#### 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 this page and the back cover. You can quickly find the first page of each section without looking through a full table of contents. The symbols printed at the top corner of each page can also be used as a quick reference system.

#### Each section includes:

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

#### Special Information

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

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

NOTE: Gives helpful information.

CAUTION: Detailed descriptions of standard workshop procedures, safety principles and service operations are not included. Please note that this manual does contain warnings and cautions against some specific service methods which could cause PER-SONAL 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.

First Edition 9/88 826 Pages Second print 9/89 All Rights Reserved Specifications Apply to U.S.A. HONDA MOTOR CO., LTD. Service Publication Office

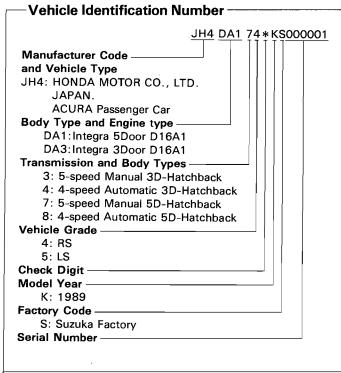
# General Info Special Tools **Specifications** Maintenance **Engine** Cooling Fuel and Emissions Transaxle Steering Suspension **Brakes** Body Heater and Air Conditioner

**Electrical** 

## **General Information**

Chassis and Paint Codes	1-	-2
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## **Chassis and Paint Codes**

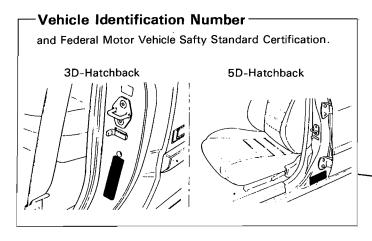


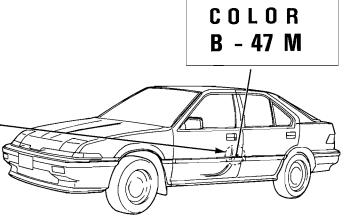
Engine Serial Number	
Engine Type	D16A1-3000001
Emission Group ————	
30: Calfornia (CAL)	
33: 49ST	
Serial Number —————	

venicle identification Number	l
JH4 DA1 74 * K\$000001	
anufacturer Code nd Vehicle Type H4: HONDA MOTOR CO., LTD. JAPAN. ACURA Passenger Car ody Type and Engine type DA1:Integra 5Door D16A1 DA3:Integra 3Door D16A1 ansmission and Body Types 3: 5-speed Manual 3D-Hatchback 4: 4-speed Automatic 3D-Hatchback 7: 5-speed Manual 5D-Hatchback 8: 4-speed Automatic 5D-Hatchback bicle Grade 4: RS 5: LS leck Digit odel Year K: 1989	

─Transm	nission Number ————	
		CG-6000001
Transmis	sion Type ————	
CG:	5-speed Manual Transmission	
P1:	Automatic Transmission	
Serial Nu	ımber	
6XXX	XXXX: with CG	
1XXX	XXXX: with P1	

Paint Color Codes	
Color Code	Color
3D Hatchback	
RS	
B-47M	Superior Blue Metallic
R-63	Rio Red
NH-95M	Blade Silver Metallic
NH-512Z	Polar White Z
LS	
YR-87M	Laguna Gold Metallic
NH-526M	Flint Black Metallic
B-47M	Superior Blue Metallic
R-63	Rio Red
NH-512Z	Polar White Z
5D Hachback	
RS	
B-47M	Superior Blue Metallic
R-63	Rio Red
NH-95M	Blade Silver Metallic
YR-88	Almond Cream
LS	
YR-87M	Laguna Gold Metallic
B-47M	Superior Blue Metallic
R-66M	Cardinal Red Metallic
NH-502M	Asturias Gray Metallic
NH-512Z	Polar White Z

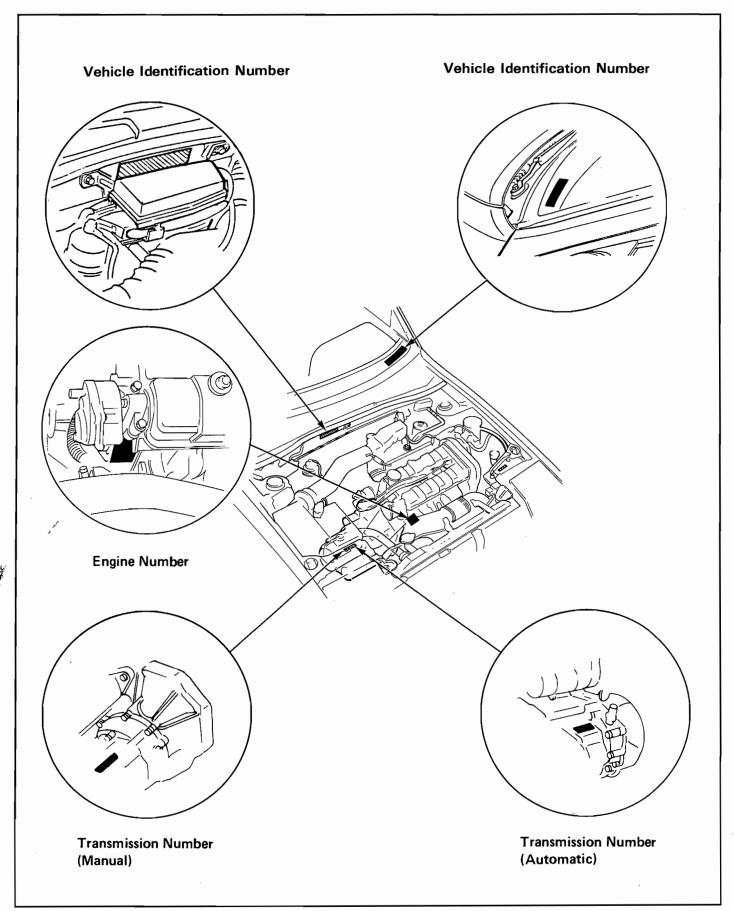




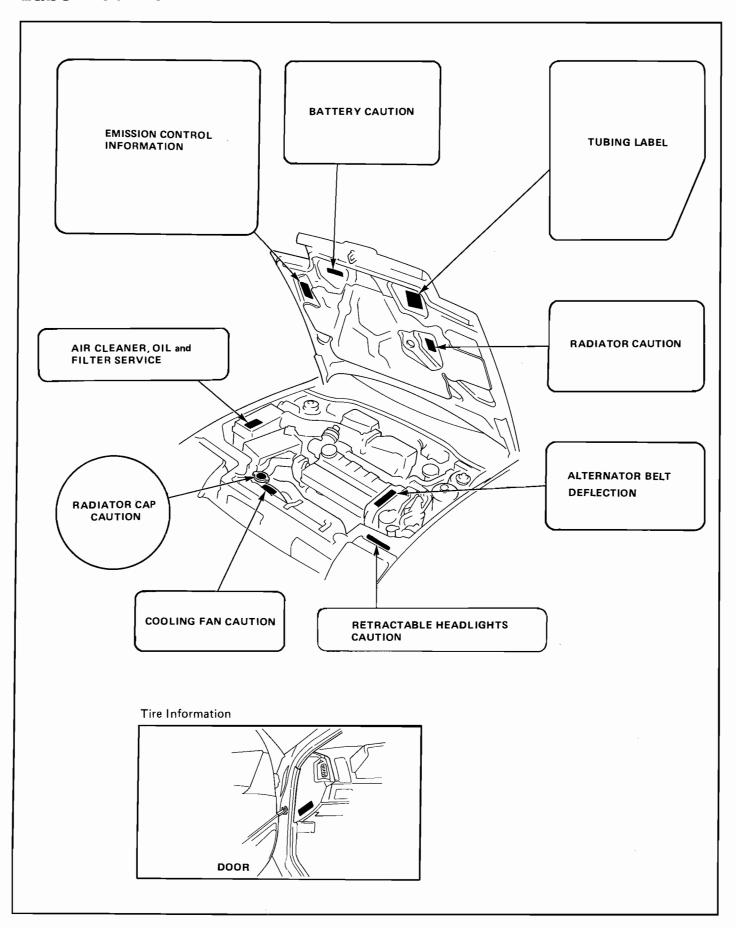
Paint Code -

## **Identification Number Locations**





## **Label Locations**



## **Lift and Support Points**

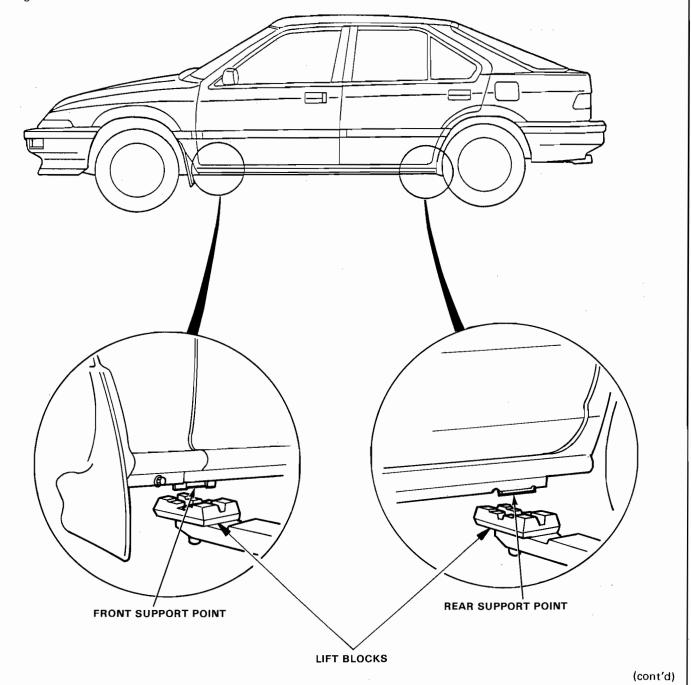


#### - Hoist -

- 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.

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

NOTE: Since each tire/wheel assembly weights approximately 30 lbs, placing the front wheels in the trunk can assist with the weight transfer.



## **Lift and Support Points**

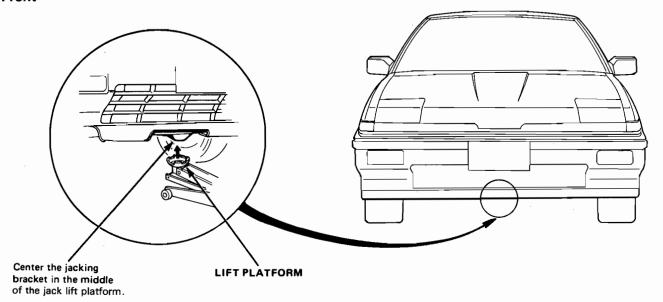
#### - Floor Jack -

- 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).
- Raise the car high enough to insert the safety stands.
- 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.

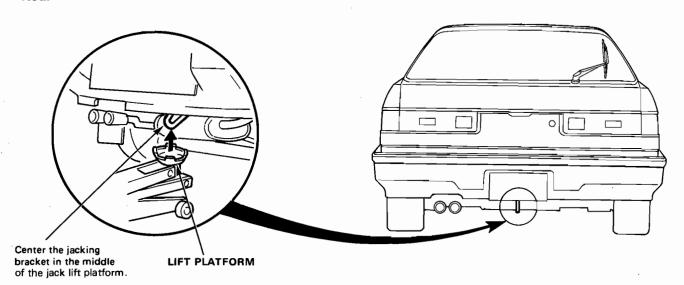
#### **WARNING**

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

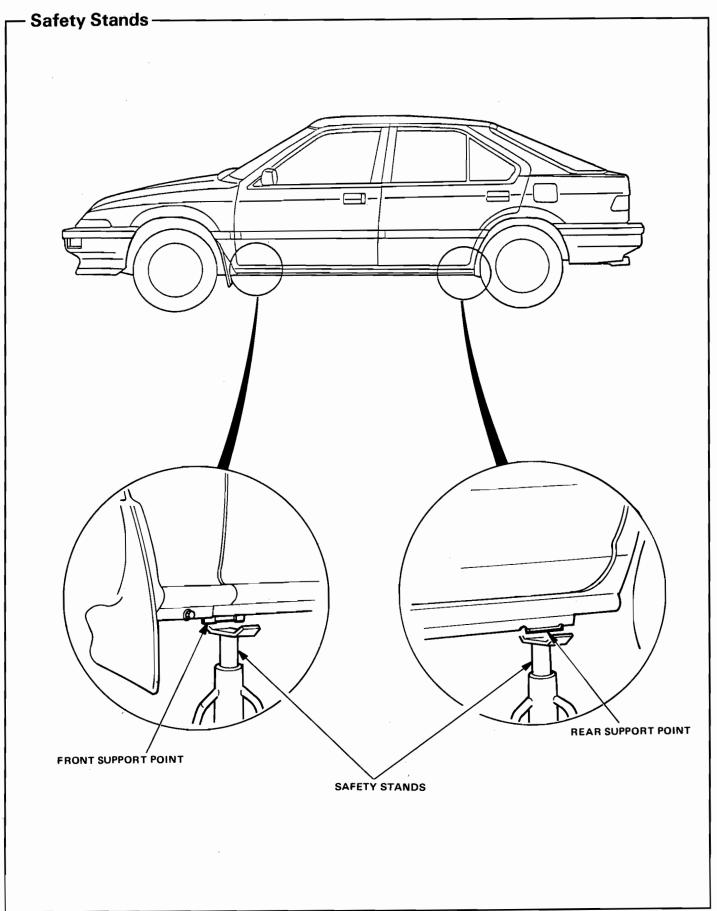
Front -



Rear







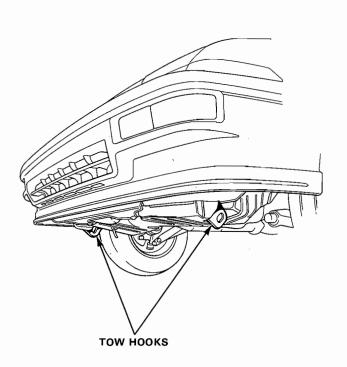
### **Towing**

If possible, always tow the car with the front wheels off the ground. The tow truck driver should position wood spacer blocks between the car's frame and his chains and lift straps to avoid damaging the bumper and the body under it. Do not use the bumpers to lift the car or to support the car's weight while towing. Check local regulation 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:

- Wheels and axle must not be touching the body or frame.
- 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.
- DO NOT exceed 35 mph (55 km/h) for distances of more than 50 miles (80 km).

WARNING DO NOT push or tow a car to start it. The forward surge when the engine starts could cause a collision. A car equipped with automatic tranmission cannot be started by pushing or towing.





## **Special Tools**

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

## specs

## **Specifications**

Standards and Service Limits	.3-	2
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Body Specifications	3-	1

## Standards and Service Limits

## ─ Cylinder Head/Valve Train ─ Section 6 ──────

	MEASURE	MENT	STANDARD (NEW)	SERVICE LIMIT
Compression	250 rpm and wide-open t	hrottle	Nominal Minimum Maximum variation	1,323 kPa (13.5 kg/cm²,192 psi) 932 kPa (9.5 kg/cm²,135 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 (1.2735)	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	*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) 0.04-0.10 (0.002-0.004) 0.10-0.16 (0.004-0.006) 32.195 (1.268)	6.55 (0.258) 6.52 (0.257) 0.16 (0.006) 0.22 (0.009) 32.985 (1.299)
Valve seat	Width	EX IN and EX	31.798 (1.252) 1.25-1.55 (0.049-0.061)	32.588 (1.283) 2.0 (0.08)
Valve spring	Free length Squareness	IN EX Inner and Outer	45.6 (1.80) 46.3 (1.82)	44.6 (1.76) 45.3 (1.78) 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) 0.007—0.012 (0.0003—0.0005)	0.10 (0.004) 75.07 (2.956) 0.05 (0.002) 0.5 (0.02)
Piston	Skirt O.D. At 16 mm (0.63 in) from bottom of skirt Clearance in cylinder Piston-to-ring clearance (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 (2.952) 0.07 (0.003) 0.13 (0.005) 0.13 (0.005)
Piston ring	Ring end gap (top) Ring end gap (second) Ring end gap (oil)	0.15-0.35 (0.006-0.014) 0.30-0.45 (0.012-0.018) 0.20-0.70 (0.008-0.028)	0.6 (0.02) 0.6 (0.02) 0.8 (0.03)
Connecting rod	Pin-to-rod interference Large end bore diameter End play installed on crankshaft	0.0140.040 (0.00060.0016) Nominal 48.0 (1.89) 0.150.30 (0.0060.012)	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 No. 1, 2, 4, 5, No. 3 Rod bearing-to-journal oil clearance	0.024-0.042 (0.0009-0.0017) 0.030-0.048 (0.0012-0.019) 0.020-0.038 (0.0008-0.0015)	0.05 (0.002) 0.05 (0.002) 0.05 (0.002)

#### Engine Lubrication — Section 8 ———

	MEAS	JREMENT		STANDARD (NEW)	SERVICE LIMIT
Engine oil	il Capacity & (U.S.qt.,Imp.qt.)		4.3 (4.5, 3.8) After engine disassembly 3.8 (4.0, 3.3) After oil change, including oil filter 3.3 (3.5, 2.9) After oil change, excluding oil filter		
Oil pump	Displacement Inner-to-outer rotor r. Pump body-to-motor Pump body-to-rotor s	radial clearance		62 ℓ (16.4 U.S. gal.,13.6 lmp. gal.)6, 0.14 (0.006) max. 0.10-0.175 (0.004-0.007) 0.03-0.08 (0.001-0.003)	750 rpm 0.2 (0.008) 0.2 (0.008) 0.15 (0.006)
Relief valve	Pressure setting	80°C (176°F)	ldle	69 kPa (0.7 kg/cm², 10 psi)	
		3,000	rpm	343 kPa (3.5 kg/cm², 50 psi)	



Unit : mm(in.)

– Coolir	ng — Section 10 ———	
	MEASUREMENT	STANDARD (NEW)
Radiator	Capacity (incl.heater) & (U.S. qt.,Imp. qt.)  Pressure cap opening pressure	Manual:5.6 (5.9,4.9) Includes reservoir tank 0.4 (0.42,0.35) Automatic:5.5 (5.8,4.8) Includes reservoir tank 0.4 (0.42,0.35) 74—103 kPa (0.75—1.05 kg/cm²,11—15psi)
Thermostat	Starts to open Full open Valve lift at full open	76—80°C (169—176°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) Subtract 5 ± 1.5°C (41 ± 34.7°F) from the actual *ON° temperature.

	MEASUREMENT	STANDARD (NEW)
Fuel pump	Delivery pressure Displacement Relief valve opening pressure	245 kPa (2.55 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	245-255 kPa (2.5-2.6 kg/cm²,35-37 psi)
Fuel tank	Capacity	50 ℓ (13.2 US.Gal.,11.0 lmp.Gal.)
Idle	Fast idle	1,250—2,250 rpm
	ldle speed with headlights and cooling fan off	Manual :750±50 rpm Automatic :700±50 rpm (N-position)
	Idle CO	0.1%

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Clutch pedal	Pedal height Stroke Pedal play Disengagement height	149 (5.87) to carpet 140—145 (5.51—5.71) 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 I.D. of pilot bush	0.05 (0.002) max. 19.000-19.071 (0.7480-0.7508)	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)

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT	
Transmission oil	Capacity ℓ (U.S.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 Diameter of pilot bush 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) 18.80-18.85 (0.7402-0.7421) 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

	MEASUREMENT	STANDARD (NEW)	39.07 (1.538) 0.18 (0.007)	
Countershaft low gear	I.D. End play	39.008-39.025 (1.5357-1.5364) 0.03-0.08 (0.0012-0.0031)		
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)	
Synchronizer 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-synchronizer 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)	
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)	
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	

	MEASUREMENT	•	STANDARD (NEW)	SERVICE LIMIT
Transmission oil	Capacity ℓ (U.S. 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		785-834 kPa (8.0-8.5 kg/cm², 114-121 psi)	736 kPa (7.5 kg/cm², 107 psi)
	□Range 2nd, 3rd, 4th clutch pressure at 2,000 rpm		412 kPa (4.2 kg/cm², 60 psi) Throttle control lever full closed	363 kPa (3.7 kg/cm², 53 psi) (closed)
			785-834 kPa (8.0-8.5kg/cm², 114-121 psi) Throttle control lever opened 2/8 or more	736 kPa (7.5 kg/cm² 107 psi) (2/8 opened)
	ZRange 2nd clutch pressure at 2,000 rpm		785-834 kPa (8.0-8.5 kg/cm²,	736 kPa (7.5 kg/cm² 107 psi)
	1st clutch pressure at 2,000 rpm		- 114—121 psi/	107 psi/
	Governor pressure at 37.5 mph (60 km/h)		213-223 kPa (2.17-2.27 kg/cm², 31-32 psi)	208kPa (2.12 kg/cm² 30 psi)
	Throttle pressure B	Full closed Full opened	0 785-834 kPa (8.0-8.5 kg/cm², 114-121 psi)	736 kPa (7.5 kg/cm², 107 psi)
	Throttle pressure A	Full closed Full opened	0-4.9 kPa (0-0.05 kg/cm², 0-0.7 psi) 486-500 kPa (4.95-5.10 kg/cm², 70-72 psi)	481 kPa (4.9 kg/cm², 70 psi)
Stall speed		_	2,300-2,900 rpm	
Clutch	Clutch inital clearance 1st, 2nd 3rd, 4th Clutch return spring free length 1st Except 1st		0.65-0.85 (0.026-0.033) 0.40-0.60 (0.016-0.024) 31.0 (1.22) 30.5 (1.20)	29.0 (1.14) 28.5 (1.12)
	Clutch disc thickness		1.88-2.0 (0.074-0.079)	Until grooves worn out



Unit: mm (in)

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Clutch	Clutch plate thickness Clutch end plate thickness Clutch end plate thickness Clutch end plate thickness  Mark 1 Mark 2 Mark 3 Mark 4 Mark 5 Mark 6 Mark 7 Mark 8 Mark 9 Mark 10	1.55-1.65 (0.061-0.065) 1.95-2.05 (0.077-0.079) 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)	Discoloration
Transmission	Diameter of needle bearing contact area on main and stator shaft Diameter of needle bearing contact area on mainshaft 2nd gear Diameter of needle bearing contact area on mainshaft 4th gear coller Diameter of needle bearing contact area on mainshaft 1st gear coller Diameter of needle bearing contact area on countershaft (L side) Diameter of needle bearing contact area on countershaft 3rd gear Diameter of needle bearing contact area on countershaft 4th gear Diameter of needle bearing contact area on countershaft reverse gear collar Diameter of needle bearing contact area on countershaft 1st gear collar Diameter of needle bearing contact area on countershaft 1st gear collar Diameter of needle bearing contact area on reverse idle gear Mainshaft 2nd gear I.D. Mainshaft 1st gear I.D. Countershaft 3rd gear I.D. Countershaft 1st gear I.D. Countershaft 1st gear I.D. Countershaft 1st gear I.D. Reverse idle gear I.D. Countershaft 2nd gear end play Mainshaft 2nd gear end play Mainshaft 1st gear end play Countershaft 2nd gear A  B C D E F G H I Mainshaft L side bearing Mainshaft 1st gear Mainshaft 2nd gear Mainshaft 2nd gear Mainshaft 3rd gear	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—27.995 (1.1014—1.1022) 36.004—36.017 (1.4175—1.4180) 31.975—31.991 (1.2589—1.2595) 27.980—27.993 (1.1016—1.1021) 29.980—29.993 (1.1803—1.1808) 29.980—29.993 (1.1803—1.1808) 13.990—14.000 (0.5508—0.5512) 41.000—41.016 (1.6142—1.6148) 33.000—33.016 (1.2992—1.2998) 38.000—38.016 (1.4961—1.4967) 33.000—33.016 (1.2992—1.2998) 38.000—38.016 (1.4961—1.4967) 35.000—35.016 (1.3780—1.3786) 36.000—36.016 (1.473—1.4179) 18.007—18.020 (0.7089—0.7094) 14.416—14.434 (0.5676—0.5683) 0.10—0.22 (0.0039—0.0087) 0.07—0.15 (0.0028—0.0059) 0.08—0.24 (0.0031—0.0094) 0.07—0.15 (0.0028—0.0059) 0.07—0.15 (0.0028—0.0059) 0.07—0.15 (0.0028—0.0059) 0.07—0.15 (0.0028—0.0059) 0.10—0.45 (0.0039—0.0177) 51.87—51.90 (2.0421—2.0433) 3.47—3.50 (0.1366—0.1378) 3.52—3.55 (0.1366—0.1378) 3.52—3.55 (0.1366—0.1378) 3.57—3.60 (0.1406—0.1417) 3.62—3.65 (0.1425—0.1437) 3.67—3.70 (0.1445—0.1456) 3.77—3.80 (0.1466—0.1378) 3.52—3.55 (0.1366—0.1378) 3.52—3.55 (0.1366—0.1378) 3.52—3.55 (0.1425—0.1437) 3.67—3.70 (0.1445—0.1456) 3.77—3.80 (0.1466—0.1516) 3.87—3.90 (0.1524—0.1535) 2.95—3.05 (0.1161—0.1201) 4.45—4.55 (0.1752—0.1791) 2.43—2.50 (0.0957—0.0984) 1.45—1.50 (0.0571—0.0591) 2.97—3.00 (0.1169—0.1181) 3.02—3.05 (0.1169—0.1181) 3.02—3.05 (0.1169—0.1181) 3.02—3.05 (0.1169—0.1181) 3.02—3.05 (0.1169—0.1201) 3.07—3.10 (0.1208—0.1220) 3.12—3.15 (0.1228—0.1220) 3.12—3.15 (0.1228—0.1220) 3.12—3.15 (0.1228—0.1220) 3.12—3.35 (0.1504—0.1516) 3.27—3.30 (0.1287—0.1299) 3.32—3.35 (0.1507—0.1299)	Wear or damage  Wear or damage  Wear or damage  Wear or damage  Wear or damage

(cont'd)

## **Standards and Service Limits**

— Automatic Transmission (cont'd) — Section 14 —

	MEASUREMENT	STANDA	RD (NEW)	SERVICE	LIMIT
Transmission (cont'd)	Countershaft distance collar length Mainshaft 1st gear collar length Mainshaft 1st gear collar length Mainshaft 1st gear collar length Countershaft reverse gear collar length Countershaft reverse gear collar flange thickness Countershaft 1st gear collar length Countershaft 1st gear collar flange thickness Diameter of countershaft one-way clutch contact area Diameter of parking gear one-way clutch contact area Mainshaft feed pipe A O.D. (at 15 mm from end) Mainshaft feed pipe B O.D. (at 12 mm from end) Countershaft feed pipe O.D. (at 20 mm from end) Mainshaft sealing ring 32 mm thickness Mainshaft bushing I.D. Mainshaft bushing I.D. Countershaft feed ping I.D. Mainshaft sealing ring groove width Statorshaft distance collar 20 mm I.D.	38.97—39.00 (1.5342—1.5354) 39.02—39.05 (1.5362—1.5374) 39.07—39.10 (1.5382—1.5394) 39.12—39.15 (1.5402—1.5413) 39.17—39.20 (1.5421—1.5433) 39.22—39.25 (1.5441—1.5433) 39.22—39.25 (1.5441—1.5453) 39.27—39.30 (1.5461—1.5472) 40.00—40.05 (1.5748—1.5768) 25.00—25.15 (0.9843—0.9902) 2.5—2.6 (0.098—0.102) 14.50—14.55 (0.5709—0.5728) 2.45—2.55 (0.0965—0.1004) 4.50—14.55 (0.5709—0.5728) 2.45—2.55 (0.0965—0.1004) 74.414—74.440 (2.9297—2.9307) 57.755—57.768 (2.2738—2.2743) 8.97—8.98 (0.353—0.354) 5.97—5.98 (0.2351—0.2354) 7.97—7.98 (0.3138—0.3142) 1.980—1.995 (0.0780—0.0785) 6.018—6.030 (0.2369—0.2374) 9.000—9.015 (0.3543—0.3549) 8.000—8.015 (0.3150—0.3156) 2.025—2.060 (0.0797—0.0811) 26.000—26.013 (1.0236—1.0241)		Wear or damage  8.95 (0.3524) 5.95 (0.2343)  7.95 (0.3130) 1.800 (0.0709) 6.045 (0.2380) 9.030 (0.3555) 8.030 (0.3161) 2.080 (0.0819) 26.030 (1.0248)	
Regulator valve body	Sealing ring contact area diameter	32.000-32.025 (	1.2598—1.2608)	32.050 (1.2618)	
Shifting device and parking brake control	Reverse shift fork thickness Parking brake ratchet pawl Parking gear Throttle cam stopper	5.90—6.00 (0.232 ———————————————————————————————————		5.40 (0.2126) Wear or other defect Wear or other defect	
Servo body	Shift fork shaft bore. I.D. A B C C Shift fork shaft valve bore I.D.	14.000—14.005 (0 14.006—14.010 (0 14.011—14.015 (0 37.000—37.039 (	0.55140.5516) 0.55160.5518)	37.045 (1.4585)	
Valve body	Oil pump gear side clearance Oil pump gear-to-body clearance Stator camshaft needle bearing bore I.D. (R side) Stator camshaft needle bearing contact and I.D. (Stator side) Oil pump driven gear I.D. Oil pump shaft O.D.	0.03-0.05 (0.001) Drive: 0.120-0. (0.0047- Driven: 0.063-0. (0.0025- 26.000-26.013 (** 24.000-24.021 (** 14.016-14.034 (** 13.980-13.990 (**	133 0.0052) 088 0.0035) 1.0236—1.0241) 0.9449—0.9457) 0.5518—0.5525)	0.07 (0.0028)  Wear or damage Wear or damage Wear or damage Wear or damage	
Springs		Wire Dia.	O.D.	Free Length	No. of Coils
	Regulator valve outer spring Regulator valve inner spring Stator reaction spring Torque converter check valve spring Relief valve spring 2nd orifice control valve spring Servo orifice control valve spring Throttle control valve A spring Throttle control valve A adjuster spring Throttle control valve B spring Throttle control valve B spring Throttle control valve B adjuster spring 1—2 shift spring 1—2 shift ball spring	1.58 x 2 (0.06 x 0.08) 1.8 (0.07) 6.0 (0.24) 1.1 (0.04) 1.0 (0.04) 0.8 (0.03) 0.9 (0.35) 1.0 (0.04) 0.8 (0.03) 1.6 (0.06) 0.8 (0.03) 0.7 (0.03) 0.45 (0.02)	14.7 (0.58) 9.6 (0.38) 38.4 (1.51) 8.4 (0.33) 8.6 (0.26) 6.1 (0.24) 8.5 (0.33) 6.2 (0.24) 8.5 (0.33) 6.2 (0.24) 4.5 (0.18)	86.5 (3.41) 44.0 (1.73) 30.3 (1.19) 36.4 (1.43) 52.0 (2.05) 43.8 (1.72) 35.9 (1.41) 22.2 (0.87) 27.0 (1.06) 41.3 (1.63) 30.0 (1.18) 38.1 (1.50) 12.7 (0.50)	20.9  7.5 2 12 23 27.6 20 6 8.5 13.9 8 25 11



Automatic Transmission (cont'd) — Section 14 ————

Unit: mm (in)

	MEASUREMENT	Wire Dia.	O.D.	Free Length	No. of Coils
Springs	2-3 shift ball spring	0.45 (0.18)	4.5 (0.18)	12.7 (0.50)	11
cont'd)	3-4 shift spring	0.9 (0.04)	9.6 (0.38)	32.8 (1.29)	10
	3-4 shift ball spring	0.5 (0.02)	4.5 (0.18)	11.2 (0.44)	7
	Low accumulator A spring	2.34 x 2.9	21.5 (0.85)	66.7 (2.63)	10.2
		(0.09 x 0.11)			
	Low accumulator B spring	2.8(0.11)	13.1 (0.52)	40.0 (1.57)	8.8
	4th accumulator spring	3.2 (0.13)	18.6 (0.73)	78.3 (3.08)	10
	2nd accumulator spring	3.5 (0.14)	20.2 (0.80)	76.7 (3.02)	9.6
	3rd accumulator spring	2.7 (0.11)	15.5 (0.61)	80.0 (3.15)	14.8
	L/C control spring	0.7 (0.03)	6.6 (0.26)	31.3 (1.23)	15.8
	L/C timing valve B spring	1.0 (0.04)	6.6 (0.26)	57.2 (2.25)	30
	CPC valve spring	1.4 (0.06)	9.4 (0.32)	31.6 (1.24)	10.9
	Servo return spring	2.6 (0.10)	28.8 (1.13)	40.3 (1.59)	3.3
	Governor spring A	1.0 (0.04)	18.8 (0.74)	38.1 (1.50)	4
	Governor spring B	0.9 (0.04)	11.8 (0.46)	23.9 (0.94)	6
	L/C shift valve spring	1.1 (0.04)	8.1 (0.32)	51.8 (2.04)	22.3
	L/C cut valve spring	0.7 (0.03)	7.6 (0.30)	29.0 (1.14)	18
	Kick down valve spring	0.9 (0.04)	10.1 (0.40)	40.8 (1.61)	14.5
	REV control spring	0.7 (0.03)	7.6 (0.30)	37.2 (1.46)	15.3
	3—2 timing valve spring	1.2 (0.05)	7.7 (0.30)	45.1 (1.78)	19.8

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

-	Driv	vesl	haft	:—S	ectio	n 16

	MEA	SUREMENT	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)	l —	

Power Steering—Section 17 ———————————

	MEAS	UREMENT	STANDARD(NEW)	SERVICE LIMIT
Steering wheel	Play Pinion-starting torque	N-m(kg-m, lb-ft)	10.0(0.39)Max 1.2(0.12, 0.87)Max,	
		valve closed(Oil temp./speed: Do not run for more than 5		
		kPa(kg/cm², psi)	7,845-8,826 (80-90, 1,138-1,28	(0)
	Fluid capacity	Reservoir	0.25 ℓ (0.26 U.S. qt.,0.22lmp.qt.)	
		At change	1.2 ℓ (1.3 U.S. qt.,1.1lmp.qt.)	
Power steering Pump belt	Deflection midway be	tween pulleys/load	18-22(0.7-0.9)/98N(10kg, 22lb) fo	or used belt
			18-20(0.7-0.8)/98N(10kg, 22lb) a	fter replacement of belt

## **Standards and Service Limits**

	MEASUREMENT		STANDARD(NEW)		SERVICE LIMIT	
Wheel alignment	Camber Caster Toe-in Kingpin inclina	ation		Front -0'30'±1' 2'10'±1' -1±3 (-0.039±0.118) 13'20'±1/2'	Rear -0*45'±15' 2±2 (0.079±0.079)	
	Steering angle	R/L	Inside Outside	30°50′±2° 36°47′±2°		
Wheel	Rim runout	Steel Aluminum	Axial Radial Axial Radial	0-1.0(0-0.039) 0-1.0(0-0.039) 0-0.7(0-0.028) 0-0.7(0-0.028)		=
Front spring	Clearance bety	ween wheel arch	and ground	653 (25.7)		638-668(25.1-26.3)

	MEASUI	REMENT	STANDARD(NEW)	SERVICE LIMIT	
Parking brake lever	Play stroke 200N(20kg	kg, 44 lbs)  To be locked when pulled 4-8 notches		_	
Foot brake pedal	Pedal height Free play	· -	179(7.0)to floor 1-5(0.04-0.20)	5(0.20)	
Master cylinder	Piston-to-pushrod clear	ance	0-0.4(0-0.016)		
Disc brake	Disc thickness	Front Rear	19.0(0.75) 10.0(0.39)	17.0(0.67) 8.0 (0.31)	
	Disc runout Disc parallelism	Front/Rear		0.10(0.004)/0.15 (0.006) 0.015(0.0006)	
	Pad thickness	Front Rear	9.5(0.37) 8.0(0.31)	3.0(0.12) 1.6(0.06)	
		Vacuum(mmHg)	Pedal Pressure kg(lb)	Line Pressure kg/cm²(psi)	
Brake booster	Characteristic	0 300 500	20(44) 20(44) 20(44)	13 (185) min. 54 (768) min. 73 (1,038) min.	

	MEASUREMENT	STANDARD (NEW)					
Ignition coil	Rated voltage Primary winding resistance Secondary winding resistance	12 Volts 1.2—1.5 ohms 9,040—13,560 ohms					
Ignition wire	Resistance	25,000 ohms max					
Spark plug	Туре	For all normal driving  For hot climates or continuous high speed driving  For cold climates	driving   Q20PR—U11 (ND),				
	Gap	1.0-1.1(0.039-0	0.043)				
Ignition timing	At idling	12°±2° BTDC					
Battery	Lighting capacity (20-hour ratio) Starting capacity (5-second ratio)	47 Ampere Hours 8.4 V minimum at 300 Ampere draw					
Alternator			ND				
	Output	13.5V/65 A a	at 6,000 rpm	55 A at 5	,000 rpm		
		STANDAR	RD (NEW)	SERVIC	E 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 (11.6d	oz)	2.8—3.0 oh 13.5 (0.53) 5.5 (0.22) 200g (7.05			
Alternator belt	Deflection midway between pulleys/load		9)/98N (10kg. 22lb) /98N (10kg. 22lb)	for used belt after replacement of b	pelt		
Starting motor		ND 1.4kW	/	Mitsuba 1.4	kW		
	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 (0.001)	0.05 (0.002)	0-0.02 (0.001)	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 (3.9lb)		2.1kg (4.6lb)			

## **Design Specifications**



		ITEMS	METRIC	ENGLISH	NOTES
DIMENSIONS	Overall Length Overall Width Overall Height Wheelbase Track F/R Ground Clearan Seating Capacit		4,355 mm 4,285 mm 1,665 mm 1,345 mm 2,520 mm 2,450 mm 1,420/1,435 mm 155 mm	171.5 in. 168.7 in. 65.6 in. 53.0 in. 99.2 in. 96.5 in. 55.9/56.5 in. 6.1 in.	
WEIGHTS	Curb Weight  Gross Vehicle W Carrying (Cargo)	5D M/T RS LS A/T RS LS S S A/T RS LS A/T RS LS A/T RS LS Ceight Rating Weight Capacity	1,084 kg 1,087 kg 1,088 kg 1,101 kg 1,049 kg 1,068 kg 1,063 kg 1,084 kg 1,535 kg 45 kg	2,390 lb. 2,396 lb. 2,399 lb. 2,427 lb. 2,313 lb. 2,355 lb. 2,344 lb. 2,390 lb. 3,385 lb. 99 lb.	M/T : 5 speed manual transmission A/T : 4 speed automatic transmission Curb weight : +A/C: 23kg(51 lb.) + Cargo: 45kg (99 lb.) + Passengers 68 kg ×5 (150 lb. ×5) + Tolerance = G. V. W. R.
ENGINE	Type Cylinder Arrange Bore and Stroke Displacement Compression Ra Valve Train Lubrication Syst Fuel Required	tio	Water cooled, 4-cycle 4-cylinder in-lir 75.0×90.0 mm 1,590ar 9.5 Timing belt driven, doul Trochoic Unleaded grade g research octane m	ne, transverse 2.95×3.54 in. 97cu. in : 1 ble overhead camshaft I pump jasoline with 91	
STARTER	Type Normal Nominal voltage Hour rating Direction of rota Weight	tion ND Mitsuba	Gear rec 1.4k 12 30 sec Clockwise as viewe 4.6 kg 3.7 kg	kW V conds	
TRANSMISSION	Clutch Transmisson Primary Reduction	A/T M/T A/T M/T	Torque Co Single plate dry, co 4 forward speeds reverse Synchronized 5 fo Direct	liaphragm spring e with torque converter prward 1 reverse 1:1	
	Gear Ratio	1 st 2 nd 3 rd 4 th 5 th Reverse	M/T 3.181 1.944 1.347 1.033 0.823 3.000	A/T 2.705 1.560 1.027 0.780 — 1.954	
	Final Reduction  Clutch Lining Are	A/T M/T	Single helical single	gear, 4.214 gear, 4.214 24.8 sq. in.	
AIR CONDITIONER	Evaporator Condenser	inlet air temperature inlet air temperature air velocity	4,130 kcal/h 1,800 27.5°C 509 35°C 4.5 m, 440 m³/h (13.5V)		
	Compressor	Type No. of cylinders Piston Displacement Max. rpm Lubricant/capacity	Swash 10 153 cc/rev. 8,300 70—90 cc	9.32 cu. in/rev.	
	Condenser		Corrugated	fin type	
	Evaporator Blower	Type Motor input Speed control Max. capacity	Corrugated fin type  Sirocco fan 175 W (12 V) 4 Position 390 m³/h (12V)   13,771 cu. ft/h		
	Temp. Control	. ,	Air-mix		
	Comp. Clutch	Type Power consumption	Dry, single plate 40 W max	e, V-belt drive	
	Refrigerant	Type	R-1:		

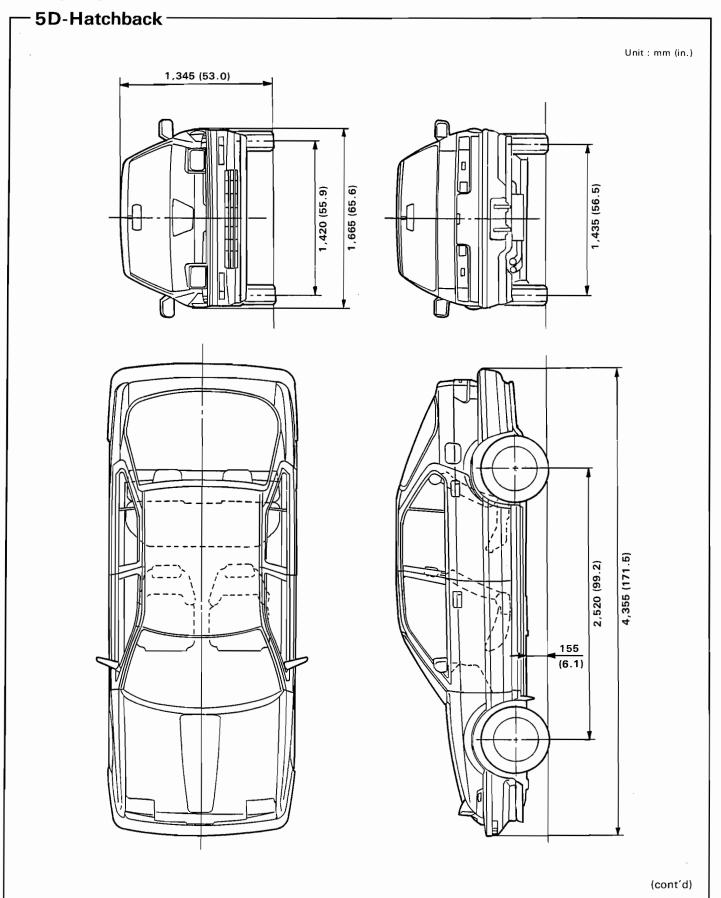
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## **Design Specifications (cont'd)**

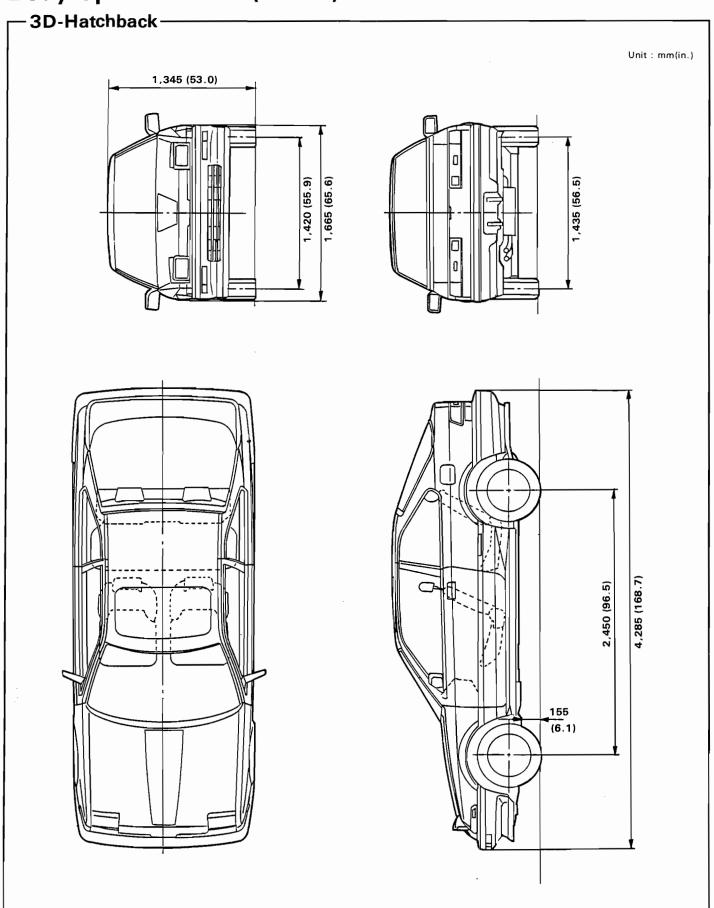
	ITEMS	METRIC	ENGLISH	NOTES
STEERING	Gear Type Overall Ratio Turns, lock-to-lock Steering Wheel Diameter Power Steering Oil capacity Power Steering Oil	18.3 3. 375 mm 1.2 lit.		
SUSPENSION	Front Rear		with torsion-bar spring	
WHEEL ALIGNMENT	Camber Front/Rear Caster Toe-in Front Rear Steering Axis Inclination	2°10 -1±3 mm 2±2 mm	-3/4±1/4° 0′±1° -0.004±0.118 in 0.079±0.079 in.	
BRAKES	Type, Front Type, Rear		assisted ventilated disc er-assisted solid disc	
	Pad Surface Area Front/Rear Effective Disc Diameter Fron Rea Parking Brake Type	r 190 mm	6.9/3.2 sq. in. 9.4 in. 7.5 in. rear two wheel brakes	
TIRES	Size Spare Tire		R14 85H 'OD, 14	
ELECTRICAL	Battery Starter Alternator Fuses Main Fuses Headlights Gauge Lights Front Turn Signal Lights Side Marker Lights (front/rear) Warning Lights Dome Light	12V-47AH 12V-1.4kW 12V-55amps 30A, 20A, 15A, 10, 60A, 50A, 40A 12V-65/35 W 12V-1.4W, 3W, 3 12V-32CP 12V-3CP/3CP 12V-1.4W 12V-5W		(SAE 1156)
	Rear Turn Signal Lights Stop/Taillights	12V-32CP 12V-32/2CP		(SAE 1156)
	Indicator Lights Hatch Light Back-up Lights License Lights	12V-0.8W, 1.4W 12V-3.4W 12V-32CP		(SAE 2057) (SAE 1156)
	High mount brake lamp	12V-4CP 12V-32CP		(SAE 1156)

## **Body Specifications**





## **Body Specifications (cont'd)**



## Maintenance

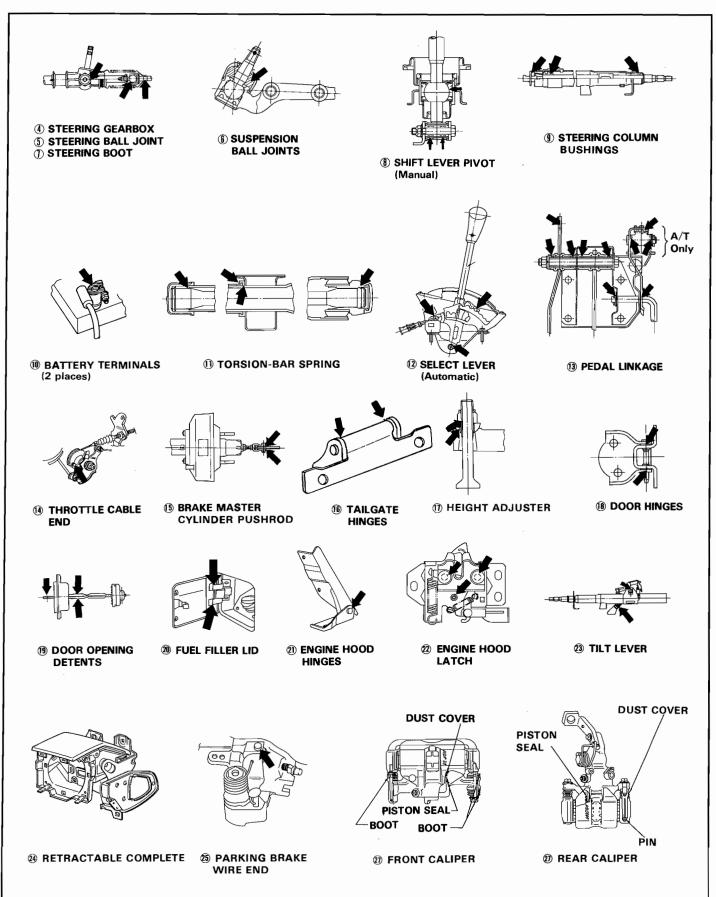
Lubrication Points	4-2
Maintenance Schedule	4-4



## **Lubrication Points**

No.	LUBRICATION POINTS	LUBRICANT		
1	Engine	API Service Grade: "Fuel Efficient" Use only SF or Grade detergent oil SAE Viscosity: See chart below		
2	Transmission Manual	API Service Grade: SE or SF		
	Automatic	SAE Viscosity: See chart below DEXRON® II Automatic transmission fluid		
3	Brake reservoir	Brake fluid DOT3 or DOT4		
4	Steering gearbox (Power)	Steering grease P/N 08733-B070E		
5	Steering ball joint			
6	Suspension ball joints			
7	Steering Boot			
8	Shift lever pivot (Manual)			
9	Steering column bushings			
10	Battery terminals (2 places)			
11	Torsion-bar spring			
12	Select lever (Automatic)			
13	Pedal linkage			
14	Throttle cable end	Multi-purpose Grease		
15	Brake master cylinder pushrod			
16	Tailgate hinges			
17	Height adjuster			
18	Door hinges upper and lower			
19	Door opening detents			
20	Fuel filler lid			
21	Engine Hood hinges			
22	Engine hood latch			
23	Tilt lever			
24	Retractable complete			
25	Parking brake wire end			
26	Battery mounting nuts			
27	Piston seal  Dust seal  Caliper  Caliper pin	Silicone Grease		
	Piston			
28	Power steering reservoir	Power steering fluid P/N 08208—99961		
	ended Engine Oil ficient" Use only SF or SG Grade detergent oil)	Recommended Manual Transmission Oil		
	10W-30	30		
	1007-30			
		20W-40		
	5W-30 PREFERRED			
		10W-30 10W-40		
-20	0 20 40 60 80 100 120 140°F	-20 0 20 40 60 80 100°F		
		-30 -20 -10 0 10 20 30 40°C		
-30 -2				
E	ngine oil viscosity for	Transmission oil viscosity for		
	mbient temperature ranges.	Transcription on the second of		





#### 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.

MAINTENA	NCE ITEM	N	/AINTEN	ANCE IN	TERVALS			
Service at the interval listed x 1,000 miles (or	×1,000 miles	15	30	45	60	75	NOTES	SEC &
km) or after that	×1,000 km	24	48	72	96	120	110120	PAGE
mounths, which- ever comes first.	months	12	24	36	48	. 60		
■Engine oil		Repla	ce every	7,500 m r 6 mont		00km)	3.8ℓ(4.0 U.S. qt.,3.3 lmp. qt.) at oil/ filter change	8-4
Engine oil filter	•		U	i o mont		t		8-5
Manual transm	ission oil		R		R		2.3 l (2.4qts.)	13-3
Automatic tran	smission fluid		R		R		2.4 (2.5qts.) DEXRON® II ATF	14-37
Parking brake		f	ı		- 1		Fully engaged: 4-8 clicks	19-4
Front Brake pa	ds	Inspe	ct every,	7,500 m r 6 montl		00km)	Min. thickness: 3.0mm(0.12 in.) Pad(lining)	19-6
Rear brake disc pads	s, calipers and	1 -	ı	ı	ı	ı	Min. thickness: 8mm (0.31 in.) Disc Min. thickness: 1.6mm (0.06 in) Pad	19-36 19-28
Front brake dis	c and calipers	- 1	ı	ı	ı	I	Min. thickness: 17mm (0.67 in.)	19-9
Suspension mo	unting bolts	I	1	ı	ı	ı	Check tightness of bolts.	18-8 25, 26
Exhaust pipe ar	nd muffler	ı	I	ı	ı	I	Check condition and tightness	9-4
Fuel line conne	ctions		***		I		Check fuel lines for loose connections, cracks and deterioration. Retighten loose connections and replace any damaged or deformed parts.	11-5
Fuel filter and h	noses				R		The rubber fuel hoses need periodic re- placement since they are subject to cracks and deterioration during a long period of use.	11-5,85
Brake hoses an	d lines	1	ı	I	ı	I		19-37
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.	19-12
Steering operatends, steering operatends, steering operatends		I	I		ŀ		Check rack grease and steering linkage. Check the boot for damage or leaking grease.	17-3,28
Front wheel alig	gnment	I	I	f	_	ı		18-4
Power steering	system	I	I	I	I	I		17-3
Power steering pump belt			i		I			17-15

<sup>\*</sup>Tension adjustment only.

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

C . Driving in	severe cold weather	L . Driving of	ii rough and/or muddy roads
Condition	Maintenance item	Maintenance operation	Interval
А В • • •	Engine oil and oil filter	R	From 3 000 miles (F 000 km) or 3 months
A B C • E	Clutch release-arm travel	ı	Every 3,000 miles (5,000 km) or 3 months
A B • D E	Brake discs, calipers and rear brake pads	I	Every 7,500 miles (12,000 km) or 6 months
• B C • E	Power steering system	I	

<sup>\*\*\*</sup>For cars sold in California, this service is recommended only; for other areas, it is required.

<sup>■</sup>Remark: Check oil and coolant level at each fuel stop.



	ANCE ITEM		MAINTEN	NANCE IN	NTERVALS	;		
Service at the interval listed x 1,000 miles (or	×1,000 miles	15	30	45	60	75	NOTES	SEC &
km) or after that number of	×1,000 km	24	48	72	96	120	NOTES	PAGE
mounths, which- ever comes first.	months	12	24	36	48	60		
Clutch release	arm travel		Inspect (12,000	every 7,5 km) or 6	00 miles months		Free play at arm : 4.0-5.0mm (0.16-0.20 in)	12-4
Cooling system connections	n hoses and		1		ı			10-2
■Radiator coo	lant			R		Ř	Cooling system capacity Manual: 4.6ℓ(4.9 U.S. qt., 4.0 lmp.qt) Automatic: 4.5ℓ(4.8 U.S. qt., 4.0 lmp.qt) Check specific gravity for freezing point.	10-3
Alternator drive	e belt		i		1		7-10 mm(0.28-0.39 in)@10kg(22 lbs.)tenstion	23-61
Positive cranko valve	ase ventilation				I		If clicking sound is heard as you pinch the PCV hose between the PCV valve and intake manifold, valve is OK.	11-107
Distributor cap	and rotor				Ī			23-36
Ignition wiring					1		Maximum resistance 25,000ohms	23-39
Spark plugs			R		R		NGK :BCPR6E-11, BCPR6EY-N11 or ND : Q20PR-U11 1.0-1.1 mm (0.039-0.043 in.)	23-41
Valve clearance	(engine cold)	ı	I	ı	ı	ı	Intake: 0.13-0.17 mm(0.0051-0.0067 in.) Exhaust : 0.15-0.19 mm(0.0059-0.0075 in.)	6-20
Air cleaner elen	nent		R		R			11-5
Evaporative emission control system (cold)					1			11-108
		W	arm up th	e engine	to norma	operation	ng temperature	
Ignition timing a system	and control				ı		12±2° (Red) BTDC	23-35
Idle speed					ı		Manual : 750±50 rpm Automatic : 700±50 rpm (in "N" position)	11-69
Idle CO					ı		Check with CO meter.	11-105
Evaporative emi control system	(hot)			-	ı			11-108
Catalytic converter heat shield					1		Check condition and tightness	11-106

<sup>\*</sup>Tension adjustment only.

\*\*Thereafter, replace every 2 years or 30,000miles (48,000km)whicherer comes first.

■Remark: Check oil and coolant level at each fuel stop.

		s.
	•	

## Engine

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



## **Engine Removal/Installation**



#### **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.
- Unbolt the hood brackets and remove the hood.
  - Disconnect the washer fluid tube.

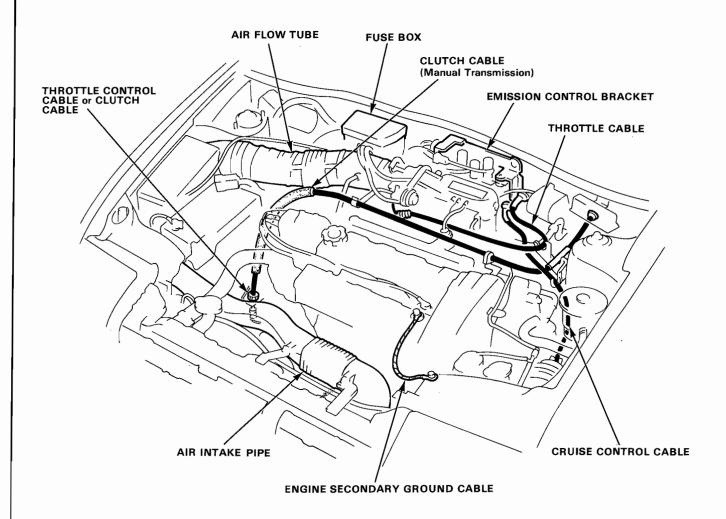
CAUTION: Use care when storing the hood to avoid damaging the paint.

- 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.

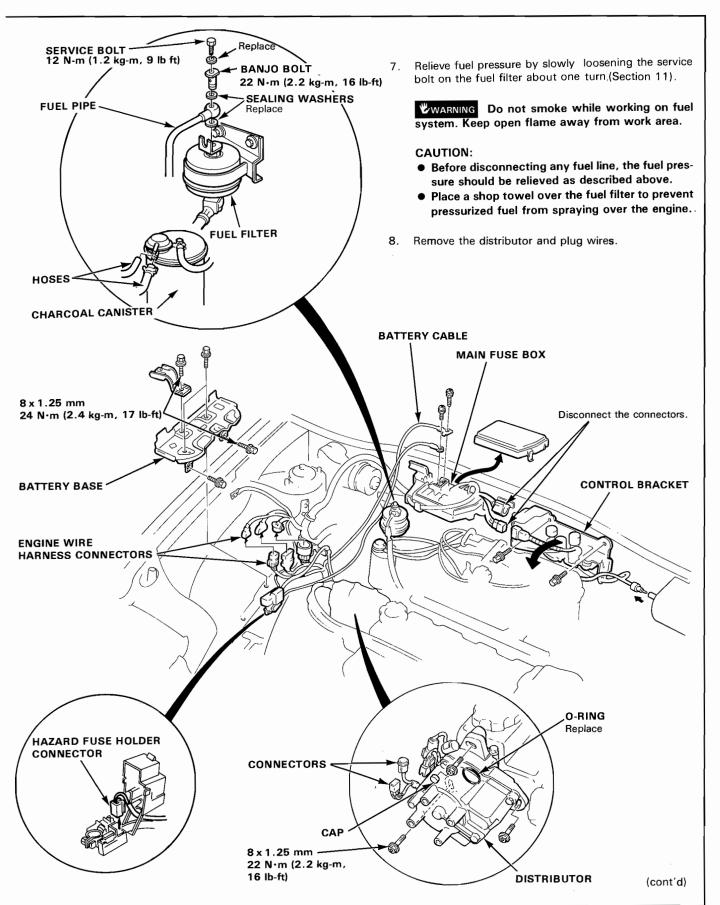
WARNING Use care when removing radiator cap to avoid scalding by hot coolant or steam.

- 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 flow tube and air intake pipe.

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.



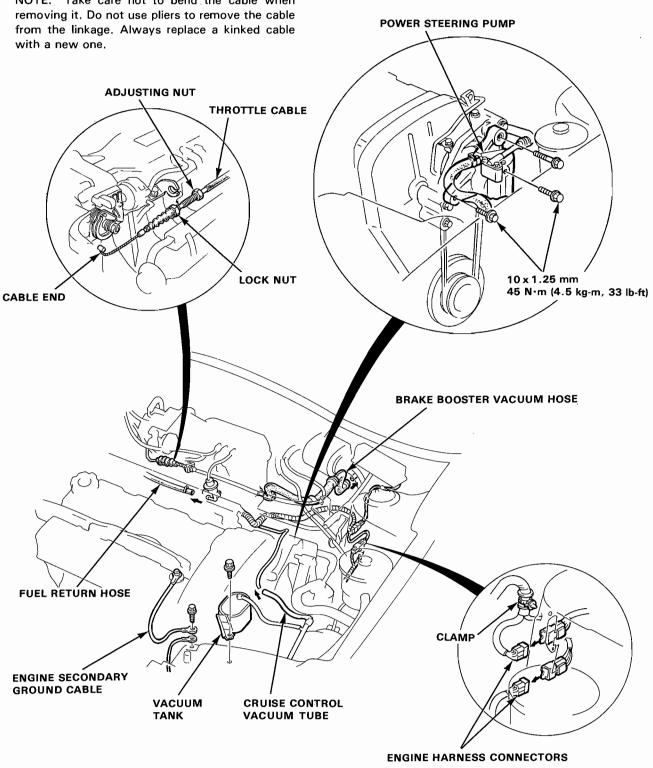




## **Engine Removal/Installation**

#### – (conťd) *–*

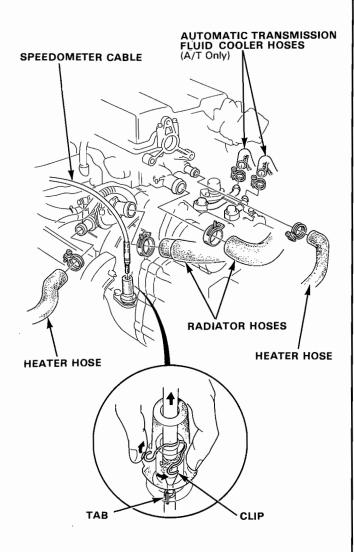
- Remove the throttle cable by loosening the lock nut and the throttle cable adjusting nut, then slip the cable end out of the throttle bracket and accelerator linkage.
  - NOTE: Take care not to bend the cable when
- 10. Remove the mounting bolts and V-belt for the power steering pump, then without disconnecting the hose, pull the pump away from its mounting bracket.





- Disconnect the radiator hoses, heater hoses and 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.



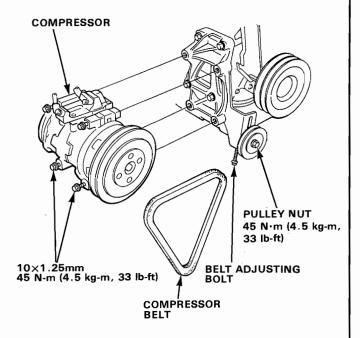
### **During Installation:**

- 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:

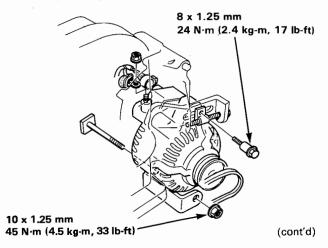
- Loosen the belt adjusting bolt and idler pulley nut.
- Remove the compressor mounting bolts, then lift the compressor out of the bracket with hoses attached, and wire it up to the front beam.

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

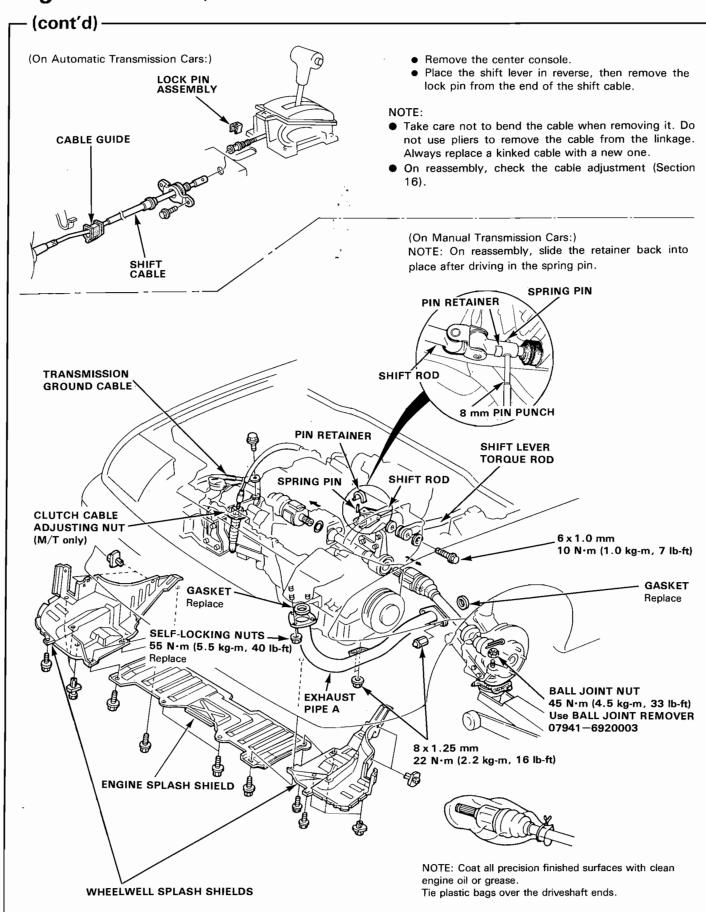


#### 14. Remove the alternator:

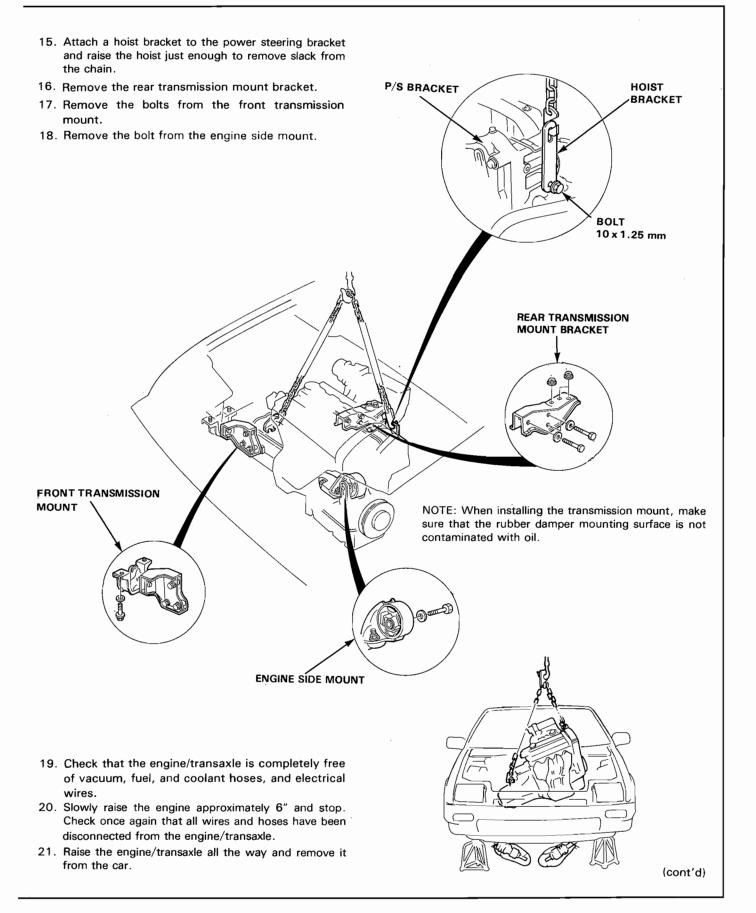
- Disconnect the alternator wire harness connectors.
- Remove the belt adjusting bolt and remove the belt.
- Remove the alternator mount bolt and remove the alternator.



# **Engine Removal/Installation**







# **Engine Removal/Installation**

### - (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.

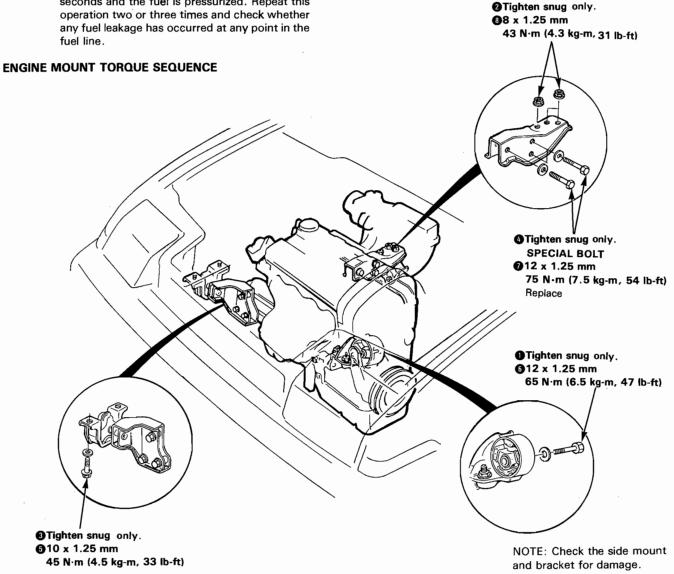
CAUTION: Failure to tighten the bolts in the proper sequence can cause excessive noise and vibration, and reduce bushing life: check that the bushings are not twisted or offset.

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

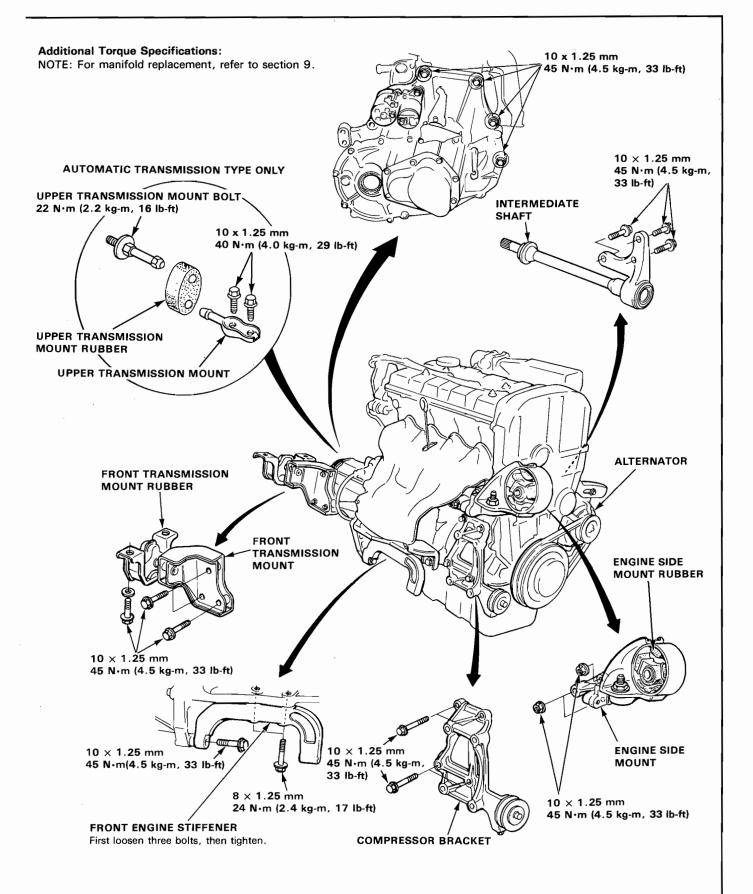
#### CAUTION: Use new spring clips on installation.

- Inspection for fuel leakage.
  - After assembling 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.







			A STATE OF THE STA

# Cylinder Head/Valve Train

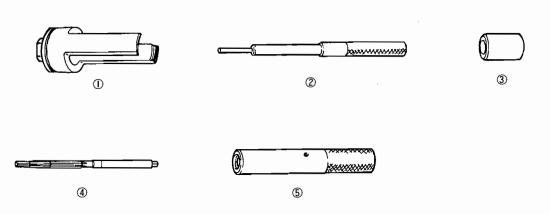
6-6
6-6
6-14
6-5
6-3
6-15
6-2
6-17
6-20
6-10
6-8
6-8
6-13



# **Special Tools**

- Special Tools -

Ref. No.	Tool Number	Description	Q'ty	Remarks
	07757—PJ1010A	Valve Spring Compressor Attachment	1	6-8
2	07942-6570100	Valve Guide Driver, 6.6 mm	1	6-11
3	07943-6890100	Valve Guide Driver Attachment	1	6-11
4	07984-657010B or 07984-657010C	Valve Guide Reamer, 6.6 mm	1	6-12
(5)	07GAD-PH70100	Valve Guide Seal Installer	1	6-13

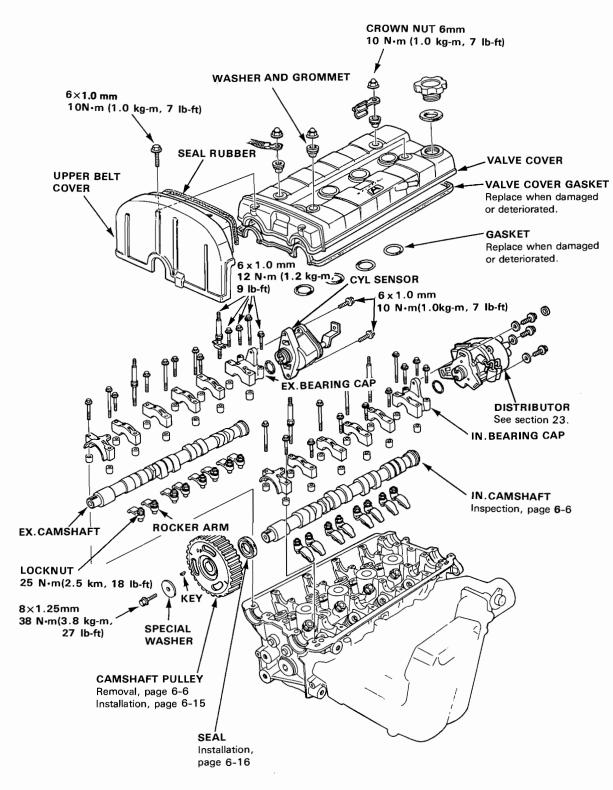


# Cylinder Head/Valve Train



### Illustrated Index-

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

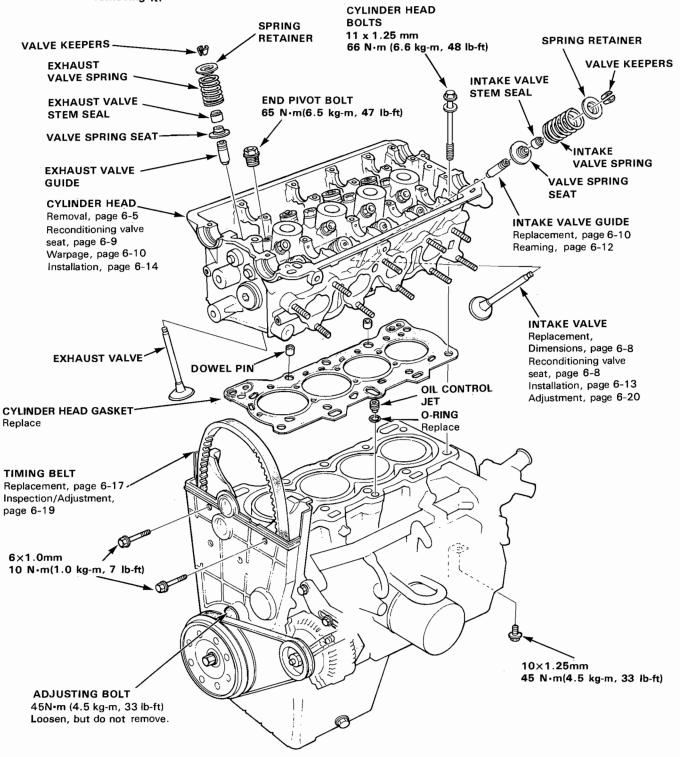


(cont'd)

# Cylinder Head/Valve Train

### Illustrated Index (cont'd)

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



# Cylinder Head



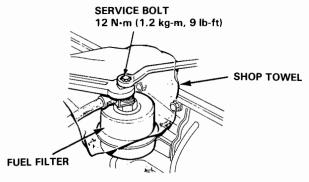
### Removal (engine removal not required) -

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 topdeadcenter (page 6-18).
- Mark all emissions hoses before disconnecting them.
- 1. Disconnect the negative terminal from the battery.
- 2. Drain the cooling system.
- Disconnect the air flow tube and vacuum tube (page 5-2).
- Remove the air cleaner cover.

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



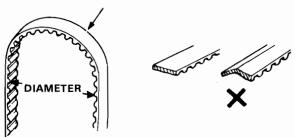
- Disconnect the fuel hose and fuel return hose (page 5-3).
- Remove the engine secondary ground cable from the valve cover.
- Remove the brake booster vacuum hose from the intake manifold.
- Disconnect the throttle cable at the throttle body (page 5-4).

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.

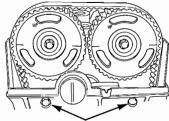
- Remove the spark plug caps from the spark plugs, then remove the distributor assembly.
- Disconnect the hoses from the charcoal canister.
- 11. Remove the emission control bracket.
  - Do not disconnect emission hoses.
- On cars equipped with air conditioning, disconnect the idle control solenoid hoses.
- 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
- TDC/Crankshaft angle sensor connector (distributor)
- EACV connector
- CYL sensor connector
- 14. Disconnect the oxygen sensor coupler.
- Disconnect the upper radiator hose, heater inlet hose, and bypass inlet hose from the cylinder head (page 5-6).
- Remove the hose between the thermostat housing and the intake manifold.
- Remove the bolts attaching the exhaust manifold and bracket.
- Remove the bolts attaching the intake manifold and bracket.
- Disconnect the hose from the intake manifold to the breather chamber.
- Remove the valve cover and the timing belt upper cover.
- Loosen the tensioner adjusting 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.



LOWER COVER BOLTS

- 23. Remove the camshaft holder bolts, then remove the camshaft holders and the camshafts and rocker arms.
- 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.

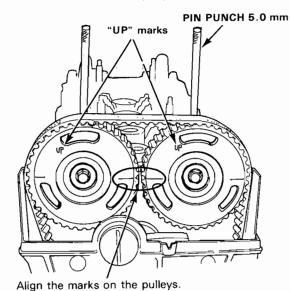
 Remove the exhaust manifold and intake manifold from the cylinder head.

# **Camshaft Pulleys**

### Removal-

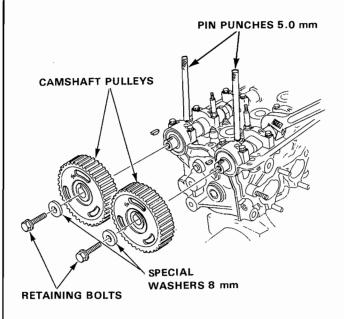
 To ease reassembly, turn the pulley until the "UP" marks face up, and the front timing marks are aligned with the both marks on the pulleys.

NOTE: To set the No.1 piston at TDC, align the holes on the camshafts with the holes in the No.1 camshaft holders and drive 5.0 mm pin punches in the holes.



Aligh 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.

# **Camshafts**

### Inspection

- 1. Loosen the adjusting screws.
- Loosen the bearing cap bolts and remove the rocker arms.

NOTE: Mark the rocker arms before removing them.

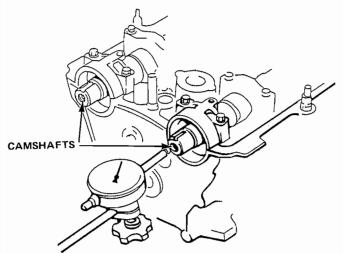
- Tighten the bearing cap bolts in a crisscross pattern, beginning with the inner bolts.
   10N·m (1.0 kg-m, 7 lb-ft)
- Seat the camshafts by pushing them toward the distributor end of the head with a screwdriver.
- Zero the dial indicator against the end of the distributor drive, push the camshafts back and forth and read the end play.

Camshaft End Play:

Standard (New): 0.05-0.15 mm

(0.002-0.006 in.)

Service Limit: 0.5 mm (0.02 in.)



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

#### NOTE:

- Unscrew the bearing cap bolts two turns at a time, in a crisscross pattern, to prevent damage to valves or rocker arms.
- Do not rotate the camshafts during inspection.
- Lift the camshafts out of the cylinder head, wipe clean, then inspect lift ramps. Replace the camshafts if any 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.

NOTE: Replace the rocker arms in their original position.



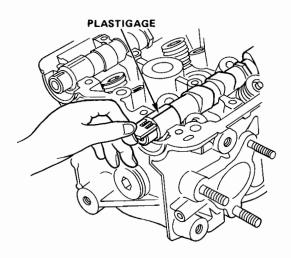
7. Measure widest portion of plastigage on each journal.

Camshaft Bearing Radial Clearance: Standard (New): 0.050-0.089 mm

(0.002-0.004 in.)

Service Limit:

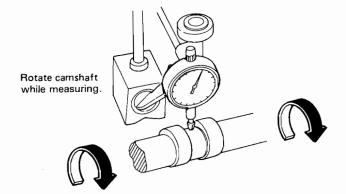
0.15 mm (0.006 in.)



- 8. 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.)



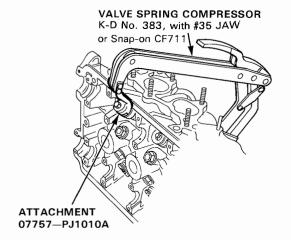
- If the total runout of the camphaft is within tolerance, replace the cylinder head.
- If the total runout is out of tolerance, replace the camshaft and recheck. If the bearing clearance is still out of tolerance, replace the cylinder head.

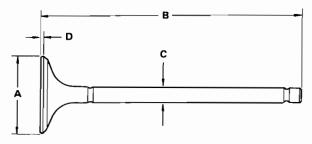
### **Valves**

## - Replacement -

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

- Tap each valve stem with a plastic mallet to loosen valve keepers before installing spring compressor.
- 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.)

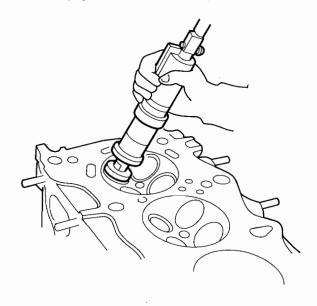
D Service Limit: 1.45mm (0.057 in.)

## Valve Seats

## -Reconditioning

 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.

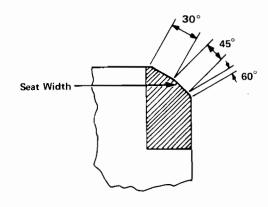


- Carefully grind a 45° seat, removing only enough material to ensure a smooth and concentric seat.
- Bevel the upper edge of seat with the 30° stone and the lower edge of seat with the 60° stone. Check width of seat and adjust accordingly.
- Make one more very light pass with the 45° stone to remove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

Valve Seat Width:

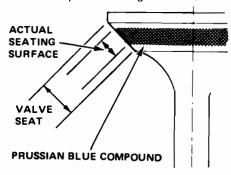
Standard: 1.25-1.55 mm (0.049-0.061 in.)

Service Limit: 2.0 mm (0.08 in.)





 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.



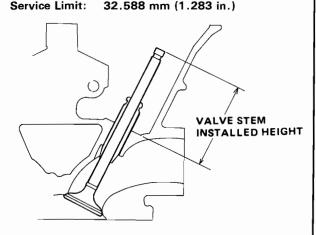
- The actual valve seating surface, as shown by the blue compound, should be centered on the seat.
  - If it is too high (closer to the valve stem), you must make a second grind with the 60° stone to move it down, then one more grind with the 45° stone to restore seat width.
  - If it is too low (closer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

NOTE: The final cut should always be made with the  $45^{\circ}$  stone.

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

Intake Valve Stem Installed Height:

Standard(New): 32.195 mm (1.268 in.) Service Limit: 32.985 mm (1.299 in.) Exhaust Valve Stem Installed Height: Standard(New): 31.798 mm (1.252 in.)



 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

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

Intake Valve Stem-to-Guide Clearance:

Standard (New): 0.04-0.10 mm

(0.002-0.004 in.)

Service Limit: 0.16 mm (0.006 in.)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.10-0.16 mm

(0.004-0.006 in.)

Service Limit: 0.22 mm (0.009 in.)

Valve extended 10 mm out from seat.



- If measurement exceeds the service limit, recheck using 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: 0.11mm (0.004 in.)

# **Cylinder Head**

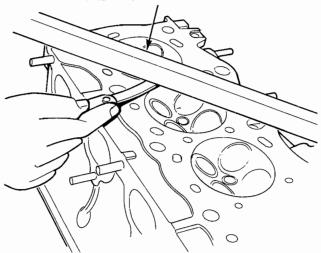
### -Warpage-

NOTE: If camshaft bearing clearances (page 6-7) 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.)

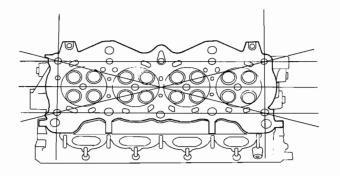
#### PRECISION STRAIGHT EDGE



#### Cylinder Head Height:

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

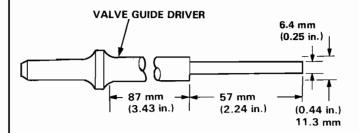
Measure along edges, and 3 ways across center.



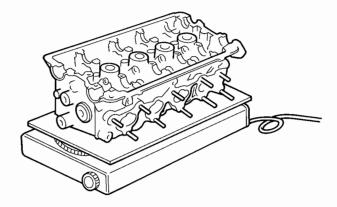
## Valve Guides

### Replacement-

 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 special tool and a conventional hammer. See tool numbers at the end of this procedure.



- Select the proper replacement guides and chill them in the freezer section of a refrigerator for about an hour.
- Use a hot plate or oven to evenly heat the cylinder head to 150°C (300°F). Check temperature with a cooking thermometer.



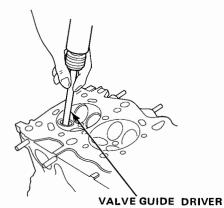
#### CAUTION:

- 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. First use the driver 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:**

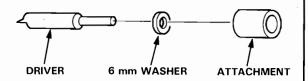
- Always wear safety goggles or a face shield when using the air hammer.
- Hold the air hammer directly in line with the valve guide to prevent damaging the driver.
- Turn the head over and drive out the guide toward the camshaft side of head.

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

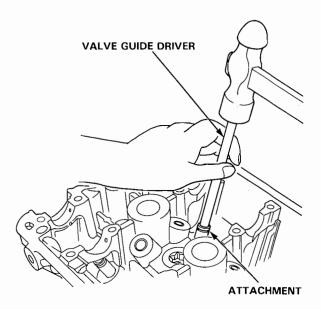
CAUTION: Drill guides only in extreme cases: you could damage the cylinder head if the guide breaks.

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

 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).



 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 more times.



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

#### Removal

VALVE GUIDE DRIVER, 6.6 mm 07942—6570100

Installation

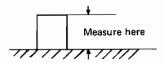
VALVE GUIDE DRIVER, 6.6 mm 07942-6570100

VALVE GUIDE DRIVER ATTACHMENT 07943-6890100

Intake: 19.4mm (0.76 in.)

Exhaust: 19.0mm (0.75 in.)

Exhaust. 19.0000 (0.75 01.)

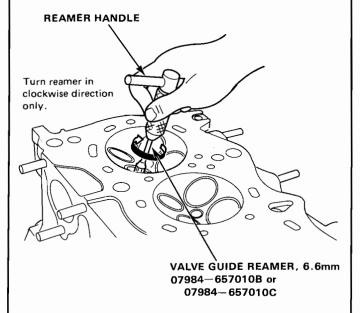


# Valve Guides

# Valve Guide Reaming

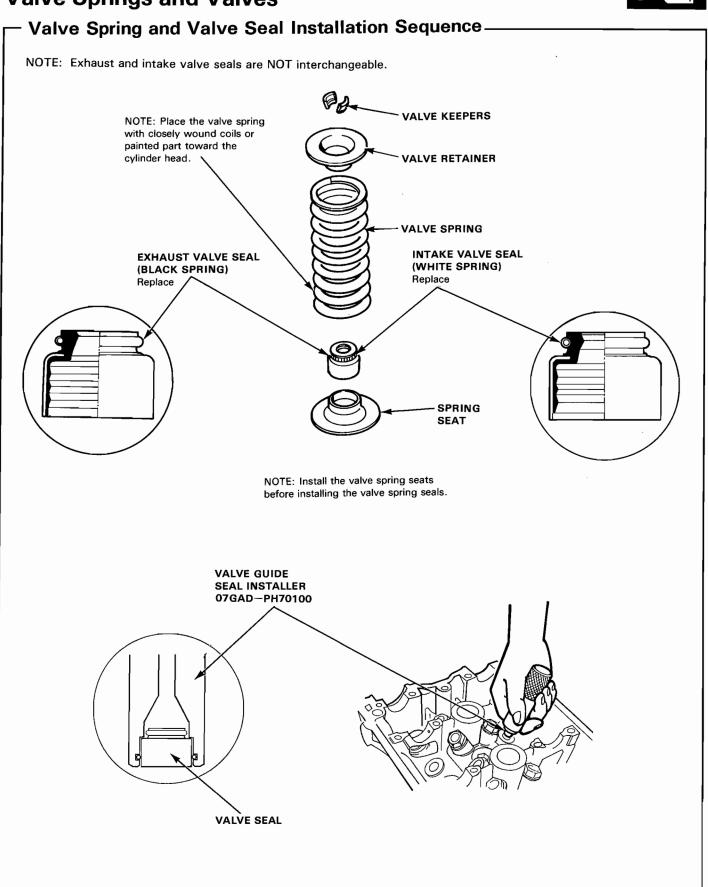
NOTE: For new valve guides only.

- 1. Coat reamer and valve guide with cutting oil.
- 2. Rotate reamer clockwise the full length of the valve guide bore.
- 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 Springs and Valves**



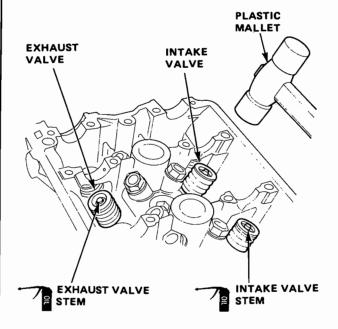


# **Valves**

### - 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.

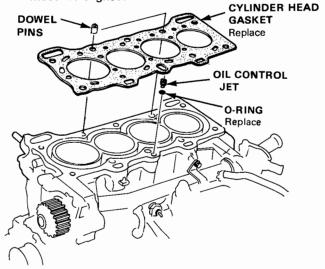
When valves and springs are in place, lightly tap the end of each valve stem two or three times to ensure proper seating of valve and valve keepers (use plastic mallet).



# Cylinder Head

### -Installation -

- Install the cylinder head in the reverse order of removal:
  - Always use a new head gasket.
  - Cylinder head and engine block surface must be clean.
  - "'UP" mark on timing belt pulley should be at the top.
- 2. Cylinder head dowel pins and oil control jet must be aligned.

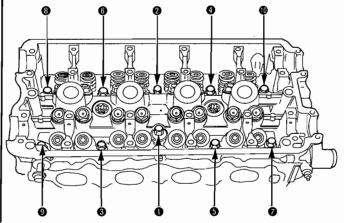


 Tighten cylinder head bolts in two steps. In the first step tighten all bolts, in sequence, to about 30 N·m (3.0 kg-m, 22 lb-ft); in the final step tighten, in same sequence, to 66 N·m (6.6 kg-m, 48 lb-ft)

#### NOTE

- Apply engine oil to the cylinder head bolts and the washers.
- Use the longer bolt at the position No.9 as shown.

#### CYLINDER HEAD BOLTS TORQUE SEQUENCE

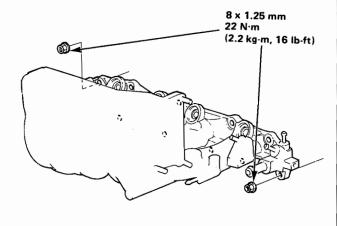


NOTE: Put longer bolt here.

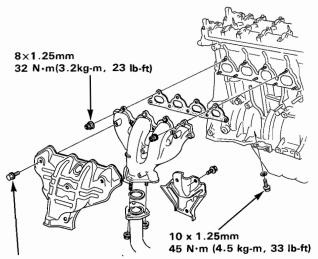
# Rocker Arms/Camshafts and Seals/Pulleys



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



5. Install the exhaust manifold and bracket.

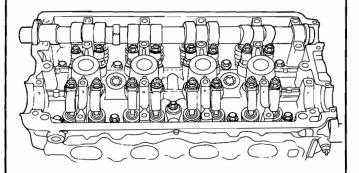


8 x 1.25 mm 24 N·m (2.4 kg-m, 17 lb-ft)

# Installation -

#### **CAUTION:**

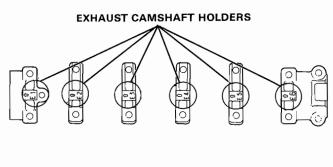
- Make sure that the keyways on the camshafts are facing up. (NO.1 cylinder TDC).
- Valve locknuts should be loosened and adjusting screws backed off before installation.
- Replace the rocker arms in their original positions
- Place the rocker arms on the pivot bolts and the valve stems

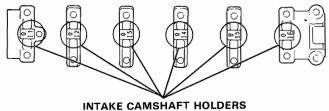


Install the camshafts and the camshaft seals with the open side (spring) facing in.

#### NOTE

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



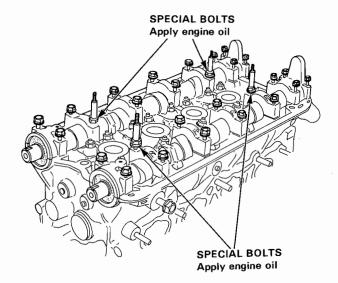


(cont'd)

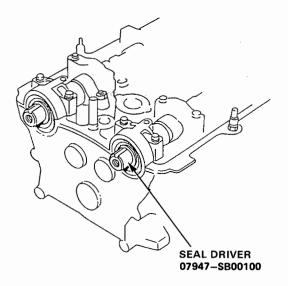
# Rocker Arms/Camshafts and Seals/Pulleys

## Installation (cont'd) -

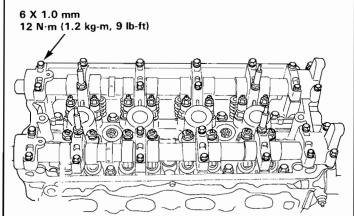
- Apply liquid gasket to the head mating surfaces of the No.1 and No.6 camshaft holders then install them, along with the No.2. 3. 4 and 5.
- 4. Tighten the camshaft holders temporarily.
  - Make sure that the rocker arms are properly positioned on the valve stems.



5. Press in the camshaft seal securely.

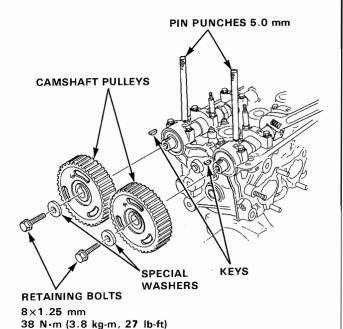


Tighten each bolt two turns at a time in the sequence shown below to insure that the rockers do not bind on the valves.



7. Install keys into grooves in camshafts.

NOTE: To set the No.1 piston at TDC, align the holes on the camshafts with the holes in No.1 camshaft holders and drive 5.0 mm pin punches in the holes.



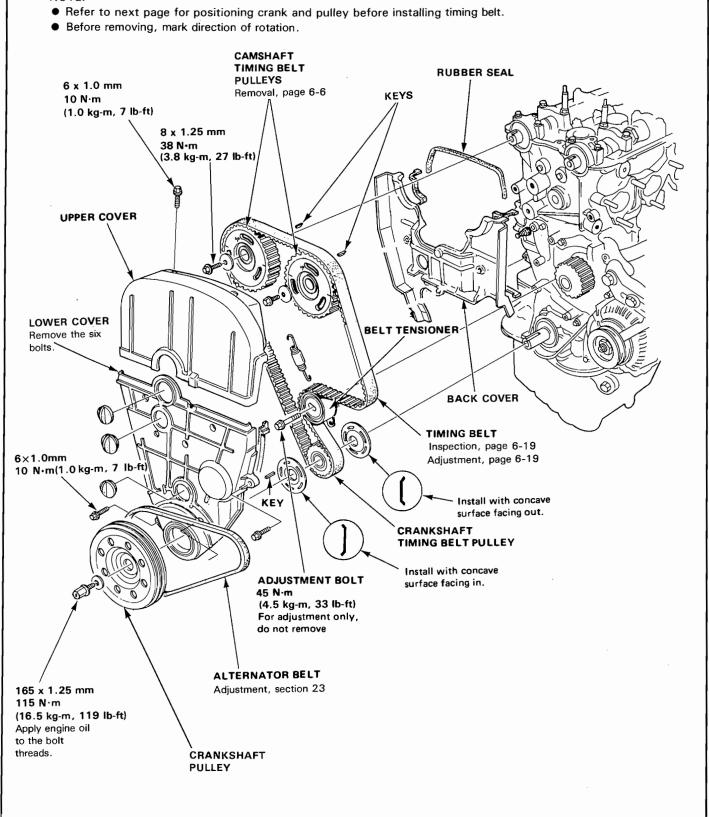
- 8. Push camshaft pulleys onto camshafts, then tighten retaining bolts to torque shown.
- 9. Adjust the valve timing (page 6-18).
- After the installation, check that the all tubes, hoses and connectors are installed correctly.

# **Timing Belt**

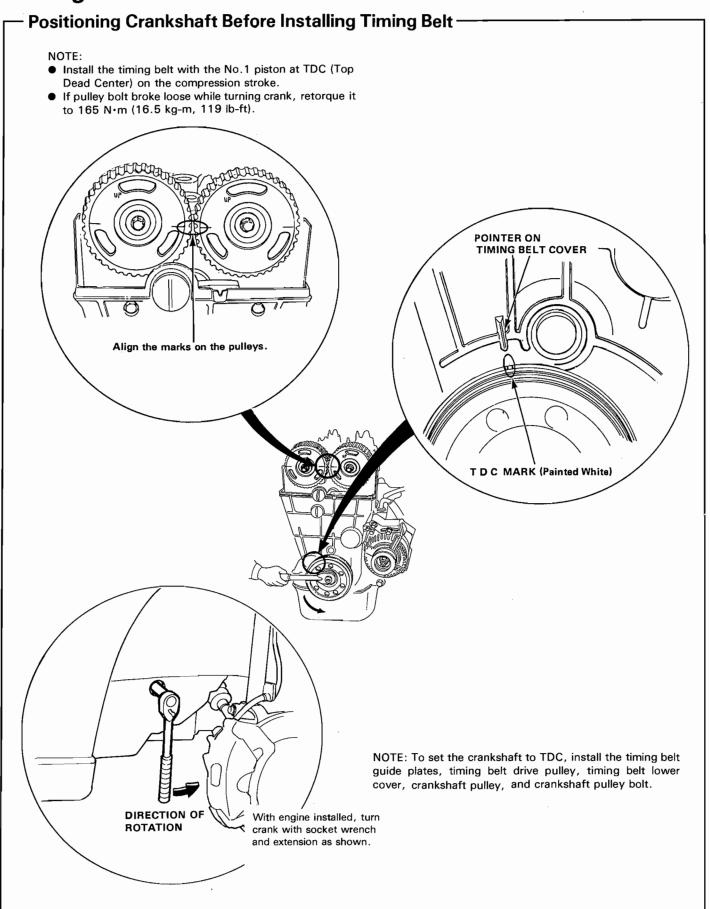


# Replacement

#### NOTE:



# **Timing Belt**



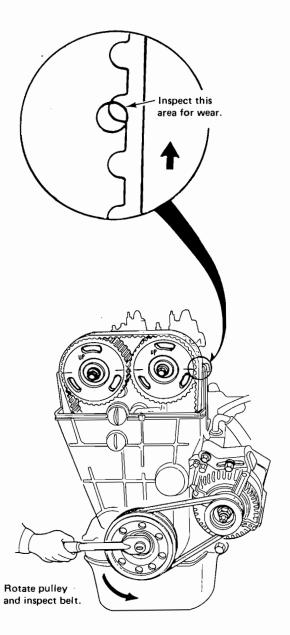
# **Timing Belt**



### Inspection –

#### NOTE:

- Replace belt if oil soaked.
- Remove any oil or solvent that gets on the belt.
- If pulley bolt broke loose while turning crank.
   retorque it to 165 N·m (16.5 kg-m, 119 lb-ft).

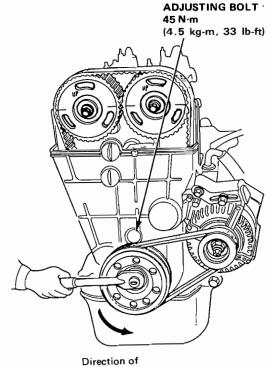


### - Tension Adjustment -

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:
- Inspect the timing belt before belt tension adjustment.
- 1. Set the No. 1 piston at TDC.
- Loosen, but do not remove, the adjusting bolt.



Direction of Rotation.

- 3. Rotate crankshaft counterclockwise 3-teeth on camshaft pulley to create tension on timing belt.
- 4. Tighten adjusting bolt.
- If pulley bolt broke loose while turning crank, retorque it to 165 N·m (16.5 kg-m, 119 lb-ft).

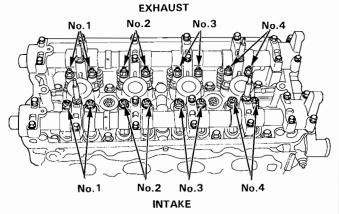
NOTE: Put transmission in gear and set parking brake before retorquing pulley bolt.

## Valve Clearance

## - Adjustment -

NOTE:

- Valves should be adjusted cold when the cylinder head temperature is less than 38°C (100°F).
   Adjusting is the same for intake and exhaust valves.
- If pulley bolt broke loose while turning crank, retorque it to 165 N·m (16.5 kg-m, 119 kg-m).
- 1. Remove the valve cover.



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

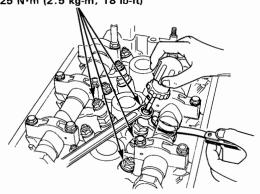
Number 1 Piston at TDC TDC GROOVES UPPER MARK
"UP" MARK

3. Adjust valves on No. 1 cylinder.

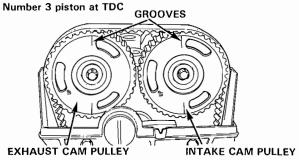
Intake: 0.13 — 0.17mm(0.0051 — 0.0067in.) Exhaust: 0.15 — 0.19mm(0.0059 — 0.0075in.)

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

LOCKNUTS 7 x 0.75 mm 25 N·m (2.5 kg-m, 18 lb-ft)

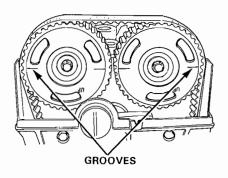


- Tighten locknut and check clearance again. Repeat adjusting if necessary.
- 6. Rotate crankshaft 180° counterclockwise (cam pulley turns 90°). The "UP" marks should be at exhaust side. Distributor rotor should point to No. 3 plug wire. Adjust valves on No. 3 cylinder.

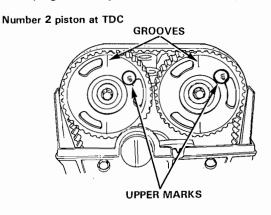


7. Rotate crankshaft 180° counterclockwise to bring No. 4 piston to TDC. Both "UP" marks should be at bottom and distributor rotor points to No. 4 plug wire. Adjust valves on No. 4 cylinder.

Number 4 piston at TDC



 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.



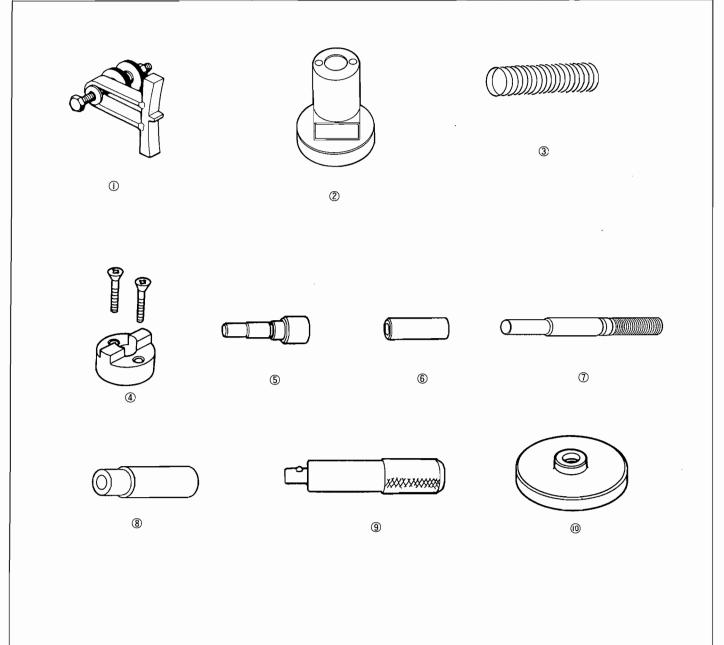
# **Engine Block**

Crankshaft/Pistons	7-8
Cylinder Block	7 – 11
Flywheel and Drive Plate	7-5
Illustrated Index	7-3
Oil Seal	7 – 17
Piston Pins	7 – 12
Piston Rings	7 – 15
Rod and Main Bearings	7-6
Special Tools	7-2



# **Special Tools**

— Special Tools ———————————————————————————————————					
Ref. No.	Tool Number	Description	Qʻty	Remarks	
①	07924—PD20003 or 07924—PD20002	Ring Gear Holder	1	7—5	
2	07973-6570500	Piston Base	1	7—12	
3	07973-6570600	Piston Base Spring	1	7—12	
4	07973-SB00100	Piston Base Head	1	7—12, 7—13	
(5)	07973-PE00400	Piston Pin Base Insert	1	7—12, 7—13	
6	07973-PE00200	Pilot Collar	1	7—12, 7—13	
7	07973-PE00310	Piston Pin Driver Shaft	1	7—12, 7—13	
8	07973-PE00320	Piston Pin Driver Head	1	7—12, 7—13	
9	07949-0010000	Driver	1	7—16	
(1)	07948-SB00101	Driver Attachment	1	7—16	



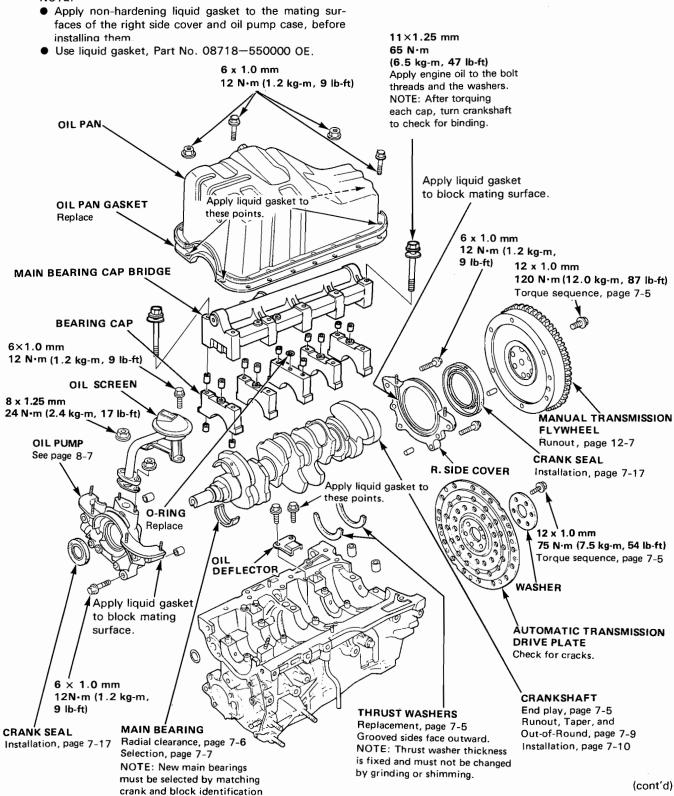
# **Engine Block**

### **Illustrated Index**

Lubricate all internal parts with engine oil during reassembly.

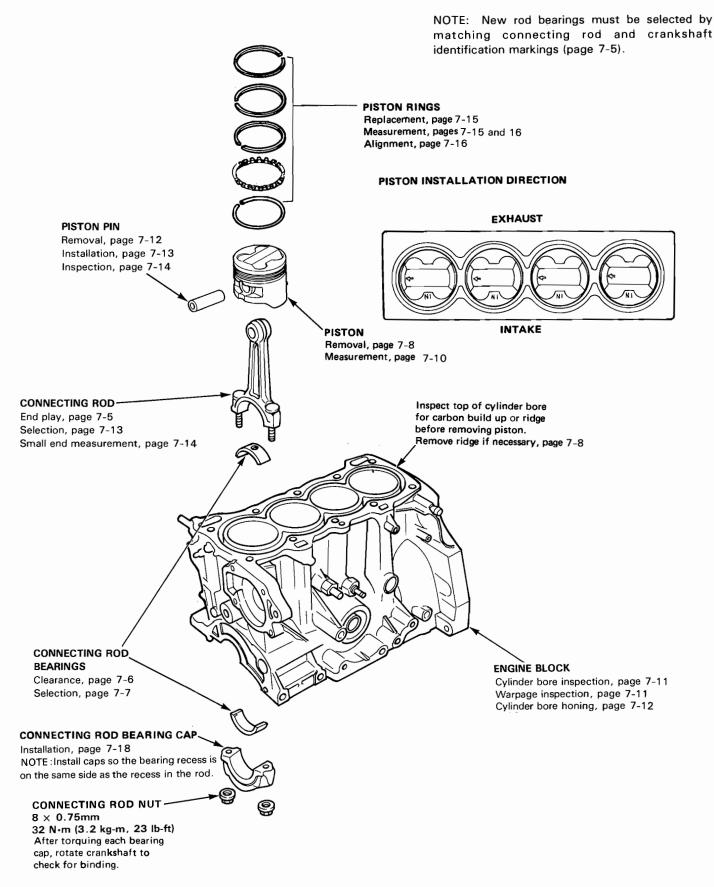
markings.

#### NOTE:



# **Engine Block**

# Illustrated Index (cont'd)

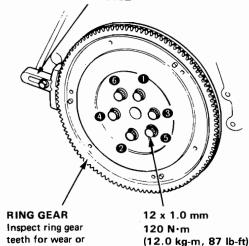


# Flywheel and Drive Plate

# 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.

RING GEAR HOLDER 07924—PD20003 or 07924—PD20002



# Connecting Rod and Crankshaft



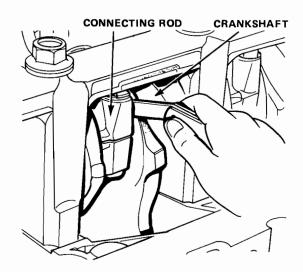
## **Connecting Rod End Play**

Standard (New): 0.15-0.30 mm

(0.006 - 0.012 in.)

Service Limit:

0.40 mm (0.016 in.)

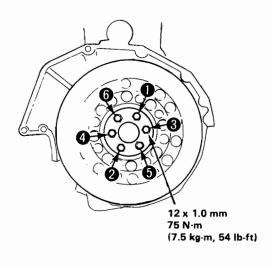


- If out of tolerance, install new connecting rod.
- If still out of tolerance, replace crankshaft (pages 7-8 and 7-18).

# **Drive Plate Replacement** (Automatic Transmission)

damage.

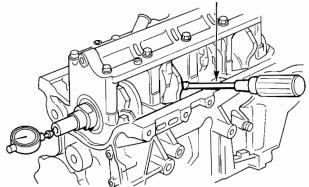
Remove the six drive plate bolts, then separate the drive plate from the crankshaft flange. After installation, tighten the bolts in the sequence shown.



# 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.

SCREWDRIVER



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 Bearings**

### Clearance -

- 1. To check main bearing clearance, remove the main cap and bearing halves.
- 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.

- Reinstall the bearings, caps and cap bridge, then torque the bolts to 65 N·m (6.5 kg-m, 47 lb-ft).
  - NOTE: Do not rotate the crank during inspection.
- Remove the cap and bearings again, and measure the widest part of the plastigage.

#### Main Bearing Clearance: Standard (New):

No.1, 5:

0.018-0.036 mm

(0.007-0.0014 in.)

No.2, 4:

0.024-0.042 mm

(0.0009-0.0017 in.) 0.030-0.048 mm

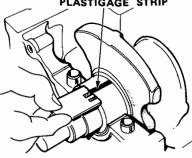
No.3:

(0.0012-0.0019 in.)

Service Limit:

0.05 mm (0.002 in.)

PLASTIGAGE STRIP



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 Bearings**

### Clearance -

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

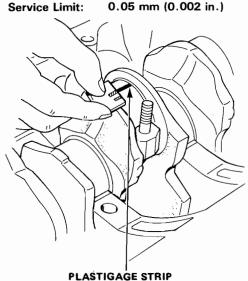
Remove the rod cap and bearing half and measure the widest part of the plastigage.

Connecting Rod Bearing Clearance:

Standard (New): 0.020-0.038 mm

(0.0008-0.0015 in.)

0.05 mm (0.002 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.

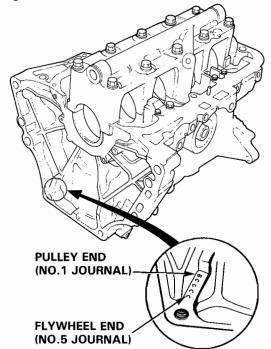
NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crank and start over.

# **Main Bearings**

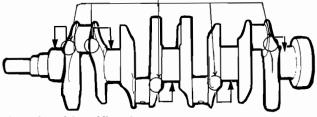
### Selection -

#### 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.

Α	В	С	D	
Smaller bearing (thicker				
Red	Pink	Yellow	Green	
Pink	Yellow	Green	Brown	
Yellow	Green	Brown	Black	

Brown

Larger crank bore

1	
2	
3	
4	
	3

Smaller main journal

Smaller bearing (thicker)

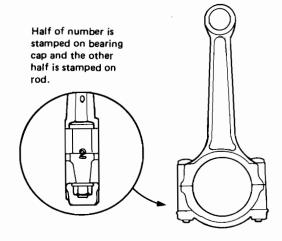
# **Rod Bearings**



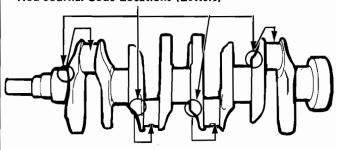
### Selection-

#### **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)**

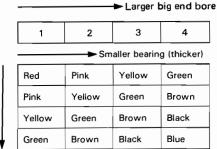


### **Bearing Identification**

В

C

Color code is on the edge of the bearing.



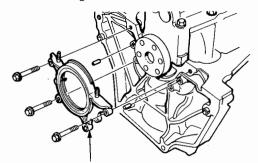
♥ Smaller rod journal

Smaller bearing (thicker)

# Crankshaft/Pistons

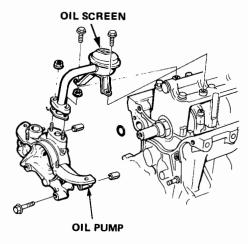
### Removal -

Remove the right side cover.

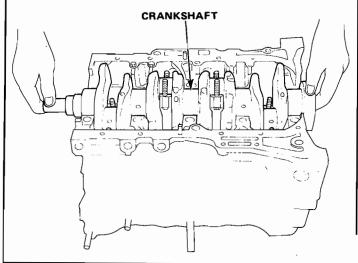


**RIGHT SIDE COVER** 

2. Remove the oil screen.

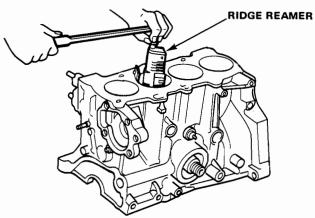


- 3. Remove the oil pump.
- Turn the crankshaft so No. 2 and 3 crankpins are at the bottom.
- Remove the bearing cap bridge, the rod caps/bearings and main caps/bearings. Keep all caps/bearings in order.
- Lift the crankshaft out of engine, being careful not to damage journals.

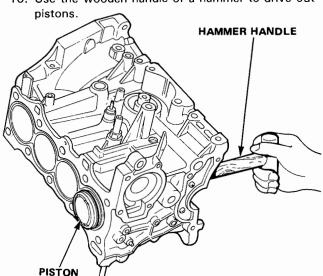


- 7. Remove upper bearing halves from connecting rods and set aside with their respective caps.
- Reinstall main cap and bearings on engine in proper order.
- If you can feel a ridge of metal or hard carbon around the top of each cylinder, remove it with a ridge reamer. Follow reamer manufacturer's instructions.

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



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

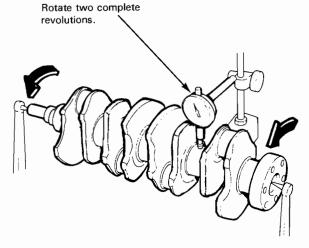
- Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
- Check the keyway and threads.

### **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 (0.002 in.)

#### **DIAL INDICATOR**



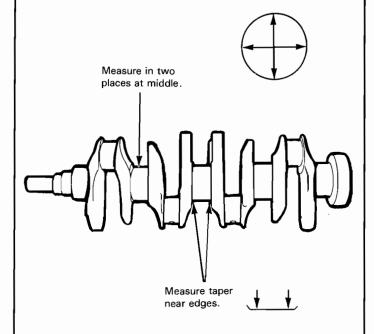
Support with lathetype tool or V-blocks.

### **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:

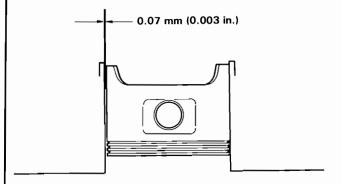
Standard (New): 0.005 mm (0.0002 in.) Service Limit: 0.010 mm (0.0004 in.)

# **Pistons**

### Piston-to-Block Clearance-

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 7-11 and piston diameter.

Piston-to-Cylinder Clearance: Standard (New): 0.01 - 0.06 mm

(0.0004-0.0024 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.

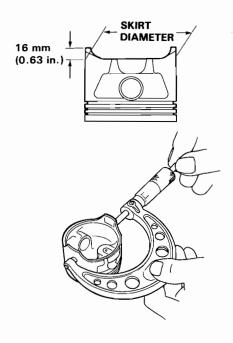
2. Measure piston diameter at a point 16 mm (0.63 in.) from bottom of skirt.

Piston Diameter:

Standard (New): 74.98-74.99 mm

(2.9520-2.9524 in.)

74.97 mm (2.952 in.) Service Limit:



Oversize Piston Diameter:

0.25: 75.23-75.24 mm (2.9618-2.9622 in.) 0.50: 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:

Standard (New): 0.010-0.040 mm

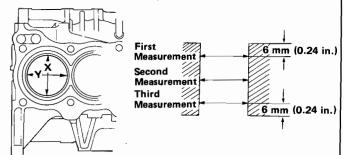
(0.0004-0.0016 in.)

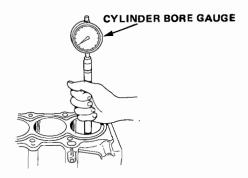
## Cylinder Block



## Inspection -

 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 (2.956 in.)

Oversize:

0.25: 75.25-75.27 mm (2.9626-2.9634 in.) 0.50: 75.50-75.57 mm (2.9724-2.9752 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 (page7-10) after reboring.

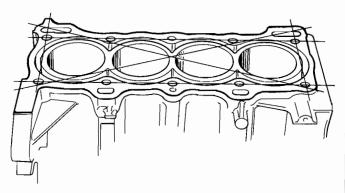
NOTE: Scored or scratched cylinder bores must be honed.

Out-of-Round:

Reboring Limit: 0.50 mm (0.02 in.)

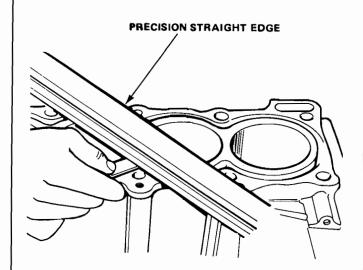
Check the top of the block for warpage. Measure along the edges and across the center as shown.

#### SURFACES TO BE MEASURED



Engine Block Warpage:

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

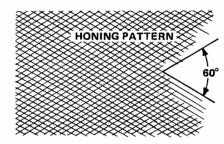


## Cylinder Bore Honing -

- Measure cylinder bores as shown on page 7-11. If the block can be re-used, hone the cylinders, and remeasure the bores.
- Hone cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree cross-hatch pattern.

#### NOTE:

- Use only a rigid hone with 400 grit or finer stone such as Sunnen, Ammco, or equivalent.
- Do not use stones that are worn or broken.

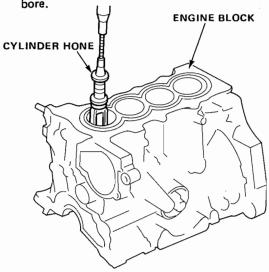


 When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil immediately to prevent rusting.

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

 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.



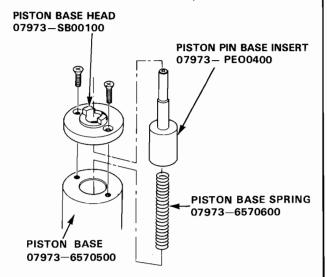
#### NOTE:

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

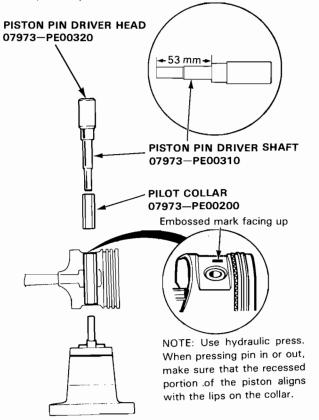
## **Piston Pins**

#### Removal-

1. Install the attachment on the piston base.



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



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

## **Connecting Rods**

#### Selection -

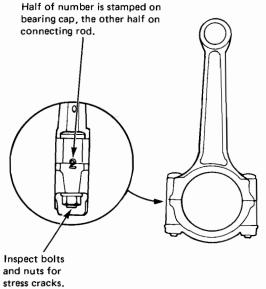
Each rod sorted into one of four tolerance ranges (from 0 to  $\pm$ 0.024 mm, in 0.006 mm increments) depending on the size of its big end bore. It's then stamped with a number (1, 2, 3, or 4) indicating that tolerance. You may find any combination of 1, 2, 3, or 4 in any engine.

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.

## CONNECTING ROD BORE REFERENCE NUMBER

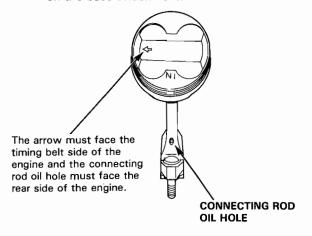


## **Piston Pins**

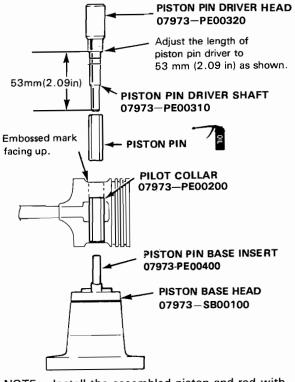


#### Installation -

- 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.



- Adjust the length B of piston pin driver.
   53.0 mm (2.09 in.)
  - When pressing the center-narrowed piston pin into the piston using a piston pin driver, the piston pin may not be in the center of the piston.
     In that case, if necessary, re-adjust the piston pin until it seats in the center of the piston.



## **Piston Pins**

## Inspection-

1. Measure the diameter of the piston pin.

Piston Pin Diameter:

Standard (New): 18.994-19.0 mm

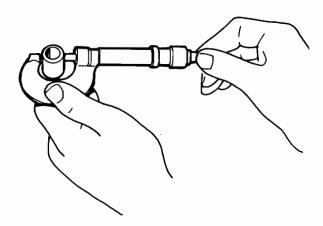
(0.7478-0.7480 in.)

Oversize:

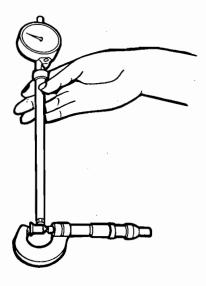
18.997-19.003 mm

(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.

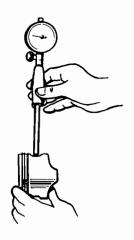
If the piston pin clearance is greater than 0.022 mm (0.0009 in.), re-measure using an oversize piston pin.

Piston Pin-to-Piston Clearance:

Service Limit:

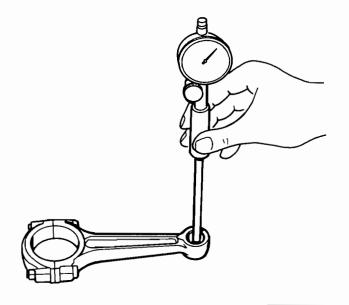
0.010-0.022 mm

(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 Rings**



#### End Gap -

- Using a piston, push a new ring into the cylinder bore 15-20 mm (0.6-0.8 in.) from the bottom.
- 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 7-10.
     If the bore is over limit, the engine block must be rebored.

Piston Ring End-Gap:

Top Ring

Standard (New): 0.15-0.30 mm

(0.006-0.012 in.)

Service Limit: 0.06 mm (0.02 in.)

Second Ring

Standard (New): 0.30-0.45 mm

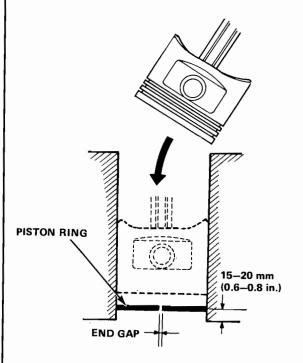
(0.012-0.018 in.)

Service Limit: 0.60 mm (0.02 in.)

Oil Ring

Standard (New): 0.2-0.7 mm (0.008-0.028 in.)

Service Limit: 0.8 mm (0.03 in.)



#### Replacement -

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

#### NOTE:

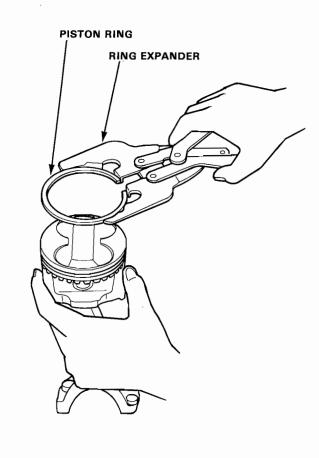
- Use a squared-off broken ring or ring groove cleaner with blade to fit piston grooves.
- Top ring groove is 1.2 mm wide, second groove is 1.5 mm wide, and oil ring groove is 2.8 mm wide.
- File down blade if necessary.

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 7-16).

NOTE: Do not re-use old piston rings.



## **Piston Rings**

## **Ring Land Clearances -**

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

Top Ring Clearance:

Standard (Nèw): 0.03-0.06 mm

(0.0012-0.0024 in.)

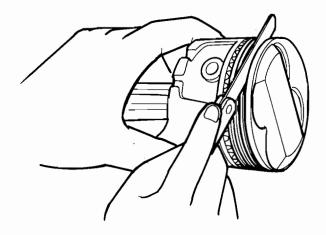
Service Limit: 0.13 mm (0.005 in.)

Second Ring Clearance:

Standard (New): 0.030-0.055 mm

(0.0012-0.0022 in.)

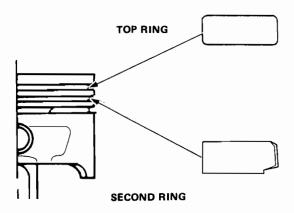
Service Limit: 0.13 mm (0.005 in.)



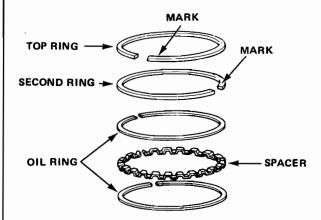
#### Alignment -

1. Install the rings as shown on page 7-15.

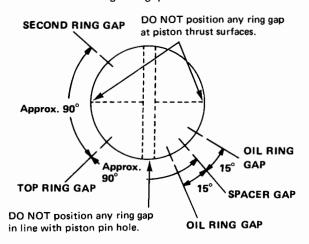
Identify top and second rings by the chamfer on the edge, and make sure they are in proper grooves on piston.



- 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:



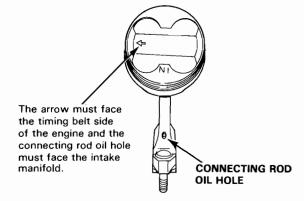
## **Pistons**

#### Installation -

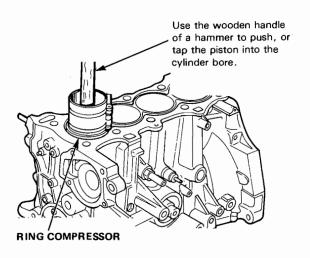


Before installing the piston, apply a coat of engine oil to the ring grooves and cylinder bores.

- 1. If the crankshaft is already installed:
  - Remove the connecting rod caps, 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

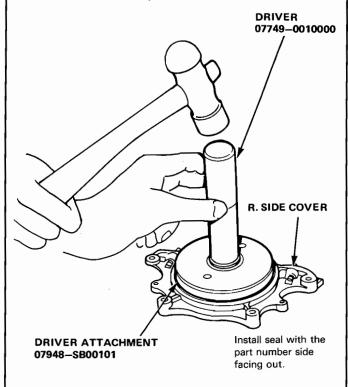


#### Installation-



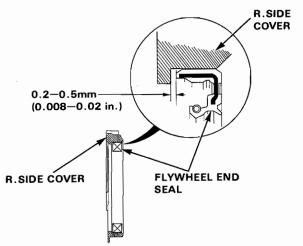
The seal surface on the block should be dry. Apply a light coat of oil to the crankshaft and to the lip of seal.

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



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

Clearance: 0.2-0.5 mm (0.008-0.02 in.)



NOTE: Refer to page 8-8 for steps on the oil pump side oil seal.

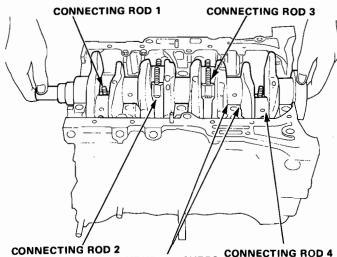
## Crankshaft

#### Installation

/<sub>QE</sub>

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

- Insert bearing halves in the engine block and connecting rods.
- Hold the crankshaft so rod journals for cylinder No.
   and No. 3 are straight down.
- 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.



THRUST WASHERS

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.

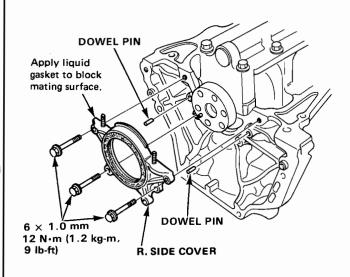
Torque the connecting rod capnuts. 32 N·m (3.2 kg-m, 23 lb-ft).

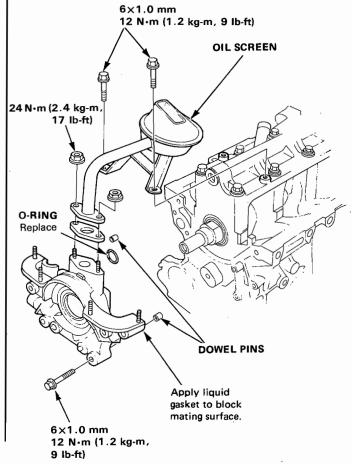
NOTE: Reference numbers on connecting rod are for big-end bore tolerance and do NOT indicate the position of piston in engine.

 Install the thrust washers, main bearing halves, caps and cap bridge check clearance with plastigage (page 7-6), then torque the nuts to 65 N·m (6.5 kg-m, 47 lb-ft). Oil thrust washer surfaces.

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.

 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.



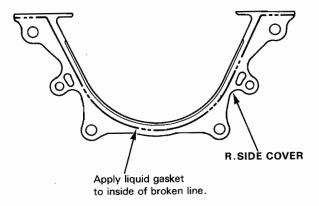




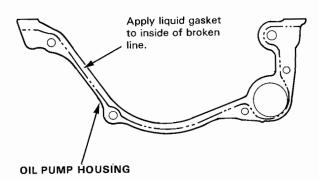
#### NOTE:

- Use liquid gasket, Part No. 08718-550000 OE.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket by starting with an even bead, 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 install the parts if 20 minutes or more have elapsed since applying liquid gasket. In that case, reapply liquid gasket after removing old residue.
- After assembly, wait at least 30 minutes before filling the engine oil.

#### R.side cover side:



#### Oil pump side:



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

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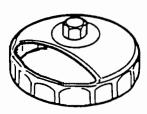
# **Engine Lubrication**

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



# **Special Tools**

Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07912—6110001	Oil Filter Socket	1	85
②	07HAD—PJ70100	Seal Driver		88







2

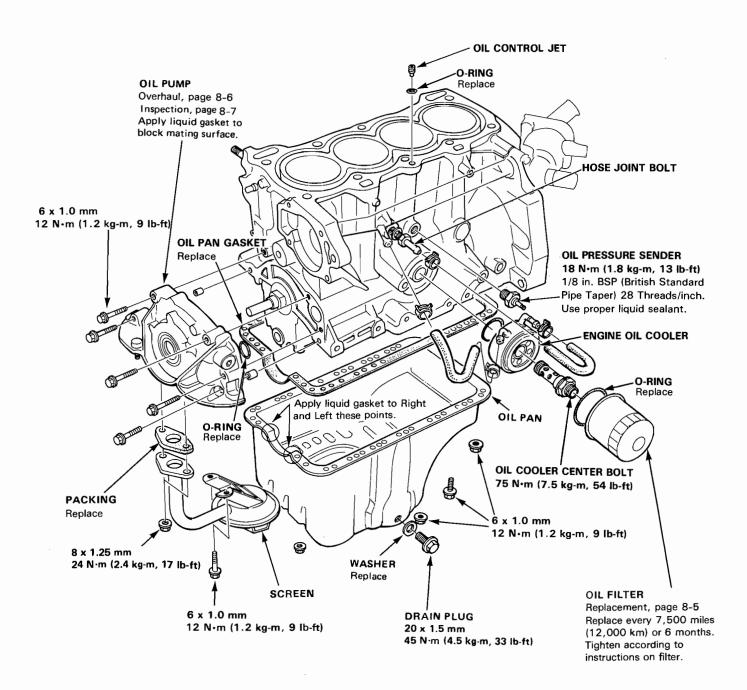
## **Engine Lubrication**



#### Illustrated Index-

#### NOTE:

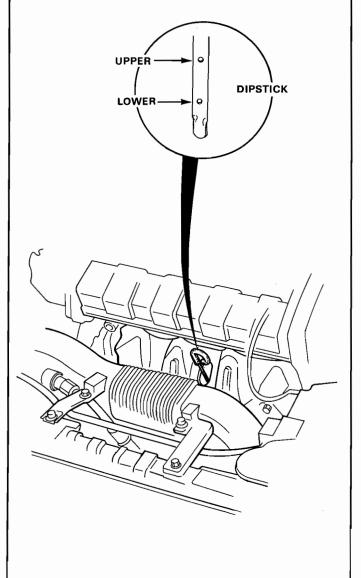
- Use new O-rings whenever reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 08718-550000 OE.



## **Engine Oil**

## Level Inspection -

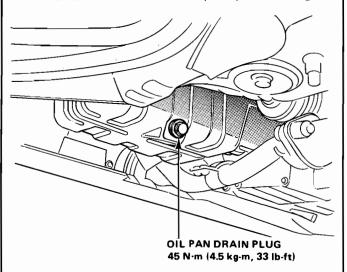
- Check engine oil with the engine off and the car parked on level ground.
- Make certain that the oil level indicated on the dipstick is between the upper and lower marks.
- If the level has dropped close to the lower mark, add oil until it reaches the upper mark.



## - Replacement –

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

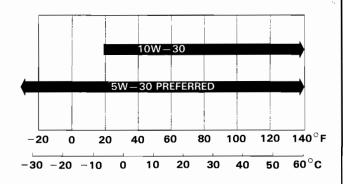
NOTE: Remove the filler cap to speed draining.



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

Requirement	"Fuel Efficient" SF or SG
Capacity	3.3 lit (3.5 US qt., 2.9 lmp. qt.) Excluding oil filter 3.8 lit (4.0 US qt., 3.3 lmp. qt.) Adding replace oil filter 4.3 lit (4.5 US qt., 3.8 lmp. qt.) Means designed value
Change	Every 7,500 miles (12,000 km) or 6 month

**Engine Oil Viscosity for Outside Temperature Ranges** 



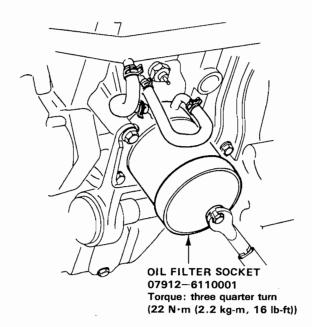
NOTE: Oil filter should be replaced at each oil change.

## Oil Filter

#### - Replacement -

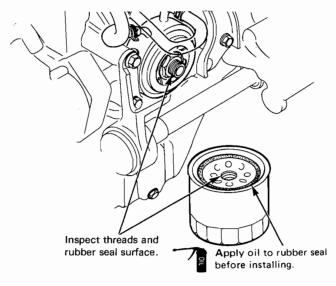
CAUTION: After the engine has been run, the exhaust pipes will be hot; be careful when working around the exhaust manifold.

1. Remove the oil filter with the special tool as shown.



- Inspect the threads and rubber seal on the new filter. Wipe off seat on engine block, then apply a light coat of oil to rubber seal, and install filter.
- After the rubber seal is seated, tighten the oil filter by turning approximately three quarter turn.

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



4. Start the engine and check the filter for oil leakage.

## Oil Pressure



#### -Test-

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

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

Engine Oil Pressure: 80°C (176°F)

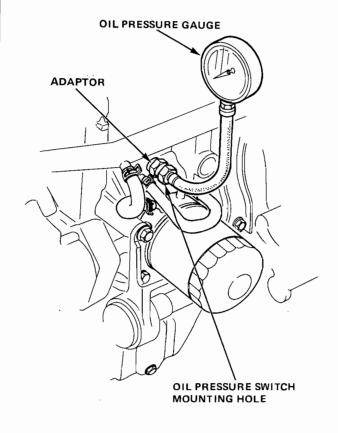
At Idle: 69 kPa (0.7 kg/cm<sup>2</sup>, 10 psi)

minimum

At 3,000 rpm: 343 kPa (3.5 kg/cm<sup>2</sup>, 50 psi)

minimum

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

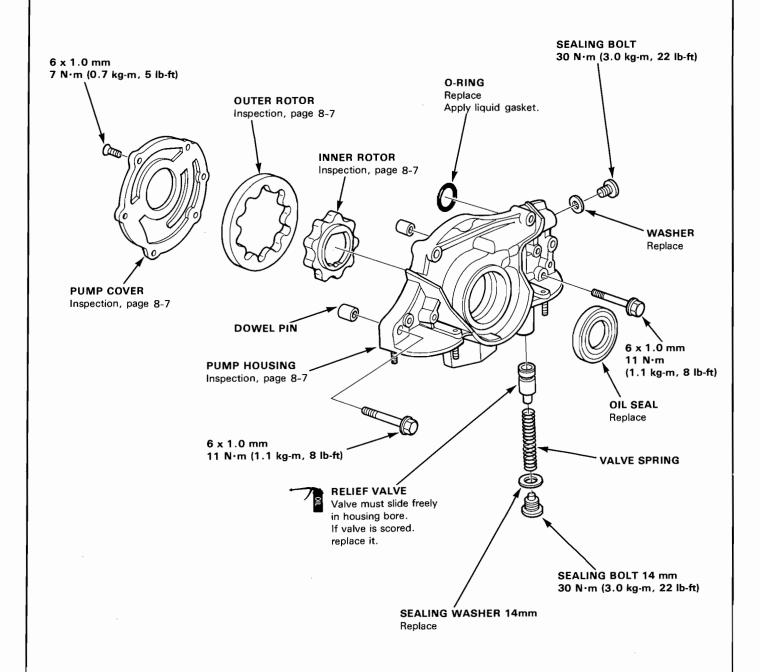


## Oil Pump

## - Overhaul

#### NOTE:

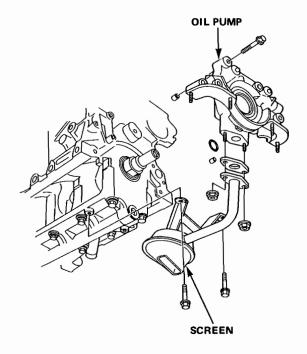
- Use new O-rings when reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 08718-550000 OE.





## Removal/Inspection -

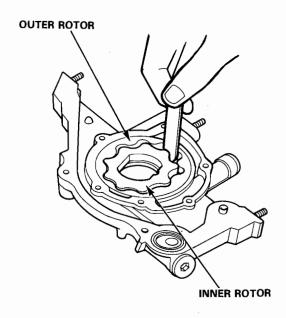
- 1. Drain the engine oil.
- 2. Turn the crankshaft and align the white groove on the crankshaft pulley with the index mark on the cover.
- 3. Remove the cylinder head cover and timing belt upper cover.
- 4. Remove the alternator belt.
- 5. Remove the crankshaft pulley and remove the timing belt lower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



- 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.)



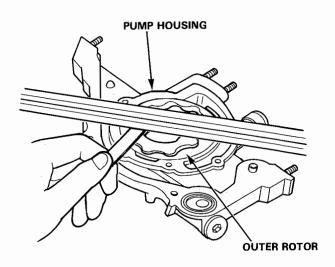
12. Check the axial clearance on the outer pump rotor.

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.)



## Oil Pump

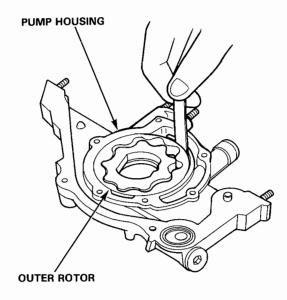
## Removal/Inspection (cont'd) —

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

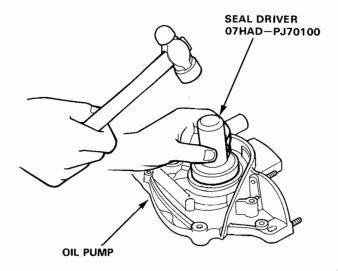
Housing-to-Rotor Radial Clearance: Standard (New): 0.1-0.175 mm

(0.004-0.007 in.)

Service Limit: 0.2 mm (0.008 in.)



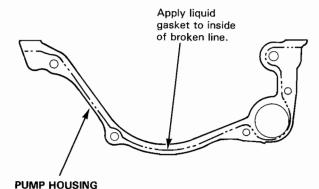
- 14. Inspect both rotors and pump housing for scoring or other damage. Replace parts if necessary.
- 15. Remove the old oil seal from the oil pump.
- 16. Gently tap in the new oil seal until the tool bottoms on the pump.



- 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:

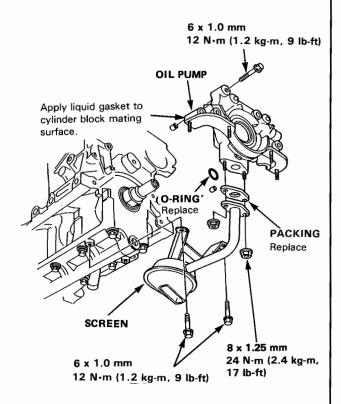
- Use liquid gasket, Part No. 08718-550000 OE.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket evenly, in a narrow bead centered on the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.



- Do not install the parts if 20 minutes or more have elapsed since applying liquid gasket. In that case, reapply liquid gasket after removing old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.



- 22. Install the oil pump on the cylinder block.
- 23. Install the oil screen.
- 24. Install the oil pan.



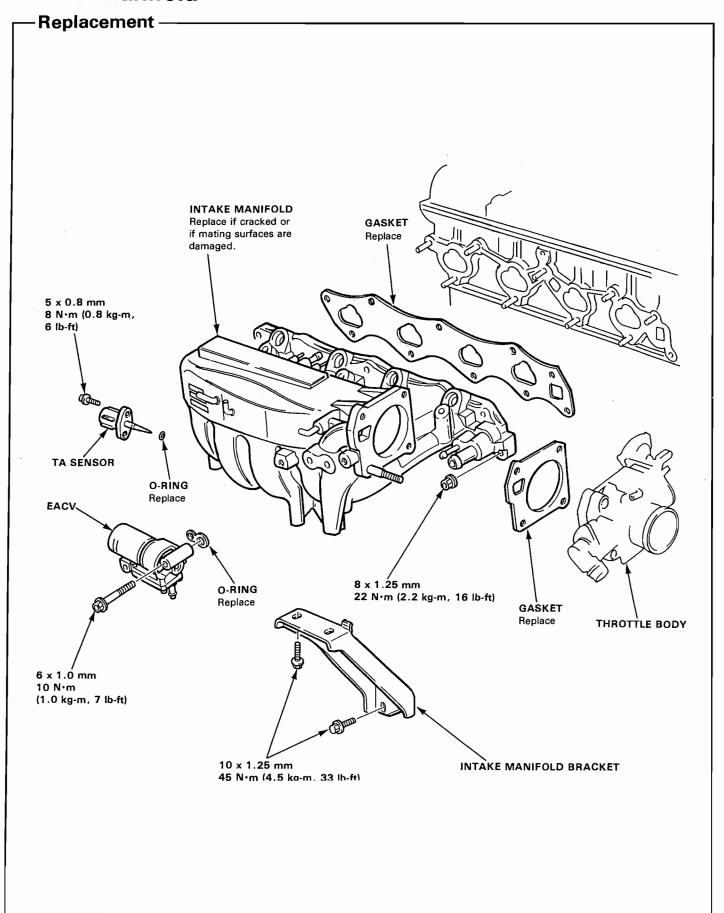
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# Intake Manifold/Exhaust System

Exhaust Manifold		9-3
Exhaust Pipe and	Muffler	9-4
Intake Manifold		9-2

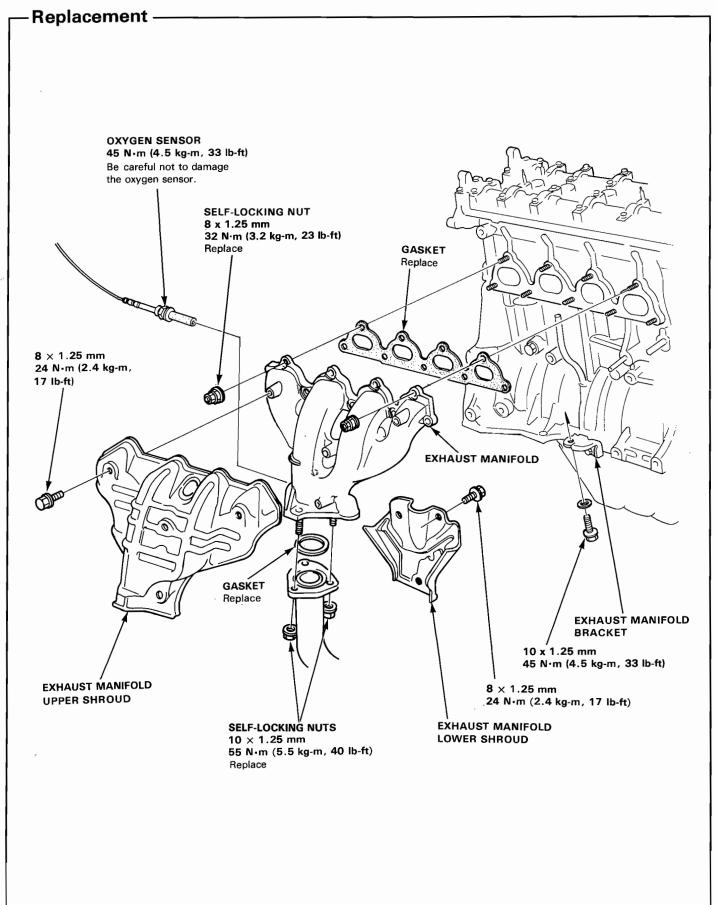


## **Intake Manifold**

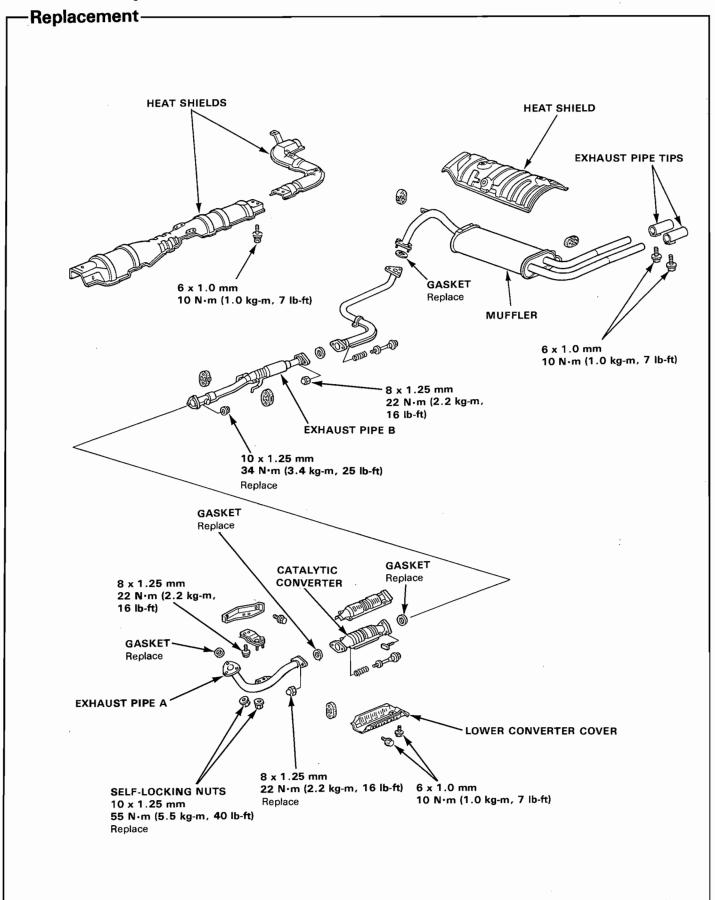


## **Exhaust Manifold**





# **Exhaust Pipe and Muffler**

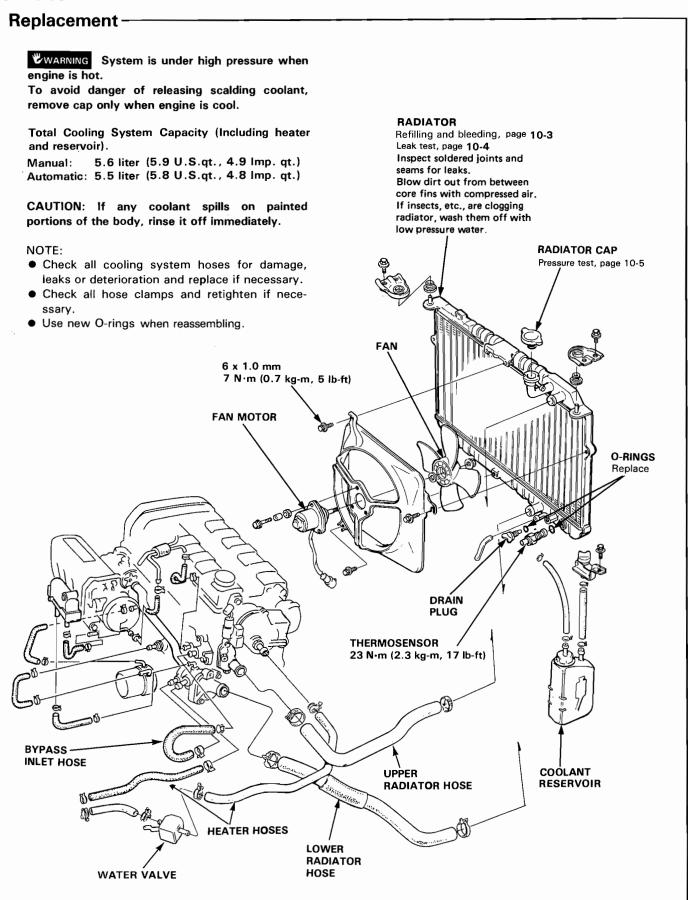


# Cooling

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## **Radiator**





#### 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.
- Reinstall the radiator drain plug and tighten it securely.
- Remove, drain and reinstall the reservoir. Fill the reservoir halfway to the MAX mark with water, then up to the MAX mark with coolant.
- Mix the recommended anti-freeze with an equal amount of water, in a clean container.

#### NOTE:

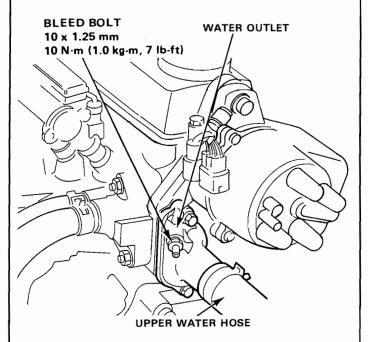
- Use only ACURA-RECOMMENDED anti-freeze/ coolant.
- For best corrosion protection, the coolant concentration must be maintained year-round at 50% MINIMUM. Coolant concentrations less than 50% may not provide sufficient protection against corrosion or freezing.
- Coolant concentrations greater than 60% 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 reservoir)

Manual: 4.6 liter (4.9 U.S.qt., 4.0 lmp. qt.) Automatic: 4.5 liter (4.8 U.S.qt., 4.0 lmp. qt.)  Loosen the air bleed bolt in the water outlet, then fill the radiator to the bottom of the filler neck with the coolant mixture. Tighten the bleed bolt as soon as coolant starts to run out in a steady stream without bubbles.

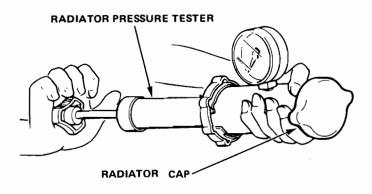


- With the radiator cap off, start the engine and let it run until warmed up (fan goes on at least twice).
   Then, if necessary, add more coolant mix to bring the level back up to the bottom of the filler neck.
- 8. Put the radiator cap on, then run the engine again and check for leaks.

## **Radiator**

## - Cap Testing -

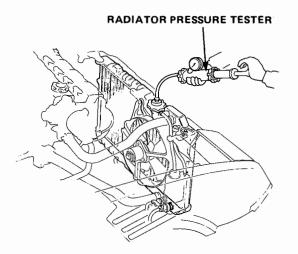
- Remove the radiator cap, wet its seal with coolant, then install it on the pressure tester.
- 2. Apply a pressure of 74–103 kPa (0.75–1.05 kg/  $cm^2$ , 11–15 psi).
- 3. Check for a drop in pressure.
- 4. If the pressure drops, replace the cap.



## -Testing

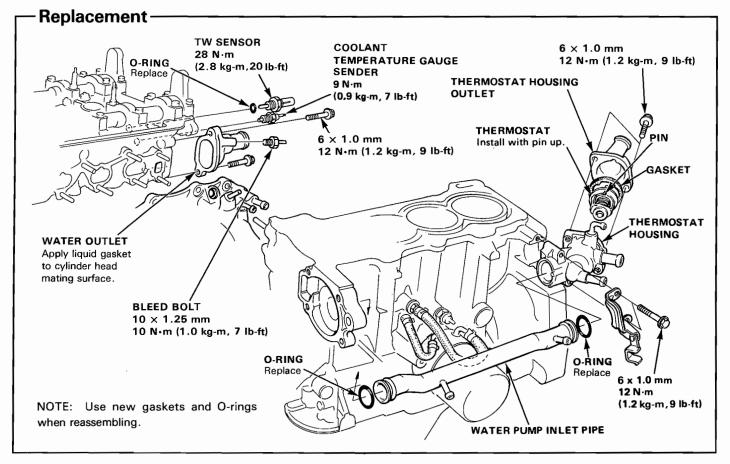
- Wait until the engine is cool, then carefully remove the radiator cap and fill the radiator with coolant to the top of the filler neck.
- 2. Attach the pressure tester to the radiator and apply a pressure of 74–103 kPa (0.75–1.05 kg/cm $^2$ , 11 –15 psi).
- 3. Inspect for coolant leaks and a drop in pressure.
- 4. Remove the tester and reinstall the radiator cap.

NOTE: Check for engine oil in coolant and/or coolant in engine oil.



## **Thermostat**





#### -Testing

Replace thermostat if it is open at room temperature.

To test a closed thermostat:

- Suspend the thermostat in a container of water as shown.
- Heat the water and check the temperature with a thermometer. Check the temperature at which the thermostat first opens, and at which it is fully open.

CAUTION: Do not let thermometer touch bottom of hot container.

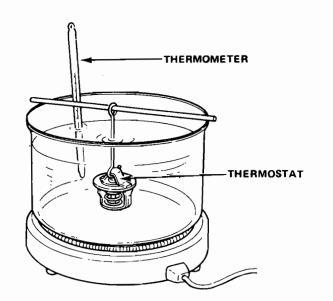
3. Measure lift height of thermostat when fully open.

#### STANDARD THERMOSTAT

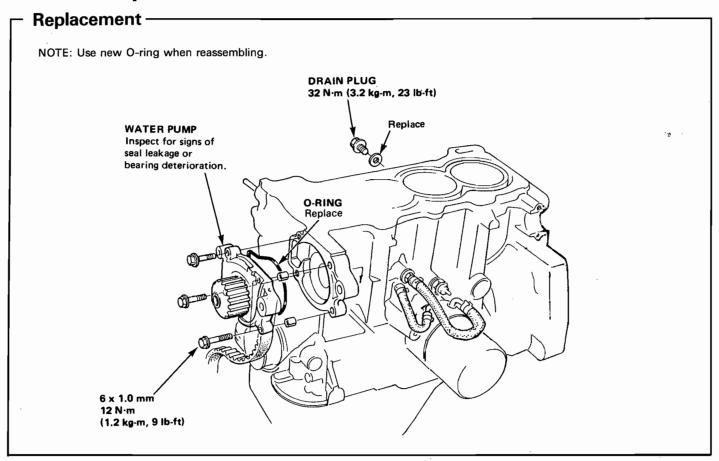
Lift height: 8 mm (0.31 in.)

Starts opening: 76-80°C (169-176°F)

Fully open: 91°C (196°F)



# **Water Pump**



## **Fuel and Emissions**

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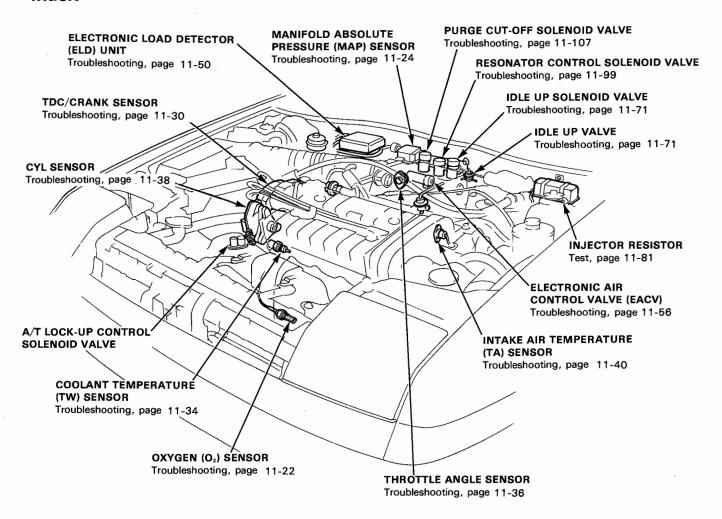
# **Special Tools**

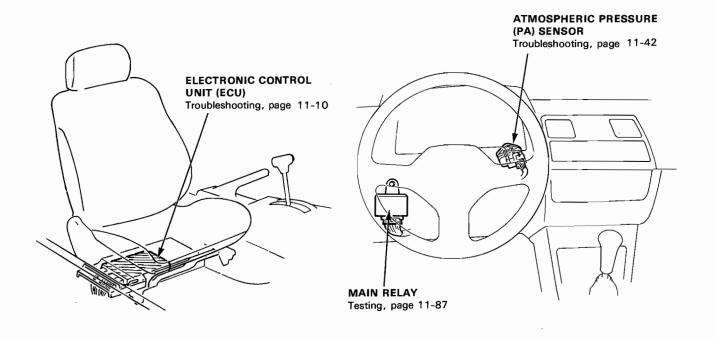
No.	Tool Number	Description	Q'ty	Page Reference
D 20 30 30 30	KS-AHM-32-003 07JAZ-001000A A973X-041-XXXXX 07406-0040001 07920-SB20000 07999-PD6000A	Digital Multimeter Vacuum/Pressure Gauge, 0-4 in. Hg Vacuum Pump/Gauge, 0-30 in. Hg Fuel Pressure Gauge Fuel Sender Wrench PGM-FI Test Harness	1 1 1 1 1 1	11-13 109, 110 11-93 11-75, 82 11-88 11-13
	3		2	(a)
	5			



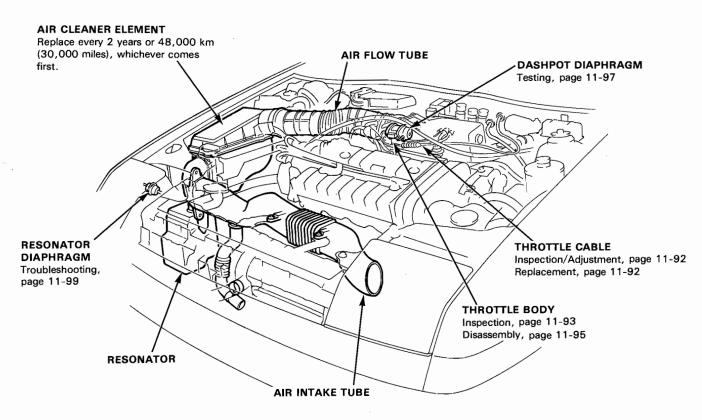
## **Component Locations**

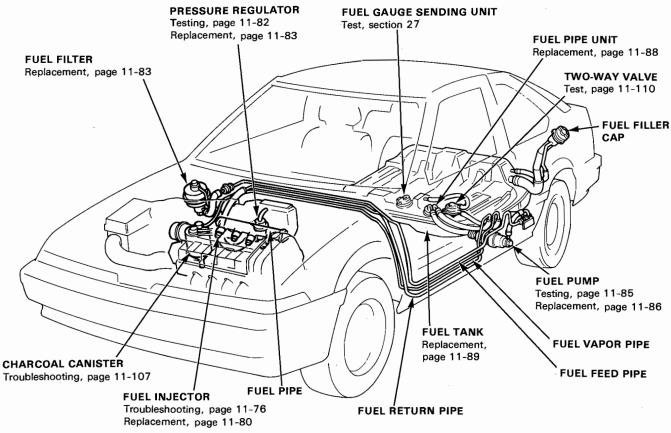
#### Index -





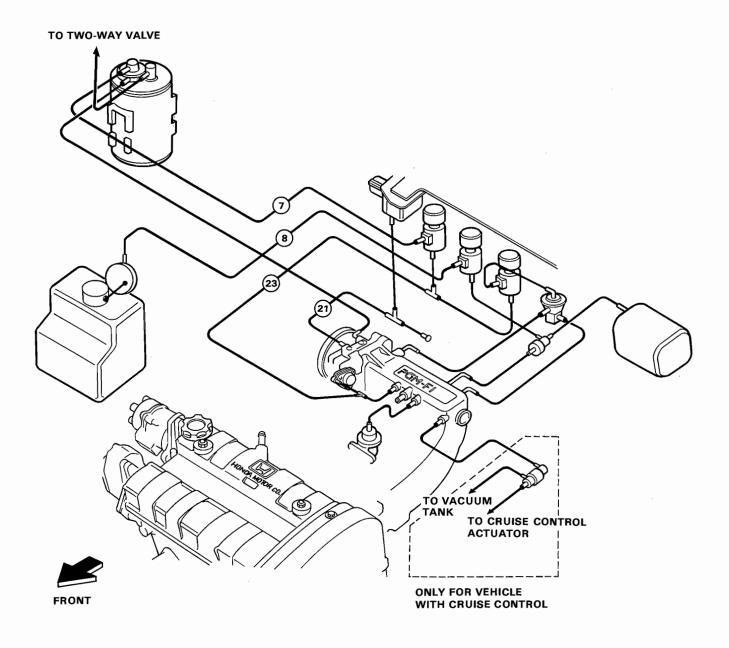




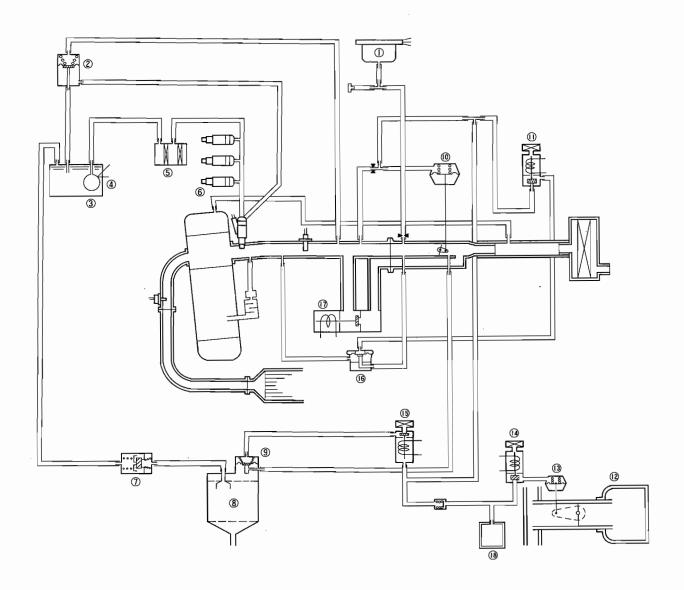


# **System Description**

## **Vacuum Connections -**



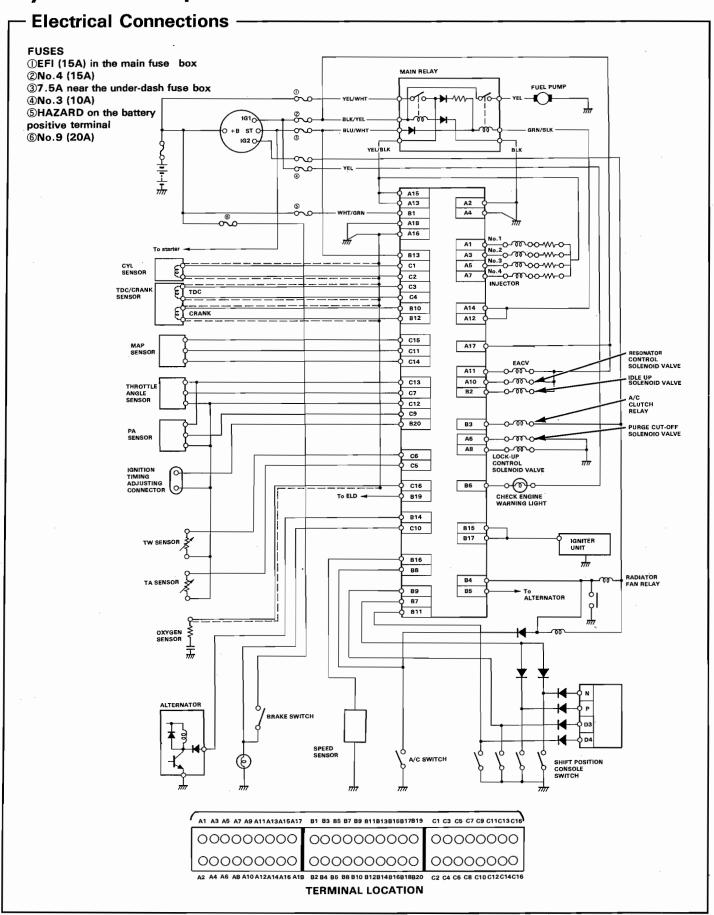




- ① MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR
- **② PRESSURE REGULATOR**
- ③ FUEL TANK
- **4** FUEL PUMP
- **5** FUEL FILTER
- **6 FUEL INJECTOR**
- **① TWO-WAY VALVE**
- **8 CHARCOAL CANISTER**
- **9 PURGE CONTROL VALVE**

- **(10) DASHPOT DIAPHRAGM**
- (1) IDLE UP SOLENOID VALVE
- **®** RESONATOR
- **(3) RESONATOR DIAPHRAGM**
- (4) RESONATOR CONTROL SOLENOID VALVE (5) PURGE CUT-OFF SOLENOID VALVE
- **(6) IDLE UP VALVE**
- 1 ELECTRONIC AIR CONTROL VALVE (EACV)
- **® VACUUM TANK**

# **System Description**





# **Troubleshooting**

## Troubleshooting Guide -

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

PAGE	PGM-FI								
	SYSTEM	ECU	OXYGEN SENSOR	MANIFOLD ABSOLUTE PRESSURE SENSOR	TDC/CRANK/CYL SENSOR	COOLANT TEMPERA- TURE SENSOR	THROTTLE ANGLE SENSOR	INTAKE AIR TEMPERA- TURE SENSOR	ATMO- SPHERIC PRESSURE SENSOR
SYMPTOM		17	22	24	30, 38	34	36	40	42
CHECK ENGINE WARNING LIGHT TURNS ON		□or∺	HCHECK	HOHEOK	- HEHER)	HCHECK	HEHEEK	- KOREST	HEHECK
SELF-DIAGNOSIS INDICATOR (LED) BLINKS		① or-(*)	1	(3) or (5)	4) or (8) or (9)	<b>6</b>	(I)	100	<b>(13</b> )
ENGINE WON'T START		2							
DIFFICULT TO START ENGINE WHEN COLD		BU		3		1			
IRREGULAR IDLING	WHEN COLD FAST IDLE OUT OF SPEC	BU				3			
	ROUGH IDLE	BU ,		2					
	WHEN WARM RPM TOO HIGH	BU							
	WHEN WARM RPM TOO LOW	BU							
FREQUENT STALLING	WHILE WARMING UP	BU		3					
	AFTER WARMING UP	BU	-	3					
POOR PERFORM- ANCE	MISFIRE OR ROUGH RUNNING	BU		3					
	FAILS EMISSION TEST	BU	1	2		3			
	LOSS OF POWER	BU		3			2		

If codes other than those listed above are indicated, count the number of blinks again. If the indicator is in fact blinking these
codes, substitute a known-good ECU and recheck. If the indication goes away, replace the original ECU.

