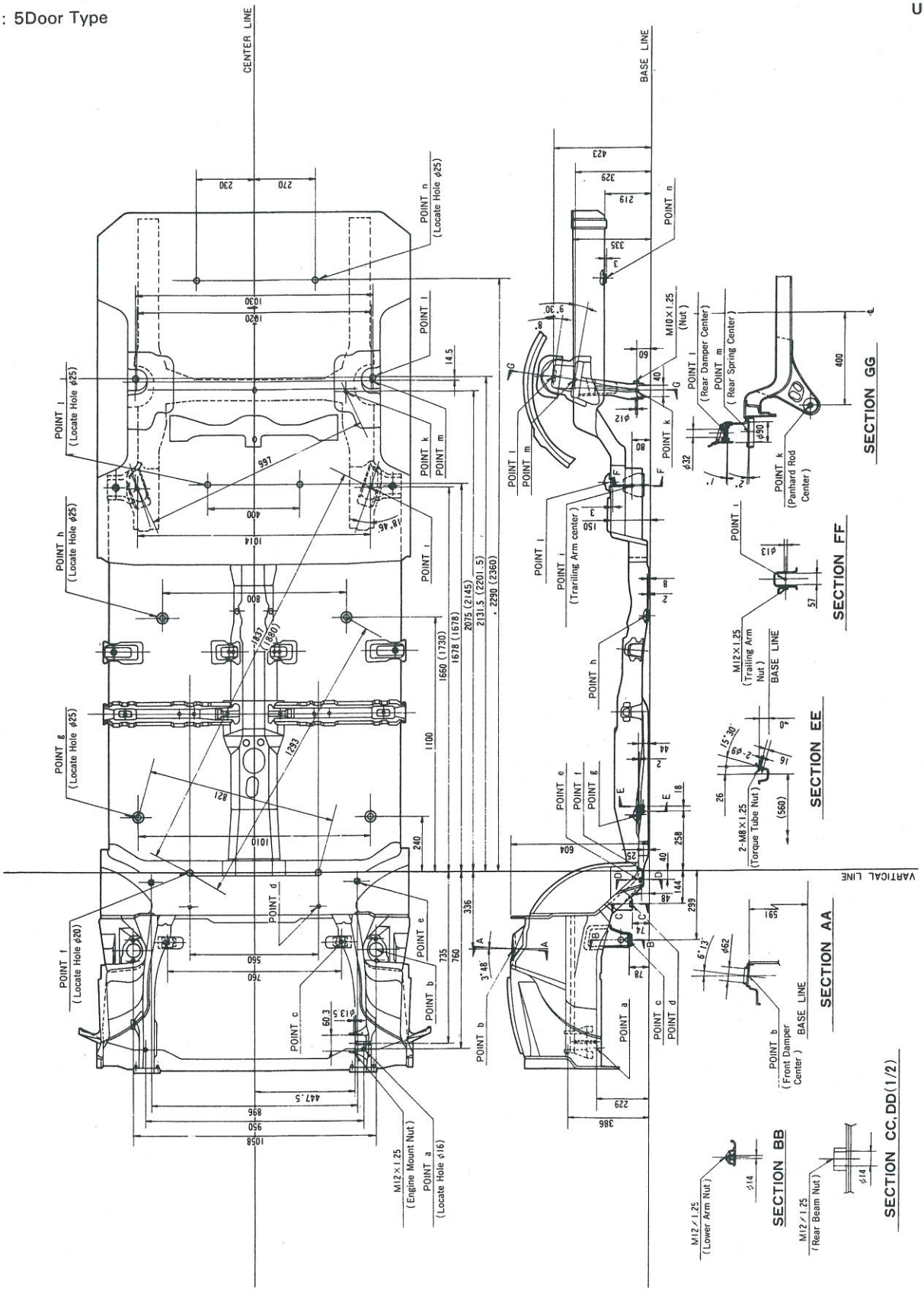


5. Install the washer in the reverse order of removal.
   NOTE:
   - Take care not to pinch the hoses during reinstallation.
   - Install the grommets firmly.
   - Secure the hoses in the cabin positively.
   - Connect the hoses to the washer motors and nozzles securely.
   - After installation, adjust the washer nozzles.

Frame Repair Chart

( ): 5Door Type

Unit: mm



Heater and Air Conditioner

Heater..... 21–2
Air Conditioner..... 22–2



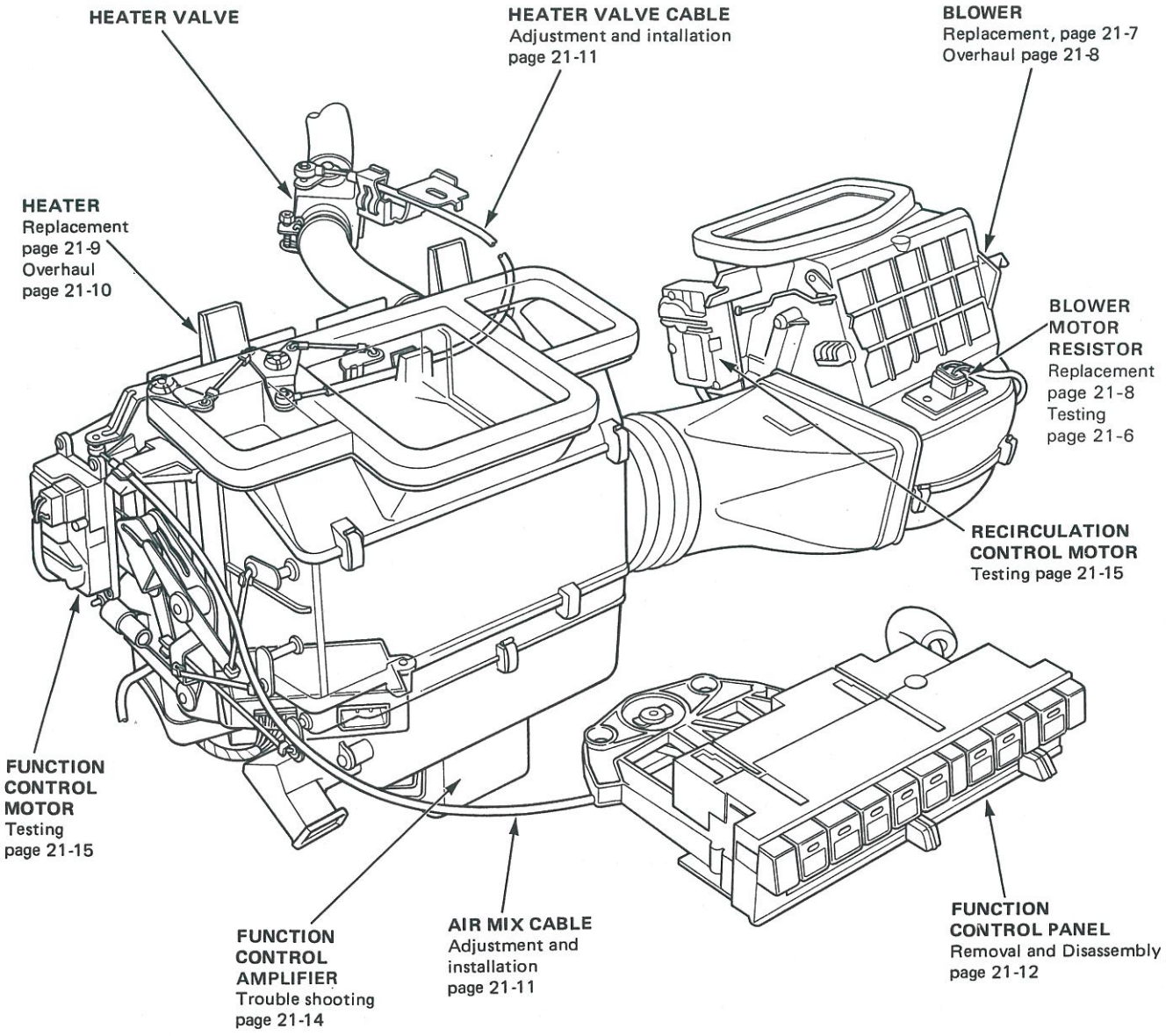
Heater

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Electrical Troubleshooting 21–5
Blower Replacement 21–7
Blower Overhaul 21–8
Heater Assembly Replacement 21–9
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Heater

Illustrated Index

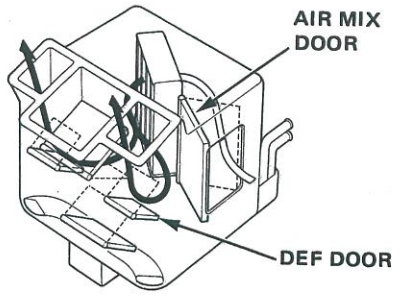


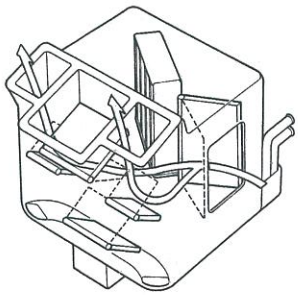
Door Positions



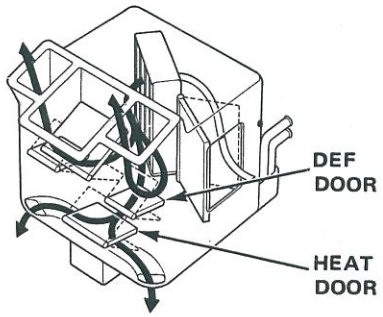
MAX HOT

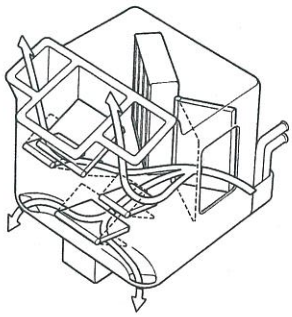
MAX COLD



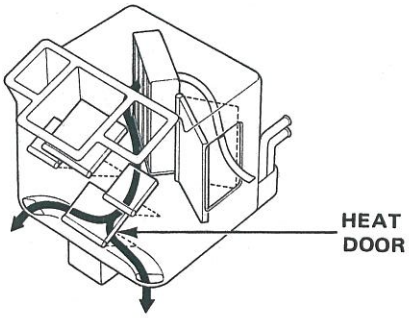


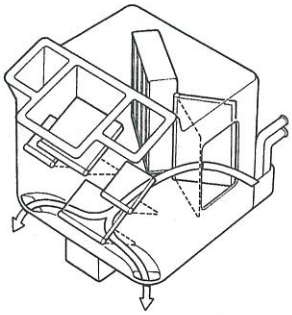
H/DEF



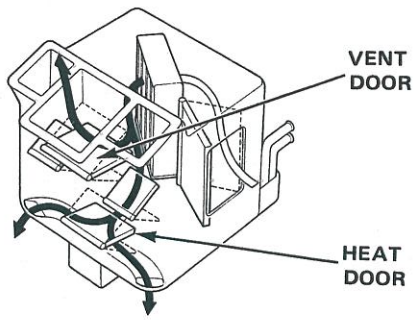


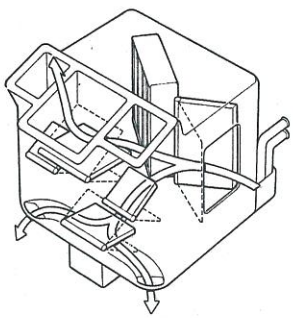
HEAT



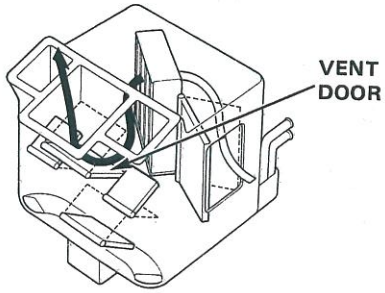


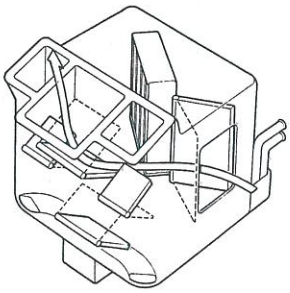
HI-LO





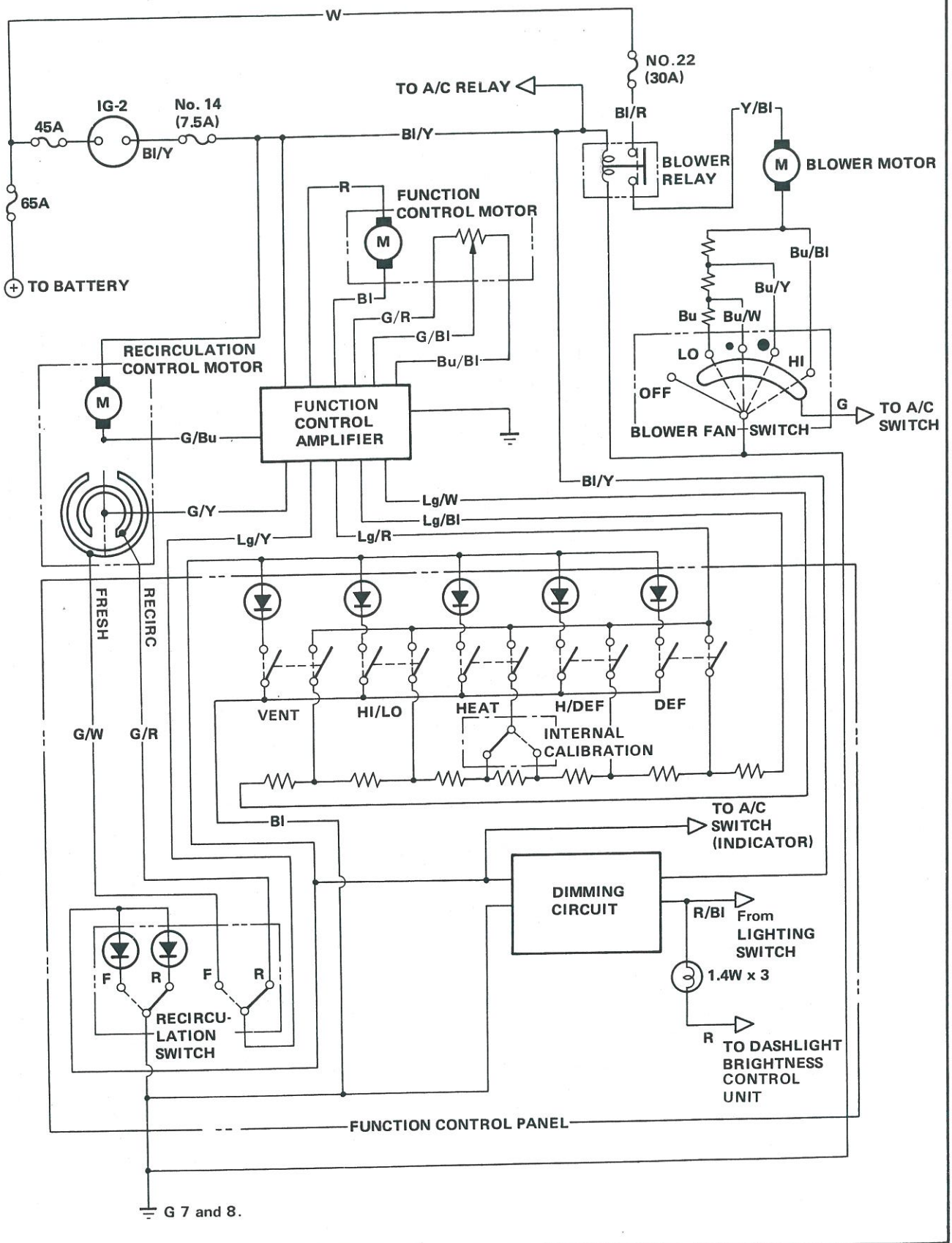
VENT





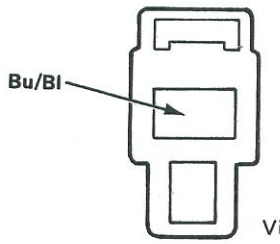
Heater

Circuit Diagram



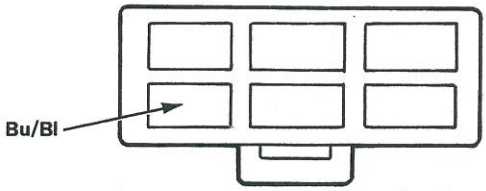
Symptom: Blower motor won't run at any speed, or won't run at high speed.
(If blower motor won't run at a particular lower speed, go to the next symptom.)
NOTE: Check that battery voltage is available at No 14 and No 22 fuses.

1. With the 2P blower motor connector attached (at the bottom of the blower housing) attach a jumper wire from the Bu/Bl wire to any convenient body ground.



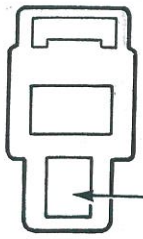
View from wire side

2. Turn the ignition switch ON, The blower should run at full speed:
   - If it does run, go to step 3.
   - If it does not, go on to step 5.
3. Remove the glovebox and move the grounded end of the jumper wire to the Bu/Bl wire of the 6P blower switch connector.



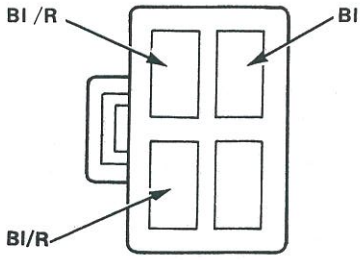
View from wire side

4. Turn the ignition switch ON, The blower should run at full speed:
   - If it does run, the blower switch or its ground is faulty.
   - If it does not, there is an open in the Bu/Bl wire between the motor and fan switch.
5. Check that the Y/Bl wire at the 2P blower motor connector has battery voltage (with the Ignition ON.)
   - If it does, the motor is faulty.
   - If it does not, go on to step 6.



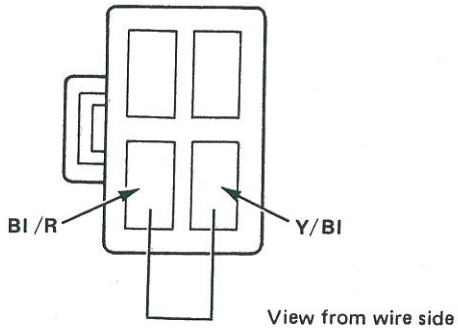
View from wire side

6. Check that the Bl /Y and Bl /R wires at the blower motor relay (above dash fusebox) have battery voltage (with the ignition ON) and that the Bl wire is properly grounded.



View from wire side

7. Attach a jumper wire between the Y/Bl and Bl /R wires. Turn the ignition switch ON:
   - If the blower motor now runs, the relay is faulty.
   - If the motor still does not run recheck the wiring in step 6.



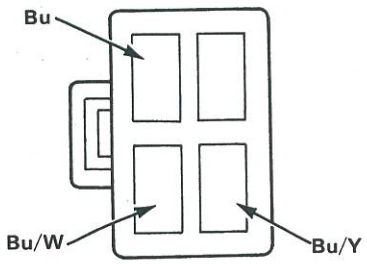
View from wire side
JUMPER WIRE

(cont'd)

Electrical Trobleshooting (cont'd)

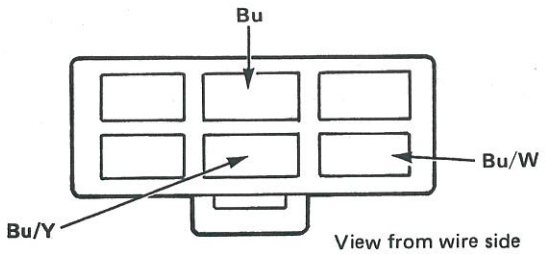
Resistor and Fan Switch Test:
Symptom: Blower motor won't run at a particular speed, but runs at other speeds.

1. Remove the glovebox. Connect a jumper wire to ground, connect the other end (depending on which speed does not run) to:Bu (slow), Bu/W (low), or Bu/Y(medium). Turn the ignition switch ON:
   - If the blower runs, go on to step 2.
   - If the blower does not run, the resistor is faulty.



View from wire side

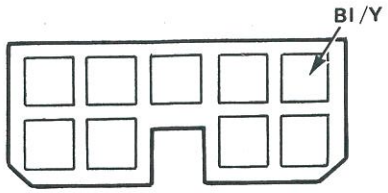
2. Perform the same test at the blower/fan switch connector.
   - If the blower runs, the blower/fan switch is fauity (go to page 21-13).
   - If the blower does does not run, there is an open in the wires between the resistor and the switch.



View from wire side

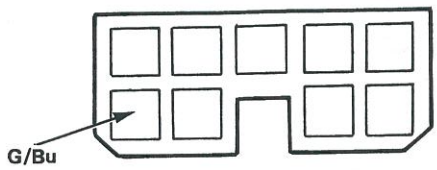
Recirculation Control Motor Test:

1. Check the 65A and 45A fuses (engine) and the No.14 fuse (under-dash).
2. Disconnect the function control amplifier connector then check voltage at the BI /Y terminal with the ignition switch ON.
   - If there is battery voltage, go to step 3.
   - If not, there is an open is the BI /Y wire.



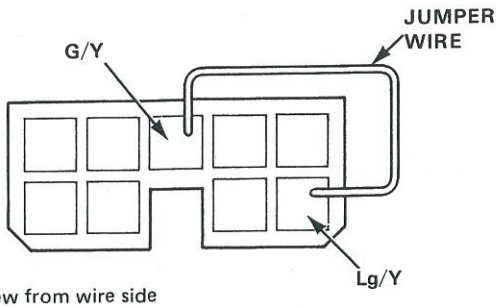
View from wire side

3. Connect the G/Bu terminal at the function control amplifier connector to ground. Turn the ignition switch ON, the recirculation control motor should run.
   - If the recirulation control motor runs, go to step 4.
   - If the motor does not run, check the recirculation control motor (go to page 21-15).



View from wire side

4. Connect a jumper wire between the G/Y terminal and the Lg/Y terminal at the function control amplifier. Turn the ignition switch ON, the recirculation control motor should start running.
   - If it does not run, the function control amplifier is faulty.
   - If it does run, check the recirculation switch and the recirculation motor (go to page 21-13 and 15).

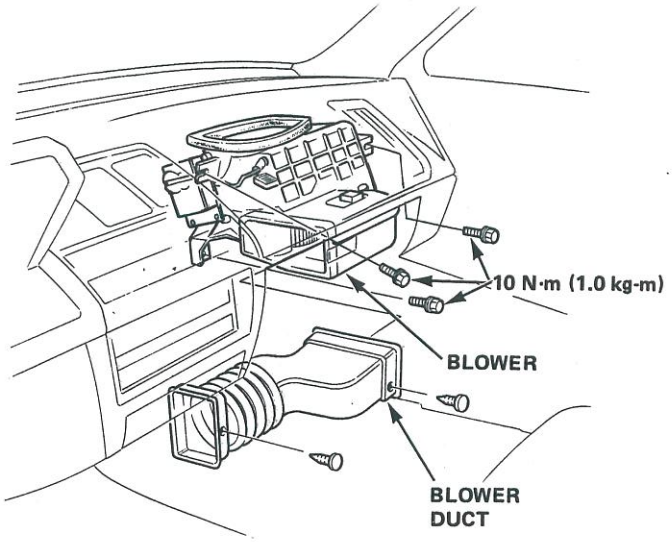


View from wire side

Blower Replacement

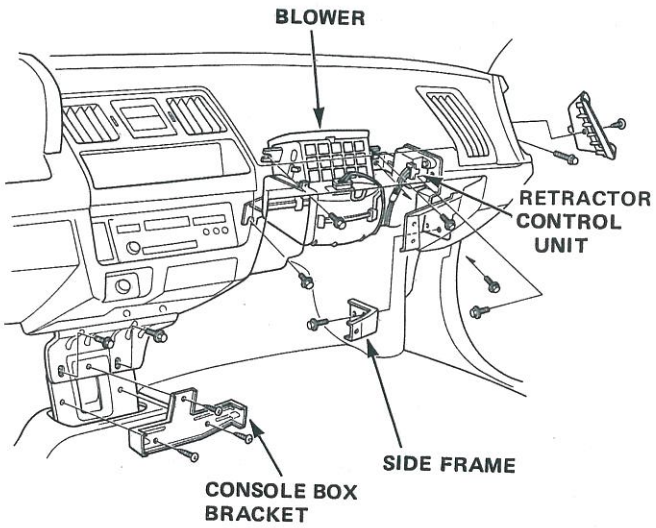
● For cars without air conditioner

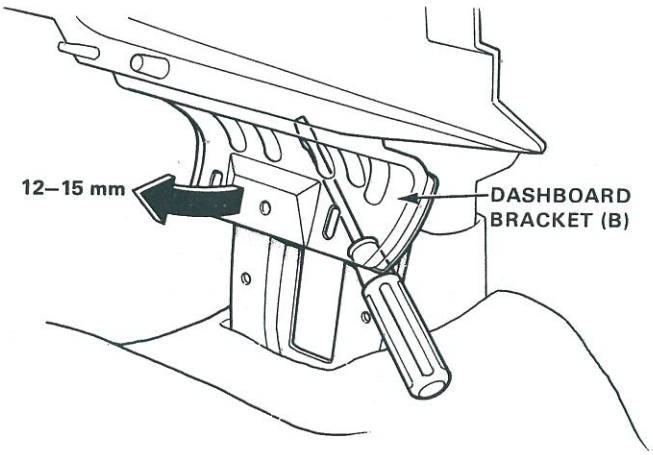
1. Remove the glove box.
2. Remove the glove box frame.
3. Remove the blower duct.
4. Disconnect the wire connections from the blower.
5. Remove the bolts (3) for the blower.
6. Remove the blower.
7. Install the blower in reverse order of removal and make sure that there is no air leakage.



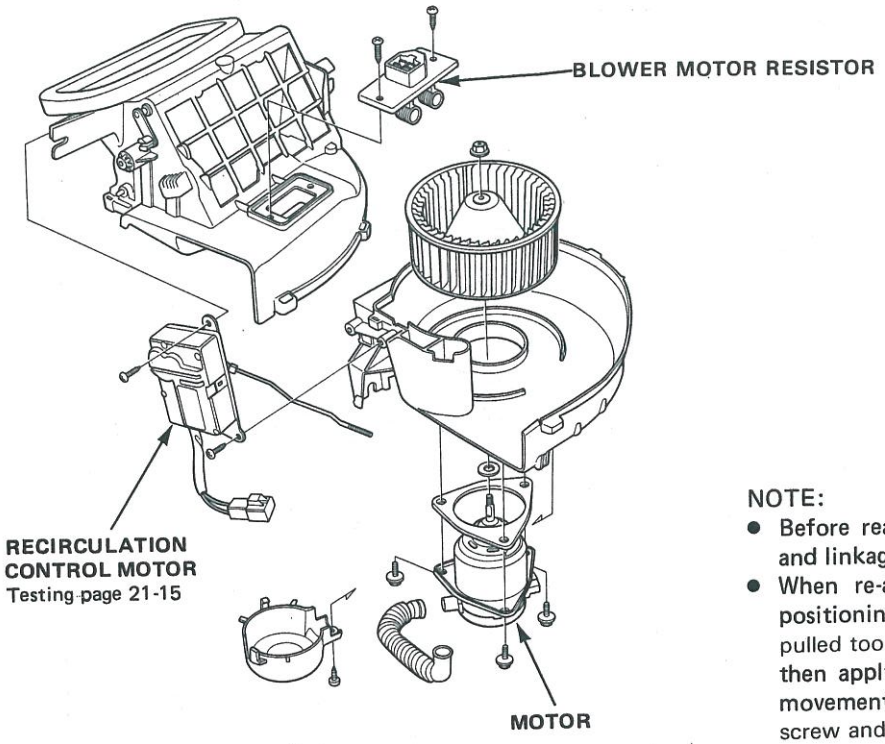
● For cars with air conditioner

1. Remove the glove box.
2. Remove the glove box frame and side frame.
3. Remove the bolts (2) and the retrector control unit with bracket.
4. Remove the console box (Section 20).
5. Remove the bolts (2), the screws (3) and the console box bracket.
6. Unbolt dashboard lower bracket (A) from bracket (B) and insert a screwdriver to pry a 12-15 mm clearance, to ease evaporator removal.
7. Loosen the sealing band toward the right side.
8. Disconnect the wire connections from the blower.
9. Remove the bolts (3) for the blower.
10. Remove the blower.
11. Install the blower in reverse order of removal and make sure that there is no air leakage.



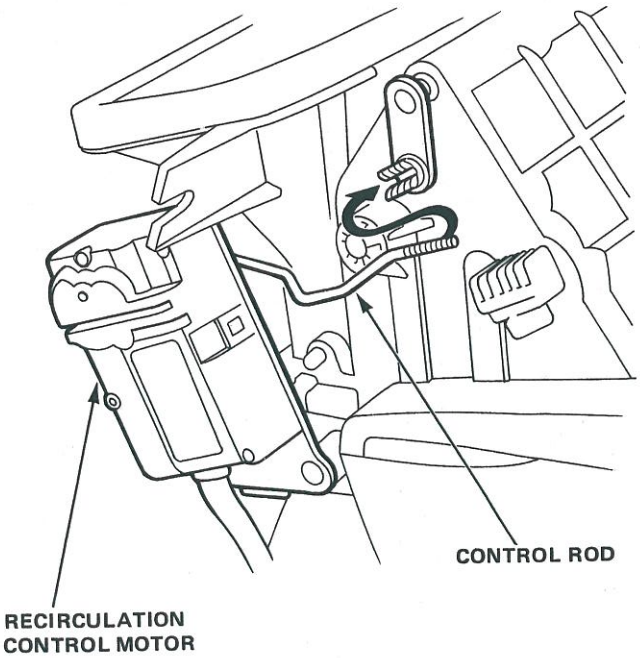


Blower Overhaul



NOTE:

- Before reassembly, make sure that the air door and linkage move smoothly without binding.
- When re-attaching 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.



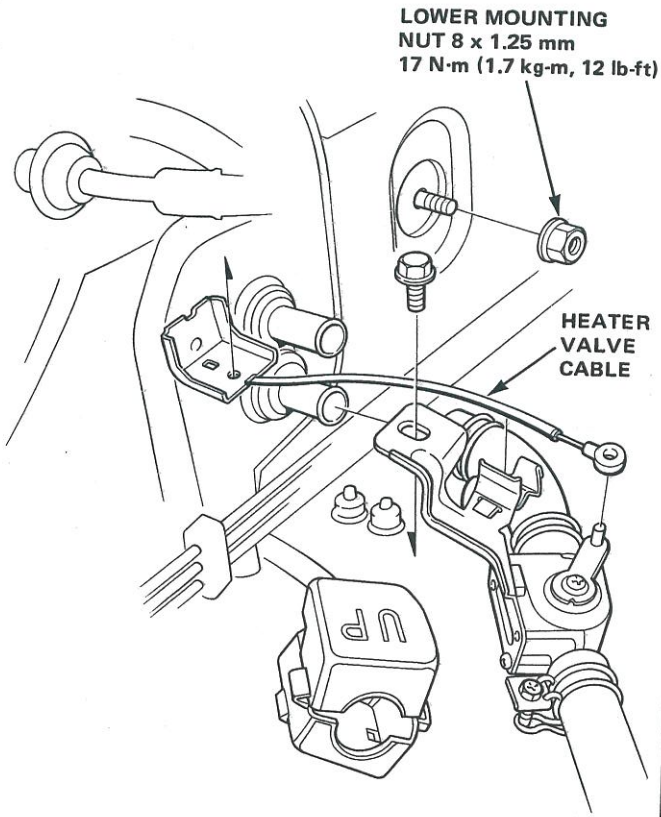
To adjust the control rod:
Connect the REC control motor connector to the main wire harness and turn the FRE/REC switch to "REC" and open the air door, then connect the control rod to the arm while holding the air door open.

Heater Assembly Replacement

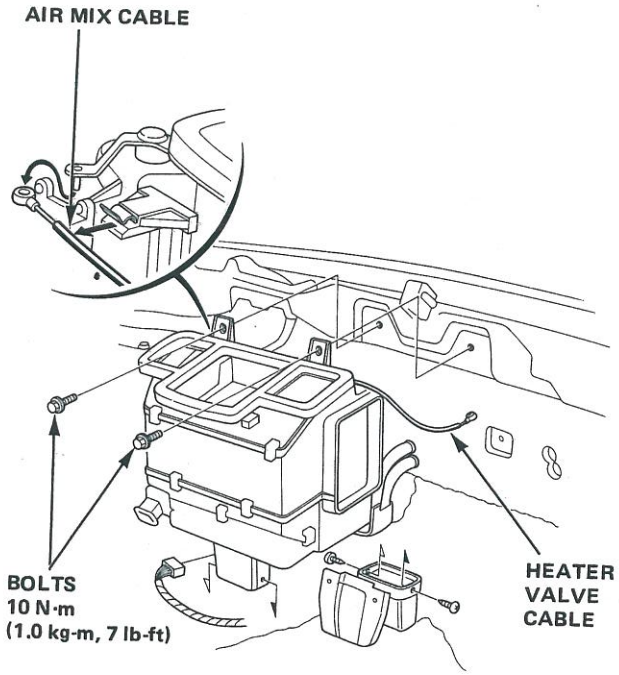
1. Drain the coolant at the radiator.
2. Disconnect the heater hoses at the firewall.

   NOTE: Coolant will run out when the hoses are disconnected, drain it into a clean drip pan.

3. Disconnect the heater valve cable from the heater valve.



4. Remove the heater lower mounting nut.
5. Remove the console.
6. Disconnect the air mix cable from the heater.
7. Remove the dashboard. (Section 20)
8. Disconnect the wire harness at the connector.
9. Remove the heater mounting bolts (2), then pull the heater away from the body.



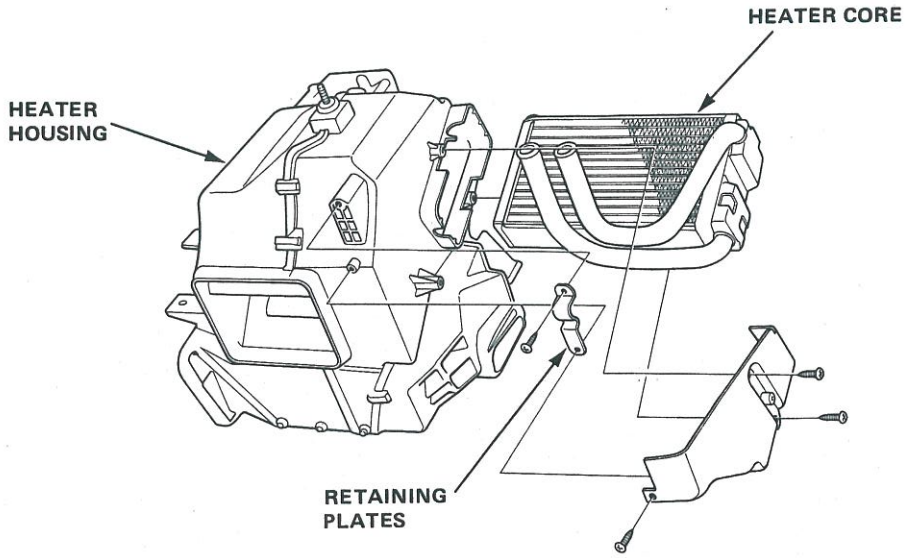
Install in reverse order of removal, and:

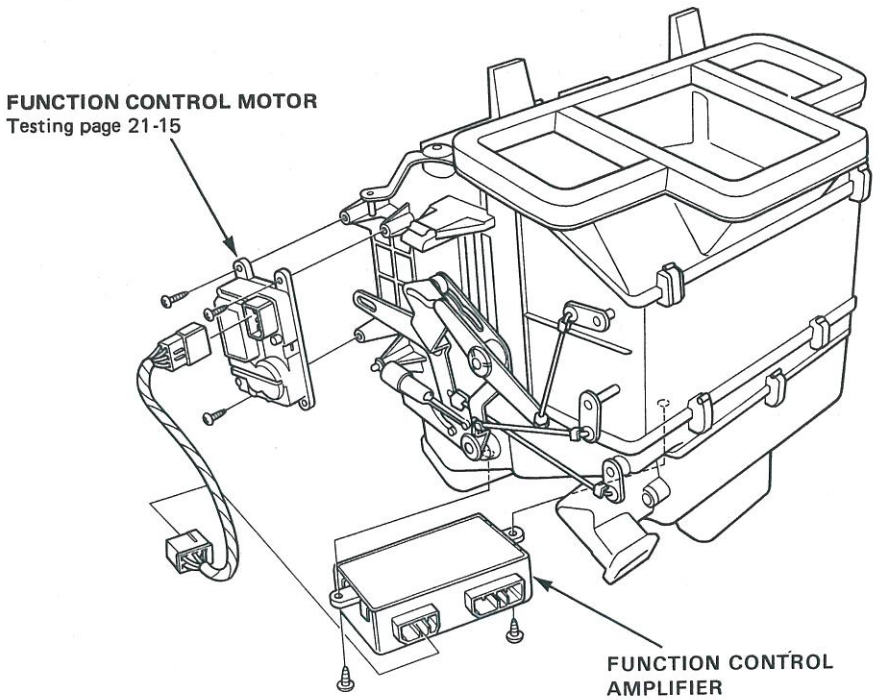
- Apply a sealant to the grommets.
- Do not interchange the inlet and outlet hoses. Make sure that the hose clamps are secure.
- Loosen the bleed bolt on the engine and refill the radiator and reservoir tank with the proper coolant mixture.
  Tighten the bleed bolt when all the trapped air has escaped and coolant begins to flow from it.
- Connect all cables and make sure they are properly adjusted. (page 21-11)

Heater Core Replacement/Overhaul

1. Remove the heater assembly (page 21-9).
2. Remove the self tapping screws and retaining plate.
3. Pull out the heater core from the heater housing.

Install in 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.

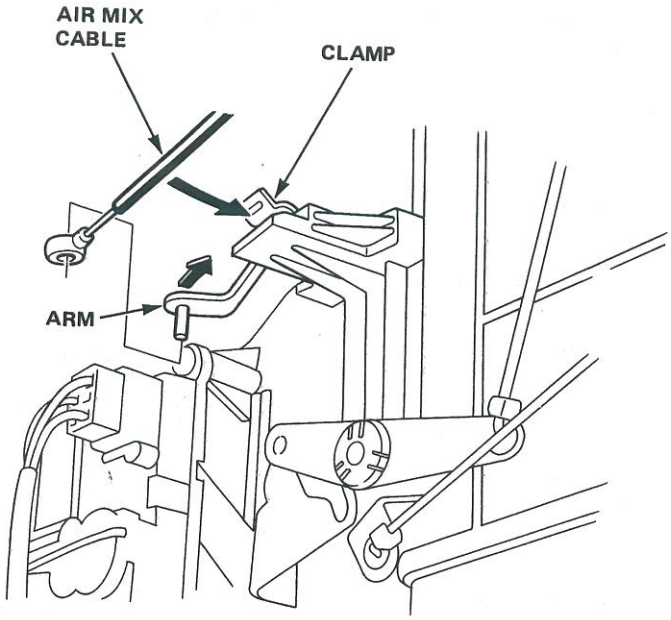




Control Cable Adjustment and Installation

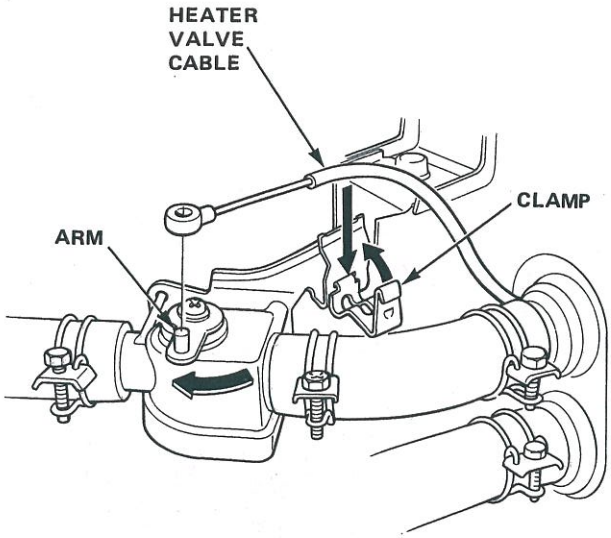
● Air Mix Cable

1. Slide temperature control lever to HOT.
2. Open the air mix door in front of heater core, then connect the end of the cable to the arm.
   Gently slide the cable housing back from the end, enough to take up any slack in the cable, but not enough to make the dashboard lever move.Then,snap the cable housing into the clamp.
3. After adjustment, make sure that the heater valve cable is adjusted properly.



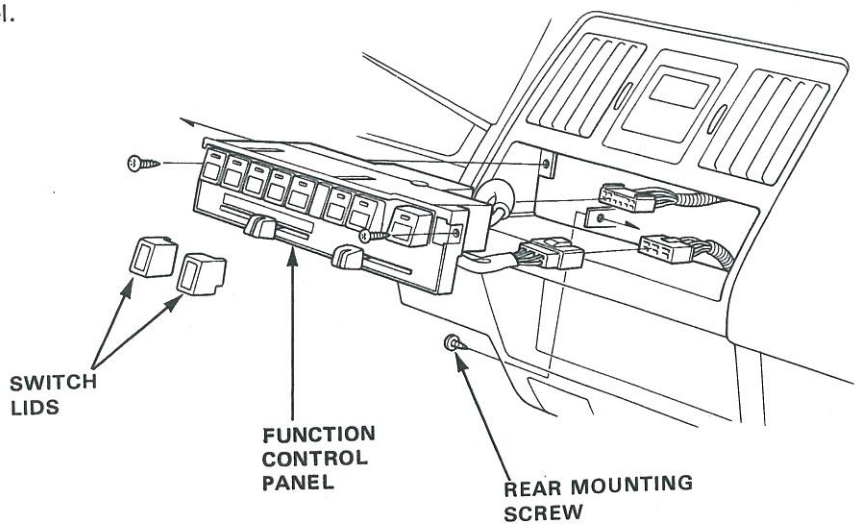
● Heater Valve Cable

1. Slide the temperature control lever to COLD.
2. Close the heater valve fully, then connect the end of the heater cable to the valve arm, and secure the cable housing with the clamp.

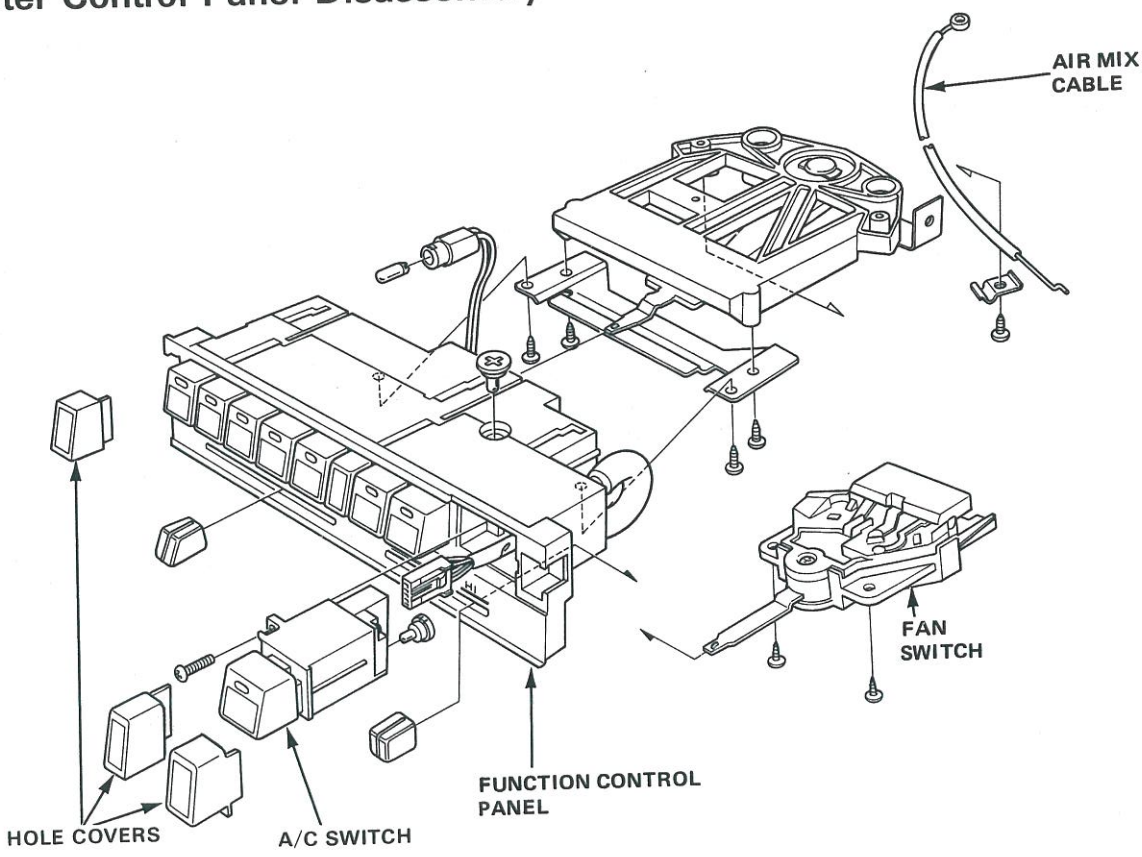


Function Control Panel Removal

1. Remove the glove box.
2. Remove the rear mounting screw (1) for the function control panel.
3. Remove the switch hole lids (2).
4. Remove the screws (2).
5. Disconnect the air mix cable.
6. Remove the function control panel.
7. Disconnect the connectors.



Heater Control Panel Disassembly



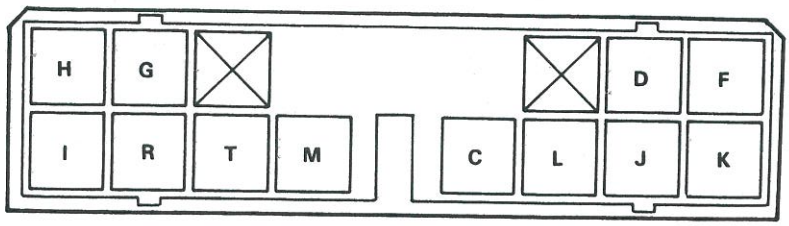
Function Control Panel Test

FRESH/REC Switch

Check for continuity between the terminals, as shown in the chart:

Position \ Terminal	L	C	M
REC	○	○	
FRESH		○	○

Control Panel Connector:



Function Switch

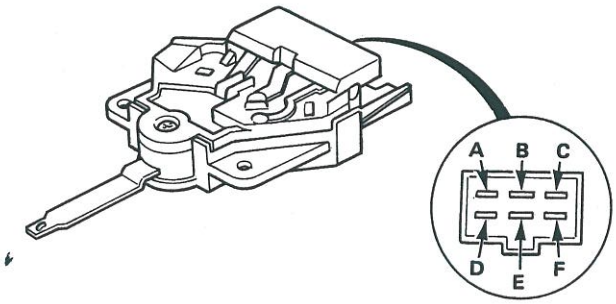
Check resistance between the terminals, as shown in the chart:

Position \ Terminal		Terminal F to M	Terminal F to M
VENT		Appox : 2.0 KΩ	Approx : 5.9 KΩ
HI-LO		Approx : 3.2 KΩ	Approx :5.9 KΩ
HEAT	DEF leak 0%	Approx :4.0 KΩ	Approx :5.9 KΩ
H/DEF		Approx :4.8 KΩ	Approx :5.9 KΩ
⛆		Approx :5.9 KΩ	Approx :5.9 KΩ

Fan Switch Test

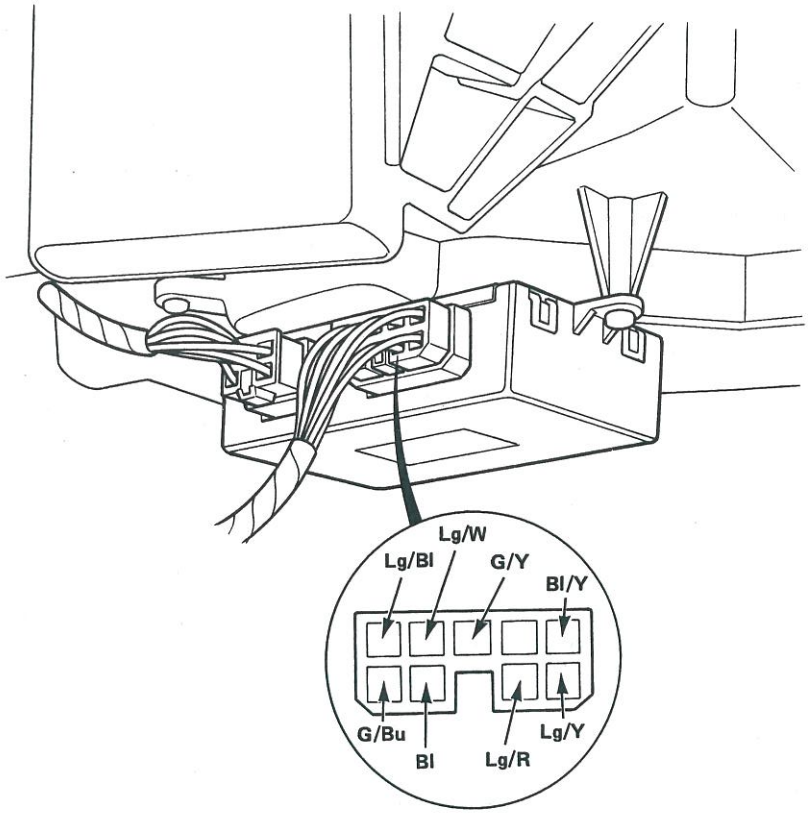
Check for continuity between the terminals as shown in the chart:

Position \ Terminal	A	B	C	D	E	F
OFF						
LO	○	○	○			
•	○	○		○		
●	○	○			○	
HI	○	○				○



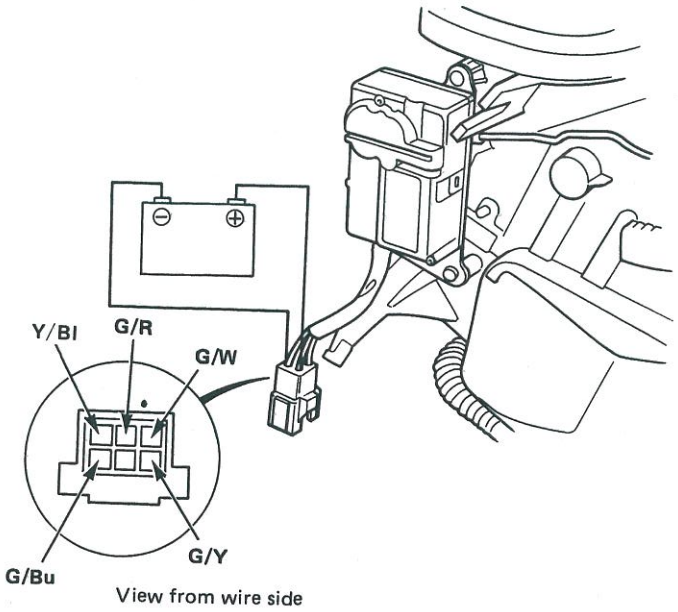
Function Control Amplifier Troubleshooting

Wire: test condition	Test: desired result	Actual: possible cause
Black/Yellow (B1/Y) Ignition switch ON.	Check voltage: should have 12 volts.	• If not, there is an open in Y/B1. • If there are 12 volts: proceed to Next step
Green/Blue (G/Bu). • Ignition switch ON. • Ground to the G/Bu wire.	Check REC motor: it should run.	• If not there is an open B/Bu or motor • If it runs: proceed to Next step
Light Green/Red (Lg/R) & Light Green/White (Lg/W): • Ignition Switch ON.	Check voltage: should have VENT : Approx 1.9V Hi-Lo : Approx 3.0V HEAT : Approx 3.8V H/DEF : Approx 4.5V DEF : Approx 5.6V	• If there is 0 volt: there is an open in Lg/R or Lg/W. • If all are OK: check the function control motor (page 21-15) or replace the heater control amplifier and retest.



Recirculation Control Motor Testing

1. Connect a battery positive lead to Y/Bl terminal of the recirculation control motor, and negative lead to the G/Bu terminal.
   The motor should run.
2. Connect ohm meter probes to the G/Y and G/R terminals.
   - The ohm meter should constantly cycle between indicating continuity and no continuity.
3. Then connect the ohm meter to terminals G/Y and G/W.
   - The ohm meter should continue to cycle back and forth but hesitate slightly longer when indicating continuity.



Function Control Motor Testing

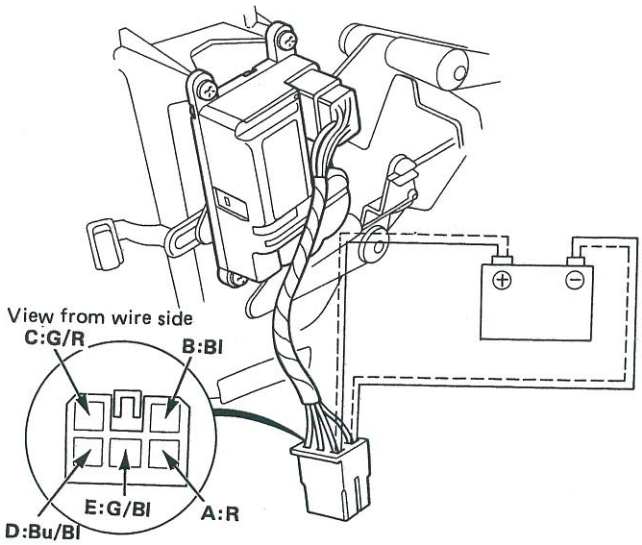
1. Measure the resistance between the Bu/Bl and G/Bl terminals.

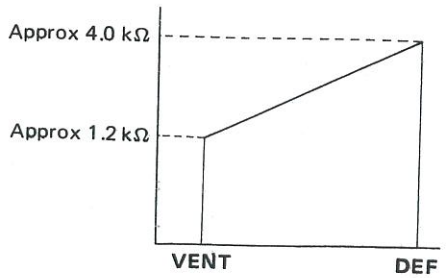
   Resistance: Approx 4KΩ

2. Check motor operation by connecting a wire from the battery positive terminal to the R terminal, and negative to the Bl terminal.
3. Reverse the wires to be sure the motor will run in both directions.

   CAUTION: Be sure to disconnect the battery from the motor as soon as the motor has started. Failure to do so will damage the motor.

4. Connect a battery to the motor terminals (positive to R and negative to Bl), and measure the resistance between the terminals G/R and Bu/Bl . The motor is nomal if the resistances agree with those shown in the table on the right.
   Also check the resistances with the battery polarity reversed.





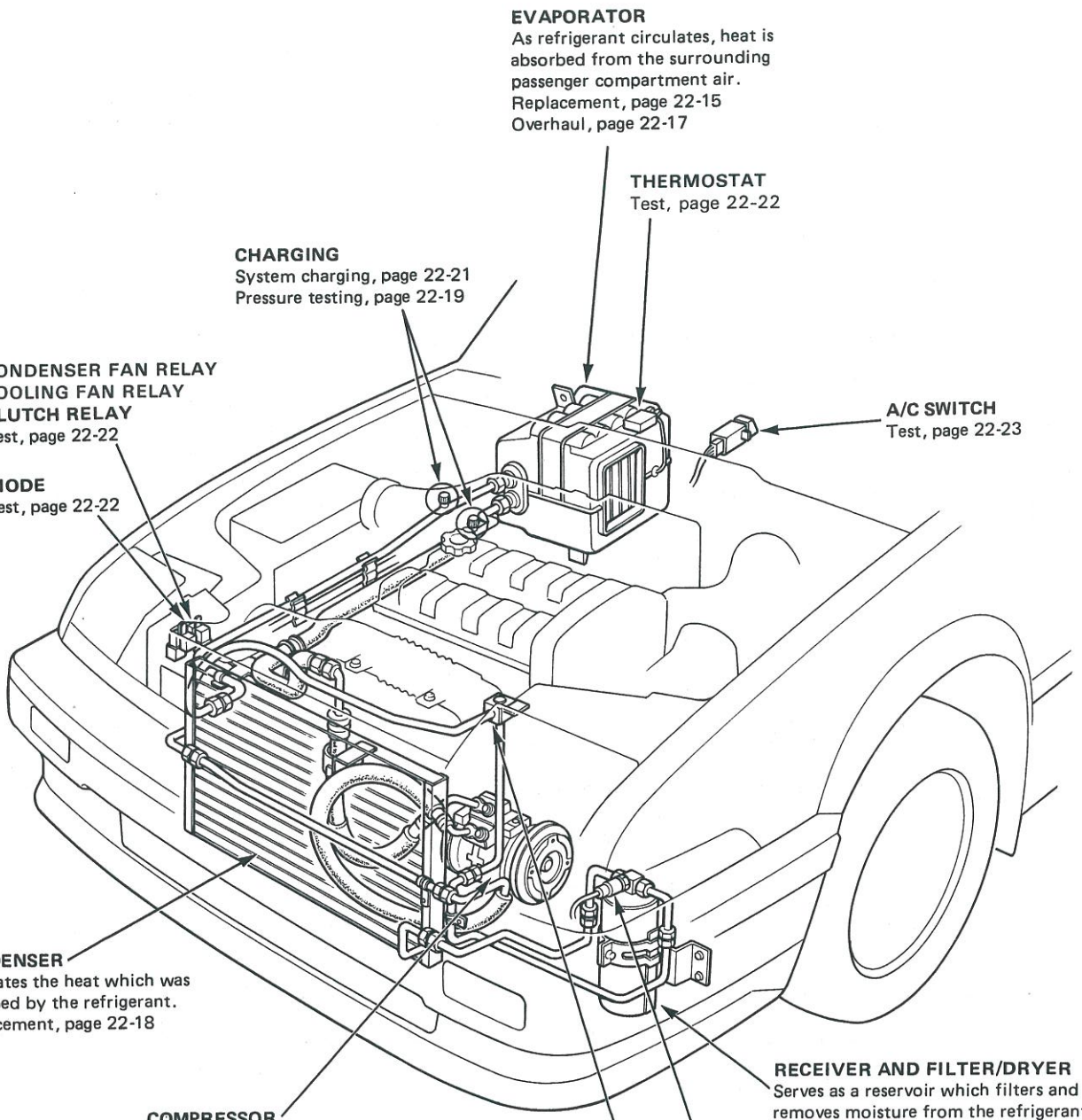
Air Conditioner

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Air Conditioner

Illustrated Index



EVAPORATOR
As refrigerant circulates, heat is absorbed from the surrounding passenger compartment air.
Replacement, page 22-15
Overhaul, page 22-17

THERMOSTAT
Test, page 22-22

CHARGING
System charging, page 22-21
Pressure testing, page 22-19

CONDENSER FAN RELAY
COOLING FAN RELAY
CLUTCH RELAY
Test, page 22-22

A/C SWITCH
Test, page 22-23

DIODE
Test, page 22-22

CONDENSER
Dissipates the heat which was absorbed by the refrigerant.
Replacement, page 22-18

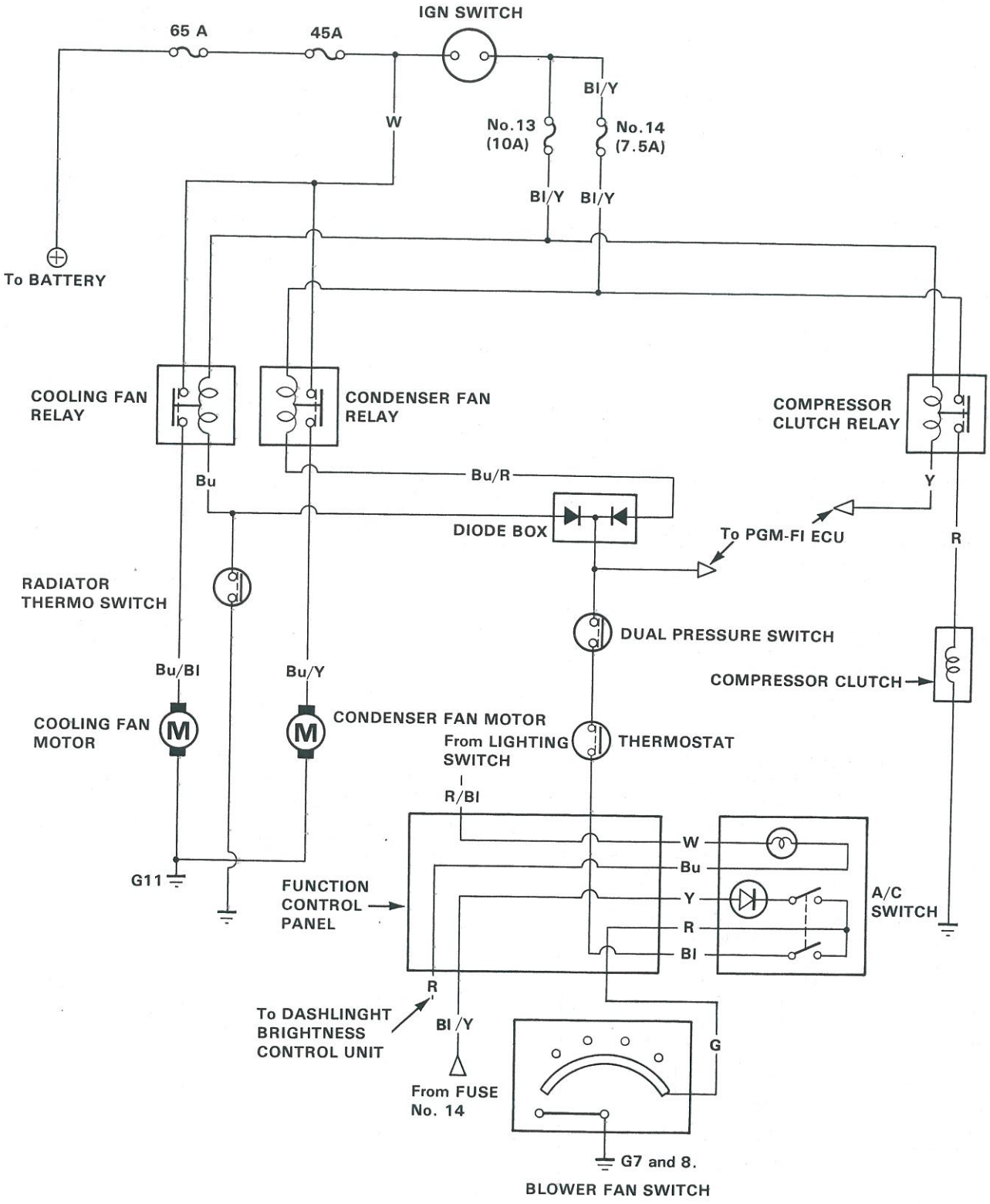
COMPRESSOR
Compresses the refrigerant and then forces it thru the condenser.
Compressor troubleshooting, page 22-8
Replacement, page 22-9

SIGHT GLASS

RECEIVER AND FILTER/DRYER
Serves as a reservoir which filters and removes moisture from the refrigerant.

DUAL PRESSURE SWITCH
Interrupts current to compressor clutch when low pressure drops below 206 kPa (30 psi) or high pressure exceeds 2648 kPa (384 psi), to prevent compressor damage.

Circuit Diagram

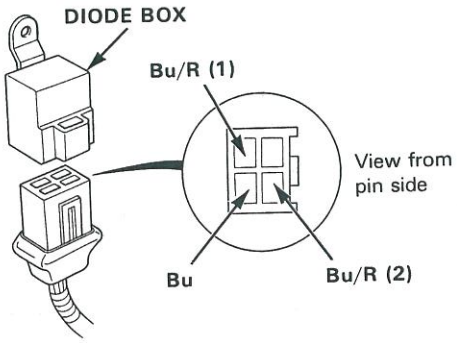


Electrical Troubleshooting

Fan Circuit Test:

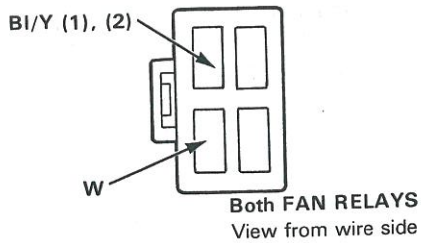
1. Check the 65 A and 45A fuses (engine), and the No. 13 and No.14 fuses (under-dash).

2. With the diode connected, use a jumper wire to connect the Bu/R (1) or Bu/R (2) terminal to ground. Turn the igntion switch ON, the compressor, the cooling fan motor and the condenser fan motor should start running.



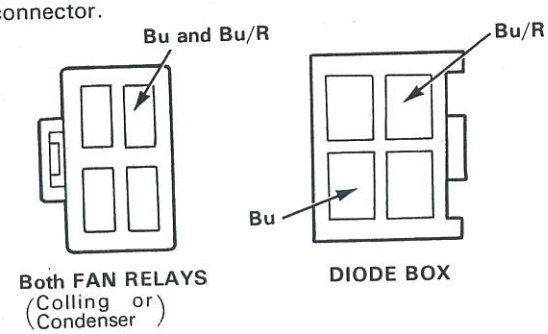
- If the fan motors run, go to step 6.
- If the compressor does not start, go to next page for the compressor circuit test.
- If either of fan motors does not run, check its relay. If the relay is OK, go to step 3.

3. Check for the voltage between the Bl/Y (1), Bl/Y (2) and W wires. Turn the ignition switch ON, there should be battery voltage.



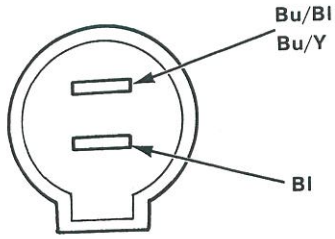
- If it is OK, go to step 4.
- If either of wires does not, there is an open in the wire between the relay and the fuse.

4. Check for continuity between the Bu wire of one relay and the Bu/R wire of the other relay to the diode box connector.



- If OK, go to step 5.
- If either of wires does not, there is an open in the wire between the relay and the diode box.

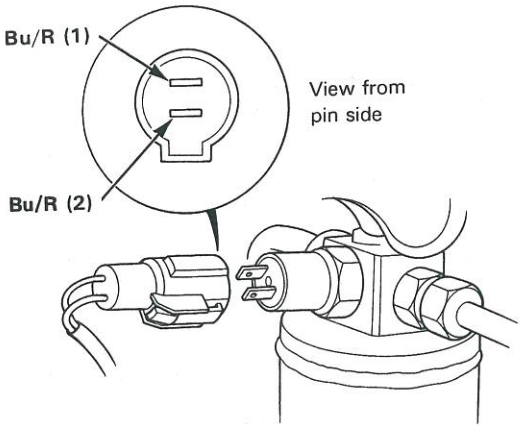
5. With the fan motors connected, attach a jumper wire between the Bu/Bl and Bl or Bu/Y and Bl wires. Each cooling fan motor should start.



View from pin side

- If either of fan motors does not run, replace it.
- If OK, there is an open in the Bu/Bl, Bl or Bu/Y wires between the relays and the fan motor connectors.

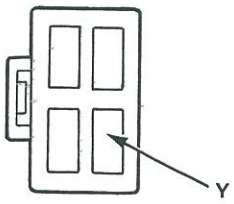
6. Disconnect the pressure switch connector, then connect the Bu/R (2) terminal to ground.
Turn the ignition switch ON, the compressor should start.



- If it does not start, there is an open in the Bu/R wire between the diode box and the pressure switch.

Compressor Circut Test:

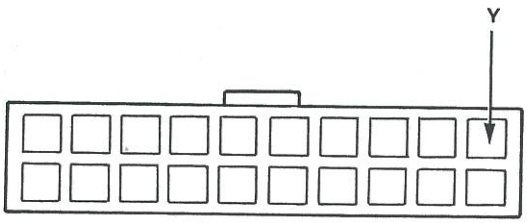
1. With the clutch relay connected, connect the Y terminal to ground with a jumper wire.
   Turn the ignition switch ON, the compressor clutch should start.



View from wire side

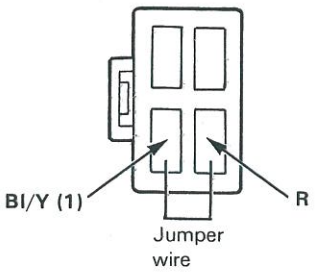
   If it starts, go to step 2.
   If not start, go to step 3.

2. Disconnect the PGM-FI ECU connector, then connect the Y terminal to ground. Turn the ignition switch ON, the compressor clutch should start.



   If the compressor clutch starts, go to step 4.
   If not, there is an open in the Y wire between the PGM-FI unit and the clutch relay.

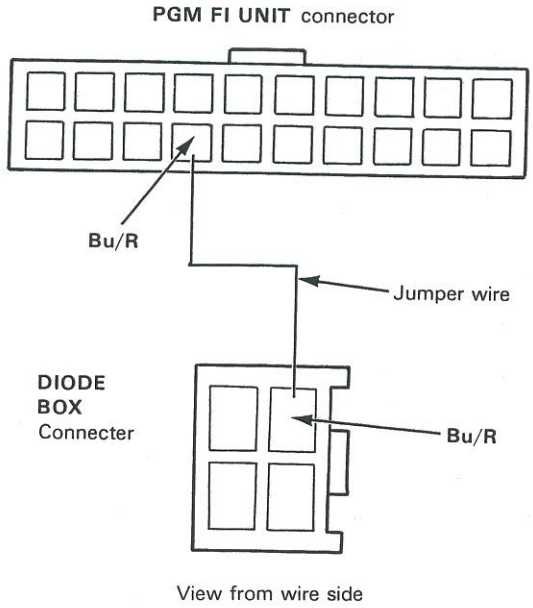
3. Connect the BI/Y (1) terminal to R terminal with a jumper wire at the clutch relay.
   Turn the ignition switch ON, the compressor clutch should start.



View from wire side

   If it does not start, check the compressor (page 22-8), or there is an open in the BI/Y or R wire.
   If the compressor starts, check the clutch relay (22-22).

4. Check for continuity between the Bu/R terminal of the diode box and Bu/R terminal of the PGM-FI ECU.



View from wire side

   If there is continuty, the PGM-FI unit is faulty.
   If not, there is an open in the Bu/R wire between the diode box and the PGM-FI unit connector.

Air Conditioner

Performance Test

NOTE: The graph (Inspection data) below shows humidity between 20% and 80%, divided into intervals of 10%.

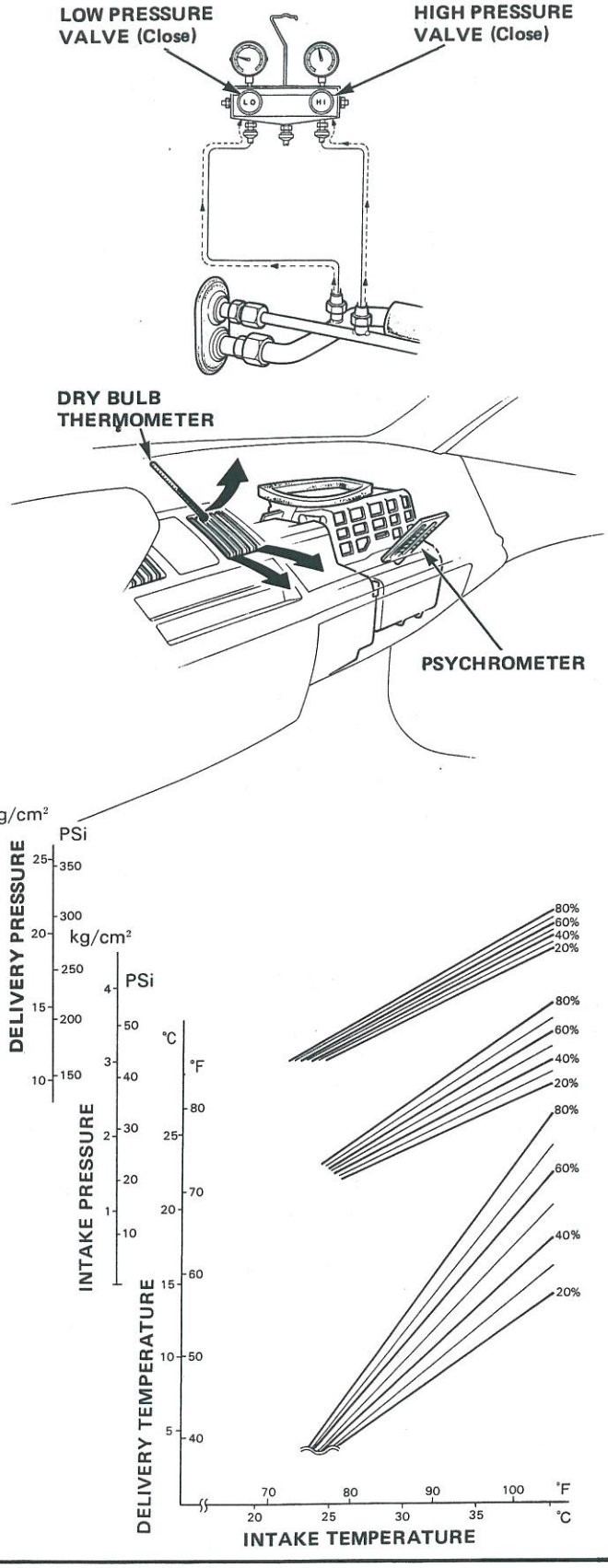
Tolerance is ± 10% when taking a reading.
This means that if humidity is 40%, 30–50% is the tolerance range.

