INTRODUCTION

How To Use This Manual

This supplement contains information for the 1985 PRELUDE 2DR COUPE.
Refer to the base Shop Manual (No. 62SB000) for service procedures and data not included in this supplement. 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. 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.

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* workshops procedures, safety principles and service operations are not included. Please note that this manual does contain warnings and cautions against some specific service methods which could cause PERSONAL INJURY, or could damage a vehicle or make it unsafe. Please understand that these warnings cannot cover all conceivable ways in which service, whether or not recommended by Honda motor might be done, or of the possible hazardous consequences of each conceivable way, nor could Honda motor inverstigate all such ways. Anyone using service procedures or tools, whether or not recommended by Honda motor, *must satisfy himself thoroughly* that neither personal safety nor vehicle safety will be jeopardized.

First Edition, 10/85
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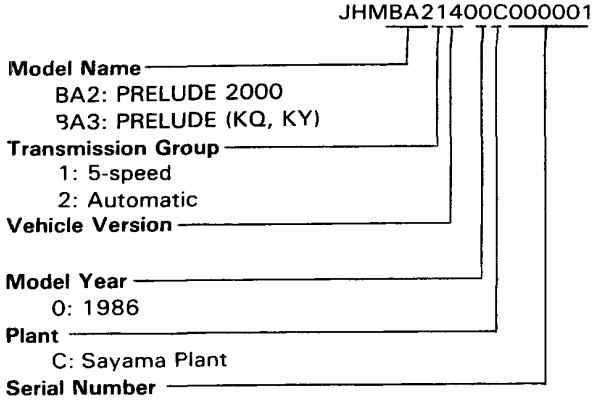
HONDA MOTOR CO., LTD.
Service Publication Office

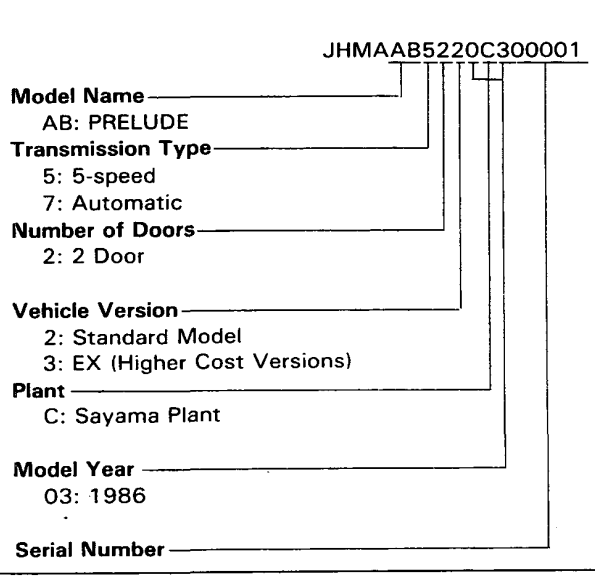
General Information

Chassis and Engine Codes

Vehicle Identification Number (2000)

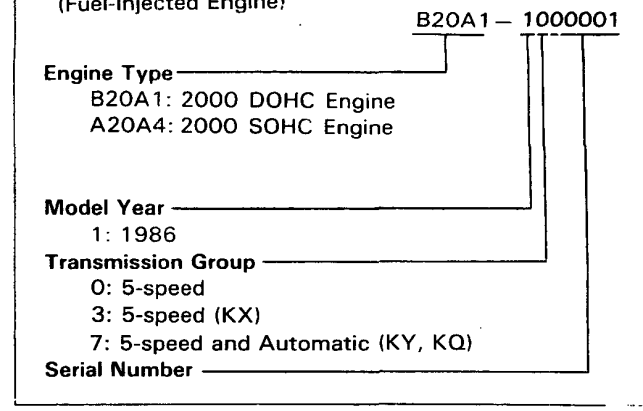


Vehicle Identification Number (1800)



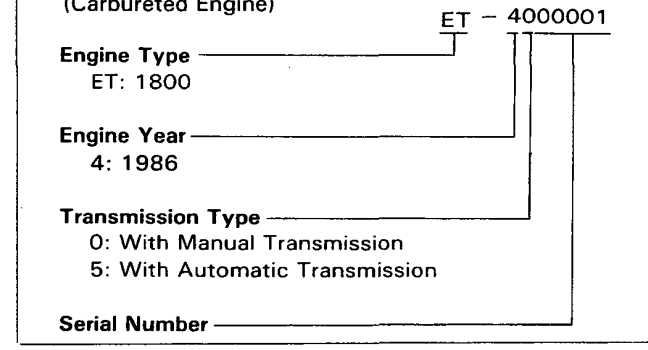
Engine Serial Number

(Fuel-Injected Engine)



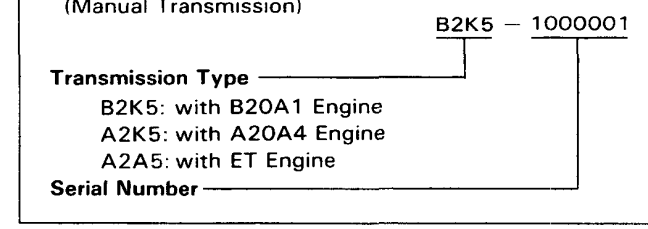
Engine Serial Number

(Carbureted Engine)



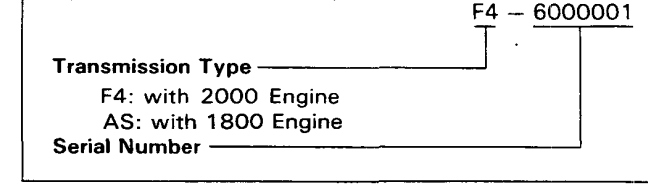
Transmission Number

(Manual Transmission)



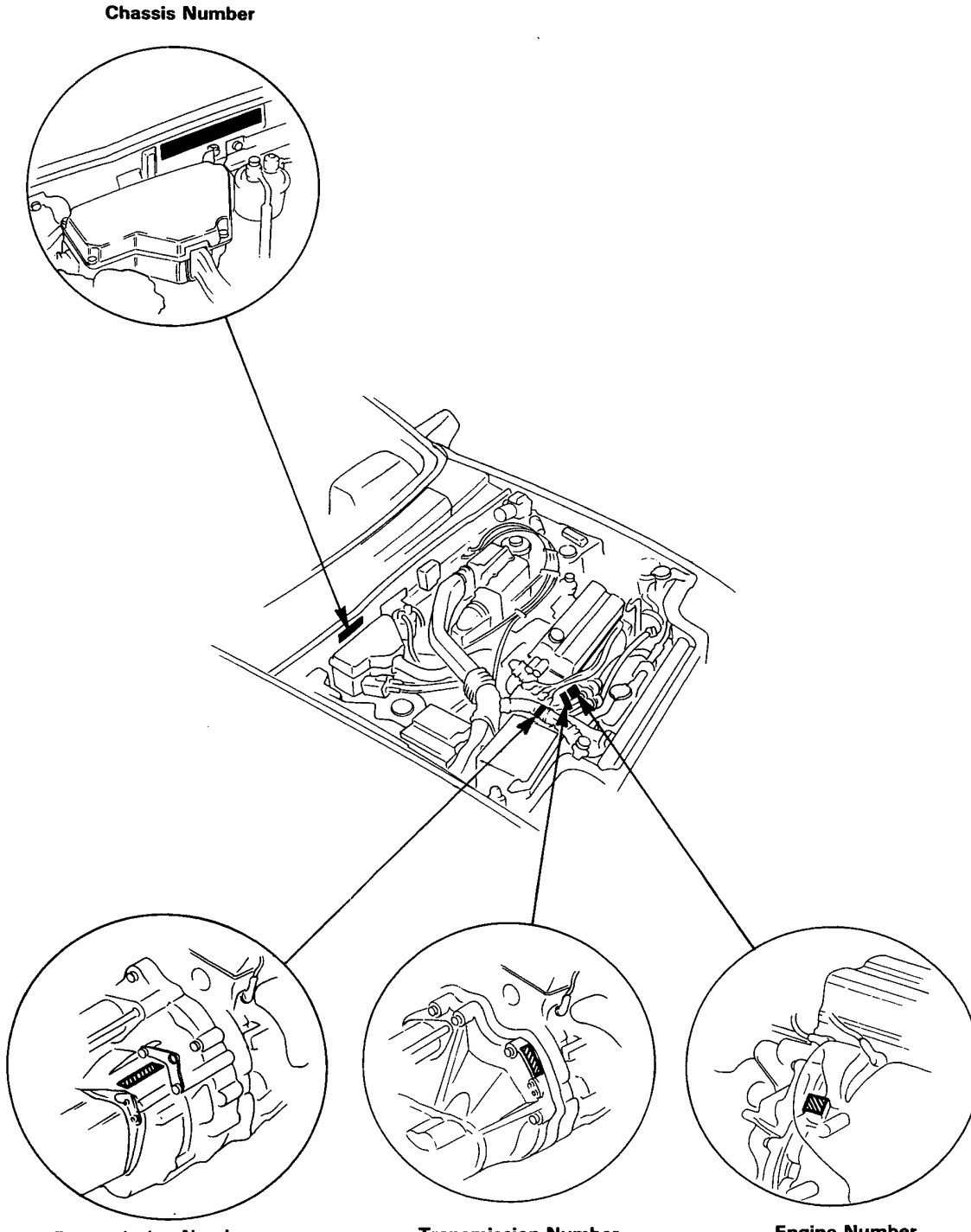
Transmission Number

(Automatic Transmission)



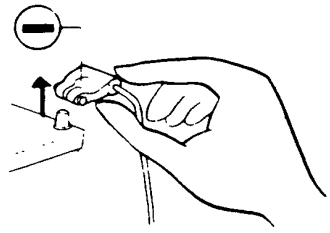
Identification Number Locations

A20A4 Engine Shown; Other Engine Similar

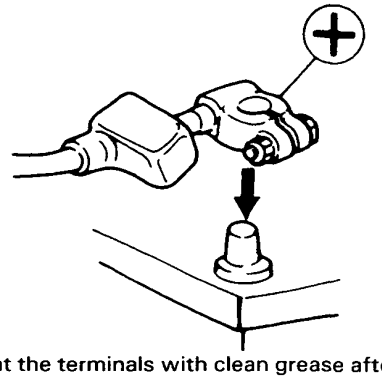


Electrical

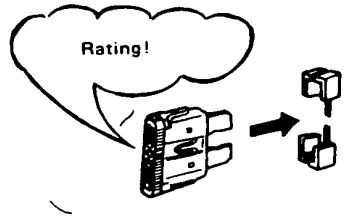
- Before making any repairs on electric wires or parts, disconnect the battery cables from the battery staring with the negative (−) terminal.



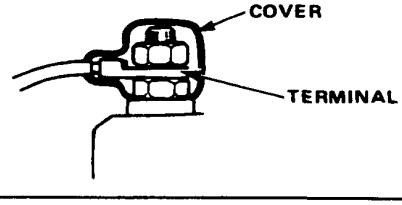
- After making repairs, check each wire or part for proper routing and installation. Also check to see that they are connected properly.
- Always connect the battery positive (+) cable first, then connect the negative (−) cable.



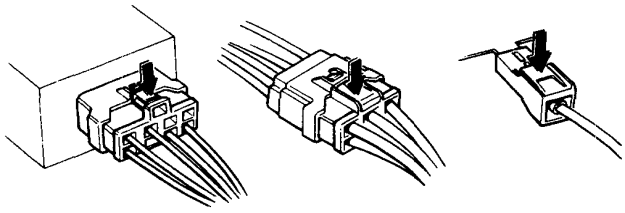
- Coat the terminals with clean grease after connecting the battery cables.
- Don't forget to install the terminal cover over the positive battery terminal after connecting.
- Before installing a new fuse, isolate the cause and take corrective measures, particularly when frequent fuse failure occurs.

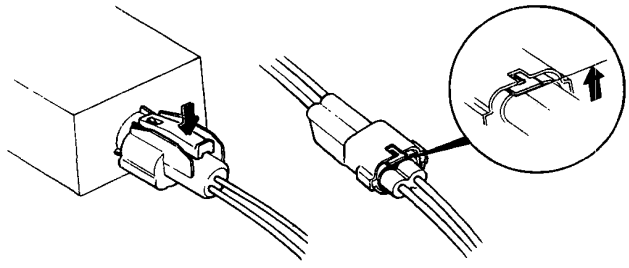


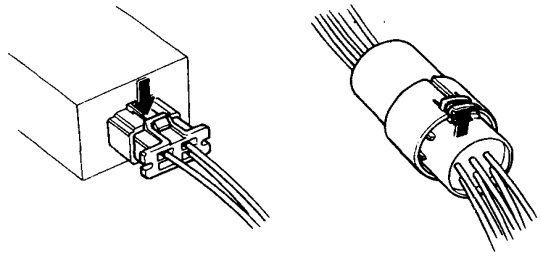
- Be sure to install the terminal cover over the connections after a wire or wire harness has been connected.



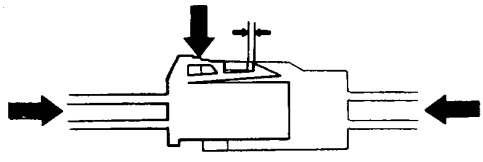
- When removing locking couplers, be sure to disconnect the lock before performing work.
- Couplers may be of two types, those in which the lock is pressed to remove, and those in which the lock is pulled up to remove. Be sure to ascertain the type of locking device before beginning work. The following is a depiction of the means of disconnecting various typical couplers.





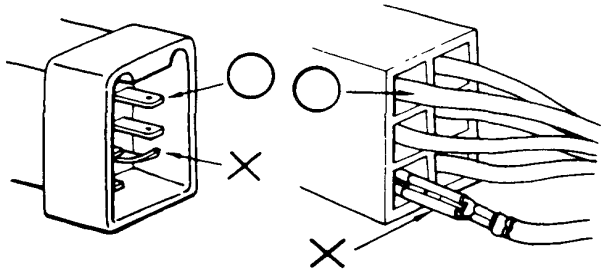


- When disconnecting locks, first press in the Coupler Tightly (to provide clearance to the locking device), then operate the tab fully and remove the coupler in the designated manner.

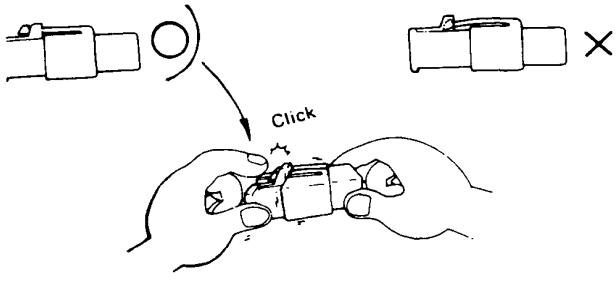


- When disconnecting a coupler, pull it off from the mating coupler by holding on both couplers.
- Never try to disconnect couplers by pulling on their wires.

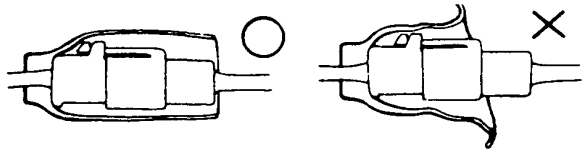
- Before connecting couplers, check to see that the terminals are in place and are not bent or distorted.



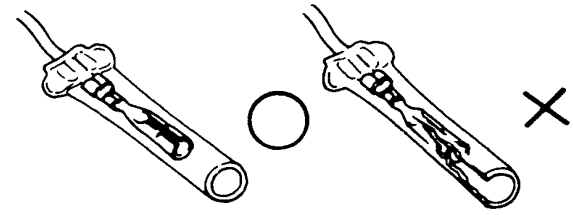
- Insert couplers fully until they will no longer go.
- Some couplers have locking tabs that must be aligned and engaged securely.
- Don't use wire harnesses with a loose wire or coupler.



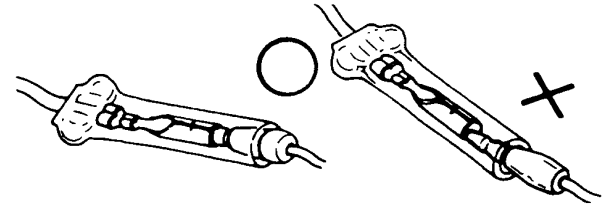
- Place the plastic cover over the mating coupler after reconnecting. Also check that the end is not inverted.



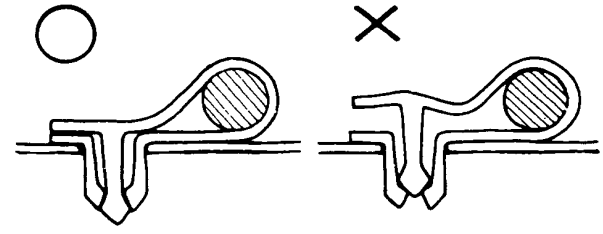
- Before connecting, check each connector cover for breakage. Also make sure that the female connector is tihgt and not pried open from the previous use.



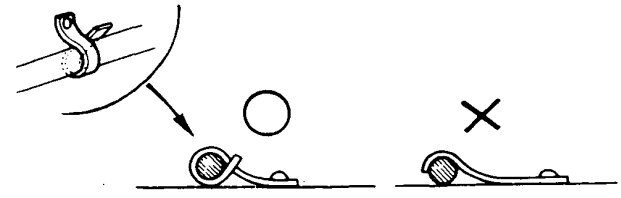
- Insert male connectors into the female connectors fully until they will no longer go.
- Be sure that plastic cover is placed over the connection.
- Don't place the opening of each plastic cover facing up.



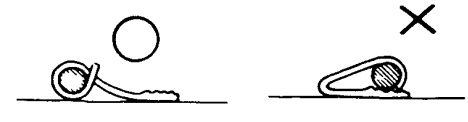
- Secure wires and wire harnesses to the frame with their respective wire bands at the designated locations. Tighten the bands so that only the insulated surfaces contact the wires or wire harnesses.



- A loose wire harness or cable can be a hazard to safety. After clamping, check each wire for security in its clamp.



- Do not squeeze wires against the weld or nugget of its clamp when a weld-on clamp is used.



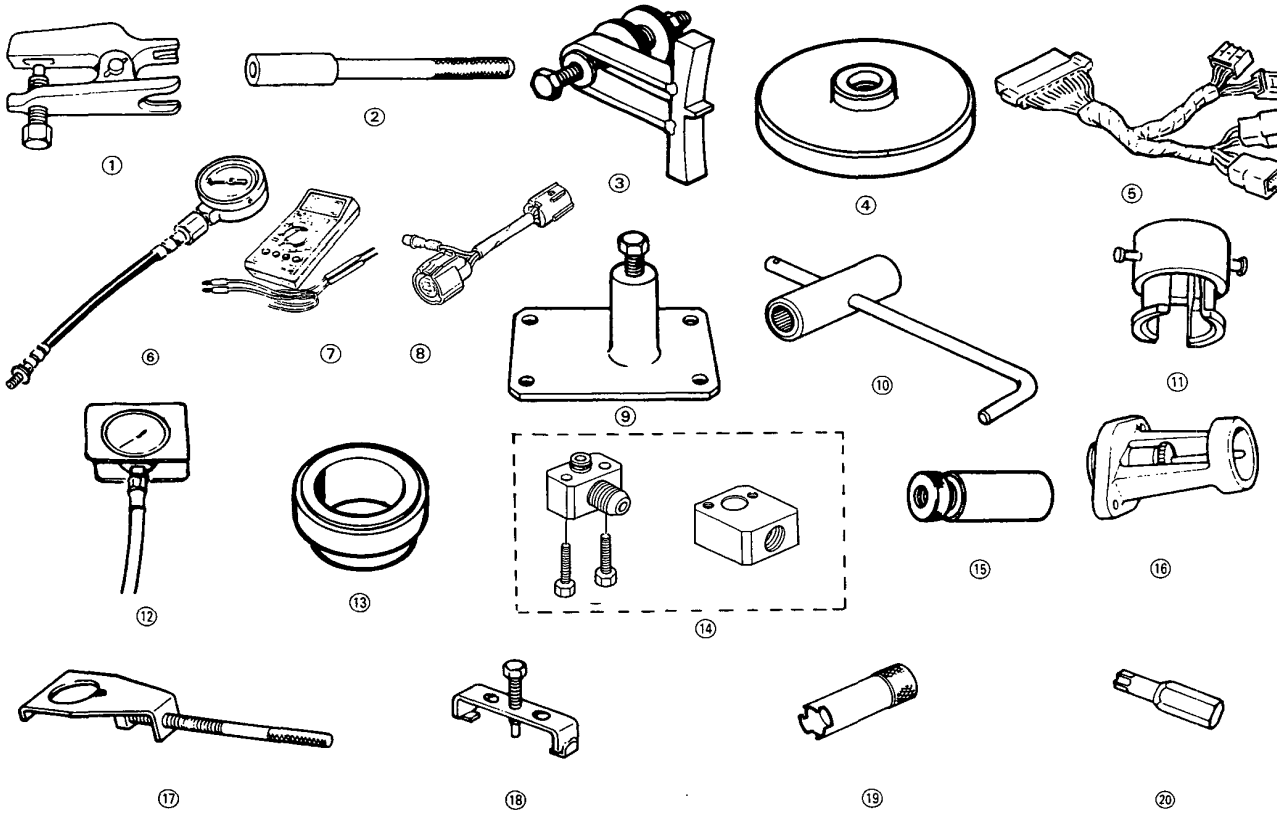
Special Tools

Special Tools

Special Tools (ET Engine and A20A4 Engine)

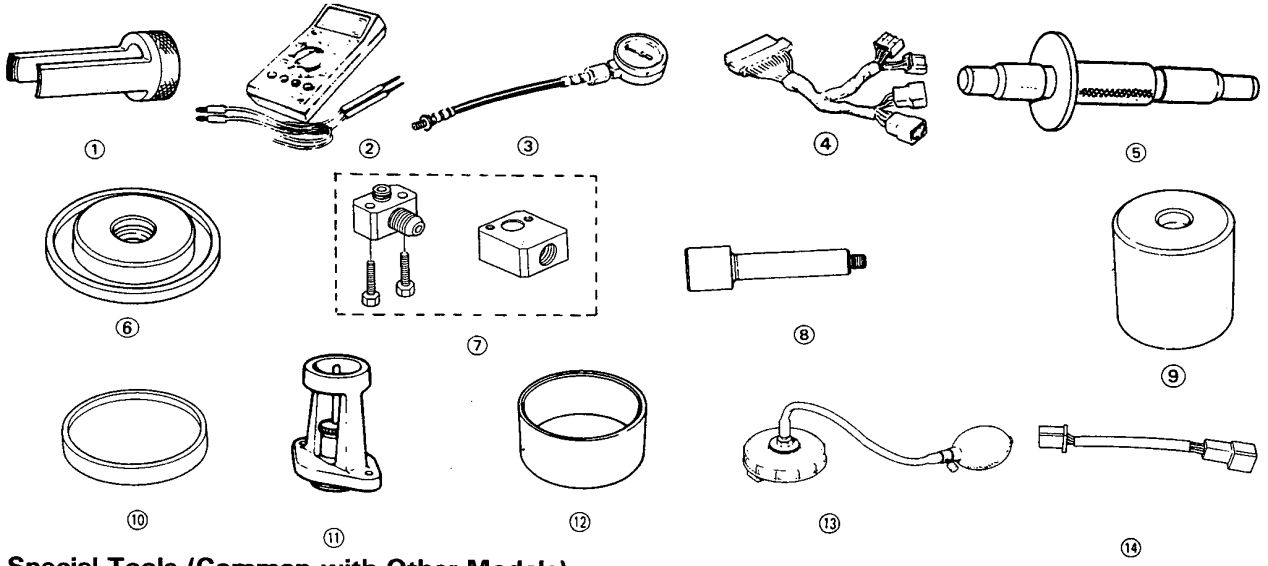
Ref. No.	Tool Number	Description	Q'ty	Remarks	Section
①	07941—6920002	Ball Joint Remover	1		5,17, 18 and 19
②	07743—0020000	Valve Guide Remover	1		6
③	07924—PD20001	Ring Gear Holder	1		7 and 13
④	07948—SB00101	Driver Attachment	1	Crankshaft Oil Seal (Cluch side)	7
⑤	07999—PD60000	System Checker Harness	1	A20A4 Engine Only	11
⑥	07406—0040000	Fuel Pressure Gauge Set	1	A20A4 Engine Only	11
⑦	07411—0020000	Digital Circuit Tester	1	A20A4 Engine Only	11
*⑧	07GAZ—SE00300	Tachometer Adapter	1		11
*⑨	07GAC—PF40100	Housing Puller	1		14 and 15
*⑩	07GAB—PF50100	Mainshaft Holder, Automatic	1		15
*⑪	07GAC—PF40210	Bearing Remover Attachment	1		15
⑫	07406—0070000	Low Pressure Gauge	1		15
⑬	07746—0030400	Attachment 35 mm	1		16
*⑭	07GAK—SE00100	Joint Adapter Kit	1		19
⑮	07975—6920002	P.S. Column Setting Guide	1		19
*⑯	07GAG—SE00100	Rod Bolt Adjustment Gauge	1		21
⑰	07923—PB80001	Pulley Holder	1		24
⑱	07934—PB80001	Clutch Remover	1		24
⑲	07934—SB20000	Shaft Seal Remover	1		24
⑳	07703—0010200	Torx Driver Bit (T-30)	1		24

* Newly Provided Tools



Newly Provided Tools (B20A1 Engine)

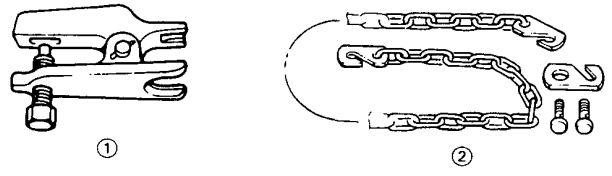
Ref. No.	Tool Number	Description	Q'ty	Remarks	Section
①	07757—PJ10100	Valve Spring Compressor Attachment	1		6
②	07411—0020000	Digital Circuit Tester	1		11
③	07406—0040000	Fuel Pressure Gauge Set	1		11
④	07999—PD6000A	System Checker Harness	1		11
⑤	07GAG—PF50100	Clutch Disc Alignment Tool	1		13
⑥	07GAD—SE00100	Oil Seal Driver Attanchment	1		17
⑦	07GAK—SE00100	Joint Adaptor Kit	1		19
⑧	07GAF—SE00100	Hub Assembly Pin	1		20
⑨	07GAF—SE00200	Hub Assembly Driver Attachment	1		20
⑩	07GAF—SE00400	Front Hub Driver Base	1		20
⑪	07GAF—SE00100	Brake Booster Adjusting Gauge	1		21
⑫	07GAF—SE00300	Pulser Driver Attachment	1		21
⑬	07GAZ—SE00100	A.L.B. Hand Pump Assembly	1		21
⑭	07GAZ—SE00200	A.L.B. Checker Harness Adaptor	1		21



Special Tools (Common with Other Models)

5. Engine Removal/Installation

Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07941—6920002	Ball Joint Remover	1	
②	07966—6340011	Engine Block Hanger	1	



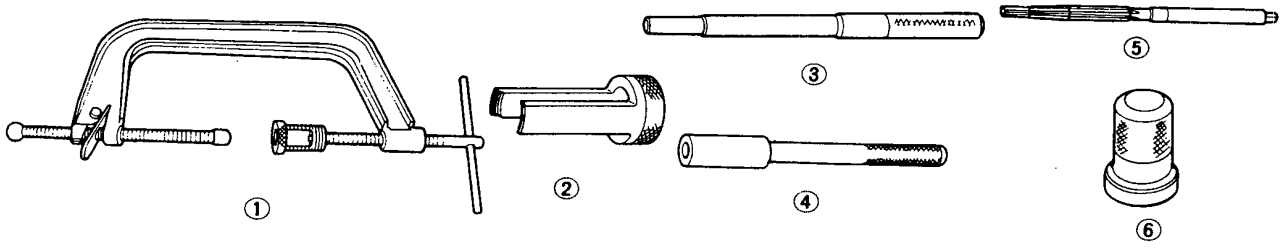
(cont'd)

Special Tools (Common with Other Models)

6. Cylinder head/Valve Train

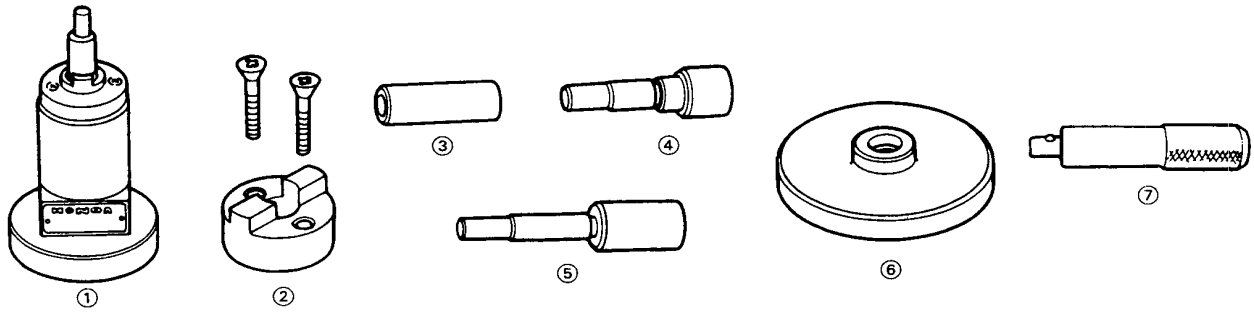
Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07757—0010000	Valve Spring Compressor	1	07957—3290001 may also be used
*②	07757—PJ10100	Valve Spring Compressor Attachment	1	Use changed to 07757—0010000 attachement
③	07942—SA50000	Valve Guide Driver	1	
④	07943—0020000	Valve Guide Remover	1	
⑤	07984—6110000	Valve Guide Reamer	1	07934—6570000 may also be used
⑥	07947—SB00100	Oil Seal Driver	1	Camshaft

* Newly Provided Tools



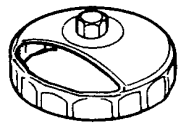
7.Engine Block

Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07973—6570002	Piston Pin Insert Base Set	1	
②	07973—SB00100	Piston Pilot	1	
③	07973—SB00200	Piston Pin Insert Attachment A	1	Not included in base set. Use each with the base set.
④	07973—PE00301	Piston Pin Pilot Collar	1	
⑤	07973—SB00400	Piston Pin Insert Attachment B	1	
⑥	07948—SB00101	Driver Attachment	1	Crankshaft Oil Seal (Clutch side)
⑦	07749—0010000	Driver	1	07949—6110000 may also be used



8. Engine Lubrication

Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07912—6110001	Oil Filter Socket Wrench	1	
②	07406—0030000	Oil Pressure Gauge Adaptor	1	
③	07746—0010400	Driver Attanchment 52 x 55 mm	1	
④	07749—0010000	Driver	1	07949—6110000 may also be used



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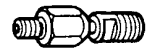

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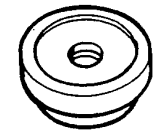

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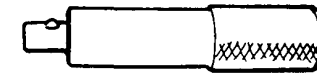
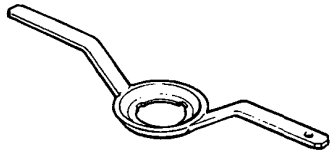


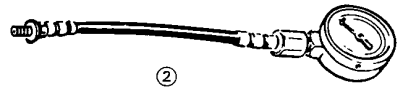
④

11. Fuel

Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07920—SA50000	Fuel Sender Wrench	1	
②	07406—0040000	Fuel Pressure Gauge Set	1	
②-1	07406—0040100	Pressure Gauge	(1)	Component Tools
②-2	07406—0040200	Hose Assy	(1)	
*③	07999—PD6000A	System Checker Harness	1	
*④	07411—0020000	Digital Circuit Tester	1	

* Newly Provided Tools





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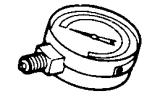

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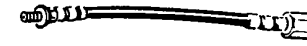

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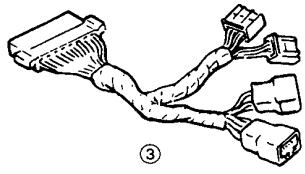

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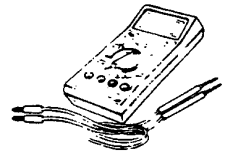
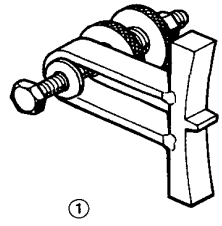


④

13. Clutch

Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07924—PD20001	Ring Gear Holder	1	
*②	07GAG—PF50100	Clutch Disc Alignment Tool	1	

* Newly Provided Tools



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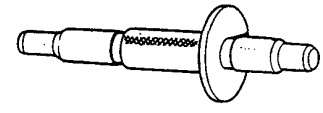

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Special Tools (Common with Other Models)

14. Manual Transmission

Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07744—0010200	3 mm Pin Punch	1	
②	07744—0010400	5 mm Pin Punch	1	07944—6110100 may also be used
③	07936—6340001	Bearing Remover Set	1	
④	07936—6890101	Bearing Remover Attachment	1	Use changed to 07936—6340000 attachment
⑤	07746—0010400	Driver Attachment 52 x 55 mm	1	07949—6340200 may also be used
⑥	07749—0010000	Driver	1	07949—6110000 may also be used
⑦	07746—0010200	Driver Attachment 37 x 40 mm	1	
⑧	07746—0010500	Driver Attachment 62 x 68 mm	1	
⑨	07998—SD90200	Crealance Scale 0.3 mm	1	
⑩	07998—SD90300	Crealance Scale 0.49 mm	1	

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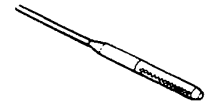

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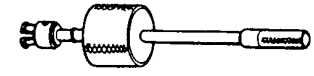

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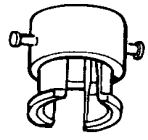

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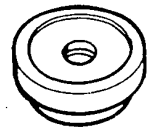

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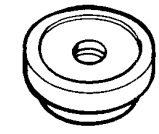

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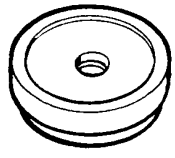

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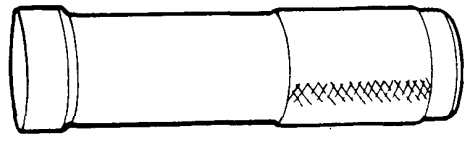
16. Differential

Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07746—0030100	Driver C	1	
②	07944—SA00000	4 mm Pin Punch	1	
③	07947—6110500	Oil Seal Driver	1	
④	07749—0010000	Driver	1	07949—6110000 may also be used
⑤	07947—6340500	Driver Attachment E	1	



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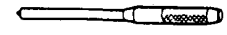

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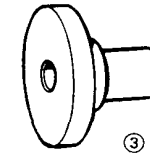

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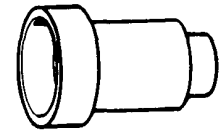

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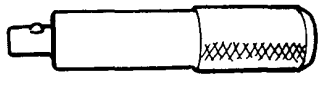
17. Driveshaft

Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07749—0010000	Driver	1	07949—6110000 may also be used
②	07946—0040900	Driver Pilot 40 mm	1	
③	07965—SD90100	Support Base	1	
④	07746—0010400	Driver Attachment 52 x 55 mm	1	
⑤	07746—0010500	Driver Attachment 62 x 68 mm	1	
*⑥	07GAD—SE00100	Oil Seal Driver Attachment	1	
⑦	07965—SD90200	Support Collar	1	
⑧	07947—SD90200	Oil Seal Driver Attachment	1	



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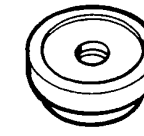

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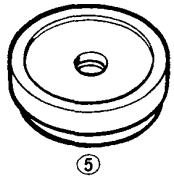

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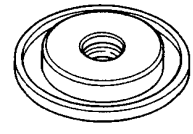

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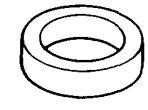

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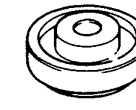

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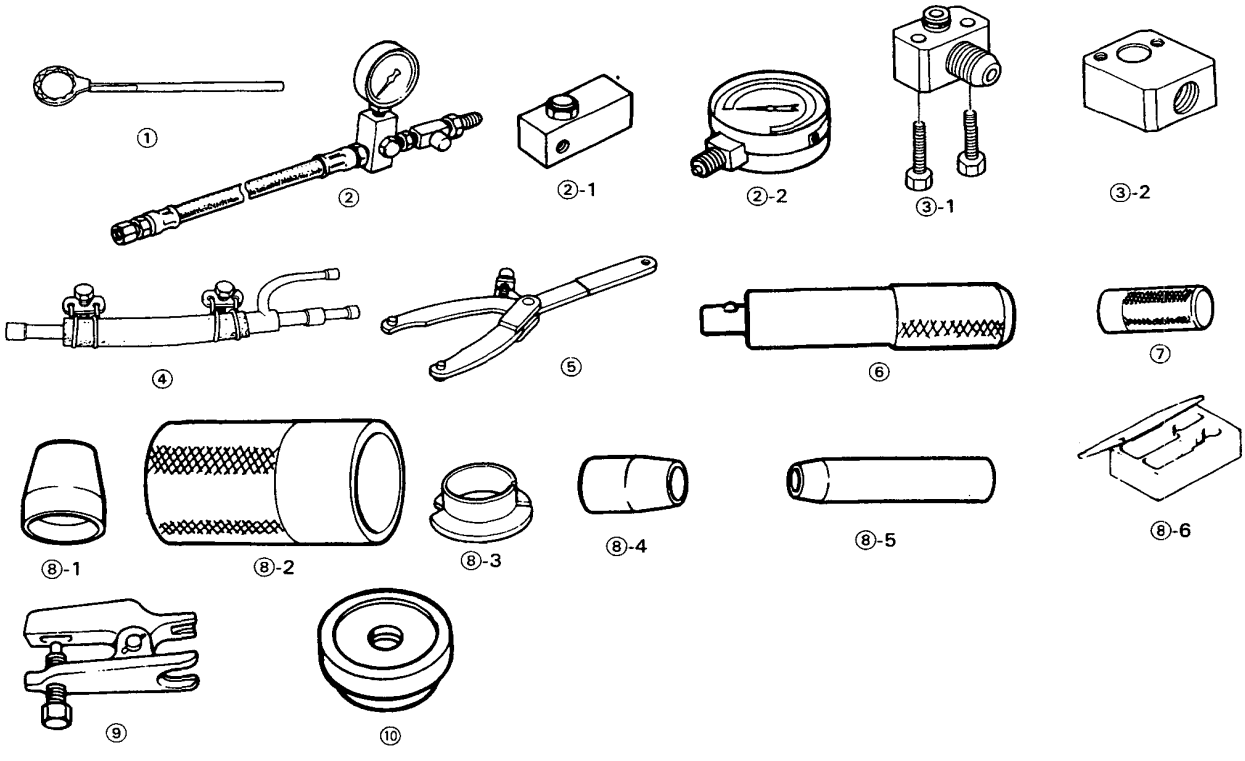
Special Tools (Common with Other Models)

19. Power Steering

Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07916—SA50001	Steering Gearbox Locknut Wrench	1	
②	07406—0010200	PS. Pressure Gauge Assy.	1	
②-1	07406—0010300	Oil Pressure Control Valve	(1)	Component tools
②-2	07406—0010400	PS.Pressure Meter	(1)	
*③	07GAK—SE00100	Joint Adaptor Kit	1	
*③-1	07GAK—SE00110	Pump Joint Adaptor	(1)	Component tools
*③-2	07GAK—SE00120	Hose Joint Adaptor	(1)	
④	07406—0010101	Bypass Tube Joint	1	
⑤	07205—0010100	Universal Holder	1	07725—0030000 may also be used
⑥	07749—0010000	Driver	1	07949—6110000 may also be used
⑦	07953—7190000	Collar Driver	1	
⑧	07900—SA50000	Power Steering Tool Kit	1	PS. Gearbox Overhaul Kit
⑧-1	07974—SA50100	Piston Seal-Ring Guide	(1)	Component tools
⑧-2	07974—SA50200	Piston Seal-Ring Sizing Tool	(1)	
⑧-3	07974—SA50300	Cylinder End Packing Slider	(1)	
⑧-4	07974—SA50400	End Seal Guide	(1)	
⑧-5	07974—SA50600	Dust Seal Guide	(1)	
⑧-6	07974—SA50900	PS. Tools Kit Case	(1)	
⑨	07941—6920002	Ball Joint Remover	1	
⑩	07746—0010300	Driver Attachment 42 x 47 mm	1	

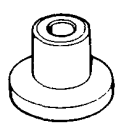
* Newly Provided Tools



20. Suspension

Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07410—0010200	Front Wheel Alignment Attachment B	1	
②	07941—6920002	Ball Joint Remover	1	
③	07965—6340301	Front Hub Dis/Assembly Tool Base A	2	
*④	07GAF—SE00100	Hub Assembly Pin	1	
⑤	07965—6920200	Front Hub Dis/Assembly Tool B	1	
*⑥	07GAF—SE00400	Front Hub Driver Base	1	
⑦	07746—0010400	Driver Attachment 52 x 55 mm	1	
*⑧	07GAF—SE00200	Hub Assembly Driver Attachment	1	
⑨	07746—0010600	Driver Attachment 72 x 75 mm	1	
⑩	07749—0010000	Driver	1	07949—6110000 may also be used
⑪	07965—SB00000	Front Hub Dis/Assembly Tool Kit	1	
⑪-1	07965—SB00100	Front Hub Dis/Assembly Tool A	(1)	
⑪-2	07965—SB00200	Front Hub Dis/Assembly Tool B	(1)	
⑪-3	07965—SB00300	Front Hub Dis/Assembly Tool C	(1)	
⑫	07974—SA50700	Clip Guide A	1	
⑬	07959—SA50000	Absorber Spring Compressor	1	
⑭	07946—6920100	Driver Attachment	1	

* Newly Provided Tools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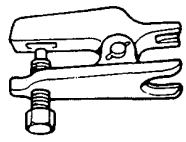
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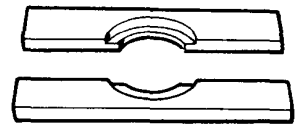
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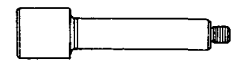
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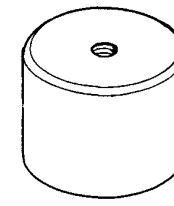
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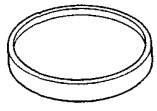
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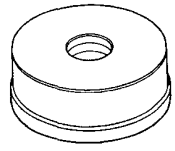
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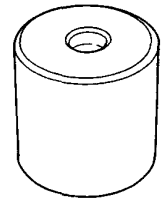
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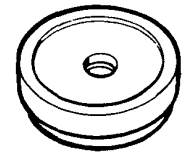
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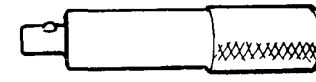
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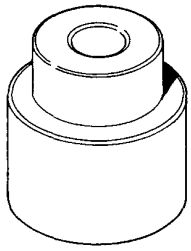
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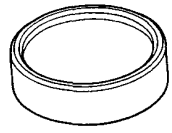
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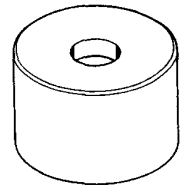
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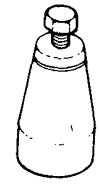
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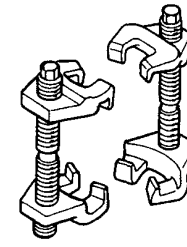
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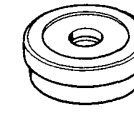
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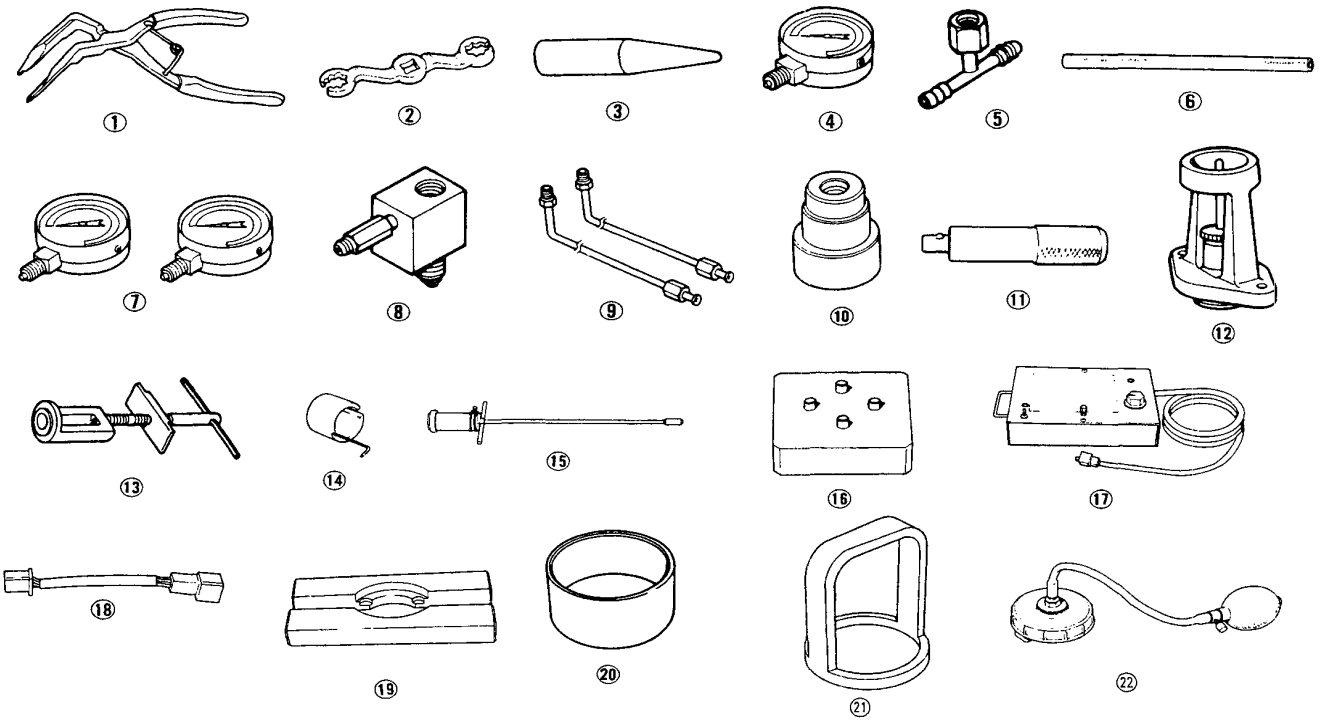
Special Tools (Common with Other Models)

21. Brake

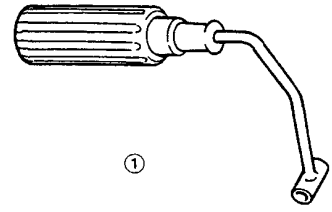
Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07914—SA50001	Snap Ring Pliers	1	Rear Caliper
②	07921—0010100	Flare Nut Wrench	1	
③	07965—5790300	Cup Guide	1	
④	07404—5790300	Vacuum Gauge	1	
⑤	07410—5790500	Tube Joint Attachment I	1	
⑥	07510—6340300	Vacuum Joint Tube A	1	Short parts of the brake power kit 07504—6340100
⑦	07406—5790200	Oil Pressure Gauge	2	
⑧	07410—5790100	Pressure Gauge Attachment C	1	
⑨	07510—6340100	Pressure Gauge Attachment	2	
⑩	07947—6890300	Driver Attachment C	1	
⑪	07749—0010000	Driver	1	07949—6110000 may also be used
*⑫	07GAG—SE00100	Brake Booster Adjusting Gauge	1	
⑬	07960—SA50002	Brake Spring Compressor	1	
⑭	07973—SA50000	Rear Caliper Guide	1	
⑮	07907—SB00000	A.L.B. T-Wrench	1	
⑯	07929—SB00000	Modulator Holder	1	
⑰	07508—SB00000	A.L.B. Checker	1	
*⑱	07GAZ—SE00200	A.L.B.Checker Harness Adaptor	1	
⑲	07965—6340301	Front Hub Dis/Assembly Tool Base A	2	
*⑳	07GAF—SE00300	Pulser Driver Attachment	1	
㉑	07967—SB00000	Pulser Driver	1	
㉒	07GAZ—SE00100	A.L.B. Hand Pump Assembly	1	

* Newly Provided Tools



22. Body

Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07GAZ—SE00400	Torsion Rod Assembly Tool	1	



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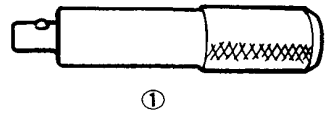
24. Air Conditioner

Ref. No.	Tool Number	Description	Q'ty	Remarks
①	07749—0010000	Driver	1	
②	07947—6340300	Bearing Driver Attachment	1	



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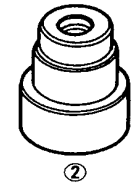

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Specifications

Standards and Service Limits

Cylinder Head/Valve Train (B20A1 Engine) - Section 6

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Compression	300 min^{-1} (rpm) and wide-open throttle		Nominal Minimum Maximum variation	1,226 kpa (12.5 kg/cm^2, 178 psi) 1,030 kpa (10.5 kg/cm^2, 149 psi) 196 kpa (2 kg/cm^2, 28 psi)
Cylinder head	Warpage Height		— 132 (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. 33.676 (1.3258) 33.737 (1.3282)	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 and EX	0.08—0.12 (0.003—0.005) 0.16—0.20 (0.006—0.008) 6.58—6.59 (0.2591—0.2594) 6.55—6.56 (0.2579—0.2583) 0.02—0.05 (0.001—0.002) 0.05—0.08 (0.002—0.003) 42.75 (1.683)	— — 6.55 (0.258) 6.52 (0.257) 0.08 (0.003) 0.11 (0.04) 43.54 (1.714)
Valve seat	Width	IN and EX	1.25—1.55 (0.049—0.061)	2.0 (0.08)
Valve spring	Free length Squareness	Inner Outer Inner and Outer	41.25 (1.622) 44.74 (1.761) —	40.2 (1.583) 43.74 (1.722) 1.6 (0.063)
Valve guide	I.D.	IN and EX	6.61—6.63 (0.260—0.261)	6.65 (0.262)

* ET Engine

Cylinder Head/Valve Train (ET and A20A4 Engine) - Section 6

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Compression	300 min^{-1} (rpm) and wide-open throttle		Nominal Minimum Maximum variation	1,226 kpa (12.5 kg/cm^2, 178 psi) * 1,323 kPa (13.5 kg/cm^2, 192 psi) 1,030 kpa (10.5 kg/cm^2, 149 psi) * 1,127 kPa (11.5 kg/cm^2, 164 psi) 196 kpa (2 kg/cm^2, 28 psi)
Cylinder head	Warpage Height		— 90 (3.54)	0.05 (0.002) 89.8 (3.54)
Camshaft	End play Oil clearance Runout Cam lobe height 	 No. 1,3 and 5 journals No. 2 and 4 journals IN A IN B EX * Manual IN EX * Automatic IN EX	0.05—0.15 (0.002—0.006) 0.050—0.089 (0.002—0.004) 0.130—0.169 (0.005—0.008) 0.03 (0.001) max. 38.853 (1.5296) 38.604 (1.5198) 38.796 (1.5274) * 38.353 (1.5296) * 38.796 (1.5274) * 38.668 (1.5224) * 38.480 (1.5150)	0.5 (0.02) 0.15 (0.006) 0.23 (0.009) 0.06 (0.002) — — — — — — —
Valve	Valve clearance Valve stem O.D. Stem-to-guide clearance Stem installed height 	IN EX IN EX IN EX IN EX	0.12—0.17 (0.005—0.007) 0.25—0.30 (0.010—0.012) 6.58—6.59 (0.2591—0.2594) 6.94—6.95 (0.2732—0.2736) 0.02—0.05 (0.001—0.002) 0.06—0.09 (0.002—0.004) 48.59 (1.913) 47.66 (1.876)	— — 6.55 (0.258) 6.91 (0.272) 0.08 (0.003) 0.12 (0.005) 49.34 (1.943) 48.41 (1.906)
Valve seat	Width	IN and EX	1.25—1.55 (0.049—0.061)	2.0 (0.08)
Valve spring	Free length Squareness	IN EX Inner Outer Inner and Outer	49.2 (1.94) 39.8 (1.57) 49.8 (1.96) —	48.2 (1.90) 38.8 (1.53) 48.8 (1.92) 1.75 (0.068)
Valve guide	I.D.	IN EX	6.61—6.63 (0.260—0.261) 7.01—7.03 (0.276—0.277)	6.65 (0.262) 7.05 (0.278)
Rocker arm	Arm-to-shaft clearance		0.008—0.054 (0.0003—0.0021)	0.08 (0.003)

Engine Block (B20A1 Engine) — Section 7

Unit: mm (in.)

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Cylinder block	Warpage of deck surface		0.07 (0.003) max.	0.10 (0.004)
	Bore diameter	A	81.01 – 81.02 (3.1894–3.1898)	81.05 (3.1909)
		B	81.00–81.01 (3.1890–3.1894)	81.04 (3.1905)
	Bore taper		0.007–0.012 (0.0003–0.0005)	0.05 (0.002)
	Reboring limit		–	0.05 (0.002)
Piston	Skirt O.D (At 21 mm (0.83 in) from bottom of skirt)	A	80.98–80.99 (3.1882–3.1886)	80.97 (3.188)
		B	80.97–80.98 (3.1878–3.1882)	80.96 (3.187)
	Clearance in cylinder		0.02–0.04 (0.0008–0.0016)	0.08 (0.003)
	Piston-to-ring clearance	Top	0.035–0.060 (0.0014–0.0024)	0.13 (0.005)
		2nd	0.030–0.055 (0.0012–0.0022)	0.13 (0.005)
Piston ring	Ring end gap	Top	0.25–0.35 (0.0.010–0.014)	0.6 (0.02)
		2nd	0.35–0.45 (0.014–0.018)	0.7 (0.03)
		Oil	0.20–0.70 (0.008–0.028)	0.8 (0.03)
Connecting rod	Pin-to-rod interference		0.013–0.032 (0.0005–0.0013)	0.013 (0.0005)
	Large end bore diameter		Nominal 51 (2.01)	–
	End play installed on crankshaft		0.15–0.30 (0.006–0.012)	0.40 (0.016)
Crankshaft	Main journal diameter		54.976–55.000 (2.1644–2.1654)	–
	Taper/out-of-round, main journal		0.005 (0.0002) max.	0.010 (0.0004)
	Rod journal diameter		47.976–48.000 (1.8888–1.8900)	–
	Taper/out-of-round, rod journal		0.005 (0.0002) max.	0.010 (0.0004)
	End play		0.10–0.35 (0.004–0.014)	0.45 (0.018)
	Runout		0.02 (0.0003) max.	0.030 (0.0012)
Bearings	Main bearing-to-journal	No. 1, 2, 4, and 5		
	Oil clearance	Journals	0.024–0.042 (0.0010–0.0017)	0.05 (0.002)
		No. 3 Journal	0.030–0.048 (0.0012–0.0019)	0.05 (0.002)
	Rod bearing-to-journal oil clearance		0.026–0.044 (0.0010–0.0017)	0.05 (0.002)

Engine Block (ET and A20A4 Engine) - Section 7

* ET Engine

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Cylinder block	Warpage of deck surface		0.08 (0.003) max.	0.10 (0.004)
	Bore diameter	A	82.70–82.71 (3.2559–3.2563)	82.74 (3.2575)
		B	82.69–82.70 (3.2555–3.2559)	82.73 (3.2571)
		*A	* 80.01–80.02 (3.1500–3.1504)	80.05 (3.1516)
		*B	* 80.00–80.01 (3.1496–3.1500)	80.04 (3.1512)
	Bore taper		0.007–0.012 (0.0003–0.0005)	0.05 (0.002)
	Reboring limit		–	0.5 (0.02)
Piston	Skirt O.D. At 21 mm (0.83 in) from bottom of skirt	A	82.67–82.68 (3.2574–3.2551)	82.71 (3.2563)
		B	82.66–82.67 (3.2543–3.2574)	82.70 (3.2559)
		*A	* 79.98–79.99 (3.1488–3.1492)	79.97 (3.1484)
		*B	* 79.97–79.98 (3.1484–3.1488)	79.96 (3.1480)
	Clearance in cylinder		0.02–0.04 (0.0008–0.0016)	0.08 (0.003)
	Piston-to-ring clearance (top and second)		0.030–0.055 (0.0012–0.0022)	0.13 (0.005)
			* 0.020–0.045 (0.0008–0.0018)	0.13 (0.005)
Piston ring	Ring end gap	Top	0.20–0.35 (0.008–0.014)	0.6 (0.02)
		2nd	0.25–0.37 (0.010–0.015)	0.6 (0.02)
		*Top and 2nd	* 0.20–0.35 (0.008–0.014)	0.6 (0.024)
		Oil	0.20–0.70 (0.008–0.020)	0.8 (0.03)
Connecting rod	Pin-to-rod interference		0.013–0.032 (0.0005–0.0013)	0.013 (0.0005)
			* 0.016–0.032 (0.0006–0.0013)	0.013 (0.0005)
	Large end bore diameter		Nominal 48 (1.89) * 45 (1.77)	–
	End play installed on crankshaft		0.15–0.30 (0.006–0.012)	0.40 (0.016)
Crankshaft	Main journal diameter		49.970–49.994 (1.9673–1.9683)	–
	Taper/out-of-round, main journal		0.005 (0.0002) max.	0.010 (0.0004)
	Rod journal diameter		44.976–45.000 (1.7707–1.7717)	–
			* 41.976–42.000 (1.6527–1.6535)	
	Taper/out-of-round, rod journal		0.005 (0.0002) max.	0.010 (0.0004)
	End play		0.10–0.35 (0.004–0.014)	0.45 (0.018)
	Runout		0.024 (0.0009) max.	0.04 (0.0016)
Bearings	Main bearing-to-journal	No. 1, 2, 4, and 5		
	Oil clearance	journals	0.026–0.055 (0.0010–0.0022)	0.07 (0.003)
		No. 3 Journal	0.032–0.061 (0.0013–0.0024)	0.07 (0.003)
		*all Journals	0.020–0.049 (0.0008–0.0019)	0.07 (0.003)
	Rod bearing-to-journal oil clearance		0.020–0.038 (0.0008–0.0015)	0.07 (0.003)

(cont'd)

Standards and Service Limits (cont'd)

Engine Lubrication (B20A1 Engine) — Section 8

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Engine oil	Capacity ℓ (US. qt., Imp. qt.)		5.0 (5.3, 4.4) After engine disassembly 4.0 (4.2, 3.5) After oil change, including oil filter 3.5 (3.7, 3.1) After oil change, without oil filter	
Oil pump	Displacement		54 ℓ (10.6 US. gal., 8.9 Imp. gal.) 5,000 min^{-1} (rpm)	
	Inner-to-outer rotor radial clearance Pump body-to-rotor radial clearance Pump body-to-rotor side clearance		0.04—0.16 (0.002—0.006) 0.10—0.19 (0.004—0.007) 0.02—0.071 (0.001—0.003)	0.2 (0.008) 0.21 (0.008) 0.12 (0.005)
Relief valve	Pressure setting 80°C (176°F)	Idle	137 kPa (1.4 kg/cm^2, 20 psi) min.	
		3,000 min^{-1} (rpm)	470—559 kPa (4.8—5.7 kg/cm^2, 67—80 psi)	

* : ET Engine

Engine Lubrication (ET and A20A4 Engine) — Section 8

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Engine oil	Capacity ℓ (US. qt., Imp. qt.)		4.0 (4.2, 3.5) After engine disassembly * 3.9 (4.1, 3.4) After engine disassembly 3.5 (3.7, 3.1) After oil change, including oil filter 3.0 (3.2, 2.6) After oil change, without oil filter.	
Oil pump	Displacement		40.3 ℓ (10.6 US. gal., 8.9 Imp. gal.) 5,500 min^{-1} (rpm)	
	Inner-to-outer rotor radial clearance Pump body-to-rotor radial clearance Pump body-to-rotor side clearance		0.15 (0.006) max. 0.10—0.18 (0.004—0.007) 0.30—0.108 (0.001—0.004)	0.2 (0.008) 0.21 (0.008) 0.15 (0.006)
Relief valve	Pressure setting 80°C (176°F)	Idle	98 kPa (1.0 kg/cm^2, 14 psi) min.	
		3,000 min^{-1} (rpm)	373—451 kPa (3.8—4.6 kg/cm^2, 54—65 psi)	

Cooling - Section 10

	MEASUREMENT	STANDARD (NEW)	
Cooling fan belt (A20A4 Engine)	Deflection midway between pulleys/load	6—9 (0.24—0.35)/98N (10 kg, 22 lb) for used belt 5 (0.20)/98N (10 kg, 22 lb) after replacement of belt	
Cooling fan belt (ET Engine)	Deflection midway between pulleys/load	7—10 (0.3—0.4)/98N (10 kg, 22 lb) for used belt 5—7 (0.2—0.3/98N (10 kg, 22 lb) for replacement of belt	
Radiator (B20A1 Engine)	Capacity (incl. heater) ℓ (US. Gal., Imp. Gal.) (Includes resvoir tank 0.8 (0.21, 0.18))	Manual 5.9 (1.6, 1.3)	
Radiator (A20A1 Engine)	Capacity (incl. heater) ℓ (US. Gal., Imp. Gal.) (Includes reservoir tank 0.8 (0.21, 0.18)	Manual 5.9 (1.6, 1.5) Automatic 6.7 (1.8, 1.5)	
Radiator (ET Engine)	Capacity (incld. heater) ℓ (US. Gal., Imp. Gal.) (includes reservoir tank 0.8 (0.21, 0.18)	Except KY: 6.8 (1.8, 1.5) KY: 7.5 (2.0, 1.7)	
Radiator cap	Pressure cap opening pressure	74—103 kPa (0.75—1.05 kg/cm^2, 11—15 psi)	
Thermostat	Starts to open Full open Valve lift at full open	Primary: 82°C ± 2 (180°F ± 3) Secondary: 85°C ± 2 (185°F ± 3) 95°C (203°F) 8 (0.31) max.	86—90°C (187—194°F) 100°C (212°F) OPTIONAL 8 (0.31) max.
Water pump	Gear ratio (crankshaft) Capacity: ℓ per min/at min^{-1} (rpm)	1.34 124/5,000 (32.7 US. gal., 27.3 Imp.gal.)/5,000 min^{-1} (rpm)	
Cooling fan	Fan-to-core clearance Thermoswitch "ON" temperature Thermoswitch "OFF" temperature	23.0 (0.90) 87°—93°C (188°—199°F) 83°C (181°F) or more (hysteresis 2°C (35°F) or more)	

Fuel (B20A1 and A20A4 Engine) - Section 11

	MEASUREMENT	STANDARD (NEW)
Fuel pump	Delivery pressure Displacement	230—270 kPa (2.35—2.75 kg/cm^2, 33—39 psi) 230 cc/min in 10 seconds
	Relief valve opening pressure	441—588 kPa (4.5—6.0 kg/cm^2, 64—85 psi)
Pressure regulator	Pressure	230—270 kPa (2.35—2.75 kg/cm^2, 33—39 psi)
Fuel Tank	Capacity	60 ℓ 15.9 US. Gal., 13.2 Imp. Gal.)

Fuel (ET Engine) — Section 11

Unit: mm (in.)

	MEASUREMENT	STANDARD (NEW)
Fuel pump	Delivery pressure	14.7—19.6 kPa (0.15—0.20 kg/cm^2, 2.1—2.8 psi)
	Displacement	620 cm^3/min. at 10V (38 cu. in./10V) 680 cm^3/min. at 12V (41 cu.in./12V)
Fuel tank	Capacity	60 ℓ (15.8 US. Gal., 13.2 Imp. Gal.)

Fuel-Injection (B20A1 and A20A4 Engine) — Section 12

	MEASUREMENT		STANDARD (NEW)
	Fast idle		1,000—1,800 min^{-1} (rpm)
	Idle Speed with headlights and cooling fan off	KQ, KX Other types	750±50 min^{-1} (rpm) 800±50 min^{-1} (rpm)
	Idle CO	KQ, KX Other types	0.1 % max. 1.0±1.0 %

Carburetor (ET Engine) - Section 12

	MEASUREMENT		STANDARD (NEW)
Carburetor	Choke fast idle	MT AT	2,000 min^{-1} (rpm) 1,800 min^{-1} (rpm)
	Idle Speed with headlights and cooling fan off		750±50 min^{-1} (rpm)
	Idle Co	KS, KX Other types	0.5—2.0 3.0
	Float level (from gasket)		22.5—24.5 (0.89—0.96)

Clutch — Section 13

* : B20A1 Engine

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Clutch pedal	Pedal height	176 (6.9) to floor 137 (5.4) to carpet	— —
	Stroke	133—143 (5.2—5.6) * 138—143 (5.4—5.6)	— —
	Pedal play	23—28 (0.9—1.1)	—
	Disengagement height	86 (3.4) min. to floor 47 (1.9) min. to carpet	— —
Clutch arm	Release arm adjustment	5.2—6.4 (0.20—0.25)	—
Flywheel	Clutch surface runout	0.05 (0.002) max.	0.15 (0.006)
Clutch plate	Rivet head depth Surface runout Radial play in splines Thickness	1.3 (0.05) min. 0.8 (0.03) max. 0.7—2.1 (0.028—0.083) 8.1—8.8 (0.32—0.35)	0.2 (0.008) 1.0 (0.04) 4.0 (0.16) 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	0.8 (0.03) max.	1.0 (0.04)

(cont'd)

Standards and Service Limits (cont'd)

Manual Transmission (B2) - Section 14

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission oil	Capacity ℓ (US. qt., Imp. qt)	1.9 (2.0, 1.7) at assembly 2.0 (2.1, 1.8) at oil change	
Mainshaft	End play	0.14–0.21 (0.006–0.008)	Adjust with a shim.
	Diameter of needle bearing contact area	27.987–28.000 (1.1018–1.1024)	27.94 (1.100)
	Diameter of third gear contact area	37.984–38.000 (1.4954–1.4961)	37.93 (1.493)
	Diameter of ball bearing contact area	27.987–28.000 (1.1018–1.1024)	27.94 (1.100)
	Runout	0.04 (0.0016) max.	0.10 (0.004)
Mainshaft third and fourth gears	I.D.	43.009–43.025 (1.6933–1.6939)	43.08 (1.696)
	End play	0.06–0.21 (0.0024–0.0083)	0.3 (0.012)
	Thickness 3rd	32.42–32.47 (1.2764–1.2783)	32.3 (1.272)
	4th	30.92–30.97 (1.2173–1.2193)	30.8 (1.213)
Mainshaft fifth gear	I.D.	43.009–43.025 (1.6933–1.6939)	43.08 (1.696)
	End play	0.06–0.21 (0.0024–0.0083)	0.3 (0.0012)
	Thickness	30.42–30.47 (1.1976–1.1996)	30.3 (1.193)
Countershaft	End play	0.10–0.35 (0.004–0.014)	0.5 (0.02)
	Diameter of needle bearing contact area	33.000–33.015 (1.2992–1.2998)	32.95 (1.297)
	Diameter of ball bearing contact area	24.987–25.000 (0.9837–0.9843)	24.94 (0.982)
	Diameter of low gear contact area	33.984–40.000 (1.3380–1.5748)	33.93 (1.336)
	Runout	0.04 (0.0016)	0.10 (0.004)
Cuntershaft low gear	I.D.	46.009–46.025 (1.8114–1.8120)	46.08 (1.814)
	End play	0.03–0.08 (0.0012–0.0031)	Adjust with a shim
Countershaft Second gear	I.D.	50.009–50.025 (1.9689–1.9695)	50.08 (1.972)
	End play	0.03–0.08 (0.0012–0.0031)	Adjust with a collar.
	Thickness	32.92–32.97 (1.2961–1.2980)	32.8 (1.291)
Spacer collar (Countershaft second gear)	I.D.	36.48–36.49 (1.4362–1.4366)	36.5 (1.437)
	O.D.	43.989–44.000 (1.7318–1.7323)	43.94 (1.730)
	Length A	28.98–29.00 (1.1409–1.1417)	–
	B	29.03–29.05 (1.1429–1.1437)	
Spacer collar (Mainshaft fourth and fifth gears)	I.D.	28.002–28.012 (1.1024–1.1028)	28.06 (1.105)
	O.D.	34.989–35.000 (1.3775–1.3780)	34.94 (1.376)
	Length A	55.95–56.05 (2.2028–2.2067)	–
	B	26.03–26.08 (1.0248–1.0268)	
Reverse Idler gear	I.D.	20.016–20.043 (0.7880–0.7891)	20.09 (0.791)
	Gear-to-reverse gear shaft clearance	0.036–0.084 (0.0014–0.0033)	0.16 (0.006)
Synchronizer ring	Ring-to-gear clearance (ring pushed against gear)	0.85–1.10 (0.033–0.043)	0.4 (0.016)
Shift fork	Synchronizer sleeve gear 1, 2, 3 and 4th	7.95–8.05 (0.313–0.317)	–
	5th	5.75–5.85 (0.226–0.230)	–
	Fork-to-synchronizer sleeve 1, 2, 3 and 4th	0.45–0.65 (0.018–0.026)	1.0 (0.04)
	5th	0.25–0.45 (0.010–0.018)	0.8 (0.03)
Reverse shift fork	End gap	13.0–13.3 (0.51–0.52)	–
	Fork-to-reverse idler gear clearance	0.5–1.1 (0.020–0.043)	1.8 (0.07)
	Groove width	7.05–7.25 (0.278–0.285)	–
	Fork-to-fifth/reverse shift shaft clearance	0.05–0.35 (0.002–0.014)	0.5 (0.02)
Shift arm	Width of groove in shift rod guide	12.8–13.0 (0.50–0.51)	–
	Shift arm-to-shift rod guide clearance	0.05–0.35 (0.002–0.014)	0.8 (0.03)
	Width in shift guide	7.9–8.0 (0.311–0.315)	–
	Shift arm-to-shift guide clearance	0.1–0.3 (0.004–0.012)	0.6 (0.02)
Shift rod guide	I.D.	14.000–14.068 (0.5512–0.5539)	–
	Guide-to-shaft clearance	0.011–0.092 (0.0004–0.0036)	0.15 (0.006)
	O.D.	11.9–12.0 (0.469–0.472)	–
	Guide-to-fifth/reverse shift shaft clearance	0.2–0.5 (0.008–0.020)	0.8 (0.03)
Selector arm	Width	11.9–12.0 (0.469–0.472)	–
	Arm-to-shift rod guide clearance	0.05–0.25 (0.002–0.010)	0.5 (0.02)
	End gap	9.9–10.0 (0.390–0.394)	–
	Arm-to-interlock clearance	0.05–0.20 (0.002–0.008)	0.45 (0.018)

Unit: mm (in.)

Manual Transmission (A2) - Section 14

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Transmission oil	*Capacity ℓ (US. qt., Imp. qt)*	2.6 (2.7, 2.3) at assembly 2.5 (2.6, 2.2) at oil change	
Mainshaft	End play	0.10–0.35 (0.004–0.014)	0.5 (0.02)
	Diameter of needle bearing contact area	28.002–28.015 (1.1024–1.1030)	27.95 (1.100)
	Diameter of third gar contact area	31.984–32.000 (1.2592–1.2598)	31.93 (1.2571)
	Diameter of ball bearing contact area	24.980–24.993 (0.9835–0.9840)	24.93 (0.981)
	Runout	0.04 (0.0016) max.	0.10 (0.004)
Mainshaft third and fourth gears	I.D.	37.009–37.025 (1.4570–1.4577)	37.07 (1.459)
	End play	0.03–0.18 (0.0012–0.0071)	0.3 (0.012)
	Thickness	30.42–30.47 (1.1976–1.1996)	30.3 (1.193)
Mainshaft fifth gear	I.D.	37.009–37.025 (1.4570–1.4577)	37.07 (1.459)
	End play	0.03–0.13 (0.0012–0.0051)	0.3 (0.012)
	Thickness	29.92–29.97 (1.1780–1.1799)	29.8 (1.173)
Countershaft	End play	0.10–0.35 (0.004–0.014)	0.5 (0.02)
	Diameter of needle bearing contact area	33.000–33.015 (1.2992–1.2998)	32.95 (1.297)
	Diameter of ball bearing contact area	24.980–24.993 (0.9835–0.9840)	24.93 (0.981)
	Diameter of low gear contact area	33.984–34.000 (1.3380–1.3386)	33.93 (1.336)
	Runout	0.04 (0.0016)	0.10 (0.004)
Countershaft low gear	I.D.	39.008–39.025 (1.5357–1.5364)	39.07 (1.538)
	End play	0.03–0.08 (0.0012–0.0031)	0.18 (0.007)
Countershaft Second gear	I.D.	43.008–43.025 (1.6932–1.6939)	43.07 (1.696)
	End play	0.003–0.10 (0.0012–0.0039)	0.18 (0.007)
	Thickness	30.42–30.47 (1.1976–1.1996)	30.3 (1.193)
Spacer cllar (Countershaft second gear)	I.D.	30.98–30.99 (1.2197–1.2201)	31.4 (1.236)
	O.D.	37.989–38.000 (1.4956–1.4961)	37.93 (1.493)
	Length	30.53–30.55 (1.2020–1.2028)	30.51 (1.201)
Spacer collar (Mainshaft fourth and fifth gears)	I.D.	25.002–25.012 (0.9843–0.9847)	25.06 (0.987)
	O.D.	31.989–32.000 (1.2594–1.2598)	31.93 (1.257)
	Length	27.03–27.08 (1.0642–1.0661)	27.01 (1.063)
Reverse Idler gear	I.D.	17.016–17.043 (0.6699–0.6710)	17.09 (0.673)
	Gear-to-reverse gear shaft clearance	0.032–0.077 (0.0013–0.0030)	0.15 (0.006)
Synchronizer ring	Ring-to-gear clearance (ring pushed against gear)	0.73–1.18 (0.031–0.046)	0.4 (0.016)
Shift fork	Synchronizer sleeve gear	6.75–6.85 (0.266–0.270)	6.0 (0.24)
	Fork-to-synchronizer sleeve clearance	0.35–0.65 (0.014–0.026)	1.0 (0.04)
Reverse shift fork	End gap	11.8–12.1 (0.46–0.48)	—
	Fork-to-reverse idler gear clearance	0.2–1.0 (0.008–0.039)	1.7 (0.07)
	Groove width	7.05–7.25 (0.278–0.285)	—
	Fork-to-fifth/reverse shift shaft clearance	0.05–0.35 (0.002–0.014)	0.5 (0.02)
Shift arm	Width of groove in shift rod guide	11.8–12.0 (0.46–0.47)	—
	Shift arm-to-shift rod guide clearance	0.05–0.35 (0.002–0.014)	0.8 (0.03)
	Width in shift guide	7.9–8.0 (0.311–0.315)	—
	Shift arm-to-shift guide clearance	0.1–0.3 (0.004–0.012)	0.6 (0.02)
Shift rod guide	I.D.	14.000–14.068 (0.5512–0.5539)	—
	Guide-to-shaft clearance	0.011–0.092 (0.0004–0.0036)	0.15 (0.006)
	O.D.	11.9–12.0 (0.469–0.472)	—
	Guide-to-fifth/reverse shift shaft clearance	0.2–0.5 (0.008–0.020)	0.8 (0.03)
Selector arm	Width	11.9–12.0 (0.469–0.472)	—
	Arm-to-shift rod guide clearance	0.05–0.25 (0.002–0.010)	0.5 (0.02)
	End gap	10.05–10.15 (0.396-0.400)	—
	Arm-to-interlock clearance	0.05–0.25 (0.002–0.010)	0.7 (0.03)
	Arm-to-holder clearance	0.01–0.20 (0.004–0.0079)	Selection with 5 types of shims

(cont'd)

Standards and Service Limits (cont'd)

Automatic Transmission (AS) - Section 15

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Transmission oil	Capacity ℓ (US. qt., Imp. qt)		2.8 (3.0, 2.5) at change 5.6 (5.9, 4.9) at assembly	
Hydraulic pressure	Line pressure at 2,000 min^{-1} (rpm)		784–833 kPa (8.0–8.5 kg/cm^2, 114–121 psi)	735 kPa (7.5 kg/cm^2, 107 psi)
	4th clutch pressure at 2,000 min^{-1} (rpm)			498 kPa (5.0 kg/cm^2, 71 psi) with lever released.
	3rd clutch pressure at 2,000 min^{-1} (rpm)		539–833 kPa (5.5–8.5 kg/cm^2, 64–121 psi)	735 kPa (7.5 kg/cm^2, 107 psi) with lever in full throttle.
	1st clutch pressure at 2,000 min^{-1} (rpm)		784–833 kPa (8.0–8.5 kg/cm^2, 114–121 psi)	735 kPa (7.5 kg/cm^2, 107 psi)
	Governor pressure at 60 km/h		216–225 kPa (2.2–2.3 kg/cm^2, 31–33 psi)	211 kPa (2.15 kg/cm^2, 29 psi)
	Throttle pressure A		505–519 kPa (5.15–5.3 kg/cm^2, 73–75 psi)	499 kpa (5.1 kg/cm^2, 73 psi)
	Throttle pressure B		784–833 kPa (8.0–8.5 kg/cm^2, 114–121 psi)	735 kPa (7.5 kg/cm^2, 107 psi)
Stall speed	Check with car on level ground		2,400 min^{-1} (rpm)	2,100–2,700 min^{-1} (rpm)
Clutch	Clutch initial clearance	1st	0.4–0.7 (0.016–0.028)	–
		2nd	0.65–0.80 (0.026–0.031)	–
		3rd, 4th	0.4–0.6 (0.016–0.024)	–
	Clutch return spring free length	2nd, 3rd, 4th	30.5 (1.20)	28.5 (1.12)
		1st	32.0 (1.26)	30.0 (1.18)
	Clutch disc thickness		1.88–2.0 (0.074–0.079)	Until grooves worn out
	Clutch plate thickness		1.95–2.05 (0.077–0.079)	Discoloration
	Clutch end plate thickness	Mark 1	2.3–2.4 (0.090–0.094)	
		Mark 2	2.4–2.5 (0.094–0.098)	
		Mark 3	2.5–2.6 (0.098–0.102)	
		Mark 4	2.6–2.7 (0.102–0.106)	
		Mark 5	2.7–2.8 (0.106–0.110)	
		Mark 6	2.8–2.9 (0.110–0.114)	
		Mark 7	2.9–3.0 (0.114–0.118)	
		Mark 8	3.0–3.1 (0.118–0.122)	
		Mark 9	3.1–3.2 (0.122–0.126)	
		Mark 10	3.2–3.3 (0.126–0.130)	Discoloration
Transmission	Diameter of needle bearing contact area on main and stator shaft		19.980–19.983 (0.7866–0.7867)	Wear or damage
	Diameter of needle bearing contact area on mainshaft 2nd gear		35.975–35.991 (1.4163–1.4169)	
	Diameter of needle bearing contact area on main 4th gear collar		31.975–31.991 (1.2588–1.2594)	
	Diameter of needle bearing contact area on mainshaft 1st gear collar		29.980–29.993 (1.1803–1.1808)	
	Diameter of needle bearing contact area on countershaft (L side)		32.984–33.000 (1.2986–1.2993)	
	Diameter of needle bearing contact area on countershaft 3rd gear		31.975–31.991 (1.2589–1.2595)	
	Diameter of needle bearing contact area on countershaft 4th gear		27.980–27.993 (1.1016–1.1021)	
	Diameter of needle bearing contact area on countershaft reverse gear collar		29.980–29.993 (1.1803–1.1808)	
	Diameter of needle bearing contact area on countershaft L gear collar		29.980–29.993 (1.1803–1.1808)	
	Diameter of needle bearing contact area on reverse idle gear		13.994–14.000 (0.5509–0.5512)	
	Reverse idler shaft holder diameter		14.016–14.034 (0.5518–0.5525)	
	Mainshaft 2nd gear I.D.		41.000–41.016 (1.6141–1.6148)	
	Mainshaft 1st gear I.D.		36.000–36.016 (1.4173–1.4179)	
	Countershaft 4th gear I.D.		33.000–33.016 (1.2992–1.2998)	
	Countershaft 3rd gear I.D.		38.000–38.016 (1.4966–1.4966)	
	Countershaft 2nd gear I.D.		31.000–31.016 (1.2204–1.2210)	
	Countershaft 1st gear I.D.		35.000–35.016 (1.3779–1.3785)	
	Countershaft reverse gear I.D.		36.000–36.016 (1.4173–1.4179)	
	Reverse idler gear I.D.		18.007–18.020 (0.7086–0.7094)	Wear or damage

Unit: mm (in.)

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Transmission (cont'd)	Mainshaft 4th gear end play		0.07–0.12 (0.003–0.005)	–
	Mainshaft 2nd gear end play		0.07–0.12 (0.003–0.005)	–
	Mainshaft 1st gear end play		0.08–0.24 (0.003–0.009)	–
	Countershaft 3rd gear end play		0.07–0.12 (0.003–0.005)	–
	Countershaft 2nd gear end play		0.07–0.12 (0.003–0.005)	–
	Reverse idler gear end play		0.05–0.18 (0.002–0.007)	–
	Countershaft reverse gear end play		0.10–0.20 (0.004–0.008)	–
	Reverse gear hub O.D.		51.87–51.90 (2.0421–0.008)	Wear or damage
	Thrust washer thickness			
	Mainshaft 2nd gear	A	3.47–3.50 (0.137–0.138)	–
		B	3.52–3.55 (0.139–0.140)	–
		C	3.57–3.60 (0.141–0.142)	–
		D	3.62–3.65 (0.143–0.144)	–
		E	3.67–3.70 (0.145–0.146)	–
		F	3.72–3.75 (0.147–0.148)	–
		G	3.77–3.80 (0.149–0.150)	–
		H	3.82–3.85 (0.151–0.152)	–
		I	3.87–3.90 (0.153–0.154)	–
	Mainshaft R side bearing		2.95–3.05 (0.1161–0.1200)	Wear or damage
	Mainshaft 1st gear		2.43–2.50 (0.0957–0.0984)	Wear or damage
	Countershaft 3rd gear	A	2.97–3.00 (0.1169–0.1181)	–
		B	3.02–3.05 (0.1189–0.1201)	–
		C	3.07–3.10 (0.1209–0.1220)	–
		D	3.12–3.15 (0.1228–0.1240)	–
		E	3.17–3.20 (0.1248–0.1260)	–
		F	3.22–3.25 (0.1268–0.1280)	–
		G	3.27–3.30 (0.1287–0.1299)	–
		H	3.32–3.35 (0.1307–0.1319)	–
		I	3.37–3.40 (0.1327–0.1339)	–
	Countershaft 4th gear thickness	A	38.97–39.00 (1.5342–1.5354)	–
		B	39.02–39.05 (1.5362–1.5374)	–
		C	39.07–39.10 (1.5382–1.5394)	–
		D	39.12–39.15 (1.5402–1.5413)	–
		E	39.17–39.20 (1.5421–1.5433)	–
		F	39.22–39.25 (1.5441–1.5452)	
		G	39.27–39.30 (1.5461–1.5472)	
	Thrust washer thickness (mainshaft 1st gear L side)		1.45–1.50 (0.057–0.059)	1.4 (0.055)
	Mainshaft 1st gear collar length		22.50–22.55 (0.8858–0.8878)	–
	Mainshaft 1st gear collar flange thickness		2.5–2.6 (0.098–0.102)	Wear or damage
	Countershaft reverse gear collar length		14.0–14.1 (0.551–0.555)	–
	Countershaft reverse gear collar flange thickness		2.45–2.50 (0.096–0.098)	Wear or damage
	Counershaft 1st gear collar length		11.0–11.1 (0.433–0.437)	–
	Countershaft 1st gear collar flange thickness		2.4–2.6 (0.095–0.102)	Wear or damage
	Diameter of countershaft one-way clutch contact area		74.414–74.440 (2.9297–2.9307)	Wear or damage
	Diameter of parking gear one-way clutch contact area		57.755–57.768 (2.2738–2.2743)	Wear or damage
	Mainshaft and countershaft feed pipe O.D. (at 20 mm from end)		7.97–7.98 (0.3138–0.3142)	7.95 (0.31)
	Mainshaft sealing ring 32 mm Thickness		1.980–1.995 (0.0780–0.0785)	1.8 (0.071)
	Mainshaft bushing I.D.		6.018–6.030 (0.2369–0.2374)	6.045 (0.238)
	Mainshaft bushing I.D.		9.000–9.015 (0.3543–0.3549)	9.03 (0.356)
	Countershaft bushing I.D.		8.000–8.015 (0.3150–0.3156)	8.03 (0.316)
	Mainshaft sealing ring groove width		2.025–2.060 (0.0797–0.0811)	2.08 (0.082)
Regulator valve body	Sealing ring contact area diameter		32.000–32.025 (1.2598–1.2608)	32.05 (1.26)
Shifting device and parking brake control	Reverse shift fork thickness		5.9–6.0 (0.232–0.236)	5.4 (0.21)
	Parking brake ratchet pawl		–	Wear or other defect
	Parking gear		–	Wear or other defect
	Throttle cam stopper		18.5–18.6 (0.728–0.732)	–

(cont'd)

Standards and Service Limits (cont'd)

Automatic Transmission (AS) — Section 15

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Servo body	Shift fork shaft bore I.D.	A	14.000—14.005 (0.5512—0.5514)	—
		B	14.006—14.010 (0.5514—0.5516)	—
		C	14.011—14.015 (0.5516—0.5518)	—
	Shift fork shaft valve bore I.D.		37.000—37.039 (1.4567—1.4582)	37.045 (1.4583)
Valve body	Oil pump gear side clearance		0.03—0.05 (0.0012—0.0020)	0.08 (0.003)
	Oil pump gear-to-body clearance		Drive: 0.21—0.27 (0.0083—0.0106)	—
			Driven: 0.05—0.09 (0.0020—0.0035)	—
	Stator camshaft needle bearing bore I.D.		24.000—24.021 (0.9449—0.9457)	Damage or dent
	Stator camshaft needle bearing contact and O.D.		26.000—26.013 (1.0236—1.0241)	Damage or dent
	Oil pump driven gear I.D.		14.016—14.034 (0.5518—0.5525)	Damage or dent
	Oil pump shaft O.D.		13.980—13.990 (0.5503—0.5507)	Damage or dent

Automatic Transmission (C9) — Section 15

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Transmission oil	Capacity ℓ (US. qt., Imp. qt.)		2.8 (3.0, 2.5) at change 5.8 (6.1, 5.1) at assembly	
Hydraulic pressure	Line pressure at 2,000 min^{-1} (rpm)		833—882 kPa (8.5—9.0 kg/cm^2, 121—128	784 kPa (8.0 kg/cm^2, 114 psi)
	4th clutch pressure at 2,000 min^{-1} (rpm)			498 kPa (5.0 kg/cm^2, 71 psi) with lever released.
	3rd clutch pressure at 2,000 min^{-1} (rpm) 2nd clutch pressure at 2,000 min^{-1} (rpm)		441—882 kPa (4.5—9.0 kg/cm^2, 64—128 psi)	784 kPa (8.0— kg/cm^2, 114 psi) with lever in full throttle.
	1st clutch pressure at 2,000 min^{-1} (rpm)		784—882 kPa (8.0—9.0 kg/cm^2, 114—128 psi)	735 kPa (7.5 kg/cm^2, 107 psi)
	Governor pressure at 60 km/h		216—225 kPa (1.98—2.08 kg/cm^2, 28.1—29.5 psi)	211 kPa (1.93 kg/cm^2, 27 psi)
	Throttle pressure A		505—519 kPa (8.5—9.0 kg/cm^2, 121—128 psi)	784 kPa (8.0 kg/cm^2, 114 psi)
Stall speed	Check with car on level ground		2,400 min^{-1} (rpm)	2,100—2,700 min^{-1} (rpm)
Clutch	Clutch initial clearance	1st	0.4—0.7 (0.016—0.028)	—
		2nd	0.65—0.80 (0.026—0.031)	—
		3rd, 4th	0.4—0.6 (0.016—0.024)	—
	Clutch return spring free length	1st	31.0 (1.22)	28.5 (1.12)
		2nd, 3rd, 4th	30.5 (1.20)	28.5 (1.12)
	Clutch disc thickness		1.88—2.0 (0.074—0.079)	Until grooves worn out
	Clutch plate thickness		1.95—2.05 (0.077—0.079)	Discoloration
	Clutch end plate thickness	Mark 1	2.3—2.4 (0.090—0.094)	
		Mark 2	2.4—2.5 (0.094—0.098)	
		Mark 3	2.5—2.6 (0.098—0.102)	
		Mark 4	2.6—2.7 (0.102—0.106)	
		Mark 5	2.7—2.8 (0.106—0.110)	
		Mark 6	2.8—2.9 (0.110—0.114)	
		Mark 7	2.9—3.0 (0.114—0.118)	
		Mark 8	3.0—3.1 (0.118—0.122)	
		Mark 9	3.1—3.2 (0.122—0.126)	
		Mark 10	3.2—3.3 (0.126—0.130)	Discoloration

Unit: mm (in.)

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Transmission	Diameter of needle bearing contact area on main and stator shaft		19.980–19.983 (0.7866–0.7867)	Wear or damage
	Diameter of needle bearing contact area on mainshaft 2nd gear		35.975–35.991 (1.4163–1.4169)	
	Diameter of needle bearing contact area on main 4th gear collar		31.975–31.991 (1.2588–1.2594)	
	Diameter of needle bearing contact area on mainshaft 1st gear collar		29.980–29.993 (1.1803–1.1808)	
	Diameter of needle bearing contact area on counershaft (L side)		32.984–33.000 (1.2986–1.2993)	
	Diameter of needle bearing contact area on countershaft 3rd gear		31.975–31.991 (1.2589–1.2595)	
	Diameter of needle bearing contact area on countershaft 4th gear		27.980–27.993 (1.1016–1.1021)	
	Diameter of needle bearing contact area on countershaft reverse gear collar		29.980–29.993 (1.1803–1.1808)	
	Diameter of needle bearing contact area on countershaft L gear collar		29.980–29.993 (1.1803–1.1808)	
	Diameter of needle bearing contact area on reverse idle gear		13.994–14.000 (0.5509–0.5512)	
	Reverse idler shaft holder diameter		14.416–14.434 (0.5676–0.5683)	
	Mainshaft 2nd gear I.D.		41.000–41.016 (1.6141–1.6148)	
	Mainshaft 1st gear I.D.		36.000–36.016 (1.4173–1.4179)	
	Countershaft 4th gear I.D.		33.000–33.016 (1.2992–1.2998)	
	Countershaft 3rd gear I.D.		38.999–38.016 (1.4961–1.4966)	
	Countershaft 2nd gear I.D.		31.000–31.016 (1.2204–1.2210)	
	Countershaft 1st gear I.D.		35.000–35.016 (1.3779–1.3785)	
	Countershaft reverse gear I.D.		36.000–36.016 (1.4173–1.4179)	
	Reverse idler gear I.D.		18.007–18.020 (0.7086–0.7094)	Wear or damage
	Mainshaft 4th gear end play		0.10–0.22 (0.004–0.009)	–
	Mainshaft 2nd gear end play		0.07–0.15 (0.003–0.006)	–
	Mainshaft 1st gear end play		0.08–0.24 (0.003–0.009)	–
	Countershaft 3rd gear end play		0.07–0.15 (0.003–0.006)	–
	Countershaft 2nd gear end play		0.08–0.40 (0.003–0.016)	–
	Reverse idler gear end play		0.05–0.18 (0.002–0.007)	–
	Countershaft reverse gear end play		0.10–0.20 (0.004–0.008)	–
	Reverse gear hub O.D.		51.87–51.90 (2.0421–2.0433)	Wear or damage
	Thrust washer thickness			
	Mainshaft 2nd gear	A	3.47–3.50 (0.137–0.138)	–
		B	3.52–3.55 (0.139–0.140)	–
		C	3.57–3.60 (0.141–0.142)	–
		D	3.62–3.65 (0.143–0.144)	–
		E	3.67–3.70 (0.145–0.146)	–
		F	3.72–3.75 (0.147–0.148)	–
		G	3.77–3.80 (0.149–0.150)	–
		H	3.82–3.85 (0.151–0.152)	–
		I	3.87–3.90 (0.153–0.154)	–
	Mainshaft R side bearing		2.95–3.05 (0.1161–0.1200)	Wear or damage
	Mainshaft 1st gear		2.43–2.50 (0.0957–0.0984)	Wear or damage
	Countershaft 3rd gear	A	2.97–3.00 (0.1169–0.1181)	–
		B	3.02–3.05 (0.1189–0.1201)	–
		C	3.07–3.10 (0.1209–0.1220)	–
		D	3.12–3.15 (0.1228–0.1240)	–
		E	3.17–3.20 (0.1248–0.1260)	–
		F	3.22–3.25 (0.1268–0.1280)	–
		G	3.27–3.30 (0.1287–0.1299)	–
		H	3.32–3.35 (0.1307–0.1319)	–
		I	3.37–3.40 (0.1327–0.1339)	–
	Countershaft 4th gear thickness	A	38.97–39.00 (1.5342–1.5354)	–
		B	39.02–39.05 (1.5362–1.5374)	–
		C	39.07–39.10 (1.5382–1.5394)	–
		D	39.12–39.15 (1.5402–1.5413)	–
		E	39.17–39.20 (1.5421–1.5433)	
		F	39.22–39.25 (1.5441–1.5453)	
		G	39.27–39.30 (1.5461–1.5472)	

(cont'd)

Standards and Service Limits (cont'd)

Automatic Transmission (C9) — Section 15

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
	Thrust washer thickness (mainshaft 1st gear L side)	1.45–1.50 (0.057–0.059)	1.4 (0.055)
	Mainshaft 1st gear collar length	22.50–22.55 (0.8858–0.8878)	—
	Mainshaft 1st gear collar flange thickness	2.5–2.6 (0.098–0.102)	Wear or damage
	Countershaft reverse gear collar length	12.00–12.05 (0.472–0.474)	—
	Countershaft reverse gear collar flange thickness	2.45–2.50 (0.096–0.098)	Wear or damage
	Countershaft 1st gear collar length	11.0–11.1 (0.433–0.437)	—
	Countershaft 1st gear collar flange thickness	2.4–2.6 (0.095–0.102)	Wear or damage
	Diameter of countershaft one-way clutch contact area	74.414–74.440 (2.9297–2.9307)	Wear or damage
	Diameter of parking gear one-way clutch contact area	57.755–57.768 (2.2738–2.2743)	Wear or damage
	Mainshaft and countershaft feed pipe O.D. (at 20 mm from end)	7.97–7.98 (0.3138–0.3142)	7.95 (0.31)
	Mainshaft sealing ring 32 mm thickness	1.980–1.995 (0.780–0.785)	1.8 (0.071)
	Mainshaft bushing I.D.	6.018–6.030 (0.2369–0.2374)	6.045 (0.238)
	Mainshaft bushing I.D.	9.000–9.015 (0.3543–0.3549)	9.03 (0.356)
	Countershaft bushing I.D.	8.000–8.015 (0.3150–0.3156)	8.03 (0.316)
	Mainshaft sealing ring groove width	2.025–2.060 (0.0797–0.0811)	2.08 (0.082)
Regulator valve body	Sealing ring contact area diameter	32.000–32.025 (1.2598–1.2608)	32.05 (1.26)
Shifting device and parking brake control	Reverse shift fork thickness	5.9–6.0 (0.232–0.236)	5.4 (0.21)
	Parking brake ratchet pawl	—	Wear or other defect
	Parking gear	—	Wear or other defect
	Throttle cam stopper	18.5–18.6 (0.728–0.732)	—
Servo body	Shift fork shaft bore I.D. A	14.000–14.005 (0.5512–0.5514)	—
	B	14.006–14.010 (0.5514–0.5516)	—
	C	14.011–14.015 (0.5516–0.5518)	—
	Shift fork shaft valve bore I.D.	37.000–37.039 (1.4567–1.4582)	37.045 (1.4583)
Valve body	Oil pump gear side clearance	0.03–0.05 (0.0012–0.0020)	0.07 (0.003)
	Oil pump gear-to-body clearance	Drive: 0.040–0.265 (0.0094–0.0104)	—
		Driven:0.125–0.175 (0.0049–0.0069)	—
	Stator camshaft needle bearing bore I.D.	24.000–24.021 (0.9449–0.9457)	Wear or damage
	Stator camshaft needle bearing contact and O.D.	26.000–26.013 (0.10236–1.0241)	Wear or damage
	Oil pump driven gear I.D.	14.016–14.034 (0.5518–0.5525)	Wear or damage
	Oil pump shaft O.d.	13.980–13.990 (0.5503–0.5507)	Wear or damage

Defferential — Section 16

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Ring gear	backlash	0.14–0.20 (0.006–0.008)	0.25 (0.010)
Differential carrier	Pinion shaft bore diameter	18.000–18.018 (0.7087–0.7094)	18.1 (0.71)
	Carrier-to-pinion shaft clearance	0.016–0.052 (0.0006–0.0020)	0.1 (0.004)
	Driveshaft bore diameter	28.000–28.021 (0.0006–0.0020)	—
	Carrier-to-driveshaft clearance	0.025–0.066 (0.0010–0.0026)	0.12 (0.005)
	Side clearance	0.10–0.20 (0.004–0.008)	0.15 (0.006)
Differential pinion gear	Backlash	0.05–0.15 (0.002–0.006)	Selection with 8 types of washers
	Pinion gear bore diameter	18.041–18.061 (0.7103–0.7111)	—
	Pinion gear-to-pinion shaft clearance	0.057–0.093 (0.0022–0.0037)	0.15 (0.006)

Driveshaft — Section 17

Unit: mm (in.)

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Driveshaft (B20A1 Engine)	Right and Left boots	As installed	498–502.2 (19.6–19.8)	
Driveshaft (A20A4 Engine)	Right boot Left boot	As installed As installed	506.0–510.5 (19.9–20.1) 805.0–809.5 (31.7–31.9)	– –
Driveshaft (ET Engine)	Right boot Left boot	As installed As installed	514.0–518.5 (20.2–20.4) 809.0–813.5 (31.9–32.0)	– –

Steering - Section 18

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Steering wheel	Play Pinion-starting torque N-m (kg-m, lb-ft)	10.0 (0.39) Max. 0.5–1.7 (0.05–0.17, 0.36–1.20)	– –

Power Steering — Section 19

	MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Steering wheel	Play Steering assist N (kg, lb)	10 (0.39) Max. 18 (1.8, 3.97)	– –
Power steering	Pump pressure with valve closed (Oil temp./ speed: 40°C (104°F) min/idle. Do not run for more than 5 seconds) kPa (kg/cm^2, psi)	7845–8826 (80–90, 1138–1280)	–
	Fluid capacity — Reservoir At change	0.5 ℓ (0.53 US qt., 0.44 Imp. qt.) approx 1.5 ℓ (1.6 US. qt., 1.3 imp. qt.)	– –

Suspension - Section 20

	MEASUREMENT			STANDARD (NEW)	SERVICE LIMIT
Wheel alignment	Camber			Front: 0°00′ ± 1 / Rear: 0°00′ ± 30′	
	Toe-in			Front: 0 ± 3 (0 ± 0.118) / Rear: 2 ± 2 (0.079 ± 0.079)	
	Kingpin incination			Front: 6°50′	
	Steering angle	R/L	Inside Outside	38°30′ ± 2° 30°00′ ± 2°	
	Side slip		Front Rear	0 ± 3 2 ± 2	
Wheel	Rim runout	Steel	Axial Radial	0–1.0 (0–0.039) 0–1.3 (0–0.051)	2.0 (0.08) 1.5 (0.06)
		Alumminum	Axial Radial	0–0.7 (0–0.028) 0–1.0 (0–0.039)	2.0 (0.08) 1.5 (0.06)
Wheel bearing	Front wheel bearing axial play Rear wheel bearing axial play			0–0.05 (0–0.002) 0–0.05 (0–0.002)	– Adjustable by the spindle nut

(cont'd)

Standard and Srvice Limit (cont'd)

Brake — Section 21

	MEASUREMENT		STANDARD (NEW)	SERVICE LIMIT
Parking brake lever	Play in stroke 200N (20 kg, 44 lbs)		To be locked when pulled 4—8 notches	
Foot brake pedal	Pedal height Free play		176 (6.9) to floor 1—5 (0.04—0.20)	— 5 (0.20)
Master cylinder	Piston-to-push rod clearance	 with A.L.B.	0—0.4 (0—0.016) 0.2—0.6 (0.008—0.024)	— —
Disc brake	Disc thickness Disc runout Disc parallelism Pad thickness	Front Rear Front Rear	19.0 (0.75) 2000: 21.0 (0.83) 10.0 (0.39) — — 9.5 (0.37) 2000: 11.0 (0.43) 8.0 (0.31)	17.0 (0.67) 2000: 19.0 (0.75) 8.0 (0.31) 0.15 (0.006) 0.015 (0.0006) 3.0 (0.11) 1.6 (0.06)
Brake booster	Characteristics	Vacuum (mm Hg)	Pedal pressure kg (lbs)	Line Pressure kg/cm² (psi)
		0 300 500	20 (44) 20 (44) 20 (44)	12.0 (171) min 48.6 (691) min 72.9 (1.037) min

Engine Electrical (B20A1 and A20A4 Engine) — Section 26, 27, 28

	MEASUREMENT		STANDARD (NEW)		
Ignition coil	Rated voltage Insulation resistance		12 Volts 10,000 hms min.		
	Performance: Make sure strong sparks jump across electrodes (3-point tester)				
	Voltage	Camshaft	Secondary Voltage	3-point gap	Condition
	6V 12V	75 min^{-1} (rpm) 3,000 min^{-1} (rpm)	430±4kV 22±4kV	15—21 mm (0.59—0.83) 13—19 mm (0.51—0.75)	 At 80°C (176°F)
Ignition wire	Resistance		25,000 ohms max.		
Spark plug	Type	standard	See page 26-11		
	Gap		1.0—1.1 (0.039—0.043)		
Ignition timing	At idling		See page 26-8		
Battery	Lighting capacity (20-hour ratio) Starting capacity (5-second ratio)		50 Ampere Hours 8.4V minimum at 300 Ampere draw		
Alternator	Output at no-load Output		14 V at 1,000 min^{-1} (rpm) max. 14V/70A at 5,500 min^{-1} (rpm) max.		
	Coil resistance (rotor) Slip ring O.D. Brush length Brush spring tension		2.8—3.0 ohms 32.5 (1.28) 10.5 (0.41) 300—500 g (10.6—18.6 oz)		±0.1 ohms 32.1 (1.26) 5.5 (0.22) —

Starting motor	MEASUREMENT	1.0 KW, 1.4 KW (ND)		1.0 KW, 1.4 KW (MITSUBA)	
		STANDARD (NEW)	SERVICE LIMIT	STANDARD (NEW)	SERVICE LIMIT
	Mica depth	0.4—0.8 (0.016—0.031)	0.2 (0.008)	0.5—0.8 (0.020—0.031)	0.2 (0.008)
	Commutator runout	0—0.02 (0.0008)	0.05 (0.020)	0—0.02 (0.0008)	0.05 (0.020)
	Commutator O.D.	30.0 (1.18)	29.0 (1.14)	28.0 (1.10)	27.5 (1.08)
	Brush length	1.4 KW: 14.0 (0.55) 1.0 KW: 13.0 (0.51)	1.4 KW: 10.0 (0.39) 1.0 KW: 8.5 (0.33)	1.4 KW: 14.5 (0.57) 1.0 KW	1.4 KW: 9.3 (0.37) 1.0 KW:
	Spring pressure (new)	1.7 kg (3.7 lb)	—	2.1 kg (4.6 lb)	—

Engine Electrical (ET Engine) — Section 26, 27, 28

Unit: mm (in.)

	MEASUREMENT	STANDARD (NEW)		
Ignition coil	Rated voltage	12 Volts		
	Insulation resitance	10,000 hms min.		
	Performance: Make sure strong sparks jump across electrodes (3-point tester)			
	Voltage / Camshaft	Secondary Voltage	3-point gap	Condition
	6V / 75 min^{-1} (rpm)	26±4kV	11—17 mm (0.43—0.67)	
	12V / 3,000 min^{-1} (rpm)	17±4kV	9—13 mm (0.35—0.51)	At 80°C (176°F)
Ignition wire	Resistance	25,000 ohms max.		
Spark plug	Type	See page 26-11		
	Gap	See page 26-11		
Ignition timing	At idling	See page 26-8		
Battery	*Lighting capacity (20-hour ratio)*	40 45, 47 or 50 Ampere Hours		
	Starting capacity (5-second ratio)	8V minimum at 150 Ampere draw		
Alternator	Output at no-load	14 V at 850 min^{-1} (rpm) max.		
	Output	14V/60A at 3,500 min^{-1} (rpm) max.		
	Coil resistance (rotor)	2.8—3.0 ohms		±0.1 ohms
	Slip ring O.D.	32.5 (1.28)		32.1 (1.26)
	Brush length	15.5 (0.61)		5.3 (0.21)
	Brush spring tension	300—500 g (10.6—17.6 oz)		—
Voltage relay	*Rated voltage*	4.5—5.8V		—
	Relay point gap	0.4—1.2 (0.02—0.05)		—
	Contact spring deflection (pulled in)	0.2—0.6 (0.01—0.02)		—
Voltage regulator	Regulated voltage	13.5—14.5 V		—
	Armature gap	0.5 (0.02) max.		—
	Point gap	0.4—1.2 (0.02—0.05)		—
	Contact spring deflection	0.2—0.6 (0.01—0.02)		—
	Angle gap	0.5 (0.02) max.		—

Starting motor	MEASUREMENT	1.0 KW, 1.4 KW (ND)		1.0 KW, 1.4 KW (MITSUBA)	
		STANDARD (NEW)	SERVICE LIMIT	STANDARD (NEW)	SERVICE LIMIT
	Mica depth	0.5—0.8 (0.020—0.031)	0.2 (0.008)	0.5—0.8 (0.020—0.031)	0.2 (0.008)
	Commutator runout	0—0.02 (0.0008)	0.05 (0.020)	0—0.02 (0.0008)	0.05 (0.020)
	Commutator O.D.	30.0 (1.18)	29.0 (1.14)	30.0 (1.18)	29.0 (1.14)
	Brush length	13.0 (0.51)	8.5 (0.33)	15.0 (0.59)	10.0 (0.39)
	Spring pressure	1.7 kg (3.7 lb)	—	21 kg (46 lb)	—

Design Specifications

2000

	ITEMS		METRIC	ENGLISH	NOTES
DIMENSIONS	Overall Length		4,375 mm	172.2 in.	
			4,385 mm	172.6 in.	KW
	Overall Width		1,690 mm	66.5 in.	
	Overall Height		1,295 mm	51. 0 in.	
	Wheelbase		2,450 mm	96.5 in.	
	Tread F/R		1,470/1,470 mm	57.9/57.9 in.	
	Ground Clearance		150 mm	5.9 in.	
	Seating Capacity		Total 4		
			2		KS
WEIGHTS	Curb Weight	EC	1,060—1,065 kg	2,337—2,348 lb.	5-MT: 5 speed manual transmission 4-AT: 4 speed Automatic transmission with torque converter
		Other tipes	1,050—1,105 kg	2,315—2,436 lb.	
	Max. Permissible Weight (EC)		1535 kg	3,385 lb.	
	Max. Loaded Vehicle Weight (ADR)	5-MT	1,411 kg	3,111 lb.	
		4-AT	1,431 kg	3,155 lb.	
	Carrying (loading) Weight Capacity		45 kg	99 lb.	
ENGINE	Type	B20A1	Water cooled, 4-cycle D.O.H.C		
		A20A4	Water cooled, 4-cycle S.O.H.C		
	Cylinder Arrangement		4-cylinder in line, transverse		
	Bore and Stroke	B20A1	81.0 x 95 mm	3.18 x 3.74 in.	
		A20A4	82.7 x 91.0 mm	3.26 x 3.58 in.	
	Displacement	B20A1	1,958 cm^3	120 cu.in.	
		A20A4	1,955 cm^3	119 cu.in.	
	Compression Ratio	B20A1	9.5:1		
		B20A1	9.4:1		KX
		A20A4	8.8:1		
	Valve Train	B20A1	Timing belt driven, double overhead camshaft		
		A20A4	Timing belt driven, single overhead camshaft		
	Lubrication System		Trochoid pump		
	Fuel Required		Leaded gasoline with 97 research octane number or higher.		EC (without cata), KY
			Unleaded gasoline with 91 research octane number or higher.		KQ, KX
			Leaded or unleaded gasoline with 91 research octan number or higher		KS
	Engine Wet Weight	B20A1	122 kg	269 lb.	Except radiator, transmission
		A20A4	123 kg	271 lb.	Except radiator, transmission
TRANSMISSION	Clutch	5-MT	Single plate dry, diaphragm spring.		
		4-AT	Torque Converter		
		5-MT	5 speeds forward, 1 speed reverse, constant mesh.		
		4-AT	4 speeds forward, 1 speed reverse with torque converter		

		5-MT	5-MT with A20A4	4-AT with A20A4
Primary Reduction		1.000	1.000	1.000
Gear Ratio	I	3.166	3.181	2.529
	II	1.857	1.842	1.481
	III	1.259	1.250	1.030
	IV	0.967	0.937	0.700
	V	0.794	0.771	—
	Reverse	3.000	3.000	1.954

	Final Reduction	5-MT	Single helical gear, 4.066	
		4-AT	Single helical gear, 3.875	
	Clutch Facing Area		176 cm^2	27.3 sq.in.

	ITEMS		METRIC	ENGLISH	NOTES
STEERING SYSTEM	Type		Rack and pinion		
	Overall Ratio		14.9 : 1		
	Turns, lock-to-lock		2.84		
	Steering Wheel Dia.		370 mm	14.6 in.	
	Power Steering Oil Capacity		1.5 lit. 1.6 US. qt., 1.3 Imp qt.		
	Power Steering Oil		HONDA Genuine Power Steering Fluid		
SUSPENSION SYSTEM	Type, Front		Independent by double wishbones, coil springs		
	Type, Rear		Independent, Mac' Pherson strut, coil springs		
	Shock Absorber	Front/Rear	Telescopic, hydraulic		
WHEEL ALIGNMENT	Wheel Alignment				
	Camber	Front	0°		
		Rear	0°		
	Caster	Front	0°		
	Toe-in	Front	0 mm	0 in.	
		Rear	2 mm	0.080 in.	
	Kingpin Inclination		6°51'		
BRAKE SYSTEM	Type, Front		Self-adjusting power assisted ventilated disc brake type		
	Type, Rear		Self-adjusting power assisted disc brake type		
	Lining Surface Area:	Front/Rear	49.2/21.0 cm^2	7.7/3.3 sq. in.	(Pad)
	Effective Disc Dia.	Front	207 mm	8.1 in.	
		Rear	208 mm	8.2 in.	
	Parking Brake Kind and Type		Mechanical actuating, rear two wheel brakes		
TIRES	Front/Rear		195/60 R14 85H		
		KQ	185/70 R13 86H		
		KY	185/70HR13		
	Spare		T105/70D14		
ELECTRICAL SYSTEM	Battery		12V – 45 AH, 47 AH		
	Starting Motor		12V – 1.4 KW, 1.0 KW		
	Generator		12V – 65 A		
	Main Fuse		65 A x 1, 35 A x 1		
	Fuses		20 A x 4, 15 A x 7, 10 A x 7		
	Headlights		12V – 60/55 W		
	Turn Signal Lights	Front	12 V – 21 W		
		Rear	12 V – 21 W		
	Stop/Tailights		12 V – 21/5 W		
	Back-up-Lights		12 V – 21 W		
	License Plate Lights		12 V – 5 W		
	Interior Light		12 V – 8 W		
	Trunk Light		12 V – 3.4 W		
	Glove box Light		12 V – 3.4 W		
	Illumination Lights		12 V – 3.4 W		
	Gauge Illumination Lights		14 V – 1.12 W		
	Indicator and Warning Lights		14 V – 1.4 W, 12 V – 1.12 W		
	Rear fog light (EC)		12 V – 21 W		

(cont'd)

Design Specifications

1800 European Model

	ITEMS		METRIC	ENGLISH	NOTES
DIMENSIONS	Overall Length		4,295 mm	169.1 in.	
			4,320 mm	170.1 in.	KW
	Overall Width		1,690 mm	66.5 in.	
	Overall Height		1,295 mm	51. 0 in.	
	Wheelbase		2,450 mm	96.5 in.	
	Tread Front/Rear		1,470/1,470 mm	57.9/57.9 in.	
	Ground Clearance		153 mm	6.0 in.	
	Seating Capacity		Total 4		
			2		KS
	Overhang Front/Rear		890/955 mm	35.0/37.6 in.	Include bumper
			915/955 mm	36.0/37.6 in.	KW
WEIGHTS	Curb Weight				
	4-AT	STD	980 kg	2,161 lb.	KE
			990 kg	2,183 lb.	KS & FINLAND
			985 kg	2,172 lb.	Other types
		EX	995 kg	2,194 lb.	KE & KX
			1,000 kg	2,205 lb.	KS
			1,010 kg	2,227 lb.	FINLAND
			1,005 kg	2,216 lb.	Other types
	5-MT	STD	970 kg	2,139 lb.	KE
			980 kg	2,161 lb.	KS & FINLAND
			975 kg	2,150 lb.	Other types
		EX	985 kg	2,172 lb.	KE & KX
			990 kg	2,183 lb.	KS
			1,000 kg	2,205 lb.	FINLAND
			995 kg	2,194 lb.	Other types
	Weight Distribution Front/Rear				
	4-AT	STD	595/385 kg	1,312/849 lb.	KE
			605/385 kg	1,334/849 lb.	KS & FINLAND
			595/390 kg	1,312/860 lb.	Other types
		EX	600/395 kg	1,323/871 lb.	KE & KX
			605/395 kg	1,334/871 lb.	KS
			610/400 kg	1,345/882 lb.	FINLAND
			605/400 kg	1,334/882 lb.	Other types
	5-MT	STD	585/385 kg	1,290/849 lb.	KE
			595/385 kg	1,312/849 lb.	KS & FINLAND
			585/390 kg	1,290/860 lb.	Other types
		EX	590/395 kg	1,301/871 lb.	KE & KX
			595/395 kg	1,312/871 lb.	KS
			600/400 kg	1,323/882 lb.	FINLAND
			595/400 kg	1,312/882 lb.	Other types
			For power steering types 2.4 kg (27 lb.) anti-lock braking device 11.5 kg (25 lb.) has to be added if installed		
	Gross Weight				
	4-AT	STD	1,280 kg	2,822 lb.	KE
			1,140 kg	2,514 lb.	KS
			1,290 kg	2,844 lb.	FINLAND
			1,285 kg	2,833 lb.	Other types
		EX	1,295 kg	2,855 lb.	KE & KX
			1,150 kg	2,536 lb.	KS
			1,310 kg	2,889 lb.	FINLAND
			1,305 kg	2,878 lb.	Other types

	ITEMS		METRIC	ENGLISH	NOTES
WEIGHTS	Gross Weight				
		5-MT STD	1,270 kg	2,800 lb.	KE
			1,130 kg	2,492 lb.	KS
			1,280 kg	2,822 lb.	FINLAND
			1,275 kg	2,811 lb.	Other types
		EX	1,285 kg	2,833 lb.	KE & KX
			1,140 kg	2,514 lb.	KS
			1,300 kg	2,867 lb.	FINLAND
			1,295 kg	2,855 lb.	Other types
	Max. permissible Weight (EC)		1,490 kg	3,285 lb.	
	Carrying (loading) Weight Capacity		45 kg	99 lb.	
ENGINE	Type		Water cooled, 4-cycle S.O.H.C.		
	Cylinder Arrangement		4-cylinder in line, transverse		
	Bore and Stroke		80 x 91 mm	3.15 x 3.8 in.	
	Displacement		1,829 cm^3	112 cu. in.	
	Compression Ratio		9.5 : 1		
			9.1 : 1		KS, KX, KT
	Carburetor Type		Side draft		
	Carburetor, Throtle Bore Dia.		34 mm	1.34 in.	
	Valve Train		Timing belt driven, single overhead camshaft		
	Lubrication System		Trochoid pump		
	Fuel Required		Leaded grade gasoline with 97 research octane number or higher.		
			Leaded or unleaded gasoline with 91 research octane number or higher.		KS, KX, KT
	Engine Weight		108 kg	238 lb.	Included oil and coolant
TRANSMISSION	Clutch	4-AT	Torque Converter		
		5-MT	Single plate dry, diaphragm spring		
	Transmission	4-AT	Torque converter with lock up clutch.		
		5-MT	5 speeds forward, 1 speed reverse, constant mesh.		
			5-MT	4-AT	
	Primary Reduction		1.000	1.000	
	Gear Ratio	I	3.181	2.380	
		II	1.944	1.560	
		III	1.250	1.032	
		IV	0.933	0.777	
		V	0.757	—	
		Reverse	3.000	1.954	
	Final Reduction	4-AT	Single helical gear, 3.875		
		5-MT	single helical gear, 4.071		
	Clutch Facing Area		160 cm^2	24.8 sq.in.	
STEERING SYSTEM	Type		Rack and Pinion		
		Power Steering	Integral		
	Overall Ratio		17.1 : 1		
		Power Steering	14.9 : 1		
	Turns, lock-to-lock		3.25		
		Power Steering	2.84		
	Steering Wheel Dia.		370 mm	14.6 in.	
	Power Steering	Tank Capacity	1.5 lit.	1.6 US.qt. 1.3 Imp.qt.	
	Power Steering	Fluid	HONDA Genuine Power Steering Fluid		
SUSPENSION SYSTEM	Type, Front		Independent by double wishbones, coil spring.		
	Type, Rear		Independent, Mac'Pherson strut, coil spring.		
	Shock Absorber Front/Rear		Telescopic hydraulic		
WHEEL ALIGNMENT	Wheel Alignment				
	Camber	Front	0°		
		Rear	0°		
	Caster	Front	0°		
	Toe-in	Front	0 mm	0 in.	
		Rear	in 2 mm	0.008 in.	
	Kingpin Inclination		6°51'		

(cont't)

Design Specifications

1800 European Model (cont'd)

	ITEMS		METRIC	ENGLISH	NOTES
BRAKE SYSTEM	Type		Front ventilated and rear non-ventilated disc brake with or without anti-lock braking device. fydraulic, four-wheel brake, servo assisted		
	Lining Surface Area	Front/Rear	35.8/20.9 cm^2	5.5/3.2 sq. in.	
	Effective Disc dia.	Front/Rear	190/208 mm	7.5/8.2 in.	
	Parking Brake Kind and Type		Mechanically pressing the disk with pads, rear two wheel brakes.		
TIRES	Tire Size	Front and Rear	185/70 HR 13, 185/70 R 13 86H 185/70 R 13 86H		KE, KF, KS-EX, KW-EX KZ-EX
ELECTRICAL SYSTEM	Battery		12 V – 47 AH 12 V – 45 AH		KE
	Starting Motor		12 V – 1.4 KW		
	Generator		12 V – 60 A		
	Main Fuse		65 A x 1,35 A x 2		
	Fuses		20 A x 4,15 A x 12, 10 A x 8		
	Headlights		12 V – 60/55 W		
	Day Time Running Lamp		12 V – 21 W		NORWAY, FILAND
	Passing Lights		12 V – 55 W		Austrian model
	Turn Signal Lights	Front	12 V – 21 W		
		Rear	12 V – 21 W		
		Side	12 V – 5 W		
	Licence plate Lights		12 V – 5 W		
	Position Light		12 V – 5 W		
	Back-up Lights		12 V – 21 W		
	Stop/Taillights		12 V – 21/5 W		
	Rear Fog Light		12 V – 21 W		
	Interior Light		12 V – 8 W		
	Trunk Light		12 V – 3.4 W		
	Other dash Lights (heater, radio, cigarette lighter, ashtray)		12 V – 3.4/1.4 W		
	Gauge Lights		12 V – 3.4/1.2 W		

1800 KY Model

NOTE: Only the design specifications for models below different from those of the European model are listed. For the other items not given here, refer to the European Model design specification.

	ITEMS	METRIC	ENGLISH	NOTES
WEIGHTS	Curb Weight 4—AT	1,040 kg	2,293 lb.	
	5—MT	1,030 kg	2,271 lb.	
	Weight Distribution Front/Rear			
	4—AT	635/405 kg	1,400/893 lb.	
	5—MT	625/405 kg	1,378/893 lb.	
	Gross Weight 4—AT	1,340 kg	2,955 lb.	
	5—MT	1,330 kg	2,933 lb.	
	Carrying (loading) Weight Capacity	45 kg	100 lb.	
ENGINE	Compression Ratio	9.5 : 1		
	Fuel Required	Leaded gasoline with 97 research octane number or higher.		
STEERING SYSTEM	Overall Ratio	14.9 : 1		
	Turns, lock-to-lock	2.84		
BREAK SYSTEM	Type	Front ventilated and rear non-ventilated disc brake, hydraulic, four-wheel brake, servo assisted.		
TIRES	Tire Size Front and Rear	185/70 SR13		
ELECTRICAL SYSTEM	Battery	12 V — 40 A		
	Starting Motor	12 V — 1.0 KW		
	Main Fuse	65 A x 1, 35 A x 1		
	Fuses	20 A x 4, 15 A x 11, 10 A x 8		

1800 General Export

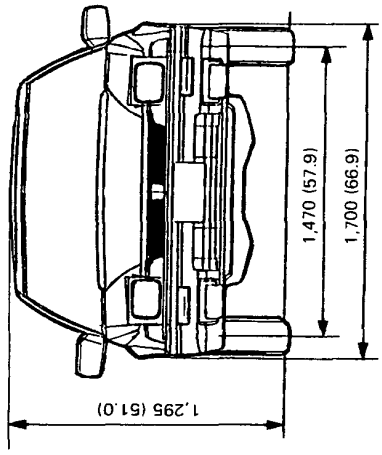
NOTE: Only the design specifications for models below different from those of the European model are listed. For the other items not given here, refer to the European Model design specification.

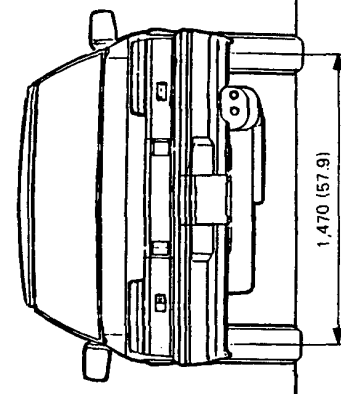
	ITEMS		METRIC	ENGLISH	NOTES
DIMENSION	Curb Weight 4—AT	STD	980 kg	2,161 lb.	
		EX	1,005 kg	2,216 lb.	
	5—MT	STD	970 kg	2,139 lb.	
		EX	995 kg	2,194 lb.	
	Weight Distribution				
	4—AT	STD	590/390 kg	1,301/860 lb.	
		EX	605/400 kg	1,334/882 lb.	
	5—MT	STD	580/390 kg	1,279/860 lb.	
		EX	595/400 kg	1,312/882 lb.	
	Gross Weight 4—AT	STD	1,280 kg	2,822 lb.	
		EX	1,305 kg	2,875 lb.	
	5—MT	STD	1,270 kg	2,800 lb.	
		EX	1,295 kg	2,855 lb.	
ENGINE	Compression Ratio		9.1 : 1		
	Fuel Required		Leaded or unleaded gasoline with 91 research octane number or higher.		
STEERING SYSTEM	Battery		12 V — 40 A		
	Starting Motor		12 V — 1.0 KW		

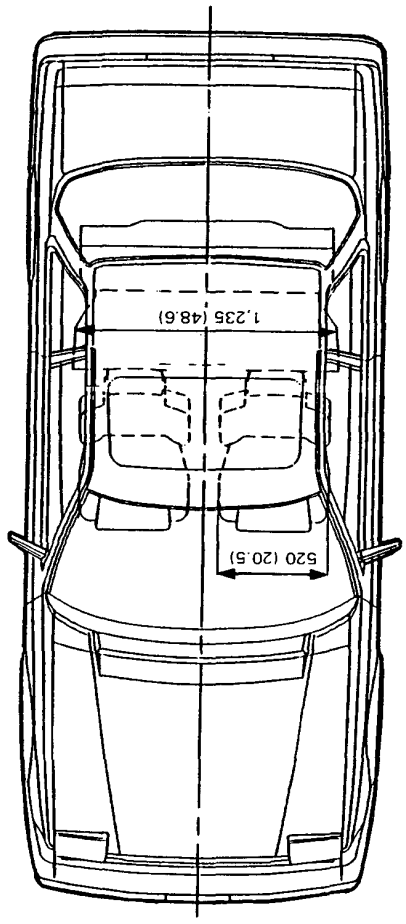
Body Specifications

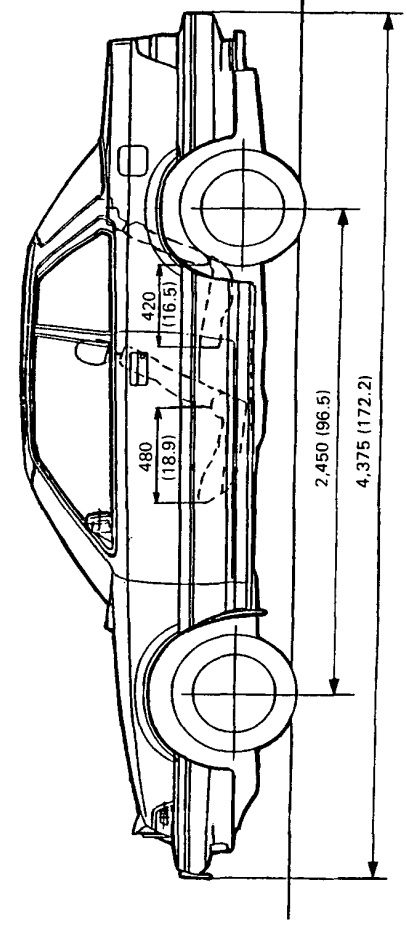
2000 Model

Unit: mm (in.)





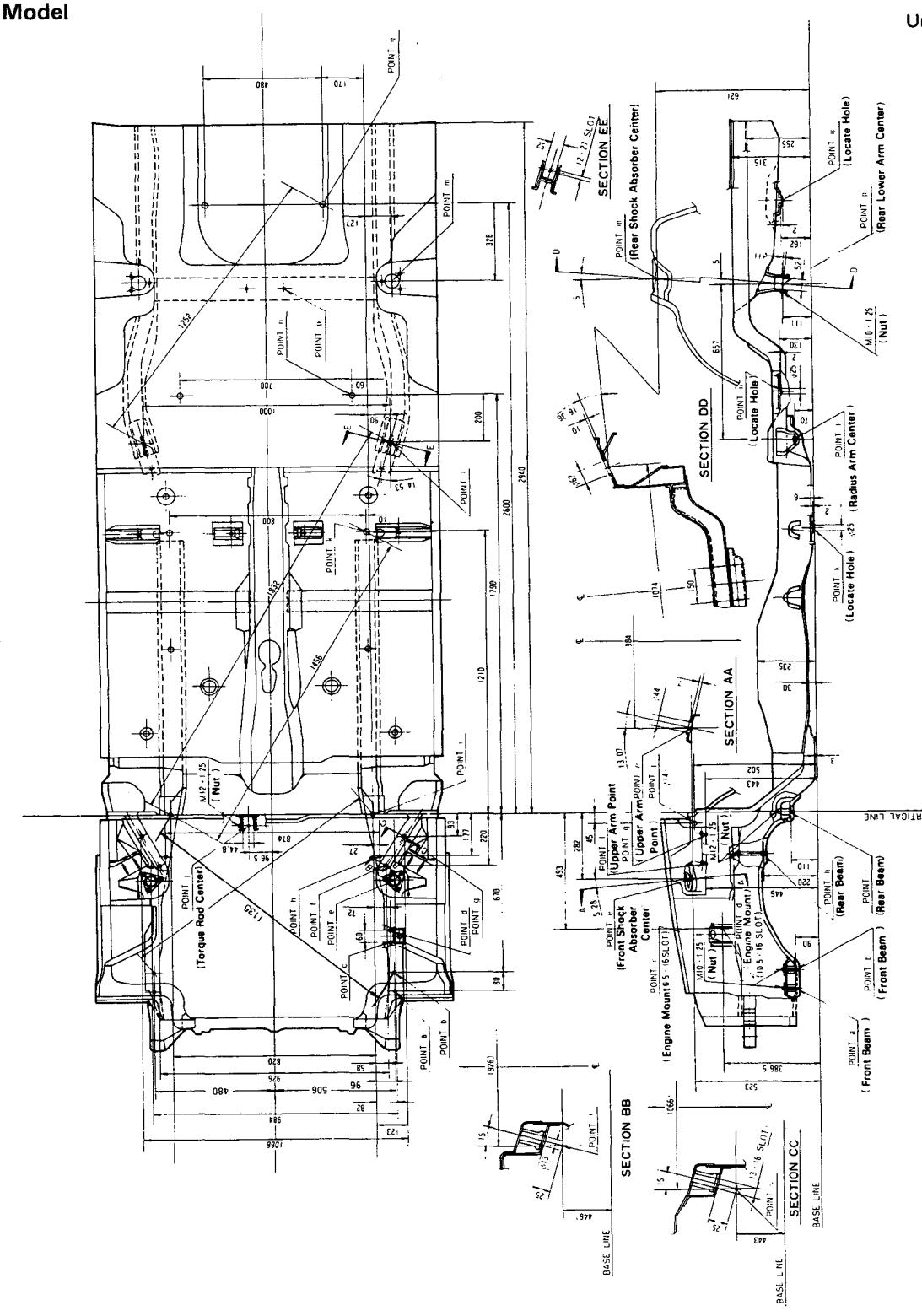




Frame Repair Chart

2000 Model

Unit: mm



Maintenance

Required Maintenance Schedule

	SERVICE AT THE INTERVAL OF LISTED KM (MILES) OR MONTHS, WHICHEVER OCCURS FIRST.						
	ITEMS	x 1,000 km	20	40	60	80	100
		x 1,000 miles	12	24	36	48	60
		months	12	24	36	48	60
	IDLE SPEED AND IDLE CO		I	I	I	I	I
	VALVE CLEARANCE		I	I	I	I	I
	ALTERNATOR DRIVE BELT			I		I	
■	ENGINE OIL AND OIL FILTER		Replace every 10,000 km (6,000 miles) or 6 months				
■	TRANSMISSION OIL			R		R	
■	RADIATOR COOLANT					R*1	
	COOLING SYSTEM, HOSES AND CONNECTIONS			I		I	
	E.G.R. SYSTEM (For carburetor type)*2						I
	SECONDARY AIR SUPPLY SYSTEM (For carburetor type)*2						I
	AIR CLEANER ELEMENT		R*4	R	R*4	R	R*4
	FUEL FILTER (Including aux. filter for carburetor type)			R		R	
	INTAKE AIR TEMP. CONTROL SYSTEM (For carburetor type)						I
	TANK, FUEL LINE AND CONNECTIONS			I		I	
	THROTTLE CONTROL SYSTEM (For carburetor type)			I		I	
	CHOKE MECHANISM (For carburetor type)			I		I	
	CHOKE OPENER OPERATION (For carburetor type)						I
	EVAPORATIVE EMISSION CONTROL SYSTEM*3						I
	IGNITION TIMING AND CONTROL SYSTEM			I		I	
	SPARK PLUGS (For cars using leaded gasoline)		R	R	R	R	R
	SPARK PLUGS (For cars using unleaded gasoline)			R		R	
	DISTRIBUTOR CAP AND ROTOR			I		I	
	IGNITION WIRING			I		I	
	CRANKCASE EMISSION CONTROL SYSTEM			I		I	
	BRAKE HOSES, LINES (Includes ALB hoses and pipes for ALB models)		I	I	I	I	I
	BRAKE FLUID (Includes ALB fluid for ALB models)			R		R	
	FRONT BRAKE DISCS AND CALIPERS		I	I	I	I	I
	FRONT BRAKE PADS		Inspect every 10,000 km (6,000 miles) or 6 months				
	REAR BRAKES			I		I	
	PARKING BRAKE		I	I		I	
	CLUTCH RELEASE ARM TRAVEL		I	I	I	I	I
	ENGINE EXHAUST SILENCER, SUSPENSION MOUNTING BOLTS		I	I	I	I	I
	FRONT WHEEL ALIGNMENT		I	I	I	I	I
	STEERING OPERATION, TIE ROD ENDS, STEERING GEAR BOX AND BOOTS		I	I		I	
	REAR WHEEL BEARING*5			I		I	
	REAR WHEEL BEARING GREASE						R
	ALB HIGH PRESSURE HOSES			R		R	
	ALB OPERATION		I	I		I	
	POWER STEERING SYSTEM		I	I	I	I	I
	POWER STEERING PUMP BELT			I		I	
	CATALYTIC CONVERTER HEAT SHIELD						I

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

■ REMARK: Day to day care (such as oil, coolant check and replenishment) should be done practically according to the Owner's Manual.

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

*2 Only for cars using unleaded gasoline

*3 Only for KQ, KY types and for KG type using unleaded gasoline

*4 Except KQ type

*5 Only for 2000

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" include:

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
F: Towing a trailer

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

Condition	Maintenance item	Maintenance operation	Interval
A, B, F	Engine oil and oil filter	R	Every 5,000 km (3,000 miles) or 3 months
A, B, D, E, F	Front brake discs and calipers	I	Every 10,000 km (6,000 miles) or 6 months
A, B, D, E, F	Rear brakes (Only for disc type brakes)	I	Every 20,000 km (12,000 miles) or 12 months
A, B, C, E, F	Clutch release arm travel	I	Every 10,000 km (6,000 miles) or 6 months
B, C, E	Power steering system	I	Every 10,000 km (6,000 miles) or 6 months

Engine

Engine Removal/Installation

B20A1 Engine

WARNING

- **Make sure jacks and safety stands are placed properly (pages 1-6 thru 8), and hoist brackets are attached to correct positions on the engine (page 5-6).**
- **Apply parking brake and block rear wheels, so car will not roll off stands and fall on you while working under it.**

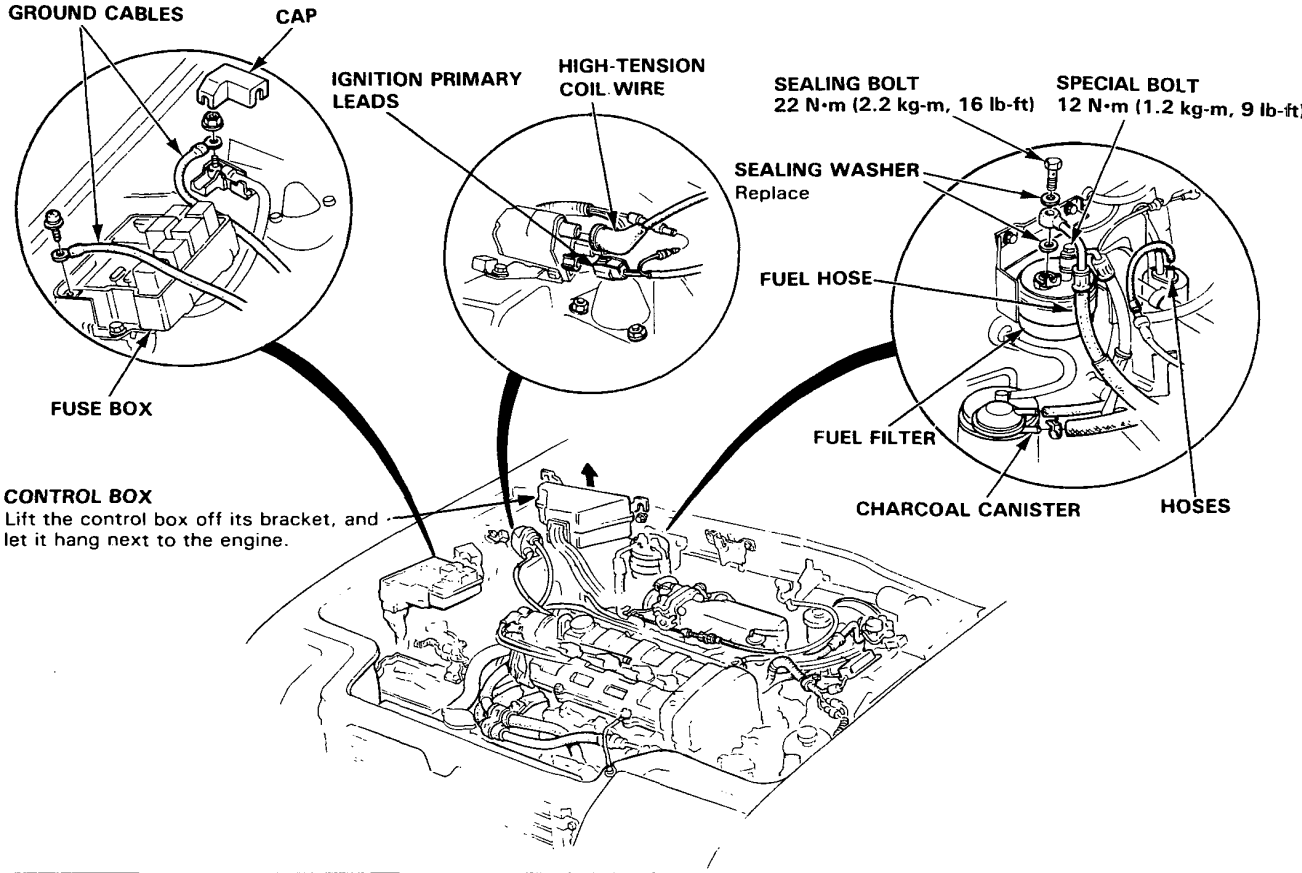
CAUTION: Use fender covers to avoid damaging painted surfaces.

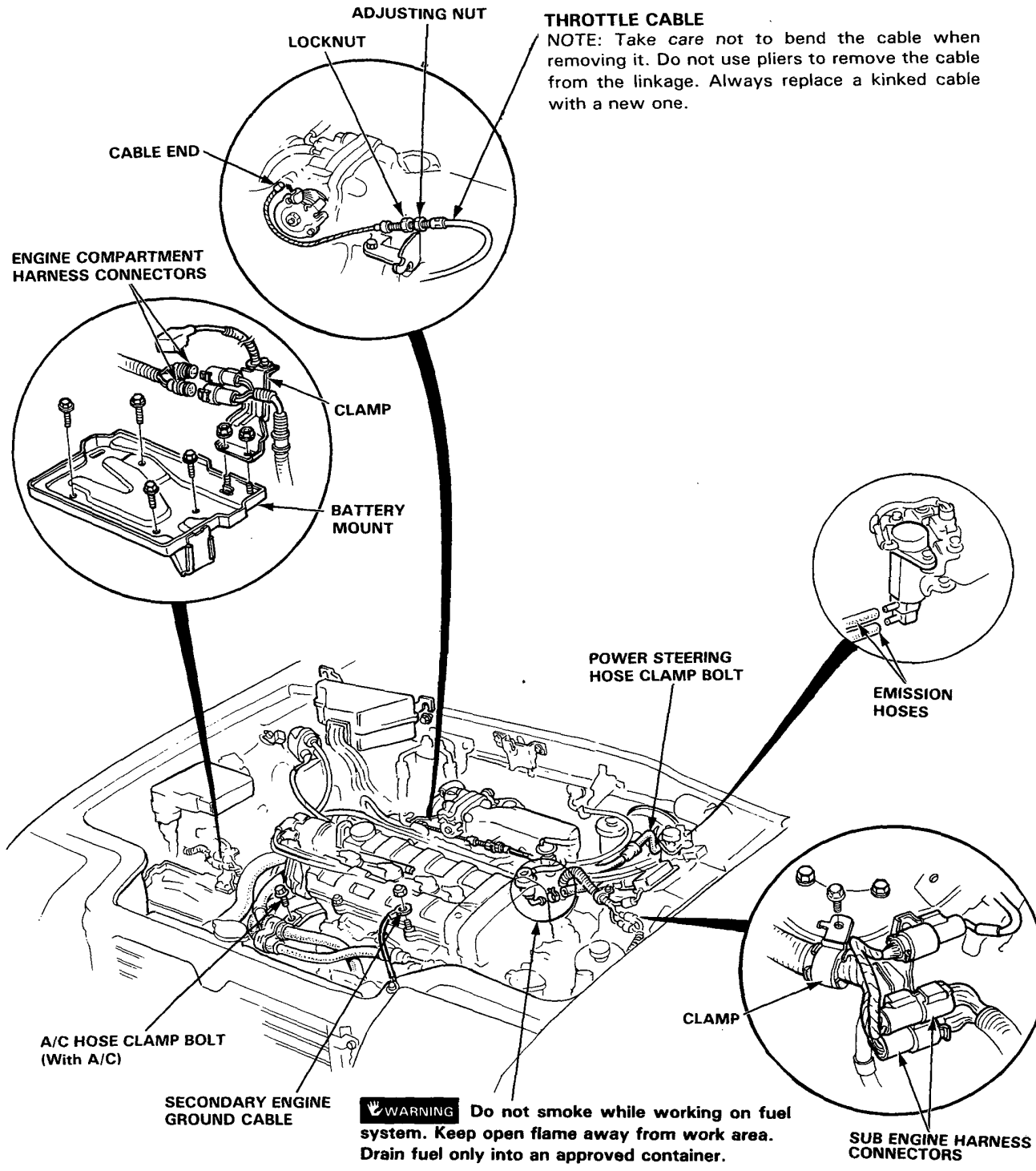
1. Disconnect the battery negative terminal first, then the positive terminal.
2. Remove the air intake duct and air cleaner case.
3. Unbolt the hood brackets and remove the hood.
   CAUTION: Use care when storing the hood to avoid damaging the paint.
4. Drain the engine oil. Remove the oil filler cap to speed draining. Reinstall the drain plug with a new washer.
   CAUTION: Do not re-use old washer.
5. 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 rediator cap to avoid scalding by hot coolant or steam.
6. 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.
7. Relieve fuel pressure.

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

   CAUTION: Before disconnecting the fuel line, fuel pressure should be relieved by loosening the service bolt on the top of the fuel filter while engine is stopped.





THROTTLE CABLE

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.

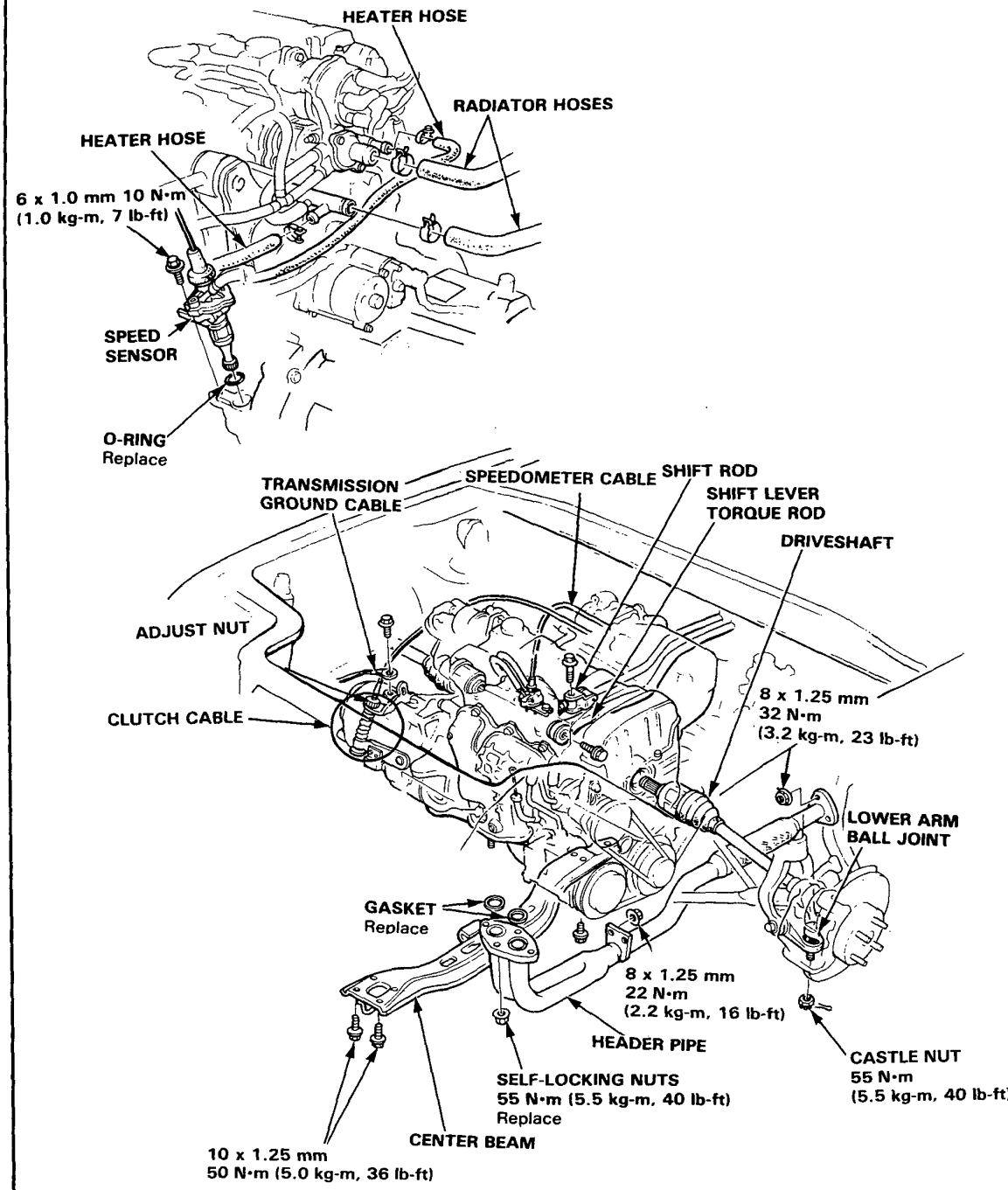
WARNING **Do not smoke while working on fuel system. Keep open flame away from work area. Drain fuel only into an approved container.**

CAUTION: Before disconnecting the fuel line, fuel pressure should be relieved by loosening the service bolt on the top of the fuel filter while engine is stopped.

(Cont'd)

B20A1 Engine

- Remove speed sensor complete with hoses.



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

POWER STEERING PUMP

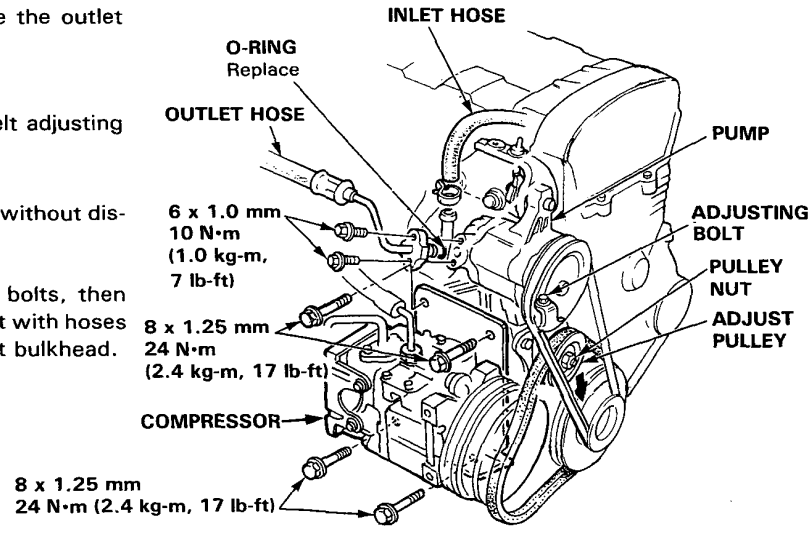
- Disconnect the inlet hose.
- Remove the two bolts then remove the outlet hose.

A/C COMPRESSOR

- Loosen the adjust pulley nut and belt adjusting bolt.

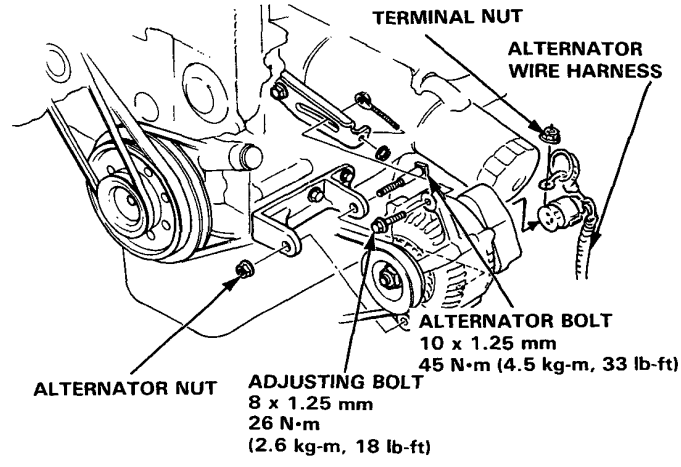
NOTE: The compressor can be moved without discharging the air conditioner system.

- Remove the compressor mounting bolts, then lift the compressor out of the bracket with hoses attached, and wire it up to the front bulkhead.



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.



(Cont'd)

B20A1 Engine

8. Attach a chain hoist to the engine block and raise the hoist just enough to remove slack from chain.

9. Check that the engine/transaxle is completely free of vacuum, fuel, and coolant hoses, and electrical wires.

10. Remove the bolt from the rear torque rod at the engine, then loosen the bolt in the frame mount and swing the rod up out of the way.

11. Raise the engine just enough to let the engine mounting brackets clear the mounting studs, then lower the engine onto the mounts. Shorten the length of the chain from 13 to 7 links on the timing belt side, then raise the engine all the way and remove it from the car.

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

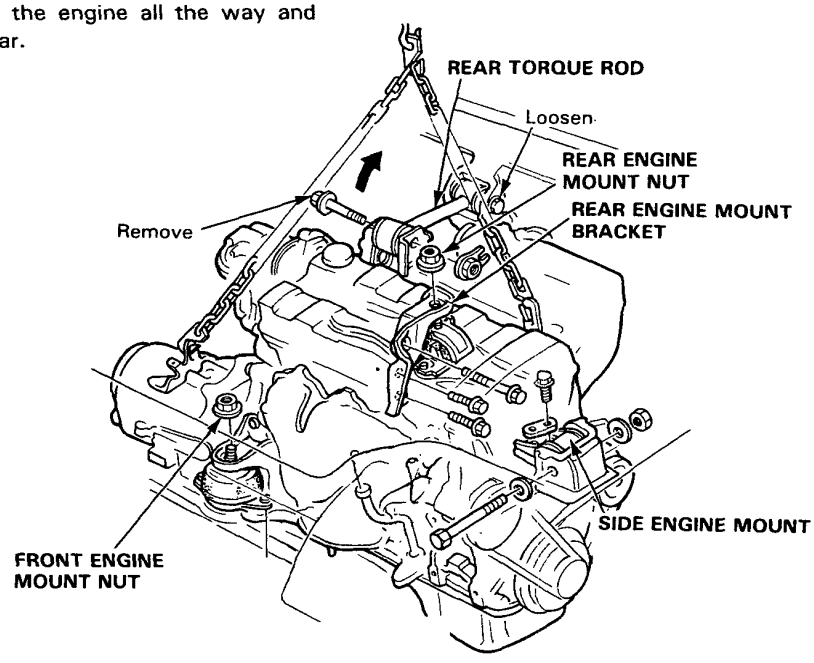
- Torque engine mount bolts in sequence shown on next page.

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 the differential.

CAUTION: Use new spring clips on installation.

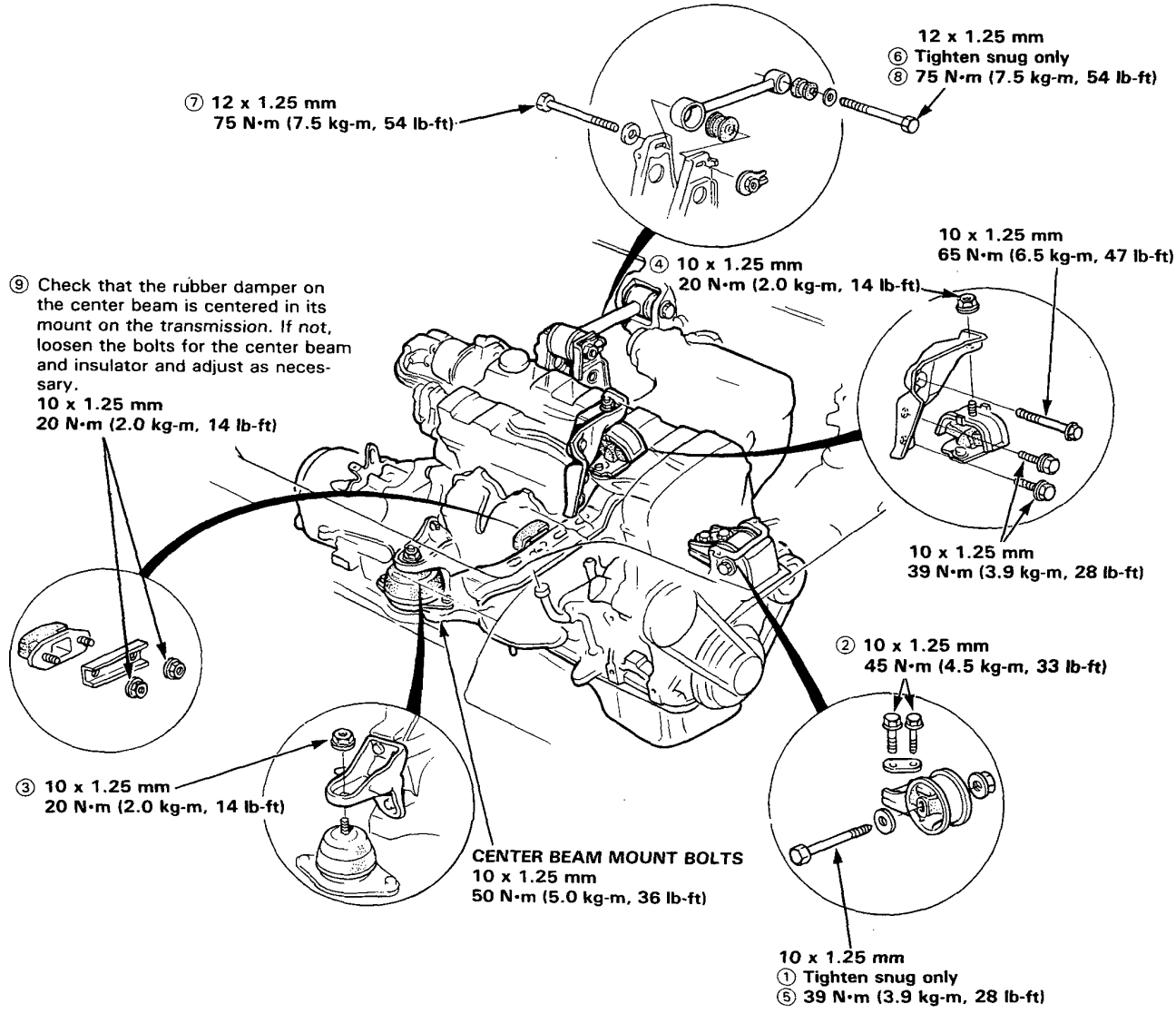
- Bleed air from the cooling system at the bleed bolt with the heater valve open.



- Adjust the throttle cable tension.
- Adjust the alternator belt tension.
- Check the clutch pedal free play.
- Check that the transmission shifts into gear smoothly.
- Connect the air conditioning hoses, wiring and V-belt.
- Clean battery posts and cable terminals with sandpaper, assemble, then apply grease to prevent corrosion.

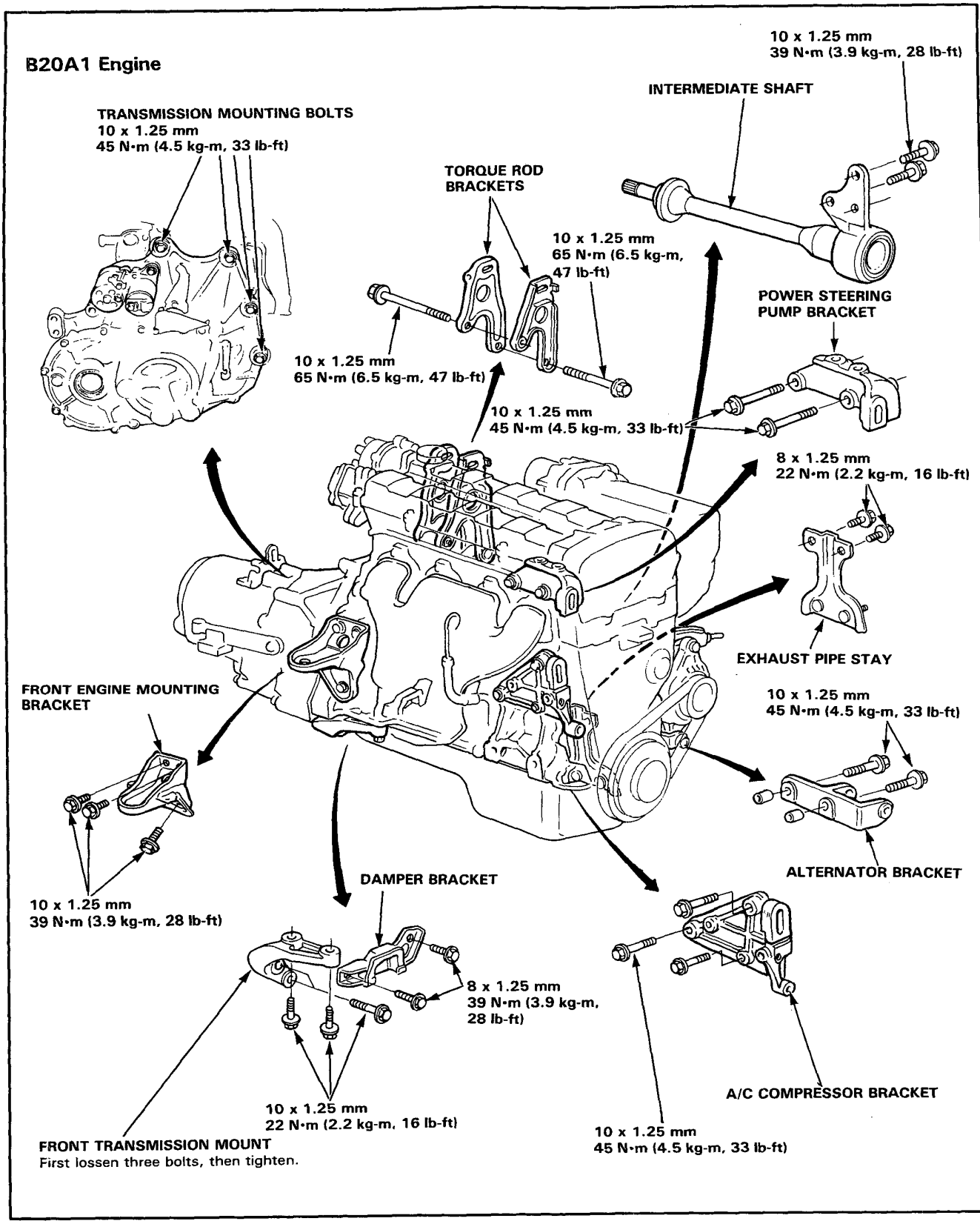
NOTE:

- For proper suppression of noise and vibration, and maximum bushing life, tighten the bolts in the sequence shown with the bushings centered in their mounts.
- From step 5 on, the car must be sitting level; make sure that the engine hoist is not holding up the engine and car.



(Cont'd)

Engine Removal/Installation (cont'd)



A20A4 Engine

WARNING

- **Make sure jacks and safety stands and hoist brackets are attached to correct positions on the engine (page 5-14).**
- **Apply parking brake and block rear wheels, so car will not roll off stands and fall on you while working under it.**

CAUTION: Use fender covers to avoid damaging painted surfaces.

1. Disconnect the battery negative terminal first, then the positive terminal.
2. Unbolt the hood brackets and remove the hood.

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

3. Drain the engine oil. Remove the oil filler cap to speed draining. Reinstall the drain plug with a new washer.

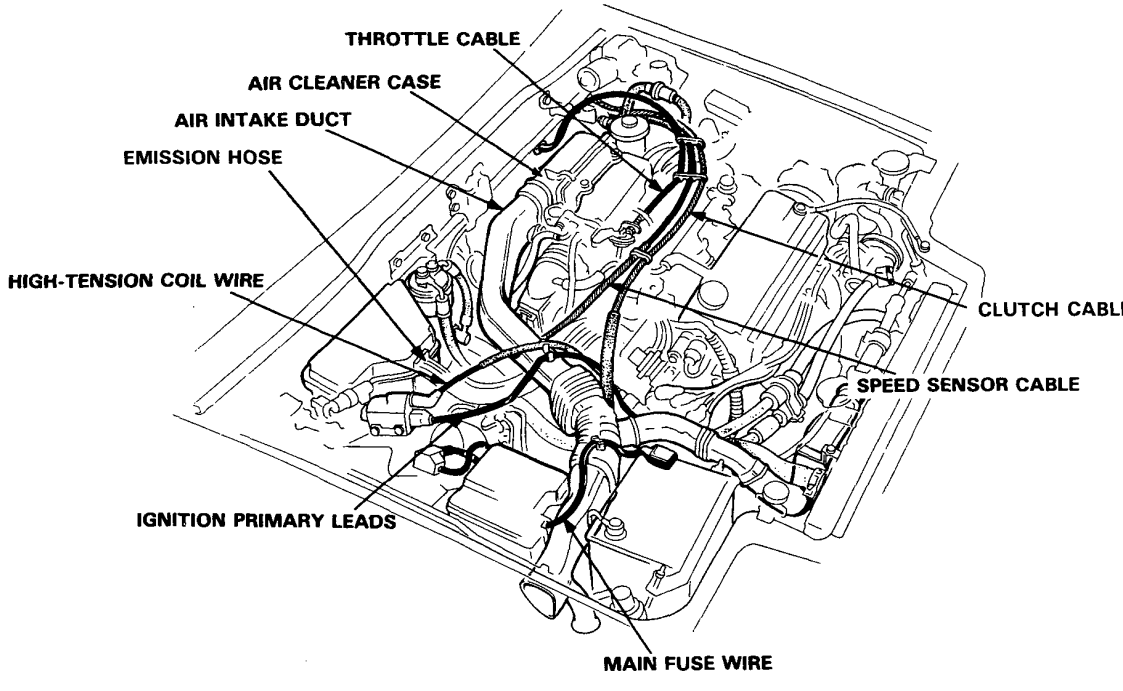
   CAUTION: Do not re-use old washer.

4. Drain the coolant from the radiator into a clean pan so it may be re-used. Remove the radiator cap to speed draining.

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

5. Drain transmission oil/fluid. Use a 3/8" drive socket wrench to remove the drain plug. Remove the oil filler plug to speed draining. Reinstall the drain plug with a new washer.
   Remove the air intake duct.

6. Remove the air cleaner case mounting bolts (nuts) then remove the air cleaner case.



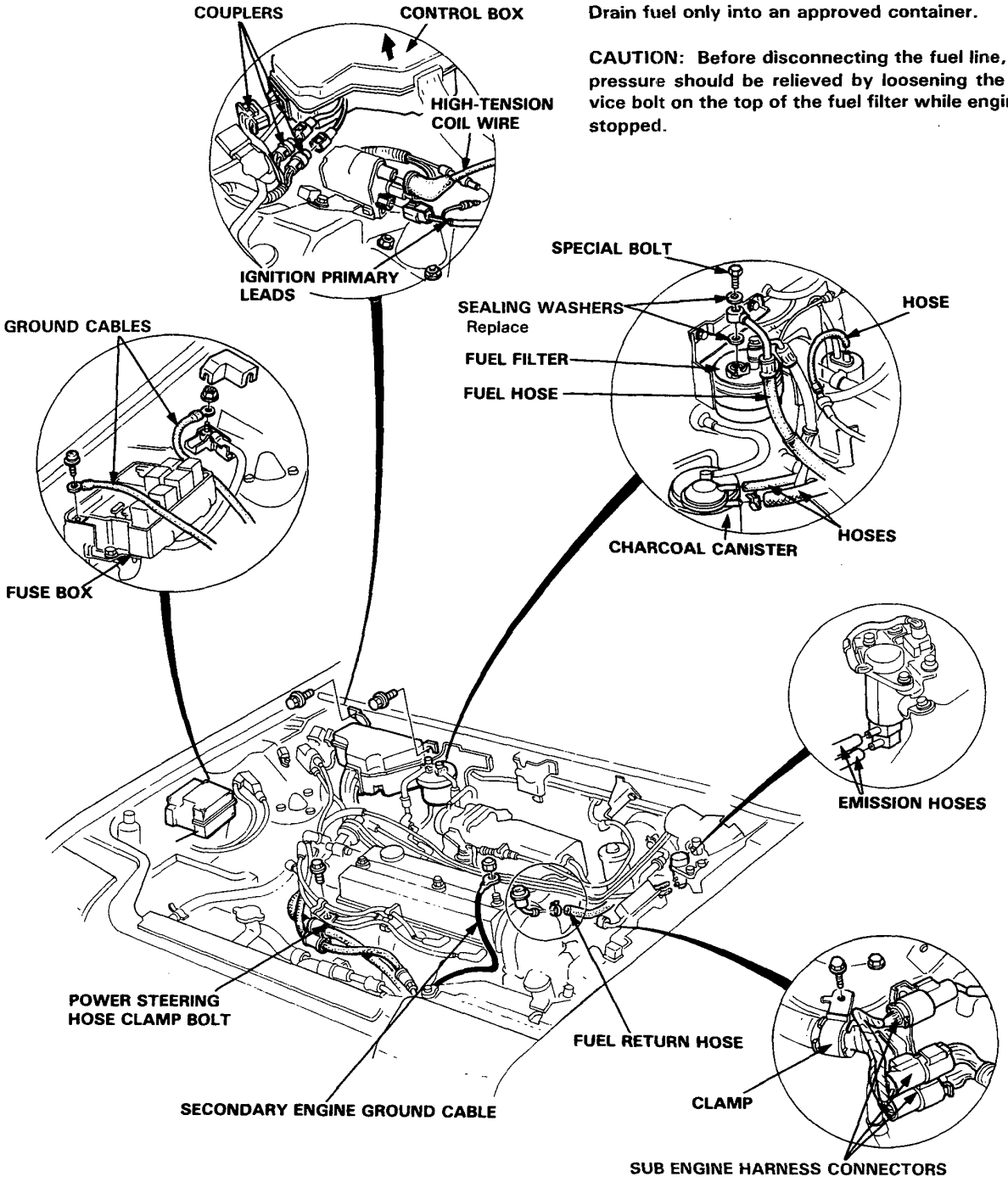
(cont'd)

A20A4 Engine

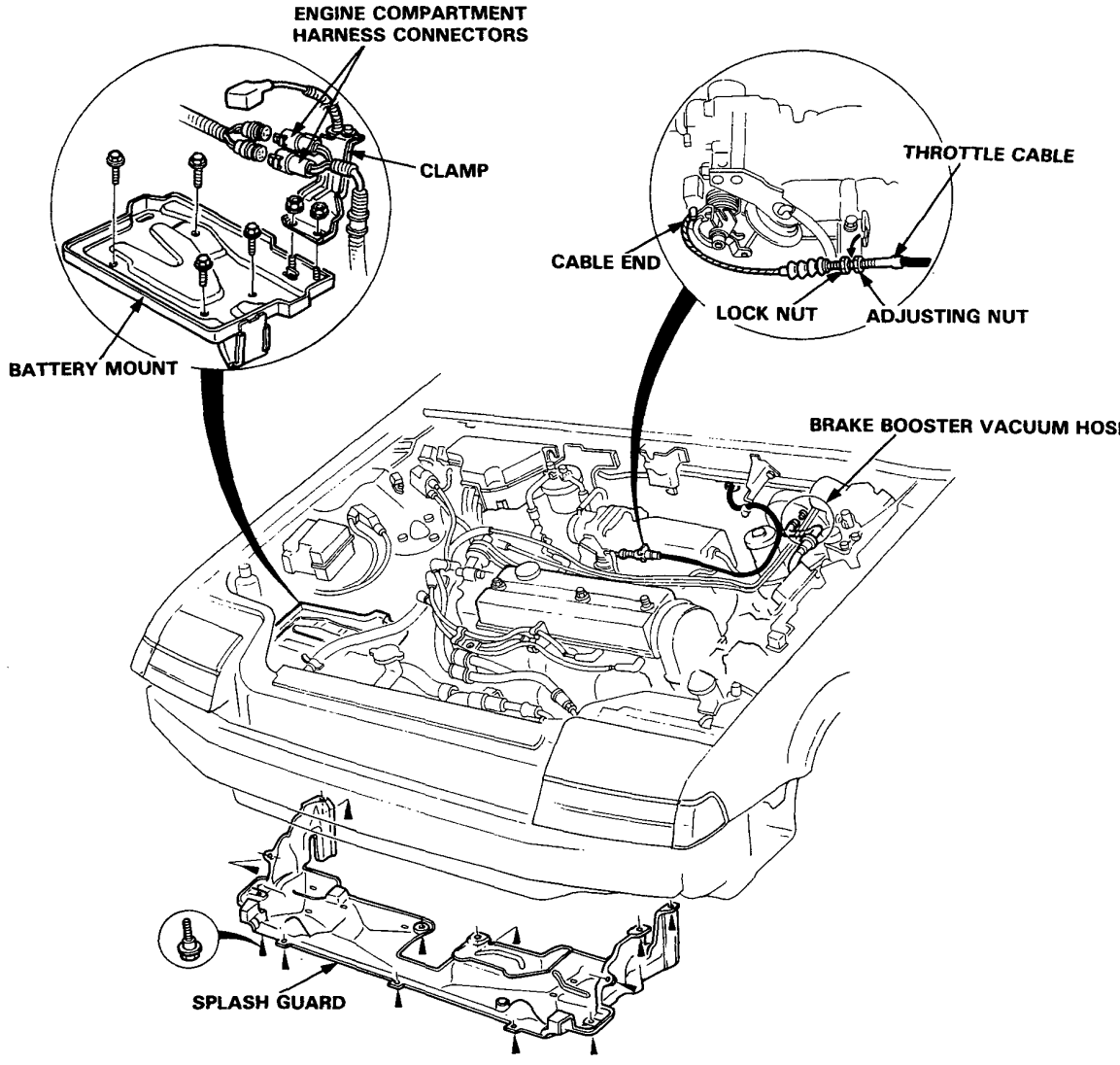
7. Relieve fuel pressure.

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

CAUTION: Before disconnecting the fuel line, fuel pressure should be relieved by loosening the service bolt on the top of the fuel filter while engine is stopped.



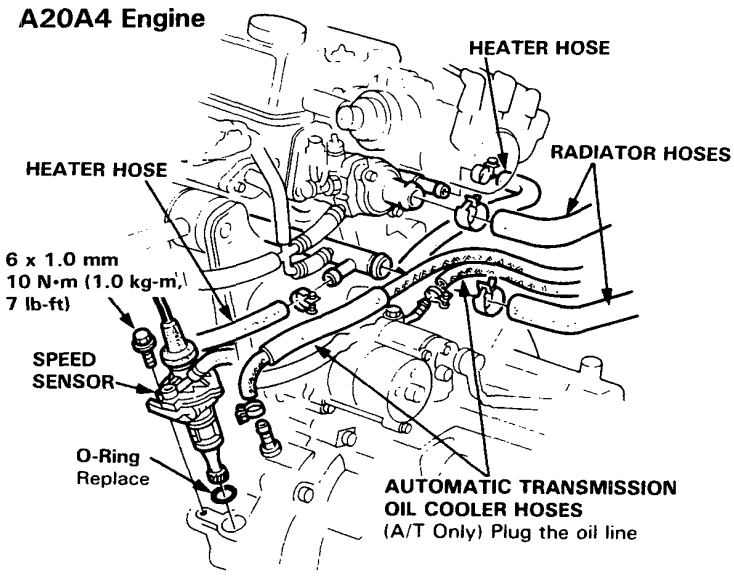
NOTE: Take care not to bend the cable when removing it. Do not use pliers to remove the cable from the linkage. Always replace a kinked cable with a new one.



Remove the splash guard from under the engine.

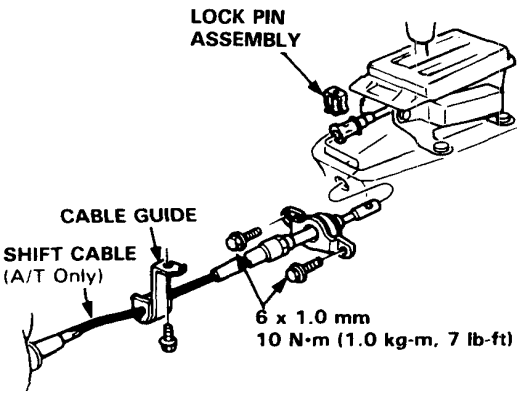
(Cont'd)

A20A4 Engine



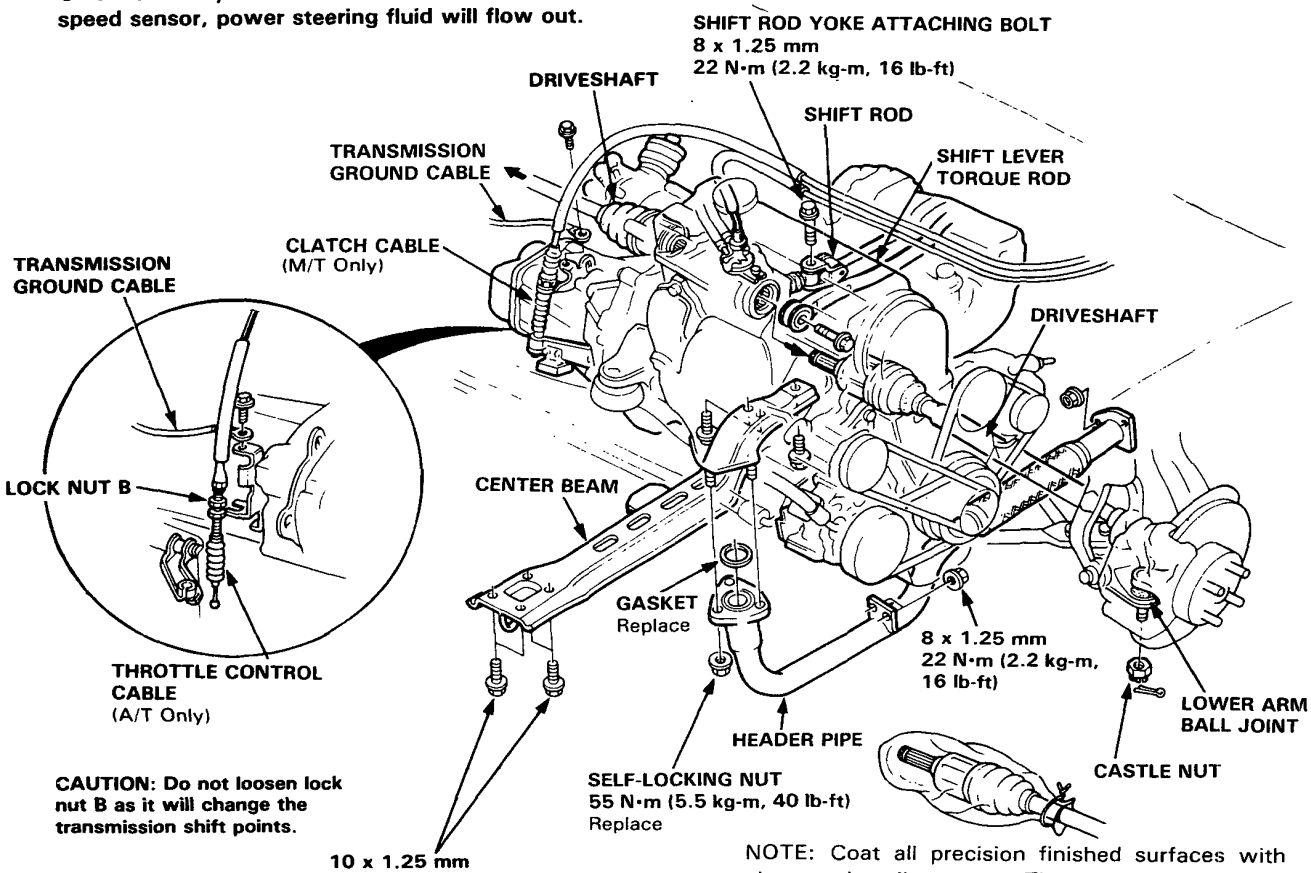
- Remove speed sensor complate with hoses.

CAUTION: If you disconnect the hoses from the speed sensor, power steering fluid will flow out.



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

NOTE: On reassembly, check the cable adjustment (page 15-66).

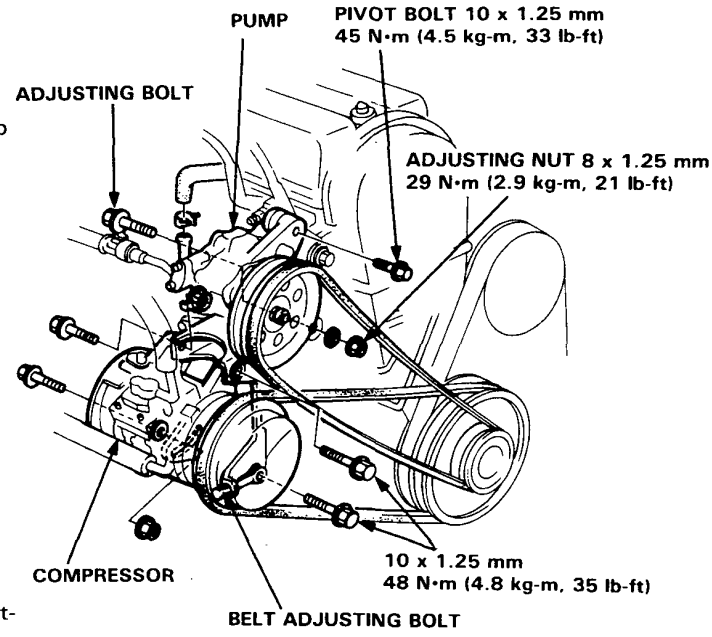


CAUTION: Do not loosen lock nut B as it will change the transmission shift points.

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

POWER STEERING PUMP

- Remove adjusting bolt and V-belt.
- Without disconnecting outlet hose pull the pump away from its mounting bracket.
  Do not disconnect hose or fluid will flow out.

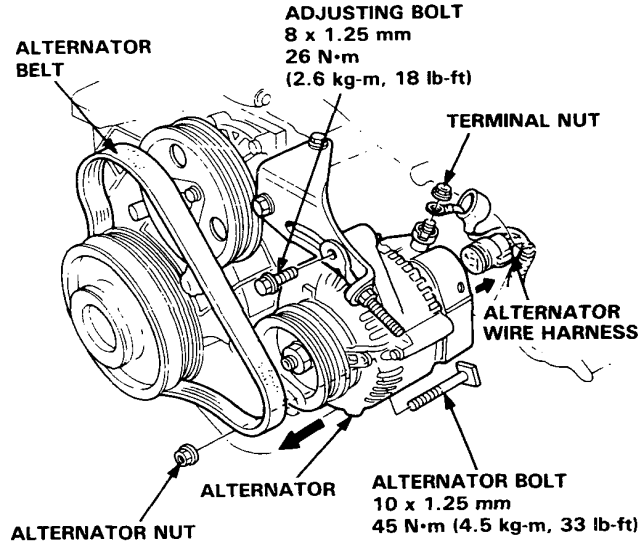


A/C COMPRESSOR

- Remove the compressor clutch lead wire.
- Loosen the comperssor mount bolts and adjusting bolt the remove the compressor belt.

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

- Remove the compressor mounting bolts, then lift the compressor out of the bracket with hoses attached, and wire it up to the front bulkhead.



ALTERNATOR

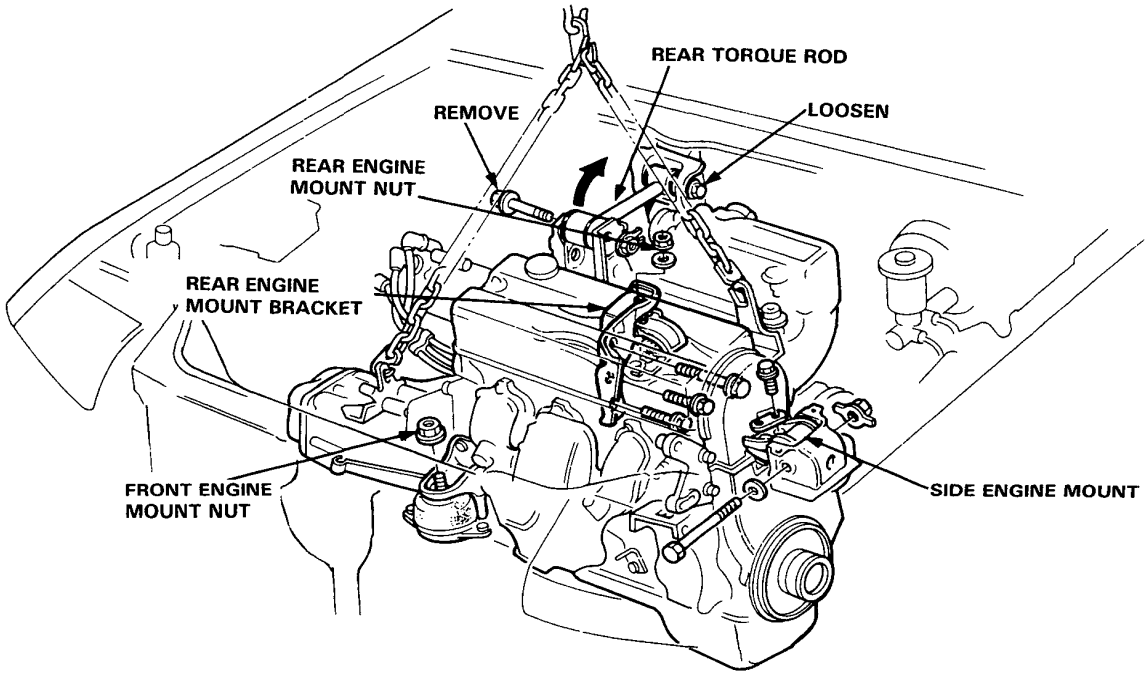
- Disconnect the alternator wire harness connectors.
- Remove the belt adjusting bolt and remove the belt.
- Remove the alternator mount bolt and remove the alternator.

(cont'd)

8. Attach a chain hoist to the engine block and raise the hoist just enough to remove slack from chain.

9. Check that the engine/transaxle is completely free of vacuum, fuel, and coolant hoses, and electrical wires.

10. Remove the bolt from the rear torque rod at the engine, then loosen the bolt in the frame mount and swing the rod up out of the way.



11. Raise the engine just enough to let the engine mounting brackets clear the mounting studs, then lower the engine onto the mounts. Shorten the length of the chain from 13 to 7 links on the timing belt side, then raise the engine all the way and remove it from the car.

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

- Torque engine mount bolts in sequence shown on next page.

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.

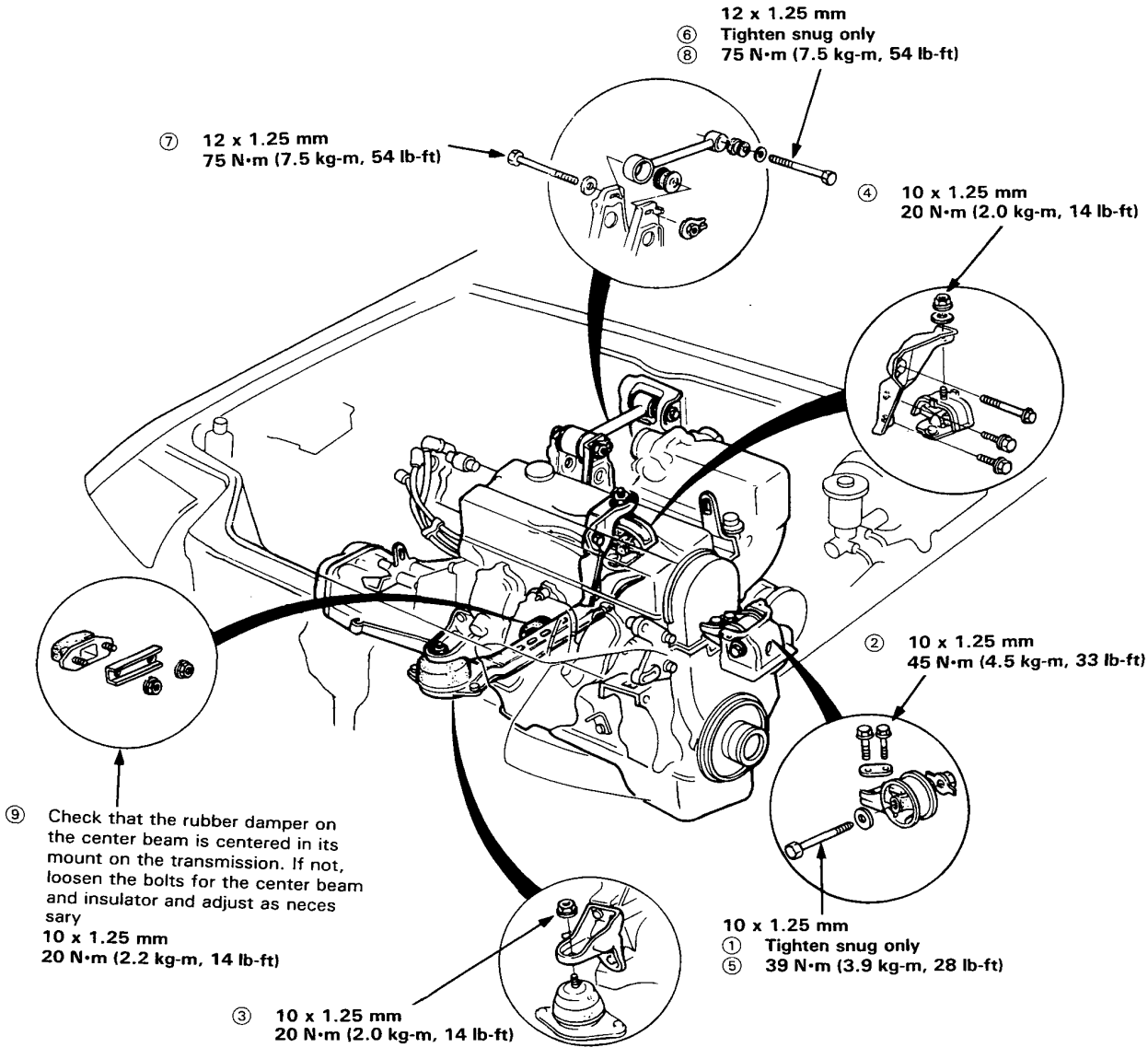
- Check that the spring clip on the end of each driveshaft clicks into the differential.

CAUTION: Use new spring clips on installation.

- 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.
- Connect the air conditioning hoses, wiring and V-belt.
- Clean battery posts and cable terminals with sandpaper, assemble, then apply grease to prevent corrosion.

NOTE:

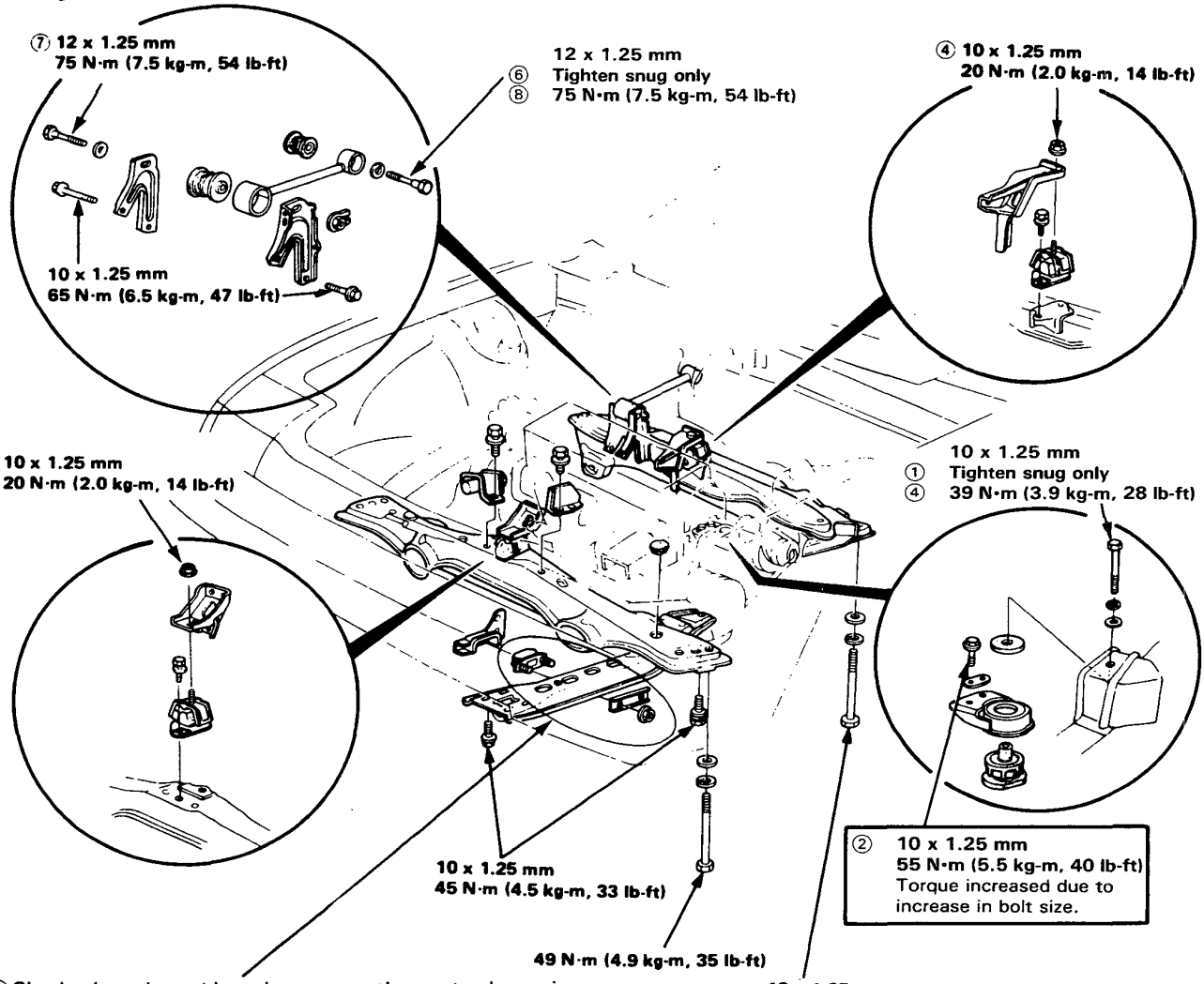
- For proper suppression of noise and vibration, and maximum bushing life, tighten the bolts in the sequence shown with the bushings centered in their mounts.
- From step 5 on, the car must be sitting level; make sure that the engine hoist is not holding up the engine and car.



ET Engine

NOTES:

- For proper suppression of noise and vibration, and maximum bushing life, tighten the bolts in the sequence shown with the bushings centered in their mounts.
- From step 5 on, the car must be sitting level; make sure that the engine hoist is not holding up the engine and car.



⑨ Check that the rubber damper on the center beam is centered in its mount on the transmission. If not, loosen the bolts for the center beam and insulator and adjust as necessary.

10 x 1.25 mm
20 N·m (2.0 kg-m, 14 lb-ft)

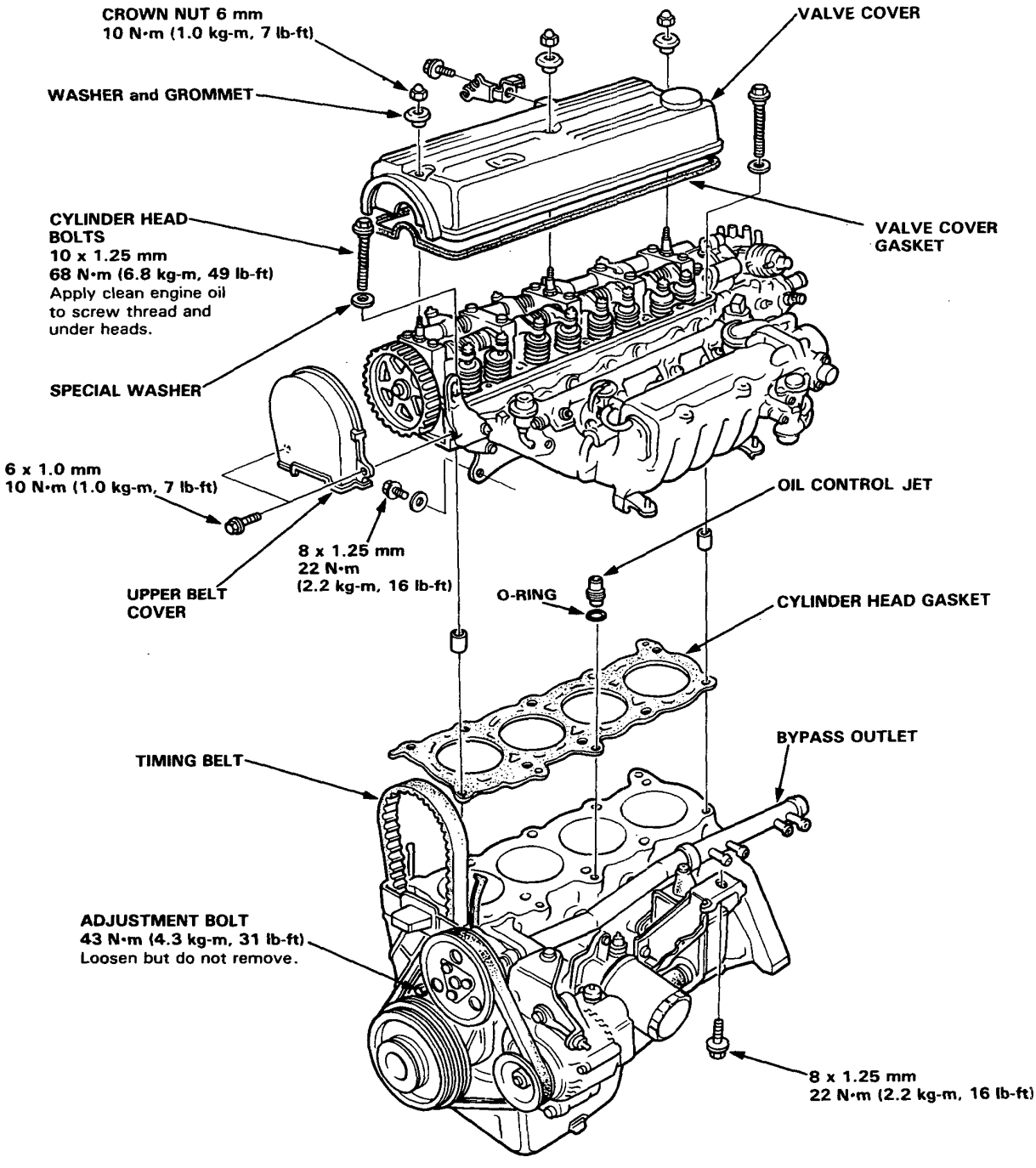
Cylinder Head/Valve Train

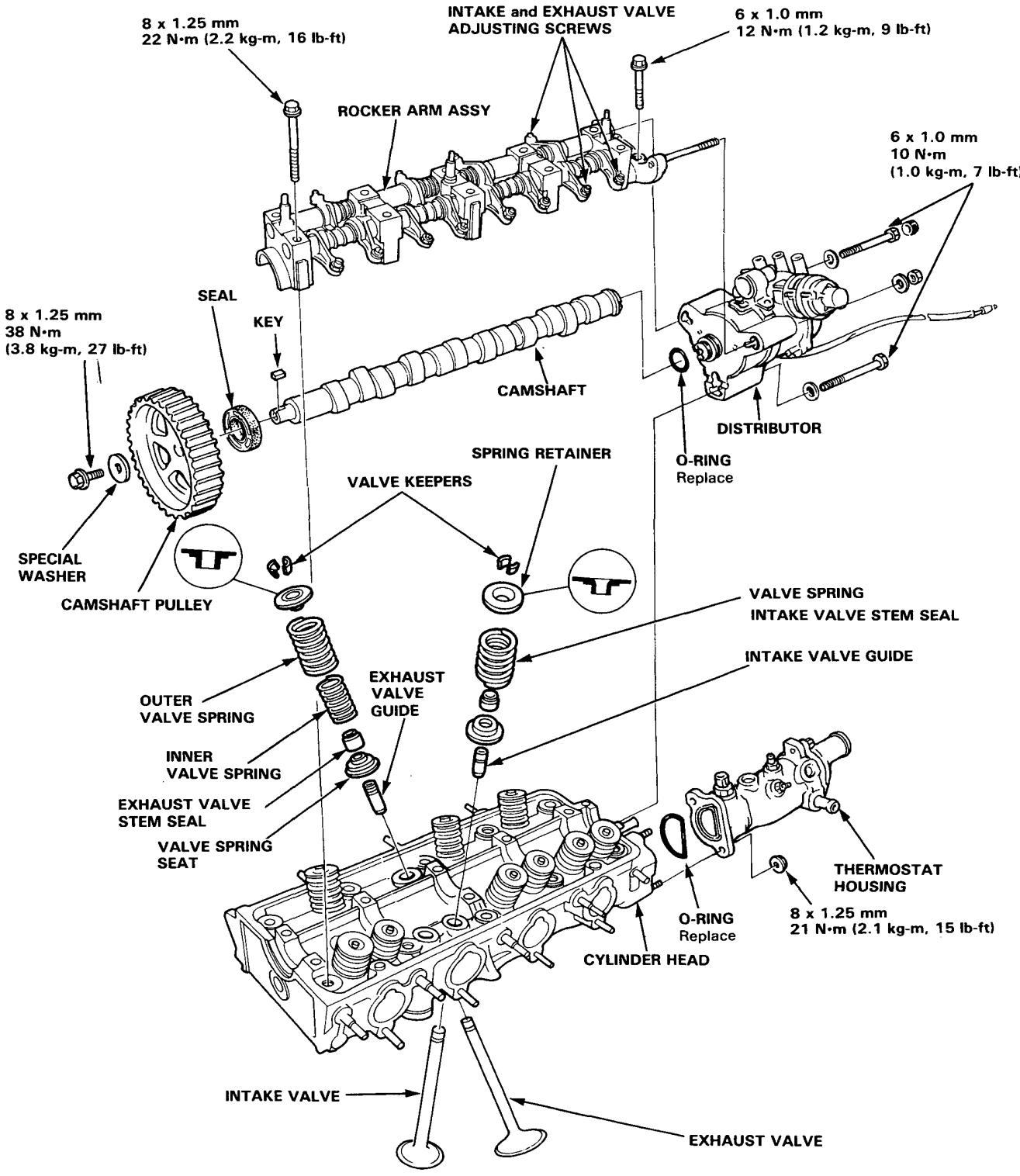
Cylinder Head/Valve Train

Illustrated Index

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

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




8 x 1.25 mm
22 N·m (2.2 kg-m, 16 lb-ft)
INTAKE and EXHAUST VALVE
ADJUSTING SCREWS
6 x 1.0 mm
12 N·m (1.2 kg-m, 9 lb-ft)
ROCKER ARM ASSY
6 x 1.0 mm
10 N·m
(1.0 kg-m, 7 lb-ft)
SEAL
KEY
8 x 1.25 mm
38 N·m
(3.8 kg-m, 27 lb-ft)
CAMSHAFT
DISTRIBUTOR
O-RING
Replace
SPRING RETAINER
VALVE KEEPERS
SPECIAL
WASHER
CAMSHAFT PULLEY
VALVE SPRING
INTAKE VALVE STEM SEAL
INTAKE VALVE GUIDE
EXHAUST
VALVE
GUIDE
OUTER
VALVE SPRING
INNER
VALVE SPRING
EXHAUST VALVE
STEM SEAL
VALVE SPRING
SEAT
THERMOSTAT
HOUSING
8 x 1.25 mm
21 N·m (2.1 kg-m, 15 lb-ft)
O-RING
Replace
CYLINDER HEAD
INTAKE VALVE
EXHAUST VALVE

Cylinder Head

Removal (engine removal not required)

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

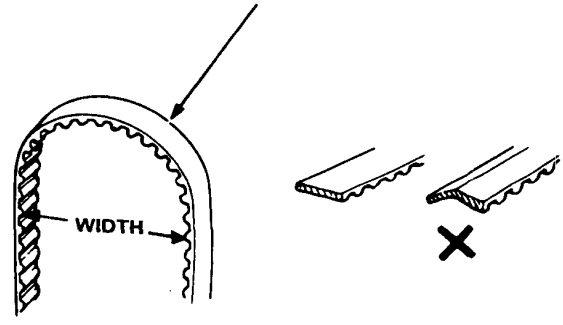
NOTE:
- Inspect the timing belt before removing the cylinder head.
- Before removal of the cylinder head, turn the flywheel so that the No. 1 cylinder is at top-dead-center.
- Mark all emissions hoses before disconnecting them.

1. Disconnect the negative terminal from the battery.
2. Drain the cooling system.
3. Remove the brake booster vaccum tube from the tubing manifold.
4. Remove the engine secondary ground cable from the valve cover (page 5-10).
5. Disconnect the radio condenser connector, high tension wire and ignition primary connector (page 5-10).
6. Remove the air cleaner cover (page 5-9).
7. Relieve fuel pressure (page 11-47).

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

8. Disconnect the fuel hose and fuel return hose (page 5-10).
9. Disconnect the throttle cable at the throttle body (page 5-11).
10. Disconnect the charcoal canister tube at the throttle valve.
11. Disconnect the engine sub harness connectors and couplers from the cylinder head and intake manifold.
    - Four injector couplers.
    - TA sensor connector
    - Temperature unit connector
    - Ground terminals at the fuel pipe
    - Throttle sensor connector
    - TW sensor connector
    - Crankshaft angle sensor coupler
    - EGR valve connector
    - Four wire harness clamps
12. Disconnect the oxygen sensor coupler.
13. Disconnect the upper radiator hose, heater inlet hose, and bypass inlet hose from the cylinder head (page 5-12).
14. Remove the hose between the thermostat housing and the intake manifold.
15. Disconnect the connecting pipe-to-valve body hose and bypass outlet hose.
16. Remove the power steering oil pump but do not disconnect the pump hoses (page 5-13).
17. Remove the hose clamp bolt on the cylinder head.
18. Remove the power steering pump bracket from the cylinder head.
19. Remove the exhaust header pipe nuts.
20. Remove the header pipe bracket and pull the pipe clear of the exhaust manifold.
21. Remove the air cleaner base mount bolts.
22. Disconnect the hose from the intake manifold to the breather chamber.
23. Remove the valve cover and the timing belt upper cover.
24. Loosen the tensioner adjustment bolt, then remove the timing belt.

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



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

CAUTION: To prevent warpage, unscrew bolts 1/3 turn each time and repeat sequence until loose.

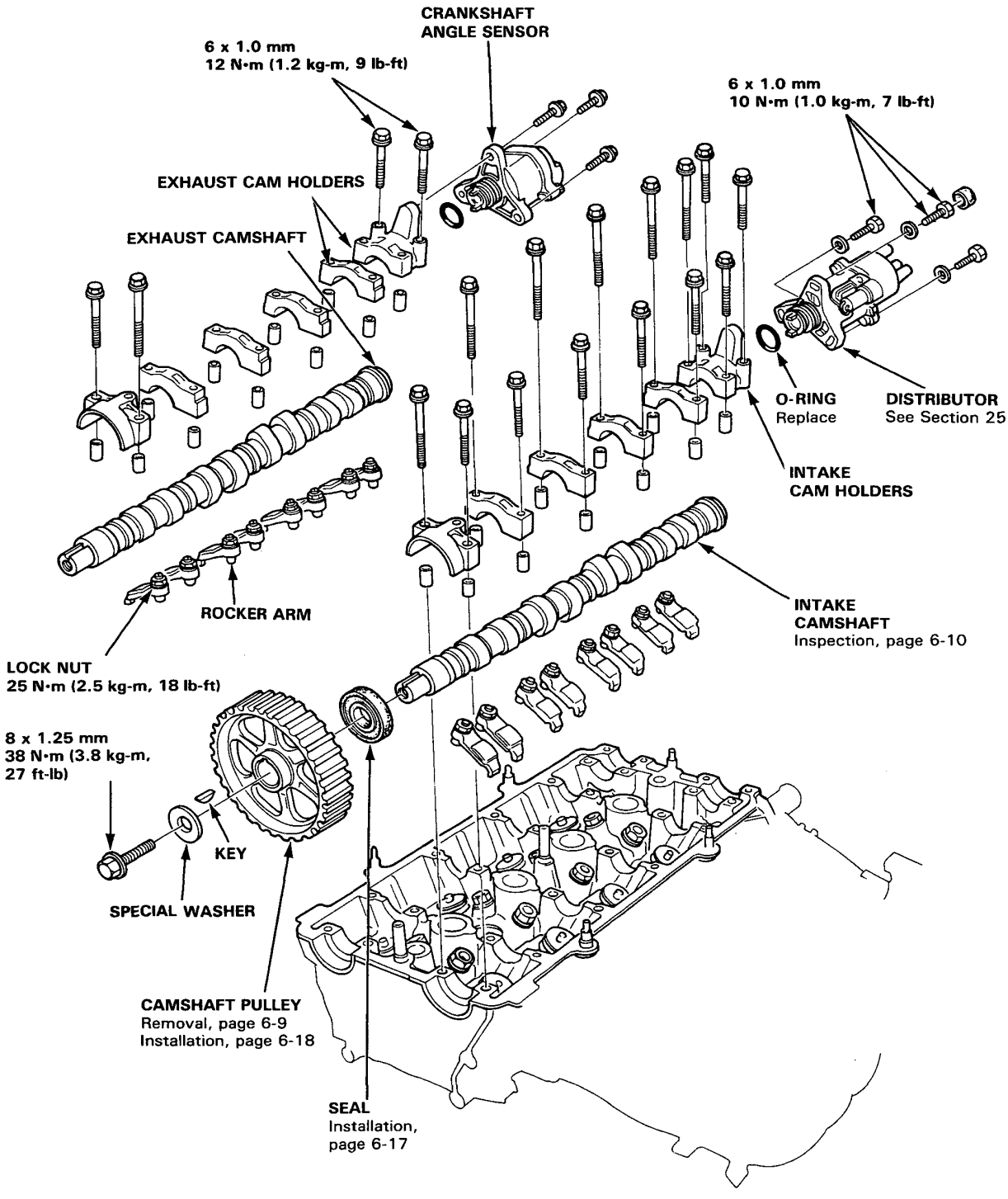
26. Remove the exhaust manifold from the cylinder head.
27. Remove the air cleaner base from the intake manifold.
28. Remove the carburetors.
29. Remove the intake manifold from the cylinder head.

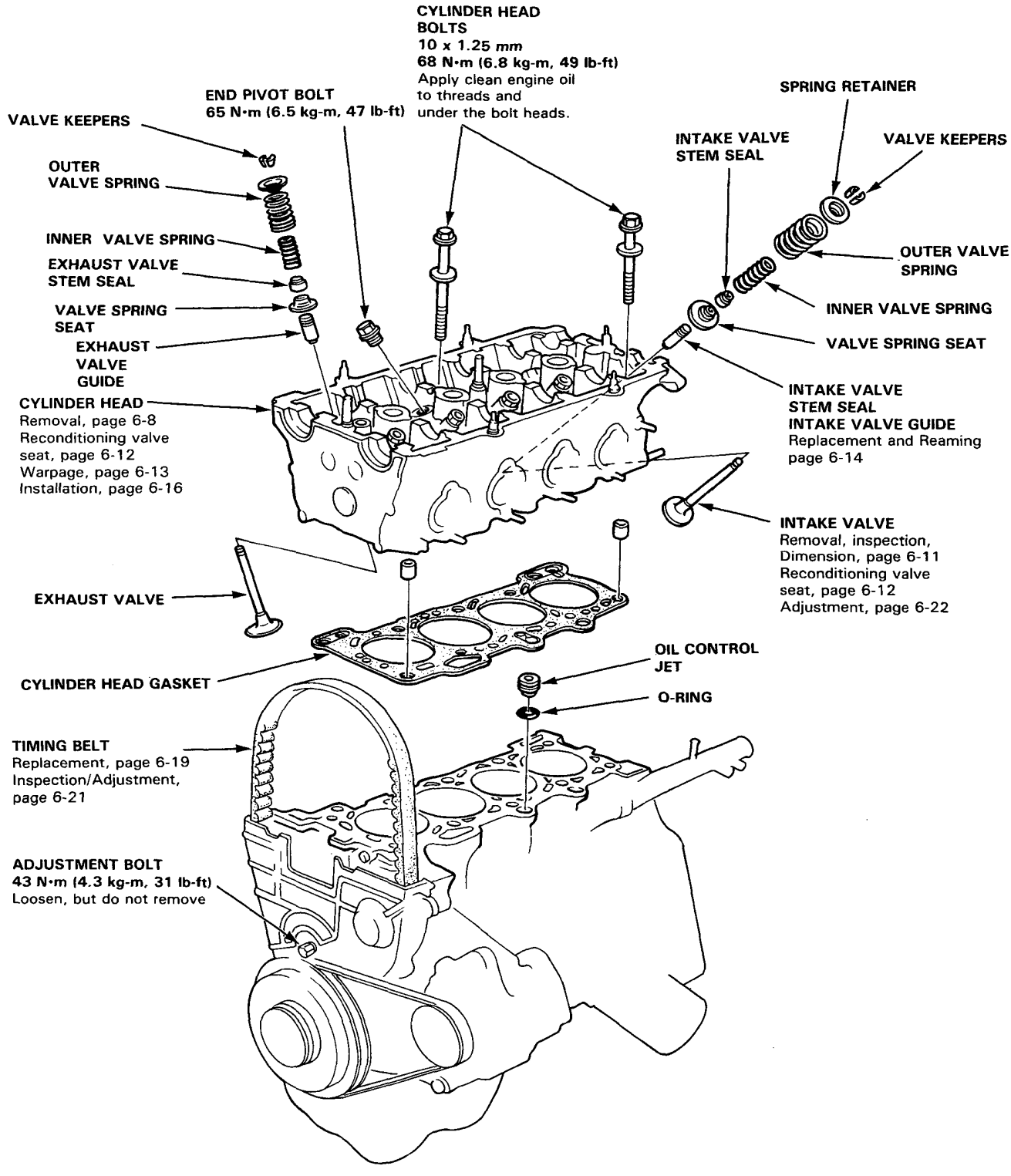
B20A1 Engine

Illustrated Index

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

NOTE: Use new O-rings and gaskets whenever reassembling




CYLINDER HEAD
BOLTS
10 x 1.25 mm
68 N·m (6.8 kg-m, 49 lb-ft)
Apply clean engine oil
to threads and
under the bolt heads.
END PIVOT BOLT
65 N·m (6.5 kg-m, 47 lb-ft)
VALVE KEEPERS
OUTER
VALVE SPRING
INNER VALVE SPRING
EXHAUST VALVE
STEM SEAL
VALVE SPRING
SEAT
EXHAUST
VALVE
GUIDE
CYLINDER HEAD
Removal, page 6-8
Reconditioning valve
seat, page 6-12
Warpage, page 6-13
Installation, page 6-16
EXHAUST VALVE
CYLINDER HEAD GASKET
TIMING BELT
Replacement, page 6-19
Inspection/Adjustment,
page 6-21
ADJUSTMENT BOLT
43 N·m (4.3 kg-m, 31 lb-ft)
Loosen, but do not remove
SPRING RETAINER
INTAKE VALVE
STEM SEAL
VALVE KEEPERS
OUTER VALVE
SPRING
INNER VALVE SPRING
VALVE SPRING SEAT
INTAKE VALVE
STEM SEAL
INTAKE VALVE GUIDE
Replacement and Reaming
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Reconditioning valve
seat, page 6-12
Adjustment, page 6-22
OIL CONTROL
JET
O-RING

Cylinder Head

Removal (engine removal not required)

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

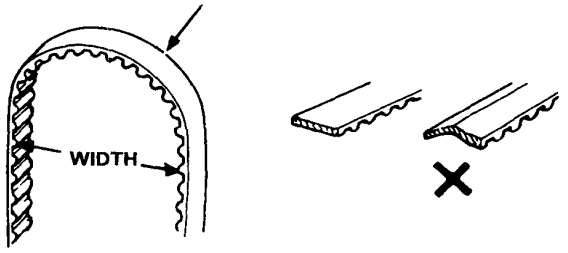
NOTE:
- Inspect the timing belt before removing the cylinder head.
- Before removal of the cylinder head, turn the flywheel so that the No. 1 cylinder is at top-dead-center (page 6-22).
- Mark all emissions hoses before disconnecting them.

1. Disconnect the negative terminal from the battery.
2. Drain the cooling system.
3. Remove the brake booster vacuum tube from the tubing manifold (page 5-3).
4. Remove the engine secondary ground cable from the valve cover (page 5-3).
5. Disconnect the radio condenser connector, high tension wire and ignition primary connector (page 5-3).
6. Remove the air cleaner cover.
7. Relieve fuel pressure.

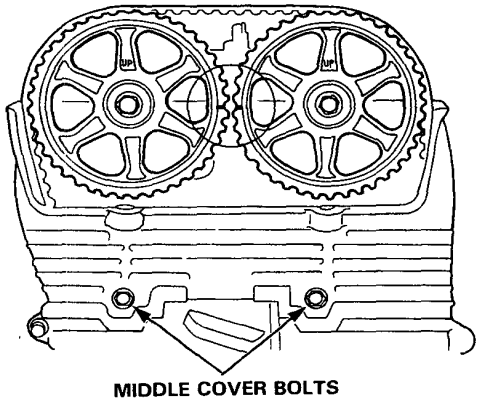
WARNING Do not smoke while working on fuel system, keep open flame or spark away from work area. Drain fuel only into an approved container.

8. Disconnect the fuel hose and fuel return hose (page 5-2).
9. Disconnect the throttle cable at the throttle body (page 5-3).
10. Disconnect the charcoal canister tube at the throttle valve.
11. Disconnect the engine sub harness connectors and couplers from the cylinder head and intake manifold.
    - Four injector couplers
    - TA sensor connector
    - Temperature unit connector
    - Ground terminals at the fuel pipe
    - Throttle sensor connector
    - TW sensor connector
    - Crankshaft angle sensor coupler
    - Four wire harness clamps
12. Disconnect the upper radiator hose, heater hose, and bypass inlet hose from the cylinder head (page 5-4).
13. Remove the hose between the thermostat housing and the intake manifold.
14. Disconnect the connecting pipe-to-valve body hose and bypass outlet hose.
15. Remove the power steering oil pump but do not disconnect the pump hoses (page 5-5).
16. Remove the hose clamp bolt on the cylinder head.
17. Remove the power steering pump bracket from the cylinder head.
18. On cars equipped with air conditioning, disconnect the idle control solenoid hoses.
19. Remove the exhaust header pipe nuts.
20. Remove the header pipe bracket and pull the pipe clear of the exhaust manifold.
21. Remove the air cleaner base mount bolts.
22. Disconnect the hose from the intake manifold to the breather chamber.
23. Remove the valve cover and the timing belt upper cover.
24. Loosen the tensioner adjustment bolt, then remove the timing belt.

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



25. Remove the timing belt middle cover bolts, which are tighten to the cylinder head.



MIDDLE COVER BOLTS

26. Remove the camshaft holder bolts, then remove the camshaft holders, camshafts and rocker arms.
27. Remove the cylinder head bolts, then remove the cylinder head.

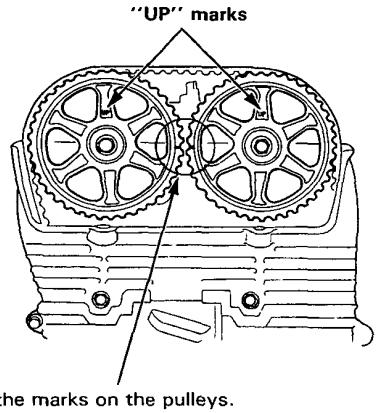
CAUTION: To prevent warpage, unscrew bolts 1/3 turn each time and repeat sequence until loose.