<sup>(</sup>BU): When the Check Engine warning light and the self-diagnosis indicator are on, the back-up system is in operation. Substitute a known-good ECU and recheck. If the indication goes away, replace the original ECU.

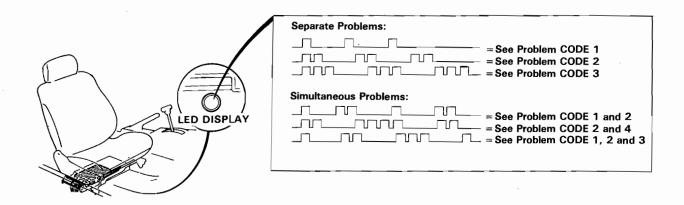


PGM-FI			IDLE CO	ONTROL	FUEL SUPPLY				
IGNITION OUTPUT SIGNAL	VEHICLE SPEED SENSOR	LOCK-UP CONTROL SOLENOID VALVE	ELECTRIC LOAD DETECTOR	ELEC- TRONIC AIR CONTROL VALVE	OTHER IDLE CONTROLS	FUEL INJECTOR	OTHER FUEL SUPPLY	AIR INTAKE	EMISSION CONTROL
44	46	48	50	56	54	76	73	90	102
HEHECKI	HCHECKI	- HEHECKT		HCHECK		- HEMERIT			
-(15)-	<b>O</b>	19	20	14		16			
3							1		
				2					
				1	2				
				3		1			
			3	2	1				
			3	2	1				
				1		2	3	3	
	3			1			2		
				2		1			
							1		`

# **Troubleshooting**

### - Self-diagnostic Procedure

When the Check Engine 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. The ECU LED can indicate any number of simultaneous component problems by blinking separate codes, one after another.

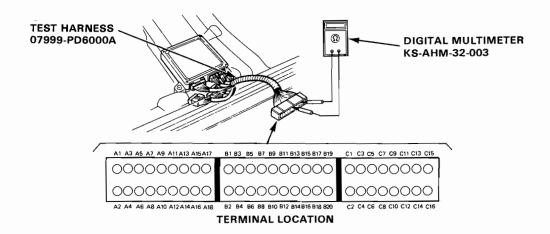


SELF-DIAGNOSIS INDICATOR BLINKS	SYSTEM INDICATED	PAGE	
0	ECU	11-17	
1	OXYGEN CONTENT	11-22	
3	MANUFOLD ADOLLITE DESCRIPT	11-24	
5	MANIFOLD ABSOLUTE PRESSURE	11-28	
4	CRANK ANGLE	11-30	
6	COOLANT TEMPERATURE	11-34	
7	THROTTLE ANGLE	11-36	
8	TDC POSITION	11-32	
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13	ATMOSPHERIC PRESSURE	11-42	
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19	LOCK-UP CONTROL SOLENOID VALVE	11-48	
20	20 ELECTRIC LOAD		

If codes other than those listed above are indicated, count the number of blinks again. If the indicator is in fact blinking these codes, substitute a known-good ECU and recheck. If the indication goes away, replace the original ECU. The Check Engine warning light and ECU LED may come on, indicating an 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 Check Engine warning light is on and LED stays on, replace the ECU.

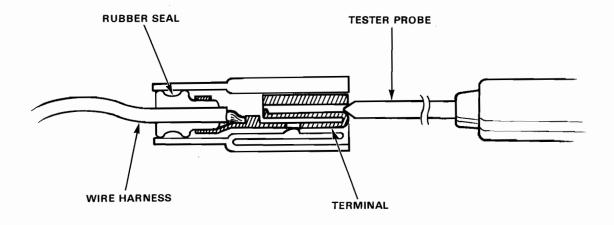


If the inspection for a particular failure code requires the PGM-FI test harness, remove the front passenger seat and connect the PGM-FI test harness and multimeter as shown. Then check the system according to the procedure described for the appropriate code (s) listed on the following pages.



#### CAUTION:

- Puncturing the insulation on a wire can cause poor or intermittent elecrical connections.
- For testing at connectors other than the PGM-FI test harness, bring the tester probe into contact with the terminal from the connector side of wire harness connectors in the engine compertment. For female connectors, just touch lightly with the tester probe and do not insert the probe.



(cont'd)

## **Troubleshooting**

#### How to Read Flowcharts -

A flowchart is designed to be used from start to final repair. It's like a map showing you the shortest distance. But beware: if you go off the "map" anywhere but a "stop" symbol, you can easily get lost.

START (bold type)

Describes the conditions or situation to start a troubleshooting flowchart.

ACTION

Asks you to do something; perform a test, set up a condition, etc.

DECISION

Asks you about the result of an action, then sends you in the appriate troubleshooting direction.

STOP (bold type)

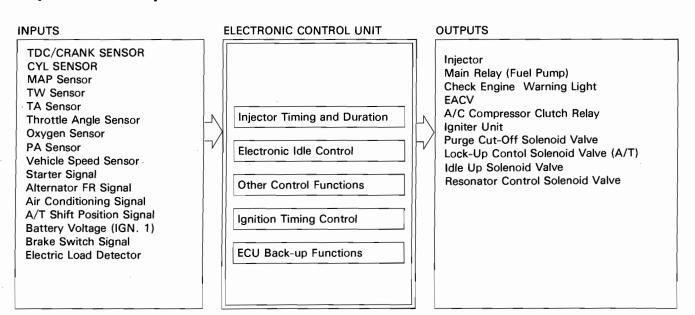
The end of a series of actions and decisions, describes a final repair action and sometimes directs you to an earlier part of the flow to confirm your repair.

#### NOTE:

- The term "Intermittent Failure" 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. In any event, even if the warning light on the dash does not come on check for poor connections or loose wires at all connectors related to the circuit that you are troubleshooting.
- "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. In simple electronics, this usually means something won't work at all. In complex electronics (like ECUs), this can sometimes mean something works, but not the way it's supposed to.
- If the electrical readings are not as specified when using the PGM-FI test harness, check the test harness connections before
  proceeding.



#### **System Description -**



#### Injector Timing and Duration

The ECU contains memories for the basic discharge durations at various engine speeds and manifold pressures. The basic discharge duration, after being read out from the memory, is further modified by signals sent from various sensors to obtain the final discharge duration.

#### **Electronic Air Control**

Electronic Air Control Valve (EACV)

When the engine is cold, the A/C compressor is on, the transmission is in gear (A/T only) or the alternator is charging, the ECU controls current to the EACV to maintain correct idle speed.

#### **Ignition Timing Control**

The ECU contains memories for basic ignition timing at various engine speeds and manifold pressures. Ignition timing is also adjusted for coolant temperature.

#### 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 two seconds to pressurize the fuel system.
  - When the engine is running, the ECU supplies ground to the main 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 to improve fuel economy at speeds over 900 rpm (M/T), 1,000 rpm (A/T).
  - Fuel cut-off action also takes place when engine speed exceeds 7,500 rpm regardless of the position of the throttle valve to protect the engine from over-running.

(cont'd)

### System Description (cont'd)

4. A/C Compressor Clutch Relay

When the ECU receives a demand for cooling from the air conditioning system (A/C switch), it delays the compressor from being energized to assure smooth transition to the A/C mode.

5. Purge Cut-off Solenid Valve

When the coolant temperature is below 60°C (140°F), the ECU supplies voltage to the purge cut-off solenoid valve which cuts vacuum to the purge control valve.

6. Resonator Control Solenoid Valve

When the engine speed is below 3,000 rpm, the ECU supplies current to the resonator control solenoid valve. This opens the solenoid valve sending intake manifold vacuum to the resonator diaphragm.

Lock-up Control Solenoid Valve (A/T)

The speed and throttle angle sensor inputs to the ECU are used to send an on/off voltage signal to the lock-up control solenoid valve for precise timing of the torque converter lock-up system.

8. Alternator Control

The system controls the voltage generated at the alternator in accordance with the electric load and drive mode, and redures the engine load to improve the fuel economy.

9. Idle Up Solenoid Valve

The idle up valve employed to increase the air flow rate for fast idling at extremely low ambient temperature.

#### **ECU Back-up Functions**

1. Fail-Safe Function

When an abnormality occurs in a signal from a sensor, the ECU ignores that signal and assumes a pre-programmed value that allows the engine to continue to run.

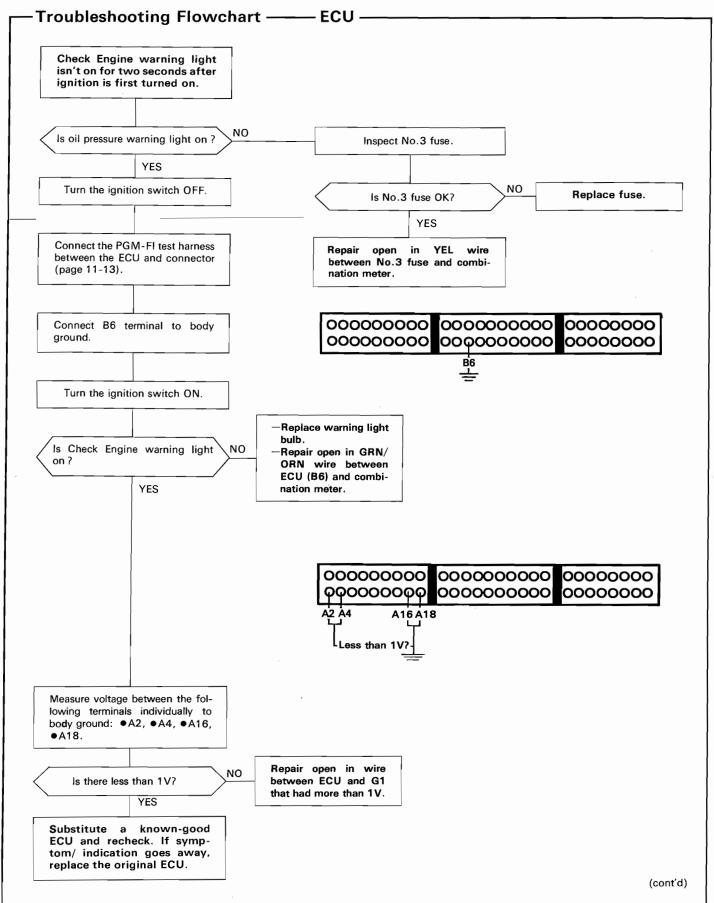
2. Back-up Function

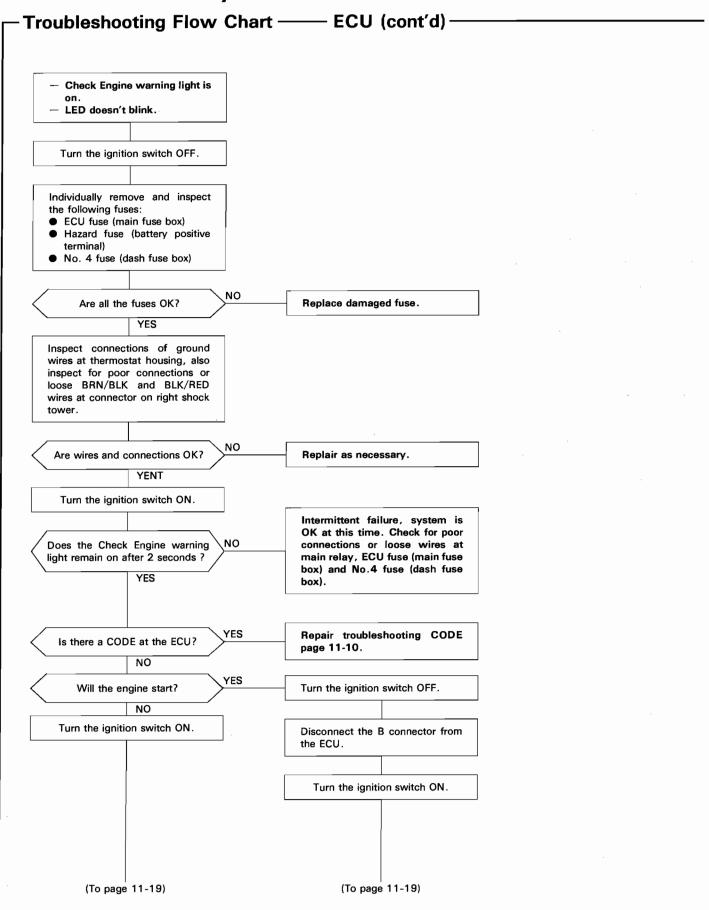
When an abnormality occurs in the ECU itself, the injectors are controlled by a back-up circuit independent of the system in order to permit minimal driving.

3. Self-diagnosis Function (Check Engine warning light, LED indicator)

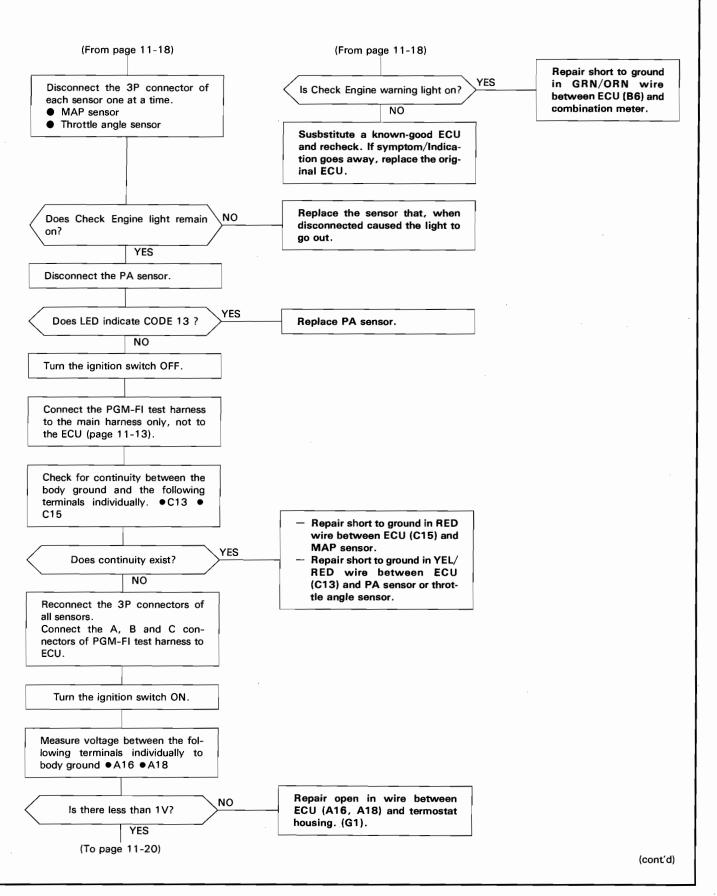
When an abnormality occurs in a signal from a sensor, the ECU lights the Check Engine warning light, stores the failure code in erasable memory and indicates the code with the LED on the ECU anytime the ignition is on. When the ignition is initially turned on, the ECU supplies ground for the Check Engine warning light for two seconds.

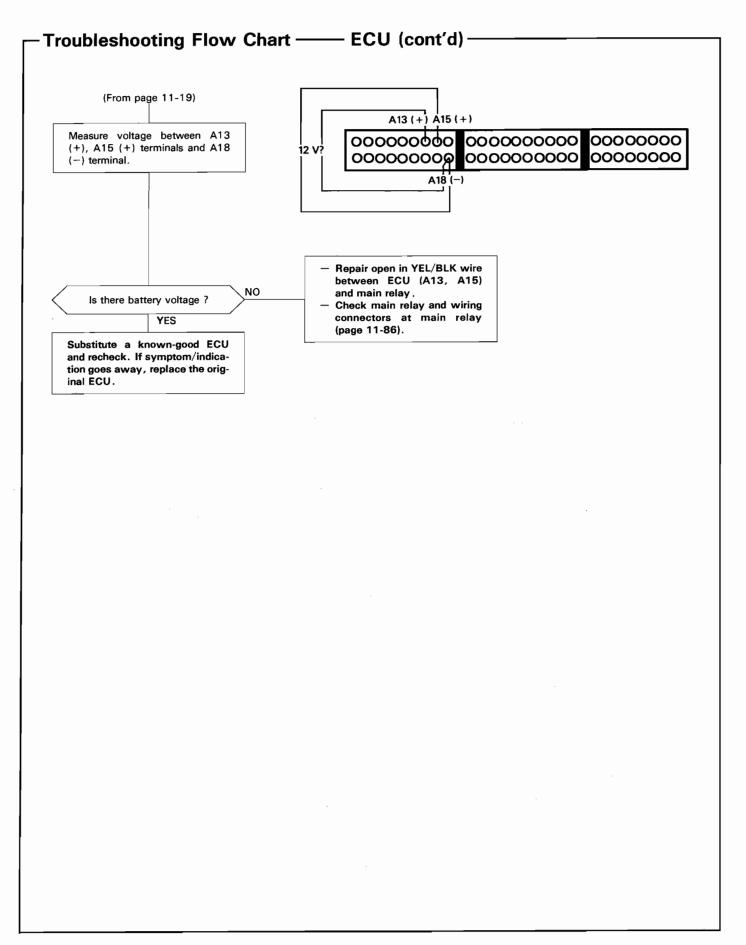








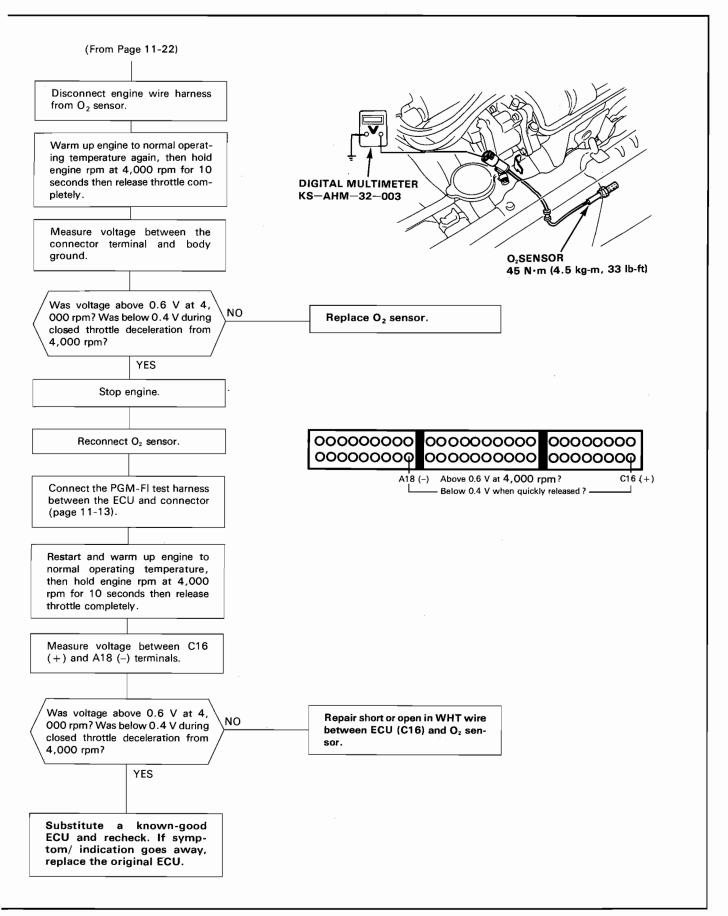


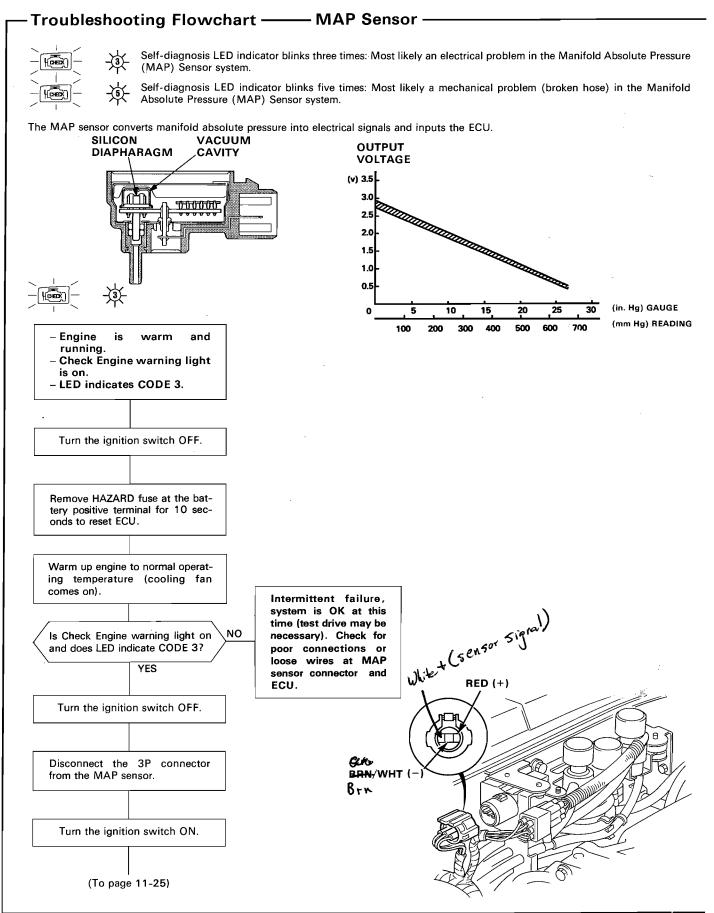




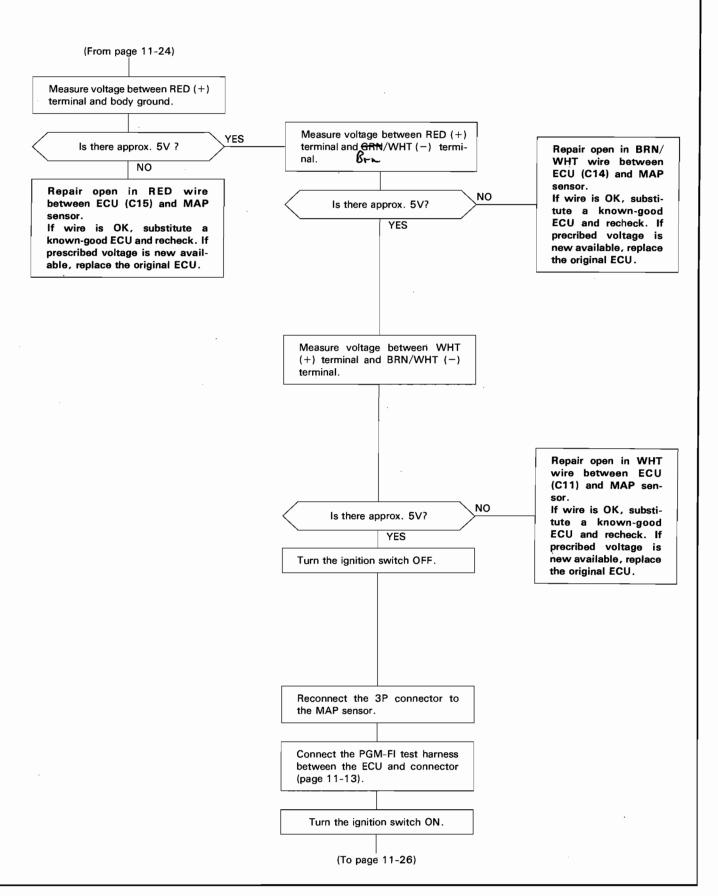
### Troubleshooting Flowchart ——— Oxygen Sensor -Self-diagnosis LED blinks once: A problem in the Oxygen (O2) Sensor circuit. The oxygen sensor, detects the oxygen content in the exhaust gas, and inputs the ECU. In operation, the ECU receives the signals from the sensor and varies the duration during which fuel is injected. The oxygen sensor is installed on the exhaust manifold. EXHAUST GAS ZIRCONIA ATMOSPHERE **STOICHIOMETRIC** VOLTAGE (V) ∤ **AIR-FUEL RATIO** PLATINUM RICH ← AIR- → LEAN - Check Engine warning light **FUEL RATIO** 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. Inspect pressure regulator (page 11-82). Replace the pressure NO Is it normal? regulator (page 11-82). YES Warm up engine to normal operating temperature (cooling fan comes on). Hold engine at 1500 rpm for 15 NOTE: Do not close throttle completely during this time. Intermittent failure, system is OK at this time. (test drive may be necessary). NO Is Check Engine warning light on Check for poor connecand does LED indicate CODE 1? tions or loose wires at thermostat housing, O2 YES sensor and C76 at the right shock tower. (To page 11-19)

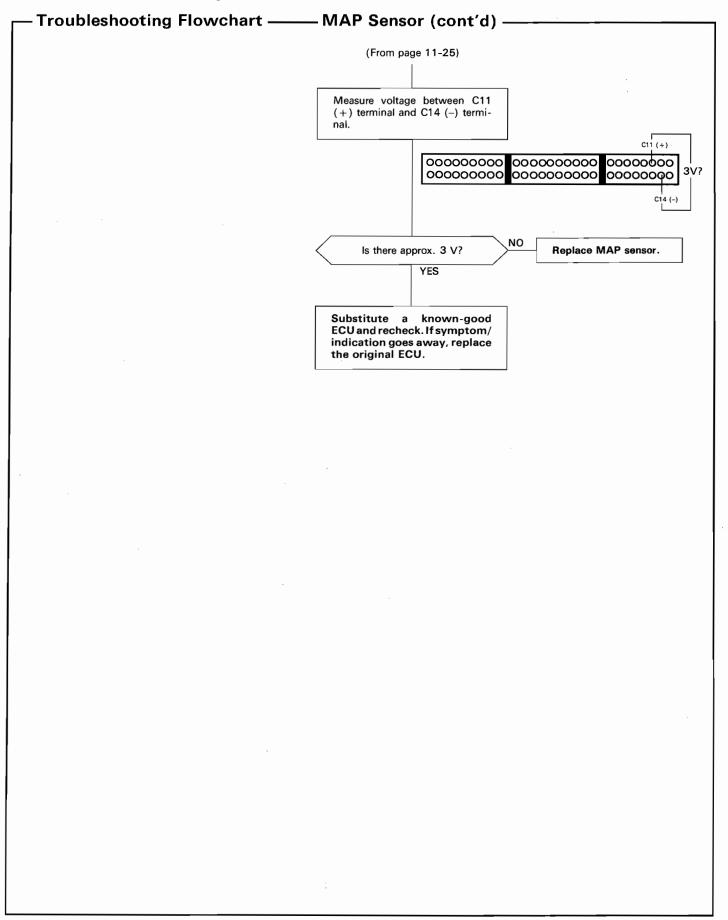




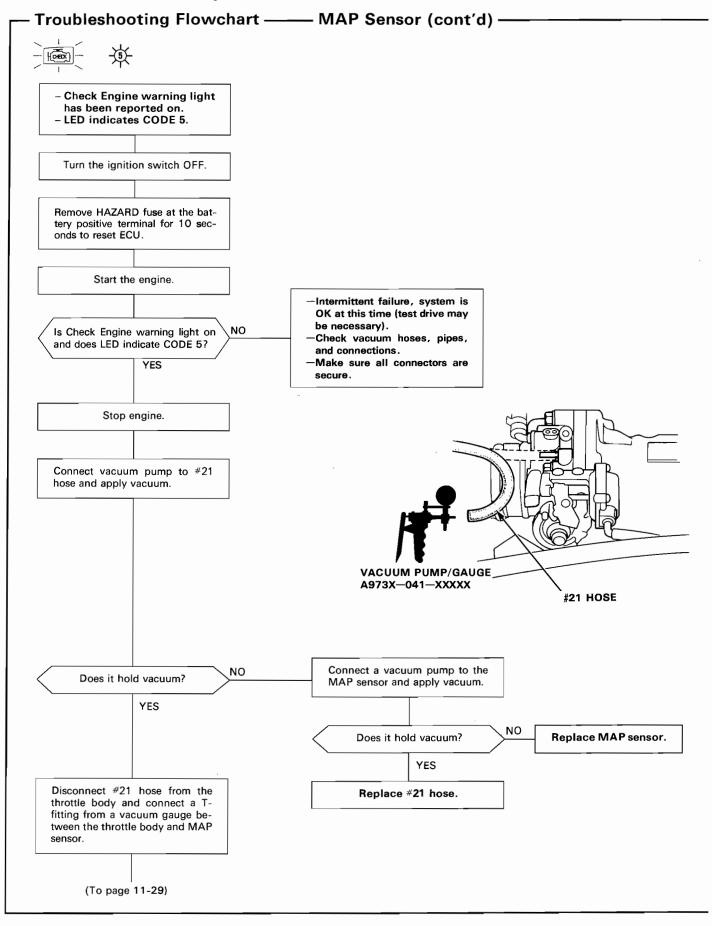




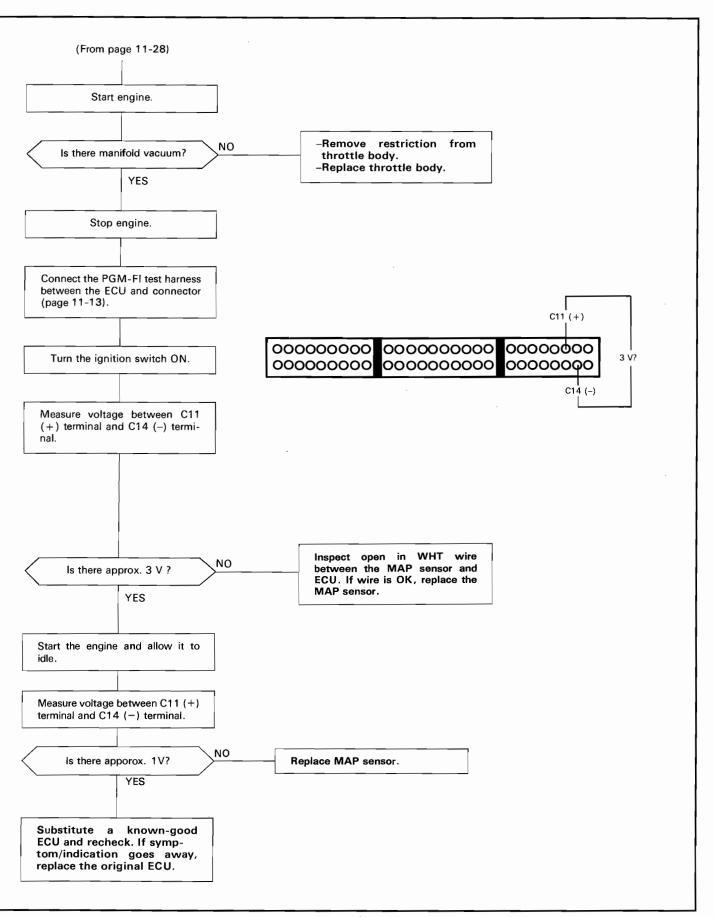


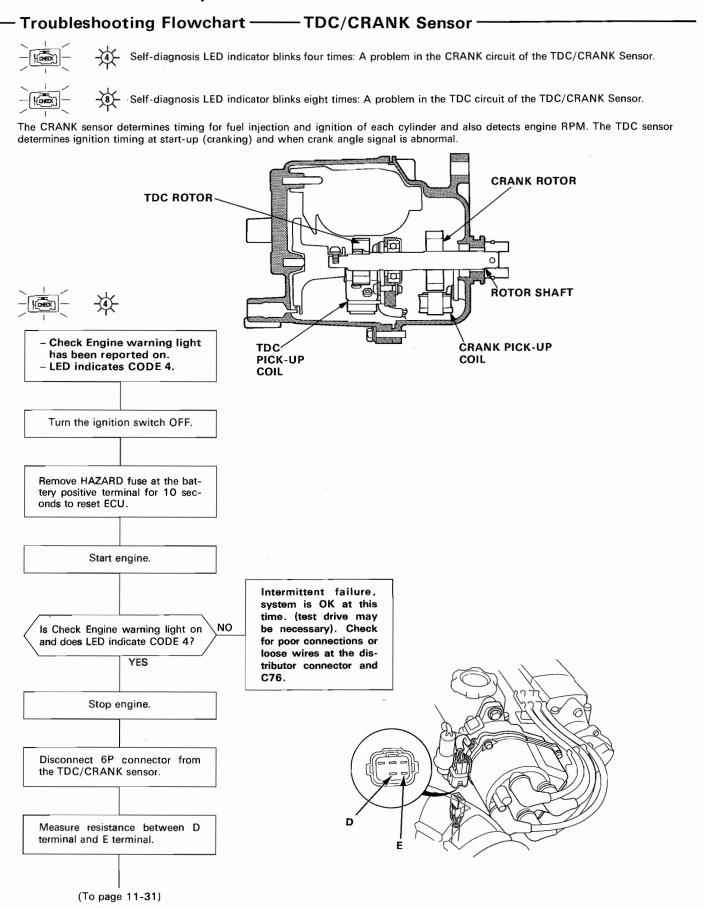




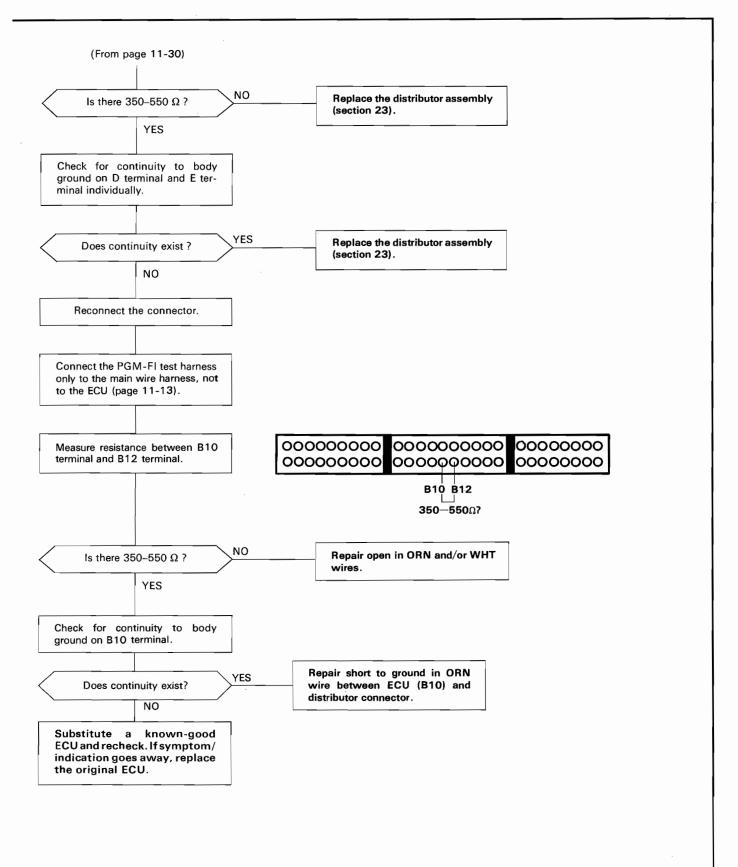




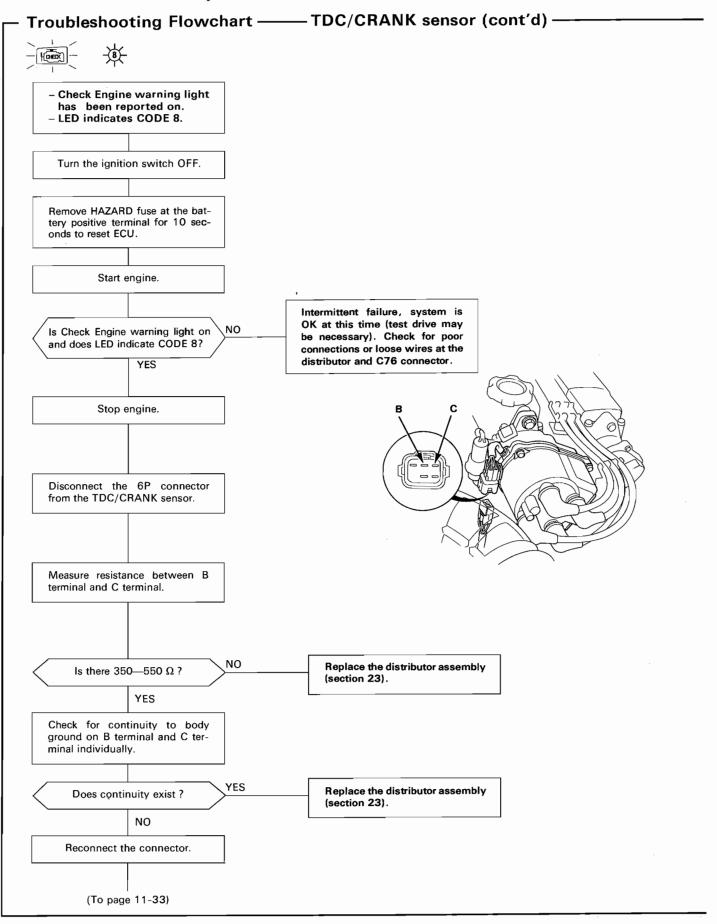




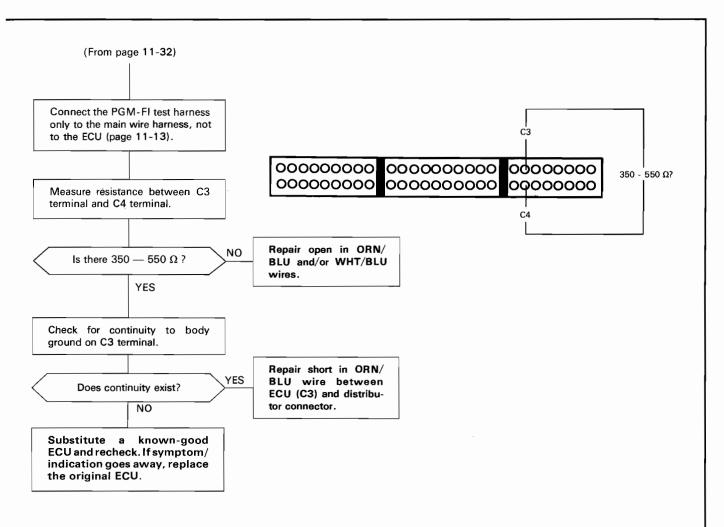


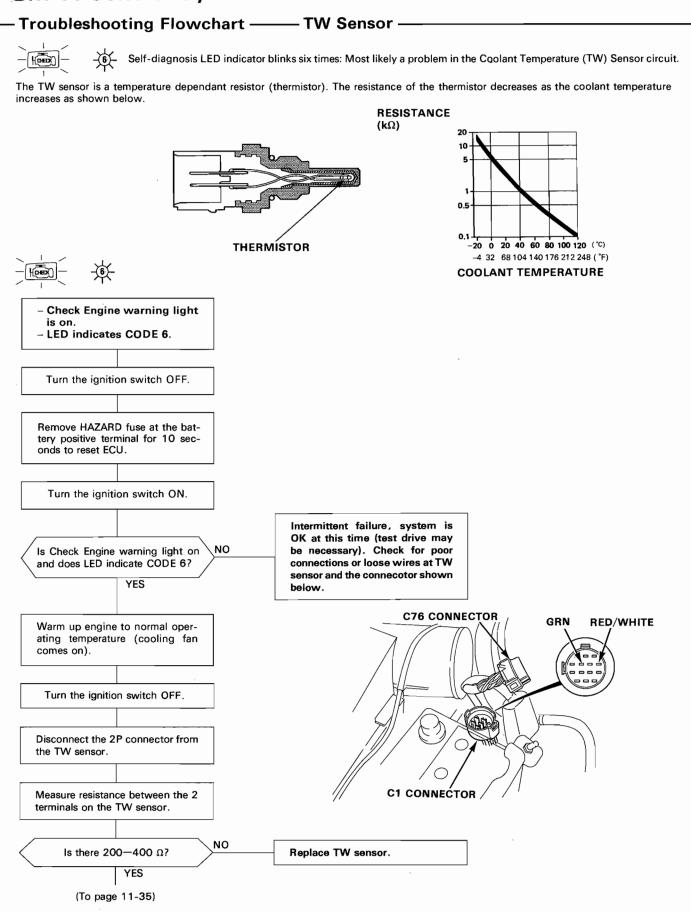


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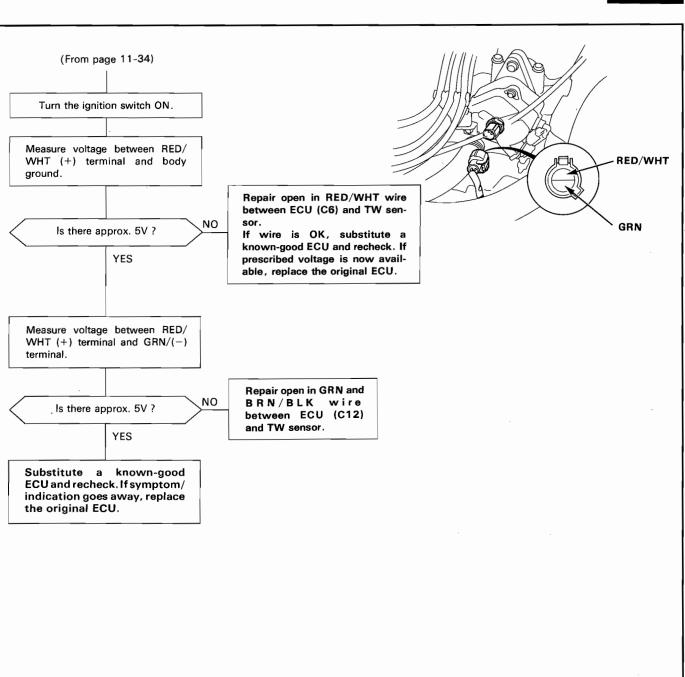


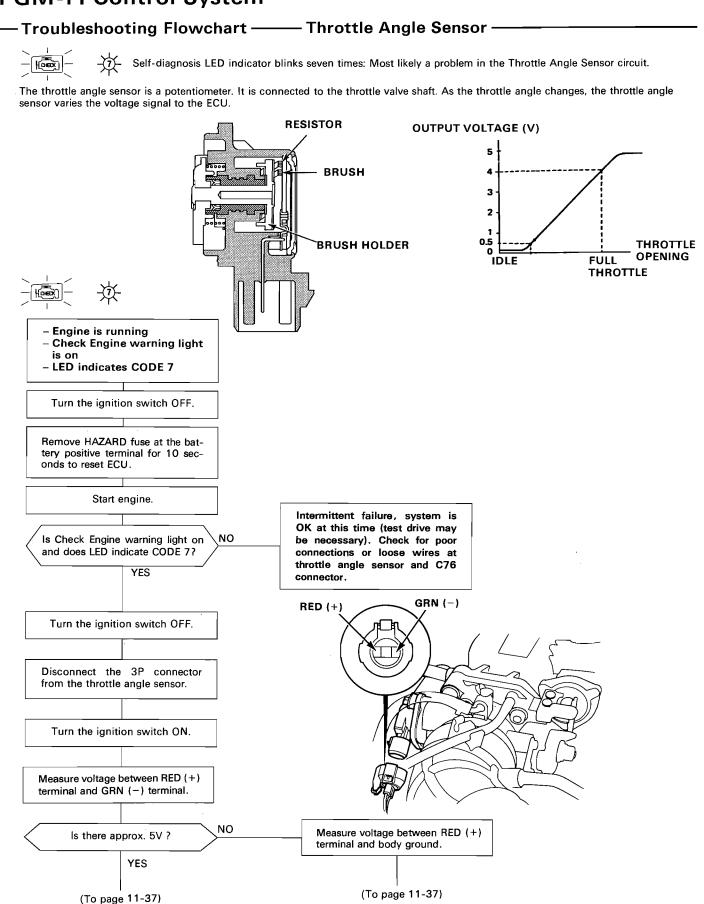




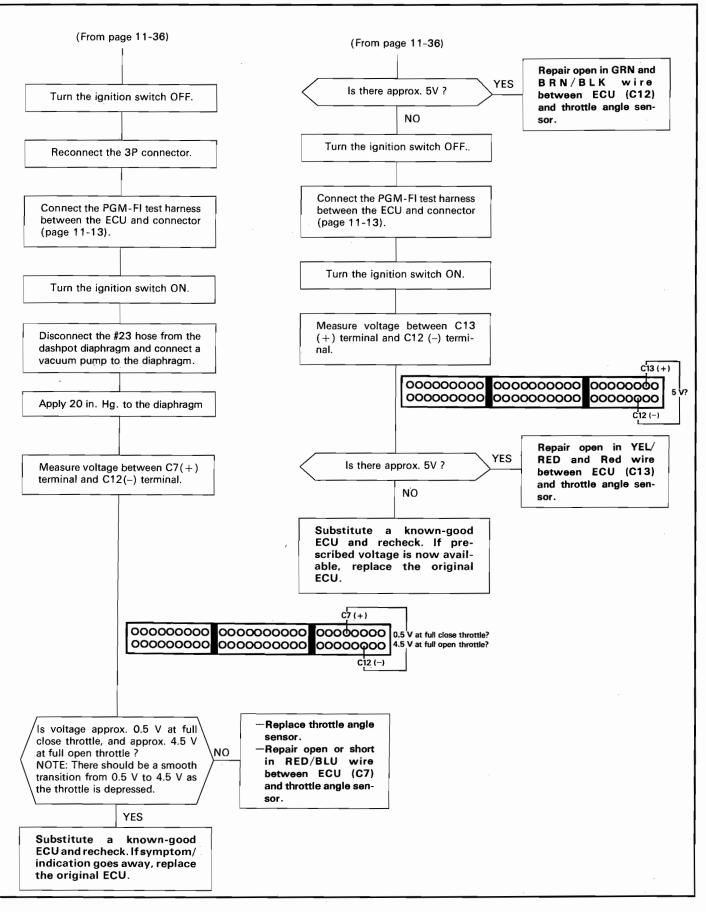




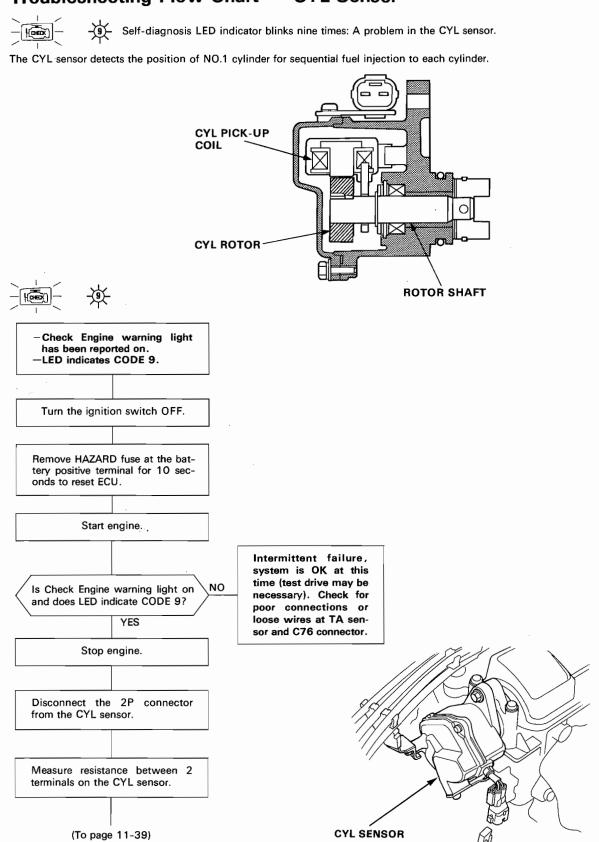




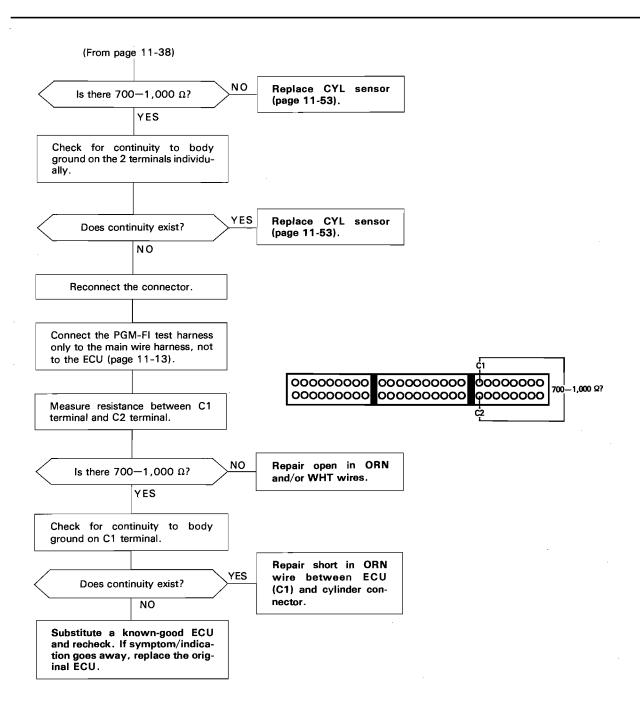




# - Troubleshooting Flow Chart — CYL Sensor

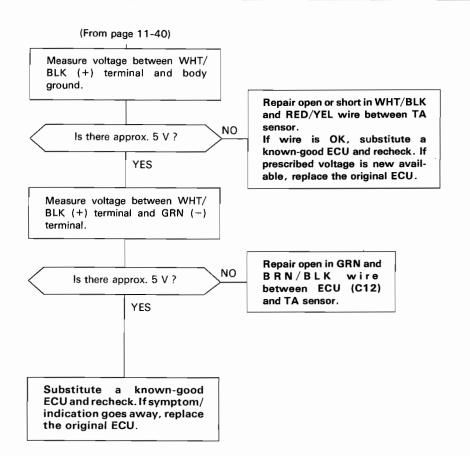


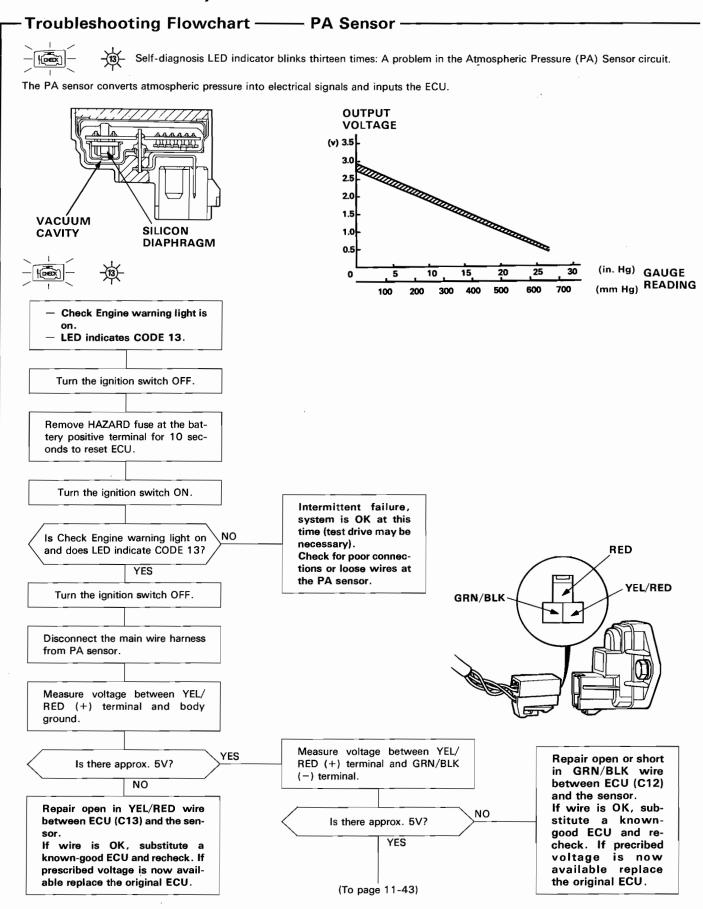




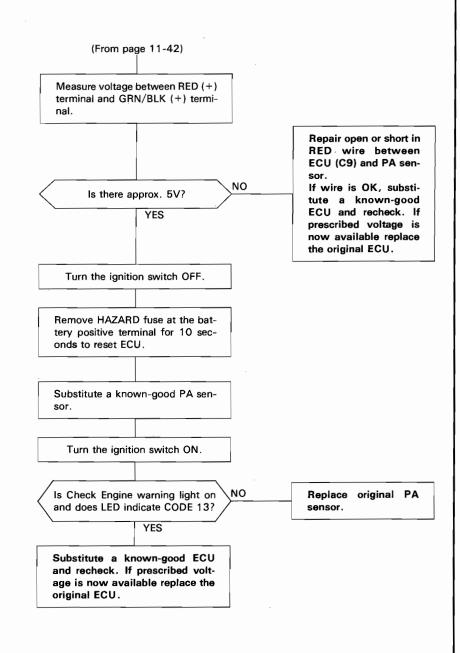
## - Troubleshooting Flowchart ——— TA Sensor Self-diagnosis LED indicator blinks ten times: Most likely a problem in the Intake Air Temperature (TA) Sensor The TA sensor is a temperature dependant resistor (thermistor). The resistance of the thermistor decreases as the intake air temperature increases as shown below. RESISTANCE $(k\Omega)$ **THERMISTOR** -20 0 20 40 60 80 100 120 (°C) -4 32 68 104 140 176 212 248 (°F) **INTAKE AIR TEMPERATURE** - Check Engine warning light - 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. Intermittent failure, system is OK at this time (test drive may be Is Check Engine warning light on NO necessary). Check for and does LED indicate CODE 10? poor connections or loose wires at the TA YES sensor. Disconnect the 2P connector from the TA sensor. Measure resistance between the 2 terminals on the TA sensor. **TA SENSOR** NO Replace TA sensor. Is there 1-4 k $\Omega$ ? YES (To page 11-41)

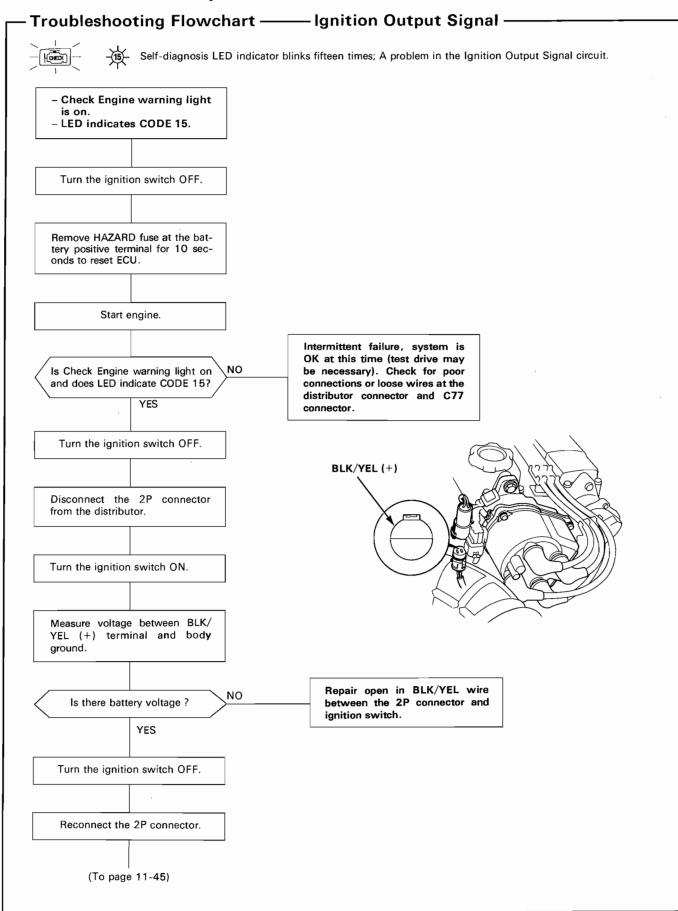




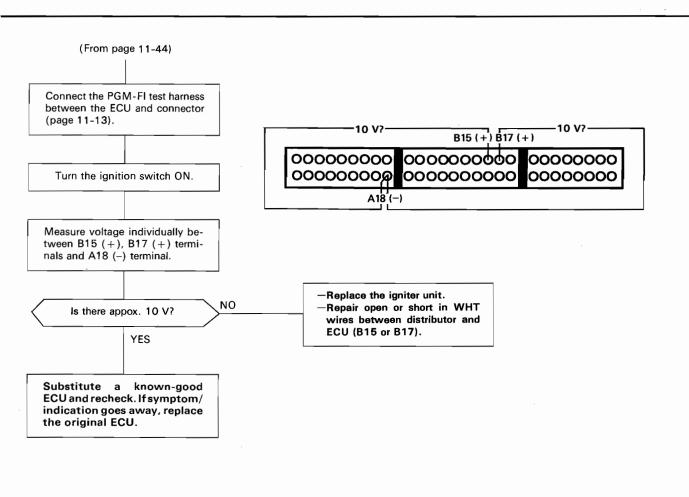


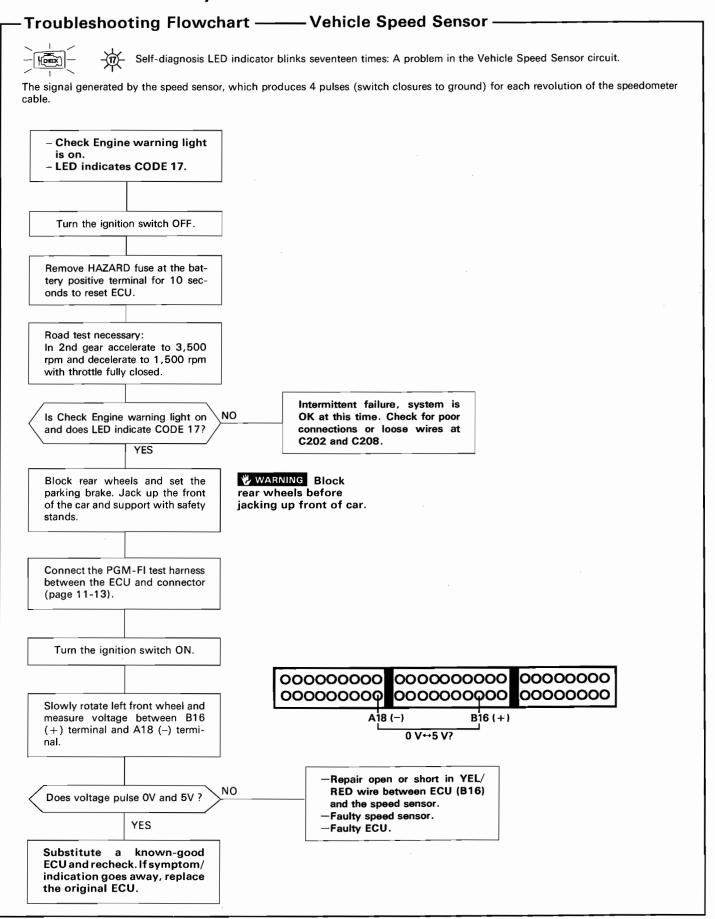






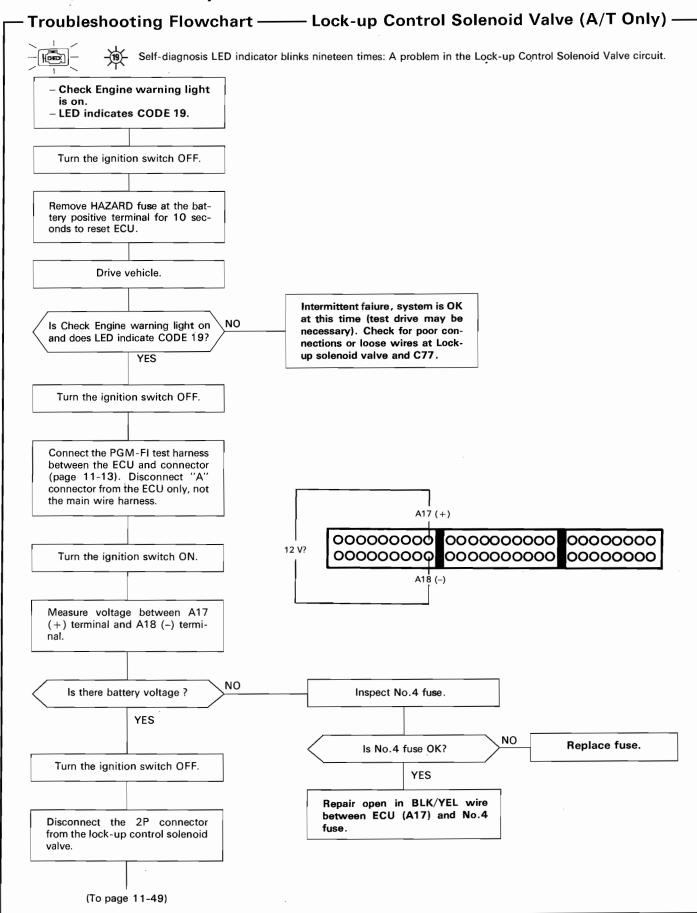




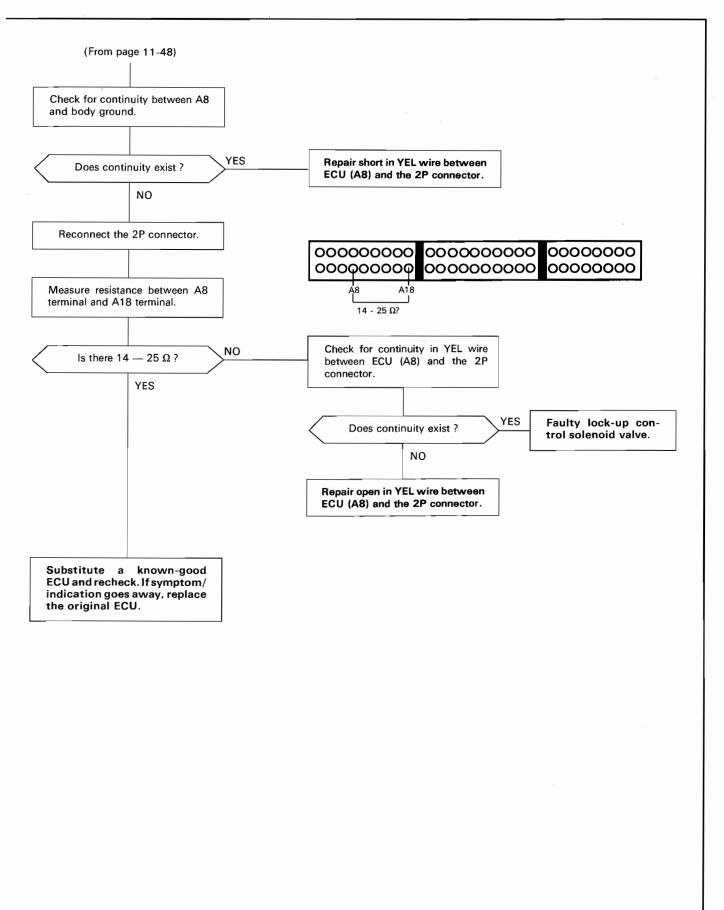


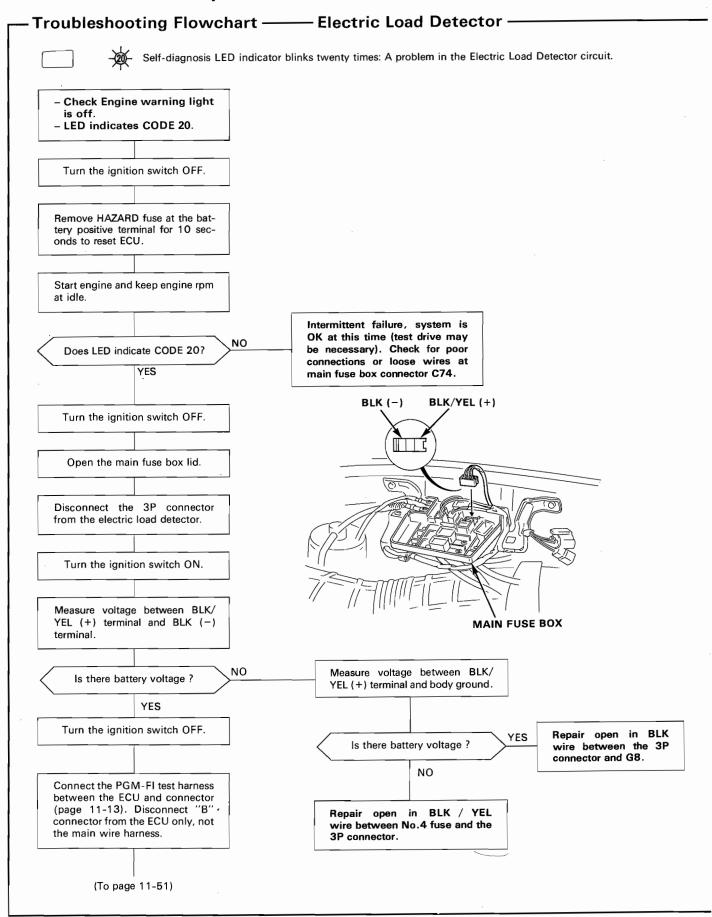


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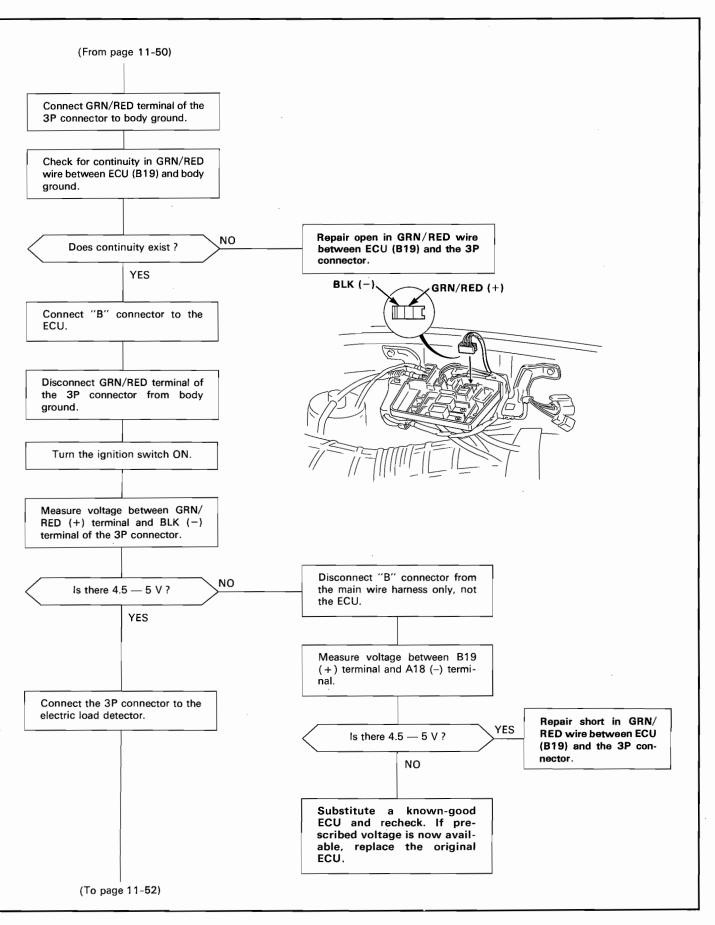


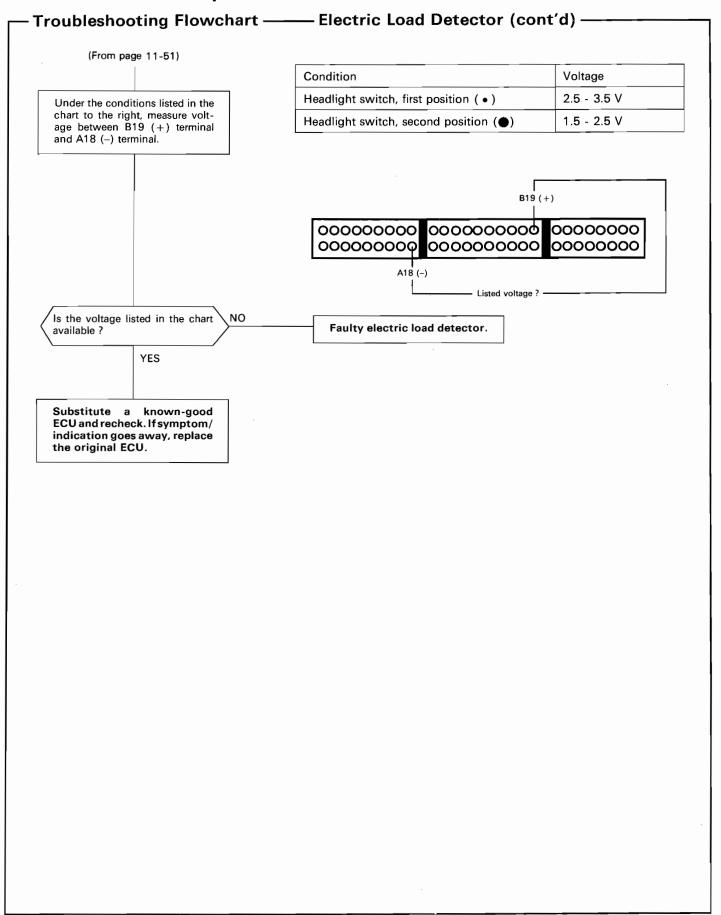










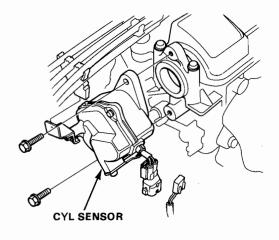




# CYL Sensor Assembly Replacement -

#### Removal:

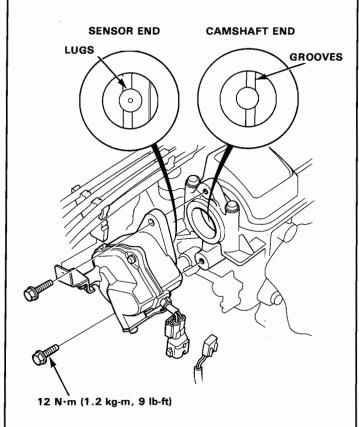
1. Remove the CYL sensor from the engine.



#### Installation:

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



## System Troubleshooting Guide -

#### NOTE:

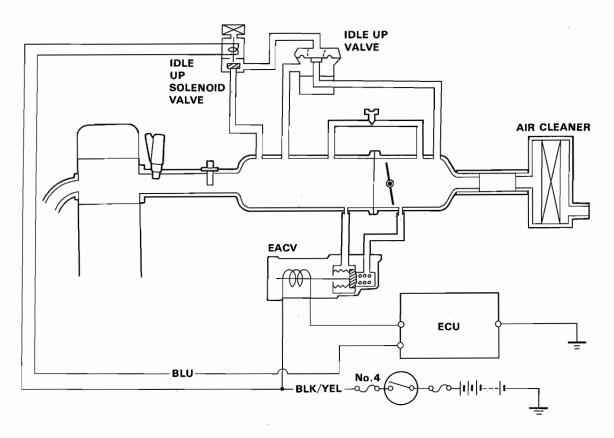
- Across each row in the chart, the sub systems that could be sources of a symptom are ranked in the order they should be inspected, starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows the system is OK, try the next system ②, etc.
- If the idle speed is out of specification and LED does not blink CODE 14, go to inspection described on page 11-72.

PAGE		SUB SYSTEM	IDLE ADJUST- ING SCREW	EACV	AIR CONDI- TIONING SIGNAL	ALTER- NATOR FR SIGNAL	A/T SHIFT POSITION SIGNAL (Automatic)	BRAKE SWITCH SIGNAL	STARTER SWITCH SIGNAL	IDLE UP CONTROL	HOSES AND CONNEC- TIONS
SYMPTOM		69	56	60	62	64	66	68	70	*	
DIFFICULT TO START ENGINE WHEN COLD			1								
WHEN COLD FAST IDLE OUT OF SPEC (1,000-2,000 rpm)		2	1							3	
ROUGH IDLE		3	2							1	
WHEN WAI	WHEN WARM RPM TOO HIGH		3	2							1
	Idle spee below sp rpm (no	pecified	2	1		3					
WHEN WARM	Idle spee not incre initial sta	ease after		1					2		
RPM TOO LOW	sion, the	ic transmis-	3	2			1				
	when air	eds drops ner in ON	3	2	1						
FREQUENT STALLING	WHILE	NG UP	2	1							
	AFTER WARMIN	NG UP	2	1							
FAILS EMISSION TEST										1	



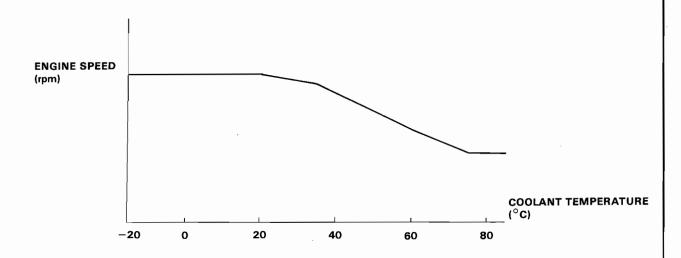
### System Description

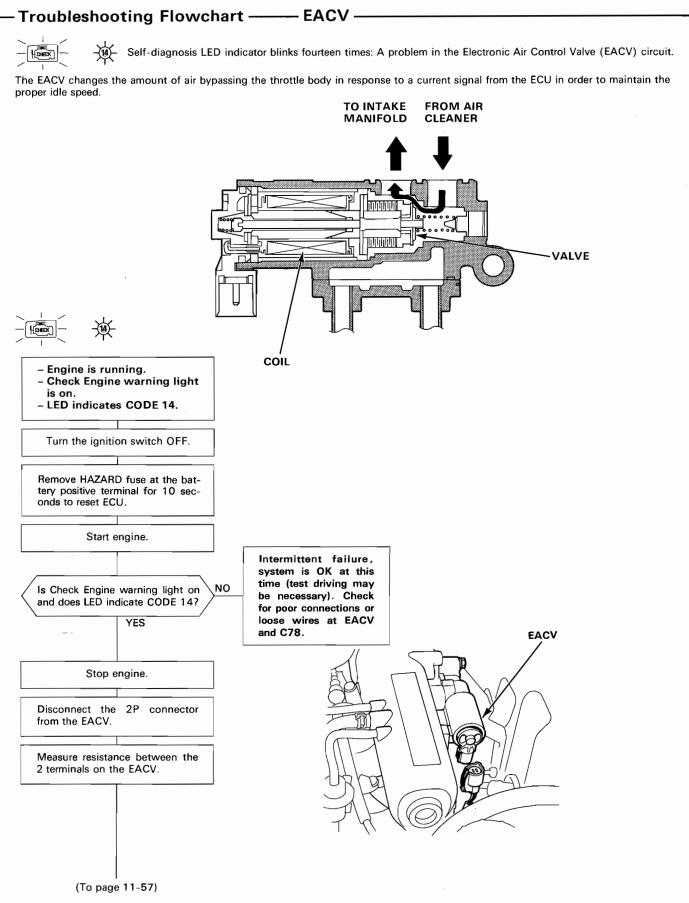
The idle speed of the engine is controlled by the Electronic Air Control Valve (EACV) and Idle Up Valve. The valve changes the amount of air bypassing into the intake manifold in response to electric current sent from the ECU. When the EACV is activated, the valve opens to maintain the proper idle speed.



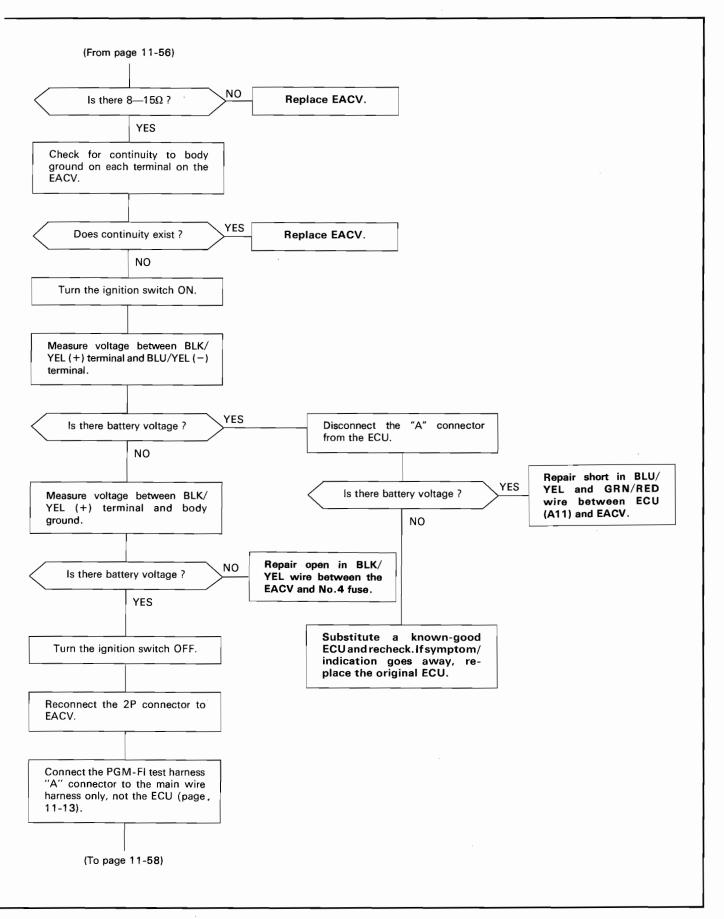
- After the engine starts, the EACV opens for a certain time. The amount of air is increased to raise the idle speed about 150

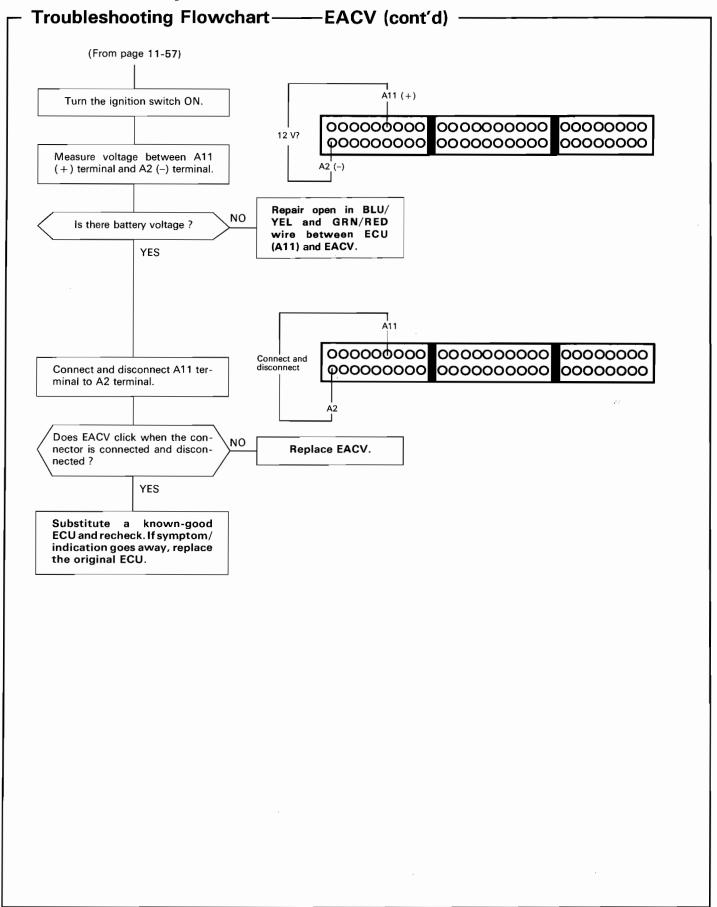
  —300 rpm.
- 2. When the coolant temperature is low, the EACV is opened to obtain the proper fast idle speed. The amount of bypassed air is thus controlled in relation to the coolant temperature.



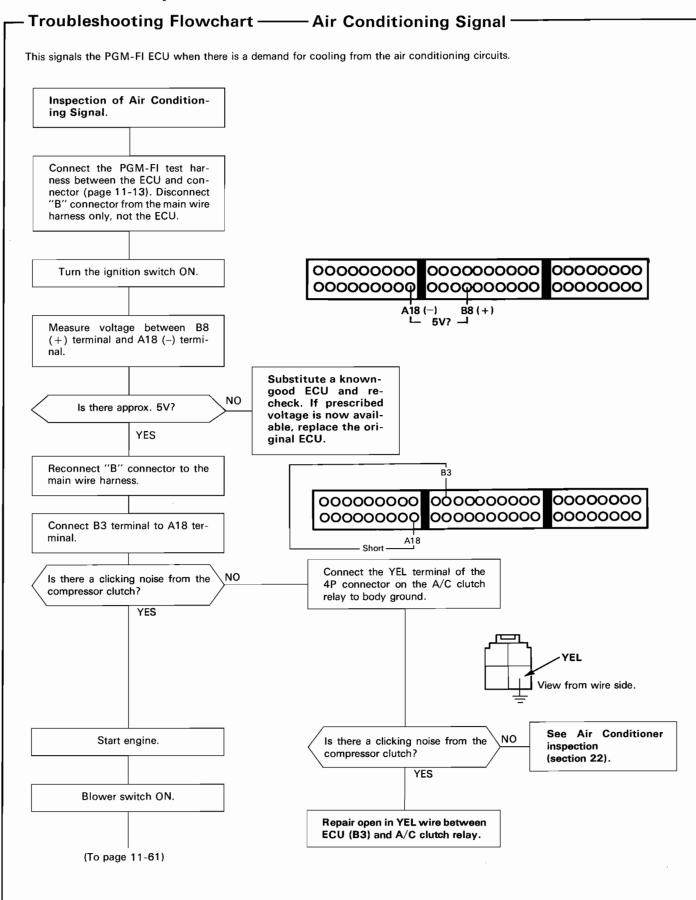




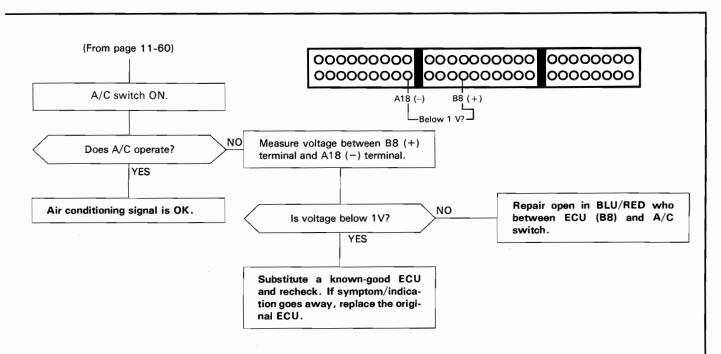


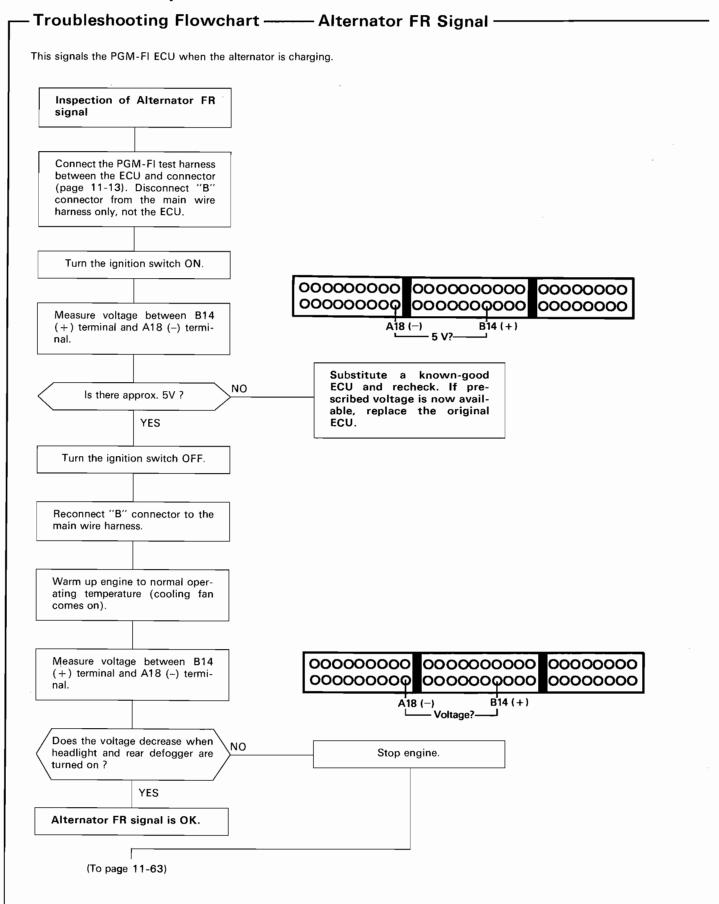




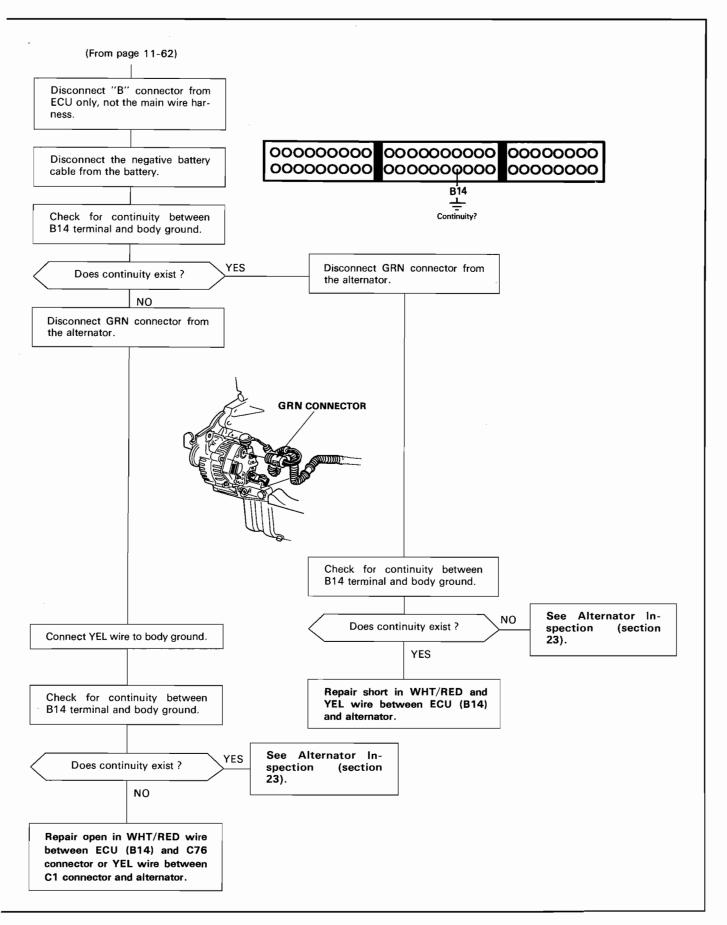


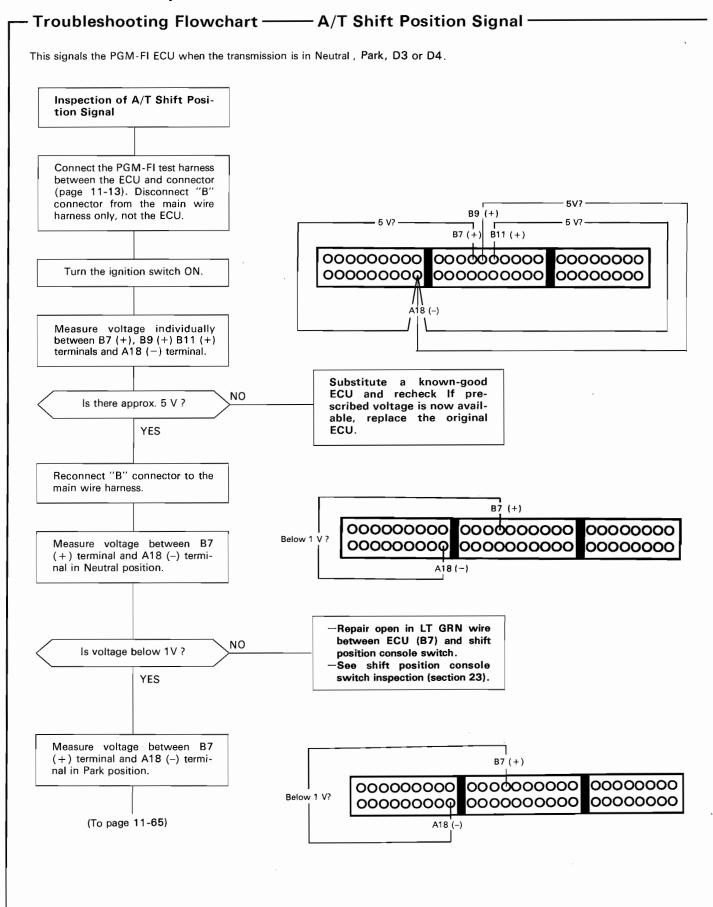




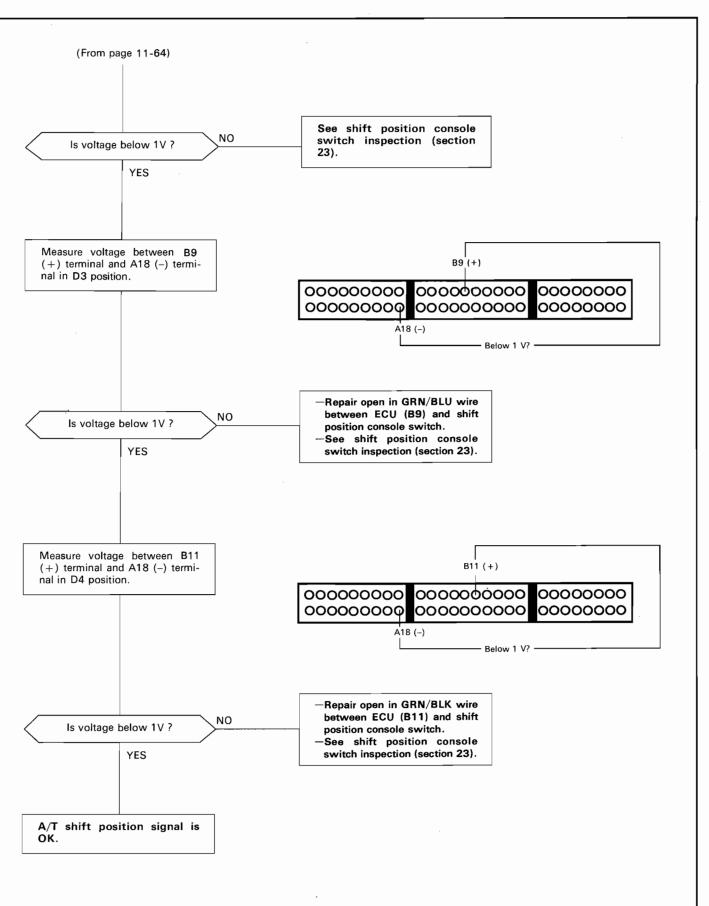


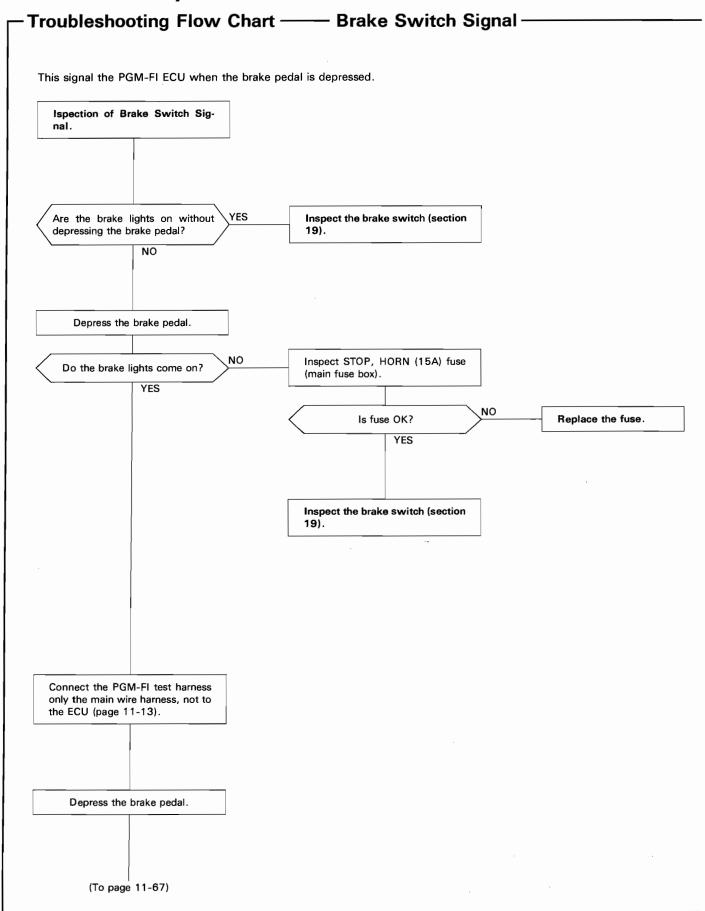




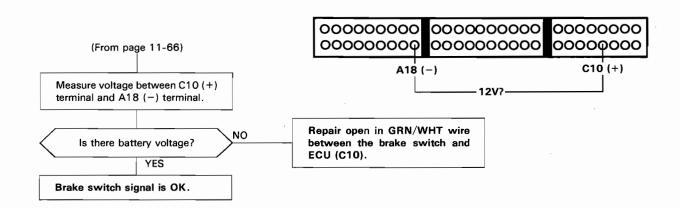


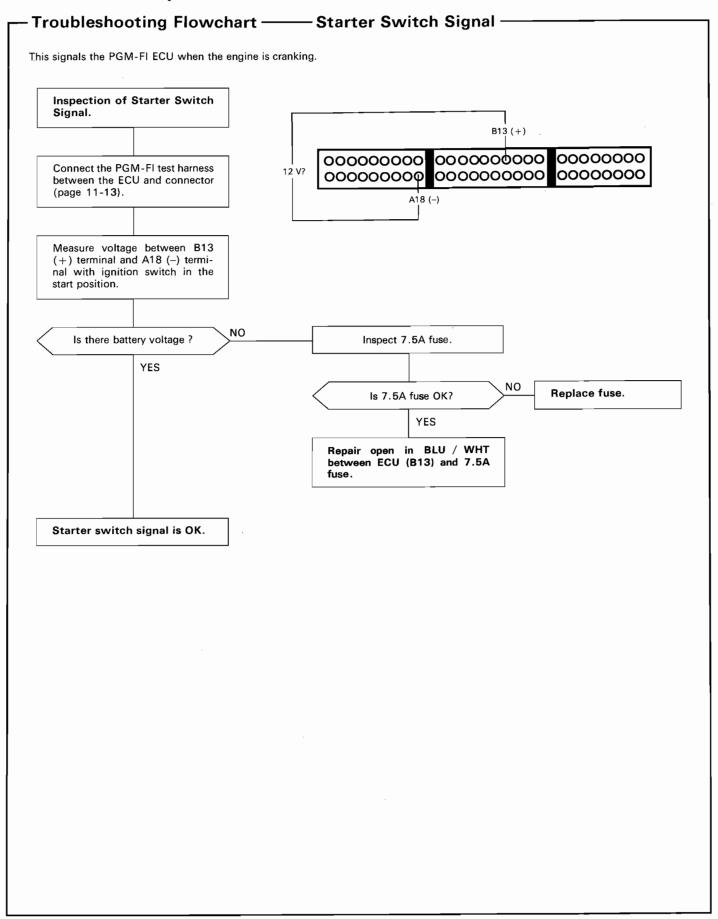










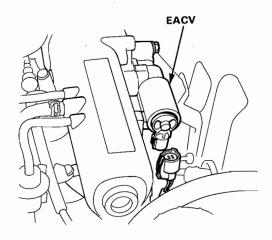




## Idle Speed Setting

#### Inspection/Adjustment

- Start the engine and warm it up to normal operating temperature (the cooling fan comes on).
- 2. Connect a tachometer.
- 3. Disconnect the 2P connector from the EACV.



 Check idling in no-load conditions in which the headlights, blower fan, rear defogger, cooling fan, and air conditioner are not operating.

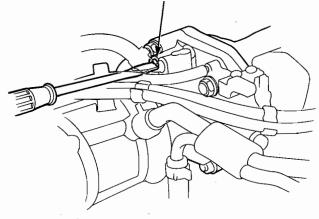
#### Idle speed should be:

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

Adjust the idle speed, if necessary, by turning the idle adjusting screw.

NOTE: If the idle speed is excessively high, check the throttle control system (page 11-97).





- 5. Turn the ignition switch OFF.
- Reconnect the 2P connector on the EACV, then remove HAZARD fuse at the battery positive terminal for 10 seconds to reset ECU.
- Idle the engine with no-load conditions in which the headlights, blower fan, rear defogger, cooling fan, and air conditioner are not oparating for one minute, then check the idle speed.

#### Idle speed should be:

Manual	750±50 rpm				
Automatic	700±50 rpm (in N or P)				

8. Idle the engine for one minute with headlights (Hi) and rear defogger ON and check the idle speed. If applicable, with Automatic transmission models, idle the engine for one minute in gear (except N or P) and check the idle speed.

#### Idle speed should be:

Manual	750±50 rpm				
Automatic	700±50 rpm (in № or 🕑)				

 Idle the engine for one minute with heater fan switch at HI (right end) and air conditioner on, then check the idle speed.

#### Idle speed should be:

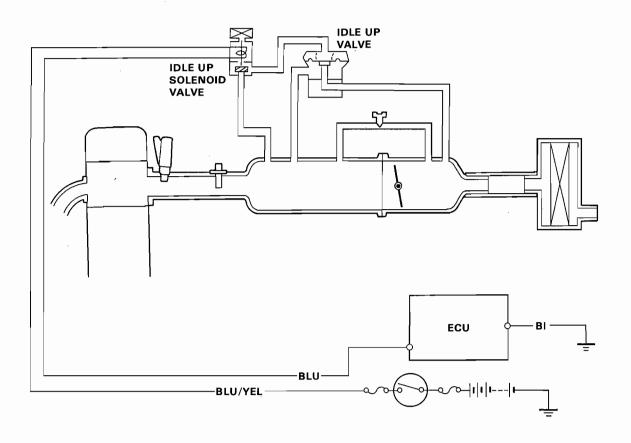
Manual	750±50 rpm				
Automatic	730±50 rpm (in N or P)				

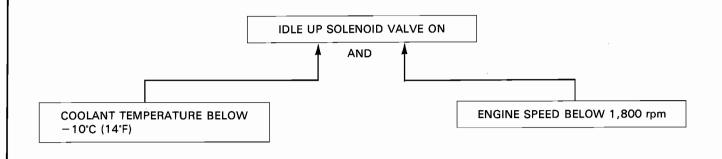
NOTE: If the idle speed is not within specifications, see System Troubleshooting Guide on page 11-54.

## - Idle Up Control -

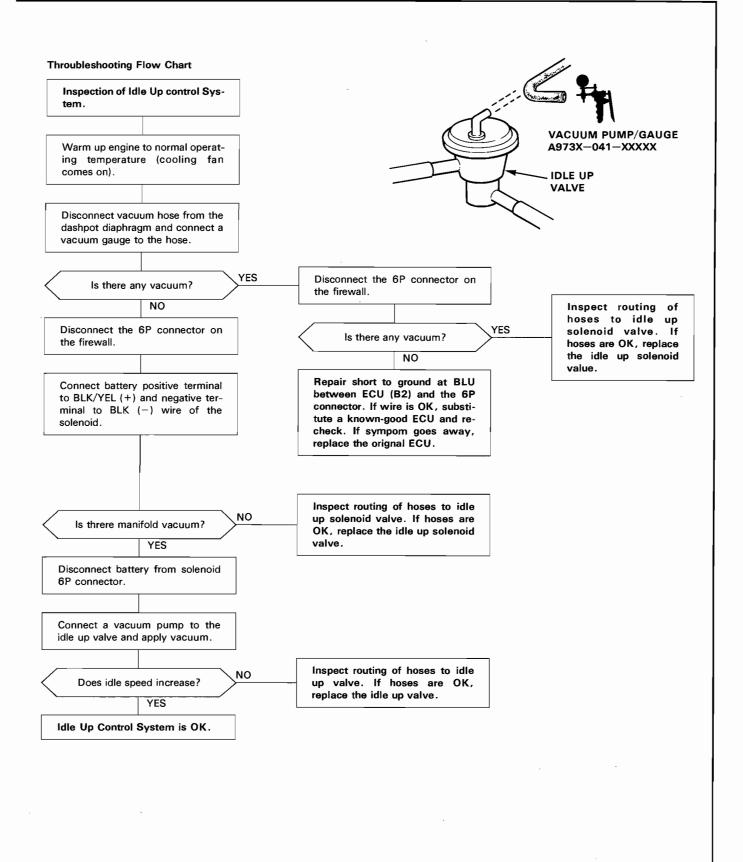
#### Description

The idle up valve employed to increase the air flow rate for fast idling at extremely low ambient temperature.









1.	When the idle speed is out of specification and LED does not blink CODE 14, check the following items:  • Adjust the idle speed (page 11-69).  • Air conditioning signal (page 11-60).  • Alternator FR signal (page 11-62).  • A/T shift position signal (page 11-64).  • Brake switch signal (page 11-66).  • Starter switch signal (page 11-68).  • Hoses and connections  • EACV and its mounting O-rings.
2.	If the above items are normal, substitute a known-good EACV and readjust the idle speed (page 11-65).
	<ul> <li>If the idle speed still cannot be adjusted to specification (and LED does not blink CODE 14) after EACV replacement, substitute a known-good ECU and recheck. If symptom goes away, replace the original ECU.</li> </ul>

# **Fuel Supply System**



## System Troubleshooting Guide -

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

PAGE	SUB SYSTEM	FUEL INJECTOR	INJECTOR RESISTER	PRESSURE REGULATOR	FUEL FILTER	FUEL PUMP	MAIN RELAY	CONTAMI- NATED FUEL
SYMPTOM		76	81	82	83	84	86	*
ENGINE WON'T START			3		_	1	2	
DIFFICULT TO START ENGINE WHEN COLD				3	2	1		
ROUGH IDLE		1		2				3
FREQUENT	WHILE WARM-	1			2	3		
STALLING	AFTER WARM- ING UP	1			3	2		
	MISFIRE OR ROUGH RUN- NING	1		2				3
POOR PERFORMANCE	FAILS EMISSION TEST	1		2				
	LOSS OF POWER				1	3		2

<sup>\*</sup> Fuel with dirt, water or a high percentage of alcohol is considered contaminated.

# **Fuel Supply System**

## **System 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.

#### Fuel Pressure -

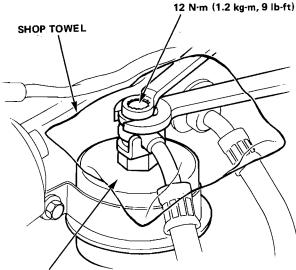
#### Relieving

#### **W** WARNING

- Do not smoke while working on the fuel system.
   Keep open flames or sparks away from the work area.
- Be sure to relieve fuel pressure while the engine is off

NOTE: Before disconnecting fuel pipes or hoses, release pressure from the system by loosening the 6 mm service bolt at top of the fuel filter.

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



#### **FUEL FILTER**

#### NOTE

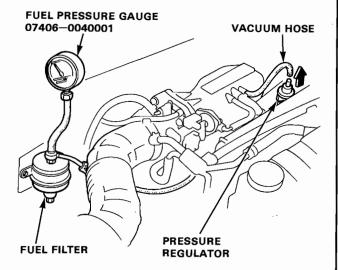
- A fuel pressure gauge can be attached at the 6 mm service bolt hole.
- Always replace the washer between the service bolt and the special banjo bolt, whenever the service bolt is loosened to relieve fuel pressure.
- Replace all washers whenever the bolts are removed to disassemble parts.



#### Inspection

- 1. Relieve fuel pressure (page 11-74).
- 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.
- Start the engine. Measure the fuel pressure with the engine idling and vacuum hose of the pressure regulator disconnected.

Pressure should be: 240—279 kPa (2.45—2.85  $kg/cm^2$  , 35-41 psi)



- If the fuel pressure is not as specified, first check the fuel pump (page 11-85). 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 11-82).
- If the pressure is lower than specified, inspect for:
  - · Clogged fuel filter
  - · Pressure regulator failure (page 11-82).
  - · Leakage in the fuel line

# **Fuel Supply System**

## - Fuel Injectors

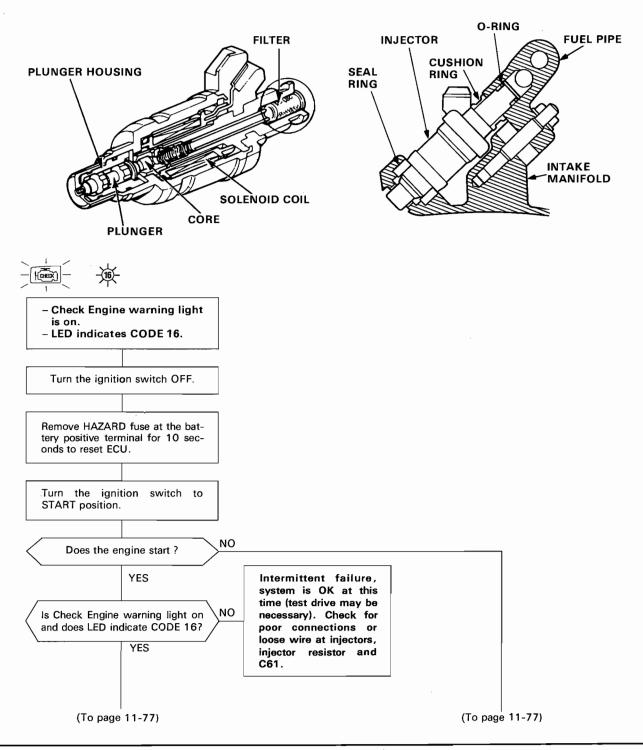
#### **Troubleshooting Flowchart**



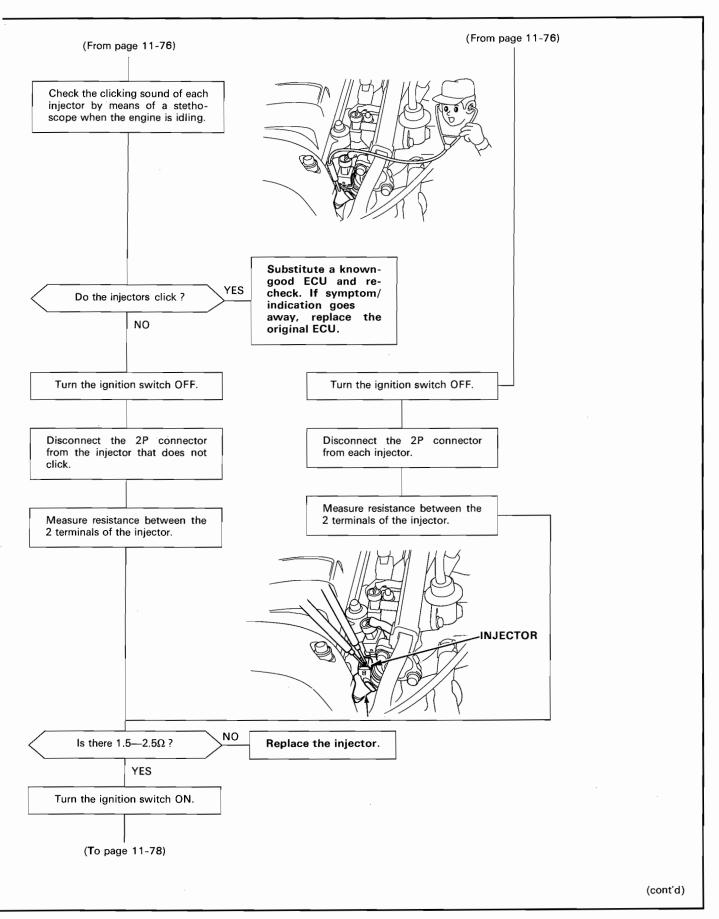


Self-diagnosis LED indicator blinks sixteen times: A problem in the fuel injector circuit.

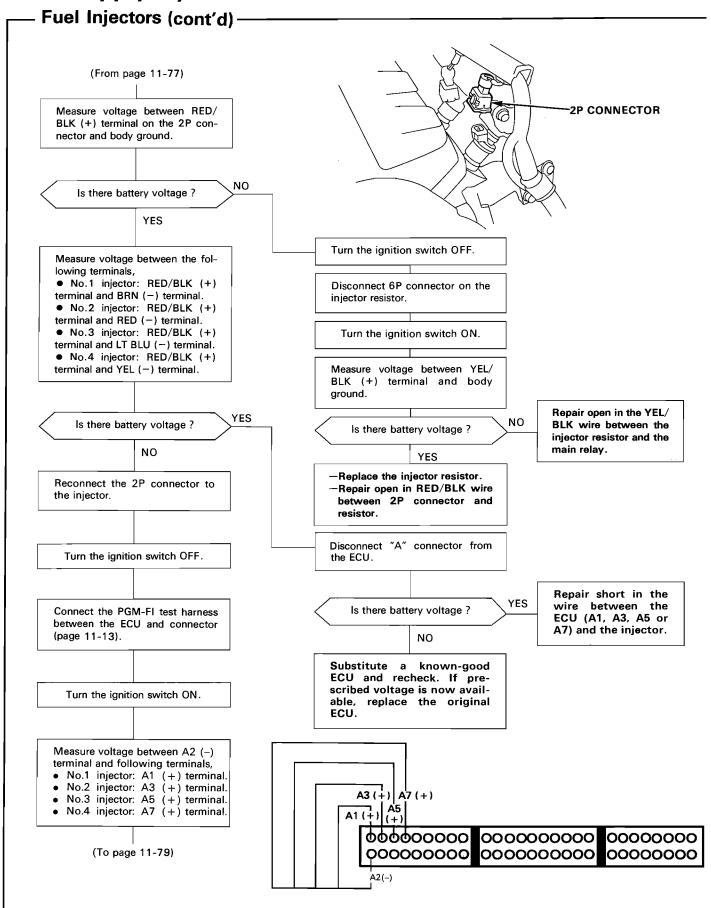
The injectors are the solenoid-actuated constant-stroke pintle type consisting of a solenoid, plunger needle valve and housing. When current is applied to the solenoid coil, the valve lifts up and pressurized fuel is injected close to the intake valve. Because the needle valve lift and the fuel pressure 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.



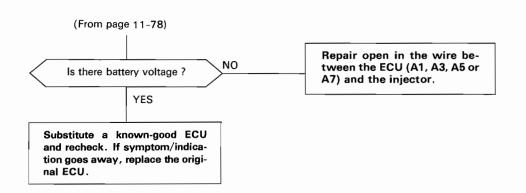




## **Fuel Supply System**







(cont'd)

## **Fuel Supply System**

### - Fuel Injectors (cont'd) -

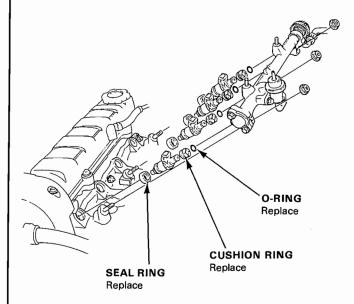
#### Replacement

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

- 1. Relieve fuel pressure (page 11-74).
- 2. Disconnect the connector of the injectors.
- 3. 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.

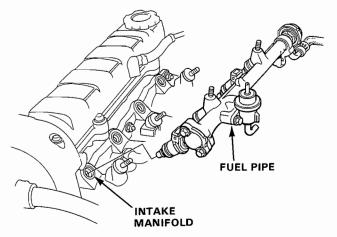
- 4. Loosen the retainer nuts on the fuel pipe.
- 5. Disconnect the fuel pipe.
- 6. Remove the injectors from the intake manifold.



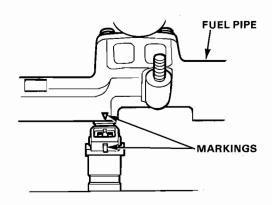
- 7. Slide new cushion rings onto the injector.
- 8. Coat new O-rings with clean engine oil and put them on the injectors.
- 9. Insert the injectors into the fuel pipe first.

- Coat new seal rings with clean engine oil and press them into the intake manifold.
- 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.



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



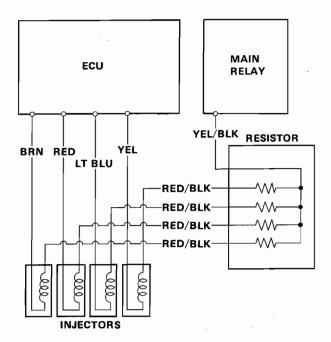
- 13. Install and tighten the retainer nuts.
- 14. Connect the vacuum hose and fuel return hose to the pressure regulator.
- 15. Install the connector on the injectors.
- 16. Turn the ignition switch ON but do not operate the starter. After the fuel pump runs for approximately two seconds, the fuel pressure in the fuel line rises. Repeat this two or three times, then check whether there is any fuel leakage.



### Injector Resistor -

### Description

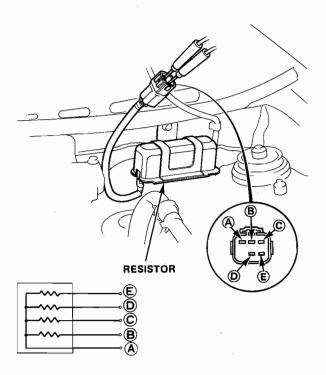
The resistor lowers the current supplied to the injectors to prevent damage to the injector coils. This allows a faster response time of the injectors.



### **Testing**

- 1. Disconnect the resistor connector.
- Check for resistance between each of the resistor terminals (E, D, C and B) and the power terminal (A).

Resistance should be: 5–7  $\Omega$ 



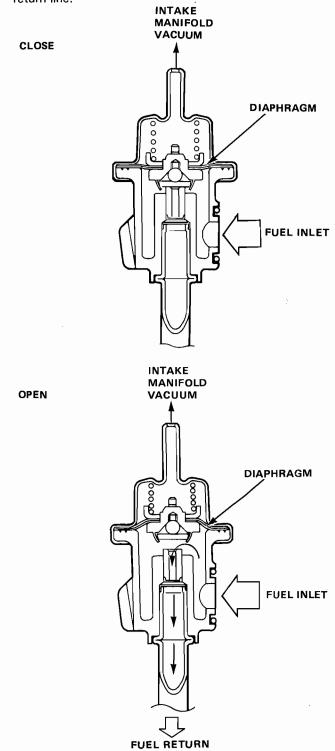
 Replace the resistor with a new one if any of the resistances are outside of the specification.

## **Fuel Supply System**

## - Pressure Regulator

### Description

The fuel pressure regulator maintains a constant fuel pressure to the injectors. When the difference between the fuel pressure and manifold pressure exceeds 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.



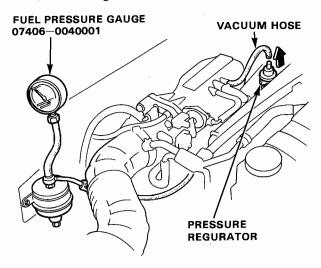
### **Testing**

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

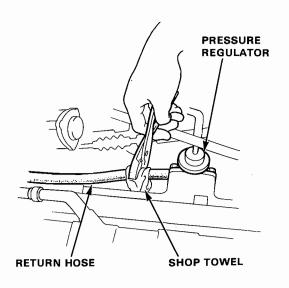
 Attach a pressure gauge to the service port of the fuel filter (page 11-75).

### Pressure should be:

240-279 kPa (2.45-2.85 kg/cm<sup>2</sup>, 35-41 psi) (with the regulator vacuum hose disconnected)



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



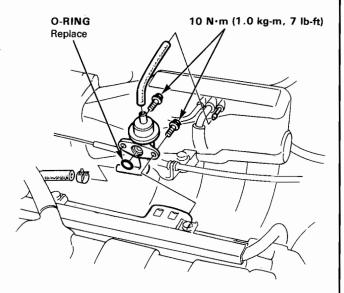
 If the pressure does not rise, replace the regulator and retest.



#### Replacement

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

- 1. Place a shop towel under pressure regulator, then relieve fuel pressure (page 11-74).
- 2. Disconnect the vacuum hose and fuel return hose.
- 3. 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.

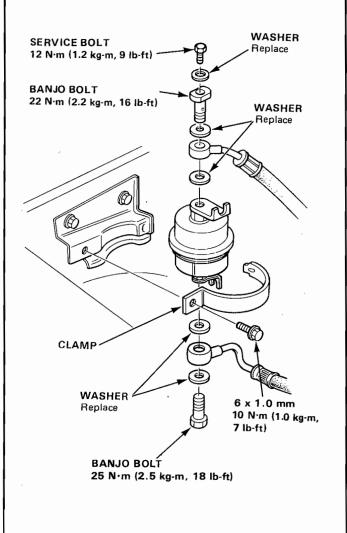
### Fuel Filter -

### Replacement

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

The filter should be replaced: every 4 years or 60,000 miles (96,000 km), whichever comes first or whenever the fuel pressure drops below the specified value (240–279 kpa, 2.45–2.85 kg/cm², 35–41 psi with the vacuum pressure hose disconnected) after making sure that the fuel pump and the pressure regulator are OK.

- 1. Place a shop towel under and around the fuel filter.
- 2. Relieve fuel pressure (page 11-74).
- Remove the 12 mm banjo bolt and the fuel feed pipe from the filter.
- 4. Remove the fuel filter clamp and fuel filter.
- 5. When assembling, use new washers, as shown.



## **Fuel Supply System**

## -Fuel Pump-

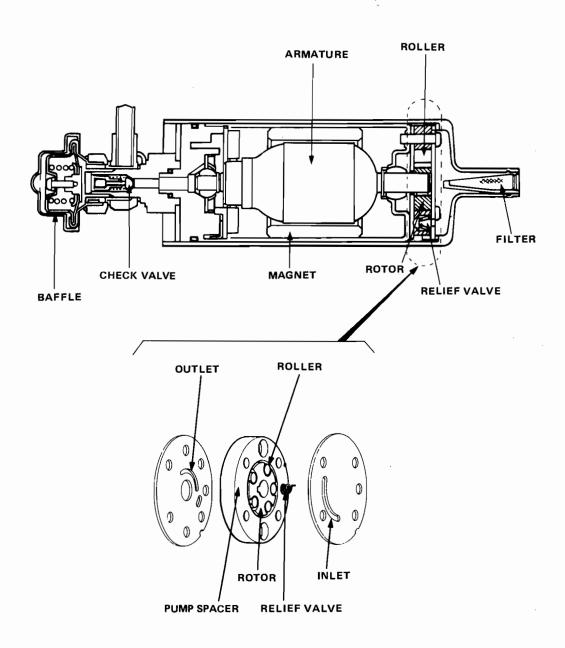
### Description

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 restarting.

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.



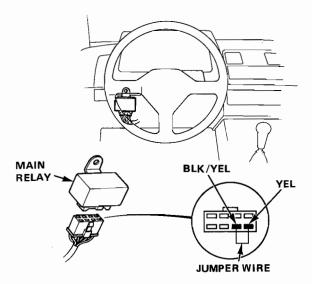


If you suspect a problem with the fuel pump, check that the fuel pump actually runs; it should make noise for 2 seconds when the ignition switch is turned on. If the pump does not make noise, check as follows:

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

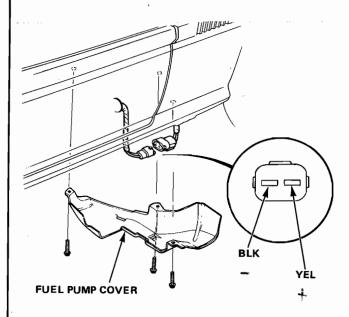
CAUTION: Be sure to turn the ignition switch OFF before disconnecting the wires.

Connect the BLK/YEL wire and YEL wire with a jumper wire.



4. Turn the ignition switch ON.

Check that battery voltage is available at the fuel pump wire connector (positive probe to the YEL wire, negative probe to the BLK wire)



- If battery voltage is available, replace the fuel pump.
- If there is no voltage, check the main relay and wire harness(page 11-87).

(cont'd)

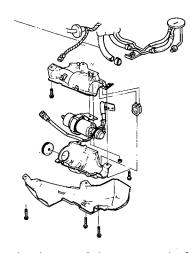
## **Fuel Supply System**

### Fuel Pump (cont'd) -

### Replacement

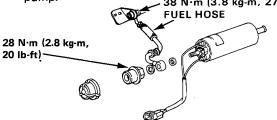
WWARNING Do not smoke while working on fuel system. Keep open flames away from your work area.

- Relieve fuel pressure (page 11-74).
- Jack up car and place jack stands in proper locations.
- 3. Remove left rear wheel.
- 4. Remove the fuel pump cover.
- Remove the three bolts, then remove the fuel pump with its mount.
- 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.

  38 N·m (3.8 kg-m, 27 lb-ft)



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.
- Reconnect the electrical wires and reinstall the fuel pump.
- 12. Check the fuel pump connections for leaks.

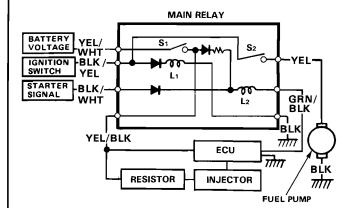
CAUTION: Clean the flared joints of high pressure hoses throughly before reconnecting them.

### 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.

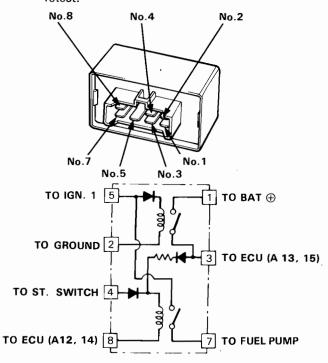
The second relay is energized for 2 seconds, when the ignition is switched on and when the engine is running which supplies power to the fuel pump.





#### **Relay Testing**

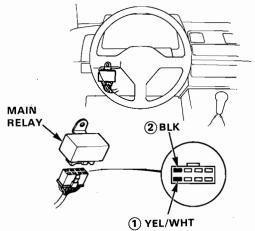
- 1. Remove the main relay.
- Attach the battery positive terminal to the No. 4 terminal and the battery negative terminal to the No. 8 terminal of the main relay. Then check for continuity between the No. 5 terminal and No. 7 terminal of the main relay.
  - If there is continuity, go on to step 3.
  - If there is no continuity, replace the relay and retest.



- Attach the battery positive terminal to the No. 5 terminal and the battery negative terminal to the No. 2 terminal of the main relay. Then check that there is continuity between the No. 1 terminal and No. 3 terminal of the main relay.
  - If there is continuity, go on to step 4.
  - If there is no continuity, replace the relay and retest.
- 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 retest.

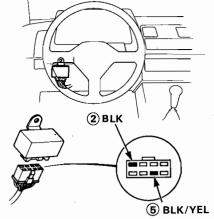
#### **Harness Testing**

- 1. Keep the ignition switch in the OFF position.
- 2. Disconnect the main relay connector.
- 3. Check for continuity between the BLK wire ② in the connector and body ground.
- Attach the positive probe of voltmeter to the YEL/WHT wire ① and the negative probe to the BLK 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 EFI fuse (15A) in the main fuse box.
- Attach the positive probe of voltmeter to the BLK/YEL wire (5) and the negative probe to the BLK wire (2).



6. Turn the ignition switch ON.

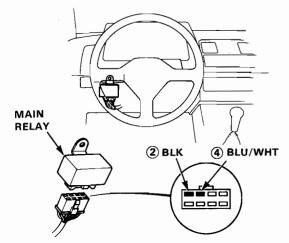
Battery voltage should be available.

 If there is no voltage, check No. 4 fuse and the wiring from the ignition switch to the fuse box and wiring from the fuse box to the main relay. (cont'd)

## **Fuel Supply System**

### - Main Relay (cont'd)-

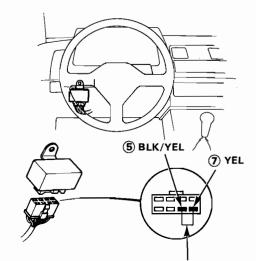
 Attach the positive probe of voltmeter to the BLU/ WHT wire @ and the negative probe to the BLK wire ②.



8. Turn the ignition switch to START position.

Approximately 10 V should be available.

- If there is no voltage, check the 7.5 A fuse and the wiring between the ignition switch and fuse box and from the fuse box main relay as well as 7.5 A fuse.
- Connect a jumper wire between the BLK/YEL wire sand YEL wire .



10. Turn the ignition switch ON. JUMPER WIRE

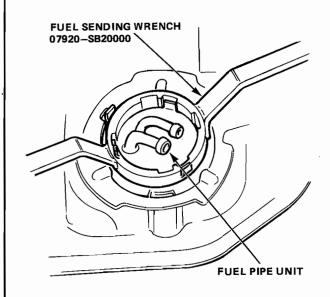
The fuel pump should work.

 If the fuel pump does not work, check the wiring between the main relay and fuel pump, and the wiring from the fuel pump to the ground (BLK wire).

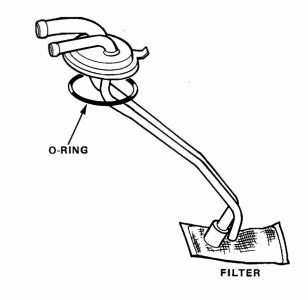
### Fuel Pipe Unit

### Replacement

- 1. Remove the fuel tank (page 11-89).
- 2. Remove the fuel pipe unit.



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





### Fuel Tank -

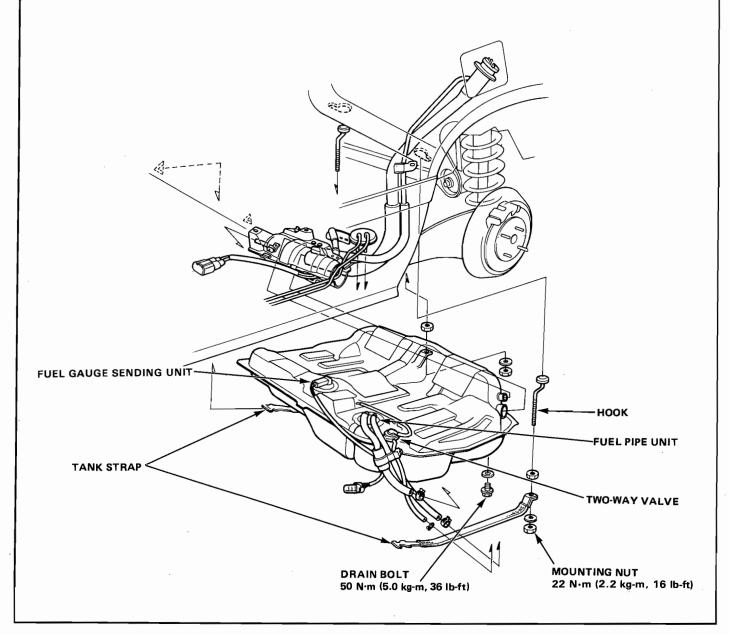
### Replacement

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

- 1. Block front wheels. Jack up the rear of the car and support with jackstands.
- 2. Remove the drain bolt and drain the fuel into an approved container.
- Remove the fuel pump cover.
- Disconnect the sending unit connector.
- 5. Disconnect the hoses.

### CAUTION:

- When disconnecting the hoses, slide back the clamps, then twist hoses as you pull, to avoid damaging them.
- Clean the flared joint of high pressure hoses throughly before reconnecting them.
- 6. Place a jack, or other support, under the tank.
- 7. Remove the strap nuts and let the straps fall free.
- Remove the fuel tank.
  - NOTE: The tank may stick 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.



## System Troubleshooting Guide -

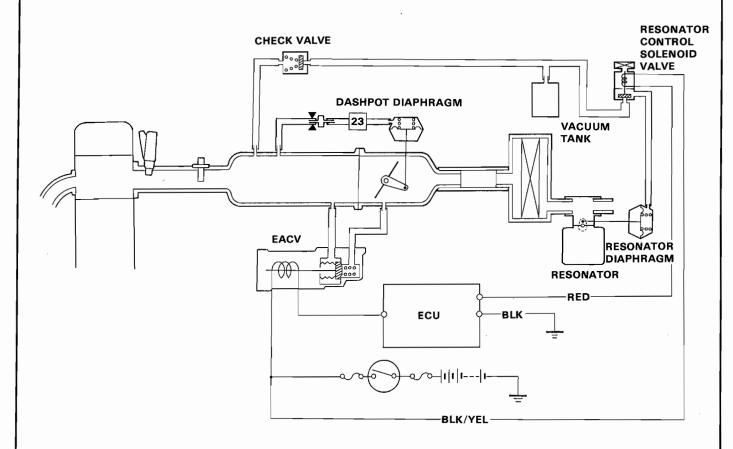
NOTE: Across each row in the chart, the sub systems that could be sources of a symptom are ranked in the order they should be inspected starting with ①. Find the symptom in the left column, read across to the most likely source, then refer to the page listed at the top of that column. If inspection shows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

PAGE	SUB SYSTEM	THROTTLE CABLE	THROTTLE BODY	THROTTLE CONTROL SYSTEM
SYMPTOM		92	93	96
DIFFICULT TO START ENGINE WHEN COLD			1	
WHEN COLD FAST IDLE OUT OF SPEC		3	2	1
WHEN WARM RPM TOO HIGH		3	2	1
WHEN WARM RPM TOO LOW			1	
FREQUENT STALLING WHILE WARMING UP		1	2	
LOSS OF POWER		2	1)	



### System Description -

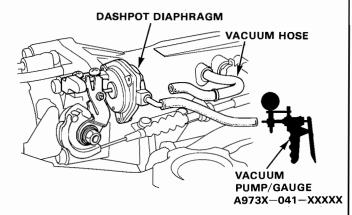
The system supplies air for all engine needs. It consists of the air intake pipe, throttle body, EACV, resonator control system, throttle control system and intake manifold. A resonator in the air intake pipe provides additional silencing as air drawn into the system.



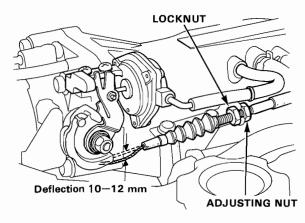
### -Throttle Cable-

### Inspection/Adjustment

- Warm up the engine to normal operating temperature (cooling fan comes on).
- Check that the throttle cable operates smoothly with no binding or sticking. Repair as necessary.
- Disconnect #23 hose from the dashpot diaphragm and connect a vacuum pump to the diaphragm. Apply vacuum.



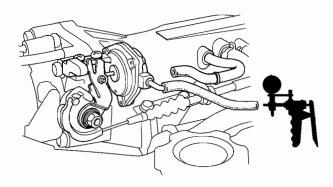
 Check cable free play at the throttle linkage. Cable deflection should be 10—12 mm (0.39—0.47 in.)



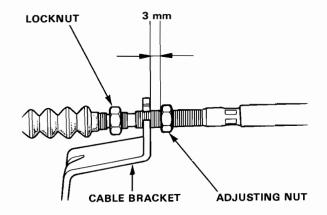
- If deflection is not within specs, loosen the locknut and turn the adjusting nut until the deflection is as specified.
- 6. With the cable properly adjusted, check the throttle valve to be sure it opens fully when you push the accelerator pedal to the floor. Also check the throttle valve to be sure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

#### Installation

- Fully open the throttle valve, then install the throttle cable in the throttle linkage and install the cable housing in the cable bracket.
- Warm up the engine to normal operating temperature (the cooling fan comes on).
- Disconnect #23 hose from the dashpot diaphragm and connect a vacuum pump to the diaphragm. Apply vacuum.



- Hold the cable sheath, removing all slack from the cable.
- Turn the adjusting nut until it is 3 mm away from the cable bracket.
- Tighten the locknut.



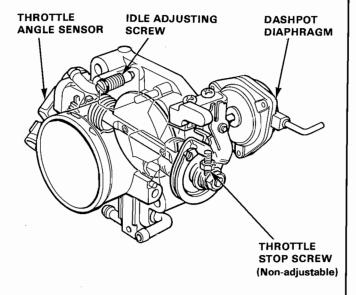
Disconnect the vacuum pump and connect the #23 vacuum hose.



### -Throttle Body -

#### Description

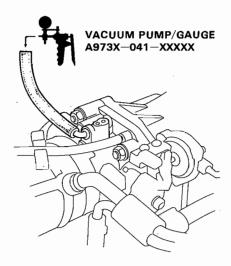
The throttle body is of the single-barrel side-draft type. The lower portion of the throttle valve is heated by engine coolant from the cylinder head. The idle adjusting screw which opens throttle plate and the canister/purge port are located on the top of the throttle body.



#### Inspection

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

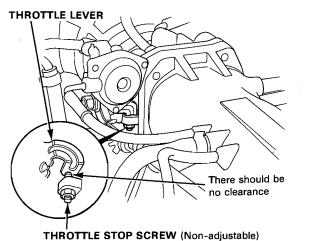
- Start the engine and allow to reach normal operating temperature (cooling fan comes on).
- Disconnect the vacuum hose (to the canister) from the top of the throttle body; connect a vacuum gauge to the throttle body.



- Allow the engine to idle and check that the gauge indicates no vacuum.
  - If there is vacuum, check the throttle control system (page 11-97).
- Check that vacuum is indicated on the gauge when the throttle is opened slightly from idle.
  - If the gauge indicates no vacuum, check the throttle body port. If the throttle body port is clogged, clean it with carburetor cleaner.
- Stop the engine and check that the throttle cable operates smoothly witout 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.

(cont'd)

## - Throttle Body (cont'd)



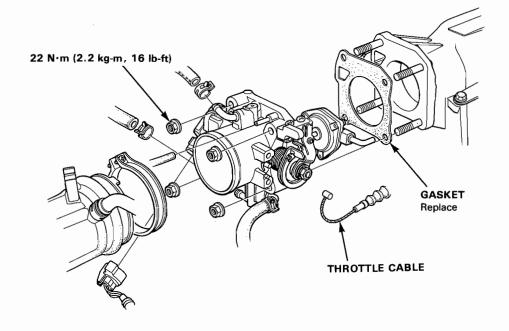
THROTTLE STOP SCREW (Non-adjustable)

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



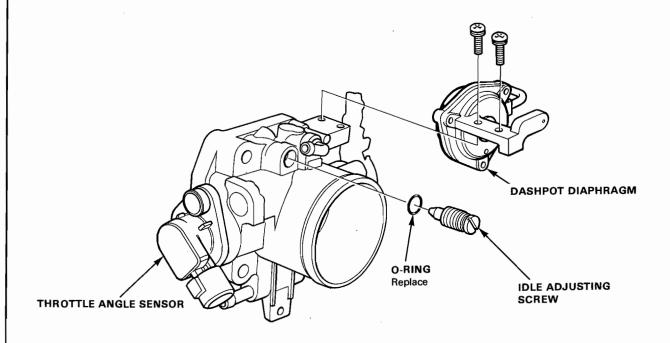
### -Throttle Body -

### Disassembly



### CAUTION:

- The throttle stop screw in non-adjustable.
- After reassembly, adjust the throttle cable (page 11-92).



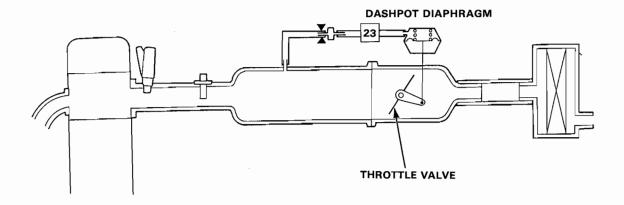
### - Throttle Control System -

### Description

The dashpot diaphragm functions as a cranking opener.

When the engine is at idle, intake manifold vacuum is applied on the dashpot diaphragm and pulls up the diaphragm rod, so that the throttle valve is in the idle position.

During cranking with the starter, the spring in the dashpot diaphragm pushes the throttle valve open a certain amount for assisting engine starting.



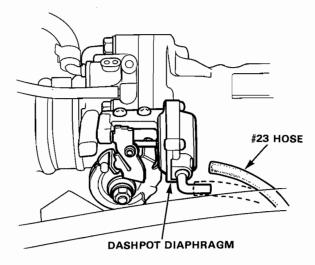


#### **Testing**

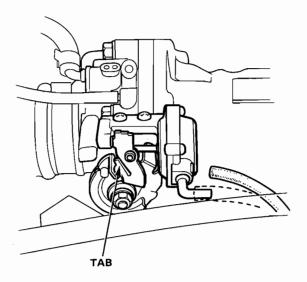
- Start the engine and warm up to normal operating temperature (the cooling fan comes on).
- Disconnect the #23 vacuum hose from the dashpot diaphragm and check the engine speed.

### Engine speed should be:

Manual	2,500±500 rpm
Automatic	2,500±500 rpm

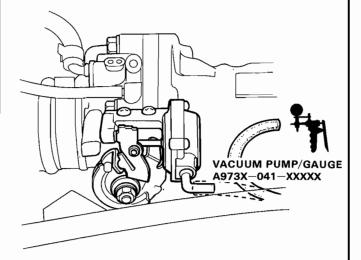


 If the engine speed is excessively high, adjust the engine speed by bending TAB.



 If the engine speed does not change, connect a vacuum pump to the #23 vacuum hose and check vacuum.

There should be vacuum.



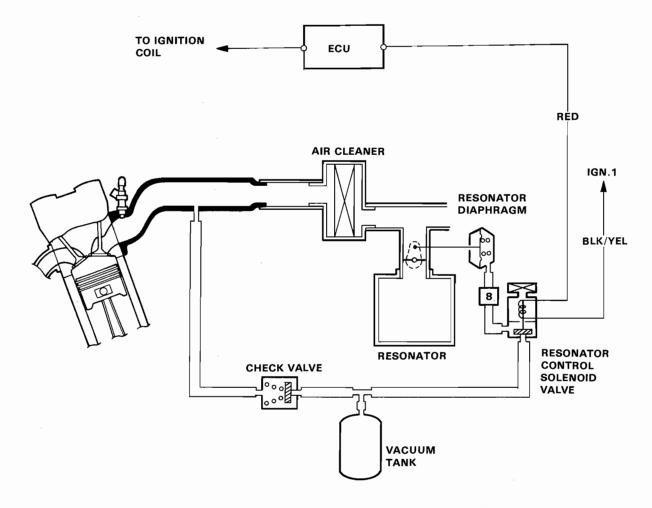
- If there is no vacuum, check the #23 vacuum hose for proper connection, cracks, blockage or disconnected hose and replace the 3-way joint.
- If there is vacuum, replace the dashpot diaphragm and retest.
- Reconnect the #23 vacuum hose and check the idle speed.

Idle speed should be within specification (page 11-69).

## - Resonator Control System

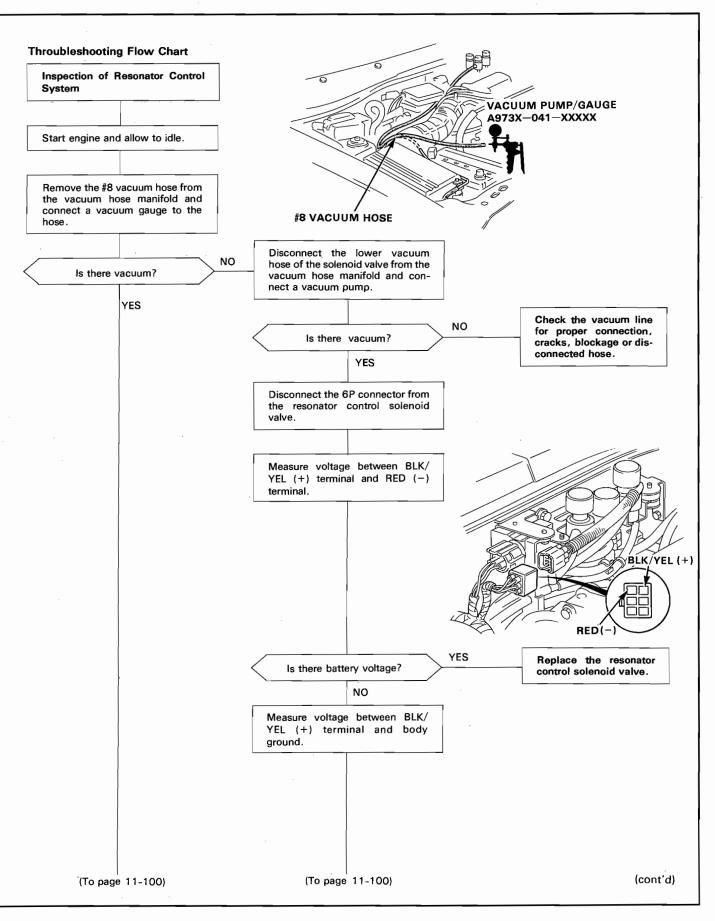
### Description

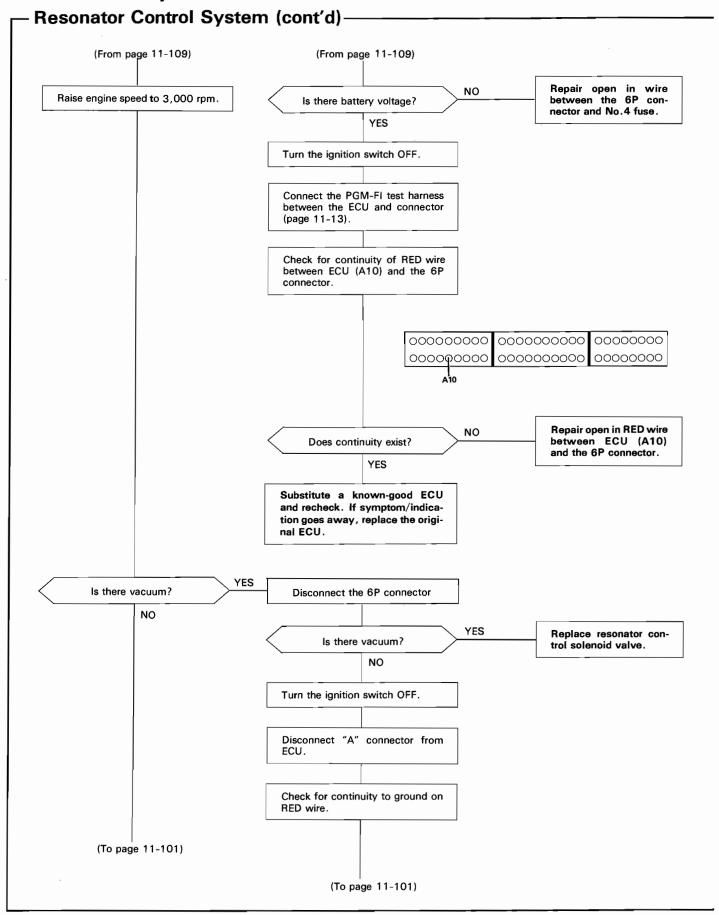
The resonator control system decreases air intake noise.



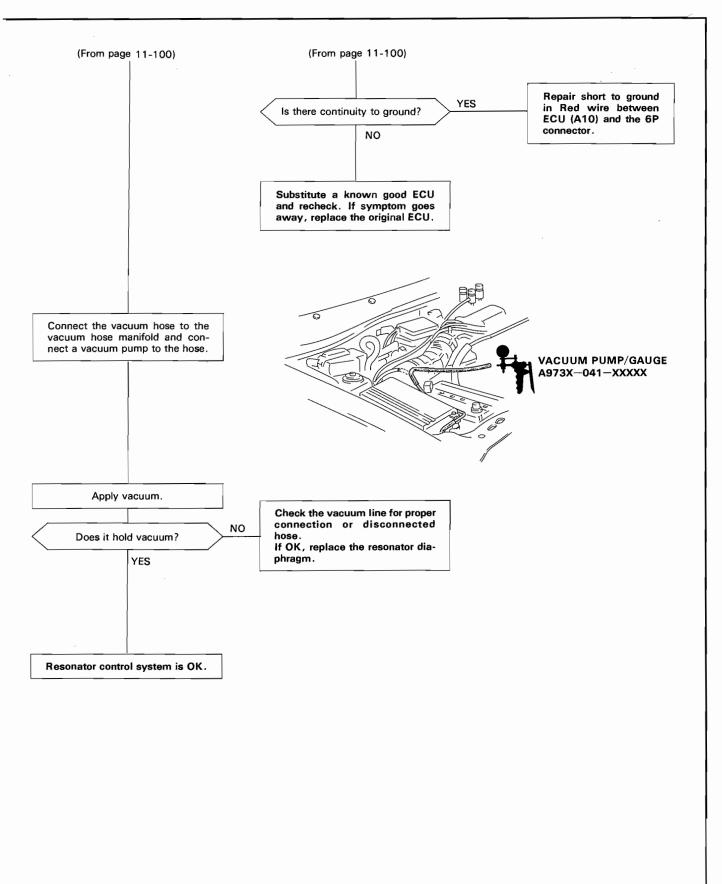
When the engine speed is below 3,000 rpm, the ECU supplies current to the resonator control solenoid valve. This opens the solenoid valve sending intake manifold vacuum to the resonator diaphragm.











## **Emission Control System**

## System Troubleshooting Guide -

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

PAGE	SUB SYSTEM	CATALYTIC CONVERTER	POSITIVE CRANKCASE VENTILATION SYSTEM	EVAPORATIVE EMISSION CONTROLS
SYMPTOM		104	105	106
ROUGH IDLE			1	
POOR	FAILS EMISSION TEST	1		2
PERFORMANCE	LOSS OF POWER	1		



### System Description-

The emission control system includes a three-way catalytic converter, crankcase ventilation system and evaporative control system.

The emission control system is designed to meet federal and state emission standards.

### Tailpipe Emission

### Inspection

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

- Start the engine and warm up to normal operating temperature (cooling fan comes on).
- 2. Connect tachometer.
- Check idle speed and adjust the idle speed, if necessary (page 11-69).
- 4. Warm up and calibrate the CO meter according to the meter manufacturer's instructions.
- Check idle CO with the headlights, heater blower, rear window defogger, cooling fan, and air conditioner off.

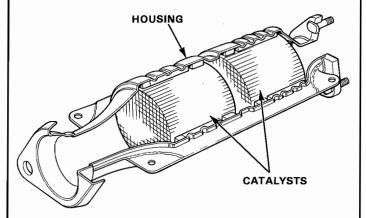
CO meter should indicate 0.1% maximum.

## **Emission Control System**

### - Catalytic Converter -

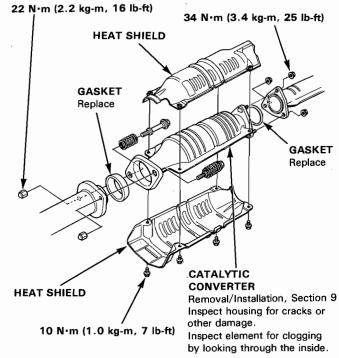
### Description

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 any of the visible area is damaged or plugged.

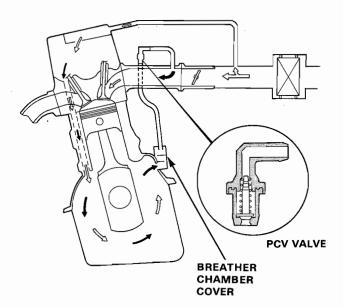




### Positive Crankcase Ventilation System

### 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 in lifted in proportion to intake manifold vacuum and the blow-by gas is drawn directly into the intake manifold.

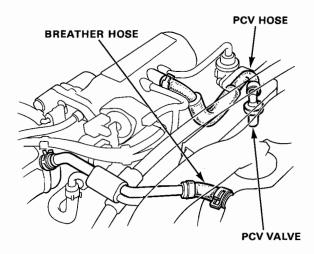


← : BLOW BY VAPOR

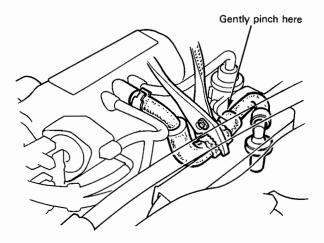
← : FRESH AIR

#### Inspection

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



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 recheck.

## **Emission Control System**

### **Evaporative Emission Controls**

#### Description

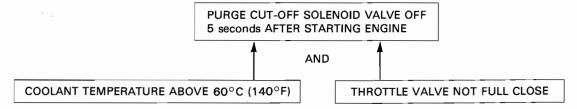
The evaporative controls are designed to minimize the amount of fuel vapor escaping to the atmosphere. The system consists of the following components:

#### A. Charcoal Canister

A canister for the temporary storage of fuel vapor until the fuel vapor can be purged from the canister into the engine and burned.

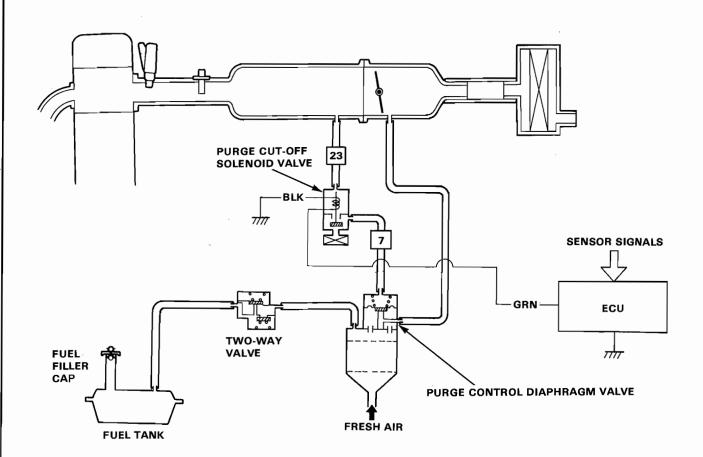
### B. Vapor Purge Control System

Canister purging is accomplished by drawing fresh air through the canister and into a port on the throttle body. The ported vacuum is controlled by the purge control diaphragm valve and the purge cut-off solenoid valve.

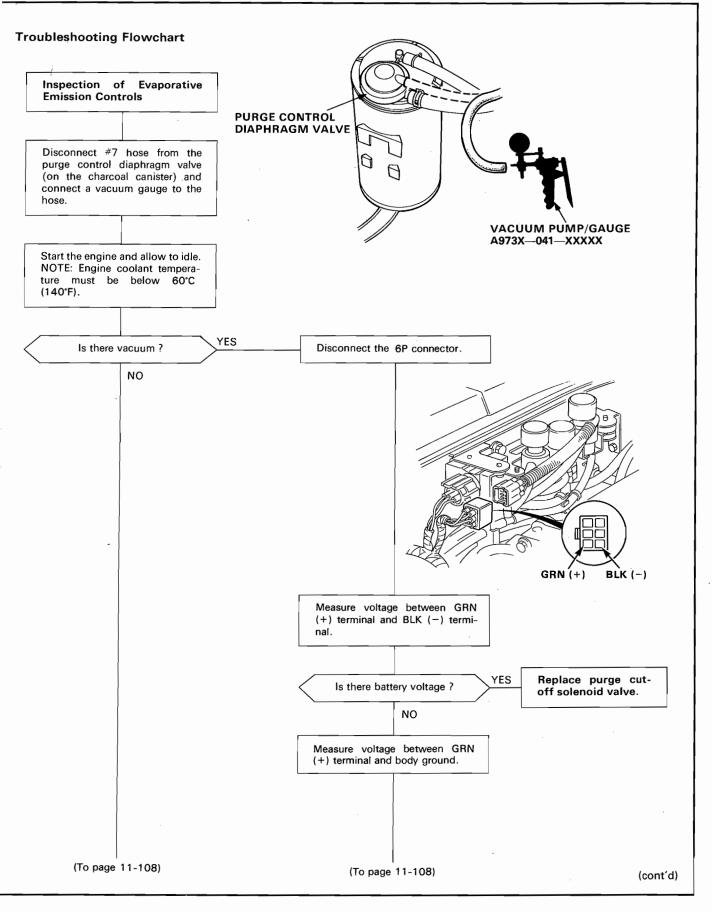


### C. Fuel Tank Vapor Control System

When fuel vapor pressure in the fuel tank is higher than the set value of the two-way valve, the valve opens and regulates the flow of fuel vapor to the caniser.

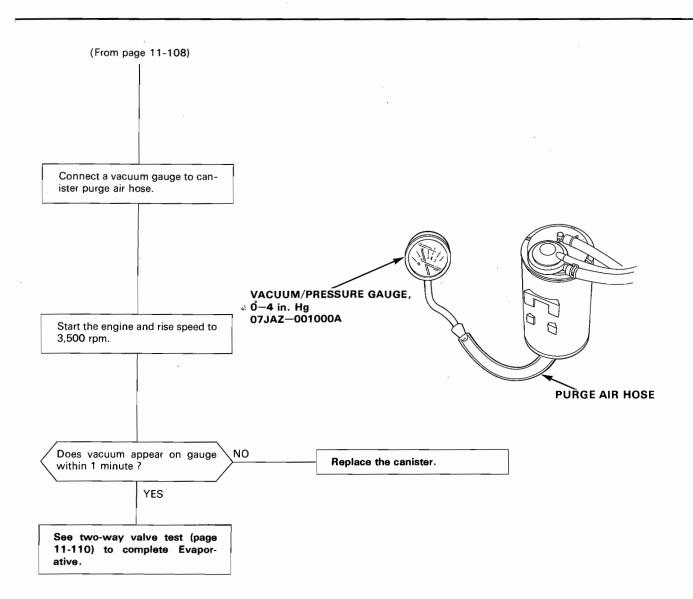






**Emission Control System**  Evaporative Emission Control (cont'd)-(From page 11-107) (From page 11-107) Repair open in BLK YES wire between 6P con-Warm up the engine to normal Is there battery voltage? operating temperature (cooling nector and G5. fan comes on). NO Turn the ignition switch OFF. Connect the PGM-FI test harness to the main wire harness only, not the ECU. 00000000 000000000 0000000000 00000000 000000000 0000000 Check for continuity of GRN wire between ECU (A6) and the 6P connector. Repair open in GRN NO Does continuity exist? wire between ECU (A6) and the 6P connector. Check for vacuum at #7 hose 5 seconds after starting the engine YES with the throttle valve is slightly opened. Substitute a known-good ECU and recheck. If symptom/indication goes away, replace the original ECU. NO Is there manifold vacuum? Disconnect the 6P connector. YES Replace purge cut-Is there vacuum? off solenoid valve. YES Turn the ignition switch OFF. Substitute a known good ECU Reconnect the hose. and recheck. If symptom goes away, replace the original ECU. Remove fuel filler cap. (To page 11-109)



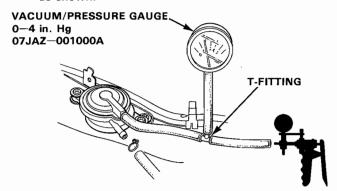


## **Emission Control System**

## - Evaporative Emission Controls

### **Two-Way Valve Test**

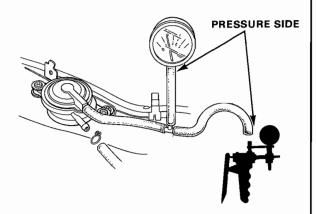
- 1. Remove the fuel filler cap.
- Remove vapor line from the fuel tank and connect to T-fitting from vacuum gauge and vacuum pump as shown.



3. Slowly apply vacuum while watching the gauge.

Vacuum should stabilize momentarily at 5 to 15 mmHg (0.2 to 0.6 in. Hg).

- If vacuum stabilizes (valve opens) below 5 mmHg (0.2 in. Hg) or above 15 mmHg (0.6 in. Hg), install new valve and retest.
- 4. Move vacuum pump hose from vacuum to pressure fitting, and move vacuum gauge hose from vacuum to pressure side as shown.



5. Slowly pressurize the vapor line while watching the gauge.

Pressure should stabilize at 10 to 35 mmHg (0.4 to 1.4 in. Hg).

- If pressure momentarily stabilizes (valve opens) at 10 to 35 mmHg (0.4 to 1.4 in. Hg), the valve is OK.
- If pressure stabilizes below 10 mmHg (0.4 in. Hg) or above 35 mmHg (1.4 in. Hg), install a new valve and retest.

# **Transaxle**

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# Clutch

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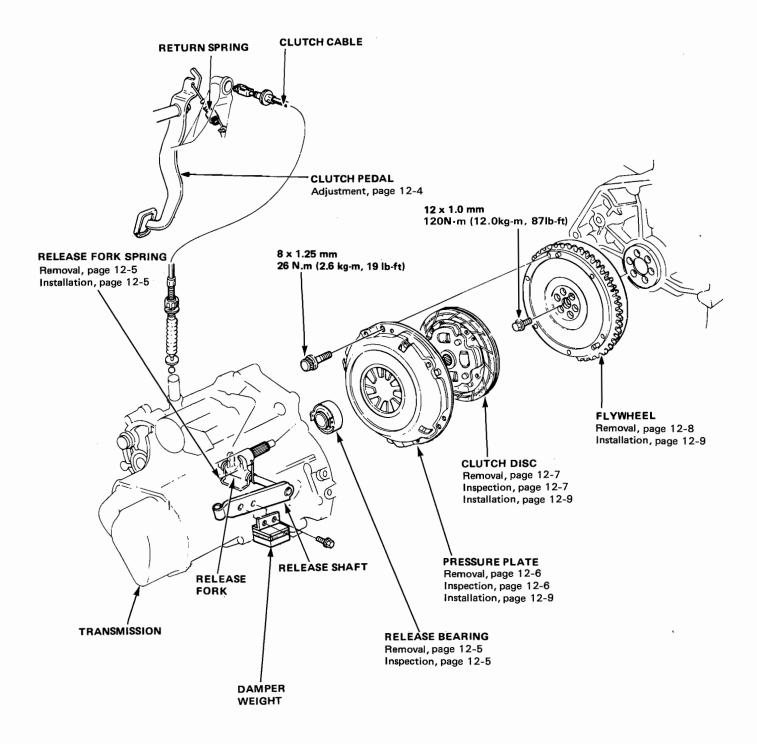
# Special Tools

Ref. No.	Tool Number	Description	Q'ty	Page Reference
① ②	07974-6890101 07924-PD20003	Clutch Disc Alignment Tool Ring Gear Holder	1 1	12-6, 12-9 12-6, 12-7, 12-8, 12-9
	①		2	-

### **Illustrated Index**



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



### **Clutch Adjustment**

- Measure the clutch pedal disengagement height. Measure the clutch pedal free play.
- Adjust the clutch free play by turning the adjusting nut.
- GREASE 4. Make sure that there is 4.0-5.0 mm (0.16-0.20 in) free play at the tip of release arm after the adjustment. **CLUTCH PEDAL STROKE** 140-145 mm (5.51-5.71 in.) CLUTCH PEDAL HEIGHT: 149 mm (5.87 in.) to carpet. **CLUTCH CABLE CLUTCH PEDAL FREE PLAY:** ADJUSTING NUT 16-21 mm (0.63-0.83 in.) **CLUTCH PEDAL DISENGAGEMENT** 56mm (2.20 in.) minimum to the carpet. RELEASE SHAFT ARM

5. Cruise Control equipped car only:

® securely.

Turn the adjuster (A) until the clutch pedal stroke is 140 to 145 mm (5.51-5.71 in.), then tighten the lock nut

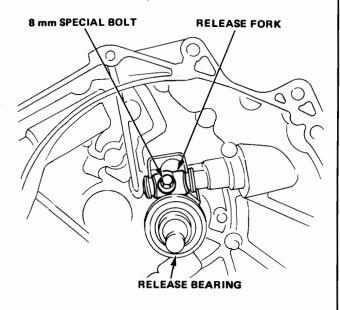
RELEASE ARM FREE PLAY: 4.0-5.0mm (0.16-0.20 in.)