1. Connect gauges as shown.
2. Insert a dry bulb thermometer in the cold air outlet, and place the psychrometer (dry and wet bulb termometer) close to the inlet of blower. Do not spill wet bulb water.
3. Test conditions:
   - Avoid direct sunlight.
   - Open engine hood.
   - Open front doors and windows.
   - Set the temperature control lever to COLD. Push the VENT and Recirculation buttons.
   - Turn the fan switch to HI.
   - Run the engine at 1,500 rpm.
   - No driver and passengers in car.
4. After running the system for about 10 minutes under the above conditions, read the thermometer and pressure valve.
5. The performance of the system is satisfactory if the measurements are within the range bands shown on the Performance Chart.

Examples

Measurements:
Intake temperature (Dry bulb): 86°F (30°C) 60% humidity
Delivery temperature: 51.8°F (11°C)
Delivery pressure: 1500 kPa (213 lbs/in²)
Intake pressure: 220 kPa (31 lbs/in²)

Proper intake/delivery pressure, and temperature ranges are shown on the chart at right.
Find your intake temperature across the bottom, and the relative intake and delivery pressures up the side: Lines down at right angles to your measurements should cross within the range bands on the graph.



Service Tips

CAUTION:

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, don't let refrigerant escape too fast; it will draw the compressor oil out of the system.
6. Add refrigerant oil after replacing the following parts:
   - Condenser . . . . . 10 cc (1/3 fl oz)
   - Evaporator . . . . . 30 cc (1 fl oz)
   - Line or hose . . . . . 10 cc (1/3 fl oz)
   - Receiver . . . . . 10 cc (1/3 fl oz)
   - Compressor . . . . . When a new compressor is installed, drain 30 cc (1 fl oz) of refrigerant oil from the suction fitting on the compressor, unless you are also replacing any of the above parts.
     Then pro-rate the amount you drain by the amount you should add for the other part(s).
7. Tighten nuts to the following torque:

Line hose or bolt dia. in (mm)		Torque N·m (lb-ft)	Application
	5/8 (15.88)	32 (23)	· Suction pipe (Cooling unit side) · Suction pipe · Suction hose
Line or hose	1/2 (12.70)	22 (16)	· Discharge pipe (Condenser side) · Discharge pipe · Discharge hose
	3/8 (9.53)	17 (12)	· Receiver pipe · Receiver pipe joint
Bolt	8 x 35	30 (22)	· Suction hose (Compressor side)
	8 x 35	30 (22)	· Discharge hose (Compressor side)

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).
- Do not handle or discharge refrigerant in an enclosed area near an open flame: it may ignite and produce a poisonous gas.

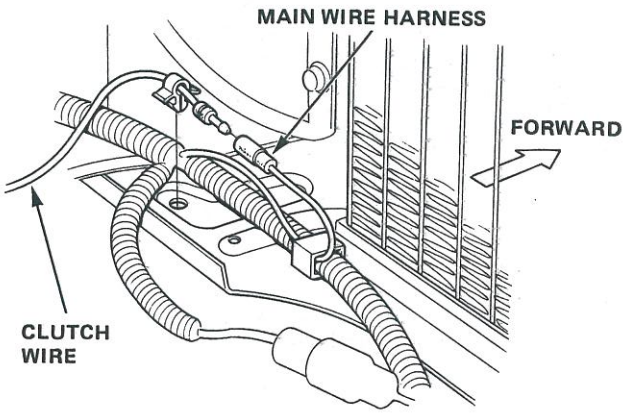
Air Conditioner

Troubleshooting

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 22-20 Recharging : page 22-21
	No bubbles in sight glass when condenser is cooled by water	Excessive refrigerant in system	Discharge refrigerant as required
	Reduced air flow through condenser fan	· Clogged condenser or radiator fins · Condenser fan not working properly	· Clean · Check voltage and fan rpm
	Line to condenser is excessively hot	Restricted flow of refrigerant in system	Repair
Discharge pressure abnormally low	Excessive bubbles in sight glass ; condenser is not hot	Insufficient refrigerant	Charge system
	High and low pressures are balanced soon after stopping compressor	· Faulty compressor discharge or inlet valve. · Faulty compressor seal	Replace compressor Replace seal
	Outlet of expansion valve is not frosted, low pressure gauge indicates vacuum	· Leaking thermostat · Frozen expansion valve · Faulty expansion valve	Repair or replace
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.	· Leaking thermostat · Frozen expansion valve · Faulty expansion valve	Replace expansion valve
	Discharge temperature is low and the air flow is low or none at all.	Frozen evaporator	Run fan with A/C off. Then check thermostat and capillary tube.
	Expansion valve frosted	Clogged expansion valve	Clean or replace
	Low pressure hose is cold near compressor.	Collapsed or restricted low pressure hose	Clean, repair or replace
Suction pressure abnormally high	Low pressure hose and check joint are cooler than around evaporator	· Expansion valve open too long · Loose thermostat (poor contact)	Repair or replace
	Suction pressure is lowered when condenser is cooled by water (High pressure side also heated)	Excessive refrigerant in system	Discharge refrigerant as necessary
	High and low pressures are balanced too early when compressor is stopped	· Faulty gasket · Faulty high pressure valve · Foreign particle stuck in high pressure valve	Repair or replace.
Suction and discharge pressures abnormally high	Reduced air flow through condenser	· Clogged condenser fins · Condenser fan not working properly	· Clean condenser · Check voltage and fan rpm.
	No bubbles in sight glass when condenser is cooled by water	Excessive refrigerant in system	Discharge refrigerant as necessary.
Suction and discharge pressures abnormally low	Low pressure hose and metal ends area 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 hose	Repair or replace
Refrigerant leaks	Refrigerant evaporates too soon ; receiver-dryer is dirty	Compressor shaft seal leaking	Replace shaft seal
	Compressor bolt (s) are dirty	Bolt (s) leaking	Replace compressor
	Compressor gasket is wet with oil	Gasket leaking	Replace compressor

Compressor Replacement

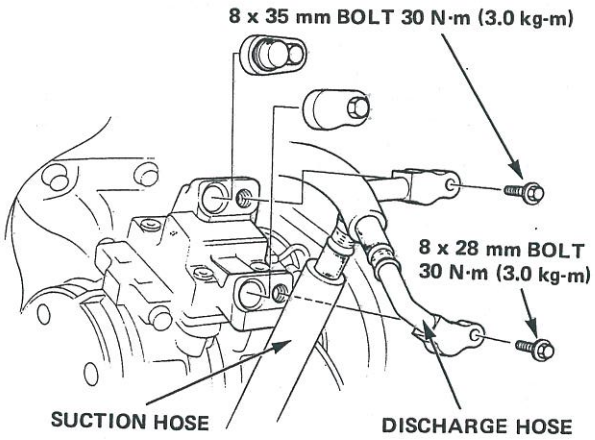
1. If the compressor works at all, run the engine at idle speed and turn on the air conditioner for a few minutes.
2. Shut the engine off and disconnect the battery negative terminal.
3. Remove the intake air duct bolt (2), and duct.
4. Remove the front under cover (section 5).
5. Discharge the refrigerant from the system (page 22-19).
6. Disconnect the compressor clutch wire and remove the connector from the holder.



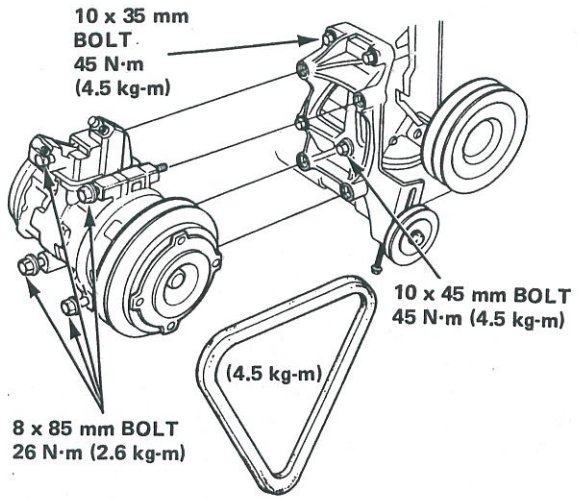
7. Disconnect the suction and discharge hoses from the compressor.

CAUTION: Cap the open fittings immediately to keep moisture and dirt out of the system.

8. Remove the suction hose clamps.
9. Remove the discharge hose holder.



10. Loosen the compressor mounting bolts (3).
11. Loosen the compressor belt adjusting bolt, nut and remove the compressor belt.
12. Remove the compressor mounting bolts (3) and the compressor.

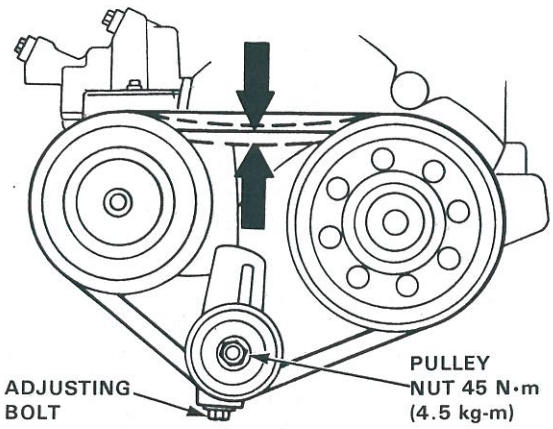


13. Remove the mount bolts (4) and the compressor bracket if necessary.

CAUTION: If the system was contaminated it should be thoroughly flushed, using a commercially available Kit and R-11 solvent, before installing a new compressor.

Install the compressor in reverse order of removal and:

- If a new compressor is installed, drain 30 cc (1 fl oz) of refrigerant oil through the suction fitting on the compressor.
- Adjust the belt.
  BELT TENSION: 7-9 mm (9/32–23/64 in) defrection when 98N (10 Kg, 22 lb) force is applied between the pulleys.

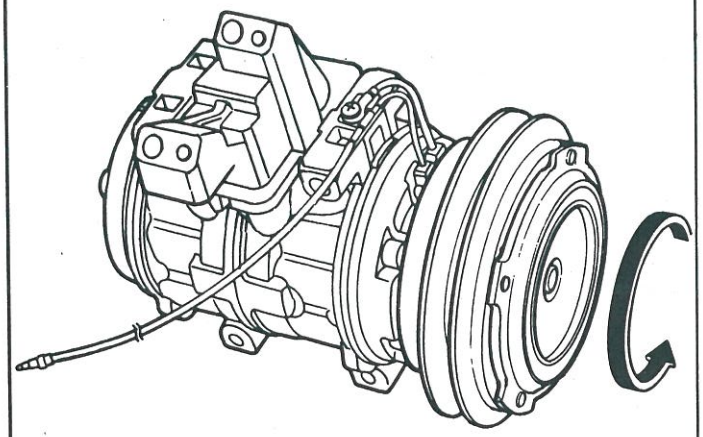


- Charge the radiator coolant (section 10).
- Charge the system (page 22-21).
- Test the performance (page 22-6).

CAUTION: Do not loosen the cylinder cover bolts on the compressor.

Clutch Inspection

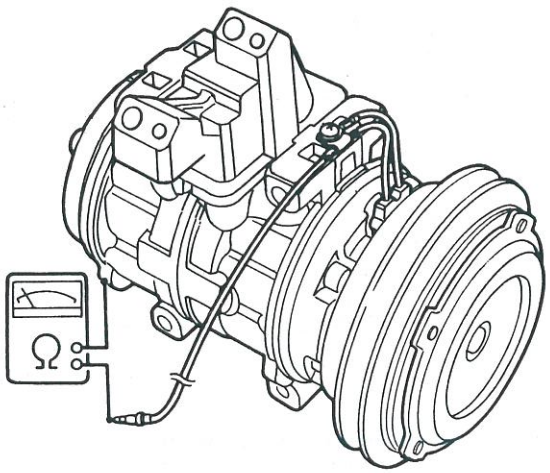
- Check pulley bearing play and drag by rotating the pulley by hand. Replace the pulley with a new one if it is noisy or has excessive play and drag.



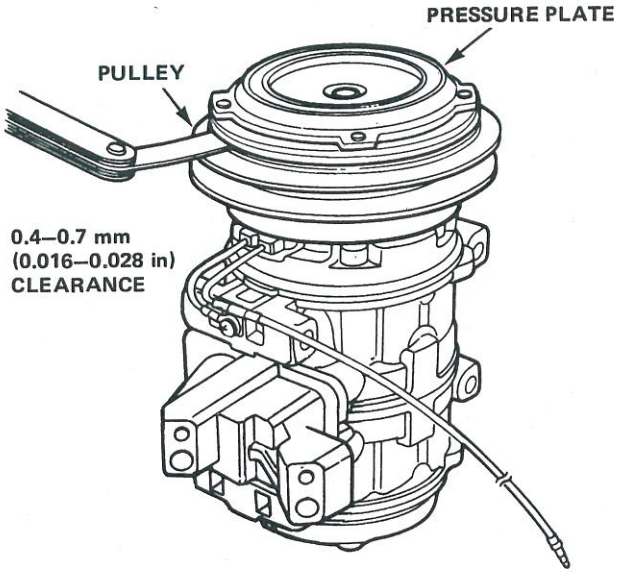
- Check resistance of the stator coil:

Stator Coil Resistance: 3.75 ± 0.2 ohm at 20°C (68°F)

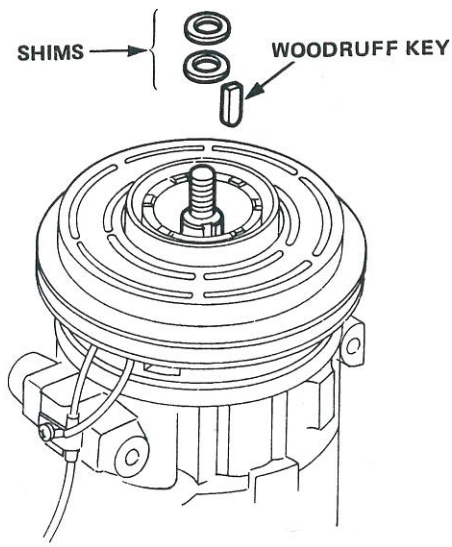
If resistance is not within specifications replace the coil.



- Tighten the hub Nut to 15–17.5 N·m (1.5–1.75 kg-m, 11–12.7 lb-ft) and measure the clearance between the pulley and pressure plate all the way around, if the clearance is not within specified limits, the pressure plate must be removed and shims added or removed as required.

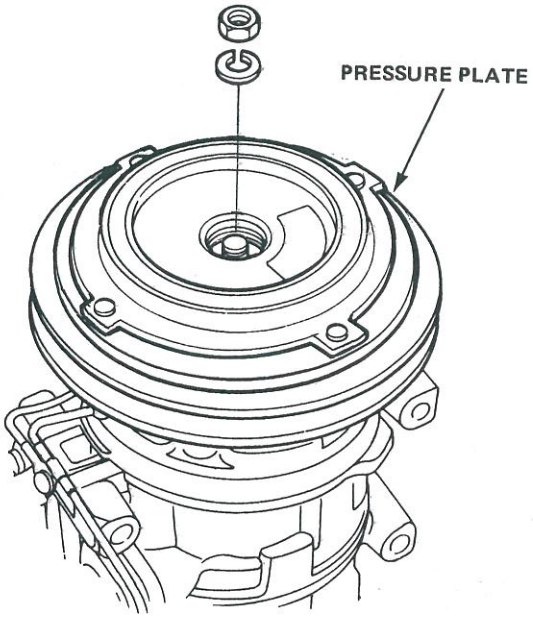


NOTE: The shims are available in six sizes: 0.1 mm~ 0.2 mm thick. 0.1 mm shim is used for minor adjustment.

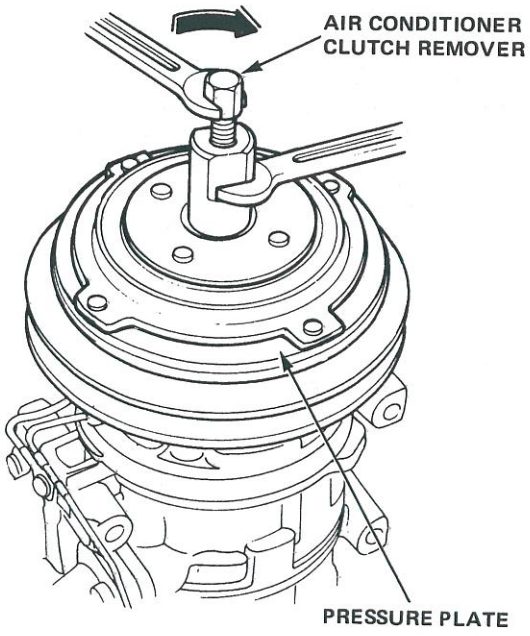


Clutch Overhaul

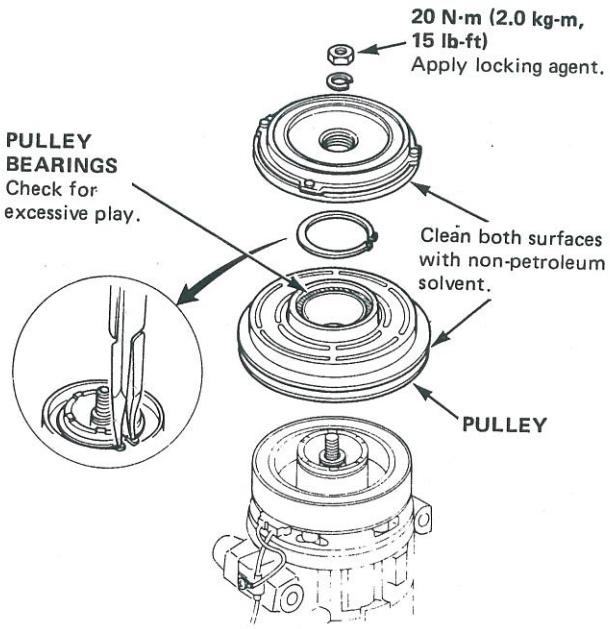
1. Remove the nut while holding the pressure plate.



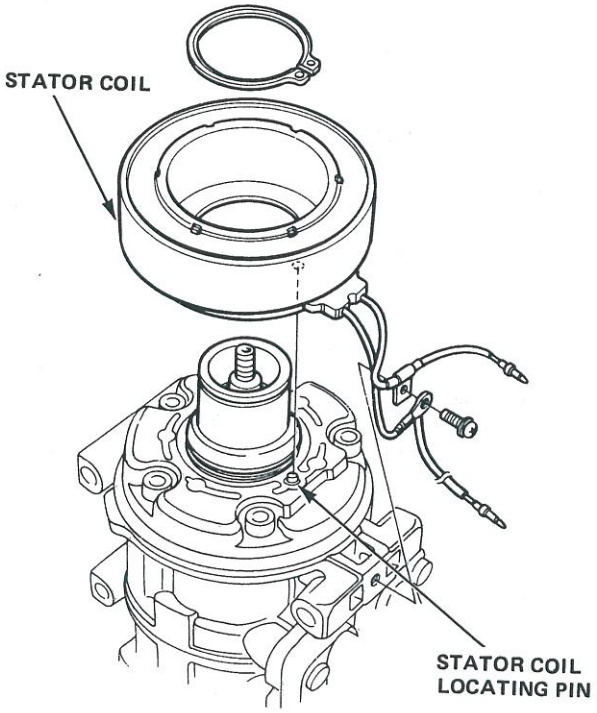
2. Thread the air conditioner clutch remover tool into the pressure plate and remove the pressure plate by screwing in the center bolt.



3. Use circlip pliers to take the circlip off and remove the pulley from the shaft with a 2 or 3 jaw puller.



4. Remove the stator coil by removing the large circlip.



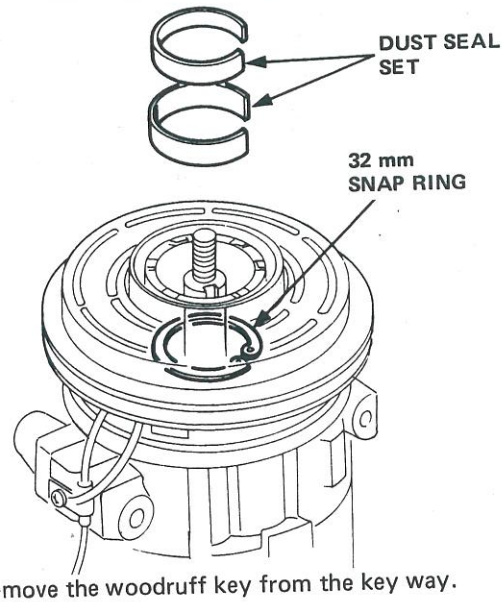
Shaft Seal Removal

NOTE: Make sure the suction and discharge joints are plugged with caps.

1. Remove the pressure plate (page 22-11).

NOTE: Removal of the clutch pulley and coil is not necessary.

2. Remove the dust seal set.
Remove the 32 mm snap ring.

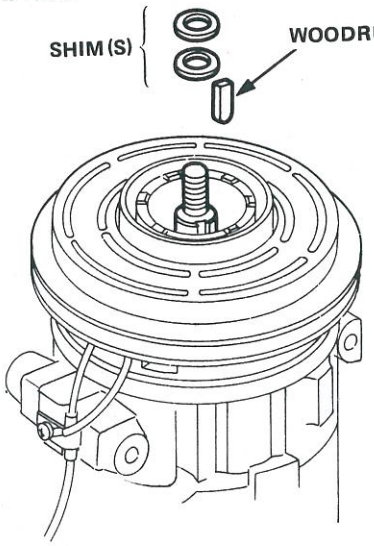


3. Remove the woodruff key from the key way.

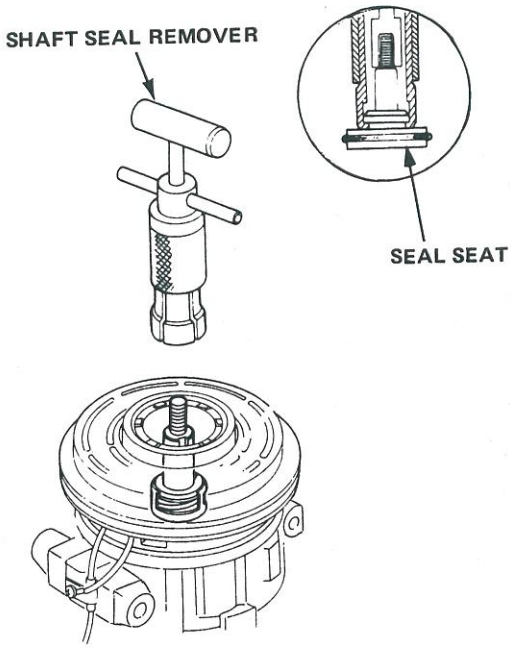
NOTE: If the woodruff key is to be reused, be careful not to damage it.

4. Remove the shim(s).

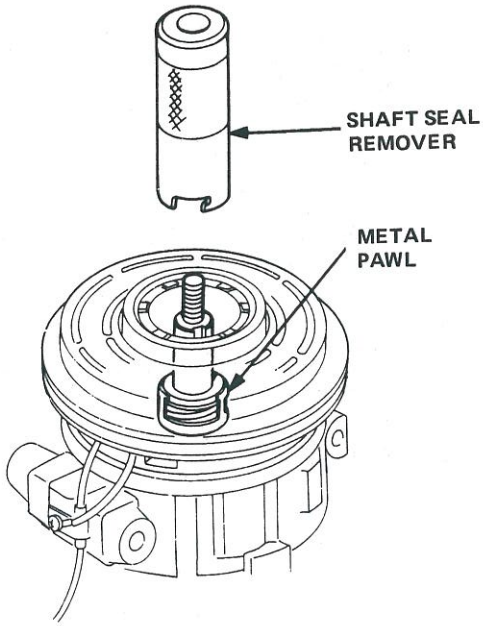
NOTE: After removing, store shim(s) safely in a parts rack.



5. Seat the seal plate into the groove of the shaft seal remover.
6. Pull out the seal seat.



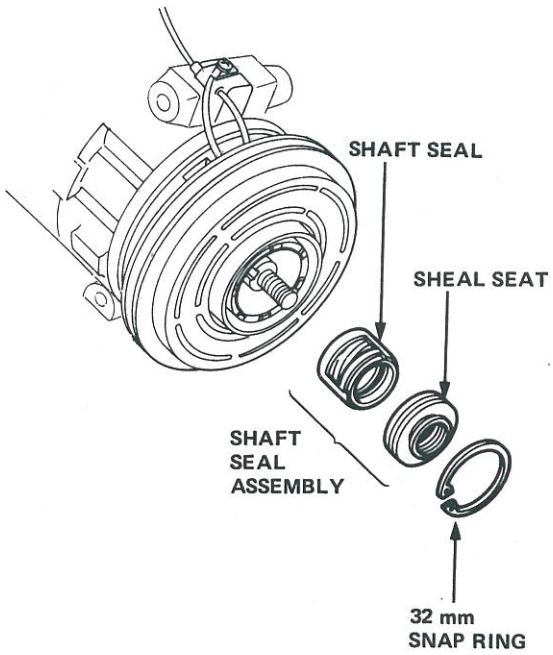
7. Insert the shaft seal remover into the compressor aligning the cutout of the remover with the metal pawl of the seal case.
8. Rotate the shaft seal remover clockwise or counterclockwise to make sure that the cutout is engaged with the metal pawl.



9. Press the remover until it bottoms, then turn it counterclockwise as far as it will go.
10. Withdraw the remover.
11. Lay down the compressor and clean the shaft seal contacting face of the compressor with cleaning solvent.

CAUTION:

- **Keep the cleaning solvent and dirt out of the compressor.**
- **Use only a lint free cloth for cleaning.**
- **Do not spill the refrigerant oil from the compressor. Refill the same amount if the oil is spilled out.**



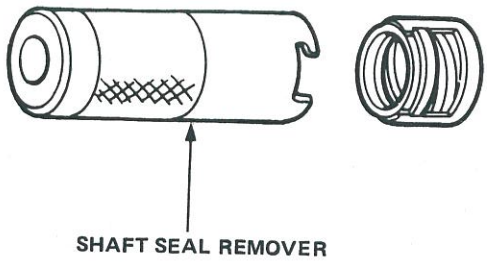
Shaft Seal Installation

1. Clean the new shaft seal thoroughly with cleaning solvent.

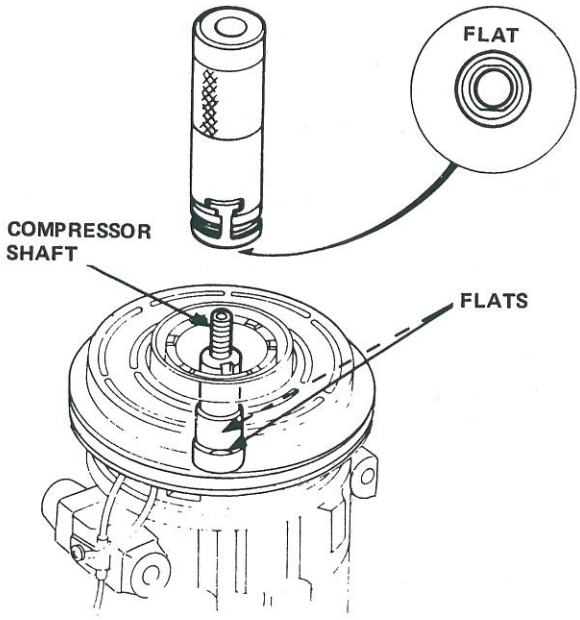
   NOTE: Install the shaft seal assembly after the cleaning solvent is dried out.

2. Lubricate the shaft seal with refrigerant oil (SUNISO 5GS or equivalent) and install it on the shaft seal remover.

   NOTE:
   - Use only clean refrigerant oil.
   - Do not touch the sealing surfaces of the shaft seal after lubricating.



3. Liberally lubricate the compressor shaft with refrigerant oil.
4. Install the shaft seal onto the compressor shaft aligning the seal case flats with the shaft flats.



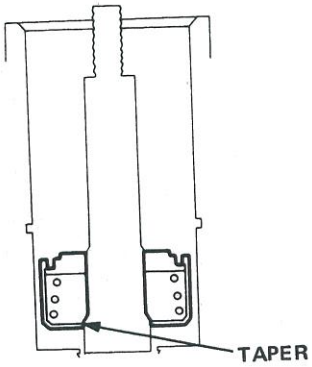
(cont'd)

Shaft Seal Installation (cont'd)

5. Press the remover until it bottoms, then turn it counterclockwise as far as it will go.

   NOTE: The remover will go lower when the flats are aligned.

6. Turn the remover clockwise, then pull it out.
7. Slide the shaft seal onto the shaft until it seats on the shaft taper as shown.

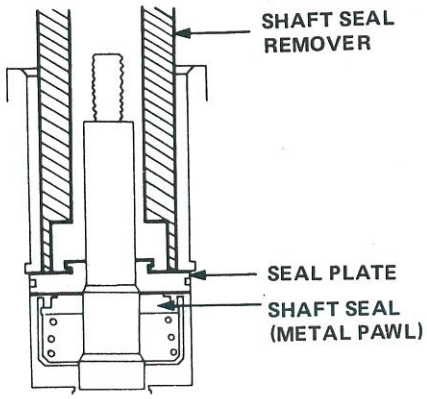


8. Check the inside diameter of the compressor for score marks or foreign particles.
9. Clean the seal seat with cleaning solvent, then lubricate the seal seat with refrigerant oil (SUNISO 5GS or equivalent).

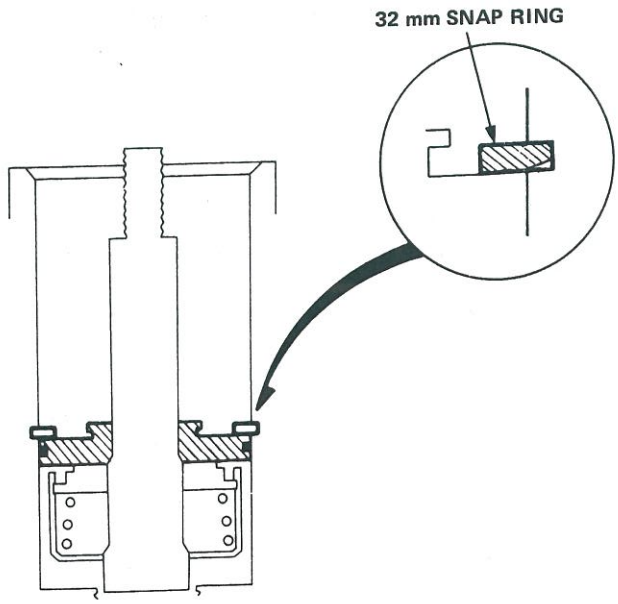
   NOTE:
   - Use only clean refrigerant oil.
   - Do not touch the sealing surface of the seal plate after lubrication.

10. First slide the seal plate into the compressor by hand as far as possible.
11. Press the seal plate with the grip side of the remover.

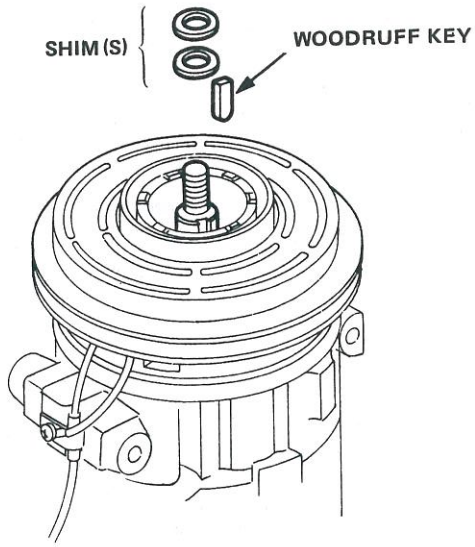
    CAUTION: Be careful not to damage the compressor.



12. Install the 32 mm snap ring with its chamfered edge inside.
13. Press the snap ring with the grip side of the remover.



14. Install the shim (s) and woodruff key.



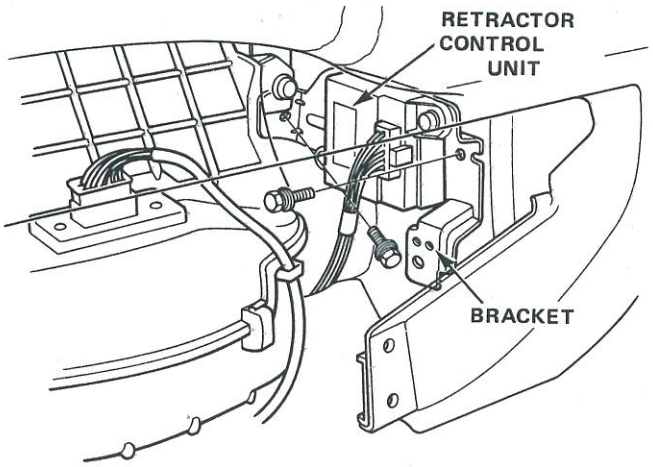
15. Install the pressure plate. Measure the clearance between the pulley and pressure plate all the way around. If the clearance is not within the specified limits, [0.4–0.7 mm (0.016–0.028 in.)] shims must be added or removed as required.
16. Evacuate and charge the compressor and then perform a leak test.

Evaporator Replacement

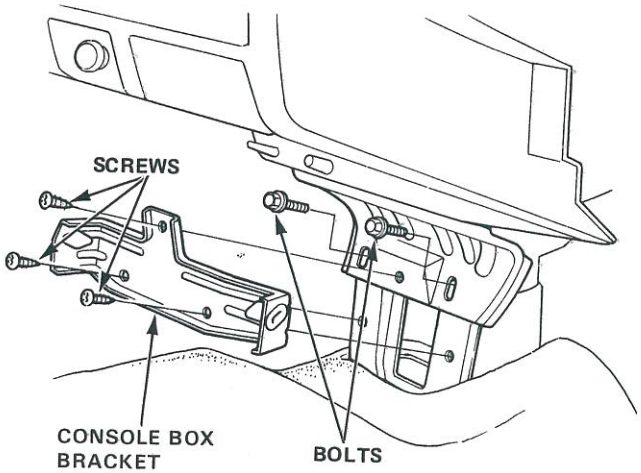
1. Disconnect the battery negative terminal.
2. Discharge the refrigerant (page 22-19).
3. Disconnect the receiver line and suction hose from the evaporator.

   CAUTION: Cap the open fittings immediately to keep moisture and dirt out of the system.

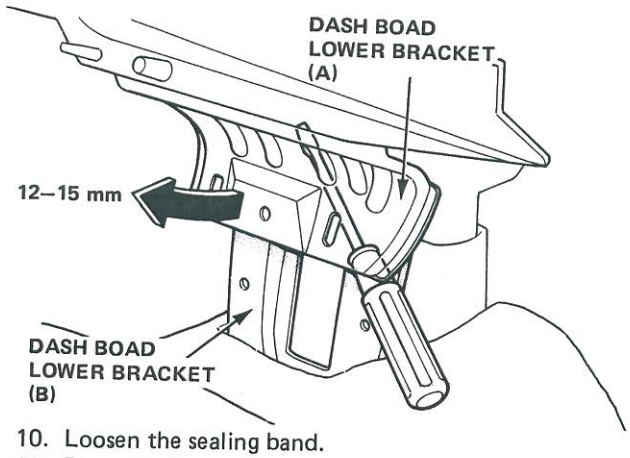
4. Remove the screws (2) and the glove box.
5. Remove the screws (3), the bolt and the glove box frame.
6. Remove the bolts (2) and the headlight retractor control unit with the bracket.



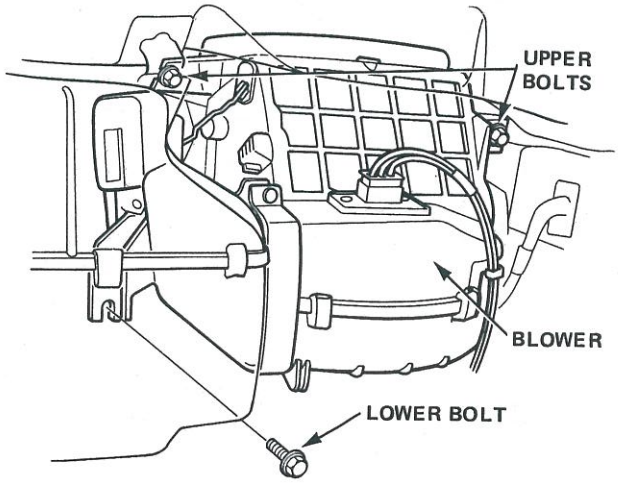
7. Remove the console box (section 20).
8. Remove the bolts (2), screws (3) and console box bracket.



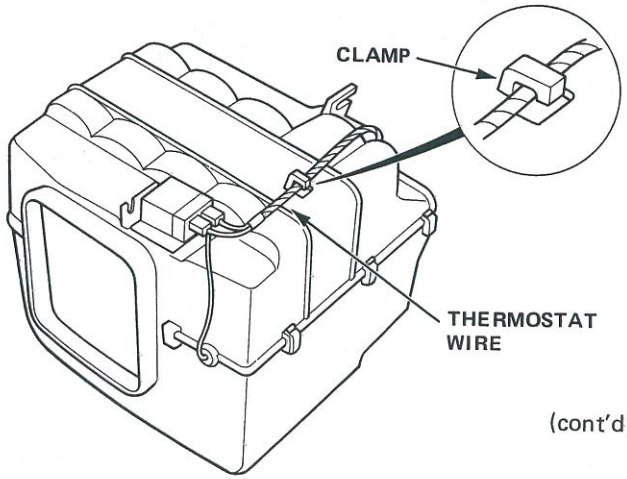
9. Unbolt dashboard lower bracket (A) from bracket (B) and insert a screwdriver to pry a 12—15 mm clearance, to ease evaporator removal.



10. Loosen the sealing band.
11. Remove the lower bolt (1) and loosen the upper bolts (2) for the blower.



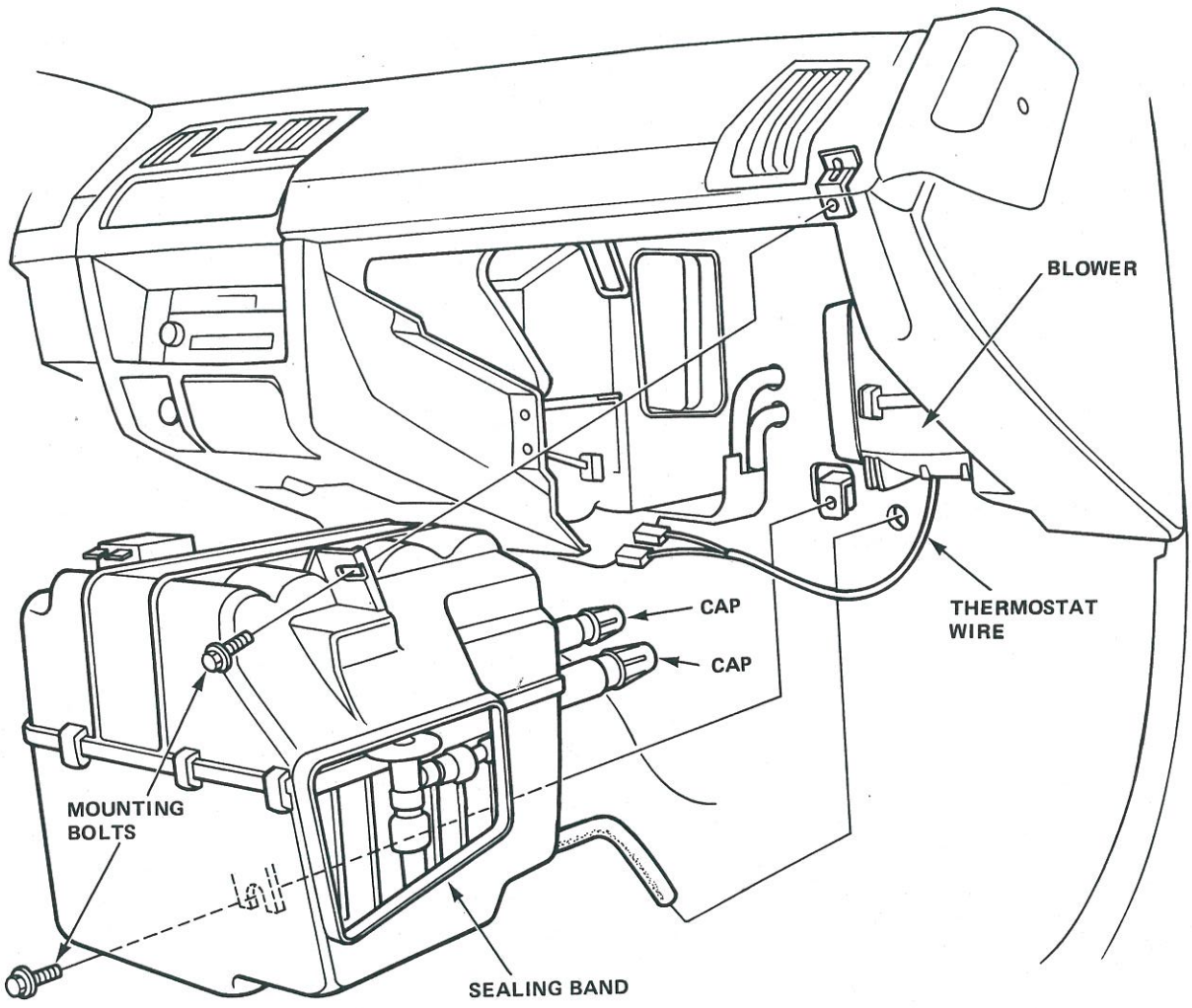
12. Slide the blower motor to the right as far as possible.
13. Disconnect the drain hose from the evaporator lower housing.
14. Remove the bolts (2) and the evaporator.
15. Disconnect the thermostat wire, and pull the wire out of the clamp at the top of the evaporator.



(cont'd)

Eraporator Replacement (cont'd.)

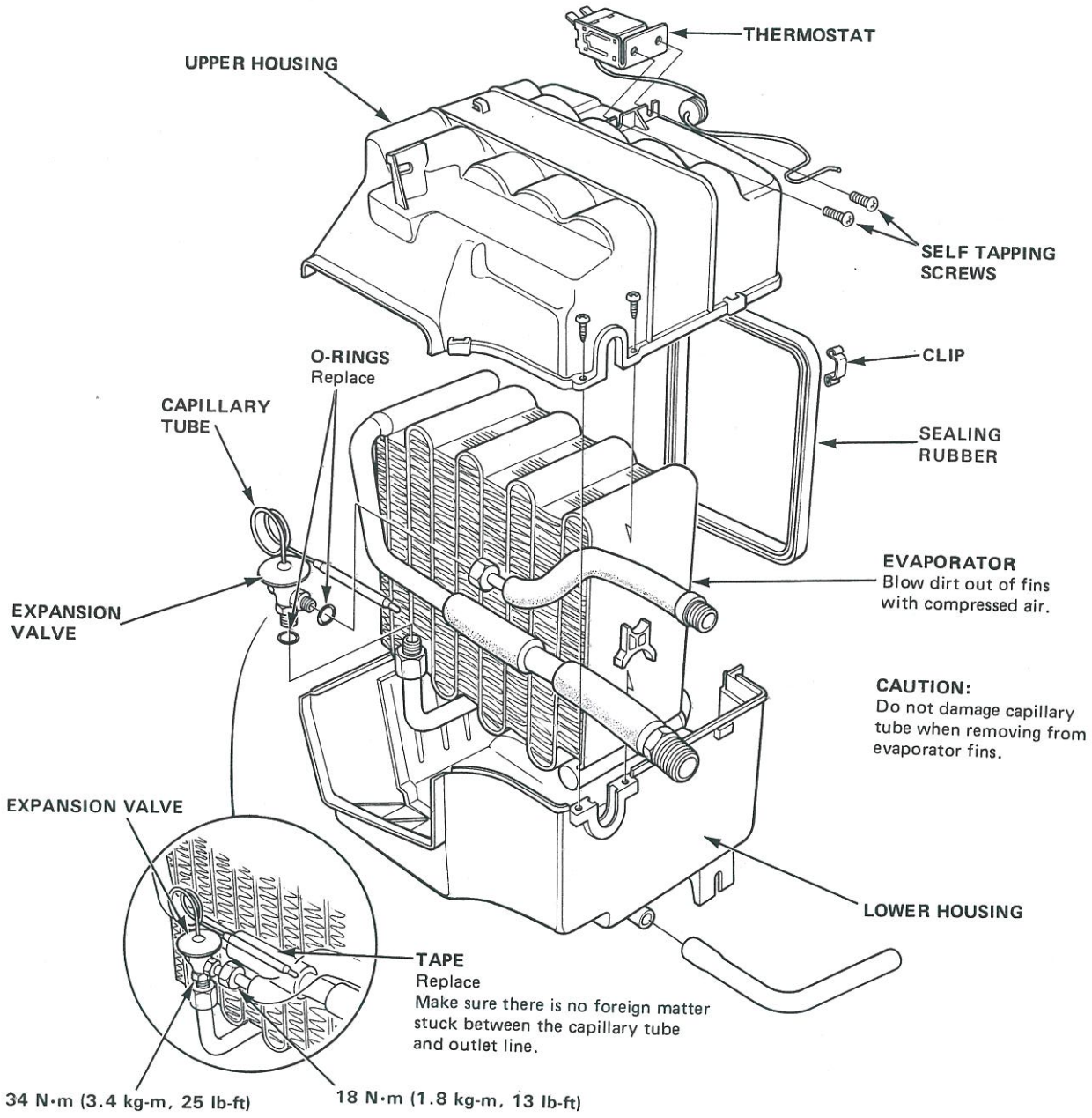
16. Install the evaporator in the reverse order of removal.
17. Charge the system (page 22-21).
    Test performance (page 22-6).



Evaporator Overhaul

1. Remove the self-tapping screws and clip from the housing.
2. Carefully separate the housings as required to obtain access to the capillary tube.
3. Pull out the capillary tube of the thermostat from the evaporator fins.
4. Separate the housings and remove the evaporator cover.
5. Remove the expansion valve if necessary.

Assemble the evaporator in the reverse order of disassembly, and;
Install the expansion cover capillary tube against the suction line, and wrap it with tape.
Reinstall the thermostat capillary tube in its original location.
Reassemble the upper and lower housings with clips, make sure there are no gaps between them.

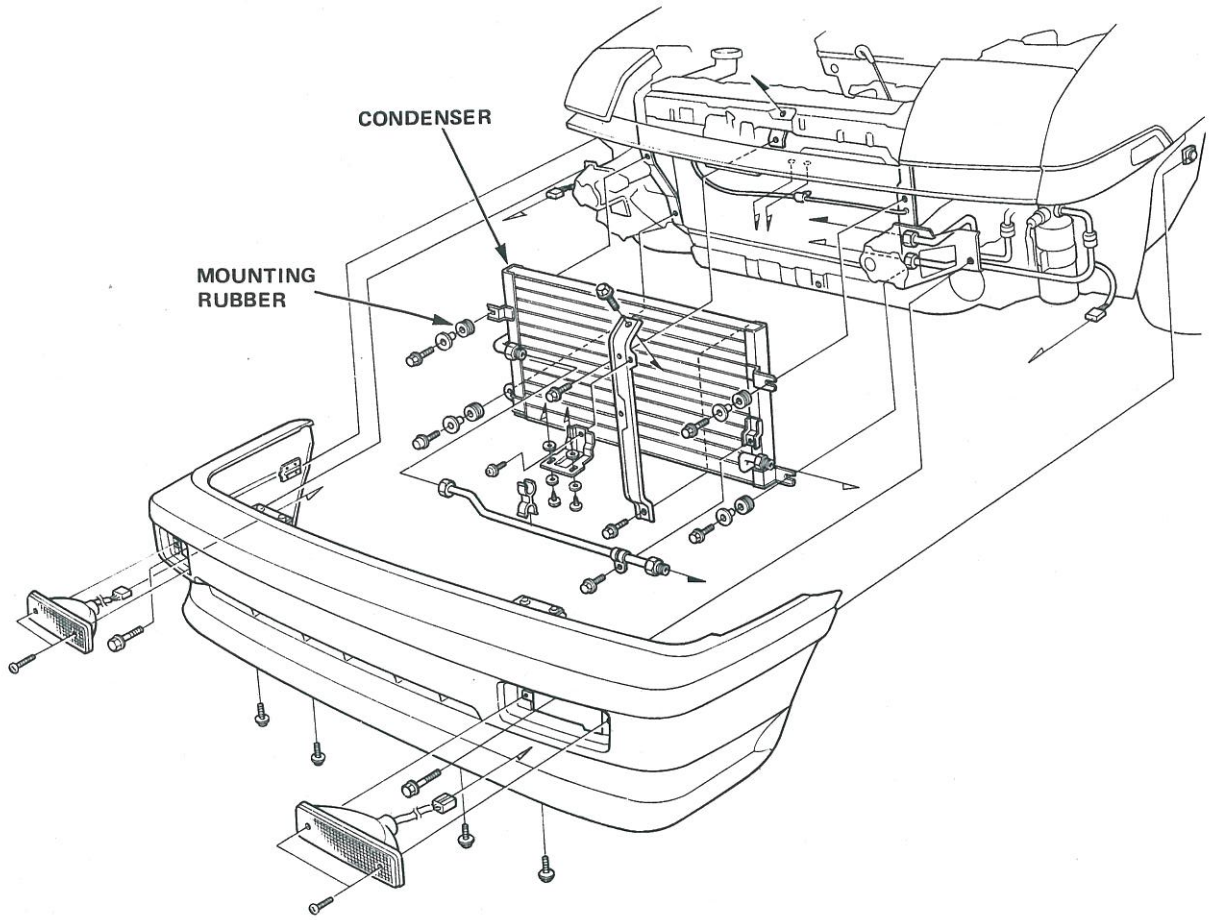


Condenser Replacement

1. Disconnect the battery negative terminal.
2. Remove the front bumper.
3. Remove the bolts (3) and the bulkhead bracket.
4. Discharge the refrigerant (page 22-19).
5. Disconnect the condenser pipe.
6. Remove the bolts (3) and the bulkhead stay.
7. Remove the open wire clip for the stay and condenser pipe clamp.
8. Disconnect the condenser line and discharge hose from the condenser.

   CAUTION: Cap the open fittings immediately to keep moisture and dirt out of system.

9. Remove the condenser mount bolts, then lift the condenser up from the car.



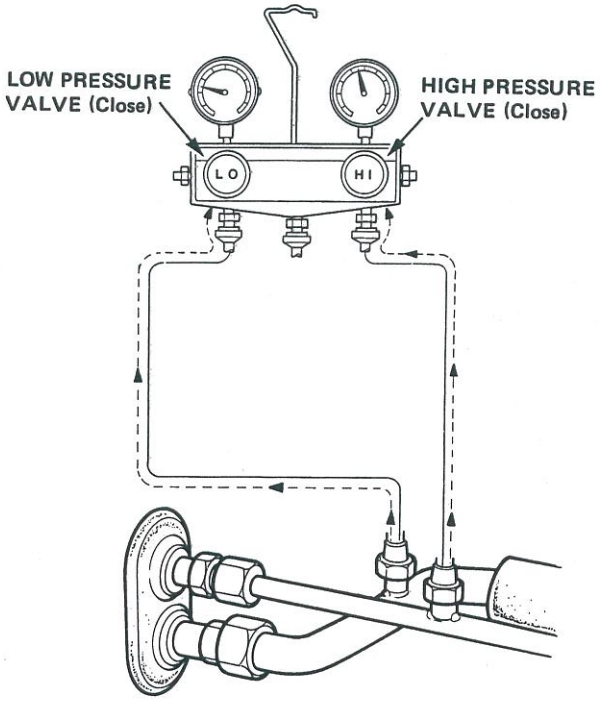
Pressure Test

1. Connect the gauges as shown.
2. Close both high and low pressure valves.
3. Test with the hood up, doors and windows open, temperature lever on COLD, function button on VENT and fan at high speed.
4. Leave the air conditioner on about 10 min. The sight glass should be free of bubbles.

   NOTE: Run the engine at 1,500 rpm.

5. The high pressure reading should be about 1,400 kPa (200 psi).

   NOTE:
   - Refer to the chart on page 22-6 for effects of ambient temperature on pressure reading.
   - If the readings are not correct, refer to the toubleshooting chart on page 22-8.



Discharge Procedure

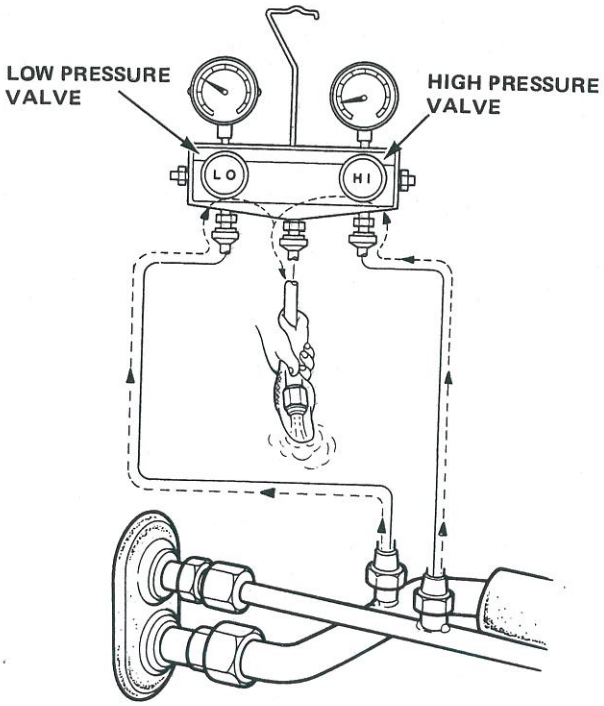
WARNING

- **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 the gauges as shown.
2. Disconnect the center hose of the gauge set and place the free end in a shop towel.
3. Slowly open the high side manifold valve slightly to let refrigerant flow from the center hose only. Do not open the valve too wide. Check the shop towel to make sure no oil is being discharged with the refrigerant.

   CAUTION: If refrigerant is allowed to escape too fast, compressor oil will be drawn out of the system.

4. After the high pressure gauge reading has dropped below 1000 kPa (142 psi), open the low side valve to discharge both high and low sides of the system.
5. Note the gauge readings and, as system pressure drops, gradually open both high and low side valves fully until both gauges indicate 0 kPa (0 psi).

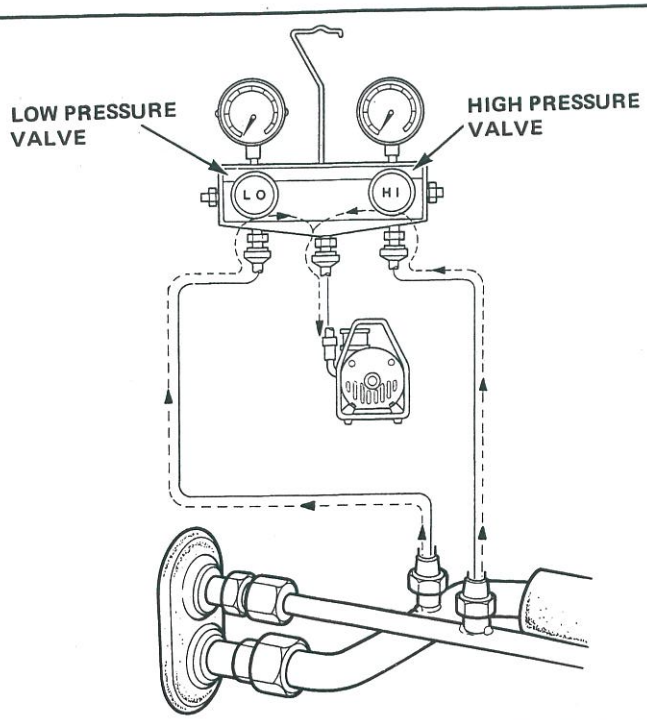


System Evacuation

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 a gauge set and pump as shown, connecting the center charging hose to the pump inlet.
3. Start the pump, then open both gauge valves. Run the pump for about 15 minutes. Close the valves and stop the pump. The low gauge should indicate above 700 mm Hg (27 in-Hg) and remain steady with the valves closed.

   NOTE: If low pressure does not reach more than 700 mm Hg (27 in-Hg) in 15 minutes, there is probably a leak in the system. Check for leaks, and repair (see Leak Test below).

4. If there are no leaks, open the valves and continue pumping for at least another 15 minutes, then close both valves, stop the pump and disconnect it from the center charging hose.

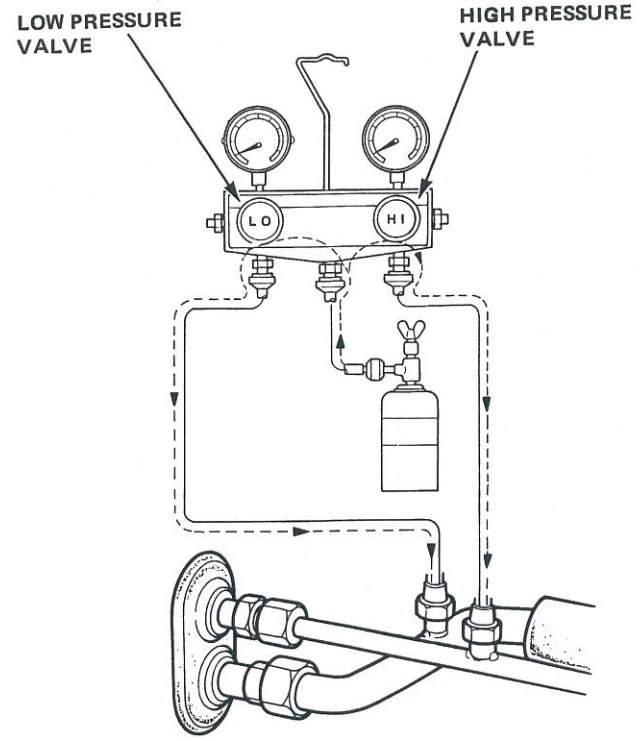


Leak Test

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 nonflammable, will produce poisonous gas if burned.**
- **Work in well-ventilated area. Refrigerant evaporates quickly, and can force all the air out of a small, enclosed area.**

1. Attach a refrigerant supply and gauge set as shown, with all valves closed. Then open the refrigerant supply valve on the can.
2. Loosen the center charging hose fitting at the gauge to purge any air from the hose, until it hisses for a few seconds, then tighten it again.
3. Open both gauge valves to charge the system to about 100 kPa (14 psi), then close the supply valve.
4. Check the system for leaks using a leak detector.
5. 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 the pervious page.
6. After checking and repairing leaks, the system must be evacuated (see System Evacuation above).



System Charging

WARNING **Always wear eye protection when charging the system.**

The A/C system may be charged with refrigerant by either Vapor or Liquid method:

CAUTION: Do not overcharge the system; the compressor will be damaged.

VAPOR CHARGING, through the low side:

1. Connect a gauge set and refrigerant can (right side up) as shown, with the gauge valves closed. Purge air from the charging hose by opening the refrigerant valve, then, loosening the center connector at the gauge, letting it hiss for a few seconds, and tightening it.
2. Open the low gauge valve [adjust it as necessary so pressure does not exceed 415 kPa (60 psi) while charging].
3. Start the engine and switch the air conditioner fan on high.

   NOTE: Run the engine below 1,500 rpm.

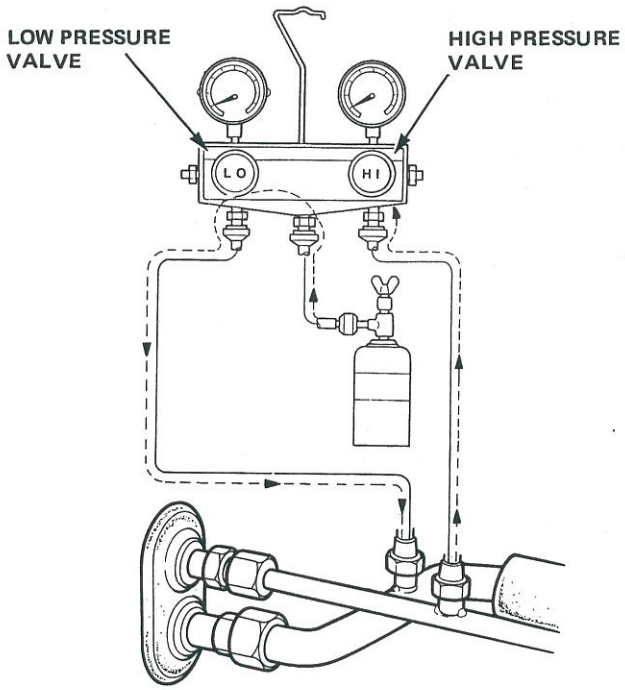
4. Keep the refrigerant can right side-up. Charge the system with 850—950 g (30—33 oz.) of refrigerant (one can of R-12 contains 14 ounces-437 grams) until sight glass is free of any bubbles, indicating a full charge.
5. When fully charged, close the gauge valves, then the valve on the can. Slowly disconnect the refrigerant hose from the center gauge connection to allow excess refrigerant to escape. Quickly remove the gauges from the system to minimize refrigerant loss.

LIQUID CHARGE through the high pressure side:

Following the charging station manufacturer's instructions, charge the system with 850—950 g (30—33 oz.) of refrigerant.

WARNING

- **Do not use disposable cans to charge through the high pressure side of the system. System pressure could transfer into the can causing it to explode. Use only the bulk supply of refrigerant from the charging station.**
- **Do not run the engine during liquid charge; the compressor will be damaged.**

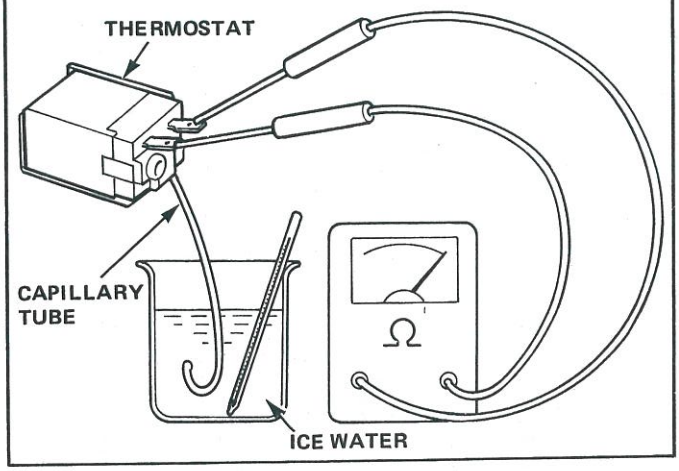


Thermostat Test

Dip the thermostat capillary tube into a pan filled with ice water, and check for continuity.

Cut-off . . . . . 1.5–0.5°C (35–33°F)
Cut-in . . . . . 2.5–5.0°C (37–41°F)

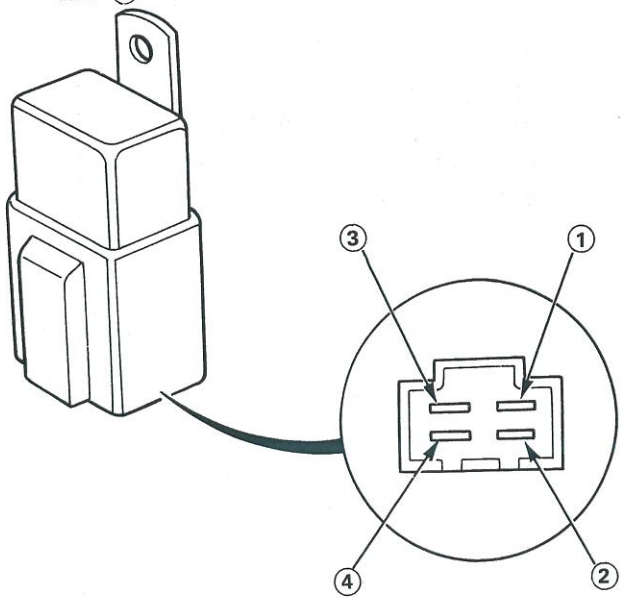
If cut-off or cut-in temperature is too low or too high, replace the thermostat.
The cut-off and cut-in of the thermostat must not be gradual, but sudden.



Relay Testing

NOTE: The same type of relay is used for the compressor clutch condenser fan and radiator cooling fan.

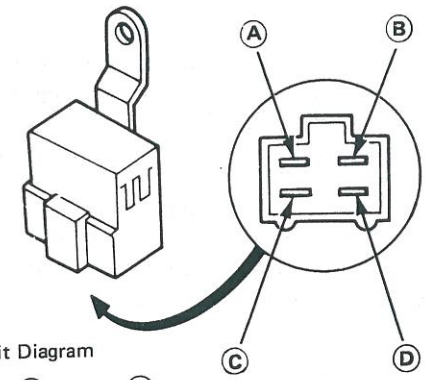
1. Check for continuity between terminals ③ and ④. There should be no continuity.
2. Connect a 12V battery across terminals ① and ②. There should be continuity between terminals ③ and ④.



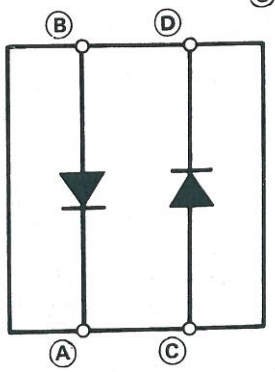
Diode Test

NOTE: The diodes are designed to pass current in one direction and block current in opposite direction.

1. Using an ohmmeter or continuity tester, check the diodes.
2. Connect positive probe to Ⓑ terminal and negative probe to Ⓐ terminal.
   There should be continuity.
3. Reverse the test probe positions and check. There should be no continuity.
4. Check the other diode (terminal Ⓒ and Ⓓ).
   - Connect positive probe to Ⓒ terminal and negative to Ⓓ.
     There should be continuity.
   - Reverse the test probe position.
     There should be no continuity.

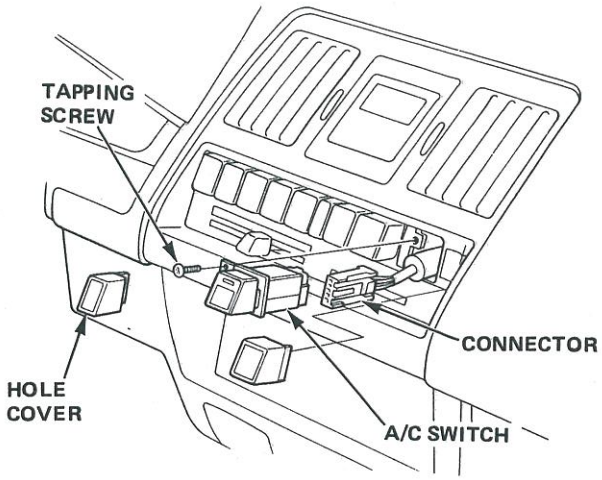


Circuit Diagram



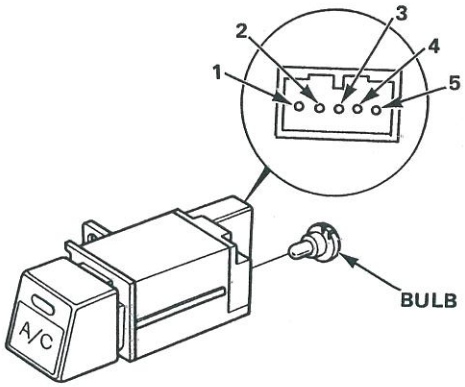
A/C Switch Test

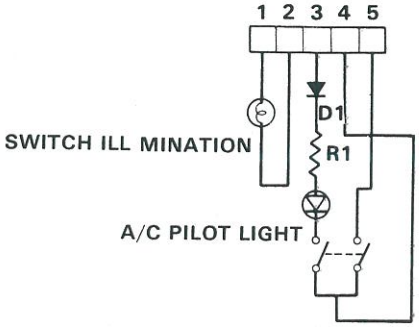
1. Pull out the screw hole cover.
2. Remove the screw and pull the switch out.
3. Disconnect the switch wire connector and remove the A/C switch.



4. Check for continuity between the terminals as shown in the chart.

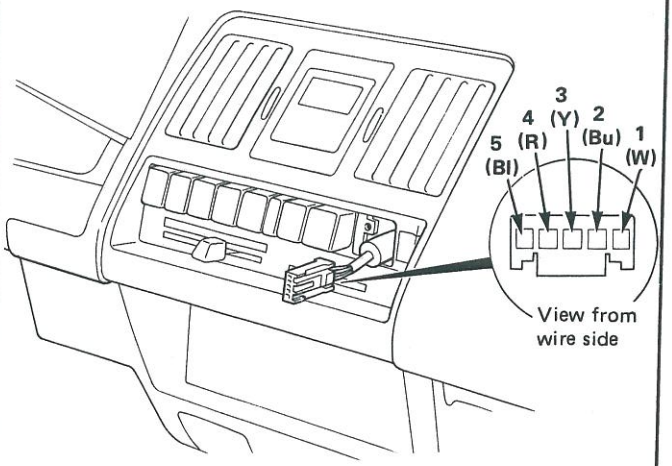
Terminal / Position	1		2	3		4	5
OFF	○	⊙	○				
ON	○	⊙	○	○	▷	○	○





A/C Switch Input Test

1. If the A/C switch is normal, check for inputs at the A/C switch connector according to the table below.



Terminal: test condition	Test: desired result	Actual result: possible cause
4 (R): blower switch on	Check for continuity to ground: there should be continuity with blower switch ON.	· If not: there is an open in R wire or blower switch.
5 (Bl): ignition switch ON	Connect to body ground: the A/C system should start.	· If not: there is an open in Bl wire to diode box.
3 (Y): ignition switch ON	Check for voltage to ground: should have battery voltage.	· If not: check the control panel (page 21-13).
2 (Bu): Headlight ON	Check for voltage to ground: should have battery voltage.	· If not: there is an open in Bu or W or switch wire.

CAUTION: Use a digital circuit tester to avoid damaging the LED's in the system.

2. Reinstall the switch in the reverse order of removal.

Electrical

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- 5-Step Troubleshooting Procedure 23–2
- Electrical Symbols 23–3
- Wire Color Codes 23–3

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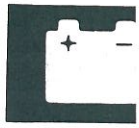
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Troubleshooting

Troubleshooting Precautions

Before Troubleshooting

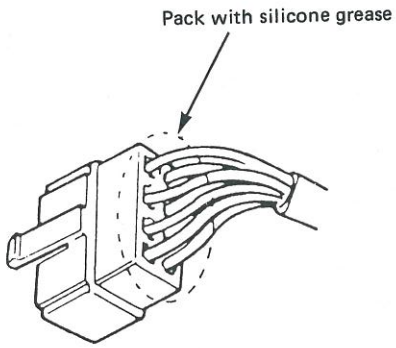
- Check the main fuse and the fuse box.
- Check the battery for damage, state of charge, and clean and tight connections.
- Check the alternator belt tension.

CAUTION:

- **Do not quick-charge a battery unless the battery ground cable has been disconnected, or you will damage the alternator diodes.**
- **Do not attempt to crank the engine with the ground cable disconnected or you will severely damage the wiring.**

While You're Working

- Make sure connectors are clean, and have no loose pins or receptacles.
- Make sure multiple pin connectors are packed with silicone grease.



CAUTION:

- **Do not pull on the wires when disconnecting a connector, pull only on the connector housings.**
- **When connecting a connector, push it until it clicks into place.**

Five-Step Troubleshooting

1. **Verify The Complaint**
   Turn on all the components in the problem circuit to check the accuracy of 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.

Schematic Symbols

BATTERY	GROUND		FUSE	COIL, SOLENOID	CIGARETTE LIGHTER
	Ground terminal	Component ground			
RESISTOR	VARIABLE RESISTOR	THERMISTOR	IGNITION SWITCH	BULB	HEATER
MOTOR	PUMP	CIRCUIT BREAKER	HORN	DIODE	SPEAKER
M	P		H		

ANTENNA		TRANSISTOR
Mast	Window	

RELAY (In normal condition)		CONDENSER
Normal open relay	Normal closed relay	

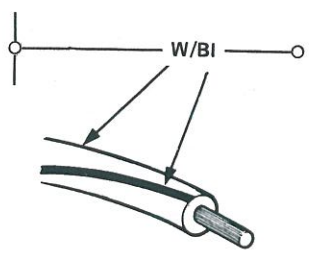
SWITCH (In normal condition)		LUMINOUS DIODE (LED)
Normal open switch	Normal closed switch	

Wire Color Codes

The following abbreviations are used to identify wire colors in the circuit schematics.

W	White
Y	Yellow
Bl	Black
Bu	Blue
G	Green
R	Red
Or	Orange
Lb	Light Blue
Lg	Light Green
P	Pink
Br	Brown
Gr	Gray

Wire insulator has one color or one color with another color stripe. The second color is the stripe.