28. Remove the exhaust manifold from the cylinder head.
29. Remove the intake manifold from the cylinder head.

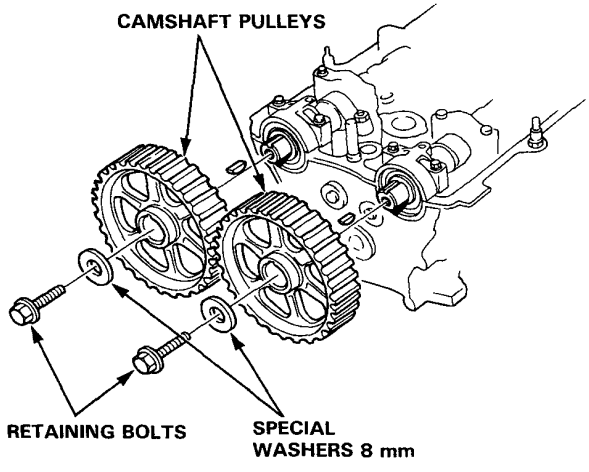
Camshaft Pulleys

Removal

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



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



NOTE: Before removing camshafts assembly, check camshaft end play.

Camshafts

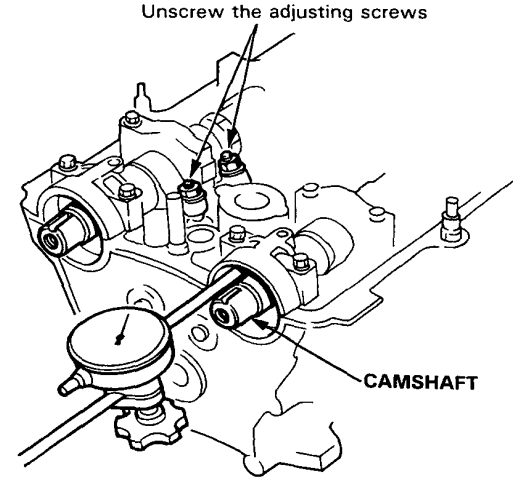
Inspection

NOTE: Do not rotate camshaft during inspection; loosen the adjusting screws before starting.

1. Seat camshafts by prying it toward distributor end of head with screwdriver.

2. Zero dial indicator against end of distributor drive, then pry camshafts back and forth, and read end play.

Camshaft End Play:
Standard (New): 0.05—0.15 mm (0.002—0.006 in.)
Service Limit: 0.5 mm (0.02 in.)



3. Remove the rocker arm bolts, then remove the rocker assembly from the cylinder head.

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

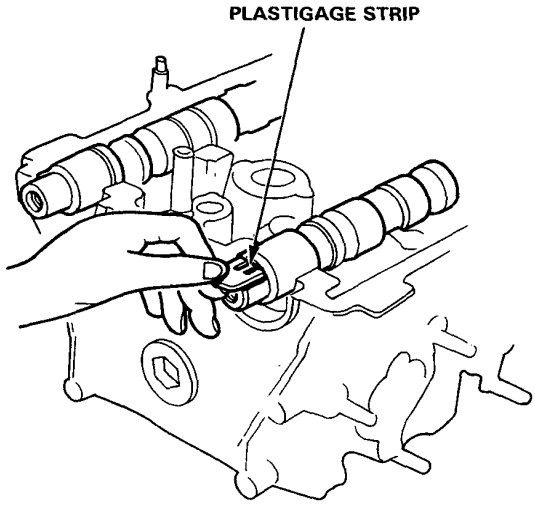
- Lift camshaft out of cylinder head, wipe clean, then inspect lift ramps. Replace camshaft if lobes are pitted, scored, or excessively worn.
- Clean the camshaft bearing surfaces in the cylinder head, then set camshaft back in place.
- Insert plastigage strip across each journal.
- Install the rocker arm assembly and torque bolts to values and in sequence shown on page 6-17, then remove the bolts and the rocker arm assembly.

(cont'd)

Inspection (cont'd)

4. Measure widest portion of plastigage on each journal.

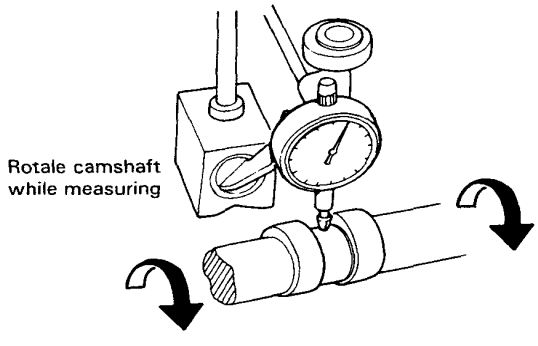
Camshaft Bearing Radial Clearance:
Standard (New): 0.050–0.089 mm (0.002–0.004 in.)
Service Limit: 0.15 mm (0.006 in.)



5. 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 camshfat supported on V-blocks.

Camshaft Total Runout:
Standard (New): 0.03 mm (0.001 in.)
Service Limit: 0.06 mm (0.002 in.)

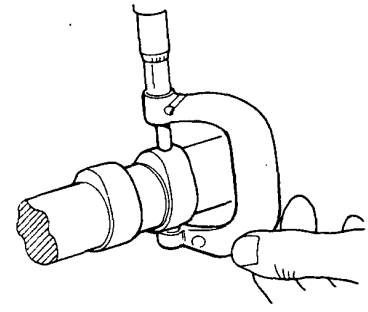


– If the total runout of the camshaft is within tolerance, replace the cylinder head.

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

6. Measure camshaft height.

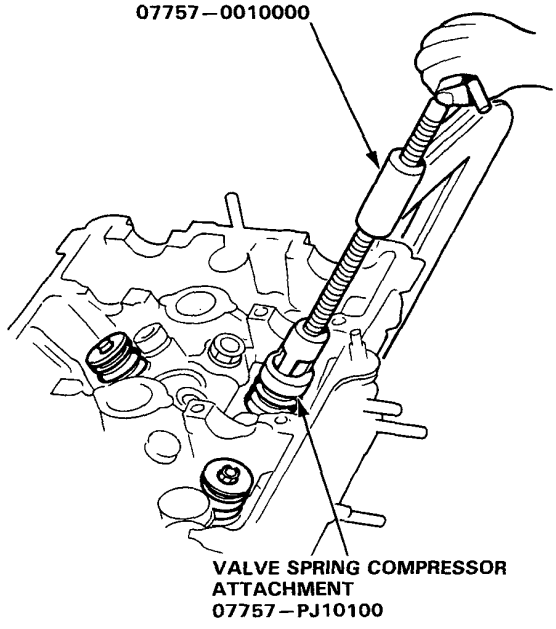
Inake Standard: 33.676 mm (1.3258 in.)
Exhaust Standard: 33.737 mm (1.3282 in.)

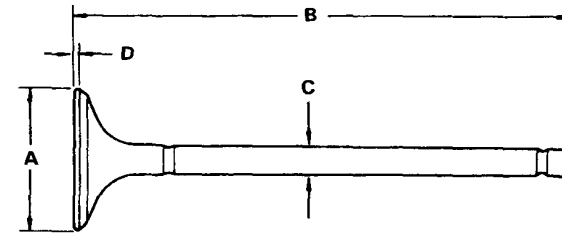


Replacement

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

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





Intake Valve Dimensions

A Standard (New):	32.9–33.1 mm (1.295–1.303 in.)
B Standard (New):	140.3–140.6 mm (5.524–5.535 in.)
C Standard (New):	6.58–6.59 mm (0.2591–0.2594 in.)
C Service Limit:	6.55 mm (0.258 in.)
D Standard (New):	1.35–1.65 mm (0.053–0.065 in.)

Exhaust Valve Dimensions

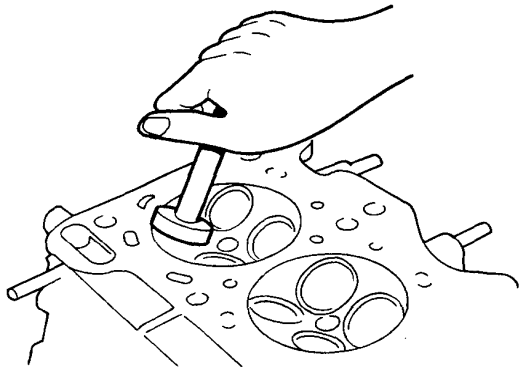
A Standard (New):	27.9–28.1 mm (1.098–1.106 in.)
B Standard (New):	106.5–106.7 mm (4.193–4.201 in.)
C Standard (New):	6.55–6.56 mm (0.2579–0.2583 in.)
C Service Limit:	6.52 mm (0.256 in.)
D Standard (New):	2.35–2.65 mm (0.093–0.104 in.)

Intake and Exhaust Valves

Valve Seat Reconditioning

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

   NOTE: If guides are worn (page 6-13), replace them (page 6-14) before cutting valve seats.



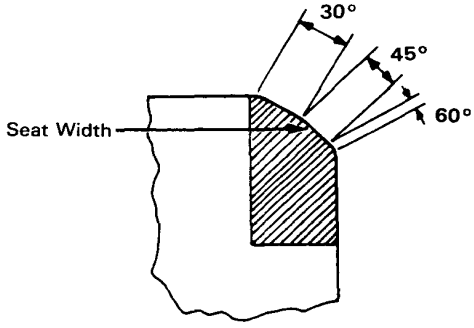
CUTTER	INTAKE	EXHAUST
32°	07780–0012900	07780–0012300
60°	07780–0014000	07780–0014100
46°	07780–0010800	07780–0010400
HOLDER	07781–0010201 and 07781–0010301	

2. Bevel the upper edge of seat with the 32° cutter until required seat width is obtained.

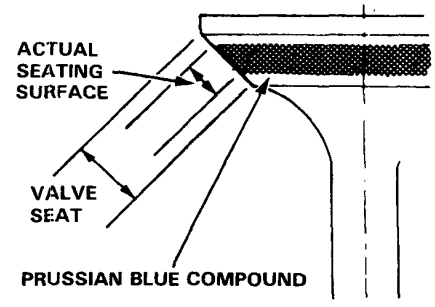
3. Bevel the inner edge of seat slightly with the 60° cutter.

4. Carefully center 45° cutter.
   Remove as little material as possible. (See measurement after reconditioning shown below.)

   Valve Seat Width:
   Standard: 1.25–1.55 mm (0.049–0.061 in.)
   Service Limit: 2.0 mm (0.08 in.)

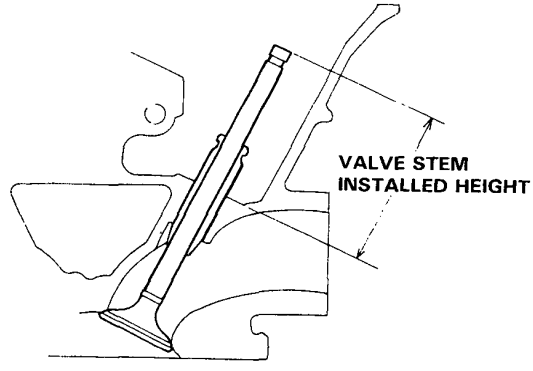


5. After resurfacing seat, inspect for even valve seating: Apply Prussian blue compound to valve face, and insert valve in original location in head, then lift it and snap it closed against seat several times.



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

7. Insert intake and exhaust valves in head and measure valve stem installed height.
   Intake and Exhaust Valve Stem Installed Height:
   Standard (New): 42.75 mm (1.683 in.)
   Service Limit: 43.54 mm (1.714 in.)



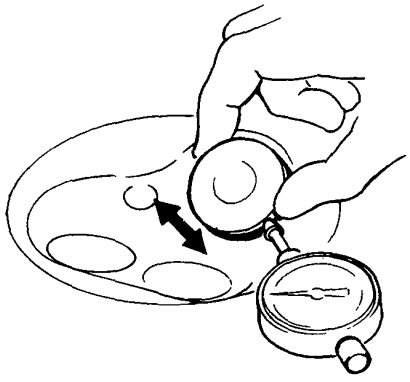
8. If valve stem installed height is over service limit, replace valve and recheck. If still over service limit, replace cylinder head; the valve seat in the head is too deep.

Valve Guide-to-Valve Stem Clearance

1. Measure the guide-to-stem clearance with a dial indicator, while rocking the stem in the direction of normal thrust (Wobble Method).

Intake Valve Stem-to-Guide Clearance
Standard (New): 0.04—0.10 mm (0.0016—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.

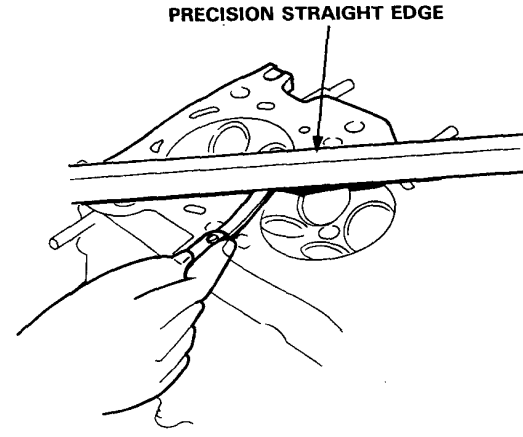
Intake Valve Stem-to-Guide Clearance
Standard (New): 0.02—0.05 mm (0.001—0.002 in.)
Service Limit: 0.08 mm (0.003 in.)
Exhaust Valve Stem-to-Guide Clearance
Standard (New): 0.05—0.08 mm (0.002—0.003 in.)
Service Limit: 0.11 mm (0.004 in.)

Warpage

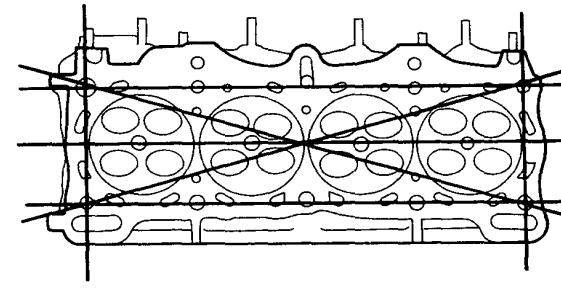
NOTE: If camshaft bearing clearances are not within specification, the head cannot be resurfaced (page 6-10).

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 131.8 mm (5.19 in.).



Measure along edges, and 3 ways across center.



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

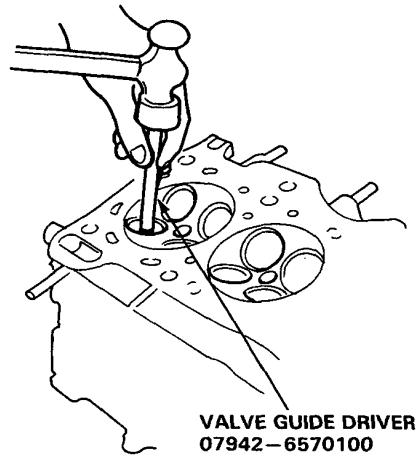
Valve Guide

Replacement

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

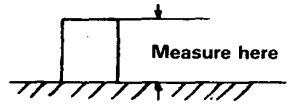
CAUTION: To avoid burns, use heavy gloves when handling heated cylinder head.

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

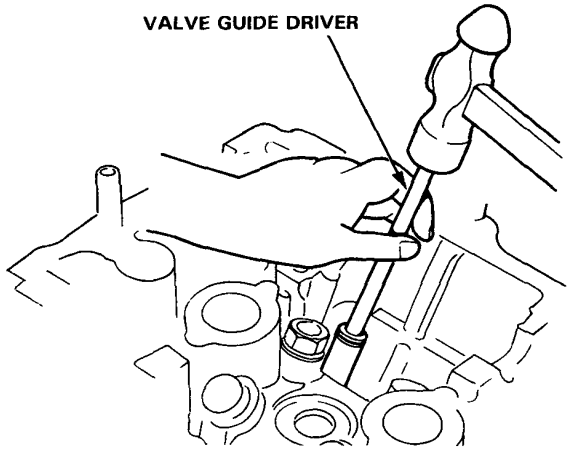


2. Drive in a new valve guide to the specified depth.

Intake: 16.0 mm (0.63 in.)
Exhaust: 16.0 mm (0.63 in.)



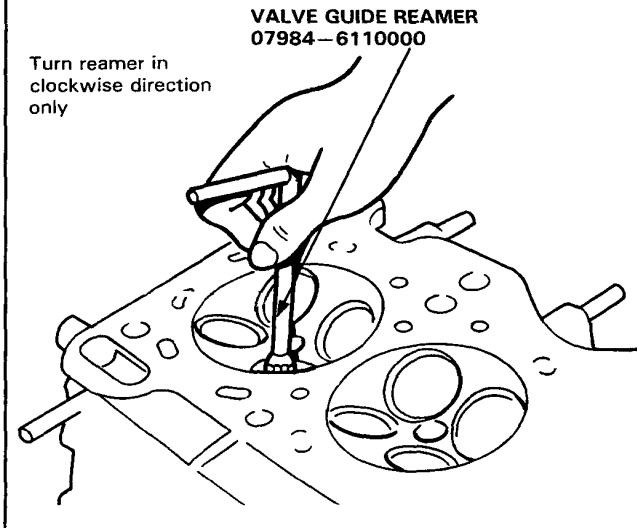
NOTE: If using adjustable valve guide driver 07743—0020000, adjust the collar depth to correspond with the measurements given above.



Reaming

NOTE: For new valve guides only.

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

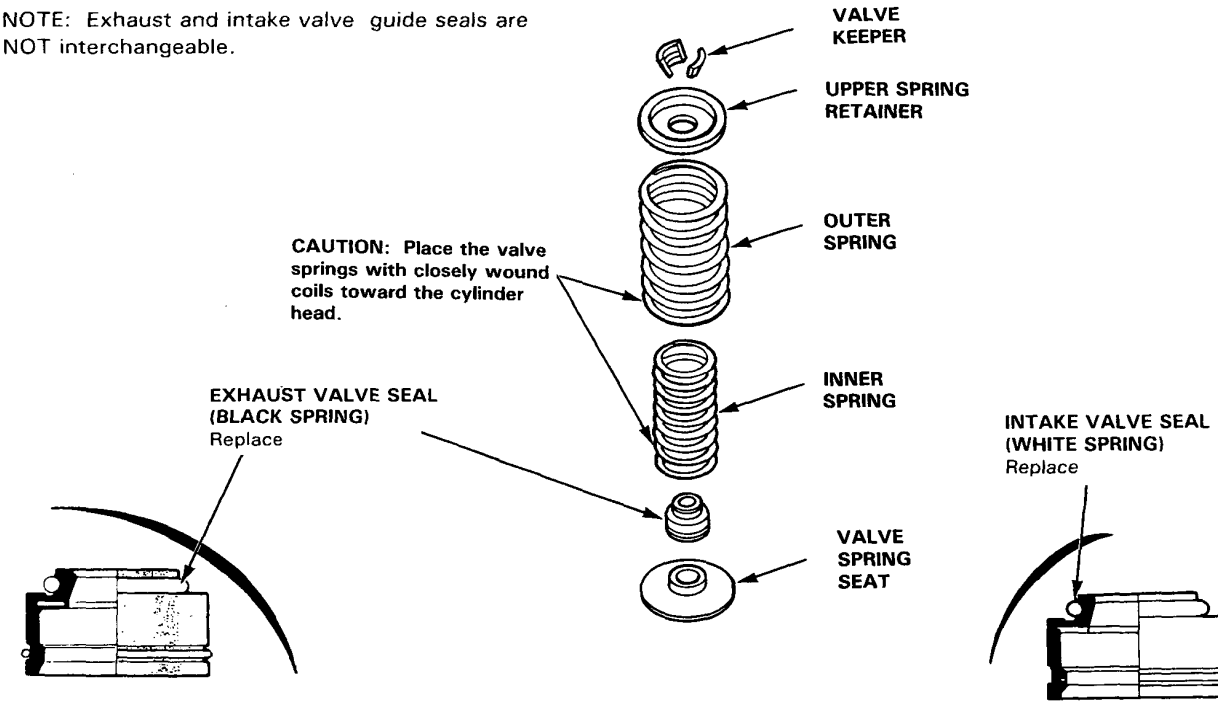


3. Continue to rotate reamer clockwise while removing.
4. Thoroughly wash the guide in detergent and water to remove any cutting residue.
5. Check clearance with valve (page 6-13).

Valve Spring, Valve

Valve Spring Installation Sequence

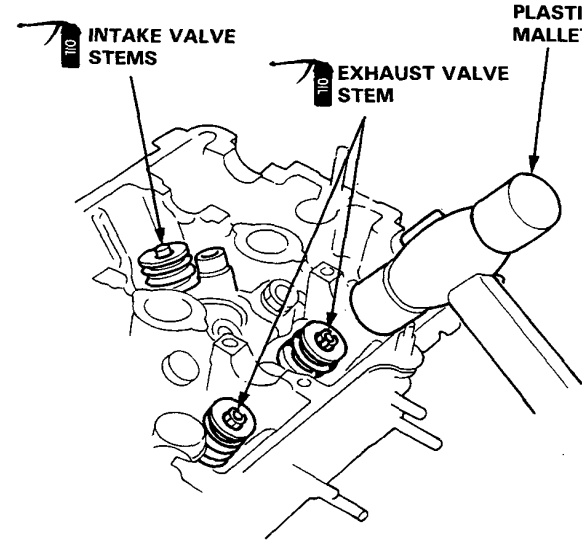
NOTE: Exhaust and intake valve guide seals are NOT interchangeable.



Valve Installation

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

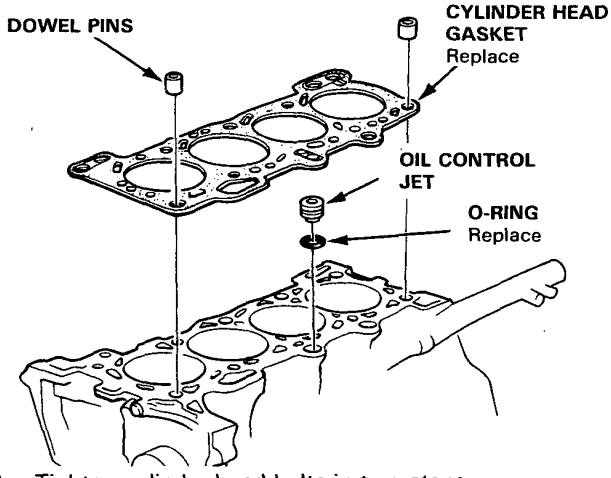
When valves and springs are in place, lightly tap the end of each valve stem two or three times with a plastic mallet to ensure proper seating of valve and valve keepers.



Cylinder Head

Installation

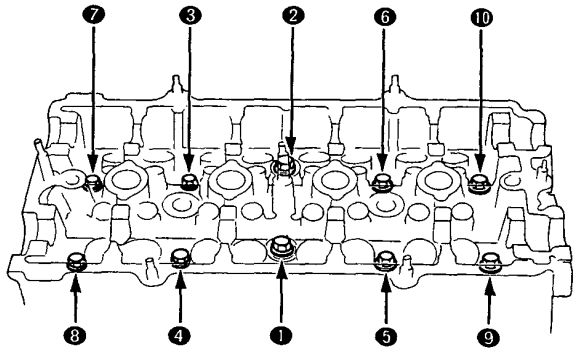
1. Install the cylinder head in reverse order of removal:
   - Always use a new head gasket.
   - Cylinder head and engine block surface must be clean.
   - "UP" mark on timing belt pulley should be at the top.
2. Cylinder head dowel pins and oil control jet must be aligned.



3. Tighten cylinder head bolts in two steps.
   In the first step tighten all bolts and nuts, in sequence, to about 30 N·m (3.0 kg-m, 22 lb-ft); in the final step tighten, in same sequence, to 68 N·m (6.8 kg-m, 49 lb-ft).

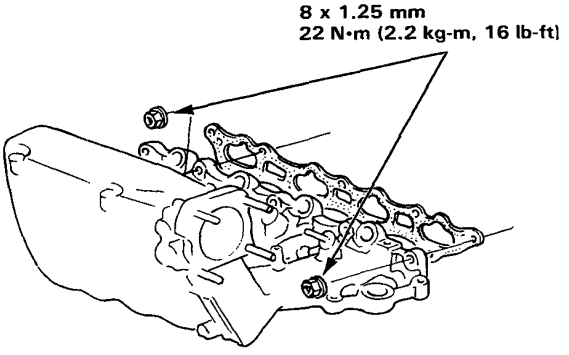
   NOTE:
   - Apply engine oil to the cylinder head bolts and the washer.
   - Use the longer bolts at the position No. 1 and No. 2 as shown.

CYLINDER HEAD TORQUE SEQUENCE

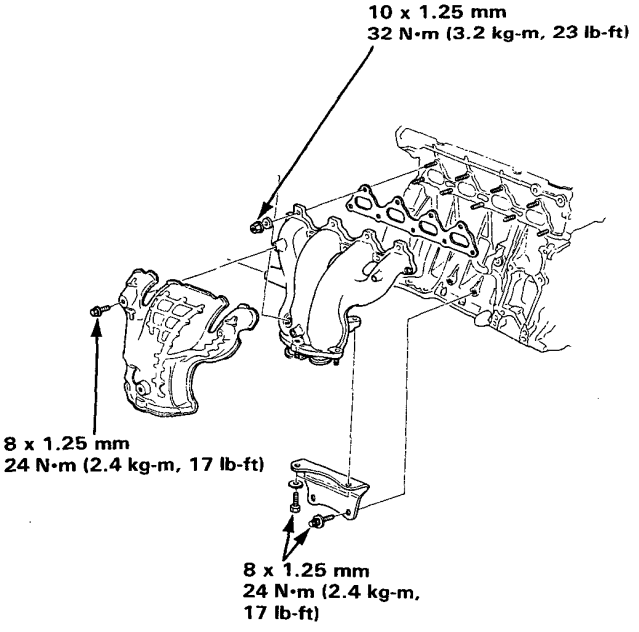


CYLINDER HEAD BOLT
10 x 1.25 mm
68 N·m (6.8 kg-m, 49 lb-ft)

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



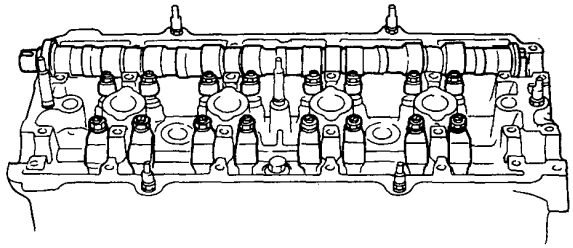
5. Install the exhaust manifold and bracket.



Installation

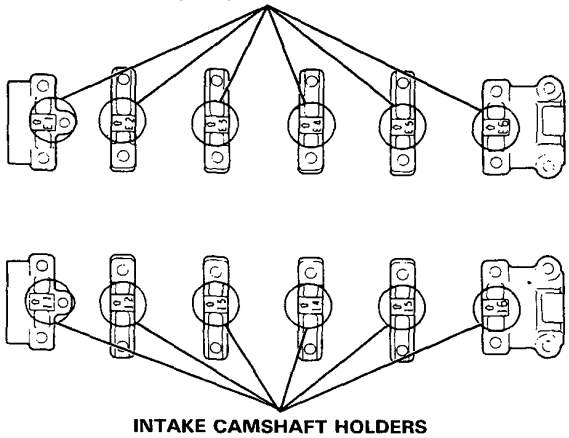
CAUTION:
- **Make sure that the keyway on the camshafts is facing UPX (No. 1 cylinder TDC).**
- **Valve locknuts should be loosened and adjusting screws backed off before installation.**
- **In case of reassembling, place the rocker arms at same position.**

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



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

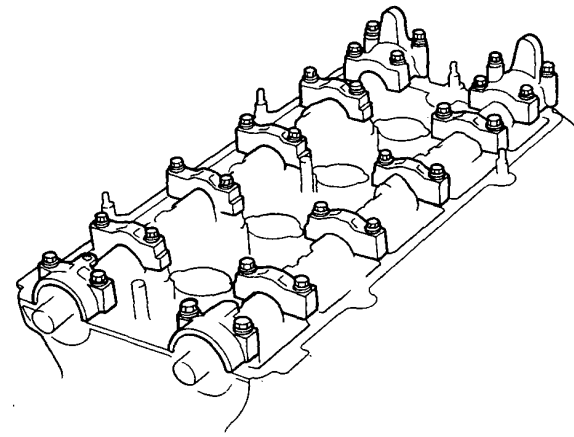
NOTE:
- "IN" or "EX" marks are stamped on the each camshaft holders. Install correct one.
- Do not apply oil to the holder mating surface of camshaft seal.



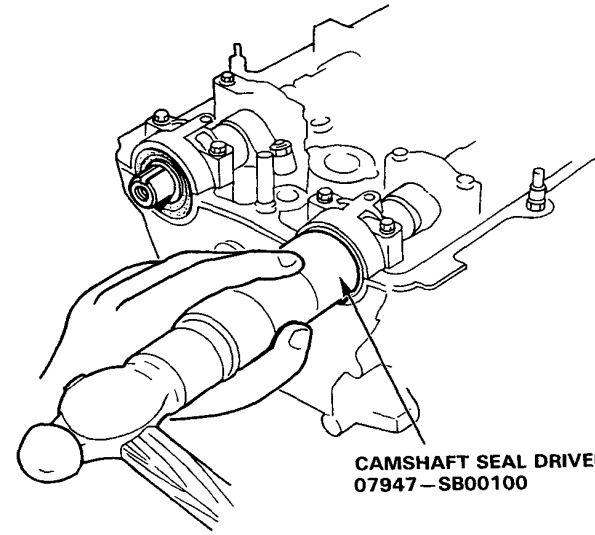
3. Apply liquid gaskets to the head mating surface of the No. 1 and No. 6 camshaft holders and place them on top of the cylinder along with the No. 2, 3, 4 and 5.

4. Tighten the camshaft holders temporarily.

NOTE: make sure that the rocker arms contact correctly with the valve stems.



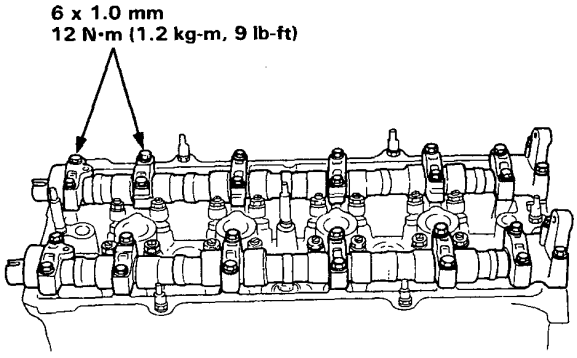
5. Drive in the camshaft oil seal securely with the special tool.



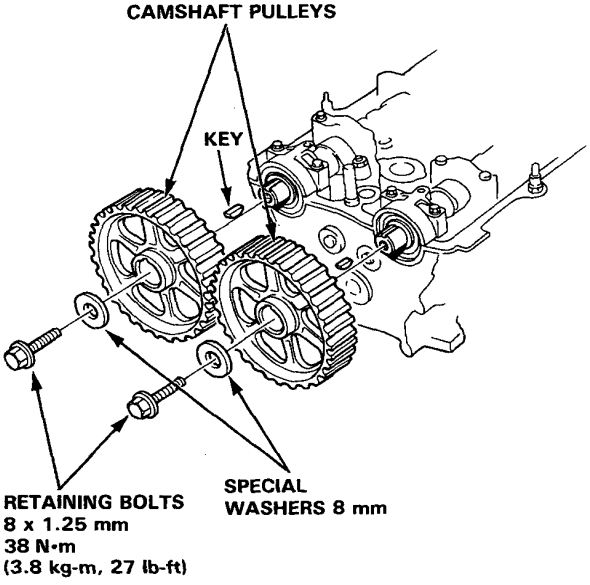
(cont'd)

Installation (cont'd)

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



7. Install key into groove in camshaft.

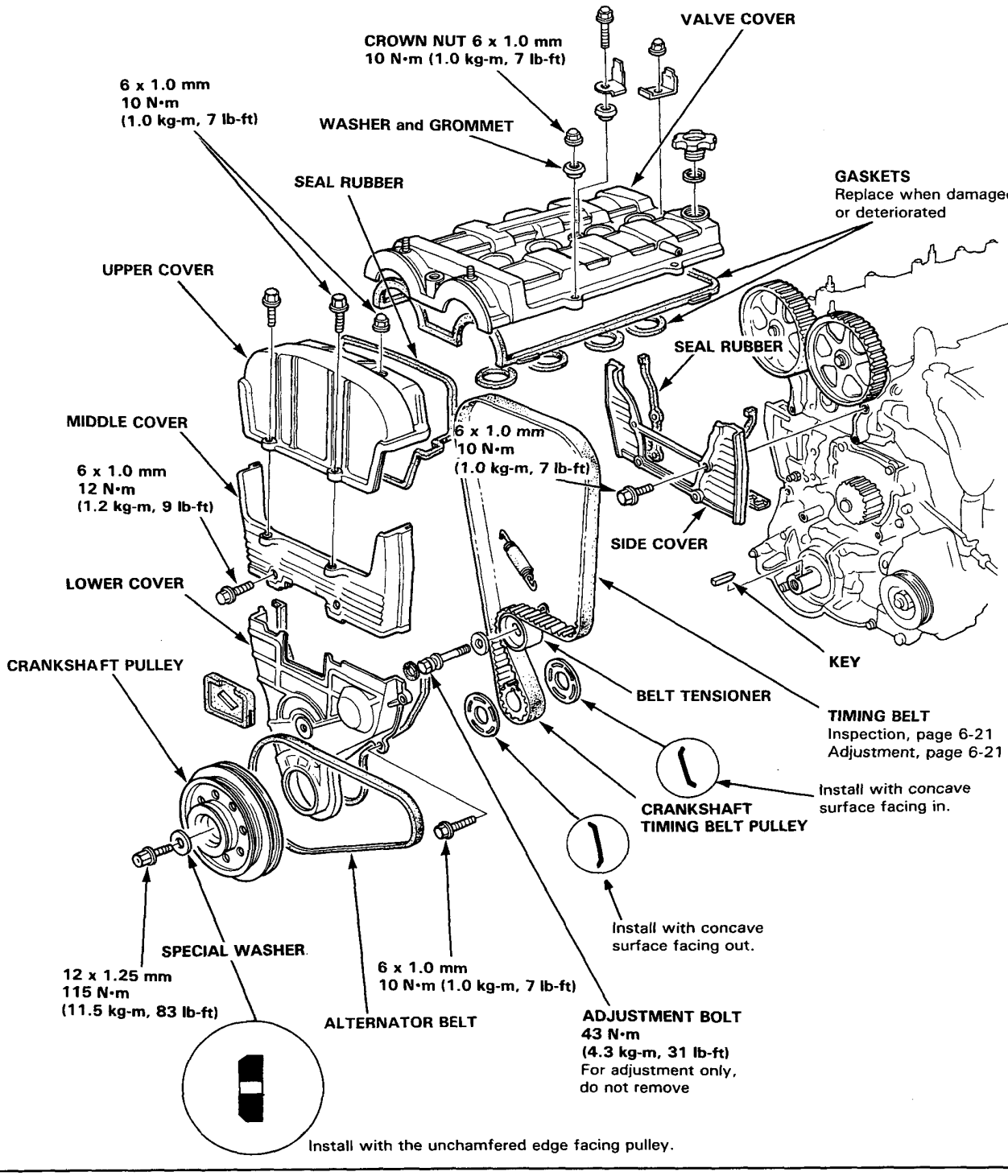


8. Push camshaft pulley onto camshaft, then tighten retaining bolt to torque shown.
9. Adjust the valve timing (page 6-20).
10. After the installation, check that the tubes, hoses and connectors are installed correctly.

Timing Belt

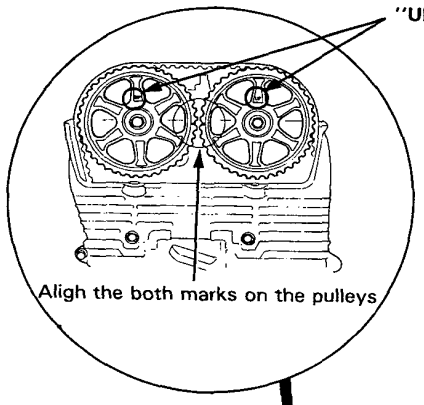
Replacement

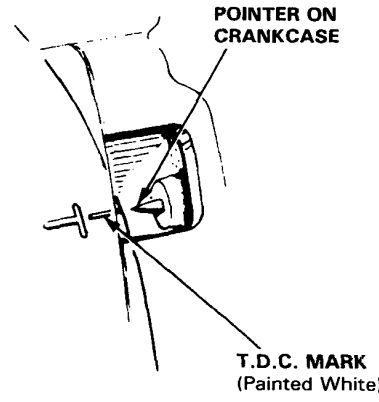
NOTE:
- Refer to next page for positioning crank and pulley before installing belt.
- Mark direction of rotation before removing.

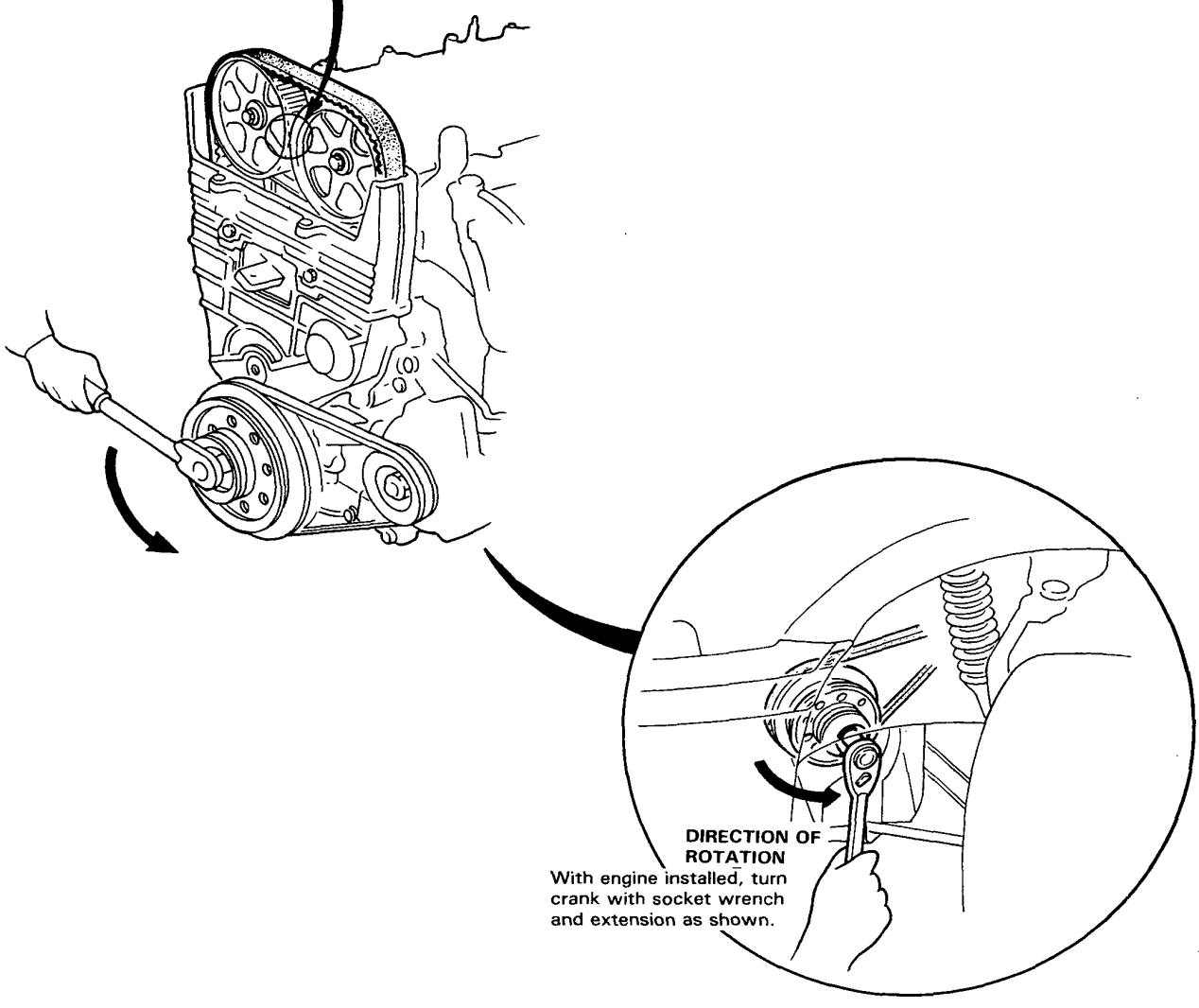


Positioning Crankshaft Before Installing Timing Belt

NOTE: Install the timing belt with the No. 1 piston at TDC (Top Dead Center) of the compression stroke.

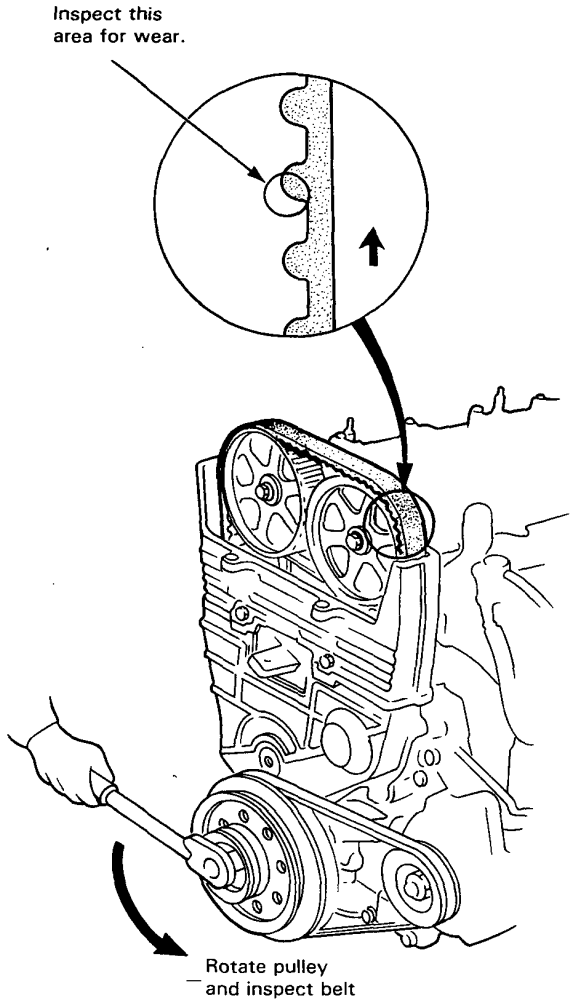






Inspection

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

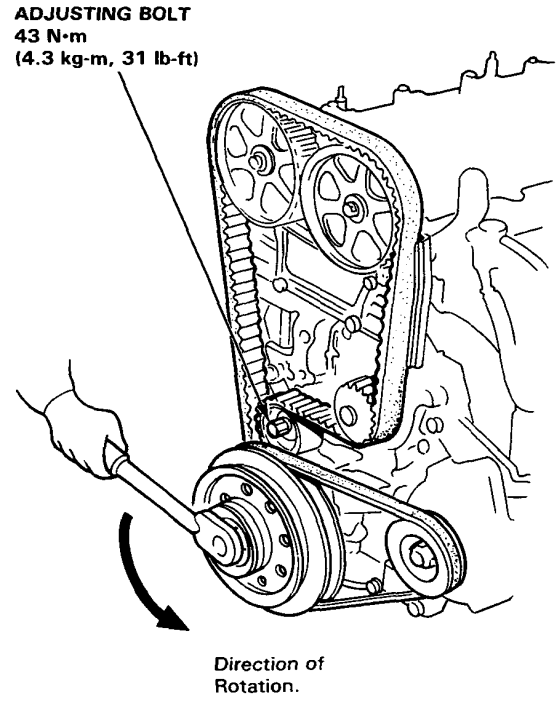


Tension Adjustment

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

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

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



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

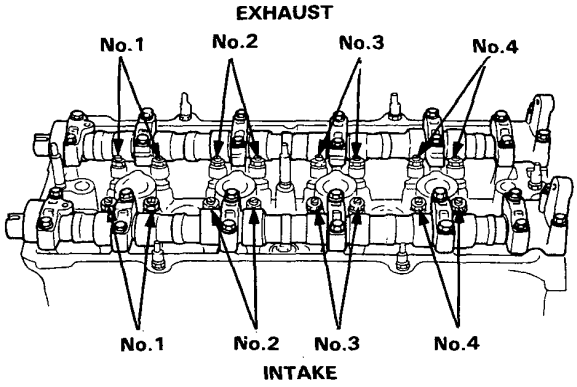
   NOTE: Put transmission in gear and set parking brake before retorquing pulley bolt.

Valve

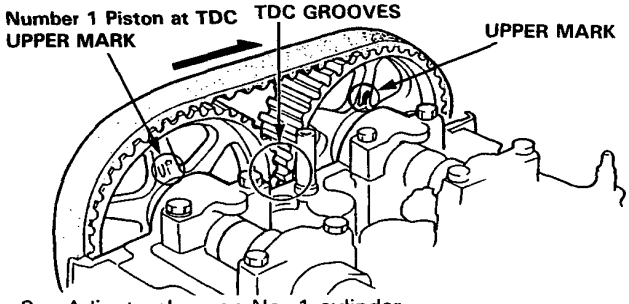
Adjustment

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

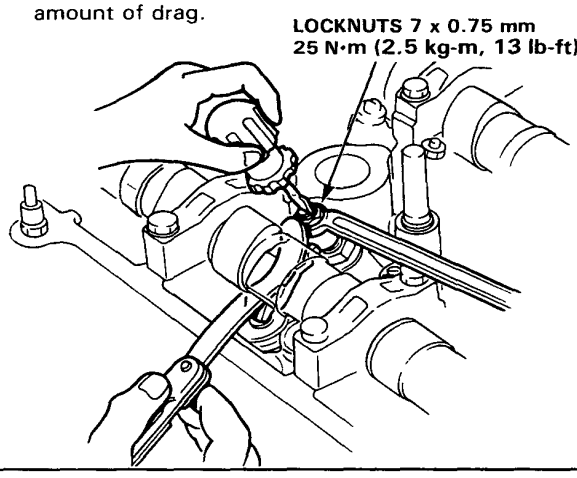
1. Remove the valve cover.



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

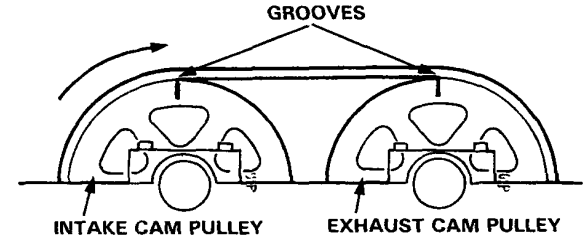


3. Adjust valves on No. 1 cylinder.
   Intake: 0.08—0.12 mm (0.003—0.005 in.)
   Exhaust: 0.16—0.20 mm (0.006—0.008 in.)
4. Loosen locknut and turn adjustment screw until feeler gauge slides back and forth with slight amount of drag.



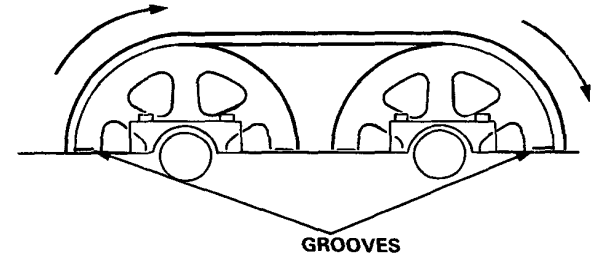
5. Tighten locknut and check clearance again. Repeat adjustment if necessary.
6. Rotate crankshaft 180° counterclockwise (cam pulley turns 90°). The "UP" marks should be at exhaust side. Distributor rotor should point to No. 3 plug wire. Adjust valves on No. 3 cylinder.

Number 3 piston at TDC



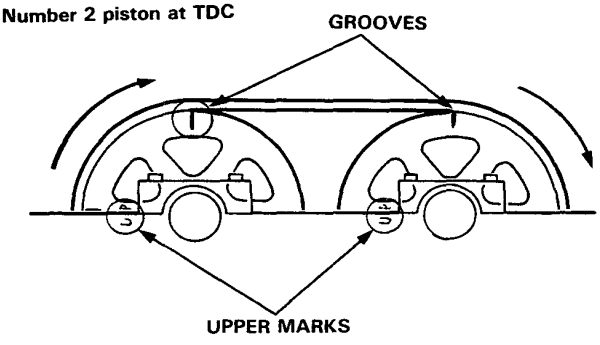
7. Rotate crankshaft 180° counterclockwise to bring No. 4 piston to TDC. Both "UP" marks should be at bottom and distributor rotor points to No. 4 plug wire. Adjust valves on No. 4 cylinder.

Number 4 piston at TDC



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

Number 2 piston at TDC

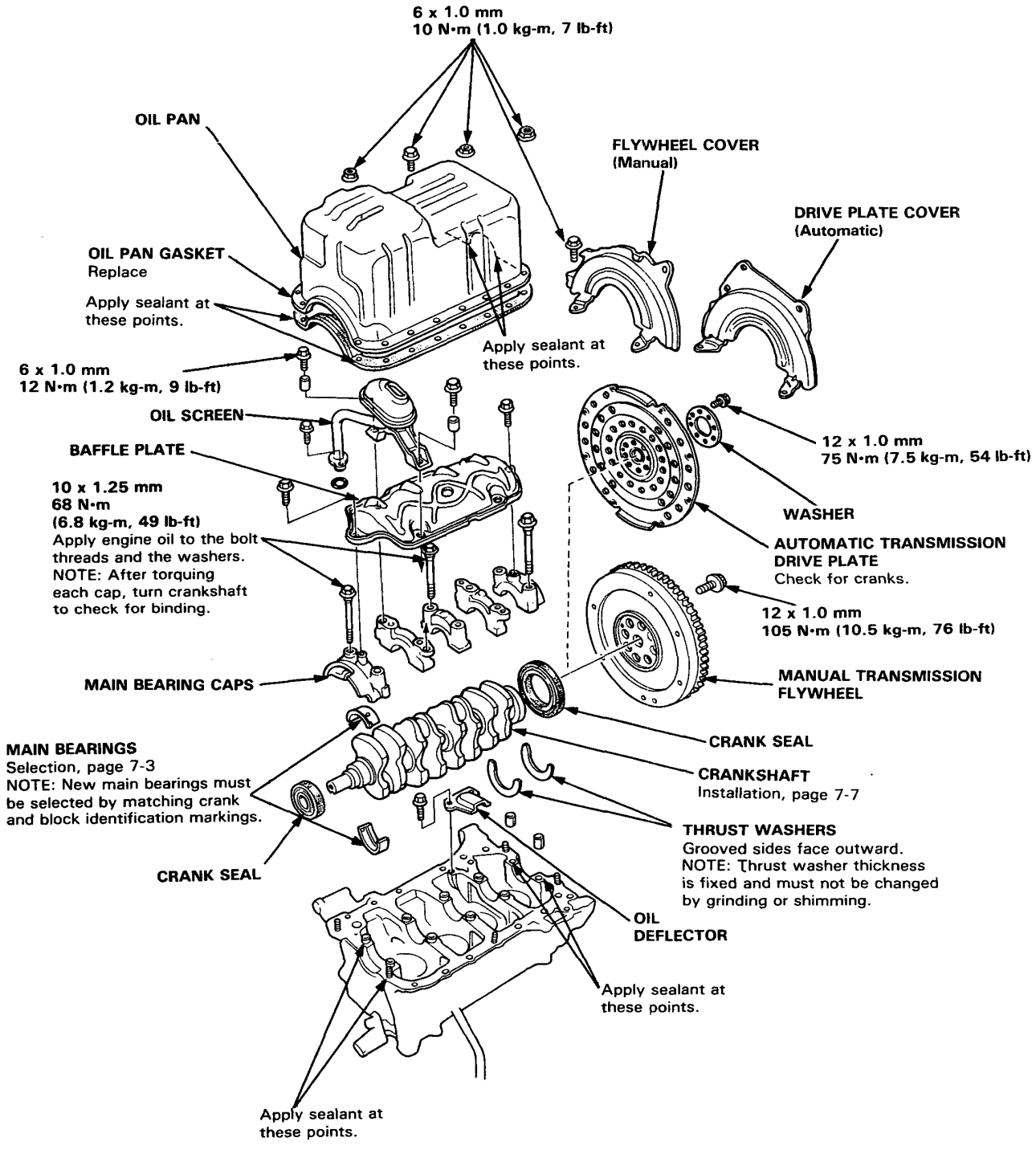


Engine Block

Engine Block

Illustrated Index

Lubricate all internal parts with engine oil during reassembly.



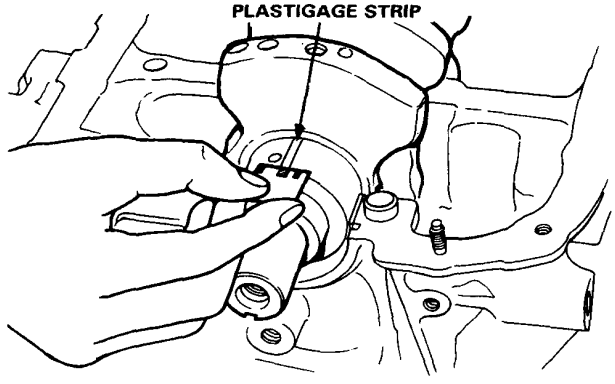
Main Bearing

Clearance

1. To check main bearing clearance, remove the main caps and bearing halves.
2. Clean each main journal and bearing half with a clean shop rag.
3. Place one strip of plastigage across each main journal.
   NOTE: If the engine is still in the car when you bolt the main cap down to check clearance, the weight of the crank and flywheel will flatten the plastigage further than just the torque on the cap bolts, and give you an incorrect reading. For an accurate reading, support the crank with a jack under the counterweights and check only one bearing at a time.
4. Reinstall the bearings and caps, then torque the bolts to 68 N·m (6.8 kg-m, 49 lb-ft).
   NOTE: Do not rotate the crank during inspection.
5. Remove the caps and bearings again, and measure the widest part of the plastigage.

Main Bearing Clearance:
Standard (New):

No. 1. 2. 4 and 5 Journals	**0.026—0.055 mm (0.0010—0.0022 in.)**
No. 3 Journal	**0.032—0.061 mm (0.0013—0.0024 in.)**
Service Limit:	**0.07 mm (0.003 in.)**



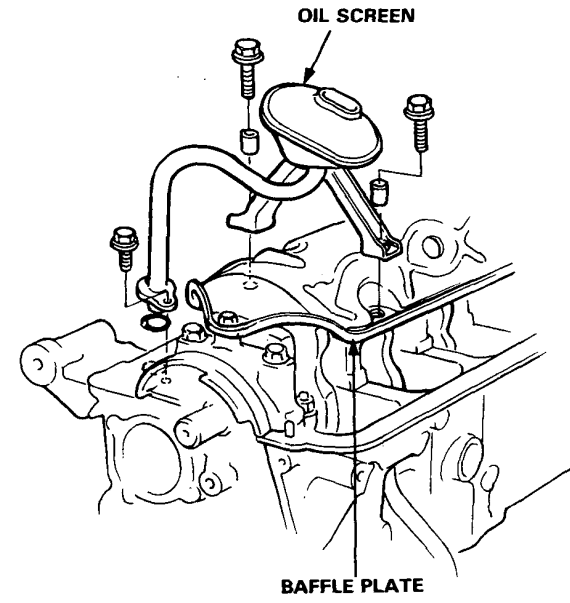
6. If the plastigage measures too wide or too narrow, (remove the engine if its still in the car), remove the crank, remove the upper half of the bearing, then install a new, complete bearing with the same color code (select the color as shown on the next page), and recheck the clearance.
   CAUTION: Do not file, shim, or scrape the bearings or the caps to adjust clearance.

7. If the plastigage shows the clearence 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.

Crankshaft/Piston

Removal

1. Remove the oil screen.

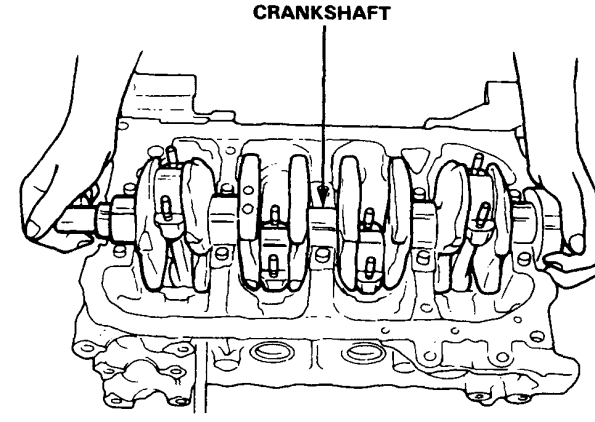


2. Remove the baffle plate.

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

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

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



(cont'd)

Crankshaft/Piston

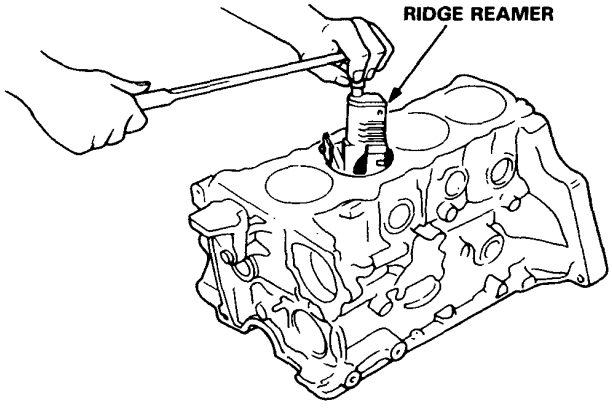
Removel (cont'd)

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

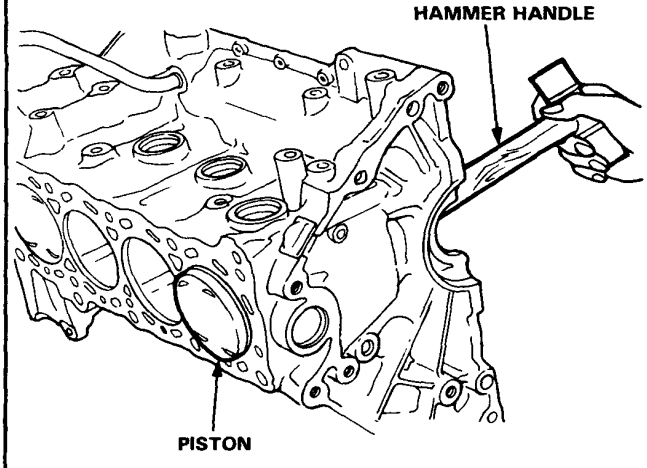
7. Reinstall main cap and bearings on engine in proper order.

8. 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 manufacturers instructions.

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



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



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

11. 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

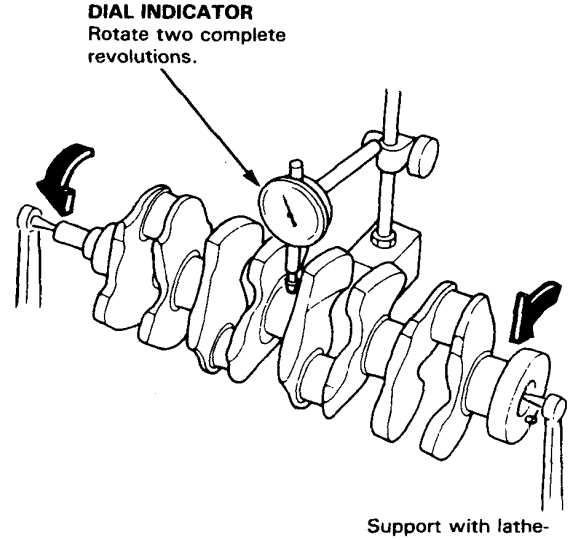
Inspection

- 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 diffirence between measurements on each journal must not be more than the service limit.

Crankshaft Total Indicated Runout:
Standard (New): 0.024 mm (0.0009 in.)
Service Limit: 0.04 mm (0.0016 in.)



Piston

Inspection

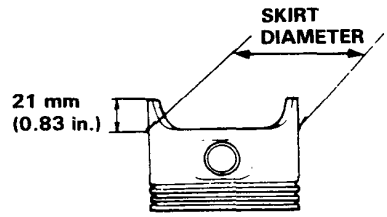
1. Check the piston for distortion or cranks.

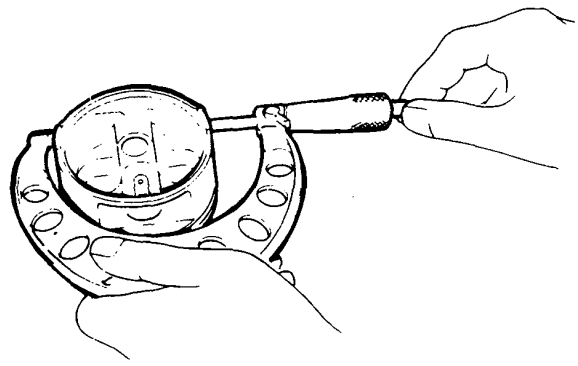
   NOTE: If cylinder is bored, an oversized piston must be used.

2. Measure piston diameter at a point 21 mm (0.83 in.) from bottom of skirt.

   Piston A Diameter
   Standard (New): 82.67—82.68 mm (3.2547—3.2551 in)
   Service Limit: 82.71 mm (3.2563 in.)

   Piston B Diameter
   Standard (New): 82.66—82.67 mm (3.2543—3.2547 in.)
   Service Limit: 82.70 mm (3.2559 in.)





   Oversize Piston Diameter
   Standard 0.30 82.98—82.99 mm (3.2669—3.2673 in.)

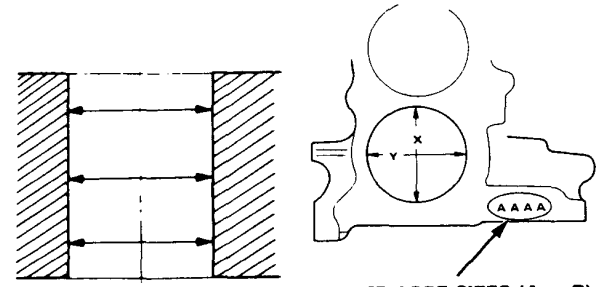
3. Check the piston pin-to-piston clearance. Coat the piston pin with engine oil.
   It should then be possible to push the piston pin into the piston hole with thumb pressure.

   Piston Pin-to-Piston Clearance:
   Service limit: 0.012—0.024 mm (0.0005—0.0009 in.)

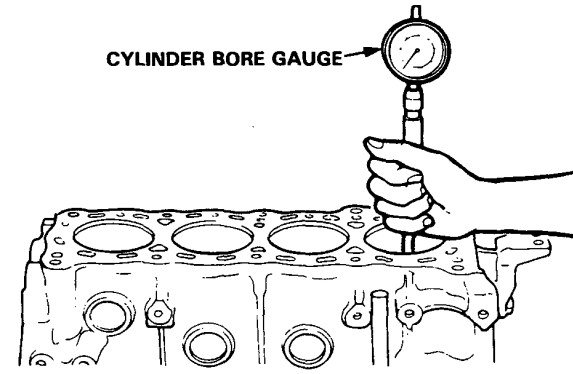
Cylinder Block

Inspection

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



CYLINDER BORE SIZES (A or B)
Read the letters from left-to-right for No. 1 through No. 4 cylinders.



Cylinder Bore Size A
Standard (New): 82.70—82.71 mm (3.2559—3.2563 in.)
Service Limit: 82.74 mm (3.2575 in.)
Cylinder Bore Size B
Standard (New): 82.69—82.70 mm (3.2555—3.2559 in.)
Service Limit: 82.73 mm(3.2571 in.)
Oversize
Standard 0.30 (New): 83.01—83.02 mm (3.2681—3.2685 in.)

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

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

NOTE: Scored or scratched cylinder bores must be honed.

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

Piston Ring

End Gap

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

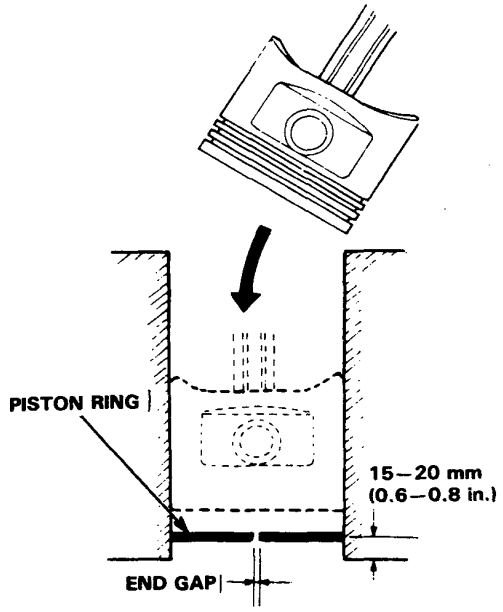
2. Measure the piston ring end-gap with a feeler gauge:

   - If the gap is too small, check to see if you have the proper rings for your engine.
   - If the gap is too large, re-check the cylinder bore diameter against the wear limits on page 7-5. If the bore is over limit, the engine block must be rebored.

Piston Ring End-Gap:
Top Ring
Standard (New): 0.20—0.35 mm (0.008—0.014 in.)
Service Limit: 0.60 mm (0.02 in.)

Second Ring
Standard (New): 0.25—0.37 mm (0.010—0.015 in.)
Service Limit: 0.60 mm (0.02 in.)

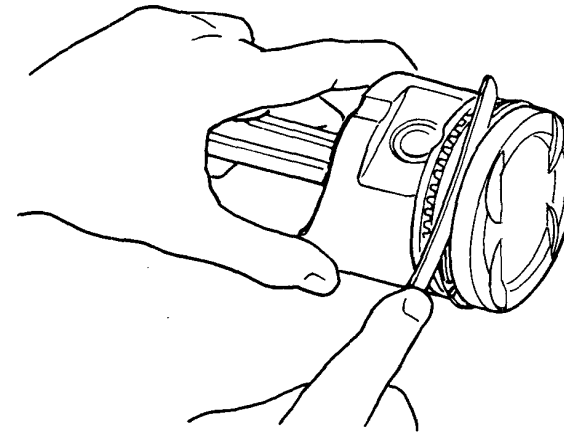
Oil Ring
Standard (New): 0.2—0.7 mm (0.008—0.028 in.)
Service Limit: 0.8 mm (0.03 in.)



Ring Land Clearance

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

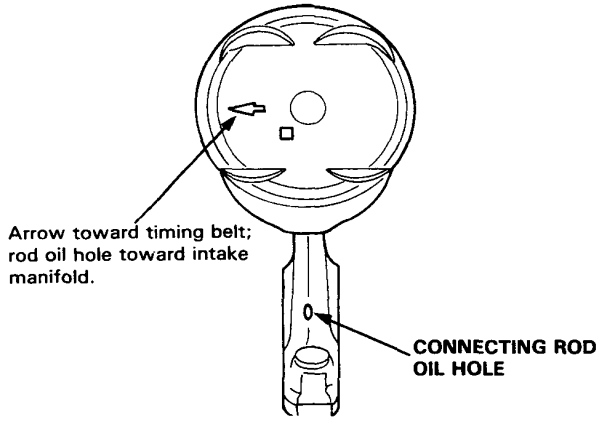
Top and Second Ring Clearance:
Standard (New): 0.030—0.055 mm (0.0012—0.0022 in.)
Service Limit: 0.13 mm(0.005 in.)



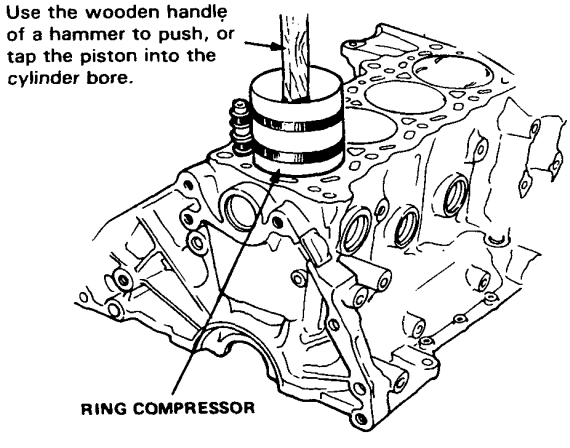
Piston Installation

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

1. If the crankshaft is already installed:
   - Remove the connecting rod caps, then slip short sections of rubber hose over the threaded ends of the connecting rod bolts.
   - Install the ring compressor, check that the bearing is securely in place, then position the piston in the cylinder and drive it in using the wooden handle of a hammer.
     Stop after the ring compressor pops free and check the connecting rod-to-crank journal alignment before driving rod into place.
   - Install the rod caps with bearings, and torque the nuts to 32 N·m (3.2 kg-m, 23 lb-ft).
2. If the crankshaft is not installed:
   - Remove the rod caps and bearings, install the ring compressor, then position the piston in the cylinder and drive it in using the wooden handle of a hammer.
   - Position all pistons at top dead center.



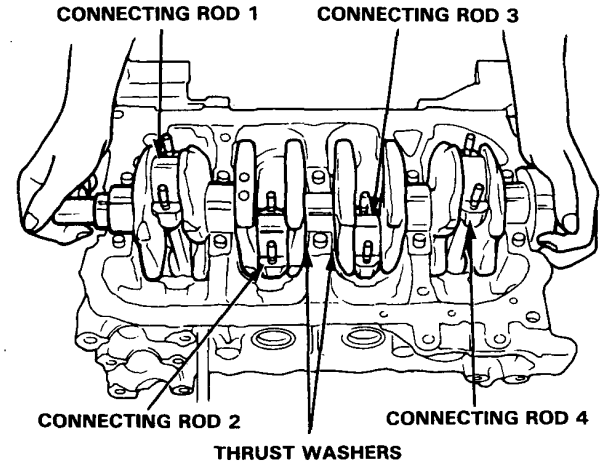
NOTE: Maintain downward force on ring compressor to prevent rings from expanding before entering the cylinder bore.



Crankshaft Installation

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

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



4. Rotate the crankshaft clockwise, seat journals into connecting rods No. 1 and No. 4, and install the rod caps and nuts finger tight.
5. Install the thrust washers, main bearing halves and caps, check clearance with plastigage (page 7-3), then torque the nuts to 68 N·m (6.8 kg-m,49 lb-ft), Oil thrust washer surfaces.
6. Check the rod bearing clearance with plastigage, then torque nuts to 32 N·m (3.2 kg-m, 23 lb-ft).

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

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

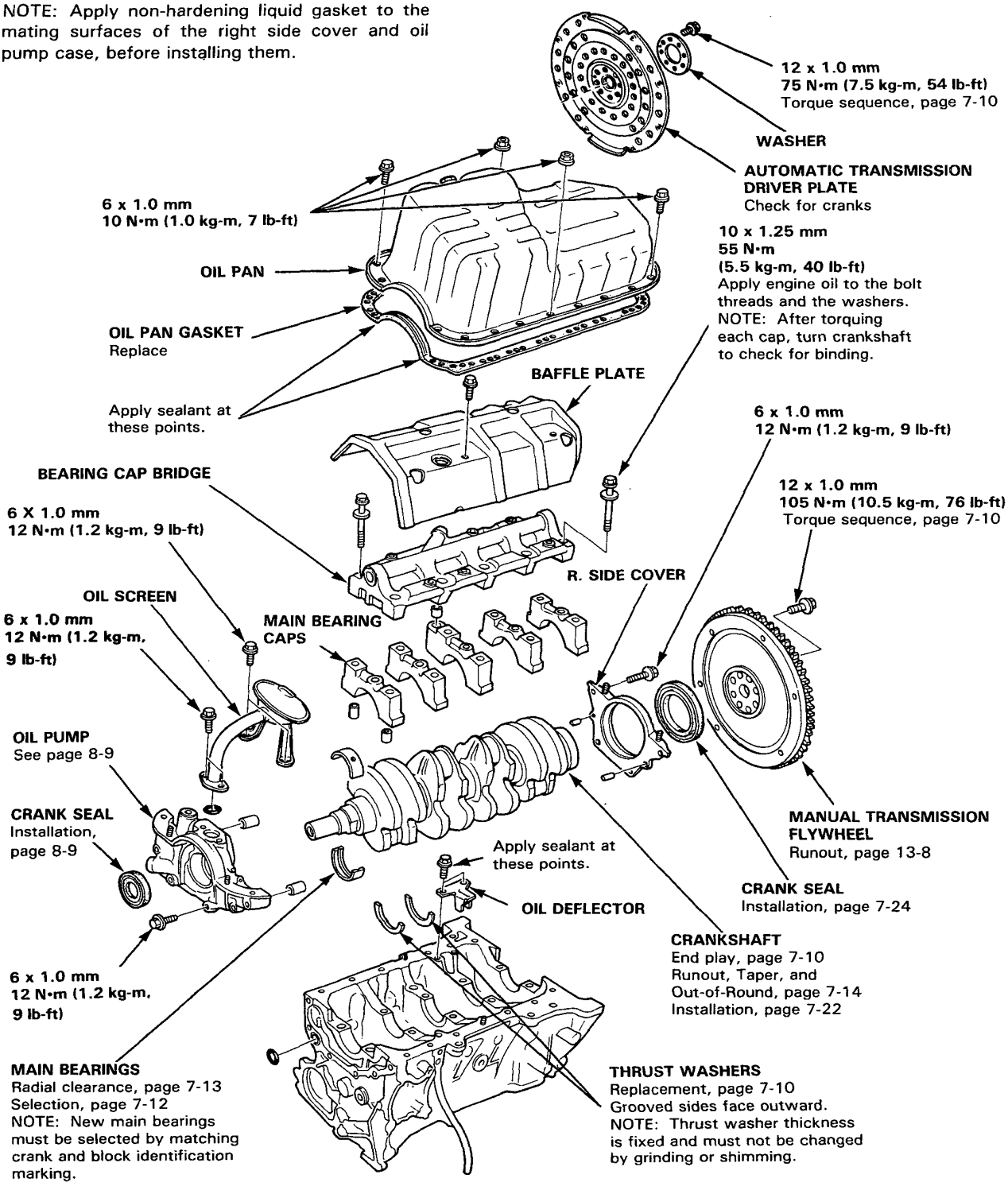
B20A1 Engine

Engine Block

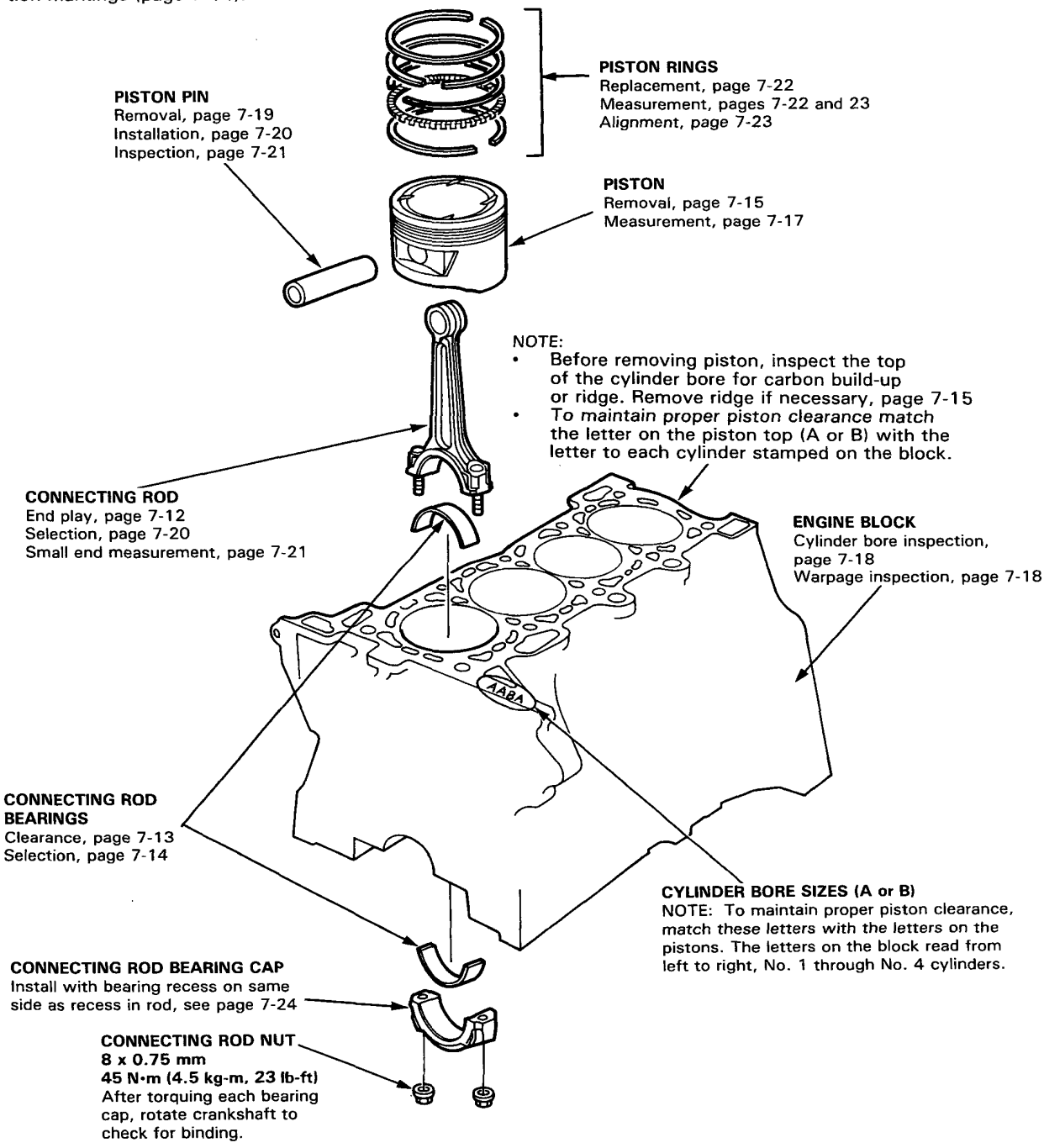
Illustrated Index

Lubricate all internal parts with engine oil during reassembly.

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



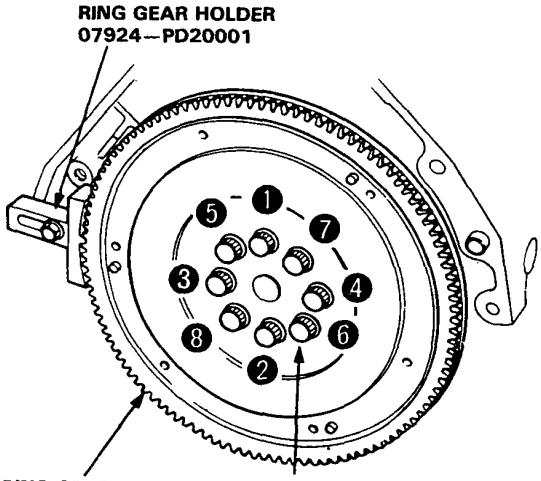
NOTE: New rod bearings must be selected by matching connecting rod and crankshaft identification markings (page 7-14).



Engine Block

Flywheel Replacement (Manual Transmission)

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

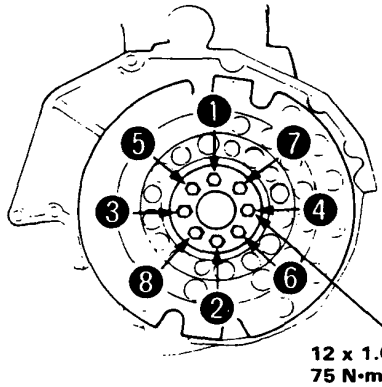


RING GEAR
Inspect ring gear teeth for wear or damage.

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

Drive Plate Replacement (Automatic Transmission)

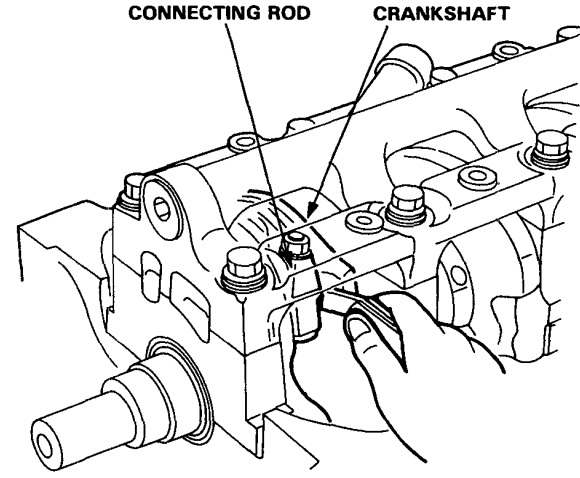
Remove the eight drive plate bolts, then separate the drive plate from the crankshaft flange. After installation, tighten the bolts in the sequence shown.



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

Connecting Rod End Play

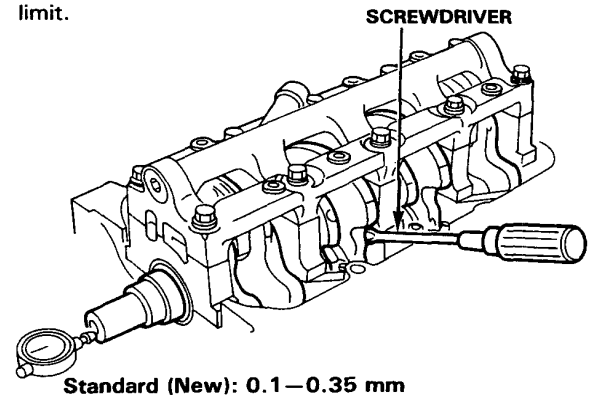
Standard (New): 0.15—0.30 mm (0.006—0.012 in.)
Service Limit: 0.40 mm (0.016 in.)



- If out-of tolerance, install new connecting rod.
- If still out-of-tolerance, replace crankshaft (pages 7-15 and 7-24).

Crankshaft End Play

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



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

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

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

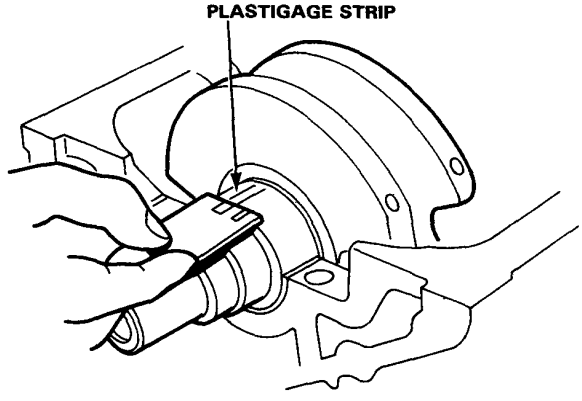
Main Bearing

Clearance

1. To check main bearing clearance, remove the main caps and bearing halves.
2. Clean each main journal and bearing half with a clean shop rag.
3. Place one strip of plastigage across each main journal.
   NOTE: If the engine is still in the car when you bolt the main cap down to check clearance, the weight of the crank and flywheel will flatten the plastigage further than just the torque on the cap bolts, and give you an incorrect reading. For an accurate reading, support the crank with a jack under the counterweights and check only one bearing at a time
4. Reinstall the bearings and caps, then torque the bolts to 55 N·m (5.5 kg-m, 40 lb-ft).
5. Remove the caps and bearings again, and measure the widest part of the plastigage.

Main Bearing Clearance:
Standard (New):

No. 1, 2, 4 and 5 Journals	**0.024—0.042 mm (0.0010—0.0017 in.)**
No. 3 Journal	**0.030—0.048 mm (0.0012—0.0019 in.)**
Service Limit:	**0.05 mm (0.002 in.)**



6. If the plastigage measures too wide or too narrow, (remove the engine if it's still in the car), remove the crank, remove the upper half of the bearing, then install a new, complete bearing with the same color code (select the color as shown on the next page), and recheck the clearance.
   CAUTION: Do not file, shim, or scrape the bearings or the caps to adjust clearance.

7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check again.
   NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crank and start over.

Rod Bearing

Clearance

1. Remove the connecting rod cap and bearing half.

2. Clean the crankshaft rod journal and bearing half with a clean shop rag.

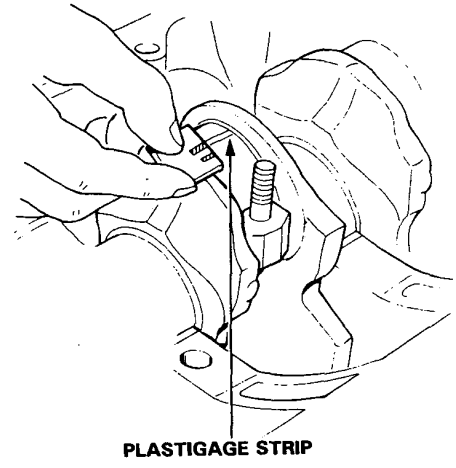
3. Place plastigage across the rod journal.

4. Reinstall the bearing half and cap, and torque the nuts to 45 N·m (4.5 kg-m, 32 lb-ft).

   NOTE: Do not rotate the crank during inspection.

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

Connecting Rod Bearing Clearance:
Standard (New): 0.026—0.044 mm (0.0010—0.0017 in.)
Service Limit: 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.

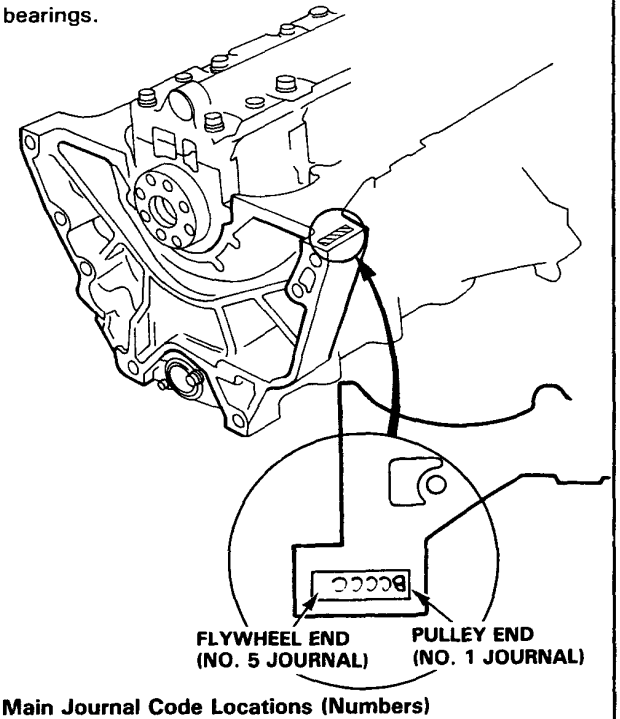
   NOTE: If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crank and start over.

Main Bearing

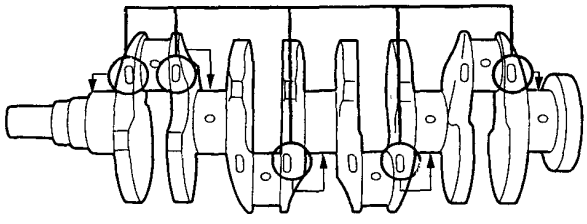
Selection

Crank Bore Code Location (Marks)

Marks have been stamped on the end of the block as a code for the size of each of the 5 main journal bores. Use them, and the numbers stamped on the crank (codes for main journal size), to choose the correct bearings.



Main Journal Code Locations (Numbers)



Bearing Identification

Color code is on the edge of the bearing

→ Larger crank bore

A or I	B or II	C or III	D or IIII

→ Smaller bearing (thicker)

Red	Pink	Yellow	Green
Pink	Yellow	Green	Brown
Yellow	Green	Brown	Black
Green	Brown	Black	Blue

1
2
3
4

Smaller main journal

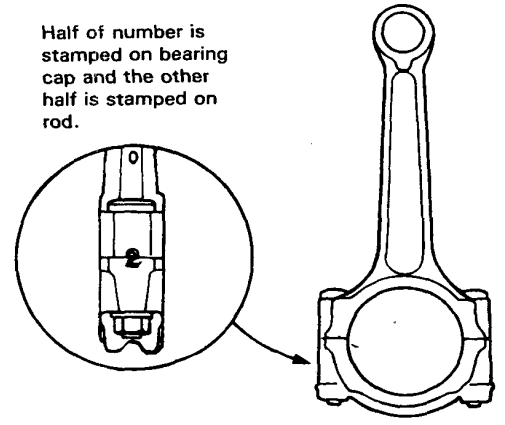
Smaller bearing (thicker)

Rod Bearing

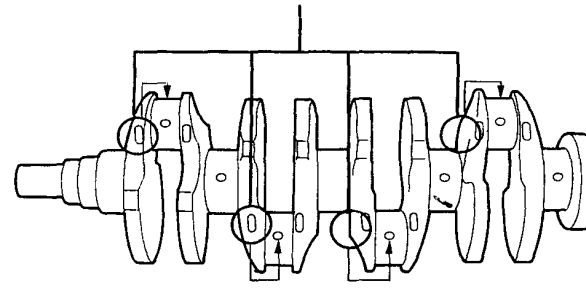
Selection

Rod Code Location (Numbers)

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



Rod Journal Code Locations (Letters)



Bearing Identification

Color code is on the edge of the bearing

→ Larger big end bore

1	2	3	4

→ Smaller bearing (thicker)

Red	Pink	Yellow	Green
Pink	Yellow	Green	Brown
Yellow	Green	Brown	Black
Green	Brown	Black	Blue

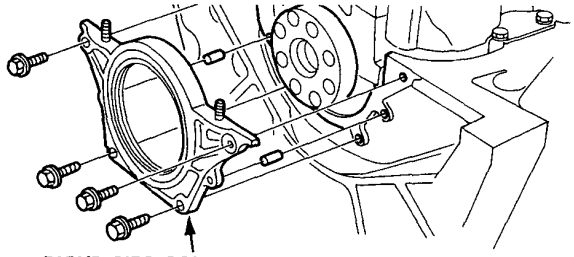
A
B
C
D

Smaller rod jounal

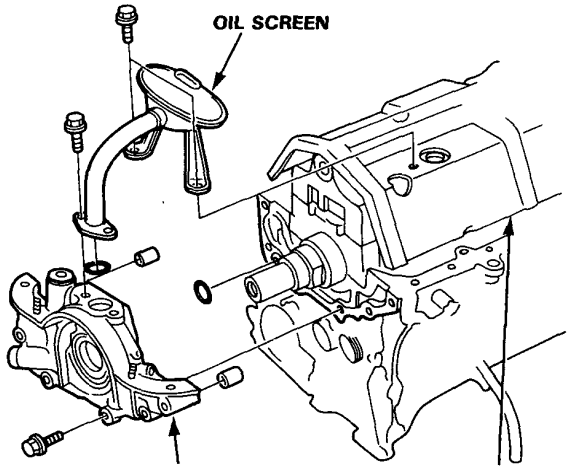
Smaller bearing (thicker)

Removal

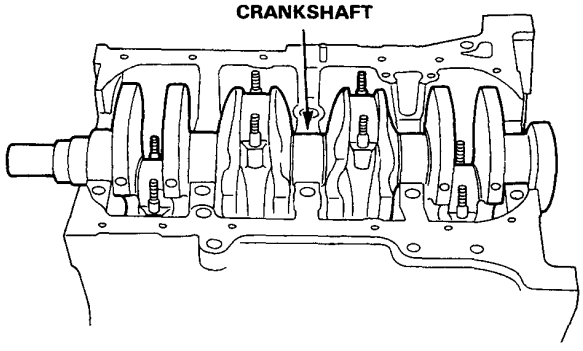
1. Remove the right side cover.



2. Remove the oil screen.

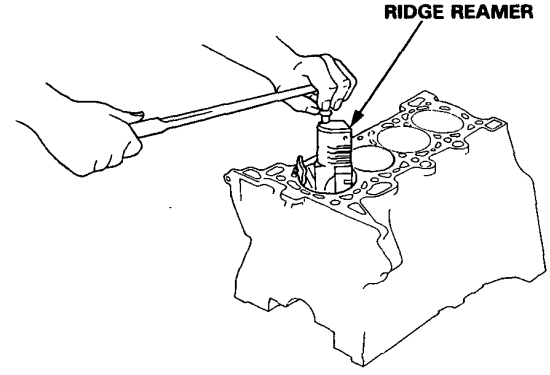


3. Remove the oil pump.
4. Remove the baffle plate.
5. Turn the crankshaft so No. 2 and 3 crankpins are at the bottom.
6. Remove the rod caps/bearings and main caps/bearings. Keep all caps/bearings in order.
7. Lift the crankshaft out of engine, being careful not to damage journals.

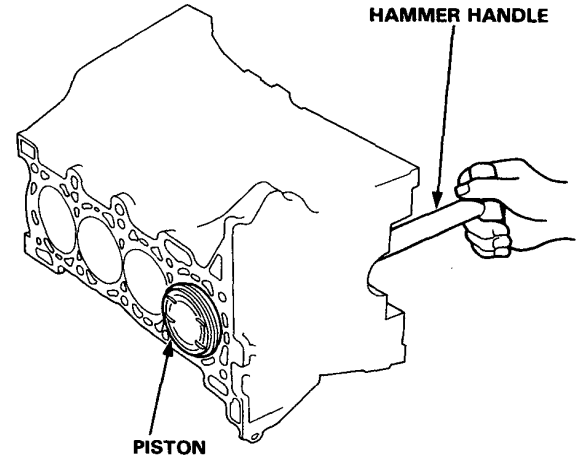


8. Remove upper bearing halves from connecting rods and set aside with their respective caps.
9. Reinstall main cap and bearings on engine in proper order.
10. If you can feel a ridge of metal or hard carbon around the top of each cylinder, remove it with a ridge reamer. Follow reamer manufacturer's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

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



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



12. Reinstall the rod bearings and caps after removing each piston/connecting rod assembly.
13. 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.

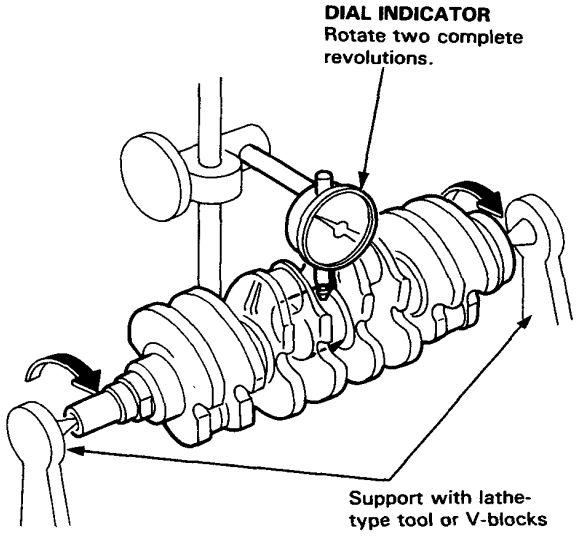
Inspection

- 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 sevice limit.

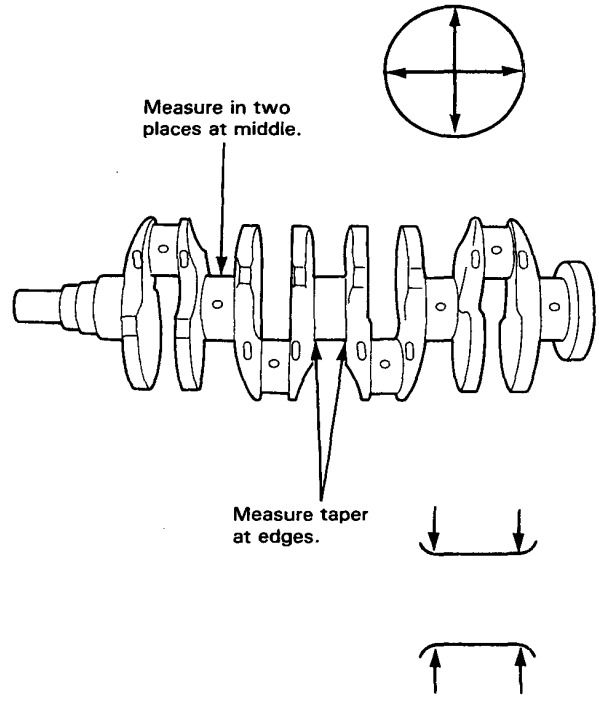
Crankshaft Total Indicate Runout:
Standard (New): 0.02 mm (0.0008 in.)
Service Limit: 0.03 mm (0.0012 in.)



Out-of-Round and Taper

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

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



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

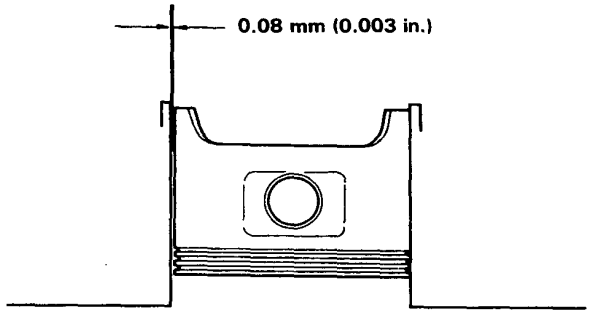
Journal Out-of-Round:
Standard (New): 0.005 mm (0.0002 in.)
Service Limit: 0.010 mm (0.0004 in.)

Cylinder Block

Piston-to-Block Clearance

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

   Service Limit: 0.08 mm (0.003 in.)



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

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

   Piston-to-Cylinder Clearance:
   Standard (New): 0.02—0.04 mm
   (0.0008—0.0016 in.)
   Service Limit: 0.08 mm (0.003 in.)

Piston

Inspection

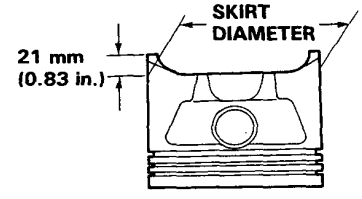
1. Check the piston for distortion or cracks.

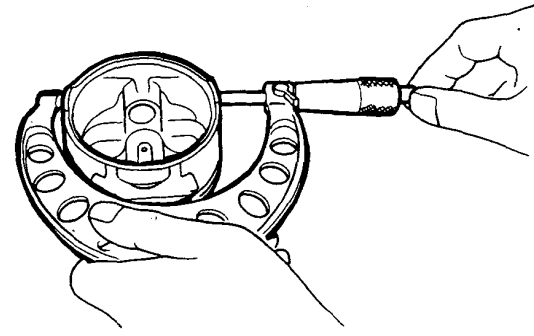
   NOTE: If cylinder is bored, an oversized piston must be used.

2. Measure piston diameter at a point 21 mm (0.83 in.) from bottom of skirt.

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

   Piston A Diameter
   Standard (New): 80.98—80.99 mm
   (3.1882—3.1886 in.)
   Service Limit: 80.97 mm (3.1878 in.)
   Piston B Diameter
   Standard (New): 80.97—80.98 mm
   (3.1878—3.1882 in.)
   Service Limit: 80.96 mm (3.1874 in.)





   Oversize Piston Diameter
   Standard 0.25: 81.248—81.249 mm
   (3.19873—3.19877 in.)
   Standard 0.5: 81.498—81.499 mm
   (3.20858—3.20862 in.)

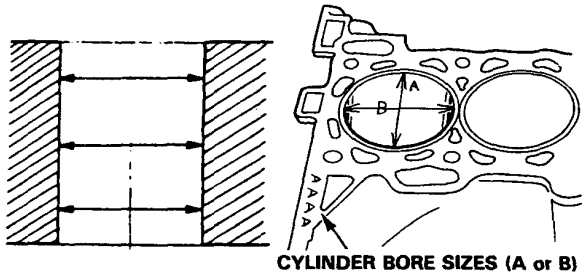
3. Check the piston pin-to-piston clearance. Coat the piston pin with engine oil.
   It should then be possible to push the piston pin into the piston hole with thumb pressure.

   Piston Pin-to-Piston Clearance:
   Service limit: 0.012—0.024 mm
   (0.0005—0.0009 in.)

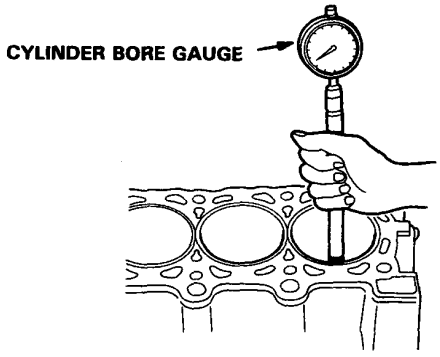
Cylinder Block

Inspection

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



CYLINDER BORE SIZES (A or B)
Read the letters from left-to-right for No. 1 through No. 4 cylinders.



Cylinder Bore Size A
Standard (New): 81.01–81.02 mm (3.1894–3.1898 in.)
Service Limit: 81.05 mm (3.1909 in.)

Cylinder Bore Size B
Standard (New): 81.00–81.01 (3.1890–3.1894 in.)
Service Limit: 81.04 mm (3.1905 in.)

Oversize
Standard 0.30 (New): 83.01–83.02 mm (3.2681–3.2685 in.)

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

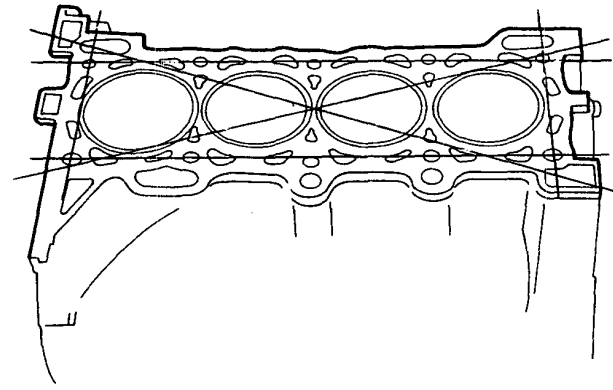
- If measurements in any cylinder are beyond Oversize Bore Service Limit, replace the block.
- If block is to be rebored, refer to Piston Clearance Inspection (page 7-17) after reboring.

NOTE: Scored or scratched cylinder bores must be honed.

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

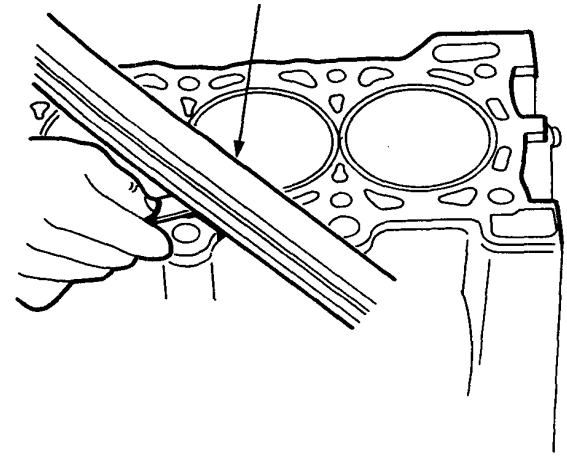
2. Check the top of the block for warpage. Measure along the edges and across the center as shown.

SURFACES TO BE MEASURED



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

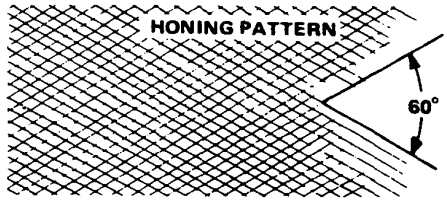
PRECISION STRAIGHT EDGE



Piston Pin

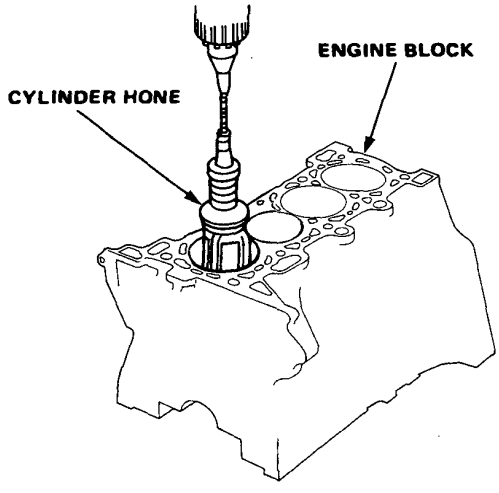
Bore Honing

1. Measure cylinder bores as shown on page 7-18. If the block is to be re-used, hone the cylinders and remeasure the bores.
2. Hone cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree cross-hatch pattern.



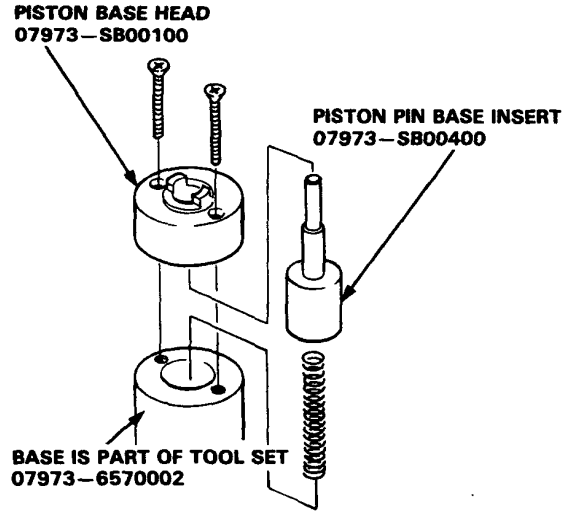
3. When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil immediately to prevent rusting.
4. If Scoring or scratches are still present in cylinder bores after honing to service limit, rebore the engine block.

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

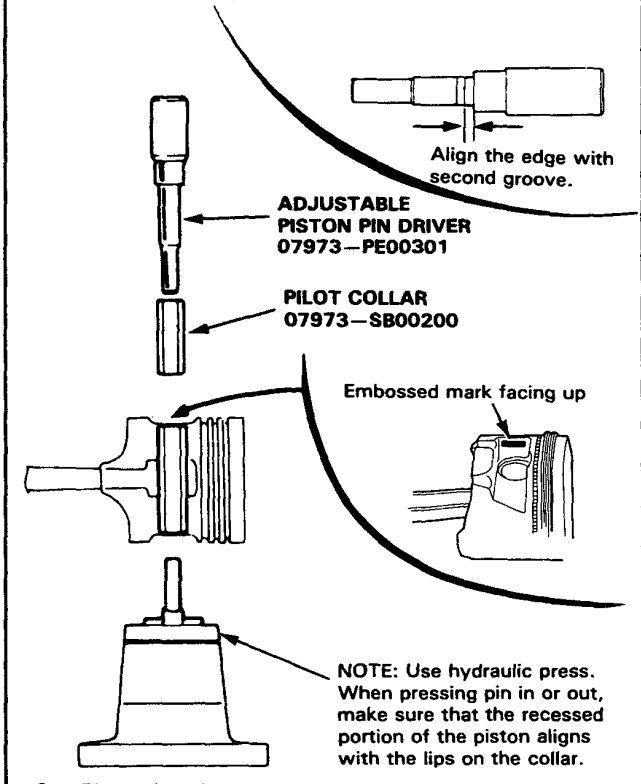


Removal

1. Install the attachment on the piston base.



2. Turn the handle of the piston pin driver so that the end of the drive aligns with the second groove of the driver body as shown.



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

Connecting Rod

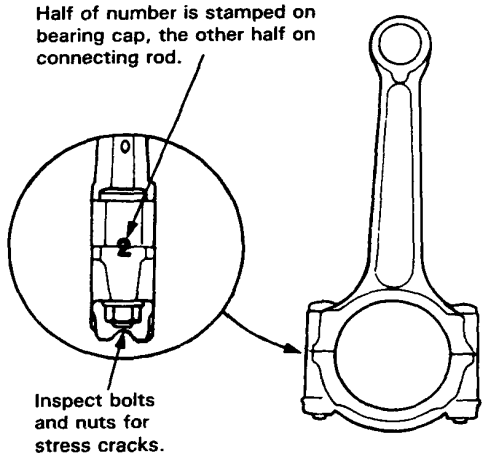
Selection

Each rod is sorted into one of four tolerance ranges (from+0.006 to 0.024 mm, in 0.006 mm increments) depending on the size of its big end bore. It's then stamped with a nubmer (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: 51 mm (2.01 in.)

NOTE:

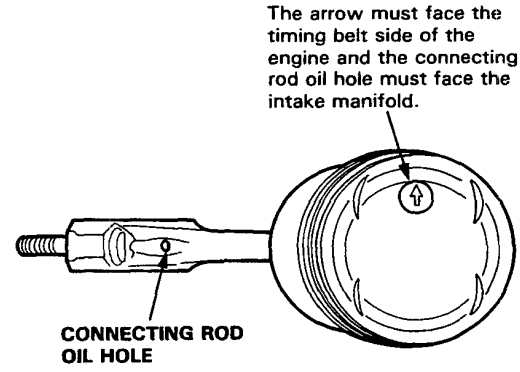
- Reference numbers are for big end bore size and do NOT indicate the postition of rod in engine.
- Inspect connecting rod for cracks and heat damage.

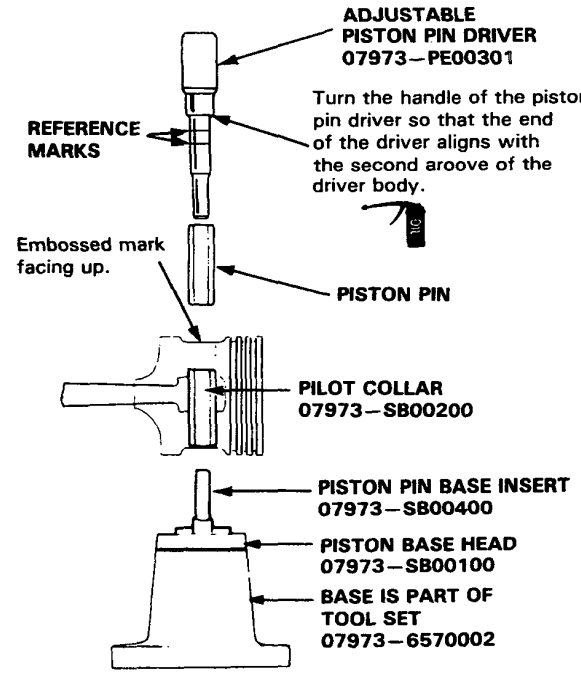


Piston Pin

Installation

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





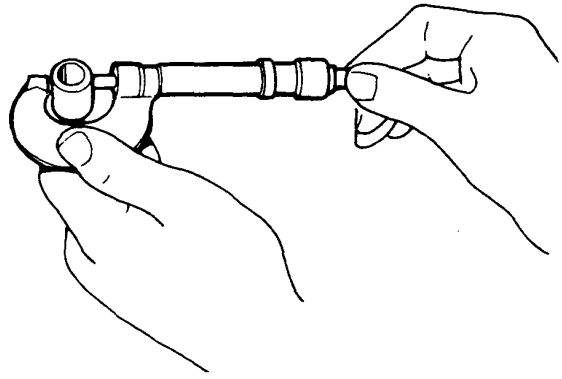
NOTE: Install the assembled piston and rod with the oil hole facing the intake manifold.

Inspection

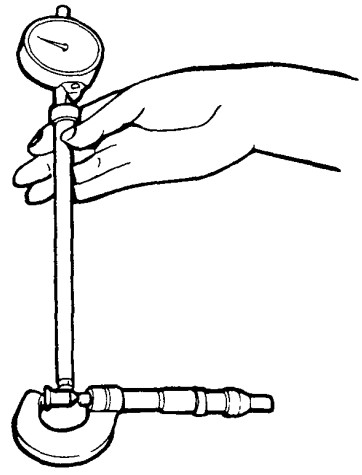
1. Measure the diameter of the piston pin.

Piston Pin Diameter:
Standard (New): 19.994—20.0 mm
(0.7872—0.7874 in.)
Oversize: 19.997—20.003 mm
(0.7873—0.7875 in.)

NOTE: All replacement piston pins are oversize.



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

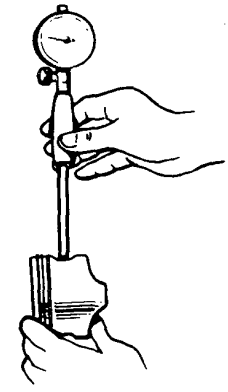


3. Measure the piston pin-to-piston clearance.

NOTE: Check the piston for distortion or cracks.

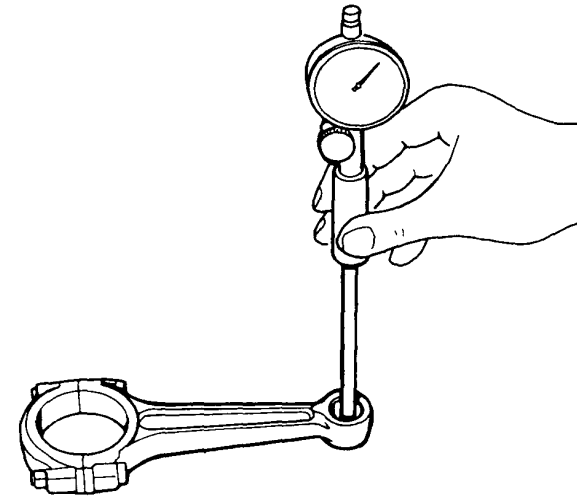
If the piston pin clearance is greater than 0.024 mm (0.0009 in.), re-measure using an oversize piston pin.

Piston Pin-to-Piston Clearance:
Service Limit: 0.012—0.024 mm
(0.0005—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): 0.013—0.032 mm
(0.0005—0.0013 in.)



Piston Ring

End Gap

1. Using a piston, push a new ring into the cylinder bore 15—20 mm (0.6—0.8 in.) from the bottom.
2. Measure the piston ring end-gap with a feeler gauge:

   - If the gap is too small, check to see if you have the proper rings for your engine.

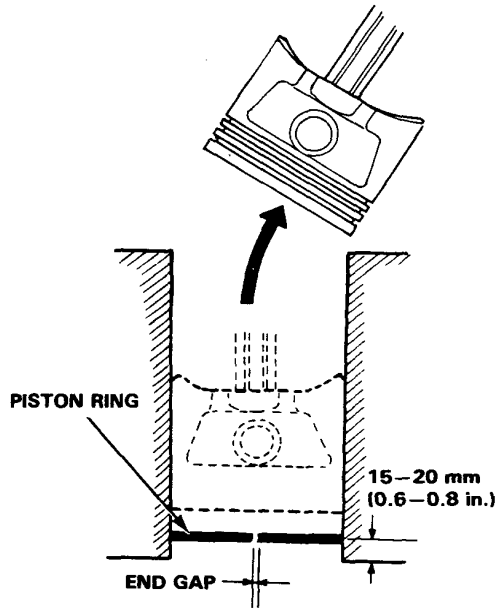
   - If the gap is too large, re-check the cylinder bore diameter against the wear limits on page 7-17. If the bore is over limit, the engine block must be rebored.

Piston Ring End-Gap:

Top Ring
Standard (New): 0.25—0.35 mm (0.010—0.014 in.)
Service Limit: 0.6 mm (0.02 in.)

Second Ring
Standard (New): 0.35—0.45 mm (0.014—0.018 in.)
Service Limit: 0.7 mm (0.03 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.

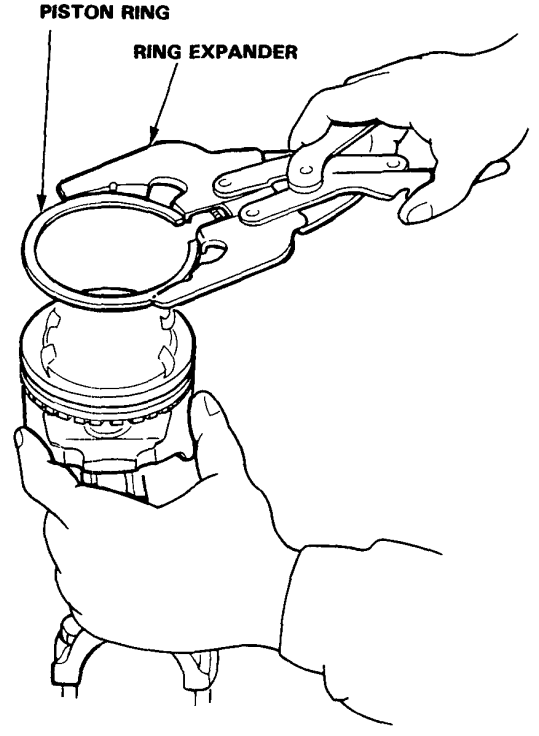
   NOTE: Use squared-off broken ring, or file down blade on ring groove cleaner to fit (compression rings are 1.5 mm wide; oil ring is 4.0 mm wide).

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

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

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

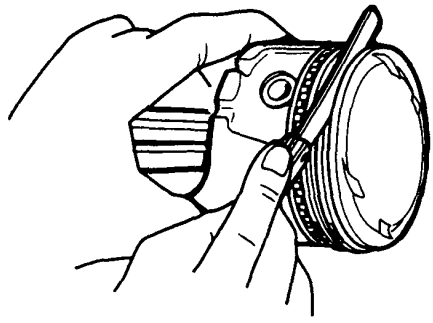
   NOTE: Do not re-use old piston rings.



Land Clearances

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

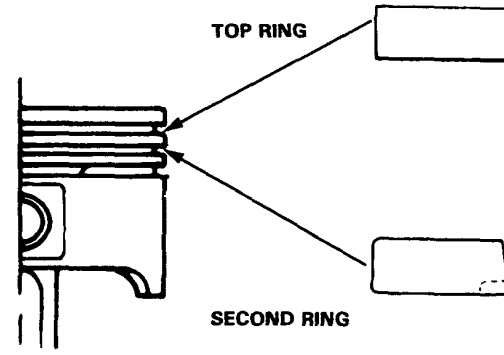
Top Ring Clearance:
Standard (New): 0.035—0.060 mm
(0.0014—0.0024 in.)
Service Limit: 0.13 mm (0.005 in.)
Second Rings Clearance
Standard (New): 0.030—0.055 mm
(0.0012—0.0022 in.)
Service Limit: 0.13 mm (0.005 in.)



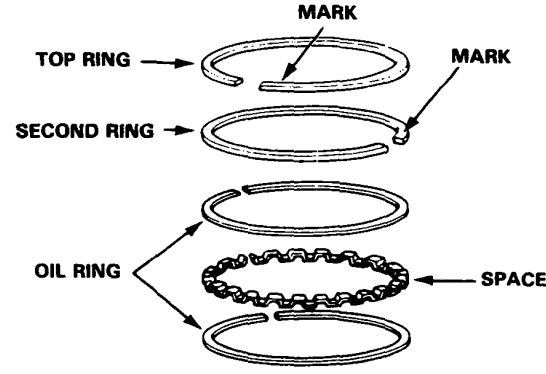
Alignment

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

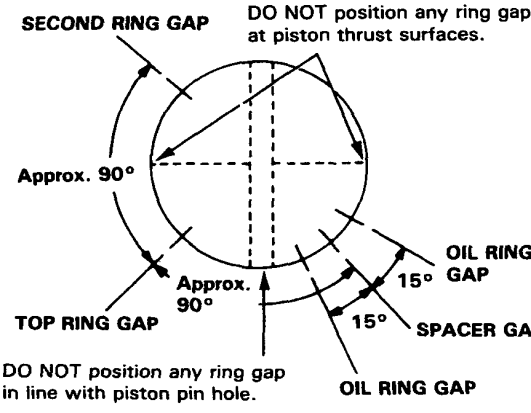
   Identify top and second rings by the chamfer on the edge, and make sure they are in proper grooves on piston.



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



4. Position the ring end gaps as shown:

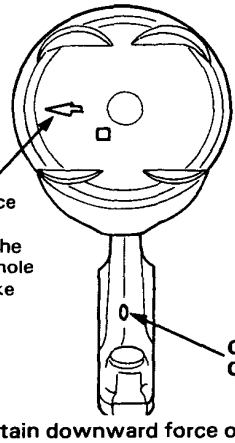


Piston

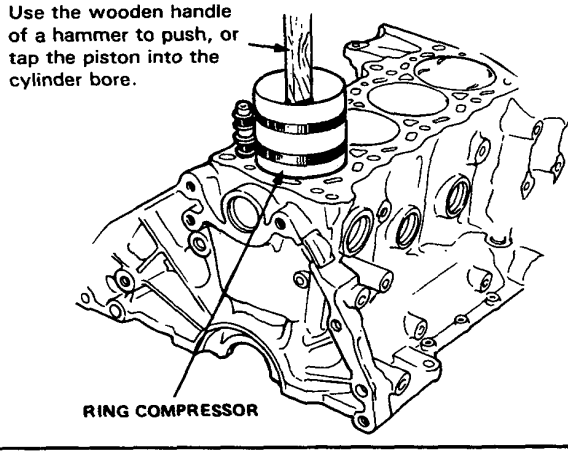
Installation

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

1. If the crankshaft is already installed:
   - Remove the connecting rod caps, then slip short sections of rubber hose over the threaded ends of the connecting rod bolts.
   - Install the ring compressor, check that the bearing is securely in place, then position the piston in the cylinder and drive it in using the wooden handle of a hammer.
     Stop after the ring compressor pops free and check the connecting rod-to-crank journal alignment before driving rod into place.
   - Install the rod caps with bearings, and torque the nuts to 45 N·m (4.5 kg-m, 32 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 cylider bore.

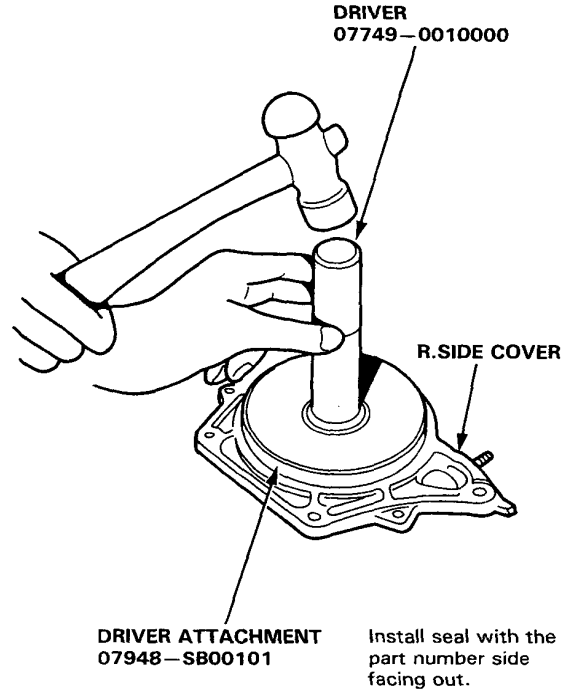


Oil Seal

Installation

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

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

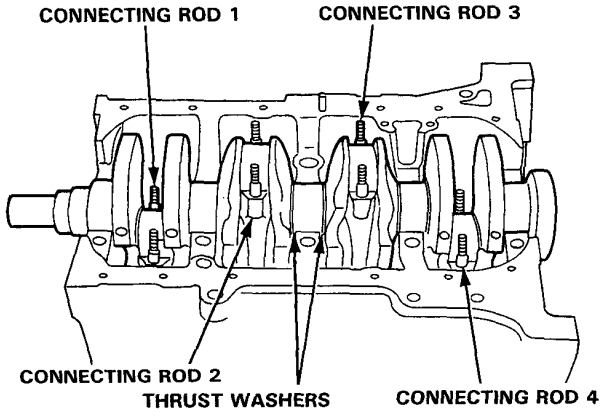


NOTE: Refer to page 8-11 for steps on the oil pun side oil seal.

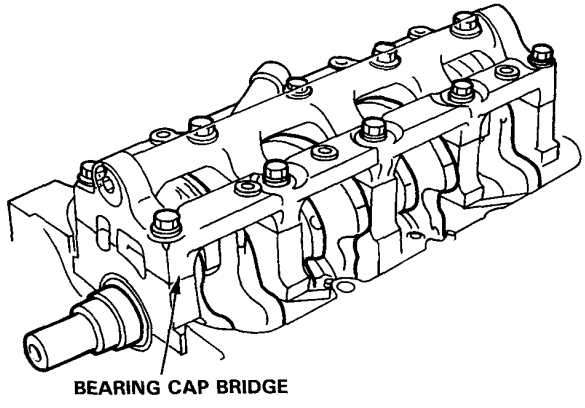
Installation

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

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



4. Rotate the crankshaft clockwise, seat journals into connecting rods No. 1 and No. 4, and install the rod caps and nuts finger tight.
5. Install the thrust washers, main bearing halves caps and cap bridge, check clearance with plastigage (page 7-13), then torque the nuts to 55 N·m (5.5 kg-m, 40 lb-ft).
   Oil thrust washer surfaces.



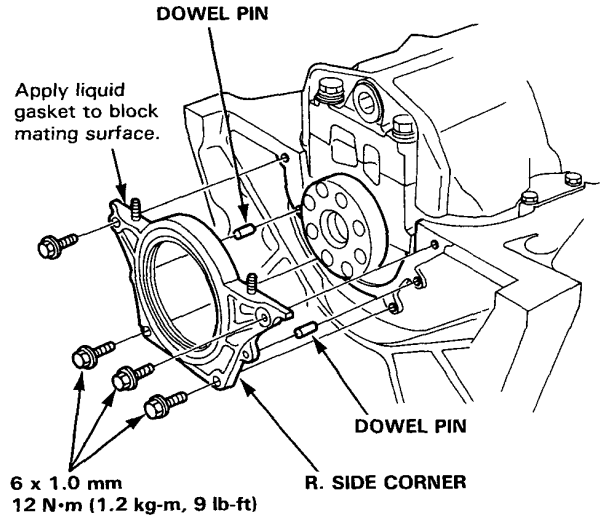
6. Check the rod bearing clearance with plastigage (page 7-5), then torque nuts to 45 N·m (4.5 kg-m, 32 lb-ft).

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

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

7. Insatll the baffle plate.
8. 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.

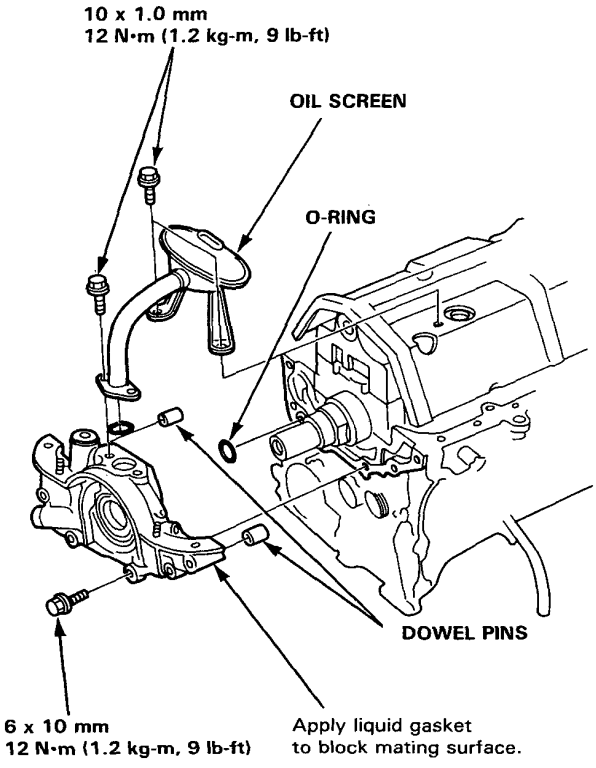
R.SIDE COVER SIDE;



(cont'd)

Installation (cont'd)

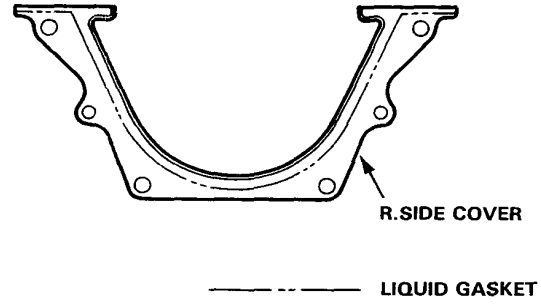
OIL PUMP SIDE:



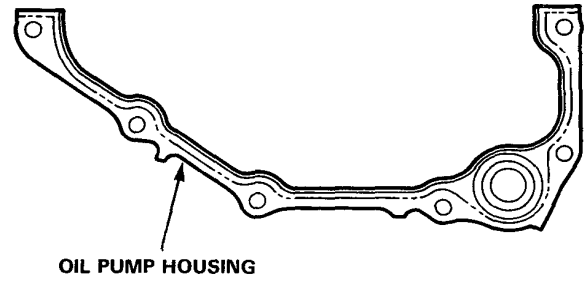
NOTE:

- Use HONDA PART NO 08740—99986 for the liquid gasket.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket by starting with an even bend, centered between edges of the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.

R.SIDE COVER SIDE:



OIL PUMP SIDE:



- Do not allow the sealant to dry before assembly.
- Wait at least 30 minutes after assembly before filling the engine with oil.

8. Install the oil screen.
9. Install the oil pan.

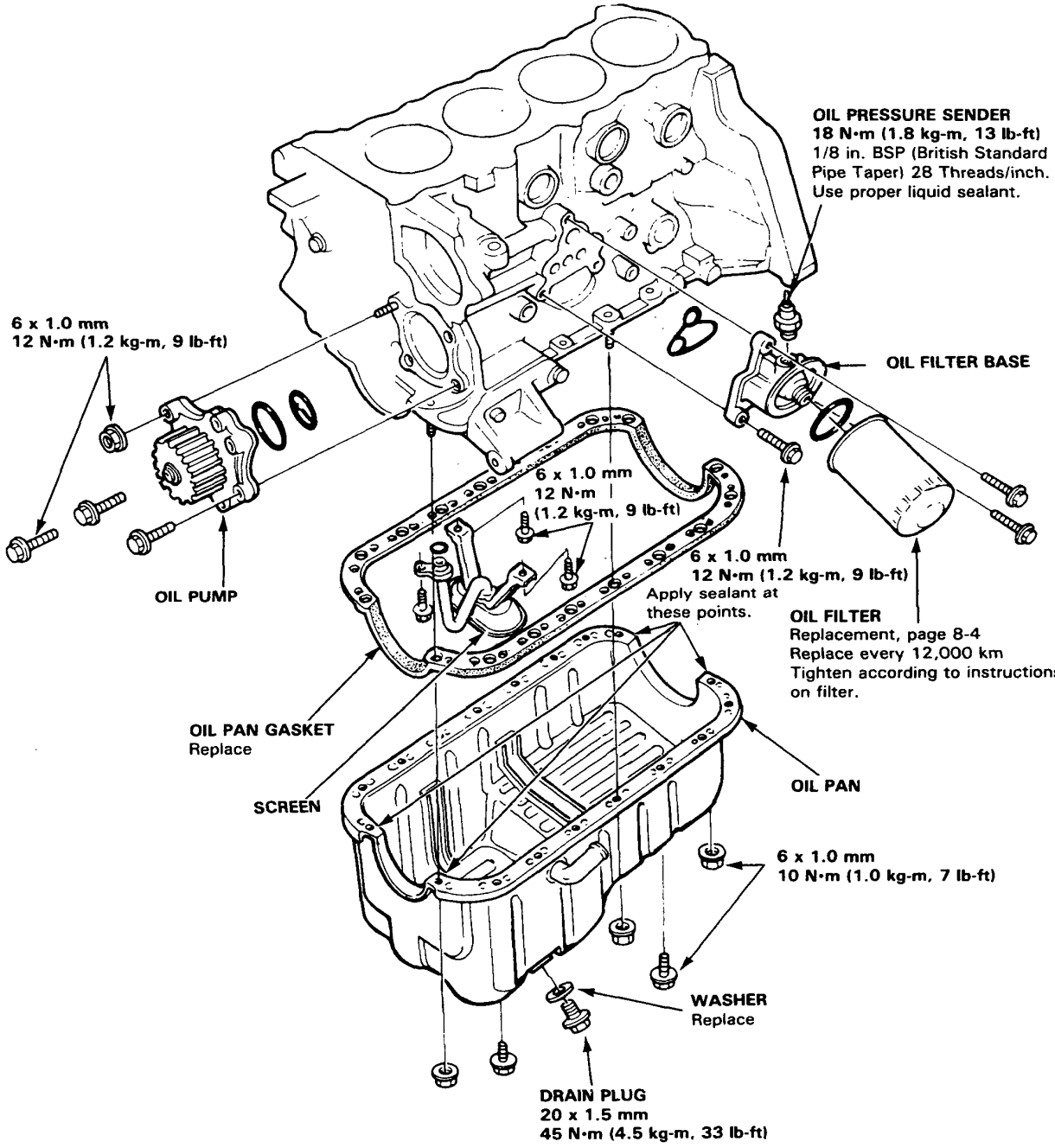
Engine Lubrication

Engine Lubrication

Illustrated Index

A20A4 Engine

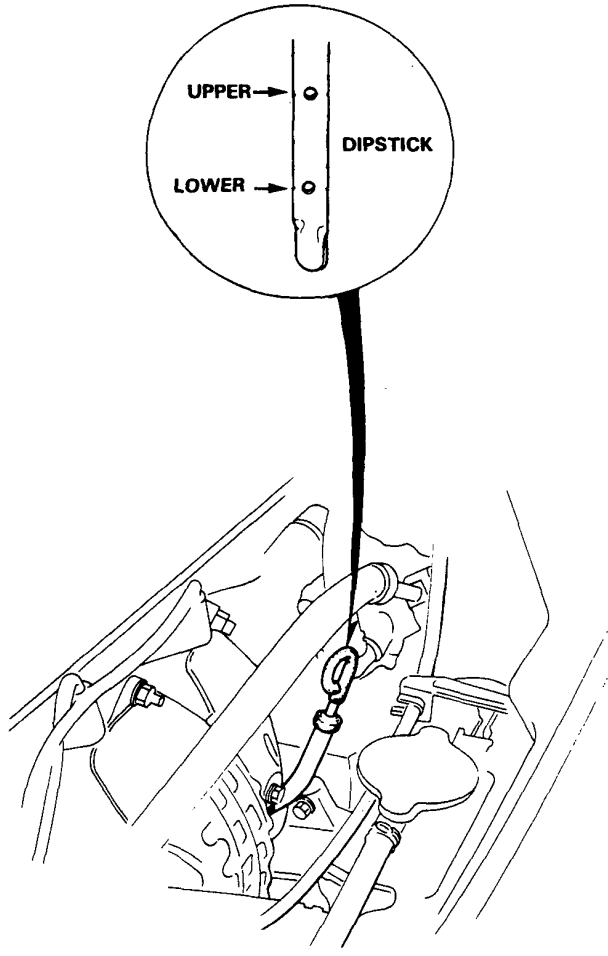
NOTE: Use new O-rings whenever reassembling.



Oil Level Inspection

A20A4 Engine

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

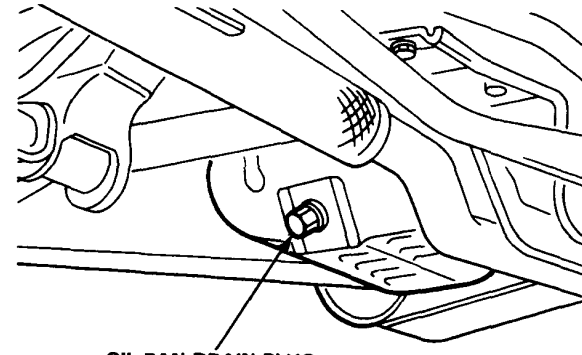


Oil Replacement

A20A4 Engine

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

   NOTE: Remove the filler cap to speed draining.

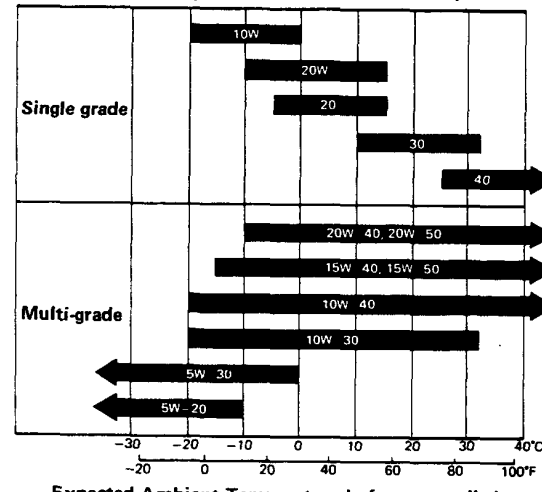


3. Reinstall the drain drain plug with a new washer, and refill with the recommended oil.

Capacity	3.0 lit (3.2 US qt, 2.6 Imp. qt) Exclude Oil filter 3.5 lit (3.7 US qt, 3.1 Imp. qt) Adding replace oil filter 4.0 lit (2 US qt, 3.5 Imp. qt) Means designed value
Change	Every 12,000 km (7,500 mi.)

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

Recommended Engine Oil (SE or SF Grade only)



Expected Ambient Temperature before next oil change

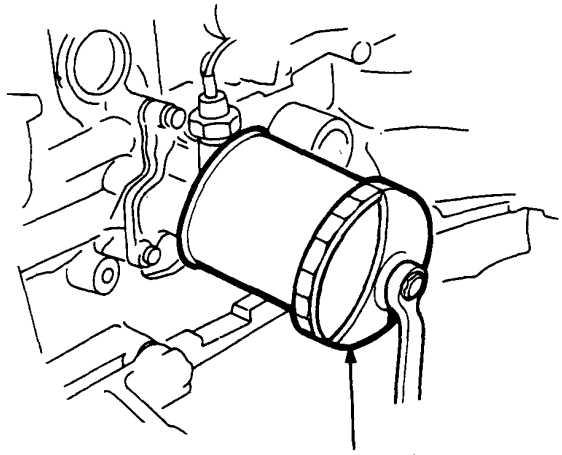
Engine Lubrication

Oil Filter Replacement

A20A4 Engine and ET Engine

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

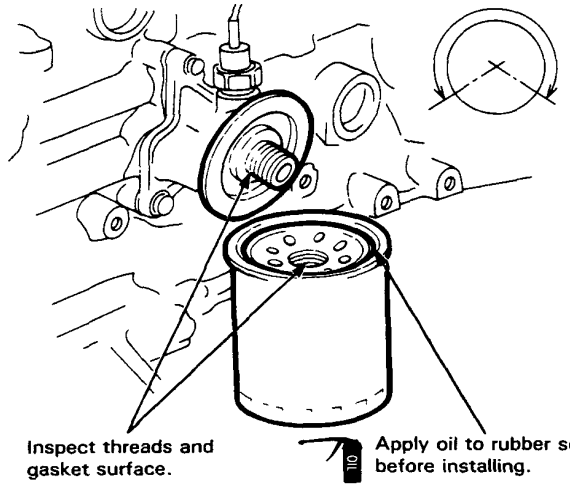
1. Remove the oil filter with the special oil filter socket.



OIL FILTER SOCKET
07912—6110001
22 N·m (22 kg-m, 16 lb-ft)

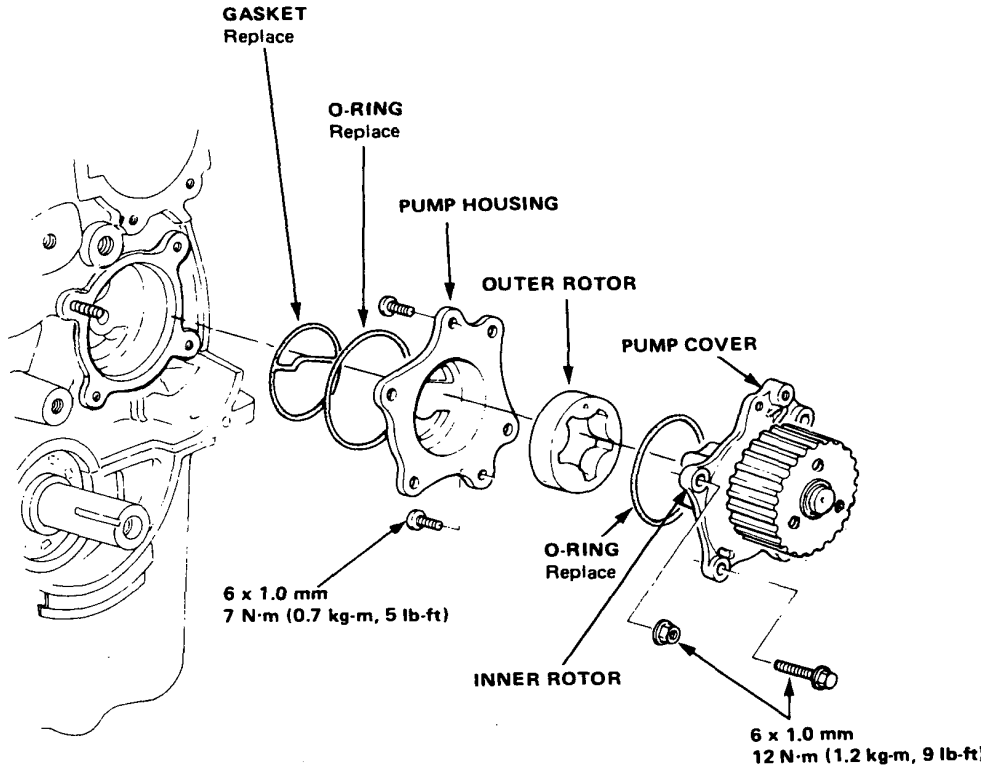
2. Inspect the threads and gasket on the new filter. Wipe off seat on engine block, then apply a light coat of oil to gasket, and install filter. Tighten according to instructions on, or with, the filter.

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



A20A4 Engine and ET Engine

NOTE: The oil pump drive pulley changes to solide type, and the inner rotor, pump cover and seal can not be disassembled.

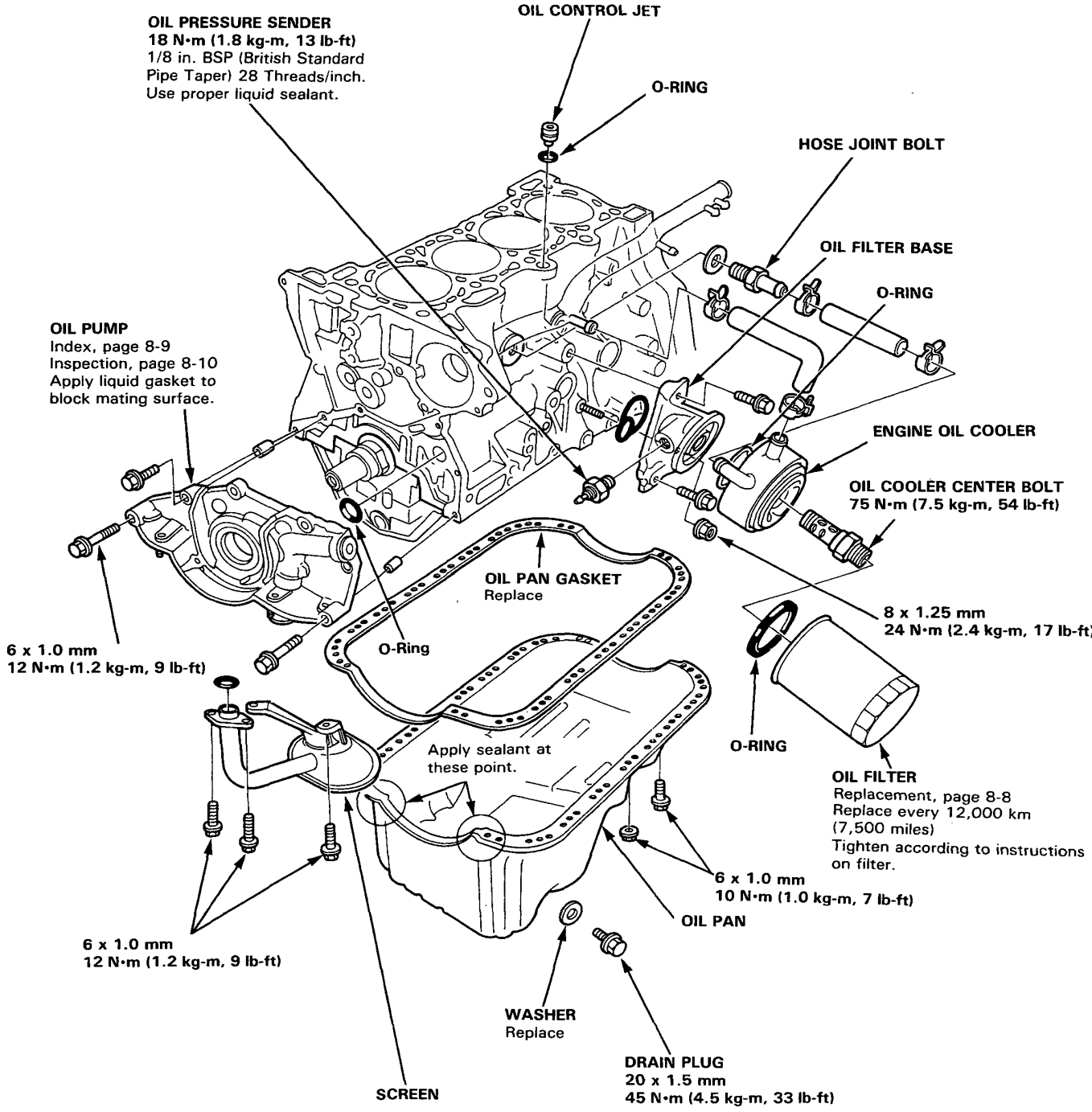


Engine Lubrication

Illustrated Index

B20A1 Engine

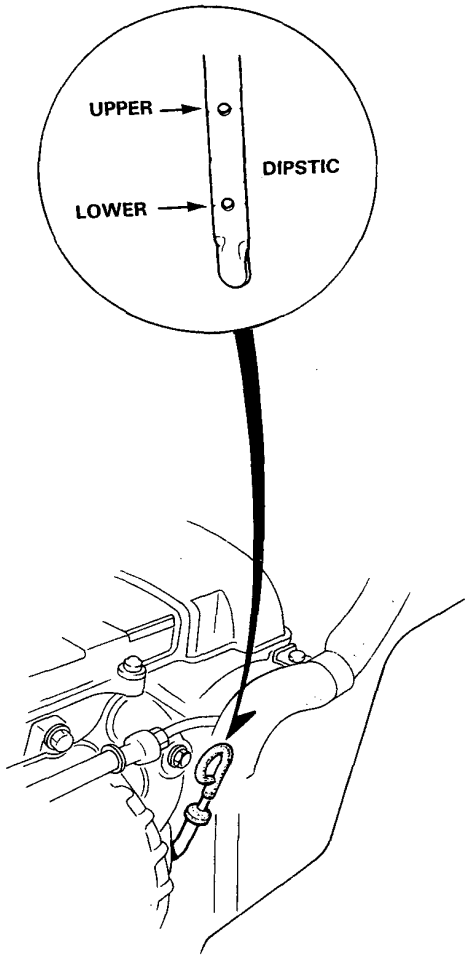
NOTE: Use new O-rings whenever reassembling.



Oil Level Inspection

B20A1 Engine

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

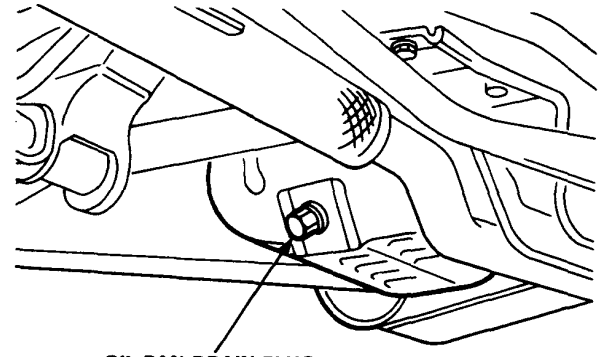


Oil Replacement

B20A1 Engine

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

   NOTE: Remove the filler cap to speed draining.



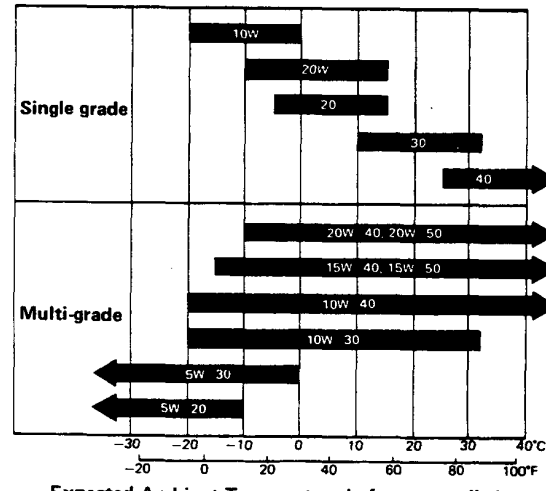
OIL PAN DRAIN PLUG
45 N·m (4.5 kg-m, 33 lb-ft)

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

Capacity	3.5 lit (3.7 US qt, 3.1 Imp. qt) Exclude oil filter 4.0 lit (4.2 US qt, 3.5 Imp. qt) Adding replace oil filter 5.0 lit (5.3 US qt, 4.4 Imp. qt) Means designed value
Change	Every 12,000 km (7,500 mi.)

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

Recommended Engine Oil (SE or SF Grade only)



Expected Ambient Temperature before next oil change

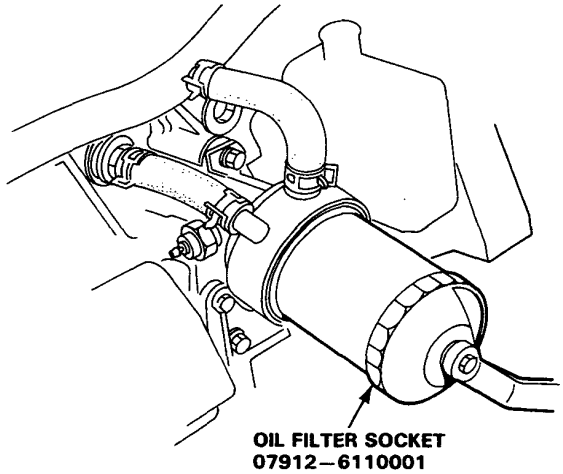
Engine Lubrication

Oil Filter Replacement

B20A1 Engine

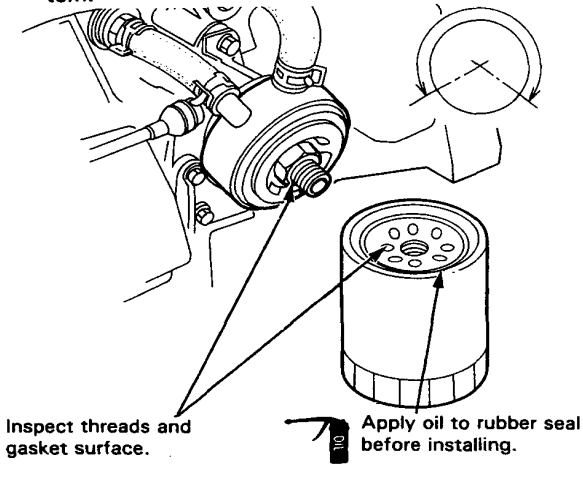
CAUTION: After the engine has been run, the exhaust pipes will be hot; be careful when working around the exhaust manifold.

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



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

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



Oil Pressure Test

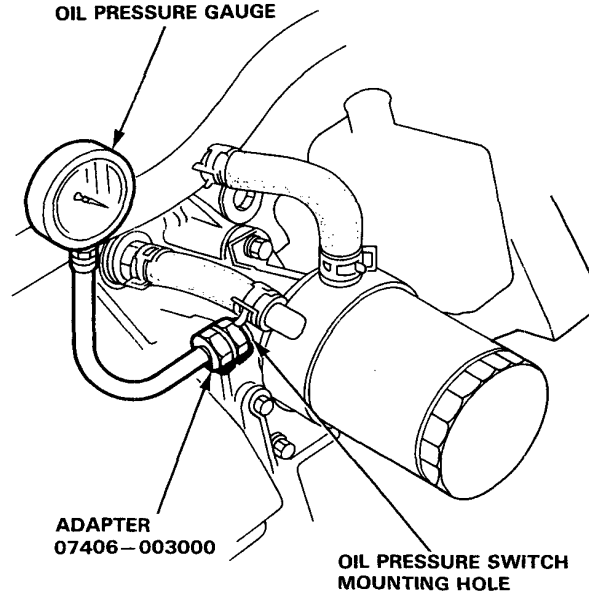
B20A1 Engine

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

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

   Engine Oil Pressure:
   Idle: 137 kPa (1.4 kg/cm², 20 psi) minimum
   3,000 rpm: 470—559 kPa (4.8—5.7 kg/cm² 67-80 psi)

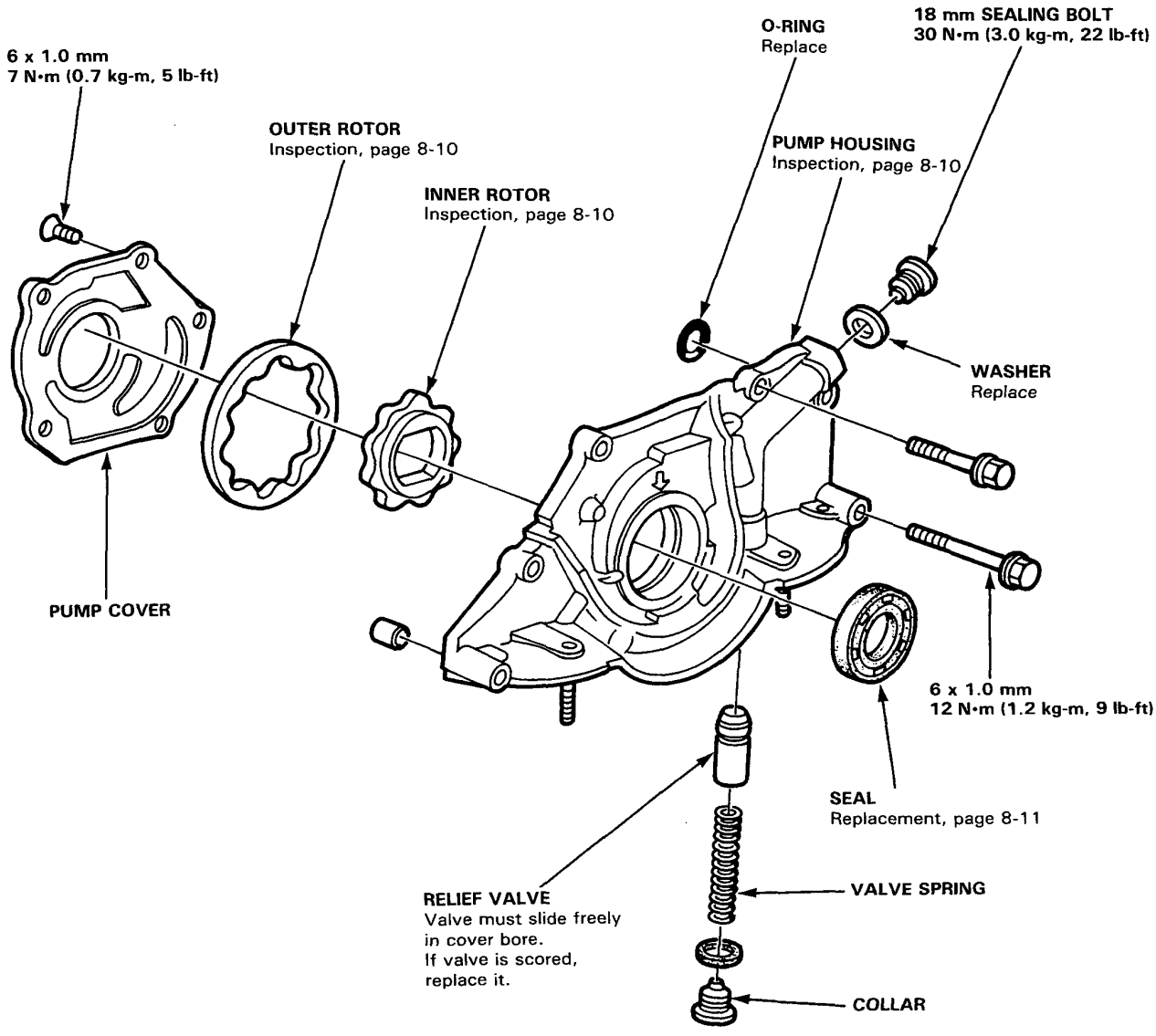
   - If oil pressure is within specifications, replace oil pressure sender and recheck.
   - If oil pressure is NOT within specifications, inspect oil pump (page 8-10).



Oil Pump Illustrated Index

B20A1 Engine

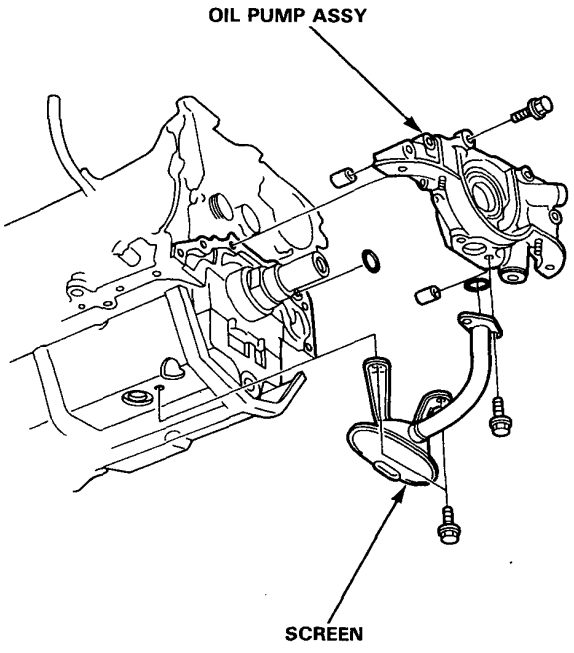
NOTE:
- Note the installation direction of the rotors.
- After assembling, check that the rotors turn smoothly.



Oil Pump Removal/Inspection

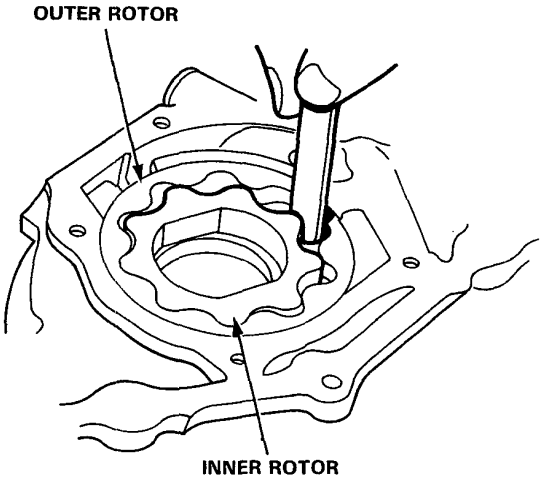
B20A1 Engine

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



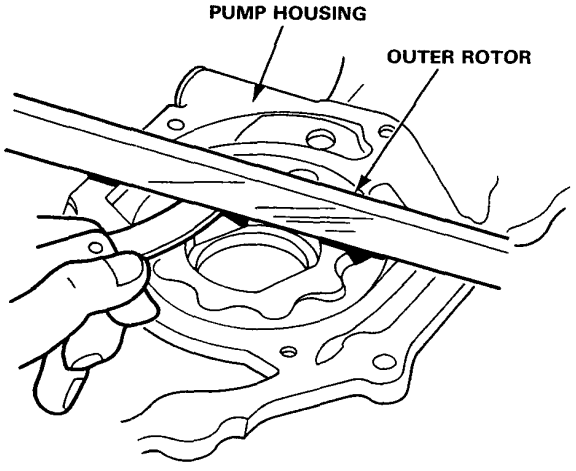
10. Remove the five screws from the pump housing, then separate the housing and cover.
11. Check the radial clearance on the pump rotor.

Rotor Radial Clearance
Standard (New): 0.04—0.16 mm (0.002—0.006 in.)
Service Limit: 0.2 mm (0.008 in.)



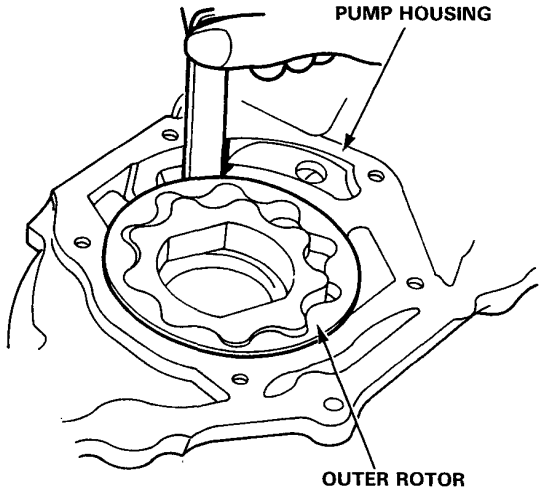
12. Check the axial clearance on the outer pump rotor.

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



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

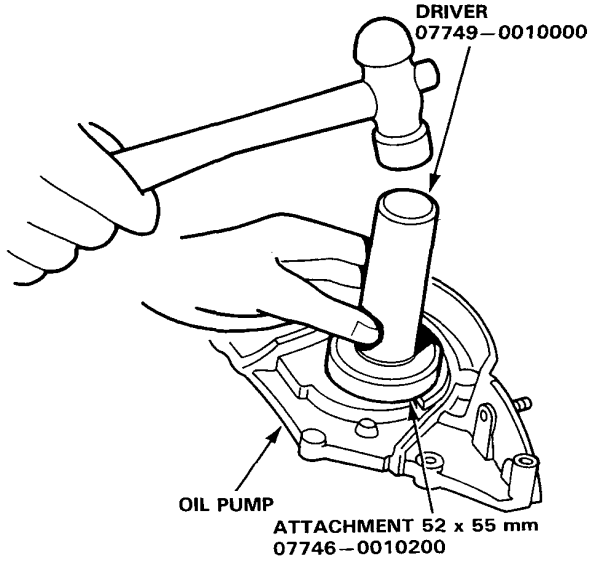
Housing-to-Rotor Radial Clearance
Standard (New): 0.1—0.19 mm (0.004—0.007 in.)
Service Limit: 0.21 mm (0.008 in.)



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

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

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



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

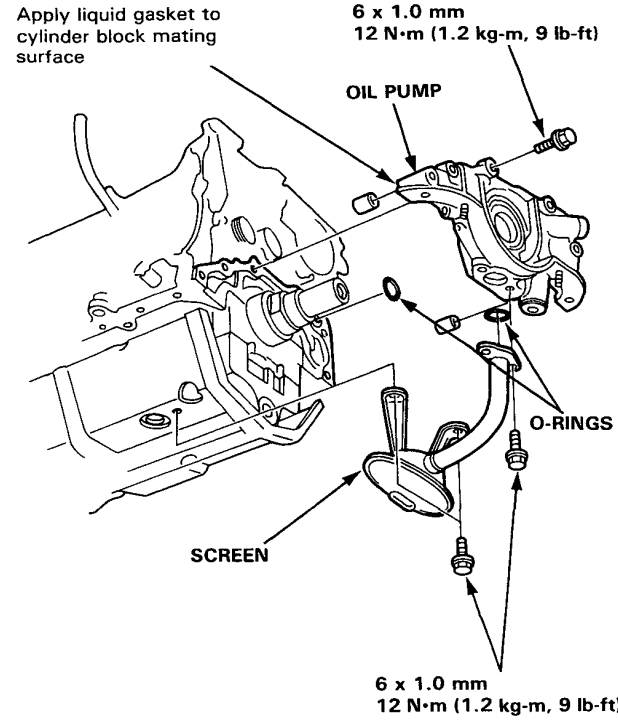
18. Check that the oil pump turns freely.

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

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

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

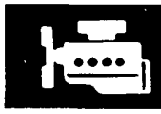
NOTE:
- Use HONDA PART NO. 08740—99986 for the liquid gasket.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket evenly, in a narrow bead centered on the mating surface.
- To prevent leakage of oil, apply sealant to the inner threads of the bolt holes.
- Do not allow the sealant to dry before assembly.
- Wait at least 30 minutes after assembly before filling the engine with oil.



22. Install the oil pump on the cylinder block.

23. Install the oil screen.

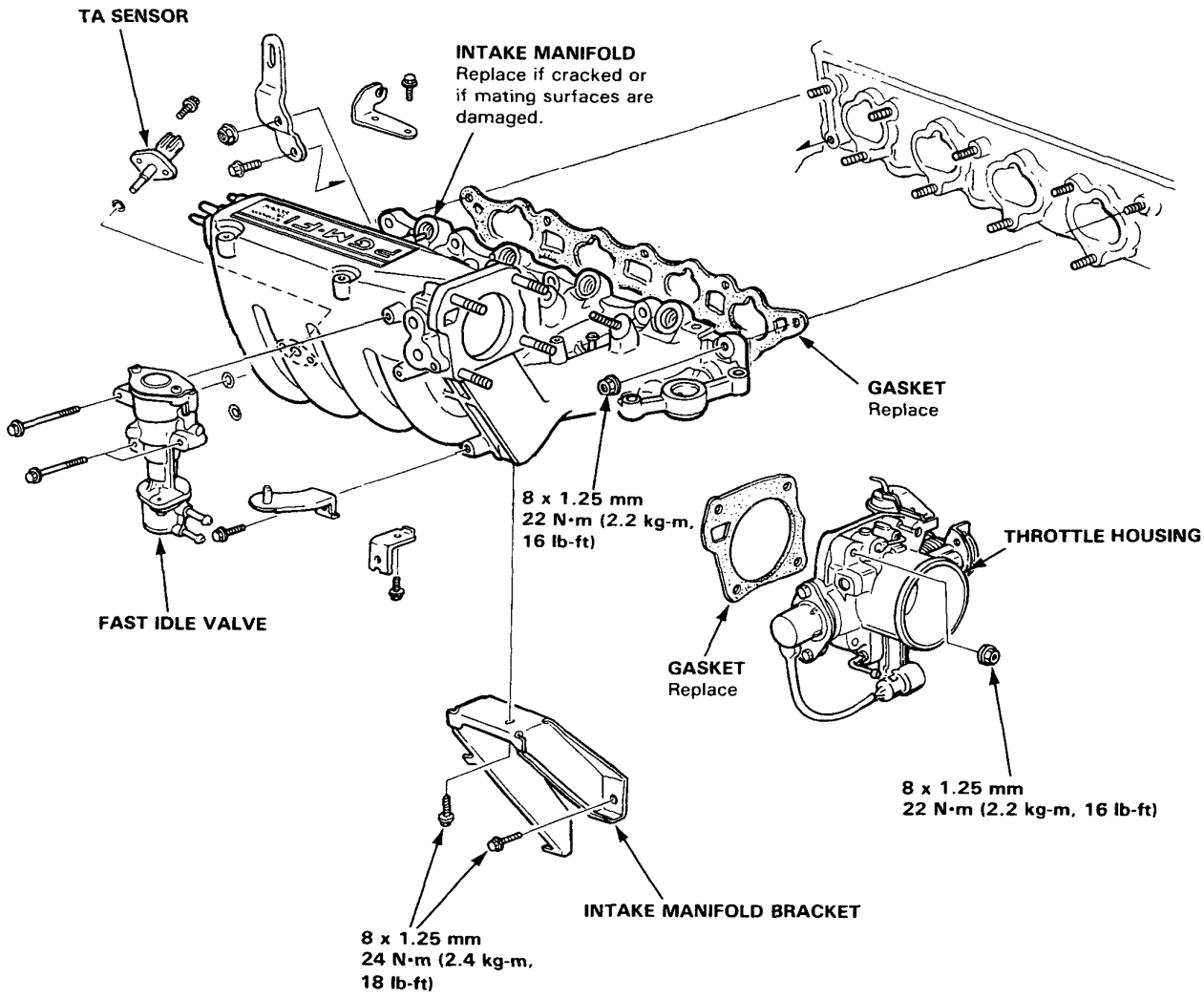
Intake Manifold/Exhaust System



Intake Manifold

Illustrated Index

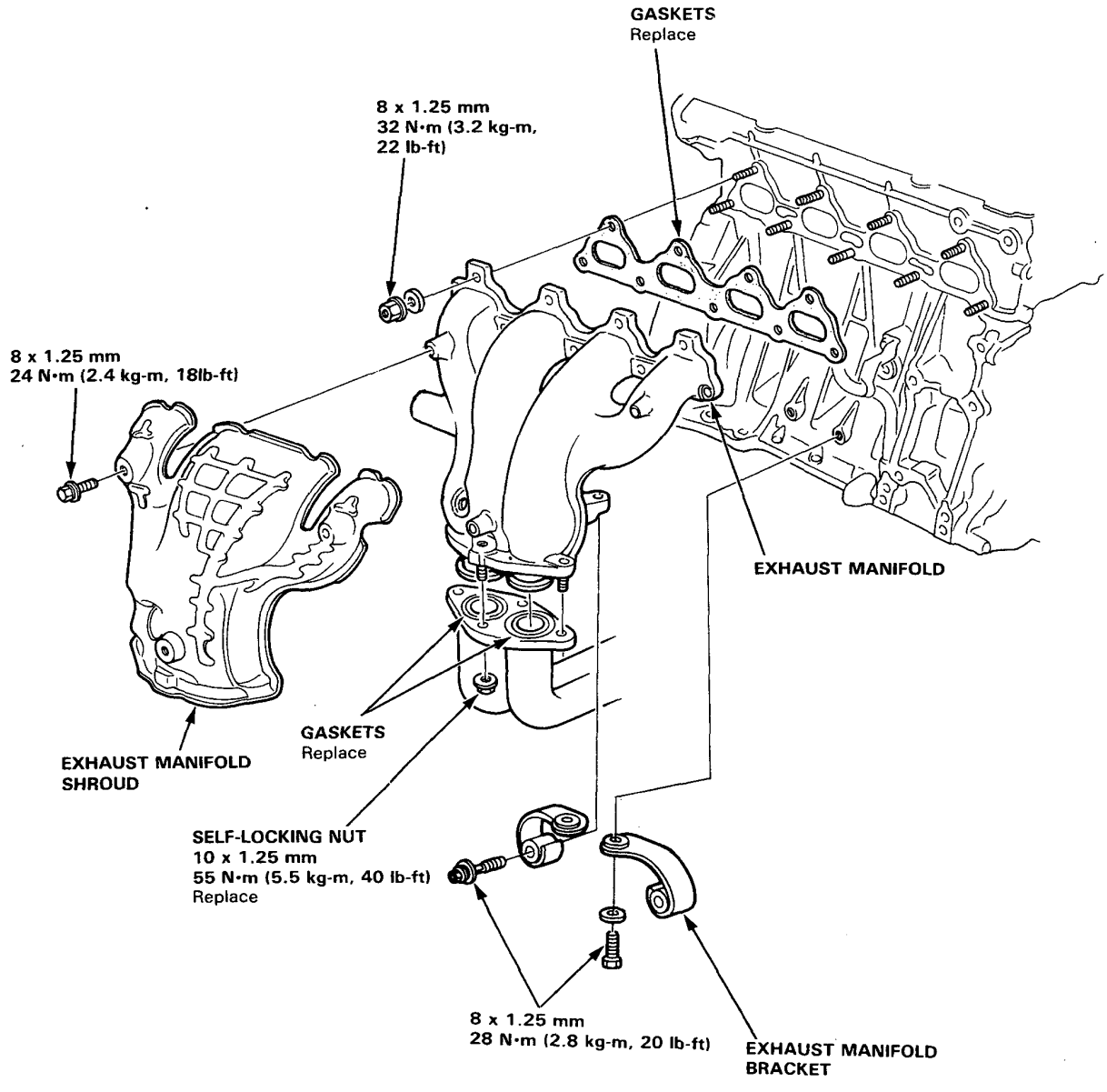
B20A1 Engine and A20A4 Engine



Exhaust Manifold

Illustrated Index

B20A1 Engine

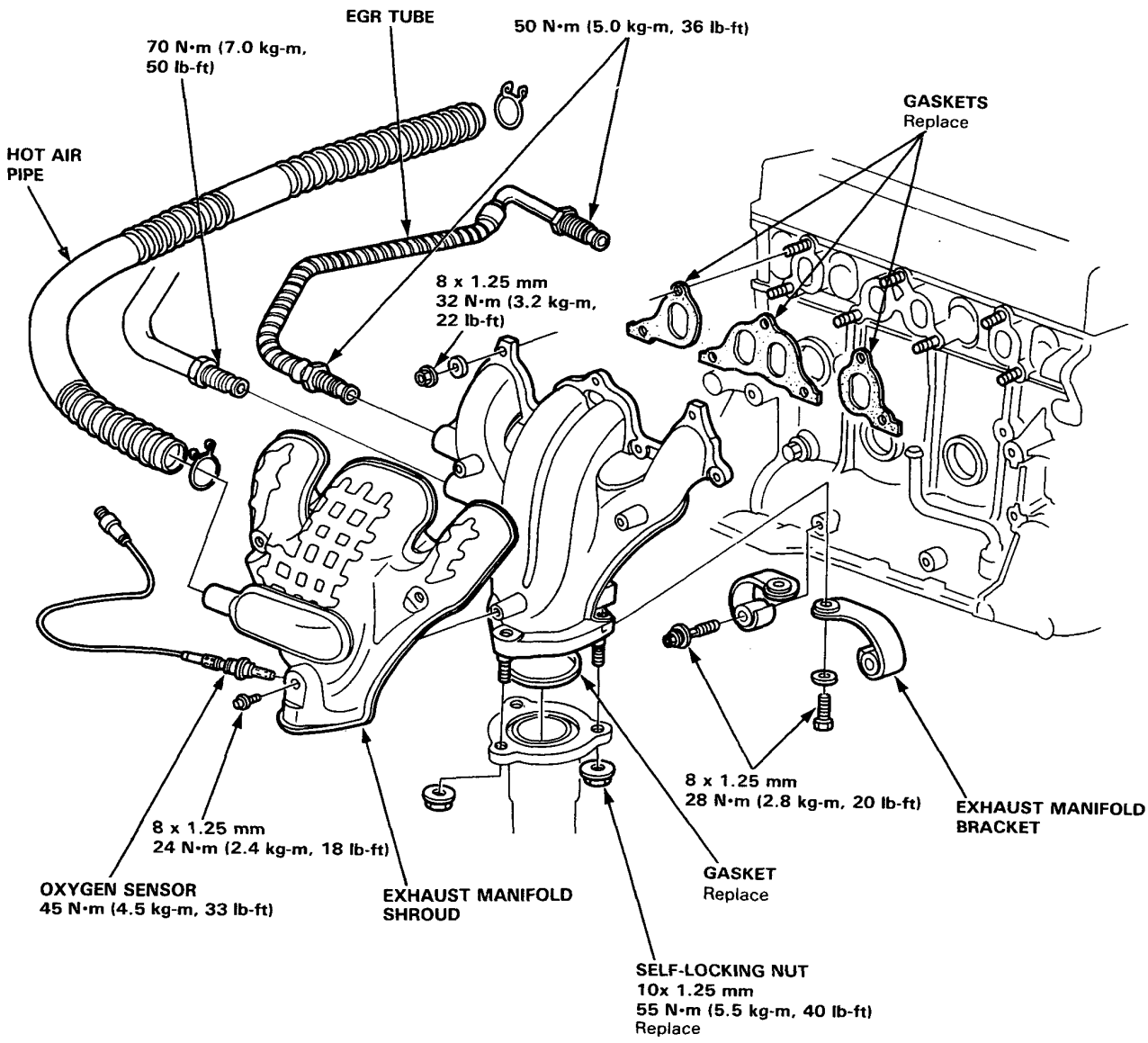


(cont'd)

Exhaust Manifold

Illustrated Index (cont'd)

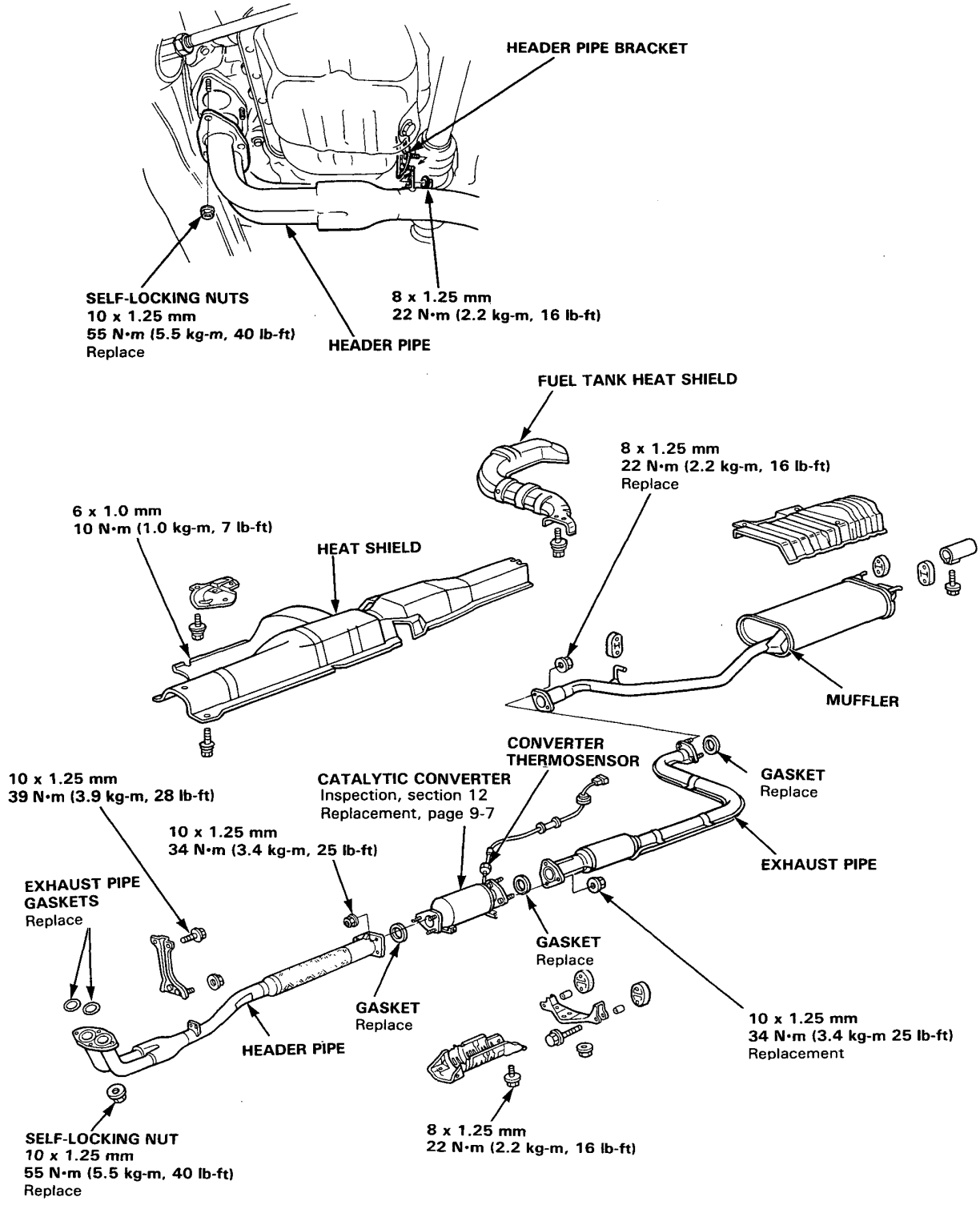
A20A4 Engine



Exhaust Pipe and Muffler

Replacement

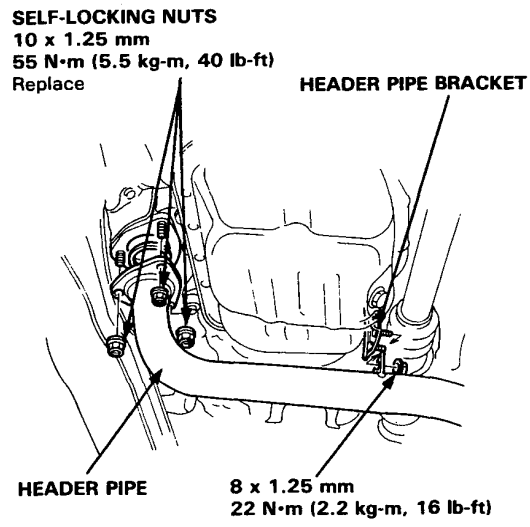
B20A1 Engine

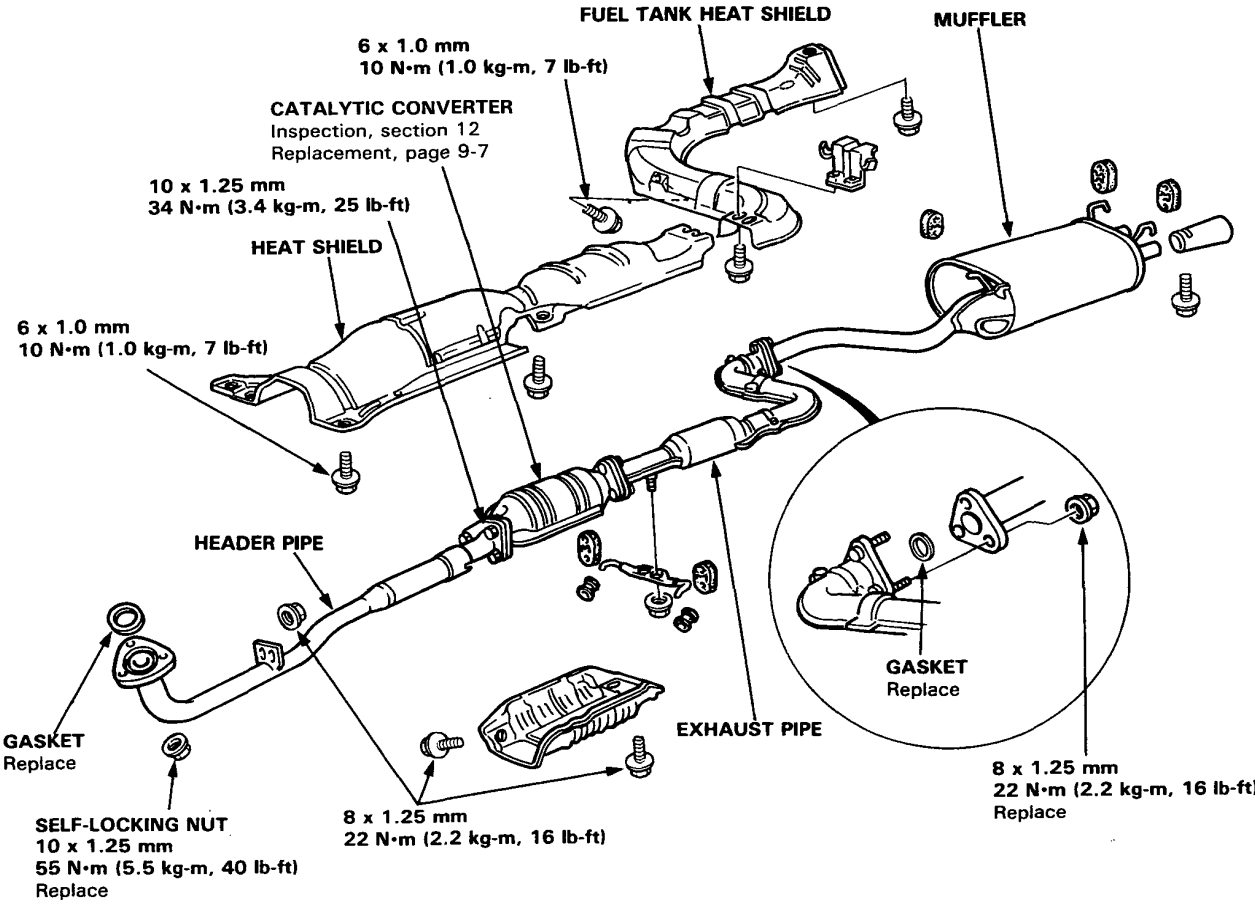


Exhaust Pipe and Muffler

Replacement

A20A4 Engine





Catalytic Converter

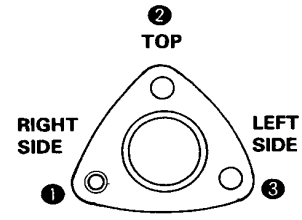
Replacement

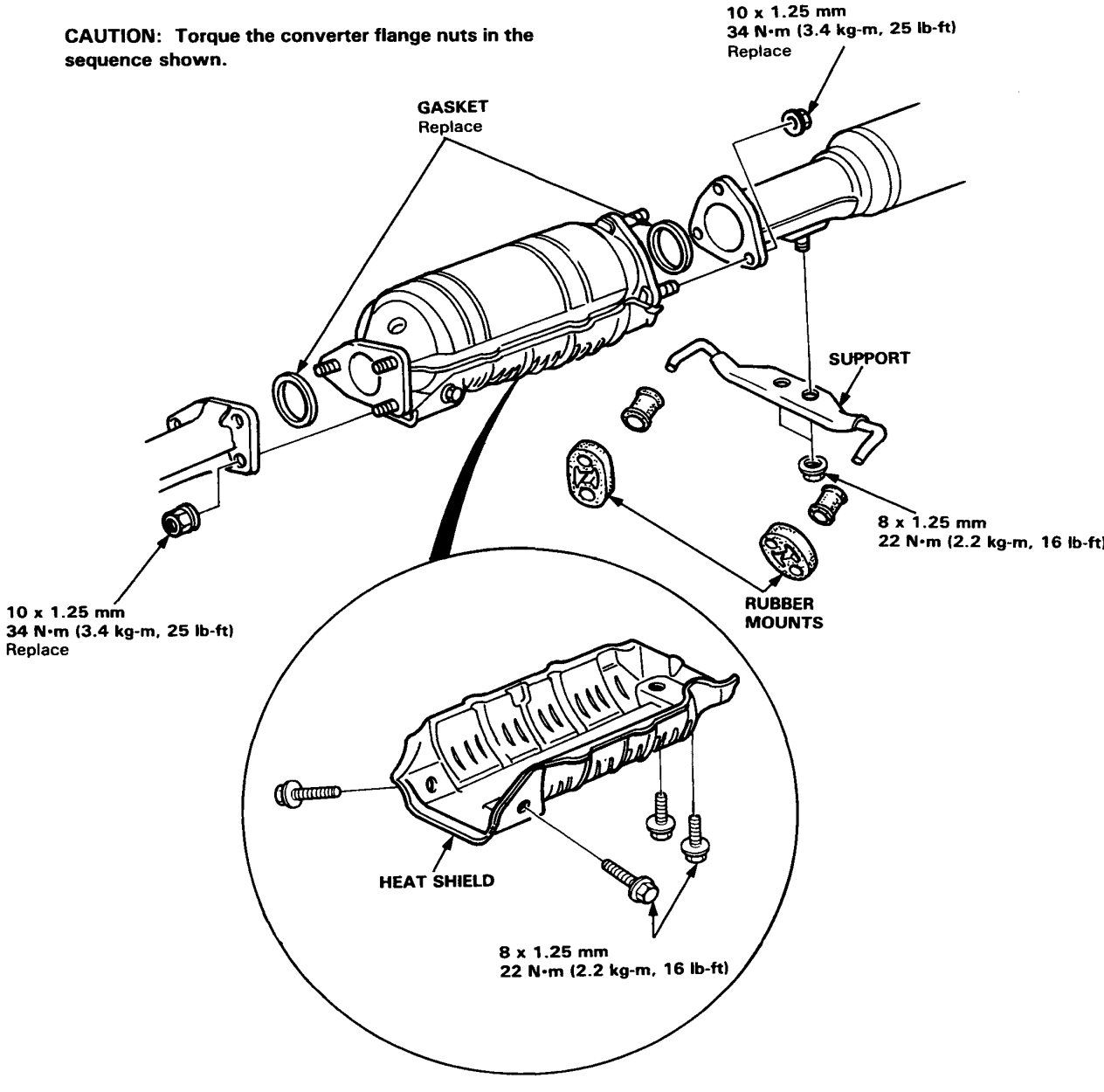
A20A4 Engine and B20A1 Engine

1. Disconnect the rubber mounts from the catalytic converter support.
2. Remove the six nuts, then remove the catalytic converter from the exhaust system.
3. Remove the converter support and heat shield.
4. Install in reverse order of removal.

CAUTION: Torque the converter flange nuts in the sequence shown.

CATALYTIC CONVERTER TORQUE SEQUENCE





Cooling

B20A1 and A20A4 Engine

Radiator

Replacement

B20A1Engine

WARNING

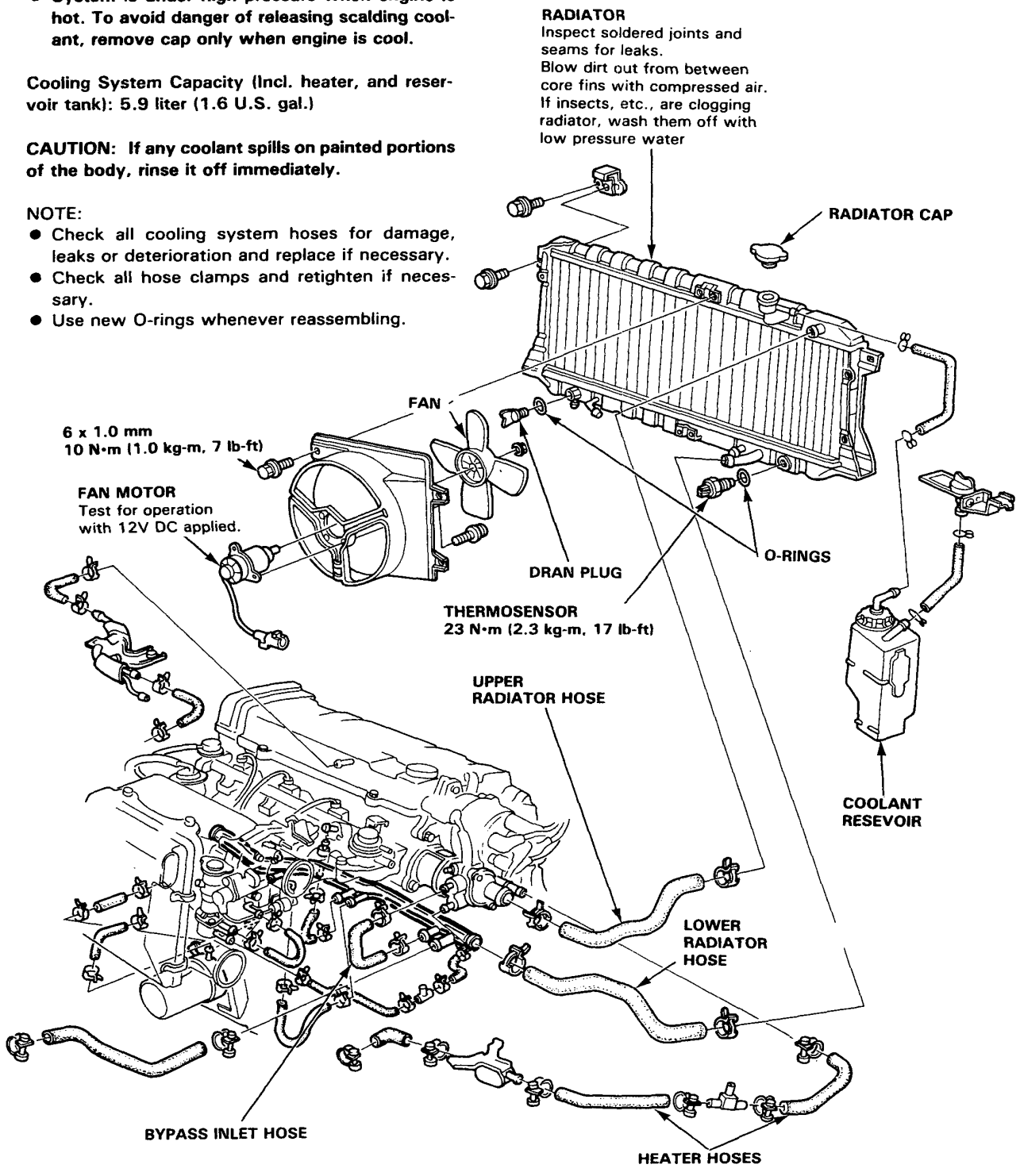
- **System is under high pressure when engine is hot. To avoid danger of releasing scalding coolant, remove cap only when engine is cool.**

Cooling System Capacity (Incl. heater, and reservoir tank): 5.9 liter (1.6 U.S. gal.)

CAUTION: If any coolant spills on painted portions of the body, rinse it off immediately.

NOTE:

- Check all cooling system hoses for damage, leaks or deterioration and replace if necessary.
- Check all hose clamps and retighten if necessary.
- Use new O-rings whenever reassembling.



A20A4 Engine

WARNING

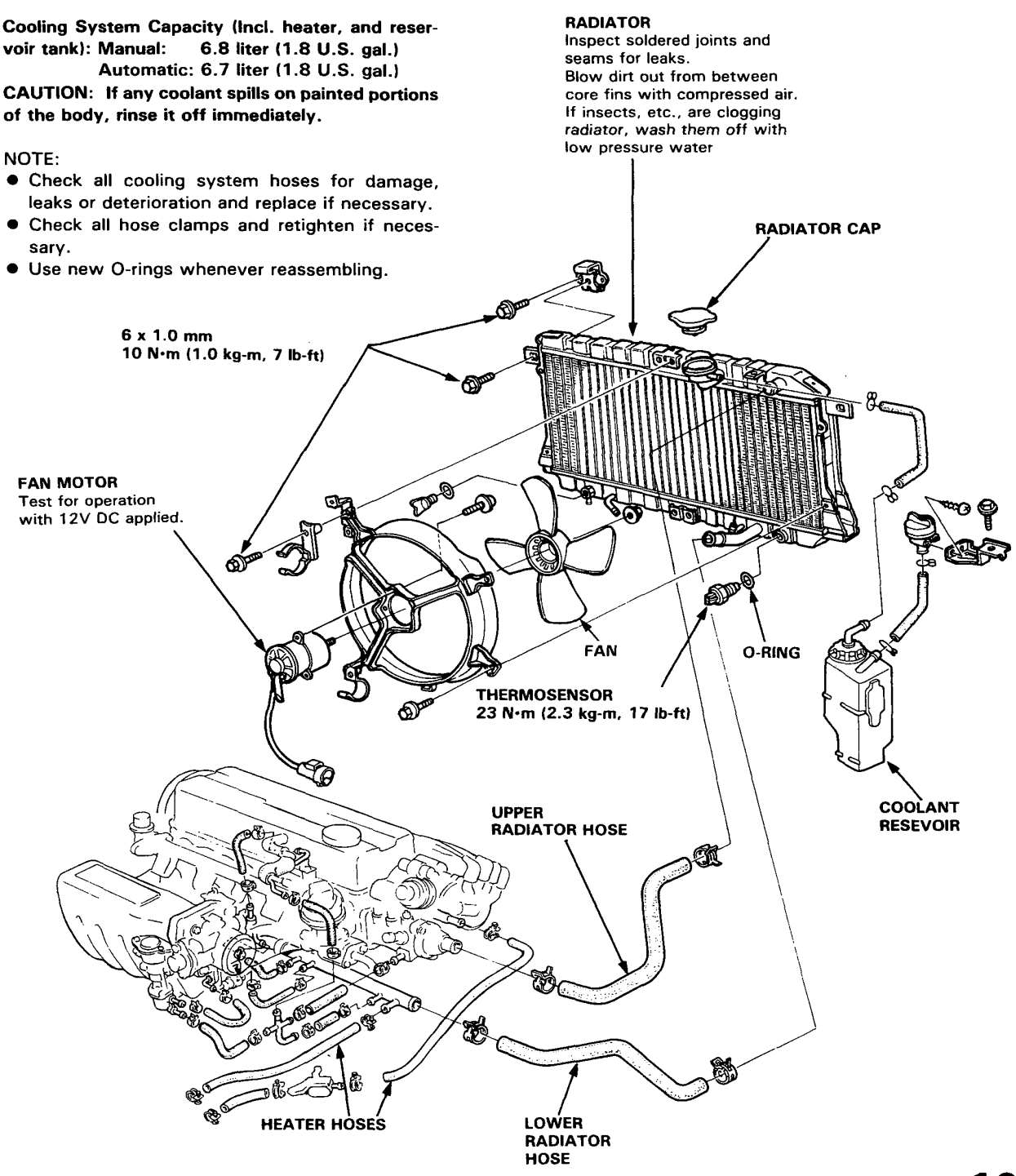
- **System is under high pressure when engine is hot. To avoid danger of releasing scalding coolant, remove cap only when engine is cool.**

Cooling System Capacity (Incl. heater, and reservoir tank): Manual: 6.8 liter (1.8 U.S. gal.)
Automatic: 6.7 liter (1.8 U.S. gal.)

CAUTION: If any coolant spills on painted portions of the body, rinse it off immediately.

NOTE:

- Check all cooling system hoses for damage, leaks or deterioration and replace if necessary.
- Check all hose clamps and retighten if necessary.
- Use new O-rings whenever reassembling.



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

NOTE:
- Use only HONDA-RECOMMENDED anti-freeze/coolant.
- For best corrosion protection, the coolant concentration must be maintained year-round at 50% MINIMUM. Coolant concentrations less than 50% may not provide sufficient protection against corrosion or freezing.
- Coolant concentrations greater than 60% will impair cooling efficiency and are not recommended.

CAUTION:
- **Do not mix different brand anti-freeze/coolants.**
- **Do not use additional rust inhibitors or anti-rust products; they may not be compatible with the recommended coolant.**

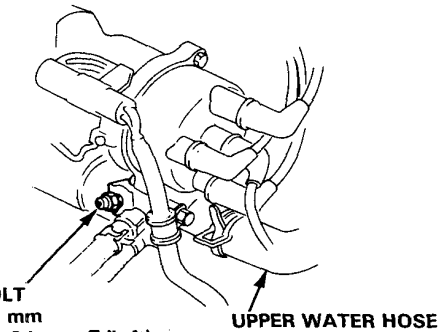
Radiator Coolant Refill Capacity

B20A1Engine
5.2 liters (1.4 U.S. gal.)

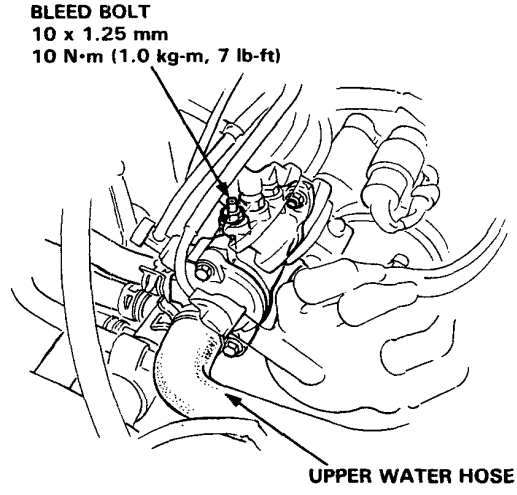
A20A4 Engine
Manual: 4.3 liters (1.1 U.S. gal.)
Automatic: 4.2 liters (1.1 U.S. gal.)

6. 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.

B20A1 Engine



A20A4 Engine



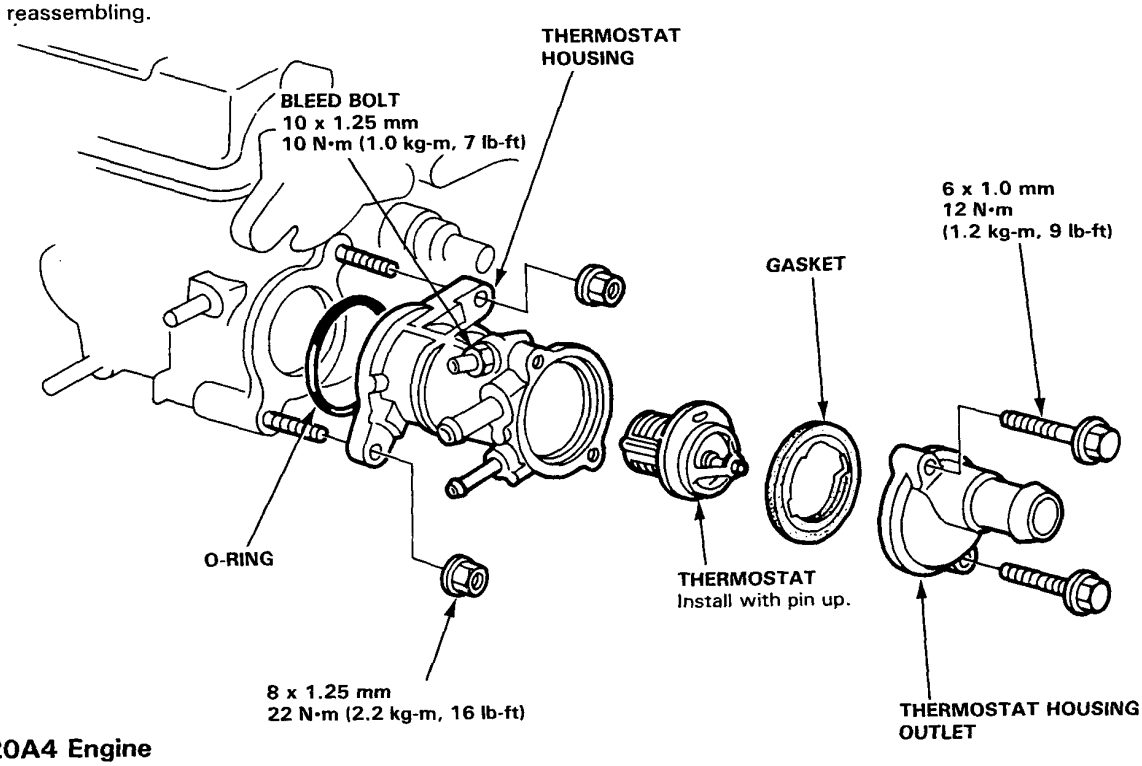
7. With the radiator cap off, start the engine and let it run until warmed up (fan goes on at least twice). Then, if necessary add more coolant mix to bring the level back up to the bottom of the filler neck.
8. Put the radiator cap on, then run the engine again and check for leaks.

Thermostat

Replacement

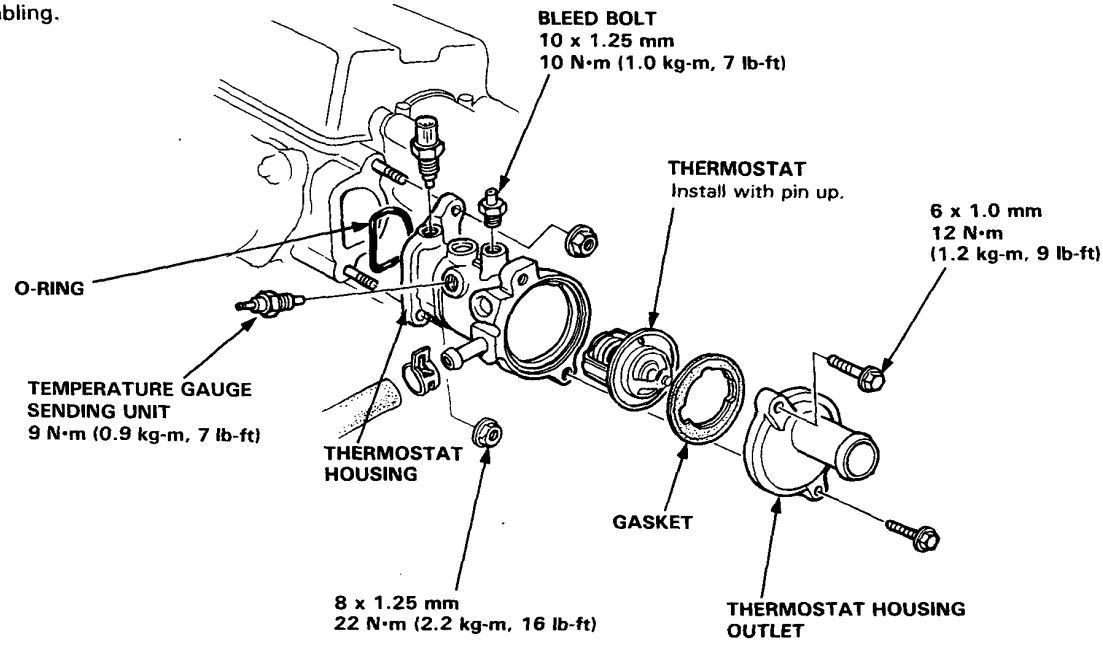
B20A1 Engine

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



A20A4 Engine

NOTE: Use new gaskets and O-rings whenever re-assembling.

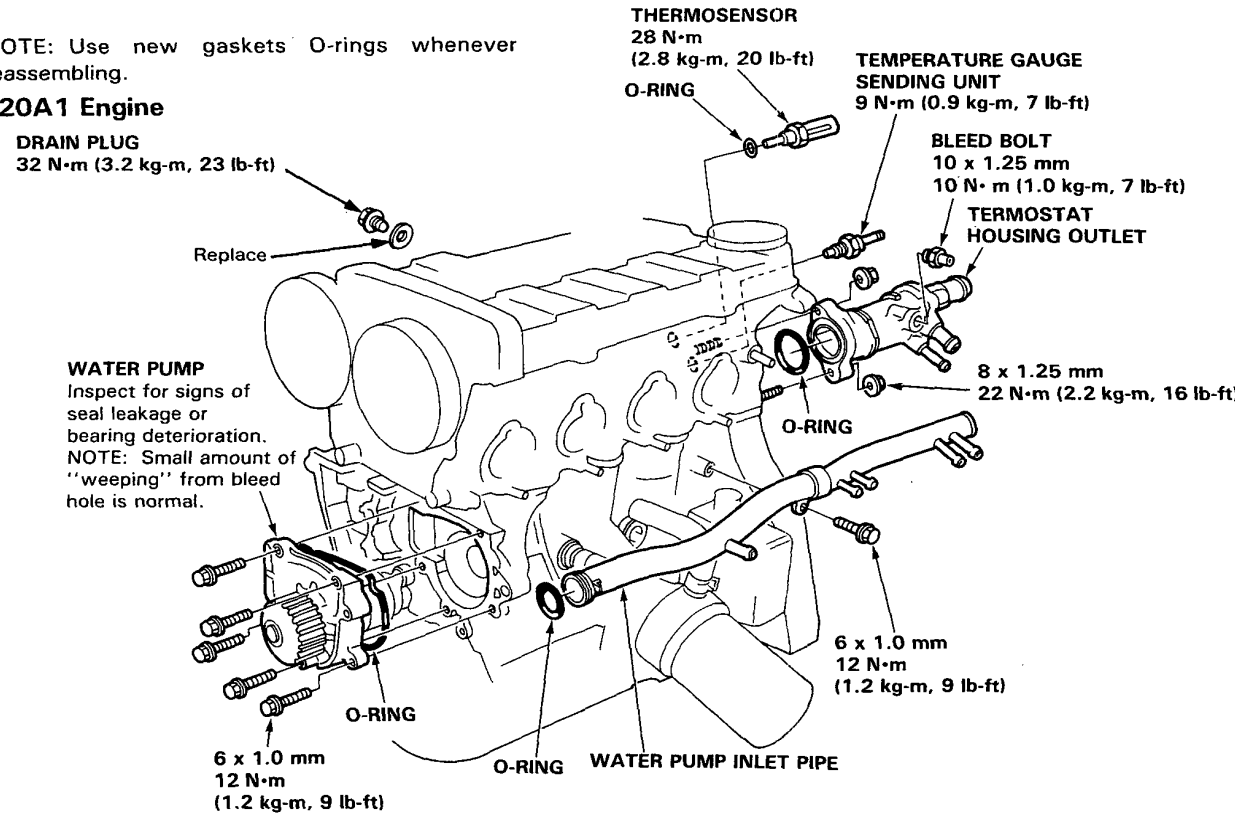


Water Pump

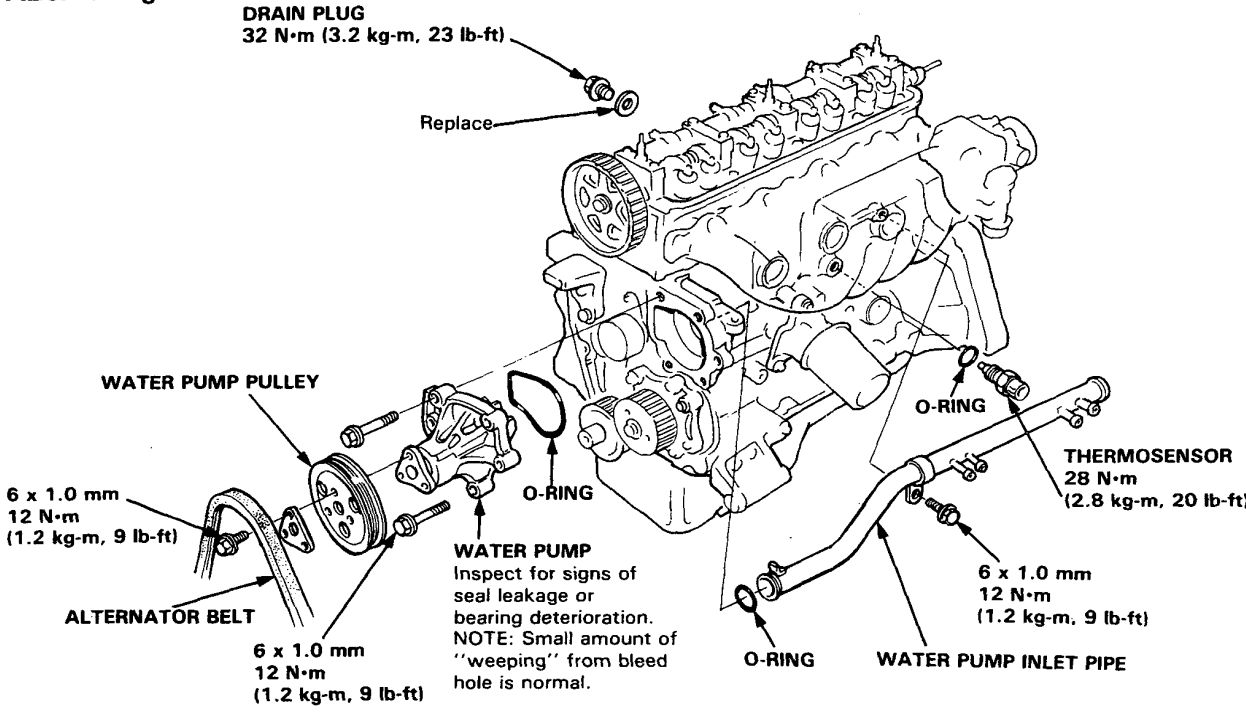
Replacement

NOTE: Use new gaskets O-rings whenever reassembling.

B20A1 Engine



A20A4 Engine



Water Pump Belt

Belt Adjustment

A20A4 Engine

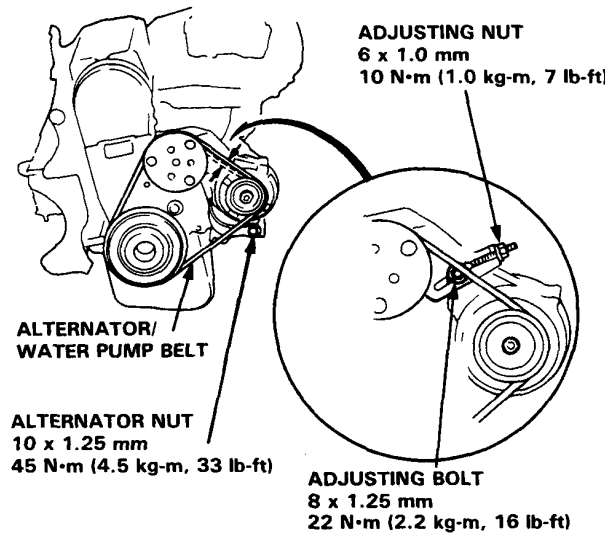
1. Apply a force of 98N (10 kg, 22 lb) and measure the deflection between the alternator and the water pump pulley.

   Deflection: 6—9 mm (0.24—0.35 in.)
   5 mm (0.20 in.) when first measured after replacing belt

2. Loosen the alternator adjusting nut and mounting.

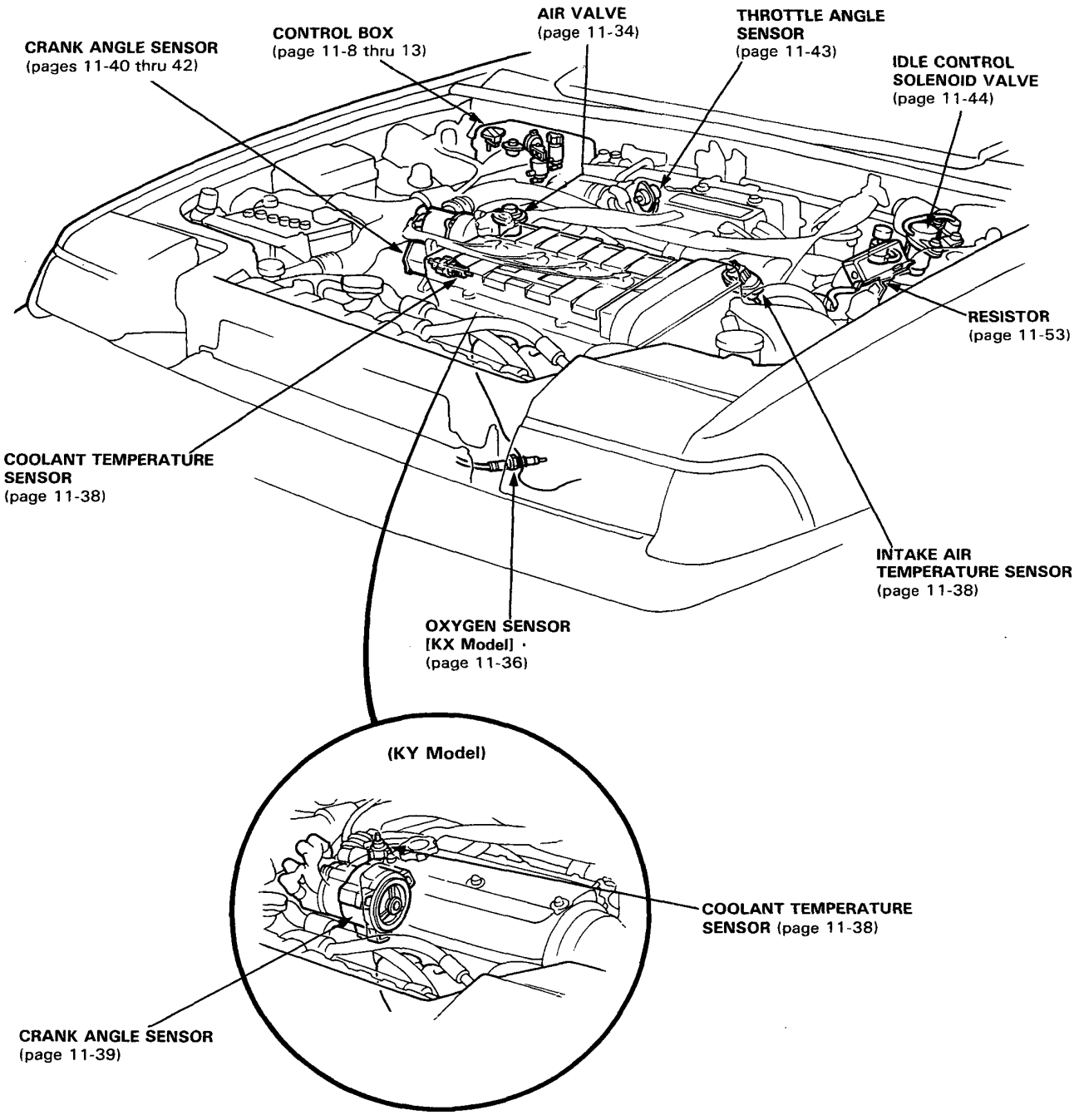
3. Move the alternator to obtain the proper belt tension and retighten the adjusting nut and mounting nut.