### **Release Bearing**

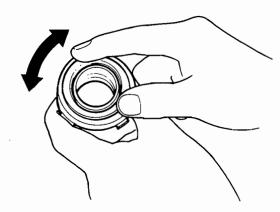
# $\odot$

### Removal/Inspection -

1. Remove the 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.
- Check the release bearing for excessive play by spining it by hand.



Replace the bearing with a new one if there is excessive play.

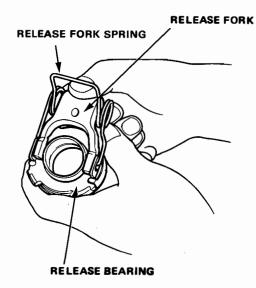
CAUTION: The bearing is packed with grease. Do not wash it in solvent.

#### Installation -

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



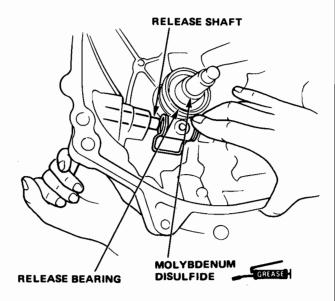
- Install the release fork spring into the release fork tabs as shown.
- Install the release fork onto the release bearing with its arms aligned with the tabs.



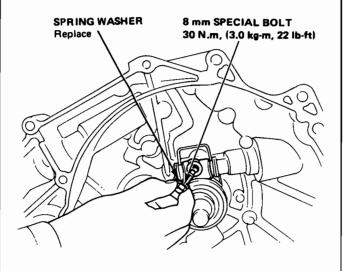
### **Release Bearing**

### -Installation (cont'd) -

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



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.



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.

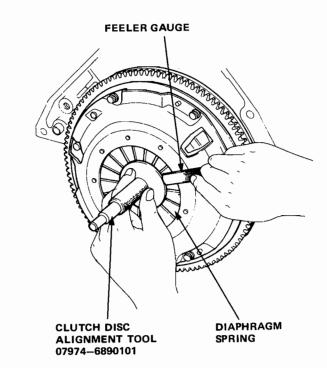
### **Pressure Plate**

### Removal/Inspection -

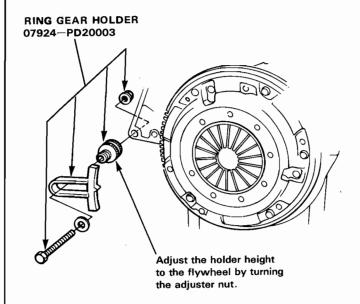
- Inspect the fingers of the diaphragm spring for wear at the release bearing contact area.
- Check the diaphragm spring fingers for height using the Clutch Disc Alignment Tool and feeler gauge.

Diaphragm spring height:

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



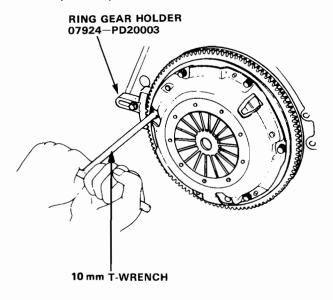
3. Install Ring Gear Holder.



### **Clutch Disc**

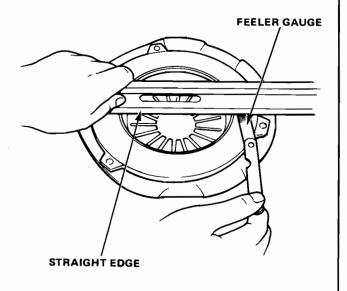


4. To prevent warping, unscrew pressure plate mounting bolts two turns at a time in a criss-cross pattern using a 10 mm T-wrench, then remove the pressure plate and clutch disc.



- Inspect the 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.)



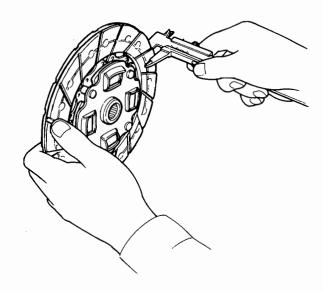
### -Inspection-

- Inspect lining for signs of slipping or oil. Replace if burned black or oil soaked.
- 2. Measure the clutch disc thickness.

Clutch Disc Thickness:

Standard: 8.1-8.8 mm (0.32-0.35 in.)

Service Limit: 5.7 mm (0.22 in.)



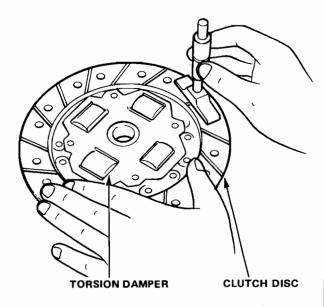
### **Clutch Disc**

### -Inspection (cont'd)-

- Check for loose rubber torsion dampers. Replace the clutch disc if any are loose.
- Measure the depth from the lining surface to the rivets, on both sides.

**Rivet Depth:** 

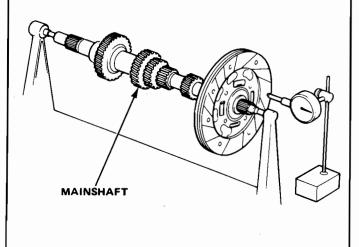
Standard (New): 1.3 mm (0.051 in.) min. Service Limit: 0.2 mm (0.008 in.)



Measure the clutch disc runout with the mainshaft and a dial indicator.

Clutch disc runout:

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



### **Flywheel**

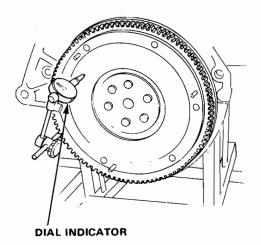
### Inspection/Removal -

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

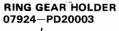
NOTE: The runout can be measured with engine installed.

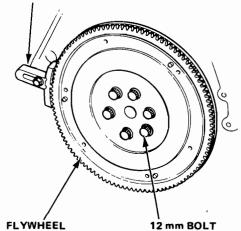
Flywheel Runout:

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



4. Remove the six flywheel mounting bolts and flywheel.



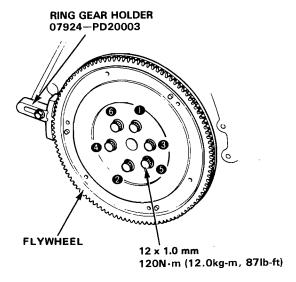


### Flywheel and Clutch

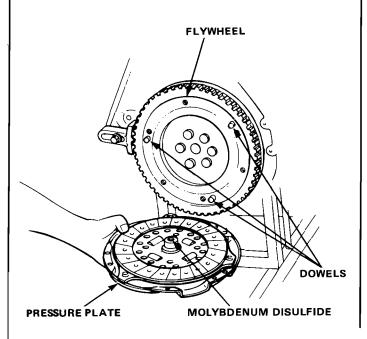
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#### Installation -

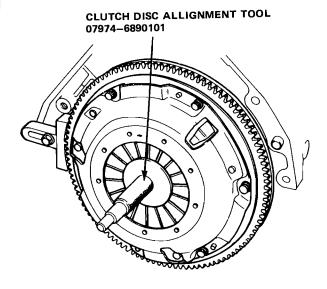
- Align the hole in flywheel with the crankshaft dowel pin and assemble. Install the bolts only finger tight.
- 2. Install the Ring Gear Holder, then torque the flywheel bolts in a criss-cross pattern.



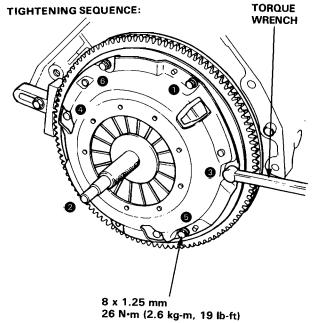
Install the clutch disc and pressure plate by aligning the flywheel dowels with dowel holes in the pressure plate.



- 4. Install the attaching bolts but do not tighten the bolts at this time.
- Insert the Clutch Disc Alignment Tool in the spline hole in the clutch 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 the Alignment Tool and Ring Gear Holder.

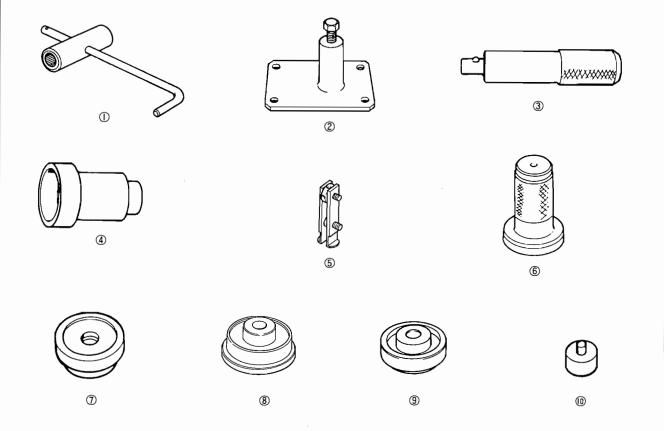
## **Manual Transmission**

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# **Special Tools**

Ref. No.	Tool Number	Description	Q'ty	Page Reference
0	07923-6890101	Mainshaft Holder	1	13-7
2	07933—6890101 or 07HAC-PK40100	Housing Puller	1	13-8
3	07749-0010000	Driver	1	13-11, 13-12, 13-31
4	07947-6340500	Driver Attachment, E	1	13-11
5	07736-A01000A	Adjustable Bearing Remover (25-40 mm)	1	13-11
6	07947-6340000	Driver	1	13-12
7	07746-0010400	Driver Attachment 52 x 55 mm	1	13-12
8	07HAD-SF10100	Driver Attachment	1	13-31
9	07947-SD90100	Driver Attachment	1	13-31
(10)	07JAD-PH80400	Pilot Driver 28 x 30 mm	1	13-31



### **Maintenance**

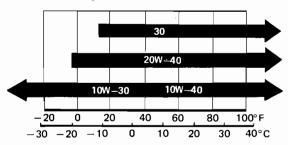
#### Transmission Oil-

#### 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.
- 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.



Ambient Temperature

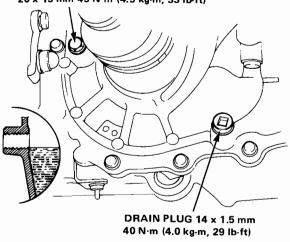
- 1. With transmission oil at operating temperature, engine OFF, and car on level ground, remove drain plug and drain transmission.
- 2. Reinstall drain plug with new washer, and refill to proper level.

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

#### Oil Capacity

2.3  $\ell$  (2.4 U.S. qt.) after drain 2.4  $\ell$  (2.5 U.S. qt.) after overhaul

OIL FILLER PLUG 20 x 15 mm 45 N·m (4.5 kg·m, 33 lb-ft)

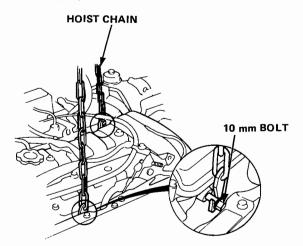


### **Transmission**

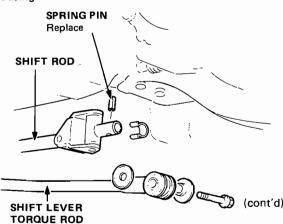


#### Removal-

- 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.
- Remove the speedometer cable by removing clip.
   Do not disassemble speedometer gear holder.
- 5. Disconnect the clutch cable at release arm.
- Drain the transmission oil. Reinstall the drain plug and washer.
- 7. Remove the right and left driveshafts and intermediate shaft (see section 16).
- Screw a 10 mm bolts at engine block, power steering pump bracket and attach hoist chain to the each side bolt; then lift the engine slightly to take the weight off the mounts.



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

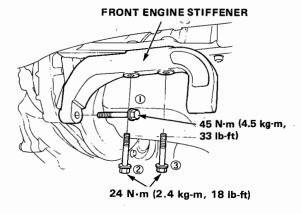


### **Transmission**

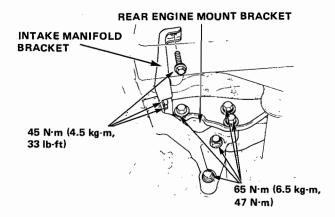
### -Removal (cont'd) -

- 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.

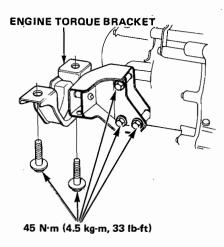
CAUTION: When installing, tighten the bolts in the sequence shown in steps ① - ③.



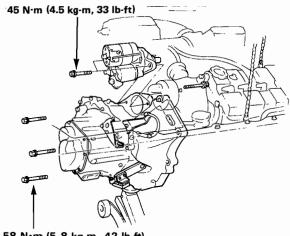
Remove the intake manifold bracket and rear engine mount bracket.



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.

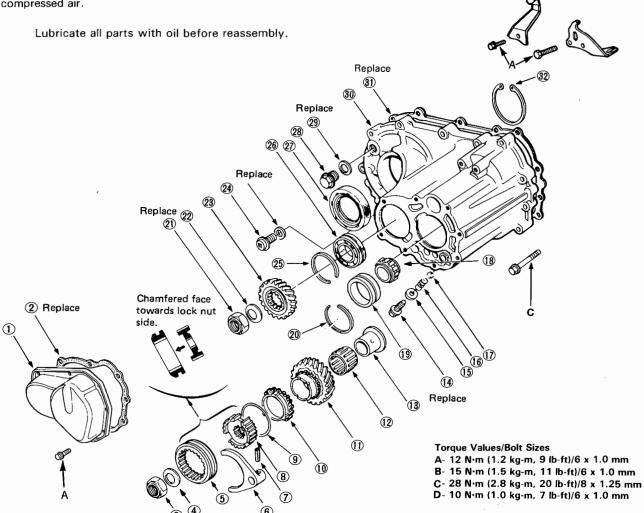


- 58 N·m (5.8 kg-m, 42 lb-ft)
- 19. Pull the transmission away from the engine until it clears the 14 mm dowel pins, then lower on the transmission jack.
- 20. Separate the mainshaft from the clutch pressure plate and remove the transmission by lowering the jack.

### **Illustrated Index**



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



- 1 END COVER Removal, Page 13-7 Installation, Page 13-30
- ② GASKET
- 3 LOCKNUT Removal, Page 13-7 Installation, Page 13-30
- 4 SPRING WASHER
- (5) FIFTH GEAR SYNCHRO SLEEVE Removal, Page 13-8 Installation, Page 13-30
- 6 FIFTH GEAR SHIFT FORK Removal, Page 13-8 Installation, Page 13-30 7 SPRING PIN
- 8 FIFTH GEAR SYNCRO HUB Removal, Page 13-8 Installation, Page 13-29
- **9 SYNCHRO SPRING**

- 10 FIFTH GEAR SYNCHRO RING Inspection, Page 13-16
- (1) MAINSHAFT FIFTH GEAR Removal, Page 13-8 Installation, Page 13-29
- 12 NEEDLE BEARING
- 13 SPACER COLLAR
- (4) RETAINING SCREW 22 N·m (2.2 kg-m, 16 lb-ft)
- 15 WASHER 12 mm
- 16 SPRING

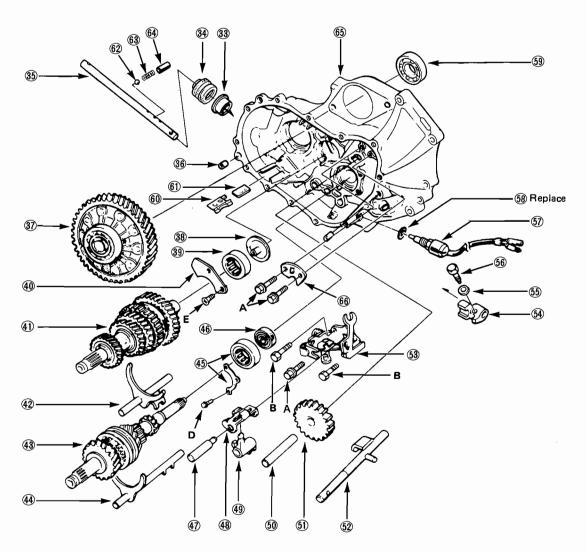
CAUTION: Left-hand threads.

Replace

- **17** DETENT BALL
- 18 ROLLER BEARING
- (9) BEARING OUTER RACE Replacement, Page 13-13
- ② SNAP RING 50 mm ② LOCKNUT
- Removal, Page 13-7 Installation, Page 13-30

- **22 SPRING WASHER**
- ② COUNTERSHAFT FIFTH GEAR
- (24) DRAIN PLUG 40 N·m (4.0 kg-m, 29 lb-ft)
- 25 SNAP RING 71mm
- 26 BALL BEARING
  - Replacement, Page 13-13
- OIL SEAL
   Removal, Page 13-11
   Installation, Page 13-31
- 28 OIL FILLER PLUG 45 N·m (4.5 kg-m, 33 lb-ft)
- 29 WASHER 20 mm
- TRANSMISSION HOUSING Disassembly, Page 13-7 Installation, Page 13-28
- 31 GASKET
- 32 SNAP RING 80 mm

### Illustrated Index (cont'd)



- 33 OIL SEAL
- **34** BOOT
- 35 SHIFT ROD
- 36 DOWEL PIN 14 x 20 mm
- (3) DIFFERENTIAL ASSY
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  Overhaul, Sec. 15
- Installation, Page 13-26

  38 OIL BARRIER PLATE
- (3) COUNTERSHAFT BEARING Replacement, Page 13-11, 12
- 40 BEARING RETAINER PLATE
- (ii) COUNTERSHAFT ASSY Removal, Page 13-10 Inspection, Page 13-18 Installation, Page 13-26 Measurements, Page 13-22
- 42 FIRST & SECOND GEAR SHIFT SHAFT

- 43 MAINSHAFT ASSY Removal, Page 13-10 Inspection, Page 13-18 Installation, Page 13-26 Measurements, Page 13-21
- 44 THIRD & FOURTH GEAR SHIFT SHAFT
- (4) MAINSHAFT BEARING AND BEARING RETAINER PLATE Replacement, Page 13-11, 12
- (46) OIL SEAL Replacement, Page 13-11
- 47 SHIFT GUIDE SHAFT
- **48 INTERLOCK**
- 49 SHIFT GUIDE
- 60 REVERSE IDLER GEAR SHAFT Removal, Page 13-9 Installation, Page 13-28
- (i) REVERSE IDLER GEAR Removal, Page 13-9 Installation, Page 13-28
- 52 FIFTH & REVERSE GEAR SHIFT SHAFT

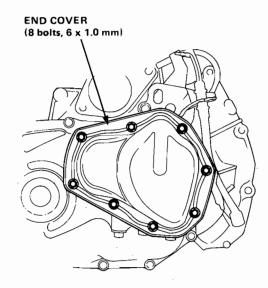
- 53 SHIFT ARM HOLDER
  - Measurements, Page 13-23, 24 Removal, Page 13-24 Installation, Page 13-26 A 12 N·m (1.2 kg-m, 9 lb-ft) B 15 N·m (1.5 kg-m, 11 lb-ft)
- Measurements, Page 13-25
- Installation, Page 13-26 5 WASHER 8 mm
- 56 BOLT, 8 x 1.25 mm 30 N·m (3.0 kg-m, 22 lb-ft)
- 57 BACK-UP LIGHT SWITCH
- 58 WASHER 14 mm
- 69 OIL SEAL Removal, Page 13-11 Installation, Page 13-31
- **60 SET PLATE**
- 61 MAGNET
- **62 DETENT BALL**
- 63 SPRING
- 64 SPRING COLLAR
- 65 CLUTCH HOUSING
- 6 BREATHER CHAMBER PLATE

### **Transmission Housing**



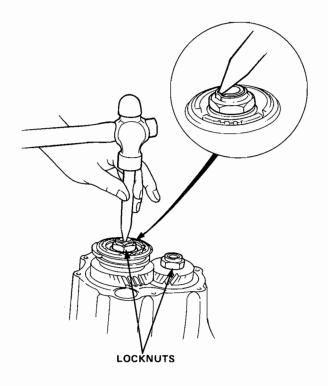
### - Disassembly -

1. Remove transmission end cover.

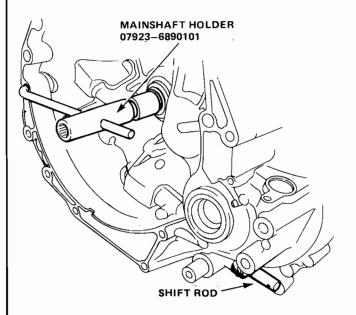


NOTE: Before removing mainshaft/countershaft locknuts, measure clearance between spacer collar and shoulder on fifth gear.

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

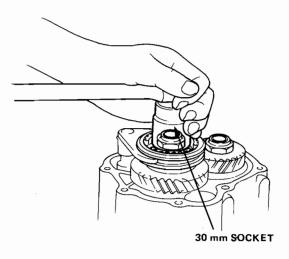


3. Install mainshaft holder.



- 4. Shift transmission into reverse gear.
- 5. Remove locknuts.

CAUTION: The mainshaft locknut has left-hand threads.

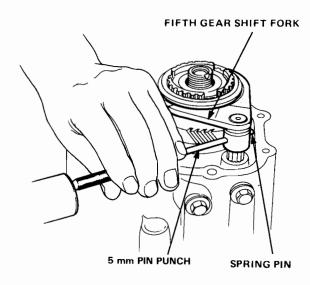


6. Remove mainshaft holder.

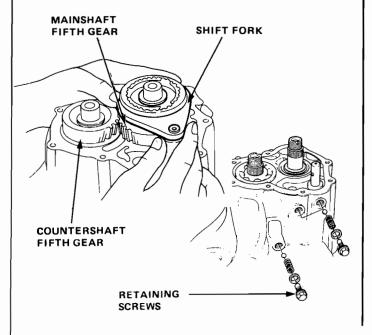
### **Transmission Housing**

### -Disassembly (cont'd) -

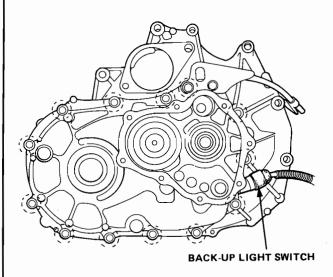
7. Drive out spring pin securing fifth gear shift fork to shaft.



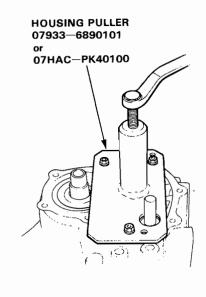
- 8. Remove mainshaft fifth gear, shift fork, synchronizer sleeve, hub, ring and spring as a unit.
- 9. Remove countershaft fifth gear.
- 10. Remove three retaining screws and detent balls.



- 11. Remove back-up light switch.
- 12. Remove thirteen housing bolts.



 Install transmission housing puller with four bolts and tighten securely. Screw the puller bolt against end of countershaft until transmission housing breaks loose.



### **Reverse Fork**

#### Shift Shaft Clearance

 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.)

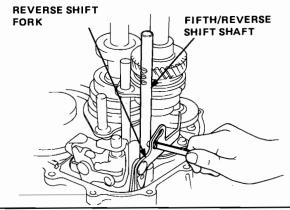
Service Limit:

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.

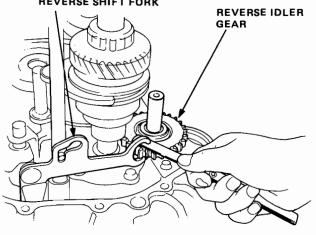
**GEAR-TO-FORK CLEARANCE** 

Standard (New): 0.2-1.0 mm (0.008-0.04 in.)

Service Limit: 1.7 mm (0.07 in.)

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.) REVERSE SHIFT FORK

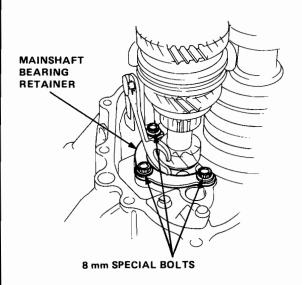


### Countershaft/ Mainshaft

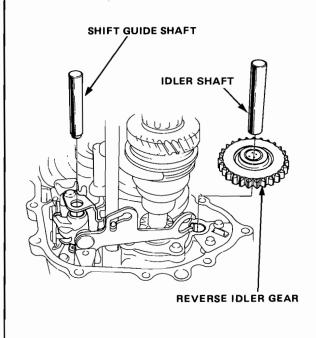


#### - Removal

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



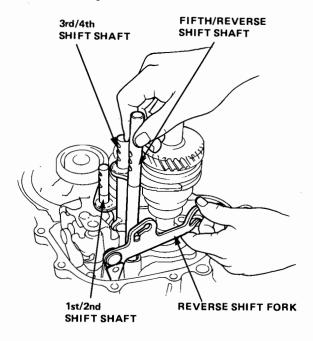
- 3. Pull out the shift guide shaft.
- 4. Pull out reverse idler shaft and remove gear.



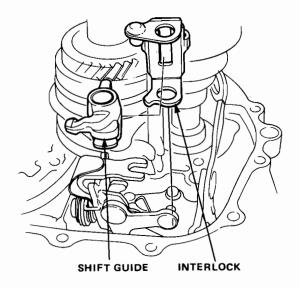
### Countershaft/ Mainshaft

### -Removal (cont'd)-

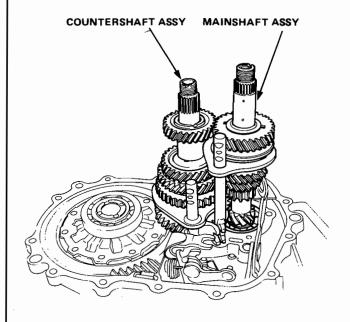
- 5. Pull the 3rd/4th and 1st/2nd shift shafts up, to shift into fourth and second.
- Remove the 5th/reverse shift shaft by pulling it up while lifting the reverse shift fork.



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



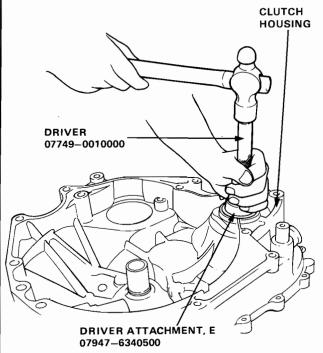
8. Remove countershaft and mainshaft as an assembly, with 1st/2nd & 3rd/4th shift shafts.



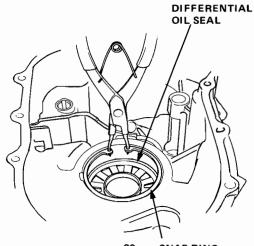
### **Differential Oil Seals**

#### · Removal-

 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.



80 mm SNAP RING

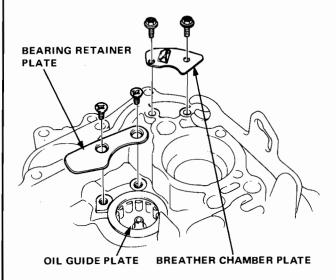
 Drive the differential oil seal out of the transmission housing.

### **Bearings and Seals**



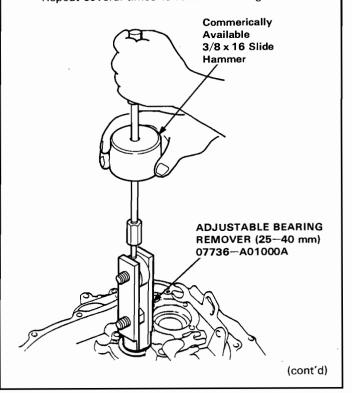
### - Replacement (Clutch Housing)

- 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.

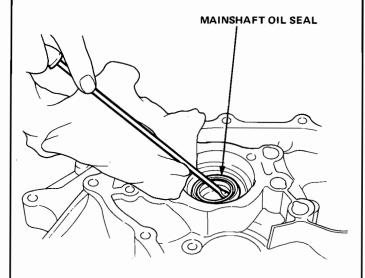


### **Bearing and Seals**

### -Replacement (clutch Housing) (cont'd)-

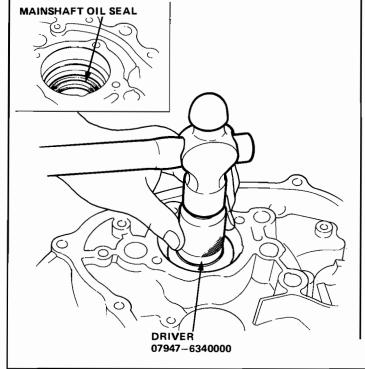
5. Remove mainshaft bearing and oil seal from clutch housing by prying out with a screwdriver.

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

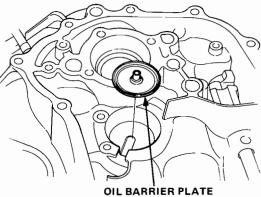


6. Install the mainshaft oil seal.

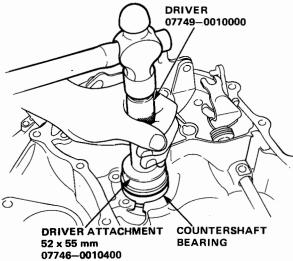
NOTE: Install the oil seal with the sealing lips facing the mainshaft bearing.



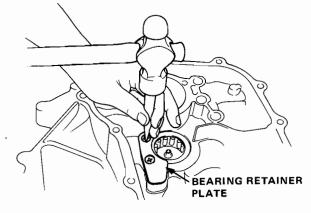
7. Install the countershaft oil barrier plate.



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.

### **Bearings**

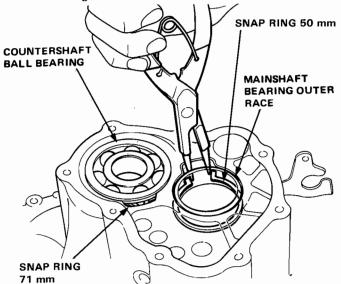


### Replacement (Transmission Housing) -

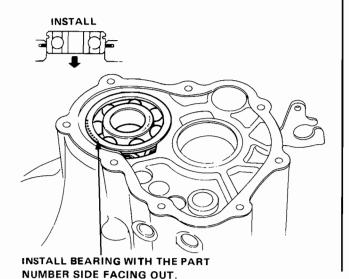
 Using snap ring pliers, carefully expand the snap ring and press the bearing out into the case.

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 transmission housing.

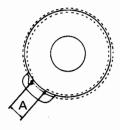
NOTE: Inspect the snap rings for wear. Replace any snap rings that are worn excessively or damaged.



- 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.
- 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.

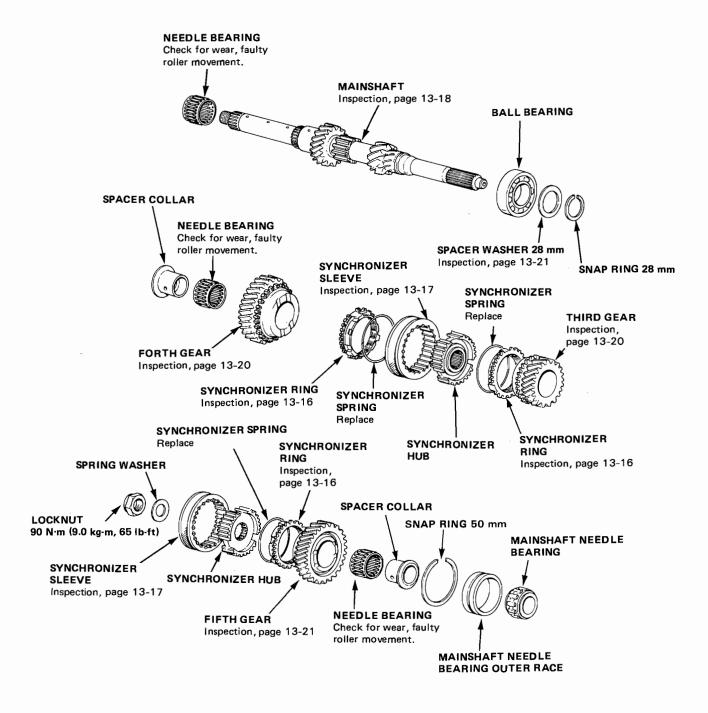
### **Mainshaft**

#### 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

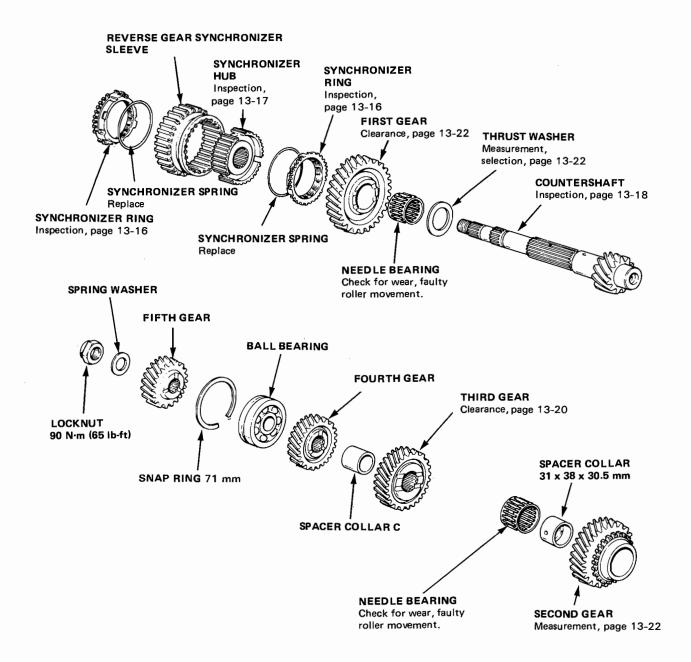


#### Index-

#### 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 -SYNCHRONIZER SPRING 1. Inspect the inside of synchronizer ring for wear. SYNCHRONIZER RING 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. GEAR 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 (0.029-0.046 in.) Service Limit: 0.4 mm (0.016 in.) 7. Separate the synchronizer ring and gear, and coat them with oil. 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 RING

### Synchronizer Sleeve, Shift Shaft



# Shift Fork to Synchronizer - Sleeve Clearance

 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.)

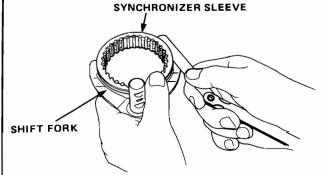
Service Limit: 1.0 mm (0.039 in.)

2. If fork-to-sleeve clearance is too great, measure width of groove in synchronizer sleeve.

Standard (New): 6.75-6.85 mm

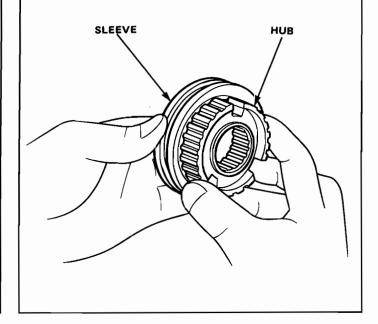
(0.266-0.270 in.)

Service Limit: 6.00 mm (0.236 in.)



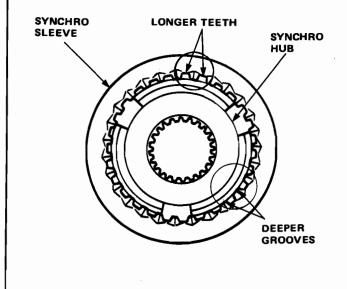
# - Synchronizer Sleeve and Hub Inspections

- Inspect gear teeth on all synchro hubs and sleeves for rounded off corners, indicating wear.
- 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

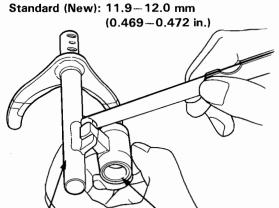
 Check third/fourth shift shaft-to-shift guide clearance as shown.

#### SHAFT-TO-GUIDE CLEARANCE

Standard (New): 0.2-0.5 mm (0.008-0.02 in.)

Service Limit: 0.8 mm (0.03 in.)

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



### **Mainshaft**

### - Inspection

#### Wear

**Outside Diameter:** 

Standard (New): A: 28.002-28.015 mm

(1.1024-1.1030 in.)

B: 31.984-32.000 mm

(1.2592-1.2598 in.)

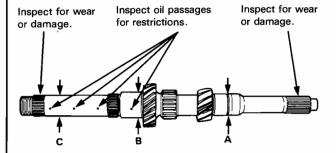
C: 24.980-24.993 mm

(0.9835-0.9840 in.)

A: 27.95 mm (1.100 in.) Service Limit:

B: 31.93 mm (1.257 in.)

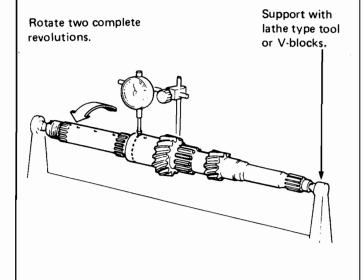
C: 24.93 mm (0.98 in.)



#### Runout

Standard (New): 0.02 mm (0.0016 in.)

Service Limit: 0.05 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.)

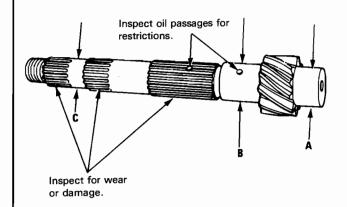
C: 24.980-24.993 mm

(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): 0.02 mm (0.0016 in.) Service Limit: 0.05 mm (0.004 in.)

Support with lathe type tool Rotate two complete or V-blocks. revolutions.

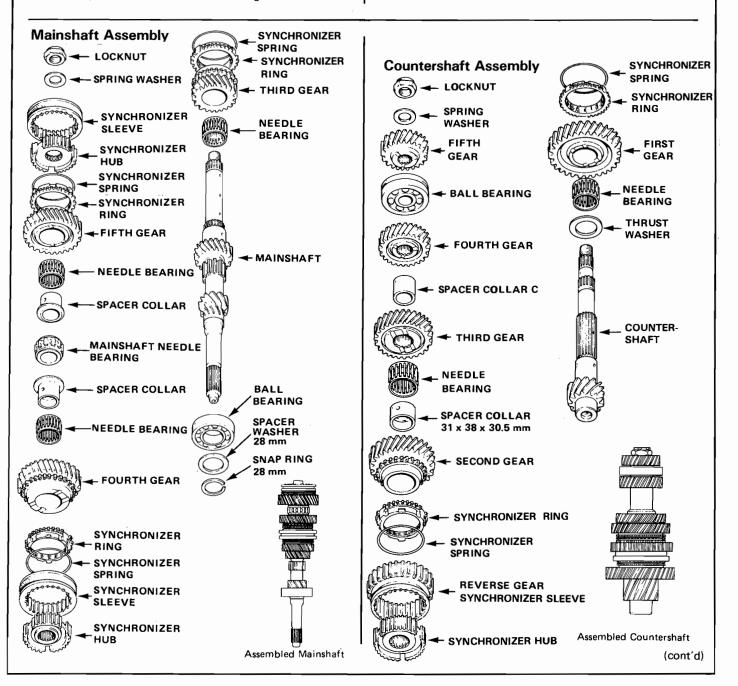
### Mainshaft/Countershaft



### Reassembly and Measurement

- Remove both mainshaft and countershaft bearings from transmission housing.
- Assemble mainshaft and countershaft including bearings and fifth gear components, as shown below. Lubricate all parts with oil before final reassembly.
- Install mainshaft/countershaft assembly into clutch housing.
- 4. Install the mainshaft holder to prevent shafts from turning, and shift transmission into gear.

- 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 main-shaft locknuts. Whenever locknuts are installed, use an accurately calibrated torque wrench.
- Remove transmission shafts from clutch housing and measure clearances as described on next two pages.



### Mainshaft/Countershaft

### Reassembly and Measurement (cont'd)

#### **Mainshaft Measurements**

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

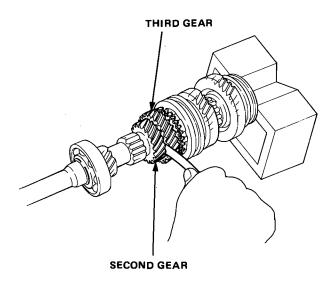
THIRD GEAR CLEARANCE

Standard (New): 0.03-0.18 mm

(0.0012-0.0071 in.)

Service Limit:

0.3 mm (0.012 in.)



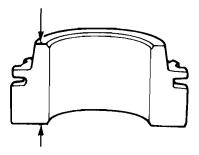
8. If out of tolerance, measure thickness of third gear.

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.

Measure clearance between spacer collar and shoulder on fourth gear.

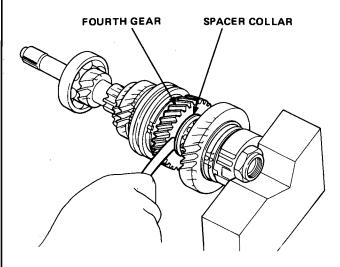
**FOURTH GEAR CLEARANCE** 

Standard (New): 0.03-0.18 mm

(0.0012-0.0071 in.)

Service Limit:

0.3 mm (0.012 in.)



 If out of tolerance, measure thickness of fourth gear.

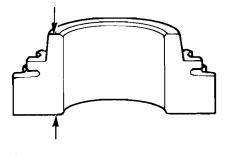
**FOURTH GEAR THICKNESS** 

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.



#### **Mainshaft Measurements**

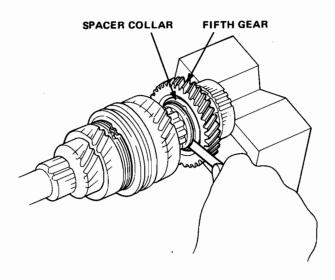
11. Measure clearance between spacer collar and shoulder on fifth gear.

FIFTH GEAR CLEARANCE

Standard (New): 0.03-0.13 mm

(0.0012-0.0051 in.)

Service Limit: 0.25 mm (0.01 in.)



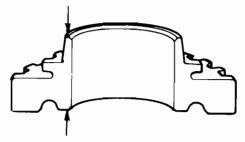
12. If out of tolerance, measure thickness of fifth gear.

**FIFTH GEAR THICKNESS** 

Standard (New): 32.42-32.47 mm

(1.276-1.278 in.)

Service Limit: 32.30 mm (1.272 in.)

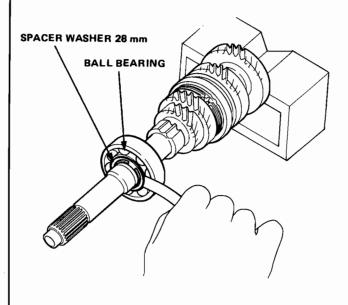


If out of limit, replace fifth gear.

 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

IDENTIFI- CATION	THICKNESS
Α	1.88-1.92 mm (0.074-0.075 in.)
В	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.)

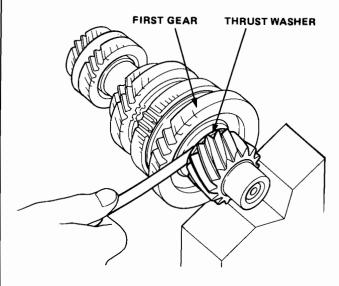
### Mainshaft/Countershaft

### Reassembly and Measurement (cont'd)-

#### **Countershaft Measurements**

14. Measure clearance between first gear thrust washer and shoulder on first gear.

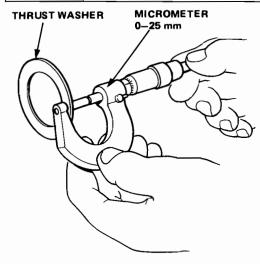
FIRST GEAR CLEARANCE Standard (New): 0.03-0.08 mm (0.0012-0.0031 in.)



If out of tolerance, change thickness of first gear thrust washer after measuring all other clearances.

#### Replacement Thrust Washers

IDENTIFI- CATION	THICKNESS
Α	2.02-2.04 mm (0.080-0.081 in.)
В	2.00-2.02 mm (0.079-0.080 in.)
С	1.98-2.00 mm (0.078-0.079 in.)
D	1.96-1.98 mm (0.077-0.078 in.)



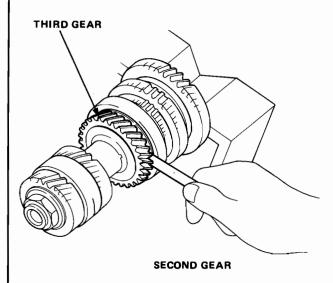
Measure clearance between shoulder on third gear and shoulder on second gear.

SECOND GEAR CLEARANCE

Standard (New): 0.03-0.10 mm

(0.0012-0.0039 in.)

Service Limit: 0.18 mm (0.007 in.)



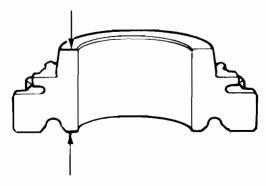
If out of tolerance, measure thickness of second gear.

**SECOND GEAR THICKNESS** 

Standard (New): 30.42-30.47 mm

(1.1976-1.1996 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.

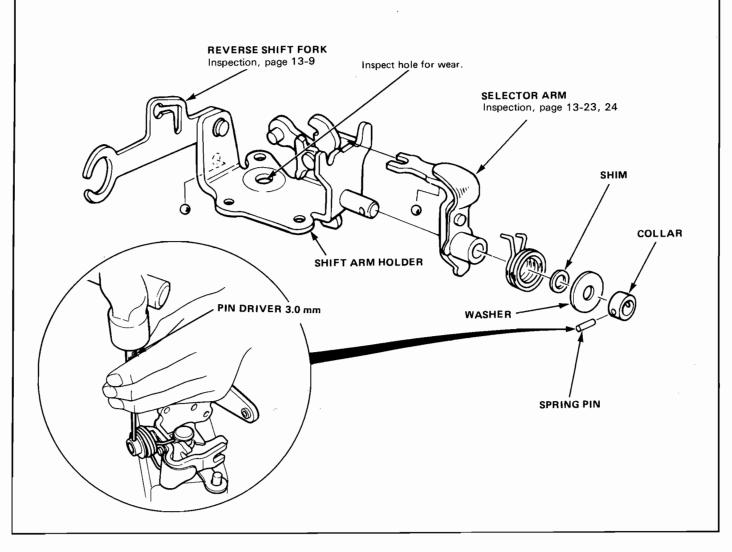
If they are correct, disassemble fifth gear components and reinstall bearings in transmission housing.

### Shift Arm Holder



#### - Index –

To remove selector arm from holder for shimming or replacement, drive out spring pin with driver.



#### Clearances -

 Measure clearance between collar and shim on shaft of selector arm as shown.

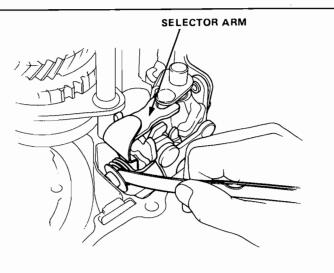
**CLEARANCE** 

Standard (New): 0.01-0.20 mm (0.0004-0.0079 in.)

2. If out of tolerance, select a new shim from following table:

#### Collar-to-Selector Arm Shim Clearance:

IDENTIFICATION	THICKNESS
Α	0.8 mm (0.031 in.)
В	1.0 mm (0.039 in.)
С	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 -

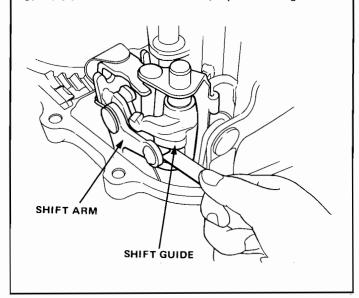
1. Check shift arm-to-shift guide clearance.

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 quide.

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.

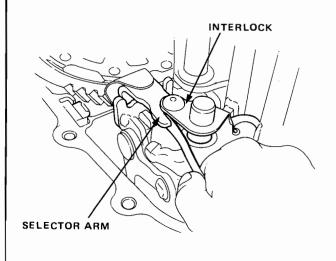
Standard (New): 0.05-0.25 mm (0.002-0.010 in.)

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 (0.396-0.400 in.)

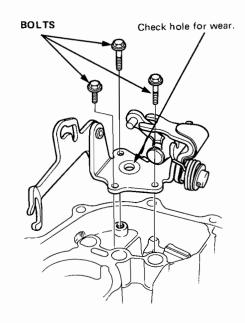
3. If gap is wider than standard, replace arm.



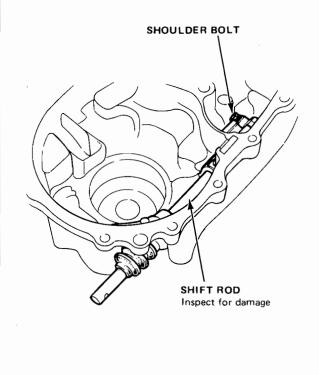
# Shift Rod and Shift Arm Holder

#### 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.

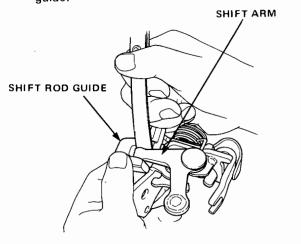
Standard (New): 0.05-0.35 mm (0.002-0.014 in.)

Service Limit: 0.8 mm (0.03 in.)

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.)

If slot is wider than standard, replace shift rod quide.



### - Shift Rod Guide Clearance -

1. Check selector arm-to-shift rod guide clearance.

Standard (New): 0.05-0.25 mm (0.002-0.010 in.)

Service Limit: 0.5 mm (0.02 in.)

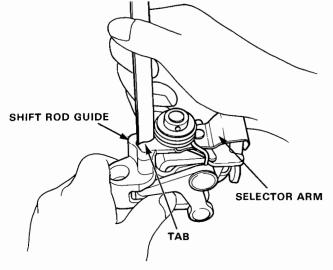
2. If not within service limit, measure width of tab on

selector arm.

Standard (New): 11.9-12.0 mm

(0.469-0.472 in.)

3. If tab is narrower than standard, replace the arm.

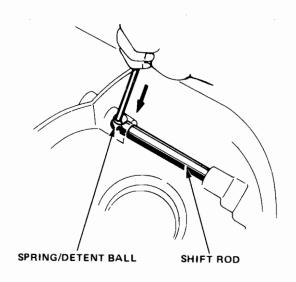


### **Shift Rod**

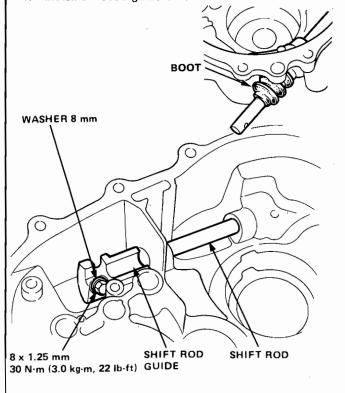
# $\odot$

#### Installation

- Install shift rod with detent notches facing downward.
- Install spring and detent ball. Lubricate spring with molylube.
- 3. Install shift rod while pushing detent ball in.



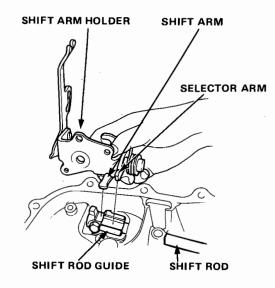
4. Install shift rod guide on shift rod.



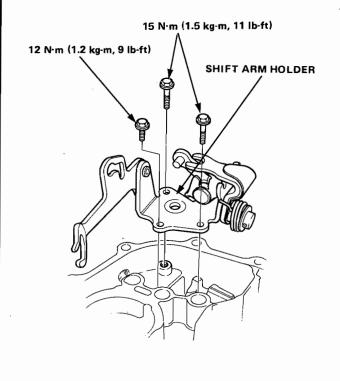
### **Shift Arm Holder Assembly**

#### - Installation -

 Hook selector arm and shift arm into shift rod guide.



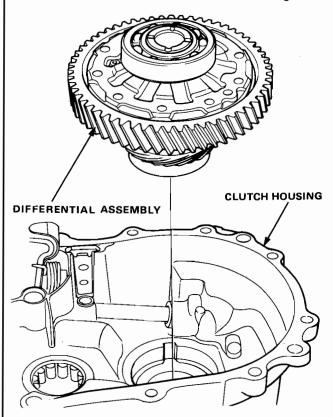
2. Install bolts in shift arm holder.



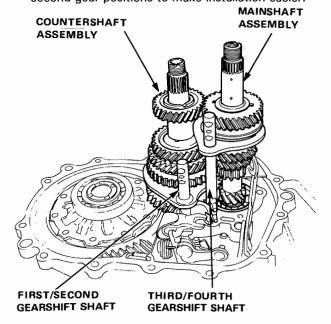
### **Transmission**

### Reassembly -

1. Install differential assembly in clutch housing.

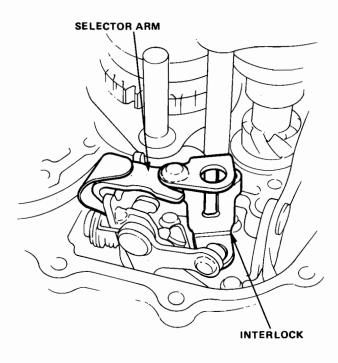


Install mainshaft, countershaft, first/second gear shift shaft and third/fourth gear shift shaft together as an assembly. Make sure forks are in fourth and second gear positions to make installation easier.

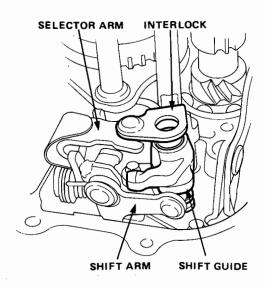




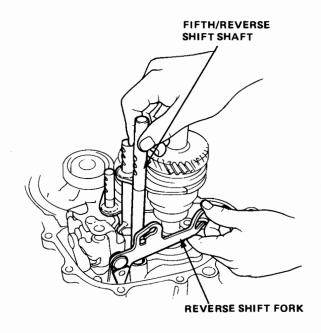
3. Lift mainshaft as shown and install interlock into the selector arm.



- 4. Place shift rod in neutral.
- Hook interlock into selector arm, first/second gearshift shaft and third/fourth gearshift shaft. Hook shift guide into shift arm.

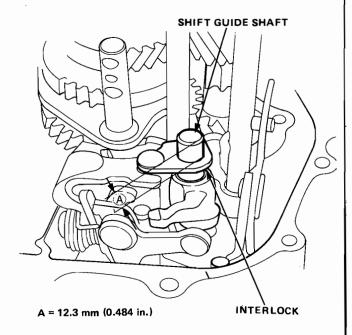


Install fifth/reverse shift shaft and hook its pin into reverse shift fork slot.



 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.

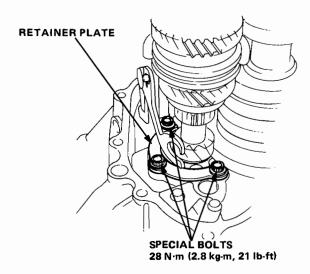
If not, check installation.



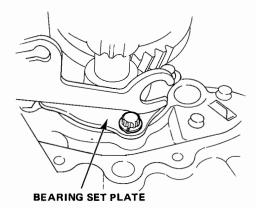
### **Transmission**

### -Reassembly (cont'd)-

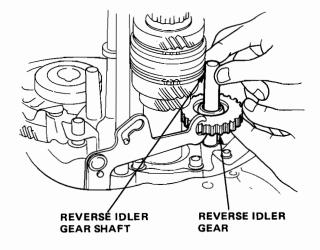
8. Install mainshaft bearing retainer plate.



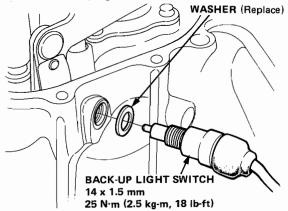
9. Stake the head of the bolt by aligning with the groove in the bearing set plate.



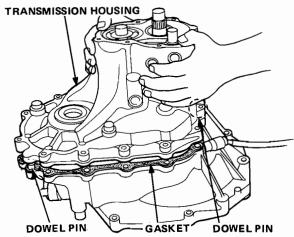
10. Install reverse idler gear and shaft.



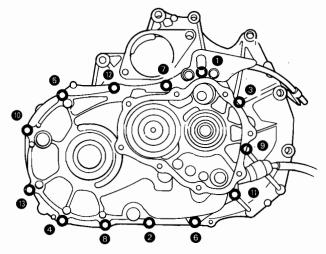
11. Install back-up light switch with new washer.



- 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.

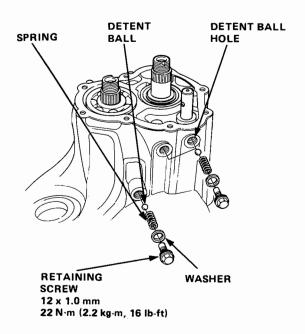


15. Torque bolts (8 x 1.25 mm) in sequence shown, to 28 N⋅m (2.8 kg-m, 21 lb-ft).

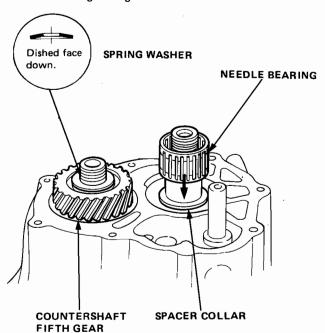




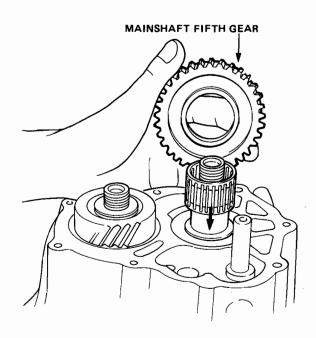
Install three detent balls, washers, and retaining screws.



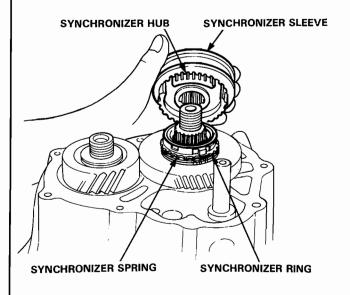
17. Install countershaft fifth gear with high side facing down. Then install spring washer with dished surface facing fifth gear.



18. Install spacer collar and needle bearing on the mainshaft. 19. Install mainshaft fifth gear.



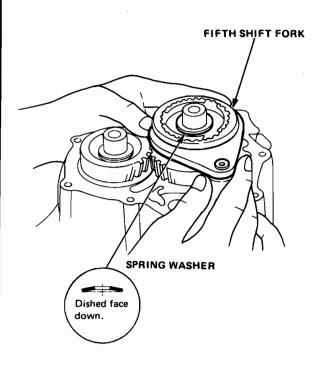
 Install synchronizer ring, synchronizer spring, synchronizer hub and synchronizer sleeve on the mainshaft.



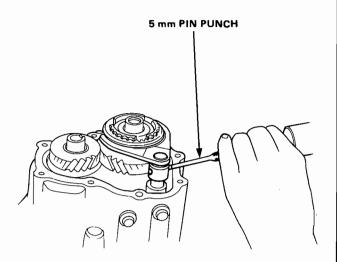
## **Transmission**

### -Reassembly (cont'd)-

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.

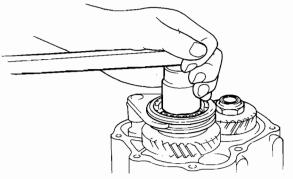


24. Install mainshaft holder 07923-6890101 to prevent shaft from rotating, then shift transmission into reverse gear.

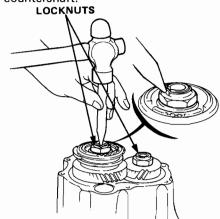
25. Torque mainshaft and countershaft locknuts. Tighten to specified torque, then loosen and retighten to same torque.

90 N·m (9.0 kg-m, 65 lb-ft)  $\rightarrow$  0  $\rightarrow$  90 N·m (9.0 kg-m, 65 lb-ft)

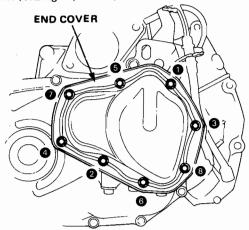
CAUTION: The mainshaft locknut has left-hand threads.



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).

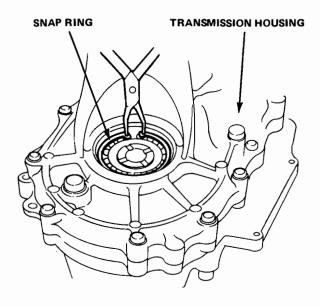


### **Differential Oil Seal**

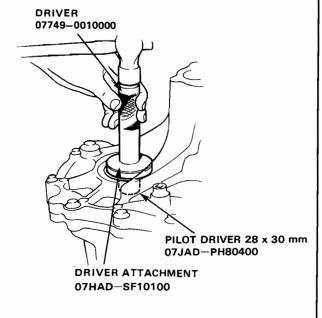


### Installation –

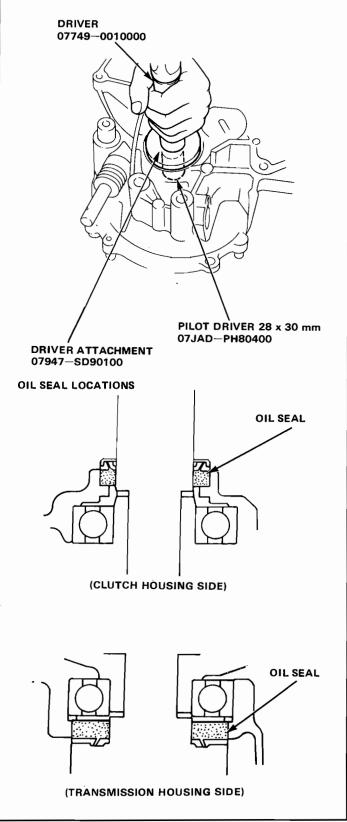
 Install 80 mm snap ring in transmission housing. If differential bearings or carrier were replaced, select snap ring of correct thickness as shown on page 15-9.



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.



### **Transmission**

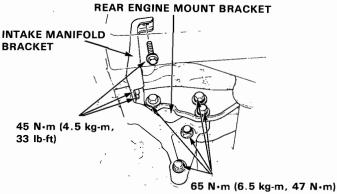
### Installation-

- Place the transmission on transmission jack.
   NOTE: Clean and grease release bearing sliding surfaces.
- 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.

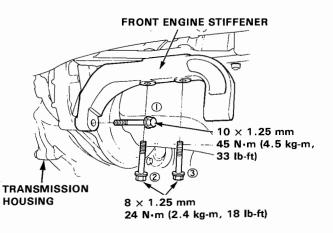
NOTE: New 26 mm spring clips must be used on both axles.

CAUTION: Make sure that axles fully bottom. Slide axle in until you feel spring clips engage differential.

- Push and wiggle the transmission until it fits flush with engine flange.
- Secure transmission to engine with mounting bolts from the engine side (12 x 1.25 x 70 mm). Torque to 58 N·m (5.8 kg-m, 42 lb-ft).
- 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).
- Loosely install the bolts for the front transmission mount, then torque them in the sequence shown.



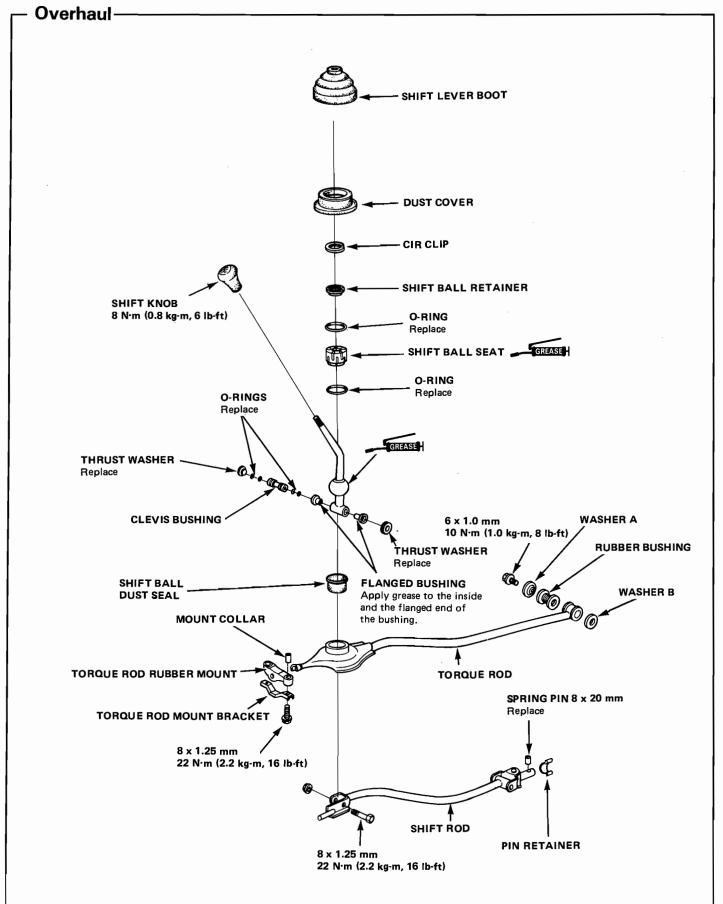
- Install the starter mounting bolts and torque to 45
   N·m (4.5 kg·m, 33 lb-ft).
- Install the intermediate shaft and, right and left driveshafts (see section 16).
- 12. Turn right steering knuckle/axle assembly outward far enough to insert free end of axle into transmission. Repeat on opposite side.

CAUTION: Make sure that axles fully bottom. Slide axle in until you feel spring clips engage differential.

- 13. Connect the shift rod and shift lever torque rod.
- Install the lower arm ball joints and torque to 45 N·m (4.5 kg-m, 33 lb-ft).
- Install 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. Connect 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).
- 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).
- 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





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# **Automatic Transmission**

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Shift Cable	
Throttle Control Cable	



# **Special Tools**

af N-	ecial Tools ——	December	0'4	Page Reference
Ref. No.	Tool Number	Description	Q'ty	
		AT Oil Pressure gauge Set (Includes Pressure Hoses)	1	14-32
	07406—0020201	AT Oil Pressure gauge replacement hose	1	14-32
2	07406-0070000	Low Pressure Gauge	1	14-32
3	07923—6890202	Mainshaft Holder	1	14-46, 81
4	07HAC-PK40100 or 07GAC-PG40102	Housing Puller	1	14-46
(5)	07GAE-PG40001	Clutch Spring Compressor Set	1	14-64, 72
⑤-1	07HAEPL50100	Clutch Spring Compressor Attachment	1	14-64, 72
<b>⑤-2</b>	07GAE-PG40200	Clutch Spring Compressor Bolt Assembly	1	14-64, 72
⑤-3	07960—6120100 or	Clutch Spring Compressor Attachment	1	14-64, 72
6	079606120101 ☆07736A01000A	☆Adj. Bearing puller, 25—40 mm	1	14-75
<b>①</b>	077490010000	Driver	i	14-75
8	07746-0010500	Attachment, 62 x 68 mm	1	14-75
9	07746-0010400	Attachment, 52 x 55 mm	1	14-75
(0)	07947-6340500	Bearing Driver Attachment E	1	14-75
(I) (I2)	07947—6340201 A973X—041—XXXXX	Oil Seal Driver Vacuum Pump/Gauge, 0-30 in. Hg	1 1	14-75 14-92
	①		2	
		<b>4</b>		(S)-3 (S)-2 (S)-1 (S)
	3			

☆Must be used with commercially available 3/8 x 16 Slide Hammer



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  $\boxed{D3}$ ,  $\boxed{D4}$ ,  $\boxed{2}$  and  $\boxed{R}$ .

#### HYDRAULIC CONTROL

The valve assembly includes the main valve body, secondary valve body, servo 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 shift 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 valves, 3-2 timing valve, shift timing valve and 3rd orifice control valve.

The servo valve body contains the accumulator pistons, 3rd orifice emtrol 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 clutches receive oil from their respective feed pipes.

#### LOCK-UP MECHANISM

In  $\boxed{\text{D4}}$ , 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. Together 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  $\boxed{D4}$  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**

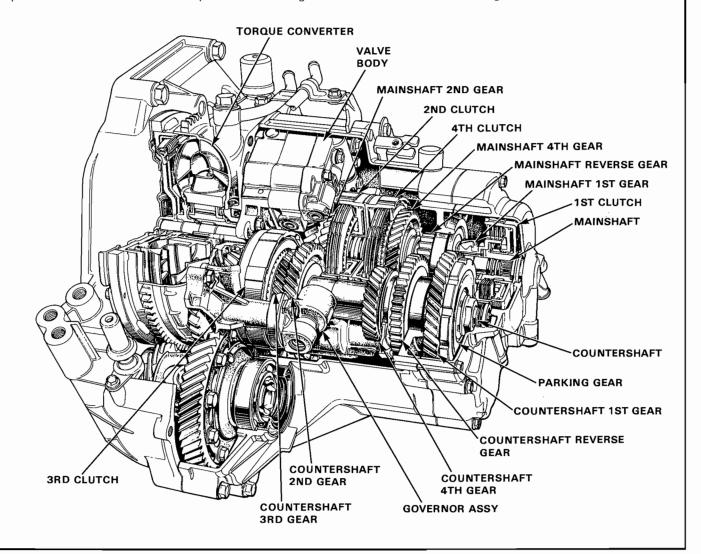
The selector lever has six positions: P PARK, R REVERSE, N NEUTRAL, D4 1st through 4th gear ranges, D3 1st through 3rd gear ranges, and 2 2nd gear.

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 automatically to 2nd, 3rd, then 4th, depending on vehicle speed and throttle position. Downshift through 3rd, 2nd and 1st on deceleration to stop.
( tanoaga i,	The lock-up mechanism comes into operation in D4
D3 DRIVE	For rapid acceleration at highway speeds and general driving; starts off in 1st, shifts automatically
(1 through 3)	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  $\boxed{\mathsf{P}}$  and  $\boxed{\mathsf{N}}$  through 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.





### Clutches

### [1st Clutch]

The 1st clutch is on the right end of the mainshaft. In the  $\boxed{D}_3$  or  $\boxed{D}_4$  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 🖸 or large, 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  $\boxed{D_i}$  or  $\boxed{D_i}$  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,  $\boxed{2}$ , or  $\boxed{2}$ , or  $\boxed{2}$ , 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.

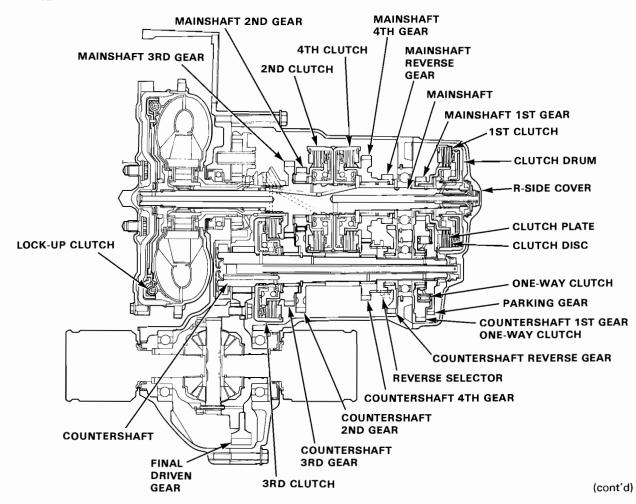
The clutch hub is joined to the countershaft 3rd gear, on the countershaft, supported by a single needle bearing.

In 3rd gear of  $\boxed{0}$  or  $\boxed{0}$ , hybraulic pressure is applied to the 3rd clutch on the countershaft, thus causing the clutch to engage, and transmitting power.

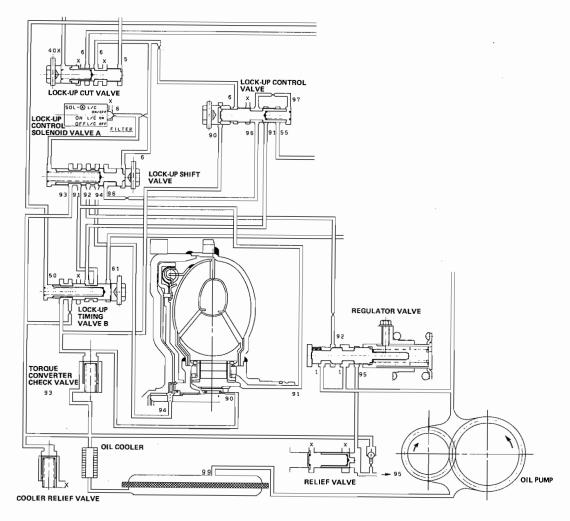
### [4th Clutch]

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 [D], hydraulic pressure is generated within the mainshaft, applying pressure to the 4th clutch on the mainshaft.



### Clutches (cont'd)



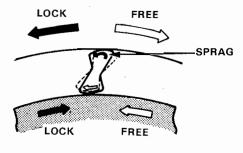
#### [One-way Clutch]

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 gears move in the  $\rightarrow$  directions, the sprags incline to the left, with the result that they lock the gears together.

When shifting from 1st to 2nd in the □ or □ range, the different ratio of the two gears causes the countershaft 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 □ or □ the same difference of ratio keeps the sprags from locking and keeps 1st gear disengaged.

When shifting from 1st to 2nd in the

### COUNTERSHAFT 1ST GEAR



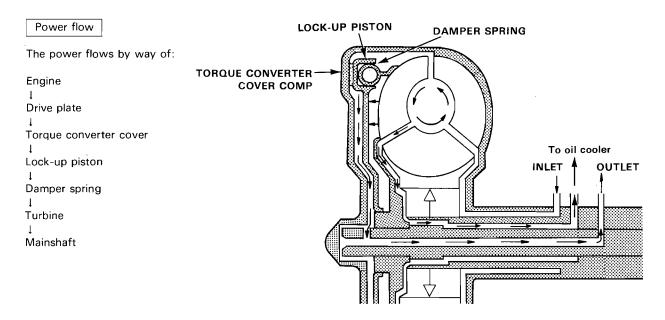
PARKING GEAR



### [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.



### Operation (clutch off)

Power flow

With the lock-up clutch off, the oil flows in the reverse of CLUTCH ON. As a result, the lock-up piston is moved away from the converter cover; that is, the torque converter lock-up is released.

Engine

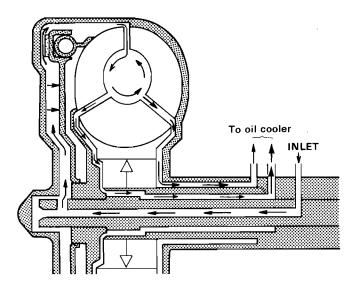
I
Drive plate

I
Torque converter cover

Pump

I
Turbine

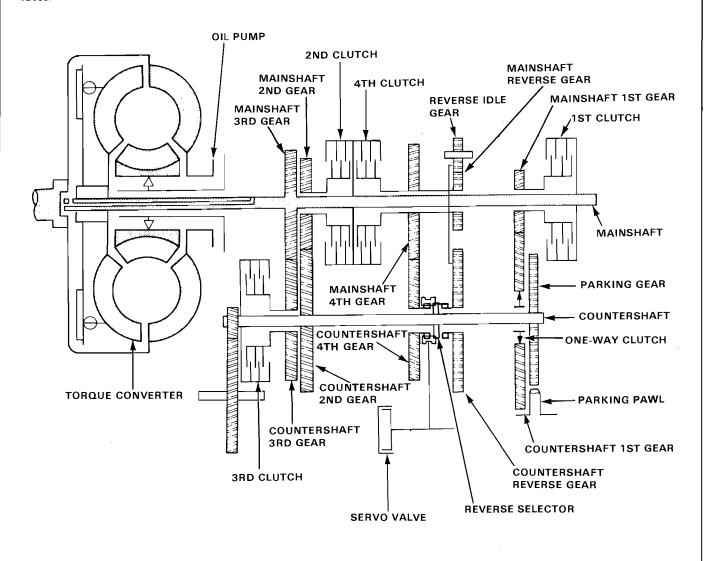
Mainshaft



## -Power Flow

RANG	PART	TORQUE CONVERTER	1ST GEAR 1ST CLUTCH	1ST GEAR ONE-WAY CLUTCH	2ND GEAR 2ND CLUTCH	3RD GEAR 3RD CLUTCH		TH CLUTCH	REVERSE GEAR	PARKING GEAR
	 P.:	0	×	×	×	×	×	×	×	0
	Ř)	0	×	×	×	×	×	0	0	×
][	N.	0	×	×	×	×	×	×	×	×
	1ST	0	0	0	×	×	×	×	×	×
D <sub>3</sub>	2ND	0	*0	×	0	×	×	×	×	×
	3RD	0	*0	×	×	0	×	×	×	×
	1ST	0	0	0	×	×	×	×	×	×
	2ND	0	*0	×	0	×	×	×	×	×
D₄	3RD	0	*0	×	×	0	×	×	×	×
	4TH	0 .	*0	×	×	×	0	0	×	×
[2	2ND	0	х	×	0	×	×	×	×	×

O: Engaged ×: Not Engaged \*: Although the 1st clutch engages, driving power in not transmitted as the one-way clutch races.





### Hydraulic Flow -

### **Hydraulic Pressure Line**

Each hydraulic pressure line is named as shown in the table below. Each line is given a line No. and a pattern.

No.	Name of hydraulic pressure line	Pattern
1	Line pressure	
2	<u> </u>	↑ ·
3	<u>†</u>	<u>†</u>
3′	<u>†</u>	î
3′′	<u>†</u>	Ť
4	<b>†</b>	<b>†</b>
4'		<b>†</b>
5	<u>†</u>	<b>†</b>
6	Modulator pressure	
10	1st clutch pressure	a
11	<b>↑</b>	<b>†</b>
20	2nd clutch pressure	<b>†</b>
21	<u></u>	1
22	<u>†</u>	<b>†</b>
23	<b>↑</b>	<b>†</b>
24	<u> </u>	<b>†</b>
30	3rd clutch pressure	<b>†</b>

No.	Name of hydraulic pressure line	Pattern
31	3rd clutch pressure	
40	4th clutch pressure	†
41	· <b>†</b>	1
42	†	†
50	Throttle A pressure	
51	<b>†</b>	†
55	Throttle B pressure	
56	††	
60	Governor pressure	
61	†	<b>†</b>
90	Torque converter pressure	語が対象
91	<u> </u>	<b>†</b>
92	†	<b>†</b>
93	Oil cooler pressure	<b>†</b>
94	Torque converter pressure	
95	Lubricating oil pressure	
96	Torque converter pressure	
97	<b>†</b>	
99	Suction pressure	
Х	Leak pressure	

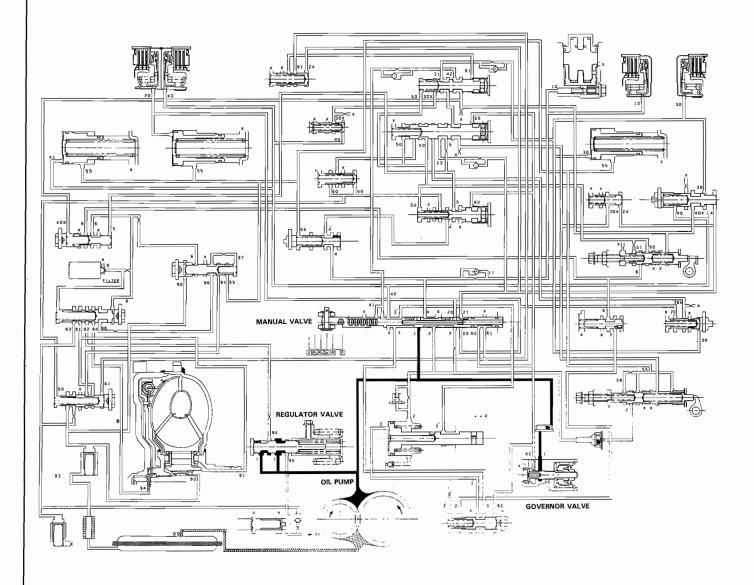
The status of hydraulic operation in each range is shown below.

### - Hydraulic Flow (cont'd)

### N Position

Starting the engine causes oil to be discharged from the oil pump. Oil flows in from (99) and is pumped into (1). The hydraulic pressure is regulated by the regulator valve to become line pressure (1). Torque converter inlet pressure (92) from the regulator valve flows through the orifice into torque converter line (94). The hydraulic pressure circulates in the torque converter and is discharged into (90).

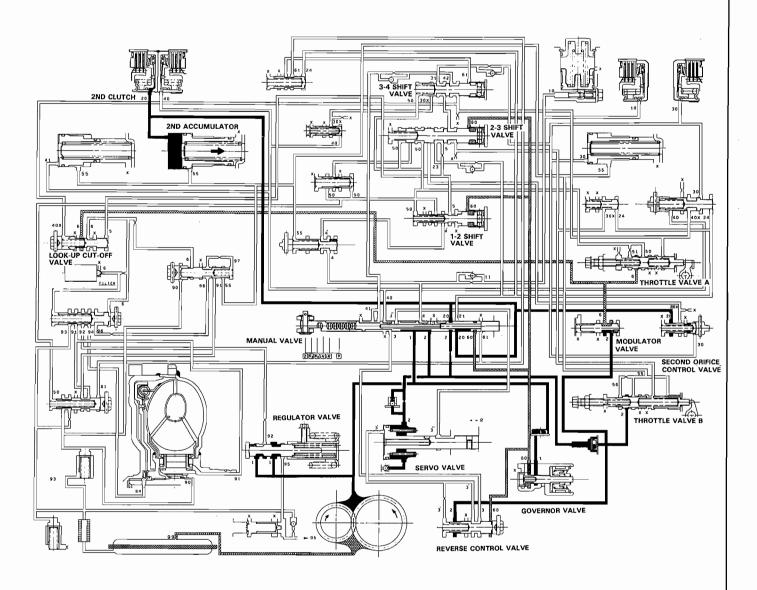
The check valve maintains consistent fluid pressure to the torque converter. Line pressure (1) is cut off by the manual valve, thus no pressure is applied to the clutches.





### 2 position

Line pressure (1) passes through the manual valve to become line pressure (2) and then line pressure (20), which is connected to the 2nd clutch. At the same time, line pressure (1) passes through a filter to be connected to the governor valve. This pressure then becomes governor pressure (60) and is connected to the 1-2 and 2-3 shift valves. Line pressure (2) is connected to the modulator valve and throttle valve B. The modulator valve regulates the pressure.



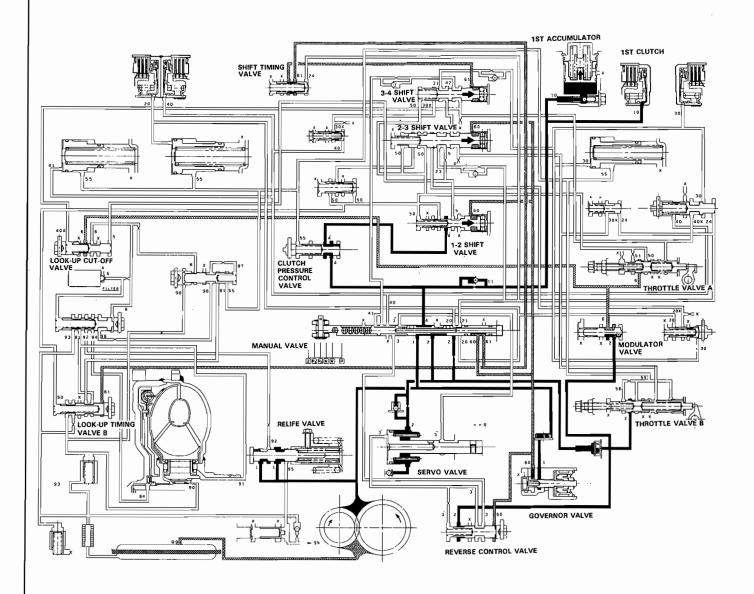
### Hydraulic Flow (cont'd)

### 1st Gear in □ or □ Position

The flow of fluid through the torque converter is the same as in N position.

The line pressure (1) become the line pressure (4) and it become the 1st clutch pressure (10) through the clutch pressure control valve. The 1st clutch pressure is applied to the 1st clutch and 1st accumulator, consequently the vehicle will move as the engine power is transmitted. Lign pressure (2) then passes through the servo valve, throttle valve B, modulator valve and throttle valve A.

Governor pressure (60) suitable for car speed acts on the 1-2 and 2-3 shift valves. Modulator pressure (6) passes through throttle valve A. Throttle pressure (50) suitable for throttle opening acts on the 1-2 and 2-3 shift valves. The 1st speed is so slow that the 1-2 shift valve remains pressed rightward.



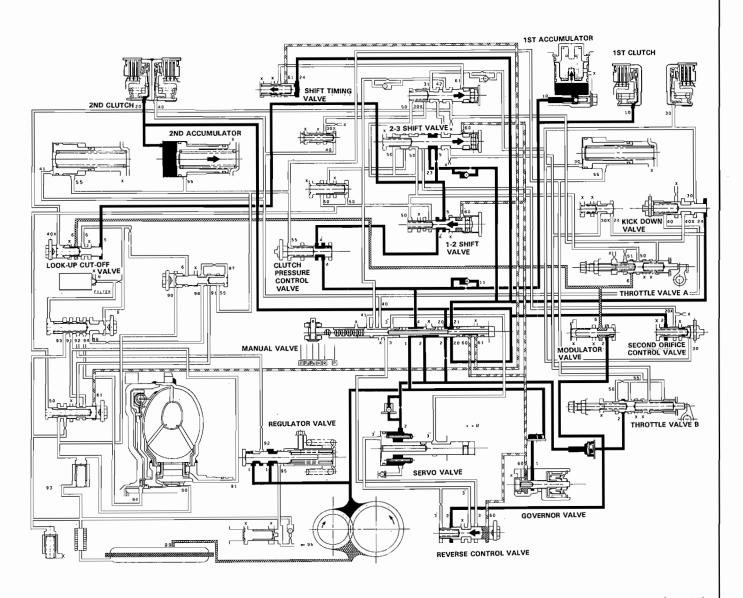


### 2nd Gear in D or D Position

The flow of fluid up to the 1-2 and 2-3 shift valves is the same as in the 1st speed. When the vehicle speed is increased and reaches the certain value, the governor pressure (60) increases. In the 1-2 shift valve, governor pressure (60) overcomes the spring drag and throttle valve A pressure (50). This valve then moves leftward.

Leftward movement of the 1-2 shift valve causes the hydraulic pressure lines to be changed. Line pressure (2) at the manual valve becomes line pressure (4), passes through the CPC valve and the 1-2 shift valve, then becomes line pressure (5) and leads to the 2-3 shift valve.

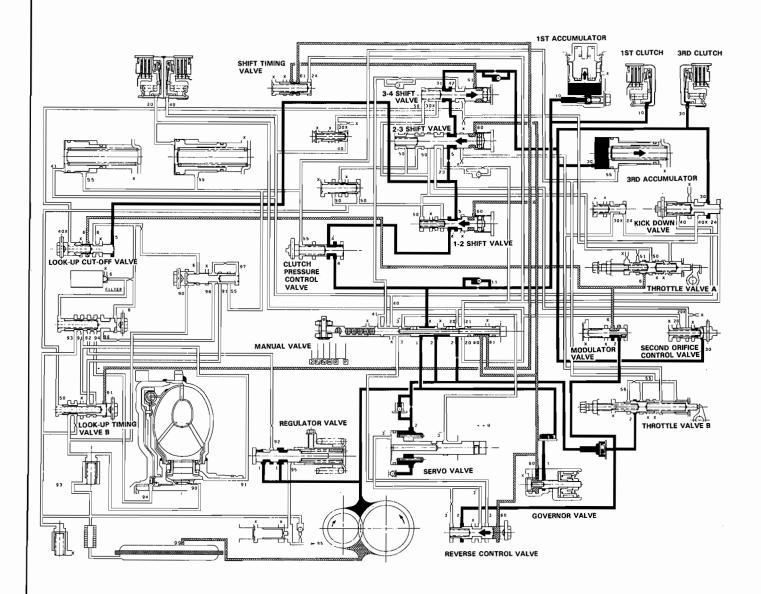
The 2-3 shift valve causes line pressure (5) to become 2nd clutch pressure (23). This pressure passes through an orifice and becomes 2nd clutch pressure (21). This pressure then passes through the manual valve and becomes 2nd clutch pressure (20) and line pressure (20) directed to the 2nd accumulator. This pressure then acts on the 2nd clutch. This is how the power transmission channels is formed. At this time, the hydraulic pressure is also applied to and connected to the 1st clutch, but the one-way clutch prevents power transmission.



### Hydraulic Flow (cont'd)

### 3rd Gear in D<sub>3</sub> or D<sub>4</sub> Position

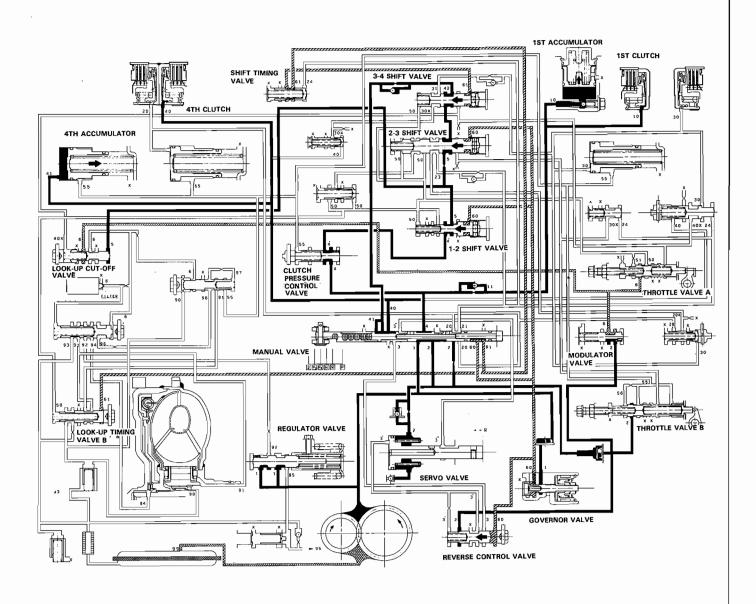
The flow of fluid up to the 1-2, 2-3 and 3-4 shift valves is the same as in the 2nd speed. As the speed of the car reaches the prescribed value, the governor pressure (60) overcomes the spring drag and throttle valve A pressure (50). This valve then moves leftward. The leftward movement of the 2-3 shift valve causes the hydraulic lines to be changed, and thus the oil passage to the 2nd clutch is closed. Line pressure (5) passes through the 2-3 shift valve and is regulated by the 3rd accumulator to become 3rd clutch pressure (30), which acts on the 3rd clutch. This is how motive power is transmitted. At the time, hydraulic pressure is also applied to the 1st clutch, but the one-way clutch prevents power transmission, just like in 2nd-speed operation.





### 4th Gear in D Position

The flow of fluid up to the 1-2, 2-3 and 3-4 shift valves is the same as in the 3rd speed. When the speed of the car reaches the prescrived value, the governor pressure (60) increases to become governor pressure (61). This pressure passes through the shift timing valve and overcomes the 3-4 shift valve's spring drag and throttle valve A pressure (50). This valve then moves leftward. The leftward movement of the 3-4 shift valve causes the hydraulic pressure lines to be changed to close the oil passage to the 3rd clutch. Line pressure (5) passes through the 2-3 shift valve to become line pressure (42). 4th clutch pressure (40) passes through the manual valve and acts on the 4th clutch. This is how motive power is transmitted. At this time, hydraulic pressure is also applied to the 1st clutch, but the one-way clutch prevents power transmission, just like in 3rd-speed operation.

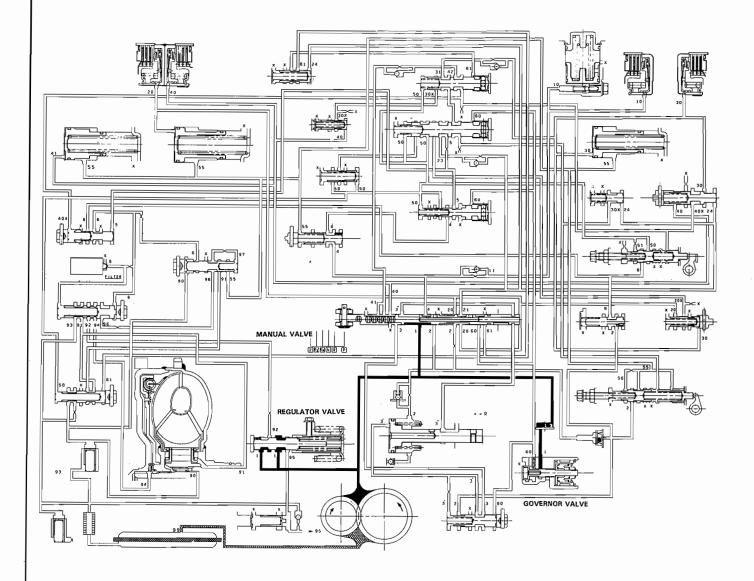


## - Hydraulic Flow (cont'd) -

### P Position

The flow of fluid through the torque converter is the same in  ${\color{red}\mathbb{N}}$  position.

The line pressure (1) is intercepted by the manual valve, and is not supplied to the clutches. The power is not transmitted.

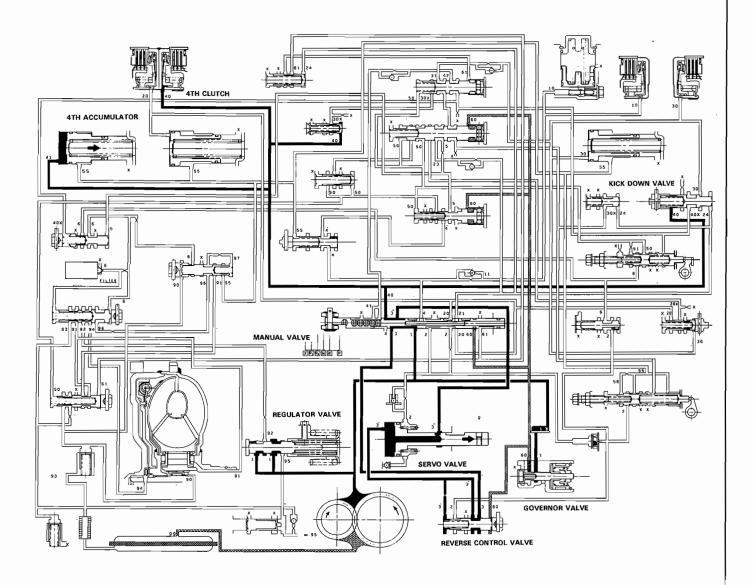




### R Position

The flow of fluid through the torque converter circuit is the same as in the  $\boxed{\mathbb{N}}$ . The fluid (1) from the oil pump flows through the manual valve and becomes the line pressure (3). This pressure then passes the reverse control valve proceeding to the servo valve (3'), moving the servo valve shift fork shaft toward the reverse side to shift to the reverse gear. The fluid (3') will flow through the servo valve and the manual valve to the 4th clutch, power is transmitted through the 4th clutch.

When driving forward at about 30 km/h and the gear shift lever is shifted to R, governor pressure (60) moves the reverse control valve leftward. This results in cutting off the oil passage which has line pressure (3) and is directed to the servo valve. Even though the manual valve is set to R, the transmission will not shift to the reverse gears.

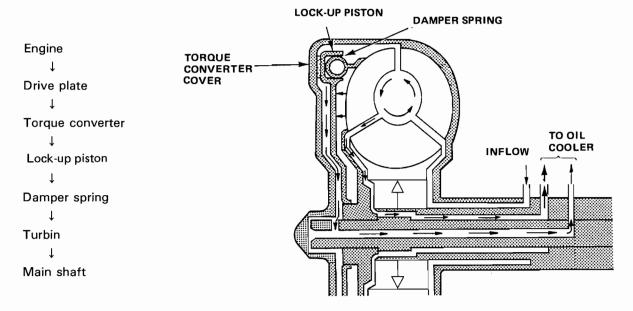


### **Hydraulic Flow (cont'd)**

### **Lock-up Operation**

Operation of the lock-up clutch control valve (lock-up clutch shift valve) causes the oil to flow as shown in the figure below, resulting in the oil being pumped from the lock-up clutch piston's left chamber.

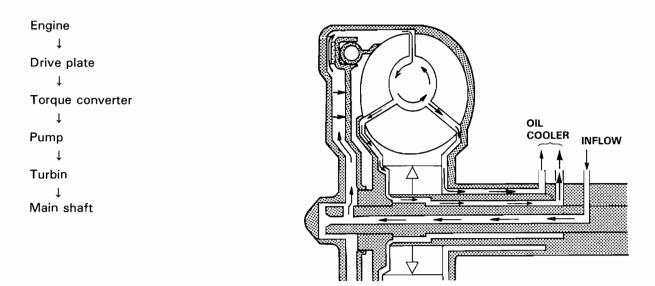
The lock-up clutch piston causes back pressure to act using the hydraulic pressure difference between the right and left sides of the piston. This causes the piston to be pressed to the cover. Engine power is then transmitted via the damper to the main shaft.



### When Lock-up Clutch Is Released

Operation of the lock-up clutch control valve causes the oil leading to the lock-up mechanism to flow as shown in the figure below, contrarily to the case when the lock-up clutch is engaged.

This causes oil to flow into the torque converter from beside the lock-up clutch piston. The lock-up clutch piston then moves rightward to transmit motive power from the engine via the torque converter to the main shaft.



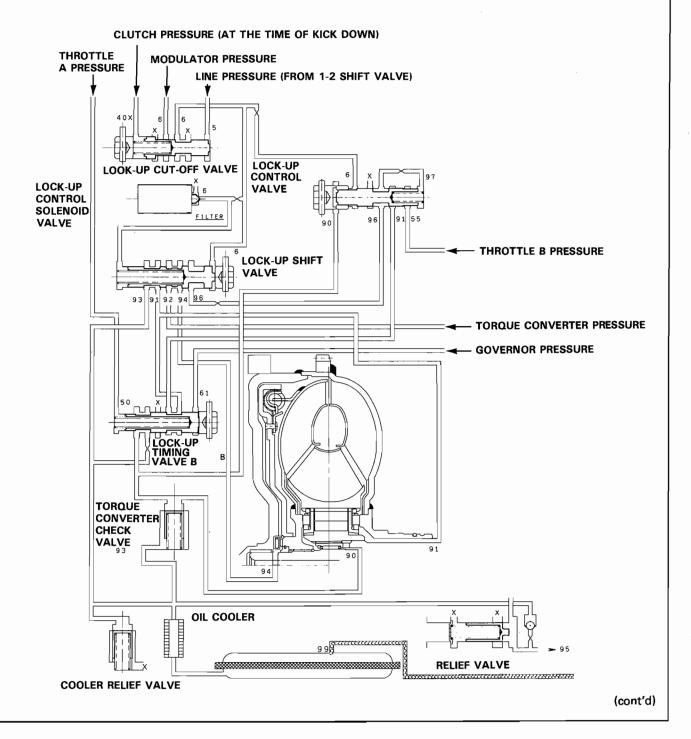


### **Description of Lock-up Control**

- \* Lock-up operation occurs when the gearshift position is is D4 range and the second or higher gear is in use or when the car is cruising. Lock-up improves driveability and fuel economy.
- \* The lock-up mechanism is controlled in the lock-up control mode, and full lock-up mode.

### Main Components of Lock-up Control

\* The lock-up mechanism consists of a lock-up cut-off valve, lock-up control solenoid valve lock-up control valve, lock-up shift valve, and lock-up timing valve B. This lock-up mechanism engages and disengages the lock-up clutch.

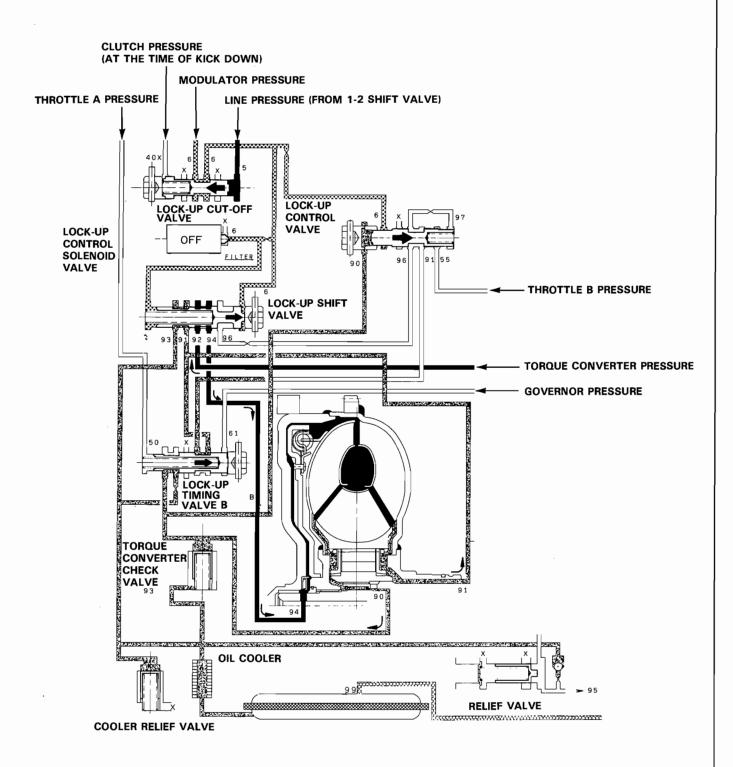


### Hydraulic Flow (cont'd) -

### Lock-up Hydraulic Control

- 1. Lock-up OFF Mode
- (1) The line pressure from the 1-2 shift valve acts on the lock-up cut-off valve right chamber. The pressure from the 1-2 shift valve always operates when the gear shift lever is set to range D3 or D4 and the 2nd or higher gear is in use.
- (2) The clutch pressure (line pressure) acts on the lock-up cut-off valve left chamber at the time of kick down only. This pressure is usually not applied.
- (3)The lock-up cut-off valve right chamber receives the line pressure from the 1-2 shift valve and overcomes the spring force to move leftward.
- (4) The modulator pressure passes through the lock-up cut-off valve and acts on both ends of the lock-up shift valve. However, the pressure acting on one end cancels the pressure acting on the other end. Therefore, only the spring force acts. This causes the lock-up shift valve to remain at the right.
- (5)In this state, the pressure directed to the torque converter comes from the left of the lock-up clutch, which remains OFF.





### Hydraulic Flow (cont'd) -

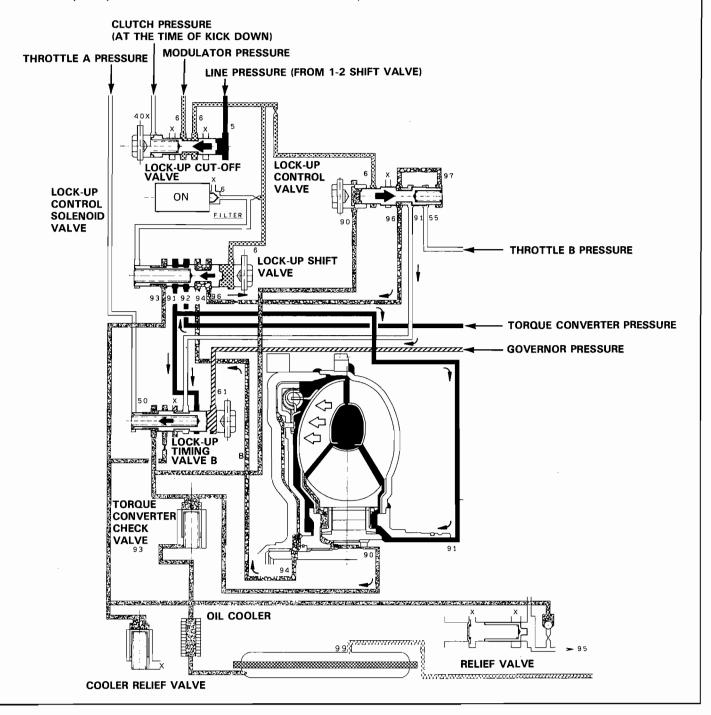
#### 2. Lock-up Control Mode

- 1. When the transmission enters the lock-up control mode (when car speed is low), lock-up control solenoid valve comes ON to release the modulator pressure that acts on the lock-up shift valve's left chamber. The modulator pressure acting on the right chamber overcomes the spring force to move the lock-up shift valve leftward.
- 2.Leftward movement of the lock-up shift valve causes the oil passages of the torque converter to be changed. The torque converter pressure is divided into the inner pressure led from the right of the torque converter and back pressure from the left. The torque converter's inner pressure (F1) attempts to press (to turn ON) the lock-up clutch. The torque converter's back pressure (F2) attempts to move away (to turn OFF) the lock-up clutch.
- 3. The torque converter back pressure is regulated by the lock-up control valve. The lock-up control valve is balanced between the throttle B pressure and the lock-up control valve back pressure, and the modulator pressure and the torque converter check valve-regulated pressure. Modulator pressure is applied to the lock-up control valve left chamber.
- 4. The modulator pressure causes leftward movement of the lock-up control valve and a small leakage amount of the torque converter's back pressure to remain. This makes the back pressure become slightly lower than the inner pressure.
- 5. The torque converter's inner pressure (F1) attempts to press (to turn ON) the lock-up clutch, but is pushed back by the torque converter's back pressure (F2). This results in a small lock-up capacity, which is here called the lock-up control mode.



### 3. Full Lock-up Mode

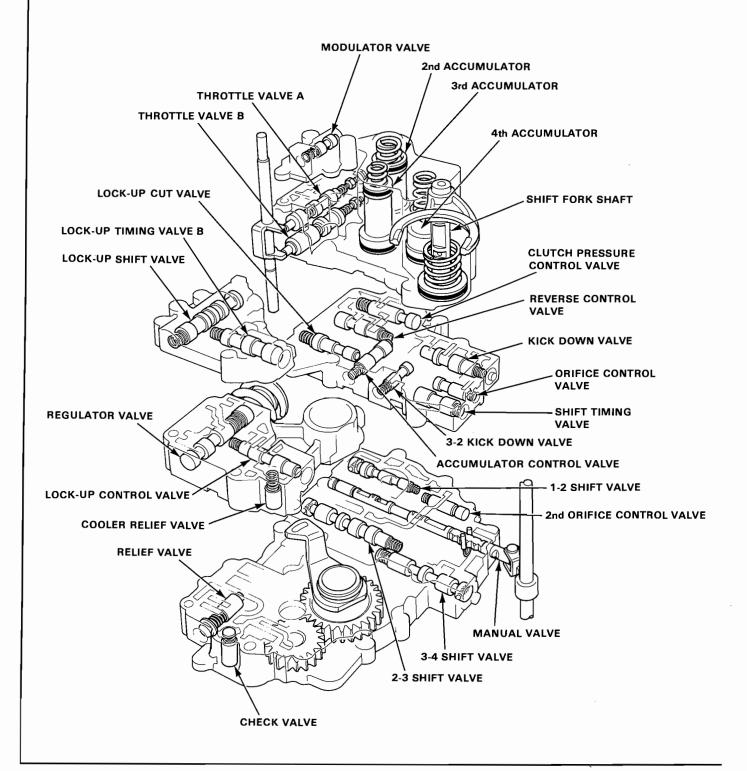
- 1. As car speed further increases, the governor pressure increases. The governor pressure that acts on lock-up timing valve B right chamber overrides the combination of the throttle A pressure acting on the left chamber and the spring drag. As a result, timing valve B moves leftward.
- 2. The leftward movement of lock-up timing valve B causes lock-up timing valve B's leak hole to open wider and the torque converter pressure to be cut off. The torque converter's back pressure passes through the lock-up shift valve and the lock-up control valve and is released by lock-up timing valve B.
- 3. This complete disappearance of the torque converter's back pressure causes the lock-up clutch to be turned completely ON. This is what is called the full lock-up mode.



### -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 valve, and servo body, directing pressure to each of the clutches.





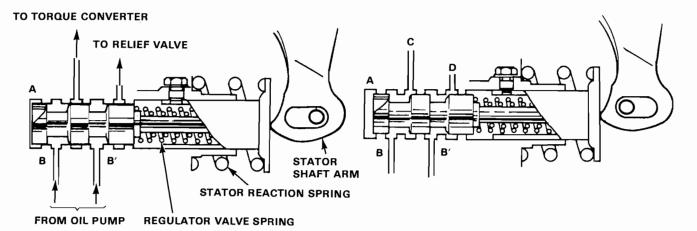
#### [Regulator Valve]

The regulator valve maintains a constant hydraulic pressure sent from the oil pump to the hydraulic control system, while also furnishing oil to the lubricating system and torque converter.

Oil flows through B and B'. The oil which enters through B flows through the valve orifice to A pushing the regulator valve to the right. According to the level of hydraulic pressure through B, the position of the valve changes, and the amount of the oil through B' from D thus changes. This operation is continued, thus maintaining the line pressure.

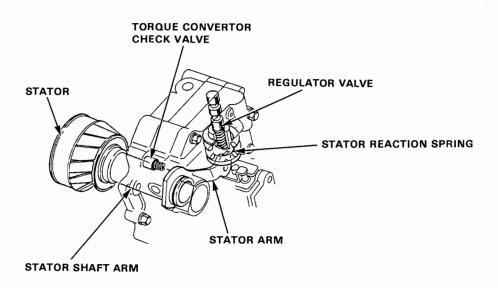
#### (ENGINE NOT RUNNING)

#### (ENGINE RUNNING)



### (Stator Reaction Hydraulic Pressure Control)

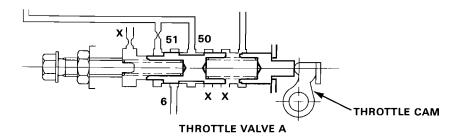
Hydraulic pressure increase according to torque is performed by the regulator valve using stator torque reaction. The stator shaft is splined in the stator and its arm end contacts the regulator spring cap. When the car is accelerating or climbing (Torque Converter Range), stator torque reaction acts 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.



### · Hydraulic Control (cont'd)

#### [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 specified shift speeds.

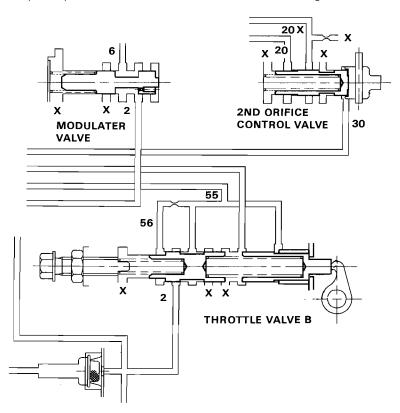


#### [Throttle Valve B, Modulator Valve]

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, and the pressure to the throttle valve A, thus the modulator valve provides the lock-up control pressure to the lock-up control valves.

#### [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.





# **Troubleshooting**

## - Symptom-to-System -

	Objects above	
	Check these items on	Check these
SYMPTOM	PROBABLE CAUSE LIST	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, 45, 49	C, M, O
Car moves in D3, D4 and R, but not in 2.	9, 30, 50	C, L
Car moves in D3, D4 and 2, but not in R.	1, 11, 12, 22, 39, 40, 41	C, L, Q
Car moves in N,	1, 8, 9, 10, 11 47, 48	C, D
Excessive idle vibration.	5, 17	8, K, L
Slips in all gears.	6, 7, 16	C, L, U
Slips in low gear.	8, 29, 45, 46, 49	C, N, O, U
Slips in 2nd gear.	9, 20, 23, 30, 46, 50	C. L. U
Slips in 3rd gear.	10, 21, 23, 31, 45, 46	C, L, U
Slips in 4th gear.	11, 23, 32, 46	C, L, U
Slips in reverse gear.	11, 32	С
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, 48	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	0
Harsh downshift (3 – 2) at closed throttle.	15	E, T
Axle(s) slips out of trans on turns.	44, 51	L, P, Q
Axle(s) stuck in trans.	44	L, Q
Ratcheting noise when shifting into R.	6, 7, 39, 40, 41	K, L, Q
Loud popping noise when taking off in R.	39, 40, 41	L, Q
Ratcheting noise when shifting from R to P, or from R to N.	39, 40, 41, 52	L, Q
Noise from trans in all selector lever positions.	6, 17	K, L, Q
Noise from trans only when wheels rolling.	40, 43	L, Q
Gear whine, rpm related (pitch changes with shifts).	6, 42	K, L, Q
Gear whine, speed related (pitch changes with speed).	40, 43	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, 38	E, L, V
Transmission has multitude of problems shifting, at disassembly large deposits of metal found on magnet.	44	L, Q

The following symptoms can be caused by improper repair or assembly.	Check these items on PROBABLE CAUSE DUE TO IMPROPER REPAIR	Check these ITEMS ON NOTES PAGE
Car creeps in N.	R1, R2	
Car does not move in D3 or D4.	R5	
Trans locks up in R.	R4	
Trans has no park.	R3	
Excessive drag in trans.	R8	R,K
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 8 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 oriffice control valve stuck
25.	Orifice control valve stuck
26.	3-2 timing valve stuck
27.	kickdown valve stuck
28.	Shift timing valve/accumulator stuck
29.	Low clutch accumulator defective
30.	2nd clutch accumulator defective
31.	3rd clutch accumulator defective
32.	4th/reverve 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. 38.	Lockup clutch control valve stuck  Lockup control solenoid valve broken
39.	Shift fork bent
40.	Reverse gears worn/damaged (3 gears)
41.	Reverse selector worn
42.	3rd gears worn/damaged (2 gears)
43.	Final gears worn/damaged (2 gears)
44.	Differential pinion shaft worn
45.	Feedpipe O-ring broken
٠٠,	



	PROBABLE CAUSE
46.	Servo valve check valve loose
47.	Gear clearance incorrect
48.	Clutch clearance incorrect
49.	Sprag clutch defective
50.	Sealing rings/guide worn
51.	Axle-inboard joint clip missing
52.	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 installed 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	

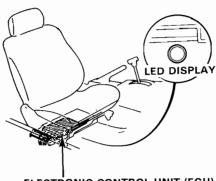
	NOTES		
A	Flushing procedure (repeat 3 times): 1. Drain the trans. 2. Refill with 3 qts. of Dexron recommended type ATF. 3. Start the engine and shift trans to D4. 4. Let trans shift through gears at least 5 times. 5. Shift to reverse and neutral at least 5 times. 6. Drain and refill.		
В	Set idle rpm in gear to specified idle speed. If still no good, adjust the motor mounts as outlined in engine section of service manual.		
С	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.		
Ε	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 downshift.		
G	If the $1-2$ valve is stuck closed, the transmission will not upshift. If stuck open, the transmission has no low gear.		
н	If the 2nd orifice control valve is stuck, inspect the 2nd and 3rd clutch packs for wear.		
ı	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
к	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 14-77.
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.
М	If the low clutch feedpipe guide in the end cover is scored by the main- shaft, inspect the ball bearing for excessive movement in the transmis- sion 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.
Ρ	Inspect the frame for collision damage.
a	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 replac- ing 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. If you push it into the torque converter case until it bottoms out, it will block the oil return passage and result in damage.
т	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. See page 14-92.
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.

# **Troubleshooting**

If the lock-up control electrical system is suspected to be faulty after referring to the symptom charts on pages 14-28 and 14-29, check the following.

Check the ECU LED under the passenger seat.
 If it blinks, count the number of blinks and inspect according to the troubleshooting chart (see Section 11).



**ELECTRONIC CONTROL UNIT (ECU)** 

- 2. Check and adjust the throttle control cable (see page 14-92).
- 3. Check for power input signal of the lock-up control solenoid valve (see Section 11) .
- 4. Check the lock-up control solenoid valve (see page 14-38).

### **Road Test**



NOTE: After transmission is installed:

- Make sure the floor mat does not interfere with accelerator pedal travel. Fully depress accelerator pedal and check 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	km/h	5360	98-109	148-158	134-142
Acceleration from a stop	mph	33-37	61-68	92-98	83-88
Half-throttle	km/h	32-35	60-69	90-100	
Acceleration from a stop	mph	20-22	37—43	56-62	_
1/8-throttle	km/h	19-23	34—37	48-55	63-71
Coasting down-hill from a stop	mph	12-14	21-23	30-34	39-44

#### Downshift

Full-throttle	km/h	126—135	93—101	40-47
When car is slowed by increased grade, wind, etc.	mph	78-84	58-63	25-29

1+h-2nd	2nd 1at
4th→2nd	2nd→1st

3rd→2nd

2nd→1st

4th→3rd

Closed-throttle	km/h	23-26	10-11
Coasting or braking to a stop	mph	14-16	6-7

3. Accelerate to about 56 km/h (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 100km/h (62.5 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. Release the brake; the car should not move.

### **Pressure**

### - Testing

CAUTION: Before testing, be sure transmission is filled to proper level.

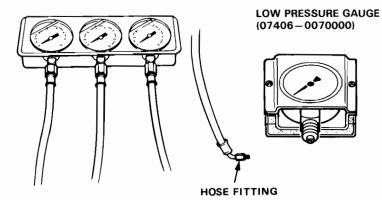
#### NOTE:

 Stop engine when attaching hoses for pressure tests.

Torque hose fitting to 18 N·m (1.8 kg-m, 12 lb-ft).

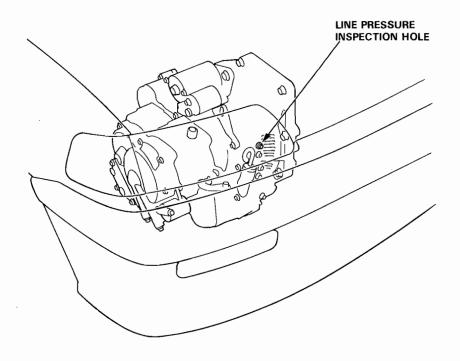
• Do not reuse aluminum washers.

#### GAUGE SET 07406-0020003 (includes pressure hose set 07406-0020201)



#### Line Pressure Measurement

- · Set the parking brake securely.
- Jack up the front of the car and support it with a jack stands.
- Run the engine at 2,000 rpm.

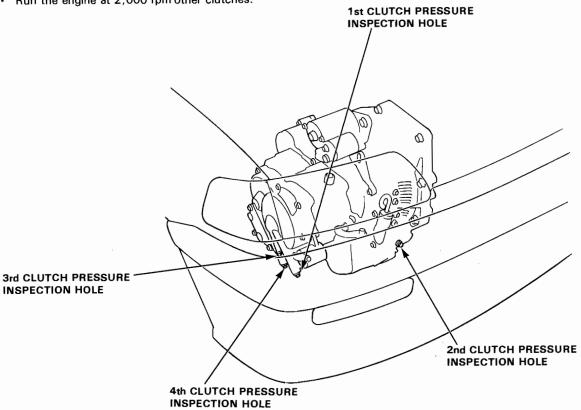


PDECCUPE	SELECTOR	SYMPTOM	PROBABLE	FLUID F	PRESSURE
PRESSURE	POSITION	STIVIPION	CAUSE	Standard	Service Limit
Line	N or P	No (or low) Line pressure	Torque converter, oil pump pressure regulator, torque converter check valve, oil pump	785-834 kPa (8.0-8.5 kg/cm <sup>2</sup> , 114-121 psi)	736 kPa (7.5 kg/cm <sup>2</sup> , 107 psi)



#### Clutch Pressure Measurement

- · Set the parking brake securely and block the rear wheels.
- Jack up the front of the car and support it with jack stands.
- Run the engine at idle speed to check 1st clutch only.
   Test stall speed in or if the 1st clutch pressure is low.
- Run the engine at 2,000 rpm other clutches.



PRESSURE	SELECTOR	SYMPTOM	PROBABLE	FLUID P	RESSURE
PRESSURE	POSITION	STIVIPTOW	CAUSE	Standard	Service Limit
1st Clutch	D3 or D4	No or low 1st pressure	1st Clutch	785-834 kPa (8.0-8.5 kg/cm <sup>2</sup> , 114-121 psi)	736 kPa (7.5 kg/cm <sup>2</sup> , 107 psi)
2nd Clutch (2nd hold)	2	No or low 2nd pressure	2nd Clutch	785—834 kPa (8.0—8.5 kg/cm², 114—121 psi)	736 kPa (7.5 kg/cm <sup>2</sup> , 107 psi)
3rd Clutch	D3	No or low 3rd pressure	3rd Clutch	412 kPa (4.2 kg/cm <sup>2</sup> , 60 psi)	363 kPa (3.7 kg/cm <sup>2</sup> , 53 psi)
4th Clutch	D4	No or low 4th pressure	4th Clutch	(throttle control lever fully closed) 785—834 kPa (8.0—8.5 kg/cm², 114—121 psi) (throttle open more than 1/4)	(throttle control lever fully closed) 736 kPa (7.5 kg/cm <sup>2</sup> ,107 psi) (throttle open more than 1/4)
	R		Servo valve or 4th Clutch	785-834 kPa (8.0-8.5 kg/cm², 114-121 psi)	736 kPa (7.5 kg/cm <sup>2</sup> ,107 psi)

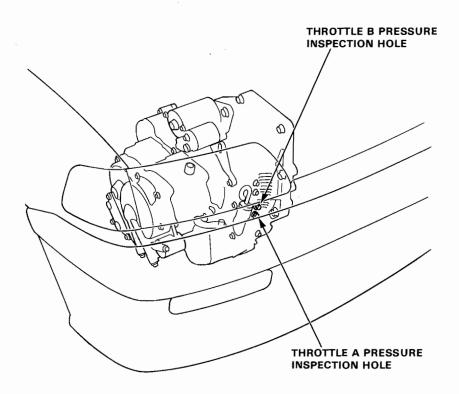
(cont'd)

# **Pressure**

# -Testing (cont'd)-

#### **Throttle Pressure Measurement**

- · Set the parking brake securely and block the wheels.
- Run the engine at 1,000 rpm.
- · Disconnect the throttle control cable from the throttle lever.

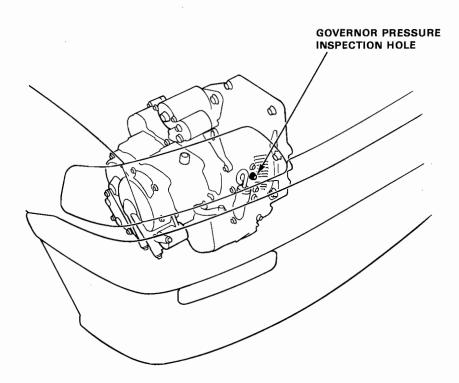


PRESSURE	SELECTOR SYMPTOM		PROBABLE	FLUID PF	RESSURE
PRESSURE	POSITION	STIVIPTON	CAUSE	Standard	Service Limit
Throttle A	D3 or D4	No (or low) throttle pressure	Throttle valve A Throttle modulator valve	0—4.9 kPa (0—0.05 kg/cm², 0—0.7 psi) with lever released. 485—500 kPa (4.95 —5.10 kg/cm², 70.4—73 psi) with lever in full throttle position.	481 kPa (4.9 kg/cm <sup>2</sup> , 69.7 psi) with lever in full throttle position.
Throttle B	D3 or D4	No (or low) throttle pressure	Throttle valve B	0 kPa (0 kg/cm², 0 psi) with lever released. 785–834 kPa (8.0–8.5 kg/cm², 114–121 psi) with lever in full throttle position.	736 kPa (7.5 kg/cm <sup>2</sup> , 107 psi) with lever in full throttle position.



#### **Governor Pressure Measurement**

- Set the parking brake securely and block the rear wheels.
- Jack up the front of the car and support it with jack stands.
- · Run vehicle at (60 km/h) 37.5 mph.



PRESSURE	SELECTOR	SYMPTOM	PROBABLE	FLUID PF	RESSURE
PRESSURE	POSITION	STIVIPTOW	CAUSE	Standard	Service Limit
Governor	D3 or D4	No (or low) governor pres- sure	Governor valve	213—223 kPa (2.17— 2.27 kg/cm², 30.9— 32psi)	208 kPa (2.12 kg/cm <sup>2</sup> , 30.1 psi)

# Stall Speed

### - Test -

#### **CAUTION:**

- To prevent transmission damage, do not test stall speed for more than 10 seconds at a time.
- Do not shift the lever while rising the engine speed.
- Be sure to remove the pressure gauge before testing stall speed.
- 1. Engage parking brake and block the front wheels.
- 2. Connect safety chains to both front hooks and attach, with minimum slack, to some strong stationary object.
- 3. Connect tachometer, and start the engine.
- 4. After the engine has warmed up to normal operating temperature, shift into  $\overline{D_3}$ .
- 5. Fully depress the brake pedal and accelerator for 6 to 8 seconds, and note engine speed.
- 6. Allow 2 minutes for cooling, then repeat same test in D, 2, and R.

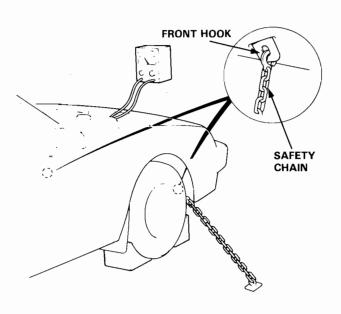
NOTE: Stall speed in  $\boxed{\textbf{D}_{\!4}}$ ,  $\boxed{\textbf{D}_{\!4}}$ ,  $\boxed{\textbf{2}}$  and  $\boxed{\textbf{R}}$  must be the same, and must also be within limits:

Stall Speed RPM:

Specification: 2,750 rpm

Service Limit: 2,300-2,900 rpm

TROUBLE	PROBABLE CAUSE
Stall rpm high in 2, D3, D4, and R	<ul> <li>Low fluid level or oil pump output.</li> <li>Clogged oil strainer.</li> <li>Pressure regulator valve stuck closed.</li> <li>Slipping clutch.</li> </ul>
Stall rpm high in D3 and D4 only	· Slippage of 1st clutch.
Stall rpm low in 2, D3, D4, and R	<ul> <li>Engine output low, throttle cable misadjusted.</li> <li>Oil pump seized.</li> <li>Torque converter one-way clutch slipping.</li> </ul>



### Fluid Level

# Checking/Changing-

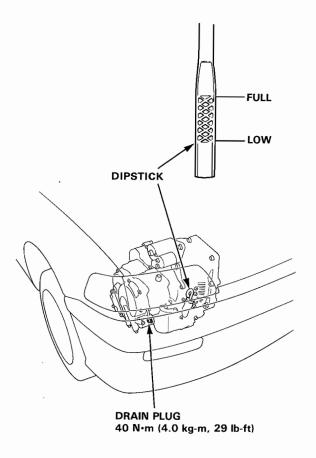
#### Checking

With the car on level ground, pull 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. Push the dipstick all the way 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.
- Reinstall the drain plug with a new washer, then refill the transmission to the full mark on the dipstick.

Automatic transmission Capacity: 2.4  $\ell$  (2.5 U.S. qts, 2.1 Imp. qt) at change 5.4  $\ell$  (5.7 U.S. qts, 4.8 Imp. qt) after overhaul

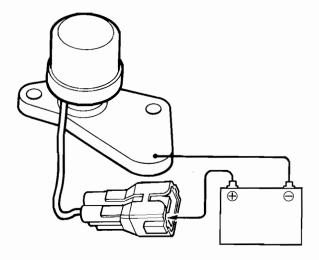




# **Lock-up Control Solenoid Valve**

### Inspection -

- Disconnect the lock-up control solenoid valve connector.
- Connect the yellow/black terminal of the lock-up control solenoid valve to the battery positive (+) terminal and the battery negative (-) terminal to the body ground. The clicking sound should be head.

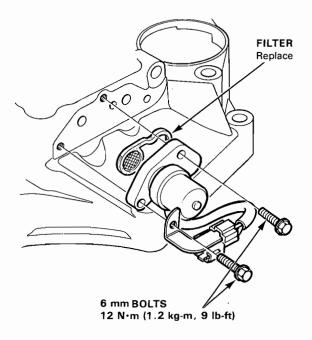


- If not, check for continuity between the harness and body ground.
- Replace the lock-up control solenoid valve if there is continuity between the harness and body ground.

### Replacement

NOTE: Be sure to replace the lock-up control solenoid valve only when it is suspected to be faulty.

- Remove the three 6×1.0 mm bolts and lock-up control solenoid valve.
- Check the oil passage in the lock-up control solenoid valve body and replace if it is clogged with dirt.



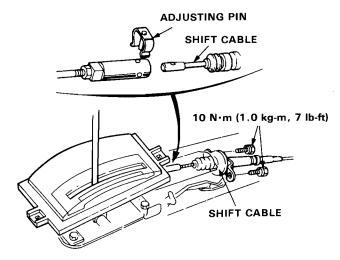
- Clean the lock-up control solenoid valve mounting surface and oil passage.
- Install a new filter O-ring and the lock-up control solenoid valve.
- Be sure that the connector is not rusted or contaminated with dirt or oil and connect it securely.

# **Transmission**

# $\odot$

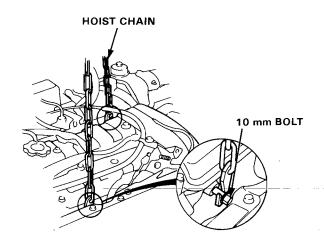
#### · Removal -

- Disconnect the ground cable at battery and transmission.
- 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.
- 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.

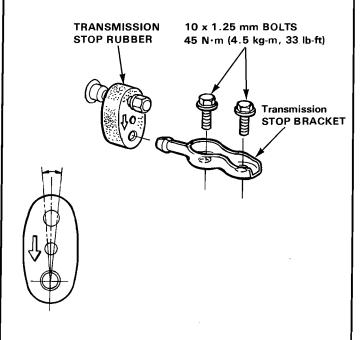


8. Unscrew the cable guide bolt, and pull the throttle control cable out of the cabin.

- Remove the right and left driveshafts and intermediate shaft.
- 10. Screw a 10 mm bolts at the cylinder head, power steering pump bracket and attach hoist chain to the each bolt, then lift the engine slightly to unload the mounts.



11. Remove the 10 x 1.25 mm bolts and transmission stop bracket.

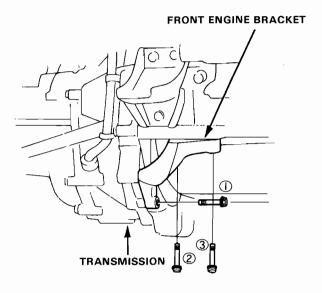


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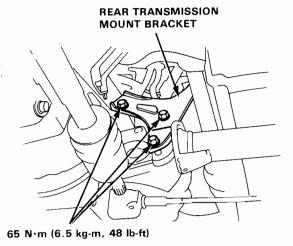
# **Transmission**

### - Removal (cont'd)-

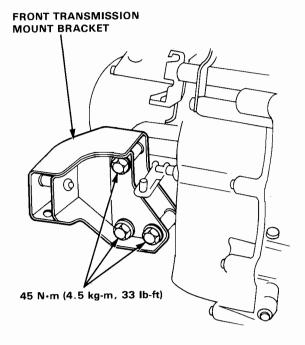
- 12. Remove the engine under cover and splash shield.
- 13. Disconnet the header pipe at exhaust manifold.
- 14. Place a jack under the transmission and raise transmission just enough to take weight off mounts.
- 15. Remove the bolts from the front mount at the front engine bracket.



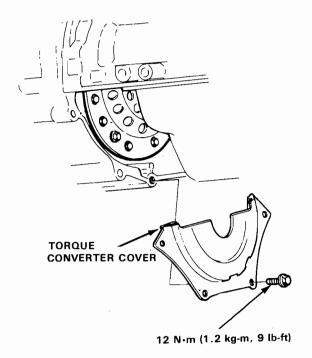
16. Remove the rear transmission mount bracket by removing the mounting bolts.



17. Remove the transmission housing bolts from front transmission mount bracket.



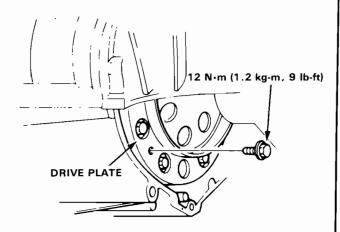
18. Remove the torque converter cover.



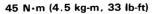


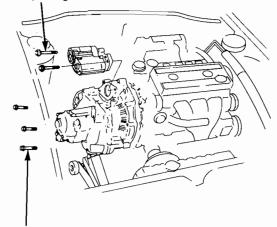
19. Remove the drive plate tightening bolts by rotating the engine crankshaft pulley.

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 tightened securely.



- 20. Remove the bolts attaching the starter motor, and remove the starter motor.
- 21. Remove the rest of the transmission mount bolts.

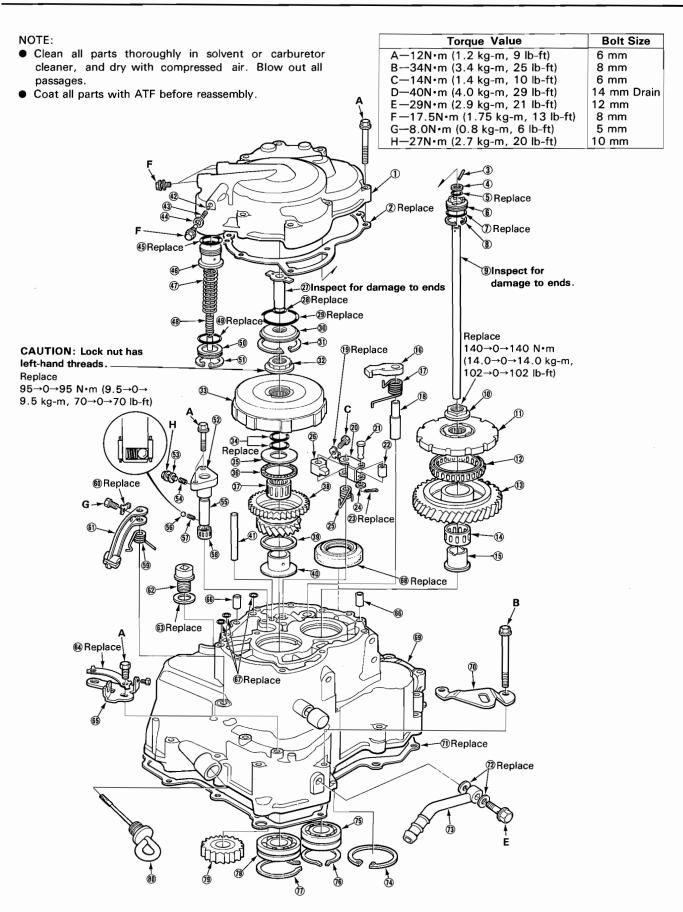




58 N·m (5.8 kg-m, 42 lb-ft)

 Pull the transmission away from the engine until it clears the 14 mm dowel pins, then lower on the transmission jack.

# **Illustrated Index**



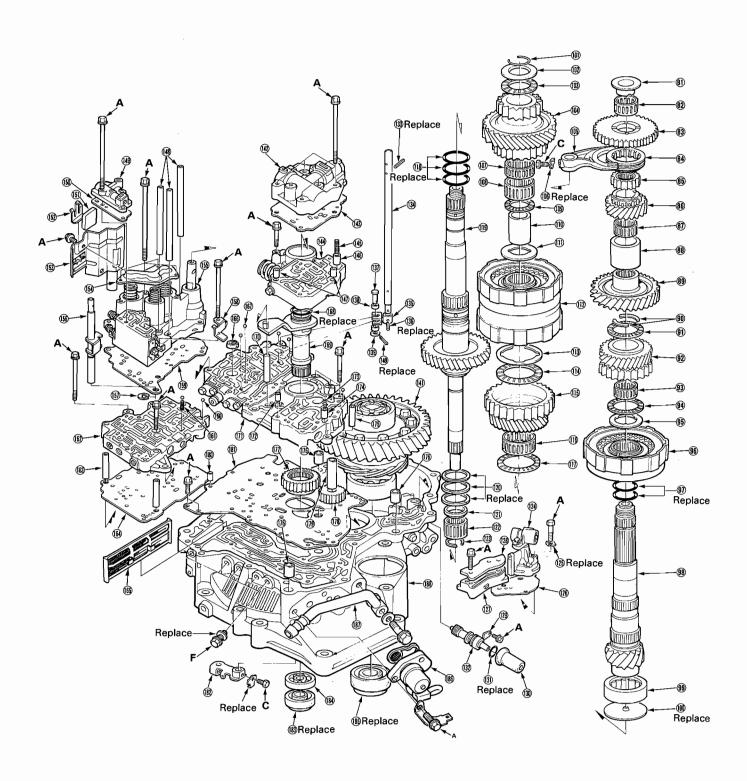


- 1 END COVER
- ② GASKET
- 3 PIN 19.8 mm
- **4** FEED PIPE WASHER
- **⑤** O-RING 7.7 x 1.9 mm
- **6** FEED PIPE FLANGE
- ① O-RING 19.8 x 1.9 mm
- ® SNAP RING 26 mm
- **9** 3rd CLUTCH FEED PIPE
- (II) LOCKNUT 23 mm(II) PARKING GEAR
- ① ONE-WAY CLUTCH Disassembly, page 14-50 inspection, page 14-50
- **(3) COUNTERSHAFT 1st GEAR**
- M NEEDLE BEARING 31 x 36 x 14 mm
- 15 COLLAR
- 16 PARKING PAWL
- **17) PARKING PAWL SPRING**
- **18 PARKING PAWL SHAFT**
- (19 LOCK WASHER
- **20 PARKING SHIFT ARM**
- **②1 ROLLER PIN**
- **22 PARKING BRAKE ROLLER**
- ② COTTER PIN 1.6 mm
- **WASHER 6 mm**
- **25 PARKING BRAKE SPRING**
- **® PARKING BRAKE STOPPER**
- 1 1st CLUTCH FEED PIPE

- 28 O-RING 8.5 x 1.9 mm
- 29 O-RING 34 x 1.9 mm
- **30 FEED PIPE GUIDE A**
- 31 SNAP RING 38 mm
- 3 LOCKNUT 19 mm
- 3 1st CLUTCH ASSEMBLY Disassembly, page 14-63 Inspection, page 14-67
- Ressasembly, page 14-69

  O-RINGS 18.8 x 1.9 mm
- **35 THRUST WASHER 23 mm**
- (§) THRUST NEEDLE BEARING 35 x 49 x 2 mm
- ③ NEEDLE BEARING 28 x 33 x 16.8 mm
- **38 MAINSHAFT 1st GEAR**
- 39 THRUST WASHER 28 x 40 x 1.5 mm
- 40 COLLAR 26 mm
- 4) STOP PIN
- STOP FIN
- **49 STEEL BALL**
- (4) SPRING (4) SEALING WASHER
- 49 O-RING 29 x 2.4 mm
- 1st ACCUMULATOR
   PISTON
- 1 OUTER SPRING
- 49 INNER SPRING
- (49) O-RING 29 x 2.4 mm
- **50 1st ACCUMULATOR COVER**
- 5 SNAP RING 38 mm
- **10 IDLER SHAFT HOLDER**

- **53 WASHER**
- (4) IDLER SHAFT SPRING A
- 55 IDLER SHAFT
- 58 STEEL BALL
- f) IDLER SHAFT SPRING B
- 98 NEEDLE BEARING 14 x 18 x 15 mm
- **59 THROTTLE LEVER SPRING**
- **60 LOCK WASHER**
- **61) THROTTLE CONTROL LEVER**
- **10 DRAIN PLUG**
- (63) SEALING WASHER
- **64 LOCK PLATE**
- 69 THROTTLE CABLE BRACKET
- 66 DOWEL PIN 8 x 14 mm
- (i) O-RING 7.7 x 2.3 mm
- 68 OIL SEAL 35 x 63 x 9 mm
- **69 TRANSMISSION HOUSING**
- TRANSMISSION HOOK
- 1 GASKET
- **® SEALING WASHER**
- **®** COOLER PIPE
- **3** SNAP RING 72 mm
- **BALL BEARING**
- 25 x 64 x 16 mm
- ® SNAP RING 64 mm
- ® BALL BEARING
- 26 x 70 x 17 mm
- **19 REVERSE IDLER GEAR**
- ® OIL LEVEL GAUGE





- **81 REVERSE GEAR COLLAR**
- **82 NEEDLE BEARING** 31 x 36 x 14 mm
- **(8) COUNTERSHAFT REVERSE GEAR**
- REVERSE GEAR SELECTOR
- **85 SELECTOR HUB**
- 86 COUNTERSHAFT 4th GEAR
- **87 NEEDLE BEARING** 28 x 33 x 20 mm
- **88 DISTANCE COLLAR 28 mm**
- **89 COUNTERSHAFT 2nd GEAR**
- **90 COTTER WASHER**
- **1 THRUST NEEDLE BEARING** 39 x 54 x 2 mm
- @ COUNTERSHAFT 3rd GEAR
- **93 NEEDLE BEARING** 32 x 38 x 20 mm
- 94 THRUST NEEDLE BEARING 35 x 52 x 2 mm
- THRUST WASHER
- 96 3rd CLUTCH ASSEMBLY Disassembly, page 14-63 Inspection, page 14-67 Reassembly, page 14-69
- 97 O-RING 31.2 x 1.9 mm
- **98 COUNTERSHAFT** Inspection, page 14-60
- **NEEDLE BEARING**
- 36 x 62 x 18 mm **(10) OIL GUIDE PLATE**
- **(III)** SNAP RING 26 mm
- **M** THRUST WASHER 26 x 45 x 3 mm
- THRUST NEEDLE BERING 32 x 44 x 2 mm
- M 4th GEAR
- **® REVERSE SHIFT FORK**

- **(III)** LOCK WASHER
- **M NEEDLE BEARING** 32 x 38 x 14 mm
- M NEEDLE BEARING 32 x 38 x 20 mm
- THRUST NEEDLE BEARING 39 x 54 x 2 mm
- 10 4th GEAR COLLAR
- m THRUST WASHER 26 x 53 x 4.5 mm
- ② 2nd/4th CLUTCH ASSEMBLY Disassembly, page 14-63 Inspection, page 14-68 Reassembly, page 14-70
- (13) THRUST WASHER 36.5 mm
- (I) THRUST NEEDLE BEARING 36 x 52 x 11 mm
- 1 2nd GEAR
- **116 NEEDLE BEARING** 36 x 41 x 14.8 mm
- THRUST NEEDLE BEARING 42 x 58 x 2 mm
- (IB O-RING 31.2 x 1.9 mm
- (II) MAINSHAFT
- Inspection, page 14-46

  SEALING RING 32 mm
- **(II) DISTANCE COLLAR 20 mm**
- 100 NEEDLE BEARING 20 x 26 x 20 mm
- 3 SNAP RING 20 mm
- **M** GOVERNOR
- 18 LOCK WASHER ASSEMBLY
- **18 SEPARATOR PLATE**
- BY-PASS BODY
- **(18) BY-PASS BODY COVER**
- **139 LOCK PLATE**
- ® BOOT
- (3) O-RING
- **(3) SPEED SENSOR ASSEMBLY**
- ® PIN
- **(B)** CONTROL SHAFT
- (3) SHIFT LEVER
- ® PIN
- **MANUAL VALVE PIN**
- **(3) ROLLERS**
- **(39) WASHER**
- (A) PIN
- (I) DIFFERENTIAL ASSEMBLY
- **(4) LOCK-UP VALVE ASSEMBLY**

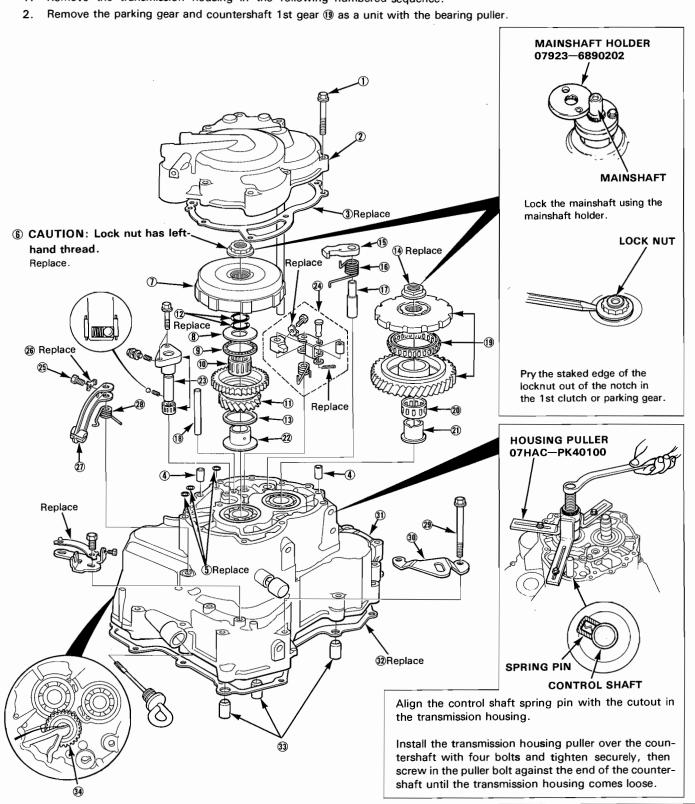
- (48) LOCK-UP SEPARATOR PLATE
- **(4) REGULATOR VALVE ASSEMBLY**
- (4) SPRING
- (4) TORQUE CONVERTER CHECK VALVE
- M DOWEL PIN
- **(48) CLUTCH PIPE**
- MODULATOR VALVE ASSEMBLY
- **MODULATOR SEPARATOR PLATE**
- (f) MAGNET
- **MAGNET HOLDER**
- **® BAFFLE PLATE**
- (B) ACCUMULATOR COVER
- (6) SERVO VALVE BODY ASSEMBLY
- (§) THROTTLE CONTROL SHAFT
- (5) E-CLIP
- **198 LOCK PLATE**
- (9) SERVO SEPARATOR PLATE
- (6) STEEL BALL
- (f) BALL SPRING
- SECONDARY VALVE BODY ASSEMBLY
- (B) DOWEL PIN
- SECONDARY SEPARATOR PLATE
- (6) FILTER SCREEN
- 66 FILTER
- (fi) STEEL BALL
- ® O-RING 27.5 x 1.7 mm
- ® STATOR SHAFT
- **M STOP PIN**
- **MAIN VALVE BODY ASSEMBLY**
- m DOWEL PIN
- CHECK VALVE SPRING
- (A) CHECK VALVE
- (B) SUCTION PIPE
- **176 DOWEL PIN**
- **(III)** OIL PUMP DRIVE GEAR
- ® OIL PUMP DRIVEN GEAR
- (B) OIL PUMP SHAFT
- ® DOWEL PIN 8 x 14 mm
- (8) MAIN VALVE SEPARATOR PLATE
- CONTROL LEVER
- ® OIL SEAL 44 x 68 x 8 mm
- BALL BEARING
- (8) OIL SEAL 35 x 56 x 8 mm
- LOCK-UP CONTROL SOLENOID VALVE
  - Inspection, page 14-38
- **®** COOLER PIPE
- ® TORQUE CONVERTER CASE

# **Transmission Housing**

#### - Removal -

#### NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner and dry with compressed air. Blow out all passages.
- Coat all parts with ATF before reassembly.
- 1. Remove the transmission housing in the following numbered sequence.

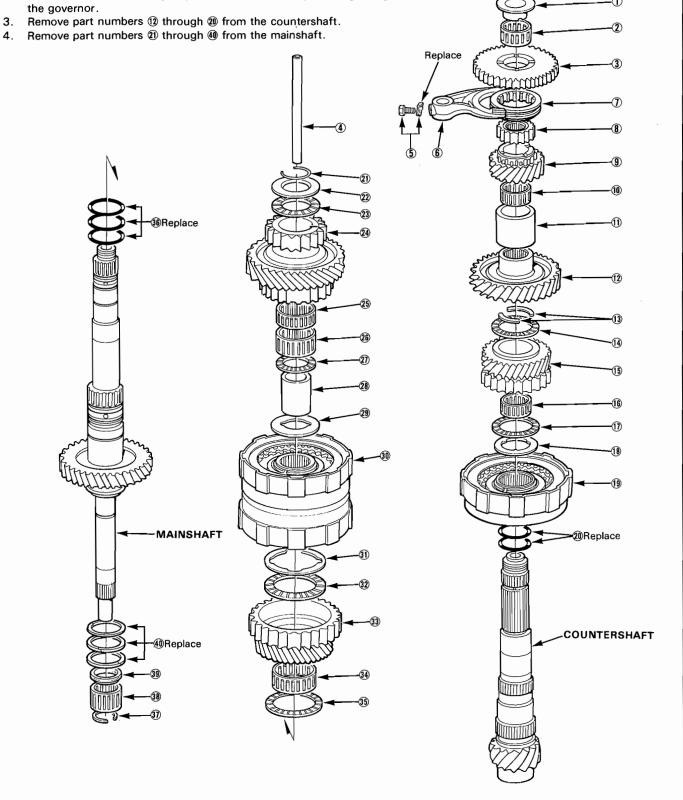


# Mainshaft/Countershaft

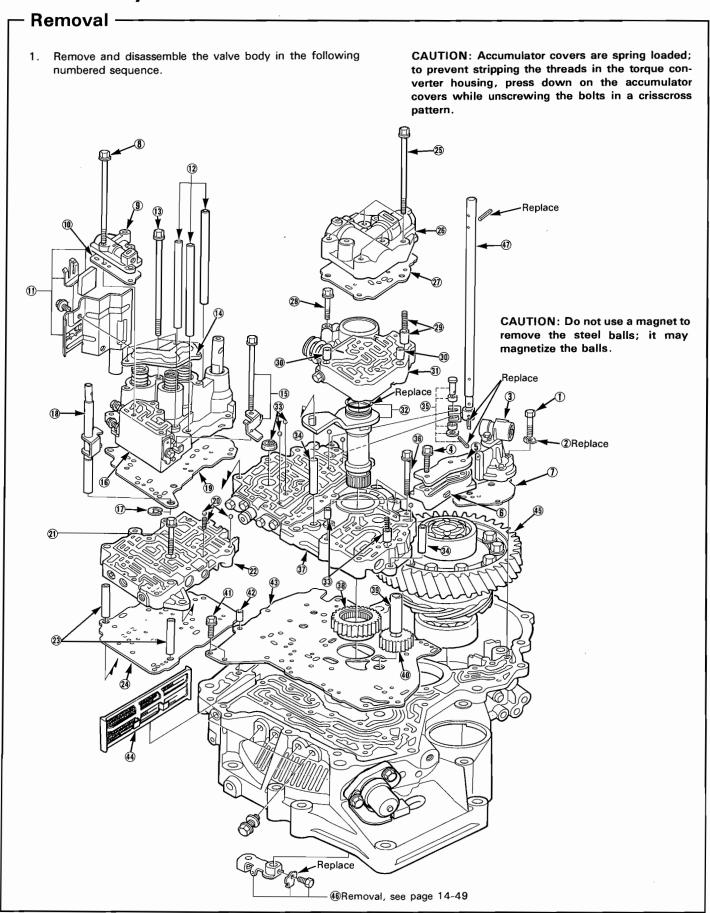


### - Disassembly-

- Remove part numbers ① through ① with the mainshaft and countershaft installed in the transmission.
- Remove the mainshaft and countershaft together. NOTE: It will be necessary to pull the countershaft up at a slight angle to clear the governor.



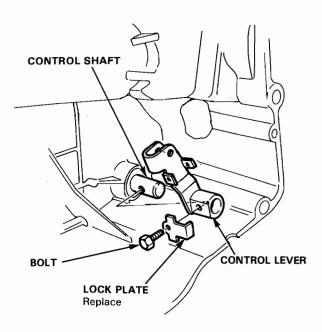
# Valve Body



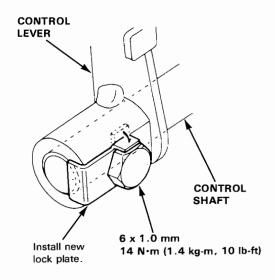
# **Control Shaft**

### - Replacement -

- Bend down the tab on the lock plate under the bolt in the control lever, then remove the bolt and lever.
- 2. Remove the control shaft.



- Install the control shaft in the torque converter housing.
- Install the control lever and new lock plate on the other end of shaft. Tighten the bolt to the torque shown, then bend the tab over against the bolt head.

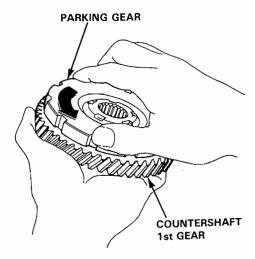




# One-Way Clutch/Parking Gear

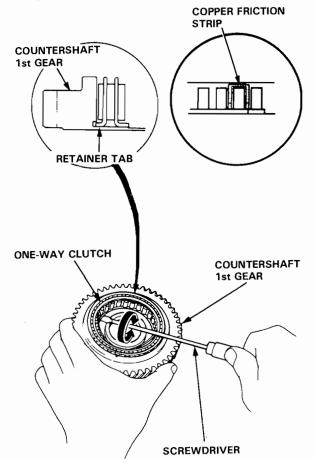
### - Disassembly and Inspection -

 Separate the countershaft 1st gear from the parking gear by turning the parking gear in the direction shown.

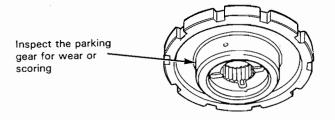


Remove the one-way clutch by prying it up with the end of a screwdriver.

CAUTION: Do not pry on the three copper friction strips; if you break a strip, the clutch will not work properly.

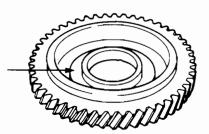


Inspect the parts as follows:

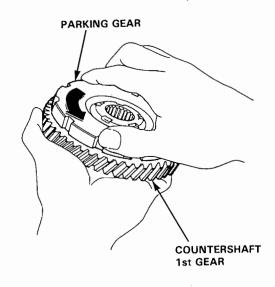


Inspect the one-way clutch for damage or faulty movement

Inspect the countershaft 1st gear for wear or scoring



3. After the parts are assembled, hold the countershaft 1st gear and turn the parking gear in direction shown to be sure it turns freely.



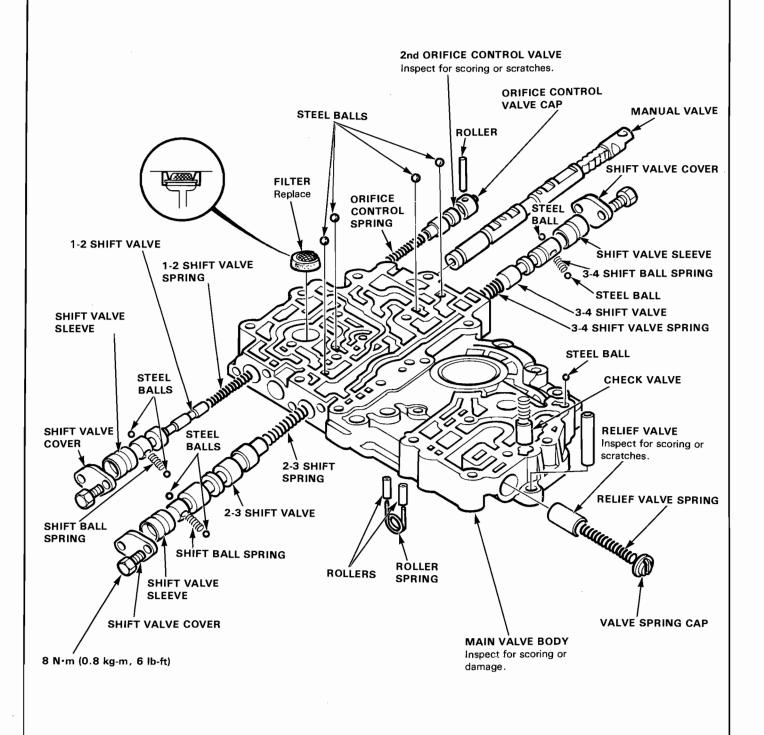
# Main Valve Body



### 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 14-53.
- See Section 3 for spring specifications.
- Coat all parts with ATF before reassembly.

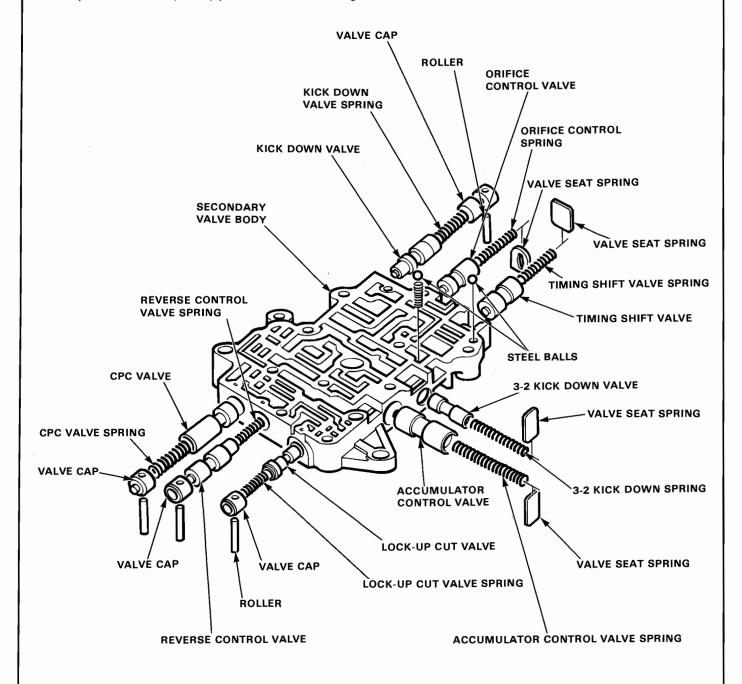


# **Secondary Valve**

# 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 14-53.
- See Section 3 for any spring specifications which are not listed below.
- Replace as assembly if any parts are worn or damaged.



# Valve Body



### Repair -

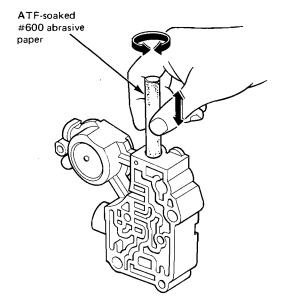
NOTE: This repair is only necessary if one or more of the valves in a valve body do not slide smoothly in their bores. You may use this procedure to free the valves in the main valve body, regulator valve body, lock-up shift valve body, and servo valve body. DO NOT use this procedure to free the valves in the governor; if any governor valves are stuck, the governor must be replaced as an assembly.

- Soak a sheet of #600 abrasive paper in ATF for about 30 minutes.
- Carefully tap the valve body so the sticking valve drops out of its bore.

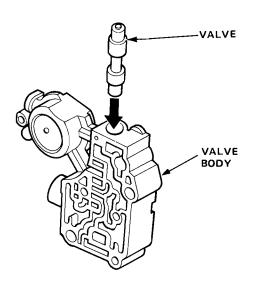
CAUTION: It may be necessary to use a small screwdriver to pry the valve free. Be careful not to scratch the bore with the screwdriver.

- Inspect the valve for any scuff marks. Use the ATFsoaked #600 abrasive paper to polish off any burrs that are on the valve, then wash the valve in solvent and dry it with compressed air.
- 4. Roll up half a sheet of ATF-soaked #600 abrasive 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.
- 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.



 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.

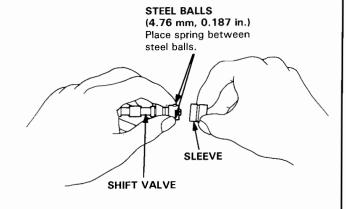
# Main Valve Body

### - Reassembly-

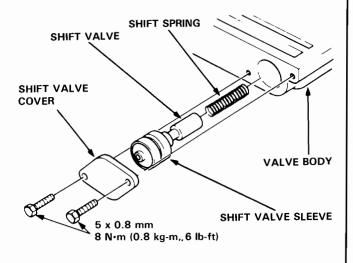
NOTE: Coat all parts with ATF before assembling.

 Slide the spring into the hole in the big end of the shift valve.

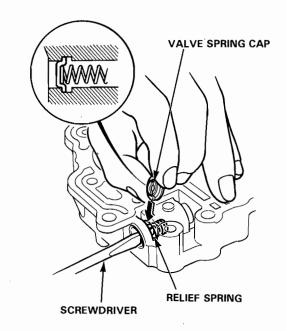
While holding the steel balls with the tips of your fingers, put the sleeve over the shift valve.



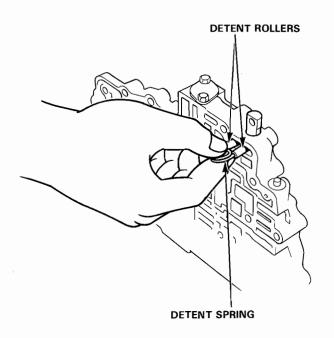
2. Place the shift spring in the shift valve, then slip it into the valve body and install the valve cover.



- 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.



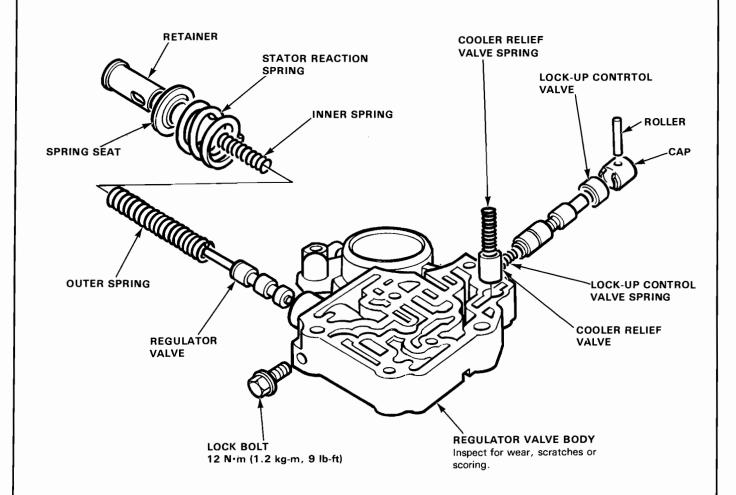
# **Regulator Valve Body**



### - Disassembly/Inspection

#### NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner.
- Replace valve body as 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 14-53.
- See Section 3 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 is in the reverse order of disassembly.
   NOTE: 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.

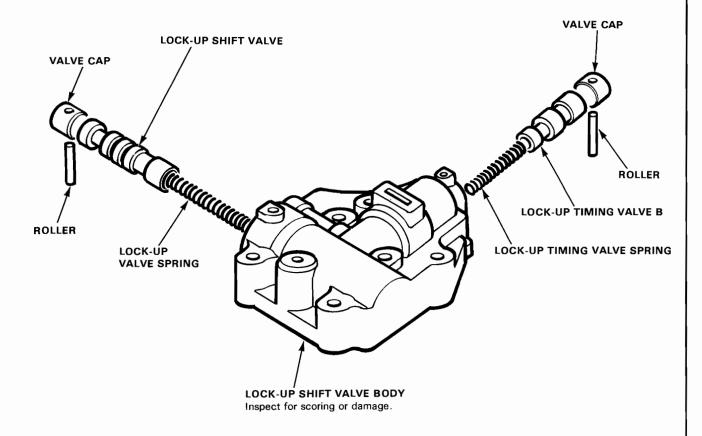


# Lock-Up Shift Valve Body

## - Disassembly/Inspection -

#### NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner.
- Replace valve body as 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 14-53.
- See Section 3 for spring specifications.
- · Coat all parts with ATF before reassembly.



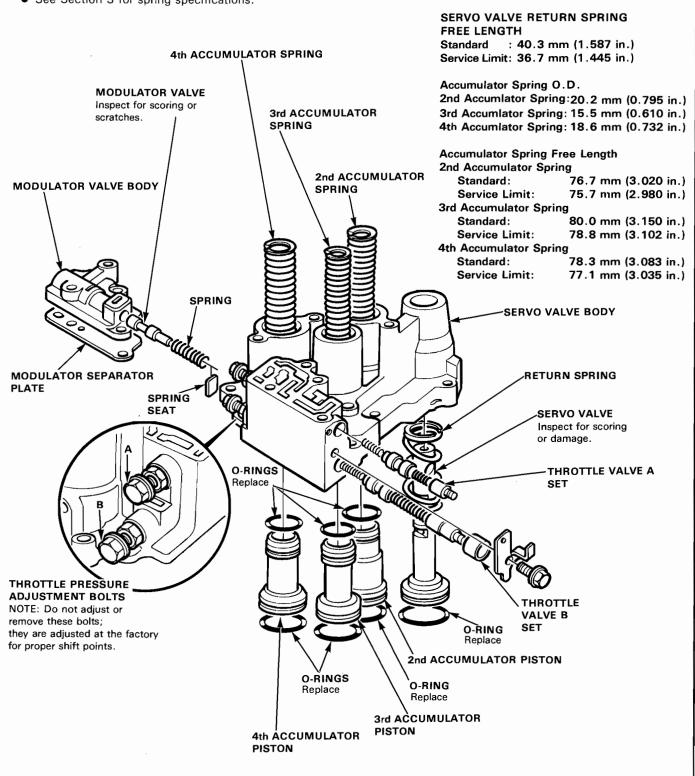
# Servo Valve Body



### 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 14-53.
- See Section 3 for spring specifications.

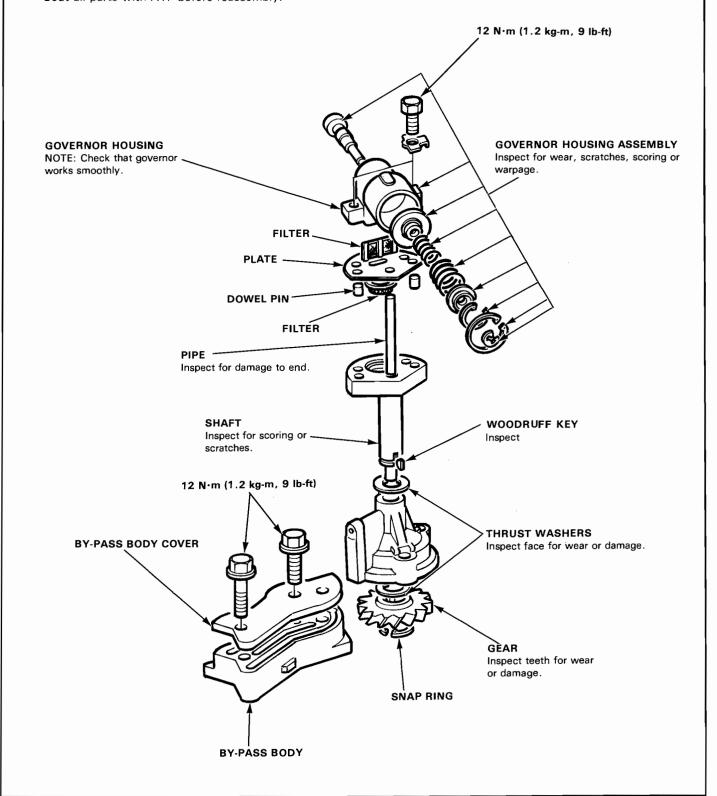


# **Governor Valve**

### 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 Section 3 for spring specifications.
- Coat all parts with ATF before reassembly.