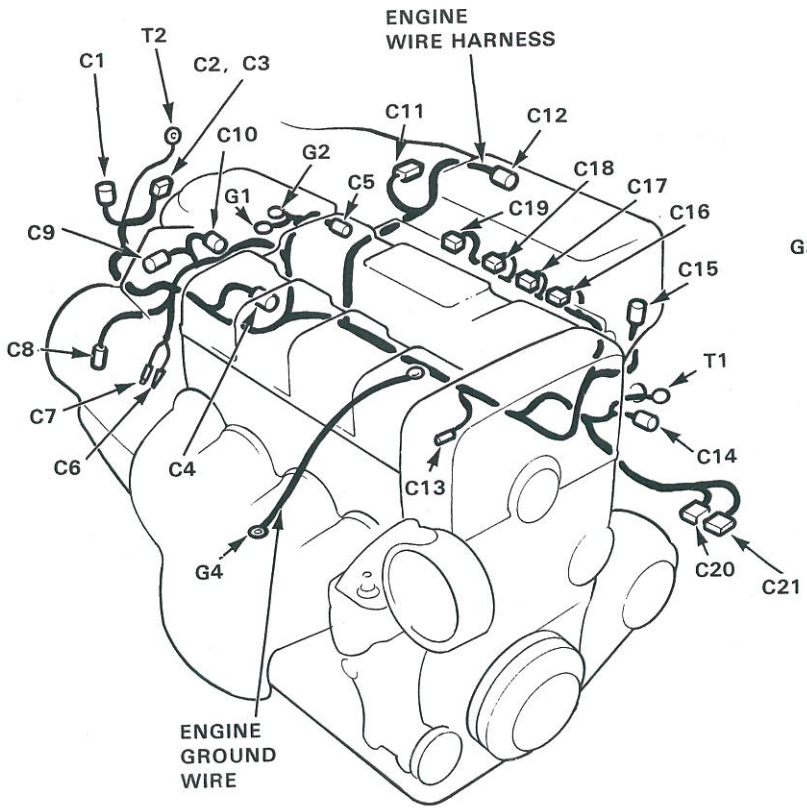


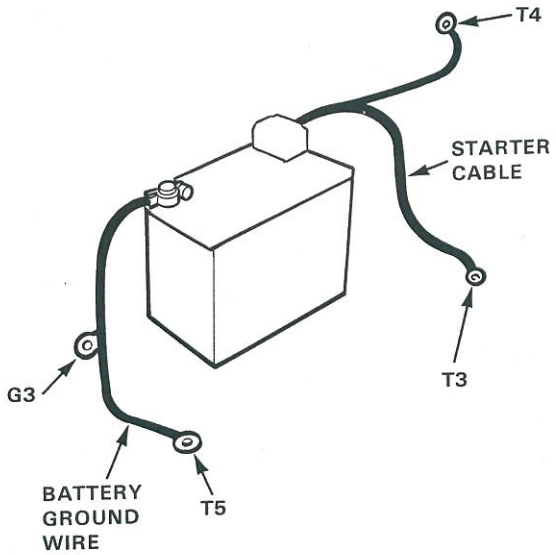
Wire Harness Routing

Connector Location

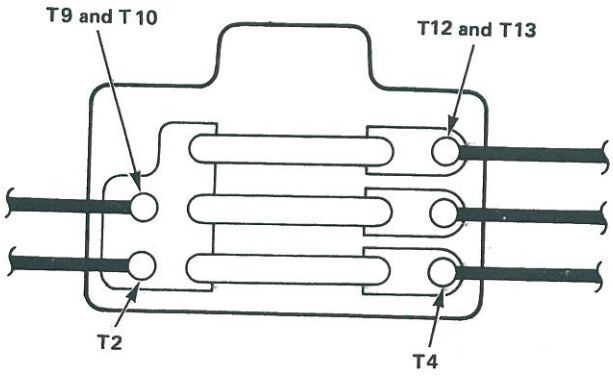
How to identify connectors:
Identifing numbers have been assigned to all connectors. The number in preceded by the letter "C" for connectors, "G" for ground terminals or "T" for non grounded terminals.

Location / Harness	Engine Compartment	Dashboard	Others (Floor, Door, Trunk, Roof)
Engine wire harness	C1 thru C21 G1 and G2 T1 and T2		
Starter cable	T3 and T4		
Battery ground wire	G3 T5		
Engine ground wire	G4 T6		
Main wire harness	C51 thru C79 G5 and G6 T7 thru T12	C80 thru C118 G7 and G8	C119 thru C131
Dashboard wire harness		C201 thru C223 G9	
Roof wire harness			C251 and C252
Rear wire harness			C301 thru C308 G10
A/C wire harness	C354 thru C362 G10,T13	C351 thru C353	
Hatch wire harness			C401 thru C406
License plate light wire harness			C411 thru C414
Drivers' door wire harness			C511 thru C519
Right front door wire harness			C521 thru C524
Rear door wire harness			C531 thru C544
Fuel gauge sending unit wire harness			C501 thru C502

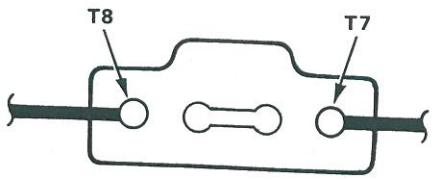


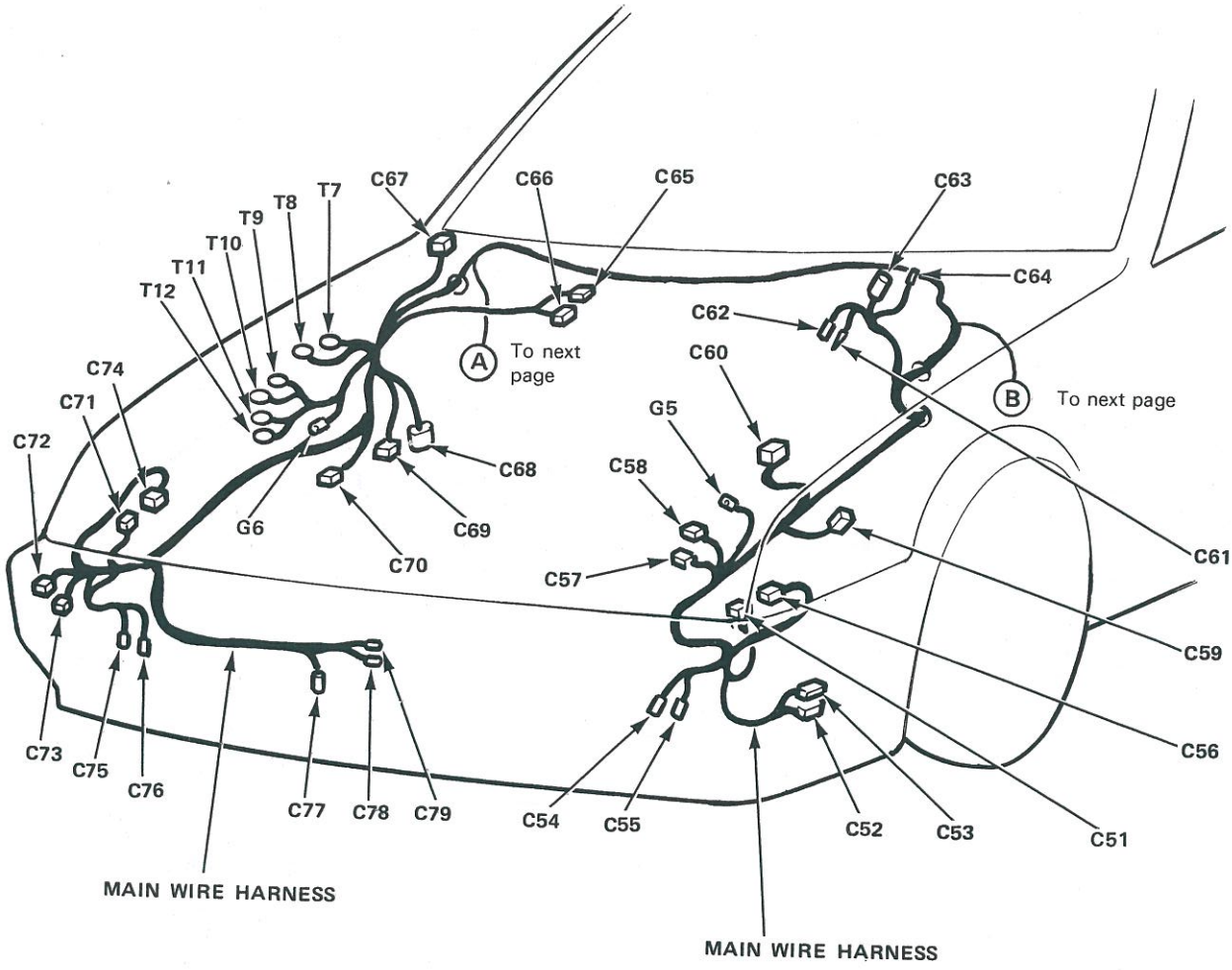


MAIN FUSE BOX:



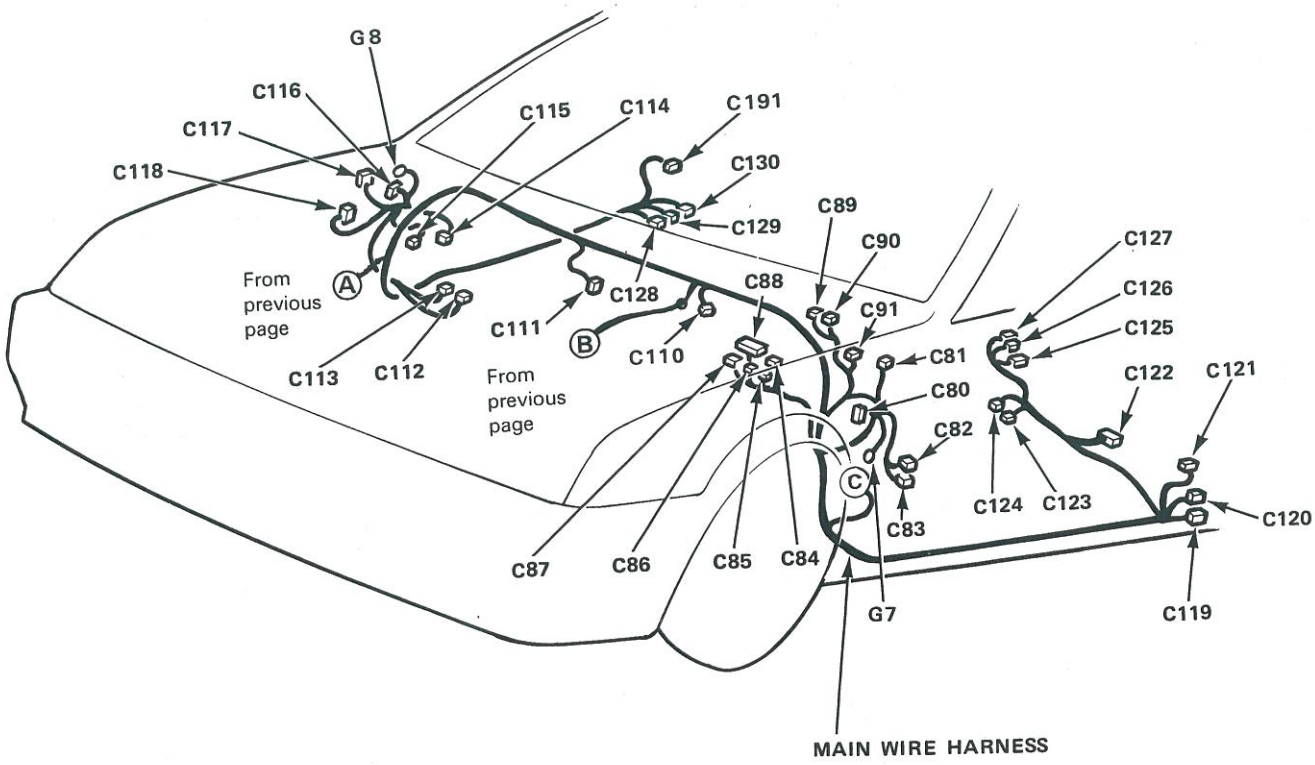
POWER WINDOW MAIN FUSE:

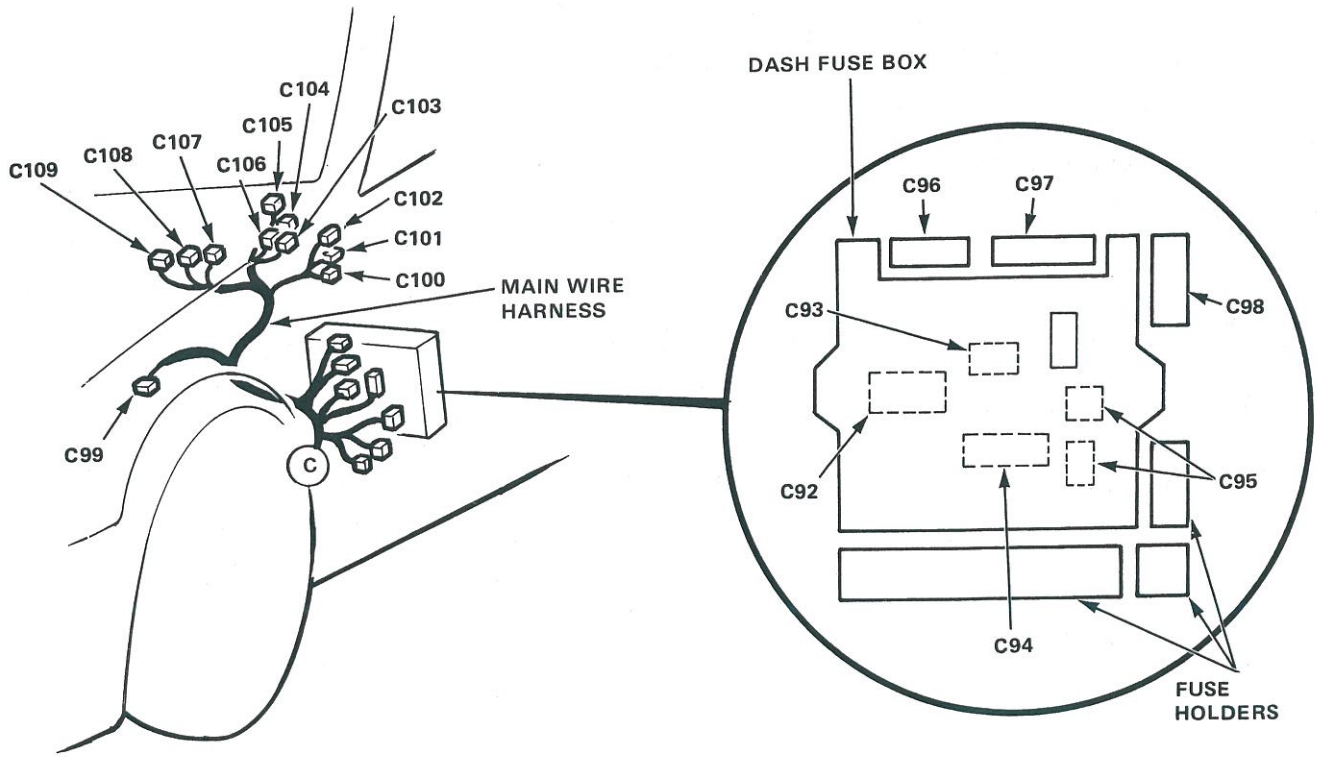


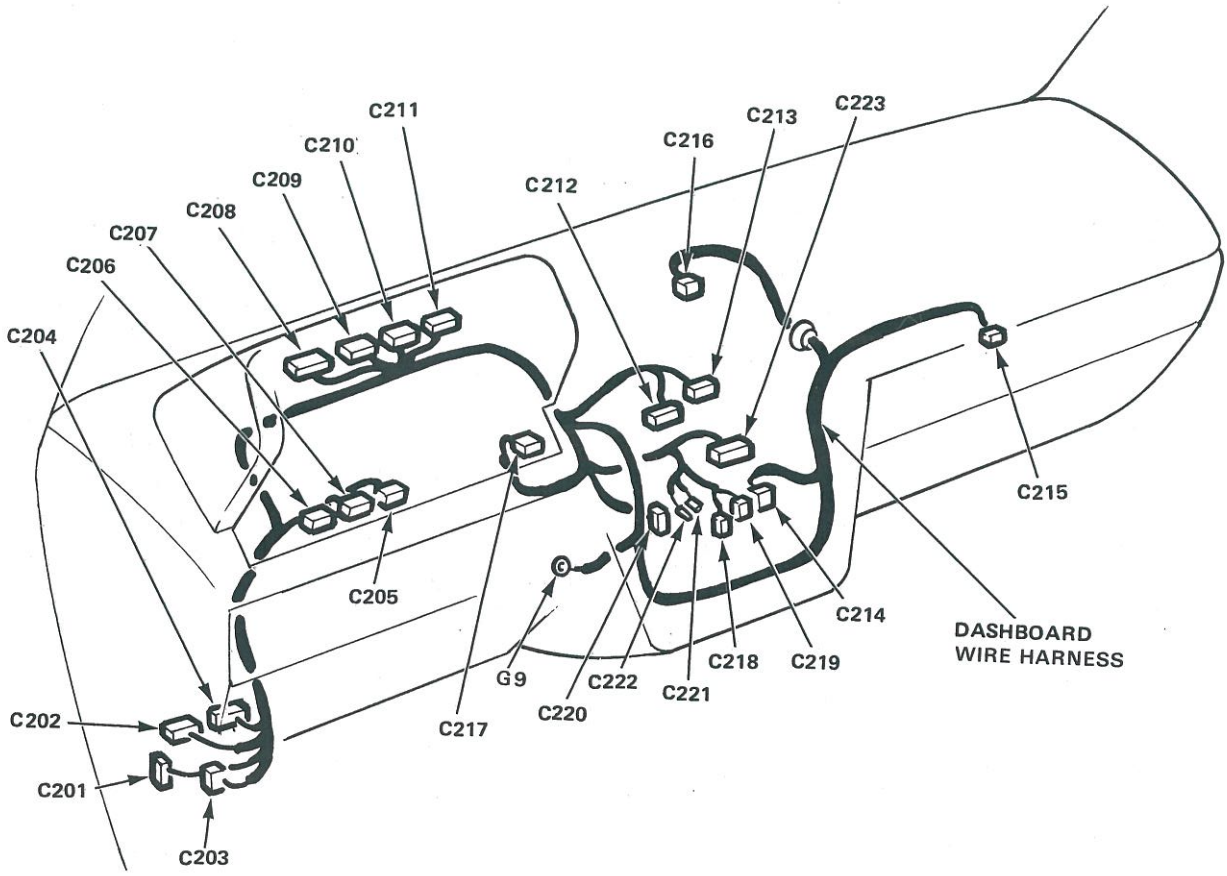


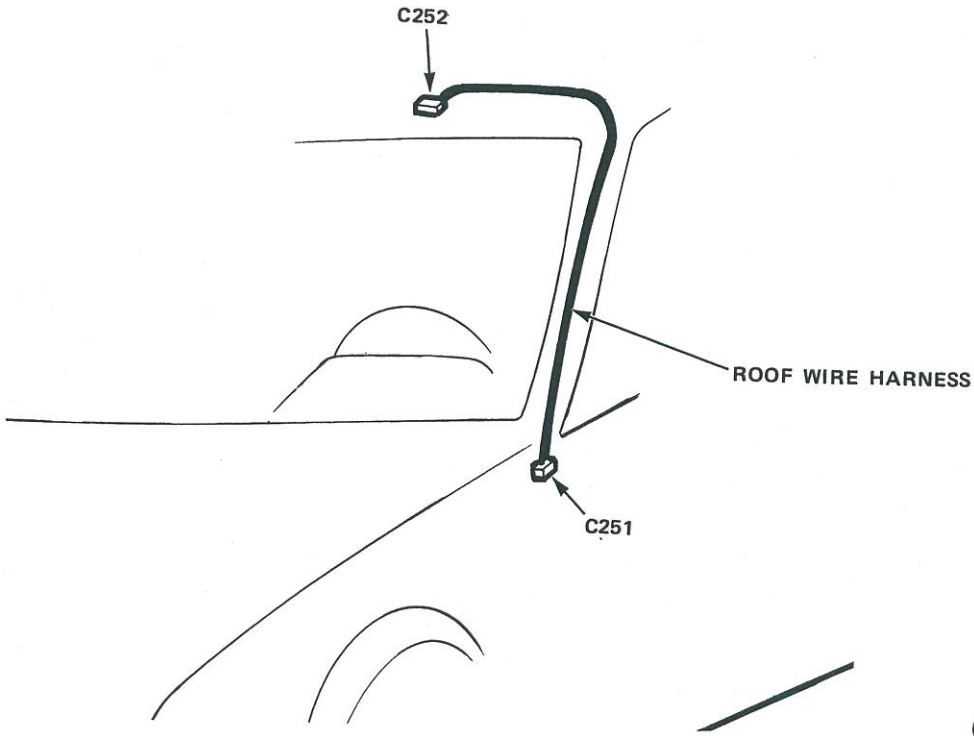
(cont'd)

Connector Location (cont'd)



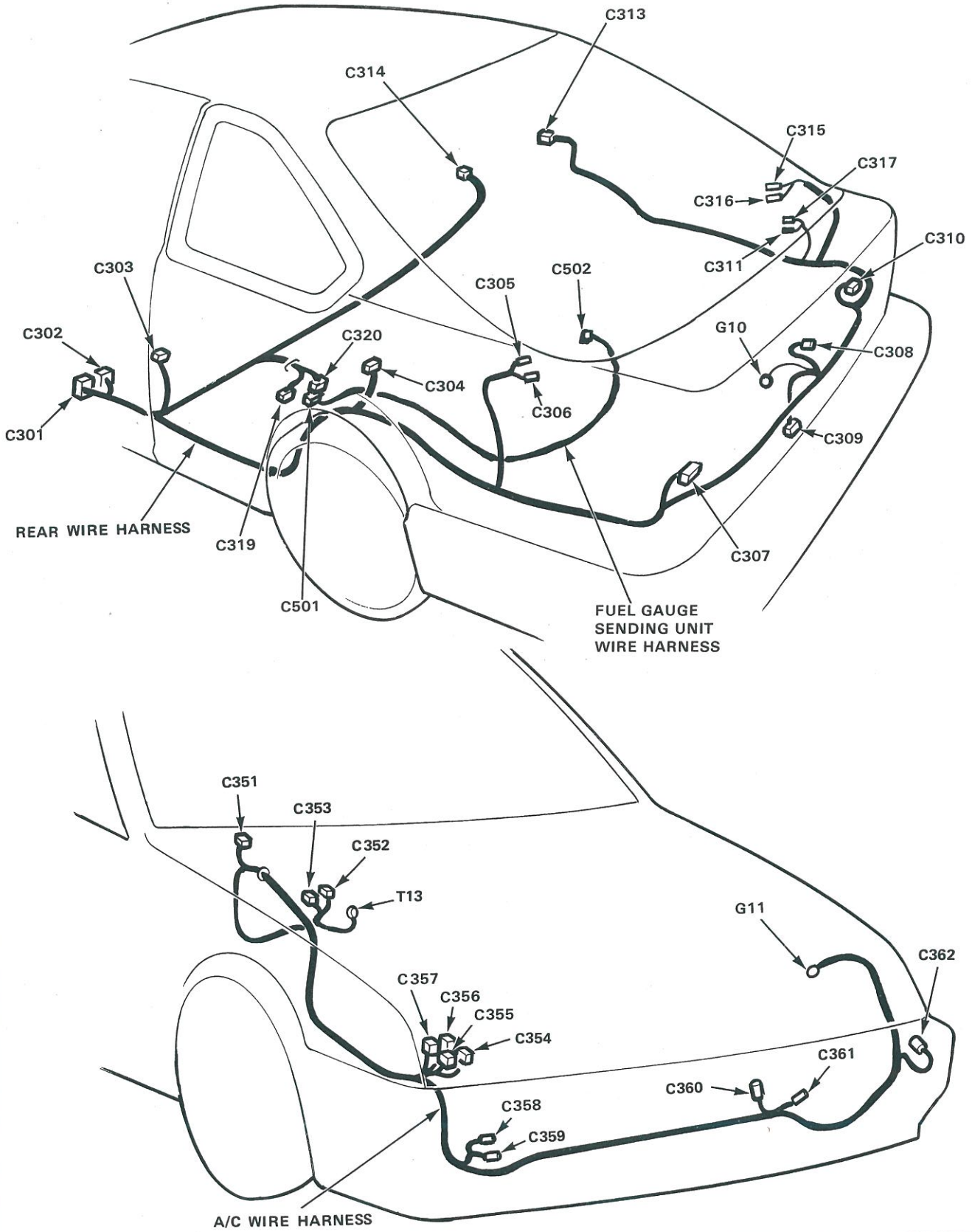


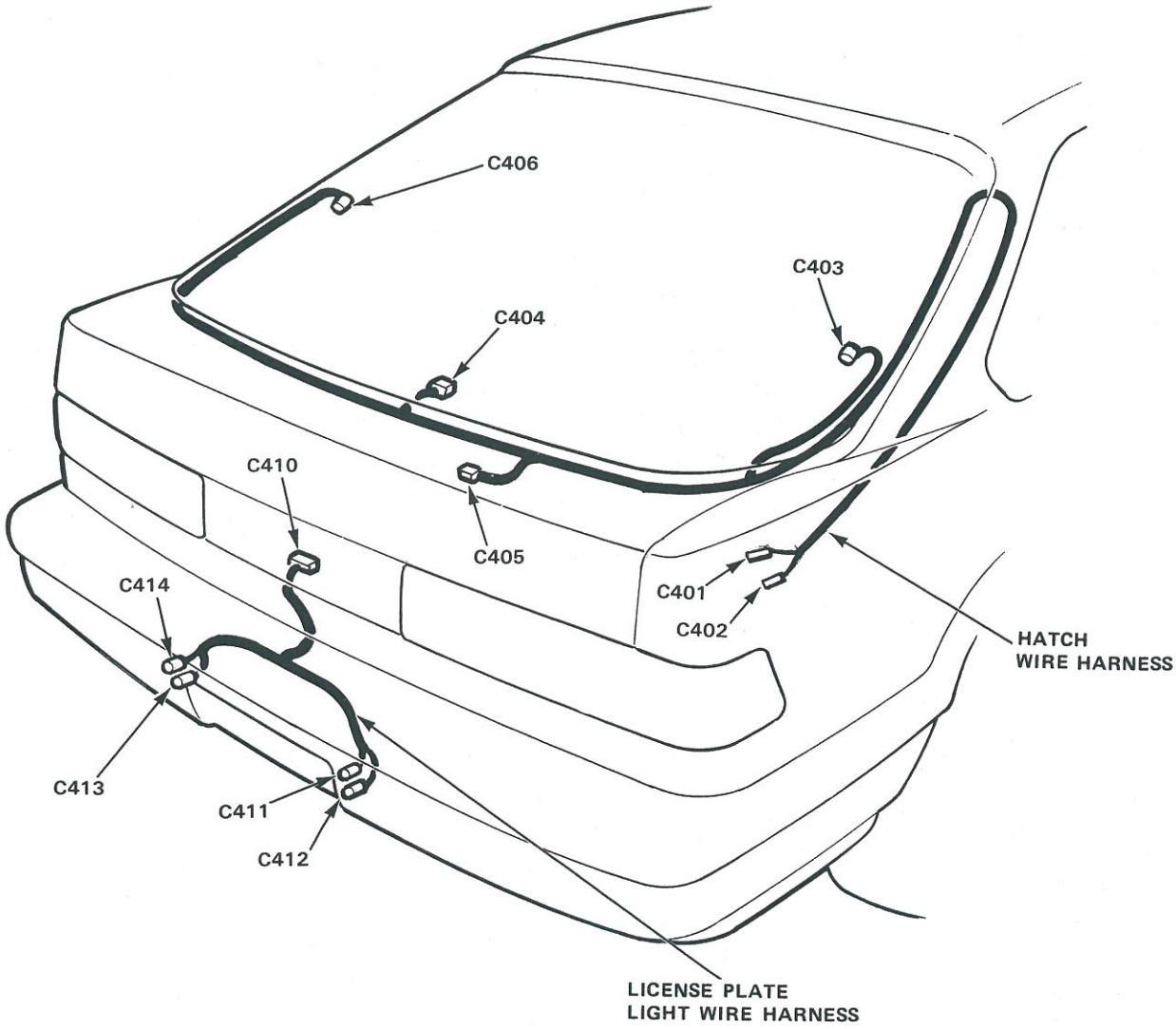

C211
C210
C209
C208
C207
C206
C204
C205
C212
C216
C213
C223
C215
C214
DASHBOARD
WIRE HARNESS
C218
C219
C221
C222
G9
C220
C217
C202
C201
C203


C252
ROOF WIRE HARNESS
C251

(cont'd)

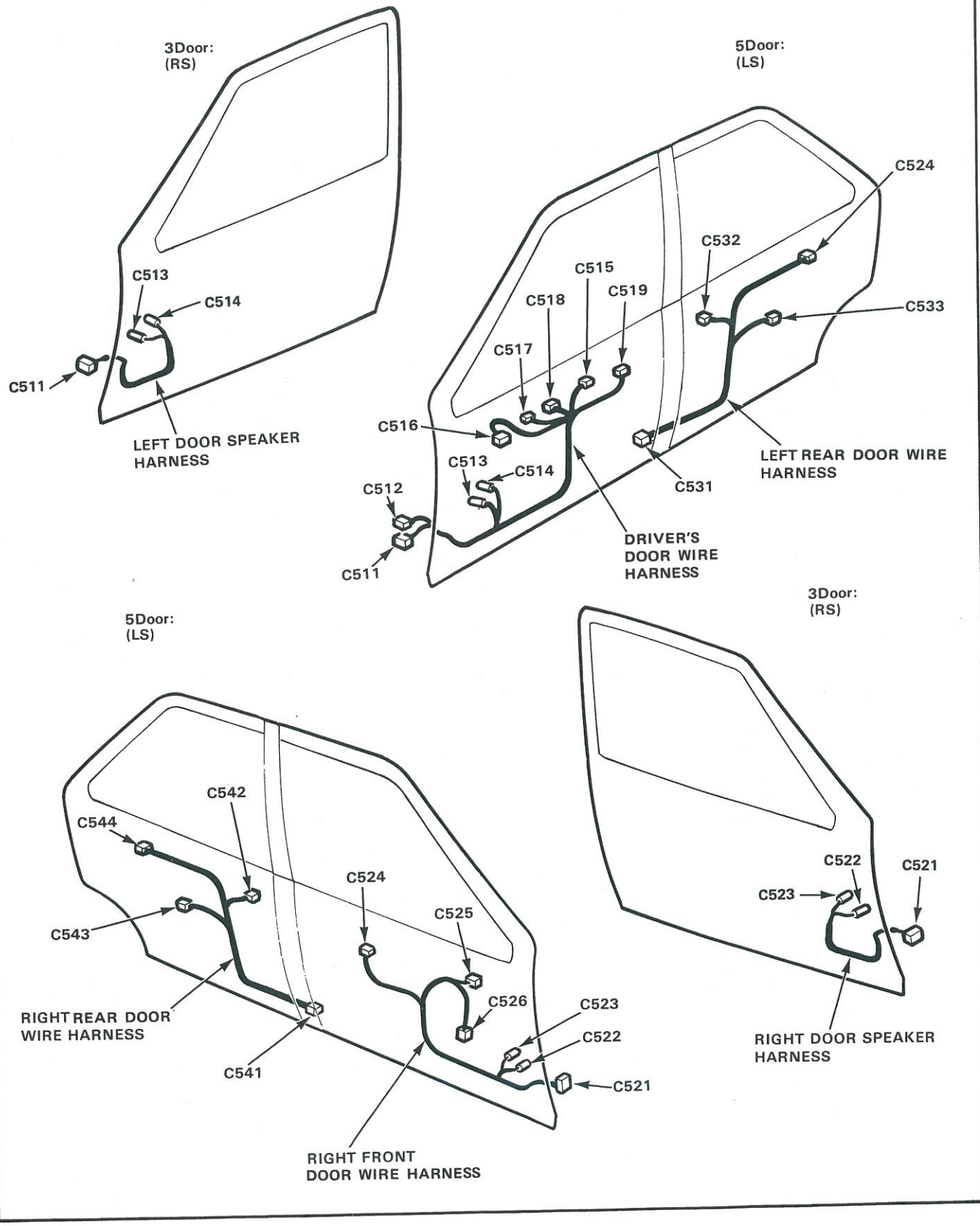
Connector Location (cont'd)




C406
C403
C404
C410
C405
C414
C401
C402
HATCH
WIRE HARNESS
C413
C411
C412
LICENSE PLATE
LIGHT WIRE HARNESS

(cont'd)

Connector Location (cont'd)



Connector Directory

Engine Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C1	14	Right center engine compartment	To Main wire harness (C-68)	
C2	6	//	// (C-68)	A/T
C3	8	//	// (C-69)	M/T
C4		Center engine compartment	To Starter solenoid	
C5		//	To Coolant temperature sensor	
C6		//	To Back-up light switch	M/T
C7		//	//	M/T
C8	1	//	To Oxygen sensor	
C9	4	//	To Crank angle sensor	
C10	2	//	To Coolant temperature sensor	
C11	3	//	To Throttle angle sensor	
C12	2	//	To EICV	
C13		//	To Oil pressure switch	
C14	4	//	To Alternator	
C15	2	//	To Intake air temperature sensor	
C16	2	//	To No.1 Fuel injector	
C17	2	//	To No.2 Fuel injector	
C18	2	//	To No.3 Fuel injector	
C19	2	//	To No.4 Fuel injector	
C20	6	Left center engine compartment	To Main wire harness (C60)	
C21	6	//	To Resistor	
T1		Center engine compartment	To Alternator	
T2		Right center engine compartment	To Main fuse box	
G1		Engine thermostat housing	To Engine ground	
G2		//	//	

Stater Cable

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
T3		Center engine compartment	To Starter motor	
T4		Right center engine compartment	To Main fuse box	

Battery Ground Wire

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
T5		Center engine compartment	To Transmission	
G3		Right front engine compartment	To Body ground	

Engine Ground Wire

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
T6		Center engine compartment	To Cylinder head	
G4		Left front engine compartment	To Body ground	

(cont'd)

Connector Directory (cont'd)

Main Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C51	3	Left front engine compartment	To Left Head light	
C52	2	//	To Left front turn signal light	
C53	3	//	To Left side marker light	
C54		//	To Left horn	
C55		//	//	
C56	6	//	To Left retractor motor	
C57	2	//	To Rear washer motor	
C58	2	//	To Windshield washer motor	
C59	4	Left center engine compartment	To Crulse control actuator	
C60	6	//	To Engine wire harness(C20)	
C61		Left rear engine compartment	To Brake fluid level switch	
C62		//	//	
C63	2	//	To Ignition coil	
C64		//	To Radio noise condenser	
C65	6	Right rear engine compartment	To control box	
C66	3	//	//	
C67	6	//	To Windshield wiper motor	
C68	14	Right center engine compartment	To Engine wire harness (C1)	
C69	6	//	// (C3)	A/T
C69	8	//	// (C3)	M/T
C70	1	Battery positive terminal	To Hazard switch	
C71	6	Right front engine compartment	To Right retractor motor	
C72	3	//	To Right side marker light	
C73	2	//	To Right front turn signal light	
C74	3	//	To Right headlight	
C75		//	To Right horn	
C76		//	To Right horn	
C77	2	Front engine compartment	To Cooling fan motor	
C78		//	To Cooling fan swich	
C79		//	To Cooling fan swich	
C80	13	Left under dash	To cruise control unit	
C81	2	//	To Roof wire harness (C251)	
C82	8	//	To Driver's door wire harness (C511)	
C83	10	//	// (C512)	
C84	4	//	To Brake check relay	
C85	4	//	To Blower motor relay	
C86	4	//	To Rear window defogger relay	
C87	8	//	To PGM-FI Main relay	
C88	16	//	To Integrated unit	
C89	6	//	To Retractor motor relay	
C90	6	//	//	
C91	2	//	To Warning chime	
C92	8	//	To Fuse box	
C93	7	//	//	
C94	14	//	//	
C95	2	//	//	
C96	13	//	To Dashboard wire harness (C201)	
C97	24	//	// (C202)	
C98	14	//	// (C203)	
C99	4	//	To Brake light switch	with cruise control
	2	//	//	
C100	1	//	To Combination switch	
C101	4	//	//	
C102	8	//	//	
C103	14	//	//	
C104	6	//	//	
C105	8	//	//	
C106	7	//	//	
C107	2	//	To Ignition switch	
C108	6	//	To Ignition switch	with cruise control
C109	3	//	To slip ring	

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C110	3	Center under dash	To PA sensor	
C111	9	//	To Heater function control amplifier	
C112	4	Left under dash	To Blower conrtol resistor	
C113	2	//	To Blower motor	
C114	4	//	To A/C wire harness (C351)	
C115	6	//	To Rcirculation control motor	
C116	13	//	To Retractable hadlight control unit	
C117	8	//	To Asistant's door wire harness (C521)	
C118	4	//	To Power window relay	
C119	18	Left floor	To Rear wire harness (C301)	
C120	2	//	// (C302)	
C121	6	//	To Left rear door wire harness (C531)	5door
C122	14	//	To Power door lock contrtol unit	
C123	2	Center console area	To Seat belt switch	
C124		//	To Parking brake switch	
C125	2	//	To shift position console switch	
C126	2	//	//	
C127	10	//	//	
C128	16	Right floor	To PGM-FI control unit	
C129	20	//	//	
C130	17	//	//	
C131	6	//	To Right rear door wire harness (C541)	5door
T-7		Right center engine compartment	To Fuse box	
T-8		//	//	
T-9		//	//	
T-10		//	//	
T-11		//	//	
T-12		//	//	
G5		Left front engine compartment	To Body ground	
G6		Right front engine compartment	//	
G7		Left under dash	//	
G8		Right under dash	//	

Dashboard Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C201	13	Left under dash	To Main wire harness (C96)	
C202	24	//	// (C97)	
C203	14	//	// (C98)	
C204	8	//	To Fuse box	
C205	5	Behind gauge	To Cruise control main switch	
C206	3	//	To Dashlight brightness controller	
C207	4	//	To Retractor switch	
C208	14	//	To Gauge assembly	
C209	12	//	//	
C210	10	//	To shift position indicator on gauge assembly	
C211	8	//	To Gauge	
C212	6	Center under dash	To Heater function cotrol panel switch	
C213	14	//	//	
C214	2	//	To Ashtray light	
C215	2	//	To Grove box light	
C216	6	//	To Clock	
C217	5	//	To Rear window defogger switch	
C218	3	//	To Cigarette lighter	
C219	1	//	//	
C220	6	//	To Dashlight brightness control unit	
C221		//	To Dashboard panel light	
C222		//	//	
C223	16	//	To Radio	
G9		Steering column bracket	To Body ground	Ground for radio only

(cont'd)

Connector Directory (cont'd)

Rear Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C301	20	Left floor	To Main wire harnesss (C119)	
C302	2	//	// (C120)	
C303		Left door area	To Left front door switch	
C304		//	To Left rear door switch	
C305		Left luggage area	To Left rear speaker	
C306		//	//	
C307		Left luggage area	To Left taillight assembly	
C308		Center //	To Tailgate switch	
C309	2	//	To License plate ligit wire harness	
C310		Right luggage area	To Right taillight assembly	
C311		Right luggage area	To Right speaker	
C312		//	//	
C313		Right door area	To Right rear door switch	5door
C314		//	To Right front door switch	3door
C315		Luggage area	To Hatch wire harness (C401)	
C316		//	// (C402)	
C317		Right luggage area	To Luggage area light	
C318		//	//	
C319		Left luggage area	To Fuel pump	
C320		//	To Fuel gauge sending unit wire harness	
G10		Rear center luggage area	To Body ground	

Roof Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C251	2	Left under dash	To Main wire harness (C91)	
C252	3	Roof area	To Interlior light	

A/C Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C351	4	Right under dush	To Main wire harness (C114)	
C352		//	To Thermostat	
C353		//	//	
C354	4	Right front engine compertment	To Diode	
C355	4	//	To Clutch relay	
C356	4	//	To Condenser fan relay	
C357	4	//	To Cooling fan relay	
C358	2	//	To Main wire harness (C77)	
C359	2	//	To Cooling fan motor	
C360	2	Front engine compartment	To Condenser fan motor	
C361		//	To Compressor clutch	
C362	2	Left front engine compartment	To Pressure switch	
T13		Right center engine compartment	To Fuse box	
G11		Left front engine compartment	To Body ground	

Hatch Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C401	4	Luggage area	To Rear wire harness (C315)	
C402	2	//	// (C316)	
C403		//	To Rear window defogger	
C404	4	//	To Rear window wiper motor	
C405	2	//	To High mount brake light	
C406		//	To Rear window defogger	

License Plate Light Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C410	2	Center trunk area	To Rear wire harness (C309)	
C411		Behind rear bumper	To License plate light	
C412		//	//	
C413		//	//	
C414		//	//	

Fuel Gauge Sending Unit Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C501	2	Right floor	To Rear wire Harness (C320)	
C502	2	Right door area	Fuel Gauge Sending Unit	

Driver's Door Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C511	8	Left under dush	To Main wire harness (C82)	
C512	10	//	// (C83)	
C513		Left front door area	To Left front speaker	
C514		//	//	
C515	3	//	To Door lock switch	
C516	6	//	To Power window control unit	
C517	2	//	To Power window master switch	
C518	14	//	//	
C519	6	//	To Door lock motor	

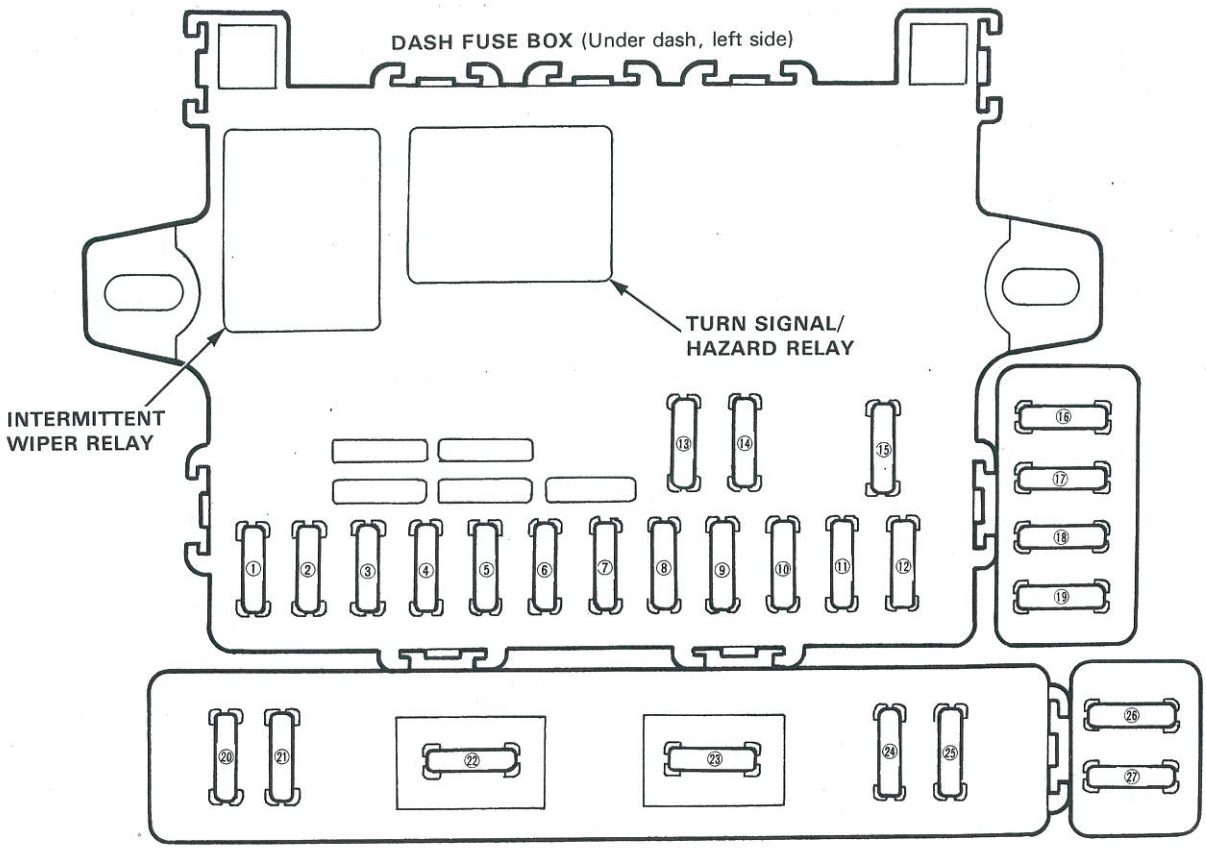
Right Front Door Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C521	8	Right under dash	To Main wire harness (C118)	
C522		Right front door area	To Right front speaker	
C523		//	//	
C524	2	//	To Door motor	
C525	6	//	To Power window motor	
C526	2	//	To Power window motor	

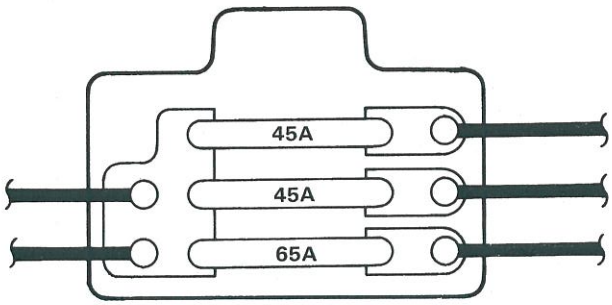
Rear Door Wire Harness

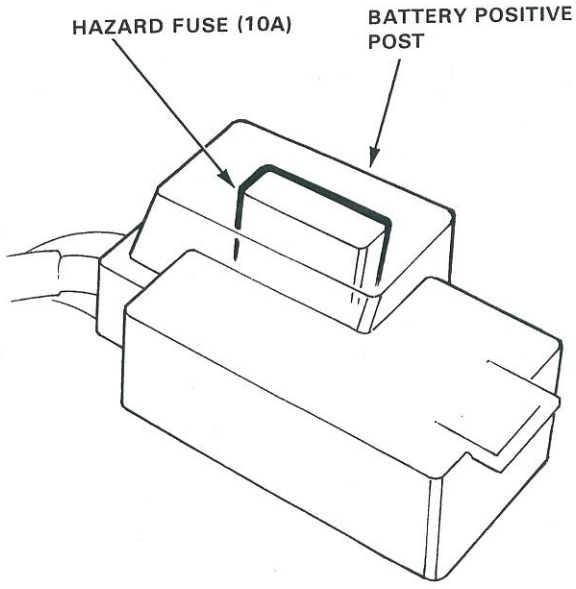
Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C531	6	Left rear door area	To Main harness (C121)	
C532	6	//	To Power window switch	
C533	2	//	To Power window motor	
C534	2	//	To door lock motor	
C541	6	Right rear door area	To Main harness (C131)	
C542	6	//	To Power window switch	
C543	2	//	To Power window motor	
C544	2	//	To Door lock motor	

Fuses

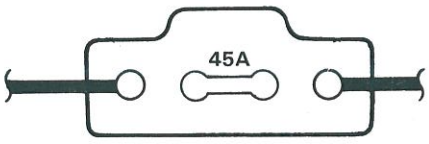


MAIN FUSE BOX (Under-hood)





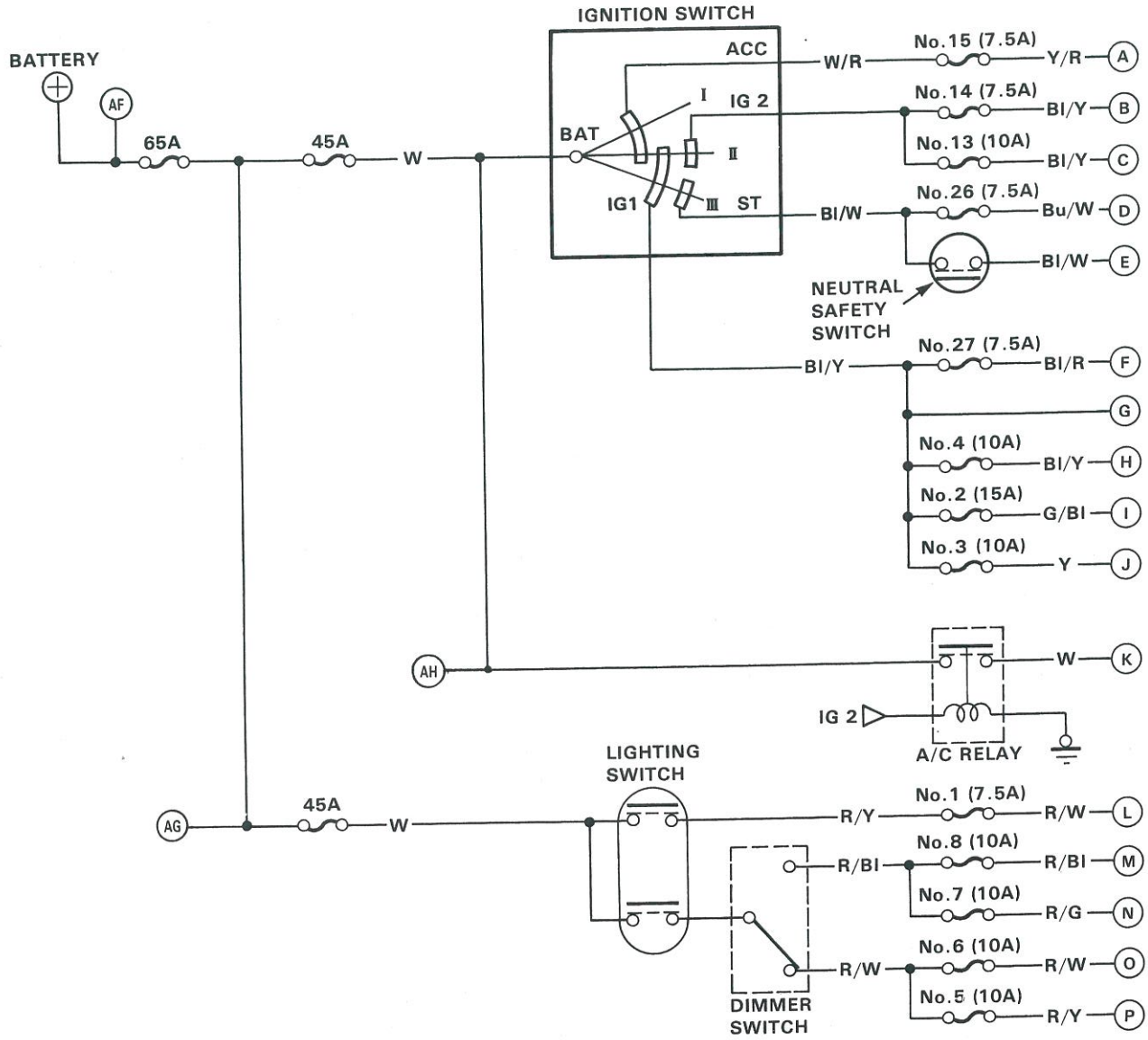
POWER WINDOW MAIN FUSE





Power Distribution

Circuit Identification

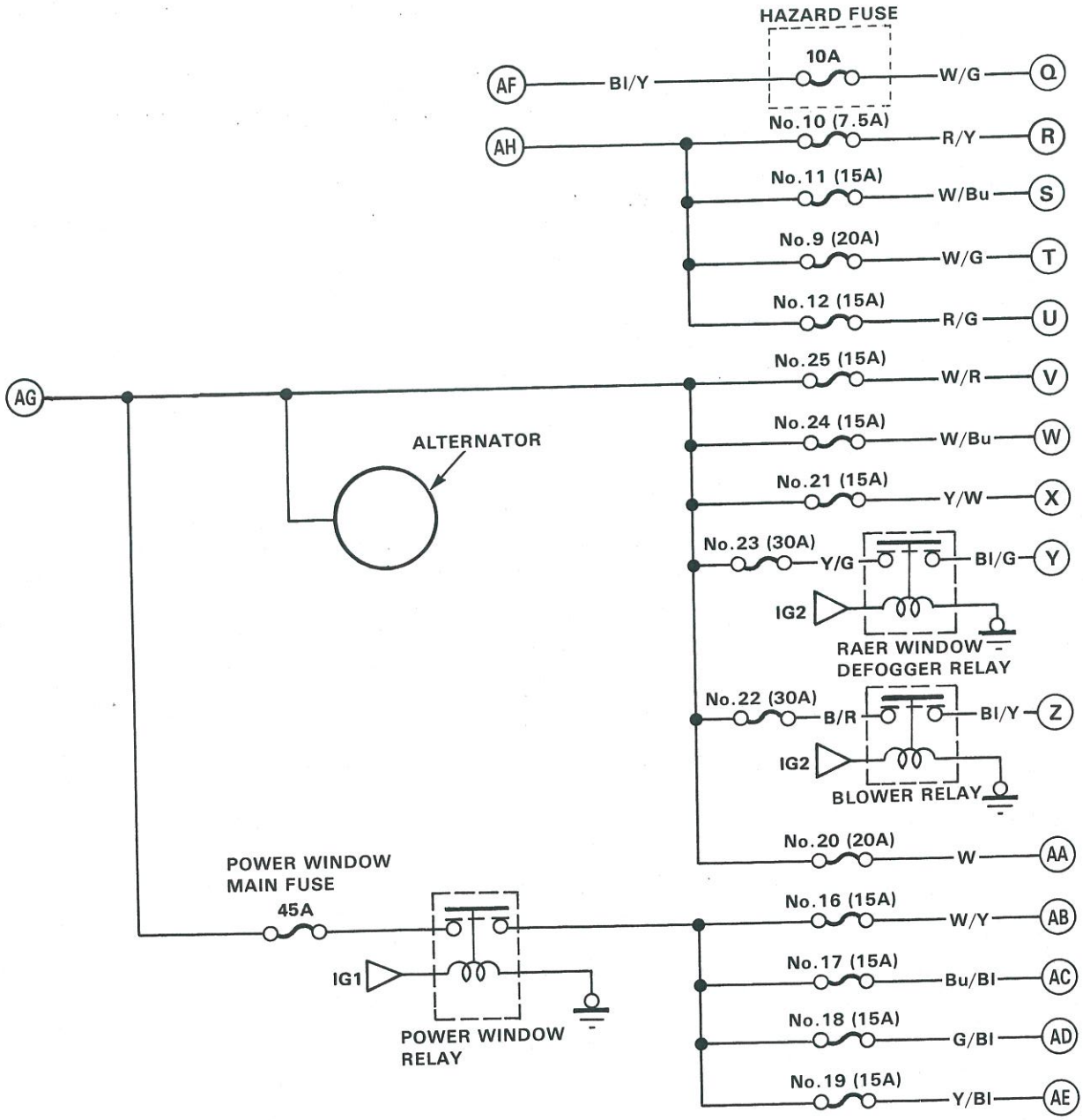




	System	Part
Ⓐ	Sound	AM/FM Stereo cassette player (ACC)
Ⓑ	Rear Window Defogger	Rear window defogger relay, Rear window defogger switch indicator light
	Heater	Fresh/Rec motor, Heater control amplifier, Indicator light dimming circuit, Blower relay
	Air Conditioner	Condenser fan relay, A/C compressor clutch
Ⓒ	Cooling	Cooling fan motor (without A/C)
	Air Conditioner	Compressor clutch relay, Compressor clutch, Cooling fan relay, ECU (ACC)
Ⓓ	PGM-FI	Main relay (STS), ECU (STS)
	Brake Warning	Bulb check relay
Ⓔ	Starting	Starter solenoid
Ⓕ	Cruise Control	Control unit, Main switch indicator light
Ⓖ	Ignition	Ignition coil, Ignitor
Ⓗ	Charging	Charge warning light, Voltage regulator
	Retractable Headlight	Control Unit
	PGM-FI	Emission control box EICV, Purge cut-off solenoid valve, Ignition control solenoid valve Main relay (IG1)
	Gauge Assembly	Emission speed sensor amplifier
	Fuel	Fuel pump motor
Ⓘ	Power Windows	Power window relay
	Wipers/Washers	Windshield wiper motor, Windshield washer motor, Rear windshield wiper motor, Rear window washer motor
Ⓙ	Gauge Assembly	Temperature gauge, Fuel gauge, Tachometer
	Brake Warning	Warning light
	PGM-FI	PGM-FI Warning light
	Clock	(IG1)
	Lights	Back-up lights, Turn signal/Hazard relay, Turn signal light, Turn signal indicator lights
	Tailgate Warning	Warning light
	Dashlight Brightness Control	Shift lever position indicator
	Oil Pressure Warning	Warning light
	Seat Belt Reminder	Seat belt reminder light
	Integrated Control Unit	Oil pressure, Seat belt/Key-on warning beeper/timer circuit, Light on warning circuit
Ⓚ	Air Conditioner	Cooling fan motor, Condenser fan motor
Ⓛ	Retractable Headlights	Control unit
Ⓜ	Lighting	Right headlight (HI beam)
	Lighting	HI beam indicator light
Ⓝ	Lighting	Left headlight (HI beam)
Ⓞ	Lighting	Right headlight (LO beam)
Ⓟ	Lighting	Left headlight (LO beam)
	Retractable Headlights	Control unit

(cont'd)

Circuit Identification (cont'd)



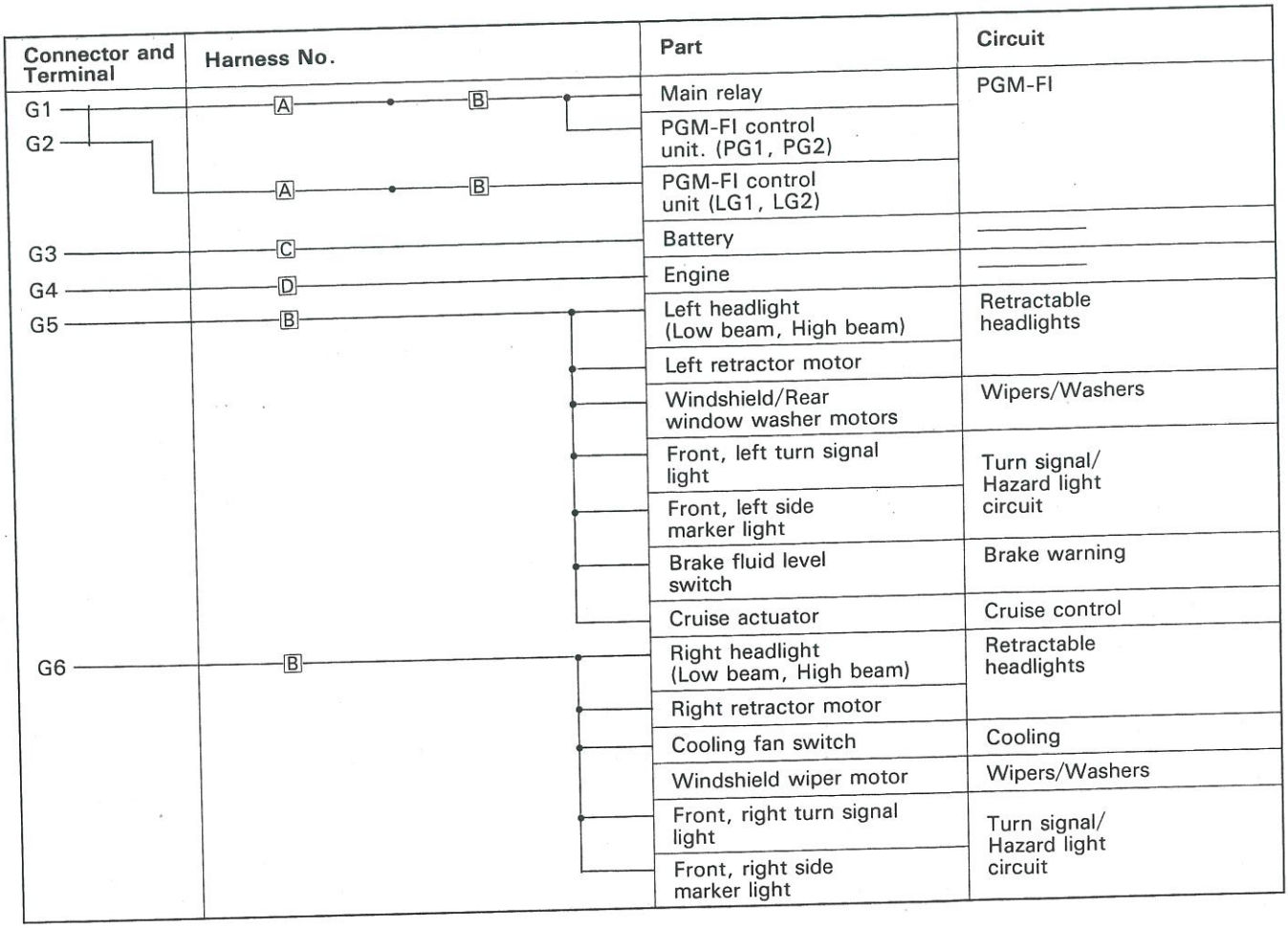
NOTE: Hazard fuse is located on the battery positive post.



	System	Part
Ⓠ	PGM-FI	PGM-FI ECU
	Integrated Control Unit	Oil pressure warning circuit
	Lights	Turn signal／Hazard relay,
Ⓡ	Retractable Headlights	Control unit, Right retractor relay, Left retractor relay,
Ⓢ	Cigarette Lighter	Cigarette lighters
	Clcok	(Battery⊕)
	Sound	AM/FM stereo cassette player (Battery⊕)
	Lights	Hatch light, Dome light,
	Integrated control Unit	Oil pressure,
Ⓣ	Horns	Horn (HI), Horn (LO),
	Cruise Control	Control unit.
	Lights	Right brake light, Left brake light, High mount brake light
Ⓤ	Lighting	Rear side marker lights, taillights,
	Dashlight Brightness Control	Cruise control main switch light, Shift lever postion indicator, Air conditioner switch light, Heater control switch light, Rear window defogger switch light, shift lever position light, Dashboard panel light, Heater panel light, Gauge light,
	Heater	Indicator light dimming signal
	Retractable Headlights	Control unit.
	Sound	AM/FM stereo cassette player (Battery ⊕)
	Integrated control unit	Side marker light circuit,
	Lighting	Glove box light, Cigarette lighter light, Ashtray light, License plate lights, Right side marker light, Left side marker light,
Ⓥ	Retractable Headlights	Control unit, Right retractor motor,
Ⓦ	Retractable Headlights	Control unit, Left retractor motor
Ⓧ	PGM-FI	Main replay (IGP), ECU (IGP), Resistor, Injectors,
Ⓨ	Rear Window Defogger	Rear window defogger
Ⓩ	Heater	Blower motor,
ⒶⒶ	Power Door Locks	Control unit, Door lock actuator,
ⒶⒷ	Power Windows	Driver's door motor, Control unit,
ⒶⒸ	Power Windows	Right front door motor,
ⒶⒹ	Power Windows	Right rear door motor,
ⒶⒺ	Power Windows	Left rear door motor,

Ground Locations

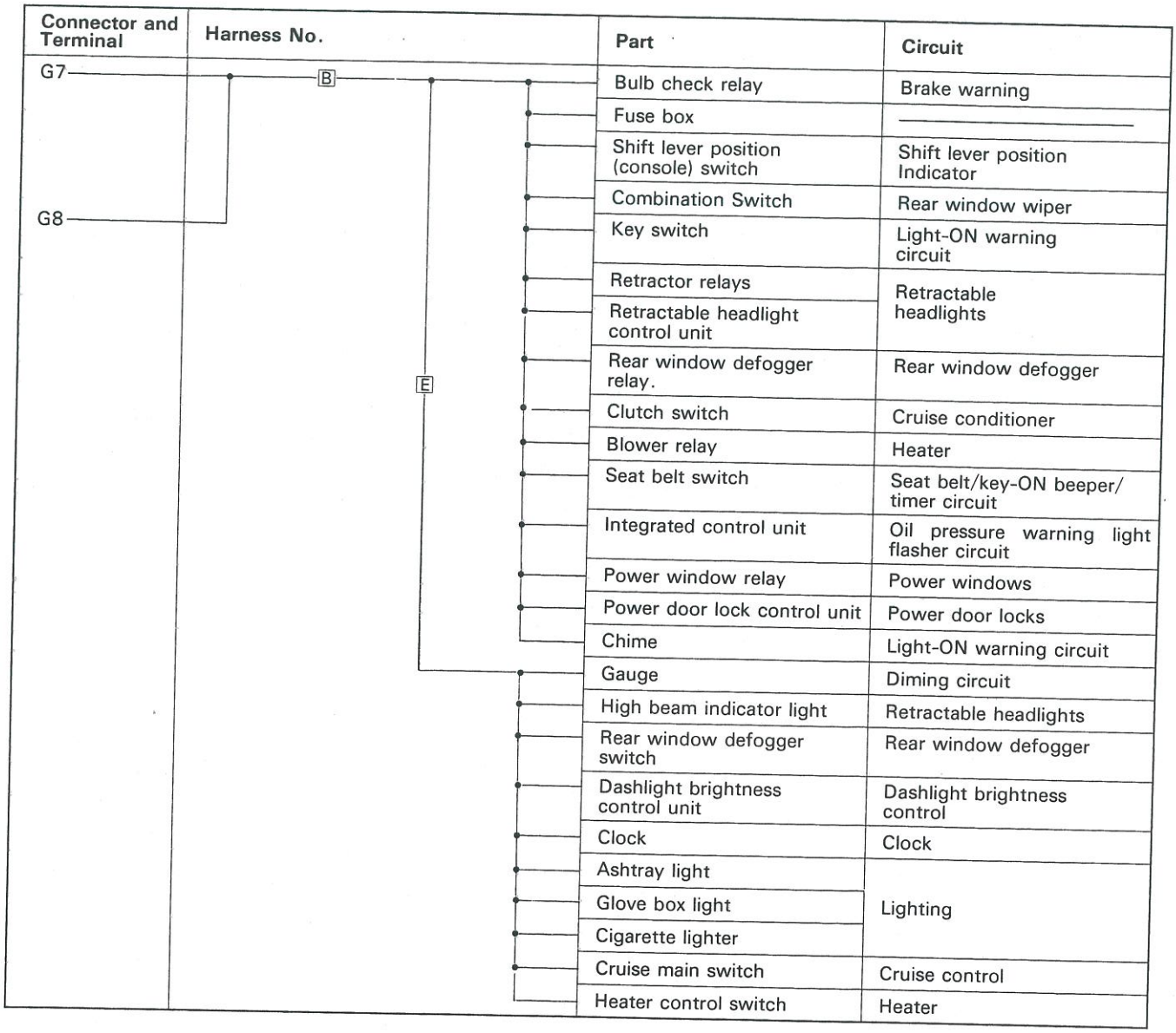
Circuit Identification



Connector and Terminal	Harness No.	Part	Circuit
G1, G2	A, B	Main relay	PGM-FI
		PGM-FI control unit. (PG1, PG2)	
	A, B	PGM-FI control unit (LG1, LG2)	
G3	C	Battery	———
G4	D	Engine	———
G5	B	Left headlight (Low beam, High beam)	Retractable headlights
		Left retractor motor	
		Windshield/Rear window washer motors	Wipers/Washers
		Front, left turn signal light	Turn signal/ Hazard light circuit
		Front, left side marker light	
		Brake fluid level switch	Brake warning
		Cruise actuator	Cruise control
G6	B	Right headlight (Low beam, High beam)	Retractable headlights
		Right retractor motor	
		Cooling fan switch	Cooling
		Windshield wiper motor	Wipers/Washers
		Front, right turn signal light	Turn signal/ Hazard light circuit
		Front, right side marker light	

A : Engine Wire harness
B : Main wire harness
C : Battery ground wire
D : Engine ground wire

Ground No.	Location	Where the wires go
G1	Center engine compartment	To Engine ground
G2	//	//
G3	Right front engine compartment	To Body ground
G4	Front engine compartment	
G5	Left under dash	//
G6	Right front engine compartment	//



Connector and Terminal	Harness No.	Part	Circuit
G7	B	Bulb check relay	Brake warning
		Fuse box	———
		Shift lever position (console) switch	Shift lever position Indicator
		Combination Switch	Rear window wiper
G8		Key switch	Light-ON warning circuit
		Retractor relays	Retractable headlights
		Retractable headlight control unit	
		Rear window defogger relay.	Rear window defogger
	E	Clutch switch	Cruise conditioner
		Blower relay	Heater
		Seat belt switch	Seat belt/key-ON beeper/ timer circuit
		Integrated control unit	Oil pressure warning light flasher circuit
		Power window relay	Power windows
		Power door lock control unit	Power door locks
		Chime	Light-ON warning circuit
		Gauge	Diming circuit
		High beam indicator light	Retractable headlights
		Rear window defogger switch	Rear window defogger
		Dashlight brightness control unit	Dashlight brightness control
		Clock	Clock
		Ashtray light	Lighting
		Glove box light	
		Cigarette lighter	
		Cruise main switch	Cruise control
		Heater control switch	Heater

B : Main wire harness

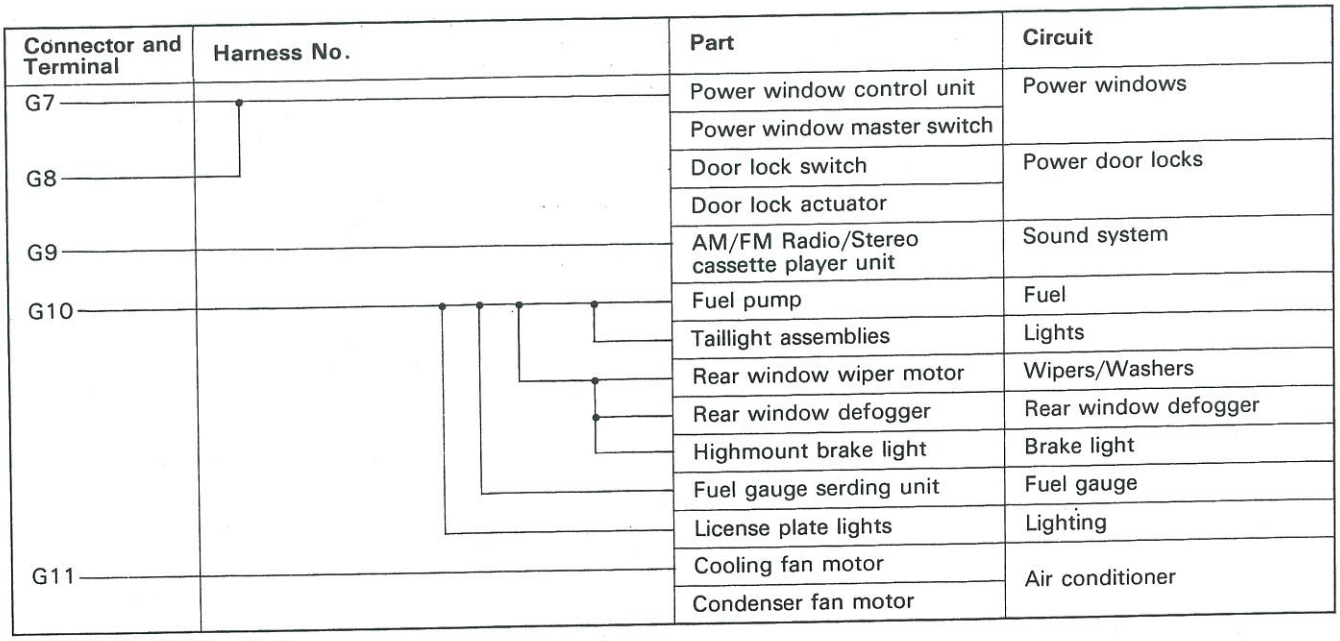
E : Dashboard wire harness

Ground No.	Location	Where the wires go
G7	Left under dash	To Body ground
G8	Right under dash	//

(cont'd)

Ground Locations

Circuit Identification (cont'd)



Connector and Terminal	Harness No.	Part	Circuit
G7		Power window control unit	Power windows
		Power window master switch	
G8		Door lock switch	Power door locks
		Door lock actuator	
G9		AM/FM Radio/Stereo cassette player unit	Sound system
G10		Fuel pump	Fuel
		Taillight assemblies	Lights
		Rear window wiper motor	Wipers/Washers
		Rear window defogger	Rear window defogger
		Highmount brake light	Brake light
		Fuel gauge serding unit	Fuel gauge
		License plate lights	Lighting
G11		Cooling fan motor	Air conditioner
		Condenser fan motor	

[E] : Dashboard wire harness
[F] : Driver's door wire harness
[G] : Rear wire harness
[H] : Hatch wire harness
[I] : Fuel gauge sending unit wire harness
[J] : License plate light wire harness
[K] : A/C wire harness

Ground No.	Location	Where the wires go
G7	Left under dash	To Body ground
G8	Right under dash	//
G9	Center under dash	//
G10	Center luggage area	//
G11	Left front engine compartment	//



Test

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 0–18V scale, Ammeter with 0–100A and 0–500A scales, and a carbon pile with 0–300W.
- 12V battery charger:
  Fast charge capability of 50A and slow charge capability of 5A.

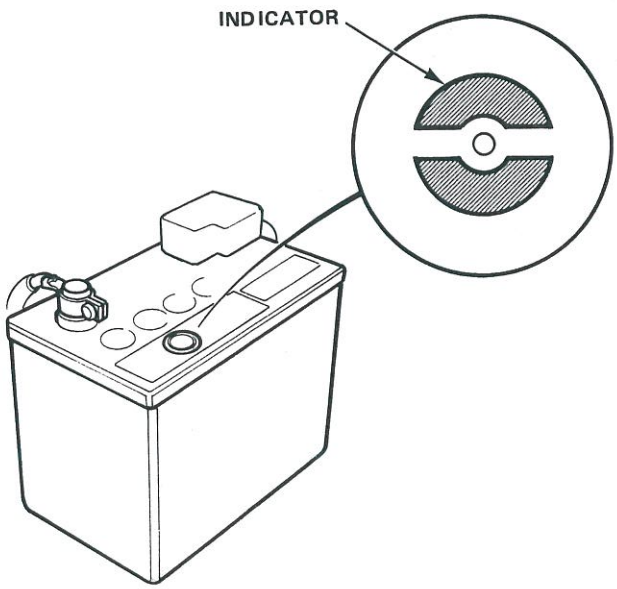
Test Procedure:

WARNING **Keep sparks, flames and cigarettes away while charging battery.**

CAUTION: Battery electrolyte is a sulfuric acid solution.

- If it spills on painted surfaces, clothing, or skin, rinse it off with water immediately to minimize the damage.
- Always wear safety goggles or a face shield when servicing a battery.