4. Recheck the deflection of the belt, and readjust if necessary.

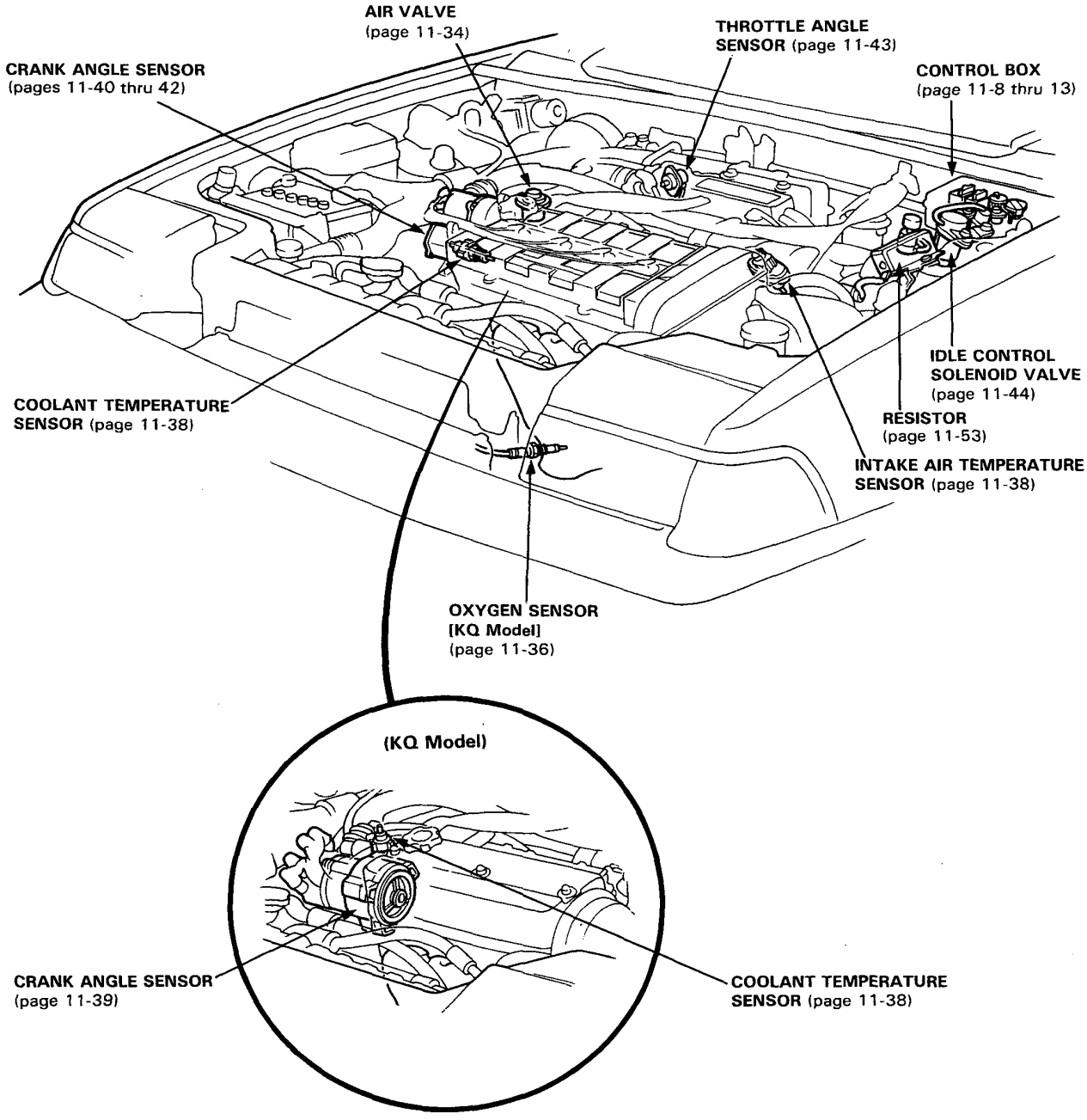


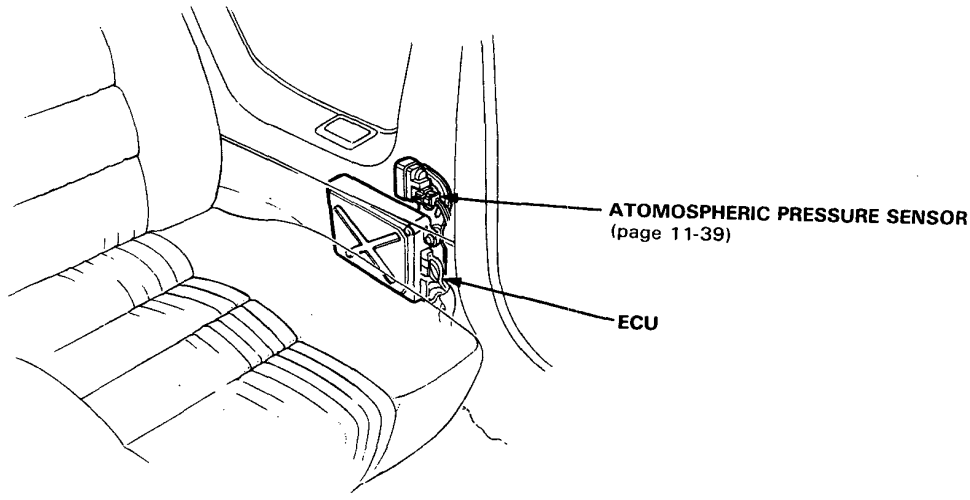
Fuel and Carburetor
(Fuel Injected Engine)

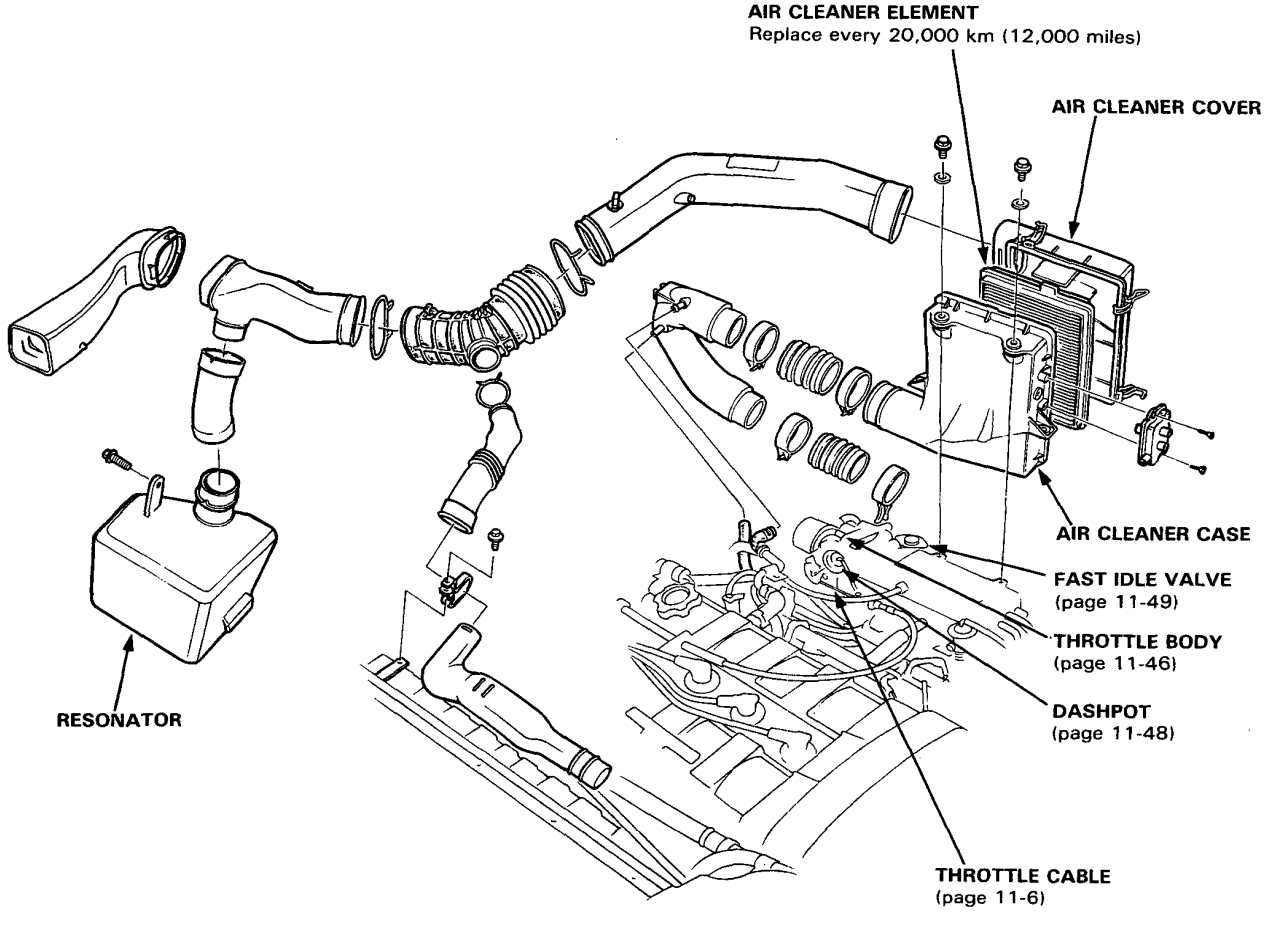
[Except KE and KQ Model]



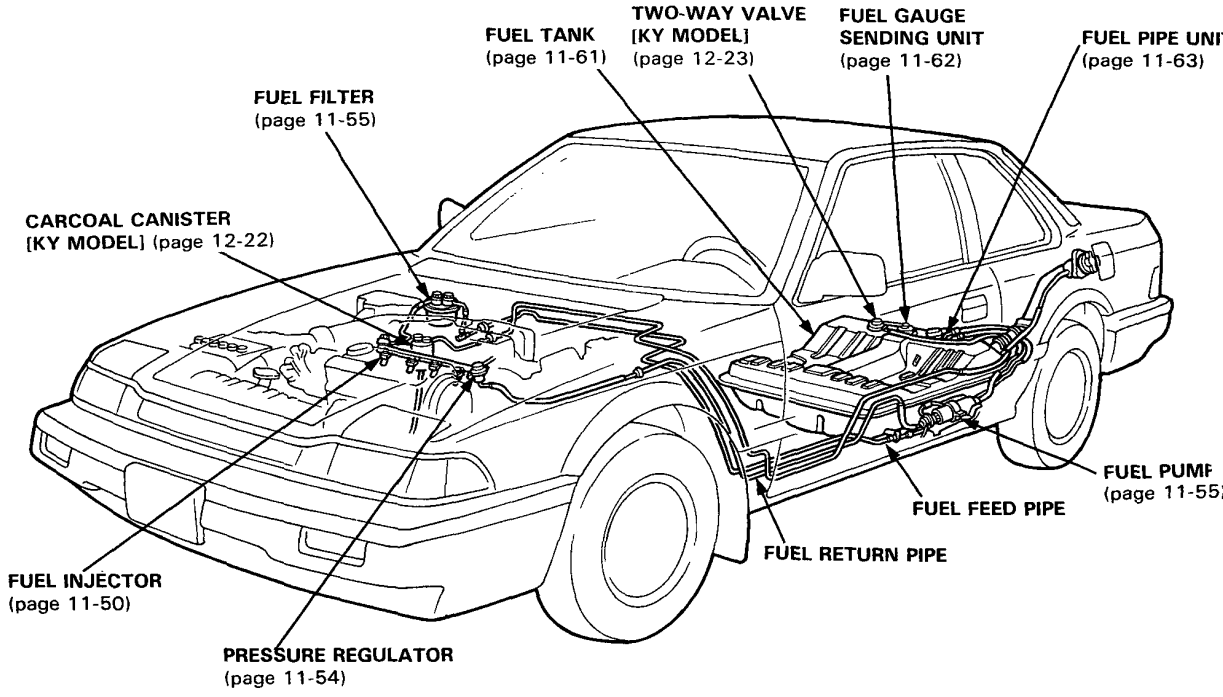
[KE and KQ Models]



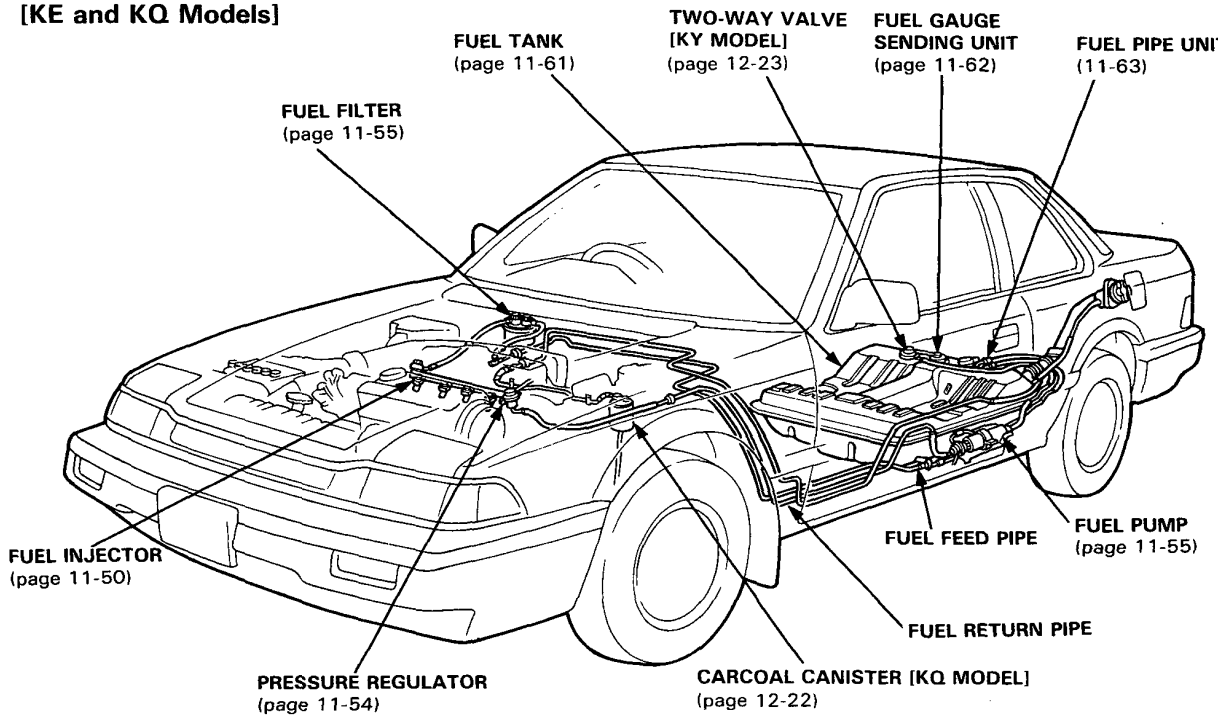

ATOMOSPHERIC PRESSURE SENSOR
(page 11-39)
ECU


AIR CLEANER ELEMENT
Replace every 20,000 km (12,000 miles)
AIR CLEANER COVER
AIR CLEANER CASE
FAST IDLE VALVE
(page 11-49)
THROTTLE BODY
(page 11-46)
DASHPOT
(page 11-48)
RESONATOR
THROTTLE CABLE
(page 11-6)

[Except KE and KQ Model]



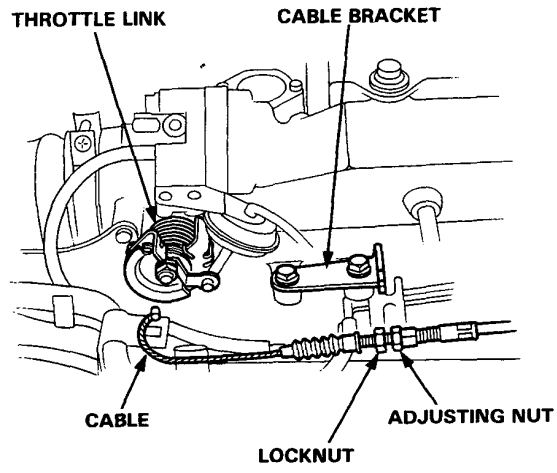
[KE and KQ Models]



Throttle Cable

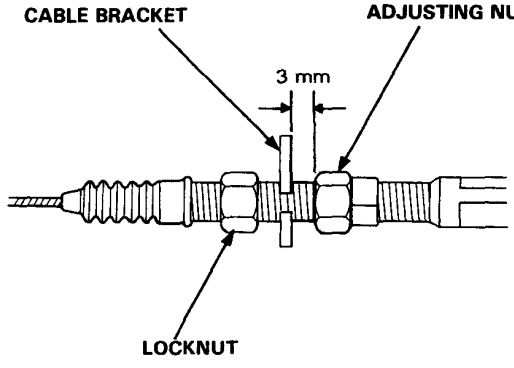
Replacement

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



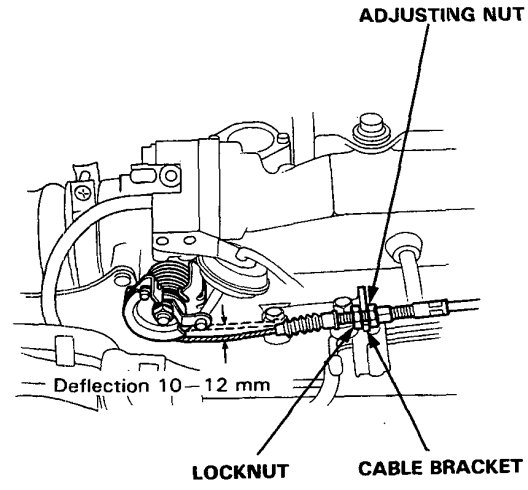
Installation

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

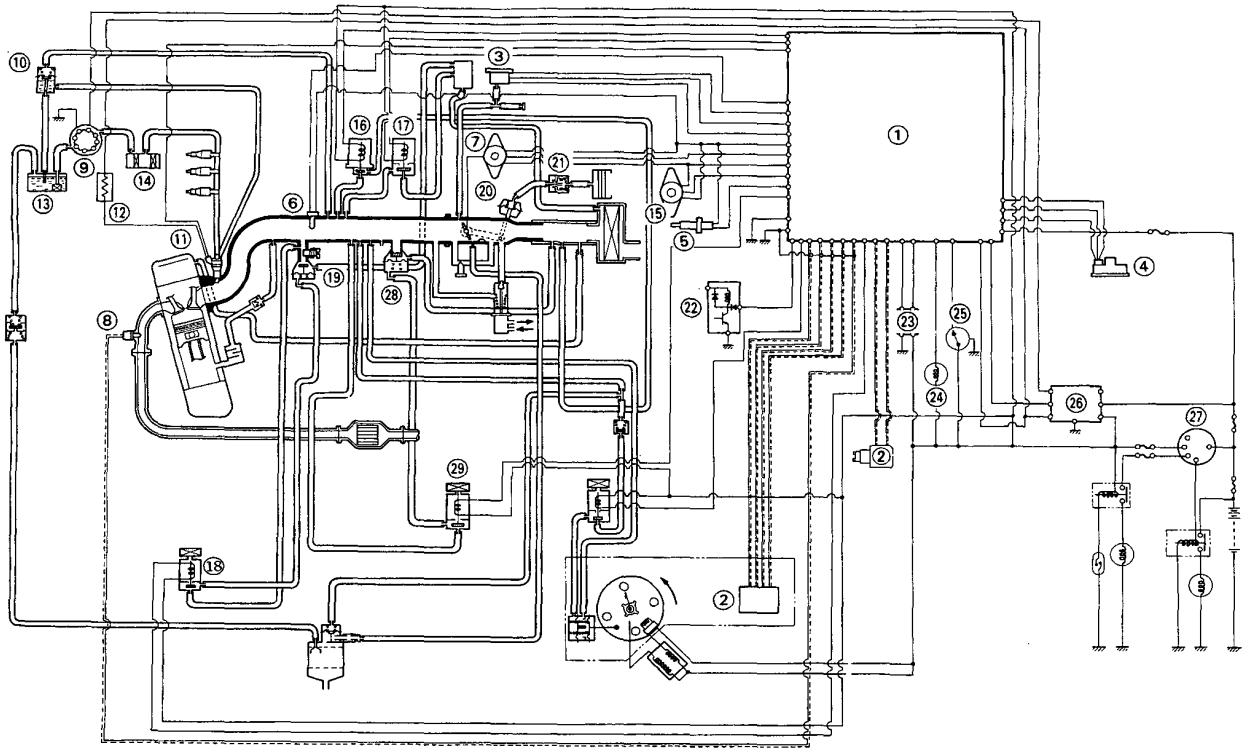


Inspection/Adjustment

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



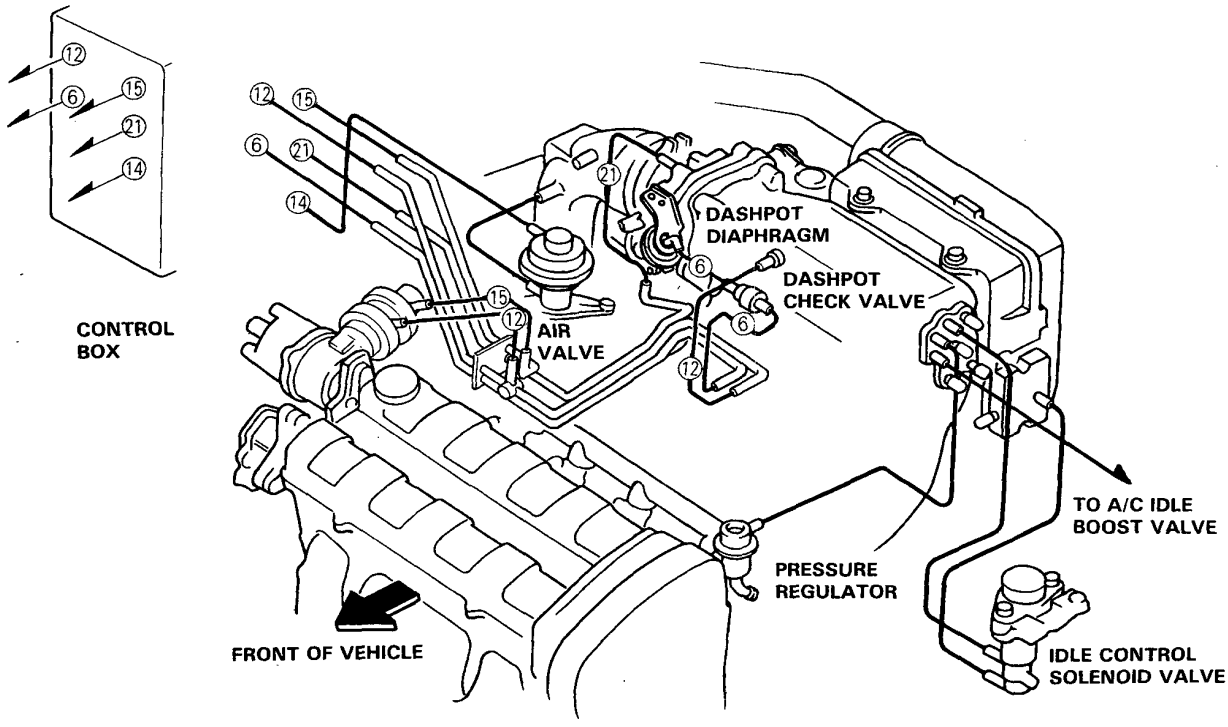
3. If deflection is not within specs, loosen the locknut and turn the adjusting nut until the deflection is as specified.
4. With the cable properly adjusted, check the throttle valve to be sure it opens fully when you push the accelerator pedal to the floor. Also check the throttle valve to be sure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



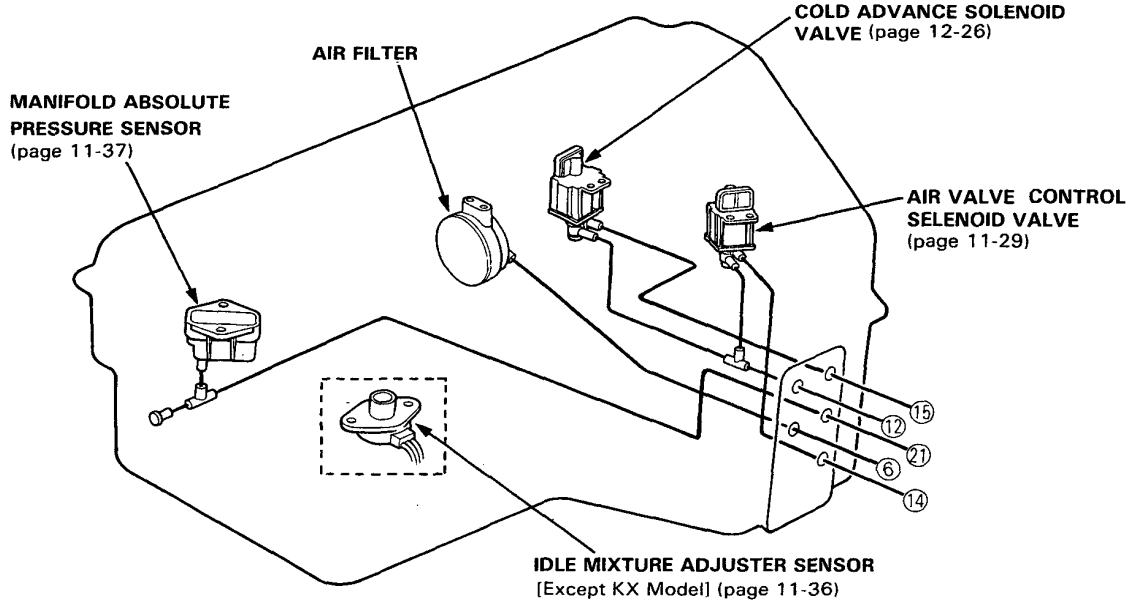
① ELECTRONIC CONTROL UNIT (ECU)
② CRANK ANGLE SENSOR
③ MANIFOLD ABSOLUTE PRESSURE SENSOR
④ ATMOSPHERIC PRESSURE SENSOR
⑤ COOLANT TEMPERATURE SENSOR
⑥ INTAKE AIR TEMPERATURE SENSOR
⑦ THROTTLE ANGLE SENSOR
⑧ OXYGEN SENSOR (KX and KQ Models)
⑨ FUEL PUMP
⑩ PRESSURE REGULATOR
⑪ INJECTOR
⑫ RESISTOR
⑬ FUEL TANK
⑭ FUEL FILTER
⑮ IDLE MIXTURE ADJUSTER SENSOR (Except KX and KQ Model)
⑯ A/T IDLE CONTROL SOLENOID VALVE (KQ and KY Models)
⑰ IDLE CONTROL SOLENOID VALVE
⑱ A/C IDLE BOOST SOLENOID VALVE
⑲ A/C IDLE BOOST VALVE
⑳ DASHPOT
㉑ DASHPOT CHECK VALVE
㉒ ALTERNATOR
㉓ A/T SHIFT POSITION SWITCH (KQ and KY Models)
㉔ PGM-FI WARNING LIGHT
㉕ SPEED SENSOR
㉖ MAIN RELAY
㉗ IGNITION SWITCH
㉘ AIR VALVE (Except KQ and KY Model)
㉙ AIR VALVE CONTROL SOLENOID VALVE (Except KQ and KY Model)

Interconnect Diagram

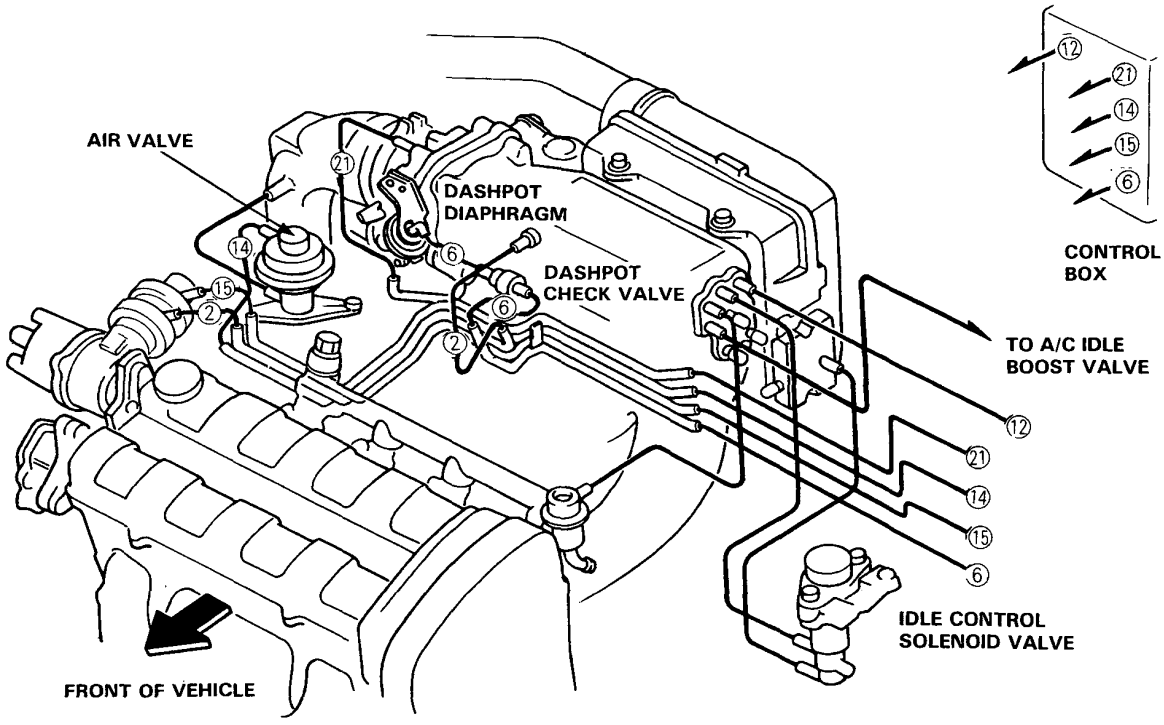
[KG, KF, KW, KS, KB and KX Models]



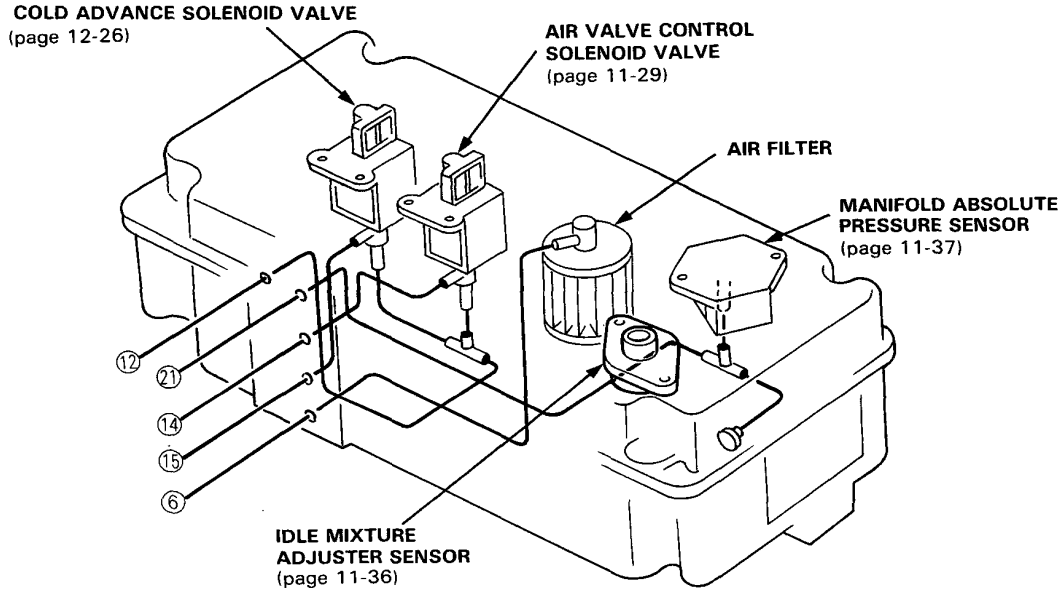
Control Box



[KE Model]



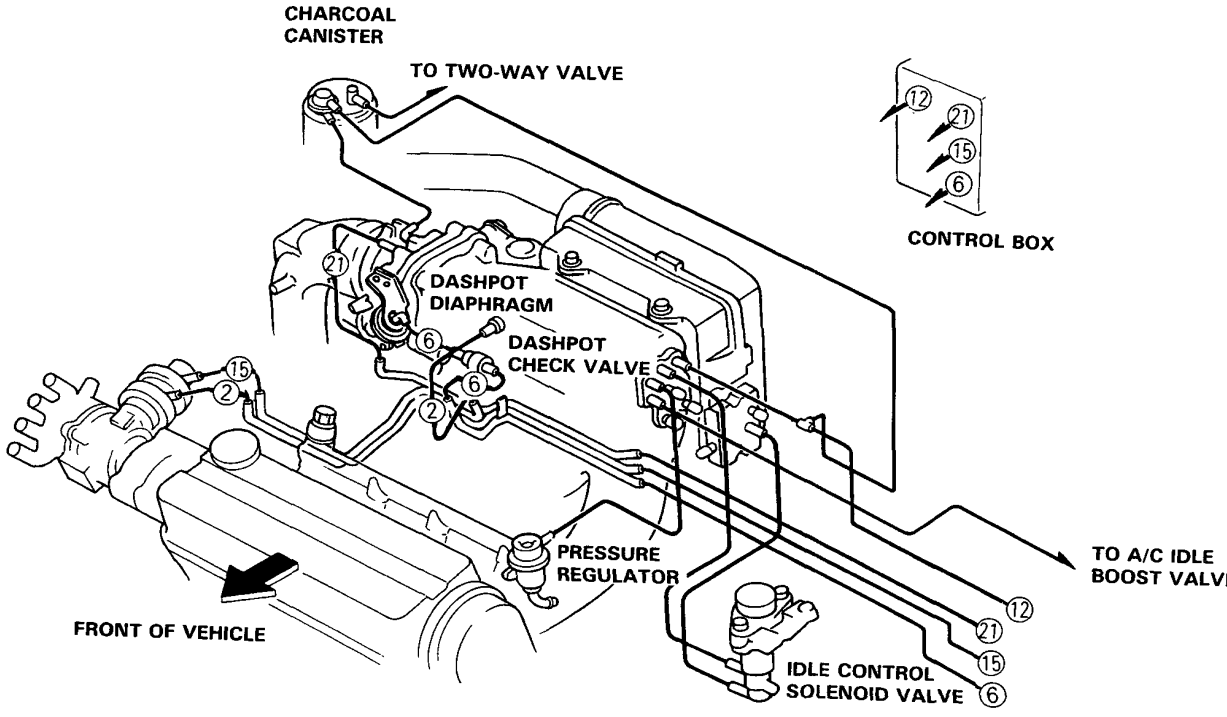
Control Box



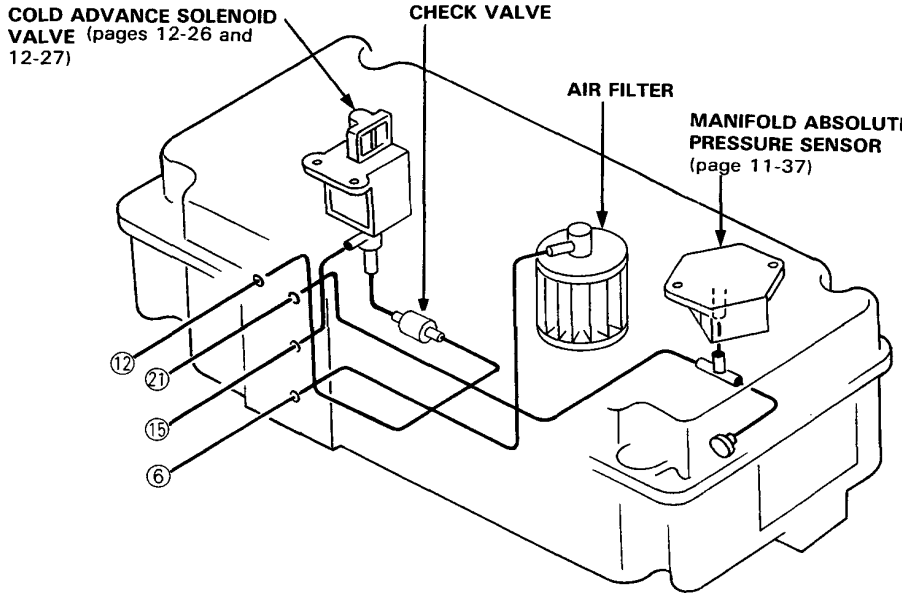
Interconnect Diagram

[KQ model]

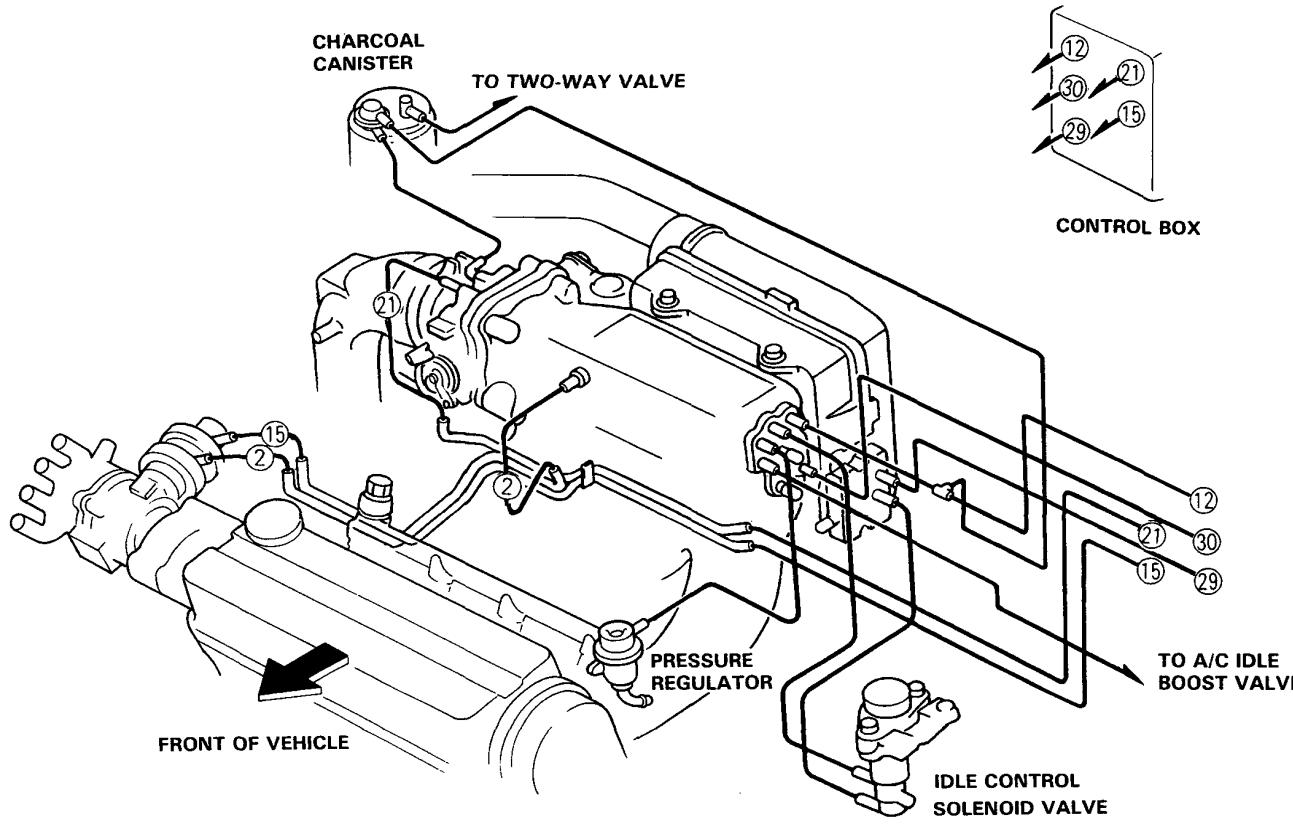
(M/T)



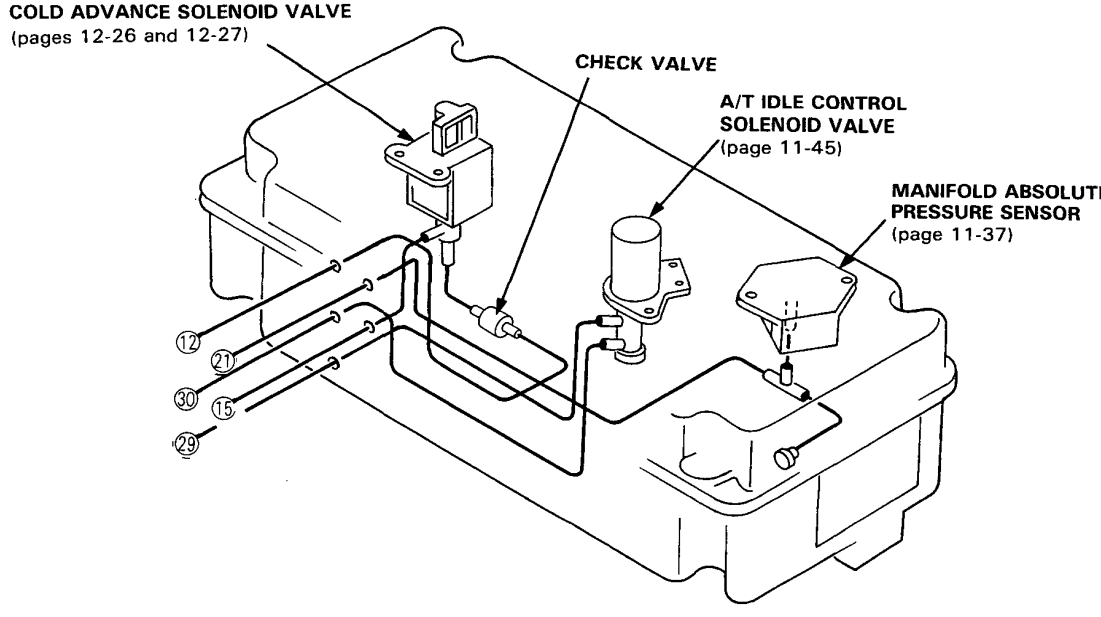
Control Box



(A/T)



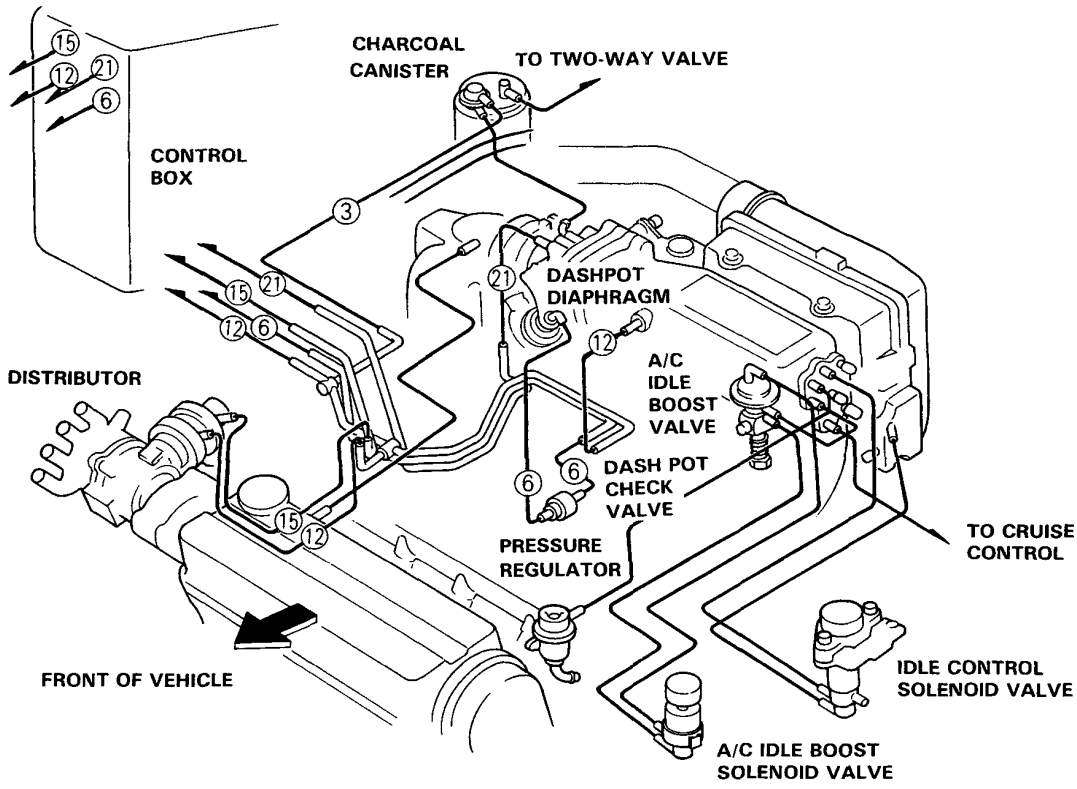
Control Box



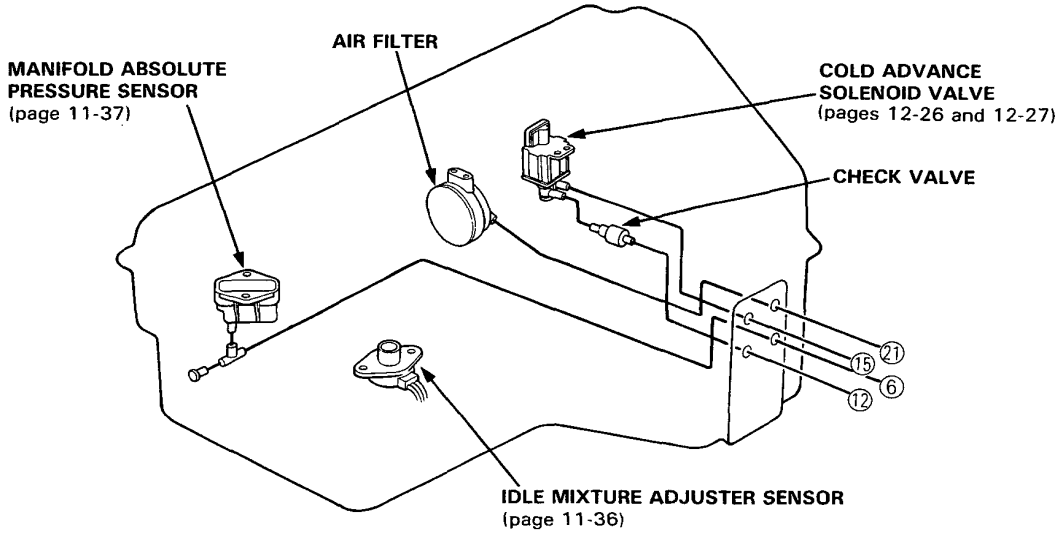
Interconnect Diagram

[KY Model]

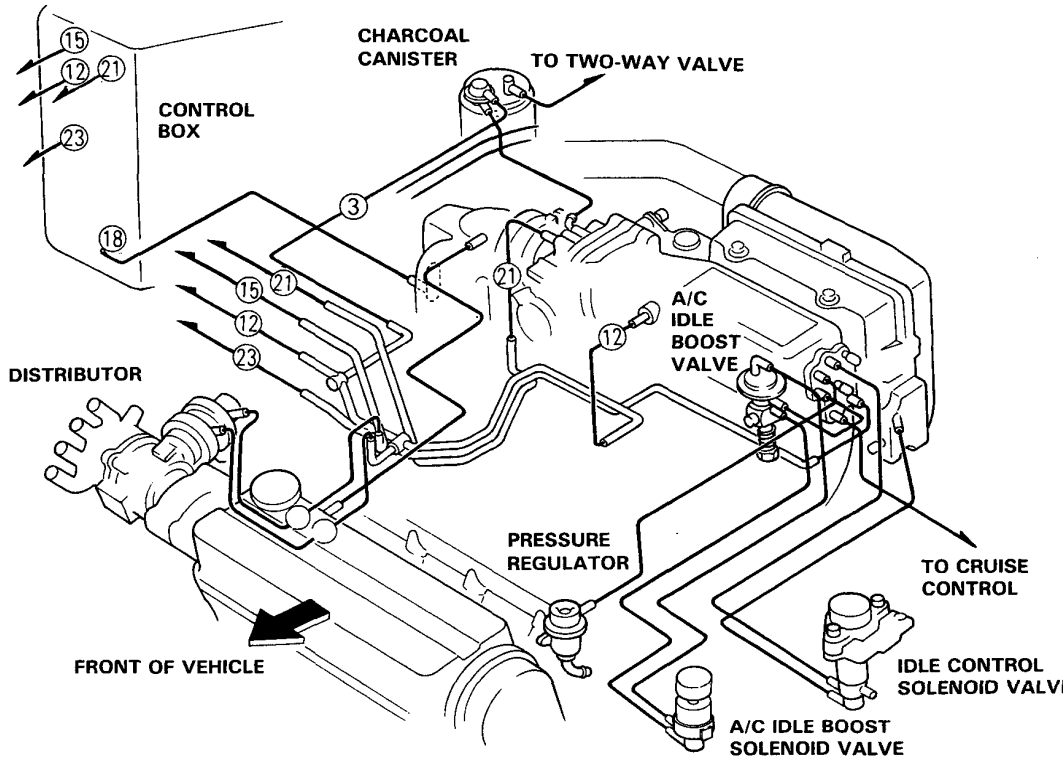
(M/T



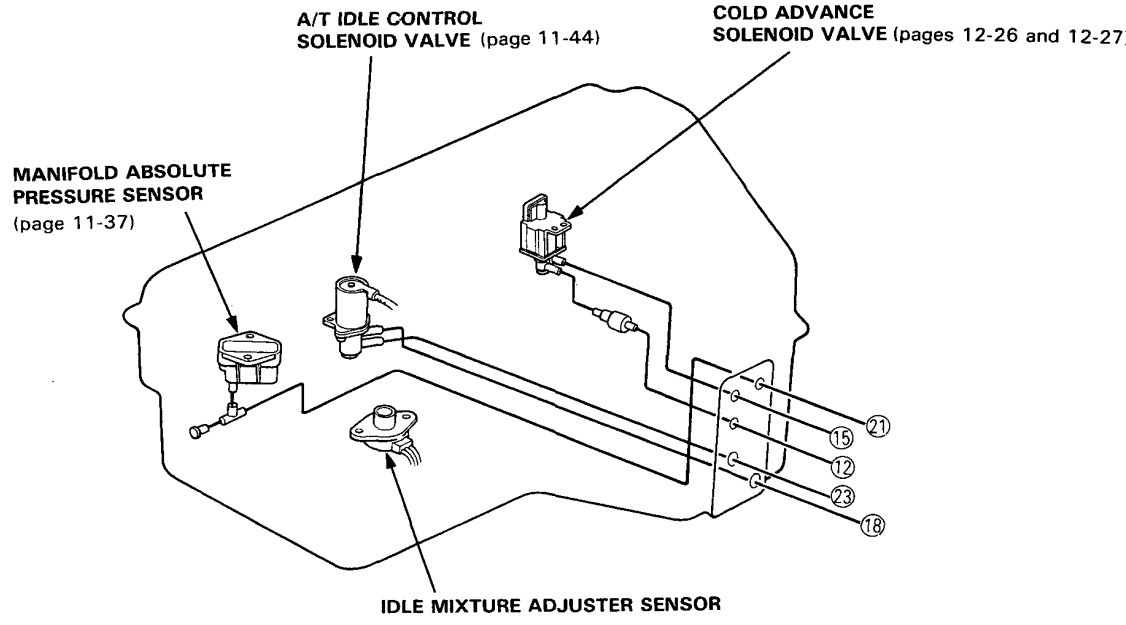
Control Box



(A/T)



Control Box



Troubleshooting

Before starting troubleshooting on the PGM-FI system, check that other items that affect engine performance are within specification. Check the valve clearance, air cleaner, and PCV valve. In addition, check the ignition timing, function of the vacuum and centrifugal advance, and the condition of the spark plugs. If those items are all within specifications, begin with the troubleshooting listed.

SYMPTOM / CAUSAL PART		ECU	INJECTOR	FUEL PUMP	FUEL LINE	FAST IDLE MECHANISM	THROTTLE BODY	CRANK ANGLE SENSOR	MANIFOLD ABSOLUTE PRESSURE SENSOR
ENGINE WON'T START		FAULTY ECU	• OPEN/SHORT CIRCUIT • DAMAGED INJECTORS	• FAULTY PUMP/MAIN RELAY • POOR GROUNDING	• FROZEN FUEL LINE • BLOCKED FILTER			• OPEN/SHORT CIRCUIT • FAULTY SENSOR	
DIFFICULT TO START ENGINE WHEN COLD		↑	• OPEN/SHORT CIRCUIT • FAULTY INJECTOR	↑	• ICE IN FUEL LINE • CLOGGED FILTER	STUCK AIR BYPASS VALVE		↑	
IRREGULAR IDLING	WHEN COLD	↑	• OPEN/SHORT CIRCUIT • STUCK INJECTOR			↑		↑	• OPEN/SHORT CIRCUIT • BROKEN/DISCONNECTED HOSE • FAULTY SENSOR
	AFTER WARMING UP	↑	↑			↑		↑	↑
	RPM TOO HIGH					↑	• IDLE ADJUSTING SCREW OUT OF ADJUSTMENT • THROTTLE VALVE STUCK OPEN		↑
	RPM TOO LOW						• IDLE ADJUSTING SCREW OUT OF ADJUSTMENT		
FREQUENT STALLING	WHILE WARMING UP	FAULTY ECU	• OPEN/SHORT CIRCUIT • STUCK INJECTOR	• FAULTY PUMP/MAIN RELAY • POOR GROUNDING	• IMPROPER LINE PRESSURE • CLOGGED FILTER	STUCK AIR BYPASS VALVE			• OPEN/SHORT CIRCUIT • BROKEN/DISCONNECTED HOSE • FAULTY SENSOR
	AFTER WARMING UP	↑	↑	↑	↑		IDLE ADJUSTING SCREW OUT OF ADJUSTMENT	• OPEN/SHORT CIRCUIT • FAULTY SENSOR	↑
POOR PERFORMANCE	POOR DRIVEABILITY HIGH FUEL CONSUMPTION	↑	↑	↑	↑	STUCK AIR BYPASS VALVE		↑	↑
	AFTERBURN	↑	↑						↑
	BACKFIRE	↑	↑	• FAULTY PUMP/MAIN RELAY • POOR GROUNDING	• IMPROPER LINE PRESSURE • CLOGGED FILTER				↑
	KNOCKING	↑	↑	↑	↑				
	LACK OF POWER AT LOW RPM	↑	↑	↑	↑				
	LACK OF POWER AT MID RPM	↑	↑	↑	↑				• OPEN/SHORT CIRCUIT • BROKEN/DISCONNECTED HOSE • FAULTY SENSOR
	LACK OF POWER AT HIGH SPEED	↑		↑	↑				↑
WARNING/ INDICATOR LIGHT TURNS ON	PGM-FI WARNING LIGHT	↑						• OPEN/SHORT CIRCUIT • FAULTY SENSOR	↑
	SELF DIAGNOSIS INDICATOR	↑						↑	↑

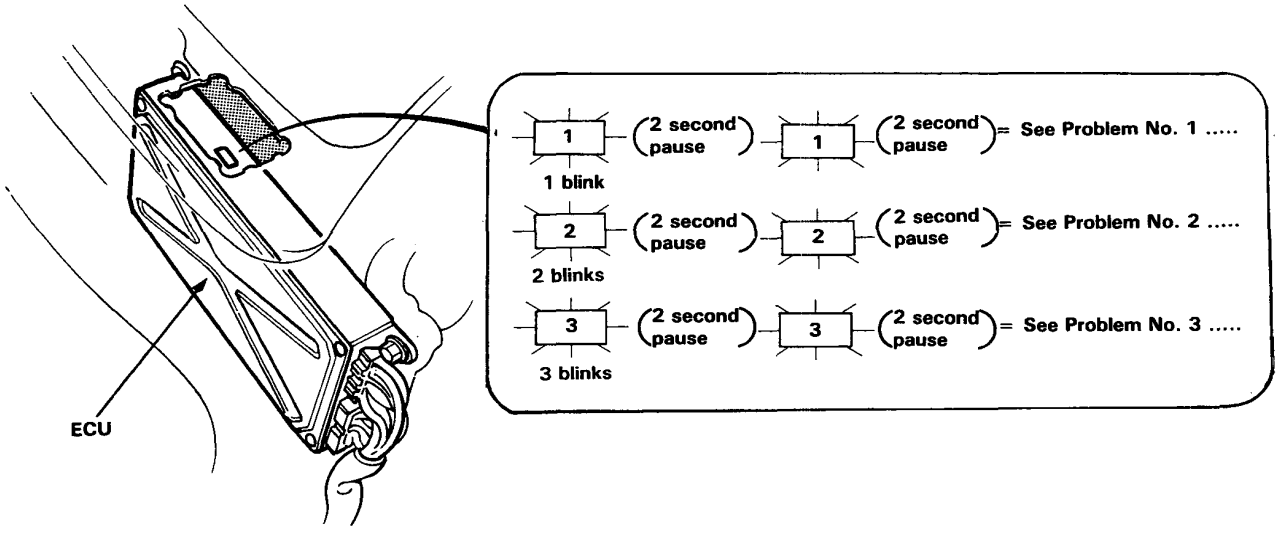
ATMOSPHERIC PRESSURE SENSOR	OXYGEN SENSOR (KX and KQ Models)	COOLANT TEMPERATURE SENSOR	THROTTLE ANGLE SENSOR	INTAKE AIR TEMPERATURE SENSOR	SECONDARY AIR SUPPLY SYSTEM	IDLE CONTROL SYSTEM	IDLE MIXTURE ADJUSTER SENSOR (Except KX and KQ Model)	IMPORTANT POINTS
								• CHECK FUEL PUMP/INJECTOR
(AT HIGH ALTITUDE) • OPEN/SHORT CIRCUIT • FAULTY SENSOR		• OPEN/SHORT CIRCUIT • FAULTY SENSOR						• CHECK FUEL PUMP/INJECTOR • POSSIBLE TO START BY OPERATING THROTTLE? (STUCK AIR BYPASS VALVE)
↑		↑						• CHECK IGNITION SYSTEM (SPARKS) AND EACH INJECTOR POSSIBLE TO START BY OPERATING THROTTLE? (STUCK AIR BYPASS VALVE)
						FAULTY SOLENOID VALVE		↑
					FAULTY SOLENOID VALVE (STUCK OPEN)			• DISCONNECTED OR LEAKY VACUUM LINES • CHECK AIR BYPASS VALVE • CHECK SELF DIAGNOSIS INDICATOR
			SENSOR OUT OF ADJUSTMENT					
		• OPEN/SHORT CIRCUIT • FAULTY SENSOR		• OPEN/SHORT CIRCUIT • FAULTY SENSOR				• CHECK AIR BYPASS VALVE • CHECK COOLANT TEMPERATURE SENSOR
						FAULTY SOLENOID VALVE (RPM DOWN)		• CHECK IDLE SPEED • CHECK FOR FUEL CUT-OFF OPERATION
	• OPEN/SHORT CIRCUIT • FAULTY SENSOR	• OPEN/SHORT CIRCUIT • FAULTY SENSOR	• OPEN/SHORT CIRCUIT • FAULTY SENSOR	• OPEN/SHORT CIRCUIT • FAULTY SENSOR		FAULTY SOLENOID VALVE (STUCK OPEN)	OPEN/SHORT CIRCUIT	• CHECK IGNITION TIMING • CHECK FOR FUEL CUT-OFF OPERATION
		↑	↑					↑
		↑	↑					• CHECK IGNITION TIMING • CHECK MANIFOLD ABSOLUTE PRESSURE SENSOR/INJECTORS
		↑	↑					• CHECK IGNITION TIMING
	• OPEN/SHORT CIRCUIT • FAULTY SENSOR	↑	↑					• CHECK IGNITION TIMING (DISCONNECTED OR BROKEN LINES) • CHECK INJECTORS
	↑	↑	↑					• CHECK IGNITION TIMING
								• CHECK MANIFOLD ABSOLUTE PRESSURE SENSOR • CHECK IGNITION TIMING
• OPEN/SHORT CIRCUIT • FAULTY SENSOR	• OPEN/SHORT CIRCUIT • FAULTY SENSOR	• OPEN/SHORT CIRCUIT • FAULTY SENSOR	• OPEN/SHORT CIRCUIT • FAULTY SENSOR	• OPEN/SHORT CIRCUIT • FAULTY SENSOR			• OPEN/SHORT CIRCUIT • FAULTY SENSOR	• CONSULT TROUBLESHOOTING CHART ON PAGE 11-17
↑	↑	↑	↑	↑			↑	↑

(cont'd)

Self-Diagnosis Indicator

Troubleshooting

The PGM-FI system's ECU is equipped with a self-diagnosis function. When an abnormality is detected, the PGM-FI dash warning light comes on, and the LED display on the ECU blinks. The location of the PGM-FI control system's trouble can be diagnosed from the frequency of the LED display blinks.



The quick reference chart on the next page covers the failure modes and possible causes for the PGM-FI. If you run through all the possible causes listed and the problem is still unsolved, go on to the more detailed troubleshooting on the following pages.

Sometimes the PGM-FI dash warning light and/or ECU LED display will come on, indicating a system problem, when, in fact, there is a bad or intermittent electrical connection. To troubleshoot bad connections, note the ECU LED display blink frequency, refer to the diagnosis chart on page 11-17 and check the connectors associated with the items mentioned in the "Possible Cause" column. Clean or repair connections if necessary.

NOTE:

- The memory for the "PGM-FI"dash warning light will be erased when the ignition switch is turned off; however, the memory for the LED display will not be cancelled. Thus, the warning light will not come on when the ignition is again turned on unless the trouble is once more detected. Troubleshooting should be done according to the LED display even if the warning light is OFF. If the LED display fails to come on when the ignition switch is turned on again, check for:
  - Blown No. 4 fuse (10A) (also the fuse for the clock, turn signals).
  - Open circuit in White/Yellow wire between ECU A17 terminal and No. 4 fuse.

  Then, if there is no problem, substitute a known-good ECU and re-check.
- Turn the ignition switch ON. The PGM-FI dash warning light should come on for about 2 seconds. If the warning light won't come on, check for:
  - Blown No. 5 fuse (also the fuse for the bakc up lights, fuel gauge).
  - Open circuit in Yellow wire between No.5 fuse and combination meter.
  - Open circuit in Green/Red wire between combination meter and ECU B6 terminal.
  - Open circuit in Black wires between ECU A2, A4 and ground 1.
  - Blown warning light bulb.

  Then, if there is no problem, substitute a known-good ECU and re-check.
- After making repairs, disconnect No. 4 fuse for at least 10 seconds to reset the ECU memory. After reconnecting the fuse, check that the LED display is turned off.

No. of LED Blinks between 2 second pauses	Dash warning light	Symptom	Possible causes
0		• Engine will not start	• Disconnected control unit ground wire • Faulty ECU
		• Engine will not start • No particular symptom shown	• Loose or poorly connected power line to ECU • Disconnected control unit ground wire • Short circuit in combination meter or warning light wire • Faulty ECU
1 [KX and KQ Models]		• No particular symptom shown • Erratic idling (Erratic injector, coupler and wiring insufficient fuel)	• Disconnected oxygen sensor coupler • Spark plug mis-fire • Short or open circuit in oxygen sensor circuit • Faulty oxygen sensor • Faulty fuel system
3		• Fuel fouled plug • Frequent engine stalling • Hesitation	• Disconnected manifold absolute pressure sensor coupler • Short or open circuit in manifold absolute pressure sensor wire • Faulty manifold absolute pressure sensor
5		• Hesitation • Fuel fouled plug • Frequent engine stalling	• Disconnected manifold absolute pressure sensor piping
6		• High idle speed during warm-up • High idle speed • Hard starting at low temp	• Disconnected coolant temperature sensor coupler • Open or short circuit in coolant temperature sensor wire • Faulty coolant temperature sensor (thermostat housing)
7		• Poor engine response to opening throttle rapidly • High idle speed • Engine does not rev up when cold	• Disccnected throttle angle sensor coupler • Open or short circuit in throttle angle sensor wire • Faulty throttle angle sensor
8		• Engine does not rev up • High idle speed • Erratic idling	• Short or open circuit in crank angle sensor wire • Crank angle sensor wire interfering with spark plug wires • Crank angle sensor at fault
9		• Same as above	• Same as above
10		• High idle speed • Erratic idling when very cold	• Disconnected intake air temperature sensor • Open or short circuit in intake air temperature sensor wire • Faulty intake air temperature sensor
11 [Except KX and KQ Models]		• No particular symptom shown • High idle speed	• Disconnected idle mixture adjuster sensor coupler • Shorted or disconnected idle mixture, adjuster sensor wire • Faulty idle mixture adjuster sensor
13		• Poor acceleration at high altitude • Hard starting at high altitude when cold	• Disconnected atmospheric pressure sensor coupler • Shorted or disconnected atmospheric pressure sensor wire • Faulty atmospheric pressure sensor

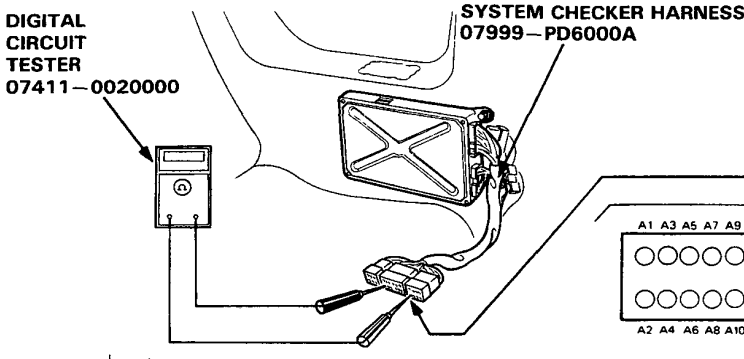
NOTE:

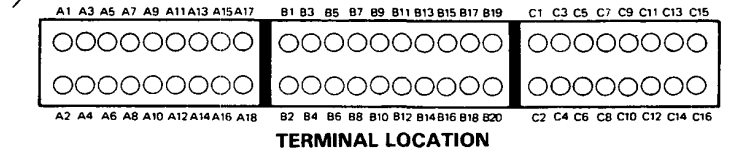
- If the number of blinks between 2 second pauses otherwise above, or if the LED indicator stays on, the ECU is faulty.
- Some failure indications (such as, one blink) require the full test procedures on the follwing pages to confirm that the failure has or has not been eliminated.

(cont'd)

Troubleshooting (cont'd)

Use the system checker harness and digital circuit tester to check the system.



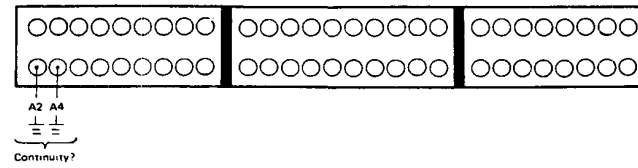


TERMINAL LOCATION

0 **Self-diagnosis indicator remain off — The dash warning light is not lit.**

Connect the system checker harness between the ECU and connector.

Check for continuity between the A2 (Black), the A4 (Black) terminals and body ground.



Does continuity exist?

NO — Faulty ground circuit at GND-1

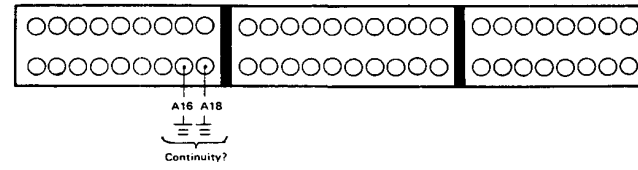
YES

Substitute a known-good ECU and recheck.
If symptom goes away, replace the original ECU.
If symptom does not go away, check to see if the dash warning light is on and the LED indicator is now blinking, and troubleshoot the true cause.

0 **Self-diagnosis indicator remains off — The dash warning light is lit.**

Connect the system checker harness between the ECU and coupler.

Check for continuity between the A16 (Brown/Black), the A18 (Black/Red) terminals and body ground.



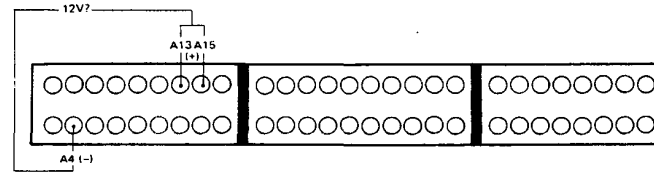
Does continuity exist?

NO — Faulty ground circuit at GND-2

YES

Turn the ignition switch ON.

Measure voltage between A15 (Yellow/Black (+)), the A13 (Black/Yellow (+)) terminals and the A4 terminal (Black (−)).



(To page 11-19)

(From page 11-18)

Is 12 V available?

NO
- PGM-FI (ECU) fuse blown
- Open circuit in Yellow/Blue wire between PGM-FI (ECU) fuse and main relay
- Faulty main relay
- Open circuit in Yellow/Black wire between main relay and ECU
- Regulator fuse (10 A) blown (fuel pump is not working).
- Open circuit in Black/Yellow wire between Regulator fuse and main relay
- Open circuit in main relay ground wire (Black)
- Faulty ECU.

NOTE: No voltage available.

YES

Check for short circuits in the Green/Red wire between the combination meter and B6 terminal (Green/Red), as well as in the combination meter printed circuit board.

Are wires normal?

NO — Faulty circuit or combination meter.

YES

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

1 — **Self diagnosis indicator blinks once** [KX and KQ Models]

NOTE: First, check the spark plugs.
Plug mis-fire can be another source of this trouble.

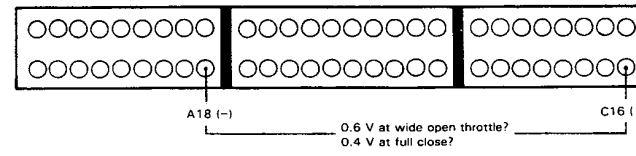
Warm up engine to operating temperature.

Rev up and slow down engine between idle and 4,000 min^{-1} (rpm) quickly.

Stop engine.

Connect system checker harness between ECU and connector.

Attach positive probe of voltmeter to C16 terminal (White) of checker, and negative probe to A 18 (Black/Red) terminal.



Open the throttle wide open then close it.

Check that voltage rises over 0.6 V at wide open throttle, and falls below 0.4 V at full close.

Is voltage above 0.6 V ... below 0.4 V?

NO — Stop engine.

Disconnect engine wire harness from oxygen sensor.

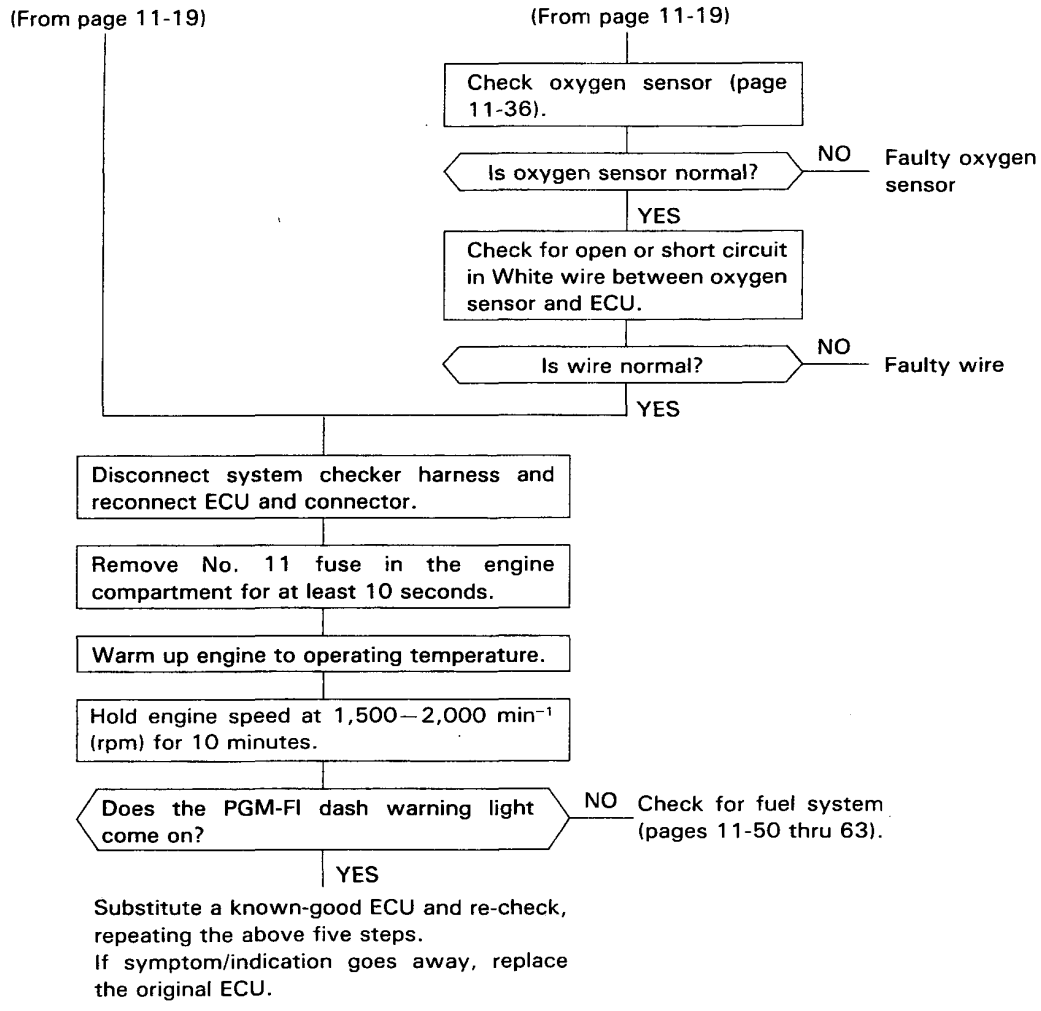
YES

(To page 11-20)

(To page 11-20)

(cont'd)

Troubleshooting (cont'd)



2 **Self diagnosis indicator blinks twice.**

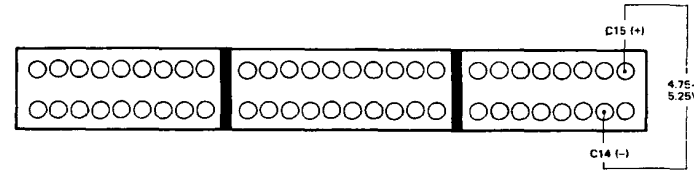
Count the number of blinks again. If the LED is, in fact, blinking twice between pauses, substitute a known-good ECU and re-check.
If the indication goes away, replace the original ECU.

3 **Self diagnosis indicator blinks three times.**

Connect system checker harness between the ECU and connector.

Turn ignition switch ON.

Measure voltage between C15 terminal (Red/White (+)) of system checker harness and C14 terminal (Blue/White (−)).

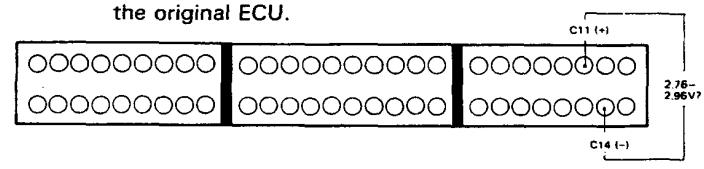


Is voltage between 4.75 and 5.25 V?

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

YES

Measure voltage between C11 terminal (White/Blue (+)) of system checker harness and C14 terminal (Blue/White (−)).



Is voltage between 2.76 and 2.96 V?

NO — Open or short circuit in White/Blue wire or Blue/White wire between manifold absolute pressure sensor and ECU.
Faulty manifold absolute pressure sensor.

NOTE: If the voltage is below the specified range, there are open or poorly connected wires. If the wires are normal, the manifold absolute pressure sensor is at fault.

YES

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

4 **Self diagnosis indicator blinks four times.**

Count the number of blinks again. If the LED is, in fact, blinking four times between pauses, substitute a known-good ECU and re-check.
If the indication goes away, replace the original ECU.

(cont'd)

Troubleshooting (cont'd)

5 — **Self diagnosis indicator blinks five times.**

Check that the manifold absolute pressure sensor pipe is connected securely.

NOTE: Also check hose routing inside control box.

Is routing normal?
- NO → Reconnect routing
- YES

Disconnect pipe from manifold absolute pressure sensor and plug open end.

Disconnect vacuum hose #21 from throttle body.

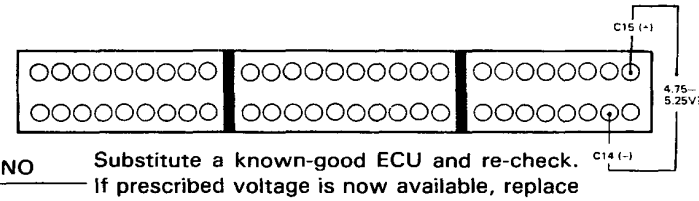
Connect hand vacuum pump to vacuum hose #21 and check for a leak.

Is vacuum maintained?
- NO → Replace vacuum hose.
- YES

Connect system checker harness between the ECU and connector.

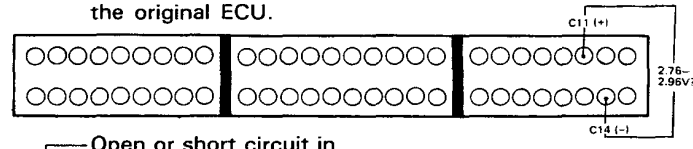
Turn ignition switch ON.

Measure voltage between C15 terminal (Red/White (+)) of system checker harness and C14 terminal (Blue/White (−)).



Is voltage between 4.75 and 5.25 V?
- NO → Substitute a known-good ECU and re-check. If prescribed voltage is now available, replace the original ECU.
- YES

Measure voltage between C11 terminal (White/Blue (+)) of system checker harness and C14 terminal (Blue/White (−)).



Is voltage between 2.76 and 2.96 V?
- NO → Open or short circuit in White/Blue or Blue/White wire between manifold absolute pressure sensor and ECU.
  Faulty manifold absolute pressure sensor.
- YES

NOTE: If there is no voltage, or if voltage is low, check for a shorted wire.
If voltage is high, wire may be open or bad contact.
If wire is normal, manifold absolute pressure sensor is at fault.

Connect hand vacuum pump to manifold absolute pressure sensor.

Check that voltage changes as vacuum is applied.

Has voltage changed?
- NO → Faulty manifold absolute pressure sensor
- YES

Substitute a known-good ECU and re-check.

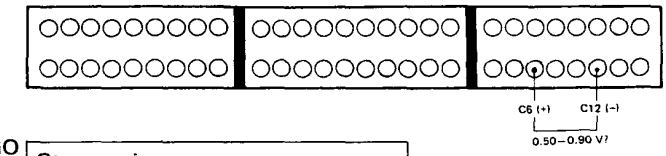
If symptom/indication goes away, replace the original ECU.

6 — **Self diagnosis indicator blinks six times.**

Connect system checker harness between the ECU and connector.

Warm up engine until radiator fan comes on twice.

Measure voltage between C6 terminal (Yellow/Green (+)) of system harness checker and C12 terminal (Green/White (−)).



Is voltage between 0.50 and 0.90 V?

NO → Stop engine.

Check for open or short circuit in Yellow/Green and Green/White wires between coolant temperature sensor and the ECU.

NOTE: If there is no voltage or if voltage is low, check for shorted wire. If voltage is high, wire may be open or bad contact.

Are wires normal?

NO → Faulty wires

YES

Check coolant temperature sensor (page 11-38).

Is sensor normal?

NO → Faulty coolant temperature sensor

YES

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

YES

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

(cont'd)

Self-Diagnosis Indicator

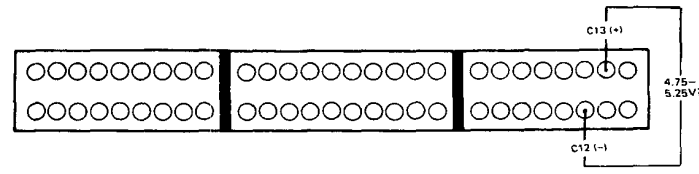
Troubleshooting (cont'd)

7 — **Self diagnosis indicator blinks seven times.**

Connect system checker harness harness between ECU and connector.

Turn ignition switch ON.

Measure voltage between C13 terminal (Yellow/White (+)) of system checker harness and C12 terminal (Green/White (−)).

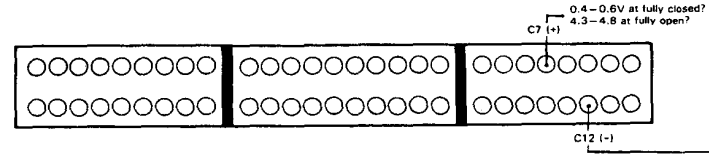


Is 4.75—5.25 V attained?

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

YES

Connect voltmeter positive probe to C7 terminal (Red/Yellow), and negative probe to C12 terminal (Green/White (−)) of system checker harness.



Operate accelerator pedal from fully closed to fully open.

Check that 0.4—0.6 V is available at fully closed, and 4.3—4.8 V at fully open.

Are voltages within above ranges?

NO — Check for short or open circuit in Red/Yellow and Green/White wires between the ECU and throttle angle sensor.

YES

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

Are wires normal?

NO — Replace wires

YES

Adjust or replace throttle angle sensor (page 11-43).

8 — **Self diagnosis indicator blinks eight times.**

Check for open or short circuit in Orange/Blue and White/Blue wires between the ECU and crank angle sensor.

NOTE: Check that crank angle sensor harness is not interfering with the spark plug wires.

Are wires normal?

NO — Replace wires

YES

Check crank angle sensor (pages 11-39 thru 42).

Does crank angle sensor operate properly?

NO — Faulty crank angle sensor

YES

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

9 **Self diagnosis indicator blinks nine times.**

Check for open or short circuit in Orange and White wires between the ECU and crank angle sensor.

NOTE: Check that sensor harness is not interfering with the spark plug wires.

Are wires normal? — NO → Replace wires

YES

Check crank angle sensor (pages 11-39 thru 42).

Is sensor normal? — NO → Faulty crank angle sensor

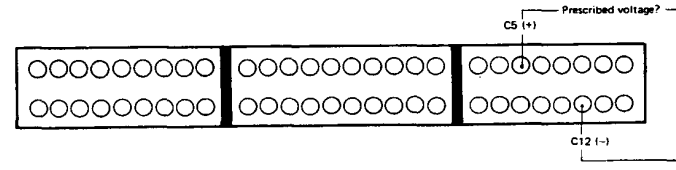
YES

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

10 **Self diagnosis indicator blinks ten times.**

Connect system checker harness between the ECU and harness connector.

Attach voltmeter positive probe to C5 terminal (White/Red), and negative probe to C12 terminal (Green/White) of system checker harness.



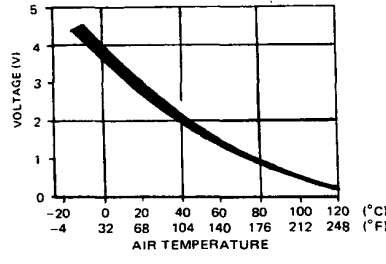
Turn ignition switch ON.

Check that voltage is correct for the intake air temperature.

Is voltage correct? — NO → Turn ignition switch OFF.

YES

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



Check for open or short circuit in White/Red and Green/White wires between intake air temperature sensor and the ECU.

NOTE: If voltage is low, or there is no voltage, check wires for short circuit. If voltage is high, probability is open or bad contact.

Are wires normal? — NO → Faulty wires

YES

Check intake air temperature sensor (page 11-38).

Is sensor normal? — NO → Faulty intake air temperature sensor

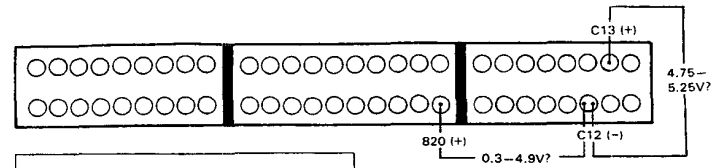
YES

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

(cont'd)

Troubleshooting (cont'd)

11 **Self diagnosis indicator blinks eleven times. [Except KX and KQ Model]**



Connect system checker harness between the ECU and harness coupler.

Turn ignition switch ON.

Measure voltage between C13 terminal (Yellow/White (+)) of system checker harness and C12 terminal (Green/White (–)).

Is 4.75–5.25 V available? NO → Replace ECU

YES

Measure voltage between B20 terminal (Brown (+)) of system checker harness and C12 terminal (Green/White (–)).

Is 0.3–4.9 V available? NO → Turn ignition switch OFF.

YES

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

Turn ignition switch OFF.

Check for open or short circuit in Brown and Green/White wires, between idle mixture adjuster sensor and the ECU.

NOTE: If there is no voltage, check for short circuit in the wires. If voltage is high, probability is open or bad contact.

Are wires normal? NO → Faulty wires.

YES

Check idle mixture adjuster sensor (page 11-36)

Does sensor operate properly? NO → Faulty idle mixture adjuster sensor.

YES

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

12 **Self diagnosis indicator blinks twelve times.**

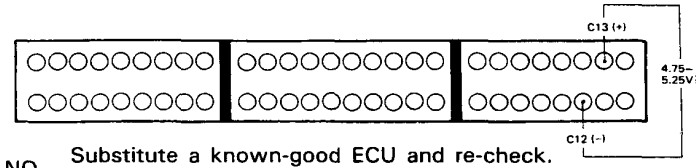
Count the number of blinks again, If the LED is, in fact, blinking twelve times between pauses, substitute a known-good ECU and re-check.
If the indication goes away, replace the original ECU.

13 **Self diagnosis indicator blinks thirteen times.**

Connect system checker harness between the ECU and harness connector.

Turn ignition switch ON.

Measure voltage between C13 terminal (Yellow/White (+)) of system checker harness and C12 terminal (Green/White (−)).

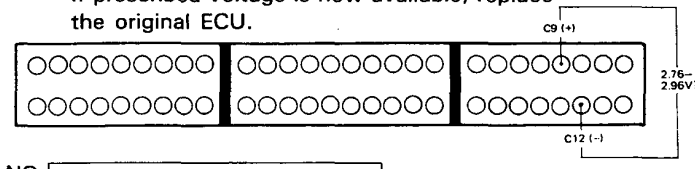


Is 4.75–5.25 V available?

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

YES

Measure voltage between C9 terminal (Red (+)) of system checker harness and C12 terminal (Green/White).



Is 2.76–2.96 V available?

NO — Turn Ignition switch OFF.

YES

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

Check for open or short circuit in Red and Green/White wires between atmospheric pressure sensor and the ECU.

NOTE: If there is no voltage, check for a short circuit. If voltage is high, wires may be open or bad contact.

Are wires normal?

NO — Faulty wires.

YES

Check atmospheric pressure sensor (page 11-39).

Does sensor operate properly?

NO — Faulty atmospheric pressure sensor.

YES

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

NOTE: If the number of blinks between 2 second pauses otherwise above, or if the LED indicator stays on, the ECU is faulty.

Idle Control

Troubleshooting

Symptom \ Part	Idle control solenoid valve	A/T idle control solenoid valve [KQ, KY Models]	A/C idle boost solenoid valve	A/C idle boost valve	Throttle body
Idle speed does not increase after initial start-up.	Valve failure/ pinched vacuum hose				Adjusting screw out of adjustment
Idle speed too high in neutral.	Leaky solenoid valve	Leaky solenoid valve	Valve failure		↑ Valve stuck open
Idle speed changes under electrical load.	Valve failure/ pinched vacuum hose				↑ Throttle angle sensor out of adjustment
Idle speed drops when blipping throttle with electrical load.					
On models with automatic transmission, the idle speed drops in gear.					
Idle speed drops when A/C switch is turned ON.	Valve failure/ pinched vacuum hose	Valve failure/ pinched vacuum hose	Valve failure/ pinched vacuum hose	Adjusting bolt out of adjustment	
Idle speed fluctuates when idle control comes into operation.	Valve failure				

Fast idle mechanism	Starter switch signal	Alternator FR terminal signal	A/T shift position signal [KQ, KY Models]	A/C switch signal	ECU	Remarks
	Open circuit				Failure in ECU	Is signal available at ECU?
Leaky fast idle valve					Failure (signal not stopped)	• Pinch idle control solenoid valve hose and re-adjust. • Any intake or bypass leak.
					Failure (signal not available)	Is idle control solenoid valve working?
		Open circuit			Failure in ECU	Is there big difference between no load and loaded conditions?
			Abnormal signal		↑	• Is shift signal available at ECU? • Is A/T idle control solenoid valve working?
				Open circuit	↑	• Is vacuum applied to A/C idle boost valve? • Is A/C idle boost valve openning adjusted properly?
					↑	Is condition improved when solenoid valve is replaced?

(cont'd)

Troubleshooting (cont'd)

Starter Switch Signal Inspection

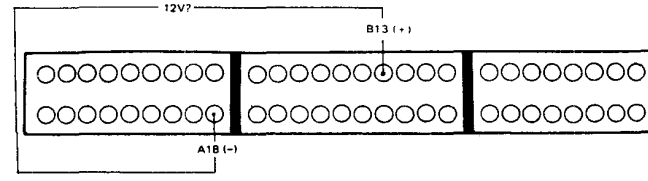
Connect system checker harness between ECU and wire harness connector.

Turn ignition switch to START.

Measure voltage between B13 terminal (Blue/ Red (+)) and A18 terminal (Black/Red (−)) of system checker harness.

Is battery voltage available?

NO
- Blown starter signal fuse
- Open circuit in Black/White wire between starter signal fuse and ECU



Alternator FR Terminal Signal Inspection

Before inspection, check operation of alternator as follows:
With the engine running, and the upper vacuum hose of idle control solenoid valve pinched (to cut off the idle control system), turn the headlights on and off.
Engine rpm should be changed. If engine rpm remains steady, re-charge battery and re-test.

Connect system checker harness between ECU and wire harness connector.

Attach positive probe of voltmeter to B14 terminal (White/Red), and negative probe to A18 terminal (Black/Red) of system checker harness.

Start engine.

Turn headlights ON and OFF.

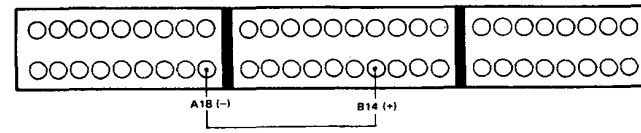
Check that voltage drops when headlights are ON, and rises when headlights are OFF, within 0 and 5 V.

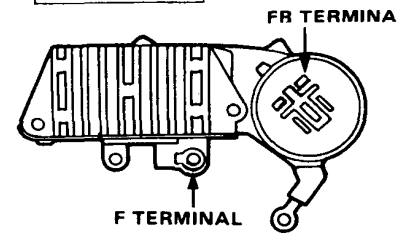
Is voltage changed?

NO
- Stop engine.
- Check for continuity in White/ Red wire between alternator and ECU.
- Is there continuity?

NO — Open circuit in harness

YES — Faulty voltage regulator or alternator



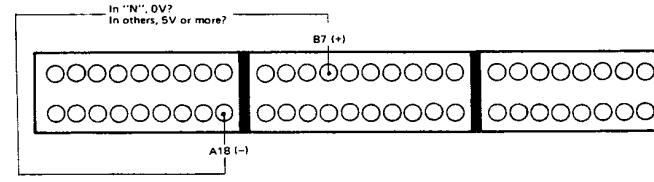


NOTE: FR terminal diode is faulty if continuity or no continuity exists in both directions between F and FR terminals of voltage regulator.

A/T Shift Position Signal Inspection [KQ, KY Models]

Connect system checker harness between ECU and wire harness connector.

Attach positive probe of voltmeter to B7 terminal (Green) and negative probe to A18 terminal (Black/Red) of system checker harness.



Turn ignition switch ON.

Move shift lever into gear.

Check that more than 5 V appears in positions other than "N" (0 V in "N").

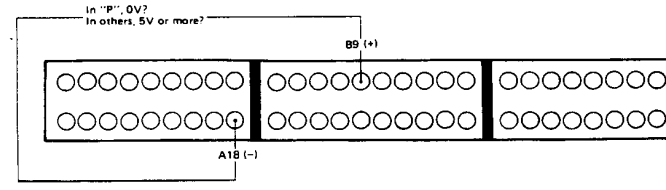
Is correct voltage available?

NO
- Open circuit in Green wire between A/T position indicator and ECU.
- Faulty A/T "N" switch

YES

Turn ignition switch OFF.

Connect positive probe of voltmeter to B9 terminal (Green/White) and negative probe to A18 terminal (Black/Red) of system checker harness.



Turn ignition switch ON.

Move shift lever into gear.

Check that more than 5 V appears in positions other than "P" (0 V in "P").

Is correct voltage available?

NO
- Open circuit in Green/White wire between A/T position indicator and ECU.
- Faulty A/T "P" switch

(cont'd)

Troubleshooting (cont'd)

Air Conditioner Switch Signal Inspection

Connect system checker harness between ECU and wire harness connector.

Start engine.

Blower switch ON.

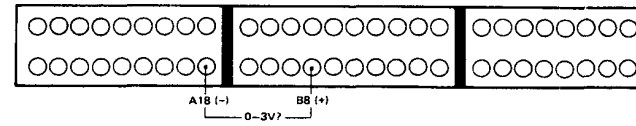
A/C switch ON.

Check that compressor and condenser cooling fan work.

Measure voltage between B8 terminal (Blue/ Red (+)) and A18 terminal (Black/Red (−)) of system checker harness.

Is 0−3 V available?

NO — Open circuit in Blue/ Red wire between A/C diode coupler and ECU.



NOTE: Voltage will be over 9 V if compressor or condenser cooling fan stops when power is cut off by pressure switch or thermostat.

Idle Control Solenoid Valve Inspection

Connect system checker harness between ECU and wire harness connector.

Attach positive probe of voltmeter to A11 terminal (Green/Black) and negative probe to A18 terminal (Black/Red) of system checker harness.

Start engine.

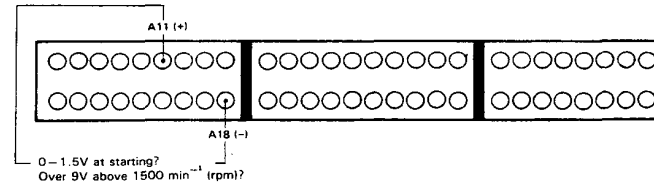
NOTE: Measure within 10 seconds.

Is 0−1.5 V available?

NO —
- Open circuit in Black/Yellow wire between Regulator fuse (10A) and idle control solenoid valve.
- Open circuit in Green/Black wire between idle control solenoid valve and ECU.
- Open circuit in idle control solenoid valve.

NOTE: No voltage available.

- Faulty ECU. NOTE: Voltage should be above 9 V.



Raise engine speed over 1,500 min^{-1} (rpm).

Is more than 9 V available?

NO — Faulty ECU.

A/T Idle Control Solenoid Valve Inspection [KQ, KY Models]

NOTE: Apply parking brake securely.

Connect system checker harness between ECU and wire harness connector.

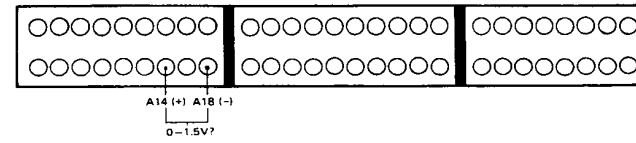
Start engine.

Shift transmission into "D_3" or "D_4".

Measure voltage between A14 terminal (Green (+)) and A18 terminal (Black/Red (−)) of system checker harness.

Is 0—1.5 V available?

NO



- Open circuit in Black/Yellow wire between Regulator fuse (10A) and A/T idle control solenoid valve
- Open circuit in Green wire between A/T idle control solenoid valve and ECU
- Open circuit in A/T idle control solenoid valve

NOTE: No voltage available.

- Faulty ECU. NOTE: Voltage should be above 9 V.

A/C Idle Boost Solenoid Valve Inspection

Connect system checker harness between ECU and wire harness connector.

Start engine.

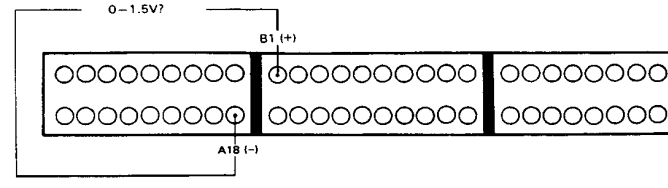
Turn A/C switch ON.

Check that compressor and condenser cooling fan work.

Measure voltage between B1 terminal (Blue/Yellow (+)) and A18 terminal (Black/Red (−)) of system checker harness.

Is 0—1.5 V available?

NO



- Open circuit in Black/Yellow wire between Regulator fuse andA/C idle boost solenoid valve
- Open circuit in Red wire between A/C idle boost solenoid valve and ECU
- Open circuit in A/C idle boost solenoid valve

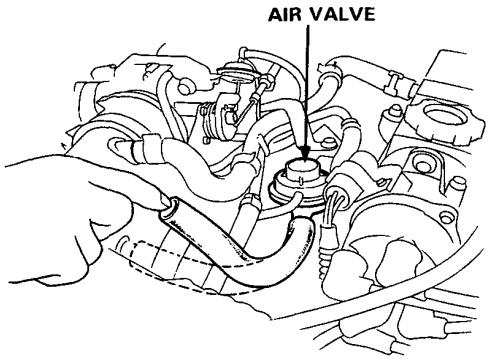
NOTE: No voltage available.

- Faulty ECU. NOTE: Voltage should be above 9 V.

Secondary Air Supply System [Except KQ, KY Models]

System Inspection

1. Warm up the engine and make sure that the idle speed is steady.
2. Raise the engine speed to around 4,000 min^{-1} (rpm) and release the accelerator pedal suddenly.
3. Make sure that the vacuum appears in the vacuum hose of the air valve after the accelerator pedal released.

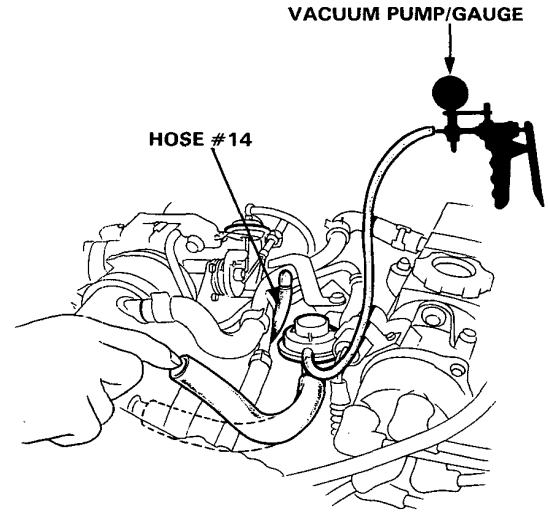


- If no vacuum, check for:

– each vacuum hose for clog, pinch, or disconnection.
– air valve.
– air valve control solenoid valve.

Air Valve Inspection

1. Disconnect the vacuum hose #14 from the air valve and connect a vacuum pump to the valve.
2. Start the engine and make sure that the vacuum appears in the vacuum hose of the air valve while operating the vacuum pump.



3. Make sure that the vacuum disappears in the hose when the vacuum pump is removed.

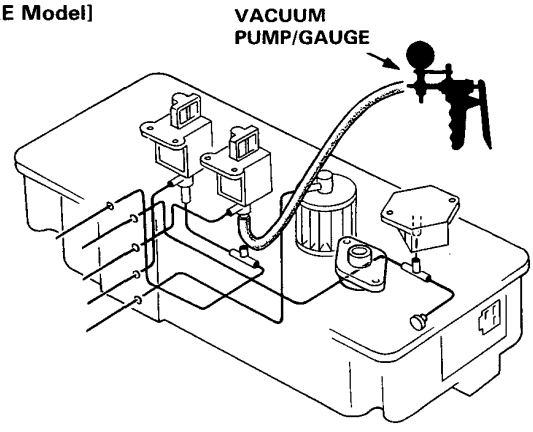
Air Valve Control Solenoid Valve Inspection

1. Open the control box lid and disconnect the rectangular connector from the control box.
2. Disconnect the lower vacuum hose of the air valve control solenoid valve (between the solenoid valve and the three-way joint) from the joint.
3. Apply vacuum to the hose.

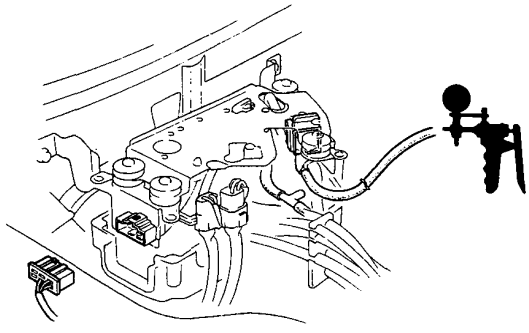
   It should hold vacuum.

   - If it does not hold vacuum, replace the valve.

[KE Model]



[Other Models]

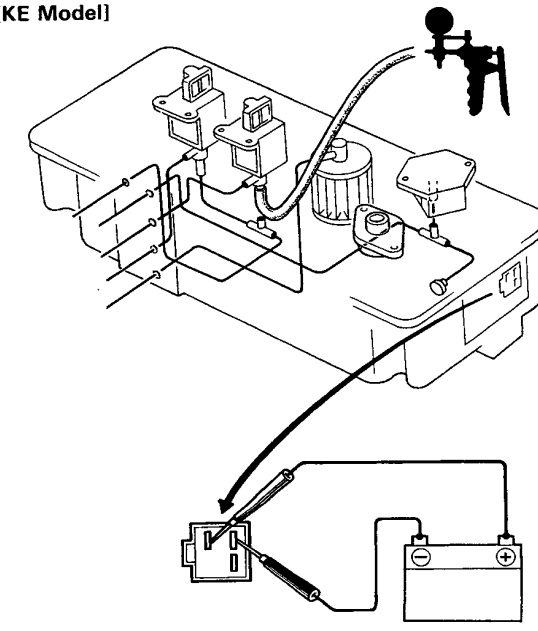


4. Connect the battery positive terminal to the Black/Yellow terminal of the control box coupler, and the negative terminal to the Orange terminal.
5. Apply vacuum to the hose.

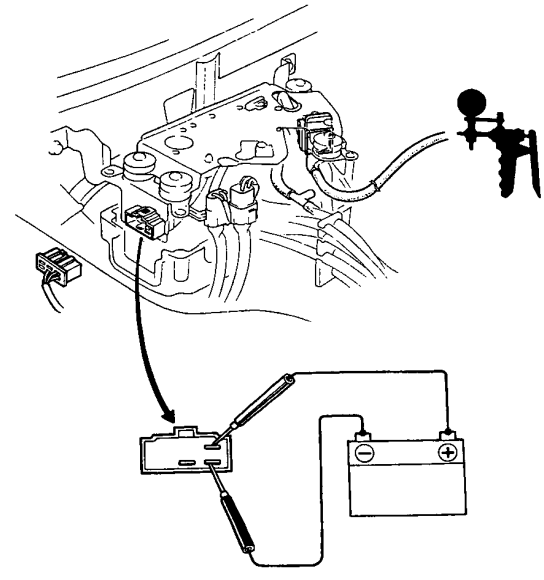
   It should not hold vacuum.

   - If it holds vacuum, replace the valve.

[KE Model]



[Other Models]



Sensors

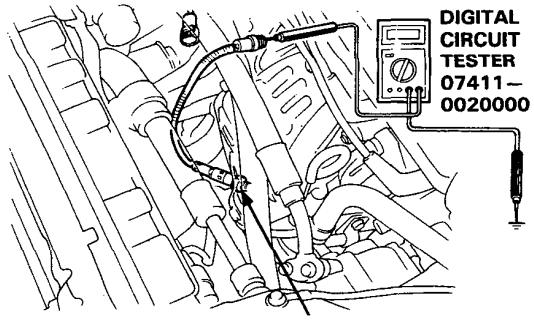
Oxygen Sensor
[KX, KΩ Models]

1. Disconnect the connector of the oxygen sensor.
2. Start the engine and warm up for 2 minutes at 3,000 min^{-1} (rpm) under no load. Raise the engine speed to 4,000 min^{-1} (rpm) and release the throttle suddenly at least 5 times.
3. Within one minute after the engine has been warmed up, measure the voltage between the connector terminal and body ground as described in steps 4 and 5.

   NOTE: If it takes more than one minute to complete the checks, warm up the engine as in step 2 before continuing.
4. Raise the engine speed to 5,000 min^{-1} (rpm) then lower to 2,000 min^{-1} (rpm) by operating the accelerator pedal.

   Voltage should be below 0.4 V.
5. Disconnect the vacuum hose #21 from the throttle body; plug the opening in the throttle body. Connect a vacuum pump to the open end of the vacuum hose and apply 300 mmHg, and raise the engine speed to 4,000 min^{-1} (rpm).

   Voltage should be above 0.6 V.



- Replace the oxygen sensor if the voltages are out of the above ranges.

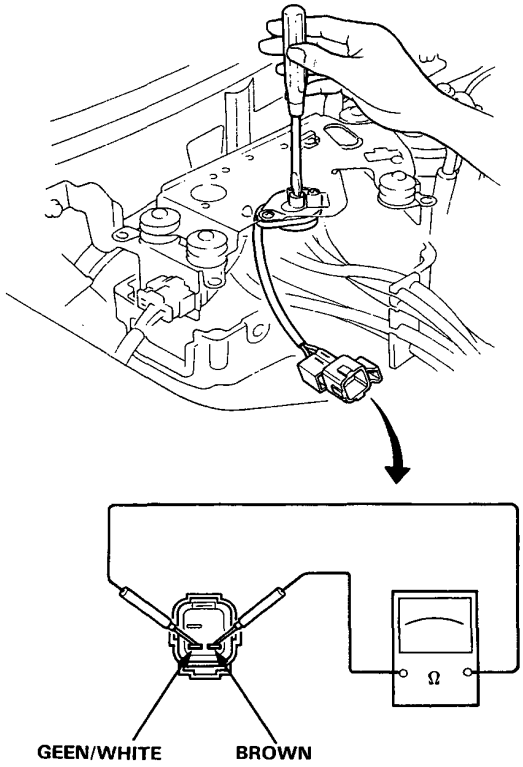
6. Reconnect the connector.

NOTE:
- Avoid damaging the wire harness.
- To prevent cross-threading, first tighten the sensor finger tight, then tighten to the specified torque with a torque wrench.
- Oxygen sensor does not operate when its intake is clogged.
- Be extremely careful not to spray anything over the oxygen sensor.

Idle Mixture Adjuster (IMA) Sensor
[Except KX, KΩ Models]

1. Open the control box lid and disconnect the connector of the IMA sensor at the control box.
2. Turning the adjusting screw on the sensor fully, measure resistance between the Brown terminal and the Green/White terminal at the sensor.

Resistance should be: 0.25—6.2 KΩ



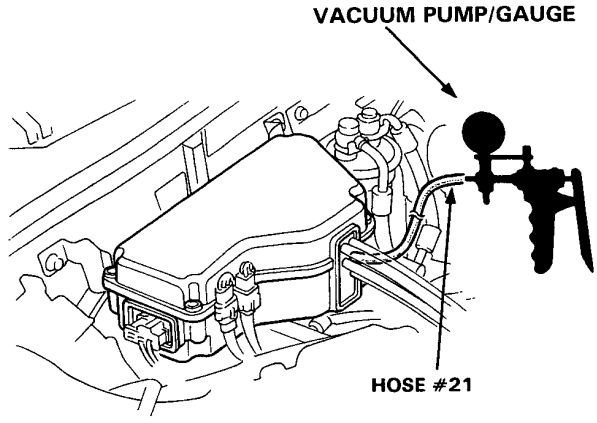
- If resistance is outside above ranges, replace IMA sensor.

NOTE: Whenever the inspection or the replacement of IMA sensor is performed, check specification for CO. See page 11-48.

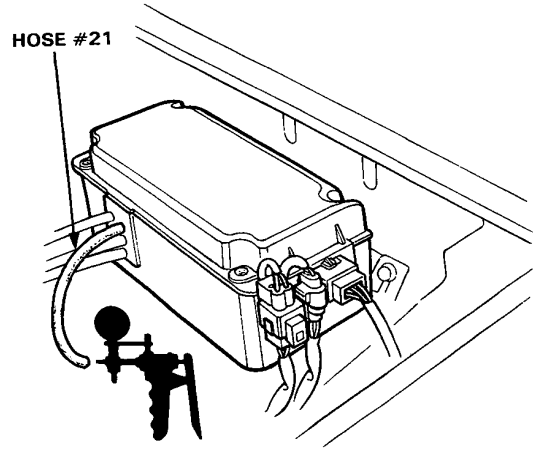
Manifold Absolute Pressure (MAP) Sensor

1. Disconnect the vacuum hose #21 from the throttle body; plug the opening in the throttle body. Connect a vacuum pump to the open end of the vacuum hose.

(Except KE, KQ Model)

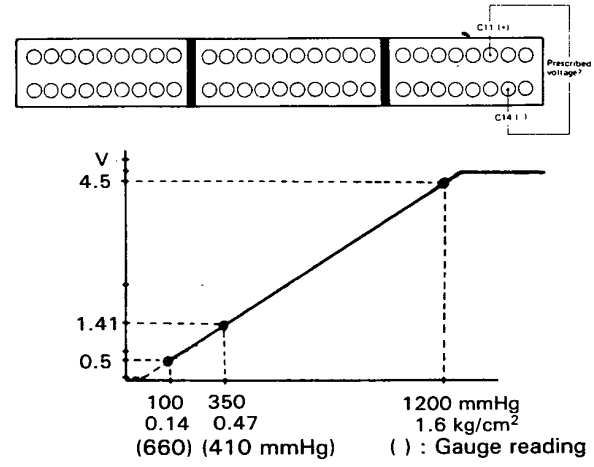


(KE, KQ Models)



2. Disconnect the connector from the control unit. Connect the system checker harness (No. 07999—PD6000A) between the control unit and wire harness connector.

3. Turn the ignition switch ON. Connect a digital voltmeter positive probe to the C11 terminal of the system checker harness and negative probe to the C14 terminal. Measure the voltage between the two terminals.



Voltmeter should indicate voltage along with the chart above.

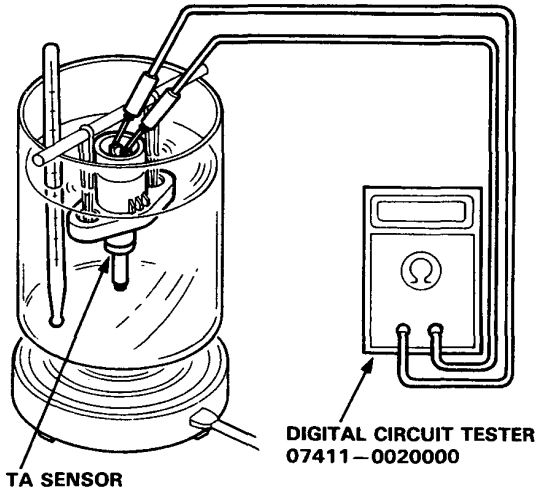
- If the voltage is incorrect, check the vacuum hose for leakage, and wires between the control unit and sensor for open or short circuit.
- Replace the sensor if the wires are normal.

Sensors

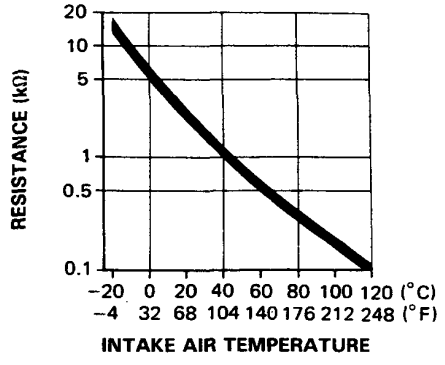
Intake Air Temperature (TA) Sensor

1. Disconnect the connector, then remove the TA sensor from the intake manifold.
2. To test the sensor, suspend it in cold water and heat the water slowly. Make sure more than half of the connector is submerged. Measure the resistance between the terminals.

STANDARDS: 0.98—1.34 kΩ at 40°C (104°F)
0.22—0.35 kΩ at 80°C (176°F)



3. The chart below shows the change in resistance over a range of intake air temperature.



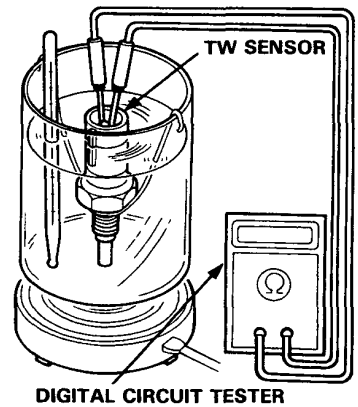
- Replace the sensor if resistance is outside the range.

NOTE:
- Don't let the sensor touch the bottom of the container.
- During the test, stir the water in the container to ensure even temperature.

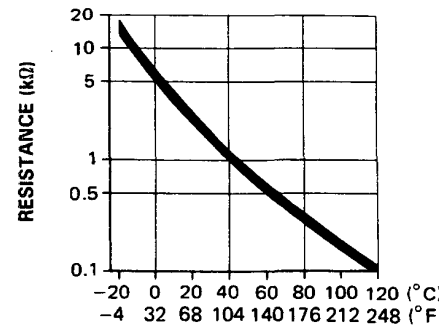
Coolant Temperature (TW) Sensor

1. Remove the connector, then remove the TW sensor from thermostat housing.
2. To test the sensor, suspend it in cold water and heat the water slowly. Make sure more than half of the connector is submerged. Measure the resistance between the terminals.

STANDARDS: 0.98—1.34 kΩ at 40°C (104°F)
0.22—0.35 kΩ at 80°C (176°F)



3. The chart below shows the change in resistance over a range of coolant temperature.



- Replace the sensor if resistance is outside the range.
- On installing the sensor, torque to:
  28 N·m (2.8 kg-m, 20 lb-ft)

NOTE:
- Don't let the sensor touch the bottom of the container.
- During the test, stir the water in the container to ensure even temperature.

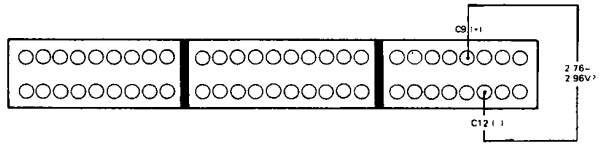
Atmospheric Pressure (PA) Sensor

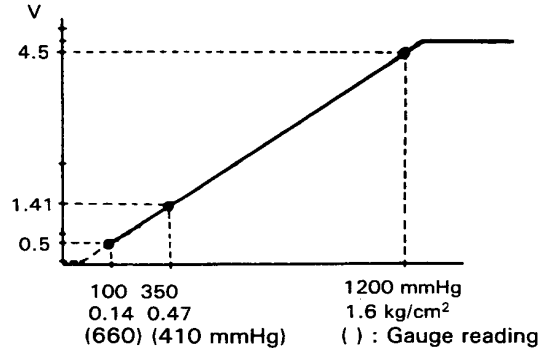
NOTE: Check the sensor at the ECU connector.

1. Disconnect the wire harness connector from the control unit and connect the system checker harness (No. 07999—PD6000A) to the control unit and wire harness connector.

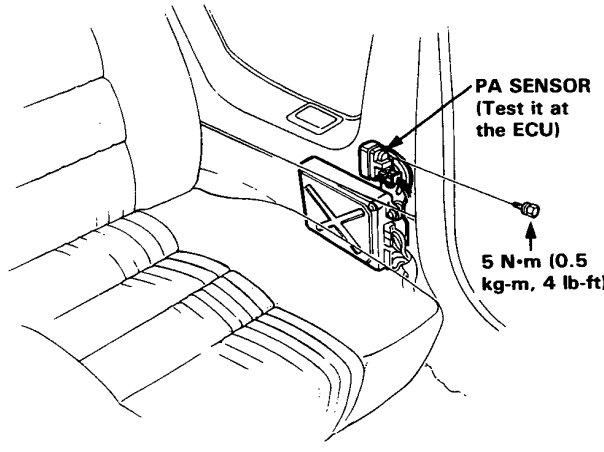
2. Turn the ignition switch ON. Connect a digital voltmeter positive probe to the C9 terminal of the system checker harness and negative probe to the C12 terminal.

   There should be: 2.76—2.96 V





- If voltage is outside ranges, check for open or short circuit between the ECU and PA sensor. Replace the PA sensor with a new one if the wires are in good condition.



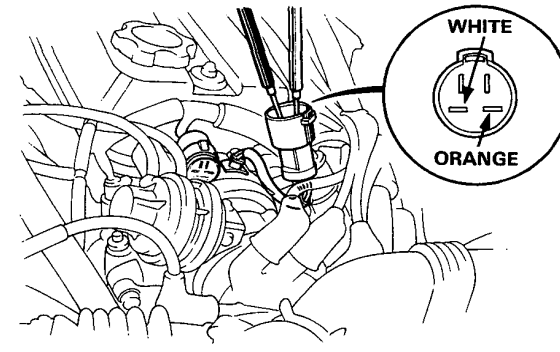
Crank Angle Sensor Inspection
[KΩ, KY Models]

NOTE: If either the CYL or TDC sensor tests bad, replace the distributor assembly.

CYL Sensor Inspection

1. Disconnect the connector of the distributor.
2. Measure the resistance between the White terminal and Orange terminal at the sensor.

   Resistance should be: 0.65—0.85 kΩ



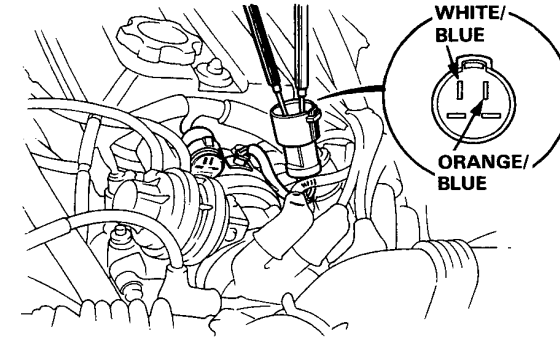
3. Measure the resistance between the White and Orange terminals, and crank angle sensor housing.

   Resistance should be: 100 kΩ or more

TDC Sensor Inspection

1. Disconnect the connector of the distributor.
2. Measure the resistance between the Orange/Blue terminal and White/Blue terminal at the sensor.

   Resistance should be: 0.65—0.85 kΩ



3. Measure the resistance between the Orange/Blue and White/Blue terminals, and crank angle sensor housing.

   Resistance should be: 100 kΩ or more

(cont'd)

Crank Angle Sensor Inspection (cont'd)

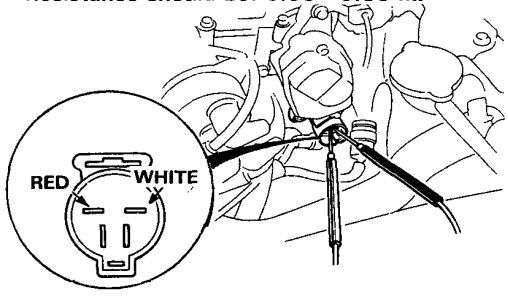
[Except KQ, KY Model]

NOTE: If either the CYL or TDC sensor tests bad, replace the crank angle sensor coil assembly.

CYL Sensor Inspection

1. Disconnect the connector of the crank angle sensor.
2. Measure the resistance between the White terminal and Red terminal at the sensor.

Resistance should be: 0.65—0.85 kΩ



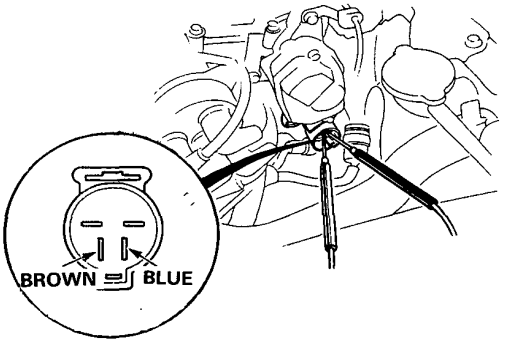
3. Measure the resistance between the White and Red terminals, and crank angle sensor housing.

Resistance should be: 100 kΩ or more

TDC Sensor Inspection

1. Disconnect the connector of the crank angle sensor.
2. Measure the resistance between the Brown terminal and Blue terminal at the sensor.

Resistance should be: 0.65—0.85 kΩ

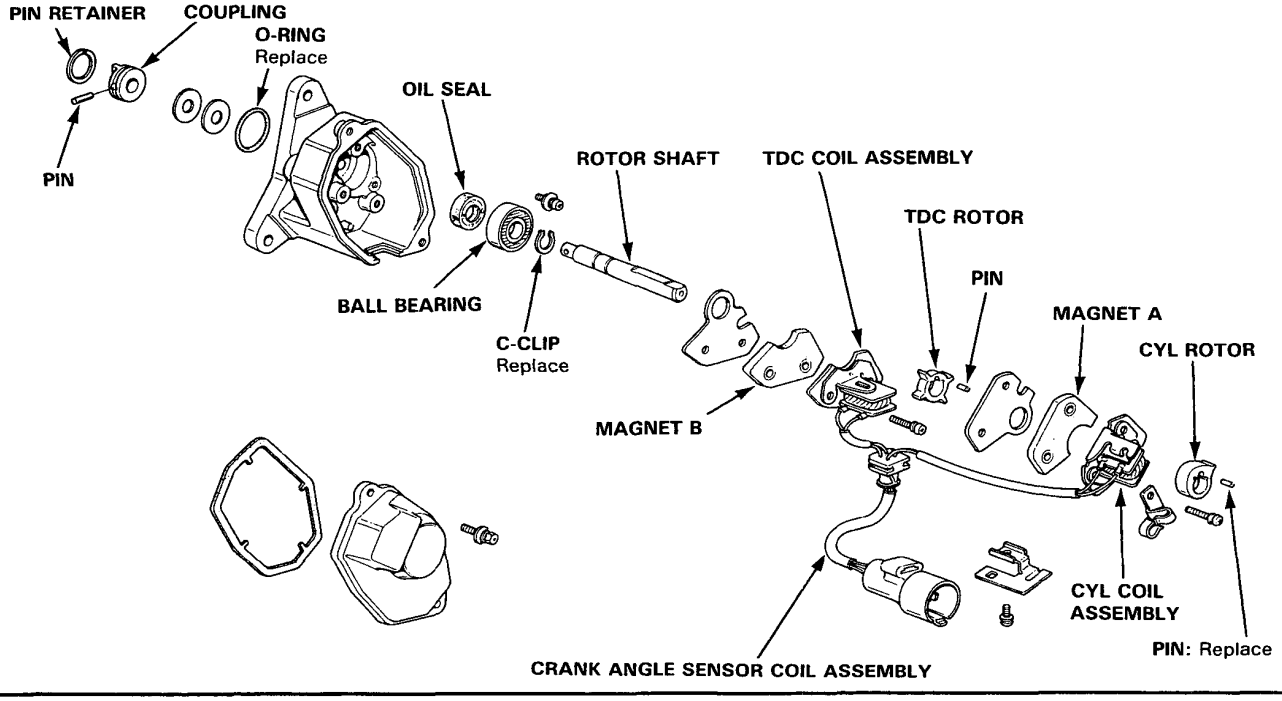


3. Measure the resistance between the Brown and Blue terminals, and crank angle sensor housing.

Resistance should be: 100 kΩ or more

Crank Angle Sensor Disassembly

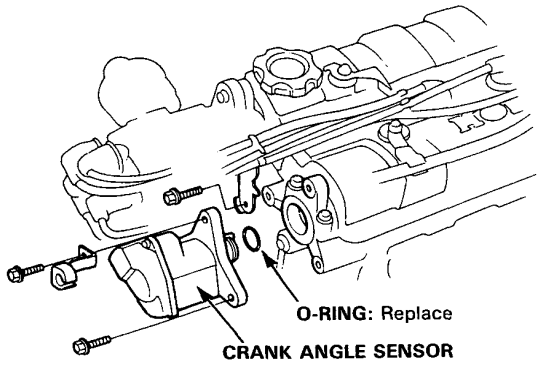
[Except KQ, KY Model]



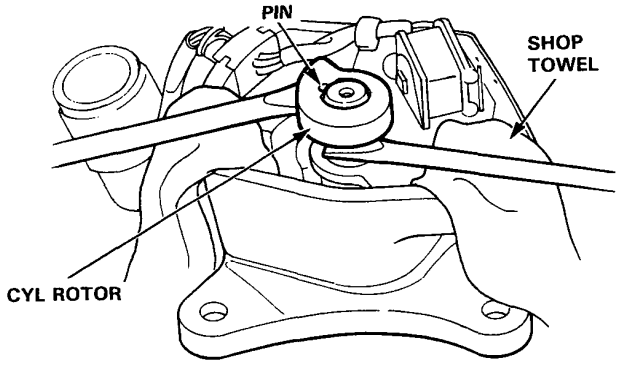
Crank Angle Sensor Disassembly

[Except KQ, KY Model]

1. Remove the crank angle sensor from the engine.



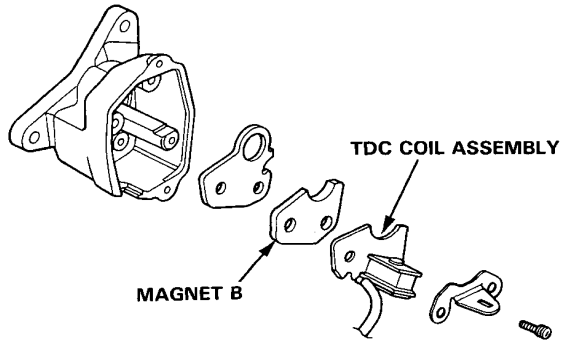
2. Carefully pry up the CYL rotor by using two screwdrivers as shown. Do not damage the CYL rotor.



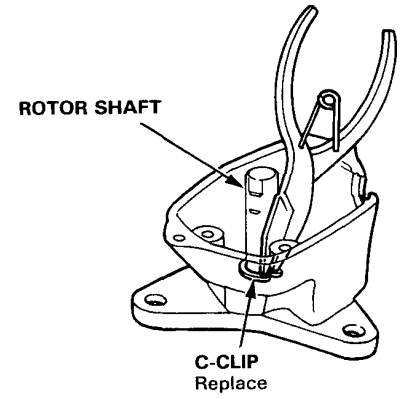
3. Pull the CYL coil assembly and magnet A out from the rotor shaft by removing the screws.

4. Pry up the TDC rotor in the same order of prying up the CYL rotor.

5. Pull the TDC coil assembly and magnet B out from the rotor shaft by removing the screws.

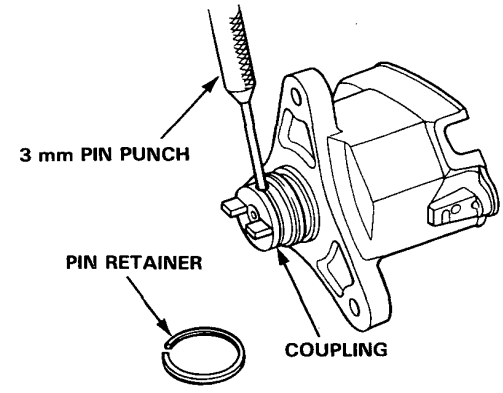


6. Remove the C-clip.

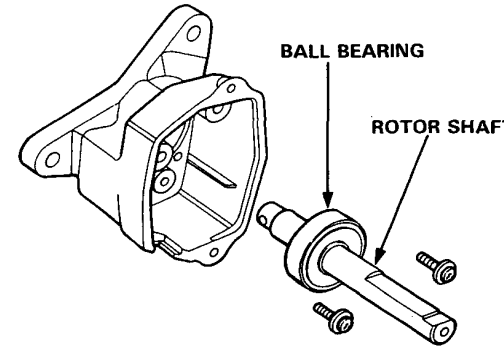


7. Slide off the pin ratainer being careful not to stretch it.

8. Separate the coupling from the shaft by removing the roll pin as shown.



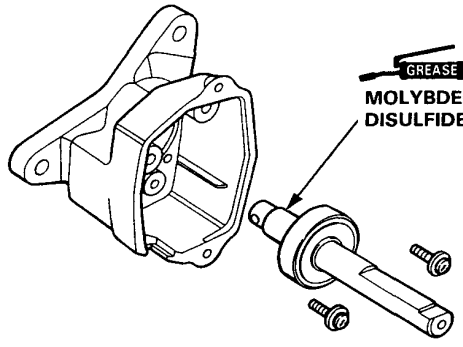
9. Remove the ball bearing and rotor shaft as an assembly by removing the screws.



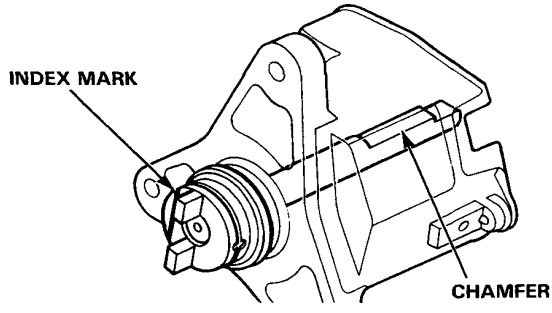
Crank Angle Sensor Reassembly

[Except KQ, KY Model]

1. Apply a molybdenum disulfide grease to the tip of the rotor shaft, then install it on the sensor housing with 4 mm screws.

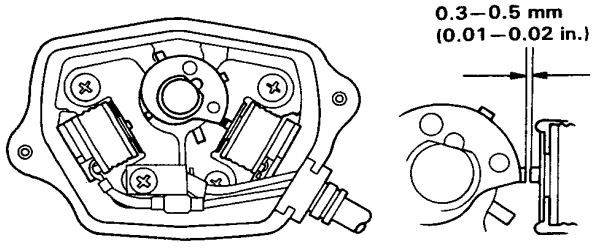


2. Install the coupling with its index mark facing in the direction shown, install the pin, and install the pin ratainer.

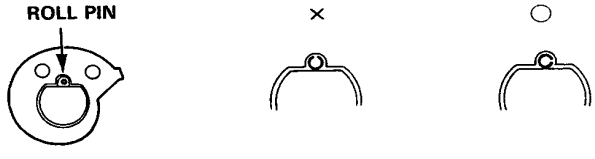


3. Install a new C-clip on the rotor shaft.

4. Install the TDC coil assembly and TDC rotor so that the air gap is 0.3—0.5 mm (0.01—0.02 in.), then install the CYL coil assembly and CYL rotor in the same way.



NOTE:
- Install the rotors with the part number facing up.
- Install the roll pin so that if faces as shown below.

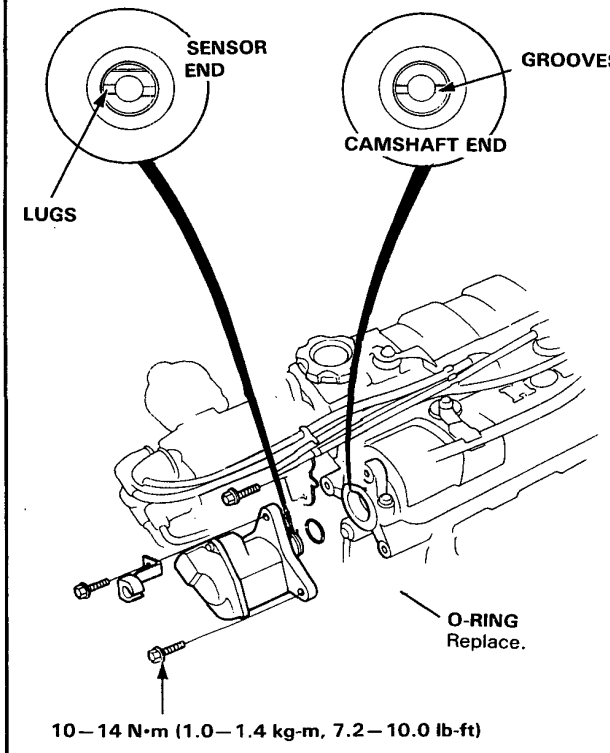


Crank Angle Sensor Installation

[Except KQ, KY Model]

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

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



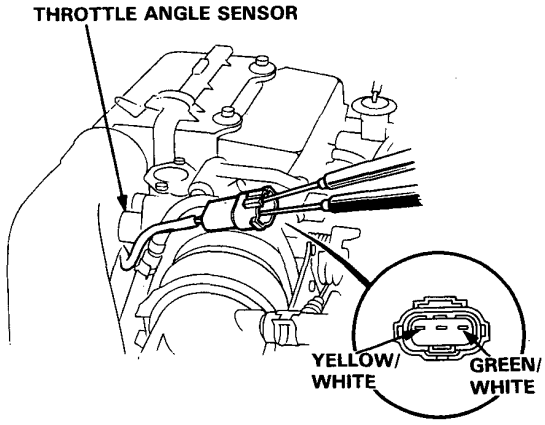
Throttle Angle Sensor

Testing/Removal:

CAUTION: The throttle stop screw is non-adjustable.

1. Disconnect the connector of the throttle angle sensor.
2. Measure full resistance between the Yellow/White terminal and Green/White terminal at the sensor.

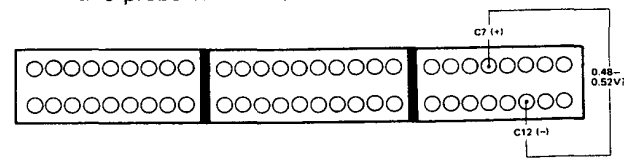
Resistance should be: 4—6 kΩ



- If the resistance is outside the above range, adjust the installation position of the sensor and re-test. Replace if necessary.

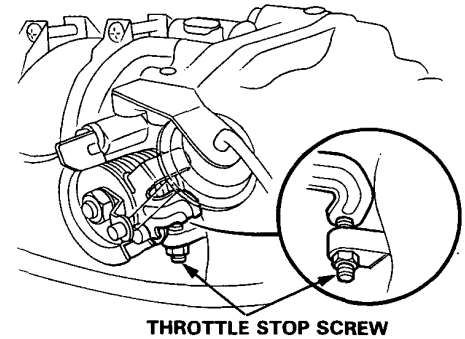
Installation:

1. Align the pin of the sensor with the throttle valve shaft groove and tighten temporarily.
2. Disconnect the control unit connectors and connect the System Checker Harness (NO. 07999—PD6000A) between the control unit and wire harness connector.
3. Connect a digital voltmeter positive probe to C7 terminal of the system checker harness and negative probe to C12 terminal.



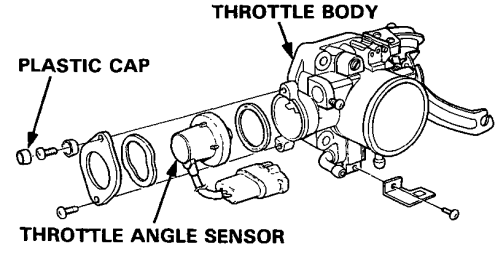
4. With the ignition switch turned ON, adjust the sensor to a position where the throttle stop lever just touches the stop screw. Then measure the voltage between the two terminals.

There should be: 0.48—0.52 V



THROTTLE STOP SCREW
(Factory set; Non-adjustable).

5. If the voltage is within specification, tighten the screws provisionally.



6. After reassembling the sensor, test the deceleration fuel cut-off system (page 11-60).
   - If the deceleration fuel cut-off system is OK, tighten the screws.
   - If the deceleration fuel cut-off system does not work, repeat steps 1 through 5 and check the voltage.

Solenoid Valves

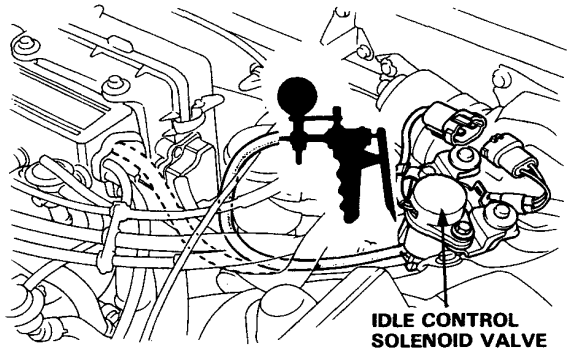
Idle Control Solenoid Valve

The idle control solenoid valve is activated by commands from the ECU. When the solenoid valve opens, this causes vacuum in the upper vacuum hose of the solenoid valve (from the intake manifold) and increases idle speed under the following conditions:

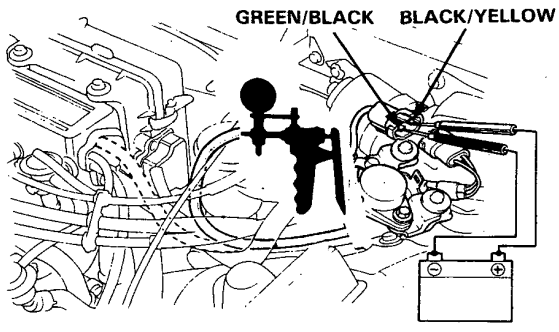
- For a short period after starting the engine.
- Whenever electrical loads are turned ON (vacuum will disappear when engine rpm is raised over 1,500 rpm by operating the throttle).

While the solenoid valve is being activated, 9 V or higher should be available between the Black/Yellow terminal (+) and Green/Black terminal (−) of the valve leads.

1. Disconnect the wire harness from the idle control solenoid valve.
2. Disconnect the upper vacuum hose of the solenoid valve from the intake manifold.
3. Apply vacuum to the hose.
   Vacuum should hold steady.
   If it does not hold vacuum, replace the valve.



4. Connect the battery positive terminal to the Black/Yellow terminal of the solenoid valve, and negative battery terminal to the Green/Black terminal.
5. Apply vacuum to the hose.
   It should not hold vacuum.
   If it holds vacuum, replace the valve.

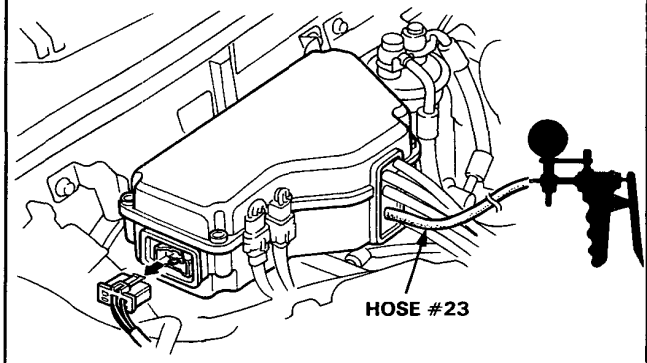


A/T Idle Control Solenoid Valve

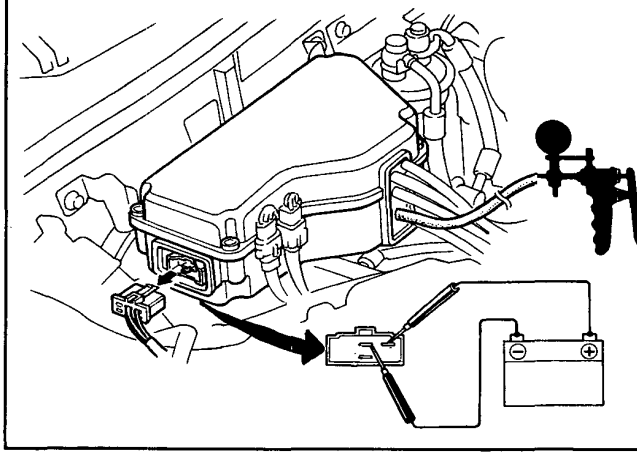
[KY Model]

The A/T idle control solenoid valve is energized when the A/T shift lever is in gear, allowing air to bypass the throttle valve and maintain the specified idle speed. While the valve is energized, 9 V or higher should be available between the Black/Yellow terminal (+) and Green terminal (−) of the main harness at the control box.

1. Disconnect the 6 cavity rectangular connector from the control box.
2. Disconnect the vacuum hose #23 from the vacuum hose manifold.
3. Apply vacuum to hose #23.
   It should hold vacuum.
   If it does not hold vacuum, replace the valve.



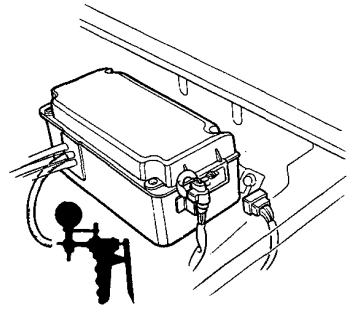
4. Connect the battery positive terminal to the Black/Yellow terminal of the control box coupler and the battery negative terminal to the Blue terminal.
5. Apply vacuum to the hose.
   It should not hold vacuum.
   If it holds vacuum, replace the valve.



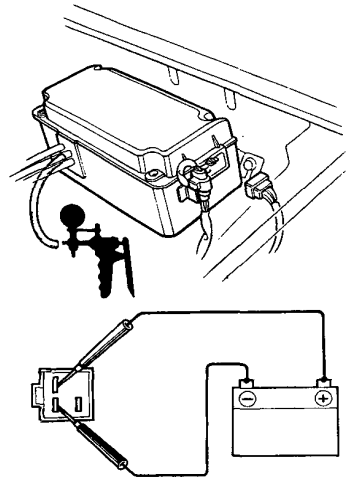
A/T Idle Control Solenoid Valve
[KQ Model]

The A/T idle control solenoid valve is energized when the A/T shift lever is in gear, allowing air to bypass the throttle valve and maintain the specified idle speed. While the valve is energized, 9 V or higher should be available between the Black/Yellow terminal (+) and Green terminal (−) of the heater harness at the control box.

1. Disconnect the 4 cavity rectangular connector from the control box.
2. Disconnect the vacuum hose #30 from the vacuum hose manifold.
3. Apply vacuum to hose #30.
   It should hold vacuum.
   If it does not hold vacuum, replace the valve.



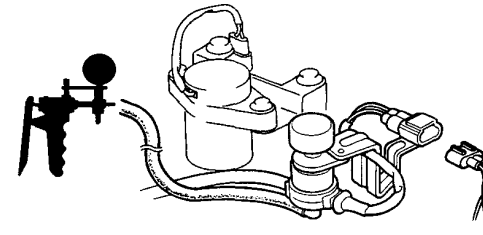
4. Connect the battery positive terminal to the Black/Yellow terminal of the control box coupler and the battery negative terminal to the Blue terminal.
5. Apply vacuum to the hose.
   It should not hold vacuum.
   If it holds vacuum, replace the valve.



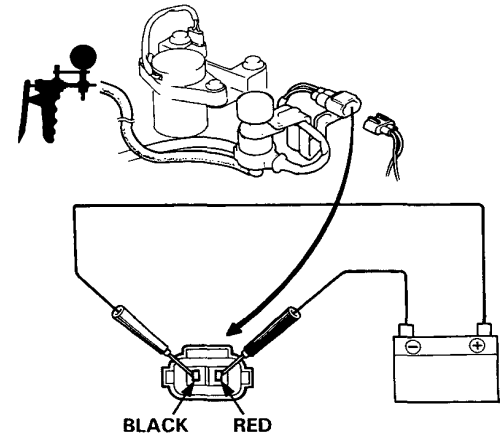
A/C Idle Boost Solenoid Valve

The A/C idle boost solenoid valve is activated when the A/C switch is turned ON. When the solenoid valve is activated, vacuum is generated in the vacuum hose #19 between the solenoid valve and A/C idle boost valve. 9V or higher should be detected between the Black/Yellow terminal (+) and Red terminal (−) of the left side (KE, KQ: heater) harness at the solenoid valve.

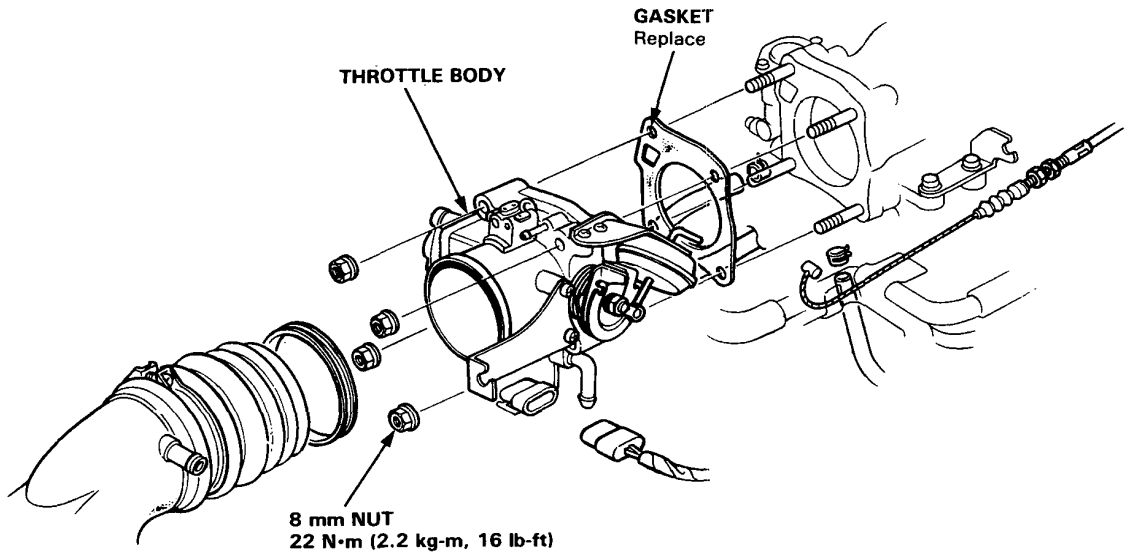
1. Disconnect the connector of the A/C idle boost solenoid valve.
2. Disconnect the lower vacuum hose of the valve (between the A/C idle boost valve and the solenoid valve) from the A/C idle boost valve.
3. Apply vacuum to the hose.
   It should hold vacuum.
   If it does not hold vacuum, replace the valve.



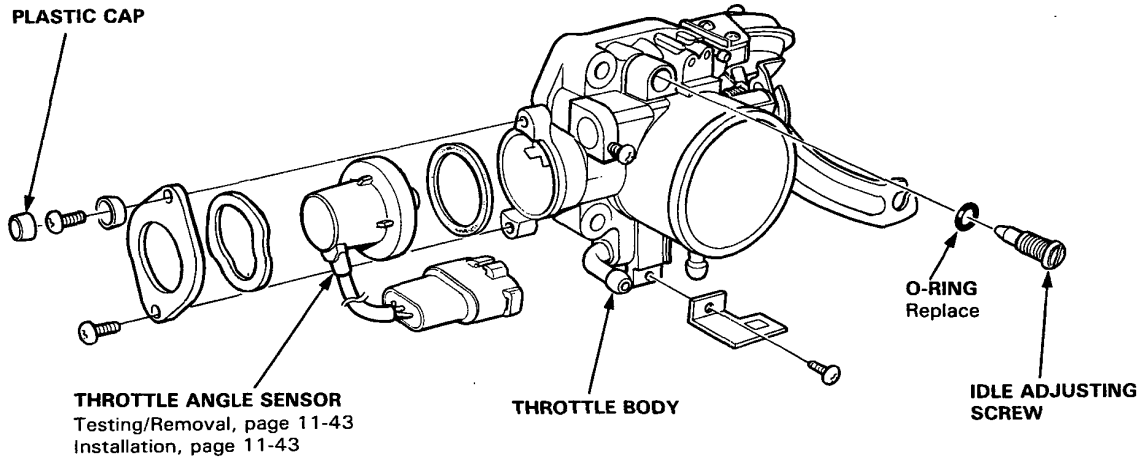
4. Connect the battery positive terminal to the Black tarminal of the connector of the valve and the negative terminal to the Red terminal.
5. Apply vacuum to the hose.
   It should not hold vacuum.
   If it holds vacuum, replace the valve.



Throttle Body Disassembly

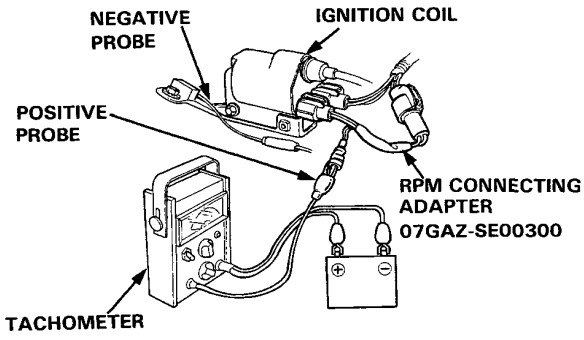


CAUTION: The throttle valve stop screw is non-adjustable.

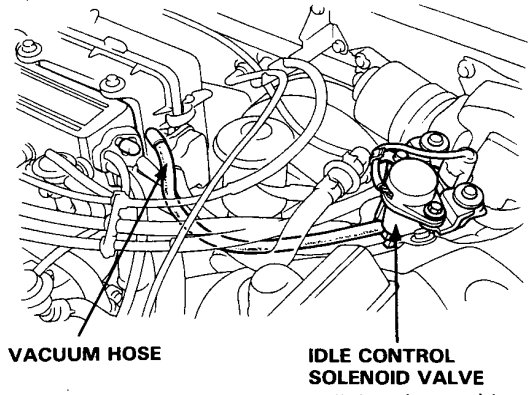


Idle Speed Inspection

1. Start the engine and warm it up to normal operating temperature (the cooling fan goes on twice).
2. Connect a tachometer.



3. Disconnect the upper vacuum hose of the idle control solenoid valve (between the valve and intake manifold) from the intake manifold.
4. Cap the end of the hose and intake manifold.



5. Adjust the idle speed with headlights, heater blower, rear window defroster, cooling fan and air conditioner off.

   Idle Speed should be:

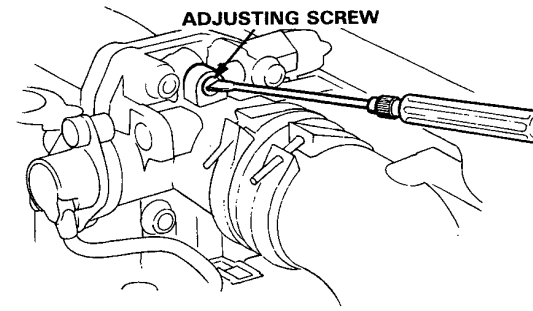
   [KX, KQ Models]

M/T	750 ± 50 min^{-1} (rpm)
A/T (KQ Model)	750 ± 50 min^{-1} (rpm)

   [Other Models]

M/T	800 ± 50 min^{-1} (rpm)
A/T (KY Model)	800 ± 50 min^{-1} (rpm)

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



6. Check the idle speed with heater fan switch at HI (right end) and air conditioner on.

   Idle Speed should be:

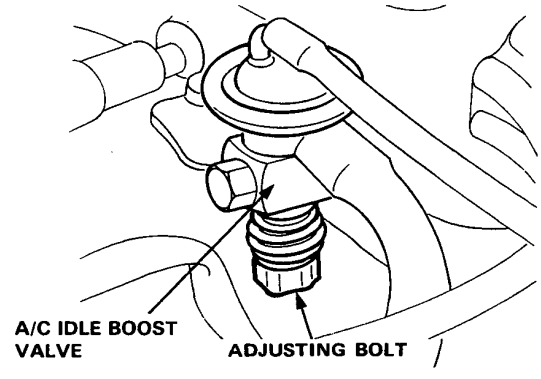
   [KX, KQ Models]

M/T	750 ± 50 min^{-1} (rpm)
A/T (KQ Model)	750 ± 50 min^{-1} (rpm)

   [Other Models]

M/T	800 ± 50 min^{-1} (rpm)
A/T (KY Model)	800 ± 50 min^{-1} (rpm)

   Adjust idle speed, if necessary, by turning the adjusting bolt on the A/C idle boost valve.



7. After adjustment, connect the idle control solenoid valve vacuum hose.
8. On Automatic Transmission model, after adjusting the idle speed, check that it remains within the specified limit when shifted in gear ("D_3" or "D_4").

   Idle speed should remain:
   750 ± 50 min^{-1} (rpm) ("D_3" or "D_4").
9. Check the idle speed with headlights,heater blower, rear window defroster, and cooling fan on but air conditioner off.
   It should be the same as normal idle speed.

   NOTE: If the idle speed is not within specifications, see Troubleshooting on pages 11-28 and 11-29.

Idle Mixture Inspection

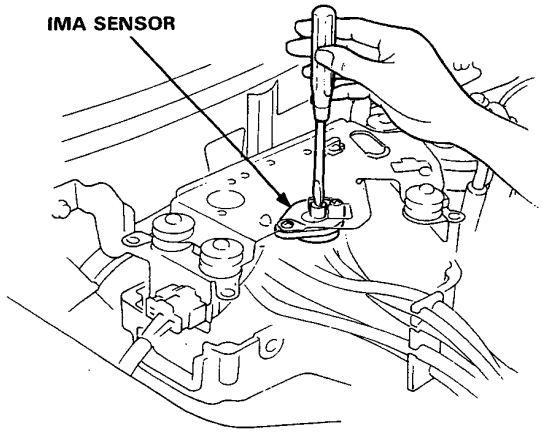
NOTE:
- Perform the measurement in a place with good ventilation and with no direct exposure to the wind and rain.
- Perform the measurement while the engine is idling. (under no load).
- Use a precise tachometer to check engine rpm.
- Use the NDIR CO meter in accordance with the manufacturers' recommended procedures.
- The following inspections and adjustments should be completed before the measurement.

  Air cleaner element
  Ignition timing and control system
  Spark plugs
  Idling speed
  Valve clearance
  PCV valve

1. Start the engine, and, after the radiator cooling fan works two times, further warm up the engine at 3,000 min^{-1} (rpm) for two minutes or more.
2. Insert exhaust gas sampling probe into the tail pipe at least 40 cm (16 in.)
3. Check idle CO with the headlights, heater blower, rear window defroster, cooling fan, and air conditioner off.

   CO meter should indicate:
   KX, KQ Models: 0.1 % maximum
   Other Models: 1.0 ± 1.0 %

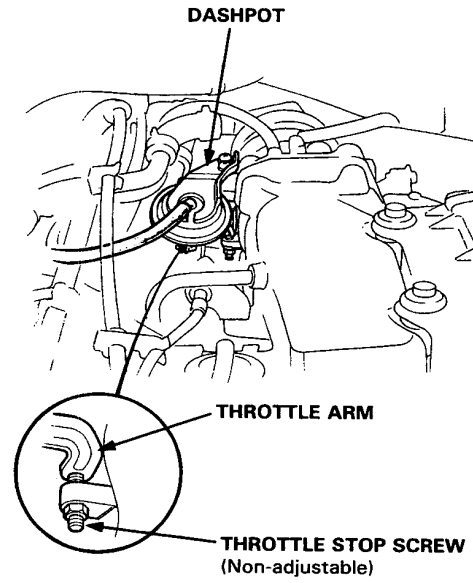
4. On except KX, KQ Models, if unable to obtain this reading, adjust by turning adjusting screw of the IMA sensor.



- If unable to obtain a CO reading of specified % by this procedure, check the engine tuen-up condition.

Throttle Control System

1. With the engine shut off, slowly open the throttle arm until the dashpot rod is raised up as far as it will go.



2. Release the throttle arm and measure the time until the throttle arm contacts the stop screw.

   Time should be: less than 2 seconds

   - If the time is over 2.0 seconds, replace the dashpot check valve and re-test.
   - If the rod does not operate, check for bound linkage, or for clogged check valve or vacuum line.

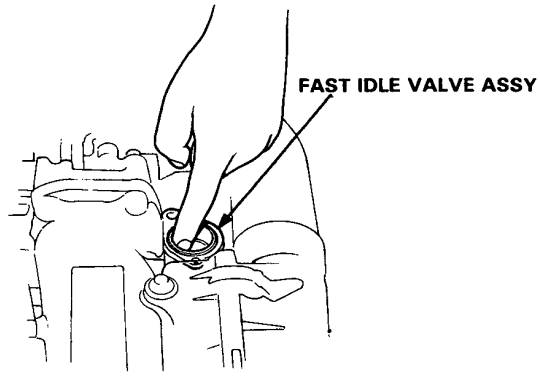
   – If they are OK, replace the dashpot with a new one.

Fast Idle Valve

NOTE:
- The fast idle valve is factory adjusted, it should not be disassembled.
- Check the PCV (engine breather) circuit tubing for breakage, disconnection, clogging, etc.
- Check that the throttle valves are fully closed.

If idle speed is too high after engine is warmed up:

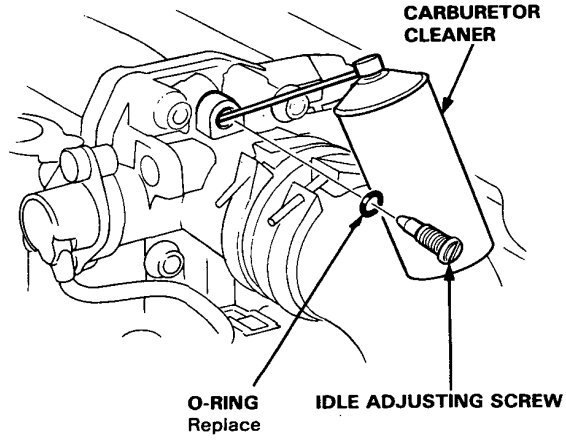
1. Remove the cover of the fast idle valve.
2. Check that the valve is completely closed. If not, an air suction sound can be heard in the valve seat area.



- If any suction is heard, the valves is leaking. Replace the fast idle valve and adjust idle speed (page 11-47)

If idle speed is too low after engine is warmed up:

1. Remove the idle adjusting screw.

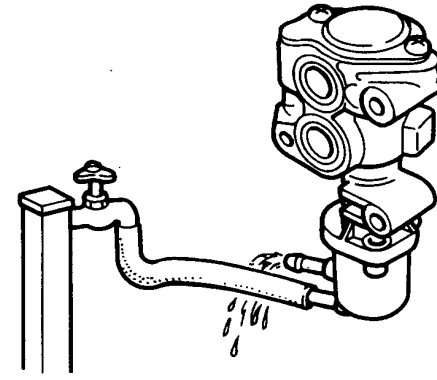


2. Wash the idle adjusting screw and the air bypass channel with carburetor cleaner.
3. Readjust idle speed after cleaning.

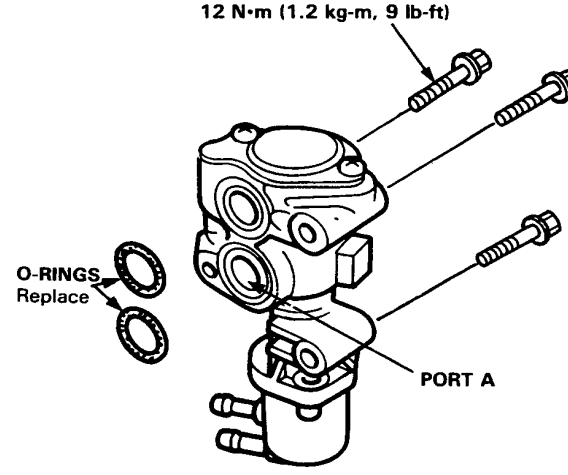
If fast idle speed is low when engine is cold (coolant temperature below 30°C (86°F)). (Fast idle valve may be stuck closed):

Fast idle speed should be:
1,000—1,800 min^{-1} (rpm) for M/T
1,000—1,800 min^{-1} (rpm) for A/T (in "N" or "P")

1. Remove the fast idle valve assy from the throttle body.
2. Apply cold water and cool down the wax part of the fast idle valve to 5—30°C (41—86°F).



3. Blow through port A of the fast idle valve, and check that a fairly large amount of air flows without resistance.



- If air does not flow or the resistance is large, replace the fast idle valve and adjust idle speed. (page 11-47)

Fuel Pressure Relieving

WARNING

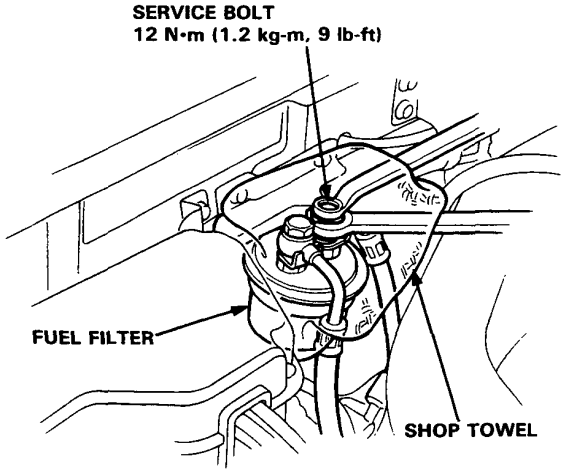
- **Do not smoke while working on the fuel system. Keep open flames or sparks away from the work area.**
- **Be sure to relieve fuel pressure while the engine is off.**

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

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

NOTE:

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



Injector Testing

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

If the engine will run:

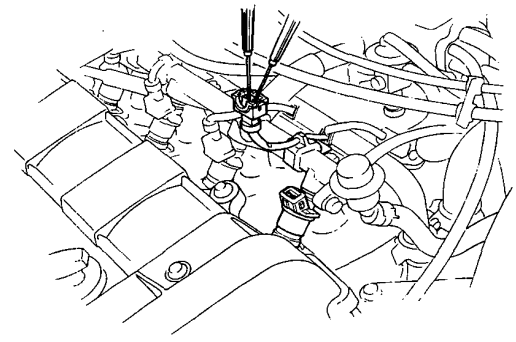
1. With the engine idling, disconnect each injector coupler individualy, and inspect the change in the idling speed.

- If the idle speed drop is almost the same for each cylinder, the injectors are normal.
- If the idle speed or quality remains the same when you disconnect a particular injector, check for voltage at that coupler.

— If voltage fluctuates between 0 and 2 volts, replace the injector.

— If there is no voltage, check the following:

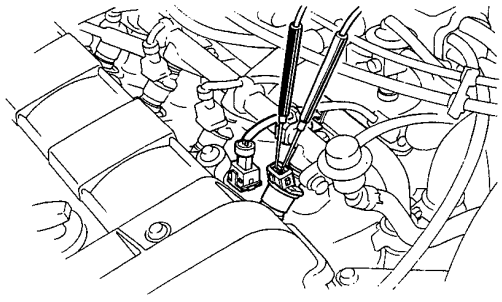
- Whether there is any short-circuiting, wire breakage, or poor connection in the wiring between the resistor and the injector.
- Whether the resistor is normal.
- Whether there is any short-circuiting, wire breakage, or poor connection in the wire between the resistor and ECU.



If the engine cannot be started:

1. Remove the coupler of the injector, and measure the resistance between the terminals of the injector.

   Resistance should be: 1.5—2.5 Ω



- If resistance is not as specified, replace the injector.

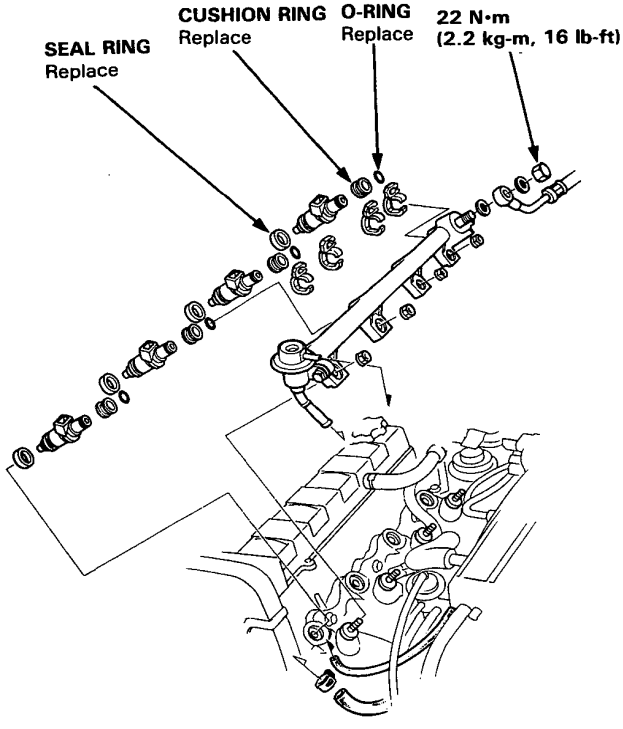
- If the resistance is normal, check the following:
  - Whether there is any short-circuiting, wire breakage, or poor connection in the wiring between the resistor and the injector.
  - Whether the resistor is normal.
  - Whether there is any short-circuiting, wire breakage, or poor connection in the wire between the resistor and ECU.

Injector Replacement

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

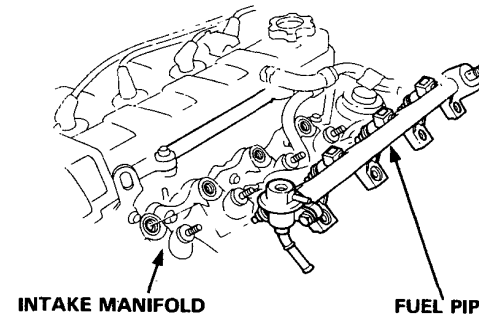
1. Disconnect the battery negative cable from the battery negative terminal.
2. Relieve fuel pressure (page 11-50).
3. Disconnect the couplers of the injectors.
4. Disconnect the vacuum hose and fuel return hose from the pressure regulator.

   NOTE: Place a rag or shop towel over the hose and tube before disconnecting them.
5. Loosen the retainer nuts on the fuel pipe.
6. Disconnect the fuel pipe.
7. Remove the injectors from the intake manifold.

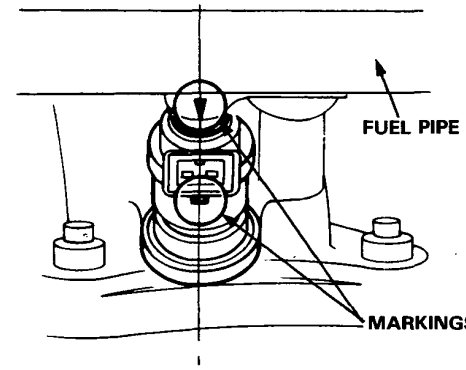


8. Slide new cushion rings onto the injectors.
9. Coat new O-rings with clean engine oil and put them on the injectors.
10. Insert the injectors into the fuel pipe first.
11. Coat new seal rings with clean engine oil and press them into the intake manifold.
12. Install the injectors and fuel pipe assembly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

    CAUTION: To prevent damage to the O-ring, install the injectors in the fuel pipe first, then install them in the intake manifold.



13. Align the center line o the coupler with the mark on the fule pipe.

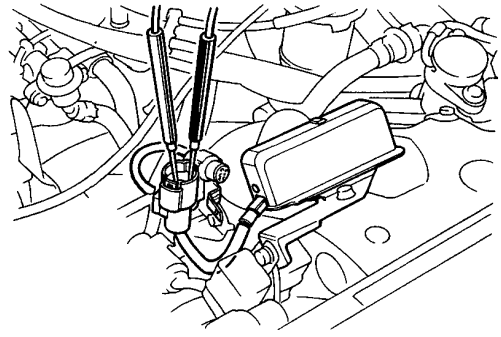


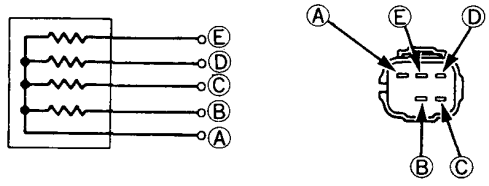
14. Install and tighten the retainer nuts.
15. Connect the vacuum hose and fuel return hose to the pressure regulator.
16. Install the couplers of the injectors.
17. Turn the ignition switch ON but do not operate the starter. After the fuel pump runs for approximately two seconds, the fuel pressure in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

Fuel System Resistor Testing

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

   Resistance should be: 5—7 Ω



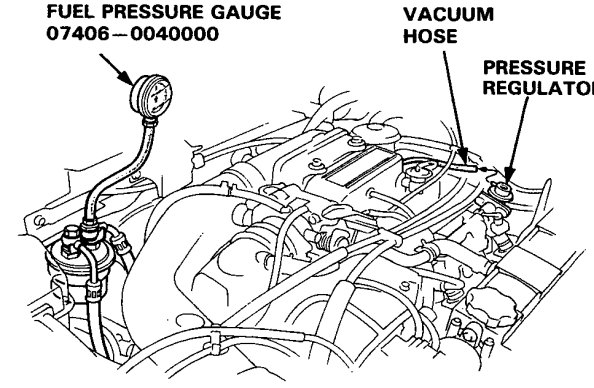


- *Replace the resistor with a new one if any of the resistances are outside of the specification.*

Fuel Pressure Testing

1. Relieve fuel pressure (page 11-50).
2. Remove the service bolt on the top of the fuel filter while holding the banjo bolt with another wrench and attach the fuel pressure gauge.
3. Start the engine. Measure the fuel pressure with the engine idling and the vacuum hose of the pressure regulator disconnected.

   Pressure should be:
   255 ± 20 kPa (2.55 ± 0.2 kg/cm², 36 ± 3 psi)



- If the fuel pressure is not as specified, first check the fuel pump (page 11-55). 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.

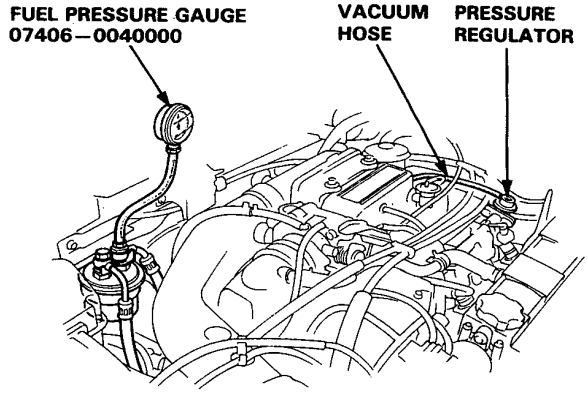
— If the pressure is lower than specified, inspect for:
  - Clogged fuel filter
  - Pinched or clogged fuel hose from the fuel tank to the fuel pump
  - Pressure regulator failure
  - Leakage in the fuel line
  - Pinched, broken or disconnected regulator vacuum hose

Pressure Regulator

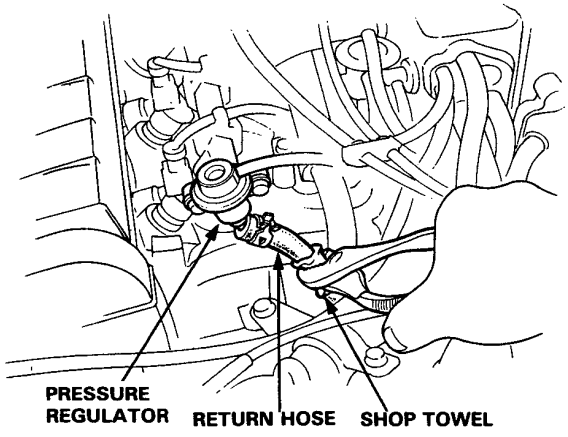
Testing:

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

1. Attach a pressure gauge to the service port of the fuel filter (remove the service bolt first), then start the engine. Leave the pressure regulator vacuum hose connected.



2. Check for pinched or broken vacuum hoses.
3. Check that the fuel pressure rises each time you lightly pinch the return hose. Check that the pressure also rises when you disconnect the vacuum hose from the regulator.



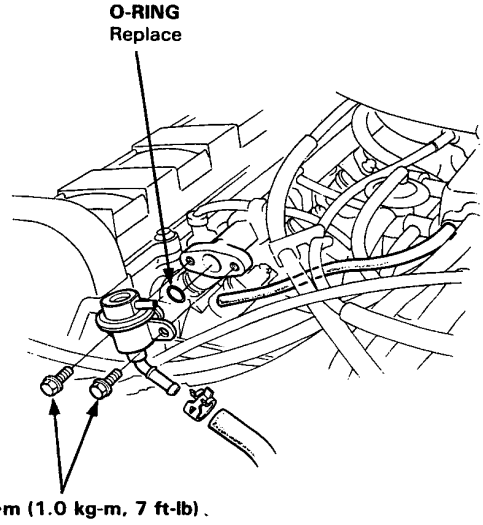
- If the pressure does not rise, replace the regulator and re-test.

Replacement:

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

1. Disconnect the negative terminal of the battery.
2. Place a shop towel under the pressure regulator, then relieve fuel pressure (page 11-50).
3. Disconnect the vacuum hose and fuel return hose.
4. Remove the two 6 mm retainer bolts.

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

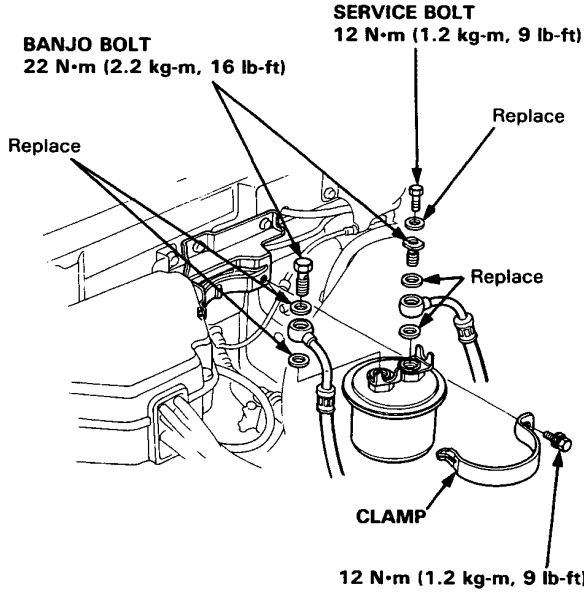


Fuel Filter Replacement

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

The filter should be replaced: every 40,000 km (24,000 miles), or whenever the fuel pressure drops below the specified value (255 ± 20 kPa, 2.55 ± 0.2 kg/², 36 ± 3 psi with the vacuum pressure hose disconnected) after making sure that the fuel pump and the pressure regulator are OK.

1. Disconnect the battery cable from the negative terminal.
2. Place a shop towel under and around the fuel filter.
3. Relieve fuel pressure (page 11-50).
4. Remove the two 12 mm banjo bolts from the filter.
5. Remove the fuel filter clamp and fuel filter.
6. When assembling, use new washers, as shown.

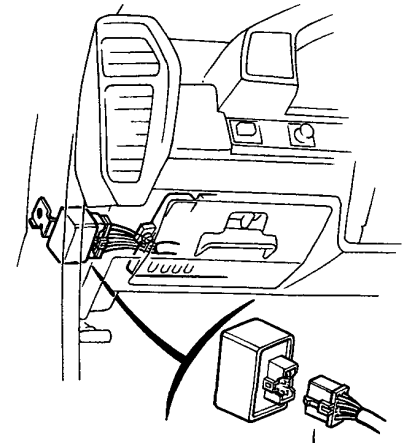


Fuel Pump Inspection

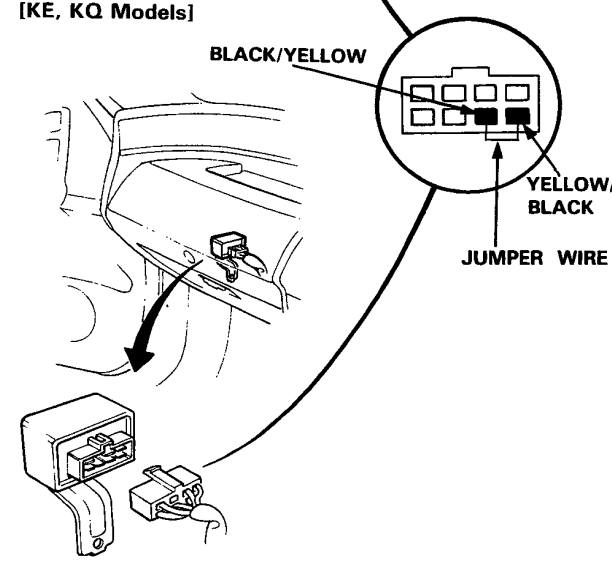
WARNING **Do not smoke during the test. Keep open flame away from your work area.**

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

[Except KE, KQ Model]



[KE, KQ Models]

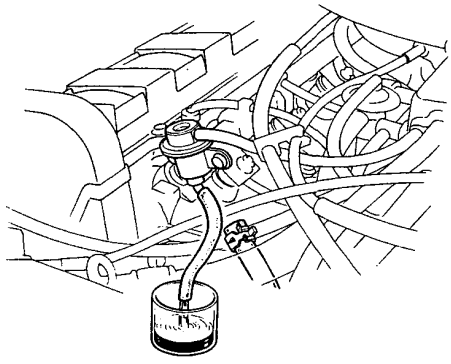


(cont'd)

Fuel Pump Inspection (cont'd)

3. Relieve fuel pressure as described on (page 11-50), then tighten the service bolt.
4. Disconnect the fuel return hose from the regulator.
5. Turn the ignition switch ON for 10 seconds. Then measure the amount of fuel flow.

Amount should be:
230 cm³ (7.8 oz) min. in 10 seconds at 12 V



- If fuel flow is less than 230 cm³ (7.8 oz), or there is no fuel flow, check for:
  - Fuel pump failure
  - Clogged fuel filter
  - Clogged fuel line
  - Pressrue regulator failure

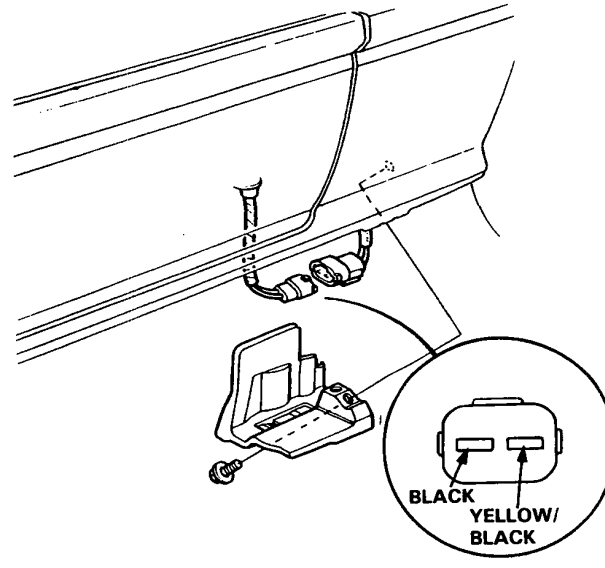
If you suspect a problem with the fuel pump, check that the fuel pump actually runs; it should make noise when it is ON. If the pump does not make noise, check as follows.

1. Jack up car and place jackstands in proper locations.

2. Remove the fuel pump cover and disconnect the coupler.

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

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



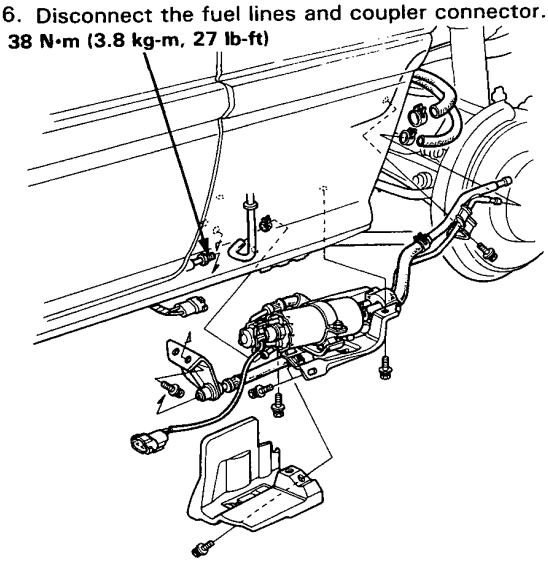
- If battery voltage is available, replace the fuel pump.

- If there is no voltage, check the main relay and wire harness (page 11-57).

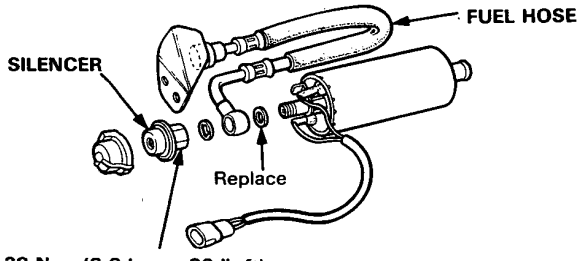
Fule Pump Replacement

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

1. Relieve fuel pressure (page 11-50)
2. Jack up car and place jackstands in proper locations.
3. Remove left rear wheel.
4. Remove the fuel pump cover.
5. Remove the three bolts, then remove the fuel pump with its mount.
6. Disconnect the fuel lines and coupler connector.



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

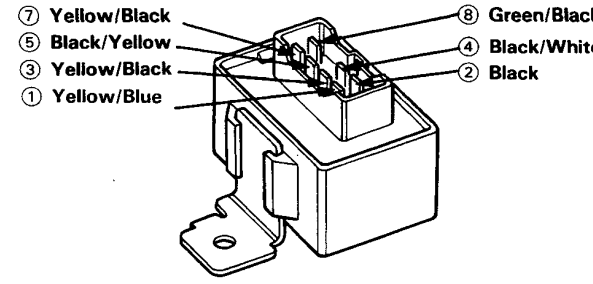


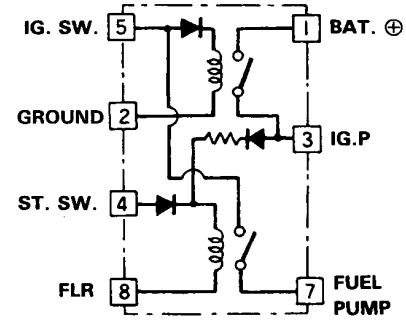
CAUTION: Do not disassemble the pump

9. Install the new fuel pump onto its mount.
10. Carefully clean the sealing surface of the flared fuel line, then install it onto the fuel pump and tighten the flare nut. Reinstall the fuel hose and silencer onto the front of the fuel pump.
11. Reconnect the electrical wires and reinstall the fuel pump.
12. Have someone turn the ignition switch to ON while you watch the fuel pump connections for leaks. Repeat this check two or three times to be sure that there are no fuel leaks.

Main Relay Testing

1. Remove the main relay, near the under-dash fuse box.
2. Connect 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.



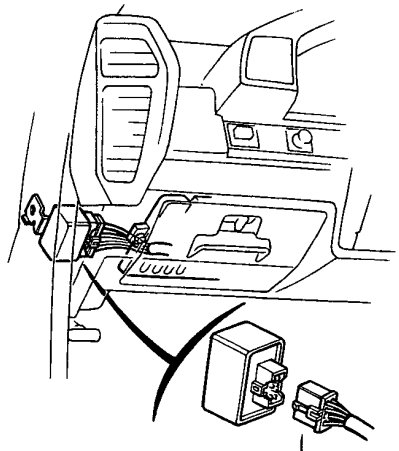


3. Connect the battery positive terminal to the No. 5 terminal and the battery negative terminal to the No. 2 terminal of the main relay. Then check that there is continuity between the No. 1 terminal and No. 3 terminal of the main relay.
   - If there is continuity, go on to step 4.
   - If there is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

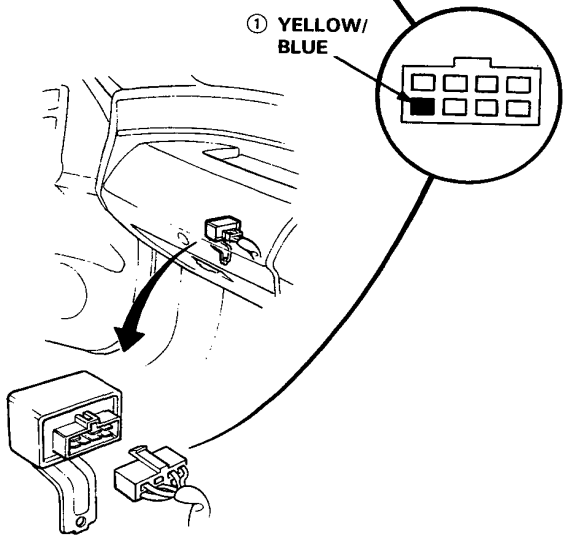
Harness Testing

1. Keep the ignition switch in the OFF position.
2. Disconnect the main relay coupler.
3. Connect the positive probe of the circuit tester to the Yellow/Blue wire ① in the coupler and ground the negative probe of the tester to body ground.
   - Battery voltage should be available.
   - — If there is no voltage, check the wiring between the battery and the main relay as well as the ECU fuse in the engine compartment.

[Except KE, KQ Model]

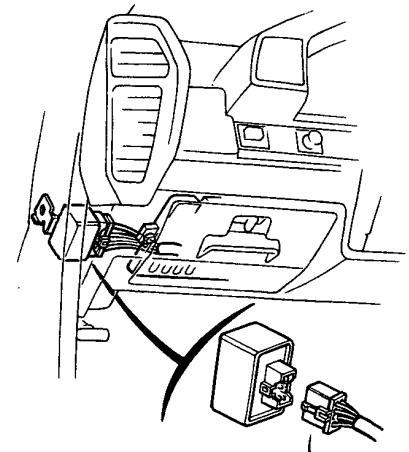


[KE, KQ Models]

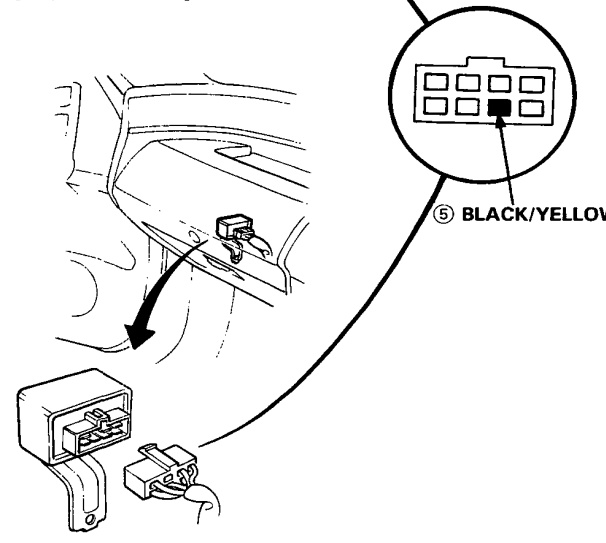


4. Connect the positive terminal of the tester to the Black/Yellow wire ⑤ of the coupler and ground the negative terminal of the tester to body ground.
5. Turn the ignition switch ON.
   - The tester should indicate battery voltage.
   - — If there is no voltage, check the wiring from the ignition switch and the main relay as well as Regulator fuse (10A).

[Except KE, KQ Model]

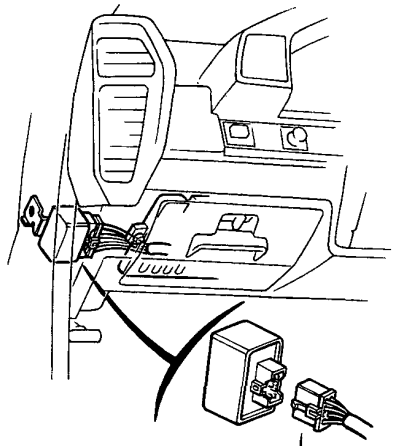


[KE, KQ Models]

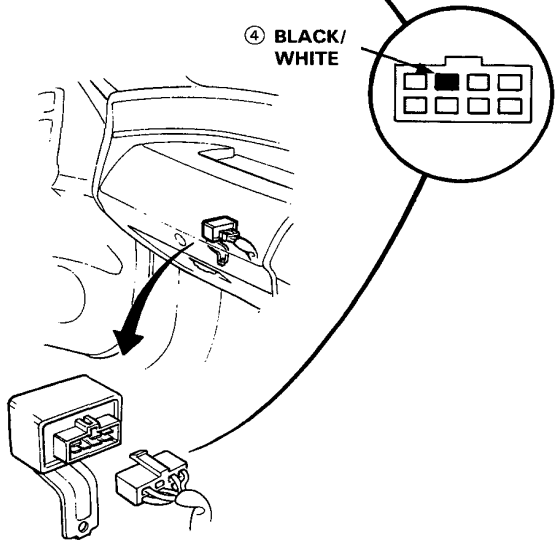


6. Connect the positive terminal of the tester to the Black/White wire ④ in the coupler and ground the negative terminal to the body.

[Except KE, KQ Model]



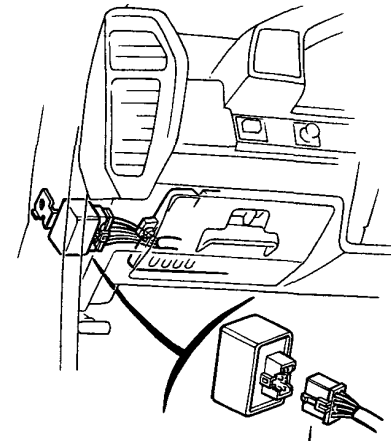
[KE, KQ Models]



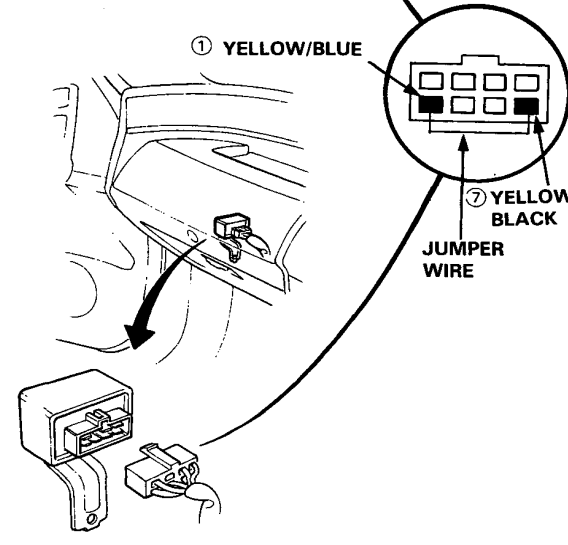
7. Turn the ignition switch to START position.
   - The tester should indicate battery voltage.
   - If there is no voltage, check the wiring between the ignition switch and main relay as well as the starter signal fuse.

8. Connect a jumper wire between the Yellow/Blue wire ① and Yellow/Black wire ⑦ in the coupler.
   - The fuel pump should work.
   - If the fuel pump does not work, check the wiring between the battery and fuel pump and the wireing from the fuel pump to the ground (Black wire).

[Except KE, KQ Model]



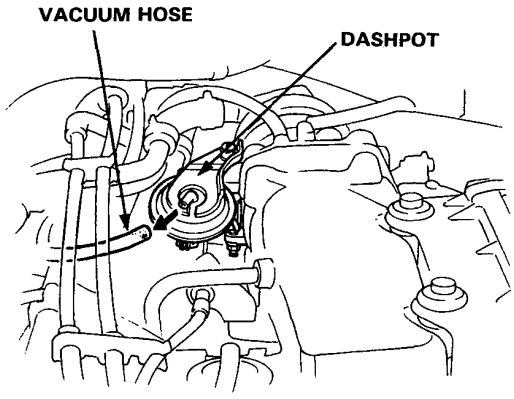
[KE, KQ Models]



Fuel Cut-Off System

1. Start the engine and warm it up to operating temperature. Check that the engine idles smoothly.

2. Disconnect the vacuum hose from the dashpot of the throttle body.



3. Use a stethoscope to confirm that the injectors are working; they should make a clicking sound.

4. While listening to an injector, raise the engine speed to 3,000 min^{-1} (rpm) then release the throttle; the clicking of the injector should cease momentarily when releasing the throttle.

   - If the clicking does not cease, check the ECU, throttle angle sensor, or wiring between the injector and ECU. Consult the Troubleshooting Chart according to the pattern of the self-diagnosis indicator on the ECU (page 11-17).

Fuel Tank Replacement

WARNING

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

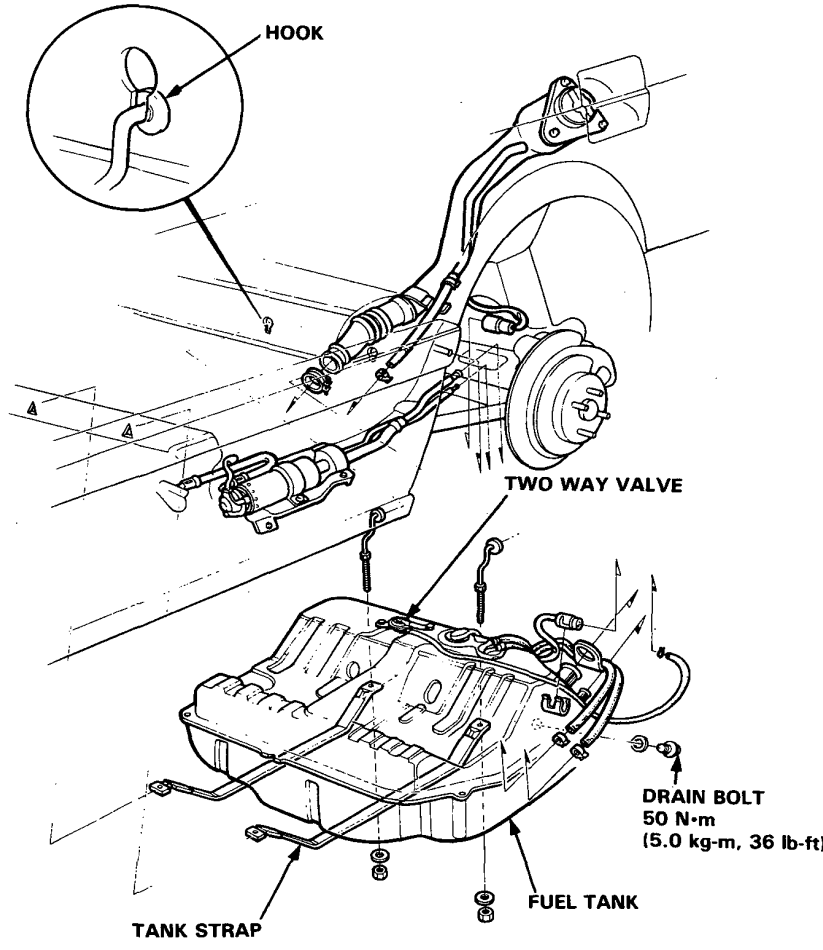
1. Raise rear of the car and place jackstands in the proper locations.
2. Remove the drain bolt and drain the fuel into an approved container.
3. Remove the exhaust silencer (page 9-5 or 9-6).
4. Disconnect the sending unit connectors.
5. Disconnect the hoses.

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

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

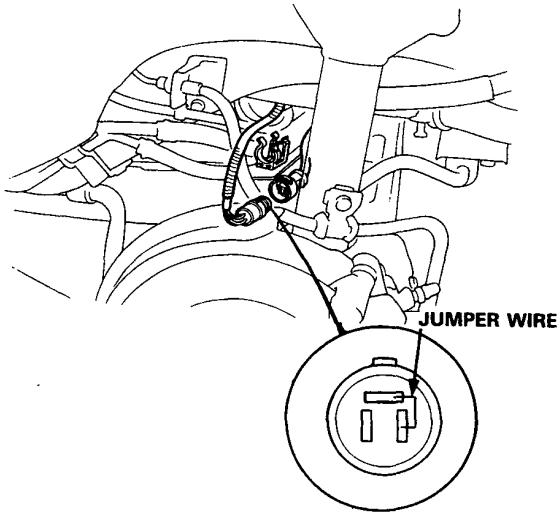
   NOTE: The tank may have stuck on the undercoat applied to its mount. To remove carefully pry it off the mount.

9. Install in the reverce order of removal.



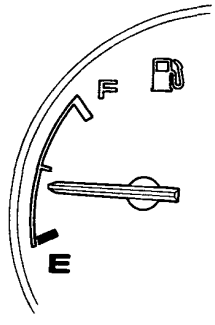
Fuel Gauge Testing

1. Disconnect the fuel unit coupler and connect the Yellow/White terminal and the Black terminal at the power source side with a piece of jumper wire.



2. Turn the ignition switch ON.
   Check that the pointer of the fuel gauge starts moving toward F.

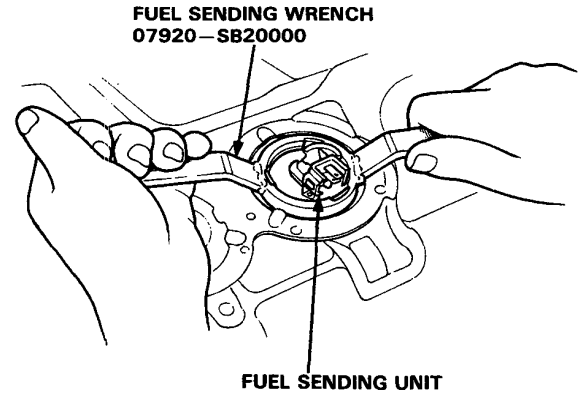
   CAUTION: Turn the ignition switch OFF within 5 seconds, before the pointers reaches "F" mark on the gauge dial. Failure to turn the ignition switch OFF before the pointer reaches the "F" mark may cause damage to the fuel gauge.



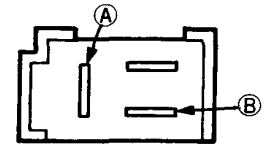
- If the pointer of the fuel gauge does not swing at all, check the fuse, wire harness and coupler. Replace the fuel gauge if they are normal.
- Inspect the fuel gauge sending unit if the fuel gauge is OK.

Fuel Sending Unit Testing

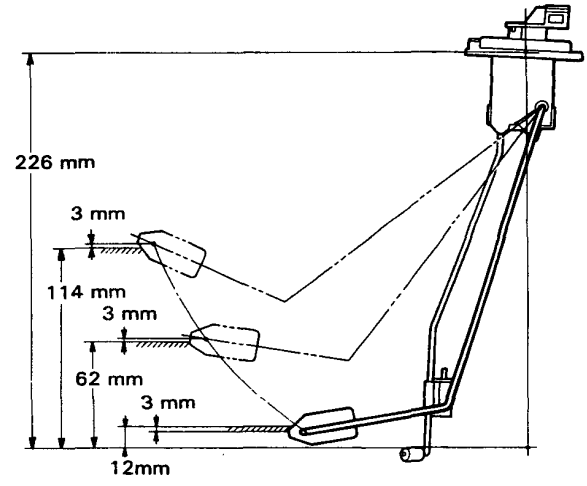
1. Remove the fuel tank (page 11-61).
2. Remove the fuel gauge sending unit.



3. Measure the resistance between A and B terminals at E (EMPTY), 1/2 (HALF FULL) and F (FULL) by moving the float.



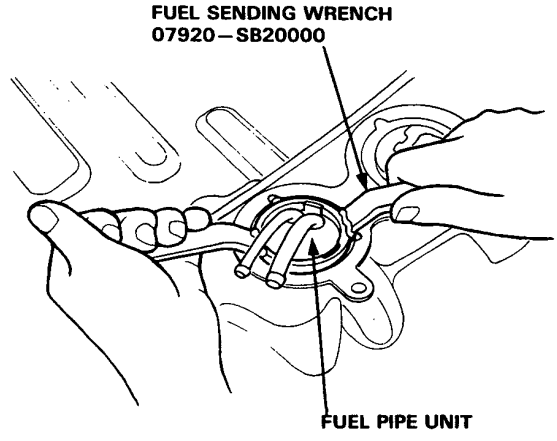
Float Position	E	1/2	F
Resistance (Ω)	105—110	25.5—39.5	2—5



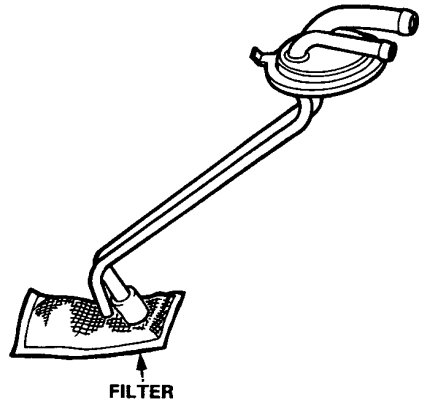
- If unable to obtain the above readings, replace the fuel unit with a new one.

Fuel Pipe Unit Replacement

1. Remove the fuel tank (page 11-61).
2. Remove the fuel pipe unit.



3. Clean the filter at the end of the pipe unit.



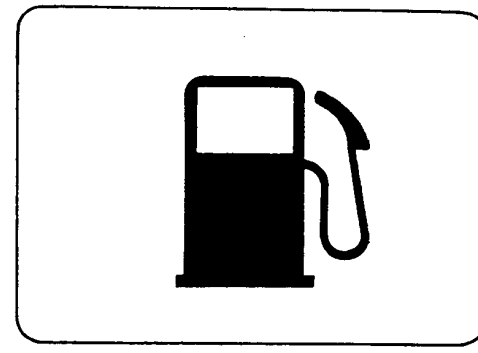
Testing

1. Park car on level ground.

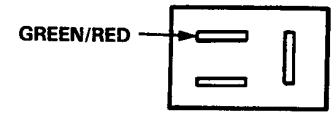
   WARNING Do not smoke while working on fuel system. Keep open flame away from work area. Drain fuel only into an approved container.

2. Drain fuel tank into an approved container.
3. Add less than 10ℓ (2.6 U.S. Gal.) of fuel and turn the ignition switch on.

   The low fuel warning light should come on within 3 minutes.



- If the dash warning does not come on, disconnect the coupler from the fuel gauge sending unit, connect the positive (+) terminal of the voltmeter to the Green/Red terminal of the 3p coupler, ground the negative (−) terminal of the voltmeter to the body ground, and measure the voltage.



— If there is voltage, replace the fuel gauge sending unit.
— If there is no voltage, it indicates broken wire harness (Yellow/White) or faulty connection of the terminals.

- If the dash warning comes on, make sure that it goes off with the coupler disconnected from the fuel gauge sending unit.

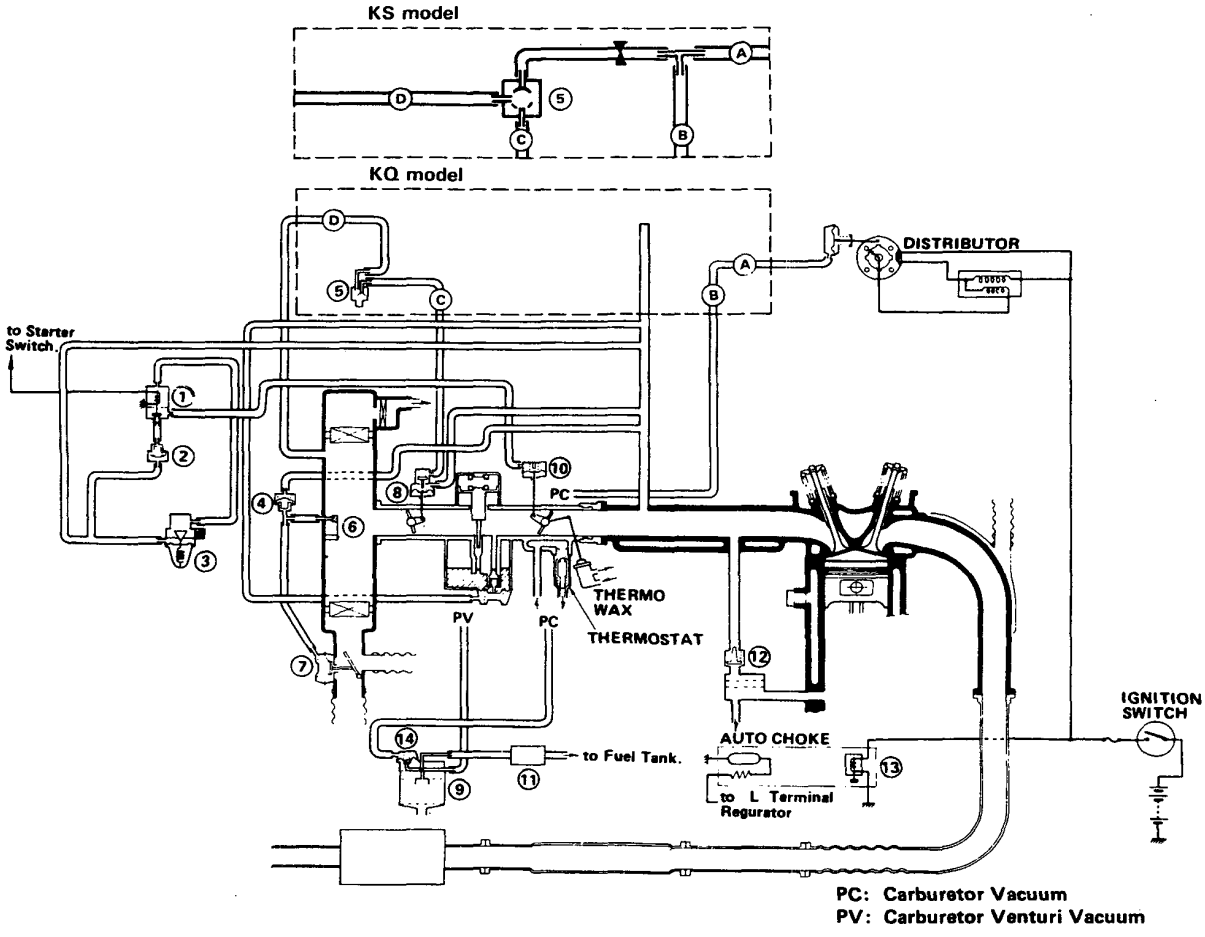
— If the dash warning stays on, it indicates shorted harness.
— If the dash warning goes off, replace the fuel gauge sending unit.

Emission Controls

Carbureted Engine

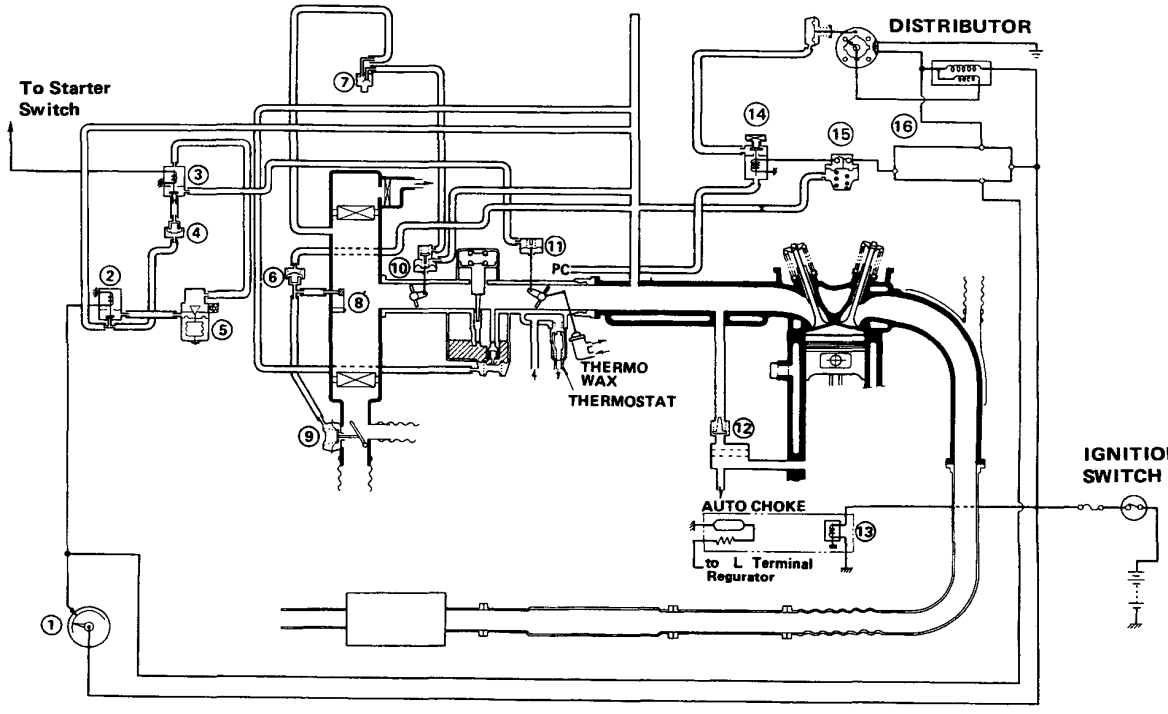
Vacuum and Electrical Connections

[KQ and KS models Manual Transmission]



① CRANKING SOLENOID VALVE
② CHECK VALVE (FOR THROTTLE CONTROL)
③ CONTROL VALVE
④ CHECK VALVE (FOR INTAKE AIR TEMP. CONTROL SYSTEM)
⑤ THERMOVALVE
⑥ AIR BLEED VALVE
⑦ AIR CONTROL DIAPHRAGM
⑧ CHOKE OPENER
⑨ CANISTER (KQ ONLY)
⑩ THROTTLE CONTROLLER
⑪ TWO-WAY VALVE
⑫ PCV VALVE
⑬ PRIMARY SLOW FUEL CUT-OFF SOLENOID VALVE
⑭ PURGE CONTROL DIAPHRAGM

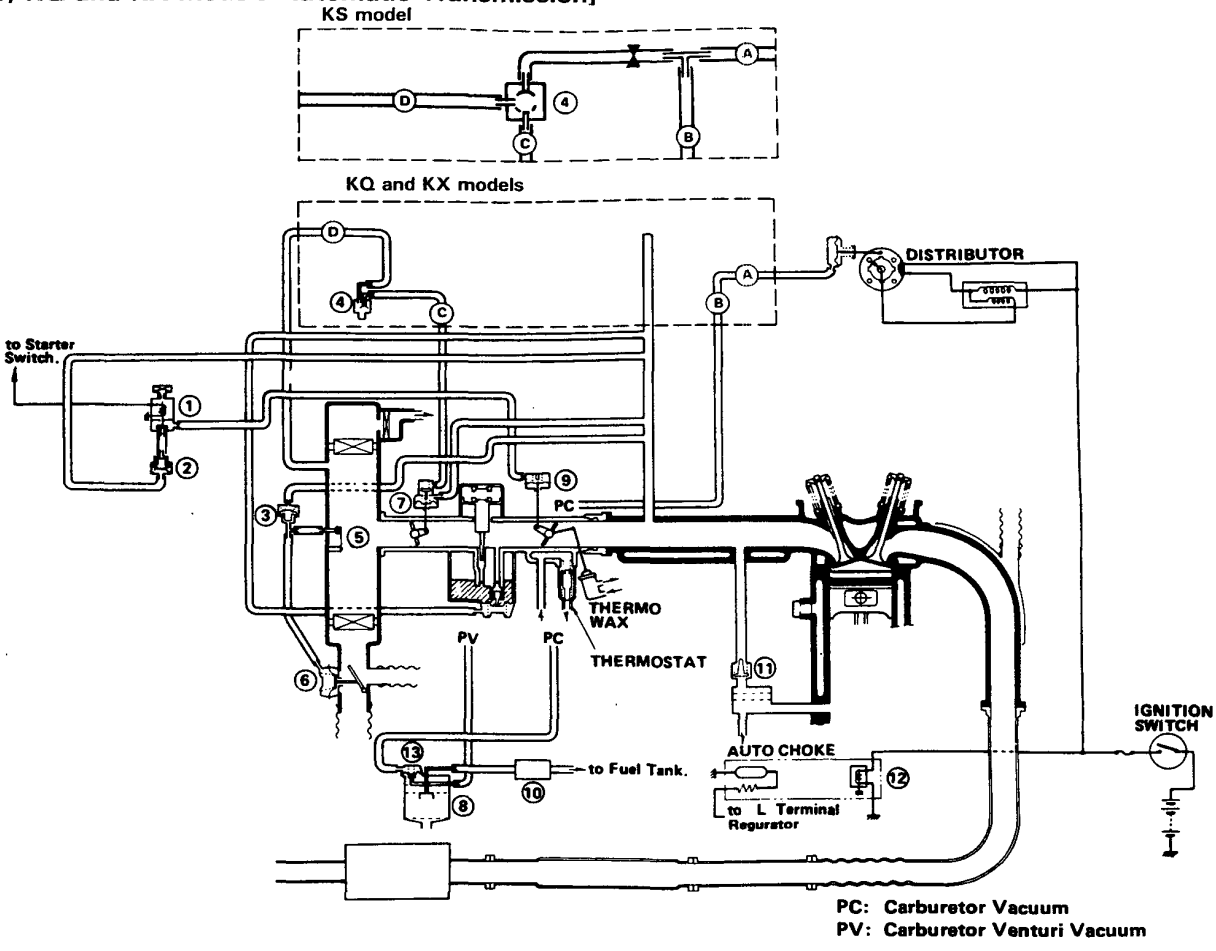
[KX model Manual Transmission]



PC: Carburetor Vacuum
PV: Carburetor Venturi Vacuum

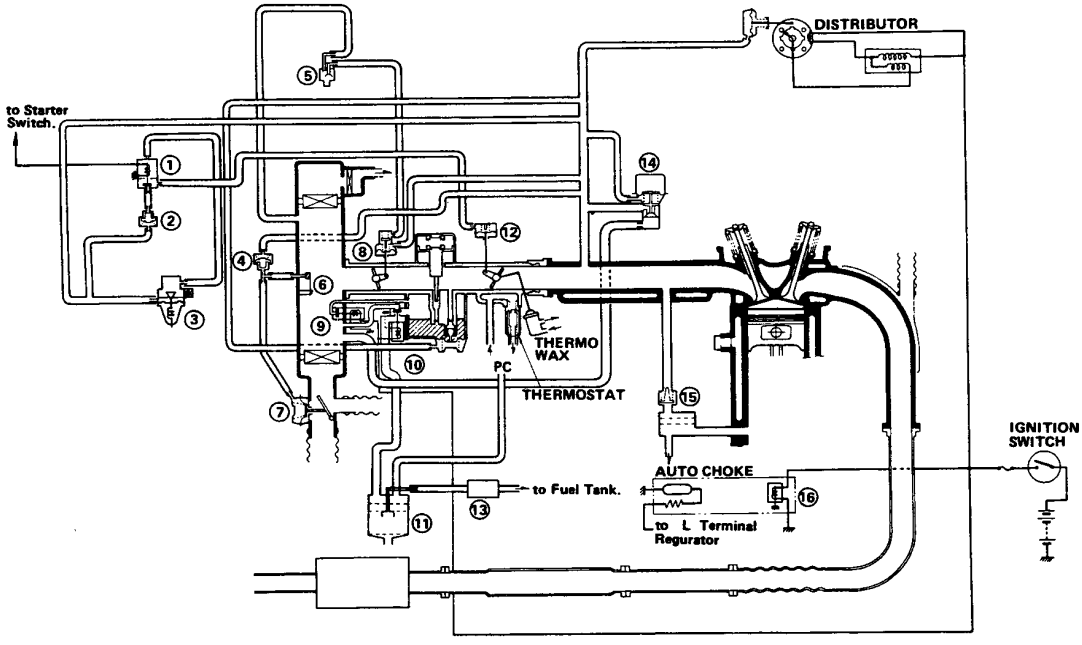
① SPEED SENSOR
② THROTTLE POSITIONER SOLENOID VALVE
③ CRANKING SOLENOID VALVE
④ CHECK VALVE (FOR THROTTLE CONTROL)
⑤ CONTROL VALVE
⑥ CHECK VALVE (FOR INTAKE AIR TEMP. CONTROL SYSTEM)
⑦ THERMOVALVE
⑧ AIR BLEED VALVE
⑨ AIR CONTROL DIAPHRAGM
⑩ CHOKE OPENER
⑪ THROTTLE CONTROLLER
⑫ PCV VALVE
⑬ PRIMARY SLOW FUEL CUT-OFF SOLENOID VALVE
⑭ VC SOLENOID VALVE
⑮ VACUUM SWITCH
⑯ NE SENSOR

[KS, KQ and KX models Automatic Transmission]



① CRANKING SOLENOID VALVE
② CHECK VALVE (FOR THROTTLE CONTROL)
③ CHECK VALVE (FOR INTAKE AIR TEMP. CONTROL SYSTEM)
④ THERMOVALVE
⑤ AIR BLEED VALVE
⑥ AIR CONTROL DIAPHRAGM
⑦ CHOKE OPENER
⑧ CANISTER (KQ ONLY)
⑨ THROTTLE CONTROLLER
⑩ TWO-WAY VALVE
⑪ PCV VALVE
⑫ PRIMARY SLOW FUEL CUT-OFF SOLENOID VALVE
⑬ PURGE CONTROL DIAPHRAGM

[KF, KG, KB, KW, KE and KY models Manual Transmission]

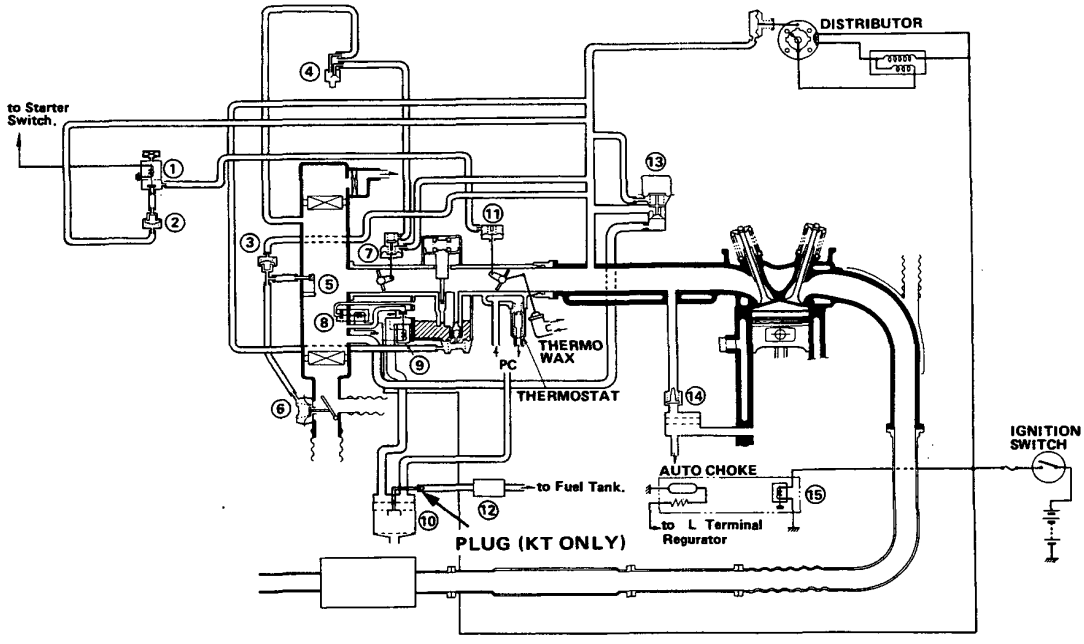


PC: Carburetor Vacuum
PV: Carburetor Venturi Vacuum

① CRANKING SOLENOID VALVE
② CHECK VALVE (FOR THROTTLE CONTROL)
③ CONTROL VALVE
④ CHECK VALVE (FOR INTAKE AIR TEMP. CONTROL SYSTEM)
⑤ THEROMOVALVE
⑥ AIR BLEED VALVE
⑦ AIR CONTROL DIAPHRAGM
⑧ CHOKE OPENER
⑨ INNER VENT SOLENOID VALVE (KY ONLY)
⑩ VENT SOLENOID VALVE (KY ONLY)
⑪ CANISTER (KY ONLY)
⑫ THROTTLE CONTROLLER
⑬ TWO-WAY VALVE
⑭ ANTI-AFTERBURN VALVE (KY ONLY)
⑮ PCV VALVE
⑯ PRIMARY SLOW FUEL CUT-OFF SOLENOID VALVE

Vacuum and Electrical Connections

[KF, KG, KB, KW, KE, KY and KT models Automatic Transmission, and KT model Manual Transmission]



PC: Carburetor Vacuum
PV: Carburetor Venturi Vacuum

① CRANKING SOLENOID VALVE
② CHECK VALVE (FOR THROTTLE CONTROL)
③ CHECK VALVE (FOR INTAKE AIR TEMP. CONTROL SYSTEM)
④ THEROMOVALVE
⑤ AIR BLEED VALVE
⑥ AIR CONTROL DIAPHRAGM
⑦ CHOKE OPENER
⑧ INNER VENT SOLENOID VALVE (KY, KT ONLY)
⑨ VENT SOLENOID VALVE (KY, KT ONLY)
⑩ CANISTER (KY, KT ONLY)
⑪ THROTTLE CONTROLLER
⑫ TWO-WAY VALVE
⑬ ANTI-AFTERBURN VALVE (KY, KT ONLY)
⑭ PCV VALVE
⑮ PRIMARY SLOW FUEL CUT-OFF SOLENOID VALVE

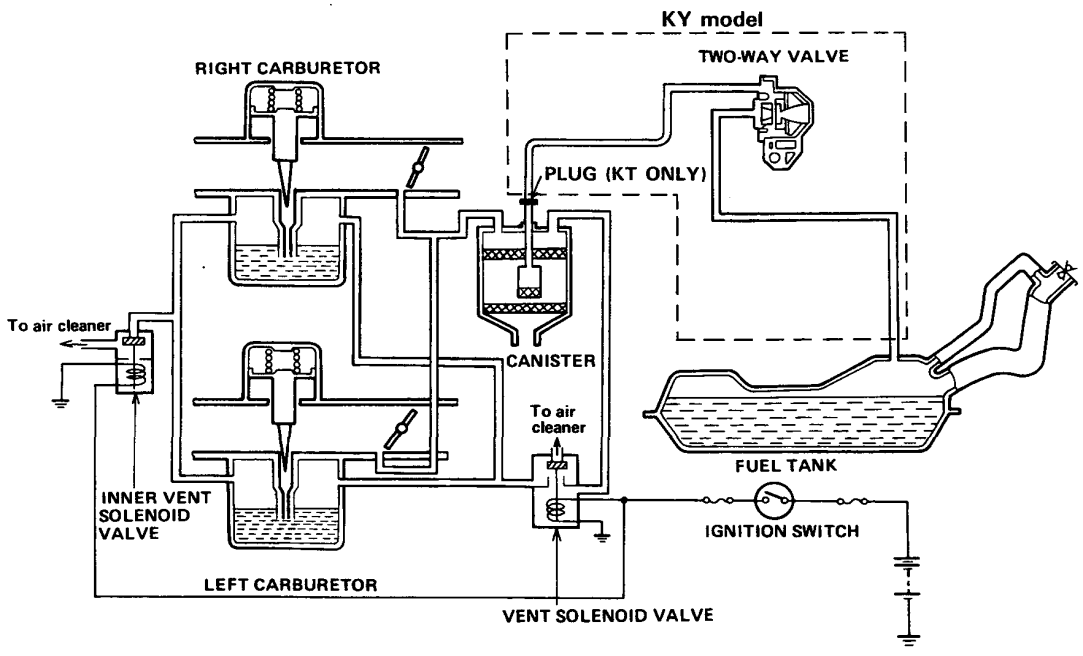
Carburetor Air Vent Cut-Off System

[KT and KY Models]

This system is designed to prevent fuel vapor in the float bowls from escaping into the atmosphere, and to prevent an over-rich condition from developing when the engine is hot started.