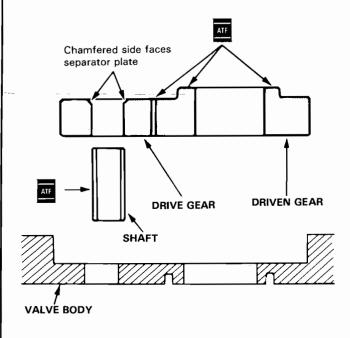


# Oil Pump



### - Inspection ·

 Install the pump gears and shaft in the main valve body.



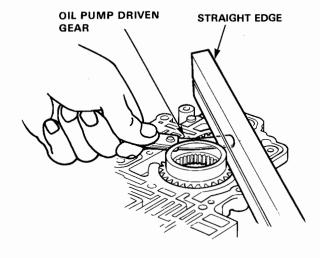
Measure the thrust clearance of the driven gear-to-valve body.

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.)



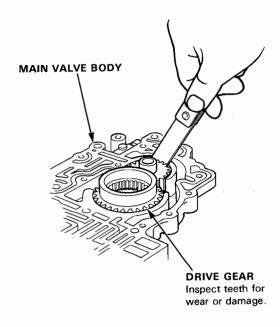
Install the oil pump shaft and measure the side clearance of the drive and driven gears.

Pump Gears Side (Radial) Clearance:

Standard (New): Drive gear 0.240-0.266 mm

(diameter) (0.0094-0.0105 in.) Driven gear 0.063-0.088 mm

(radius) (0.0025—0.0035 in.)

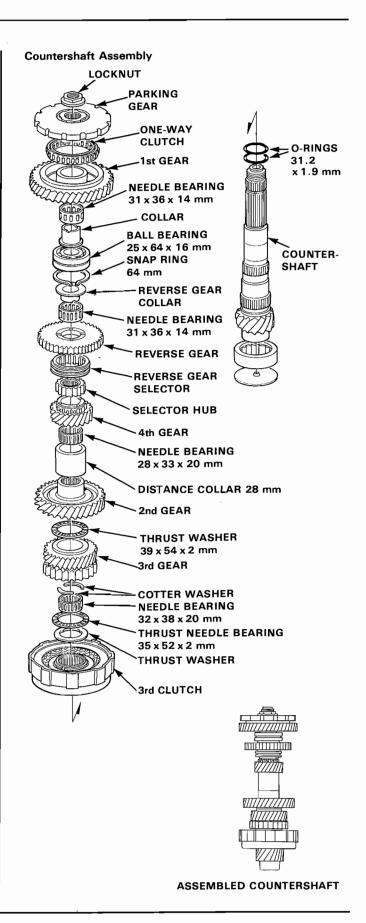


# Countershaft/Mainshaft

#### Clearance Measurement

- Remove both the mainshaft and countershaft bearings from the transmission housing.
- 2. Assemble the mainshaft and the countershaft including bearings and all parts shown to the right and on page 14-62.
- Install the mainshaft and countershaft assemblies into the torque converter housing.
- 4. Install the mainshaft holder to prevent the shafts from turning.
- Torque the mainshaft locknut to 30 N·m (3.0 kg-m, 22 lb-ft). (Left-hand threads.)
- Hold the parking gear on the contershaft with your hand and torque the contershaft locknut to 30 N·m (3.0 kg-m, 22 lb-ft).
- 7. Measure clearances as described on the next page.

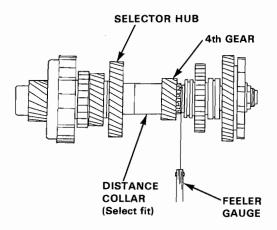
Lubricate all parts with ATF before final reassembly.

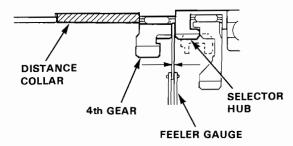




On the countershaft, measure the clearance between the shoulder on the selector hub and the shoulder on 4th gear.

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 distance collar and select one which gives the correct clearance.

#### Replacement distance collars:

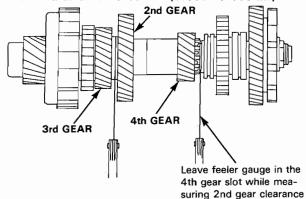
CLASS	P/N	THICKNESS
1	90503-PC9-000	39.00 mm (1.535 in.)
2	90504—PC9—000	39.10 mm (1.539 in.)
3	90505—PC9—000	39.20 mm (1.543 in.)
4	90507—PC9—000	39.30 mm (1.547 in.)
5	90508PC9000	39.05 mm (1.537 in.)
6	90509—PC9—000	39.15 mm (1.541 in.)
. 7	90510—PC9—000	39.25 mm (1.545 in.)

Slide the 3rd gear out fully. Measure and record the clearance between the 2nd and 3rd gears with a feeler gauge.

NOTE: Leave feeler gauge in place (4th gear) while measuring 3rd gear clearance.

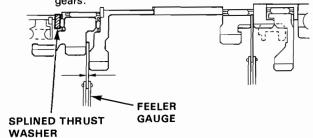
Countershaft 3rd Gear Clearance:

Standard: 0.07-0.15 mm (0.003-0.006 in.) 2nd GEAR



 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.



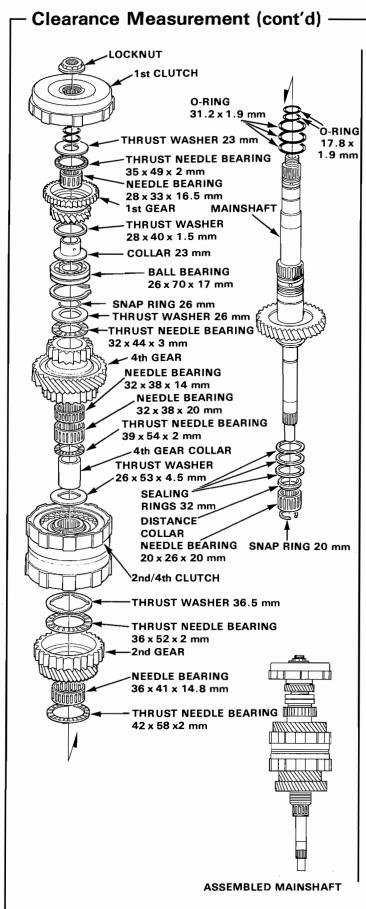
If clearance exceeds service limit, measure the thickness of the splined thrust washer (35 mm I.D.) and select one which gives the proper clearance.

#### 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—0.134 in.)

(cont'd)

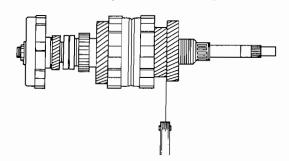
# Countershaft/Mainshaft



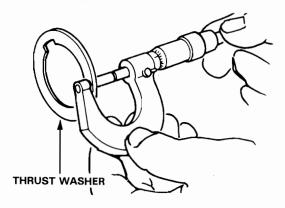
NOTE: Make all measurements before changing the thrust washers. Recheck after making the adjustments.

10. On the mainshaft measure the clearance between the shoulder of 2nd gear and main 3rd gear, in 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.)

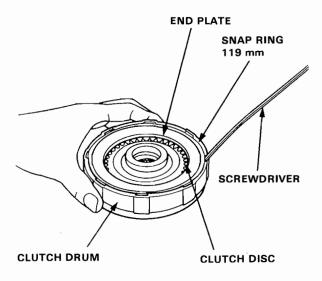
CLASS	P/N	THICKNESS
Α	90441-PC9-010	3.47-3.50 mm
		(0.137-0.138 in.)
В	90442-PC9-010	3.52-3.55 mm
		(0.139-0.140 in.)
С	90443-PC9-010	3.57-3.60 mm
		(0.141-0.142 in.)
D	90444-PC9-010	3.62-3.65 mm
		(0.143-0.144 in.)
E	90445-PC9-010	3.67-3.70 mm
		(0.145-0.146 in.)
F	90446-PC9-010	3.72-3.75 mm
		(0.147-0.148 in.)
G	90447-PC9-010	3.77-3.80 mm
		(0.149-0.150 in.)
Н	90448-PC9-010	3.82-3.85 mm
	_	(0.151-0.152 in.)
l	90449-PC9-010	3.87-3.90 mm
		(0.153-0.154 in.)

### Clutch

# $\odot$

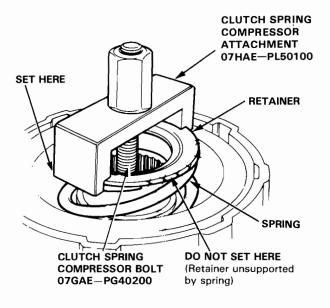
### Disassembly -

- 1. 1st and 3rd Clutch.
  - -1. Remove the snap ring.
  - -2.Remove the end plate, clutch discs and plates.



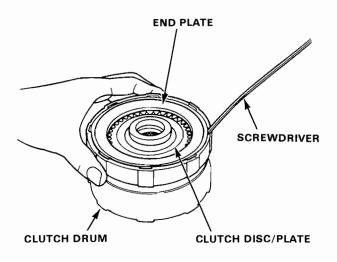
—3. Install the clutch spring compressor as shown and compress the clutch return spring.

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.

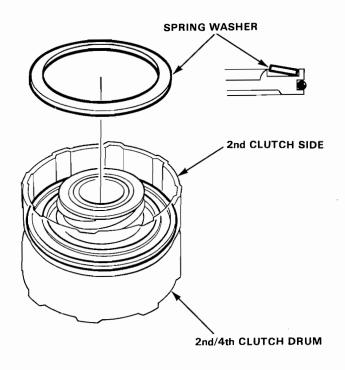


#### 2. 2nd Clutch

- -1.Remove the snap ring.
- $-2.\mbox{Remove}$  the end plate, clutch discs and plates.



-3. Remove the spring washer.



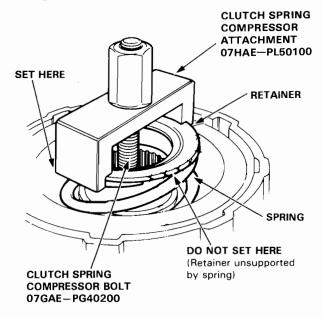
(cont'd)

### Clutch

### Disassembly (cont'd) -

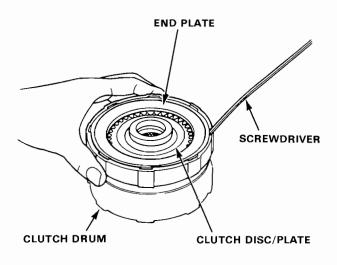
 -4. Install the clutch spring compressor as shown and compress the clutch return spring.

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.



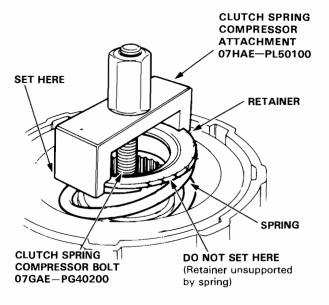
#### 3. 4th Clutch

- -1. Remove the snap ring.
- —2. Remove the end plate, clutch discs and plates.



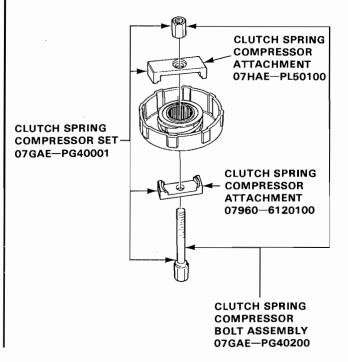
—3. Install the clutch spring compressor as shown and compress the clutch return spring.

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.



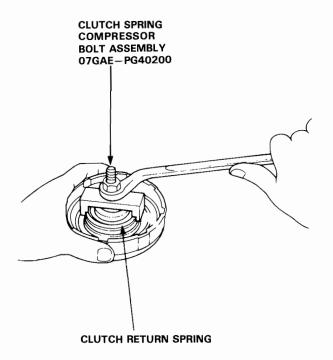
#### 4. 1st and 3rd Clutch

 -1. Assemble the spring compressor on the clutch drum.



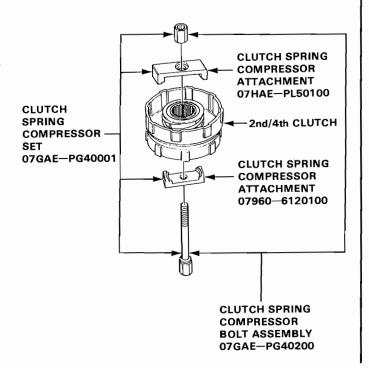


-2. Compress the clutch return spring.

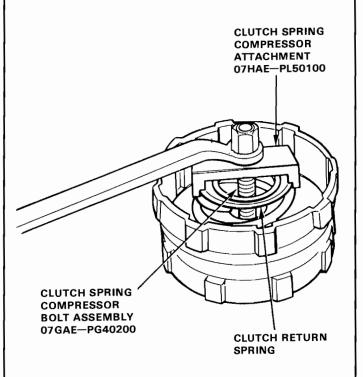


#### 5. 2nd/4th Clutch

 —1. Assemble the spring compressor on the clutch drum.

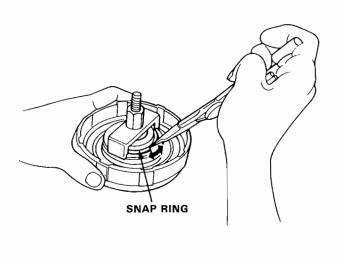


-2. Compress the clutch return spring.



NOTE: Steps 6 and 7 are for all clutches.

6. Remove the snap ring. Then remove the clutch spring compressor, spring retainer and spring.

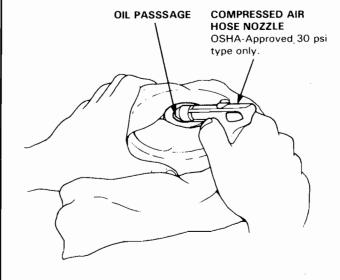


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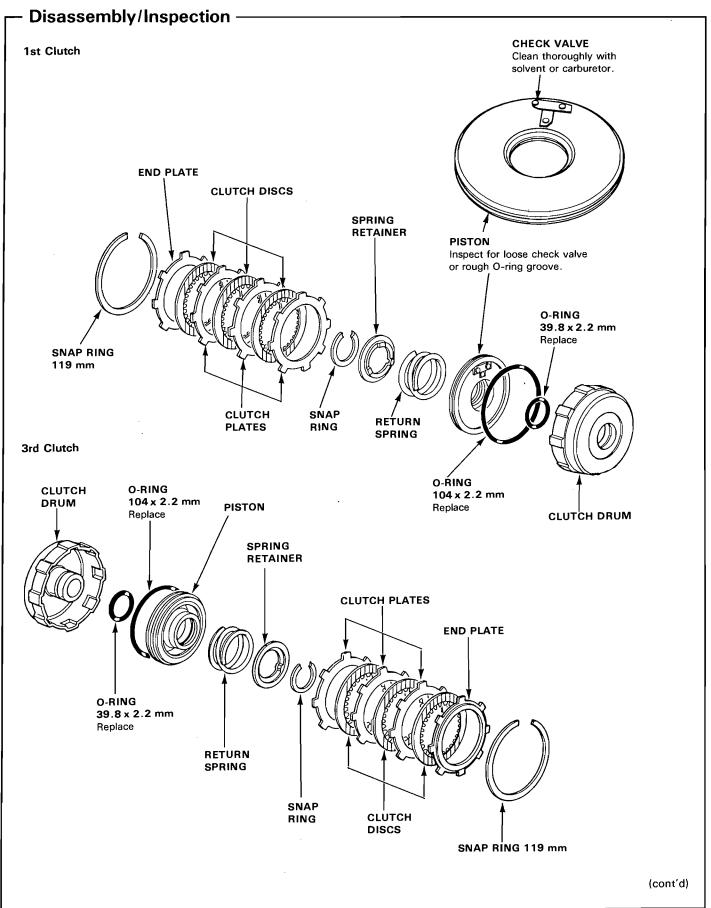
# Clutch

# Disassembly (cont'd) —

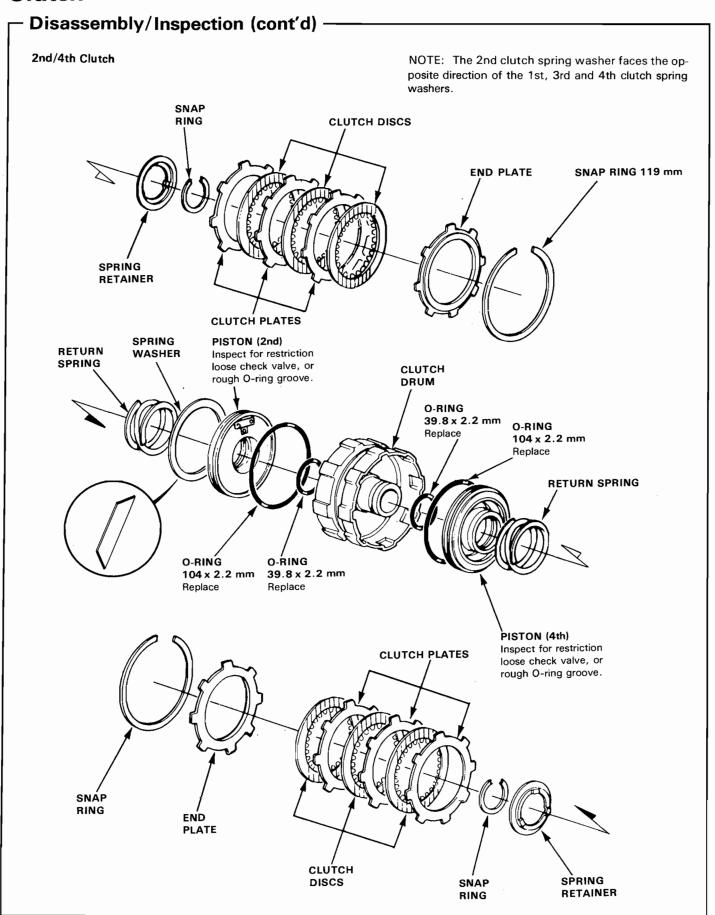
 Wrap a shop rag around the clutch drum and apply air pressure to the oil passage to remove the piston.
 Place a finger tip on the other end while applying air pressure.







# Clutch

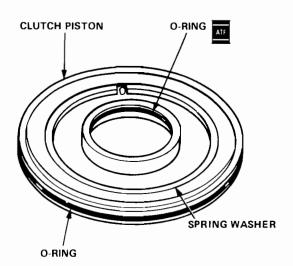


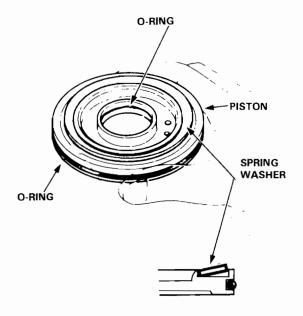


## Reassembly -

#### NOTE:

- Clean all parts thoroughly in solvent, and dry with compressed air. Blow out all passages.
- Lubricate all parts with ATF before reassembly.
- 1. 1st and 3rd clutch.
  - -1. Install a new O-ring on the clutch piston.
     Be sure that the disc spring is securely staked.

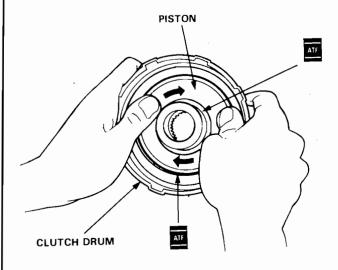




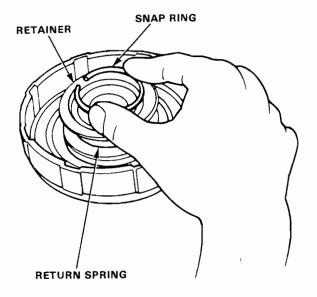
-2. Install the piston in the clutch drum. Apply pressure and rotate to ensure proper seating.

NOTE: Lubricate the piston O-ring with ATF before installing.

CAUTION: Do not pinch O-ring by installing the piston with force.



- -3. Install the return spring and retainer.
- —4. Position the snap ring on the spring retainer.



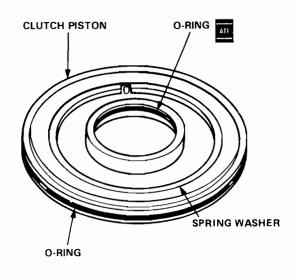
(cont'd)

# Clutch

## - Reassembly (cont'd) -

#### 2. 2nd Clutch

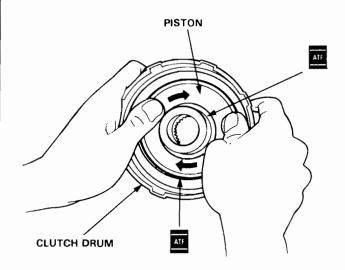
-1. Install a new O-ring on the clutch piston.



-2. Install the piston in the clutch drum. Apply pressure and rotate to ensure proper seating.

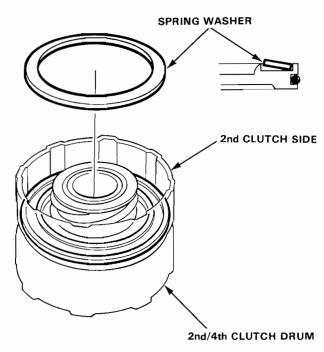
NOTE: Lubricate the piston O-ring with ATF before installing.

CAUTION: Do not pinch O-ring by installing the piston with force.

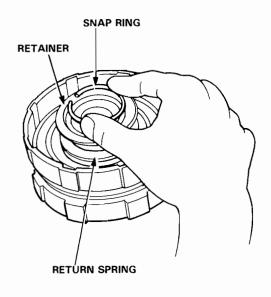


-3. Install the spring washer.

NOTE: Note the spring washer direction.



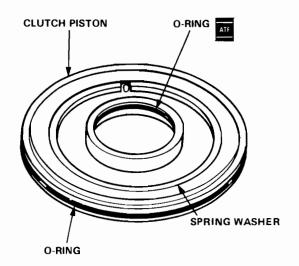
- —4. Install the return spring and retainer.
- -5. Position the snap ring on the spring retainer.

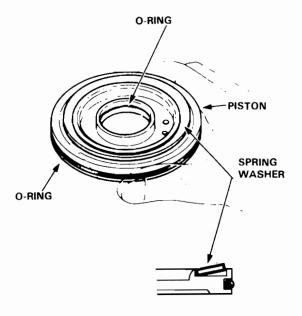




#### 3. 4th clutch.

-1. Install a new O-ring on the clutch piston.
 Be sure that the disc spring is securely staked.

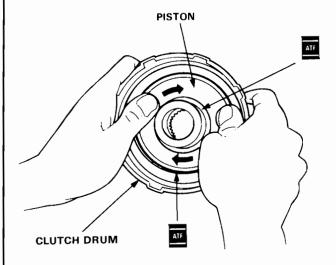




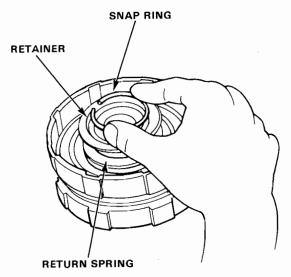
-2. Install the piston in the clutch drum. Apply pressure and rotate to ensure proper seating.

NOTE: Lubricate the piston O-ring with ATF before installing.

CAUTION: Do not pinch O-ring by forcing piston installation.



- -3. Install the return spring and retainer.
- -4. Position the snap ring on the spring retainer.



(cont'd)

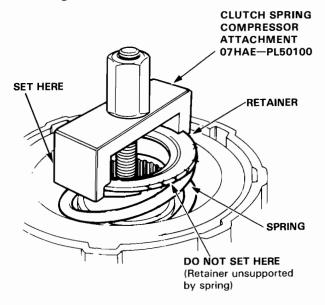
# Clutch

## Reassembly (cont'd) -

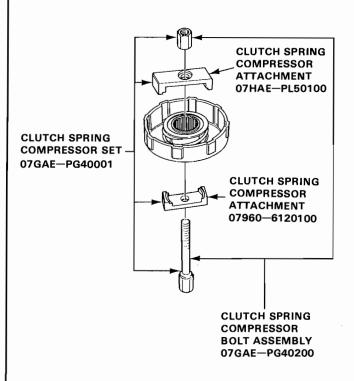
NOTE: Step 4 is for all clutches.

4. Install the spring compressor on the clutch drum and compress the clutch return spring.

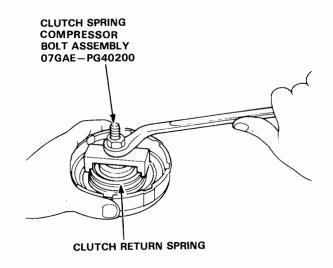
CAUTION: If either end of the compressor attachment is set over an area of the retainer which is unsupported by the spring, the retainer may be damaged.



5. 1st and 3rd Clutch

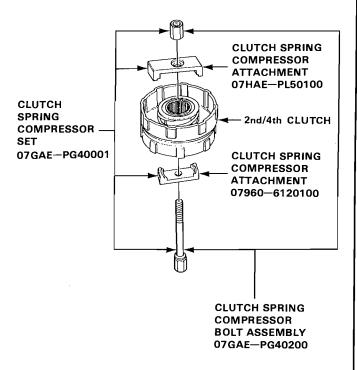


-1. Compress the clutch return spring.

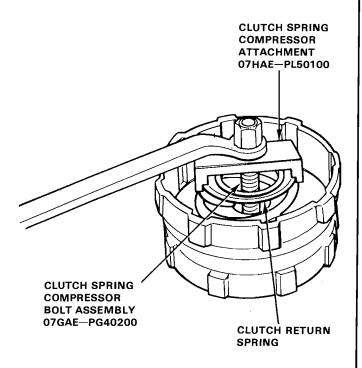




#### 6. 2nd/4th Clutch

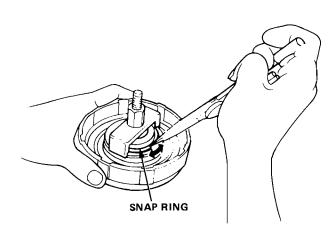


-1. Compress the clutch return spring.



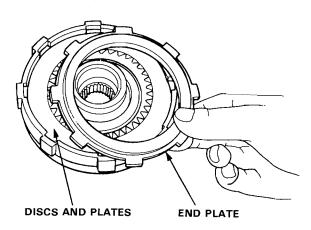
NOTE: Steps 7 thru 14 are for all clutches.

- 7. Install the snap ring.
- 8. Remove the clutch spring compressor.



- 9. Soak the clutch discs thoroughly in automatic transmission fluid for a minimum of 30 minutes.
- Starting with a clutch plate, alternately install the clutch plates and discs. Install the clutch end plate with flat side toward the disc.

NOTE: Before installing the plates and discs, make sure the inside of the clutch drum is free of dirt or other foreign matter.

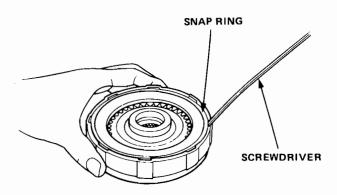


(cont'd)

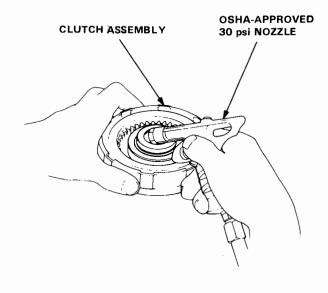
# Clutch

## - Reassembly (cont'd)

11. Install the 119 mm snap ring.



12. 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.



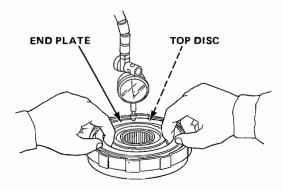
 Measure the clearance between the clutch end plate and top disc with a dial indicator.

Zero the dial indicator with the clutch end plate lowered and lift it up to the snap ring. Distance where the clutch end plate moves is the clearance between the clutch end plate and top disc.

NOTE: Measure at three locations.

#### End Plate-to-Top Disc Clearance:

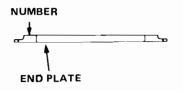
	Service Limit	
1st	0.65-0.85 mm	(0.026-0.033 in.)
2ND	0.650.85 mm	(0.026-0.033 in.)
3RD	0.40-0.60 mm	(0.016-0.024 in.)
4TH	0.40-0.60 mm	(0.016-0.024 in.)



14. If the clearance is not within the service limits, select a new clutch end plate from the following table.

NOTE: If the thickest clutch and plate is installed but the clearance is still over the standard, replace the clutch discs and clutch plates.

PLATE NO.	P/N	THICKNESS
1	22551-PC9-000	2.4 mm (0.094 in.)
2	22552-PC9-000	2.5 mm (0.098 in.)
3	22553-PC9-000	2.6 mm (0.102 in.)
4	22554-PC9-000	2.7 mm (0.106 in.)
5	22555-PC9-000	2.8 mm (0.110 in.)
6	22556-PC9-000	2.9 mm (0.114 in.)
7	22557-PC9-000	3.0 mm (0.118 in.)
8	22558-PC9-000	3.1 mm (0.122 in.)
9	22559PC9000	3.2 mm (0.126 in.)
10	22560-PC9-000	3.3 mm (0.130 in.)
11	22561-PC9-000	2.1 mm (0.082 in.)
12	22562-PC9-000	2.2 mm (0.086 in.)
13	22563-PC9-000	2.3 mm (0.090 in.)



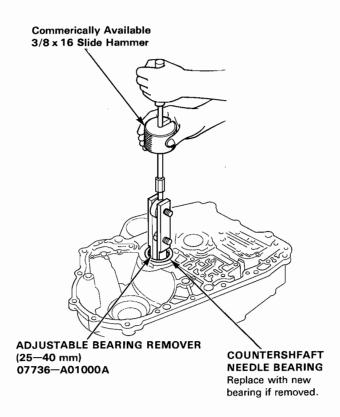
# **Bearing and Oil Seals**



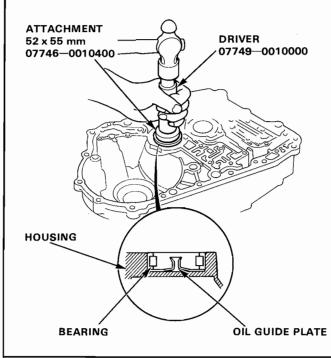
## - Replacement -

#### Torque converter housing

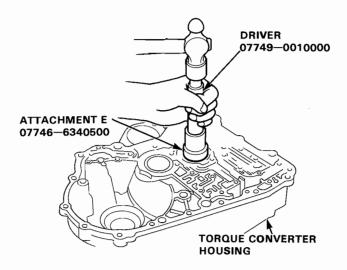
- 1. Remove the differential assembly.
- 2. Remove the countershaft bearing.
- 3. Replace the oil guide plate.



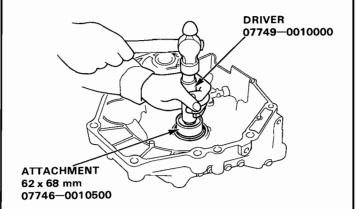
Drive the new bearing in to the housing.



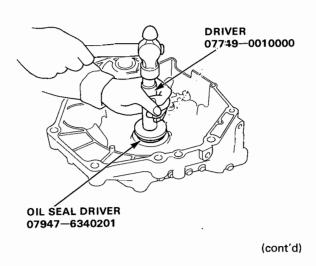
5. Drive out the mainshaft bearing and oil seal.



6. Drive in the new mainshaft bearing until it bottoms in housing.



7. Install the oil seal flush with the housing.



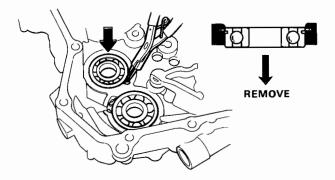
# **Bearing and Oil Seals**

# - Replacement (cont'd) -

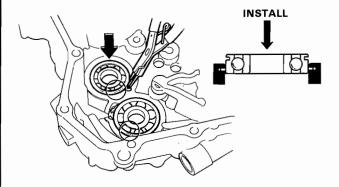
#### Transmission housing

 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.



9. 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.



10. Make sure the snap rings are seated in the bearing and housing grooves.

# **Transmission**



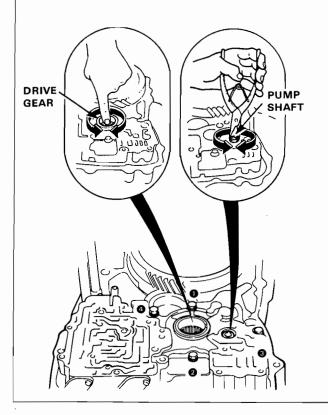
## Reassembly -

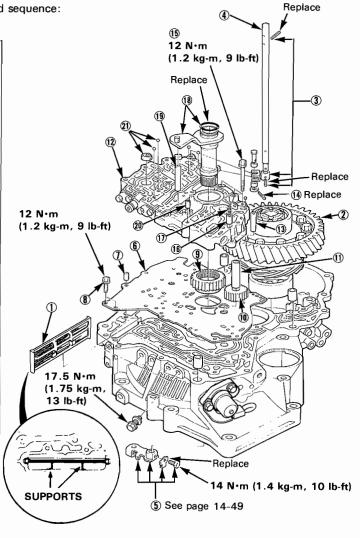
1. Reassemble the transmission in the following numbered sequence:

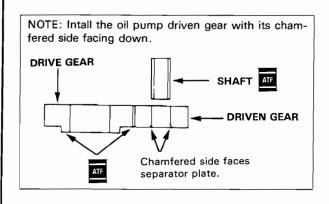
#### NOTE:

Make sure the pump drive gear rotates smoothly in the normal operating direction and the pump shaft moves smoothly in the axial and normal operating directions.

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.





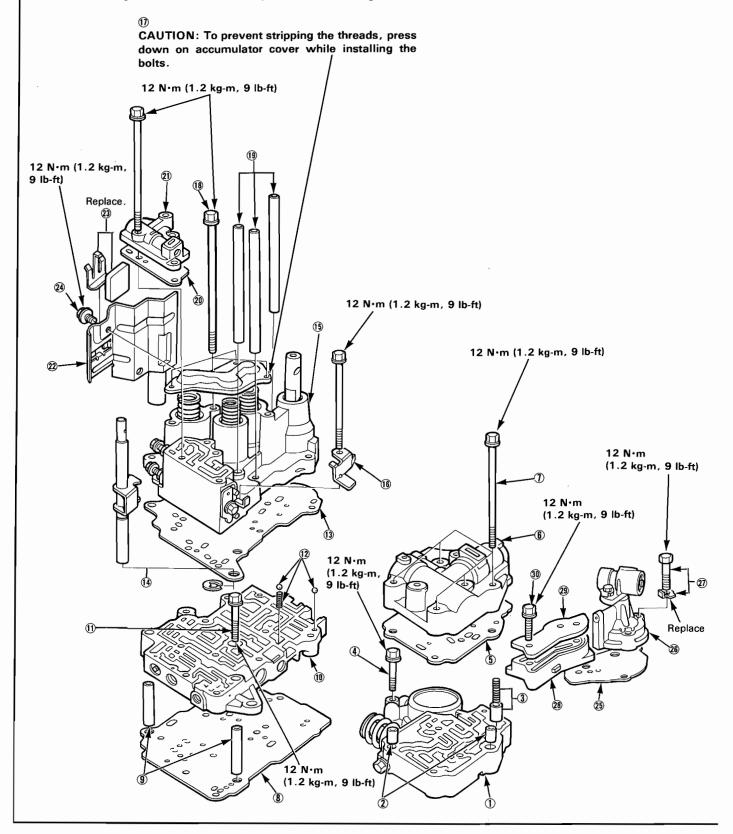


(cont'd)

# **Transmission**

## - Reassembly (cont'd) -

- 2. Install the secondary valve body, servo valve body, regulator valve body, lock-up valve body and modulator valve body in the following numbered sequence:
- 3. Install the governor valve on the torque converter housing.





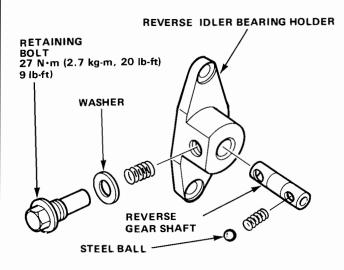
4. Intall parts number ① through ② on the mainshaft. Install parts number 22 through 30 on the countershaft. Set the countershaft and mainshaft in place as an assembly. 6. NOTE: Do not tap on the shafts with a hammer to drive in. Install parts number (1) through (4) on the countershaft. 7. NOTE: Install the reverse gear selector with its flat facing up. COUNTERSHAFT 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. Install parts number 39 through 40 on the countershaft. MAINSHAFT FORK BOLT HOLE Turn valve stem so chamfered hole faces fork bolt hole. ŚERVO VALVE BODY 14 N·m Flat face up (1.4 kg-m, 10 lb-ft) **←**(1) 36 Replace Groove up 3 Replace -21 Replace MAINSHAFT COUNTER SHAFT 1) Replace (cont'd)

## **Transmission**

## Reassembly (cont'd) -

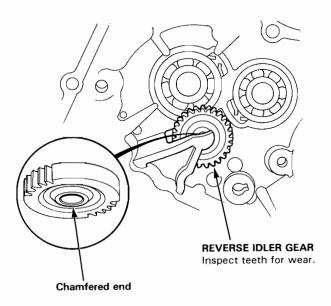
10. Assemble the reverse idler bearing holder.

NOTE: Align the hole in the shaft with the spring.



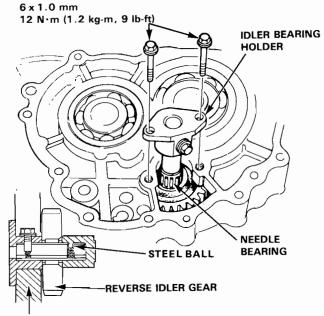
11. Install the reverse idler gear.

NOTE: Install the reverse idler gear so that the larger chamfer on the shaft bore faces the torque converter housing.



- 12. Install the needle bearing into the idler gear.
- Install the reverse idler bearing holder into the transmission housing.

- 14. Tighten the reverse idler bearing holder bolts.
- Install the spring and then tighten the retaining bolt and washer.



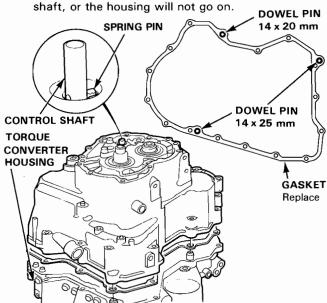
#### TRANSMISSION HOUSING

Install the new gasket and three dowel pins in the torque converter housing.

NOTE: Dowel pins are different in length. Be sure to install properly.

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 counter-





Shift to park and install the

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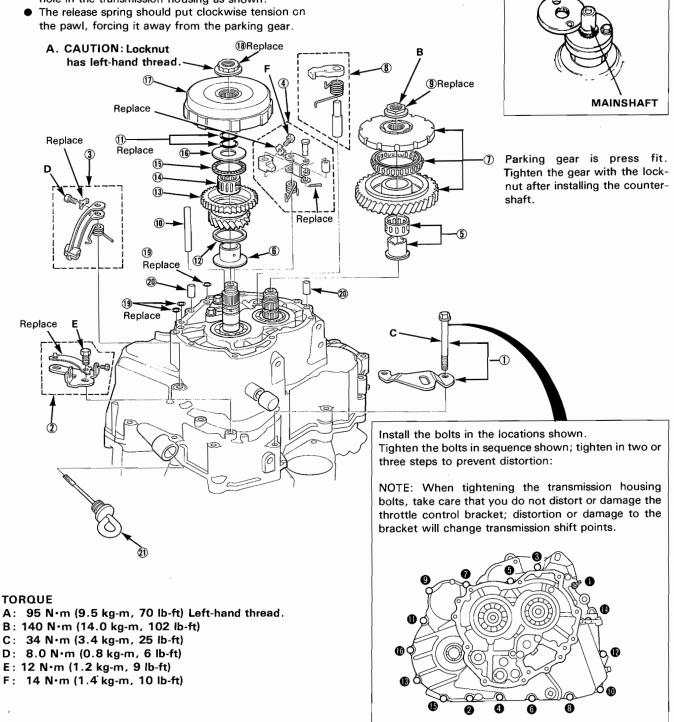
MAINSHAFT HOLDER

mainshaft holder.

 Assemble the transmission in the following numbered sequence.

#### 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.

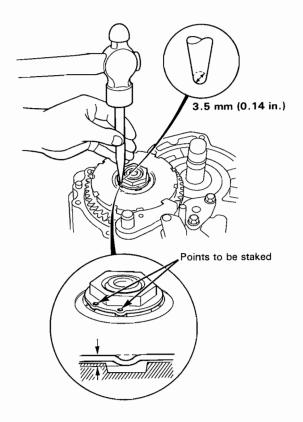


(cont'd)

# **Transmission**

# Reassembly (cont'd) -

18. Stake the locknut flange at two places into the gear grooves using a 3.5 mm punch.



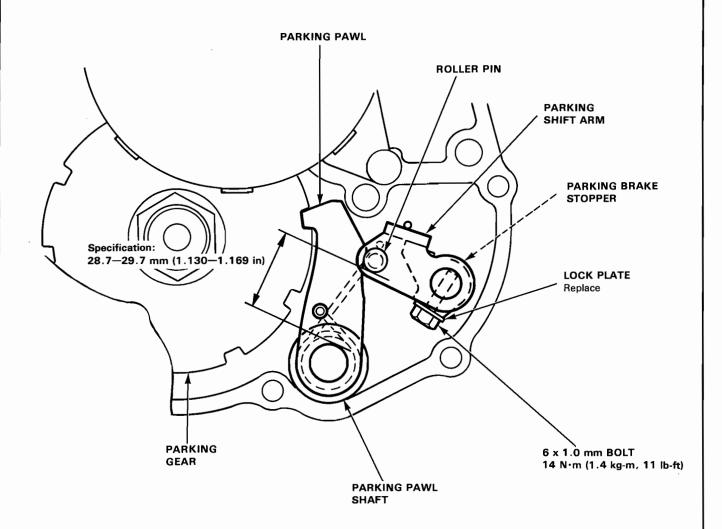
# **Parking Brake Stopper**



# Inspection/Adjustment -

- 1. Set the parking shift arm in PARKING position.
- 2. Measure the distance between the outer face of the parking pawl shaft and outer face of the parking shift arm roller pin.

Specification: 28.7-29.7 mm (1.130-1.169 in)



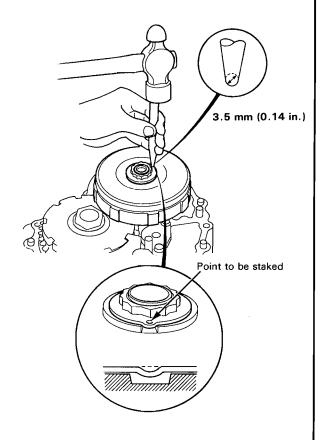
3. If the measurement is out of the specification (distance), select the appropriate parking brake stopper using the table below, and install it on the parking shift arm.

No.	PART NUMBER
1	24537-PA9-003
2	24538-PA9-003
3	24539-PA9-003

# **Transmission**

# Reassembly -

1. Stake the locknut flange into the groove in the 1st clutch.



2. Install the end cover.

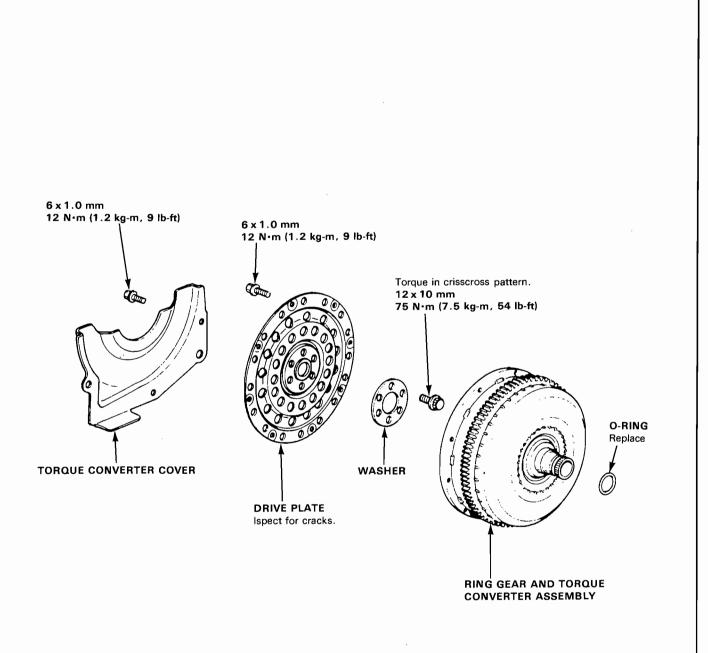
TORQUE: 12 N·m (1.2 kg-m, 9 lb-ft)

NOTE: Tighten the end cover bolts in a crisscross pattern.

# **Torque Converter**

– Disassembly –





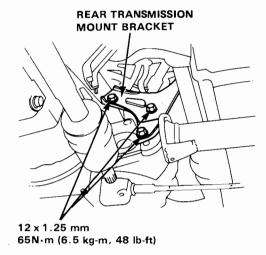
# **Transmission**

#### - Installation

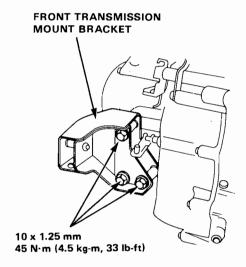
- Place the transmission on the transmission jack, and raise to the engine level.
- Check that the two 14 mm dowel pins are installed in the torque converter housing.
- Align the dowel pins with holes in block; align the torque converter bolt heads with holes in drive plate.
- If you left the front end 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.

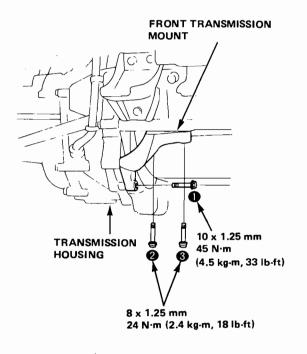
- 5. Secure the transmission to engine with the engine side mounting bolt (12 x 1.25 x 70 mm) and torque to 58 N·m (5.8 kg-m, 42 lb-ft).
- 6. Attach the torque converter to the drive plate with eight (6 x 10 x 12 mm) bolts, and torque to 12 N·m (9 lb-ft). Rotate the crank as necessary to tighten bolts 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.
- 8. Remove the transmission jack.
- 9. Install the torque converter cover plate.
- 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).

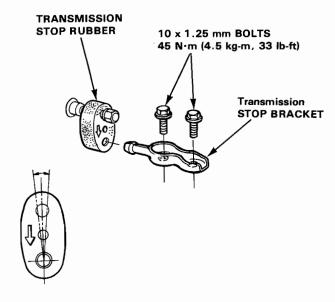


12. Loosely install the front transmission mount bolts, then torque in the sequence shown.





 Install the transmission stop bracket and 10 x 1.25 mm bolts.



- Install the starter mounting bolts and torque to 45 N·m (4.5 kg-m, 33 lb-ft).
- Install the intermediate shaft and right and left driveshafts.
- Install a new 26 mm spring clip on the end of each axle.
- 17. Turn the right steering knuckle fully outward, and slide axle into the differential until you feel its spring clip engages 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.
- Reconnect the lower arm ball joints and torque to 45 N·m (4.5 kg-m, 33 lb-ft).
- Reconnect the tie-rod end ball joints and torque to 45 N·m (4.5 kg-m, 33 lb-ft).
- 20. Install the splash shields and exhaust header pipe.
- Install the front wheels, lower car to ground, and torque lug nuts to 110 N-m (11.0 kg-m, 80 lb-ft).
- Remove the hoist chain from the 10 mm bolt on the cylinder head and engine hanger plate.
- 23. Insert the speedometer cable into gear holder, then secure the cable with clip and install the boot.
- 24. 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).

- 25. Connect the cooler hoses, and torque the banjo bolts to 29 N·m (2.9 kg-m, 21 lb-ft).
- Attach the shift control cable to shaft lever with pin and clip, if removed. Check the cable adjustment.
- 27. Reinstall the center console.
- 28. Connecting wiring:
  - Battery positive cable to starter.
  - Black/white wire to starter solenoid.
  - Transmission ground cable.
- 29. With the ignition key OFF, connect the ground cable to the battery and transmission.
- Unscrew the dipstick from the top of transmission housing and add 2.4 l Dexron<sup>®</sup> II ATF through the hole. Reinstall the dipstick.

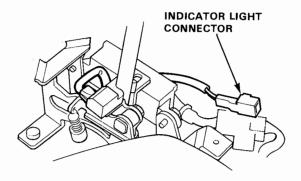
NOTE: If the torque converter was replaced, the ATF fill quantity is  $5.4 \,\ell$ .

- 31. Start the engine, set the parking brake, and shift the transmission through all gears three times. Check for proper control cable adjustment.
- Let the engine reach operating temperature with the transmission in Neutral or Park, then turn it off and check the fluid level.
- 33. Install the throttle control cable and adjust.
- 34. Road test as described.

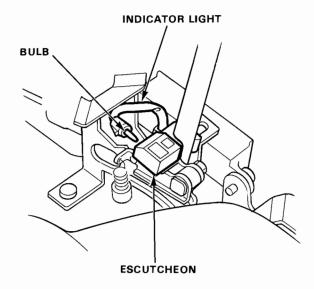
# **Shift Indicator Light**

# - Check and Installation -

 Check for continuity between indicator light connector terminals as shown. If there is no continuity, check for burned out bulb or open circuit.



 Install the indicator bulb in the bulb housing. Insert the bulb housing into slot in escutcheon, then turn 90° to bulb housing.



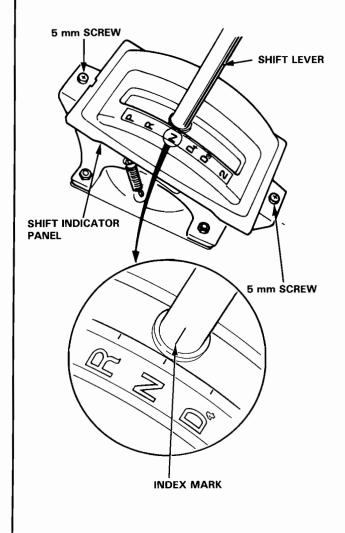
# **Shift Indicator Panel**

# $\odot$

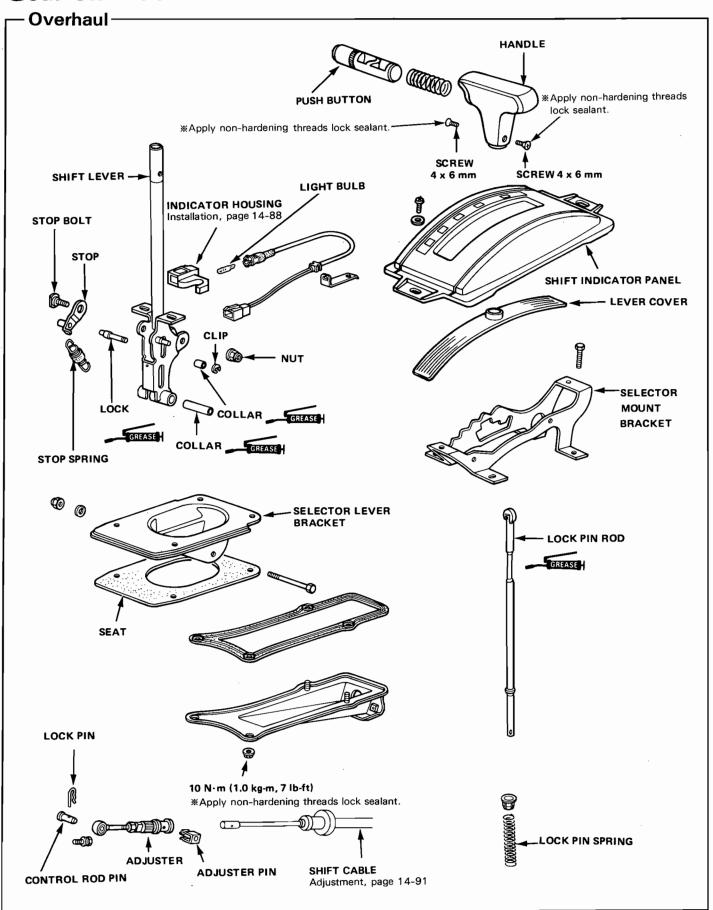
## - Adjustment -

- 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., reinstall the panel as described above.



# **Gear Shift Selector**

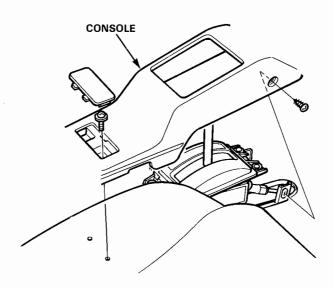


## **Shift Cable**

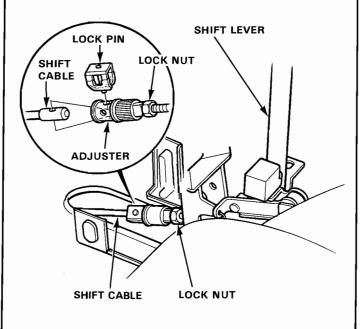
# $\odot$

## - Adjustment

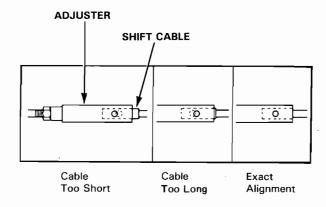
- Start the engine. Shift to reverse to see if the reverse gear engages.
- 2. With the engine off, remove the console.



Shift to N or R, then remove the lock pin from the cable adjuster.



 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 again.

8. Start the engine and check the shift lever in all gears. If any gear does not work properly, refer to Troubleshooting on page 14-28.

# **Throttle Control Cable**

## Adjustment/Inspection -

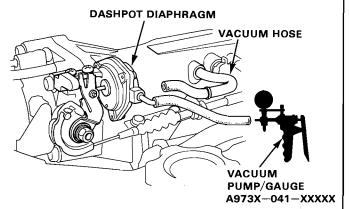
NOTE: Before adjusting the throttle control cable, make sure.

- The throttle cable free play is correct. (See Section 11).
- The engine is at normal operating temperature (cooling fan comes on).
- The idle speed is correct. (See Section 11)

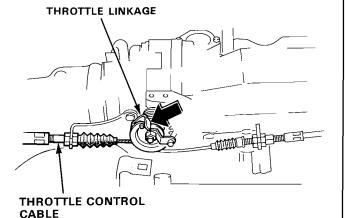
#### Inspection:

NOTE: You can work the throttle linkage body with your hand.

Disconnect the vacuum tube from the dash pot. Connect the vaccum pump and keep vacuum applied.
 This simulates a normal operating amount of pull by the dash pot as if the engine were running.



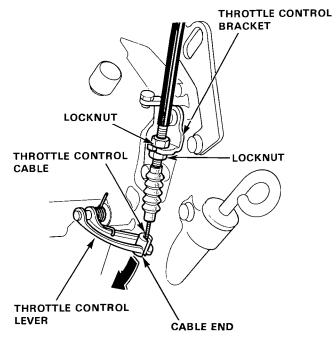
- 2. Remove the throttle cable free play.
- Apply light thumb pressure to the throttle control lever, then work the accelerator or throttle linkage.
   The lever should move just as the engine speed increases above idle. If not, proceed to Adjustment.



#### Adjustment:

 Loosen the nuts on the control cable at the transmission end and synchronize the control lever to the throttle.

NOTE: To tailor the shift/lock-up characteristics to a particular customers driving expectations, you can adjust the control cable up to 3 mm shorter than the "synchronized" point.



# Differential (Manual Transmission)

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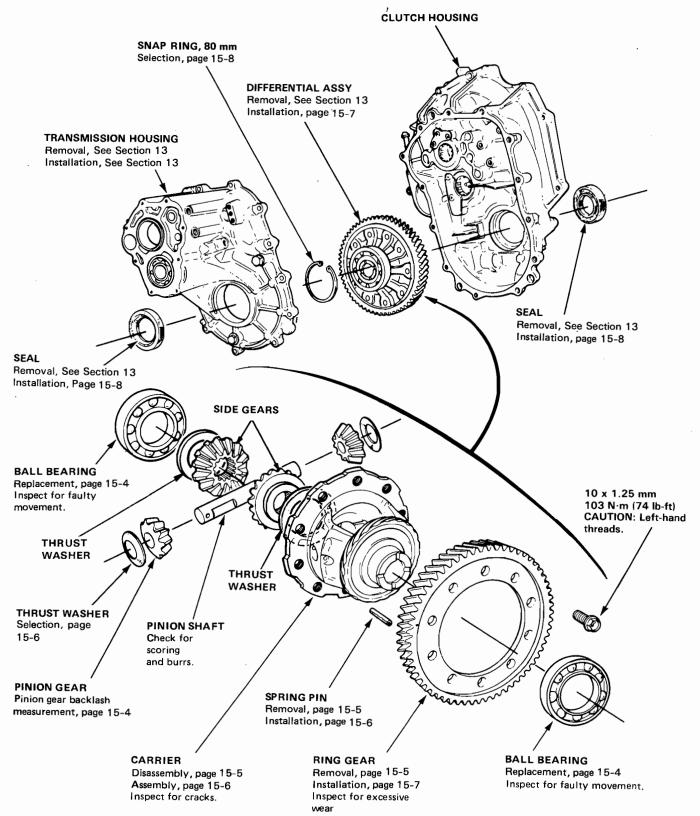
# **Special Tools**

ef. No.	Tool Number	Description	Q'ty	Page Reference
①	07746-0030100 07749-0010000	Driver Driver	1	15-4, 15-10, 15-14
② ③	07749-0010000	Attachment	1 1	15-8, 15-15 15-16 15-8,
4	079476110500	Attachment	1	15-15, 15-16
(S)	07HAD-SF10100 07947-SD90100	Attachment Attachment	1	15-18, 15-16
© ⑦	07947—5D90100 07JAD—PH80400	Pilot Driver 28 x 30 mm	1 1	15-8 15-8, 15-16
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# **Differential (Manual Transmission)**



Index -

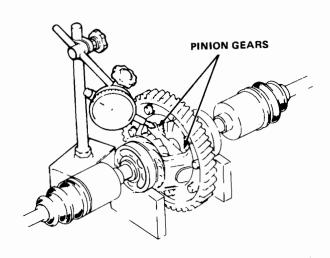


# **Differential (Manual Transmission)**

## Backlash Inspection -

- 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.)

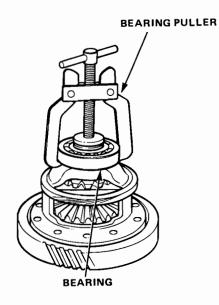


If out of tolerance, disassemble the differential and select new thrust washers according to the chart on page 15-6.

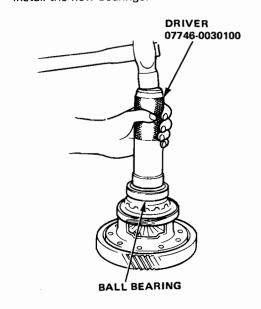
# **Bearing Replacement**

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.



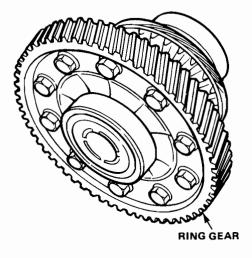
2. Install the new bearings.



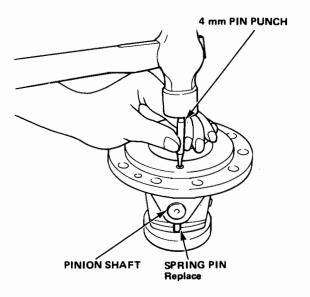


 Remove the ring gear and inspect teeth for excessive wear.

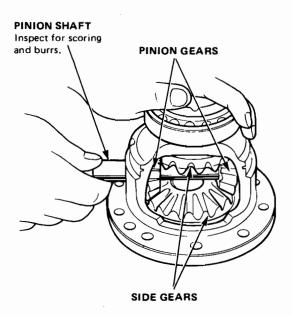
CAUTION: The ring gear bolts have left-hand threads.



2. Drive out the spring pin with pin punch.



3. Remove the pinion shaft, pinion gears and the thrust washers.



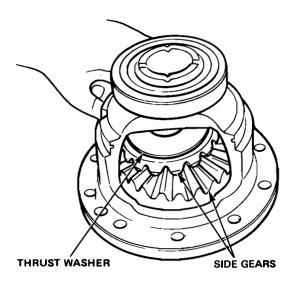
 Wash parts thoroughly in solvent and dry with compressed air. Inspect all parts for wear or damage and replace any that are defective.

# **Differential (Manual Transmission)**

## - Reassembly -

 Install the side gears in differential carrier. Install a thrust washer between each side gear and carrier.

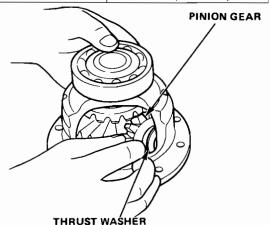
CAUTION: Coat all gears with molybdenum disulfide grease on all sides.



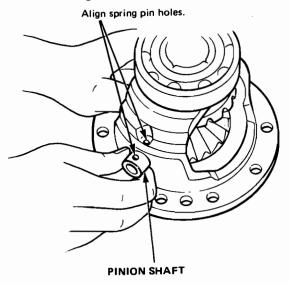
Set pinion gears in place exactly opposite each other in mesh with side gears, then install a thrust washer behind each one. Washers must be of equal thickness.

**Thrust Washers** 

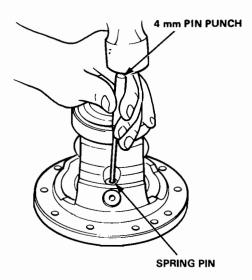
PART NUMBER	THICKNESS
41351-689-000	0.7 mm (0.028 in.)
41352-689-000	0.8 mm (0.031 in.)
41353-689-000	0.9 mm (0.035 in.)
41354-689-000	1.0 mm (0.039 in.)
41355-PC8-000	0.75 mm (0.030 in.)
41356-PC8-000	0.85 mm (0.033 in.)
41357-PC8-000	0.95 mm (0.037 in.)



- Rotate gears as shown until shaft holes in pinion gears line up with shaft holes in carrier.
- 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.



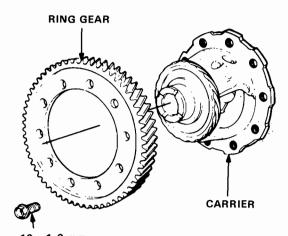
6. Check backlash of both pinion gears again.

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.



Install the ring gear with the chamfer on inside diameter facing the carrier.

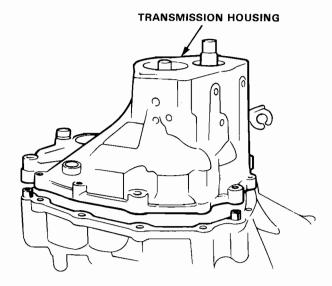


10 x 1.0 mm 103 N·m (10.3 kg-m, 74 lb-ft)

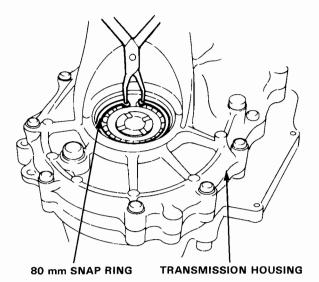
CAUTION: Ring gear bolts have left-hand threads.

## Installation-

- Install differential assembly and all transmission gear assemblies in clutch housing.
   Refer to See Section 13.
- Install dowel pins in clutch housing then carefully lower the transmission housing into place.



3. Install 80 mm snap ring in transmission housing.



#### Side Clearance Measurement

NOTE: If clutch housing, transmission housing, differential carrier, or differential bearings were replaced, the differential side clearance must be measured.

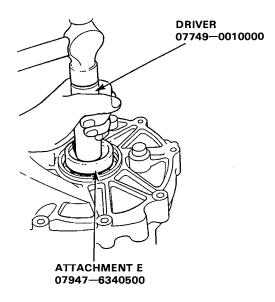
(cont'd)

# **Differential (Manual Transmission)**

## -Installation (cont'd) -

4. Seat the snap ring.

Tap on transmission housing side of differential assembly with driver and attachment to seat 80 mm snap ring in transmission housing.

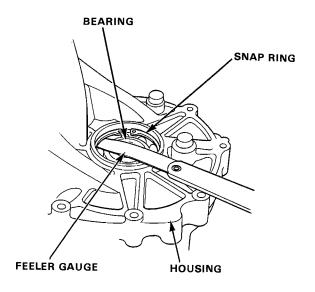


Turn the transmission over and seat the differential assembly.

Tap on transmission housing side of differential assembly with driver and attachment to seat the assembly in the clutch housing.

Measure clearance between snap ring and outer race of bearing in transmission housing.

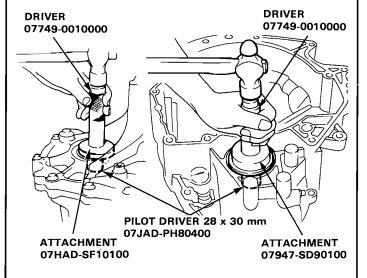
Side Clearance: 0.15 mm (0.006 in.) Max.



7. If out of limits, select new snap ring from following table and install. Repeat Steps 6-8.

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)
90419-PC8-000	3.0 mm (0.118 in)

 Apply oil to new differential seals and install them in clutch/torque converter housing and transmission housing with special tools as shown.

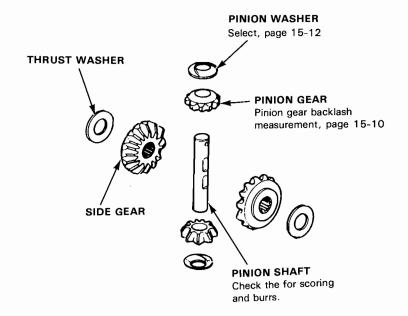


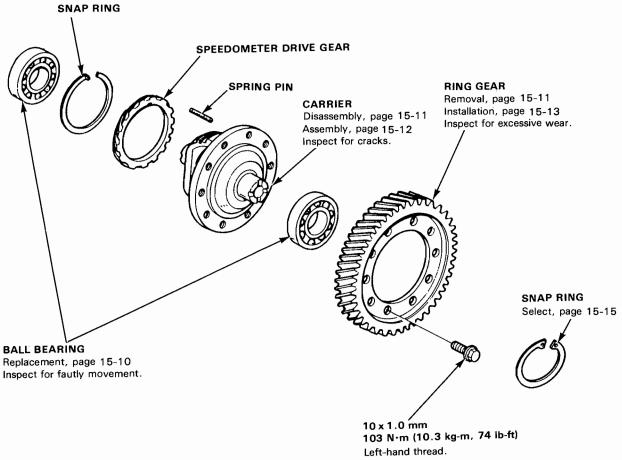
9. Refer to see section 13 for assembly or remaining parts.

# **Differential (Automatic Transmission)**



**Illustrated Index -**



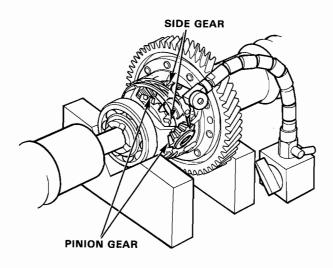


# **Differential (Automatic Transmission)**

## - Backlash Inspection -

- Place differential assembly on V-blocks and install both axles.
- 2. Check backlash of both pinion gears.

Standard (New): 0.05-0.15 mm (0.002-0.006 in.)



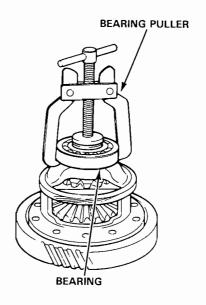
 If out of tolerance, disassemble differential and select new pinion washers from the table below.

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.)

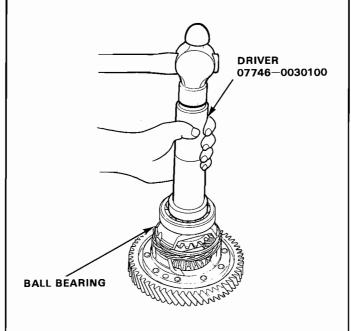
## - Bearing Replacement

NOTE: Check bearings for wear and rough rotation. If bearings are OK, removal is not necessary.

1. Remove bearings using a standard bearing puller.



2. Install new bearings.

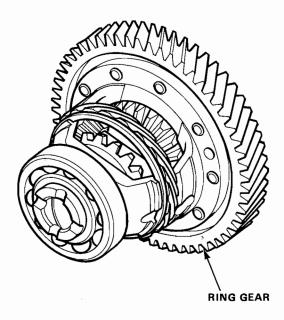




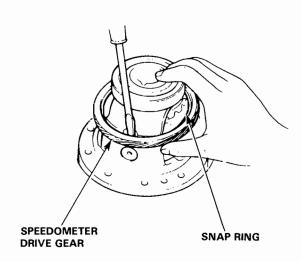
### Inspection/Disassembly -

1. Remove ring gear and inspect teeth for wear or damage.

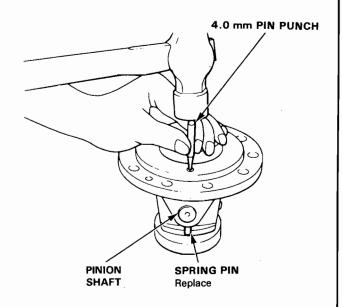
CAUTION: The ring gear bolts have left-hand threads.



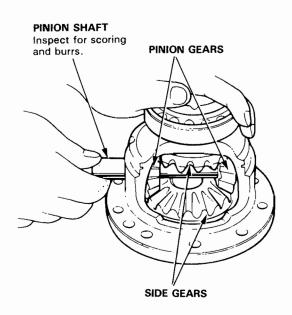
2. Pry snap ring off carrier, then remove speedometer drive gear and dowel pin.



3. Drive out spring pin with pin punch.



4. Remove pinion shaft, pinion gears, and thrust washers.



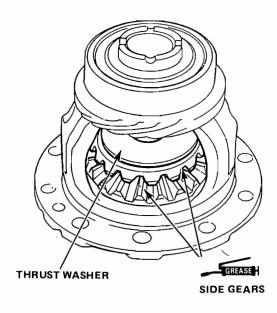
Wash parts thoroughly in solvent and dry with compressed air. Inspect all parts for wear or damage and replace any that are defective.

### **Differential (Automatic Transmission)**

### Reassembly-

 Install the side gears with thrust washers in differential carrier.

CAUTION: Coat all gears with molybdenum disulfide grease on all sides.

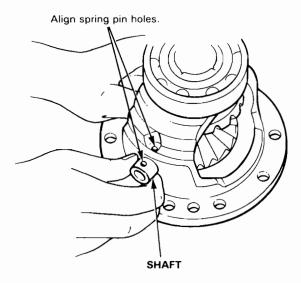


Set pinion gears in place exactly opposite each other in mesh with side gears, then install a thrust washer behind each one. Washers must be of equal thickness.

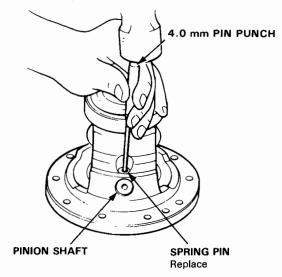
NOTE: Select the correct pinion washer from the table on page 15-10.



- 3. Rotate gears as shown until shaft holes in pinion gears line up with shaft holes in carrier.
- Insert pinion shaft and align spring pin holes in one end with matching hole in carrier.



5. Drive in spring pin with pin punch.



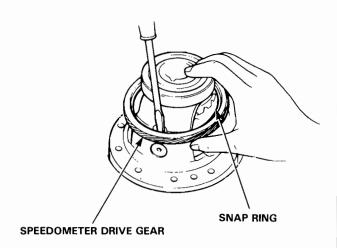
6. Check backlash of both pinion gears again.

Standard (New): 0.05-0.015 mm (0.002-0.006 in.)

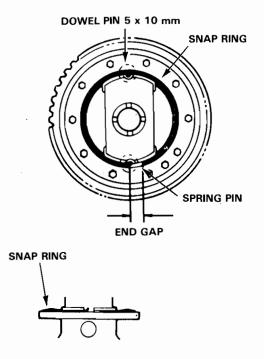
- If still out of tolerance, replace both pinion gears, then recheck backlash.
- If still out of tolerance, replace side gears, and recheck backlash.
- If still out of tolerance, replace carrier assembly.



 Install speedometer drive gear with its chamfer (on inside diameter) facing carrier and secure with snap ring.

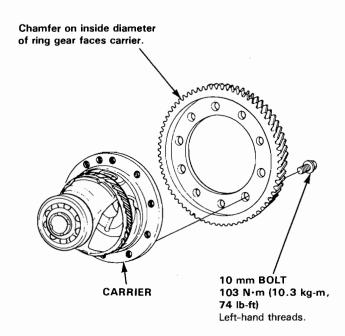


8. Align snap ring on carrier as shown.



9. Install ring gear. Torque bolts to 103 N·m (10.3 kg-m, 74 lb-ft).

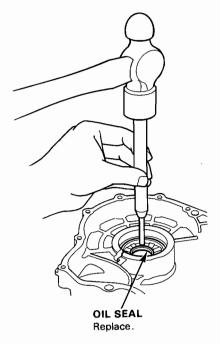
CAUTION: Ring gear bolts have left-hand threads.



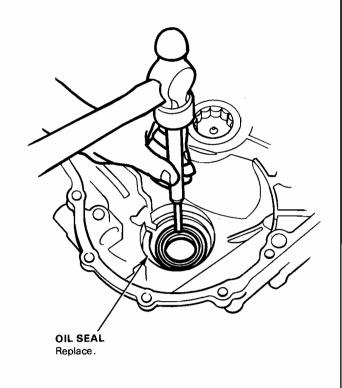
### **Differential (Automatic Transmission)**

### - Oil Seal Removal -

- 1. Remove the differential assembly.
- 2. Remove the oil seal from the transmission housing.



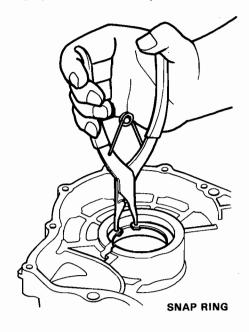
 Remove the oil seal from the torque converter housing.



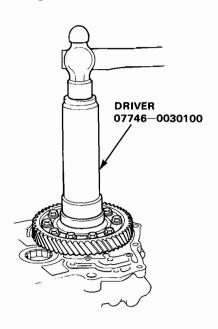
### Oil Seal Installation

Install a 2.50 mm (0.09843 in) snap ring in transmission housing.

Do not install the oil seal yet.



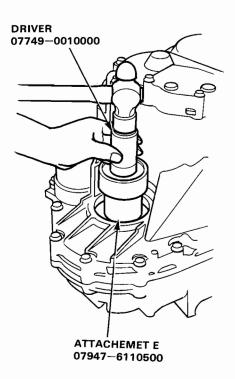
Install the differential assembly into the torque coverter housing.



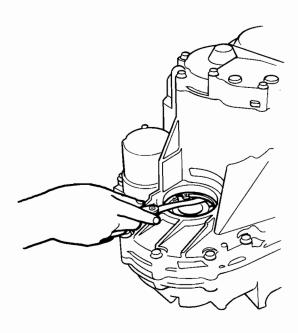
 Assemble the transmission (page 14-77).
 Install the transmission housing and tighten the bolts (page 14-81).



 Tap on transmission housing side of differential assembly with driver and attachment to seat the assembly in torque conveter housing.



Measure clearance between the snap ring and outer race of bearing in transmission housing.



If out of limits, select new snap ring from following table and install:

Side Clearance: 0.15 mm (0.006 in.) Max.

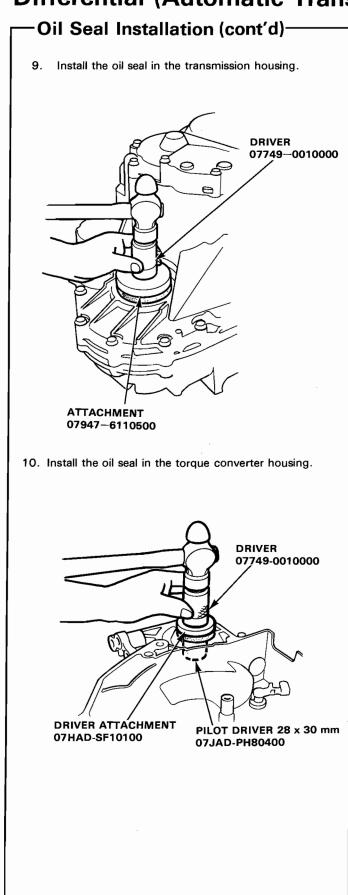
PART NUMBER	THICKNESS
90414-689-000	2.50 mm (0.09843 in.)
90415-689-000	2.60 mm (0.10236 in.)
90416-689-000	2.70 mm (0.10630 in.)
90417-689-000	2.80 mm (0.11024 in.)
90418-689-000	2.90 mm (0.11417 in.)
90419-PH8-000	3.00 mm (0.11811 in.)

NOTE: If the snap ring-to-bearing outer race clearance calculated in step 5 is less than the specification, it is not necessary to steps 6 and 7.

- 6. Remove the transmission housing.
- 7. Replace the 2.50 mm (0.09843 in) snap ring with the one of the correct thickness selected the step 5.
- 8. Install the transmission housing (see page 14-81).

(cont'd)

### **Differential (Automatic Transmission)**



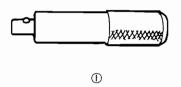
### **Driveshafts**

Special Tools	.16 - 2
Driveshafts	.16-3
Intermediate Shaft	16 - 7



# **Special Tools**

Special Tools				
Ref. No.	Tool Number	Description	Q'ty	Page Reference
① ② ③ ④ ⑤ ⑥ ⑦ 8	07749-0010000 07746-0040900 07965-SD90100 07746-0010400 07746-0010500 07GAD-SE00100 07965-SD90200 07947-SD90200	Driver 40 mm, Pilot Support Base 52 x 55 mm, Attachment 62 x 68 mm, Attachment Oil Seal Driver Attachment Support Collar Oil Seal Driver Attachment	1 1 1 1 1 1 1	16-7, 16-8, 16-9, 16-10 16-7, 16-8, 16-9 16-7, 16-8 16-8 16-9 16-9 16-9 16-9

















### **Driveshafts**

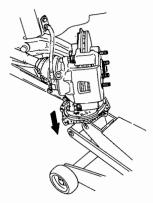
# $\odot$

#### - Removal -

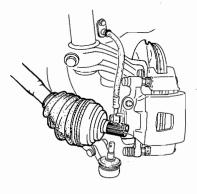
- Loosen the front wheel spindle nut with a 32 mm socket wrench.
- Raise the front end of the car and support it with safety stands (see section 1 for the proper locations for the stands).
- 3. Drain the transmission (see section 13 or 14).
- 4. Remove the front wheel and the spindle nut.
- 5. Use a 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.

- Separate the ball joint from the front hub with the ball joint puller.
- Slowly, lower the floor jack to lower the control arm.



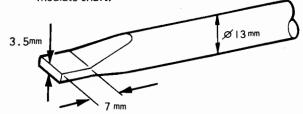
Pull the front hub outward, all the way off the driveshaft.

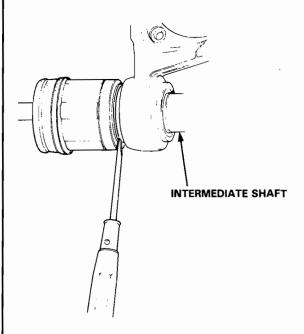


 Using a tool like the one shown below, pry out the inboard CV joint approximately 12 mm (1/2 in) in order to force the spring clip out of the groove in the differential side gears.

#### CAUTION:

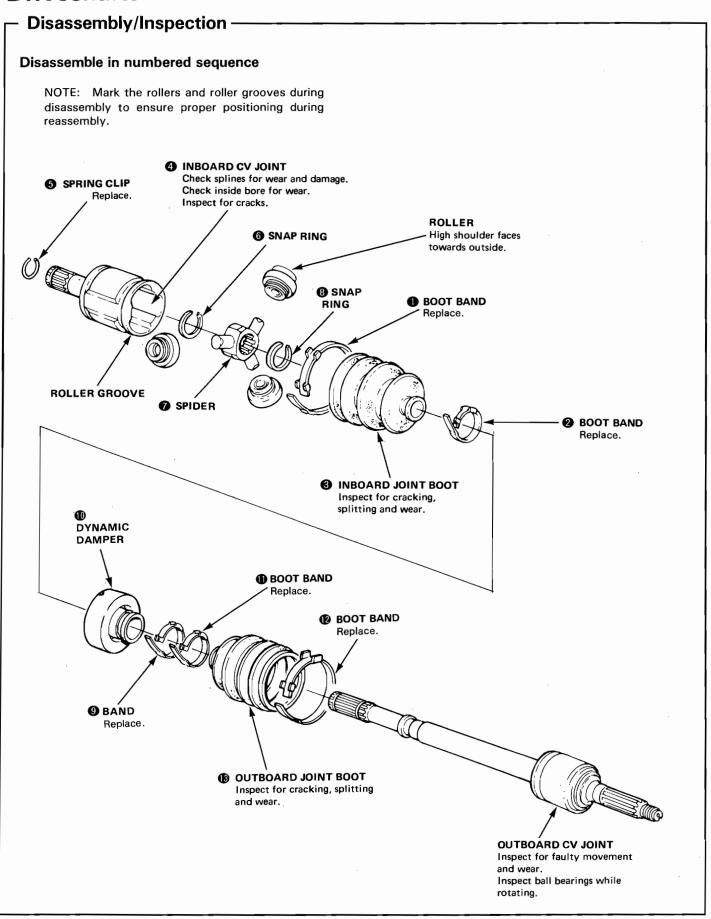
- Pry carefully to avoid damaging the oil seal.
- Do not pull on the inboard CV joint; it may come apart.
- Pull the driveshaft out of the differential or intermediate shaft.





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.

### **Driveshafts**





### Reassembly-

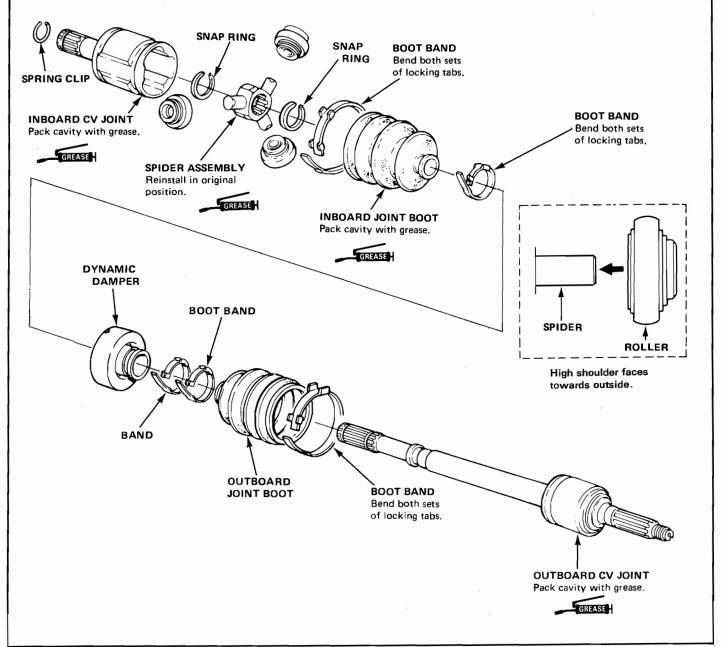
1. Reassemble the driveshafts in reverse order of disassembly.

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.

- 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.

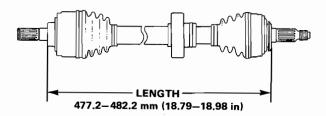


### **Driveshafts**

#### Installation

 Adjust the length of the driveshafts to the figures given below.

NOTE: The ends of boots seat in the groove of the driveshaft and joint.

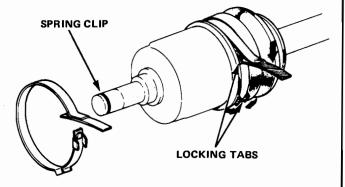


2. Install the new boot bands on the boots.

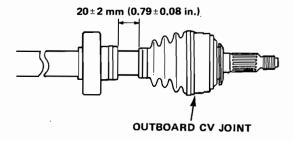
#### NOTE:

- 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.



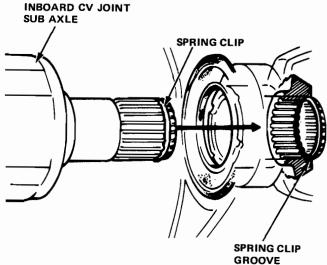
- Install the dynamic damper in the position as shown below.
- 4. Install the new dynamic damper band and bend down both sets of locking tabs.



- Install the spring clip on the groove of the CV joint sub-axle.
- Install the inboard end of the driveshat into the differential or inter mediate shaft.

#### 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.



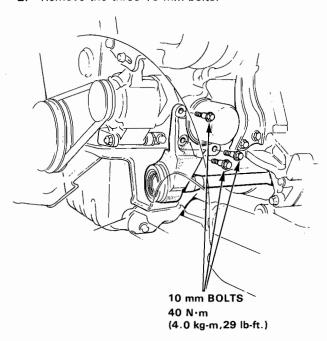
7. Refill the transmission to the prescribed level.

### Intermediate Shaft

# $\odot$

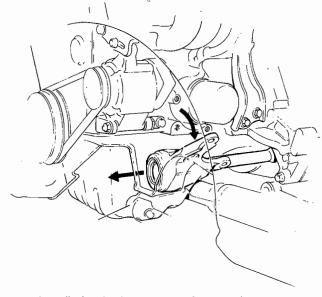
### - Replacement -

- 1. Drain oil from the transmission.
- 2. Remove the three 10 mm bolts.



Lower the bearing support close to the steering gearbox and remove the intermediate shaft from the differential.

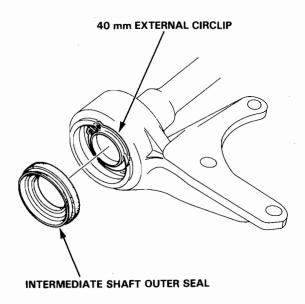
CAUTION: To prevent damage to the differential oil seal, hold the intermediate shaft horizontal until it is clear of the differential.



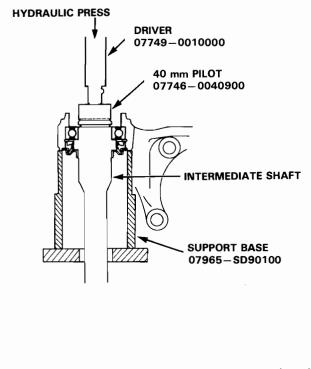
Installation is the reverse of removal.

### Disassembly-

- 1. Remove the intermediate shaft outer seal.
- 2. Remove the 40 mm external circlip.



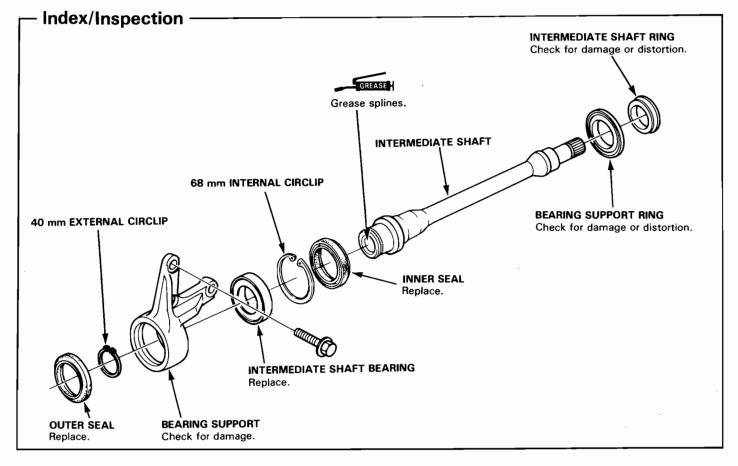
3. Press the intermediate shaft out of the shaft bearing.



(cont'd)

### Intermediate Shaft

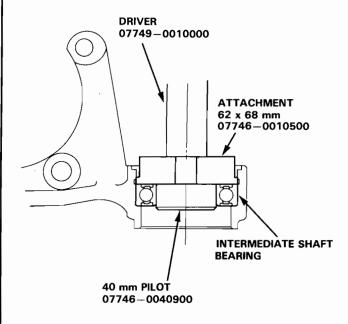
### -Disassembly (cont'd) -6. Press the intermediate shaft bearing out of the 4. Remove the intermediate shaft inner seal. bearing support. 5. Remove the 68 mm internal circlip. Press. DRIVER 07749-0010000 **68 mm INTERNAL CIRCLIP ATTACHMENT** 52 x 55 mm 07746-0010400 **BEARING SUPPORT INTERMEDIATE SHAFT** BEARING SUPPORT BASE 07965-SD90100 INTERMEDIATE SHAFT INNER SEAL 40 mm PILOT 07746-0040900





### Reassembly-

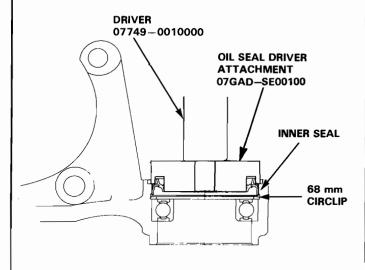
Press the intermediate shaft bearing into the bearing support.



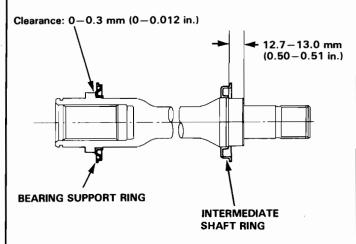
Seat the 68 mm circlip in the groove of the bearing support.

CAUTION: Install the circlip with the tapered end facing out.

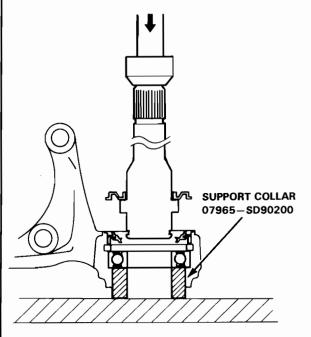
Press the intermediate shaft inner seal into the bearing support.



 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.



(cont'd)

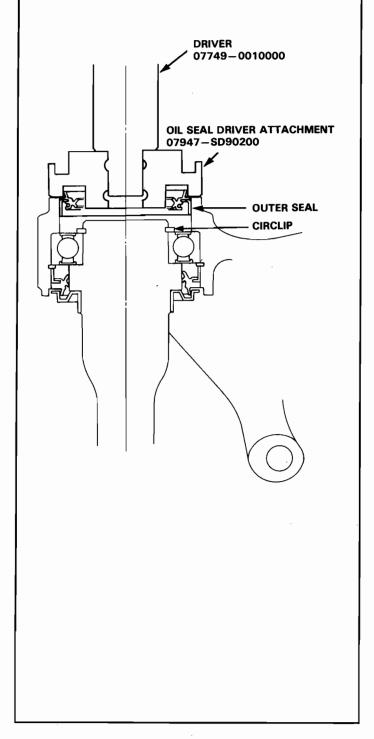
### **Intermediate Shaft**

### -Reassembly (cont'd)-

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**

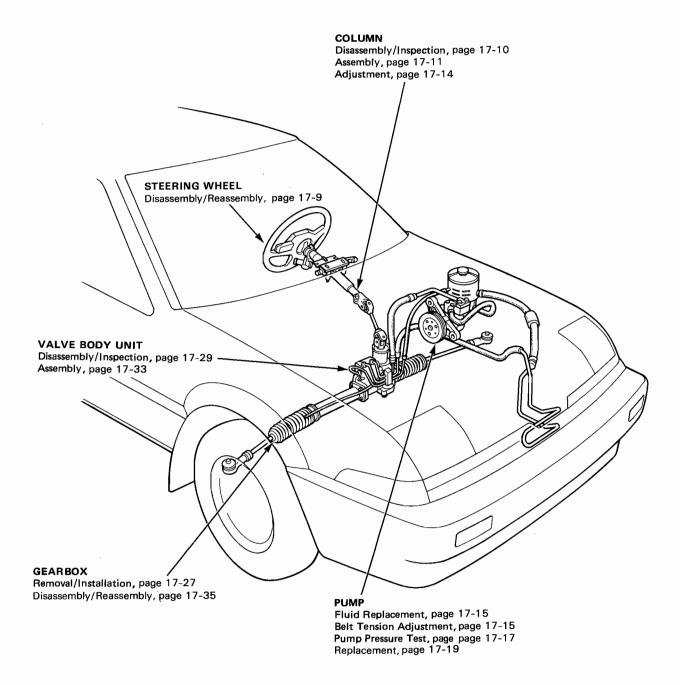
Special Tools	17-2
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Column	
Power Steering Fluid	17-15
On-Car Checks	17-15
Pump	
Gearbox	
Operation	



# Special Tools

07GAK—SE00100 07GAK—SE00110 07GAK—SE00120 07406—0010001 07406—0010300 07406—0010400 07725—0030000 07746—0010300 07749—0010000	P/S Joint Adaptor Set P/S Joint Adaptor (Pump) P/S Joint Adaptor (Hose) P/S Pressure Gauge Set Pressure Control Valve Pressure Gauge Assembly Universal Holder Attachmet, 42 x 47 mm	1 1 1 1 1 1	17—17 17—17 17—17 17—17 17—17
07900—SA50000 07974—SA50100 07974—SA50200 07974—SA50300 07974—SA50400 07974—SA50500 07974—SA50600 07908—6920000 07916—SA50001 07941—6920002 07947—6340300 07953—7190000 07973—6920001	Driver P/S Seal Replacement Tool Set Piston Seal Ring Guide Piston Seal Sizing Tool Cylinder End Seal Slider End Seal Guide End Cover Seal Guide Pinion Shaft Slider Steering Gearbox Adjust Wrench 40 mm Lock Nut Wrench Ball Joint Remover Attachment Collar Driver Adjustment Gudie		17-20 17-39, 17-46 17-34, 17-39 17-41 17-42 17-43 17-45 17-25 17-34 17-16, 17-48 17-16, 17-36, 17-48 17-27 17-34 17-25 17-14
1 ①-2	② (2-1		2-2 3
⑤	<ul><li>⑥-1</li><li>⑥-2</li></ul>	©-3	<ul><li>⑥-4</li><li>⑥-5</li></ul>
	07974—SA50300 07974—SA50400 07974—SA50500 07908—6920000 07916—SA50001 07941—6920002 07947—6340300 07953—7190000 07973—6920001	07974—SA50300 07974—SA50400 07974—SA50500 07974—SA50600 07908—6920000 07916—SA50001 07941—6920002 07947—6340300 079953—7190000 079973—6920001 079973—6920001  © — 1 — — 2 — 2 — 2 — 1	07974—SA50300 07974—SA50500 07974—SA50500 07974—SA50600 07974—SA50600 07974—SA50600 07974—SA50600 07916—SA50001 07916—SA50001 07941—6920002 07947—6340300 079953—7190000 07973—6920001 07973—692001

Index-

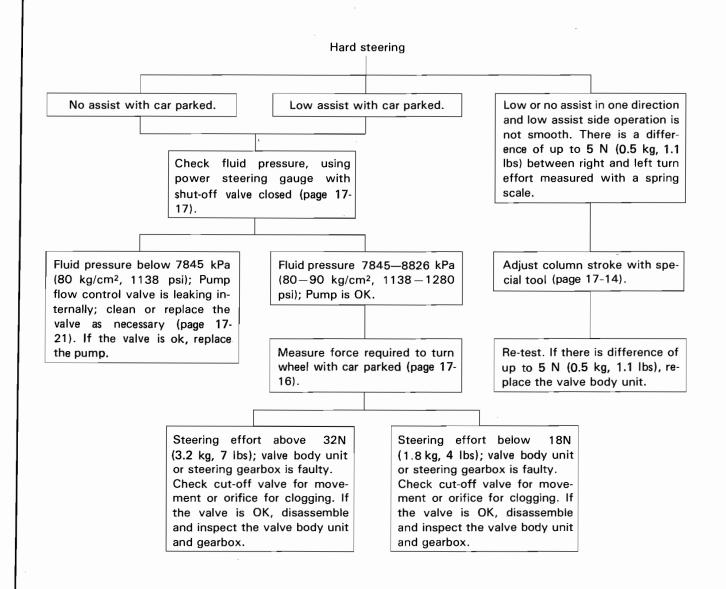


### **Troubleshooting**

#### 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?

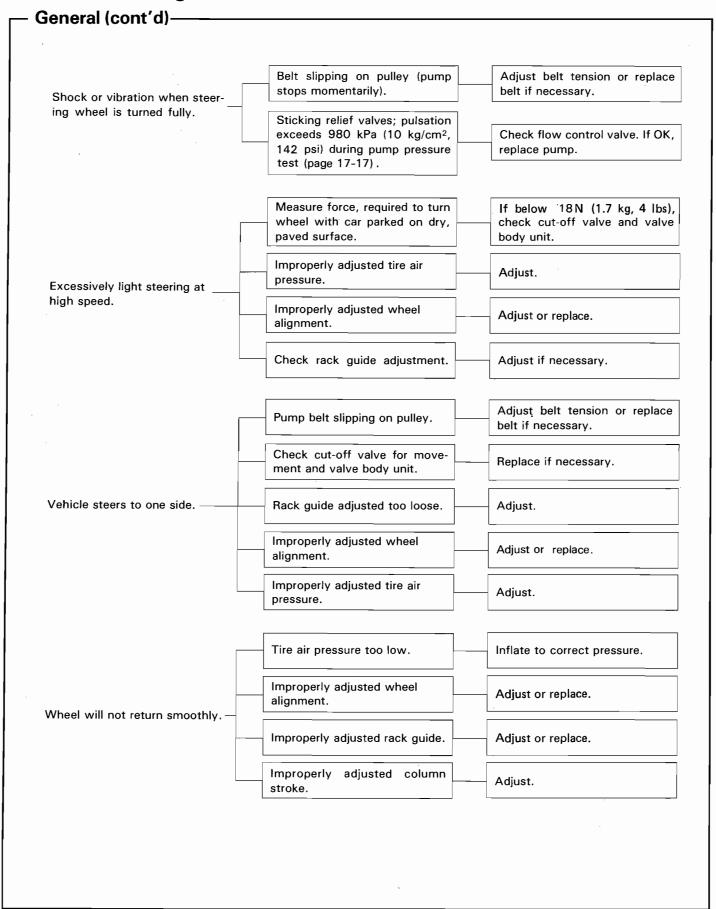




	Belt slipping on pulley.	Adjust belt tension (page 17-15). Replace if necessary.
	Cut-off valve sticking or leaking.	Check cut-off valve. Replace if necessary.
	Engine idle speed low or erratic.  If engine stalls when wheel is turned while car is stopped or moving at low speeds, adjust engine idle speed.	Check power steering pump preload (page 17-19).
neven or rough steering	Improperly adjusted steering shaft stroke.	Adjust shaft.
	Air bubbles visible in reservoir fluid. Check fluid level. If low, check for leaks. Add fluid to proper level.	If fluid level is OK, check oil strainer for clogging or O-ring for deterioration. Replace if necessary.
	Improperly adjusted rack guide.  Adjust rack guide (page 17-16).	If rack guide adjustment is OK, check pinion bearings for wear.  If worn, replace them (17-39).

(cont'd)

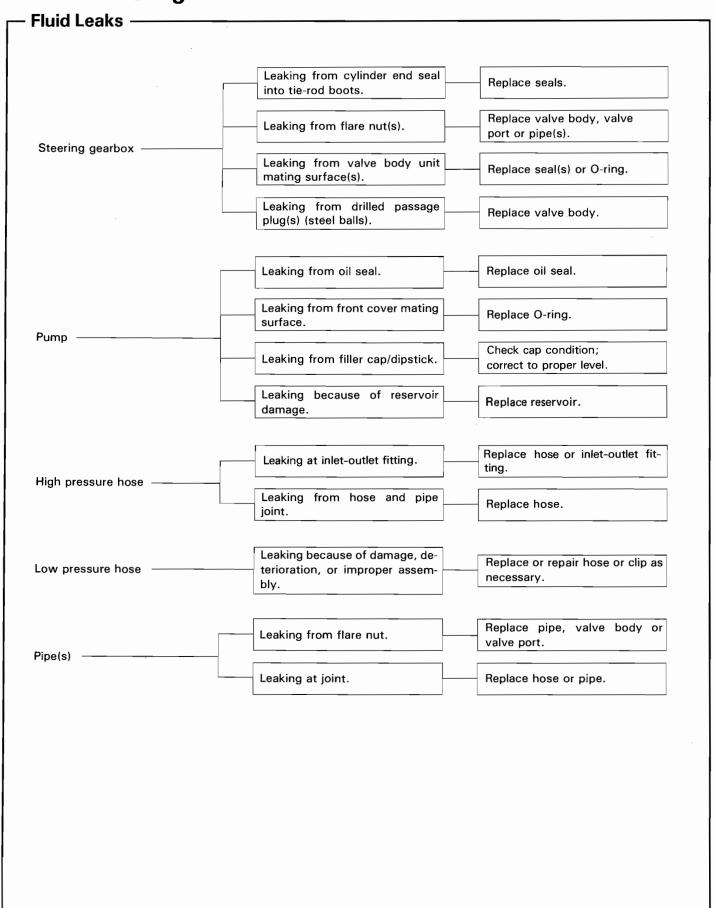
### **Troubleshooting**





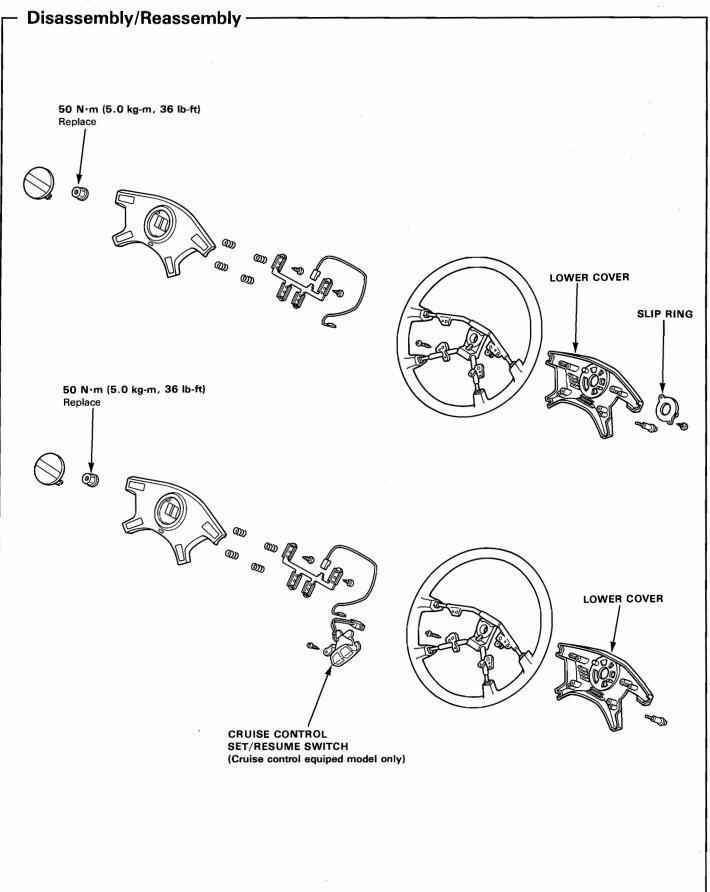
#### Noise and Vibration-NOTE: Pump noise within 2-3 minutes after starting in cold weather ( $-20^{\circ}$ F or colder) is normal. Humming, due to pulsation Lines or hoses from the valve of fluid, is normal, particularbody unit touching each Hissing ly when wheel is turned with other. Reposition lines so car stopped. they don't touch. If the valve body unit lines Hum could be torque conare not touching, and noise is Humming verter noise; confirm by temfrom valve body unit, replace porarily removing pump belt. the valve body unit. High pressure line touching Normal. Check pump noise the frame. Reposition the on a car you know is OK, line. Pump gear noise then compare. Belt slipping. Tighten or re-Check fluid level. If low, fill place belt. reservoir to proper level, and Grating noise Pinion shaft seal not lubricatcheck for leaks. Tighten or from pump ed. Grease it. replace parts. (cavitation Squeaking \_ caused by air Check for crushed suction Horn contact not lubricated, bubbles in or under too much pressure. hose or loose hose clamp alfluid.) Grease the contact, or bend lowing air into the system. it to reduce the pressure. Tighten or replace parts. Burrs on the pinion gear. Remove pinion and file burrs smooth. 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. Rattling or chattering Loose steering shaft connector, tie-rod, or ball joint. Check and tighten, or replace parts. Lower column hanger bushing damaged. Replace column assembly.

### **Troubleshooting**

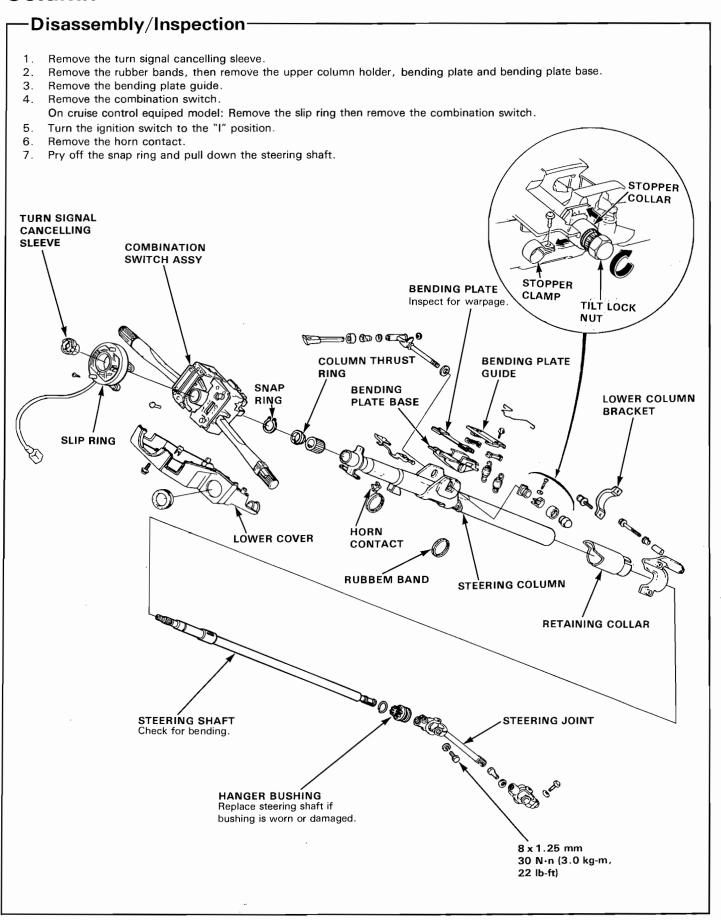


### Steering Wheel





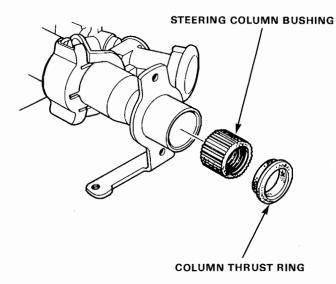
### Column



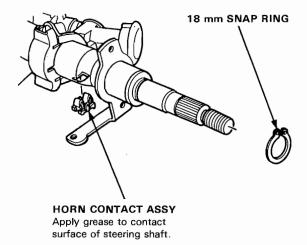


### -Reassembly-

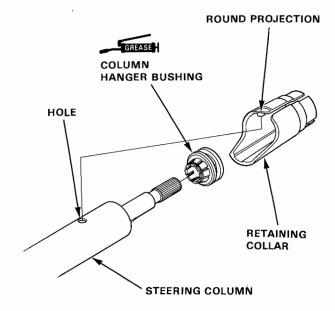
- 1. Insert the column bushing.
- 2. Set the column thrust ring in position.



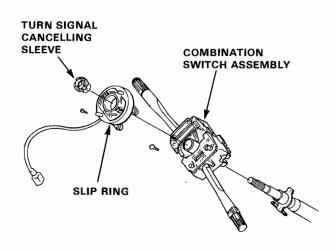
- 3. Insert the steering shaft in the steering column from the bottom.
- 4. Install the snap ring on the steering shaft.
- Insert the horn contact in the hole in the steering column.



- 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 retaining collar on the steering column aligning the hole in the column with round projection on the retaining collar.



- 9. Install the combination switch assembly.
- 10. Install the turn signal cancelling sleeve.

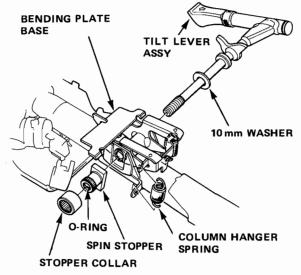


(cont'd)

### Coulmn

### -Reassembly (cont'd)-

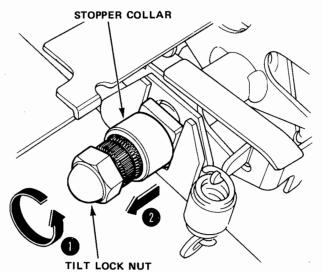
- 11. Install the 10 mm washer on the tilt lever assembly.
- Install the bending plate base on the steering column.
- Insert the tilt lever assembly shaft into the hole in the bending plate base.
- Install the spin stopper on the shaft.
   NOTE: Apply grease to each sliding surface.
- 15. Install the stopper collar over the spin stopper.
- 16. Install the column hanger spring as shown.



 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.

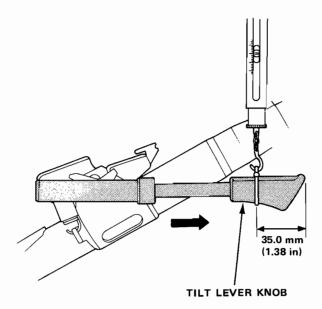
#### NOTE:

- The tilt lock nut has left hand threads.
- If the stopper collar cannot be moved, turn the tilt lock nut counterclockwise.

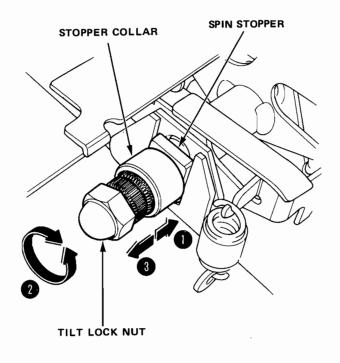


18. Pull out the tilt lever knob toward you and measure the lever preload at 35.0 mm (1.38 in) from the tip of the knob.

Lever Preload: 50-90 N (5.0-9.0 kg, 11.0-19.8 lb)

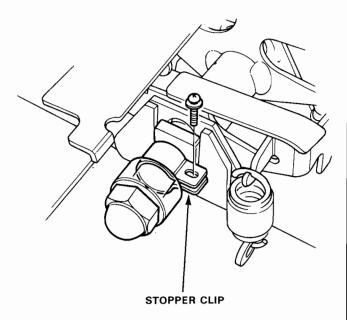


19. If the preload is out of the specification, adjust by sliding the stopper collar to the spin stopper side and turning the tilt lock nut one turn right or left.





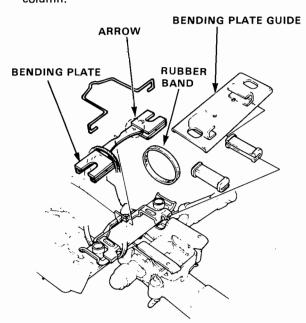
- 20. Slide the stopper collar to the tilt lock nut side.
- 21. Install the stopper clip between the spin stopper and stopper collar and tighten with 3 mm screw.



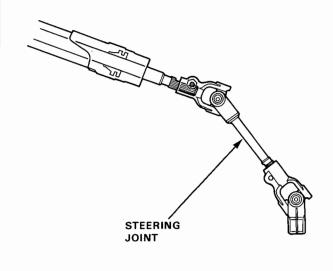
22. Install the upper column holder and bending plate on the steering column with the rubber bands.

NOTE: Install the bending plate with the arrow toward the gearbox.

23. Install the bending plate guide on the steering column.



24. Loosely install the steering joint on the steering shaft.



### Column

### - Adjustment

NOTE: A special tool (adjustment guide) is required to position the steering column during installation.

- Install the adjustment guide on the top end of the steering shaft and turn it as far as it will go.
- 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.
- Tighten the upper colum holder nuts to the specified torque.

TORQUE: 13 N·m (1.3 kg-m, 9 lb-ft)

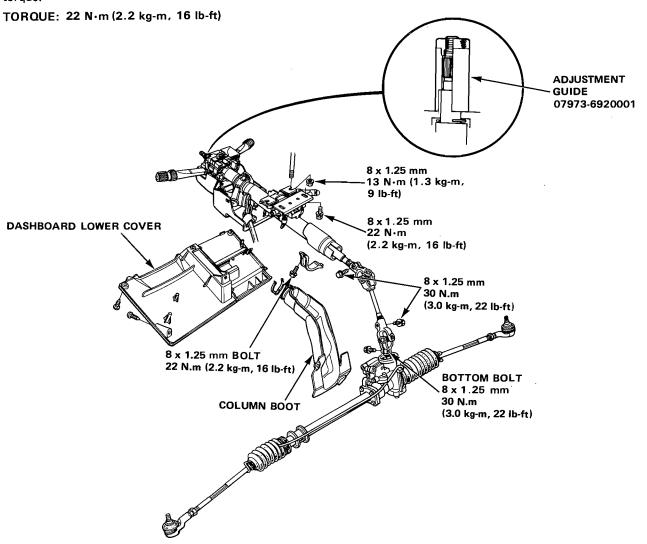
Tighten the lower bracket bolts to the specified torque.

- 6. Tighten the bending plate guide bolts to the specified torque.
  - TORQUE: 22 N·m (2.2 kg-m, 16 lb-ft)
- 7. Connect the steering joint to the pinion and install and hand tighten the steering joint bolts.
- 8. 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.

Install the column cover, column boot, and dashboard lower panel.



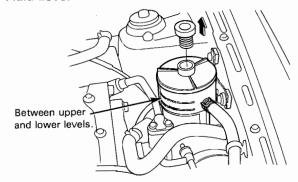
### **Power Steering Fluid**

### Replacement

Check the reservoir level at regular intervals, and add fluid as necessary.

CAUTION: Use only Power Steering Fluid (part Number 08208—99961). Use of fluids such as ATF or other manufacturers' power steering fluid will damage the system.

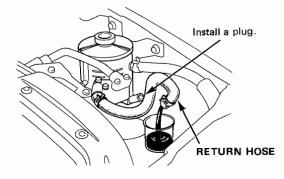
#### Fluid Level



#### Fluid Replacement

#### CAPACITY: 1.2 & (1.3 US qt) at change

- Raise the front end of the car and place safety stands in the proper locations.
- Disconnect the return hose from the gearbox at the reservoir, and the put the end in a suitable container.
- 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.



- 4. Refit the return hose to the reservoir.
- 5. Fill the reservoir to the upper level mark.
- 6. 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.
- 7. Recheck the fluid level and add fluid if necessary.

CAUTION: Do not fill the reservoir beyond the upper level mark.

### **On-Car Checks**

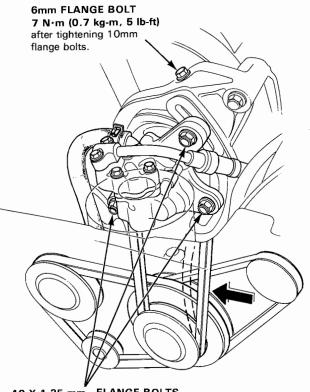


### Belt Tension Adjustment-

A properly adjusted belt should deflect about 18-22 mm (0.7 - 0.9 in.) when you push on it mid-way between the pulleys with a force of about 98N (10kg, 22 lbs).

NOTE: On a brand-new belt, the deflection should be 18-20 mm (0.7-0.8 in.) when first measured.

- 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.



### **On-Car Checks**

### Assist Check With Car Parked—

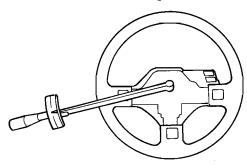
- Check the power steering fluid level and pump belt tension.
- Start the engine, allow to idle, and turn the steering wheel from lock-to-lock several times to warm up the fluid.

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.

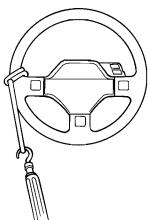
TORQUE: 6.2 N·m (0.62 kg-m, 4.4 lb-ft)



#### **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.

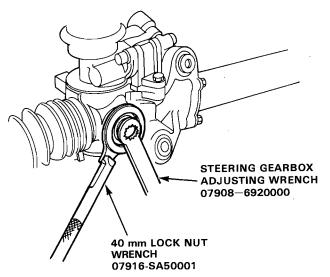


If values are not within the specification, test the pump pressure.

### - 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

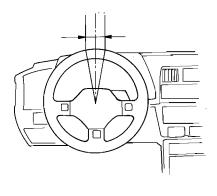


 Tighten the guide screw until it compresses the spring against the guide; then loosen it, and tighten it to about 4 N·m (0.4 kg-m, 3 lb-ft) and back it off about 25°. Tighten the locknut to about 25 N·m (2.5 kg-m, 18 lb-ft) while preventing the guide screw from moving.

### 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.)



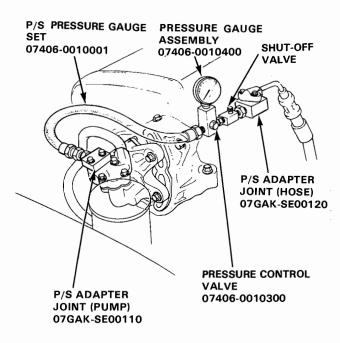


### Pump Pressure Test-

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.

 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.
- Turn the steering wheel from lock-to-lock several times to get the fluid up to operating temperature.

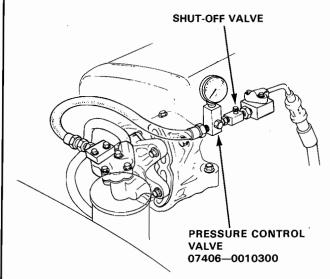
Measuring Fluid Temperature: 40-50°C (104-120°F)

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.

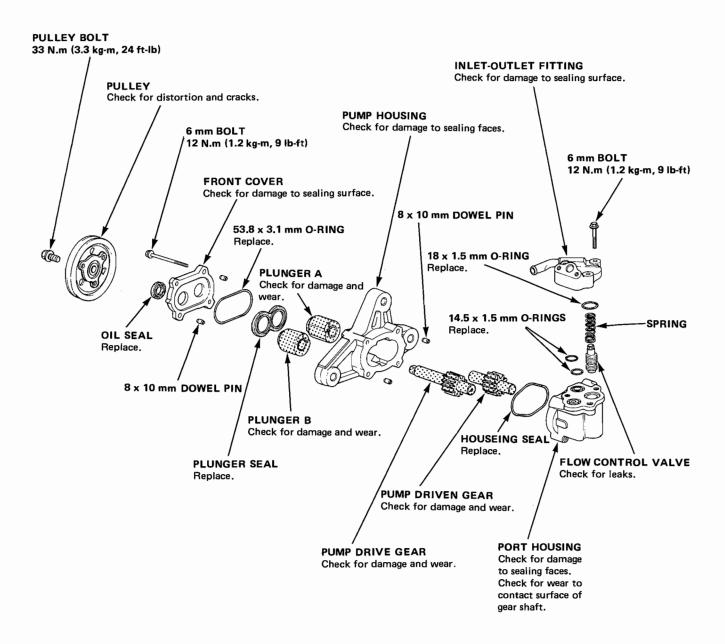


### **Pump**

### 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.
- STEERING GREASE......Part Number 08733—B070E



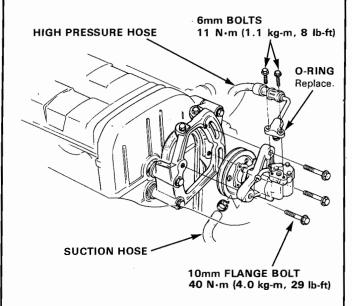


### Replacement -

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.



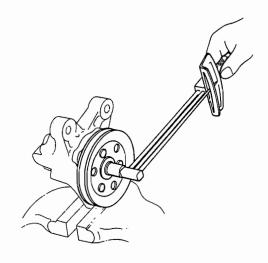
Install in the reverse order, and:

- 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.

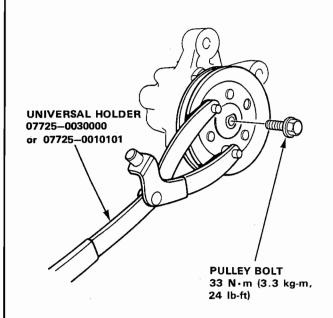
PRELOAD: 4 N·m (0.4 kg-m, 3 lb-ft) max.



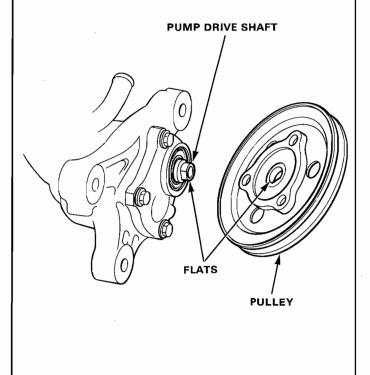
### **Pump**

### -Pulley Replacement -

 Remove the pulley nut using the special tool, then remove the pulley.

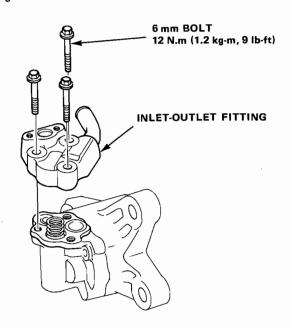


Install the pulley with the flat surface of the pump drive shaft aligned with the corresponding flat surface of the pulley.

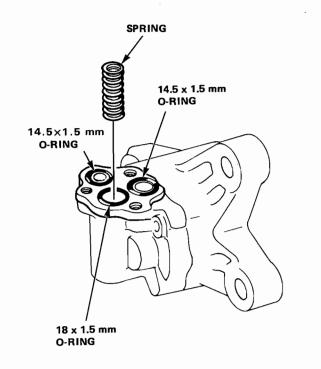


# Flow Control Valve Inspection and Replacement

1. Remove the three 6 mm bolts and inlet-outlet fitting.

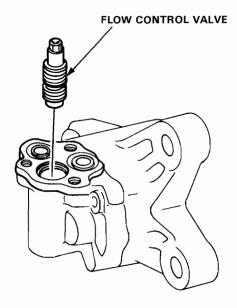


- 2. Remove the two 14.5  $\times$  1.5 mm O-rings and one 18  $\times$  1.5 mm O-ring.
- 3. Remove the spring.

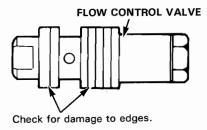




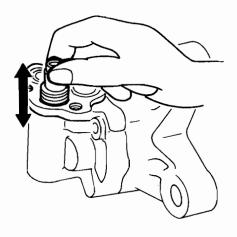
4. Remove the flow control valve.



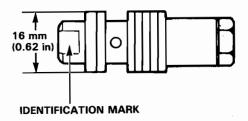
5. Check for wear, burrs, and other damage to the edges of the grooves in the valve.



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.

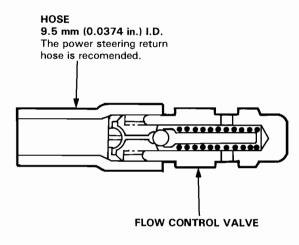


Mark	Part No.	Part Name	Outside Diameter mm (in)
A		Flow Control Valve Assembly A	15.995—16.000 (0.6297—0.6299)
Without mark		Flow Control Valve Assembly B	16.000-16.006 (0.6299-0.6302)

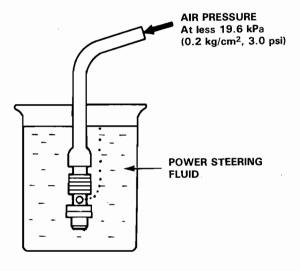
## **Pump**

#### Flow Control Valve Inspection and Replacement (cont'd)

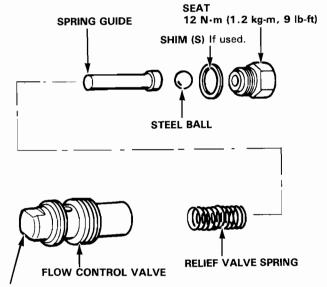
7. Attach a hose to the end of the valve.



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.



Clamp this end in a vise with soft jaws.

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.

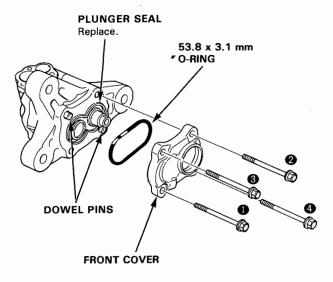
- 12. Install in the reverse order of removal. Also:
  - Coat the new O-rings with steering grease to hold them.
  - Coat the flow control valve with power steering fluid.



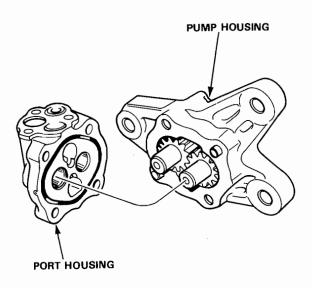
### Housing Disassembly

CAUTION: Pump components are made of aluminum. Be careful not to drop or damage them.

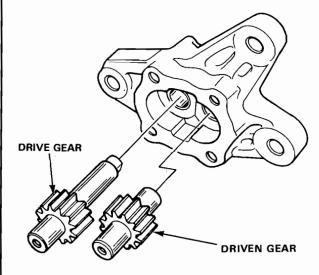
- Remove the flow control valve if necessary (page 17-36).
- Loosen the four 6 mm bolts in the sequence shown, then remove them and the front cover.
- 3. Remove the 53.8 x 3.1 mm O-ring from the front cover.
- 4. Remove the plunger seal.



5. Separate the port housing from the pump housing.



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.

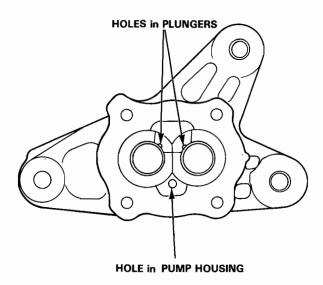


## **Pump**

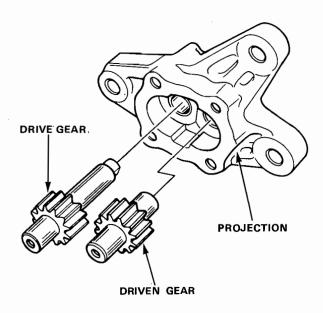
#### Housing Assembly-

 If the plungers are removed, be sure to position them correctly, as shown.

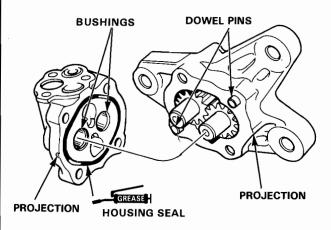
NOTE: Lubricate the plunger housing with power steering fluid before installing the plungers.



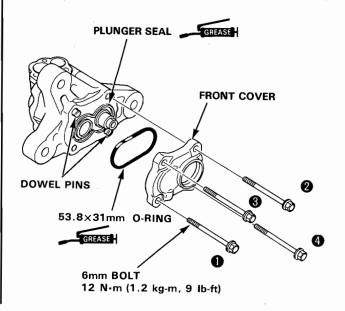
- Lubricate the inside surface of the plungers and gears with power steering fluid.
- 3. Install the gears in the pump housing with the driven gear toward the projection on the housing.



- 4. Lubricate the gear bushings of the port housing.
- Install the two dowel pins and housing seal.
- 6. Install the port housing on the pump housing with the projections on the housings aligned.

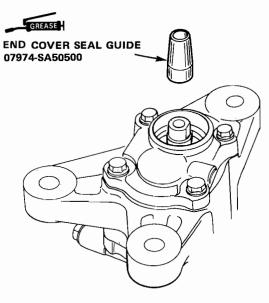


- Grease the plunger seal, then install it over the plungers.
- 8. Install the dowel pins in the pump housing.
- Put grease in the groove of the front cover first, then position the 53.8 x 3.1 mm O-ring on the cover.
- Install the front cover on the pump housing with the projections aligned.
- 11. Install the four 6 mm bolts. Torque them to the specified torque in the sequence shown.



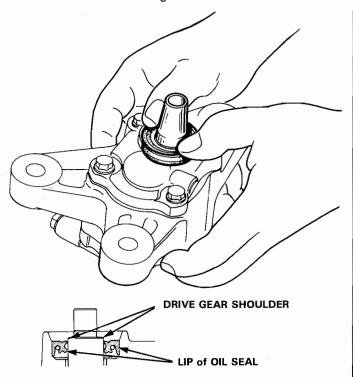


12. Grease the end cover seal guide then install it over the drive gear.

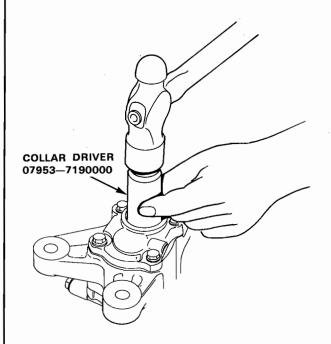


13. Install the oil seal by hand.

NOTE: Remove the special tool if the lip of the oil seal is over the drive gear shoulder.



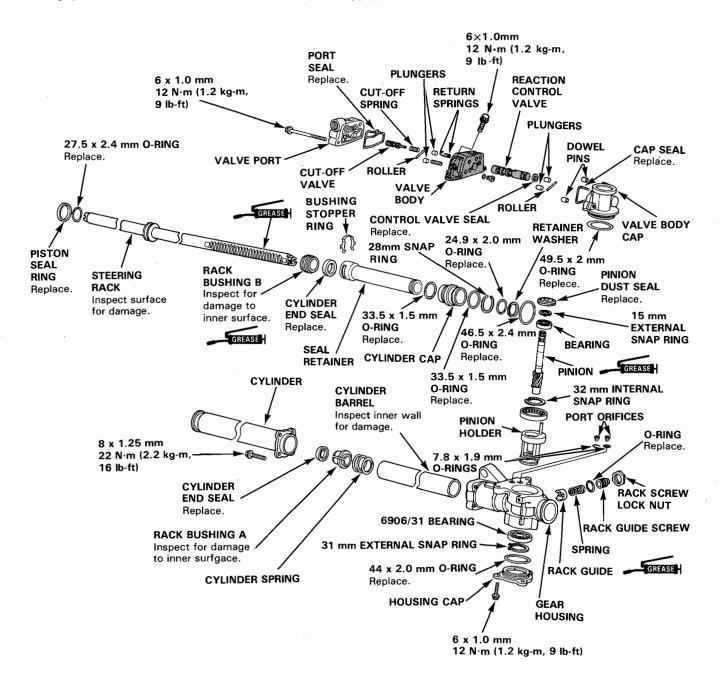
14. Drive in the oil seal with special tool.



#### Index-

#### **CAUTION:**

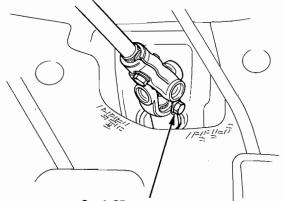
- Before disassembling the gearbox, wash it off with solvent.
- Thoroughly clean all disassembled parts.
- Always replace O-rings and seals.
- Replace parts with damaged sliding surfaces.
- Do not dip seals and O-rings in solvent; coat O-rings with grease, and make sure they stay in position during reassembly.
- 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.
- GREASEH STEERING GREASE. . . Part Number 08733-B070E





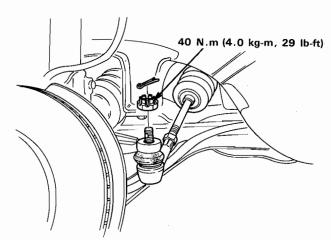
#### Removal/Installation-

 Remove the steering joint cover, remove the bolts in the steering shaft connector, and pull the connector up off the pinion shaft.

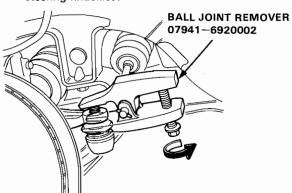


8 x 1.25 mm 30 N.m (3.0 kg-m, 22 lb-ft)

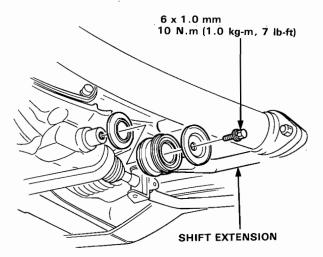
- Raise the front of car on jack stands and remove the front wheels.
- Remove the cotter pins, and unscrew the tie-rod end ball joint nuts halfway.



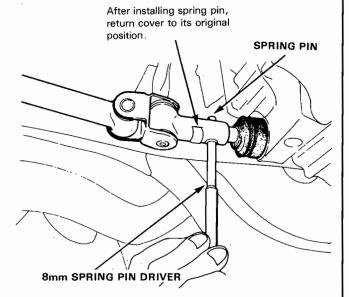
- 4. Break the ball joints loose using the Ball Joint Remover.
- Then, remove the nuts, and lift the tie-rod ends out of steering knuckles.



- 6-1 Manual Transmission Model Only:
  - Remove the shift extension from the transmission case.



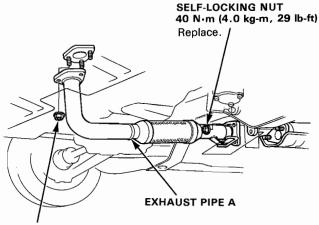
• Slide pin retainer out of way, drive out spring pin with punch, then disconnect shift rod.



6-2 Automatic Transmission Model Only: Remove the shift cable guide from the floor and pull the shift cable down by hand.

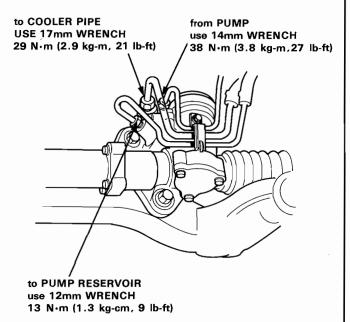
### -Removal/Installation (cont'd)-

- Drain the power steering fluid as described on page 17-30.
- 8. Remove the exhaust pipe A.

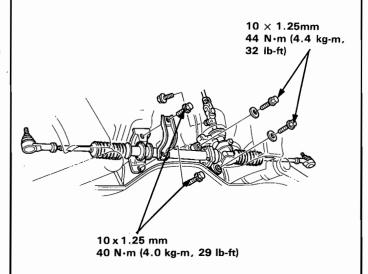


SELF-LOCKING NUT 55 N·m (5.5 kg-m, 40 lb-ft) Replace.

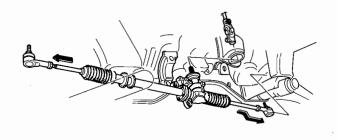
- 9. Clean the gearbox and surrounding area throughly.
- Disconnect the three fluid lines from the valve body unit.



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.

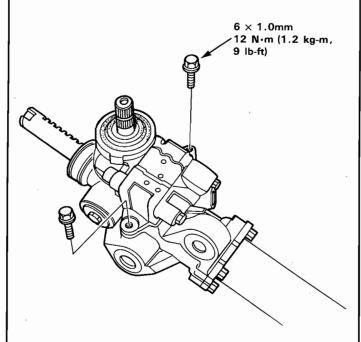


13. Gearbox installation is in the reverse order of removal.

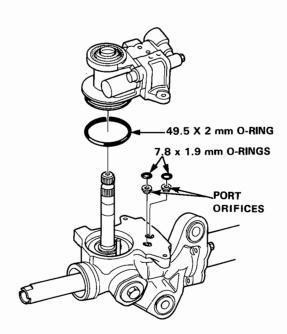


### Valve Body Unit Disassembly -

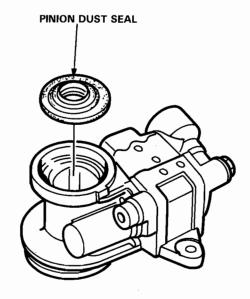
1. Remove the two 6 mm bolts holding the valve body unit to the gear housing.



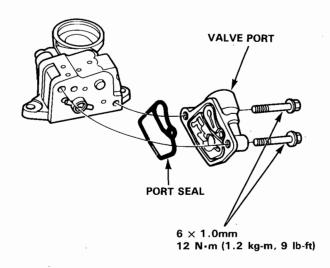
- 2. Remove the 7.8 x 1.9 mm O-rings and port orifices from the gear housing.
- 3. Remove the 49.5  $\times$  2 mm O-ring from the valve body unit.



Remove the pinion dust seal from the valve body unit.

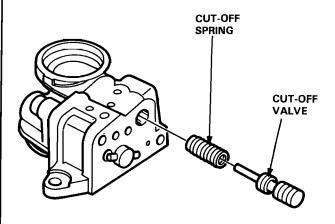


- Remove the two 6 mm bolts and remove the valve port from the valve body.
- 6. Remove the port seal.

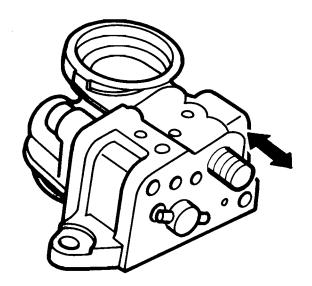


## Vale Body Unit Disassembly (cont'd)-

7. Remove the cut-off valve and spring from the valve body.

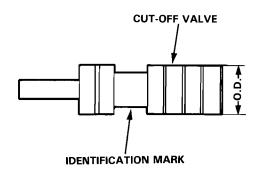


- 8. Check the cut-off valve:
  - Inspect its surface for scoring or scratches.
  - Slip it back into the valve body, and make sure it slides smoothly without drag and without side play.



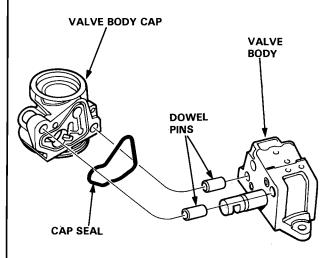
#### NOTE:

- 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.



Identifica- tion Mark	Outside Diameter	Part Number
А	10.000-10.005 mm (0.3937-0.3939 in.)	53650-SB4-950
В	9.995—10.000 mm (0.3935—0.3937 in.)	53651-SB4-950
С	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.

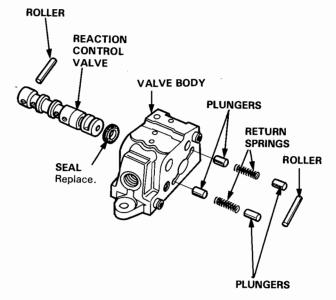




12. Remove the rollers from the valve body by pushing the valve out one side of the valve body, and then the other.

NOTE: When removing the rollers, hold the plungers with your fingers to keep them from popping out.

- Remove the plungers, return springs and reaction control valve.
- Remove the control valve seal from the reaction control valve.

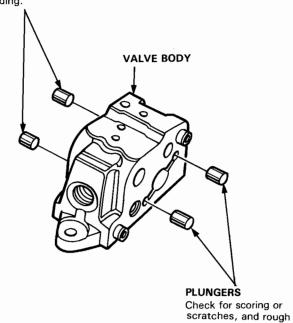


- 15. Check the plungers.
  - Inspect their surface for scoring or scratches.
  - Slip each plunger into the valve body, and make sure it slides smoothly, without drag or side play. If any plunger is damaged, replace it.

NOTE: If the valve body is damaged, replace the valve body unit as a set.

#### **PLUNGERS**

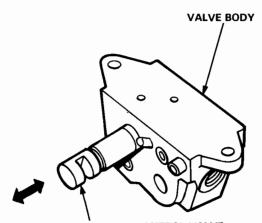
Check for scoring or scratches, and rough sliding.



sliding.

## Vale Body Unit Disassembly (cont'd) –

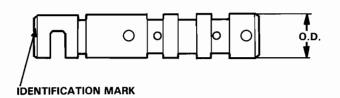
- 16. Check the reaction control valve.
  - Inspect its surface for scoring or scratches.
  - Slip it into the valve body, and make sure it slides smoothly, without drag or side play.



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.



Identifica- tion 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

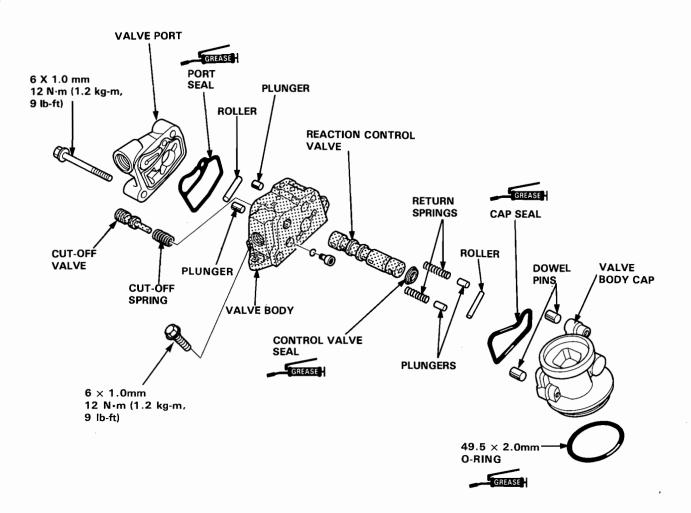


#### Valve Body Unit Assembly-

- 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 x 2.0mm O-ring for valve body cap and reaction control valve seal to keep them
  in place.
- STEERING GREASE......Part Number 08733-B070E

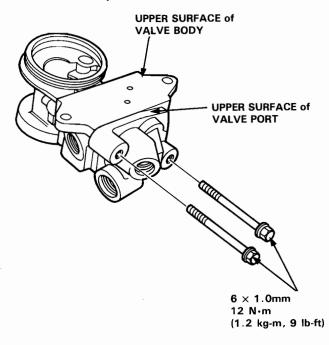


NOTE: If the Valve Body is damaged, it must be replaced as a set, with the Cut-off Valve and Reaction Control Valve (shaded parts).

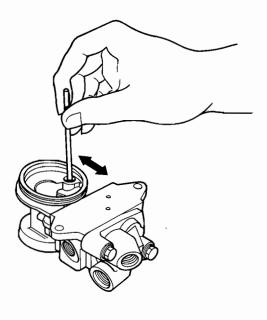
### -Vale Body Assembly (cont'd)-

4. Tighten the 6 mm bolts in the valve body unit.

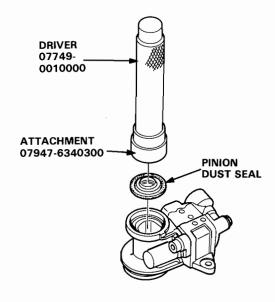
CAUTION: Make sure that the upper surface of the valve port does not exceed the upper surface of the valve body.



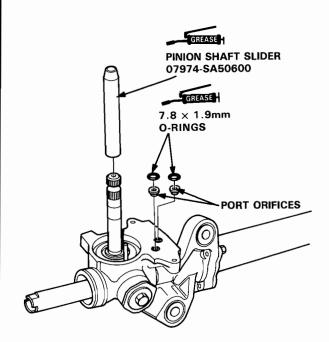
5. Make sure the reaction control valve moves smoothly, and returns to a neutral position.



6. Install the pinion dust seal with the special tool.



- 7. Apply grease in the 7.8  $\times$  1.9mm O-ring grooves of the gear housing.
- 8. Install the port orifices and 7.8 x 1.9mm O-rings.
- 9. Apply grease to surface of special tool and install the special tool on the pinion.

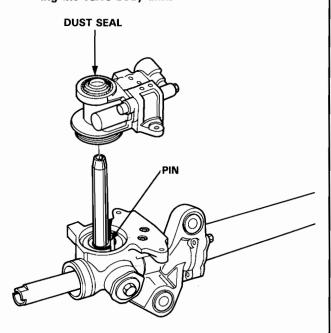




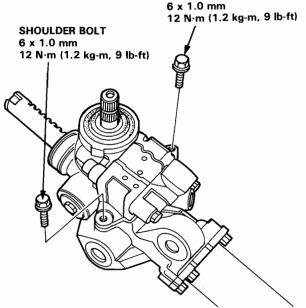
10. Install the valve body unit on the gearbox housing.

#### 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 0-ring is positioned properly and is not pinched when installing the valve body unit.



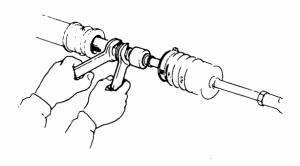
11. Tighten the 6 mm bolts.



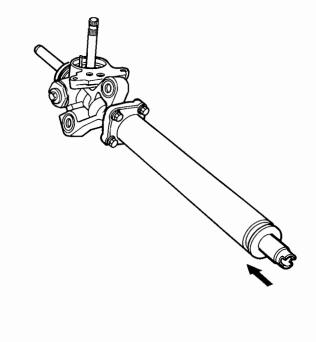
CAUTION: For proper assembly, the shoulder bolt must be installed in the hole toward the rear of the car.

### Disassembly/Reassembly

- Remove the gearbox assembly from the rear beam (page 17-42).
- Remove the valve body unit from the gearbox housing (page 17-44).
- 3. Bend back the tie-rod lock washers.
- Hold the rack with a 19 mm wrench and unscrew the tie-rods with a 17 mm wrench.

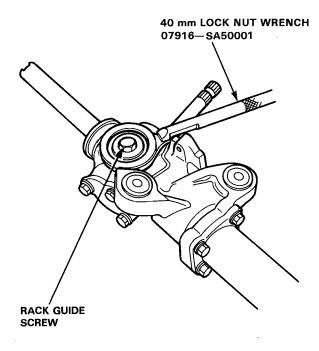


5. To prevent damage to the sealing surface of the steering rack, push the rack into its cylinder.

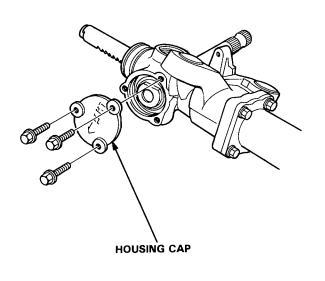


## -Disassembly/Reassembly (cont'd) -

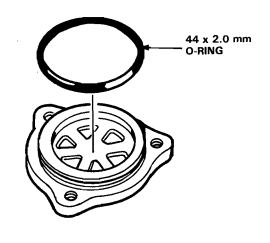
6. Loosen the rack screw locknut and remove the rack guide screw, spring and rack guide.



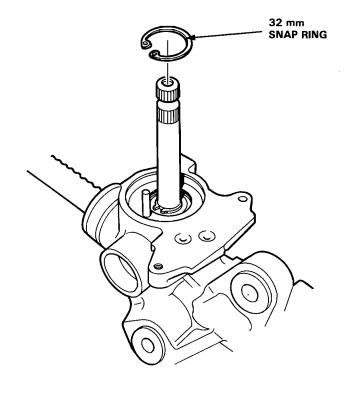
7. Remove the three 6 mm bolts and housing cap.



8. Remove the 44 x 2.0 mm O-ring from the housing cap.

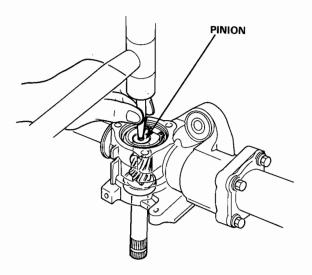


9. Remove the 32 mm snap ring.

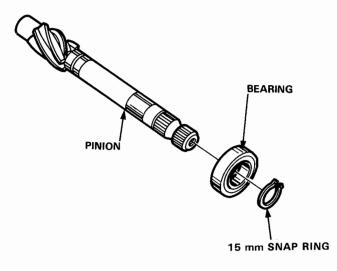




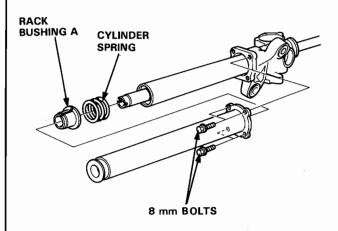
10. Remove the pinion from the gear housing by tapping it lightly.



11. Remove the 15 mm snap ring and bearing if necessary.



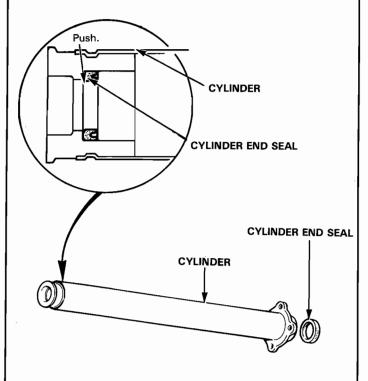
- 12. Remove the four 8 mm bolts.
- 13. Remove the cylinder.
- 14. Remove the rack bushing A and cylinder spring.



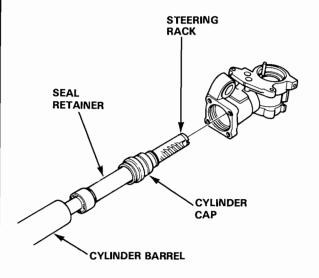
### Disassembly/Reassembly (cont'd)-

15. Remove the cylinder end seal from the cylinder.

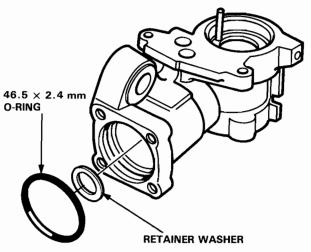
CAUTION: Do so by hand to avoid damaging the housing.



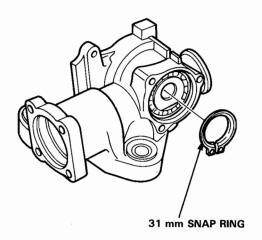
Remove the cylinder barrel, seal retainer, cylinder cap and steering rack from the gear housing.



17. Remove the  $46.5 \times 2.4 \text{ mm O-ring}$  and retainer washer from the gear housing.

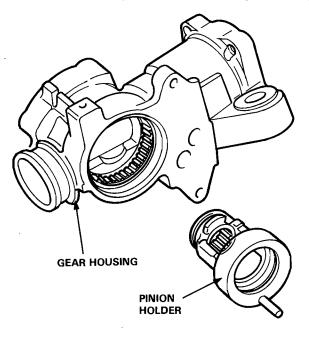


- 18. Check the bearing and pinion holder for faulty movement and excessive play. If they are OK and the grease in the bearing is clean, go on to step 19. If they are damaged, or if there is dirt in the grease, proceed as follows:
  - Remove the 31 mm snap ring.

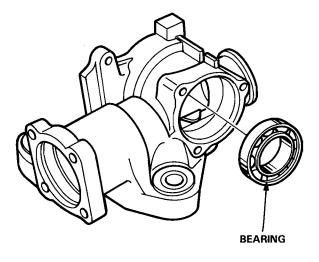




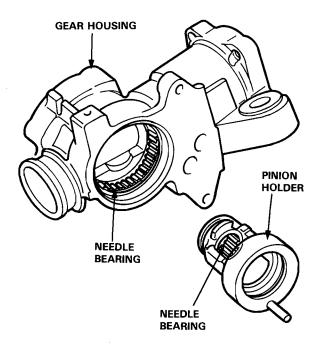
• Remove the pinion holder from the gear housing.



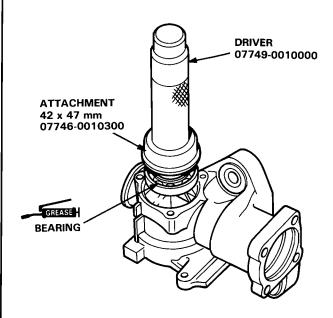
• Remove the bearing from the gear housing.



 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.

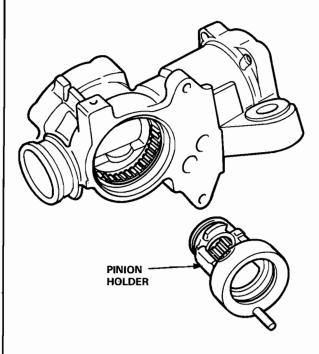


 Pack a new bearing with grease, then install with special tool, as shown.

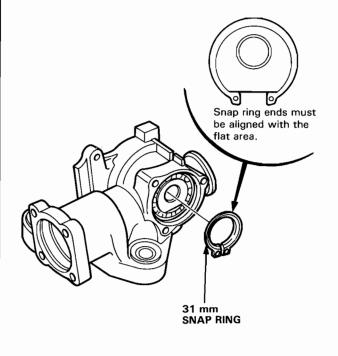


### -Disassembly/Reassembly (cont'd)-

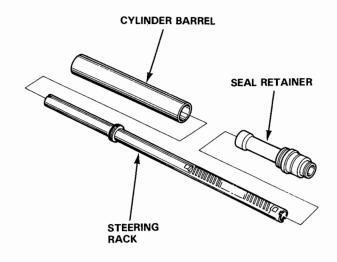
• Install the pinion holder in the gear housing.



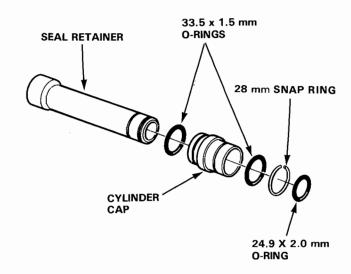
 Install the 31 mm snap ring with the taper side facing out.



Remove the cylinder barrel and seal retainer from the steering rack.

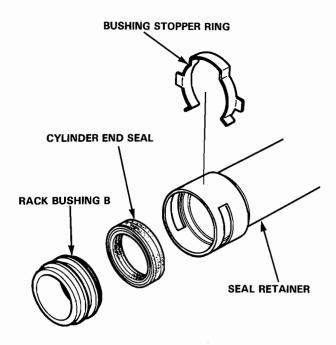


20. Remove the 24.9  $\times$  2.0 mm O-ring, the 28 mm snap ring, and the cylinder cap from the seal retainer. Remove 33.5  $\times$  1.5 mm O-rings from the cylinder cap.

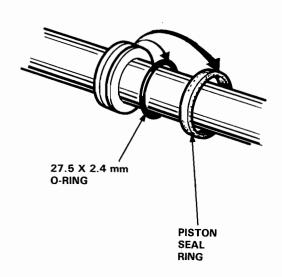




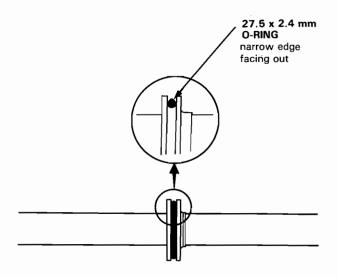
- 21. Remove the bushing stopper ring from the seal retainer.
- 22. Remove the cylinder end seal.



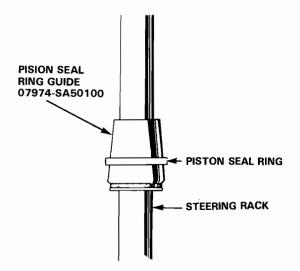
23. Carefully pry off the piston seal ring with a small screwdriver, then remove the 27.5 x 2.4 mm Oring.



24. Install a new 27.5 ×2.4 mm O-ring on the rack.



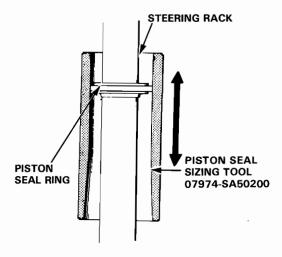
- 25. Install a new piston seal ring.
  - Coat the piston seal ring guide tool with power steering fluid, and slide it onto the rack, big end first.



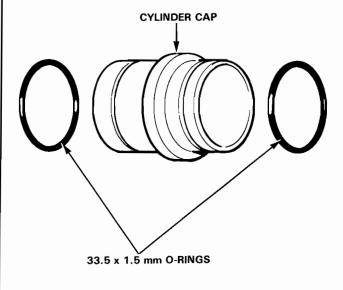
 Slide the new piston seal ring onto the guide tool, work it down to the big end of the tool, and then pull it off into the piston groove, on top of the O-ring.

### -Disassembly/Reassembly (cont'd) -

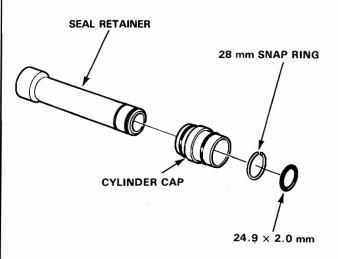
26. Coat the piston seal ring and the inside of the sizing tool with power steering fluid. Carefully slide the tool onto the rack and over the piston seal ring, then rotate the tool as you move it up and down to break-in the piston ring.



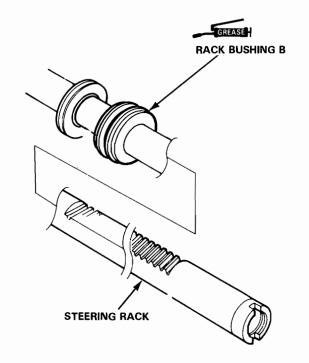
27. Coat new O-rings with grease and install them on the cylinder cap.



- 28. Slide the cylinder cap onto the seal retainer.
- 29. Install the 28 mm snap ring on the seal retainer.
- 30. Install a new 24.9  $\times$  2.0 mm O-ring on the seal retainer.

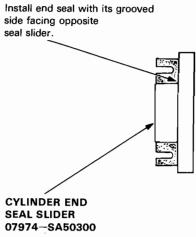


31. Grease the sliding surface of the steering rack bushing B, and install the bushing on the steering rack with the groove of the bushing facing the steering piston.



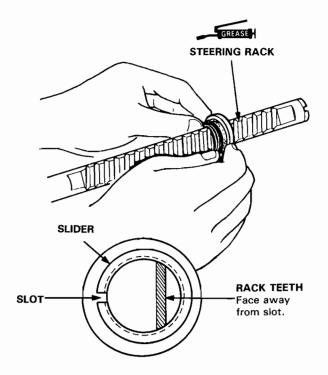


32. Grease the sliding surface of the new cylinder end seal, and the cylinder end seal slider, then set the seal on the seal slider with its grooved side facing opposite the slider.

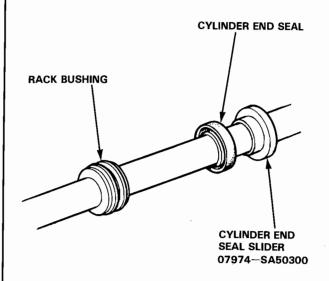


33. Grease the steering rack, and install the cylinder end seal.

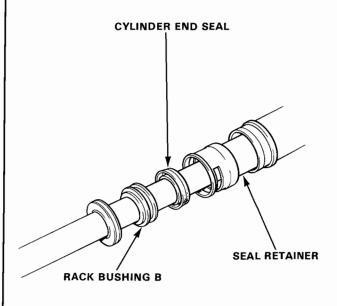
CAUTION: Make sure the rack teeth do not face the slot in the guide tool.



 Remove the guide tool from the cylinder end seal, then separate the ends of the tool and remove it from the rack.

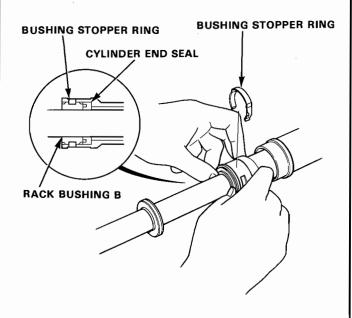


35. Fit the seal retainer on the steering rack.

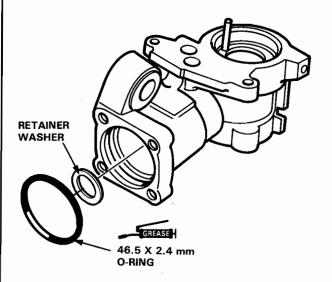


## Disassembly/Reassembly (cont'd)-

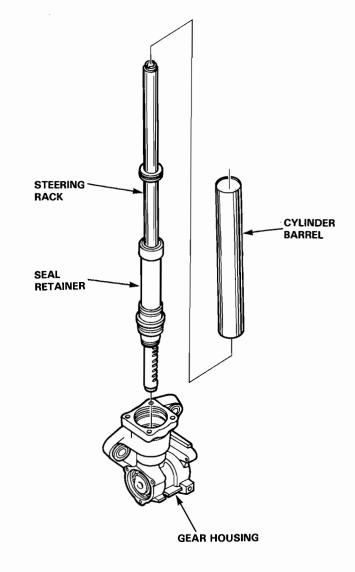
36. Push the rack bushing B toward the seal retainer by hand until the cylinder end seal is seated in the retainer. Fit the seal stopper ring in the groove of the seal retainer securely.



37. Install the 46.5 x 2.4 mm O-ring and retainer washer into the gear housing.

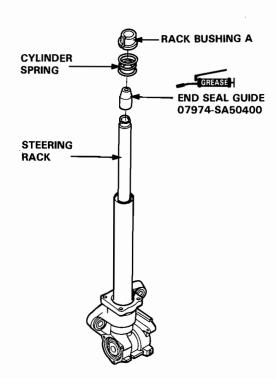


- 38. Stand the gear housing on the work bench and press the seal retainer and steering rack into the gear housing.
- 39. Coat the inside surface of the cylinder barrel with power steering fluid, slide it over the rack and into the gear housing; press it into the housing until it seats.

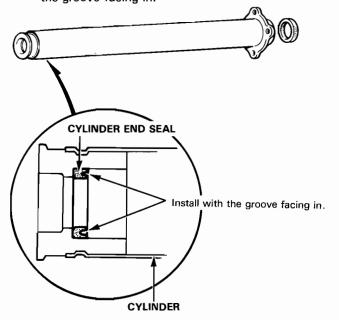




- 40. Install the end seal guide tool on the steering rack.
- 41. Install the cylinder spring over the rack, then coat the rack bushing A with power steering fluid, and install it on the spring.

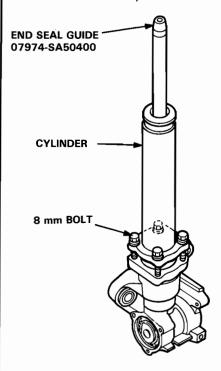


42. Coat the inside surface of the cylinder with power steering fluid and install the cylinder end seal with the groove facing in.

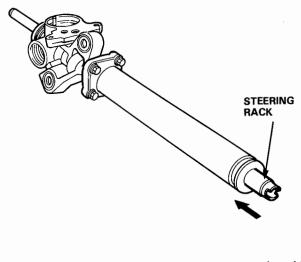


- 43. Coat the end seal guide tool with grease.
- 44. Carefully slide the cylinder over the rack and install it on the gear housing.

CAUTION: Be carefull not to damage the cylinder end seal in the cylinder.



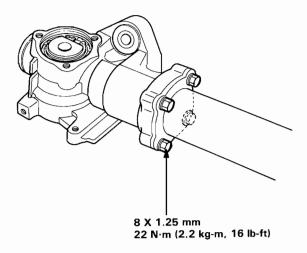
45. Push the steering rack until the rack is in the cylinder to prevent damage to the sliding surface of the steering rack.