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 185 amps.
   When the load has been applied for exactly 15 seconds, the battery voltage reading should stay above 9.6V.

   - If the reading stays above 9.6V, the battery is OK; clean its terminals and case, and reinstall it.
   - If the reading is between 6.5 and 9.6V, 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 15.5V.

     – If the reading stays below 15.5V, the battery is OK; clean its terminals and case, and reinstall it.
     – If the reading exceeds 15.5V any time during the 3 minutes of fast charge, the battery is no good; replace it.

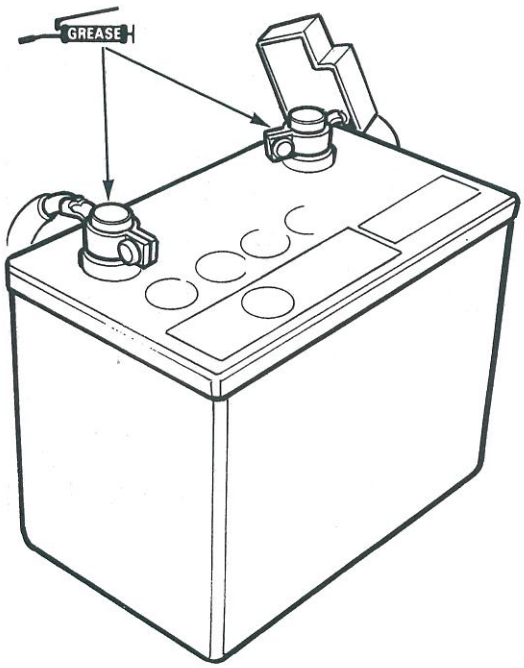
   - If the reading drops below 6.5, slow charge the battery by connecting a battery charge, at 5 amps for no more than 24 hours, (or until the indicator shows full charge, or the specific gravity of the electrolyte is at least 1.250).
     Then test load capacity again.

     – If the voltage stays above 9.6V, the battery is OK; clean its terminals and case, and reinstall it.
     – If the voltage still drops below 9.6V, the battery is no good; replace it.

Battery Installation Procedure:

- Keep the battery and terminals clean. If necessary, brush with baking-soda solution and flush with clean, lukewarm water. Check for loose terminal clamps.
- If clamps become corroded inside, clean out with a wire brush or coarse emery cloth.

NOTE: Coat terminals lightly with petroleum jelly to retard corrosion. Baking soda may be mixed with the jelly for additional protection against acid build-up.

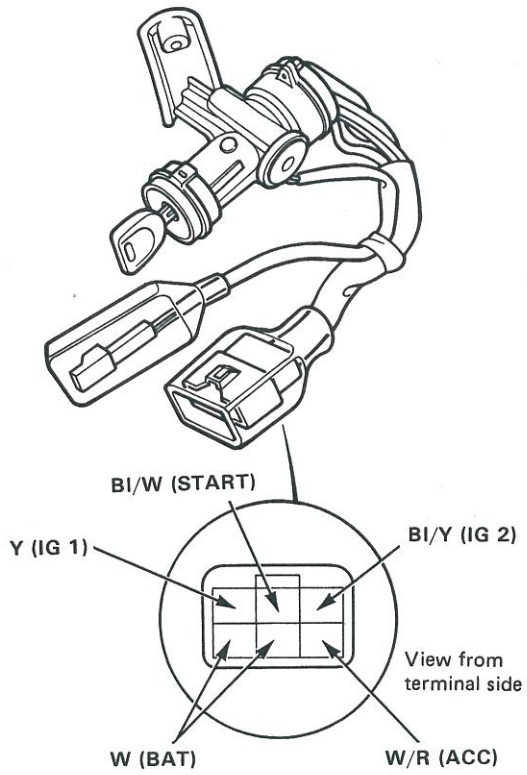


Ignition Switch

Test

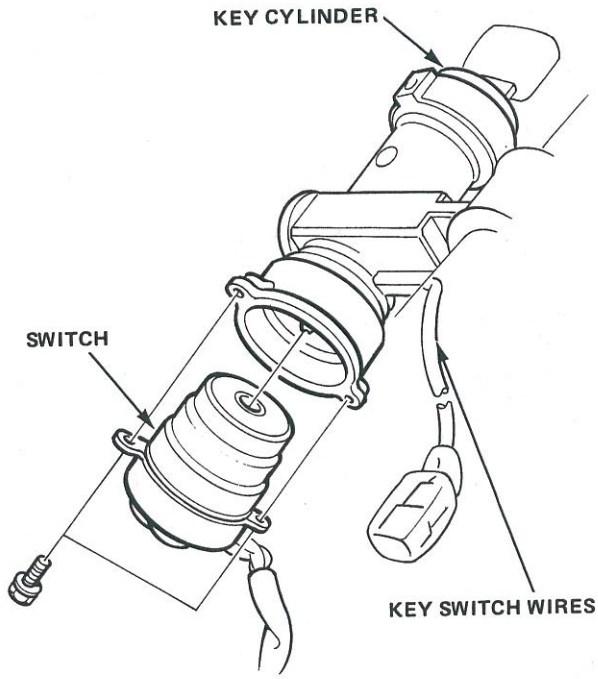
1. Disconnect the 6-P connector.
2. Check for continuity between the terminals in each switch position according to the table.

Terminal / Position	W/R (ACC)	W (BAT)	Y (IG1)	Bl/Y (IG2)	Bl/W (START)
0					
I	○——	——○			
II	○——	——○	——○	——○	
III		○——	——○		——○



Electrical Switch Replacement

1. Remove the column lower panel and cover.
2. Disconnect the 6-P connector.
3. Insert the key and turn it to "0".
4. Untape the key switch wires to free the switch base wires.
5. Remove the two bolts and replace the base of switch.
6. If necessary, replace the key cylinder.

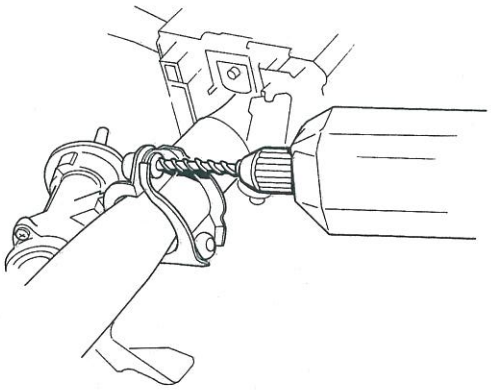


Steering Lock Replacement

1. Remove the steering column covers.
2. Disconnect the ignition switch connectors.
3. Center punch each of 2 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 bolt heads.

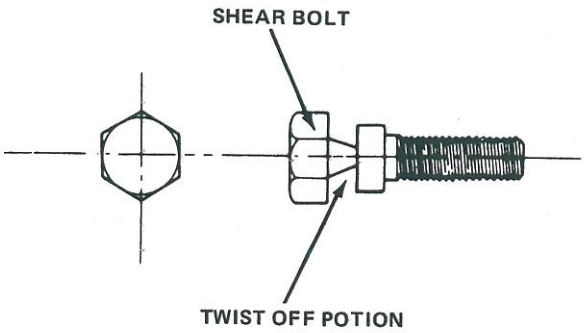
4. Remove the shear bolts from the switch body.



5. Install the new ignition switch without the key inserted.
6. Loosely tighten the new shear bolts.

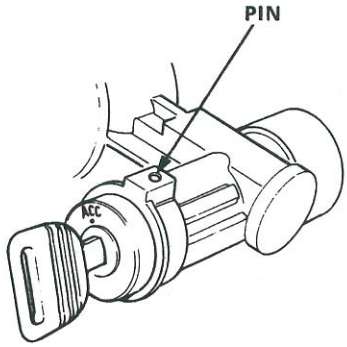
   NOTE: Make sure the projection on the ignition switch is aligned with the hole in the steering column.

7. Insert the ignition key and check for proper operation of the steering wheel lock and that the ignition key turns freely.
8. Tighten the shear bolts until the hex heads twist off.

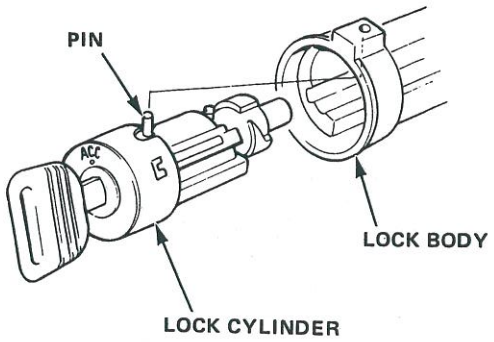


Lock Cylinder Replacement

1. Remove the ignition switch.
2. Turn the ignition key to "I".
3. Push the pin in and remove the lock cylinder from the lock body.



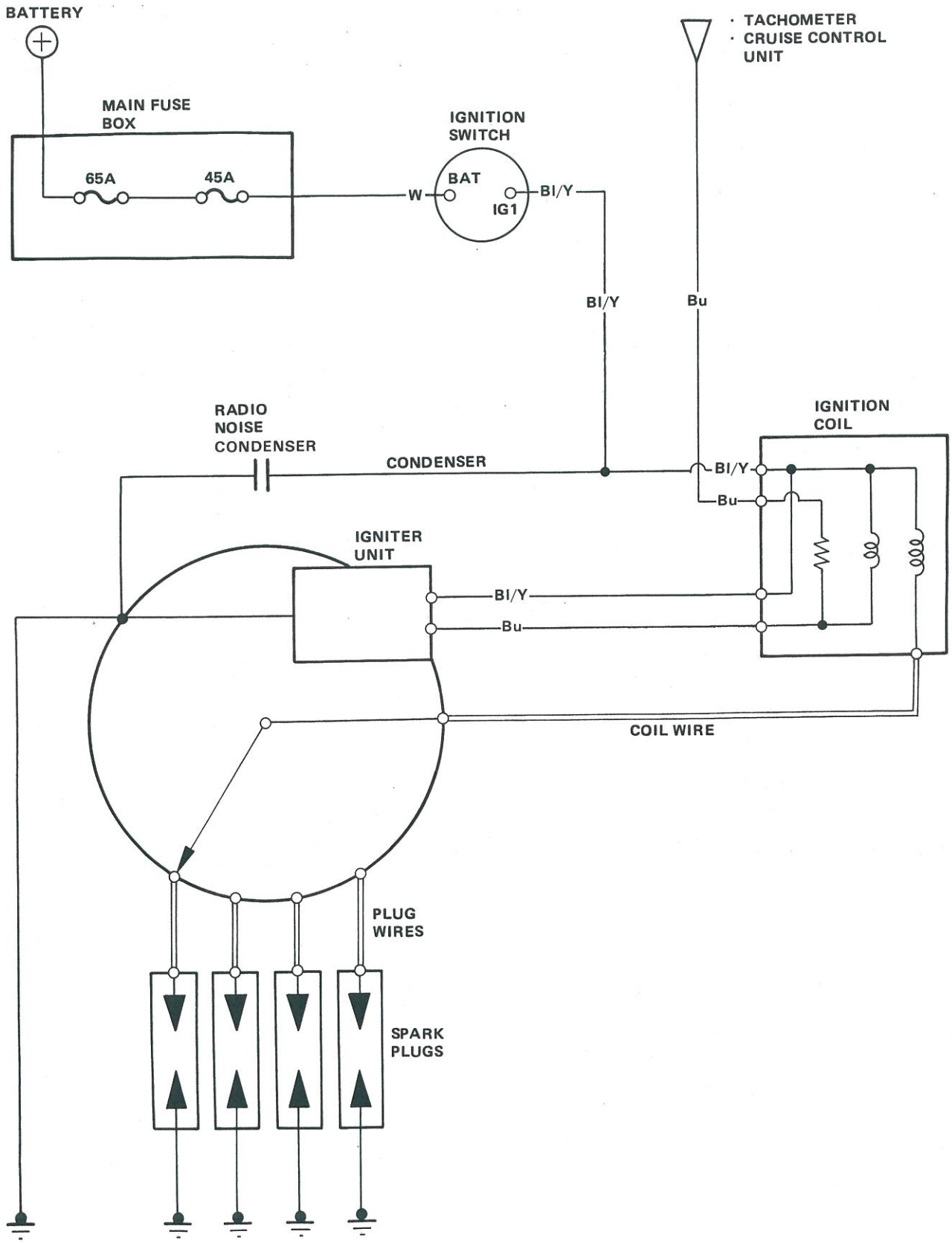
4. Turn the key to LOCK and align the lock cylinder with the lock body.
5. Turn the key almost to "I" and insert the lock cylinder until the pin touches the body.
6. Turn the key to the "I" push the pin and insert the lock cylinder into the lock body until the pin clicks into place.



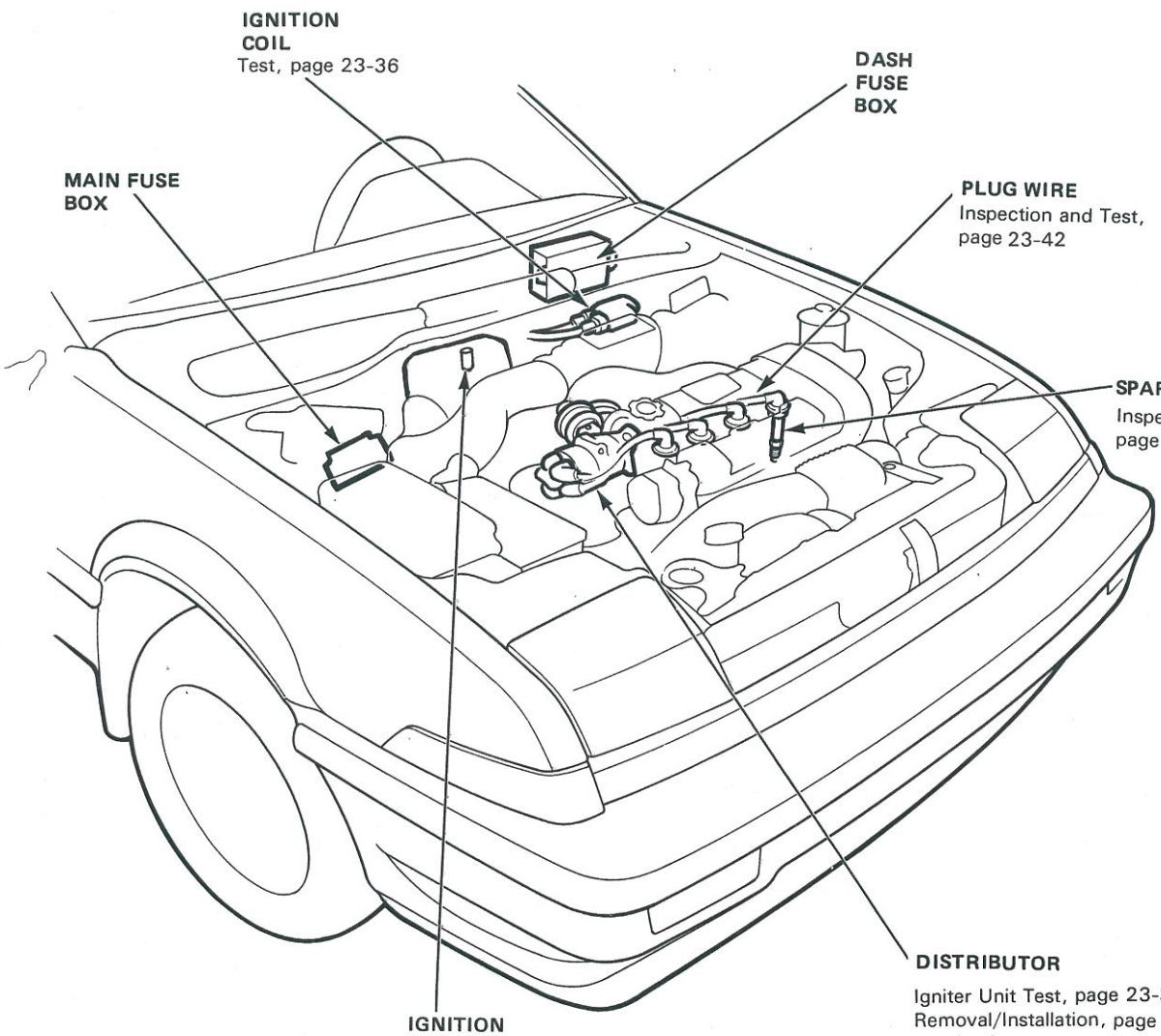
7. Install the ignition switch.

Ignition System

Circuit Diagram



Component Location Index



IGNITION COIL
Test, page 23-36

DASH FUSE BOX

MAIN FUSE BOX

PLUG WIRE
Inspection and Test, page 23-42

SPARK PLUGS
Inspection, page 23-43

IGNITION CONTROL SOLENOID VALVE (In Control Box)
Inspection, page 23-35

DISTRIBUTOR
Igniter Unit Test, page 23-37
Removal/Installation, page 23-38
Overhaul, page 23-41
Advance Diaphragm Inspection, page 23-33
Top End Inspection, page 23-36

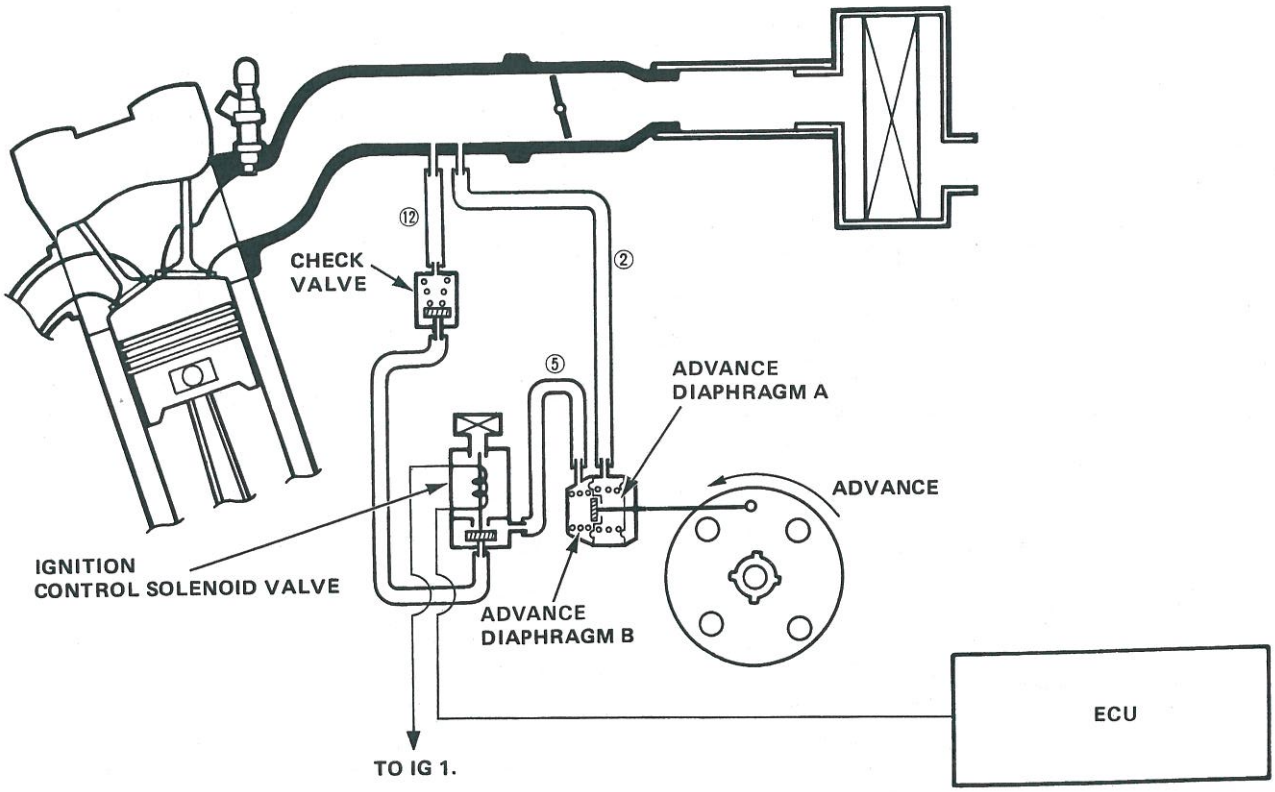
Ignition System

Timing Control

Description:

Ignition timing control, combined with the internal distributor control (centrifugal advance), affects the time at which each spark plug ignites the air-fuel mixture, in accordance with engine speed, load and coolant temperature.
This control system gives vacuum advance in response to the manifold vacuum and coolant temperature. This optimizes ignition timing during and after engine warm-up to control emission levels while maximizing fuel economy and engine performance.

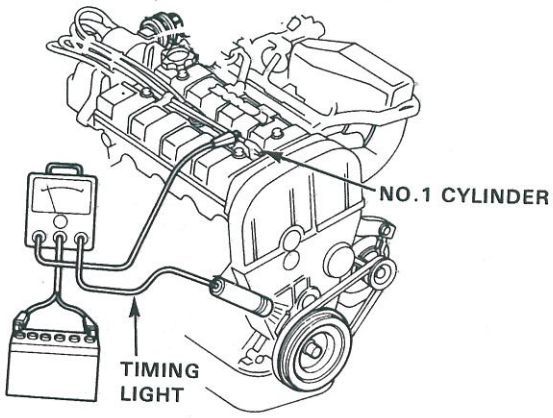
This distributor has two separate vacuum advance diaphragms which operate on manifold vacuum. Diaphragm B also has a solenoid valve (ignition control solenoid valve) in the line. It is operated by the ECU which receives signals from the engine coolant temperature, engine speed and manifold vacuum. When the solenoid valve is open, it sends vacuum to Diaphragm B to improve cold engine performance.



Ignition Timing Inspection and Setting

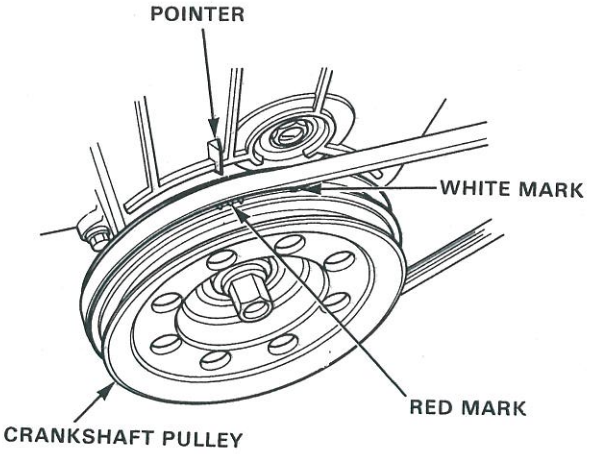
1. Start the engine and allow it to warm up (cooling fan comes on).

2. Connect a timing light to the engine. At idle, point the timing light toward the pointer and the crankshaft pulley.

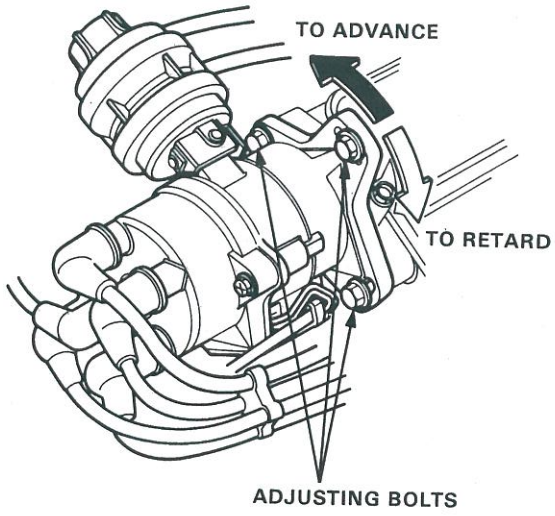


3. Disconnect and plug the # 2 and # 5 vacuum hoses from the vacuum advance diaphragm.

   The pointer should be on the white mark (0°±2°) on the crankshaft pulley.



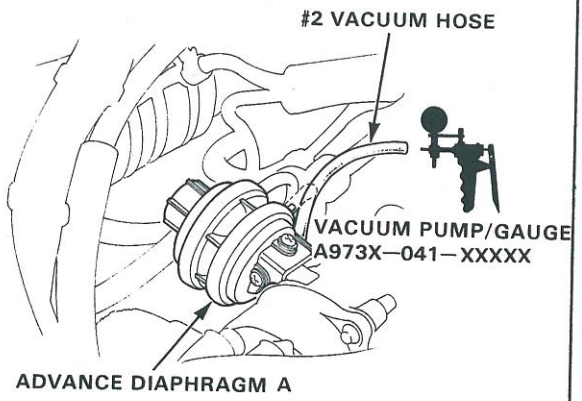
- If not, adjust by loosen the distributor adjusting bolts, and turn the distributor housing counter-clockwise to advance the timing or clockwise to retard the timing.



4. After rechecking the timing, install the cap on the upper adjusting bolt.

5. Unplug the # 2 vacuum hose and check for vacuum.

   Vacuum should be approx. 500 mmHg (20 in. Hg).



- If the vacuum is not specified, check hose and its port on the throttle body.

6. Connect the # 2 vacuum hose to advance diaphragm.

   The timing should advance 6°±2° (1/2 way between the white and red marks).

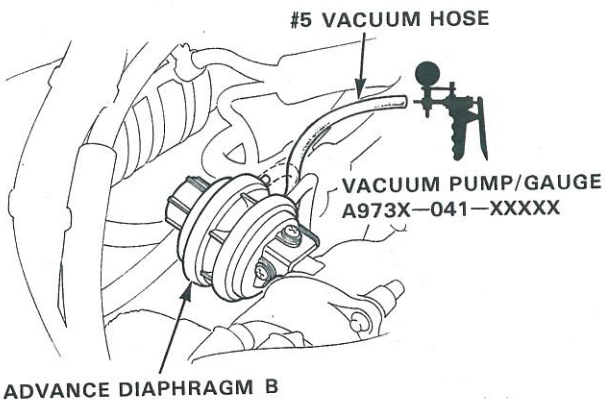
- If it does not advance, go to advance diaphragm inspection (page 23-34).

(cont'd)

Ignition Timing Inspection and Setting (cont'd)

7. Unplug the # 5 vacuum hose and check for vacuum.

   The #5 hose should have vacuum.



   - If the hose has no vacuum, go to the ignition control solenoid valve test I (page 23-35).

8. Rapidly open and release the throttle.
   The vacuum should be momentarily go to 0.
   - If the vacuum does not go to 0, go to the ignition control solenoid valve test II (page 23-35).

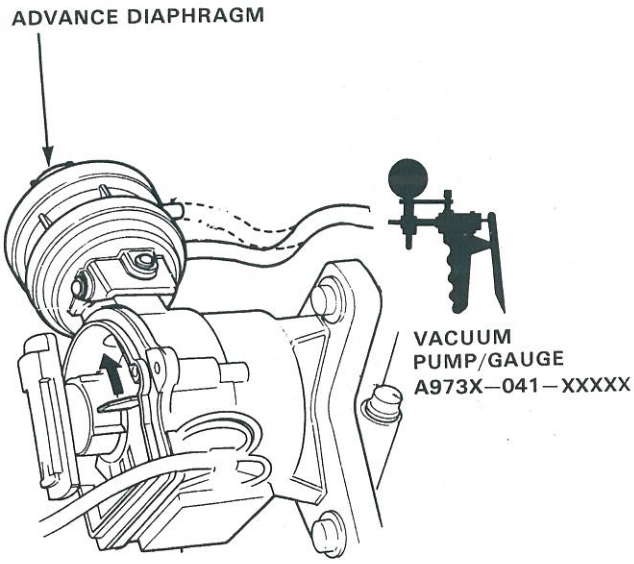
9. Connect the # 5 vacuum hose to advance diaphragm.

   The timing should advance 12°±2° (on the red mark).
   - If it does not advance, go to advance diaphrgm inspection .

Advance Diaphragm Inspection

1. Remove the distributor cap and vacuum hoses (#2, #5) from the advance diaphragm.

2. Connect a vacuum pump/gauge to advance diaphragm A (inside port).



When vacuum (more than 500 mHg, 20 in.Hg) is applied to the diaphragm,the stator should turn counterclockwise and stay. If the stator does not turn or stay, replace the diaphragm.

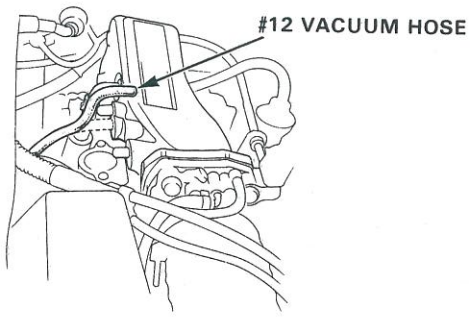
When vacuum is released, the stator should return.If the stator does not return, repair or replace as necessary.

Repeat step 1—3 for advance diaphragm B (outside port).

Ignition Control Solenoid Valve Test

Test Ⅰ:

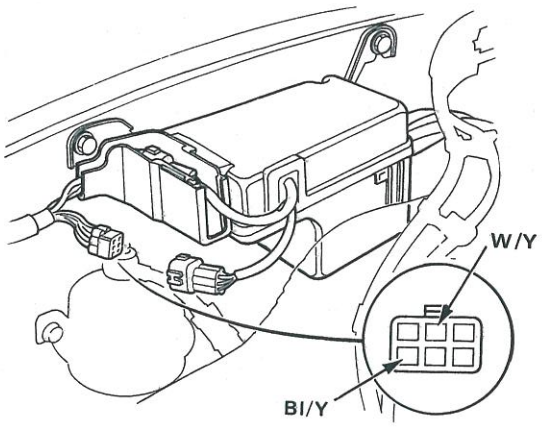
1. Start the engine and warm up the engine to normal operating temperature (the cooling fan comes on).
2. Disconnect the # 12 vacuum hose from the intake manifold and check the vacuum.



- If there is no vacuum, check the vacuum port.
- If there is vacuum, check the vacuum line for proper connection, cracks, blockage or disconnected hose.

— If the vacuum line is OK, re-connect the #12 vacuum hose.

3. Disconnect the 6-P connector.
4. Attach the positive probe of the voltmeter to BI/Y terminal of the connector, an the negative probe to W/Y terminal. Check for voltage at idle.



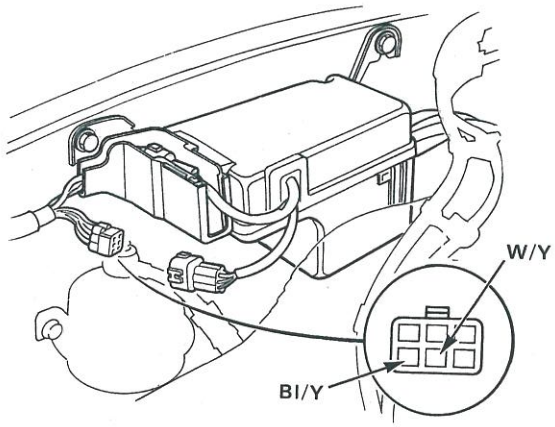
- If there is voltage, replace the solenoid valve and re-test.
- If there is no voltage, attach the positive probe of the voltmeter to BI/Y terminal of the connector, and negative probe to body ground. Check the voltage.

— If there is no voltage, repair open or short in BI/Y wire between the solenoid valve and NO.4 fuse (10A).

— If there is voltage, inspect open in W/Y wire between the solenoid valve and ECU.
If wire is OK, see ECU troubleshooting (page 11-8).

Test Ⅱ:

1. Start the engine and warm up the engine to normal operating temperature (the cooling fan comes on).
2. Disconnect the 6-P connector.
3. Attach the positive probe of the voltmeter to BI/Y terminal of the connector, and the negative probe to W/Y terminal. Check for voltage at idle.



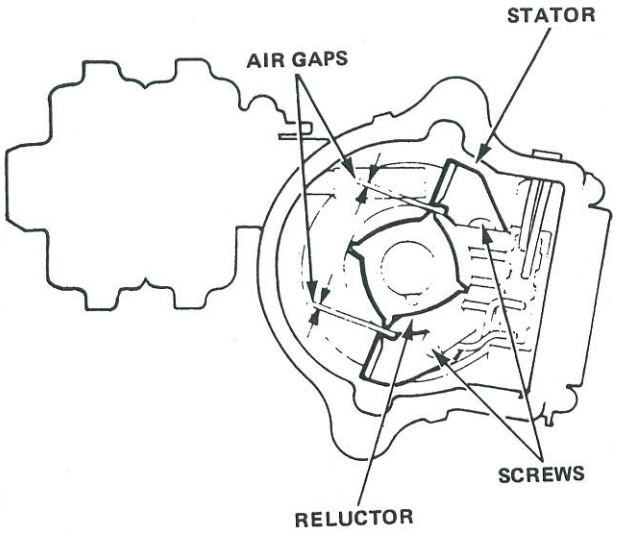
4. Rapidly open and release the throttle.

The voltage should momentalily go to O.

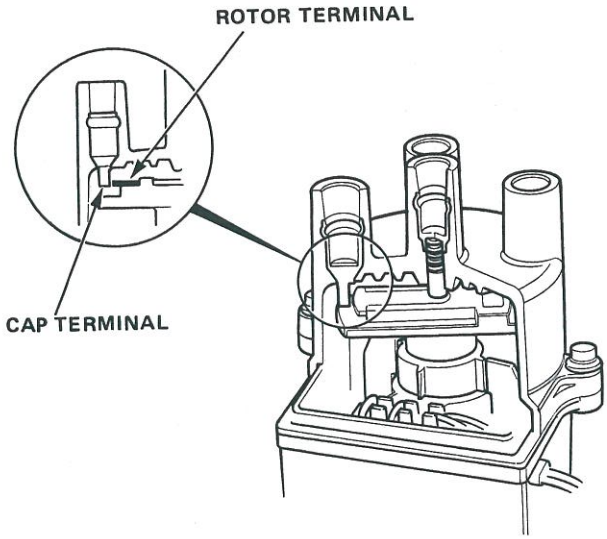
- If the voltage is not specified, inspect short in W/Y wire between the solenoid valve and ECU.
- If the voltage does, replace the solenoid valve and re-test.

Distributor Top End Inspection

1. Check to be sure that the air gaps are equal.
2. If necessary, back off the screws and move the stator as required to adjust.



3. Check for rough or pitted rotor and cap terminals.
4. Scrape or file off the carbon deposits. Smooth the rotor terminal with an oil stone or #600 sandpaper if rough.
5. Check the distributor cap for cracks, wear and damage. If necessary, clean or replace it.

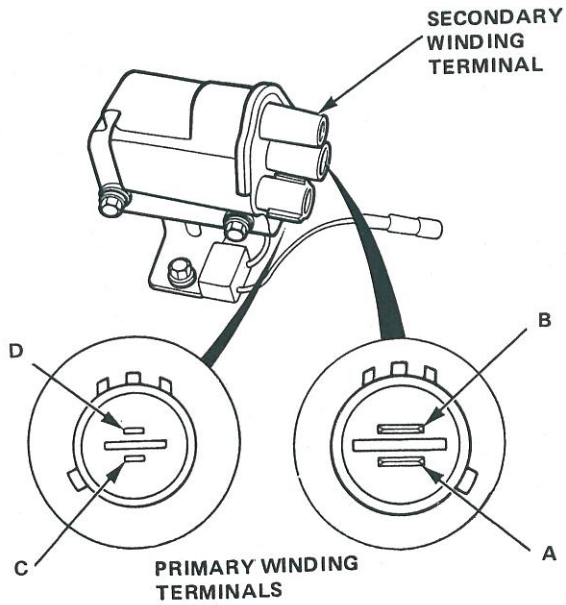


Ignition Coil Test

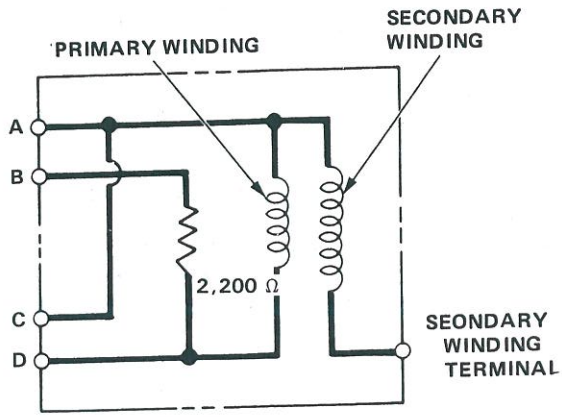
1. With the ignition switch OFF, disconnect the primary connectors and the coil wire.
2. Using an ohmmeter, measure resistance between the terminals. Replace the coil if the resistance is not within specifications.

NOTE: Resistance will vary with the coil temperature; specifications are at 20°C (70°F).

Primary Winding Resistance (between the A and D terminals):
1.215—1.485 ohms
Secondary Winding Resistance (between the A and secondary winding terminal:
9,040—13,560 ohms
Resistance between the B and D terminals:
Approx. 2,200 ohms

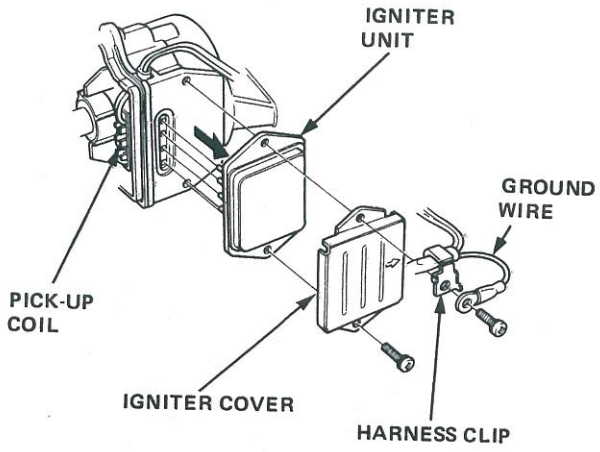


3. Check for continuity between A and C terminals. Replace the coil if there is no continuity.

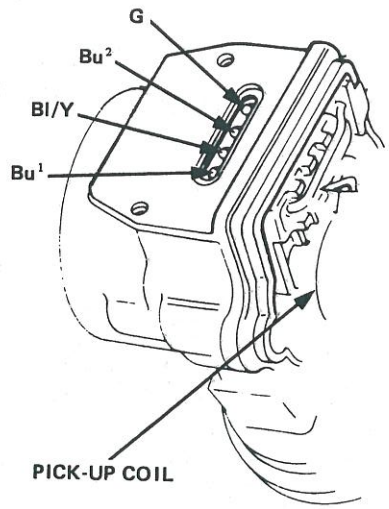


Igniter Unit Test

1. Remove the igniter cover and pull out the igniter unit.



2. Check voltage between the Bu[1] terminal and body ground, then the Bl/Y terminal and body ground, with the ignition switch ON.
There should be battery voltage.

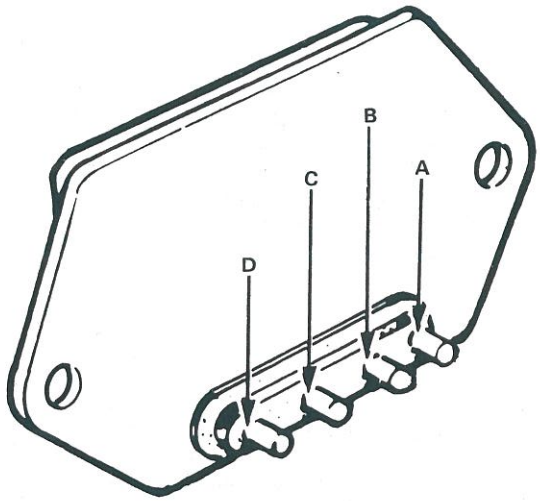


3. Measure resistance between the G and Bu[2] terminals on the pick-up coil. Replace the pick-up coil if the resistance is not within specifications.

NOTE: Resistance will vary with the pick-up coil temperature.

Pick-up Coil Resistance:
750 ± 100 ohms at 20°C (70°F)

4. Check for continuity in both directions between A and B terminals on the igniter output. (R x 100 scale).
There should be continuity in only one direction.



IGNITER UNIT (Ground)

5. Connect ohmmeter positive probe to D terminal, and negative probe to the igniter unit (ground), then measure resistance on the igniter input.

NOTE: Resistance will vary with the unit temperature.

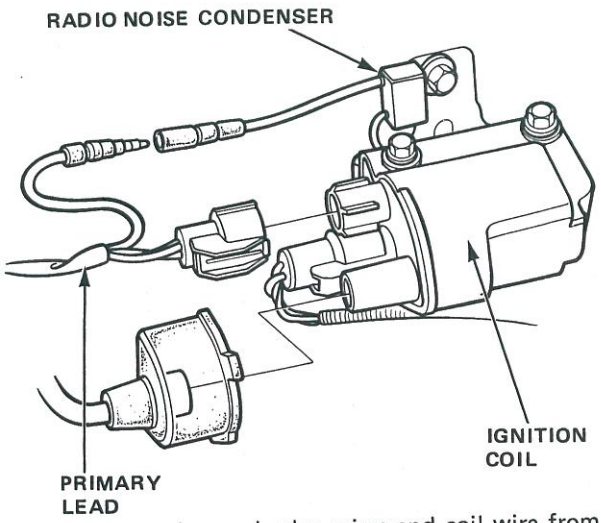
Igniter Input Resistance:
50,000 ohms or more at 20°C (70°F)

NOTE: When installing the igniter, pack silicone grease in the connector housing.

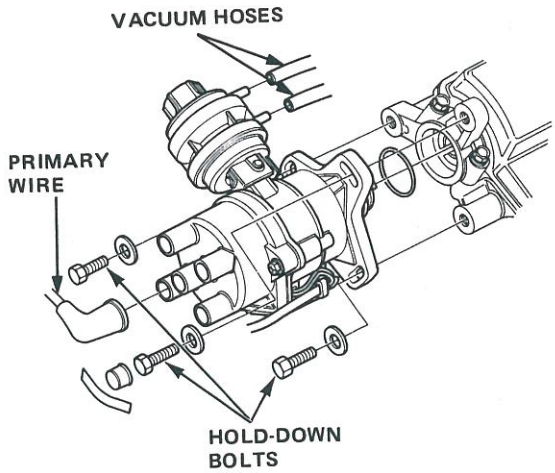
Distributor Removal/Installation

Removal

1. Disconnect the primary lead from the ignition coil and radio noise condenser.



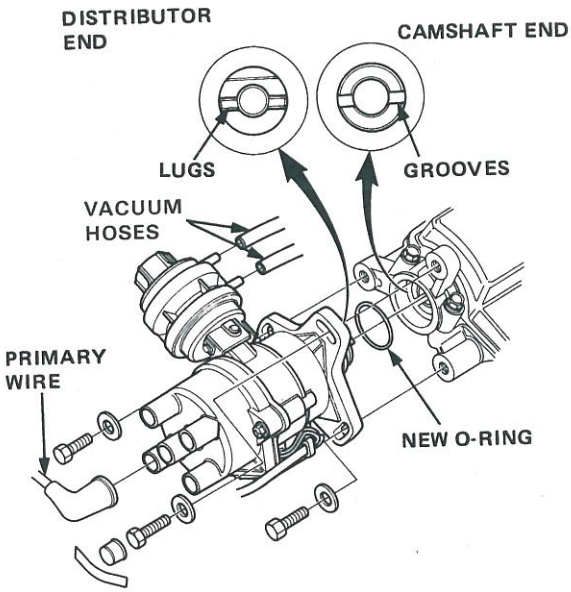
2. Disconnect the spark plug wires and coil wire from the distributor cap.
3. Disconnect the vacuum hoses from the advance diaphragm.
4. Remove the distributor hold-down bolts then remove the distributor from the cylinder head.



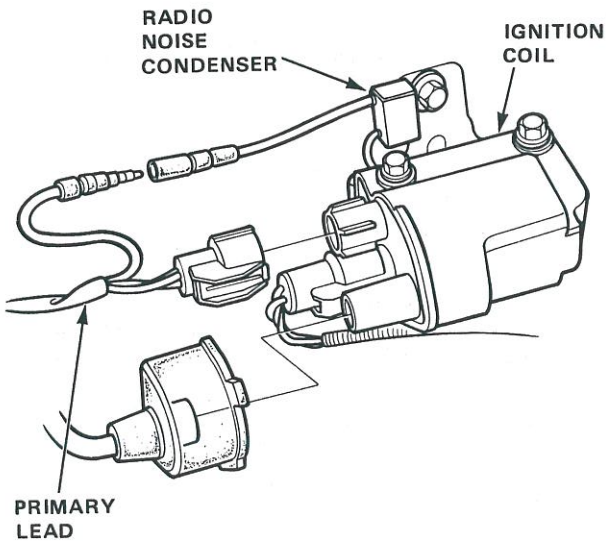
Installation

1. Coat a new O-ring with engine oil then install it.
2. Slip the distributor into position.

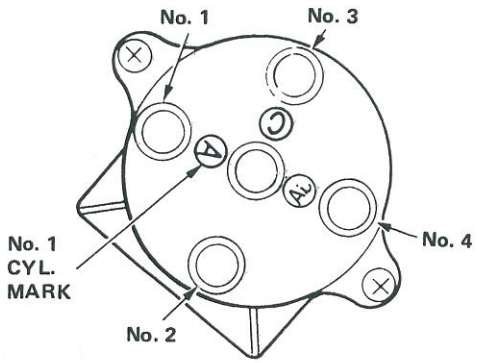
NOTE: The lugs on the end of the distributor and its mating grooves in the camshaft end are both offset to eliminate the possibility of installing the distributor 180° out of time.



3. Install the adjusting bolts, then tighten temporarily.
4. Connect the coil wire.
5. Connect the primary lead to the ignition coil and radio condenser.



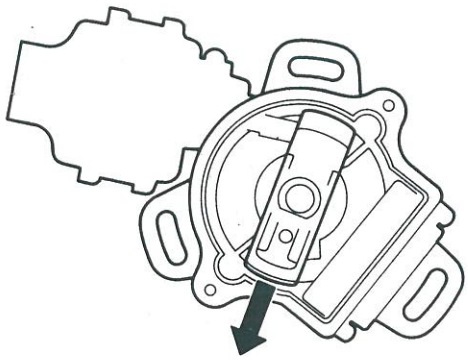
6. Connect the spark plug wires as shown.



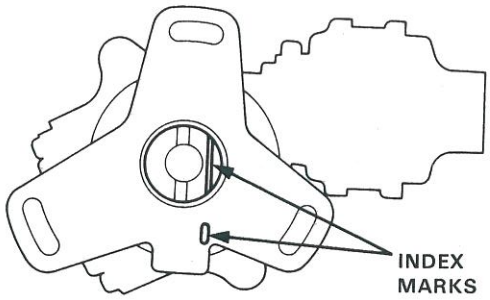
7. Set the timing with a timing light as shown on page 23-33.
8. After adjusting, tighten the adjusting bolts, then install the cap on the upper adjusting bolt.

Distributor Coupling Installation

1. Install the rotor, then turn it so that if faces in the direction shown (toward the No. 1 cylinder).



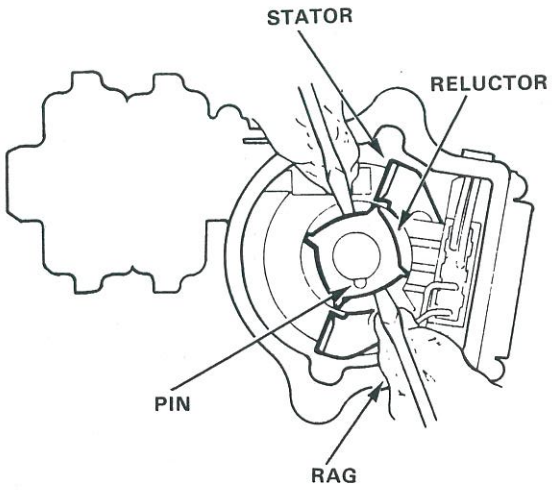
2. Set the thrust washer and coupling on the shaft.
3. Check that the rotor is still pointing toward No. 1 cylinder, then align the index mark on the housing with the index mark on the coupling.



4. Drive in the pin and secure it with the pin retainer.

Reluctor Replacement

1. Carefully pry up the reluctor by using two screw drivers as shown. Do not damage the reluctor and stator.

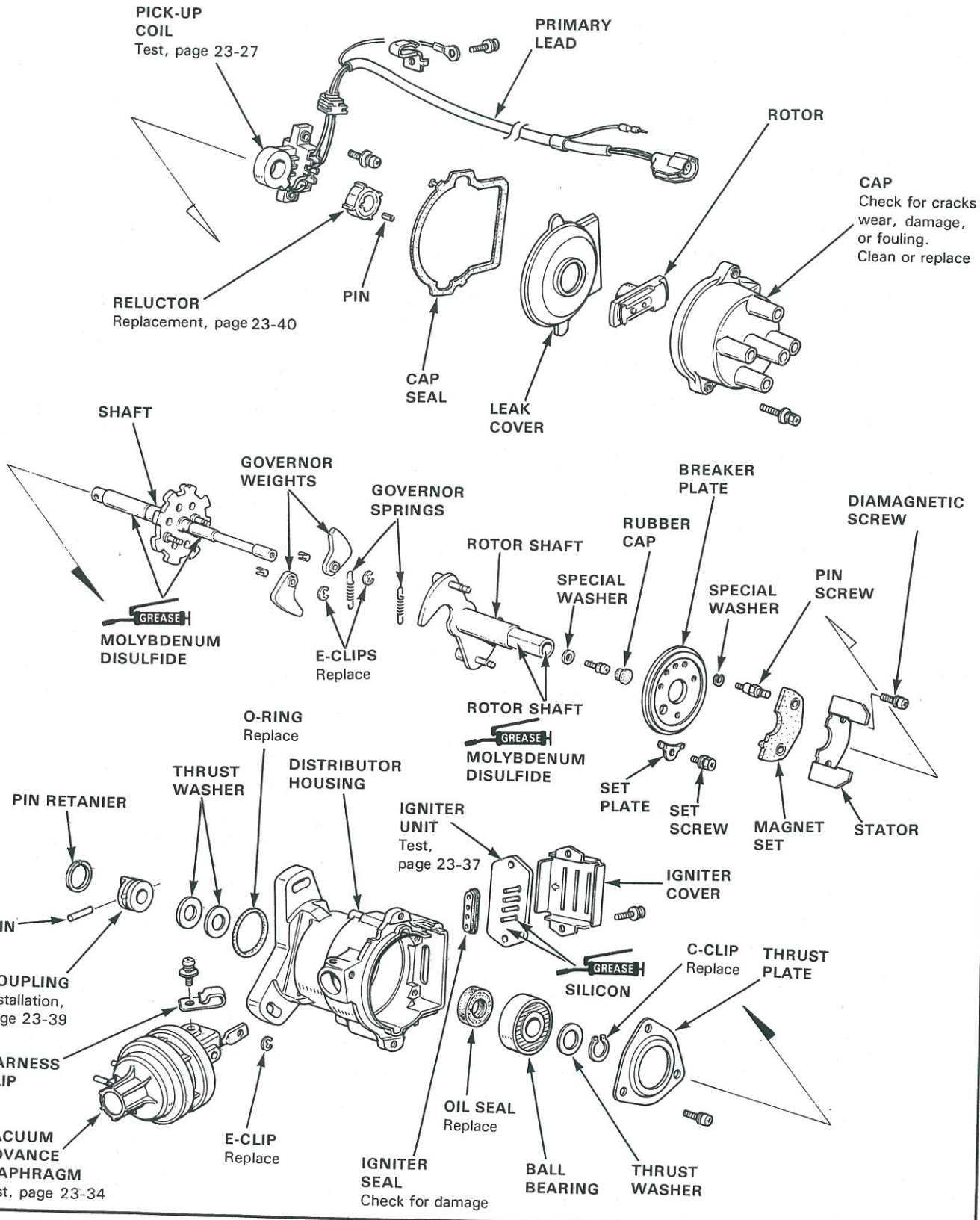


2. When installing the reluctor, be sure to drive in the pin with its gap away from the shaft.

   NOTE: The number or letter manufacturing code on the reluctor must always face up.

Distributor Overhaul

NOTE: After installing the reluctor, adjust the air gaps between the stator and reluctor.



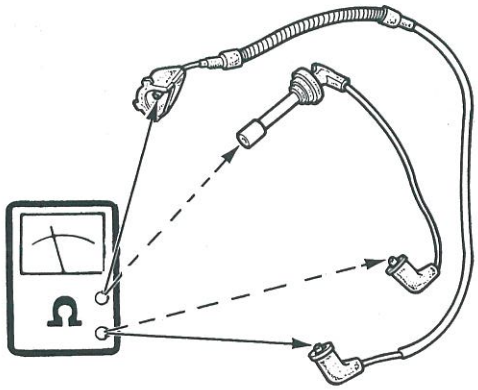
Ignition System

Ignition Wire Inspection and Test

CAUTION: Carefully remove the ignition wires by pulling on the rubber boots. Do not bend the wire or the conductor may be broken.

1. Check 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/Coil Wire Resistance:
25,000 ohms max at 20°C (70°F)

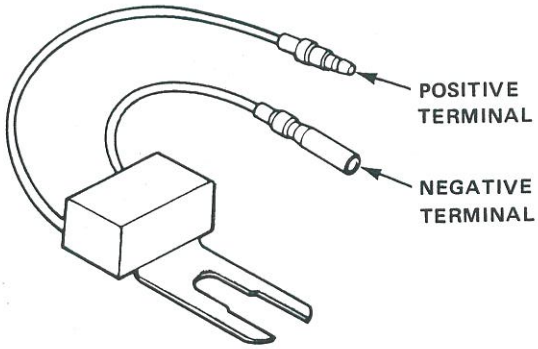


3. If the resistance exceeds 25,000 ohms, replace the ignition wire or coil wire.

Radio Noise Condenser Capacity Test

1. Use a commercially available condenser tester. Connect the tester probes and measure condenser capacity.

Condenser Capacity: 0.47 ± 0.09 microfarads (μF)

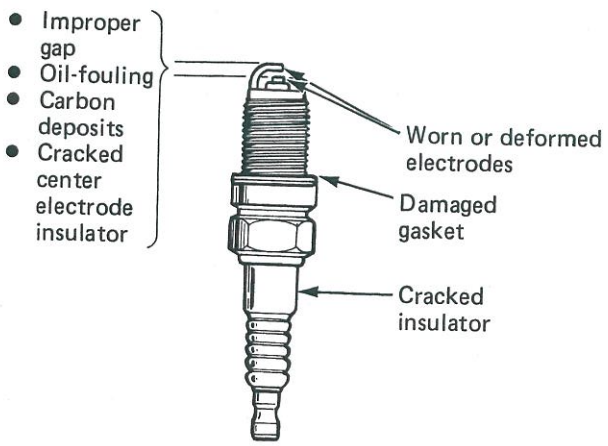


NOTE: The radio noise condenser is intended to reduce ignition noise; however, condenser failure may cause the engine to stop running.

2. If not within the specifications, replace the radio noise condenser.

Spark Plug Inspection

1. Inspect the electrodes and ceramic insulator for:



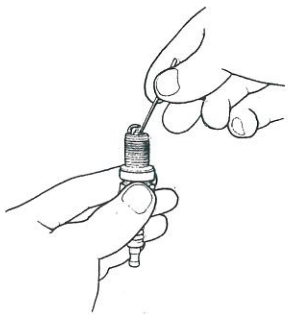
Burned or worn electrodes may be caused by:

- Lean fuel mixture
- Advanced ignition timing
- Loose spark plug
- Plug heat range too high
- Insufficient cooling

Fouled plug may be caused by:

- Rich fuel mixture
- Retarded ignition timing
- Oil in combustion chamber
- Incorrect spark plug gap
- Plug heat range too low
- Excessive idling/low speed running
- Clogged air cleaner element
- Deteriorated ignition coil, coil wire or ignition wire

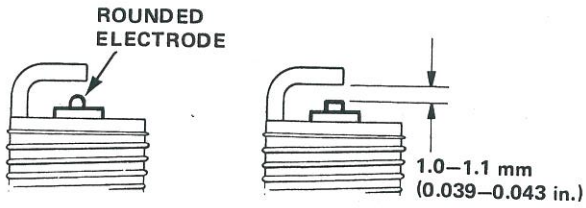
2. Clean the electrodes with a spark plug cleaning machine, or with a wire brush. Clean between the outer shell and center insulator with a stiff wire as shown. Clean plug threads with a wire brush.



3. Replace the plug if the center electrode is rounded as shown below.

Standard Plug :

For all normal driving	BCPR6EY—11 (NGK), Q20PR—U11 (ND), BCPR6EY—N11 (NGK)
For hot climates or continuous high speed driving	BCPR7EY—11 (NGK), Q22PR—U11 (ND), BCPR5EY—N11 (NGK)
For cold climates	BCPR5EY—11 (NGK), Q16PR—U11 (ND), BCPR5EY—N11 (NGK)



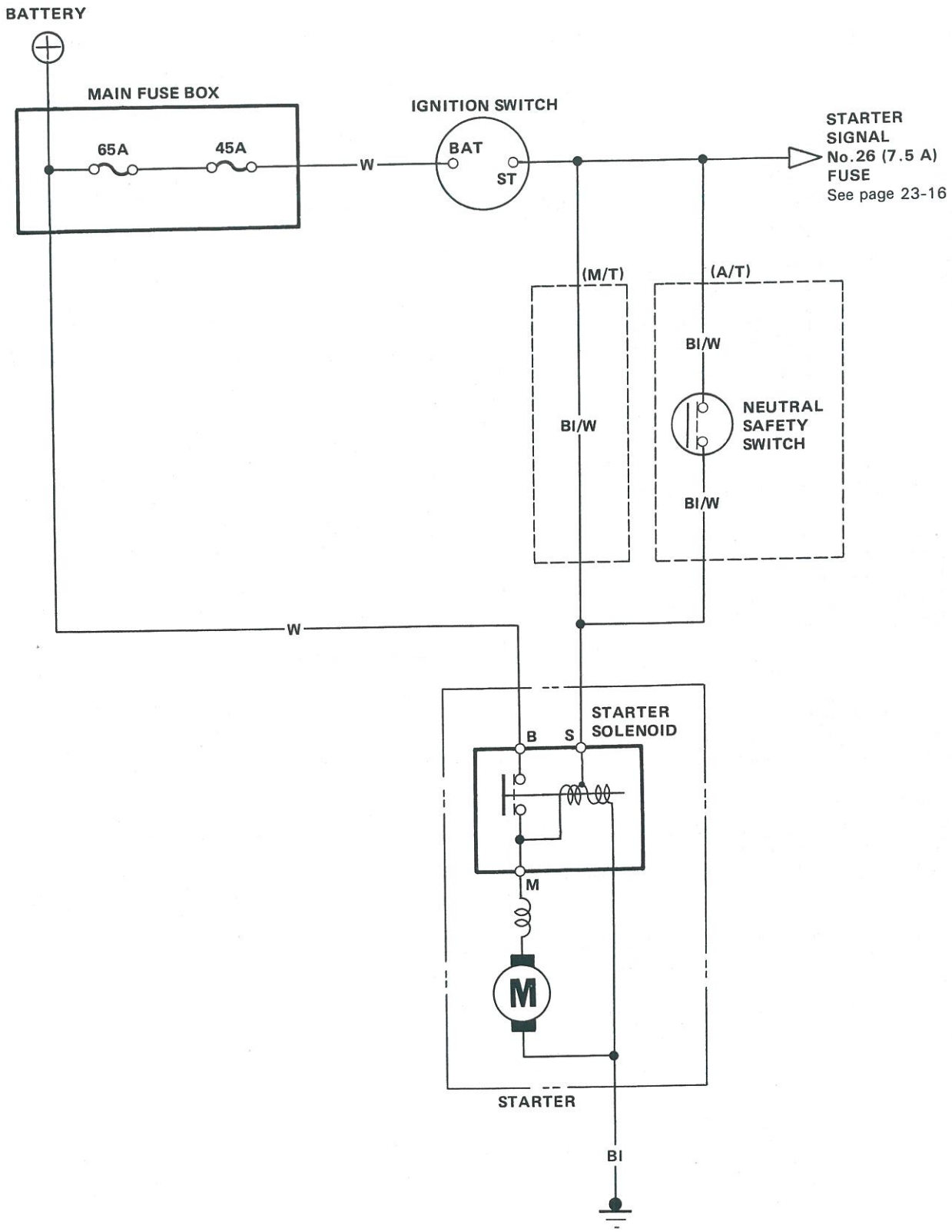
4. Adjust the gap with a suitable gapping tool.

   Electrode Gap: 1.0—1.1 mm (0.039—0.043 in.)

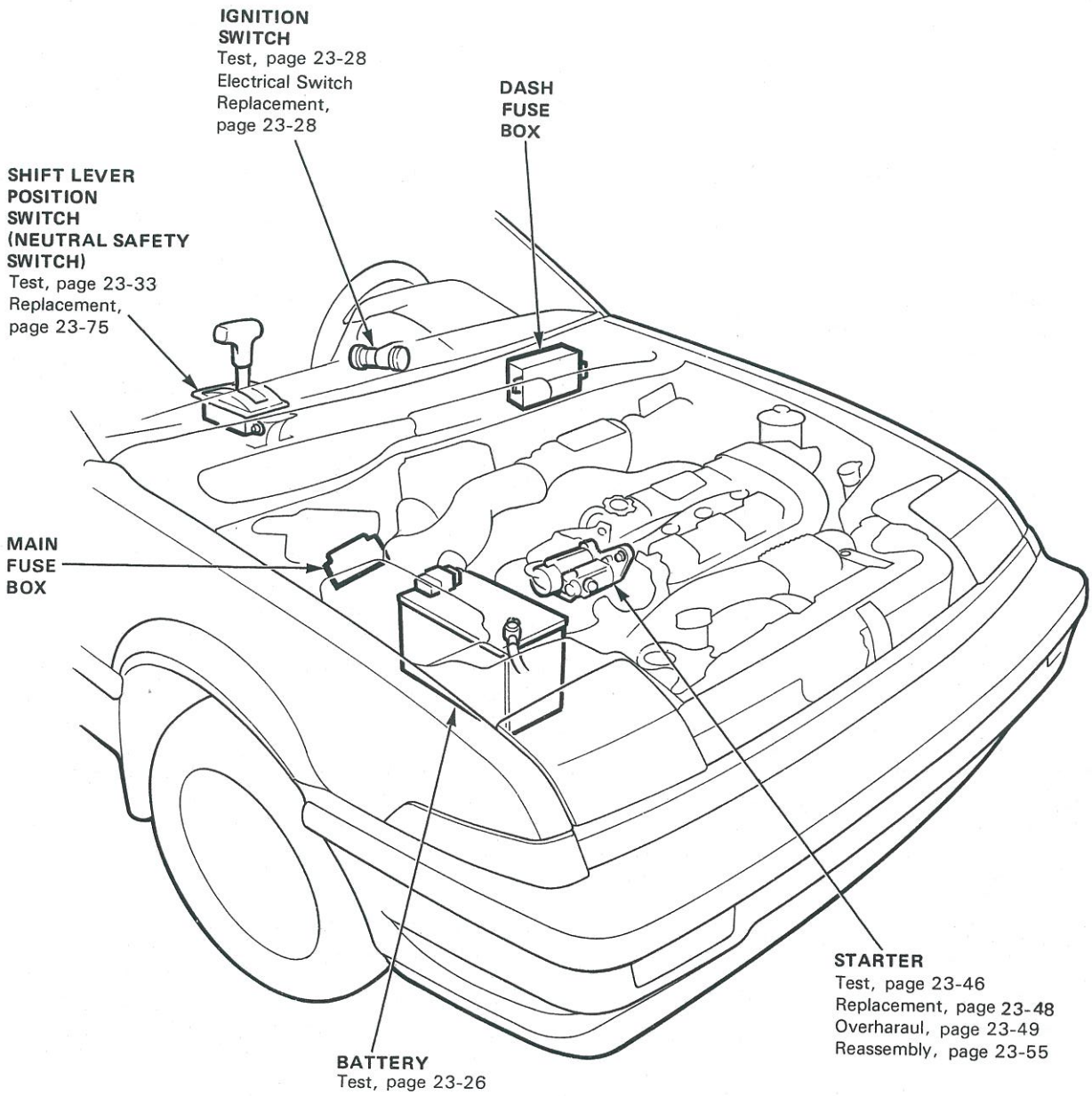
5. Screw the plugs into the cylinder head finger tight, then torque them to 18 N·m (1.8 kg-m, 13 lb-ft).

   NOTE: Apply a small quantity of anti-seize compound to the plug threads before installing.

Circuit Diagram



Component Location Index



Starter Test

NOTE: The air temperature must be between 15 and 38°C (59 and 100°F) before testing.

Recommended Procedure:

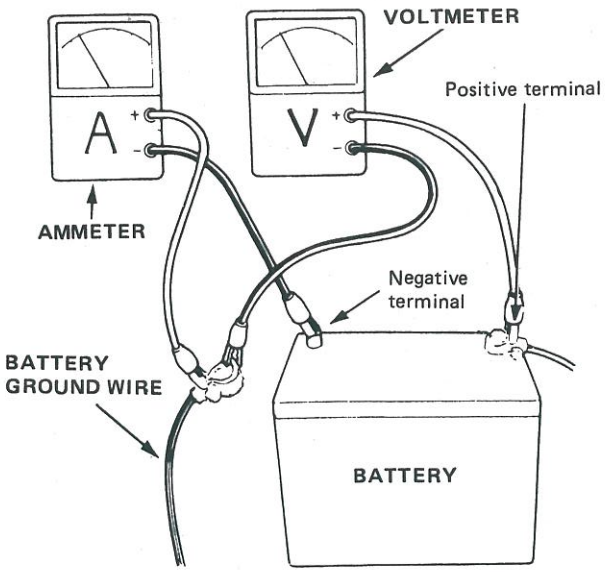
Use a starter system tester.
Connect and operate the equipment in accordance with manufacturer's instructions.
Test and troubleshoot as described starting with step 2.

Alternate Procedure:

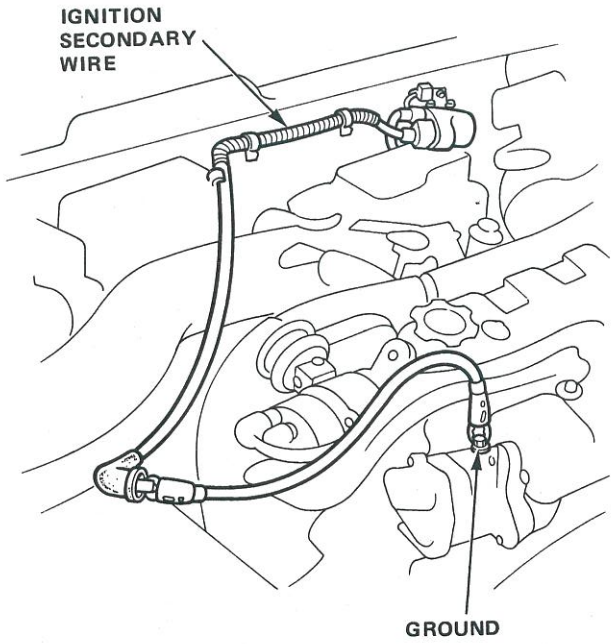
Use the following equipment:

- Ammeter, 0–400A
- Voltmeter, 0–20V (accurate within 0.1 volt)
- Tachometer 0–1200 rpm

1. Hook up voltmeter and ammeter as shown.



2. Disconnect the ignition coil secondary wire from the distributor, and ground it.



3. Check the starter engagement.
Turn the ignition switch to "III". The starter should crank the engine.

- If the starter does not crank the engine, check the battery, the battery positive cable and ground, and the cable connections for looseness or corrosion.

- Test again.
If the starter still does not crank the engine, bypass the ignition switch circuit as follows:
Unplug the connector (BI/W wire) from the starter. Connect the 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 wire in the BI/W wire circuit between the starter and ignition switch, and connectors. Check the ignition switch. On cars with automatic transmission, check the neutral safety switch and connectors.

4. 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 overrunnning clutch for binding or slipping when the armature is rotated with the drive gear held. Replace the gears if damaged.

5. Check cranking voltage and current draw.

   Voltage should be no less than 8 volts.
   Current should be no greater than 350 amperes.

   If voltage is too low, or current draw too high, check for:

   - Battery fully charged.
   - Open circuit in starter armature commutator segments.
   - Starter armature dragging.
   - Shorted armature winding.
   - Excessive drag in engine.

6. Check cranking rpm.

   Engine speed during cranking should be approximately 400 rpm.

   If cranking rpm is too low, check for:
   - Loose battery or starter terminals.
   - Excessively worn starter brushes.
   - Open circuit in commutator segments.
   - Dirty or damaged helical spline on drive gear.
   - Defective drive gear overrunning clutch.

7. Check the starter disengagement:

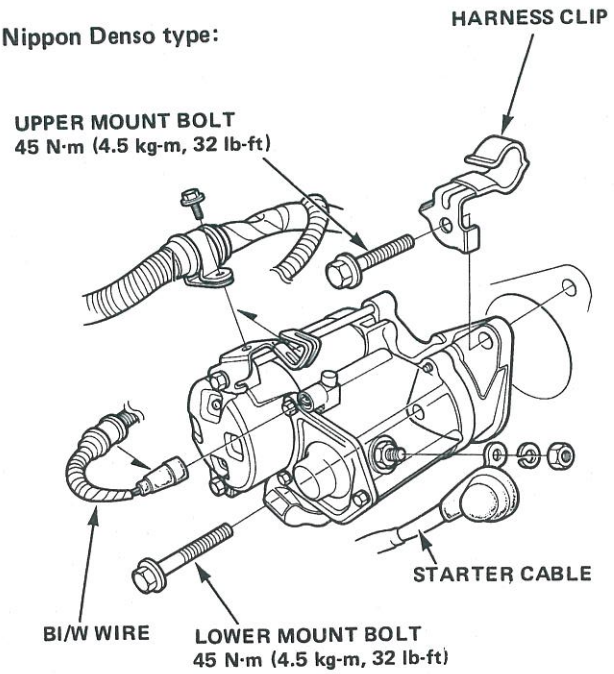
   Turn the ignition switch to "III" and release to "II".
   The starter drive gear should disengage from the flywheel ring gear.
   If the drive gear hangs up on the flywheel ring gear, check:
   - Solenoid plunger and switch for malfunction.
   - Drive gear assembly for dirty or damaged overrunning clutch.

Starting System

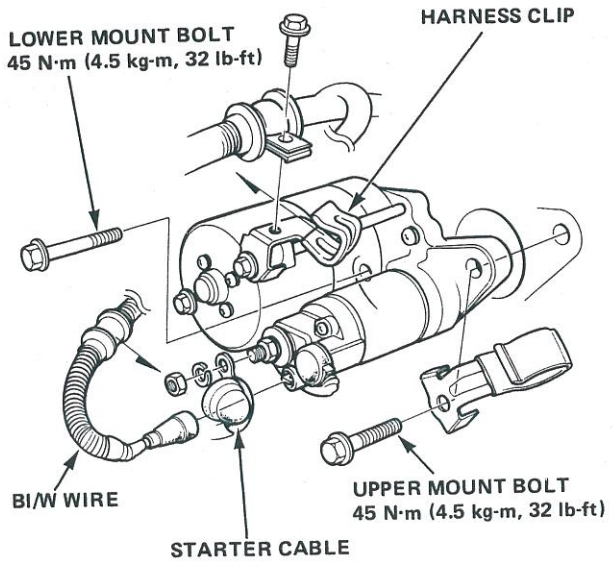
Starter Replacement

1. Disconnect the ground wire from the battery negative ⊖ terminal.
2. Disconnect the starter cable from the B terminal on the starter motor.
3. Remove the engine compartment sub wire harness from the harness clip on the starter motor.
4. Disconnect the BI/W wire from the S terminal on the starter solenoid.
5. Remove the two bolts holding starter motor, and remove the starter motor.

Nippon Denso type:



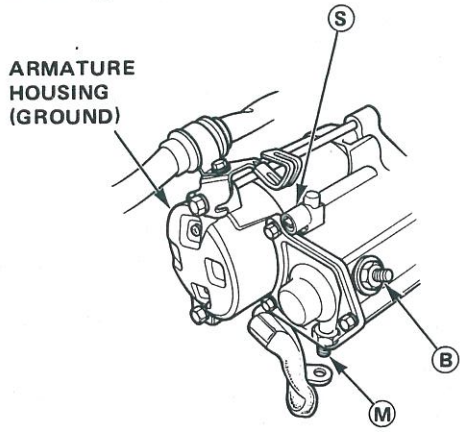
Mitsuba type:



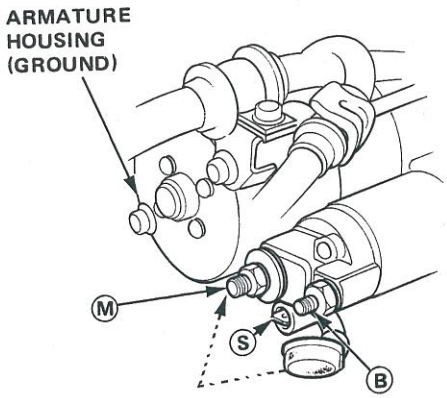
Starter Solenoid Test

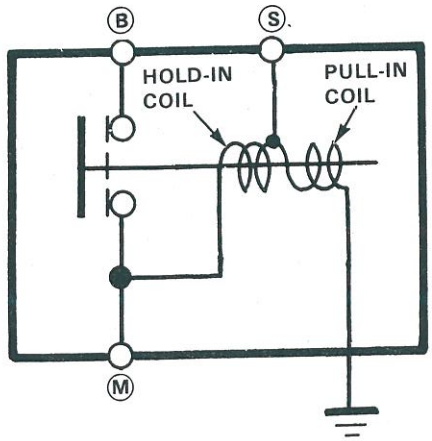
1. Check the pull-in coil for continuity between S terminal and the armature housing (ground).
   Coil is OK if there is continuity.
2. Check the hold-in coil for continuity between S and M terminals.
   Coil is OK if there is continuity.