When the engine is not running, air vent passages are closed by the vent solenoid valve and inner vent solenoid valve, so that fuel vapor in the float bowls can be vented into the canister.

When the engine is running, the vent solenoid valve and inner vent solenoid valve open air vent passages, so that fuel vapor in the float bowls can be vented into the carburetors through the air cleaner.



Description

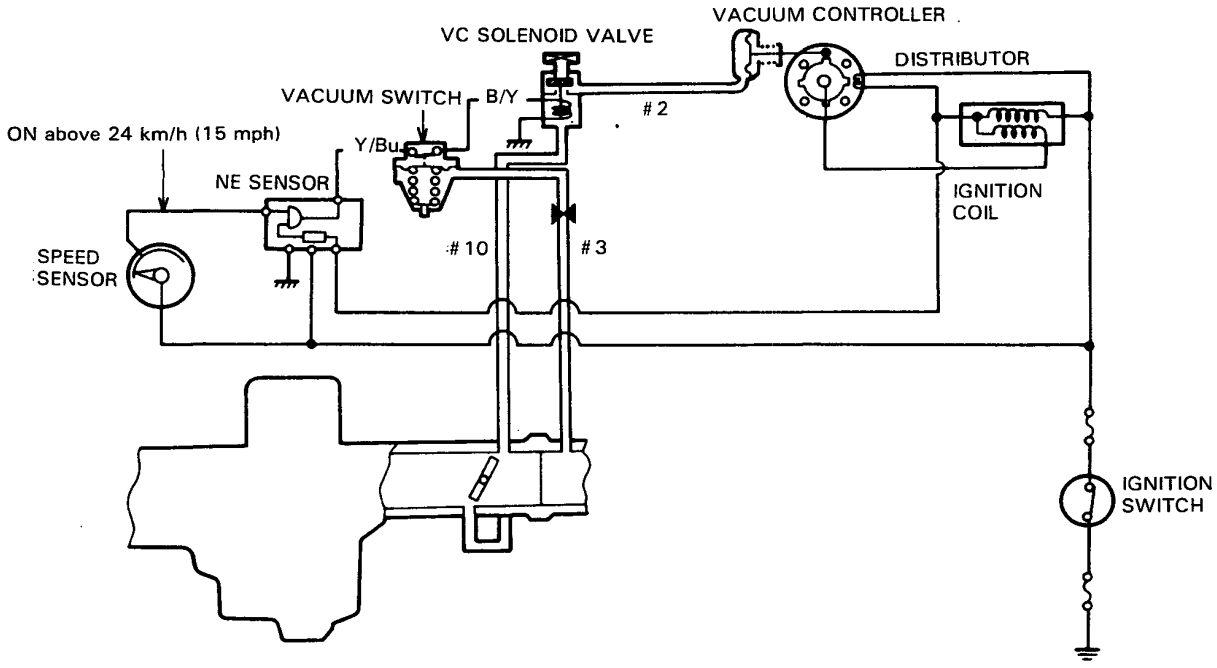
Ignition Timing Controls

[KX Model Manual Transmission]

During normal cruising speed and idling, the VC solenoid valve is deactivated allowing manifold vacuum to enter the vacuum controller so that ignition timing is advanced.
During deceleration above 24 km/h (15 mph), the VC solenoid valve is activated and vacuum controller is cut off. Atmosphere is then led to the vacuum controller and ignition timing is retarded.

Operation of VC Solenoid Valve

Vehicle condition	Vacuum SW	NE sensor	Speed sensor	VC solenoid valve	Vacuum controller
Idling	ON	OFF	OFF	OFF	Vacuum
Cruise & Acceleration	OFF	ON	above 24 km/h (15 mph) ON	OFF	Vacuum
			below 24 km/h (15 mph) OFF		
Deceleration	ON	ON	above 24 km/h (15 mph) ON	ON	Atmosphere
			below 24 km/h (15 mph) OFF	OFF	Vacuum

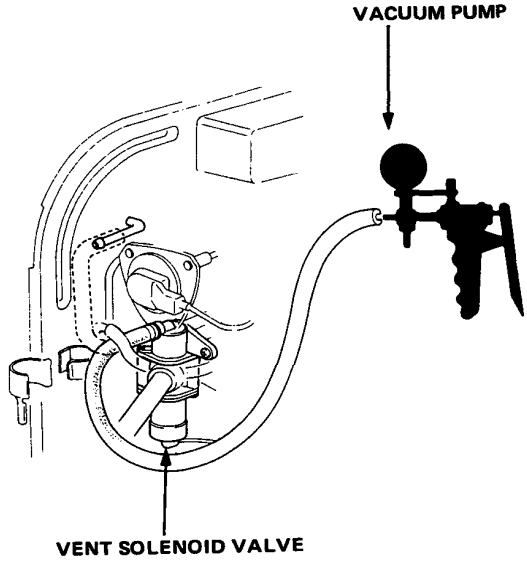


Carburetor Air Vent Cut-Off System

Inspection [KT and KY Models]

Vent Solenoid Valve

1. Disconnect the upper hose from the vent solenoid valve and connect a vacuum pump to the solenoid valve as shown, and apply between 100—125 mmHg (4—5 in.Hg) vacuum.



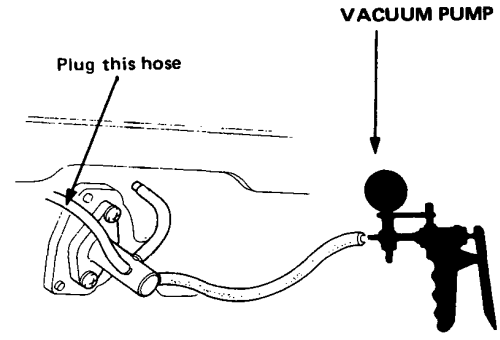
2. Turn the ignition switch on.

   Vacuum should drop to zero.

   - If vacuum drops to zero, the vent solenoid valve is OK.
   - If vacuum does not drop to zero, check for voltage at the vent solenoid valve.
     - If there is voltage, replace the solenoid valve and re-test.
     - If no voltage, check fuse and wiring.

Inner Vent Solenoid Valve

1. Remove the air cleaner cover and filter element.
2. Disconnect the three hoses from the inner vent solenoid valve, plug two of fittings and install a vacuum pump to the inner vent solenoid valve as shown, and apply vacuum (less than 250 mmHg, 10 in.Hg).



3. Turn the ignition switch on.

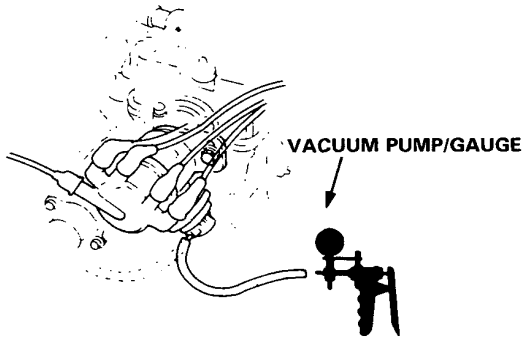
   Vacuum should drop to zero.

   - If vacuum drops to zero, the inner vent solenoid valve is OK.
   - If vacuum does not drop to zero, check for voltage at inner vent solenoid valve.
     - If there is voltage, replace the solenoid valve and re-test.
     - If no voltage, check fuse and wiring.

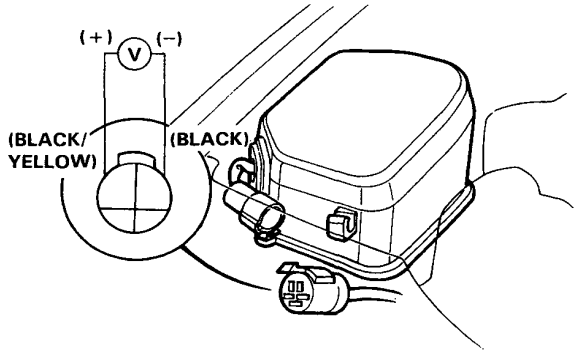
Inspection

1. Start the engine, wait for it to warm up.
2. Disconnect the hose from the vacuum controller, connect a vacuum gauge to the hose, and check for vacuum.

   There should be vacuum at idle.



- If there is no vacuum, check the hose for leaks or blockage and check for voltage at VC solenoid valve.



There should be no voltage.

- If there is voltage, go to step 6 and control unit inspection (page 12-11).
- If there is no voltage, replace the solenoid valve.

5. Jack up the front of the car and support with safety stands. Block rear wheels and set the parking brake.

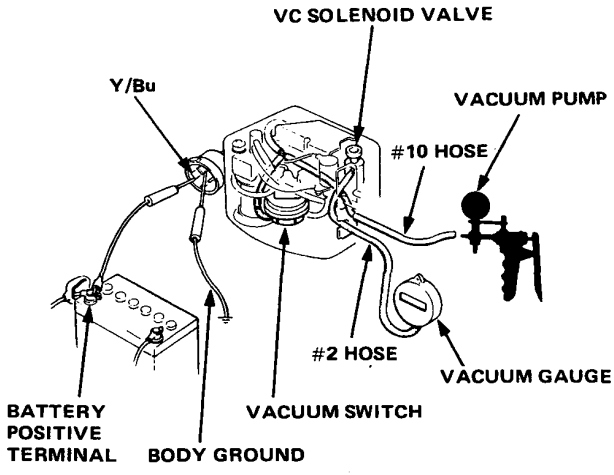
   Check for vacuum the hose of vacuum controller with the car above 24 km/h (15 mph).

   There should be no vacuum.

- If there is vacuum, check for voltage at VC solenoid valve.
  - If there is voltage, replace the solenoid valve.
  - If there is no voltage go to step 6 and control unit inspection (page 12-11).

Vacuum Switch

6. Disconnect the hose # 10 to the control box at the install pipe A and connect a vacuum pump to the hose. Pulg the end of the install pipe A.



7. Apply battery voltage to the Yellow/Blue wire terminal of the control box connector.

   There should be vacuum at the hose #2 from the vacuum controller when vacuum above 510 mmHg (20 in.Hg) is applied to the hose #10, and there should be no vacuum when vacuum is released.

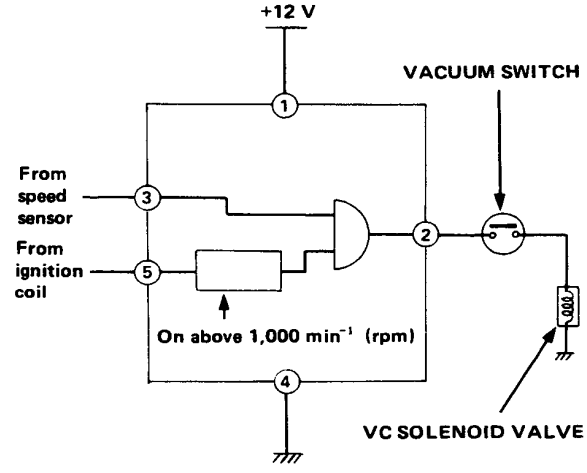
   - Replace the vacuum switch if vacuum is not as specified.

Control Unit (NE Sensor)

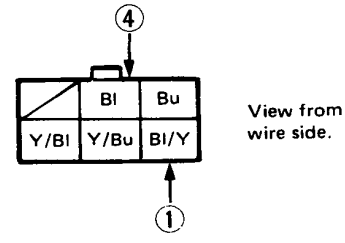
CAUTION: Whenever test is performed, connect test probes of the circuit tester to terminals of the connector from wire side.

NOTE: The NE sensor is installed in the rear left cowl side lining.

If there is no voltage from the NE sensor when there should be voltage or if there is voltage from the NE sensor when there shouldn't be voltage, inspect as follows and if no defects can be found, replace the NE sensor and re-test.



1. Disconnect the 6P connector from the NE sensor. Measure voltage between ① (Bl/Y: positive) and ④ (Bl: negative) terminals at 6P connector with ignition switch ON.



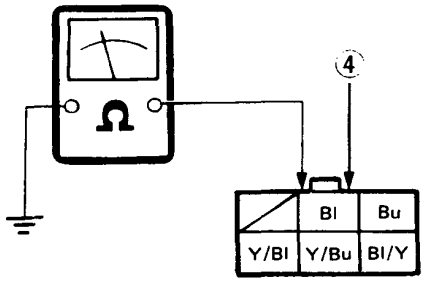
   There should be battery voltage.

   - If there is battery voltage, go on to step 2.
   - If there is no battery voltage, check fuse and wire harness.

(cont'd)

Inspection (cont'd)

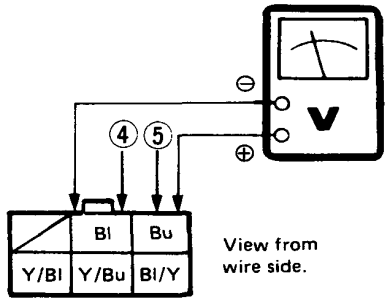
2. Disconnect the 6P connector from the NE sensor. Check for continuity between (4) (Bl) terminal and body ground.



There should be continuity.

- If there is continuity, go on to step 3.
- If there is no continuity, check wire harness and ground.

3. Disconnect the 6P connector from the NE sensor. Measure voltage between (5) (Bu: positive) and (4) (Bl: negative) terminals at 6P connector when the engine is idling.



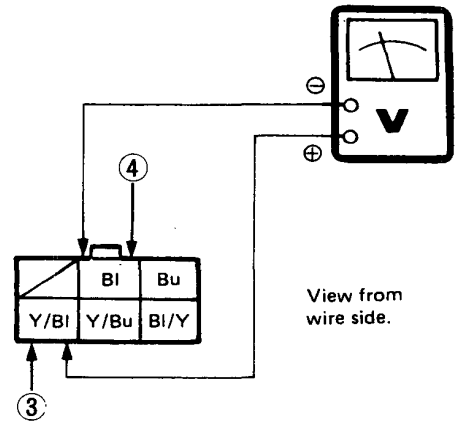
There should be battery voltage.

- If there is battery voltage, go on to step 4.
- If there is no battery voltage, check blue wire circuit between connector and ignition coil negative terminal.

WARNING **Block rear wheels before jacking up front of car.**

4. Jack up front of car and place jack stands in proper locations. Set the parking brake.

5. Disconnect the 6P connector from the NE sensor. Connect voltmeter positive probe to (3) (Y/Bl) terminal at 6P connector and negative probe to (4) (Bl) terminal.



6. Start the engine. Place the shift lever in second gear and accelerate slowly, while observing the voltmeter.

   The voltmeter should show approximately 10 V above 25 km/h (15 mph), and no voltage below 15 km/h (9 mph).

   - If there is no voltage below approximately 15 km/h (9 mph), and there is battery voltage above approximately 25 km/h (15 mph), the speed sensor is OK. Go on to step 8.
   - If the voltmeter readings do not correspond to the above km/h (mph) range, replace the speed sensor and re-test.
   - If there is no voltage during speed sensor test, go on to step 7.

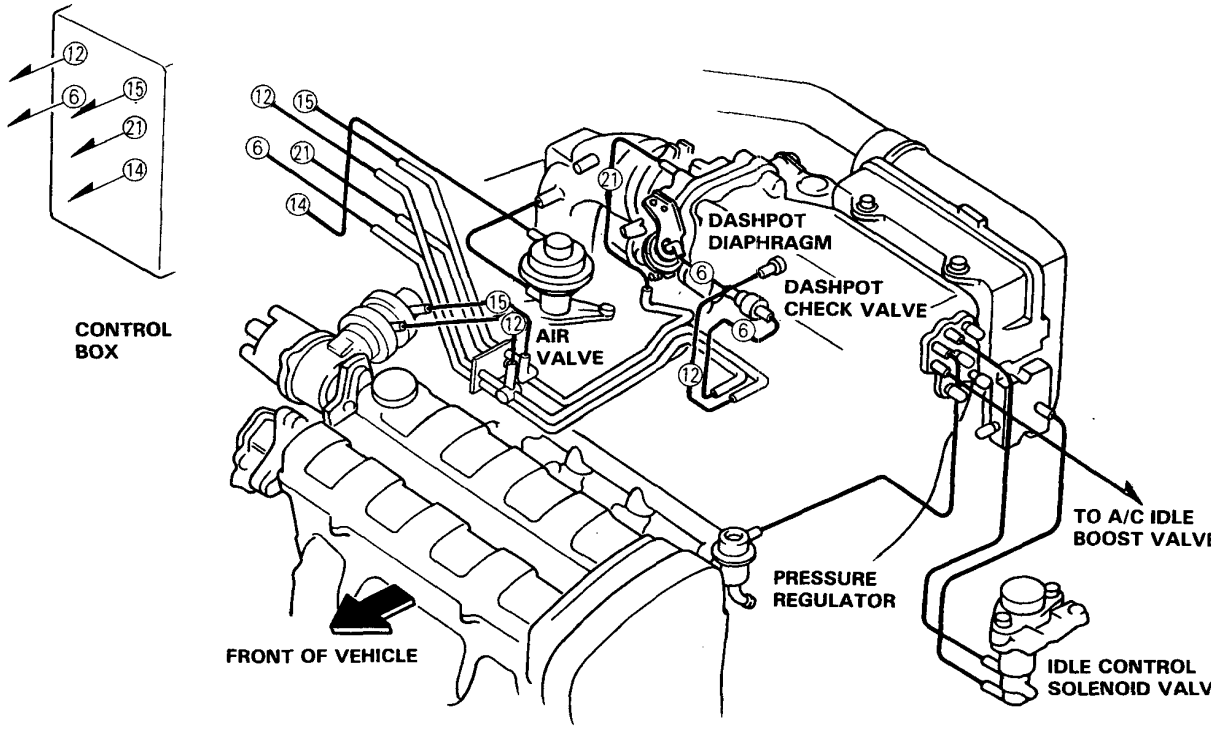
7. Check for loose or improper wire connections, faulty fuse or speed sensor. Replace or repair as necessary and re-test.

8. Stop the engine, lower the car to the ground, and disconnect the voltmeter.

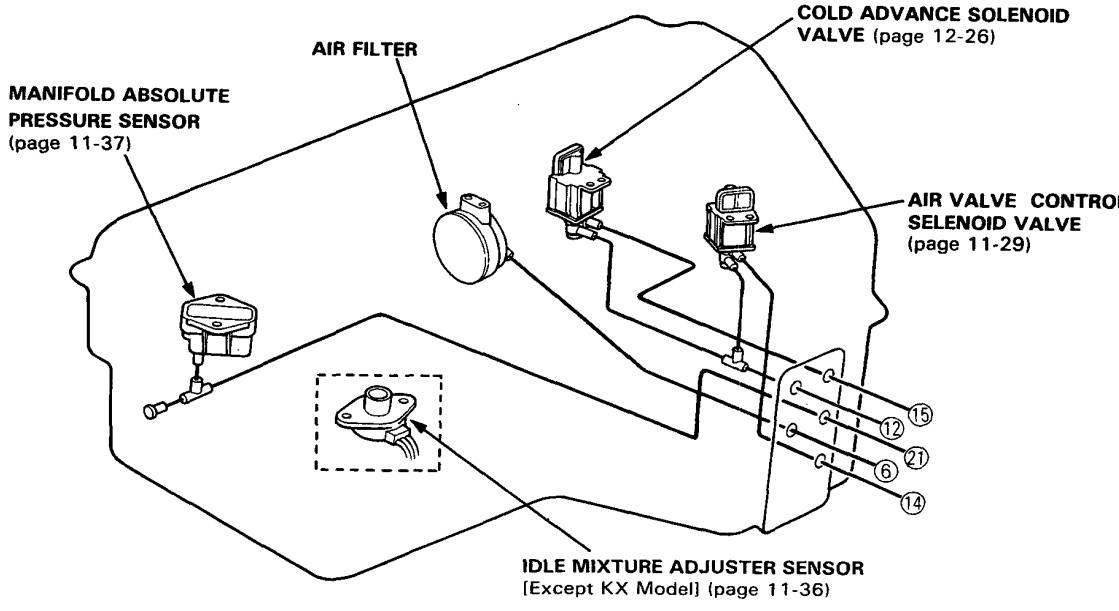
Fuel Injected Engine

Interconnect Diagram

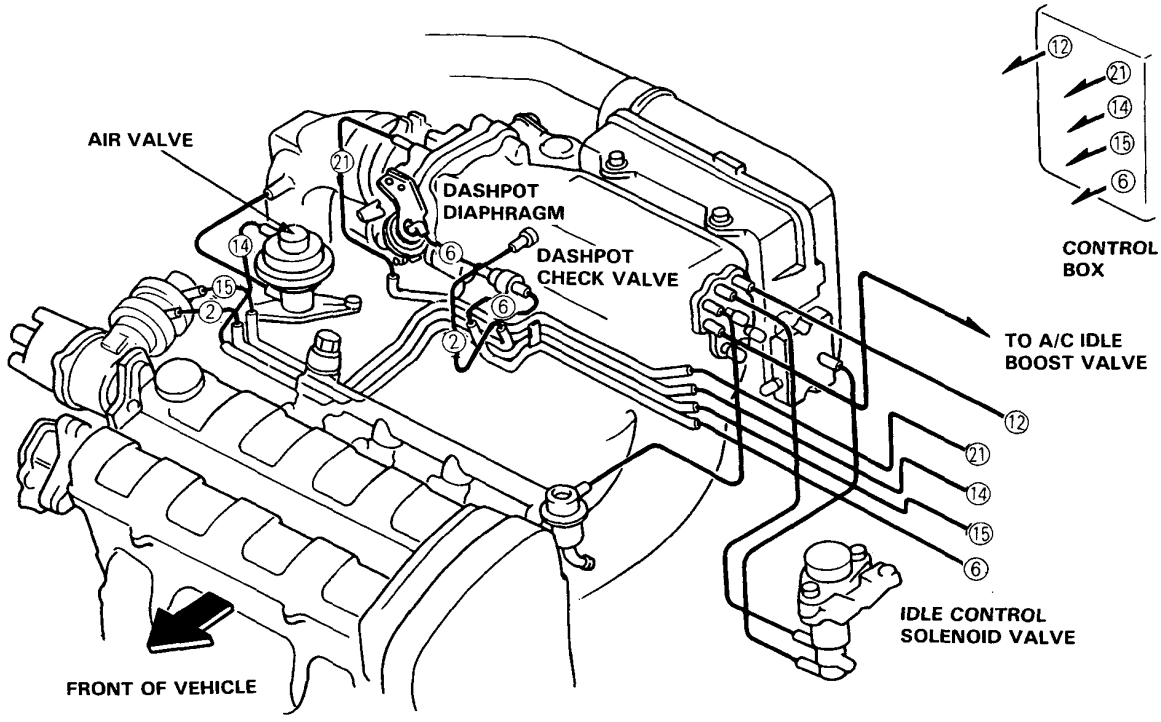
[KG, KF, KW, KS, KB and KX Models]



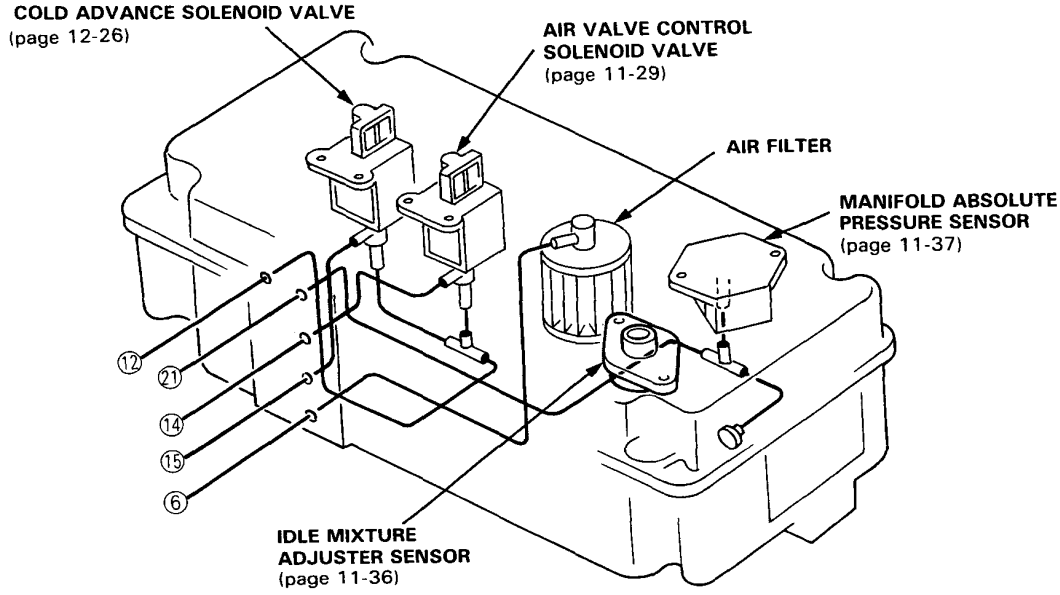
Control Box



[KE Model]



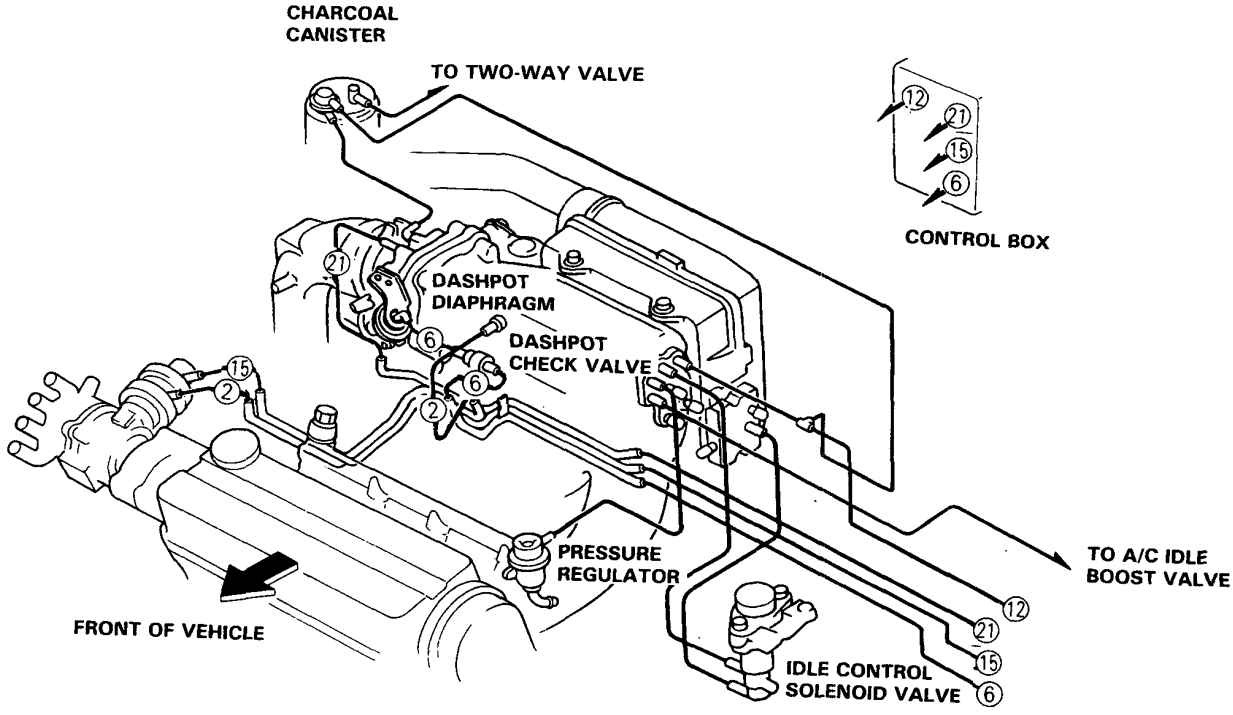
Control Box



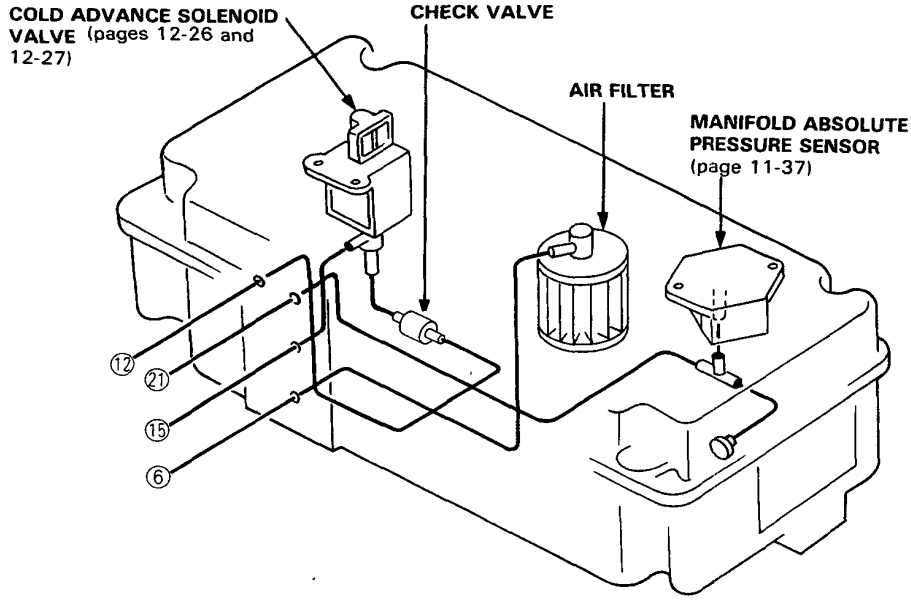
Interconnect Diagram

[KQ model]

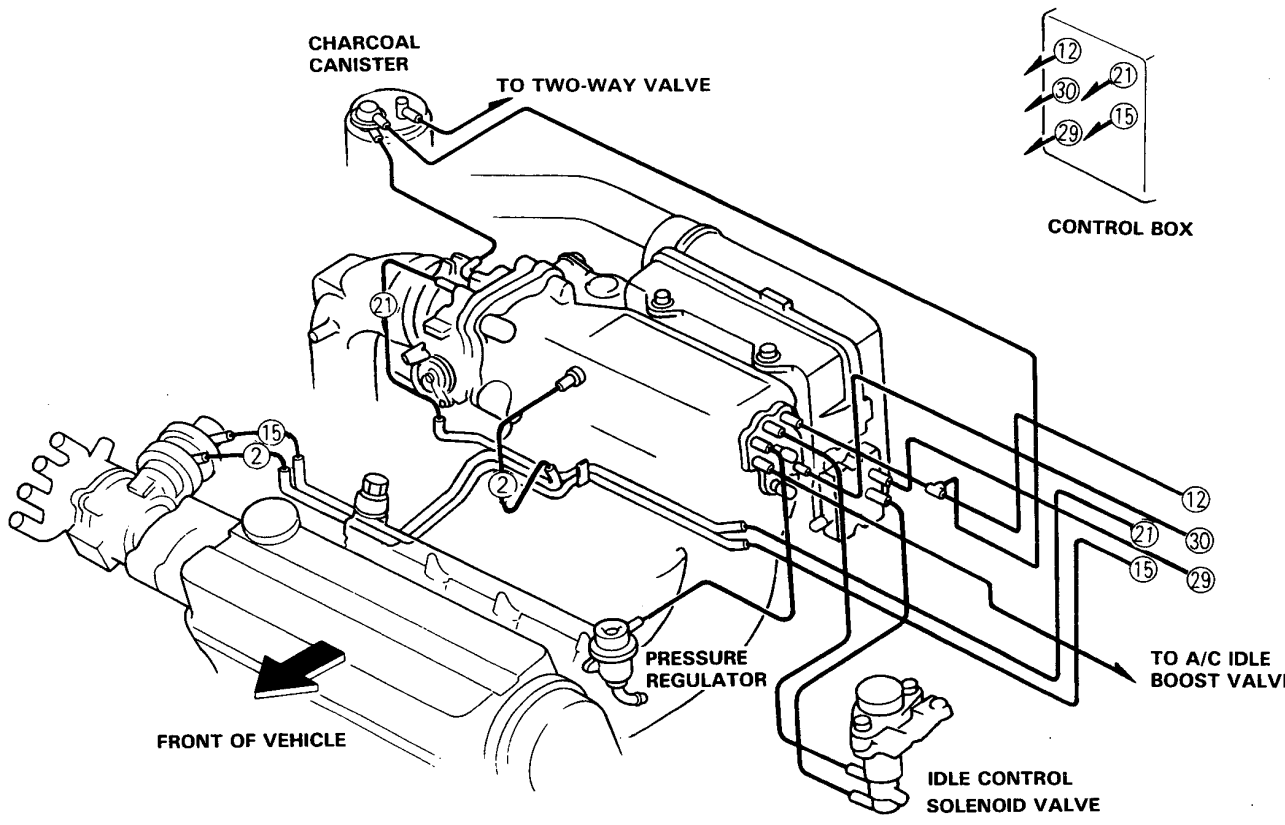
(M/T)



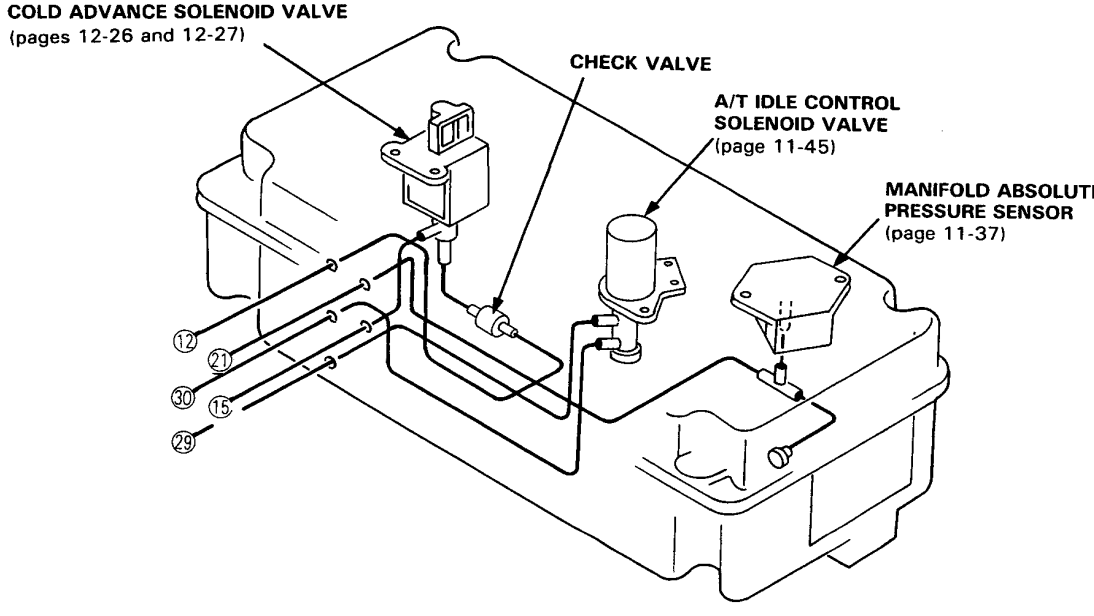
Control Box



(A/T)

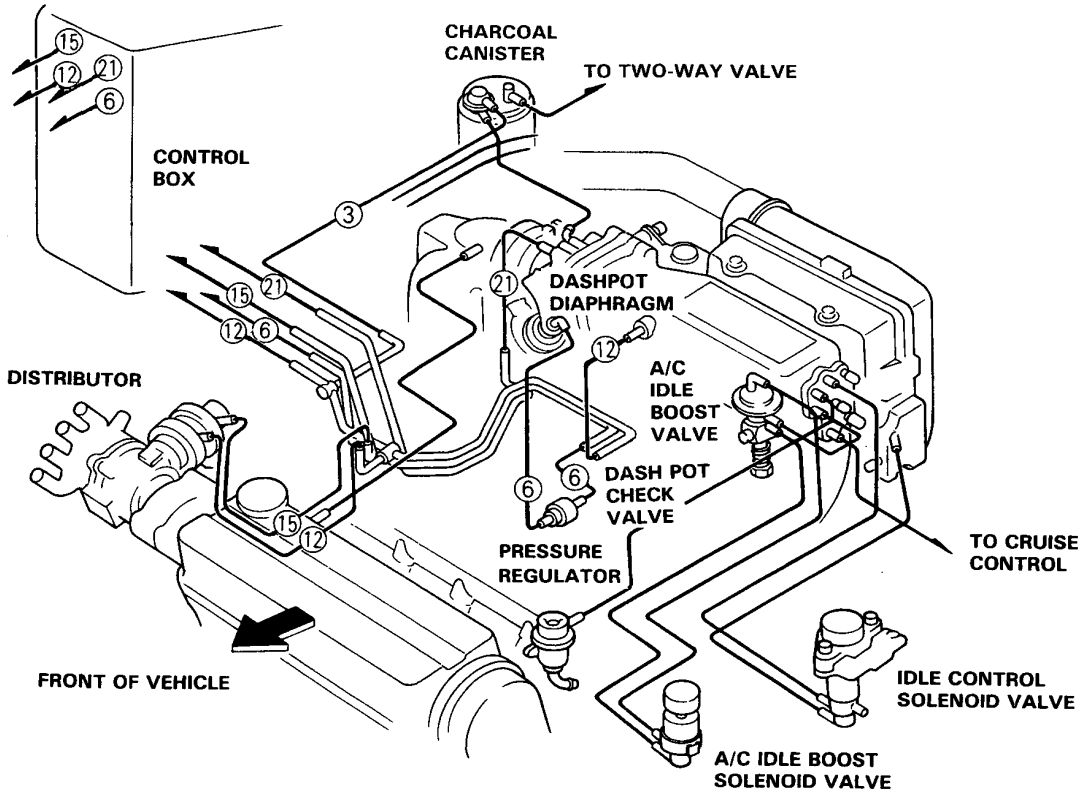


Control Box

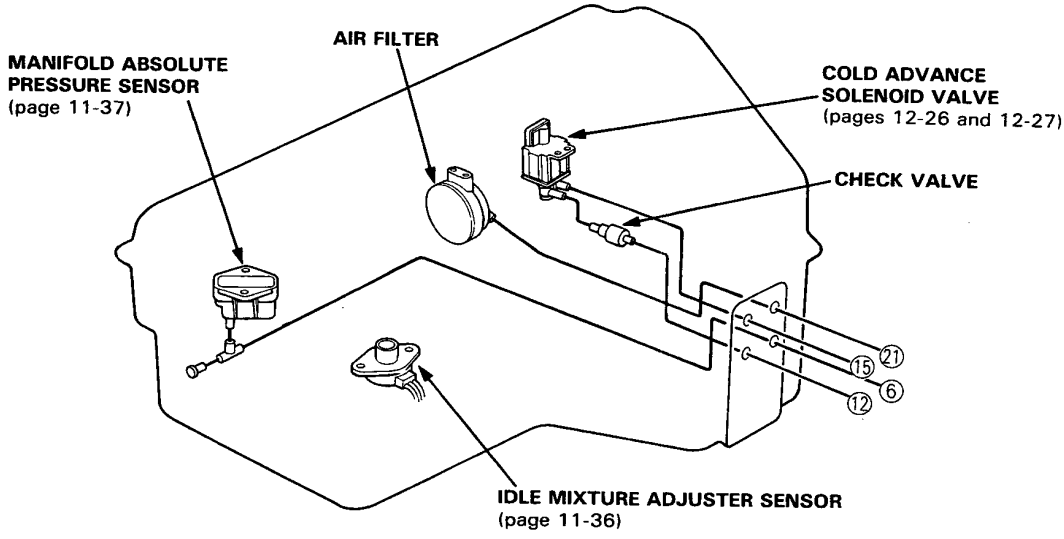


Interconnect Diagram

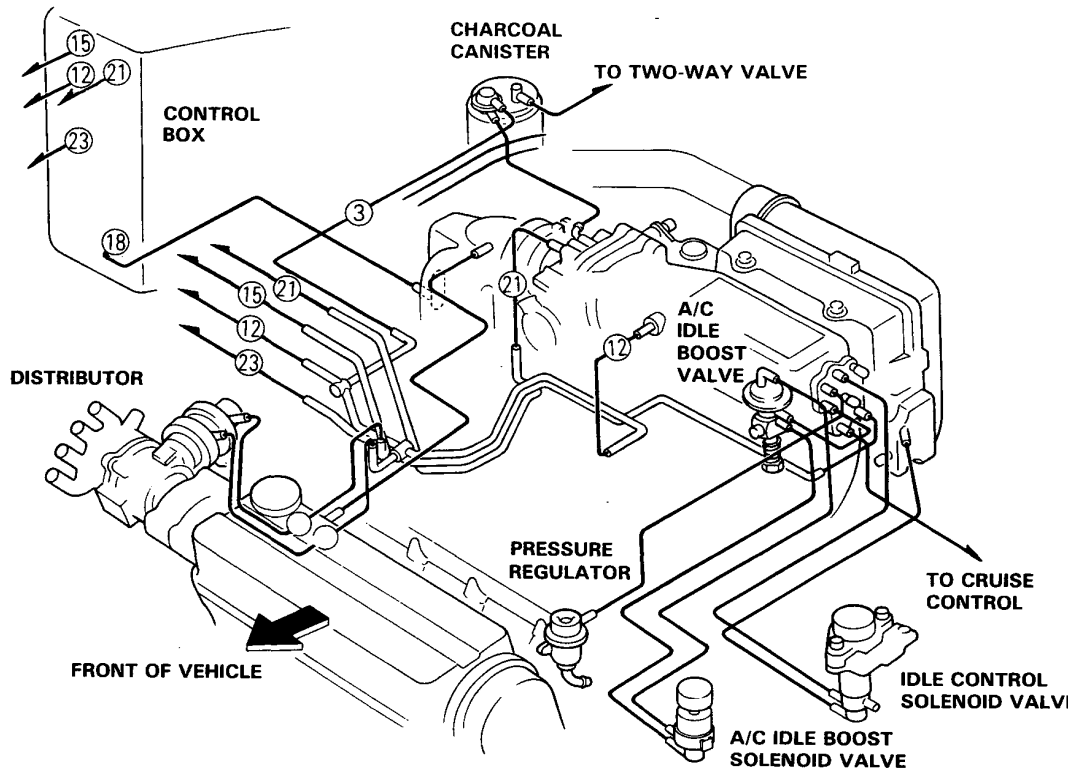
[KY Model]
(M/T)



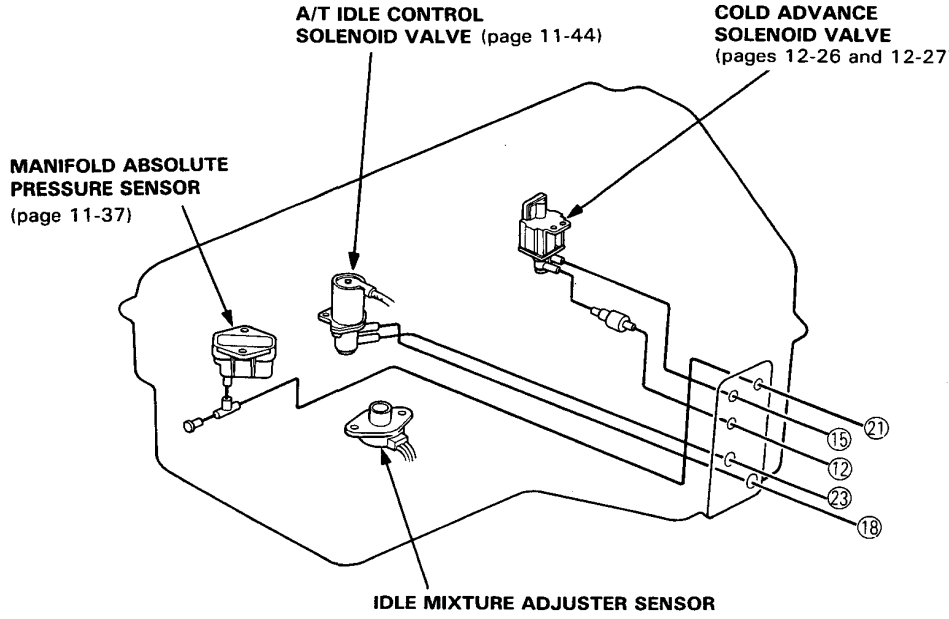
Control Box



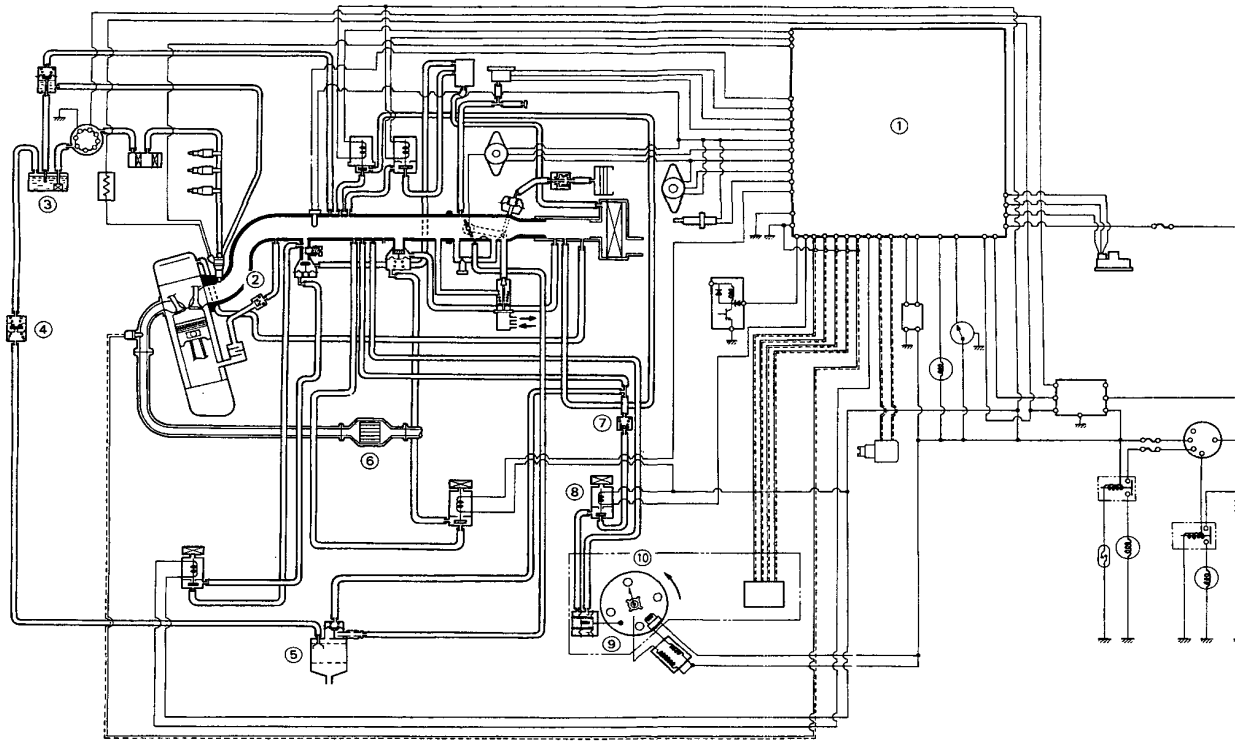
(A/T)



Control Box



Vacuum and Electrical Connections



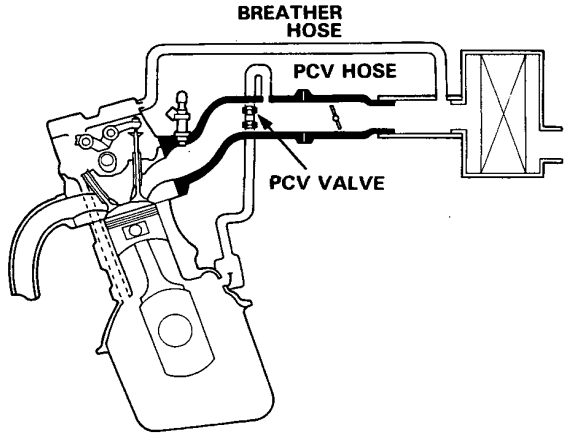
① ELECTRONIC CONTROL UNIT (ECU)
② PCV VALVE
③ FUEL TANK
④ TWO-WAY VALVE [KQ and KY Models]
⑤ CHARCOAL CANISTER [KQ and KY Models]
⑥ CATALYTIC CONVERTER [KX, KQ and KY Models]
⑦ CHECK VALVE [KQ and KY Models]
⑧ COLD ADVANCE SOLENOID VALVE
⑨ VACUUM ADVANCE DIAPHRAGM
⑩ DISTRIBUTOR

Inspection

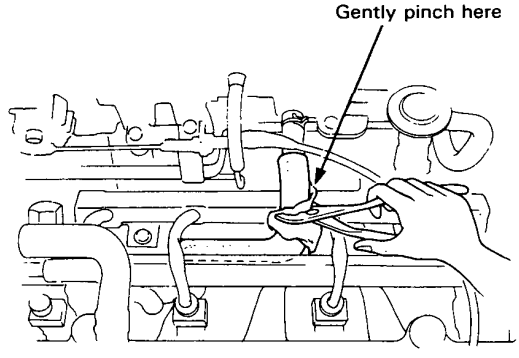
Crankcase Controls

PCV Valve

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



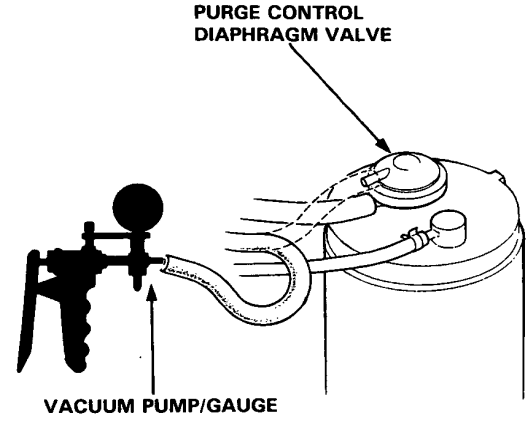
2. At idling, make sure there is a clicking sound from the PCV valve when the hose between PCV valve and intake manifold is lightly pinched with your fingers or plies.



- If there is no clicking sound, check the PCV valve grommet for cracks of damage.
- If the grommet is OK, replace the PCV valve and recheck.

Evaporative Controls
[KQ and KY Models]

1. Disconnect the upper vacuum hose of the purge control diaphragm valve (on the charcoal canister) and connect vacuum gauge to the hose.



2. Start the engine and allow to idle.

   There should be vacuum.

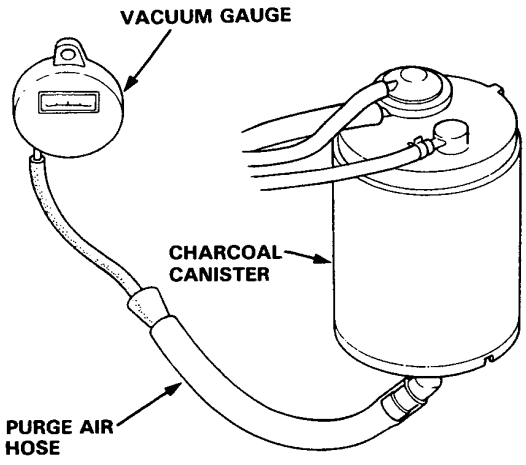
   - If vacuum is not available, check the hose for clogging, kinking or leakage.

(cont'd)

Evaporative Controls (cont'd)

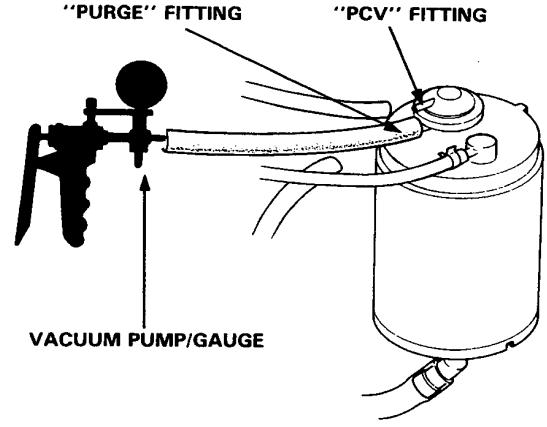
Charcoal Canister

1. Remove fuel filler cap.
2. Remove canister purge air hose from frame and connect hose to vacuum gauge as shown.



3. Start engine and raise speed to 3500 min^{-1} (rpm). Vacuum should appear on gauge within 1 minute.
   - If vacuum appears on gauge in 1 minute, remove gauge, test is complete.
   - If no vacuum, disconnect vacuum gauge and re-install fuel filler cap.
4. Remove charcoal canister and check for signs of damage or defects.
   - If defective, replace canister.
   - If OK, go on to step 5.
5. Stop engine. Disconnect the upper vacuum hose of the purge control diaphragm valve from canister "PCV" fitting.
   Connect vacuum pump to canister "purge" fitting as shown, and apply vacuum.

   Vacuum should remain steady.



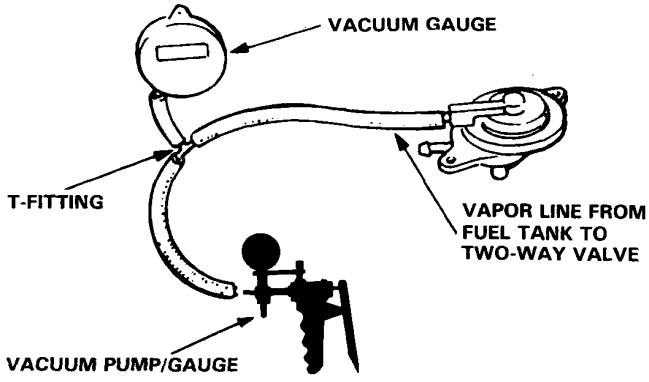
   - If vacuum remains steady, go on to step 6.
   - If vacuum drops, replace canister and re-test.
6. Restart engine. Reconnect hose to canister "PCV" fitting.

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

Two-Way Valve

1. Remove the fuel filler cap.

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

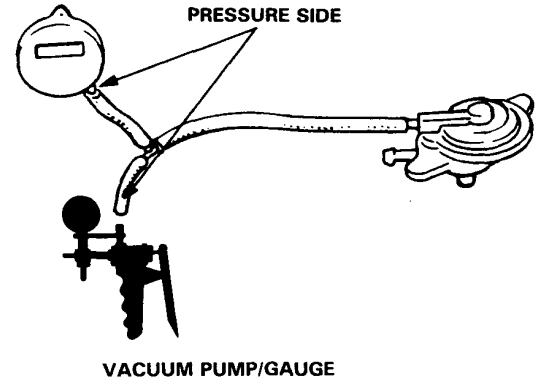


3. Slowly apply a vacuum while watching the gauge.

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

   - If vacuum stabilizes momentarily (two-way valve opens) between 5 and 15 mmHg (0.2 and 0.6 in.Hg), go on to Step 4.
   - If vacuum stabilizes (valve opens) below 5 mmHg (0.2 in.Hg) or above 15 mmHg (0.6 in.Hg), install new valve and re-test.

4. Move vacuum pump hose from vacuum to pressure fitting, and move vacuum gauge hose from vacuum to pressure side as shown.



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

   Pressure should stabilize at:

KQ Model	**25 to 55 mmHg (1.0 to 2.2 in.Hg)**
KY Model	**10 to 25 mmHg (0.4 to 1.0 in.Hg)**

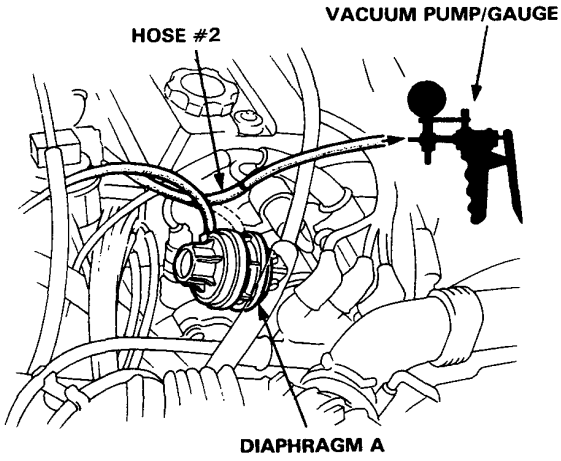
   - If pressure momentarily stabilizes (valve opens) at above ranges, the valve is OK.
   - If pressure stabilizes out of above ranges, install a new valve and re-test.

Ignition Timing Controls

[KQ Model]

NOTE: Engine coolant temperature must be below 60°C (140°F).

1. Disconnect vacuum hose #2 from the vacuum advance diaphragm A on the distributor and connect a vacuum pump/gauge to the hose.

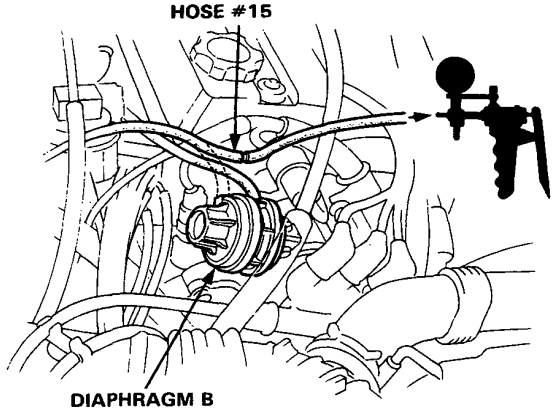


2. Start the engine, allow it to idle and check for vacuum.

   There should be vacuum.

   - If there is no vacuum, check the vacuum line for leaks, blockage or a disconnected hose and retest.
   - If there is vacuum, go on to step 3.

3. Disconnect vacuum hose #15 from the vacuum advance diaphragm B on the distributor and connect a vacuum pump/gauge to the hose.



4. Allow the engine to idle and check for vacuum.

   There should be vacuum.

   - If there is vacuum, go on to step 5.
   - If there is no vacuum, check the vacuum line for leaks, blockage or a disconnected hose.
     If no problem, go on to cold advance selenoid valve inspection (pages 12-26 and 12-27).

5. Wait for the engine to warm up (cooling fan comes on).
   Check for vacuum at idle.

   There should be no vacuum.

   - If there is no vacuum, go on to step 6.
   - If there is vacuum, go on to cold advance solenoid valve inspection (pages 12-26 and 12-27).

6. Raise engine speed to above 1,500 min^{-1} (rpm) and check for vacuum.

   There should be vacuum.

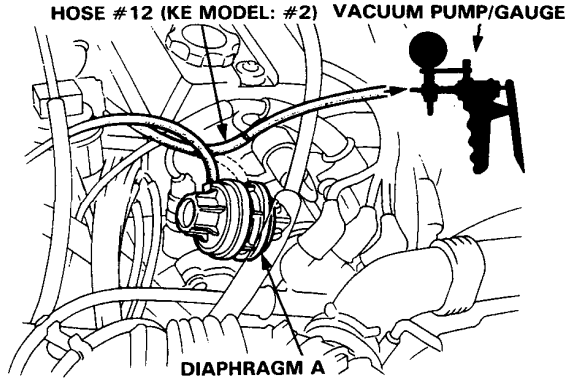
   - If there is vacuum, go on to step 7.
   - If there is no vacuum, go on to cold advance solenoid valve inspection (pages 12-26 and 12-27).

7. If there is no abnormality at each test, inspect the vacuum advance diaphragm (page 26-9).

[Except KQ Model]

NOTE:
- On KX Model, engine coolant temperature must be below 20°C (68°F).
- On KY Model, engine coolant temperature must be below 60°C (140°F) and intake air temperature must be below 20°C (68°F).
- Other models, engine coolant temperature must be below 45°C (113°F) and intake air temperature must be below 20°C (68°F).

1. Disconnect vacuum hose #12 (KE Model: #2) from the vacuum advance diaphragm A on the distributor and connect a vacuum pump/gauge to the hose.

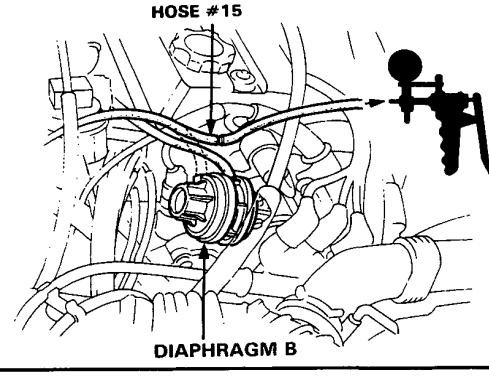


2. Start the engine, allow it to idle and check for vacuum.

   There should be vacuum.

   - If there is no vacuum, check the vacuum line for leaks, blockage or a disconnected hose and re-test.
   - If there is vacuum, go on to step 3.

3. Disconnect vacuum hose #15 from the vacuum advance diaphragm B on the distributor and connect a vacuum pump/gauge to the hose.



4. Allow the engine to idle and check for vacuum.

   There should be vacuum.

   - If there is vacuum, go on to step 5.
   - If there is no vacuum, check the vacuum line for leaks, blockage or a disconnected hose.
     If no problem, go on to cold advance selenoid valve inspection (page 12-26 and 12-27).

5. Wait for the engine to warm up (cooling fan comes on).
   Check for vacuum at idle.

   There should be no vacuum.

   - If there is no vacuum, go on to step 6.
   - If there is vacuum, go on to cold advance solenoid valve inspection (pages 12-26 and 12-27).

6. If there is no abnormality at each test, inspect the vacuum advance diaphragm (page 26-9).

(cont'd)

Ignition Timing Controls (cont'd)

Cold Advance Solenoid Valve

The cold advance selenoid valve is activated by commands from the ECU. When the selenoid valve opens, this causes vacuum in the #15 vacuum hose and sends vacuum to diaphragm B to improve cold engine performance under the following conditions:

[KQ Model]
- When the coolant temperature is 60—100°C (140—212°F), it is operated by the control unit which receives signals from the engine speed and manifold vacuum.
- Whenever the coolant temperature is below 60°C (140°F).

[KX Model]
- Whenever the coolant temperature is below 20°C (68°F).

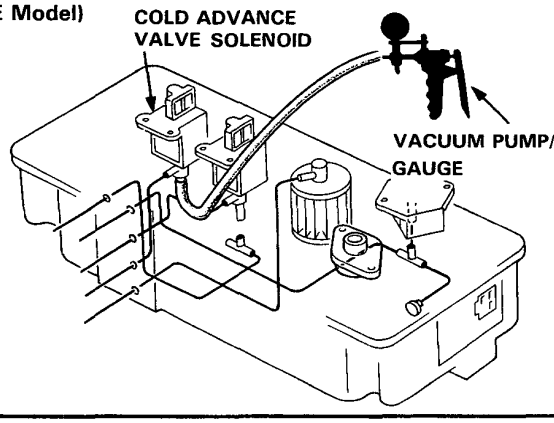
[KY Model]
- Whenever the coolant temperature is below 60°C (140°F) and the intake air temperature is below 20°C (68°F).

[Other Models]
- Whenever the coolant temperature is below 45°C (113°F) and the intake air temperature is below 20°C (68°F).

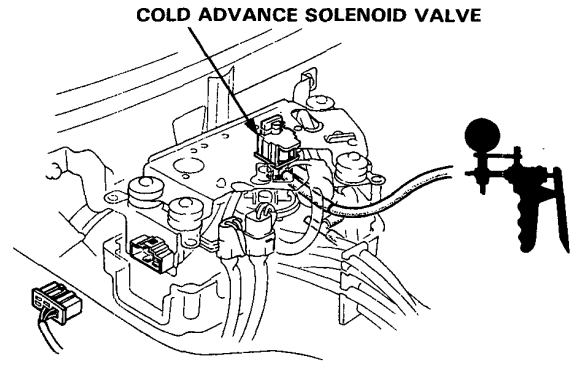
[Except KQ and KY Models]

1. Open the control box lid and disconnect the rectangular connector from the control box.
2. Disconnect the lower vacuum hose of the cold advance selenoid valve (between the selenoid valve and the three-way joint) from the three-way joint.
3. Apply vacuum to the hose.
   It should hold vacuum.
   If it does not hold vacuum, replace the valve.

(KE Model)

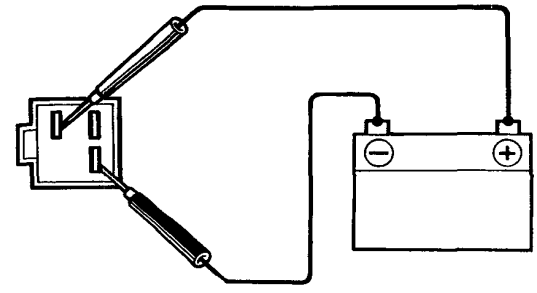


(Except KE Model)

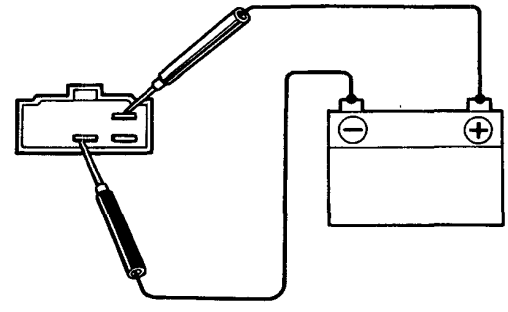


4. Connect the battery positive terminal to the Black/Yellow terminal of the control box coupler, and the battery negative terminal to the Yellow/Green terminal.

(KE Model)



(Except KE Model)



5. Apply vacuum to the hose.
   It should not hold vacuum.
   If it holds vacuum, replace the valve.

[KQ and KY Models]

1. Disconnect the rectangular connector from the control box.

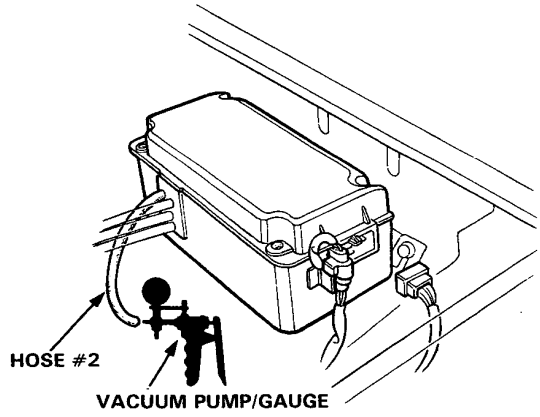
2. Disconnect vacuum hose #12:
   KQ Model: From the three-way joint (between the control box and the intake manifold).
   KY Model: From the vacuum hose manifold.

3. Apply vacuum to the hose.
   It should hold vacuum.

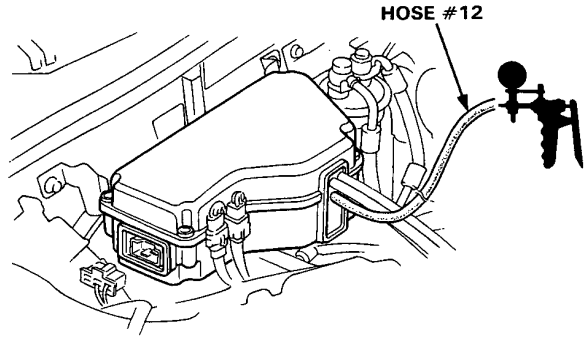
   If it does not hold vacuum, check for the check valve and hose #12.

   - If the check valve and hose #12 are OK, replace the solenoid valve.

(KQ Model)



(KY Model)



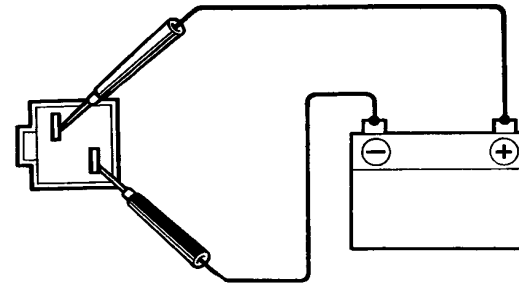
4. Connect the battery positive terminal to the Black/Yellow terminal of the control box coupler, and the battery negative terminal to the Yellow/Green terminal.

5. Apply vacuum to the hose.
   It should not hold vacuum.

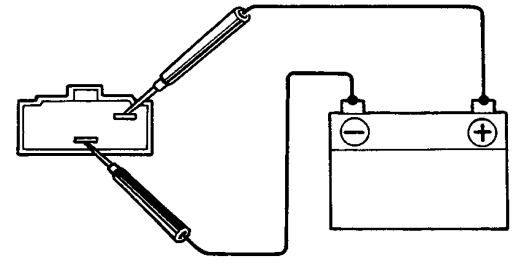
   If it holds vacuum, check for the check valve and hose #12.

   - If the check valve and hose #12 are OK, replace the solenoid valve.

(KQ Model)

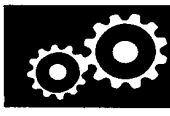


(KY Model)



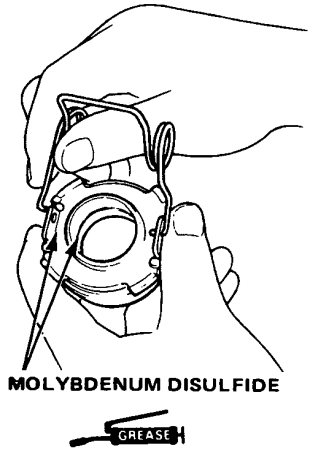
Transaxle

Clutch



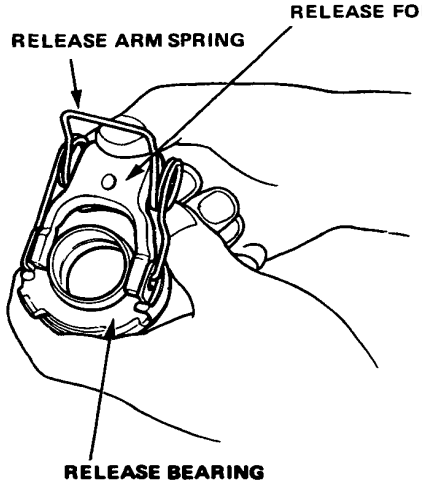
Release Bearing Installation

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



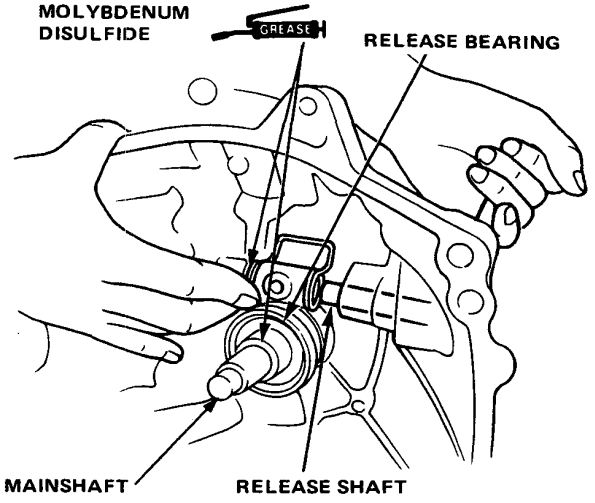
2. Install the release arm spring into the release fork tabs as shown.

3. Install the release fork onto the release bearing with its arms aligned with the tabs.

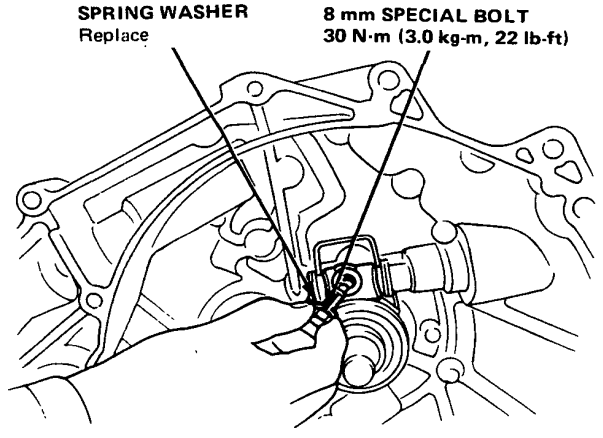


4. Slip the release bearing over the mainshaft, while holding the release arm spring as shown, then install the release shaft.

NOTE: Apply molybdenum disulfide grease to the sliding surfaces of the mainshaft and release shaft.



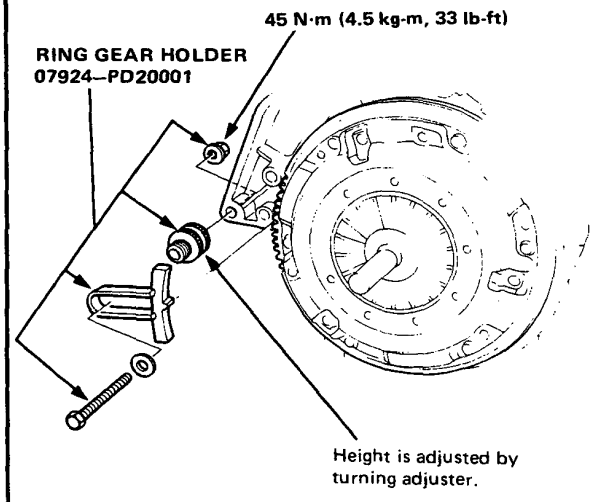
5. Align the hole on the release shaft with the one on the release fork then install the 8 mm special bolt and new spring washer.

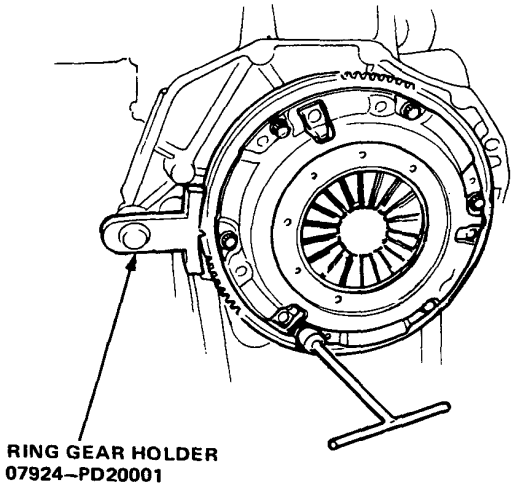


6. After installation, pull release arm up, then let it down, to be sure fork fits against bearing holder properly, and holder slides freely on sleeve.

Ring Gear Holder Installation

1. Adjust the height of the ring gear holder by turning the height adjuster.
2. Install the ring gear holder to hold the ring gear.





Manual Transmission <B20A1 Engine>

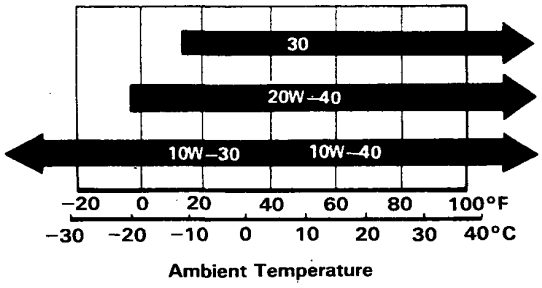
Maintenance

Oil Level Inspection

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

Oil Change

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

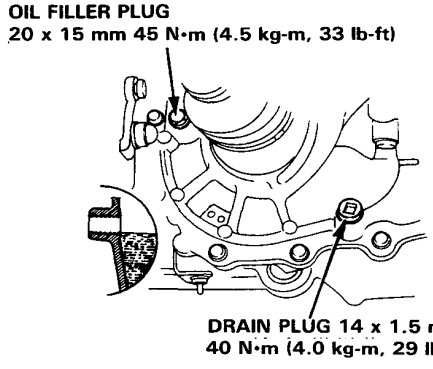


1. With transmission oil at operating temperature, engine OFF, and car on level ground, remove drain plug and drain transmission.
2. Reinstall drain plug with new washer, and refill to proper level.

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

Oil Capacity

1.9 ℓ (2.0 U.S. qt.) after drain.
2.0 ℓ (2.1 U.S. qt.) after overhaul.



Transmission Assembly

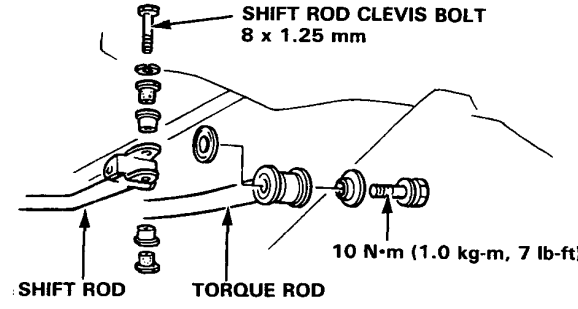
Removal

Car on Ground

1. Disconnect the ground cable at battery and at transmission.
2. Release the steering lock and place gear selector in neutral position.
3. Disconnect the engine compartment wiring as follows:
   - Battery positive cable from starter motor.
   - Black/white wire from starter solenoid.
   - Green/black and yellow wires from back-up light switch.
4. Release the engine sub wire harness from clamp at clutch housing.
5. Disconnect the clutch cable at the release arm.
6. Remove the two upper transmission mounting bolts.

Car Raised on Hoist

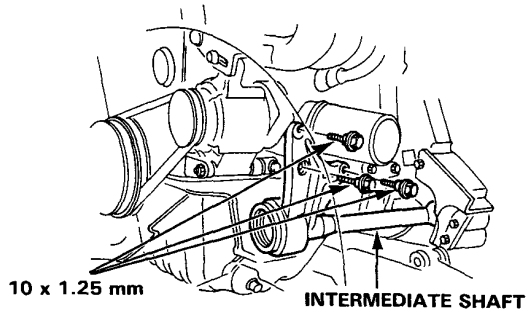
7. Drain transmission oil. Reinstall drain plug and washer.
8. Remove front wheels.
9. Place transmission jack securely beneath transmission.
10. Remove bolt securing speedometer drive holder and pull assembly out of transmission.
11. Disconnect shift lever torque rod from clutch housing.
12. Remove bolt from shift rod clevis.



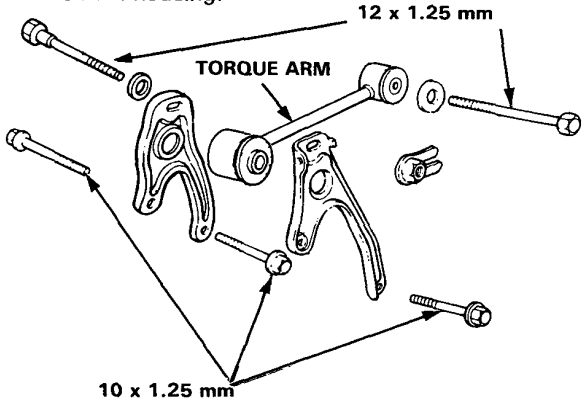
13. Disconnect the tie-rod ball joints and remove using the Ball Joint Remover.
14. Remove the lower arm ball joint bolt from the rightside lower control arm, then use a puller to disconnect the ball joint from the knuckle. Remove the damper fork bolt.

15. Turn each steering knuckle to its most outboard position. With screwdriver, pry right-side CV joint out approximately 1/2", then pull sub-axle out of transmission housing. Repeat on opposite side. Remove the right-side radius rod.

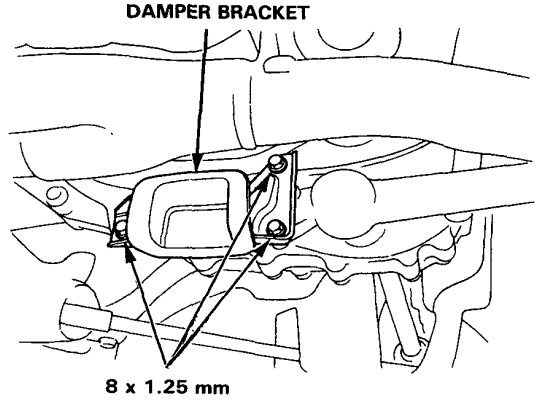
16. Remove the intermediate shaft from clutch housing.



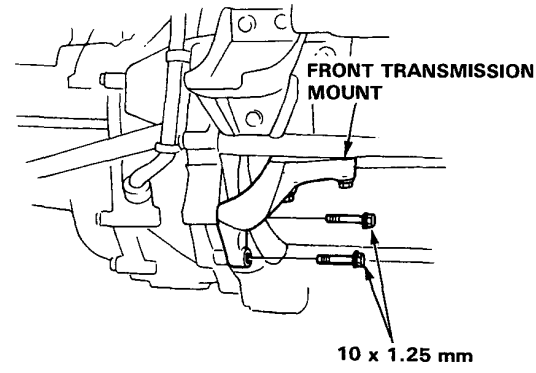
17. Remove the torque arm bracket bolts from the clutch housing.



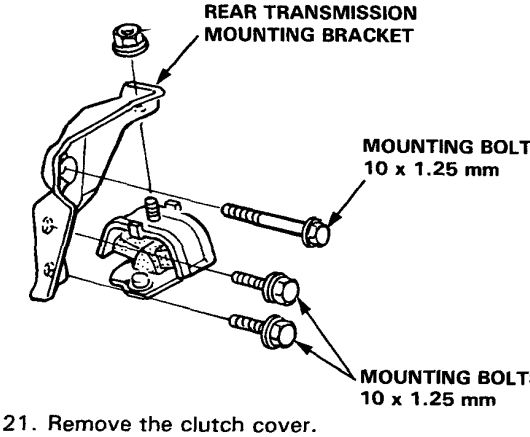
18. Remove the damper bracket from the transmission.



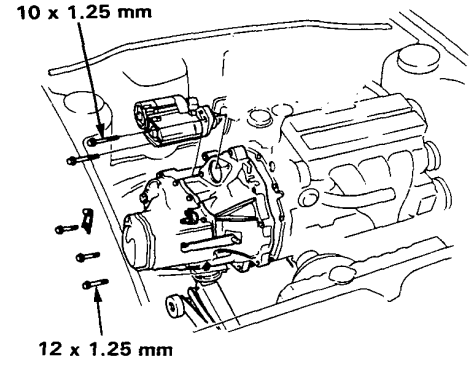
19. Remove the clutch housing bolts from the front transmission mount.



20. Remove the clutch housing bolts from the rear transmission mounting bracket.



21. Remove the clutch cover.
22. Remove the starter mounting bolts. Detach the starter motor and lower through chassis.
23. Remove the front transmission mounting bolt.
24. Pull transmission away from the engine block to clear the two 14 mm dowel pins and lower on transmission jack.

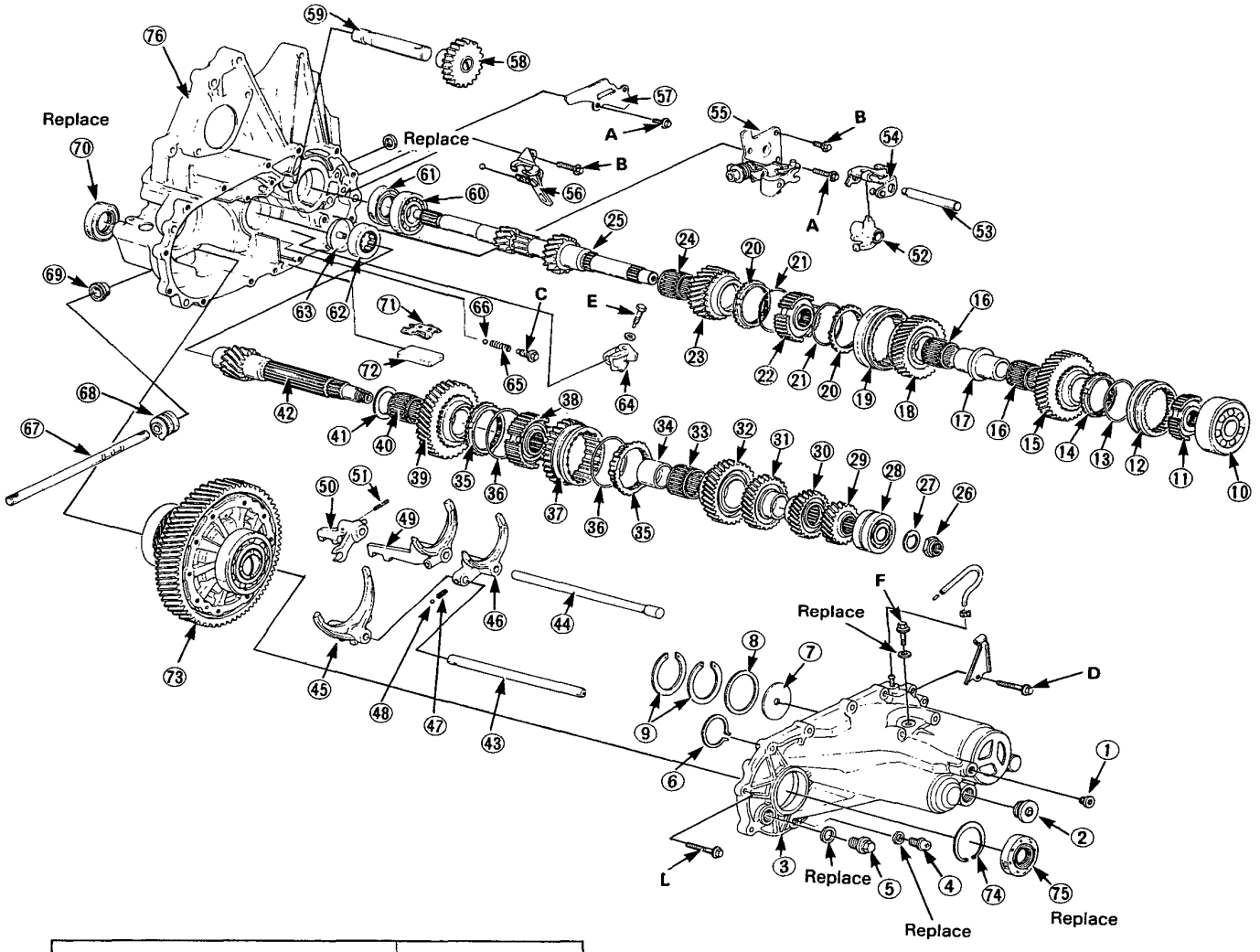


Illustrated Index

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

Lubricate all parts with oil before reassembly.

NOTE: This transmission uses no gaskets between the major housings; use Honda P/N 08740—99986 sealant. Assemble the housings within 20 minutes after applying the sealant and allow it to cure at least 30 minutes after assembly before filling the transmission with oil.



Torque Value	Bolt Size
A-12 N·m (1.2 kg-m, 9 lb-ft)	1-6 x 1.0 mm
B-14 N·m (1.4 kg-m, 10 lb-ft)	2-8 x 1.25 mm
C-22 N·m (2.2 kg-m, 16 lb-ft)	3-10 x 1.5 mm
D-26 N·m (2.6 kg-m, 19 lb-ft)	
E-29 N·m (2.9 kg-m, 21 lb-ft)	
F-55 N·m (5.5 kg-m, 40 lb-ft)	

NOTE: Always clean the magnet ⑫ whenever the transmission housing is disassembled.

① 18 mm SEALING BOLT
35 N·m (3.5 kg-m, 25 lb-ft)
② 32 mm SEALING BOLT
70 N·m (7.0 kg-m, 51 lb-ft)
③ TRANSMISSION HOUSING
④ OIL DRAIN PLUG
40 N·m (4.0 kg-m, 29 lb-ft)
⑤ OIL FILLER BOLT
45 N·m (4.5 kg-m, 33 lb-ft)
⑥ SNAP RING
⑦ OIL GUIDE PLATE
⑧ 75 mm DISH SPRING
⑨ THRUST SHIM
Inspection, page 14-14
⑩ MAINSHAFT BALL BEARING
⑪ 5th GEAR SYNCHRO HUB
⑫ 5th GEAR SYNCHRO SLEEVE
⑬ SYNCHRO SPRING
⑭ 5th GEAR SYNCHRO RING
⑮ 5th GEAR
Inspection, page 14-24
⑯ NEEDLE BEARING
⑰ COLLAR
Inspection, page 14-24
⑱ 4th GEAR
Inspection, page 14-24
⑲ SYNCHRO SLEEVE
⑳ SYNCHRO RING
㉑ SYNCHRO SPRING
㉒ SYNCHRO HUB
㉓ 3rd GEAR
Inspection, page 14-23
㉔ NEEDLE BEARING
㉕ MAINSHAFT
Disassembly, page 14-16
Inspection, page 14-20
Measurement, page 14-23
㉖ COUNTERSHAFT LOCKNUT
110 N·m (11.0 kg-m, 80 lb-ft)
㉗ LOCK WASHER
㉘ COUNTERSHAFT BALL BEARING
㉙ COUNTERSHAFT 5th GEAR
㉚ COUNTERSHAFT 4th GEAR
㉛ COUNTERSHAFT 3rd GEAR
㉜ COUNTERSHAFT 2nd GEAR
㉝ NEEDLE BEARING
㉞ COLLAR
㉟ SYNCHRO RING
㊱ SYNCHRO SPRING
㊲ REVERSE GEAR
㊳ SYNCHRO HUB
㊴ 1st GEAR
㊵ NEEDLE BEARING
㊶ THRUST WASHER
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㊸ SHIFT FORK SHAFT
㊹ SHIFT FORK SHAFT
㊺ 1st GEAR SHIFT FORK
㊻ 5th GEAR SHIFT FORK
㊼ DETENT SPRING
㊽ DETENT BALL
㊾ 3rd/4th GEAR SHIFT FORK
㊿ 5th/REVERSE GEAR SHIFT PIECE
(51) 3 mm SPRING PIN
(52) SHIFT SHAFT GUIDE
(53) SHIFT ARM SHAFT
(54) INTERLOCK
(55) GEAR SHIFT ARM HOULDER ASSEMBLY
(56) REVERSE SHIFT FORK
(57) SEPARATOR PLATE
(58) REVERSE IDLE GEAR
(59) REVERSE IDLE GEAR SHAFT
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(62) NEEDLE BEARING
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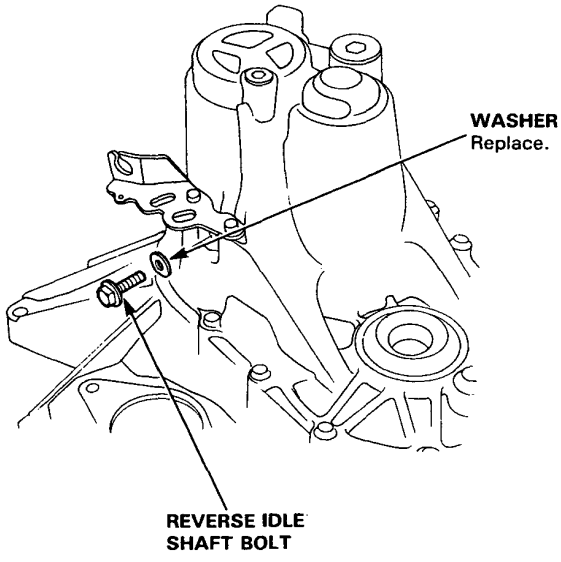
(64) GEAR SHIFT ARM
(65) DETENT SPRING
(66) DETENT BALL
(67) GEAR SHIFT ROD
(68) BOOT
(69) SEAL
(70) SEAL
(71) HOLD-DOWN PLATE
(72) MAGNET
(73) DIFFERENTIAL
(74) SNAP RING
(75) SEAL
(76) CLUTCH HOUSING

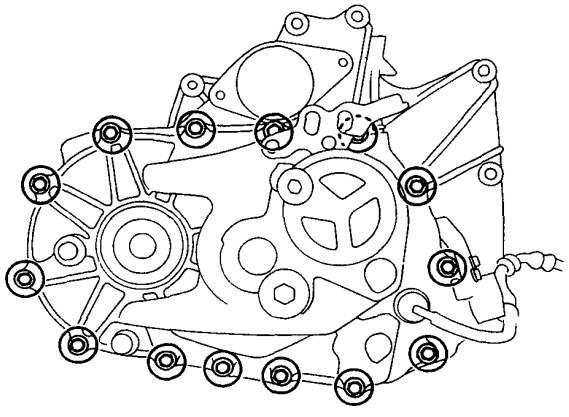
Transmission Housing

Removal

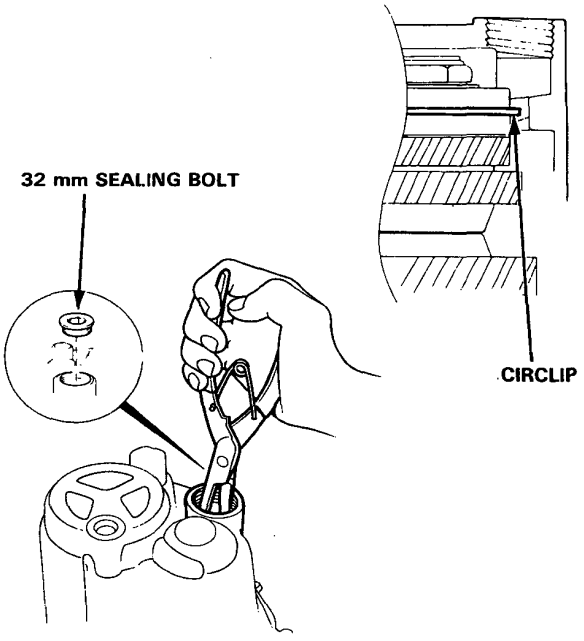
1. Remove the reverse idle shaft bolt shown from the transmission housing.



2. Remove 8 mm bolts attaching the clutch housing to the transmission housing.

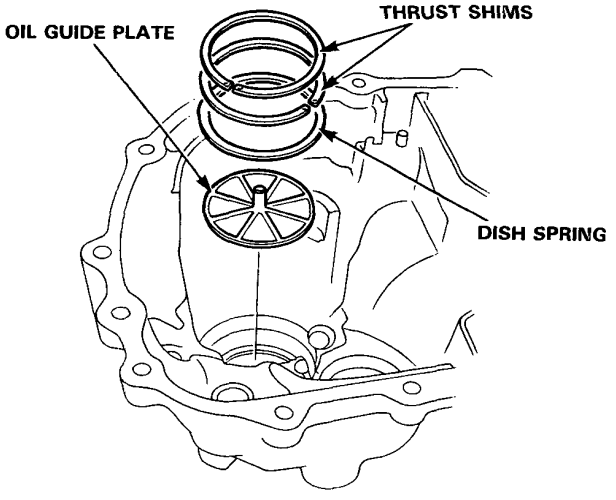


3. Remove the 32 mm sealing bolt and the circlip holding the countershaft ball bearing.



4. Separate the clutch housing from the transmission housing. Clean the mating surfaces thoroughly.

5. Remove the thrust shim, dish spring and oil guide plate from the transmission housing.



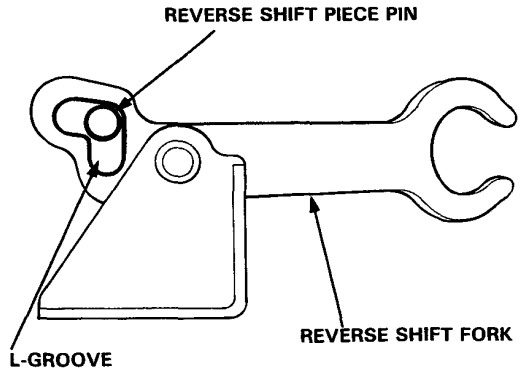
Reverse Shift Fork/ 5th Reverse Shift Fork

Clearance Inspection

1. Measure the clearance between the reverse shift fork and 5th/reverse shift piece pin.

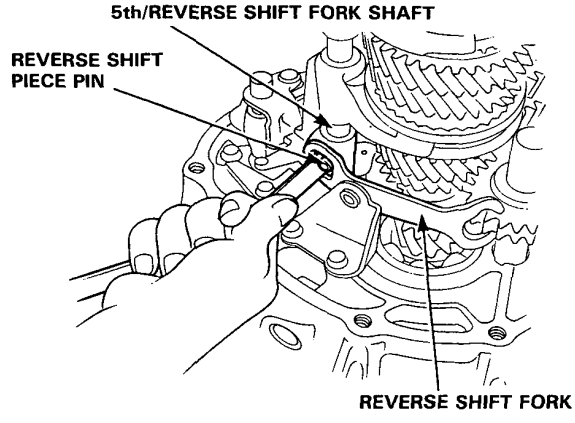
   Standard: 0.05—0.35 mm (0.002—0.014 in.)
   Service Limit: 0.5 mm (0.020 in.)

2. If the clearance is outside the above limits, measure the width of the L-groove in the reverse shift fork.



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

3. Replace the reverse shift fork with a new one if the width exceeds 7.25 mm.

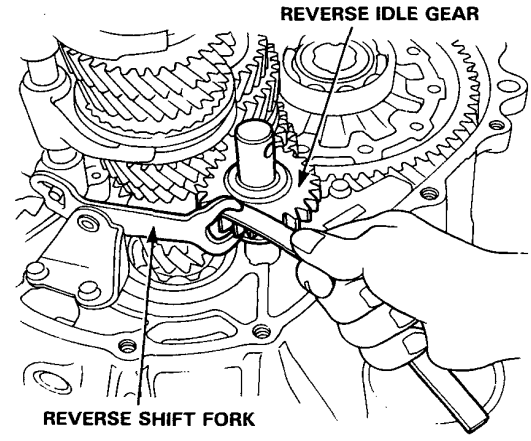


Reverse Shift Fork/ Reverse Idle Gear

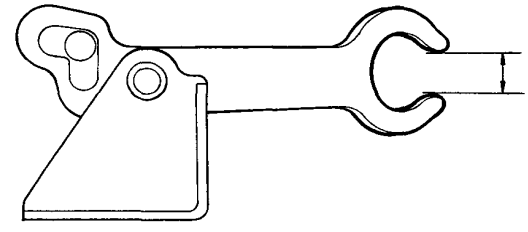
Clearance Inspection

1. Measure the clearance between the reverse idle gear and reverse shift fork.

   Standard: 0.5—1.1 mm (0.020—0.043 in.)
   Service Limit: 1.8 mm (0.071 in.)



2. If the clearance exceeds 1.8 mm (service limit), measure the width of the reverse shift fork pawl groove.



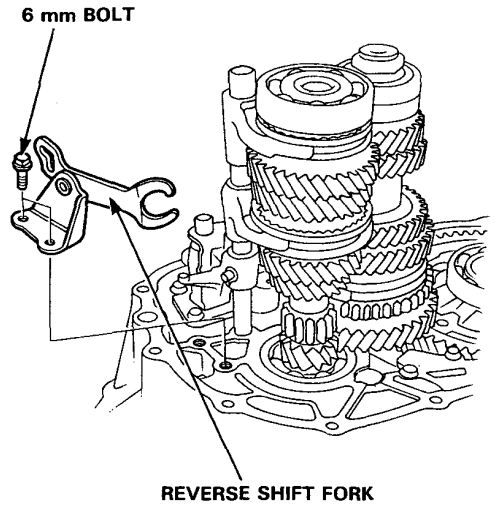
   Standard: 13.0—13.3 mm (0.512—0.524 in.)

3. If the width is outside the above limits, replace the shift fork with a new one.

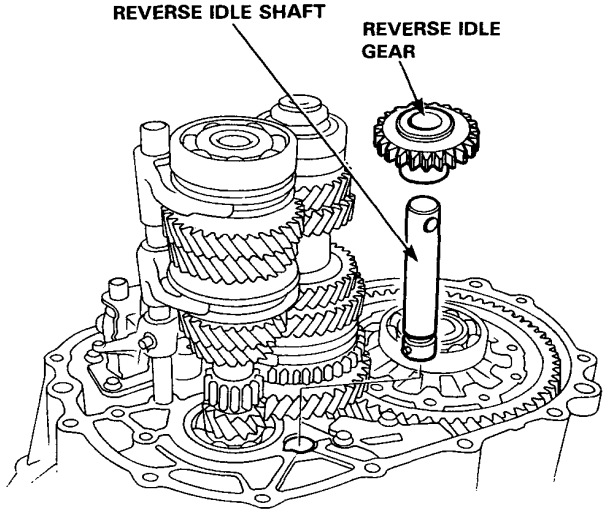
Reverse Shift Fork/ Reverse Idle Gear

Removal

1. Remove the reverse shift fork from the clutch housing.



2. Remove the reverse idle shaft and reverse idle gear from the clutch housing together.



Shift Arm Holder/ Shift Piece

Clearance Inspection

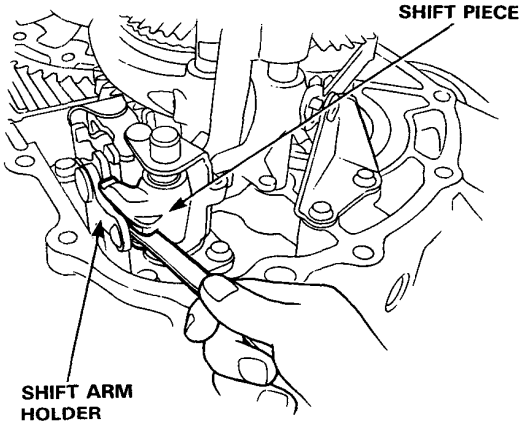
1. Measure the clearance between the shift arm holder and shift piece.

   Standard: 0.1—0.3 mm (0.004—0.019 in.)
   Service Limit: 0.6 mm (0.024 in.)

2. If the clearance is outside the above limits, measure the width of the groove in the shift piece.

   Standard: 7.9—8.0 mm (0.311—0.315 in.)

3. Replace the shift arm with the new one if the width exceeds 8.0 mm.



Selector Arm/Interlock

Clearance Inspection

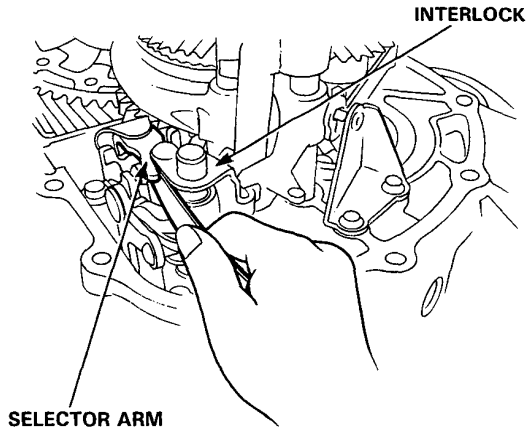
1. Measure the clearance between the selector arm and interlock.

   Standard: 0.05—0.20 (0.002—0.008 in.)
   Service Limit: 0.45 mm (0.017 in.)

2. If the clearance is outside the above limits, measure the width of the groove in the selector arm.

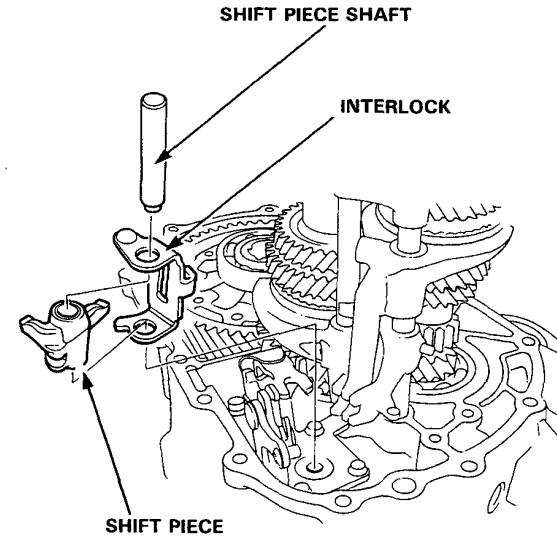
   Standard: 9.9—10.0 mm (0.390—0.394 in.)

3. Replace the selector arm with a new one if the width exceeds 10.0 mm (0.394 in.)

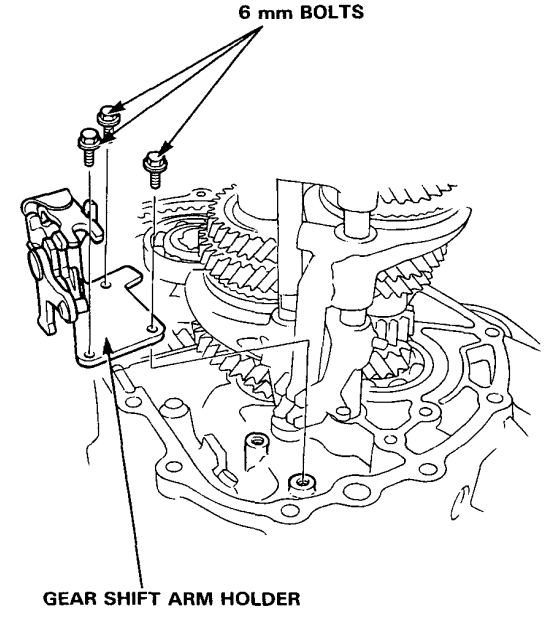


Removal

1. Remove the shift piece shaft, shift piece and interlock from the clutch housing.



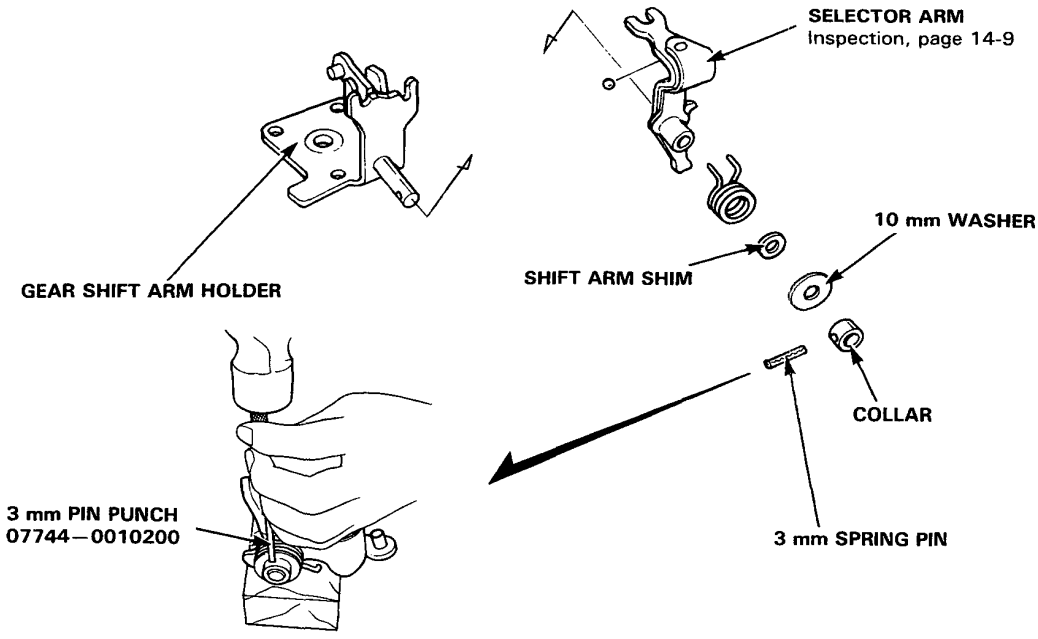
2. Remove the gear shift arm holder assembly from the clutch housing.



Shift Arm Holder

Disassembly

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



Clearance Inspection

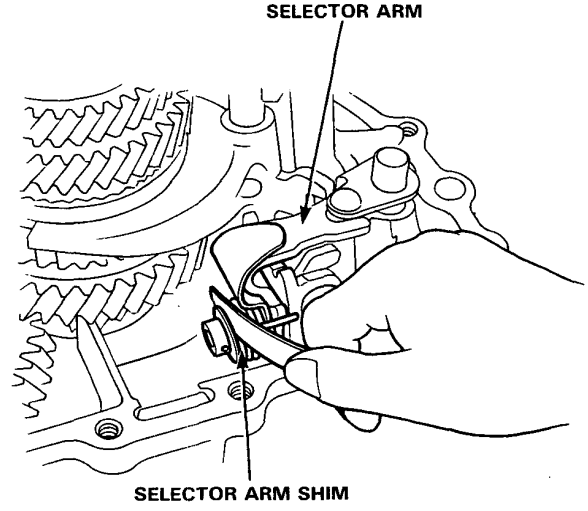
1. Measure the clearance between the gear shift arm holder and the selector arm shim.

   Standard: 0.01—0.2 mm (0.0003—0.008 in.)

2. If the clearance is outside the above limits, select the appropriate selector arm shim for the correct clearance from the chart below.

   Thickness of Select or Arm Shim

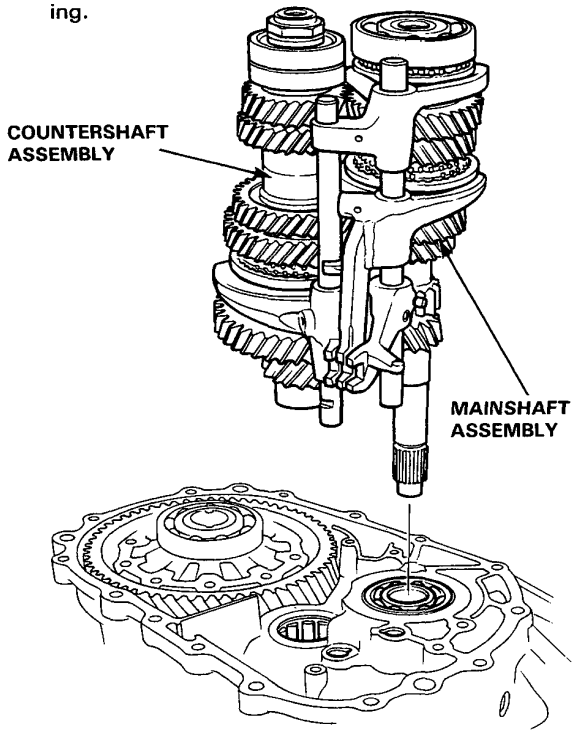
Class	Thickness
A	0.8 mm (0.032 in.)
B	1.0 mm (0.039 in.)
C	1.2 mm (0.047 in.)
D	1.4 mm (0.055 in.)
E	1.6 mm (0.063 in.)



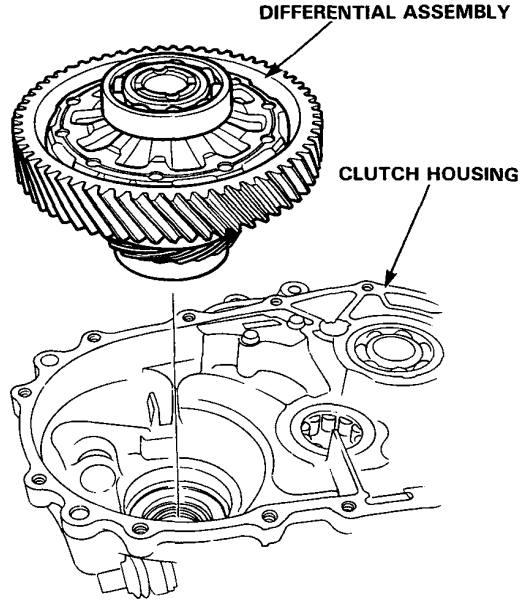
Transmission Assembly

Removal

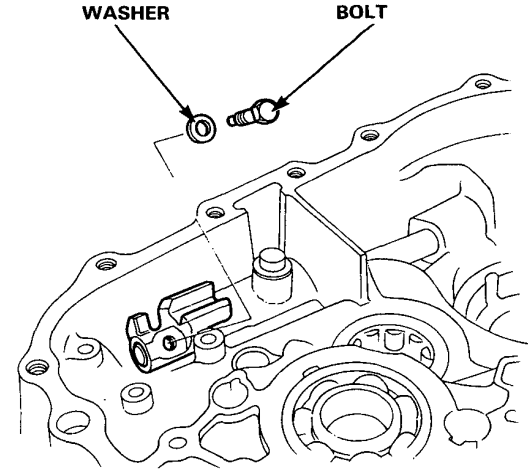
1. Remove the mainshaft assembly and countershaft assembly with the shift fork from the clutch housing.



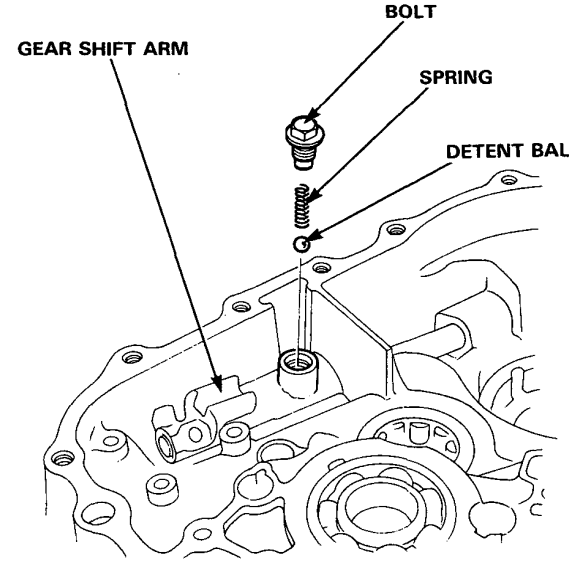
2. Remove the differential assembly from the clutch housing.



3. Remove the bolt and washer which hold the gear shift arm.



4. Remove the detent ball and spring from the clutch housing.

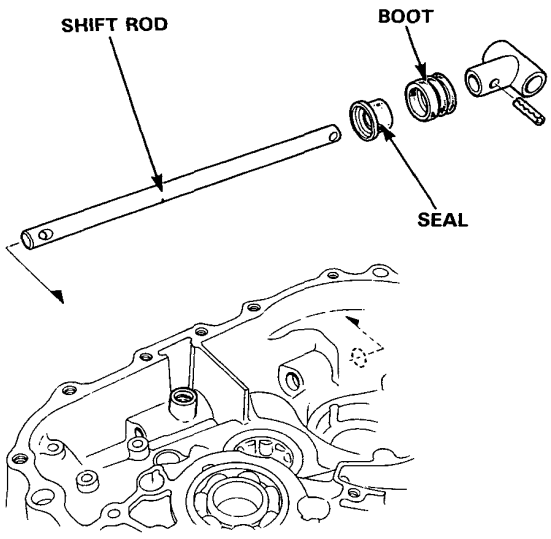


(cont'd)

Transmission Assembly

Removal (cont'd)

5. Remove the shift rod and boot from the clutch housing.



Shift Arm Holder

Clearance Inspection

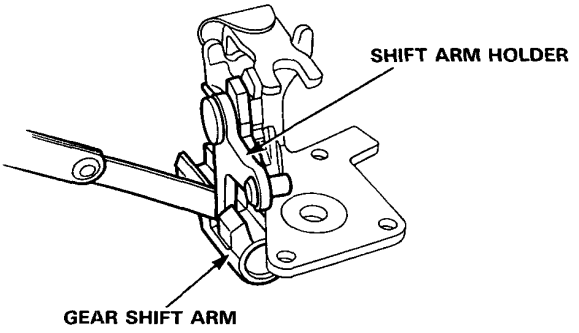
1. Measure the clearance between the shift arm holder and the gear shift arm.

   Standard: 0.05—0.35 mm (0.002—0.014 in.)
   Service Limit: 0.8 mm (0.032 in.)

2. If the clearance is outside the above limits, measure the width of the groove in the gear shift arm.

   Standard: 12.8—13.0 mm (0.504—0.512 in.)

3. If the width of the groove is outside the standard, replace the gear shift arm with a new one.



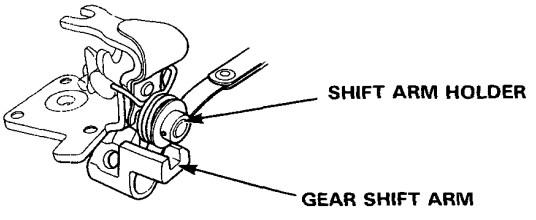
1. Measure the clearance between the selector arm and the gear shift arm.

   Standard: 0.05—0.25 mm (0.002—0.010 in.)
   Service Limit: 0.5 mm (0.020 in.)

2. If the clearance is outside the limits, measure the width of the groove in the selector arm.

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

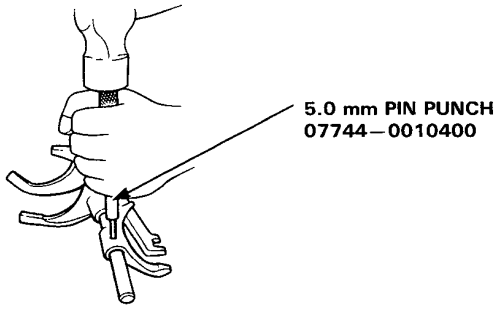
3. If the width is outside the standard, replace the selector arm with a new one.

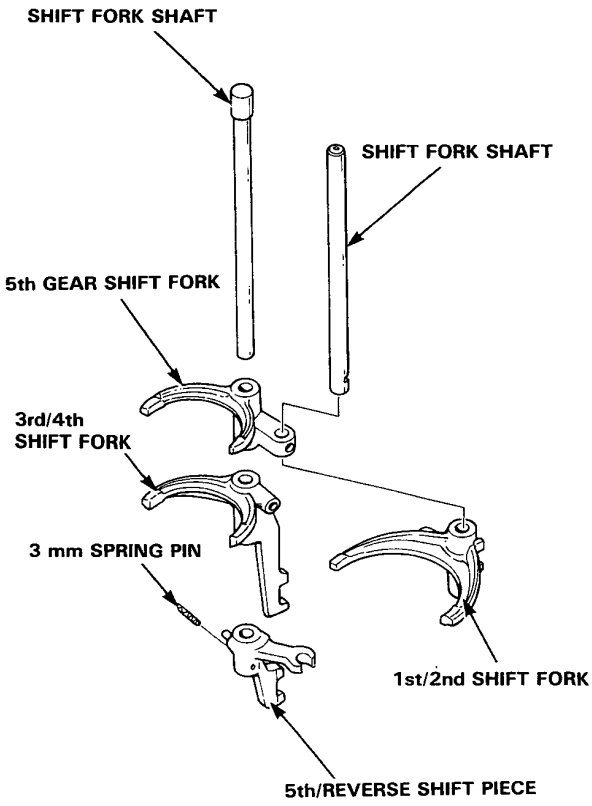


Shift Fork

Removal

1. Remove the shift fork shaft by removing the spring pin on 5th/Reverse shift piece.

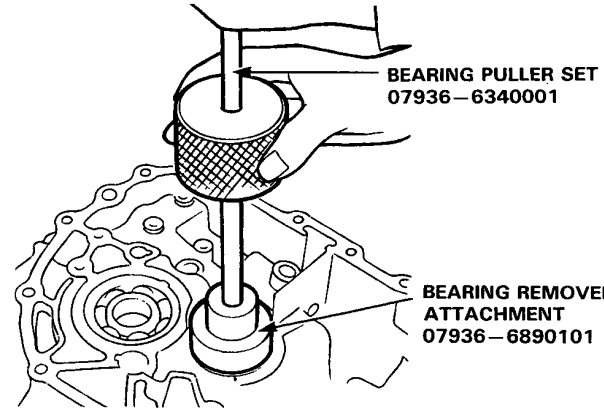




Countrshaft Bearing (Clutch Housing)

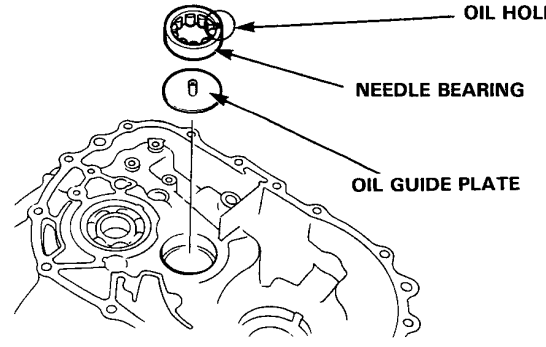
Replacement

1. Remove the needle bearing with the bearing puller.

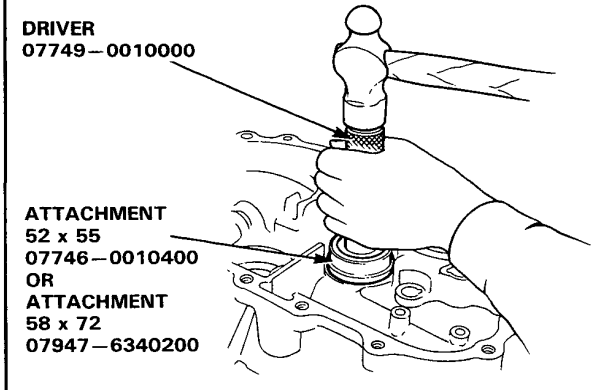


2. Position the oil guide plate and new needle bearing in the bore of the clutch housing.

   NOTE: Position the needle bearing with the oil hole facing up.



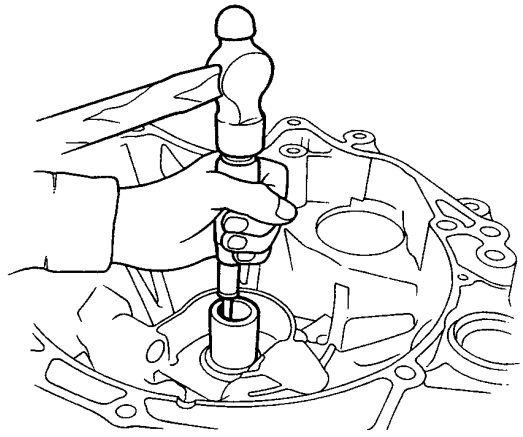
3. Drive the needle bearing in using the tools shown.



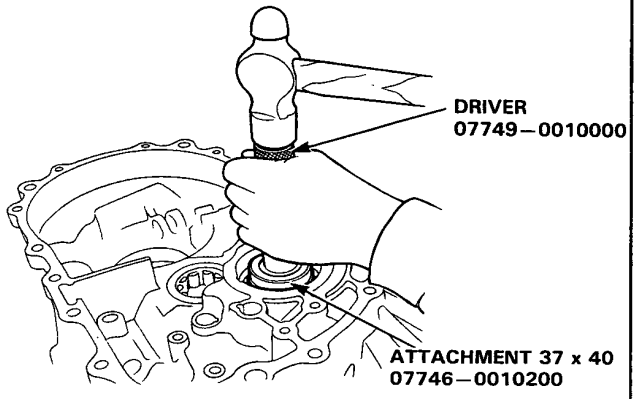
Mainshaft Bearing/Oil Seal (Clutch Housing)

Replacement

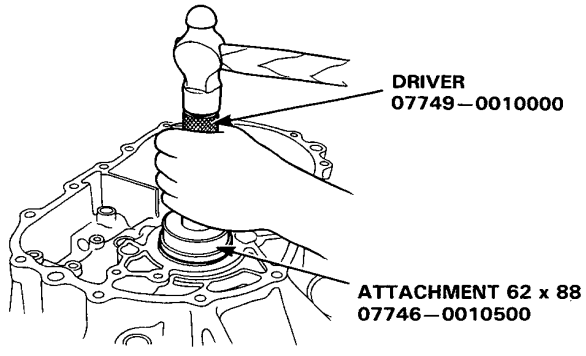
1. Remove the mainshaft bearing and oil seal from the clutch side.



2. Drive in a new oil seal from the transmission side.



3. Using the tools as shown, drive in a new bearing from the transmission side.

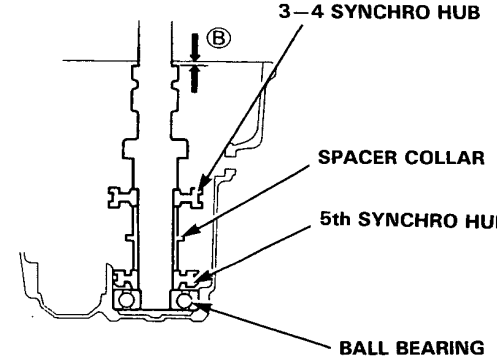


Mainshaft/Countershaft

Thrust Shim Selection

1. Remove the thrust shim, dish spring and oil guide plate from the transmission housing. (See Page 14-6).

2. Install the 3–4 synchro hub, spacer collar, 5th synchro hub, and ball bearing on the mainshaft; install the above assembly in the transmission case.

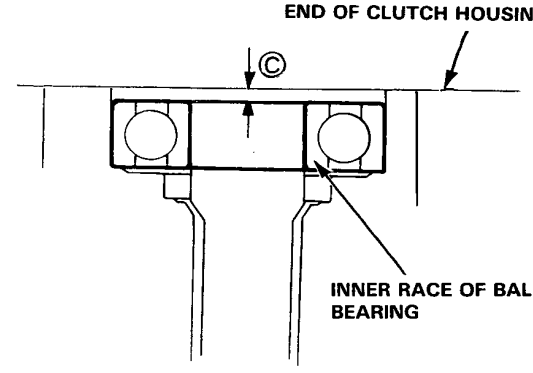


3. Measure distance Ⓑ between the end of the transmission housing and mainshaft.

   NOTE:
   - Use a straight edge and vernier caliper.
   - Measure at three locations and average the reading.

4. Measure distance Ⓒ between the end of the clutch housing and bearing inner race.

   NOTE:
   - Use a straight edge and feeler gauge.
   - Measure at three locations and average, the readings.



5. Calculate the thickness of shim to be added as follows:
   - Add the measurements recorded for (B) (step 3) and (C) (step 4).
   - Subtract 1 mm (0.039 in.), i.e., the height of the dish spring after installation; the remainder is the shim thickness needed.

   Example:

   B: 1.94
   +C: 0.06
   = 2.0 − 1.0 = 1.0
   Shim needed: 1.00 mm

   NOTE: When making measurement (C), if the inner race protrudes above the clutch housing, measure the height it protrudes and subtract this amount from measurement (B); then subtract the 1.0 mm dish spring to compute the shim needed.

   Example:

   B: 1.94
   −C: 0.06
   = 1.88 − 1.0 = 0.88
   Shim needed: 0.9 mm

Part No.	Thickness
23931−PG1−0100	0.5 mm (0.020 in.)
23932−PG1−0100	0.55 mm (0.022 in.)
23933−PG1−0100	0.6 mm (0.024 in.)
23934−PG1−0100	0.65 mm (0.026 in.)
23935−PG1−0100	0.7 mm (0.028 in.)
23936−PG1−0100	0.75 mm (0.030 in.)
23937−PG1−0100	0.8 mm (0.032 in.)
23938−PG1−0100	0.85 mm (0.033 in.)
23939−PG1−0100	0.9 mm (0.035 in.)
23940−PG1−0100	0.95 mm (0.037 in.)
23941−PG1−0100	1.0 mm (0.039 in.)
23942−PG1−0100	1.05 mm (0.041 in.)
23943−PG1−0100	1.1 mm (0.043 in.)
23944−PG1−0100	1.15 mm (0.045 in.)

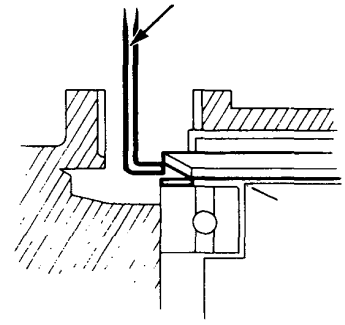
6. Check the thrust clearance in the manner described below.

   - Install the dish spring and shim selected in the transmission housing.

   NOTE: Clean the spring and shim thoroughly before installation.

   - Install the mainshaft in the clutch housing.
   - Place the transmission housing over the mainshaft and onto the clutch housing.
   - Tighten the clutch and transmission housings using several 8 mm bolts.
   - Reach through the 18 mm sealing bolt hole and measure the clearance between the dish spring and thrust shim at its opening.

MAINSHAFT CLEARANCE GAUGE A
07998−SD90200
OR
MAINSHAFT CLEARANCE GAUGE B
07998−SD90300



NOTE: Scale 0.3 mm (07998−SD90200) side should fit whereas the Scale 0.49 mm (07998−SD90300) side should not.

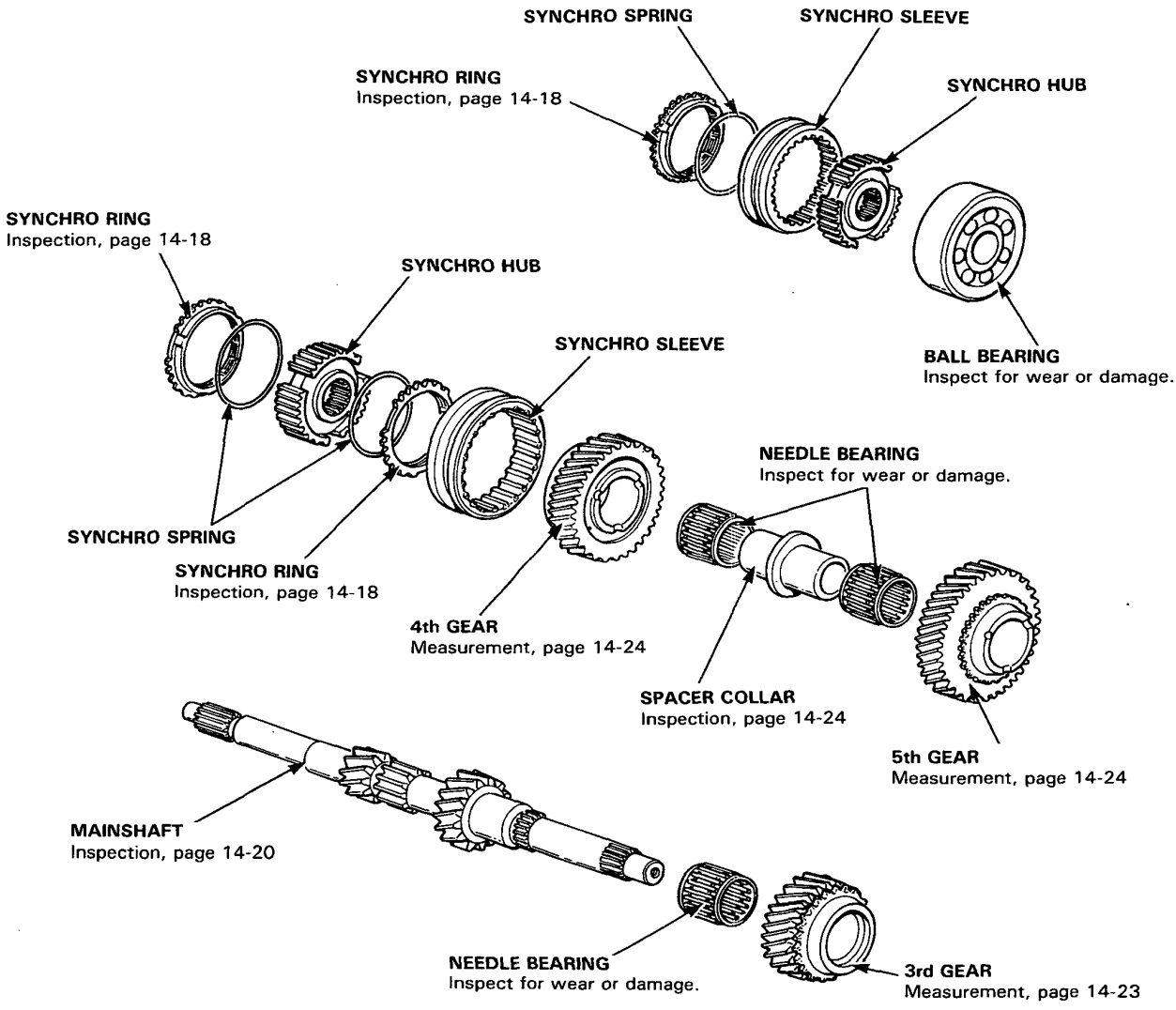
If the clearance is incorrect, readjust in the manner as before.

Mainshaft Assembly

Index

NOTE: The needle bearings are of the same size

Before assembling, clean all parts in solvent, dry them with compressed air, then coat them with clean oil.

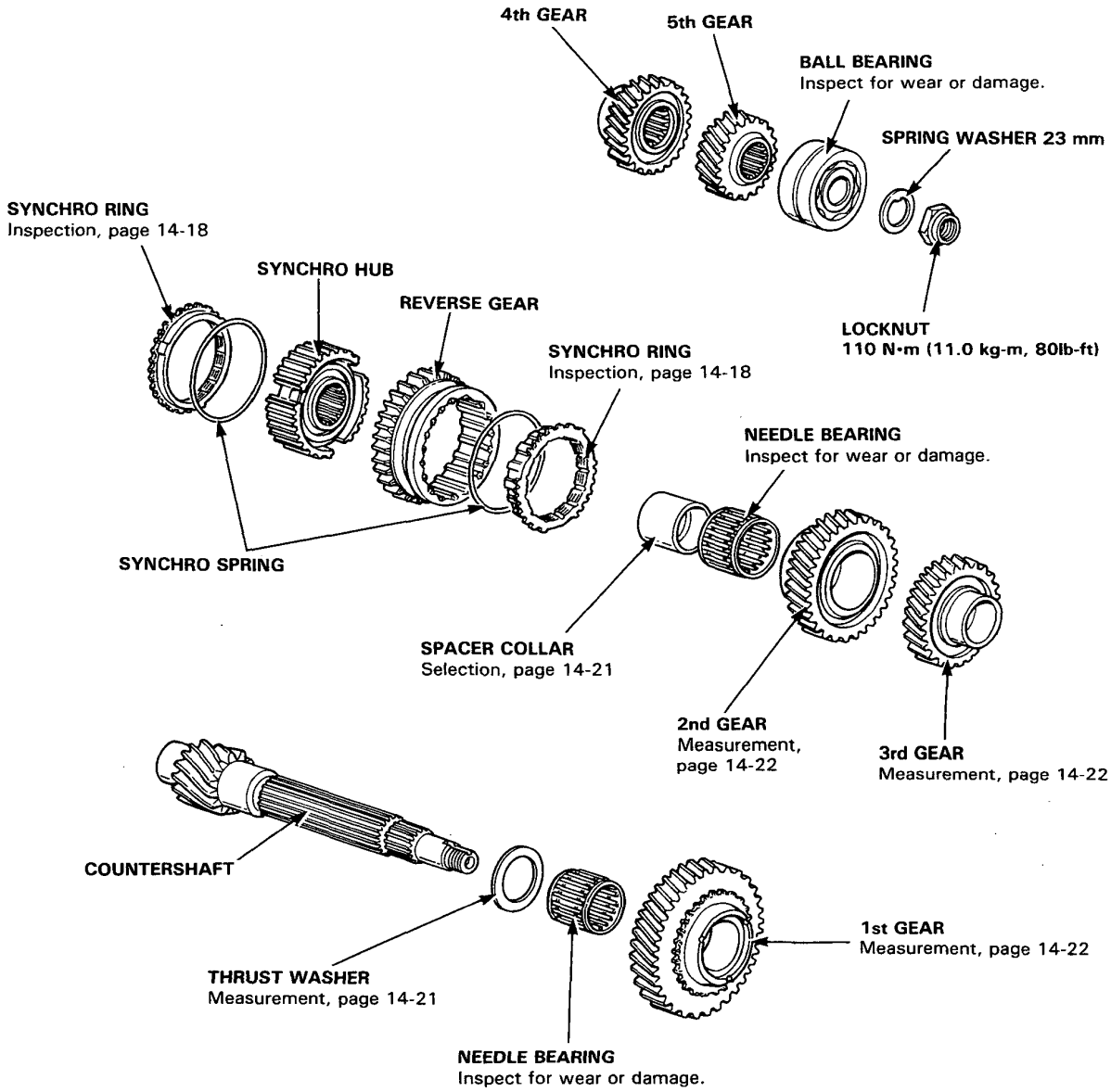


Countershaft Assembly

Index

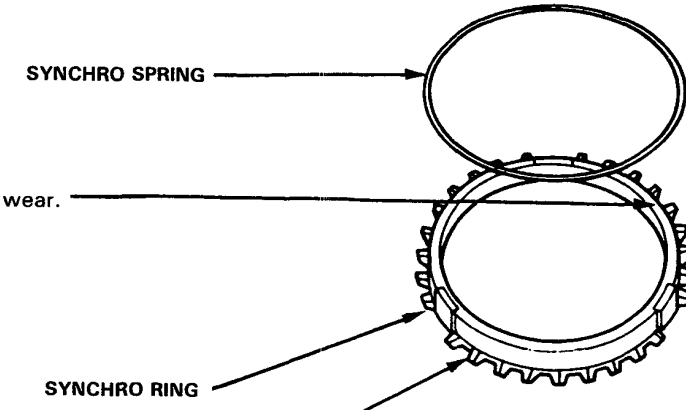
NOTE: The needle bearings are of the same size.

Before assembling, clean all parts in solvent, dry them with compressed air, then coat them with clean oil.



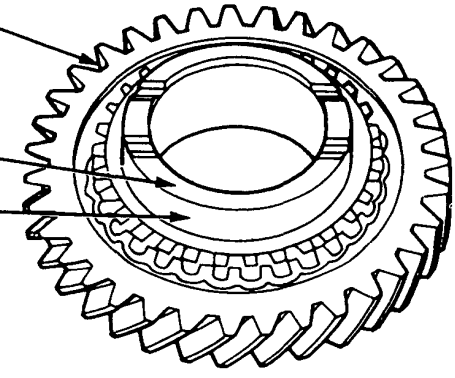
Gear and Synchro Ring

Inspection



1. Inspect the inside of synchro ring for wear.

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



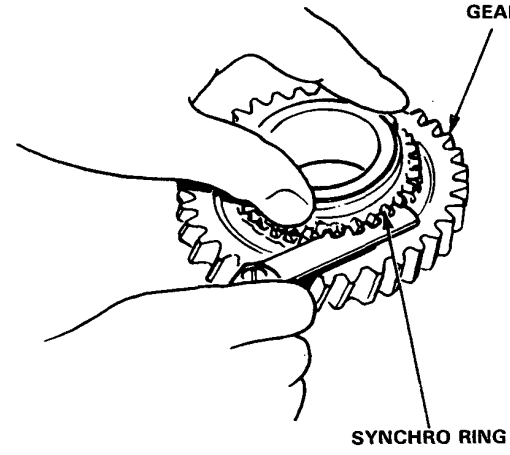
3. Inspect the gear hub thrust surface for wear.

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

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

6. Place the synchro 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): 0.85—1.1 mm (0.033—0.043 in.)
   Service Limit: 0.4 mm (0.016 in.)



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

8. Install the synchro spring on synchronizer ring.

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

Shift Fork/Synchro Sleeve/Synchro Hub/Shift piece

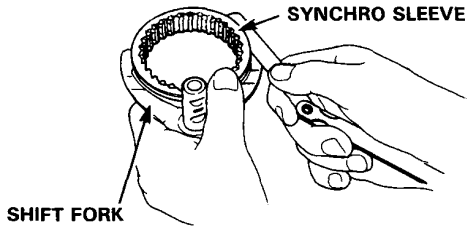
Shift Fork to Synchro Sleeve Clearance

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

	1st, 2nd, 3rd, 4th	5th
Standard	0.45—0.65 mm (0.018—0.026 in.)	1.0 mm (0.039 in.)
Service Limit	0.25—0.45 mm (0.010—0.018 in.)	0.8 mm (0.032 in.)

2. If the clearance exceeds the service limit, measure the thickness of the shift fork fingers.

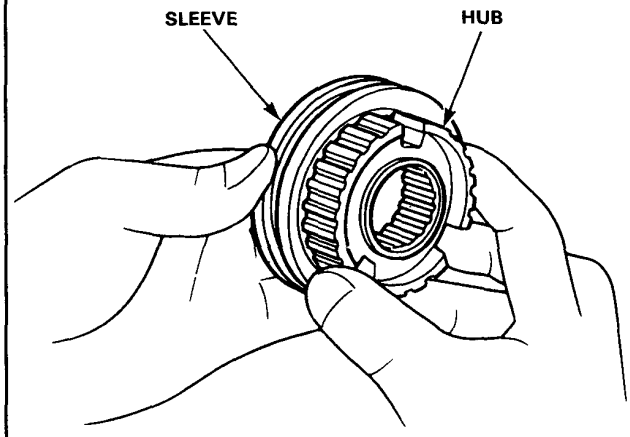
	1st, 2nd, 3rd, 4th	5th
Standard	7.95—8.05 mm (0.313—0.317 in.)	5.75—5.85 mm (0.226—0.230 in.)



Synchro Sleeve and Hub Inspection

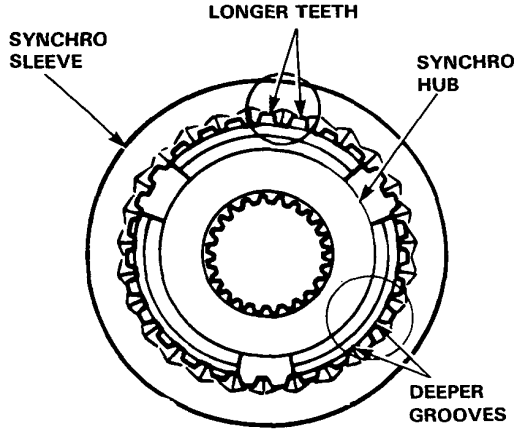
1. Inspect the gear teeth on all synchro hubs and sleeves for rounded off corners, indicating wear.
2. Install each hub in its mating sleeve and check for freedom of movement.

   NOTE: If replacement is required, always replace the synchro sleeve and hub as a unit.



Installing Synchro Hubs in Sleeves

Each synchro sleeve has three sets of longer teeth (120 degrees apart) that must be matched with the three sets of deeper grooves in the hub when assembled.



4th Shift Fork to Shift Piece Clearance

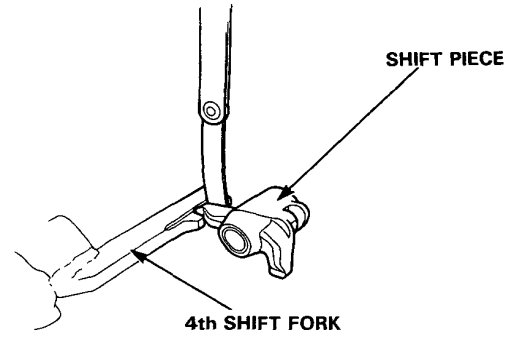
1. Measure the clearance between the 4th shift fork and the shift piece.

   Standard: 0.2—0.5 mm (0.008—0.020 in.)
   Service Limit: 0.8 mm (0.032 in.)

2. If the clearance exceeds the service limit, measure the width of the shift piece.

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

3. Replace the shift piece if the width is outside the standard value with a new one.

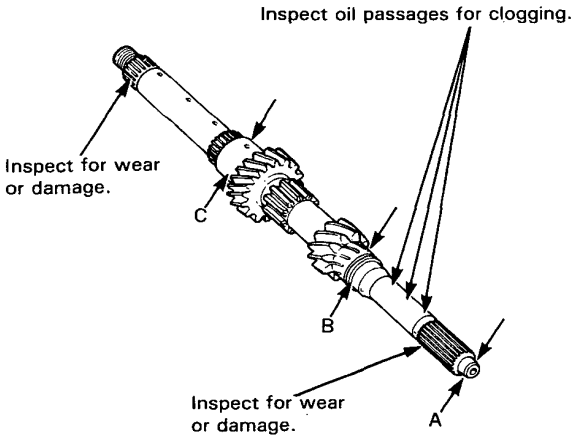


Mainshaft

Inspection

1. Measure gear and bearing O.D.s.

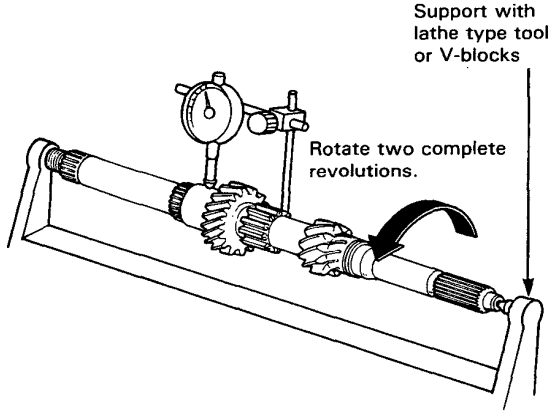
Standard: A: 27.987–28.000 mm (1.102–1.102 in.)
B: 37.984–38.000 mm (1.495–1.496 in.)
C: 27.987–28.000 mm (1.102–1.102 in.)
Service Limit A: 27.94 mm (1.099 in.)
B: 37.93 mm (1.493 in.)
C: 27.94 mm (1.099 in.)



2. Replace the mainshaft if any readings are out of tolerance.

3. Inspect for runout.

Standard: 0.02 mm (0.0008 in.)
Service Limit: 0.05 mm (0.0020 in.)



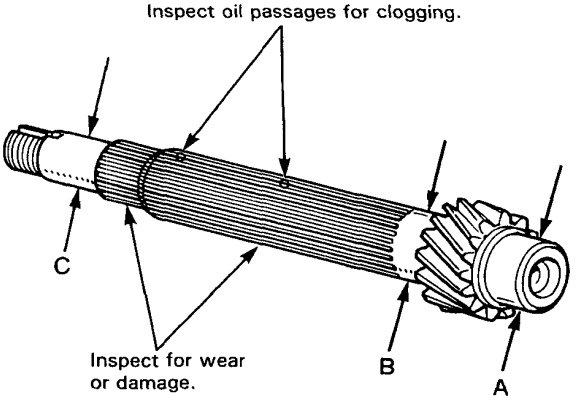
4. Replace the mainshaft if the reading is out of tolerance.

Countershaft

Inspection

1. Measure gear and bearing O.D.s.

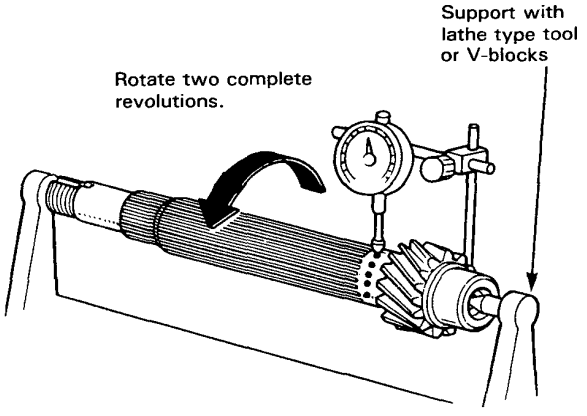
Standard: A: 33.000–33.015 mm (1.299–1.230 in.)
B: 39.984–40.000 mm (1.574–1.575 in.)
C: 24.987–25.000 mm (0.984–0.984 in.)
Service Limit: A: 32.95 mm (1.295 in.)
B: 39.93 mm (1.572 in.)
C: 24.94 mm (0.980 in.)



2. Replace the countershaft if any readings are out of tolerance.

3. Inspect for runout.

Standard: 0.02 mm (0.0008 in.)
Service Limit: 0.05 mm (0.0019 in.)



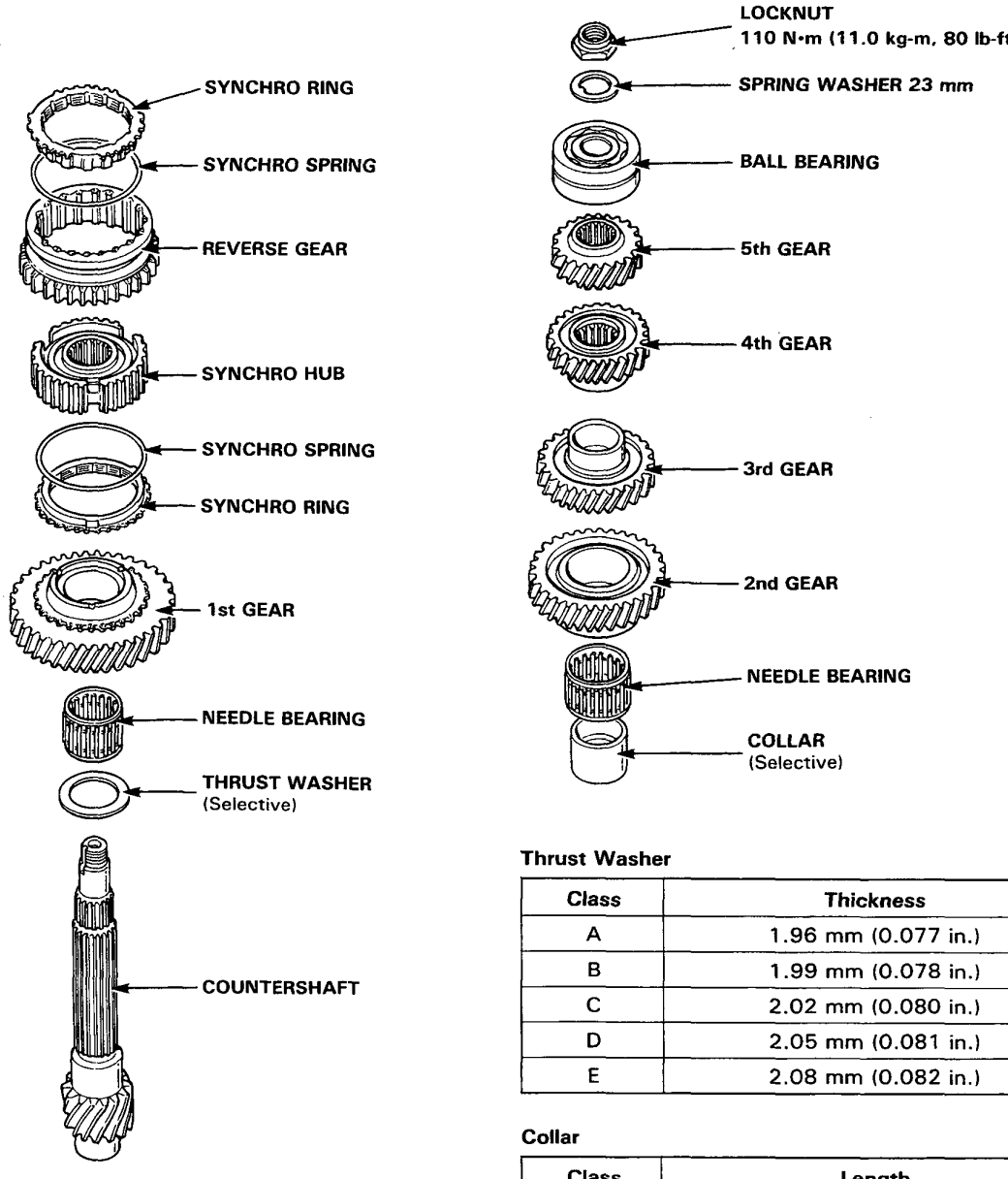
4. Replace the countershaft if the reading is out of tolerance.

Countershaft Assembly

Clearance Inspection

NOTE: Two types of 36 x 44 x 29 mm collars and four types of thrust washers for 1st gear are available for the adjustment of the clearance between the gears on the countershaft.

1. Assemble the gears, spacer collars, thrust washer, synchro hub, synchro ring, etc. as shown below.



Thrust Washer

Class	Thickness
A	1.96 mm (0.077 in.)
B	1.99 mm (0.078 in.)
C	2.02 mm (0.080 in.)
D	2.05 mm (0.081 in.)
E	2.08 mm (0.082 in.)

Collar

Class	Length
A	29.03—29.05 mm (0.143—0.144 in.)
B	28.98—29.00 mm (1.141—1.142 in.)

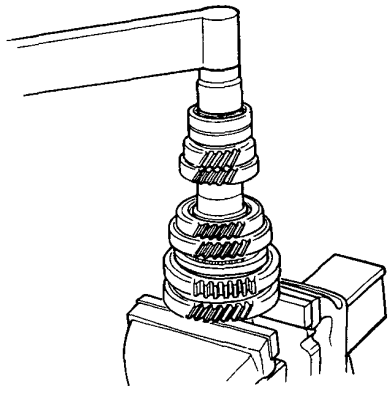
(cont'd)

Countershaft Assembly

Clearance Inspection (cont'd)

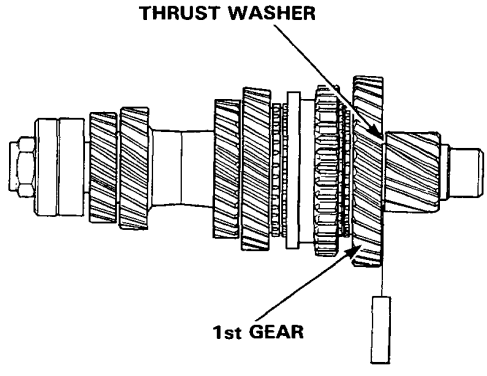
2. Torque the countershaft locknut to 110 N·m (11.0 kg-m,80 lb-ft) before checking clearance.

   NOTE: Put a piece of wood between the vise and the mainshaft.



3. Measure the clearance between 1st gear and the thrust washer.

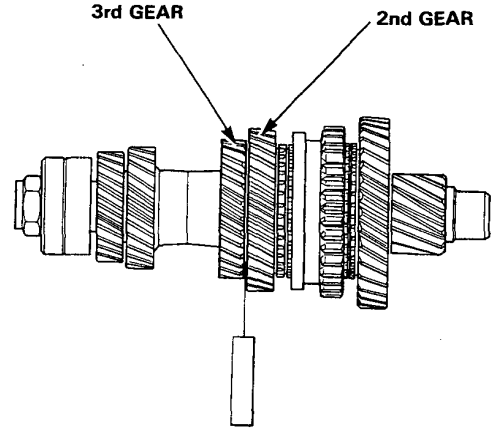
   Standard: **0.03—0.08 mm (0.001—0.003 in.)**
   Service Limit: **0.18 mm (0.007 in.)**



4. If the clearance is out of tolerance, select the appropriate thrust washer or spacer collar for the correct clearance from the charts on page 14-21.

5. Measure the clearance between the 2nd gear and 3rd gear.

   Standard: **0.03—0.08 mm (0.001—0.003 in.)**
   Service Limit: **0.18 mm (0.007 in.)**

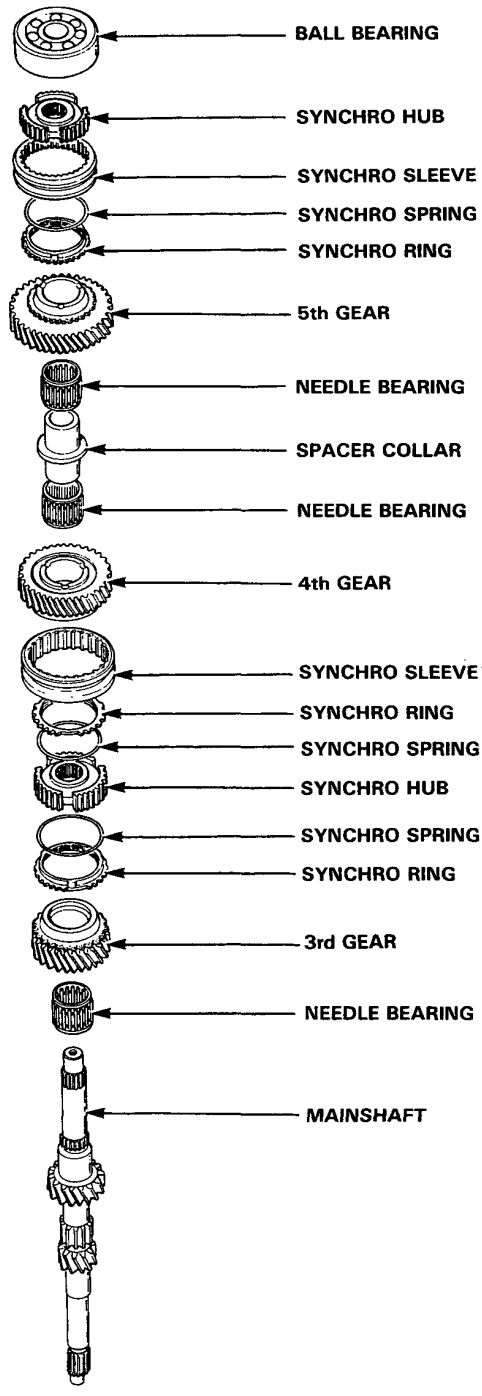


6. If the clearance is out of tolerance, select the appropriate thrust washer or spacer collar for the correct clearance from the charts on page 14-21.

Mainshaft Assembly

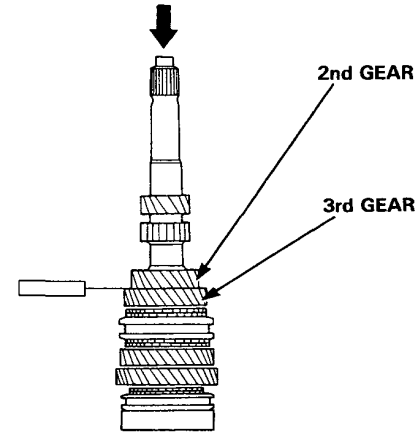
Clearance Inspection

1. Assemble the bearings, synchro hub, synchro sleeve, gears, spacer collar, etc. on the mainshaft as instructed below.



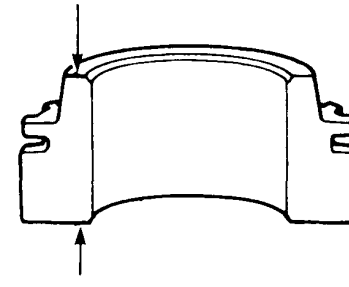
2. Measure the clearance: push down on the bearing race with a socket, and measure the clearance between 3rd and 2nd gears.

3rd Gear Clearance:
Standard: 0.06–0.21 mm (0.002–0.008 in.)
Service Limit: 0.3 mm (0.012 in.)



3. If the reading is outside specifications, measure the thickness of 3rd gear.

3rd Gear Thickness:
Standard: 32.42–32.47 mm (1.276–1.278 in.)
Service Limit: 32.3 mm (1.272 in.)



4. If the reading is within specifications, replace the synchro hub.

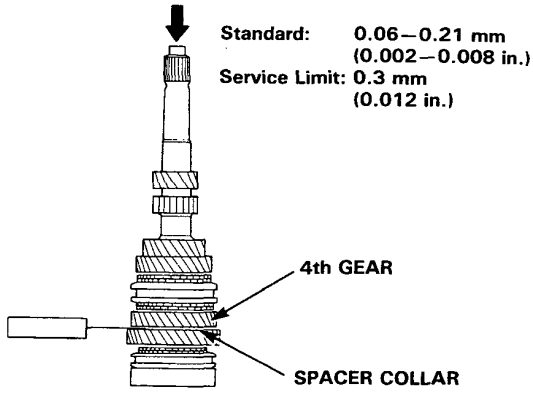
5. If the service limit is exceeded, replace the gear.

(cont'd)

Mainshaft Assembly

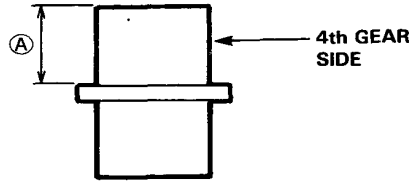
Clearance Inspection (cont'd)

6. Measure the clearance between 4th gear and the spacer collar.



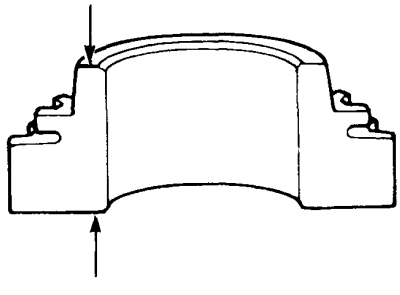
7. If the reading is out of specifications measure distance Ⓐ on the spacer collar.

Standard: 26.03—26.08 mm (1.025—1.027 in.)
Service Limit: 26.01 mm (1.024 in.)



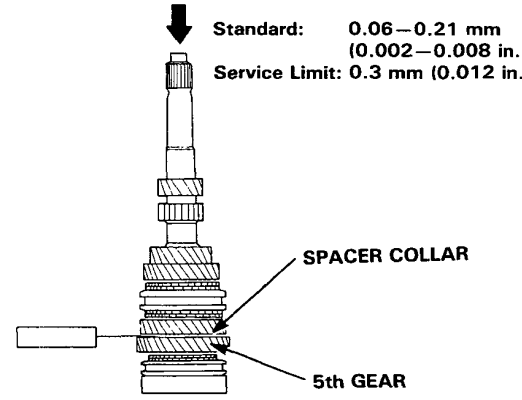
8. If distances Ⓐ are within specification, measure the thickness of 4th gear,

4th Gear Thickness:
Standard: 30.92—30.97 mm (1.217—1.220 in.)
Service Limit: 30.8 mm (1.213 in.)



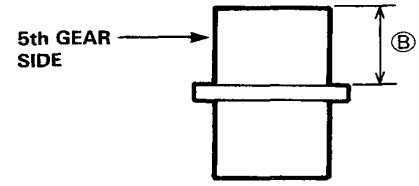
Replace the 4th gear if the respective measurement is out of specification.
Replace the 4th gear synchro hub if the respective measurement is within specification.

9. Measure the clearance between 5th gear and the spacer collar.



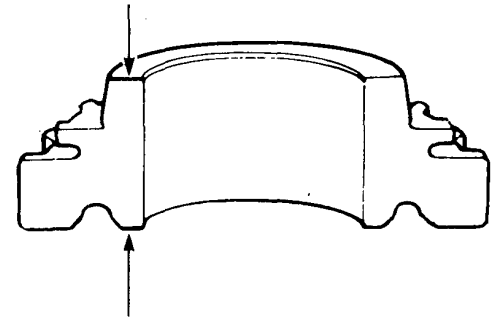
10. If the reading is out of specifications measure distance Ⓑ on the spacer collar.

Standard: 26.03—26.08 mm (1.025—1.027 in.)
Service Limit: 26.01 mm (1.024 in.)



11. If distance Ⓑ is within specification, measure the thickness of 5th gear.

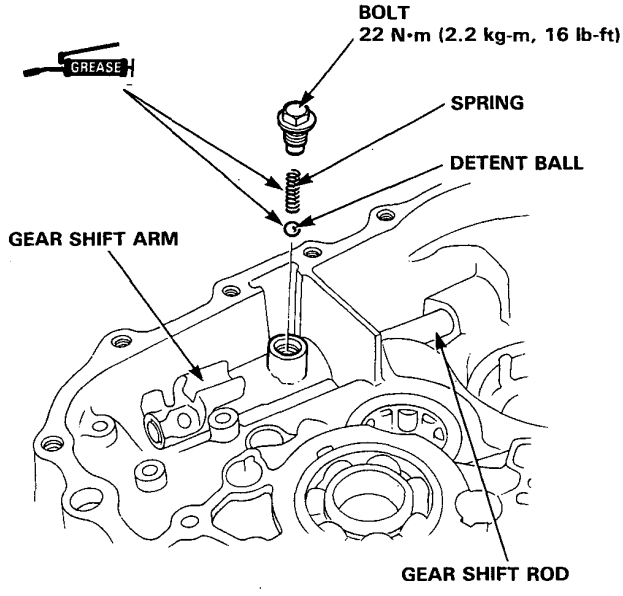
5th Gear Thickness:
Standard: 30.42—30.47 mm (1.198—1.200 in.)
Service Limit: 30.3 mm (1.193 in.)



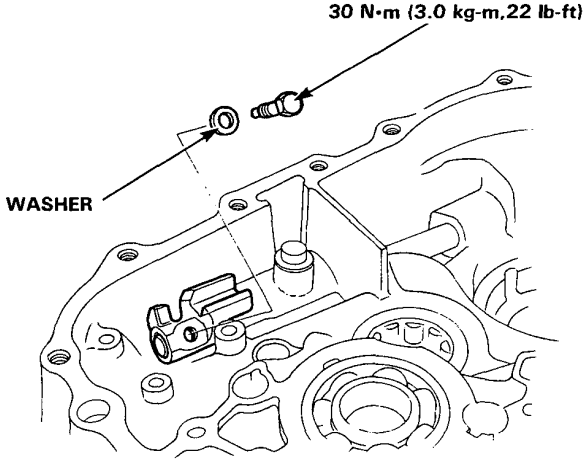
Replace 5th gear if the respective measurement is out of specification.
Replace the 5th gear synchro hub if the respective measurement is within specification.

Reassembly

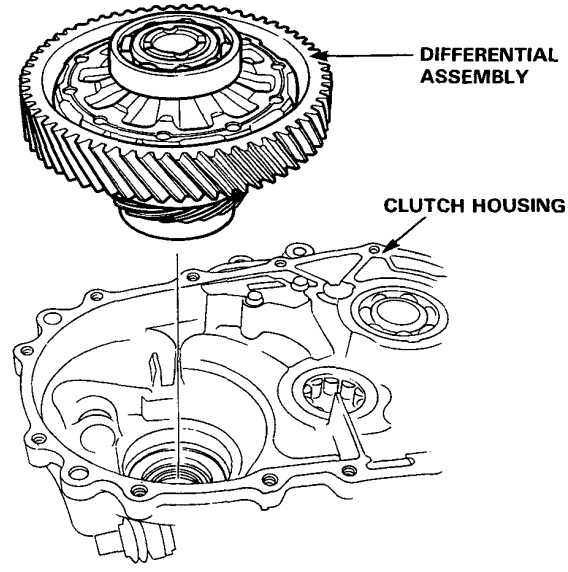
1. Set the gear shift arm.
2. Place the boot for the shift rod.
3. Install the shift rod with its detent hole up.
4. Grease the detent ball and spring, and them in the shift arm.



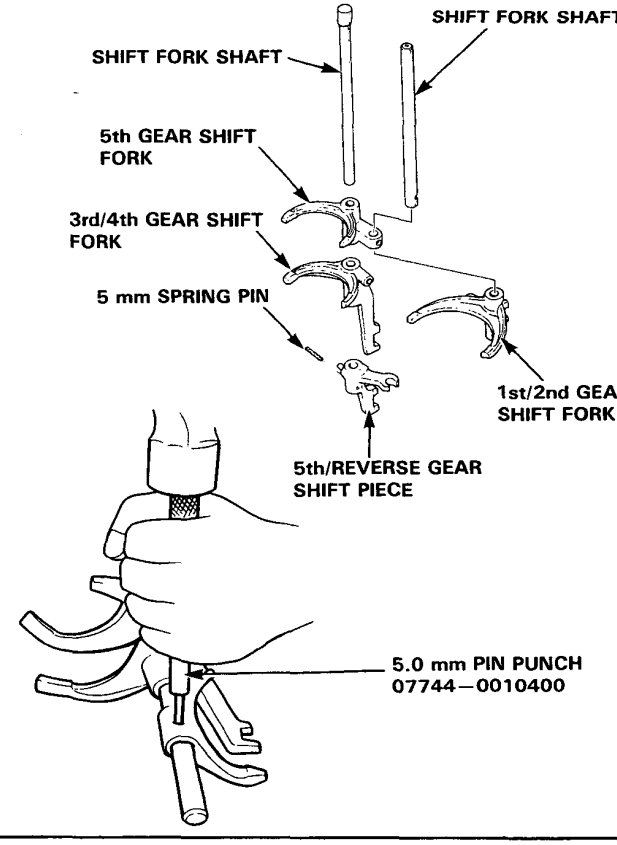
5. Place the bolt and washer holding the gear shift arm.



6. Install the differential assembly in the clutch housing.

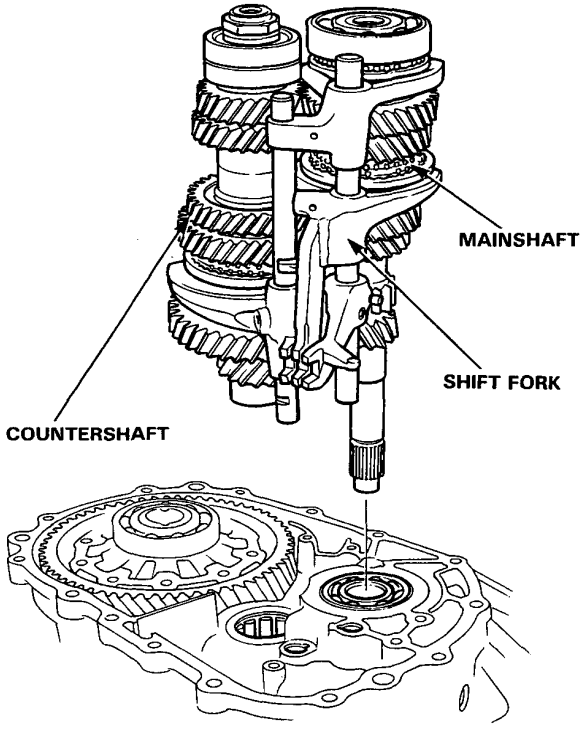


7. Insert the shift fork shafts into the shift forks and drive in the spring pin.

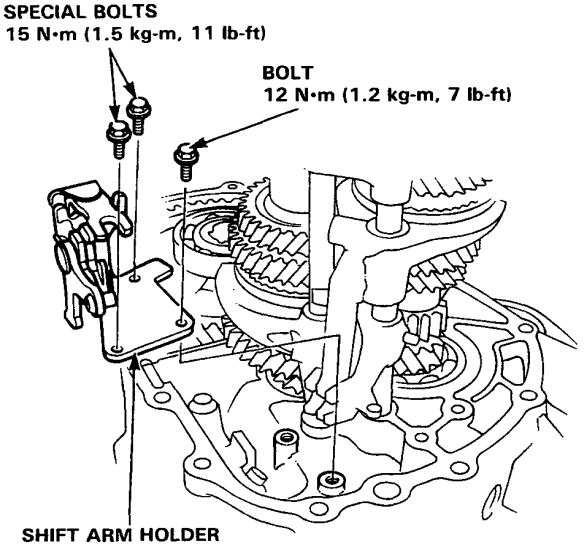


Reassembly (cont'd)

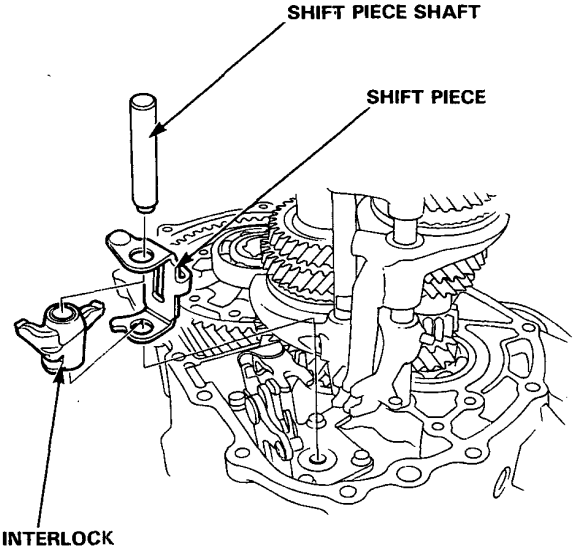
8. Insert the mainshaft and contershaft into the shift forks and install them as an assembly.



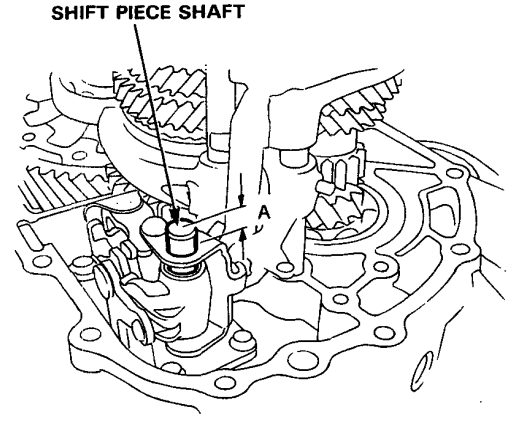
9. Install the gear shift arm holder in the clutch housing.



10. Assemble the shift piece and interlock, then insert the shift piece shaft.

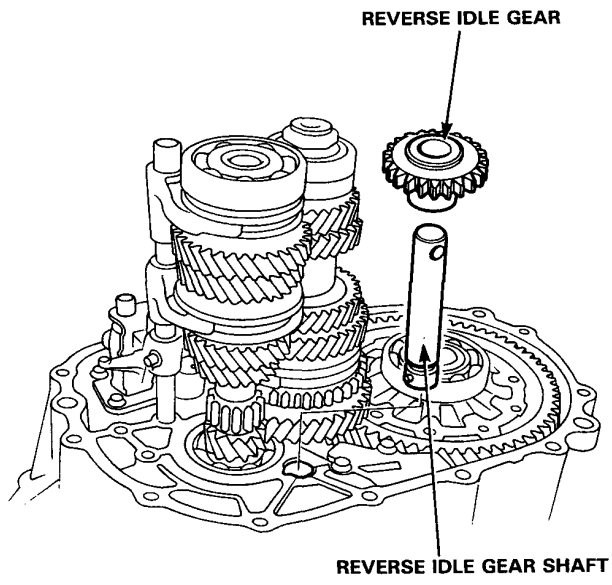


11. Measure the distance A after mounting the shift piece shaft assembly.

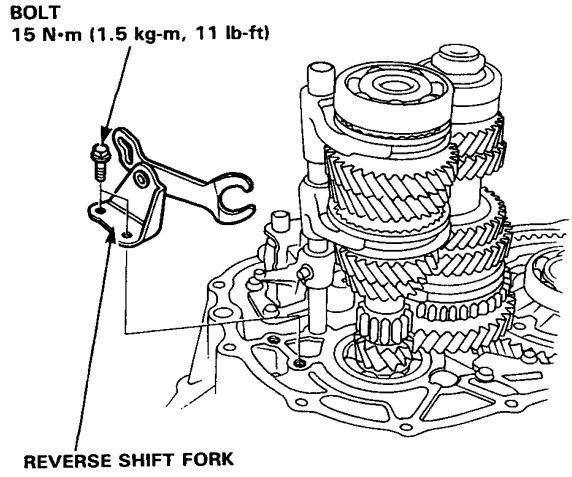


Distance A
Standard: 11.9—12.3 mm (0.468—0.484 in.)

12. Install the reverse idle gear and idle gear shaft in the clutch housing.

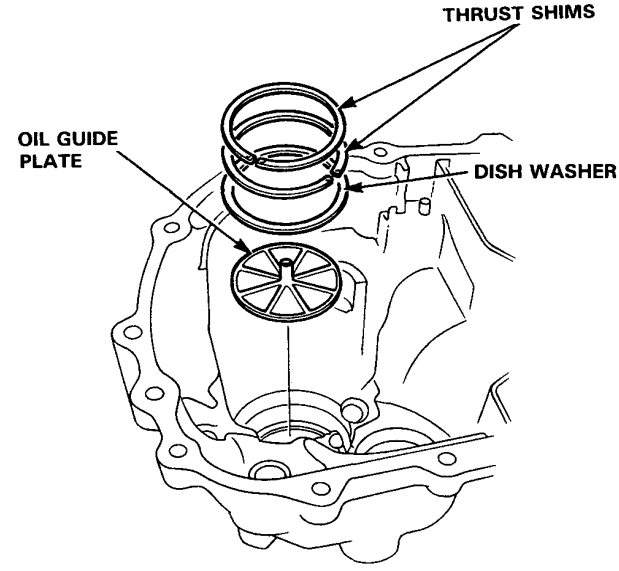


13. Install the reverse shift fork in the clutch housing with the 5th/reverse fork pin matched the groove of the reverse shift fork.

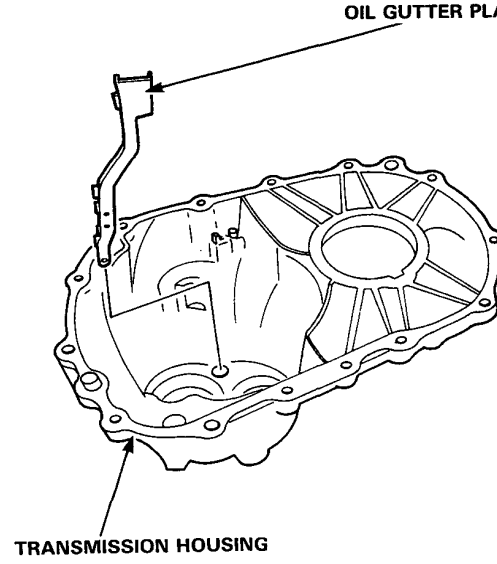


NOTE: Prepare the mainshaft thrust shim of which thrust clearance is set to appropriate value. (See page 14-14)

14. Install the oil guide plate, dish washer and mainshaft thrust shim into the transmission housing.



15. Install the oil gutter plate into the transmission housing.

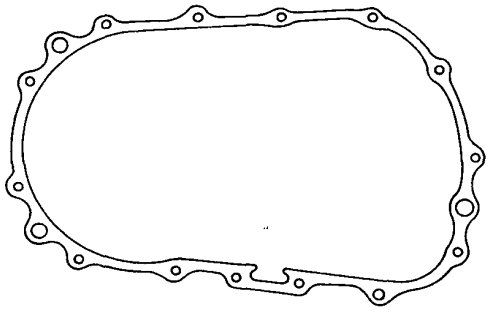


(cont'd)

Reassembly (cont'd)

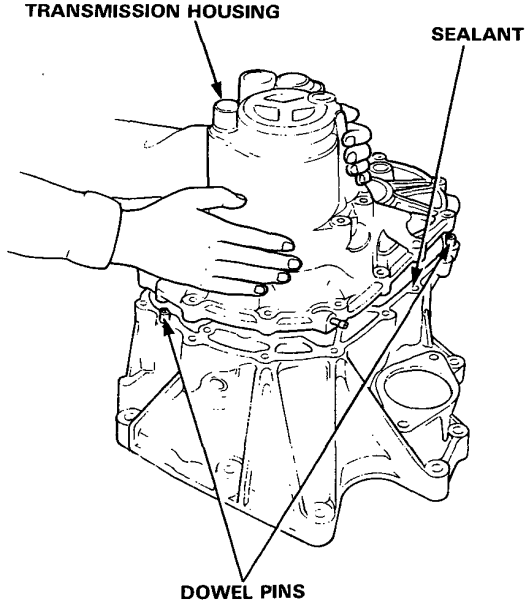
16. Apply sealant on the sealing surface of the transmission housing and clutch housing as shown.

    NOTE: This transmission uses no gasket between the major housings; use Honda P/N 08740–99986 sealant. Assemble the housings within 20 minutes after applying the sealant and allow it to cure at least 30 minutes after assembly before filling it with oil.

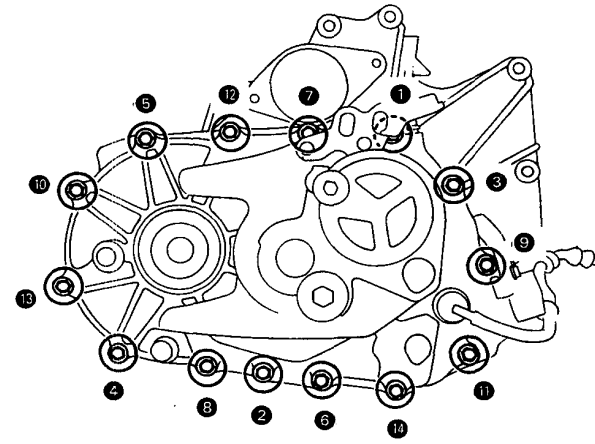


17. Install the dowel pins on the clutch housing.

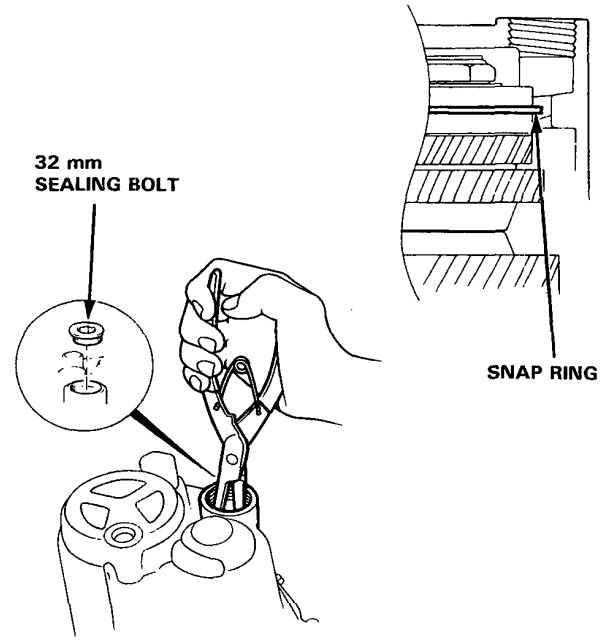
18. Mount the transmission housing to the clutch housing.



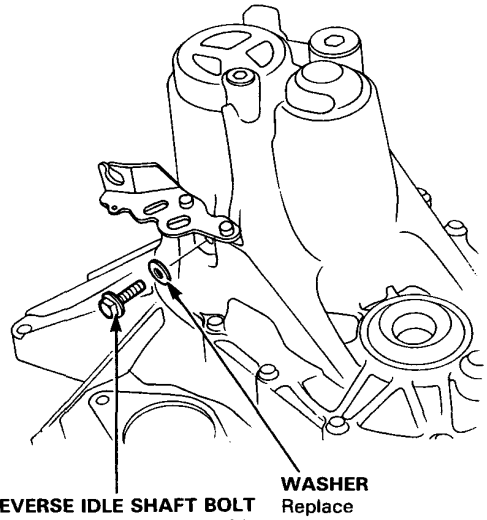
19. Torque bolts (8 x 1.25 mm) in sequence shown, 27 N·m (2.7 kg-m, 20 lb-ft).



20. Install the snap ring to the countershaft ball bearing and torque 32 mm sealing bolt.



21. Install the reverse idle shaft bolt.



Installation

Car Raised on Hoist

1. Place the transmission on transmission jack.

   NOTE: Clean and grease release bearing sliding surfaces.

2. Check that two 14 mm dowel pins are installed in the clutch housing.

3. Raise the transmission far enough to align dowel pins with matching holes in block.

4. Roll the transmission toward engine and fit mainshaft into clutch disc splines. If driver's side suspension was left in place, install new spring clips on both axles, then carefully insert left axle into differential as you install transmission.

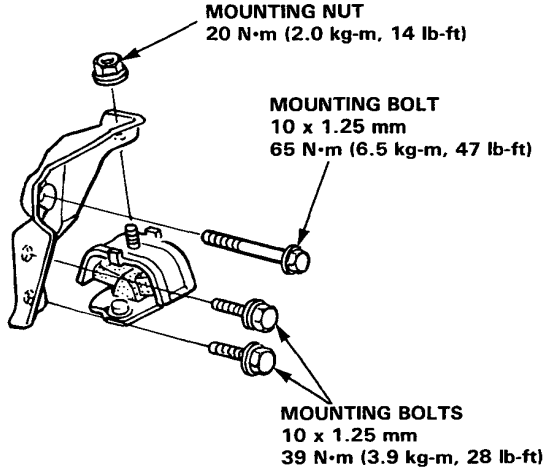
   NOTE: New 26 mm spring clips must be used on both axles.

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

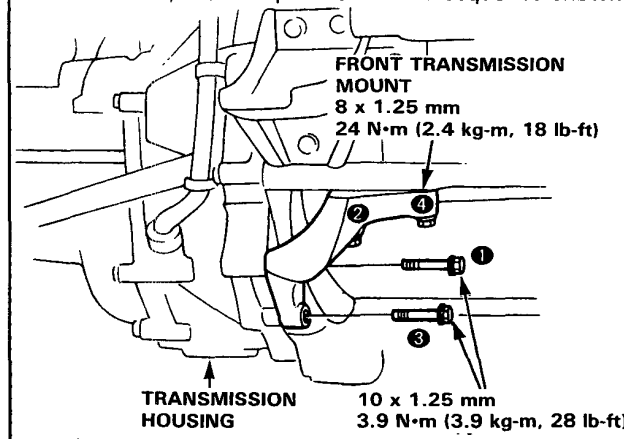
5. Push and wiggle the transmission until it fits flush with engine flange.

6. Secure transmission to engine with mounting bolts from the engine side (12 x 1.25 x 70 mm). Torque to 68 N·m (6.8 kg-m, 50 lb-ft).

7. Install the rear transmission mount on the transmission housing as shown.

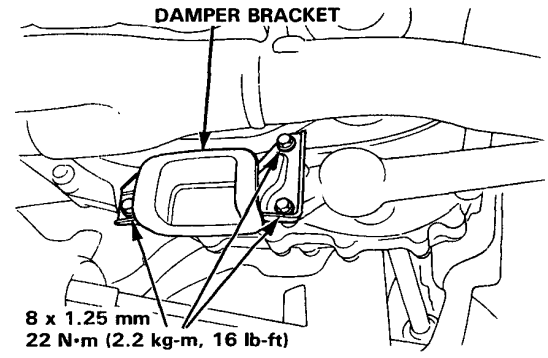


8. Loosely install the bolts for the front transmission mount, then torque them in the sequence shown.

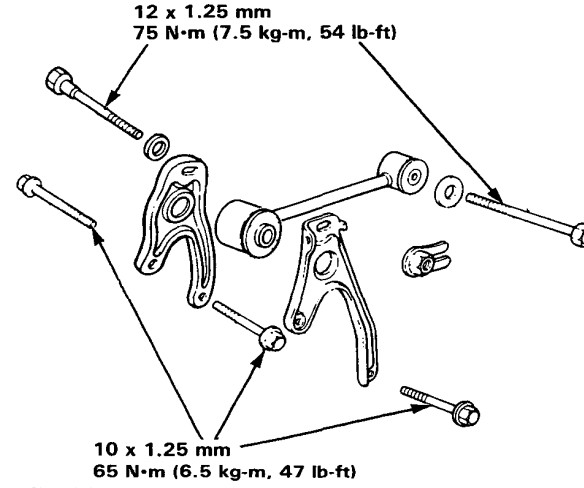


9. Install the starter mounting bolts and torque to 45 N·m (4.5 kg-m, 33 lb-ft).

10. Install the damper bracket in the transmission.



11. Install the upper torque arm and its brackets as shown.

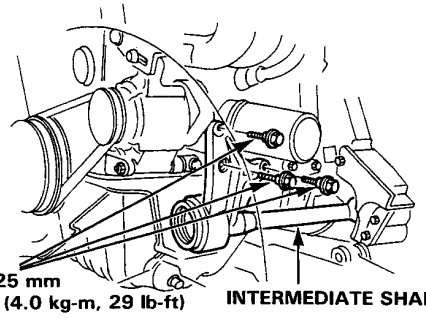


12. Remove the transmission jack.
13. Install the starter with its mounting bolts, 10 x 1.25 mm and torque to 45 N•m (4.5 kg-m, 33 lb-ft).
14. Turn right steering knuckle/axle assembly outward far enough to insert free end of axle into transmission. Repeat on opposite side.

    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.

15. Install lower arm ball joint bolts, tie-rod ball joint nuts and damper fork bolt.
16. Connect shift linkage.
17. Connect shift lever torque rod to clutch housing and torque 8 x 1.25 mm bolt to 22 N•m (2.2 kg-m, 16 lb-ft).
18. Install the Intermediate shaft.



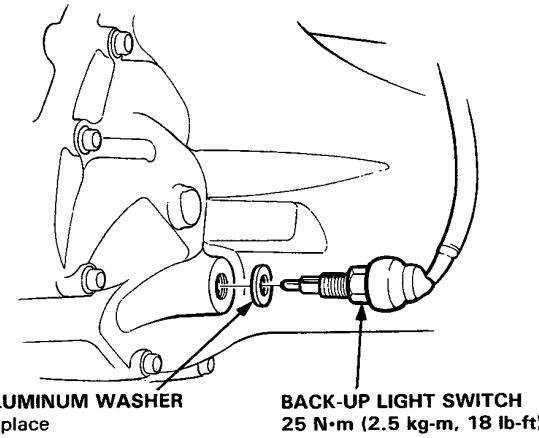
19. Install the front wheels.
20. Torque the 14 mm transmission drain plug to 40 N•m (4.0 kg-m, 29 lb-ft).

Car on Ground

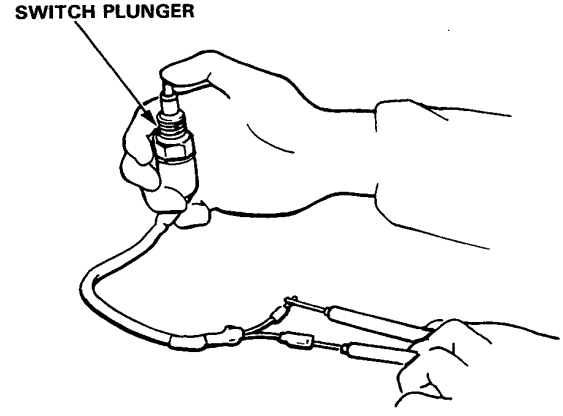
21. Install the clutch cable at the release arm.
22. Coat the new O-ring with oil, put it on speedometer gear holder, then install holder in transmission housing and secure with hold-down tab and bolt.
23. Install engine sub wire harness in clamp at clutch housing.
24. Connect the engine compartment wiring:
    - Battery positive cable to starter.
    - Black/white wire to starter solenoid.
    - Green/black and yellow wires to back-up light switch.
25. With ignition key OFF connect ground cable to battery and transmission.
26. Refill transmission with recommend oil (page 14-2).
27. Check transmission for smooth operation.

Test

1. Test the back-up light switch by placing the gear shift lever in reverse and turning the ignition switch to ON.



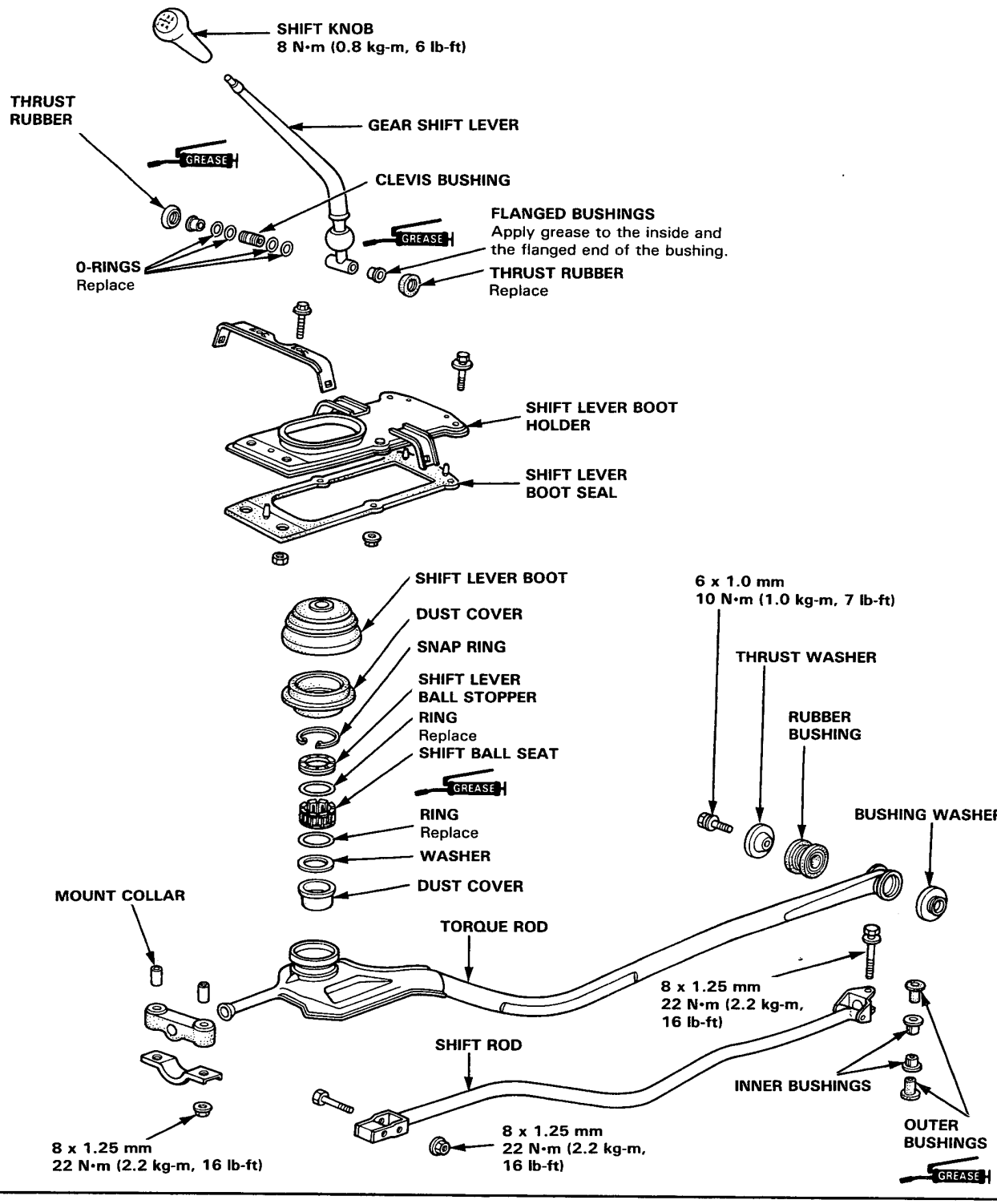
2. If back-up lights do not go on, remove the back-up light switch.
3. Using an ohmmeter check the switch for continuity while pushing in on the switch plunger.



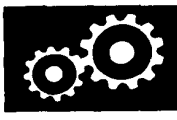
Gearshift Mechanism

Overhaul

NOTE: Inspect rubber parts for wear or damage when disassembling.



Manual Transmission <Except B20A1 Engine>



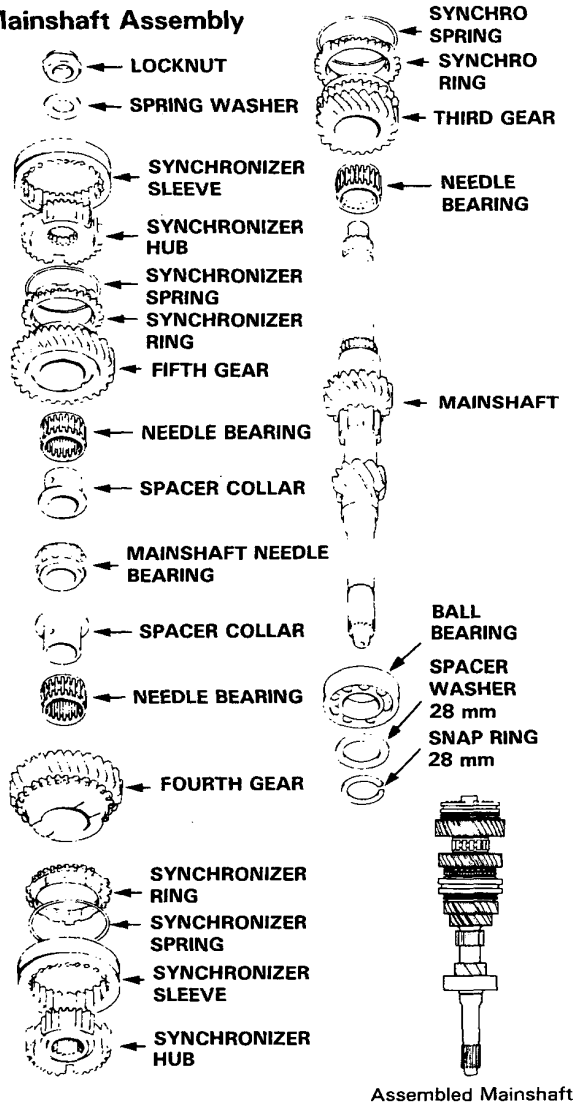
Mainshaft/Countershaft Reassembly and Measurement

1. Remove both mainshaft and countershaft bearings from transmission housing.
2. Assemble mainshaft and countershaft including bearings and fifth gear components, as shown below.

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

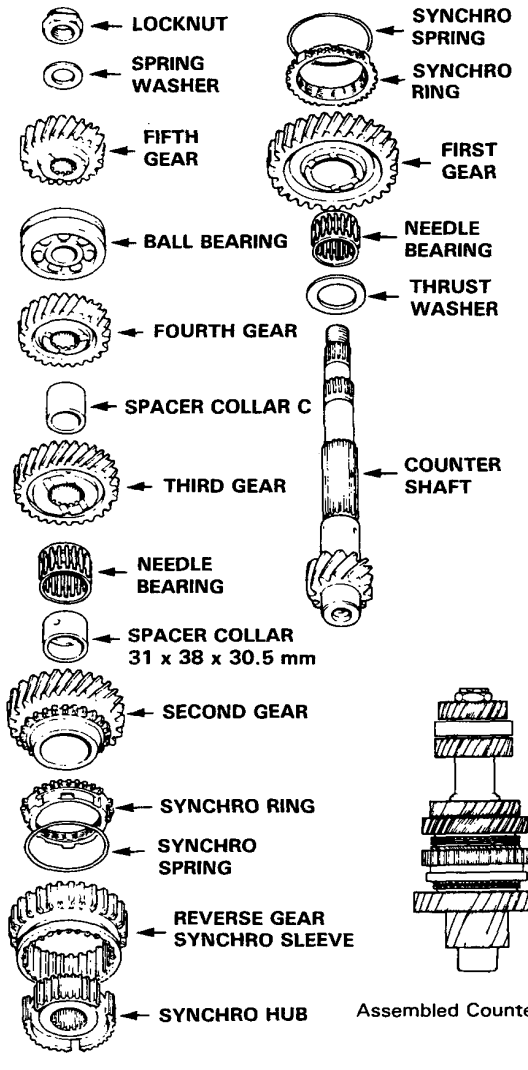
   CAUTION: Incorrect gear clearances can be caused by overtorquing the countershaft or mainshaft locknuts. Whenever locknuts are installed, use an accurately calibrated torque wrench.
6. Remove transmission shafts from clutch housing and measure clearances.

Mainshaft Assembly



Assembled Mainshaft

Countershaft Assembly

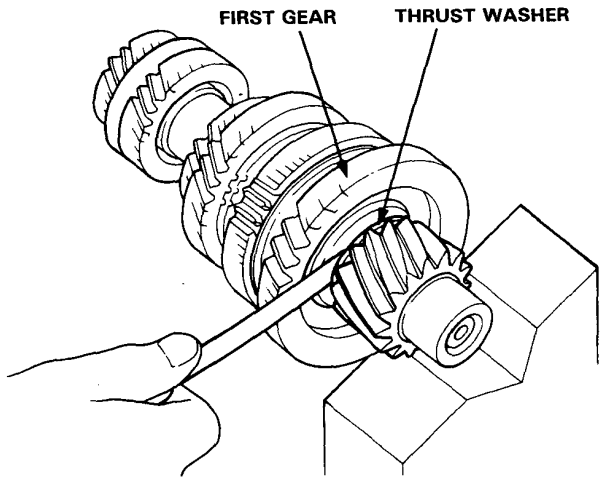


Assembled Countershaft

Countershaft Measurements

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

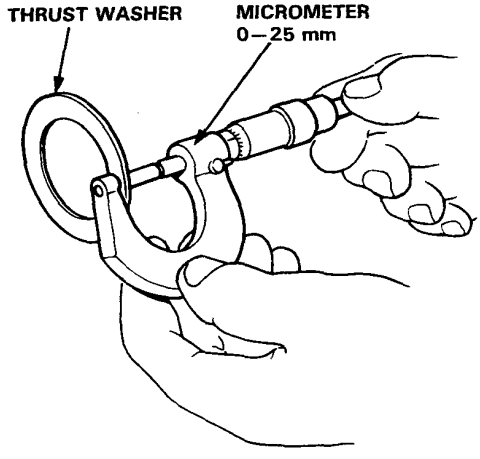
FIRST GEAR CLEARANCE
Standard (New): 0.03—0.08 mm (0.001—0.003 in.)



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

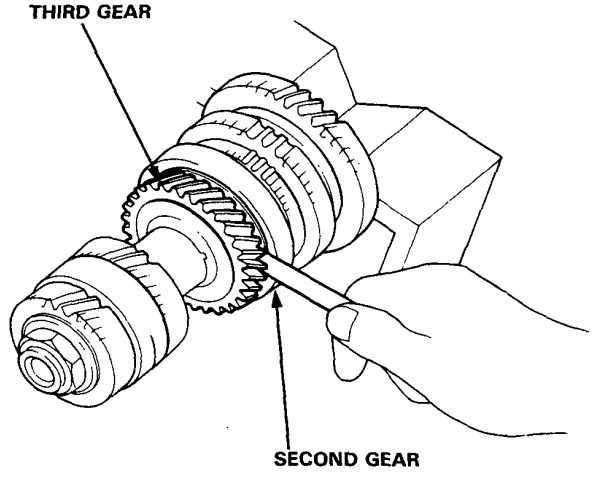
REPLACEMENT THRUST WASHERS

IDENTIFICATION	THICKNESS
A	2.02—2.04 mm (0.080—0.081 in.)
B	2.00—2.02 mm (0.079—0.080 in.)
C	1.98—2.00 mm (0.078—0.079 in.)
D	1.96—1.98 mm (0.077—0.078 in.)



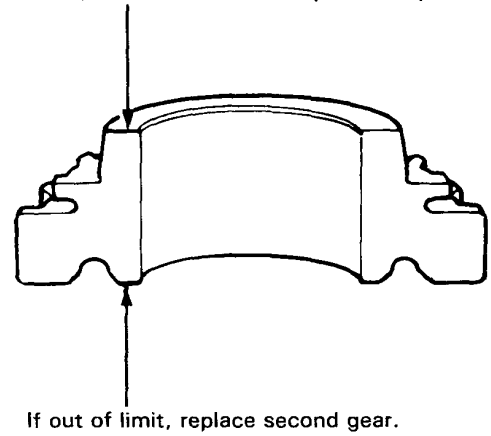
2. Measure clearance between shoulder on third gear and shoulder on second gear.

SECOND GEAR CLEARANCE
Standard (New): 0.03—0.1 mm (0.0012—0.004 in.)
Service Limit: 0.18 mm (0.007 in.)



3. If out of tolerance, measure thickness of second gear.

SECOND GEAR THICKNESS
Standard (New): 30.42—30.47 mm (1.198—1.200 in.)
Service Limit: 30.3 mm (1.192 in.)



If out of limit, replace second gear.

4. 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.

Automatic Transmission <F4 with A20A4 Engine>

Description

The Honda 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 engine.

TORQUE CONVERTER, GEARS, AND CLUTCHES

The torque converter consists of a pump, turbine and stator, assembled in a single unit.
They are connected to the engine crankshaft so they turn together as a unit as the engine turns. Around the outside of the torque converter is a ring gear which meshes with the starter pinion when the engine is being started. The entire torque converter assembly serves as a flywheel while transmitting power to the transmission mainshaft.
The transmission has two parallel shafts, the mainshaft and countershaft. The mainshaft is in line with the engine crankshaft.
The mainshaft includes the clutches for 1st, and 2nd/4th, and gears for 3rd, 2nd, 4th, Reverse and 1st (3rd gear is integral with the mainshaft, while reverse gear is integral with 4th gear).
The countershaft includes 3rd clutch and gears for 3rd, and 4th, Reverse and 1st.
4th and reverse gears can be locked to the countershaft at its center, providing 4th gear or Reverse, depending on which way the selector is moved.
The gears on the mainshaft are in constant mesh with those on the countershaft. When certain combinations of gears in the transmission are engaged by the clutches, power is transmitted from the mainshaft to the countershaft to provide D3 , D4 , 2 or REVERSE.

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 valve, accumulator control valve and shift timing valves.

The servo valve body contains the accumulator pistons, 3rd orifice control valve, throttle A and B valves, and the modulator valve. The regulator valve body contains the lock-up timing valves, pressure regulator valve and lock-up control valve. Fluid from the regulator passes through the manual valve to the various control valves.

The lock-up shift valve body contains a lock-up timing valve and lock-up shift valve. The 1st, 3rd and 4th cluches receive oil from their respective feed pipes.

LOCK-UP MECHANISM

In D4, in 2nd, 3rd and 4th, 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.

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 2nd, 3rd and 4th gears (in D4 range).

The lock-up cut valve is housed in the secondary valve body and prevents lock-up from taking place when the throttle is not opened sufficiently.

GEAR SELECTION

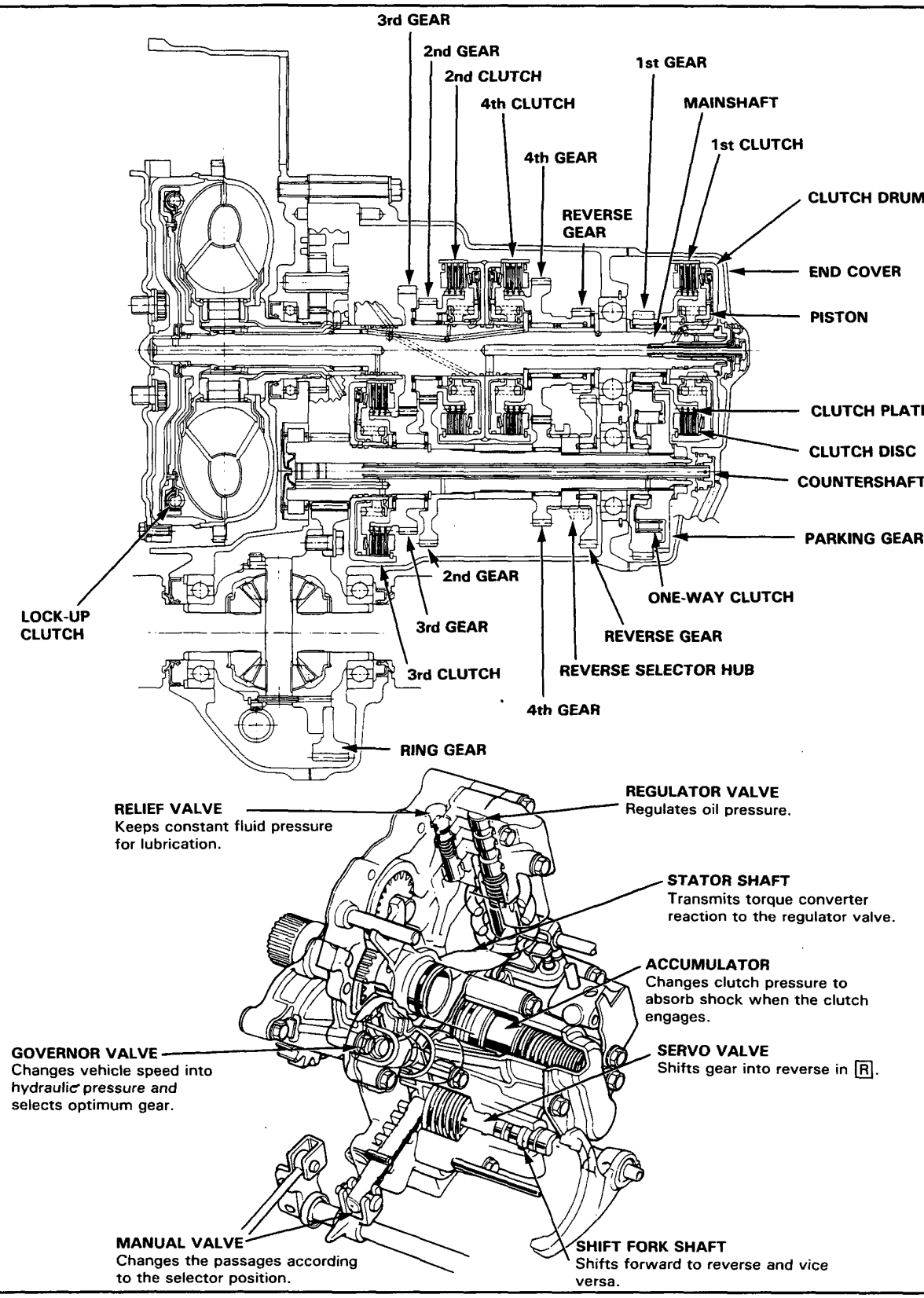
The selector lever has six positions: P PARK, R REVERSE, N NEUTRAL, D4 1st through 4th gear ranges, D3 1st through 3rd gear ranges, and 2 2nd gear.

Position	Discription
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. Downshifts through 3rd, 2nd and 1st on deceleration to stop. The lock-up mechanism comes into operation in 2nd, 3rd and 4th when the transmission is in D4.
D3 DRIVE (1 through 3)	For rapid acceleration at highway speeds and general driving; starts off in 1st, shifts automatically to 2nd, then 3rd, depending on vehicle speed and throttle position. Downshifts through 2nd to 1st on deceleration to stop.
2 SECOND	For engine braking or better traction starting off on loose or slippery surfaces; stays in 2nd gear, does not shift up or down.

Starting is possible only in P and N trough use of a slide-type, neutral-safety switch.

POSITION INDICATOR

A position indicator in the instrument panel shows what gear has been selected without having to look down at the console.


3rd GEAR
2nd GEAR
2nd CLUTCH
4th CLUTCH
4th GEAR
1st GEAR
MAINSHAFT
1st CLUTCH
CLUTCH DRUM
REVERSE GEAR
END COVER
PISTON
CLUTCH PLATE
CLUTCH DISC
COUNTERSHAFT
PARKING GEAR
ONE-WAY CLUTCH
LOCK-UP CLUTCH
2nd GEAR
3rd GEAR
3rd CLUTCH
REVERSE GEAR
REVERSE SELECTOR HUB
4th GEAR
RING GEAR
RELIEF VALVE
Keeps constant fluid pressure for lubrication.
REGULATOR VALVE
Regulates oil pressure.
STATOR SHAFT
Transmits torque converter reaction to the regulator valve.
ACCUMULATOR
Changes clutch pressure to absorb shock when the clutch engages.
GOVERNOR VALVE
Changes vehicle speed into hydraulic pressure and selects optimum gear.
SERVO VALVE
Shifts gear into reverse in R.
MANUAL VALVE
Changes the passages according to the selector position.
SHIFT FORK SHAFT
Shifts forward to reverse and vice versa.

SYMPTOM	Check these items on PROBABLE CAUSE LIST	Check these items on NOTES PAGE
Engine runs, but car does not move in any gear.	1, 6, 7, 16	K, L, R, S
Car moves in R and 2, but not in D3 or D4.	8, 29, 44, 48	C, M, O
Car moves in D3, D4 and R, but not in 2.	9, 30, 49	C, L
Car moves in D3, D4 and 2, but not in R.	1, 11, 12, 22, 38, 39, 40	C, L, Q
Car moves in N.	1, 8, 9, 10, 11 46, 47	C, D
Excessive idle vibration.	5, 17	B, K, L
Slips in all gear.	6, 7, 16	C, L, U
Slips in low gear.	8, 29, 44, 45, 48	C, N, O, U
Slips in 2nd gear.	9, 20, 23, 30, 45, 49	C, L, U
Slips in 3rd gear.	10, 21, 23, 31, 44, 45	C, L, U
Slips in 4th gear.	11, 23, 32, 45	C, L, U
Slips in reverse gear.	11, 32	C
Slips on 2—3 upshift.	3, 15, 24	E, L, V
Slips on 3—4 upshift.	3, 15, 25	E, L, V
No upshift; trans stays in low gear.	12, 13, 14, 19, 23	E, F, G, L
No downshift to low gear.	12, 19	G, L
Late upshift.	2, 12, 13, 14	E, F, L, V
Early upshift.	3, 13, 14	E, F, L, V
Erratic shifting.	2, 14, 26	E, F, V
Harsh shift (up & down shifts).	2, 4, 15, 23, 24, 25, 27, 47	A, E, H, I, L, V
Harsh shift (1—2).	2, 9	C, D, V
Harsh shift (2—3).	2, 10, 23, 24	C, D, H, L, V
Harsh shift (3—4).	2, 11, 23, 25	C, D, I, L, V
Harsh kickdown shifts.	2, 23, 27	L, V, Q
Harsh kickdown shift (2—1).	48	O
Harsh downshift (3—2) at closed throttle.	15	E, T
Axle(s) slips out of trans on turns.	43, 50	L, P, Q
Axle(s) stuck in trans.	43	L, Q
Ratcheting noise when shifting into R.	6, 7, 38, 39, 40	K, L, Q
Loud popping noise when taking off in R.	38, 39, 40	L, Q
Ratcheting noise when shifting from R to P, or from R to N.	38, 39, 40, 51	L, Q
Noise from trans in all selector lever positions.	6, 17	K, L, Q
Noise from trans only when wheels rolling.	39, 42	L, Q
Gear whine, rpm related (pitch changes with shifts).	6, 41	K, L, Q
Gear whine, speed related (pitch changes with speed).	39, 42	L, Q
Trans will not shift into 4th gear in D4.	1, 21, 28	L
Engine stalls on emergency stops (shift lever in D4 only).	2, 33	L, V
Lockup clutch does not lock up smoothly.	35, 37, 17	L
Lockup clutch does not operate properly.	2, 3, 12, 15, 18, 33, 34, 35, 36, 37	E, L, V
Transmission has multitude of problems shifting, at disassembly large deposits of metal found on magnet.	43	L, Q

The following symptoms can be caused by improper repair or assembly.	Check these items on PROBABLE CAUSE DUE TO IMPROPER REPAIR	Check these ITEMS ON NOTES PAGE
Car creeps in N.	R1, R2	
Car does not move in D3 or D4.	R5	
Trans lock up in R.	R4	
Trans has no park.	R3	
Excessive drag in trans.	R8	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 B valve stuck
16.	Oil screen clogged
17.	Torque convertor defective
18.	Torque governor check valve stuck
19.	1—2 shift valve stuck
20.	2—3 shift valve stuck
21.	3—4 shift valve stuck
22.	Reverse control valve stuck
23.	Clutch pressure control valve stuck
24.	2nd oriffice control valve stuck
25.	3rd orifice control valve stuck
26.	3—2 timing valve stuck
27.	Kickdown vavle stuck
28.	Shift timing valve/accumulator stuck
29.	Low clutch accumulator defective
30.	2nd clutch accumulator defective
31.	3rd clutch accumulator defective
32.	4rh/reverse accumulator defective
33.	Lockup clutch cut valve stuck
34.	Lockup clutch timing valve A stuck
35.	Lockup clutch timing valve B stuck
36.	Lockup clutch shift valve stuck
37.	Lockup clutch control valve stuck
38.	Shift fork bent
39.	Reverse gears worn/damaged (3 gears)
40.	Reverse selector gear worn
41.	3rd gears worn/damaged (2 gears)
42.	Final gears worn/damaged (2 gears)
43.	Differential pinion shaft worn
44.	Feedpipe O-ring broken

	PROBABLE CAUSE
45.	Servo valve check valve loose
46.	Gear clearance incorrect
47.	Clutch clearance incorrect
48.	Sprag clutch defective
49.	Sealing rings/guide worn
50.	Axle-inboard joint clip missing
51.	4th gears worn/damaged (2 gears)

	PROBABLE CAUSES DUE TO IMPROPER REPAIR
R1	Improper clutch clearance
R2	Improper gear clearance
R3	Parking pawl installed upside down
R4	Parking shift arm 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.
B	Set idle rpm in gear to specified idle speed. If still no good, adjust the motor mounts as outlined in engine section of service manual.
C	If the large clutch piston O-ring is broken, inspect the piston groove for rough machining.
D	If the clutch pack is seized, or is excessively worn, inspect the other clutches for wear, and check the orifice control valves and throttle valves for free movement.
E	If throttle valve B is stuck, inspect the clutches for wear.
F	If the modulator valve is stuck open (does not modulate line pressure), the trans will shift normally with less than 5/8 throttle but will shift up very late over 5/8 throttle. If the modulator valve is stuck closed, throttle valve A pressure will be zero and result in early upshifts and no forced downshift.
G	If the 1—2 valve is stuck closed, the transmission will not upshift. If stuck open, the transmission has no low gear.
H	If the 2nd orifice control valve is stuck, inspect the 2nd and 3rd clutch packs for wear.
I	If the 3rd orifice control valve is stuck, inspect the 3rd and 4th clutch packs for wear.
J	If the clutch pressure control valve is stuck closed, the transmission will not shift out of low gear.