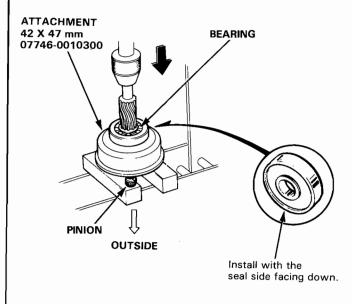
### -Disassembly/Reassembly (cont'd)

46. Secure the cylinder to the gear housing with the four 8 mm bolts.

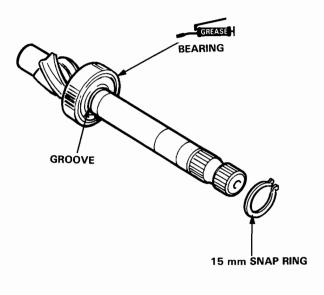
NOTE: Before tightening, make sure the mating surface of the cylinder and gear housing fit properly. Push and hold them together while you tighten the bolts.



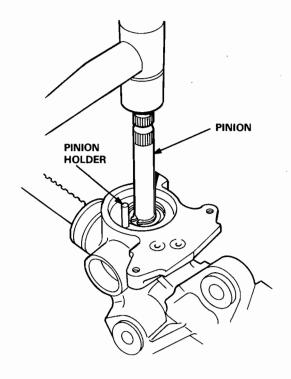
47. Using a press, install the bearing on the pinion, with its seal side facing down (out).



48. Install the 15 mm snap ring on the pinion.

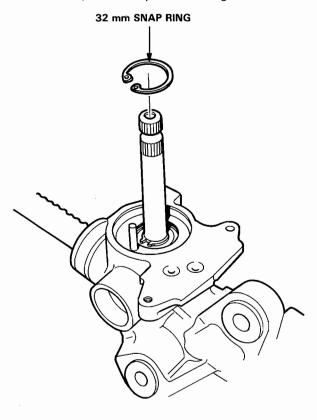


- 49. Grease the bearing and make sure that it turns smoothly.
- Insert the pinion into the pinion holder in the gear housing.





 Install 32 mm snap ring in the groove in the pinion holder, with its taper side facing out.

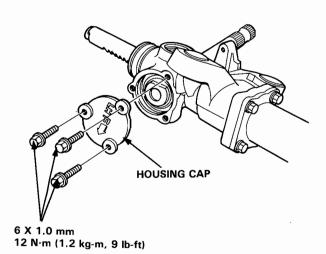


52. Coat the 44 x 2.0 mm O-ring with grease and install it in the groove in the housing cap.

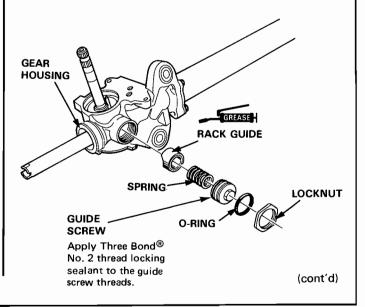


53. Tighten the three 6 mm bolts to secure the housing cap to the gear housing.

NOTE: The arrow on the housing cap must face toward the front of the car when the gearbox is installed.



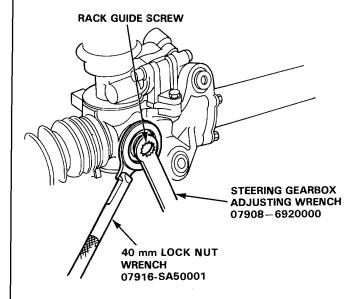
- 54. Coat the rack guide with grease.
- 55. Install the rack guide, spring, O-ring and rack guide screw in the gear housing.
- 56. Install the locknut on the rack guide screw, finger tight.



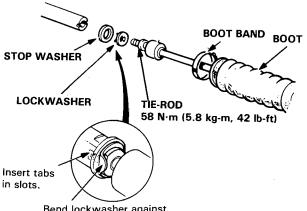
### -Disassembly/Reassembly (cont'd)-

57. 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°.

While holding the guide screw in its position, tighten the locknut to 25 N·m (2.5 kg-m, 18 lb-ft) with the locknut wrench.



58. 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.



Bend lockwasher against flat on tie-rod flange.

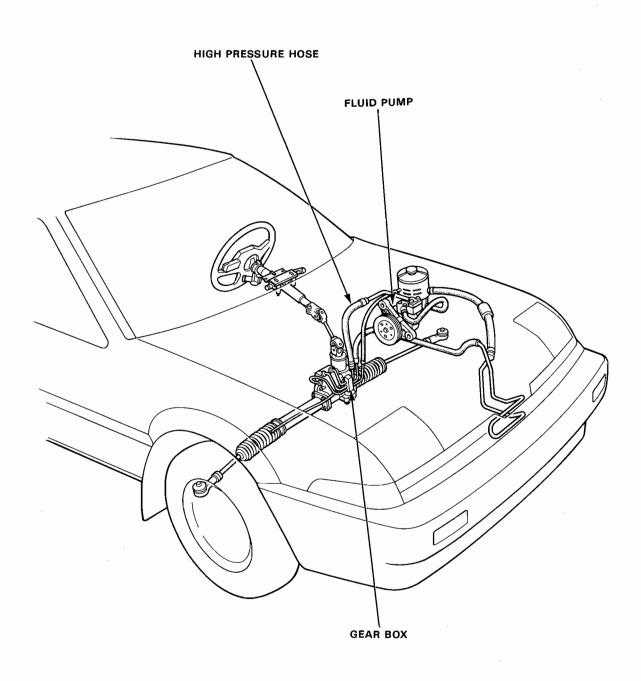
59. Make sure that the boots move smoothly while sliding the steering rack.

# **Operation**

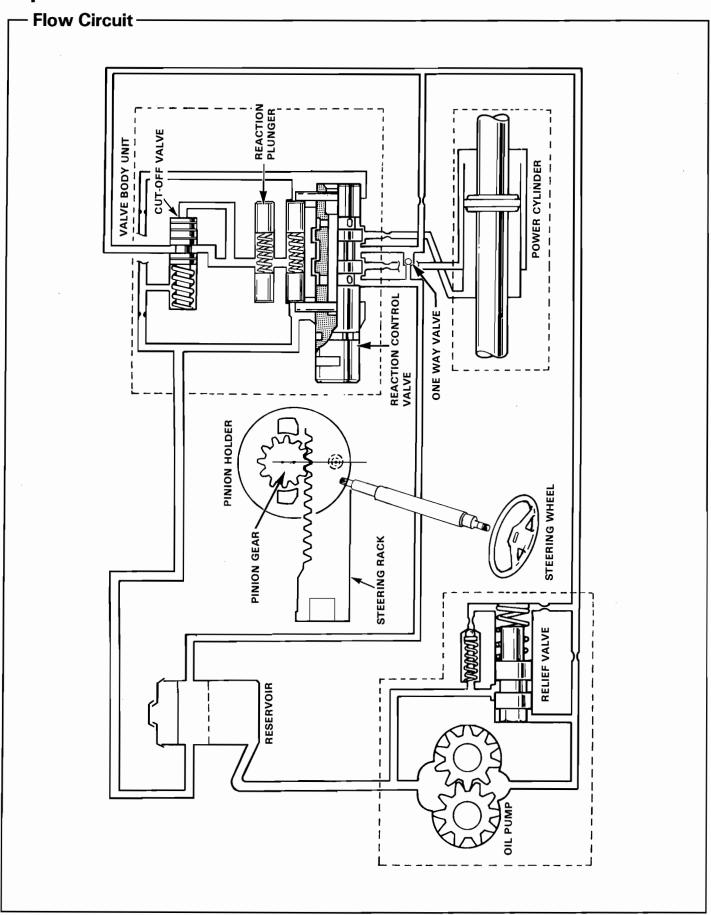


## Description -

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.



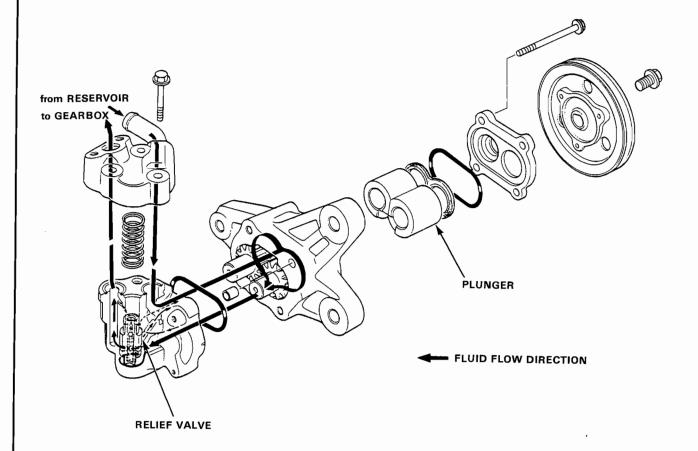
# Operation





### 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.



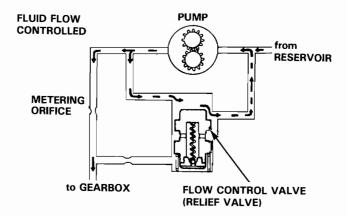
## **Operation**

#### -Pump-

#### 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.

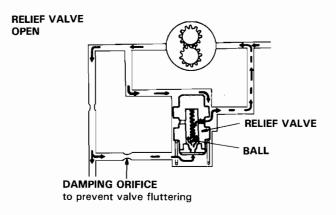


#### **Pressure Relief**

As pressure on the valve body side builds up, it pushes the relief valve ball (inside the flow control valve) up against its spring.

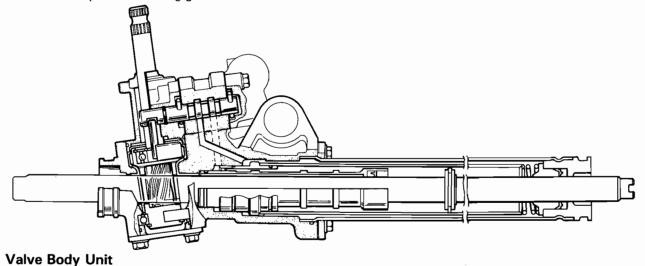
As the pressure under the flow control valve drops, the relief valve ball is closed by its spring, and the flow control valve is forced down again, allowing excess fluid from the pump side to return to the inlet.

This flow control valve-relief valve cylinder keeps pump output pressure between  $7845-8826 \, \text{KPa} (80-90 \, \text{kg/cm}^2,1138-1280 \, \text{psi})$ .





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.



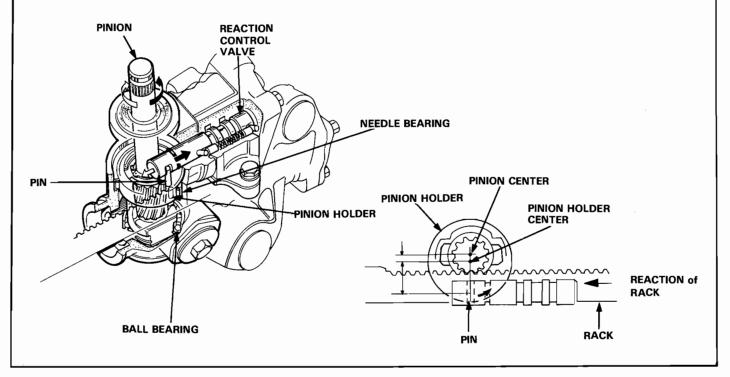
In the nower steering unit, the method used to direct a single of

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.



## **Operation**

#### Gearbox

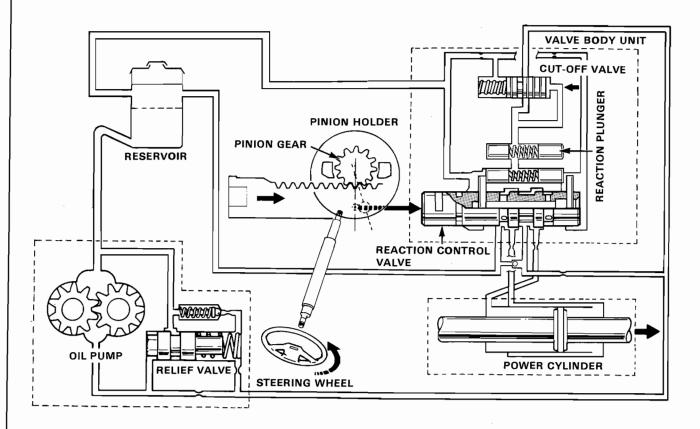
#### **Hydraulic Reaction Sensing Mechanism**

#### 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."



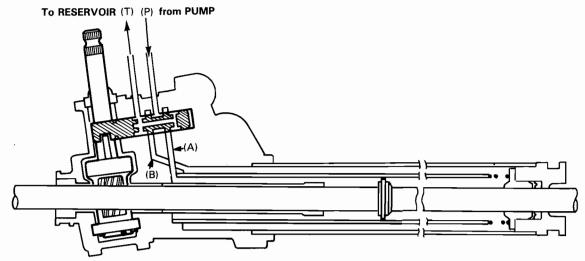
#### **Power Cylinder**

#### 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.



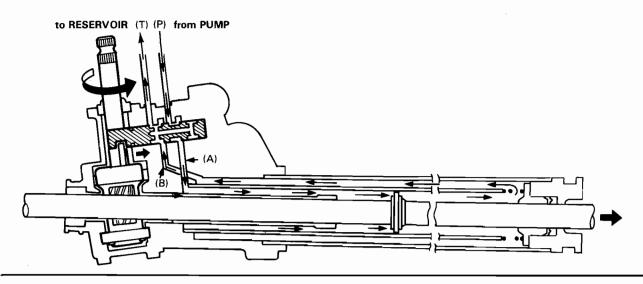
#### Left Turn

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.

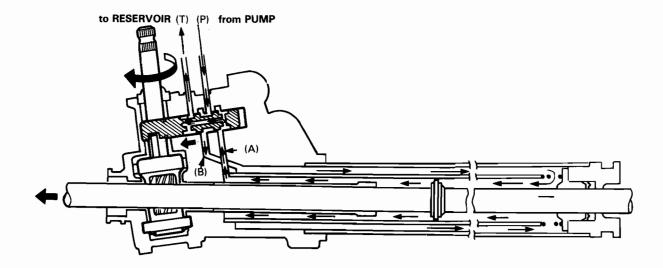


# **Operation**

### -Gearbox-

#### 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.

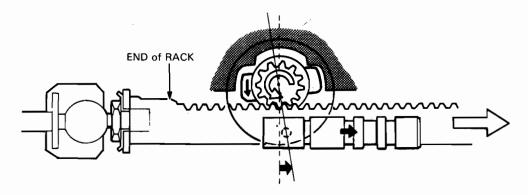


#### **Unloader System**

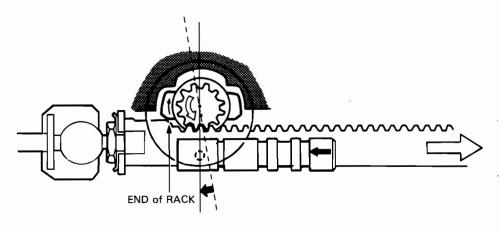
The control valve shifts the direction of fluid flow when the steering wheel is turned right or left.

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

# **Operation**

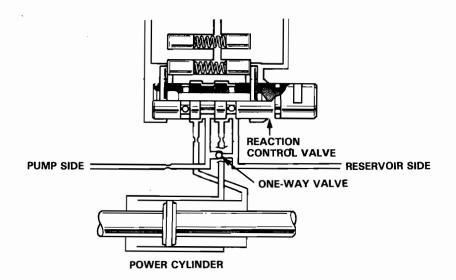
#### -Gearbox -

#### 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

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Illustrated Index	18-3
Wheel Alignment	18-4
Front Suspension	18-8
Rear Suspension	18-23



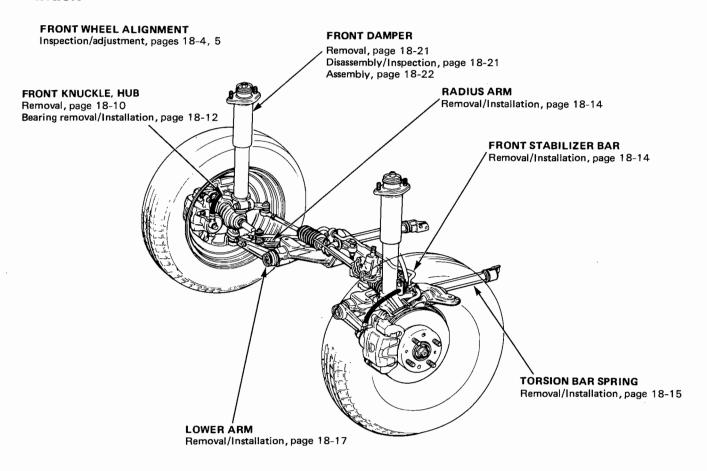
# **Special Tools**

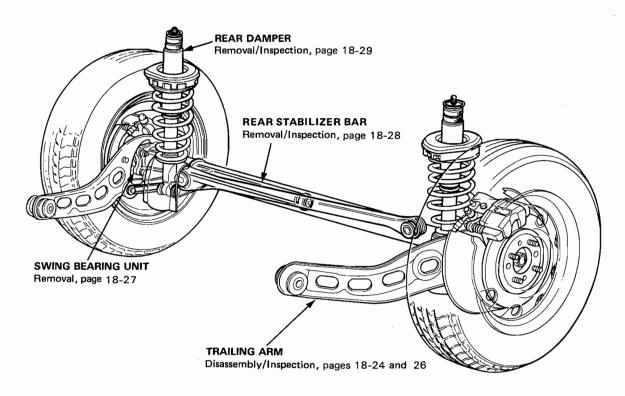
Ref. No.	Tool Number	Description	Q'ty		Page Refere	ence
	07045 51100104	Transmission Suprement Breaket	1	18-18		
①	07GAF-PH0010A	Transmission Support Bracket	1		10.10	
2	07GAF-SD40700	Hub Dis/Assembly Base	2	18-11,	18-12	
3	07HGK-0010100	Wheel Alignment Gauge Attachment	1	18-4		
4	07746-0010600	Attachment	1	18-12		
(5)	07746-0030100	Inner Handle, C	1	18-28		
6	07746-0030300	30 mm, Inner Driver	1	18-28		
	1	•	1	18-12		
<b>①</b>	07749-0010000	Driver	1	1		
8	07941-6920002	Ball Joint Remover	1	18-10		
9	07947-6340000	Driver	1	18-12		
(1)	07965-SA00600	Front Hub Dis/Assembly Tool, F	1	18-12		
<u>(i)</u>	07965-SB2000A	Lower Control Arm R & R Set	1			
			1	10 10		
<u>()</u> -1	07965-SB2010A	Remover Shaft	1	18-18		
<b>⊕-2</b>	07965-SB20200	Collets	2	18-18		
<b>⊕-3</b>	07965-SB2030A	Receiver	1	18-18		
<u>(1)</u> -4	07965-SB2040A	Assembly Pilot	1	18-19		
_	07965-SB2050A		i	18-18		
<u>(1)</u> -5		Bolt Assembly	1			
⊕-6	07965-SB2060A	Installer	1	18-19		
<u>(1</u> )-7	07965-SB2070A	Engine Mount Spacer	1	18-17		
<u> </u>	07965-SB2080A	Thrust Bearing	1	18-18		
⊕	07965-SB2090A	Nut	1	18-18		
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<b>(14)</b>	07965-6920101	Front Hub Dis/Assembly Tool, A	1	18-12		
<u>(</u> 5	07965-6920201	Front Hub Dis/Assembly Tool, B	1	18-12		
(B)	07965-6920500	Front Hub Dis/Assembly Tool, E	1	18-12		
(1)			1			
0	07974-SA50700	Ball Joint Boot Clip Installation Guide, A	1	18-13		
(8)	07974-SA50800	Ball Joint Boot Clip Installation Guide, B	1	18-13		
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# Suspension



#### Index -





### Wheel Alignment

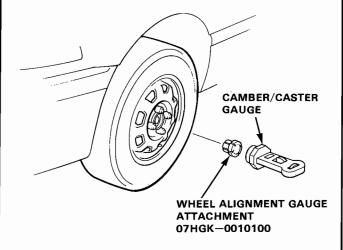
#### Camber Inspection

- 1. Check the tire pressure.
- Check the steering wheel angle. If significantly off center, it may be necessary to remove the steering wheel and reposition it on the splines. Turn the steering wheel to the straight-ahead position.
- Install the Wheel Alignment Gauge Attachments on the wheels.

NOTE: Make sure the whee hubs are clean and rust-free before installing the wheel alignment attachments.

 Read the camber on the gauge with the bubble at the center of the gauge.

Camber anble: Front:  $-0^{\circ}30' \pm 1^{\circ}$ Rear:  $-0^{\circ}45' \pm 30'$ 



If out specification, check for bent or damaged suspension components.

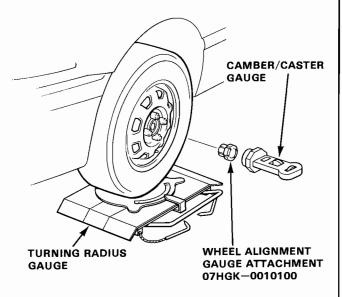
#### Caster Inspection

- 1. Check the tire pressure.
- Check the steering wheel angle. If significantly off center, it may be necessary to remove the steering wheel and reposition it on the splines. Turn the steering wheel to the straight-ahead position.
- 3. Install the Wheel Alignment Gauge Attachments on the wheels.

NOTE: Make sure the wheel hubs are clean and rustfree before installing the wheel aylignment attachments.

- Install a camber/caster gauge on the Wheel Alignment Gauge Attachment and apply the front brake. Turn the wheel 20° inward.
- Turn the adjust screw so that the bubble in the caster gauge is at 0°.
- Turn the wheel outward 20° and read the caster on the gauge with the bubble at the center of the gauge.

Caster Angle: 2°10′ ± 1°



If out of specification, check for bent or damaged suspension components.



### Front Toe Adjustment-

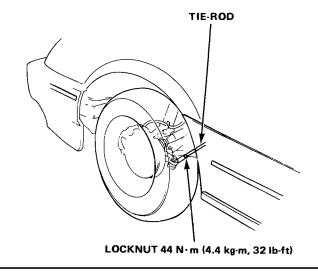
1. Center steering wheel spokes.

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.
- Loosen the tie-rod locknuts and turn both tie-rods in the same direction until the front wheels are in straight ahead position.
- 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**

Release parking brake.

NOTE: If the parking brake is engaged, you may get an incorrect reading.

Rear toe in:  $2 \pm 2 \, \text{mm} (0.079 \pm 0.079 \, \text{in})$ 

NOTE: Rear wheel toe is not adjustable. If out of specification, check suspension for damage and replace parts as necessary, then recheck alignment.

### **Spring Height**

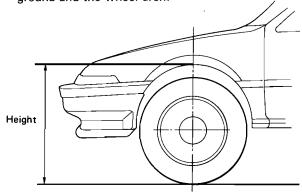
#### -Inspection -

#### 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.



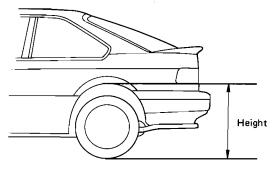
Standard: 653  $\pm$  15 mm (25.71  $\pm$  0.59 in)

2. Adjust the height if the reading is not within specifications. (Page 18-6)

#### Rear

 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.)



Rear spring height is not adjustable. If out of specification replace coil spring.

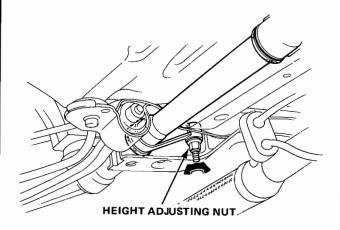
# **Spring Height**

### Torsion Bar Adjustment -

- 1. Raise the front wheels off the ground.
- Adjust the height by turning the height adjusting nut.

Height adjusting nut	Height
Tighten (Turned right)	Up
Loosen (Turned left)	Down

Height varies 5 mm (0.20 in) per turn of the adjusting nut.



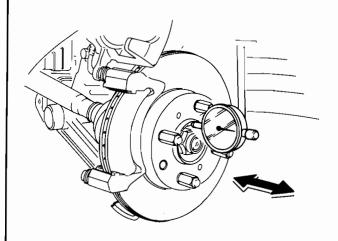
Lower the front wheels to the ground, push the car up and down and back and forth several times, then confirm that the spring height is within specifications.

### **Wheel Measurement**

### Bearing End Play -

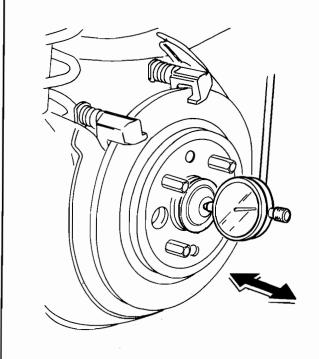
#### Front Wheel End Play

Standard: 0-0.05 mm (0-0.002 in.)



#### Rear Wheel End Play

Standard: 0-0.05 mm (0.002 in)



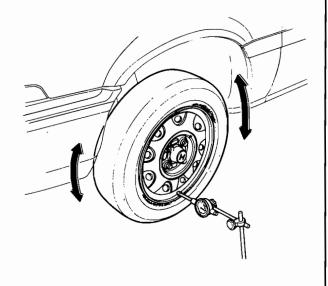


#### - Runout —

# Front and Rear Wheel Axial Runout

Standard: Steel - 0-1.0 mm (0.039 in.)

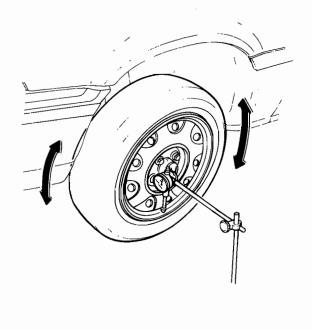
Aluminum-0-0.7 mm (0.028 in.)



# Front and Rear Wheel Radial Runout

Standard: Steel- 0-1.0 mm (0.039 in.)

Aluminum - 0 - 0.7 mm (0.028 in.)

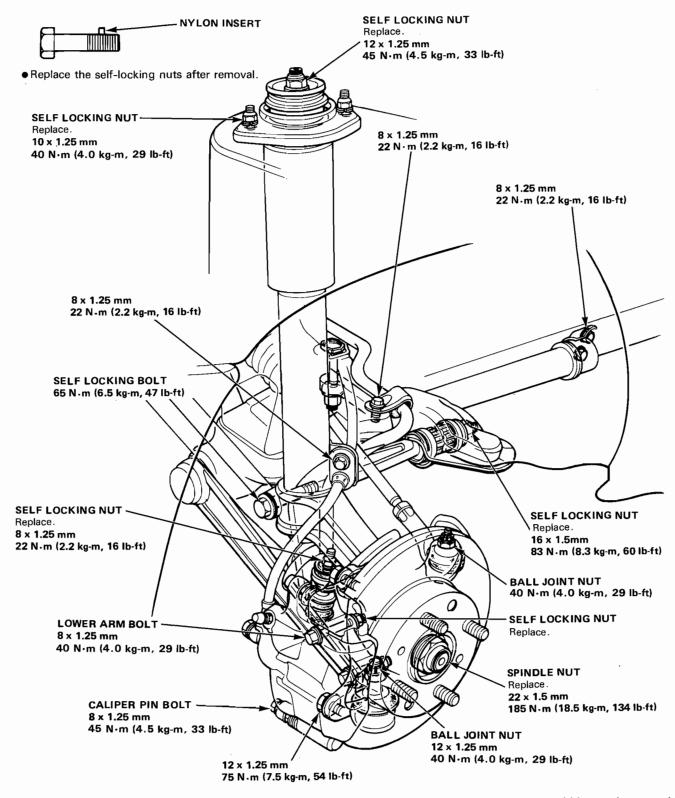


### **Front Suspension**

#### Index-

#### NOTE:

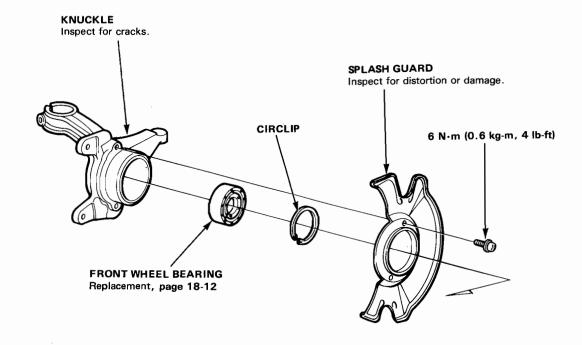
• Replace the self-locking bolts if you can easily thread a nut past their nylon locking inserts.

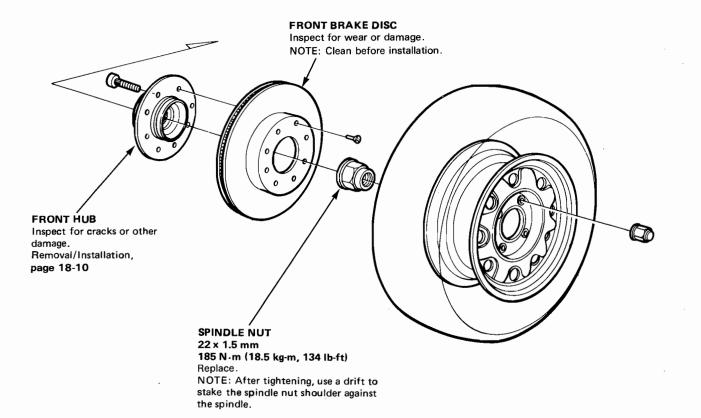


CAUTION: Before tightening the bolts or nuts connected to rubber mounts or bushings, the vehicle should be on the ground.

Index-







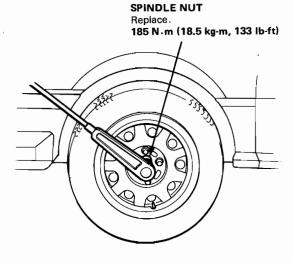
NOTE: Remove the center cap by prying it out with a flat screwdriver. Avoid damage to the cap by not allowing it to fall during removal.

CAUTION: Use a rag at the point you are going to pry, because aluminum alloy wheels can be easily damaged.

### Knuckle/Hub

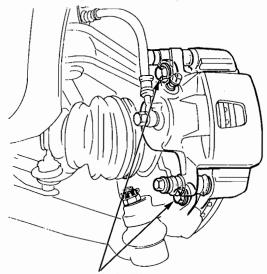
#### Replacement -

 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.
- Raise the front of car and support with safety stands in the proper locations.
- 4. Remove the lug nuts, wheel, and spindle nut.
- Remove the caliper mounting bolts and hang the caliper assembly to one side.

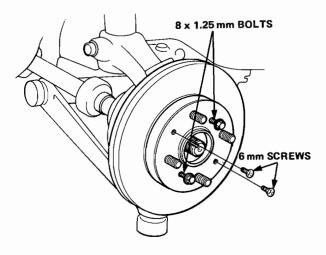
CAUTION: To prevent accidental damage to the caliper assembly or brake hose, use a short piece of wire to hang the caliper assembly from the undercarriage.



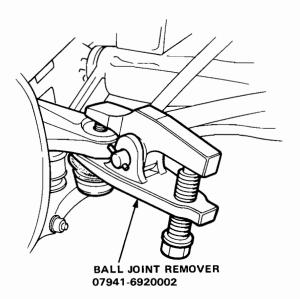
CALIPER MOUNTING BOLTS 75 N·m (7.5 kg-m, 54 lb-ft)

- 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.



- 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.

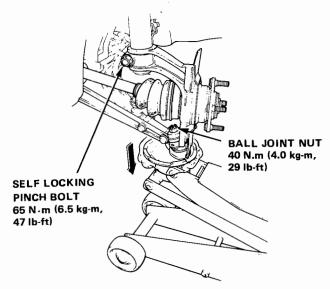




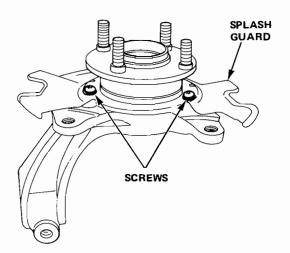
 Use a floor jack to support the lower control arm, then remove the ball joint cotter pin and nut.

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.

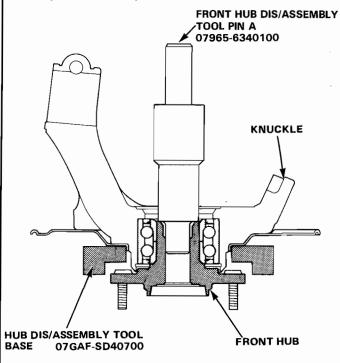
 Pry the ball joint out of the steering knuckle. If necessary use the ball joint remover.



- 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.
- Remove the two screws holding the splash guard on the steering knuckle.



Remove the hub from the knuckle with a hydraulic press and the special tools shown below.



#### **CAUTION:**

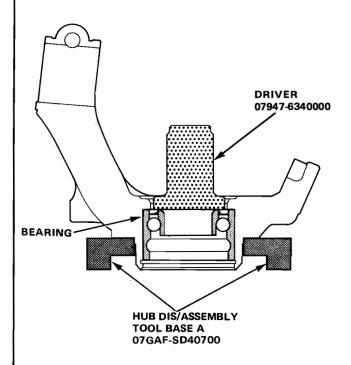
- Make sure the knuckle is securely mounted on the base.
- Take care not to distort the splash guard.
- Support the hub by hand to prevent it from falling.

### Knuckle/Hub

#### Bearing Removal

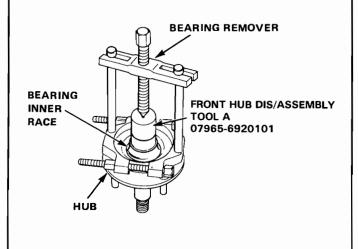
NOTE: Replace the bearing with a new one afrer removal.

- 1. Remove the circlip.
- Remove the bearing from the steering knuckle with the hydraulic press and special tools shown below.



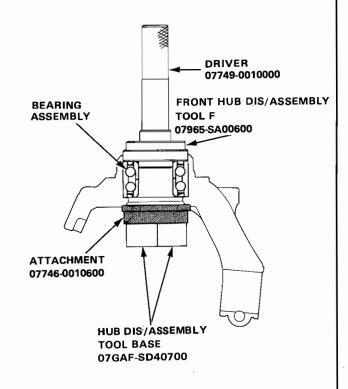
3. Remove the outboard bearing inner race from the hub with the special tool and a bearing remover.

NOTE: Wash the knuckle and hub thoroughly before reassembly.



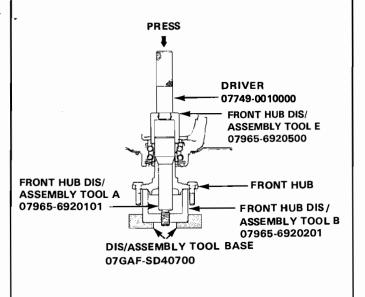
### Knuckle/Hub Reassembly -

 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.
- Press the front hub into the knuckle with a hydraulic press and the special tools shown below.

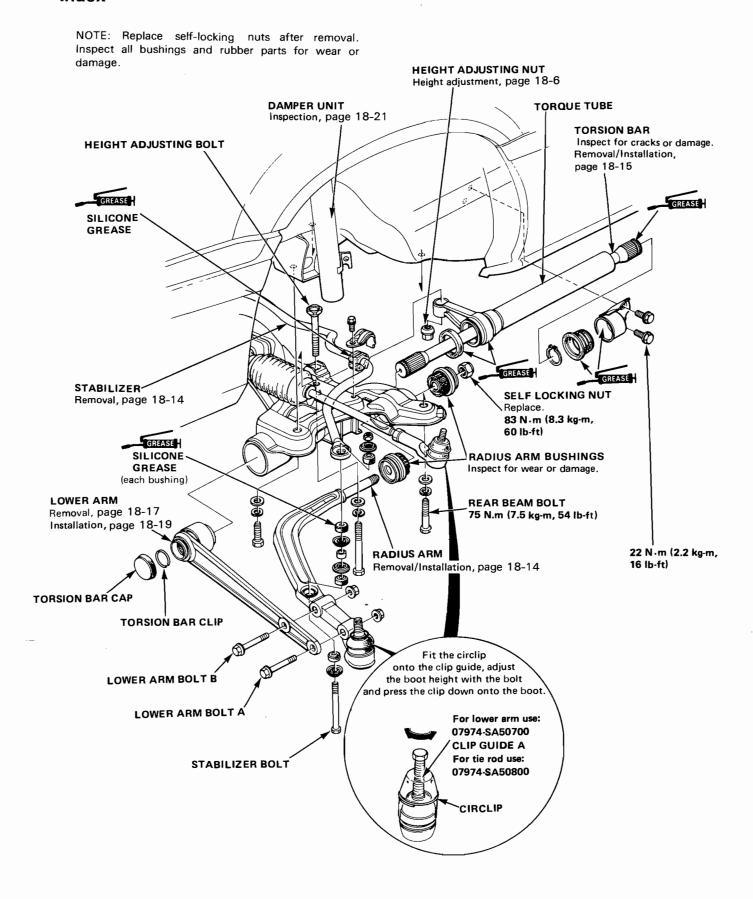
CAUTION: Maximum press load: 2.0 tons



### Lower Arm/Radius Arm/Stabilizer/Torsion Bar



#### Index-



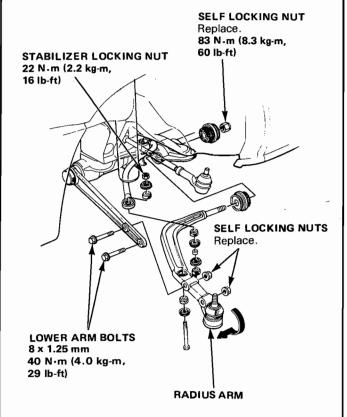
#### Radius Arm

#### Removal/Installation -

- Raise the front of the car off the ground and support it with safety stands (see section 1 for the proper location of the safety stands).
- 2. Remove the front wheels.
- Remove the radius arm ball joint from the knuckle (page 18-11).

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.
- 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

- Raise the front of the car off the ground and support it with safety stands (see section 1 for the proper location of the safety stands).
- 2. Remove the front wheels.
- Support the weight of the engine with a chain hoist or similar device.
- 4. Remove the steering gearbox. (section 17).
- 5. Separate the radius arm ball joint from the knuckle (page 18-11).

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:

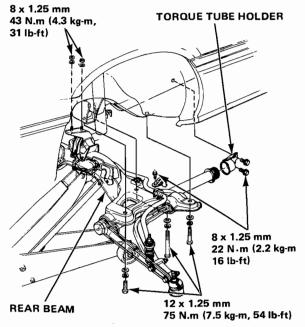
Disconnect the shift rod and extension from the transmission.

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.
- 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.



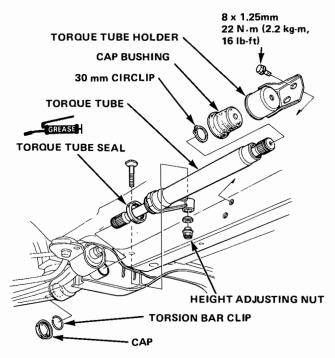
- Remove the stabilizer bracket and bolt, and then remove the stabilizer spring.
- 12. Remove the rear mounting bracket.

### **Torsion Bar Assembly**

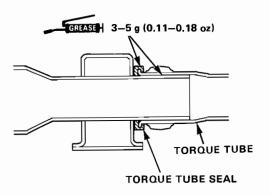
#### Removal/Installation -

- Jack up the front of the car and support it with safety stands (see section 1 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.
- 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.



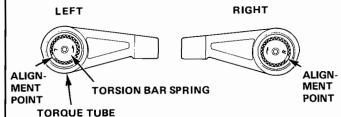
- Tap the torsion bar backward, out of the torque tube.
- 7. Remove the torque tube.
- 8. Inspect the torsion bar for cracks or damage.
- 9. Install a new torque tube seal onto the torque tube.
- Coat the torque tube seal and the torque tube sliding surface with grease, then install the torque tube on the rear beam.



11. Grease the splines at each end of the torsion bar.

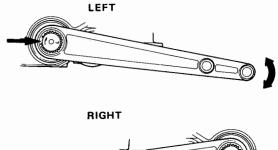


- 12. Insert the torsion bar into the torque tube from the
- 13. Align the projection or punch mark on the torque tube splines with the cutout or paint mark in the torsion bar splines and insert the torsion bar approximately 10 mm (0.394 in).



#### 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.





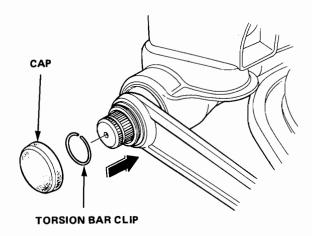
14. Align the projection in the lower arm splines with the cutout in the torsion bar splines and push the torsion bar in until the torsion bar clip can be installed.

(cont'd)

### **Torsion Bar Assembly**

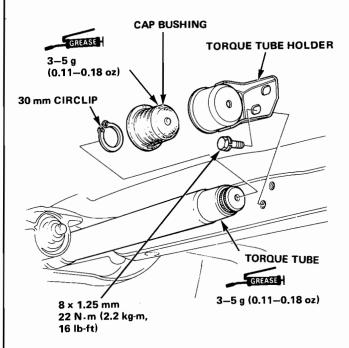
### -Removal/Installation (cont'd)-

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.



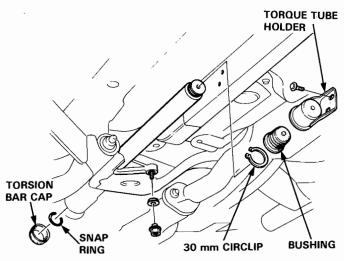
- Coat the cap bushing with grease and install it on the torque tube.
- 18. Install the torque tube holder.

- 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 18-6).

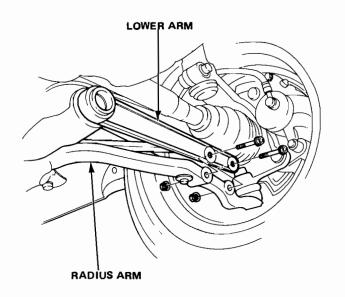
#### **Lower Arm**

#### Removal -

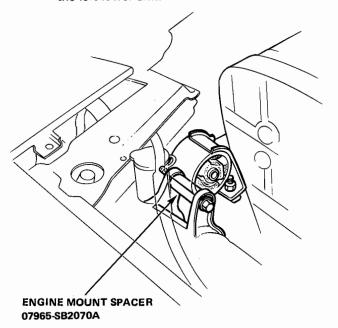
- Jack up the front of the car and support it with safety stands in the proper locations(see section 1.)
- Remove the front fender splash shields and engine under cover.
- Remove the height adjusting nut, torque tube holder, bushing, and 30 mm circlip.



- Remove the torsion bar cap, then tap the torsion bar forward to gain access to its snap ring. Remove the snap ring.
- Remove the torsion bar by tapping it backwards out of the torque tube.
- 6. Remove the torque tube.
- 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.
- 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 adjuster 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.

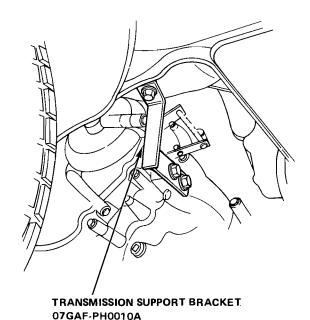


• If you're replacing the right side and the car has a manual transmission, the engine can stay in place. But if the car has an automatic transmission, you'll need to install the transmission support bracket. In that case, remove the battery and its tray. Raise the transmission slightly and remove the transmission mount. Install the transmission support bracket as shown on the next page.

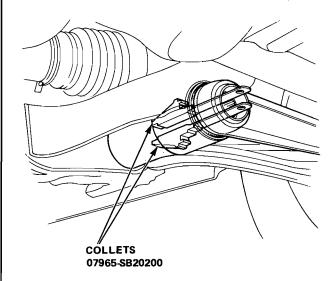
(cont'd)

#### **Lower Arm**

#### -Removal (cont'd)

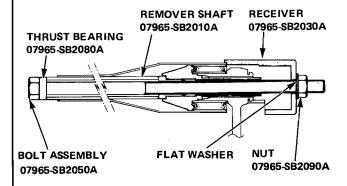


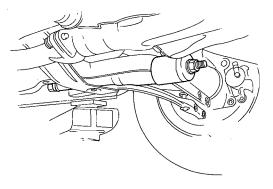
 Insert the collets into the lower arm so they are directly opposite each other (180° apart), then slide the remover shaft into the bushing from the rear.



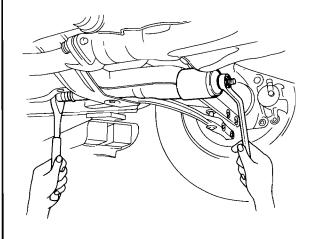
11. Slide the thrust bearing onto the remover shaft's bolt, then slide the bolt through the remover shaft.

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.

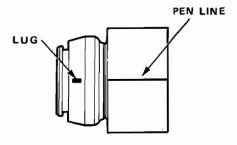


14. Remove the special tools from the beam.

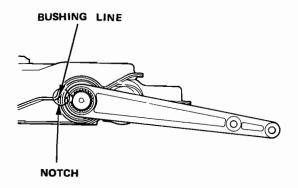


#### Installation -

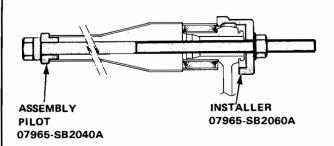
There is an alignment lug cast onto the lower arm.
 Use a felt tip pen to draw a line directly through the center of the lug and onto the bushing.

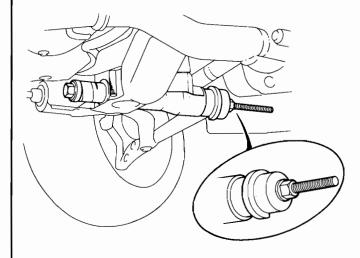


- 2. With the flat washer and thrust bearing still on the bolt, slide the assembly pilot onto it, then insert them into the back of the bushing hole in the beam.
- Slip the lower arm onto the bolt and align the bushing line (felt tip pen) with the notch on the beam's bushing mount.

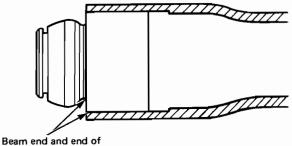


- 4. Fit the installer, flat washer and nut onto the bolt.
- 5. Hold the nut with a wrench as you turn the bolt clockwise; this will pull the new lower arm/bushing into place. When the edge of the bushing's steel outer sleeve is flush with the beam end, the bushing is installed to the correct depth.









bushing are flush.

(cont'd)

#### **Lower Arm**

#### -Installation (cont'd)-

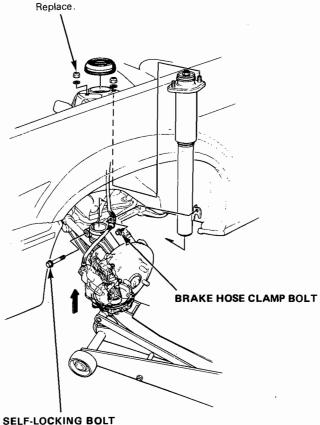
- 6. Remove the special tools from the beam end.
- Remove any special tools used to hold the engine or transmission elevated, and reinstall any parts that were removed.
  - On the left side, remove the engine mount spacer, then reinstall the engine mount bolt. Reinstall alternator adjuster bolt, adjust 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.
- 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 18-15.

### **Front Damper**

#### - Removal –

- Jack up the front of the car, support it with safety stands and remove the front wheels.
- 2. Remove the brake hose clamp bolt.
- 3. Use a floor jack to support the lower control arm.





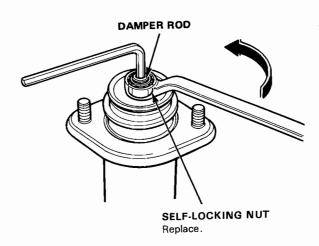
Remove the self-locking bolt, then lower the jack gradually and remove it from the knuckle.

CAUTION: Make sure the floor jack is positioned securely under the lower control arm at the ball joint. Otherwise, torsion bar tension on the control arm may cause the knuckle to "jump" suddenly away from the front shock absorber as the pinch bolt is being removed.

Remove the self-locking nut and then remove the damper from the frame by compressing the shock absorber spring.

#### Disassembly/Inspection

 Remove the self-locking nut while holding the damper rod.

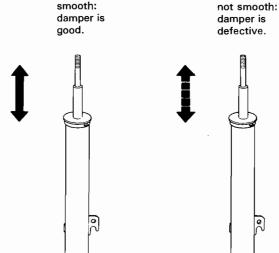


- 2. Disassemble the damper assembly.
- 3. Slowly move the damper piston rod a full stroke and check for smooth operation.
- 4. Move the piston rod back and forth 5 10cm (2–4 in.) to check for smooth operation.

Operation

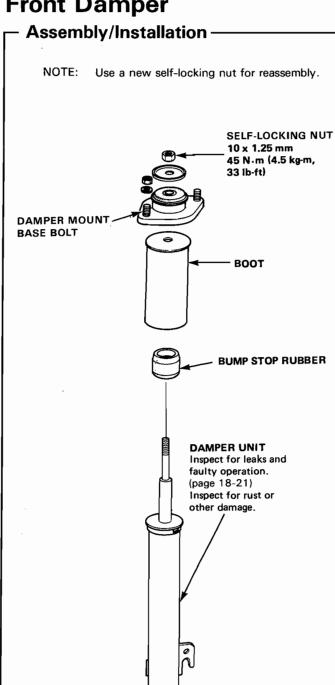
- 5. Inspect for oil leaks or cracks in the piston rod.
- 6. Listen for abnormal noises.

Operation

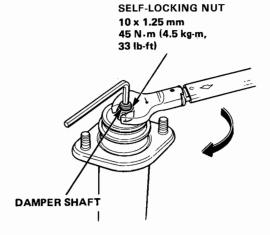


NOTE: The damper cannot be disassembled. If it does not operate smoothly, or if it makes any abnormal noises during operation, replace it.

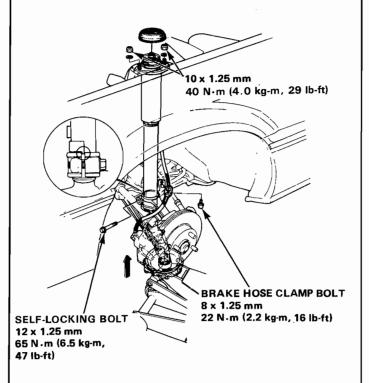
### **Front Damper**



1. Install the damper assembly.



- Install the self-locking nut and tighten it while 2. holding the damper shaft.
- 3. Compress the damper assembly and fit it into the
- 4. Extend the damper, align the projection on the damper with the slot in the steering knuckle, then fit the damper into the knuckle and tighten the self locking bolt.



Install and tighten the brake hose clamp bolt.

### **Rear Suspension**



#### Index (Disc Brake Equipped Model)

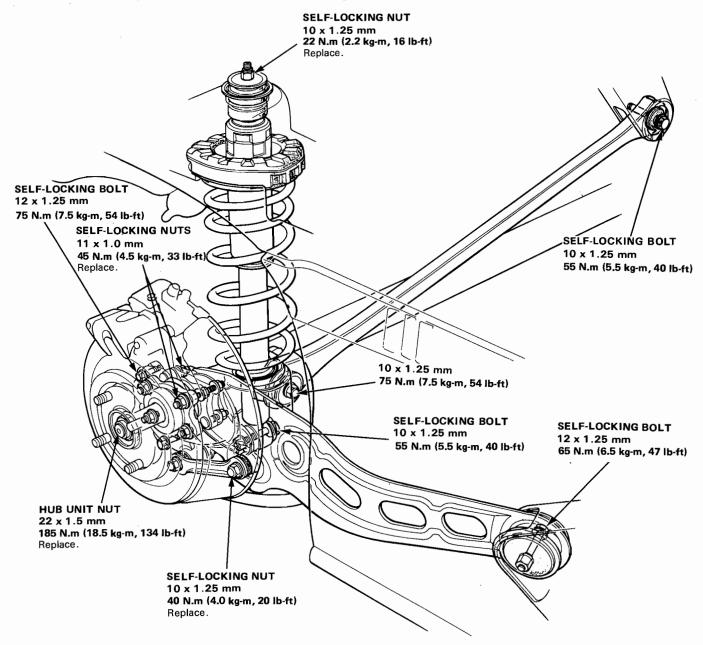
#### NOTE:

• Replace self-locking bolts if you can easily thread a nut past their nylon locking inserts.

#### SELF-LOCKING BOLT



- Replace all self-locking nuts at disassembly.
- Inspect all bushings and rubber parts for wear and damage.



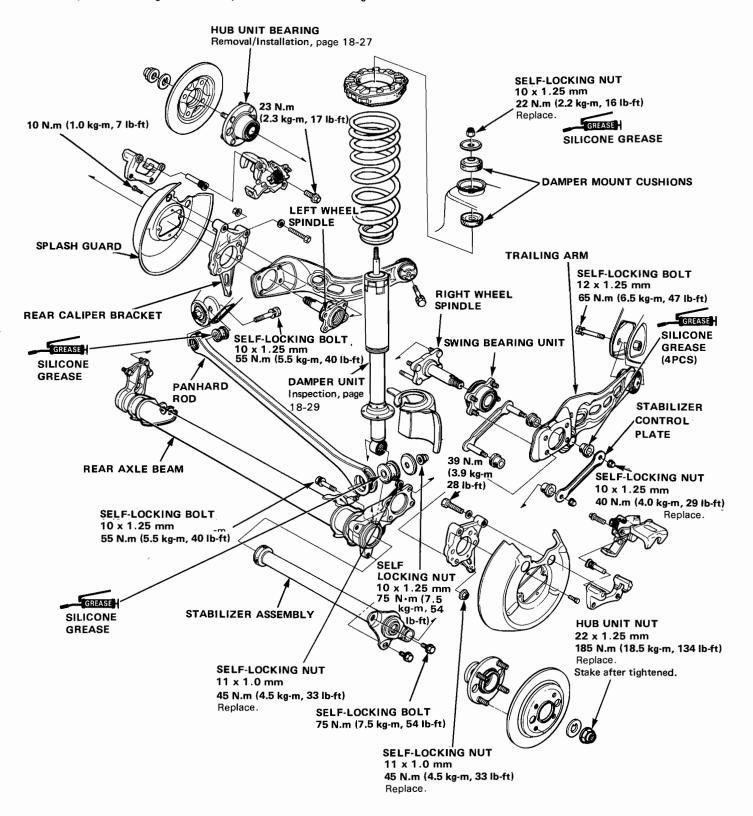
CAUTION:Before tightening the bolts and nuts connected to rubber mounts or bushings, the vehicle should be on the ground.

### **Rear Supension**

#### Disassembly/Inspection (Disc Brake Equipped Model) -

#### 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.

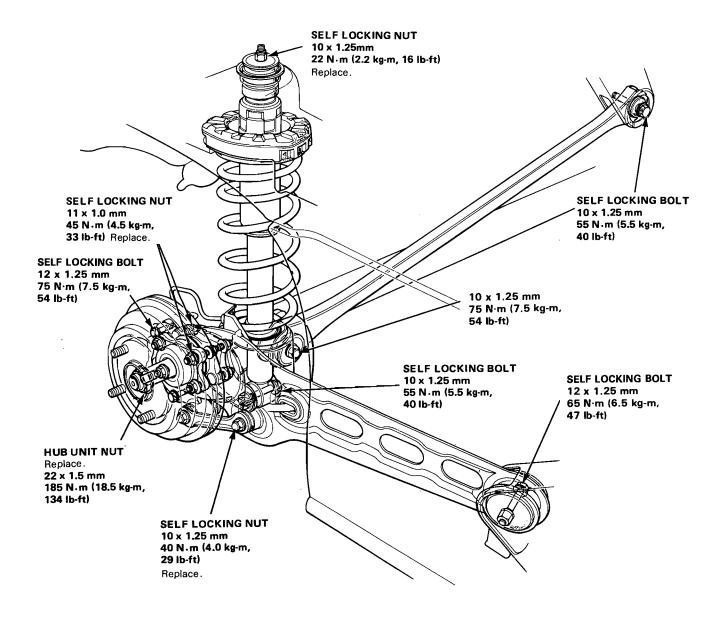




### Index (Drum Brake Equipped Model) -

#### 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.



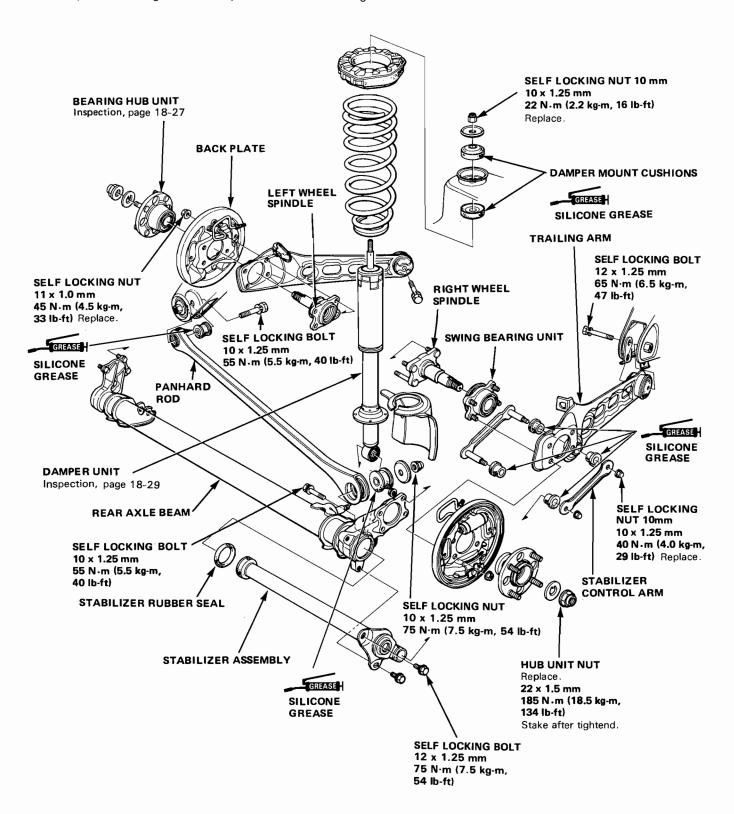
CAUTION: Before tightening the bolts and nuts connected to rubber mounts or bushings, the vehicle should be on the ground.

### **Rear Suspension**

### Disassembly/Inspection (Drum Brake Equipped Model) -

#### NOTE:

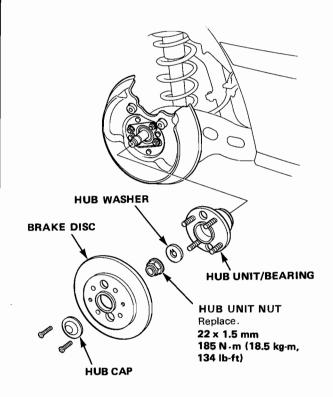
- Replace self-locking bolts if you can easily thread a nut past their nylon locking inserts.
- Replace all self-locking nuts at disassembly.
- Inspect all bushings and rubber parts for wear and damage.



### **Hub Unit**

#### Removal/Installation-

- 1. Raise the rear of the car and support it with safety stands (see section 1 for the proper locations for the safety stands).
- 2. Remove the rear wheels.
- Remove the brake caliper and inspect the wheel bearing end play (page 18-6).
- 4. Remove the brake disc.
- 5. Remove the hub cap and nut.



- 6. Remove the hub unit.
- 7. Installation is the reverse order of removal.

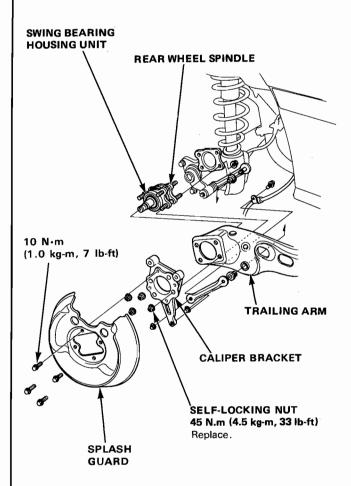
NOTE: Stake the shoulder of the hub unit nut against the groove in the spindle after tightening.

### **Swing Bearing**



#### Removal -

- 1. Remove splash guard.
- 2. Remove the caliper bracket.
- Remove the stabilizer control plate, then remove the trailing arm from the swing bearing housing unit.

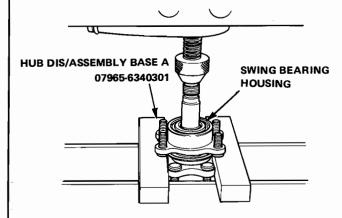


4. Remove the rear wheel spindle from the axle beam.

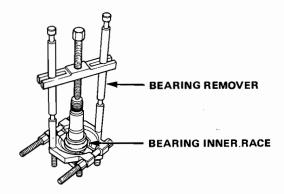
### **Swing Bearing**

#### Replacement -

5. Separate the rear wheel spindle from the swing bearing housing with a hydraulic press.

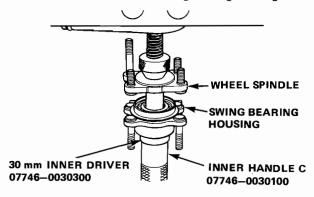


6. Remove the inner race with a bearing remover.



- 7. Install a new swing bearing when reassembling.
- 8. 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.

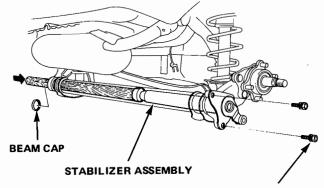


NOTE: On the car with the drum brake, use the Hub Dis/Assembly Base (No. 07GAF-SD40700) instead of 30mm Inner Driver and Inner Handle C.

### Stabilizer Assembly

#### - Removal/Installation

- Raise the rear of the car and support with safety stands (see section 1 for the proper locations for the safety stands).
- 2. Remove the rear wheels.
- Remove both right and left caliper brackets (page 18-24).
- 4. Remove the stabilizer control arm (page 18-24).
- 5. Remove the stabilizer assembly mounting bolt.



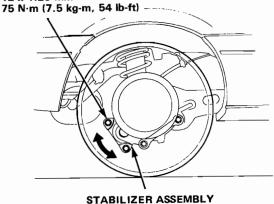
SELF-LOCKING BOLT 12 x 1.25 mm 75 N·m (7.5 kg-m, 54 lb-ft)

- 6. Remove the right beam cap.
- 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.

SELF-LOCKING BOLT

12 x 1.25 mm



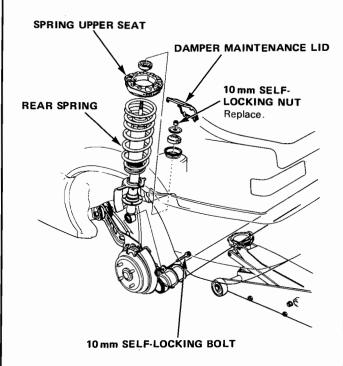
9. Tighten all bushings and rubber dampened parts after the car is back on the ground.

### **Rear Damper Assembly**

# \*

#### Removal -

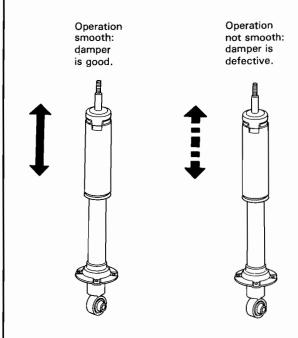
- Raise the rear of the car and support it with safety stands (see section 1 for the proper locations for the safety stands).
- 2. Remove the rear wheels.
- 3. Place a jack under the rear axle beam.
- Remove the damper maintenance lid and the selflocking nut.



5. Lower the jack gradually and remove the self-locking bolt, rear spring, and spring seat.

#### Inspection -

- Slowly move the damper piston rod a full stroke and check for smooth operation.
- 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.

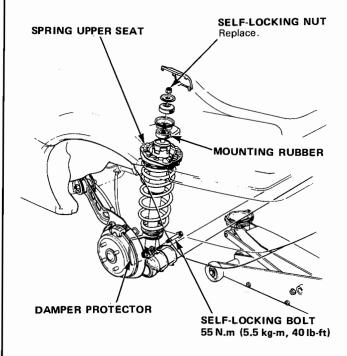


NOTE: The damper cannot be disassembled. If it does not operate smoothly, or if it makes any abnormal noises during operation, replace it.

# **Rear Damper Assembly**

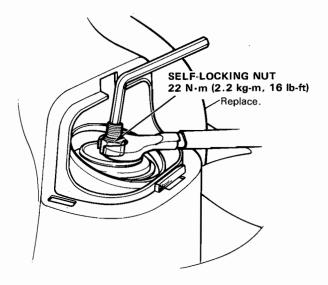
#### Installation -

- 1. Fit the upper spring seat into the frame.
- 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.
- Jack up the axle beam so that the damper shaft fits into the hole in the frame.

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.

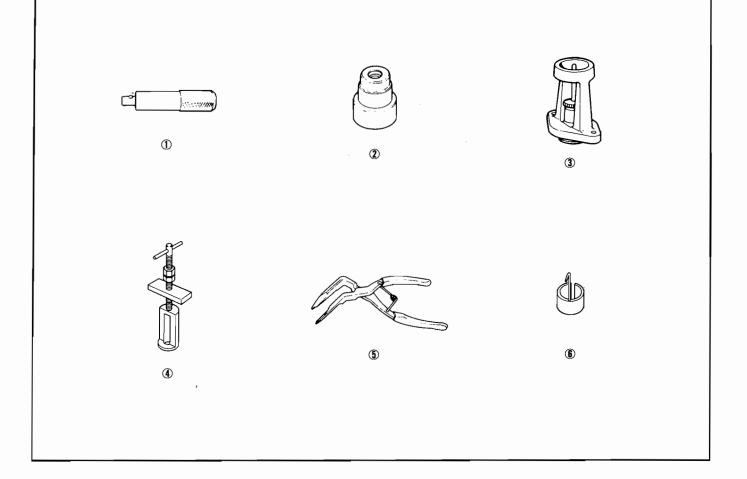
# **Brakes**

Special Tools	19-2
Illustrated Index	19-3
Front Brakes	19-5
Master Cylinder	19-12
Brake Booster	19-15
Rear Brakes	19-27
Brake Hoses/Pipes	19-37
Parking Brake	



# Special Tools

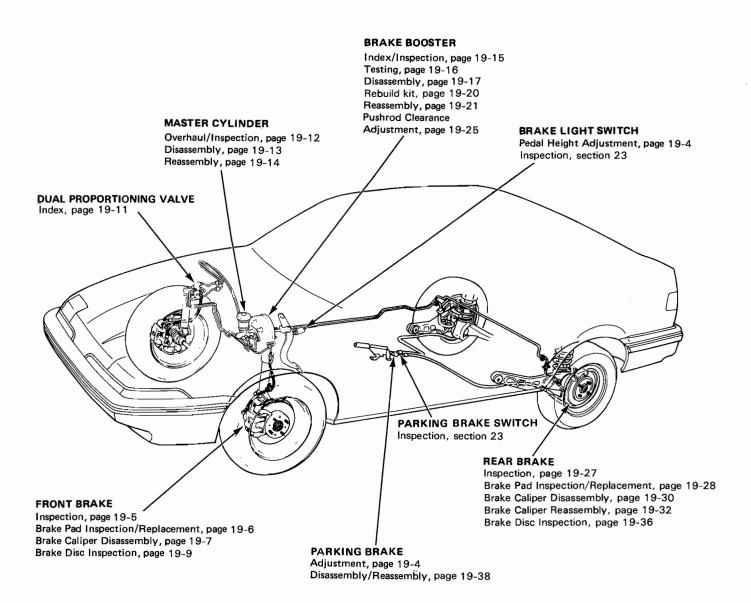
No.	Tool Number	Description	Q'ty	Page Reference
0	07749-0010000	Driver	1	19-22
2	07947-6890300	Driver Attachment, C	1	19-22
3	07JAG-SD40100	Pushrod Adjustment Gauge	1	19-25
4	07HAE-SG00100	Brake Spring Compressor	1	19-31, 34
(5)	07914-SA50001	Snap Ring Pliers	1	19-31, 34
6	07973-SA50000	Rear Caliper Guide	1	19-33, 34





#### BRAKE HOSE/LINE

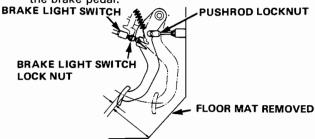
Inspection, page 19-37



### **Pedal Height**

#### - Adjustment -

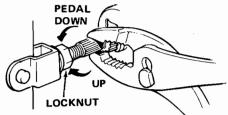
 Loosen the brake light switch locknut and back off the brake light switch until it is no longer touching the brake pedal.



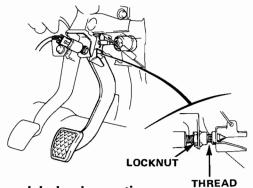
PEDAL PLAY: 1-5 mm (0.04-0.20 in)
PEDAL HEIGHT: 179 mm (7.05 in)

2. Loosen the pushrod locknut and screw the pushrod in or out with pliers until the pedal height from the floor is 179 mm (7.05 in.).

After adjustment, tighten the locknut firmly.



 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 (0.04-0.20 in.)

NOTE: Do not adjust the pedal height with the pushrod pushed.

CAUTION: Check that the brake lights go off when the pedal is released.

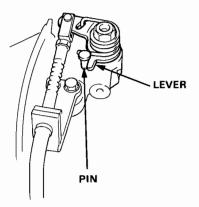
### **Parking Brake**

#### Adjustment -

NOTE: After rear caliper servicing, depress the brake pedal several times to set the selfadjusting brakes before adjusting brake cable.

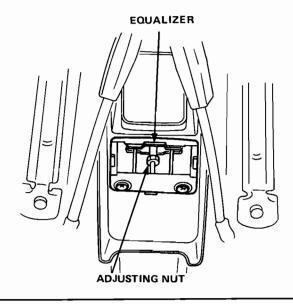
WARNING Block the front wheels before jacking up the rear of the car.

- 1. Raise the rear wheels off the ground.
- 2. Make sure that the rear caliper lever is in contact with the pin.



- Pull the parking brake lever up one notch.
- 4. Tighten the equalizer adjusting nut until the rear wheels drag slightly when turned.
- 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**

Inhaled asbestos fibers have been found to cause respiratory disease and cancer. Never use an air hose or dry brush to clean brake or clutch assemblies. In the United States, use OSHA-approved vacuum cleaner or alternate method approved by OSHA designed to minimize the hazard caused by airborne asbestos fibers.

#### NOTE:

• Coat piston, piston seal and caliper bore with

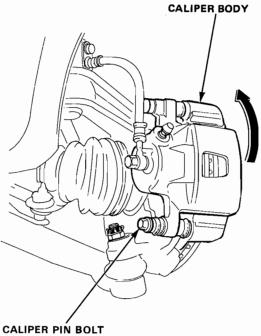
GREASE

clean brake fluid. 12 mm BOLT • Replace all rubber parts with new ones when-78 N·m ever disassembled. (7.8 kg-m, 53 lb-ft) **CALIPER BRACKET CALIPER PIN** Check for cracks. INNER PAD SHIM B 45 N·m (4.5 kg-m, 33 lb-ft) Apply Molykote M77 compound to both sides of shim. **INNER PAD SHIM A PAD RETAINER -**Apply Molykote M77 compound to **BRAKE PADS** both sides of shim. Check lining thickness. Apply Molykote M77 compound to the back of the pads. PIN BOOT Check for deterioration or damage. PAD RETAINER Check for weakness or damage. **BLEED SCREW** 9 N·m **OUTER PAD SHIM** (0.9 kg-m, 7 lb-ft) **CALIPER BODY** Apply Molykote M77 Check for scoring compound to both sides on cylinder wall. of shim. **PISTON** Check for scoring on surface. **CALIPER BOLT** 45 N·m (4.5 kg-m, 33 lb-ft) SLEEVÉ BOOT B **PISTON BOOT** Check for deterioration Replace. or damage. Check for damage. GREASE GREASE. PIŜTON SEAL SLEEVE BOOT A Replace. Check for deterioration or damage.

### **Brake Pad**

### Inspection/Replacement -

- 1. Remove the front wheels and support the front of the car on safety stands.
- Remove caliper pin bolt and pivot caliper up out of the

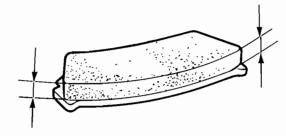


45 N·m (4.5 kg-m, 33 lb-ft)

- Remove the pad shim and pads.
- Using a vernier caliper, measure the thickness of each brake pad lining.

#### **Brake Pad Thickness**

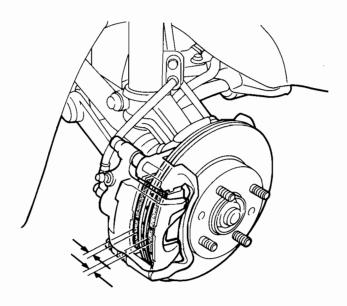
Standard: 9.5 mm (0.38 in.) Service Limit: 3.0 mm (0.12 in.)



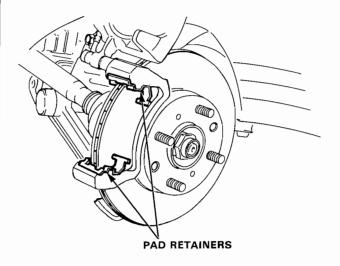
NOTE: Measurement does not include shoe thickness.

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 Molykote M77 compound.



- Clean the caliper thoroughly; remove any rust, and check for grooves or cracks.
- Install the pad retainers.

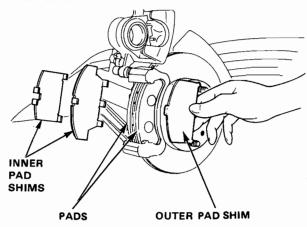


# **Brake Caliper**

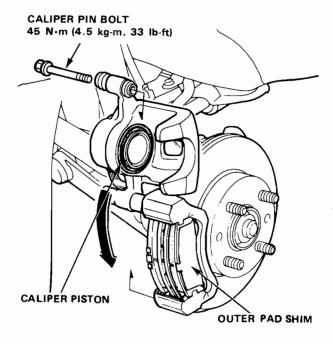
**(** 

- Apply Molykote M77 compound to both sides of the pad shims and back of the pads.
- Install the brake pads, inner pad shims A and B and outer pad shim.

NOTE: Install the inner pad with the pad wear indicator on the inside.



- Loosen the bleed screw and push in the piston so the caliper will fit over the pads. Tighten the bleed screw.
- 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).



12. Depress the brake pedal several times to make sure the brakes are working, then road test.

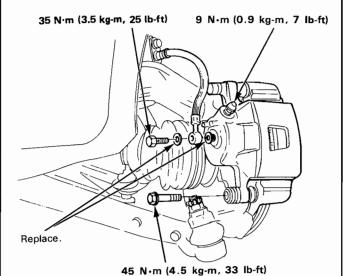
### Disassembly -

- 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.



(cont'd)

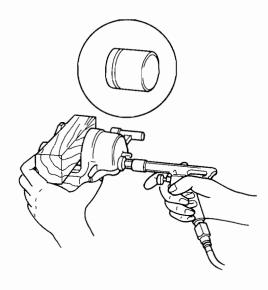
# **Brake Caliper**

### Disassembly (cont'd)-

 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.

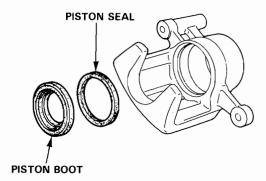
#### **W**WARNING

- Do not place your fingers in front of the piston.
- Do not use high air pressure.



4. Remove the piston boot and piston seal.

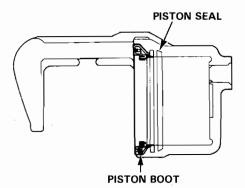
CAUTION: Take care not to damage the cylinder.



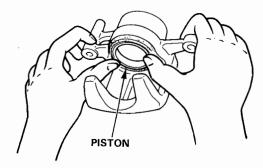
### - Reassembly-

#### **CAUTION:**

- Make sure all parts are clean before reassembly.
- Use only new replacement parts.
- Use only 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.
- Clean the piston and caliper bore with brake fluid and inspect for wear or damage.
- 2. Apply brake cylinder grease to a new piston seal, then install the piston seal in the cylinder groove.
- 3. Install the piston boot.



 Lubricate the caliper cylinder and piston with brake fluid, then install the piston in the cylinder with the dished end facing in .



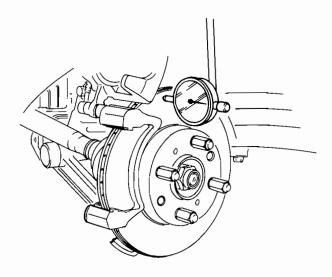
- 5. Reinstall the caliper in the reverse order of removal.
- Fill the brake reservoir and bleed the brake system (page 19-10).

### Front Brake Disc



#### - Run-Out -

- Remove the front wheels and support the front of the car with safety stands.
- Remove the 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 19-6).



- Inspect the disc surface for grooves, cracks, and rust. Clean the disc thoroughly and remove all rust.
- 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.

NOTE: Check the runout while turning the disc slowly by hand.

**Brake Disc Runout:** 

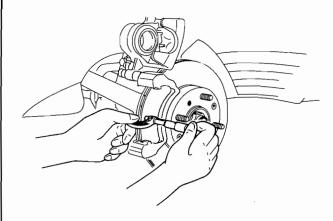
Service Limit: 0.10 mm (0.004 in.)

Max. Refinishing Limit:17 mm (0.67 in.)

If the disc is beyond the service limit, remove it and install a new one.

### - Thickness and Parallelism

- Remove the front wheels and support the front of the car with safety stands.
- 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, remove it and install a new one.

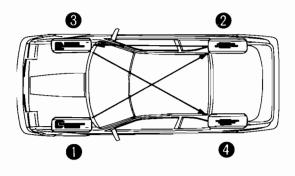
# **Bleeding**

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.

#### **CAUTION:**

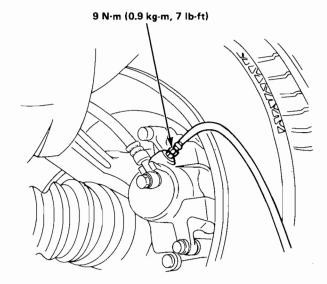
- Make sure no dirt or other foreign matter is allowed to contaminate the brake fluid.
- Avoid spilling brake fluid on painted surfaces as it can damage the finish. Wash spilled brake fluid off immediately with clean water.

#### **Bleeding Sequence**

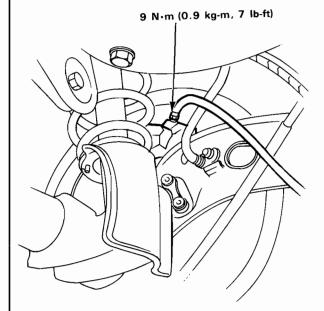


- Have someone slowly pump the brake pedal several times, then apply steady pressure.
- Loosen the brake bleed screw to allow air to escape from the system.

#### **FRONT**



REAR

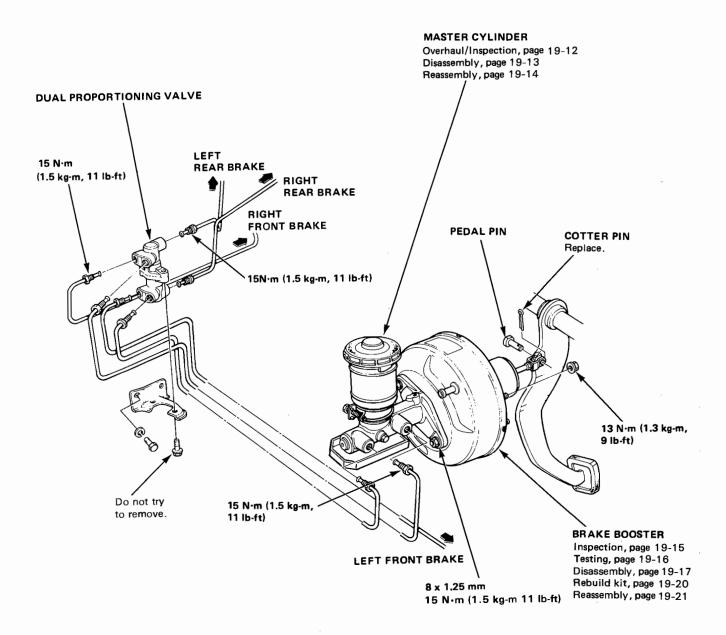


3. Repeat the procedure for each wheel in the sequence shown. When air bubbles no longer appear in the fluid, tighten the bleed screw securely.

# **Brake Booster, Master Cylinder, Proportioning Valve**



Index-



# **Master Cylinder**

### Overhaul/Inspection

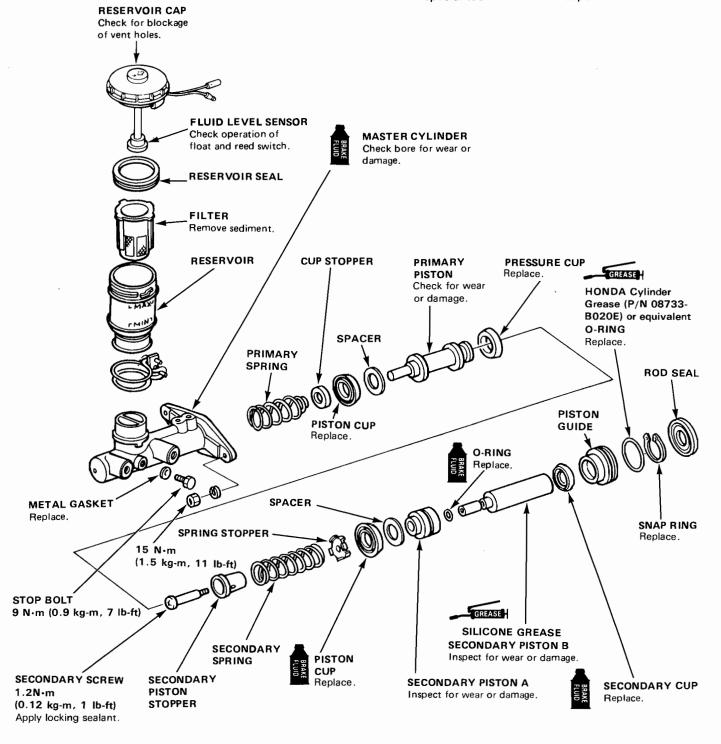
#### **CAUTION:**

- 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

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.

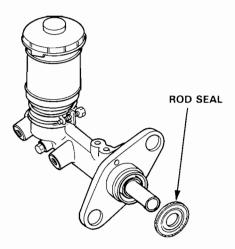




### Disassembly-

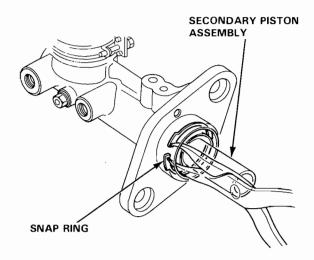
#### CAUTION:

- 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.

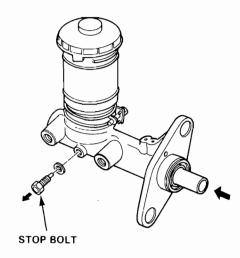


2. Push the secondary piston assembly, then remove the snap ring.

CAUTION: Avoid damaging the master cylinder wall.



Remove the stop bolt while pushing in the secondary piston assembly,

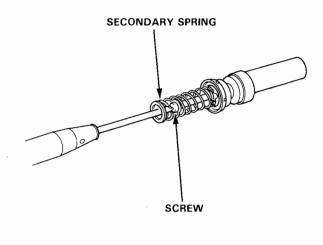


4. Remove the piston guide, secondary piston assembly and primary piston assembly.

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.
- Remove the screw from the secondary piston assembly, then remove the secondary spring.



6. Clean all parts with brake fluid.

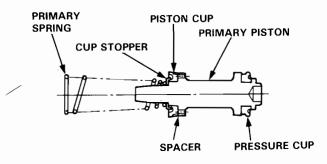
# **Master Cylinder**

### Reassembly-

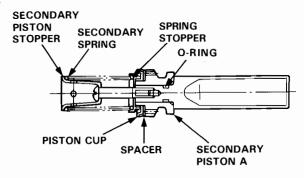
#### **CAUTION:**

- 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.
- Lubricate new piston assemblies with brake fluid, then fit them together.

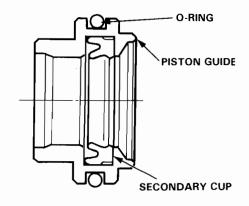
#### PRIMARY PISTON ASSEMBLY



#### SECONDARY PISTON ASSEMBLY



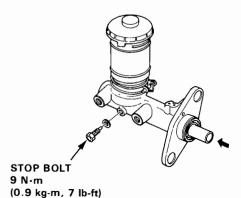
#### **PISTON GUIDE ASSEMBLY**



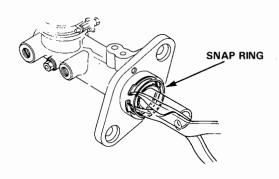
2. Install the piston assemblies in the master cylinder.

NOTE: To ease assembly, rotate the pistons while inserting.

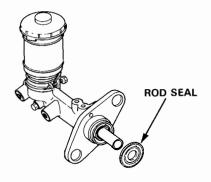
Install the stop bolt and new sealing washer while pushing in the secondary piston assembly, then tighten the stop bolt.



4. Install the snap ring after pushing in the secondary piston assembly.



5. Install a new rod seal.



### **Brake Booster**

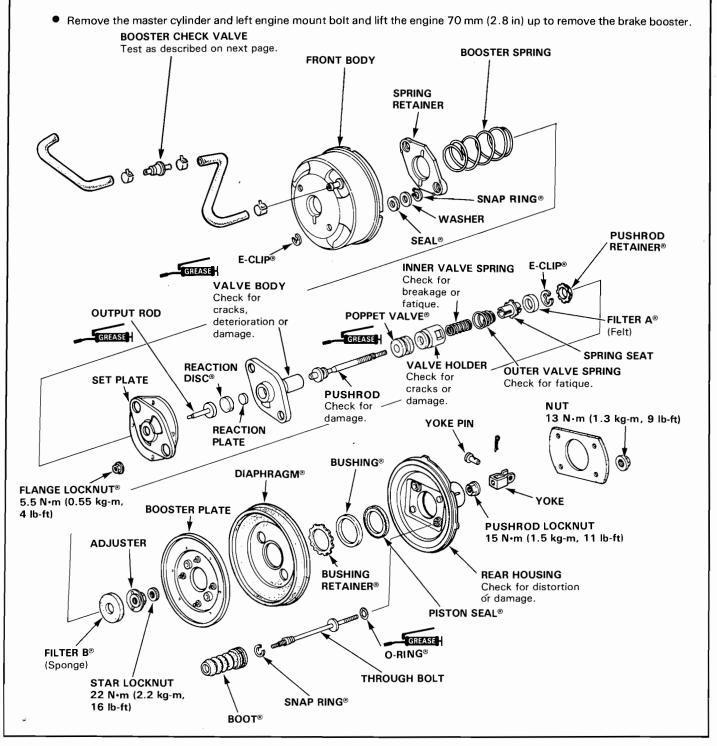


### - Index and Inspection

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 19-17).



### **Brake Booster**

#### -Tests-

#### **Functional Test**

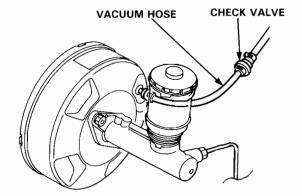
- 1 With the engine stopped, depress the brake pedal several times, then depress the pedal hard and hold that pressure for 15 seconds. If the pedal sinks, the master cylinder, brake line or a wheel cylinder is faulty.
- Start the engine with the pedal depressed. If the pedal sinks slightly, the vacuum booster is working. If the pedal height does not vary, the booster or check valve is faulty.

#### Leak Test

- 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.
- 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**

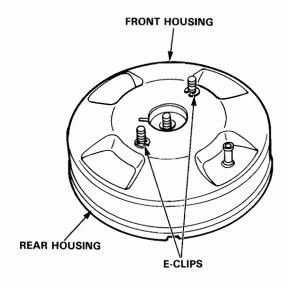
- Disconnect the brake booster vacuum hose at the booster.
- Start the engine and let it idle. There should be vacuum available. If no vacuum is available, the check valve is not working correctly. Replace the check valve and retest.



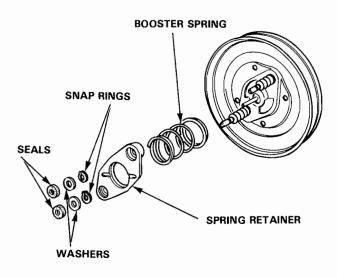


### Disassembly-

- 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.

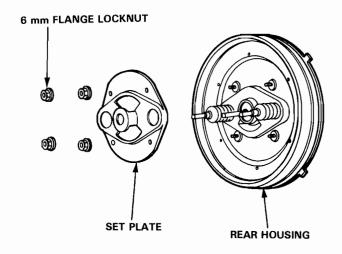


3. Remove the seals and washers from the spring retainer then remove the snap rings.

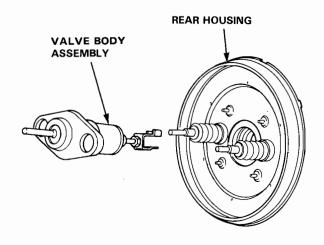


4. Remove the spring retainer and booster spring.

5. Remove the 6 mm flange locknuts and set plate.



6. Remove the valve body assembly from the rear housing.

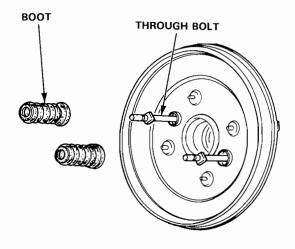


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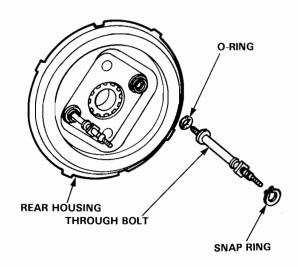
### **Brake Booster**

### -Disassembly (cont'd)-

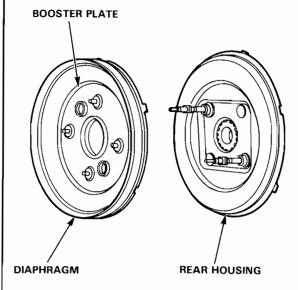
7. Remove the boots from the through bolts.



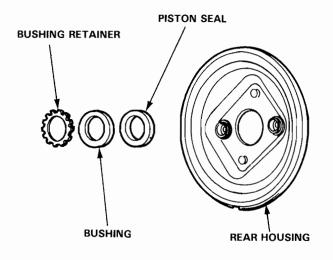
Remove the snap rings, then remove the through bolts and O-rings from the rear housing.



8. Remove the booster plate and diaphragm together from the rear housing.



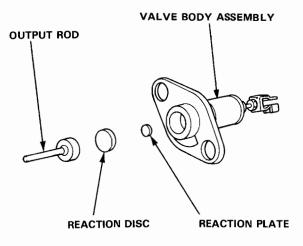
11. Remove the bushing retainer, bushing and piston seal from the rear housing.



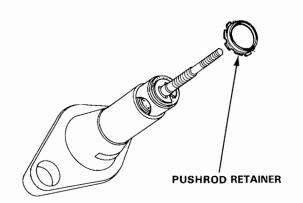
9. Remove the diaphragm from the booster plate.



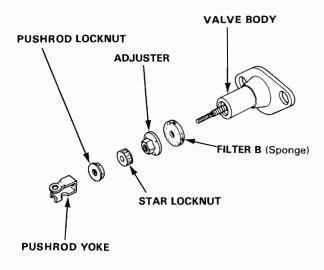
12. Remove the output rod, reaction disc and reaction plate from the valve body assembly.



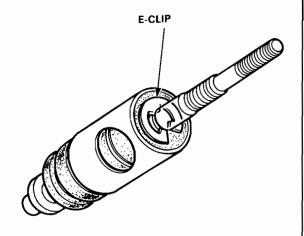
Remove the pushrod retainer, then remove the pushrod from the valve body assembly.



13. Remove the pushrod yoke, locknut, star locknut, adjuster and filter B from the valve body.

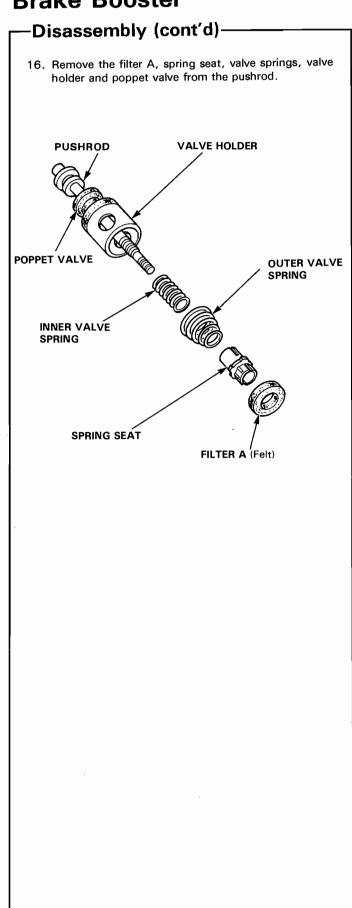


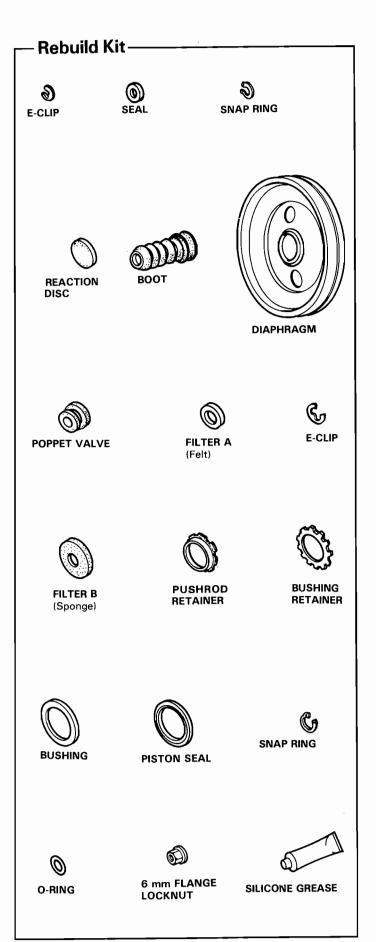
15. Remove the E-clip from the pushrod.



(cont'd)

### **Brake Booster**

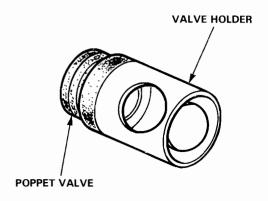




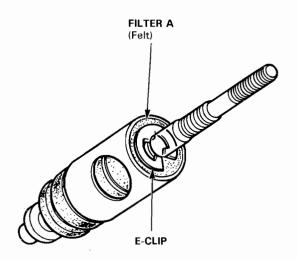


### - Reassembly -

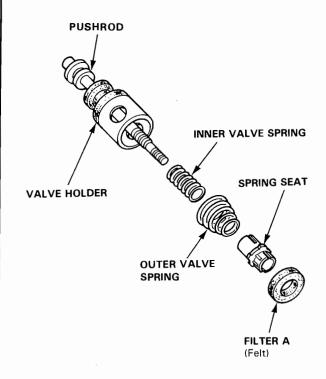
1. Install the poppet valve on the valve holder.



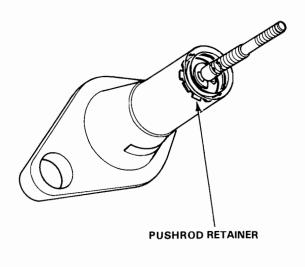
3. Install the filter A and E-clip on the pushrod.



2. Install the valve holder, inner valve spring, outer valve spring and spring seat on the pushrod.



4. Apply silicone grease to the inner and outer surfaces of the valve body tube. Press the pushrod assembly into the valve body tube, and install the pushrod retainer.

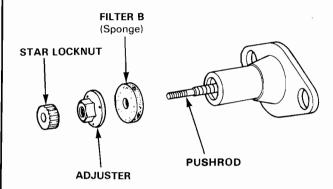


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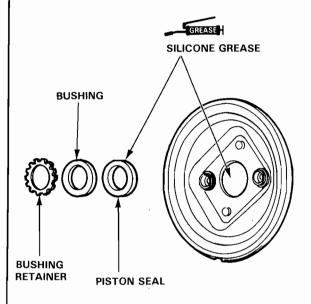
### **Brake Booster**

### -Reassembly (cont'd)-

Slip the filter B (sponge) over the end of the pushrod.
 Thread the adjuster and star locknut onto the pushrod but do not tighten.



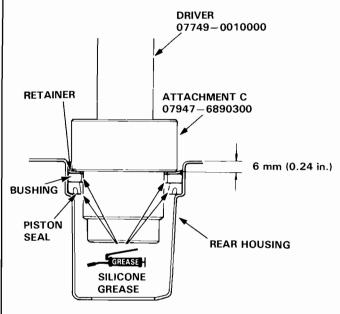
Apply silicone grease to the piston seal, then set the seal in position on the housing.



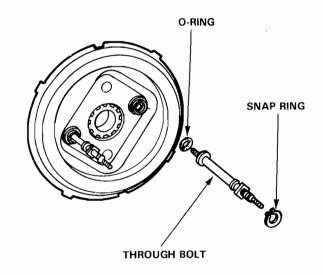
NOTE: Make sure the lip of the seal is facing in, as shown in drawing below.

 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.

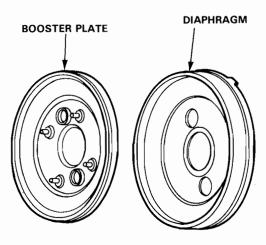


8. Install both through bolts, using the O-rings and snap rings.

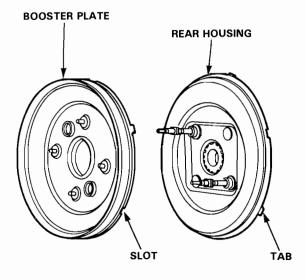




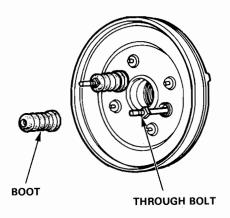
9. Install the diaphragm on the booster plate.



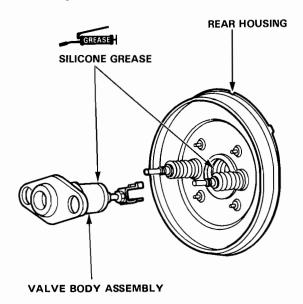
Attach the booster plate to the rear housing, aligning their tabs and slots.



11. Install the boots on the through bolts.



 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.

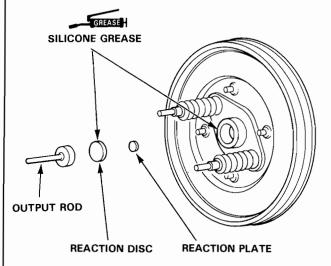


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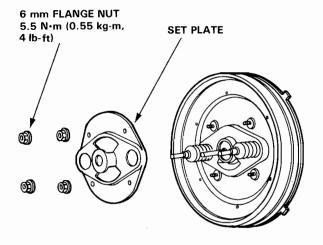
### **Brake Booster**

### -Reassembly (cont'd) -

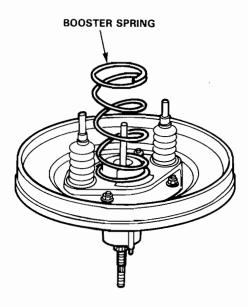
 Apply silicone grease to the bore of the valve body, then install the reaction plate, reaction disc and output rod.



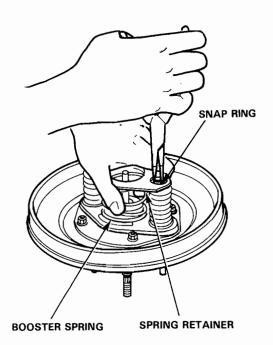
 14. Install the set plate, and tighten four 6 mm flange nuts.



15. Install the booster spring.

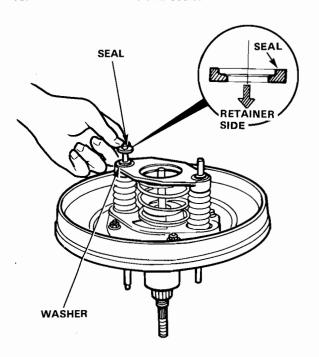


- 16. Install the spring retainer on the through bolts, aligning the square portions of the bolts and retainer.
- 17. Secure the spring retainer by compressing the booster spring, and installing the snap rings on the through bolts.

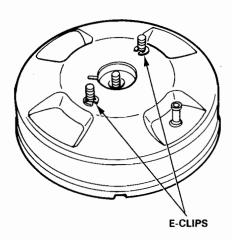




18. Install the washers and seals.



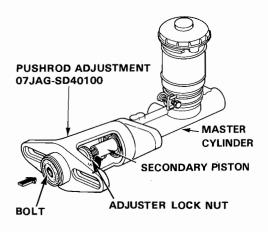
Assemble the front and rear housings.
 Press down on the front housing, then install the Eclips on the through bolts.



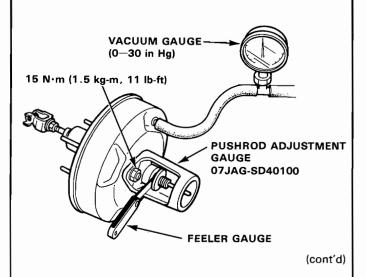
### **Pushrod Clearance Adjustment**

NOTE: Master cylinder pushrod-to-piston clearance must be checked and adjustments made, if necessary, before installing master cylinder.

 Using the Rod Bolt Adjustment Gauge, adjust bolt so the end of it contacts the end of master cylinder piston.



- Install the rod seal of the master cylinder between the brake booster and rod bolt adjustment gauge.
- 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.
- 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.



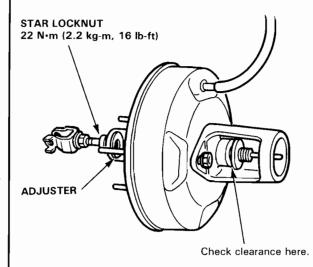
### **Brake Booster**

### -Pushrod Clearance Adjustment -(cont'd)

6. With a feeler gauge, measure the clearance between the gauge body and adjuster locknut as shown.

Clearance: 0-0.4 mm (0-0.016 in)

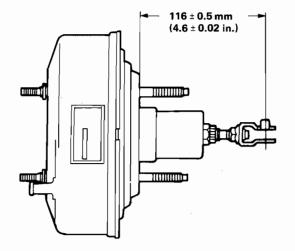
- If clearance is incorrect, loosen the star locknut and turn the adjuster in or out to adjust.
- 8. Tighten the star locknut securely.



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.



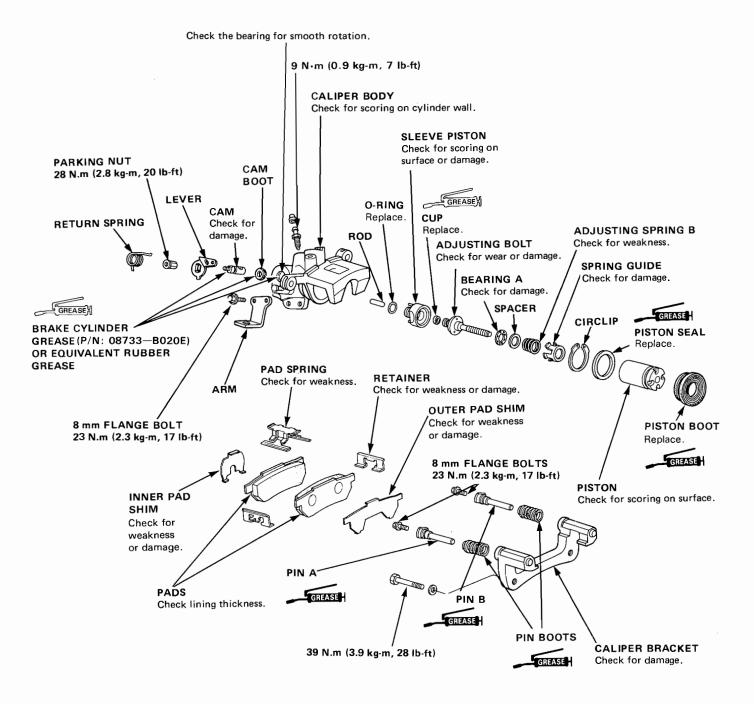
### Rear Disc Brake



Inspection -

GREASEN : BRAKE CYLINDER GREASE (P/N 08733-B020E) OR EQUIVALENT RUBBER GREASE

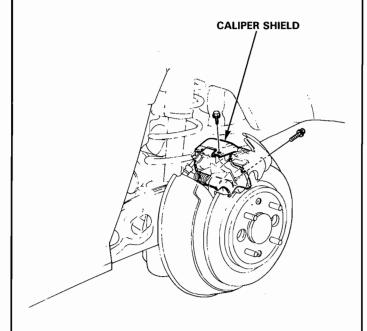
GREASEH : SILICONE GREASE



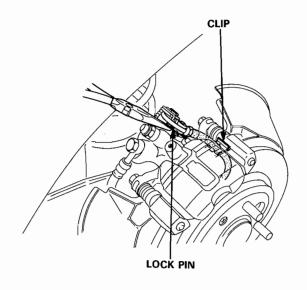
### **Brake Pad**

### Inspection/Replacement-

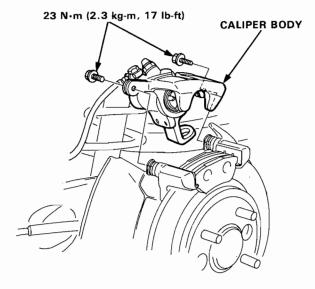
1. Remove the caliper shield.



2. Remove the parking brake cable from the caliper.



3. Remove the caliper mounting bolts, then remove the caliper.

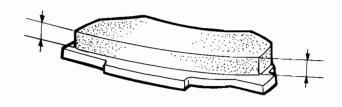


4. Remove the pads and, using a vernier caliper, measure the thickness of each brake pad lining.

NOTE: Measurement does not include shoe thickness.

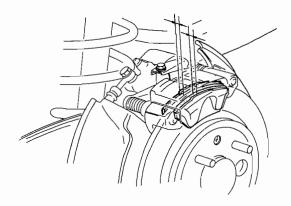
**Brake Pad Thickness:** 

Standard: 8.0 mm (0.315 in.) Service Limit: 1.6 mm (0.063 in.)

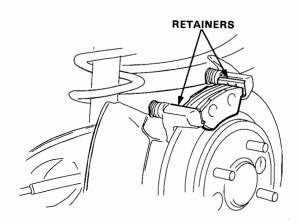




If lining thickness is less than the service limit, replace both pads as a set.



- 6. Remove the pads and pad guides.
- Inspect the disc surface for grooves, cracks and rust.
- 8. Clean the caliper thoroughly and remove all rust. Install the pad retainers.

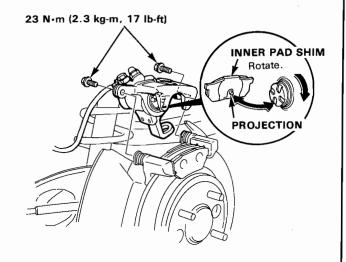


9. Install new brake pads.

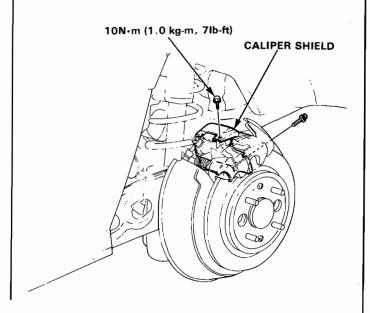
10. Rotate the caliper piston clockwise into place in the cylinder, then align the cutout in the piston with the projection on the inner pad by turning back the piston.

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:

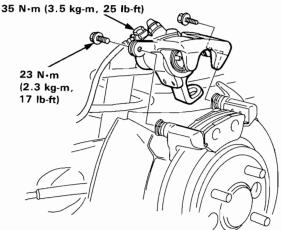
- Make sure all parts are clean before reassembly.
- Use only new replacement parts.
- Use only new clean brake fluid.
- Do not allow dirt or other foreign matter to contaminate the brake fluid.
- Do not mix different brands of brake fluid.
- Avoid spilling brake fluid on painted, plastic or rubber surfaces as it can damage the finish.
   Wash spilled brake fluid off immediately with clean water.
- Remove the caliper shield and disconnect the parking brake cable.
- Remove the banjo bolt and remove the brake hose from the caliper.

CAUTION: The sealing washers must be replaced whenever disassembled.

Remove the caliper mounting bolts, and remove the caliper from the caliper bracket.

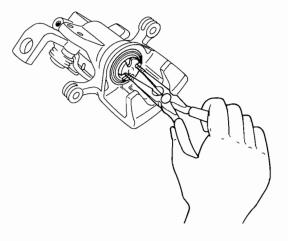
CAUTION: Thoroughly clean the outside of the caliper to prevent dust and dirt from entering.

BANJO BOLT

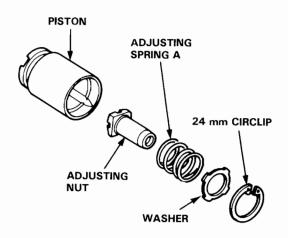


- 4. Remove the pad spring from the caliper.
- Remove the piston and piston boot while rotating the piston.

CAUTION: Avoid damaging the piston and piston boot.



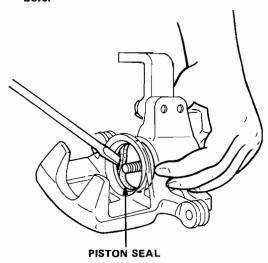
 Remove the circlip, then washer, adjusting spring A, and the adjusting nut from the piston.



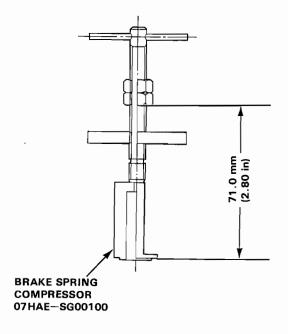


7. Remove the piston seal.

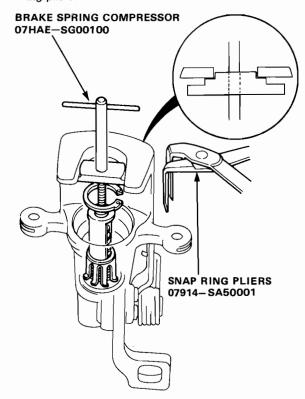
CAUTION: Take care not to damage the cylinder bore.



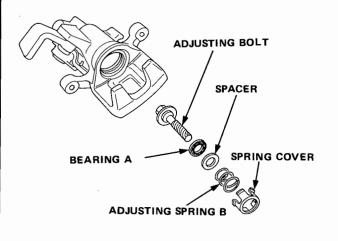
Adjust the brake spring compressor (special tool) as shown.



- Install the special tool between the caliper body and spring cover as shown.
- Compress the adjusting spring B by turning the shaft of the special tool, then remove the circlip with snap ring pliers.



 Remove the spring cover, adjusting spring B, spacer, bearing A and adjusting bolt.

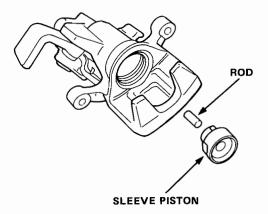


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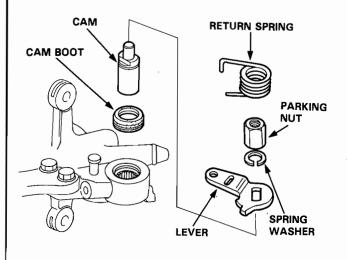
# **Brake Caliper**

### -Disassembly (cont'd)-

Remove the sleeve piston, and remove the rod from the cam.



 Remove the return spring, parking nut, spring washer, lever, cam and cam boot.

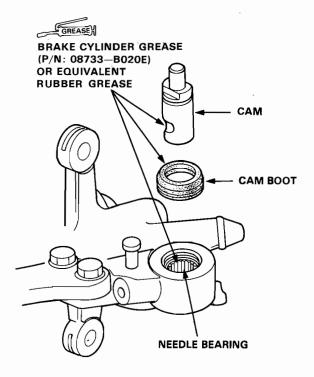


### Reassembly-

#### CAUTION:

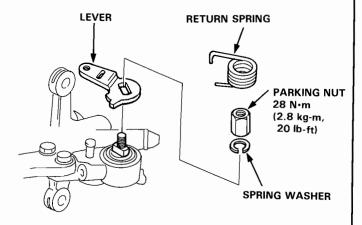
- Make sure all parts are clean before reassembly.
- Use only new replacement parts.
- Use only new clean brake fluid.
- Do not allow dirt or other foreign matter to contaminate the brake fluid.
- Do not mix different brands of brake fluid.
- Avoid spilling brake fluid on painted, plastic or rubber surfaces as it can damage the finish.
   Wash spilled brake fluid off immediately with clean water.
- Pack all cavities of the needle bearing with Brake Cylinder Grease (P/N: 08733—B020E), or equivalent rubber grease.
- Coat the new cam boot with Brake Cylinder Grease (P/ N: 08733—B020E), 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.

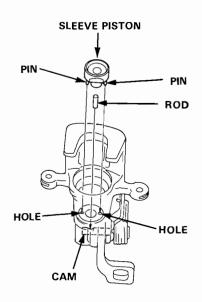




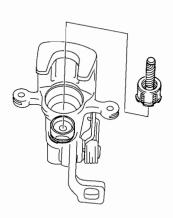
- 4. Install the lever, spring washer and parking nut, then tighten the parking nut.
- 5. Install the return spring.



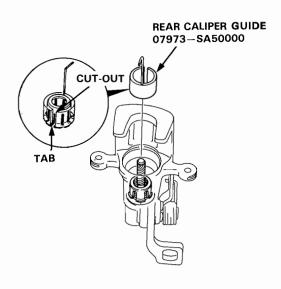
- 6. Install the rod in the cam.
- 7. Install the new O-ring on the sleeve piston.
- Install the sleeve piston so the hole in the bottom of the piston is aligned with the rod in the cam, and two pins on the piston are aligned with the holes in the caliper.



- 9. Install the new cup with its groove facing the bearing A side on the adjusting bolt.
- 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.

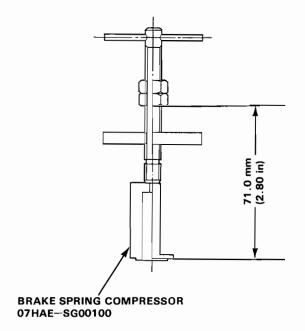


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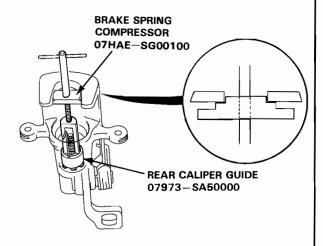
# **Brake Caliper**

### Reassembly (cont'd)-

Adjust the brake spring compressor (special tool) as shown.



13. Install the brake spring compressor as shown.

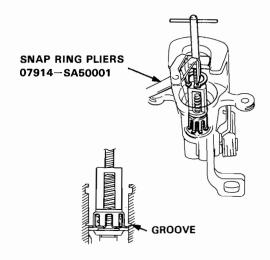


14. Compress the spring until its bottom out.

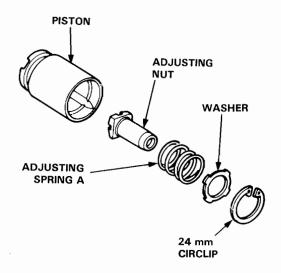
NOTE: Check that the rear caliper guide doesn't hang up while the spring is being compressed.

 Remove the rear caliper guide. Check that the flared end of the spring cover in below the circlip groove. Install the circlip, then remove the brake spring compressor.

NOTE: Check that the circlip is seated in the groove properly.

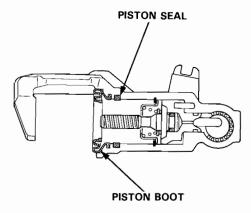


 Install the adjusting nut, adjusting spring A, and washer, and secure with the circlip.



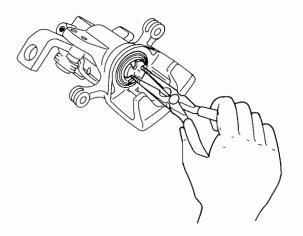


Coat the new piston seal and piston boot with silicone grease and install them in the caliper.



 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.



20. Install the brake pad retainers and brake pads.

- 21. Install the pad springs on the caliper.
- 22. Install the caliper on the caliper bracket and tighten the caliper mounting bolts.
- 23. Connect the brake hose to the caliper with new sealing washers and tighten the banjo bolt.
- 24. Fill the brake reservoir up and bleed the brake system (page 19-10).
- Connect the parking brake cable to the arm on the caliper.
- 26. Operate the brake pedal several times, then adjust the parking brake lever (page 19-4).

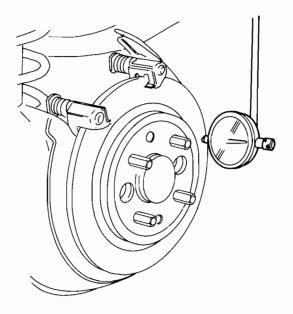
NOTE: Before adjustments, make sure the parking brake arm on the caliper touches the pin.

27. Install the caliper shield and tighten the bolts.

### **Rear Brake Disc**

#### - Run-Out-

- Block the front wheels, support the rear of the car on safety stands, then remove the rear wheels.
- Remove the caliper bolts, lift the caliper up out of the way, then remove the pads and pad guides



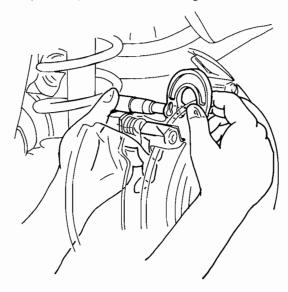
- Inspect the disc surface for grooves, cracks, and rust. Clean the disc thoroughly and remove all rust.
- 4. Use the lug nuts to hold the disc securely against the hub, then mount a dial indicator 10 mm (0.39 in.) in from the outer edge. Check the runout while turning the disc slowly by hand.

Brake Disc Runout: Service Limit: 0.15 mm (0.006 in.)

Replace the disc if beyond the service limit. Remove the caliper bracket and the old disc, then install a new one.

### **Thickness and Parallelism**

- Block the front wheels, support the rear of the car on safety stands, then remove the rear wheels.
- Move the caliper and pads out of the way as described in the preceding column.
- Using a micrometer, measure the disc thickness at eight points, approximately 45° apart and 10 mm (0.39 in.) 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.)

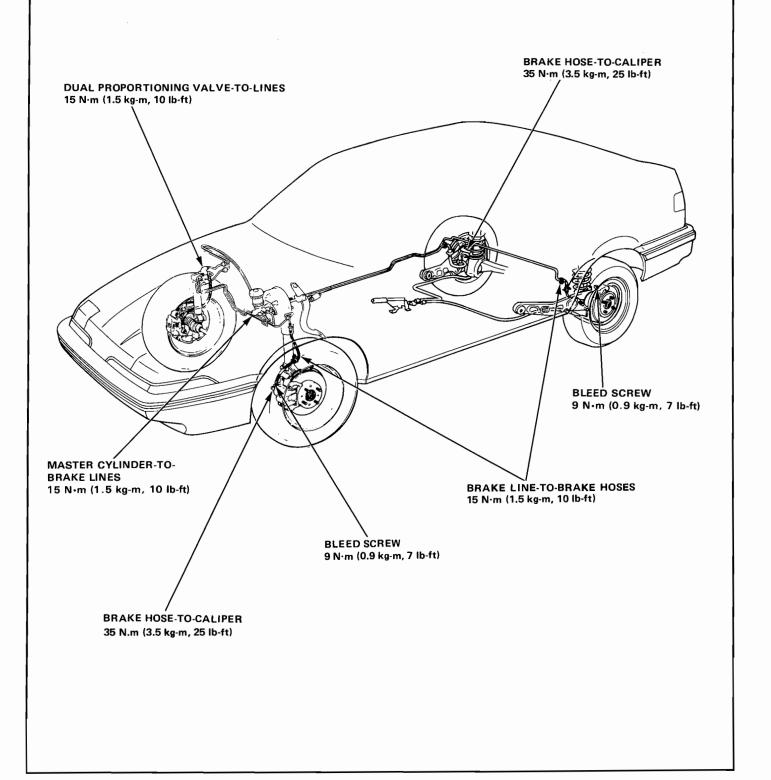
 Replace the disc if beyond the limits. Remove the caliper mount and the old disc, then install a new one.

# **Brake Hoses/Pipes**

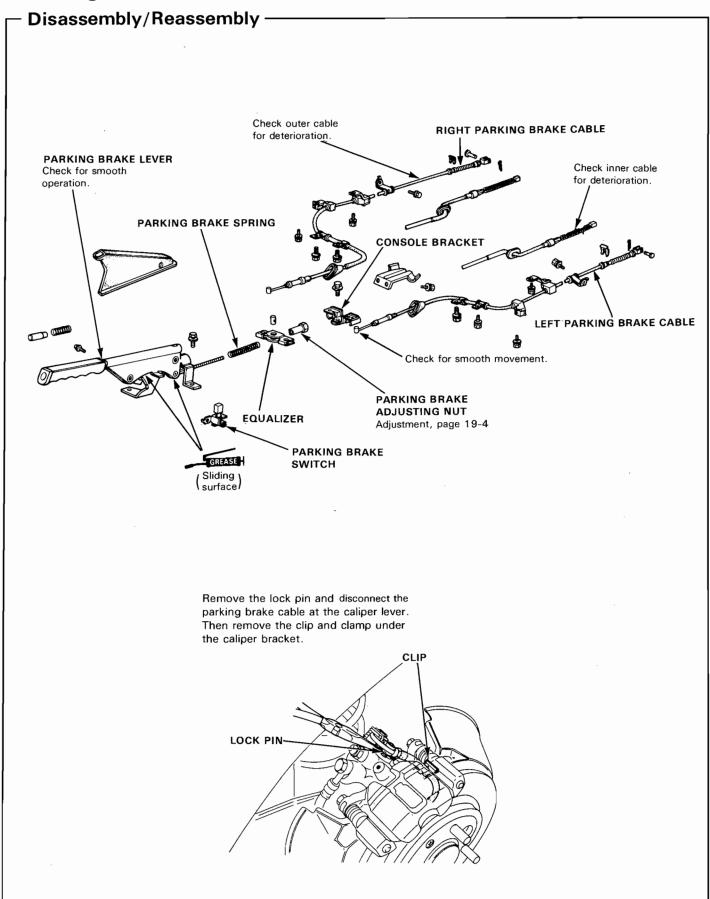


### Inspection -

- 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.



# **Parking Brake**



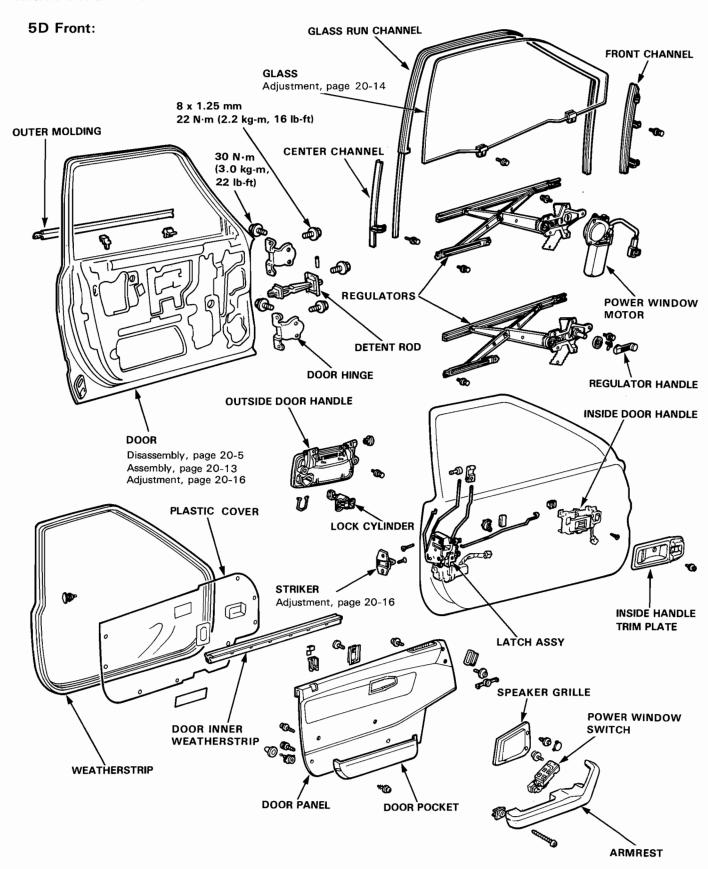
# Body

Bumpers	Seats
Front	Front Disassembly
Dashboard	Seat Belts
Components	Front Replacement
Doors	Side sill panel
Index20-2	Replacement20-64
Disassembly(Front)20-5 (Rear)20-10	Sunroof
Assembly	Index
Replacement/Adjustment20-60 Instrument Panel	
Door Mirror (Manual)20-18	Tailgate
Mirror Glass Replacement (Manual)	Replacement/Adjustment20-61 Opener and Latch Replacement

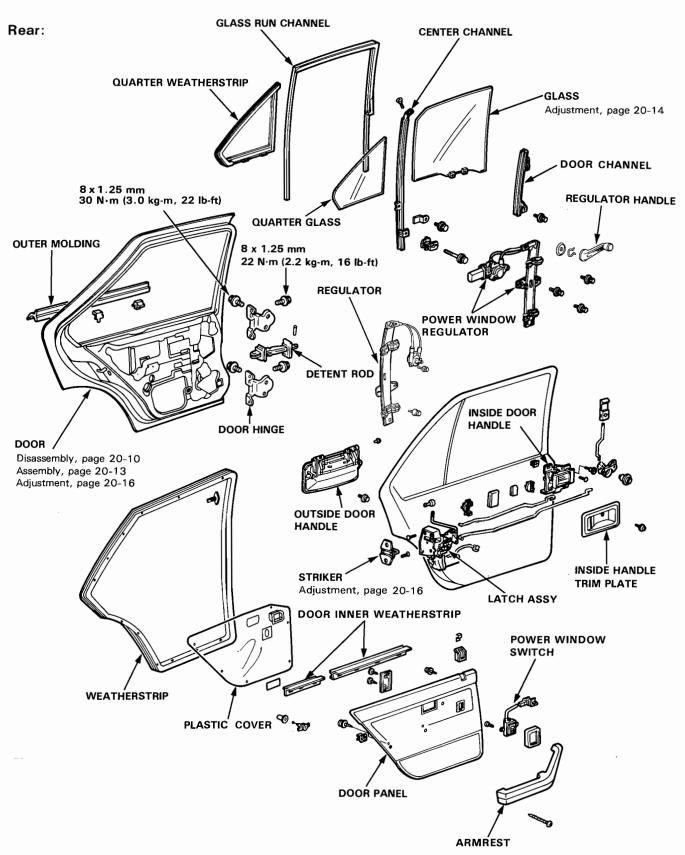


### **Doors**

#### **Illustrated Index**





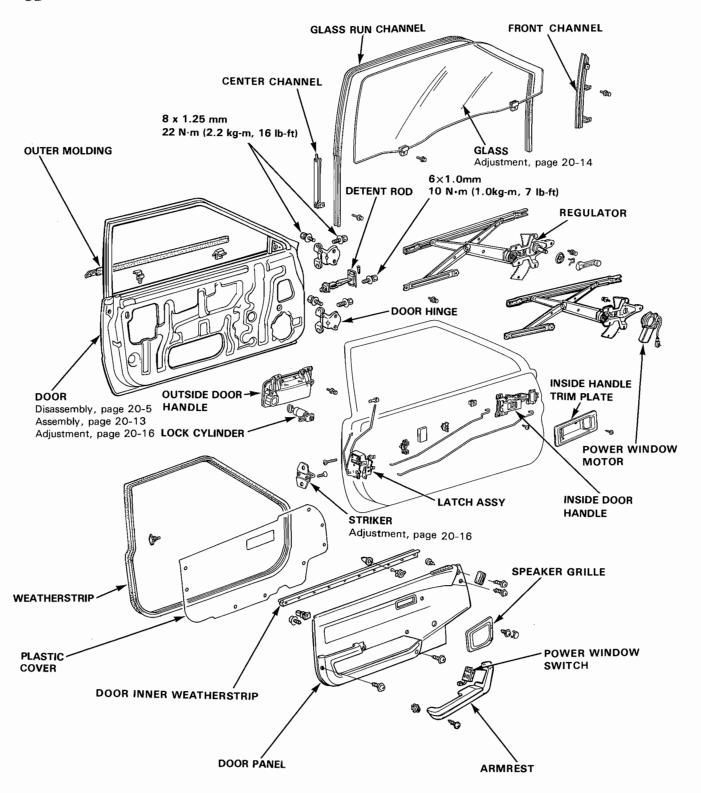


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### **Doors**

### Illustrated Index (cont'd) -

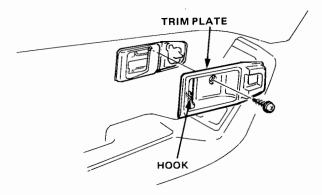
3D:



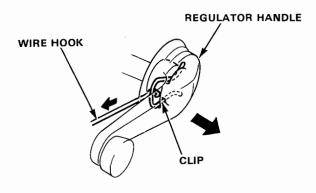
# **Front Door**

### Disassembly -

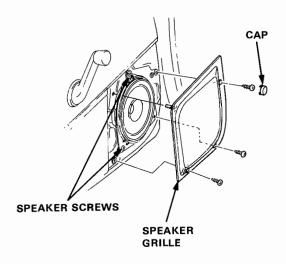
 Remove the screw, then carefully remove the trim plate.



2. If applicable, remove the regulator handle by pulling the clip out with a wire hook.

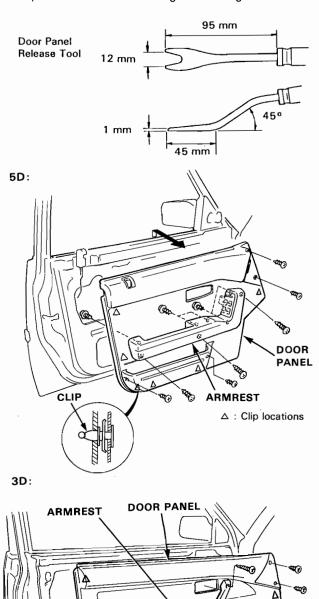


Remove the speaker screws and speaker. NOTE: The speaker cables are soldered to the terminals on the speaker.



4. Remove the 3 screws attaching the armrest.
Remove the 4 screws attaching the door panel.
Remove the door panel by removing the clips and pulling it upward. Disconnect the power window harnesses. Remove the 5 screws, then remove the arm rest (Driver side).

NOTE: Remove the panel with as little bending as possible to avoid creasing or breaking it.

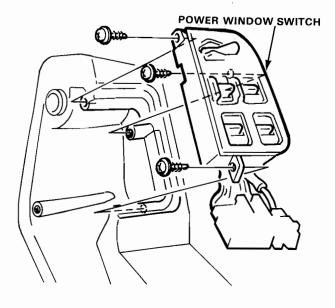


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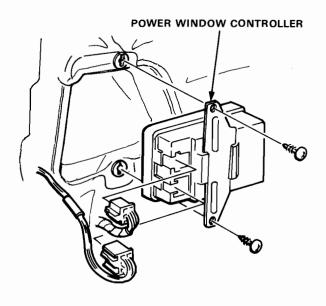
### **Front Door**

### Disassembly (cont'd) -

Remove the power window switch, if equipped, from the armrest by removing the three screws.

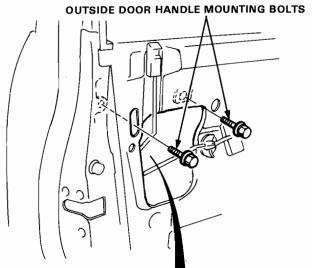


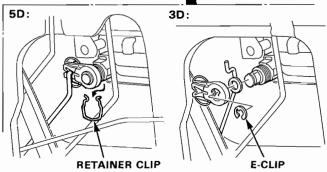
- 6. Raise the window fully.
- Disconnect the wire harness and remove the 2 screws, then remove the power window controller.



8. Peel off the plastic shield cover without tearing it.

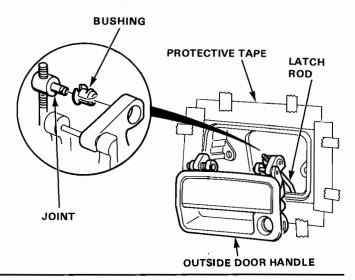
- Remove the mounting bolts for the outside door handle.
- Pull out the retainer clip, and take out the lock cylinder, then disconnect the lock rod.





 Pull the outside door handle out, and pry the joint off the handle with a flat tip screwdriver. Remove the handle from the rod.

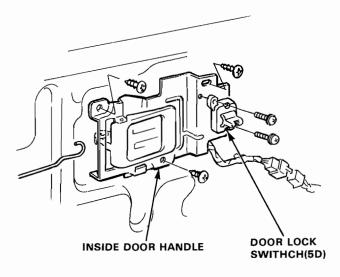
NOTE: Use protective tape around the edge of the door handle to prevent scratching the paint.





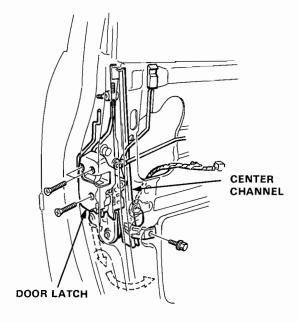
12. Disconnect the wire harness and remove the 3 screws, then remove the inside door handle.

Remove the screws, then remove the door lock switch.



13. Remove the lower bolt of the center channel and slide the center channel 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.

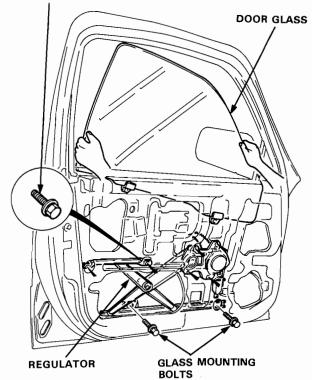


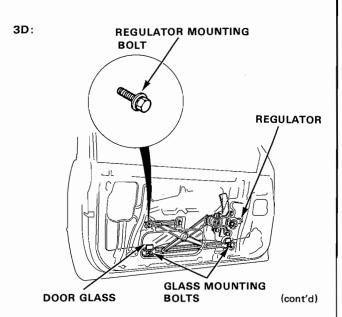
14. Carefully lower the door glass until you can see its mounting bolts. Remove the bolts and pull the door glass out through the window slot. Remove the regulator mounting bolts, then take out the regulator assembly through the lower hole in the

5D:

door.





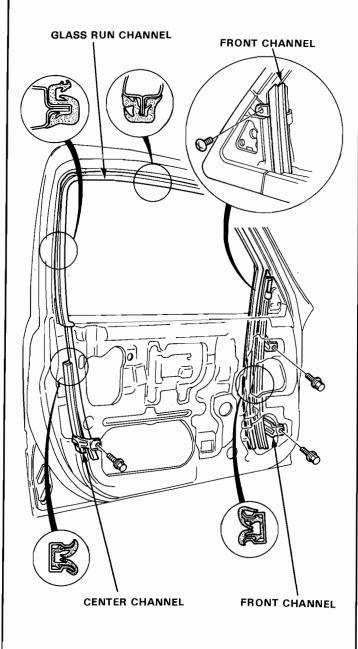


## **Front Door**

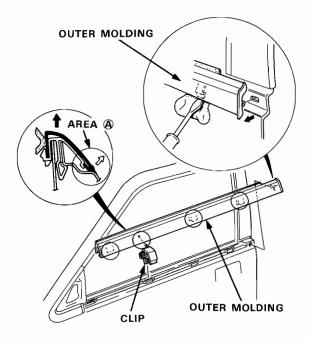
### -Disassembly (cont'd)-

- 15. Remove the glass run channel.
- Remove the front channel by removing the 2 bolts and the screw.
- 17. Remove the bolt, then remove the center channel.

NOTE: Before installation insert the glass run channel into the front and the center channel.



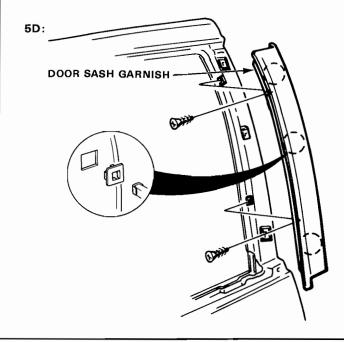
18. Pry out the clip at the rear of the outer molding.



 Remove the 4 clips from the door molding (area (a)), 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.

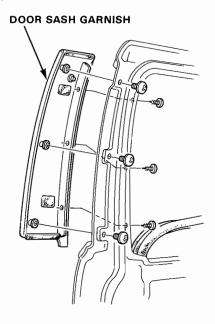
20. Remove the 2 screws and the 3 clips, then remove the door sash garnish by prying, starting of the top.





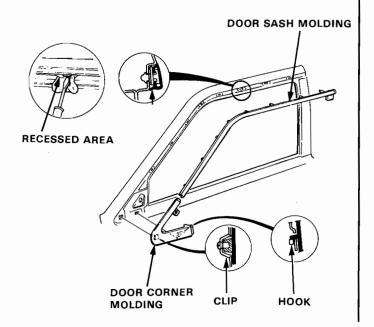
#### 3D:

Remove the 6 screws, then remove the door sash garnish.



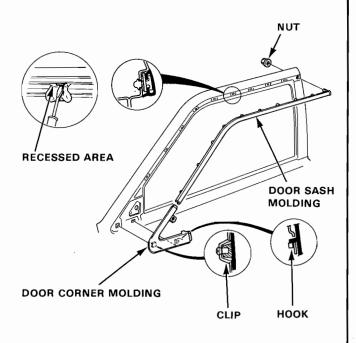
- 21. Remove the door mirrors (pages 20-17, 18)
- 22. Remove the 8 clips from the recess of the door sash, then remove the door sash molding.
- 23. Remove a clip, release the hook, and remove the door corner molding.

5D:

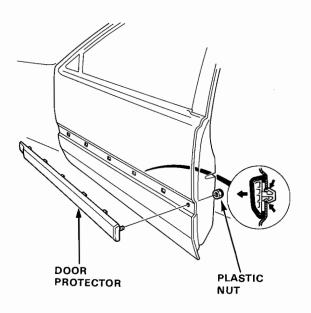


#### 3D:

Remove the end nut and 9 clips.



24. Remove the door protector by removing the nut and clips from the inside.



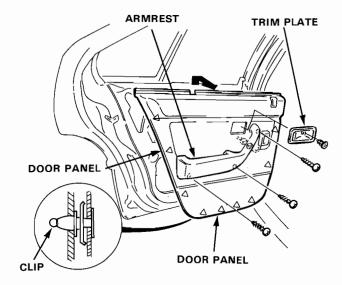
## **Rear Door**

### Disassembly-

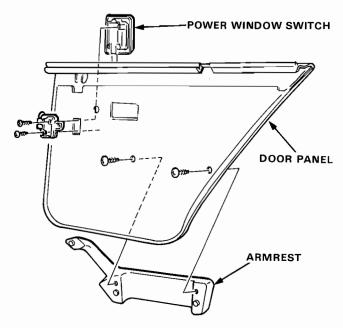
 Remove the trim plate by removing the screw and remove the screws of armrest.

NOTE: The armrest on the door panel.

- 2. Raise the window fully.
- Pry apart the 9 clips and lift the door panel straight up off the window sill. Disconnect the wire connector of the power window.

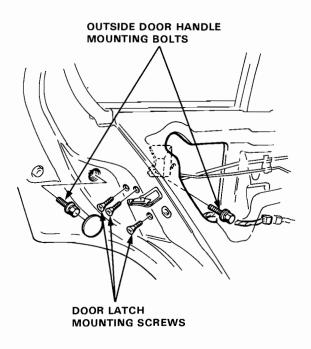


 Remove the screws from inside, and remove the armrest and power window switch.



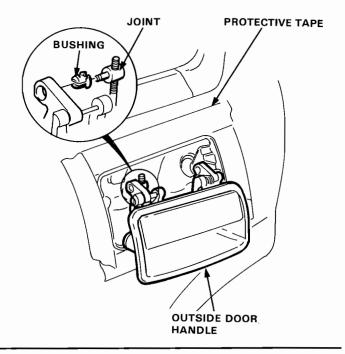
5. Peel off the plastic shield cover without tearing it.

Remove the 3 screws of the door latch, and remove the 2 bolts of the outside door handle.



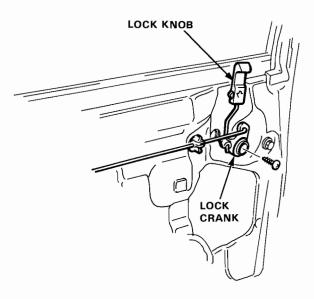
 Pull the outside door handle out, and pry the joint off the handle with a flat tip screwdriver. Remove the handle from the rod.

NOTE; Use protective tape around the edge of the door handle to prevent scratching the paint.

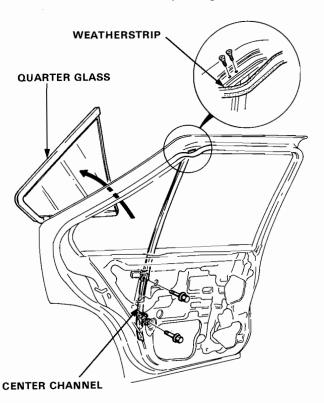




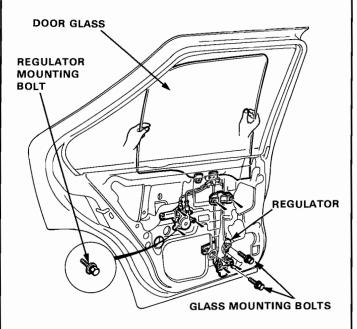
8. Remove the 2 screws of the inside door handle and the screw of the lock crank, then remove it from the door.



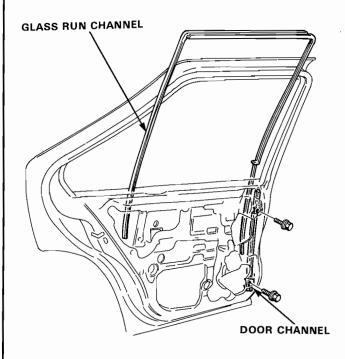
 Peel the weatherstrip off and remove the 2 screws as shown.Remove the 2 channel bolts, then remove the center channel.Remove the quarter glass.



10. 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.



11. Remove the glass run channel and the 2 bolts, then remove the door channel.



(cont'd)

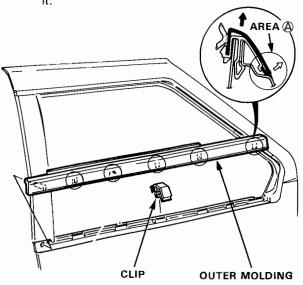
## **Rear Door**

### Disassembly (cont'd)-

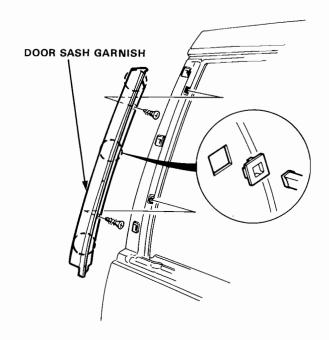
12. Carefully pry off the outer molding at the 4 clip locations A.

#### NOTE:

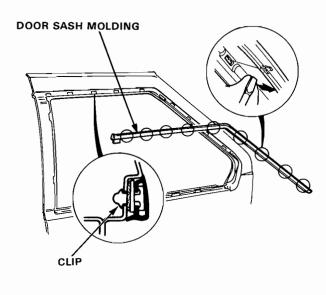
- Remove the molding with as little bending as possible.
- Set the clips on the door molding before installing it



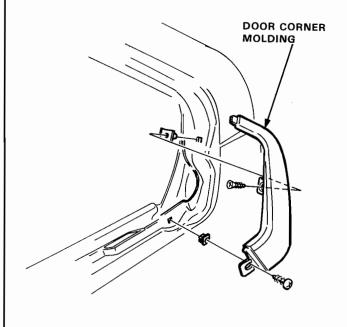
13. Remove the door sash garnish by removing the 2 screws and 3 clips.



14. Remove the door sash molding by removing the 9 clips.

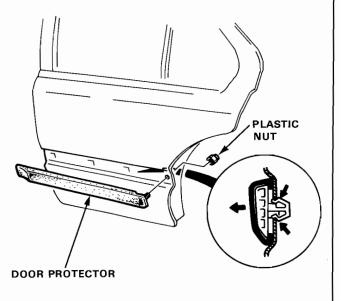


15. Remove the door corner molding by removing the screw.



## **Doors**

Remove the door protector by removing the nut and clips from the inside.

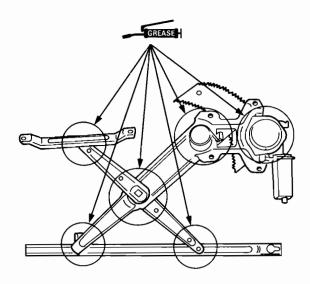


### - Assembly-

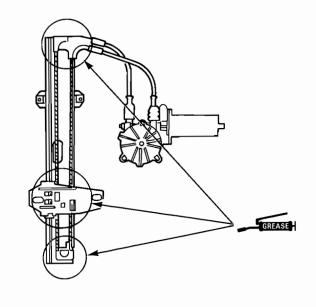
Assemble the door in the reverse order of disassembly, and also:

1. Grease all the sliding surfaces of the window regulator where shown.

Front:



Rear:



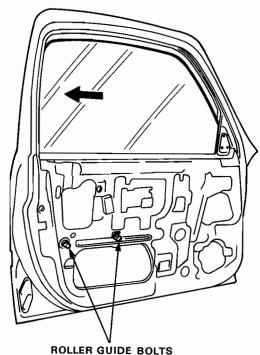
(cont'd)

## **Doors**

### -Assembly (cont′d)-

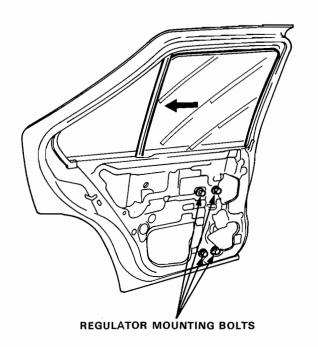
2. To adjust glass fit in the door, raise the glass as far up as possible and hold it against the door sash. Then, tighten the roller guide bolts or motor mounting bolts.

#### 5D Front:

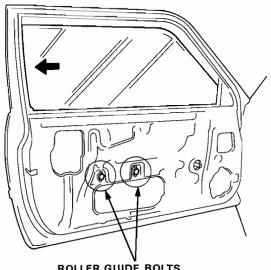


Rear:

Raise the glass as far up as possible and hold it against the door sash then tighten the regulator mounting bolts.



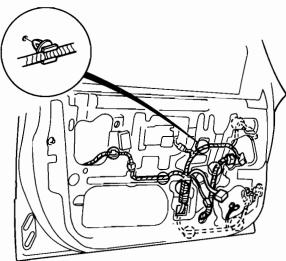
3D:



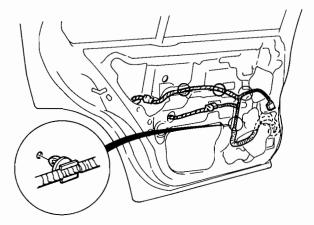
**ROLLER GUIDE BOLTS** 

3. Attach the wire harness correctly to the door.

#### 5D Front:

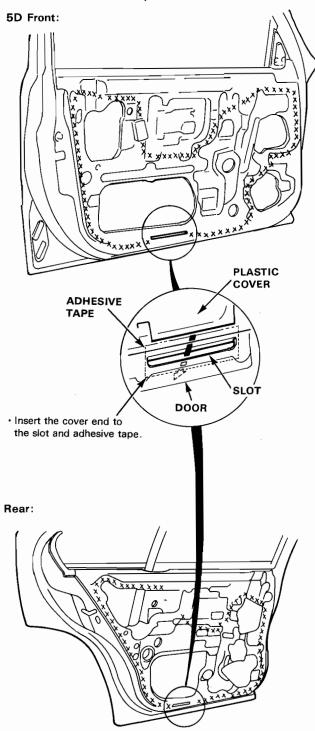


Rear:

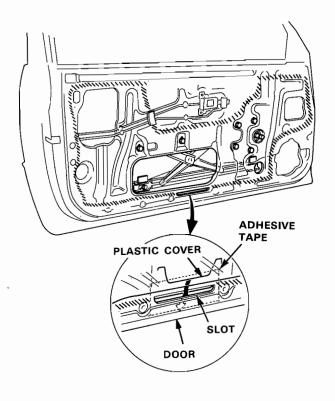




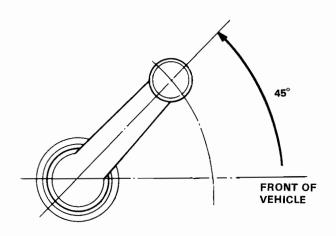
4. When reinstalling the plastic cover, apply adhesive along the edge where necessary to maintain a continuous seal and prevent air/water leaks.



3D:



5. Install the regulator handle so it points forward, and up at a 45 degree angle with the window closed.



### **Doors**

### **Door Position Adjustment-**

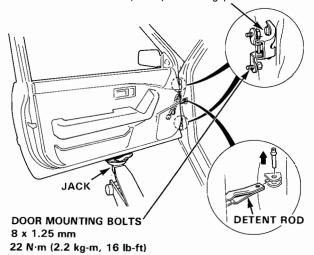
After installing the door, check for a flush fit with the body, then check for equal gap between the front and rear, and top and bottom door edges and the body. The door and body edges should also be parallel. Adjust at the hinges as shown.

CAUTION: Place a shop towel on the jack to prevent damage to the door when the hinge bolts are loosened for adjustment.

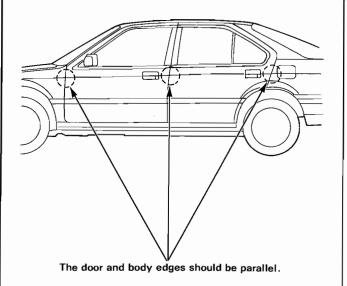
# HINGE MOUNTING BOLTS 8 x 1.25 mm

30 N·m (3.0 kg-m, 22 lb-ft)

Loosen the bolts, and move the door BACKWARD or FORWARD, UP or DOWN as necessary to equalize the gaps.



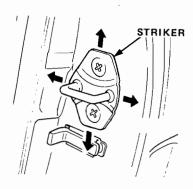
Loosen the bolts slightly to move the door IN or OUT until flushwith the body. If necessary, you can install a shim behind one hinge to make the door edges PARALLEL with the body.



### 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.
- 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.

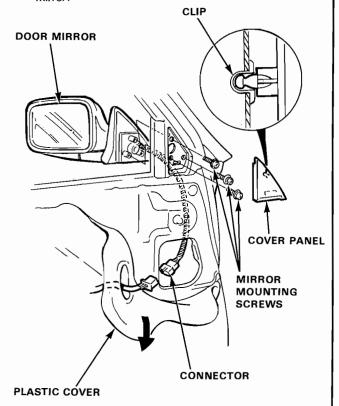
If the door latches properly, tighten the screws and recheck.

## **Power Door Mirror**



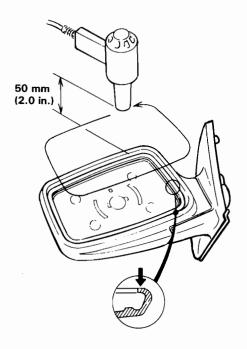
#### - Removal -

- Remove the door panel and disconnect the power mirror connector.
- 2. Pry out the cover panel with a flat tip screwdriver, then remove the cover panel.
- Remove the mirror mounting screws while holding the mirror.

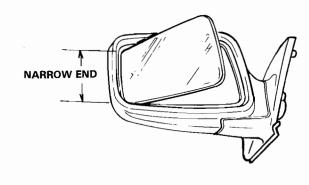


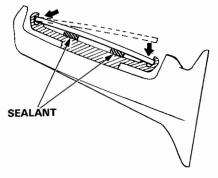
### **Mirror Glass Replacement**

1. Heat the edge of the glass with a low powered heat gun for several minutes, then remove the glass.



2. Install the glass in the mirror case, narrow end first.

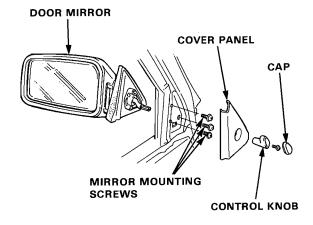




## **Manual Door Mirror**

#### -Removal -

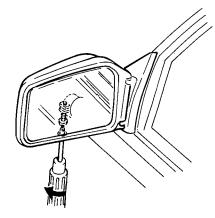
 Remove the cap and the screw, then remove the control knob.



- 2. Remove the cover panel.
- Remove the mirror mounting screws while holding the mirror

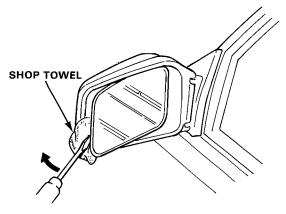
## Mirror Glass Replacement -

 Insert a screwdriver in the mirror through the service hole, and loosen the glass retaining screw.

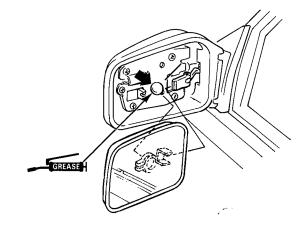


2. Cerefully pry out the mirror with a flat tip screwdriver as shown.

CAUTION: To prevent damage to the mirror, wrap the end of the screwdriver with a shop towel. towel.



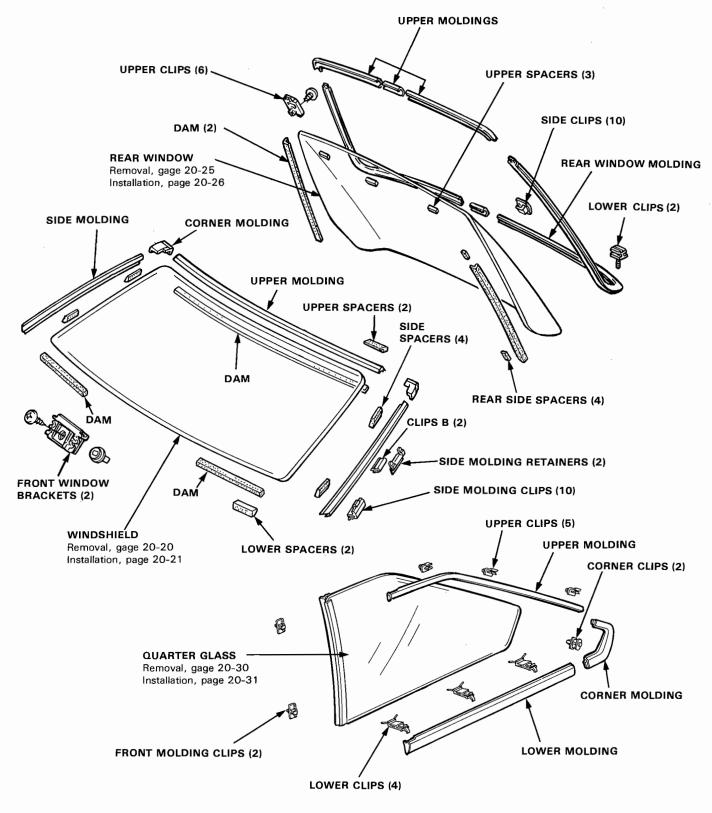
Install the mirror in the reverse order of removal, and also apply grease to the location indicated by the arrow.



# Windshield and Rear Windows



#### Illustrated Index-

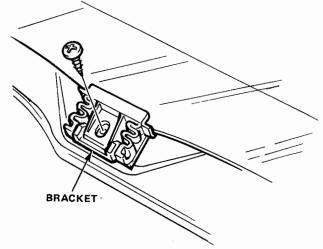


( ): Quantity of part used.

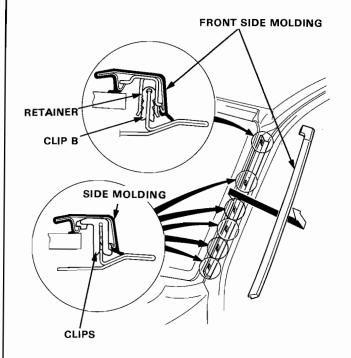
## Windshield

#### - Removal -

- 1. To remove the windshield, first remove the:
  - Rearview mirror (page 20-50).
  - Sun visor.
  - Front pillar trim (pages 20-42 to 43).
  - Front wiper and air scoop (See section 23).
- 2. Remove the right and left brackets.

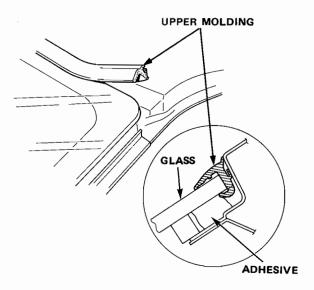


Remove the front side molding.
 NOTE: Take care not to damage the molding.

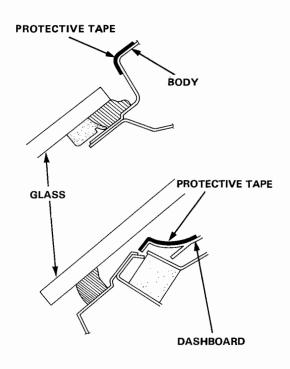


Peel off the upper molding, then pull down the front edge of the headliner so it will not interfere with the glass removal.

NOTE: Take care not to bend the headliner excessively.

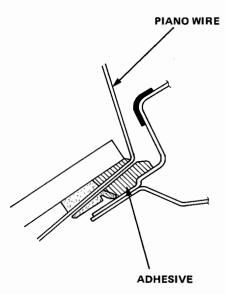


Apply protective tape along the edge of the dashboard and body next to the windshield as shown.



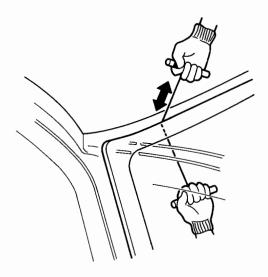


Using an awl, make a hole through the windshield adhesive from inside the car. Push piano wire through the hole and wrap each end around a piece of wood.



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 -

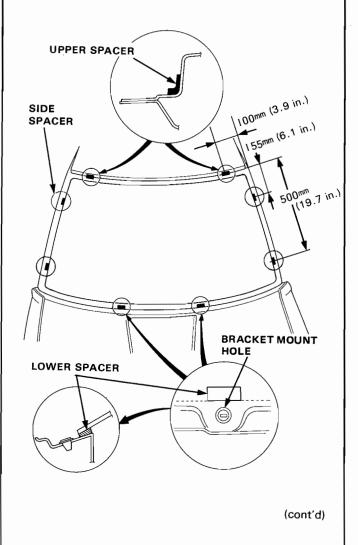
 Scrape the old adhesive smooth with a knife, to a thickness of about 2 mm (0.08 in.) on the bonding surface around the entire windshield flange.

#### 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.
- 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.

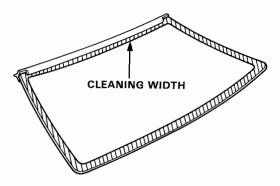


## Windshield

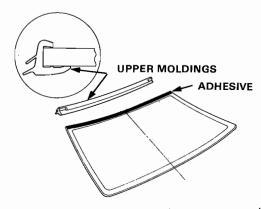
### -Installation (cont'd)-

 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.

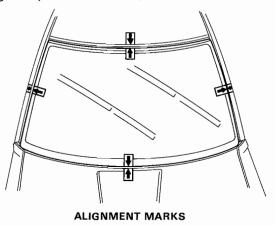
NOTE: Make sure the bonding surface is kept free of water, oil and grease.



Center and glue the upper molding to the upper edge of the windshield.

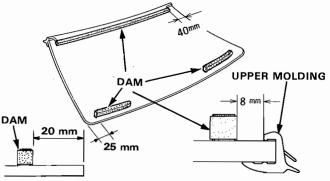


Set the windshield upright on the spacers, and center it in the opening. Mark the location by marking lines across the glass and body with a grease pencil at the four points shown.



 Glue the rubber dam to the inside face of the windshield as shown, to contain the adhesive during installation.

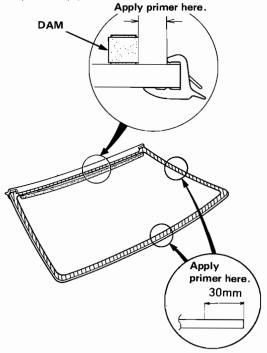
NOTE: Be careful not to touch the glass where adhesive will be applied.



 With a sponge, apply a light coat of glass primer around the edge of the glass as shown, then lighly 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.

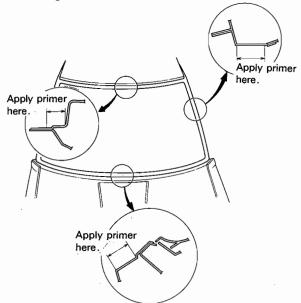




 With a sponge, apply a light coat of body primer to the original adhesive remaining around the window opening flange. The glass should be installed 10 minutes after you apply the primer.

#### NOTE:

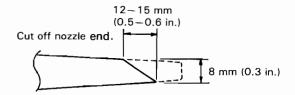
- Do not apply glass primer to the body, and be careful not to mix up glass and body primer sponges.
- Never touch the primed surfaces with your hands.
- Mask off the dashboard before painting the flange.



 Thoroughly mix all the adhesive and hardener together on a glass or metal plate with a putty knife.

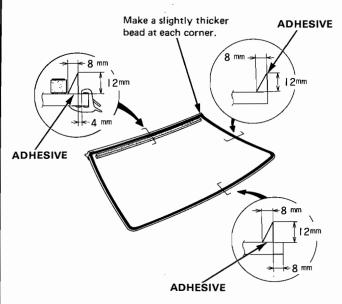
#### NOTE:

- 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.

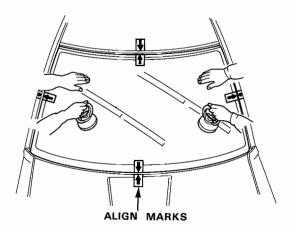


12. Pack adhesive into the cartridge without air pockets, to ensure continuous delivery. Put the cartridge in a caulking gun, and run a bead of adhesive around the edge of the glass as shown.

NOTE: Apply the adhesive within 30 minutes after applying the glass primer.



13. Use suction cups to hold the glass over the opening, align it with the marks made in step 6 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.

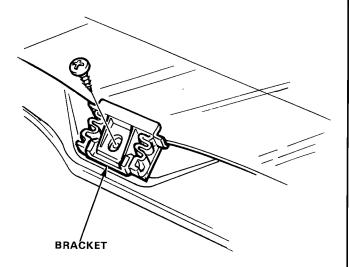


(cont'd)

# Windshield

### -Installation (cont'd)-

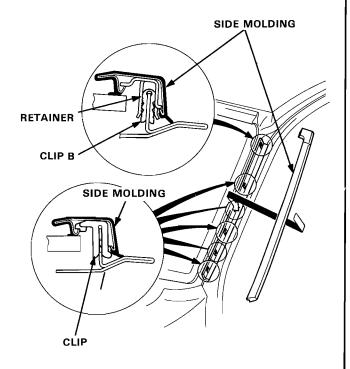
14. Install the bracket to prevent the glass from falling.



15. Scrape or wipe the excess adhesive off with a putty knife or gauze.

NOTE: Wipe with a soft shop towel dampened with alcohol to remove adhesive from a painted surface or glass.

16. Install the clips and retainers on the side molding.



17. Install the front side molding.

18. 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 urethan windshield adhesive.

#### 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.

19. 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.

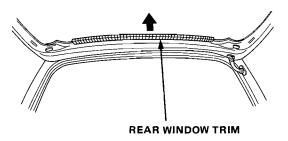
### **Rear Window**



### - Removal -

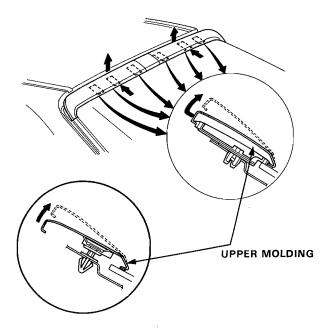
#### **CAUTION:**

- Wear gloves to remove and install the glass.
- Do not damage the defroster grid lines.
- 1. To remove the rear window glass, first remove the:
  - Rear end shelf, frame garnish and tailgate lining (pages 20-42, 43 and 61).
  - High mount brake light (page 20-61).
  - Rear wiper (See section 23).
- 2. Remove the rear window trim.

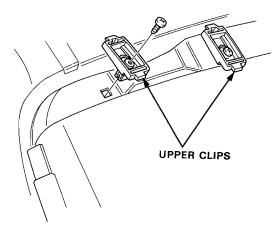


NOTE: Take care not scratch or score the glass.