Nippon Denso type:



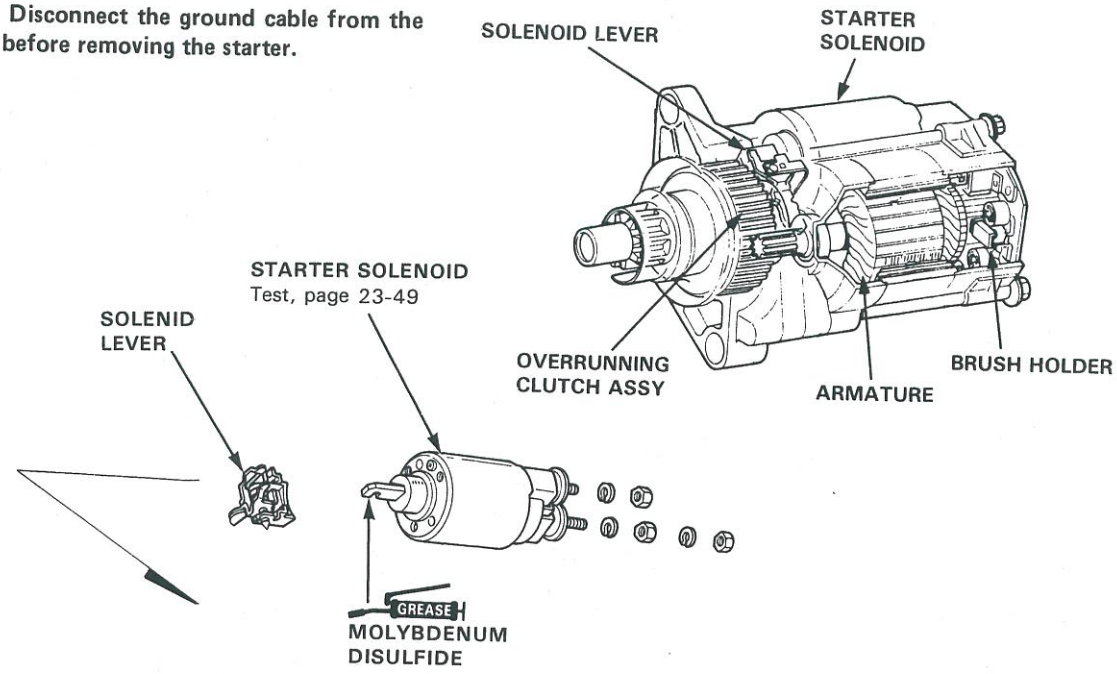
Mitsuba type:

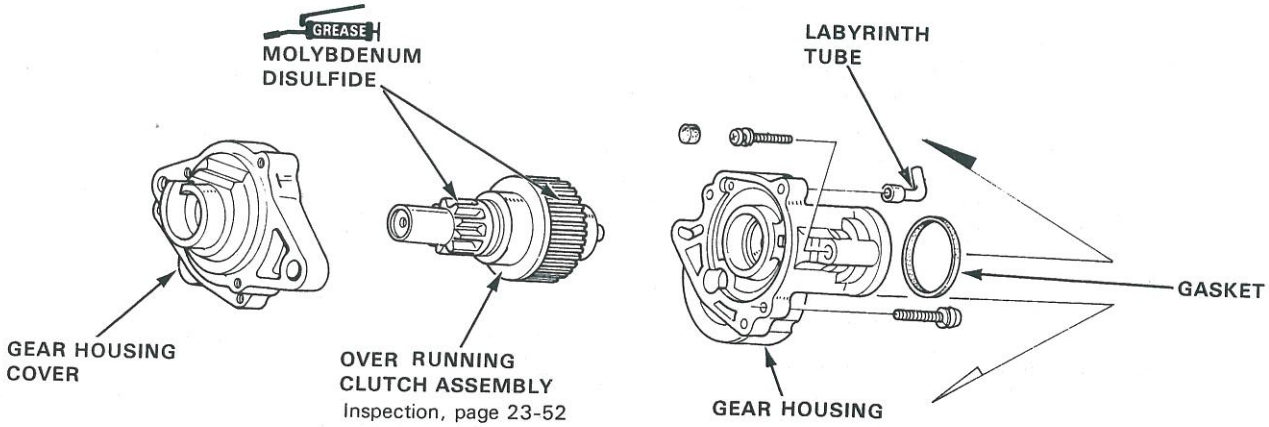


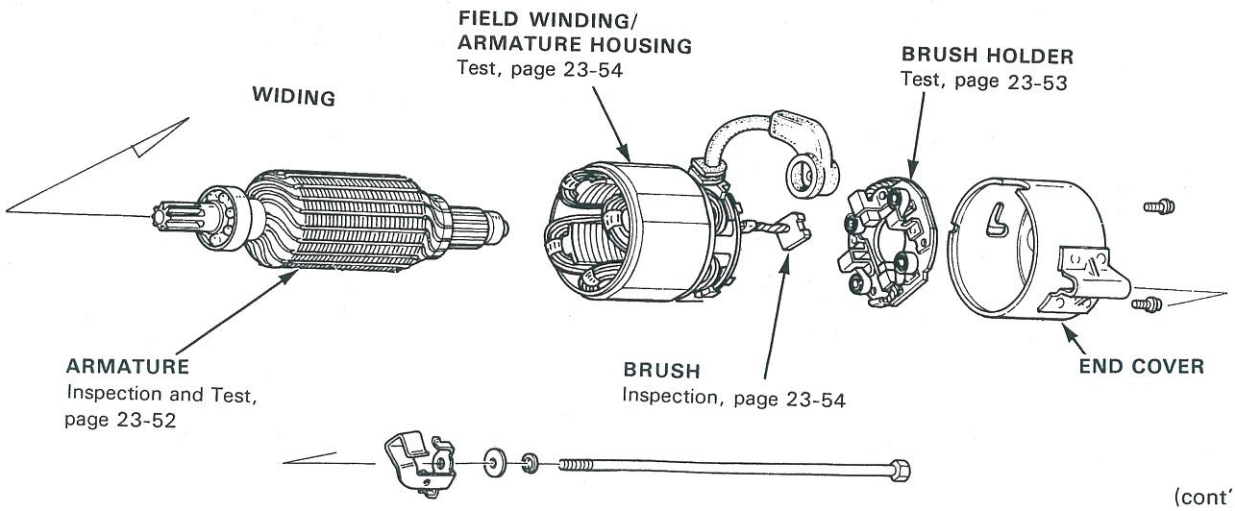


Starter Overhaul (Gear Reduction 1.4kw Mitsuba)

CAUTION: Disconnect the ground cable from the battery post before removing the starter.



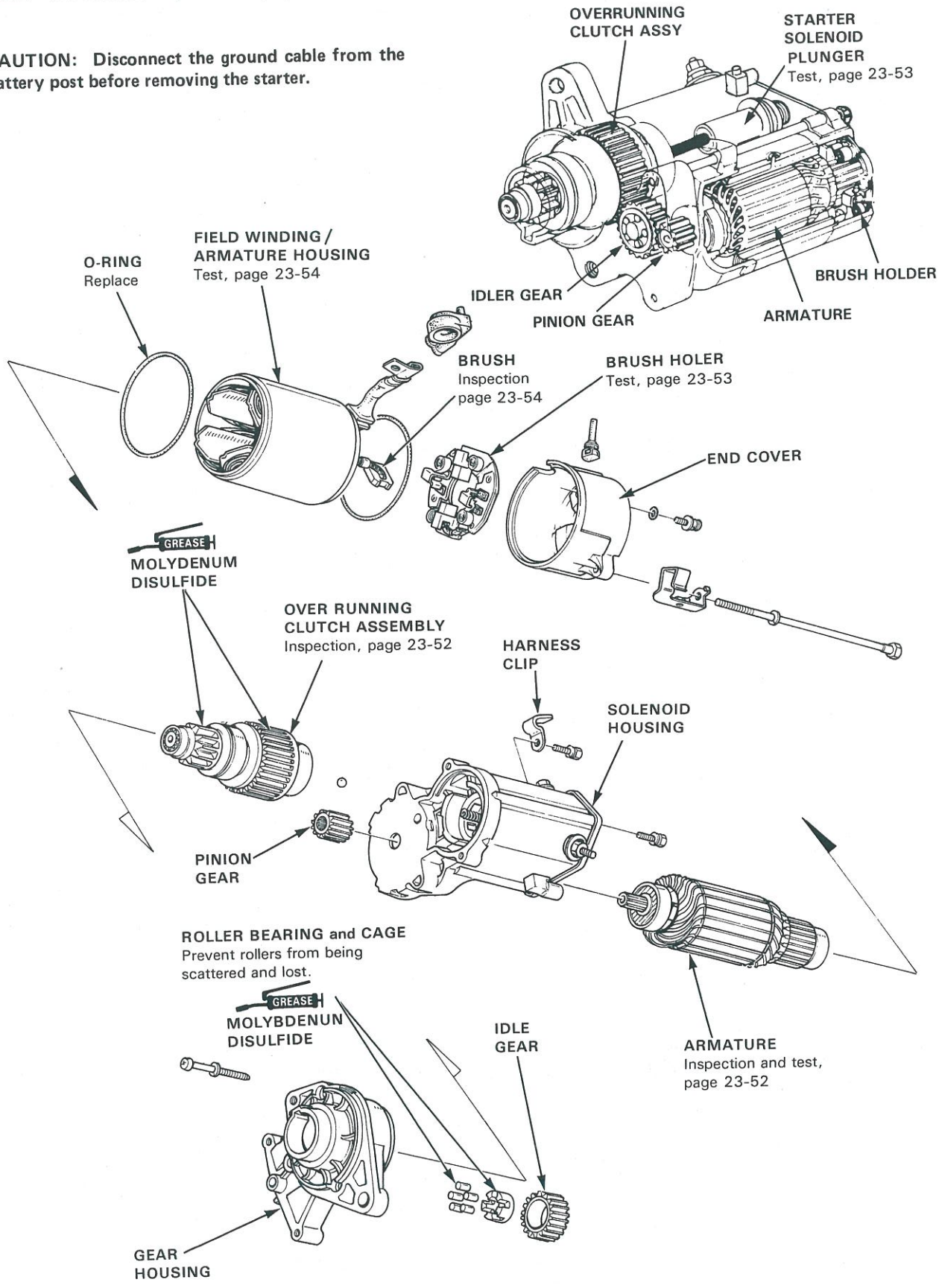




(cont'd)

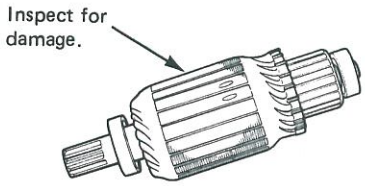
Starter Overhaul (cont'd) (Gear Reduction 1.4kw ND)

CAUTION: Disconnect the ground cable from the battery post before removing the starter.



Armature Inspection and Test

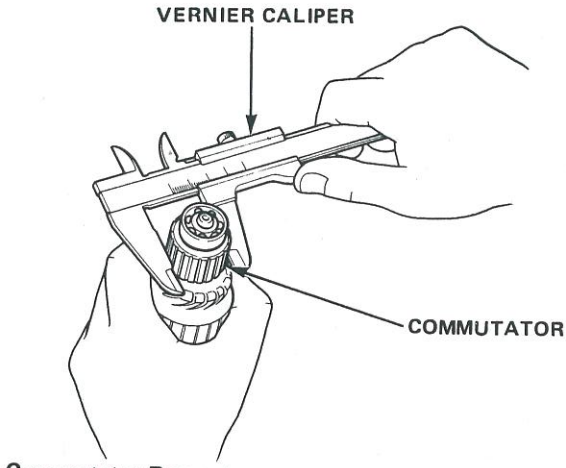
1. Inspect the armature for wear or damage due to contact with the field coil magnets.



2. A dirty or burnt surface may be resurfaced with emery cloth or lathe within the following specifications.

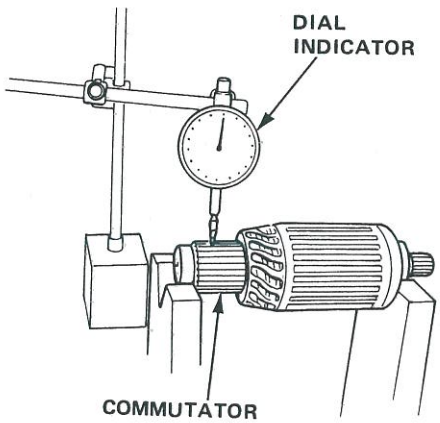
Commutator Diameter

Standard (New):	
ND:	**29.9–30.0 mm (1.18 in.)**
MITSUBA:	**28.0–28.1 mm (1.11 in.)**
Service Limit:	
ND:	**29.0 mm (1.14 in.)**
MITSUBA:	**27.5 mm (1.08 in.)**

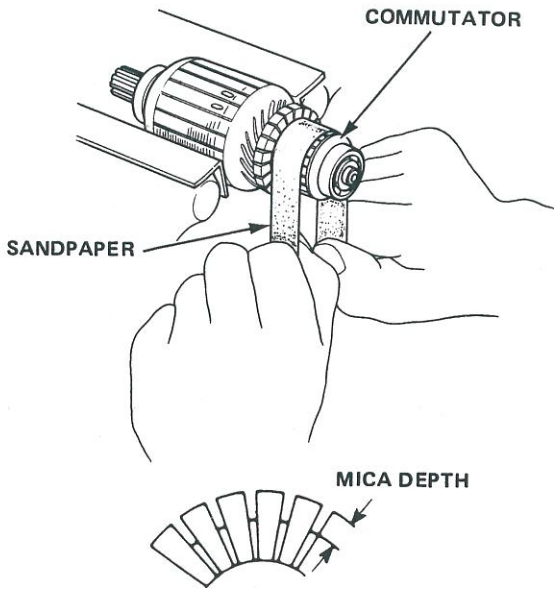


Commutator Runout

Standard (New):	**0–0.02 mm (0–0.001 in.)**
Service Limit:	**0.05 mm (0.002 in.)**



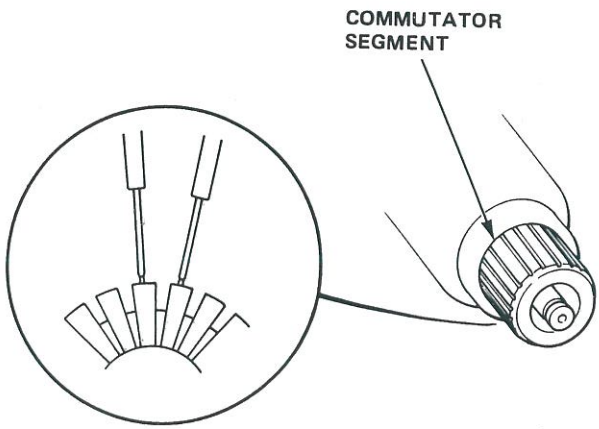
3. If the commutator runout and diameter are within limits, check the commutator for damage or for carbon dust or brass chips between the segments.
4. If surface is dirty, recondition it with a #500 or #600 sandpaper. Then, check mica depth. If necessary, undercut mica with a hacksaw blade to achieve proper depth as shown.



Commutator Mica Depth

Standard (New):	
ND:	**0.5–0.8 mm (0.020–0.031 in.)**
MITSUBA:	**0.4–0.5 mm (0.016–0.020 in.)**
Service Limit:	
ND:	**0.2 mm (0.008 in.)**
MITSUBA:	**0.15 mm (0.006 in.)**

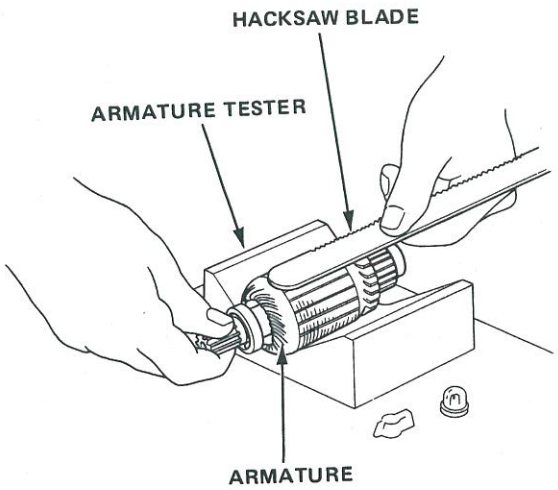
5. Check for continuity between each segment of the commutator. If an open circuit exists between any segment, replace the armature.



(cont'd)

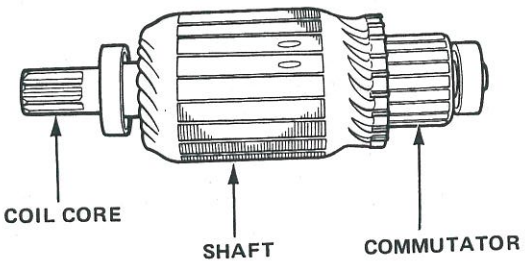
Armature Inspection and Test (cont'd)

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 core is turned, the armature is shorted. Replace the armature.

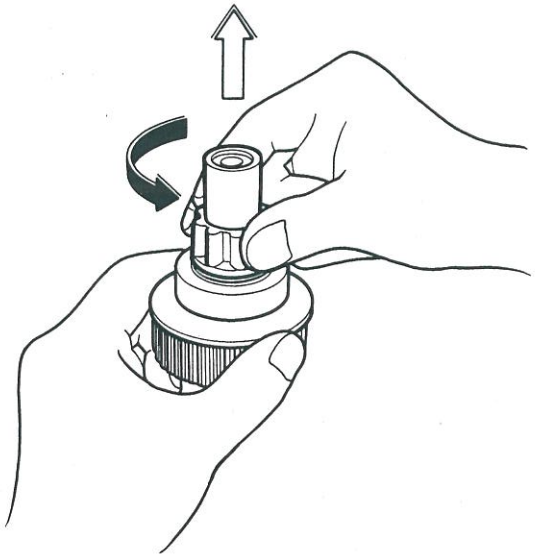
7. With an ohmmeter, check that no continuity exists between the commutator and armature coil core, and between the commutator and armature shaft. If continuity exists, replace the armature.



Overrunning Clutch Check

Move the overrunning clutch along the shaft.

If it doesn't move freely, or if the clutch slips when the armature is rotated while holding the drive gear, replace the clutch assembly.

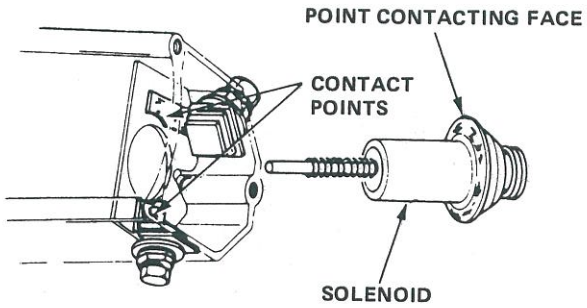


If the gear is worn or damaged, replace the overrunning clutch assembly; the gear is not available separately.

NOTE: Check condition of the flywheel or torque converter ring gear if the starter drive gear teeth are damaged.

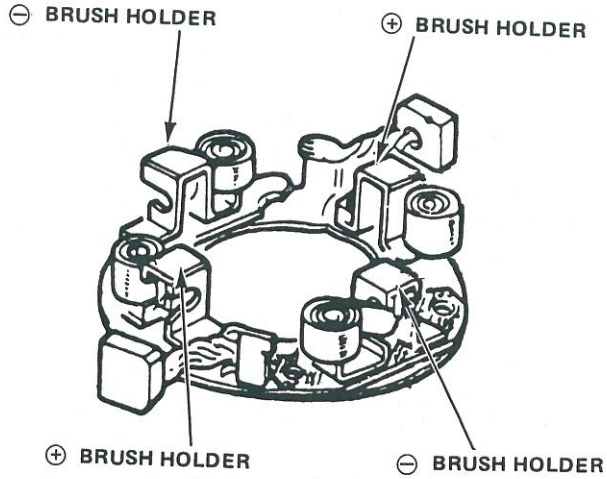
Solenoid Plunger Inspection (ND)

Check the contact points and face of the starter solenoid plunger for burning, pitting or any other defects. If surfaces are rough, recondition with a strip of #500 or #600 sandpaper.



Starter Brush Holder Test

1. Check that there is no continuity between the ⊕ and ⊖ brush holders.
   If continuity exists, replace the brush holder assembly.

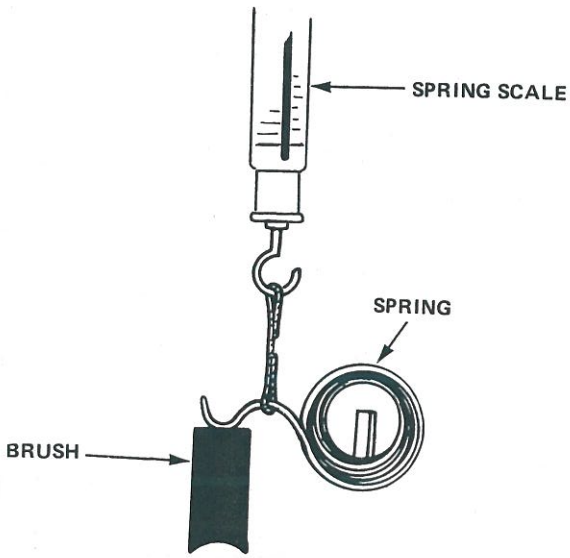


2. Insert the brush into the brush holder, and bring the brush into contact with commutator, then attach a spring scale to the spring. Measure spring elastic force at the moment when the spring separates from the brush.

Elastic Force:

Standard (New):

ND:	**14.22–20.01 N (1.45–2.04 kg, 3.22–4.53 lb)**
MITSUBA:	**18.15–23.05 N (1.85–2.35 kg, 4.11–5.22 lb)**

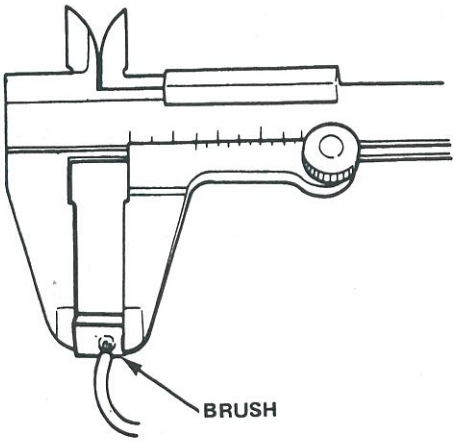


Starter Brush Inspection

Measure brush length. If not within service limit, replace the armature housing and brush holder assembly.

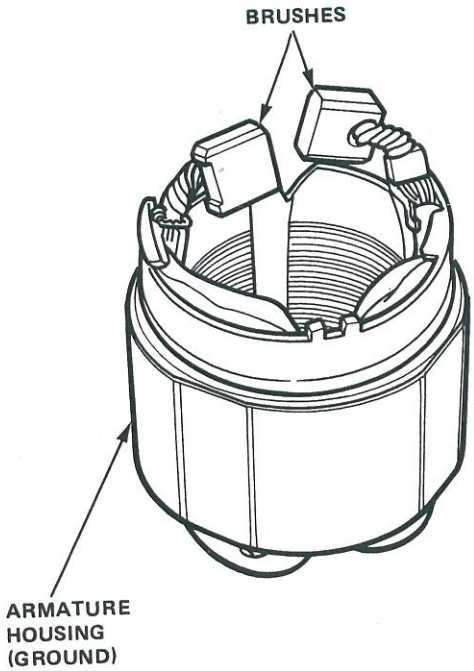
Standard (New):
ND: 14.5–15.5 mm (0.57–0.61 in.)
MITSUBA: 14.3–14.7 mm (0.56–0.58 in.)
Service Limit:
ND: 8.5 mm (0.33 in.)
MITSUBA: 9.3 mm (0.37 in.)

NOTE: To seat new brushes after installing them in their holders, slip a strip #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 same contour as the commutator.



Starter Field Winding Test

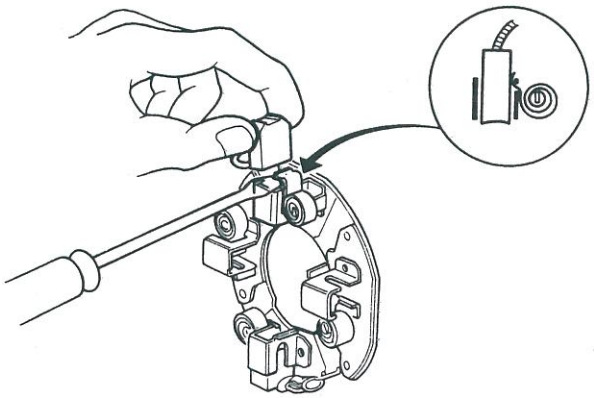
1. Check for continuity between the brushes. If there is no continuity, replace the armature housing.
2. Check for continuity between each brush and the armature housing (ground).
   If continuity exists, replace the armature housing.



Starter Reassembly

Reassemble the starter in the reverse order of disassembly.

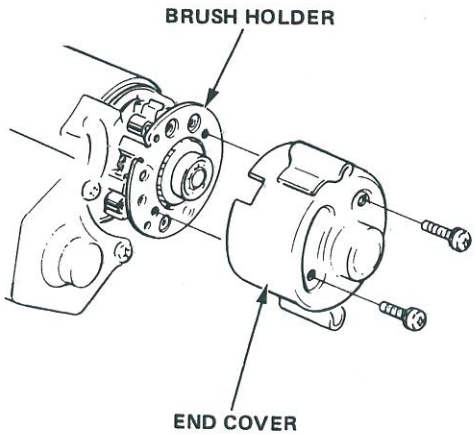
1. Pry back each brush spring with a screwdriver, then position the brush about halfway out of its holder, and release the spring to hold it there.



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.

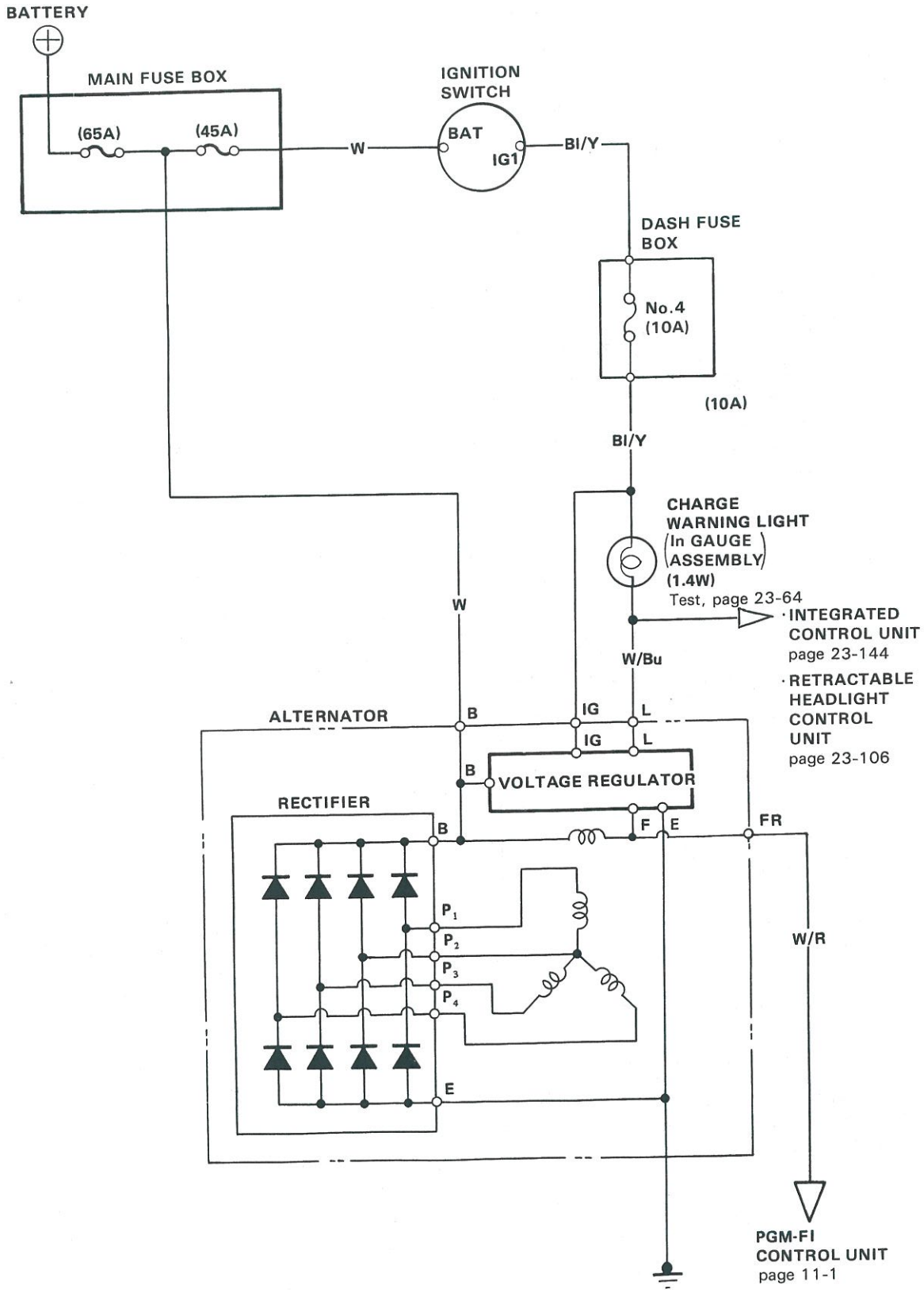


3. Install the end cover on the brush holder.

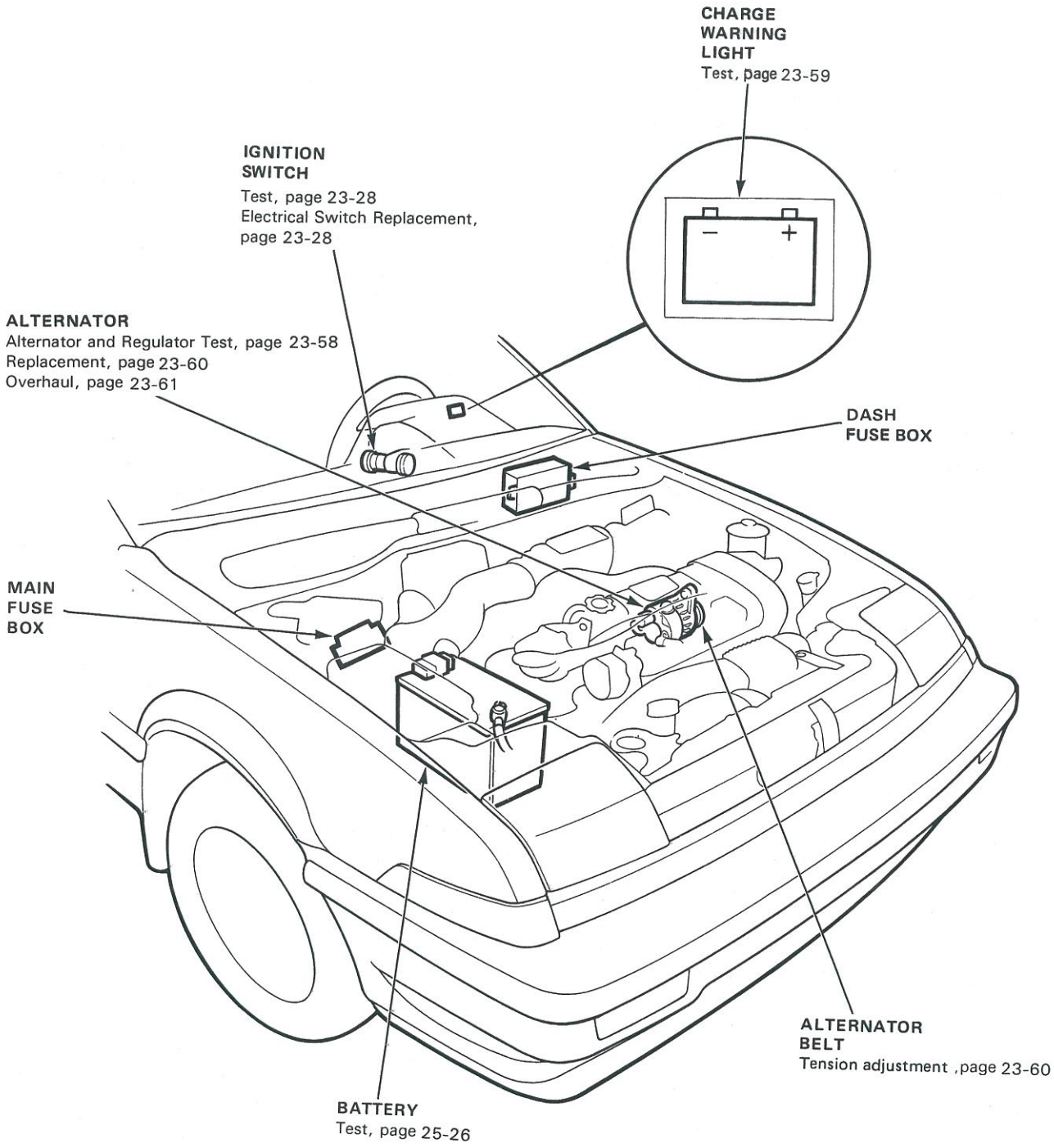


Charging System

Circuit Diagram



Component Location Index



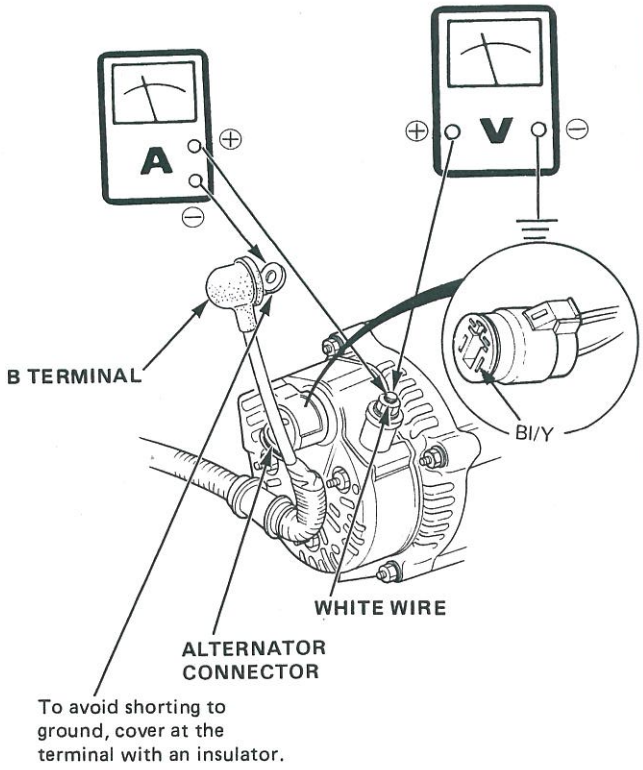
Charging System

Alternator and Regulator Test

1. First make sure you have a good battery, and that the alternator belt, and connections at the alternator and main fuses are good. Next check the No.4 (10A) fuse in the dash fuse box.

2. Disconnect the alternator. With the ignition switch on, there should be battery voltage between the IG (BI/Y) terminal and body ground.

3. If these check OK, connect a voltmeter, and an ammeter (100 amp capacity or higher) between the alternator B terminal and the white wire as shown. (An inductive pick-up can be used instead of disconnecting the white wire.

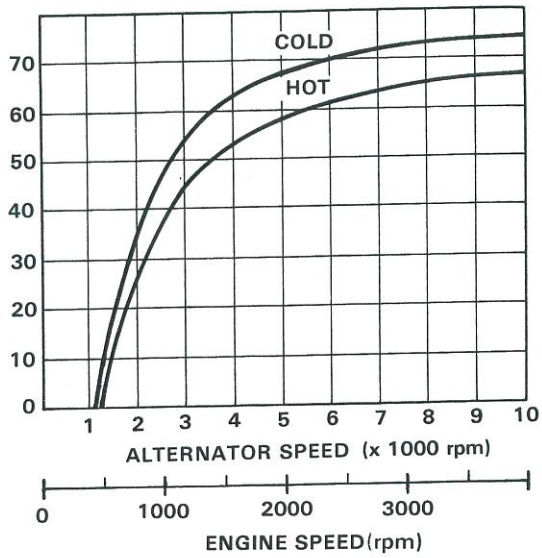


4. Start the engine, and turn on the headlights, blower motor, rear wind on defogger etc.

   NOTE: If voltage stays above 13.5 V, apply more electrical load to lower the votage to less than 13.5V.

If the voltage goes over 16V, stop the engine and replace the voltage reglator.

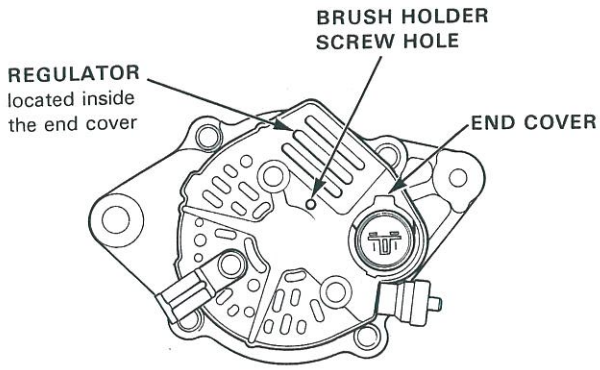
5. Compare the readings to the chart below. If no output or below specification, go to step 7. If output is within specification and voltage is between 13.9 and 15.1V, go to step 6.



6. Turn off all loads in step 4, then, make measure the alternator output voltage at 1,500 rpm.

   - If the voltage remains between 13.9V and 15.1V, The alternator and regulator are OK. Test is complete.
     If the charge warning light is still on, see Charge Warning Light Test.

7. Perform a full-field test: Insert a short screwdriver into the brush holder screw hole in the alternator and cover.



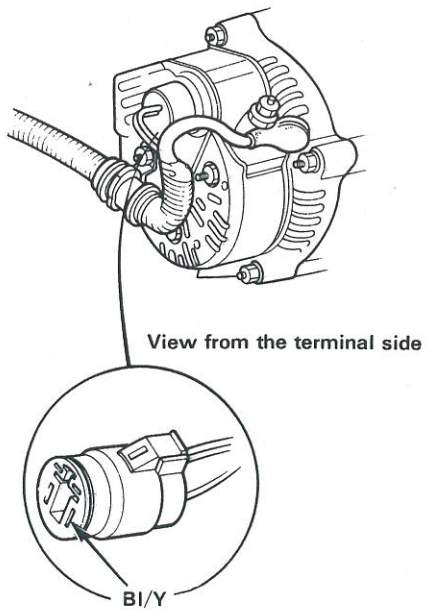
While it's touching the brush screw, ground the screwdriver against the cover (you may have to scrape some off the cover for a good ground). Note the amperage while grounding the screwdriver.

CAUTION: Ground the screwdriver for as short a time as possible. Do not exceed the maximum recommended voltage 16 V. There could possibly be damage to electrical components in the system.

Now compare the amperage reading from the full field test with the specifications shown in the graph of the alternator output.

- If the reading is out of specification and you have 12 volts at the BI/Y terminal in the alternator connector with the ignition switch ON, the alternator is faulty.

- If the amperage reading is within specification and you have 12 volts at the BI/Y terminal in the alternator connector with the ignition switch ON, the regulator is faulty.



Charge Warning Light Test

NOTE: Before testing, check the wire harness connections and alternator belt tension.

1. Turn the ignition switch on. The charge warning light should come on.
   If it does not come on, unplug the alternator connector and short the pin of the W/Bu wire to ground.

   - If the warning light still does not come on, check for:
   - Blown No4 (10A) fuse in the dash fuse box
   - Bad bulb
   - An open in the BI/Y wire between the warning light and fuse box, or fuse box and ignition switch
   - An open in the W/Bu wire between warning light and voltage regulator (inside the alternator)

   - If the light comes on, go to the alternator and regulator test (see page 23-58).

2. Start the engine and let it idle. The charge warning light should go off.
   If it stays on, go to the alternator and regulator test (page 23-58).

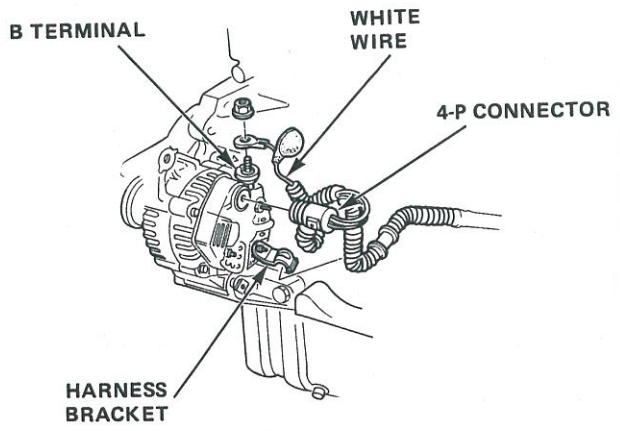
3. If the light stays on, stop the engine and disconnect the 3-P connector from the alternator. Turn on the ignition; if the light goes out, the voltage regulator is faulty.

4. If the light remains on with the 2-P connector disconected, disconnect the retractable headlight control unit and the integrated control unit.

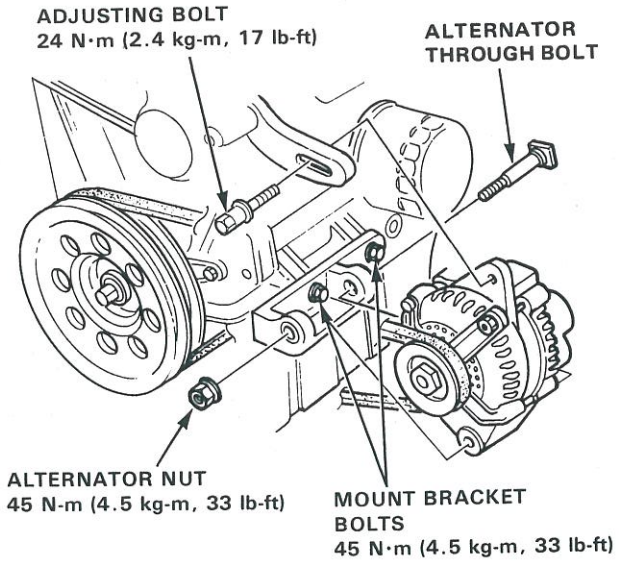
5. If the light stays on throughout steps 3 and 4 there is short to ground in the Bu/W wire from the charge warning light to one of the above components.

Alternator Replacement

1. Disconnect the ground wire from the battery negative post (–).
2. Disconnect the 4-P connector from the alternator.



3. Remove the terminal nut and the white wire from the B terminal.
4. Remove the alternator bolt and nut, then remove the alternator belt from the alternator pulley.



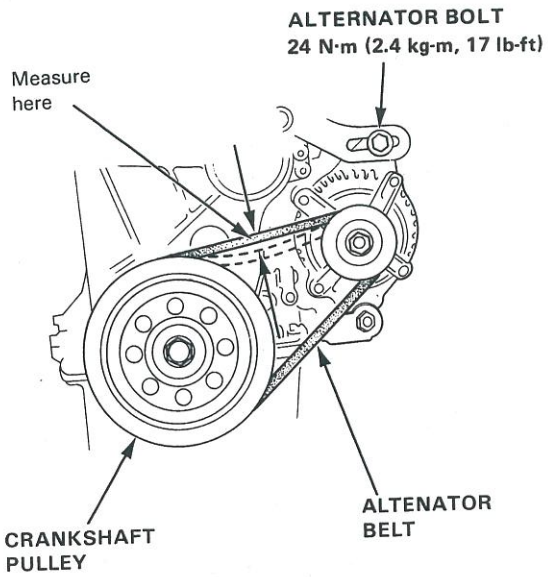
5. Remove the alternator through bolt, then the alternator.
6. If necessary, remove the mount bracket bolts, and the upper and lower mount brackets.
7. Adjust the alternator belt tension after installation (page 23-60).

Alternator Belt Adjustment

1. Apply a force of 98 N (10 kg, 22 lb) and measure the deflection between the alternator and crankshaft pulley.

   Deflection: 7—10 mm (0.25—0.38 in.)

   NOTE: On a brand-new belt, the deflection should be 4—6 mm (0.16—0.24 in.) when first measured.

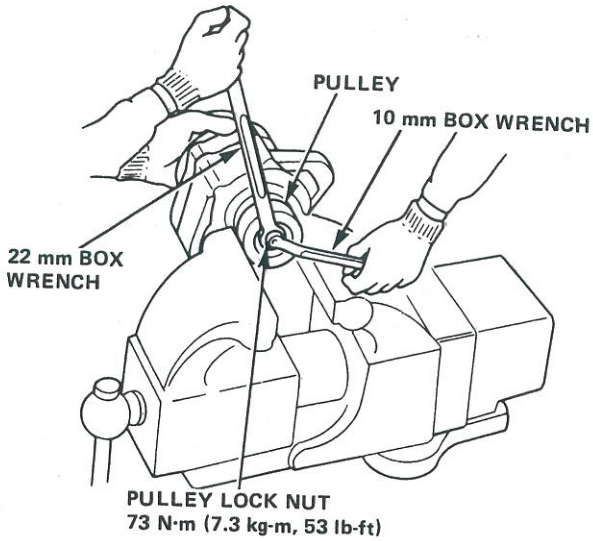


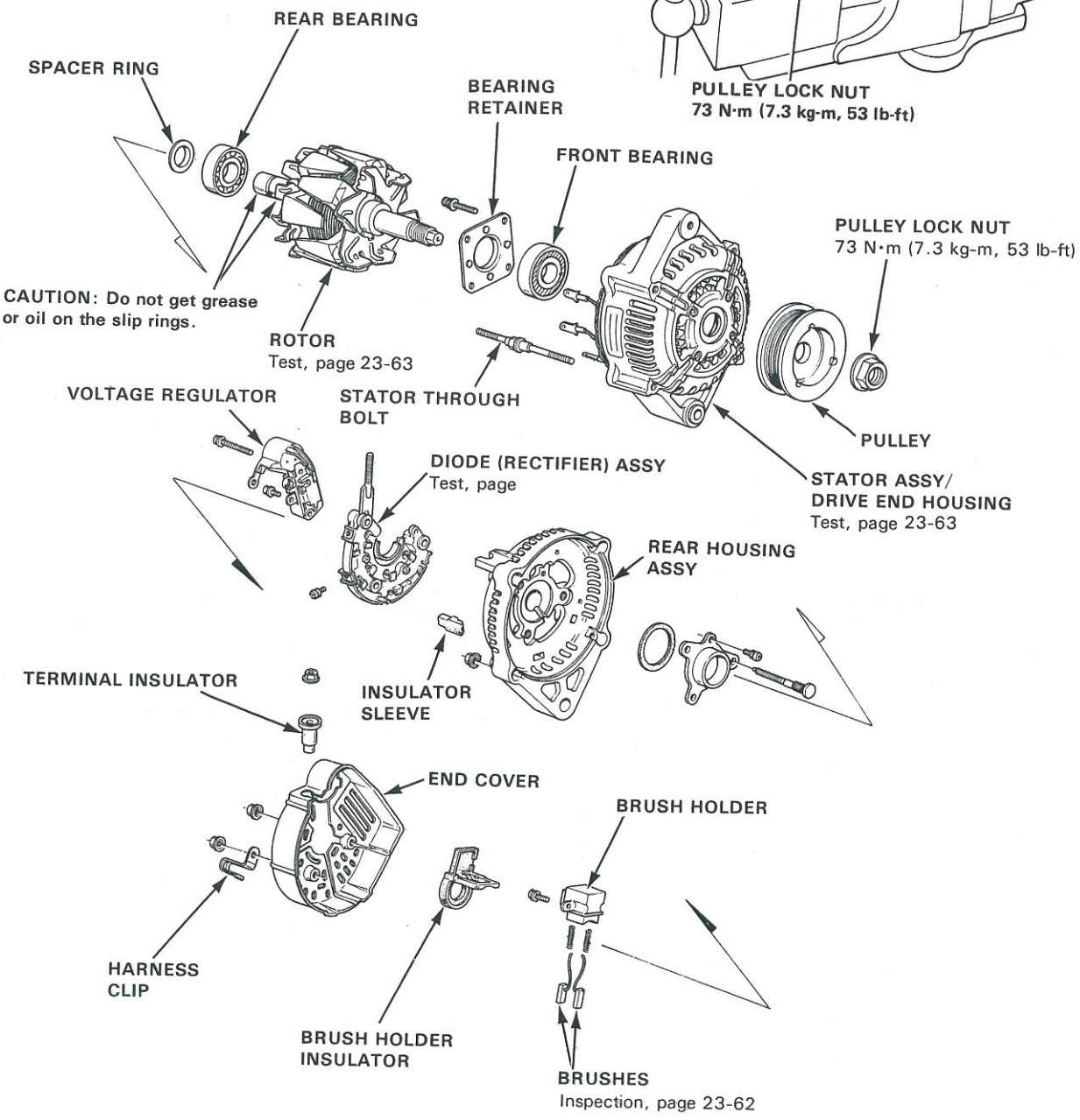
2. Loosen the alternator bolt and nut.
3. Move the alternator to obtain the proper belt tension, then retighten the bolt and nut.
4. Recheck the deflection of the belt.

Alternator Overhaul

NOTE: It is only necessary to separate the pulley, drive end housing and rotor when the front bearing needs replacement.

To remove the pulley and rotor, use 10 mm and 22 mm box wrenches to loosen the pulley locknut. Use an impact wrench to remove the nut if necessary.

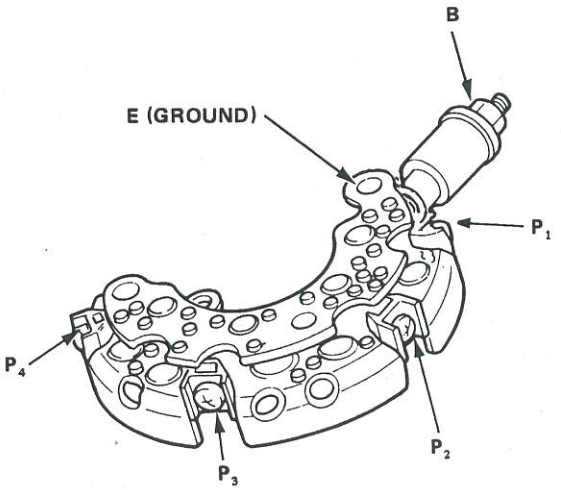




Rectifier Test

NOTE: The diodes are designed to pass current in one direction and block current 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 directions; a total of 16 checks.

1. Check for continuity in both directions, between the B and P (of each diode pair) terminals, and between the E (ground) and P (of each diode pair). All diodes should have continuity in only one direction.

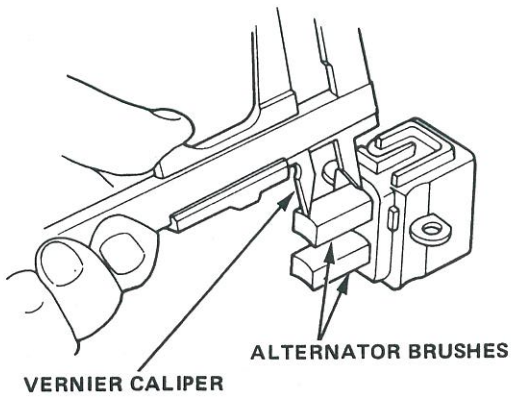


2. If any of the 8 diodes fails, replace the rectifier assembly. (Diodes are not available separately.)

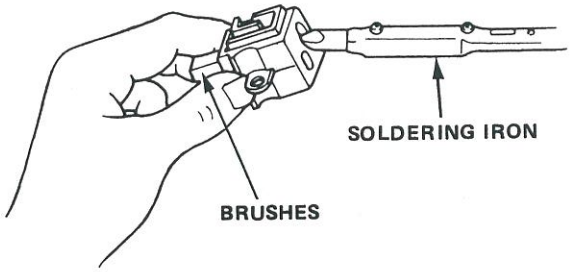
Alternator Brush Inspection

1. Remove the end cover, then take out the brush holder by removing its 2 screws.
2. Measure length of the brushes with a vernier caliper.

Alternator Brush Length
Standard: 10.5 mm (0.41 in.)
Service Limit: 5.5 mm (0.22 in.)



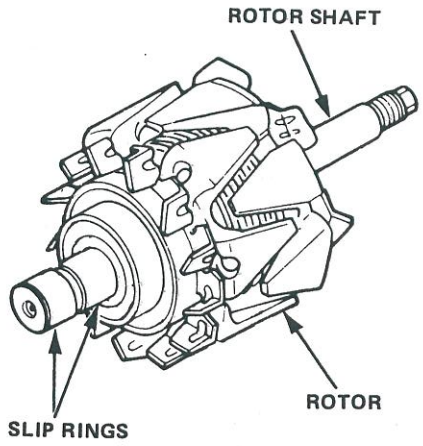
If the brushes are not within the service limit, replace them.



CAUTION: When replacing the brushes, use only a rosin core type solder or solder joints will corrode.

Rotor Slip Ring Test

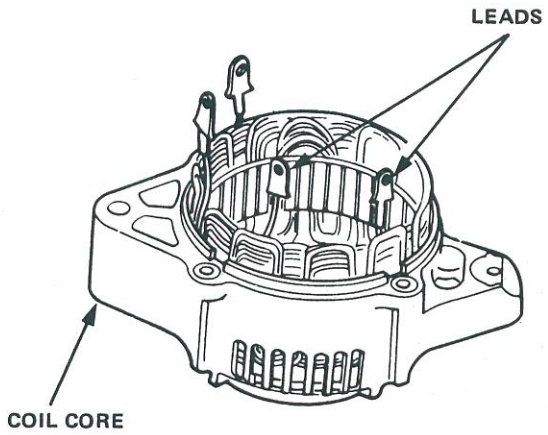
1. Check that there is continuity between the slip rings.
2. Check that there is no continuity between the rings and the rotor or rotor shaft.



3. If the rotor fails either continuity check, replace it.

Stator Test

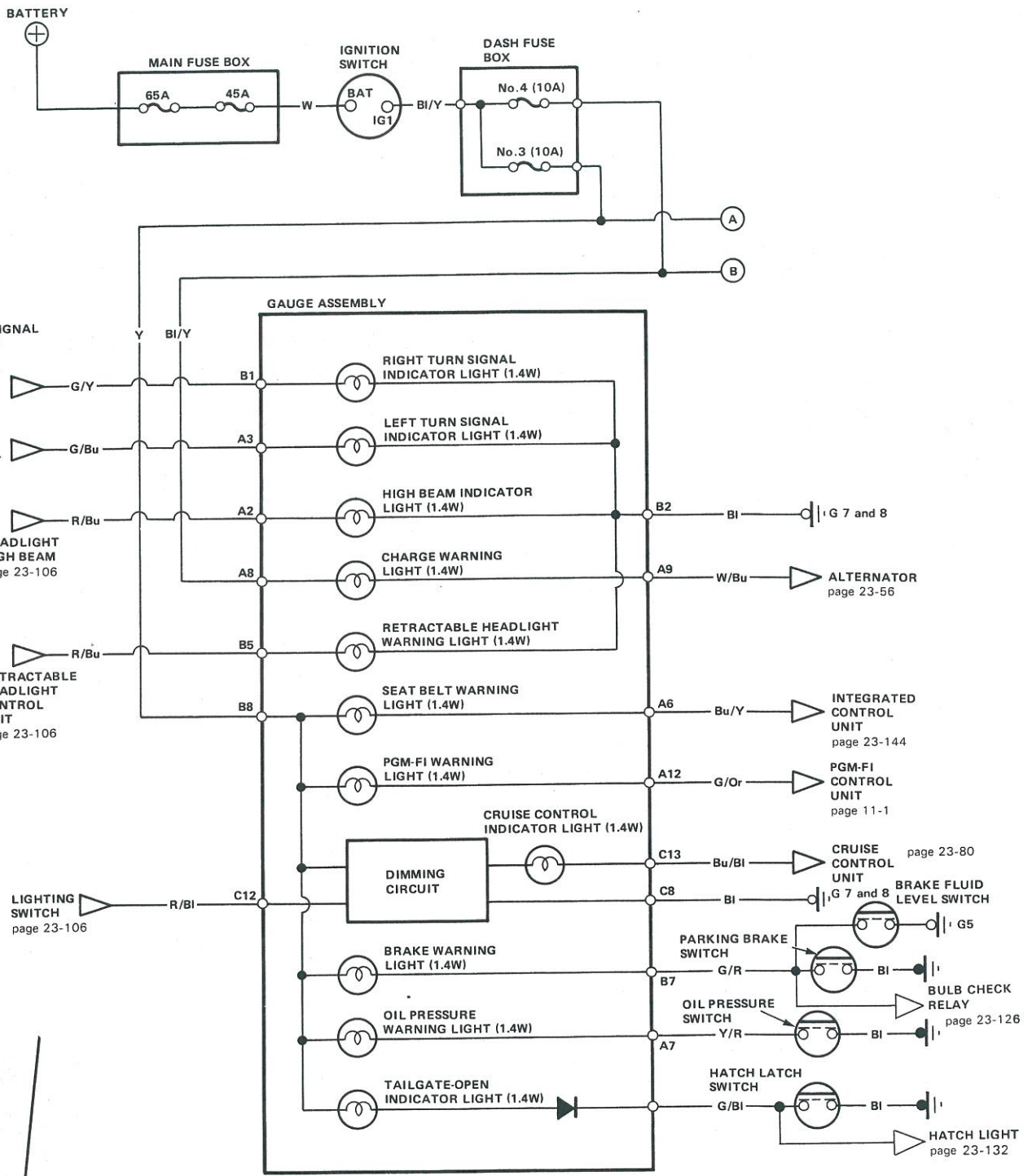
1. Check that there is continuity between each pair of leads.
2. Check that there is no continuity between each lead and the coil core.

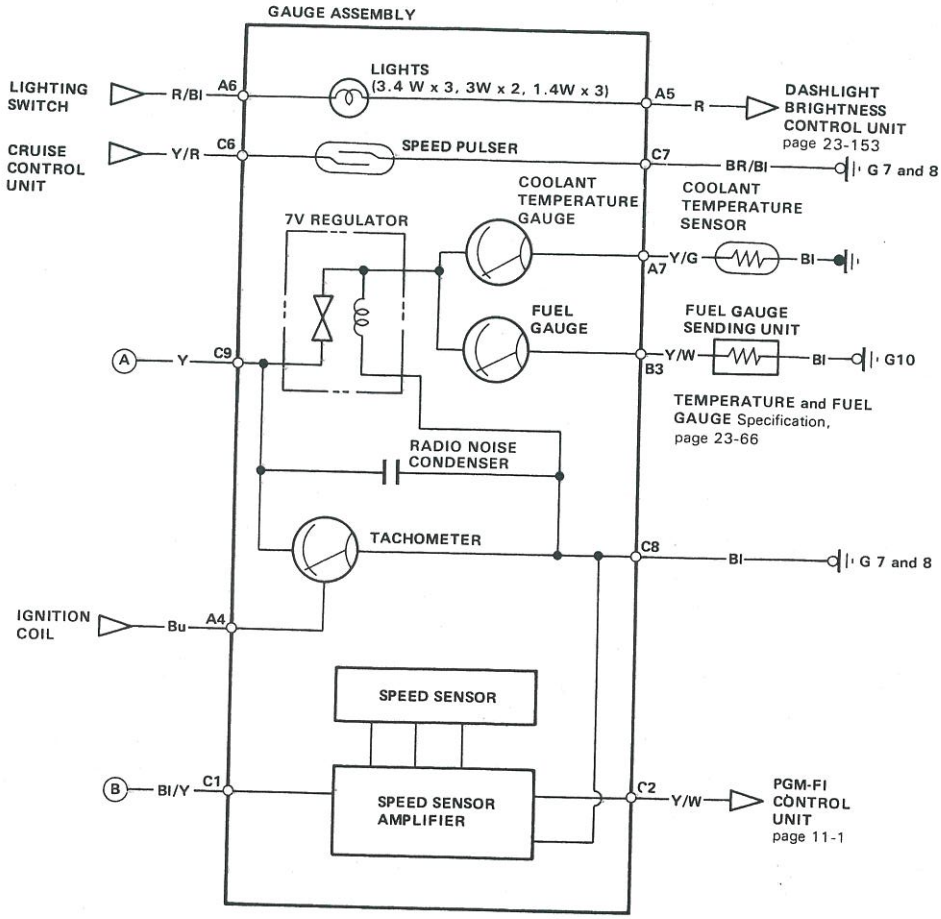


3. If the coil fails either continuity check, replace the stator.

Gauge Assembly

Circuit Diagram



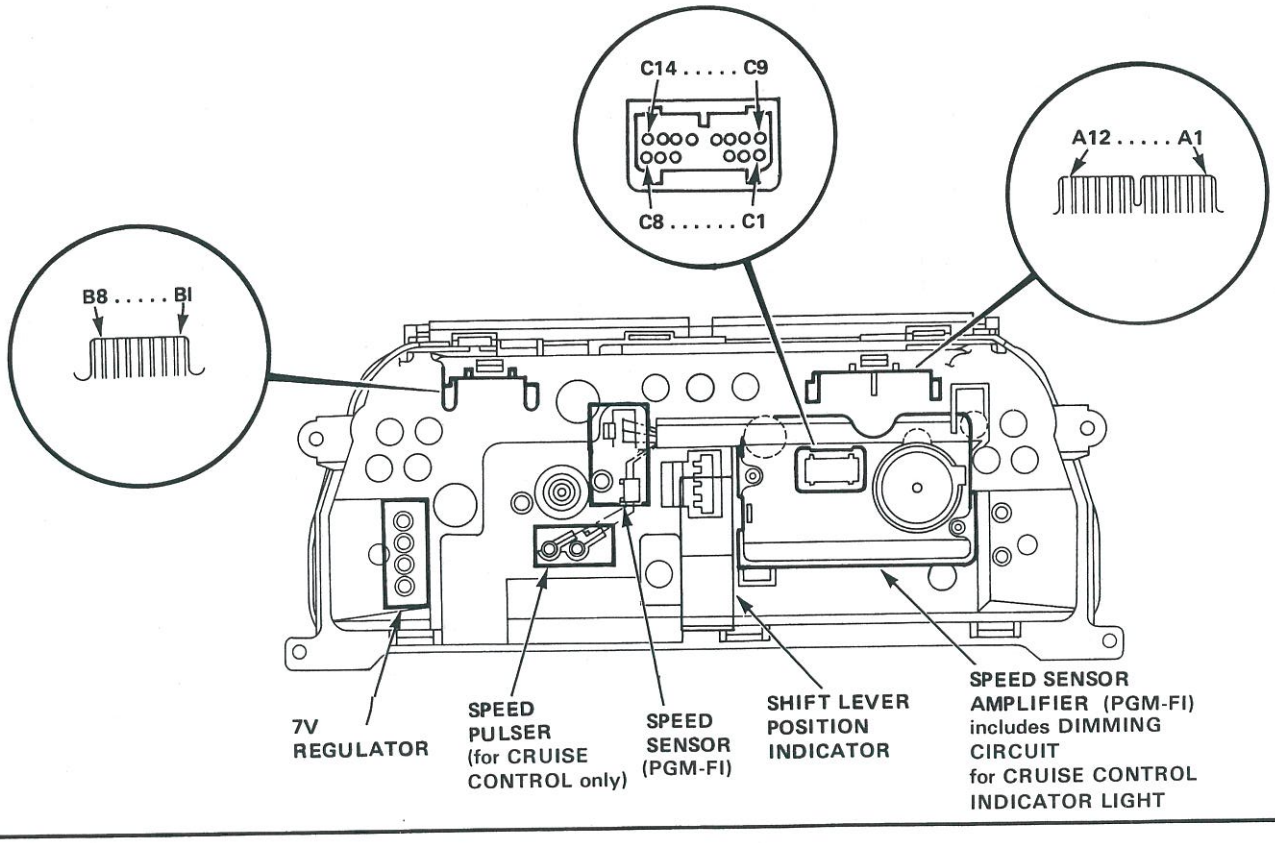

GAUGE ASSEMBLY
LIGHTING SWITCH
R/Bl
A6
LIGHTS (3.4 W x 3, 3W x 2, 1.4W x 3)
A5
R
DASHLIGHT BRIGHTNESS CONTROL UNIT
page 23-153
CRUISE CONTROL UNIT
Y/R
C6
SPEED PULSER
C7
BR/Bl
G 7 and 8
COOLANT TEMPERATURE GAUGE
COOLANT TEMPERATURE SENSOR
7V REGULATOR
Y/G
A7
Bl
FUEL GAUGE
FUEL GAUGE SENDING UNIT
A
Y
C9
Y/W
B3
Bl
G10
TEMPERATURE and FUEL GAUGE Specification, page 23-66
RADIO NOISE CONDENSER
TACHOMETER
C8
Bl
G 7 and 8
IGNITION COIL
Bu
A4
SPEED SENSOR
B
Bl/Y
C1
SPEED SENSOR AMPLIFIER
C2
Y/W
PGM-FI CONTROL UNIT
page 11-1

Gauge Assembly

Specifcations

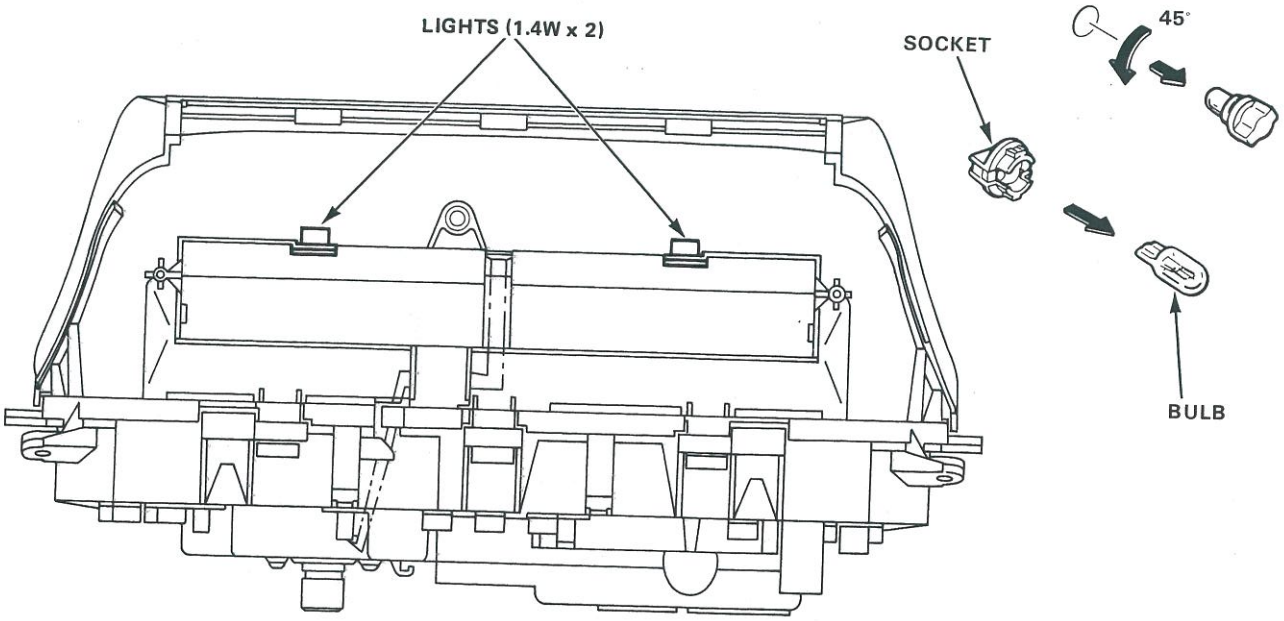
Parts	Input Terminal	Specifications
Speedometer		Indicates 37.5 mph (60 km/h) at 637 cable revolutions.
Tachometer	A4	Indicates approximately 100 rpm at 200 ignition pulses.
Fuel Gauge	B3	Indicates F (Full) at 5 ohms, a half scale at 32.5 ohms, and E (Empty) at 105 ohms of the fuel gauge sending unit.
Temperature Gauge	A7	Indicates C (cold) at 153.9 ohms (122°F), and H (Hot) at 14.2 ohms (275°F) of the coolant temperature sensor.
Speed Pulser	C6	Grenerates 4 pulses per 1 cable revolution.
Speed Sensor Amplifier	C2	Generates 4—5V at 10 mph (15 km/h).

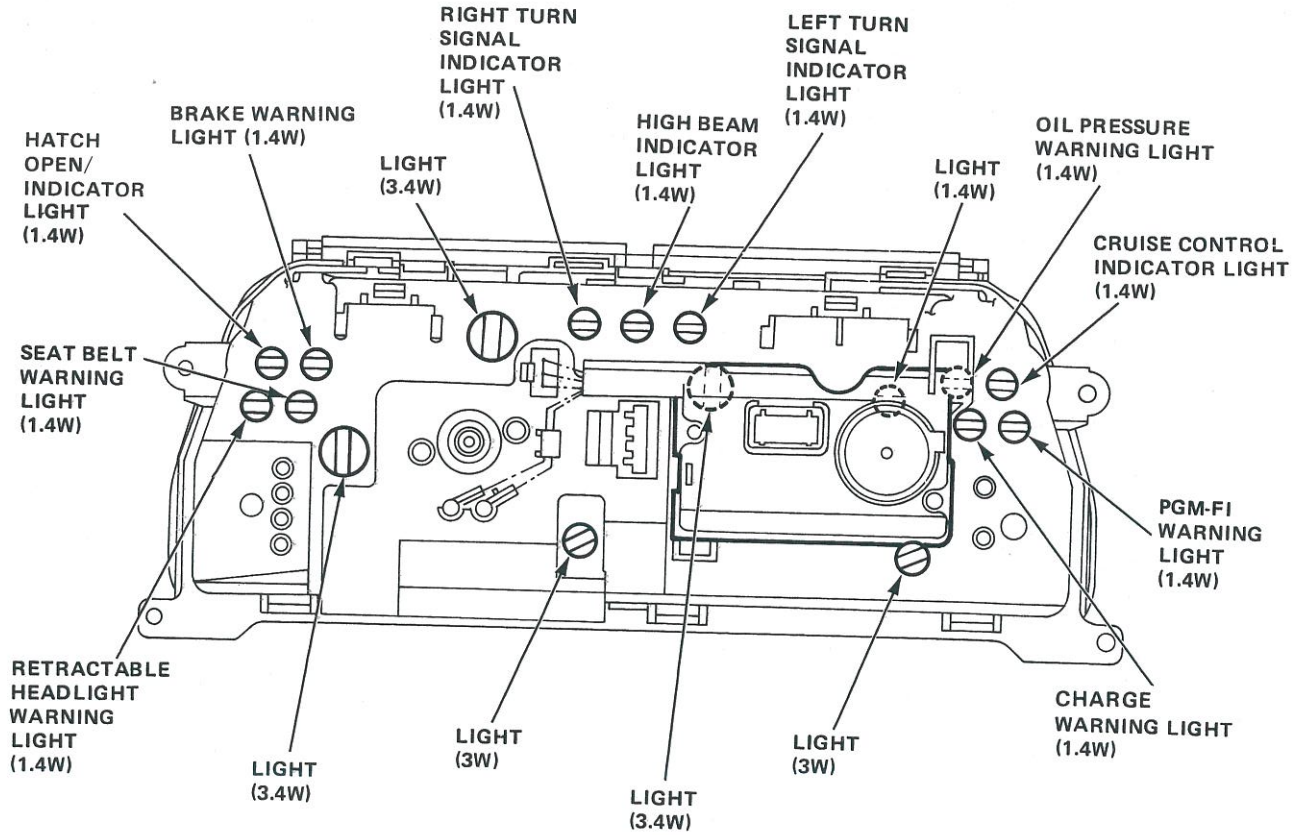
Terminal Arrangement



Bulb Replacement

If necessary, turn the socket 45° counterclock wise to remove it, and replace the bulb by pulling it out of the socket.