	NOTES
K	Improper alignment of main valve body and torque converter case may cause oil pump seizure. The symptoms are mostly an rpm related-ticking noise high pitched squeak. In severe instances, it may stall the engine. Follow instruction procedure on page 15-49.
L	If the oil screen is clogged with particles of steel or aluminum, inspect the oil pump and differential pinion shaft. If both are OK, and no cause for the contamination is found, replace the torque converter.
M	If the low clutch feedpipe guide in the end cover is scored by the mainshaft, inspect the ball bearing for excessive movement in the transmission housing. If OK, replace the end cover as it is dented. The O-ring under the guide is probably broken.
N	Replace the mainshaft if the bushings for the low-and 4th feedpipe are loose or damaged. If the low feedpipe is damaged or out of round, replace it. If the 4th feedpipe is damaged or out of round, replace the end cover.
O	A worn or damaged sprag clutch is mostly a result of shifting the trans in D3 or D4 while the wheels rotate in reverse, such as rocking the car in snow.
P	Inspect the frame for collision damage.
Q	Inspect for damage or wear: 1. Governor shaft woodruff key 2. Reverse selector gear teeth chamfers 3. Engagement teeth chamfers of countershaft 4th & reverse gear 4. Shift fork, for scuff marks in center 5. Differential pinion shaft for wear under pinion gears 6. Bottom of 3rd clutch for swirl marks Replace items 1, 2, 3 and 4 if worn or damaged. If trans makes clicking, grinding or whirring noise, also replace mainshaft 4th gear and reverse idler gear and counter 4th gear in addition to 1, 2, 3, or 4. If differential pinion shaft is worn, overhaul differential assy and replace oil screen and thoroughly clean trans, flush torque converter and cooler and lines. If bottom of 3rd clutch is swirled and trans makes gear noise, replace countershaft and ring gear.
R	Be very careful not to damage the torque converter case when replacing the main ball bearing. You may also damage the oil pump when you torque down the main valve body; this will result in oil pump seizure if not detected. Use proper tools.
S	Install the main seal flush with the torque converter case. If you push it into the torque converter case until it bottoms out, it will block the oil return passage and result in damage.
T	Harsh downshifts when coasting to a stop with zero throttle may be caused by a bent-in throttle valve retainer/cam stopper. Throttle cable adjustment may clear this problem. See page 15-67.
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.

NOTE: After transmission is installed;
- Make sure the floor mat does not interfere with accelerator pedal travel. Fully depress accelerator pedal and check carburetor to make sure the throttle lever is fully opened.
- Release the accelerator pedal and check both inner control cables to be sure they have slight play.

Warm up the engine to operating temperature.

D3 and D4 Range

1. Apply parking brake and block the wheels. Start the engine, then move the selector to D4 while depressing the brake pedal. Depress the accelerator pedal, and release it suddenly. Engine should not stall.
2. Check that shift points occur at approximate speeds shown. Also check for abnormal noise and clutch slippage.

- **Upshift**

		1st → 2nd	2nd → 3rd	3rd → 4th	LC. ON
Full-throttle Acceleration from a stop (km/h)	KY	51–58	95–102	145–153	128–136
	KQ	50–58	93–103	142–151	119–130
Half-throttle Acceleration from a stop (km/h)	KY	28–34	50–57	75–85	57–64
	KQ	29–35	60–69	92–103	66–76
Closed-throttle Coasting down-hill from a stop (km/h)	KY	15–19	29–33	34–40	24–28
	KQ	16–19	31–37	42–52	23–29

- **Downshift**

		4th → 3rd	3rd → 2nd	2nd → 1st
Full-throttle When car is slowed by increased grade, wind, etc. (km/h)	KY	126–135	83–92	37–45
	KQ	118–129	85–97	34–43

		4th → 2nd	2nd → 1st
Closed-throttle Coasting or braking to a stop (km/h)	KY	12–18	7–12
	KQ	24–31	8–13

3. Accelerate to about 35 mph so the transmission is in 4th, then shift from D4 to 2. The car should immediately begin slowing down from engine braking.

CAUTION: Do not shift from D4 or D3 to 2 at speeds over 60 mph; you may damage the transmission.

2 (2nd Gear)

1. Accelerate from a stop at full throttle. Check that there is no abnormal noise or clutch slippage.
2. Upshifts and downshifts should not occur with the selector in this range.

R (Reverse)

Accelerate from a stop at full throttle, and check for abnormal noise and clutch slippage.

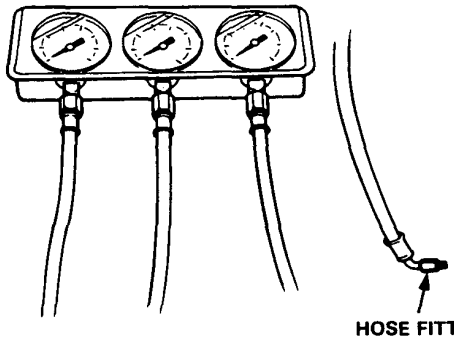
P (Park)

Park car on a slope (approx. 16°), apply the parking brake, and shift into Park. Then release the brake; the car should not move.

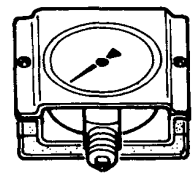
Pressure Test

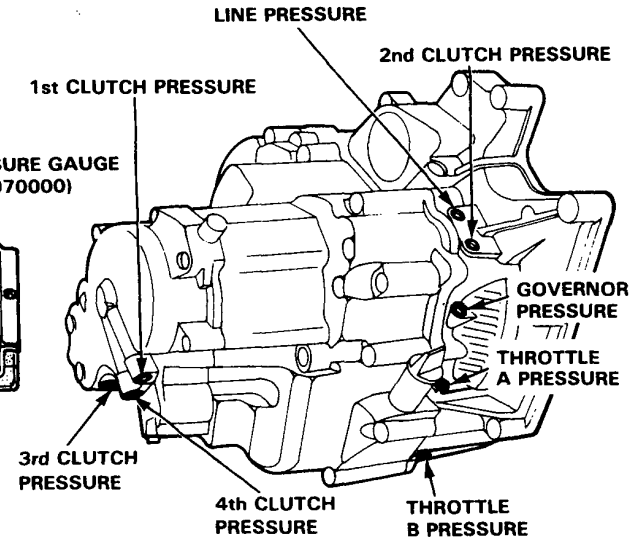
NOTE:
- Stop engine when attaching hoses for pressure tests.
  Torque hose fitting to 18 N·m (1.8 kg-m, 12 lb-ft).
- Do not reuse aluminum washers.
- For throttle and governor test, use Low Pressure Gauge, 07406–0070000.

GAUGE SET 07406–00200002
(includes pressure hose Assy 07406–0020201)



LOW PRESSURE GAUGE
(07406–0070000)





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

PRESSURE	SELECTOR POSITION	MEASUREMENT	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
					Standard	Service Limit
LINE	N or P	• With parking brake applied • Run engine at 2,000 min^{-1} (rpm)	No (or low) LINE pressure	Torque converter, oil pump pressure regulator, torque converter check valve, oil pump	834 – 883 kPa (8.5 – 9.0 kg/cm^2, 121 – 128 psi)	785 kPa (8.0 kg/cm^2, 114 psi)
1st	D3 or D4	MEASUREMENTS • With parking brake applied raise front wheels off ground and support with safety stands. • Run engine at 2,000 min^{-1} (rpm)	No (or low) First pressure	1st clutch O-rings	785 – 883 kPa (8.0 – 9.0 kg/cm^2, 114 – 128 psi)	785 kPa (8.0 kg/cm^2, 114 psi)
2nd	2		No (or low) SECOND pressure	2nd clutch O-rings	441 – 883 kPa (4.5 – 9.0 kg/cm^2, 64 – 128 psi) varies with throttle opening.	392 kPa (4.0 kg/cm^2, 57 psi) with lever released. 785 kPa (8.0 kg/cm^2, 114 psi) with lever in full throttle.
3rd	D3		No (or low) THIRD pressure	3rd clutch		
4th	D4		No (or low) FOURTH pressure	4th clutch		
	R			Servo valve		
THROTTLE	D3 or D4	• With parking brake applied raise front wheels off ground and support with safety stands. • Run engine at 1,000 min^{-1} (rpm) • Disconnect throttle control cable at throttle lever. • Read pressure with lever released. • Manually push lever up simulating full throttle. • Read pressure with lever in full throttle position.	No (or low) THROTTLE pressure	Throttle valve A Throttle modulator valve	0 kPa (0 kg/cm^2, 0 psi) lever is released. 505 – 485 – 500 kPa (4.95 – 5.10 kg/cm^2, 70 – 73 psi) * 505 – 520 kPa (5.15 – 5.30 kg/cm^2, 73 – 75 psi) with lever in full throttle position.	481 kPa (4.90 kg/cm^2, 69.7 psi) throttle position * 500 kPa (5.10 kg/cm^2, 72.5 psi) with lever in full throttle position.
				Throttle valve B	0 kPa (0 kg/cm^2, 0 psi) with lever released 834 – 883 kPa (8.5 – 9.0 kg/cm^2, 121 – 128 psi) with lever in full throttle position	785 kPa (8.0 kg/cm^2, 114 psi)
GOVERNOR	D3 or D4	• Place vehicle on chassis dynamometer or jack up front of car, support with safety stands, block rear wheels, and set hand brake • Run vehicle at 60 km/h	No (or low) GOVERNOR pressure	Governor valve	191-201 kPa (1.95-2.05 kg/cm^2, 28-29 psi) * 211 – 221 kPa (2.15 – 2.25 kg/cm^2, 31 – 32 psi)	186 kPa (1.90 kg/cm^2, 27 psi) * 206 kPa (2.10 kg/cm^2, 30 psi)

* KQ type

Stall Speed

Test

1. Engage parking brake and block front wheels.
2. Connect tachometer, and start engine.
3. After engine has warmed up to normal operating temperature, shift into [D3].
4. Fully depress brake pedal and acceleraror for 6 to 8 seconds, and note engine speed.

   CAUTION: To prevent transmission damage, do not test stall speed for more than 10 seconds at a time.
5. Allow 2 minutes for cooling, then repeat same test in [D4], [2] and [R]

   Stall speed in [D3], [D4], [2], and [R] must be the same, and must also be within limits:

Stall Speed RPM:

Specification:	2,650 rpm
Service Limit:	2,500—2,800 rpm

TROUBLE	PROBABLE CAUSE
Stall rpm high in [2], [D3], [D4] & [R].	Low fluid level or oil pump output, clogged oil strainer, pressure regulator valve stuck closed. Slipping clutch.
Stall rpm high in [D3], [D4] only.	Slippage of 1st clutch
Stall rpm low in [2], [D3], [D4] & [R].	• Engine output low, throttle cable misadjusted at carburetor. • Oil pump seized. • Torque Converter one-way clutch slipping.

Maintenance

Checking/Changing

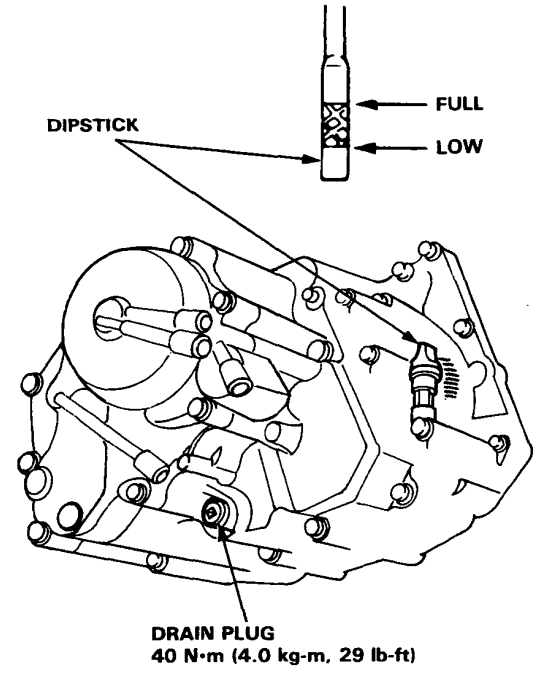
Checking

With the car on level ground, unscrew the transmission dipstick and check the level of fluid immediately after the engine is shut off (within one minute). The fluid level should be between the full and low marks. Do not screw dipstick in to check the fluid level. If the level is at, or below, the low mark, add DEXRON-type automatic transmission fluid.

Changing

1. Bring the transmission up to operating temperature by driving the car. Park the car on level ground, turn the engine off, then remove drain plug.
2. Reinstall the drain plug with a new washer, then refill the transmission to the full mark on the dipstick.

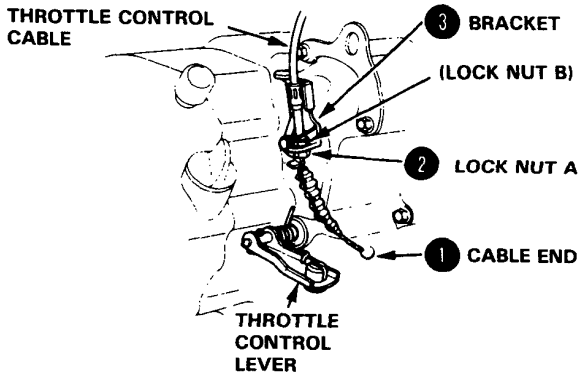
Automatic transmission Capacity:
3.0 ℓ (3.2 U.S. qts., 2.6 Imp. qts) at change
6.0 ℓ (6.3 U.S. qts., 5.3 Imp. qts) after overhaul



Transmission Assy

Removal

1. Disconnect ground cable at battery and transmission.
2. Release steering lock, and shift gear selector to N.
3. Disconnect wiring:
   - Battery positive cable from starter.
   - Black/white wire from starter solenoid.
4. Disconnect cooler hoses, and wire them up next to the radiator so ATF won't drain out.
5. Remove starter mounting bolts and top transmission mounting bolt.
6. Loosen front wheel nuts.
7. Apply parking brake, block rear wheels, then raise front end on jack stands and remove front wheels.
8. Drain transmission. Reinstall drain plug with a new washer.
9. Remove throttle control cable:
   - Remove the cable end from the throttle lever.
   - Loosen the lock nut A only.
   - Remove the cable from bracket.

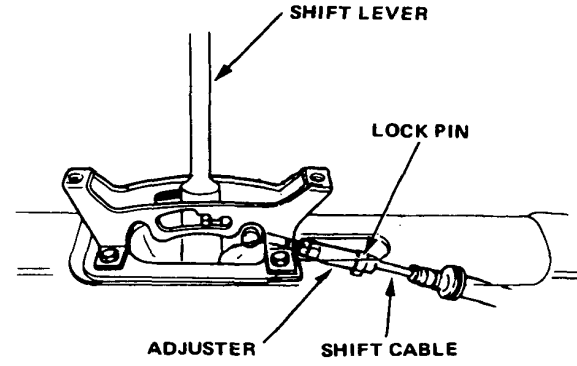


NOTE: For cable adjustment see page 15-67.

10. Remove power steering speed sensor complete with speedometer cable and hoses.
11. Remove two upper transmission mounting bolts.
12. Place transmission jack securely beneath transmission, and hook hanger plate with hoist; make sure hoist chain is tight.
13. Remove subframe center beam and splash pan.
14. Remove the ball joint pinch bolt from the right-side lower control arm, then use a puller to disconnect the ball joint from the knuckle. Removethe damper fork bolt.
15. Turn right side steering knuckle to its most outboard position. With screwdriver, pry CV joint out approximately 1/2", then pull CV joint out of transmission housing.

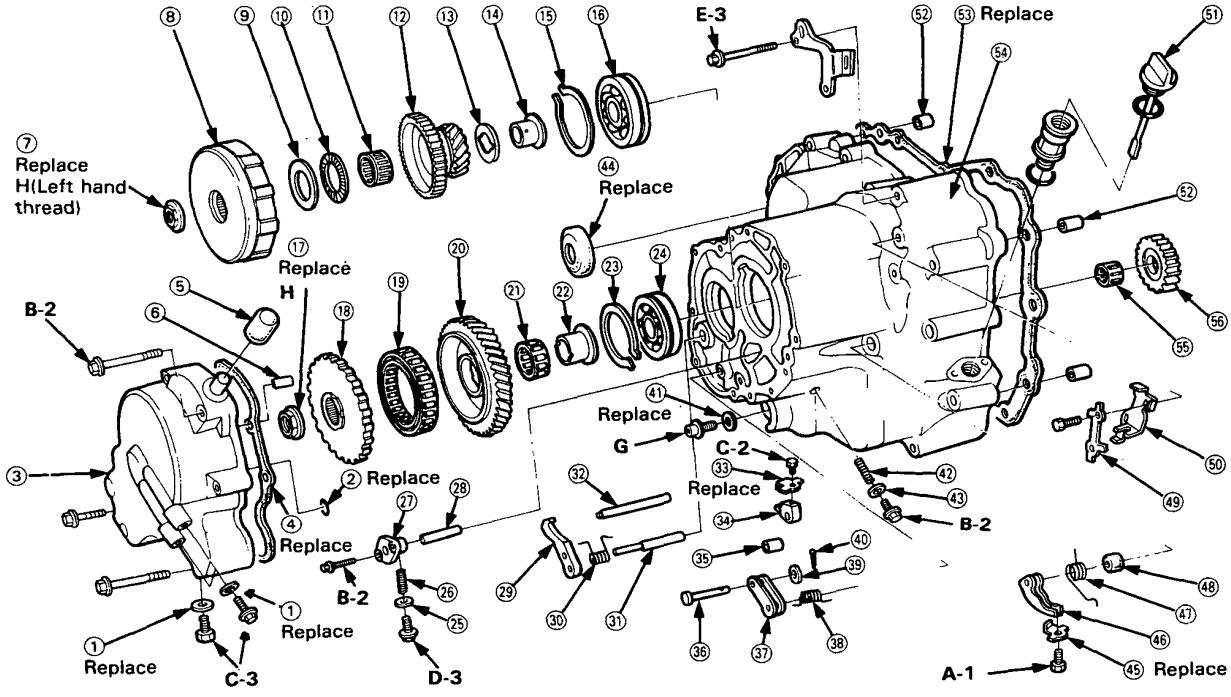
    CAUTION: Do not pull on the driveshaft or knuckle since this may cause the inboard CV joint to separate; pull on the inboard CV joint.

16. Remove transmission damper bracket located in front of torque converter cover plate.
17. Remove torque converter cover plate.
18. Remove center console and shift indicator.

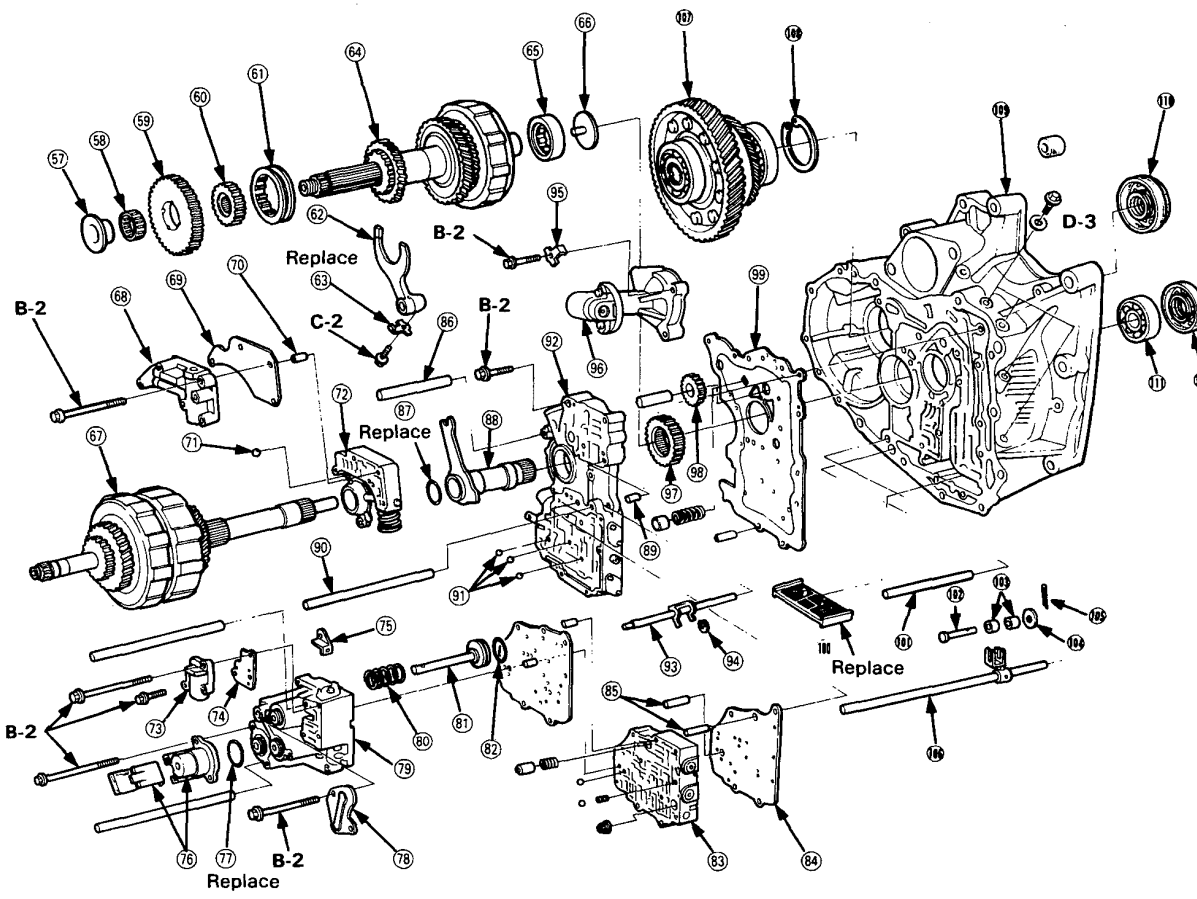


19. Remove lock pin from adjuster and shift cable.
    NOTE: On reassembly, check cable adjustment page 15-67.
20. Remove both bolts and pull shift cable out of housing.
21. Unbolt torque converter assy from drive plate by removing eight bolts.
22. Remove the three rear engine mounting bolts from transmission housing.
    Remove the rear engine mount.
23. Remove the front transmission mount's two bolts.
24. Remove the lower transmission mounting bolt.
25. Pull transmission away from the engine to clear the two 14 mm dowel pins.
    - Pry left-side CV joint out approximately 1/2".
    - Pull transmission out and lower on tansmission jack.
    - Remove torque converter from transmission.

Torque	Bolt size
A— 8 N·m (0.8 kg-m, 6 lb-ft)	1—5 x 0.8 mm
B—12 N·m (1.2 kg-m, 9 lb-ft)	2—6 x 1.0 mm
C—14 N·m (1.4 kg-m, 10 lb-ft)	3—8 x 1.25 mm
D—18 N·m (1.8 kg-m, 12 lb-ft)	
E—27 N·m (2.7 kg-m, 20 lb-ft)	
F—29 N·m (2.9 kg-m, 21 lb-ft)	
G—40 N·m (4.0 kg-m, 29 lb-ft)	
H—95 N·m (9.5 kg-m, 70 lb-ft)	



① **WASHER 8 mm**
② **O-RING 6 x 2.3 mm**
③ **END COVER**
Disassembly/Inspection, page 15-47
④ **GASKET**
⑤ **BREATHER CAP**
⑥ **DOWEL PIN 8 x 14 mm**
⑦ **LOCK NUT**
Removal, page 15-12
Installation, page 15-58
⑧ **1st CLUTCH**
Removal, page 15-13
Disassembly, page 15-36
Reassembly, page 15-40
⑨ **THRUST WASHER 26 mm**
⑩ **THRUST NEEDLE BEARING 31 x 47 x 2 mm**
⑪ **NEEDLE BEARING 31 x 36 x 18.5 mm**
⑫ **MAINSHAFT 1st GEAR**
⑬ **THRUST WASHER**
⑭ **COLLAR 26 mm**
⑮ **SNAP RING 75 mm**
⑯ **MAINSHAFT BEARING**
Replacement, page 15-44
⑰ **LOCK NUT**
Removal, page 15-12
Installation, page 15-58
⑱ **PARKING GEAR**
⑲ **ONE-WAY CLUTCH**
⑳ **COUNTERSHAFT 1st GEAR**
Disassembly/Inspection, page 15-21
㉑ **NEEDLE BEARING**
㉒ **1st GEAR COLLAR**
㉓ **SNAP RING 68 mm**
㉔ **COUNTERSHAFT BEARING**
㉕ **WASHER 10 mm**
㉖ **SPRING**
㉗ **REVERSE IDLER BEARING HOLDER**
Removal, page 15-14
㉘ **REVERSE GEAR SHAFT**
㉙ **PARKING PAWL**
㉚ **PARKING PAWL SPRING**
㉛ **PARKING PAWL SHAFT**
㉜ **STOP PIN**
㉝ **LOCK PLATE**
㉞ **PARKING LEVER**
㉟ **PARKING PAWL ROLLER**
㊱ **ROLLER PIN**
㊲ **PARKING SHIFT ARM**
㊳ **RETURN SPRING**
㊴ **WASHER 6 mm**
㊵ **LOCK PIN**
㊶ **WASHER 14 mm**
㊷ **SPRING**
㊸ **WASHER 8 mm**
㊹ **DIFFERENTIAL OIL SEAL**
Installation, page 15-44
㊺ **LOCK PLATE**
㊻ **THROTTLE CONTROL LEVER**
㊼ **THROTTLE CONTROL SHAFT SPRING**
Removal, page 15-14
Installation, page 15-56
㊽ **THROTTLE CONTROL SHAFT SEAL**
㊾ **LOCK PLATE**
㊿ **THROTTLE CONTROL CABLE BRACKET**
(51) **DIPSTICK**
(52) **DOWEL PIN 14 x 25 mm**
(53) **GASKET**
(54) **TRANSMISSION HOUSING**
(55) **NEEDLE BEARING**
(56) **REVERSE IDLER GEAR**
Replacement, page 15-55



⑤⑦ **REVERSE GEAR COLLAR**
⑤⑧ **NEEDLE BEARING**
⑤⑨ **COUNTERSHAFT REVERSE GEAR**
⑥⓪ **SELECTOR HUB**
⑥① **REVERSE GEAR SELECTOR**
⑥② **REVERSE SHIFT FORK**
⑥③ ***LOCK PLATE***
⑥④ **COUNTERSHAFT ASSY**
Disassembly/Inspection, page 15-32
⑥⑤ **COUNTERSHAFT NEEDLE BEARING**
⑥⑥ **OIL GUIDE PLATE**
⑥⑦ **MAINSHAFT ASSY**
Disassembly/Inspection page15-31
⑥⑧ **LOCK UP SHIFT VALVE BODY**
Removal, page 15-18
Disassembly, page 15-28
⑥⑨ **SEPARATOR PLATE**
⑦⓪ **DOWEL PIN**
⑦① **STEEL BALL**
⑦② **REGULATOR VALVE BODY**
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Repair, page 15-24
Disassembly, page 15-27
⑦③ **MODULATOR VALVE BODY**
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⑦④ **SEPARATOR PLATE**
⑦⑤ **CHECK VALVE STOP PLATE**
⑦⑥ **4th ACCUMULATOR COVER**
⑦⑦ **O-RING**
⑦⑧ **2nd/3rd ACCUMULATOR COVER**
⑦⑨ **SERVO VALVE BODY ASSY**
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⑧⓪ **RETURN SPRING**
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⑧② **O-RING 31 x 2.7 mm**
⑧③ **SECONDARY VALVE BODY ASSY**
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⑧④ **SEPARATOR PLATE**
⑧⑤ **DOWEL PIN**
⑧⑥ **STOP PIN**
⑧⑦ **O-RING**
⑧⑧ **STATOR SHAFT**
⑧⑨ **DOWEL PIN**
⑨⓪ **1st CLUTCH PIPE**
⑨① **STEEL BALL**
⑨② **MAIN VALVE BODY ASSY**
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⑨③ **THROTTLE CONTROL SHAFT**
⑨④ **E-CLIP**
⑨⑤ **LOCK PLATE**
⑨⑥ **GOVERNOR VALVE**
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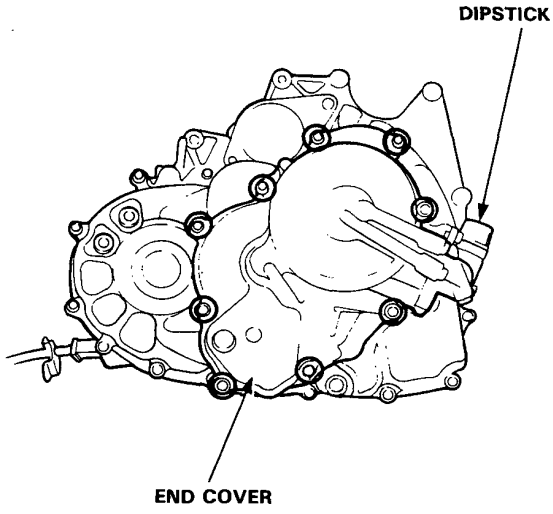
⑨⑧ **PUMP DRIVEN GEAR**
⑨⑨ **MAIN VALVE SEPARATOR PLATE**
⑩⓪ **FILTER SCREEN**
⑩① **SUCTION PIPE**
⑩② **MANUAL VALVE PIN**
⑩③ **ROLLER**
⑩④ **WASHER 5 mm**
⑩⑤ ***COTTER PIN***
⑩⑥ **CONTROL SHAFT**
⑩⑦ **DIFFERENTIAL**
⑩⑧ **SNAP RING 80 mm**
⑩⑨ **TORQUE CONVERTER HOUSING**
⑪⓪ **DIFFERENTIAL OIL SEAL**
⑪① **MAINSHAFT BEARING**
⑪② **MAINSHAFT OIL SEAL**

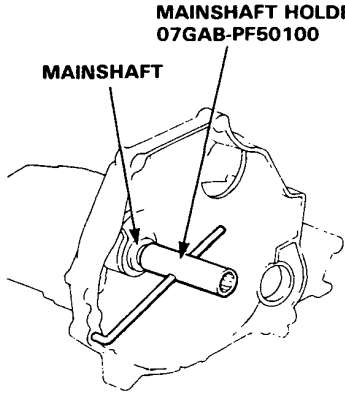
Transmission Housing

Removal

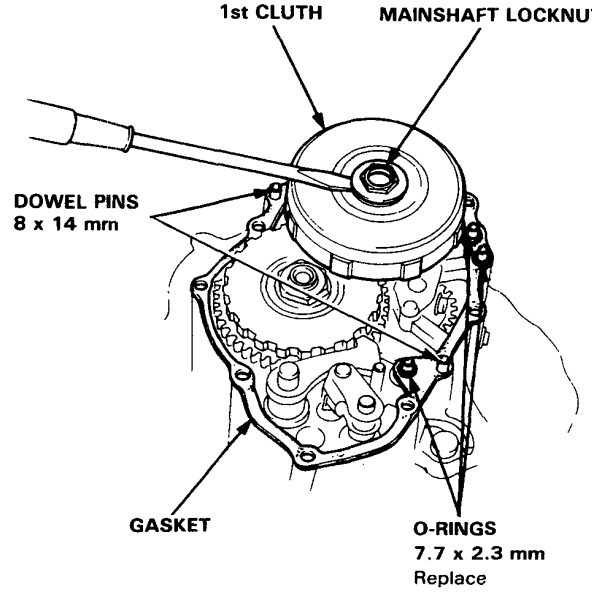
1. Remove the dipstick.
2. Remove the nine bolts from the end cover, then remove the cover.



3. Shift the transmission to PARK.
4. Lock the mainshaft using the mainshaft holder.

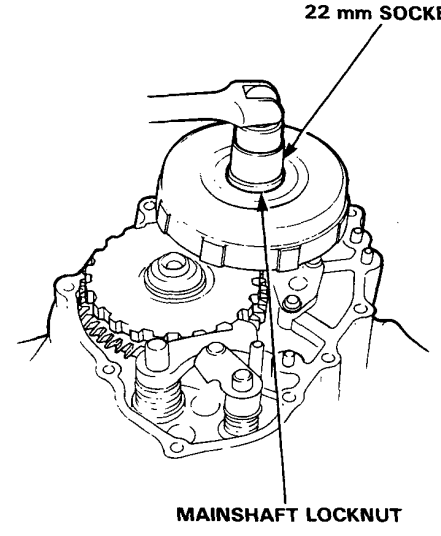


5. Remove the end cover gasket, dowel pins, and O-rings.
6. Pry the staked edge of the locknut flange out of the notch in the 1st clutch.



7. Remove the mainshaft locknut.

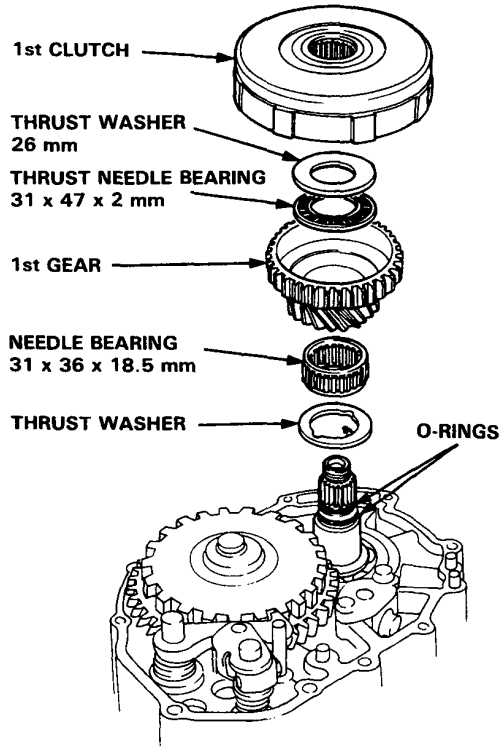
CAUTION: The mainshaft locknut has left-hand threads.



8. Remove the 1st clutch.

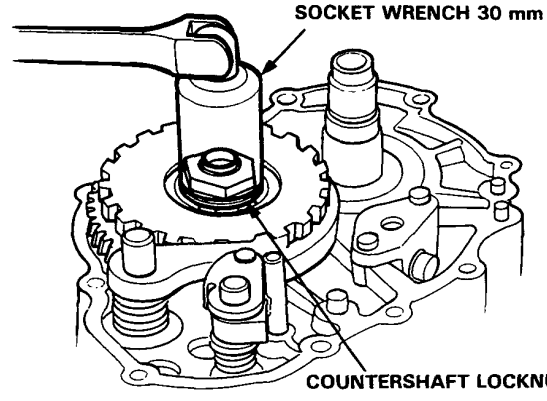
9. Remove the needle bearing and thrust washer from the mainshaft.

10. Remove the O-rings and first gear from the mainshaft.

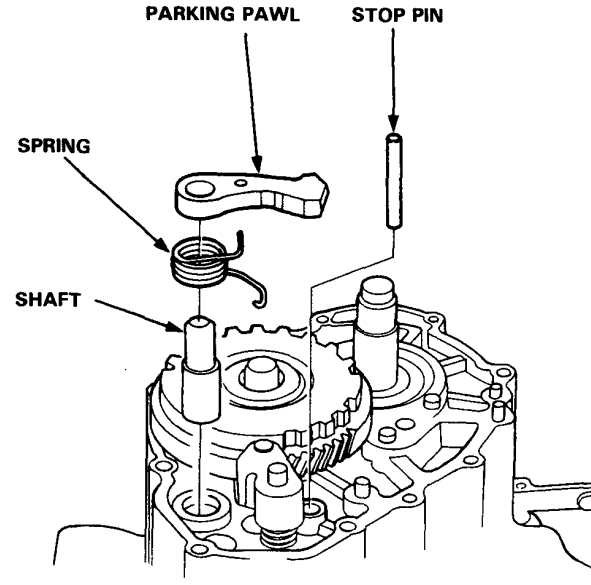


11. Pry the staked edge of the locknut out of the notch in the parking gear.

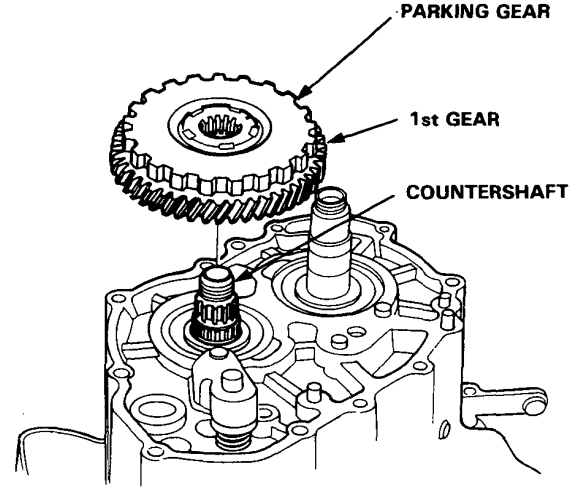
12. Remove the countershaft locknut.



13. Remove the parking pawl, shaft, stop pin and spring.



14. Remove the parking gear and countershaft 1st gear as a unit.

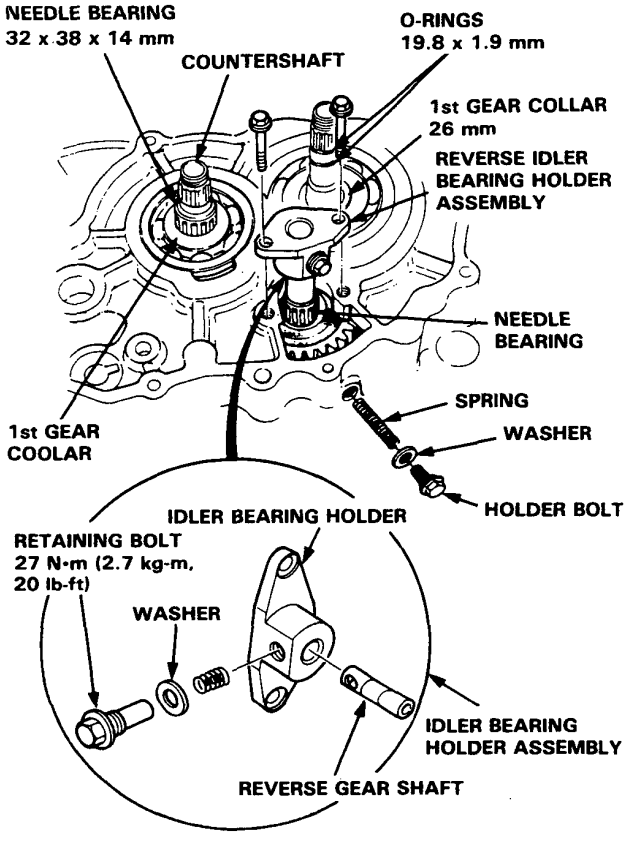


(cont'd)

Removal (cont'd)

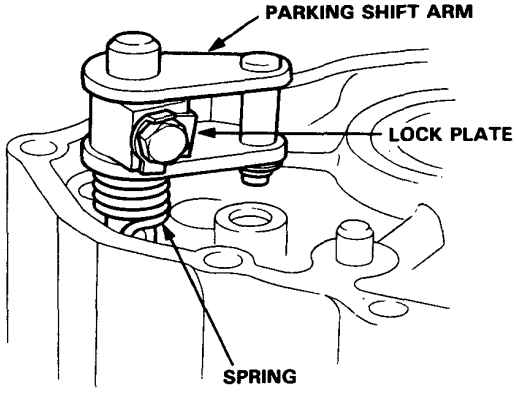
15. From the countershaft, remove the needle bearing and 1st gear collar. From the mainshaft, remove the 1st gear collar.

16. Remove the reverse idler bearing holder assembly.

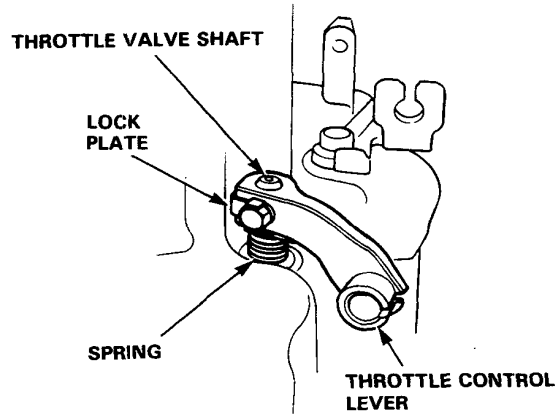


17. Bend down the tab on the lock plate under the parking shift arm bolt.

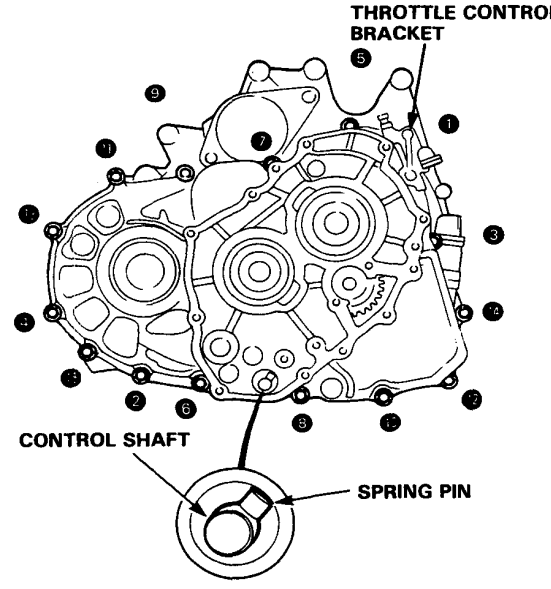
18. Remove the bolt, then remove the parking shift arm.



19. Bend down the tab on the throttle control lever bolt lock plate, then remove the bolt. Now, remove the throttle control lever and spring from the throttle valve shaft.

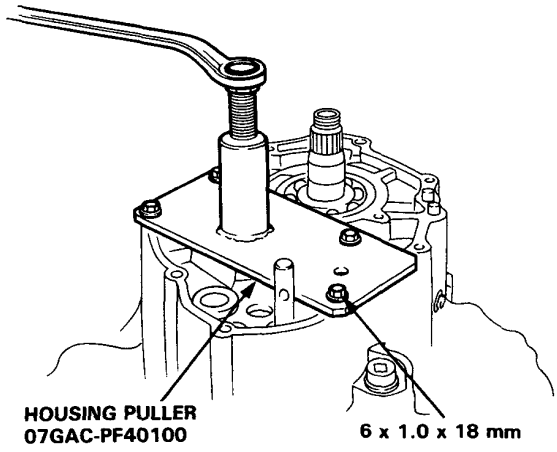


20. Remove the 8 x 1.25 mm bolts, (1) thru (15), in the sequence shown.



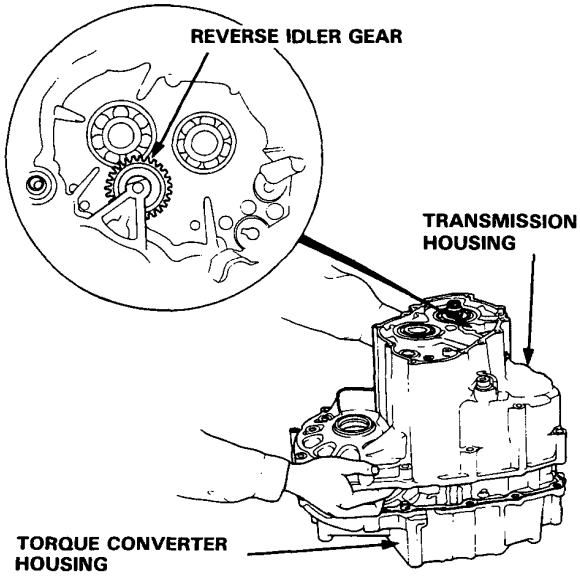
21. Align the control shaft spring pin with the cutout in the transmission housing.

22. Install the transmission housing puller over the countershaft with four bolts and tighten securely. Then screw in the puller bolt against the end of the countershaft until the transmission housing comes loose.



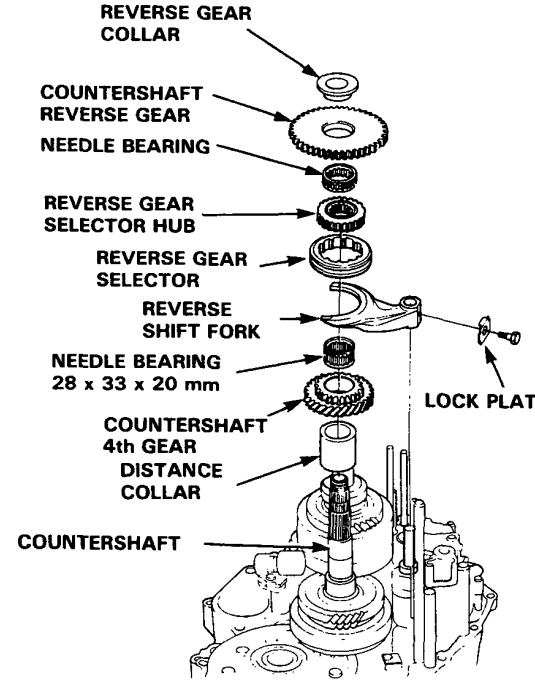
23. Remove the puller and separate the housings. Remove the reverse idler gear and needle bearing from the transmission housing.

24. Remove the gasket and the dowel pins.

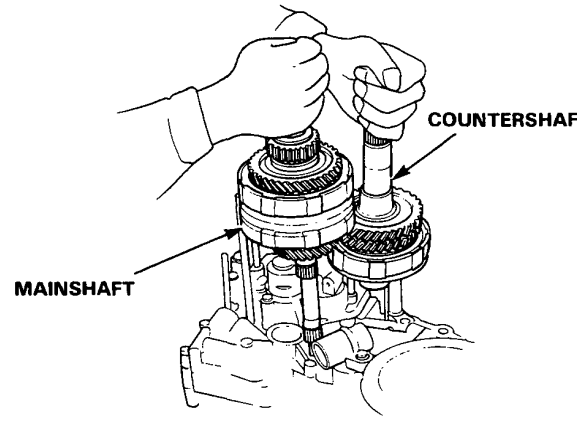


Removal

1. Remove the reverse gear collar, countershaft reverse gear and needle bearing.



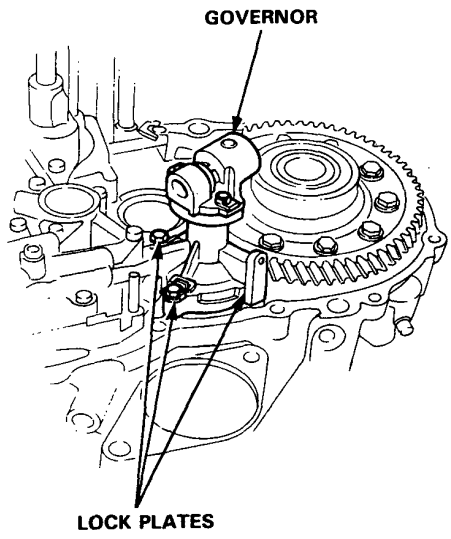
2. Bend down the tab on the lock plate and remove the bolt from the reverse shift fork.
3. Remove the reverse shift fork and reverse gear selector as a unit.
4. Remove the selector hub, countershaft 4th gear, needle bearing and distance collar.
5. Remove the mainshaft and countershaft together. NOTE: It will be necessary to pull up the countershaft at a slight angle to clear the governor.



Governor Valve

Removal

Bend down the tabs on the lock plates, remove the bolts holding the governor to the torque converter housing, and remove the governor.



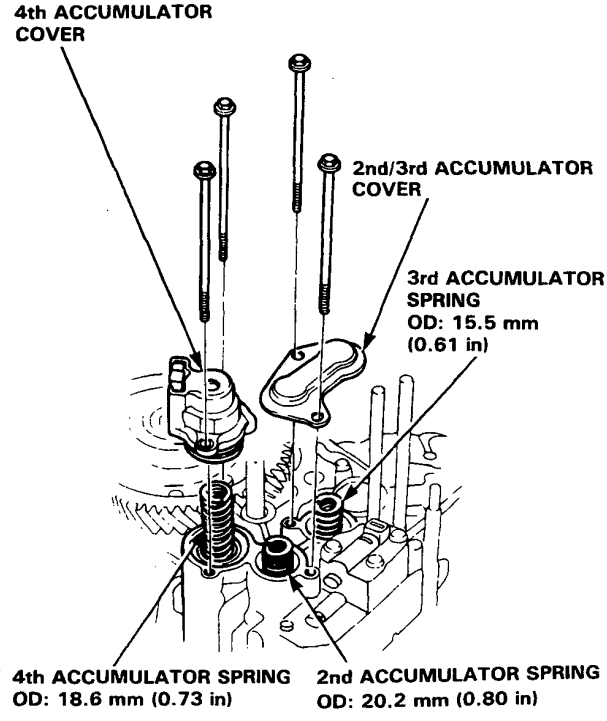
Main Valve Body

Removal

1. Remove the accumulator covers.

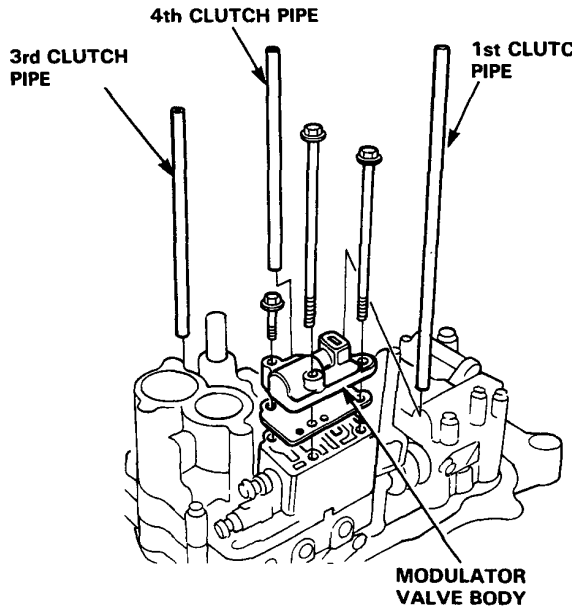
   CAUTION: Accumulator covers are spring loaded; to prevent stripping the threads in the torque converter housing, press down on the accumulator covers while unscrewing the bolts in a criss-cross pattern.

2. Remove the accumulator springs.

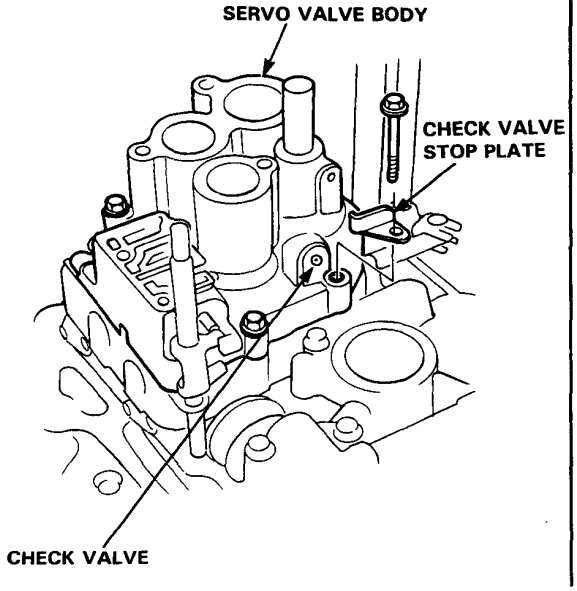


3. Remove the three bolts attaching the modulalor valve body.

4. Remove the 1st, 4th and 3rd clutch pipes.

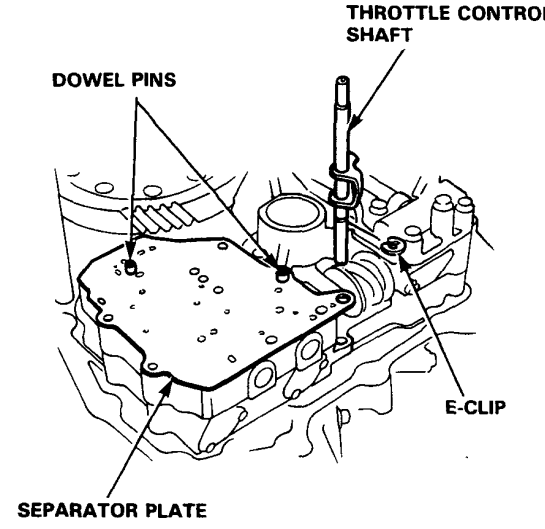


5. Remove the servo valve body (3 bolts).
6. Remove the check valve stop plate.



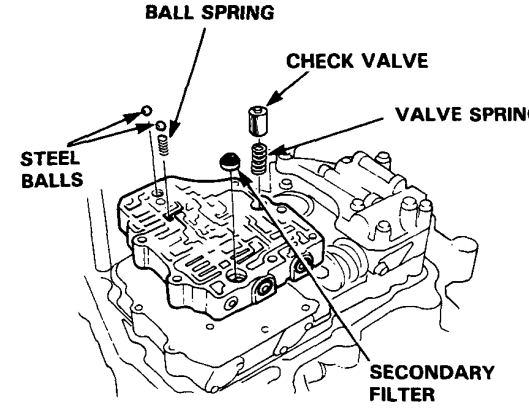
7. Remove the E-clip. Then remove the thottle control shaft from the separator plate.

8. Remove the separator plate and dowel pins.



9. Remove the secondary valve body, being careful not to lose the 2 steel balls, ball spring, check valve and spring, secondary filter.

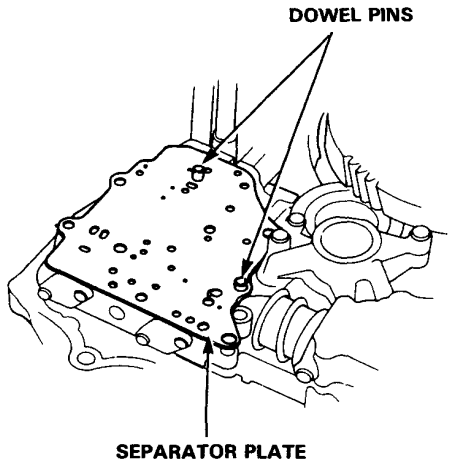
CAUTION: Do not use a magnet to remove the steel balls; it may magnetize the balls.



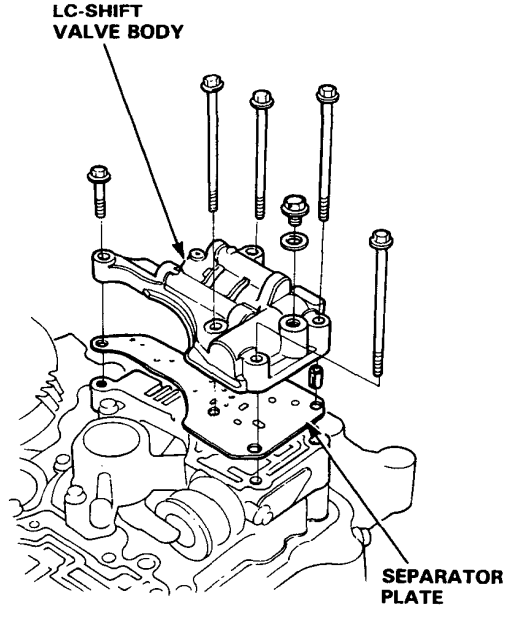
(cont'd)

Removal (cont'd)

10. Remove the separator plate and dowel pins.

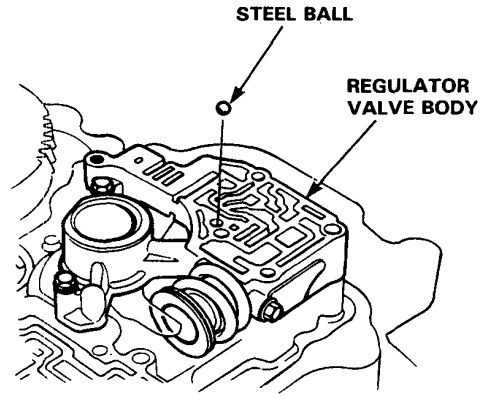


11. Remove the LC-Shift valve body and separator plate (5 bolts).

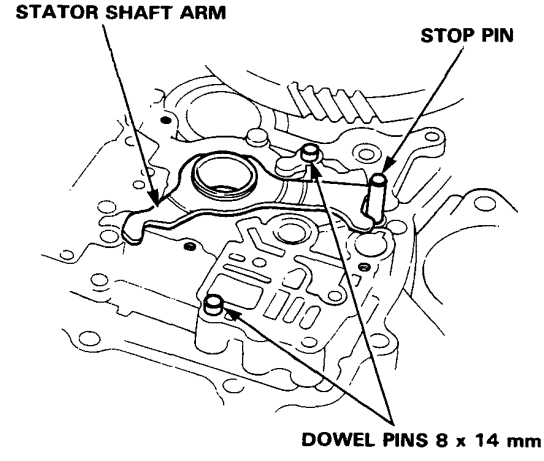


12. Remove the regulator valve body being careful not to lose the steel ball.

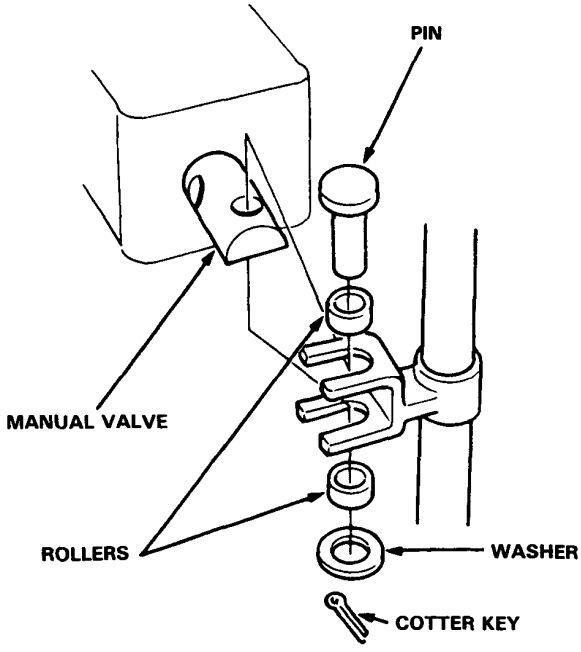
CAUTION: Do not use a magnet to remove the steel ball; it may magnetize the ball.



13. Remove the stator shaft arm, dowel pins and stop pin.



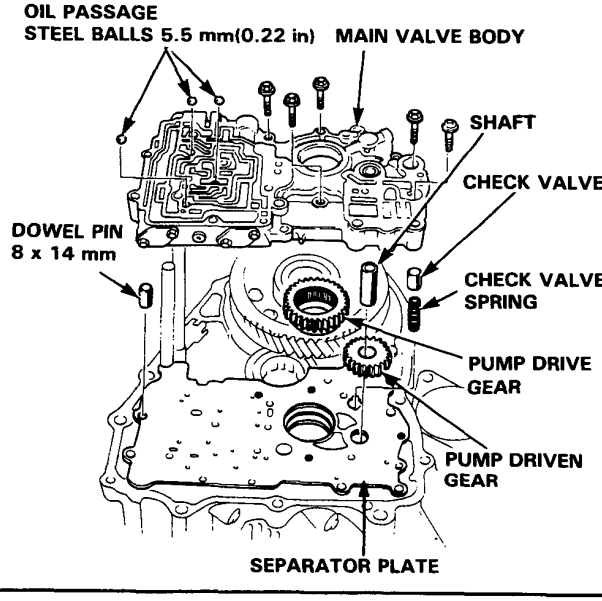
14. Remove the cotter key, washer, rollers, and pin from the manual valve.



15. Remove the main valve body being careful not to lose the 3 steel balls, check ball spring, torque converter check valve and spring.

CAUTION: Do not use a magnet to remove the steel balls; it may magnetize the balls.

NOTE: Top oil passage steel ball in this drawing has a spring beneath it.

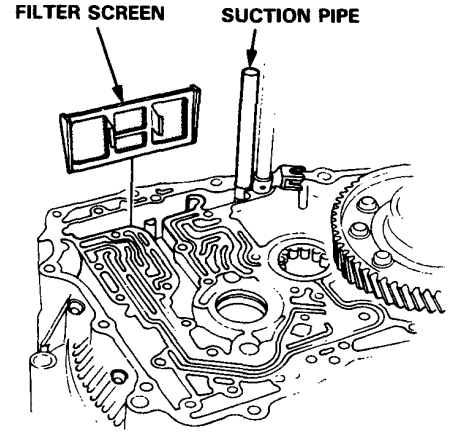


16. Remove the pump gears and shaft.

17. Remove the separator plate, dowel pins, check valve, and spring.

18. Remove the filter screen and suction pipe.

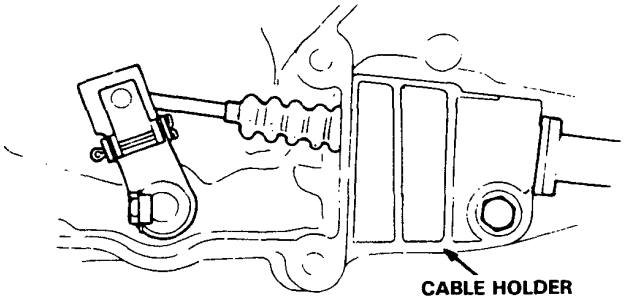
NOTE: Do not reuse filter screen; install a new one on reassembly.



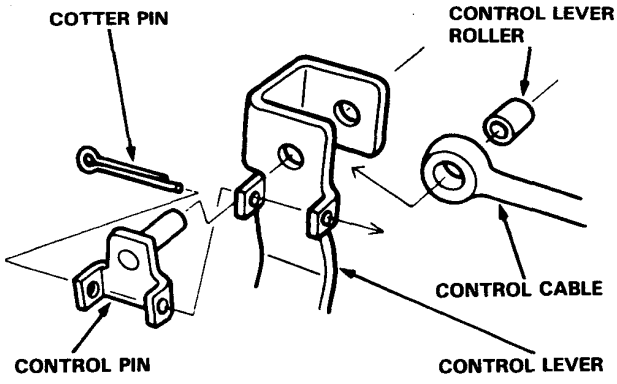
Control Shaft

Removal

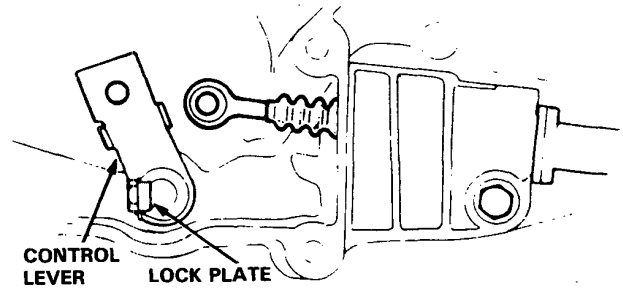
1. Remove the cable holder.



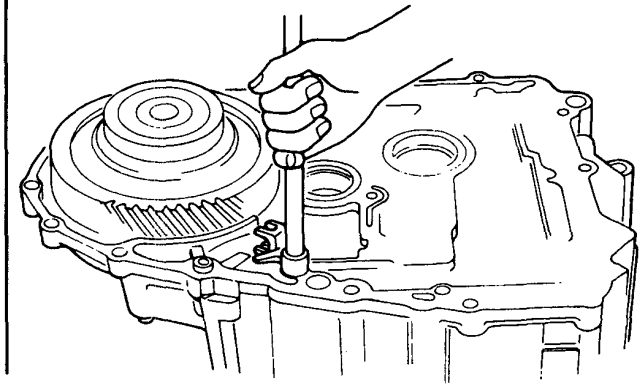
2. Remove the cotter pin, control pin, and control lever roller from the control lever.



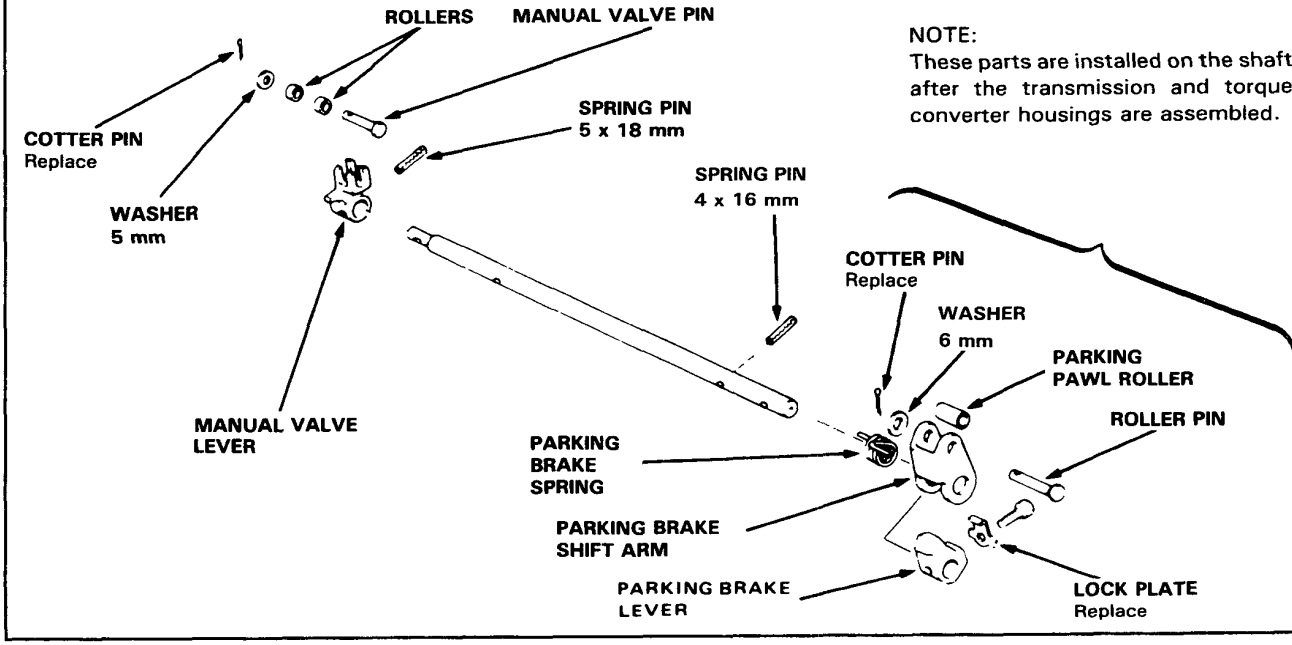
3. Bend down the tab on the lock plate under the bolt in the control lever. Then remove the bolt and lever.



4. Turn the torque converter housing over and remove the control shaft.



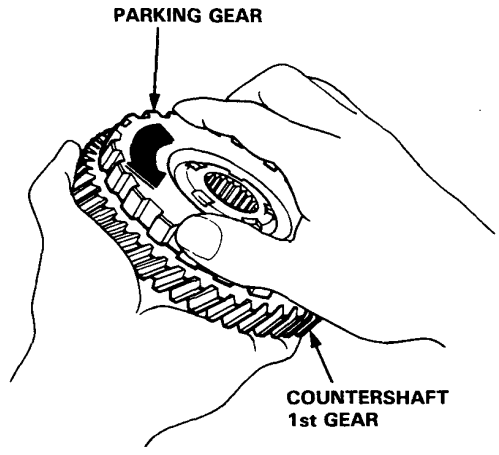
Disassembly/Reassembly



NOTE:
These parts are installed on the shaft after the transmission and torque converter housings are assembled.

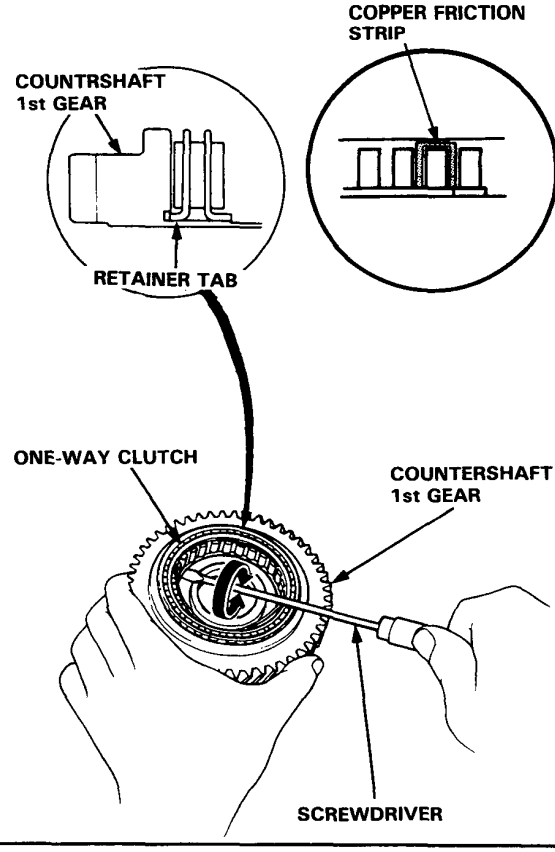
Disassembly and Inspecion

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



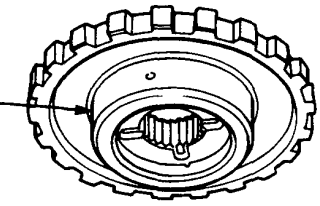
2. Remove the one-way clutch by prying it up with the end of a screwdriver.

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

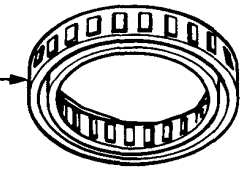


Inspect the parts as follows:

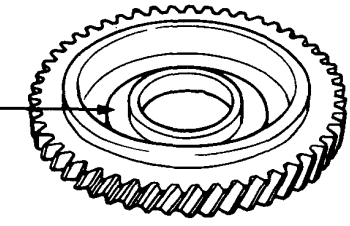
Inspect the parking gear for wear or scoring



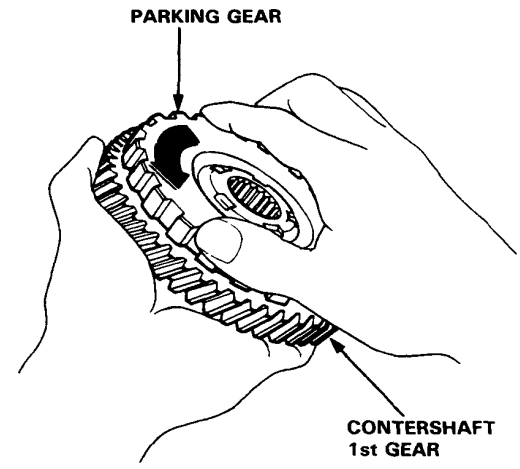
Inspect the one-way clutch for damage or faulty movement



Inspect the countershaft 1st gear for wear or scoring



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

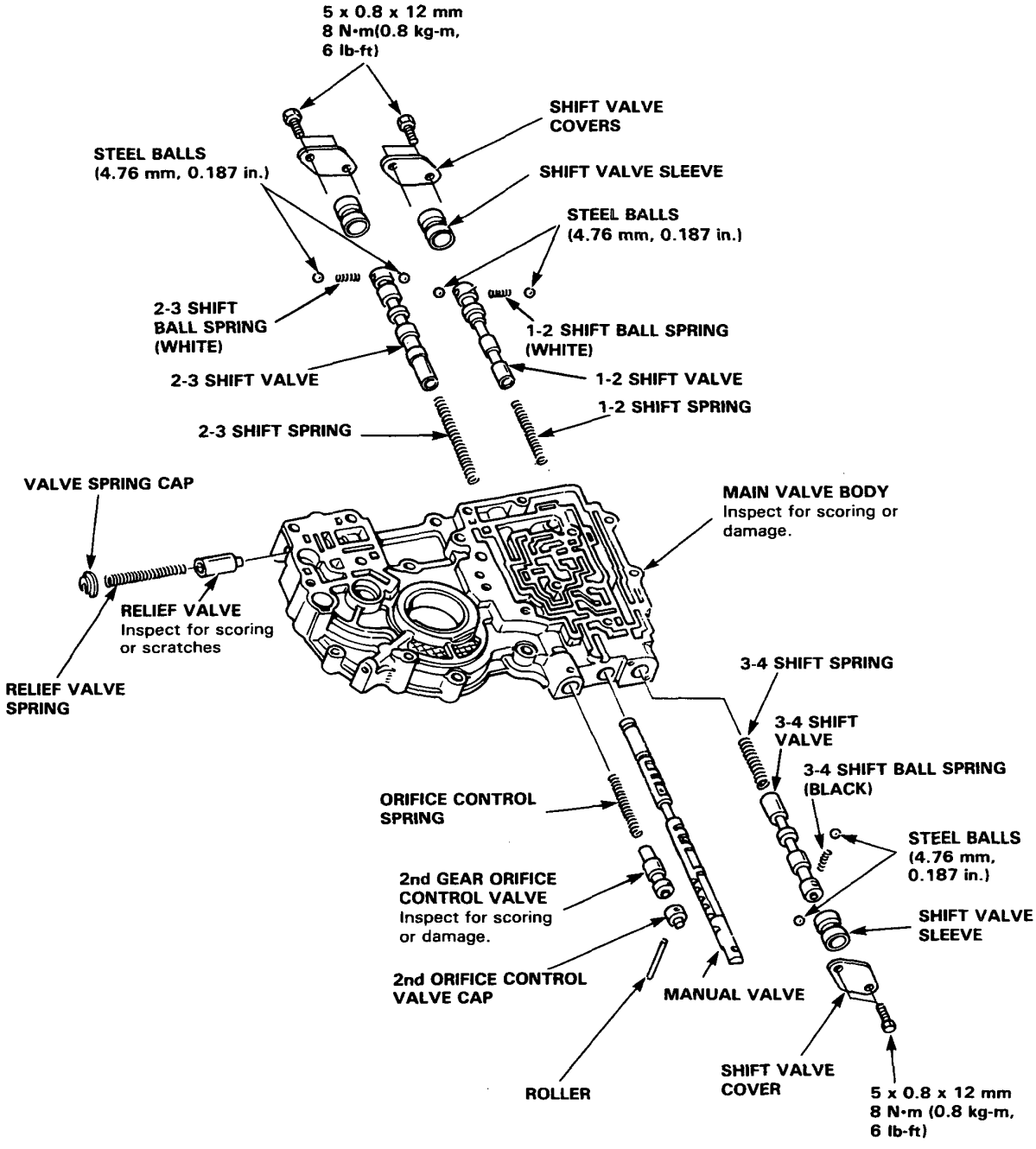


Main Valve Body

Disassembly

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Replace valve body as an assembly if any parts are worn or damaged.
- Check all valves for free movement. If any fail to slide freely, see valve Body Repair on page 15-24
- Coat all parts with ATF before reassembly.

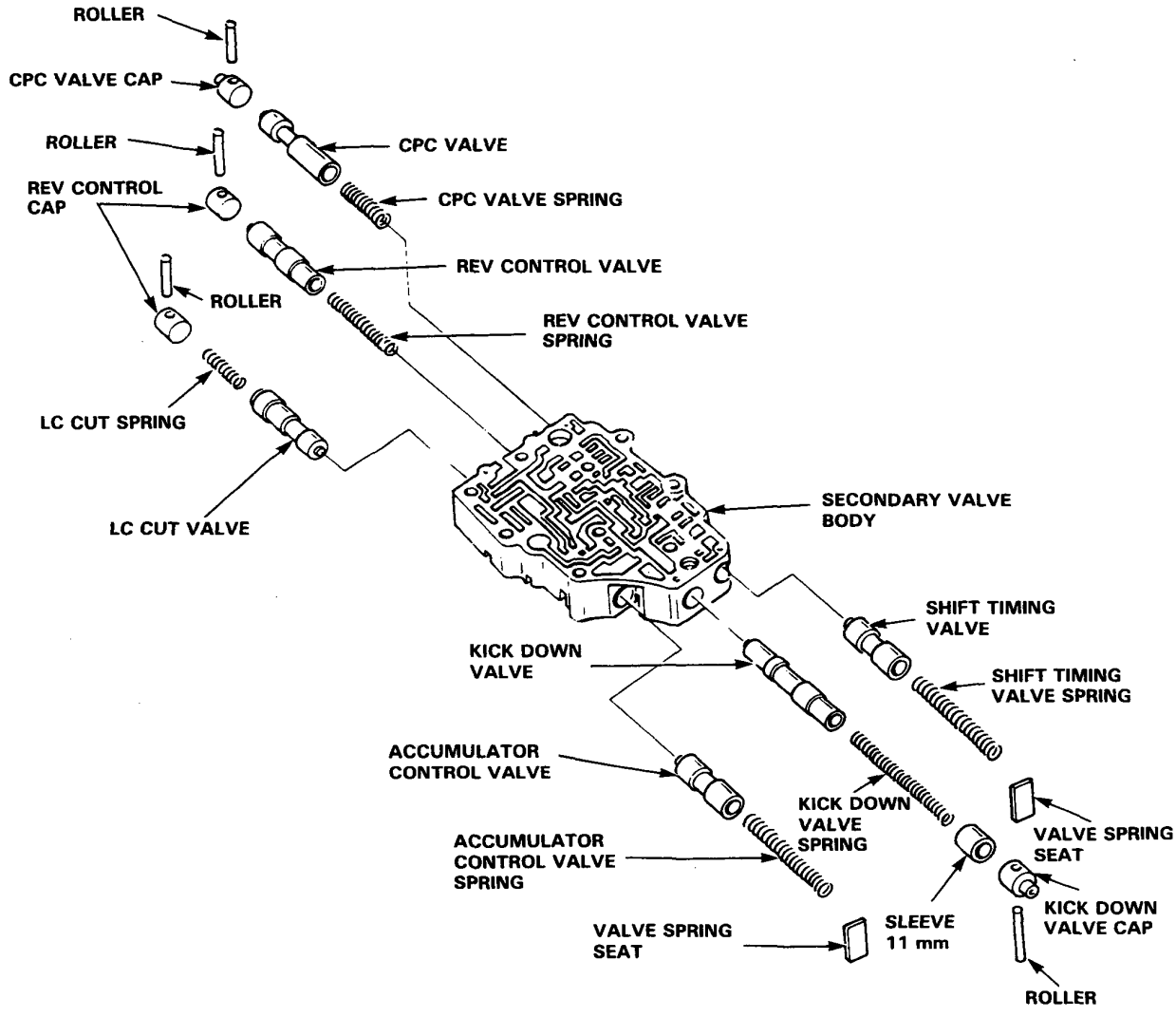


Secondary Valve

Disassembly/Inspection/Reassembly

NOTE:

- Clean all parts thoroughly is 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 15-24.



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.

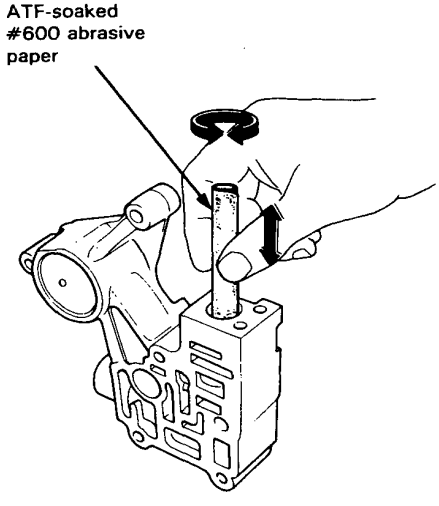
1. Soak a sheet of #600 abrasive paper in ATF for about 30 minutes.
2. Carefully tap the valve body so the sticking valve drops out of its bore.

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

3. Inspect the valve for any scuff marks. Use the ATF-soaked #600 paper to polish off any burrs that are on the valve, then wash the valve in solvent and dry it with compressed air.

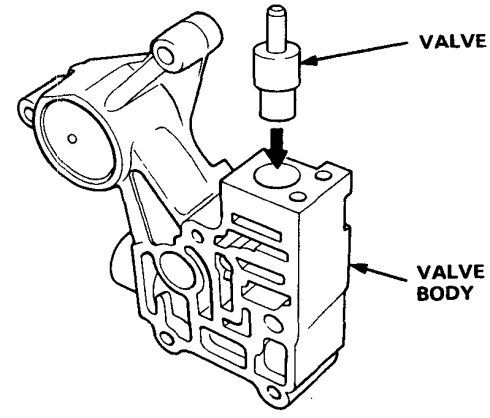
4. Roll up half a sheet of ATF-soaked paper and insert it in the valve bore of the sticking valve. Twist the paper slightly, so that it unrolls and fits the bore tightly, then polish the bore by twisting the paper as you push it in and out.

CAUTION: The valve body is aluminum and doesn't require much polishing to remove any burrs.



5. Remove the #600 paper and thoroughly wash the entire valve body in solvent, then dry with compressed air.

6. Coat the valve with ATF then drop it into its bore. It should drop to the bottom of the bore under its own weight. If not, repeat step 4, then retest.

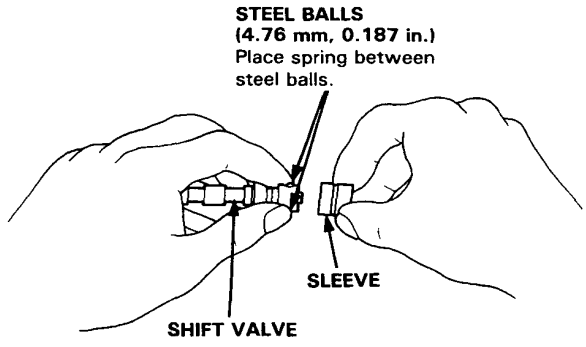


7. Remove the valve and thoroughly clean it and the valve body with solvent. Dry all parts with compressed air, then reassemble using ATF as a lubricant.

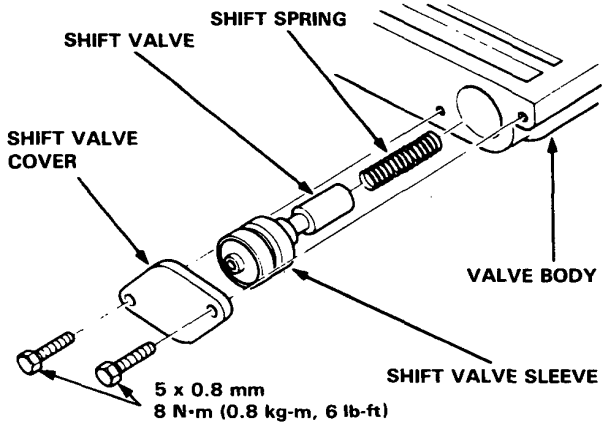
Reassembly

NOTE: Coat all parts with ATF before assembling.

1. Slide the spring into the hole in the big end of the shift valve.
   While holding the steel balls with the tips of your fingers, put the sleeve over valve.

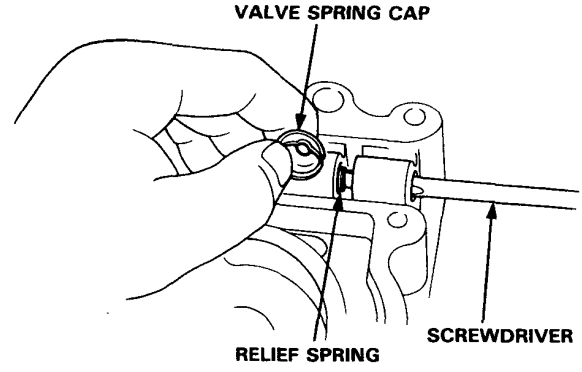


2. Place the shift spring in the valve, then slip it into the valve body and install the valve cover.

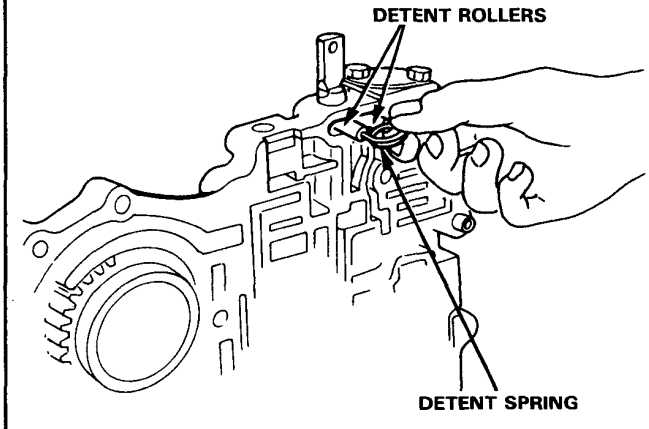


3. Set the relief spring in the relief valve and install it in the main valve body.

4. Install the spring with a screwdriver, then install the check valve cap with the cutout aligned with the screwdriver.



5. Install the manual valve, detent rollers and spring.

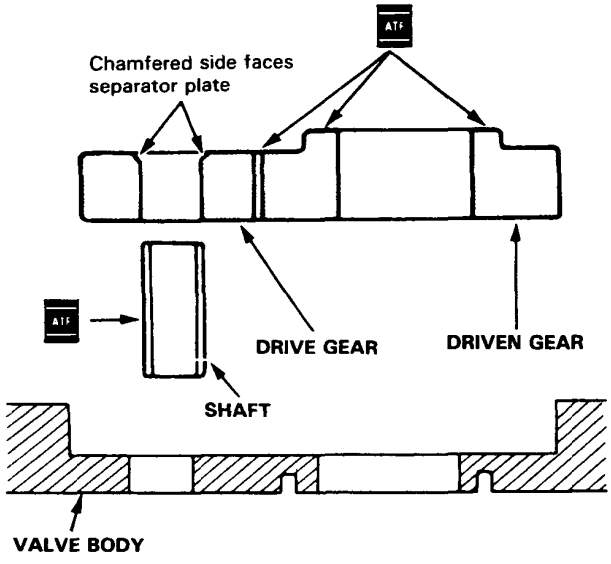


(cont'd)

Main Valve Body

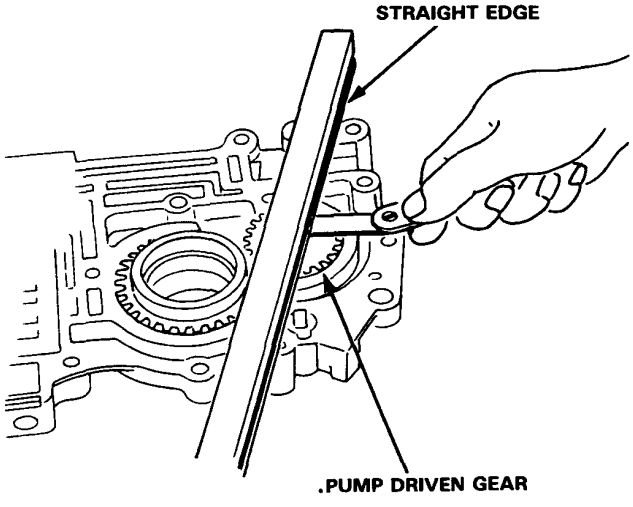
Reassembly (cont'd)

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



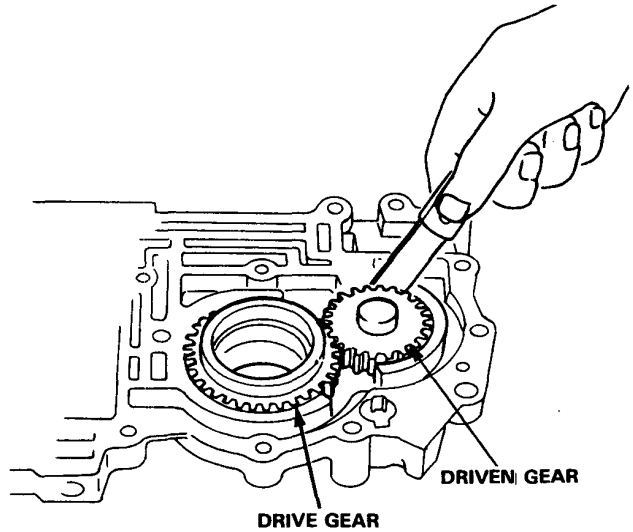
7. Measure the thrust clearance of the driven gear-to-valve body.

Drive/Driven Gear thrust (Axial) Clearance:
Standard (New): 0.03—0.05 mm
(0.001—0.002 in.)
Service Limit: 0.08 mm (0.003 in.)



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

Pump Gears Side (Radial) Clearance:
Standard (New): Drive gear 0.21—0.27 mm
(0.008—0.010 in.)
Driven gear 0.05—0.09 mm
(0.002—0.004 in.)

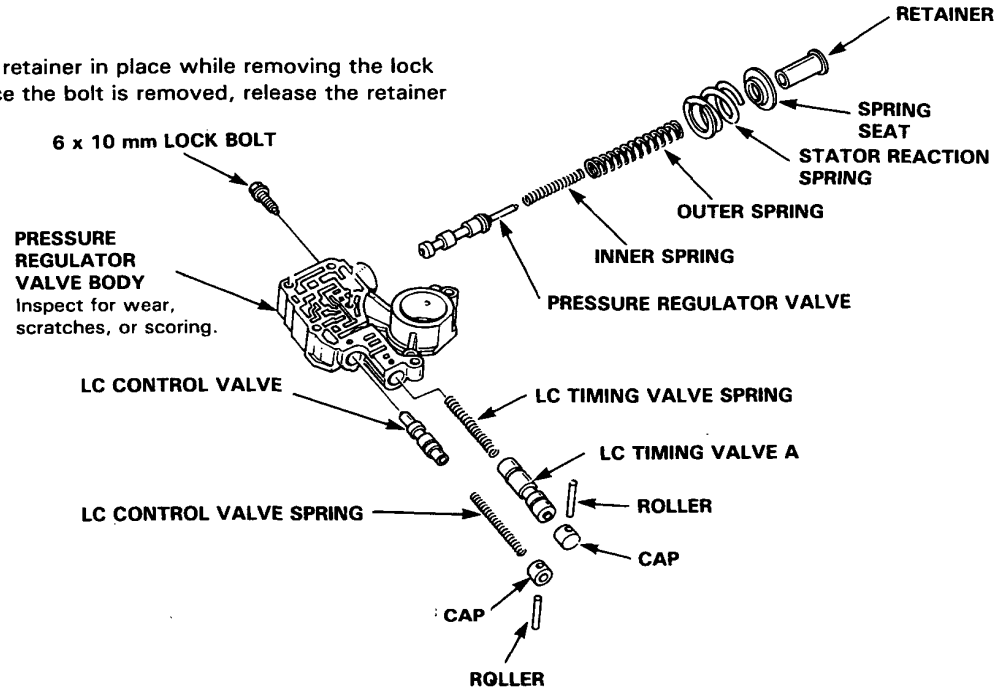


Regulator Valve Body

Disassembly/Inspection

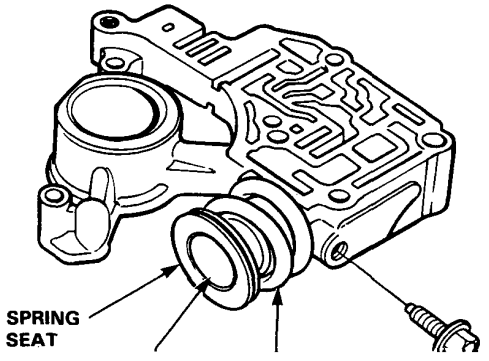
NOTE:
- Clean all parts thoroughly in solvent or carburetor cleaner.
- Replace valve body as assembly if any parts are worn or damaged.
- Check all valves for free movement, if any fail to slide freely, see Valve Body Repair on page 15-24
- Coat all parts with ATF before reassembly.

1. Hold the retainer in place while removing the lock bolt. Once the bolt is removed, release the retainer slowly.



Reassembly

1. Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
2. Coat all valves with ATF.
3. Install the pressure regulator valve, and the inner and outer springs.
4. Install the reaction spring, spring seat, and retainer. Align the hole in the retainer with the hole in the valve body, then press the retainer into the valve body and tighten the lock bolt

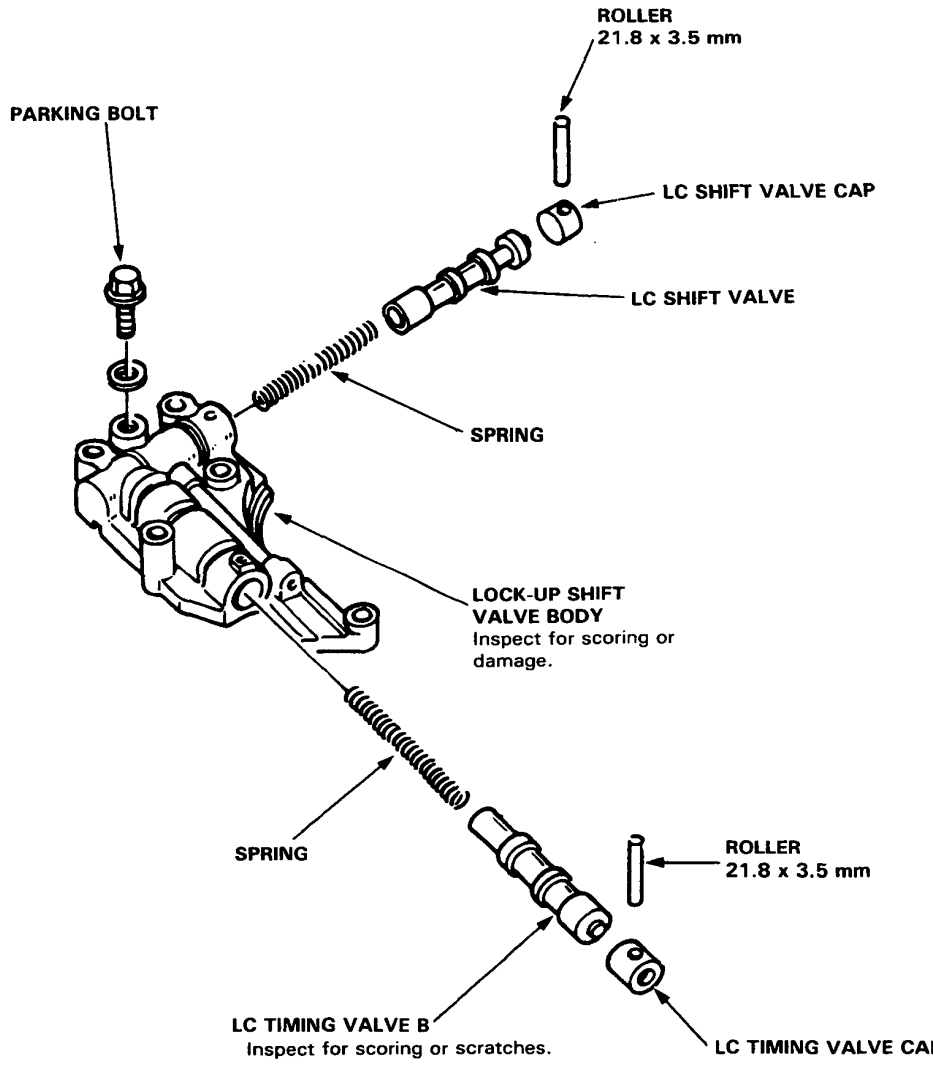


Lock-Up Shift Valve Body

Disassembly/Inspection

NOTE:

- Clean all parts thoroughly in solvent or carburetor cleaner.
- Replace valve body as assembly if any parts are worm or damaged.
- Check all valves for free movement, if any fail to slide freely, see Valve Body Repair on page 15-24
- Coat all parts with ATF before reassembly.

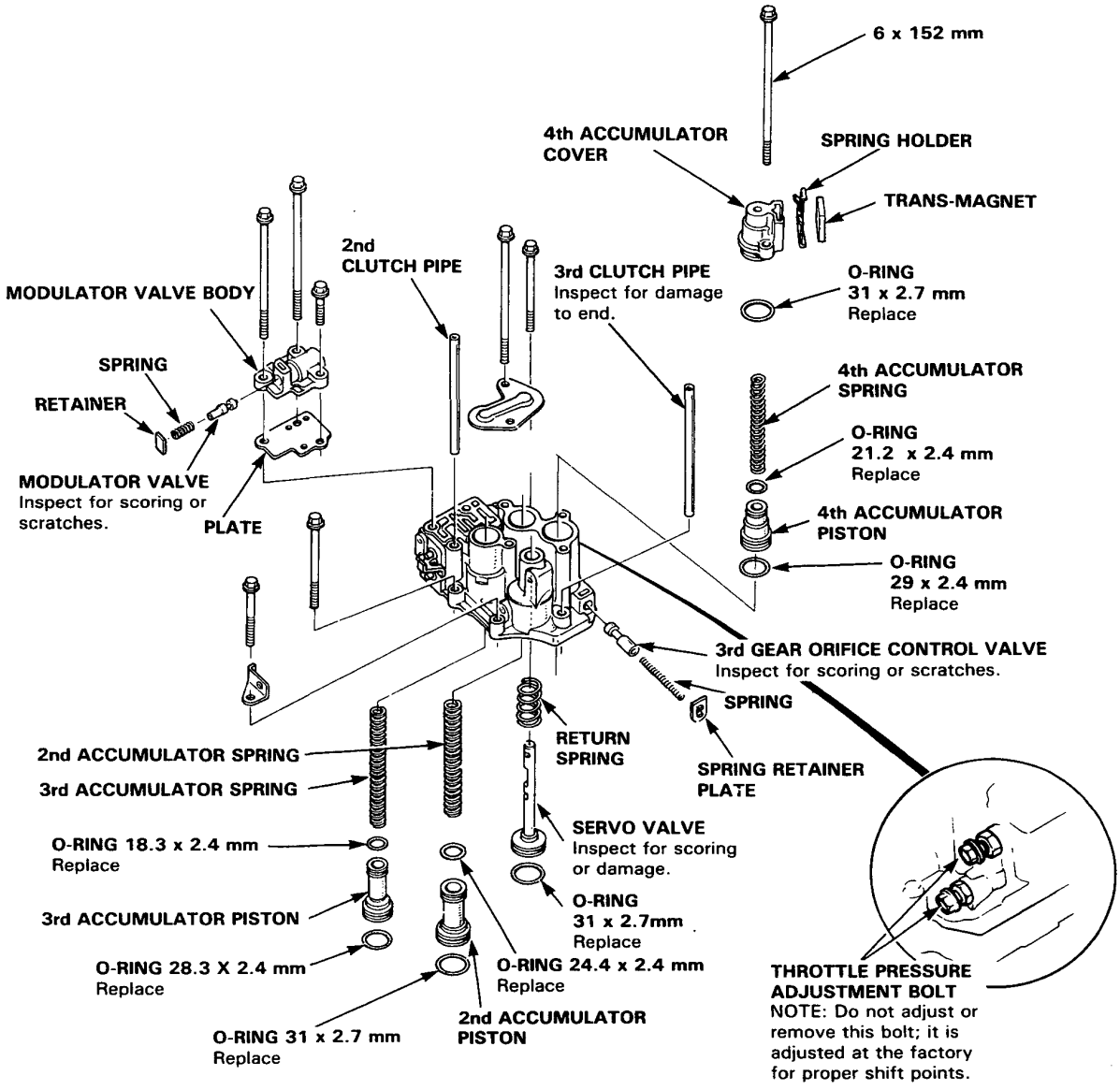


Servo Valve Body

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 15-24.

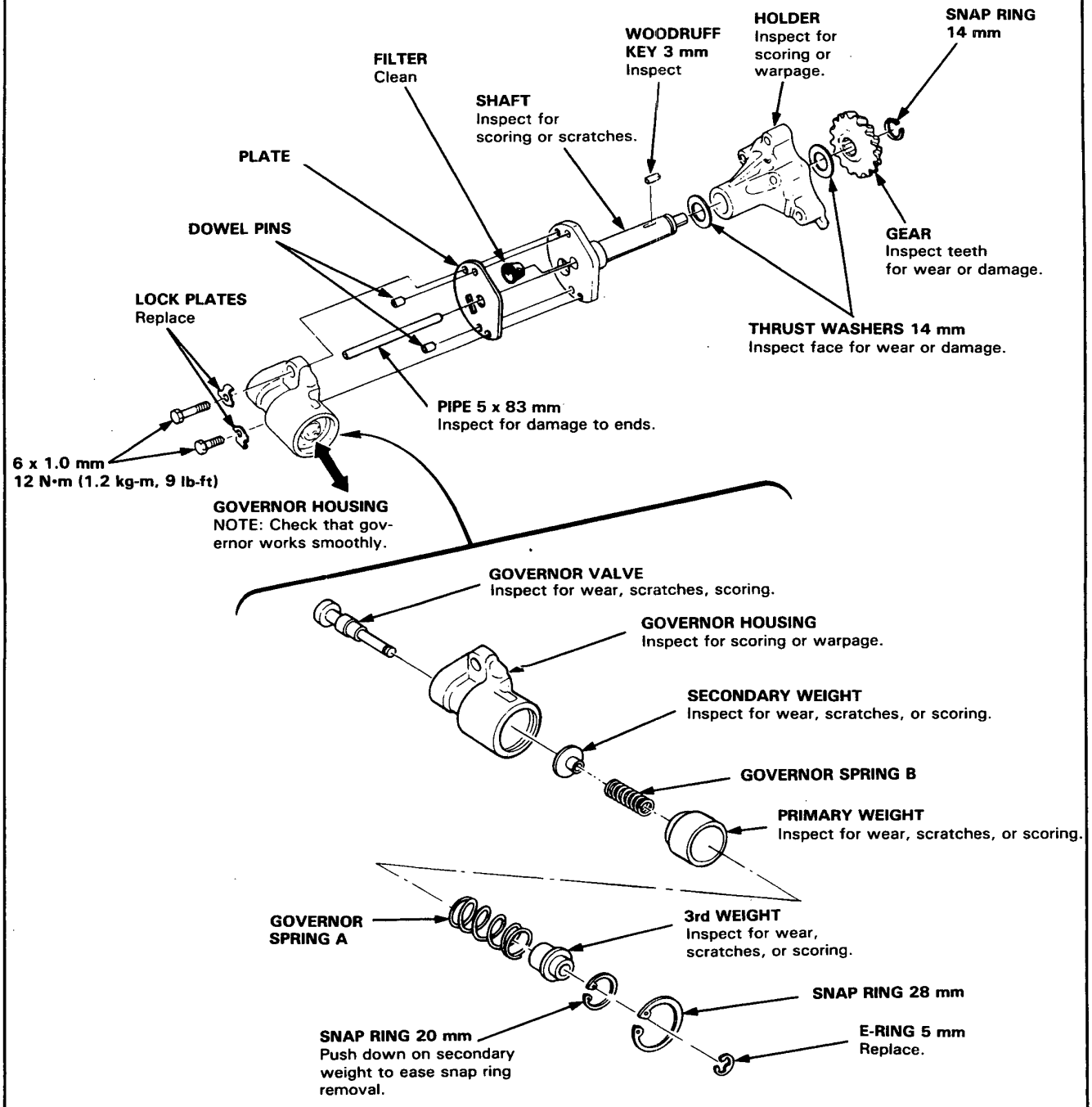


Governor Valve

Disassembly/Inspection/Reassembly

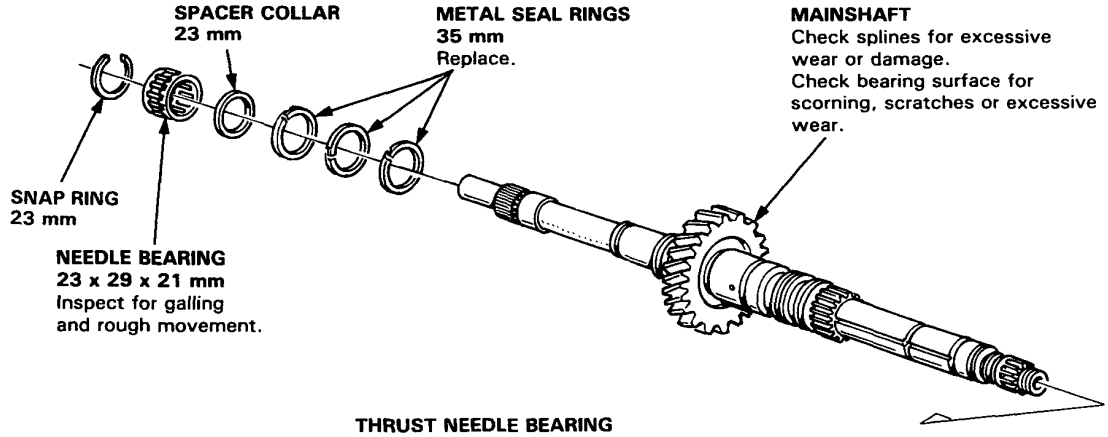
NOTE:

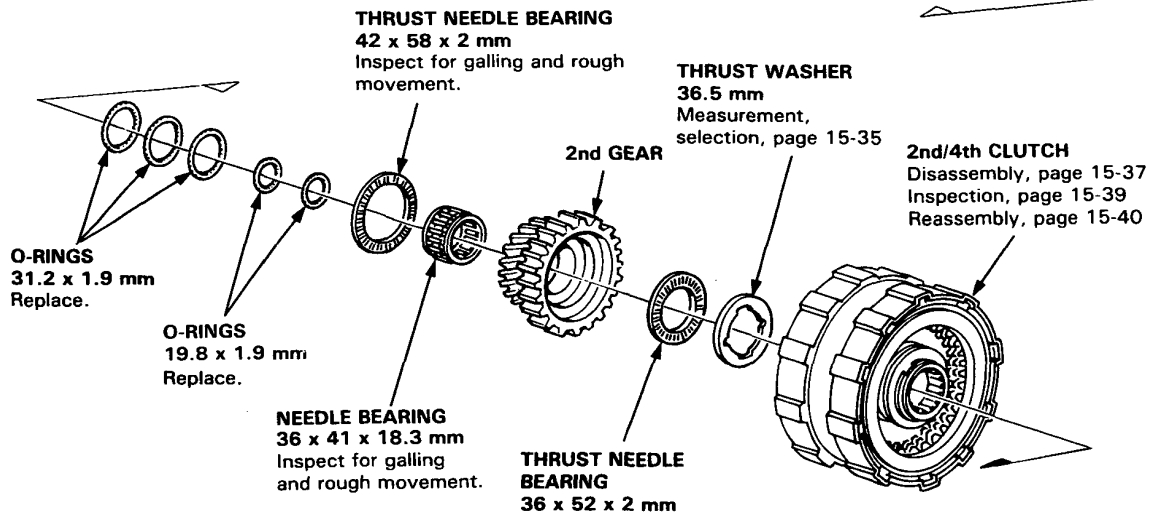
- Clean all parts thoroughly solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Check that the governor works smoothly; replace it if it does not.
- Coat all parts with ATF before reassembly.

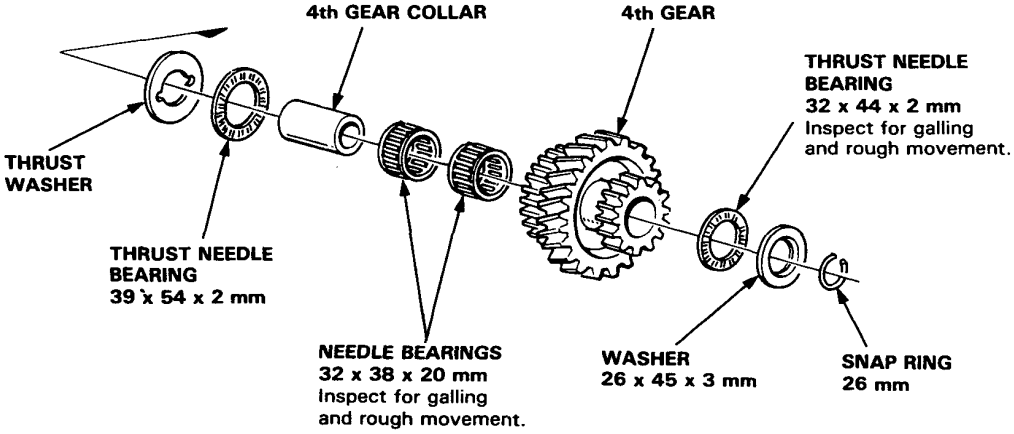


Disassembly/Inspection/Reassembly

NOTE:
- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearings with unrolled edge of bearing retainer facing washer.



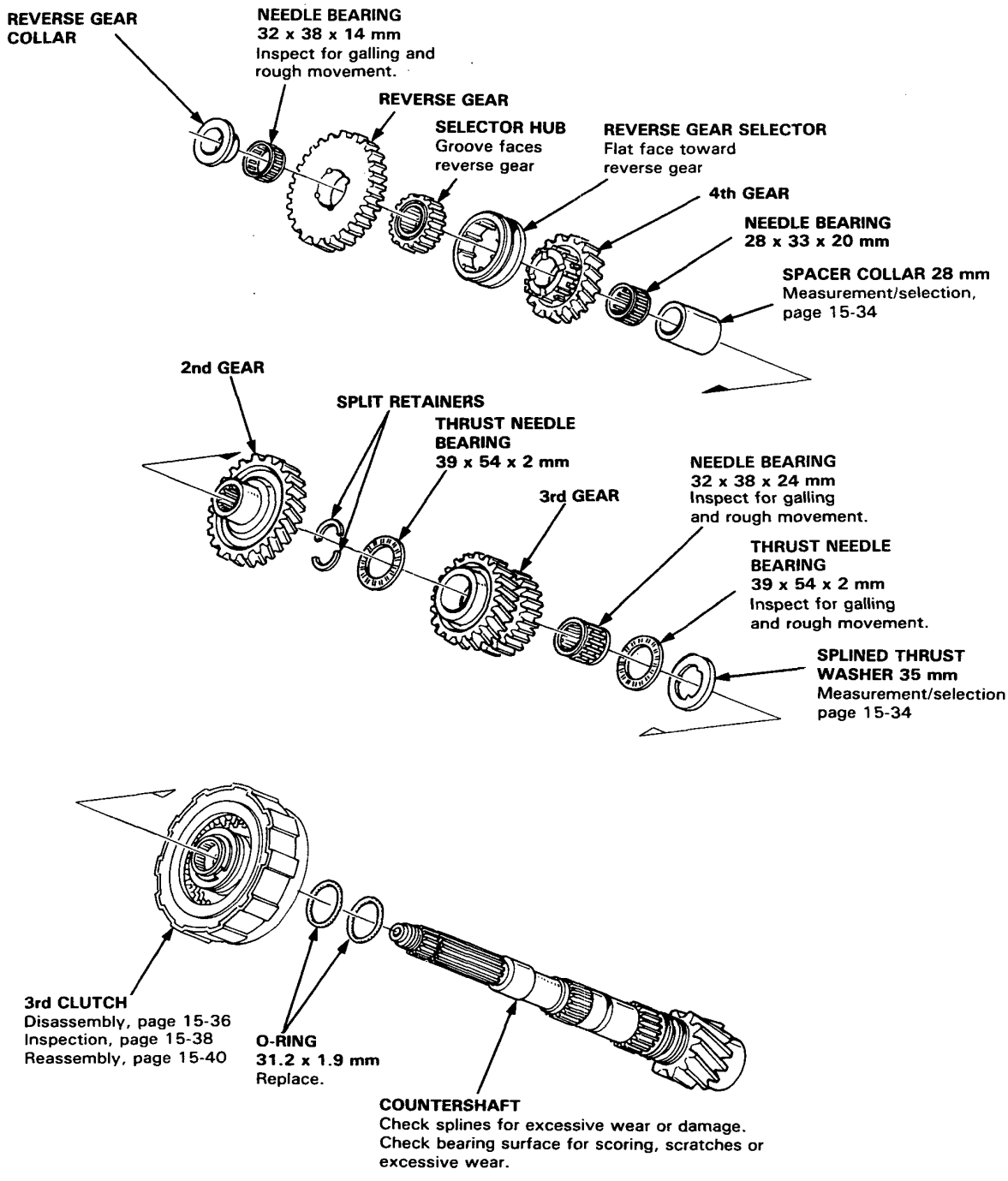




Countershaft

Disassembly/Inspection/Reassembly

NOTE:
- Lubricate all parts with ATF during reassembly.
- Install thrust needle bearing with unrolled edge of bearing retainer facing washer.

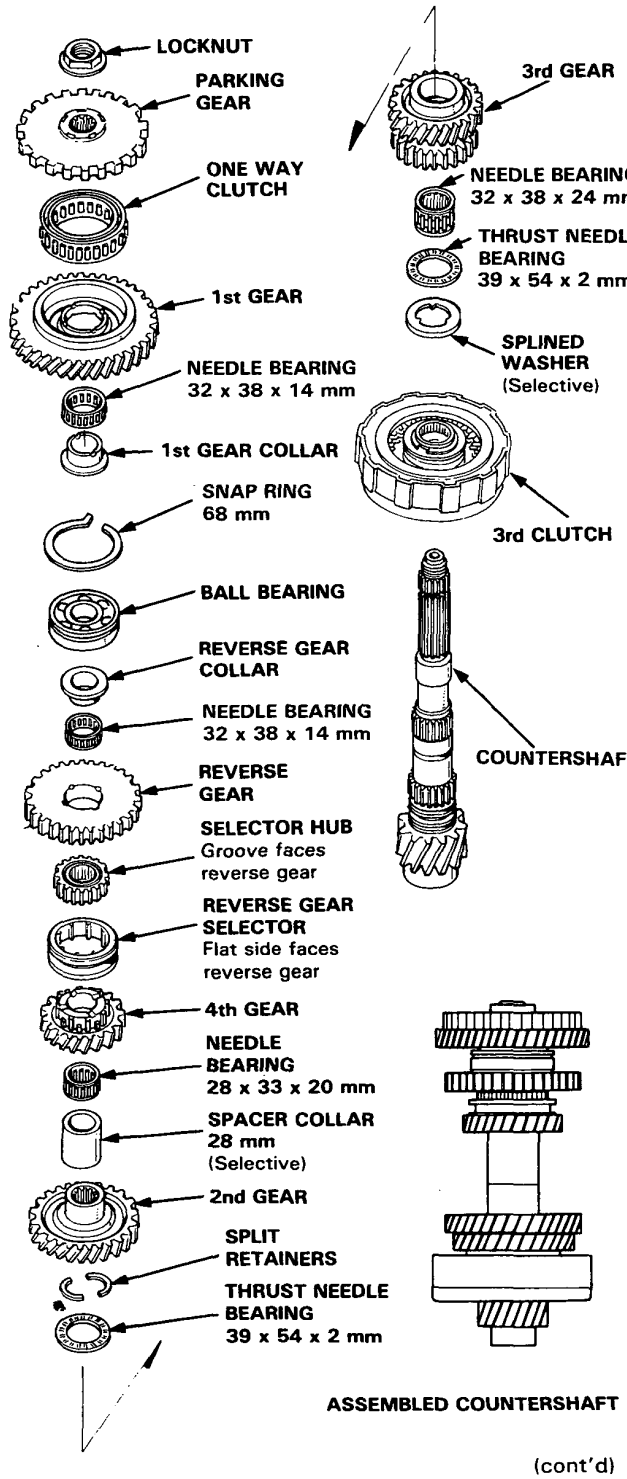


Clearance Measurements

1. Remove both the mainshaft and countershaft bearings from the transmission housing.
2. Assemble the mainshaft and the countershaft including bearings and all parts shown below.
3. Install the mainshaft and countershaft assemblies into the torque converter housing.
4. Install the mainshaft holder to prevent the shafts from turning.
5. Torque the mainshaft locknut to 35 N·m (3.5 kg-m, 25 lb-ft). (Left-hand threads).
6. Hold the parking gear on the countershaft with your hand and torque the countershaft locknut to 35 N·m (3.5 kg-m, 25 lb-ft).
7. Measure clearances as described on the next page.

ATF Lubricate all parts with ATF before final reassembly.

Countershaft Assembly

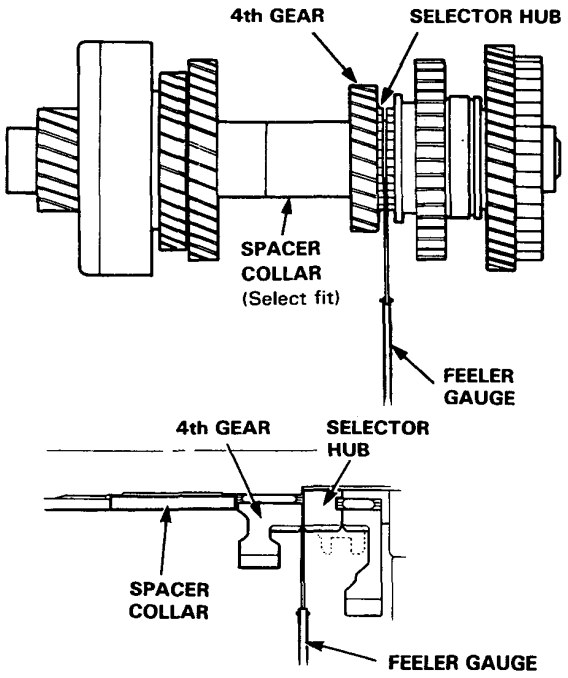


(cont'd)

Clearance Measurments (cont'd)

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

Countershaft 4th Gear Clearance:
Standard: 0.07—0.15 mm (0.003—0.006 in.)



If clearance exceeds the service limit, measure the thickness of the spacer collar and select one which gives correct clearance.

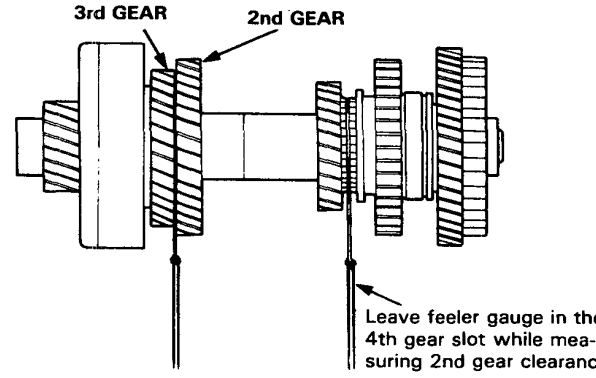
Replacement spacer collars:

CLASS	P/N	THICKNESS
A	90503—PC9—000	38.97—39.00 mm (1.534—1.535 in.)
B	90504—PC9—000	39.02—39.05 mm (1.536—1.537 in.)
C	90505—PC9—000	39.07—39.10 mm (1.538—1.539 in.)
D	90507—PC9—000	39.12—39.15 mm (1.540—1.541 in.)
E	90508—PC9—000	39.17—39.20 mm (1.542—1.543 in.)
F	90509—PC9—000	39.22—39.25 mm (1.544—1.545 in.)
G	90510—PC9—000	39.27—39.30 mm (1.546—1.547 in.)

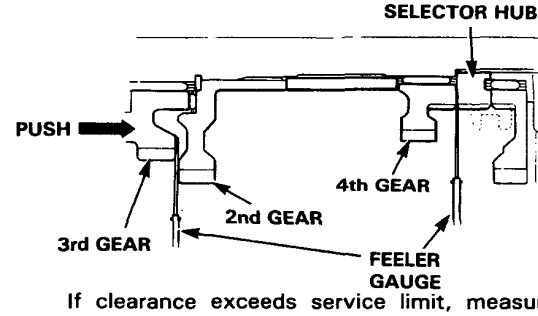
NOTE: Leave feeler gauge in place (4th gear) while measuring 2nd gear clearance.

Countershaft 2nd Gear Clearance:
Standard: 0.07—0.15 mm (0.003—0.006 in.)

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



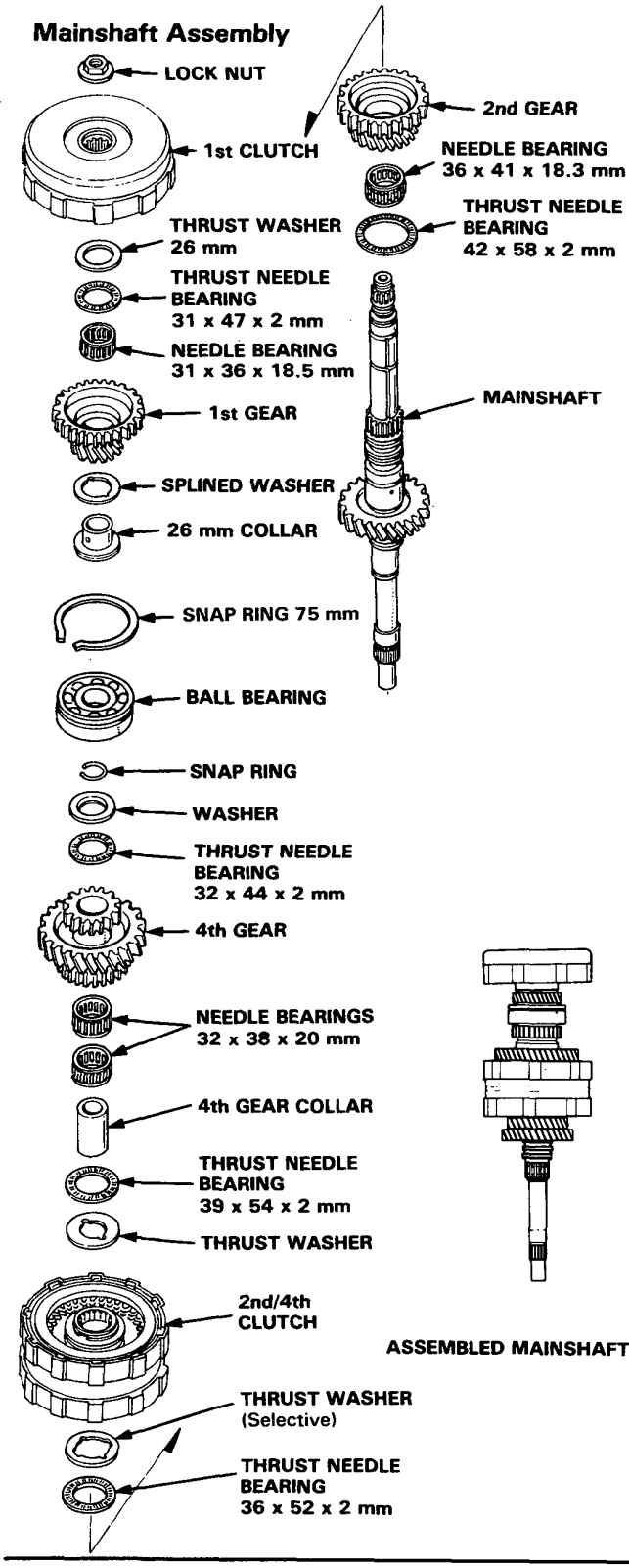
- Slide the 3rd gear in fully and again measure the clearance between the 2nd and 3rd gears with another feeler gauge.
- Calculate the difference between the two readings to determine the actual clearance between the two gears.



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

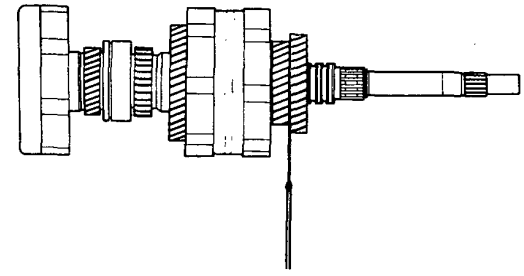
Replacement splined thrust washers:

CLASS	P/N	THICKNESS
A	90411—PF4—010	2.97—3.00 mm (0.117—0.118 in.)
B	90412—PF4—010	3.02—3.05 mm (0.119—0.120 in.)
C	90413—PF4—010	3.07—3.10 mm (0.121—0.122 in.)
D	90414—PF4—010	3.12—3.15 mm (0.123—0.124 in.)
E	90415—PF4—010	3.17—3.20 mm (0.125—0.126 in.)
F	90416—PF4—010	3.22—3.25 mm (0.127—0.128 in.)
G	90417—PF4—010	3.27—3.30 mm (0.129—0.130 in.)
H	90418—PF4—010	3.32—3.35 mm (0.131—0.132 in.)
I	90419—PF4—010	3.37—3.40 mm (0.133—0.134 in.)

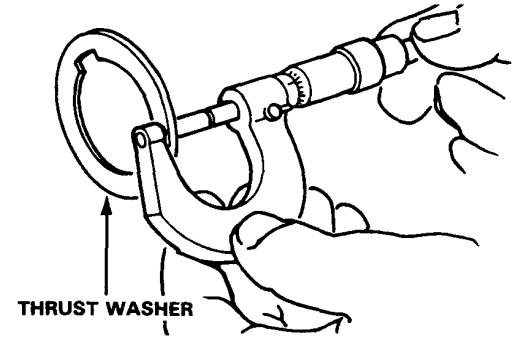


NOTE: Make *all measurements before changing* the thrust washers. Recheck after making the adjustments.

10. On the mainshaft measure the clearance between the shoulder of 2nd gear and main 3rd gear, the same way you did on the countershaft in step 9.
Mainshaft 2nd Gear Clearance:
Standard (New): 0.07—0.15 mm
(0.003—0.006 in.)



If the clearance exceeds the service limit, measure the thickness of the 2nd clutch thrust washer (36 mm I.D.) and select one which gives the correct clearance.



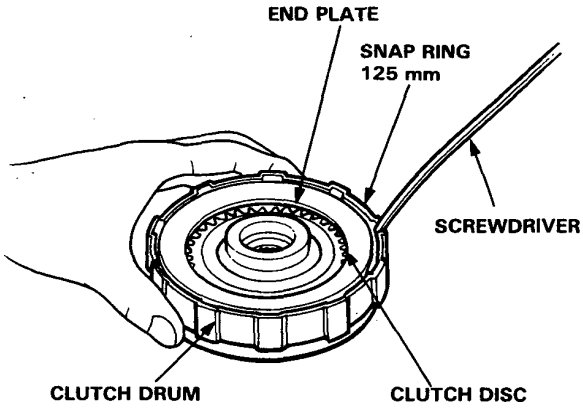
Replacement washers (36 mm I.D.)

CLASS	P/N	THICKNESS
A	90441—PF4—000	3.97—4.00 mm (0.156—0.157 in.)
B	90442—PF4—000	4.02—4.05 mm (0.158—0.159 in.)
C	90443—PF4—000	4.07—4.10 mm (0.160—0.161 in.)
D	90444—PF4—000	4.12—4.15 mm (0.162—0.163 in.)
E	90445—PF4—000	4.17—4.20 mm (0.164—0.165 in.)
F	90446—PF4—000	4.22—4.25 mm (0.166—0.167 in.)
G	90447—PF4—000	4.27—4.30 mm (0.168—0.169 in.)
H	90448—PF4—000	4.32—4.35 mm (0.170—0.171 in.)
I	90449—PF4—000	4.37—4.40 mm (0.172—0.173 in.)

Disassembly

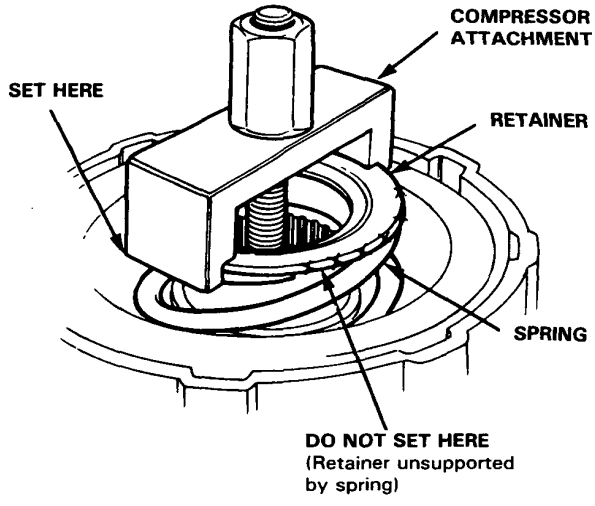
NOTE:
- The 1st and 3rd clutches are identical.
- To disassemble the 2nd/4th clutch, use the special tool in Step 3 in the same manner as for the 1st and 3rd clutches.

1. Remove the snap ring.

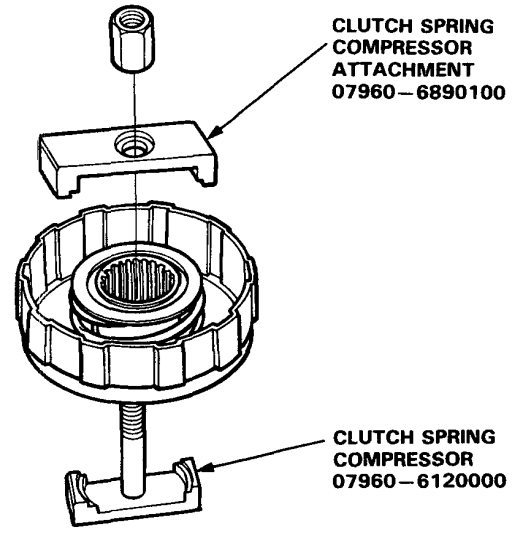


2. Remove the end plate, clutch discs and plates.
3. Install the clutch spring compressor as shown.

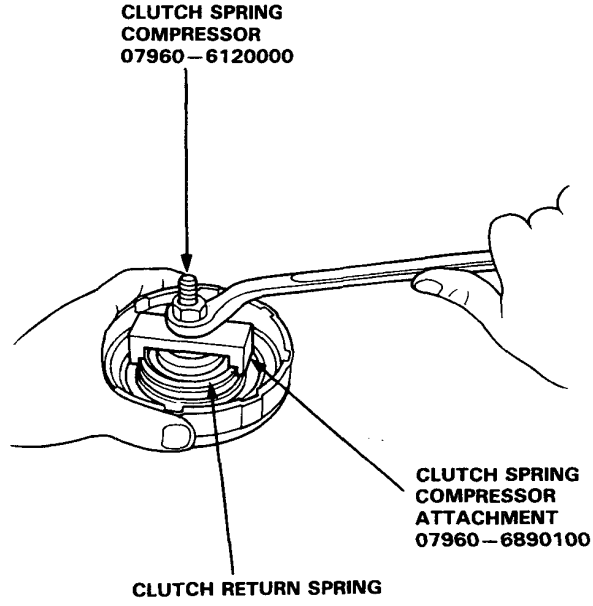
CAUTION: If either end of the compressor attachment is set over an area of the retainer which is unsupported by the spring, the retainer may be damaged.



1st and 3rd Clutches

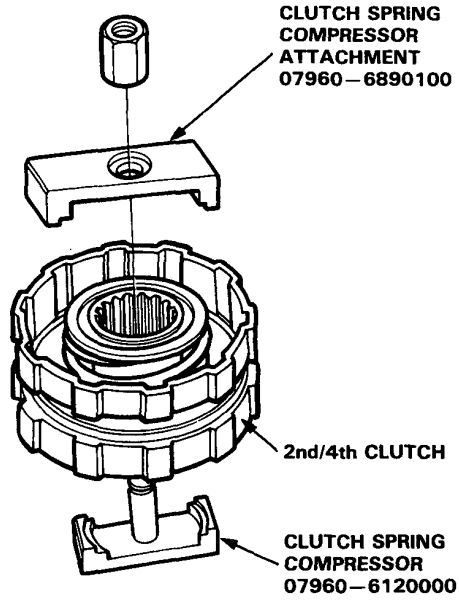


- Compress the clutch return spring.

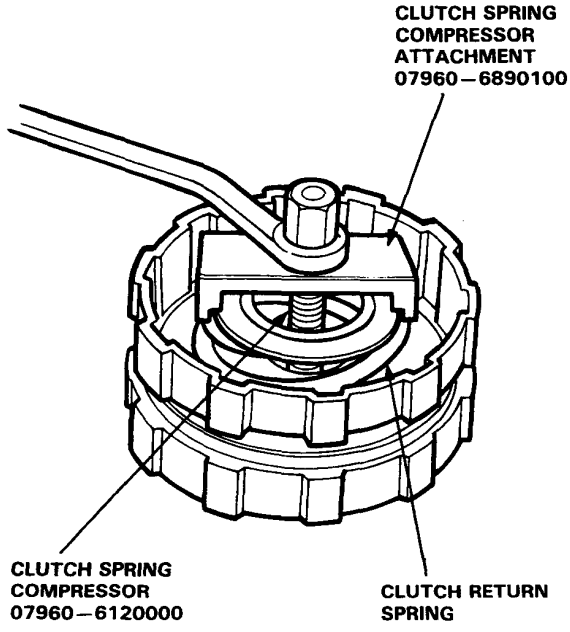


2nd/4th Clutch

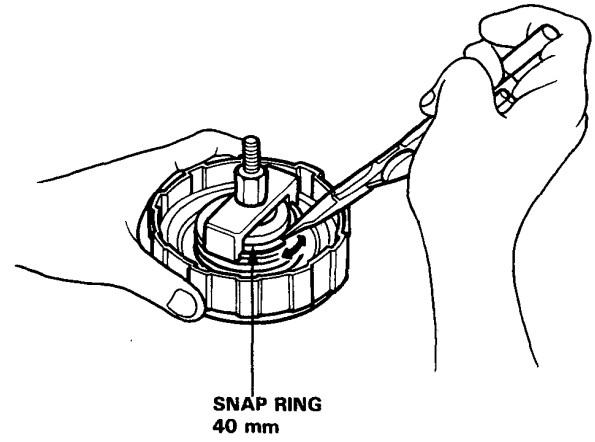
- Assemble the spring compressor on the clutch drum.



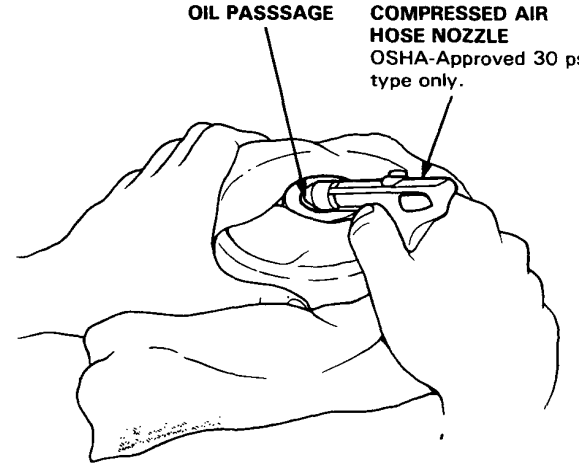
- Compress the clutch return spring.



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



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



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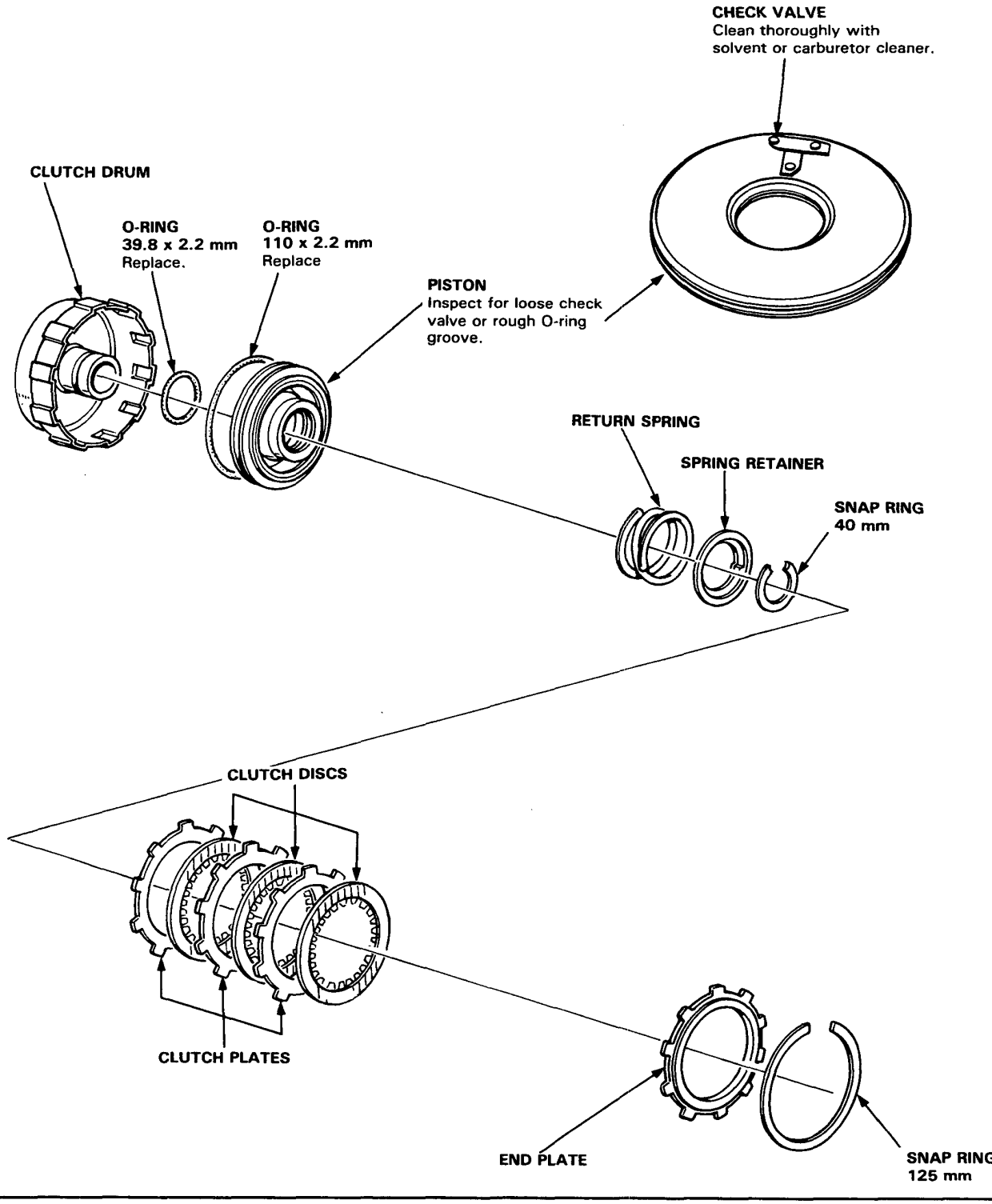
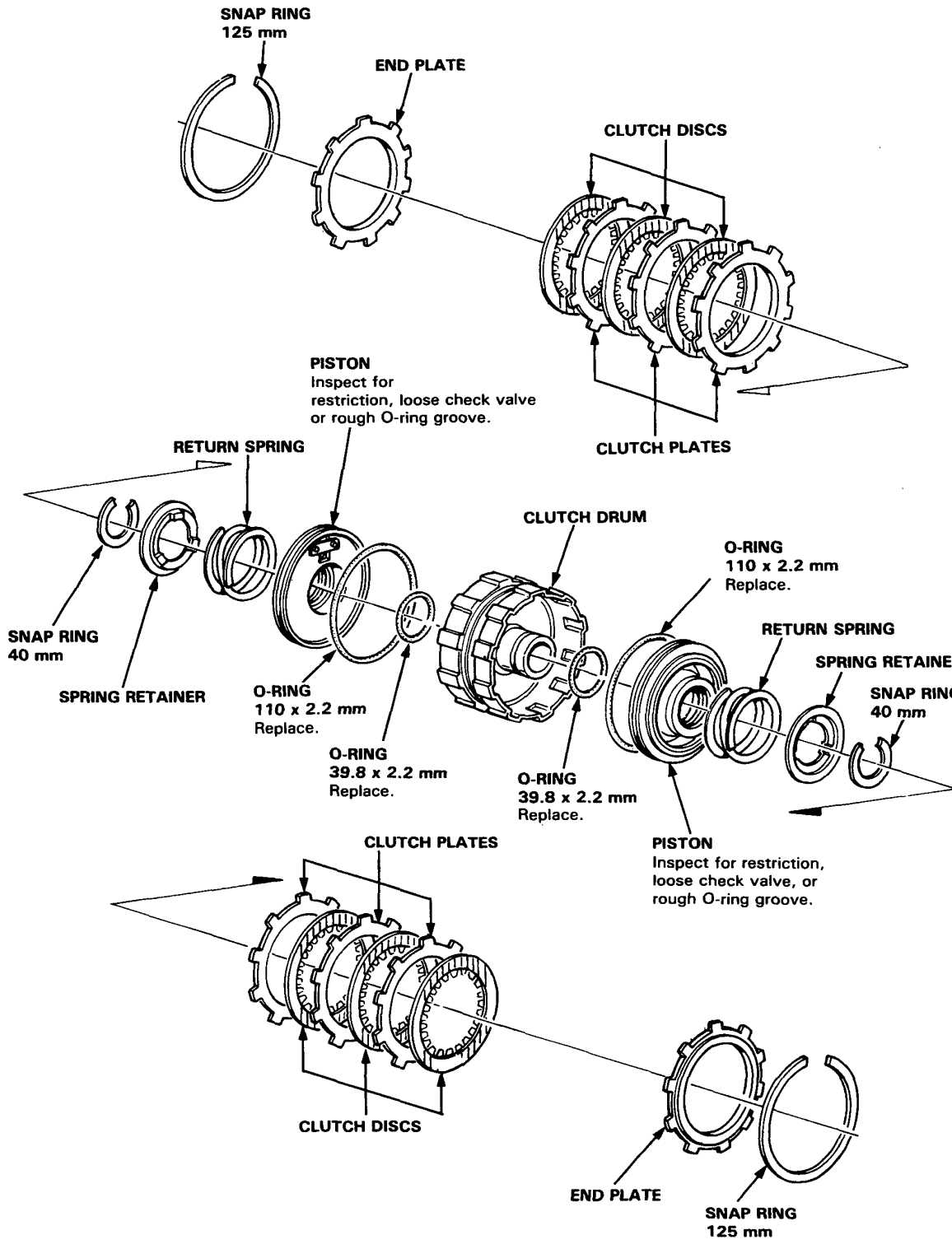
Disassembly/Inspection (cont'd)

1st and 3rd Clutches



2nd/4th Clutch

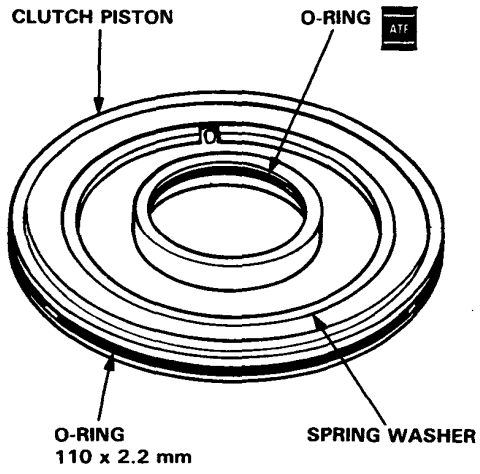


Reassembly

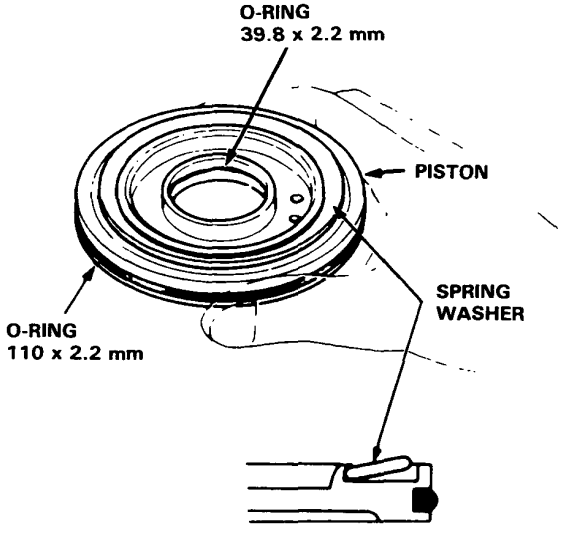
NOTE:
- The 1st and 3rd clutches are identical.
- To reassemble the 2nd/4th clutch, use the special tool in Step 7 in the same manner as for the 1st and 3rd clutches.

1. Clean all parts thoroughly in solvent, and dry with compressed air. Blow out all passages.

2. Lubricate all parts with ATF before reassembly.



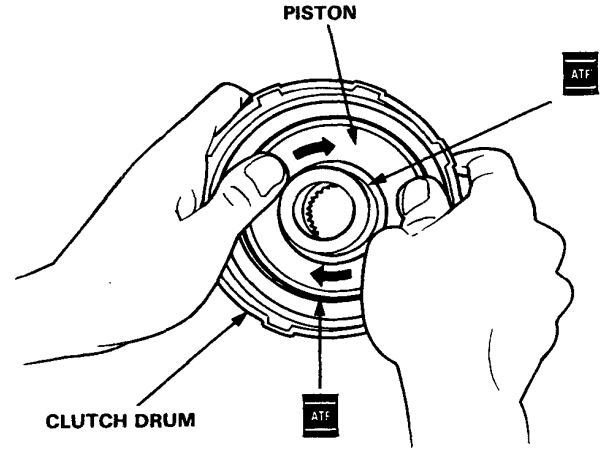
3. Install new O-ring on clutch piston.
Make sure the spring washer is properly positioned as shown.



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

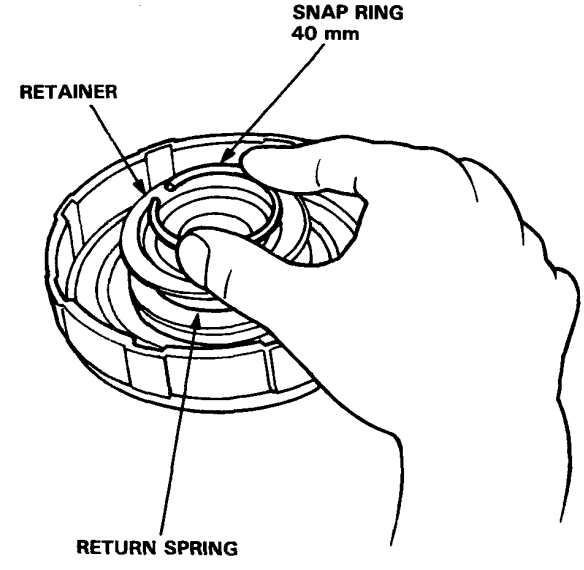
NOTE: Lubricate the piston O-ring with ATF before installing.

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



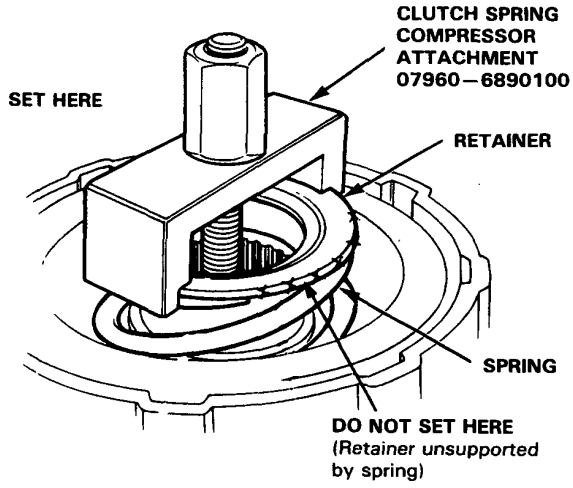
5. Install the return spring and retainer.

6. Position the 40 mm snap ring on the spring retainer.

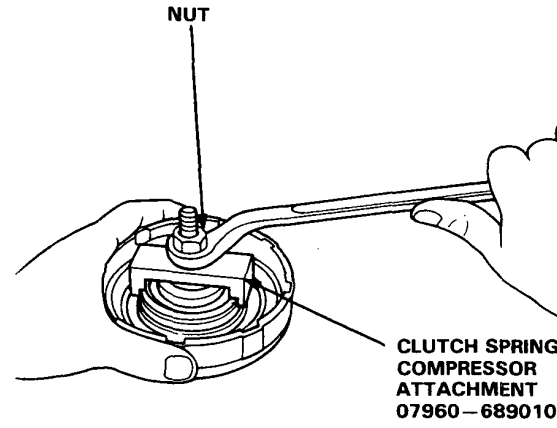


7. Assemble the spring compressor on the clutch drum.

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

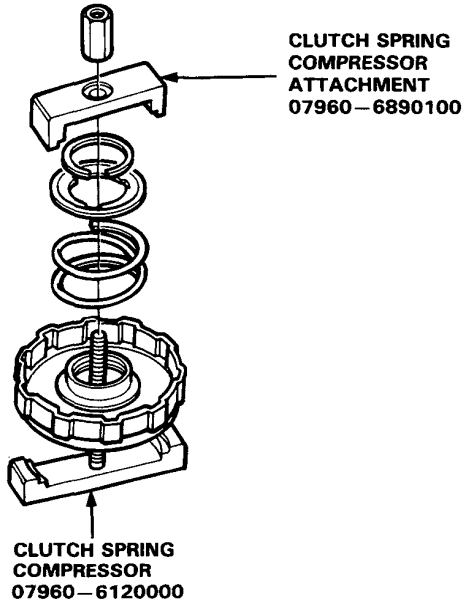


8. Compress the spring until the retainer is below the snap ring groove in the hub.



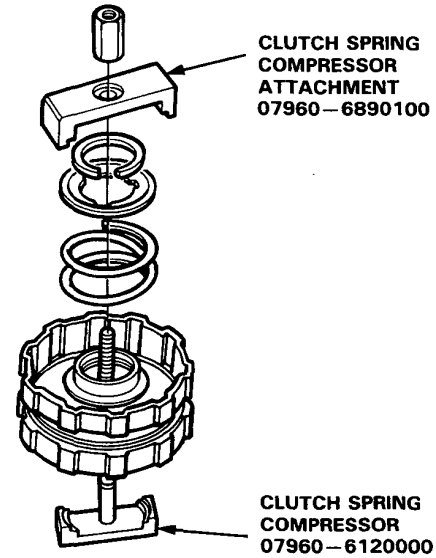
1st and 3rd clutches

- Assemble the spring compressor on the clutch drum.



2nd/4th Clutch

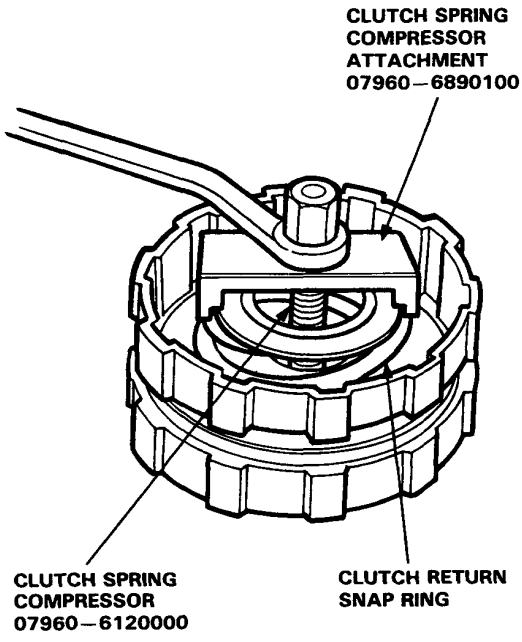
- Assemble the spring compressor on the clutch drum.



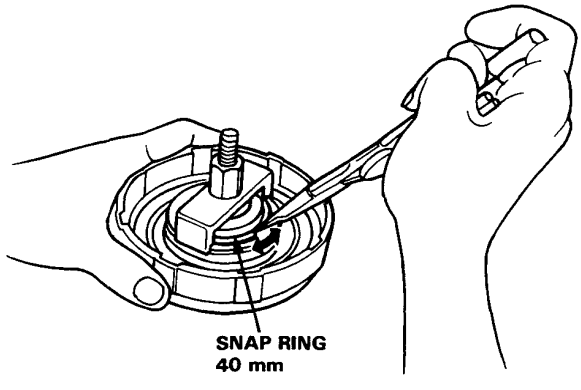
(cont'd)

Reassembly (cont'd)

- Compress the clutch return spring.



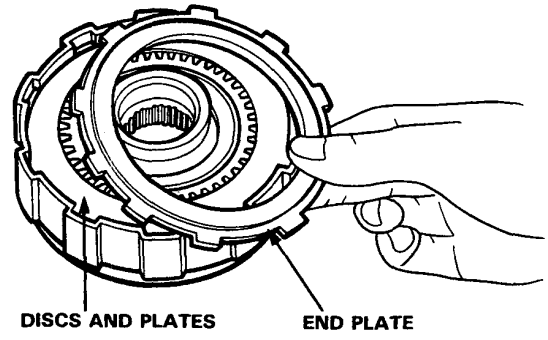
9. Then install the snap ring (with its rounded edge facing in) in the hub groove and remove the spring compressor.



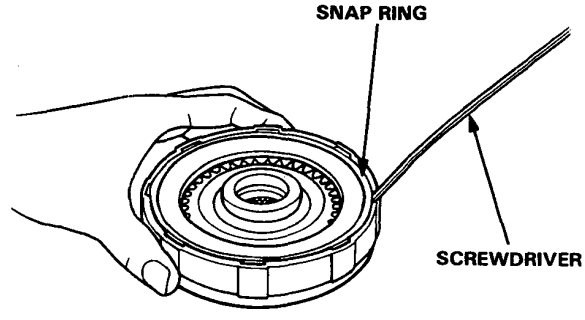
10. Soak the clutch discs thoroughly in automatic transmission fluid for a minimum of 30 minutes.

11. Starting with a clutch plate, alternately install the clutch plates and discs. Install the clutch end plate with flat side toward the disc.

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



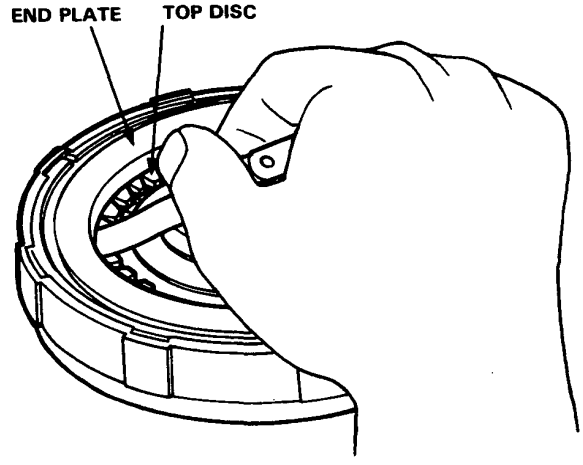
12. Install the 125 mm snap ring.



13. Using bent feeler gauges, carefully measure the clearance between the clutch end plate and the top disc. Do not damage the disc.

End Plate-to-Top Disc Clearance:

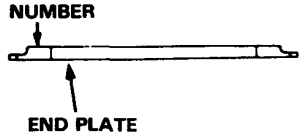
	Service Limit	
LOW	0.4—0.7 mm	(0.016—0.028 in.)
2ND	0.65—0.8 mm	(0.026—0.031 in.)
3RD	0.4—0.6 mm	(0.016—0.023 in.)
4TH	0.4—0.6 mm	(0.016—0.023 in.)



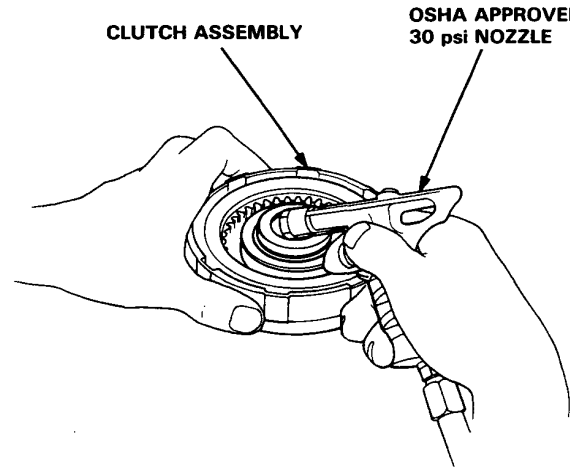
14. If not within service limit, select a new clutch end plate from following table.

Replacement clutch end plates:

P/N	PLATE NO.	THICKNESS
22551—PF4—000	1	2.1 mm (0.082 in.)
22552—PF4—000	2	2.2 mm (0.086 in.)
22553—PF4—000	3	2.3 mm (0.090 in.)
22554—PF4—000	4	2.4 mm (0.094 in.)
22555—PF4—000	5	2.5 mm (0.098 in.)
22556—PF4—000	6	2.6 mm (0.102 in.)
22557—PF4—000	7	2.7 mm (0.106 in.)
22558—PF4—000	8	2.8 mm (0.110 in.)
22559—PF4—000	9	2.9 mm (0.114 in.)
22560—PF4—000	10	3.0 mm (0.118 in.)



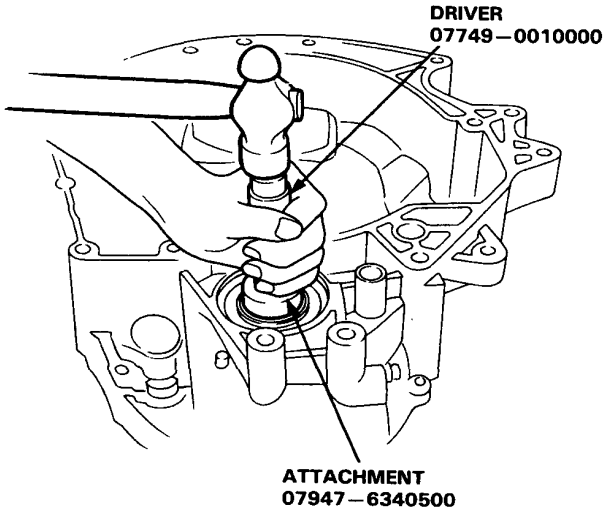
15. Check the clutch engagement by blowing air into the oil passage in the clutch drum hub. Remove the air pressure and check that the clutch releases.



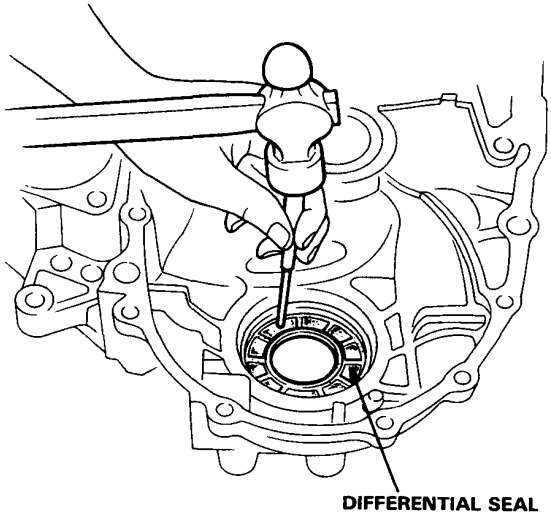
Differential and Seal

Replacement

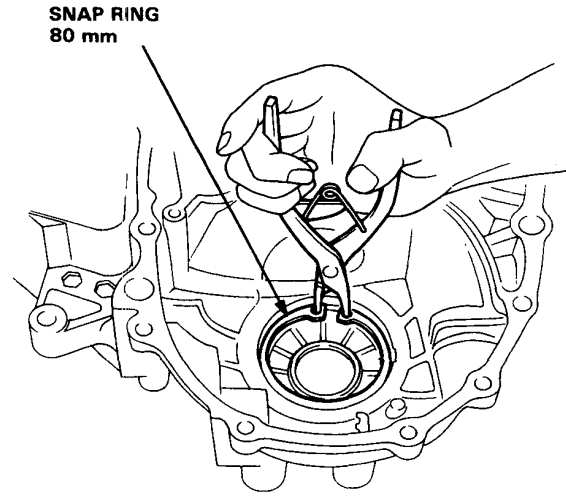
1. If seals are to be replaced, or if differential needs repair, remove the differential.



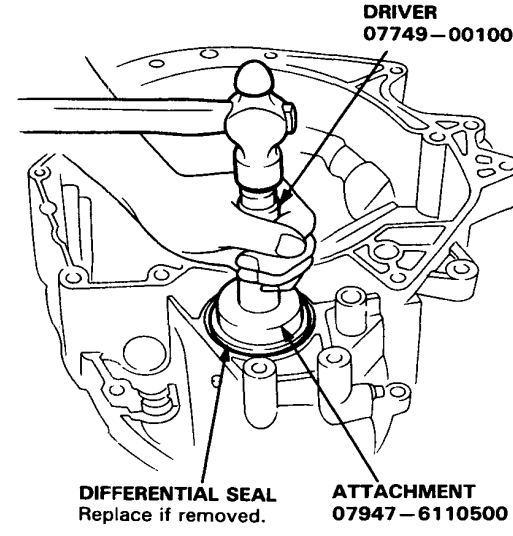
2. On the torque converter housing, remove the 80 mm snap ring, then drive out the seal as shown.
3. Remove the differential seal from the transmission housing in the same way.



4. On the torque converter housing, install the differential 80 mm snap ring if removed.



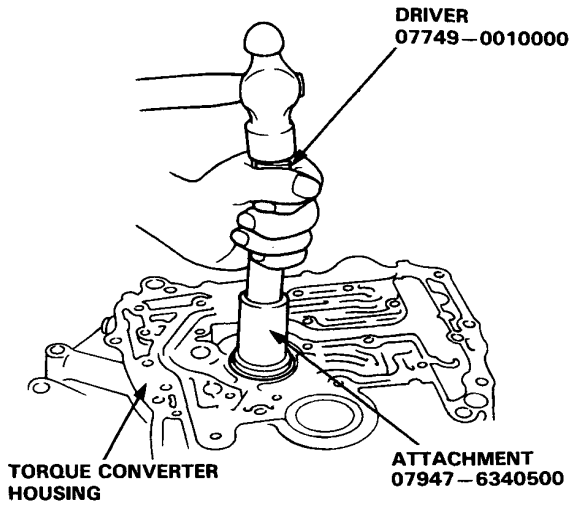
5. Install the differential seals into the torque converter housing and transmission housing.



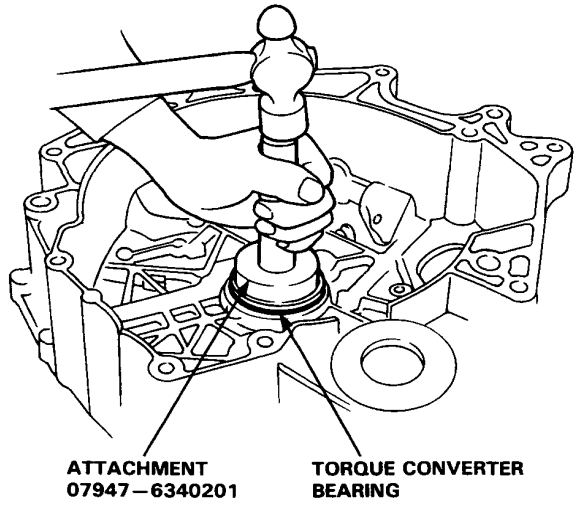
Replacement

Torque converter housing

1. Remove the mainshaft bearing and seal from the torque converter housing.

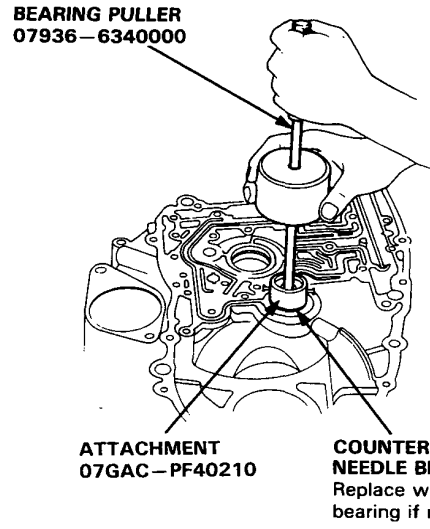


2. Drive in the new mainshaft bearing until it bottoms in housing.



3. Then install the new mainshaft seal flush with the housing, using attachment 07947–6340201.

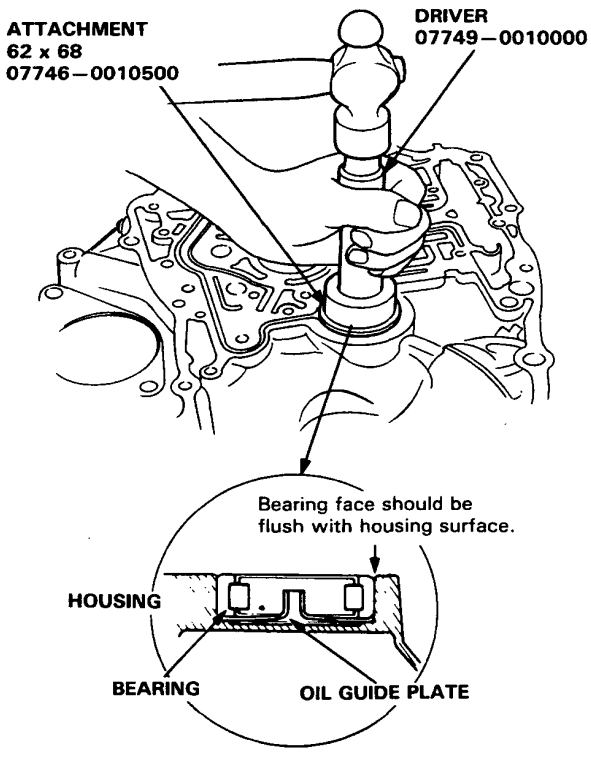
4. Turn the torque converter housing over and remove the countershaft bearing.



5. Make sure the oil guide plate is installed in the bearing hole, then install a new countershaft bearing flush with the housing.

(cont'd)

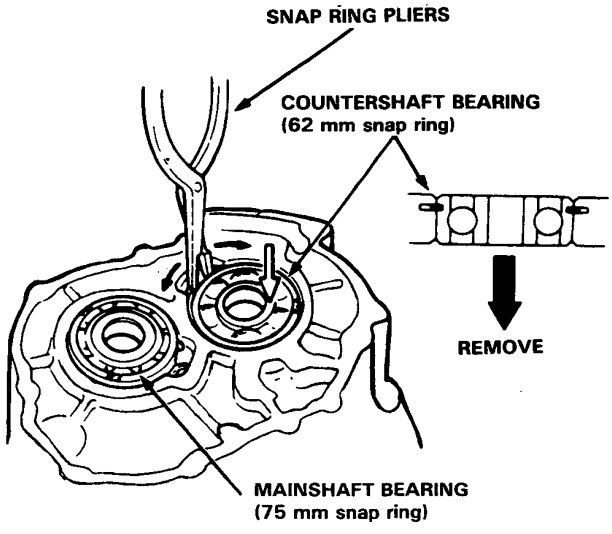
Replacement (cont'd)



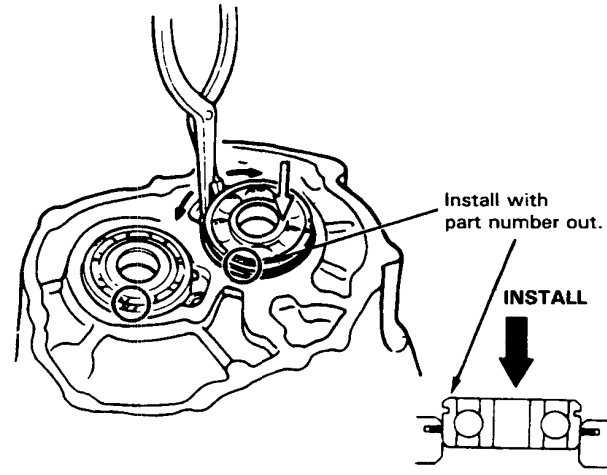
Transmission housing

1. To remove the mainshaft and countershaft bearings from the transmission housing, expand each snap ring with snap ring pliers, then push the bearing out by hand.

   NOTE: Do not remove the snap rings unless it's necessary to clean the grooves in the housing.



2. Expand each snap ring with snap ring pliers, insert the new bearing part-way into it, then release the pliers. Push the bearing down into the transmission until the ring snaps in place around it.

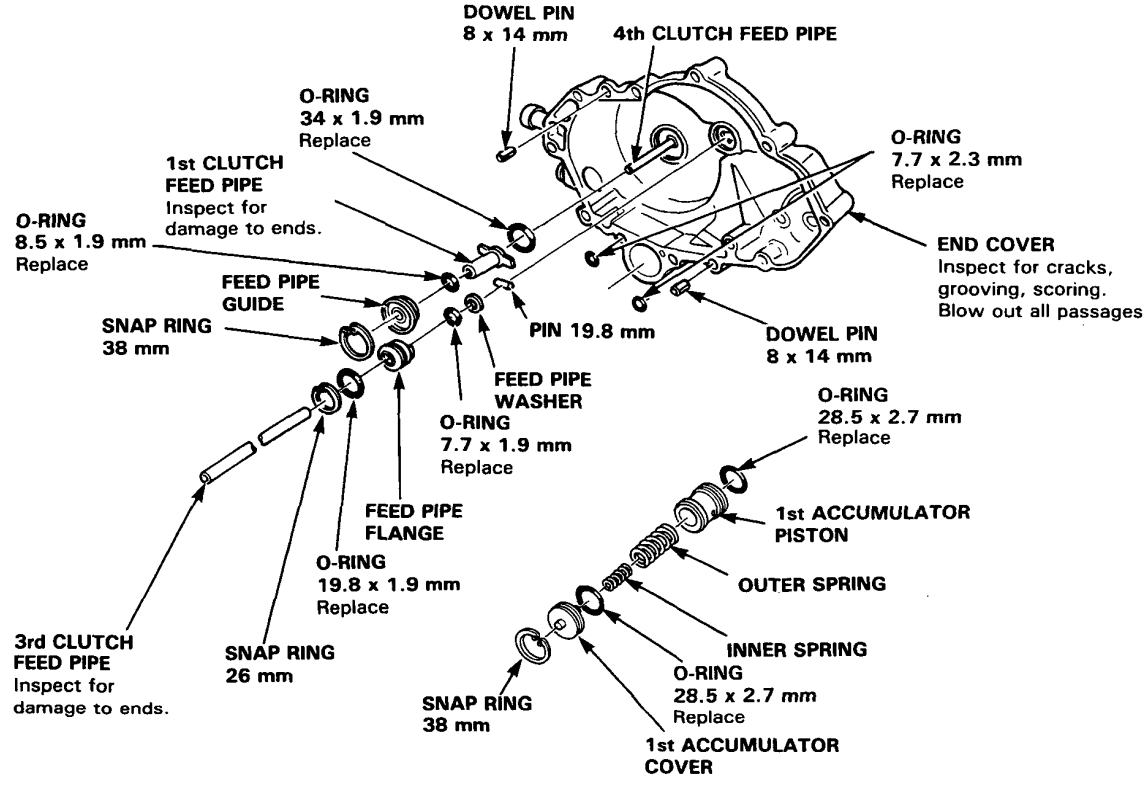


3. Make sure the snap rings are seated in the bearing and housing grooves.

End Cover

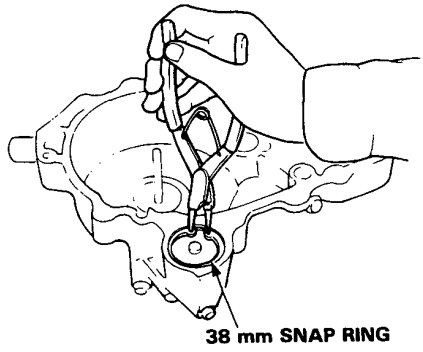
Disassembly/Inspection

CAUTION: Remove and install parts carefully to avoid damaging them.

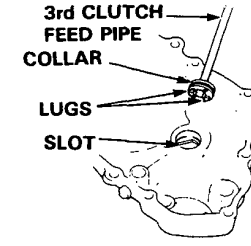


Reassembly

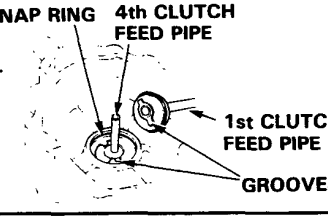
1. Seat the O-ring in the groove of the 1st accumulator piston, and slide the accumulator piston into the right side transmission cover. Then, install the outer spring, inner spring, another O-ring and accumulator cover in that order.
2. Install 38 mm snap ring.



3. With feed pipes assembled, align lugs on the collars with slot in end cover.
4. Install the snap ring.

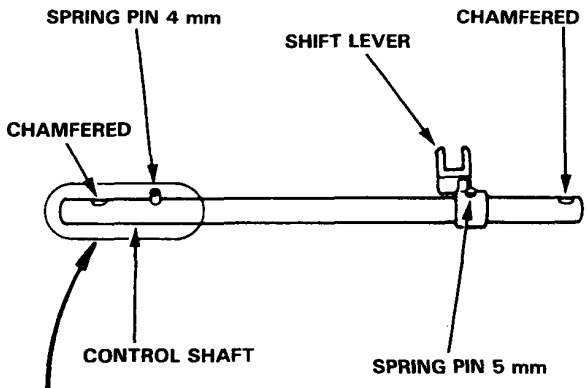


5. Install the feed pipes in the end cover, aligning the lugs of the 1st clutch feed pipe with the grooves of the end cover.
6. Install the snap ring.

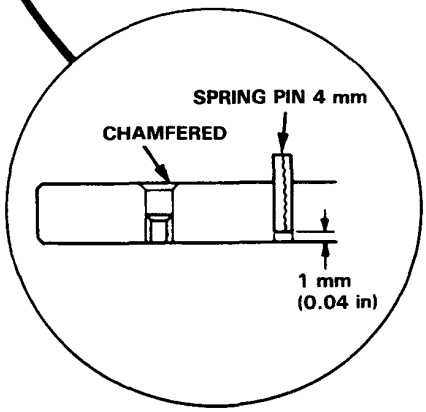


Throttle Control Shaft

Installation



Drive the 4 mm spring pin to a depth 1 mm in from the side that is opposite the chamfer in the threaded hole.



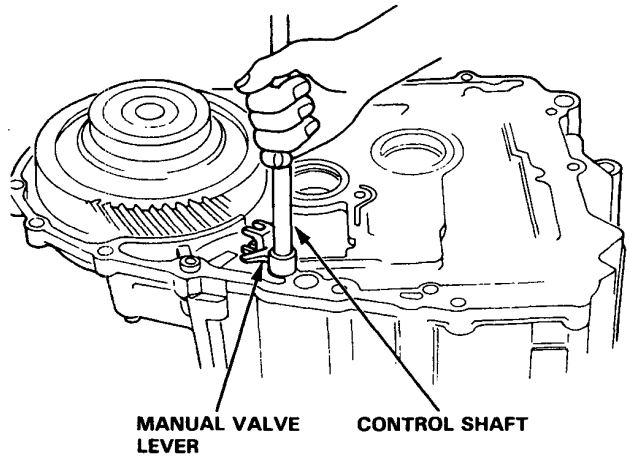
Transmission Assy

Reassembly

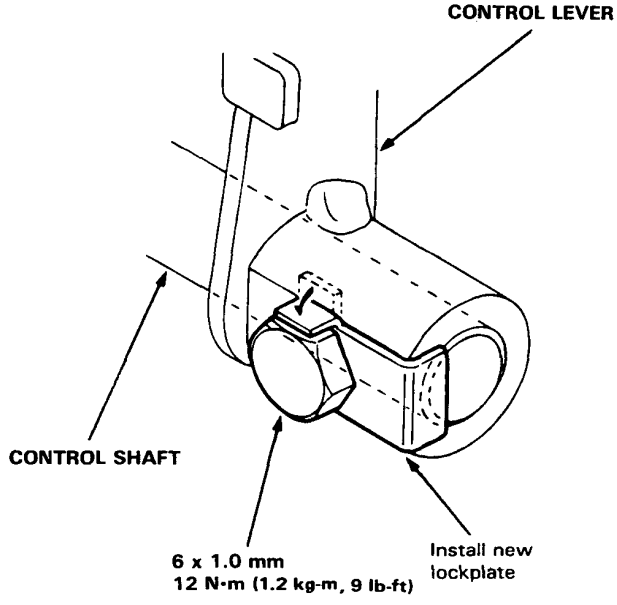
NOTE: Lubricate all parts with ATF during reassembly.

1. Install the differential assembly. If the torque converter housing, transmission housing and/or differential side bearings were replaced, the differential side clearance must be checked as shown in section 16.

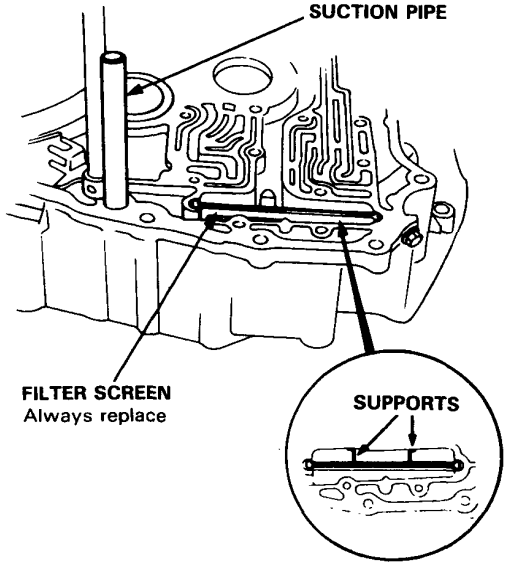
2. Assemble the manual valve lever on the control shaft, then install in the torque converter housing as shown.



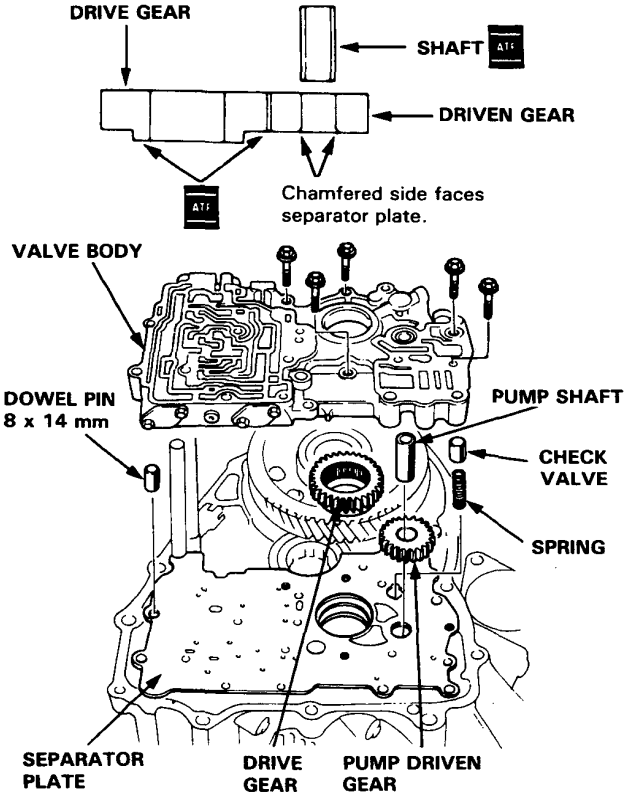
3. Install the control lever and new lock plate on the other end of the shaft. Tighten the bolt to the torque shown, then bend the tab over against the bolt head.



4. Install the suction pipe and new filter screen.



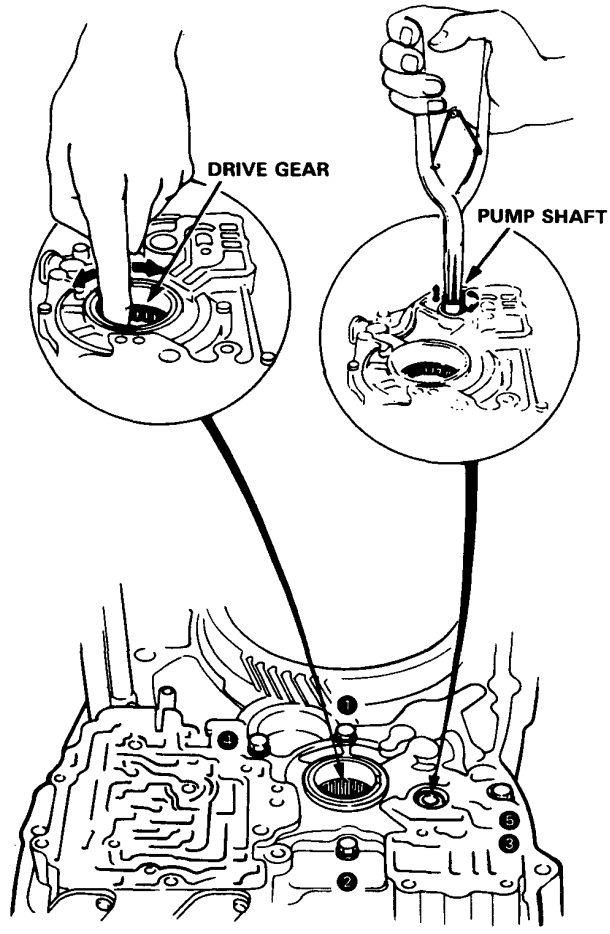
5. Install the separator plate, dowel pin, pump gears, and shaft.
6. Install the check valve and spring, then install the main valve body on the torque converter housing.



7. Tighten the 4 valve body bolts in the sequence shown. Make sure the pump drive gear rotates smoothly in the normal operating direction and the pump shaft moves smoothly in both the axial and normal operating directions.

8. Torque the valve body bolts to 12 N·m (1.2 kg-m, 9 lb-ft), and again check that the pump gear and pump shaft move freely.

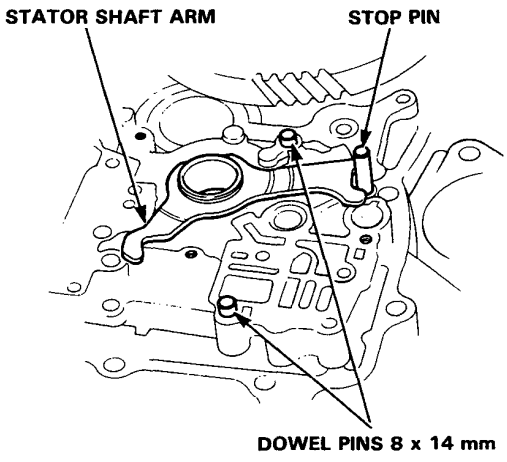
CAUTION: If the pump gear and pump shaft do not move freely, Loosen the valve body bolts, realign the shaft, and then retighten to the specified torque. Failure to align the pump shaft correctly will result in seized pump gear or pump shaft.



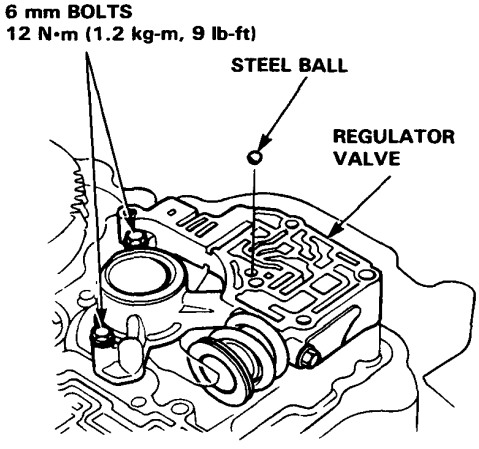
(cont'd)

Reassembly (cont'd)

9. Install the stator shaft arm, stop pin and dowel pins.

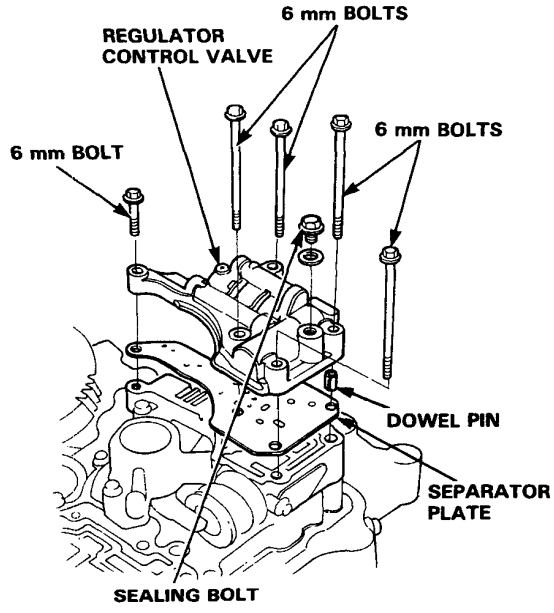


10. Install the regulator valve and torque its 2 bolts to 12 N·m (1.2 kg-m, 9 lb-ft), and install the steel ball.

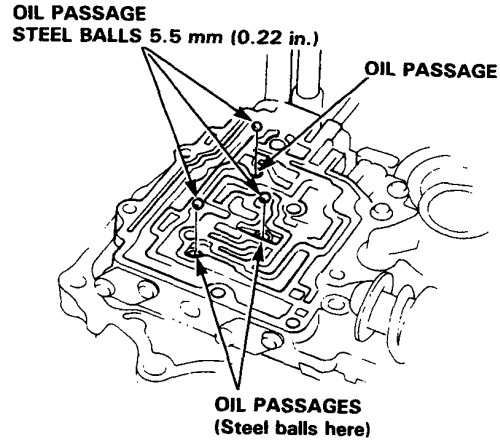


11. Install the dowel pin, and separator plate.

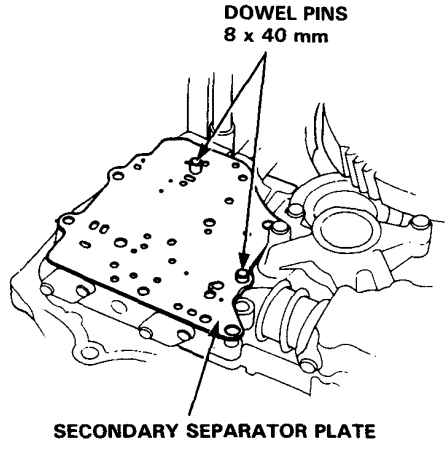
12. Install the regulator control valve body bolts as shown, and torque to 12 N·m (1.2 kg-m, 9 lb-ft).



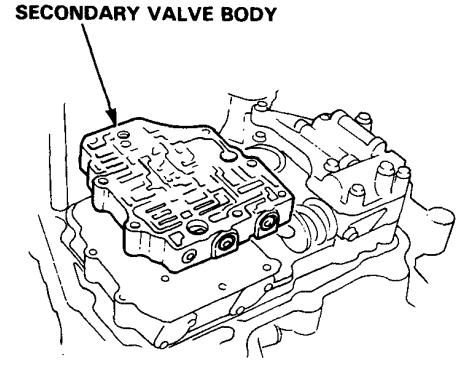
13. Install the 3 steel balls in main valve body oil passages.



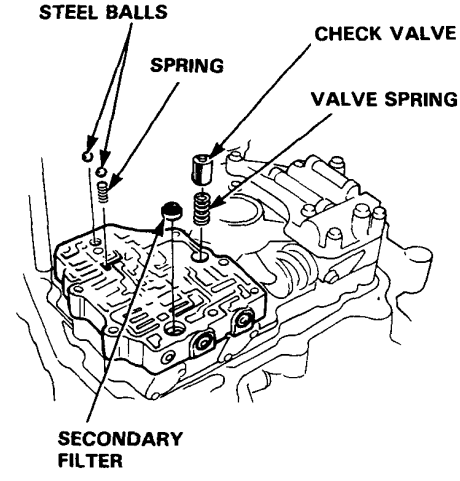
14. Install the separator plate and dowel pins.



15. Install the secondary valve body.



16. Install the steel balls, ball spring, check valve, valve spring and secondary filter in the secondary valve body.

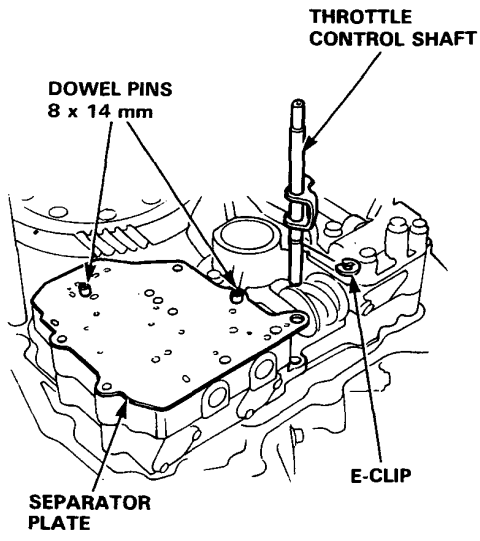


NOTE: The ball for the top oil passage has a spring to press the ball against the separator plate.

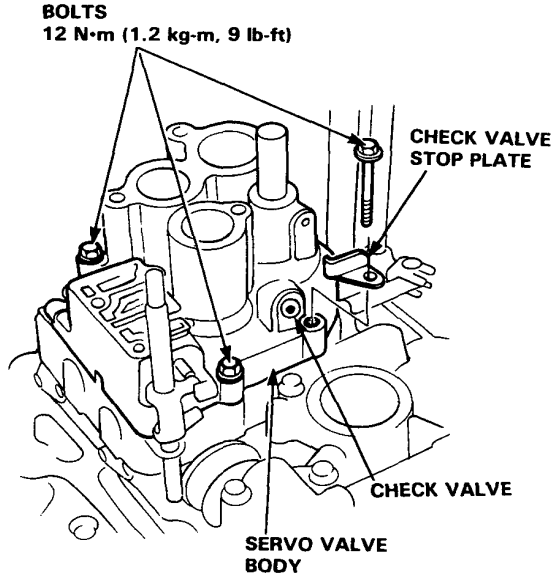
(cont'd)

Reassembly (cont'd)

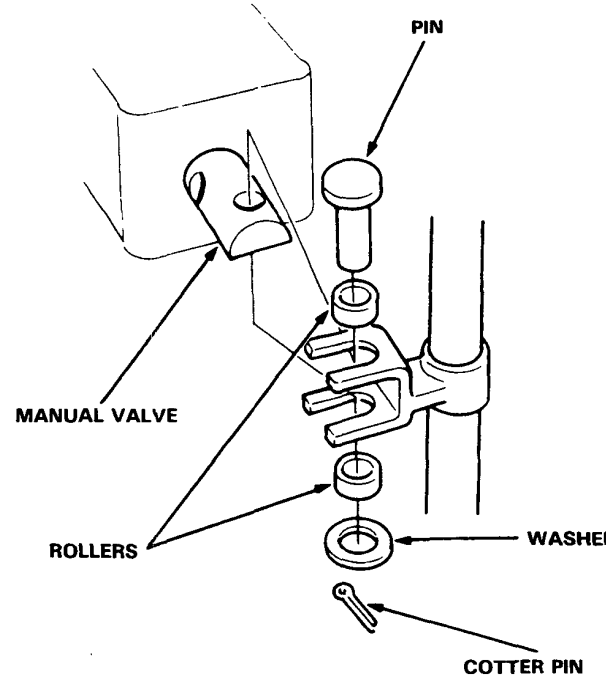
17. Install the separator plate and dowel pins, then install the throttle control shaft.



18. Install the servo valve body (2 bolts) and check valve stop plate (1 bolt) as shown.

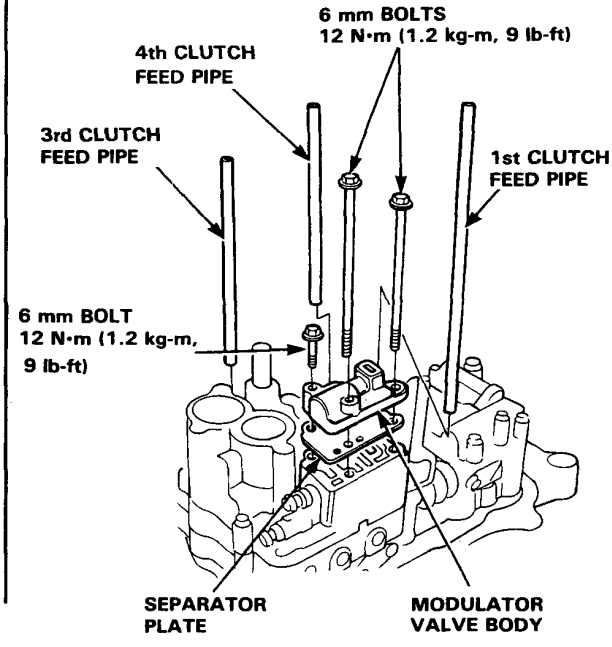


19. Put the rollers on each side of the manual valve stem, then attach the valve to the lever with the pin. Secure with the lock pin.



20. Install the separator plate.

21. Install the 1st, 3rd and 4th clutch feed pipes.

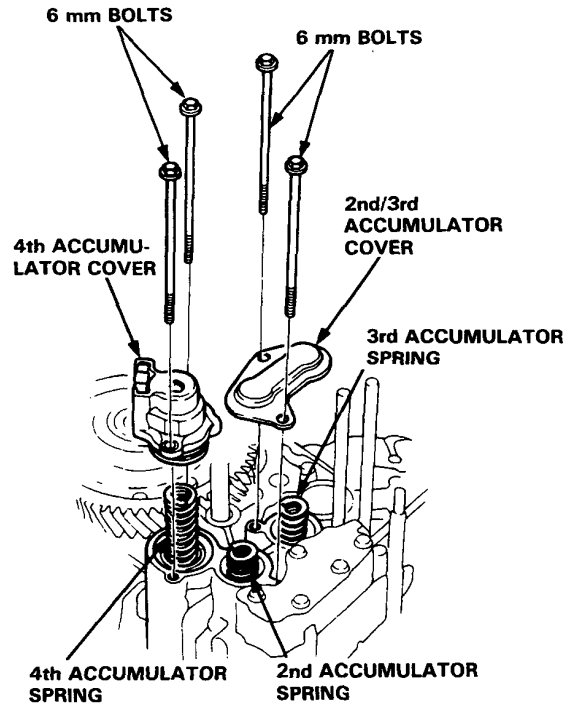


22. Install the accumulator springs.

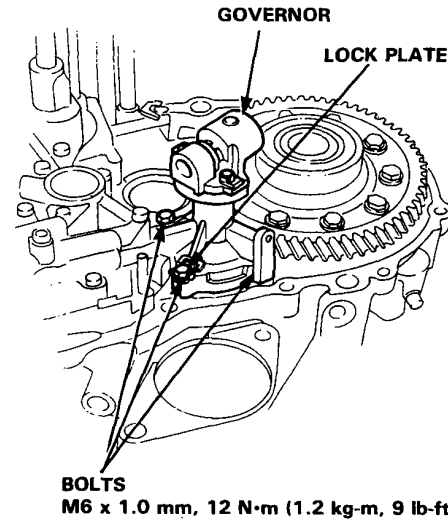
23. Install the 2nd/3rd accumulator cover, and torque the bolts to 12 N·m (1.2 kg-m, 9 lb-ft) in a criss-cross pattern.

24. Install the 4th accumulator cover, and torque the bolts to 12 N·m (1.2 kg-m, 9 lb-ft) in a criss-cross pattern.

CAUTION: To prevent stripping the threads, press down on accumulator cover, then install the bolts.

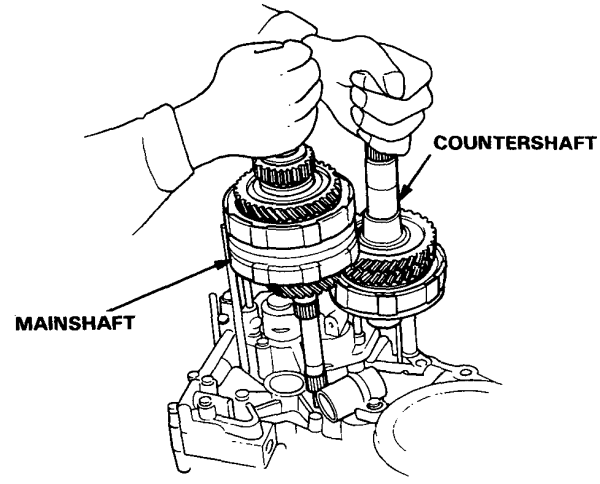


25. Install the governor valve using new lock plates, and the thrree 6 mm bolts.



26. Set the countershaft and mainshaft in place as an assembly.

NOTE: Do not tap on the shafts with a hammer to drive in.



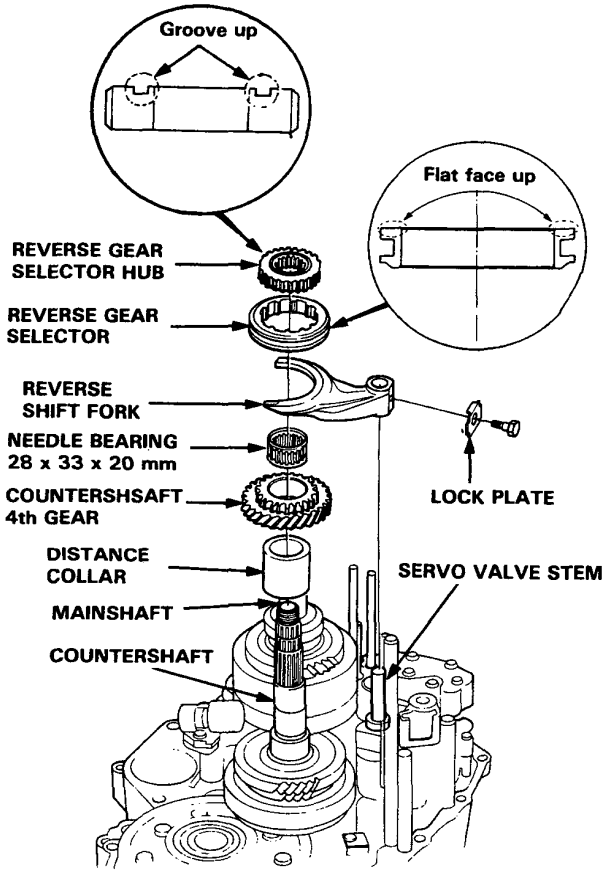
(cont'd)

Reassembly (cont'd)

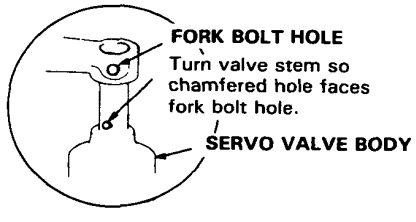
27. Install 4th gear and its needle bearing, and the countershaft 4th gear and its selector hub.

28. Assemble the reverse shift fork and selector sleeve, then install them as an assembly on the countershaft.

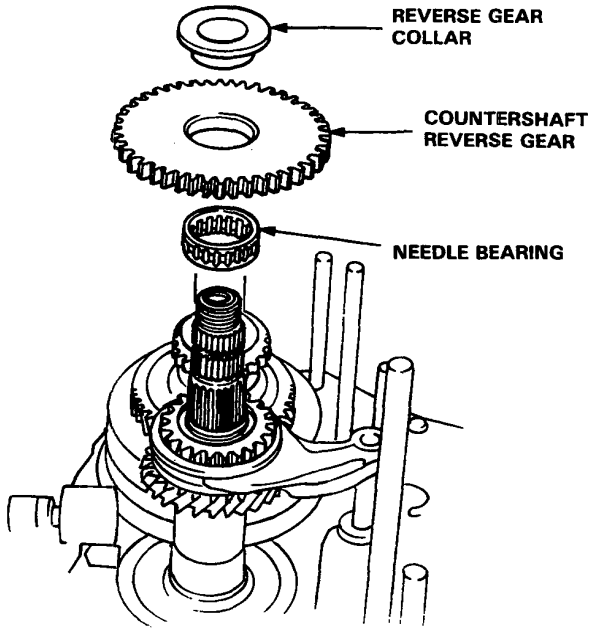
    NOTE:
    - Install the sleeve with its flat face up.
    - Install the reverse gear selector hub with the groove facing up.



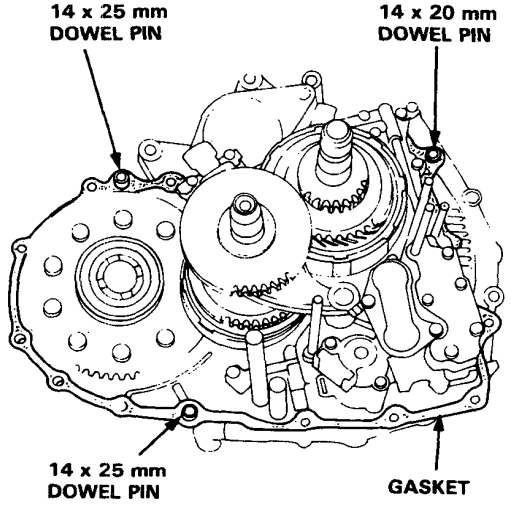
29. Install the reverse shift fork over the servo valve stem. Align the hole in the stem with hole in fork as shown, and install the bolt and new lock plate. Bend the lock tab against the bolt head.



30. Install the countershaft reverse gear, needle bearing, and reverse gear collar.

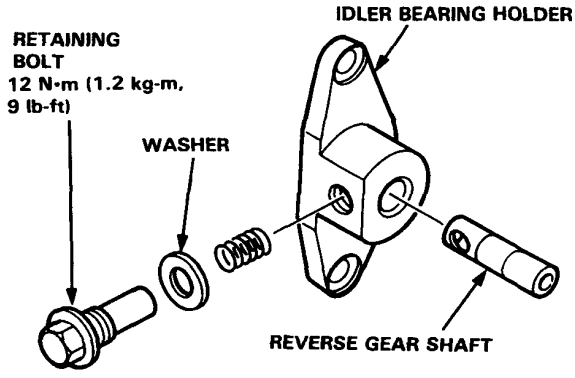


31. Install the new gasket and three dowel pins in the torque converter housing.



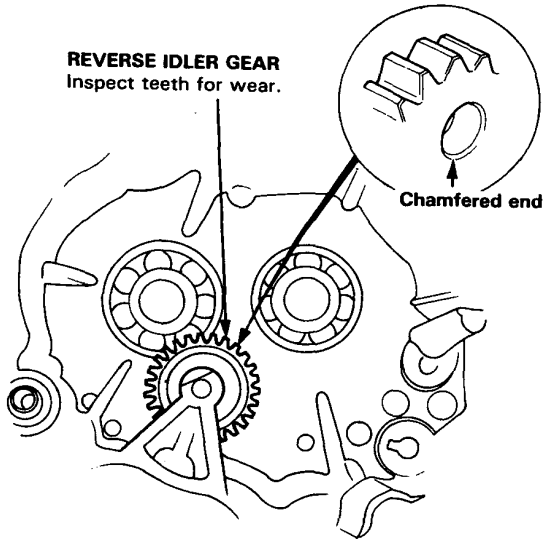
32. Assemble the idler bearing holder.

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



33. 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.

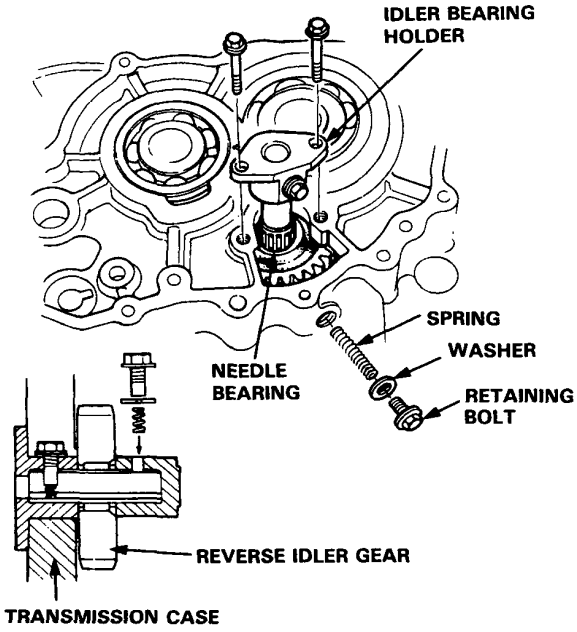


34. Install the needle bearing into the idler gear.

35. Install the idler bearing holder into the transmission housing.

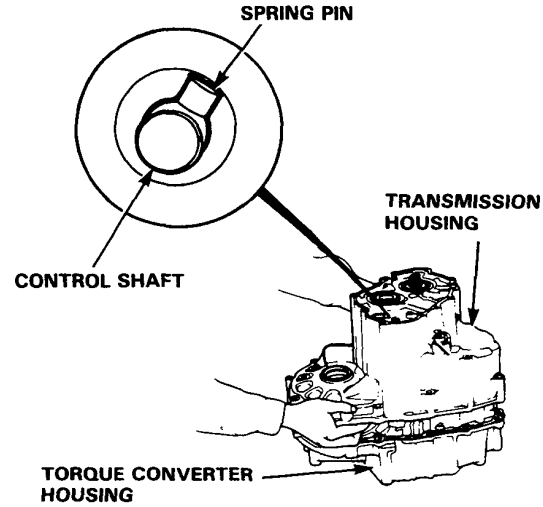
36. Tighten the reverse idler bearing holder bolts.

37. Install the spring and then tighten the retaining bolt with sealed washer.



38. Place the transmission housing on the torque converter housing.

NOTE: Be sure the main valve control shaft lines up with the hole in the housing and that the reverse idler gear meshes with the mainshaft and countershaft, or the housing will not go on.

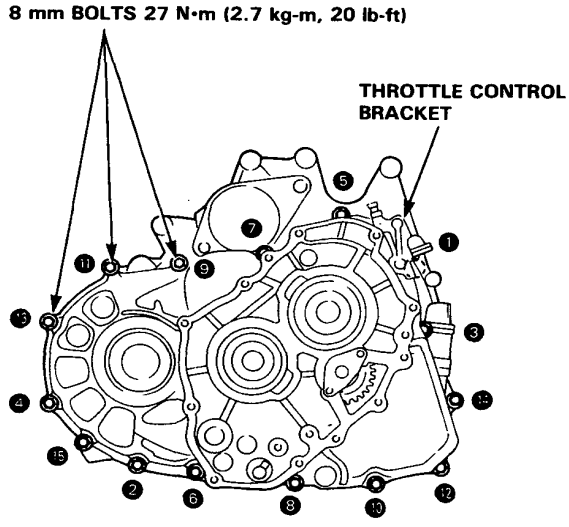


(cont'd)

Reassembly (cont'd)

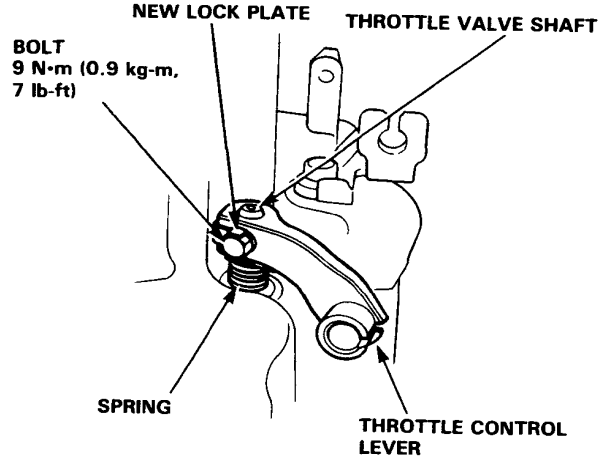
39. Torque bolts to 27 N·m (2.7 kg-m, 20 lb-ft) in order of (1) thru (15) in two or more steps.

    NOTE: When tightening the transmission housing bolts, take care that you do not distort or damage the throttle control bracket; distortion or damage to the bracket will change transmission shift points.



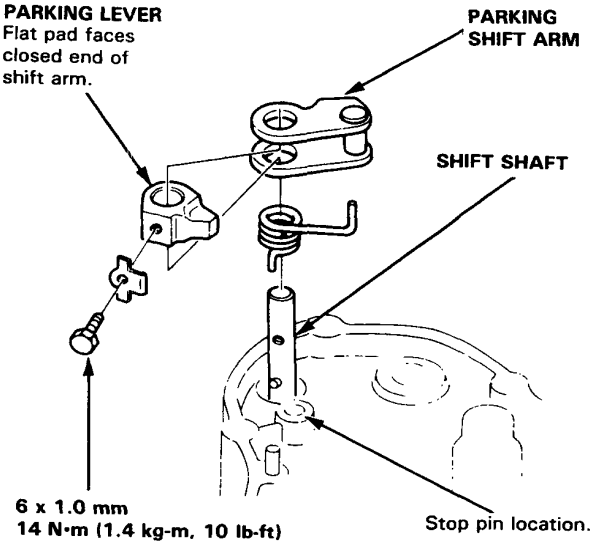
40. Install the throttle control lever and spring on the throttle control shaft.

41. Install the bolt and new lock plate. Bend the lock tab against the bolt head.



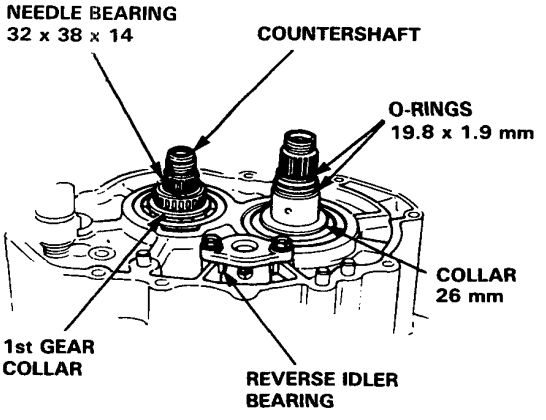
42. Install the parking shift arm and spring on the shift shaft with the bolt and a new lock plate. Bend the lock tab against the bolt head.

    NOTE: The spring should put clockwise tension on the shift arm, forcing it against the stop pin.

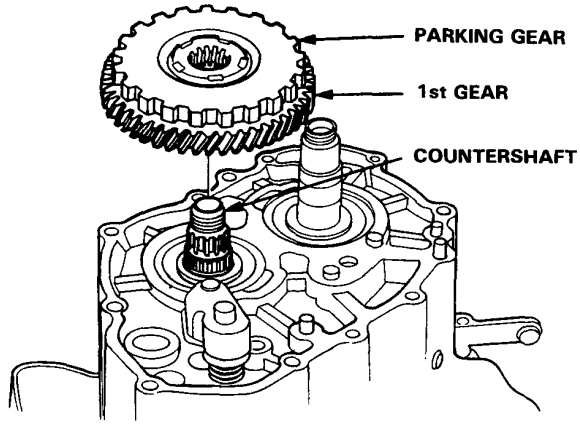


43. Install the 1st gear collar and needle bearing on the countershaft. Install the 26 mm collar on the mainshaft.

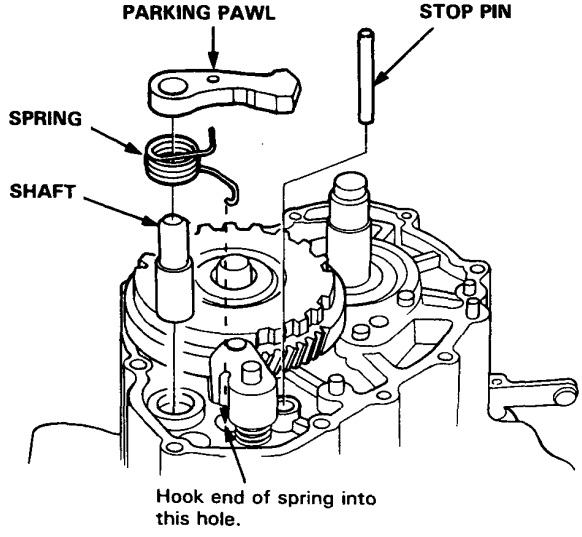
44. Install new 19.8 x 1.9 mm O-rings on the mainshaft.



45. Install the countershaft 1st gear and parking gear on the countershaft.



46. Install the stop pin, parking pawl shaft, parking pawl, and pawl release spring.

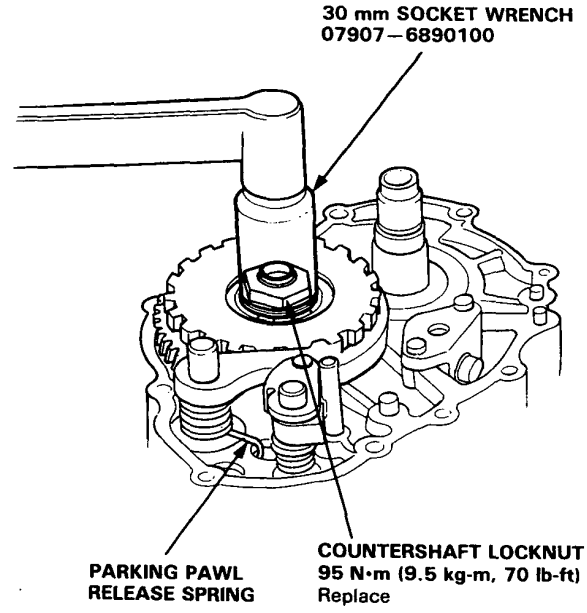


NOTE:

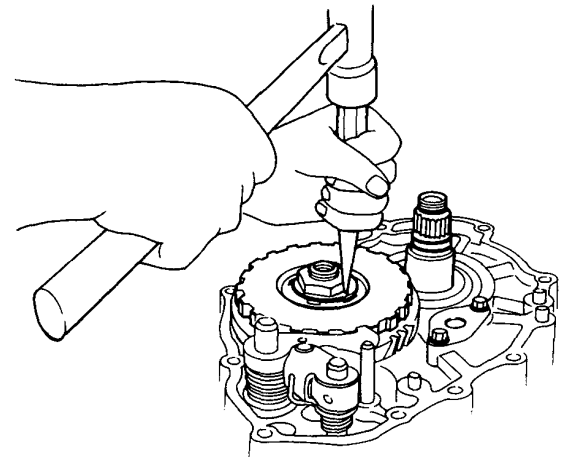
- One end of the parking pawl release spring fits into the hole in the parking pawl, the other end into the hole in the transmission housing as shown.
- The release spring should put clockwise tension on the pawl, forcing it away from the parking gear.