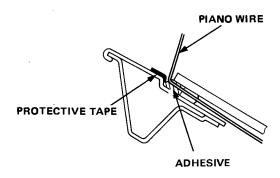
3. Remove the upper molding by sliding it upward.



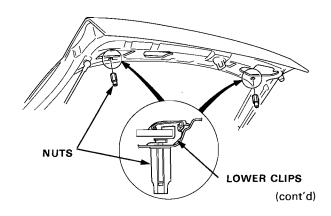
4. Remove the upper clips.



- Apply protective tape along the edge of the body next to the glass.
- 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.



Remove the rear window lower molding by removing the 2 nuts.

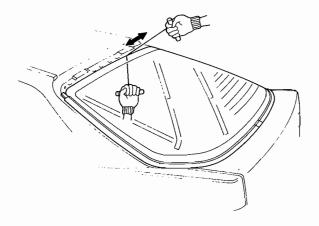


## **Rear Window**

### Removal (cont'd)-

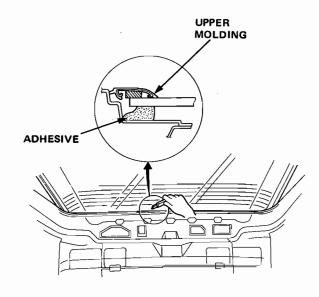
 With a helper on the outside, pull the wire back and forth in a sawing motion and carefully cut through the adhesive around the entire glass.

CAUTION: Hold the piano wire as close to the glass as possible to prevent damage to the body.



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.



Remove the rear window molding when the glass is reused.

#### Installation-

 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.

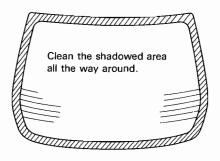
#### NOTE:

- 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.
- Clean the body bonding surface with a sponge dampened in alcohol.

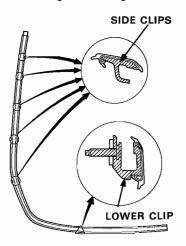
NOTE: After cleaning, keep oil, grease or water from getting on the surface.

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.

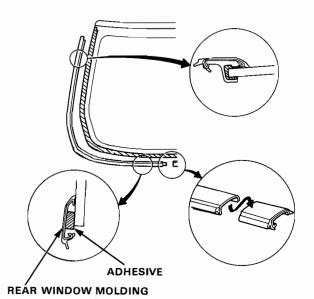


 Install the 10 side clips and 2 lower clips on the rear window molding when the glass is reused.



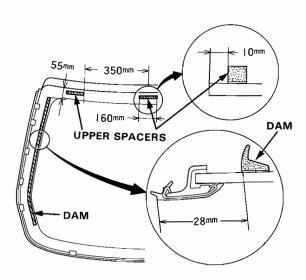


 When the glass is reused, cement the rear window molding to the glass using adhesive.
 NOTE: Be careful not to touch the glass where adhesive will be applied.



Peel the lining from the upper spacer, and attach the spacer to the glass as shown.

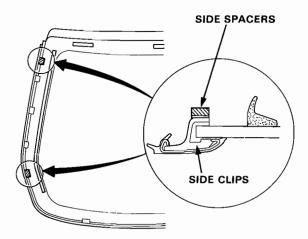
NOTE: Be careful not to touch the glass where the spacer will be attached.



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.

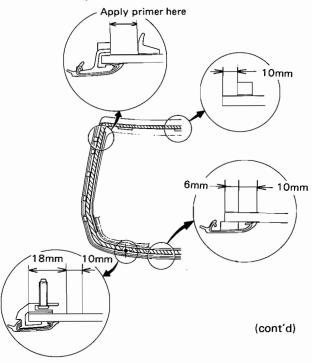
8. Glue the side spacers to the four side clips.



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.



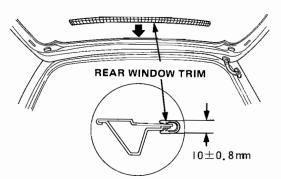
## **Rear Window**

### -Installation (cont'd)-

10. Install the rear window trim in the frame.

#### NOTE:

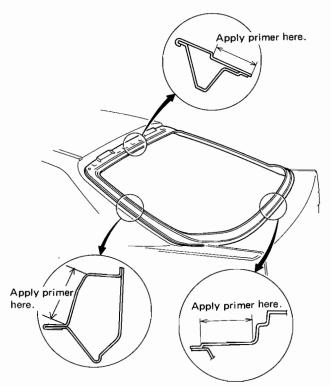
- Install the rear window trim with the wide end on the interior side.
- When attaching the rear window trim, make sure the thickness is even all the way around.



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:

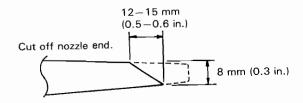
- Do not apply glass primer to the body, and be careful not to mix up glass and body primer sponges.
- Never touch the primed surfaces with your hands.



12. Thoroughly mix all the adhesive and hardener together on a glass or metal plate with a putty knife.

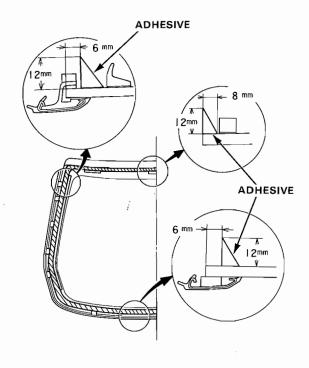
#### NOTE:

- 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.

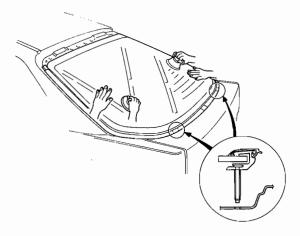
NOTE: Apply the adhesive within 30 minutes after applying the glass primer.





15. Holding the glass with rubber suckers as shown, install it on the tailgate while inserting the 2 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.

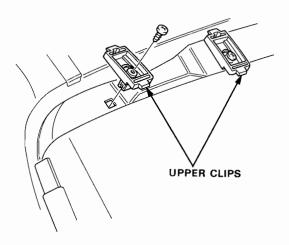
NOTE: Do not open and close the tailgate or doors until the adhesive has dried thoroughly.



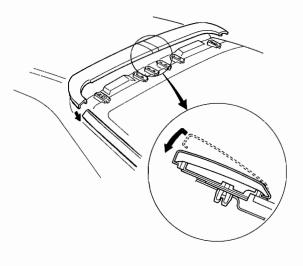
- 16. Tighten the lower clip mounting nuts.
- 17. Scrape or wipe the excess adhesive off with a putty knife or gauze.

NOTE: Wipe with a soft shop towel dampend 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.



 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 urethan windshield adhesive.

#### NOTE:

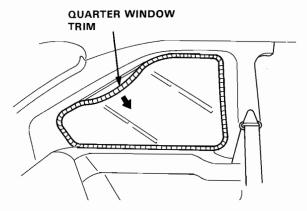
- Let the car stand for at least 4 hours after glass installation. If the car has to be used within the first 4 hours, it must be driven slowly.
- Keep the glass dry within the first hour afterinstallation.
- 21. Reassemble all removed parts.

CAUTION: Do not drive the car on rough or uneven surfaces for at least 4 hours.

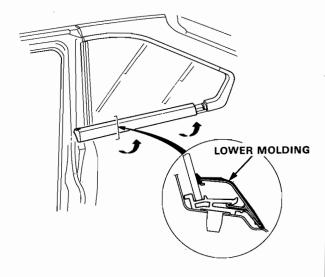
## **Quarter Glass**

#### -Removal-

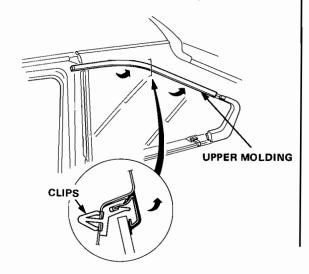
 To remove the quarter glass, first remove the quarter window trim.



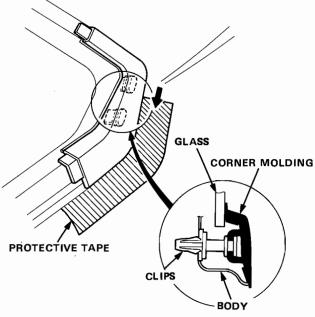
2. Remove the lower molding by turning it as shown.



3. Remove the upper molding by turning it as shown.

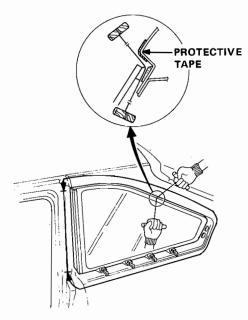


 Attach protective tape along the edge of the body next to the corner molding, remove the molding by sliding it down.



- Apply protective tape along the edge of the body next to the glass as shown.
- Using an awl, make a hole through the glass adhesive from inside the car. Push piano wire through the hole and wrap each end around a piece of wood.
- 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.

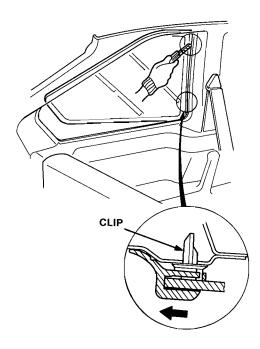
CAUTION: Hold the piano wire as close to the glass as possible to prevent damage to the body.



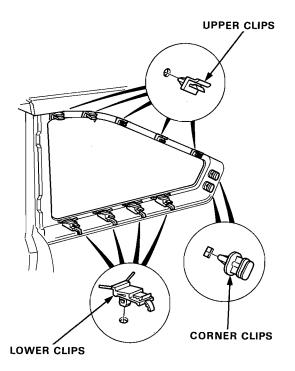


Cut the rubber spacers away from body with a knife.

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 -

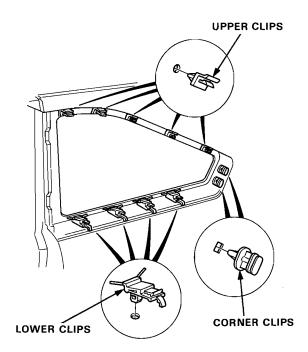
 Scrape the old adhesive smooth with a knife, to a thickness of about 2 mm (0.08 in.) on the bonding surface around the entire window glass flange.

#### 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.



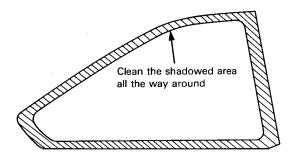
(cont'd)

## **Quarter Glass**

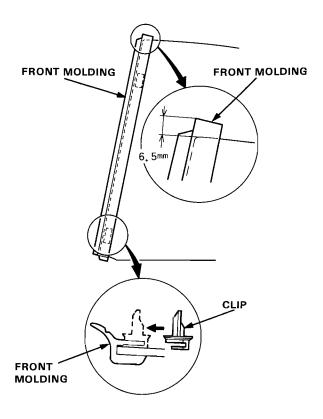
#### Installation (cont'd) -

 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.



Adhere the front molding to the front edge of the quarter glass as shown.

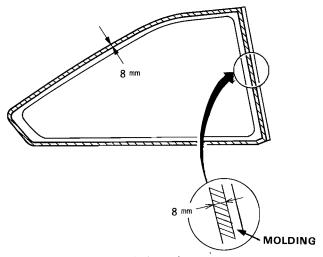


6. Install the clips on the front molding.

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:

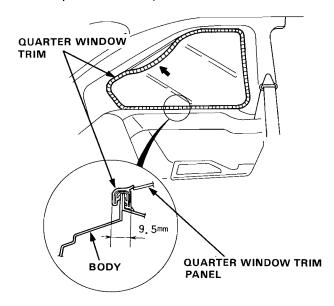
- Do not apply body primer to the glass, and do not get body and glass primer sponges mixed
- Never touch the primed surfaces with your hands. If you do, the adhesive may not bond to the glass properly, causing a leak after the glass is installed.
- Keep water, dust, and abrasive materials away from 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 window trim panel.

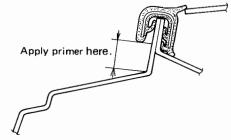




 With a sponge, apply a light coat of body primer to the original adhesive remaining around the window opening flange. The glass should be installed 10 minutes after you apply the primer.

#### NOTE:

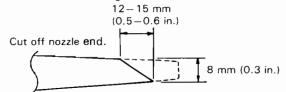
- Do not apply glass primer to the body, and be careful not to mix up glass and body primer sponges.
- Never touch the primed surfaces with your hands.



 Thoroughly mix all the adhesive and hardener together on a glass or metal plate with a putty knife.

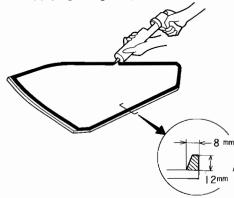
#### NOTE:

- 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.



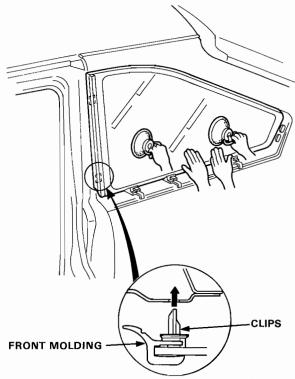
12. Pack adhesive into the cartridge without air pockets, to ensure continuous delivery. Put the cartridge in a caulking gun, and run a bead of adhesive around the edge of the glass as shown.

NOTE: Apply the adhesive within 30 minutes after applying the glass primer.



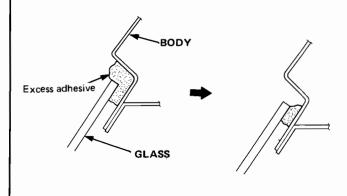
13. Use suction cups to hold the glass over the opening, then set it down on the adhesive. Lightly push on the glass untill its edge is fully seated on the adhesive all the way around.

NOTE: Do not open and close the rear window and other doors once the glass has been glued.



 Scrape or wipe the excess adhesive off with a putty knife or gauze.

NOTE: Wipe with a soft shop towel dampened with unleaded gasoline to remove adhesive from a painted surface or glass.

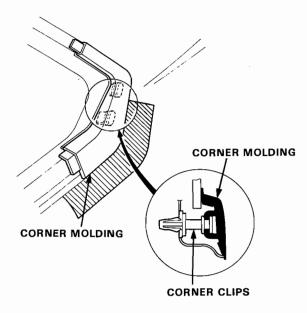


(cont'd)

## **Quarter Glass**

### -Installation (cont'd)-

Install the clips on the corner molding, then install the molding.



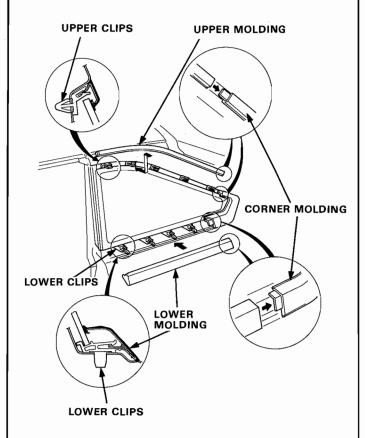
16. Spray water on the quarter glass 1—2 hours after installing the glass. Mark any leaks and let the windshield dry, then seal leaking area with urethan windshield adhesive.

#### NOTE:

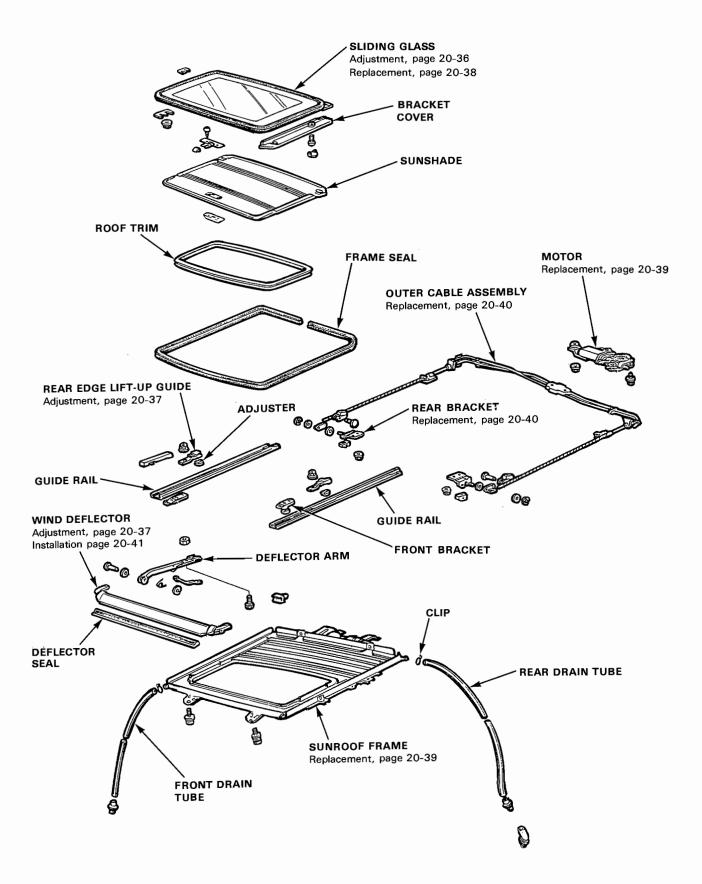
- Avoid getting water on freshly applied adhesive.
- Drive the car slowly if it must be driven during the first 4 hours after the quarter glass has been installed.

CAUTION: Do not drive the car on rough or uneven surfaces for at least 4 hours.

 Press on the upper and lower moldings, and install the upper and corner clips. Align the ends of the moldings.



Index -



## **Sunroof**

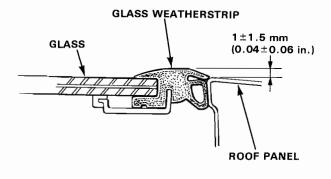
## - Troubleshooting -

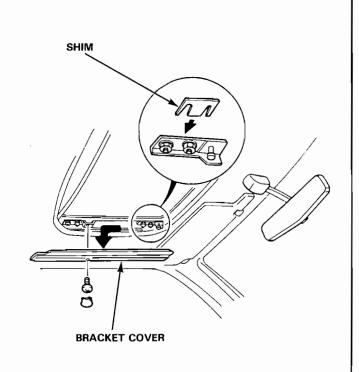
Symptom	Probable Cause
Water leak	<ol> <li>Clogged drain tube.</li> <li>Gap between glass weatherstrip and roof panel.</li> <li>Defective or improperly installed glass weatherstrip.</li> </ol>
Wind noise	Excessive clearance between glass weatherstrip and roof panel.
Deflector noise	<ol> <li>Improper clearance between deflector seal and frame seal.</li> <li>Insufficient deflector extension.</li> <li>Deformed deflector.</li> </ol>
Motor noise	<ol> <li>Loose motor.</li> <li>Worn gear or bearing.</li> <li>Outer cable deformed.</li> </ol>
Sliding glass does not move, but motor turns	<ol> <li>Clutch out of adjustment.</li> <li>Foreign matter stuck between guide rail and sliding glass.</li> <li>Outer cable loose.</li> <li>Outer cable not attached properly.</li> </ol>
Sliding glass does not move and motor does not turn (Sliding glass can be moved with sunroof wrench)	<ol> <li>Blown fuse.</li> <li>Faulty switch.</li> <li>Battery run down.</li> <li>Defective motor.</li> </ol>

## Glass Height Adjustment

Roof panel should be even with the glass weatherstrip, to within 1  $\pm$  1.5 mm (0.04  $\pm$  0.06 in.) all the way around. If not, slide sunshade back, and:

- Pry plug out of the bracket cover, remove screw, then slide cover off to the rear.
- 2. Loosen bracket mounting nuts and install shims between glass frame and bracket as shown.
- 3. Repeat on opposite side if necessary.



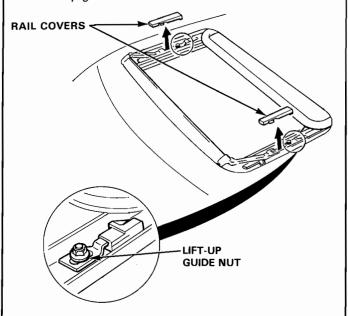




## Rear Edge Closing Adjustment ——

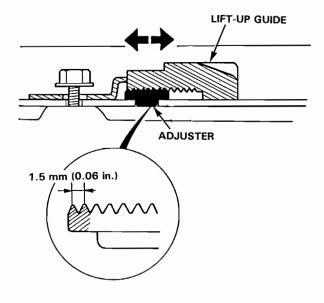
Open the glass about a foot, then close it to check where rear edge begins to rise. If it riese too soon and seats too tightly against the roof panel, or too late and does not seat tightly enough, adjust it.

- Open the glass fully.
- Remove the rail covers from both sides, and loosen lift-up guide nuts.



3. Move the guides forward or back, then tighten nuts and re-check roof closing.

The guides have pitches of 1.5 mm (0.06 in.) each and can be adjusted 2 pitches forward or backward.

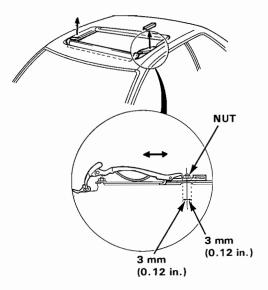


### Wind Deflector Adjustment

NOTE: A gap between deflector seal and roof panel will cause wind noise when driving at high speed with the sunroof open.

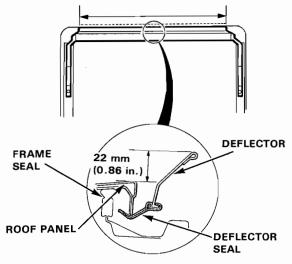
- 1. Open the sunroof and pry the caps off both sides.
- Loosen deflector mounting mounting nuts.

NOTE: Wind deflector can be adjusted 3 mm (0.12 in.) forward or backward.



 Adjust deflector forward or backward so the edge of its seal touches the roof evenly.

Deflector seal should touch the roof panel across entire front edge.

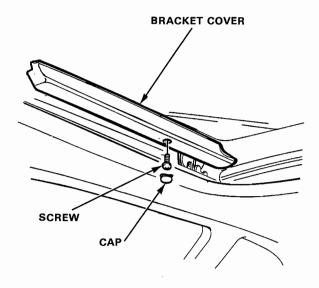


NOTE: The height of the deflector when open can not be adjusted. If damaged or deformed, replace it.

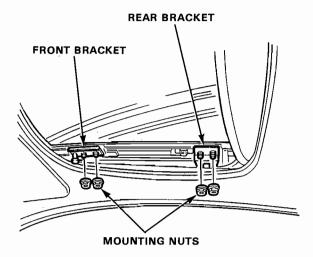
## **Sunroof**

## Glass and Sunshade Replacement

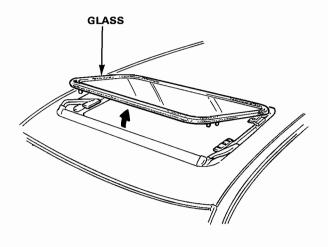
- 1. Slide sunshade all the way back.
- 2. Pry plug out of each bracket cover, remove screw, and slide cover off to the rear.



- 3. Close the glass fully.
- Remove the mounting nuts from front and rear brackets on both sides.

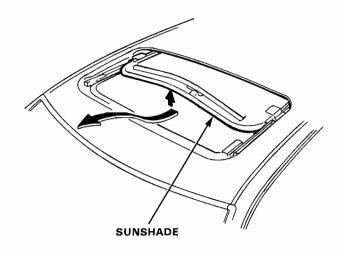


5. Remove the glass by lifting up and pulling forward as shown.



- 6. Remove the wind deflector.
- 7. Remove the sunshade as shown.

NOTE: The sunshade may be bent slighty to ease removal.

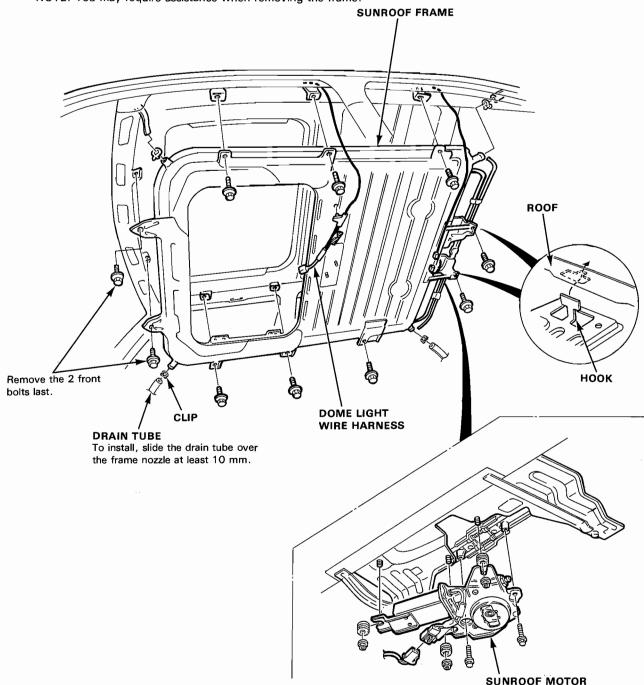




#### Motor, Drain Tube, and Frame Replacement

#### CAUTION: Be careful not to damage the seats or other interior trim.

- 1. Remove the sliding glass (page 20-38) and the headliner (page 20-52).
- 2. Disconnect the motor and limit switch wire harness; remove the clips securing the dome light wire harness.
- 3. Remove the sunroof motor by removing the two bolts and three nuts.
- 4. Disconnect the drain tubes.
- 5. Remove the ten 6 x 16 mm mounting bolts from the frame, and remove the frame from the car. NOTE: You may require assistance when removing the frame.



6. To install, insert the frame's rear hooks into the body holes, then install parts in the reverse order of removal.

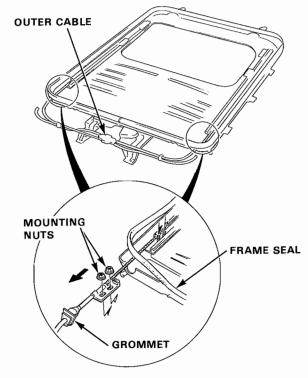
NOTE: Install the tube clips with the ends facing the side to ease installation of the headliner.

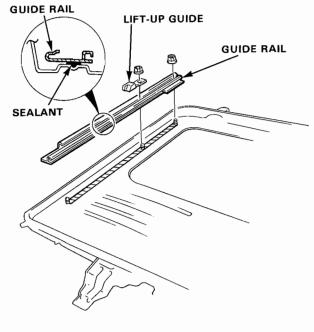
#### Sunroof

#### Cable Replacement

With sunroof out of the car, remove the guide rail mounting nuts, lift off the guide rails, and remove the cables with rear brackets attached.

NOTE: Fill the groove in each grommet with sealant and apply molybdenum grease to the inner cable.



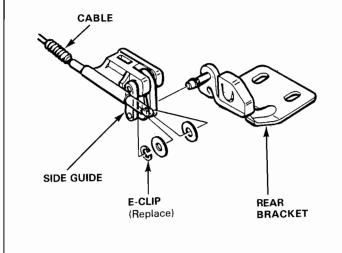


#### Rear Bracket Disassembly-

1. Remove the side guides from the rear brackets.

NOTE: Replace the guides with new ones whenever they are disassembled.

2. Pry the E-clip off the pin, and remove the rear bracket from the cable.

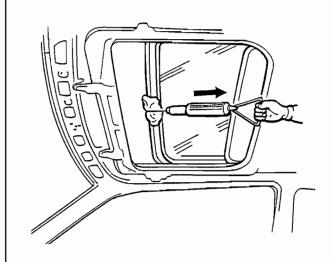


# Closing Drag Check(Motor Removed)

Before installing the sunroof motor, measure effort required to open sliding glass using a spring scale as shown.

CAUTION: When using the spring scale, protect the leading edge of the sunroof with a shop towel.

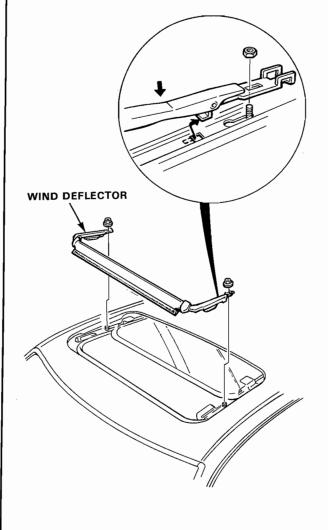
If load is over 98 N (10 kg, 22 lb), check side clearance and glass height adjustment (page 20-36).





#### Wind Deflector Installation -

Installation is done in the reverse order of removal. When installing, make sure to insert the deflector ends tightly into the guide rails and arrange the deflector and rails in parallel.



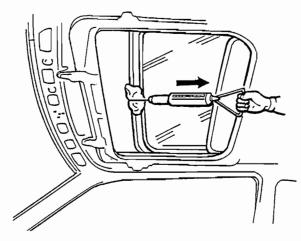
## Closing Force Check - (Motor Installed)

 After installing all removed parts, have a helper hold the switch to close the sunroof while you measure force required to stop it. Attach spring scale as shown. Read force as soon as glass stops moving, then immediately release the switch and spring scale.

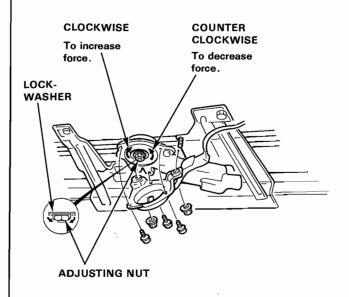
CAUTION: When using the spring scale, protect the leading edge of the sunroof with a shop towel.

Closing Force: 196-245 N

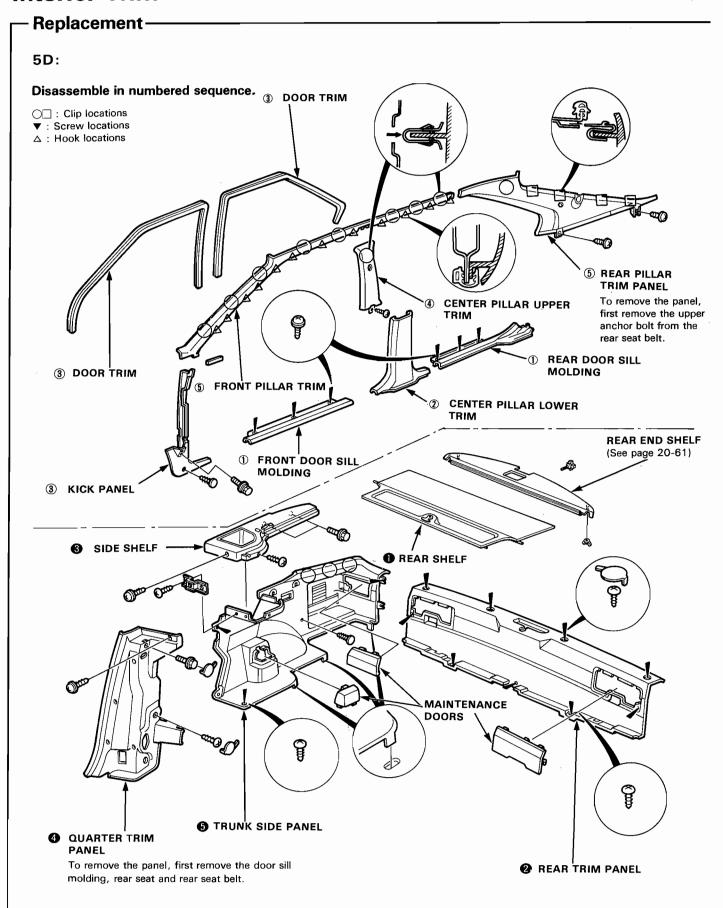
(20-30 kg, 44-55 lb)



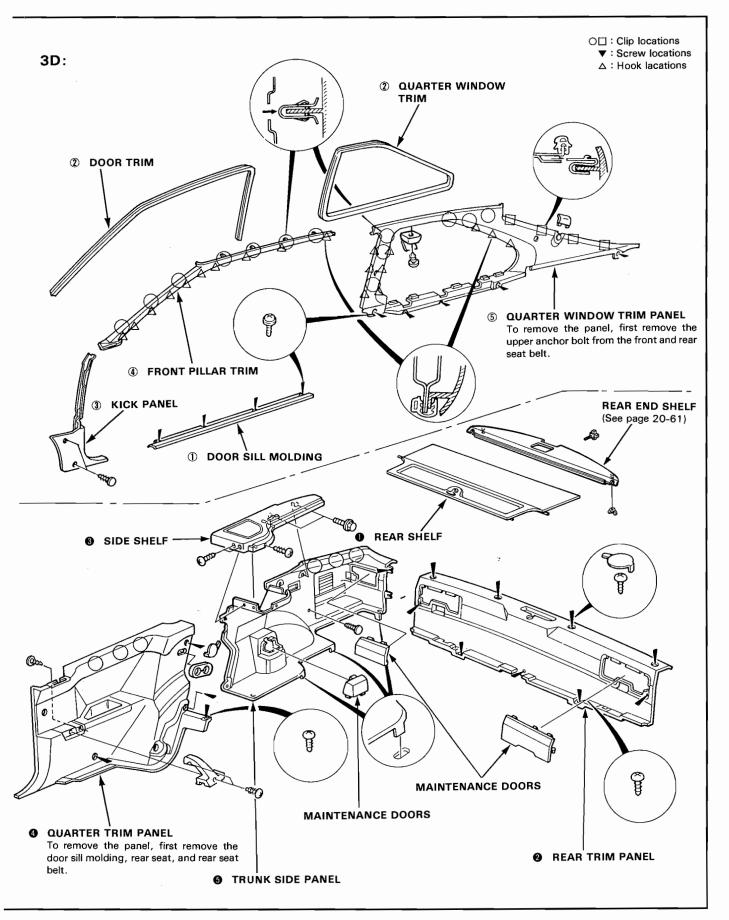
If force is not within specification, install a new lockwasher, adjust the tension by turning the sunroof motor clutch adjusting nut, and bend the lockwasheragainst the adjusting nut.



### **Interior Trim**



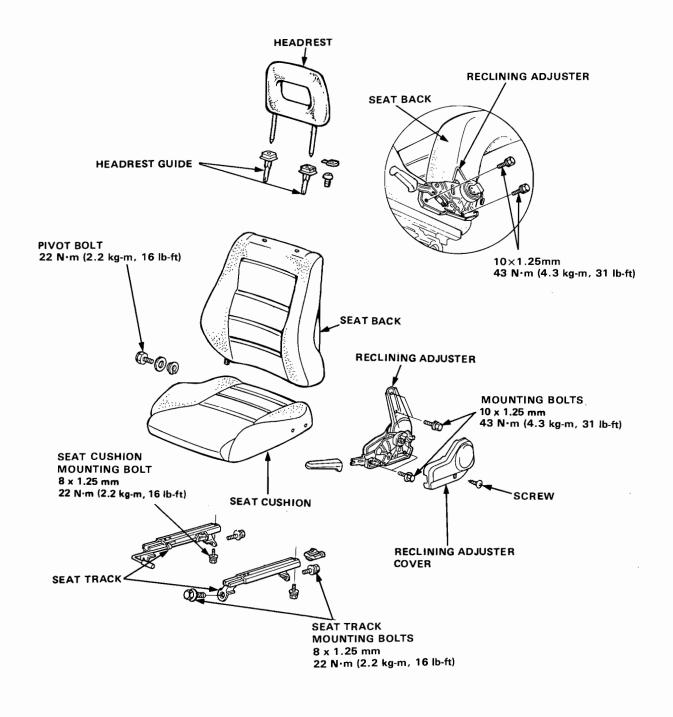




#### **Front Seat**

#### - Replacement

- 1. Remove the seat track mounting bolts by sliding the seat back and forth.
- 2. Unscrew the seat cushion mounting bolts, then separate the seat from the seat tracks.
- Remove the reclining adjuster cover screw and cover. Remove the bolts attaching the reclining adjuster to the seat cushion, then reclining adjuster to the seat back.
- 4. Turn seat back trim cover over (page 20-46), and remove the bolts attaching the reclining adjuster to the seat back.
- 5. Assemble the seat in the reverse order of disassembly. After assembly, check the adjuster spring for proper tension.

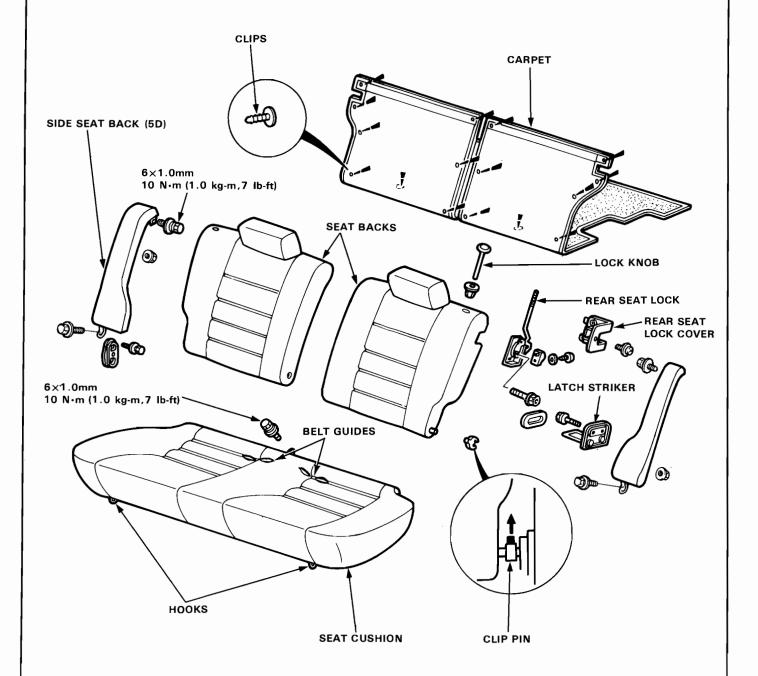


#### **Rear Seat**



#### - Replacement

- 1. Tilt the seat backs all the way backward by pushing up on the seat lock knobs. Remove the 16 clips, 2 at the body side and 14 at the seat back side, then remove the trunk floor carpet.
- 2. Remove the 2 clip pins, and push the seat backs toward the center until the outer pivot pin clears the pin hole; remove the seat backs.
- Remove the bolt retaining the seat cushion, then pull up on the rear of the cushion until the 2 forward retaining hooks clear the rotating tabs. Remove the seat cushion.
   NOTE: Before removing the seat cushion, pull out the seat belts from the belt holes in the seat cushion.
- 4. Remove the quarter trim panel (page 20-42), remove the nuts from the rear, and remove the side seat backs (5D only).
- 5. Remove the rear seat lock cover and rear seat lock.



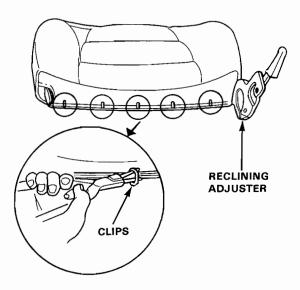
6. Assemble the seat in the reverse order of disassembly. Check that the rear seat belts are installed properly.

#### **Front Seat Cover**

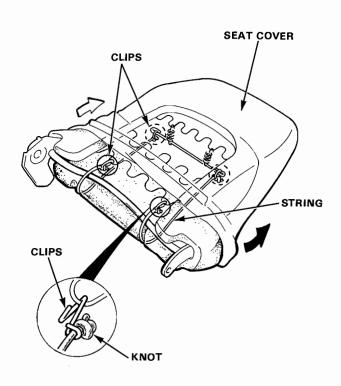
#### - Replacement-

#### Seat back cover removal

- Separate the seat back from the seat cushion (page 20-44).
- 2. Remove all the clips from the bottom of the seat back.

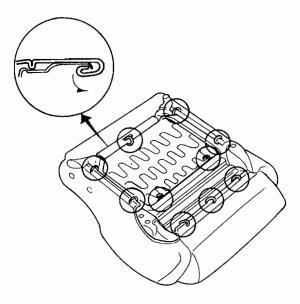


 Turn the forward edge of the seat cover up to expose the lower clips at the ends of the retaining strings. Remove the seat cover by releasing the upper clips. NOTE: Take care not to open the seams or damage the cover.

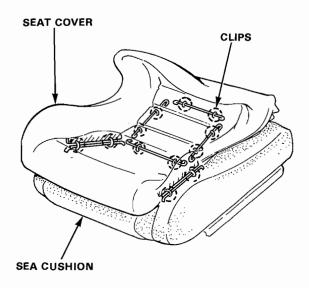


#### Seat cushion cover removal

- 1. Remove the seat, and separate the seat cushion from the seat back (page 20-44).
- 2. Remove all hooks from under the seat cushion.



Turn up the edge of the trim cover all the way around, then release the clips of the cushion.



#### Seat cover installation

Install the seat cover in the reverse order of removal. After installing the cover, check that there are no wrinkles or lines.

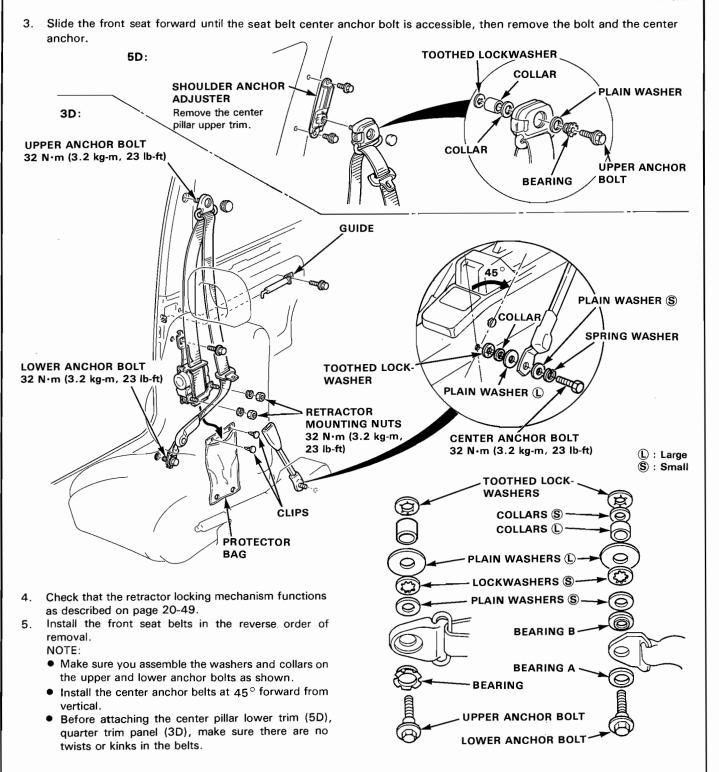
#### Front Seat Belts



#### - Replacement -

CAUTION: Check the seat belts for damage and replace them if necessary. Be careful not to damage them during removal and installation.

- 1. Remove the guarter trim panel (for 3D), or the center pillar lower trim (for 5D).
- 2. Remove the upper anchor bolt, lower anchor bolt and retractor bolt or nuts (for 3D) with a 17 mm socket or box-end wrench.

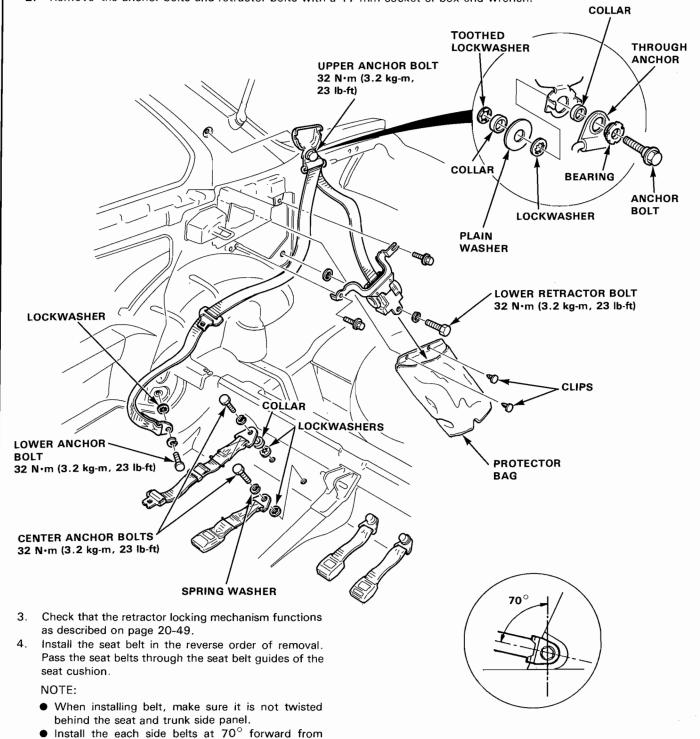


### **Rear Seat Belts**

#### Replacement -

CAUTION: Check the seat belts for damage and replace them if necessary. Be careful not to damage them during removal and installation.

- 1. Remove the rear seat and trunk side panel (pages 20-42, 43)
- 2. Remove the anchor bolts and retractor bolts with a 17 mm socket or box-end wrench.



vertical.

#### **Seat Belts**

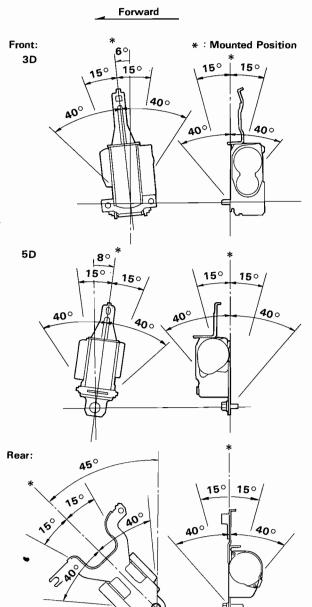


#### - Inspection

#### **Retractor Inspection**

- With the retractor installed, check that the belt can be pulled out freely.
- Make sure that the belt does not lock when the retractor is leaned slowly up to 15° from the mounted position. The belt should lock when the retractor is leaned over 40°.

CAUTION: Do not attempt to disassemble the retractor.



Replace the belt with a new one if there is any abnormality.

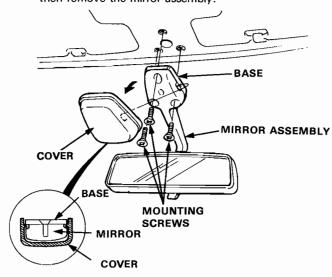
#### On the Car Belt Inspection

- Check that the belt is not twisted or caught on anything.
- After installing the anchors, check for free movement on its retaining bolt. If necessary, remove the bolt and check that the washers and other parts are not damaged or improperly installed.
- Check the belts for damage or discoloration. Clean with a shop towel if necessary.
   CAUTION: Use only soap and water to clean.
- Check that the belt does not lock when pulled out slowly. The belt is designed to lock only during a sudden stop or impact.
- 5. Make sure that the belt will retract automatically when released.
- Replace the belt with a new one if there is any abnormality.

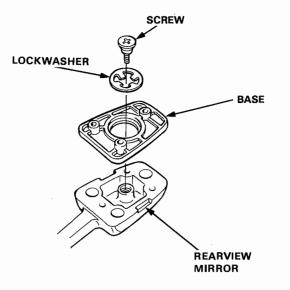
### **Rearview Mirror/Console**

#### -Rearview Mirror Replacement

- 1. Pry the cover off using the end of a flat tip screwdriver.
- Remove the 3 mounting screws from the mirror base, then remove the mirror assembly.



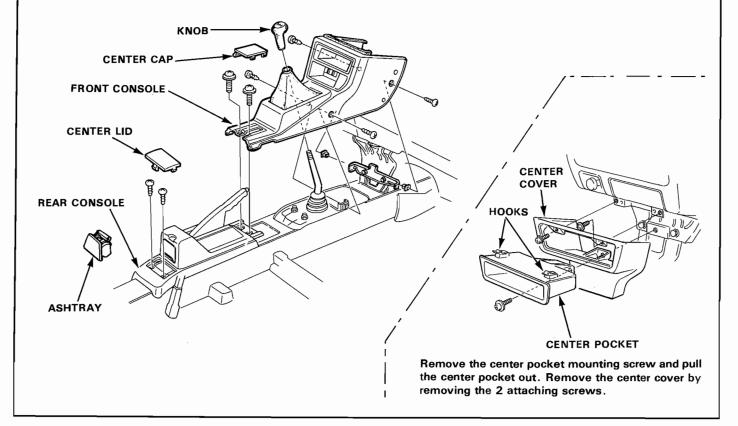
Remove the base from the bracket by removing the screw.



#### Console Replacement

- 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.

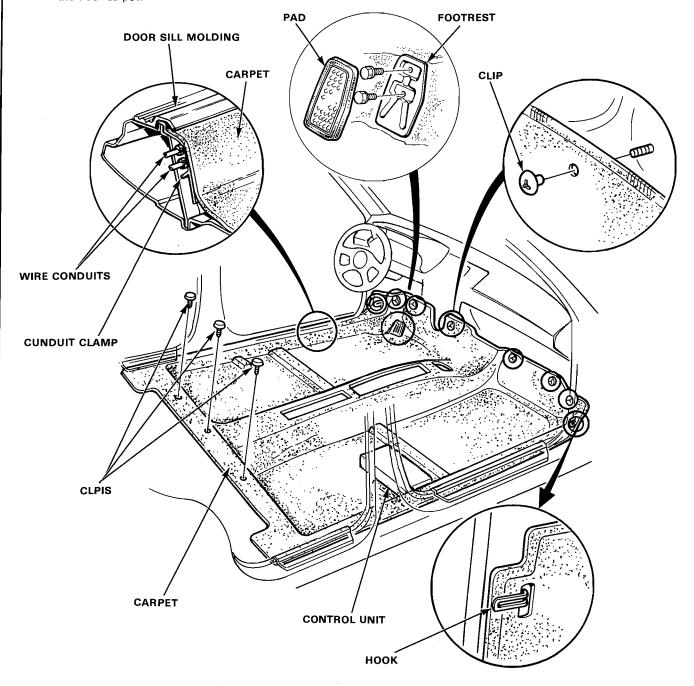


### Carpet



#### Replacement-

- 1. Remove
  - Front seats and control unit under the seat.
  - Seat belt lower and center anchor bolts (page 20-47).
  - Console (page 20-50).
  - Tailgate, fuel lid opener.
  - Door sill moldings, kick panels lower trims.
  - Rear seat cushion
  - Footrest
  - 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.

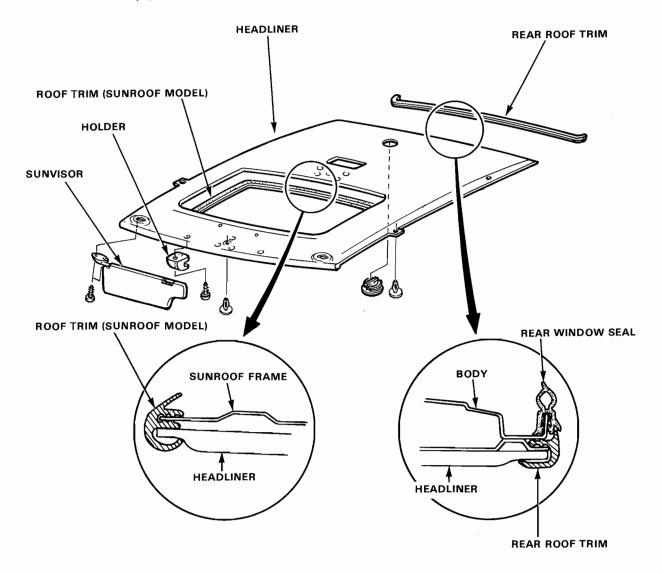
### Headliner

#### -Replacement-

- 1. Remove
  - Sunvisors and holders
  - Rearview mirror (page 20-50)
  - Quarter window trim panel (3D), rear pillar trim panel (5D)
  - Front pillar trim.

NOTE: It's not necessary to remove front pillar trim from the dashboard.

- Dome light (See section 23)
- Rear roof trim
- Roof trim (Sunroof model only)
- 2. Remove the trim clips, then remove the headliner.



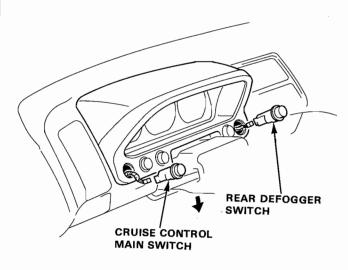
3. Install the headliner in the reverse order of removal. Remove the rear window seal when installing the rear trim.

#### **Instrument Panel**

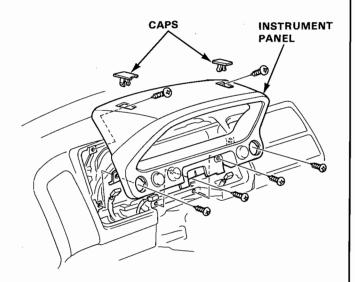
#### Replacement -

 Remove the right and left switches from the instrument panel, then disconnect the wire couplers from the switches.

NOTE: Lower the steering column.

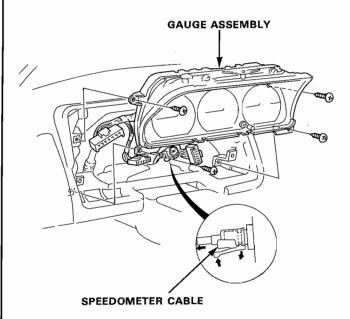


- Remove the caps and 2 instrument panel attaching screws.
- Remove the screws under the holes made by removing the switches.
- Remove the 2 screws, then remove the instrument panel.

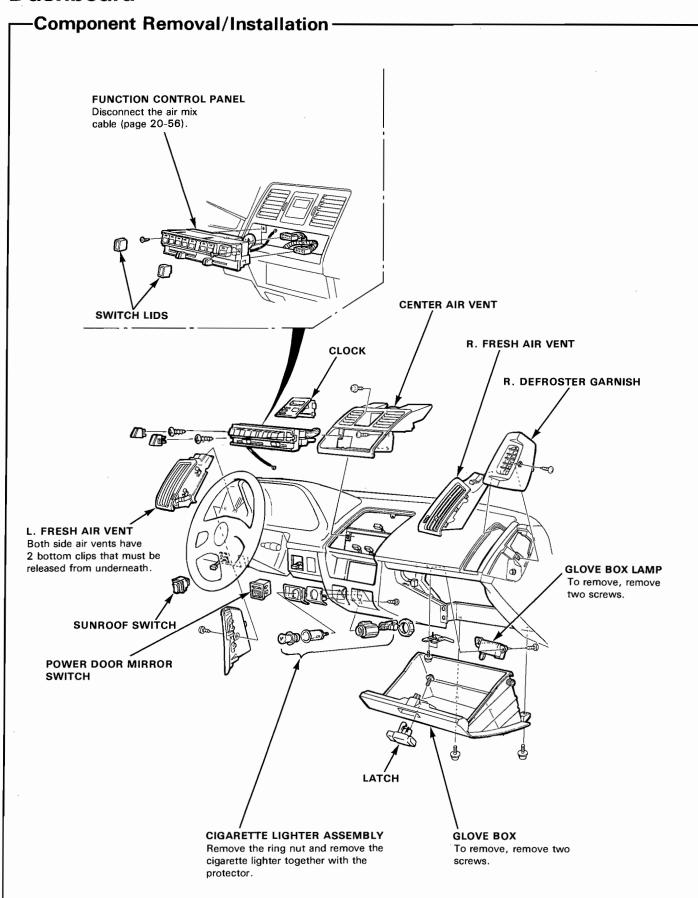


Remove the 4 screws, lift the gauge assembly, and disconnect the speedmeter and wire harness cables.

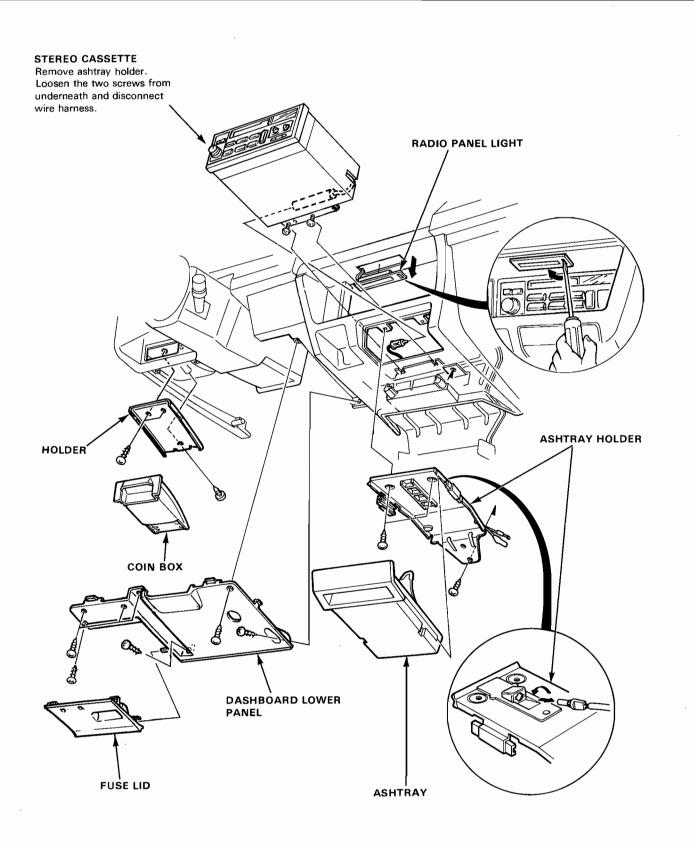
NOTE: To disconnect the speedometer cable and wire harness couplers, release the locking tabs.



### **Dashboard**



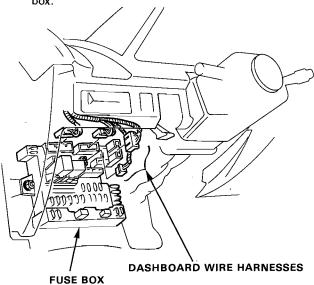




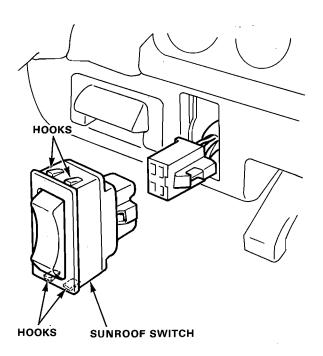
### **Dashboard**

#### -Replacement

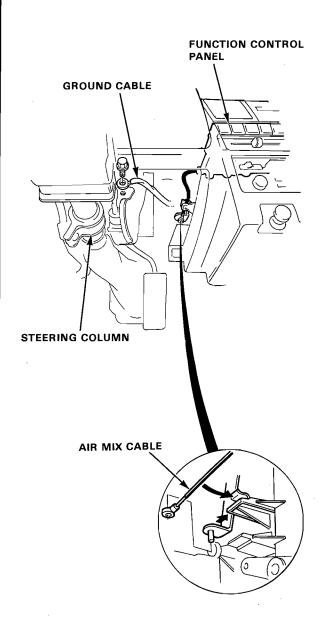
- 1. Remove the steering wheel.
- 2. Remove the console (page 20-50).
- Remove the fuse lid, then remove the dashboard lower panel.
- Disconnect the wire harnesses from the fuse area.
   If necessary: Remove the 2 nuts and lower the fuse how



5. Remove the sunroof switch and disconnect the connector.

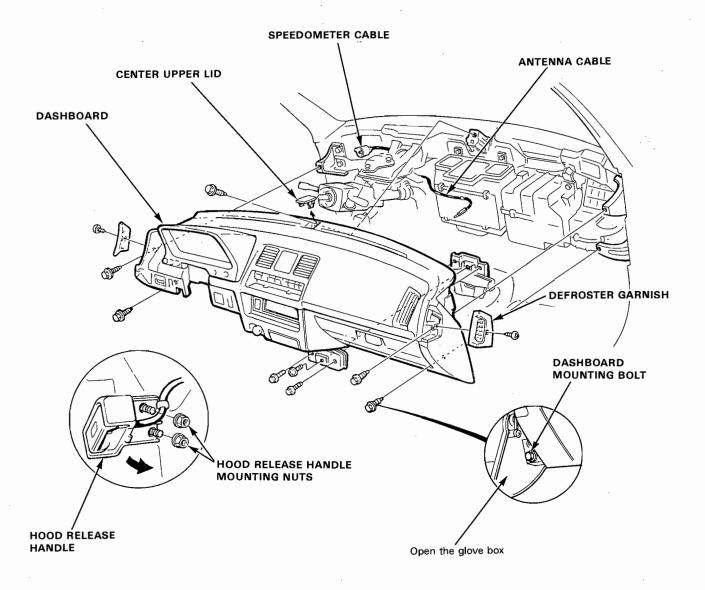


- 6. Disconnect the ground cable at right of the steering column.
- 7. Lower the steering column.
- 8. Disconnect the air mix cable.





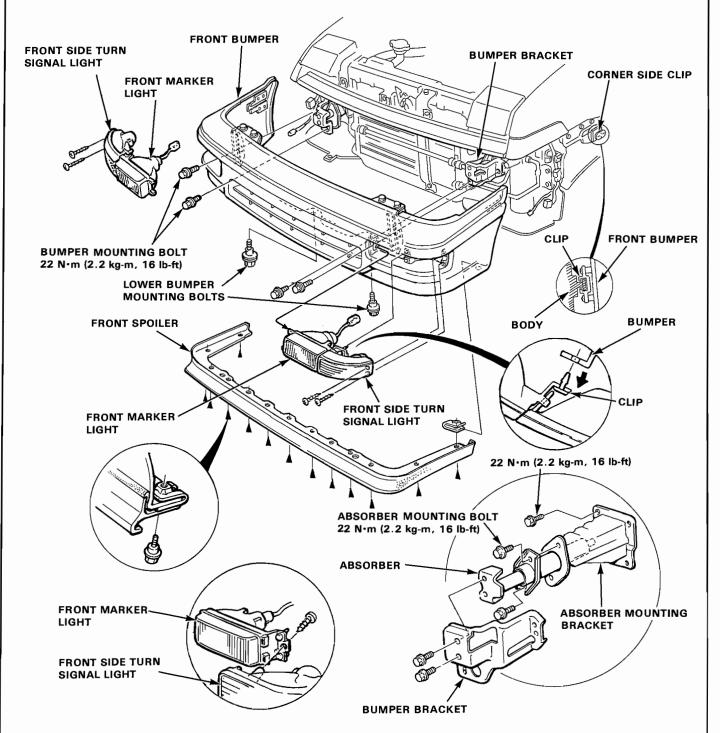
- 9. Disconnect the antenna cable.
- 10. Remove the 2 mounting nuts for the hood release handle.
- 11. Remove the center upper lid from top of the dashboard.
- 12. Remove the defroster garnishes from both ends of the dashboard.
- 13. Remove the 7 bolts and screw. Lift the dashboard, and disconnect the 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 and front marker lights, then disconnect the wire harness.
- 2. If necessary: Remove the screw, then separate the turn signal light and marker light.
- 3. Remove the 2 lower bumper mounting bolts.
- 4. Remove the 4 bumper mounting bolts, then remove the bumper by silding it forward.
- 5. To remove the bumper brackets and remove the absorber mounting bolts, then remove the absorber.



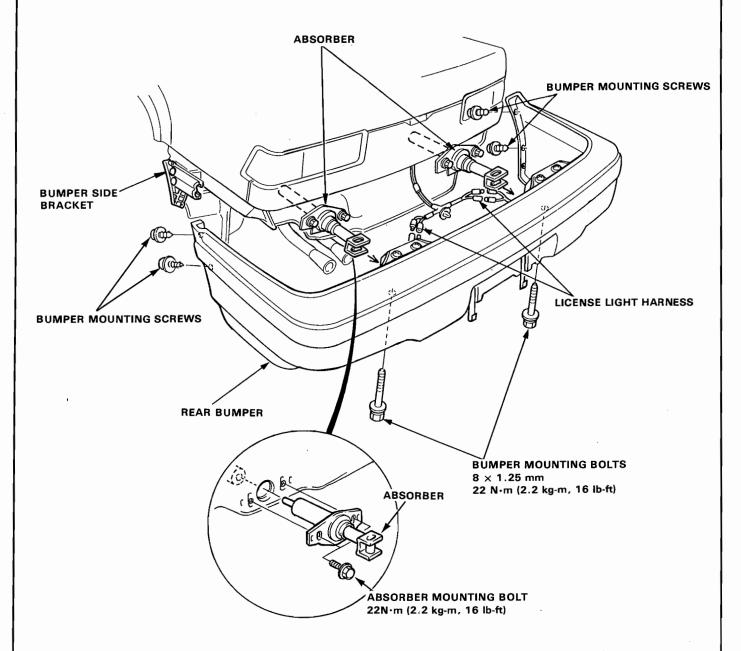
Installation sequence is essentially the reverse order of removal. After installing, check that the corner slide crips on the body engage the grooves of the retainers at the rear edge of the bumper.

### Rear Bumper



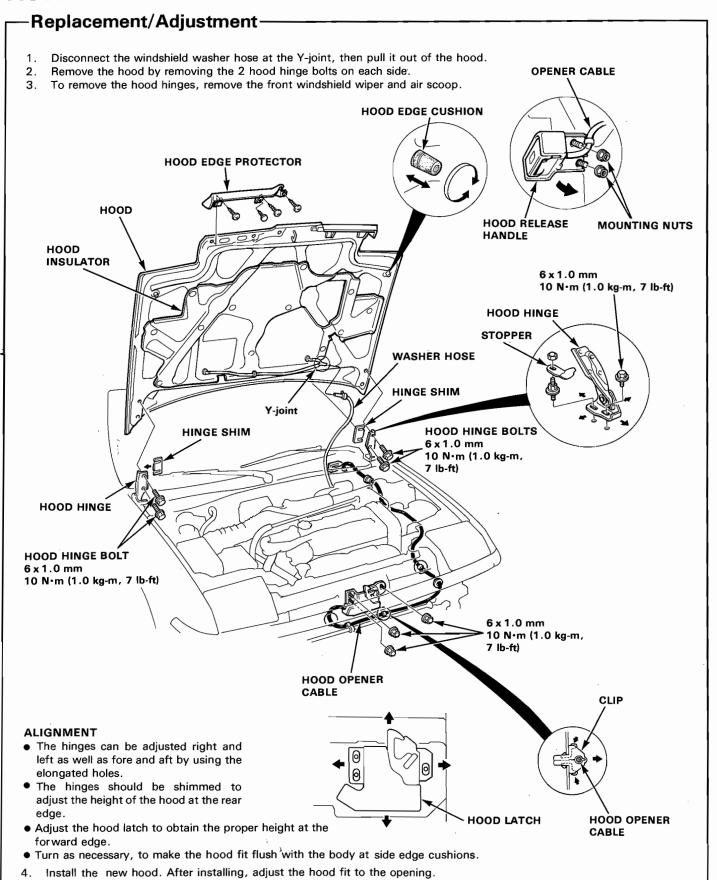
#### Replacement -

- 1. Remove the 2 bumper mounting screws on each side at the rear edge of the bumper.
- 2. Remove the 2 bumper mounting bolts.
- 3. Pull the bumper toward you, then disconnect the wire harness.
- 4. Remove the bumper by silding it to the rear, and remove the absorber mounting bolts, then remove the absorber.



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

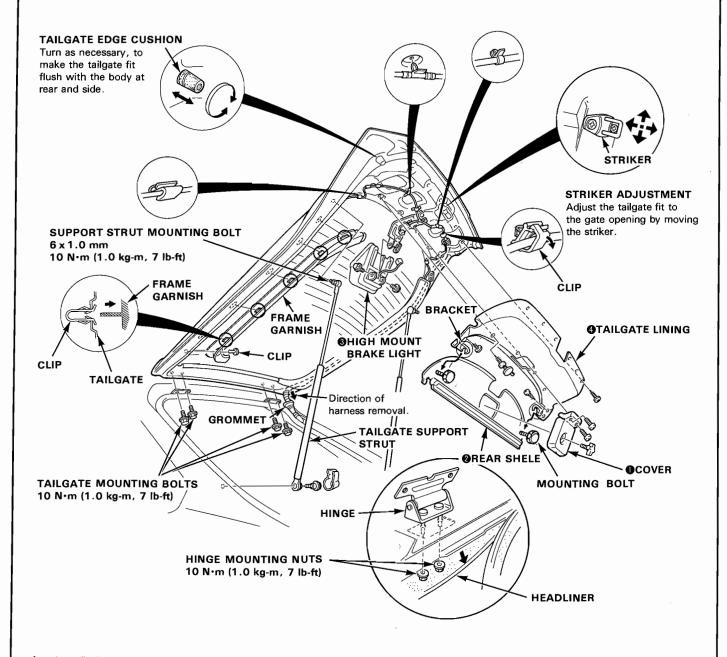


### **Tailgate**



#### Replacement/Adjustment -

- 1. Remove the tailgate lining by removing the numbered sequence as shown.
- 2. Pull the wire harness out of the tailgate.
  - NOTE: Before pulling out the wire harness, tie a string to the end of it so you can pull it back in when the tailgate is reinstalled.
- 3. Remove the tailgate support struts and tailgate mounting bolts, then remove the taligate.
  - NOTE: Let an assistant hold the tailgate when removing the struts and take care not to damage the roof panel. If necessary:
  - Lower the rear of the headiner just enough to gain access to the hinge mounting nuts, then remove the hinge by ermoving the hinge mounting nuts.

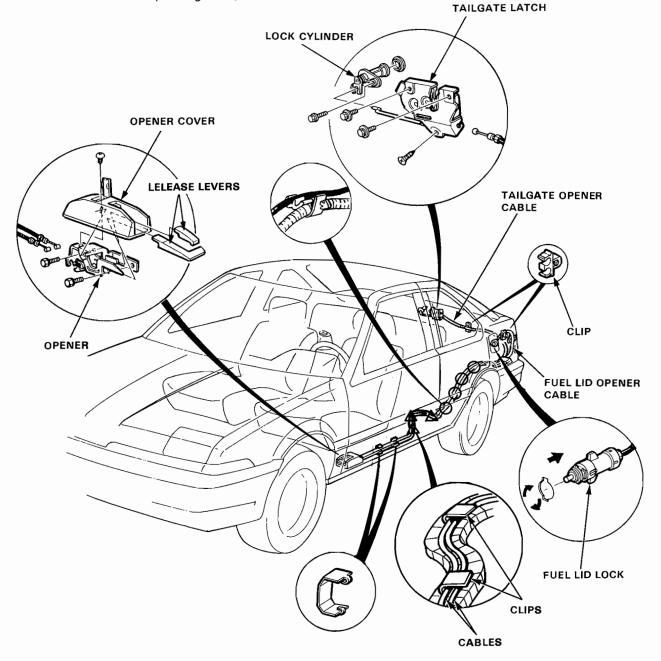


- 4. Installation sequence is essentially the reverse order of removal. However, observe the following:
  - Before tightening the hinge nuts, adjust the tailgate fit and striker.
  - Use care when pulling the wire harness back in to avoid damaging the body.
  - Coat the inside and outside of the grommet with sealant.

### **Opener and Latch**

#### Replacement-

- 1. Remove the rear trim panel (pages 20-42, 43)
- 2. Disconnect the rod and the opener cable, then remove the latch by removing the 2 bolts and 1 screw.
- 3. Remove the bolt, then remove the lock cylinder.
- 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 door sill moldings, left half of carpet, left quater trim panel.
  - Left rear trunk side panel.
- 6. Remove the fuel lid lock by turning it 90°.



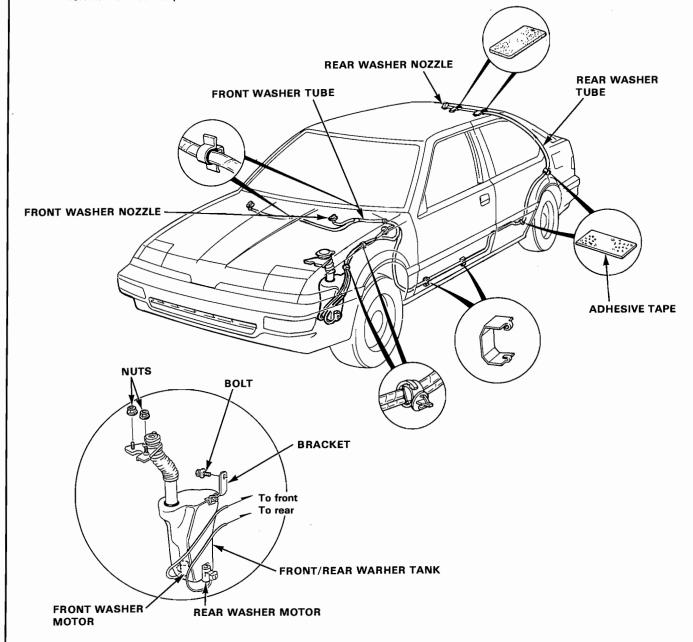
To install, reverse the removal procedure. Check that the tailgate and fuel lid opener cables are routed and connected properly.

### Windshield Washer



#### Replacement -

- 1. Remove the vacuum tank and cruise control actuator.
- 2. Remove the washer tank by removing the 2 nuts and 1 bolt.
- 3. Disconnect the hoses and wire harness from the front and rear windshield washer motors.
- 4. 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.
- 5. To remove the rear washer hose, first remove the:
  - Door sill molding, quarter trim panel, rear pillar trim panel and rear half of headliner.
  - Left half of floor carpet.



- 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.

### Rear Spoiler/Side Sill Panel

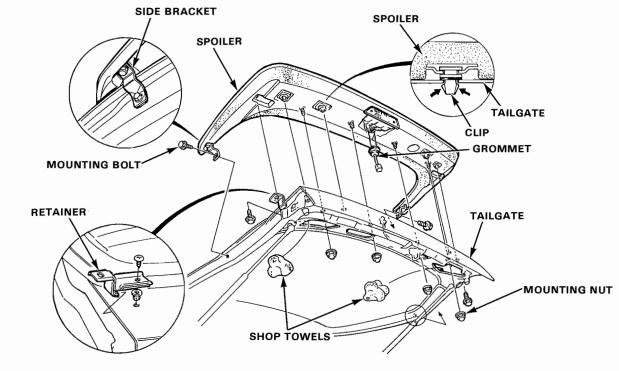
#### -Rear Spoiler Replacement -

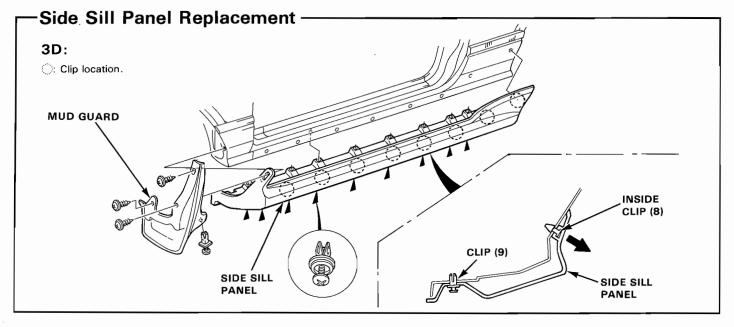
#### 3D:

- 1. Remove the tailgate lining (page 20-61).
- 2. Remove the rear wiper and wiper motor (See section 23).
- 3. Remove the clips and mounting nuts from tailgate of inside.

  NOTE: Do not drop the mounting nuts into the tailgate panel inside.
- 4. Remove the right and left side mounting bolts, then remove the rear spoiler, and disconnect the high mount brake light connector.
- 5. Install the reverse order of removal.

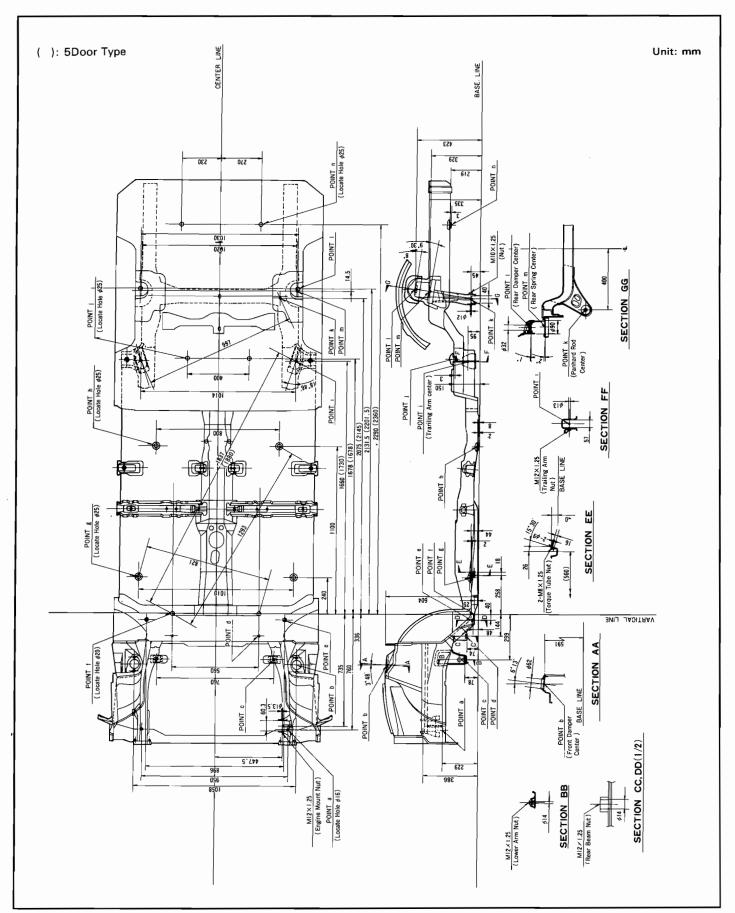
NOTE: Coat the inside and outside of the grommet with sealant.





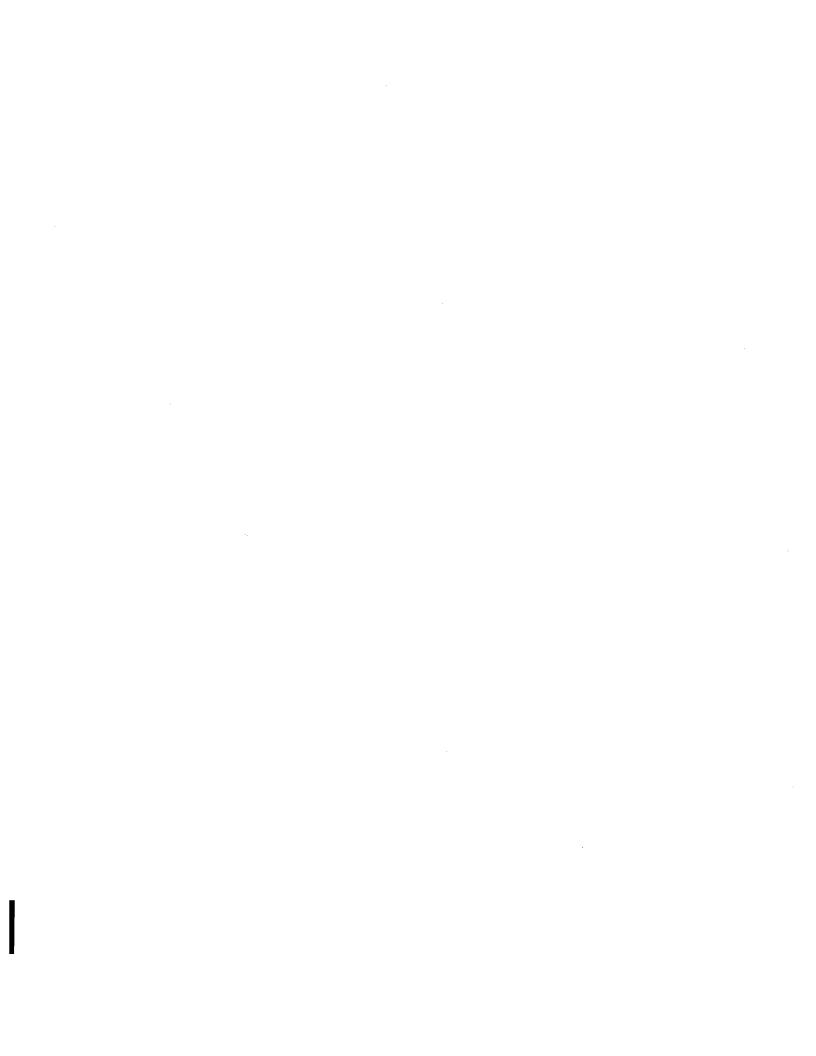
### Frame Repair Chart





### **Heater and Air Conditioner**

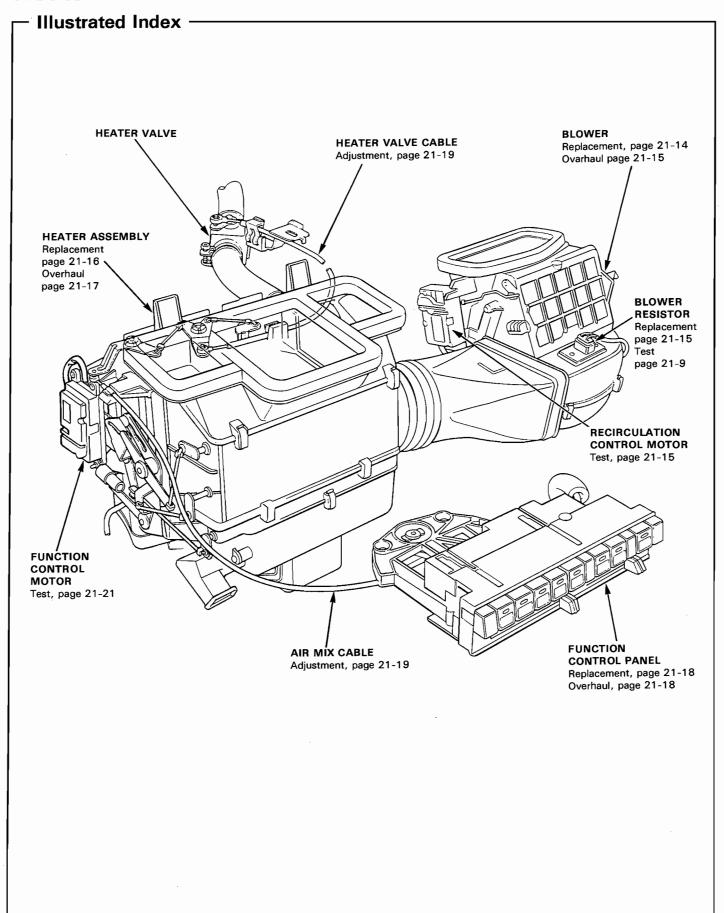
Heater	.21 –	1
Air Conditioner	.22 –	1



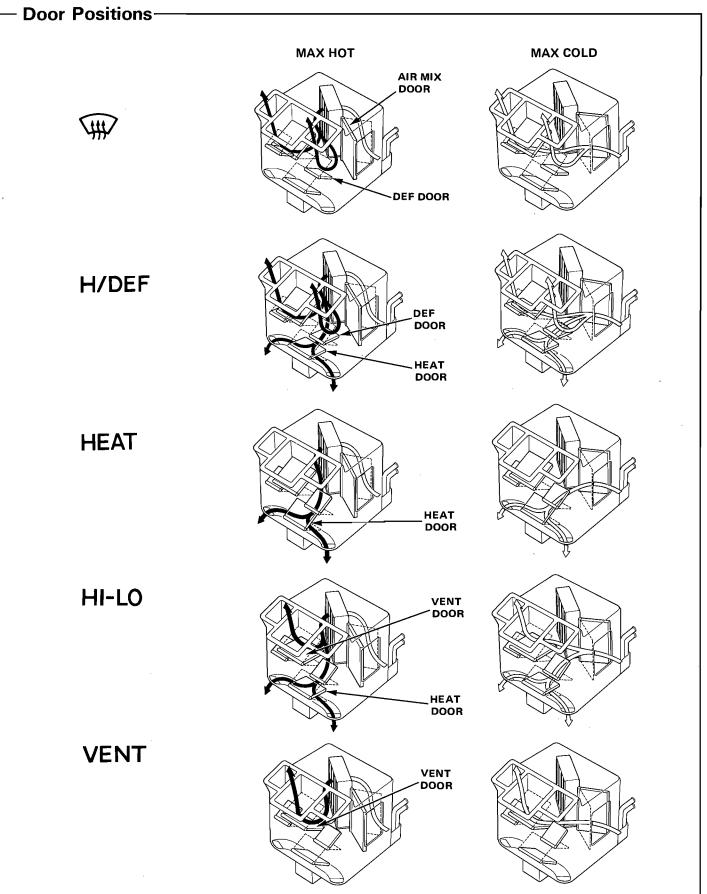
### Heater

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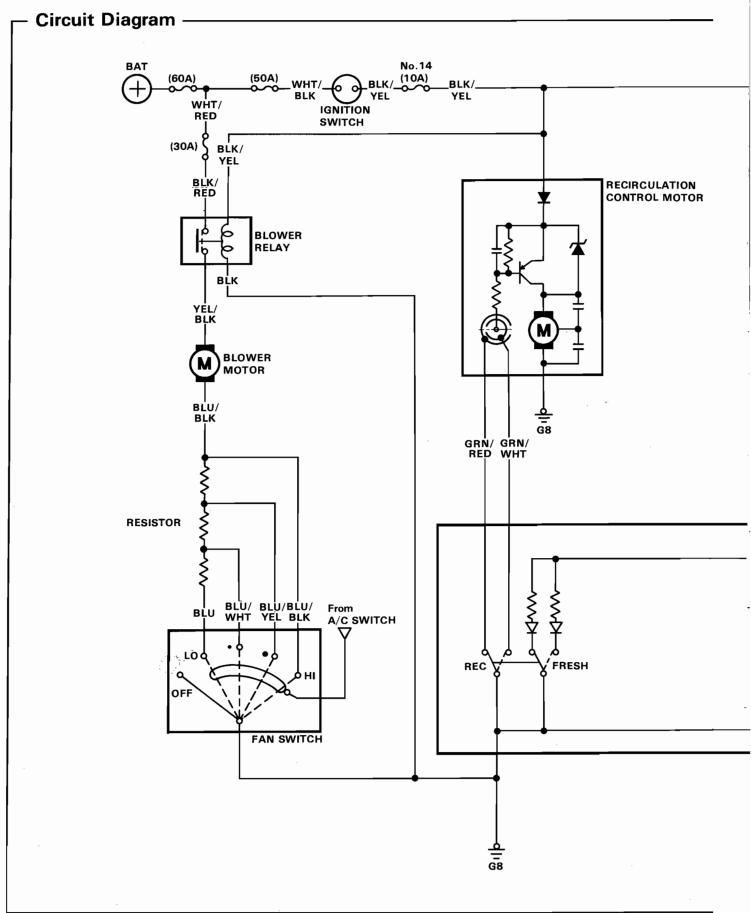
### Heater

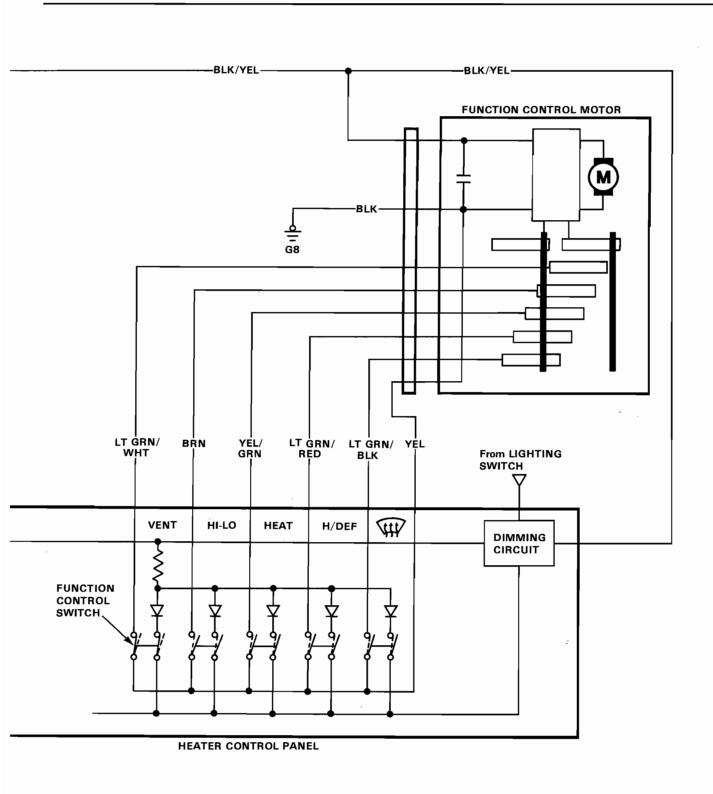






### Heater



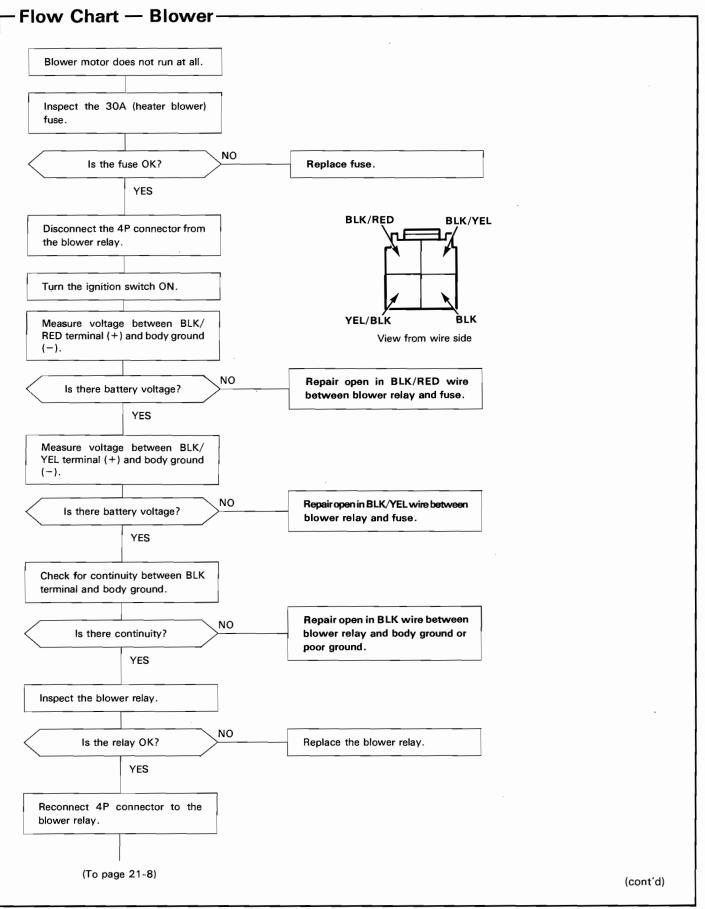


## **Troubleshooting**

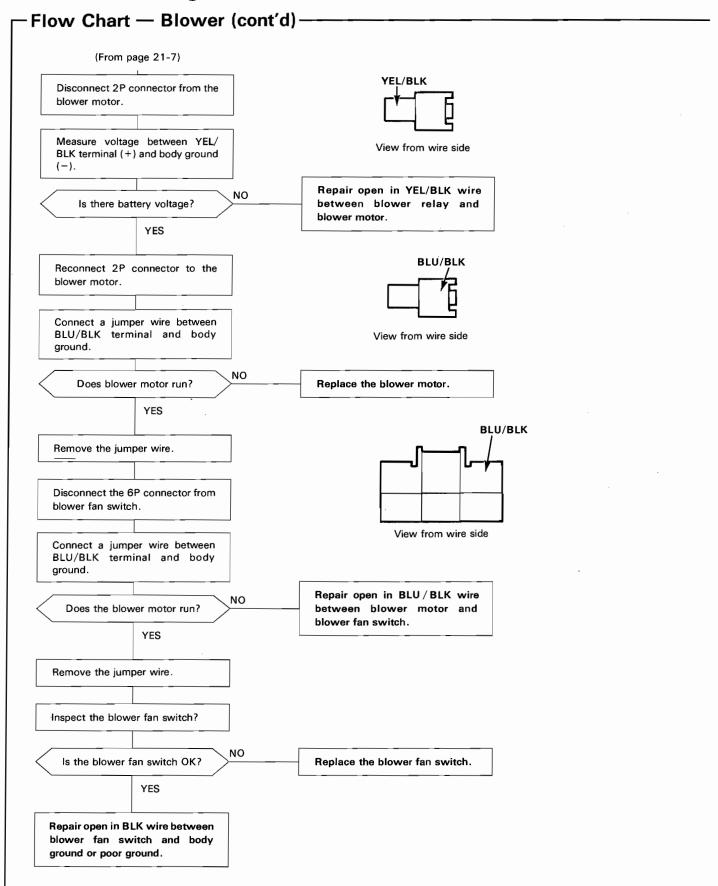
### Symptom Chart ——

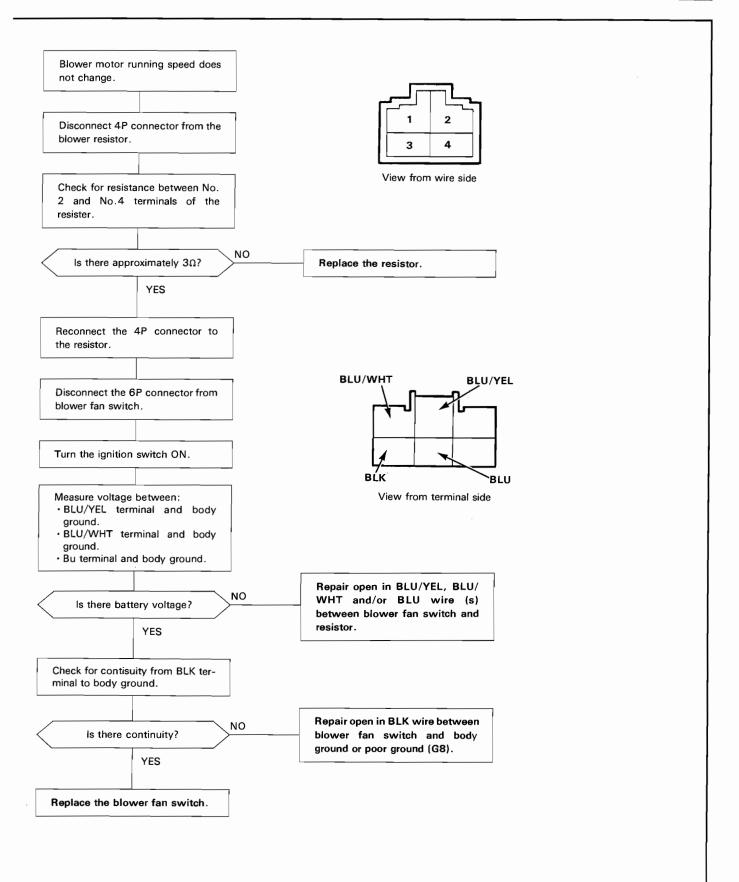
SYMPTOM		REMEDY
No hot air flow	Blower motor does not run	See flow chart (page 21-7)
	Blower motor runs	Check following: Clogged heater duct Clogged blower outlet Clogged heater valve Faulty air mix door Air mix cable out of adjustment Faulty thermostat (section 22)
Hot air flow is low	Blower speed does not change	See flow chart (page 21-9)
	Blower runs properly	Check following:
Function does not change	Function control motor does not run	See flow chart (page 21-10)
	Function control motor runs	Check the heater door linkage and cable adjustments.
Recirculation door does not change	Recirculation motor does not run	See flow chart (page 21-12)
	Recirculation motor runs	Check the door linkage then see flow chart (page 21-12)



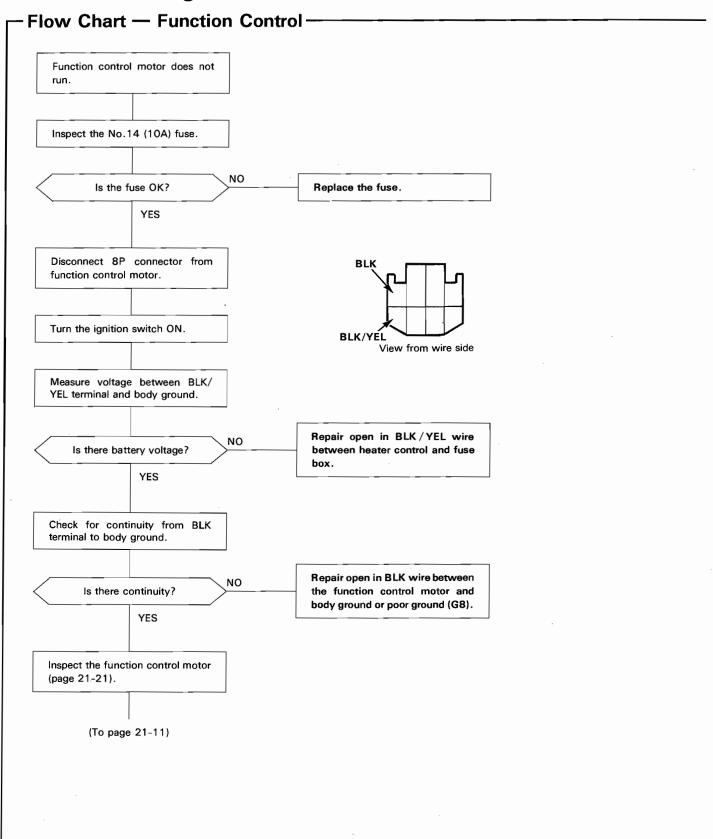


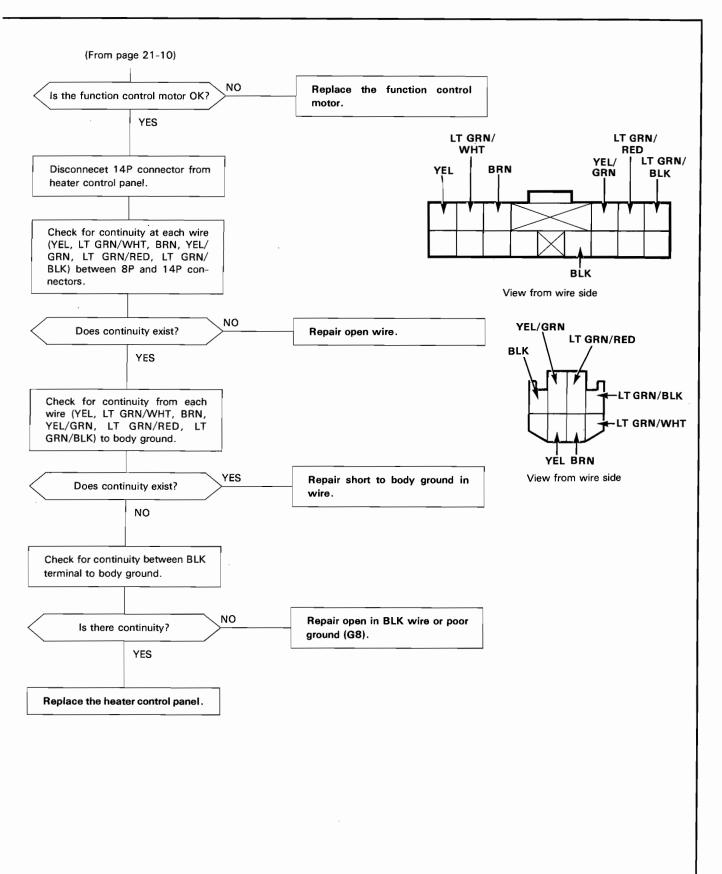
## **Troubleshooting**



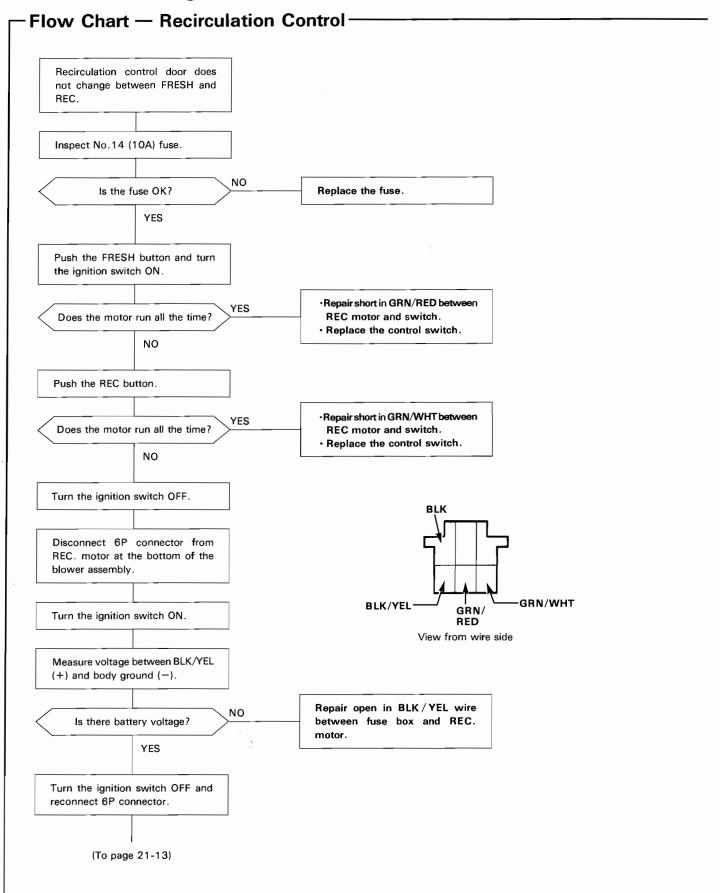


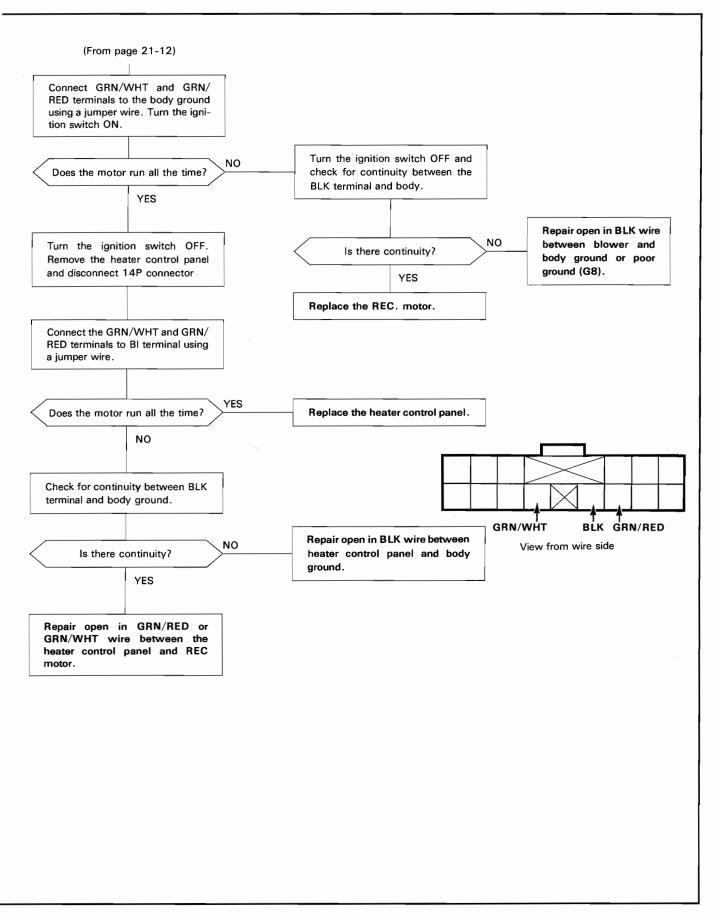
## **Troubleshooting**





## **Troubleshooting**

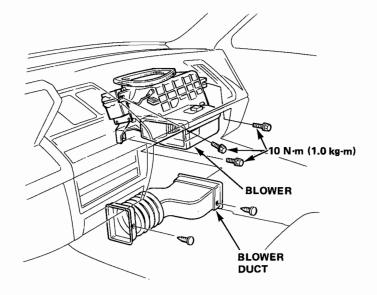


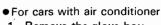


### **Blower**

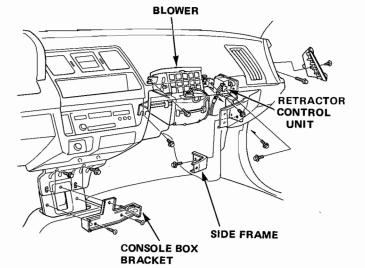
### -Replacement

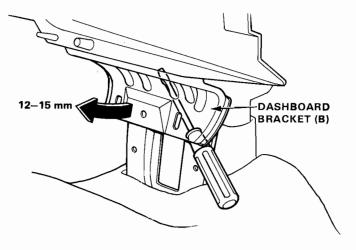
- For cars without air conditioner
- 1. Remove the glove box.
- 2. Remove the glove box frame.
- Remove the blower duct.
- 4. Disconnect the wire connections from the blower.
- 5. Remove the bolts (3) for the blower.
- 6. Remove the blower.
- 7. Install the blower in reverse order of removal and make sure that there is no air leakage.





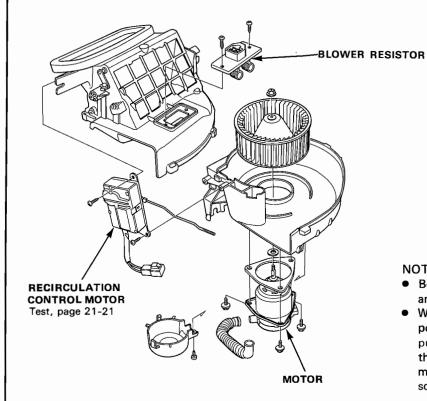
- 1. Remove the glove box.
- 2. Remove the glove box frame and side frame.
- 3. Remove the bolts (2) and the retractor control unit with bracket.
- 4. Remove the console box (Section 20).
- Remove the bolts (2), the screws (3) and the console box bracket.
- Unbolt dashboard lower bracket (A) from bracket (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.





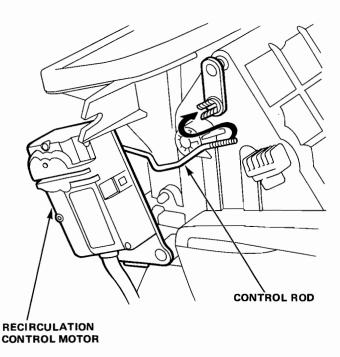


### Overhaul-



#### 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 FRESH/REC switch to "REC" and open the air door, then connect the control rod to the arm while holding the air door open.

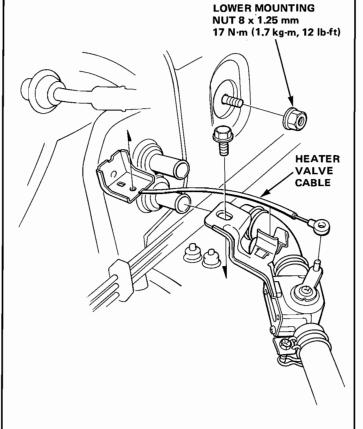
## **Heater Assembly**

### -Replacement-

- 1. Drain the coolant at the radiator.
- 2. Disconnect the heater hoses at the firewall.

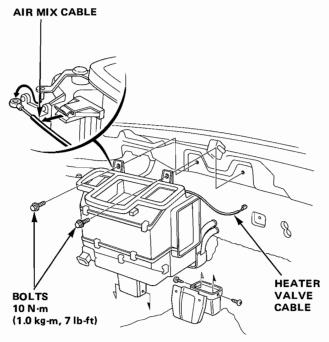
NOTE: Coolant will run out when the hoses are disconnected; drain it into a clean drip pan.

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.
- 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 21-19)

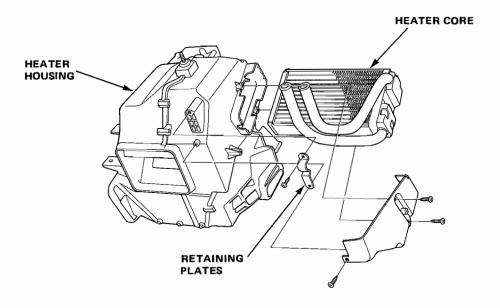


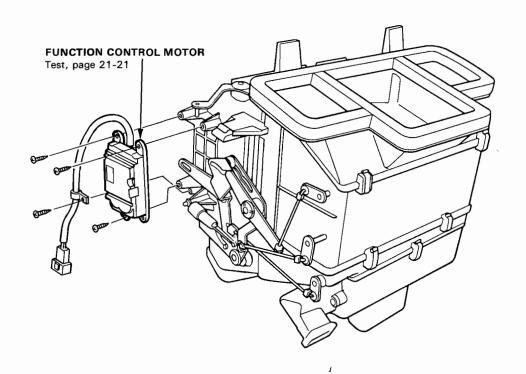
### Overhaul -

- 1. Remove the heater assembly.
- 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:

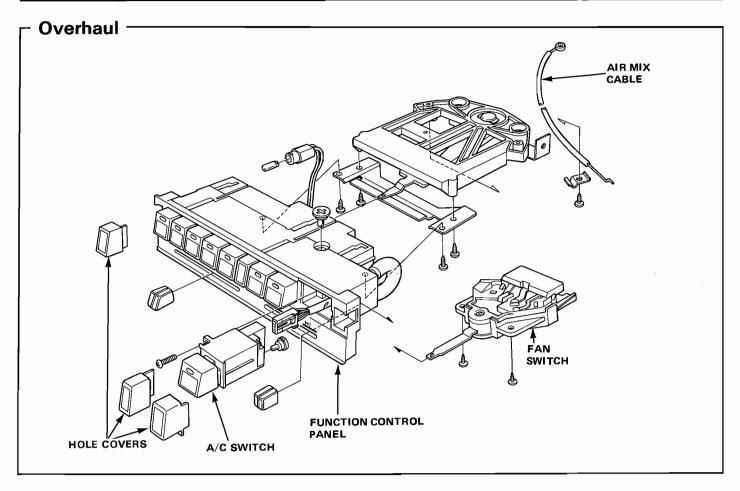
Loosen the bleed bolt on the engine and refill the radiator and reservoir tank with the proper coolant mixture. Tighten the bleed bolt when all the trapped air has escaped and coolant begins to flow from it.





## **Function Control Panel**

## - Replacement 1. Remove the glove box. 2. Remove the rear mounting screw (1) for the function control panel. Remove the hole covers (2). 4. Remove the screws (2). 5. Disconnect the air mix cable. 6. Remove the function control panel. 7. Disconnect the connectors. 8. Install in the reverse order of removal. HOLE COVERS **FUNCTION** CONTROL PANEL REAR MOUNTING **SCREW**



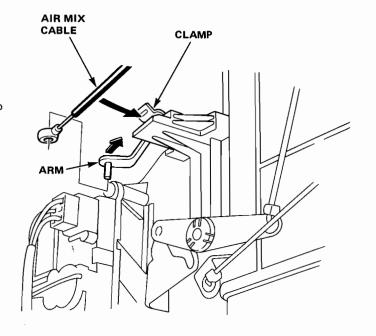
### **Control Cables**



### -Adjustment -

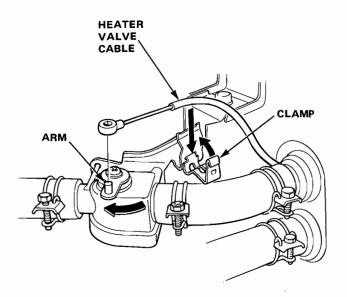
#### • Air Mix Cable

- 1. Slide temperature control lever to HOT.
- 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.



### **Test**

### - Panel Switches

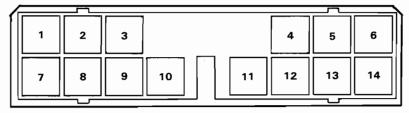
Use the digital multimeter (KS-AHM-32-003) to check

### FRESH/REC Switch

Check for continuity between the terminals, as shown in the chart:

Terminal Position	12	11	10
REC	0-		
FRESH		0	

**Control Panel Connector:** 



#### **Function Switch**

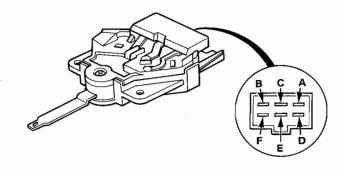
Check resistance between the terminals, as shown in the chart:

	Terminal NO.	1	2	3	4	5	6
Position		'					
VENT		0					
HI-LO		0		<del></del> 0			
HEAT		0			<del></del> 0		
H/DEF		O					
<b>W</b>		0					

#### Fan Switch

Check for continuity between the terminals as shown in the chart:

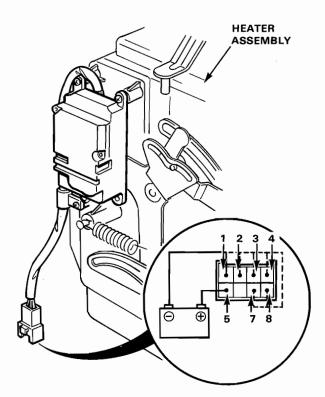
Terminal Position	A	В	С	D	E	F
OFF						
LO	0	_0_	-0			
•	0-	-0-		0		
•	0	<del>-</del> 0-			_	
н	0	0				0





### **Function Control Motor -**

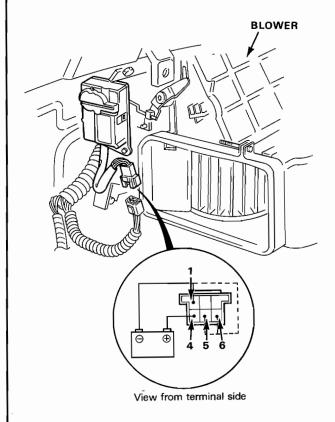
- Connect the battery positive terminal to the 5 terminal of the function control motor and negative to the 1 terminal.
- Using a jumper wire short the 1 terminal to the 2, 3, 4, 7 and 8 terminals in order.
  - The motor should run each time the short circuit is made.



View from terminal side

### **Recirculation Control Motor**

- Connect the battery positive to the 4 terminal of the recirculation control motor connector and negative to 1 terminal.
- 2. Using a jumper wire connect the 1 terminal and 5 or 6 terminal.
  - From the recirculation door REC position, the motor should turn with the 1 terminal connected to 6 terminal.
  - From the door FRESH position, the motor should turn with the 1 terminal connected to 5 terminal.
- The motor automatically stops after half turn with the jumper wire connected.

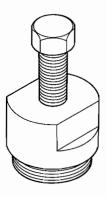


## **Air Conditioner**

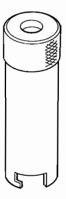
Special Tools	22-2
Illustrated Index	
Circuit Diagram	
Troubleshooting	
Performance Test	22 – 15
Service Tips	
Discharge Procedure	
Condenser	
Replacement	22 – 18
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Replacement	22 – 19
Overhaul	22-21
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System Evacuation	22-28
Leak Test	22-28
Charging Procedure	22-29
Test	
A/C Switch	22-30
A/C Switch Inputs	22 – 30
Thermostat	22-31
Relay	22-31
Diode	22 – 31

## **Special Tools**

Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07933-6920001 Commercially Available in U.S.A.	A/C Clutch Puller Seal Remover/Installer	1 1	22—24 22—25, 26







2

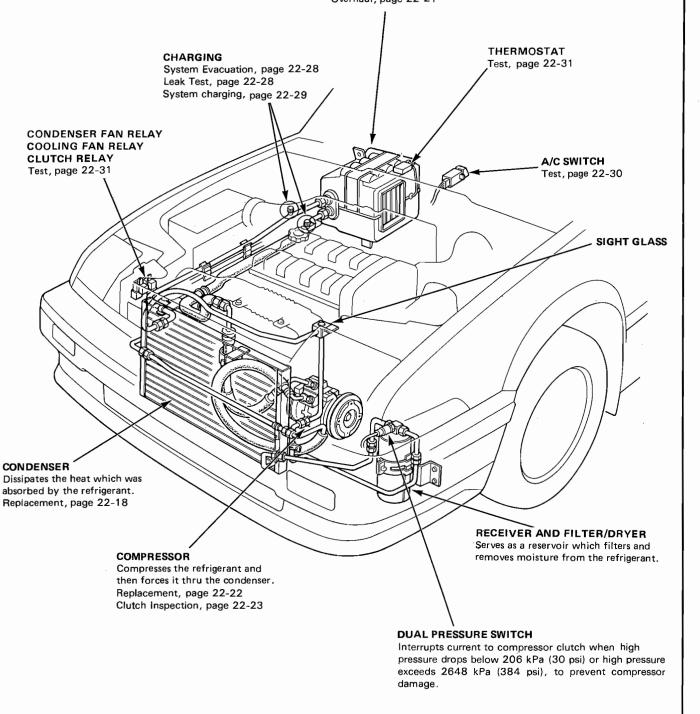
## **Illustrated Index**



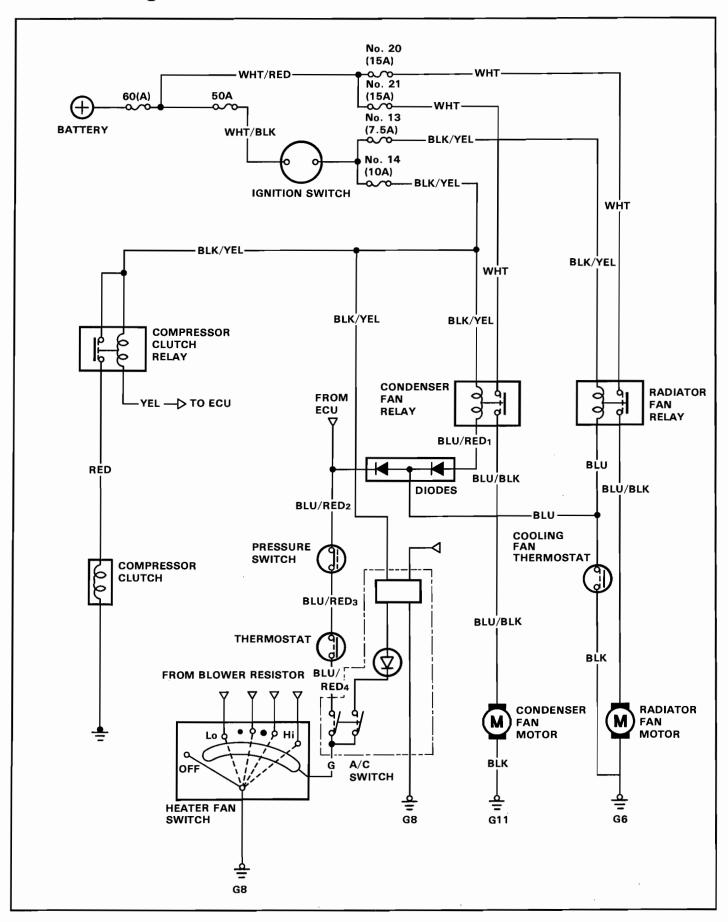
#### A/C high side adapter:

The A/C high side charging fitting's O.D. size is reduced from 7/16" to 3/8" to prevent you from accidentally con- EVAPORATOR necting the low side hose to the high side fitting. Conse- As refrigerant circulates, heat is quently, you'll need an adapter for the existing hose on absorbed from the surrounding your charging station.

passenger compartment air. Replacement, page 22-19 Overhaul, page 22-21



## **Circuit Diagram**







## -Symptom Chart -

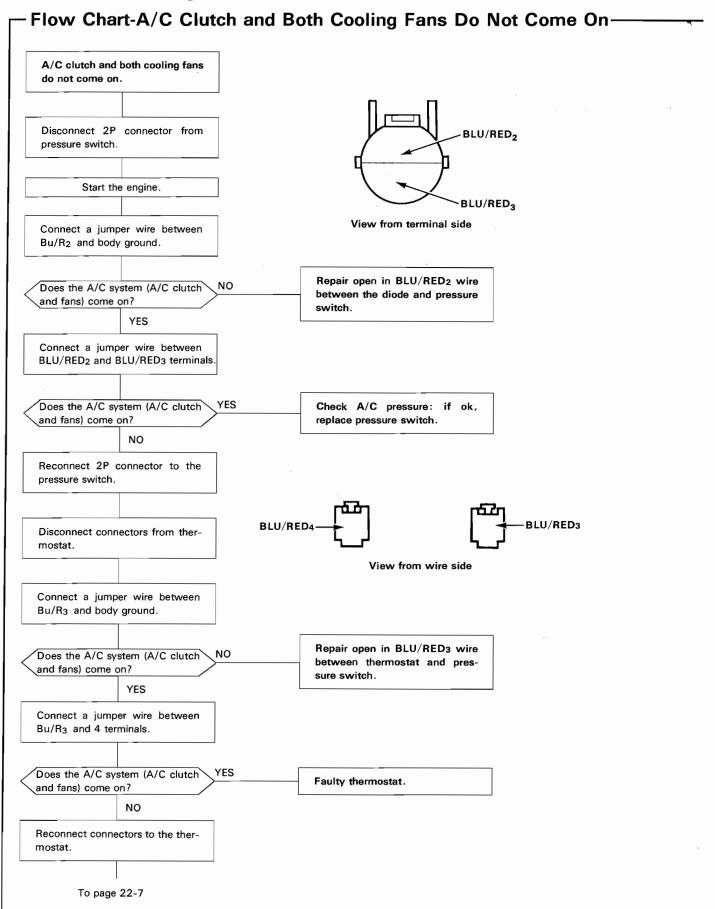
- · Any abnormality must be corrected before continuting the test.
- · Because of the precise measurements needed, use a voltmenter and ammeter when testing.

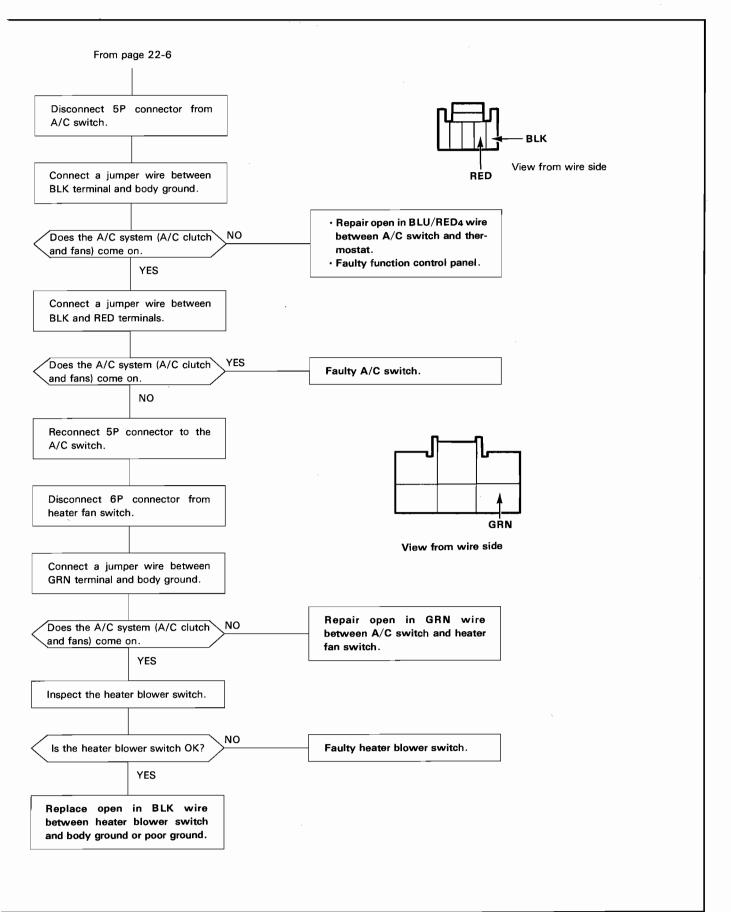
Before performing any troubleshooting procedures check:

- Fuses No.13, 14, 20, 21
- · Grounds No. 6, 8, 11
- · All electrical connections are clean and tight.

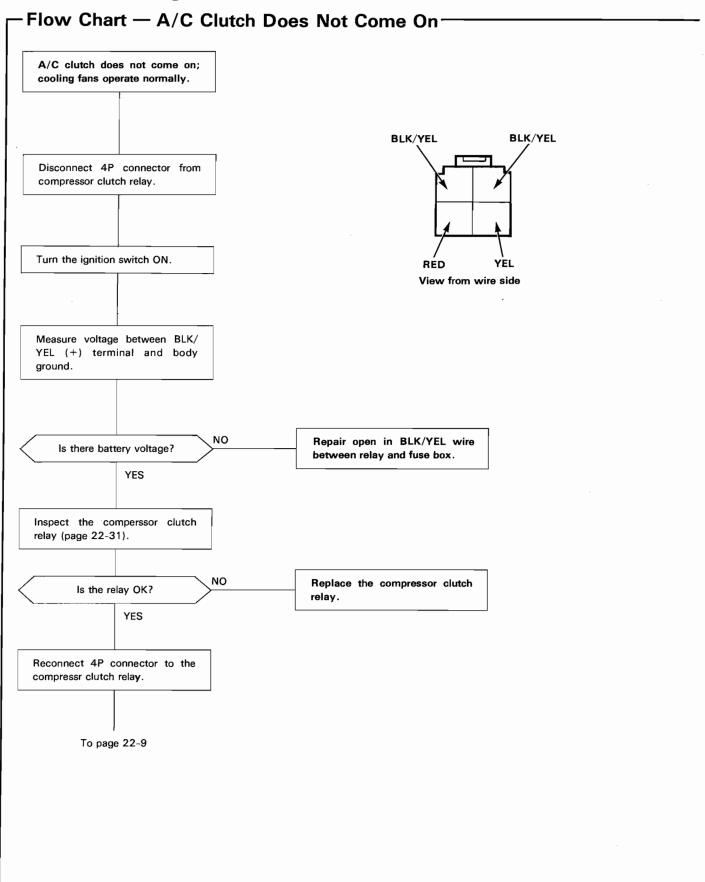
SYMPTOM	REMEDY
A/C clutch and both cooling fands do not come on.	See flow chart page 22-6.
A/C clutch does not come on; the cooling fans operate normally.	See flow chart page 22-8.
One cooling fan does not come on; the A/C clutch operates normally.	See flow chart page 22-10.
Both cooling fans do not come on; the A/C clutch operates normally.	See flow chart page 22-12.

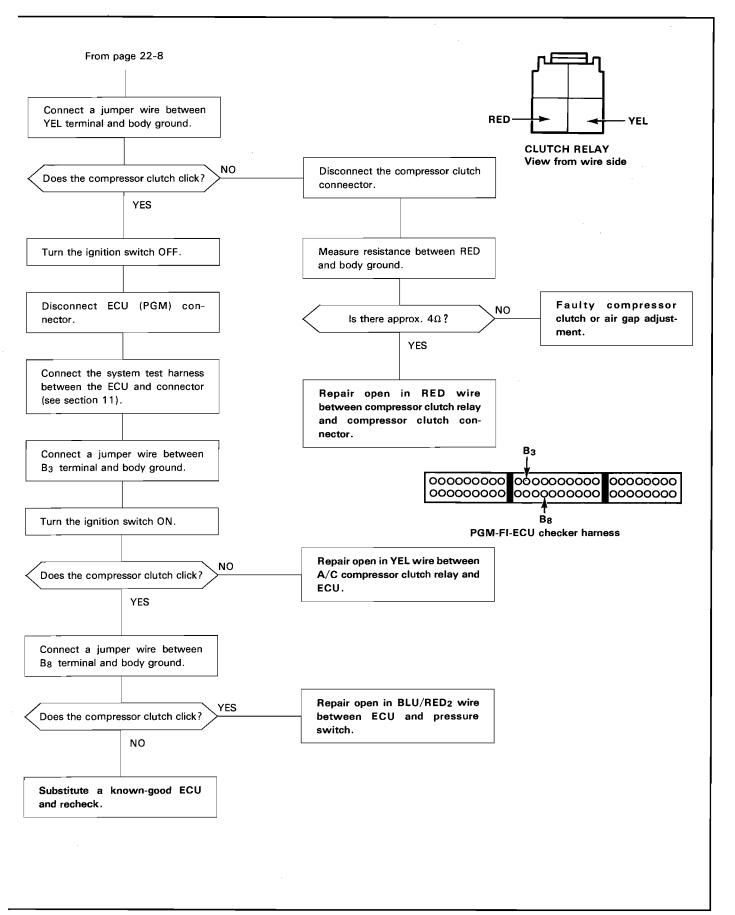
## **Trobuleshooting**





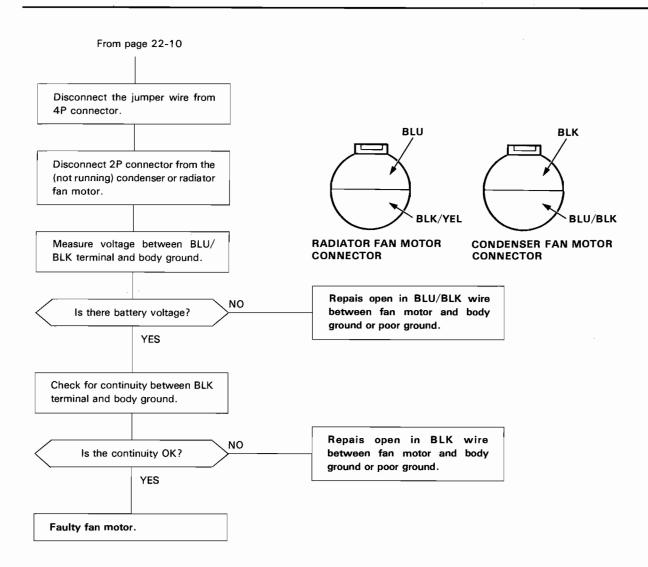
## **Trobleshooting**



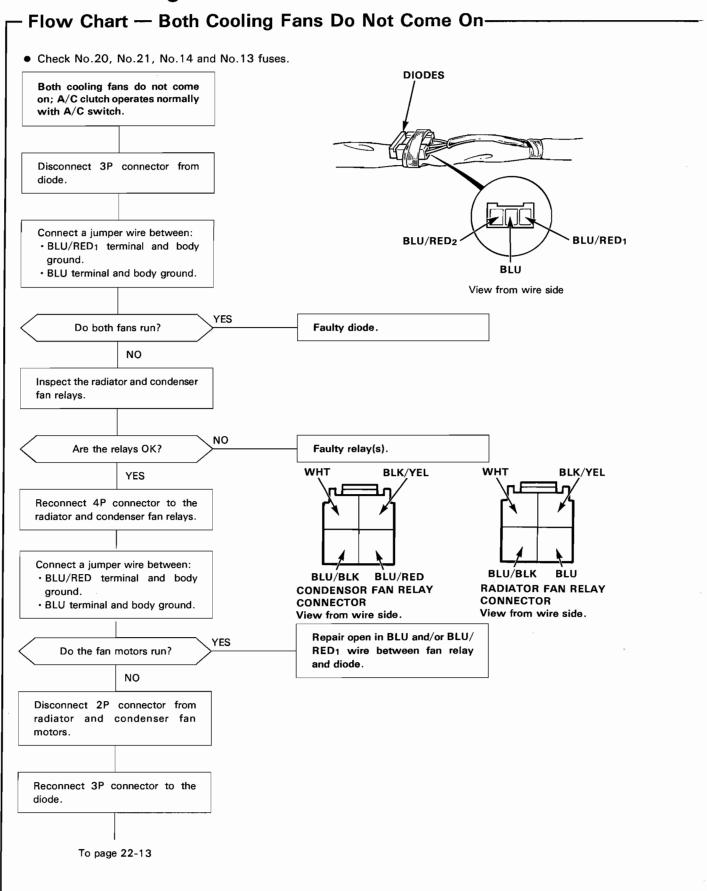


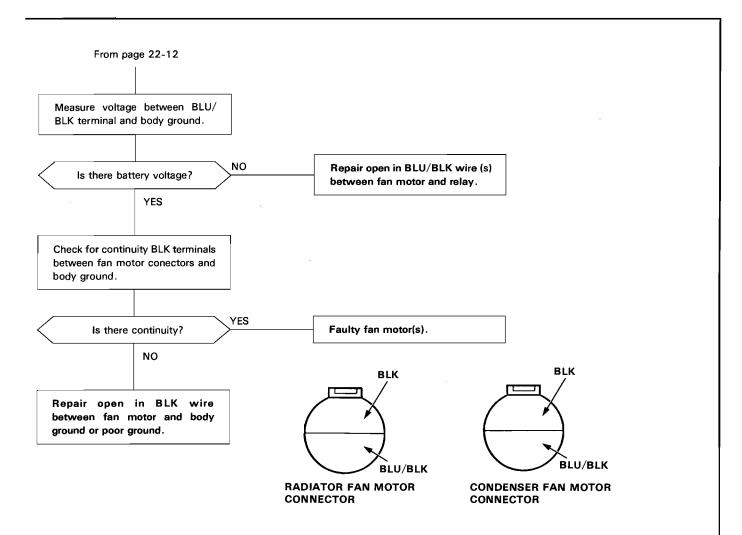
## **Trobleshooting**

### -Flow Chart — Cooling Fan Does Not Come On-• Check for No. 20, No. 21, and No. 13 fuses. One cooling fan does not come on; A/C clutch operates normally with the A/C switch. **BLK/YEL BLK/YEL** WHT Disconnect 4P connector from (not running) radiator or condenser fan relay. Turn the ignition switch ON. BLU/BLK BLU/BLK **RADIATOR FAN RELAY CONDENSOR FAN RELAY** CONNECTOR CONNECTOR View from wire side. Measure voltage between WHT View from wire side. terminal (+) and body ground. NO Repair open in WHT wire Is there battery voltage? between the fuse and relay. YES Connect a jumper wire between WHT (+) and BLU/BLK terminals. Does the condensor (or radiator) fan motor come on. To page 22-11 YES Measure voltage between BLK/ YEL wire (+) and body ground. NO Repair open in BLK/YEL wire Is there battery voltage? between the fuse and relay. YES Check the relay (page 22-31). Is the relay OK? Replace the relay. YES Faulty diode or repair open in BLU / RED (or BLU) wire between the relay and diode.



## **Trobleshooting**





## A/C System -

NOTE: Performance Test on page 22-15.

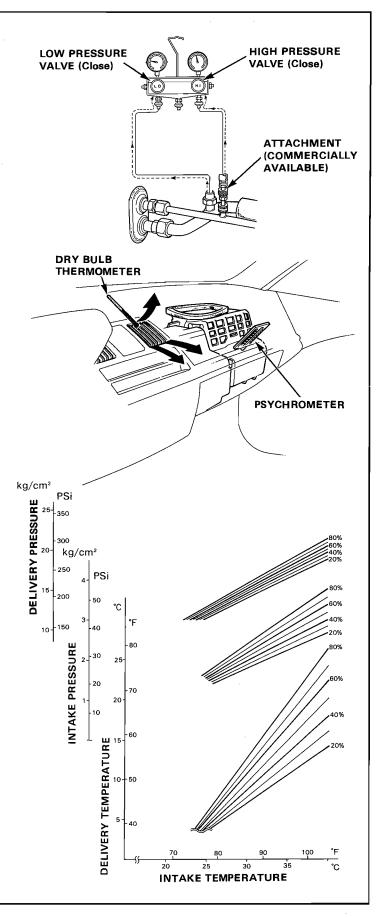
TEST RESULTS	RELATED SYMPTOMS	PROBABLE CAUSE	REMEDY
Discharge (high) pressure abnormally high	After stopping compressor, pressure drops to about 196 kPa (28 psi) quickly, and then falls gradually	Air in system	Evacuate system; then recharge Evacuation: page 22-28 Recharging: 22-29
	No bubbles in sight glass when con- denser is cooled by water	Excessive refrigerant in system	Discharge refrigerant as required
	Reduced or no air flow through condenser.	Clogged condenser or radiater fins     Condenser or radiator fan not working properly	Clean     Check voltage and fan rpm
	Line to condenser is excessively hot	Restricted flow of refrigerant in system	Expansion valve
Discharge pressure abnormally low	Excessive bubbles in sight glass; con- denser is not hot	Insufficient refrigerant in system	· Charge system · Check for leak
,	High and low pressures are balanced soon after stopping compressor	Faulty compressor discharge or inlet valve Faulty compressor seal	Replace compressor  Repair
	Outlet of expansion valve is not frosted, low pressure gauge indicates vacuum	· Faulty expansion valve	Repair or Replace
Suction (low) pressure abnormally low	Excessive bubbles in sight glass; condenser is not hot Expansion valve is not frosted and low pressure line is not cold. Low pressure gauge indicates vacuum.	Insufficient refrigerant  · Frozen expansion valve  · Faulty expansion valve	Check for leaks. Charge as required. Replace expansion valve
	Discharge temperature is low and the air flow from vents is restricted	Frozen evaporator	Run the fan with compressor off then check the thermostat and capillary tube.
	Expansion valve frosted	Clogged expansion valve	Clean or Replace
	Receiver dryer is cool (should be warm during opration)	Clogged receiver dryer	Replace
Suction pressure abnormally high	Low pressure hose and check joint are cooler than around evaporator	Expansion valve open too long     Loose expansion valve	Repair or Replace
	Suction pressure is lowered when con- denser is cooled by water	Excessive refrigerant in system	Discharge refrigerant as necessary
	High and low pressure are equalized as soon as the compressor is stopped	<ul> <li>Faulty gasket</li> <li>Faulty high pressure valve</li> <li>Foreign particle stuck in high pressure valve</li> </ul>	Replace compressor
Suction and discharge pressures abnormally high	Reduced air flow through condenser	<ul> <li>Clogged condenser or radiator fins</li> <li>Condenser or radiator fan not working properly</li> </ul>	Clean condenser and radiator     Check voltage and fan rpm
	No bubbles in sight glass when con- denser is cooled by water	Excessive refrigerant in system	Discharge refrigerant as necessary.
Suction and discharge pressure	Low pressure hose and metal end areas are cooler than evaporator	Clogged or kinked low pressure hose parts	Repair or Replace
abnormally low	Temperature around expansion valve is too low compared with that around receiver-driver.	Clogged high pressure line	Repair or Replace
Refrigerant leaks	Compressor clutch is dirty	Compressor shaft seal leaking	Replace compressor shaft seal
	Compressor bolt(s) are dirty	Leaking around bolt(s)	Replace compressor
	Compressor gasket is wet with oil	Gasket leaking	Replace compressor

### **Performance Test**



The performance test will help deterimine if the air conditioning system is operating with specifications.

- Connect gauges as shown.
- Insert a thermometer in the vent outlet. Determine the relative humidity and ambient air temperature by a portable weather station or calling the local weather station.
- 3. Test conditions:
  - Avoid direct sunlight.
  - Open engine hood.
  - Open front doors.
  - Set the temperature control dial to max cold and push the VENT and fresh air buttons.
  - Turn the fan switch to HI.
  - Run the engine at 1,500 RPM.
  - No driver or passengers in vehicle.
- 4. After running the air conditioning for 10 minutes under the above conditions, read the delivery temperature from the thermometer in the dash vent and the high and low system pressure from the A/C gauges.
- 5. To complete the charts:
  - Mark the delivery temperature along the vertical line.
  - Mark the intake temperature (ambient air temperature) along the bottom line.
  - Draw a line straight up from the air temperature to the humidity.
  - Mark a point one line above and one line below the humidity level. (10% above and 10% below the humidity level)
  - From each point, draw a horizontal line across to the delivery temperature.
  - The delivery temperature should fall between the two lines.
  - Complete the low side pressure test and high side pressure test in the same way.
  - Any measurements outside the lines way indicate the need for further inspection.



### **Service Tips**

#### CAUTION:

- 1. Always disconnect the negative cable from the battery whenever replacing air conditioner parts.
- 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:

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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 bo	Line hose or bolt dia. in (mm)		Application	
5/8 (15.88)		32 (23)	Suction pipe (Evaporator side)     Suction pipe     Suction hose	
Line or hose	1/2 (12.70)	22 (16)	<ul> <li>Discharge pipe (Condenser side)</li> <li>Discharge pipe</li> <li>Discharge hose</li> </ul>	
	3/8 (9.53)	17 (12)	Receiver pipe     Receiver pipe joint	
D-I	8 x 35	30 (22)	· Suction hose (Compressor side)	
Bolt	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.

## **Discharge Procedure**

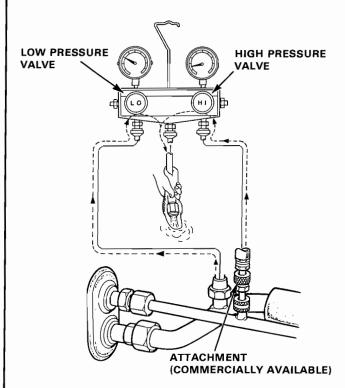


#### **WARNING**

- 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.
- Connect the gauges as shown.
- 2. Disconnect the center hose of the gauge set and place the free end in a shop towel.
- 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.

- 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.
- 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).



NOTE: Set the attachment to the gauge hose at high pressure side first, then install the gauge set as shown. When disconnecting the gauge hose at high pressure side, remove the attachment from the high pressure charging valve.

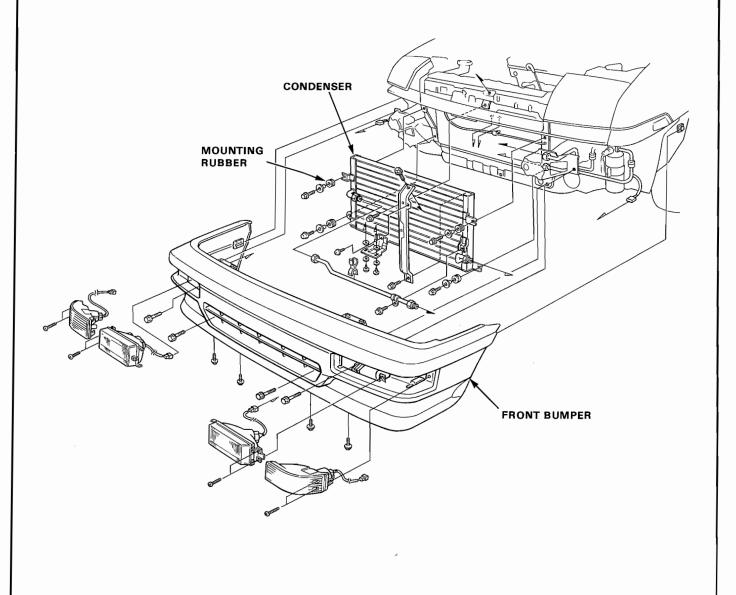
## Condenser

### -Replacement-

- 1. Disconnect the battery negative terminal.
- 2. Remove the front bumper. (Section 20)
- 3. Remove the bolts (3) and the bulkhead bracket.
- 4. Discharge the refrigerant (page 22-17).
- 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.



### **Evaporator**

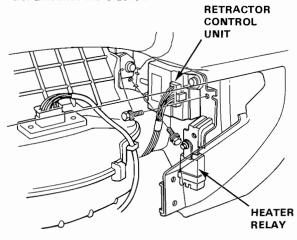
# Tunium T

### -Replacement

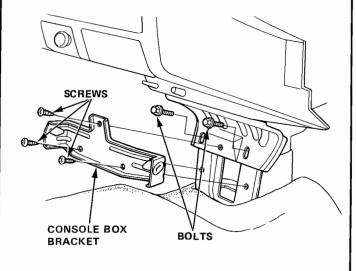
- 1. Disconnect the battery negative terminal.
- 2. Discharge the refrigerant (page 22-17).
- Disconnect the receiver line and suction hose from the evaporator.

CAUTION: Cap the open fittings immediately to keep moisture and dirt out of the system.

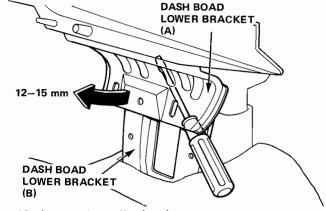
- 4. Remove the screws (2) and the glove box.
- Remove the screws (3), the bolt and the glove box frame.
- Remove the bolts (2) and the headlight retractor control unit with the bracket.



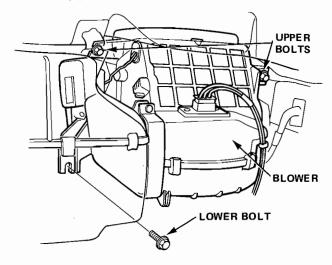
- 7. Remove the console box (section 20).
- Remove the bolts (2), screws (3) and console box bracket.



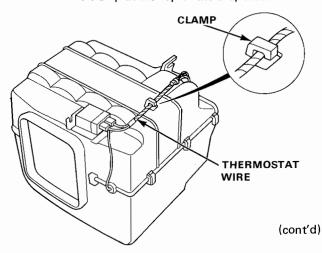
 Unbolt dashboard lower bracket (A) from bracket (B) and insert a screwdriver to pry a 12—15 mm clearance, to ease evaporator removal.



- 10. Loosen the sealing band.
- 11. Remove the lower bolt (1) and loosen the upper bolts (2) for the blower.



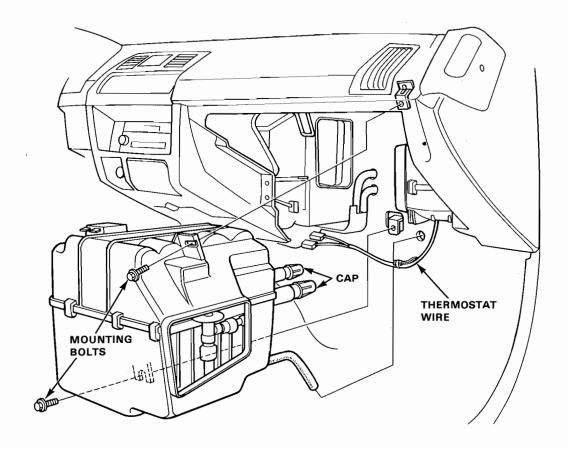
- 12. Slide the blower motor to the right as far as possible.
- 13. Disconnect the drain hose from the evaporator lower housing.
- 14. Remove the bolts (2) and the evaporator.
- 15. Disconnect the thermostat wire, and pull the wire out of the clamp at the top of the evaporator.



## **Evaporator**

## Replacement (cont'd)

- 16. Install the evaporator in the reverse order of removal.
- 17. Charge the system (page 22-28). Test performance (page 22-15).



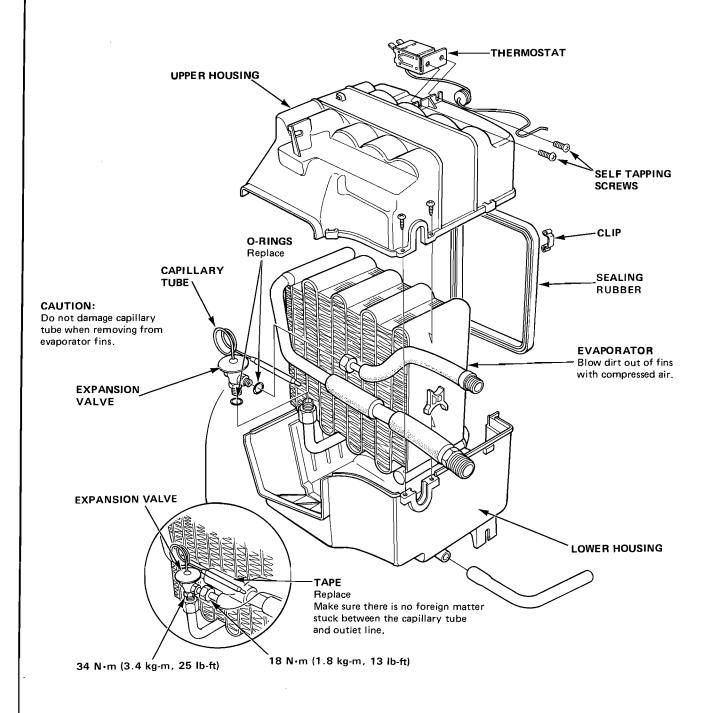


### Overhaul-

- 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;

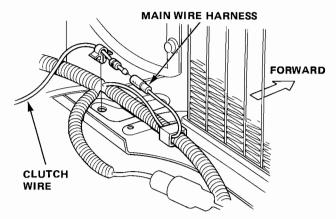
- Install the expansion cover capillary tube against the suction line, and wrap it with tape.
- Reinstall the thermostat capillary tube in its original location.
- Reassemble the upper and lower housings with clips, make sure there are no gaps between them.



## Compressor

### Replacement

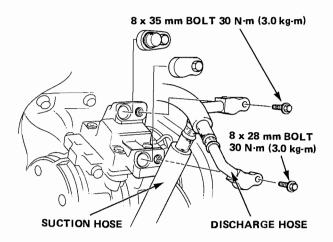
- If the compressor works at all, run the engine at idle speed and turn on the air conditioner for a few minutes.
- Shut the engine off and disconnect the battery negative terminal.
- 3. Remove the intake air duct bolt (2), and duct.
- 4. Remove the front under cover (section 5).
- Discharge the refrigerant from the system (page 22-17).
- Disconnect the compressor clutch wire and remove the connector from the holder.



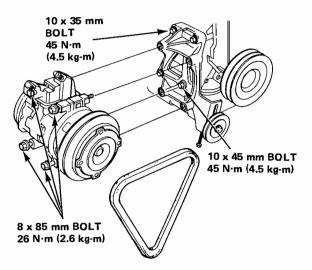
Disconnect the suction and discharge hoses from the compressor.

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.

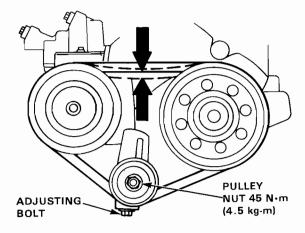


13. Remove the mount bolts (4) and the compressor bracket if necessary.

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.



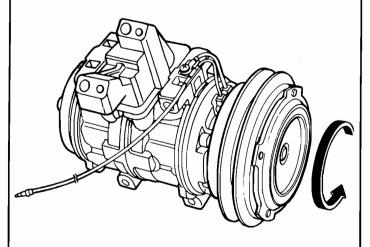
- Charge the radiator coolant (section 10).
- Charge the system (page 22-28).
- Test the performance (page 22-15).

CAUTION: Do not loosen the cylinder cover bolts on the compressor.



### Clutch Inspection-

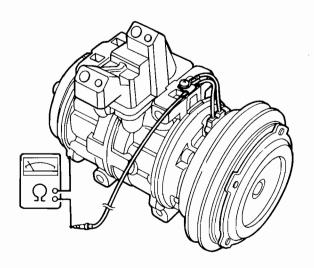
 Check pulley bearing play and drag by rotating the pulley by hand. Replace the pulley with a new one if it is noisy or has excessive play or drag.



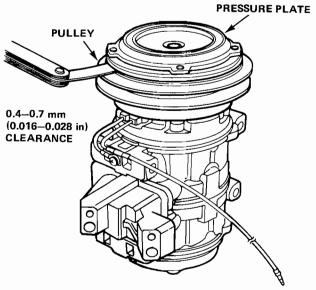
• Check resistance of the stator coil:

Stator Coil Resistance: 3.75  $\pm$  0.2 ohm at 20°C (68°F)

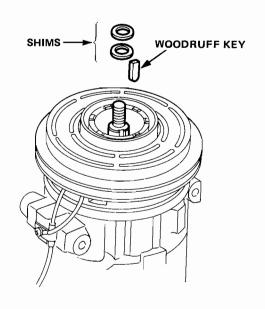
If resistance is not within specifications replace the coil.



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.



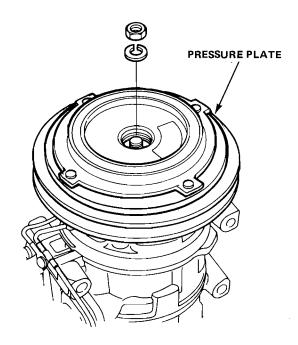
NOTE: The shims are available in six sizes: 0.1 mm  $\sim$  0.2 mm thick. 0.1 mm shim is used for minor adjustment.



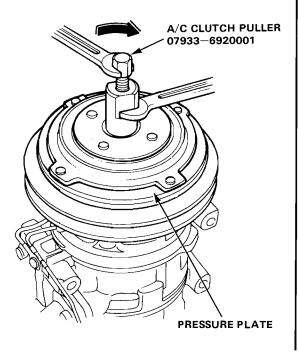
## Compressor

### - Clutch Overhaul

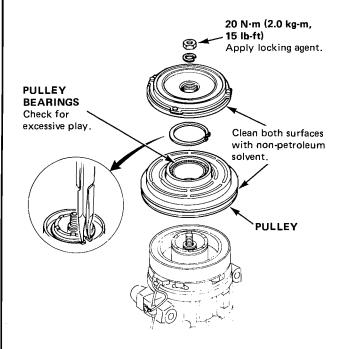
1. Remove the nut while holding the pressure plate.



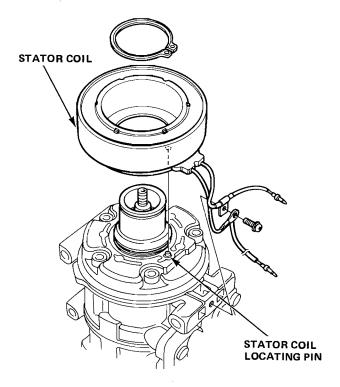
Thread the special tool into the pressure plate and remove the pressure plate by screwing in the center bolt.



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 Replacement -

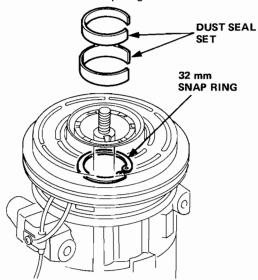
Removal

NOTE: Make sure the suction and discharge joints are plugged with caps.

1. Remove the pressure plate (page 22-22).

NOTE: Removal of the clutch pulley and coil is not necessary.

Remove the dust seal set. Remove the 32 mm snap ring.

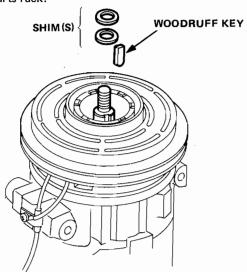


3. Remove the woodruff key from the key way.

NOTE: If the woodruff key is to be reused, be careful not to damage it.

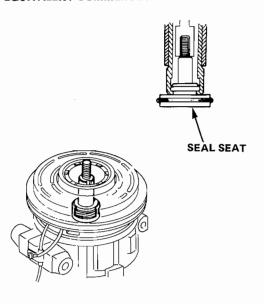
4. Remove the shim (s).

NOTE: After removing, store shim(s) safely in a parts rack.

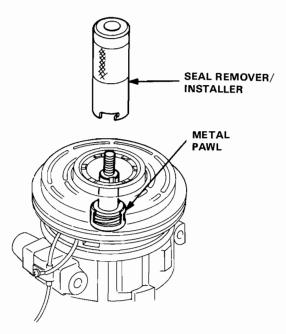


- Set the pawls of the tool into the groove of the seal shaft.
- 6. Pull out the seal seat.

SEAL REMOVER/INSTALLER
EQUIVALENT COMMERCIALLY AVAILABLE IN U.S.A.



- Insert the special tool into the compressor aligning the cutout of the remover with the metal pawl of the seal case.
- Rotate the special tool clockwise or counterclockwise to make sure that the cutout is engaged with the metal pawl.



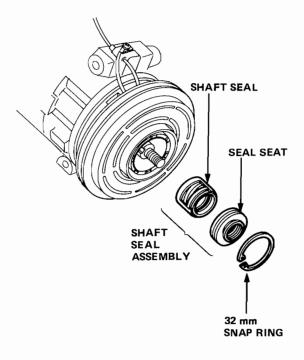
### Compressor

### -Shaft Seal Replacement (cont'd) -

- Press the remover until it bottoms, then turn it clockwise as far it will go.
- 10. Withdraw the remover.
- 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.



#### Installation

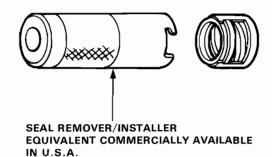
 Clean the new shaft seal thoroughly with cleaning solvent.

NOTE: Install the shaft seal assembly after the cleaning solvent is dried out.

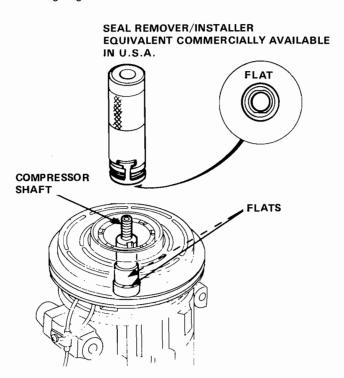
 Lubricate the shaft seal with refrigerant oil (SUNISO 5GS or equivalent) and install it on the special tool.

#### NOTE:

- Use only clean refrigerant oil.
- Do not touch the sealing surfaces of the shaft seal after lubricating.



- Liberally lubricate the compressor shaft with refrigerant oil.
- Install the shaft seal onto the compressor shaft aligning the seal case flats with the shaft flats.

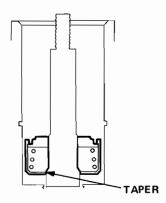




Press the remover until it bottoms, then turn it counterclockwise as far as it will go.

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.

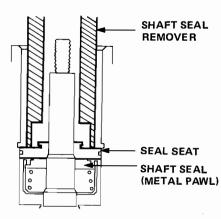


- 8. Check the inside diameter of the compressor for score marks or foreign particles.
- Clean the seal seat with cleaning solvent, then lubricate the seal seat with refrigerant oil (SUNISO 5GS or equivalent).

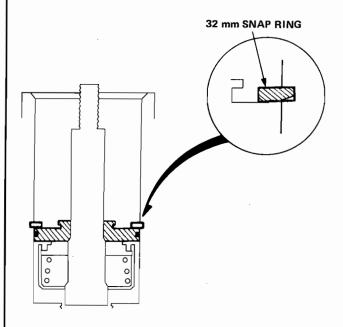
#### NOTE:

- Use only clean refrigerant oil.
- Do not touch the sealing surface of the seal plate after lubrication.
- First slide the seal seat into the compressor by hand as far as possible.
- 11. Press the seal seat with the grip side of the remover.

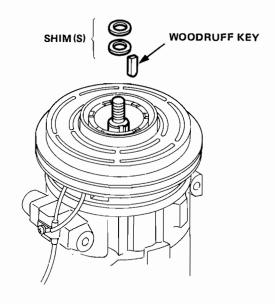
CAUTION: Be careful not to damage the compressor.



- 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.
- Evacuate and charge the compressor and then perform a leak test.

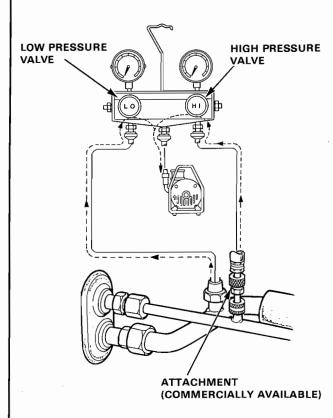
## **System Charging**

### -System Evacuation -

- 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).
- Attach a gauge set and pump as shown, connecting the center charging hose to the pump inlet.
- 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.

 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.

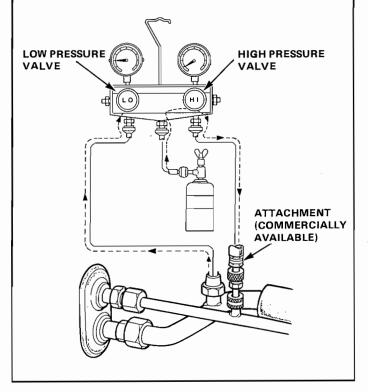


NOTE: Set the attachment to the gauge hose at high pressure side first, then install the gauge set as shown. When disconnecting the gauge hose at high pressure side, remove the attachment from the high pressure charging valve.

#### 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.
- Attach a refrigerant supply and gauge set as shown, with all valves closed. Then open the refrigerant supply valve on the can.
- 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.
- 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.
- 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.
- After checking and repairing leaks, the system must be evacuated.





### **Charging Procedures**

**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:

- 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.
- Open the low gauge valve [adjust it as necessary so pressure does not exceed 415 kPa (60 psi) while charging].
- Start the engine and switch the air conditioner fan on high.

NOTE: Run the engine below 1,500 rpm.

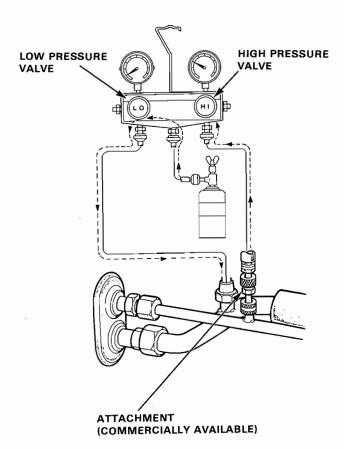
- 4. Keep the refrigerant can right side-up. Charge the system with 850-950 g (30-33 oz.) of refrigerant (one can of R-12 contains 14 ounces-437 grams) until sight glass is free of any bubbles, indicating a full charge.
- 5. When fully charged, close the gauge valves, then the valve on the can. Slowly 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  $850-950\,\mathrm{g}$  (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.

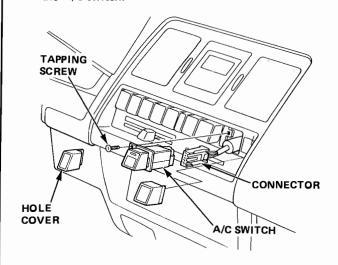


NOTE: Set the attachment to the gauge hose at high pressure side first, then install the gauge set as shown. When disconnecting the gauge hose at high pressure side, remove the attachment from the high pressure charging valve.

### **Test**

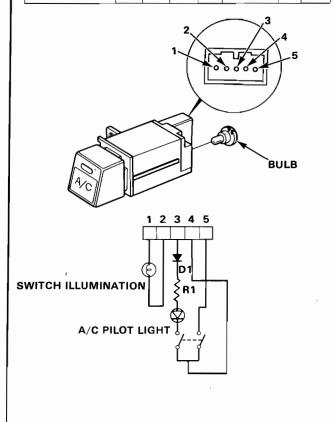
### -A/C Switch-

- 1. Pull out the screw hole cover.
- 2. Remove the screw and pull the switch out.
- Disconnect the switch wire connector and remove the A/C switch.



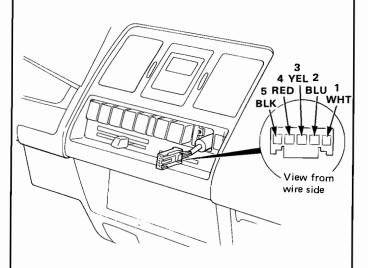
4. Check for continuity between the terminals as shown in the chart.

Terminal Position	1		2	3		4	5
OFF	6	1	0				
ON	0	•	-0	0-	<b>→</b> ~~⊕	0	0



### -A/C Switch Inputs-

 If the A/C switch is normal, check for inputs at the switch connector according to the table below.



Terminal: test condition	Test: desired result	Actual result: possible cause
4 (RED): blower switch on	Check for conti- nuity to ground: there should be continuity with blower switch ON.	•If not: there is an open in RED or GRN wire or blower swioh, or faulty control panel.
5 (BLK): ignition switch ON	Connect to body ground: the A/C system should start.	•If not: there is an open in BLK or BLU/RED wire to diode box, or faulty control panel.
3 (YEL): ignition switch ON	Check for voltage to ground: should have battery voltage.	•If not: check the control panel (page 21-20), or there is an open in BLK/YEL wire to fuse No.14.
1:-(WHT): Headlight ON	Check for voltage to ground: should have battery voltage.	•If not: there is an open in RED/ BLK or WHT or switch wire, or faulty control panel.
2 (BLU): Headlight ON	Check for voltage to ground: Should: have voltage:	•If not: there is an open in BLU or RED wire or faulty control panel.

2. Reinstall the switch in the reverse order of removal.



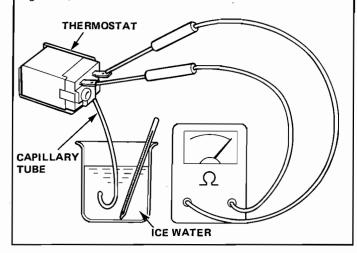
#### Thermostat -

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.

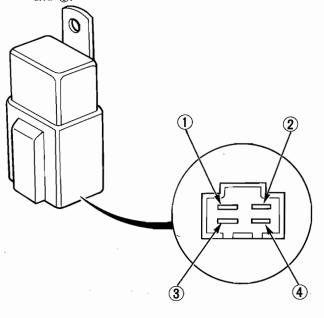
The cut-off and cut-in of the thermostat must not be gradual, but sudden.



### -Relay -

NOTE: The same type of relay is used for the compressor clutch, condenser fan and radiator cooling fan.

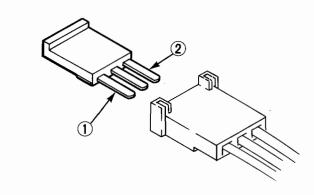
- Check for continuity between terminals ① and ③.
   There should be no continuity.
- 2. Connect a 12V battery across terminals ② and ④. There should be continuity between terminals ① and ③.



#### Diode -

NOTE: The diodes are designed to pass current in one direction and block current in opposite direction.

- Using an ohmmeter or continuity tester, check the diodes.
- Check for continuity in both directions between ① and ② terminals. There should be continuity in only one direction.





# **Electrical**

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Five-step Troubleshooting23-3	Headlights	
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	Wiring Diagram (Complete Car) .	