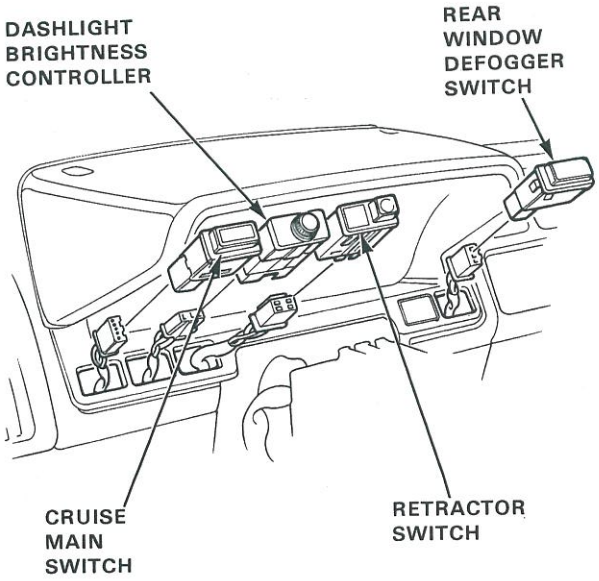




Gauge Assembly

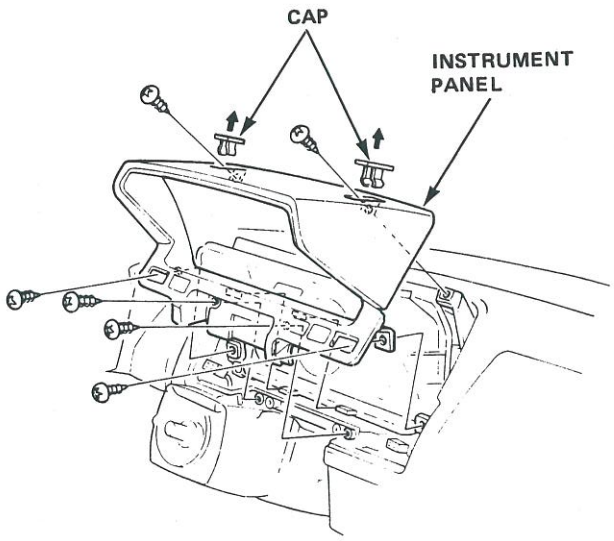
Removal

1. Remove the left side lower dash panel and switch by pushing it out, then disconnect the connectors.

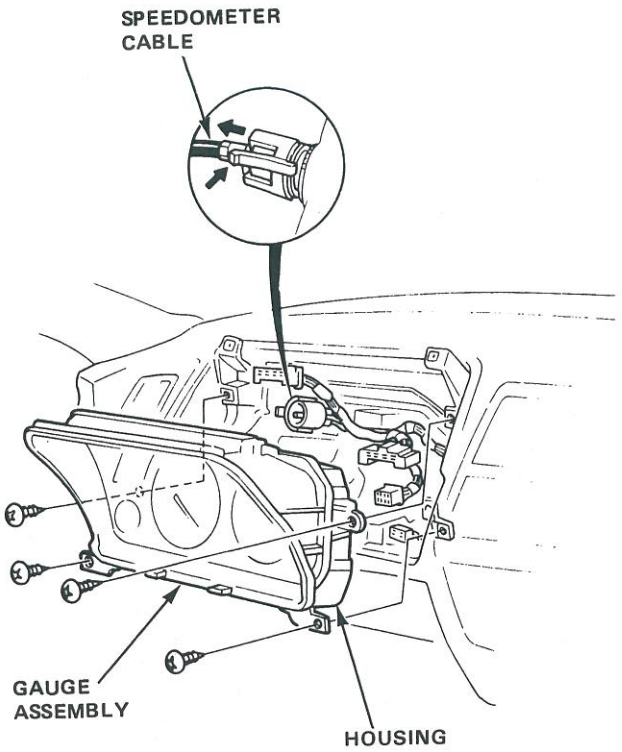


2. Remove the upper caps and the 2 screws.

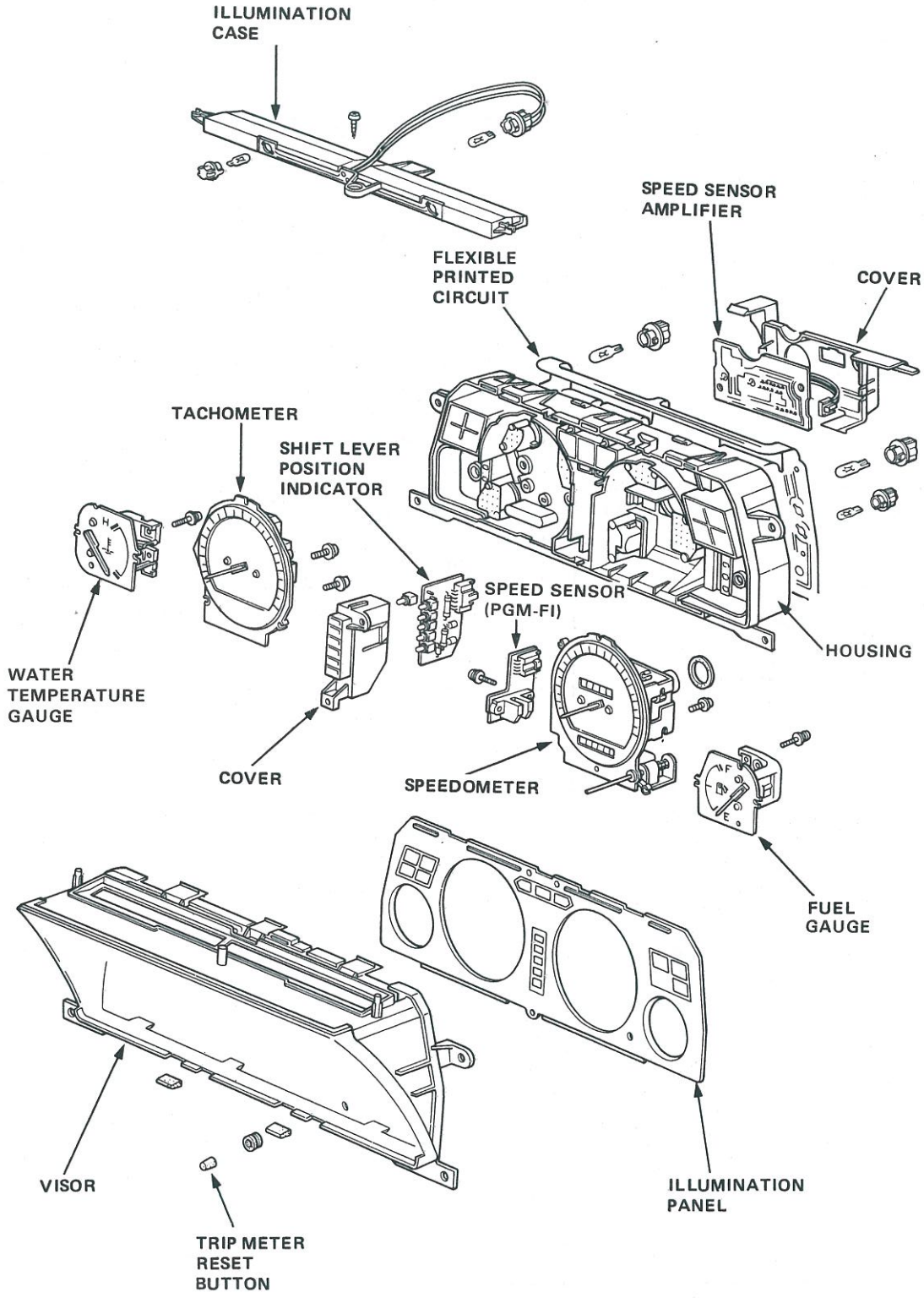
3. Remove the 2 screws from behind the column cover and 2 screws from back of cruise control main switch and rear window defogger switch, then remove the instrument panel.



4. Remove the 4 gauge assembly screws, then remove the gauge assembly by disconnecting the speedometer cable and wire harnesses.



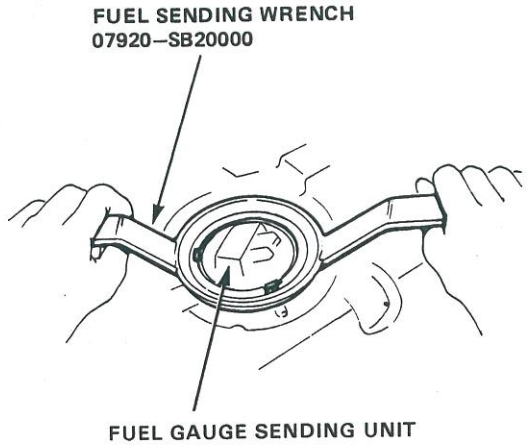
Disassembly



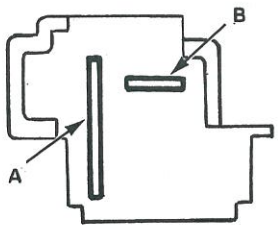
Gauge Assembly

Fuel Gauge Sending Unit Test

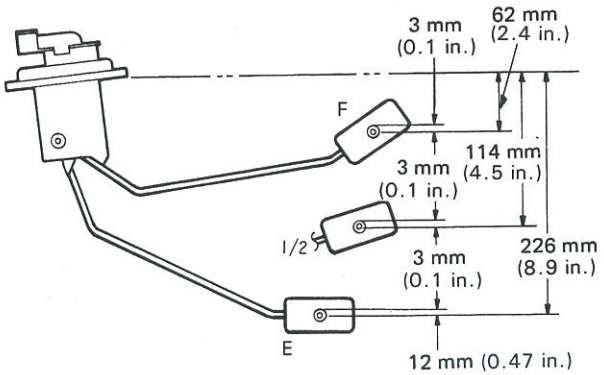
1. Remove the fuel tank.
2. Remove the fuel gauge sending unit.



3. Measure the resistance between A and B terminals at E (EMPTY), 1/2 (HALF FULL) and F (FULL) by moving the float.



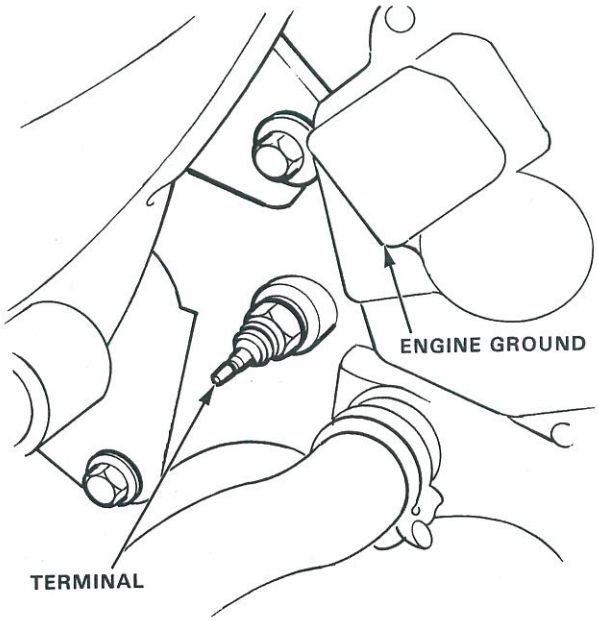
Float Position	E	1/2	F
Resistance (Ω)	105–110	25.5–39.5	2–5



4. If the above readings are not obtainable, replace the fuel gauge sending unit with a new one.

Coolant Temperature Sensor Test

1. Disconnect the Y/G wire from the sensor.
2. With the engine cold, use an ohmmeter to measure the resistance between the sender terminal and he engine ground.



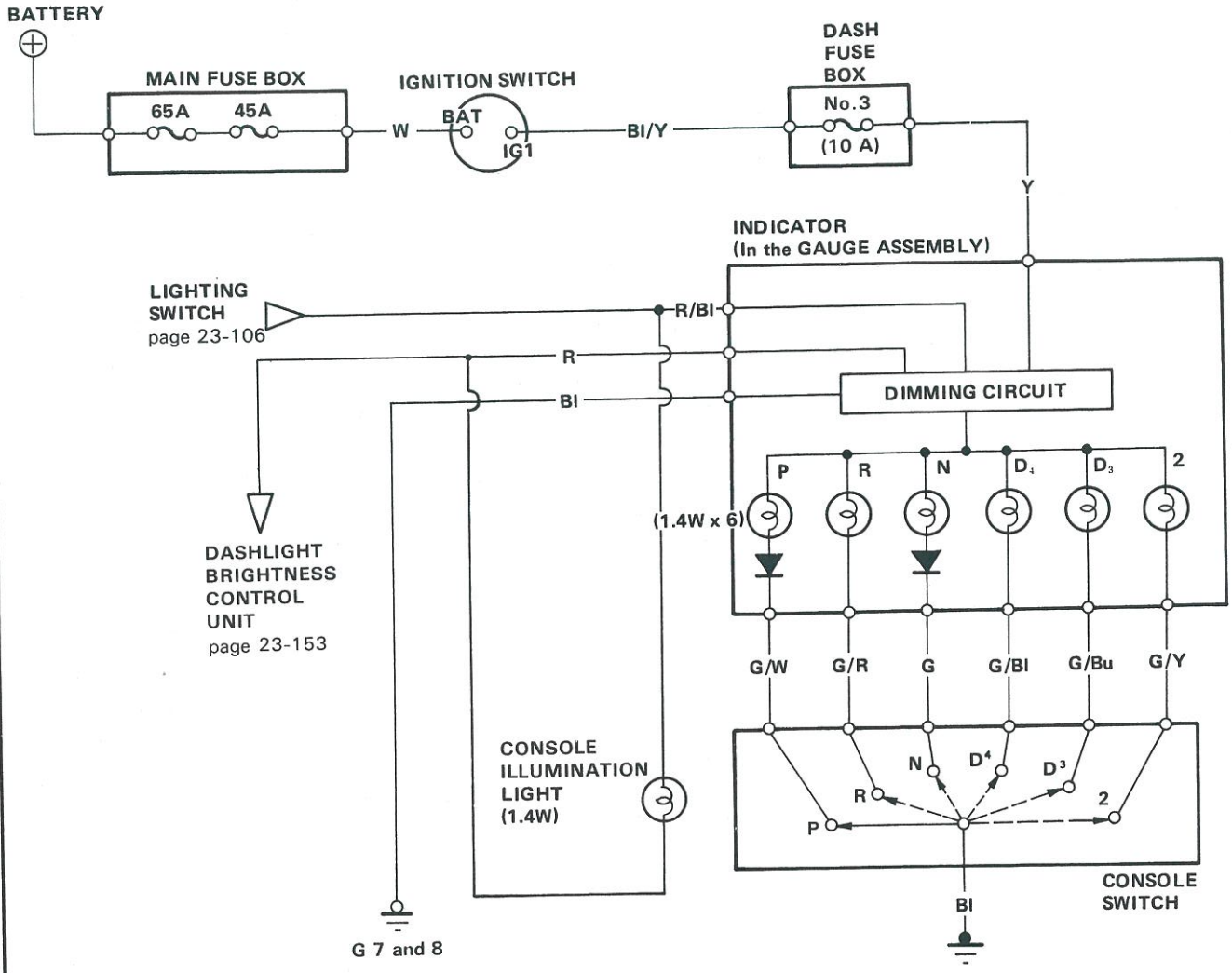
3. Check the temperature of coolant.
4. Run the engine and measure the change in resistance with engine at operating temperature.

Temperature	L	1/2	H
	50°C (122°F)	100°C (212°F)	125°C (257°F)
Resistance (Ω) Applox	153.9	27.5	14.2



Shift Lever Position Indicator

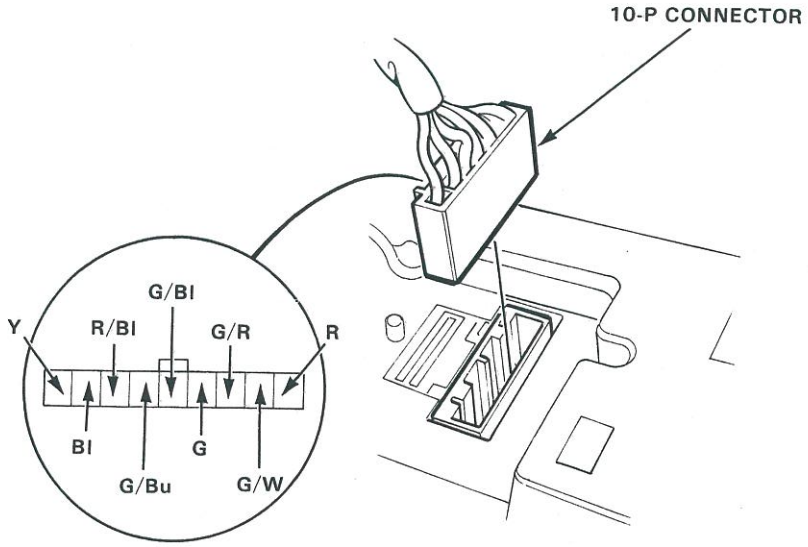
Circuit Diagram



Indicator Input Test

Remove the gauge assembly from the dashboard to disconnect the 10-P connectors from the indicator.

Make the following input tests at the harness pins.
If all tests prove OK, yet the indicator still fails to work, replace the indicator assembly.



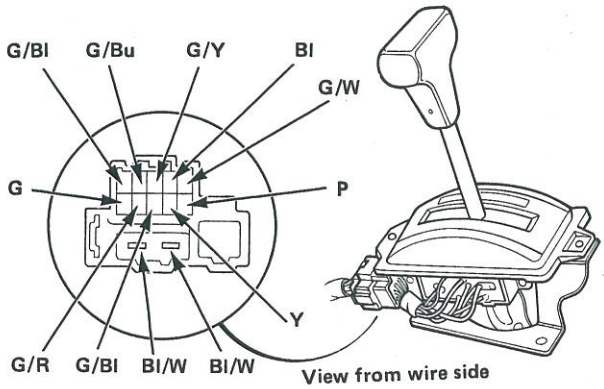
View from wire side

No.	Wire	Test condition	Test : desired result	Possible cause (if result is not obtained)
1	B1	Under all conditions	Check for continuity to ground: should be continuity.	Poor ground. An open in the wire.
2	Y	Ignition switch ON	Check for voltage to ground: should have battery voltage.	An open in the wire. Blown No. 4 (10 A) fuse.
3	G/W	Shift lever position in P	Check for continuioy to ground: should be continuity.	An open in the wire. Faulty shift lever position switch. Poor ground.
	G/R	Shift lever position in R		
	G	Shift lever position in R		
	G/BI	Shift lever position in D[4]		
	G/Bu	Shift lever position in D[3]		
	G/Y	Shift lever position in 2		
4	R/BI and R	Lighting switch ON and dashlight brightness control dial on full bright	Check for voltabe between R/BI and R terminals: should have battery voltage.	An open in the wire. Faulty lighting switch. Faulty dashlight brightness control system.

Shift Lever Position Indicator

Console Switch Test

1. Remove the front console .
2. Disconnect the 10-P and 2-P connectors from the shift lever position switch and check for continuity between the terminals in each switch position according to the table.



Shift Lever Position Switch :

Terminal / Position	Bl	G/Y	G/Bu	G/Bl	G	G/R	G/W
2	○—○						
D_3	○—	—○					
D_2	○—	—	—	—○			
N	○—	—	—	—	—○		
R	○—	—	—	—	—	—○	
P	○—	—	—	—	—	—	—○

Neutral Safety Switch:

Terminal / Position	Bl/w	Bl/w
N	○—○	
R		
P	○—○	

Back-up Switch :

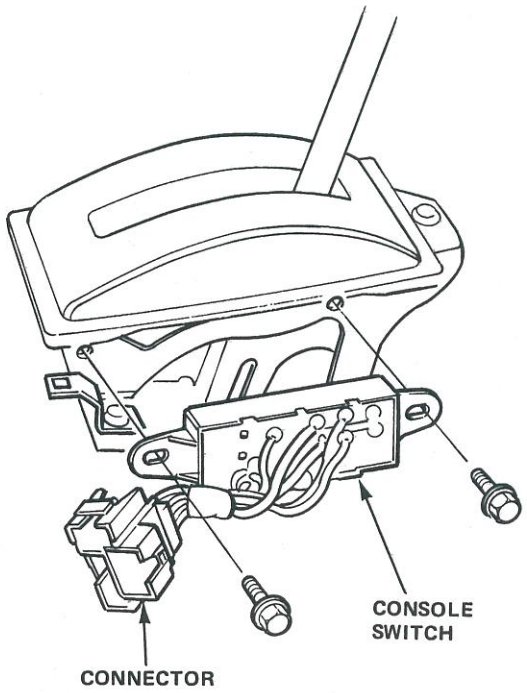
Terminal / Position	Y	G/Bl
N		
R	○—○	
P		

Shift Position Switch:
(With Cruise Control only)

Terminal / Position	Bl	P
2	○—○	
D_3	○—○	
D_4	○—○	
N		
R		
P		

Console Switch Replacement

1. Remove the front console.
2. Disconnect the 10-P and 2-P connectors from the console switch.
3. Remove the 2 bolts and console switch.



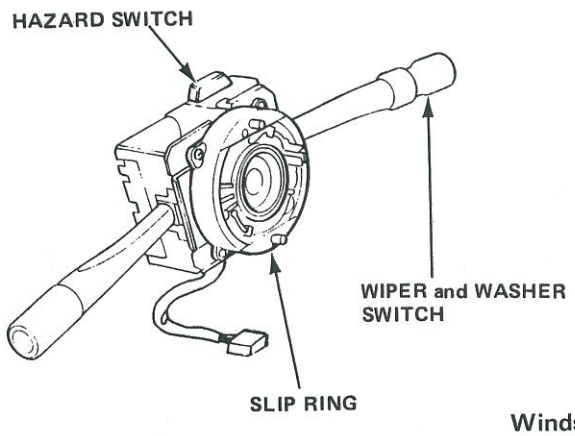
Combination Switch

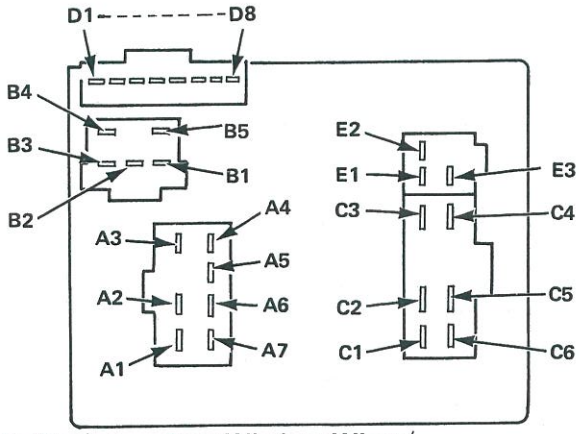
Test

1. Disconnect the connectors from the back of combination switch.
2. Check for continuity between the terminals in each switch position according to the table.

CAUTION:
- **Make sure the wire leads are not being pulled when you move the lever.**
- **Check that the lever works freely without binding.**

With Cruise Control:





Windshield Wiper Switch

Position: Wiper Switch	Position: Mist Switch	A1	A5	A2	A3	A4	A7
OFF	OFF		○	○			
	ON	○	○				
INT	OFF		○	○		○	○
	ON	○	○			○	○
LO	OFF		○	○			
	ON	○	○				
HI	OFF	○	○				
	ON	○	○				

Windshield Washer Switch

Position	A4	A7
OFF		
ON	○	○

Rear Window Wiper/ Washer Switch

Position	B1	B2	B3	B4	B5
OFF	○	○			
ON	○	○	○		
WASHER	○	○	○	○	○

(Internal connection)

(Internal connection)

Lighting/Dimmer Switch

Position: Lighting Switch	Position: Dimmer Switch	C4	C6	C3	C5	C2	C1
OFF							
•		○	○				
•	HIGH	○	○	○	○		○
	LOW	○	○	○		○	○

Passing Switch

Position	C5	C3
OFF		
ON	○	○

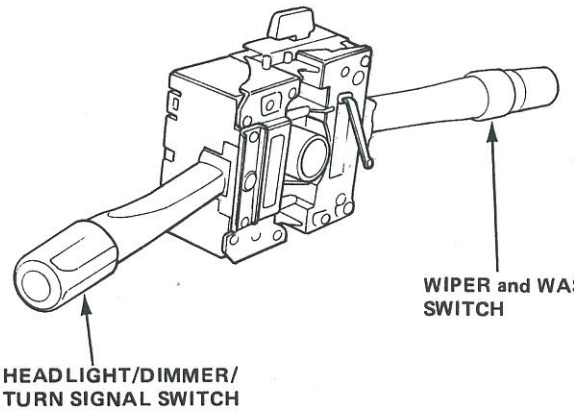
(Internal connection)

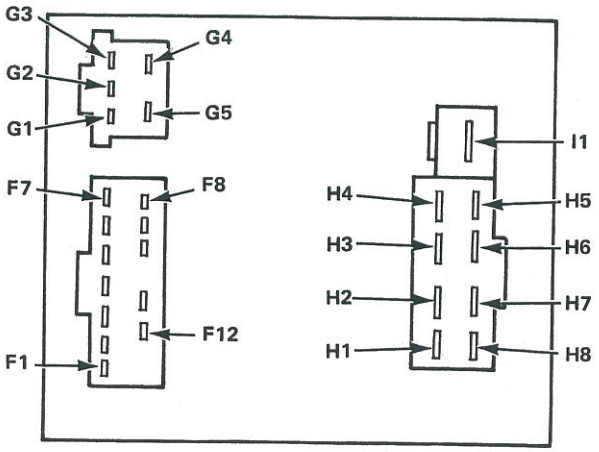
(Internal connection)

Turn Signal/Hazard Switch

Position: Hazard Switch	Position: Turn Signal Switch	D4	D1	D5	D6 (E2)	D2 (E1)	D3 (E3)
OFF	R		○—○		○—○		
	NEUTRAL		○—○				
	L		○—○		○———○		
ON	R	○———○			○—○—○		
	NEUTRAL	○———○			○—○—○		
	L	○———○			○—○—○		

Without Cruise Control:





Windshield Wiper Switch

Position: Wiper Switch	Position: Mist Switch	F2	F10	F11	F4	F6	F1
OFF	OFF		○———○				
	ON	○———○					
INT	OFF		○———○			○—○	
	ON	○———○				○—○	
LO	OFF		○—○				
	ON	○———○					
HI	OFF	○———○					
	ON	○———○					

Windshield Washer Switch

Position	F3	F6
OFF		
ON	○—○	

Rear Window Wiper/ Washer Switch

Position	G1	G2	G3	G4	G5
OFF	○—○				
ON	○———○				
WASHER	○———○			○—○	

(cont'd)

Test (cont'd)

Lighting/Dimmer Switch

Position \ Terminal		H1	H7	H8	H3	H2	H1
Lighting Switch	Dimmer Switch						
OFF							
•		○—○					
●	HIGH	○—○	○—○	○—○	○—○		○
	LOW	○—○	○—○	○—○		○—○	○

(Internal connection)

(Internal connection)

Passing Switch

Position \ Terminal	H1	H3
OFF		
ON	○—○	

Turn Signal/Hazard Switch

Position \ Terminal		F9	F8	F10	H6	H4	H5
Hazard Switch	Turn Signal Switch						
OFF	R		○—○		○—○		
	NEUTRAL		○—○				
	L		○—○		○		○
ON	R	○		○	○—○		○
	NEUTRAL	○		○	○—○		○
	L	○		○	○—○		○

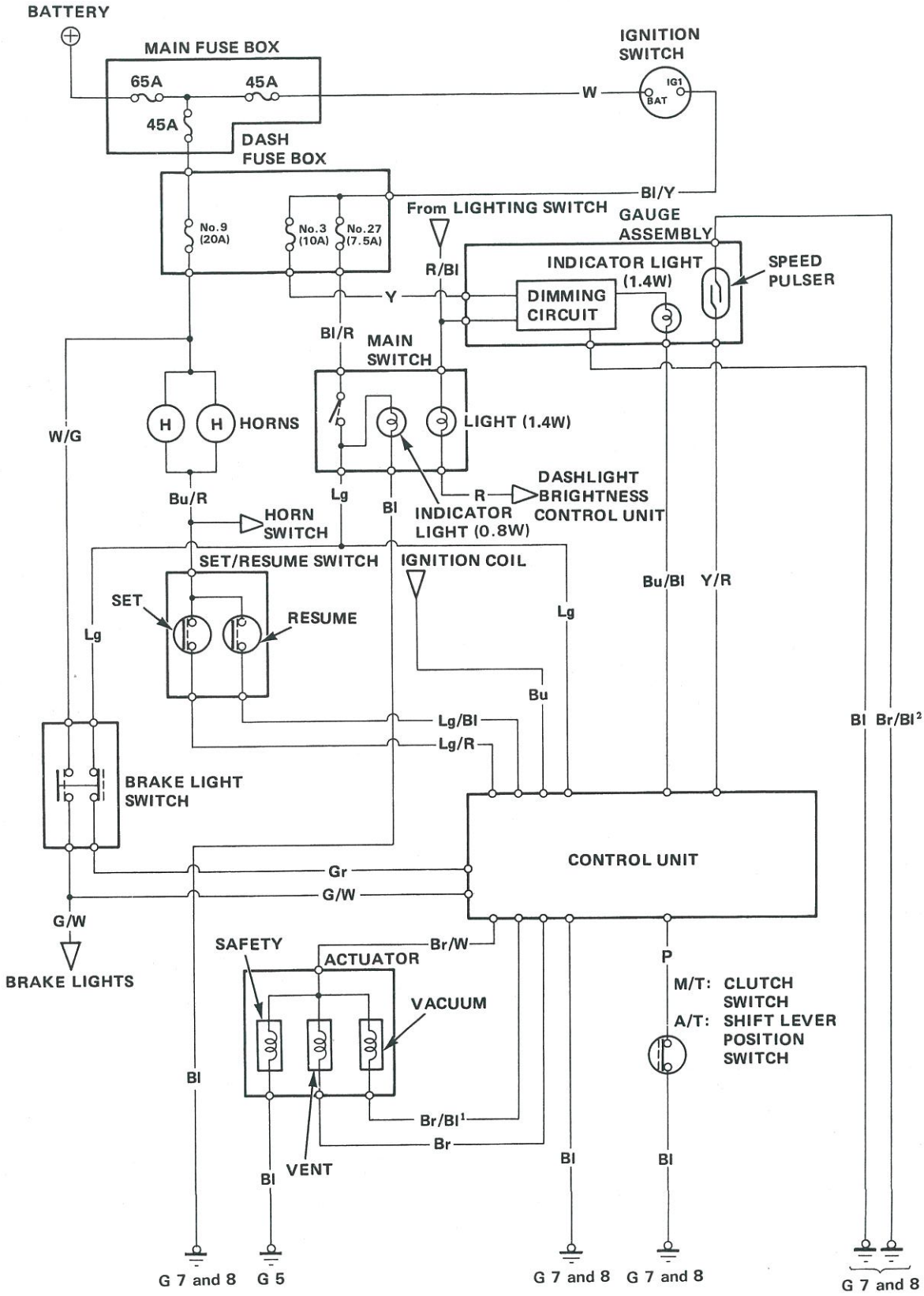
Horn Switch (No Cruise Control only)

Position \ Terminal	F5	
OFF		
ON	○	⏚



Cruise Control

Circuit Diagram



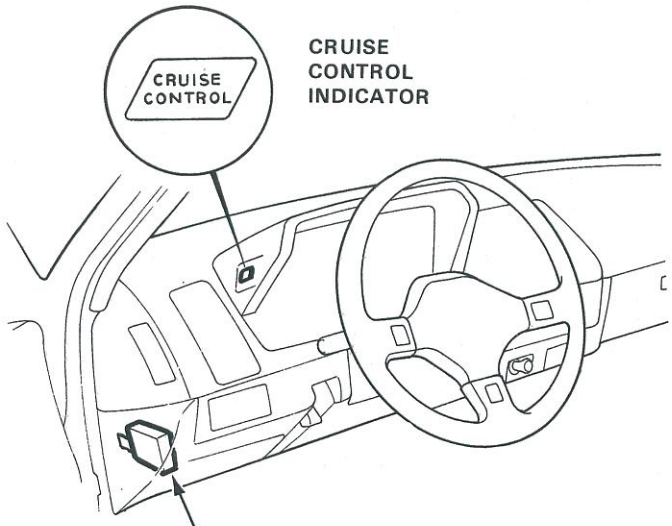
NOTE: Different wires have the same color. They have been given a number suffix to distinguish them (for example, Br/Bl[1] and Br/Bl[2] are not the same).

Component Location Index

MAIN SWITCH
Removal, page 23-68
Test, page 23-85

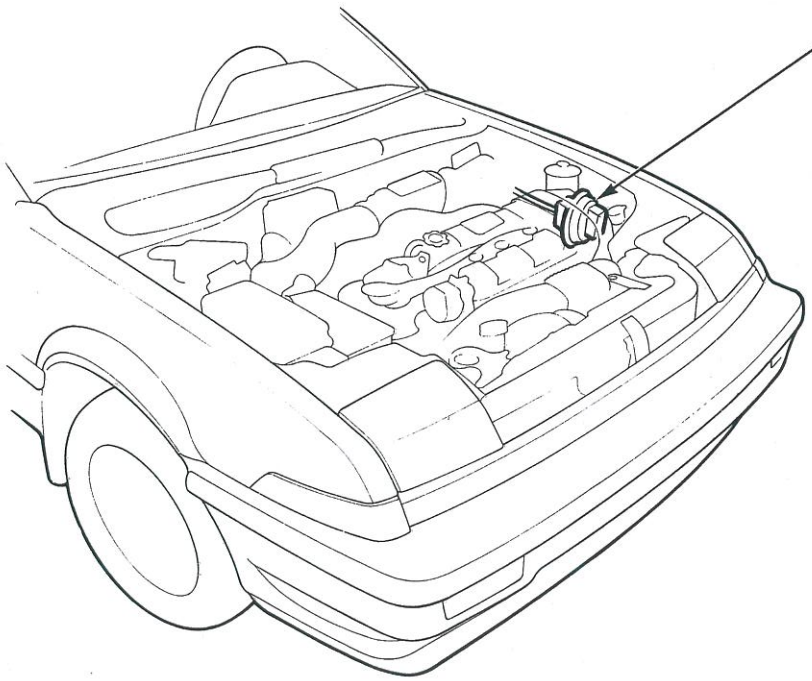
SET/RESUME SWITCH
Test, page 23-86
Replacement, page 23-86

BRAKE LIGHT/CLUTCH SWITCH
Test, page 23-85



CRUISE CONTROL INDICATOR

CRUISE CONTROL UNIT
Input, page 23-84



ACTUATOR
Solenoid Test, page 23-88
Test, page 23-88
Actuator/ Cable Replacement, page 23-89
Cable Adjustment, page 23-90
Disassembly 23-87

Cruise Control

Description

The cruise control system uses mechanical, electrical, and vacuum operated devices to maintain vehicle speed at a setting selected by the driver.

The cruise control unit receives command signals from the cruise control main switch and the cruise control set/resume switch. It receives information about operating conditions from the brake switch, the distributor, speed sensor, the clutch switch (with manual transmission), or the shift lever position switch (with automatic transmission). The cruise control unit sends operational signals to the devices that regulate the throttle position. The throttle position mainatains the selected vehicle speed. Essentially, the control unit compares the actual speed of the vehicle to the selected speed. Then, the control unit uses the result of that comparison to open or close the throttle.

The brake switch releases the system's control of the throttle at the instant the driver depresses the brake pedal. The switch sends an electronic signal to the control unit when the brake pedal is depressed; the control unit responds by allowing the throttle to close. The clutch switch (manual transmission) or the shift lever position switch (automatic transmission) sends a disengage signal input to the control unit that also allows the throttle to close.

Operation

The cruise control system will set and automatically maintain any speed above 30 mph (45 kph). To set, make sure that the main switch is in the "On" position. After reaching the desired speed, press the set switch. The cruise control unit will receive a set signal input and, in turn, will actuate the cruise control motor. When the set switch is depressed and the cruise control system is on, the "cruise control" on indicator on the warning display will light up.

You can cancel the cruise control system by pushing the main switch to "Off." This removes power to the control unit and erases the set speed from memory. If the system is disengaged temporarily by the brake switch, clutch switch, or gear selector switch and vehicle speed is still above 30 mph, press the resume switch. With the resume switch depressed and the set memory retained, the vehicle automatically returns to the previous set speed.

For gradual acceleration without depressing the accelerator pedal, push the resume switch down and hold it there until the desired speed is reached. This will send an acceleration signal input to the control unit. When the switch is released, the system will be reprogrammed for the new speed. To slow the vehicle down, depress the set switch. This will send a deceleration signal input to the control unit causing the vehicle to coast until the desired speed is reached. When the desired speed is reached, release the set switch. This will reprogram the system for the new speed.

Troubleshooting

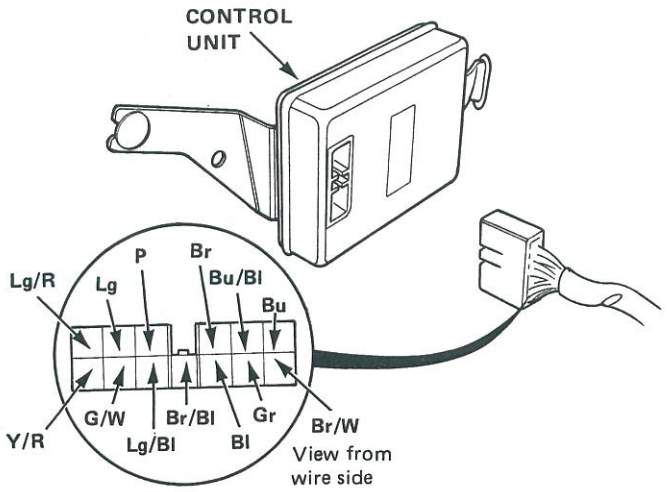
NOTE :
- The numbers in the table show the troubleshooting sequence.
- Before trouble shooting
  - —Check the No.3 (10A),No. 27 (7.5A) and No.9 (20A) fuses in the box.
  - —Check that the horns sound.
  - —Check the tachometer for proper operation.

Symptom \ Items to be inspected	Main switch	SET/RESUME switch	Brake light switch and mounting	Clutch switch and mounting (M/T)	Shift lever position switch (A/T)	Speedometer pulser or cable	Dimming circuit in gauges	Actuator	Disconnected, clogged or testricted vacuum lines/stuck check valve/ leaky vacuum reservoir	Control unit	Poor ground	Open circuit in Wires or loose or disonnected terminals
Cruise control can't be set	2	3	4	5					6	1	G7 and 8 G 5	Bu/R, Lg/R, Bu, Bl/R,Lg, Gr, Y/R, Br, Br/Bl, Br/W, or P
Cruise control can be set, but indicator light does not go on							2			1	G7 and 8	Y or Bu/Bl
Cruise speed noticeably higher or lower than what was set						1		2		3		
Excessive overshooting and/or undershooting when trying to set speed						2		1		3		
Steady speed not held even on a flat road with cruise control set						1		2	3	4		
Car does not decelerate or accelerate accordingly when SET or RESUME button is pushed		1								2		Lg/Bl
Set speed not cancelled when clutch pedal is pushed (M / T)				1						2		
Set speed not cancelled when shift lever is moved to (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		Lg/Bl

Control Unit Input Test

Lower the fuse box and disconnect the 13-P connector from the control unit.
Make the following tests at the harness pins:

NOTE: Replace the control unit if all input tests prove OK.

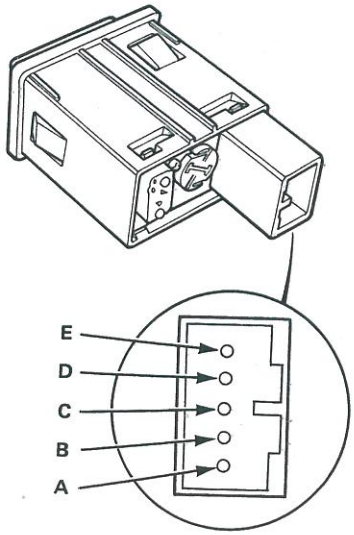


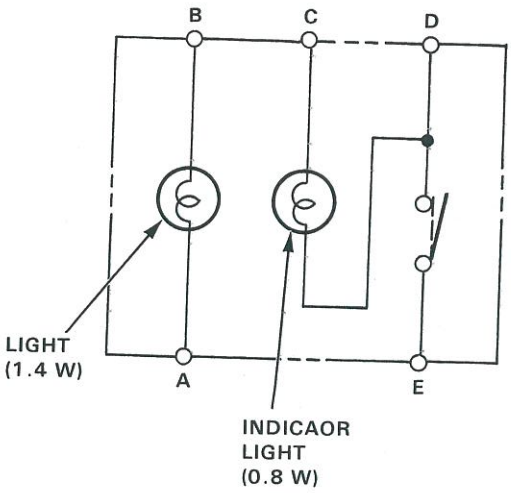
Wire	Test conditions	Test: desired result	Possible cause (if result is not obtained)
Bl	Under all conditions	Check for continuioy to ground: should be continuity.	Poor ground. An open in the wire.
Lg	Ignition switch ON and main switch ON	Check for voltage to ground: should have battery voltage.	An open in the wire.Faulty main switch.Blown No.27 (7.5A) fuse.
Lg/Bl	Resume switch pushed	Ground each terminal:Horns should sound as the switch is pushed.	An open in the wire. Faulty SET/RESUME switch Faulty slip ring. Faulty horn. Blown No.9 (20A) fuse
Lg/R	Set switch pushed		
P	M/T:Clutch pedal not pushed A/T:Shift lever in 2,D[3] or D[4]	Check for continuity to ground: should be continuity.	Poor ground.An open in the wire. Faulty or misadjusted clutch switch (M/T). Faulty shift lever position switch.
Bu	Start the engine	Check for voltage to ground: should have battery voltage.	An open in the wire. Faulty ignition system.
Y/R	Raise the front of the car and rotate one wheel. or remove the speedometer cable from the transmission and turn slowly by hand.	Check resistance in both directions between Y/R and Bl wires.There should be continuity in only one direction.4 times per cable revolution or 23 times per 10 wheel revolutions.	Faulty speed pulser in speedometer. An open in the wire. Poor ground.
Gr	Ignition switch ON,main switch ON and brake pedal pushed,then released	Check for voltage to ground: There should be O V with the pedal pushed and battery voltage with the pedal released.	An open in Gr wire circuit. Faulty brake light switch.
G/W	Brake pedal pushed,then released	Check for voltage to ground: There shounld be battery voltage with the pedal pushed,and O V with the pedal released.	An open in G/W wire circuit. Blown No.9 (20A) fuse. Faulty brake light switch.
Bu/Bl[1]	Ignition switch ON	Attach Bu/Bl[1] wire to ground: Indicator light in dash should come on.	Blown bulb.An open in Bu/Bl[1] wire cimcuit. Faulty dimming circuit in gauges Blown No.3 (10A) fuse.
Br	Under all conditions	Resistance to ground: should be 80—120Ω	Open or short in Br wire. Faulty actuator solenoid.
Br/Bl	Under all conditions	Resistance to ground: should bee 80—120Ω	Open or short in Br/Bl wire. Faulty actuator solenoid.
Br/W	Under all conditions	Resistance to ground: should be 40—60Ω	Open or short in Br/W wire. Faulty actuator solenoid.

Main Switch Test

1. Remove the switch from the instrument panel.
2. Check for continuity between the terminals in each switch position according to the table.

Terminal / Position	A	B		C	D		E
OFF		○	⊖	○	○	⊖	○
ON	○	○	⊖	○	○	⊖	○



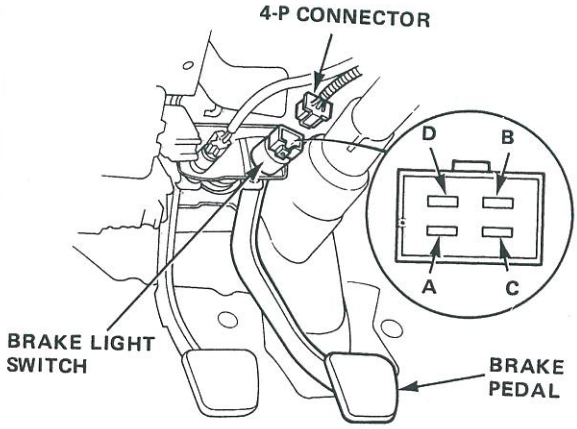


Brake Light/Clutch Switch Test

Brake Switch:

1. Disconnect the 4-P connector from the switch.
2. Check for continuity between the terminals according to the table.

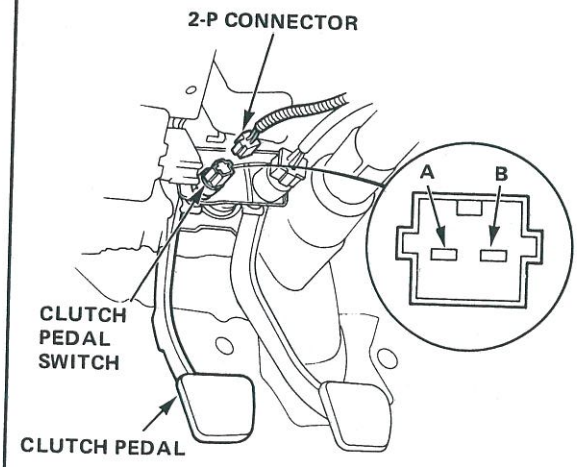
Terminal / Brake pedal	A	B	C	D
RELEASED	○	○		
PUSHED			○	○



Clutch Switch:

1. Disconnect the 2-P connector from the switch.
2. Check for continuity between the terminals according to the table.

Terminal / Clutch pedal	A	B
RELEASED	○	○
PUSHED		



NOTE: If necessary, replace the switch or adjust the pedal height.

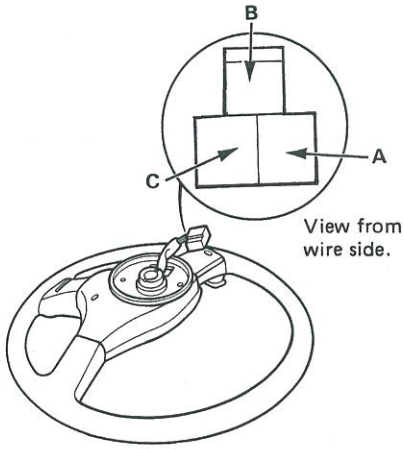
Cruise Control

Set/Resume Switch Test

Switch Test:

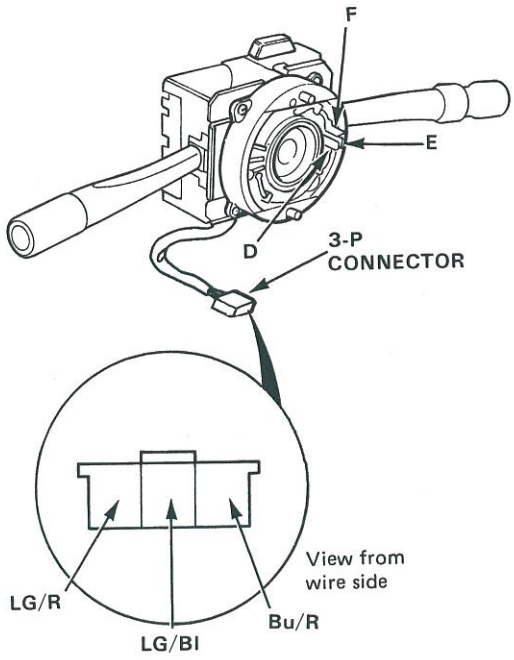
1. Remove the steering wheel.
2. Check for continuity between the terminals in each switch position according to the table.

Terminal / Position	A	B	C
OFF			
SET(ON)	○		○
RESUME(ON)		○	○



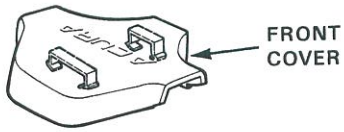
Slip Ring Test:

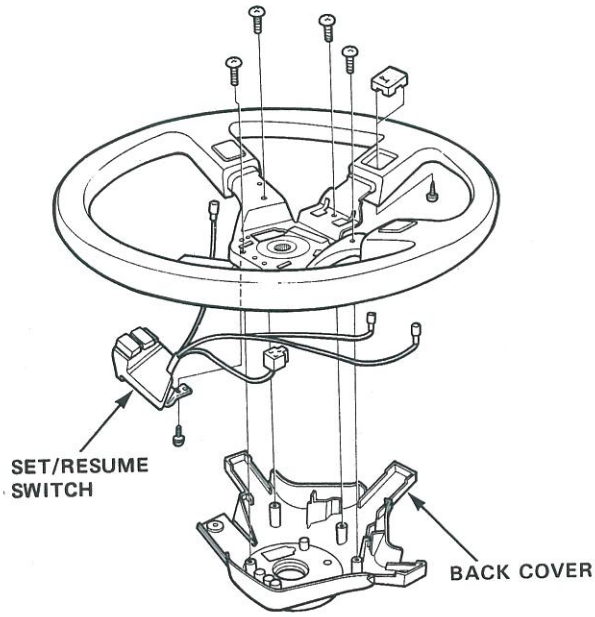
3. Remove the column cover, then disconnect the 3-P connector.
4. There should be continuity between the Bu/R and D terminal, the Lg/R and E terminal, and the Lg/Bl and F terminal, as you turn the slip ring.



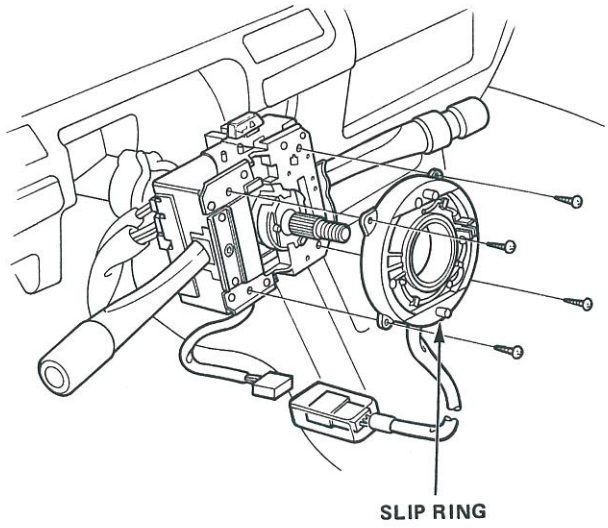
Set/Resume Switch Replacement

1. Remove the steering wheel.
2. Separate the upper wheel cover, then remove the body cover by removing the 4 screws.
3. Remove the 3 screws and the SET/RESUME switch from the steering wheel.

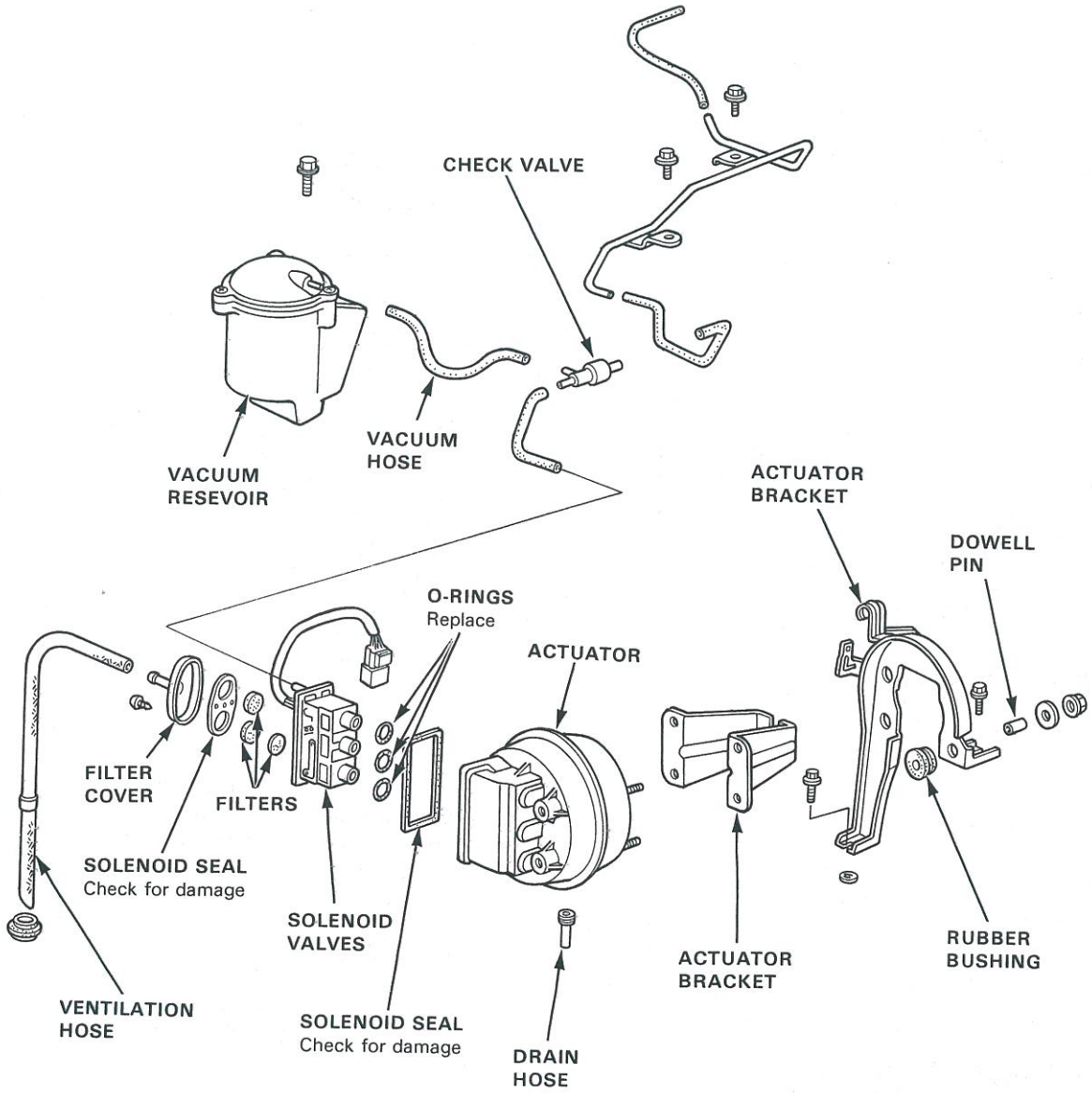




4. If necessary, remove the upper and lower steering column covers, then remove the 4 screws and the slip ring.



Actuator Disassembly

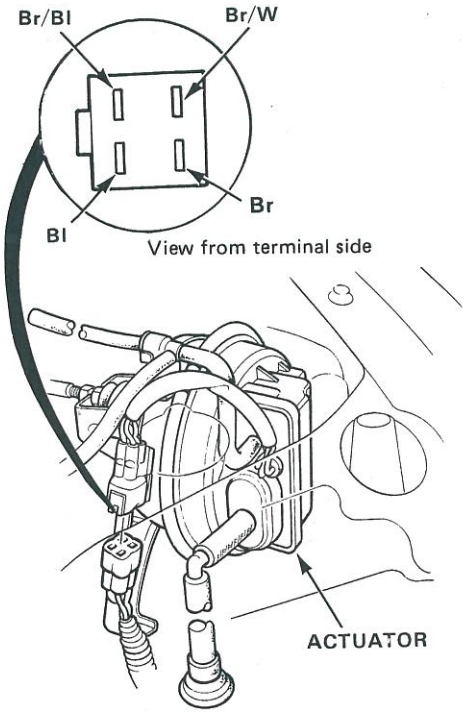


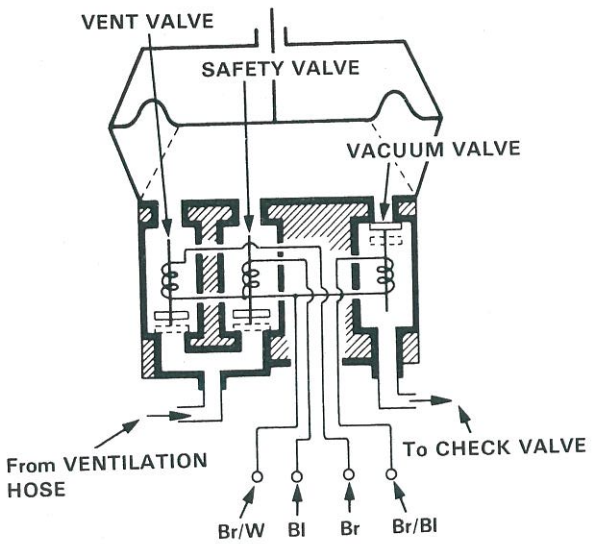
Actuator Solenoid Test

1. Disconnect the 4-P connector.
2. Measure resistance between the terminals.

Resistance:
VACUUM SOLENOID (between Br/W and Br/Bl)
30—50 Ω
VENT SOLENOID (between Br/W and Br)
40—60 Ω
SAFETY SOLENOID (between Br/W and Bl)
40—60 Ω

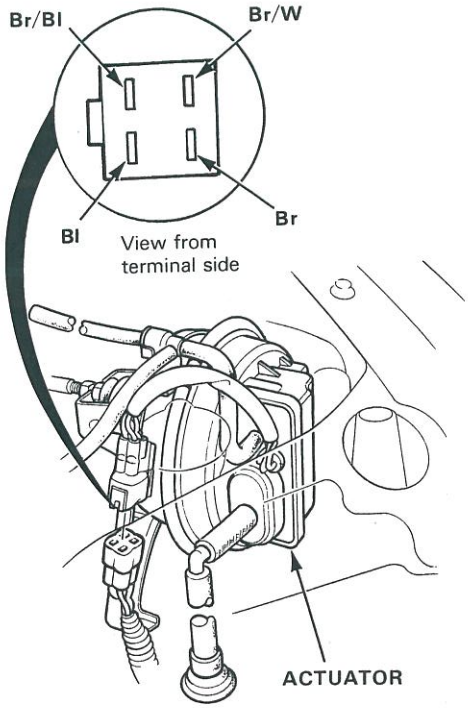
NOTE: Resistance will vary slightly with temperature; specified resistance is at 20°C (70°F).



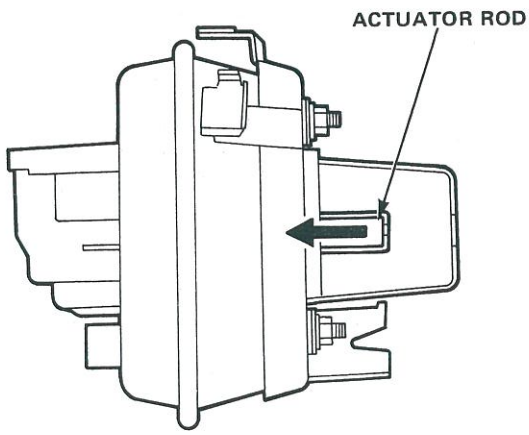


Actuator Test

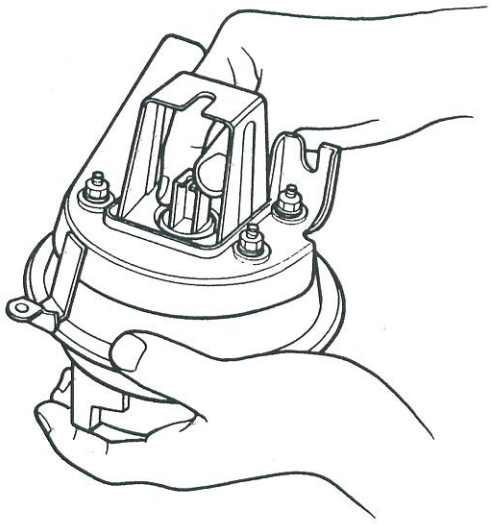
1. Disconnect the actuator cable from the actuator rod and the 4-P connector.
2. Connect battery positive wire to the Br/W terminal and negative to the Br/Bl , Br and Bl terminals.
3. Connect a vaccum pump to the check valve. Then apply vacuum to the actuator.



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.



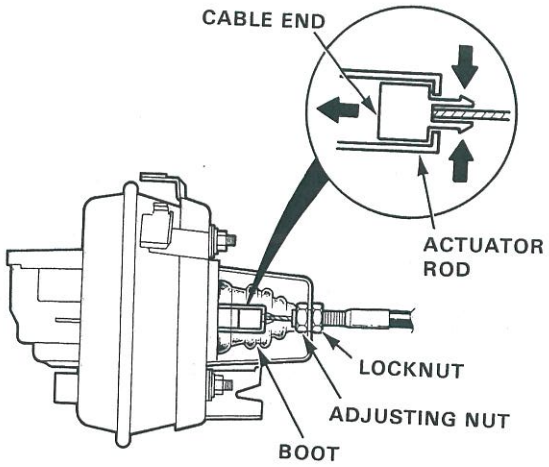
5. With voltage and vacuum still applied, try to pull the actuator rod out by hand.
   You should not be able to pull it. If you can, it is defective.



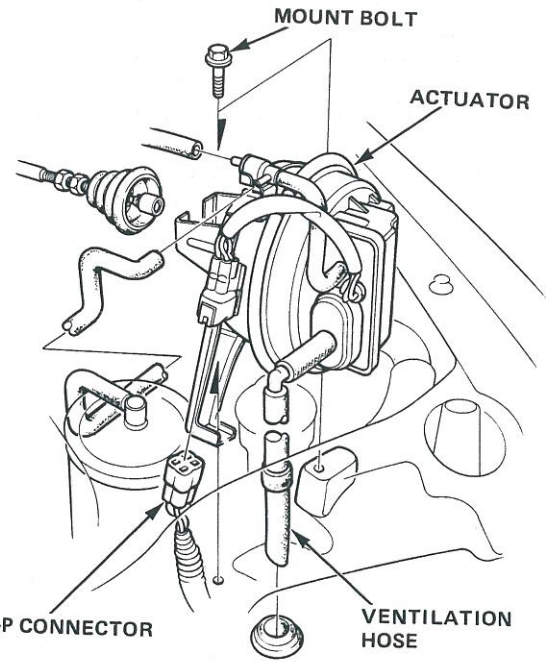
6. Disconnect battery negative wire from the Br terminal. The actuator rod should return.
   If the actuator rod does not return, and the ventilation hose and filter are free, the solenoid valve assembly is defective.
7. Repeat the steps 2—6, but this time disconnect battery negative wire from the BI terminal.
   The actuator rod should return. If it does not return, and the ventilation hose and filter are free, the solenoid valve assembly is defective.
8. If the solenoid valve assembly is replaced, be sure to use new O-rings at 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.
4. Pull the ventilation hose from the grommet.
5. Disconnect the vacuum hose from the check valve.
6. Remove the 2 mount bolts and the actuator with the bracket.

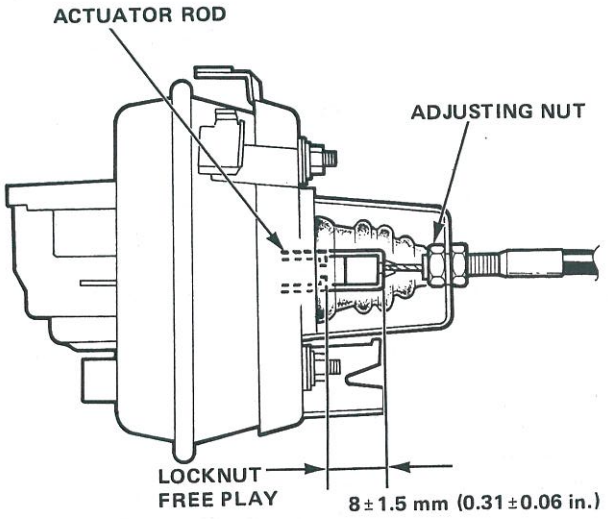


7. If necessary, disconnect the cable end from the linkage over the accelerator pedal.
8. Install in the reverse order of removal, and adjust free-play at actuator rod after connecting the cable (see next column).

Cruise Control

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 8 ± 1.5 mm (0.31 ± 0.06 in.).



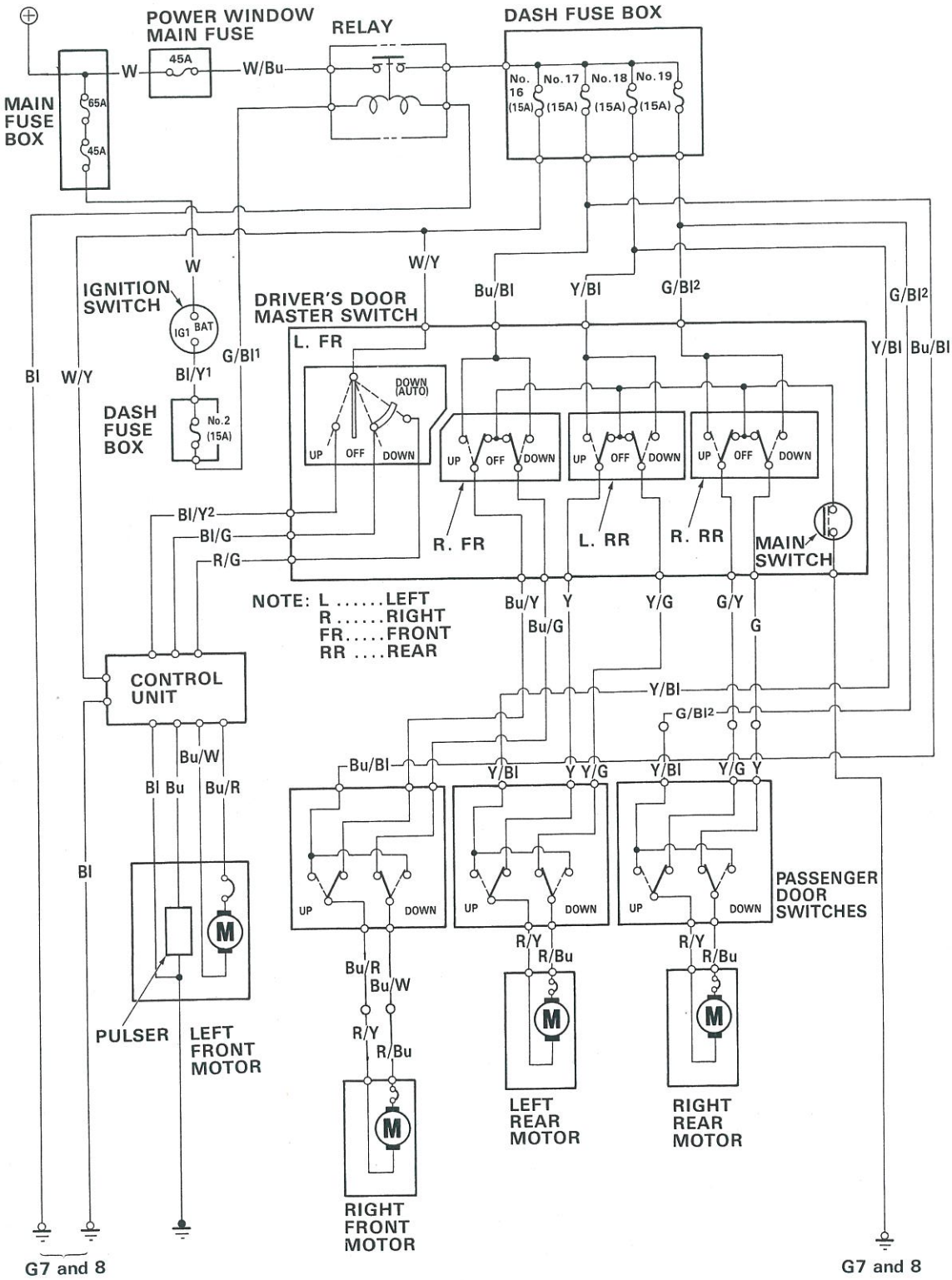
4. If free play is not within specs, loosen the locknut and turn the adjusting nut as required.
5. Retighten the locknut and recheck the free play.
6. Test drive the car to make sure that over and undershoot are held within ±2 mph of the set speed.

NOTE: If necessary, check the throttle cable free play (section 11), then recheck the actuator rod free play.



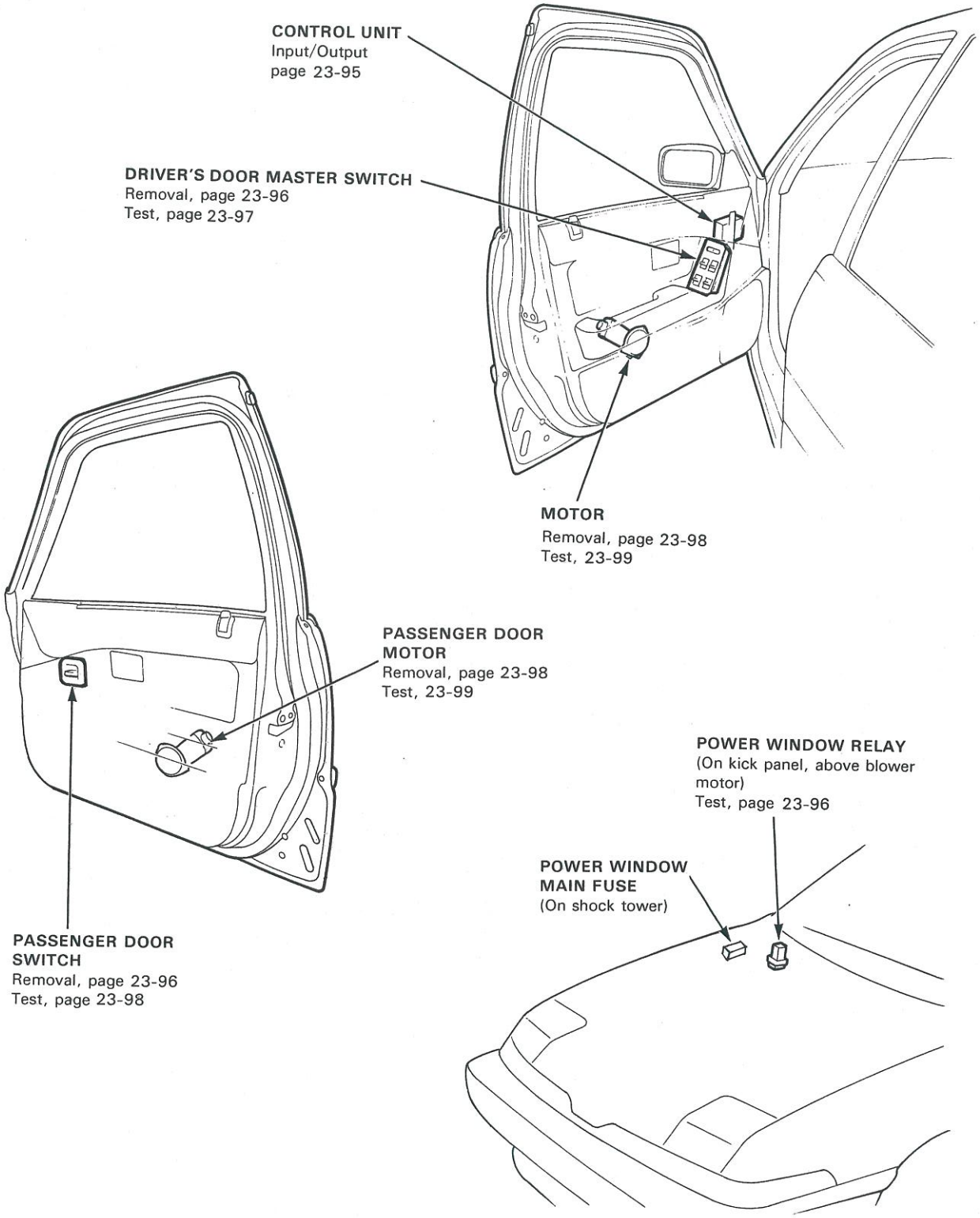
Power Windows

Circuit Diagram



NOTE: Several different wires have the same color. They have been given a number suffix to distinguish them (for example G/Bl[1] and G/Bl[2] are not the same).

Component Location Index



Power Windows

Troubleshooting

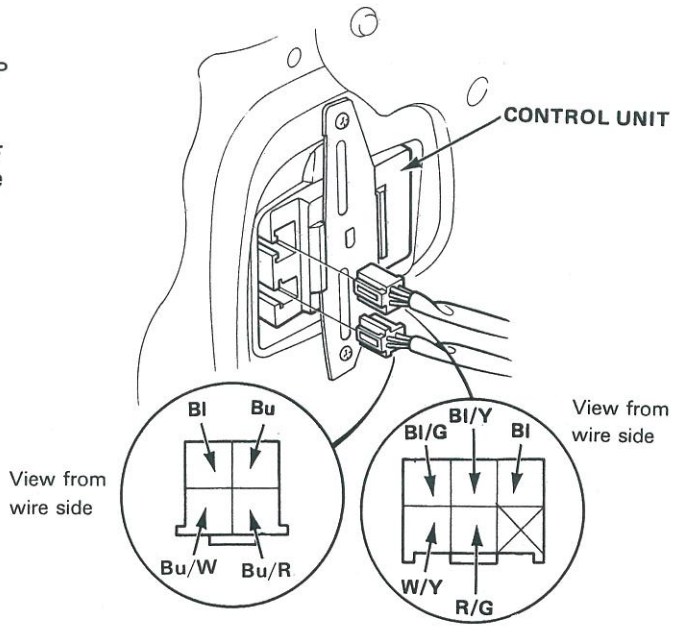
NOTE: The numbers in the table show the troubleshooting sequence.

Symptom \ Item to be inspected		Blown No. 15 (15A), No. 16 (15A), No. 17 (15A) or No. 18 (15A) fuse	Blown No. 2 (15A) fuse in fuse box	Relay	Control unit	Motor	Pulser in driver's door motor	Drivers door switch	Passenger door switch			Window regulator (section 20)	State of change of battery	Poor ground	Open circuit in wires or loose or disconnected terminals
									Right front	Left rear	Right rear				
All windows dead			1	3									2	G7and8	Bl/Y[1] or G/Bl[1]
Driver's door window dead		1			2	4		3				5		G7and8	W/Y, Bl/Y[2], Bl/G, R/Y or R/Bu
Driver's door window dead in DOWN (AUTO)					1		2	3							R/G, Bu or Bl
Passenger door windows dead	Right front	1				4		3	2			5		G7and8	Bu/Bl, Bu/Y, Bu/G, R/Y or R/Bu
	Left rear	1				4		3		2		5		G7and8	Y/Bl, Y Y/G, R/Y, or R /Bu
	Right rear	1				4		3			2	5		G7and8	G/Bl[2], G/Y, G, R/Y,or R/Bu

Control Unit Input/Output Test

Input Test:
Remove the driver's door trim panel and disconnect the 4-P and 6-P connectors from the control unit.

NOTE: To test the unit, keep the driver's door switch connector connected with the door wire harness.