47. Shift to PARK and install the mainshaft holder.

48. Install and torque the new countershaft locknut.



49. Stake the locknut flange into the gear groove.

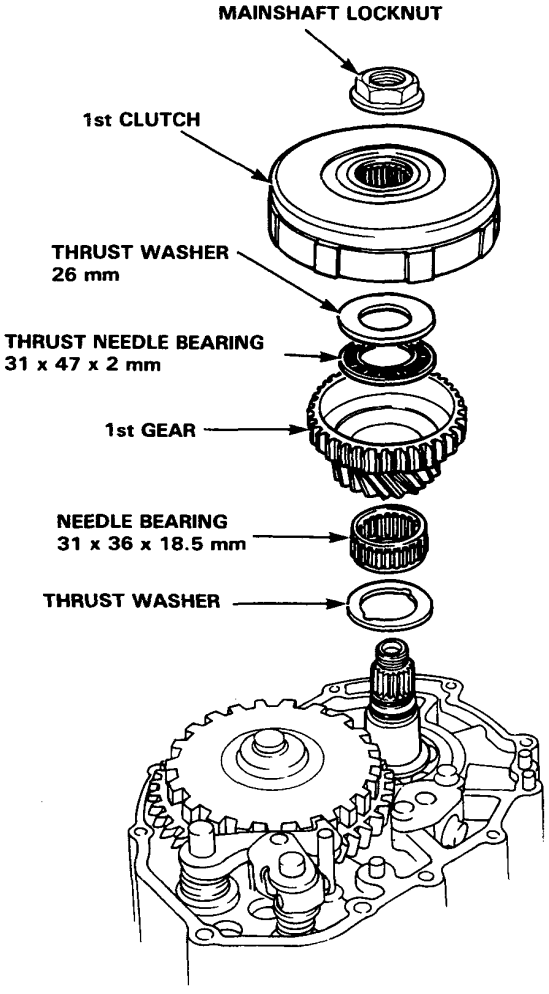


(cont'd)

Reassembly (cont'd)

50. Install 31 x 36 x 18.5 mm needle bearing and thrust washer on the mainshaft.

51. Install 1st gear, thrust needle bearing, and the thrust washer on the mainshaft.

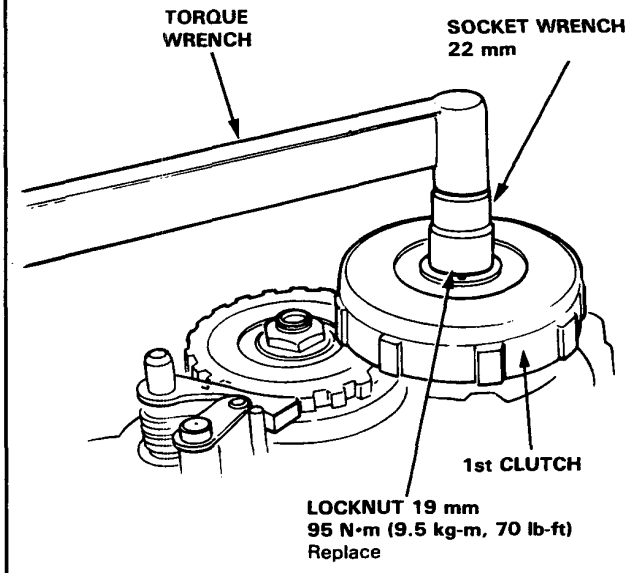


52. Install the 1st clutch on the mainshaft.

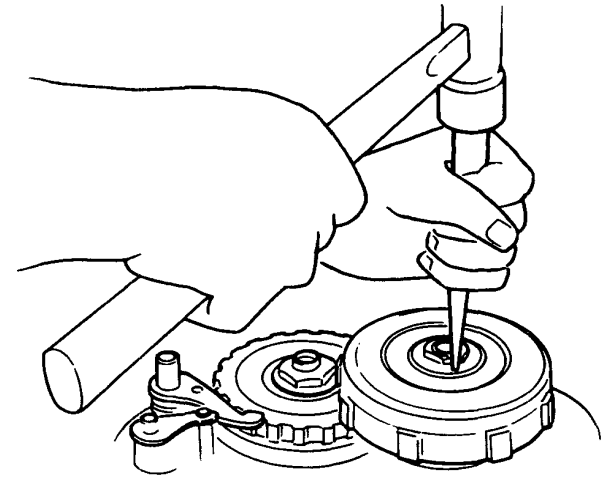
53. Attach the mainshaft holder 07932—6890202 from the underside of the torque converter case.

54. Install and torque the new mainshaft locknut.

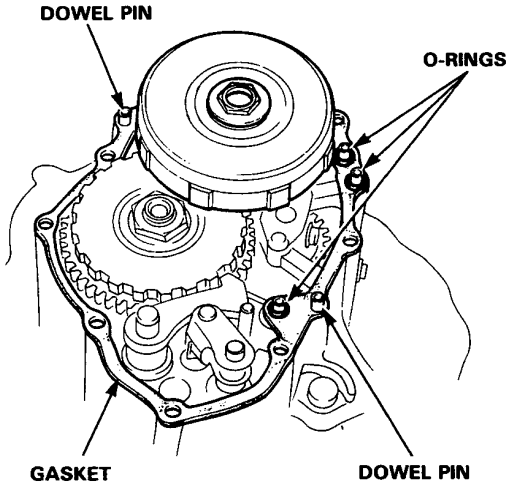
CAUTION: Locknut has left-hand threads.



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



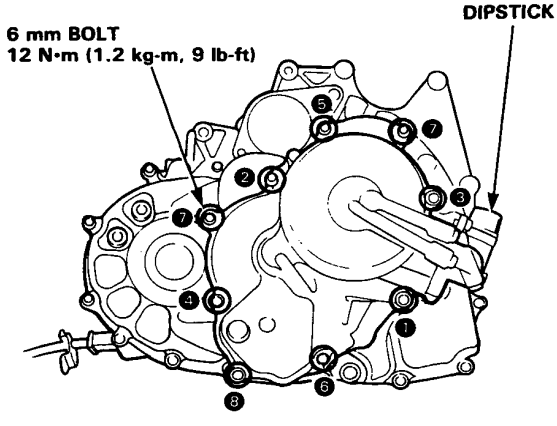
56. Install the gasket, dowel pins, and O-rings on the transmission housing.



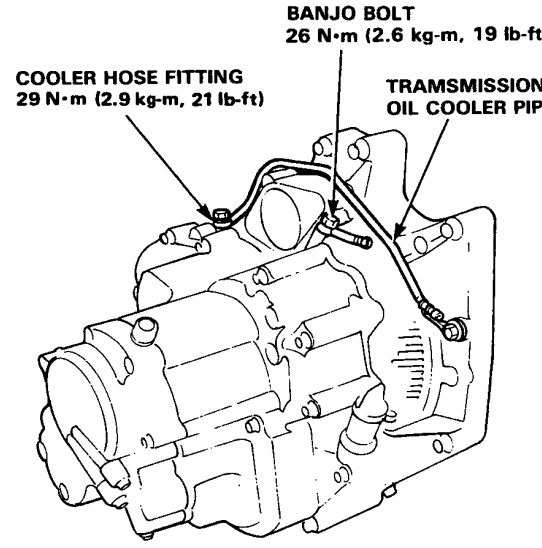
57. Install the end cover and torque all bolts (9) to 12 N•m (1.2 kg-m. 9 lb-ft).

58. Install the dipstick.

59. Install the transmission cooler banjo fitting, but do not tighten until the transmission is installed in the car and the hose is positioned properly.

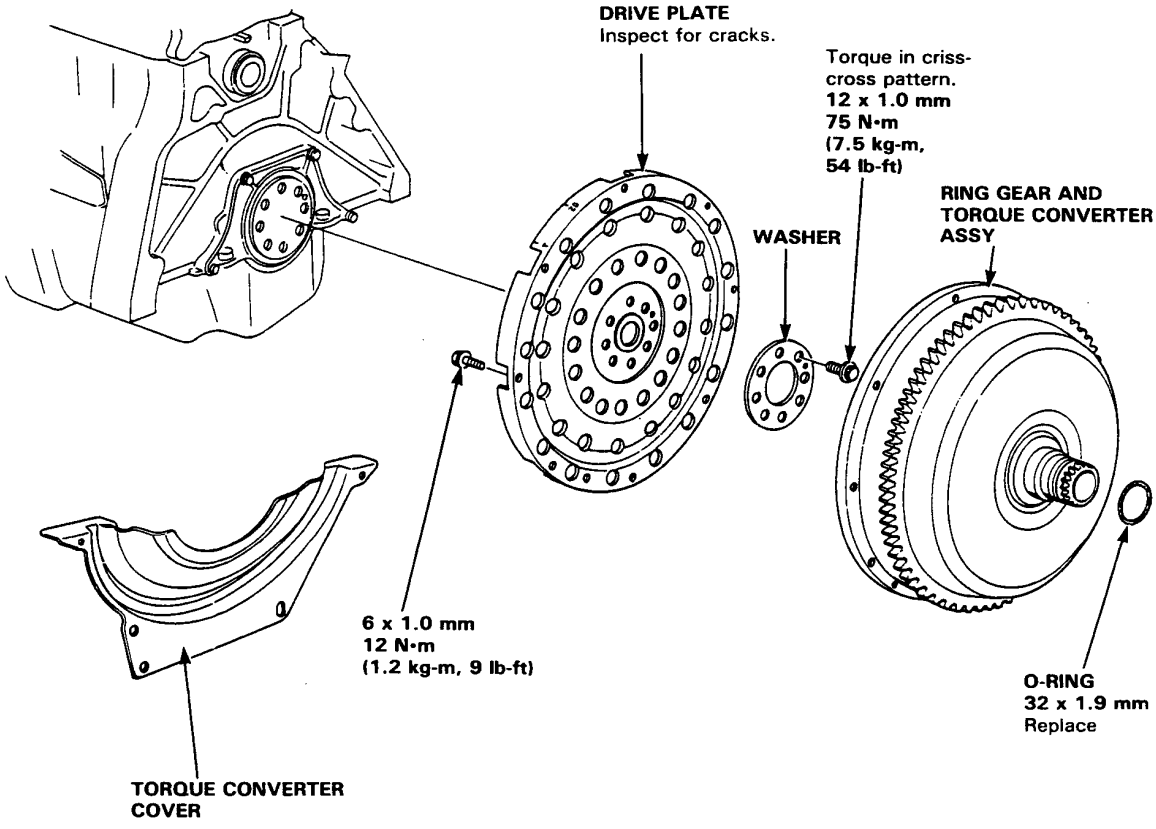


60. Install the transmission cooler hose fitting and torque to 26 N•m (2.6 kg-m, 19 lb-ft).



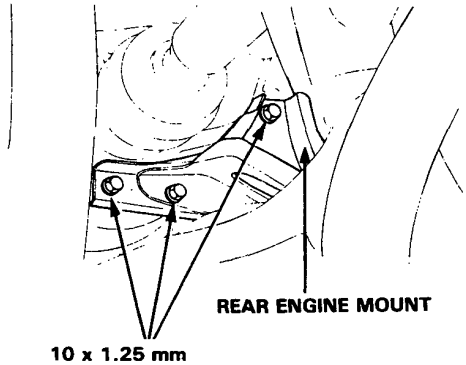
Torque Converter

Disassembly

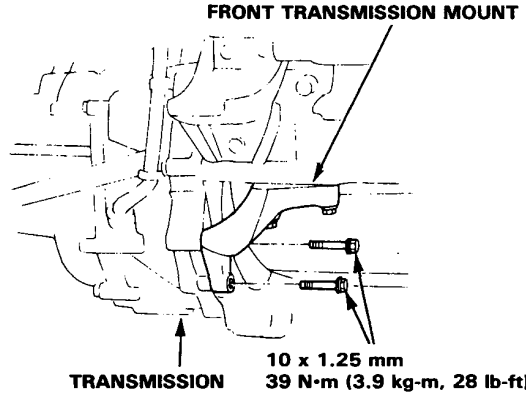


Installation

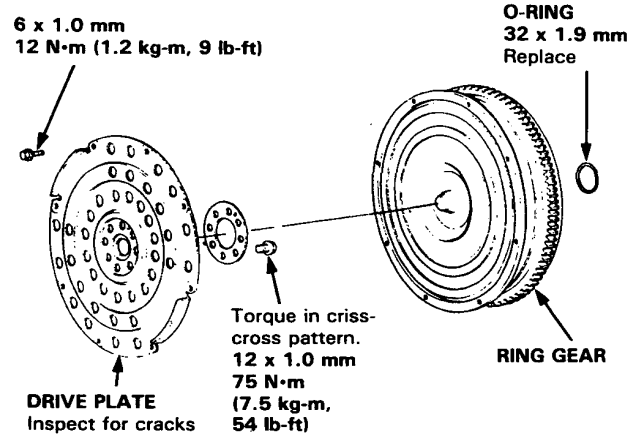
1. Attach shift cable to shift arm with pin, then secure cable to edge of housing with cable holder and bolt, 12 N•m (1.2 kg-m, 9 lb-ft).
2. Install torque converter on transmission.
3. Place transmission on transmission jack, and raise to engine level.
4. Hook hanger plate with hoist and make hoist chain tight.
5. Check that the two 14 mm dowel pins are installed in transmission housing.
6. Install new 26 mm spring clips on the end of each axle.
7. Align the dowel pins with holes in block; align torque converter bolt head with holes in drive plate.
8. Fit the left axle into the differential as you raise the transmission up to the engine.
9. Secure transmission to engine with two (10 x 1.25 x 90 mm) lower mounting bolts, torque bolts when others are installed in step 23.
10. Install rear engine mounts on transmission housing, torque to 39 N•m (3.9 kg-m, 28 lb-ft).



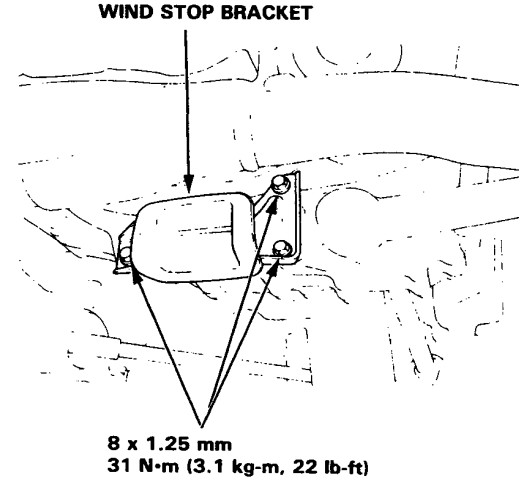
11. Install the front transmission mount bolts and torque to 39 N•m (3.9 kg-m, 28 lb-ft).



12. Attach torque converter to drive plate with eight (6 x 1.0 x 12 mm) bolts, and torque to 12 N•m (1.2 kg-m, 9 lb-ft). Rotate crank as necessary to tighten bolts to 1/2 torque, then the final torque, in a criss-cross pattern. Check for free rotation after tightening the last bolt.



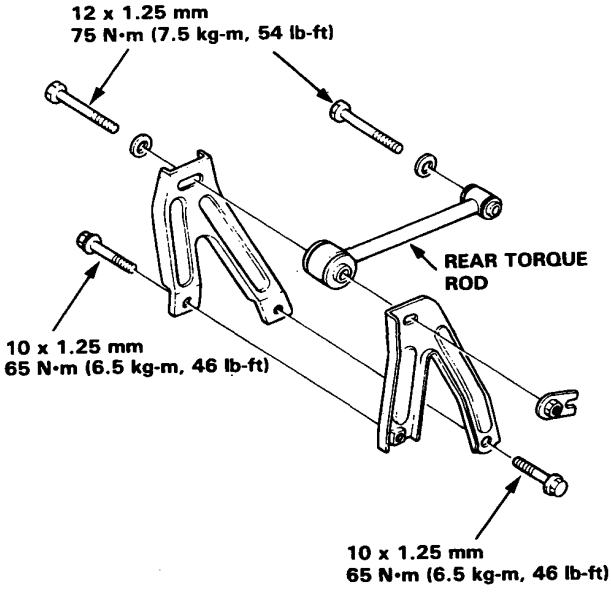
13. Remove the transmission jack.
14. Install torque converter cover plate, torque two 6 x 1.0 mm bolts (in oil pan flange) to 12N•m (1.2 kg-m, 9 lb-ft).
15. Install the wind stop rubber on the center beam, torque 10 x 1.25 mm nuts to 55 N•m (5.5 kg-m, 40 lb-ft), and install wind stop bracket on the transmission housing , torque three 8 x 1.25 mm bolts to 31 N•m (3.1 kg-m, 22 lb-ft).



16. Remove hoist from transmission.
17. Install starter mount bolts (10 x 1.25 x 125 mm) and torque to 45 N•m (4.5 kg-m, 33 lb-ft).

(cont'd)

18. Install the rear torque rod and brackets as shown.

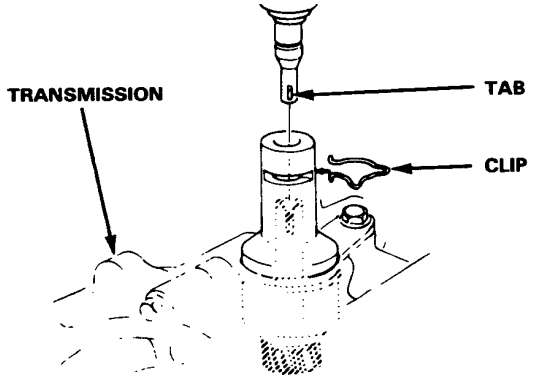


19. Turn right steering knuckle fully outward, and slide axle into differential until you feel its spring clip engage the side gear.

20. Reconnect ball joint to knuckle, then torque its bolt to 55 N·m (5.5 kg-m, 40 lb-ft).
Reinstall the damper fork and torque its bolt to 44 N·m (4.4 kg-m, 32 lb-ft).

21. Install speedometer cable.

- Align tab on cable end with slot in holder.
- Install clip so bent leg is on groove side.



NOTE: After installing, pull speedometer cable to see that it is secure.

22. Install front wheels, lower car to ground, and torque nuts to 110 N·m (11.0 kg-m, 80 lb-ft).

23. Install transmission mounting bolt (10 x 1.25 x 90 mm), and torque all bolts to 45 N·m (4.5 kg-m, 33 lb-ft).

24. Connect cooler hoses, and torque banjo bolts to 29 N·m (2.9 kg-m, 21 lb-ft).

25. Connect wiring:

- Battery positive cable to starter.
- Black/white wire to starter solenoid.
- Yellow/green wire to water temperature sending unit.
- Black/yellow and yellow wires to ignition timing thermosensor.

26. With ignition key in 0 position, connect ground cable to battery and transmission.

27. Unscrew the dipstick from top of transmission end cover and add 3.0 quarts Dexron® ATF through the hole. Reinstall dipstick.

NOTE: If transmission and torque converter have been disassembled, add a total of 5.4 ℓ (5.7 US. qts, 4.8 Imp. qts).

28. Install and reconnect shift cable (page 15-66).

29. Install console.

30. Start engine, set parking brake, and shift transmission through all gears three times. Check for proper shift cable adjustment (page 15-67).

31. Let engine reach operating temperature with transmission in Neutral or Park, then turn it off and check fluid level.

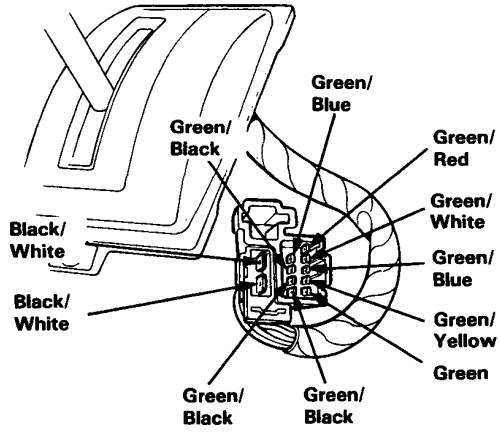
32. Install throttle control cable and adjust.

33. Road test as described on page 15-6.

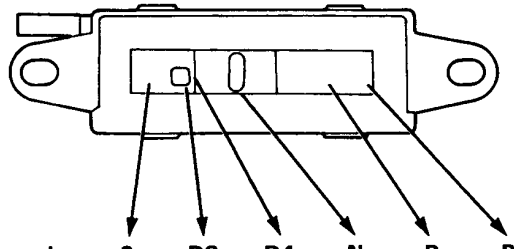
Neutral/Back-Up Light Switch

Testing / Installation

Move the selector lever to Park, Reverse, and Neutral to check continuity of combined neutral safety (inhibiter) and back-up light switch.
Replace the switch if there is no continuity between connector terminals shown on the chart.



NEUTRAL/BACK-UP SWITCH

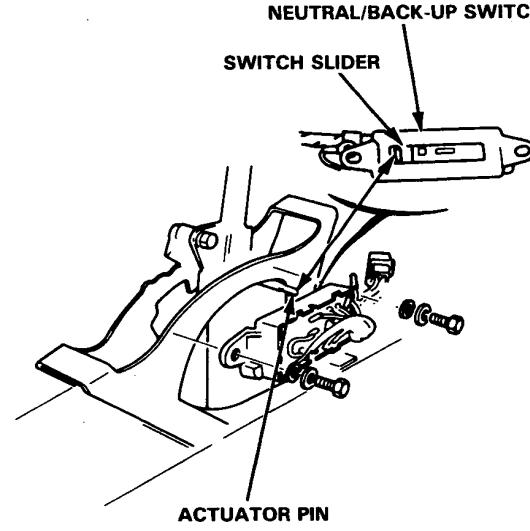


Wire color	2	D3	D4	N	R	P
Green/ Blue (cruise control)	○	○	○			
GND	○	○	○	○	○	○
Green/ Yellow	○					
Green/ Blue		○				
Green/ Black			○			
Green				○		
Green/ Red					○	
Green/ White						○

INHIBITER SWITCH

Wire color	N	R	P
Black/ White	○		○
Green/ Black		○	
Black/ White	○		○
Green/ Black		○	

1. Position the switch slider to Park, as shown.
2. Shift the selector lever to Park.

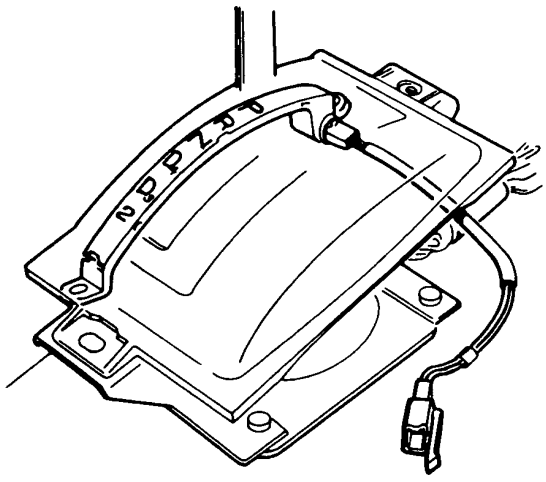


3. Tighten the switch with two bolts and lockwashers.

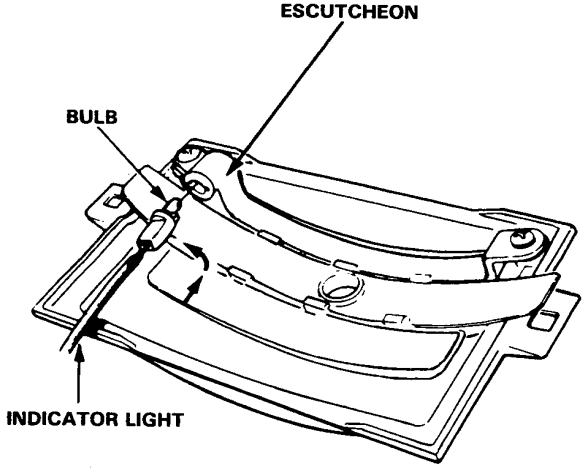
Shift Indicator Light

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.



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

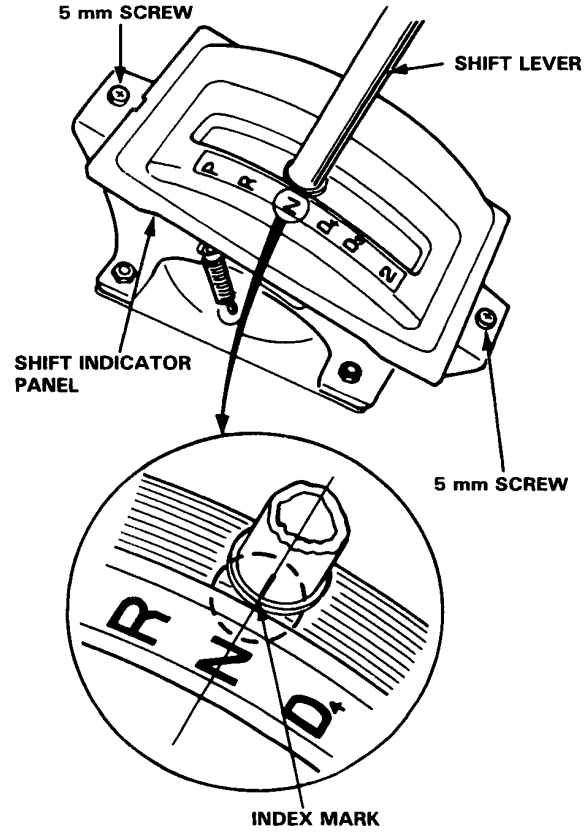


Shift Indicator Panel Position

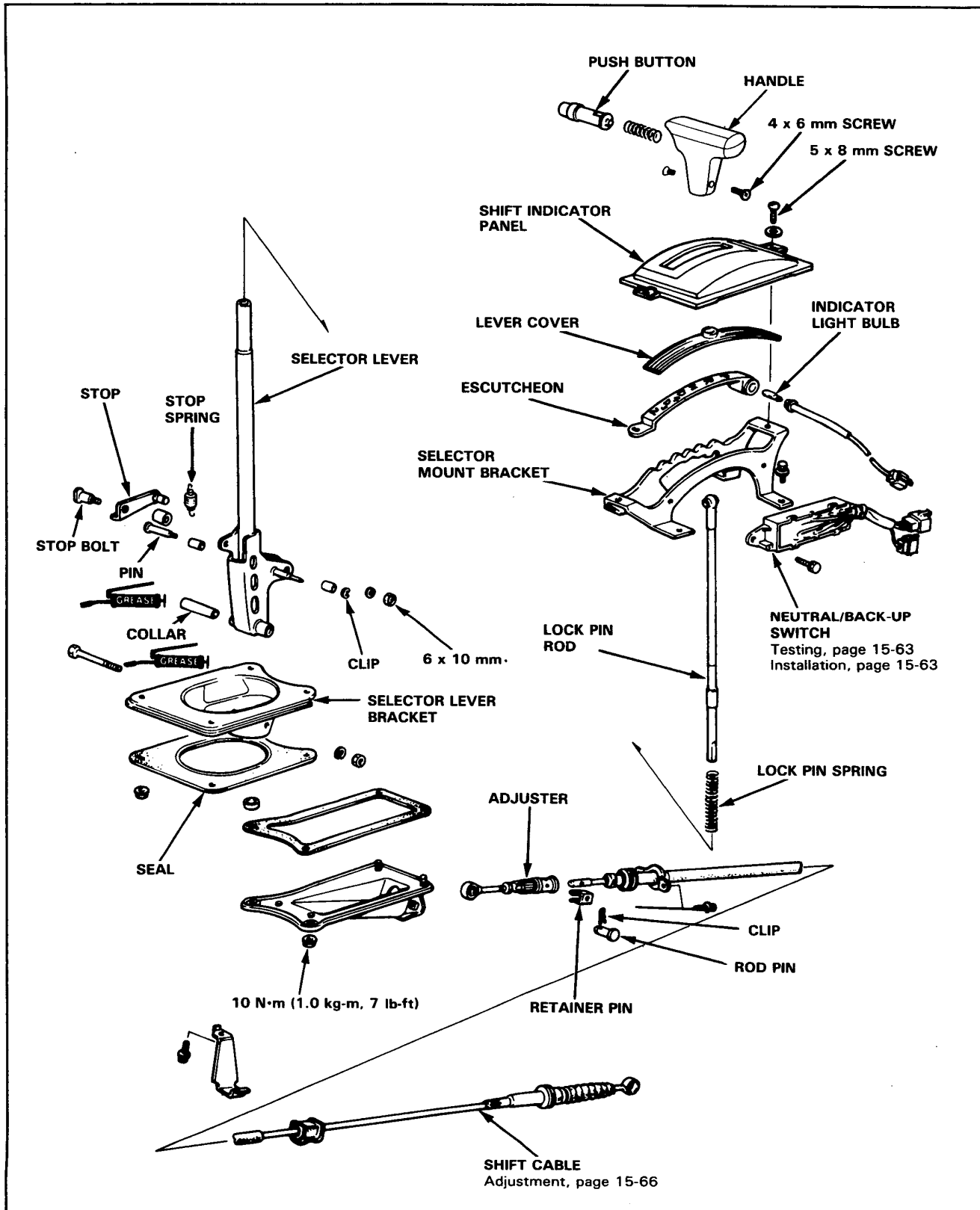
Adjustment

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.



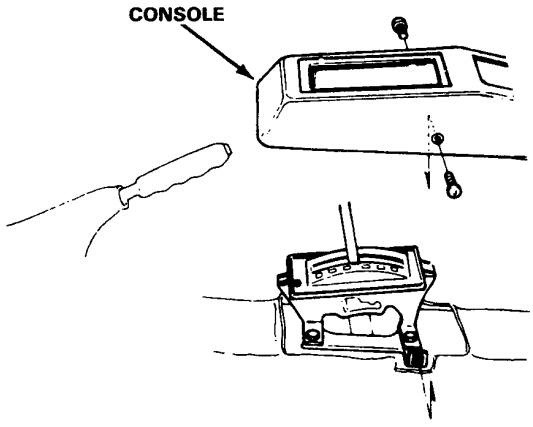
Gearshift Selector



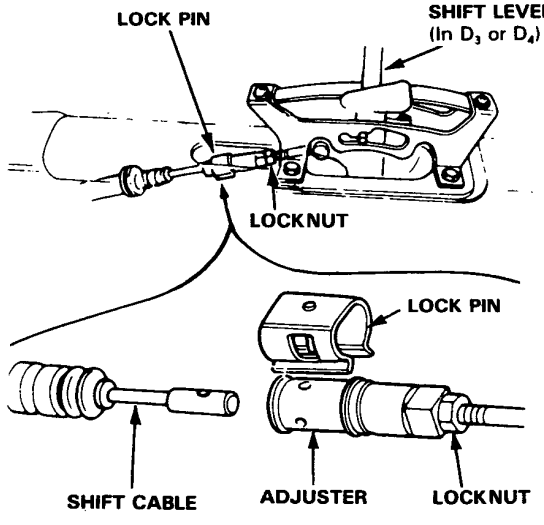
Shift Cable

Adjustment

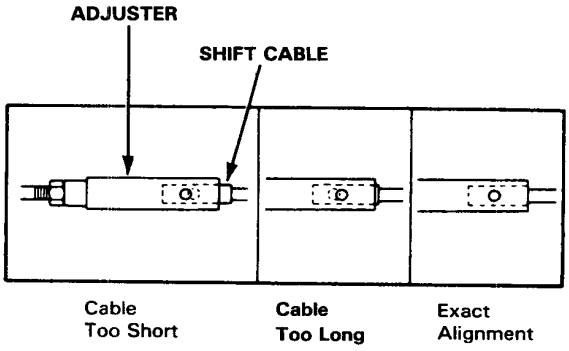
1. Start the engine. Shift to reverse to see if the reverse gear engages.If not, refer to troubleshooting on page 15-4.
2. With the engine off, remove the console.



3. Shift to Drive, then remove the lock pin from the cable adjuster.



4. Check that the hole in the adjuster is perfectly aligned with the hole in the shift cable.



NOTE: There are two holes in the end of the shift cable. They are positioned 90° apart to allow cable adjustments in 1/4 turn increments.

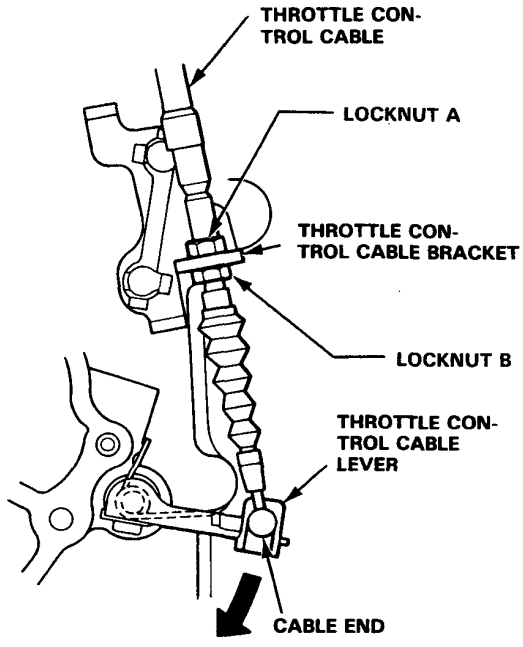
5. If not perfectly aligned, loosen the locknut on shift cable and adjust as required.
6. Tighten the locknut.
7. Install the lock pin on the adjuster.

NOTE: If you feel the lock pin binding as you reinstall it, the cable is still out of adjustment and must be readjusted 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 15-4.

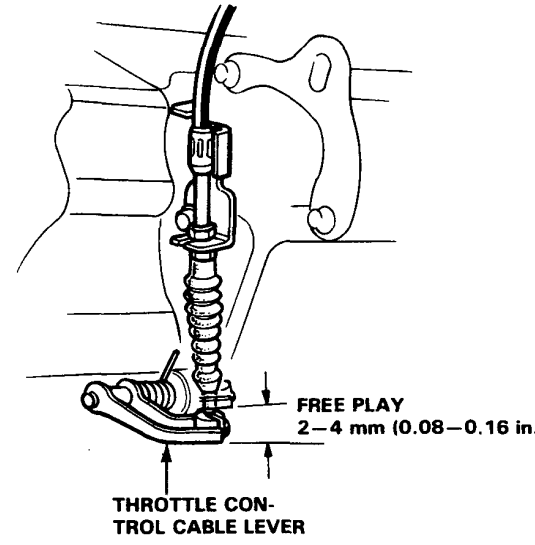
Adjustment/Inspection (Fuel-Injected Engine)

1. Loosen locknuts (A) and (B) on the throttle control cable.
2. Press down as shown on the throttle control lever until it stops.
   Turn the locknut in until lightly seats on the throttle control cable bracket.
3. While holding locknut (A), tighten the locknut (B).



NOTE: Be sure to hold locknut (A) while tightening the locknut (B) to prevent it from being turned with the locknut (B).

4. Check the following items before starting the engine:
   - Remove the accelerator pedal weight, and check that there is play in the throttle control lever by depressing the accelerator to floor.

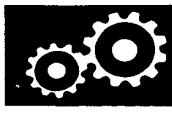


   - Check that the cable moves freely by depressing the accelerator.
5. Start the engine and check the following:
   - With the shift lever in N or P , check that the throttle control lever is synchronized with the engine speed by gradually depressing the accelerator.

NOTE: Readjust if necessary by turning locknut (A).

(cont'd)

Automatic Transmission (As with ET Engine)



Troubleshooting

PROBLEM	REFER TO:
Engine runs but car does not move:	1, 2, 3, 6, 7, 8, 41
Car does not move in [D3] or [D4] but does move in [2] (No low gear)	7, 9, 10, 11, 56
Car does not move in [2] (OK in [D3] and [D4])	7, 12, 13
Car does not move in [R] (OK in [D3], [D4] and [2])	4, 7, 14, 23, 36
Poor acceleration, Engine races when starting off in [D3] and [D4]:	
– Stall rpm high in [D3], [D4] and [2]	1, 2, 3, 7, 46, 49
– Stall rpm high in [D3] and [D4]	7, 9, 11
– Stall rpm high in [2]	7, 13
– Stall rpm OK	16
– Stall rpm low	17, 18, 37
Engine vibrates at idle	2, 37, 41
Up-shift speed too high	15, 19, 20, 48
Jumps from first to third in [D3]	23
Jumps from first to fourth in [D4]	23, 24
Up-shift point too early or too late	
– 1st to 2nd, 2nd to 3rd, and 3rd to 4th	15, 19, 20, 48
– 1st to 2nd only	15, 22
– 2nd to 3rd only	15, 23
– 3rd to 4th only	15, 24
Harsh shift from 1st to 2nd	13, 21, 25
Harsh shift from 2nd to 3rd	21, 26, 28, 35
Harsh shift from 3rd to 4th	21, 27, 36, 37
Harsh shift from 2nd to 1st	21, 25, 28, 42
Harsh shift from 3rd to 2nd	21, 26, 32, 43
Harsh shift from 4th to 3rd	21, 27, 44
Engine races when shifting up from 2nd to 3rd	21, 26, 28, 29, 33, 35
Engine races when shifting up from 3rd to 4th (Shift timing OK)	21, 27, 32, 36
Engine Vibrates when shifting up from 2nd to 3rd	13, 21, 26, 31, 43, 50
Engine Vibrates when shifting up from 3rd to 4th (Shift timing OK)	21, 32, 44, 50
Car creeps foward in [N] (Shift cable adjusted correctly)	11, 13, 16, 35, 36, 38, 39, 40
Excessive time lag from [N] to [D3], [D4] (Shift cable adjusted correctly)	11, 30
Excessive time lag from [N] to [R] (Shift cable adjusted correctly)	4, 23, 36
Malfunctions after reassembly:	
– Loud noise in all gears, neutral and park	2, 5, 45
– Car will only accelerate to 50 km/h	17
– Vibration in all gears	41
– Shift lever requires excessive force	7, 47
– Car has only 4th gear	15
– Transmission has no park	7, 47
– Stall rpm is high, but clutch pressure is OK in all positions	49
Lock-up clutch engage or disengages abnormally.	19, 21, 51, 52, 53
Engine vibrates when lock-up clutch is engaged	52, 53, 54, 55, 57
Lock-up clutch slips.	3, 49, 53, 57

POSSIBLE CAUSE

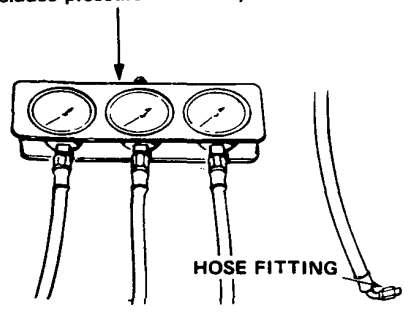
1. *ATF level too low*
2. *Faulty ATF pump*
3. *Stuck regulator valve or damaged spring*
4. *Stuck servo shaft*
5. *Damaged 3rd gear*
6. *Damaged mainshaft*
7. *Manual shift out of adjustment (broken cable, loose end pin)*
8. *Damaged final gear*
9. *Worn or damaged one-way clutch*
10. *Damaged low gear*
11. *Faulty first clutch*
    - a. *Stuck clutch piston*
    - b. *Damaged clutch O-ring*
    - c. *Damaged clutch feed pipe or O-ring*
    - d. *Foreign matter stuck in check valve*
    - e. *Worn or burnt clutch disc*
12. *Damaged 2nd gear*
13. *Faulty 2nd clutch*
    - a. *Stuck clutch piston*
    - b. *Damaged clutch O-ring*
    - c. *Foreign matter stuck in clutch check valve*
    - d. *Worn or damaged sealing rings.*
    - e. *Worn or burnt clutch disc.*
14. *Damaged reverse gear*
15. *Faulty governor valve*
16. *ATF level too high*
17. *Burnt or seized torque convertor one-way clutch*
18. *Improperly adjusted throttle cable at carburetor*
19. *Improperly adjusted throttle control cable at automatic transmission*
20. *Defective throttle valve A*
21. *Defective throttle valve B*
22. *Defective 1–2 shift valve*
23. *Defective 2–3 shift valve*
24. *Defective 3–4 shift valve*
25. *Defective second accumulator*
26. *Defective third accumulator*
27. *Defective fourth accumulator*
28. *Defective second orifice control valve*
29. *Foreign matter stuck in main orifice*
30. *Foreign matter stuck in first orifice*
31. *Foreign matter stuck in second orifice*
32. *Defective third orifice control valve*
33. *Foreign matter stuck in third orifice*
34. *Foreign matter stuck in fourth orifice*
35. *Defective third clutch*
    - a. *Stuck clutch piston*
    - b. *Damaged clutch O-ring*
    - c. *Foreign matter stuck in clutch check valve*
    - d. *Damaged clutch feed pipe or O-ring*
    - e. *Worn or burnt clutch disc.*
36. *Defective fourth clutch*
    - a. *Stuck clutch piston*
    - b. *Damaged clutch O-ring*
    - c. *Foreign matter stuck in clutch check valve*
    - d. *Worn or damaged sealing rings*
    - e. *Worn or burnt clutch disc.*
37. *Lack of engine power*
38. *Burnt needle bearing*
39. *Burnt thrust washer*
40. *Improper clutch clearance*
41. *Torque convertor not fully seated, causing flex plate to deform*
42. *No 2nd ball check valve*
43. *No 3rd ball check valve*
44. *No 4th ball check valve*
45. *Damaged mainshaft ball bearing and/or countershaft ball bearing.*
46. *Oil filter clogged*
47. *Cable housing damaged*
48. *Defective modulator valve*
49. *Faulty torque convertor check valve*
50. *Foreign matter stuck in separator port orifice*
51. *Defective pressure control timing valve*
52. *Defective governer cut valve*
53. *Defective pressure control shift valve*
54. *Defective lock-up piston*
55. *Defective lock-up piston damper spring*
56. *Defective CPC valve*
57. *Defective pressure control valve*

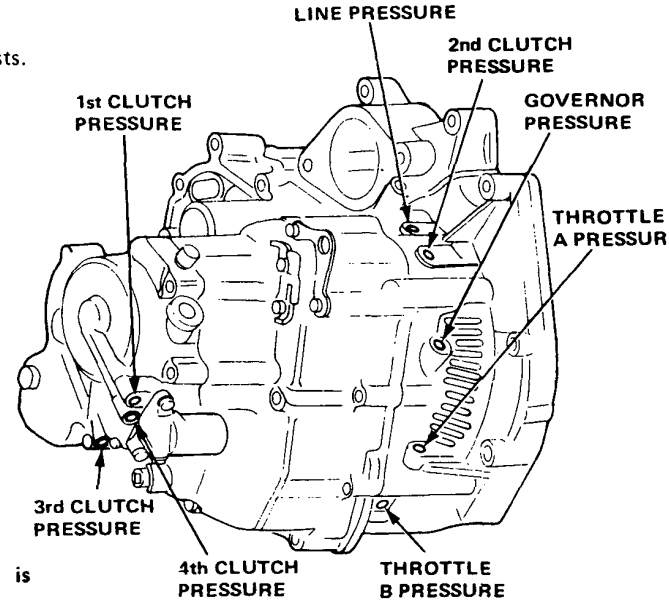
Road Test

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 07406-0020002
(includes pressure hose Assy 07406-0020201)





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

PRESSURE	SELECTOR POSITION	MEASUREMENT	SYMPTOM	PROBABLE CAUSE	FLUID PRESSURE	
					SPECIFICATION	SERVICE LIMIT
LINE	[N] or [P]	• With parking brake applied. • Run engine at 2,000 min^{-1} (rpm).	No (or low) LINE pressure	Torque converter, oil pump pressure regulator, torque converter check valve.	784–833 kPa (8.0–8.5 kg/cm^2, 114–121 psi)	735 kPa (7.5 kg/cm^2, 107 psi)
1st	[D3] or [D4]	MEASUREMENTS • With parking brake applied, raise front wheels off ground and support with safety stands. • Run engine at 2,000 min^{-1} (rpm).	No (or low) First pressure	1st clutch	784–833 kPa (8.0–8.5 kg/cm^2, 114–121 psi)	735 kPa (7.5 kg/cm^2, 107 psi)
2nd	[2]		No (or low) SECOND pressure	2nd clutch	539–833 kPa (5.5–8.5 kg/cm^2, 64–121 psi) Varies with throttle openings.	498 kPa (5.0 kg/cm^2, 71 psi) with lever released. 735 kPa (7.5 kg/cm^2, 107 psi) with lever in full throttle.
3rd	[D3]		No (or low) THIRD pressure	3rd clutch		
4th	[D4]		No (or low) FORTH pressure	4th clutch		
	[R]			Servo valve		
THROTTLE	[D3] or [D4]	• With parking brake applied, raise front wheels off ground and support with safety stands. • Run engine at 1,000 min^{-1} (rpm) • Disconnect throttle control cable at throttle lever. • Read pressure with lever released. • Manually push lever up simulating full throttle. • Read pressure with lever in full throttle position.	No (or low) THROTTLE pressure	Throttle valve A Throttle modulator valve.	0 kPa (0 kg/cm^2, 0 psi) with lever released. 505–519 kPa (5.15–5.3 kg/cm^2, 73–75 psi) with lever in full throttle position.	500 kPa (5.1 kg/cm^2, 72 psi)
				Throttle valve B.	0 kPa (0 kg/cm^2, 0 psi) with lever released. 784–833 kPa (8.0–8.5 kg/cm^2, 114–121 psi) with lever in full throttle position	735 kPa (7.5 kg/cm^2, 107 psi)
GOVERNOR	[D3] or [D4]	• Place vehicle on chassis dynamometer, or jack up front of car, support with safety stands, block rear wheels, and set hand brake. • Run vehicle at 60 km/h(38 mph).	No (or low) Governor pressure.	Governor valve	216–225 kPa (2.2–2.3 kg/cm^2, 31–33 psi)	211 kPa (2.15 kg/cm^2 29 psi)

Stall Speed Test

1. Engage parking brake and block front wheels.
2. Connect tachometer, and start engine.
3. After engine has warmed up to normal operating temperature, shift into [D3]
4. Fully depress brake pedal and accelerator for 6 to 8 seconds, and note engine speed.
5. Allow 2 minutes for cooling, then repeat same test in [D4] , [2] and Reverse.

Stall speed in [D3] , [D4] , [2], and [R] must be the same, and must also be within limits:

Stall Speed RPM:
Specification: 2,400 min^{-1} (rpm)
Service Limit: 2,100–2,700 min^{-1} (rpm)

KY type only:
Specification: 2650 min^{-1} (rpm)
Service Limit: 2,100–2,700 rpm

CAUTION: Do not test stall speed for more than 10 seconds at a time.

TROUBLE	PROBABLE CAUSE
Stall rpm high in [2] , [D3] , [D4] & R.	Low fluid level or oil pump output, clogged oil strainer, pressure regulator, slipping one-way clutch in torque convertor. Slipping clutch.
Stall rpm high in [D3] , [D4] only.	Slippage of 1st clutch
Stall rpm low in [2] , [D3] , [D4] & [R] .	· Engine output low, throttle cable mis-adjusted at carburetor. · Oil pump seized, torque convertor thrust washer seized.

Maintenance

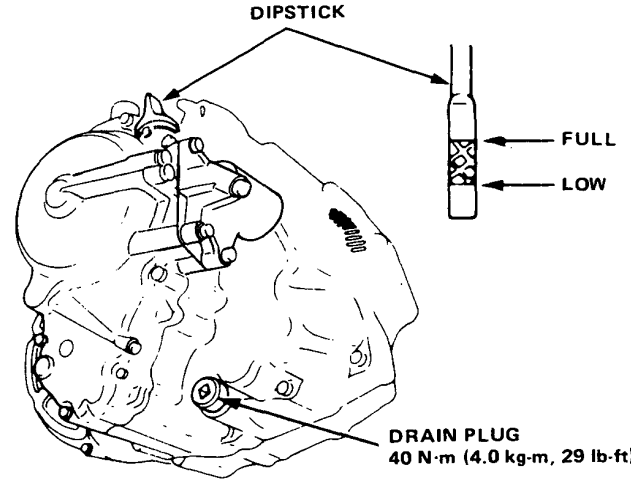
Checking

With the car on level ground, unscrew the transmission dipstick and check the level of fluid immediately after the engine is shut off (within one minute). The fluid level should be between full and low marks. If the level is at, or below, the low mark, add DEXRON-type automatic transmission fluid. Do not screw dipstick in to check the fluid level.

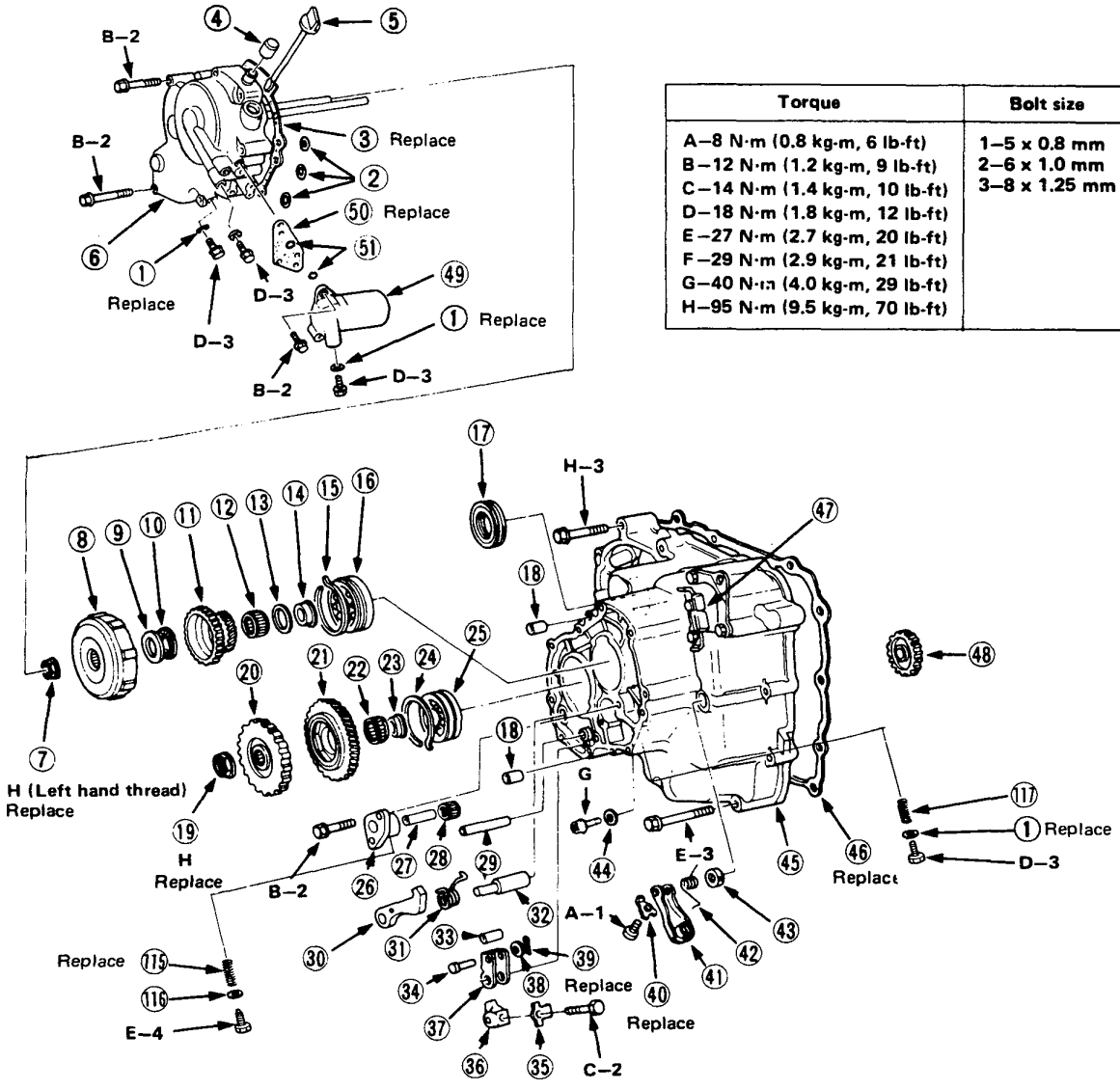
Changing

1. Bring the transmission up to operating temperature by driving the car. Park the car on level ground, turn the engine off, then remove drain plug.
2. Reinstall the drain plug with a new washer, then refill the transmission to the full mark on the dipstick.

Automatic transmission Capacity:
2.8 ℓ (3.0 U.S. qts., 2.5 Imp. qt) at change
5.6 ℓ (5.9 U.S. qts., 4.9 Imp. qt) after overhaul



Illustrated Index



Torque	Bolt size
A–8 N·m (0.8 kg-m, 6 lb-ft)	1–5 x 0.8 mm
B–12 N·m (1.2 kg-m, 9 lb-ft)	2–6 x 1.0 mm
C–14 N·m (1.4 kg-m, 10 lb-ft)	3–8 x 1.25 mm
D–18 N·m (1.8 kg-m, 12 lb-ft)	
E–27 N·m (2.7 kg-m, 20 lb-ft)	
F–29 N·m (2.9 kg-m, 21 lb-ft)	
G–40 N·m (4.0 kg-m, 29 lb-ft)	
H–95 N·m (9.5 kg-m, 70 lb-ft)	

① WASHER 8 mm
② O-RING 6 x 2.3 mm
③ GASKET
④ BREATHER CAP
⑤ DIPSTICK
⑥ END COVER
⑦ LOCKNUT
⑧ 1st CLUTCH
⑨ THRUST WASHER 26 mm
⑩ THRUST NEEDLE BEARING 31 x 47 x 2 mm
⑪ MAINSHAFT 1st GEAR
⑫ NEEDLE BEARING 31 x 36 x 18.5 mm
⑬ THRUST WASHER
⑭ COLLAR 26 mm
⑮ SNAP RING 68 mm
⑯ MAINSHAFT BEARING
⑰ DIFFERENTIAL OIL SEAL
⑱ DOWEL PIN 8 x 14 mm
⑲ LOCKNUT
⑳ PARKING GEAR
㉑ COUNTERSHAFT 1st GEAR
㉒ NEEDLE BEARING 30 x 35 x 11 mm
㉓ 1st GEAR COLLAR
㉔ SNAP RING 62 mm
㉕ COUNTERSHAFT BEARING
㉖ REVERSE IDLER BEARING HOLDER
㉗ REVERSE IDLER SHAFT
㉘ NEEDLE BEARING
㉙ STOP PIN
㉚ PARKING PAWL
㉛ PARKING PAWL SPRING
㉜ PARKING PAWL SHAFT
㉝ PARKING PAWL ROLLER
㉞ ROLLER PIN
㉟ LOCK PLATE
㊱ PARKING LEVER
㊲ PARKING SHIFT ARM
㊳ WASHER 5 mm
㊴ COTTER PIN
㊵ LOCK PLATE
㊶ THROTTLE CONTROL LEVER
㊷ THROTTLE CONTROL SHAFT SPRING
㊸ THROTTLE CONTROL SHAFT SEAL
㊹ DRAIN PLUG WASHER
㊺ TRANSMISSION HOUSING
㊻ GASKET
㊼ THROTTLE CONTROL CABLE BRACKET
㊽ REVERSE IDLER GEAR
㊾ 1st ACCUMULATOR
㊿ GASKET
(51) O-RING 6 x 2.3 mm

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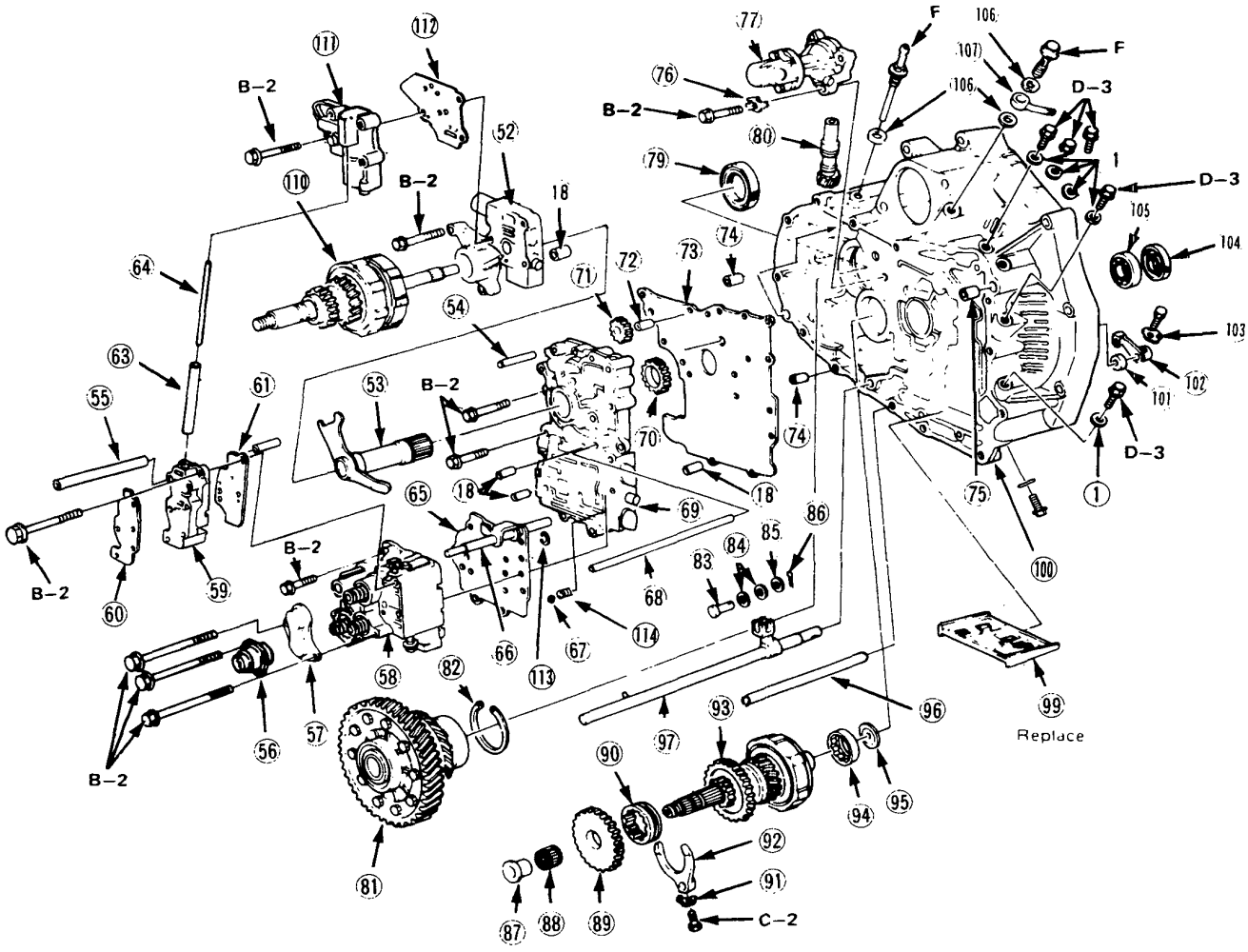
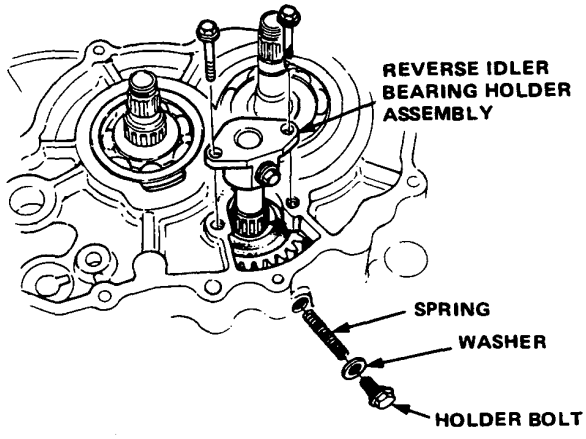


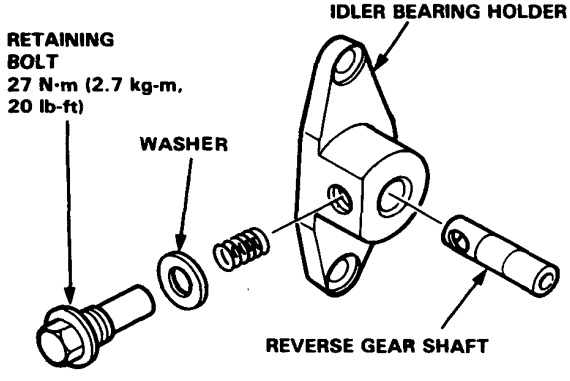
52 REGULATOR ASSY
53 STATOR SHAFT
54 3rd CLUTCH PIPE
55 4th CLUTCH PIPE
56 4th ACCUMULATOR COVER
57 2nd/3rd ACCUMULATOR COVER
58 SERVO VALVE ASSY
59 CLUTCH PRESSURE CONTROL VALVE
60 COVER
61 PLATE
63 8 x 136 mm PIPE
64 5 x 168 mm PIPE
65 SERVO SEPARATOR PLATE
66 THROTTLE CONTROL SHAFT
67 STEEL BALLS NO. 6
68 1st CLUTCH PIPE
69 MAIN VALVE BODY
70 PUMP DRIVE GEAR
71 PUMP DRIVEN GEAR
72 PUMP SHAFT
73 MAIN VALVE SEPARATOR PLATE
74 DOWEL PIN 14 x 25 mm
75 DOWEL PIN 14 x 20 mm
76 LOCK PLATE
77 GOVERNOR ASSY
79 DIFFERENTIAL OIL SEAL
80 SPEEDOMETER DRIVE GEAR
81 DIFFERENTIAL
82 SNAP RING 72 mm
83 MANUAL VALVE PIN
84 ROLLERS
85 WASHER 5 mm
86 COTTER PIN
87 REVERSE GEAR COLLAR
88 NEEDLE BEARING
89 COUNTERSHAFT REVERSE GEAR
90 SELECTOR HUB
91 LOCK PLATE
92 REVERSE SHIFT FORK
93 COUNTERSHAFT ASSY
94 COUNTERSHAFT NEEDLE BEARING
95 OIL GUIDE PLATE
96 SUCTION PIPE
97 CONTROL SHAFT
99 FILTER SCREEN
100 TORQUE CONVERTOR HOUSING
101 CONTROL SHAFT OIL SEAL
102 SHIFT LEVER
103 LOCK PLATE
104 MAINSHAFT OIL SEAL
105 MAINSHAFT BEARING
106 WASHER 12 mm
107 HOSE JOINT
108 8 x 29.5 mm PIPE
109 8 x 50 mm PIPE
110 MAINSHAFT/ASSY
111 PRESSURE VALVE
112 CONTROL VALVE SEPARATOR PLATE
113 E-CLIP
114 SPRING
115 SPRING
116 WASHER 8 mm
117 SPRING

Reverae Idler Bearing Holder Removal

1. Remove the holder bolt, washer and spring.
2. Remove the two bolts and then remove the idle gear bearing holder and needle bearing.



3. Remove the shaft holder bolt, washer and spring then pull out idle gear shaft.

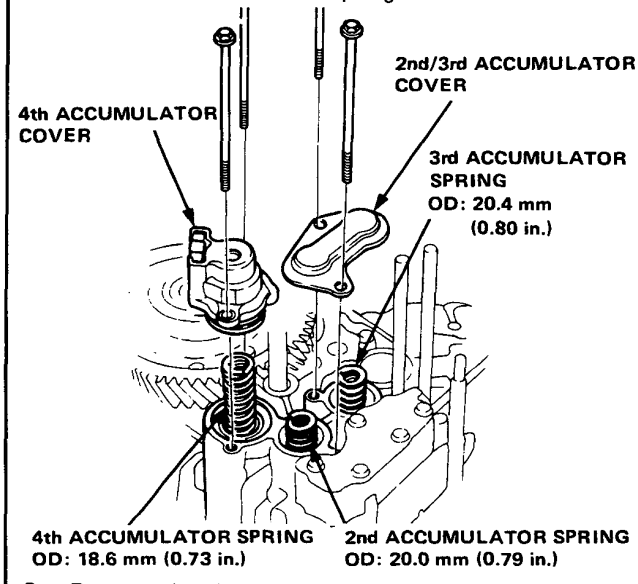


Servo Valve Body Removal

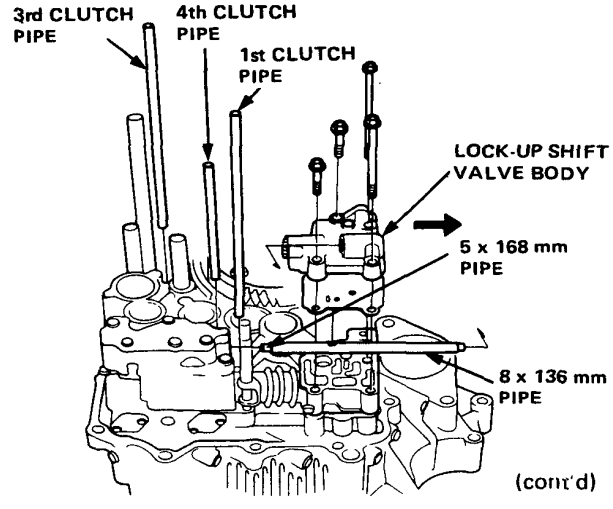
1. Remove the accumulator covers.

   CAUTION: Accumulator covers are spring loaded; to prevent stripping the threads in the torque convertor housing, press down on the accumulator covers while unscrewing the bolts in a criss-cross pattern.

2. *Remove the accumulator springs.*



3. Remove the three bolts attaching the lock-up shift valve body.
4. Remove the oil pipes (5 x 168 mm and 8 x 136 mm) by removing the lock-up shift valve body in the direction of arrow.
5. Remove the 1st, 3rd and 4th clutch pipes.



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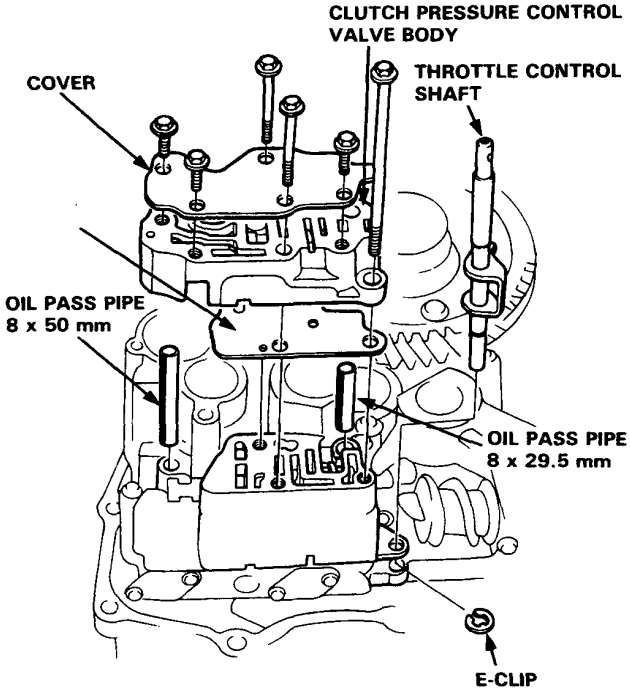
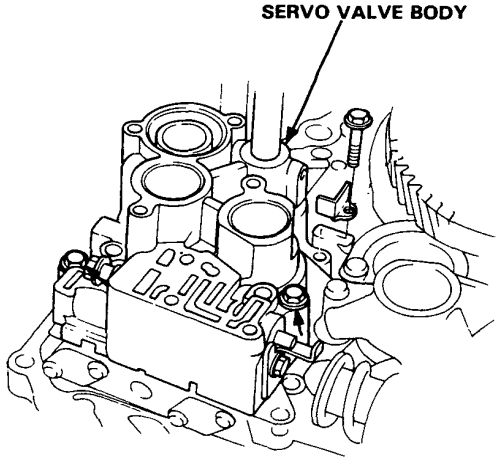
Servo Valve Body Removal (cont'd)

6. Remove the clutch pressure control valve body.
7. Remove the oil pass pipes (8 x 29.5 mm and 8 x 50 mm).
8. Remove the E-clip from the throttle control shaft, then remove the throttle control shaft.

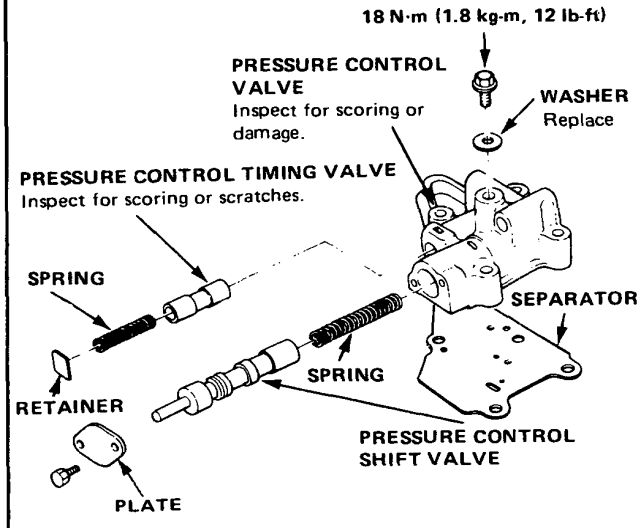


9. Remove the servo valve body (3 bolts) and stopper cap for check valve.



Pressure control valve Disassembly/Inspection

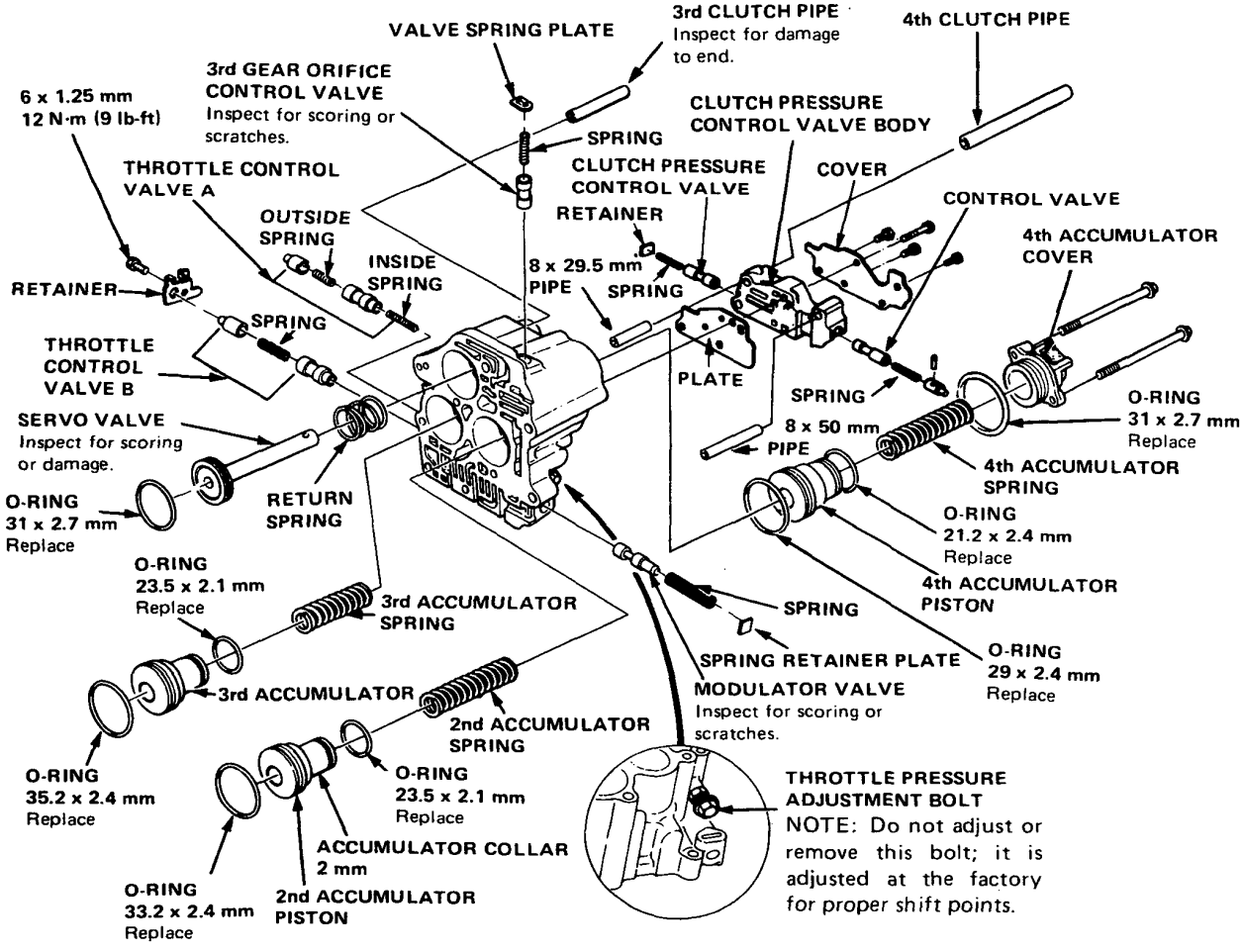
- Clean all parts thoroughly in carburetor cleaner, and dry with compressed air. Blow out all passages.



Servo Disassembly/Inspection/Reassembly

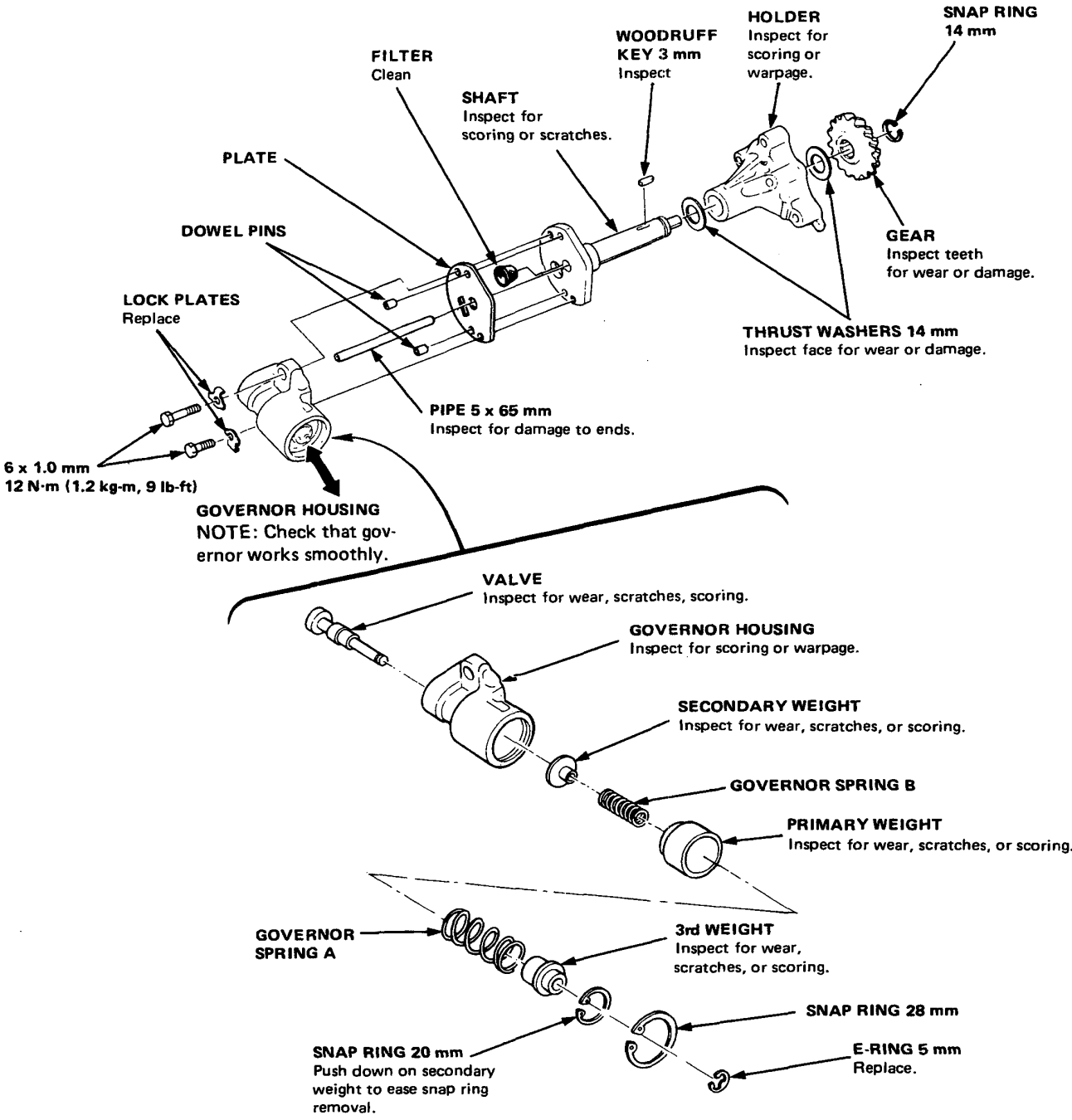
- Clean all parts thoroughly in solvent or carburetor cleaner, and dry with compressed air. Blow out all passages.
- Check all valves for free movement.

Servo valve return spring.
Standard: 40.3 mm (1.59 in.)
Service Limit: 36.7 mm (1.44 in.)
2nd Accumulator spring.
Standard: 81.2 mm (3.20 in.)
Service Limit: 80.0 mm (3.15 in.)
3rd Accumulator spring.
Standard: 88.1 mm (3.47 in.)
Service Limit: 86.5 mm (3.41 in.)
4th Accumulator spring.
Standard: 96.4 mm (3.80 in.)
Service Limit: 94.4 mm (3.72 in.)



Governor Disassembly/Inspection/Reassembly

- 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.

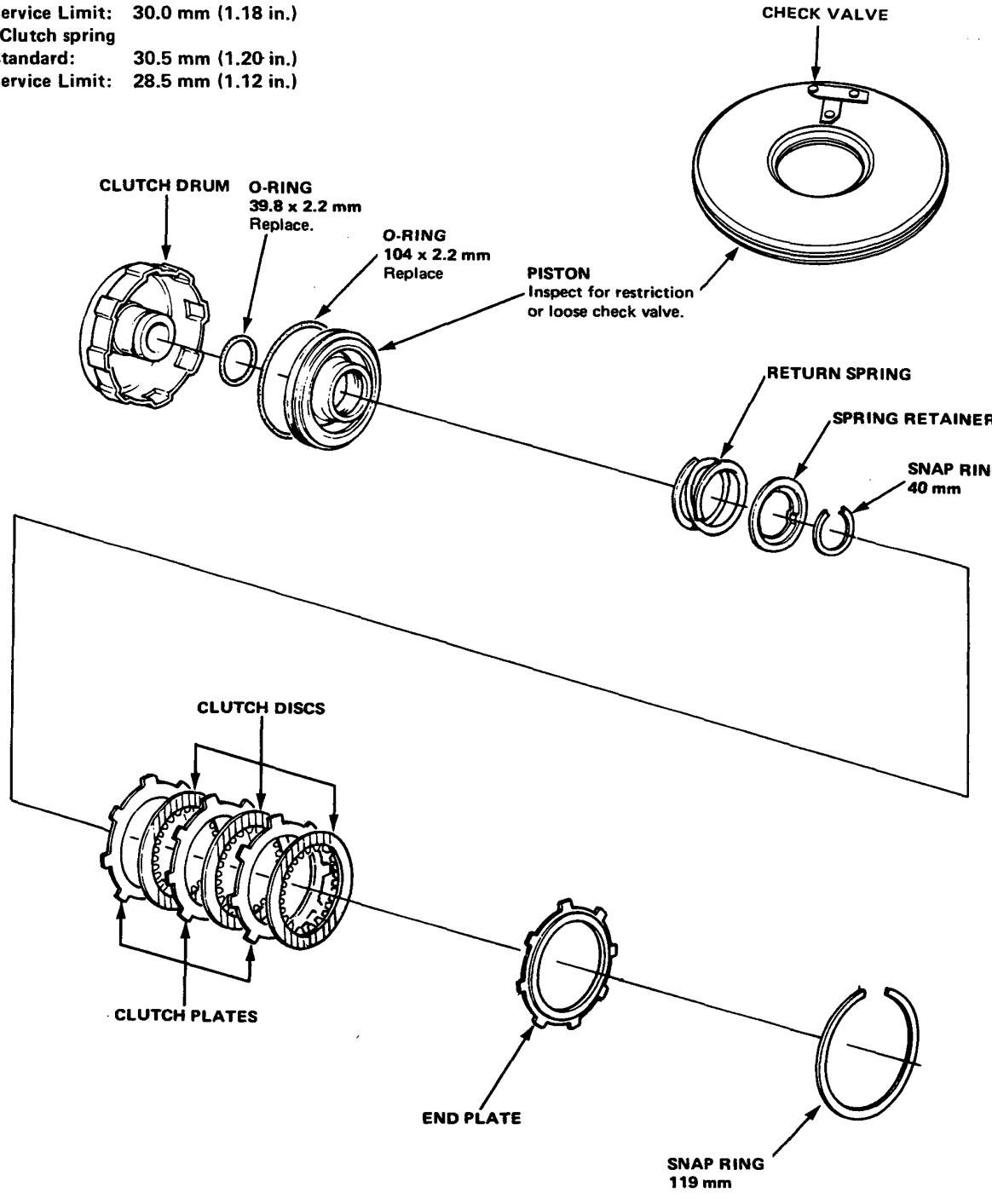


Clutch Disassembly/Inspection

1st and 3rd Clutches

1st Clutch spring
- Standard: 32.0 mm (1.26 in.)
- Service Limit: 30.0 mm (1.18 in.)

3rd Clutch spring
- Standard: 30.5 mm (1.20 in.)
- Service Limit: 28.5 mm (1.12 in.)



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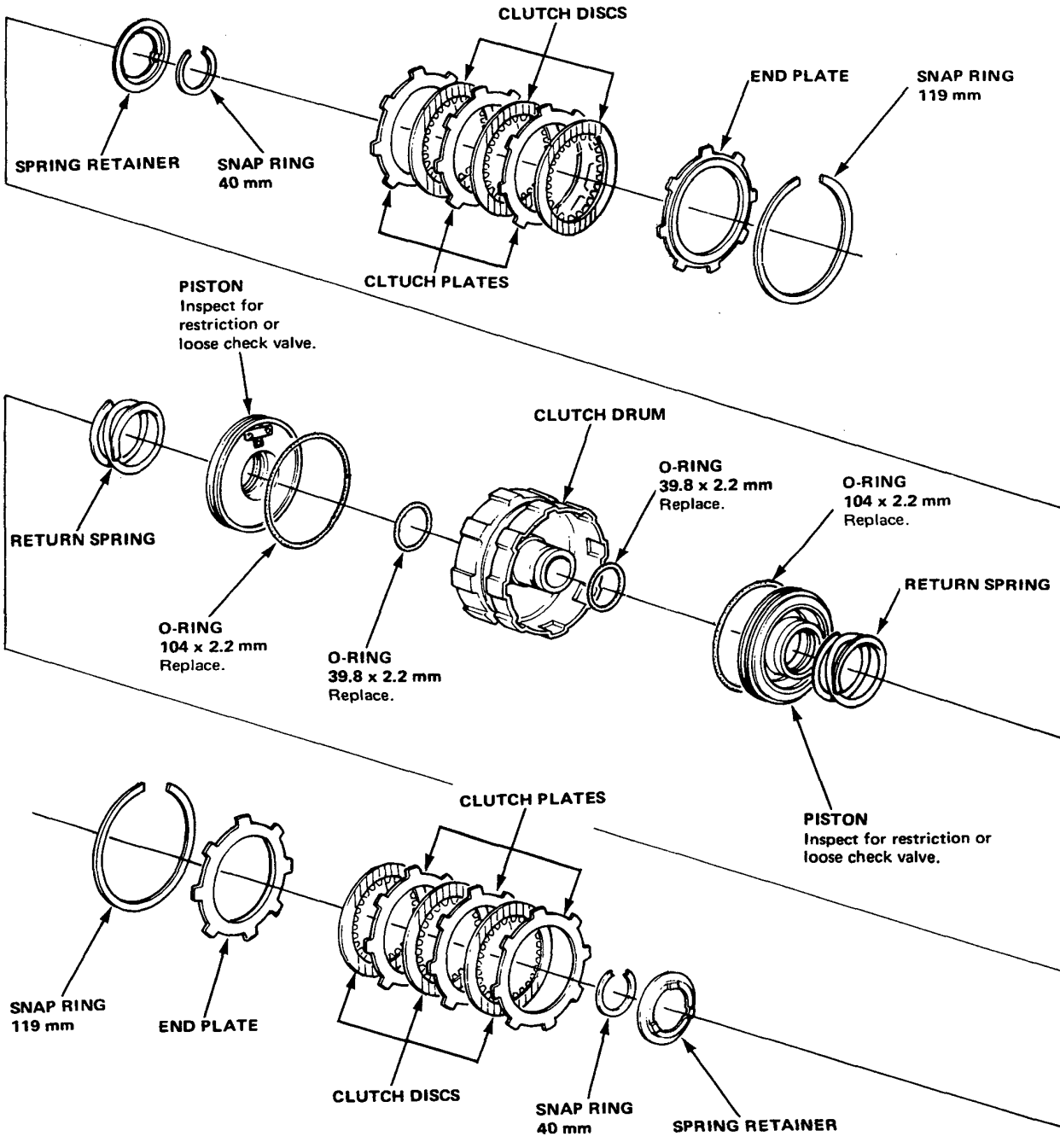
Clutch Disassembly/Inspection (cont'd)

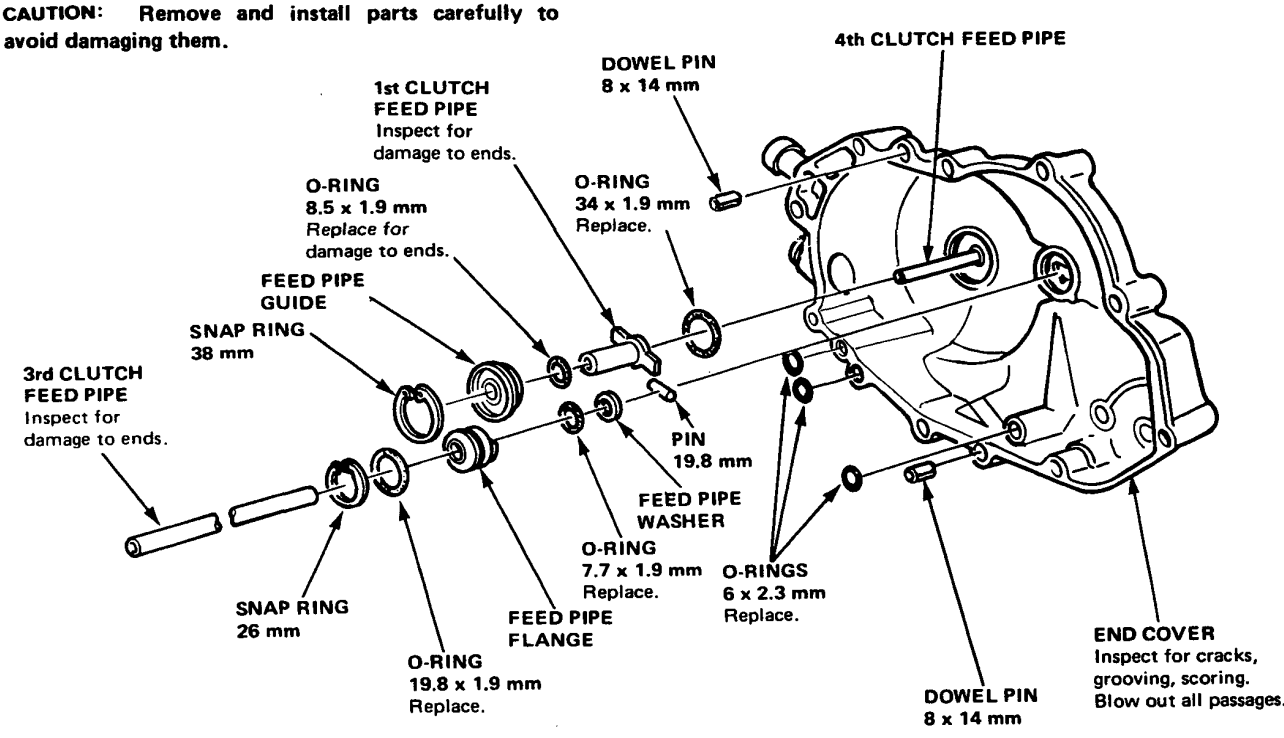
2nd/4th Clutch

2nd and 4th Clutch springs
Standard: 30.5 mm (1.20 in.)
Service Limit: 28.5 mm (1.12 in.)



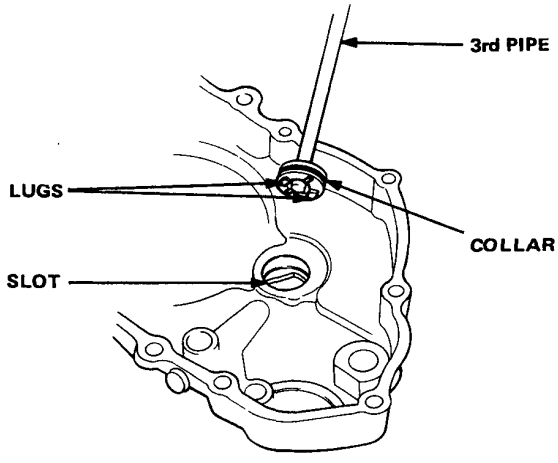
End Cover Disassembly/Inspection

CAUTION: Remove and install parts carefully to avoid damaging them.



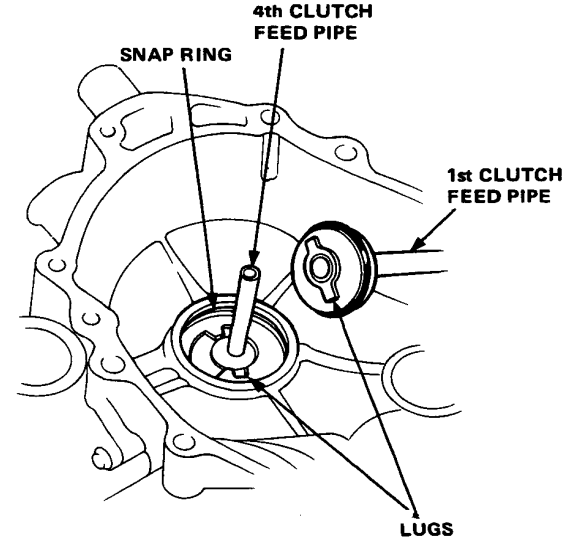
End Cover Reassembly

1. With feed pipes assembled, align lugs on the collars with slot in end cover.



2. Install the snap ring.

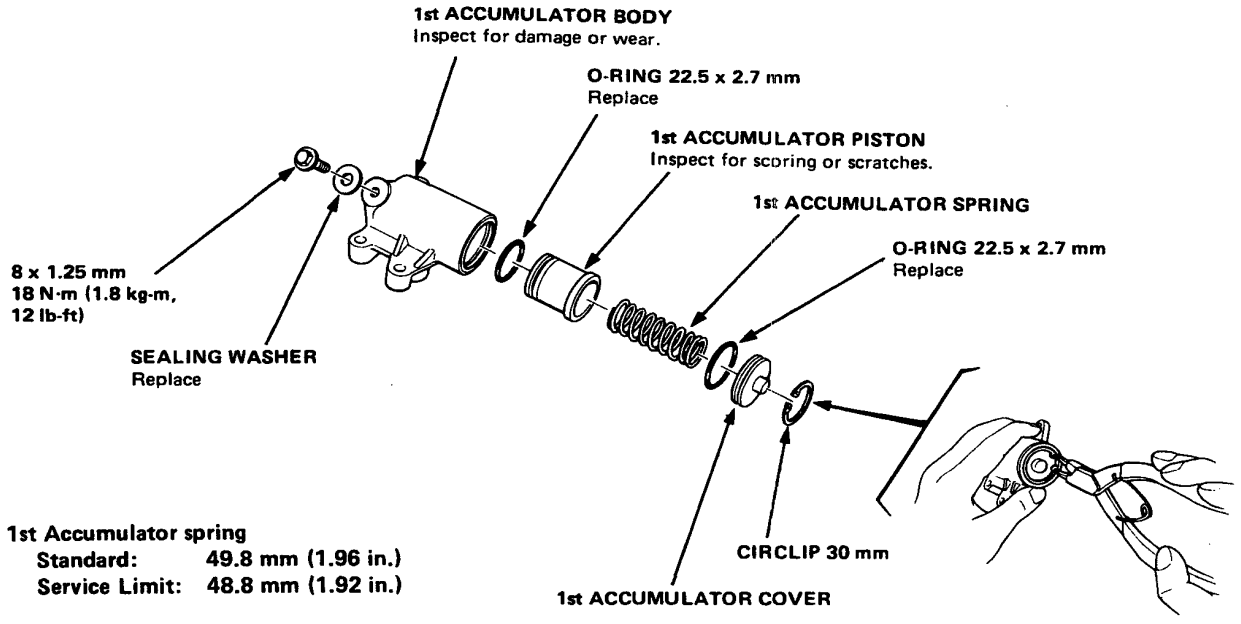
3. Install the feed pipes in the end cover, aligning the lugs of the 1st clutch feed pipe with the grooves of the end cover.



4. Install the snap ring.

1st Accumulator Disassembly/Inspection

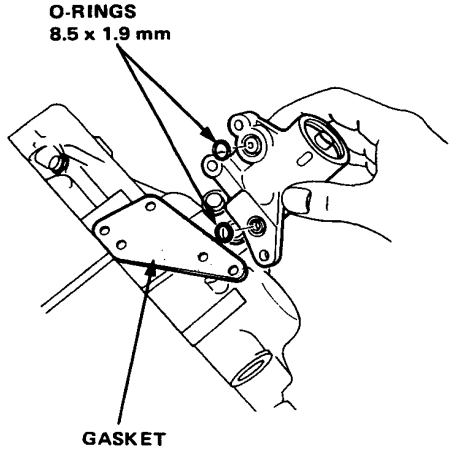
NOTE: 1st accumulator assembly can be removed with the engine installed.



1st Accumulator spring
Standard: 49.8 mm (1.96 in.)
Service Limit: 48.8 mm (1.92 in.)

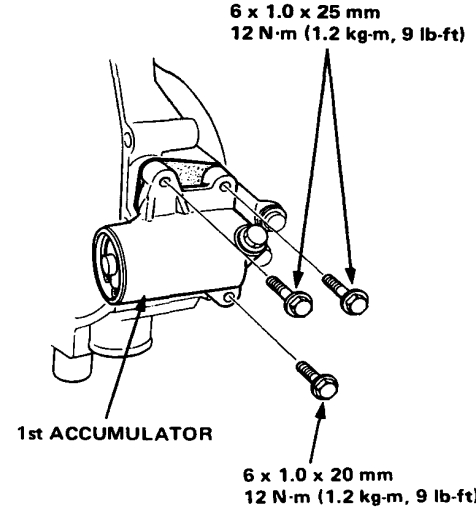
1st Accumulator Installation

1. Place a new gasket onto the end cover.
2. Set new O-rings (8.5 x 1.9 mm) onto the 1st accumulator body.



3. Install the 1st accumulator onto the end cover, then tighten the 6 mm bolts.

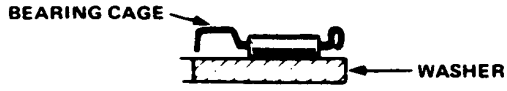
NOTE: Make sure that the gasket and O-rings are in place.



Countershaft/Mainshaft Clearance Measurements

1. Remove both the mainshaft and countershaft bearings from the transmission housing.
2. Assemble the mainshaft and the countershaft including bearings and all parts shown below.

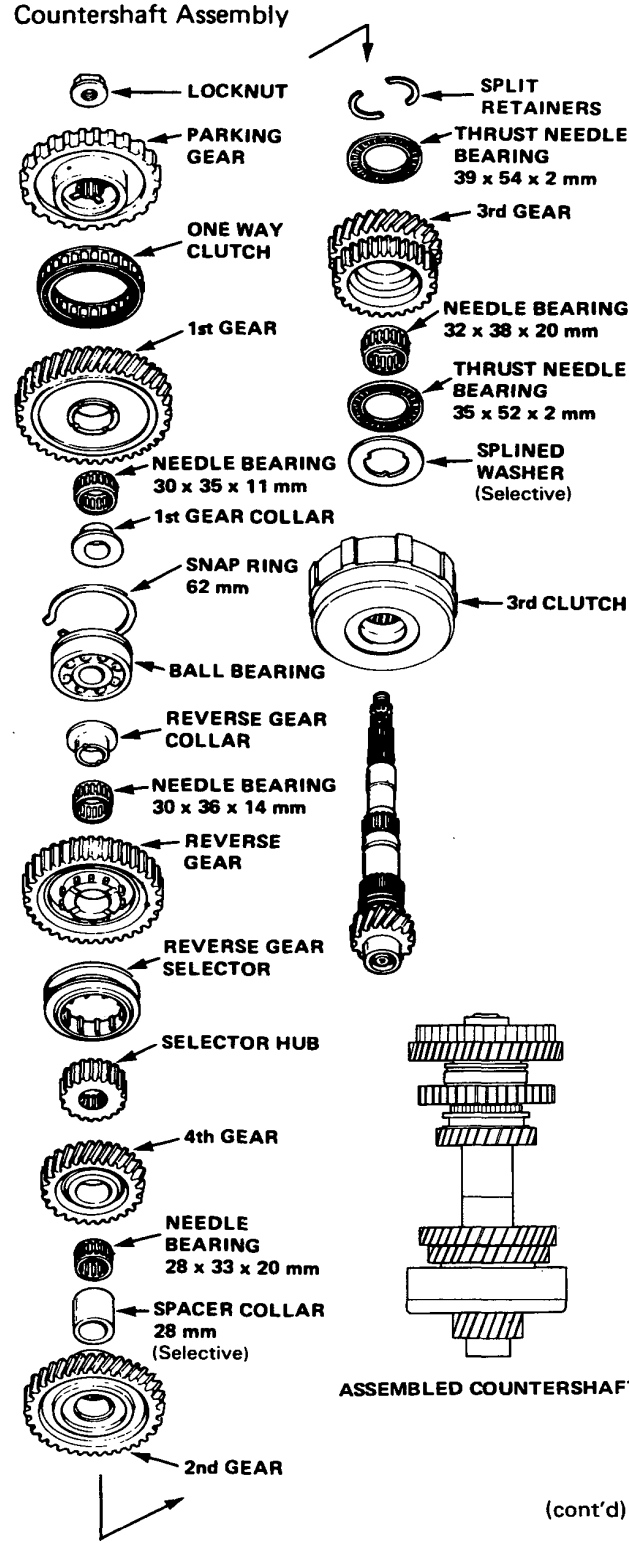
   NOTE: On all thrust needle bearings, the unrolled edge of the bearing cage faces the thrust washer.



3. Install the mainshaft and countershaft assemblies into the torque converter housing.
4. Install the mainshaft holder to prevent the shafts from turning.
5. Torque the mainshaft locknut to 35 N·m (3.5 kg-m, 25 lb-ft). (Left hand threads.)
6. Hold the parking gear on the countershaft with your hand and torque the countershaft locknut to 35 N·m (3.5 kg-m, 25 lb-ft).
7. Measure clearances as described on the next page.

ATF Lubricate all parts with ATF before final re-assembly.

Countershaft Assembly



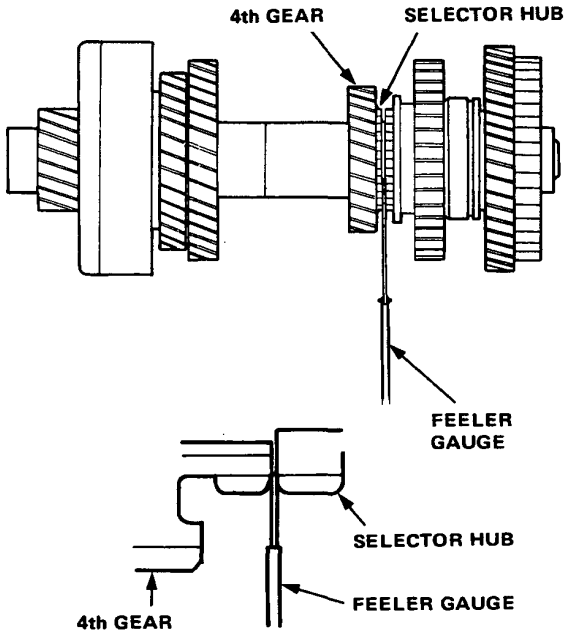
ASSEMBLED COUNTERSHAFT

(cont'd)

Countershaft/Mainshaft Clearance Measurements (cont'd)

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

Countershaft 4th Gear Clearance:
Standard: 0.07–0.15 mm (0.003–0.006 in.)



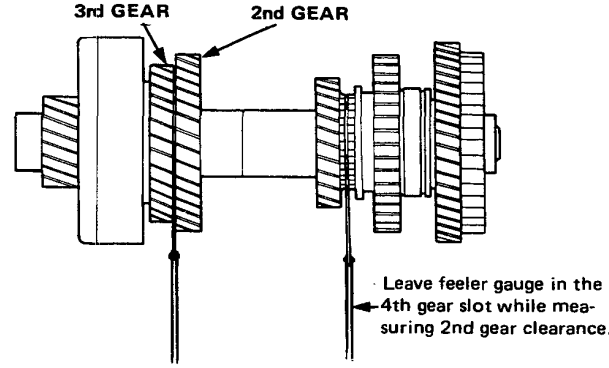
If clearance exceeds the service limit, measure the thickness of the spacer collar and select one which gives correct clearance.
Replacement spacer collars:

CLASS	P/N	THICKNESS
A	90503–PC9–000	38.97–39.00 mm (1.534–1.535 in.)
B	90508–PC9–000	39.02–39.05 mm (1.536–1.537 in.)
C	90504–PC9–000	39.07–39.10 mm (1.538–1.539 in.)
D	90509–PC9–000	39.12–39.15 mm (1.540–1.541 in.)
E	90505–PC9–000	39.17–39.20 mm (1.542–1.543 in.)
F	90510–PC9–000	39.22–39.25 mm (1.544–1.545 in.)
G	90507–PC9–000	39.27–39.30 mm (1.546–1.547 in.)

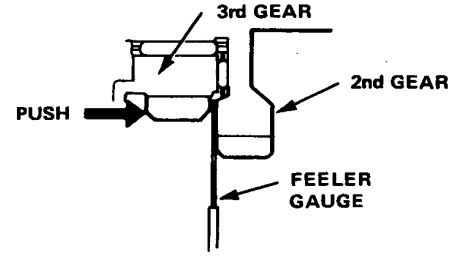
NOTE: Leave feeler gauge in place (4th gear) while measuring 2nd gear clearance.

Countershaft 2nd Gear Clearance:
Standard: 0.07–0.15 mm (0.003–0.006 in.)

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



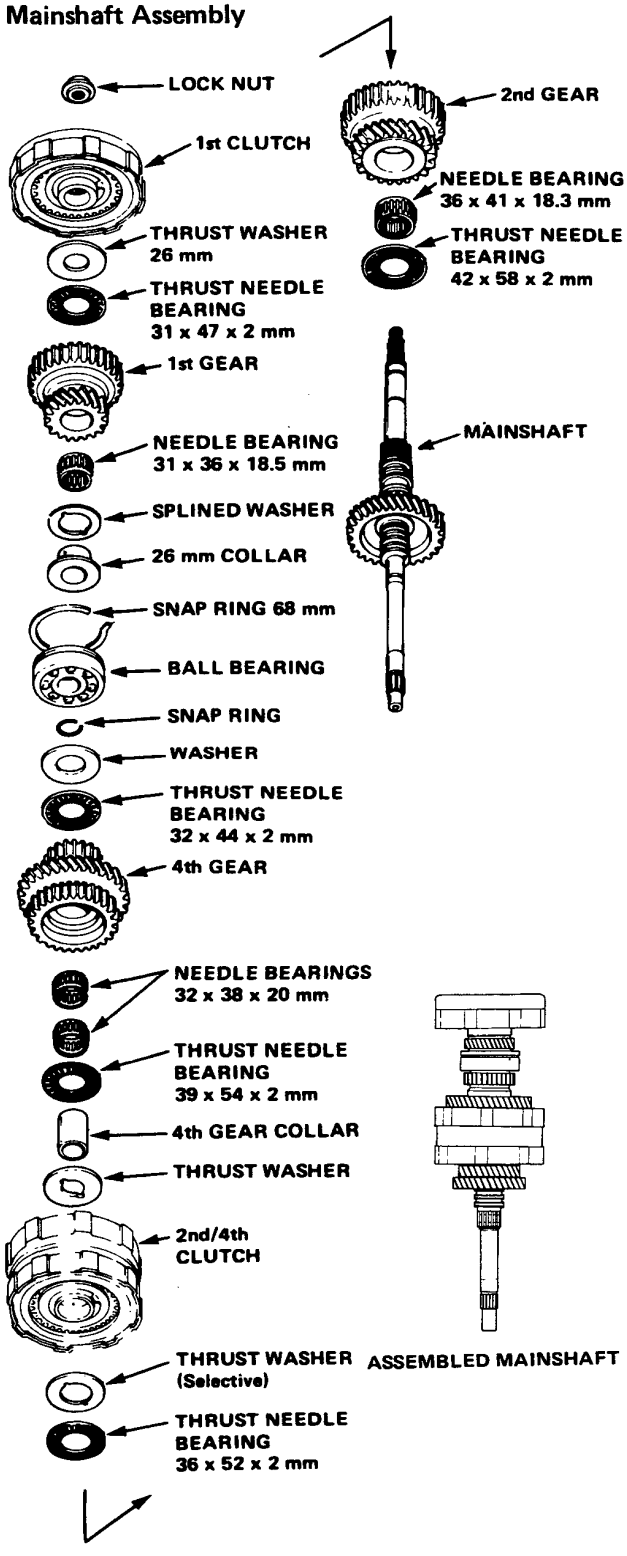
- Slide the 3rd gear in fully and again measure the clearance between the 2nd and 3rd gears with another feeler gauge.
- Calculate the difference between the two readings to determine the actual clearance between the two gears.



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

CLASS	P/N	THICKNESS
A	90411–PA9–010	2.97–3.00 mm (0.117–0.118 in.)
B	90412–PA9–010	3.02–3.05 mm (0.119–0.120 in.)
C	90413–PA9–010	3.07–3.10 mm (0.121–0.122 in.)
D	90414–PA9–010	3.12–3.15 mm (0.123–0.124 in.)
E	90415–PA9–010	3.17–3.20 mm (0.125–0.126 in.)
F	90418–PA9–000	3.22–3.25 mm (0.127–0.128 in.)
G	90419–PA9–000	3.27–3.30 mm (0.129–0.130 in.)
H	90420–PA9–000	3.32–3.35 mm (0.131–0.132 in.)
I	90421–PA9–000	3.37–3.40 mm (0.133–0.134 in.)

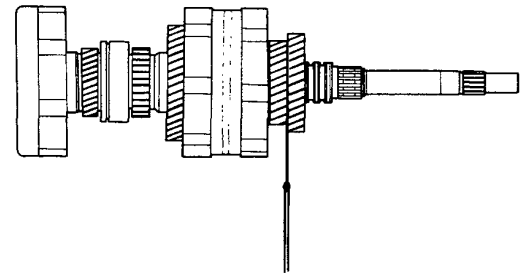
Mainshaft Assembly



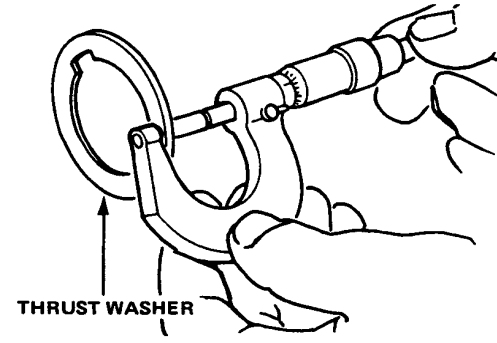
NOTE: Make all measurements before changing the thrust washers. Recheck after making the adjustments.

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

Mainshaft 2nd Gear Clearance:
Standard (New): 0.07–0.15 mm (0.003–0.006 in.)



If the clearance exceeds the service limit, measure the thickness of the 2nd clutch thrust washer (36 mm I.D.) and select one which gives the correct clearance.



Replacement washer (36 mm I.D.)

CLASS	P/N	THICKNESS
A	90441–PC9–000	3.47–3.50 mm (0.137–0.138 in.)
B	90442–PC9–000	3.52–3.55 mm (0.139–0.140 in.)
C	90443–PC9–000	3.57–3.60 mm (0.141–0.142 in.)
D	90444–PC9–000	3.62–3.65 mm (0.143–0.144 in.)
E	90445–PC9–000	3.67–3.70 mm (0.145–0.146 in.)
F	90446–PC9–000	3.72–3.75 mm (0.147–0.148 in.)
G	90447–PC9–000	3.77–3.80 mm (0.149–0.150 in.)
H	90448–PC9–000	3.82–3.85 mm (0.151–0.152 in.)
I	90449–PC9–000	3.87–3.90 mm (0.153–0.154 in.)

Reverse Idler Gear Installation

1. Assemble the idler bearing holder.

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

2. Install the reverse idler gear.

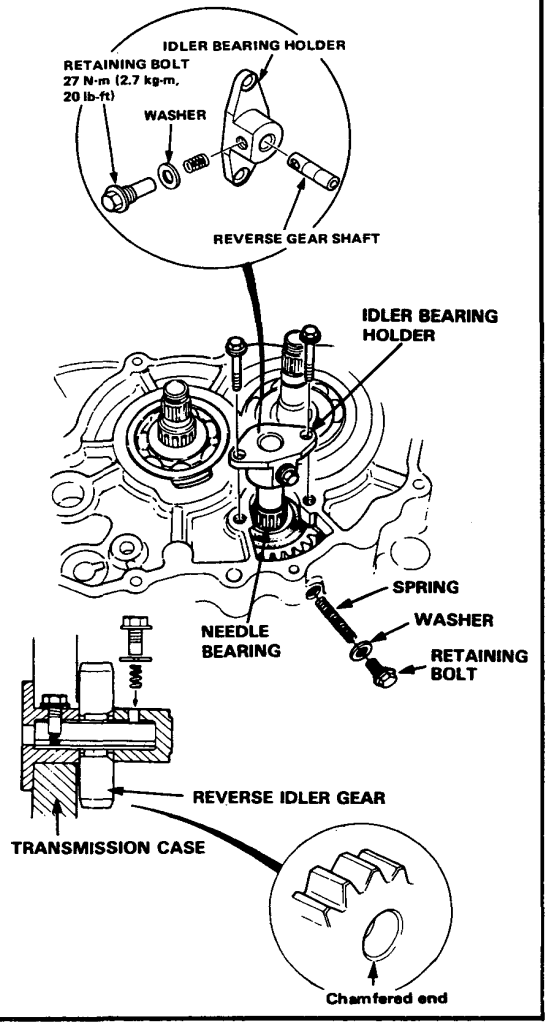
   NOTE: Install the reverse idler gear so that the larger chamfer on the shaft bore faces the torque converter housing.

3. Install the needle bearing into the idler gear.

4. Install the idler bearing holder into the transmission housing.

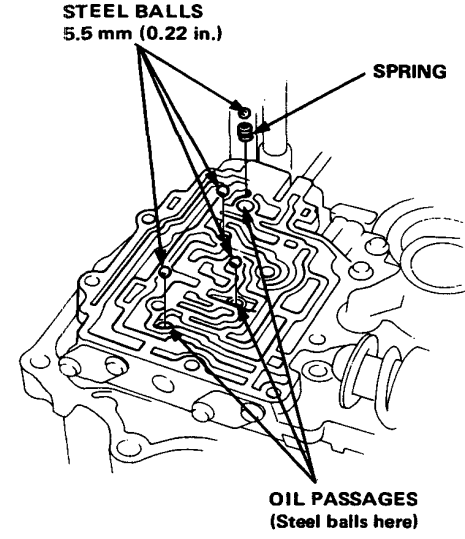
5. Tighten the reverse idler bearing holder bolts.

6. Install the spring and then tighten the retaining bolt with sealed washer.



Main Valve Body Installation

NOTE: The ball for the top oil passage may use a spring to press the ball against the separator plate.



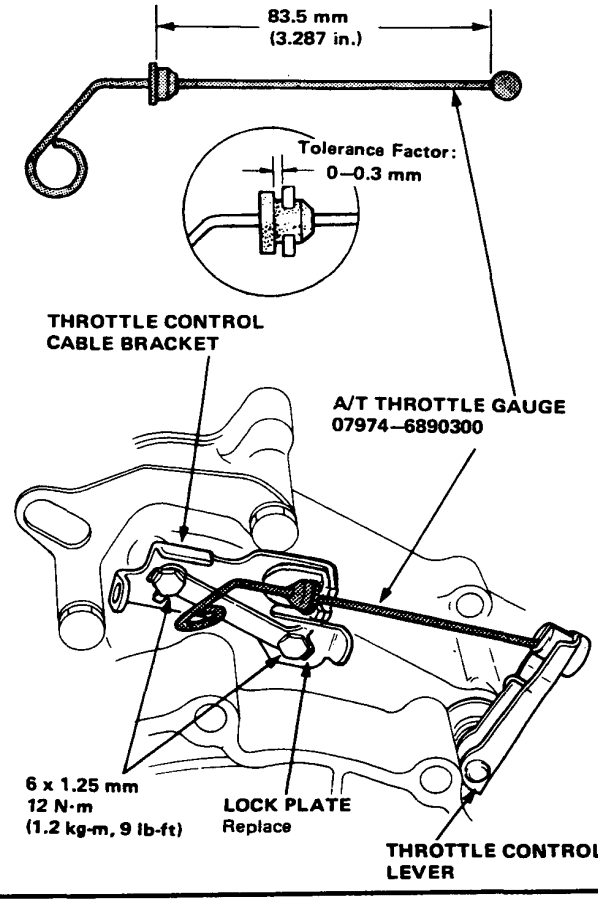
Throttle Control Cable Bracket Adjustment

1. Disconnect the throttle control cable from the throttle control lever.
2. Bend down the lock tabs of the lock plate and remove the two 6 mm bolts to free the bracket.
3. Loosely install a new lock plate.
4. Position the special tool between the throttle control lever and the bracket as shown.

   NOTE: The special tool is designed so that the distance between the lever and the bracket is 83.5 mm (3.287 in.) when it is installed.

5. Position the bracket so that there is no binding between the bracket and the special tool (tolerance 0 to +0.3 mm).
   Then tighten the two 6 mm bolts, bend up the lock plate tabs against the bolts heads.

   CAUTION: Make sure the control lever doesn't get pulled toward the bracket side as you tighten the bolts.



Throttle Control Cable Adjustment/Inspection

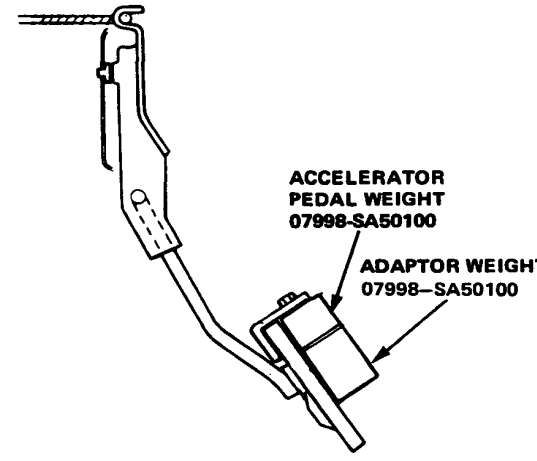
NOTE: Perform the following inspections before adjusting the throttle control calbe.

- The carburetor throttle cable play is correct.
- The engine is warmed-up to operating temperature.

  NOTE: The cooling fan should come on twice or more.

- The idle speed is correct.
  750 ± 50 rpm
- The distance between the throttle control lever and the throttle control bracket is correct.
  See Left column.

1. With the engine off, disconnect the throttle control cable from the throttle control lever.
2. Attach a weight of about 1.5 kg (3 lbs) to the accelerator pedal. Raise the pedal, then release it, this will allow the weight to remove the normal free play from the throttle cable.

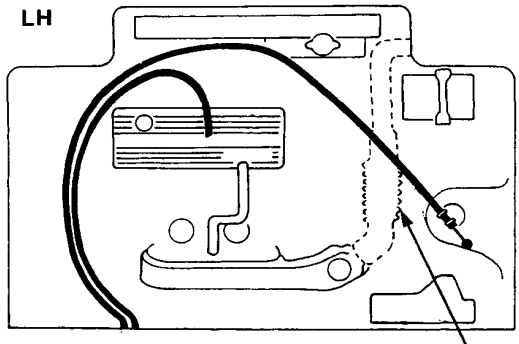


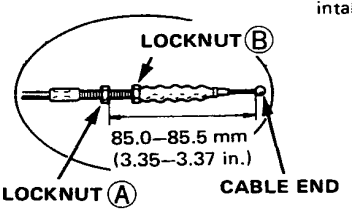
(cont'd)

Throttle Control Cable Adjustment/Inspection (cont'd)

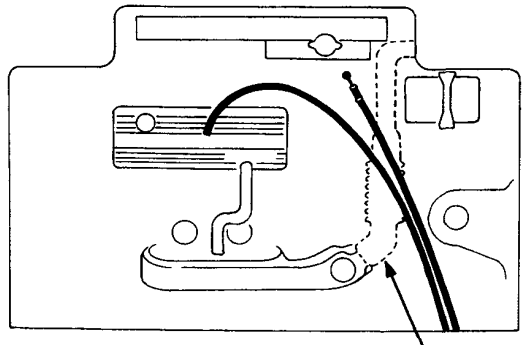
3. Secure the throttle control cable with clamps as shown.

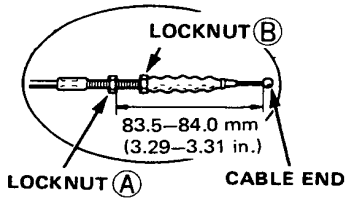
LH





R/H

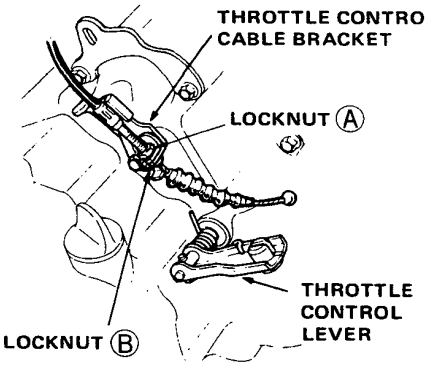




4. L/H: Lay the end of the throttle control cable to the dash board.
   R/H: Lay end of the throttle control cable to the radiator cap.

5. Adjust the distance between the throttle control cable end and nut (A) to specified length see above.

6. Insert the end of throttle control cable in the groove of the throttle control lever.

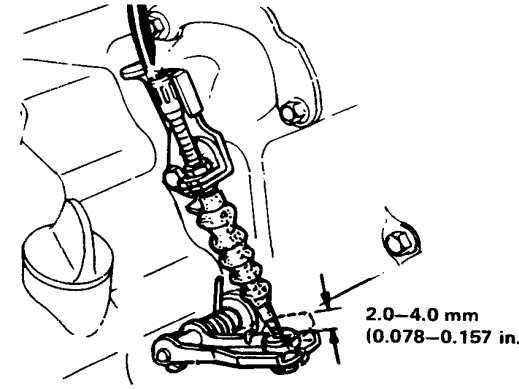


7. Insert the throttle control cable in the bracket and secure with locknut (B).

   NOTE: Make sure the cable is not kinked or twisted.

8. Check that the cable moves freely by depressing the accelerator.

9. Remove the weight on the accelerator pedal and push the pedal to make sure that there is the specified play at the throttle control lever.



10. Start the engine and check the synchronization between the carburetor and the throttle control cable.

    NOTE: The throttle control lever should start to move as engine speed increases.

    - If the throttle control lever moves before engine speed increases, turn the cable locknut A counter clockwise and tighten locknut B.
    - If the throttle control lever moves after engine speed increases, turn locknut A clockwise and tighten the locknut B.

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 carburetor to make sure throttle lever is fully opened.
- Release accelerator pedal and check both inner control cables to be sure they have slight play.

Warm up 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 brake pedal. Depress the accelerator pedal, and release it suddenly. Engine should not stall.
2. Check that shift points occur at approximate speeds shown. Also check for abnormal noise and clutch slippage.

- **Upshift**

		1st → 2nd	2nd → 3rd	3rd → 4th	LC. ON
Full-throttle Acceleration from a stop	Km/h	58–65	96–103	148–156	149–155
	Mil/h	35–40	59–65	92–98	93–98
Half-throttle Acceleration from a stop	Km/h	27–33	56–63	79–89	83–90
	Mil/h	18–22	38–44	57–64	59–65
Closed-throttle Coasting down-hill from a stop	Km/h	19–23	35–40	41–48	49–54
	Mil/h	11–14	22–25	25–31	31–34

- **Downshift**

		4th → 3rd	3rd → 2nd	2nd → 1st
Full-throttle When car is slowed by increased grade, wind, etc.	Km/h	133–142	85–94	37–45
	Mil/h	83–89	53–58	23–28
Closed-throttle Coasting or braking to a stop	Km/h	–	28–34	8–13
	Mil/h		18–21	5–8

3. Accelerate to about 35 mph so transmission is in 4th, then shift from [D4] to [2]. The car should immediately begin slowing down from engine braking.

CAUTION: Do not shift from [D4] or [D3] to [2] at speeds over 60 mph; you may damage the transmission.

[2] (2nd Gear)

1. Accelerate from a stop at full throttle. Check that there is no abnormal noise or clutch slippage.
2. Upshifts and downshifts should not occur with the selector in this range.

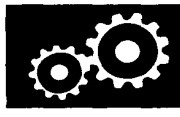
[R] (Reverse)

Accelerate from a stop at full throttle, and check for abnormal noise and clutch slippage.

[P] (Park)

Park car on a slope (approx. 16°), apply the parking brake, and shift into Park. Then release the brake; the car should not move.

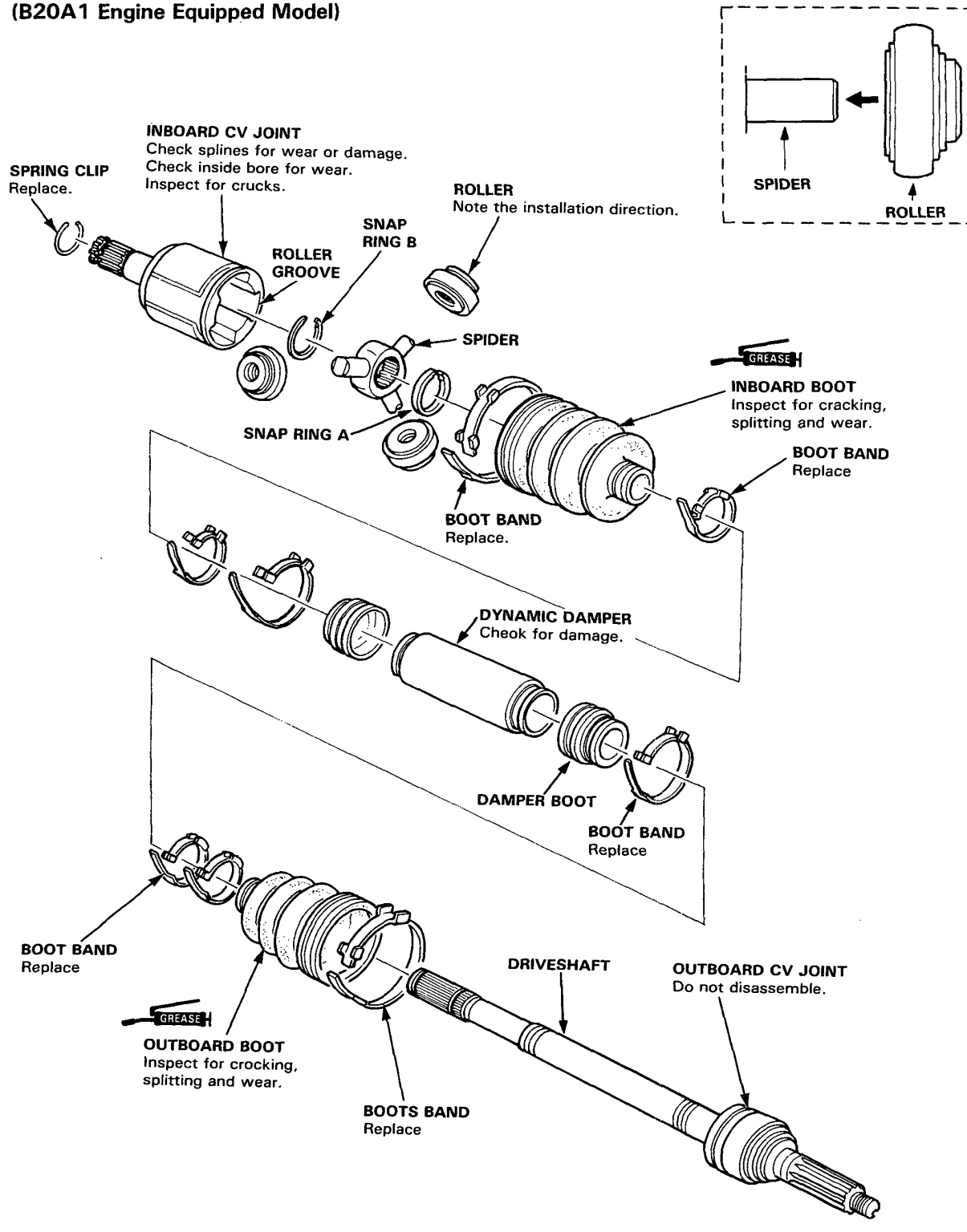
Driveshafts
(B20A1 Engine Equipped Model)



Driveshafts

Disassembly/Inspection

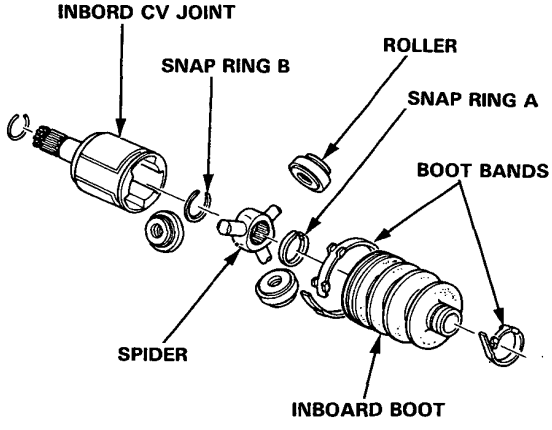
(B20A1 Engine Equipped Model)



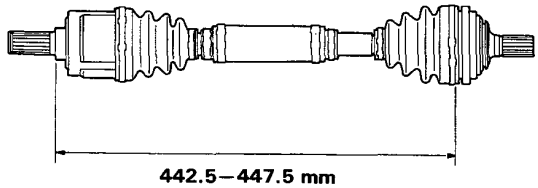
Reassembly/Installation

1. Install the outboard boot, dynamic damper boots, dynamic damper and inboard boot over the driveshaft.
2. Install the snap ring A on the driveshaft.
3. Install the spider on the driveshaft and secure with the snap ring B.
4. Install the rollers on the spider with its high shoulder face towards outside.
5. Thoroughly pack the inboard and outboard joints and joint boots with high quality molybdenum disulfide grease.
6. Install the driveshaft to the inboard CV joint.

   NOTE: Install the rollers and spider in the original position of the inboard CV joint groove.

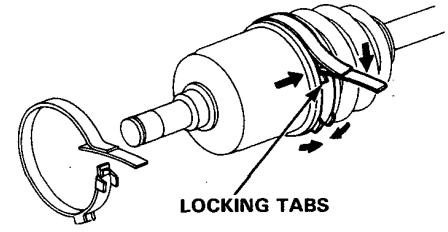


7. Adjust the length of the driveshaft to the figures below, then adjust the boots to halfway between full compression and full extension.



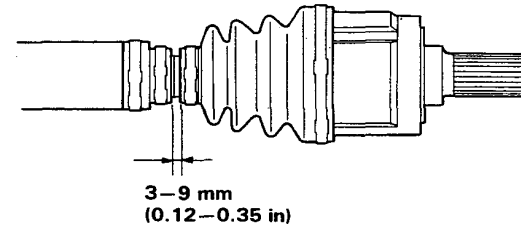
8. Install the new boot bands on the boots.
9. Bent both sets of the locking tabs and lightly tap on the doubled-over portions to reduce their height.

   CAUTION: Do not strike the boot.



10. Position the dynamic damper as shown and secure with new boot bands.
11. Bent both sets of the locking tabs and lightly tap on the double-over portions to reduce their height.

    CAUTION: Do not strike the boot.

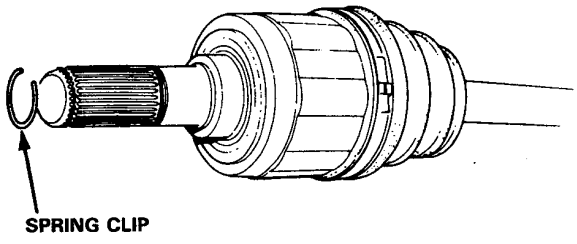


(cont'd)

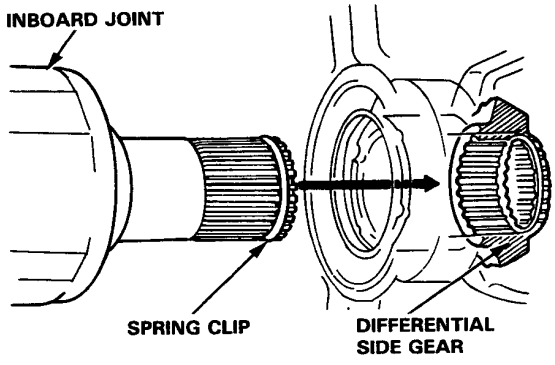
Reassembly/Installation (cont'd)

12. Install the spring clip in the groove in the inboard joint.

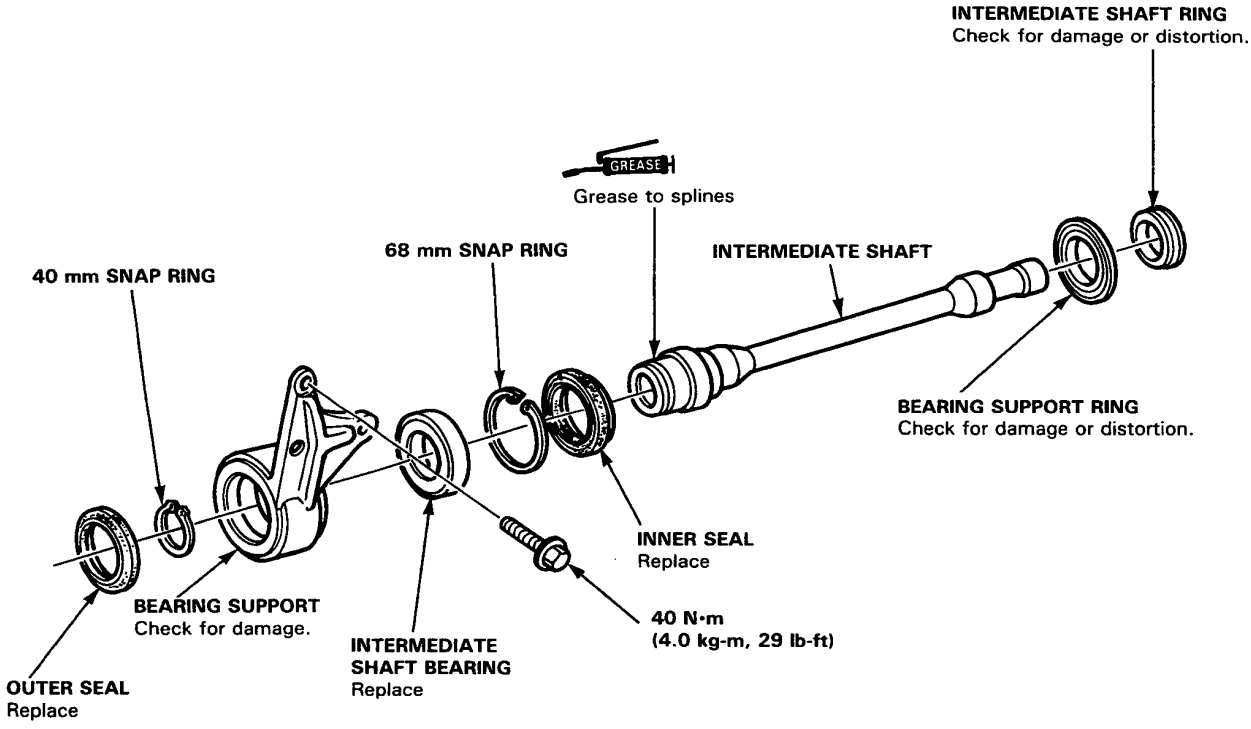
    NOTE: Replace the spring clip with a new one whenever the driveshaft is removed.



13. Insert the driveshaft into the intermodiate shaft or differential until the spring clip locks in the intermediate shaft or differential side gear groove.



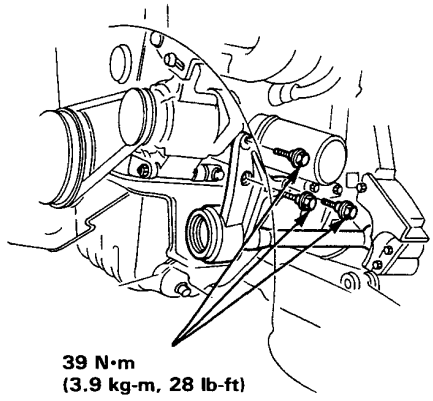
Inspection


INTERMEDIATE SHAFT RING
Check for damage or distortion.
GREASE
Grease to splines
68 mm SNAP RING
INTERMEDIATE SHAFT
40 mm SNAP RING
BEARING SUPPORT RING
Check for damage or distortion.
INNER SEAL
Replace
BEARING SUPPORT
Check for damage.
40 N·m
(4.0 kg-m, 29 lb-ft)
INTERMEDIATE
SHAFT BEARING
Replace
OUTER SEAL
Replace

Intermediate Shaft

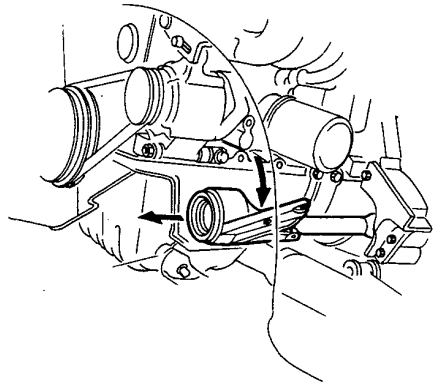
Replacement

1. Drain the transmission oil.
2. Remove the three 10 mm bearing support mounting bolts.



3. Lower the bearing support close to the steering gear box and remove the intermediate shaft from the differential.

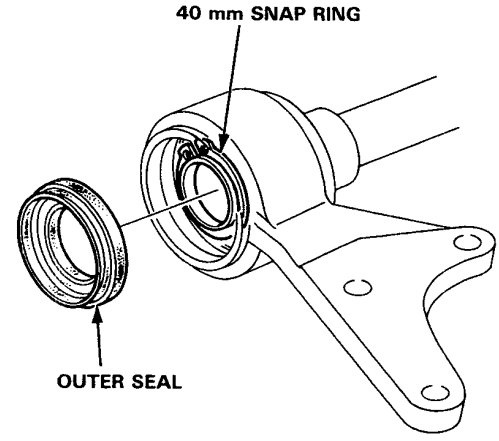
   CAUTION: To prevent damage to the differential oil seal, hold the intermediate shaft horizontal until it is clear of the differential.



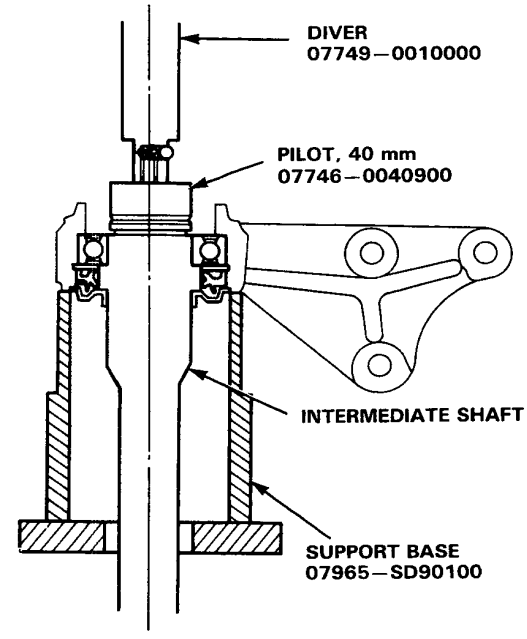
4. Install the intermediate shaft in the reverse order of removal.

Disassembly

1. Remove the intermediate shaft outer seal.
2. Remove the 40 mm snap ring.

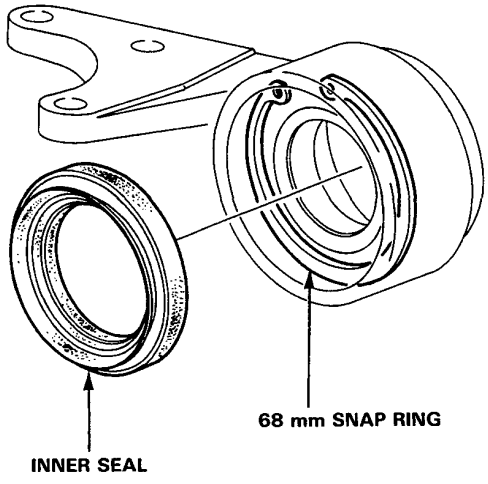


3. Press the intermediate shaft out of the bearing support using the special tools and hydraulic press.

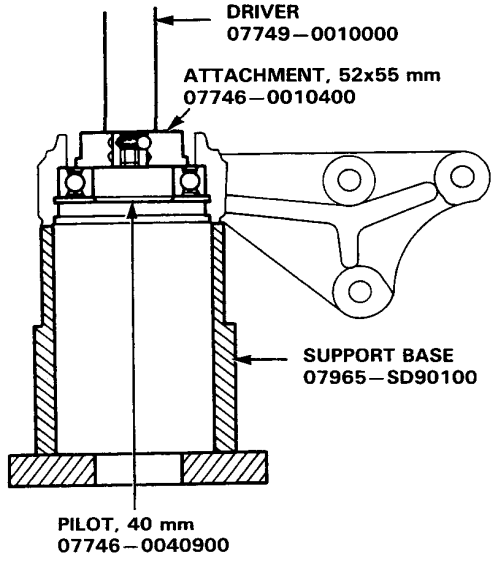


4. Remove the intermediate shaft inner seal.

5. Remove the 68 mm snap ring.

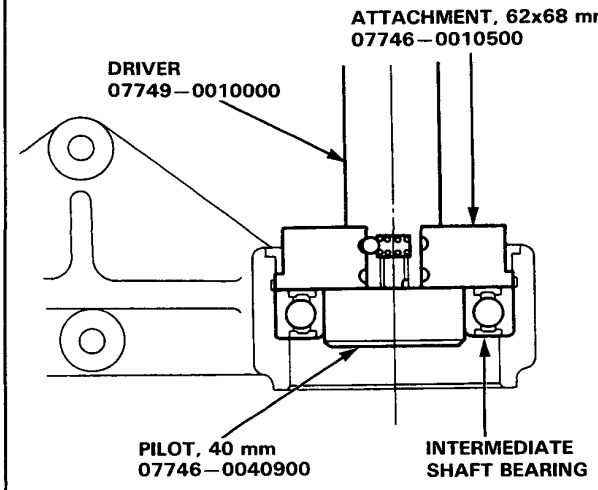


6. Remove the intermediate shaft bearing out of the bearing support using the special tools and hydraulic press as shown.



Reassembly

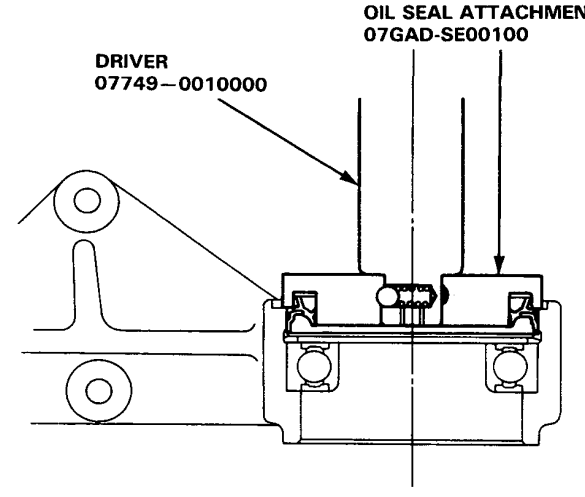
1. Press the intermediate shaft bearing into the bearing support using the special tool and hydraulic press as shown.



2. Install the 68 mm snap ring in the groove in the bearing support.

   CAUTION: Install the snap ring with its tapered end facing out.

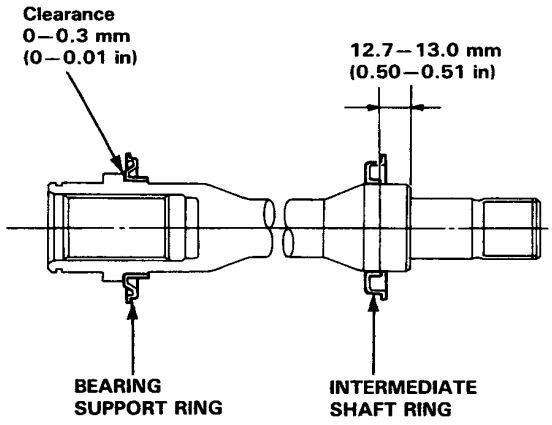
3. Press the intermediate shaft inner seal into the bearing support using the special tool as shown.



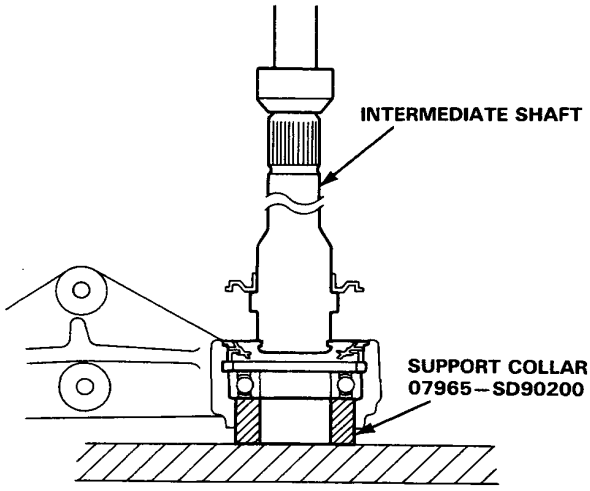
(cont'd)

Reassembly (cont'd)

4. Install the intermediate shaft ring and bearing support ring on the intermediate shaft and position them as shown using a soft hammer.



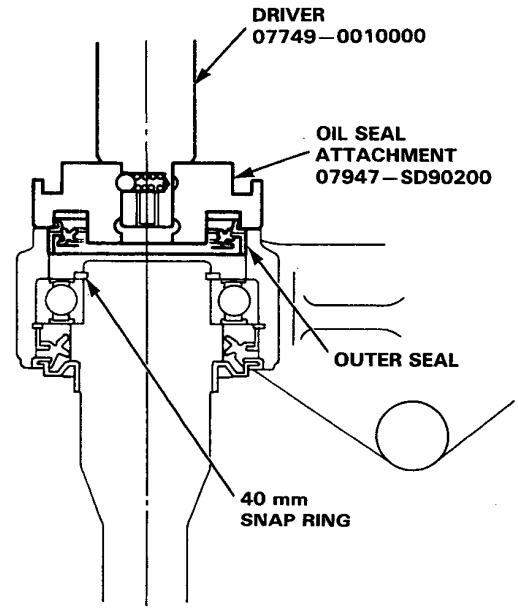
5. Press the intermediate shaft into the bearing support using the special tool and hydraulic press as shown.



6. Install the 40 mm snap ring in the groove in the sitermediate shaft.

CAUTION: Install the snap ring with its tapered end facing out.

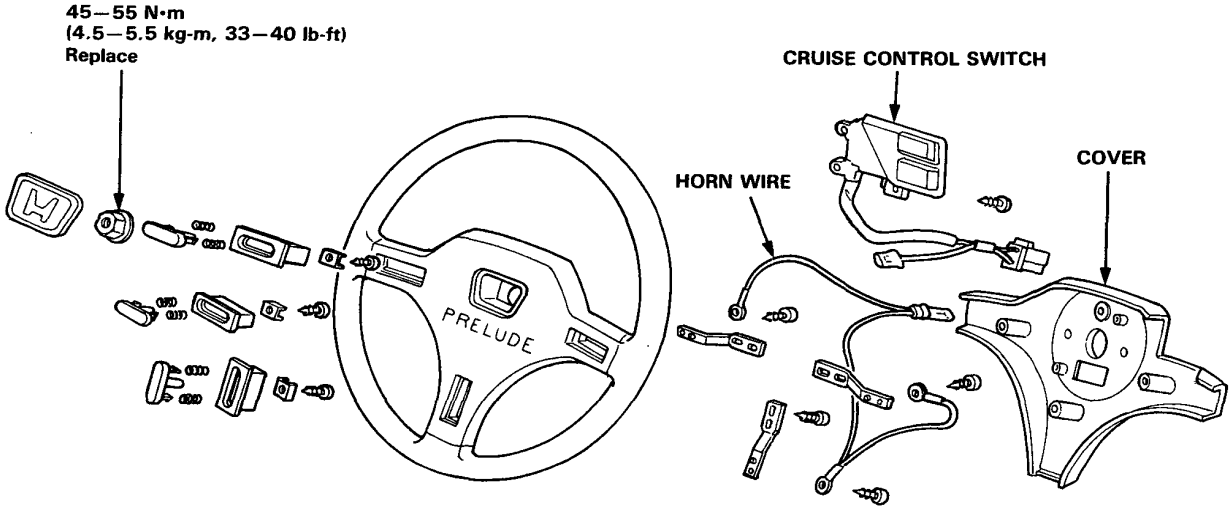
7. Press the intermediate shaft outer seal into the bearing support using the special tools as shown.



Manual Steering

Steering Wheel

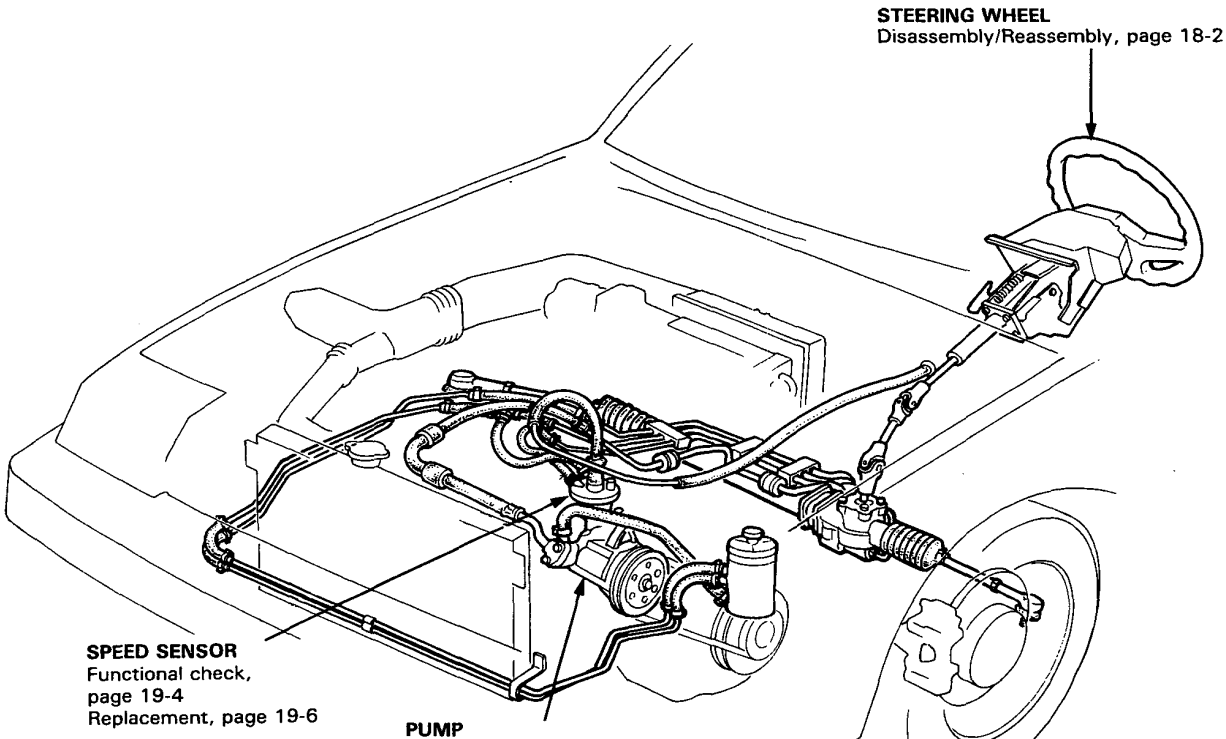
Disassembly/Reassembly



Power steering

Power Steering

Index

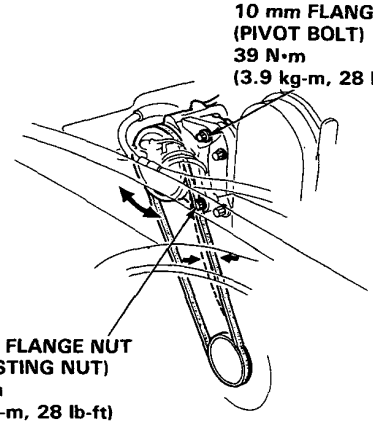


Pump Belt Adjustment

(ET and A20A4 Engine Equipped Model)

A properly adjusted belt should deflect about 18-22 mm (3/4—7/8 in.) when you push on it mid-way between the pulleys with a force of about 100 N (10 kg, 22 lbs).

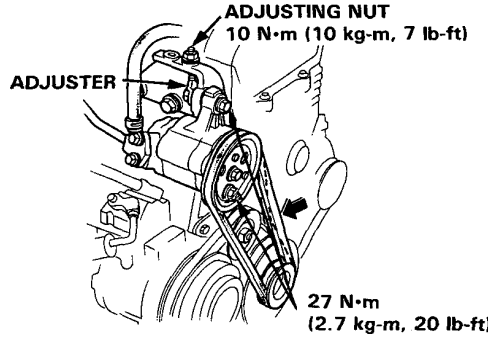
1. Loosen the pump adjusting nut, and pivot bolt.
2. Pry the pump away from the engine to get the proper tension, then retighten the adjusting nut, and pivot bolt.



(B20A1 Engine Equipped Model)

A properly adjusted belt should deflect about 18—22 mm (3/4—7/8 in) when you push on it mid-way between the pulleys with a force of about 100N (10kg, 22 lbs).

1. Loosen the two 8 mm flange bolt nut and adjusting nut.
2. Adjust the pump belt tension by turning the adjusting nut.
3. Retighten the two 8 mm bolt and nut, then recheck the belt tension.
4. Tighten the adjusting nut.

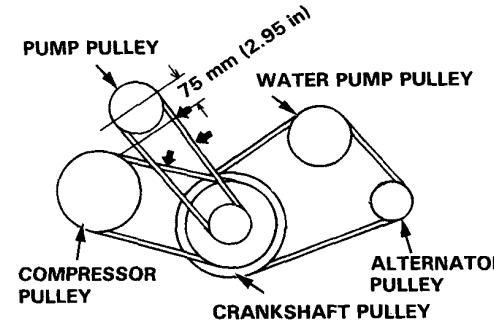


On-Car Check

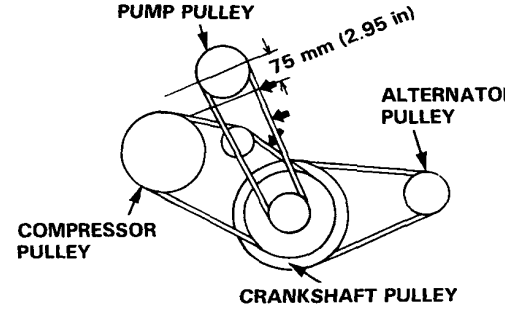
Measure the pump belt tension by pushing on it 75 mm (2.95 in) from the center of the pump pulley with a force of about 100 N (10 kg, 22 lbs).

Pump belt should deflect about 14—17 mm (0.55—0.67 in).

(ET and A20A4 Engine Equipped Model)



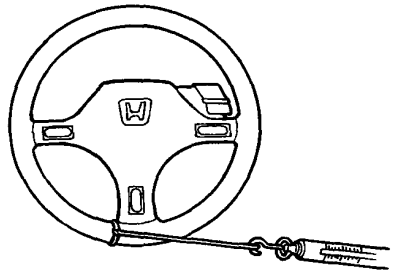
(B20A1 Engine Equipped Model)



On-Car Checks

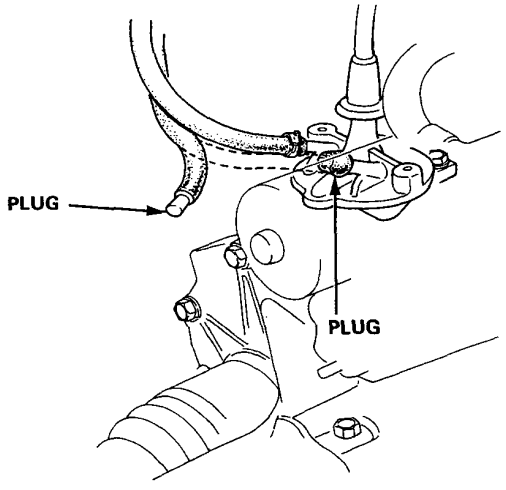
Assist Check with Car Parked

1. Check the power steering fluid level and pump belt tension.
2. Start the engine, allow to idle, and turn the steering wheel from lock-to-lock several times to warm up the fluid.
3. Attach a spring scale to the steering wheel. With the engine idling and the car on a clean, dry floor, pull the scale as shown and read it as soon as the tires begin to turn.



The scale should read no more than 18 N (1.8 kg, 4 lbs). If it reads more, go on step 4.

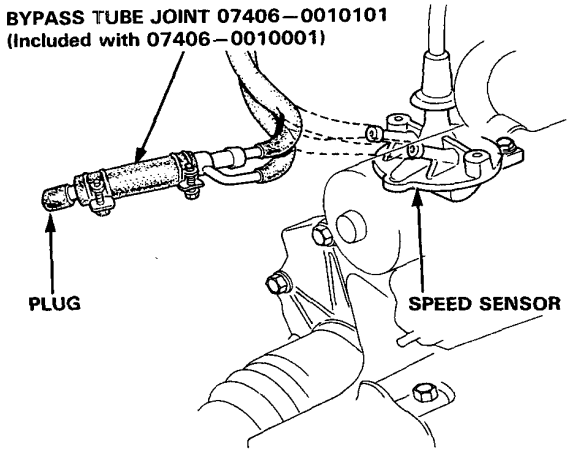
4. Stop the engine. Disconnect the speed sensor hose from the speed sensor and plug both hose and the sensor fitting as shown.



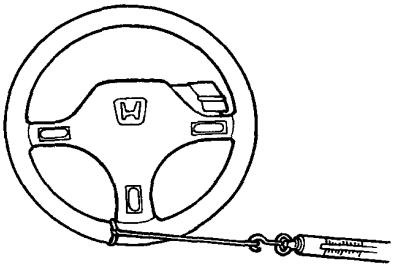
5. Start the engine and let it idle.
   - If the reading is now 18 N (1.8 kg, 4 lbs) or less, replace the speed sensor, see page 19-7.
   - If the reading is still more than 18 N (1.8 kg, 4 lbs) check the gearbox and pump.

Assist Check, Simulated 50 km/h (30 mph)

1. Check the power steering fluid level and pump belt tension.
2. Start the engine, let it warm up to normal temperature, and turn the steering wheel lock-to-lock a few times to warm up the fluid.
3. Stop the engine. To simulate speeds above 50 km/h (30 mph), disconnect the hoses from the speed sensor and connect them to the bypass Tube Joint.



4. Attach the spring scale to the steering wheel. With the engine idling and the car on a clean, dry floor, pull the scale as shown read it as soon as the tires begin to turn.



- If the scale reads a normal 50 N (5.0 kg, 11 lbs), or more, the assist at high speeds is being caused by reduced speed sensor output. Replace the sensor.
- If the scale reads less than 50 N (5.0 kg, 11 lbs), the sensor is OK, and the problem is in the sensor feed line, the pump, or the control unit. See if the feed line is pinched or bent then check pump.

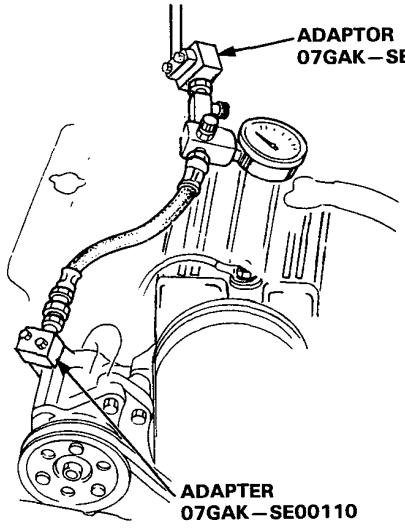
Pump Pressure Check

Check the fluid pressure as follows to determine whether the trouble is in the pump or gearbox.

NOTE: First check the power steering fluid level and pump belt tension.

1. Disconnect the outlet hose from the pump outlet fitting, and install the hose joint adaptor on the outlet hose.
2. Install the pump joint adaptor to the pump outlet.
3. Install the power steering pressure gauge between the hose and pump joint adaptors as shown.

   NOTE: If power steering gauge (07406—0010000) is used, the pressure control valve (07406—0010300) and pressure gauge (07406—0010400) must be installed as shown.



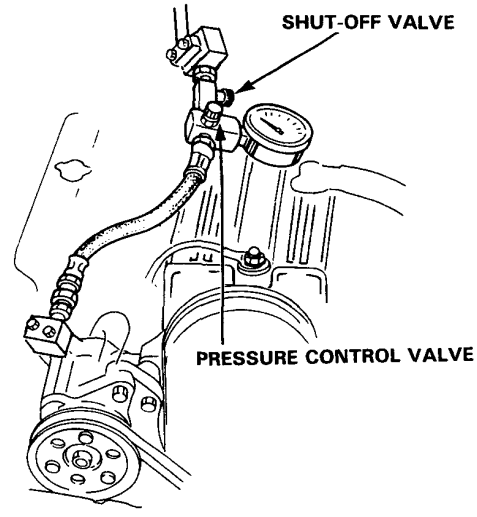
4. Open the shut-off valve fully.
5. Open the pressure control valve fully.
6. Start the engine and let it idle.

   Idle speed: 750 min^{-1} (rpm)

7. Turn the steering wheel from lock-to-lock several times to warm the fluid to operating temperature.
8. Close the shut-off valve, then, close the pressure control valve gradually until the pressur gauge needle is stable. Read pressure.
9. Open the shut-off valve fully.

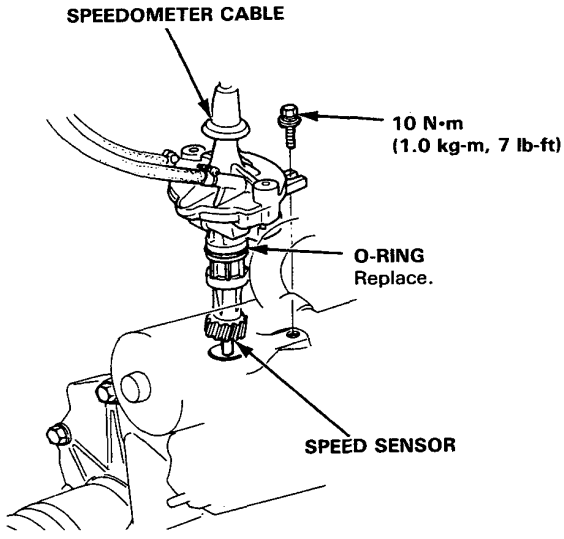
   CAUTION: Do not keep the shut-off valve closed more then 5 seconds or the pump could be damaged by over-heating.

   If the pump is in good condition, the gauge should read at least 7845—8421 kPa (80—90 kg/cm^2, 1137—1280 psi). A low reading means pump output is too low for full assist. Repair or replace the pump.



Speed Sensor Replacement

1. Remove the speed sensor mounting bolt and pull the speed sensor from the transmission housing.



2. Pull up the speedometer cable boot, remove the clip, and pull out the speedometer cable.
3. Disconnect the speed sensor hoses and plug the fittings.
4. After installing a new sensor, turn the steering wheel lock-to-lock with the engine idling to bleed air from the system.
5. Check the reservoir and add fluid if necessary.

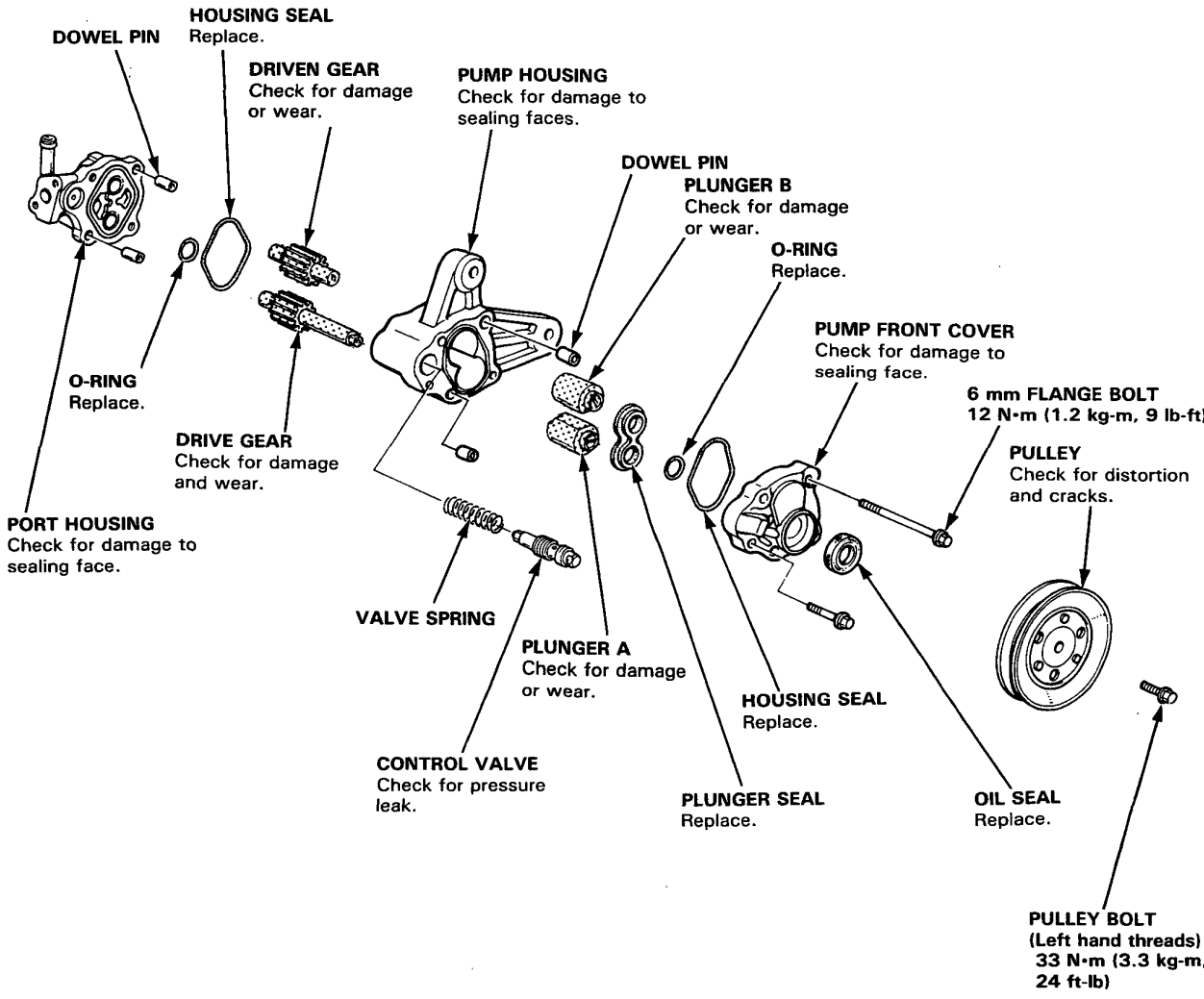
Pump

Inspection

(ET and A20A4 Engine Equipped Model)

CAUTION: Pump components are made of aluminum. Be careful not to damage them when servicing.

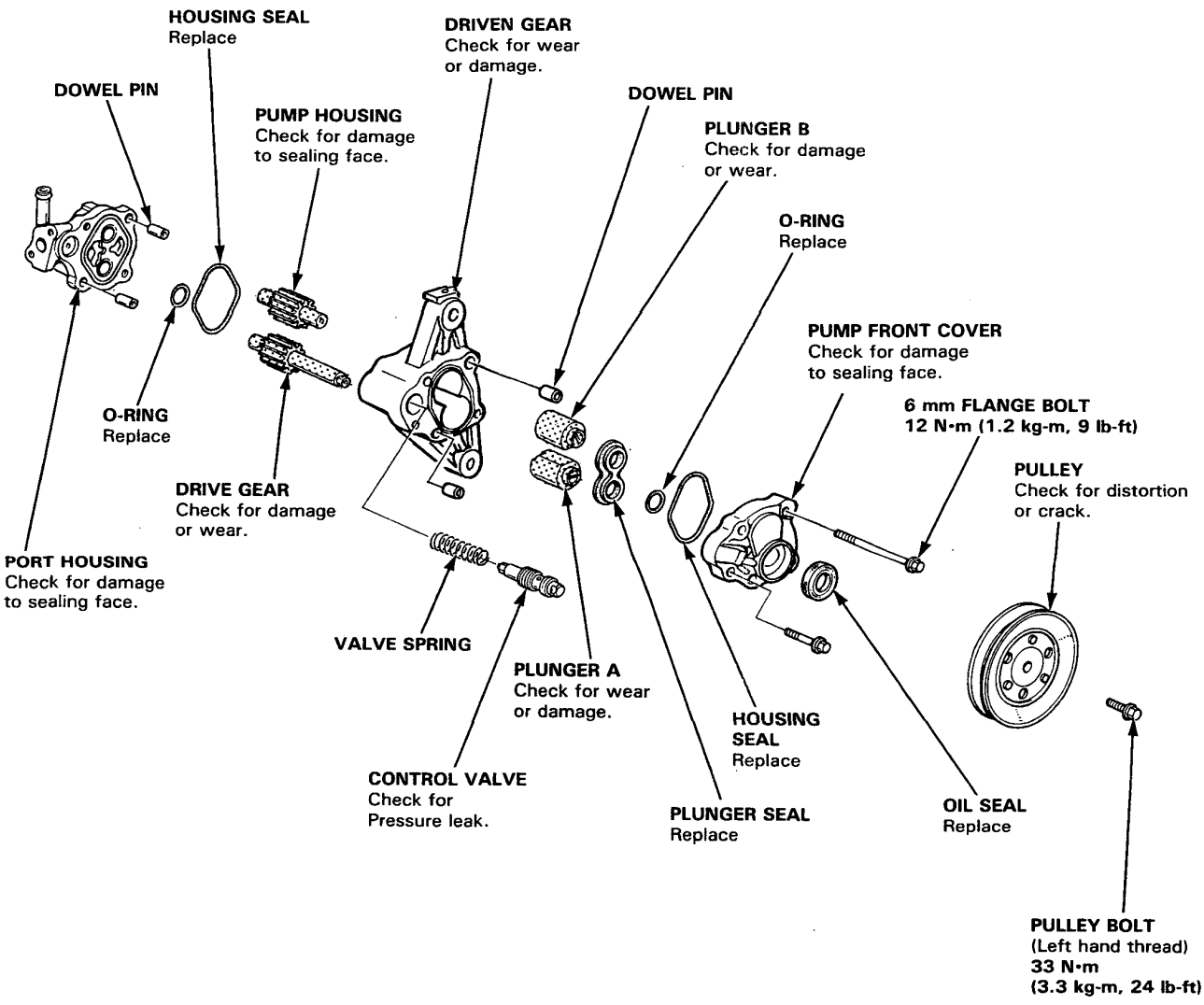
- Clean all the disassembled parts thoroughly.
- Replace all O-rings and seals. Do not dip new O-rings and seals in solvent; coat O-rings with steering grease before installation, and make sure they stay in place during reassembly.
- The shaded parts are selectively fitted, and should not be disassembled except to replace seals. If any one of them is faulty, replace the whole pump as an assembly.



(cont'd)

Inspection (cont'd)

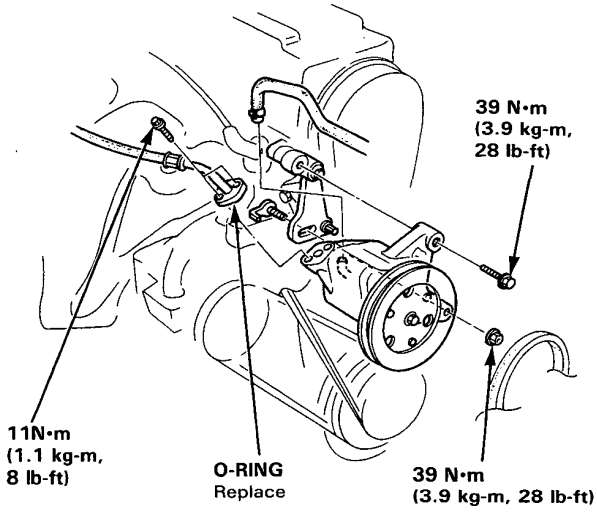
(B20A1 Engine Equipped Model)



Pump Replacement

(ET and A20A4 Engine Equipped Model)

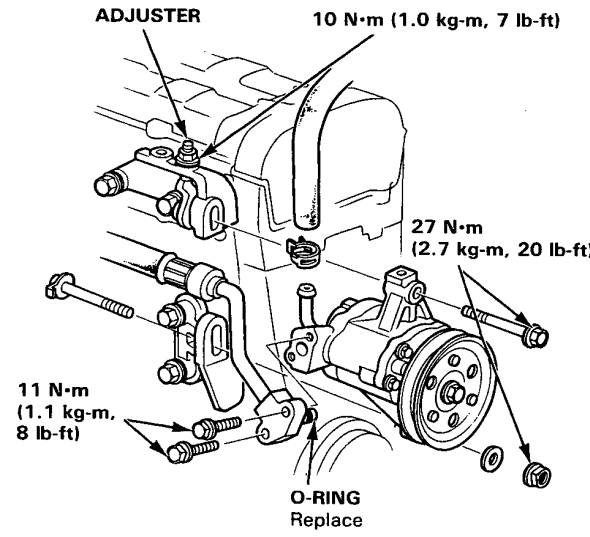
1. Disconnect the pump outlet and inlet hoses and plug the both hose ends.
2. Remove the belt by loosening the pump pivot bolt and adjusting nut, then remove the pump.



3. Loosely install the new pump on the bracket.
4. Connect the inlet and outlet hoses to the pump.
5. Adjust the belt tension (page 19-3).
6. Fill the reservoir with new fluid to the UPPER level on the reservoir.
7. Start the engine and let it run at fast idle while turning the steering wheel lock-to-lock several times to bleed air from the system.
8. Check the reservoir and add fluid if necessary.

(B20A1 Engine Equipped Model)

1. Disconnect the pump outlet and inlet hoses and plug the both hose ends.
2. Remove the belt by removing the two 8 mm flange nuts and loosening the adjuster nut.

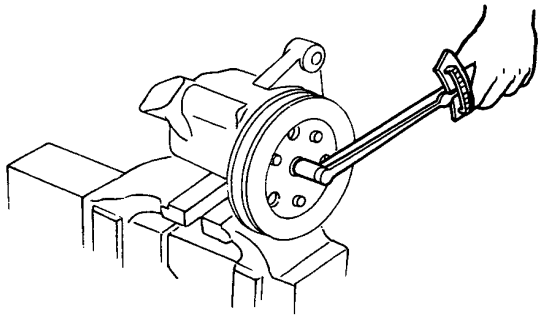


3. Loosely install the pump on the bracket.
4. Connect the inlet and outlet hoses to the pump.
5. Install the pump belt and adjust the belt tension (page 19-3).
6. Fill the reservoir with new fluid to the UPPER level on the reservoir.
7. Start the engine and let it run at fast idle while turning the steering wheel lock-to-lock several times to bleed air from the system.
8. Check the reservoir and add fluid if necessary.

Preload Inspection

Check the pump preload with a torque wrench.

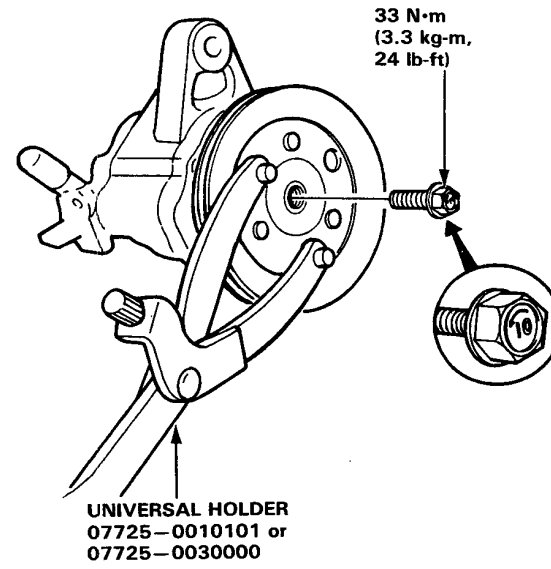
Preload: 4 N·m (0.4 kg-m, 3 lb-ft)



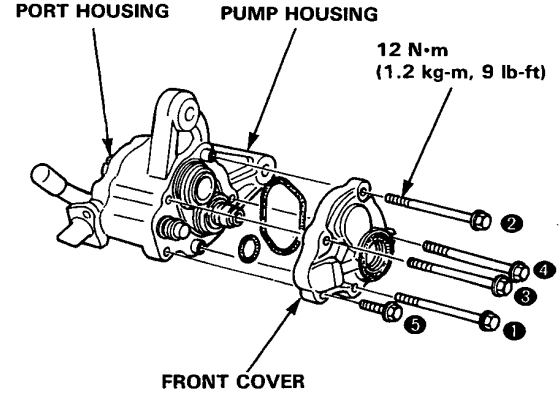
Control Valve Inspection and Replacement

1. Hold the pulley with universal holder, and remove the pulley bolt, then remove the pulley.

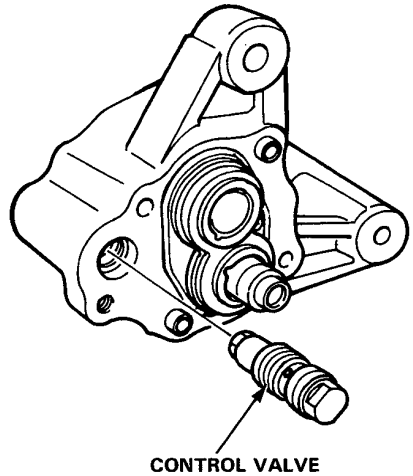
   NOTE: Pulley bolt has left hand threads.



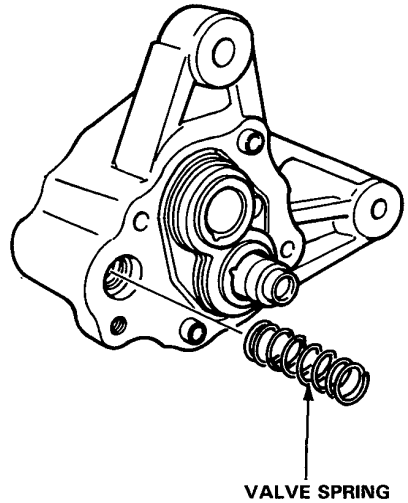
2. Remove the five 6 mm bolts in the order shown, then separate the pump front cover, pump housing and port housing.



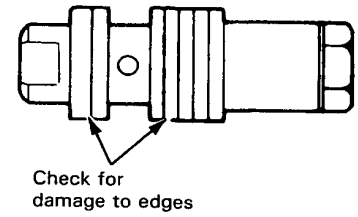
3. Remove the control valve from the pump housing.



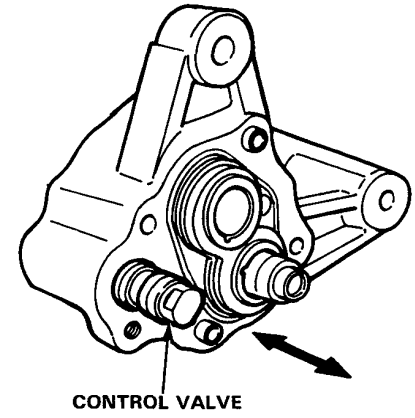
4. Remove the valve spring from the pump housing.



5. Check for wear, burrs, and other damage to the edges of the grooves in the valve.

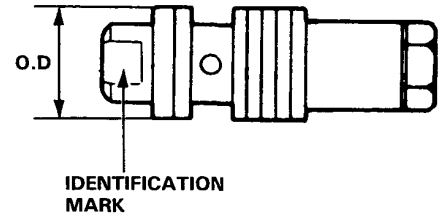


6. Slip the valve back in the pump and check that it moves up and down smoothly.



If OK, go on to step 7, if not, replace the valve:

- The original valve was selected for a precise fit in the pump housing bore, so make sure the new one has the same identification mark.

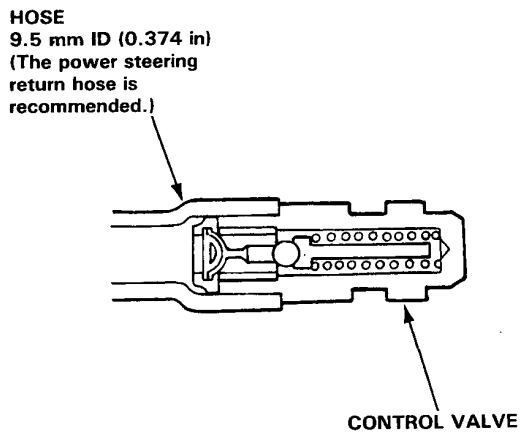


Mark	Part Number	Part Name	Size mm (in)
A	56350—PC1—010	CONTROL VALVE A	15.995—16.000 (0.6297—0.6299)
Without mark	56360—PC1—010	CONTROL VALVE B	16.000—16.006 (0.6299—0.6302)

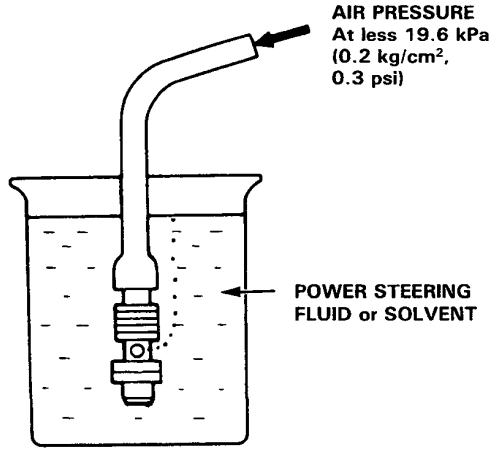
(cont'd)

Control Valve Inspection and Replacement (cont'd)

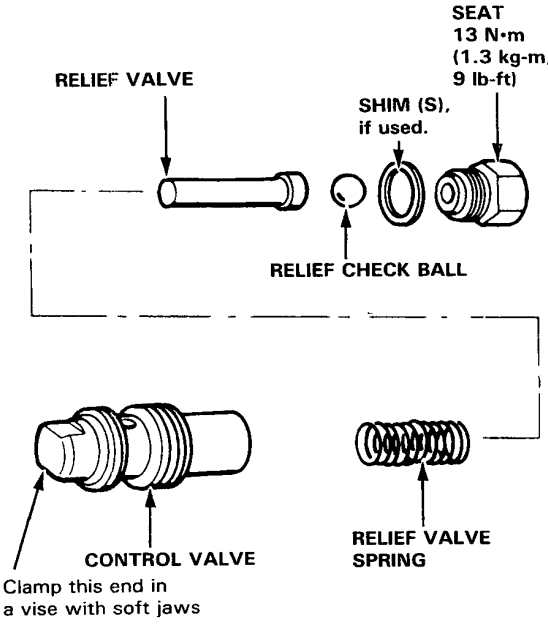
7. Attach a hose to the end of the valve as shown.



8. Then submerge the valve in a container of power steering fluid or solvent, and blow on the hose. If air bubbles leak through the valve, replace it or repair it as follows.



9. If the valve leaks, clamp the bottom end of it in a vise with soft jaws.



10. Unscrew the seat in the top end of the valve, and remove any shims, the relief check ball, relief valve and relief valve spring.

11. Clean all the parts in solvent, dry them off, then re-assemble and re-test the valve.

    NOTE: If necessary, relief pressure is adjusted at the factory by adding shims under the check ball seat. If you found shims in your valve, be sure you reinstall as many as you took out.

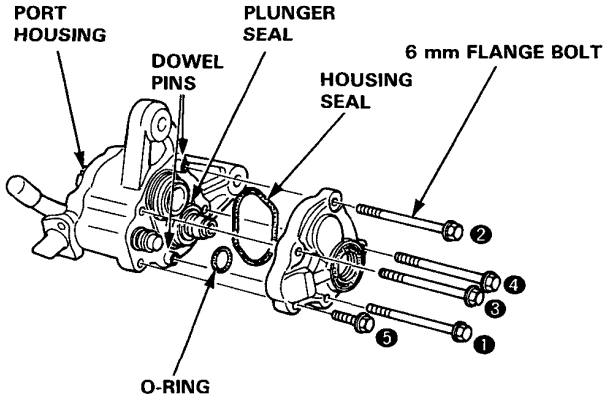
12. Install the control valve in the reverse order of removal.

    - Apply steering grease (Honda P/N 08740—99969) to new O-rings.
    - Coat the control valve with power steering fluid then install the relief spring and control valve.

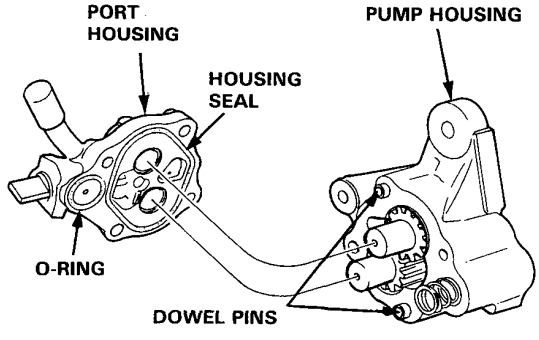
Resealing

CAUTION: The pump components are made of aluminum, be carefull not to damage them when servicing.

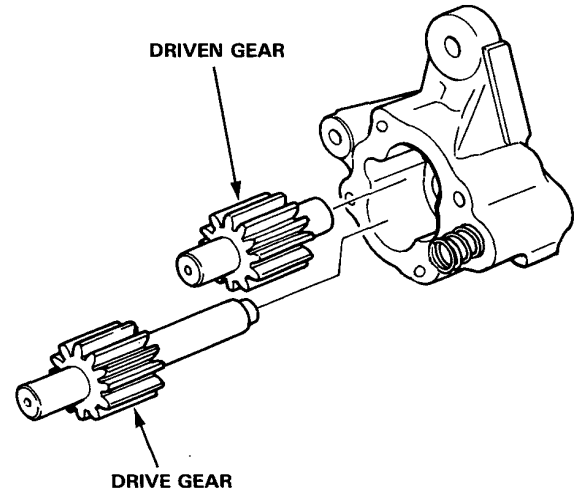
1. Remove the pump from car (page 19-9), and remove the pulley and pump front cover (page 19-10).
2. Remove the housing seal from the pump front cover.



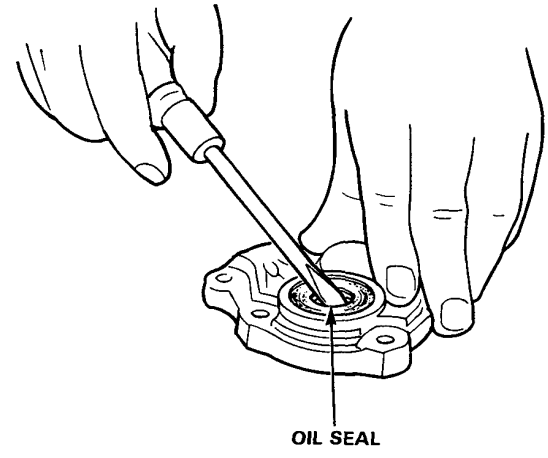
3. Remove the dowel pins, plunger seal and O-ring from the pump housing.
4. Separate the port housing from the pump housing.



5. Remove the dowel pins from the pump housing, and remove the housing seal and O-ring from the port housing.
6. Remove the pump drive and driven gears from the pump housing.



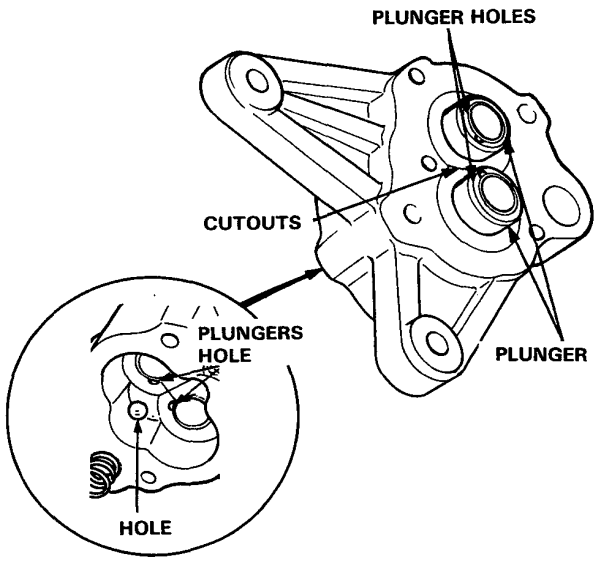
7. Remove the plungers from the pump housing.
8. Pry the seal out of the pump front cover.



(cont'd)

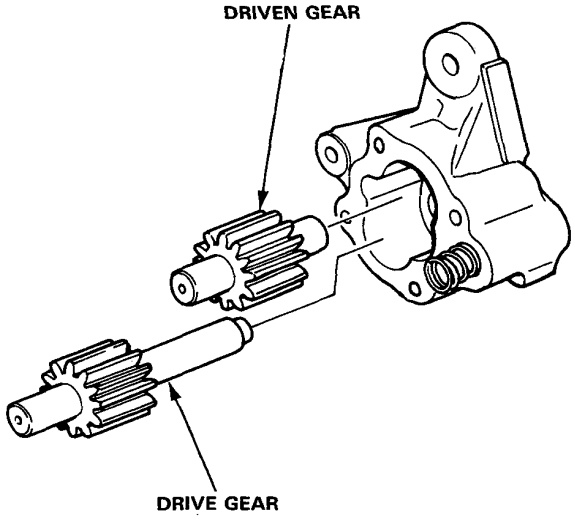
Resealing (cont'd)

9. Coat the outer surface of the plungers with power steering fluid, then install them in the pump housing. Make sure the small diameter side faces the front cover and the cutouts are aligned as shown.



10. Apply power steering fluid to the inside of the plungers.

11. Install the pump drive and driven gears in the pump housing.

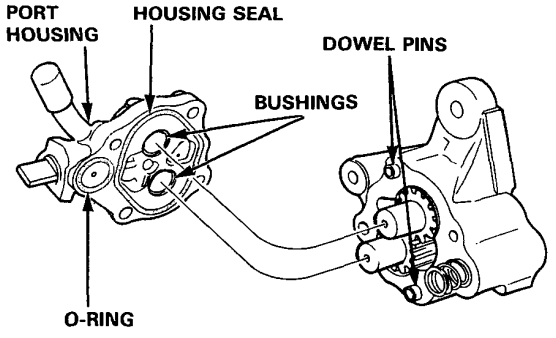


12. Coat the bushings on the port housing with power steering fluid.

13. Install the two dowel pins in the pump housing, then install the housing seal and O-ring in the port housing.

    NOTE: Coat the new housing seal and O-ring with grease.

14. Install the port housing on the pump housing.



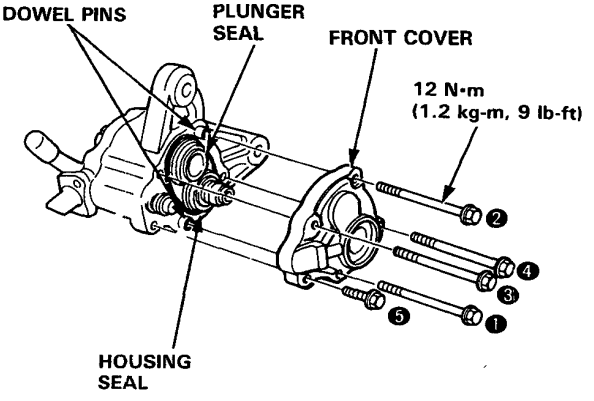
15. Grease the new plunger seal and install it over the plungers.

16. Install the dowel pins.

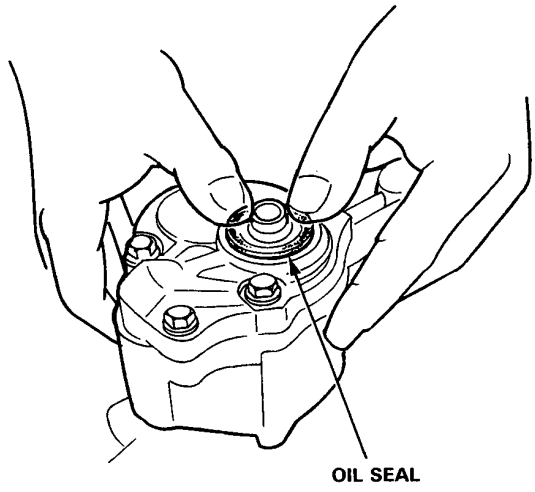
17. Fill the groove of the pump housing with grease and install the new housing seal in the pump housing.

18. Grease the new O-ring and install it in the pump housing.

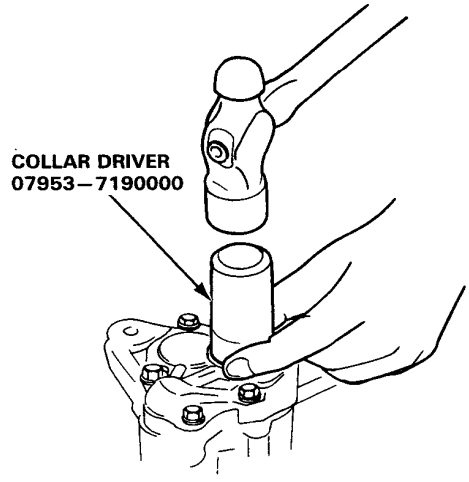
19. Install the pump front cover with the five 6 mm bolts and tighten them in the order shown below.



20. Loosely install the new oil seal in the pump front cover.



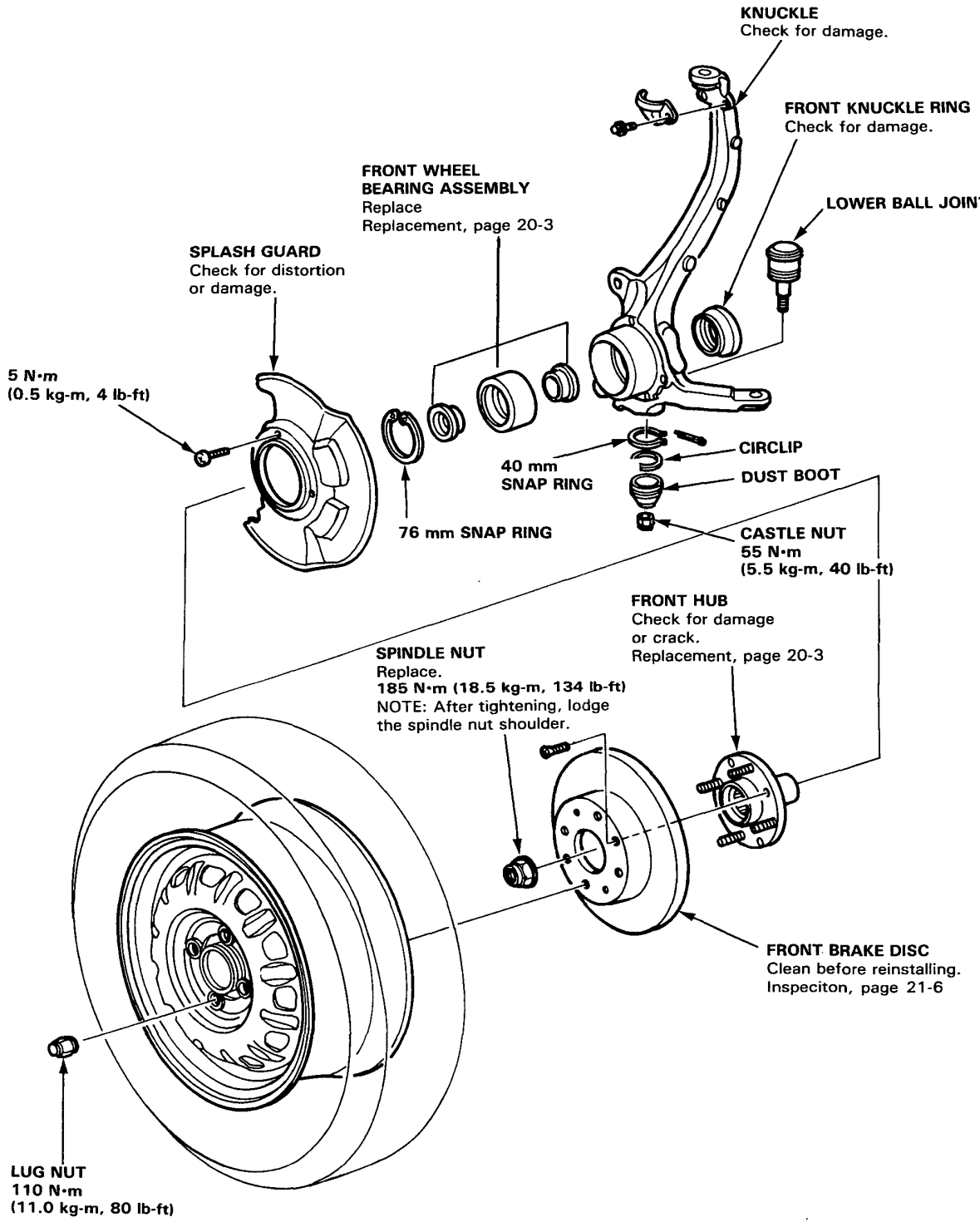
21. Install a new seal in the front cover; get it started by hand, then use a special tool to push it in the rest of the way.



Suspension
(B20A1 Engine Equipped Model)

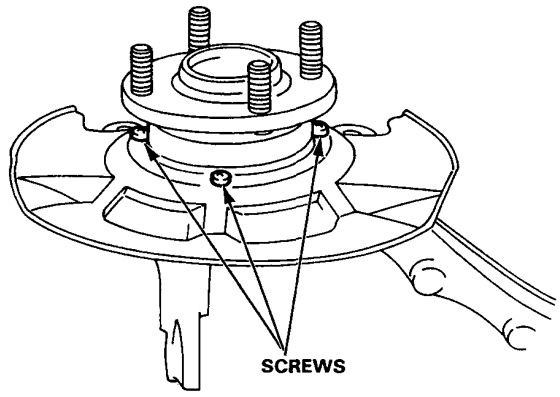
Knuckle/Hub

Index/Inspection



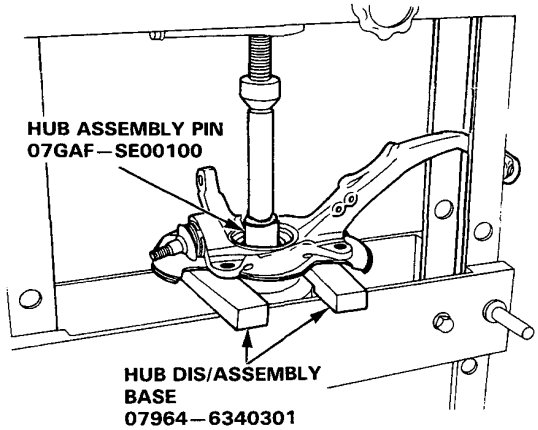
Disassembly

1. Remove the splash guard screws.



2. Remove the hub from the knuckle using special tool and hydraulic press.

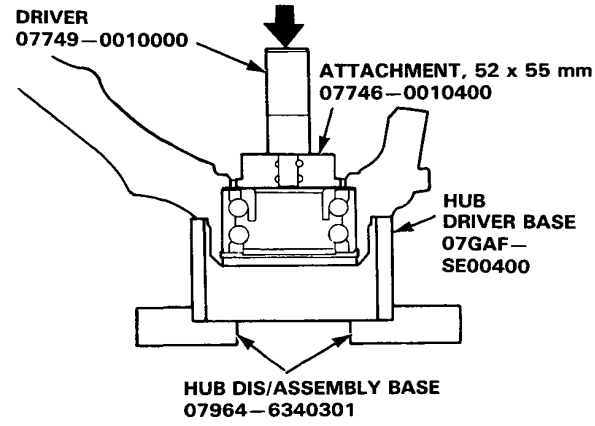
CAUTION:
Hold the hub by hand to prevent it from failling.
Take care not to distort the splash guard.



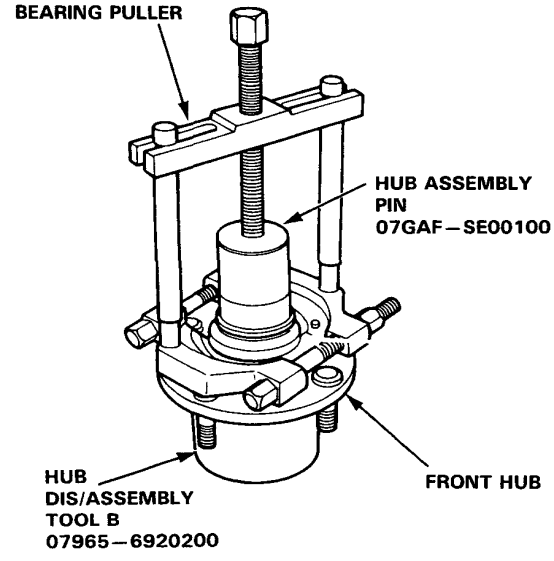
NOTE: Replace the front wheel bearing assembly with new one whenever the bearing has been disassembled.

3. Remove the splash guard and 76 mm snap ring, then remove the front knuckle ring from the knuckle.

4. Remove the bearing out of the knuckle using special tools and hydraulic press.



5. Remove the bearing inner race from the front hub using special tools and commercially available bearing puller.

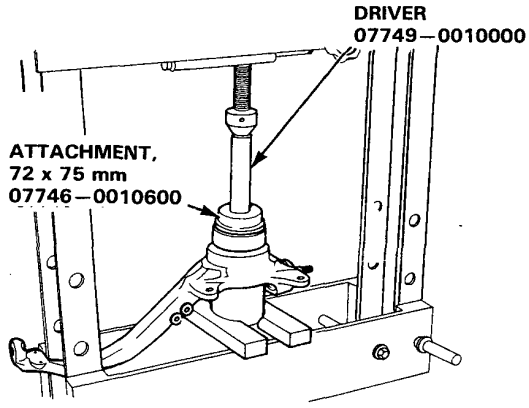


Reassembly

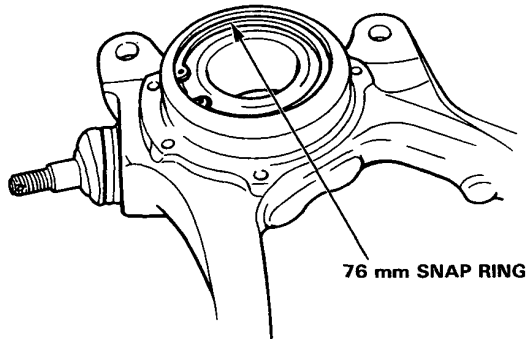
1. Press the front wheel bearing assembly into the knuckle using special tools and hydraulic press.

   CAUTION: *Maximum press load: 2.5 tons.*

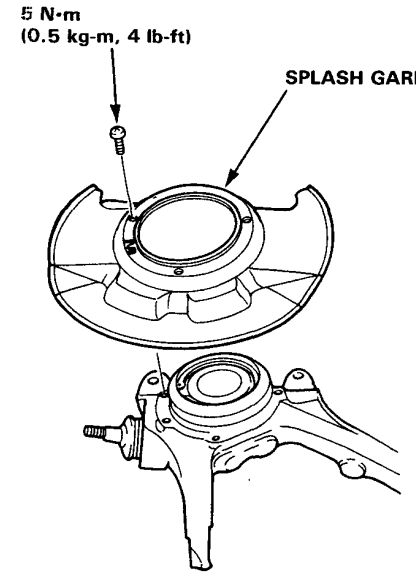
   NOTE: Pack the bearing, outer race and inner races with grease before installation.



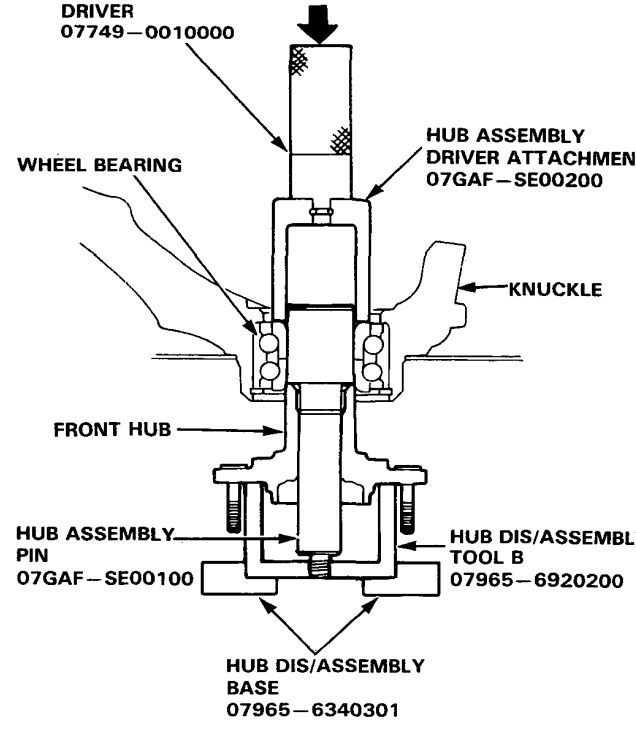
2. Install the 76 mm snap ring in the knuckle groove securely.



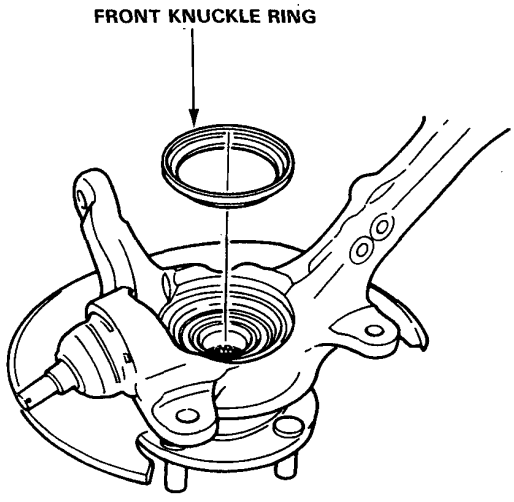
3. Install the splash guard.



4. Press the front hub on the knuckle using special tools and hydraulic press.



5. Install the front knuckle ring on the knuckle.



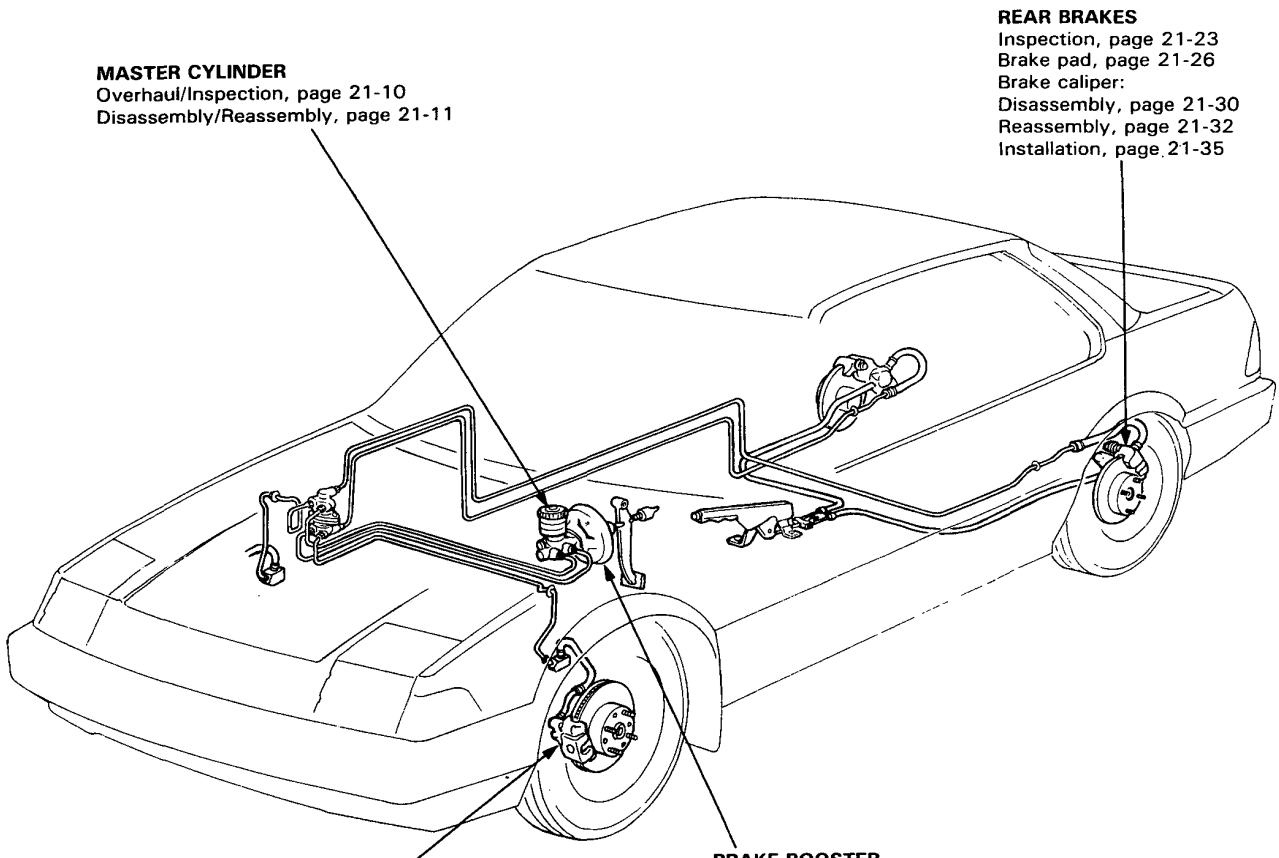
Brakes

Without 4W-ALB

4W-ALB

Without 4W-ALB

Index

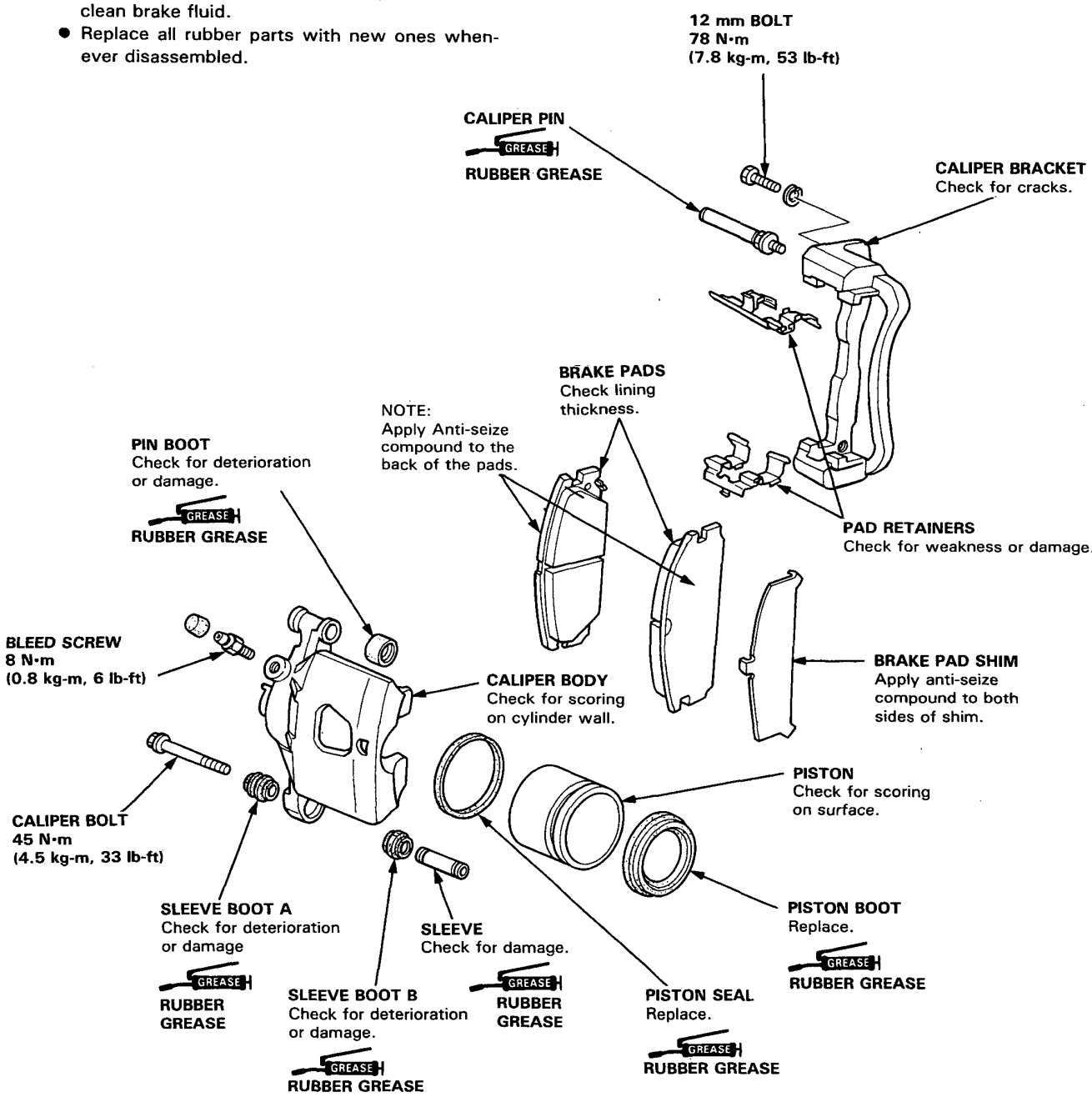


Inspection

A20A4 Engine Equipped Model

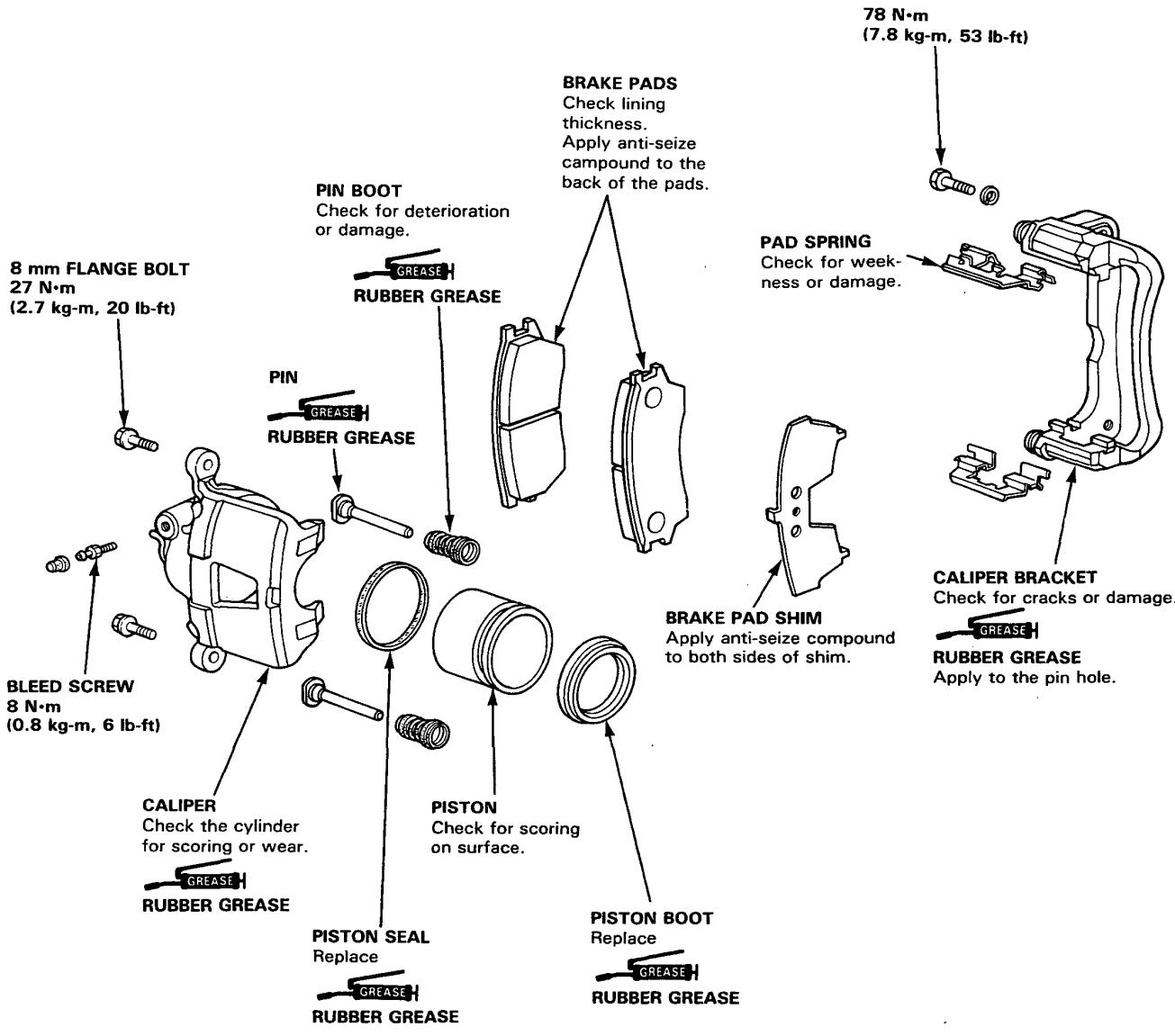
WARNING **Do not use air hose to blow brake assembly clean. Use an OSHA-approved vacuum cleaner to prevent avoid breathing brake dust.**

NOTE:
- *Coat piston, piston seal, and caliper bore with* clean brake fluid.
- Replace all rubber parts with new ones whenever disassembled.



(cont'd)

B20A1 Engine Equipped Model

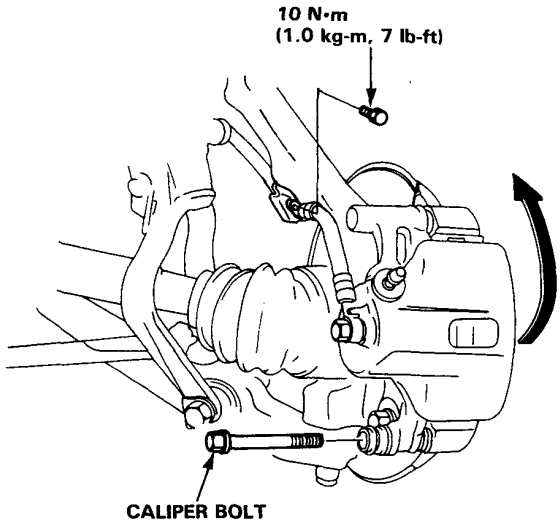


Inspection/Replacement

A20A4 and B20A1 Engine Equipped Model

WARNING Do not use air hose to blow brake assembly clean.

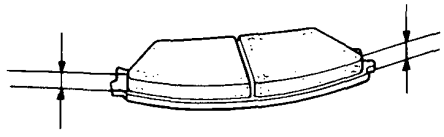
1. Separate the front wheels and support the front of car on safety stands.
2. Separate the brake hose clamp from the knuckle by removing the bolt.
3. Remove caliper bolt and pivot caliper up out of the way.



4. Remove the pad shim and pads.
5. Using a vernier caliper, measure the thickness of each brake pad lining.

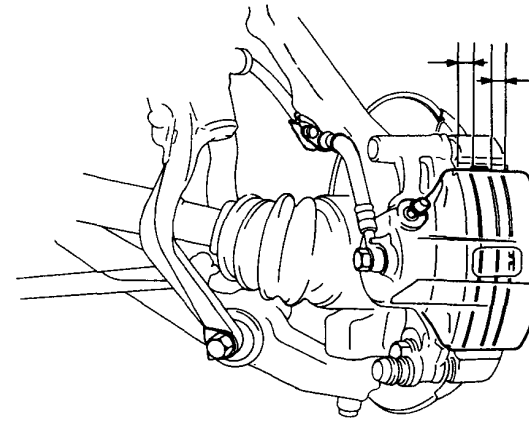
Brake Pad Thickness:

	Except B20A1 Engine Equipped Model	B20A1 Engine Equipped Model only
Standard	9.5 mm (0.37 in)	11 mm (0.49 in)
Service Limit	3 mm (0.12 in)	3 mm (0.12 in)

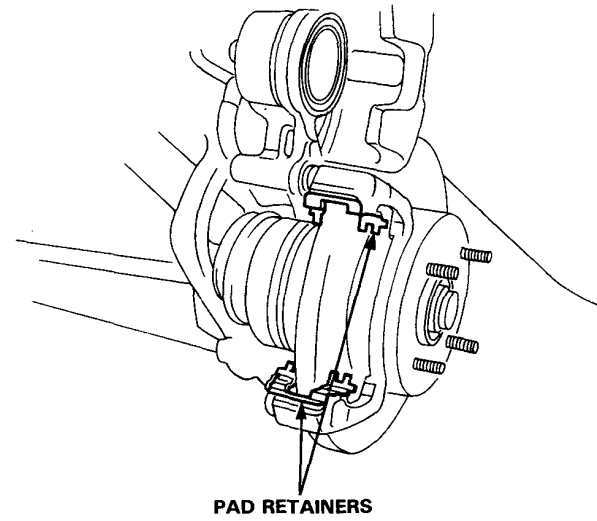


NOTE: Measurement does not include pad backing thickness.