# Special Tools

Ref. No.	Tool Number	Description	Q'ty	Page Reference
①	07920-SB20000	Fuel Sender Wrench	1	23-69
		$\sim$		
			3	

## **Troubleshooting**



### Troubleshooting Precautions

#### **Before Troubleshooting**

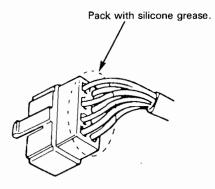
- Check the main fuse and the fuse box.
- Check the battery for damage, state of charge, and clean and tight connections.
- Check the alternator belt tension.

#### **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 (except watertight 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.

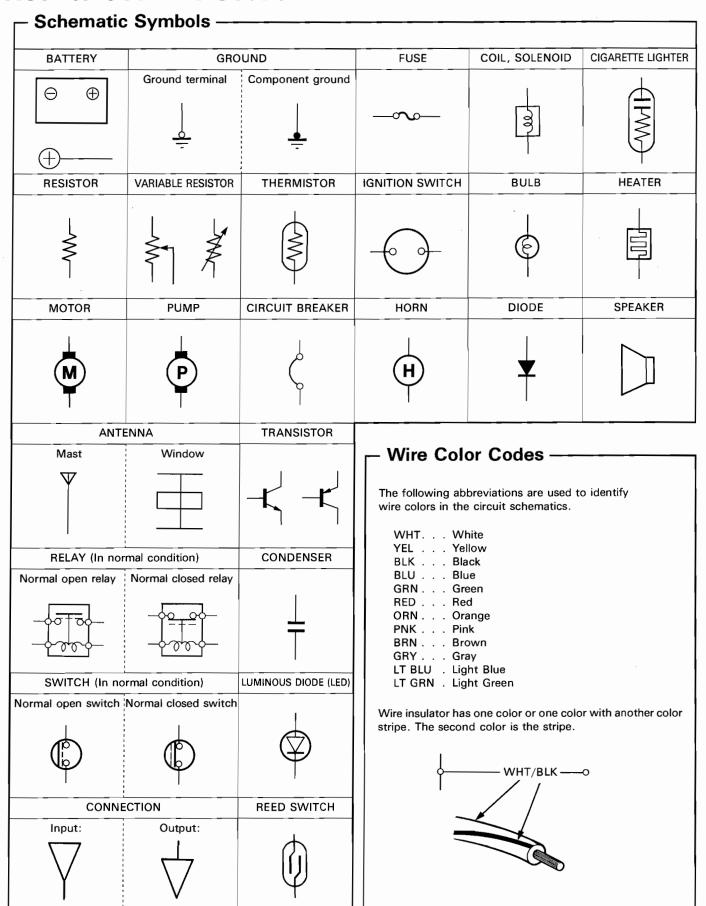
#### 4. Fix The Problem

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.

### **How to Use This Section**





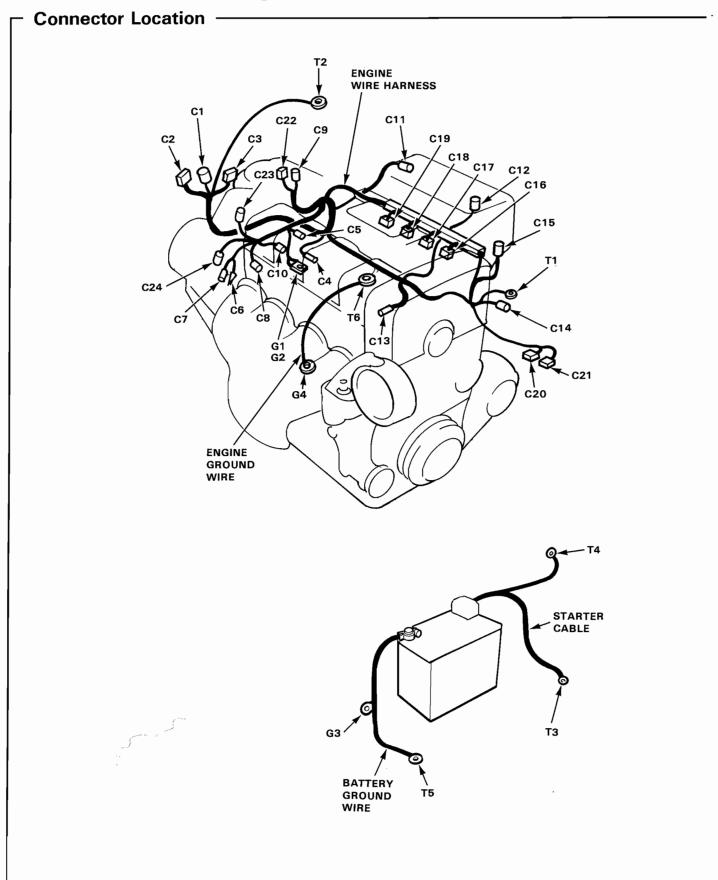


### **Connector Location -**

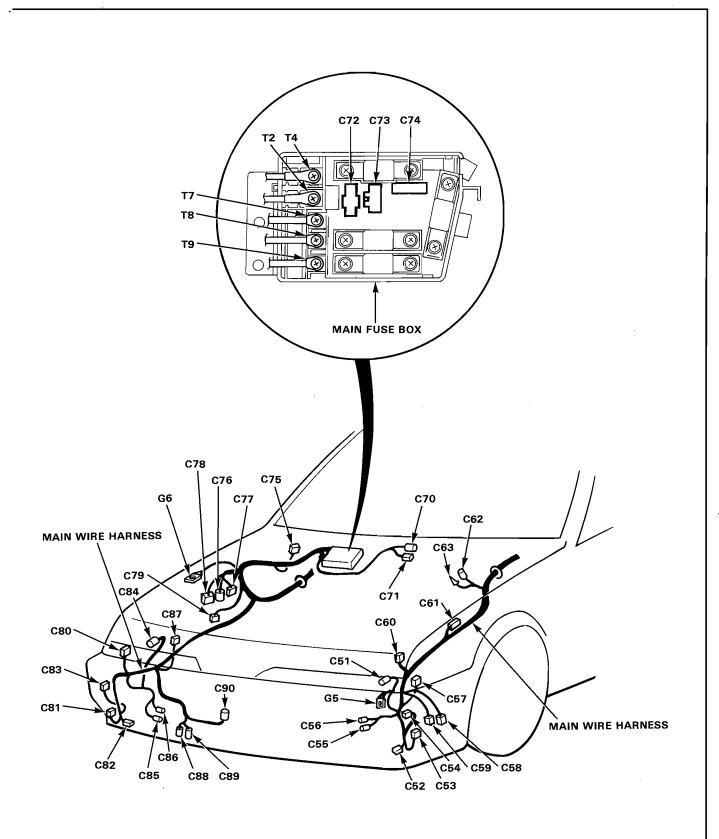
How to identify connectors:

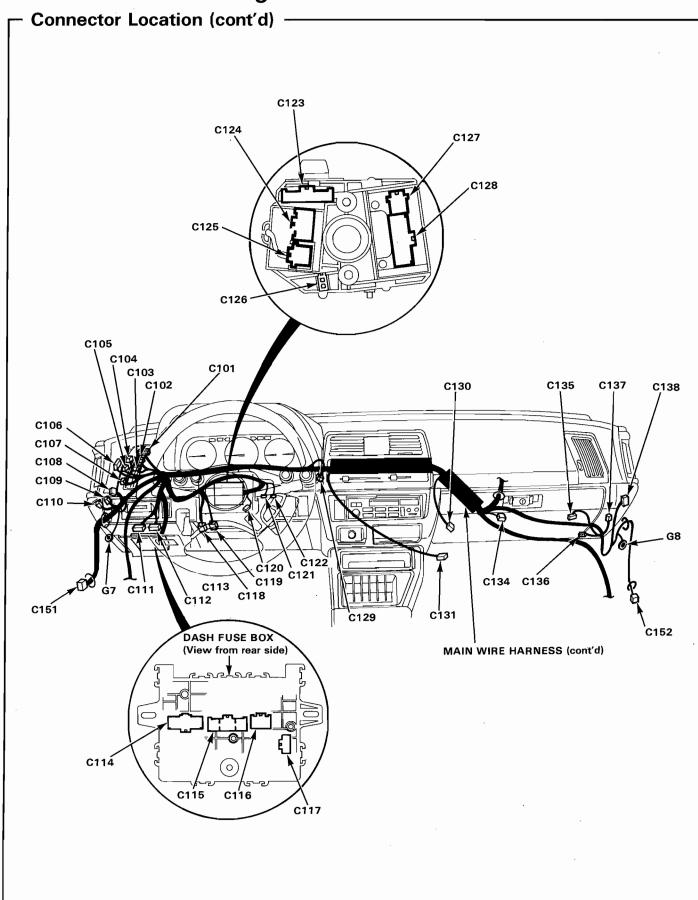
Identifing numbers have been assigned to all connectors. The number is preceded by the letter C'' for connectors, G'' for ground terminals and T'' for non-grounded terminals.

Location			Oth a s
Harness	Engine Compartment	Dashboard	Others (Floor, Door, Trunk, Roof)
Engine wire harness	C1 thru C24 G1 and G2 T1 and T2		
Starter cable	T3 and T4		
Battery ground wire	G3 T5		
Engine ground wire	G4 T6		_
Front turn signal wires	C31 and C32 C41 and C42		
Main wire harness	C51 thru C90 G5 and G6 T7 thru T9	C101 thru C138 G7 and G8	C151 and C152 C119 thru C131 C161 thru C174
Dashboard wire harness		C202 thru C219 G9	
Roof wire harness			C251 thru C256
Rear wire harness			C301 thru C320 G10
A/C wire harness	C355 thru C359 G11	C351 thru C354	
Hatch wire harness			C401 thru C406
License plate light wire harness			C410 thru C414
Driver's door wire harness			C511 thru C519
Right front door wire harness			C521 thru C526
Rear door wire harness			C531 thru C534 C541 thru C544
Fuel gauge sending unit wire harness			C501 and C502
Power window wire harness			C551 thru C553 C561 thru C563

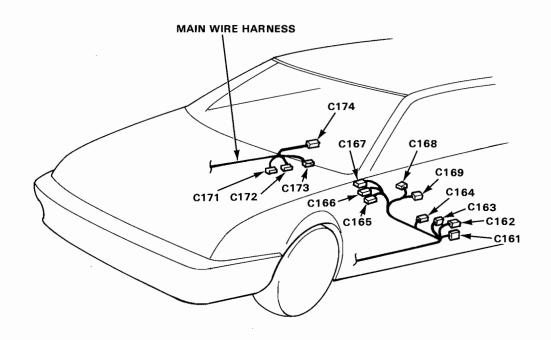


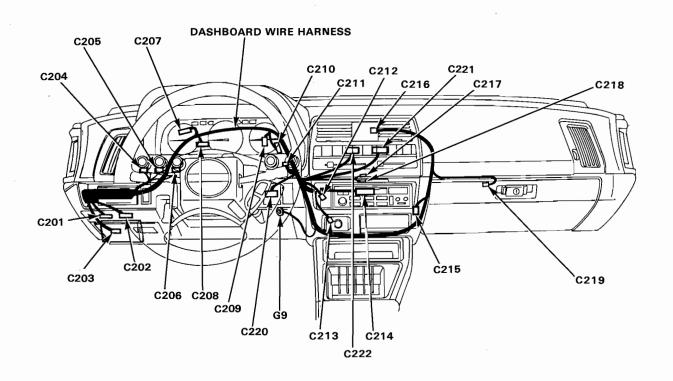


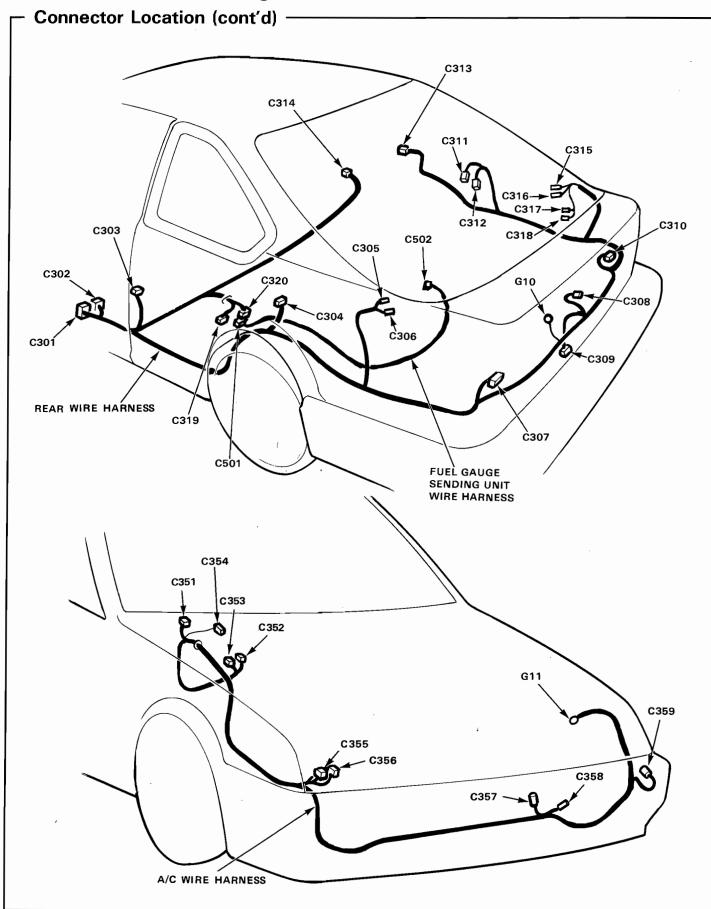




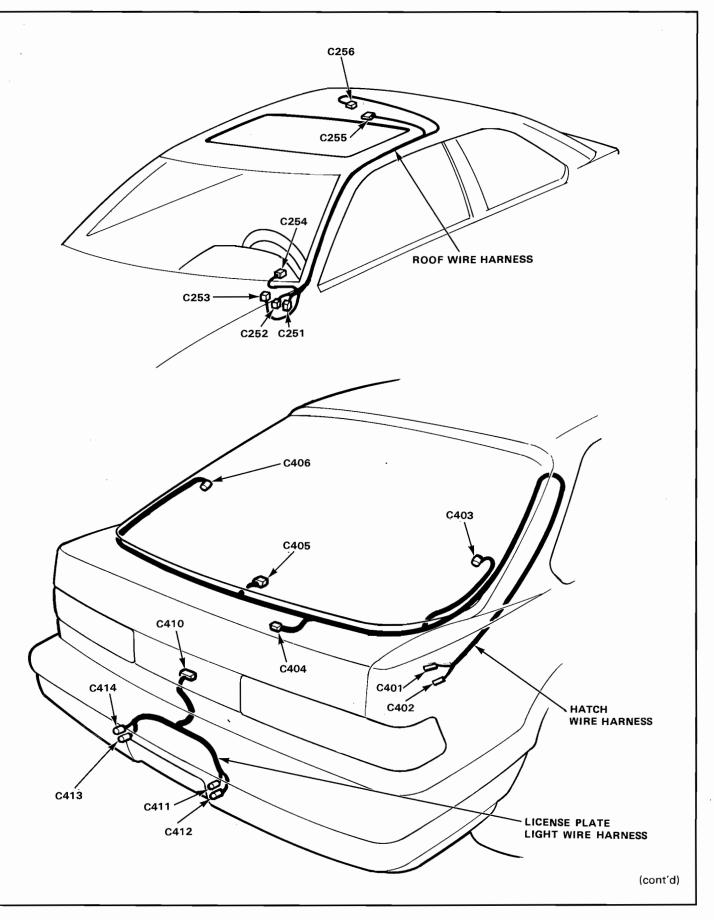


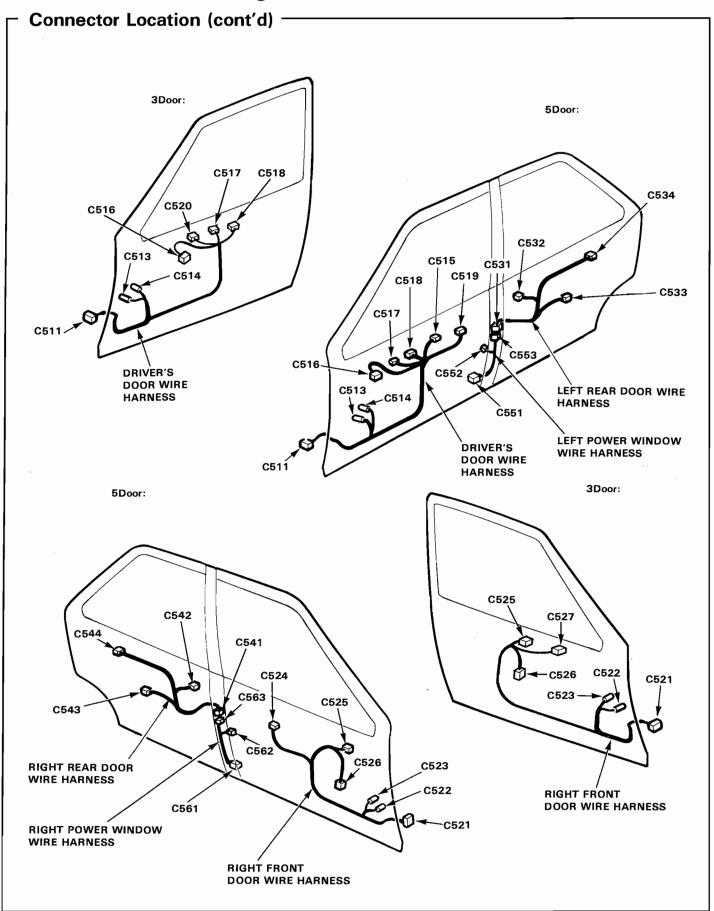














### **Connector Directory** -

### **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-76)	
C2	6 8	//	// (C-77)	
C3	8	//	// (C-78)	
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	2	//	To Ignition coil	
C10	2 2 3 2	//	To TW(Coolant temperature) sensor	
C11	3	//	To Throttle angle sensor	
C12	2	//	To EACV	
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	4 2 2 2 2 2 6 6 6 6 2	Left center engine compartment	To Main wire harness (C60)	
C21	6	//	To Resistor	
C22	6	Center engine compertment	To TDC/CRANK sensor	
C23	2	//	To CYL sensor	
C24	2	//	To Lock-up control solenoid valve	A/T
T1	·	Center engine compartment	To Alternator	
T2		Right center engine compartment	To Main fuse box	
G1		Center engine compartment	To Body ground	
G2		<i>"</i>	//	

### Starter Cable

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
Т3		Center engine compartment	To Starter motor	
T4		Right center engine compartment	To Main fuse box	

### **Battery Ground Wire**

and T	nector Ferminal Imber	Number of Pins	Location	Where the wires go	Remark
7	T5		Center engine compartment	To Transmission	
	G3		Right 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		Front engine compartment	To Body ground	

# - Connector Directory (cont'd) ----

### Main Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
		Left front anging compartment	To Left headlight	
C51	3	Left front engine compartment	To Left front turn signal light	
C52	2	<i>"</i>		
C53	3	"	To Left side marker light	
C54	2	<i>"</i>	To Left marker light	
C55		//	To Left horn	
C56	•	//	To be of the contract of the c	
C57	6	<i>"</i>	To Left retractor motor	
C58	2	//	To Rear window washer motor	
C59	2	"	To Windshield washer motor	
C60	4	Left center engine compartment	To Cruise control actuator	
C61	6	//	To English wire harness (C20)	
C62 C63		Left rear engine compartment	To Brake fluid level switch	
C70	6	Center engine compartment	To Emission control solenoid valves	
C71	3	//	To MAP sensor	
C72	2 2 3	//	Ignition timing adjusting connector	
C73	2	//	To Main fuse box	
C74				
C75	6	Right rear engine compartment	To Windshield wiper motor	
C76	14	Right center engine compartment	To Engine wire harness (C1)	
C77	6	//	// (C2)	
C78	8	//	// (C3)	
C79	1	Battery positive terminal	To Hazard fuse	
C80	6	Right front engine compartment	To Right retractor motor	
C81	3 2 2	//	To Right side marker light	
C82	2	//	To Right front turn signal light	1
C83	2	//	To Right front marker light	
C84	3	//	To Right headlight	
C85		//	To Right horn	1
C86		//	To Right horn	
C87 .	4	//	To Radiator fan relay	
C88		//	To Coolant temperature switch	
C89		//	<i>"</i>	
C90	2	//	To Radiator fan motor	
C101		Left under dash	To PGM-FI main relay	
C102		//	To Left headlight retractor relay	
C103		 //	To Right headlight retractor relay	
C104			To Rear window defogger relay	
C105		<i>"</i>	To Power window relay	
C106		//	To Integrated control unit	
C107			To Chime	
C108	13	<i>"</i>	To Cruise control unit	
C109	2	 //	To Roof wire harness (C251)	
C110	3	 //	// (C252)	with sun
C111	24	 //	To Dashboard wire harness (C201)	
C112	22	 //	// (C202)	
C113	7	. //	To Dash fuse box (C957)	
C114	14	` "	// (C958)	
C115	8	<i>"</i>	// (C959)	
C116	ž	<i>"</i>	// (C960)	
C117	2	<i>"</i>	To Clutch switch ) With cruise	M/T
C118	2 4	<i>"</i>	To Brake light switch control	, .
C118	2	,, ,,	To Brake light switch	
C119	3	<i>"</i>	To Slip ring (With cruise control)	
	6	<i>"</i>	To Ignition switch	
C120				



## Main Wire Harness (cont'd)

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C123	7	Left under dash	To Hazard switch	
C124	8	//	To Windshield wiper switch	
C125	6	//	To Rear window wiper switch	
C126		//	To horn switch (Without cruise control)	
C127	4	//	To Turn signal switch	
C128	Ŕ	"	To Lighting switch	
C129	8 3 6	Center under dash	To Atmospheric pressure sensor (PA)	
C130	6	Right under dash	To Heater recirculation control motor	
C131	8	Right under dash	To Heater mode motor	
C132	•	(Not used)		
C133		(Not used)		•
C134	6	Right under dash	To A/C wire harness (C351)	
C135	4	//	To Blower resistor	
C136	2	//	To Blower motor	
C137	4	//	To Blower relay	
C138	13	//	To Retractable headlight control unit	
C151	2	Driver's door area	To Left door speaker harness (C511)	
C151	19	//	To Driver's door wire harness (C511)	
C152	2	Right front door area	To Right door speaker harness (C521)	
C152	8	<i>"</i>	To Right front door wire harness (C521)	
C161	18	Left floor	To Rear wire harness (C301)	
C162	2	//	// (C302)	
C163	6	"	To Left power window wire harness (C551)	
C164	14	//	To Door lock control unit	
C165	2	Center console area	To Shift position console light	A/T only
C166	10	//	To Shift position console switch	A/T only
C167	2	//	To Neutral safety switch	A/T only
C168	1	//	To Parking brake switch	
C169	2	//	To Driver's seat belt switch	
C171	16	Right floor	To PGM-FI ECU	
C172	20		To PGM-FI ECU	
C173	17	//	To PGM-FI ECU	
C174	6	//	To Right power window wire harness (C561)	
T-7		//	To Main fuse box	
T-8		//	//	
T-9		//	//	
G5		Left engine compartment	To Body ground	
G6		Right engine compartment	, , , , , , , , , , , , , , , , , , ,	
G7		Left under dash	//	
G8		Right under dash	//	

## - Connector Directory (cont'd) -

### **Dashboard Wire Harness**

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C201	24	Left under dash	To Main wire harness (C111)	
C202	22	//	// (C112)	
C203	8	//	To Dash fuse box (C951)	
C204	8 5 3 5	//	To Cruise control main switch	
C205	3	//	To Dashlight brightness controller	
C206	5	//	To Retractor switch	
C207	12	Behind gauge	To Gauge assembly	
C208	10	//	//	
C209	14	//	To Shift position indicator	
C210	8	//	To Gauge assembly	
C211	10 14 8 5 2	Center under dash	To Rear window defogger	
C212	2	//	To Cigarette lighter (Without	
			dashlight brightness controller)	
C212	3	//	To Cigarette lighter	
C213		//	//	
C214	16	//	To Stereo radio/cassette player	
C215	2	//	To Ashtray light	
C216	4	//	To Clock	
C217		//	To Dashboard door panel(+)	
C218		//	// (-)	
C219		Right under dash	To Glove box light	
C220	10	Center under dash	To Power door mirror switch	
C221	6	Center under dash	To Heater fan switch	
C222	14	Center under dash	To Heater control switch	
G9		Steering column bracket	To Body ground	

### **Rear Wire Harness**

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C301	18	Left floor	To Main wire harnesss (C161)	
C302	2	//	// (C162)	
C303		Left door area	To Left front door switch	
C304		//	To Left rear door switch	5door
C305		Left luggage area	To Left rear speaker	
C306		"	. //	
C307	6	Left luggage area	To Left taillight assembly	
C308		Center luggage area	To Tailgate switch	
C309	3	//	To License plate light wire harness (C410)	
C310	6	Right luggage area	To Right taillight assembly	
C311		Right luggage area	To Right speaker	
C312			//	
C313		Right door area	To Right rear door switch	5doo
C314		//	To Right front door switch	
C315	4	Luggage area	To Hatch wire harness (C401)	
C316	4 2	//	// (C402)	
C317		Right luggage area	To Luggage area light	
C318			//	
C319		Left luggage area	To Fuel pump	
C320		<i>"</i>	To Fuel gauge sending unit wire harness (C501)	
G10		Rear inner panel	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 (C109)	
C252	3	//	// (C110)	With sunroof
C253	4 .	//	To Sunroof relay	//
C254	4	//	To Sunroof Switch	//
C255	2	Roof area	To Sunroof motor	//
C256	3	//	To Dome light	

### A/C Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C351	4	Right under dash	To Main wire harness (C114)	
C352		//	To Thermostat	
C353		//	//	
C354	3	//	To A/C diode	
C355	4	Right front engine compartment	To Condenser fan relay	
C356	4	//	To A/C clutch relay	
C357	2	Left front engine compartment	To Condenser fan motor	
C358		//	To A/C compressor clutch	
C359	2	//	To A/C pressure switch	
G11		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		Hatch area	To Rear window defogger
C404	4	//	To Rear window wiper motor
C405	2	//	To High mount brake light
C406		//	To Rear window defogger

Connector Director (cont'd)

License Plate Light Wire Harness

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C410 C411	3	Center trunk area Behind rear bumper	To Rear wire harness (C309) 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 C502	2 2	Right floor Fuel tank area	To Rear wire harness (C320) To Fuel gauge sending unit	

### **Driver's Door Wire Harness**

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C511	19	Driver's doors area	To Main wire harness (C151)	3Door
C511	19	//	// (C151)	5Door: LS
C513		//	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 actuator	
C520	_ 3	Driver's door area	To Power door mirror (left)	3Door: LSS

**Right Front Door Wire Harness** 

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C521	19	Right front door area	To Main wire harness (C152)	3Door
C521	8	//	To Main wire harness (C152)	5Door: LS
C522		//	To Right front speaker	
C523		//	<i>"</i>	
C524	2	//	To Door lock actuator	
C525	6	//	To Power window switch	
C526	2	//	To Power window motor	
C527	3	Right front door area	To Power door mirror (right)	3Door: LSS

### **Rear Door Wire Harness**

Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C531	6	Left rear door area	To Left power window wire harness (C553)	
C532	6	//	To Power window switch	
C533	2	//	To Power window motor	
C534	2	//	To Door lock actuator	
C541	6	Right rear door area	To Right power window wire harness (C563)	
C542	6	//	To Power window switch	
C543	2	//	To Power window motor	
C544	2	//	To Door lock actuator	

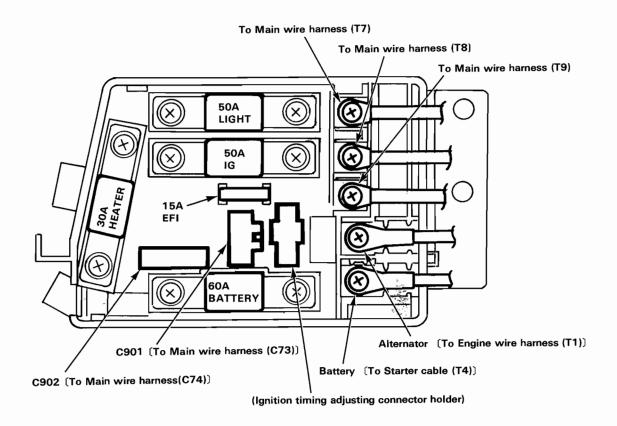
### **Power Window Wire Harness**

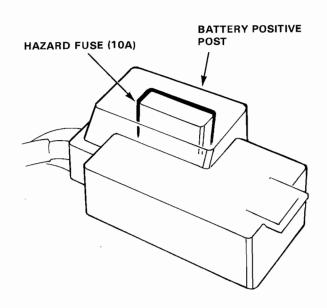
Connector and Terminal Number	Number of Pins	Location	Where the wires go	Remark
C551	6	Left floor	To Main wire harness (C163)	
C552		Left front door area	To Left front door switch	
C553	6	Left rear door area	To Left rear door wire harness (C531)	
C561	6	Right floor	To Main wire harness (C174)	
C562		Right front door area	To Right front door switch	
C563	6	Right rear door area	To Right rear door wire harness (C541)	



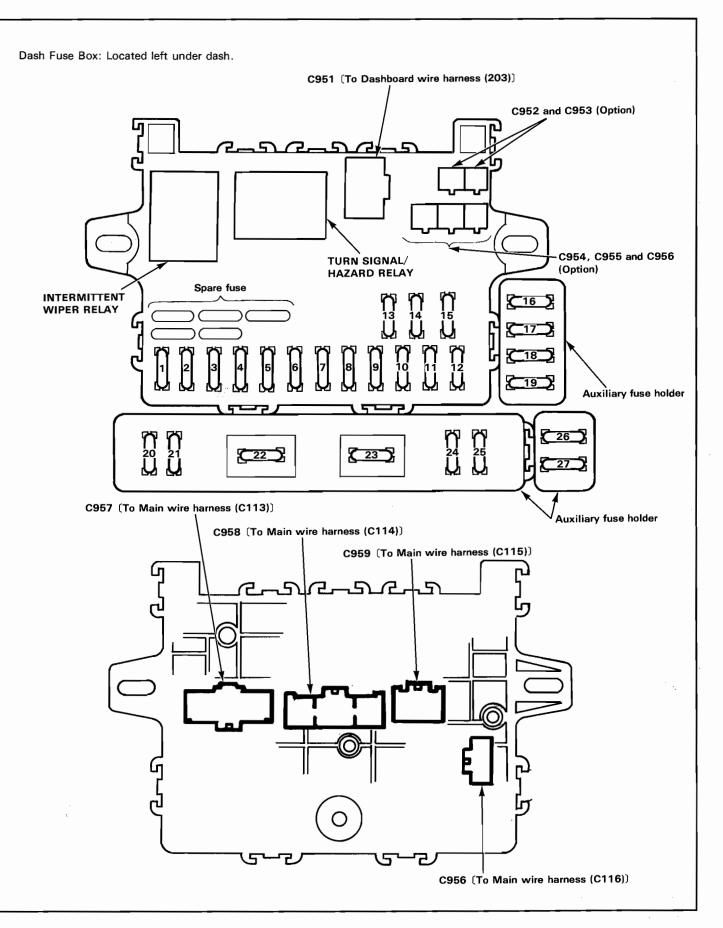
### **Fuses**

Main Fuse Box: Located rear side, engine compartment.

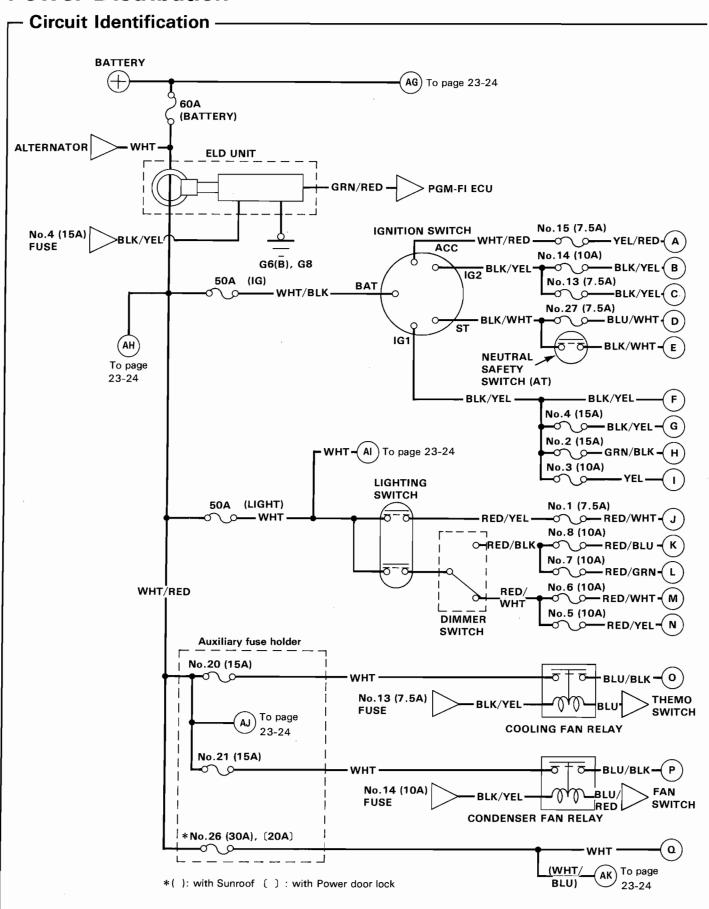








### **Power Distribution**

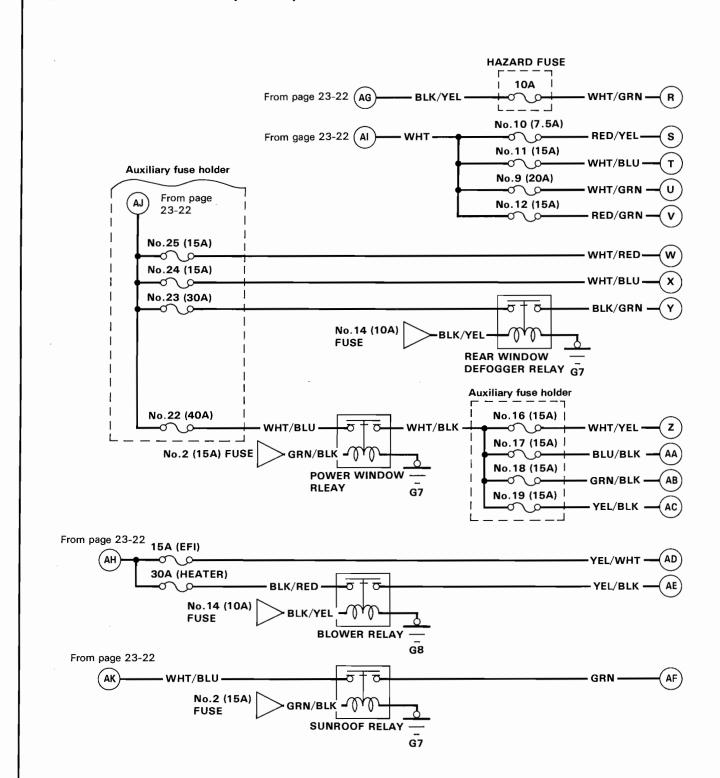




	System	Part
<u>A</u> —	Sound	Stereo radio/cassette player (ACC)
B——	Rear Window Defogger	Rear window defogger relay, Rear window defogger switch Indicator light
-	Heater	Recirculation/mode motor, Heater control switch, Blower relay
	Air Conditioner	Condenser fan relay, A/C compressor clutch, A/C switch indicator light, A/C compressor clutch relay
©	Cooling	Cooling fan relay
D	PGM-FI	Main relay (STS), ECU (STS), ECU (FLR)
	Brake Warning	Bulb check circuit (in the gauge assembly)
З <b>-</b> —	Starting	Starter solenoid
Ē— —	Ignition	Ignition coil, Igniter
Ğ—,—	Cruise Control	Control unit, Main switch indicator light
-	Charging	Charge warning light, Voltage regulator
	Retractable Headlight	Control Unit
	PGM-FI	ECU (IG1) EACV, Purge cut-off solenoid valve, Ignition control solenoid valve Main relay (IG1)
	Fuel	Fuel pump motor
<u> </u>	Power Windows	Power window relay
	Wipers/Washers	Windshield wiper/washer motor, Rear window wiper/Washer motor
	Sunroof	Sunroof relay
D	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
	Shift lever position indicator	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
) <del> </del>	Retractable Headlights	Control unit
<u> </u>	Lighting	Right headlight (HI beam)
	Lighting	HI beam indicator light
)— <del>-</del>	Lighting	Left headlight (HI beam)
)— <del>-</del> —	Lighting	Right headlight (LO beam)
<u> </u>	Lighting	Left headlight (LO beam)
	Retractable Headlights	Control unit
)———	Cooling	Cooling fan motor
)— <del> </del>	Air Conditioner	Condenser fan motor
<u> </u>	Power Door Lock	Control unit, Actuators

### **Power Distribution**

### Circuit Identification (cont'd)



NOTE: Hazard fuse is located on the battery positive stud.



	System	Part
®	PGM-FI	PGM-FI ECU(VBU)
	Lights	Turn signal / Hazard relay
<u>s</u> —	Retractable Headlights	Control unit, Right retractor relay, Left retractor relay
① <del></del>	Cigarette Lighter	Cigarette lighter
	Clock	(Battery⊕)
-	Sound	Stereo radio ∕ cassette player (Battery⊕)
	Lights	Hatch light, Dome light
	Integrated Control Unit	Side marker relay circuit
0	Horns	Horn (HI), Horn (LO)
	Cruise Control	Control unit
	Lights	Right brake light, Left brake light, High mount brake light
<b>V</b>	Lighting	Marker lights, Taillights
	Dashlight Brightness Control	Cruise control main switch light, Shift lever position indicator, Air conditioner switch light, Rear window defogger switch light, Shift lever position light, Dashboard panel light, Heater control panel light, Gauge light
	Retractable Headlights	Control unit.
	Sound	Stereo radio/cassette player
	Integrated Control Unit	Side marker light circuit, Light-on warning circuit
	Lighting	Glove box light, Cigarette lighter light, Ashtray light, License plate lights
<b>®</b>	Retractable Headlights	Control unit, Right retractor motor
⊗——	Retractable Headlights	Control unit, Left retractor motor
Ŷ	Rear Window Defogger	Rear window defogger
<b>2</b>	Power Windows	Driver's door motor, Control unit
<u> </u>	Power Windows	Right front door motor
<b>AB</b>	Power Windows	Left rear door motor
<u></u>	Power Windows	Right rear door motor
<b>®</b> ——	PGM-FI	Main relay (+B)
<u>AB</u>	Heater	Blower motor
	Sunroof	Sunroof motor

# **Ground Locations**

## Circuit Identification

Connector and Terminal		Part	Circuit
G1		Main relay	PGM-FI
G2——		PGM-FI ECU (PG1, PG2)	
	—————————————————————————————————————	PGM-FI ECU (LG1, LG2)	
G3		Battery	
G4		Engine	
G5(A)	B	Left headlight (Low beam, High beam)	Retractable headlights
		Windshield/Rear window washer motors	Wipers/Washers
		Left front turn signal light	Turn signal/ Hazard light
		Front, left side marker light	circuit
		Left retractor motor	Retractable headlight
		Brake fluid level switch	Brake warning
		Left front maker light	Lighting
G6(A)	B	Right headlight (Low beam, High beam)	Retractable headlights
		Right retractor motor	
		Cooling fan switch	Cooling
	ļ	Right front turn signal light	Turn signal/
		Front, right side marker light	Hazard light circuit
		Cooling fan motor	Cooling
		Right front make light	Lighting

A: Engine wire harness

B: Main wire harnessC: Battery ground wire

D: Engine ground wire

Ground No.	Location	Where the wires go
G1	Center engine compartment	To Engine ground
G2	//	//
G3	Right engine compartment	To Body ground
G4	Front engine compartment	//
G5(A)	Left engine compartment	//
G6(A)	Right engine compartment	//



Connector and Terminal	Harness	Part	Circuit
G5(B)	В	Shift lever position (console) switch	Shift lever position Indicator
	<del> </del>	Combination switch	Wiper circuit
G7 —		Key switch	Light-on warning circuit
	<del> </del>	Retractor relays	Retractable headlights
	<u> </u>	Rear window defogger relay	Rear window defogger
1	+	Clutch switch	Cruise control
	-	Seat belt switch	Seat belt/key-on beeper/ timer circuit
	<del> </del>	Integrated control unit	Warning lights circuit
	+	Power window relay	Power windows
	+	Power door lock control unit	Power door locks
	<del> </del>	Chime	Light-on warning circuit
	-	Emission control solenoid valves	PGM-FI
	+	Cruise actuator	Cruise control
		Cruise control unit	Cruise control
		Fuse box	
	<u> </u>	Clock	Clock
		Ashtray light	
	<u> </u>	Glove box light	Lighting
	·	Cigarette lighter	
		Cruise main switch	Cruise control
	<u> </u>	Dimming circuit	
	•	High beam indicator light, Retractable headlight warn- ing light. Turn signal indica- tor light	Gauge assembly
	<del> </del>	AT position indicator	
		Rear window defogger switch	Rear window defogger
		Dashlight brightness controller	Dashlight brightness control
	E	Heater control panel	Heater

### M : Main wire harness

E: Dashboard wire harness

Ground No.	Location	Where the wires go	
G5(B) G7	Left engine compartment Left under dash	To Body ground	

(cont'd)

# **Ground Locations**

## Circuit Identification (cont'd) —

Connector and Terminal	Harness	Part	Circuit
G6(B)		Retractable headlight control unit	Retractable headlights
G8	<b>—</b>	Windshield wiper motor	Wipers/Washers
	<del> </del>	ELD unit	Charging
		Blower relay	
	+	F/R Motor	Heater
		Mode motor	
G5(B) -	• B • F	Power window control unit	Power windows
		Power window master switch	Fower willdows
G7 <del>#</del>	➡   +	Door lock switch	Power door locks
		Door lock actuator	- Fower door locks
	L———	— Sunroof switch	Sunroof
		Sunroof relay	Sumoon
	B—E—BRN/B	K Speed pulser	Gauge assembly
G9-#	<u> </u>	Stereo radio/ cassette player unit	Sound system
G10——	G + + - + - +	Fuel pump	Fuel
		Taillight assemblies	Lights
		Rear window wiper motor	Wipers/Washers
		Rear window defogger	Rear window defogger
		High mount brake light	Brake light
		Fuel gauge sending unit	Fuel gauge
		License plate lights	Lighting
G11	<u>K</u>	Condenser fan motor	Air conditioner

B: Main wire harness

E: Dashboard wire harness

F: Driver's door wire harness

G: Rear wire harness

□ : Roof wire harness

Ground No.	Location	Where the wires go
G5 (B)	Left engine compartment	To Body ground
G6 (B)	Right engine compartment	//
G7	Left under dash	//
G8	Right under dash	//
G9	Steering column bracket	//
G10	Rear inner panel	//
G11	Front engine compartment	//

## **Battery**



### Test

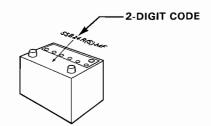
CAUTION: Battery electrolyte is a sulfuric acid solution.

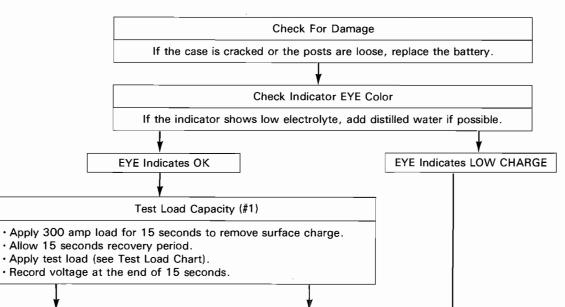
- If it spills on painted surfaces, clothing, or skin, rinse it off with water immediately to minimize the damage.
- Always wear safety goggles or a face shield when servicing a battery.
- Do not overcharge. If electrolyte escapes from battery, or temperature rises above 52°C (125°F), stop charging and wait for battery to return to a safe state.

NOTE: To get accurate results, the temperature of the electrolyte must be between 21°C (70°F) and 38°C (100°F).

Most batteries are categorized by a 2-digit code (found on top of the battery).

The 2-digit code is located on either an identification sticker or embossed on the casing. See the illustrations on the right.





#### LOAD TEST CHART

Battery Code	Load (amps)
24	160 amps
26	200 amps

Stays above 9.6 volts; battery is OK.

#### Charge on High Setting (40 amps)

Drops below 9.6 volts.

Charge until EYE shows charge is  $\mathsf{OK};$  plus an additional 30 minutes to assure full charge.

NOTE: If the battery charge is very low, it may be necessary to bypass the chargers polarity protection circuitry.

If the EYE does not show charge is OK within 3 hours, the battery is no good; replace it.

#### Test Load Capacity (#2)

- · Apply 300 amp load for 10 seconds to remove surface charge. · Allow 15 secods recovery period.
- · Apply that load (see Test Load Chart). · Record voltage at the end of 15 seconds.

Stays above 9.6 volts; battery is OK.

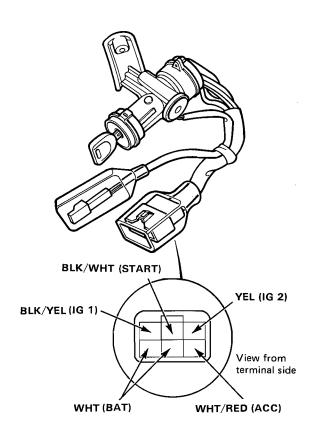
Drops below 9.6 volts; battery is no good.

# **Ignition Switch**

### -Test-

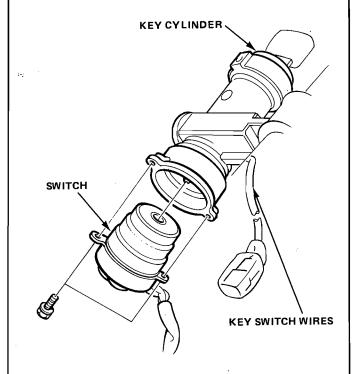
- 1. Disconnect the 6-P connector.
- 2. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	WHT/RED (ACC)	WHT (BAT)	BLK / YEL (IG1)	YEL (IG2)	BLK/WHT (START)
0					
I	0-	—			
II	0-	<del>-</del>	<del>-</del> 0-	<u> </u>	
III		0—			-0



## -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.



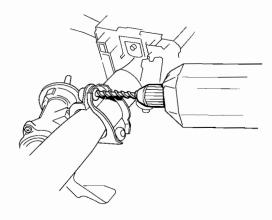


## Steering Lock Replacement

- 1. Remove the steering column covers.
- 2. Disconnect the ignition switch connectors.
- Center punch each of the 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.

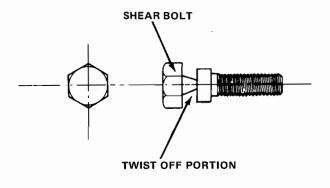
4. Remove the shear bolts from the switch body.



- Install the new ignition switch without the key inserted.
- 6. Loosely tighten the new shear bolts.

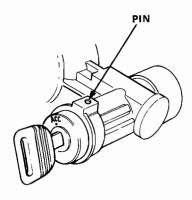
NOTE: Make sure the projection on the ignition switch is aligned with the hole in the steering column.

- Insert the ignition key and check for proper operation of the steering wheel lock and that the ignition key turns freely.
- Tighten the shear bolts until the hex heads twist off.

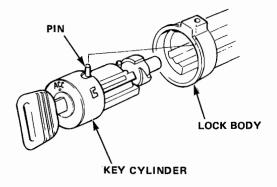


## -Key Cylinder Replacement-

- 1. Remove the ignition switch.
- 2. Turn the ignition key to "I".
- Push the pin in and remove the key cylinder from the lock body.

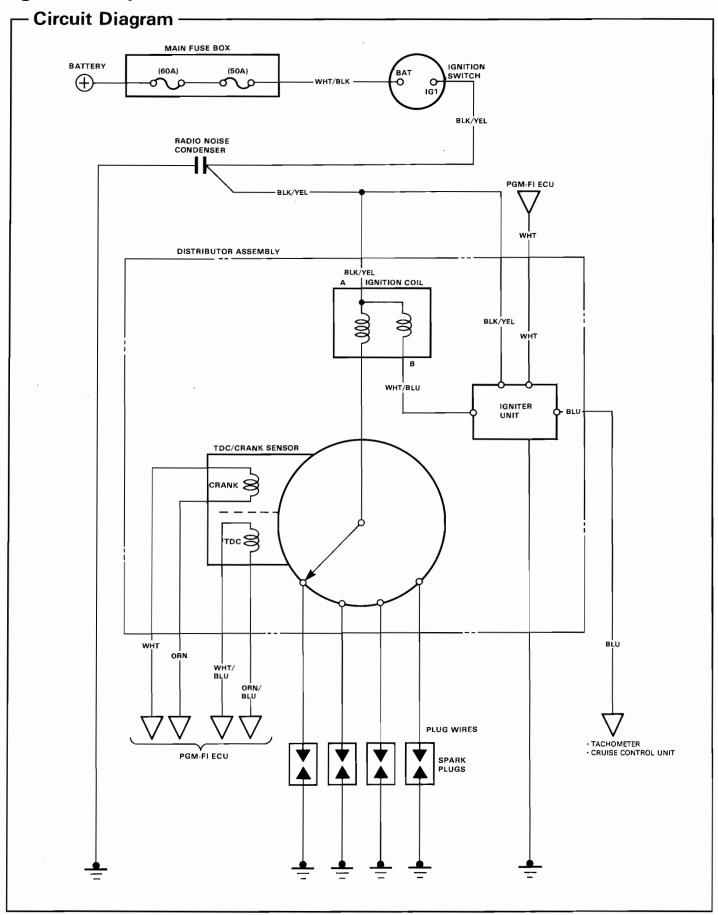


- 4. Turn the key to LOCK and align the key cylinder with the lock body.
- 5. Turn the key almost to "I" and insert the key cylinder until the pin touches the body.
- 6. Turn the key to the "I", push the pin and insert the key cylinder into the lock body until the pin clicks into place.

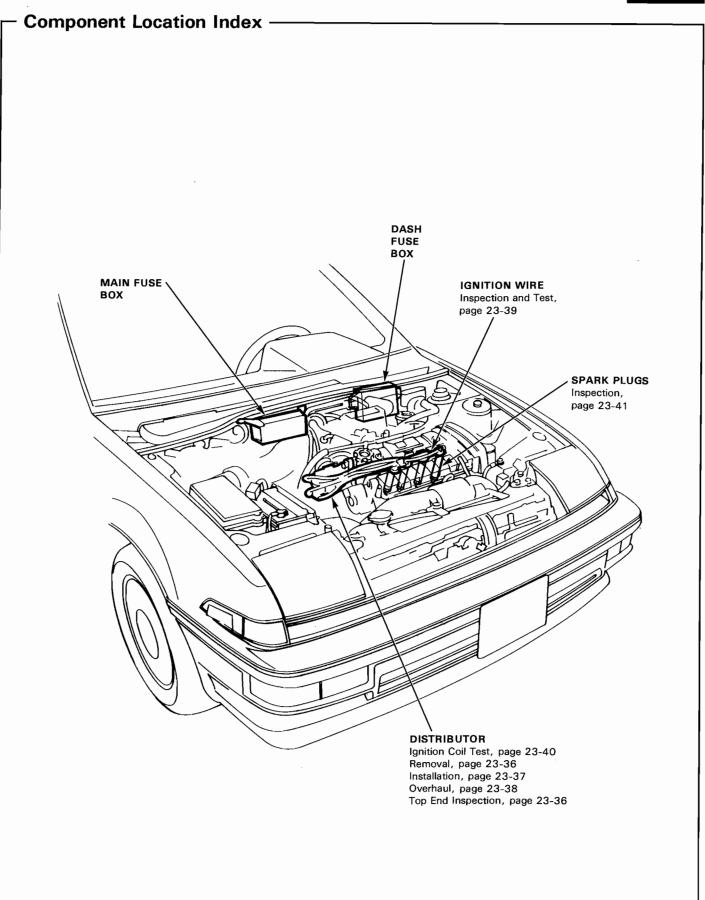


7. Install the ignition switch.

# **Ignition System**





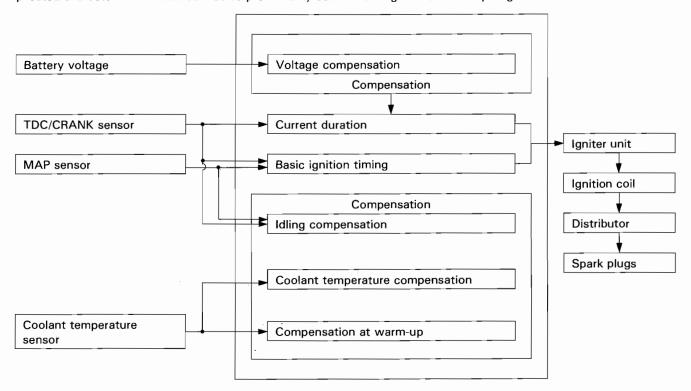


## **Ignition System**

### Description -

#### **Ignition Timing Control:**

The programmed ignition (PGM-IG) employed in this engine provides optimum control of ignition timing by determining the optimum timing using a microcomputer in response to engine speed and vacuum pressure in the intake manifold, which are transmitted by signals from TDC/CRANK sensor, throttle angle sensor, coolant temperature sensor and MAP sensor. This system, not dependent on a governor or vacuum diaphragm, is capable of setting lead angles with complicated characteristics which cannot be provided by conventional governors or diaphragms.



#### **Basic Control**

Determination of ignition timing/current duration:

The control unit has stored within it the optimum basic ignition timing for operating conditions based upon engine speed and intake manifold pressure. With compensation by signals from sensors, the system determines optimum timing for ambient conditions and sends voltage pulses to the igniter unit.

#### Compensation of ignition timing:

Compensation Item Related Sensor and Information		Description	
Idling	TDC/CRANK sensor MAP sensor	Ignition timing is controlled to the target speed with compensation according to the idling speed.	
Compensation at warm-up	Coolant temperature sensor	Lag angle is adjusted in accordance with the warming up conditions to bring about a good balance between operating performance and exhaust gas level.	
Coolant temperature compensation	Coolant temperature sensor	Compensation for lead angle at a low coolant temperature and lag angle at high coolant temperature.	

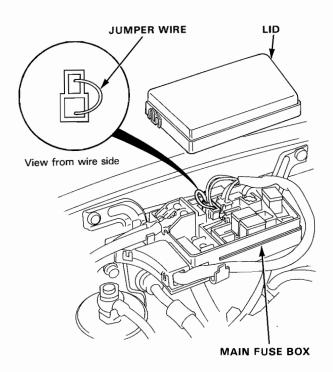
#### **Control at Start**

Ignition timing is fixed at BTDC  $4^{\circ}$  for cranking. The cranking is detected by the TDC/CRANK sensor (cranking revolution) and starter signal.

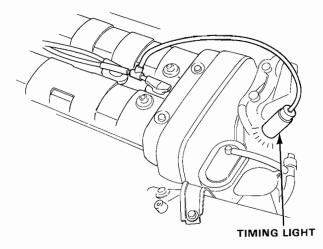


## Ignition Timing Inspection and Setting -

- Start the engine and allow it to warm up (cooling fan comes on).
- Remove the main fuse box lid and connect the Br/Bl and Br terminals with a jumper wire.

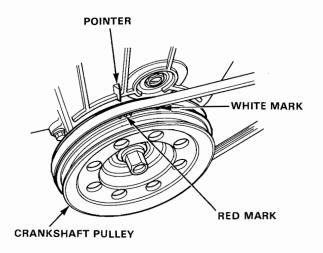


Connect a timing light to the engine; while the engine idles, point the light toward the pointer on the timing belt cover.

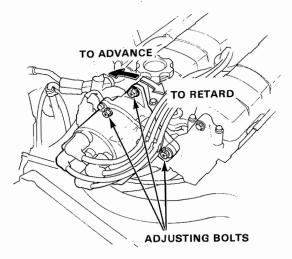


4. Adjust ignition timing, if necessary, to the following specifications:

Ignition Timing
M/T:12°±2°BTDC (RED)
at 750±50 rpm in neutral
A/T:12°±2°BTDC (RED)
at 700±50 rpm in neutral



 Adjust as necessary by loosening the distributor adjusting bolts, and turn the distributor housing counterclockwise to advance the timing, or clockwise to retard the timing.

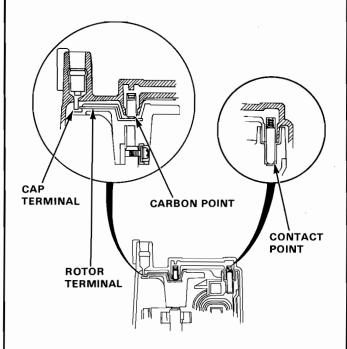


- 6. Tighten the adjusting bolts and recheck the timing.
- Remove the jumper wire and put the lid on the main fuse box.

# **Ignition System**

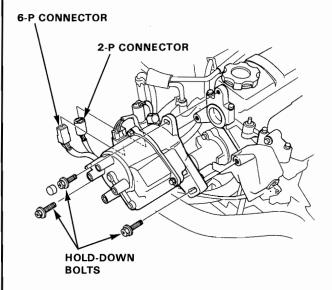
## **Distributor Top End Inspection-**

- 1. Check for rough or pitted rotor and cap terminals.
- Scrape or file off the carbon deposits.
   Smooth the rotor terminal with an oil stone or #600 sandpaper if rough.
- Check the distributor cap for cracks, wear and damages. If necessary, clean or replace it.



## - Distributor Removal

- Disconnect the 2-P and 6-P connectors from the distributor.
- Disconnect the spark plug wires from the distributor cap.



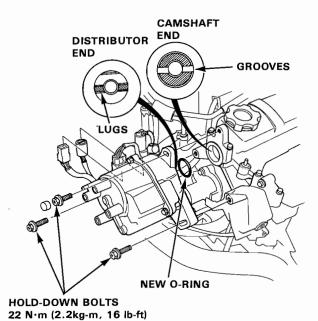
3. Remove the distributor hold-down bolts, then remove the distributor from the cylinder head.



### - Distributor Installation -

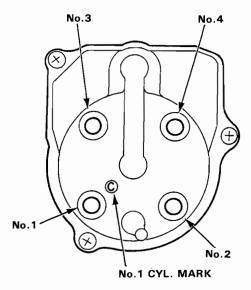
- 1. Coat a new O-ring with engine oil then install it.
- 2. Slip the distributor into position.

NOTE: The lugs on the end of the distributor and its mating grooves in the camshaft end are both offset to eliminate the possibility of installing the distributor  $180^\circ$  out of time.



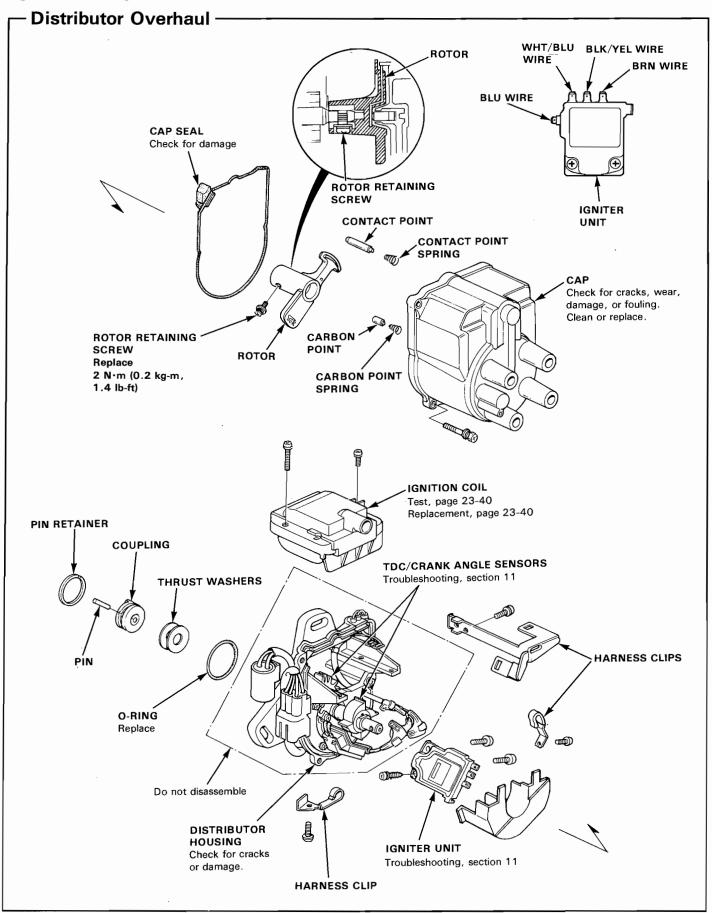
- 3. Install the hold-down bolts and tighten temporarily.
- Connect the 2-P and 6-P connectors to the distributor.

5. Connect the spark plug wires as shown.



- 6. Set the timing with a timing light as shown on page 23-57.
- 7. After adjusting, tighten the hold-down bolts, then install the cap on the bolt.

# **Ignition System**

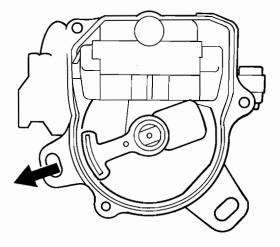




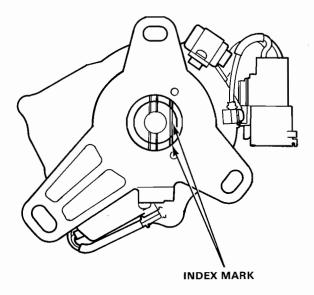
### **Distributor Reassembly**

Reassemble the distributor in the reverse order of disassembly.

 Install the rotor, then turn it so that it faces in the direction shown (toward the No. 1 cylinder).



- 2. Set the thrust washer and coupling on the shaft.
- Check that the rotor is still pointing toward the No. 1 cylinder, then align the index mark on the housing with the index mark on the coupling.

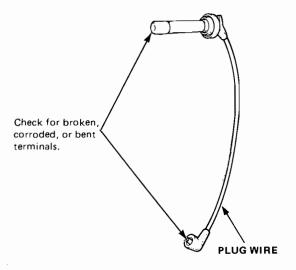


4. Drive in the pin and secure it with the pin retainer.

### Ignition Wire Inspection and Test -

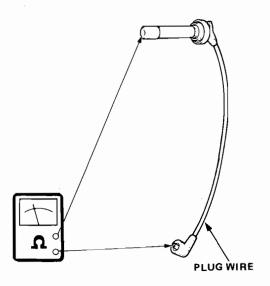
CAUTION: Carefully remove the ignition wires by pulling on the rubber boots. Do not bend the wire or the conductor may be broken.

 Check the condition of the wire terminals. If any terminal is corroded, clean it, and if it is broken or distorted, replace the wire.



2. Connect ohmmeter probes and measure resistance.

Ignition Wire Resistance: 25,000 ohms max. at 20°C (70°F)

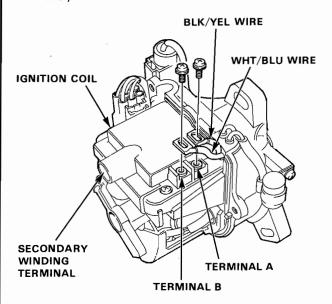


If resistance exceeds 25,000 ohms, replace the ignition wire.

## **Ignition System**

### - Ignition Coil Test

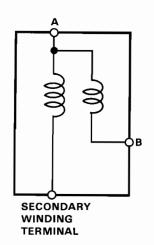
- With the ignition switch OFF, remove the distributor cap.
- Remove the 2 screws to disconnect the BLK/YEL and WHT/BLU wires from the terminals A and B respectively.



 Using an ohmmeter, measure resistance between the terminals. Replace the coil if the resistance is not within specifications.

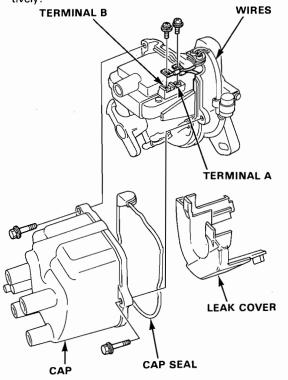
NOTE: Resistance will vary with the coil temperature; specifications are at  $20^{\circ}\text{C}$  ( $70^{\circ}\text{F}$ )

Primary Winding Resistance (between the A and B terminals): 0.3-0.5 ohms
Secondary Winding Resistance (between the A and secondary winding terminals): 9.440-14.160 ohms

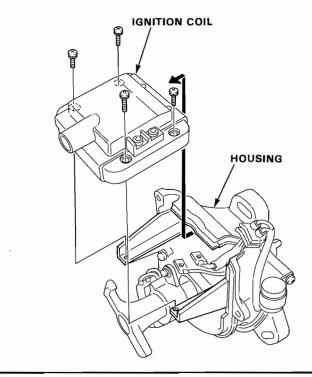


## **Igsition Coil Replacement -**

- With ignition switch OFF, remove the distributor cap and cap seal, then remove the leak cover.
- Remove the 2 screws to disconnect the BLK/YEL and WHT/BLU wires from the terminals A and B respectively.



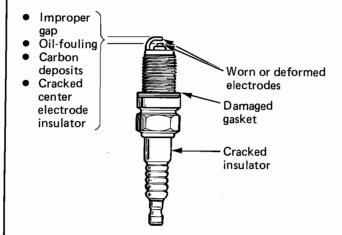
Remove the 4 screws and slide the ignition coil out of the distributor housing.





## 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 wires

Replace the plug if the center electrode is rounded as shown below.

#### Standard Plug:

o tanaara riagi.	
For all normal driving	BCPR6E—11 (NGK), Q20PR—U11 (ND), BCPR6EY—N11 (NGK)
For hot climates or continuous high speed driving	BCPR7E—11 (NGK), Q22PR—U11 (ND), BCPR7EY—N11 (NGK)
For cold climates	BCPR5E—11 (NGK), Q16PR—U11 (ND), BCPR5EY—N11 (NGK)



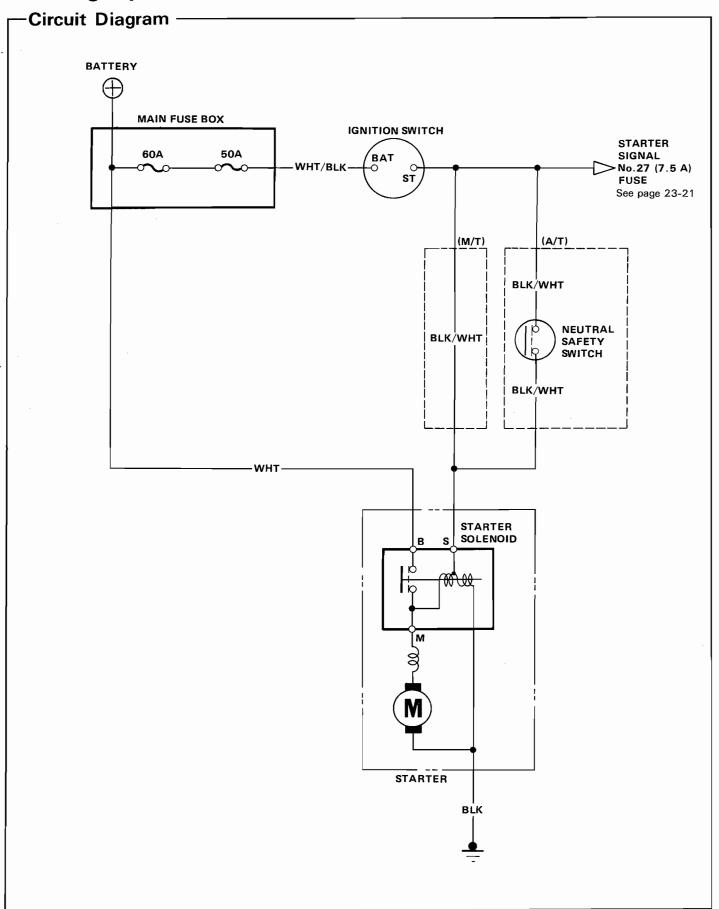
3. Adjust the gap with a suitable gapping tool.

Electrode Gap: 1.0-1.1 mm (0.039-0.043 in.)

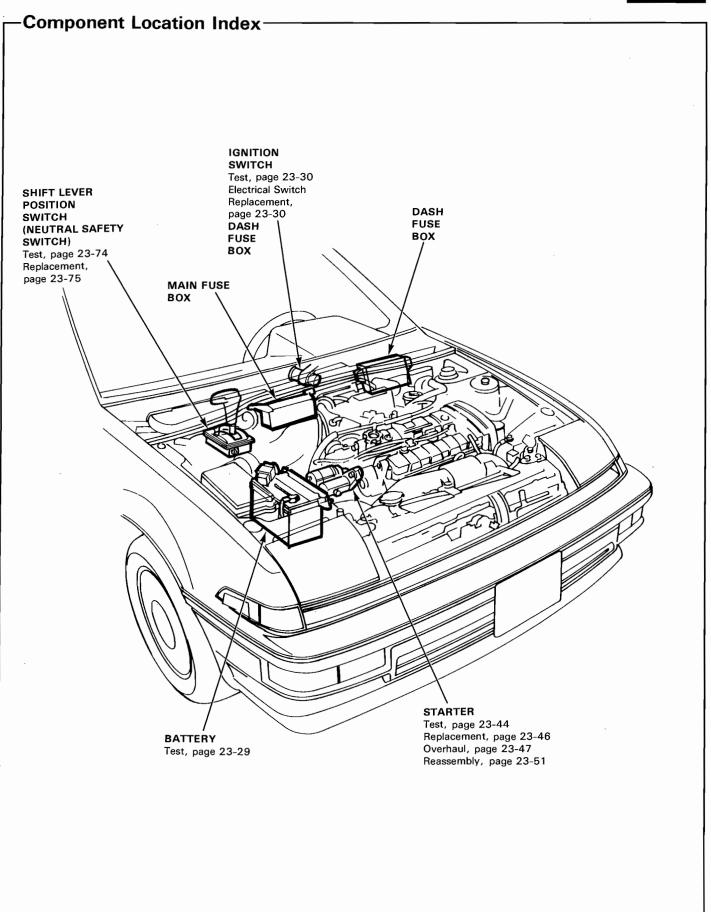
4. Screw the plugs into the cylinder head finger tight, then torque them to 18 N·m (1.8 kg·m, 13 lb·ft).

NOTE: Apply a small quantity of anti-seize compound to the plug threads before installing.

# **Starting System**







## **Starting System**

### Starter Test-

NOTE: The air temperature must be between 15 and 38°C (59 and 100°F) before testing.

#### Recommended Procedure:

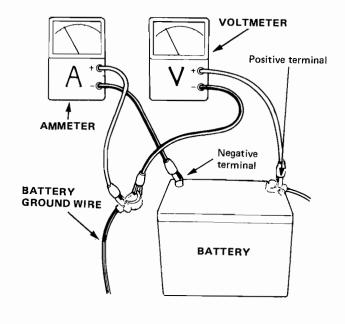
Use a starter system tester.

Connect and operate the equipment in accordance with manufacturer's instructions.

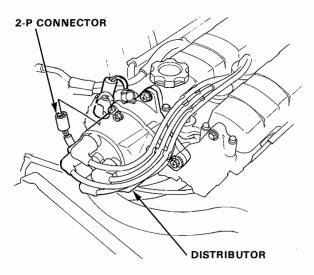
Test and troubleshoot as described.

### Alternate Procedure:

- Use the following equipment:
  - Ammeter, 0–400 A
  - Voltmeter, 0-20 V (accurate within 0.1 volt)
  - Tachometer, 0-1200 rpm
- Hook up voltmeter and ammeter as shown.

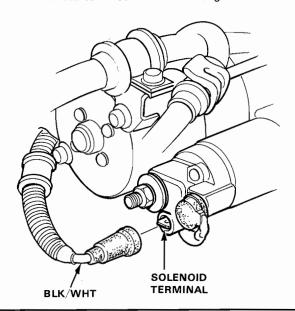


 Disconnect the 2-P connector (Ignition coil primary lead) from the distributor.



- 2. Check the starter engagement:
  Turn the ignition switch to "Start". The starter should crank the engine.
  - If the starter does not crank the engine, check the battery, battery positive wire and ground, and the wire 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 (BLK/WHT wire) from the starter. Connect a jumper wire from the battery positive (+) terminal to the solenoid terminal. The starter should crank the engine.





- If the starter still does not crank the engine, remove the starter and diagnose its internal problems.
- If the starter cranks the engine, check for an open in the BLK/WHT wire circuit between the starter and ignition switch, and connectors. Check the ignition switch. On cars with automatic transmission, check the shift position console switch (neutral safety switch) and connector.
- 3. Check for wear or damage:

The starter should crank the engine smoothly and steadily.

If the starter engages, but cranks the engine erratically, remove the starter motor. Inspect the starter, drive gear, and flywheel ring gear for damage. Check the drive gear overrunning clutch for binding or slipping when the armature is rotated with the drive gear held. Replace the gears if damaged.

 Check cranking voltage and current draw, Voltage should be no less than 8V. Current should be no greater than 350A.

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.

- Check cranking rpm: Engine speed during cranking should be above 100 rpm.
  - Loose battery or starter terminals.
  - Excessively worn starter brushes.
  - Open circuit in commutator segments.
  - Dirty or damaged helical spline or drive gear.
  - Defective drive gear overrunning clutch.
- 6. Check the starter disengagement:
  Turn the ignition switch to "Start" and release to
  "Run." The starter drive gear should disengage
  from the flywheel ring gear.

If the drive gear hangs up on the flywheel ring gear, check:

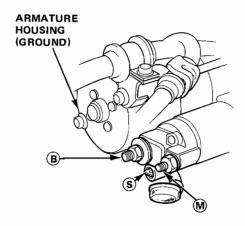
- Solenoid plunger and switch for malfunction.
- Drive gear assembly for dirty or damaged overrunning clutch.

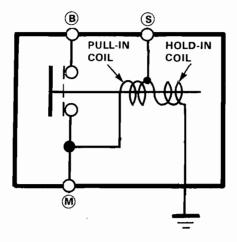
# **Starting System**

## - Starter Solenoid Test -

- Check the hold-in coil for continuity between the S terminal and the armature housing (ground). Coil is OK if these is Continuity.
- Check the pull-in coil for continuity between the S and M terminals.

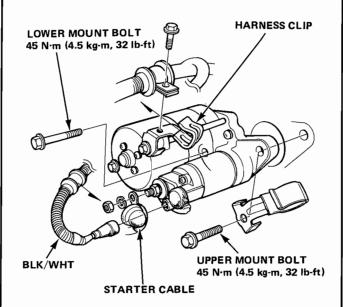
Coil is OK if there is continuity.



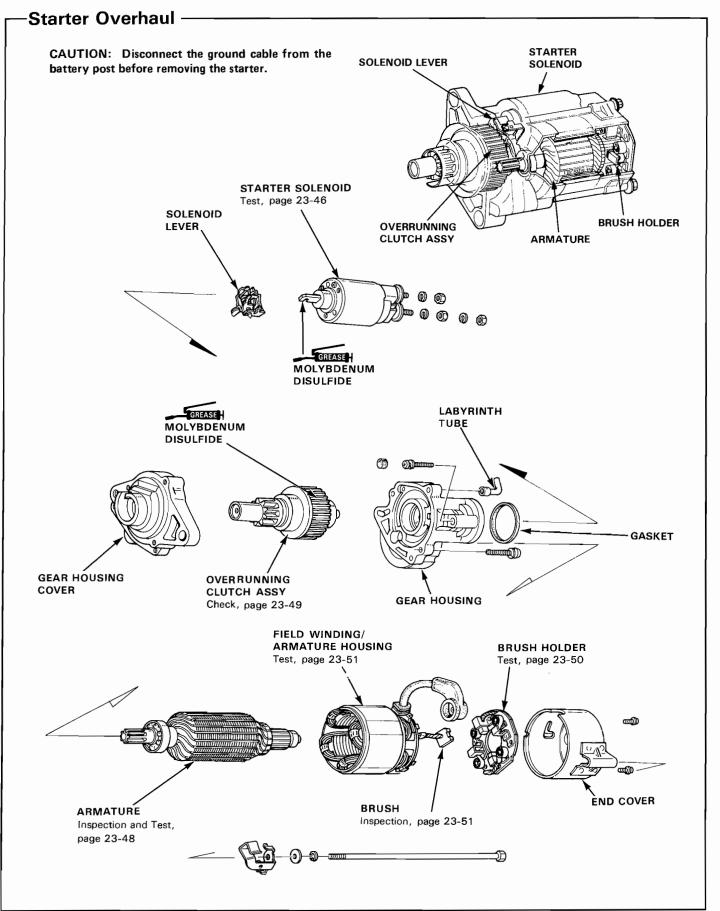


### **Starter Replacement**

- 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.
- Disconnect the BLK/WHT wire from the S terminal on the starter solenid.
- Remove the two bolts holding starter motor, and remove the starter motor.



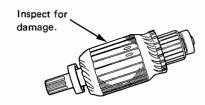




## Starting System

## Armature Inspection and Test-

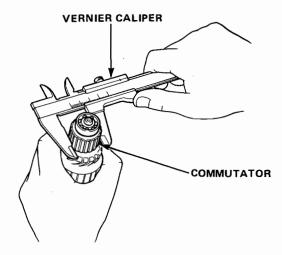
 Inspect the armature for wear or damage due to contact with the field coil magnets.



A dirty or burnt surface may be resurfaced with emery cloth or lathe within the following specifications.

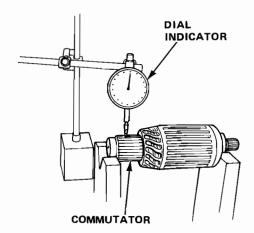
#### **Commutator Diameter**

Standard (New): 28.0—28.1 mm (1.11 in.) Service Limit: 27.5 mm (1.08 in.)

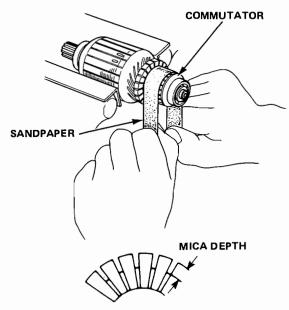


#### Commutator Runout

Standard (New): 0-0.02 mm (0-0.001 in.)
Service Limit: 0.05 mm (0.002 in.)



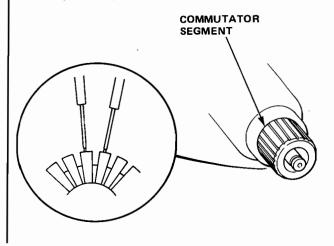
- If the commutator runout and diameter are within limits, check the commutator for damage or for carbon dust or brass chips between the segments.
- If surface is dirty, recondition it with #500 or #600 sandpaper. Then, check mica depth. If necessary, undercut mica with a hacksaw blade to achieve proper depth as shown.



#### Commutator Mica Depth

Standard (New): 0.4-0.5 mm (0.016-0.020 in.) Service Limit: 0.15 mm (0.006 in.)

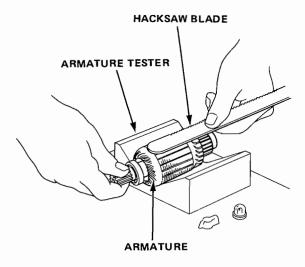
Check for continuity between each segment of the commutator. If an open circuit exists between any segment, replace the armature.





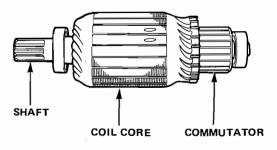
## Armature Inspection and Test —

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.

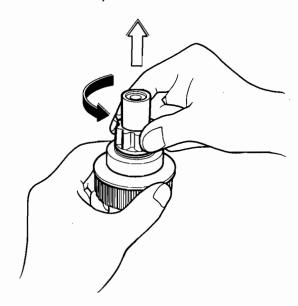
 With an ohmmeter, check that no continuity exists between the commutator and armature coil core, and between the commutator and armature shaft. If continuity exists, replace the armature.



## 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.

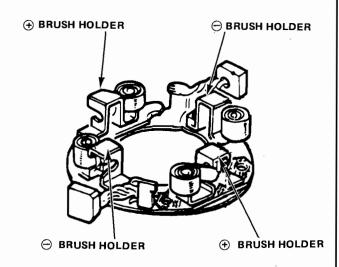
NOTE: Check condition of the flywheel or torque converter ring gear if the starter drive gear teeth are damaged.

## **Starting System**

### Starter Brush Holder Test-

1. Check that there is no continuity between the  $\oplus$  and  $\ominus$  brush holders.

If continuity exists, replace the brush holder assembly.

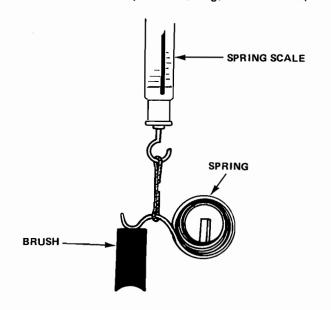


 Insert the brush into the brush holder, and bring the brush into contact with commutator, then attach a spring scale to the spring. Measure spring elastic force at the moment when the spring separates from the brush.

#### Elastic Force:

Standard (New): 20.5-27.0 N

(2.05-2.70 kg, 4.50-6.02 lb)

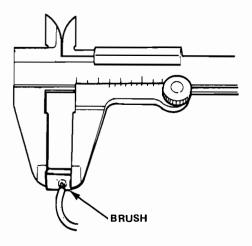


## -Starter Brush Inspection -

Measure brush length. If not within service limit, replace the armature housing and brush holder assembly.

Standard (New): 14.3-14.7 mm (0.56-0.58 in.) Service Limit: 9.3 mm (0.37 in.)

NOTE: To seat new brushes after installing them in their holders, slip a strip of #500 or #600 sandpaper, with the grit side up, over the commutator, and smoothly rotate the armature. The contact surface of the brushes will be sanded to same contour as the commutator.

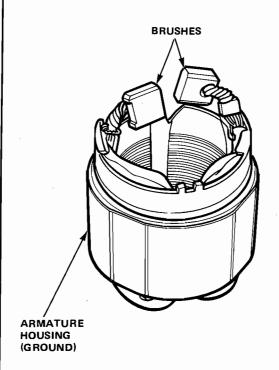




## -Starter Field Winding Test –

- 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).

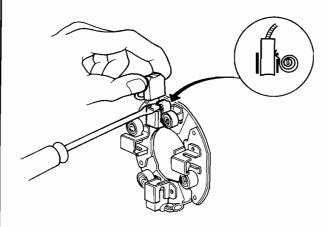
If continuity exists, replace the armature housing.



### -Starter Reassembly -

Reassemble the starter in the reverse order of disassembly.

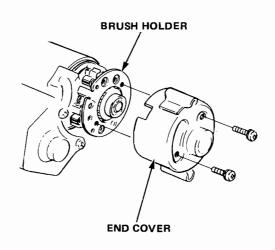
1. Pry back each brush spring with a screwdriver, then position the brush about halfway out of its holder, and release the spring to hold it there.



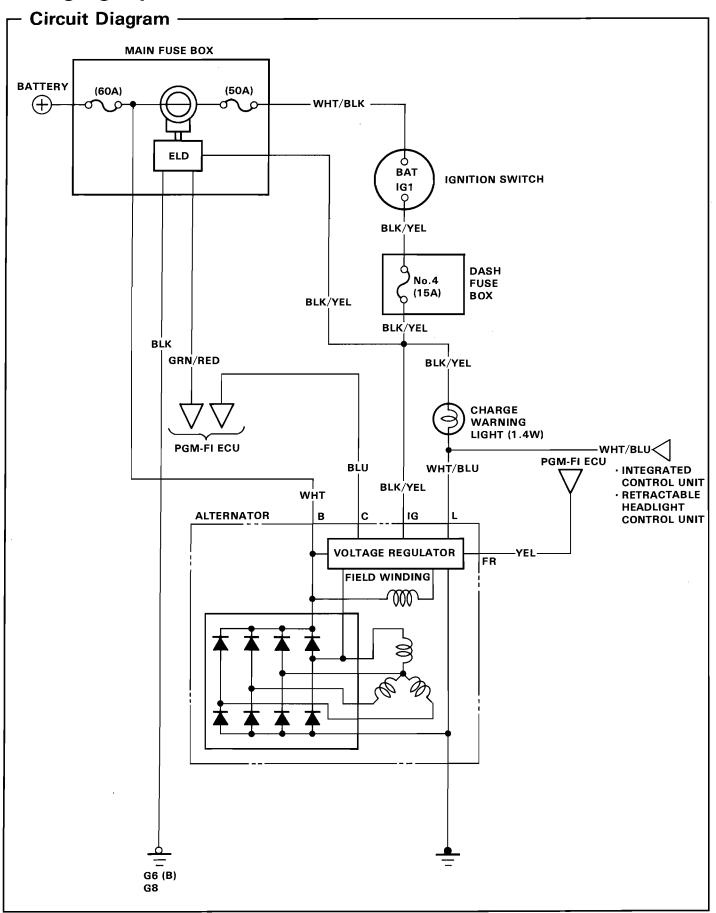
2. Install the armature in the housing. Next pry back each brush spring again and push the brush down until it seats against the commutator, then release the spring against the end of the brush.



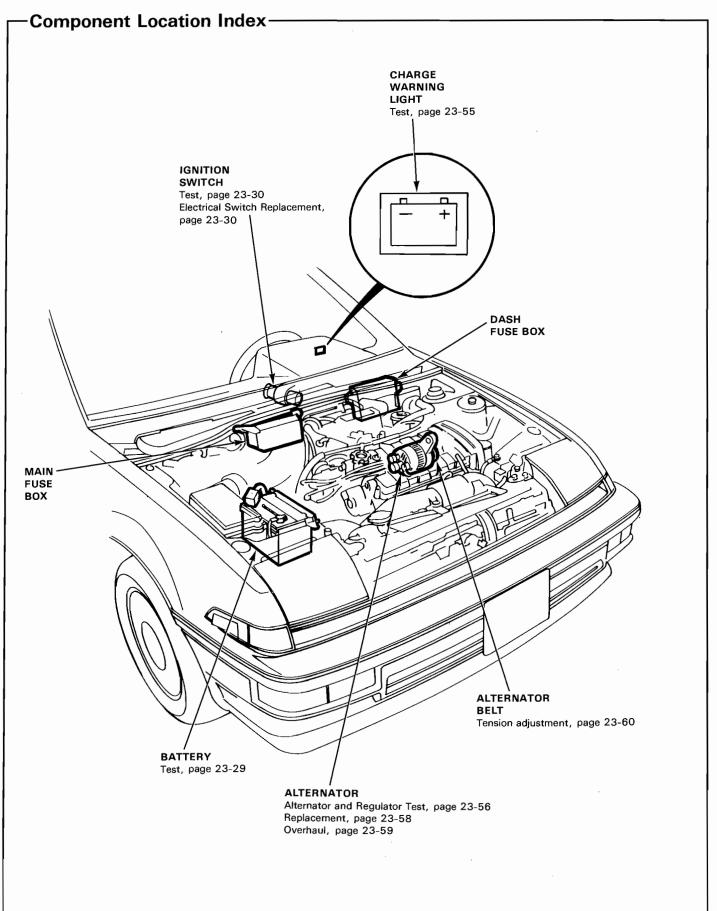
3. Install the end cover on the brush holder.



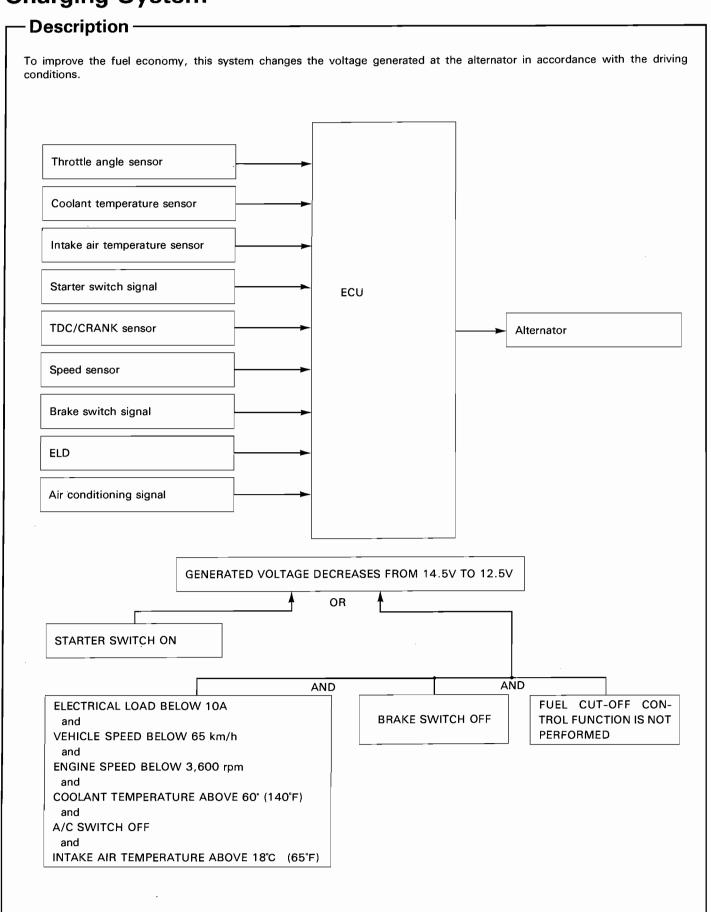
# **Charging System**







# **Charging System**



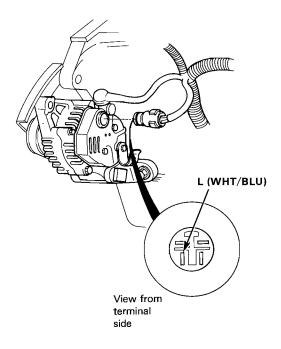


### **Charge Warning Light Test**

NOTE: Before testing, check the wire harness connection and alternator belt tension.

 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 L (WHT/BLU) terminal to ground.

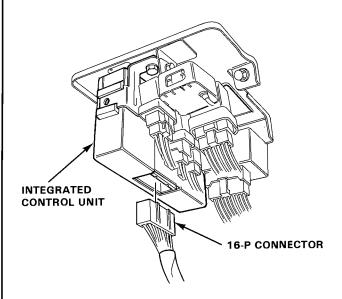


- If the warning light still does not come on, check for:
  - Blown No.4 (15A) fuse in the dash fuse box.
  - Bad bulb.
  - An open in the WHT/BLU wire between the warning light and voltage regulator.
  - An open in the BLK/YEL wire between the warning light and the dash fuse box, or the dash fuse box and the ignition switch.
- If the light comes on, check the alternator and regulator (see page 23-56).
- Start the engine and let it idle. The charge warning light should go off.

If it stays on this time, check the alternator and regulator (see page 23-56).

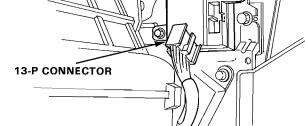
If the system is charged, proceed as follows:

3. Remove the dashboard lower panel to disconnect the 16-P connector from the control unit. With the engine running, the charge warning light should go out.



- If the light goes out, there is a short in the integrated control unit.
- If the light does not go out, go to step 4.
- Remove the right kick panel to disconnect the 13-P connector from the control unit. With the engine running, the charge warning light should go out.





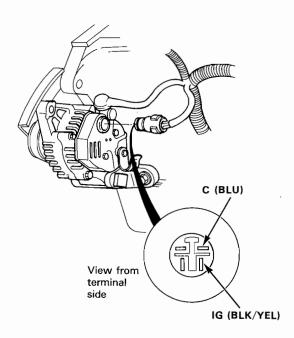
- If the light goes out, there is a short in the retractable headlight control unit.
- If the light does not go out, there is a short to ground in the WHT/BLU wire from the warning light to the control unit.

## **Charging System**

### Alternator and Regulator Test

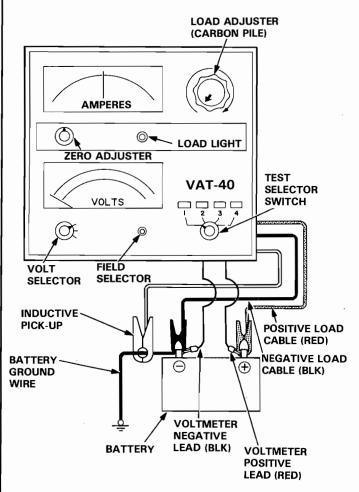
- First make sure you have a good battery, and that the alternator belt, and connections at the alternator and main fuses are good. Next, check the No. 4 (15A) fuse in the dash fuse box. (If blown, the charge warning light will come on even if the system' s working properly)
  - Start the engine and allow it to warm up (cooling fan comes on).
- Disconnect the alternator connector from the alternator.

With the ignition switch on, there should be battery voltage between the IG (BLK/YEL) terminal and body ground.



- If there is no voltage, check for:
  - Blown No.4 (15A) fuse in the dash fuse box.
  - An open in the BLK/YEL wire between the dash fuse box and the voltage regulator.
- If there is battery voltage, go to step 3.
- Connect the voltmeter positive probe to the battery positive (+) post and the negative probe to the C (BLU) terminal of the alternator connector.
   Start the engine and turn off all accessories.
   There should be battery voltage.

- If there is no voltage, check for:
  - An open in the Bu wire between the voltage regulator and PGM-FI ECU.
  - Faulty PGM-FI ECU (see section 11).
- If there is battery voltage, turn on the headlight.
   There should be no voltage.
  - If there is battery voltage, check for a short to ground in the Bu wire from the voltage regulator to the PGM-FI ECU or faulty PGM-FI ECU (see section 11).
  - If there is no voltage, go to step 4.
- Following the manufacturer's instructions, connect the SUN VAT-40 (or equivalent) and turn the selector switch to the "Starting (No. 1)" position.



 Start the engine. Turn off all accessories, move the selector switch to the "Charging (No. 2) position, remove the inductive pick-up, and zero the ammeter.

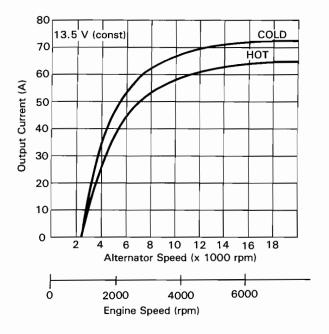
Reconnect the inductive pick-up to the battery ground wire, so the arrow is pointing away from the battery.



Turn on the headlight and rear window defogger, then raise engine speed to 2000 rpm and hold (make sure cooling fans are off).

Apply a "load" with the carbon pile, so the voltage drops to no less than 12 volts.

Check the maximum amperage reading and compare with the chart below.

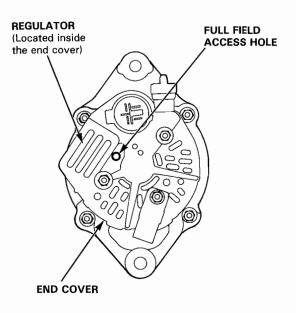


NOTE: Subtract 5 to 10 amperes from the maximum reading due to engine operation.

- If amperage is within specification, the system is OK: Proceed to the Charge Warning Light Test (see page 23-55).
- If amperage is not within specification, proceed to step 7.
- 7. Perform full field test: Attach a probe to the VAT-40 full field test lead and insert the probe into the full field access hole at the back of the alternator. Switch the VAT-40 to the "A" (ground) position momentarily and check amperage reading.

NOTE: As an alternative, use a screwdriver and an ammeter.

CAUTION: The voltage will rise quickly when the alternator is full fielded. Do not allow the voltage to exceed 18 volts or damage to the electrical system may result.



- If the amperage is not within specification, replace the alternator.
- If the amperage is within specification:
  - Check the BLK/YEL (IG) wire for battery voltage.
  - Check the BLU (C) wire for continuity to ground (should be open).

NOTE: If the BLU wire is grounded by a short to body ground or a bad ECU or a faulty ELD signal to the ECU, then the charging system will never charge.

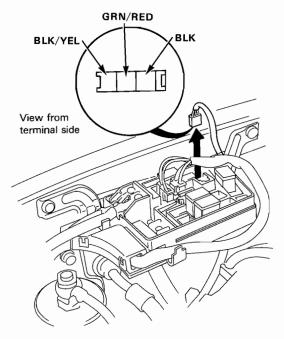
 If the alternator and the BLK/YEL and BLU wires are OK, then replace the voltage regulator.

## **Charging System**

### - ELD Unit Test -

- First make sure you have a good battery (see page 23-29).
- Open the main fuse box lid and disconnect the 3-P connector from the ELD unit.

With the ignition switch ON, there should be battery voltage between the BLK/YEL (+) and BLK(-) terminals.

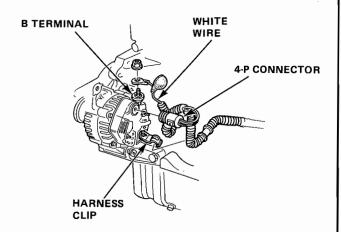


- If there is no voltage, check for:
  - Blown No.4 (15A) fuse in the dash fuse box.
  - An open in the BI/Y wire between the dash fuse box and main fuse box.
  - Poor ground (G6(B), G8).
  - If there is battery voltage, go to step 3.
- Check for voltage between the GRN/RED terminal and body ground with the ignition switch ON. There should be approximately.5V.
  - If the voltage is not as specified, check the alternator control system (see section 11).
  - If the voltage is as specified, go to step 4.
- 4. Connect the 3-P connector to the ELD unit.
- Check for voltage between the GRN/RED terminal and body ground with the ignition switch ON and turn on the headlight low beam.
   There should be approximately. 2V.
  - If the voltage is not as specified, replace the main
  - fuse box (ELD unit is not available separately).

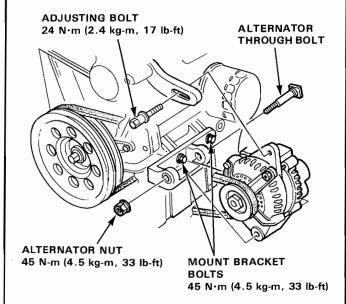
     If the voltage is as specified above, ELD unit is OK.

## -Alternator Replacement-

- Disconnect the ground wire from the battery negative (-) terminal stud.
- Disconnect the 4-P connector from the alternator.
- Remove the terminal nut and the white wire from the B terminal.



4. Remove the adjusting bolt and alternator nut, then remove the alternator belt from the alternator pulley.



- Remove the alternator through bolt, then the alternator.
- If necessary, remove the mount bracket bolts, and the upper and lower mount brackets.
- Adjust the alternator belt tension after installation (page 23-61).



## Alternator Overhaul-NOTE: It is only necessary to separate the pulley, drive end housing and rotor when the front bearing **PULLEY** needs replacement. 10 mm BOX WRENCH 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. 22 mm BOX WRENCH **REAR BEARING** SPACER RING BEARING PULLEY LOCKNUT RETAINER 75-130 N·m (7.5-13.0 kg-m, 54.2-94.0 lb-ft) FRONT BEARING **PULLEY LOCKNUT** 75-130 N·m (7.5-13.0 kg-m, 54.2-94.0 lb-ft) CAUTION: Do not coat the slip rings ROTOR with grease or oil. Test, page 23-61 STATOR THROUGH **VOLTAGE REGULATOR** BOLT **PULLEY** DIODE (RECTIFIER) ASSY STATOR ASSY/ Test, page 23-60 DRIVE END HOUSING Test, page 23-61 REAR HOUSING ASSY **TERMINAL INSULATOR** INSULATOR SLEEVE **END COVER BRUSH HOLDER** HARNESS CLIP **BRUSH HOLDER INSULATOR**

BRUSHES

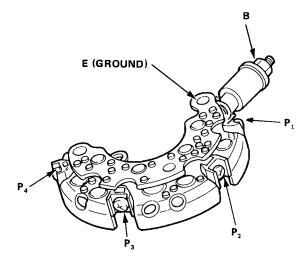
Inspecoion, page 23-61

## **Charging System**

### -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.

 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.



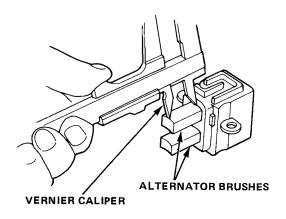
2. If any of the 8 diodes fails, replace the rectifier assembly. (Diodes are not available separately.)

## -Alternator Brush Inspection

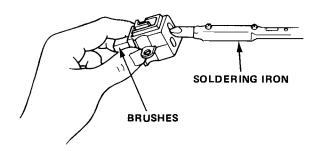
- 1. Remove the end cover, then take out the brush holder by removing its 2 screws.
- 2. Measure length of the brushes with a vernier caliper.

Alternator Brush Length

Standard: 13.5 mm (0.53 in) Service Limit: 4.5 mm (0.18 in)



If the brushes are not within the service limit, replace them.

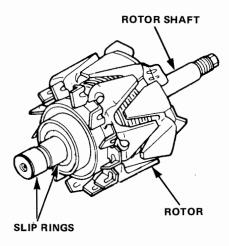


CAUTION: When replacing the brushes, use only a rosin core type solder or solder joints will corrode.



### Rotor Slip Ring Test-

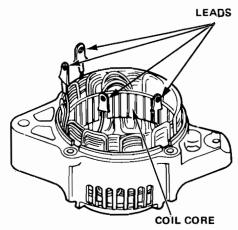
- Check that there is continuity between the slip rings.
- Check that there is no continuity between the rings and the rotor or rotor shaft.



3. If the rotor fails either continuity check, replace it.

### Stator Test-

- Check that there is continuity between each pair of leads.
- 2. Check that there is no continuity between each lead and the coil core.



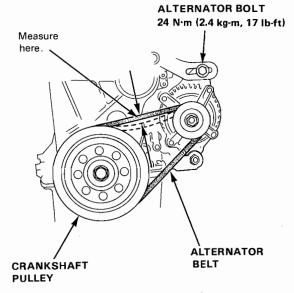
If the coil fails either continuity check, replace the stator.

## -Alternator Belt Adjustment

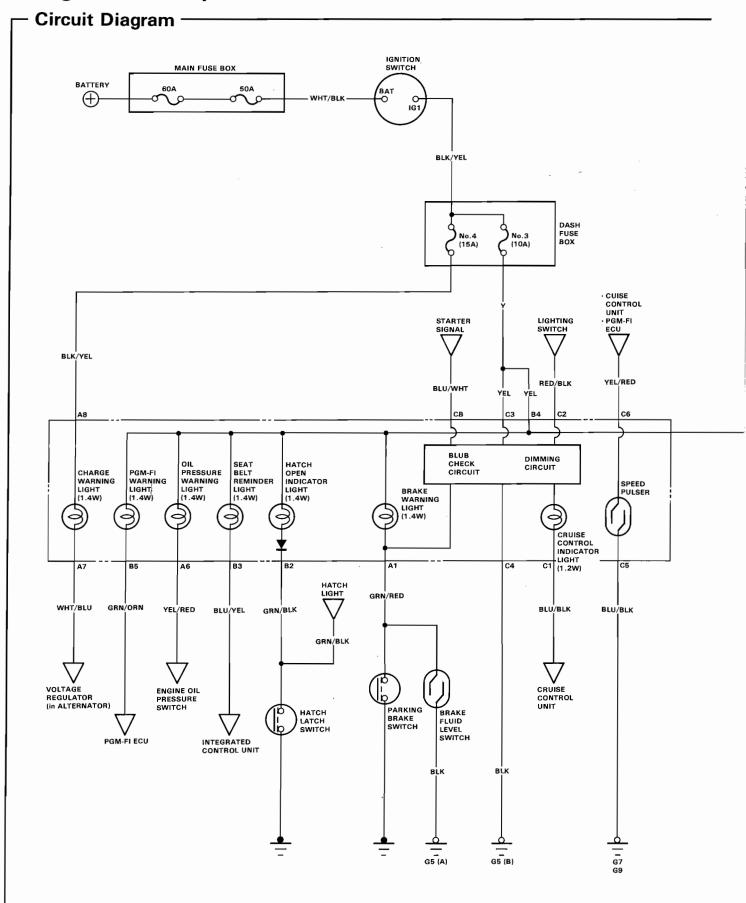
 Apply a force of 98 N (10 kg, 22 lb) and measure the deflection between the alternator and crankshaft pulley.

Deflection: 7-10 mm (0.28-0.39 in )

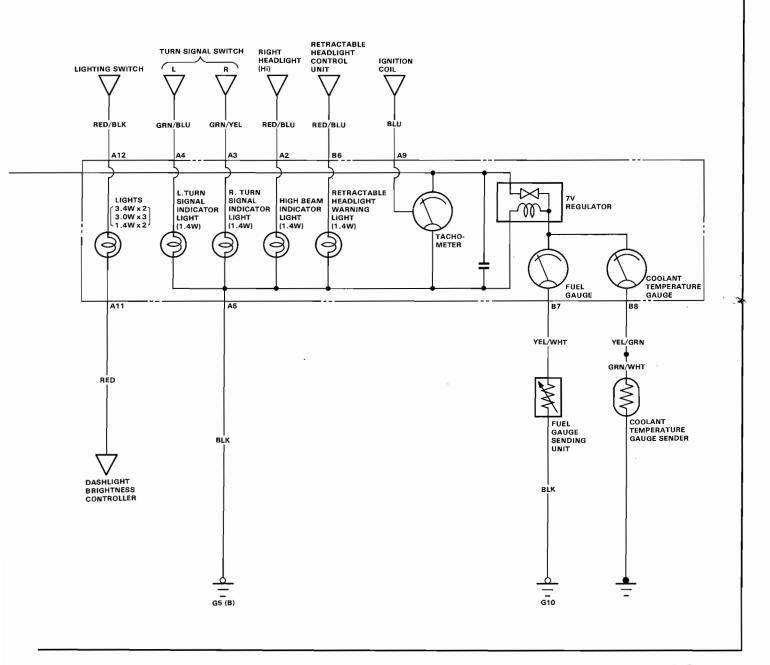
NOTE: On a brand-new belt, the deflection should be 4–6.5 mm(0.16–0.26 in) when first measured.

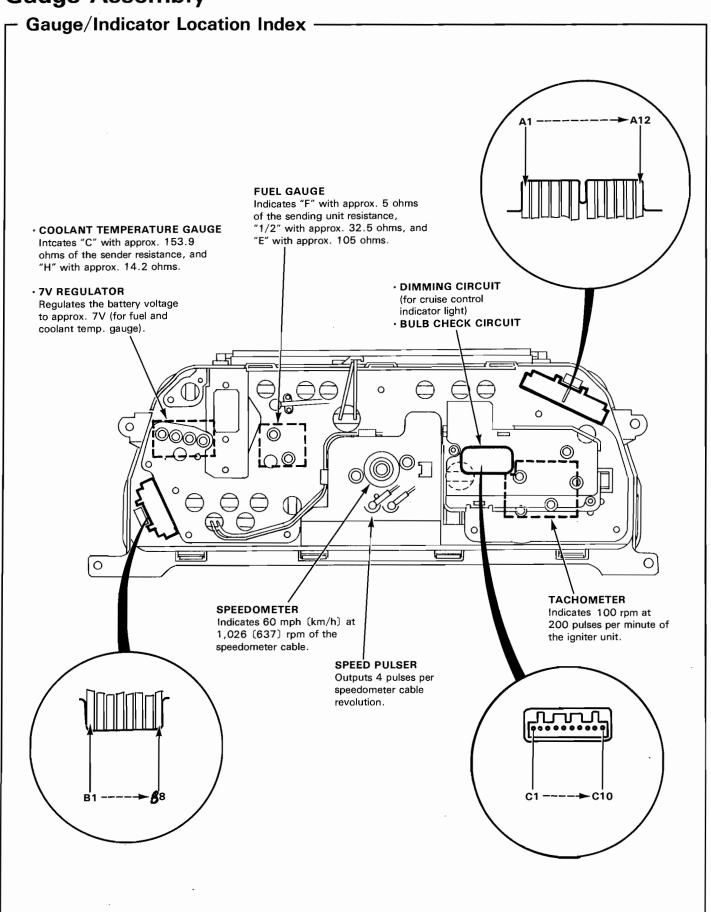


- 2. Loosen the alternator bolt and nut.
- 3. Move the alternator to obtain the proper belt tension, then retighten the bolt and nut.
- 4. Recheck the deflection of the belt.





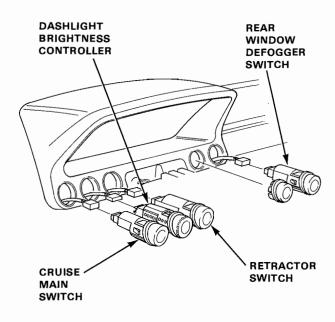




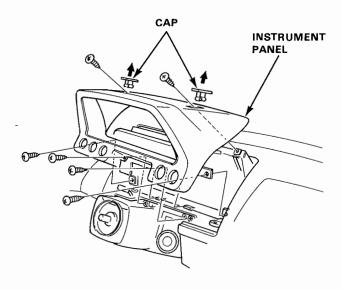


### -Removal -

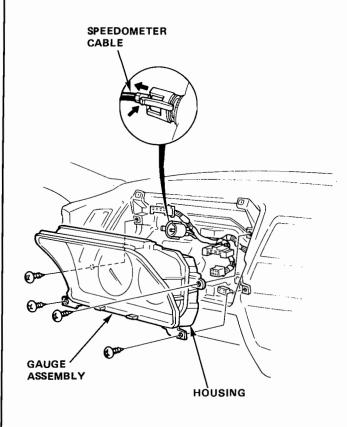
1. Remove the left side lower dash panel and switch by pushing it out, then disconnect the connectors.

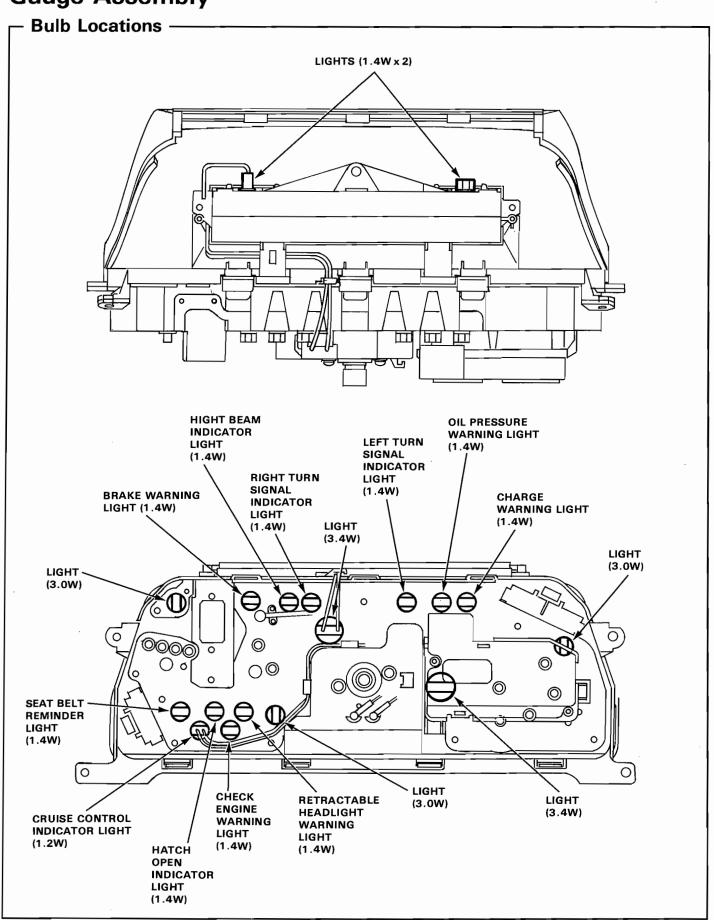


- 2. Remove the upper caps and the 2 screws.
- Remove the 2 screws from behind the column cover and 2 screws from back of cruise control main switch and rear window defogger switch, then remove the instrument panel.

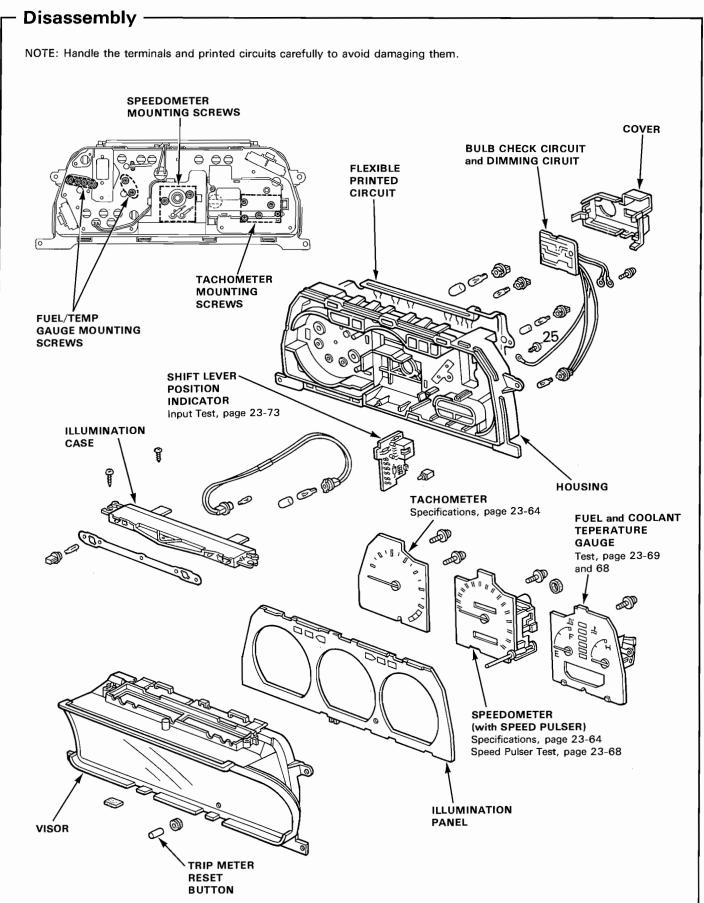


 Remove the 4 screws, then remove the gauge assembly by disconnecting the speedometer cable and wire harnesses.



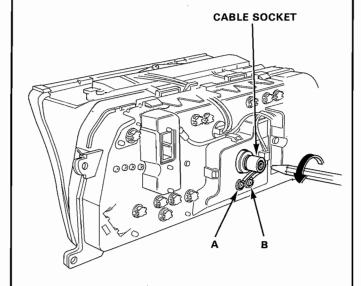






# - Speed Pulser Test

- Remove the gauge assembly from the dashboard, then turn it over.
- Break the lead off a pencil tip then insert the pencil into the speedometer cable connector socket and turn it.
   Connect an ohmmeter between the A and B terminals.
   There should be continuity 4 times between the A and B terminals per revolution.



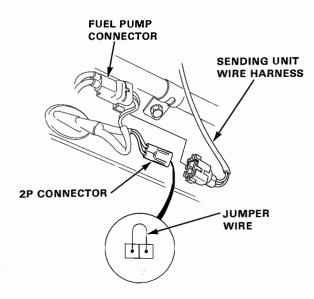
# **Fuel Gauge**



### - Gauge Test ·

NOTE: Refer to page 23-62 for wiring description of the fuel gauge circuit.

- Remove the fuel pump cover (see section 11).
- Make sure the ignition switch is off, then disconnect the 2-P connector from the sending unit wire harness and at the 2-P connector, attach a jumper wire between the YEL/WHT and BLK terminals.



Turn the ignition switch ON. Check that the pointer of the fuel gauge starts moving toward "F" mark.

CAUTION: Turn the ignition switch OFF within 5 seconds, before the pointer reaches "F" mark on the gauge dial. Failure to turn the ignition switch OFF before the pointer reaches the "F" mark may cause damage to the fuel gauge.

- If the pointer of the fuel gauge does not swing at all, check for:
  - Blown No.3 (10A) fuse in the dash fuse box.
  - An open in the YEL, YEL/WHT or BLK wire.
  - Poor ground (G10).

Replace the fuel gauge if the fuse and wiring are

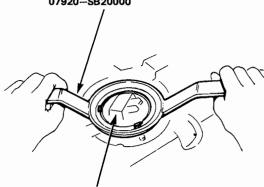
- If the gauge is OK, check for:
  - An open in the YEL/WHT or BLK wire (fuel sending unit wire harness).
  - Faulty fuel sending unit.

# -Fuel Gauge Sending Unit Test-

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

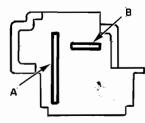
- Remove the fuel tank.
- Remove the fuel gauge sending unit.



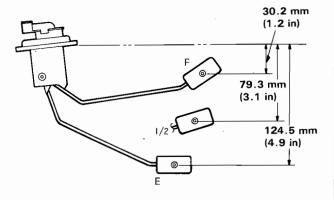


**FUEL GAUGE SENDING UNIT** 

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



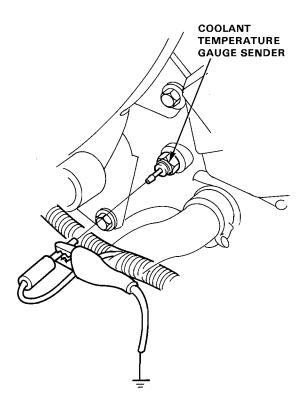
If the above readings are not obtainable, replace the fuel gauge sending unit with a new one.

# **Coolant Temperature Gauge**

## - Gauge Test -

NOTE: Refer to page 23-62 for wiring description of the coolant temperature gauge circuit.

 Make sure the ignition switch is OFF, then disconnect the GRN/WHT wire from the coolant temperature gauge sender and ground it with a jumper wire.



Turn the ignition switch ON.
 Check that the pointer of the coolant temperature gauge starts moving toward "H" mark.

CAUTION: Turn the ignition switch OFF within 2 seconds, before the pointer reaches "H" mark on the gauge dial. Failure to turn the ignition OFF quickly enough may cause damage to the gauge.

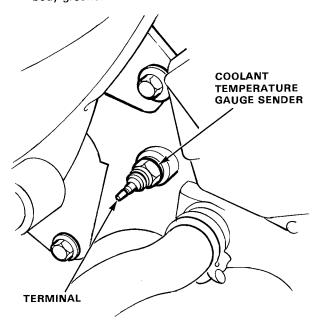
- If the pointer of the gauge does not swing at all, check for:
- Blown No.3 (10A) fuse in the dash fuse box:
- An open in the YEL or GRN/WHT wire.

Replace the coolant temperature gauge if the fuse and wiring are normal.

• Inspect the gauge sender if the gauge is OK.

### Sender Test -

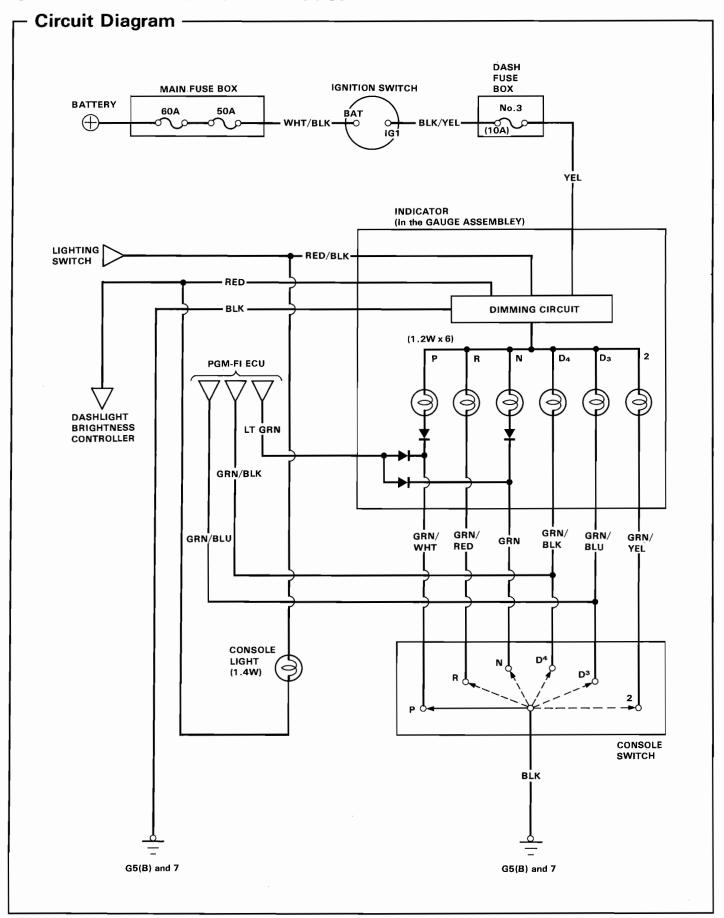
- 1. Disconnect the GRN/WHT wire from the Sender.
- 2. With the engine cold, use an ohmmeter to measure the resistance between the sender terminal and the body ground.



- 3. Check the temperature of coolant.
- 4. Run the engine and measure the change in resistance with engine at operating temperature.

	L		H	
Temperature	50°C (122°F)	80°C (176°F)	125°C (257°F)	
Resistance (Ω) Approx.	153.9	51.9	14.2	

# **Shift Lever Position Indicator**

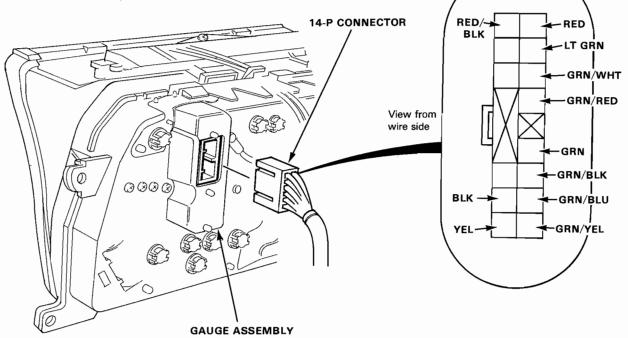




# - Indicator Input Test -

Remove the gauge assembly from the dashboard to disconnect the 14-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.

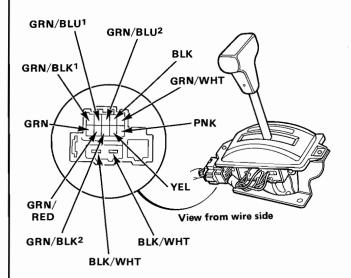


No.	Wire	Nire Test condition Test : desired result		Possible cause (if result is not obtained
1	BLK	Under all conditions.	Check for continuity to ground: should be continuity.	Poor ground (G5(B) and 7).  An open in the wire.
2	YEL	Ignition switch ON.	Check for voltage to ground: should be battery voltage.	An open in the wire. Blown No.3 (10A) fuse.
	GRN/WHT	Shift lever position in P.		
	GRN/RED	Shift lever position in R.		
3	GRN	Shift lever position in N.	Check for continuity to ground:	An open in the wire.
3	GRN/BLK	Shift lever position in D4.	should be continuity.	Faulty shift lever position switch. Poor ground (G5(B) and 7).
	GRN/BLU	Shift lever position in D³.		
	GRN/YEL	Shift lever position in 2.		
4	RED/BLK and RED	Lighting switch ON and dashlight brightness control dial on full bright.	Check for voltage between RED/BLK and R terminals: should be battery voltage.	An open in the wire. Faulty lighting switch. Faulty dashlight brightness control system.
5	LT GRN	Ignition switch ON	Check for valtage to ground: should be about 5V.	Faulty PGM-FI system. An open in the wire.

# **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:

Sillit Level				_		_	
Terminal Position	BLK	GRN/ BLU <sup>2</sup>	GRN/ BLU <sup>1</sup>	GRN/ BLK <sup>1</sup>	GRN	GRN/ RED	GRN/ WHT
2	<u> </u>						
D <sub>3</sub>	$\Diamond$		-0				
D <sub>4</sub>	0-			0			
N	0-						
R	0-						
Р	0-						_

### Neutral Safety Switch:

Terminal Position	BLK/ WHT	BLK/ WHT
N	0-	
Ř		
Р	. 0-	0

### Back-up Switch:

Terminal Position	YEL	GRN/ BLK <sup>2</sup>
N		
R	0	0
Р		

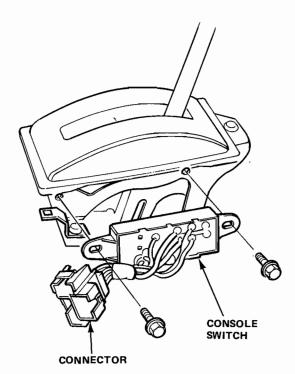
# Shift Position Switch: (With Cruise Control only)

(**************************************			
Terminal	BLK	PNK	
Position	DEN		
2	0	<u> </u>	
$D_3$	$\Diamond$	0	
D₄	$\Diamond$		
N			
R			
Р			



# Console Switch Replacement -

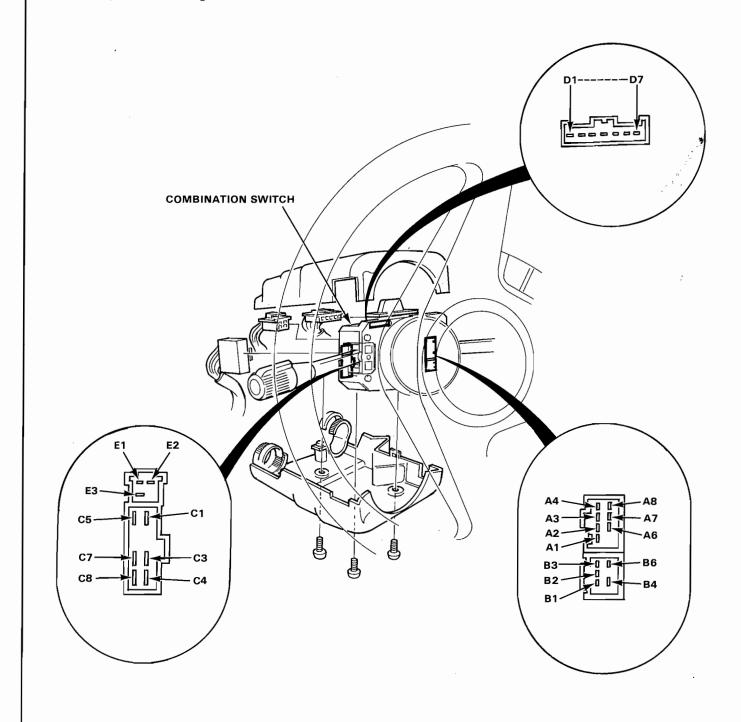
- 1. Remove the front console.
- 2. Disconnect the 10-P and 2-P connectors from the console switch.
- 3. Remove the 2 bolts and console switch.



# **Combination Switch**

## - Test -

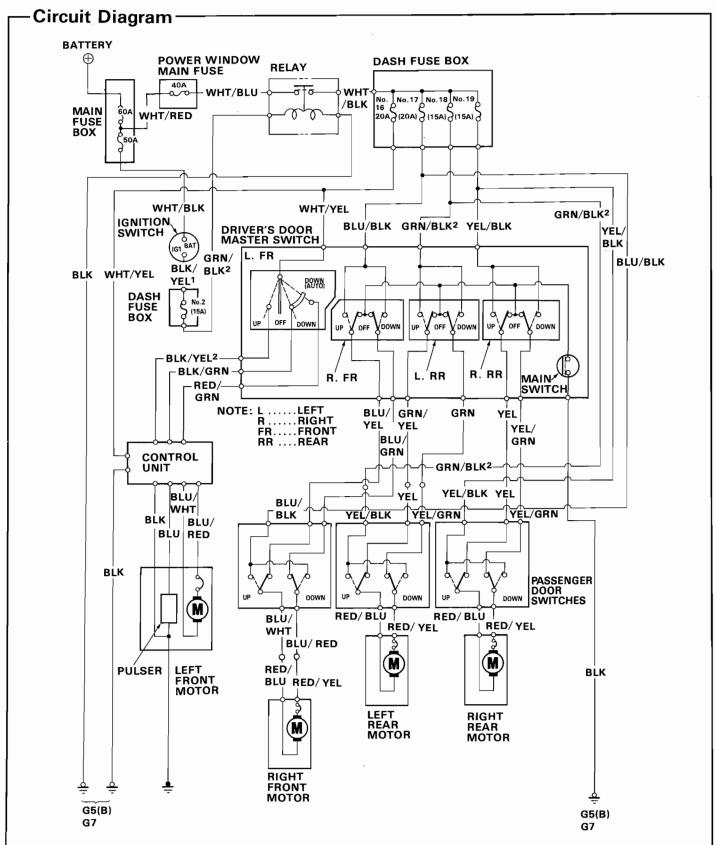
- Remove the column covers.
   Disconnect the connectors from the switch.
   Check for continuity between the terminals in each switch position according to the tables.





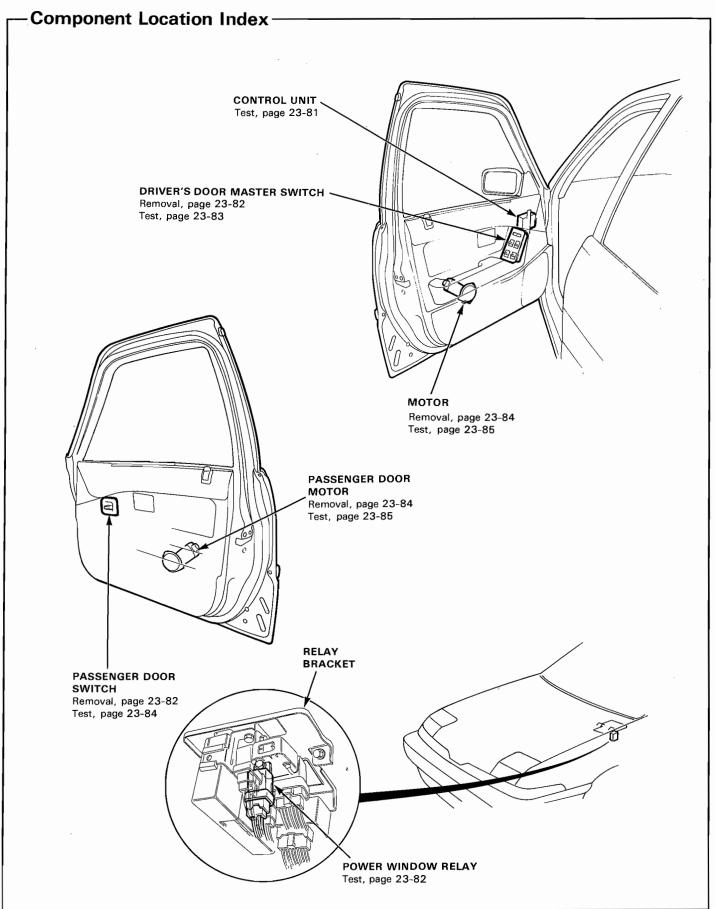
	Terminal	A1	A2	А3	A4	A6	A7	A
Position			A2		A4	Ao	Α/	
	OFF	<u> </u>	0 .					_
	INT			0—	0			
	LO	0				,		
	Н	_				0	0 '	
Mis	t Switch "ON"					0	0	
Wash	ner Switch "ON"				0-			
ear Window	Wiper/Washer Switch	_					_	
Position	Terminal	В1	B2	В3	В4	В6		
Wash	er Switch "ON"	0-		<del></del>				
	OFF	0						
	ON				0-			
Wash	er Switch "ON"	0		<del></del>				
iahtina/Dimm	ner/Passing Switch	•						
Position	Terminal	C1	СЗ	C4	C5	. C7	C8	
- COMMON	OFF							
	•	O—-				٠.	_	
Lighting Switch	DIMMER SWITCH LOW	0—						
SWITCH	DIMMER SWITCH HIGH	<u> </u>					0	
	PASSING SWITCH ON		0		<del>-</del>			
azard Switch					. •			
Position	Terminal	D1	D2	D3	D4		D6	
	OFF						,	
ON					0-	·		
0. 10			<u> </u>	<u> </u>			<u> </u>	
ırn Signal Sv	Terminal	E1	E2	E3	*			
Position R		0	_					
	NEUTRAL							/

## **Power Windows**



NOTE: Several different wires have the same color. They have been given a number suffix to distinguish them (for example  $GRN/BLK^1$  and  $GRN/BLK^2$  are not the same).





# **Power Windows**

# - Troubleshooting –

NOTE: The numbers in the table show the troubleshooting sequence.

Item to be ins	Item to be inspected		2 (15A) fuse in the dash fuse box				door motor	ch		Passenger door switch		r (section 20)	of battery		ires or loose erminals
Symptom		Blown No. 16 (20A), No. 17 (20A), No. 18 or No. 19 (15A) fuse in the dash fuse box	Blown No. 2 (15/	Relay	Control unit	Motor	Pulser in driver's door motor	Driver's door switch	Right front	Left rear	Right rear	Window regulator	State of change of battery	Poor ground	Open circuit in wires or loose or disconnected terminals
All windows dea	ıd.		1	3									2	G5(B), G7	BLK/YEL <sup>1</sup> or GRN/BLK <sup>1</sup>
Driver's door wi	ndow	1			2	4		3				5		G5(B);G7	WHT/YEL, BLK /YEL <sup>2</sup> , BLK/GRN, BLU/RED or BLU/WHT
Driver's door wi					1		2	3							RED/GRN, BLU or BLK
	Right front	1				4		3	2			5		G5(B), G7	BLU/BLK, BLU/ YEL, BLU/GRN, BLU/RED BLU/ WHT, RED/YEL or RED/ BLU
Passenger door windows dead.	Left rear	1				4		3		2		5		G5(B), G7	GRN/BLU <sup>2</sup> , GRN/YEL,GRN, RED/YEL,or RED/BLU
	Right rear	, 1				4		3			2	5		G5(B), G7	YEL/BLK, YEL, YEL/GRN, RED/ YEL, or RED/BLU

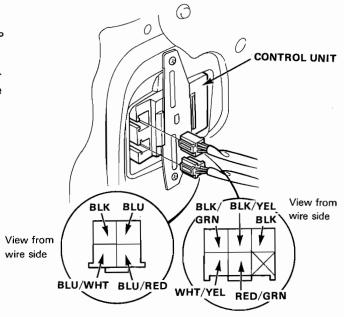


### Control Unit Test

### 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	BLK	At all times under all conditions.	Check for continuity to ground : should be continuity.	Poor ground (G5(B), G7). An open in the wire.
2	WHT/YEL	Ignition switch ON.	Check for voltage to ground : should be battery voltage.	An open in the wire. Blown No.16 (20 A) fuse.
3	BLK/YEL	Ignition switch ON and front left window switch UP.		
4	BLK/GRN	Ignition switch ON and front left window switch DOWN.	Check for voltage to ground : should be battery voltage.	An open in the wire. Faulty driver's door switch.
5	RED/GRN	Ignition switch ON and front left window switch DOWN (AUTO).		
6	BLU	Connect battery wires to Bu/W and Bu/R terminals.	Check for resistance to ground : should be 20-50 $\Omega$ 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.

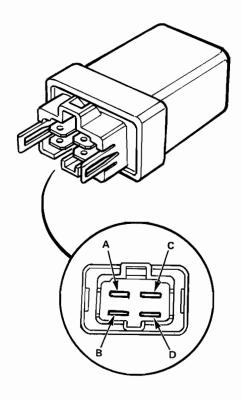
7	BLU/RED	Ignition switch ON and front left window switch UP.	Check for voltage to the BLU/WHT wire: should be battery voltage.	
8	BLU/WHT	Ignition switch ON and front left window switch DOWN or DOWN (AUTO).	Check for voltage to the BLU/RED wire: should be battery voltage.	Faulty control unit.

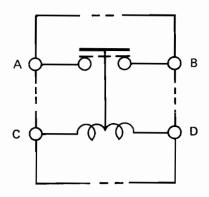
# **Power Windows**

## -Relay Test —

- Remove the power window relay from the relay bracket.
- 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.

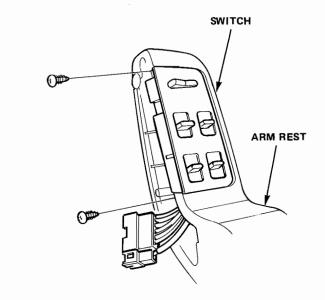




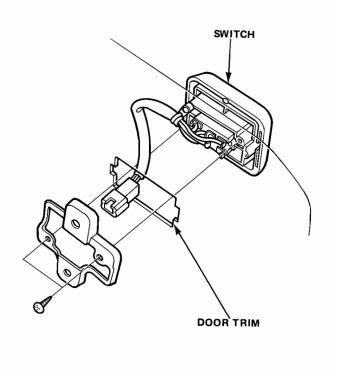
## Switch Removal -

- 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:



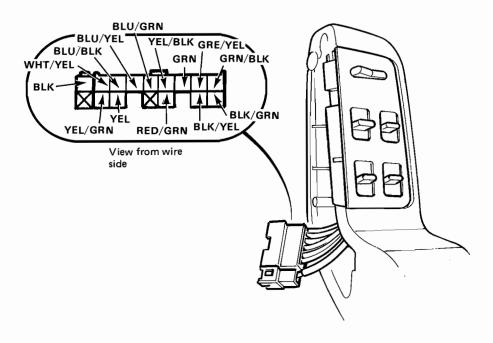
### Passenger Door Switch:





# 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**

Terminal Position	BLK/ YEL	WHT/ YEL	BLK/ GRN	RED/ GRN
UP	0-			
OFF				
DOWN		9		
DOWN (AUTO)		0	0-	-0

### **Right Front Switch**

Terr	BLU/	BLU/	BLU/	BLK	
Position	Main Switch		YEL	GRN	DLK
UP	ON	0	-0	0	0
UP .	OFF	0	<u> </u>		
OFF	ON		9	0	$\bigcirc$
OFF	OFF		9	0	
	ON	0-		0	
DOWN	ON		0		<u> </u>
	OFF	0		0	

### Left Rear Switch

Terr	GRN/	GRN/	GRN	BLK				
Position	Main Switch	BLK	YEL	01111	DER			
LID	ON	0-	-0	0	9			
UP	OFF	0-	-0					
055	ON		0-	$\phi$	9			
OFF	OFF		0	9				
	ON	0-		9				
DOWN	ON		0	_	$\overline{}$			
	OFF	0		-0				

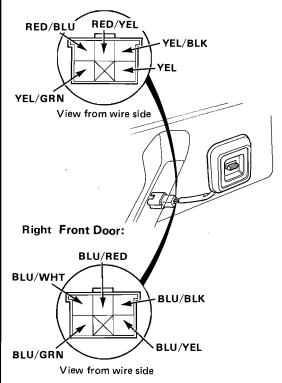
### **Right Rear Switch**

Terr	Terminal			YEL/	DLK	
Position	Position Main Switch		YEL	GRN	BLK	
UP	ON	0-	-0	0-		
OF .	OFF	0-				
OFF	ON		0	<del>-</del>	$\bigcirc$	
OFF	OFF		0	9		
	ON	0		0		
DOWN	ON		0-		—O	
	OFF	0		0		

## Passenger Door Switch Test-

- Remove the door trim panel.
- Check for continuity between the terminals in each switch position according to the tables.

#### Rear Doors:



#### **Rear Door Switches**

Terminal Position	YEL/ BLK	RED/ BLU	RED/ YEL	YEL	YEL/ GRN
LID	0	-0			
UP			0		9
055			0		9
OFF		0		<u> </u>	
DOM/N	0		0		
DOWN		0-		9	

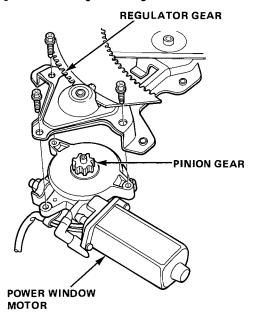
### **Front Door Switches**

Terminal Position	BLU/ BLK	BLU/ WHT	BLU/ RED	BLU/ YEL	BLU/ GRN
LID	0-	-0			
UP			0-		9
055			0		9
OFF		0		-0	
DOMA/NI	0		-0		
DOWN		0		-0	

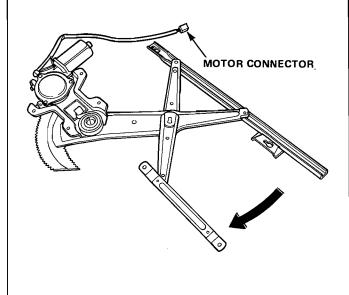
### Motor Removal-

- 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.



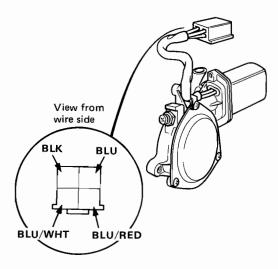
- Install in the reverse order of removal. Engage the regulator gear with the pinion gear while moving the regulator gear by hand, then install the motor with the 3 mount bolts.
- To ease installation in the door panel, lower the regulator by connecting battery to the motor connector.





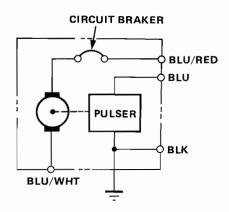
### Driver's Door Motor Test-

- 1. Remove the door trim panel.
- Disconnect the 4-P connector from the power window control unit.
- Test power window motor operation by connecting battery to the BLU/RED and BLU/WHT terminals.
   Test the motor in each direction, by switching the leads from the battery.
- 4. If the motor does not run, replace it.



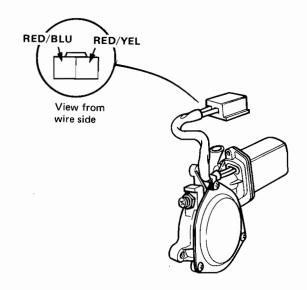
#### **Pulser Test:**

Measure resistance between the BLU and BLK terminals when running the motor by connecting battery wires to the BLU/WHT and BLU/RED terminals. Ohmmeter should indicate some valve between  $20{-}50\Omega as$  the motor runs.

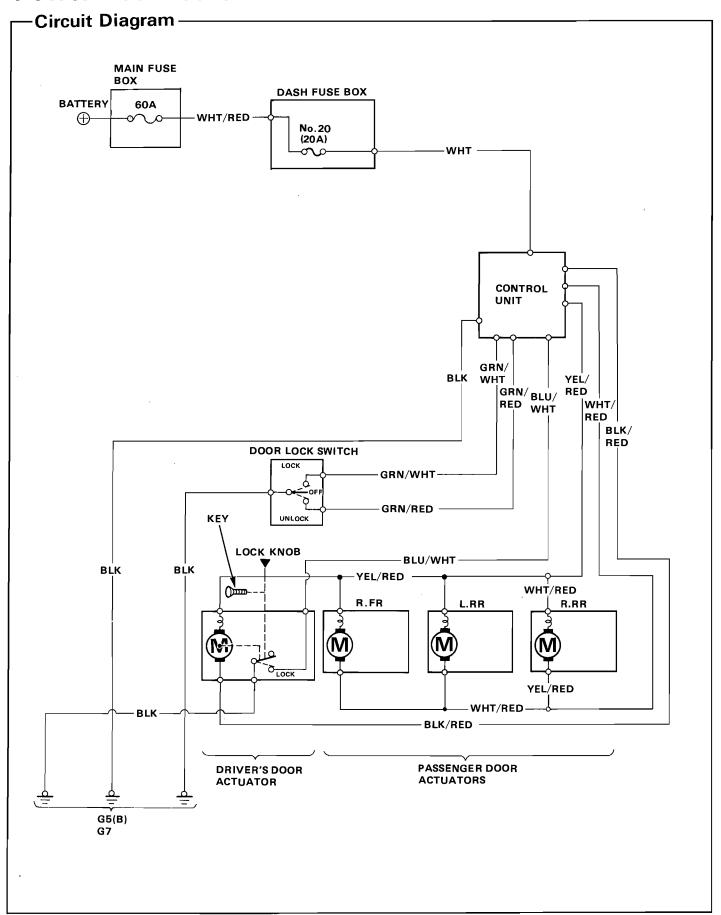


## -Passenger Door Motor Test-

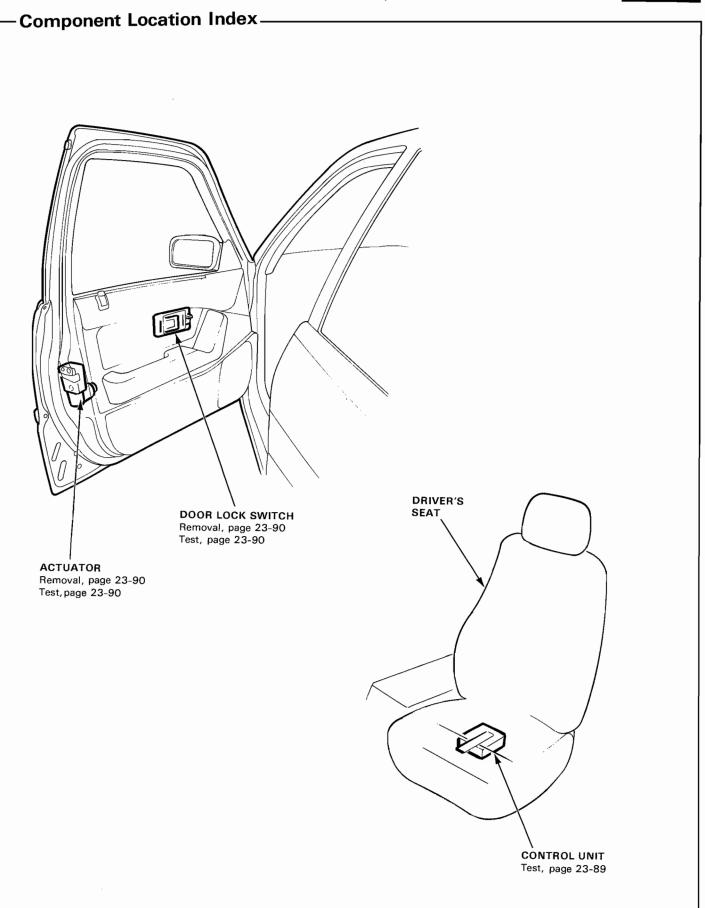
- 1. Remove the trim panel.
- 2. Disconnect the 2-P connector.
- Test power window motor operation by connecting battery to theRED/YEL and RED/BLU terminals. Test the motor in each direction, by switching the leads from the battery.
- 4. If the motor does not run, replace it.



# **Power Door Locks**







# Power Door Locks (5Door only)

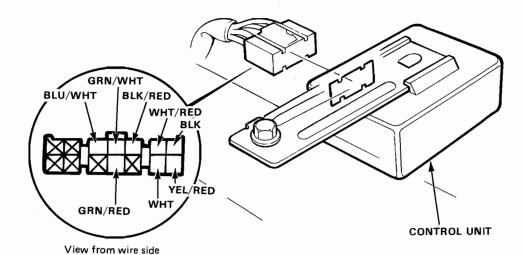
	Item to be inspected	Blown No.20 (20 A) fuse in the dash fuse box		Driver's door activity	מססו מכוממוסו	actuator		linkage (Section 20)		Open circuit in wires or loose or disconnected termi- nals
Symptom		Blown No.20 (2	Door lock switch	Door lock Knob switch	Motor	Passenger door actuator	Control Unit	Door lock rod / linkage	Poor ground	
Doors don't lock	All passenger door	1		2			3	4	G5(B), G7	WHT,BLU/WHT, YEL/RED or WHT/RE
with driver's door lock knob switch.	One or more Passenger door					1		2		YEL/RED or WHT/RE
	All doors	1 .	2				3		G5(B), G7	WHT,GRN/WHT, GRN/RED or YEL/RE
Doors don't lock or	Driver's door				1		2	3		YEL/RED or BLU/RED
unlock with door lock switch.	All passenger doors						1		G5(B), G7	YEL/RED or WHT/RE
	One or more passenger door					1		2		YEL/RED or WHT/RE



## Control Unit Test -

### Input Test:

Remove the front driver's seat and disconnect the 14-P connector from control unit.



No.	Wire	Test condition	Test: desired result	Possible cause (if result is not obtained)
1	BLK	Under all conditions.	Check for continuity to ground: should be continuity.	Poor ground (G5(B), G7). An open in the wire.
2	WHT	T Under all conditions. should be battery voltage.		An open in the wire. Blown No. 20 (20A) fuse in the dash fuse box.
3	BLU/WHT	Driver's door lock knob in LOCK.	Check for continuity to ground:	Poor ground (G5(B), G7).  An open in the wire.  Faulty driver's door actuator.
4	GRN/WHT	Door lock switch in LOCK.	should be continuity.	Poor ground (G5(B), G7).
5	GRN/RED	Door lock switch in UNLOCK.		An open in the wire. Faulty door lock switch.

### **Output Test:**

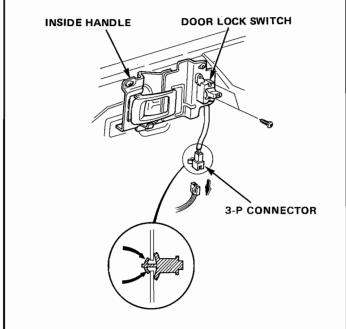
Reconnect the 14-P connectors to the control unit.

6	YEL/RED	Door lock switch or driver's door lock knob in LOCK.	Check momentailly for voltage to the WHT/RED or BLK/RED wire: should be battery voltage.	Faulty control unit.
7	BLK/RED	Door lock swhtch in UNLOCK.	Check momentarily for voltage to the	Faulty control unit.
8	WHT/RED	Door lock switch or driver's door lock knob in UNLOCK.	YEL/RED wire: sheould be battery voltage.	·

# Power Door Locks (5Door only)

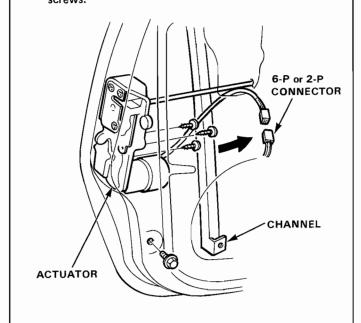
### Door Lock Switch Removal -

- 1. Remove the driver's door trim panel.
- Disconnect the 3-P connector and remove the switch from the inside handle by removing the 2 screws.



### -Actuator Removal-

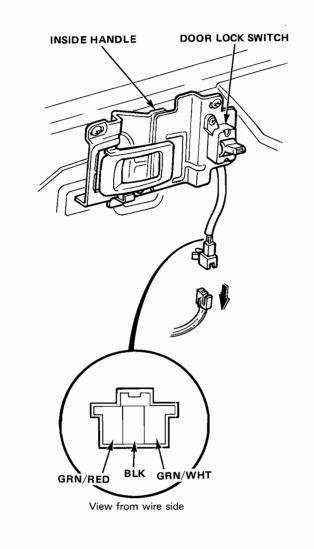
- 1. Remove the door trim panel.
- On the front doors, move away the channel by removing its lower bolt.
- Disconnect the 6-P or 2-P connector and remove the actuator from the latch by removing the 3



## -Door Lock Switch Test -

- 1. Remove the driver's door trim panel.
- 2. Disconnect the 3-P connector.
- 3. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	GRN/ RED	BLK	GRN/ WHT
UNLOCK	$\bigcirc$	$\overline{}$	
OFF			
LOCK		0	9





### Driver's Door Actuator Test -

- Remove the door trim panel.
- 2. Disconnect the 6-P connector.
- Test actuator operation:

LOCK:

UNLOCK:

With battery positive connected to the

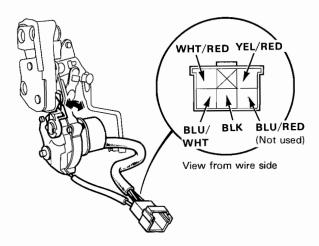
YEL/RED terminal, connect negative to

the WHT/RED terminal momentarily.

With battery positive connected to the WHT/RED terminal, connect negative

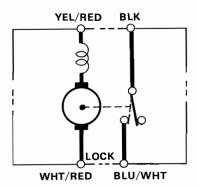
to the YEL/RED terminal momentarily.

CAUTION: To prevent damage to the motor, apply battery voltage momentarily.



- 4. If the actuator fails to operate properly, replace it.
- Check for continuity between the Bu/W and BI terminals according to the table.

Terminal Position	BLU/ WHT	BLK
LOCK	0	9
UNLOCK		



# -Passenger Door Actuators Test-

- Remove the door trim panel.
- 2. Disconnect the 2-P connector.
- 3. Test actuator operation:

LOCK:

With battery positive connected to the YEL/RED (WHT/RED) terminal, connect negative to the WHT/RED (YEL/

RED) terminal momentarily.

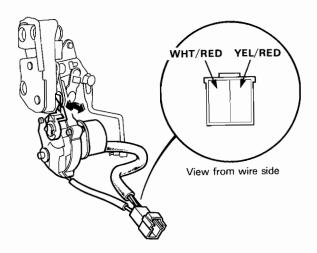
UNLOCK:

With battery positive connected to the WHT/RED (YEL/RED) terminal, connect negative to the YEL/RED (WHT/

RED) terminal momentarily.

( ): Right rear actuator test.

CAUTION: To prevent damage to the motor, apply battery voltage momentarily.



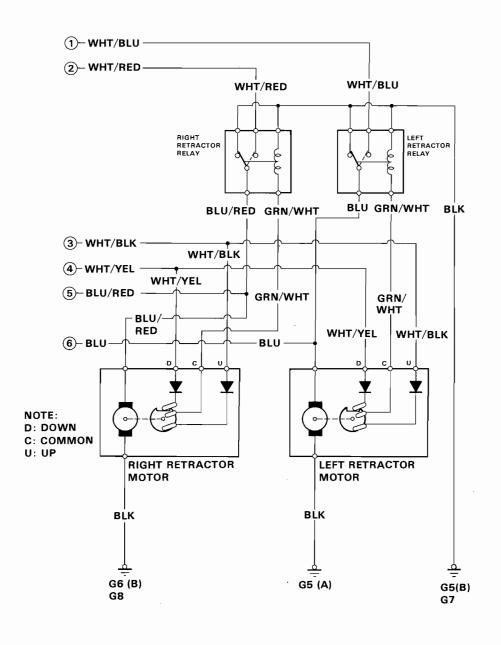
If the actuator fails to operate properly, replace it.

# **Retractable Headlights**

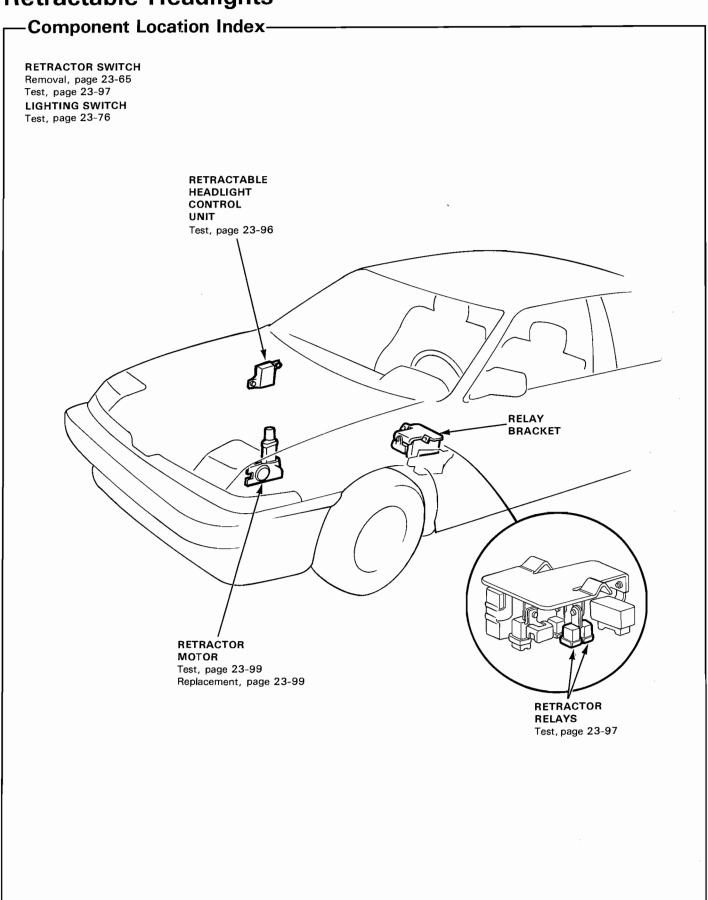
#### Circuit Diagram-**BATTERY** DASH FUSE BOX $\oplus$ No.24 (15A) MAIN FUSE BOX WHT/-(1) BLU 60A No.25 (15A) WHT/RED WHT/-(2) RED WHT DASH FUSE BOX - RED/YEL1 -No. 10 (7.5A) No.12 (15A) RETRACTOR SWITCH VOLTAGE REGULATOR LIGHTING SWITCH RED/GRN1 (In Alternator) DASH FUSE BOX OFF OFF ON No.1 RED/ (7.5A) WHT/BLU RED/ GRN<sup>2</sup> YEL<sup>2</sup> WHT/BLK DIMMER SWITCH RED/WHT1 WHT/ **PASSING** BLK **SWITCH** LO WHT/YEL(4) BLU/RED(5) RED/BLK CONTROL UNIT RED/BLU1 RED/WHT2 BLU — DASH FUSE BOX No.7 9 No.8 9 (10A) (10A) No.5 | No.6 | (10A) | · DASHLIGHTS · TAILLIGHTS · LICENSE LIGHTS · SIDE MARKER LIGHTS RED/BLU3 RED/YEL3 · FRONT MARKER LEFT RED/ RIGH LOW RED/YEL3 WHT3 BEAM (35W) (35W) **BLK/YEL** LIGHTS RED/BLU<sup>2</sup> BLK RED/ BEAM GRN3 (35W) No.4 (15A) FUSE HIGH WARNING LIGHT (1.4W) BEAM INDICATOR LIGHT (1.4W) (In gauge assembly) RIGHT HIGH LEFT HIGH **BEAM** BEAM (65W) G5(A) G6(A) (65W) G5(B) G6 (B) G8

NOTE: Different wires have the same color. They have been given a number suffix to distinguish them (for example, RED/BLU¹ and RED/BLU² are not the same).





# **Retractable Headlights**





## -Troubleshooting -

Function: The retractor motors are controlled by their respective relays. The relays are energized by power to either the up-wire (WHT/BLK) or down-wire (WHT/YEL), through the slip ring in the retractor motors. The up-wire can be powered either by the headlight switch/control unit or via the retractor switch directly. The down-wire can only be powered by the control unit via either the headlight switch or the retractor switch. The control unit also senses any abnormality in the way the retractor motors operate and warns the driver by illuminating the warning light in the gauge assembly.

#### NOTE:

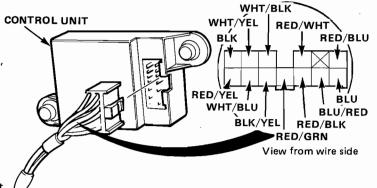
- The numbers in the table show the troubleshooting sequence.
- Before troubleshooting:
  - Check the No.1, 10(7.5A), No.4 (15A) and No.12 (15A) fuses in the dash fuse box.
  - Check the No. 24 and 25 (15 A) fuses in the fuse holder.

	Item to inspected								
Symptom		Retractor relay	Retractor motor	Lighting switch	Retractor switch	Control unit	Frozen, stuck, or improperly installed retractor linkage	Poor ground	Open circuit in wires or loose or disonnected terminals
Warning light ON	I.		3			2	1		
	With either switch (lighting and retractor)					1		G5(B), G6(B), G8,G7	WHT/BLK
Both headlights won't open.	With lighting switch			1		2			WHT, RED/YEL <sup>2</sup> or RED/WHT <sup>1</sup>
	With retractor switch		-"-		1				RED/YEL1 or WHT/BLK
	With either switch					1			WHT/YEL, RED/GRN <sup>2</sup> or RED/YEL <sup>1</sup>
Both headlights won't close.	With lighting switch NOTE: All other switches OFF					1			WHT/YEL
	With retractor switch NOTE: All other switches OFF					1			RED/GRN <sup>2</sup> , WHT/YEL
Headlights close from "•" to "•"  NOTE: other swit						1			RED/BLK

# **Retractable Headlights**

# Retractable Headlight Control Unit Test

The control unit is located behind the right kick panel. Make the following input/output test at the harness pins. If all tests prove OK, yet the system still fails to work, replace the control unit.



### 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	BLK	At all times under all conditions.	Check for continuity to ground: should be continuity.	Poor ground (G6(B), G8). An open in the wire.
2	RED/GRN	Retractor switch OFF.	,	An open in the wire. Blown No.10 (7.5A) fuse. Faulty retractor switch.
3	RED/WHT	Lighting switch "●".	Check for voltage to ground:	An open in the wire. Blown No.1 (7.5 A) fuse.
4	RED/BLK	Lighting switch "●" or "●".	should be battery voltage.	An open in the wire. Blown No. 12 (15 A) fuse.
5	RED/YEL	Lighting switch "●" and dimmer switch Low.		An open in the wire. Blown No. 5 (10 A) fuse.
6	BLU/RED or BLU	Retractor motor stationary.	Check for continuity to ground: should be continuity.	An open in the wire. Poor ground (G5(A) or G6(B), G8). Faulty retractor motor.
7	BLK/YEL	Ignition switch ON.	Check for voltage to ground: should be battery voltage.	An open in the wire. Blown No. 4 (15 A) fuse.
8	WHT/BLU	Start engine, and let it idle.	Check for voltage to ground: should be battery voltage for few sec- onds.	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 relay bracket and 2 retractor motors and perform tests 9-11.

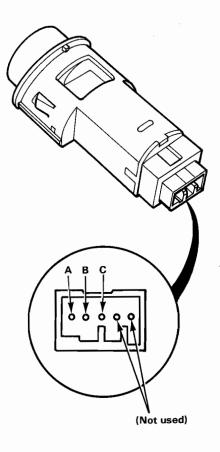
9	RED/BLU	Connect battery positive wire to BLU/RED or BLU terminal, negative to ground.	Check for voltage to ground: should be battery voltage within about 4 seconds after battery has been connected.	Faulty control unit.
10	WHT/BLK	Retractor switch OFF and lighting switch "•" or when lighting switch is turned from "•" to "•".	Check for voltage to ground: should be battery voltage.	
11	WHT/YEL	Retractor switch OFF and lighting switch OFF.		



#### Retractor Switch Test-

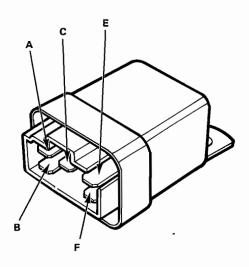
- 1. Remove the retractor switch (page 23-65).
- 2. Check for continuity between the terminals in each switch position according to the table.

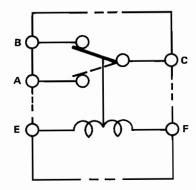
Terminal Position	А	В	С
OFF(RETRACT)		0	9
ON (RAISE)	0	0	



# Retractor 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.



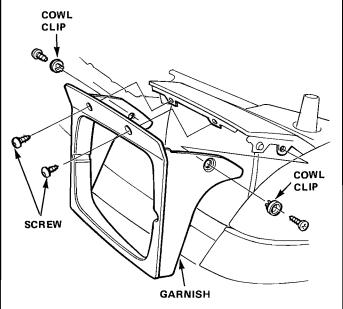


# **Retractable Headlights**

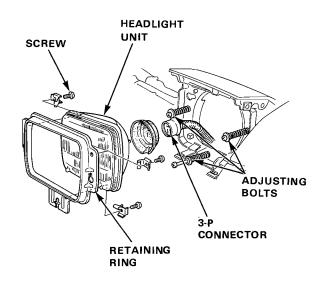
#### Headlight Replacement -

#### **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 2 screws and cowl clips and slide the headlight garnish upward to remove it.

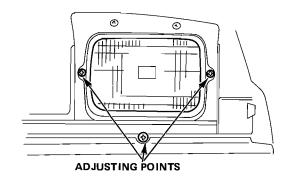


- Unclip the retaining ring from side adjusting bolts by pushing it forward and upward, then disconnect the 3-P connector from behind the unit to remove it.
- 4. Remove the 3 screws to remove the retaining ring from the unit.



#### Headlight Adjustment

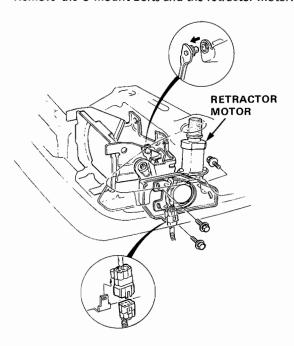
NOTE: Adjust headlight to local requirements.



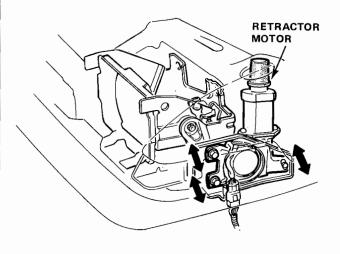


#### Retractor Motor Replacement -

- Disconnect the ground wire from the battery negative (-) terminal stud.
- 2. Remove the headlights.
- Pry the retractor linkage off the motor arm. 3.
- 4. Disconnect the 6-P connector.
- Remove the 3 mount bolts and the retractor motor.