No.	Wire	Test condition	Test : desired result	Possible cause (if result is not obtained)
1	Bl	At all times under all conditions	Check for continuity to ground : should be continuity.	Poor ground. An open in the wire.
2	W/Y	Ignition switch ON	Check fom voltage to ground : should have battery voltage.	An open in the wire. Blown No.16 (15 A) fuse.
3	Bl/Y	Ignition switch ON and front left window switch UP	Check for voltage to ground : should have battery voltage.	An open in the wire. Faulty driver's door switch.
4	Bl/G	Ignition switch ON and front left window switch DOWN		
5	R/G	Ignition switch ON and front left window switch DOWN (AUTO)		
6	Bu	Connect battery wires to Bu/W and Bu/R terminals.	Check for resistance to ground : shold indicate between 20-50 Ω while operating the motor.	An open in the wire. Faulty driver's door motor.

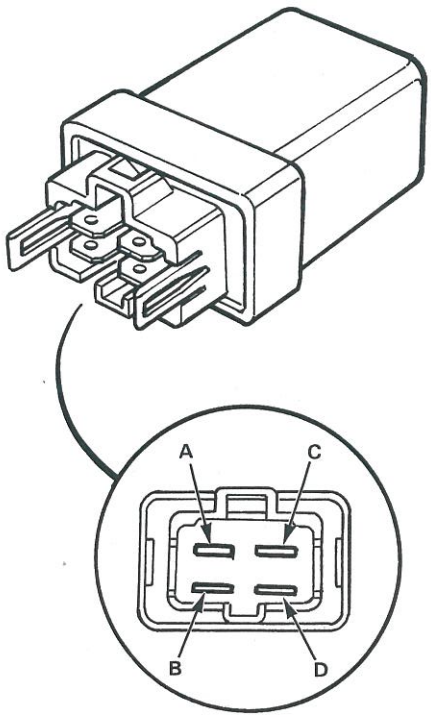
Output Test:
Reconnect the 4-P and 6-P connectors to the control unit.

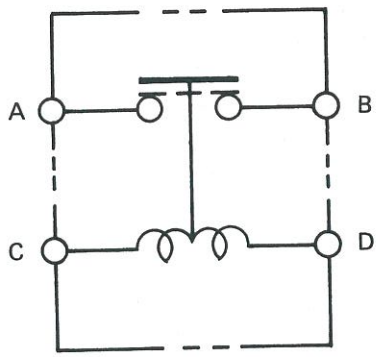
7	Bu/R	Ignition switch ON and front left window switch UP	Check for voltage to Bu/W wire: should have battery voltage.	Faulty control unit.
8	Bu/W	Ignition switch ON and front left window switch DOWN or DOWN (AUTO)	Check for voltage to Bu/R wire: should have battery voltage.	

Power Windows

Relay Test

1. Remove the power window relay on the right side kick panel above the blower motor.
2. There should be continuity between A and B terminals when the battery is connected to C and D terminals.
   There should be no continuity when the battery is disconnected.

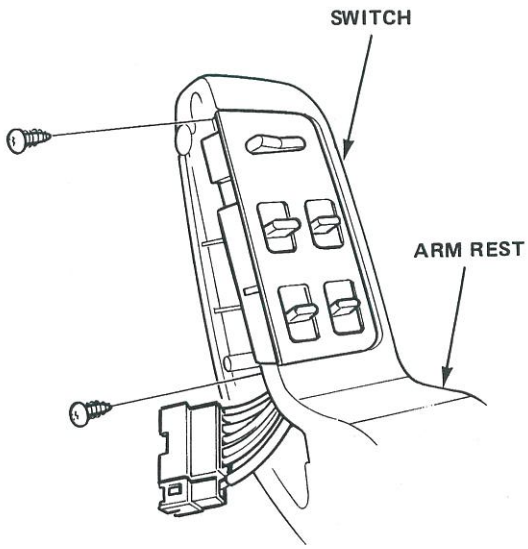




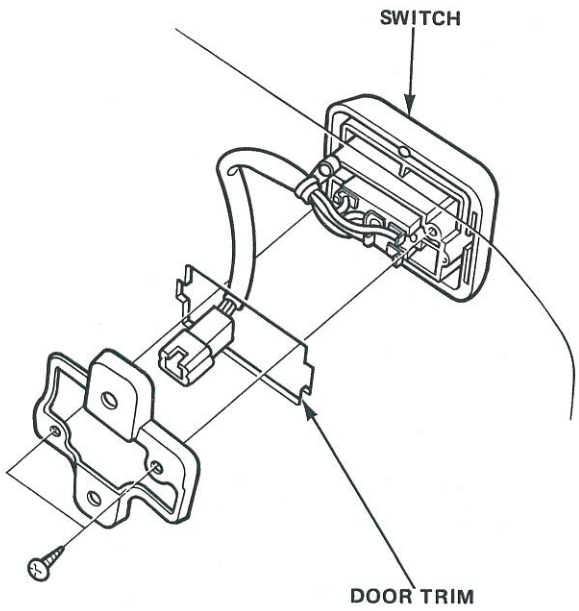
Switch Removal

1. Remove the door trim panel and the arm rest.
2. Remove the switch by removing the 2 screws on passenger doors, or the 2 screws on driver's door.

Driver's Door Switch:

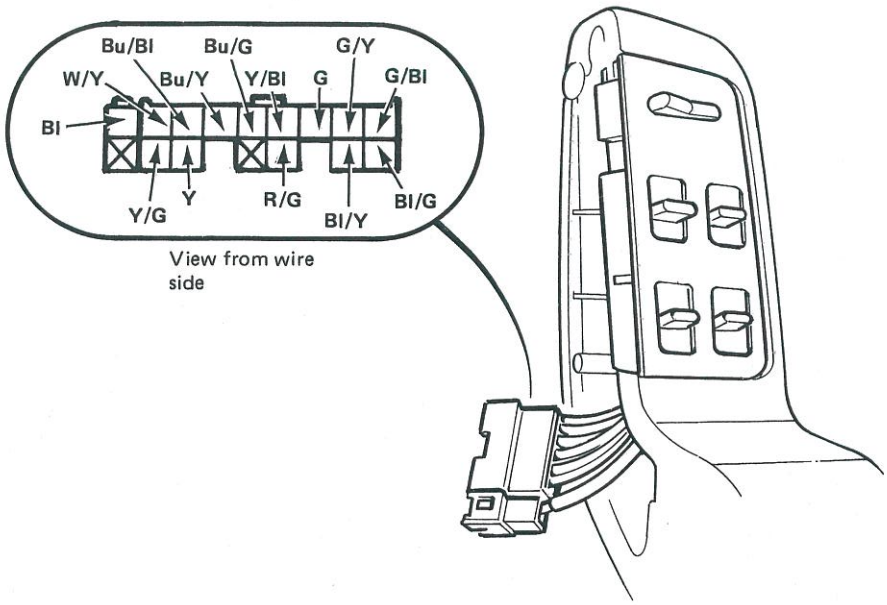


Passenger Door Switch:



Driver's Door Master Switch Test

1. Remove the door trim panel and the arm rest.
2. Check for continuity between the terminals in each switch position according to the tables.



Left Front Switch

Position \ Terminal	Bl/Y	W/Y	Bl/G	R/G
UP	○—○			
OFF				
DOWN		○—○		
DOWN (AUTO)		○—○	○	○

Left Rear Switch

Position	Main Switch \ Terminal	Y/Bl	Y	Y/G	Bl
UP	ON	○—○		○—○	
	OFF	○—○			
OFF	ON		○—○	○	○
	OFF		○—○		
DOWN	ON	○			○
			○	○	
	OFF		○—○		

Right Front Switch

Position	Main Switch \ Terminal	Bu/Bl	Bu/Y	Bu/G	Bl
UP	ON	○—○		○—○	
	OFF	○—○			
OFF	ON		○—○	○	○
	OFF		○—○		
DOWN	ON	○			○
			○	○	
	OFF		○—○		

Right Rear Switch

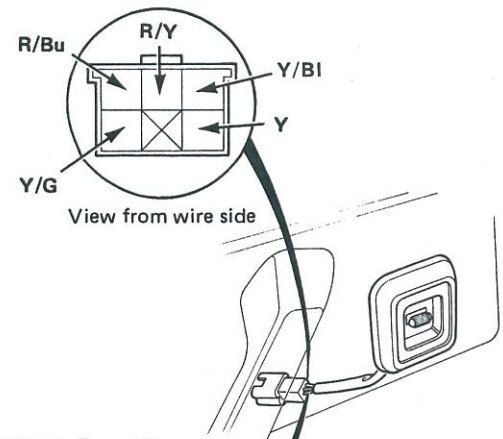
Position	Main Switch \ Terminal	G/Bl	G/Y	G	Bl
UP	ON	○—○		○—○	
	OFF	○—○			
OFF	ON		○—○	○	○
	OFF		○—○		
DOWN	ON	○			○
			○	○	
	OFF		○—○		

Power Windows

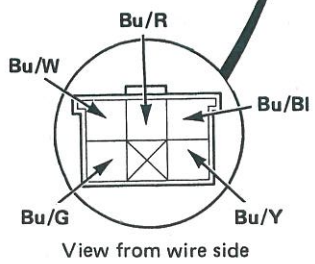
Passenger Door Switch Test

1. Remove the door trim panel.
2. Check for continuity between the terminals in each switch position according to the tables.

Rear Doors:



Right Front Door:



Rear Door Switches

Terminal / Position	Y/Bl	R/Y	R/Bu	Y	Y/G
UP	○—○				
			○——	——○	
OFF			○——	——○	
		○——		——○	
DOWN	○——		——○		
		○——		——○	

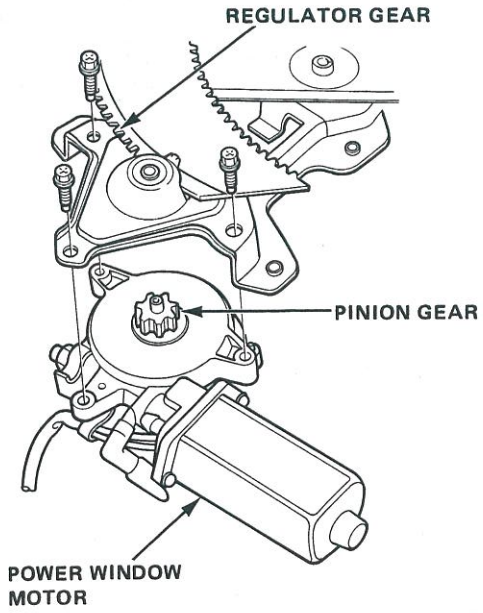
Front Door Switches

Terminal / Position	Bu/Bl	Bu/R	Bu/W	Bu/Y	Bu/G
UP	○—○				
			○——	——○	
OFF			○——	——○	
		○——		——○	
DOWN	○——		——○		
		○——		——○	

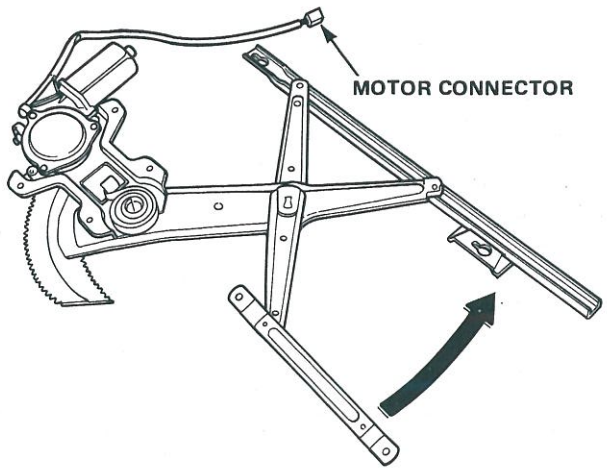
Motor Removal

1. Take the power window regulator with motor out of the door panel.
2. Remove the 3 mount bolts and motor from the regulator.

CAUTION: The regulator gear will move suddenly when the motor is removed, because the regulator spring is tensioned against the gear.

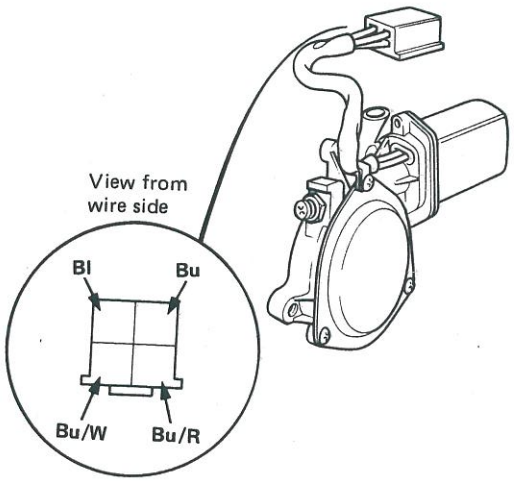


3. Install in the reverse order of removal. Engage the regulator gear with the pinion gear while moving the regulator gear by hand, then install the motor with the 3 mount bolts.
4. To ease installation in the door panel, lower the regulator by connecting battery wires to the motor connector.

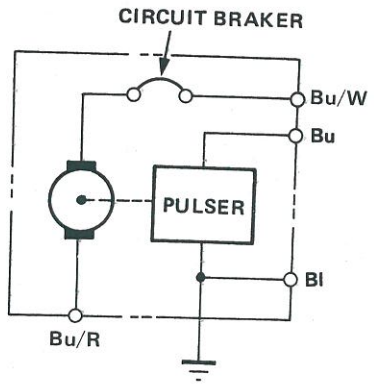


Driver's Door Motor Test

1. Remove the door trim panel.
2. Disconnect the 4-P connector from the power window control unit.
3. Test power window motor operation by connecting battery wires to the R/Y and R/Bu terminals. Test the motor in each direction, by switching the leads from the battery.
4. If the motor does not run, replace it.

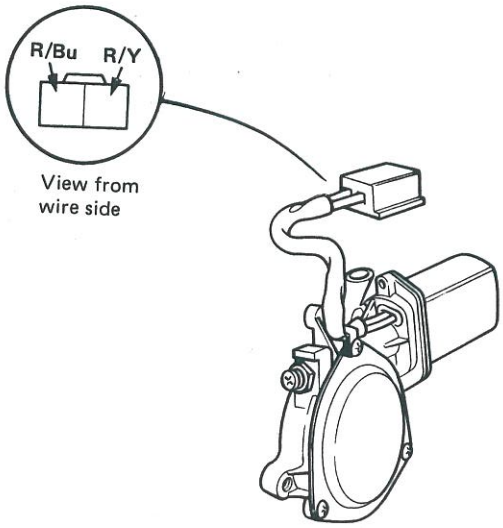


Pulser Test:
Measure resistance between the Bu and Bl terminals when running the motor by connecting battery wires to the Bu/W and Bu/R terminals. Ohmmeter needle should indicate in between 20—50 Ω as the motor runs.



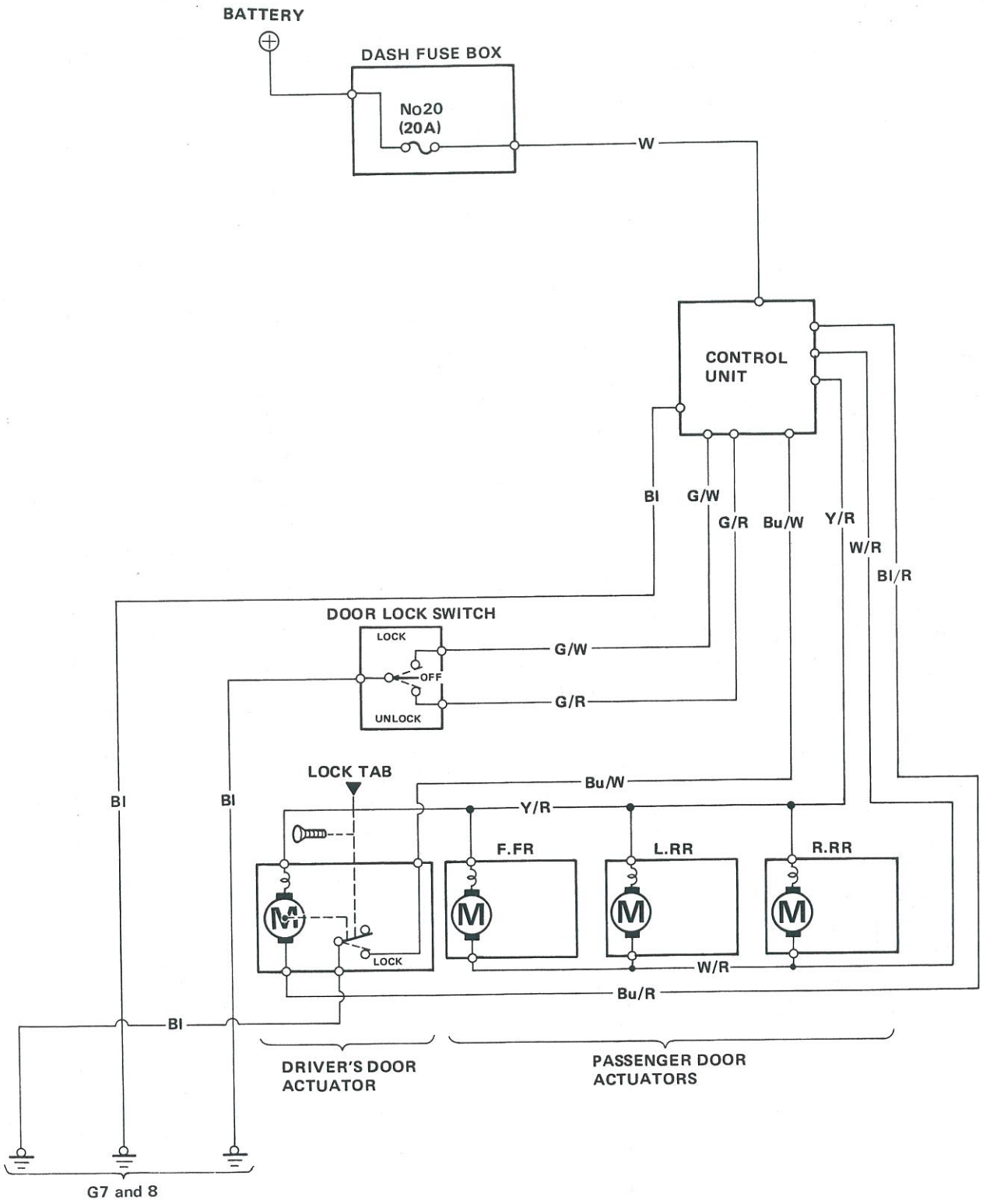
Passenger Door Motor Test

1. Remove the trim panel.
2. Disconnect the 2-P connector.
3. Test power window motor operation by connecting battery wires to the R/Y and R/Bu terminals. Test the motor in each direction, by switching the leads from the battery.
4. If the motor does not run, replace it.

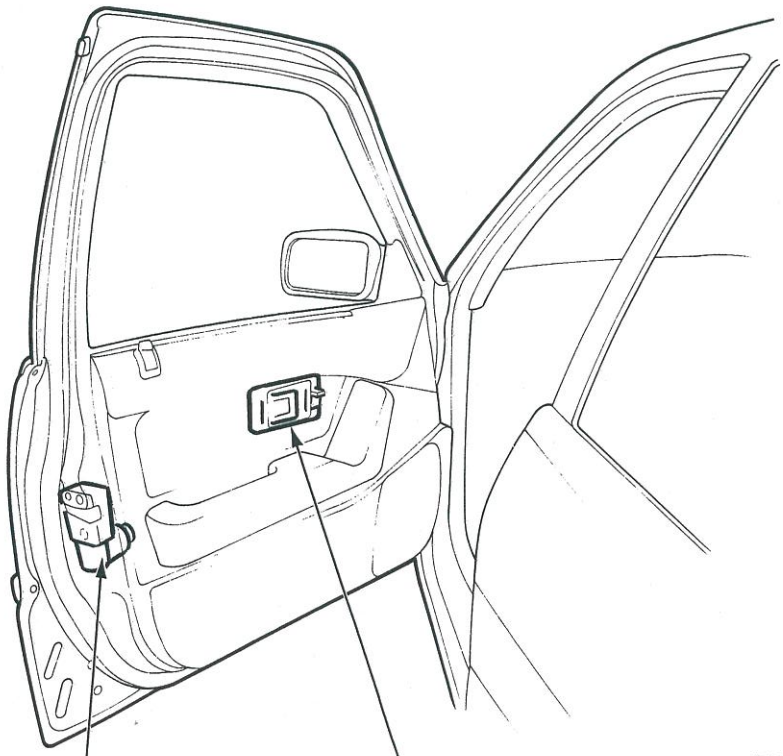


Power Door Locks

Circuit Diagram

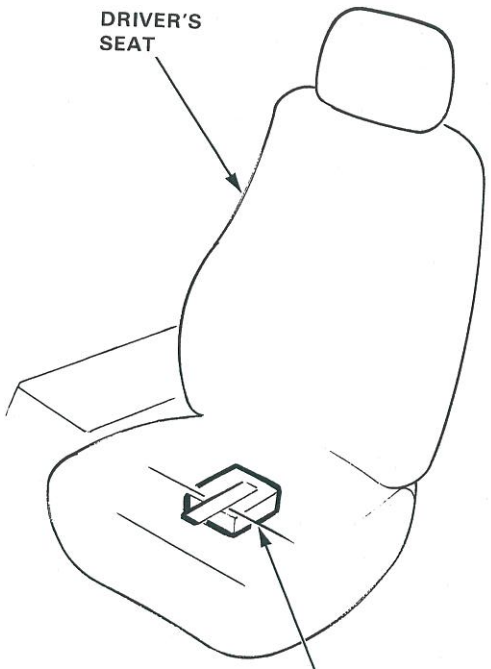


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ACTUATOR
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DRIVER'S SEAT

CONTROL UNIT
Test, page 23-103

Power Door Locks

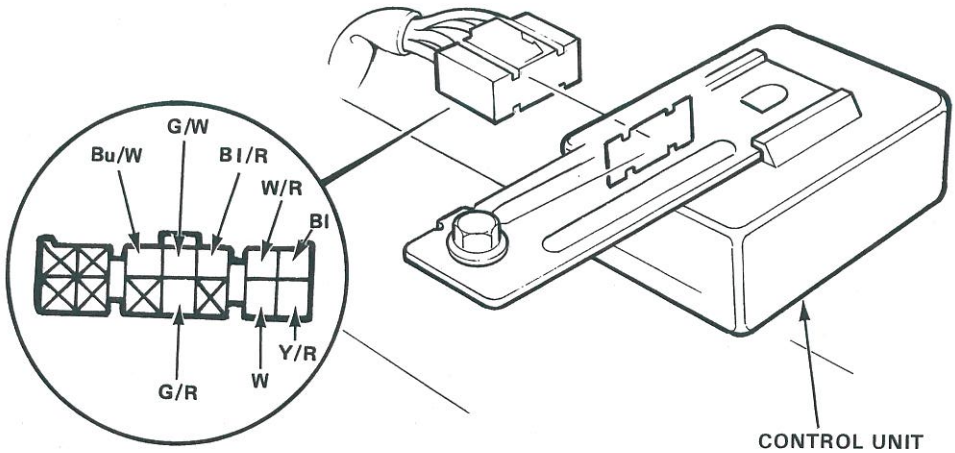
Troubleshooting

Symptom	Item to be inspected	Blown No.20 (20 A) dash fuse box	Door look switch	Driver's door actuator: Door lock Knob switch	Driver's door actuator: Motor	Passenger door actuator	Control Unit	Door lock rod/linkage (Section 20)	Poor ground	Open circuit in wies or loose or disconected terminals
Doors don't lock with driver's door lock knob switch	All passenger door	1		2			3	4	G7and8	W,Bu/W,Y/R or W/R
	One or more Pasenger door					1		2		Y/R or W/R
Doors don't lock or unlock with door lock switch	All doors	1	2				3		G7and8	W,G/W,G/R or Y/R
	Driver's door				1		2	3		Y/R or Bu/R
	All passenger doors						1		G7and8	Y/R or W/R
	One or more passenger door					1		2		Y/R or W/R

Control Unit Test

Input Test:

Remove the front driver's seat and disconnect the 14-P connector from control unit.



View from wire side

No.	Wire	Test condition	Test : desired result	Possible cause (if result is not obtained)
1	Bl	Under all conditions	Check for continuity to ground: should be continuity.	Poor ground. An open in the wire.
2	W	Under all conditions	Check for voltage to ground: should have battery voltage.	An open in the wire. Blown No. 20 (20 A) fuse in the dash fuse box.
3	Bu/W	Driver's door lock knob in LOCK	Check for continuity to ground: should be continuity.	Poor ground. An open in the wire. Faulty driver's door actuator.
4	G/W	Door lock switch in LOCK		
5	G/R	Door lock switch in UNLOCK		Poor ground. An open in the wire. Faulty door lock switch.

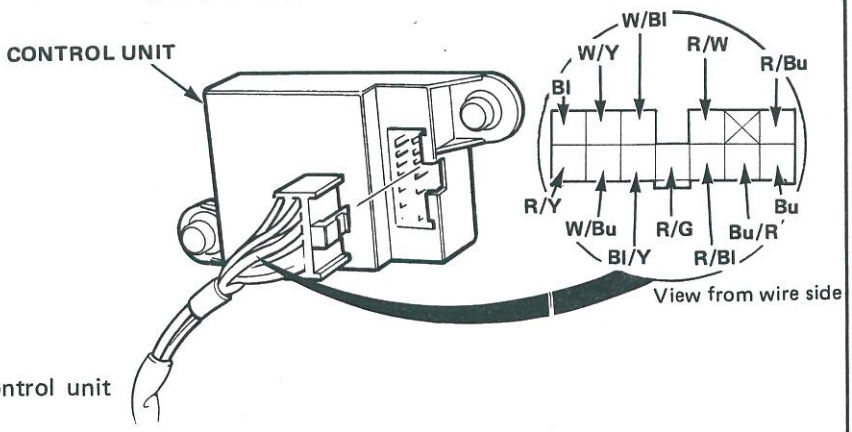
Output Test:

Reconnect the 14-P connector to the control unit.

6	Y/R	Door lock switch or driver's door lock knob in LOCK	Check momentarily for voltage to W/R or Bl/R wire : should have battery voltage.	Faulty control unit.
7	Bl/R	Door lock switch in UNLOCK	Check momentarily for voltage to Y/R wire:should have battery voltage.	Faulty control unit.
8	W/R	Door lock switch or driver's door lock knob in UNLOCK		

Retractable Headlights

Retractable Headlight Control Unit Input/Output



Input Test:
Disconnect the 13-P connector from the control unit and perform tests 1–8.

No.	Wire	Test condition	Test : desired result	Possible cause (if result is not obtained)
1	Bl	At all times under all conditions	Check for continuity to ground: should be continuity.	Poor ground. An open in the wire.
2	R/G	Retractor switch OFF	Check for voltage to ground: should be battery voltage.	An open in the wire. Faulty retractor switch.
3	R/W	Lighting switch "●"		An open in the wire. Blown No.1 (7.5 A) fuse.
4	R/Bl	Lighting switch "●" or "●"		An open in the wire. Blown No. 12 (15 A) fuse.
5	R/Y	Lighting switch "●" and dimmer switch Low		An open in the wire. Blown No. 10 (7.5 A) fuse.
6	Bu/R or Bu	Retractor motor stationary	Check for continuity to ground: should be continuity	An open in the wire. Poor ground. Faulty retractor switch.
7	Bl/Y	Ignition switch ON	Check for voltage to ground: should be bettery voltage.	An open in the wire. Blown No. 4 (10 A) fuse.
8	W/Bu	Start engine, and let it idle.	Check for voltage to ground: should have battery voltage for few seconds.	An open in the wire. Faulty voltage regulator. Check function of charge warning light.

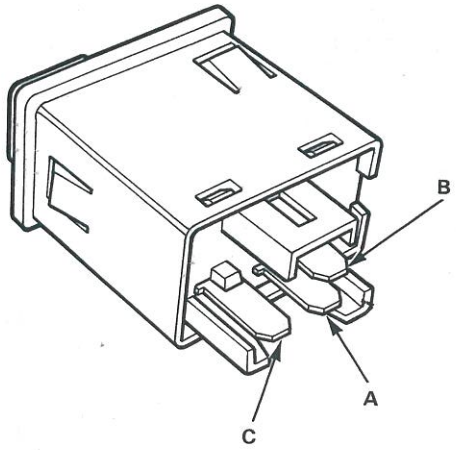
Output Test:
Connect the 13-P connector to the control unit and disconnect the 5-P connectors from the 2 retractor relays on the engine compartment and perform tests 9–11.

9	R/Bu	Connect battery positive wire to R/Bu or Bu terminal, negative to ground.	Check for voltage to ground: should be battery voltage within about 4 seconds after battery has been connected.	Faulty control unit.
10	W/Bl	Retractor switch OFF and lighting switch "●" or When lighting switch is turned from "●" to "●"	Check for voltage to ground: should be battery voltage.	
11	W/Y	Retractor switch OFF and lighting switch OFF		

Retractor Switch Test

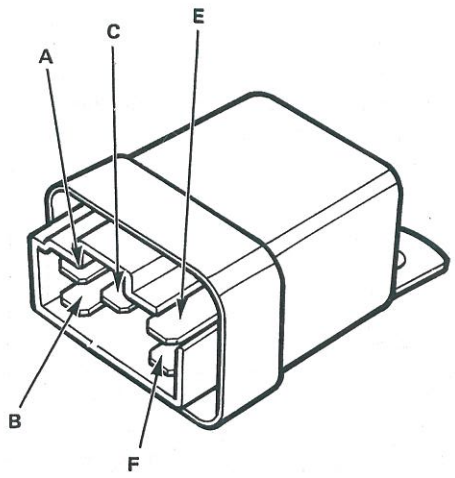
1. Remove the retractor switch (page 68).
2. Check for continuity between the terminals in each switch position according to the table.

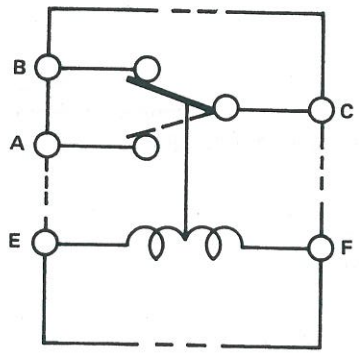
Terminal / Position	A	B	C
OFF (RETRACT)	○		○
ON (RAISE)	○	○	



Retrator Relay Test

There should be continuity between A and C terminals when the battery is connected to E and F terminals.
There should be continuity between B and C terminals when the battery is disconnected.





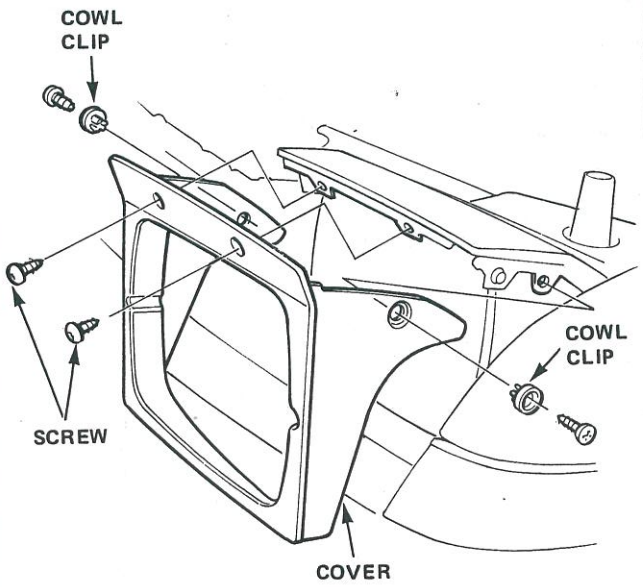
Retractable Headlights

Headlight Replacement

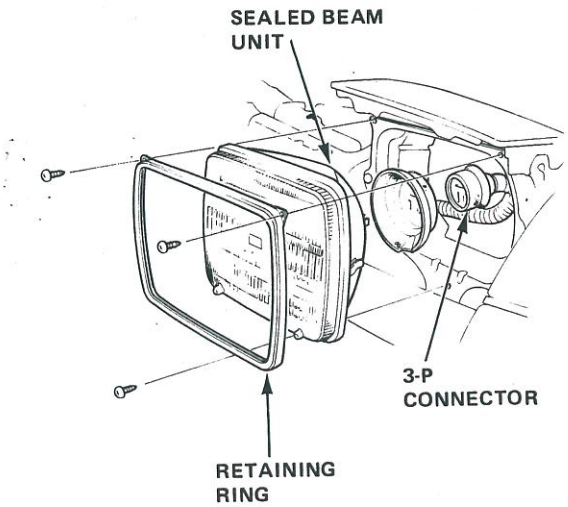
CAUTION:

- **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 units with the lights on.**

1. Raise the headlights with retractor switch ON.
2. Remove the front lower grille.
3. Remove the 2 screws and cowl clips and slide the headlight garnish upward to remove it.

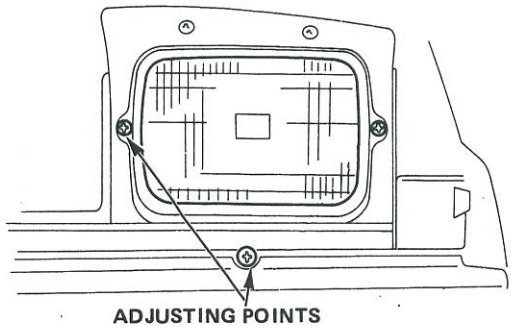


3. Remove the retaining ring by removing the 3 screws, then disconnect the 3-P connector from behind the unit to remove the headlight.



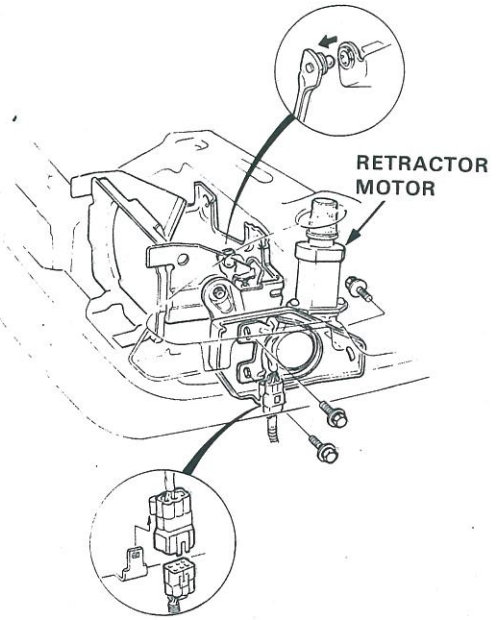
Headlight Adjustment

NOTE: Adjust headlight to local requirements.

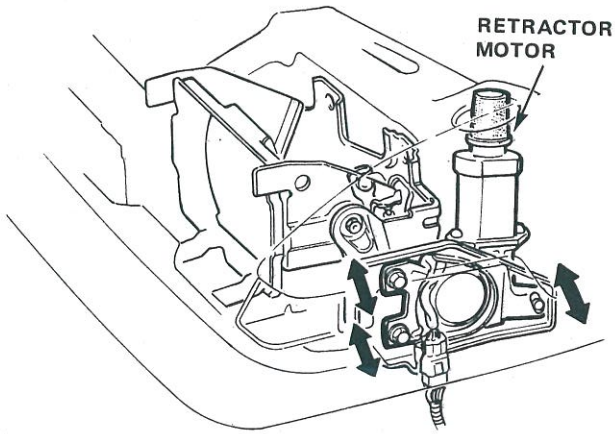


Retractor Motor Replacement

1. Remove the headlights.
2. Pry the retractor linkage off the motor arm.
3. Disconnect the 6-P connector.
4. Remove the 3 mount bolts and the retractor motor.



5. Install in the reverse order of removal, and:
   - Make sure there is no interference between the wire harness and linkage.
   - Coat the joints with grease and make sure the linkage moves smoothly.
   - Adjust the retractor motor fore or aft until the headlight doors fit flush with the front fender when the headlights are closed.

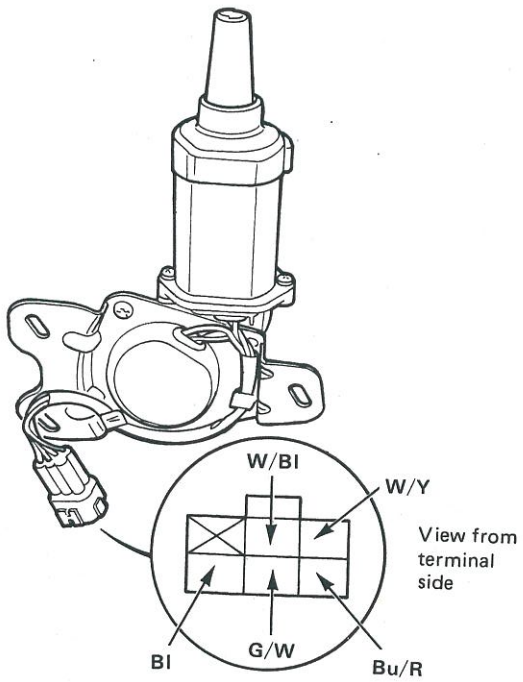


Retractor Motor Test

1. Test the retractor motor by applying battery voltage to Bu or Bu/R (positive) and Bl (negative) leads.
2. Connect ohmmeter probes to R/Bl and G/W leads, and R/W and G/W leads.
3. Rotate the motor by hand.
4. Ohmmeter needle should indicate continuity and no continuity repeatedly.

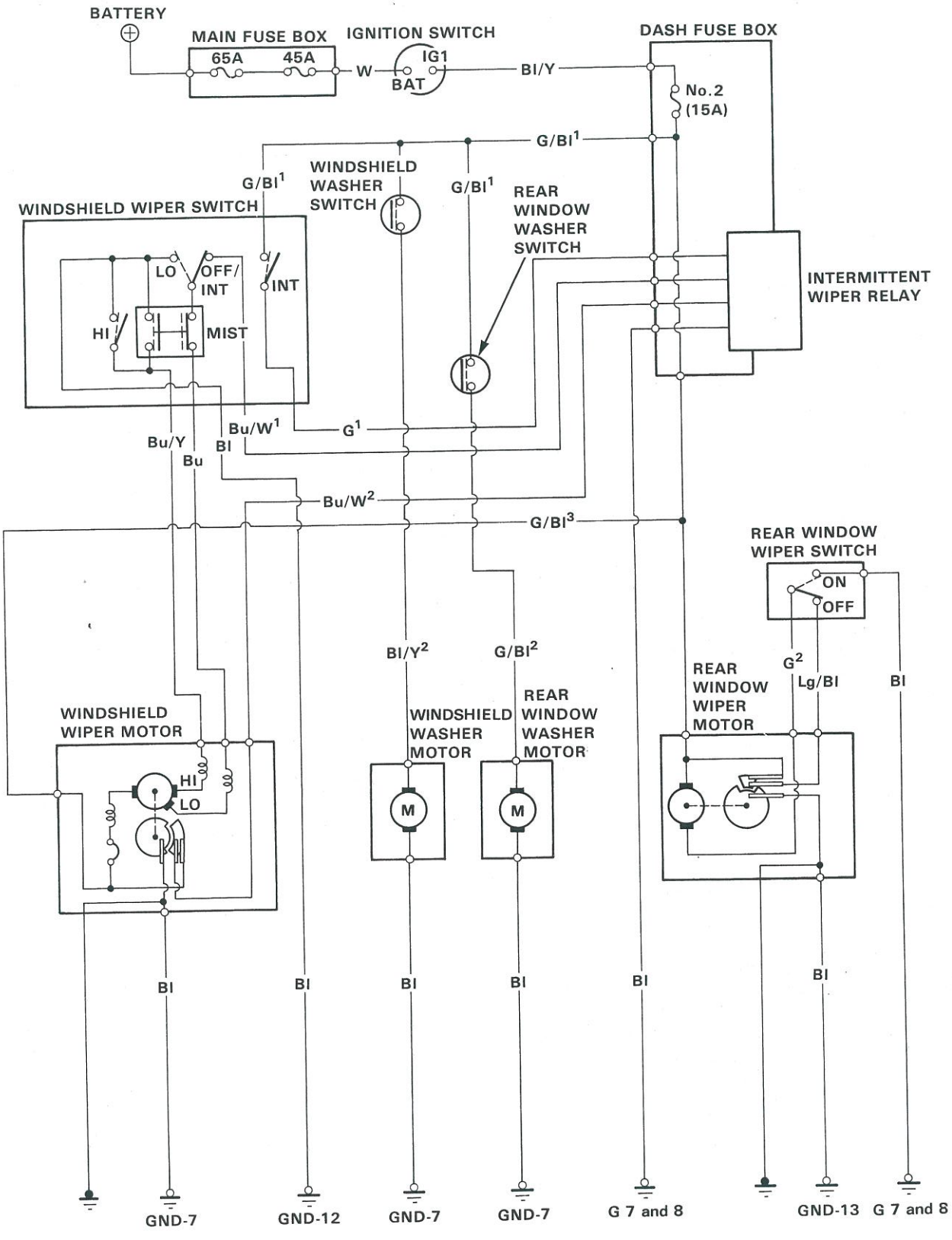
CAUTION: Before installing the motor, remove 15A fuse.

NOTE: Install the cap correctly.



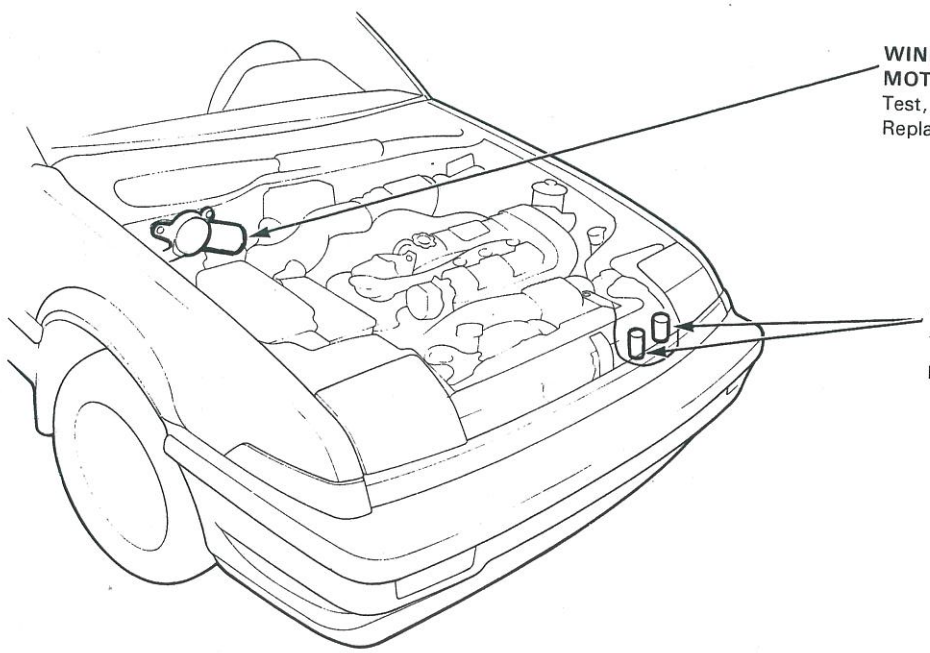
Circuit Diagram

NOTE: Several different wires have the same color. They have been given a number suffix to distinguish them (for example G/Bl^1 and G/Bl^2 are not the same).



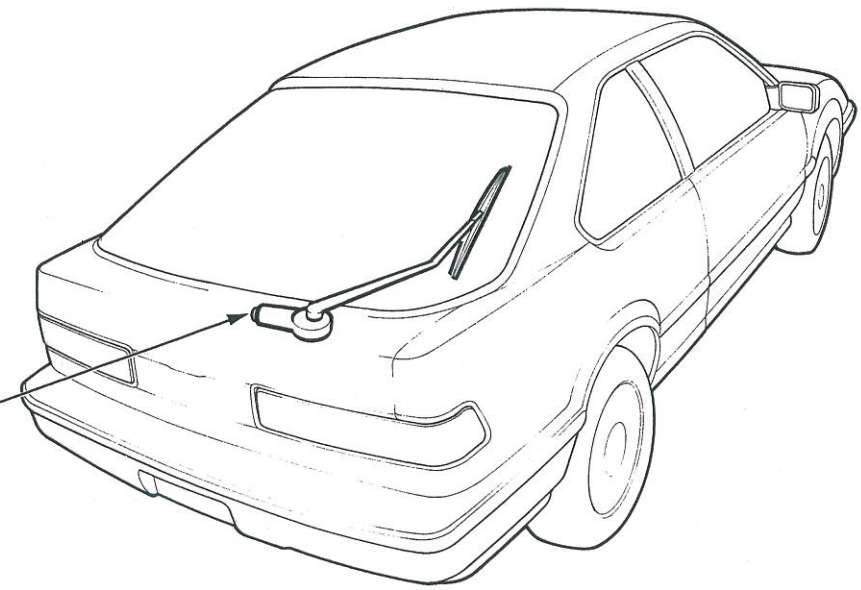
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WASHER MOTOR
Test/Replacement, page 23-119



REAR WINDOW WIPER MOTOR
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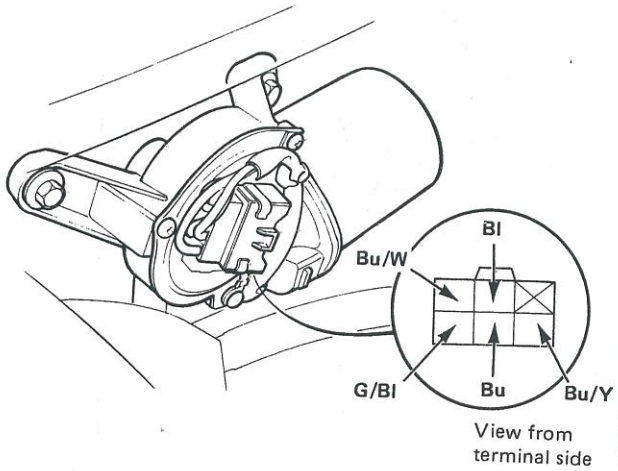
Troubleshooting

NOTE: The numbers in the table show the troubleshooting sequence.

Symptom \ Items to be inspected		Blown No. 2 (15A) fuse in	Wiper switch	Wiper motor	Washer switch	Washer motor	Insufficient washer fluid in reservoir	Faulty intermittent wiper relay	Disconnected wiper linkage	Disconnected, blocked washer hoses or clogged outlet	Poor ground	Open circuit in wires or loose or disconnected terminals
Windshield wiper does not operate	In all positions	1	3	2					4		G7and8	G/Bl[3]
	In INT		1					2			G7and8	Bu/W[1], G/Bl[3] or G[1]
	In LO or HI		2	1								Bu or Bu/Y
	In MIST		1									Bu/Y
Rear window wiper does not operate		1	3	2							G7and8	G/Bl[3] or G[2]
Blades not returned to park position when wiper is turned OFF	Windshield wiper		2	1				3			G6	Bu/W[1] or Bu/W[2]
	Rear window wiper		2	1							G10	Lg/Bl
Erratic intermittent cycle or wiper not operated intermittently			1					2				
Washer fluid not squirted at all		2			5	3	1			4	G5	G/Bl[4] or G/Bl[2]

Windshield Wiper Motor Test

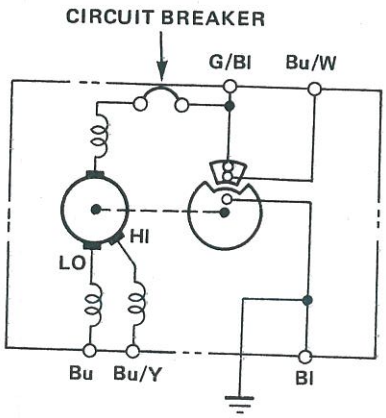
1. Remove the motor cover.
2. Disconnect the 6-P connector.
3. Test wiper motor operation:
   LOW SPEED: Connect battery positive wire to the G/Bl terminal and negative to the Bu terminal.
   HIGH SPEED: Connect battery positive wire to the G/Bl terminal and negative to the Bu/Y terminal.
4. If the motor fails to run smoothly, replace it.



5. Check for continuity between the terminals according to the table.

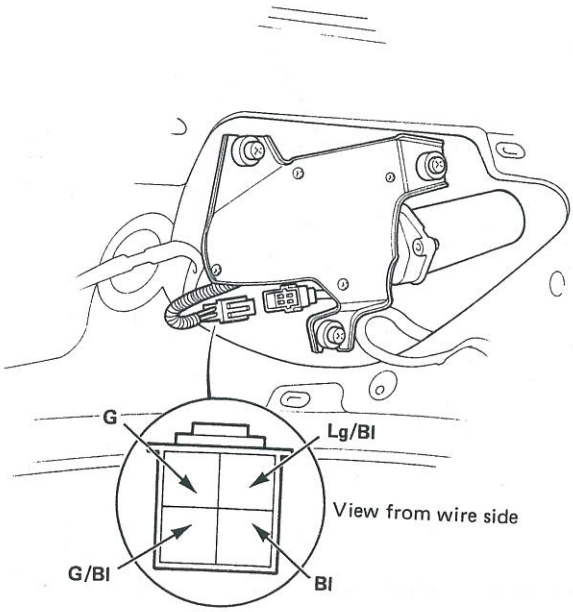
Wiper Blade \ Terminal	G/Bl	Bu/W	Bl
At park position	○	○	
At center position		○	○

Circuit Diagram



Rear Window Wiper Motor Test

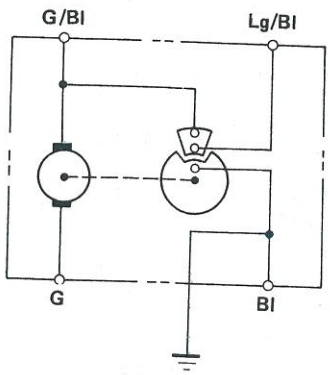
1. Remove the hatch trim panel .
2. Disconnect the 4-P connector.
3. Test wiper motor operation by connecting battery positive wire to the G/Bl terminal and negative to the G terminal.
4. If the motor fails to run smoothly, replace it.



5. Check for continuity between the terminals according to the table.

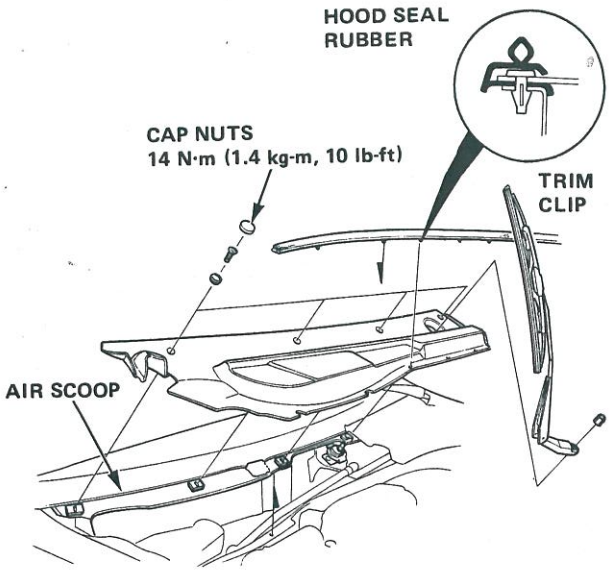
Wiper Blade \ Terminal	G/Bl	Lg/Bl	Bl
At park position	○	○	
At center position		○	○

Circuit Diagram

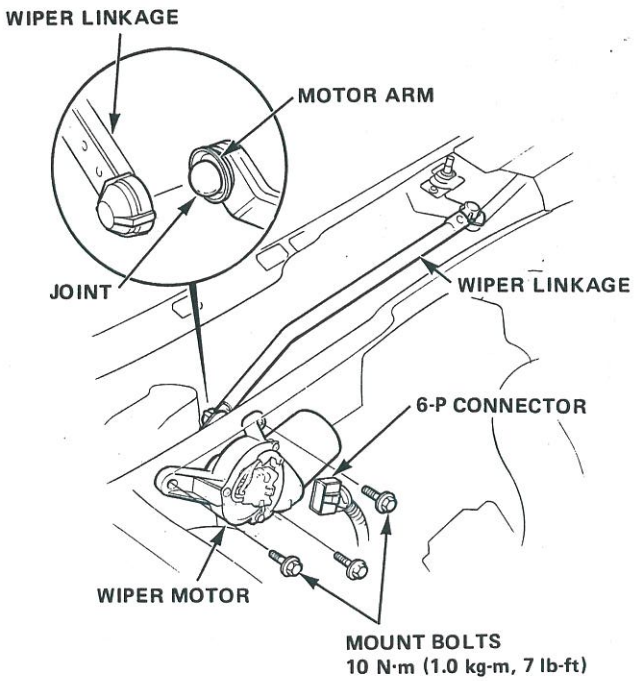


Windshield Wiper Motor Replacement

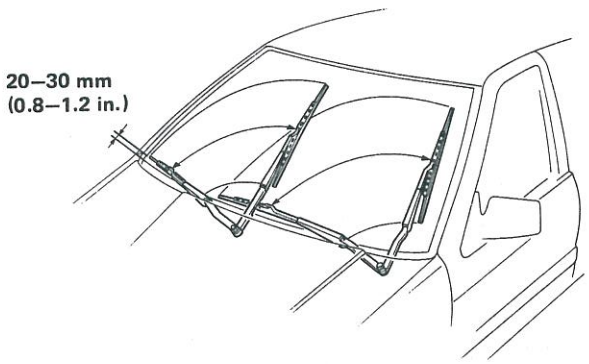
1. Remove the cap nuts and the wiper arm.
2. Remove the air scoop by prying out the trim clip.



3. Pry the wiper linkage off the motor arm.
4. Remove the motor cover and disconnect the 6-P connector.
5. Remove the motor cover and 3 mount bolts, then remove the wiper motor.

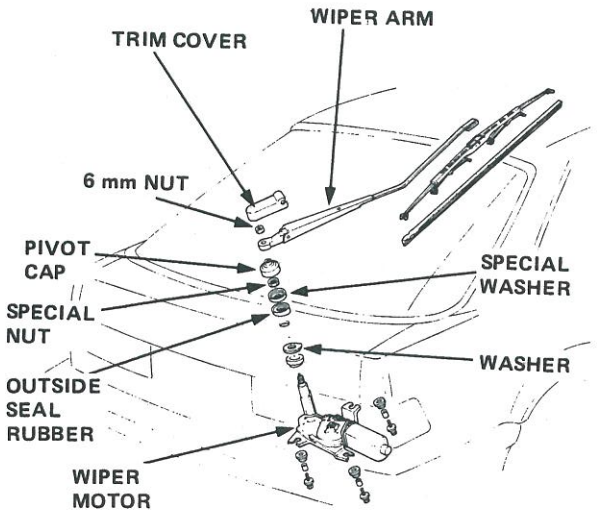


6. Install in the reverse order of removal. Coat the joints with grease and make sure the linkages move smoothly.
   And also install the wiper arms so the tips are 20–30 mm (0.8–1.2 in.) from the air scoop at rest.



Rear Window Wiper Motor Replacement

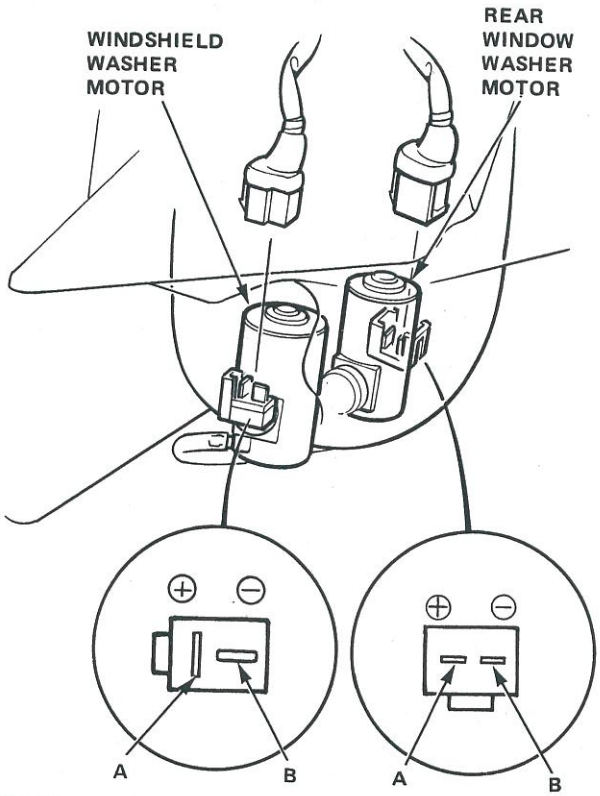
1. Remove the hatch trim panel.
2. Remove the trim cover, 6 mm nut, wiper arm, pivot cap, special nut/washer and the outside seal rubber.
3. Disconnect the 4-P connector from the wiper motor.
4. Remove the 3 mount bolts and the wiper motor.



Washer Motor Test/Replacement

Test

1. Remove the front bumper.
2. Disconnect the 2-P connector from the washer motor.
3. Test either washer motor operation by connecting battery posittive wire to A terminal and negative to B terminal.
4. If a motor fails to run, replace it.



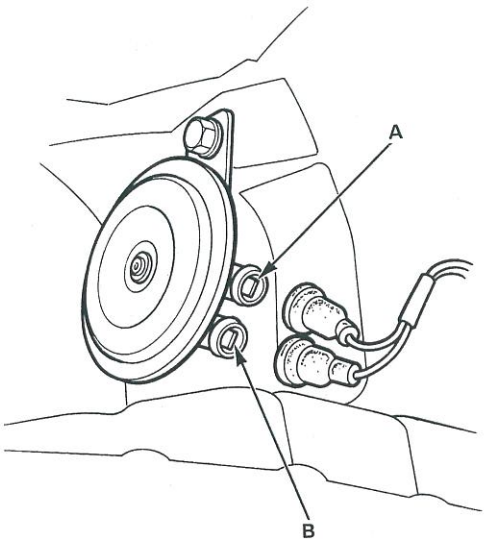
Replacement

5. Remove the washer tank by removing the mount bracket.
6. Disconnect the hoses and wire harness from the washer motors.

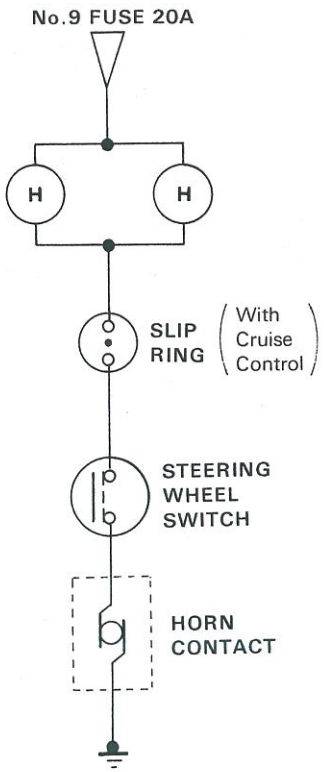
Horns

Test

1. Remove the front bumper.
2. Disconnect the wires from the horn.
3. Test the horn by connecting battery wires to A and B terminals.
4. If the horn fails to sound, replace it.



Horn Circuit:

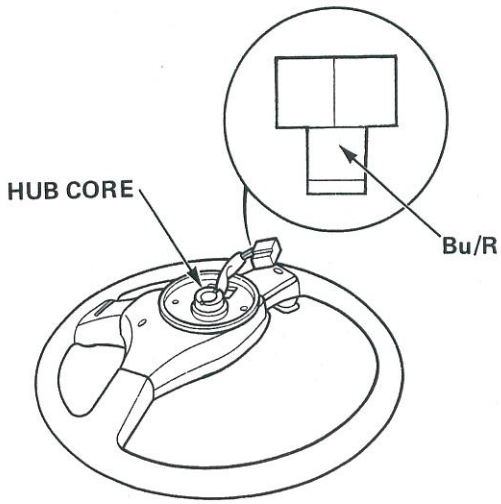


Switch Test

1. Remove the steering wheel, then turn it over.
2. Check for continuity between the hub core and the contact ring, or the hub core and the Bu/R lead for cars equipped with cruise control, according to the table.

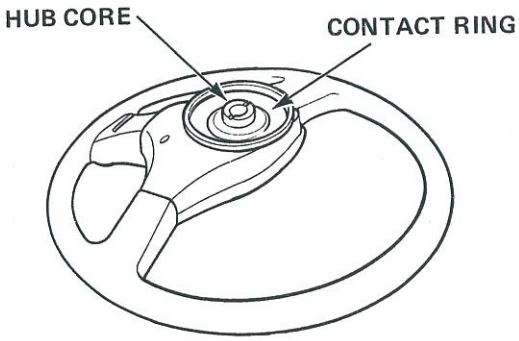
With Cruise Control:

Terminal / Position	HUB CORE	Bu/R
PRESS	○——	——○
FREE		



Without Cruise Control:

Terminal / Position	HUB CORE	CONTACT RING
PRESS	○——	——○
FREE		



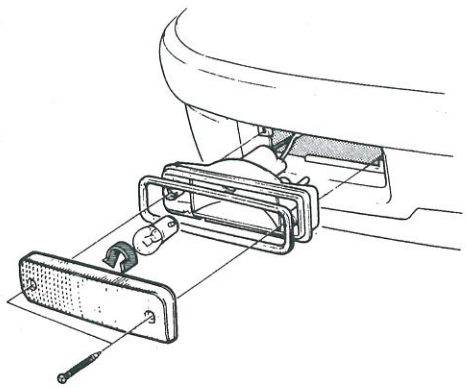
3. If OK, reinstall the steering wheel, then test the combination switch.



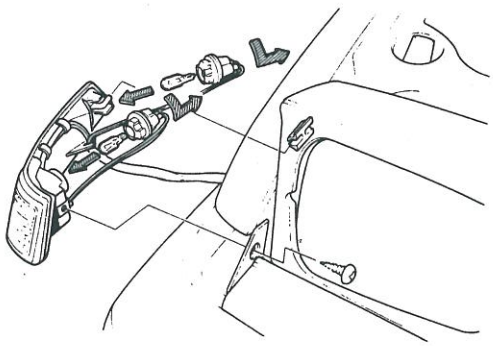
Front Turn Signal/Side Marker Lights

Replacement

Front Turn Signal Light:

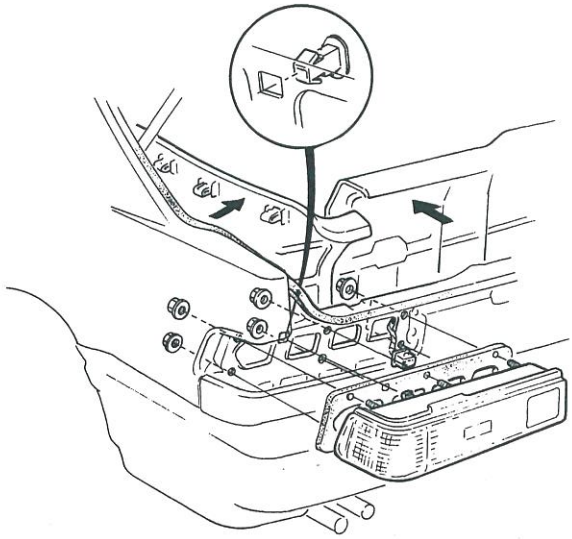


Front Side Marker/Turn Signal Lights:



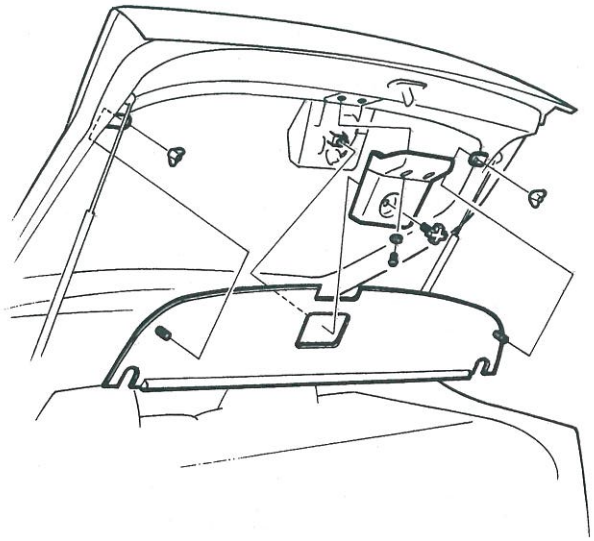
Taillight Assembly

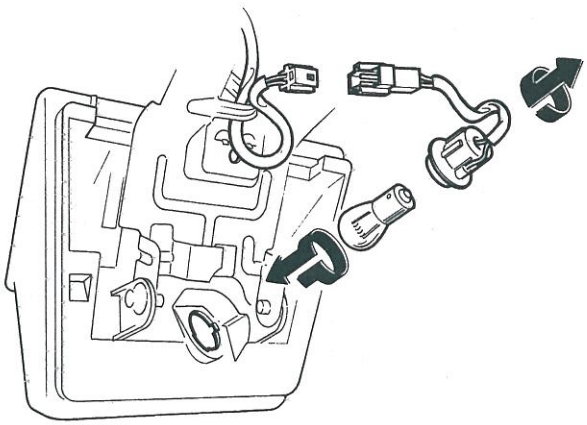
Replacement



High Mount Brake Light

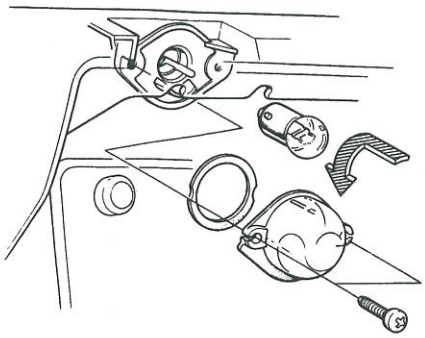
Replacement





License Plate Lights

Replacement

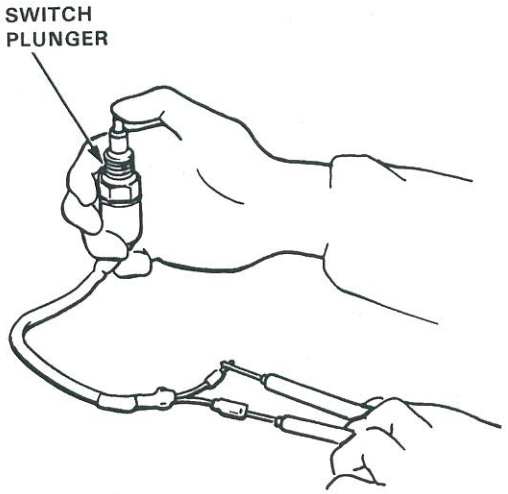


Back-up Light

Switch Test

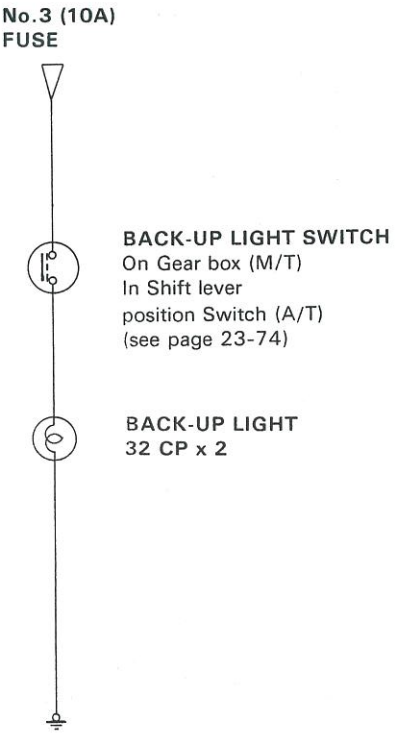
Manual Transmission:

1. Test back-up light switch by placing the gearshift lever in the reverse and turning the ignition switch to ON.
2. If the back-up lights do not go on, check the No.3 (10A) fuse in the dash fuse box and the back-up light bulbs in the taillight assembly.
3. If the fuse and bulbs are OK, remove the back-up light switch.
4. Using an ohmmeter, check the switch for continuity while pushing in on the switch plunger.



Automatic Transmission:

1. Test back-up light switch by shifting the shift lever in "R" and turning the ignition switch to ON.
2. If the back-up lights do not go on, check the No. 3 (10A) fuse in the dash fuse box and the back-up light bulbs in the taillight assembly.
3. If the fuse and bulbs are OK, remove the front console, then disconnect the 10-P connector from the shift lever position console switch (back-up light switch).
4. Check for continuity between the terminals (see page 23-74).
   - If there is no continuity, replace the switch assembly.
   - If there is continuity, yet the back-up lights still do not go on, it must be caused by an open in the Y or G/Bl wire.



Brake Warning System

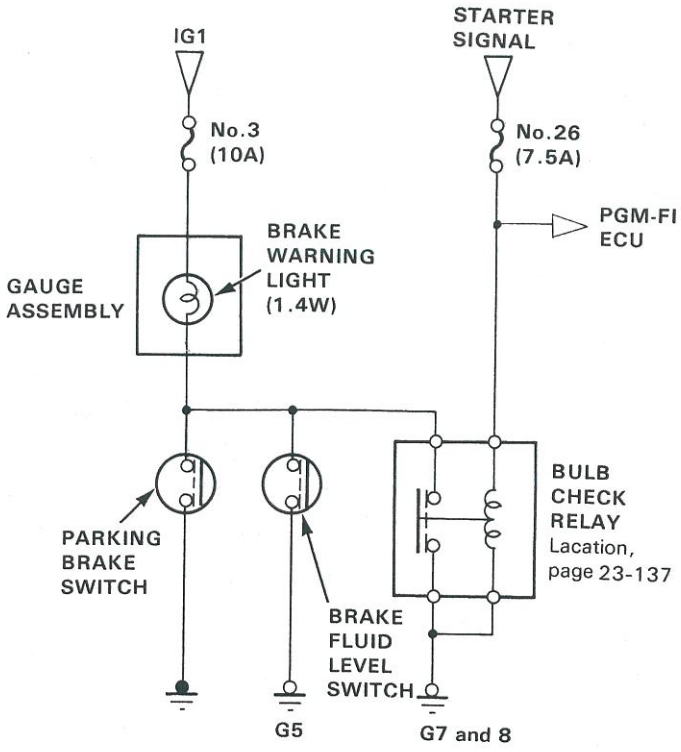
Description

The brake warning light goes on if the parking barke is applied, the brake fuied level is low, or as a bulb test while cranking the engine.

Parking Brake; With the ignition switch "II" (RUN) or "III" (START) and parking brake switch closed, the brake warning light operates to remind the driver that the parking brake is applied.

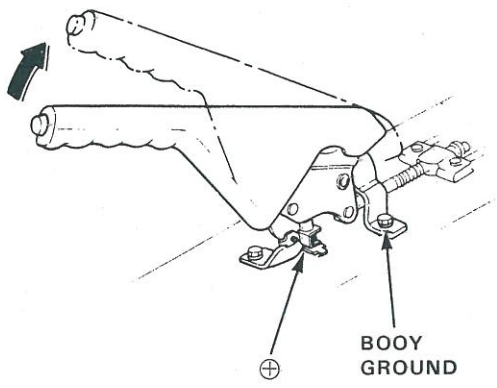
Brake Fluid Level; With the ignition switch in "II" (RUN) or "III" (START) and the brake fluid level switch closed, the brake warning light operates to warn the driver of low brake fluid in the brake master cylinder.

Bulb Check Relay; With the ignition switch is "III" (START), voltage is applied through the starter signal fuse in the fuse box to the bulb (warning light) check relay located on the under dash, left side. The bulb check relay contacts close to complete the circuit, and the warning light goes on.



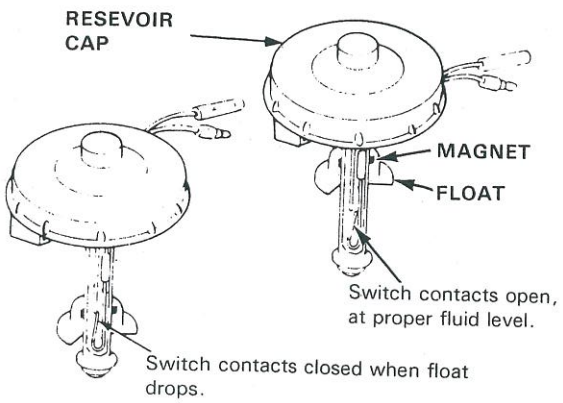
Parking Brake Switch Test

1. Remove the front console.
2. Check for continuity between the ⊕ terminal and body ground with the brake lever up and down.



Brake Fluid Level Switch Test

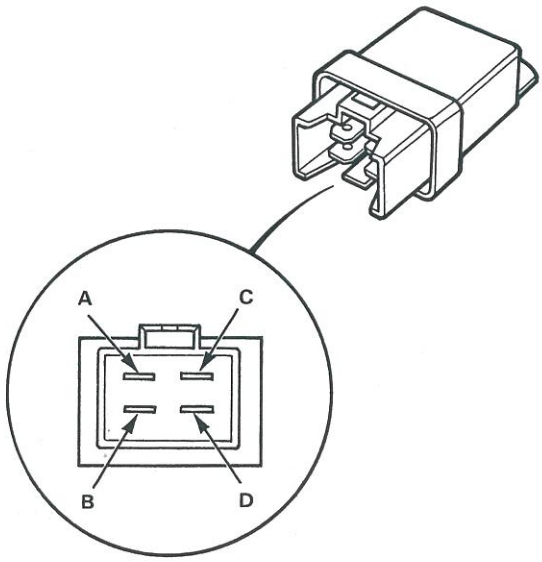
1. Remove the reservoir cap. Check that the float moves up and down freely.
   Replace the reservoir cap assembly if the float does not move freely.
2. Check for continuity between the terminals with the float up and down.
   There should be continuity with the float down and no continuity with the float up.
   Replace the reservoir cap assembly if necessary.