6. If lining thickness is less than service limit, replace both pads as a set.



7. Clean the caliper thoroughly; remove any rust, and check for grooves or cracks.
8. Install the pad retainers.



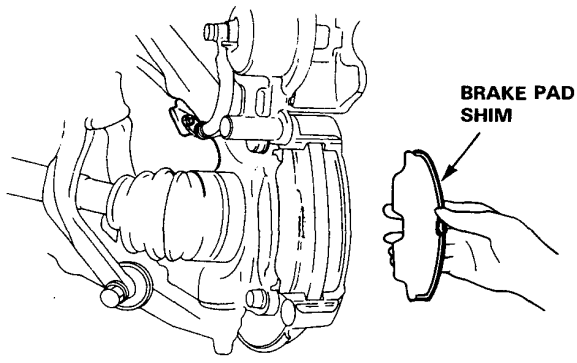
(cont'd)

Brake Pad

Inspection/Replacement (cont'd)

9. Apply anti-seize compound to both surfaces of the shim and back of the pad.

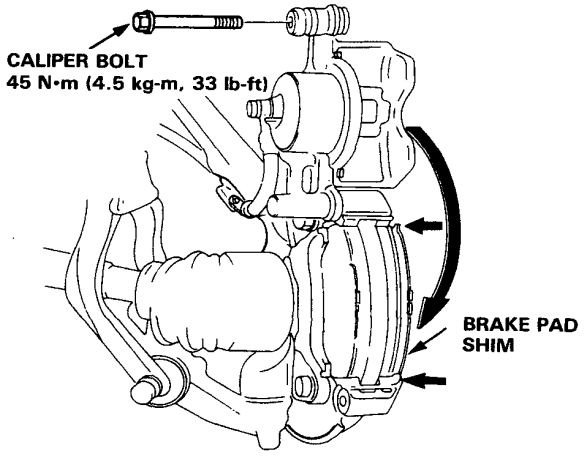
10. Install the brake pad and brake pad shim with the shim on the outside.



11. Push in the piston so that the caliper will fit over the pads and boot is in original position to prevent damaging the boot when pivot the caliper down.

12. Pivot the caliper down into position, then install the caliper bolt and tighten to 45 N·m (4.5 kg-m, 33 lb-ft).

    NOTE: Install the pad with the wear indicator on the inside.



13. Depress the brake pedal several times to make sure the brakes work, then road-test.

Brake Caliper

Disassembly

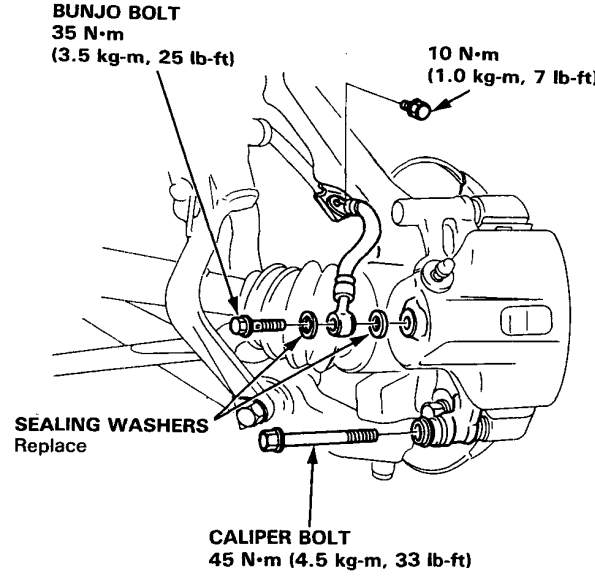
A20A4 and B20A1 Engine Equipped Model

CAUTION:
- **Avoid spilling brake fluid on painted, plastic, or rubber parts as it may damage the finish. Wash spilled brake fluid off immediately with clean water.**
- **Plug the end of the brake hose with a shop rag to prevent brake fluid from flowing out of the brake hose after disconnecting.**
- **Clean all parts thoroughly with the clean brake fluid. Blow out all passages with compressed air.**
- **Do not allow the foreign matter to enter the system.**

1. Remove the banjo bolt and disconnect the brake hose from the caliper.

2. Remove the caliper bolt, then remove the caliper.

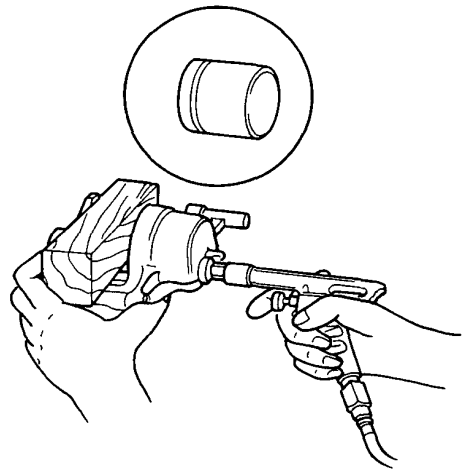
   NOTE: Avoid damaging the splash guard.



3. Place a wooden block or shop rag in the caliper opposite the piston, then carefully remove the piston from the caliper by applying air pressure through the brake line hole.

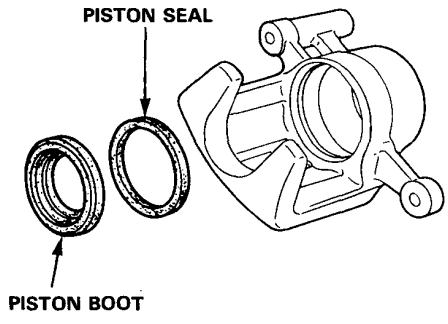
WARNING

- **Do not place your fingers in front of the piston.**
- **Do not use high air pressure.**



4. Remove the piston boot and piston seal.

CAUTION: Take care not to damage the cylinder.



Reassembly

A20A4 and B20A1 Engine Equipped Model

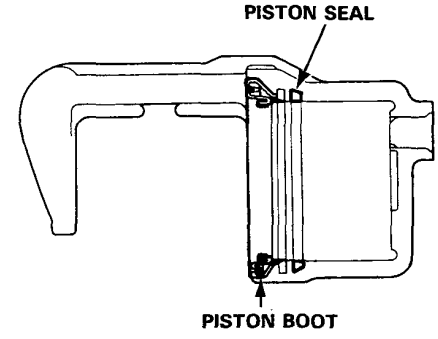
CAUTION:

- **Make sure all parts are clean before reassembly.**
- **Use only new replacement parts.**
- **Use only new clean brake fluid.**
- **Do not allow dirt or other foreign matter to contaminate the brake fluid.**
- **Do not mix different brands of brake fluid.**
- **Avoid spilling brake fluid on painted, plastic or rubber surfaces as its can damage the finish. *Wash spilled brake fluid off immediately with* clean water.**

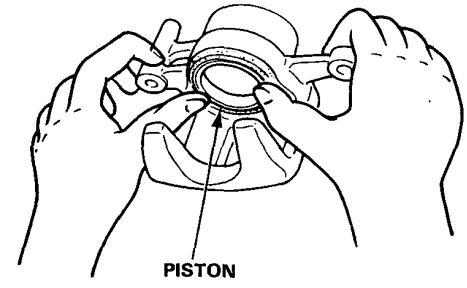
1. Clean the piston and cylinder bore with brake fluid and inspect for wear or damage.

2. Apply brake cylinder grease to a new piston seal, then install the piston seal in the cylinder groove.

3. Install a new piston boot.



4. Lubricate the caliper cylinder and piston with clean brake fluid, then install the piston in the caliper cylinder with the piston dished end facing in.



5. Reinstall the caliper in the reverse order of removal.

6. Fill the brake reservoir up and bleed from the system.

Front Brake Disc

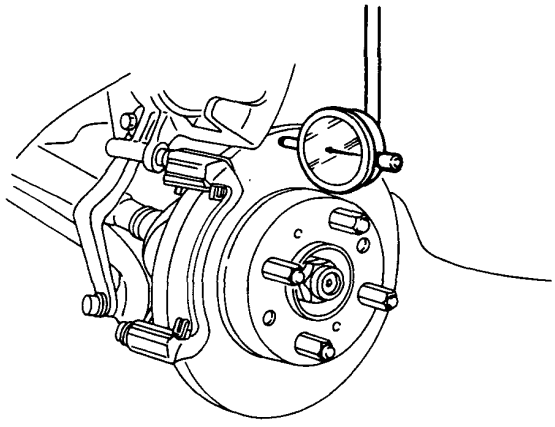
Run-Out

A20A4 and B20A1 Engine Equipped Model

1. Remove the front wheels, and support the front of car on safety stands.
2. Remove caliper pin A bolt, then pivot caliper up out of the way on the upper guide pin A bolt, and remove the pads and pad retainers (page 21-4).
3. Inspect the disc surface for grooves, cracks, and rust. Clean the disc thoroughly and remove all rust.
4. Use the lug nuts to hold the disc securely against the hub, then mount a dial indicator as shown.

   Brake Disc Runout:
   Service Limit: 0.15 mm (0.006 in.)

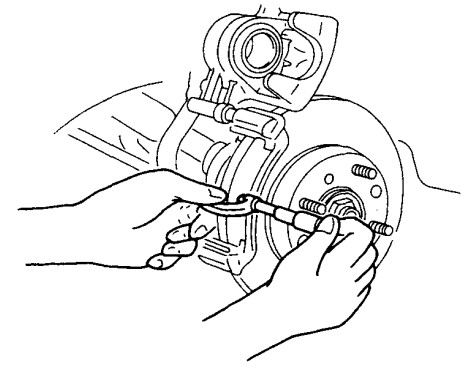
5. If the disc is beyond the service limit, refer to the Honda Brake Disc Grinder Manual to see if it can be ground. If it can't be ground, remove it and install a new one.



Thickness and Parallelism

A20A4 and B20A1 Engine Equipped Model

1. Remove the front wheels, and support the front of car on safety stands.
2. Move the caliper and pads out of the way as described in the preceeding 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

	ET Engine Equipped Model	A20A4 and B20A1 Engine Equipped Model
Standard	17.0 mm (0.67 in)	21.0 mm (0.83 in)
Service Limit	15.0 mm (0.59 in)	19.0 mm (0.75 in)

Brake Disc Parallelism:
The difference between any thickness measurements should not be more than 0.015 mm (0.0006 in.)

4. If the disc is beyond the limits for thickness or parallelism, refer to the Honda Brake Disc Grinder Manual to see if it can be ground. If it can't be ground, remove it and install a new one.

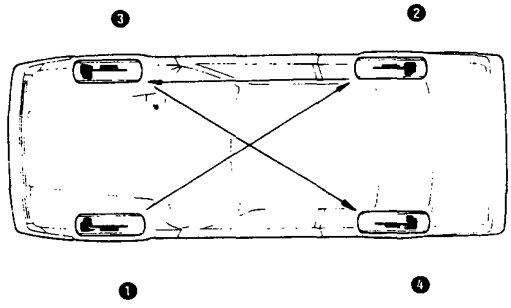
   NOTE: A new disc should be ground if its run-out is greater than 0.10 mm (0.004 in).

CAUTION:

- **Make sure all parts are clean before reassembly.**
- **Use only new clean brake fluid.**
- ***Do not allow dirt or other foreign metter to contaminate the brake fluid.***
- **Do not mix different brands of brake fluid.**
- **Avoid spilling brake fluid on painted, plastic or rubber surfaces as its can damage the finish. Wash spilled brake fluid off immediately with clean water.**

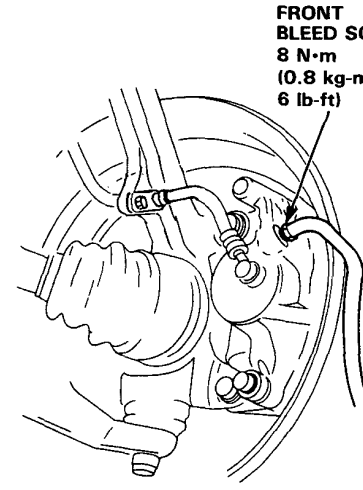
NOTE: The reservoir on the master cylinder must be full at the start of bleeding procedure, and checked after bleeding each wheel cylinder. Add fluid as required. Use only DOT 3 or 4 brake fluid.

Bleeding Sequence

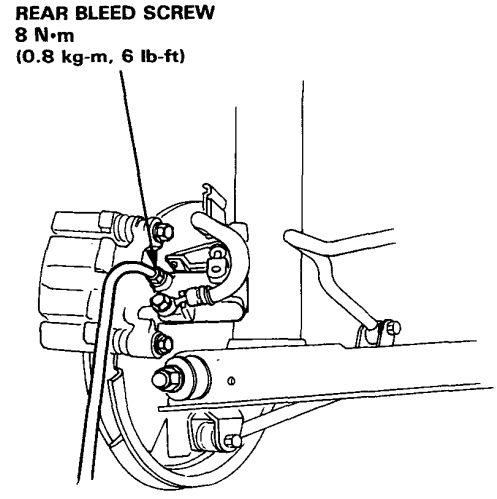


1. Have someone slowly pump the brake pedal several times, then apply steady pressure.
2. Loosen the brake bleed screw to allow air to escape from the system. Then tighten the bleed screw securely.
3. Repeat the procedure for each wheel in the sequence shown above, until air bubbles no longer appear in the fluid.

FRONT



REAR



Master Cylinder

Overhaul/Inspection

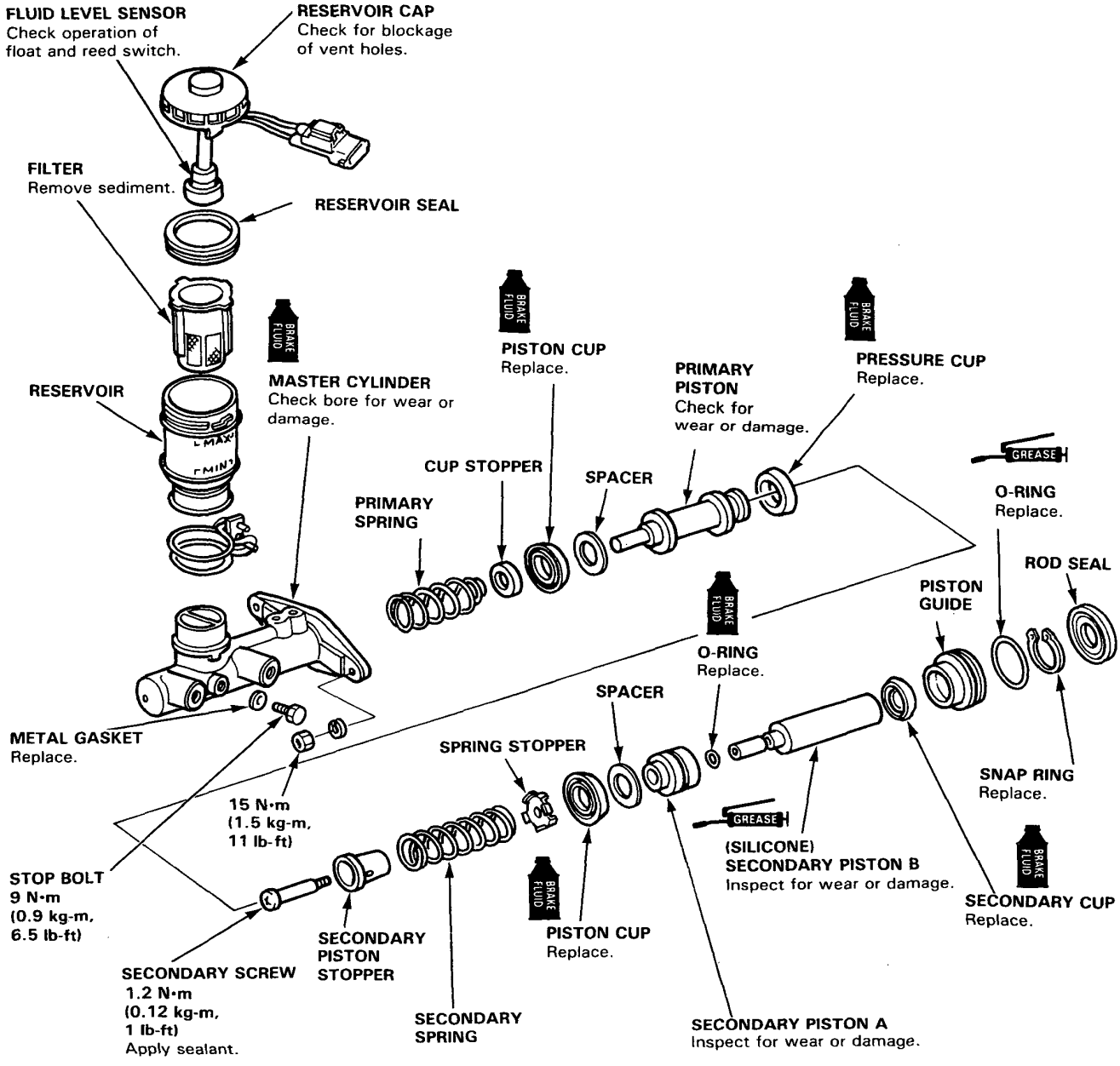
A20A4 and B20A1 Engine Equipped Model

CAUTION:

- **Avoid spilling brake fluid on painted surfaces as severe damage can result. Wipe up spilled fluid at once and rinse well with clean water.**
- BRAKE FLUID **This symbol represents brake fluid. Use only DOT 3 or 4 brake fluid.**
- GREASE **(SILICONE) Use only Honda Cylinder Grease (P/N 08733—BOZOE) or equivalent.**

NOTE:

- Wash all removed parts in brake fluid and blow dry with compressed air. Blow open all passages and fluid parts.
- Repalce 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.

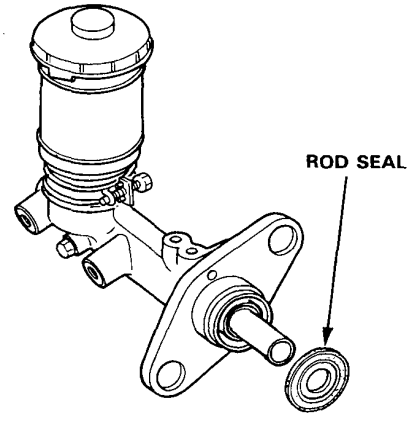


Disassembly

A20A4 and B20A1 Engine Equipped Model

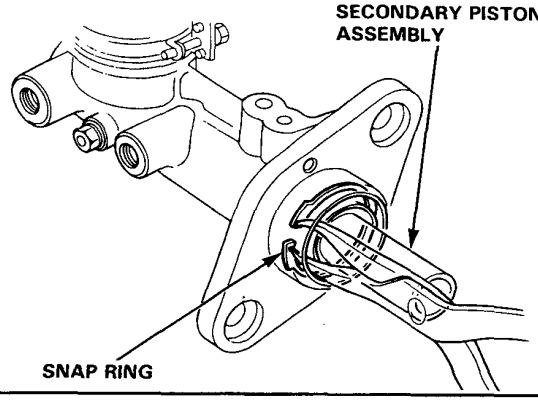
CAUTION:
- **Avoid spilling fluid on painted, plastic, or rubber parts as it may damage the finish. Wash spilled brake fluid off immediately with clean water.**
- **Plug the end of the brake hose with a shop rag to prevent brake fluid from flowing out of the brake hose after disconnecting.**
- **Do not mix different brands of brake fluid.**
- **Use only new clean brake fluid.**
- **Clean all parts thoroughly with the brake fluid. Blow out all passage with compressed air.**
- **Do not use high air pressure; use an OSHA-approved 30 psi nozzle.**
- **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.

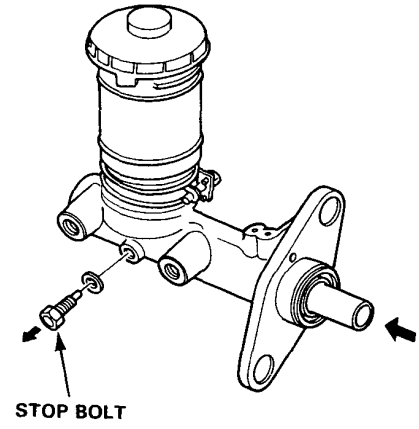


2. Push in the secondary piston assembly, then remove the snap ring.

CAUTION: Avoid damaging the master cylinder wall.



3. Remove the stop bolt while pushing in the secondary piston assembly.

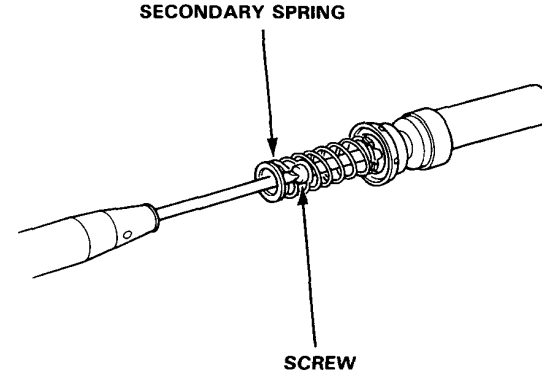


4. Remove the piston guide, secondary piston assembly and primary piston assembly.

NOTE: If the primary piston assembly is difficult to remove, apply compressed air from the primary piston side outlet.

CAUTION:
- **Do not use high pressure air or bring the nozzle too close to the inlet.**
- **Place a shop rag over the master cylinder to prevent the primary piston from becoming a projectile.**

5. Remove the screw from the secondary piston assembly, then remove the secondary spring.



6. Clean all parts with brake fluid.

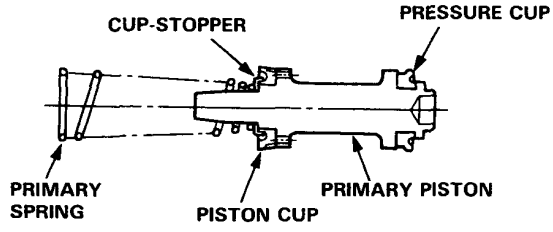
Reassembly

A20A4 and B20A1 Engine Equipped Model

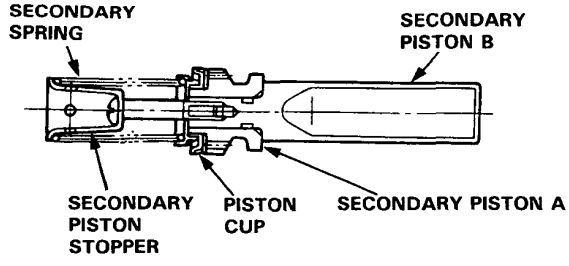
CAUTION:
- **Make sure all parts are clean before reassembly.**
- **Use only new replacement parts.**
- **Use only new clean brake fluid.**
- **Do not allow dirt or other foreign matter to contaminate the brake fluid.**
- **Do not mix different brands of brake fluid. Avoid spilling brake fluid on painted, plastic or rubber surfaces as its can damage the finish. Wash spilled brake fluid off immediately with clean water.**

1. Lubricate new piston assemblies with brake fluid, then fit them together.

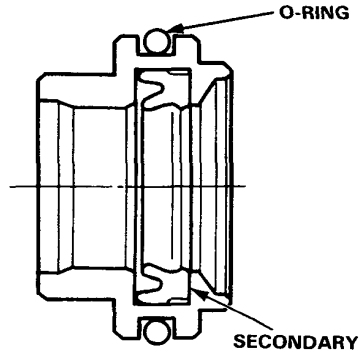
PRIMARY PISTON ASSEMBLY



SECONDARY PISTON ASSEMBLY



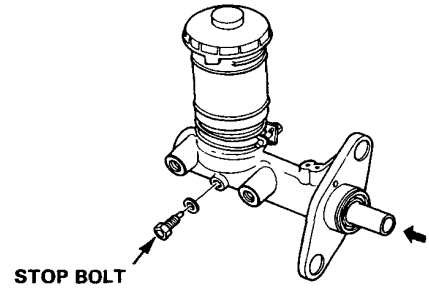
PISTON GUIDE ASSEMBLY



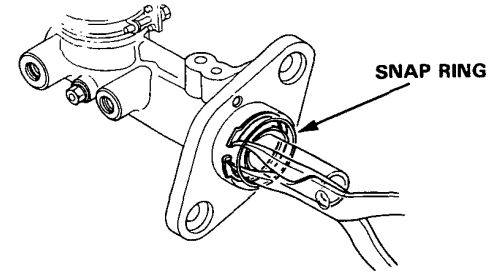
2. Install the piston assemblies in the mastor cylinder.

   NOTE: To ease assembly, rotate the pistons while inserting.

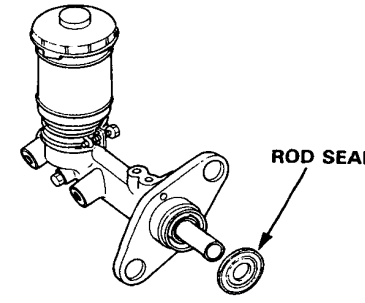
3. Install the stop bolt and new sealing washer while pushing in the secondary piston assembly, then tighten the stop bolt.



4. Install the snap ring while pushing in the secondary piston assembly.



5. Install a new rod seal.



Brake Booster

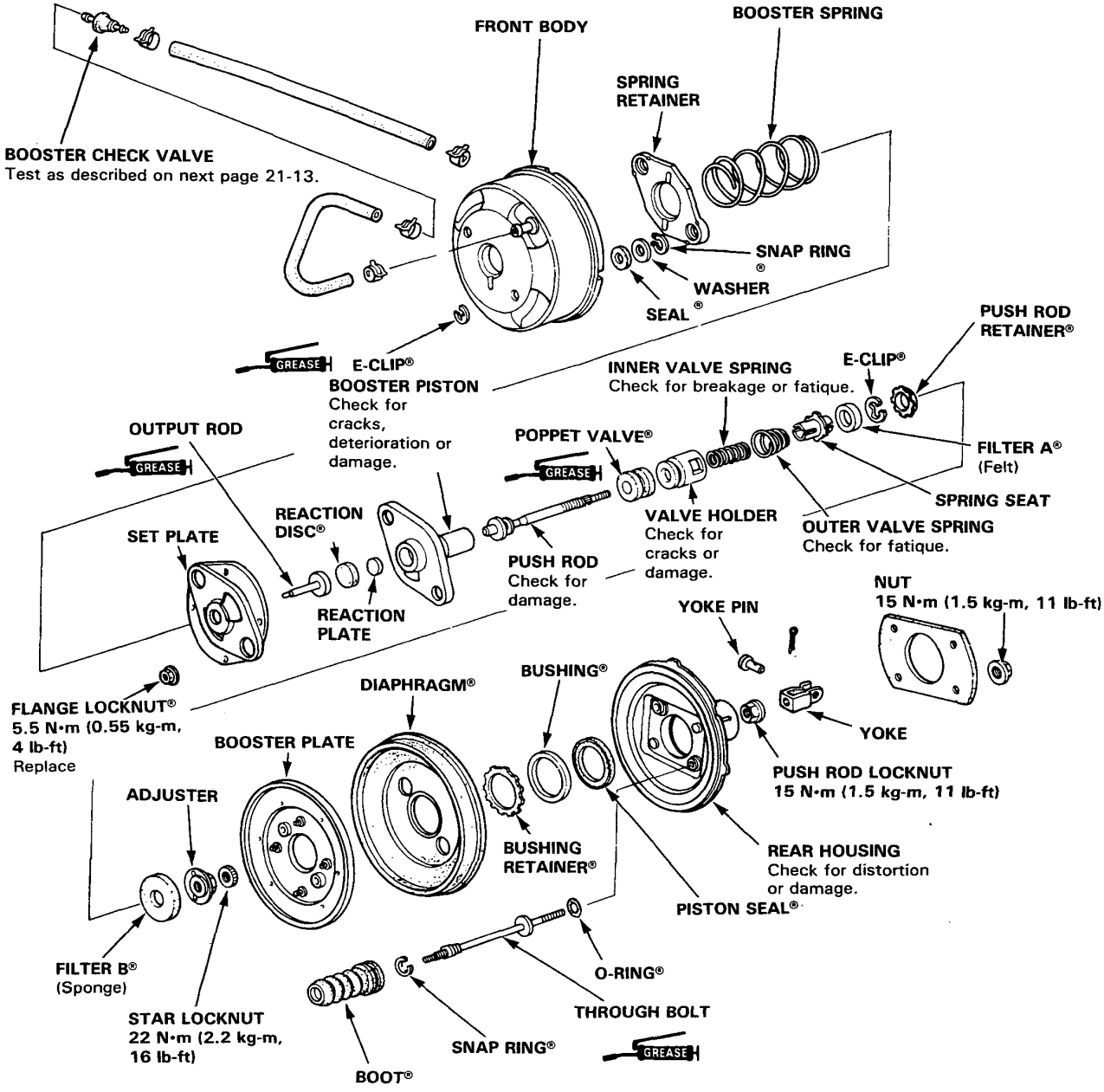
Index and Inspection

A20A4 and B20A1 Engine Equipped Model

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 21-15).



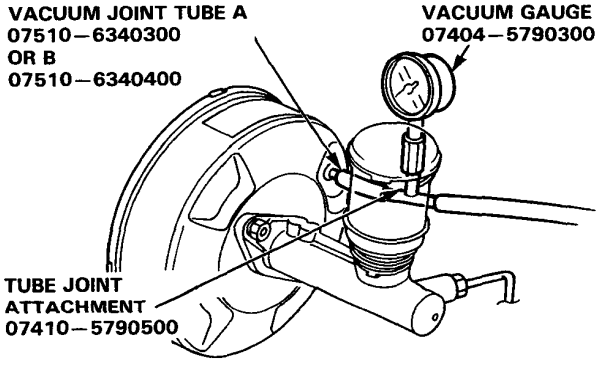
Booster Test

A20A4 and B20A1 Engine Equipped Model

Leak Test

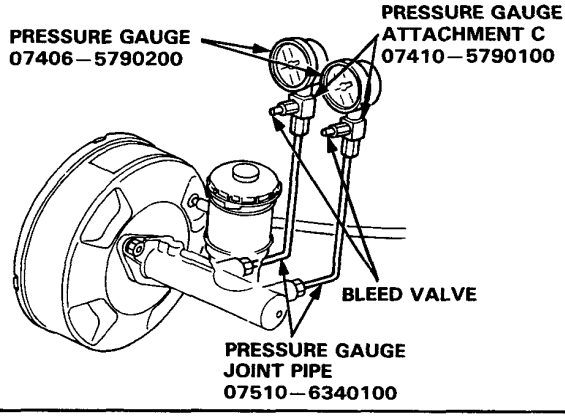
1. Install the Brake Power Kit (07504—6340100) as shown.
2. Start the engine, adjust the engine speed with the accelerator pedal so that the vacuum gauge readings show 300—500 mmHg, then stop the engine.
3. Read the vacuum gauge.

   If the vacuum readings decreases 20 mmHg or more after 30 seconds, check following parts for leaks.
   - Check valve
   - Vacuum hose
   - Seals
   - Diaphragm
   - Master cylinder rod seal and secondary cup

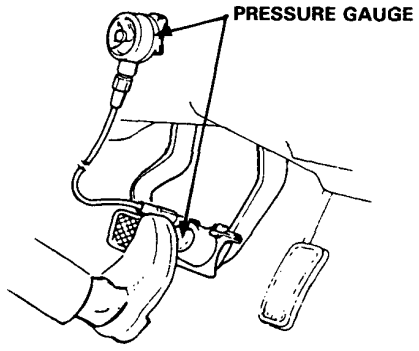


1. Install the vacuum gauge as same the leak test.
2. Connect the oil pressure gauges to the master cylinder using the attachments as shown.
3. Bleed air through the valves.

   CAUTION: Avoid spilling brake fluid on painted, plastic or rubber partsas it may damage the finish.



4. Start the engine.
5. Depress the brake pedal with a 200 N (20 kg, 44 lbs) of pressure. The following pressures should be observed at the pressure gauges in each vacuum.

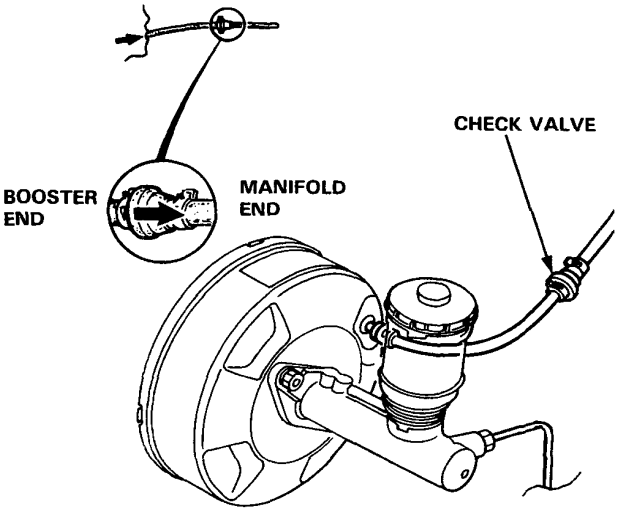


Vacuum mmHg	Line pressure kpa (kg/cm, psi)
0	1,177 (12.0, 170.6)
300	4,766 (48.6, 691.1)
500	7,149 (72.9, 1,036.6)

6. Inspect the master cylinder pistons and cups in the readings do not fall within the limits shown above.

Check Valve Test

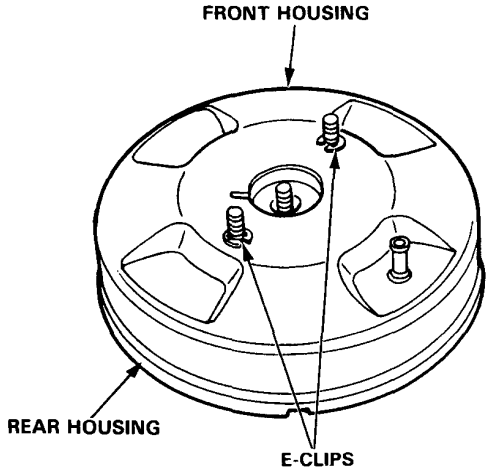
1. Remove the check valve, blow on one end of the hose and then the other; if you can blow through the booster end, but not through the manifold end, the check valve is OK.



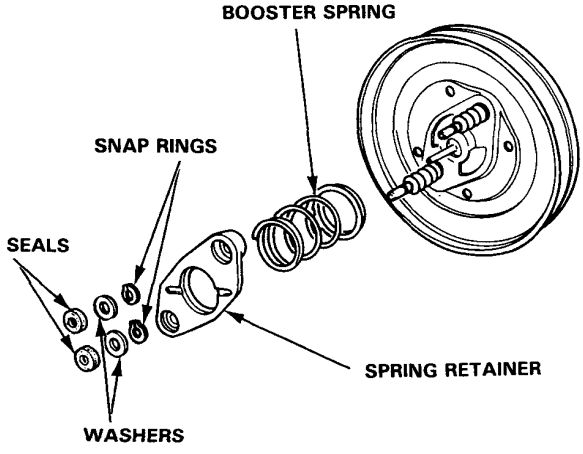
Disassembly

A20A4 and B20A1 Engine Equipped Model

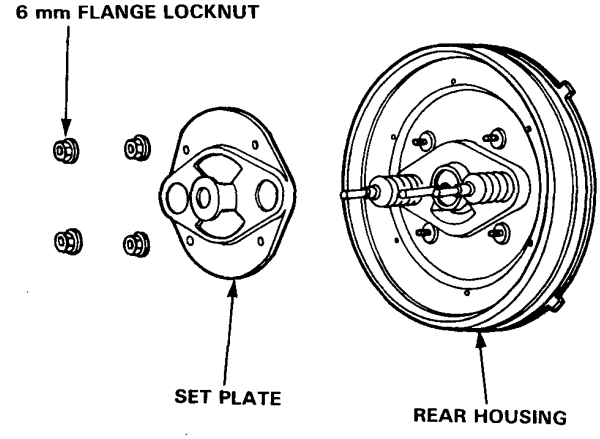
1. Scribe an aligning mark across the front and rear booster housings to ensure proper positioning of parts on reassembly.
2. *Remove the master cylinder.*
3. Remove the E-clips, and separate the front booster housing and the rear booster housing.



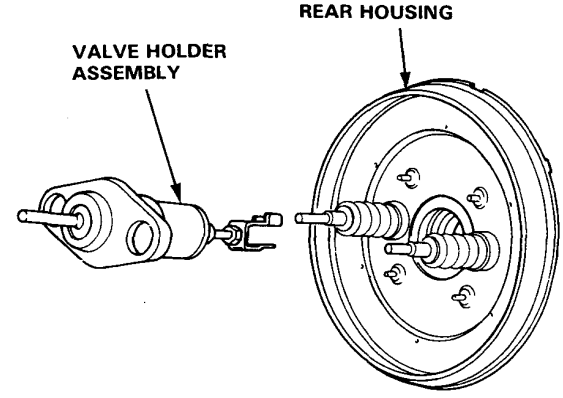
4. Remove the seals and washers from the spring retainer then remove the snap rings.



5. Remove the spring retainer and booster spring.
6. Remove the 6 mm flange locknuts and set plate.



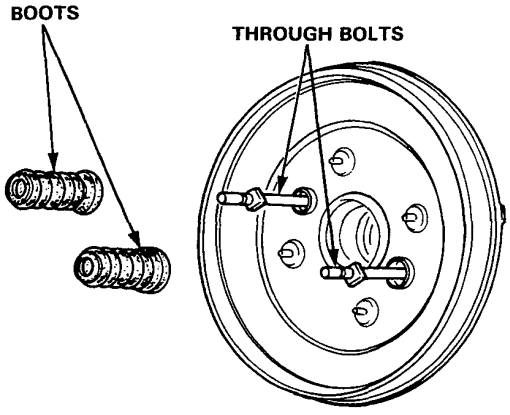
7. Remove the valve holder assembly from the rear housing.



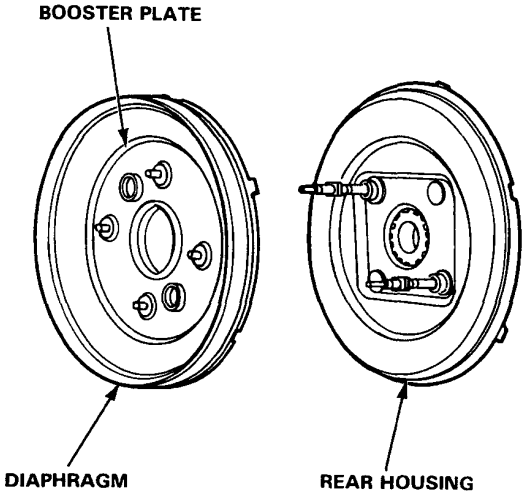
(cont'd)

Disassembly (cont'd)

8. Remove the boots from the through bolts.

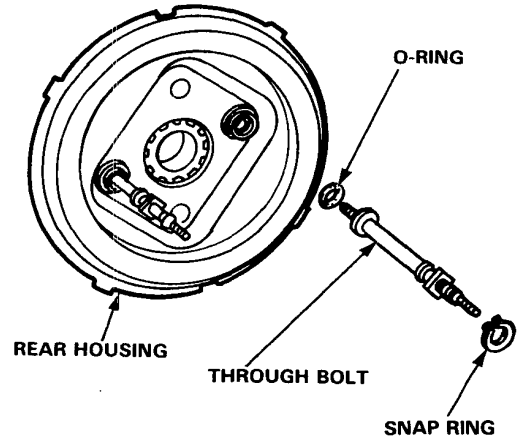


9. Remove the booster plate and diaphragm together from the rear housing.

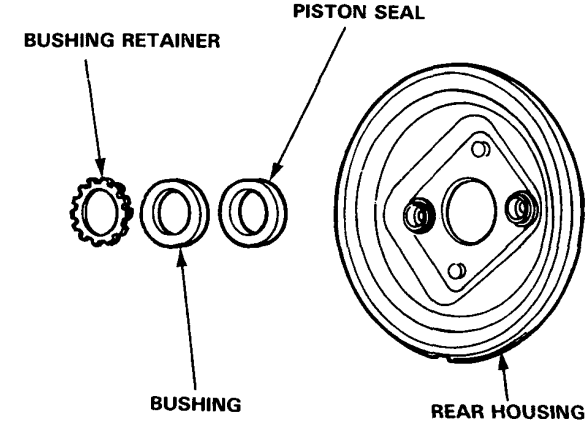


10. Remove the diaphragm from the booster plate.

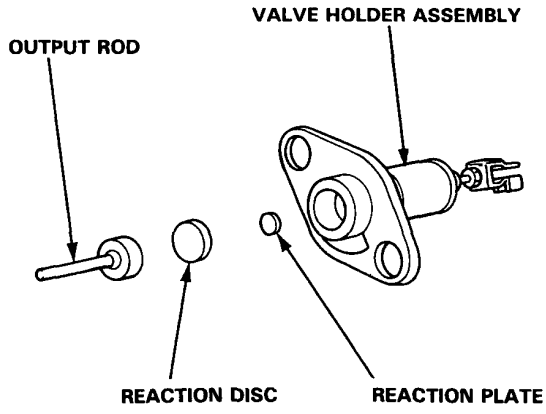
11. Remove the snap rings, then remove the through bolts and O-rings from the rear housing.



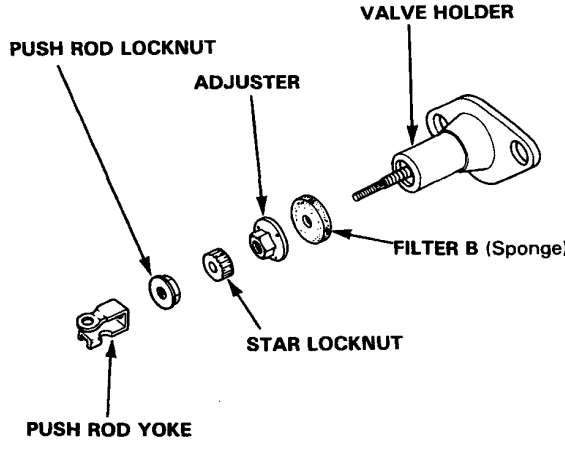
12. Remove the bushing retainer, bushing and piston seal from the rear housing.



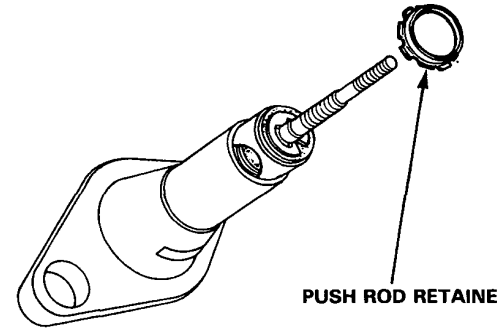
13. Remove the output rod, reaction disc and reaction plate from the valve holder assembly.



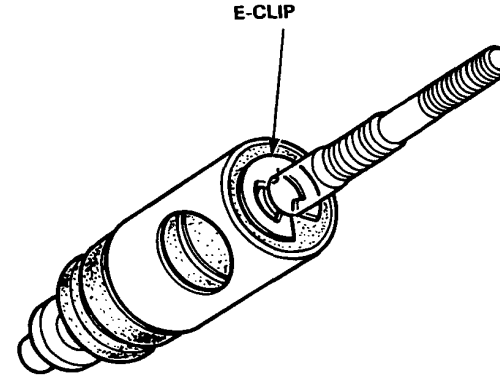
14. Remove the push rod yoke, locknut, star locknut, adjuster and filter B from the valve holder.



15. Remove the push rod retainer, then remove the push rod from the valve holder assembly.



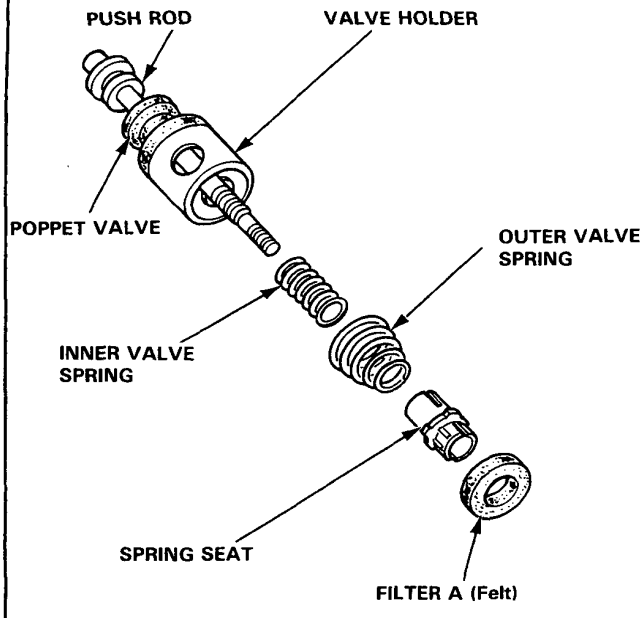
16. Remove the E-clip from the push rod.



(cont'd)

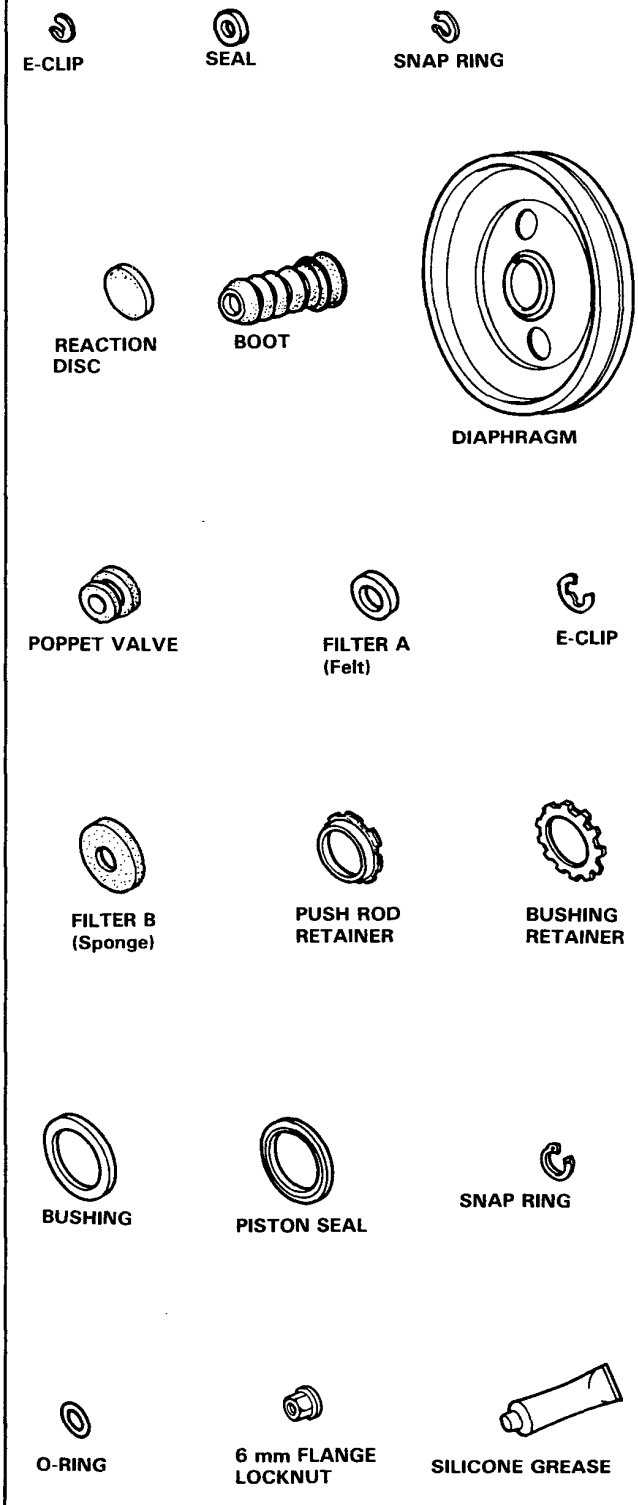
Disassembly (cont'd)

17. Remove filter A, the spring seat, valve springs, valve holder and poppet valve from the push rod.



Rebuild Kit

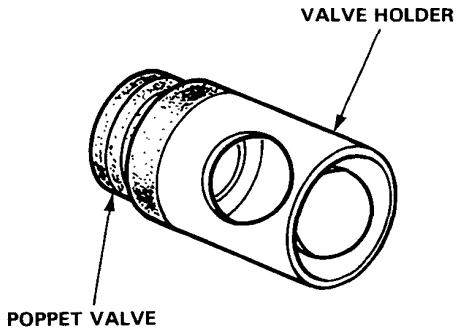
A20A4 and B20A1 Engine Equipped Model



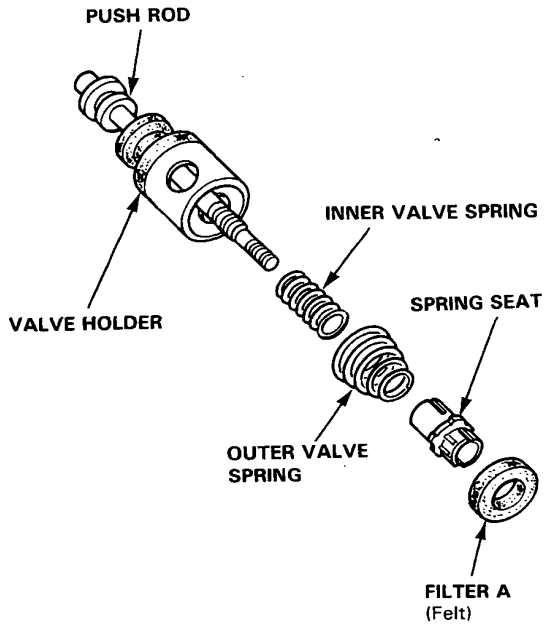
Reassembly

A20A4 and B20A1 Engine Equipped Model

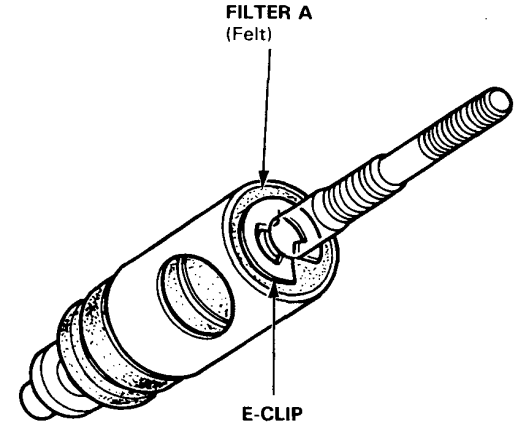
1. Install the poppet valve on the valve holder.



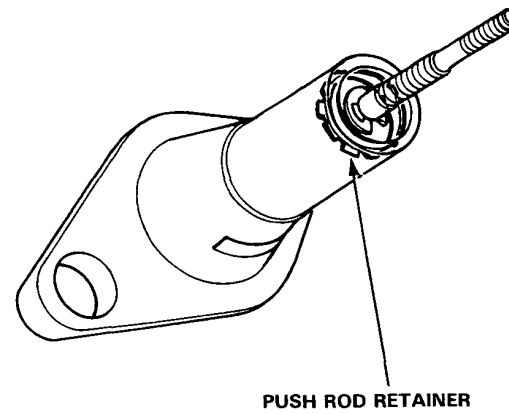
2. Install the valve holder, inner valve spring, outer valve spring and spring seat on the push rod.



3. Install filter A and the E-clip on the push rod.



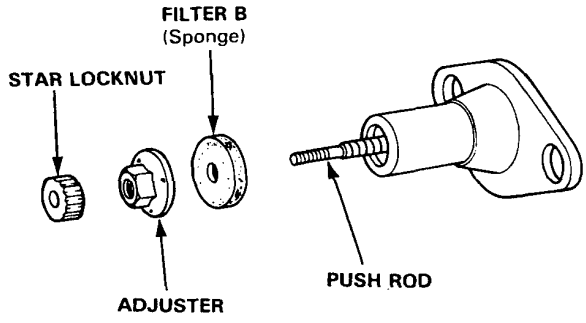
4. Apply silicone grease to the inner and outer surfaces of the booster piston tube. Press the valve holder assembly into the booster piston tube, and install the push rod retainer.



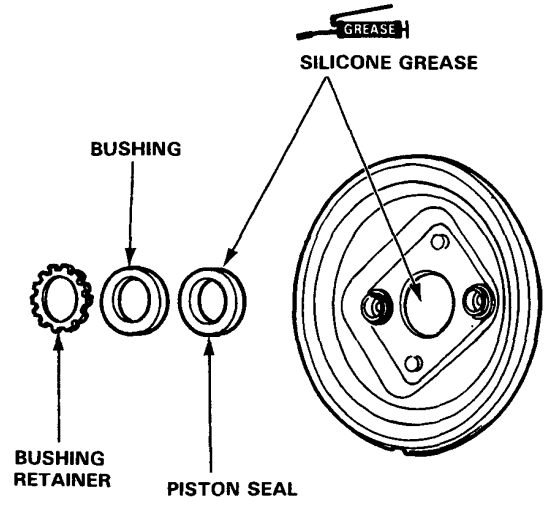
(cont'd)

Reassembly (cont'd)

5. Slip filter B (sponge) over the end of the push rod. Thread the adjuster and star locknut onto the push rod but do not tighten.



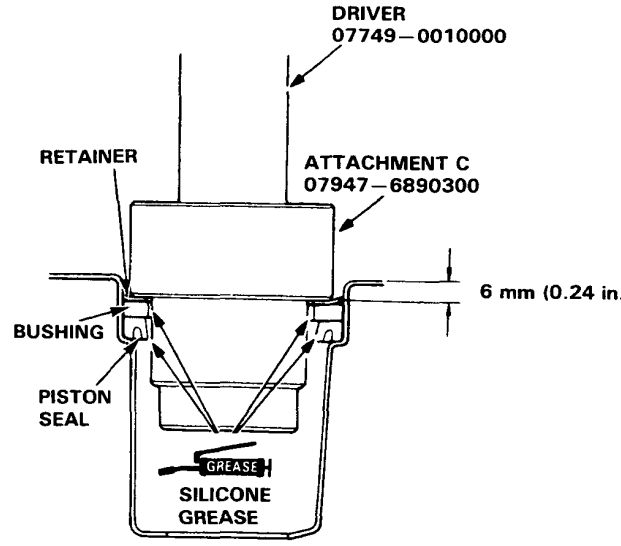
6. Apply silicone grease to the piston seal, then set the seal in position on the housing.



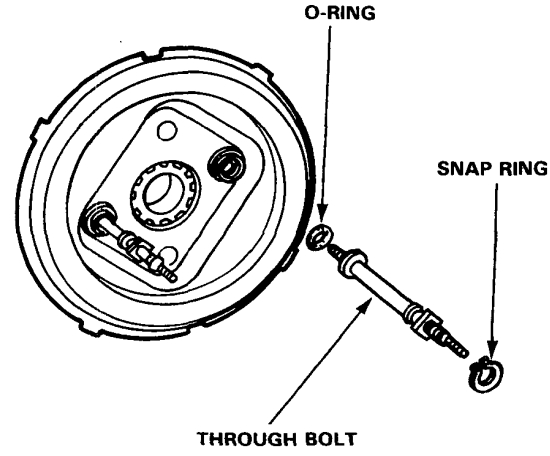
NOTE: Make sure the lip of the seal is facing in, as shown in drawing below.

7. Install the piston seal and bushing in the rear housing, and gently drive the retainer in until it is 6 mm below the edge of the rear housing.

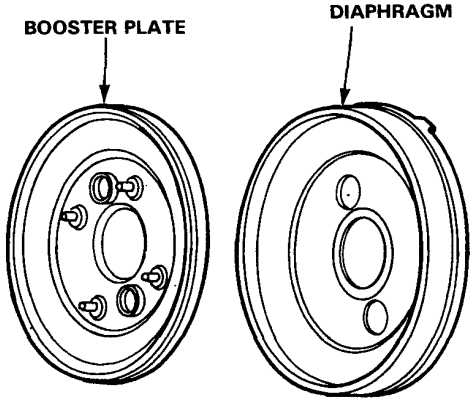
CAUTION: If you drive in the retainer more than 6 mm, you may distort the piston seal.



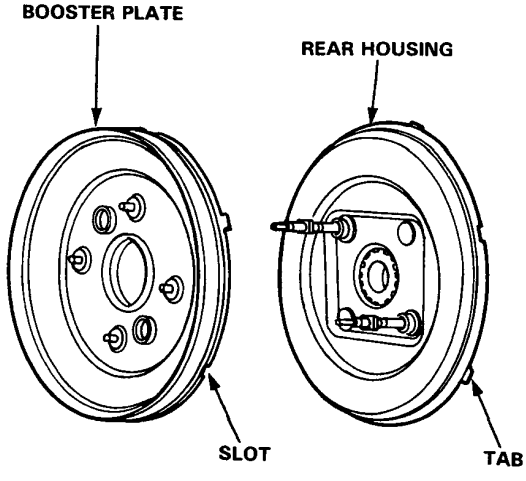
8. Install both through bolts, using the O-rings and snap rings.



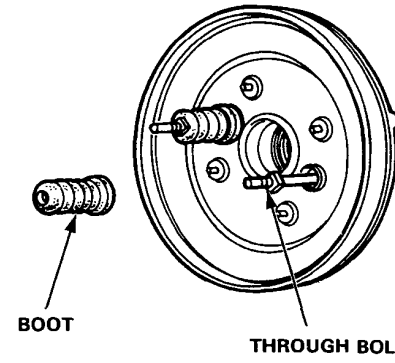
9. Install the diaphragm on the booster plate.



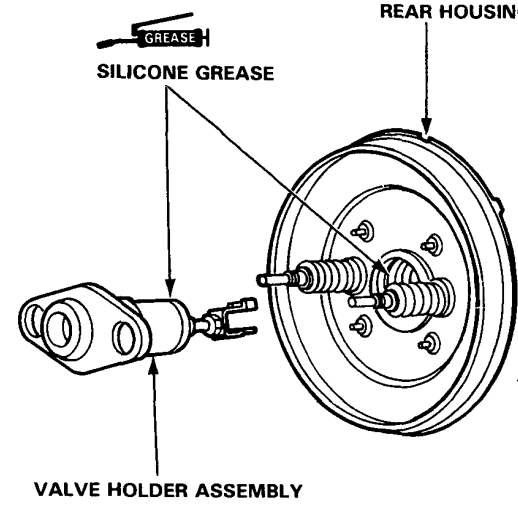
10. Attach the booster plate to the rear housing, aligning their tabs and slots.



11. Install the boots on the through bolts.



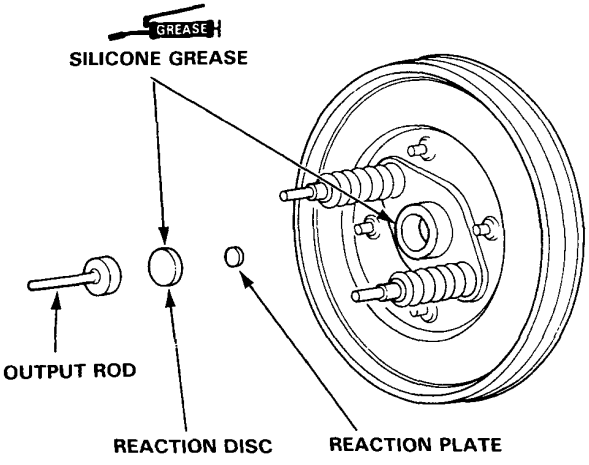
12. Apply silicone grease to the bore of the rear housing and the outer surface of the valve holder assembly. Install the valve holder assembly in the rear housing.



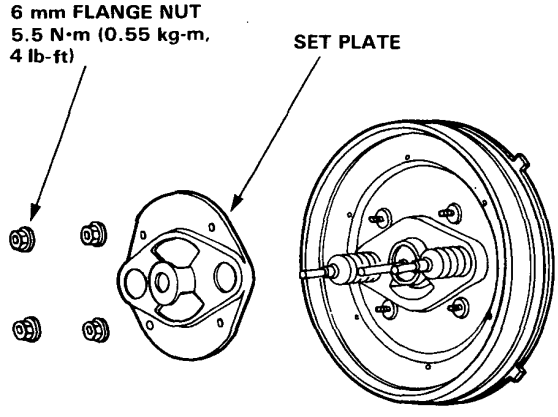
(cont'd)

Reassembly (cont'd)

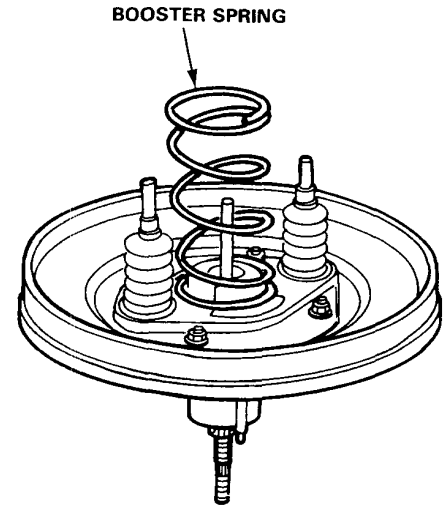
13. Apply silicone grease to the bore of the booster piston, then install the reaction plate, reaction disc and output rod.



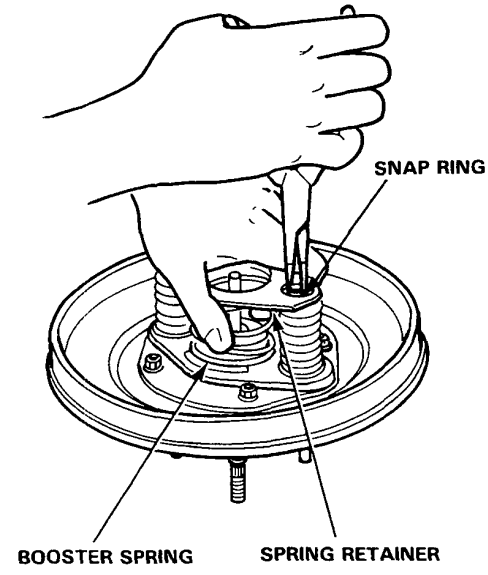
14. Install the set plate, and tighten the four 6 mm flange nuts.



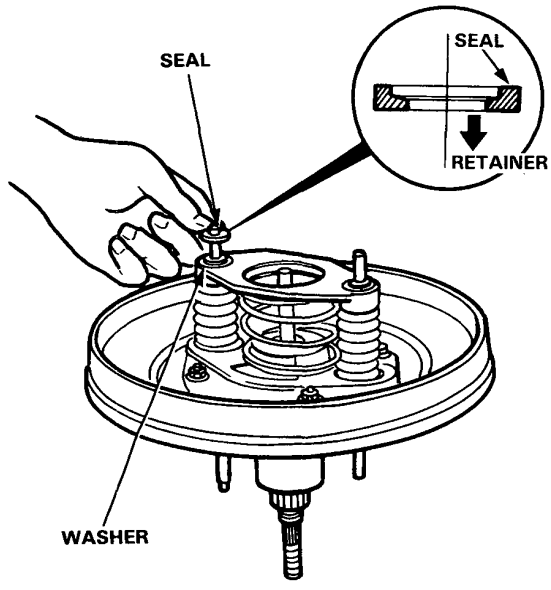
15. Install the booster spring.



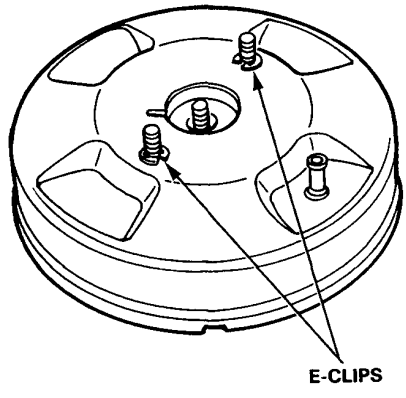
16. Install the spring retainer by compressing the booster spring, and installing the snap rings on the through bolts.



17. Install the washers and seals.



18. Assemble the front and rear housings.
Press down on the front housing, then install the E-clips on the through bolts.

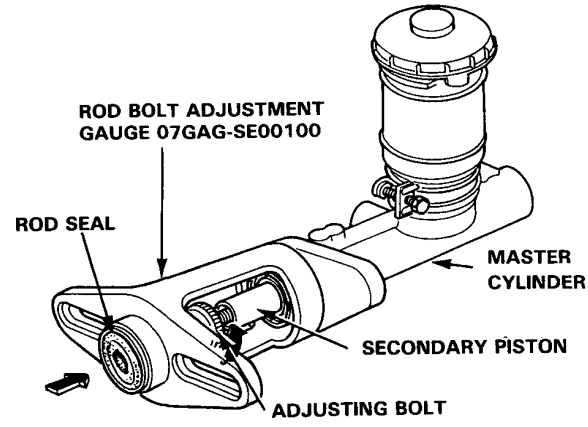


Pushrod Clearance Adjustment

A20A4 and B20A1 Engine Equipped Model

NOTE: Master cylinder pushrod-to-piston clearance must be checked and adjustments made, if necessary, before installing master cylinder.

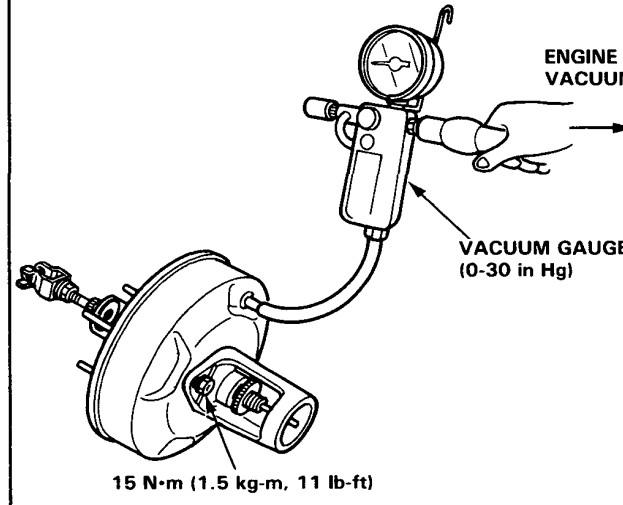
1. Using the Rod Bolt Adjustment Gauge, adjust bolt so the top of it is flush with end of master cylinder piston.



2. Without disturbing the adjusting bolt's position, put the gauge upside down on the booster.

3. Install the master cylinder nuts and tighten to the specified torque.

4. 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.



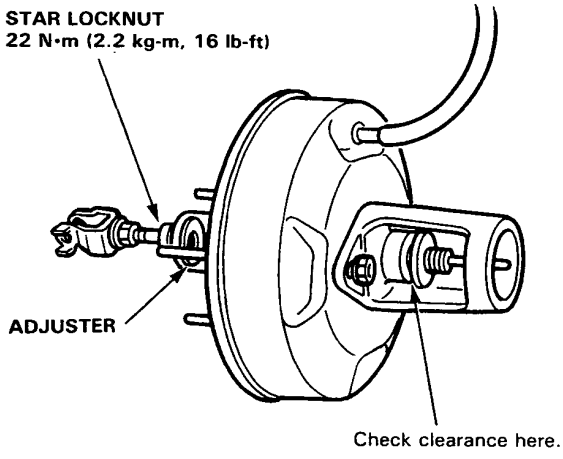
Pushrod Clearance Adjustment (cont'd)

5. With a feeler gauge, measure the clearance between the gauge body and the adjusting nut.

   CLEARANCE: 0—0.4 mm (0—0.016 in)

6. If clearance is incorrect, loosen star locknut and turn adjuster in or out to adjust. Hold the clevis while adjusting.

7. Tighten locknut securely.

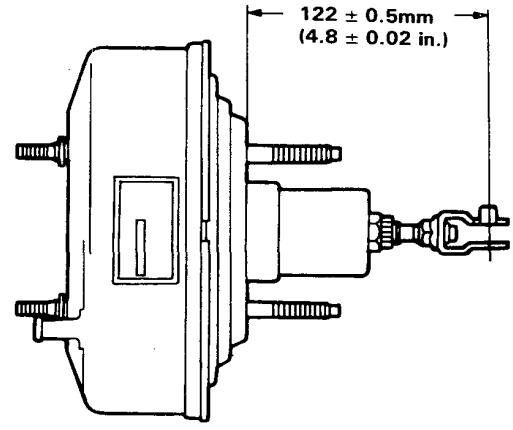


NOTE: When the clearance between the gauge body and adjusting nut is 0 mm (0.0 in.) while turning the booster adjuster, the clearance between the master cylinder and booster push rod is 0.4 mm (0.0016 in.).
If the clearance is 0.4 mm (0.0016 in.), the push rod clearance is 0 mm (0.0 in.).

Pushrod Adjustment

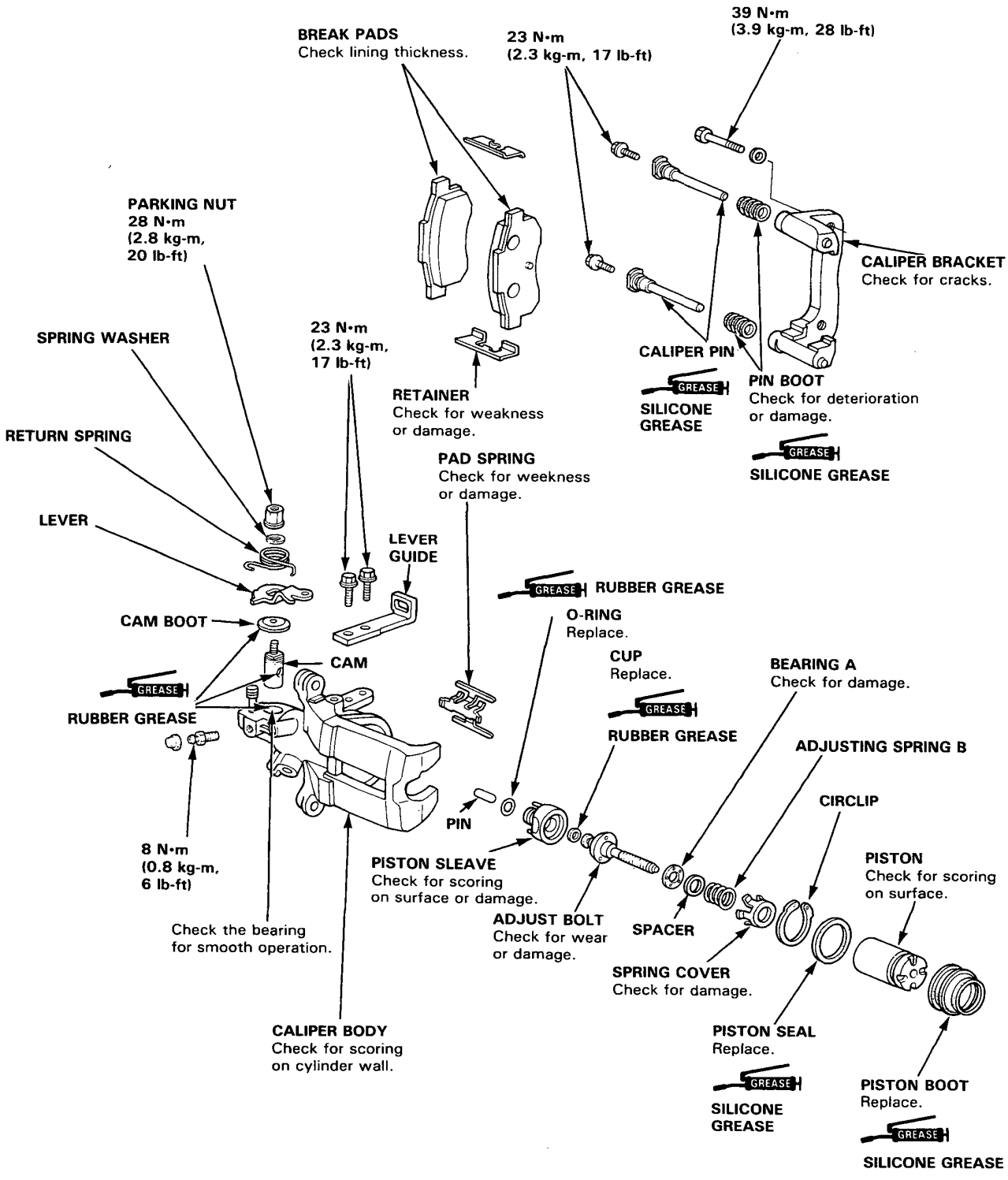
A20A4 and B20A1 Engine Equipped Model

Install the locknut and pushrod yoke on the pushrod, adjust the pushrod length as shown, then tighten the locknut.



Inspection

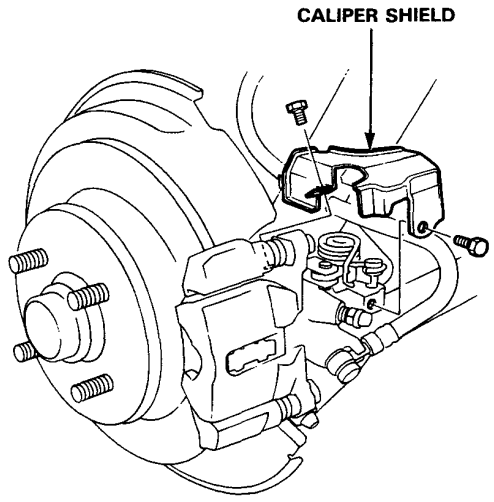
A20A4 and B20A1 Engine Equipped Model



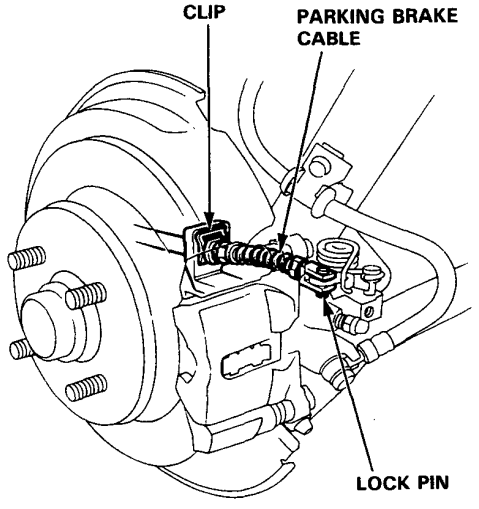
Inspection/Replacement

A20A4 and B20A1 Engine Equipped Model

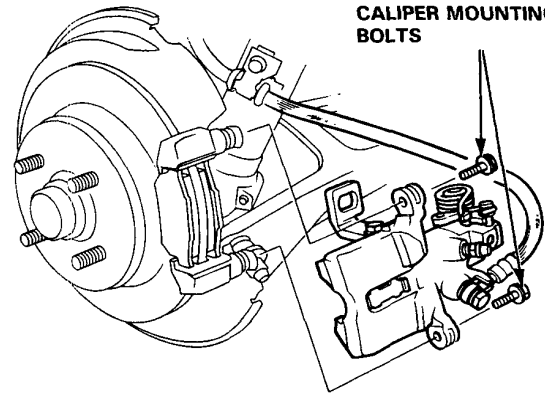
1. Remove the caliper shield.



2. Remove the parking brake cable from the caliper.



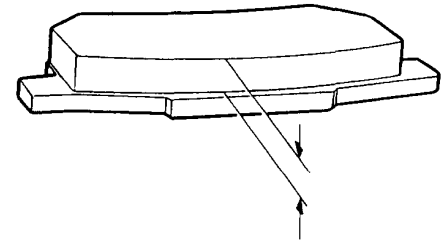
3. Remove the caliper mounting bolts, then remove the caliper.



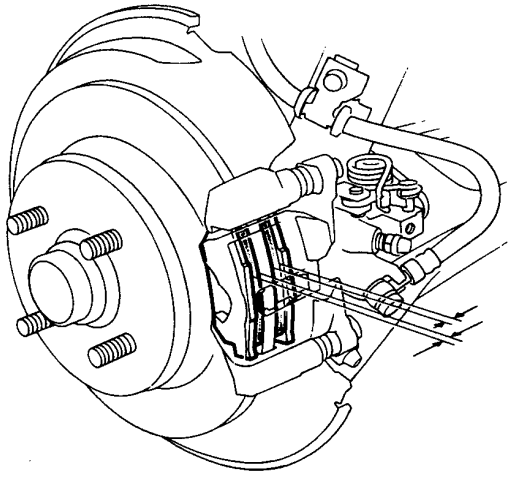
4. Remove the pads and, using a vernier caliper, measure the thickness of each brake pad lining.

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.)



5. If lining thickness is less than the service limit, replace both pads as a set.



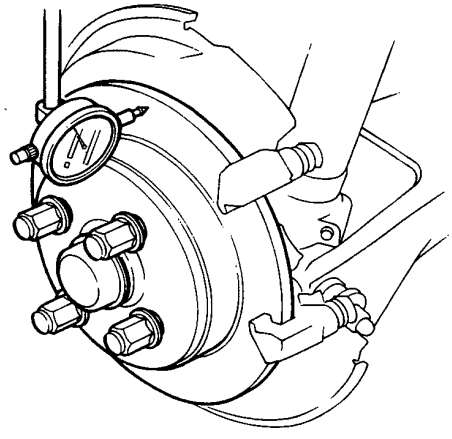
6. Remove the pads and pad guides.

7. Inspect the disc surface for grooves, cracks, and rust. Clean disc thoroughly and remove all rust.

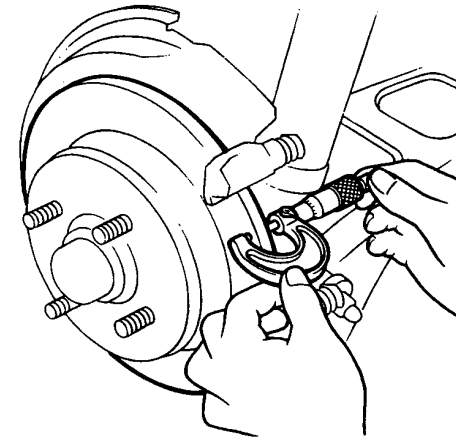
8. Mount a dial indicator as shown.

Brake Disk Runout:
Service Limit: 0.15 mm (0.006 in.)

9. Replace the disc if beyond the service limit. Remove the caliper bracket and the old disc, then install a new one.



10. Using a micrometer, measure the disc thickness at eight points, approximately 45° apart and 10 mm (0.39 in.) from the outer edge of the disc.



Replace the disc if it exceeds the following service limits:

Brake Disk Thickness:

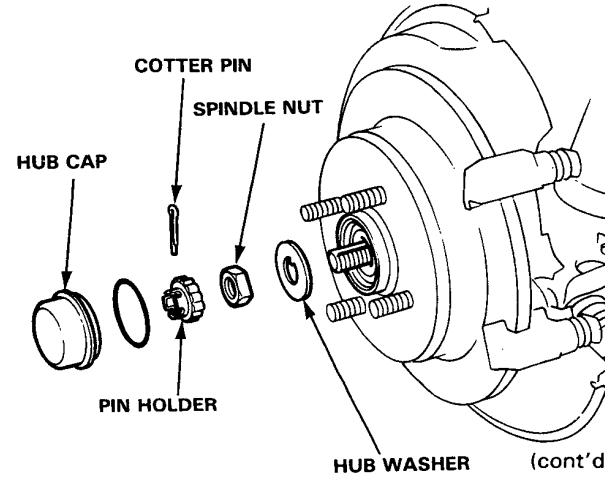
Standard	**10.0 mm (0.39 in.)**
Max. Refinishing Limit:	**8.0 mm (0.31 in.)**

Brake Disc Parallelism:
The difference between any thickness measurements should not be more than 0.015 mm (0.0006 in.)

11. Replace the disc if beyond the limits. Remove the caliper mount and the oild disc, then install a new one.

12. Remove the rear wheel bearing cap, then remove the cotter pin and pin holder.

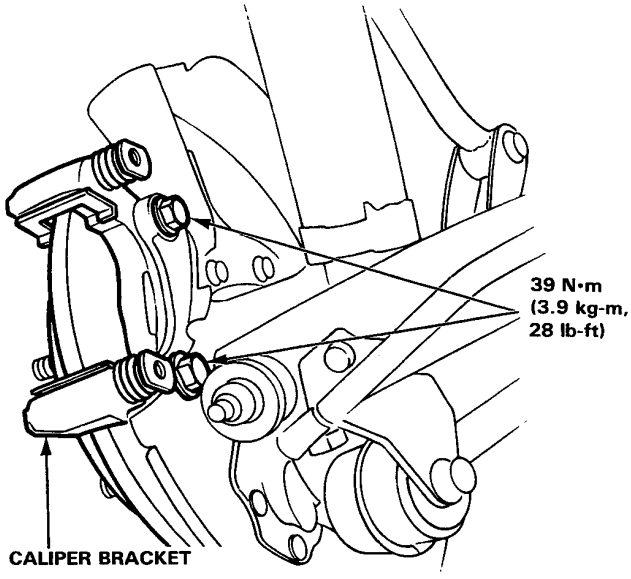
13. Remove the rear spindle nut and rear axle washer.



(cont'd)

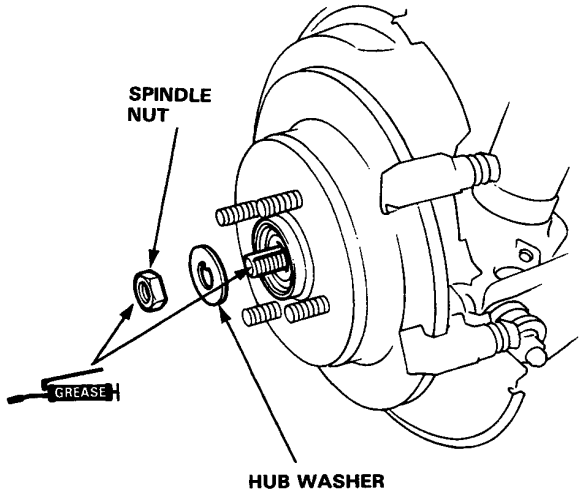
Inspection/Replacement (cont'd)

14. Remove the caliper bracket bolts, rear disc and caliper bracket.



15. Install a new disc and caliper bracket, then tighten the caliper bracket bolts.

16. Loosely install the rear axle washer and spindle nut.



17. Apply grease or oil on the spindle nut and spindle threads.

18. Install and tighten the spindle nut to 25 N·m (2.5 kg-m, 18 lb-ft) and rotate the brake disc 2-3 turns by hand, then retighten the spindle nut to 25 N·m (2.5 kg-m, 18 lb-ft).

19. Repeat the step 18. until the spindle nut does not loose.

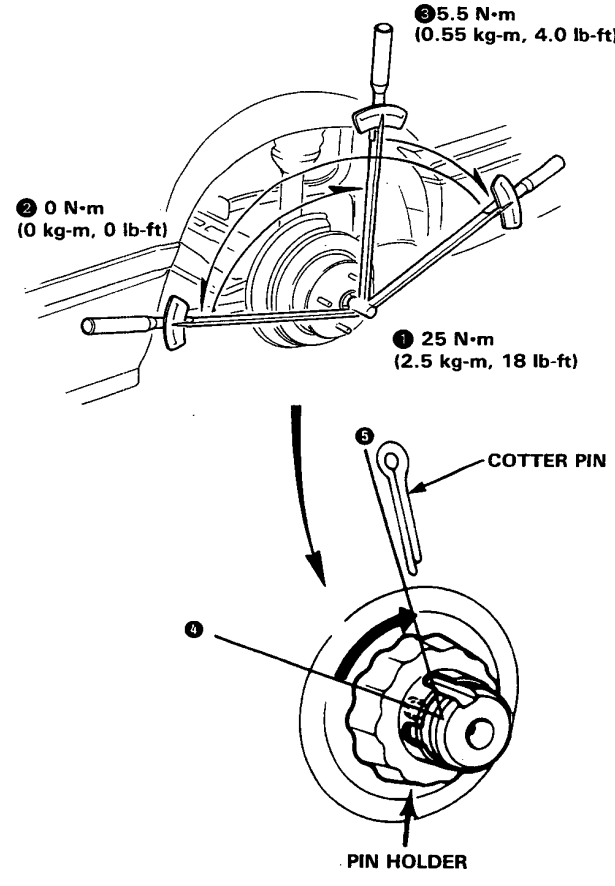
20. Loosen the spindle nut to 0 N·m (0 kg-m, 0 lb-ft).

CAUTION: Don't loosen beyond 0 N·m (0 kg-m, 0 lb-ft).

21. Retighten the spindle nut to 5.5 N·m (0.55 kg-m, 40 lb-ft).

22. Set the pin holder so slots will be as close as possible to hole in spindle.

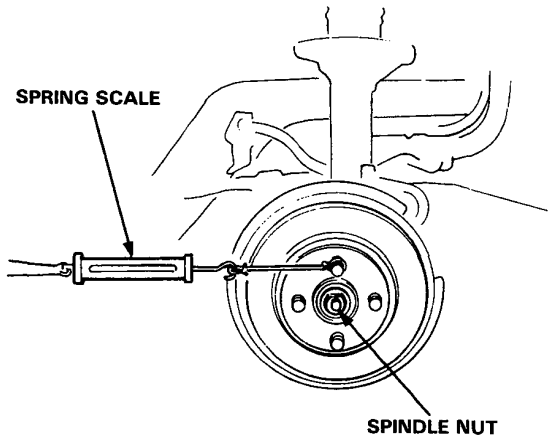
23. Tighten the spindle nut just enough to align slot and hole, then secure with a new cotter pin.



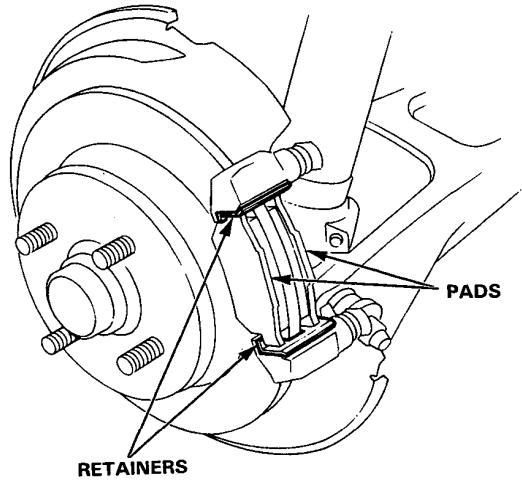
24. Check drag on rear bearing by turning the brake disc with spring scale.

Standard bearing drag:
4—18 N (4—8 kg, 0.9—4.0 lb)

If reading exceeds limit; check spindle nut torque and check for damaged bearing.



25. Clean the caliper thoroughly and remove all rust. Install the pad retainers.

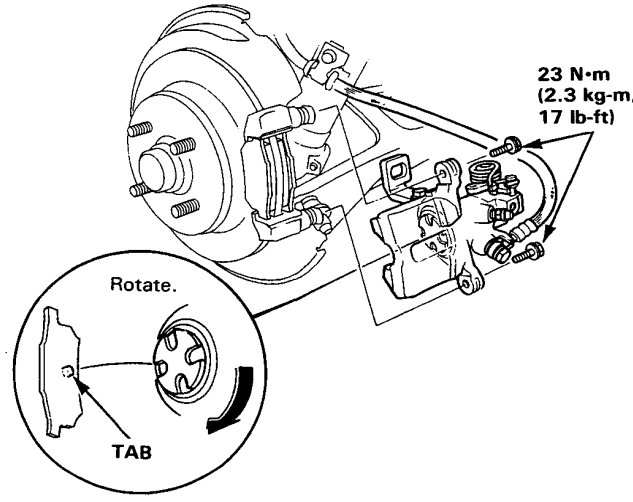


26. Install new brake pads as a set.

27. Rotate the caliper piston clockwise into place in the cylinder, then align the cutout in the piston with the tab on the inner pad by turning the piston back.

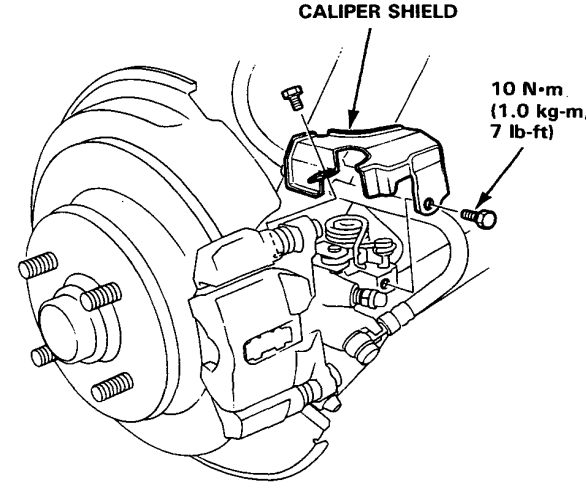
CAUTION: Avoid twisting the piston boot. If the piston boot is twisted, back it out so it sits properly.

28. Install the brake caliper.



29. Install the parking brake cable.

30. Install the caliper shield.



Brake Caliper

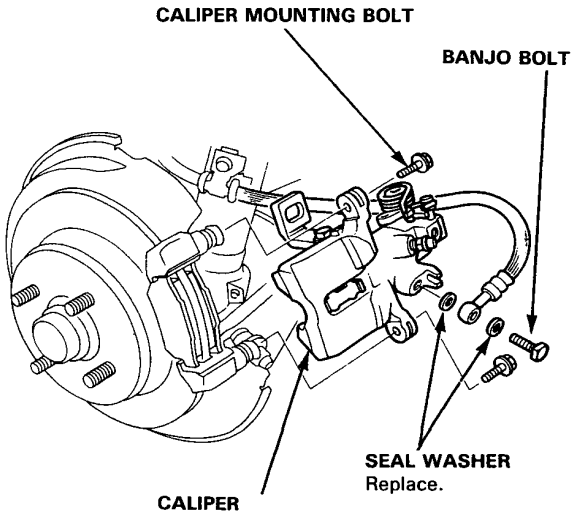
Disassembly

A20A4 and B20A1 Engine Equipped Model

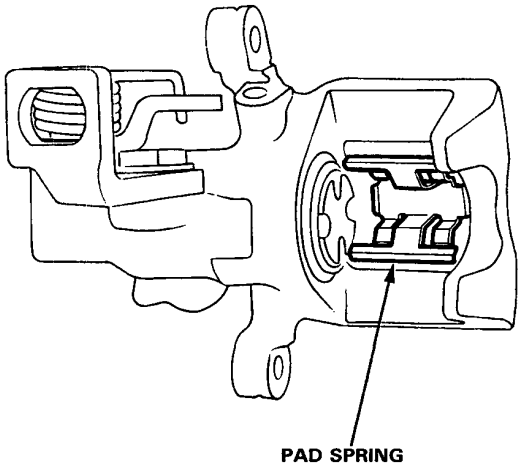
CAUTION:
- **Make sure all parts are clean before reassembly.**
- **Use only new replacement parts.**
- **Use only new clean brake fluid.**
- **Do not allow dirt or other foreign matters to contaminate the brake fluid.**
- **Do not mix different brands of brake fluid.**
- **Avoid spilled brake fluid on painted, plastic or rubber surfaces as its can damage the finish. Wash spilled brake fluid off immediately with clean water.**

1. Remove the caliper shield and disconnect the parking brake cable.
2. Remove the banjo bolt and remove the brake hose from the caliper.
3. Remove the two 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 inside.

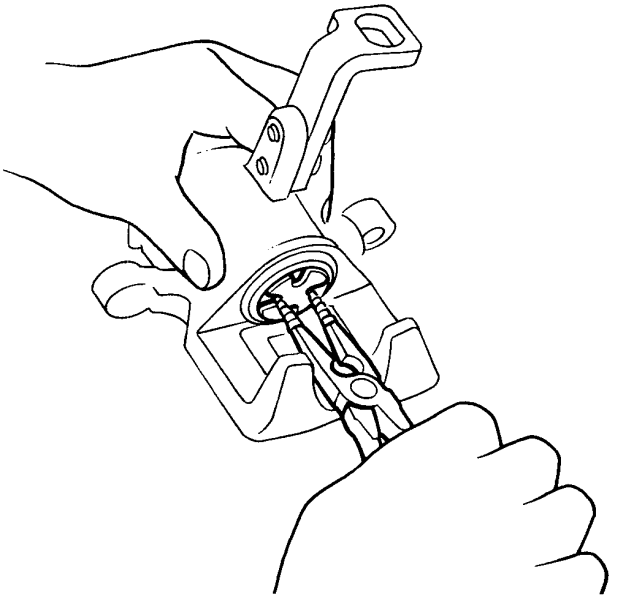


4. Remove the pad spring from the caliper.

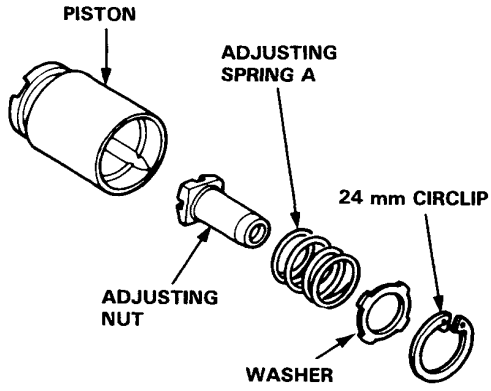


5. Remove the piston and piston boot while rotating the piston.

CAUTION: Avoid damaging the piston and piston boot.

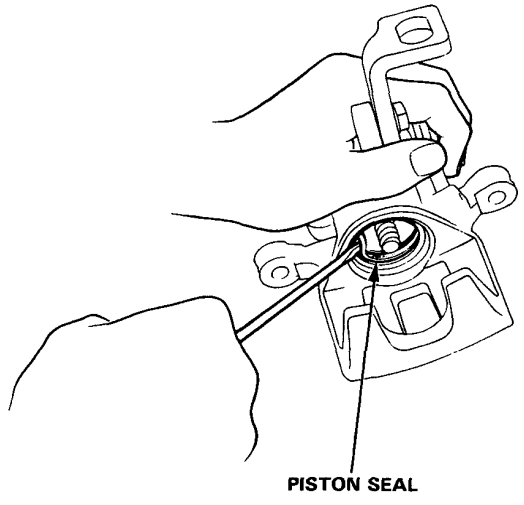


6. Remove the circlip, then washer, adjusting spring A, and the adjusting nut from the piston.



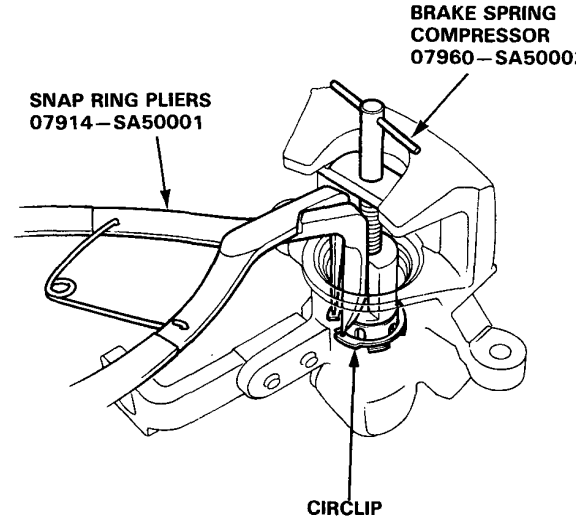
7. Remove the piston seal.

CAUTION: Take care not to damage the cylinder bore.

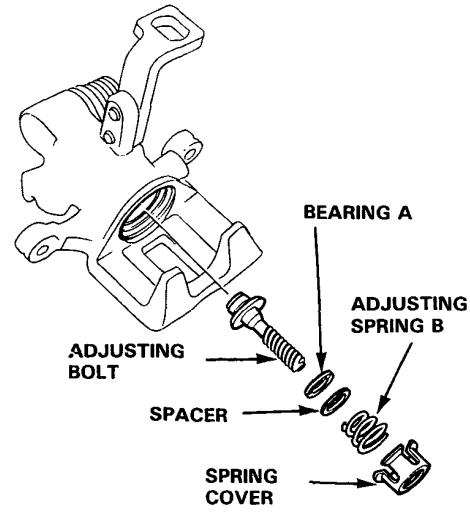


8. Install the special tool between the caliper body and spring guide as shown.

9. Compress the adjusting spring B by turning the shaft of the special tool, then remove the circlip with snap ring pliers.



10. Remove the spring cover, adjusting spring B, spacer, bearing A and adjusting bolt.



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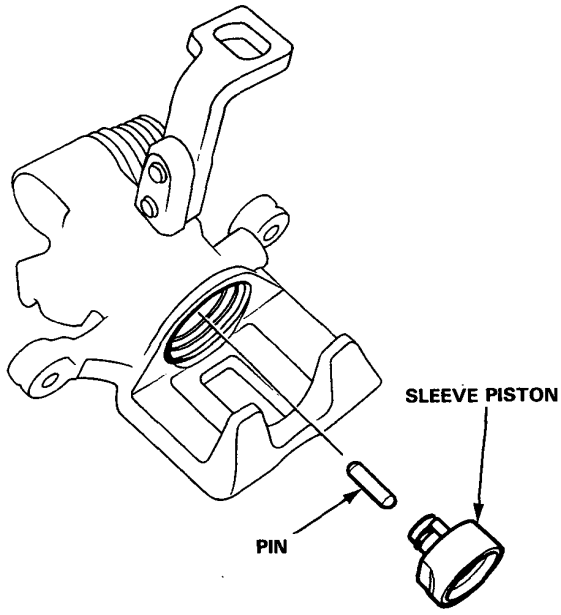
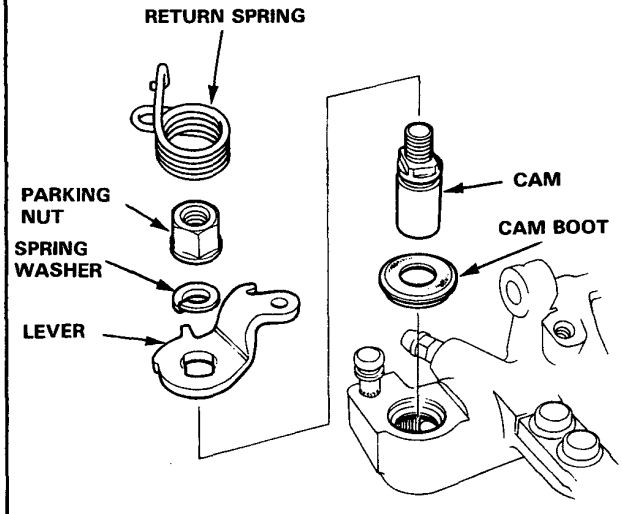
Disassembly (cont'd)

11. Remove the sleeve piston, and remove the pin from the cam.



12. Remove the return spring, parking nut, spring washer, lever, cam and cam boot.



Reassembly

A20A4 and B20A1 Engine Equipped Model

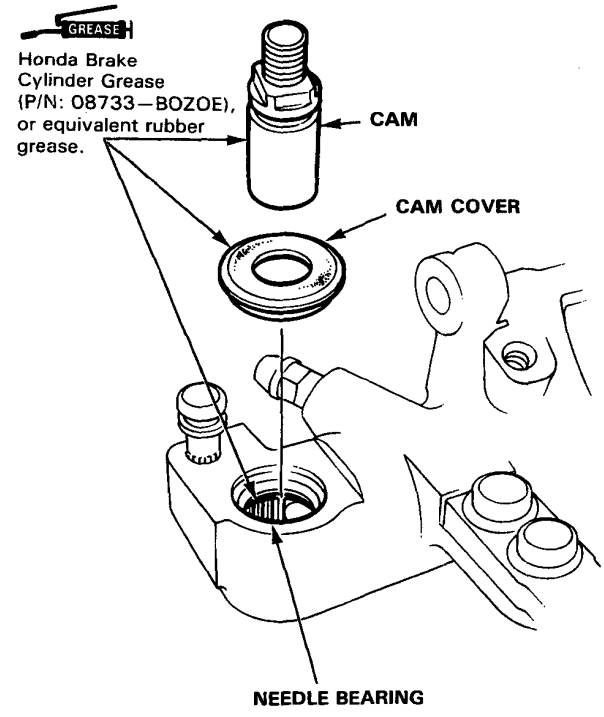
CAUTION:
- **Make sure all parts are clean before reassembly.**
- **Use only new replacement parts.**
- **Use only new clean brake fluid.**
- **Do not allow dirt or other foreign matters to contaminate the brake fluid.**
- **Do not mix different brands of brake fluid.**
- **Avoid spilling brake fluid on painted, plastic or rubber surfaces as it can damage the finish. Wash spilled brake fluid off immediately with clean water.**

1. Pack all cavities of the needle bearing with Honda Brake Cylinder Grease (P/N: 08733—BOZOE), or equivalent rubber grease.

2. Coat the new cam boot with Honda Brake Cylinder Grease (P/N: 08733—BOZOE), or equivalent rubber grease and install in the caliper.

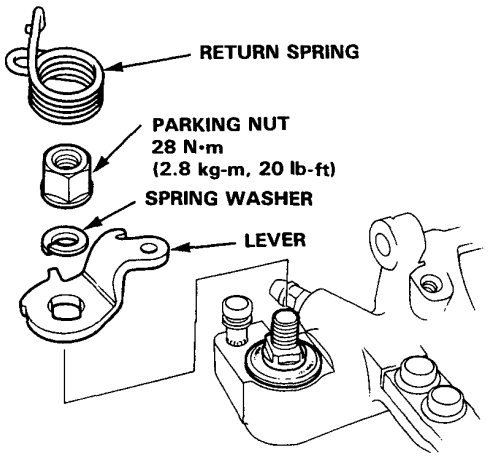
3. Install the cam with threaded end facing up.

   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.

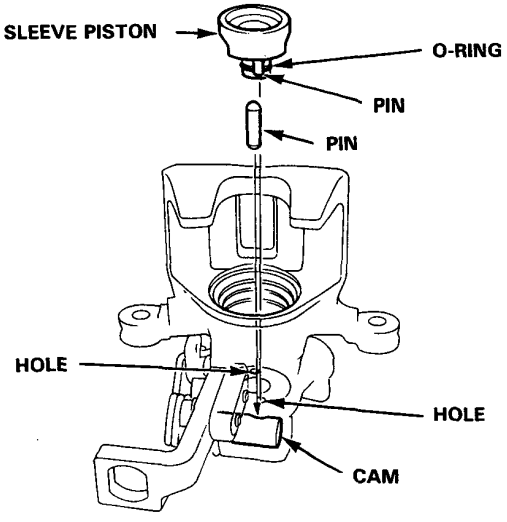
5. Install the return spring.



6. Install the pin in the cam.

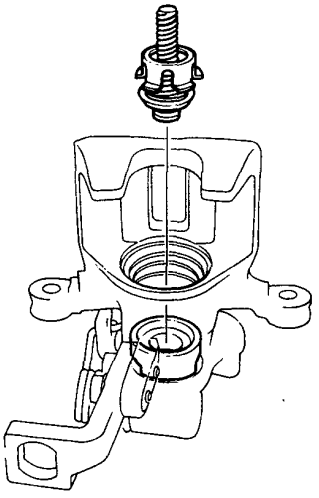
7. Install the new O-ring on the sleeve piston.

8. Install the sleeve piston so the hole in the bottom of the piston is aligned with the pin in the cam, and two pins on the piston is aligned with the holes in the caliper.

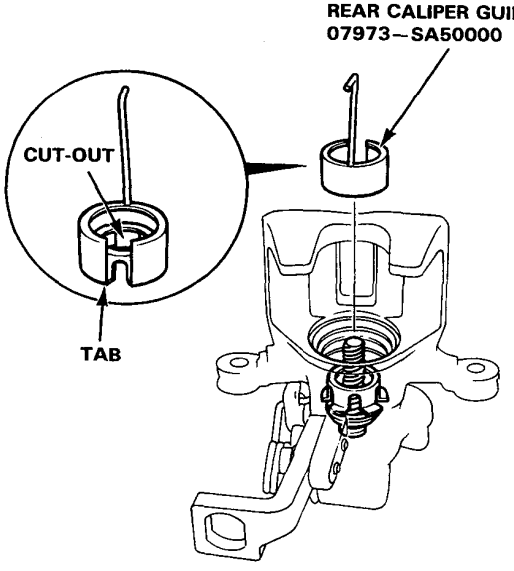


9. Install the new cup with its groove facing the bearing A side on the adjusting bolt.

10. Fit bearing A, the spacer, adjusting spring B and spring cover on the adjusting bolt, and install in the caliper cylinder.



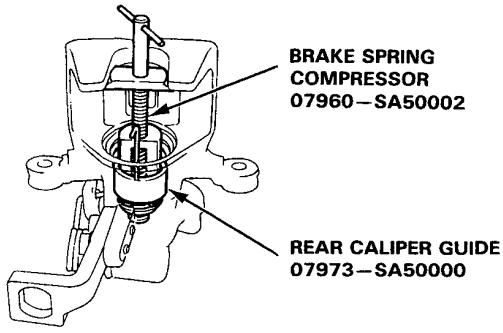
11. Install the rear caliper guide in the cylinder aligning, the cutout on the tool with the tab on the spring cover.



(cont'd)

Reassembly (cont'd)

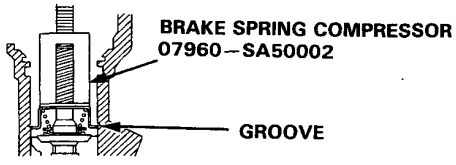
12. Install the brake spring compressor as shown.



13. Compress the spring until it bottom out.

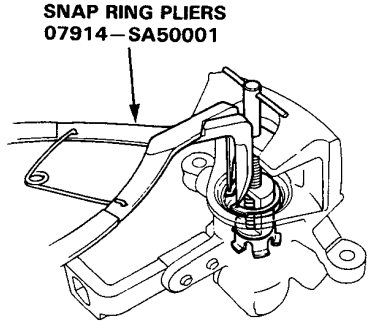
    NOTE: Check that the rear caliper guide doesn't hang up while the spring being is compressed.

14. Remove the rear caliper guide. Check that the flared end of the spring cover is below the circlip groove.

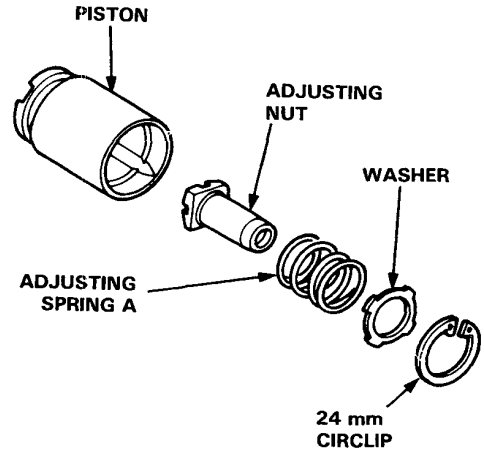


15. Install the circlip then remove the brake spring compressor.

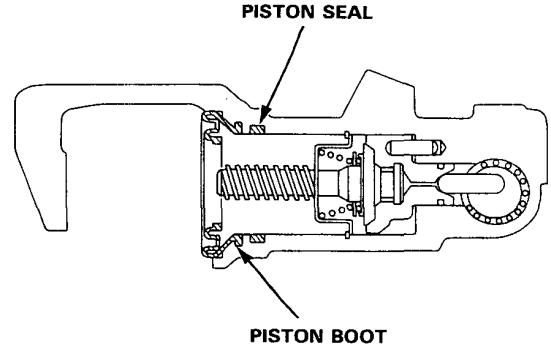
    NOTE: Check that the circlip is seated in the groove properly.



16. Install the adjusting nut, adjusting spring A, and washer, and secure with the circlip.

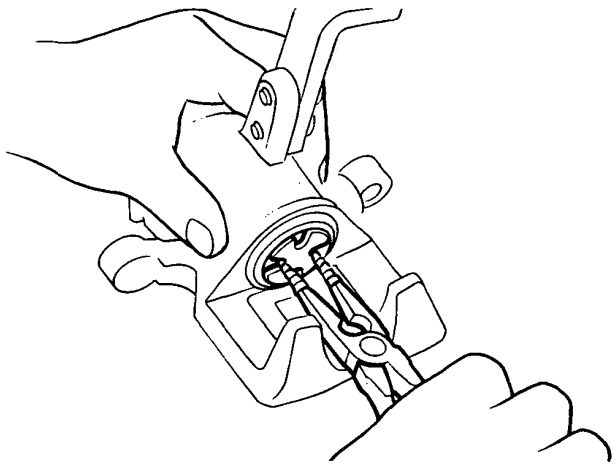


17. Coat the new piston seal and piston boot with silicone grease and install them in the caliper.

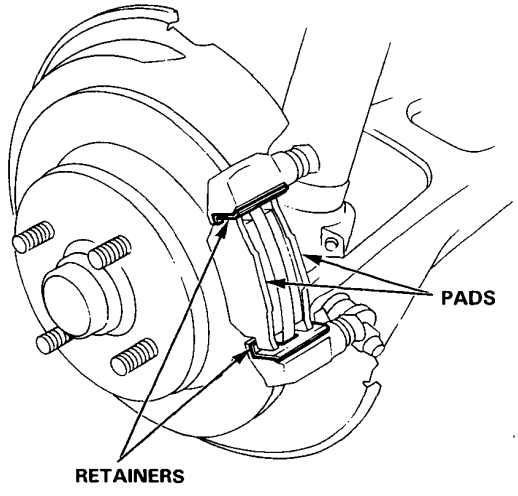


18. Coat the outside of the piston with silicone grease, and install it on the adjusting bolt while rotating it clockwise.

CAUTION: Avoid damaging the piston boot.

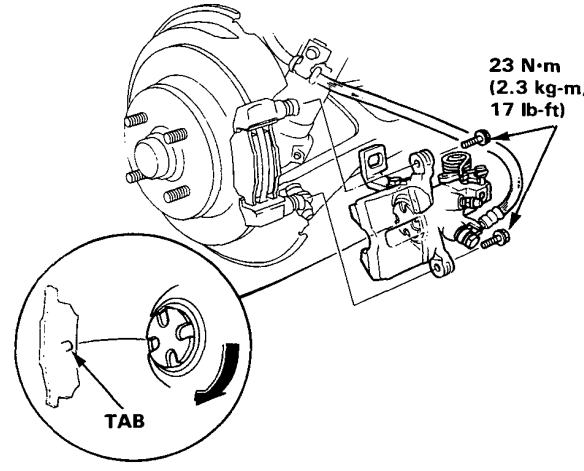


19. Install the brake pad retainers and brake pads.



20. Rotate the caliper piston clockwise into place in the cylinder, then align the cutout in the piston with the tab on the inner pad by turning the piston back.

21. Install the pad springs on the caliper.



22. Install the caliper on the caliper bracket and tighten the caliper mounting bolts.

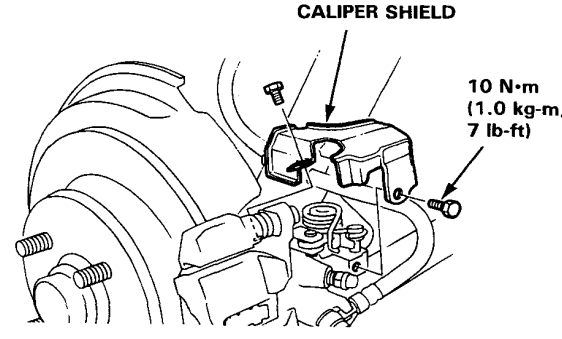
23. Connect the brake hose to the caliper with new sealing washers and tighten the banjo bolt.

24. Connect the parking brake cable to the arm on the caliper.

25. Operate the brake pedal several times, then adjust the parking brake lever (refer base manual 61SB002).

NOTE: Before adjustments, make sure the parking brake arm on the caliper touches with the pin.

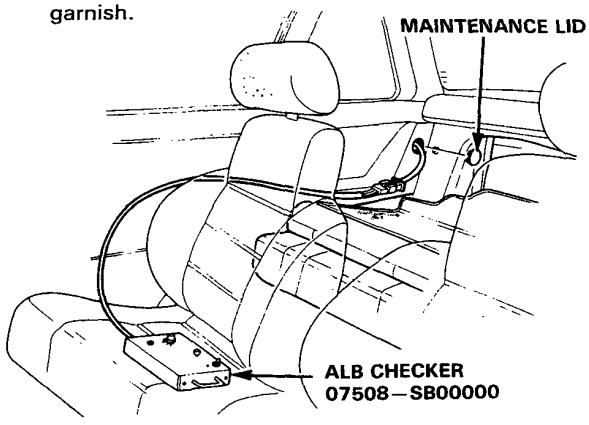
26. Install the caliper shield and tighten the bolts.



Functional Test

NOTE: Perform the following inspections. The procedures described below are to test each individual function of the system by simulating actual operating conditions.

1. Lean the rear seat back forward and remove the maintenance lid on the side garnish. Connect the ALB checker coupler to the 6-P coupler in the side garnish.

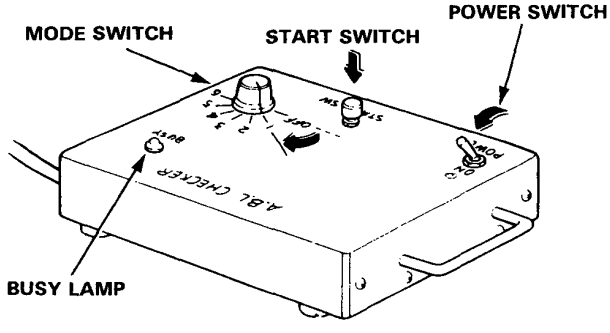


2. Start the engine, and release the parking brake lever.

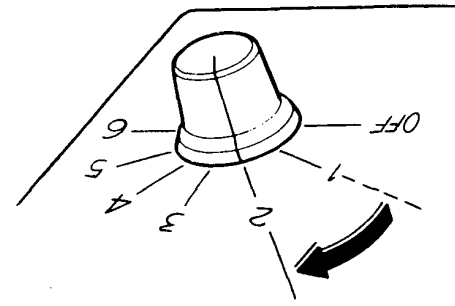
3. Depress the brake pedal to go out ALB warning lamp, then release the brake pedal.

   NOTE: Place the vehicle upright on level ground with the wheels blocked. Put the transmission in neutral for manual transmission models, and in P for automatic transmission models.

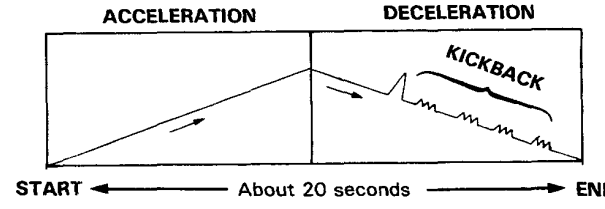
4. Operate the ALB CHECKER as follows:
   1) Turn the power switch ON.



   2) Turn the mode switch to "1".
   3) Press the start switch.
      - The [ALB], [(!)] or [BRAKE] Lamp should not go on while the BUSY Lamp is ON.
      - If the [ALB], [(!)] or [BRAKE] Lamp should go on, follow the steps described in TROUBLESHOOTING (page 21-40 or 46).
   4) Lightly pull up parking brake lever to first knotch until parking brake warning lamp is ON.
   5) Turn the mode switch further to "2".



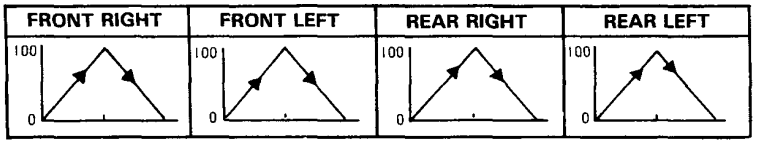
   6) Press the brake pedal down.
   7) Press the start switch.
      - MODE SWITCH POSITIONS 2,3 and 6.



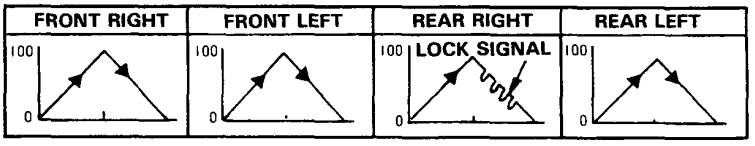
      - The ALB Lamp should not light while the BUSY Lamp is on. There should be kickback on the brake pedal.
      - If otherwise, follow the instructions described in TROUBLESHOOTING (page 21-40 or 46).
   8) Rotate the mode switch to "3" and perform the Steps (6) tru (7).
   9) Turn the mode switch to "4".
   10) Press the brake pedal.
   11) Press the start switch.
      - The ALB Lamp should not light while the BUSY Lamp is on. There should be no kickback on the brake pedal (slight kickback is normal).
   12) Rotate the mode switch to "5" and perform the Steps (10) thru (11).
   13) Turn the mode switch to "6" and perform the Steps (6) thru (7).

ALB Checker Operation

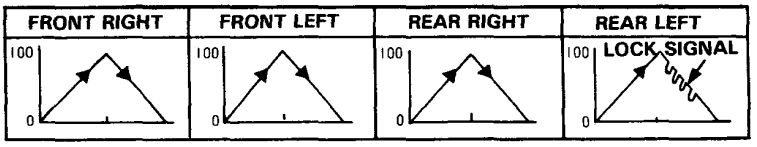
Mode 1: Send the driving signal simulated 0 km/h → 100 km/h → 0 km/h of each wheels to the control unit to check the control unit self diagnosis circuit.



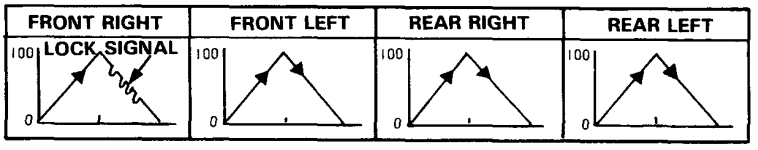
Mode 2: Send the driving signal of each wheels, then send lock signal of the rear right wheel to the control unit. There should be kickback.



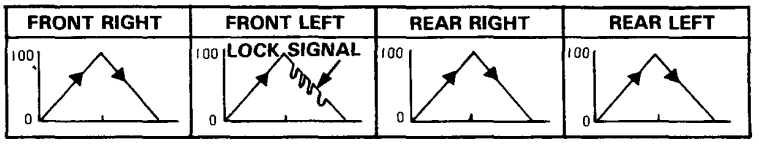
Mode 3: Send the driving signal of each wheels, then send the lock signal of the rear left wheel to the control unit. There should be kickback.



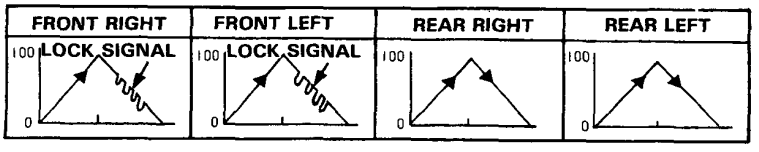
Mode 4: Send the driving signal of each wheels, then send the locking signal of the front right wheel to the control unit. There should be no kickback. (Slight kickback is normal)



Mode 5: Send the driving signal of each wheels, then send the locking signal of the front left wheel to the control unit. There should be no kickback. (Slight kickback is normal)



Mode 6: Send the driving signal of each wheels, then send the locking signal of the front wheels to the control unit. There should be kickback.



(cont'd)

Functional Test (cont'd)

Inspection points:

1. The ALB lamp go ON in mode 1.
   Check the wiring, if there is good condition, the control unit is faulty.

2. There are no kickback in mode 2, 3 and 6.

   Faulty pressure switch (remain ON)
   Open or shorted wires
   Faulty or disconneted power unit coupler
   Faulty power unit relay

3. Weak kickback in mode 2. 3 and 6.
   Bleed high pressure circuits.

4. Power unit does not stop in modes 1 to 6 and there are no kickback in modes 2, 3 and 6.

   Brake fluid leakage
   Bleed power unit.
   Clogged power unit outlet
   Clogged or deteriorated power unit hose

5. Power unit does not stop in modes 1 to 6 and there are kickback in modes 2, 3 and 6.

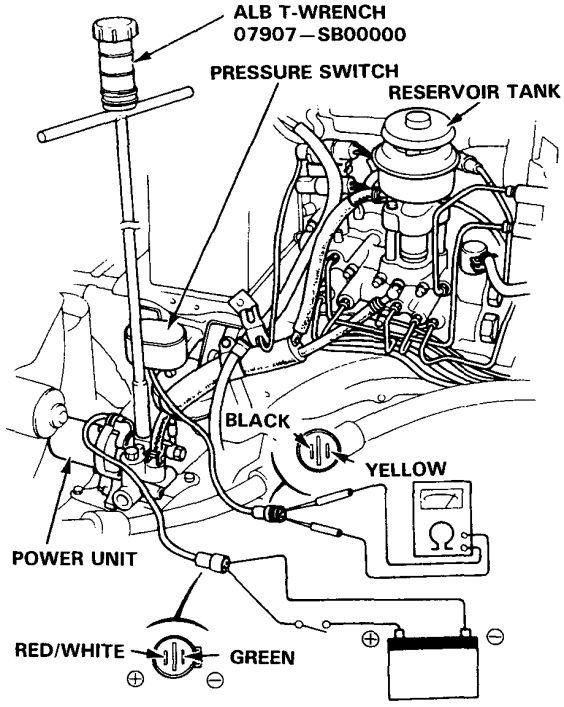
   Faulty pressure switch (remains OFF)
   Open or shorted circuit in pressure switch circuit
   Disconnected pressure switch coupler

Fluid Delivery

NOTE: Perform the following checks should the ALB Light go on due to faults in the high pressure circuits.

Pump delivery

1. Remove the red cap from the bleeder on the pump body.
2. Apply the ALB T-wrench to the bleeder and turn out the bleeder slowly about 90° to let the high pressure brake fluid go up into the wrench reservoir. Turn out the bleeder further one complete turn to aid in complete fluid recovery into the wrench reservoir.
3. Retighten the bleeder screw. Discard the brake fluid in the reservoir.
4. Check that the brake fluid reservoir tank is filled to the proper level.



5. Connect the probes of an ohmmeter to the Black and Yellow terminals of the accumulator pressure switch coupler.
6. Attach the positive (+) lead of a fully charged 12 V battery to the Red/White terminal of the power unit motor wire coupler (yellow), and negative (−) lead to the Green terminal. Hook up a battery switch between the battery positive terminal and Red/White terminal as shown.

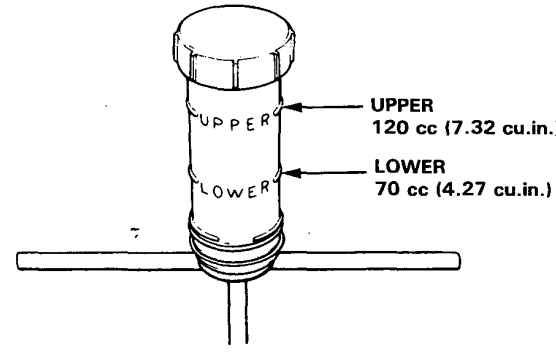
   NOTE: Use only a fully charged 12 V battery.

7. Turn the battery switch on and measure time before the tester shows continuity.

30—60 seconds approx.:	Normal
Less than 30 seconds:	Abnormal Replace pressure switch.
Over 60 seconds:	Abnormal (See Page 21-45 or 54)

Accumulator delivery

1. If the pump is normal, operate it further for 4 seconds.
2. Using the ALB T-wrench, again loosen the bleeder.



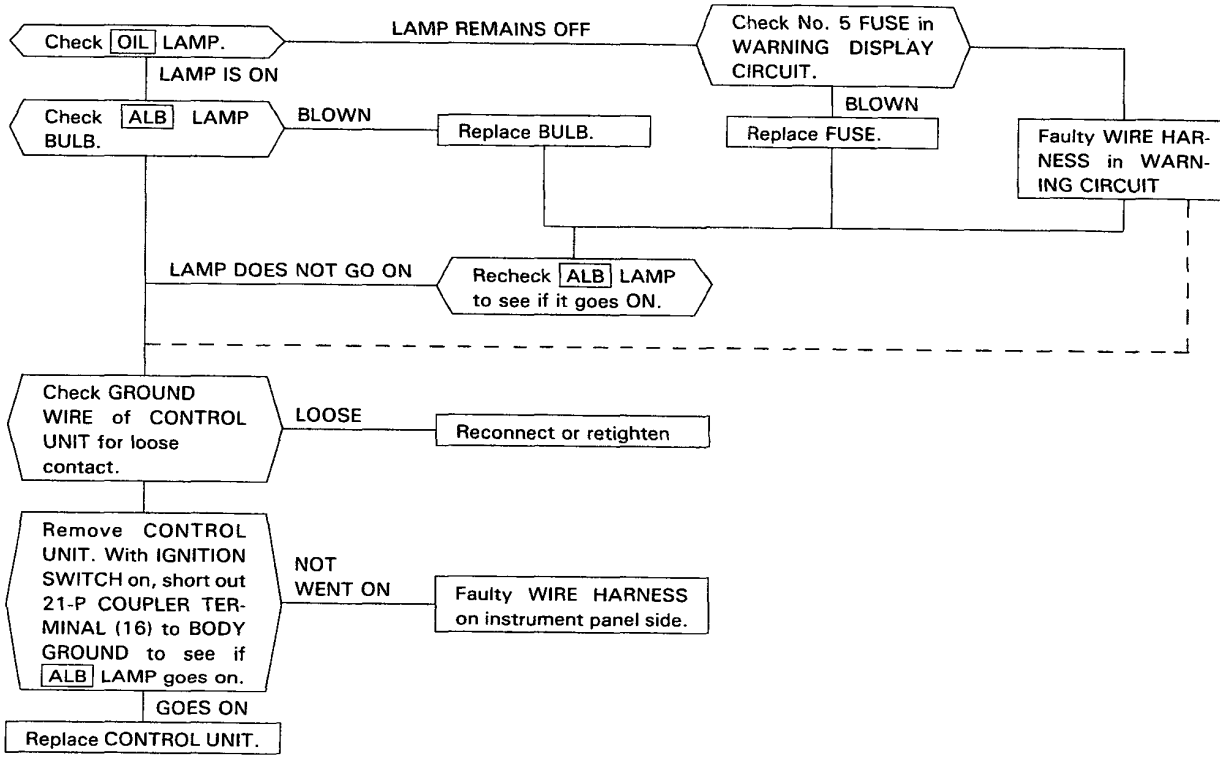
Between UPPER (120 cc, 7.32 cu.in.) and LOWER (70 cc, 4,27 cu.in.):	Normal
Over UPPER level:	Abnormal Replace accumulator.
Below LOWER level:	Abnormal (See Page 21-45 or 54)

Troubleshooting

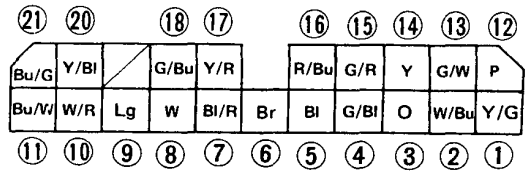
ET Engine Equipped Model

AT ENGINE STARTING

1. [ALB] lamp won't light (Lamp should go on when the ignition switch is turned on).

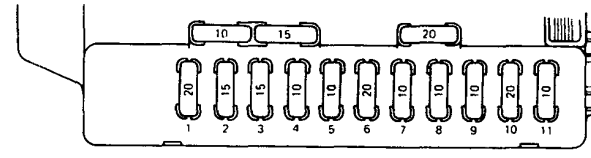


CONTROL UNIT 21-P COUPLER



* View from wire side.

FUSE BOX ASSY



2. [ALB] lamp remains ON when brake pedal is depressed after engine is started.

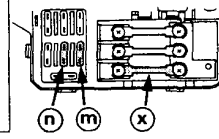
Check if STOPLIGHTS come ON when BRAKE PEDAL is depressed.
- REMAINED OFF → Check for BLOWN BULB. Check for BLOWN FUSE. Check for faulty STOPLIGHT SWITCH at pedal.
- LIT

Disconnect CONTROL UNIT COUPLER and measure voltage between TERMINAL (13) of 21-P COUPLER and BODY.
- 10—14 V INDICATED
- → Check for faulty STOPLIGHT SWITCH at pedal. Check WIRE HARNESS.

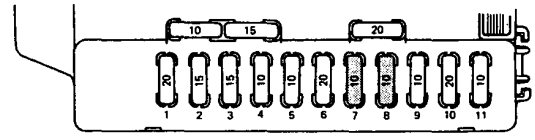
Check [CHG] LAMP.
- REMAINED ON
- REMAINED OFF → Check AC GENERATOR
- WENT OFF

Disconnect CONTROL UNIT COUPLER. With IGNITION SWITCH on, measure voltages between TERMINAL (7), (8), (24) OR (29) of 11-P and 21-P COUPLERS and BODY.
- 0 V
- NO VOLTAGE INDICATED → Check following FUSES and replace if necessary:
  No. 20 in FUSE BOX for terminal (7)
  No. x in ENGINE ROOM RELAY BOX for terminal (8)
  No. 8 in FUSE BOX for terminal (24)
  No. (m) in ENGINE ROOM RELAY BOX for terminal (29)

ENGINE ROOM RELAY BOX



FUSE BOX ASSY



- 10—14 V INDICATED

Disconnect CONTROL UNIT COUPLER. With IGNITION SWITCH on, short out TERMINAL (12) of 21-P COUPLER to BODY. Check that 10—14 V appears between TERMINAL (10) and BODY.
- → Check FUSE (n) in ENGINE ROOM RELAY BOX (10) and replace if necessary.

Disconnect CONTROL UNIT COUPLER. With IGNITION SWITCH on, short out TERMINAL (12) of 21-P COUPLER to BODY.

Disconnect CONTROL UNIT COUPLER. With IGNITION SWITCH on, short out TERMINAL (12) of 21-P COUPLER to BODY. Check that 10—14 V appears between TERMINAL (10) and BODY GROUND.
- NO VOLTAGE INDICATED
- 0 V → Replace FAILSAFE RELAY.

Disconnect CONTROL UNIT COUPLER and check taht resistance between TERMINAL (9), (20), (28) or (30) of 11-and 21-P COUPLER and BODY is 2.5—10 Ω.
- THERE IS 0 Ω READING. (OVER OR UNDER 2.5—10 Ω)
- 2.5—10 Ω

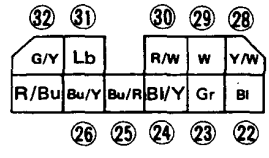
Check RELATIVE SOLENOID (9) • (20) FRONT SOLENOID (28) • (30) REAR SOLENOID Check FAIL-SAFE RELAY OF RELAY BOX.
- CORRECTED → WIRE HARNESS pinched between SOLENOID and CONTROL UNIT, etc.

Replace SOLENOID.

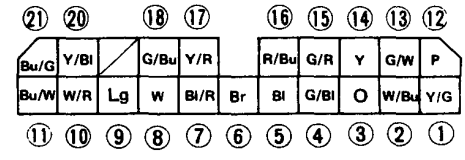
Replace CONTROL UNIT.

CONTROL UNIT

11-P COUPLER



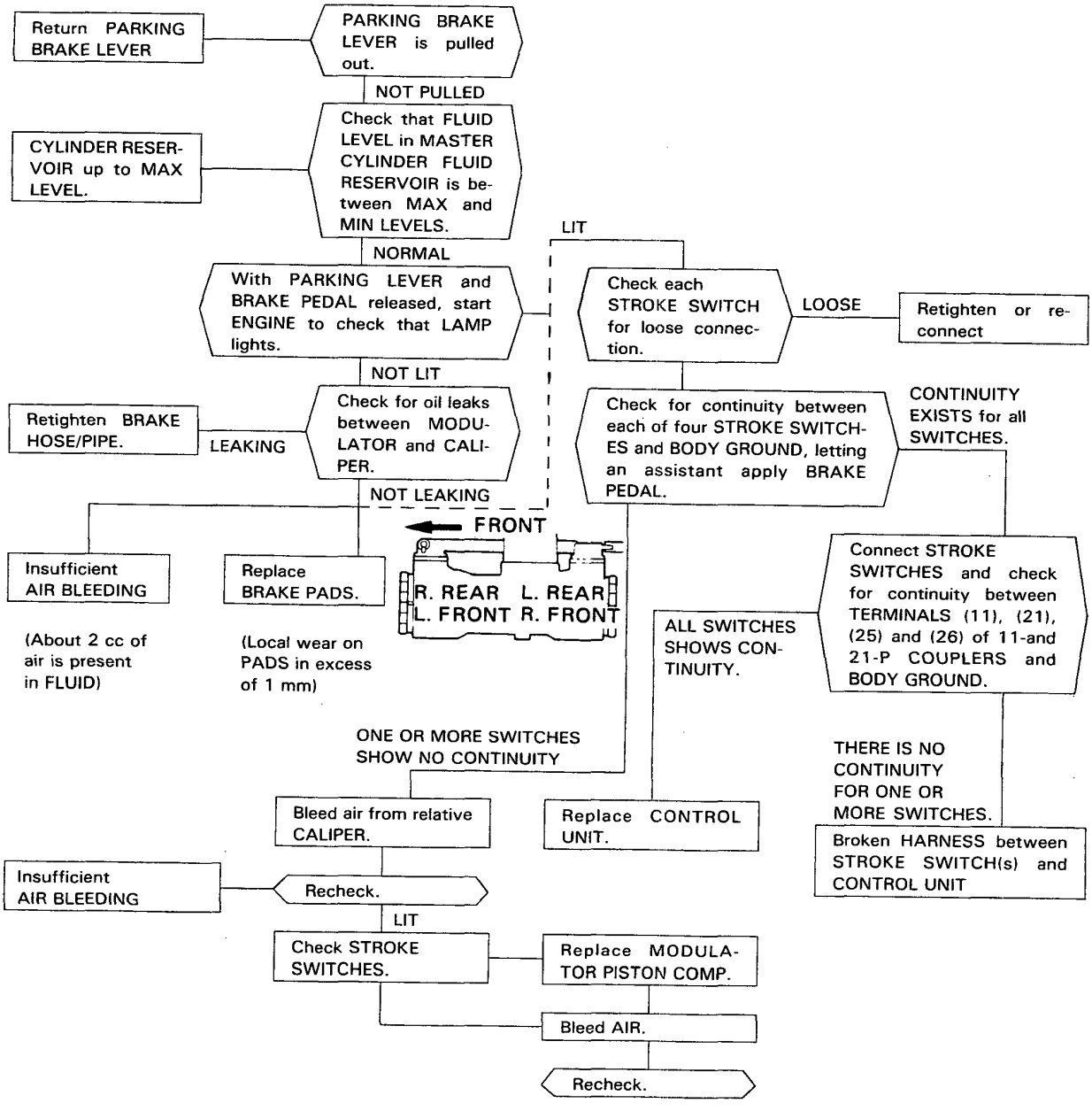
21-P COUPLER



(cont'd)

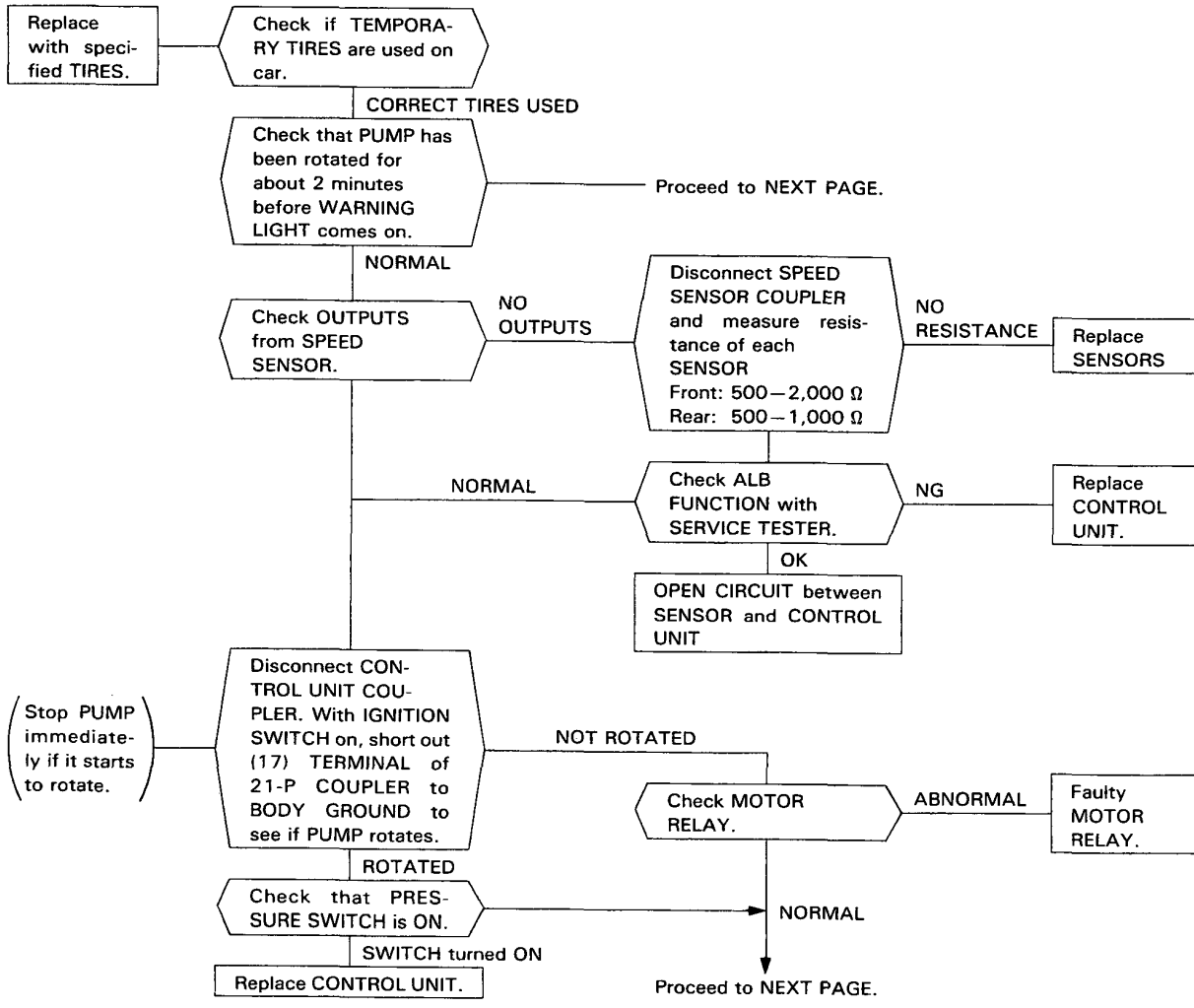
Troubleshooting (cont'd)

3. (!) OR BRAKE LAMP won't go OFF (LAMP should be reset after engine has been restarted).

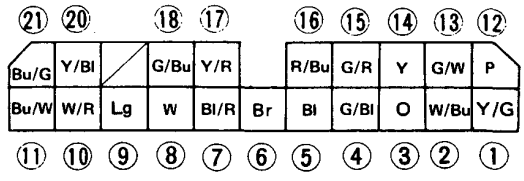


DURING RUNNING

1. **ALB lamp comes on or remains on. (Remains on or comes on frequently.....ABNORMAL)**



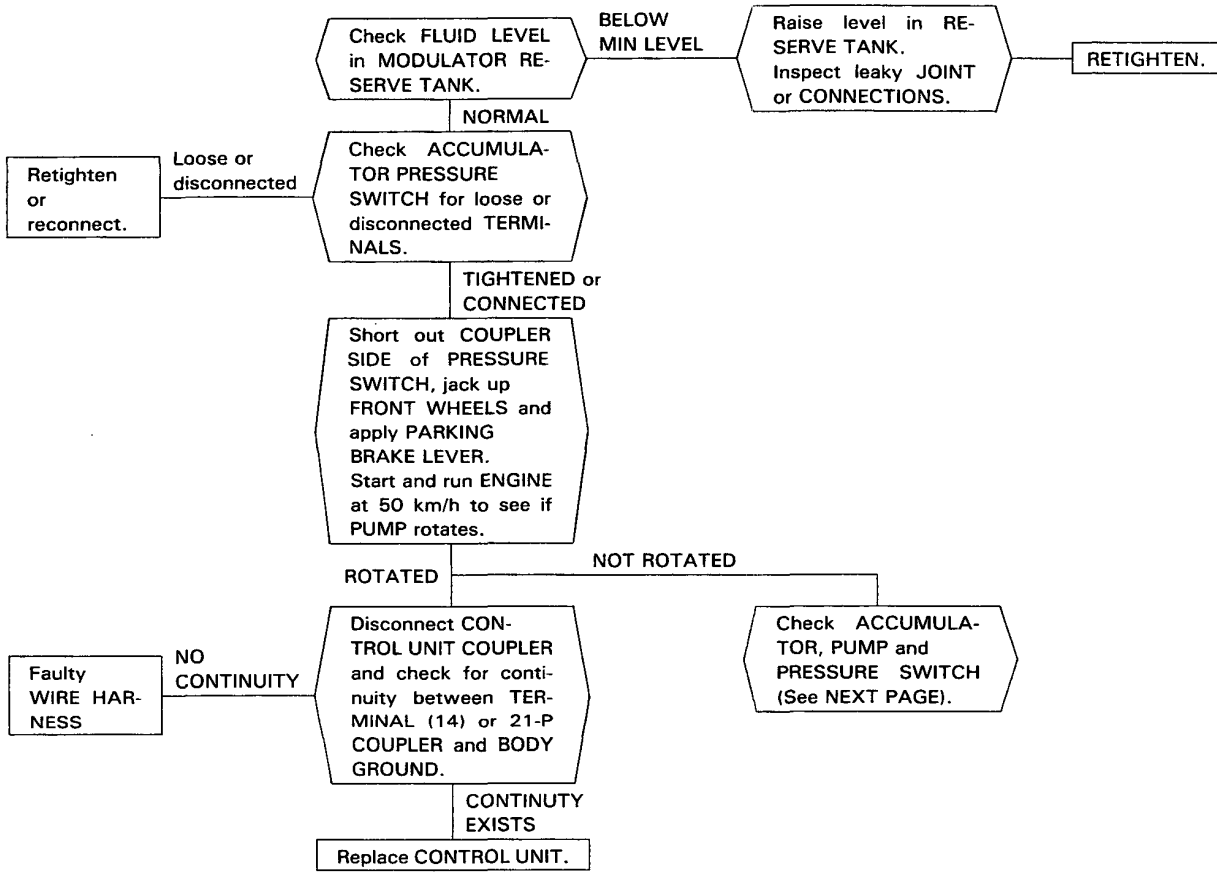
CONTROL UNIT 21-P COUPLER



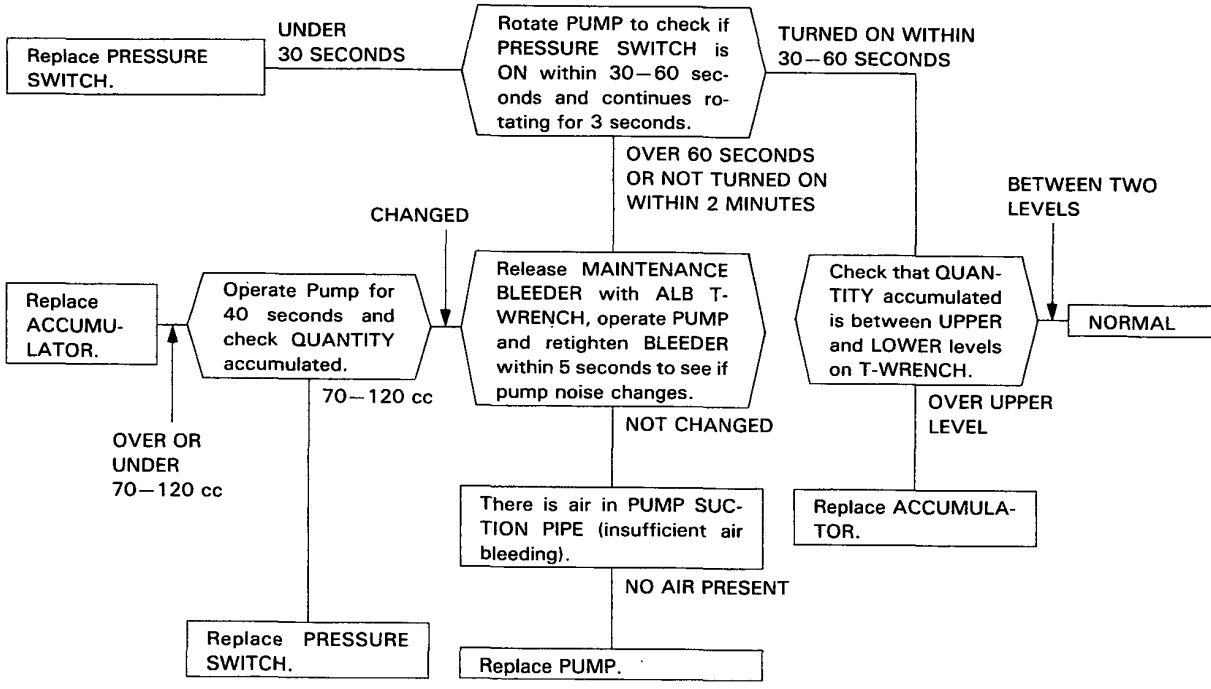
(cont'd)

Troubleshooting

2. **Too frequent pump rotation; [ALB] lamp also comes ON (Pump may rotate when ALB SYSTEM is operated. System is normal if pump is rotated for about 15 seconds, 1—2 times/day when car is used every day).**



INSPECTION OF ACCUMULATOR, PUMP AND PRESSURE SWITCH



Troubleshooting

A20A4 and B20A1 Engine Equipped Model

1. THE [ALB] lamp does not go on (after the engine is started).

Turn the ignition switch ON.

Check the other warning lamps.
- Lamps remain OFF. → Turn the ignition switch OFF. → Check the No. 5 fuse (10 A) in the fuse box.
  - Blown → Replace the fuse and recheck.
  - NORMAL → Open wire harness between the No. 5 fuse and combination meter
- Lamps are ON.

Turn the ignition switch OFF.

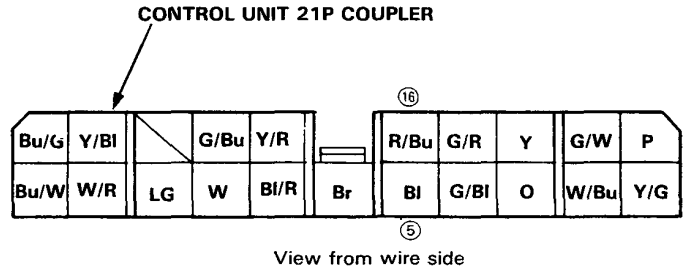
Check for continuity between ALB ground wire and body ground.
- Poor or No → Repair ground and recheck.
- YES

Disconnect the control unit 21-P coupler.

Short the 16 terminal (Red/Blue) with 5 terminal (Black) using a jumper wire.

Turn the ignition switch ON.

Check the [ALB] lamp goes ON.
- Not went ON → Open the Red/Blue wire between the ALB lamp and Control Unit, or blown ALB lamp
- Goes ON → Replace Control Unit



View from wire side

2. [ALB] lamp remains ON when the brake pedal is depressed after the engine is started.

- Check the [CHG] lamp goes OFF.
  - NO → Check the charging circuit.
- Stop the engine and disconnect the 21-P control unit coupler.
- Check for continuity of the No. 2 terminal (White/Blue) and alternator.
  - No continuity → Open wire harness
  - Continuity
- Depress the brake pedal and check the stoplight come ON.
  - Remain OFF. → Check the stoplight, horn fuse (15 A).
    - Blown → Replace and re-check
    - Blown stoplight bulb, or open of Green/White or White/Green wires.
  - Come ON.
- Check for continuity of the No. 13 terminal (Green/White) and Brake switch.
  - No continuity → Open wire harness
  - Continuity
- Check the voltage between the No. 8 (White: Positive) and No. 5 (Black: Negative) terminals.
  - No voltage → Blown ALB fuse (35 A); Open White wire between ALB fuse (35 A) and Control Unit
  - Battery voltage
- Disconnect the 11-P coupler from the Control Unit.
- Check the voltage between the No. 29 (White: Positive) and No. 22 (Black: Negative) terminals.
  - No voltage → Blown ALB 2 fuse; Open White wire between the ALB 2 fuse and Control Unit
  - Battery voltage
- Turn the ignition switch ON.

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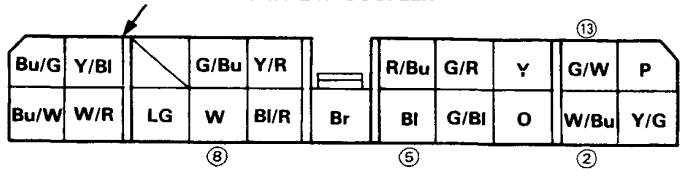
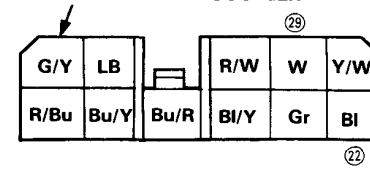
CONTROL UNIT 21P COUPLER



View from wire side

CONTROL UNIT 11P COUPLER



View from wire side

(cont'd)

Troubleshooting

Check voltage between the No. 7 (Black/Red: Positive) and No. 5 (Black: Negative) terminals of the 21-P coupler.
- No voltage
  - Blown No. 7 fuse
  - Open Black/Red wire between the No. 7 fuse and Control Unit.

Battery voltage

Check voltage between the No. 24 (Black/Yellow: positive) and No. 22 (Black: Negative) terminals of the 11-P coupler.
- No voltage
  - Blown No. 8 fuse.
  - Open Black/Yellow wire between the No. 8 fuse and Control Unit.

Battery voltage

Turn the ignition switch OFF.

Short the No. 12 (Pink) and No. 5 (Black) wires of the 21-P coupler, then turn the ignition switch ON.

Check voltage between the No. 10 (White/Red: Positive) and No. 5 (Black: Negative) terminals of the 21-P coupler.
- No voltage
  - Blown ALB 1 fuse
  - Open white wire between the ALB 1 fuse and indoors Fail Safe Relay
  - Open White/Red wire between the Indoor Fail Safe Relay and Control Unit
  - Faulty indoors Fail Safe Relay
  - Open White/Red wire between the No. 7 fuse and Indoors Fail Safe Relay
  - Open Pink wire between the indoors Fail Safe Relay and Control Unit

Battery voltage

Measure the resistance between the No. 9 (Light Green) and No. 5 (Black) terminals of the 21-P coupler.

There are 2.5—10 ohms
- No
  - If there is 0 ohm;
    Shorted front solenoid
    Shorted Brown/Black wire between the engine room Fail Safe Relay and Front Solenoid
  - If there is no continuity;
    Faulty Front Solenoid
    Open Brown/Black wire between the engine room Fail Safe Relay and Front Solenoid
    Open Black wire between engine room Fail Safe Relay
  - Faulty engine room Fail Safe Relay
  - Open Black/Red wire between No. 7 Fuse and engine room Fail Safe Relay
  - Open Pink wire between the engine room Fail Safe Relay and Control Unit

Yes

(cont'd to next page)

CONTROL UNIT 21P COUPLER

View from wire side

Bu/G	Y/Bl		G/Bu	Y/R		R/Bu	G/R	Y	G/W	P	⑫
Bu/W	W/R	LG	W	Bl/R	Br	Bl	G/Bl	O	W/Bu	Y/G	
⑩		⑨		⑦		⑤					

CONTROL UNIT 11P COUPLER

View from wire side

G/Y	LB		R/W	W	Y/W
R/Bu	Bu/Y	Bu/R	Bl/Y	Gr	Bl
			㉔		㉒

Measure the resistance between the No. 20 (Yellow/Black) and No. 5 (Black) terminals of the 21-P coupler.

There is 2.5–10 ohms.

No

- If there is 0 ohm;
  Shorted Front Solenoid
  Shorted Brown/Black wire between the engine room Fail Safe Relay and Front Solenoid
- If there is no continuity;
  Faulty Front Solenoid
  Open Brown/Black wire between the engine room Fail Safe Relay and Front Solenoid
- Open Black wire between the Fail Safe Relay and Ground in the engine room
- Faulty engine room Fail Safe Relay
- Open Black/Red wire between the No. 7 fuse and engine room Fail Safe Relay
- Open Pink wire between the engine room Fail Safe Relay and Front solenoid

Yes

Turn the ignition switch OFF.

Measure the resistance between the No. 28 (Yellow/White) and NO. 22 (Black) terminals of the 11-P coupler.

There is 2.5–10 ohms.

No

- If there is 0 ohm;
  Shorted Rear Solenoid
  Shorted Yellow/White wire between the Rear Solenoid and Control Unit
- If there is no continuity;
  Faulty Rear Solenoid
  Open Yellow/White wire between Rear Solenoid and Control Unit
- Open Black wire between the Rear Solenoid and Control Unit

Yes

Measure the resistance between the No. 30 (Red/White) and No. 22 (Black) terminals of the 11-P coupler.

There is 2.5–10 ohms

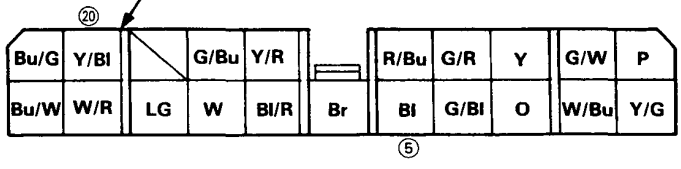
No

- If there is 0 ohm;
  Shorted Rear Solenoid
  Shorted Red/White wire between the Rear Solenoid and Control Unit
- If there is no continuity;
  Faulty Rear Solenoid
  Open Red/White wire between the Rear solenoid and Control Unit
- Open Black wire between the Rear Solenoid and body ground

Yes

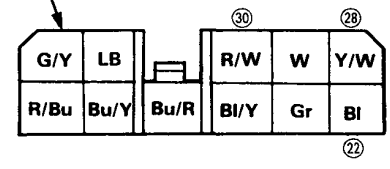
Faulty Control Unit.

CONTROL UNIT 21P COUPLER



View from wire side

CONTROL UNIT 11P COUPLER



View from wire side

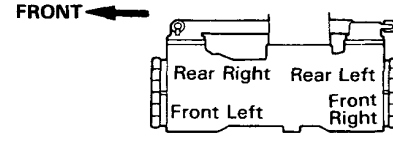
(cont'd)

Troubleshooting

3. (!) or BRAKE lamp won't go OFF (Lamp should be reset after engine has been restarted).

- Check the fluid lever in the Master Cylinder Reservoir.
  - No → Fill the Master Cylinder Reservoir up to the Max level.
  - Normal
- Check the (!) or BRAKE lamp go off.
  - No
- Stop the engine.
- With the parking lever and brake pedal released, start the engine to check the (!) or BRAKE lamp go off.
  - No
- Check the Stroke Switch and wire harness connection.
  - Loose → Reconnect and recheck.
  - Normal
- Stop the engine and disconnect the stroke switch wire harness, then start the engine.
- Check for continuity between the stroke switch and ground with the brake pedal depressed.
  - No Continuity → Stop the engine and bleed air from relative caliper then recheck.
    - No continuity
      - Faulty Stroke Switch
      - Faulty Modulator Piston
    - Continuity
  - Continuity
- Stop the engine.
- Reconnect the Stroke Switch to the wire harness.
- Disconnect the couplers from the Control Unit.
- Check for continuity between the No. 11 (Blue/White) and No. 5 (Black) terminals of the 21-P coupler.
  - No continuity → Open Blue/White wire between the Stroke Switch and Control Unit
  - Continuity

(Cont'd to next page)



CONTROL UNIT 21P COUPLER

Bu/G	Y/Bl		G/Bu	Y/R		R/Bu	G/R	Y	G/W	P
Bu/W	W/R	LG	W	Bl/R	Br	Bl	G/Bl	O	W/Bu	Y/G

⑪ ⑤

View from wire side

Check for continuity between the No. 21 (Blue/Green) and No. 5 (Black) terminals of the 21-P coupler.
- No Continuity → Open Blue/Green wire between the Stroke Switch and Control Unit
- Continuity ↓

Check for continuity between the No. 25 (Blue/Red) and No. 22 (Black) terminals of the 11-P coupler.
- No Continuity → Open Blue/Red wire between the Stroke Switch and Control Unit
- Continuity ↓

Check for continuity between the No. 26 (Blue/Yellow) and No. 22 (Black) terminals of the 11-P coupler.
- No Continuity → Open Blue/Yellow wire between the Stroke Switch and Control Unit
- Continuity ↓

Faulty Control Unit.

CONTROL UNIT 21P COUPLER

㉑										
Bu/G	Y/Bl		G/Bu	Y/R		R/Bu	G/R	Y	G/W	P
Bu/W	W/R	LG	W	Bl/R	Br	Bl	G/Bl	O	W/Bu	Y/G
						⑤				

CONTROL UNIT 11P COUPLER

G/Y	LB		R/W	W	Y/W
R/Bu	Bu/Y	Bu/R	Bl/Y	Gr	Bl
㉖		㉕			㉒

4. The [ALB] lamp comes on or remains on. (Remains on or comes on frequently.....ABNORMAL)

Check that the pump has been rotated for about 15 seconds before [ALB] lamp comes on.
- No (About 2 minutes) → Proceed to step 5.
- Yes ↓

Stop the engine and jack up the car. ↓

Start the engine and turn the front wheel. ↓

Measure the voltage between Black (negative) and Green/Black: Front right, Green/Blue: Front left, Green/Yellow: Rear right, or Light blue: Rear left (positives) using AC voltage range of a circuit tester.
- No output → (Cont'd to next page)
- 60 mV at 1 turn/second. ↓

(Cont'd to next page)

MAINTENANCE COUPLER

View from wire side.

G/Bl	G/Bu
G/Y	LB
Bl/R	Bl

(cont'd)

Troubleshooting (cont'd)

Stop the engine.

Disconnect the 21-P coupler from the Control Unit.

Short the No. 17 (Yellow/Red) and No. 5 (Black) terminals and turn the ignition switch to on.

The pump should turn.
- No → Turn the ignition switch off.
- Yes → Turn the ignition switch off.

Check for continuity between the No. 14 (Yellow) and No. 5 (Black) terminals of the 21-P coupler.
- No continuity → Disconnect the pressure switch connections.
- Continuity → Faulty Control Unit

Check for continuity of the Yellow wire terminals between the wire harness and No. 14 (Yellow) terminal of the 21-P coupler.
- No continuity → Open Yellow wire
- Continuity → Disconnect the pressure switch connections.

(Cont'd nest page)

Turn the ignition switch off.

Check the motor relay.
- Faulty → Replace and recheck.
- Normal → Measure the voltage between the White (positive) terminal for the relay coupler and No. 5 (Black: Negative) terminal of the 21-P coupler.

Measure the voltage between the White (positive) terminal for the relay coupler and No. 5 (Black: Negative) terminal of the 21-P coupler.
- No voltage → Open White wire between the ALB fuse and motor relay
- Battery voltage → Check for continuity of the Yellow/Red wire terminals between the No. 17 terminal of the 21-P coupler and the relay coupler.

Check for continuity of the Yellow/Red wire terminals between the No. 17 terminal of the 21-P coupler and the relay coupler.
- No continuity → Open Yellow/Red wire
- Continuity → Turn the ignition switch on.

Turn the ignition switch on.

(Cont'd to next page)

Stop the engine and disconnect the speed sensor wire.

Measure the resistance of the speed sensor.

There is 500–1000 ohms.
- No → Faulty speed sensor
- Yes → Reconnect the speed sensor.

Reconnect the speed sensor.

Install the ALB checker to the maintenance coupler and check the function.
- Abnormal → Faulty sensor gap / Faulty Control Unit
- Normal → Open wire harness between the Speed Sensor and Control Unit.

Open wire harness between the Speed Sensor and Control Unit.

CONTROL UNIT 21P COUPLER

⑰						⑭				
Bu/G	Y/Bl		G/Bu	Y/R		R/Bu	G/R	Y	G/W	P
Bu/W	W/R	LG	W	Bl/R	Br	Bl	G/Bl	O	W/Bu	Y/G
						⑤				

MAINTENANCE COUPLER

View from wire side

G/Bl	G/Bu
G/Y	LB
Bl/R	Bl

Check for continuity of the Black wire between the wire harness and No. 5 (Black) terminal of the 21-P coupler.
- No continuity → Open Black wire
- Continuity → Procedure step 5.

Measure the voltage between the Black/Red (positive) for relay coupler and No. 5 (Black: Negative) terminal of the 21-P coupler.
- No voltage → Open Black/Red wire
- Battery voltage → Procedure step 5.

5. Too frequent pump rotation; ALB lamp also comes on (Pump may rotate when the ALB system is operated. The system is normal if pump is rotated for about 15 seconds, 1—2 times/day when car is used every day).

Check fluid level in the modulator reservoir tank.
- Below MIN level → Fill the reservoir up to the MAX level. Inspect leaky joint or connections and retighten if necessary, then recheck.
- Normal

Check accumulator pressure switch for loose or disconnected terminals.
- Loose or disconnected → Retighten or reconnect, then recheck.
- Normal

Disconnect the pressure switch connector and short Black wire with Yellow wire at the harness side.

Jack up the front of the car and pull the parking brake lever.

Start the engine at 50 km/h to see if pump rotates.
- Not rotated → Procedure step 6.
- Rotated

Stop the engine and disconnect the 21-P coupler from the Control Unit.

Check for continuity between No. 14 (Yellow) and No. 5 (Black).
- No continuity → Open wire harness
- Continuity → Replace Control Unit

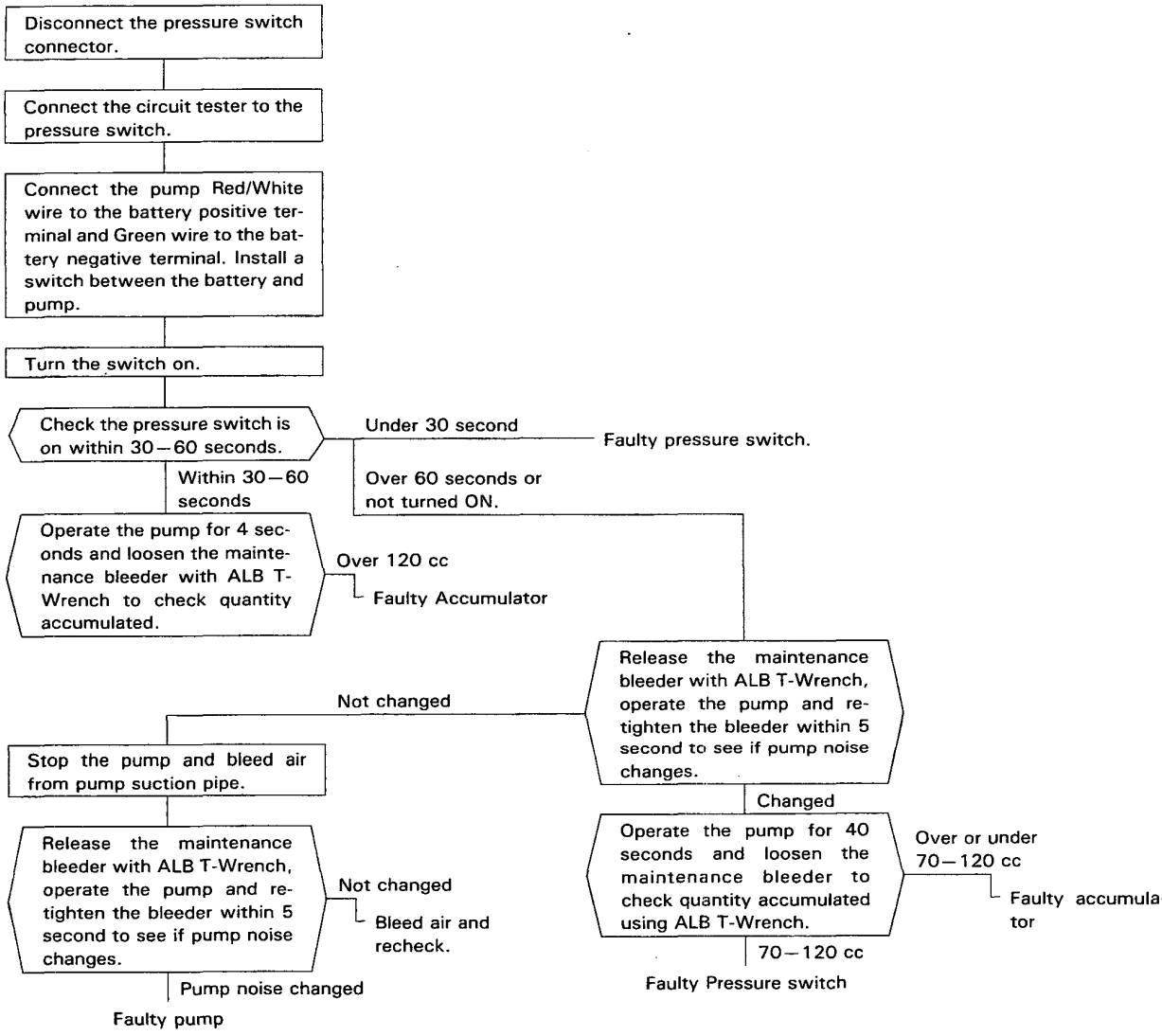
CONTROL UNIT 21P COUPLER

Bu/G	Y/Bl		G/Bu	Y/R		R/Bu	G/R	Y	G/W	P	⑭
Bu/W	W/R	LG	W	Bl/R	Br	Bl	G/Bl	O	W/Bu	Y/G	⑤

(cont'd)

Troubleshooting (cont'd)

6. Accumlator, pump and pressure switch inspection



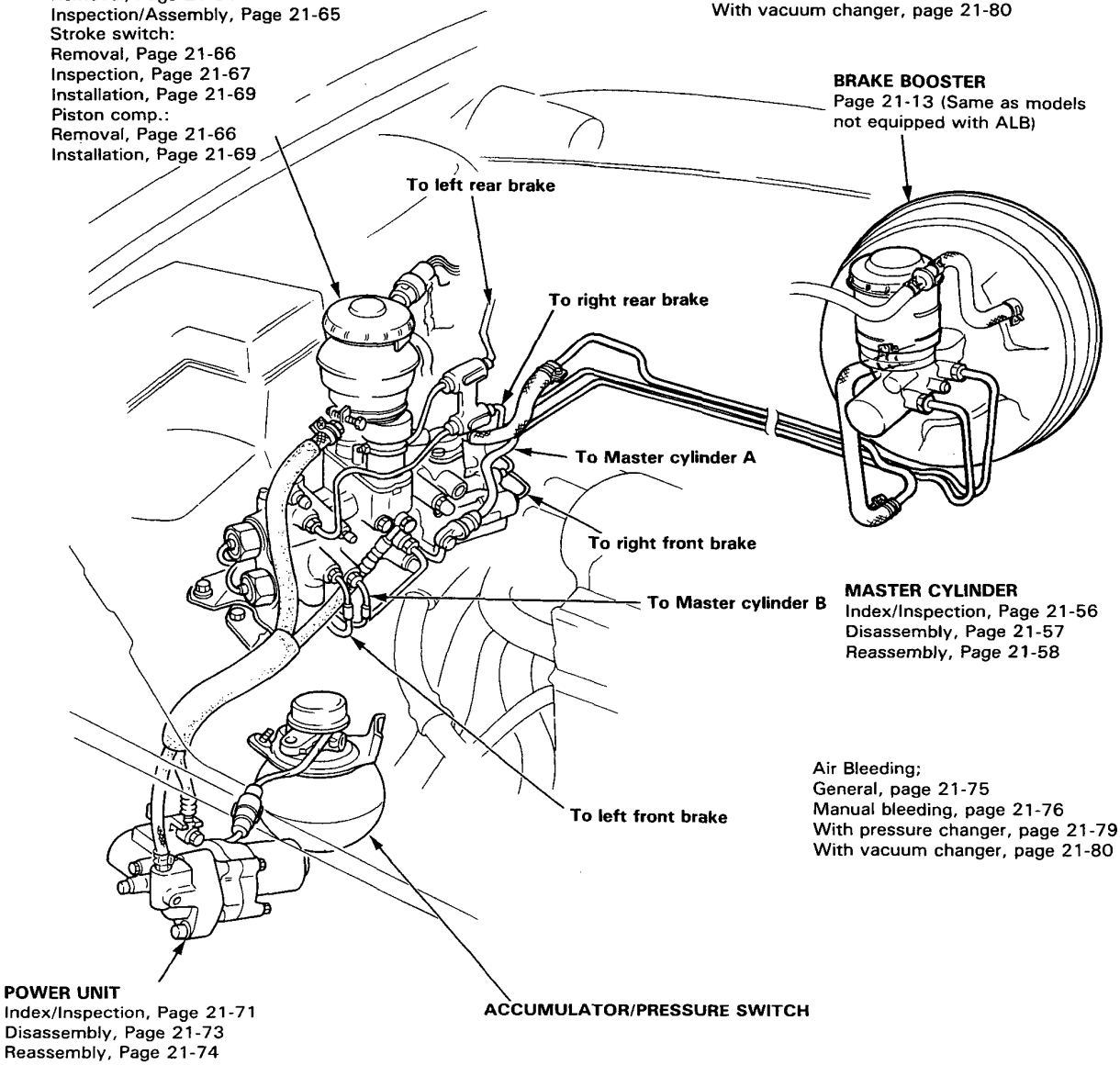
Brake Booster/Master Cylinder/Modulator Assy/ Power Unit/Accumulator

Index

A20A4 and B20A1 Engine Equipped Model

CAUTION:

- **Avoid spilling brake fluid on painted surfaces or instruments as severe damage can result. Wipe up spilled fluid at once and rinse well with clean water.**
- **The flare nuts should be tightened to 15 N·m (1.5 kg-m, 11 lb-ft).**
- **The brake pipes and modulator pipe fittings are color coded.**



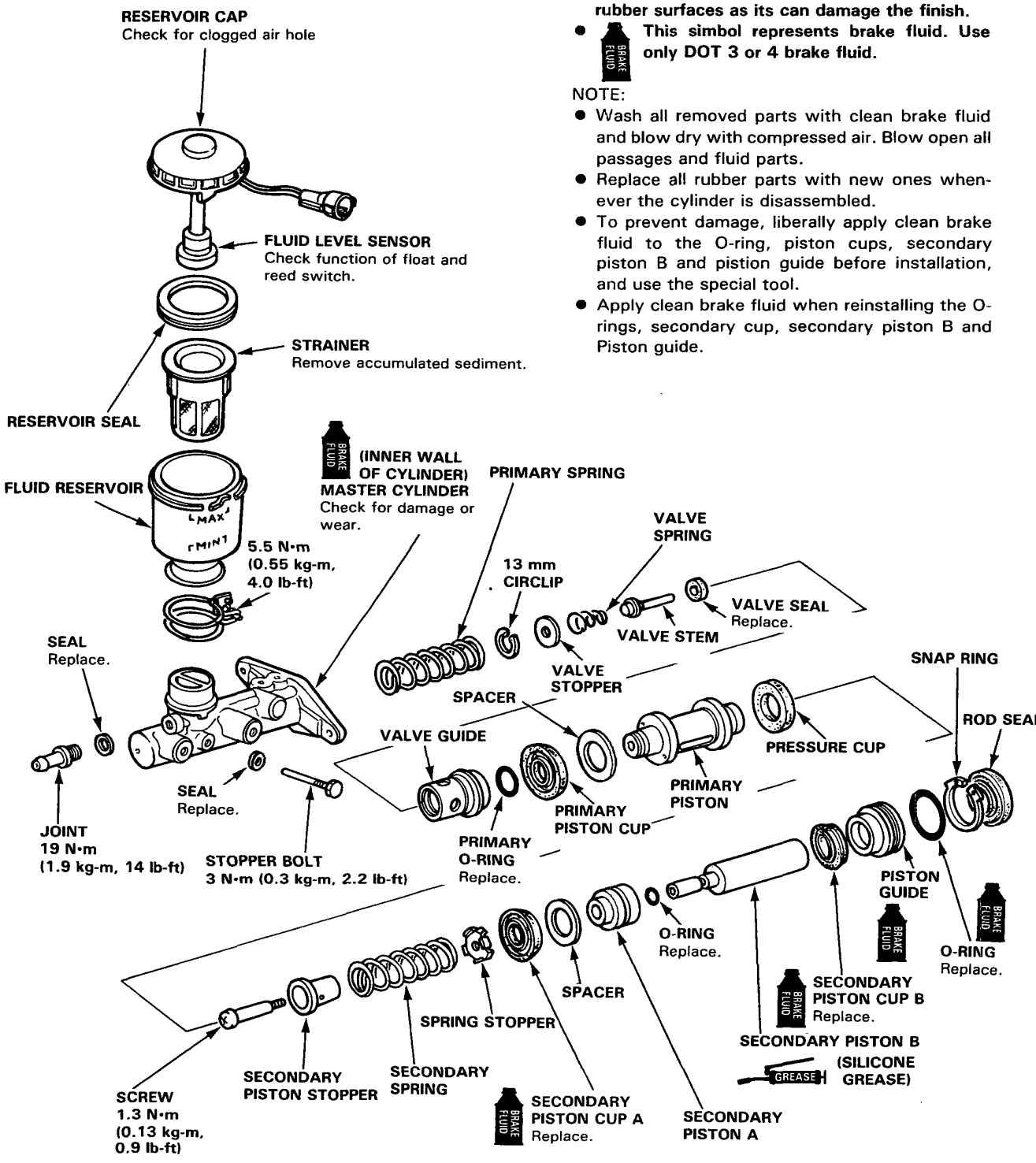
Master Cylinder

Index/Inspection

A20A4 and B20A1 Engine Equipped Model

CAUTION:
- **Avoid spilling brake fluid on painted, plastic or rubber surfaces as its can damage the finish.**
- **This simbol represents brake fluid. Use only DOT 3 or 4 brake fluid.**

NOTE:
- Wash all removed parts with clean brake fluid and blow dry with compressed air. Blow open all passages and fluid parts.
- Replace all rubber parts with new ones whenever the cylinder is disassembled.
- To prevent damage, liberally apply clean brake fluid to the O-ring, piston cups, secondary piston B and pistion guide before installation, and use the special tool.
- Apply clean brake fluid when reinstalling the O-rings, secondary cup, secondary piston B and Piston guide.

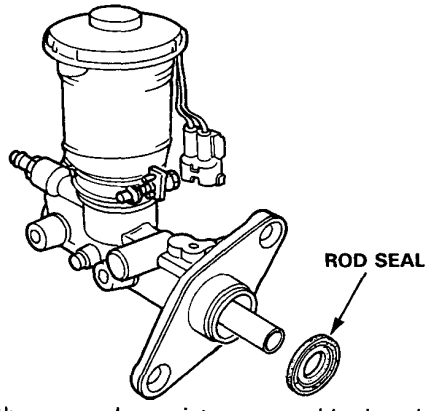


Disassembly

A20A4 and B20A1 Engine Equipped Model

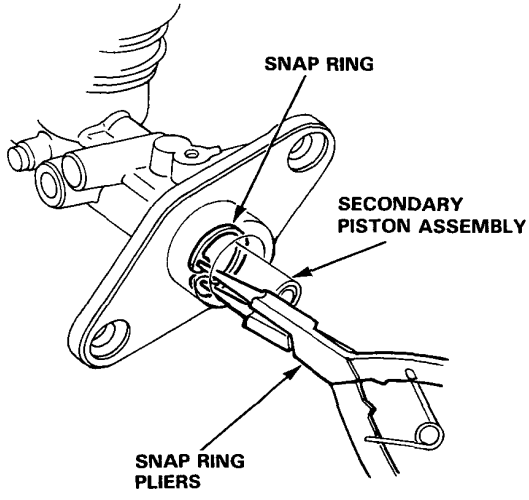
CAUTION:
- **Avoid spilling brake fluid on painted, plastic or rubber surfaces as its can damage the finish; Wash spilled brake fluid off immediately with clean water.**
- **Make sure all parts are clean before reassembly and blow dry with compressed air. Blow open all passages and fluid parts.**
- **Use only new clean brake fluid.**
- **Use only new replacement parts.**
- **Do not allow dirt or other foreign metter to contaminate the brake fluid.**
- **Do not mix different brand of brake fluid.**
- **Do not bend or damage the brake pipes when dis/connecting.**

1. Remove the rod seal.

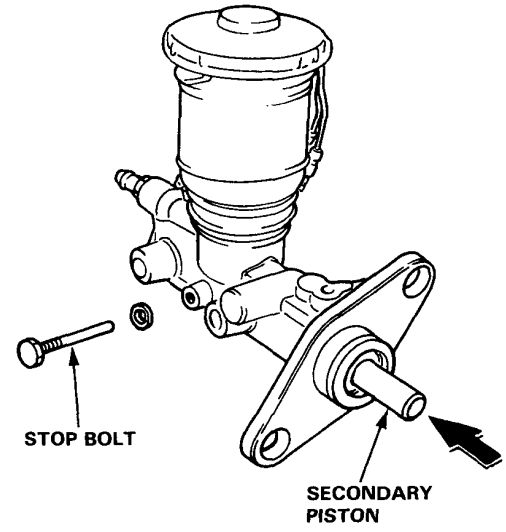


2. Press the secondary piston assembly in, then remove the snap ring.

CAUTION: Avoid scratching or scoring the inner wall of the master cylinder and outside of the secondary piston.



3. Remove the stop bolt while pushing the secondary piston assembly.

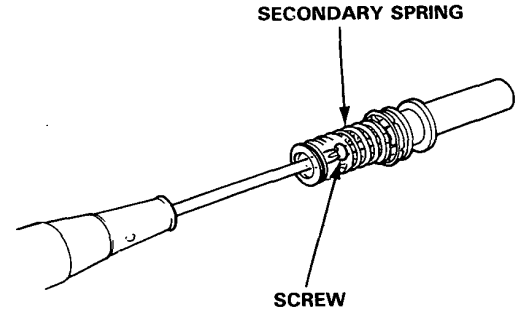


4. Remove the piston guide assembly, secondary piston assembly and primary piston assembly.

NOTE: If the primary piston assembly is difficult to remove, apply compressed air from the primary piston side outlet.

CAUTION:
- **Do not use high pressure air or bring the nozzle too close to the inlet.**
- **Place a shop rag over the master cylinder to prevent the primary piston from becoming a projectile.**

5. Remove the screw from the secondary piston assembly, then remove the secondary spring.



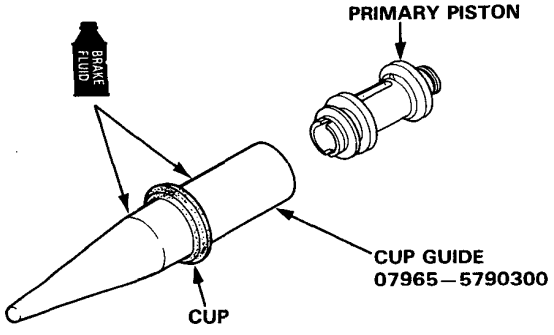
6. Clean all parts with brake fluid.

Reassembly

A20A4 and B20A1 Engine Equipped Model

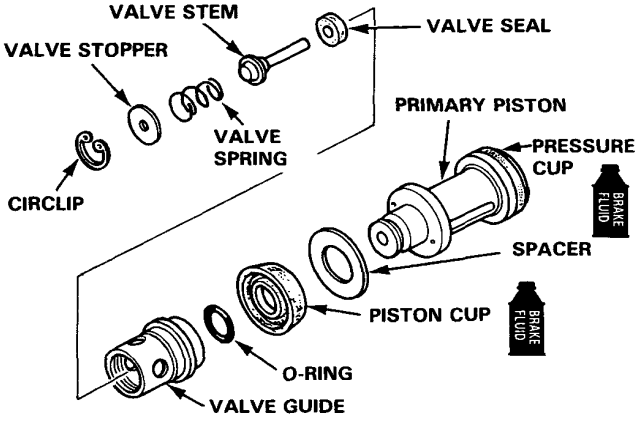
CAUTION:
- **Avoid spilling brake fluid on painted, plastic or rubber surfaces as its can damage the finish; Wash spilled brake fluid off immediately with clean water.**
- **Make sure all parts are clean before reassembly and blow dry with compressed air. Blow open all passages and fluid parts.**
- **Use only new clean brake fluid.**
- **Use only new replacement parts.**
- **Do not allow dirt or other foreign metter to contaminate the brake fluid.**
- **Do not mix different brand of brake fluid.**

1. Coat the cup guide (Special tool) with brake fluid, install the cup over the cup guide, then slide the cup to the primary piston.

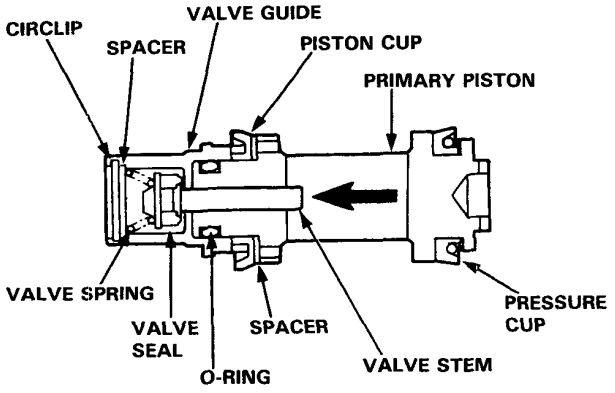


2. Install the spacer, piston cup and O-ring to the primary piston.

3. Install the valve seal, valve stem, valve spring and valve stopper on the valve guide and secure with circlip.

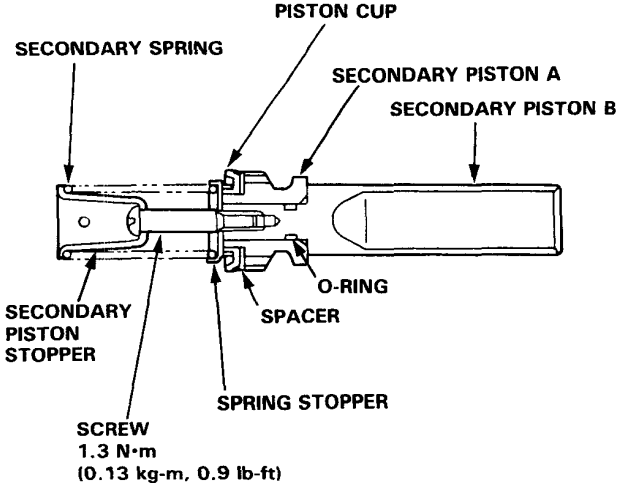


4. Install the valve guide to the primary piston.



NOTE: Reaching through the primary piston stop bolt hole, lightly press on the valve stem to see if its moves smoothly.

5. Install the O-ring, secondary piston A, spacer, piston cup, spring stopper, secondary spring, secondary piston stopper to the secondary piston B.

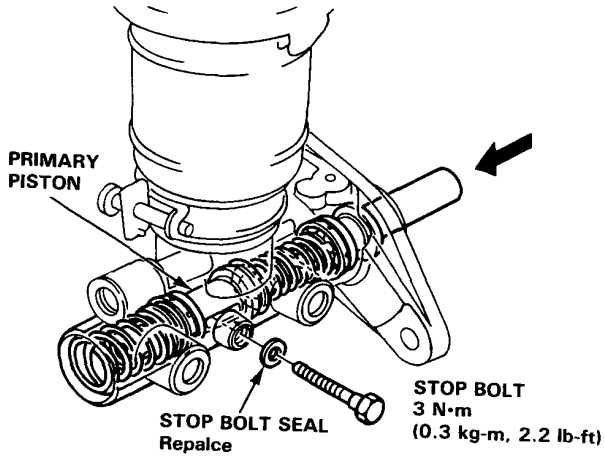


6. Assemble the primary piston assembly, secondary piston assembly and piston guide assembly in the master cylinder body.

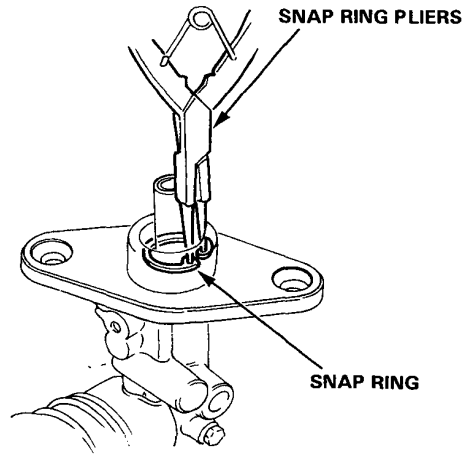
   NOTE: Install the primary piston with the slot on the cylinder stop bolt hole side.

7. Push the secondary piston in until slot aligns with the stop bolt hole, then install and tighten the stop bolt.

   CAUTION:
   - **Replace the stop bolt seal with a new one when ever disassembled.**
   - **Apply brake fluid to the inner wall of the cylinder and piston cups, being careful that they are not inverted inside out during installation.**

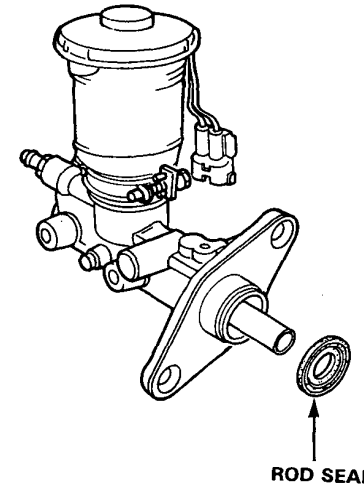


8. Press the secondary piston and install the snap ring.



CAUTION: Avoid damaging the sliding surface of the secondary piston when installing the snap ring.

9. Install the rod seal.



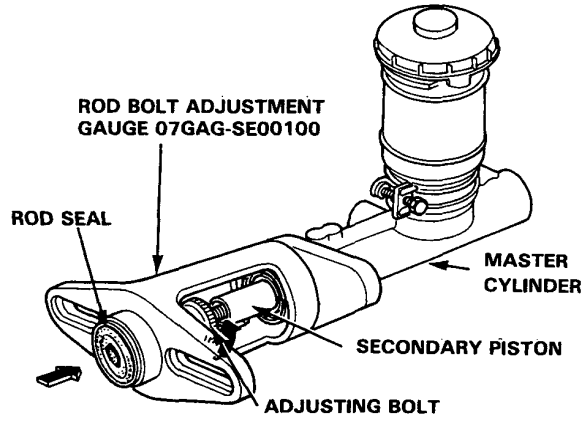
Master Cylinder/Brake Booster

Pushrod Clearance Adjustment

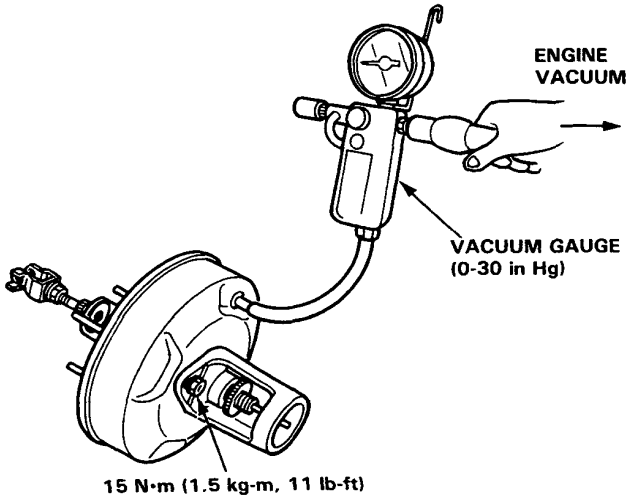
A20A4 and B20A1 Engine Equipped Model

NOTE: Master cylinder pushrod-to-piston clearance must be checked and adjustments made, if necessary, before installing master cylinder.

1. Using the Rod Bolt Adjustment Gauge, adjust bolt so the top of it is flush with end of master cylinder piston.



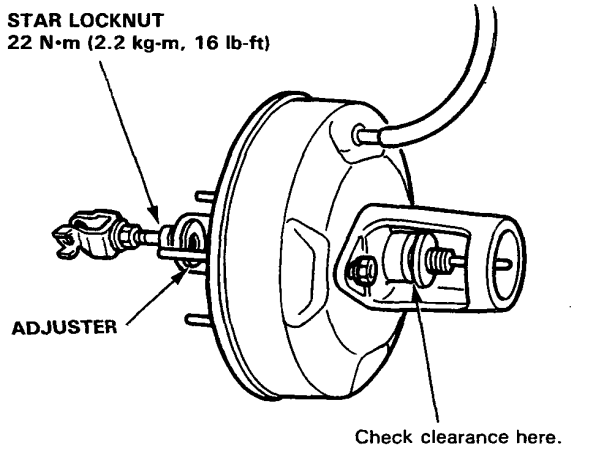
2. Without disturbing the adjusting bolt's position, put the gauge upside down on the booster.
3. Install the master cylinder nuts and tighten to the specified torque.
4. Connect the booster in-line with a vacuum gauge (0—30 in Hg) to the booster's engine vacuum supply, and maintain an engine speed that will deliver 500 mm Hg (20 in Hg) vacuum.



5. With a feeler gauge, measure the clearance between the gauge body and the adjusting nut.

CLEARANCE: 0—0.2 mm (0—0.008 in)

6. If clearance is incorrect, loosen star locknut and turn adjuster in or out to adjust. Hold the clevis while adjusting.
7. Tighten locknut securely.



NOTE: If the clearance between the adjustment gauge and locknut is 0 mm, the pushrod clearance between the master cylinder and brake booster is 0.4 mm (0.016 in).
If the clearance is 0.2 mm (0.008 in) between the gauge and lock nut, the pushrod clearance is 0.2 mm (0.008 in).

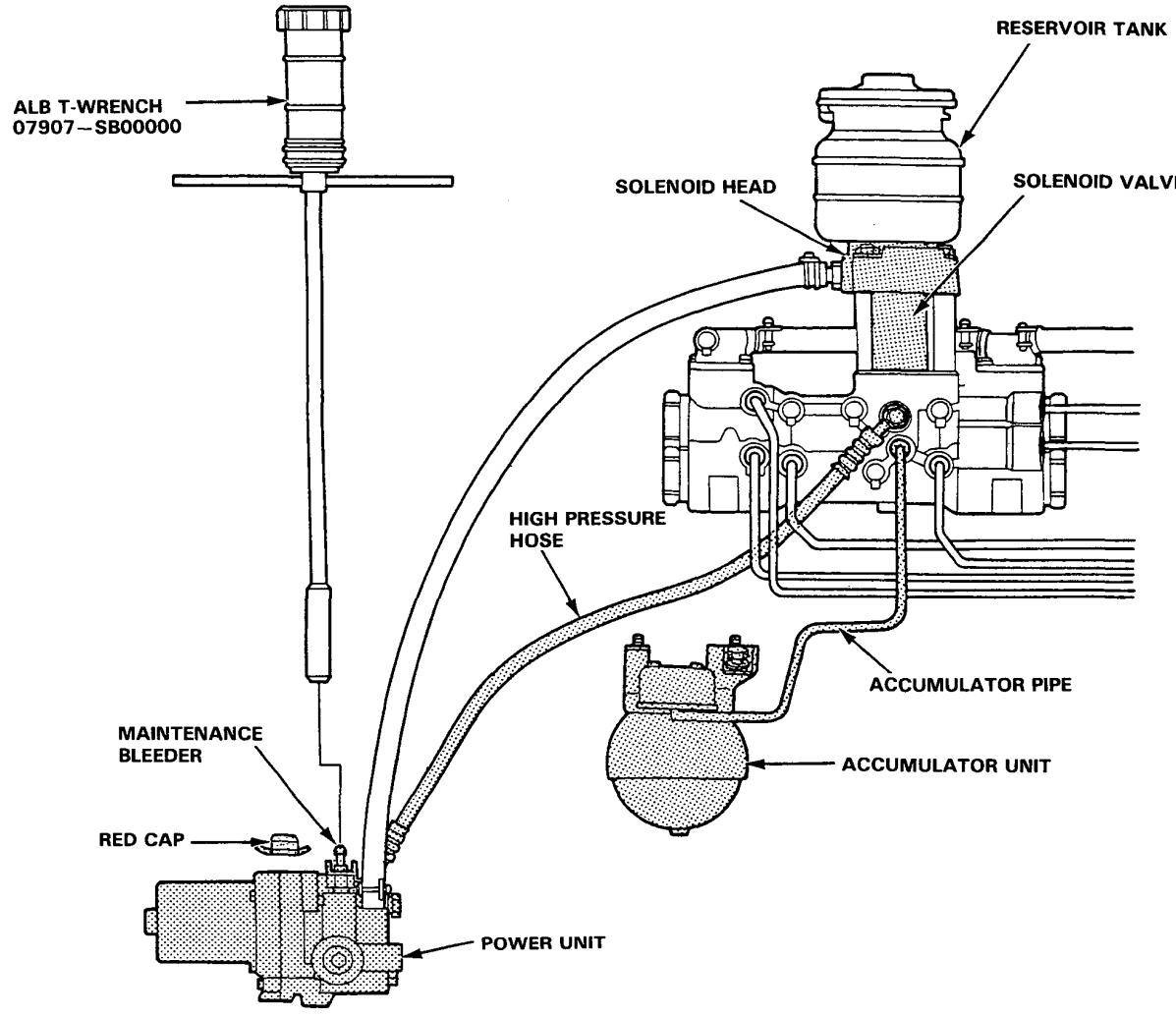
PUSHROD CLEARANCE:
0.2—0.6 mm (0.008—0.024 in)

Modulator Assy

Draining High Pressure Brake Fluid

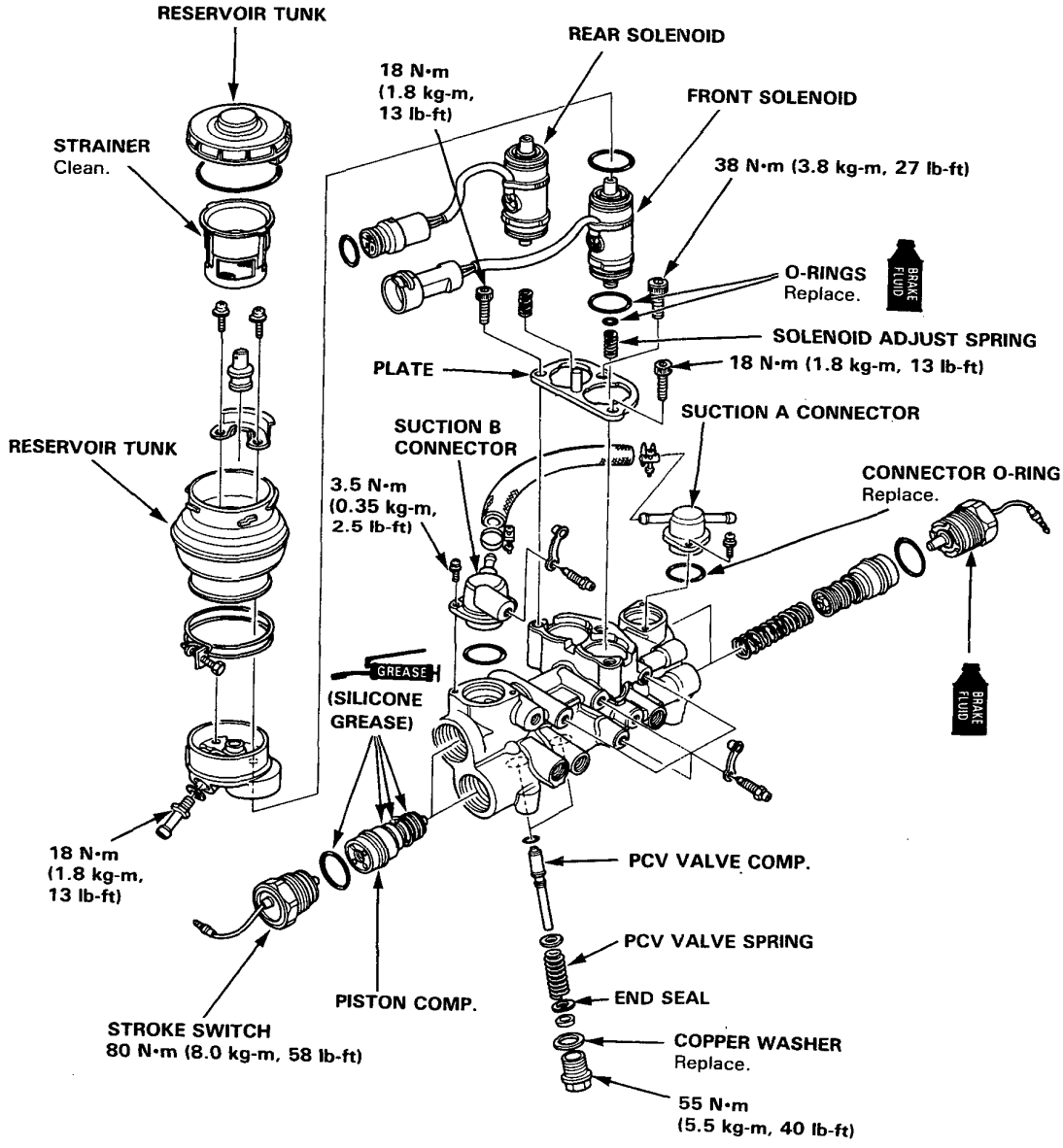
WARNING USE the ALB T-WRENCH before disassembling the parts shadowed in the illustration.

1. Drain the brake fluid from the master cylinder modulator oil reservoir thoroughly.
2. Remove the red cap from the bleeder on the top of the power unit.
3. Install the ALB T-WRENCH on the bleeder screw and turn it out slowly 90° to collect high pressure fluid into reservoir. Turn the T-WRENCH out one complete turn to drain the brake fluid thoroughly.
4. Retighten the bleeder screw.
5. Reinstall the red cap.



ET Engine Equipped Model

CAUTION: Do not spill brake fluid on painted surfaces as severe damage can result. Wipe up spilled fluid at once and rinse well with clean water.



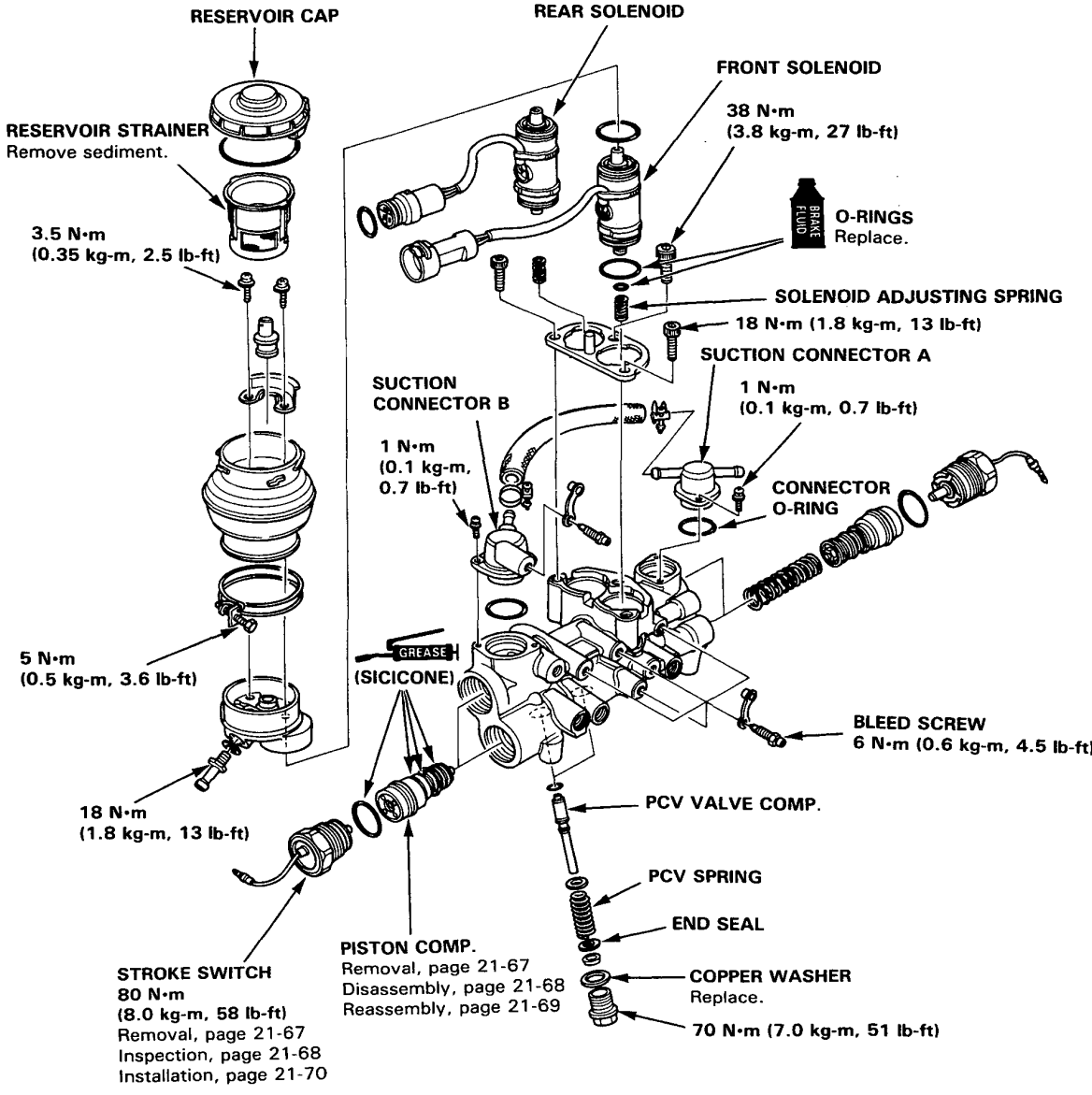
Modulator Assy

Index/Inspection

A20A4 and B20A1 Engine Equipped Model

CAUTION:

- **Avoid spilling brake fluid on painted, plastic or rubber surfaces as its can damage the finish;**
- **Wash spilled brake fluid off immediately with clean water.**
- **Make sure all parts are clean before reassembly and blow dry with compressed air. Blow open all passages and fluid parts.**
- **Use only new clean brake fluid.**
- **Use only new replacement parts.**
- **Do not allow dirt or other foreign metter to contaminate the brake fluid.**
- **Do not mix different brand of brake fluid.**

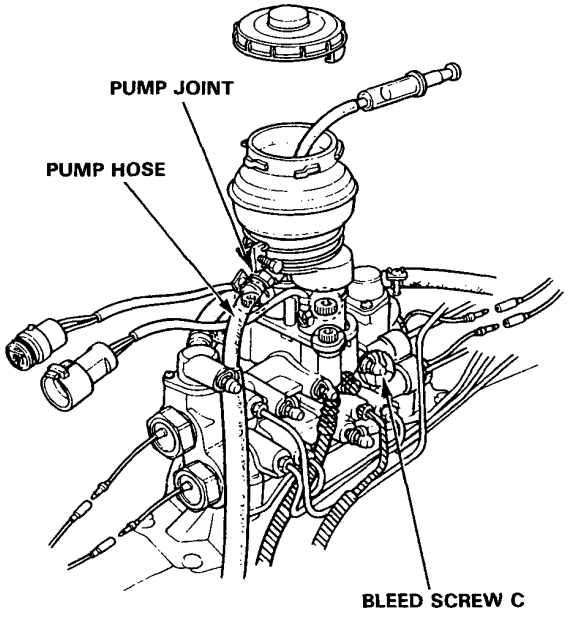


Reservoir

Brake Fluid Draining

A20A4 and B20A1 Engine Equipped Model

1. Draining brake fluid from modulator tank.
   The brake fluid may be sucked out through the top of the modulator tank with a syringe. It may also be drained through the pump joint after disconnecting the pump hose.



2. Draining brake fluid from master cylinder:
   Loosen the bleeder and pump the brake pedal to drain the brake fluid from the master cylinder.

WARNING

- **High pressure fluid will be squirted out if the tube shadowed is removed or solenoid head 8 mm nuts are loosened.**
- **To drain high pressure brake fluid, follow the procedure under Draining of High Pressure Brake Fluid on Page 21-61.**

Solenoid

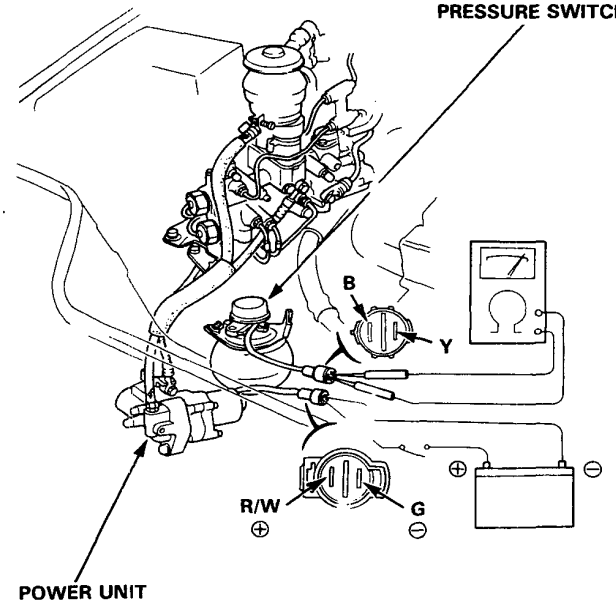
Leak Test

A20A4 and B20A1 Engine Equipped Model

1. Check for the resistance between the Black and Yellow terminals of the accumulator pressure switch coupler (pink) with an ohmmeter.

2. Attach the positive (+) lead of a fully charged 12 V battery to the Red/White terminal of the power unit motor coupler (yellow) and negative (−) lead to the Green terminal with a battery switch in between as shown.

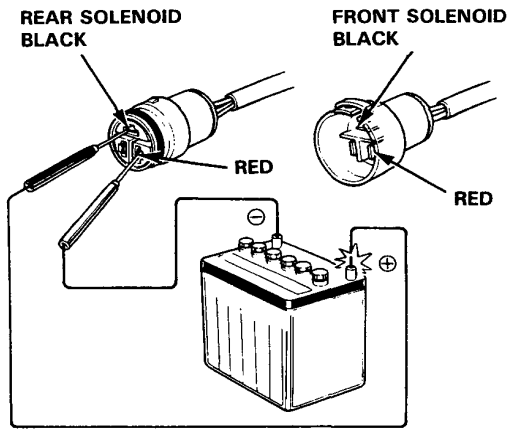
3. Turn the battery switch ON and check for continuity between the terminals. For subsequent testing, to allow sufficient pressure to build up within the accumulator, rotate the power unit for 4 seconds, then turn the battery switch OFF, after the pressure switch has been turned ON.



NOTE: Keep the battery switch OFF after building the pressure within the accumulator.

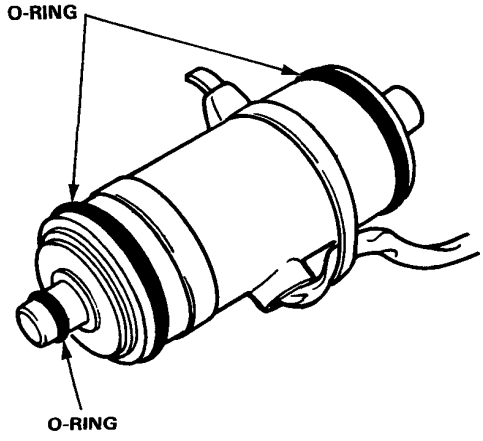
No continuity.....Leaky solenoid (if the pipe joint is tight)

4. Apply a 12 V across the Black and Red terminals of the solenoid coupler (pink) momentarily.



- Check if the solenoid hisses or squeaks. Replace the solenoid with a new one if it hisses or squeaks.
- Make sure that the solenoid does not hiss or squeak after it has clicked into position. Replace with a new one if it hisses or squeaks.
- Check the pressure switch for continuity within one minute. It is normal if there is continuity. If there is no continuity, solenoid is faulty and must be replaced.

NOTE: The solenoid must be replaced with a new one as a unit except when the O-ring is faulty.

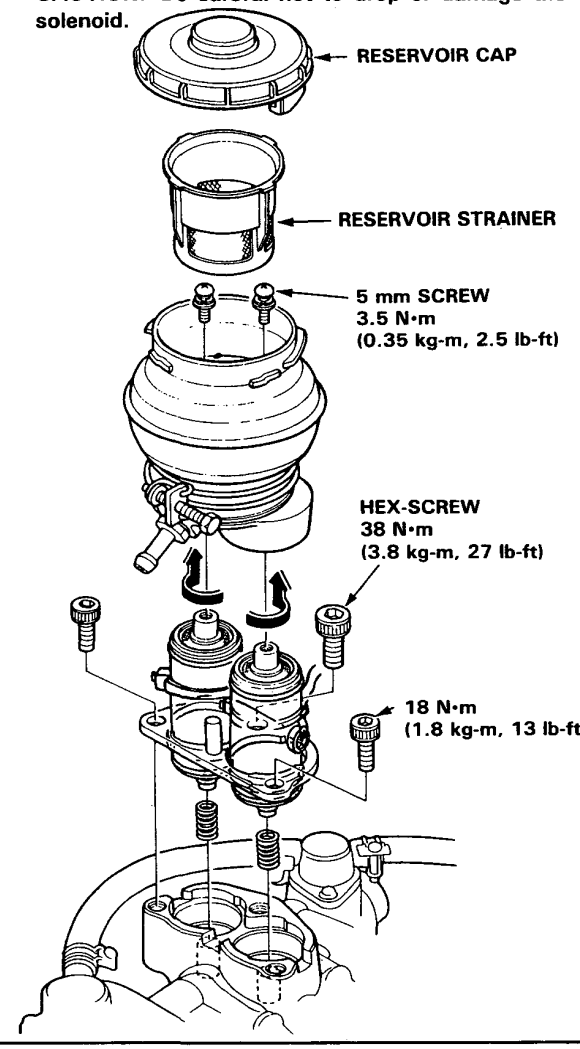


Removal

A20A4 and B20A1 Engine Equipped Model

1. Drain the brake fluid from the modulator tank.
2. Drain the high pressure brake hose (page).
3. Disconnect the inlet hose.
4. Remove the reservoir strainer.
5. Remove the 5 mm screws and remove the reservoir with the solenoid head.
6. Remove the hex-screws and solenoid set plate.
7. Remove the solenoids aligning the groove in the plate with the tab on the solenoids by turning the solenoid as shown.

CAUTION: Be careful not to drop or damage the solenoid.



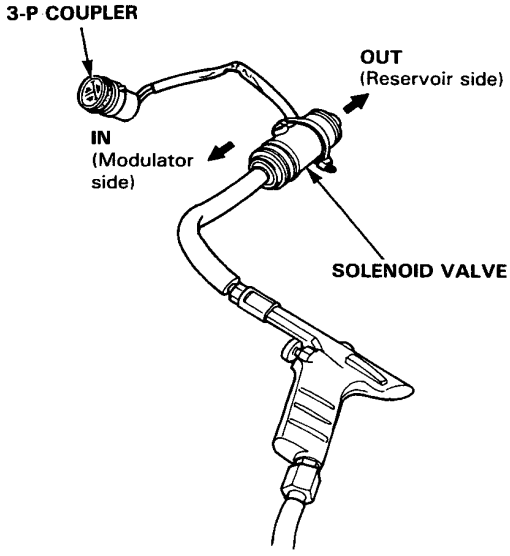
Solenoid

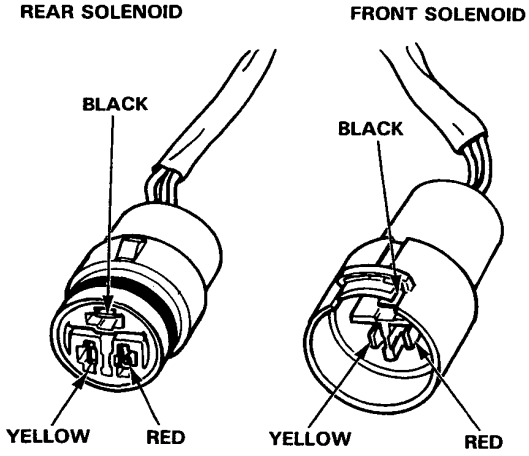
Inspection

A20A4 and B20A1 Engine Equipped Model

1. Connect a tube to the inlet of the solenoid valve. Apply compressed air to the solenoid valve through the tube.
2. Check the solenoid valve for proper operation by connecting a 12 V fully charged battery to the 3-P coupler terminals:

   Voltage not applied: There should be no air flow.
   Black — Red: There should be air flow through IN and OUT.
   Black — Red: } There should be air flow
   Black — Yellow: } through IN.





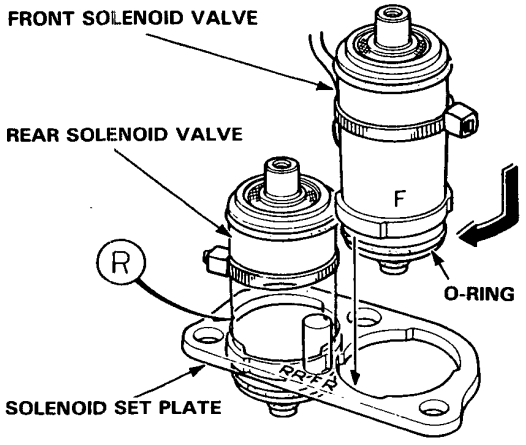
NOTE: Handle the solenoid valve with care as it may be damaged if dropped.

Reassembly

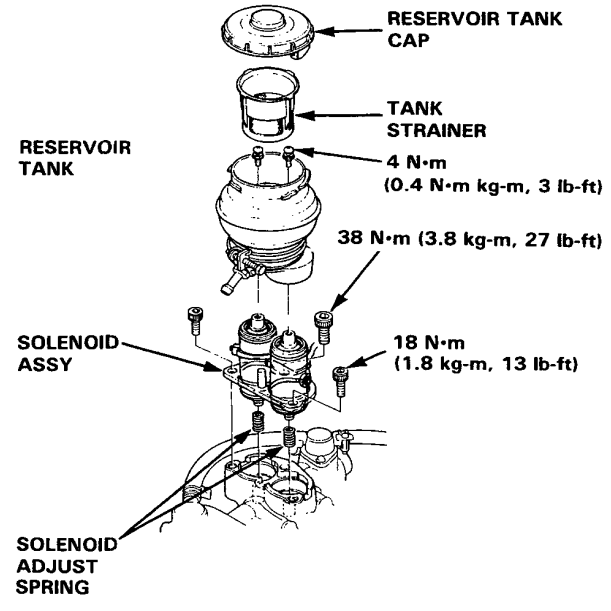
A20A4 and B20A1 Engine Equipped Model

1. Coat the O-ring with the clean brake fluid and install the O-ring onto the solenoid valve.
2. Install the solenoid valves on the set plate as shown.

WARNING The front and rear solenoid valves are not interchangeable or the system will not work properly. Make sure that the solenoid valves are installed in correct positions as shown.



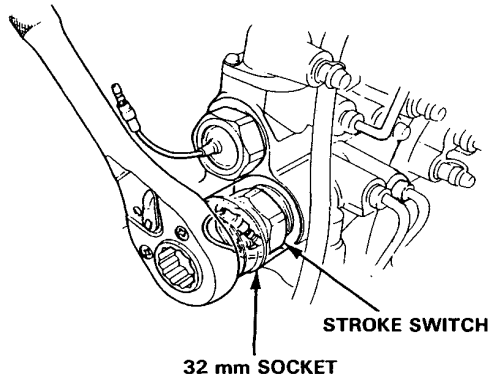
3. Install the solenoid adjust springs on the modulator.
4. Install the solenoid assy, reservor tank and connect the inlet hose.



Removal

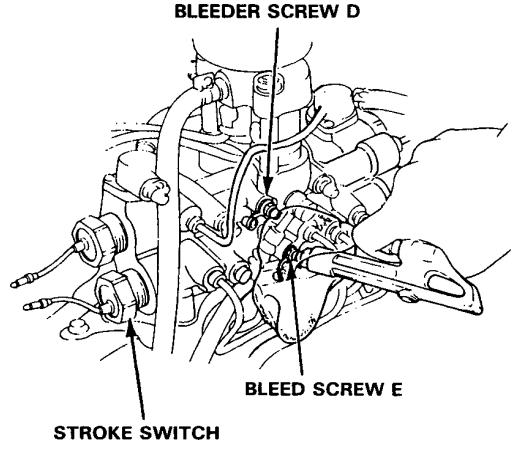
A20A4 and B20A1 Engine Equipped Model

1. Remove the terminal from each stroke switch, and tuck it into the recess of a 32 mm socket out of way. Loosen off the switch using the socket.