- 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.

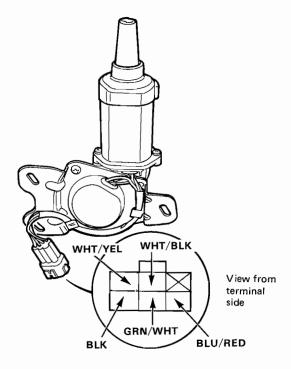


#### Retractor Motor Test

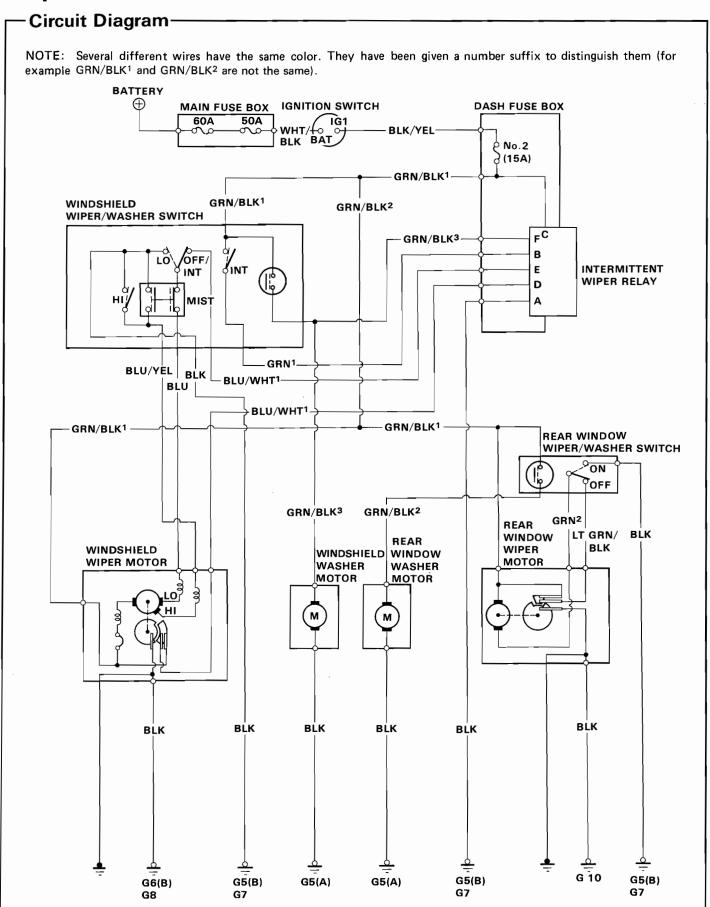
- 1. Test the retractor motor by applying battery voltage to the BLU/RED (positive) and BLK(negative) leads. The motor should run continuously.
  - If the motor fails to run smoothly, replace it.
- 2. Disconnect the power supply and connect ohmmeter probes to the WHT/BLK and GRN/WHT leads, and the WHT/YEL and GRN/WHT leads.
- 3. Rotate the motor by hand.
- 4. Ohmmeter should indicate continuity and no continuity repeatedly.

CAUTION: Before installing the motor, remove No.24/No.25 fuse (15A).

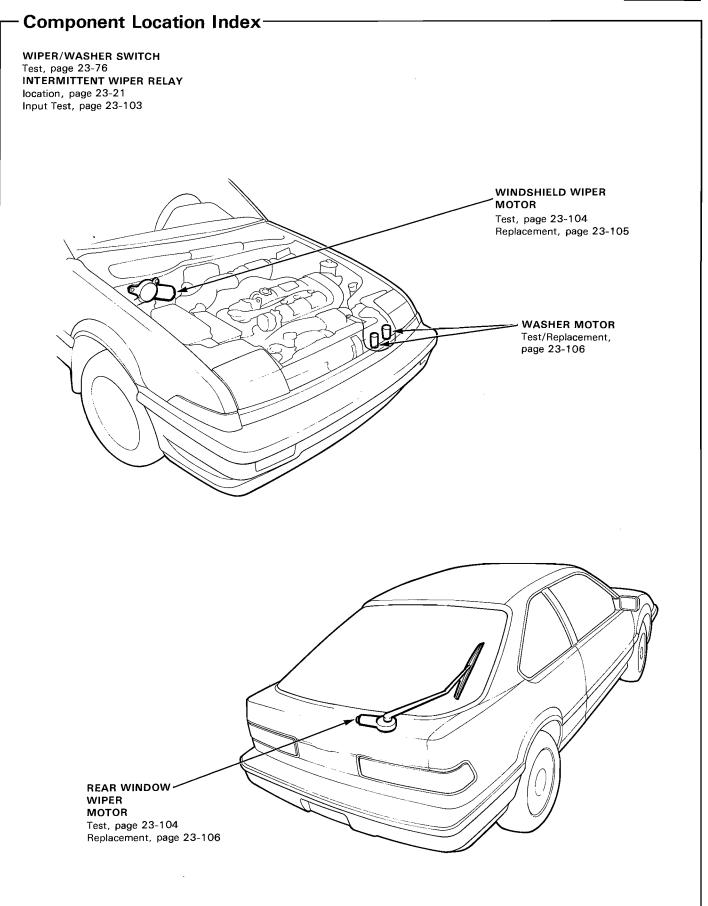
NOTE: Install the cap correctly.



# v√ipers/Washers







# Wipers/Washers

# -Troubleshooting-

NOTE: The numbers in the table show the troubleshooting sequence.

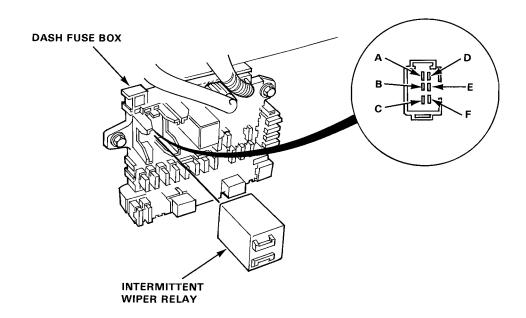
Item to b	e inspected	Blown No.2 (15A) fuse (in the dash fuse box)	Wiper switch	Wiper motor	Washer switch	Washer motor	Insufficient washer fluid in reservoir	Faulty intermittent wiper relay	Disconnected wiper linkages	Disconnected, blocked washer hose or clogged outlet	Poor ground	Open circuit in wires or loose or disconnected terminals
	In all	1	3	2					4		G5(B), G7	GRN/BLK <sup>1</sup> , GRN/BLK <sup>5</sup>
	positions								ı.		G6(B), G8	
Windshield wipers	In INT		1					2			G5(B) G7	BLU/WHT, GRN1
does not operate.	In LO or Hi		2	1								BLU or BLU/YEL
	In MIST		1									BLU/YEL
Rear window window window operate.	per does	1	3	2							G5(B), G7	GRN/BLK4 or GRN2
Blades not returned to park	Windshield wiper		2	1				3			G6(B), G8	BLU/WHT¹ or BLU/WHT²
position when wiper is turned OFF.	Rear window wiper		2	1							G10	LT GRN/BLK
Erratic intermitte wiper not operar intermittently.			1					2				
Washer fluid no at all.	t squirted	2			5	3	1			4	G5 (A)	GRN/BLK <sup>3</sup> or GRN/BLK <sup>2</sup>



#### Input Test -

Remove the dashboard lower panel and remove the intermittent wiper relay from the dash fuse box.

Make the following input tests at the terminals. If all tests prove OK, yet the system still fails to work, replace the control unit.



ı	۷o.	Terminal Test condition Test : desired result		Test: desired result	Possible cause (if result is not obtained)
	1	А	Under all conditions.	Check for continuity to ground: should be continuity	Poor ground (G5 (B), G7) An open in the BLK wire.
	2	С	Ignition switch "ON"	Check for voltage to ground: should be battery voltage.	Blown No.2 (15A) fuse.     An open in the BLK/YEL wire.
	3	F	Ignition switch ON and washer switch ON.	Check for voltage to ground: should be battery voltage.	Faulty washer switch.     An open in the wire.
	4	В	Ignition switch "ON" and wiper switch INT.	Check for valtage to ground: should be battery voltage.	Faulty wiper switch.     An open in the wire.
	5	E	Ignition switch ON, wiper switch OFF and mist switch OFF.	Attach to ground. Wiper motor should run at low speed.	<ul> <li>Faulty wiper switch.</li> <li>Faulty mist switch.</li> <li>Faulty wiper motor.</li> <li>An open in the BLU and BLU/WHT¹ wire.</li> </ul>
	,		•	Check for continuity to ground: should be continuity.	Faulty wiper motor (automatic-stop circuit).     An open in the BLU/WHT <sup>2</sup> wire.

# Wipers/Washers

# -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 to the GRN/BLK

terminal and negative to the BLU ter-

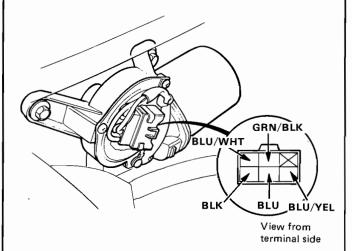
minal.

 $\label{eq:higher_bound} \textbf{HIGH SPEED: } \textbf{Connect battery positive to the GRN/BLK}$ 

terminal and negative to the BLU/YEL

terminal.

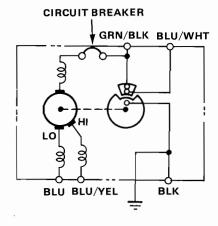
4. If the motor fails to run smoothly, replace it.



Check for continuity between the terminals according to the table.

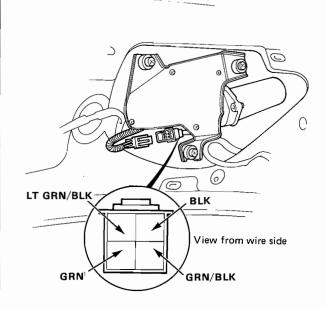
Terminal Wiper Blade	GRN/ BLK	BLU/ WHT	BLK
At park position	0-	—	
At center position		0	<u> </u>

#### Circuit Diagram



#### — Rear Window Wiper Motor Test-

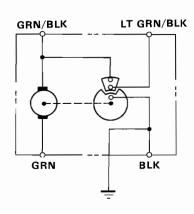
- 1. Remove the hatch trim panel.
- 2. Disconnect the 4-P connector.
- Test wiper motor operation by connecting battery positive to the GRN/BLK terminal and negative to the GRN terminal.
- 4. If the motor fails to run smoothly, replace it.



Check for continuity between the terminals according to the table.

Terminal Wiper Blade	GRN/ BLK	LT GRN /BLK	BLK
At park position	0-	$\bigcirc$	
At center position		0-	$\bigcirc$

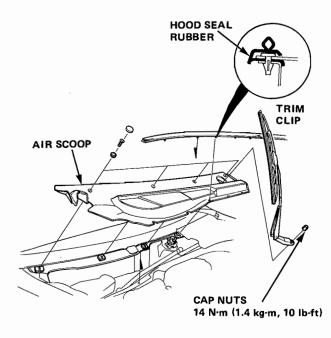
#### Circuit Diagram



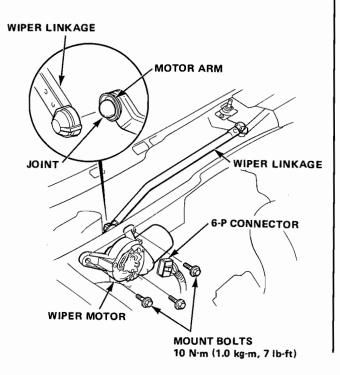


#### -Windshield Wiper Motor Replacement

- 1. Remove the cap nuts and the wiper arm.
- 2. Remove the air scoop by prying out the trim clip.

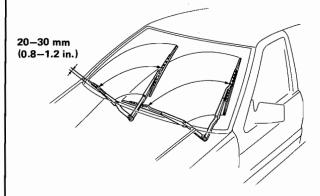


- 3. Pry the wiper linkage off the motor arm.
- 4. Remove the motor cover and disconnect the 6-P connector.
- Remove the motor cover and 3 mount bolts, then remove the wiper motor.



Install in the reverse order of removal. Coat the joints with grease and make sure the linkages move smoothly.

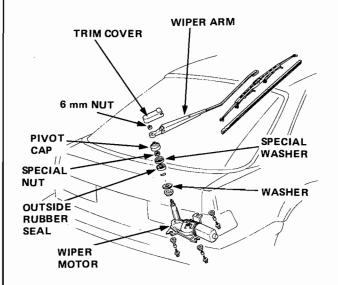
And also install the wiper arms so the tips are 20-30 mm (0.8-1.2 in.) from the air scoop at rest.



# Wipers/Washers

## -Rear Window Wiper Motor -Replacement

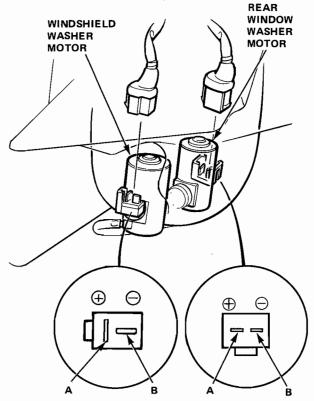
- 1. Remove the hatch trim panel.
- 2. Remove the trim cover, 6 mm nut, wiper arm, pivot cap, special nut/washer and the outside rubber seal.
- Disconnect the 4-P connector from the wiper motor.
- 4. Remove the 3 mount bolts and the wiper motor.



# Washer Motor Test/Replacement -

#### Test

- 1. Remove the front bumper.
- Disconnect the 2-P connector from the washer motor.
- Test either washer motor operation by connecting battery positive to the A terminal and negative to the B terminal.
- 4. If a motor fails to run, replace it.



#### Replacement

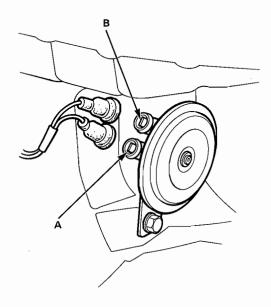
- Remove the washer tank by removing the mount bracket.
- Disconnect the hoses and wire harness from the washer motors.

# **Horns**

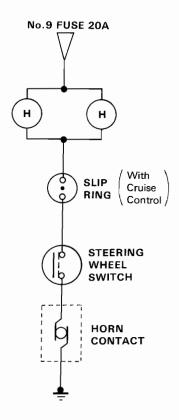
# --+

#### -Test-

- 1. Remove the front bumper.
- 2. Disconnect the wires from the horn.
- Test the horn by connecting battery to the A and B terminals.
- 4. If the horn fails to sound, replace it.



#### **Horn Circuit:**

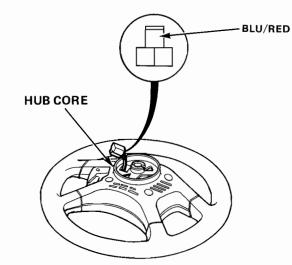


#### -Switch Test -

- 1. Remove the steering wheel, then turn it over.
- Check for continuity between the hub core and the contact ring, or the hub core and the BLU/RED lead for cars equipped with cruise control, according to the table.

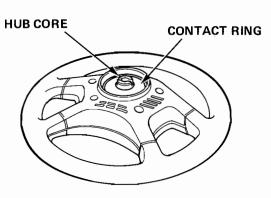
#### With Cruise Control:

Terminal Position	HUB CORE	BLU/RED
PRESS	$\circ$	0
FREE		



#### Without Cruise Control:

Terminal Position	HUB CORE	CONTACT RING
PRESS	0	
FREE		

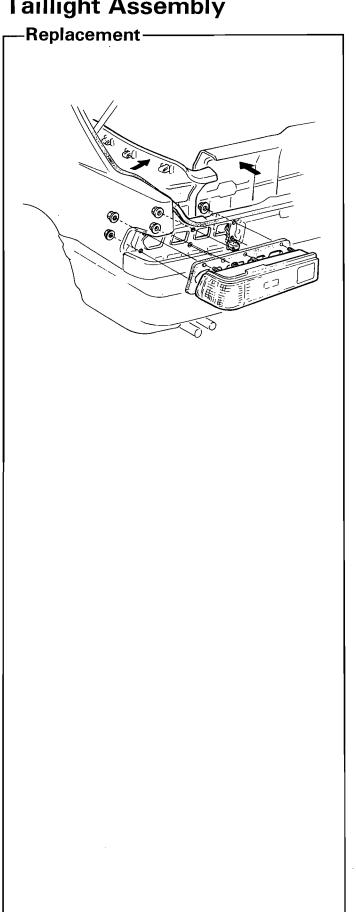


If OK, reinstall the steering wheel, then test the combination switch.

# Front Turn Signal/Side Marker/Marker Lights

# -Replacement-Front Turn Signal Light: Front Side Marker/Turn Signal Lights: Front Marker Light:

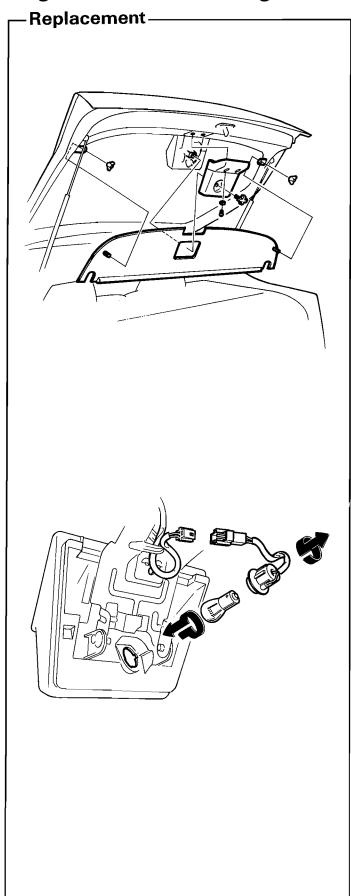
# **Taillight Assembly**

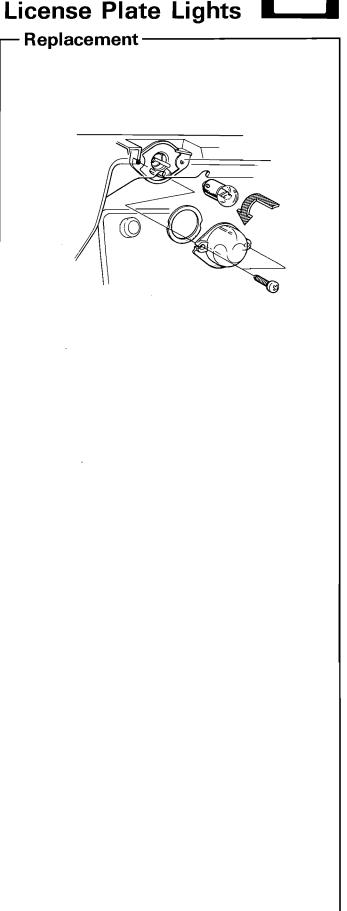


# **High Mount Brake Light**

# **License Plate Lights**





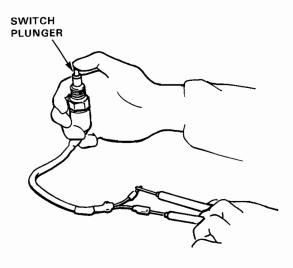


# **Back-up Lights**

#### - Switch Test -

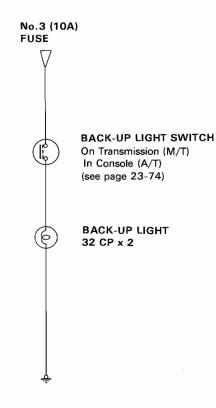
#### Manual Transmission:

- 1. Test back-up light switch by placing the gearshift lever in the reverse and turning the ignition switch to ON.
- 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.
- If the fuse and bulbs are OK, remove the back-up light switch.
- Using an ohmmeter, check the switch for continuity while pushing in on the switch plunger.



#### Automatic Transmission:

- Test back-up light switch by shifting the shift lever in "R" and turning the ignition switch to ON.
- 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.
- 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).
- 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 GRN/BLK wire.



# **Brake Warning System**



#### -Description-

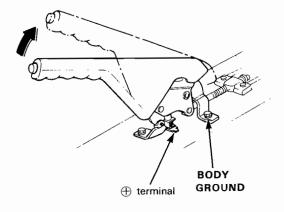
The brake warning light goes on if the parking brake is applied, the brake fluid level is low, or as a bulb test while cranking the engine.

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.

#### Parking Brake Switch Test-

- 1. Remove the front console.
- Check for continuity between the terminal and body ground with the brake lever up and down.
   There should be continuity with the brake lever up and no continuity with the brake lever down.



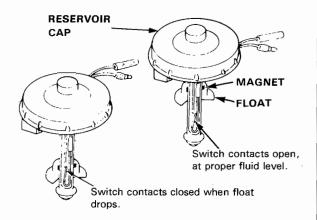
#### **Brake Fluid Level Switch Test**

- Remove the reservoir cap. Check that the float moves up and down freely.

  Professional descriptions are appropriately if the float does the reservoir cap.
  - Replace the reservoir cap assembly if the float does not move freely.
- 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.

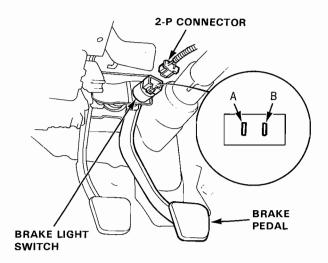


# **Brake Light**

#### ·Brake Pedal Switch Test -(Without Cruise Control)

- 1. Disconnect the 2-P connector from the switch.
- Check for continuity between the A and B terminals in each switch position according to the table.

Terminal	Α	В
Brake pedal	4	ь
RELEASED		
PRESSED		9



If necessary, replace the switch or adjust the pedal height (section 19)

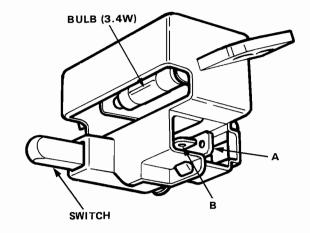
NOTE: Brake Pedal Switch (With Cruise Control) Test, see page 23-144.

# **Glove Box Light**

#### -Test-

- 1. Disconnect the 2-P connector.
- Check for continuity between the A and B terminals according to the table.

Terminal Switch	A		В
PUSH (OFF)			
RELEASE (ON)	0-	0	0

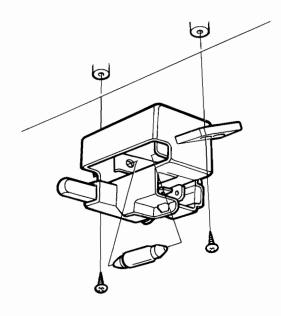


# Dashboard Panel Light



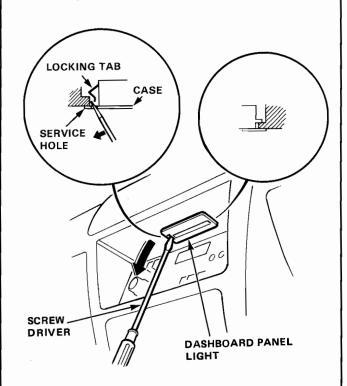
#### -Replacement -

- 1. Open the glove box.
- 2. Remove the 2 screws and the glove box light, disconnect the 2-P connector.

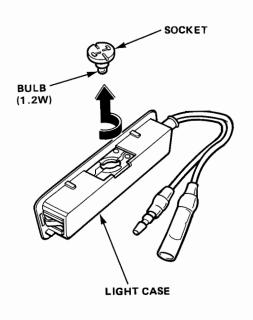


## Bulb Replacement-

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.



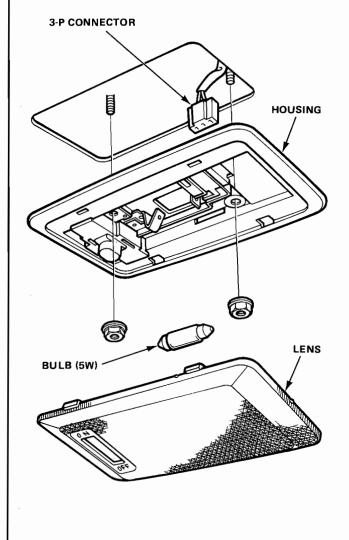
2. Turn the bulb socket 45° counterclockwise to remove it.



# **Dome Light**

#### - Removal —

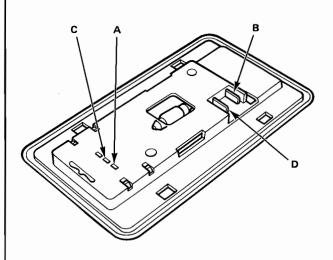
- 1. Turn the light switch OFF.
- 2. Pry off the lens.
- 3. Remove the 2 nuts and the housing.
- 4. Disconnect the 3-P connector from the housing.



#### -Test-

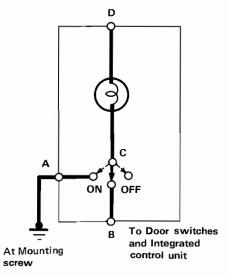
- 1. Remove the dome light.
- 2. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	Α	В	С		D
OFF			$\bigcirc$	0	0
MIDDLE		0-		0	-0
ON	0		$\downarrow$	0	-0



#### Circuit Diagram

From No.11 (15A) Fuse

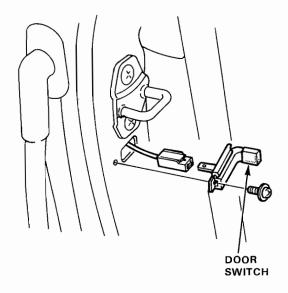


# **Door Switch**

#### -Door Switch Removal/Test-

#### Removal

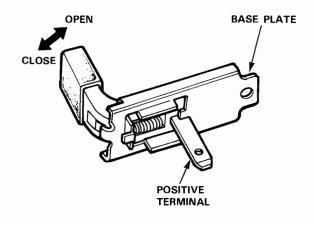
- 1. Open the door.
- 2. Remove the screw and pull out the switch.
- 3. Disconnect the 1P connector from the switch.



#### 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)	0	
CLOSE(OFF)		

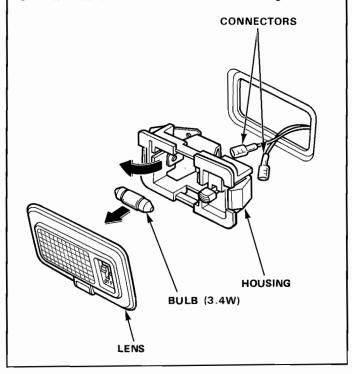


# **Hatch Light**



#### - Removal -

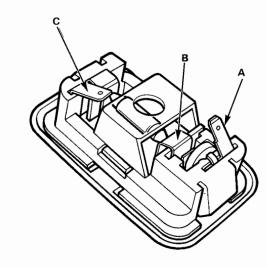
- 1. Pry off the luggage light lens from either side.
- 2. Pry off the light assembly from either end.
- 3. Disconnect the connectors from the housing.



#### Test-

- 1. Remove the luggage light.
- 2. Check for continuity between the terminals in each switch position according to the table.

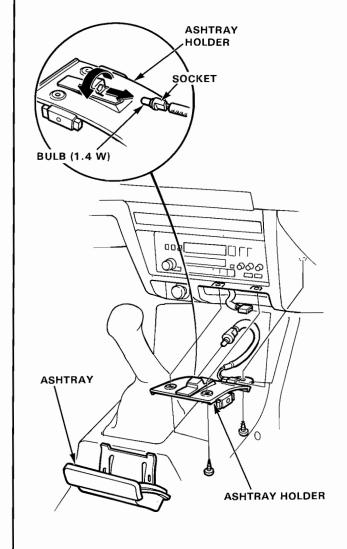
Terminal Position	Α	В		С
OFF		0-	0	-0
ON	0-		0	-0



# **Ashtray Light**

#### Bulb Replacement

- 1. Remove the ashtray.
- Remove the console box, then remove the ashtray holder by removing the 3 screws.
- 3. Turn the socket 45° counterclockwise and remove the bulb.

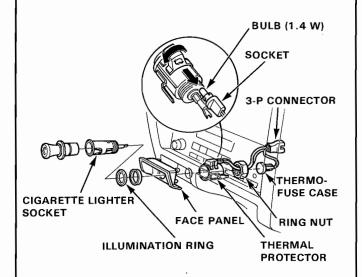


# Cigarette Lighter Light

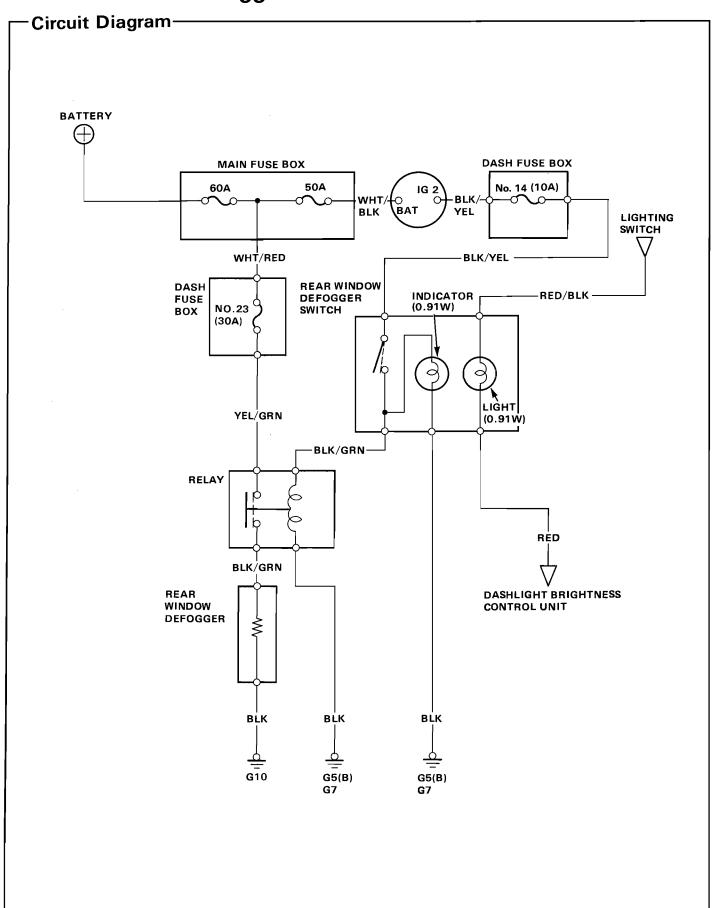


#### -Replacement-

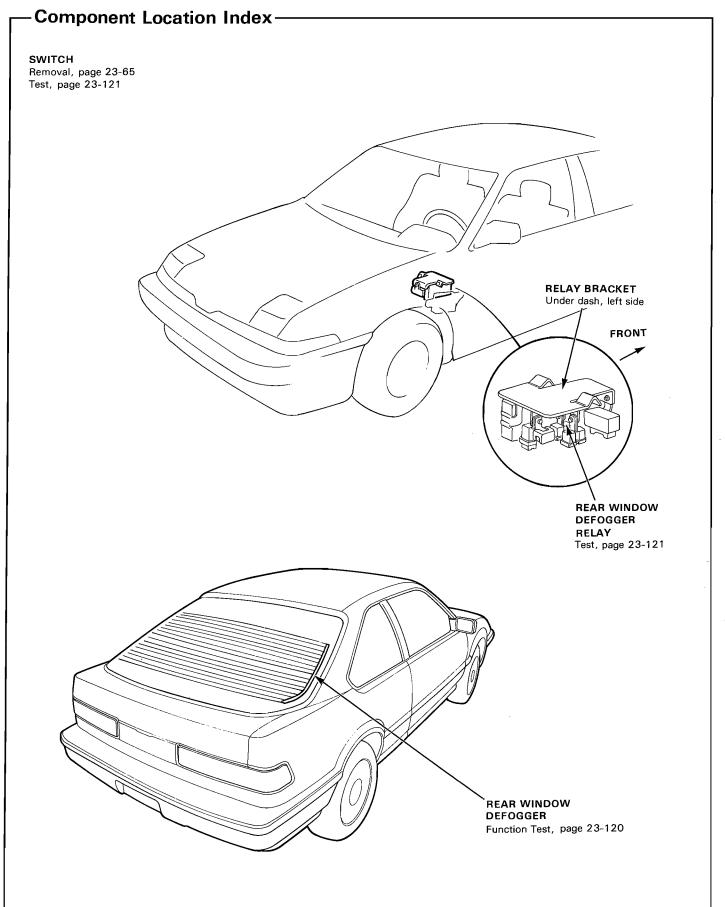
- 1. Remove the stereo radio/cassette player.
- 2. Remove the ring nut and the cigarette lighter.
- 3. Disconnect the ground wire and the thermofuse case by pulling it straight back.
- 4. Disconnect the 3-P connector and take out the thermal protector with the bulb.
- 5. If necessary, turn the socket 45° counterclockwise and remove the bulb.



# Rear Window Defogger







# **Rear Window Defogger**

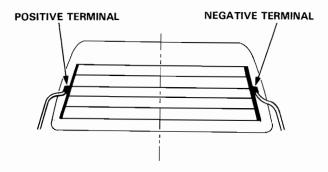
#### Function Test –

CAUTION: Be careful not to scratch or damage the defogger wires with the tester probe end.

 Check for voltage between the positive terminal and body ground with the ignition switch and the defogger switch ON.

There should be battery voltage.

- · If there is no voltage, check for:
  - Faulty defogger relay.
  - An open in the BLK/GRN or YEL/GRN wire.
- If there is battery voltage, go to step 2.



Check for continuity between the negative terminal and body ground.

If no continuity, check for open in the defogger ground wire.

Connect the voltmeter positive probe to the center of each defogger wire, and the negative probe to the negative terminal.

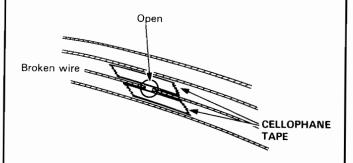
There should be approximately 6 V with the ignition switch and the defogger switch ON.

- If the voltage is as specified, the defogger wire is OK.
- If there is battery voltage, the defogger wire is broken in the negative side of the center.
- If there is no voltage the defogger wire is broken in the positive side of the center.

#### Defogger Wire Repair-

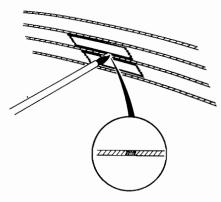
NOTE: Repair section must be no longer than one inch.

- Lightly scour area around the break with the fine steel wool, then clean with alcohol.
- Carefully mask broken portion of the defogger wire with cellophane tape.



Using a small brush, apply heavy coat of silver conductive paint extending about 1/8 in. on both sides of the break. Allow 30 minutes to dry.

NOTE: Throughly mix paint before use.

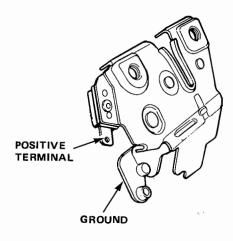


- 4. Check for proper operation with a voltmeter (approximately 6 V at the mid-point).
- 5. Apply a second coat of paint in the same manner. Dry 3 hours before removing tape.

# **Hatch Light**

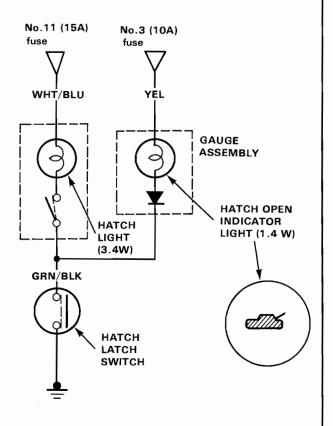
#### -Latch Switch Test -

- 1. Remove the hatch trim panel.
- 2. Remove the hatch latch.
- There should be continuity between the positive terminal and the ground.



## Hatch Open Indicator Light -

The hatch open indicator light in the gauge warning display comes on, when the ignition switch is ON, and the hatch is open. It reminds the driver to securely close the hatch before driving or parking.

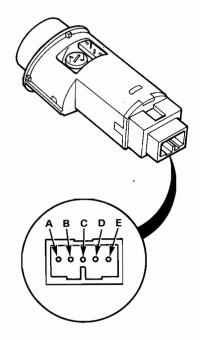


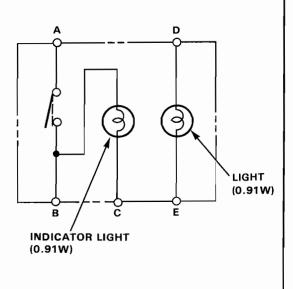


#### -Switch Test-

- 1. Remove the rear window defogger switch (page 23-65).
- 2. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	A	В		С	D		Е
OFF		0	0	—	0	0	<u></u>
ON	0	<del>-</del>		$\bigcirc$	0		$\overline{}$

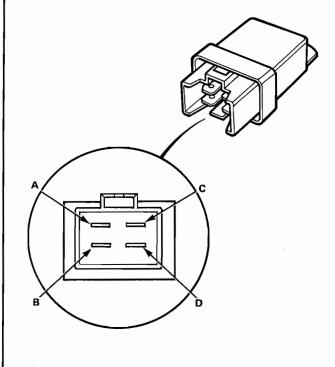


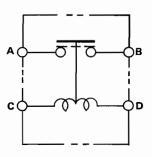


#### -Relay Test-

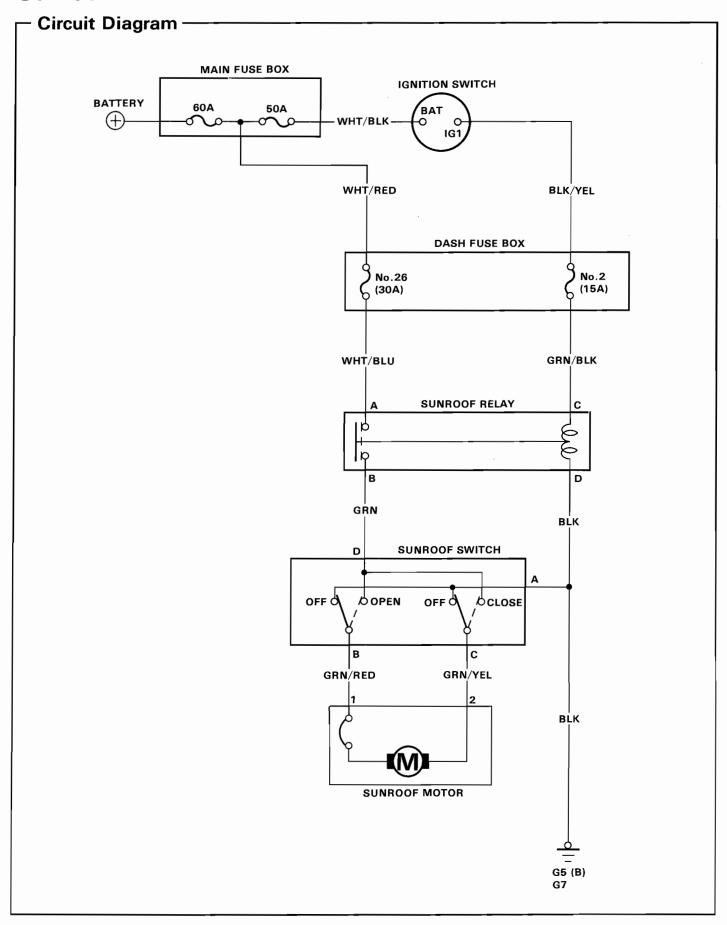
- 1. Remove the rear window defogger relay .
- There should be continuity between the A and B terminals when the battery is connected to the C and D terminals.

There should be no continuity when the battery is disconnected.

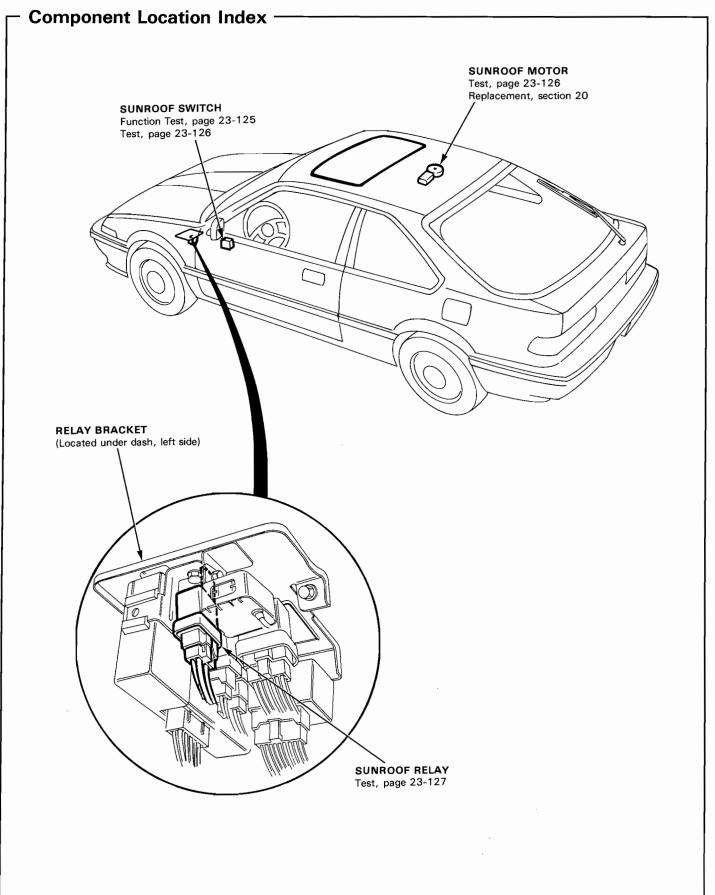




# **Sunroof**







# **Sunroof**

# Electrical Troubleshooting —

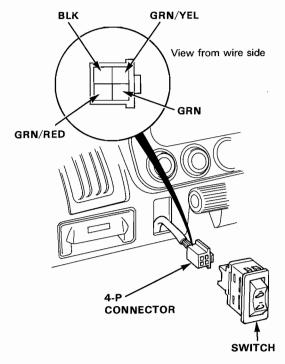
NOTE: The numbers in the table show the troubleshooting sequence.

Item to be inspected  Symptom		Clutch out of adjustment, foregin matter stuck between guide rail and sunroof, or outer cable not attached properly	Blown No.26 (30A) fuse (in the dash fuse box)	Blown No.2 (15A) fuse (in the dash fuse box)	Sunroof relay	Sunroof motor	Sunroof switch	Poor ground	Open circuit in wires or loose or disconnected terminals.
Sunroof does not move, but motor turns.		1							
motor does not turn (sunroof can be moved with sunroof	Switch in any position.		1	2	3	4		G5 (B) G7	WHT/BLU, GRN/BLK, GRN or BLK
	With OPEN switch.						1		GRN/RED
	With CLOSE switch.						1		GRN/YEL



#### **Function Test-**

- 1. Remove the dashboard lower panel.
- Push out the switch from behind the instrument panel, then disconnect the 4-P connector to remove the switch.



- Check for continuity between the BLK terminal and body ground.
  - There should be continuity.
  - If there is no continuity, check for
  - An open in the BLK wire.
  - Poor ground (G5 (B), G7).
  - If there is continuity, go to step 4.

- 4. Check for voltage between the GRN terminal and the BLU terminal with ignition switch ON.
  - There should be battery voltage.
  - If there is no voltage, check for
  - Blown No.2 (15A) or No.26 (30A) fuse in the dash fuse box
  - An open in the GRN/BLK, GRN or WHT/BLU wire.
  - Faulty sunroof relay.
  - If there is battery voltage go to step 5.
- Connect the GRN terminal to the GRN/RED terminal, and the GRN/YEL terminal to the BLK terminal with jumper wires.

The sunroof should open when the ignition switch is turned ON.

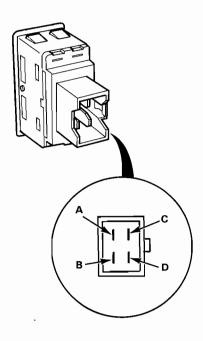
- If the sunroof opens, check the switch.
- If sunroof does not open, remove the headliner and check the motor.

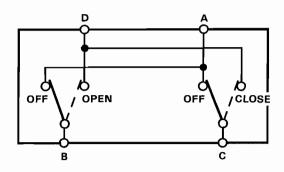
## **Sunroof**

#### - Switch Test -

- 1. Remove the dashboard lower panel.
- Push out the switch from behind the instrument panel, then disconnect the 4-P connector to remove the switch.
- Check for continuity between the terminals in each switch position according to the table.

Terminal	А	В	С	D
OFF	0—	$\stackrel{\downarrow}{\circ}$	9	
OPEN		0		0
CLOSE			0	<u></u>

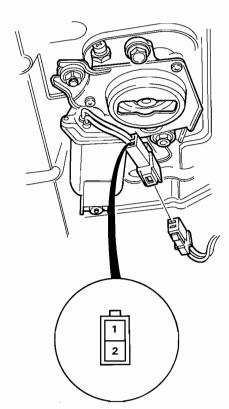




#### **Motor Test -**

- 1. Remove the headliner.
- Disconnect the 2-P connector from the sunroof motor.
- 3. Test motor operation by connecting a battery to the No.1 and No.2 terminals. Test the motor in each direction, by switching the leads from the battery.
- 4. If the motor does not run, replace it.

NOTE: See Closing Force Check in section 20 for motor clutch test.



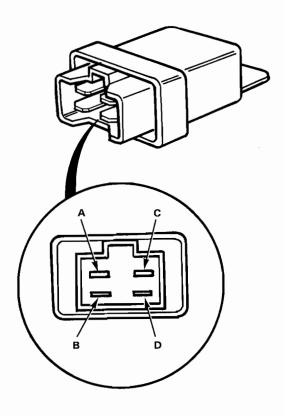
View from wire side.

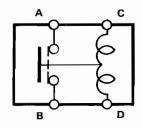


#### Relay Test -

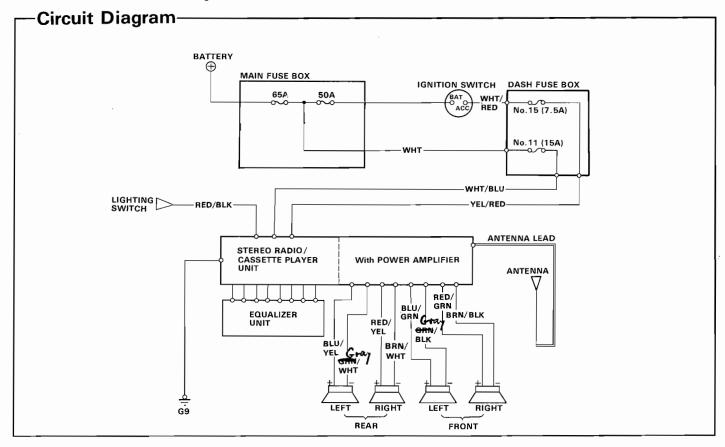
- 1. Remove the sunroof relay from the relay bracket.
- There should be continuity between the A and B terminals when the battery is connected to the C and D terminals.

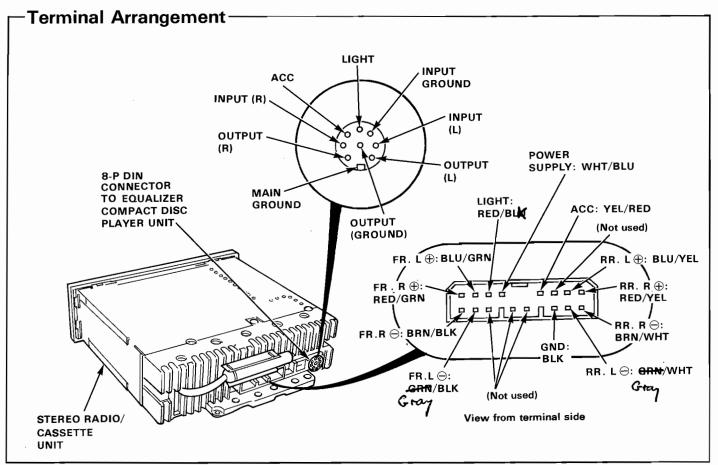
There should be no continuity when the battery is disconnected.





# Stereo Sound System



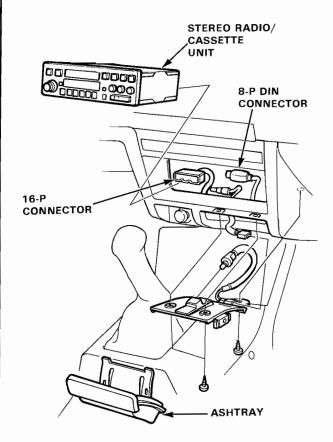




#### -Unit Replacement -

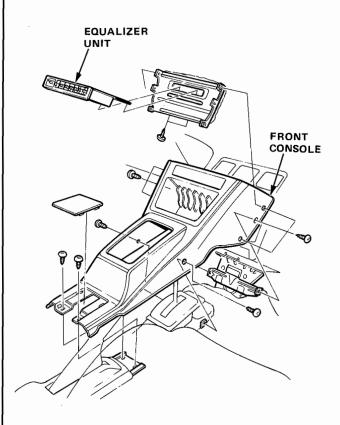
#### Stereo Radio/Cassette Unit:

- 1. Remove the ashtray and ashtray holder.
- Remove the 2 screws from under the center dashboard, then push the stereo radio/cassette unit out from behind it.
- 3. Disconnect the 16-P connector, antenna feeder cable and 8-P DIN connector.



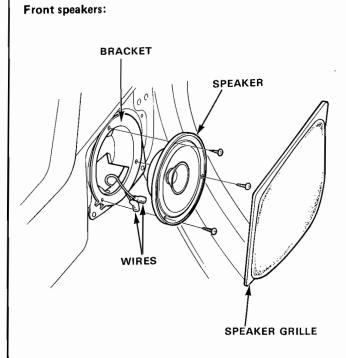
#### **Equalizer Unit:**

- 1. Remove the front console.
- Remove the 2 screws from under the center dashboard and equalizer unit.
- 3. Disconnect the 8-P DIN connector.

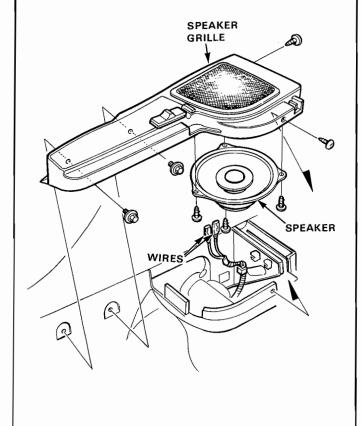


# Stereo Sound System

# -Speaker Replacement-



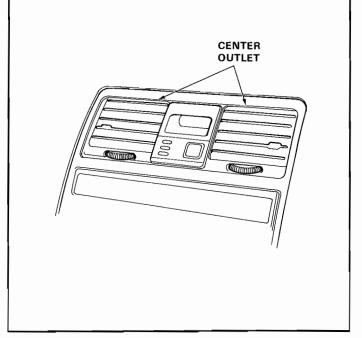
#### Rear speakers:

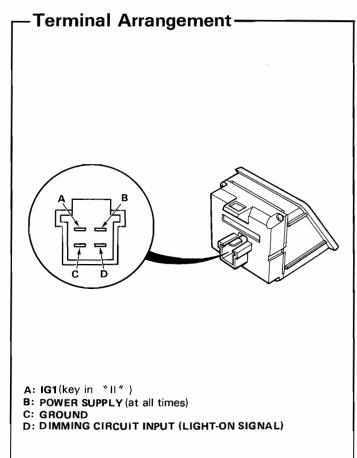


# **Clock**

#### -Removal -

- Pull out the clock from the center outlet on the dashboard.
- 2. Disconnect the 6-P connector from the clock.





# Integrated Control Unit



#### Description-

#### **Integrated Control Unit:**

A multi-function control unit located on the relay bracket, above the under dash fuse box, integrates the functions of the oil pressure alarm system, side marker flasher relay, seat belt and key alarm, dome light circuit (driver's door only) and lighting alarm onto one circuit board, sharing common circuit functions.

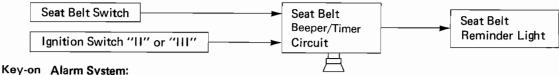
#### Oil Pressure Alarm System:

If oil pressure falls below the set value for more than 10 seconds (due to loss of oil, clogging, etc.), the oil pressure warning light will flash continuously to warn the driver. The light will cease flashing only when the ignition switch is turned OFF. If there is a total loss of oil pressure, the warning light will come on steady.

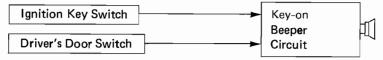


#### Seat Belt Alarm System:

With the ignition switch in "II" or "III", with the driver's seat belt unbuckled, a beeper and warning light are activated to warn the driver to buckle the seat belt. After 5 seconds the beeper stops, and the light goes out. If the driver's seat belt is buckled the beeper is deactivated.

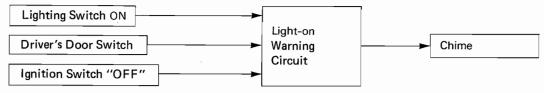


When the ignition key is turned from "II" to "0" position but not removed, and the driver's door opened, a beeper is activated to warn the driver to remove the key.



#### Light-on Warning System:

When the ignition key is turned to OFF position and removed, and the driver's door is opened while the headlights are still on, a chime is activated to remind the driver to turn off the lights.



#### Side Marker Light Flasher System:

The front side marker lights have two distinct modes of operation, one for daytime and another for nighttime:

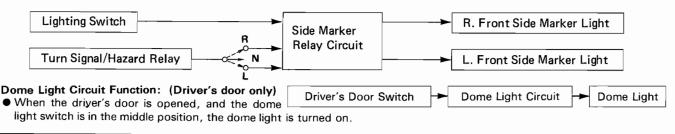
Daytime mode - (Taillights off) The left or right front side marker lights flash simultaneously with the front and rear

Nighttime mode — (Taillights on) The front side marker lights are illuminated when the taillights are on and flash when the turn signals are operated. With the taillights on and the turn signals (or hazard) flashing, the front side marker lights and the turn signals flash alternately.

#### Failure modes:

- One or both of the front side marker lights stay on all the time (ignition and headlights off).
- One or both of the front side marker lights will not illuminate.

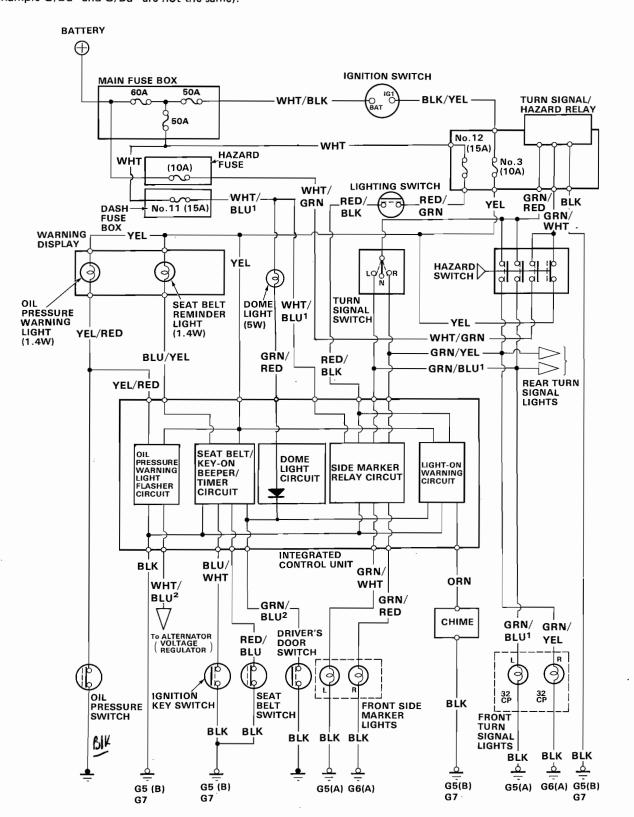
If either of these problems exists, test the side marker relay circuit(in the integrated control unit).



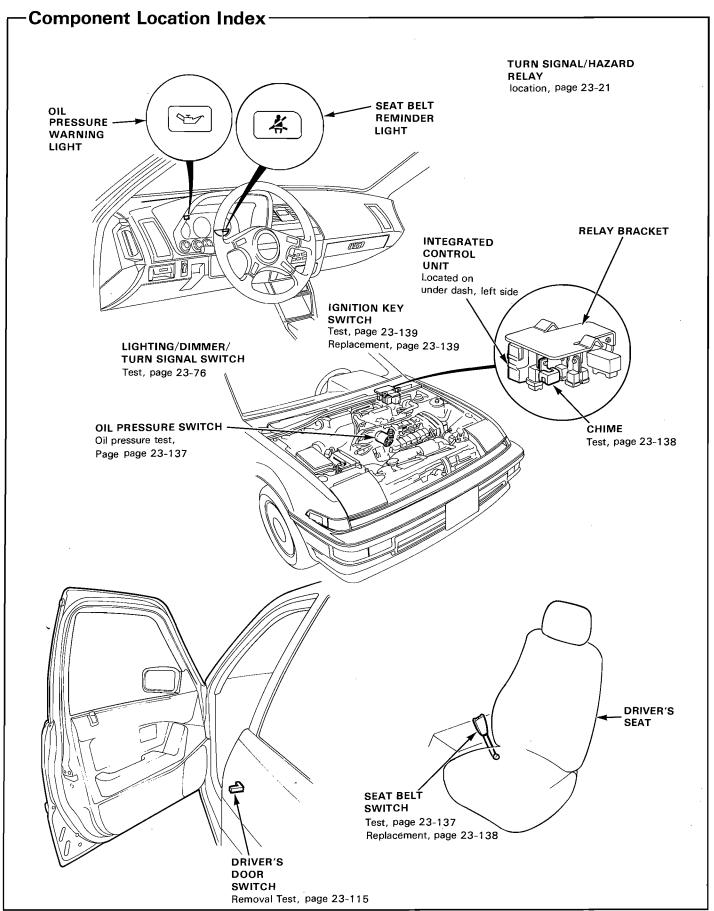
# **Integrated Control Unit**

#### -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).





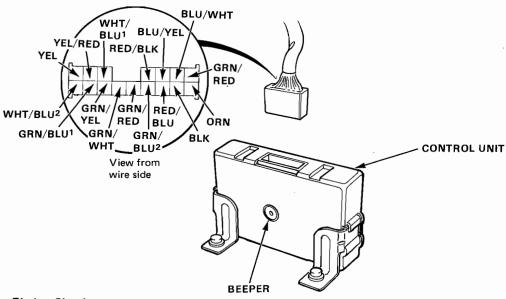


## **Integrated Control Unit**

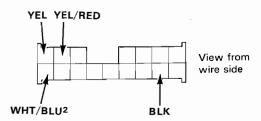
## -Input Test-

Remove the dashboard lower panel to disconnect the 16-P connector from the control unit.

NOTE: Replace the control unit if all tests prove  $\mathsf{OK}.$ 



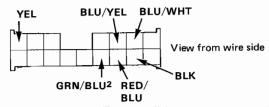
### Oil Pressure Warning Light Flasher Circuit:



No.	Wire	Test condition	Test : desired result	Possible cause (if result is not obtained)
1	BLK	Under all conditions.	Check for continuity to ground : should be continuity.	Poor ground (G5(B), G7). An open in the wire.
2	YEL	Ignition switch ON.	Check for voltage to ground : should be battery voltage	An open in the wire. Blown No.3 (10A) fuse.
3	WHT/BLU2	Start the engine.	Check for voltage to ground : should be battery voltage.	Faulty alternator. An open in the wire.
		Ignition switch OFF.	Check for continuity to ground : should be continuity.	Faulty oil pressure switch. An open in the wire. Poor ground.
4	YEL/RED	Ignition switch ON.	Check warning light operation. If the light does not come on, attach the Y/R terminal to ground: Light should come on as the ignition switch is turned ON.	Blown bulb or No.3 (10A) fuse. An open in the wire.
		Start the engine.	Check warning light operation: Light should go out as the engine starts.	Improper lubrication. Insufficient oil. Faulty oil pressure switch.

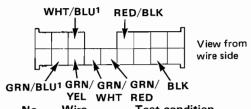


### Seat Belt/Key-on Beeper/Timer Circuit:



No.	Wire	Test condition	Test : desired result	Possible cause (if result is not obtained)
1	BLK	Under all conditions.	Check for continuity to ground: should be continuity.	Poor ground (G5(B), G7). An open in the wire.
2	YEL	Ignition switch ON.	Check for voltage to ground: should be battery voltage.	An open in the wire. Blown No. 3 (10 A) fuse.
3	BLU/YEL	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	BLU/WHT	Ignition switch turned from "II" to "O"position.	Check for continuity to ground:	Faulty ignition key switch. An open in the wire. Poor ground (G5(B), G7).
5	RED/BLU	Driver's seat belt not buckled.	should be continuity.	Faulty seat belt switch. An open in the wire. Poor ground (G5(B), G7).
6	GRN/BLU2	Driver's door opened.		Faulty door switch. An open in the wire. Poor ground.

### Side Marker Relay Circuit:



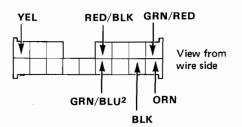
No.		Test condition	Test: desired result	Possible cause (if result is not obtained)
1	BLK	Haday all appditions	Check for continuity to ground: should be continuity.	Poor ground (G5(B), G7). An open in the wire.
2	WHT/BLU1	Under all conditions.	Check for voltage to ground: should be battery voltage.	Blown No.11 (15 A) fuse. An open in the wire.
3	RED/BLK	Lighting switch ON.	Check for voltage to ground: shold be battery voltage.	Blown No. 12 (15 A) fuse. An open in the wire.
4	GRN/BLU <sup>1</sup>	Ignition switch ON and turn signal switch in L.	Check for voltage to ground: should be battery voltage.	Blown No. 3 (10 A) fuse. Faulty turn signal system.
5	GRN/YEL	Ignition switch ON and turn signal switch in R.	Should be battery voltage.	An open in the wire.
6	GRN/WHT	Connect battery positive wire to the GRN/	Check side marker light opera- tion: Light should come on as the battery is connected.	Blown bulb Poor ground (G5(A) or G6(A)). An open in the wire.
7	GRN/RED	(or GRN/RED) terminal to ground.	the battery is confidence.	7 an open an are much

(cont'd)

# **Integrated Control Unit**

## Input Test (cont'd)-

Light-on Warning Circuit and Dome Light Circuit



No.	Wire	Test condition	Test: desired result	Possible cause (if result is not obtained)
1	BLK	Under all conditions.	Check for continuity to ground : should be continuity.	Poor ground (G5(B), G7). An open in the wire.
2	YEL	Ignition switch ON.	Check for voltage to ground : should be battery voltage	An open in the wire. Blown No.3 (10A) fuse.
3	RED/BLK	Lighting switch ON.	Check for voltage to ground: should be battery voltage.	Blown No. 12 (15 A) fuse. An open in the wire.
4	GRN/BLU <sup>2</sup>	Driver's door opened.	Check for continuity to ground: should be continuity.	Faulty door switch. An open in the wire. Poor ground.
5	ORN	Connect battery positive to the Or terminal, and negative to ground.	Check chime operation: Chime should sound each time the battery is connected.	Faulty chime. Poor ground (G5(B), G7). An open in the wire.
6	GRN/RED	Under all conditions.	Attach to ground: With the dome light switch in the middle position, the dome light should come on.	Blown No. 11 (15A) fuse. Faulty dome light. An open in the wire.



### Oil Pressure Test-

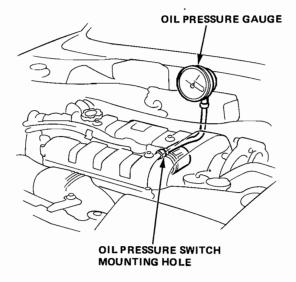
If the oil pressure warning light stays on with the engine running, check the engine oil level. If the oil level is correct:

- 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** 

At Idle: 147kPa (1.5 kg-m, 21 psi) minimum At 3000 min<sup>-1</sup> (rpm): 412 kPa (4.2—5.5 kg/cm², 60—78 psi)

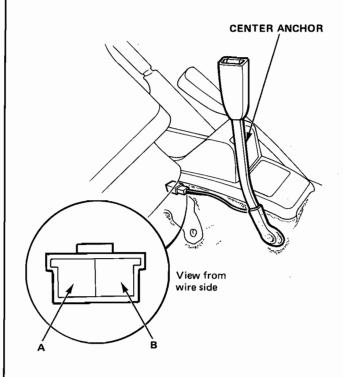
- If oil pressure is within specifications, replace oil pressure switch and recheck.
- If oil pressure is not within specifications, inspect oil pump (section 8).



### -Seat Belt Switch Test-

- Remove the rear console, and disconnect the 2-P connector.
- 2. There should be continuity between the A and B terminals when the driver's seat belt is not buckled.

There should be no continuity when the driver's seat belt is buckled.

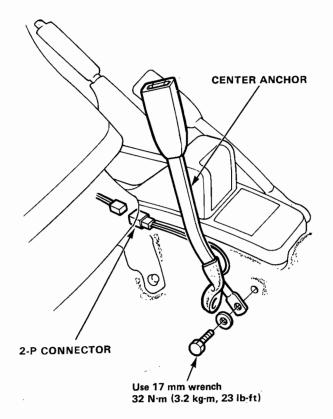


## **Integrated Control Unit**

## -Seat Belt Switch Replacement-

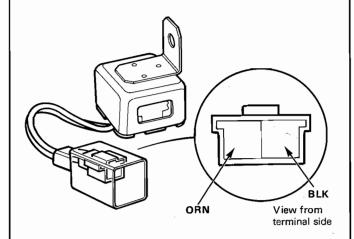
- 1. Remove the rear console.
- 2. Slide the drivers seat forward until the seat belt center anchor bolt is accessible.
- 3. Remove the bolt and disconnect the 2-P connector to remove the center anchor.

CAUTION: Do not pinch the harness when the new anchor bolt is installed.



### -Chime Test-

- 1. Remove the dashboard lower panel.
- Test chime operation by connecting battery positive to the ORN terminal and negative to the BLK terminal, and cycling the power on-off repeatedly.
- 3. If the chime fails to sound every time power is cycled, replace it.

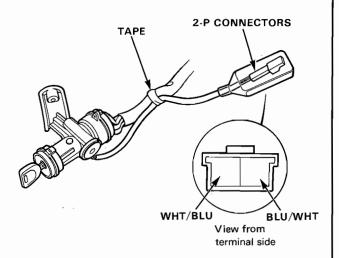




### Ignition Key Switch Test-

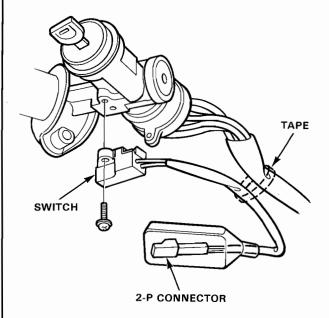
- 1. Remove the dashboard lower panel then disconnect the 2-P connector.
- There should be continuity between the BLU/WHT and WHT/BLU terminals when the ignition switch is turned from "II" to "O" position.

There should be no continuity when the ignition key is removed.



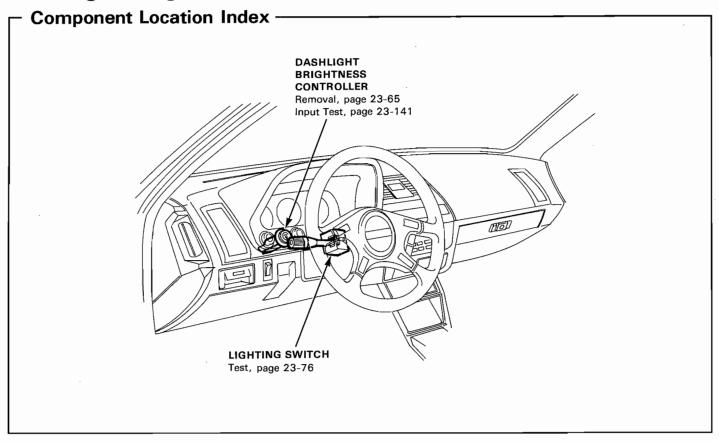
## -Ignition Key Switch Replacement-

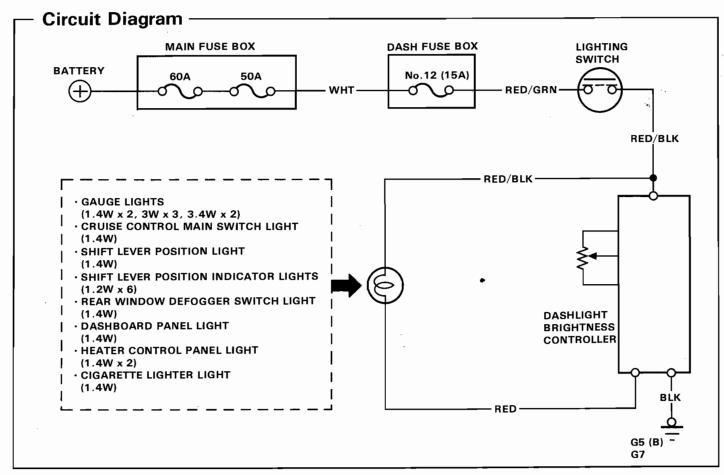
- 1. Remove the column lower panel and cover.
- Untape the switch wires and disconnect the 2-P connector.
- 3. Remove the switch from the key cylinder by removing the attaching screw.



NOTE: On reassembly, secure the switch wires using tape.

## **Dashlight Brightness Control**





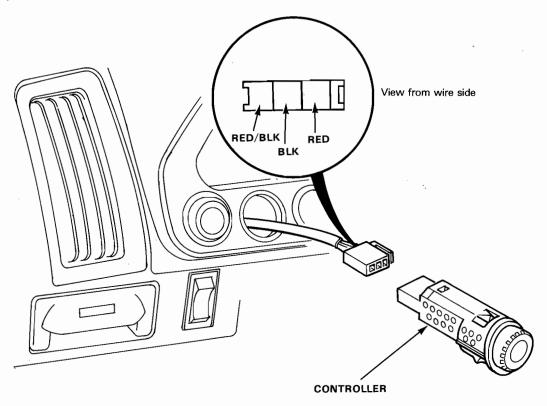


### Controller Input Test-

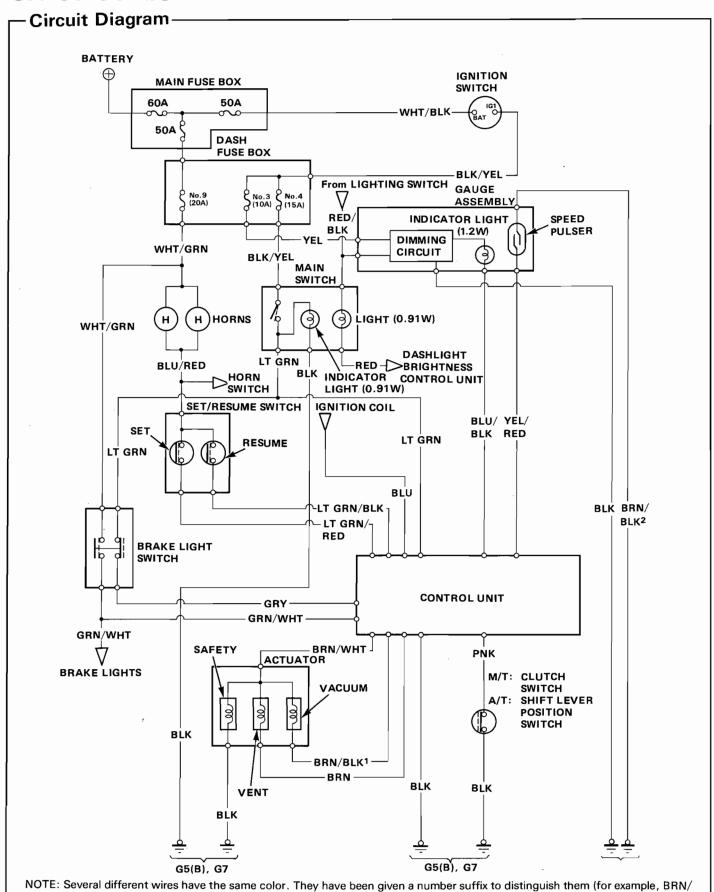
NOTE: The control unit is built in the dashlight brightness controller.

Remove the dashboard lower panel. Push out the controller from behind the instrument panel, then disconnect the 3-P connector from the controller.

Make the following input tests at the harness pins. If all tests prove OK, yet the dashlights still can not be controlled, check the connector for good connection. If OK, then replace the controller.



No.	Terminal	Test condition	Test: desired result	Possible cause (if result is not obtained)
1	BLK	Under all conditions.	Check for continuity to ground: should be continuity,	• Poor ground (G5 (B), G7) • An open in the wire.
2	RED/BLK	Lighting switch ON.	Check for voltage to ground: should be battery voltage.	Blown No.12 (15A) fuse. Faulty lighting switch. An open in the wire.
3	RED	Lighting switch ON.	Attach to ground: dashlights should come on full bright. NOTE: If the fuse blows the RED and RED/BLK wires are connected.	An open in the RED/BLK or RED wire.



BLK1 and BRN/BLK2 are not the same).



## Component Location Index-

#### MAIN SWITCH

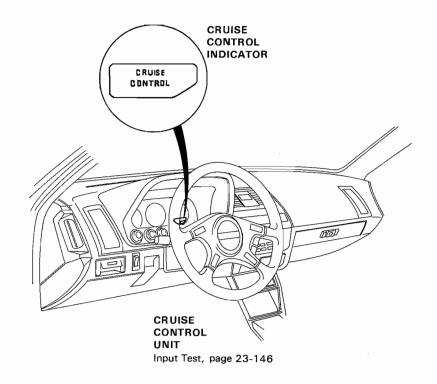
Removal, page 23-65 Test, page 23-149

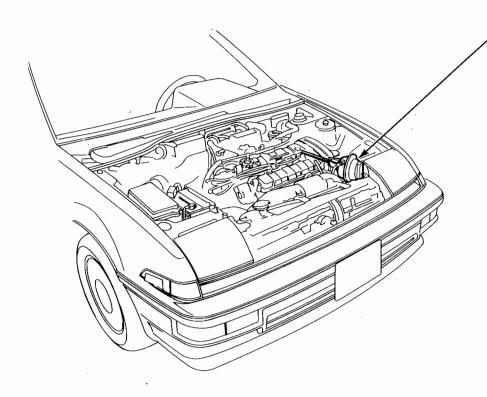
#### SET/RESUME SWITCH

Test, page 23-148 Replacement, page 23-148

### BRAKE LIGHT/CLUTCH SWITCH

Test, page 23-147





#### ACTUATOR

Solenoid Test, page 23-150 Actuator test, page 23-150 Actuator/ Cable Replacement, page 23-150 Cable Adjustment, page 23-152 Disassembly, page 23-149

### - 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 maintains 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 actuator. 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 troubleshooting
  - —Check the No.3 (10A), No.4 (15A) and No.9 (20A) fuses in the dash box. —Check that the horns sound.

  - —Check the tachometer for proper operation.

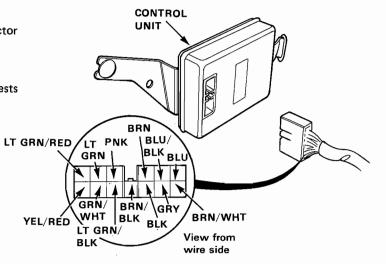
Items to be inspected.	Main switch	SET/RESUME switch	Brake light switch and mounting	Clutch switch and mounting (M/T)	Shift lever position switch (A/T)	Speedometer pulser or cable	Dimming circuit in gauges	Actuator	Disconnected, clogged or restricted vacuum lines/stuck check valve/leaky vacuum reservoir	Control unit	Poor ground	Open circuit in wires or loose or disconnected terminals
Cruise control can't be set.	2	3	4	ţ	5				6	1	G5(B), G7	BLU/RED, LTGRN/ RED, BLU, BLK/YEL, LT GRN, GRN, YEL/RED, BRN, BRN/BLK1, BRN/WHT or PNK
Cruise control can be set, but indicator light does not go on.							2			1	G5(B), G7	YEL or BLU/BLK
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		LT GRN/BLK
Set speed not cancelled when clutch pedal is pushed (M/T).				1						2		
Set speed not cancelled when shift lever is moved to N (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		LT GRN/BLK

## -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.



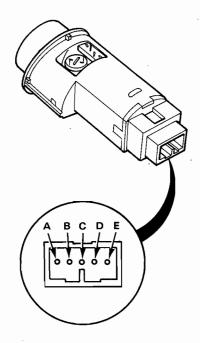
Wire	Test conditions	Test: desired result	Possible cause (if result is not obtained)
BLK	Under all conditions.	Check for continuity to ground: should be continuity.	Poor ground (G5(B), G7). An open in the wire.
LT GRN	Ignition switch ON and main switch ON.	Check for voltage to ground: should be battery voltage.	An open in the wire.Faulty main switch.Blown No.4 (15A) fuse.
LT GRN /BLK	Resume switch pushed.	Ground each terminal:Horns should sound as the switch is	An open in the wire. Faulty SET/RESUME switch
LT GRN /RED	Set switch pushed.	pushed.	Faulty slip ring. Faulty horn. Blown No.9 (20A) fuse
PNK	M/T:Clutch pedal not pushed. A/T:Shift lever in 2,D3 or D4.	Check for continuity to ground: should be continuity.	Poor ground (G5(B), G7).An open in the wire. Faulty or misadjusted clutch switch (M/T). Faulty shift lever position switch (A/T).
BLU	Start the engine.	Check for voltage to ground: should have battery voltage.	An open in the wire. Faulty ignition system.
	Raise the front of the car and rotate one wheel.	Check resistance in both directions between Y/R and BI wires.There should be continuity in only one di-	Faulty speed pulser in speedometer. An open in the wire. Poor ground (G5(B), G7).
YEL/RED	or remove the speedometer cable from the transmission and turn slowly by hand.	rection.4 times per cable revolution or 23 times per 10 wheel revolutions.	
GRY	Ignition switch ON,main switch ON and brake pedal pushed,then released.	Check for voltage to ground: should be O V with the pedal pushed and battery voltage with the pedal released.	An open in the GRY wire circuit. Faulty brake light switch.
GRN/WHT	Brake pedal pushed, then released.	Check for voltage to ground: should be battery voltage with the pedal pushed, and O V with the pedal released.	An open in the GRN/WHT wire circuit. Blown No.9 (20A) fuse. Faulty brake light switch.
BLU/BLK	Ignition switch ON.	Attach Bu/Bl wire to ground: Indicator light in dash should come on.	Blown bulb. An open in the BLU/BLK wire circuit. Faulty dimming circuit in gauges Blown No.3 (10A) fuse.
BRN	Under all conditions.	Resistance to ground: should be $80-120\Omega$ .	Open or short in the BRN wire. Faulty actuator solenoid.
BRN/BLK	Under all conditions.	Resistance to ground: should be $70-110\Omega$ .	Open or short in the BRN/BLK wire. Faulty actuator solenoid.
BRN/WHT	Under all conditions.	Resistance to ground: should be $40-60\Omega$ .	Open or short in the BRN/WHT wire. Faulty actuator solenoid.

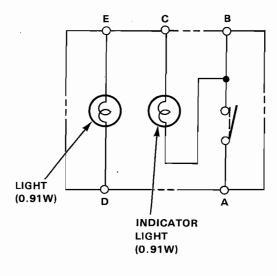


### -Main Switch Test -

- 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	А	В		С	D	E
OFF		0	<del>-</del>	9	0	 _0
ON	0-	<del>-</del>	<u> </u>	7	0-	 <del>-</del>



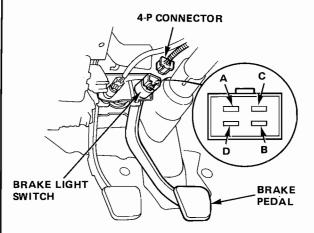


### - Brake Light/Clutch Switch Test -

#### **Brake Switch:**

- 1. Disconnect the 4-P connector from the switch.
- 2. Check for continuity between the terminals according to the table.

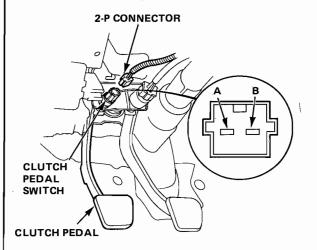
Terminal	A	В	С	D
Brake pedal				
RELEASED	0-	<u> </u>		
PUSHED			0	0



#### Clutch Switch:

- 1. Disconnect the 2-P connector from the switch.
- 2. Check for continuity between the terminals according to the table.

Terminal	Α	R	
Clutch pedal	A	Ь	
RELEASED	$\Diamond$	$-\circ$	
PUSHED			



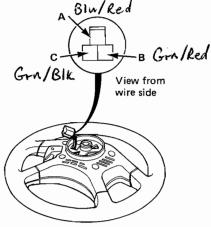
NOTE: If necessary, replace the switch or adjust the pedal height.

### -Set/Resume Switch Test -

#### Switch Test:

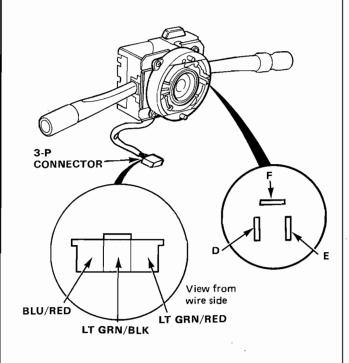
- 1. Remove the steering wheel.
- 2. Check for continuity between the terminals in each switch position according to the table.

Terminal Position	А	В	С
OFF			
SET(ON)	0		$\overline{\bigcirc}$
RESUME(ON)		9	9



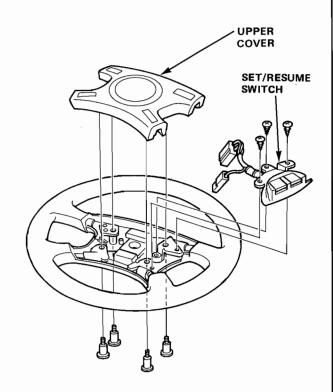
### Slip Ring Test:

- Remove the column cover, then disconnect the 3-P connector.
- There should be continuity between the BLU/RED and F terminal, the LT GRN/RED and D terminal, and the LT GRN/BLK and E terminal, as you turn the slip ring.

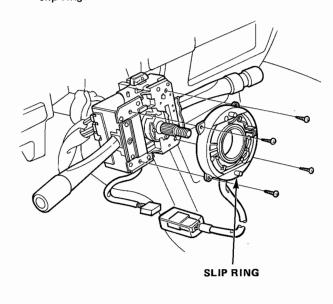


## Set/Resume Switch Replacement -

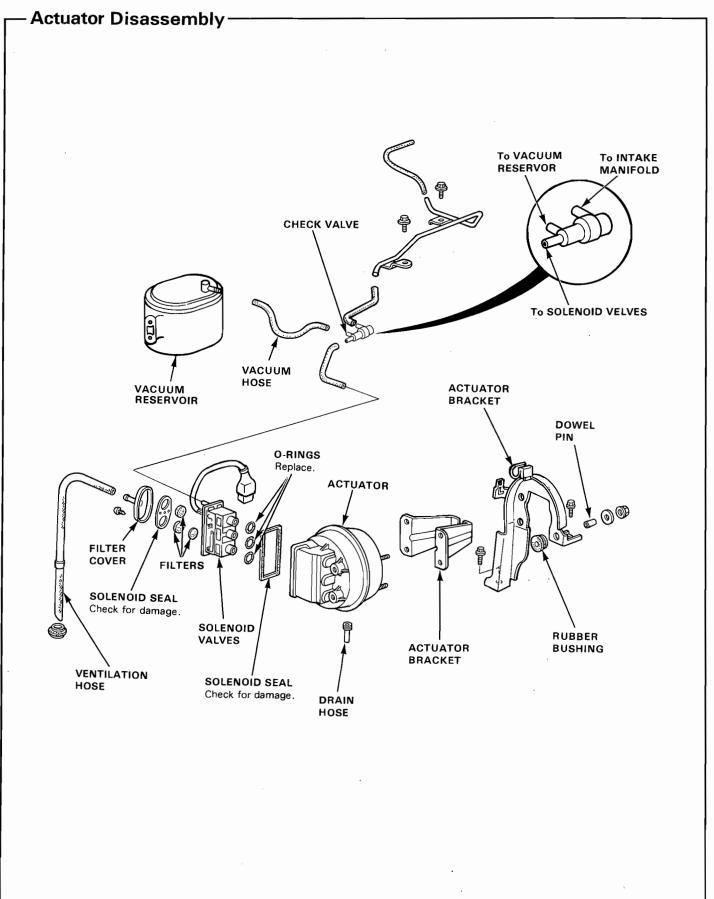
- 1. Remove the steering wheel.
- Separate the wheel upper cover by removing the 4 screws.
- 3. Remove the 3 screws and the SET/RESUME switch from the steering wheel.



 If necessary, remove the upper and lower steering column covers, then remove the 4 screws and the slip ring.







### - Actuator Solenoid Test -

- 1. Disconnect the 4-P connector.
- 2. Measure resistance between the terminals.

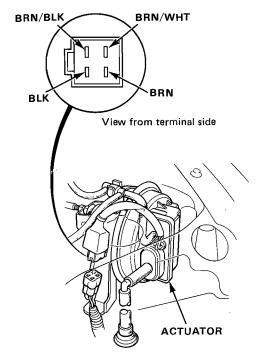
#### Resistance:

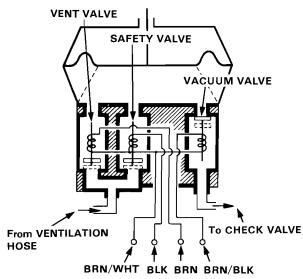
VACUUM SOLENOID (between BRN/WHT and 30–50  $\Omega$  BRN/BLK)

VENT SOLENOID (between BRN/WHT and BRN)

SAFETY SOLENOID (between BRN/WHT and BLK) 40–60  $\Omega$ 

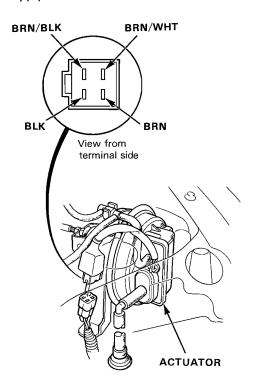
NOTE: Resistance will vary slightly with temperature; specified resistance is at 20°C (70°F).



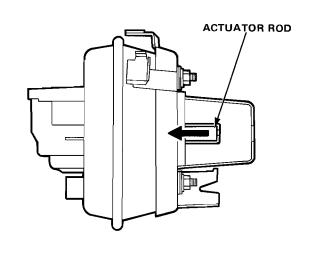


### Actuator Test -

- 1. Disconnect the actuator cable from the actuator rod and the 4-P connector.
- Connect battery positive wire to the BRN/WHT terminal and negative to the BRN/BLK, BRN and BLK terminals.
- 3. Connect a vacuum pump to the check valve. Then apply vacuum to the actuator.



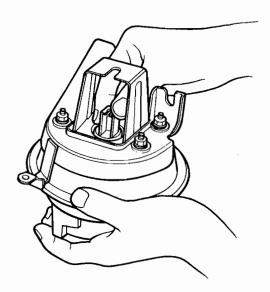
4. The actuator rod should pull in completely. If the rod pulls in only part-way or not at all, check for a leaking vacuum line or defective solenoid.





5. With voltage and vacuum still applied, try to pull the actuator rod out by hand.

You should not be able to pull it. If you can, it is defective.



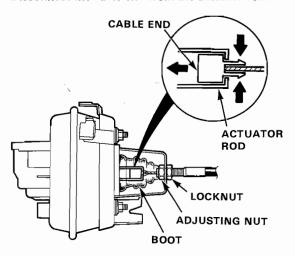
6. Disconnect battery negative wire from the BRN terminal. The actuator rod should return. If the actuator rod does not return, and the ventila-

tion hose and filter are free, the solenoid valve assembly is defective.

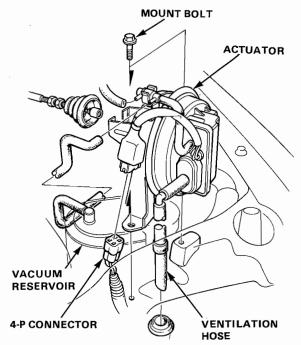
- 7. Repeat the steps 2-6, but this time disconnect battery negative wire from the BLK terminal. The actuator rod should return. If it does not return, and the ventilation hose and filter are free, the solenoid valve assembly is defective.
- 8. If the solenoid valve assembly is replaced, be sure to use new O-rings at each solenoid.

### **Actuator/Cable Replacement**

- Pull back the boot and loosen the locknut, then disconnect the cable from the bracket.
- Disconnect the cable end from the actuator rod.



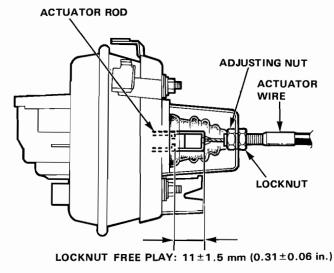
- Disconnect the 4-P connector.
- Pull the ventilation hose from the grommet.
- Disconnect the vacuum hose from the check valve.
- Remove the 2 mount bolts and the actuator with the bracket.



- 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).

### - Actuator Cable Adjustment -

- Check that the actuator cable operates smoothly with no binding or sticking.
- 2. Start the engine.
- 3. Measure the amount of movement of the actuator rod until the cable pulls on the accelerator lever (engine speed starts to increase). Free play should be  $11\pm1.5$  mm (0.31±0.06 in.).

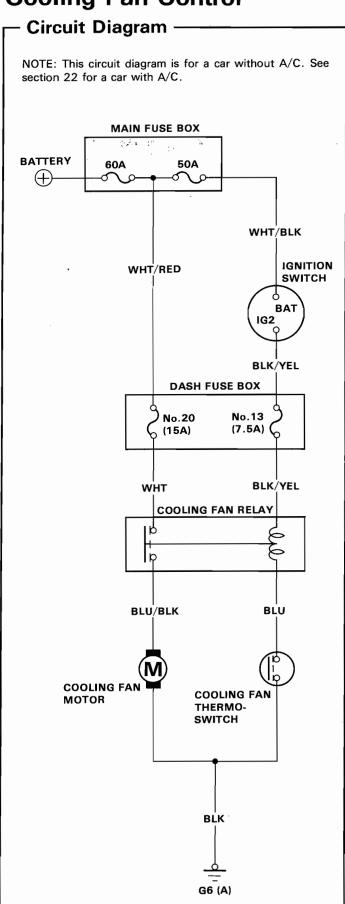


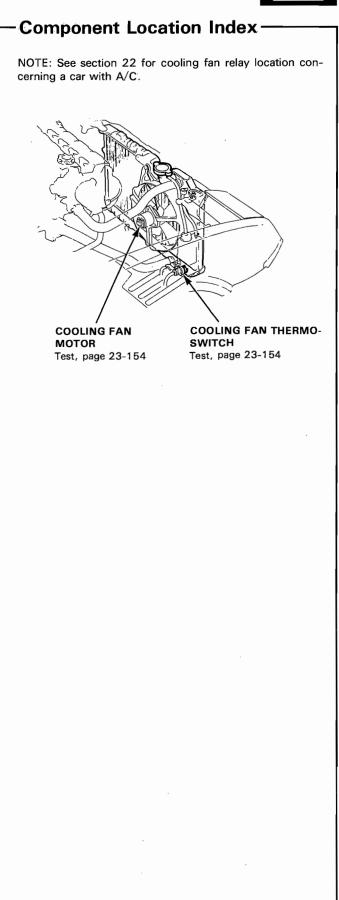
- 4. If free play is not within specs, loosen the locknut and turn the adjusting nut as required.
- 5. Retighten the locknut and recheck the free play.
- Test the car under drive to make sure that overshoot and undershoot are held within ± 2 mph of the set speed.

NOTE: If necessary, check the throttle cable free play (section 11), then recheck the actuator rod free play.

## **Cooling Fan Control**



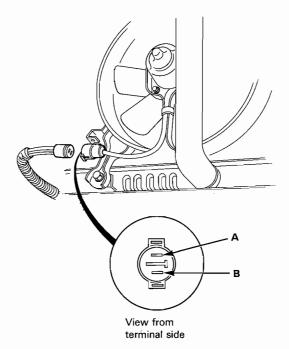




# **Cooling Fan Control**

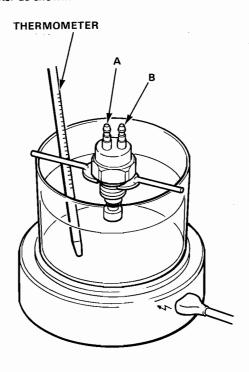
## Fan Motor Test

- 1. Disconnect the 2-P connector from the fan motor.
- Test motor operation by connecting battery positive to the A terminal, and negative to the B terminal.
- 3. If the motor fails to run smoothly, replace it.



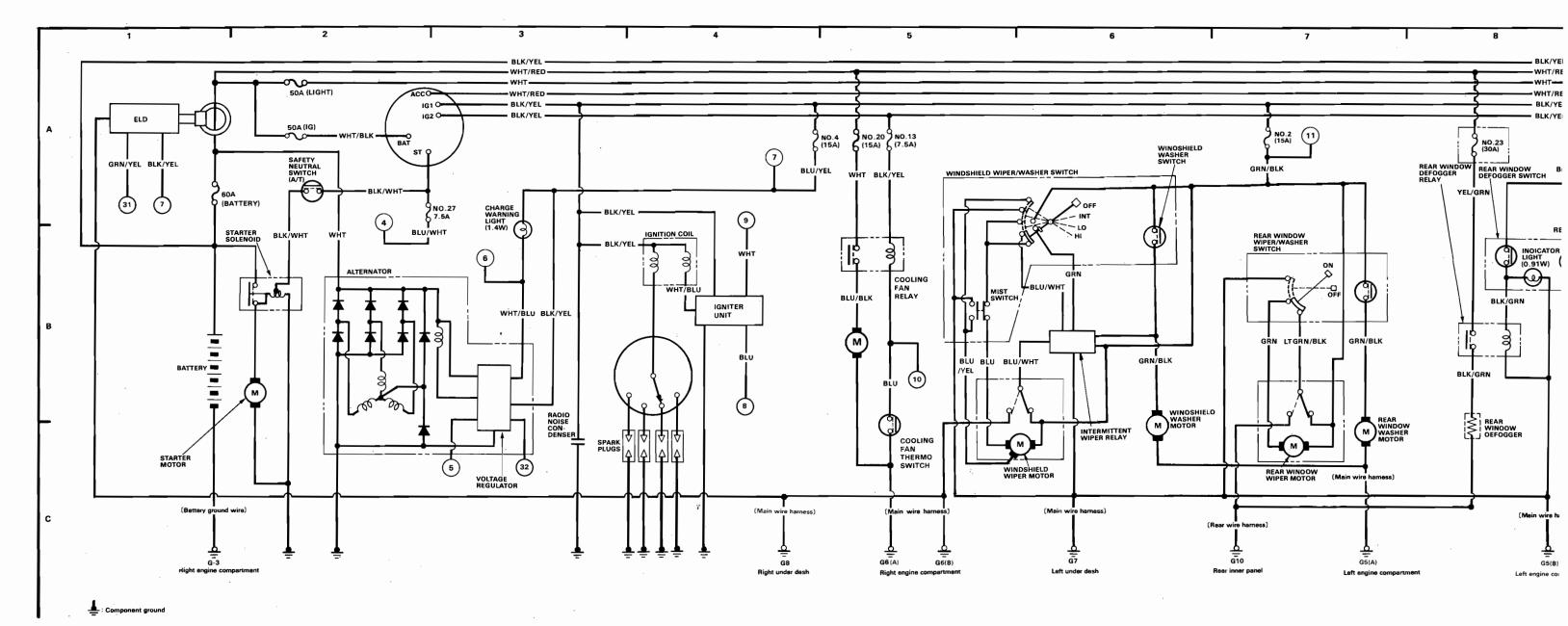
## Thermoswitch Test -

- 1. Remove the coolant thermoswitch from the radiator.
- Suspend the coolant thermoswitch in a container of water as shown.



- Heat the water and check thermoswitch with a thermometer.
- 4. Check for continuity between the A and B terminals according to the table.

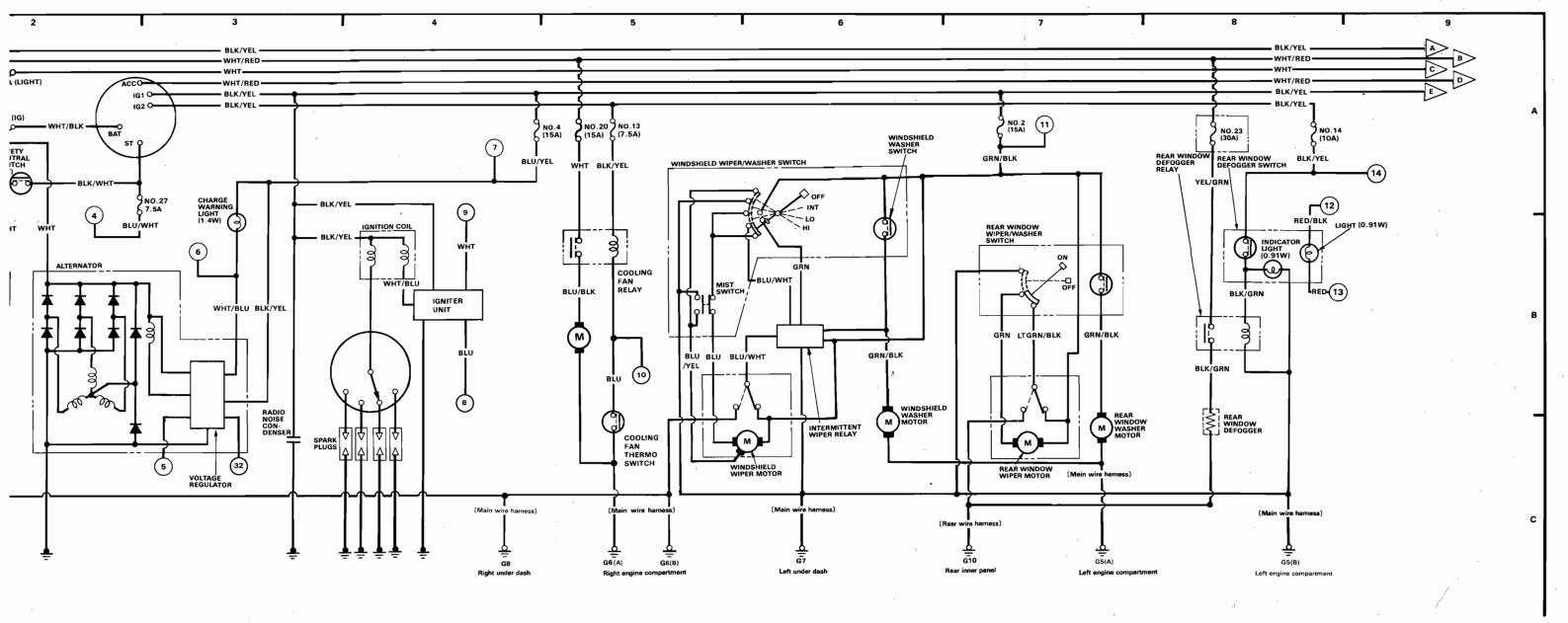
Terminal Water temperature	А	В
Above 88.5—91.5°C (191—197°F)	0-	-0
82-88°C Below (179-190°F)		



No.	Part <sup>'</sup>	Location	Connection	Part	Location	Remark
<b>4</b> )	No.27 FUSE (7.5A)	2-B		PGM-FI MAIN RELAY/ECU	39-A	
4)	NO.27 FOSE (7.5A)	2-6		BULB CHECK CIRCUIT	13-A	
(5)	VOLTAGE REGULATOR	3-C	<b>-</b>	PGM-FI ECU	42-B	
<u></u>	VOLTAGE REGULATOR	2.0	-	INTEGRATED CONTROL UNIT	15-B	
6	VOLTAGE REGULATOR	3-B		RETRACTOR CONTROL UNIT	22-A	
7	ELD UNIT	1-A -		No. 4 FUSE (15A)	4-A	
3)	ELD UNIT	1-A		PGM-FI ECU	42-A	
33	VOLTAGE REGULATOR	3-C		PGM-FI ECU	42-A	
		•				
				,		

No.	Part	Location	Connection	Part	Location	Remark
				PGM-FI MAIN RELAY/ECU	39-A	
7)	No 4 FUEF (10A)	4.4	<b>_</b>	RETRACTOR CONTROL UNIT	23-В	
Ψ	No.4 FUSE (10A)	4-A		ELD UNIT	1-A	
				CRUISE MAIN SWITCH	29-C	
8	ICAUTED LIANT	4-B	·	TACHOMETER	13-B	
(8)	IGNITER UNIT	4-B		CRUISE CONTROL UNIT	30-A	
0	COOLING FAN TERMO	5-В		A/C DIODE	33-B	
1	SWITCH	э-в		PGM-FI ECU	43-B	
9	IGNITER UNIT	4-A	-	PGM-FI ECU	42-B	

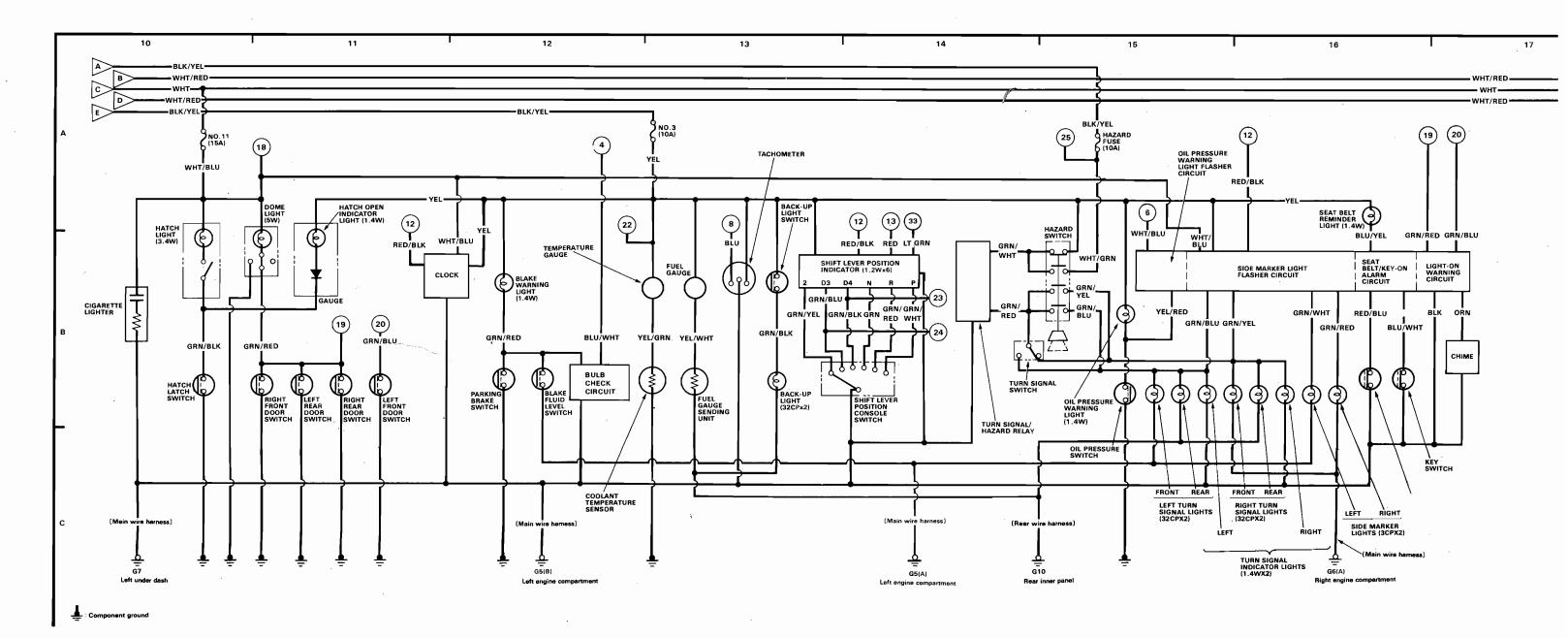
No.	Part	Location	Connection	F
0	No.2 FUSE (15A)	7-A	<b></b>	SUNROOF REL POWER WIND
(1)	DEFOGGER SWITCH LIGHT	9-B		LIGHTING SWI
(3)	DEFOGGER SWITCH LIGHT	9-B		DASHLIGHT BRIC
(1)	No.14 FUSE (10A)	9-B		BLOWER RELA CONDENSER F A/C CLUTCH F



on	Part	Location	Remark
	PGM-FI MAIN RELAY/ECU	39-A	
	BULB CHECK CIRCUIT	13-A	
	► PGM-FI ECU	42-B	
	INTEGRATED CONTROL UNIT	15-B	
	RETRACTOR CONTROL UNIT	22-A	
	No. 4 FUSE (15A)	4-A	
	► PGM-FI ECU	42-A	
	► PGM-FI ECU	42-A	

No.	Part	Location	Connection	Part	Location	Remark
			<del>-</del>	PGM-FI MAIN RELAY/ECU	39-A	
	N- 4 FUOF (40A)			RETRACTOR CONTROL UNIT	23-B	
1	No.4 FUSE (10A)	4-A	-	ELD UNIT	1-A	
			L	CRUISE MAIN SWITCH	29-C	
•	IONITED LINET	4.0	· ·	TACHOMETER	13-B	
8	IGNITER UNIT	4-B		CRUISE CONTROL UNIT	30-A	
	COOLING FAN TERMO	- n .		A/C DIODE	33-B	
(0)	SWITCH	5-B		PGM-FI ECU	43-B	
9	IGNITER UNIT	4-A	<u> </u>	PGM-FI ECU	42-B	

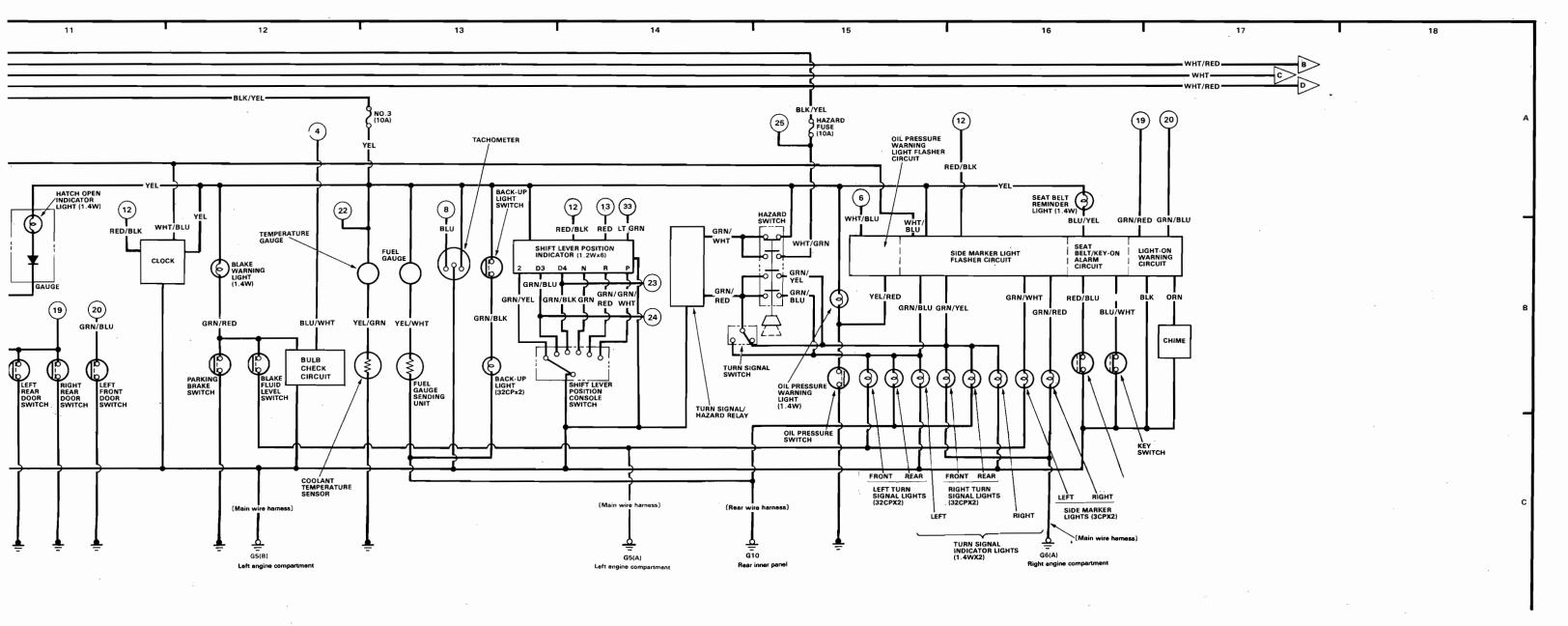
No.	Part	Location	Connection	Part	Location	Remark
(1)	No.2 FUSE (15A)	7-A		SUNROOF RELAY POWER WINDOW RELAY	44-A 25-A	
(2)	DEFOGGER SWITCH LIGHT	9-B		LIGHTING SWITCH	21-B	
(3)	DEFOGGER SWITCH LIGHT	9-B	<u> </u>	DASHLIGHT BRIGHTNESS CONTROL UNIT	21-B	
			<b></b>	BLOWER RELAY	29-A	
<b>(14)</b>	No.14 FUSE (10A)	9-B	<b></b>	CONDENSER FAN RELAY	29-A	
			L	A/C CLUTCH RELAY	29-A	



No.	Part	Location	Connection	Part	Location	Remark
(2)	CLOCK	11-A	•	LIGHTING SWITCH	21-B	
(1)	No.11 FUSE (15A)	11-A	<u> </u>	STEREO RADIO/CASSETTE PLAYER	38-A	
(19)	L.RR/R.FR./R.RR. DOOR SWITCH	11-B	<u>-</u>	INTEGRATED CONTROL UNIT	17-A	
20	L.FR.DOOR SWITCH	11-B		INTEGRATED CONTROL UNIT	17-A	
			,			
		ľ				
				* .		

No.	Part	Location	Connection	Part	Location	Remark
4	BULB CHECK CIRCUIT	12-A	-	No.26 FUSE (7.5A)	2-B	
6	INTEGRATED CONTROL UNIT	15-A	-	VOLTAGE REGULATOR	3-B	
8	TACHOMETER	13-A		IGNITION COIL	4-B	
(2)	SHIFT LEVER POSITION INDICATOR	14-A	-	LIGHTING SWITCH	21-B	
(3)	SHIFT LEVER POSITION INDICATOR	14-B	_	DASHLIGHT BRIGHTNESS CONTROL UNIT	21-B	
<b>2</b> 2	N- 2 FUCE (10A)	12-A	] <del></del>	PGM-FI WARNING LIGHT	40-A	
49	No.3 FUSE (10A)	12-A		DIMMING CIRCUIT	28-A	
23	SHIFT LEVER POSITION CONSOLE SWITCH	14-B	<u>.</u>	PGM-FI	42-B	
2	SHIFT LEVER POSITION CONSOLE SWITCH	14-B		PGM-FI ECU	42-B	
<b>3</b>	HAZARD FUSE (10A)	15-A		PGM-FI ECU	41-A	
33	SHIFT LEVER POSITION INDICATOR	14-A	<b></b>	PGM-FI ECU	42-B	

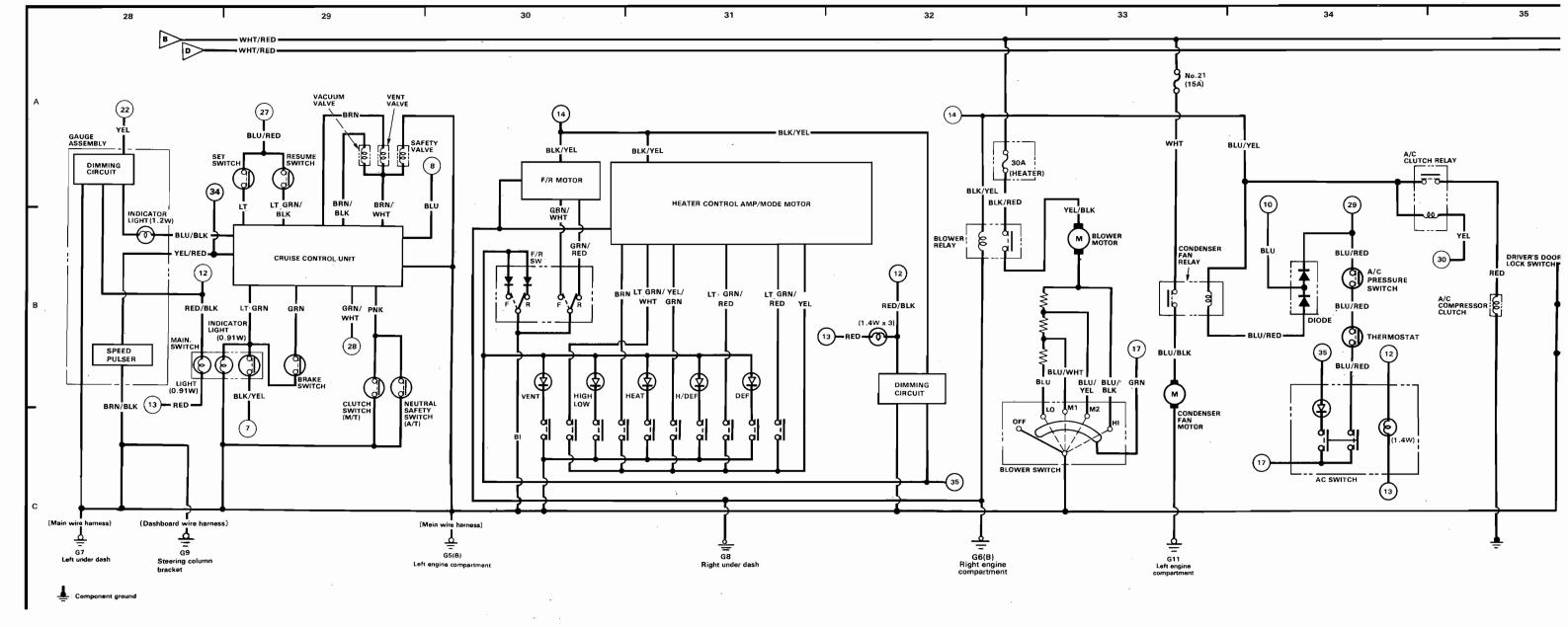
ю.	Part .	Location	Connection	
0	INTEGRATED CONTROL	16-A	4	LIGHTIN
(B)	INTEGRATED CONTROL UNIT	17-A	<b>-</b>	L.RR./R SWITCH
20	INTEGRATED CONTROL UNIT	17-A	<b></b>	L.FR. D(
	•			



onnection	Part	Location	Remark
	LIGHTING SWITCH	21-B	
	STEREO RADIO/CASSETTE PLAYER	38-A	
	INTEGRATED CONTROL UNIT	17-A	
	INTEGRATED CONTROL UNIT	17-A	
	,		
			*

No.	Part	Location	Connection	Part	Location	Remark
4	BULB CHECK CIRCUIT	12-A -		No.26 FUSE (7.5A)	2-B	
6	INTEGRATED CONTROL	15-A -		VOLTAGE REGULATOR	3-B	
8	TACHOMETER	13-A -		IGNITION COIL	4-B	
(2)	SHIFT LEVER POSITION INDICATOR	14-A +		LIGHTING SWITCH	21-B	
(3)	SHIFT LEVER POSITION INDICATOR	14-B		DASHLIGHT BRIGHTNESS CONTROL UNIT	21-B	
	N- 0 51105 (40A)	40.6		PGM-FI WARNING LIGHT	40-A	
<b>Ø</b>	No.3 FUSE (10A)	12-4		DIMMING CIRCUIT	28-A	
23	SHIFT LEVER POSITION CONSOLE SWITCH	14-B -		PGM-FI	42-B	
<b>@</b>	SHIFT LEVER POSITION CONSOLE SWITCH	14-B -		PGM-FI ECU	42-B	
23	HAZARD FUSE (10A)	15-A		PGM-FI ECU	41-A	
33	SHIFT LEVER POSITION	14-A +		PGM-FI ECU	42-B	

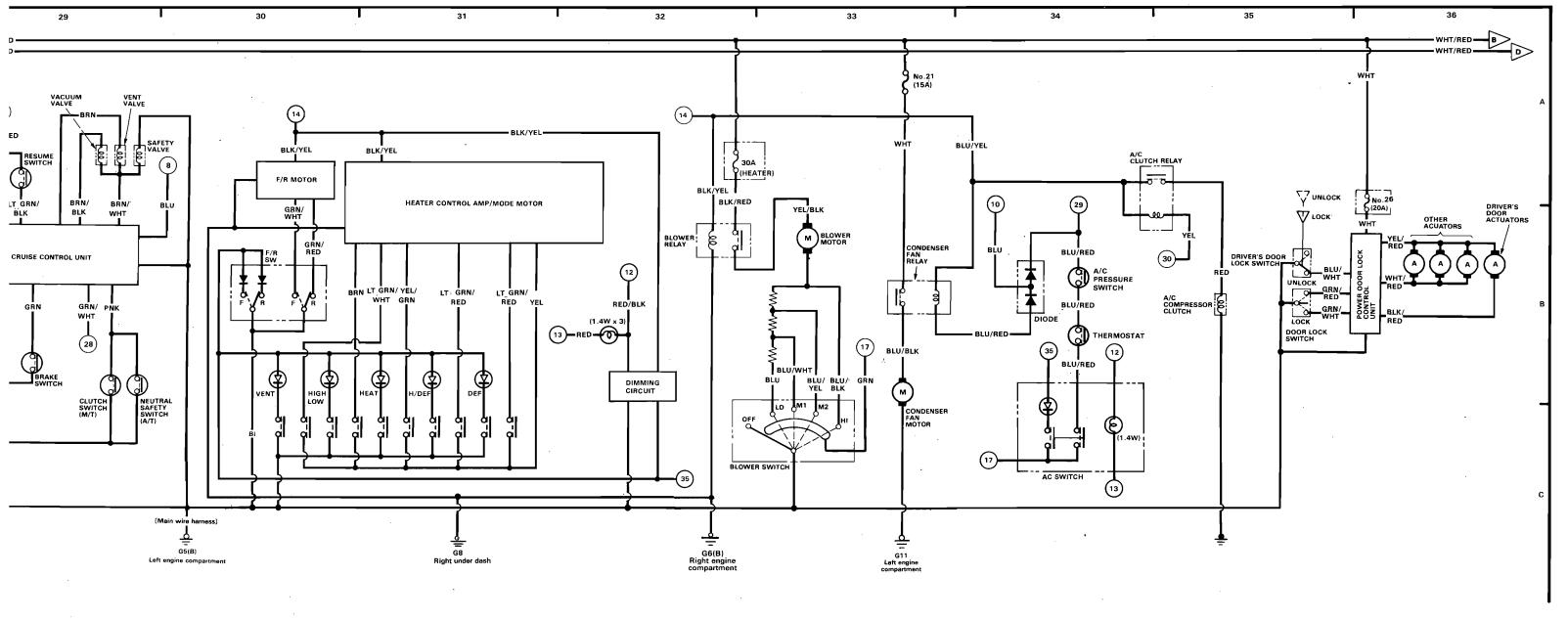
No.	Part .	Location	Connection	Part	Location	Remark
<b>(2</b> )	INTEGRATED CONTROL	16-A	-	LIGHTING SWITCH	21-B	
(9	INTEGRATED CONTROL UNIT	17-A		L.RR./R.FR./R.RR. DOOR SWITCH	11-B	_
<u>@</u>	INTEGRATED CONTROL UNIT	17-A	<b>-</b>	L.FR. DOOR SWITCH	11-B	
				_		
		1				



No.	Part	Location	Connection	Part	Location	Remark
7	CRUISE CONTROL MAIN SWITCH	29-C	-	No.4 FUSE (15A)	4-A	
8	CRUISE CONTROL UNIT	30-A	<del>-</del>	IGNITION COIL	4-B	
<u> </u>	DIMMING CIRCUIT	28-B	<del> </del>	LIGHTING SWITCH	21-B	
(2)	CRUISE CONTROL MAIN SWITCH LIGHT	28-B	]-	LIGHTING SWITCH	Z1-B	
(3)	CRUISE CONTROL MAIN SWITCH LIGHT	28-C	<b>-</b>	DASHLIGHT BRIGHTNESS CONTROL UNIT	21-B	
	F/R MOTOR	30-A	}		9-A	
<b>(4)</b>	HEATER CONTROL AMP	30-A	-	No.14 FUSE (10A)		
	DIMMING CIRCUIT	30-A	}			,
23	DIMMING CIRCUIT	28-A	-	No.3 FUSE (10A)	12-A	
2	SET/RESUME SWITCH	29-A	}-	HORNS .	20-B	
<b>(8)</b>	CRUISE CONTROL UNIT	29-B	] <del>-</del>	BRAKE SWITCH	20-B	
34	SPEEP PULSER	28-A	-	PGM-FI ECU	42-B	

No.	Part	Location	Connection	Part	Location	Remark
(12)	DIMMING CIRCUIT LIGHTS	32-B	-	LIGHTING SWITCH	21-B	_
(3)	DIMMING CIRCUIT LIGHTS	32-B	<u> </u>	DASHLIGHT BRIGHTNESS CONTROL UNIT	21-B	
	BLOWER RELAY	32-A				
<b>(3</b> )	CONDENSOR FAN RELAY	32-A	I	No.14 FUSE (10A)	9-A	
	A/C CLUTCH RELAY	32-A	<del>-</del>			
0	BLOWER SWITCH	33-B	<u> </u>	A/C SWITCH	34-C	
33	DIMMING CIRCUIT	32-C	<u> </u>	A/C SWITCH	34-B	

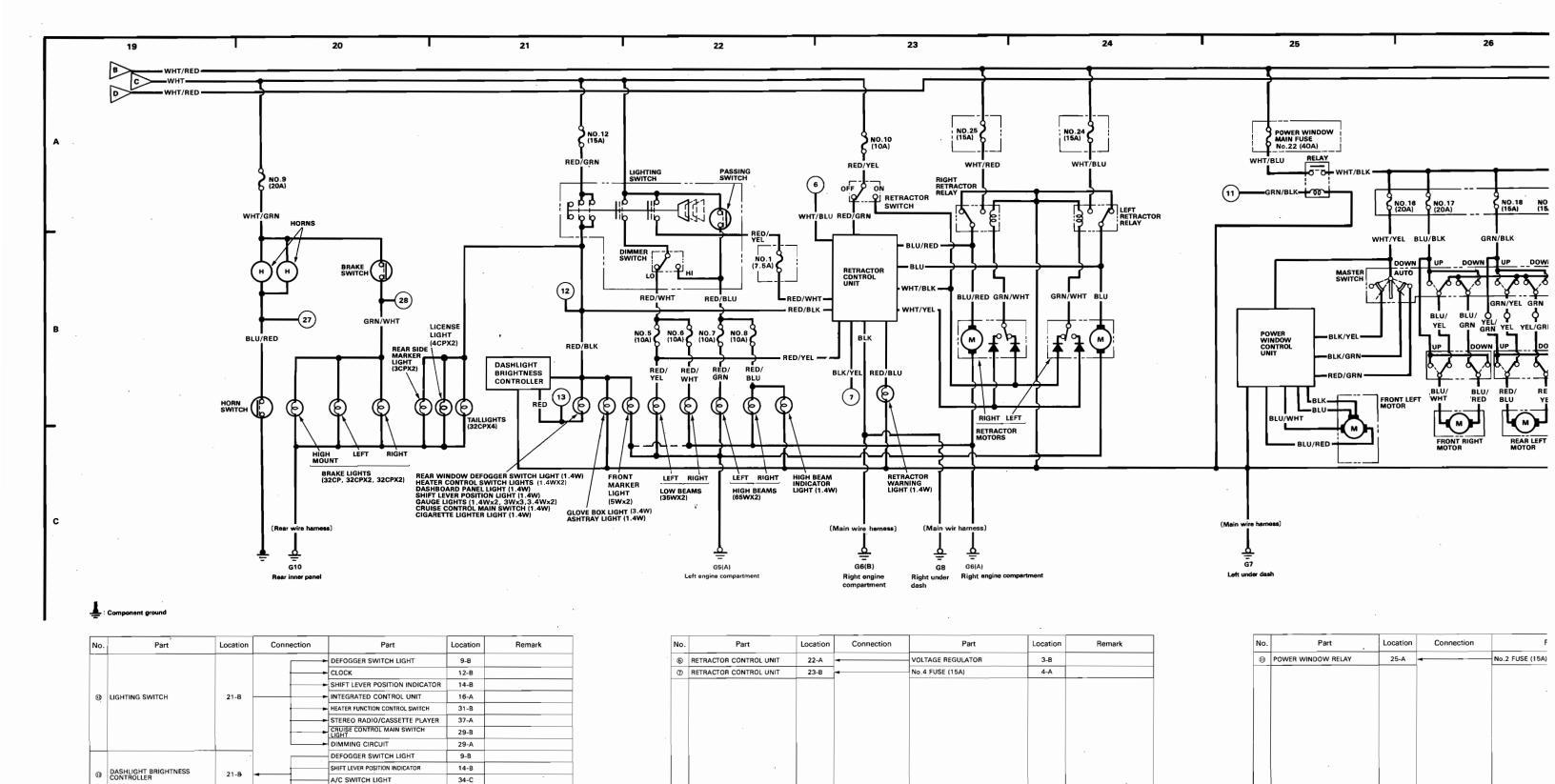
No.	Part	Location	Connection	
(0)	A/C DIODE	34-B	4	COOLING
(2)	A/C SWITCH LIGHT	34-B	-	LIGHTIN
(3)	A/C SWITCH LIGHT	34-C	<b>-</b>	DASHLI( CONTRC
0	A/C SWITCH	34-C	<u> </u>	BLOWEF
29	DIODE	34-B		PGM-FI
30	A/C CLUTCH RELAY	35-B	<b>-</b>	PGM-FI
33	A/C SWITCH	34-B	<del></del>	DIMMIN
	· .			



nnection	Part	Location	Remark
	No.4 FUSE (15A)	4-A	
	IGNITION COIL	4-B	
	LIGHTING SWITCH	21-B	
	DASHLIGHT BRIGHTNESS CONTROL UNIT	21-B	
		9-A	
	No.3 FUSE (10A)	12-A	
	HORNS	20-B	
	BRAKE SWITCH	20-B	
	PGM-FI ECU	42-B	

No.	Part	Location	Connection	Part	Location	Remark
(2)	DIMMING CIRCUIT LIGHTS	32-B	4	LIGHTING SWITCH	21-B	
(1)	DIMMING CIRCUIT LIGHTS	32-B	ļ	DASHLIGHT BRIGHTNESS CONTROL UNIT	21-B	
	BLOWER RELAY	32-A	<del> </del>			
<b>(4</b> )	CONDENSOR FAN RELAY	32-A	-	No.14 FUSE (10A)	9-A	
	A/C CLUTCH RELAY	32-A	<u> </u>			
(1)	BLOWER SWITCH	33-B	1	A/C SWITCH	34-C	
(3)	DIMMING CIRCUIT	32-C	ļ	A/C SWITCH	34-B	
		-				

No.	Part	Location	Connection	Part	Location	Remark
(1)	A/C DIODE	34-B	-	COOLING FAN THERMO SWITCH	5-B	
<b>@</b>	A/C SWITCH LIGHT	34-B	4	LIGHTING SWITCH	21-A	
(3)	A/C SWITCH LIGHT	34-C		DASHLIGHT BRIGHTNESS CONTROL UNIT	21-B	
0	A/C SWITCH	34-C		BLOWER SWITCH	33-В	
29	DIODE	34-В	•	PGM-FI ECU	42-B	
30	A/C CLUTCH RELAY	35-B		→ PGM-FI ECU	42-B	
33	A/C SWITCH	34-B		DIMMING CIRCUIT	32-C	<u> </u>



CRUISE CONTROL MAIN SWITCH LIGHT

SET/RESUME SWITCH

CRUISE CONTROL UNIT

PGM-FI ECU

@ HORNS

BRAKE SWITCH

20-B

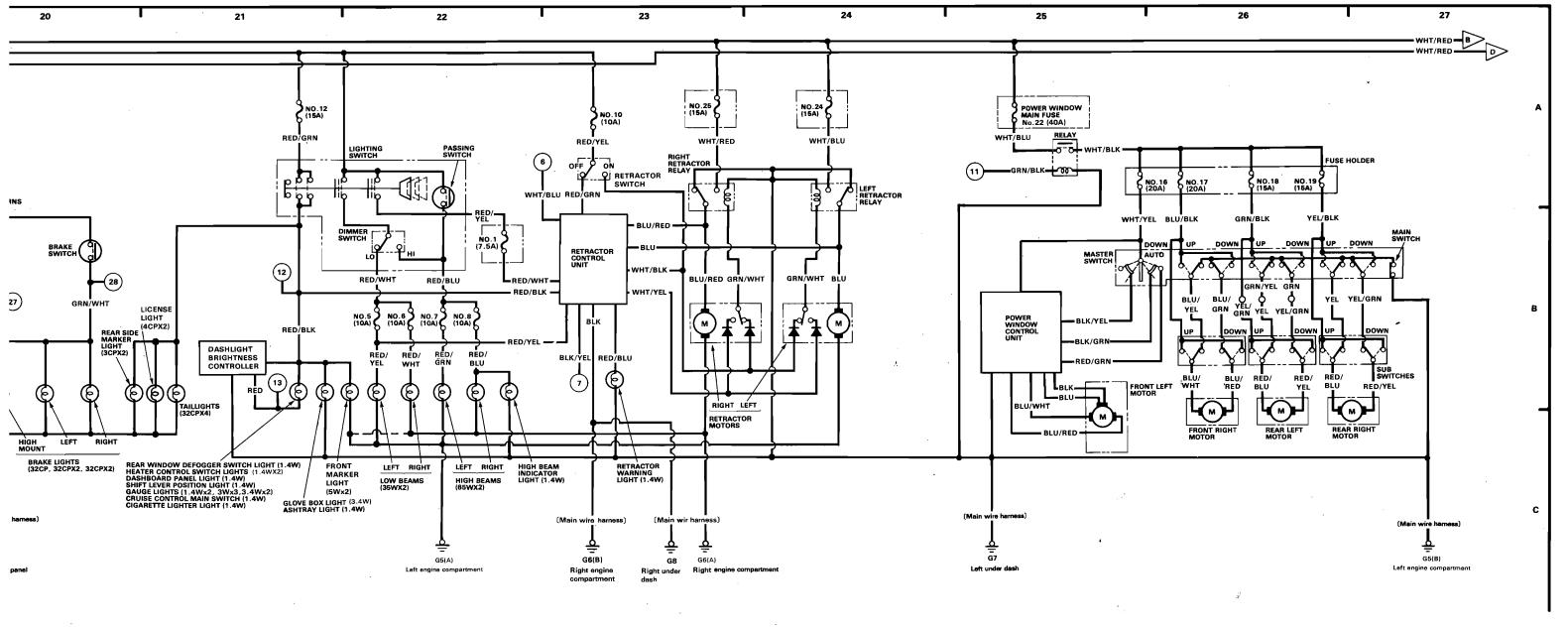
20-B

29-C

30-A

30-B

43-B



nc	Part	Location	Remark
-	DEFOGGER SWITCH LIGHT	9-B	
-	сьоск	12-B	
	SHIFT LEVER POSITION INDICATOR	14-B	
	INTEGRATED CONTROL UNIT	16-A	
	HEATER FUNCTION CONTROL SWITCH	31-B	
	STEREO RADIO/CASSETTE PLAYER	37-A	
	CRUISE CONTROL MAIN SWITCH	29-B	
	DIMMING CIRCUIT	29-A	
	DEFOGGER SWITCH LIGHT	9-B	
	SHIFT LEVER POSITION INDICATOR	14-B	
	A/C SWITCH LIGHT	34-C	
	CRUISE CONTROL MAIN SWITCH LIGHT	29-C	
	SET/RESUME SWITCH	30-A	
	CRUISE CONTROL UNIT	30-B	
	PGM-FI ECU	43-B	

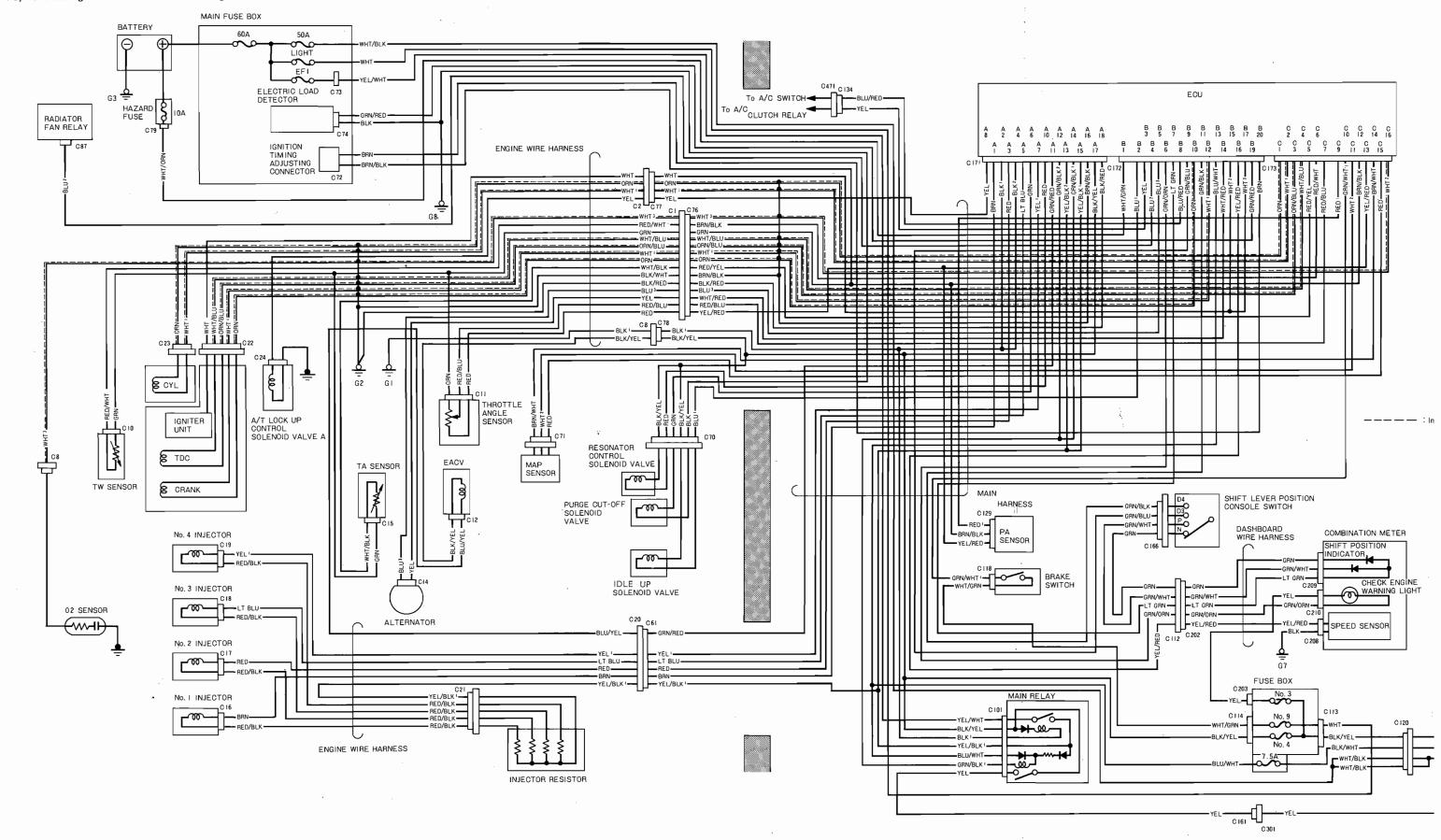
۷o.	Part	Location	Connection	Part	Location	Remark
6	RETRACTOR CONTROL UNIT	22-A	-	VOLTAGE REGULATOR	3-B	
0	RETRACTOR CONTROL UNIT	23-B	]-	No.4 FUSE (15A)	4-A	
		-				
				•		

No.	Part .	Location	Connection	Part	Location	Remark
0	POWER WINDOW RELAY	25-A	-	No.2 FUSE (15A)	7-A	

# Fuel-Injected System Diagram

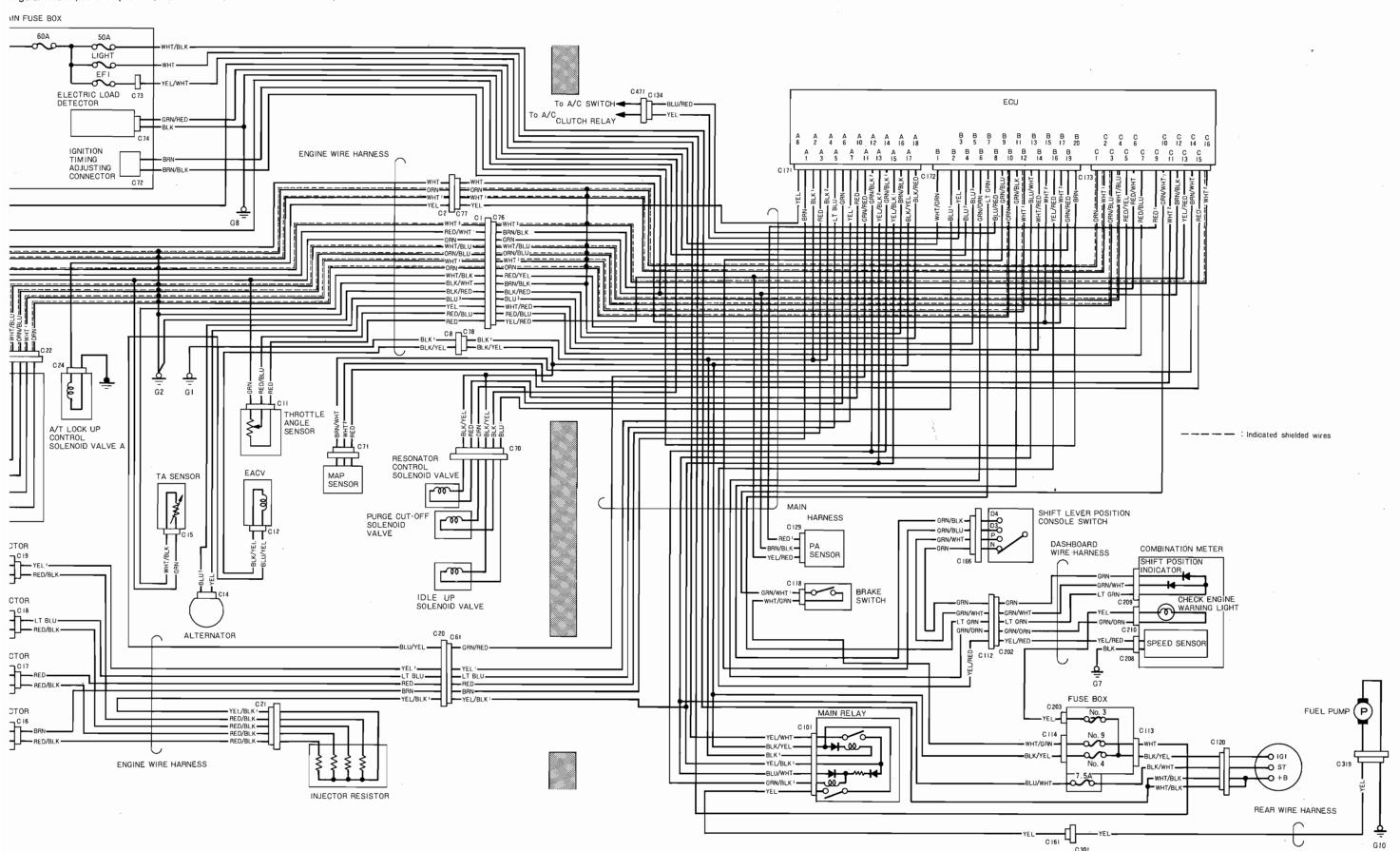
NOTE: Several different wires have the same color.

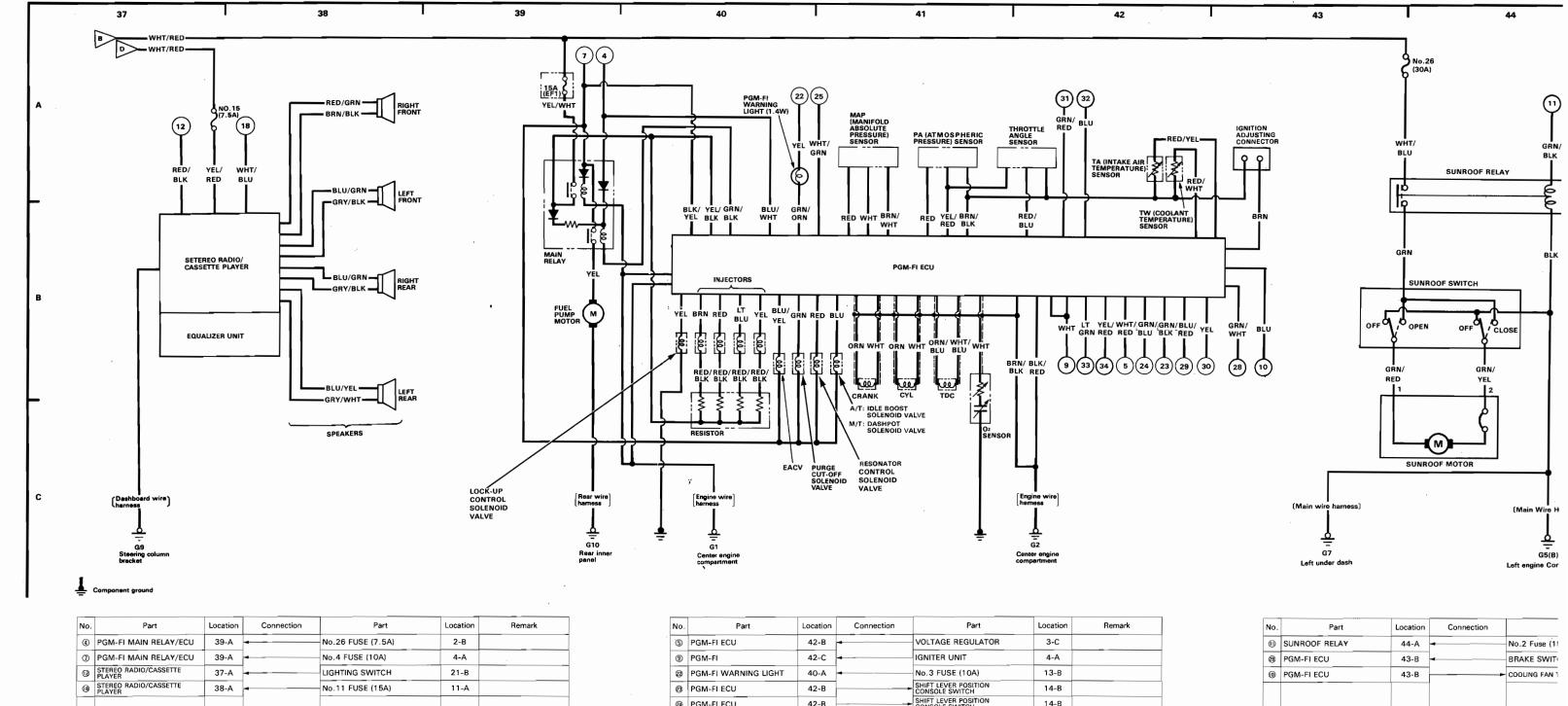
They have been given a number suffix to distinguish them (for example YEL/BLK¹ and YEL/BLK² are not the same).



## Diagram

inguish them (for example YEL/BLK1 and YEL/BLK2 are not the same).

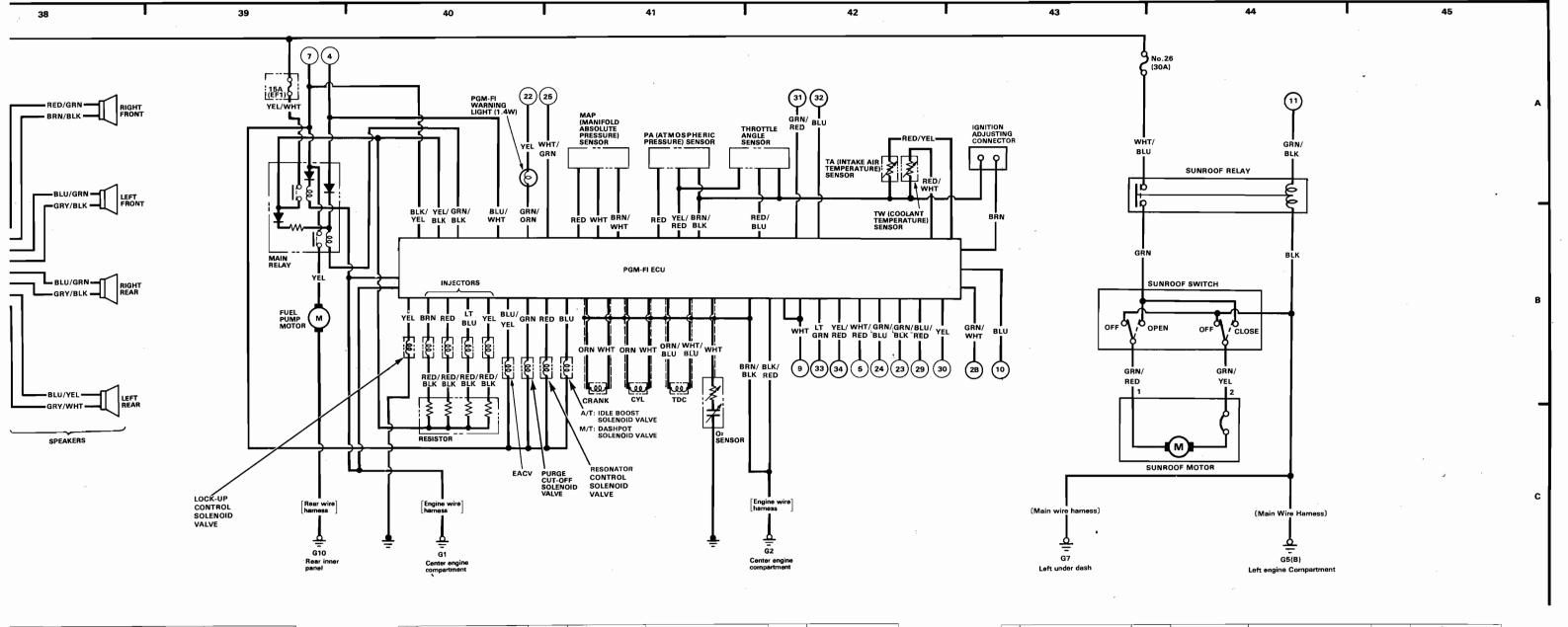




No.	Part	Location	Connection	Part	Location	Remark
4	PGM-FI MAIN RELAY/ECU	39-A		No.26 FUSE (7.5A)	2-B	
7	PGM-FI MAIN RELAY/ECU	39-A	ļ <b>.</b>	No.4 FUSE (10A)	4-A	
(Z)	STEREO RADIO/CASSETTE PLAYER	37-A	<b> </b>	LIGHTING SWITCH	21-B	
	STEREO RADIO/CASSETTE PLAYER	38-A	ļ <b>.</b>	No.11 FUSE (15A)	11-A	
				1	[	

No.	Part	Location	Connection	Part	Location	Remark
<u>(S</u>	PGM-FI ECU	42-B	4	VOLTAGE REGULATOR	3-C	
9	PGM-FI	42-C	<b>_</b>	IGNITER UNIT	4-A	
23	PGM-FI WARNING LIGHT	40-A		No.3 FUSE (10A)	13-B	
<b>(3)</b>	PGM-FI ECU	42-B	-	SHIFT LEVER POSITION CONSOLE SWITCH	14-B	
24	PGM-FI ECU	42-B		SHIFT LEVER POSITION CONSOLE SWITCH	14-B	
23	PGM-FI ECU	41-A	ļ <u>-</u>	HAZARD FUSE (10A)	15-A	
29	PGM-FI ECU	42-B	<del>-</del>	DIODE	34-A	
30	PGM-FI ECU	42-B		A/C CLUTCH RELAY	34-B	
34	PGM-FI ECU	42-B		SPEED PULSER	29-A	
33	PGM-FI ECU	42-B	<b></b>	SHIFT LEVER POSITION INDICATOR	14-B	
30	PGM-FI ECU	42-A	ļ .	ELD UNIT	1-A	
33	PGM-FI ECU	42-A		VOLTAGE REGULATOR	3-C	

No.	Part	Location	Connection	
0)	SUNROOF RELAY	44-A	-	No.2 Fuse (1!
8	PGM-FI ECU	43-B	<b>_</b>	BRAKE SWIT
(0)	PĢM-FI ECU	43-B	<b>-</b>	COOLING FAN 1
	_			

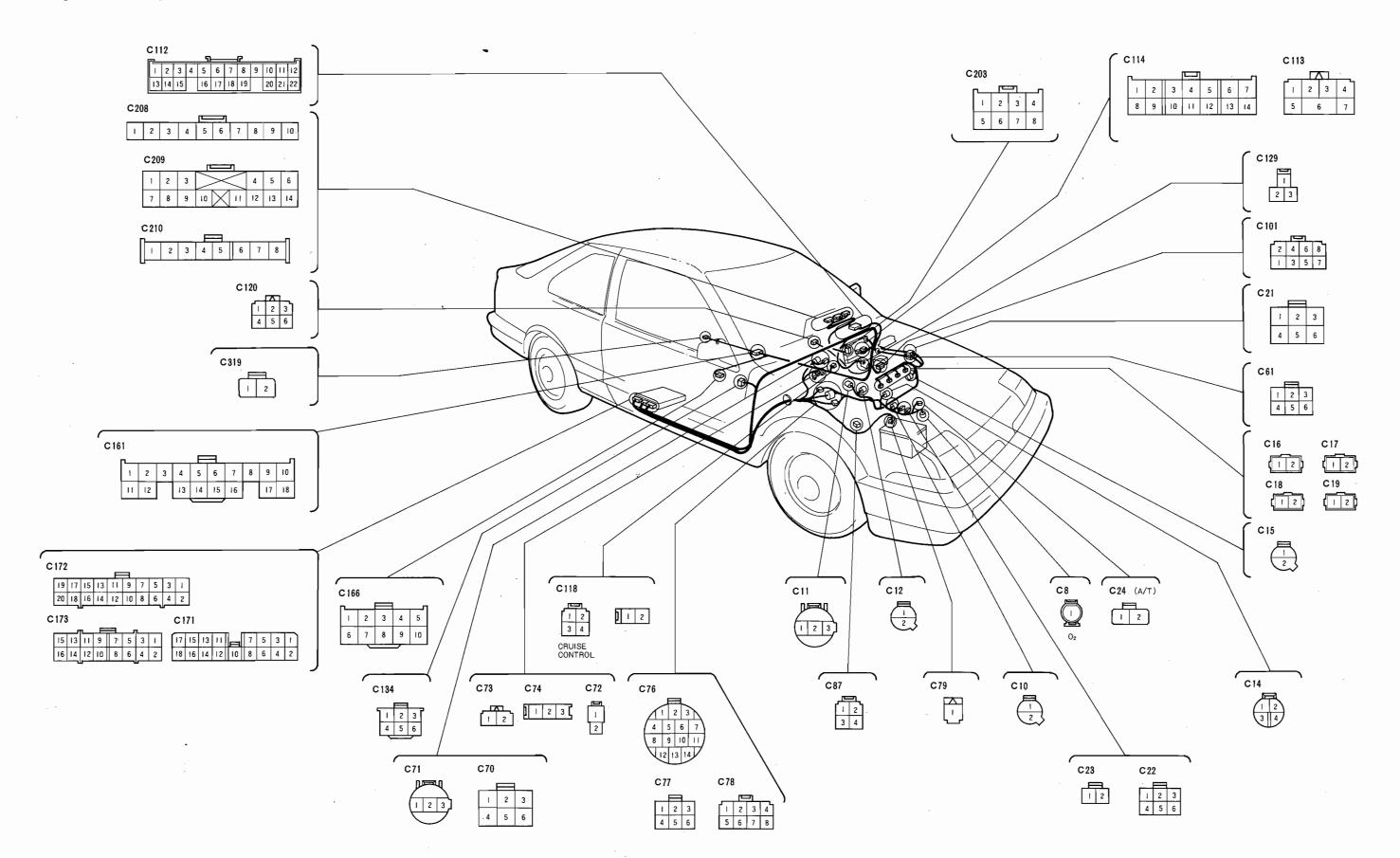


tion	Part	Location	Remark
	No.26 FUSE (7.5A)	2-B	
	No.4 FUSE (10A)	4-A	
	LIGHTING SWITCH	21-B	
	No.11 FUSE (15A)	11-A	

No.	Part	Location	Connection	Part	Location	Remark
(5)	PGM-FI ECU	42-B	•	VOLTAGE REGULATOR	3-C	
9	PGM-FI	42-C	<del> </del>	IGNITER UNIT	4-A	
23	PGM-FI WARNING LIGHT	40-A		No.3 FUSE (10A)	13-B	
<b>(3)</b>	PGM-FI ECU	42-B	<b>-</b>	SHIFT LEVER POSITION CONSOLE SWITCH	14-B	
29	PGM-FI ECU	42-B	<b>-</b>	SHIFT LEVER POSITION CONSOLE SWITCH	14-B	
23	PGM-FI ECU	41-A	ļ <u>.</u>	HAZARD FUSE (10A)	15-A	
<b>@</b>	PGM-FI ECU	42-B	<b>├</b> ── <del>-</del>	DIODE	34-A	
30	PGM-FI ECU	42-B	<b>.</b>	A/C CLUTCH RELAY	34-B	
34	PGM-FI ECU	42-B	•	SPEED PULSER	29-A	
33	PGM-FI ECU	42-B	<b>├</b>	SHIFT LEVER POSITION INDICATOR	14-B	
3)	PGM-FI ECU	42-A	ļ <u>.                                    </u>	ELD UNIT	· 1-A	
32	PGM-FI ECU	42-A	ļ <b>-</b>	VOLTAGE REGULATOR	3-C	

No.	Part	Location	Connection	Part .	Location	Remark
(1)	SUNROOF RELAY	44-A	4	No.2 Fuse (15A)	7-A	
28	PGM-FI ECU	43-B	<b> -</b>	BRAKE SWITCH	20-В	
(1)	PGM-FI ECU	43-B	<b></b>	COOLING FAN TERMO SWITCH	5-B	
	,					

# **Fuel-Injected System Connectors**



C8 ① WHT C10 1) RED/WH 2) GRN

C11
1 RED
2 RED/BLU
3 GRN

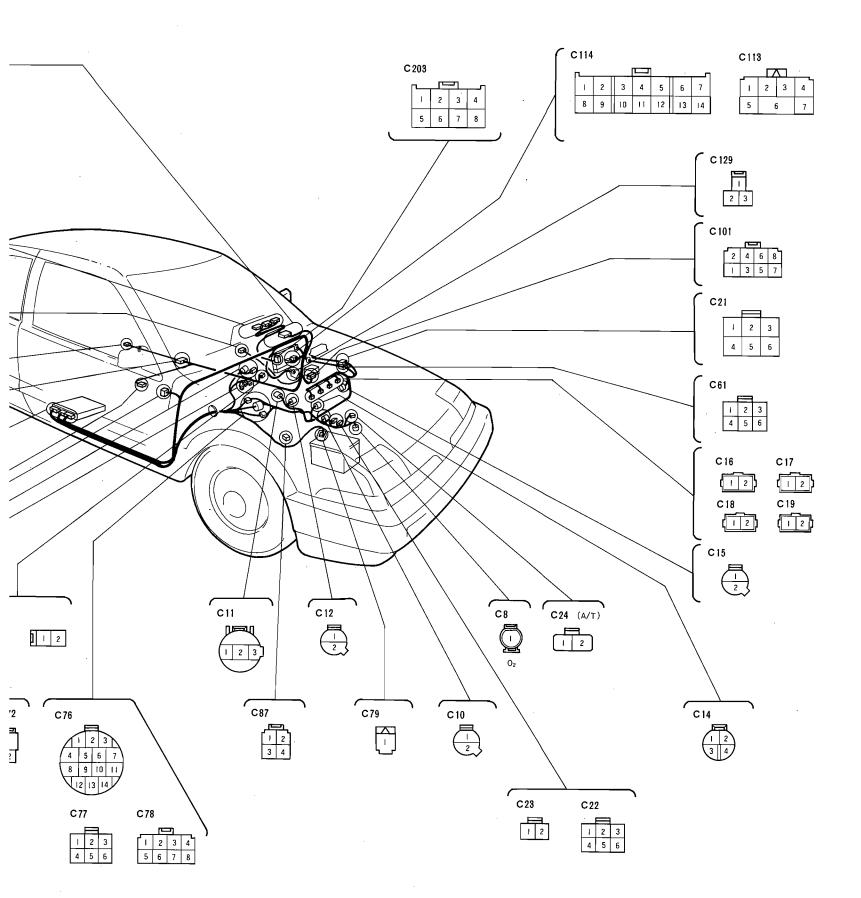
C12
1 BLU/YEL
2 BLK/YEL

C14
1 YEL
2 BLU
3 WHT/BL
4 BLK/YEL
C15
1 GRN
2 WHT/BL
C16
1 RED/BLI
2 RED
C17
1 RED/BLI
2 RED
C61
2 RED
3 BRN
4 YEL/BLK
6 GRN/RE
6 YEL
C70
1 GRN
2 BLU
3 RED
6 BLK/YEI
6 BLK/YEI

C76

1 BLK/REI
2 BRN/BL
3 WHT
4 RED/WI
5 RED/YE
6 BRN/BL
7 BLU

◯ : Re



C8	C18	C77	C87	C161		C209	
① WHT	1) RED/BLK	1 YEL	1 BLK/YEL	1 GRN/BLU	10 BRN/WHT	1 RED/BLK	(8) LT GRN
	2) LT BLU	(2) WHT	2 WHT	2 GRN/WHT	11 GRN/BLK	2	9 GRN/WHT
210	7 040	3 ORN	(3) BLU	3 LT GRN/BLK	12 BLU/YEL	3 —	10 GRN/RED
1 RED/WHT	C19	¬ [4]—	4 BLU/BLK	4 GRN/BLK	13 GRN/BLU	4 —	(1) GRN
2 GRN	1 RED/BLK	_   5 <u></u>	0101	5 WHT/BLU	14 GRN	5 BLK	12 GRN/BLK
C11	② YEL	( <u>6</u> wнт	C101 1 YEL/WHT	6 GRN/YEL	15 RED/BLK	6 YEL	13 GRN/BLU
1 RED	C21	. 070	2) BLK	7 YEL/WHT	16 GRN/BLK	7 RED	14 GRN/YEL
2 RED/BLU	1 RED/BLK	C78	3 YEL/BLK	8 —	17 GRN/RED	C210	C319
3 GRN	2 RED/BLK	2 BLK/WHT	4 BLU/WHT	9 YEL	18 RED/YEL	1 YEL/GRN	(1) BLK
C12	3 YEL/BLK	3 WHT/BLU	(5) BLK/YEL	C166		2 YEL/WHT	2 YEL
1) BLU/YEL	RED/BLK	4 BLK/YEL	6 —	(1) GRN/BLK	(6) GRN	3 RED/BLU	
2) BLK/YEL	6 RED/BLK	5 8LU	7 YEL	2 GRN/BLU	7 GRN/RED	4 GRN/ORN	-
Z/ BER/TEE	<b>┛</b> [6[—	6 YEL/GRN	8 GRN/BLK	3 GRN/YEL	8 GRN/BLK	(5) YEL	
C14	¬ C22	7 YEL/RED	- O O O O O O O O O O O O O O O O O O O	4 BLK	7 YEL	6 BLU/YEL	_
1 YEL	1 ORN/BLU	8) BLK	C113	(5) GRN/WHT	10 PNK	7 GRN/BLK	-
2 BLU	2 WHT/BLU		1 RED/WHT		IOFIAK	8 —	
3 WHT/BLU	3 wht	<u>C79</u>	2 RED/BLU	C171		_ 🖳	
4 BLK/YEL	4 ORN	- 1 WHT/GRN	3 BLK/YEL	1 BRN	10 RED		
C15	5 WHT		4 BLK/YEL	2 BLK'	① GRN/RED	$\dashv$	
1 GRN	6 —		6 BLK/YEL	3 RED	12 GRN/BLK <sup>2</sup>	_	•
2 WHT/BLK			⑥ wнт	4 BLK <sup>2</sup>	13 YEL/BLK <sup>2</sup>		
<u> </u>	<u> c23</u>	_	7 WHT/RED	€ LT BLU	(14) GRN/BLK		
C16	1 ORN	C112		6 GRN	15 YEL/BLK		
1 RED/BLK	② WHT	1 BRN/BLK	(12) GRN	7 YEL'	16 BRN/BLK		
2 BRN	_	2 GRN/WHT	13 RED	→ 8 YEL <sup>7</sup>	17 BLK/YEL		
C17	1 —	3 BRN/WHT	14 YEL/RED	<b>-</b> [9]	18 BLK/RED		
1 RED/BLK	2 YEL	4 RED/YEL	15 BLU/YEL	C172			
2 RED		(5) GRN/ORN	16 YEL/WHT	1 WHT/GRN	(11) GRN/BLK		
		6 BLU/GRN	17 BLU/BLK	② BLU¹	(12) WHT		
C61	C71	7 YEL/BLK	18 YEL/RED	3 YEL	(13) BLU/WHT		
1 LT BLU	① WHT	8	19 GRN/BLK	4 BLU <sup>2</sup>	(14) WHT/RED		
2 RED	2 BRN/WHT	9 GRN/BLU	20 GRN/WHT	(5) BLU <sup>2</sup>	(15) WHT <sup>2</sup>	_	
3 BRN	3 RED	10 RED	21) LT GRN	6 GRN/ORN	16 YEL/RED	_	
4 YEL/BLK	C72	11 GRN/YEL	22 GRN/BLK	7 LT GRN	(17) WHT'		
5 GRN/RED	1) BRN/BLK	¬ <del>' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '</del>		8 BLU/RED	<u> </u>		
6 YEL	2 BRN	<u>C114 ·                                     </u>		9 GRN/BLU	19 GRN/RED	-	
C70		1 RED/YEL	8 YEL	10 ORN	20 BRN		
1) GRN	C73	2 RED/WHT	9 BLK/YEL				
2 BLU	1 YEL/WHT	3	10 —	C173		_	
3 RED	2 BLK/RED	4 RED/ORN	① WHT/GRN	1 ORN	9 RED:		
4 BLK	C74	5 RED/BLU	12 RED/YEL	② WHT'	10 GRN/WHT		
5 BLK/YEL	1) BLK	6 RED/BLK	13 BLK/YEL	3 ORN/BLU	1) WHT	$\dashv$	
6 BLK/YEL	2 GRN/RED	7 WHT/BLU	14 RED/GRN	4 WHT/BLU	12 BRN/BLK	-	
-	3 BLK/YEL	C118		5 RED/YEL	13 YEL/RED	$\dashv$	
276	1.56.1	1 WHT/GRN	1 WHT/GRN	6 RED/WHT	14 BRN/WHT	$\dashv$	
1) BLK/RED	(8) ORN/BLU	2 LT GRN	2 GRN/WHT	7 RED/BLU	15 RED <sup>2</sup>	$\dashv$	
2 BRN/BLK	9 WHT/RED	3 GRN	C120	┚⑱—	16 wнт∙		
3) WHT	10 YEL/RED	4 GRN/WHT	C129	C203	C208		
4) RED/WHT	(1) RED/BLU		1 RED 2 BRN/BLK	1 RED/BLU	1 —		
5) RED/YEL	(12) WHT'	C120		2 WHT/BLU	2		
6) BRN/BLK	(13) ORN		3 YEL/RED	3 YEL/RED	3 BLU/WHT		
7) BLU'	(14) WHT/BLU	2 BLK/WHT	C134	4 —	4 —		
<u> </u>	10311/550	3 BLK/YEL	1 BLK/YEL	5 RED/BLK	5 YEL/RED		
		4 WHT/RED	2 YEL	6 BLK/YEL	6 BRN/BLK		
		5 WHT/BLK	3 BLU/RED	7 YEL	(7) BLK		
		6 WHT/BLK	4 BLK/RED	8 BLK	8 YEL		
			5 WHT	7	9 RED/BLK		

NOTE: Several different wires have the same color.

They have been given a number suffix to distinguish them (for example YEL/BLK¹ and YEL/BLK² are not the same).

: Related to PGM-FI SYSTEM