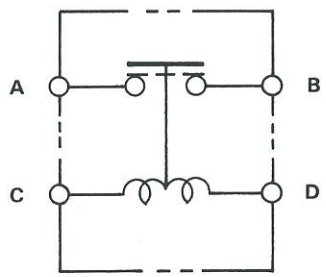


Brake Warning System

Bulb Check Relay Test

1. Remove the relay located on the under dash, left side (page 23-137).
2. There should be continuity between A and B terminals when battery is connected to C and D terminals.
   There should be no continuity when the battery is disconnected.



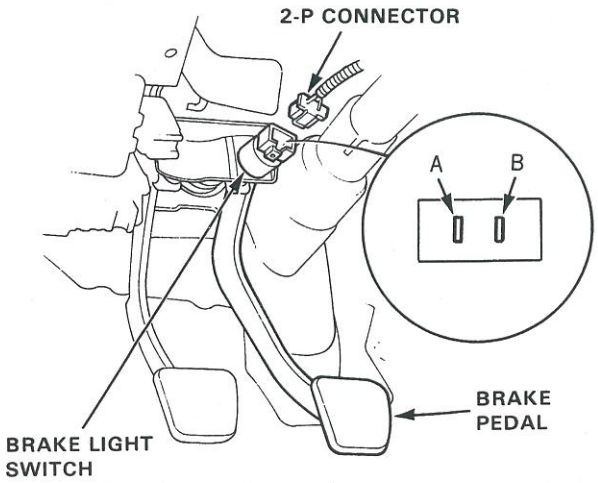


Brake Light

Brake Pedal Switch Test (Without Cruise Control)

1. Disconnect the 2-P connector from the switch.
2. Check for continuity between the A and B terminals in each switch position according to the table.

Terminal / Brake pedal	A	B
RELEASED		
PRESSED	○	○



3. If necessary, replace the switch or adjust the pedal height (section 19)

NOTE: Brake Pedal Switch (With Cruise Control) Test, see page 23-85

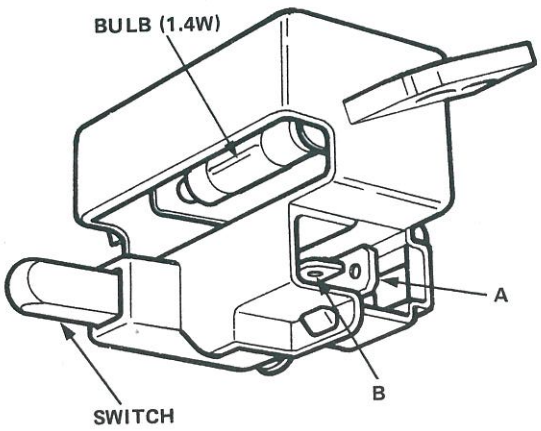


Glove Box Light

Test

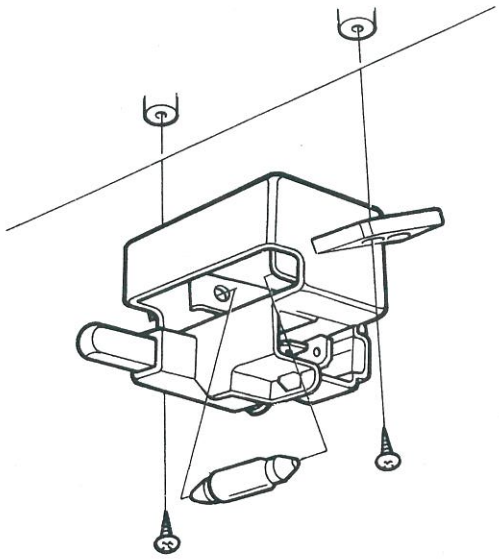
1. Disconnect the 2-P connector.
2. Check for continuity between A and B terminals according to the table.

Terminal / Switch	A		B
PUSH (OFF)			
RELEASE (ON)	○	—○—	○



Replacement

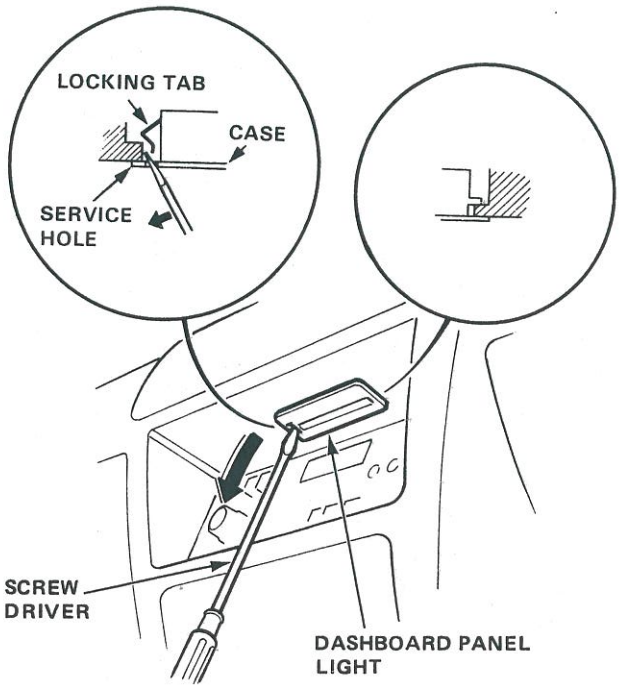
1. Open the glove box.
2. Remove the 2 screws and the glove box light, disconnect the 2-P connector.



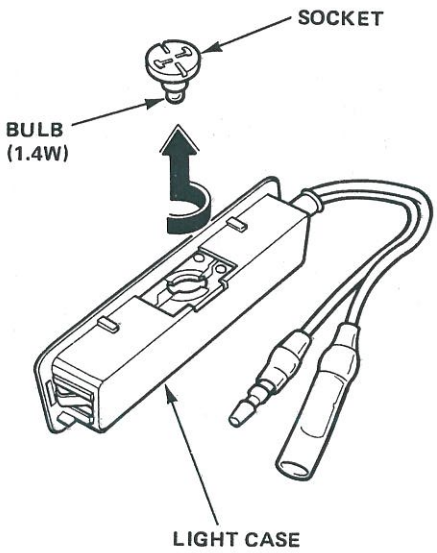
Dashboard Panel Light

Bulb Replacement

1. Insert a thin flat-blade screwdriver through the service hole and into the light case. Remove the case by releasing the lock tab as shown.



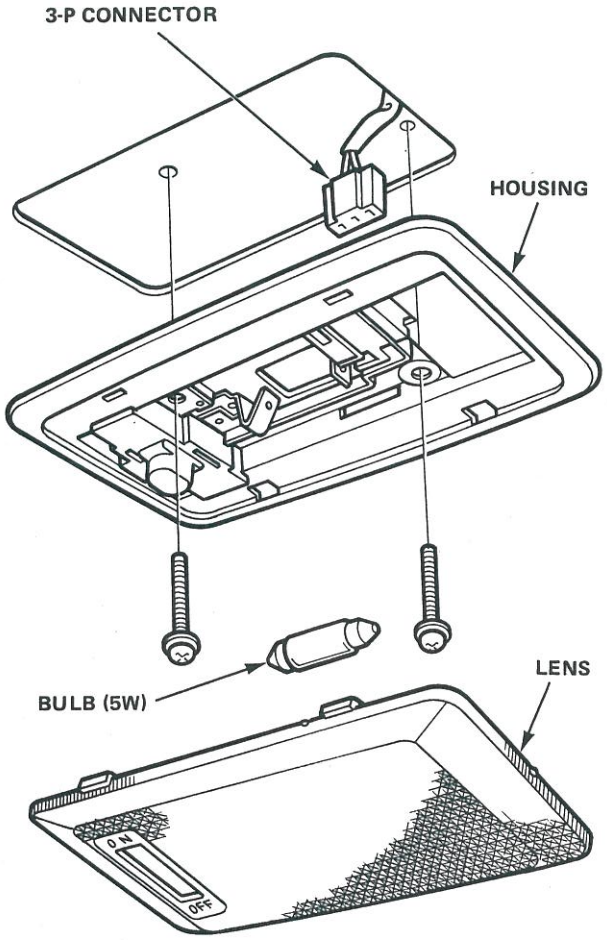
2. Turn the bulb socket 45° counterclockwise to remove it.



Dome Light

Removal

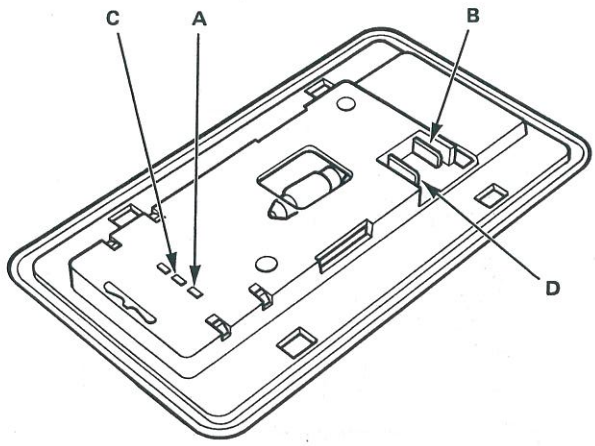
1. Turn the light switch OFF.
2. Pry off the lens.
3. Remove the 2 screws and the housing.
4. Disconnect the 3-P connector from the housing.



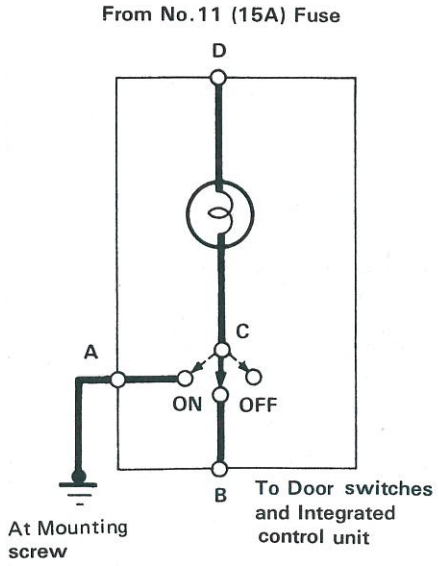
Test

1. Remove the Dome light.
2. Check for continuity between the terminals in each switch position according to the table.

Terminal / Position	A	B	C		D
OFF			○	○	○
MIDDLE		○	○	○	○
ON	○	○	○	○	○



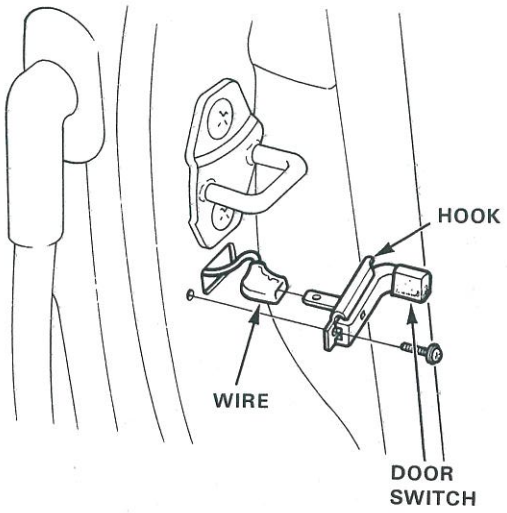
Circuit Diagram



Door Switch Removal/Test

Removal

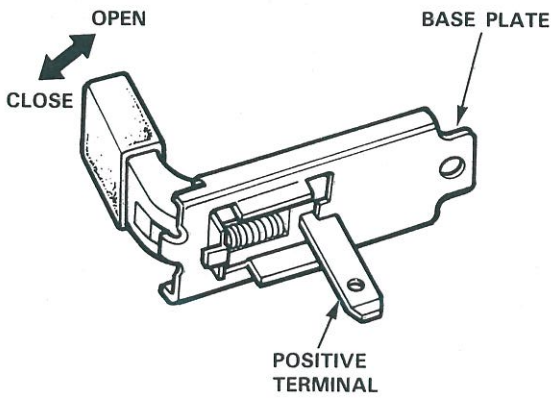
1. Open the door.
2. Remove the screw and pull out the switch.
3. Disconnect the wire from the switch.



Test

1. Remove the door switch.
2. Check for continuity between the positive terminal and the base plate according to the table.

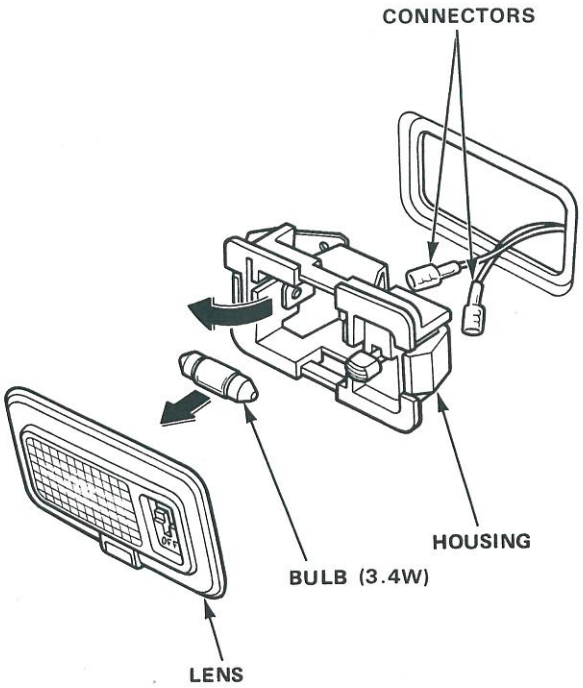
Terminal / Position	POSITIVE TERMINAL	BASE PLATE
OPEN (ON)	○	○
CLOSE(OFF)		



Hatch Light

Removal

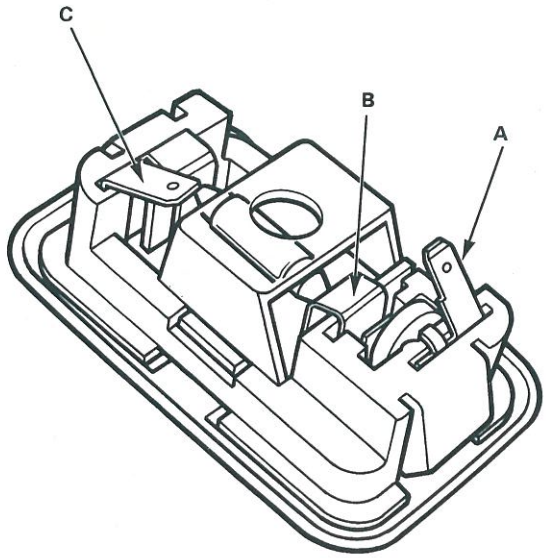
1. Pry off the luggage light lens from either side.
2. Pry off the light assembly from either end.
3. Disconnect the connectors from the housing.



Test

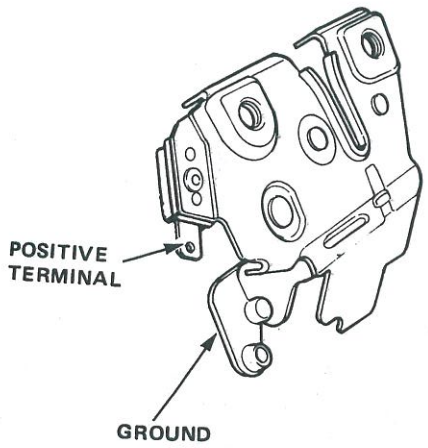
1. Remove the luggage light.
2. Check for continuity between the terminals in each switch position according to the table.

Terminal / Position	A	B		C
OFF		○	○	○
ON	○	○	○	○



Latch Switch Test

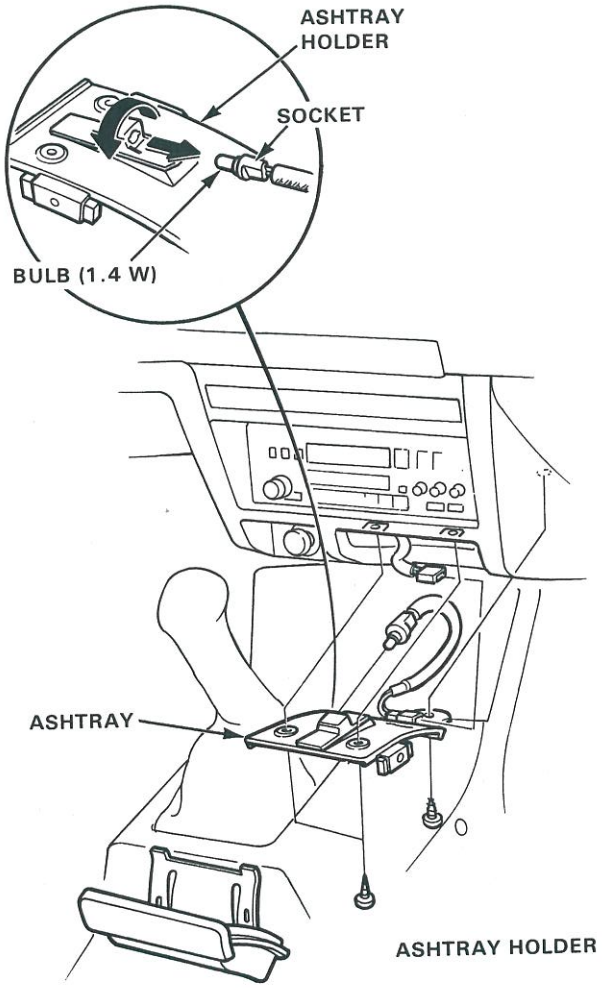
1. Remove the hatch trim panel.
2. Remove the hatch latch.
3. There should be continuity between the positive terminal and the ground.



Ashtray Light

Bulb Replacement

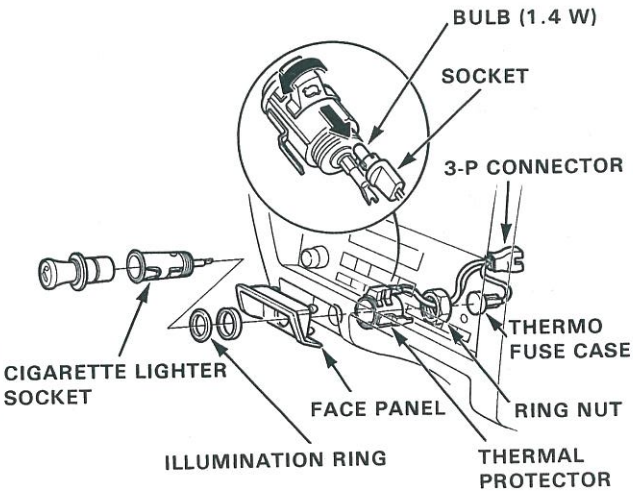
1. Remove the ashtray.
2. Remove the console box, then remove the ashtray holder by removing the 3 screws.
3. Turn the socket 45° counterclockwise and remove the bulb.



Cigarette Lighter Light

Replacement

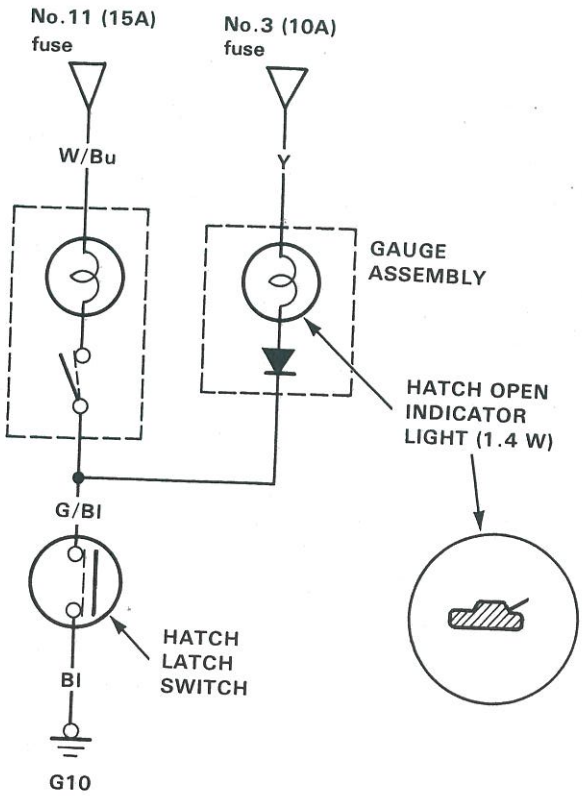
1. Remove the ashtray and holder.
2. Remove the ring nut and the cigarette lighter.
3. Disconnect the ground wire and the thermo fuse case by pulling it straight back.
4. Disconnect the 3-P connector and take out the thermal protector with the bulb.
5. If necessary, turn the socket 45° counterclockwise and remove the bulb.



Hatch Open Indicator Light

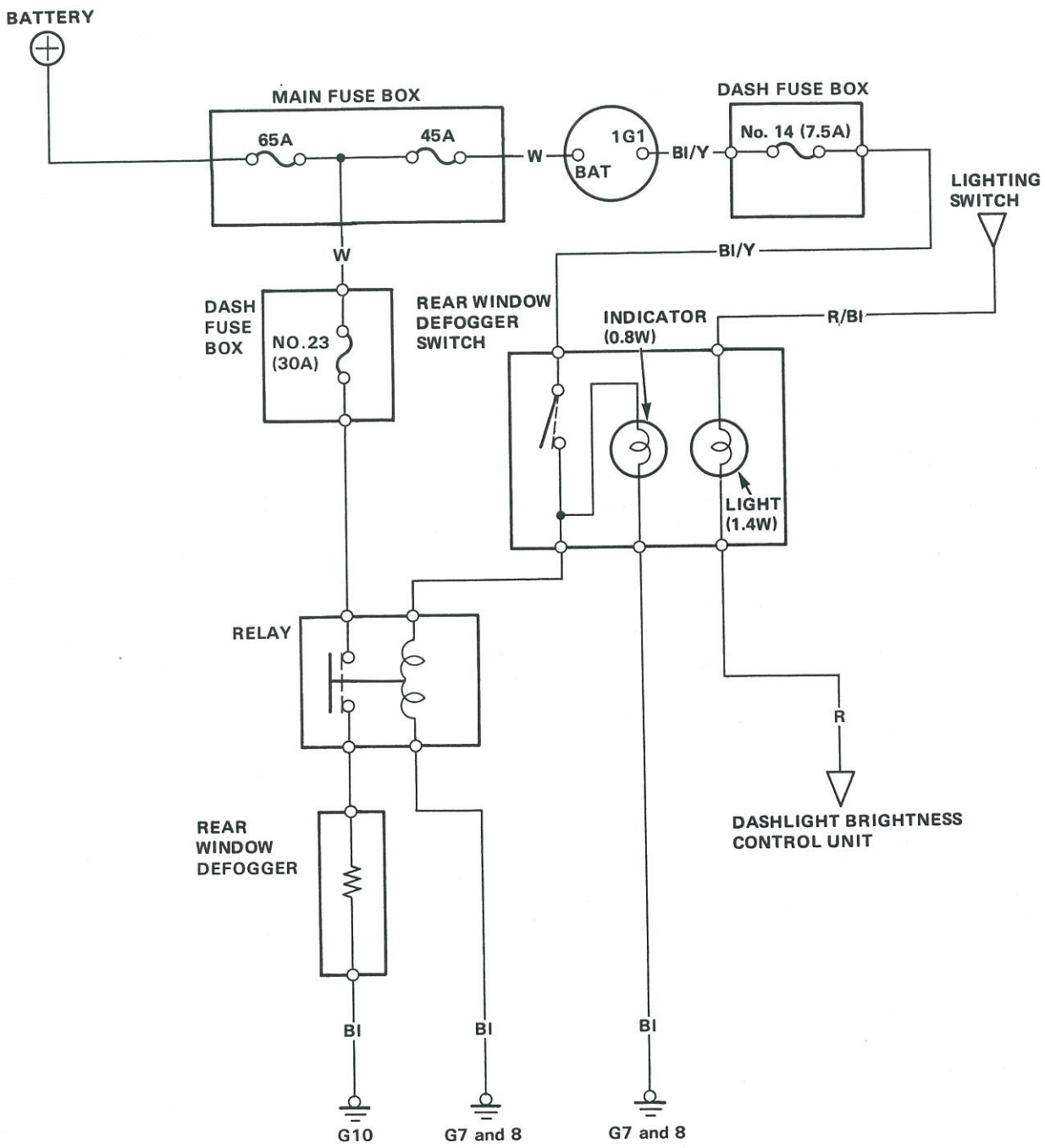
Description

The hatch open indicator light in the gauge warning display comes on, when the ignition switch is ON, and the hatch is open. If reminds the driver to securely close the hatch before driving or parking.



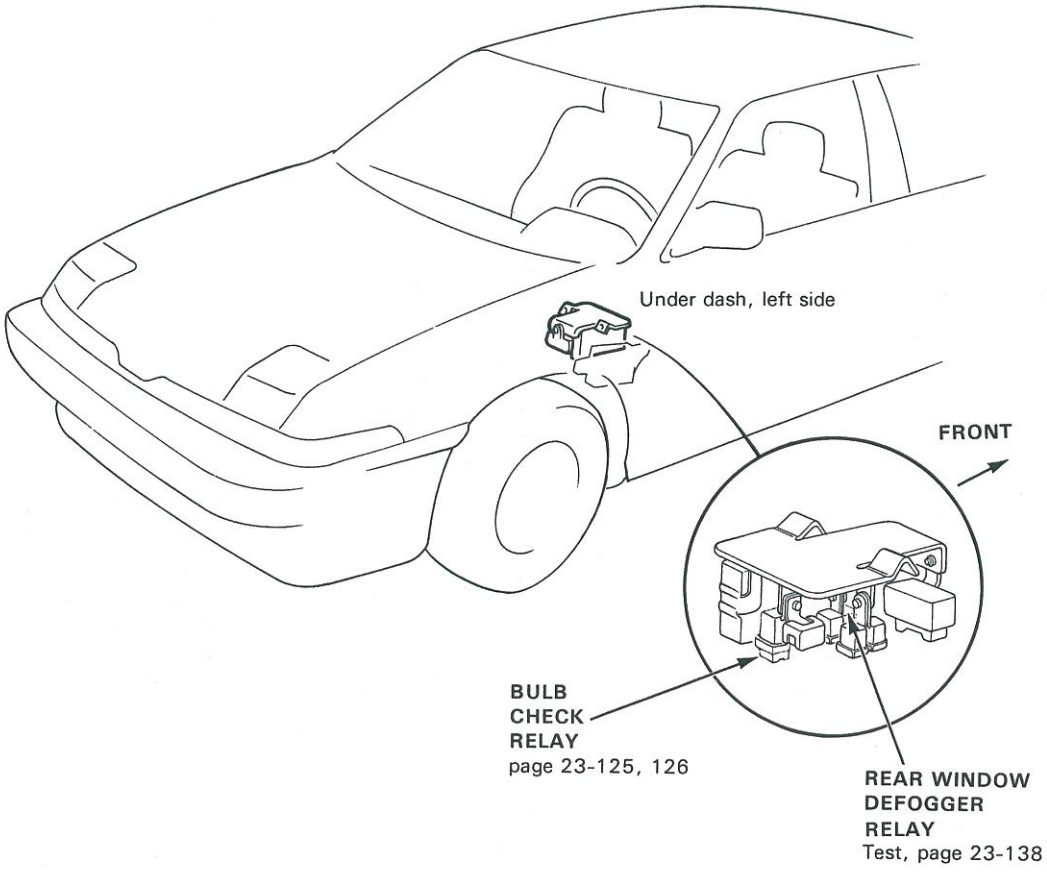
Rear Window Defogger

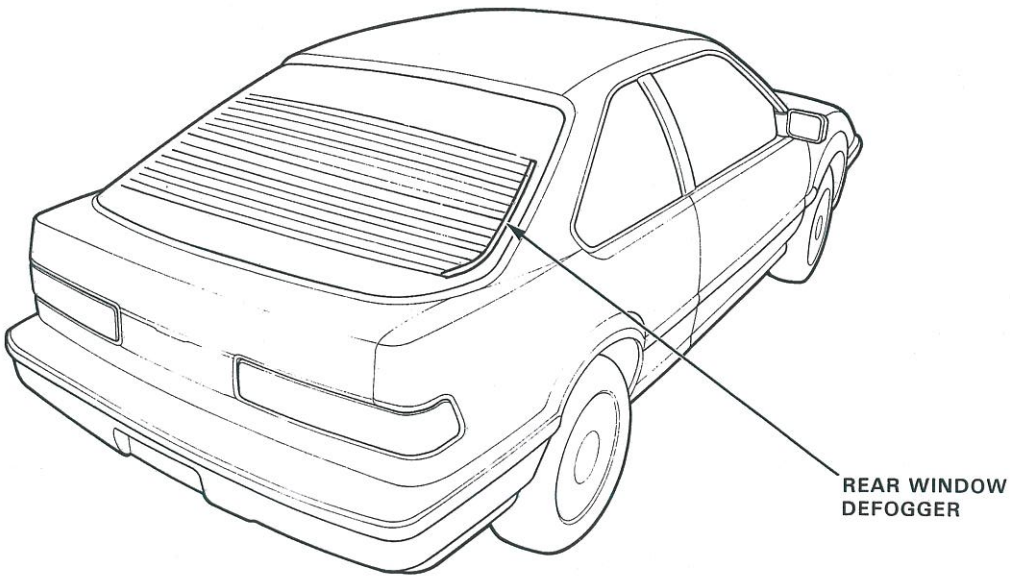
Circuit Diagram



Component Location Index

SWITCH
Removal, page 23-68
Test, page 23-138



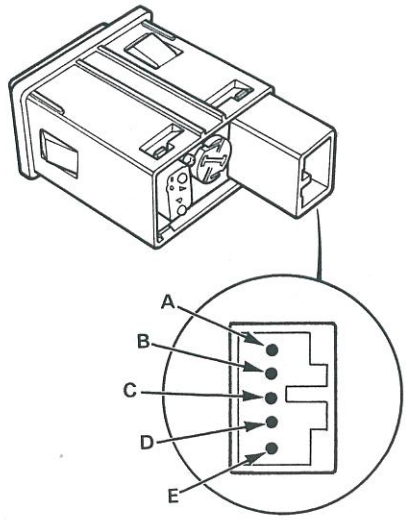


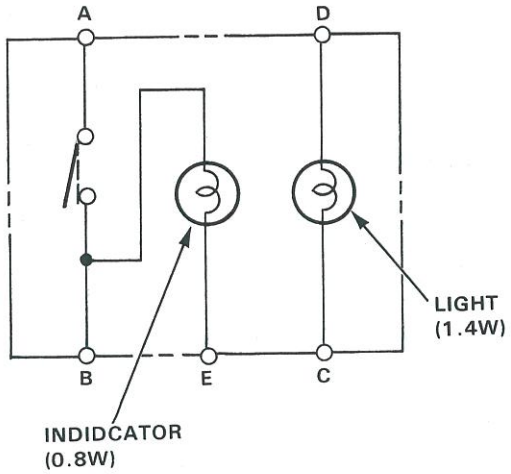
Rear Window Defogger

Switch Test

1. Remove the rear window defogger switch (page 23-68).
2. Check for continuity between the terminals in each switch position according to the table.

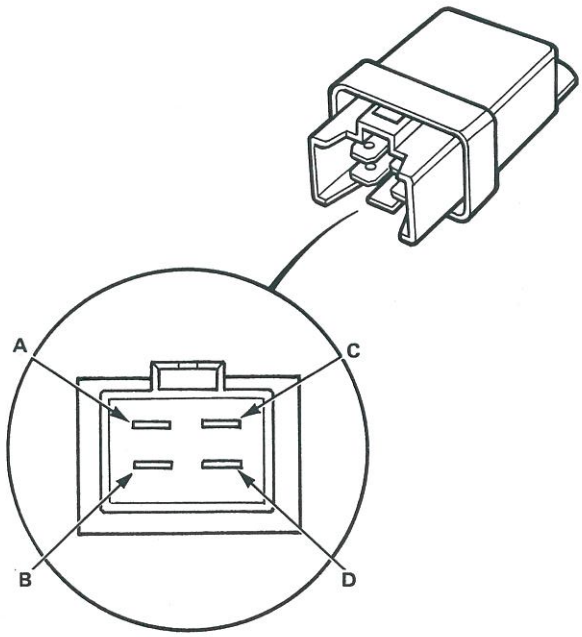
Terminal / Position	A	B		C	D		E
OFF		○	⌒	○	○	⌒	○
ON	○	○	⌒	○	○	⌒	○

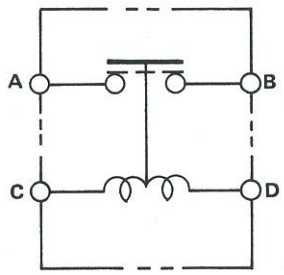




Relay Test

1. Remove the rear window defogger relay .
2. There should be continuity between A and B terminals when the battery is connected to C and D terminals.
   There should be no continuity when the battery is disconnected.



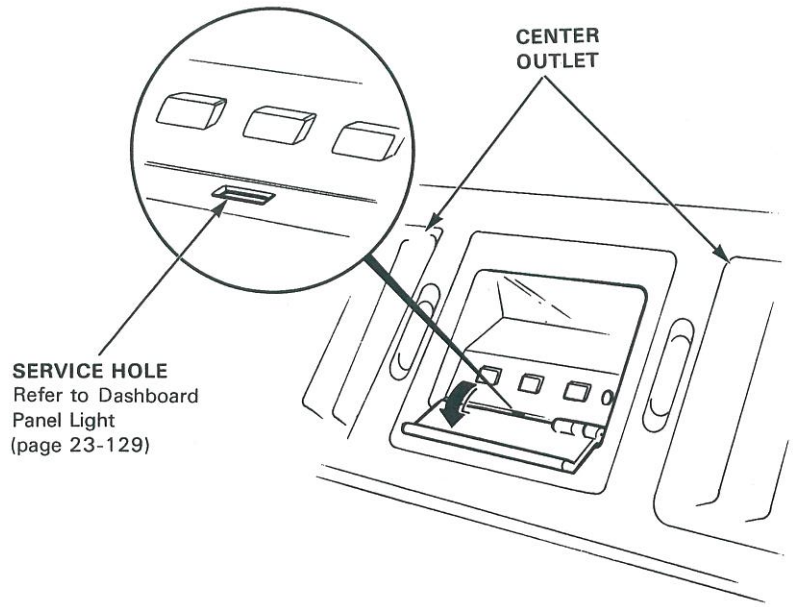




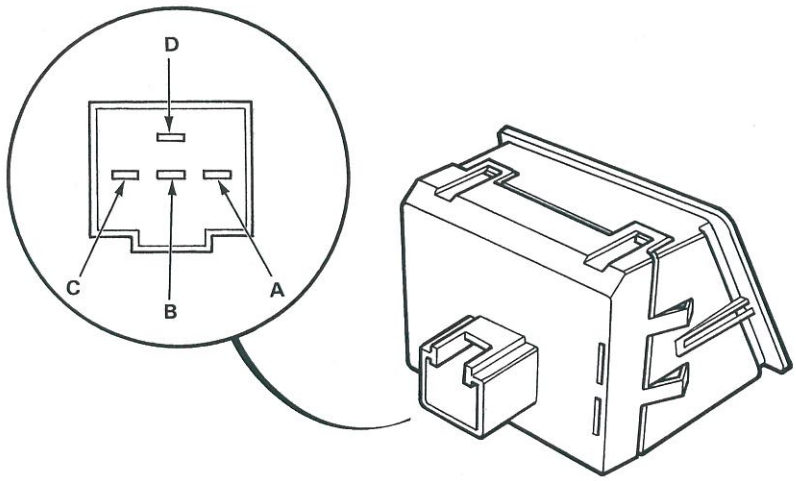
Clock

Removal

1. Remove the clock from the center outlet on the dashboard by inserting a thin flat blade screwdriver into the service hole.
2. Disconnect the 6-P connector from the clock.



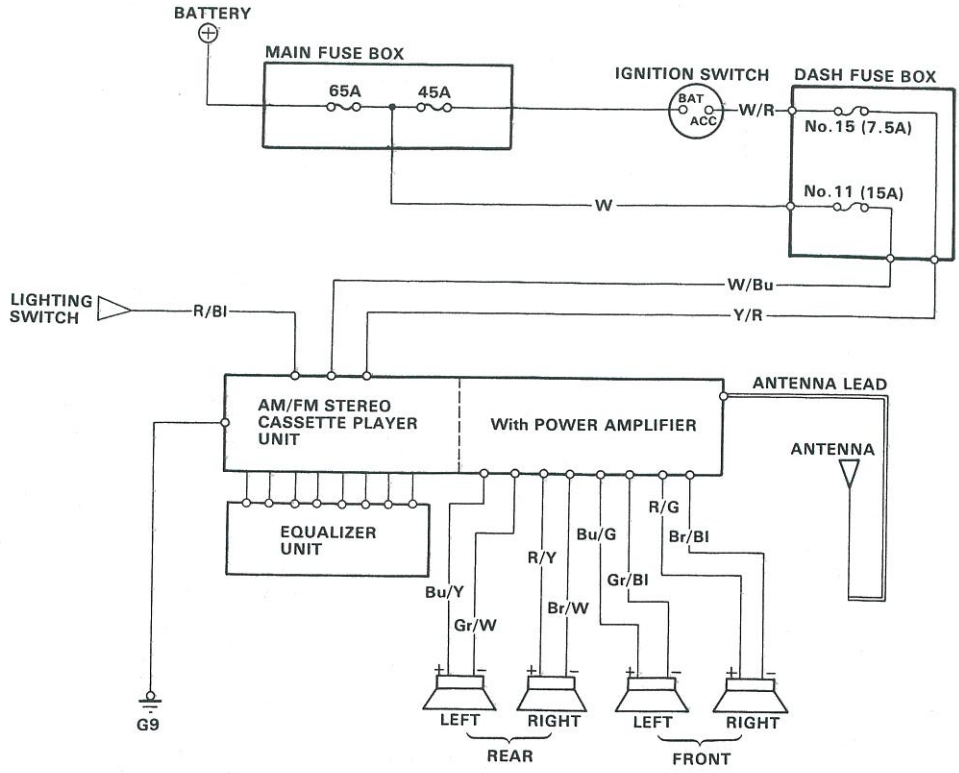
Terminal Arrangement



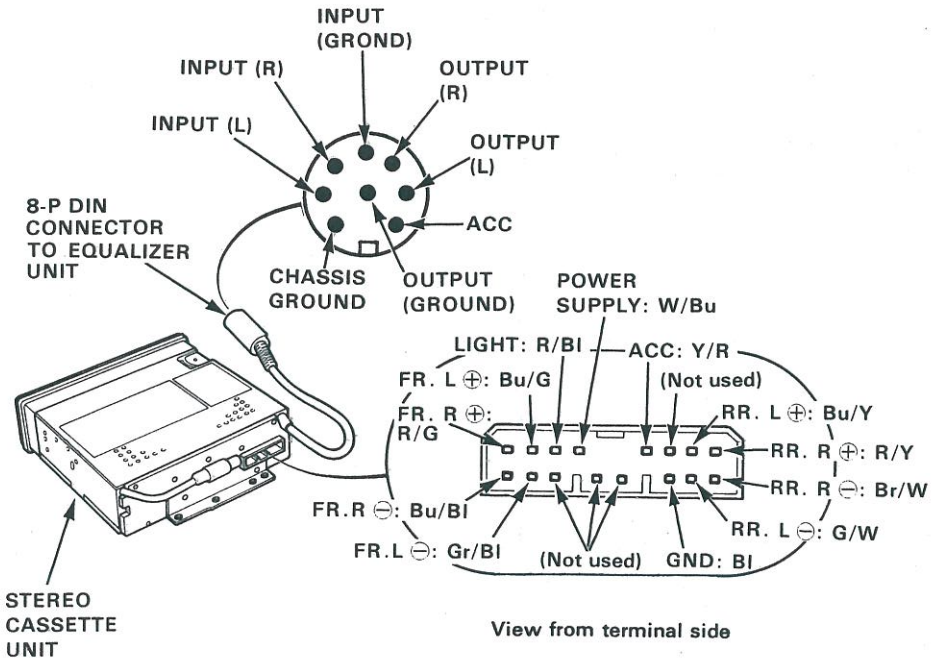
A: POWER SUPPLY (at all times)
B: IG1 (key in "II")
C: DIMMING CIRCUIT INPUT (LIGHT-ON SIGNAL)
D: GROUND

Sound System

Circuit Diagram



Terminal Arrangement

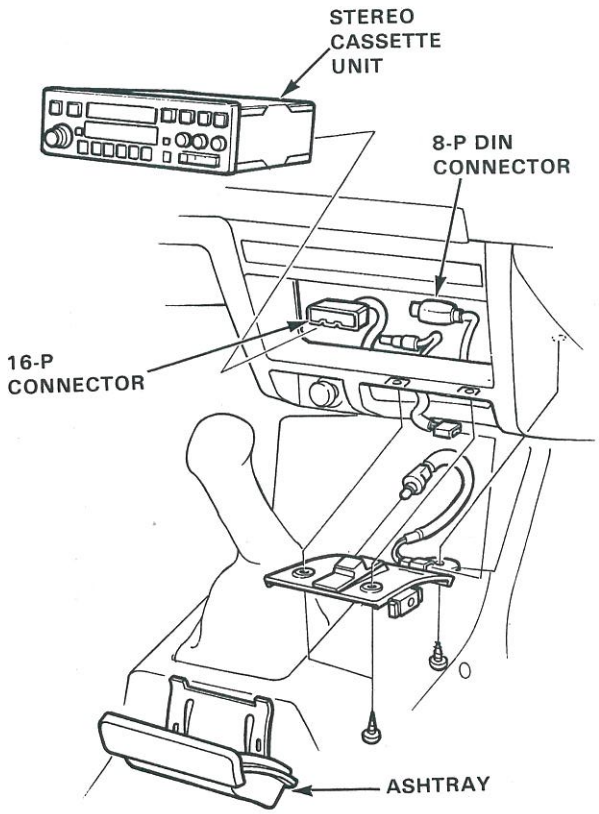


Sound System

Stereo Cassette/Equalizer Unit Replacement

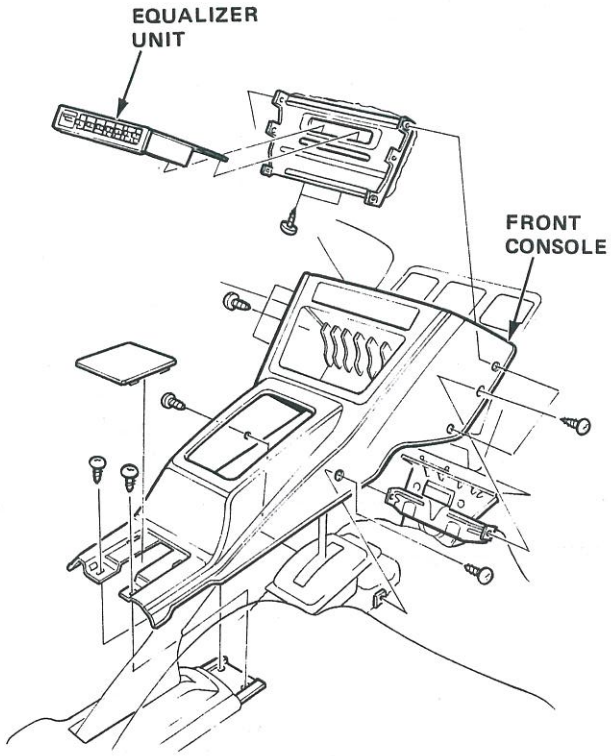
Stereo Cassette Unit:

1. Remove the ashtray and ashtray holder.
2. Remove the 2 screws from under the center dashboard, then push the stereo/cassette unit out from behind it.
3. Disconnect the 16-P connector, antenna feeder cable and 8-P DIN connector.



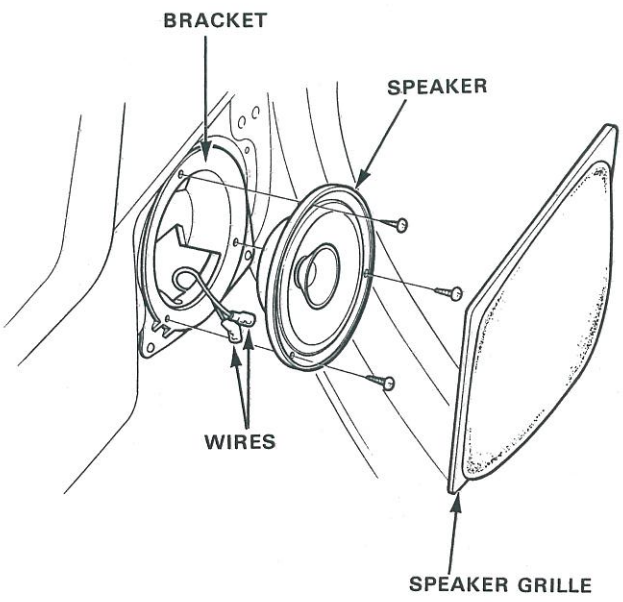
Equalizer Unit:

1. Remove the front console.
2. Remove the 2 screws from under the center dashboad and equalizer unit.
3. Disconnect the 8-P DIN connector.

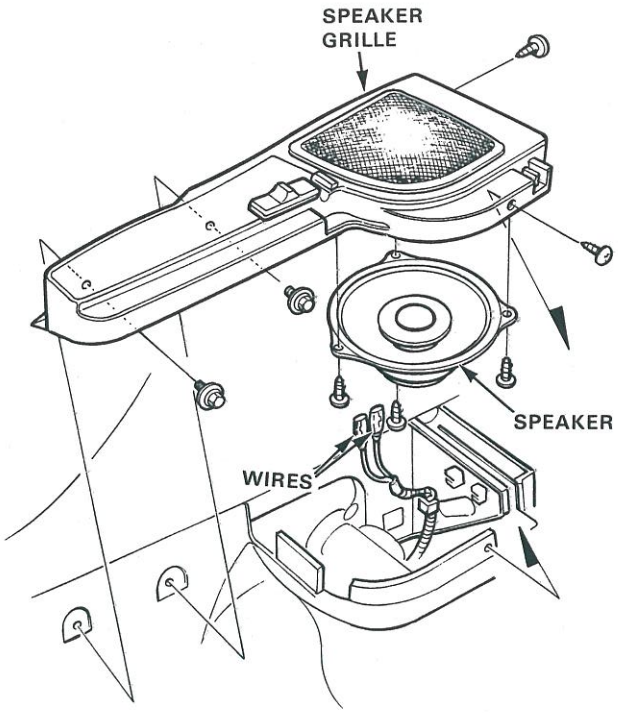


Speaker Replacement

Front speakers:



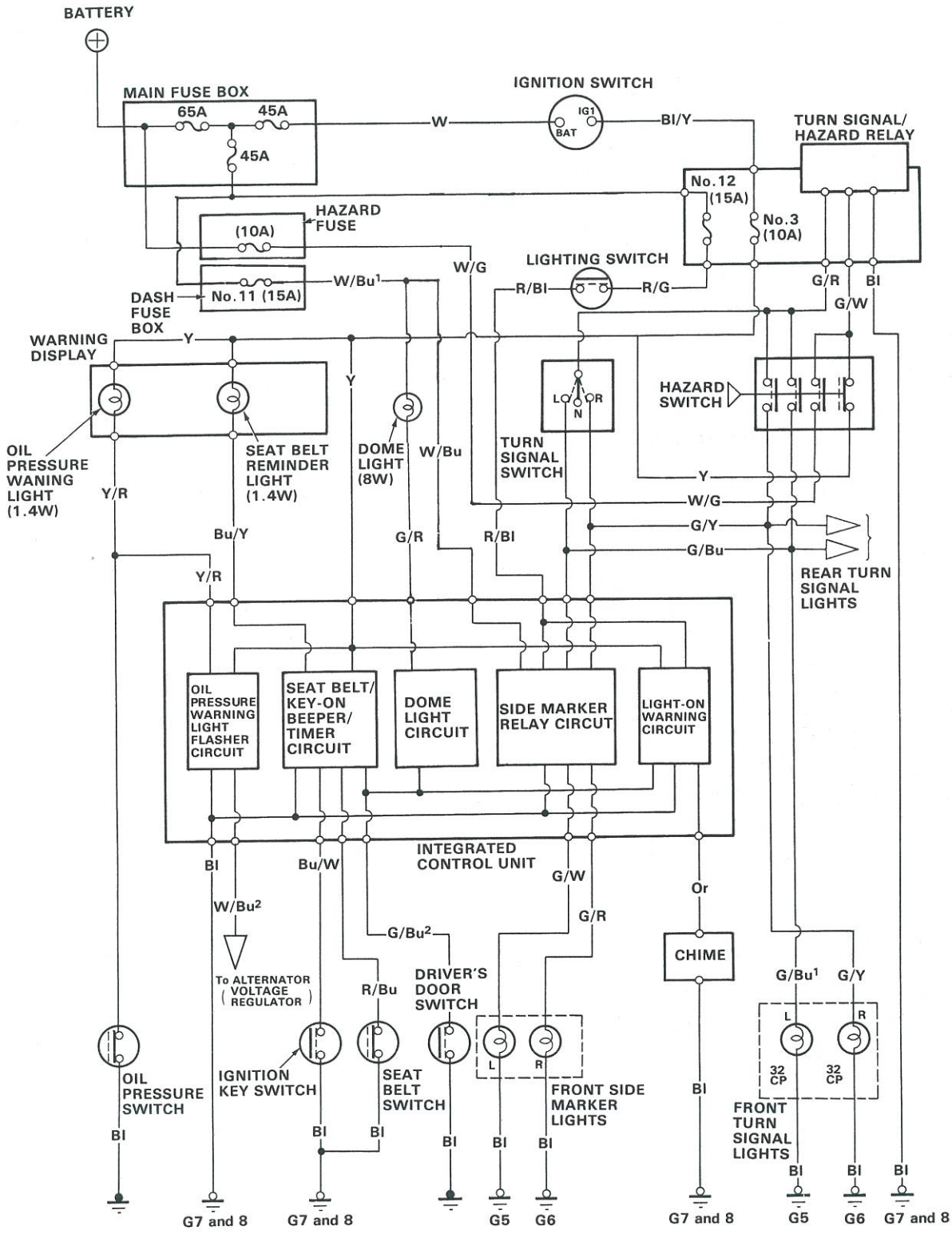
Rear speakers:



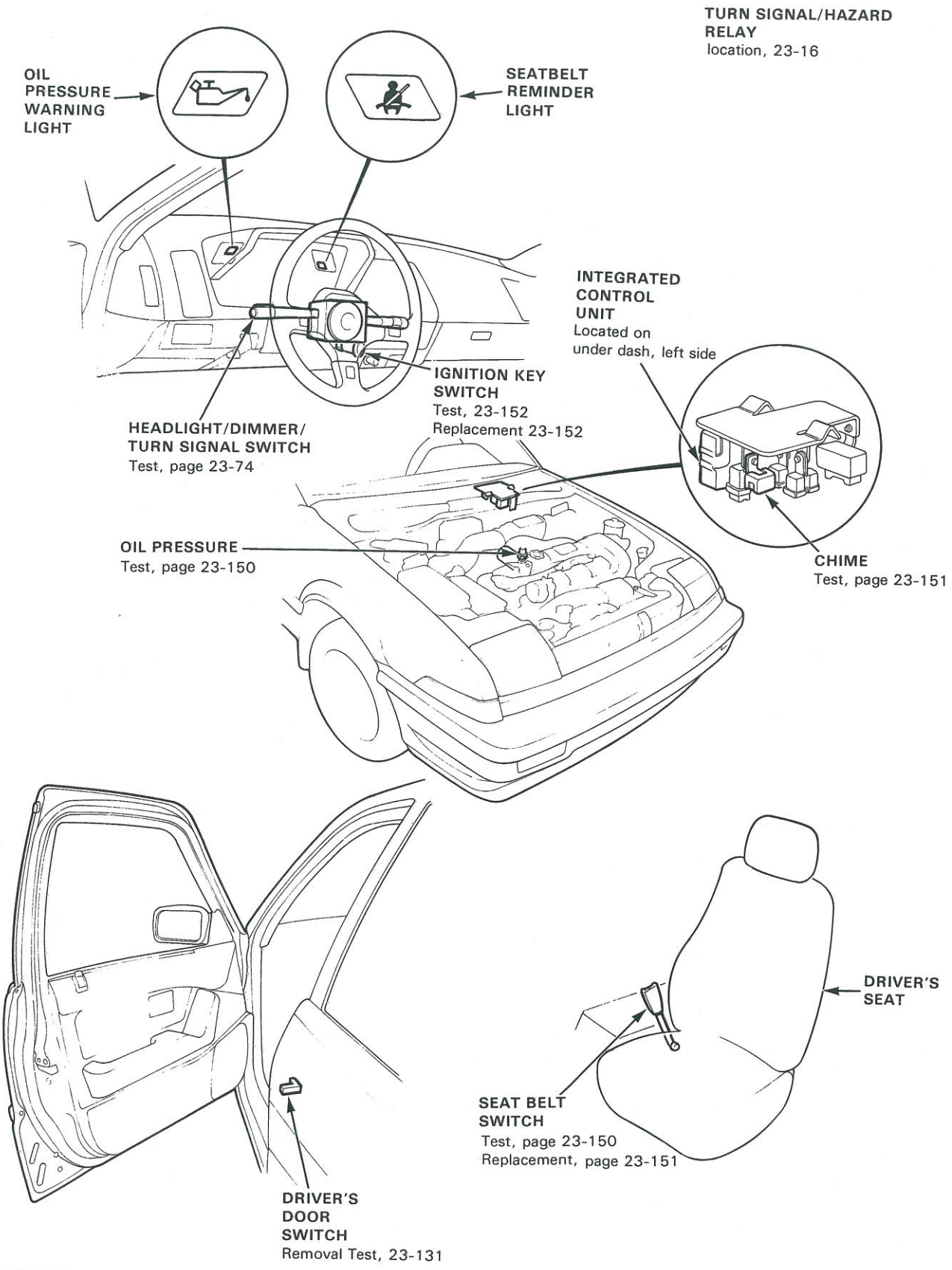
Integrated Control Unit

Circuit Diagram

NOTE: Several different wires have the same color. They have been given a number suffix to distinguish them (for example G/Bu^1 and G/Bu^2 are not the same).



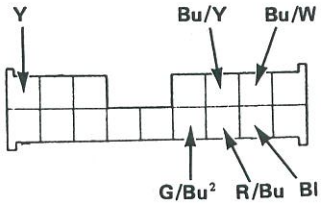
Component Location Index



Integrated Control Unit

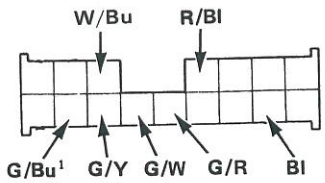
Input Test (cont'd)

Side Marker Relay Circuit:



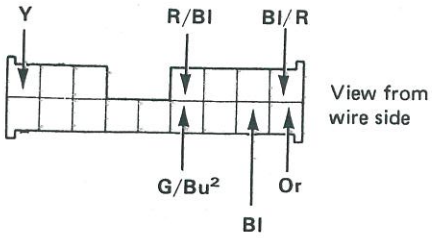
No.	Wire	Test condition	Test : desired result	Possible cause (if result is not obtained)
1	Bl	Under all conditions	Check for continuity to ground: should be continuity.	Poor ground. An open in the wire.
2	Y	Ignition switch ON	Check for voltage to ground: should have battery voltage.	An open in the wire. Blown No. 3 (10 A) fuse.
3	Bu/Y	Ignition switch ON	Attach to ground: Reminder light should come on as the ignition switch ON.	Blown bulb or No. 3 (10 A) fuse. An open in the wire.
4	Bu/W	Ignition switch turned from "II" to "O"position	Check for continuity to ground: should be continuity.	Faulty ignition key switch. An open in the wire. Poor ground.
5	R/Bu	Driver's seat belt not buckled		Faulty seat bolt switch. An open in the wire. Poor ground.
6	G/Bu²	Driver's door opened		Faulty door switch. An open in the wire. Poor ground.

Seat Belt/Key-ON Beeper/Timer Circuit:



No.	Wire	Test condition	Test : desired result	Possible cause (if result is not obtained)
1	Bl	Under all conditions	Check for continuity to ground: should be continuity.	Poor ground. An open in the wire.
2	W/Bu		Check for voltage to ground: shold have battery voltage.	Blown No.11 (10 A) fuse. An open in the wire.
3	R/Bl	Lighting switch ON	Check for voltage to ground: shold have battery voltage.	Blown No. 12 (15 A) fuse. An open in the wire.
4	G/Bu¹	Ignition switch ON and turn signal switch in L.	Check for voltage to ground: should have battery voltage.	Blown No. 3 (10 A) fuse. Faulty turn signal system. An open in the wire.
5	G/Y	Ignition switch ON and turn signal switch in R.		
6	G/W	Connect battery positive wire to G/W (or G/R) terminal to ground.	Check side marker light operation : Light should come on as the battery is connected	Blown bulb Poor ground. An open in the wire.
7	G/R			

Light-ON Warning Circuit and Dome Light Circuit



No.	Wire	Test condition	Test : desired result	Possible cause (if result is not obtained)
1	Bl	Under all conditions	Check for continuity to ground : should have continuity.	Poor ground. An open in the wire.
2	Y	Ignition switch ON	Check for voltage to ground : should have battery voltage	An open in the wire. Blown No.3 (10A) fuse.
3	R/Bl	Lighting switch ON	Check for voltage to ground: should have battery votage.	Blown No. 12 (15 A) fuse. An open in the wire.
4	G/Bu²	Driver's door opened	Check for continuity to ground: should be continuity.	Faulty door switch. An open in the wire. Poor ground.
5	Or	Connect battery positive wire to Or terminal, and negative to ground.	Check chime operation: Chime should sound each time the battery is connected.	Faulty chime. Poor ground. An open in the wire.
6	Bl/R	Under all conditions	Attach to ground: With the dome light switch in the middle position, the dome light should come on.	Blown No. 11 fuse. Faulty dome light. An open in the wire.

Integrated Control Unit

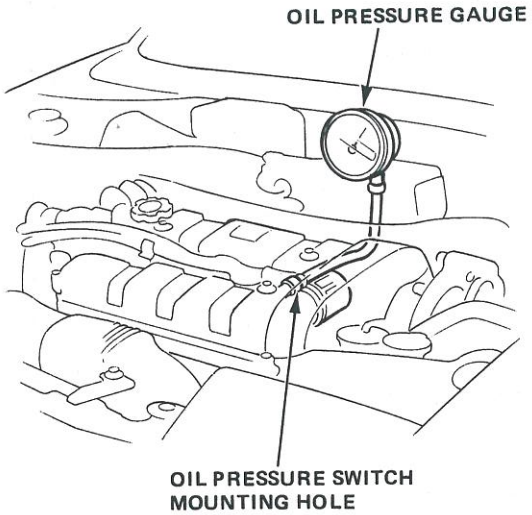
Oil Pressure Test

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

1. Remove the oil pressure switch and install an oil pressure gauge.
2. Start the engine and allow to reach operating temperature (fan comes on at least twice).
3. Pressure should be:

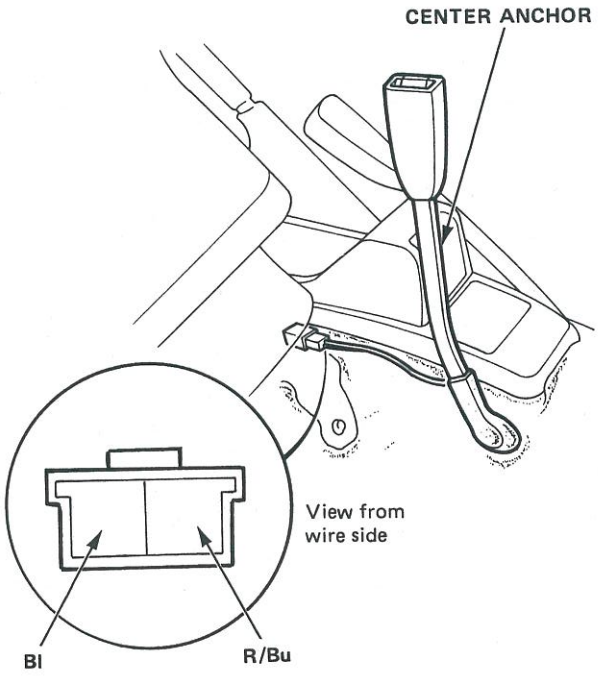
Engine Oil Pressure
Idle: 147kPa (1.5 kg-m, 21 psi) minimum
3000 rpm: 412 kPa (4.2—5.5 kg/cm², 60—78 psi)

- If oil pressure is within specifications, replace oil pressure switch and recheck.
- If oil pressure is not within specifications, inspect oil pump (section 8)



Seat Belt Switch Test

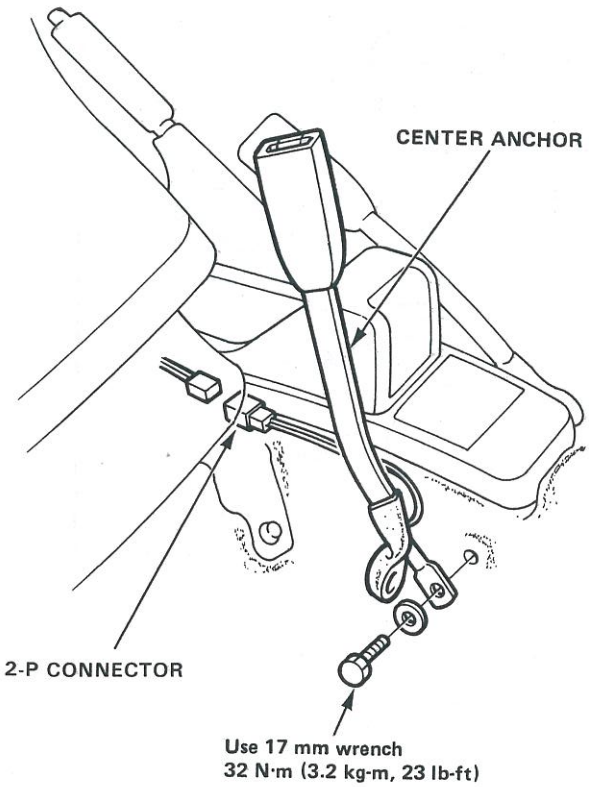
1. Remove the rear console, and disconnect the 2-P connector.
2. There should be continuity between the R/Bu and Bl terminals when the driver's seat belt is not buckled.
   There should be no continuity when the driver's seat belt is buckled.



Seat Belt Switch Replacement (Driver's Center Anchor only)

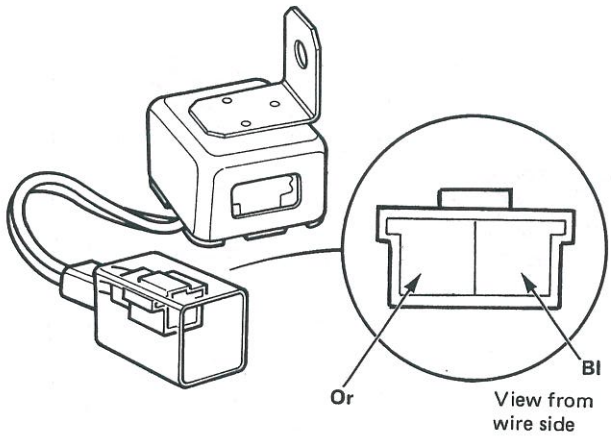
1. Remove the rear console.
2. Slide the drivers seat forward until the seat belt center anchor bolt is accessible.
3. Remove the bolt and disconnect the 2-P connector to remove the center anchor.

CAUTION: Do not pinch the harness when the new anchor bolt is installed.



Chime Test

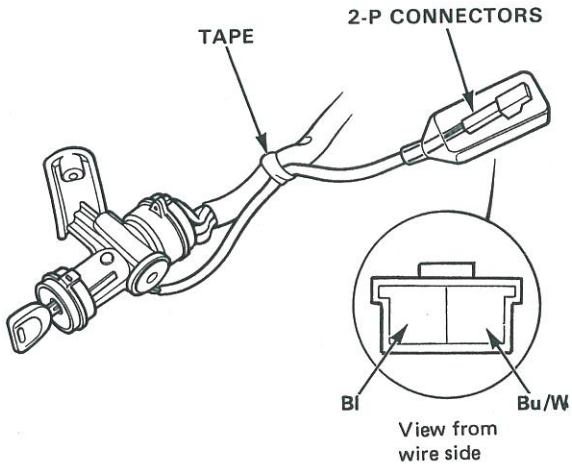
1. Remove the dashboard lower panel .
2. Test chime operation by connecting battery positive wire to the Or terminal and negative to the Bl terminal, and cycling the power on-off repeatedly.
3. If the chime fails to sound every time power is cycled, replace it.



Integrated Control Unit

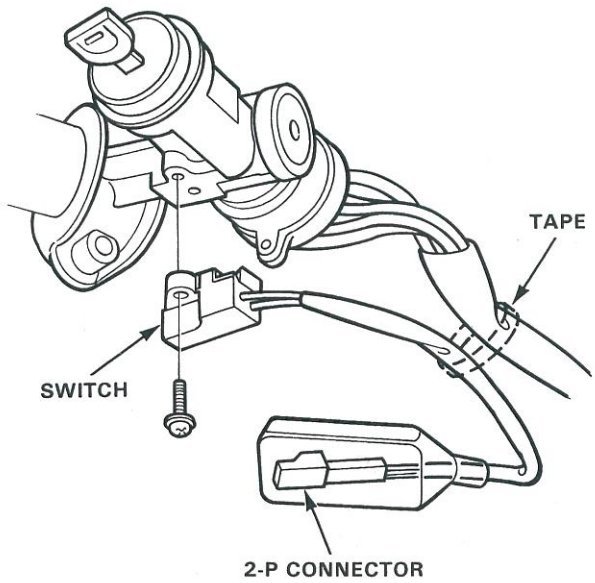
Ignition Key Switch Test

1. Remove the dashboard lower panel then disconnect the 2-P connector.
2. There should be continuity between the Bu/W and Bl terminals when the ignition switch is turned from "II" to "O" position.
   There should be no continuity when the ignition key is removed.



Ignition Key Switch Replacement

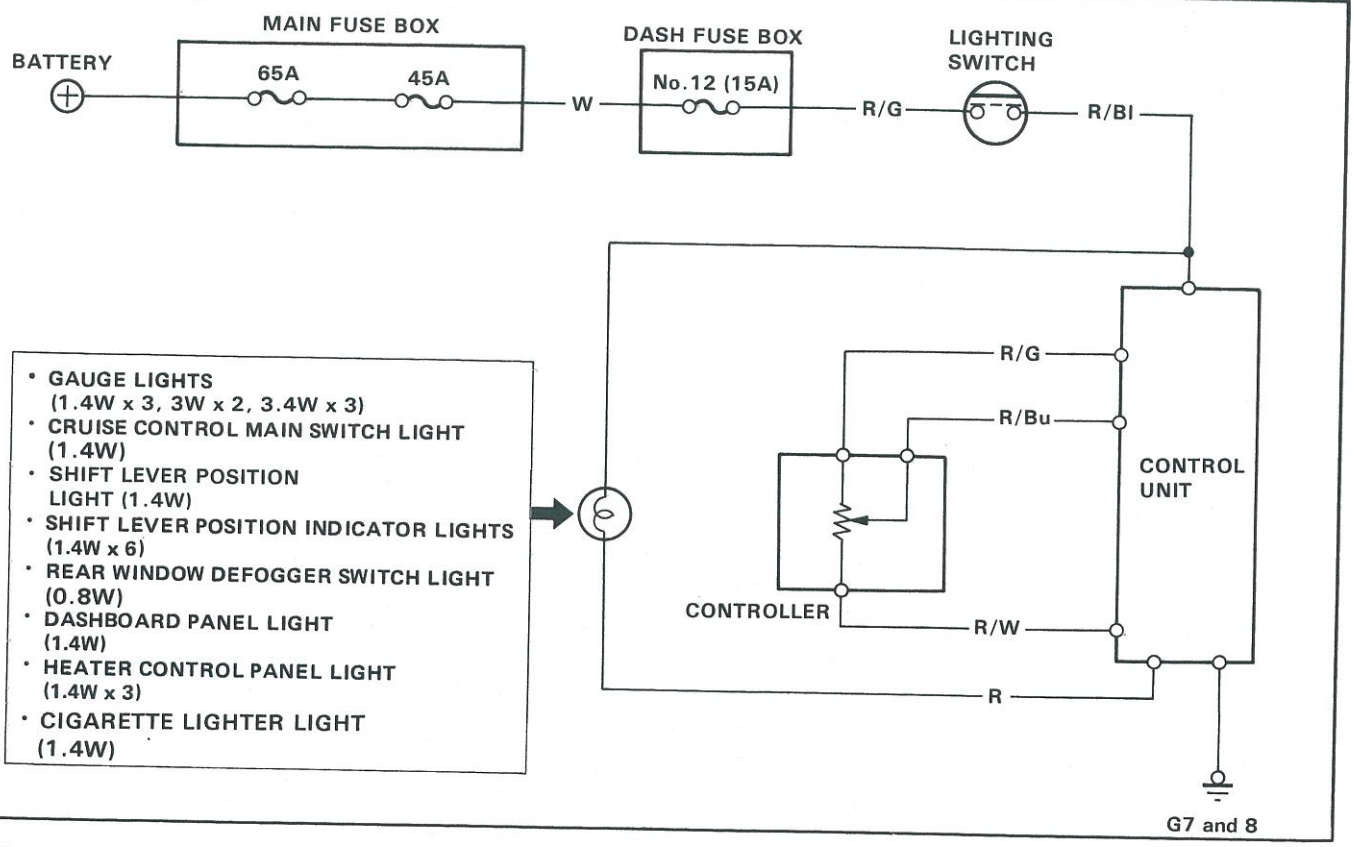
1. Remove the column lower panel and cover.
2. Untape the switch wires and disconnect the 2-P connector.
3. Remove the switch from the key cylinder by removing the attaching screw.



NOTE: On reassembly, secure the switch wires using tape.

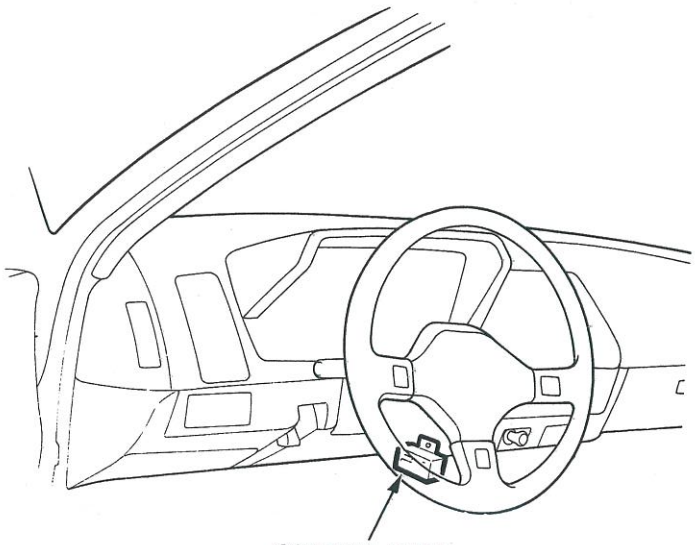
Dashlight Brightness Control

Circuit Diagram



Component Location Index

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Removal, page 23-68
Test, page 23-154
LIGHTING SWITCH
Test, page 23-74

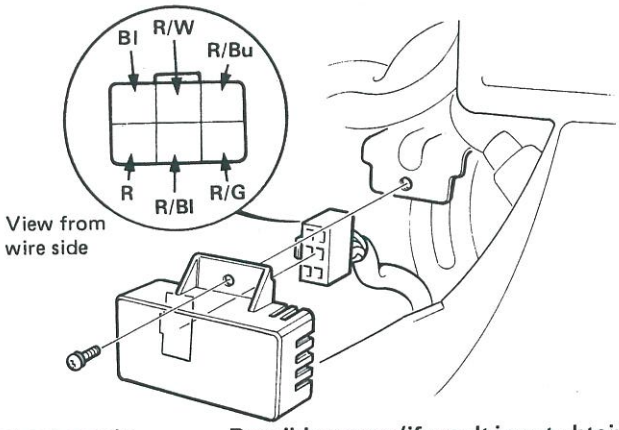


CONTROL UNIT
Input, page 23-154

Dashlight Brightness Control

Control Unit Input Test

If the dashlight does not work properly, remove the dashboard lower panel and disconnect the 6-P connector from the control unit.



No.	Wire	Test condition	Test : desired result	Possible cause (if result is not obtained)
1	Bl	At all times under all conditions	Check for continuity to ground: should be continuity.	Poor ground. An open in the wire.
2	R/Bl	Lighting switch ON	Check fom voltage to ground: should have battery voltage.	An open in the wire. Blown No. 12 (15 A) fuse.
3	Bl/R	Lighting switch ON	Attach to ground: dash lights should come on full bright.	An open in R/Bl or R wire.
4	R/G and R/W	Adjusting dial rotated	Check for resistance between R/G and R/W wires: should have 10 kΩ at all time.	An open in the wire. Faulty driver's door switch. Go to controller, test bellow.
5	R/Bu and R/W	Adjusting dial rotated	Check for resistance between R/Bu and R/W wires : should vary from 0 to 10,000 ohms as the dial is rotated.	An open in the wire. Faulty controller. Go to controller, test bellow.

NOTE: Replace the control unit if fails test 1-3.
Go to controller test if it fails test 4 and 5.

Controller Test

1. Remove the controller (page 23-68).
2. Measure resistance between the terminals.

NOTE: Resistance will vary slightly with temperature.

- Resistance should be 10 kΩ between A and C terminals.
- Resistance should vary from 0 to 10 kΩ as dial is rotated.