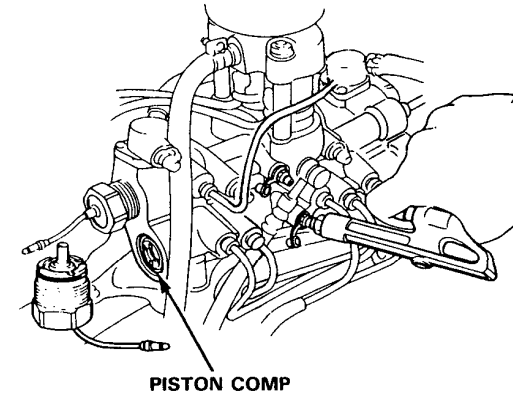
NOTE: Place a pan or shop rag under the switch to receive the brake fluid drained.

2. Screw the stroke switch into the modulator two complete turns.
3. Apply the same procedure to the remaining solenoid switches.
4. Loosen the bleeder screws D and E.
5. Blow air through the holes in the bleeder screws D and E for a few seconds.



NOTE: Place a shop towel around the holes as brake fluid will be blown out by the compressed air.

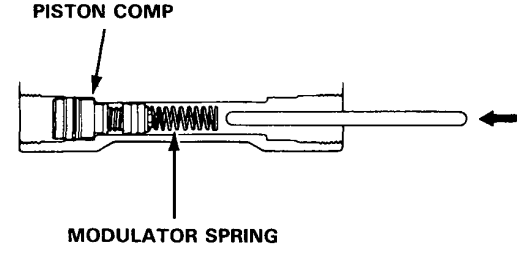
6. Remove the stroke switches and pry the pistons out with the help of the special tool Snap Ring Pliers.



NOTE: Should difficulty be encountered in removing the piston, further blow air for several seconds.

CAUTION: Place the piston end of the switch with a shop rag as the piston can be a projectile.

7. Remove the modulator spring from the cylinder.
8. Press the remaining piston out using a bar with a round end as shown.



CAUTION: Take care not to damage the cylinder wall.

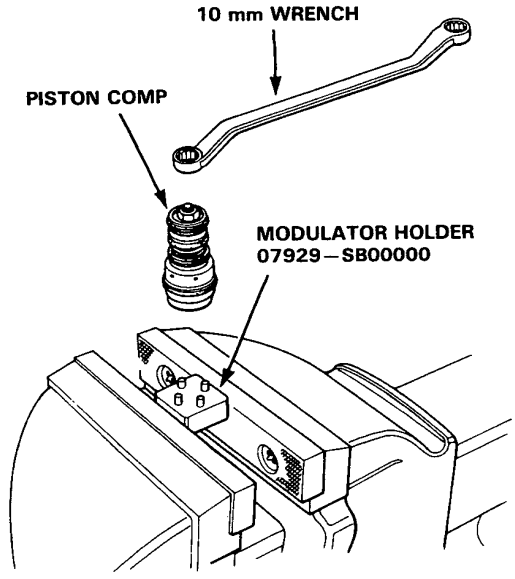
Piston/Stroke Switch

Piston Disassembly

A20A4 and B20A1 Engine Equipped Model

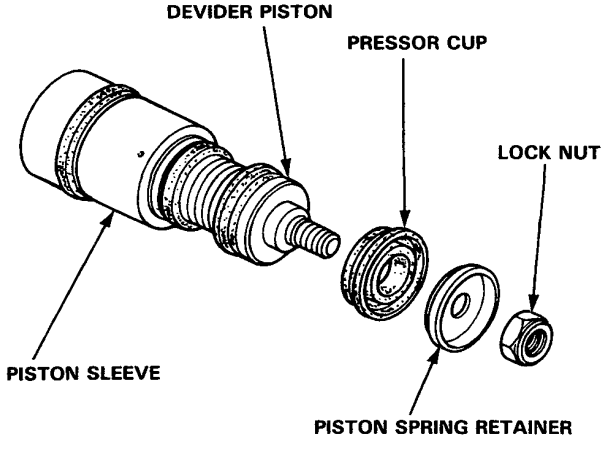
1. Place the modulator holder in a vise as shown. Install the piston aligning the holes in the piston bottom surface with the lugs on the modulator holder.

2. Hold the piston by hand and remove the devider lock nut.



3. Carefull remove the parts.

   CAUTION: The spring can pop out when removing the devider piston.

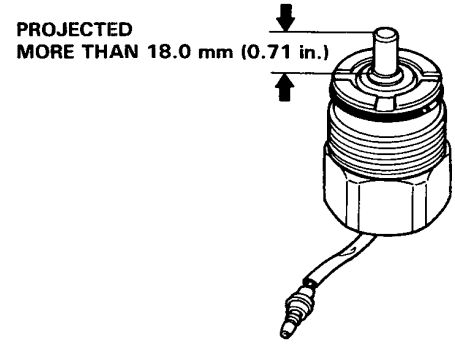


4. Clean the parts with clean brake fluid. Blow the piston sleeve and devider piston with compressed air.

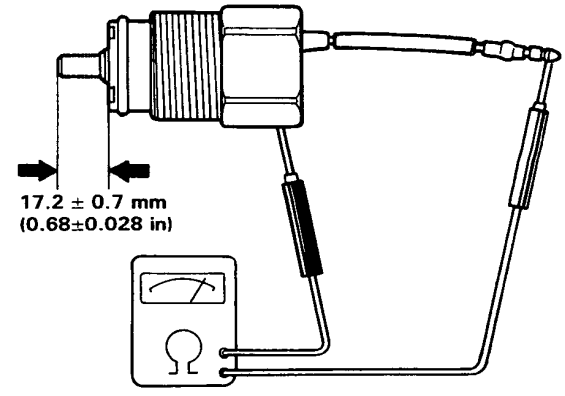
Stroke Switch Inspection

A20A4 and B20A1 Engine Equipped Model

1. Press down on the end of the piston with a finger pressure (1 kg, 7 lb). The piston should come out more than 18.0 mm (0.71 in) when released.

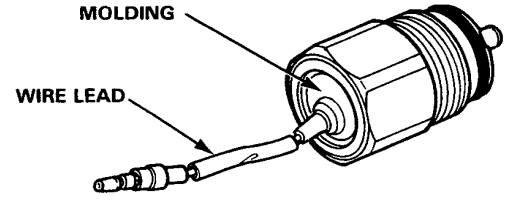


2. Check for continuity between the switch lead and body ground.
   There should be no continuity when the projected height of the piston is above 17.2 ± 0.7 mm (0.68 ± 0.028 in.). There should be continuity when the height is below 17.2 ± 0.7 mm (0.68 ± 0.028 in.).



3. Check the wire lead, body (threads) and molding for damage, cracks or other faults.

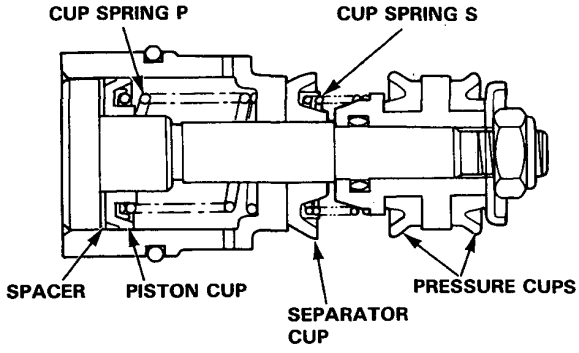
   NOTE: Do not let the switch fall.



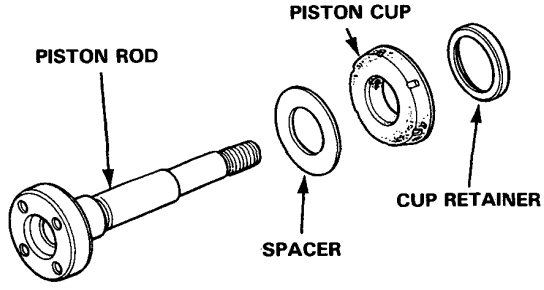
Piston Assembly

A20A4 and B20A1 Engine Equipped Model

NOTE: Replace the cups and O-rings with new ones. Apply clean brake fluid when installing.

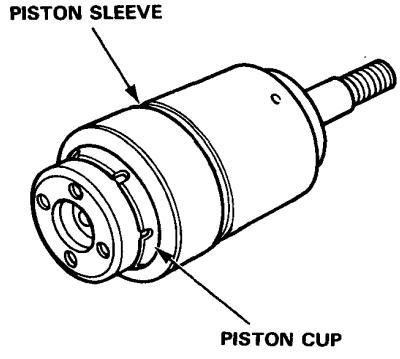


1. Install the spacer, piston cup and cup retainer on the piston rod.

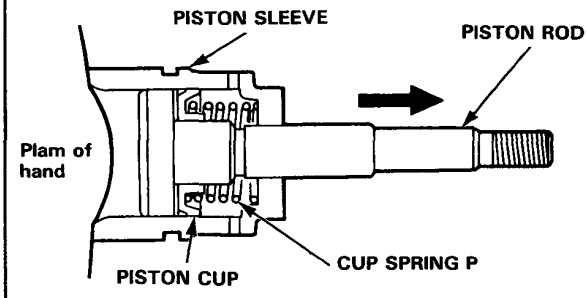


2. Install the cup spring P on the cup retainer, then install the piston sleeve over them.

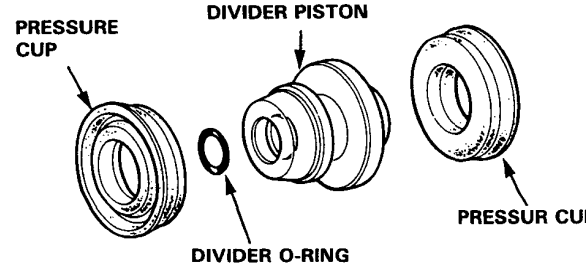
3. Install the piston cup into the piston sleeve being carefull not to allow the lip of the cup to turn inside out.



4. Put the piston sleeve on the plam of your hand, pull the piston rod, and check that the plam is sucked.

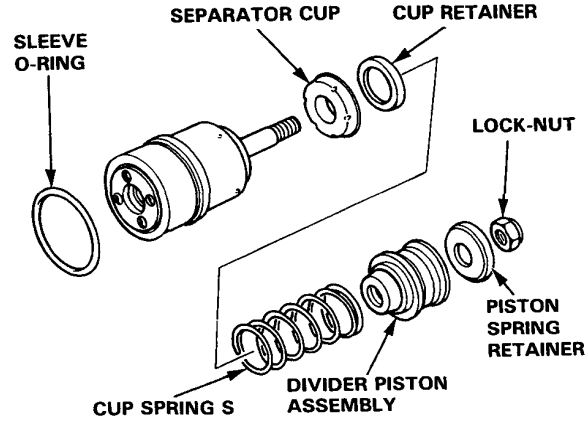


5. Install the divider O-ring and pressure cups on the divider piston.



6. Position the separator cup, cup retainer, cup springs, divider piston assembly and piston spring retainer on the piston sleeve, and loosely install the lock-nut.

7. Install the sleeve O-ring on the piston sleeve.

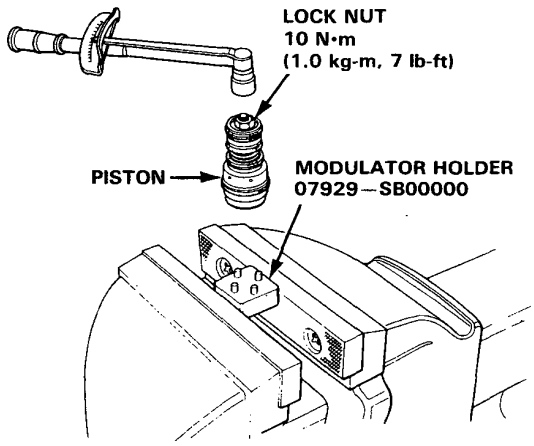


(cont'd)

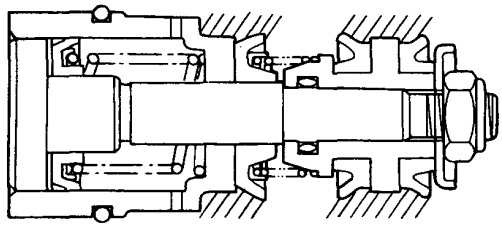
Piston Assembly (cont'd)

8. Hold the modulator holder (special tool) in a vise and set the piston rod on the holder aligning the four tabs on the holder with the four piston rod holes.

9. Tighten the lock-nut.



10. Apply Honda Cylinder Grease (P/N 08733—BOZOE) or equivalent rubber grease onto the shaded portion of the piston.

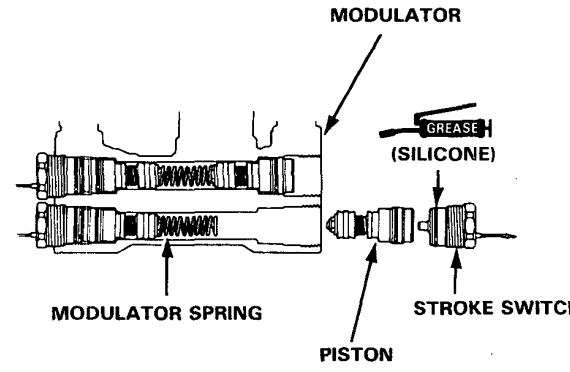


Installation

A20A4 and B20A1 Engine Equipped Model

1. Insert the modulator pistons into the modulator and install the pistons being carefull not to allow the lips of the cup to turn inside out.

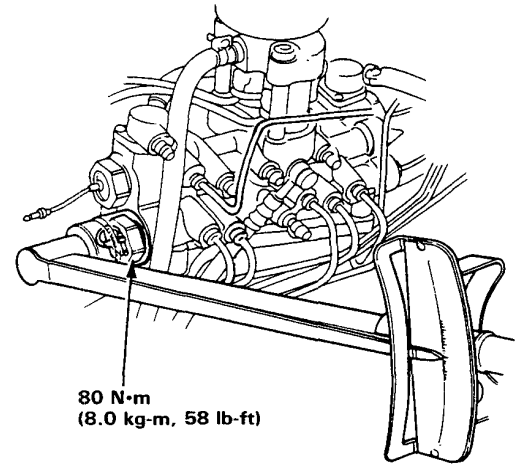
   NOTE: Note the piston installation direction.



2. Loosely tighten the stroke switchs using a 32 mm socket wrench.

   CAUTION: Never use a impact wrench.

3. Tighten the stroke switchs.

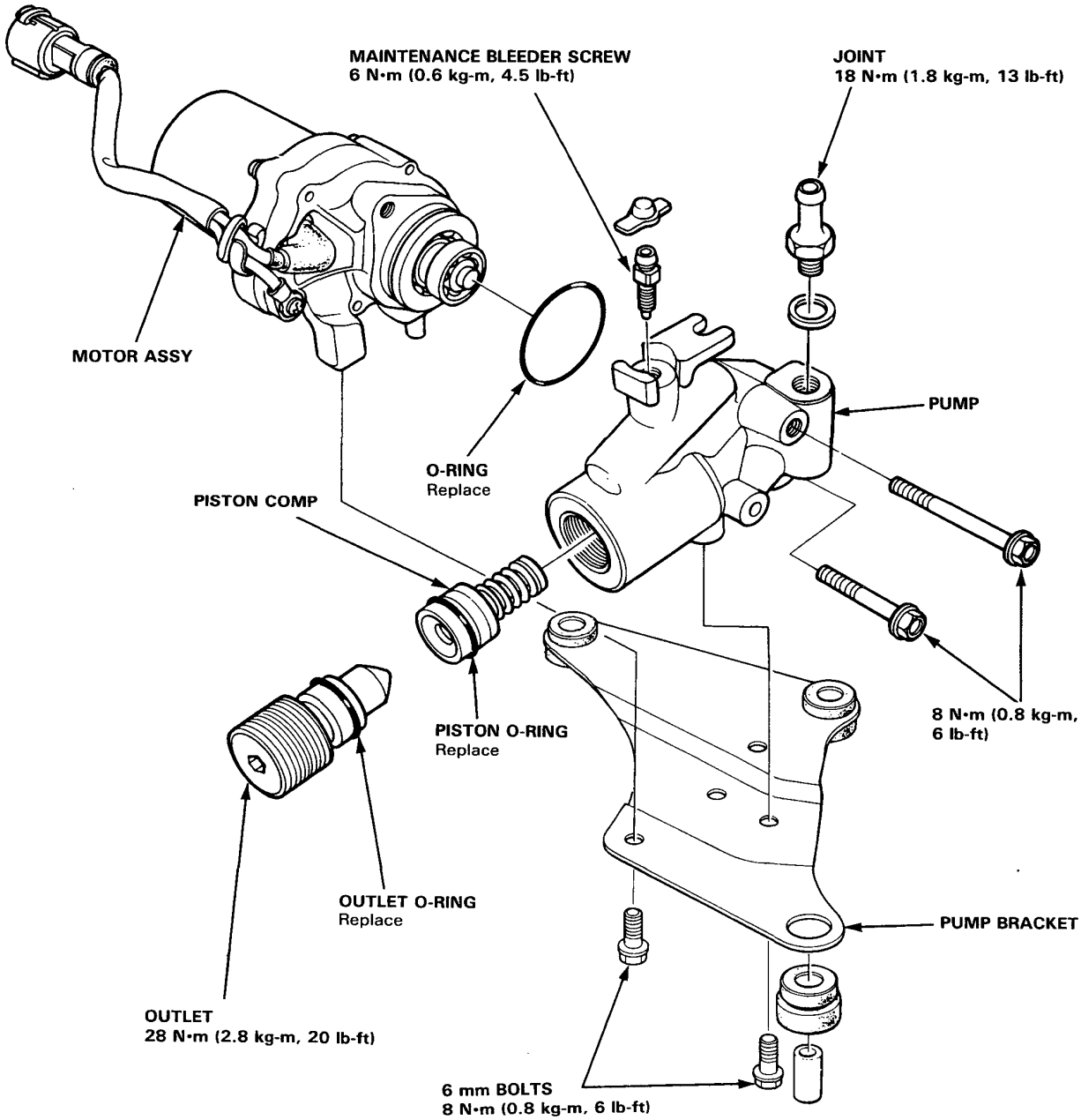


Pump Assy

Index/Inspection

ET Engine Equipped Model

CAUTION: Do not attempt to disassemble the pump parts except for those shown exploded in this illustration.

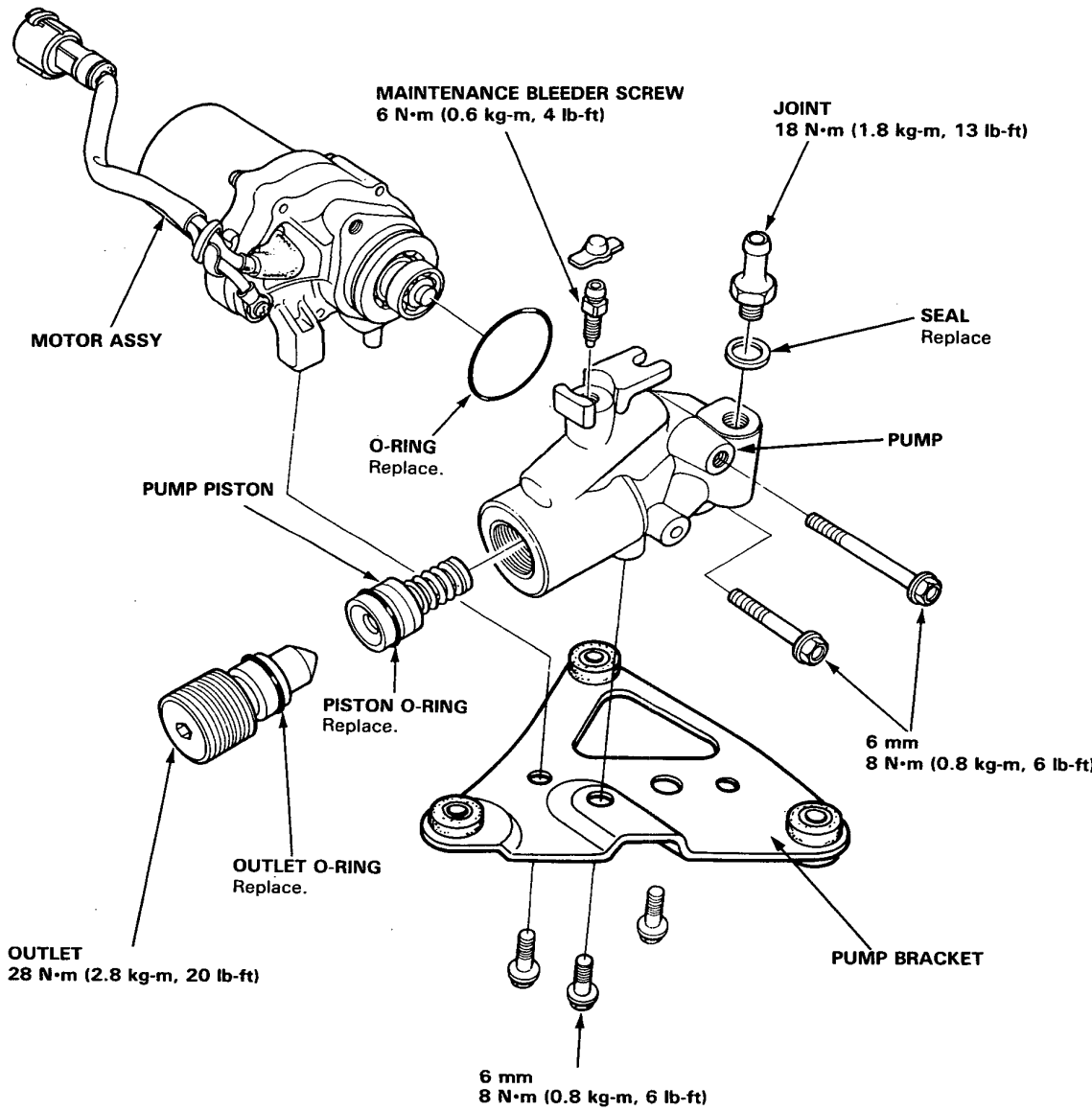


Pump Assy

Index/Inspection

A20A4 and B20A1 Engine Equipped Model

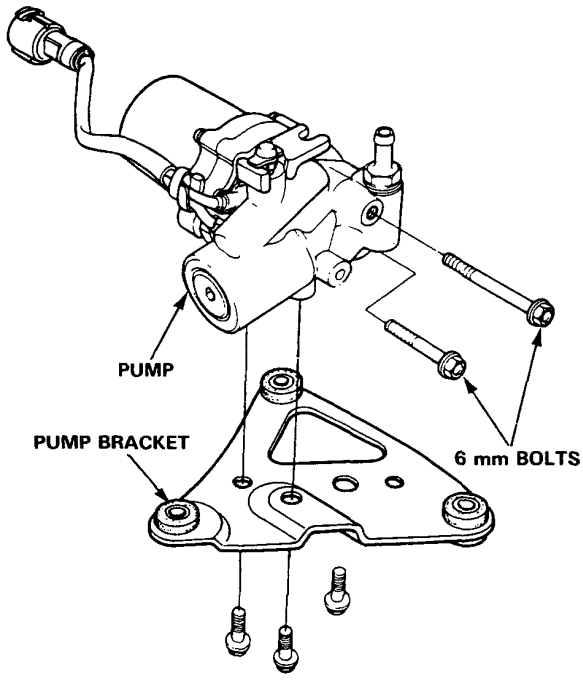
CAUTION: Do not attempt to disassemble the pump parts except for those shown exploded in this illustration.



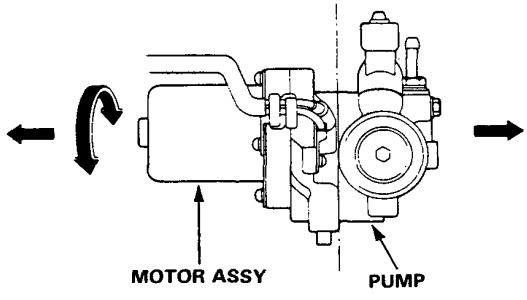
Disassembly

A20A4 and B20A1 Engine Equipped Model

1. Remove the pump bracket.
2. Remove the 6 mm bolts attaching the pump to the pump motor.

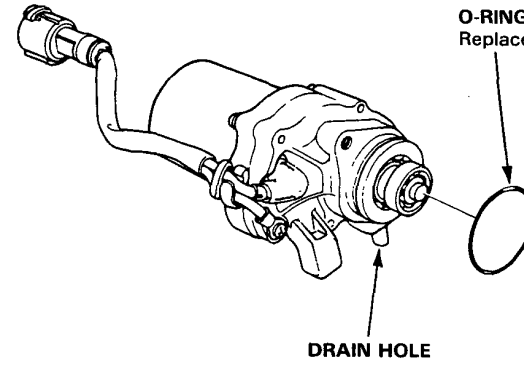


3. Separate the motor from the pump while rotating the pump right and left.



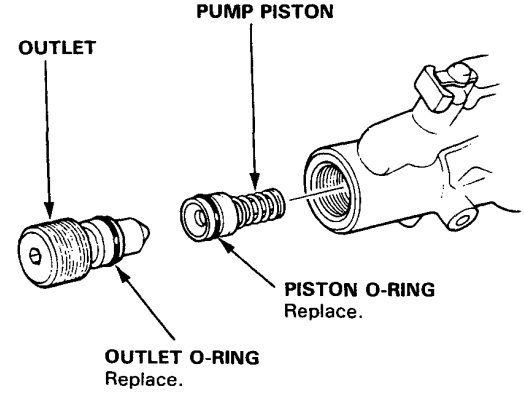
NOTE: An about 10 cc (0.6 cu-in) of brake fluid will flow out when the motor is removed from the pump.

4. Wash the motor with clean brake fluid only on the exposed end and blow dry with compressed air.



NOTE: Do not wash or dip the motor in brake fluid. Also be careful not to allow oil or water to enter the inside through the water drain hole.

5. Remove the outlet from the pump.
6. Remove the pump piston by pushing its from inside of the pump body.

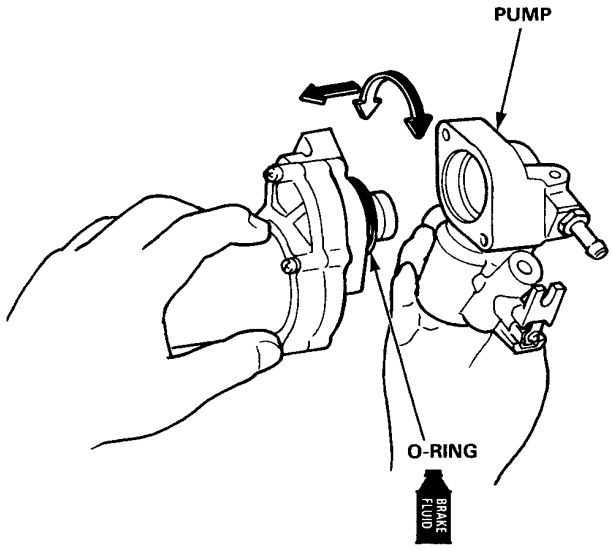


Pump Assy

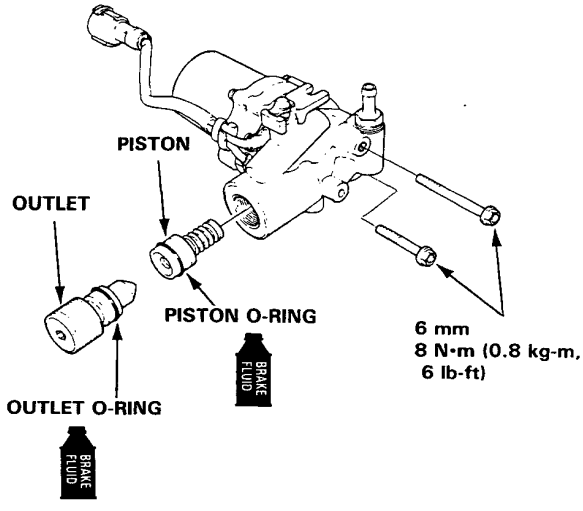
Reassembly

A20A4 and B20A1 Engine Equipped Model

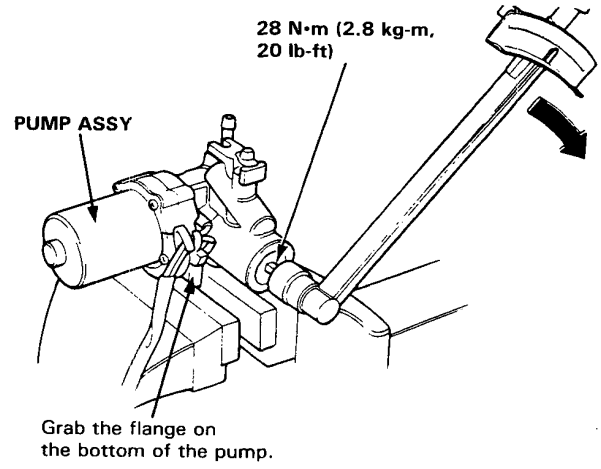
1. Install the O-ring on the pump motor.
2. Coat the O-ring with clean brake fluid and install the pump on the motor while rotating it right and left by hand.



3. Install the 6 mm bolts and tighten.
4. Coat the pump piston O-ring with the clean brake fluid and insert the pump piston into the pump.
5. Coat the outlet O-ring with the clean brake fluid and loosely install the outlet into the pump.

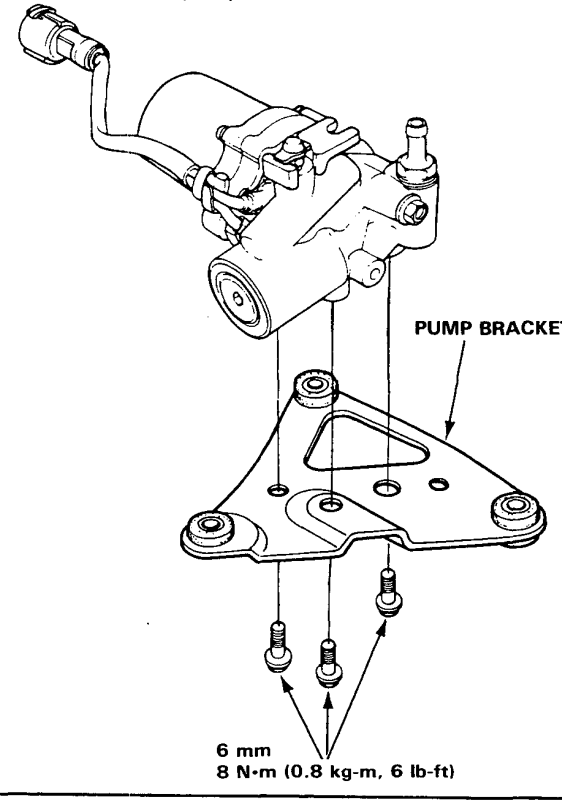


6. Place the motor in a vise as shown and tighten the outlet.



NOTE: Do not place the pump in a vise at locations other than shown above.

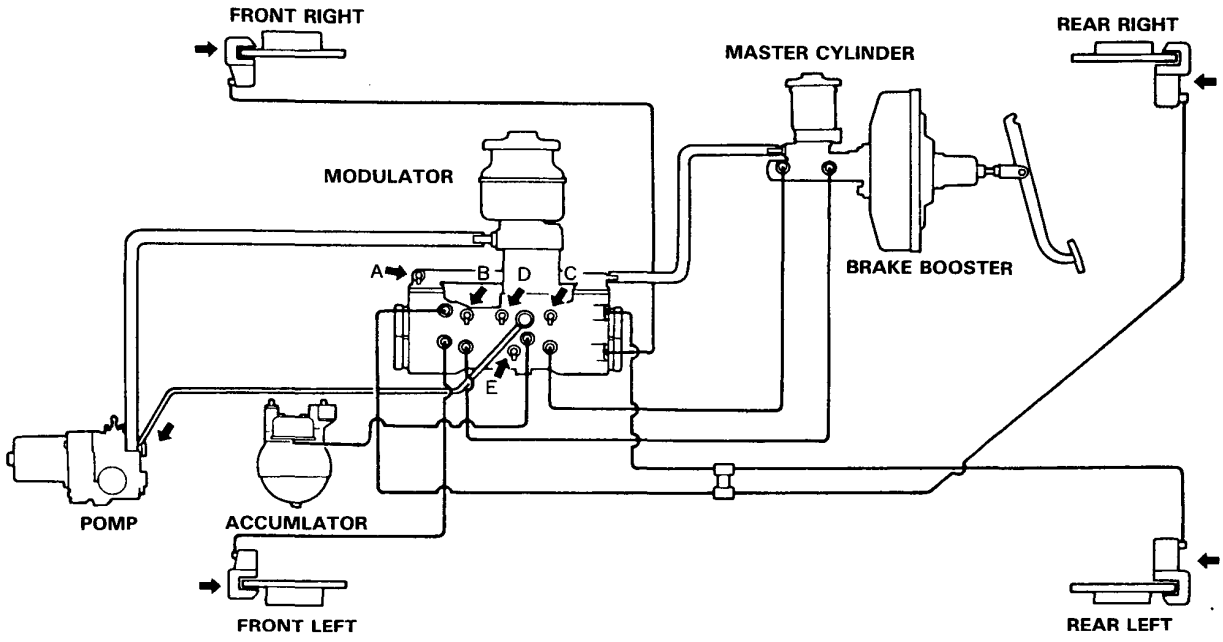
7. Install the pump bracket.



Air Bleeding

Air Bleeding (General)

The air must be bleed from the two hydraulic system.
Main hydraulic brake system.
ALB control hydraulic system.
Arrows indicate bleed screw locations and A to E are bleed screw name in this manual.

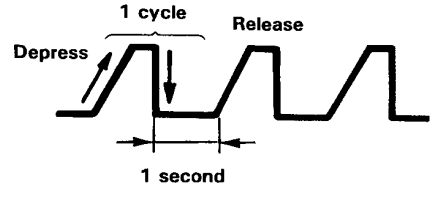


NOTE: The ALB equipped models have a modulator inserted in the circuit between the master cylinder and individual brake calipers in place of the proportioning valve. To bleed air from the system, it is essential have a five bleed screws on the modulator be loosed in the specific orders.

The description which follows relates mainly to manual bleeding, with added notes and explanations on Hondaline vacuum changer (07468—0010001) and pressure type changer which is commercially available for the purpose.

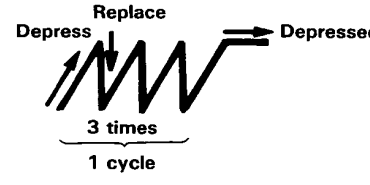
There are two pedal pumping procedures in air bleeding for cars equipped with 4W-ALB. They are indicated by mode 1 and mode 2 in this manual.

Mode 1



Bleed screw: OPEN

Mode 2



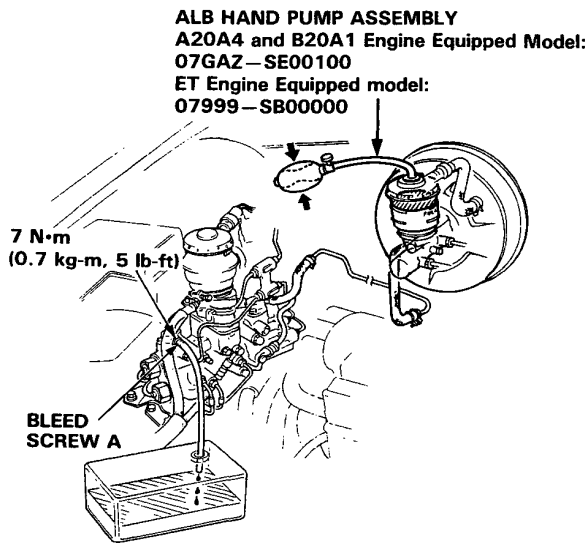
Bleed screw: OPEN CLOSE

Air Bleeding

Manual Bleeding

Main Hydraulic Brake System:

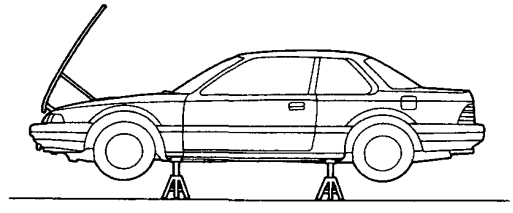
1. Fill the master cylinder reservoir with recommended brake fluidup to the MAX level.
2. Install the ALB hand pump assembly onto the master cylinder as shown.
3. Loosen the bleed screw A on the modulator.



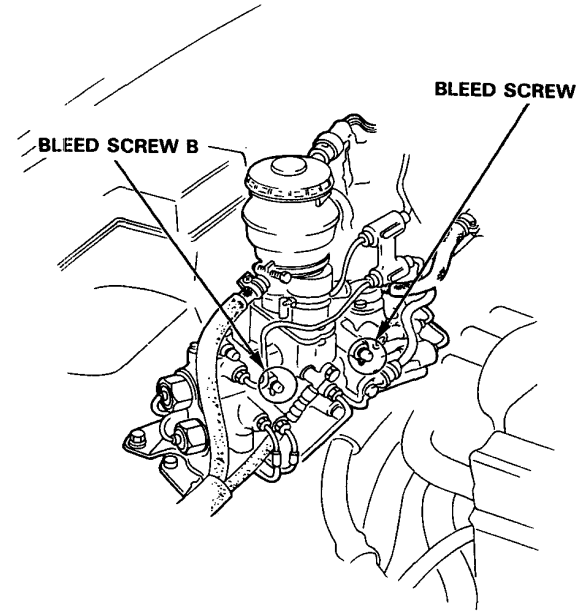
4. Pump the ALB hand pump until the brake fluid flows out from the bleed screw A.

   NOTE: Check the fluid level often while bleeding the brakes to prevent air from being pumped into the system.

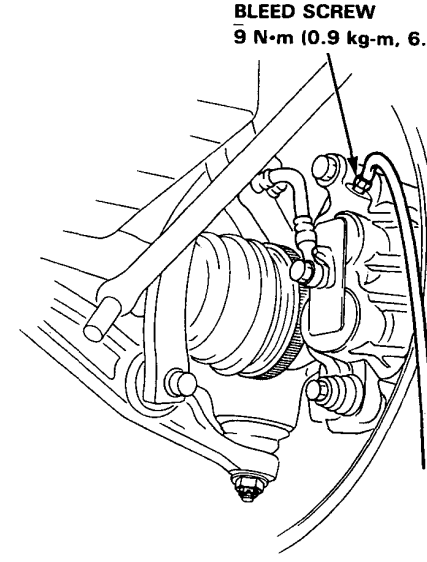
5. Retighten the bleed screw A after being sure that there is no air from the bleed screw A.
6. Raise the car and support with safety stand in proper locations.



7. Loosen the bleed screw B.
8. Have a someone get in the car and pump the brake pedal in mode 2 until fluid flows out that almost free of air bubbles.
9. Bleed the bleed screw as same as steps 7 to 8.



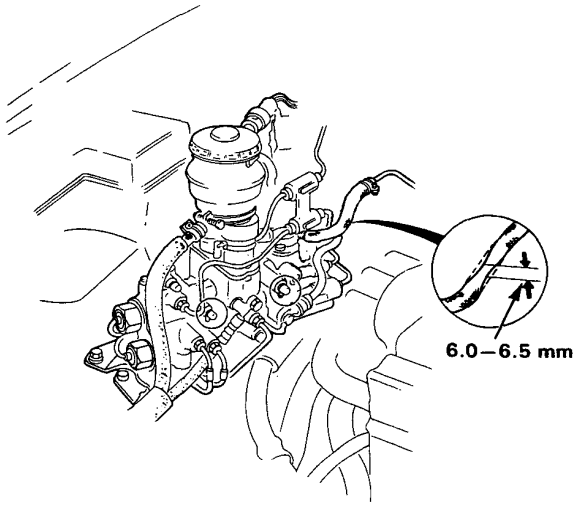
10. Loosen the bleed screw on the left front caliper about two turns.



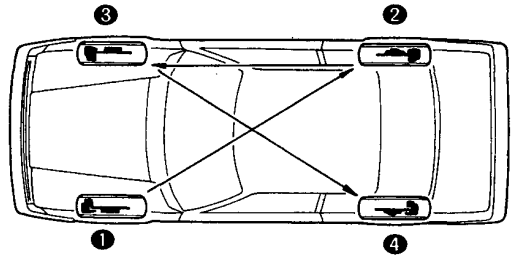
11. Pump the brake pedal in mode 1 about 30 times until air bubbles do not apper from the bleed screw.

12. Pump the brake pedal in mode 2 for 5—6 times.

    NOTE: In the new parts are installed or the brake fluid does not flow in mode 1, narrow the hose between the master cylinder and modulator to 6.0—6.5 mm (0.24—0.26 in) as shown.

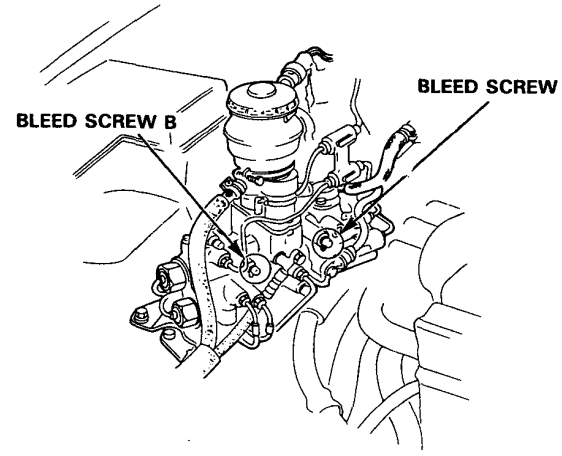


13. Bleed air from each wheel caliper as order shown below until air bubbles do not apper from the bleed screws.



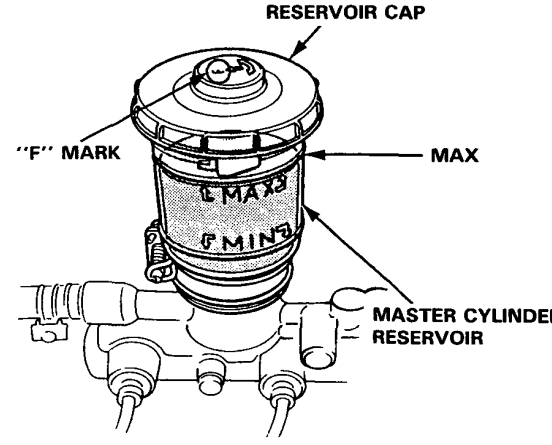
14. Bleed the bleed screw B and C on the modulator.

15. Retighten the bleed screw B and C when the fluid flows in a solid stream that is free of air bubbles.



16. Fill the master cylinder reservoir up to the MAX level.

17. Install the reservoir cap with its F mark facing forward.



NOTE:

- If the [(O)] comes on, the main hydraulic brake system is improper.
- Start the engine, release the parking brake and depress the brake pedal fully, the [(O)] lamp should not come on.

18. Road test to see if the brakes are operating properly.

    CAUTION: The ALB system may still not function properly in this time.

(cont'd)

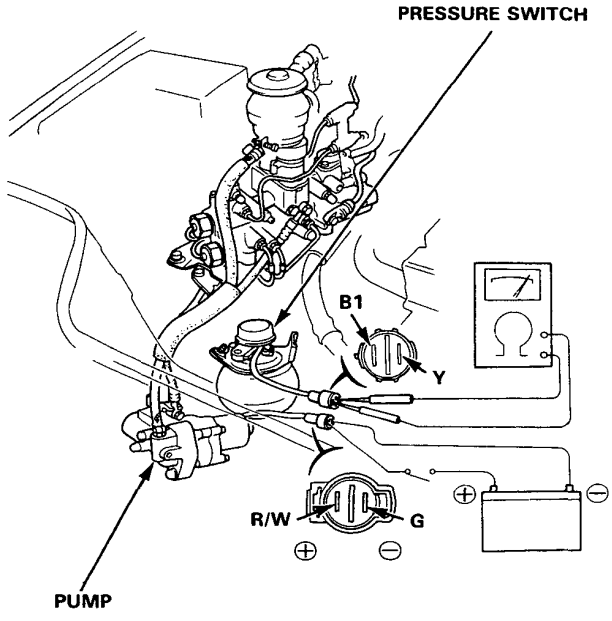
Manual Bleeding (cont'd)

ALB Control Hydraulic Brake System:

1. Fill the modulator reservoir up to the MAX level with recommended brake fluid.

2. Connect the probes of an ohmmeter to the Black and Yellow terminals of the accumulator pressure switch coupler (Pink).

3. Connect a positive wire of a fully charged battery to the Red/White terminal of the power unit motor coupler (Yellow), and negative wire to the Green terminal, with a battery switch next to the battery positive terminal as shown.



5. Turn the switch for 4 seconds and check for continuity.

6. Bleed air from the circuit between the accumulator and the modulator.

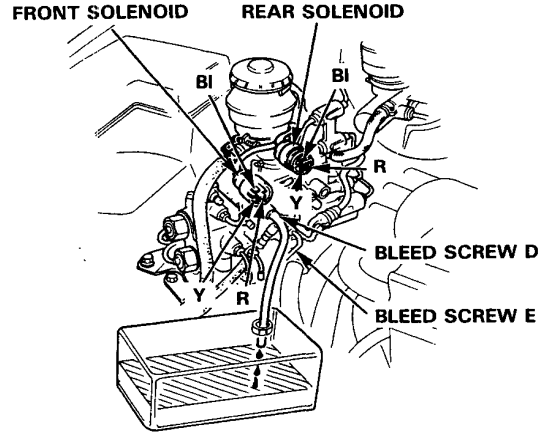
   NOTE: The air can be bleed by operating the solenoids, or by loosening the bleed screw D and E.

Bleeding with solenoids:

6-1. Apply 12 V battery across the Red (positive) and Black (negative) terminals of the solenoid coupler (Pink) (front or rear) momentarily.

6-2. Turn the battery switch off when the fluid coming up into the reservoir is free of air bubbles (about 4-5 minutes).

6-3. Repeart the steps 5, 6-1 and 6-2 three times.



Bleeding with bleed screw D and E:

6-4. Connect the positive wire of a fully charged 12 V battery to the Red terminal of the solenoid coupler, and negative wire to the black terminal.

6-5. Loosen the bleed screw slightly.

Front solenoid ..... Bleed screw E
Rear solenoid ..... Bleed screw D

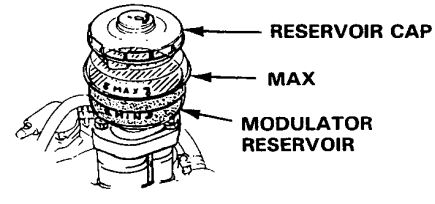
6-6. Tighten the bleed screw when there is no air in the fluid flowing out from the bleed screw.

7. Perform the step 5. and reconnect the coupler.

8. Fill the modulator reservoir up to the MAX level.

9. Install the reservoir cap with its F mark facing forward.

10. Check the operation of the ALB system using the ALB checker (page 20-36).



Air Bleeding (with a pressure changer)

The number ❶ thru ❼ indicate the bleeding sequence.

Main brake system:

1. Fill the master cylinder reservoir up until the fluid does not flow out of the reservoir while install the changer adaptor.
2. Install the changer.

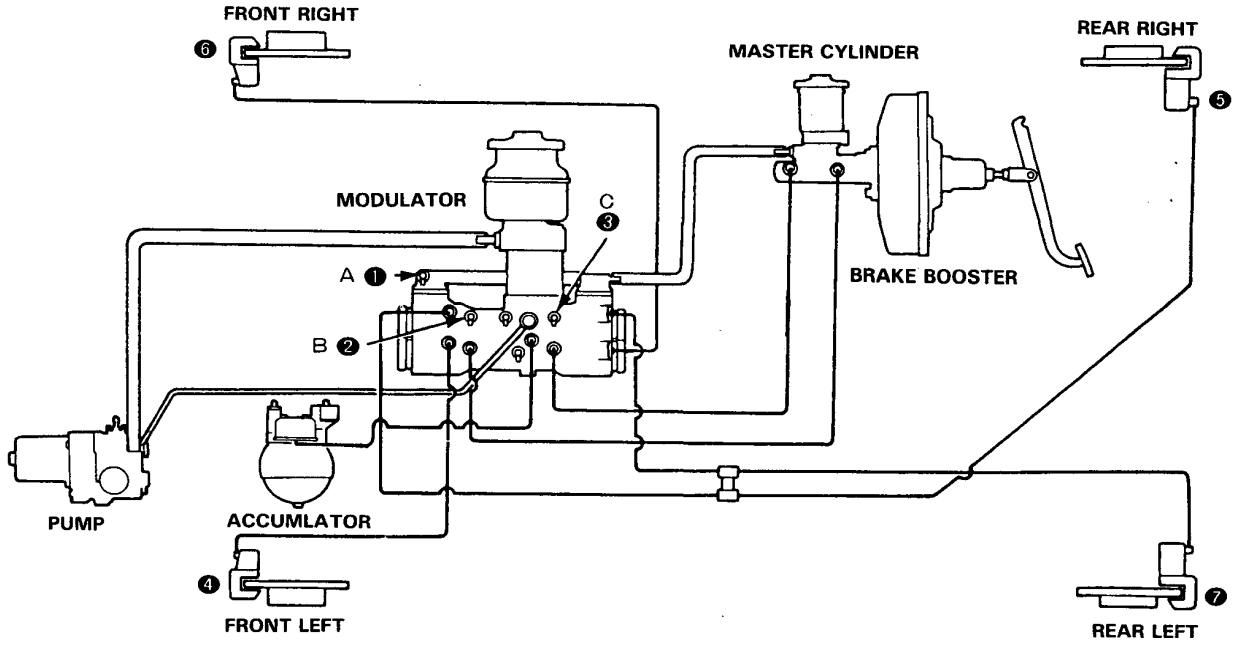
   NOTE:
   - Follow the changer manufacture's instructions.
   - Make sure that there are not fluid leaks past the pipe joints or connections by operating the changer.

3. Bleed air from bleed screw A (❶).
4. Bleed air from bleed screw B and C (❷ and ❸).
5. Bleed air from bleed screw of each wheels in order ❹, ❺, ❻, ❼.
6. Repeat step 4.

   Recommended changer pressure:
   294—392 kpa (3—4 kg-cm², 43—57 psi)

ALB control system:

1. Install the changer on the modulator reservoir.
2. Follow the steps described on the manual bleeding on page .



Air Bleeding

Air Bleeding (with a vacuum changer)

The numbers 1 thru 7 indicate the bleeding sequence.

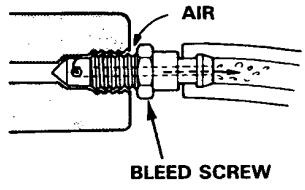
Main bleeding system:

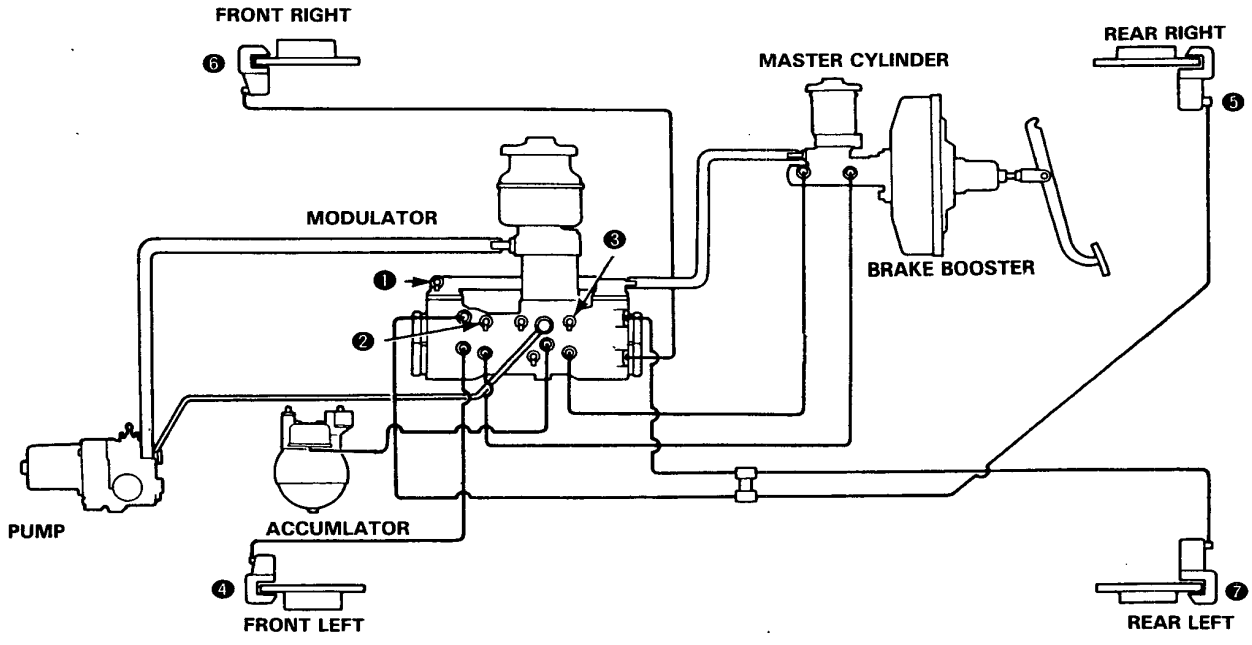
1. Fill the master cylinder reservoir up to the MAX level.
2. Install the changer.
3. Close the changer valve when the level of the fluid in the reservoir falls 10 mm (0.4 in).

   NOTE: Air will be sucked in through the bleed screw when the vacuum valve is opened. To copr with this, open the valve slightly so that the least possible amount of fluid is sucked in by the changer. Before closing, have someone pump the brake pedal to make sure there is no air in the system.

ALB control system:

Follow the steps for manual bleeding on page.



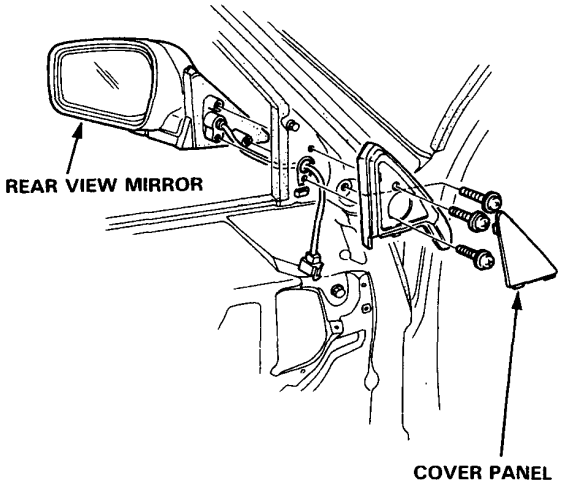


Body

Power Door Mirror (KQ, KY Types)

Removal

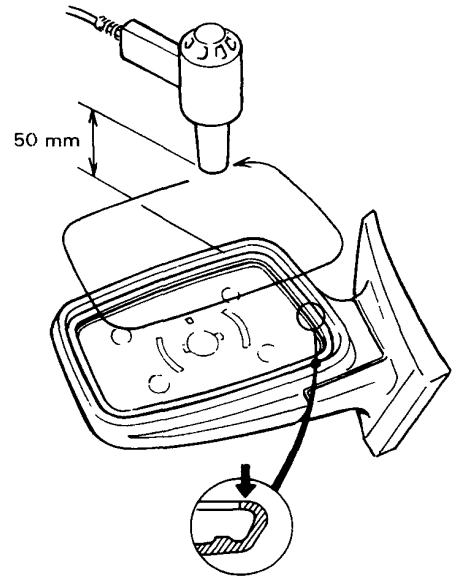
1. Remove the door panel and disconnect the power mirror wires.
2. Pry out the cover panel with a flat screwdriver.



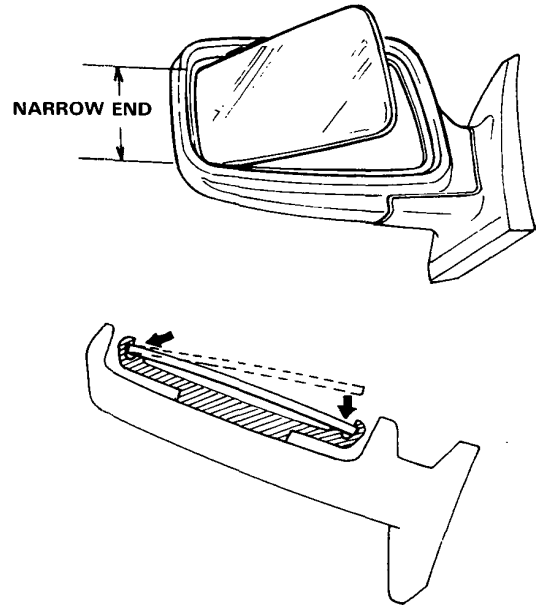
3. Remove the mirror mounting screws while holding the mirror.

Mirror Glass Replacement

1. Heat the edge of the glass with a low powered heat gun for several minutes, then remove the glass.



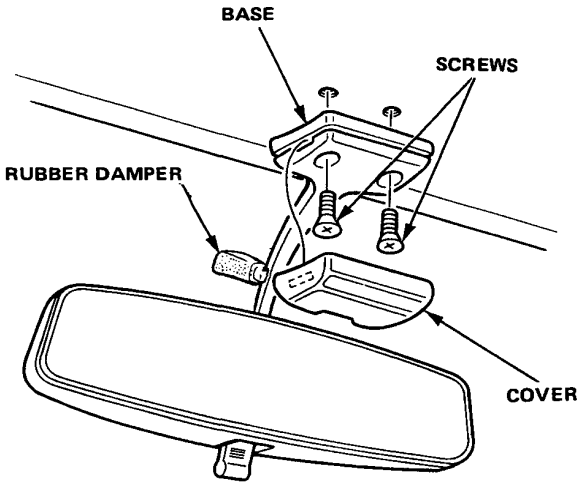
2. Install the glass in the mirror case, narrow end first.



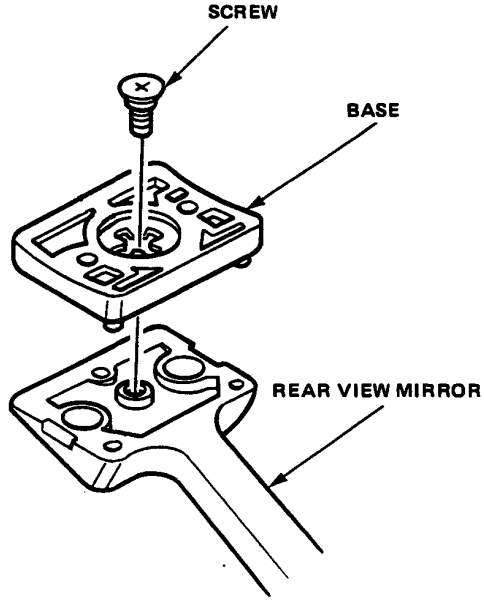
Rear View Mirror

Removal

1. Remove the rubber damper.
2. Pry the cover off using the end of a slot-head screwdriver.



3. Remove the two base mounting screws and remove the room mirror from the roof with the base as an assembly.
4. Remove the base from the bracket by removing the screw.

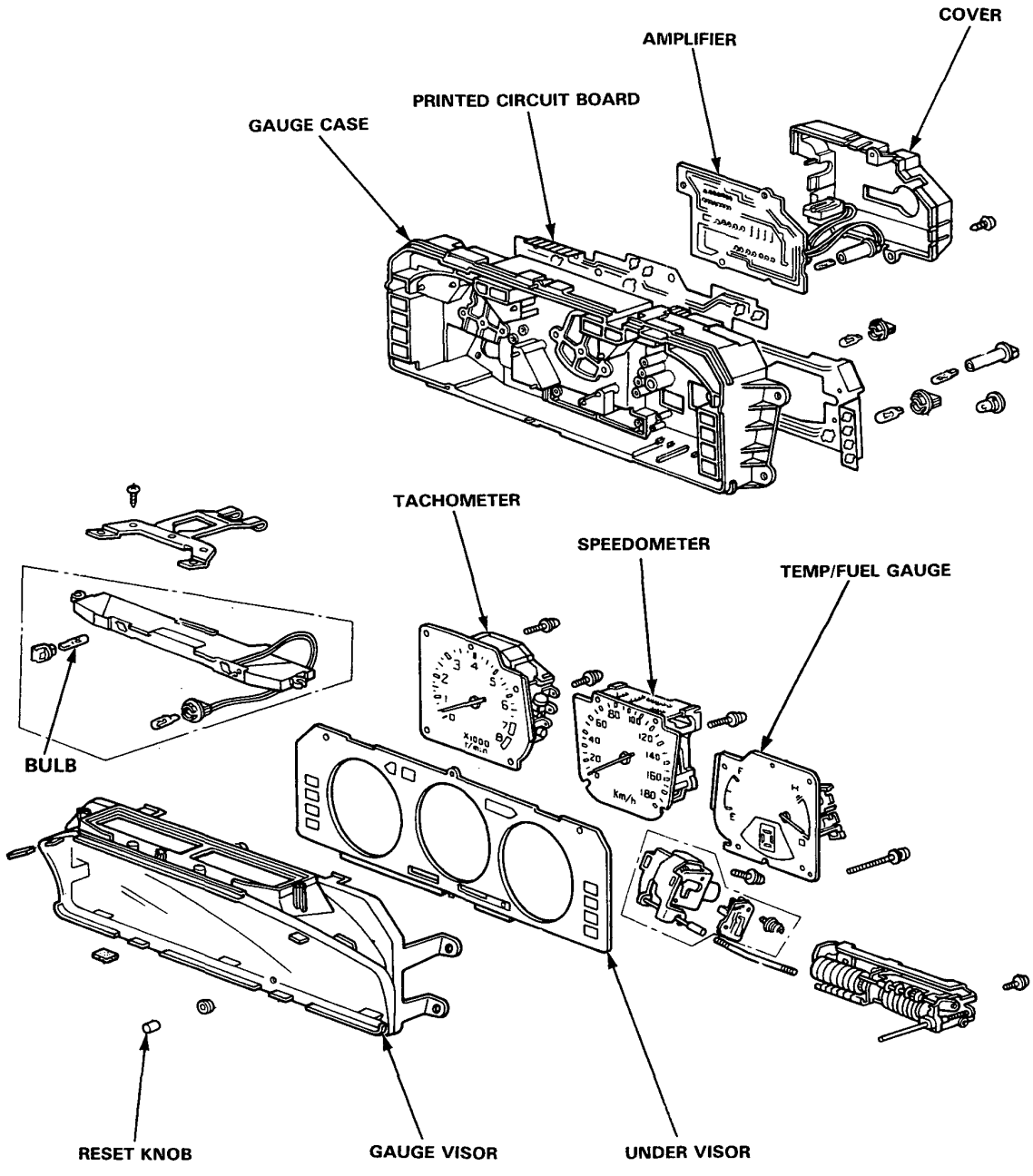


Gauge

Overhaul

(2000)

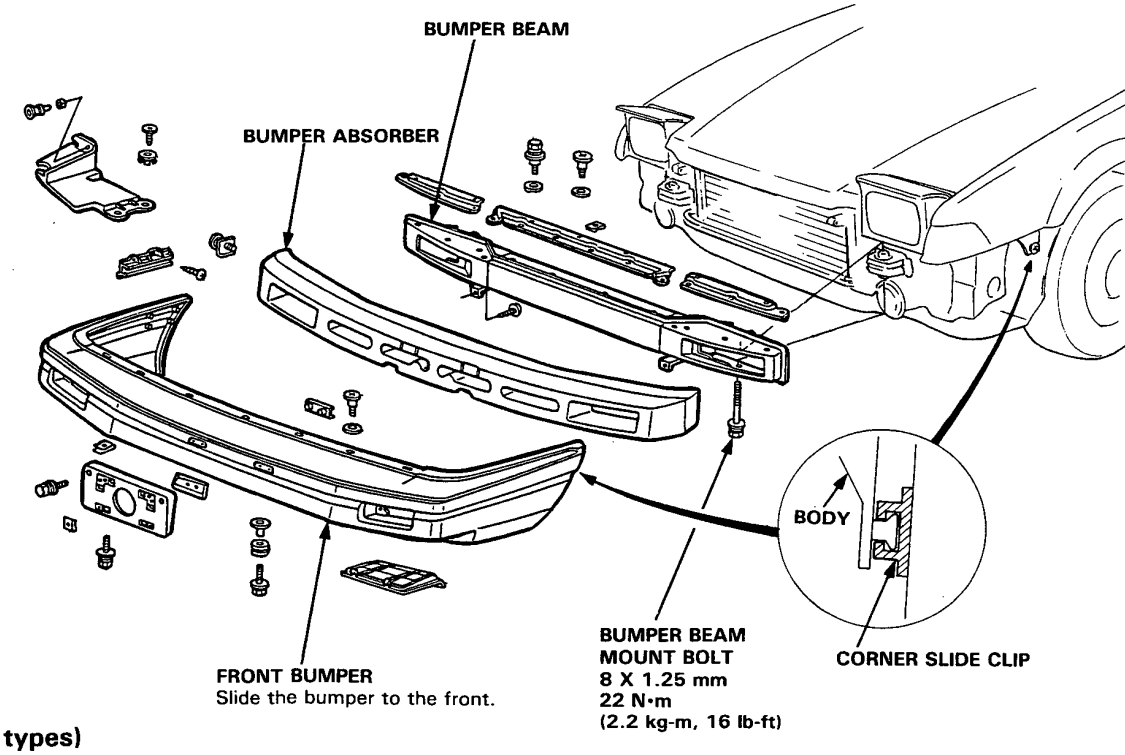
NOTE: Avoid damaging terminals and printed circuit.



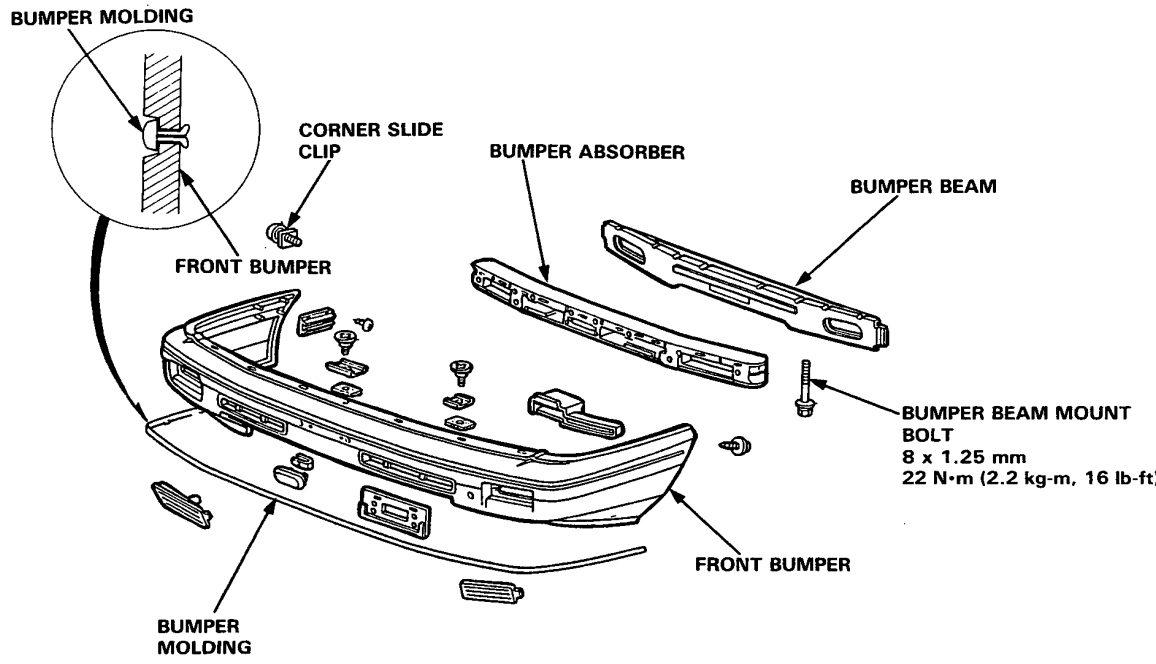
Front Bumper

Replacement

(2000)



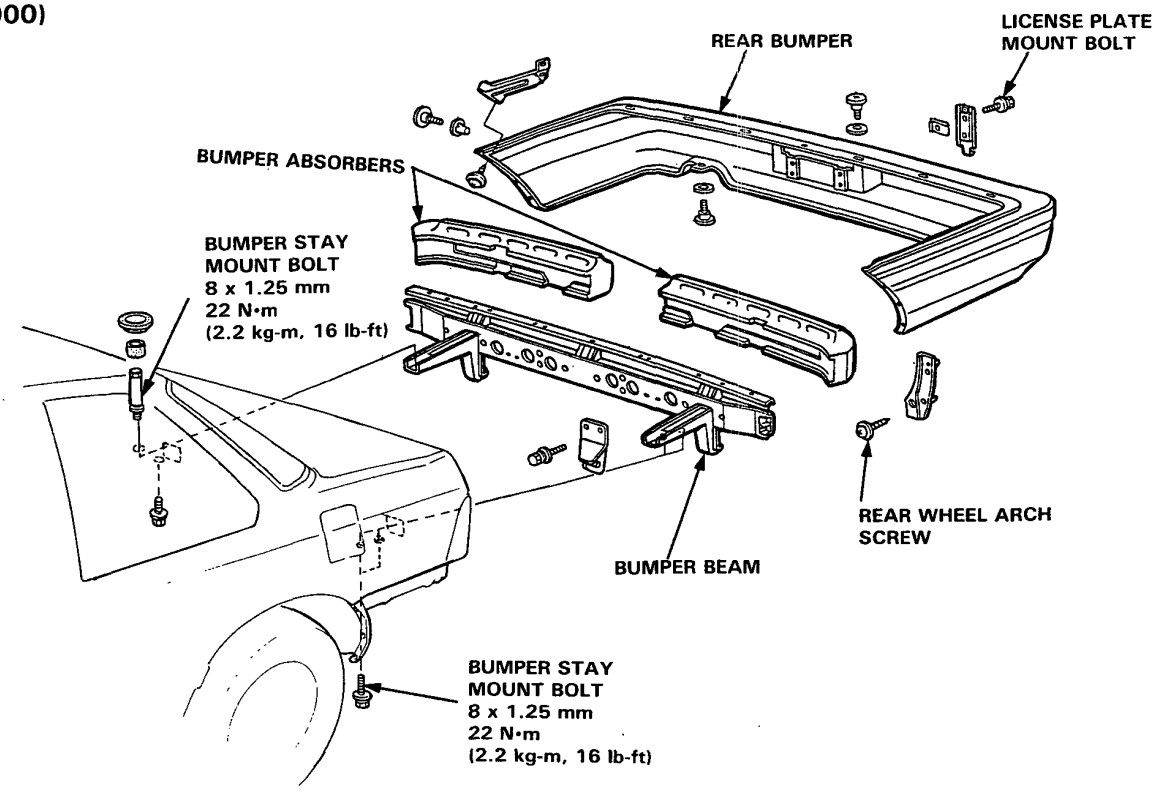
(Other types)



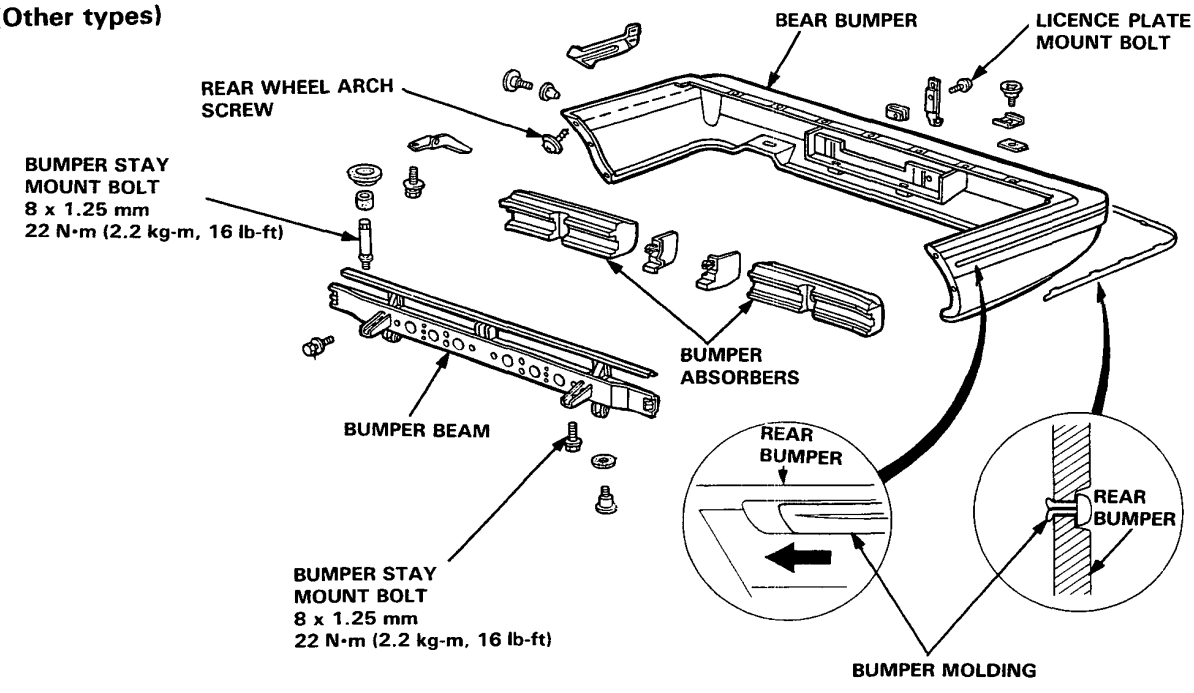
Rear Bumper

Replacement

(2000)

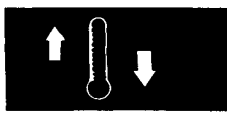


(Other types)

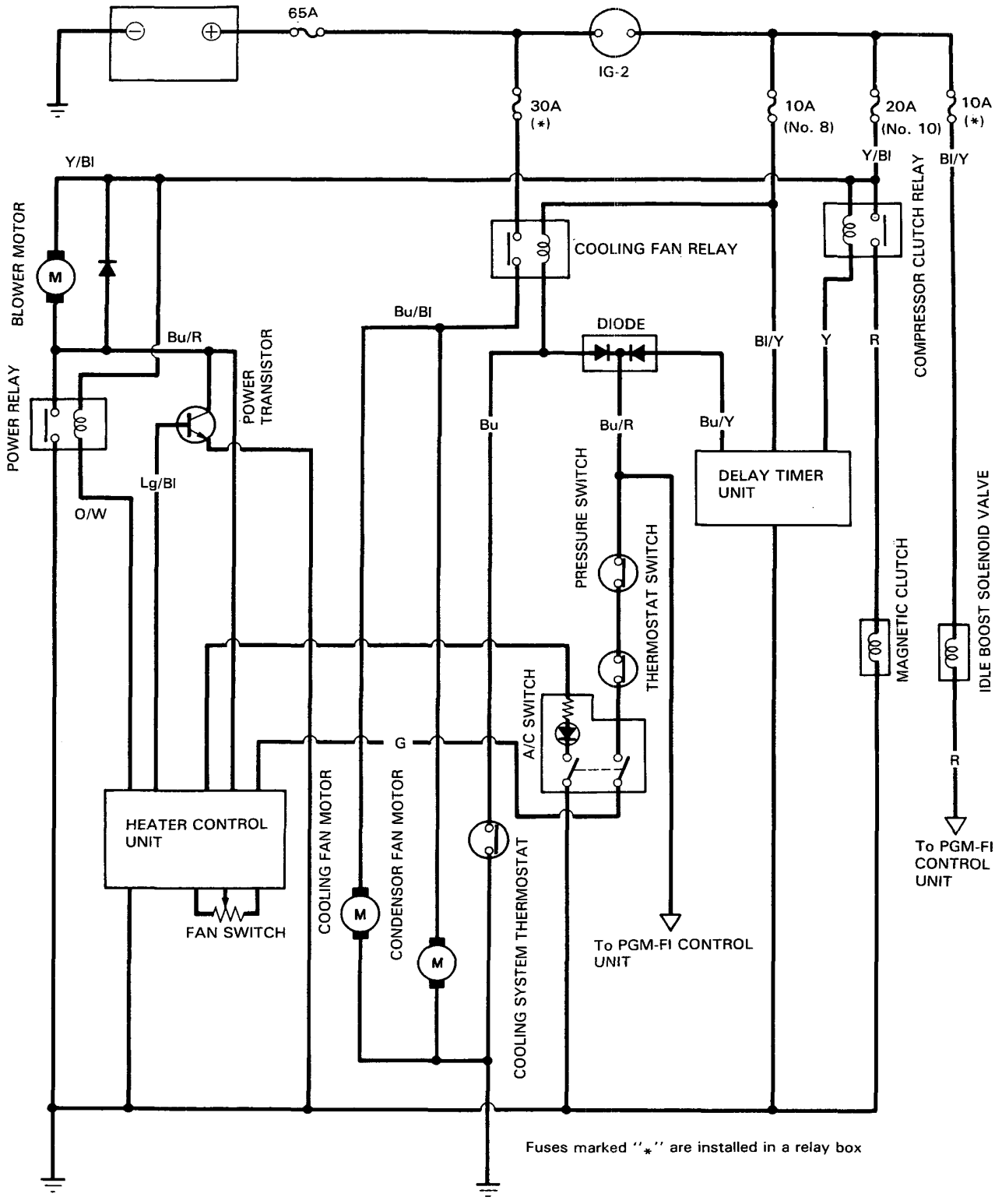


NOTE: Use new rear wheel arch clips when reinstalling the bumper.

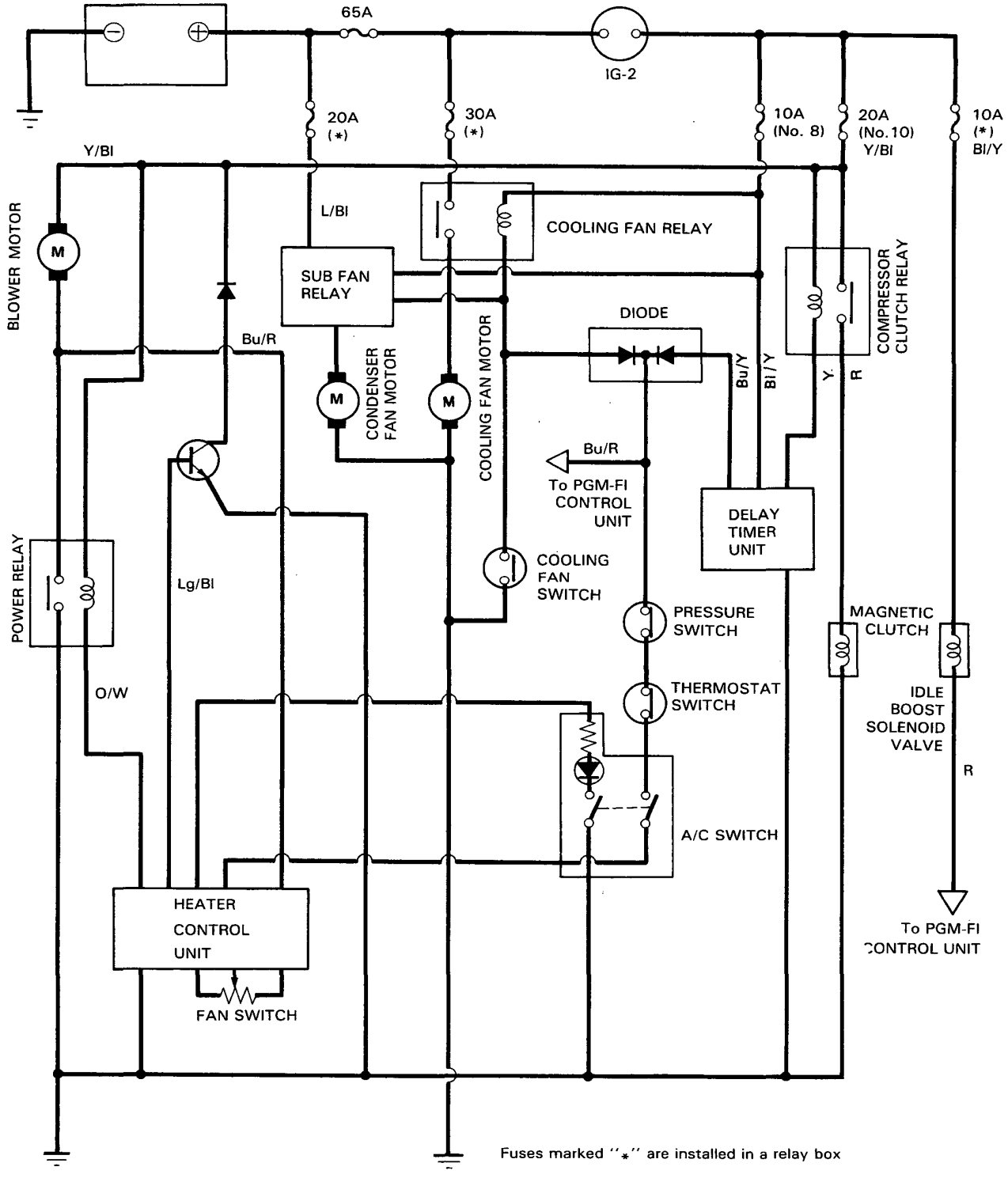
Air Conditioning



Circuit Diagrpm (KQ, KS, KW, KX, KG, KF, KE, KB, Type)



— (KY Type)


65A
IG-2
20A (*)
30A (*)
10A (No. 8)
20A (No.10)
10A (*)
Y/Bl
Bl/Y
L/Bl
BLOWER MOTOR
M
COOLING FAN RELAY
SUB FAN RELAY
DIODE
COMPRESSOR CLUTCH RELAY
Bu/R
CONDENSER FAN MOTOR
COOLING FAN MOTOR
Bu/Y
Bl/Y
Y
R
Bu/R
To PGM-FI CONTROL UNIT
DELAY TIMER UNIT
POWER RELAY
Lg/Bl
COOLING FAN SWITCH
PRESSURE SWITCH
MAGNETIC CLUTCH
O/W
THERMOSTAT SWITCH
IDLE BOOST SOLENOID VALVE
R
A/C SWITCH
HEATER CONTROL UNIT
FAN SWITCH
To PGM-FI CONTROL UNIT
Fuses marked "*" are installed in a relay box

Compressor

Replacement

1. Run the engine at idle speed and turn on the air conditioner for a few minutes.
2. Disconnect the battery negative terminal.
3. Disconnect the compressor clutch lead.
4. Discharge the refrigerant very slowly from the system
5. On the car with a power steering, loosen the oil pump adjusting and mounting bolts.
6. Lift the power steering belt off the pully.
7. Remove the power steering oil pump.
8. Disconnect the suction and discharge hoses from the compressor.

   CAUTION: Cap the open fittings immediately to keep moisture and dirt out of the system.

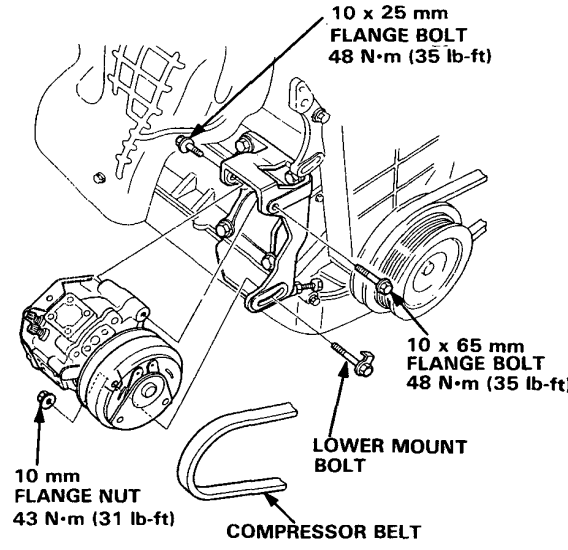
9. Loosen the compressor adjusting/mounting bolts and nut, then lift the belt off the pully.
10. Remove the air conditioner cooling fan motor with the motor mounting frame.
11. Remove the mounting bolts and compressor and put on the engine support beam.
12. Remove the compressor bracket.
13. Remove the compressor from the engine compartment.

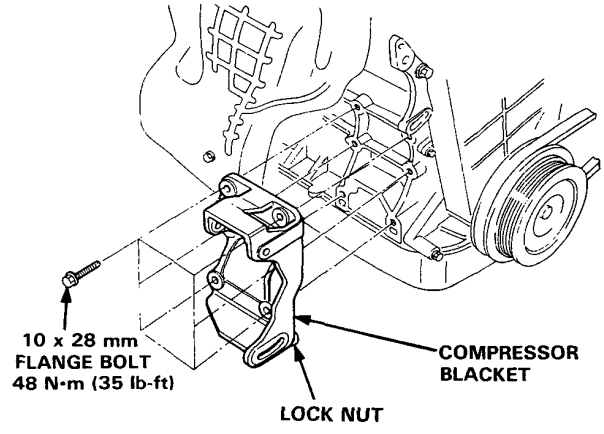
Install the compressor in the reverse order of removal, and:

- If a new compressor is installed, drain 30 cm^3 (1 fl oz) of refrigerant oil through the suction fitting on the compressor.
- Adjust the belt.

  BELT TENSION: 10–12 mm (3/8–1/2 in.) when 98 N (10 kg, 22 lbs) force is applied between pulleys.
- Charge the system
- Test the performance

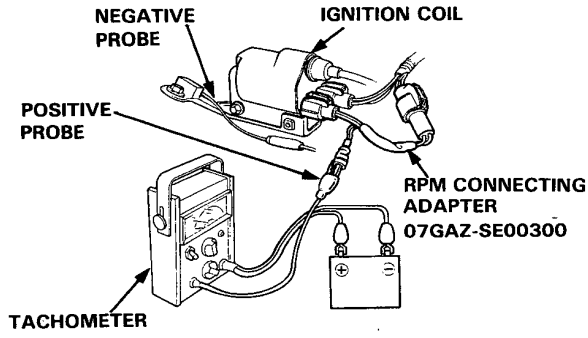
CAUTION: Don't loosen the cylinder cover bolts of the compressor.



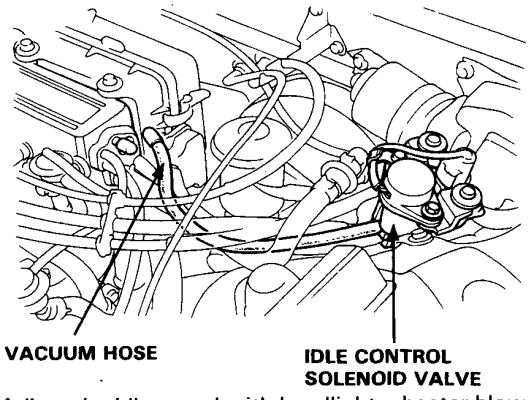


Idle Speed Inspection

1. Start the engine and warm it up to normal operating temperature (the cooling fan goes on twice).
2. Connect a tachometer.



3. Disconnect the upper vacuum hose of the idle control solenoid valve (between the valve and intake manifold) from the intake manifold.
4. Cap the end of the hose and intake manifold.



5. Adjust the idle speed with headlights, heater blower, rear window defroster, cooling fan and air conditioner off.

   Idle Speed should be:

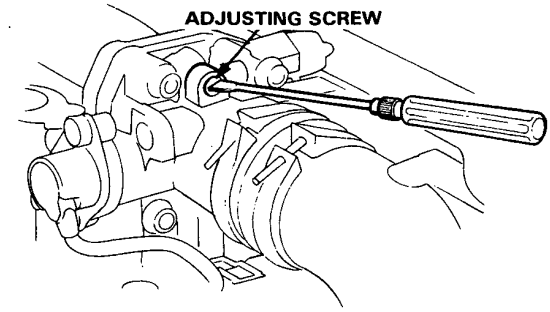
   [KX, KQ Models]

Manual	750 ± 50 min^{-1} (rpm)
Automatic (KQ Model)	750 ± 50 min^{-1} (rpm)

   [Other Models]

Manual	800 ± 50 min^{-1} (rpm)
Automatic (KY Model)	800 ± 50 min^{-1} (rpm)

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



6. Check the idle speed with heater fan switch at HI (right end) and air conditioner on.

   Idle Speed should be:

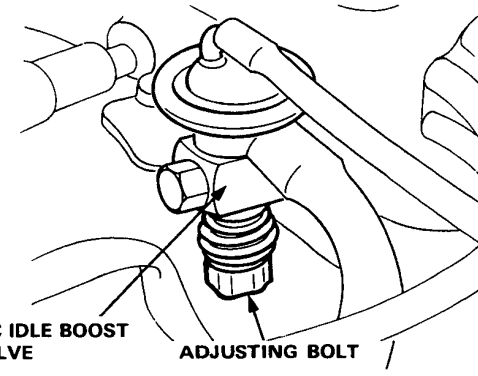
   [KX, KQ Models]

Manual	750 ± 50 min^{-1} (rpm)
Automatic (KQ Model)	750 ± 50 min^{-1} (rpm)

   [Other Models]

Manual	800 ± 50 min^{-1} (rpm)
Automatic (KY Model)	800 ± 50 min^{-1} (rpm)

   Adjust idle speed, if necessary, by turning the adjusting bolt on the A/C idle boost valve.



7. After adjustment, connect the idle control solenoid valve vacuum hose.
8. On Automatic Transmission model, after adjusting the idle speed, check that it remains within the specified limit when shifted in gear ("D_3" or "D_4").

   Idle speed should remain:
   750 ± 50 min^{-1} (rpm) ("D_3" or "D_4").

9. Check the idle speed with headlights,heater blower, rear window defroster, and cooling fan on but air conditioner off.
   It should be the same as normal idle speed.

   NOTE: If the idle speed is not within specifications, see Troubleshooting on pages 11-30 and 11-31.

Body Electrical

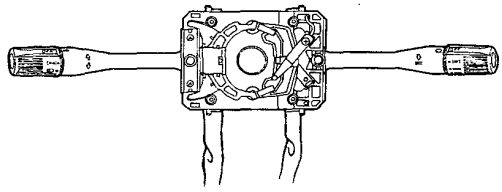
Combination Switch

Testing

Check for continuity between the terminals in each switch position according to the table.

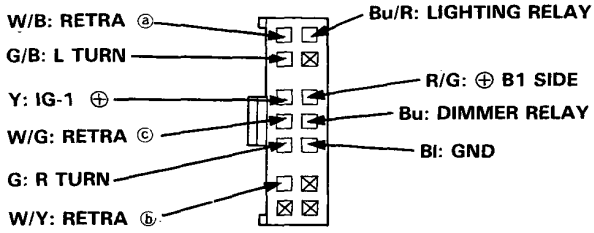
CAUTION:

- **Make sure the wire leads are not pulled when the lever is moved.**
- **Check that the lever works freely without bingding.**

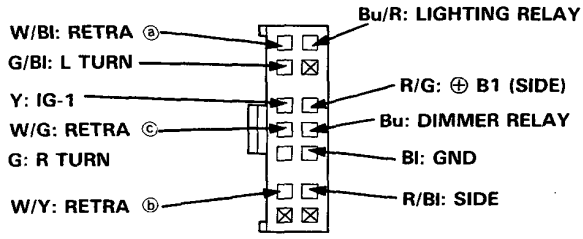


View from wire side

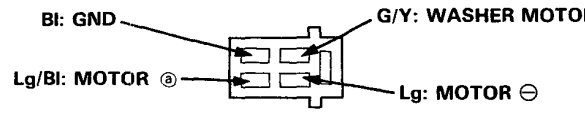
to fuse box



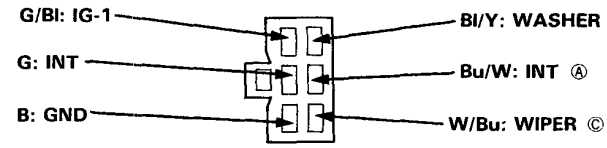
to fuse box (KY Model)



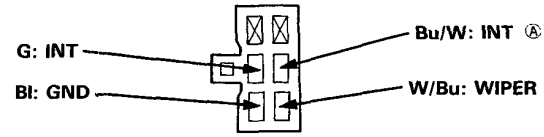
to heater wire harness



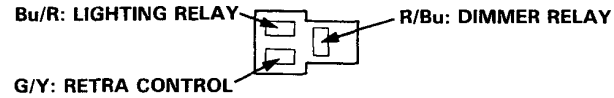
to intermittent wiper relay



to intermittent wiper relay (KY Model)



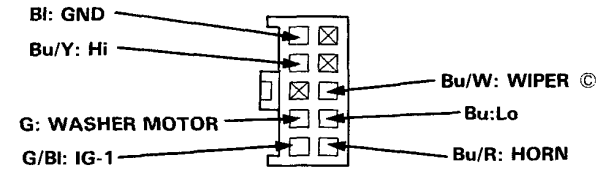
to dash board wire harness



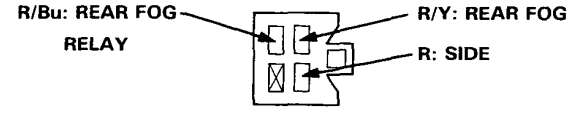
to side wire harness

KS. KW MODELS TO DAYLIGHT
OTHER MODELS TO REAR FOG RELAY

to side wire harness:
L.H. Drive to engine compartment
wire harness: R.H. Drive



to side wire harness (KF. KX Models)



Front Wiper Switch

	IG-1	INT	INT Ⓐ	LO	HI	GND	WIPER MIST
OFF			○—○				OFF
					○—○		ON
INT	○—○		○—○				OFF
	○—○				○—○		ON
LO				○—○			OFF
					○—○		ON
HI					○—○		OFF
					○—○		ON
WIRE COLOR	G/Bl	G	Bu/W	Bu	Bu/Y	Bl	

Front Washer Switch

	Washer Motor	GND
OFF		
ON	○—○	
WIRE COLOR	Bl/Y	Bl

Rear Washer Switch

	W1	IG-1
OFF		
ON	○—○	
WIRE COLOR	G/Y	G/Bl

Rear Wiper Switch

	L	S	GND
OFF	○—○		
ON	○—○		○
WIRE COLOR	Lg	Lg/Bl	Bl

Turn Signal Switch

		⊕IG-1	DIODE		R TURN	L TURN
OFF				○		
ON	R	○—▶		○—○		
	L			○		○
WIRE COLOR		Y			G	G/Bl

Lighting Switch (KY Model)

	⊕ Bl (SIDE)	SIDE	RETRA ⓒ	RETRA ⓐ	RETRA ⓑ	LIGHT-ING RELAY	GND
OFF			○—○				
•	○—○						
●	○—○		○—○			○—○	
WIRE COLOR	R/G	R/Bl	W/G	W/Bl	W/Y	Bu/R	Bl

Passing Switch (KW Model)

	LIGHT-ING RELAY	GND	DIMMER RELAY
OFF			
ON	○—○	○	○
WIRE COLOR	Bu/R	Bl	Bu

Horn Switch

	Horn	GND
OFF		
ON	○	⏚
WIRE COLOR	Bu/R	

Lighting Switch (Car without rear fog light)

	⊕ Bl (SIDE)	SIDE	RETRA ⓒ	RETRA ⓐ	RETRA ⓑ	LIGHT-ING RELAY	GND
OFF			○—○				
•	○—○						
●	○—○		○—○			○—○	
WIRE COLOR	R/G	R	W/G	W/B	W/Y	Bu/R	Bl

Passing Switch

	LIGHT-ING RELAY	GND	RETRA CONT UNIT	DIODE	DIMMER RELAY
OFF			○	▶|	○
ON	○	○	○	▶|	○
WIRE COLOR	Bu/R	Bl	G/Y		Bu

Dimmer Switch

	GND	DIMMER RELAY
HIGH	○—○	
LOW		
WIRE COLOR	Bl	Bu

Dimmer Switch (KF, KX Models)

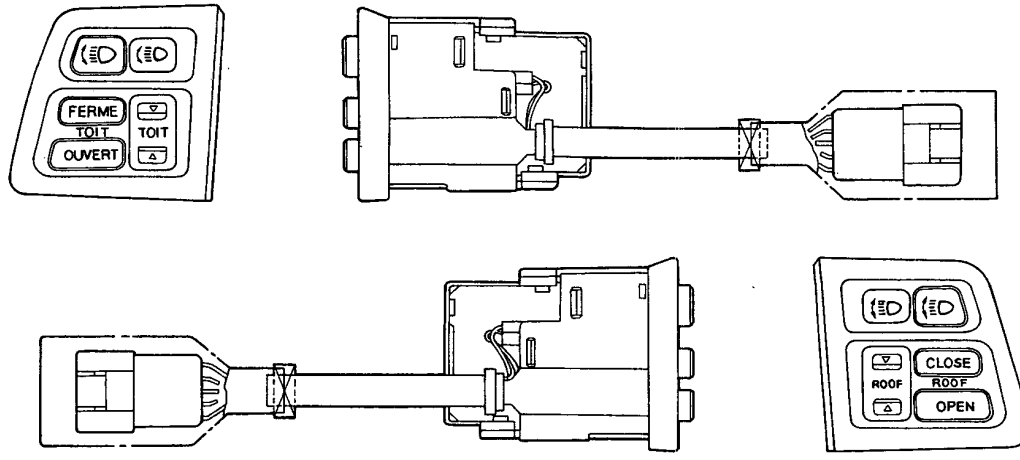
	GND	DIMMER RELAY	R. R FOG
HIGH	○—○		
LOW	○	○	
WIRE COLOR	Bl	Bu	R/Y

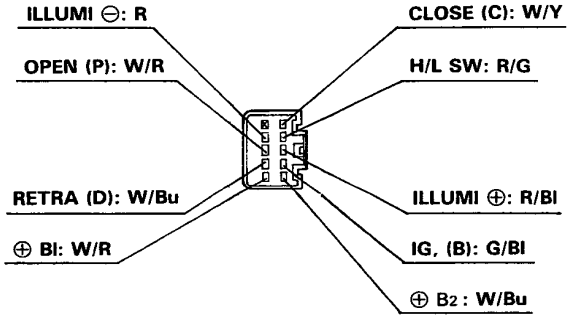
Lighting Switch (Car with rear fog light)

	⊕ Bl (SIDE)	SIDE	RETRA ⓒ	RETRA ⓐ	RETRA ⓑ	REAR FOG	GND
OFF			○—○				
•	○—○						
●	○—○		○—○			○—○	
WIRE COLOR	R/G	R	W/G	W/Bl	W/Y	W/Bu	Bl

Retractable Headlight/Sunroof Switch test

Check for continuity according to the talbe felow





View from terminal side

Retractable Headlight Switch

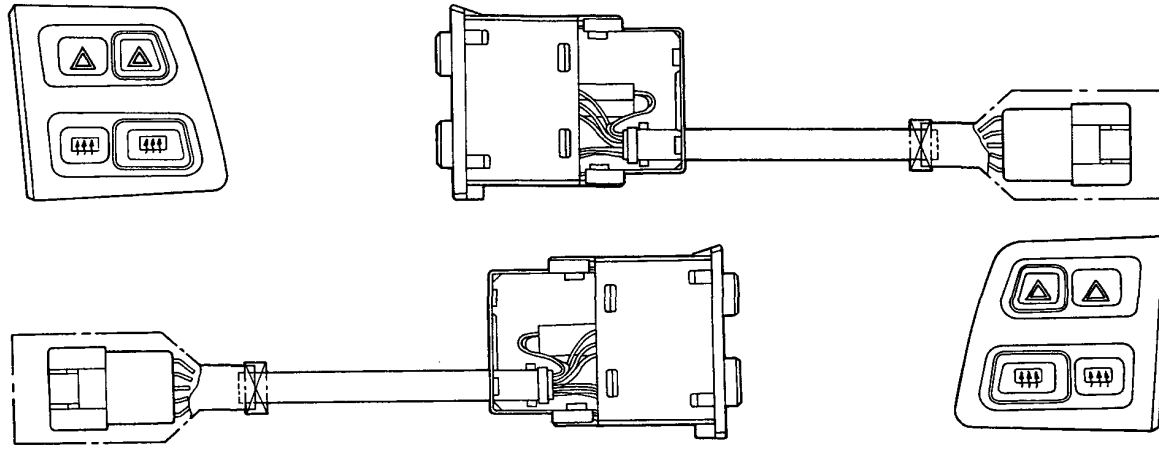
Terminal / Position	LIGHT-ING Switch	RETRA-CTOR (D)		⊕ B1	⊕ B2
OFF	○		○		
ON		○	○		
Wire Color	R/G	W/BI		W/R	W/Bu

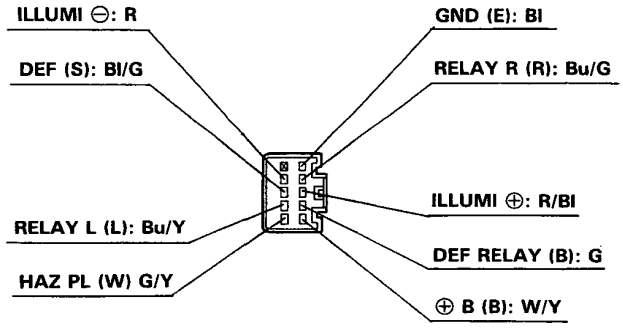
Sun Roof Switch

Terminal / Position	IG-1 (B)	OPEN (P)	CLOSE (C)
OFF			
OPEN	○	○	
CLOSE	○		○
Wire Color	G/BI	W/R	W/Y

Hazard/Rear Defroster Switch Test

Check for continuity according to table below





View from terminal side

Defroster Switch

Terminal / Position	DEF (S)		GND	DEF RELAY (B)
OFF	○	(D)	○	
ON	○	(D)	○	○
Wire Color	Bl/G		Bl	G

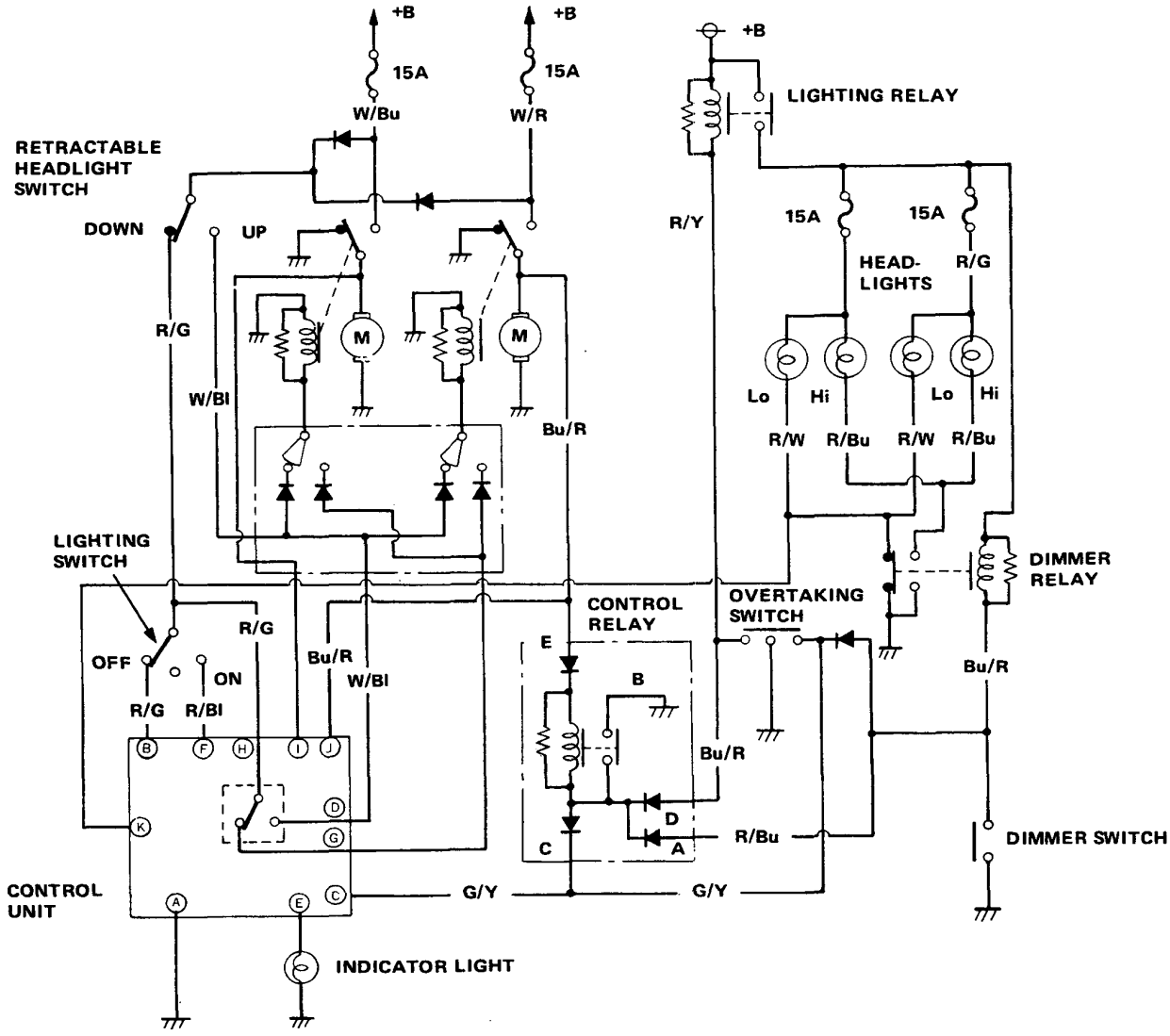
Hazard Switch

Terminal / Position	⊕ B	DEF (S)		RELAY (L)	RELAY (R)	HAZARD PILOT
OFF		○	▶	○		
		○	▶		○	
		○	▶			○
ON		○	▶	○		
	○	○	▶		○	
		○	▶			○
Wire Color	W/Y			Bu/Y	Bu/G	G/Y

Retractable Headlight

Circuit Diagram

When the overtaking switch is turned ON, the C terminal of the control unit jumps to ground, the headlight up circuit in the control unit operates, and the headlights acend to UP position.
By the holding circuit of the control unit, the headlights are stayed in UP position for a few seconds, then the headlights automalially descend to the DOWN position, therefore, if the overtaking switch is operated with the headlight UP position, the headlights go on.
When the overtaking switch is turned ON and the retracter motors start, the relay in the control relay is hold and the headlights stay on until the motors stop. When the motors stop, the current to the relay stops flowing, the relay turns off therfore the headlights do not come on while they are descending.



Troubleshooting

1. Headlight doesn't rise when retractable headlight switch is turned on.

Check fuse.

Is it normal? NO — Replace and recheck.

YES

Check for a stuck retractor caused by foreign matter or iced-up mechanism.

Is it normal? NO — Remove fuse.

YES

Clean or repair mechanism, insert fuse, and recheck.

Measure voltage between A (positive) and B (negative) terminals at retractor relay.

Is 12 volts available? NO — Open circuit between fuse and retractor relay

YES

Measure voltage between C (positive) and B (negative) terminals at retractor relay.

Is 12 volts available? NO — Measure voltage between E (positive) and F (negative) terminals at retractor relay.

YES

(cont'd – A)

Is 12 volts available? NO — Disconnect wire harness from retractor motor.

YES

(cont'd–B)

Measure voltage between W/Bl (positive) and Bl (negative) leads at wire harness.

Is 12 volts available? NO — Check for continuity between Bl lead and body ground at wire harness.

YES

(cont'd–C)

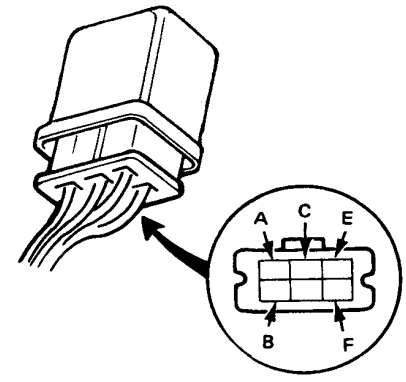
Is there continuity? NO — Poor ground

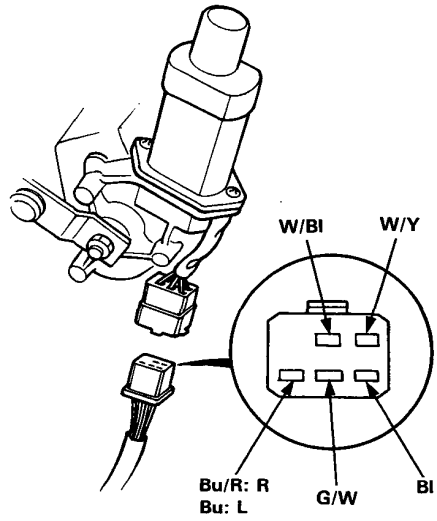
YES

Remove retractable headlight switch.

Check retractable headlight switch.

(cont'd–D)



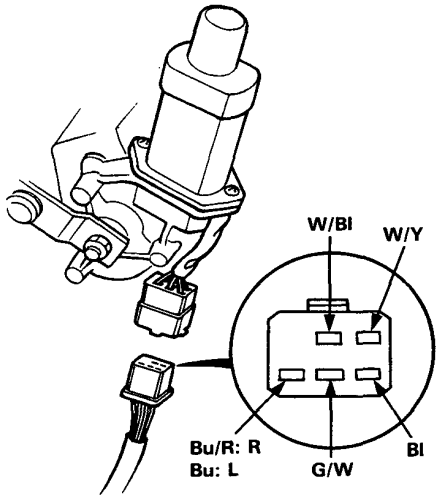


View from terminal side

(cont'd)

Retractable Headlight

Troubleshooting (cont'd)



View from terminal side

(cont'd—A)

Disconnect wire harness from retractor motor.

Check Bu/R lead for continuity between retractor motor and relay.

Is there continuity? NO → Open circuit

YES

Check for continuity between Bl lead and body ground at wire harness.

Is there continuity? NO → Poor ground

YES

Faulty retractor motor

NOTE: Bu/R is for right motor. Left motor is connected to Bu.

(cont'd—B)

Check for continuity between F terminal and body ground at retractor relay.

Is there continuity? NO → Poor ground

YES

Faulty retractor relay

(cont'd—C)

Check G/W lead for continuity between retractor motor and relay.

Is there continuity. NO → Open circuit

YES

Connect W/Bl lead to G/W lead with jumper wire at wire harness connector.

CAUTION: Avoid contact to other terminals and erroneous connection.

Measure voltage between C (positive) and B (negative) terminals at retractor relay.

Is 12 volts available? NO → Check for continuity between B terminal and body ground at retractor relay.

YES

Faulty retractor motor

Is there continuity? NO → Poor ground

YES

Faulty retractor relay

(cont'd—D)

Faulty retractable headlight switch ← NO ← Is it normal?

YES

NOTE: W/R is for right motor. Left motor is connected to W/Bu.

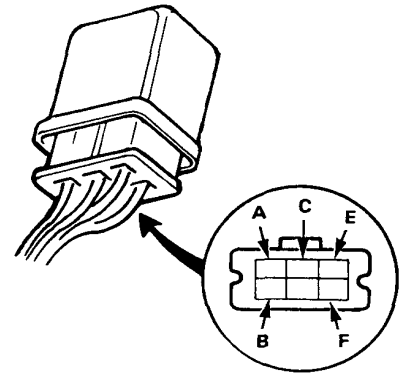
Measure voltage between W/R (positive) and Bl (negative) leads at wire harness.

Open circuit between fuse and retractable headlight switch ← NO ← Is 12 volts available?

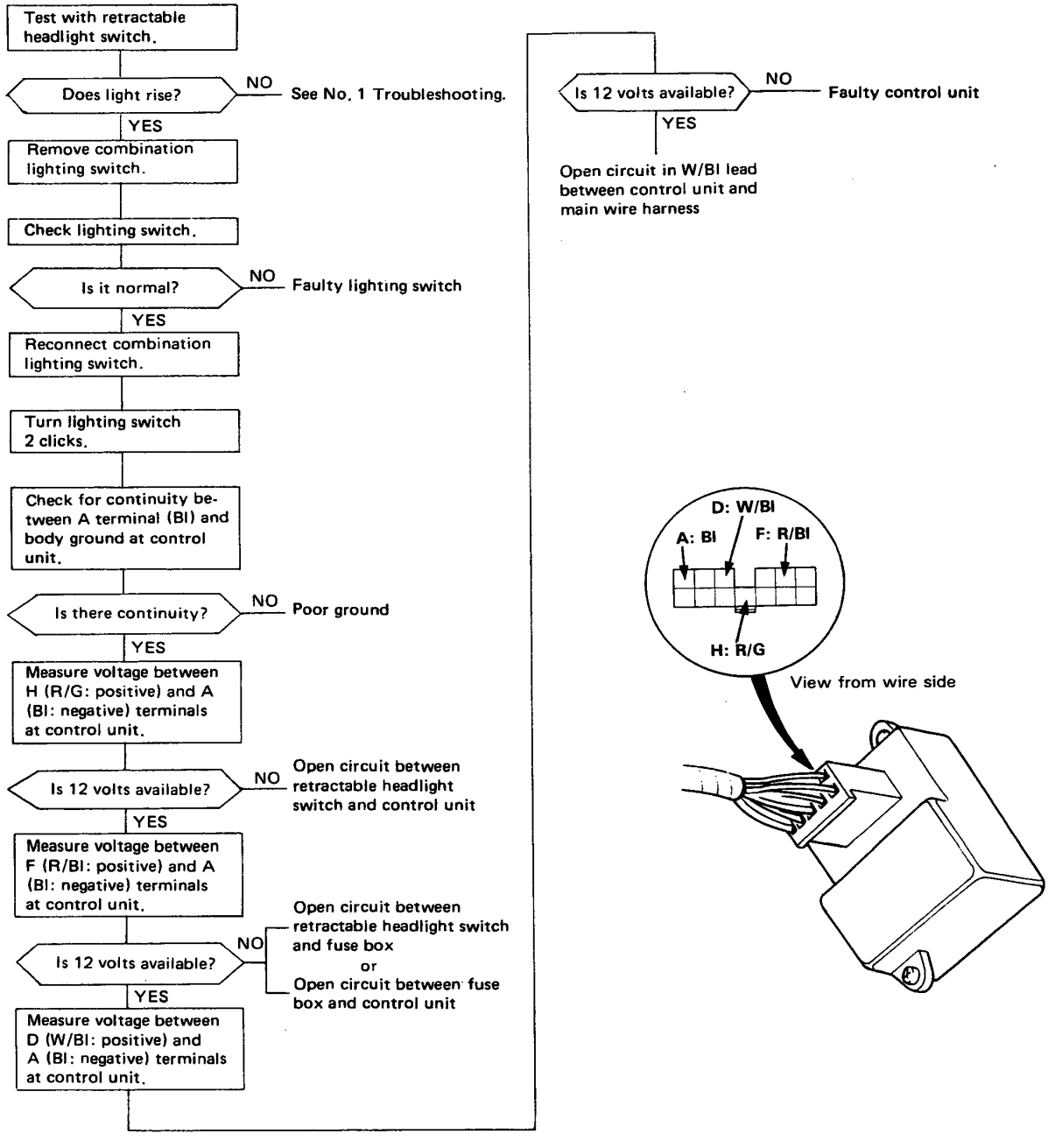
YES

Check W/Bl lead for continuity between retractable headlight switch and motor.

Is there continuity. NO → Open circuit



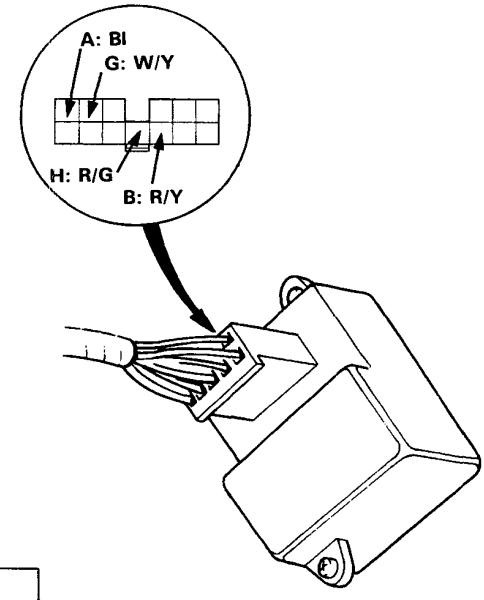
2. Headlight doesn't rise when headlight is turned on with lighting switch.



(cont'd)

Troubleshooting (cont'd)

3. Headlight doesn't retract when retractable headlight switch and lighting switch are turned off.



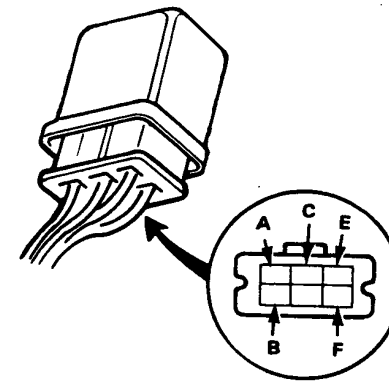
- Check fuse.
- Is it normal? NO → Replace and recheck.
- YES
- Check for a stuck retractor caused by foreign matter or iced-up mechanism.
- Is it normal? NO → Remove fuse. → Clean or repair mechanism, insert fuse, and recheck.
- YES
- Remove combination switch.
- Check lighting switch.
- Is it normal? NO → Faulty lighting switch
- YES
- Remove retractable headlight switch.
- Check retractable headlight switch.
- Is it normal? NO → Faulty retractable headlight switch
- YES
- Measure voltage between W/R lead (positive) and body ground. NOTE: W/R is for right motor. Left retractor relay is connected to W/Bu.
- Is 12 volts available? NO → Open circuit between fuse and retractable headlight switch
- YES
- Reconnect switches.
- Make sure all switches are in off position.
- Check for continuity between A(BI) terminal and body ground at control unit.
- Is there continuity? NO → Poor ground
- YES
- Measure voltage between B(R/Y: positive) and A (BI: negative) terminals at control unit.
- Is 12 volts available? NO → Open circuit between retractable headlight switch and fuse box; Open circuit between fuse box and control unit
- Measure voltage between H (R/G: positive) and A (BI: negative) terminals at control unit.
- Is 12 volts available? NO → Open circuit between retractable headlight switch and control unit
- YES
- Measure voltage between G (W/Y: positive) and A (BI: negative) terminals at control unit.
- YES
- Is 12 volts available? NO → Faulty control unit
- YES

(See page 25-11)

(From page 25-10)

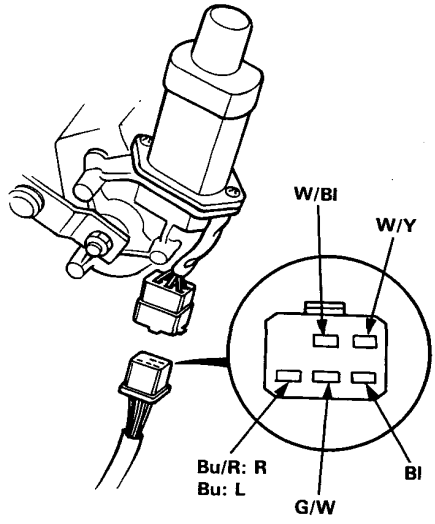
Measure voltage between A (positive) and B (negative) terminals at retractor relay.

Is 12 volts available?
- NO → Check for continuity between B terminal and body ground at retractor relay.
  - Is there continuity?
    - NO → Poor ground
    - YES → Open circuit between fuse and retractor relay
- YES



Measure voltage between C (positive) and B (negative) terminals at retractor relay.

Is 12 volts available?
- NO → Measure voltage between E (positive) and F (negative) terminals at retractor relay.
  - Is 12 volts available?
    - NO → Check for continuity between F terminal and body ground at retractor relay.
      - Is there continuity?
        - NO → Poor ground
        - YES → Disconnect wire harness from retractor motor.
          - Measure voltage between W/Y (positive) and Bl (negative) leads at wire harness.
            - Is 12 volts available?
              - NO → Check for continuity between Bl lead and body ground at wire harness.
                - Is there continuity?
                  - NO → Poor ground
                  - YES → Open circuit between control unit and retractor motor
              - YES → Check G/W lead for continuity between retractor motor and relay.
                - Is there continuity?
                  - NO → Open circuit
                  - YES → Connect W/Y lead to G/W lead with jumper wire at wire harness. **CAUTION: Avoid contact to other terminals and erroneous connection.**
                    - (cont'd—H)
    - YES → (Cont'd—G)
- YES → (cont'd—F)



View from terminal side

(cont'd)

Troubleshooting (cont'd)

(cont'd–F)

Disconnect wire harness from retractor motor.

Check Bu/R lead for continuity between retractor motor and relay.

NOTE: Bu/R is for right motor. Left motor is connected to Bu.

Is there continuity? NO — Open circuit

YES

Check for continuity between Bl lead and body ground at wire harness.

Is there continuity? NO — Poor ground

YES

Faulty retractor motor

(cont'd–G)

Check for continuity between F terminal and body ground at retractor relay.

Is there continuity? NO — Poor ground

YES

Faulty retractor relay

(cont'd–H)

Measure voltage between C (positive) and B (negative) terminals at retractor relay.

Is 12 volts available? NO — Check for continuity between B terminal and body ground at retractor relay.

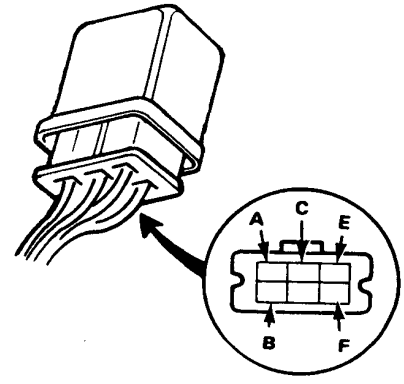
YES

Faulty retractor motor

Is there continuity? NO — Poor ground

OK

Faulty retractor relay



4. Headlight doesn't rise when over-taking switch is turned on.

Check fuse.

Is it normal? NO — Replace and recheck.

YES

Check for continuity between A terminal (Bl) and body ground at control unit.

Is there continuity? NO — Poor ground

YES

(See page 25-13)

(From page 25-12)

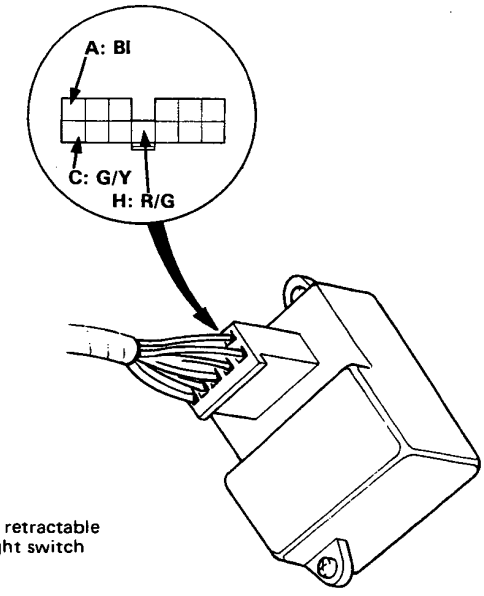
Check for continuity between C (G/Y) and A (Bl) terminals at control unit, with over-taking switch turned on.

Is there continuity?
- NO → Faulty over-taking switch.
- NO → Open circuit between over-taking switch and control unit
- YES

Measure voltage between H (R/G: positive) and A (Bl: negative) terminals at control unit.

Is 12 volts available?
- NO → Check retractable headlight switch.
- YES → Faulty control unit

Does switch work properly?
- NO → Faulty retractable headlight switch
- YES → Open circuit between retractable headlight switch and control unit



5. Headlight high beam turns off before headlight rises fully.

Check for continuity between B terminal (Bl) and body ground at control relay.

Is there continuity?
- NO → Poor ground
- YES

Check for continuity between C (G/Y) and B (Bl) terminals at control relay, with over-taking switch turned on.

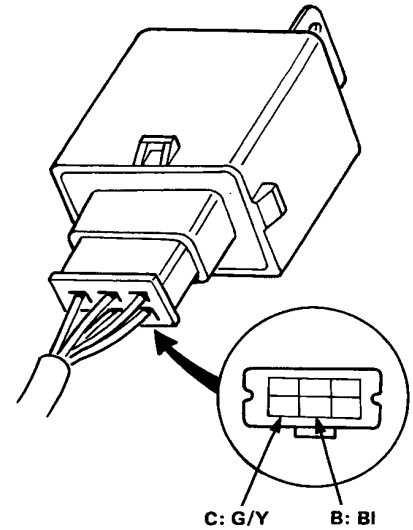
Is there continuity?
- NO → Faulty over-taking switch
- NO → Open circuit between over-taking switch and control relay
- YES

Check retractor motor for operation.

Does motor work properly?
- NO → See No. 4 troubleshooting.
- YES

Check control relay.

Does relay work propely?
- NO → Faulty control relay
- YES → Faulty dimmer relay or Faulty lighting relay



(cont'd)

Troubleshooting (cont'd)

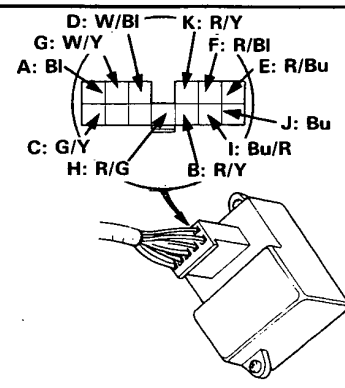
6. **Headlights lower when the lighting switch turn to ● from · position.**

   - Faulty control unit.

Control Unit Warning Output Test

1. Connect the battery positive cable to J terminal of the control unit, and negative cable to A terminal.
2. The right warning circuit is normal if there is voltage between E (positive) and A (negative) terminals at approximately 2.5 – 5.5 seconds after connecting the battery.

   NOTE: For left warning circuit check, connect the battery positive cable to I terminal and perform the same procedure as for the left circuit.



Control Relay Test

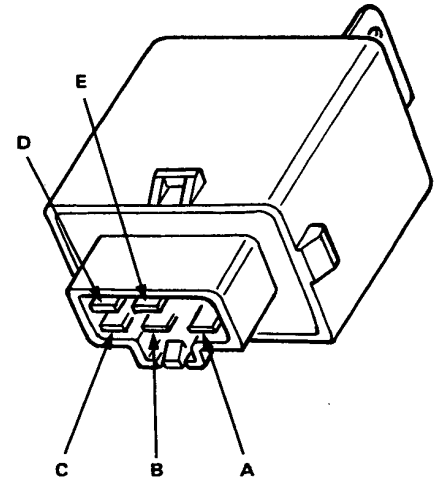
1. Connect the battery positive cable to E terminal of the control relay, and the negative cable to B and C terminals.
2. Check for continuity between A and B terminals. If there is no continuity, the control relay is faulty.

   NOTE: Connect the negative probe of the ohmmeter to A terminal, and the positive probe to B terminal.
3. Check for continuity between D and B terminals. If there is no continuity, the control relay is faulty.

   NOTE: Connect the negative probe of the ohmmeter to D terminal, and the negative probe to B terminal.
4. Disconnect the battery negative cable from C terminal.
5. Check for continuity between A and B terminals. If there is no continuity, the control relay is faulty.

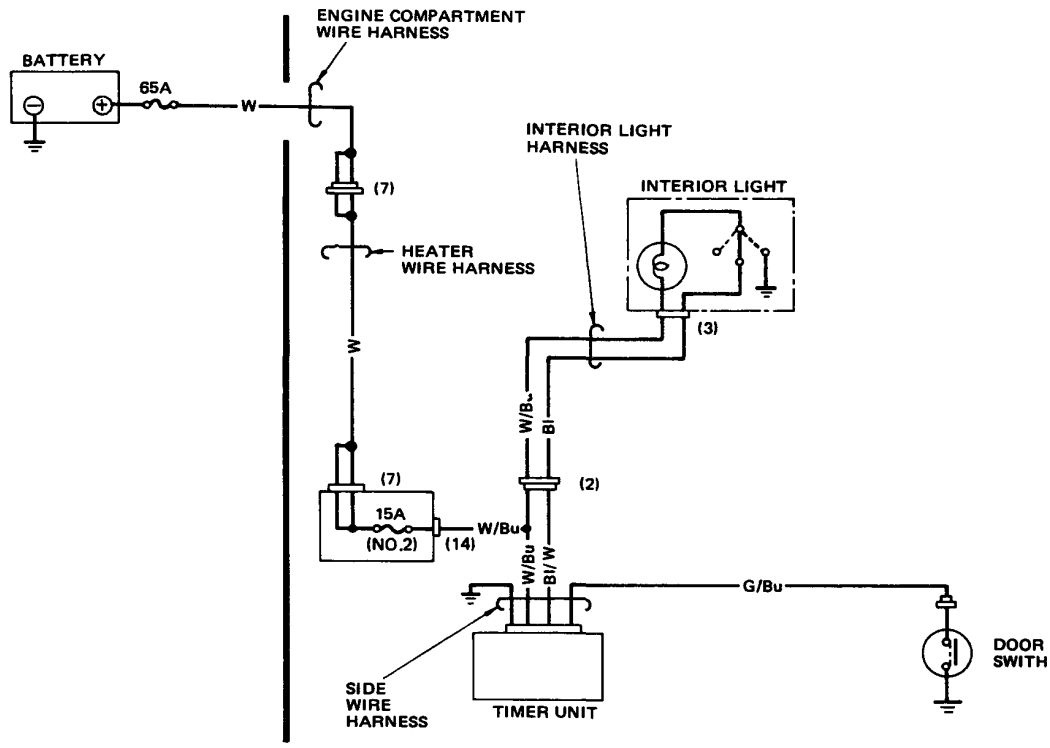
   NOTE: Connect the negative probe of the ohmmeter to A terminal, and the positive probe to B terminal.
6. Check for continuity between D and B terminals. If there is no continuity, the control relay is faulty.

   NOTE: Connect the negative probe of the ohmmeter to D terminal, and the positive probe to B terminal.



Interior Light Timer

Circuit Diagram



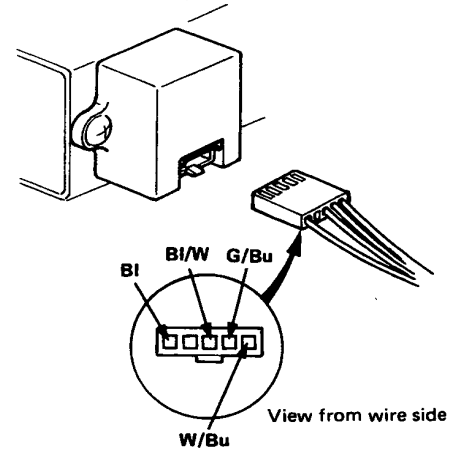
Troubleshooting

1. **Interior light doesn't stay on for a few seconds after closing door.**
   - Blown out 15 A fuse (No. 2).
   - Open circuit in W/Bu lead between 15 A fuse and timer unit.
   - Faulty timer unit.

2. **Interior light doesn't shut off a few seconds after closing door.**
   - Short circuit in Bl (Bl/W) lead between interior light and timer unit.

NOTE: Check door switch for correct operation, if necessary.

NOTE:
- There should be continuity between Bl lead and ground at the connector.
- There should be continuity between G/Bu and Bl lead at the connector with driver side door opened.
- There should be 12 volts between W/Bu (positive) and Bl (negative) leads at the connector.
- There should be 12 volts between Bl/W (positive) and Bl (negative) leads at connector when interior light switch is in mid position.



120km/h Speed Warning

Troubleshooting

Speed warning buzzer doesn't sound.

Drive car.

Check speedometer.

Does speedometer work properly? — NO → Check odometer.

YES

Stop engine.

Remove combination meter.

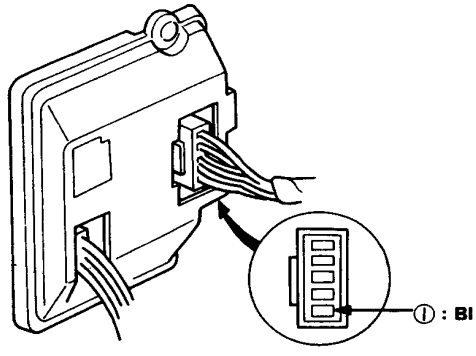
Remove buzzer.

Connect battery to R lead (positive) and Y lead (negative) of buzzer.

Does buzzer sound. — NO → Faulty buzzer

YES

Faulty speed sensor amplifier



Check odometer.

Does odometer work properly? — NO → Faulty speedometer cable / Faulty odometer

YES

Stop engine.

Remove combination meter.

Remove buzzer.

Connect battery to R lead (positive) and Y lead (negative) of buzzer.

Does buzzer sound? — NO → Faulty buzzer

YES

Connect 5P connector to speed sensor amplifier.

Check for continuity between ① lead of 4P connector and ① lead of 5P connector.

Is there continuity? — NO → Faulty speed sensor amplifier (ground line)

YES

Turn ignition switch on.

Measure voltage between ④ (positive) and ① (negative) leads at 4P connector.

(See page 25-17.)

(From page 25-16)

Is approx. 9 volts available?
- NO → Faulty speed sensor amplifier
- YES ↓

Measure voltage between ② (positive) and ① (negative) leads at 4P connector.

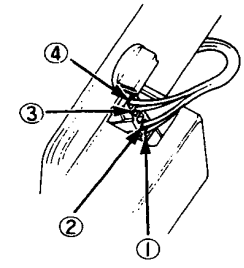
Is approx. 1 volt available?
- NO → Faulty speed sensor amplifier
- YES ↓

Connect volt meter positive probe to ③ lead and negative probe to ① lead at 4P connector.

Rotate speedometer cable.

Does volt meter show approx. 9 volts?
- NO → Faulty speed pulser
- YES ↓

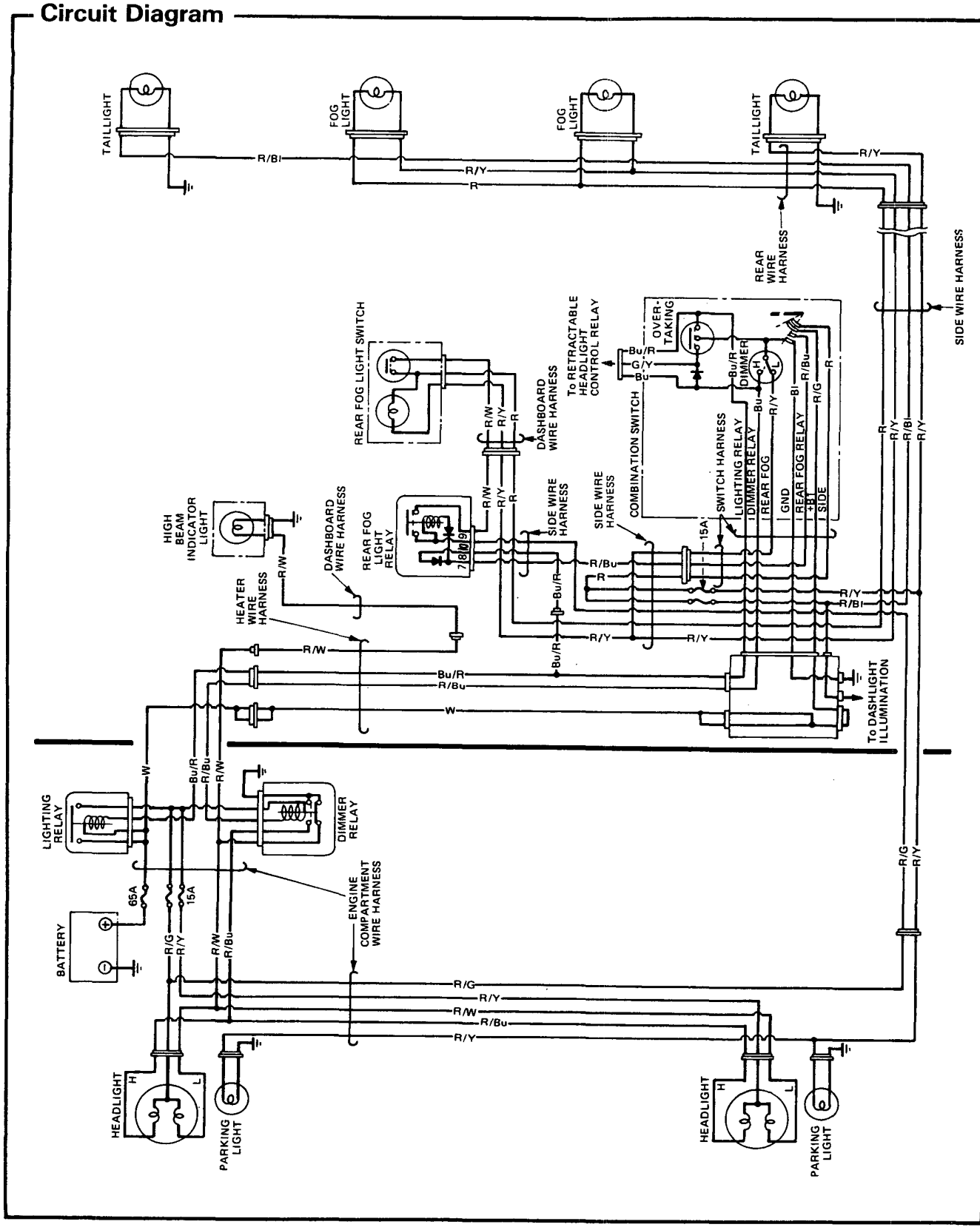
Faulty speed sensor amplifier



NOTE: In fact, voltage will fluctuate but volt meter should shown an average of the specified.

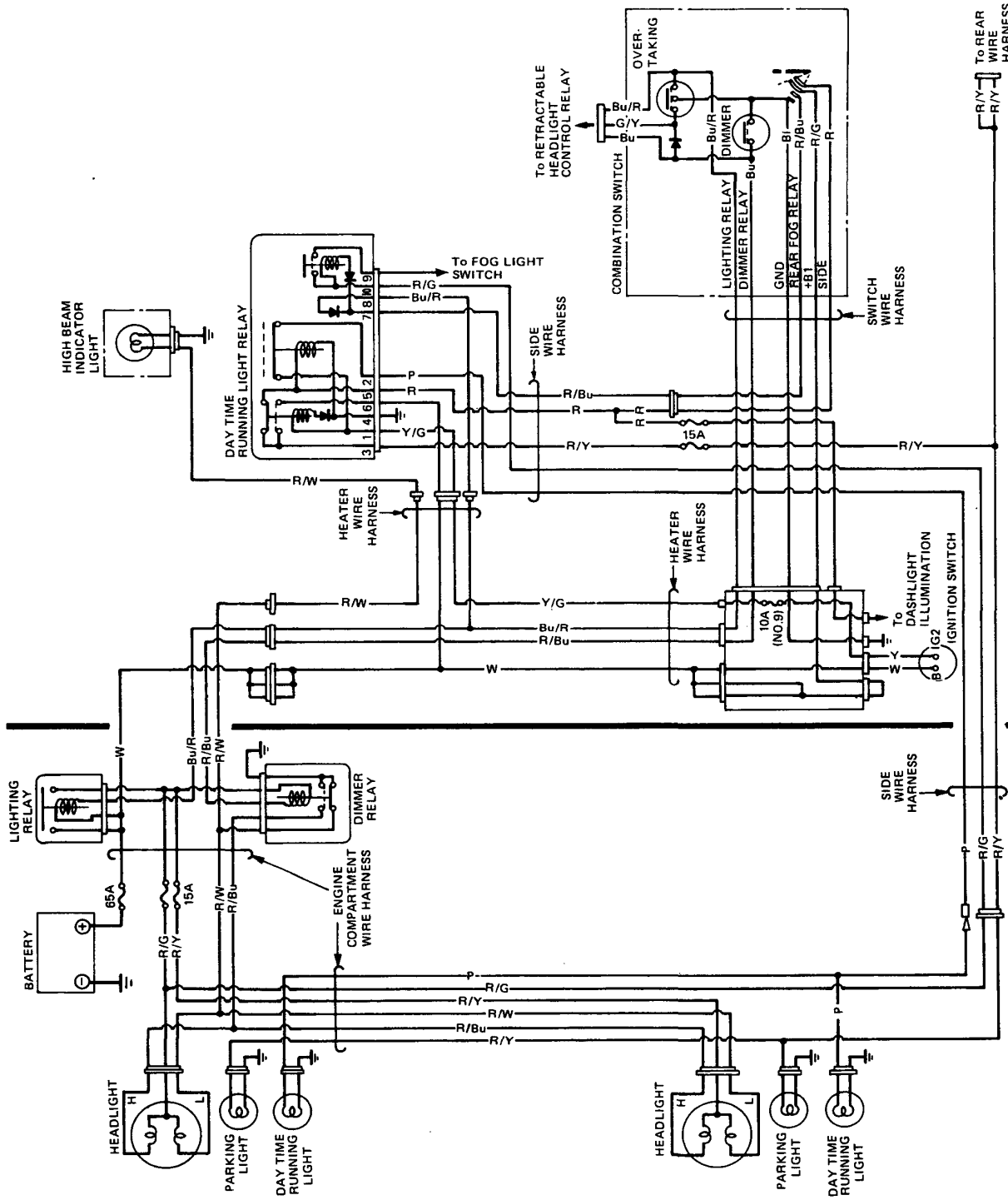
Rear Fog Light (KF and KX Model)

Circuit Diagram



Day Time Running Light

Circuit Diagram



Running Light Relay Test

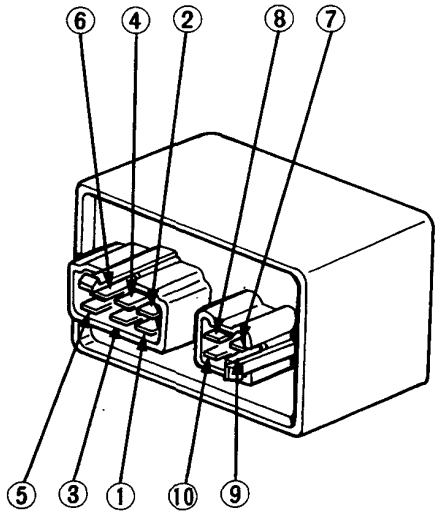
1. Check for continuity with the battery disconnected.

   - There should be continuity between ⑤ and ③ terminals.
   - There should be continuity between ① and ② terminals.
   - There should be continuity between ⑧ and ⑦ terminals.

   NOTE: Connect ohmmeter negative probe to ⑧ terminal and positive probe to ⑦ terminal.

2. Check for continuity and voltage with the battery connected.

   - There should be continuity between ③ and ⑥ terminals, when the battery positive wire is connected to ① terminal and negative wire to ④ terminal.
   - There should be no continuity between ① and ② terminals, when the battery positive wire is connected to ⑤ terminal and negative wire to ④ terminal.
   - There should be 12 volts between ⑨ (positive) and ⑦ (negative) terminals, when the battery positive wire is connected to ⑩ terminal and negative wire to ⑦ terminal.

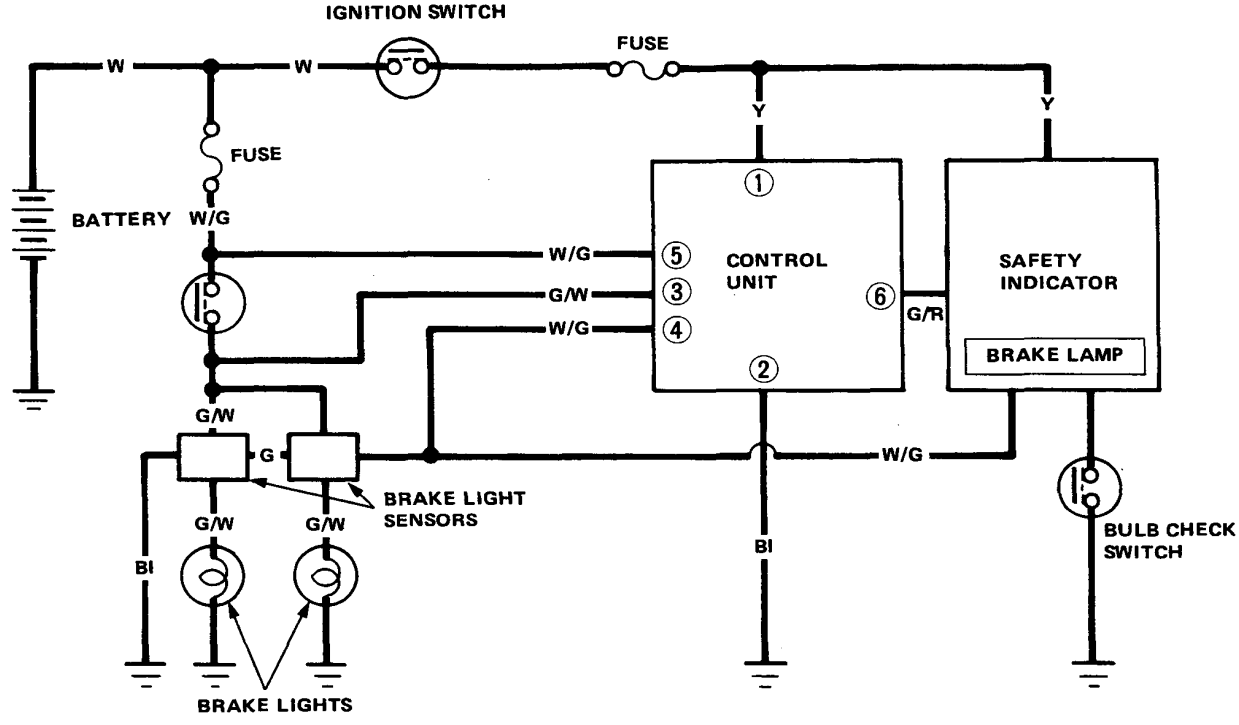


Brake Warning System

Circuit Diagram

Operation

When the ignition switch turned ON, brake warning lamp (BRAKE LAMP) stays on.
When the brake pedal is depressed once, the warning lamp should go out.
If there is defect in the brake system (blown fuse, defective brake light switch, open or short circuit and/or blown bulb(s)) the brake warning lamp stay on with the brake pedal operated.



Troubleshooting

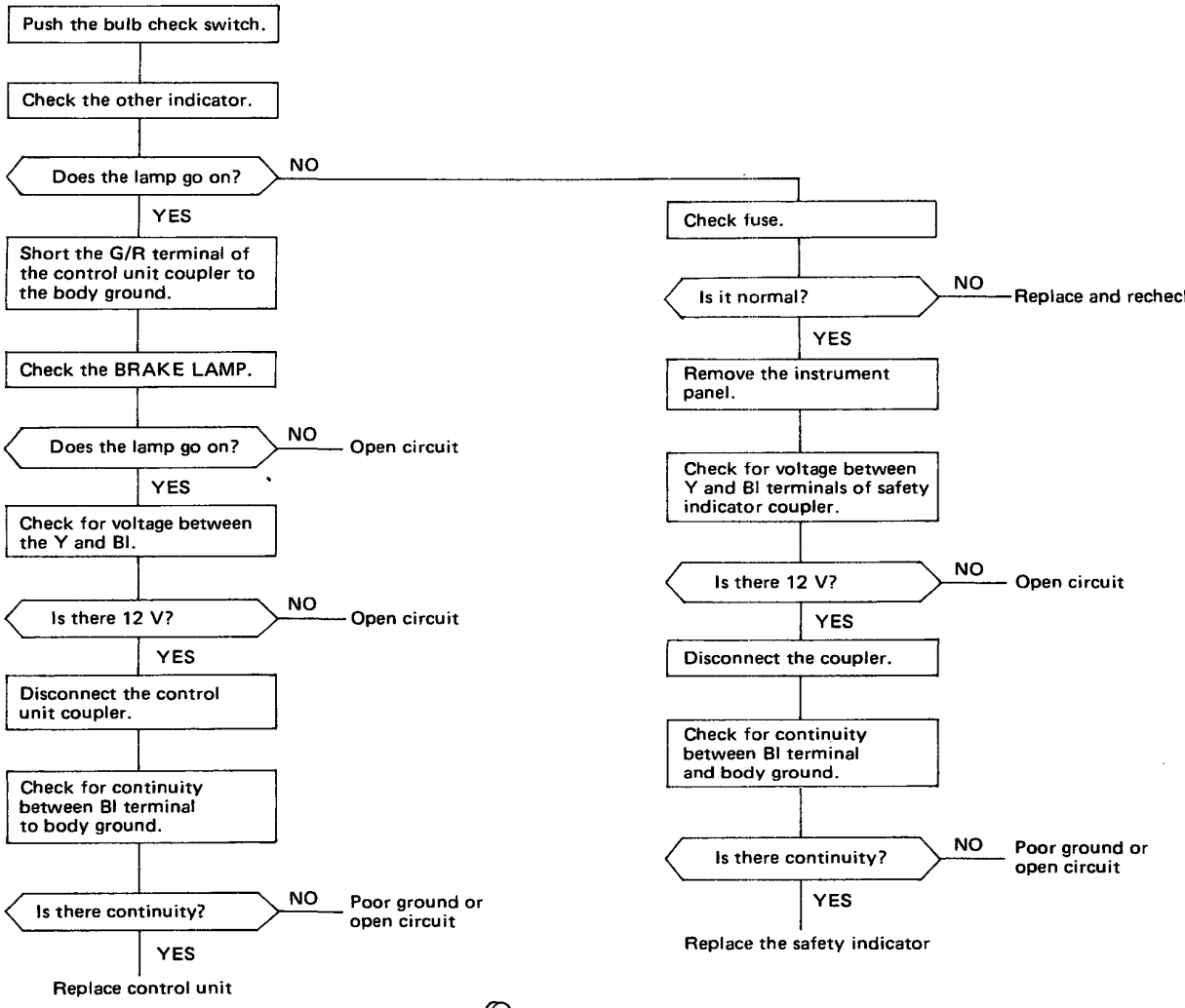
- If the BRAKE LAMP does not go off with the brake pedal depressed, check the following items. Repair or replace if necessary.

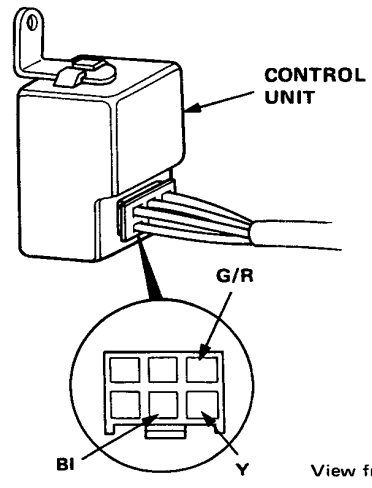
- Blown fuse (Brake)
- Open or short (in brake light circuit)
- Faulty brake light switch
- Blown brake light bulb(s)

(cont'd)

Troubleshooting (cont'd)

1. BRAKE LAMP does not come on when the ignition switch ON.





(cont'd)

Troubleshooting (cont'd)

2. BRAKE LAMP does not go off with the brake pedal depressed while the brake system is normal.

Turn the ignition switch OFF.

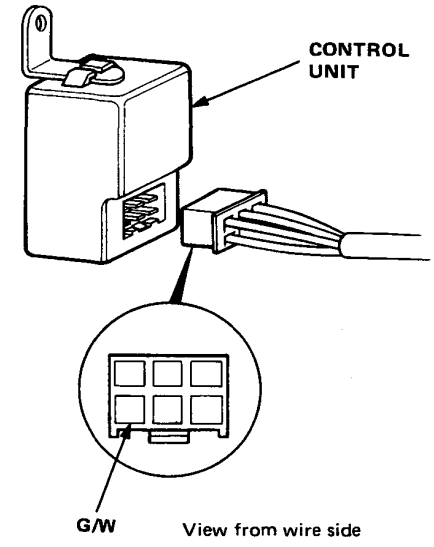
Disconnect the couplers from the control unit and brake light switch.

Check for continuity between G/W terminals of the each coupler.

Is there continuity? NO — Open circuit

YES

Replace the control unit



Control Unit Test

Disconnect the control unit coupler.

Check for voltage between the W/G (5) and body ground.

Is there 12 volts. NO — Open circuit

YES

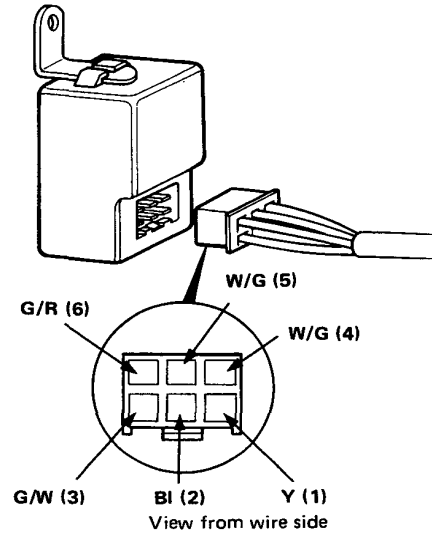
Check for voltage between the G/W (3) and body ground.

Is there 12 volts with the brake pedal depressed. NO — Open circuit

YES

See page 25-24.

NOTE: Before this test, make sure that the brake bulb and fuse are good condition.



(cont'd)

Control Unit Test (cont'd)

(From page 25-23)

Check for continuity between BI terminal to body ground.

Is there continuity? NO — Poor ground

YES

Turn the ignition switch ON.

Check for voltage between Y terminal and body ground.

Is there 12 volts? NO — Open circuit

YES

Check for continuity between the W/G (4) terminal and body ground while the brake pedal depressed.

Is there continuity? NO — Open circuit, Faulty brake light sensor

YES

Turn the ignition switch OFF.

Disconnect the safety indicator coupler.

Check for continuity between G/R terminals.

Is there continuity? NO — Open circuit

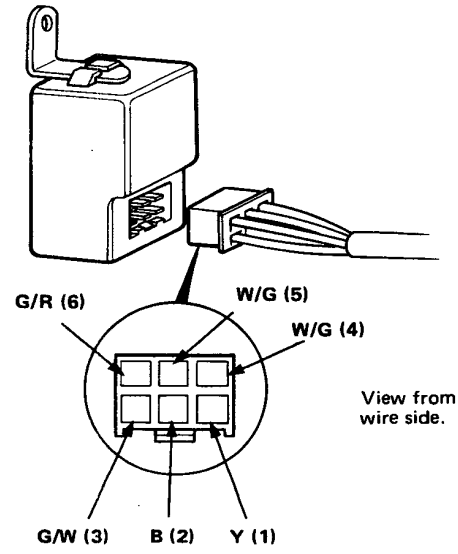
YES

Check for continuity between the W/G terminals.

Is there continuity? NO — Open circuit

YES

Replace the control unit.



Ignition Coil

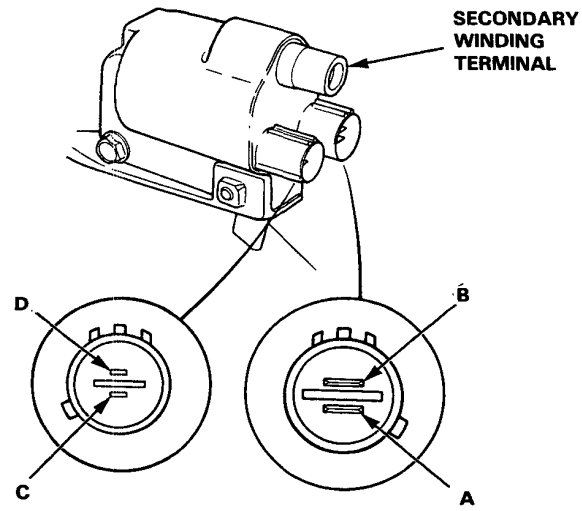
Ignition Coil

Test

1. With the ignition switch OFF, disconnect the primary connectors and the coil wire.
2. Using an ohmmeter, check the resistance between the terminals. Replace the coil if the resistance is not within specifications.

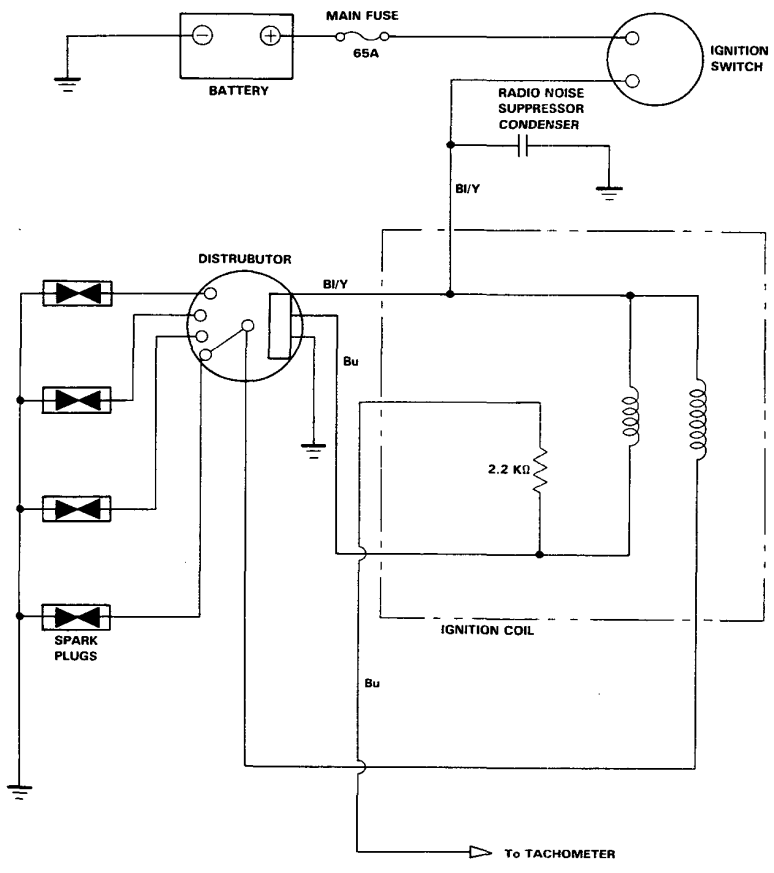
   NOTE: Resistance will vary with the coil temperature.

   Primary Winding Resistance (between the A and D terminals):
   1,215—1,485 ohms at 20°C (70°F)
   Secondary Winding Resistance (between the A and secondary winding terminals):
   11,074—11,526 ohms at 20°C (70°F)
   Resistance between the B and D terminals:
   Approx. 2,200 ohms at 20°C (70°F)
3. Check for continuity between the A and C terminals. Replace the coil if there is no continuity.



PRIMARY WINDING TERMINALS

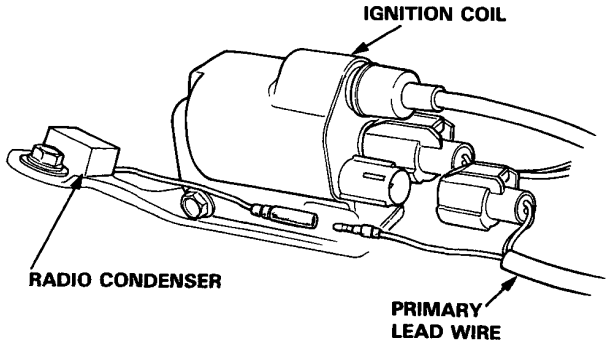
Circuit Diagram



Distributor

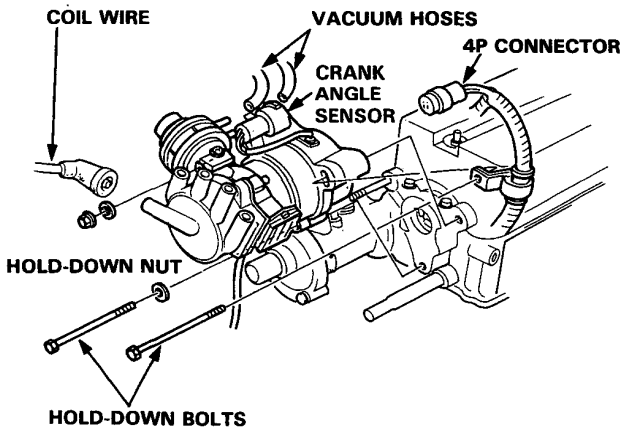
Removal

1. Disconnect the spark plug wires.
2. Disconnect the hoses from the advance diaphragm.
3. Disconnect the coil wire and the primary lead from the ignition coil and radio condenser.

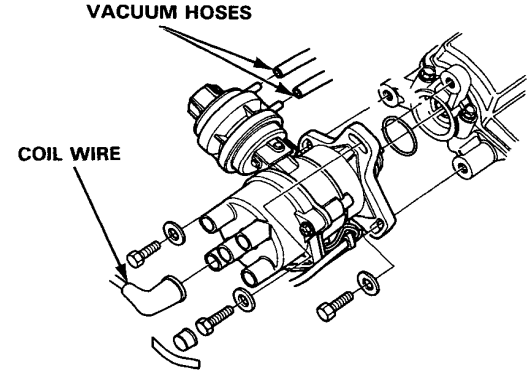


4. Disconnect the 4P connector from the crank angle sensor on the distributor.

A20A4 engine



B20A1 engine



5. Remove the distributor hold-down bolts and nut, then remove the distributor from the cylinder head.

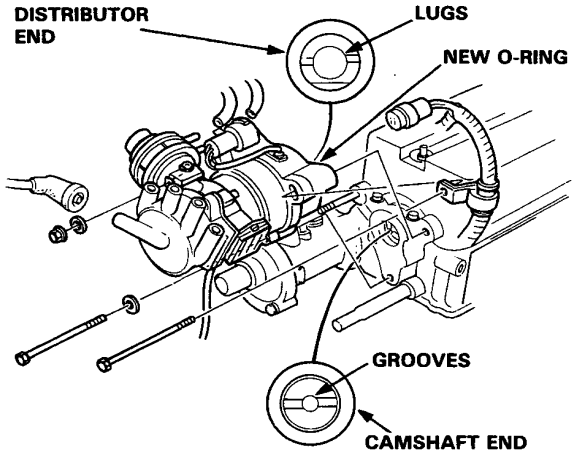
Distributor

Installation

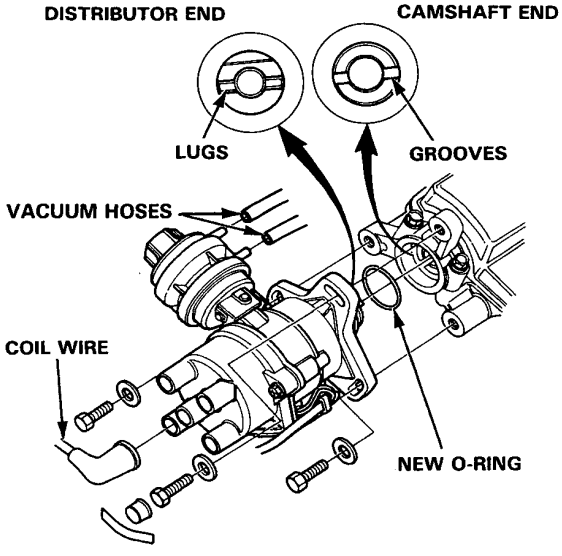
1. Coat a new O-ring with engine oil, then install it on the distributor housing.
2. Slip the distributor into position.

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

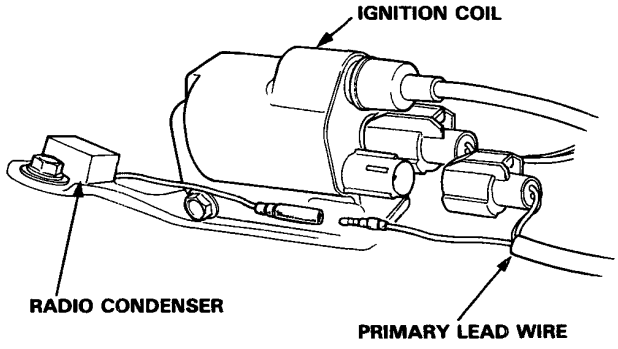
A20A4 engine



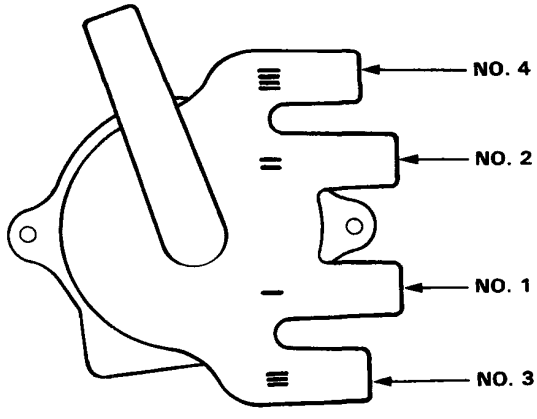
B20A1 engine



3. Install the adjusting bolts and tighten temporarily. Final tightening should be done after the timing has been adjusted.
4. Connect the hoses to the advance diaphragm.
5. Connect the coil wire and the primary lead wire to the ignition coil and radio condenser.

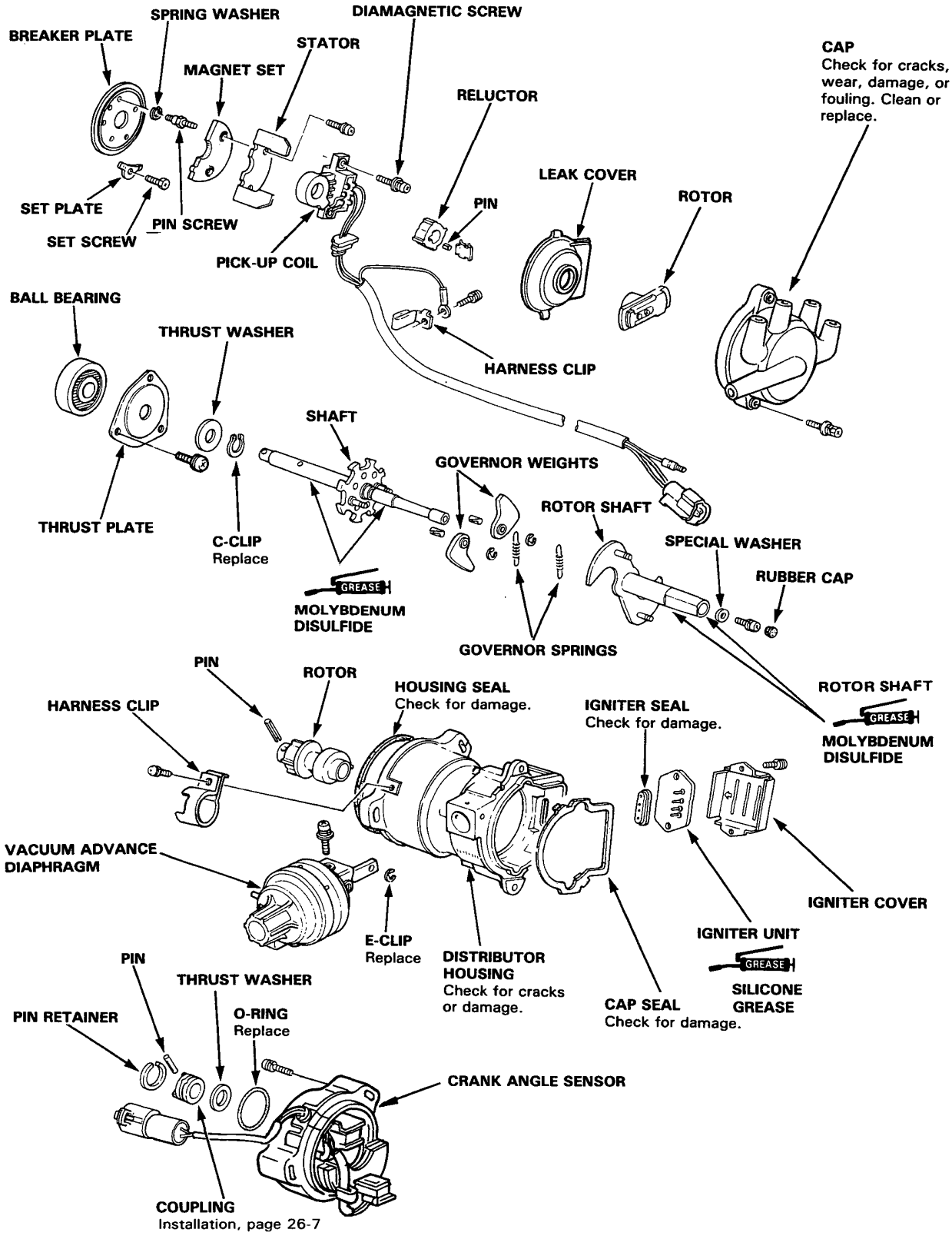


6. Connect the spark plug wires as shown.



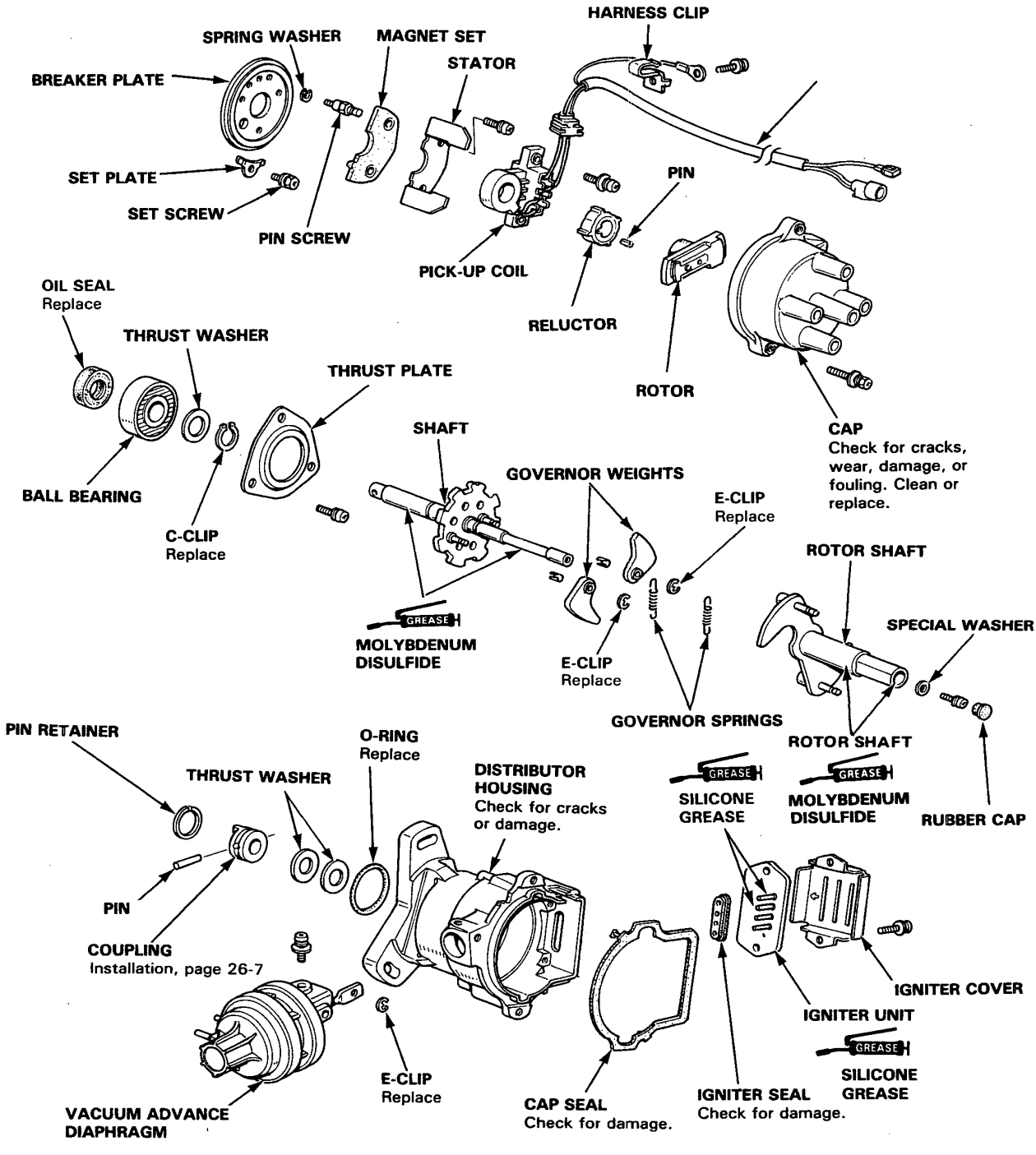
7. Set the timing with a timing light as shown on page 26-8.

Overhaul (A20A4 engine)



Distributor

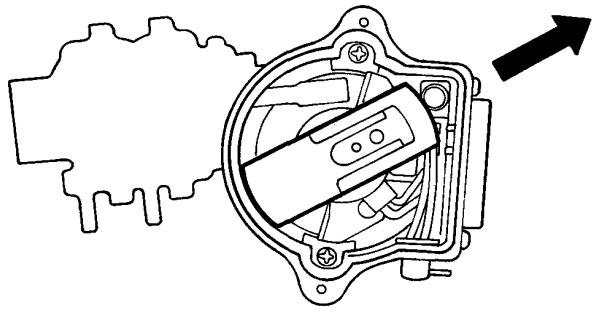
Overhaul (B20A1 engine)



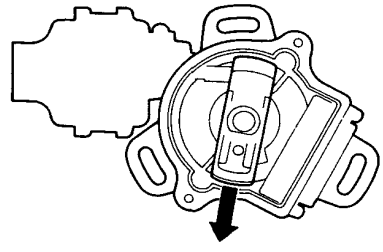
Coupling Installation

1. Install the rotor, then turn it so that it faces in the direction shown (toward the No. 1 cylinder).

A20A4 engine:



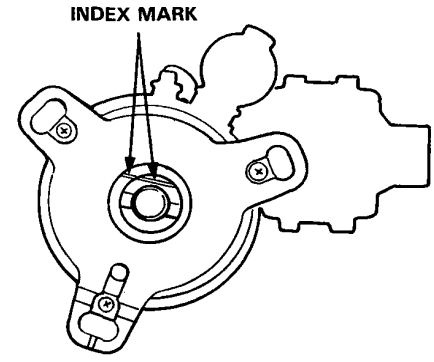
B20A1 engine:



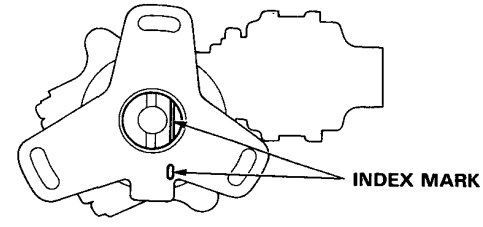
2. Set the thrust washer and coupling on the shaft.

3. Check that the rotor is still pointing toward No. 1 cylinder, then align the index mark on the housing with the index mark on the coupling.

A20A4 engine:



B20A1 engine:



4. Drive in the pin and secure it with the pin retainer.

Ignition Timing Inspection and Setting

1. Remove the rubber cap from the inspection window of the cylinder block.

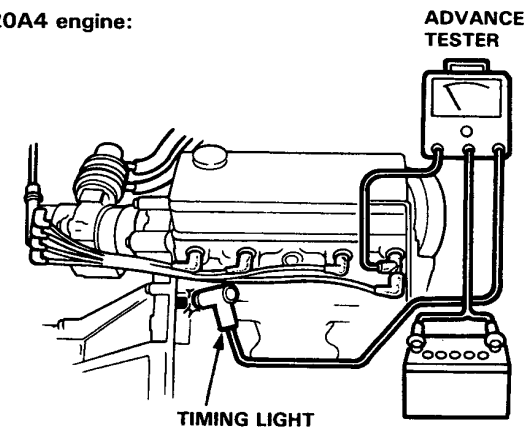
2. Start the engine and allow it to warm up (cooling fan comes on).

3. Disconnect the vacuum hoses from the vacuum advance diaphragm and, while the engine idles, check each hose for vacuum and plug the hoses.
   - The inside hose (#2 or #12 for Fuel-injected Engine) should have vacuum.
   - The outside hose (#15 for Fuel-injected engine) should not have vacuum.

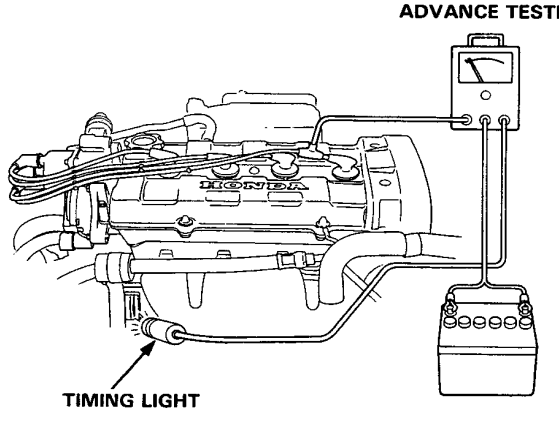
   If vacuum is not as specified, see Timing Control System (see page 12-24 and 25)

4. Connect an advance tester to the engine, while the engine idles, point a timing light toward the flywheel (for M/T), or the drive plate (for A/T).

A20A4 engine:



B20A1 engine:



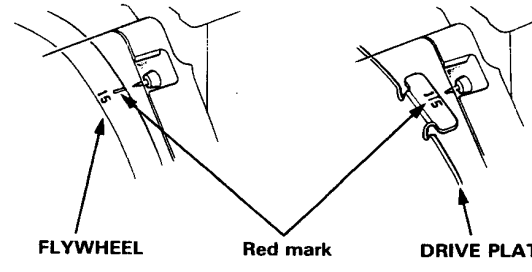
5. Adjust-ignition timing, if necessary, to the following specifications:

Ignition Timing
Carbureted engine:
- Manual: KE, KF, KG, KB, KY, KW models: 18° ± 2° BTDC (Red) in neutral.
  KT, KS, KX models: 12° ± 2° BTDC (Red) in neutral.
- Automatic: KE, KW, KF, KS, KG, KB models: 18° ± 2° BTDC (Red) in gear.
  KT, KX models: 12° ± 2° BTDC (Red) in gear.
  KS model: 6° ± 2° BTDC (Red) in gear.

Fuel Injected Engine:
A20A4 engine:
- Manual: KQ, KY models: 15° ± 2° BTDC (Red) in neutral.
- Automatic: KQ, KY models: 15° ± 2° BTDC (Red) in gear.

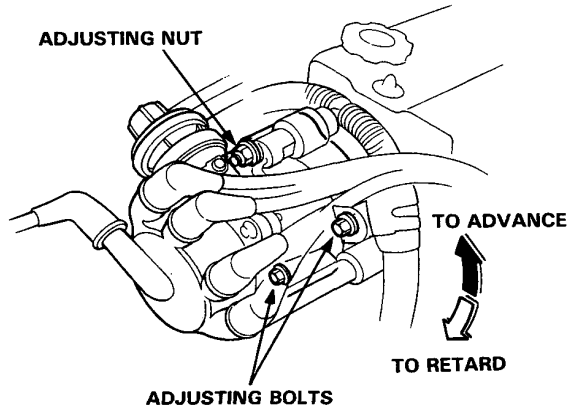
B20A1 engine:
KF, KG, KB, KW, KX, KE models: 15° ± 2° BTDC (Red) in neutral.
KS model: 7° ± 2° BTDC (Red) in neutral.

Manual Transmission **Automatic Transmission**

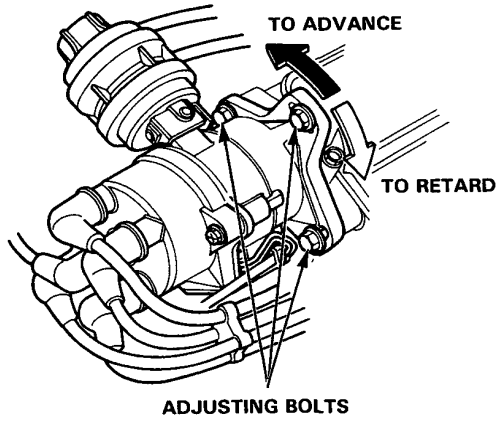


6. Loosen the distributor adjusting bolts (and nut for Fuel-Injected engine), and turn the distributor housing counterclockwise to advance the timing, or clockwise to retard the timing.

A20A4 engine:



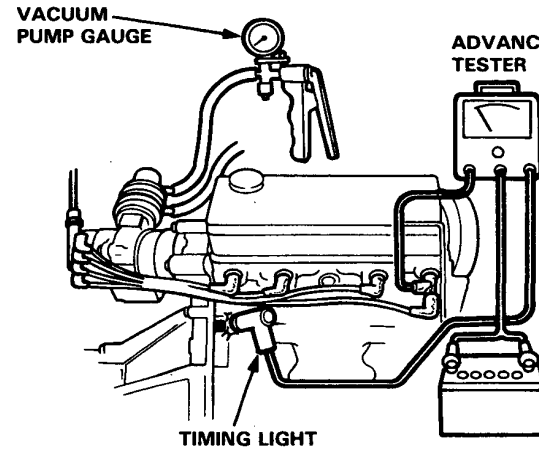
B20A1 engine:



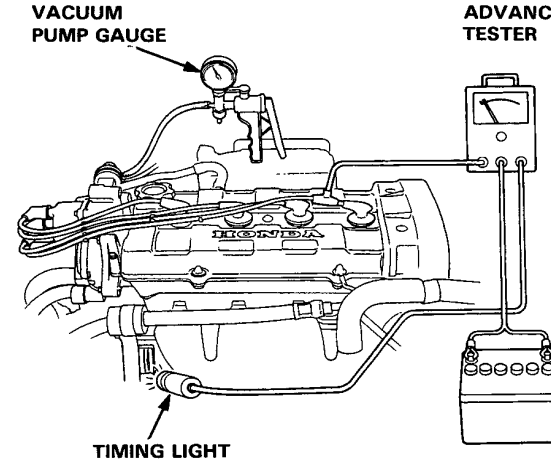
7. Tighten the adjusting bolts (and nut for A20A4 engine), recheck the timing.

8. Disconnect the outside vacuum hose (#15) from the diaphragm and apply vacuum (more than 500 mmHg, 20 in. Hg), to the outside diaphragm with a vacuum pump.
The timing mark (Red) should advance an addition additional.

A20A4 engine: KQ6°
KY9°



B20A1 engine: KF, KG, KB, KW, KX, KS, KE 12°

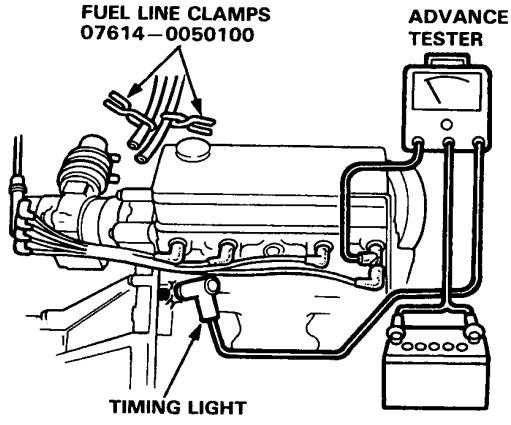


(cont'd)

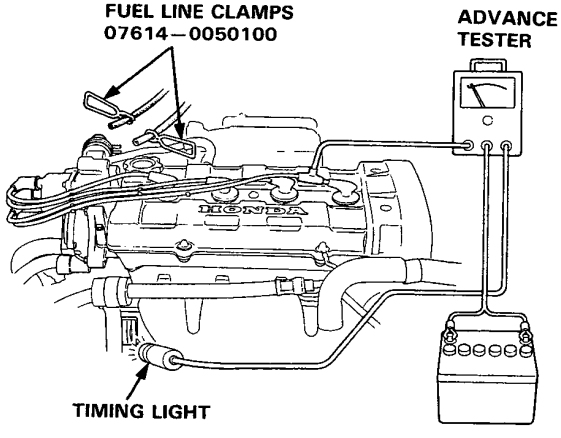
Ignition Timing Inspection and Setting (cont'd)

9. Disconnect the vacuum hoses from the vacuum advance diaphragm and pinch the end of the hoses using fuel line clamps, 07614—0050100. The timing should be:

A20A4 engine: KQ 4° BTDC
KY 9° BTDC



B20A1 engine: KS, KX 1° BTDC
KF, KG, KW, KE, KB 9° BTDC

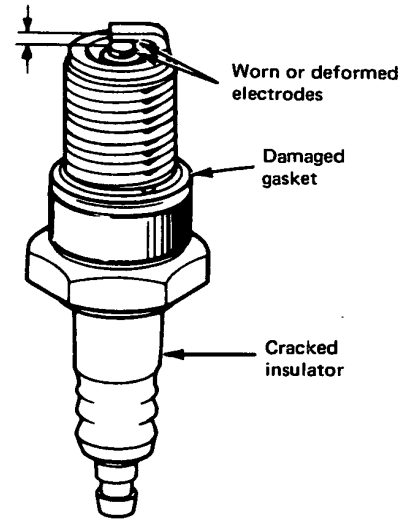


10. If advance is not as specified, check the advance diaphragm and the distributor advance mechanism.

Spark Plug Inspection

1. Inspect electrodes and ceramic insulator for:

- Improper gap
- Oil-fouling
- Carbon deposits
- Cracked center electrode insulator



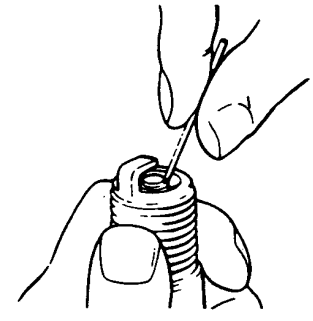
Burned or worn electrodes may be caused by:

- Lean fuel mixture
- Advanced ignition timing
- Loose spark plug
- Incorrect heat range plug

Fouled plug may be caused by:

- Rich fuel mixture
- Retarded ignition timing
- Oil in combustion chamber
- Incorrect spark plug gap

2. Clean electrodes in spark plug cleaning machine, or with a wire brush. Clean between outer shell and center insulator with stiff wire as shown. Clean plug threads with a wire brush.



3. Replace plug if center electrode is rounded as shown.
4. Adjust gap with suitable gapping tool.

Carbureted engine:

	Standard Plug		Optional Plug	
KF, KG, KB, KS, KX, KE	NGK	BPR-6ES BPR-6EY	BPR-7ES BPR-5ES	BPR-7EY BPR-5EY
	ND	W20EXR-U W20EPR-U	W22EPR-U W16EPR-U	W22EXR-U W16EXR-U
KY, KT	NGK	BP-6ES BP-6EY	BP-7ES BP-5ES	BP-7EY BP-5EY
	ND	W20EX-U W20EP-U	W22EP-U W16EP-U	W22EX-U W16EX-U

A20A4 engine:

KY	NGK	BPR-6ES-11	
	ND	W20EPR-U11	
KQ	NGK	BPR-5EY-11	
	ND	W16EXR-U11	
KY, KQ	NGK		BPR-6EY-11
	ND		W20EXR-U11

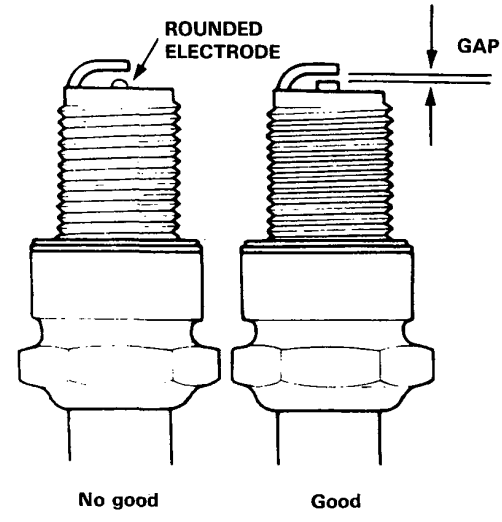
B20A1 engine:

KF, KG, KB, KW, KS, KX, KE	NGK		BCPR-7EY-N11	
	ND	Q20PR-U11	Q22PR-U11	Q16PR-U11
KF, KG, KB, KW, KS, KE	NGK	BCPR-6E-11	BCPR-7E-11 BCPR-5E-11	BCPR-6EY-N11 BCPR-5EY-N11
KX	NGK	BCPR-6EY-N11	BCPR-7EY-11 BCPR-5EY-11	BCPR-6EY-11

Gap:
NGK S: 0.7—0.8 mm (0.028—0.031 in.)
Y: 0.8—0.9 mm (0.031—0.035 in.)
ND U: 0.7—0.8 mm (0.028—0.031 in.)
Others: 1.0—1.1 mm (0.039—0.043 in.)

5. Screw plugs into cylinder head finger tight, then torque them to 18 N·m (1.8 kg-m, 13 lb-ft).

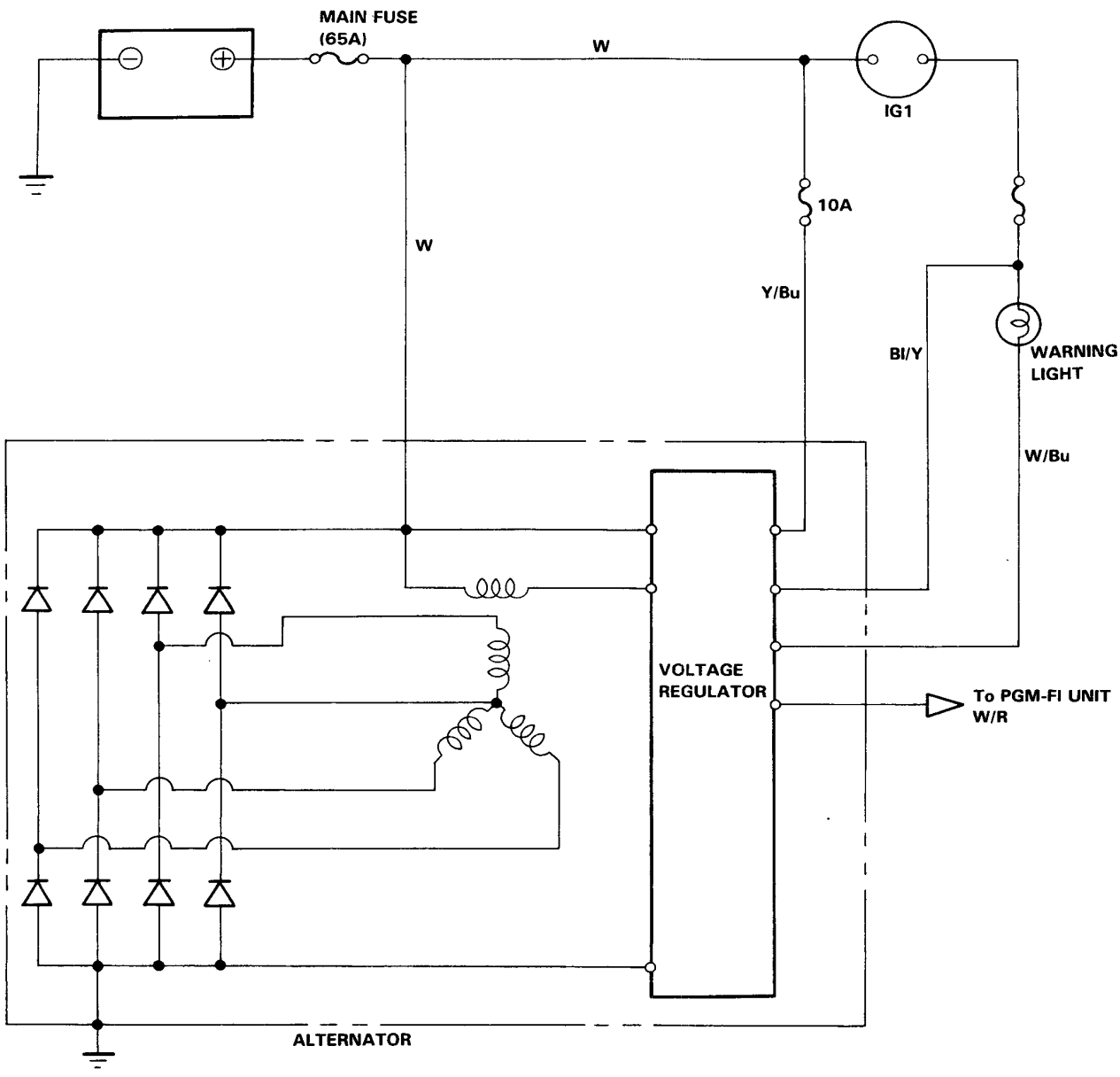
NOTE: Apply a small quantity of anti-seize compound to plug threads before installing.



Charging

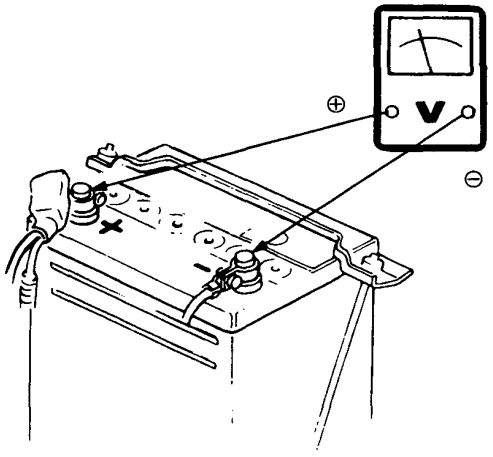
Charging

Circuit Diagram

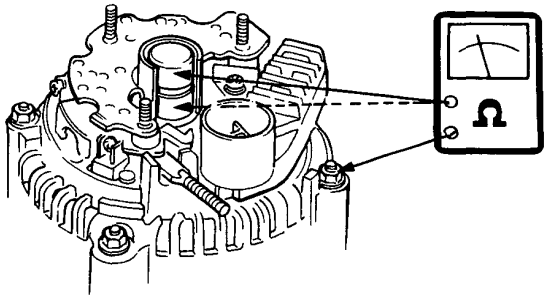


Alternator and Regulator Test

1. Check the alternator belt tension, and adjust or replace the belt as necessary.
2. Start the engine and take the voltage reading at the battery under no load.



- If the reading is 13.9—15.1 volts, check the alternator output.
- If the reading is more than 15.1 volts, remove the rear end cover and brush holder, and check for continuity between each slip ring and ground.

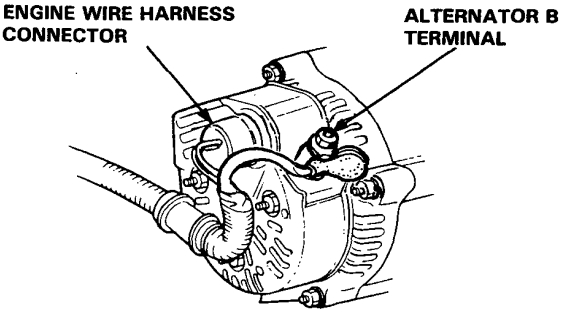


— If either slip ring or both are grounded, the rotor coil is poorly insulated and calls for replacement.

— If there is no continuity between each slip ring and ground, replace the voltage regulator.

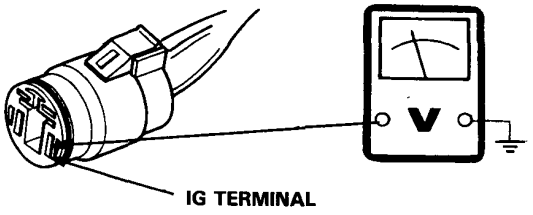
- If the reading is about 12 bolts, go on to the step 3.

3. With the engine off, check the alternator B terminal and engine wire harness connector for secure connection.



- If loose or not connected securely, repair and repeat step 2.
- If OK, go on to the step 4.

4. Stop the engine and disconnect the engine wire harness connector from the alternator. Take the voltage reading between the connector IG terminal and ground.



- If there is no battery voltage, check the IG terminal wire (black/yellow) and No. 4 fuse (10A).
- If there is battery voltage, go on to the step 5.

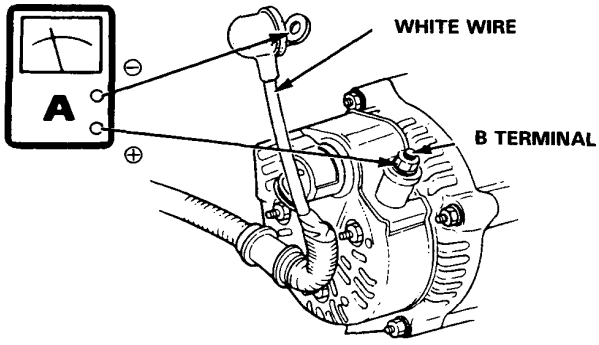
5. Check the rectifier and stator.

- If OK, replace the voltage regulator.
- If not OK, repair or replace either the rectifier or stator and go back to step 2.

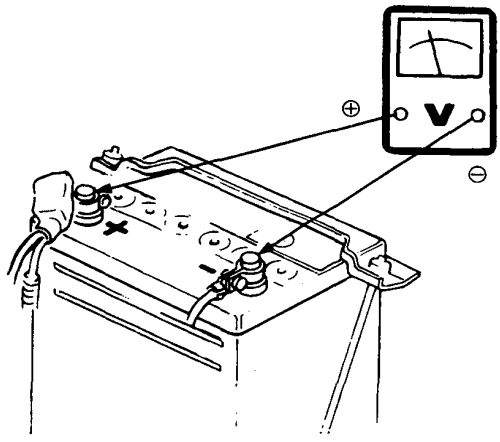
Charging

Alternator output Test

1. With the engine cff, disconnect the white wire from terminal B on the alternator.
2. Hook up an ammeter (60 amp capacity or higher) at the alternator as shown.



3. Hook up a voltmeter at the battery as shown.

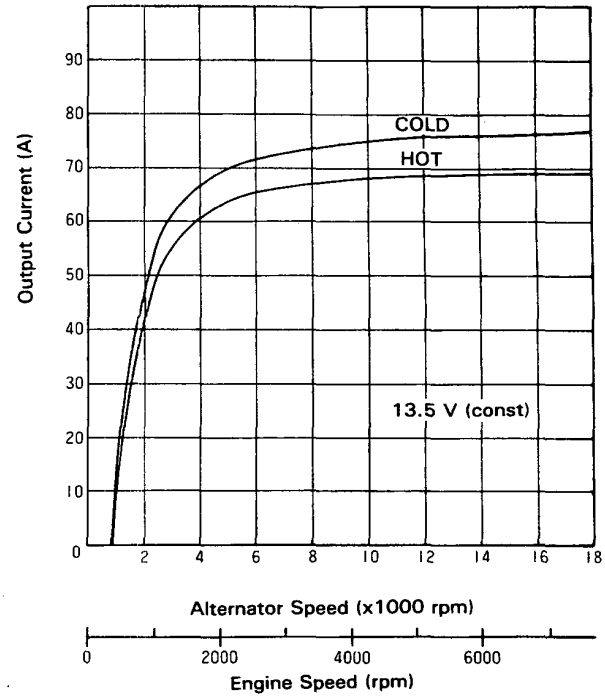


4. Start the engine.

   CAUTION: Don't let the voltage reading at the battery exceed 19 volts. If it does, shut the engine off, and then check the voltage regulator and rotor coil.

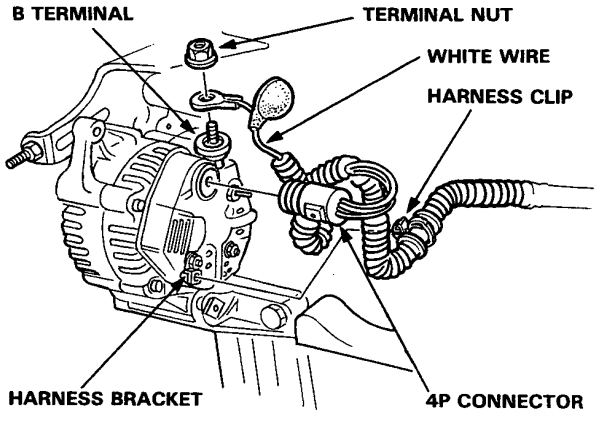
5. Turn on:
   - Headlight switch (high beam).
   - Rear window defroster switch.
   - Heater fan switch (III).

6. Check the alternator output:
   If it's within the output curve shown, the alternator is OK.
   If it's not, this is an indication that the stator coil is open. Repair or replace the alternator as necessary.

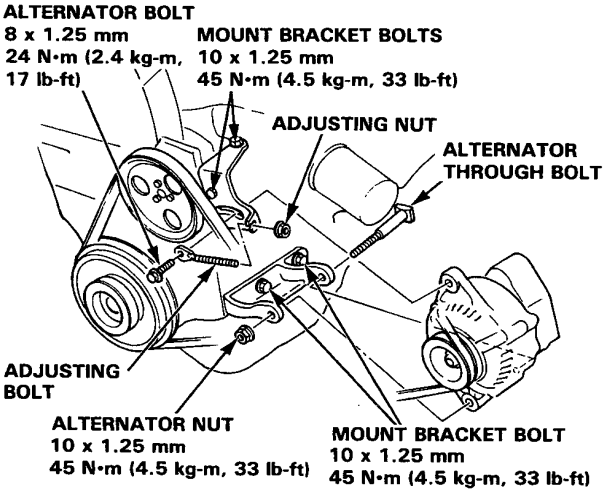


Alternator Replacement

1. Disconnect the ground cable from the battery negative post (−).
2. Remove the air cleaner assembly (section 11).
3. Disconnect the 4P connector from the alternator, and remove the clip from the harness bracket.



4. Remove the terminal nut and the white wire from the B terminal.
5. Remove the alternator bolt and nut, then remove the alternator belt from the alternator pulley.



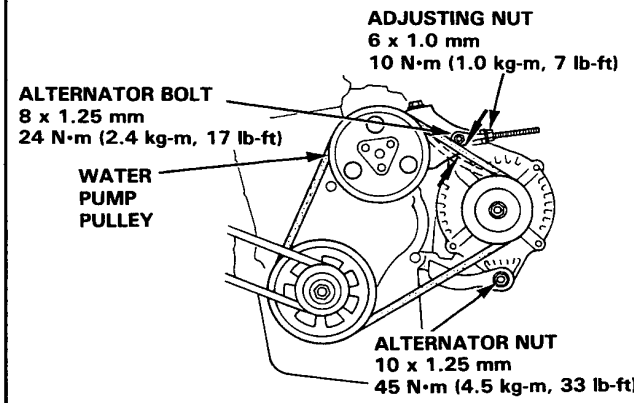
6. Remove the alternator through bolt, then the alternator.
7. If necessary, remove the mount bracket bolts, and the upper and lower mount brackets.
8. Adjust the alternator belt tension after installing.

Alternator Belt Adjustment

1. Apply a force of 98 N (10 kg, 22 lb) and measure the deflection between the alternator and the water pump pulley.

   Deflection: 6—9 mm (0.24—0.35 in.)

   NOTE: On a brand-new belt, the deflection should be 4—6 mm (0.16—0.24 in.) when first measured.

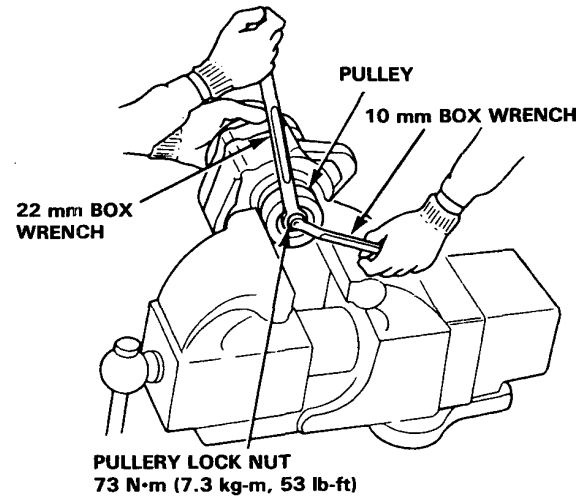


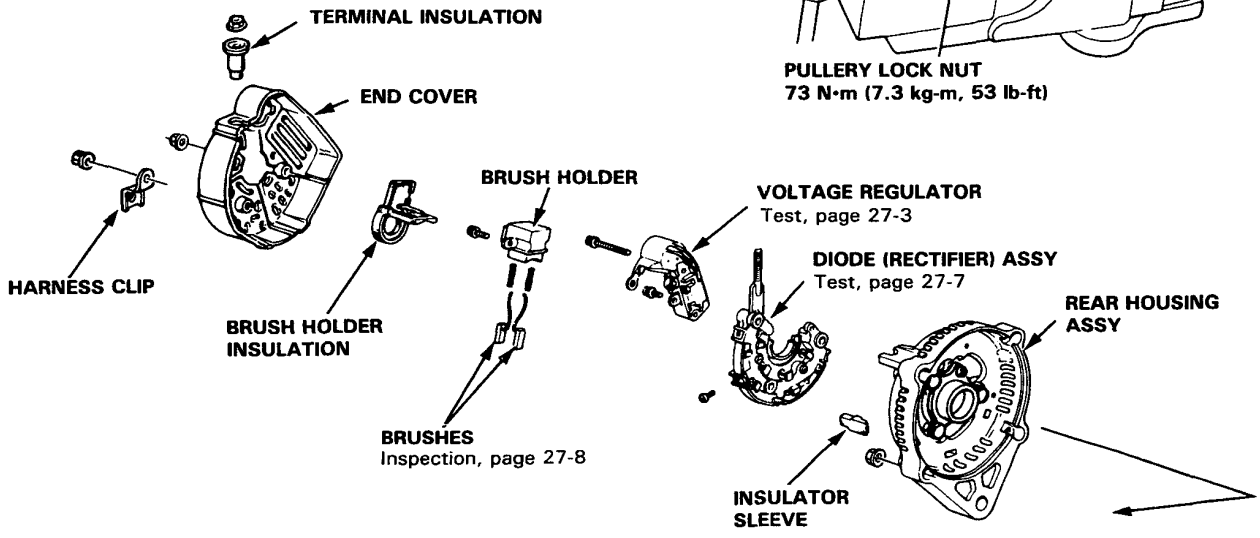
2. Loosen the alternator bolt and nut.
3. Move the alternator by turning the adjusting nut to obtain the proper belt tension, then retighten the bolt and nut.
4. Recheck the deflection of the belt.

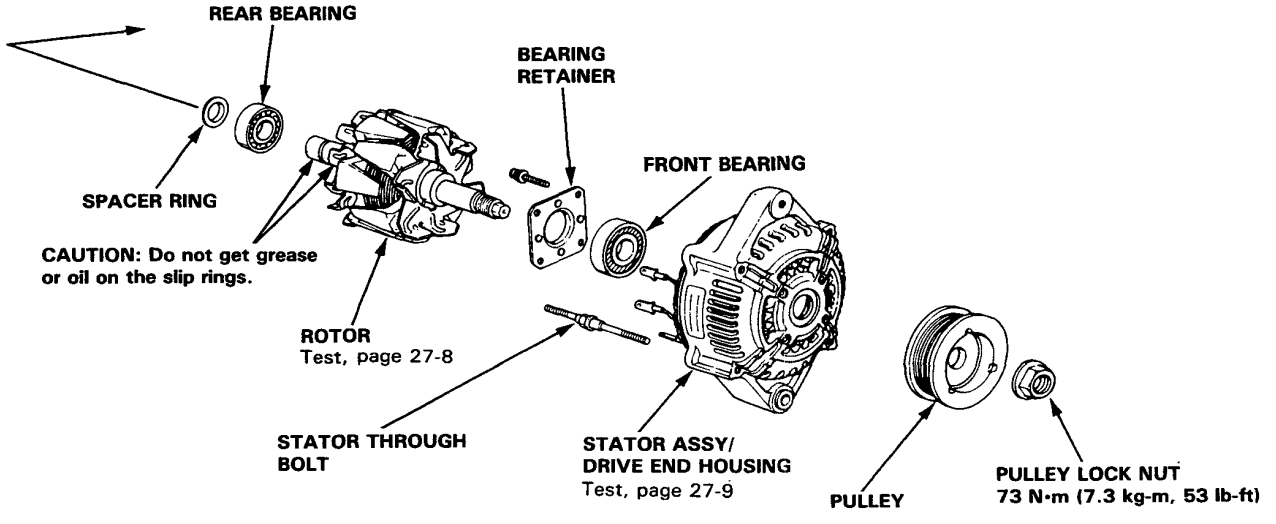
Alternator Overhaul

NOTE: It is only necessary to separate the pulley, drive end housing and rotor when the front bearing needs replacement.

To remove the pullery and rotor, use 10 mm and 22 mm box wrenches to loosen the pulley lock nut. Use an impact wrench to remove the nut if necessary.





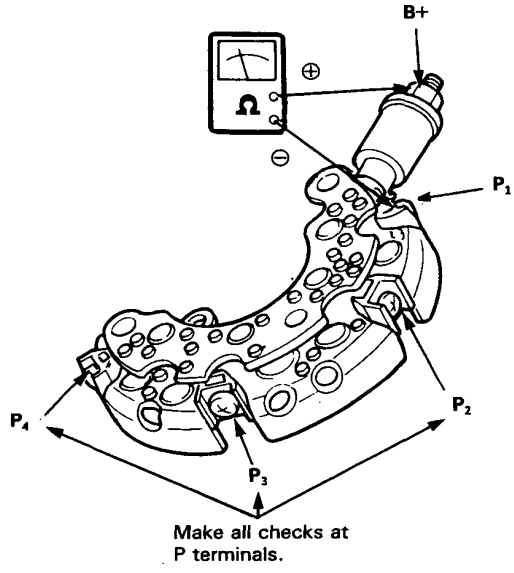


Rectifier Test

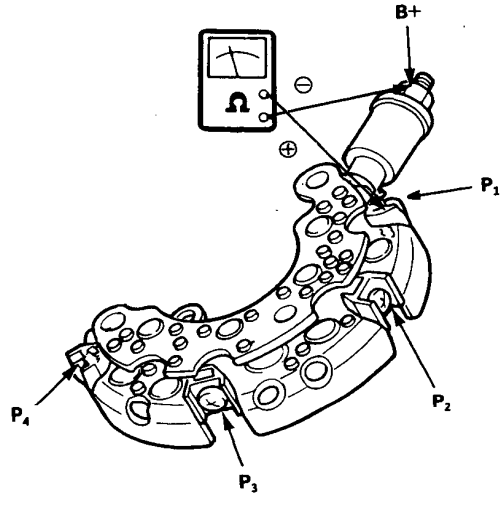
NOTE: The diodes are designed to pass current in one direction and block current in the opposite direction.
Since the alternator rectifier is made up of eight diodes (4 pairs), each diode must be tested for continuity in both directions; a total of 16 checks.

1. Using an ohmmeter or continuity tester (test light), check one diode from each pair, in both directions:

   - Connect POSITIVE test probe to B+ terminal and NEGATIVE test probe to P terminal of each diode pair. Note readings.

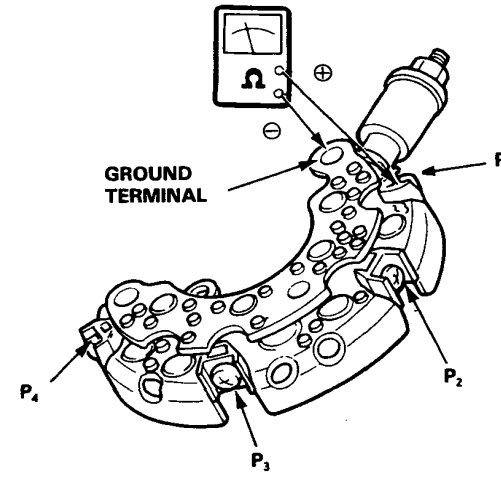


   - Reverse probe position and check the diodes at P terminals again.

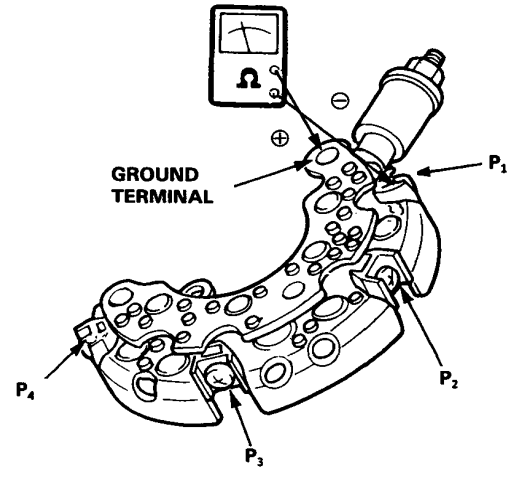


2. Check the other diode from each pair, in both directions:

   - Connect NEGATIVE test probe to ground terminal and POSITIVE probe to P terminal of each diode pair.



   - Reverse probe position and check the diodes at P terminals again.

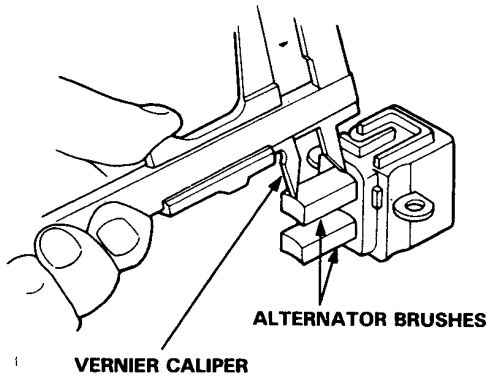


3. If any of the 16 checks shows continuity in both directions, or no continuity in both directions, the diode is defective and the rectifier assembly must be replaced. (Diodes are not available separately.)

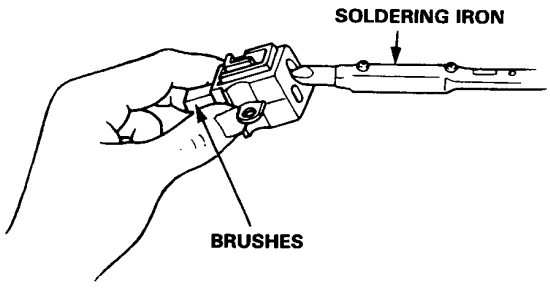
Alternator Brush Inspection

1. Remove the end cover, then take out the brush holder by removing its 2 screws.
2. Measure length of the brushes with a vernier caliper.

Alternator Brush Length
Standard: 10.5 mm (0.41 in.)
Service Limit: 5.5 mm (0.22 in.)



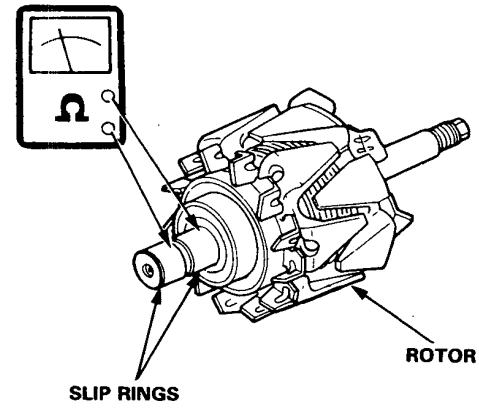
If the brushes are not within the service limit, replace them.



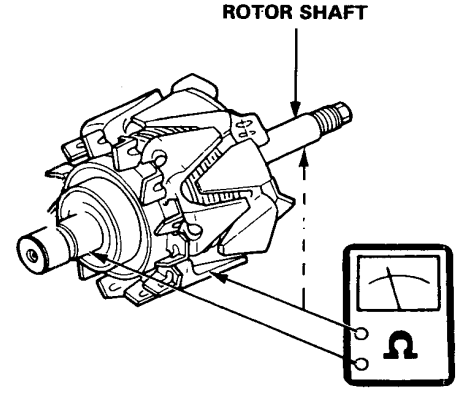
CAUTION: When replacing the brushes, use only a rosin core type solder or solder joints will corrode.

Rotor Slip Ring Test

1. Check that there is continuity between the slip rings.

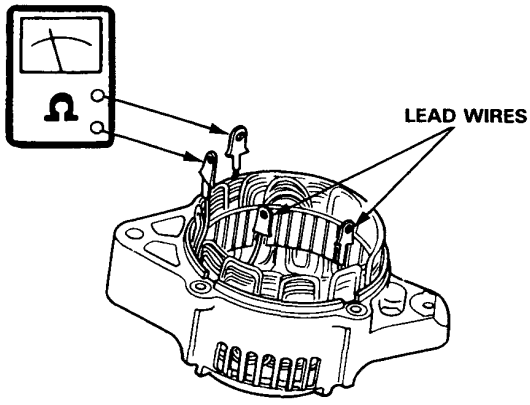


2. Check that there is no continuity between the rings and the rotor or rotor shaft.

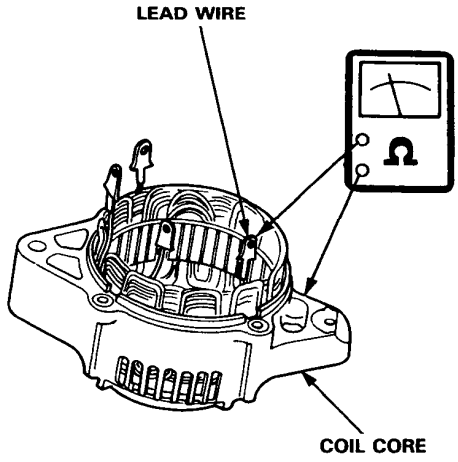


3. If the rotor fails either continuity check, replace it.

1. Check that there is continuity between each pair of lead wires.



2. Check that there is no continuity between each lead wire and the coil core.



3. If the coil fails either continuity check, replace the stator.

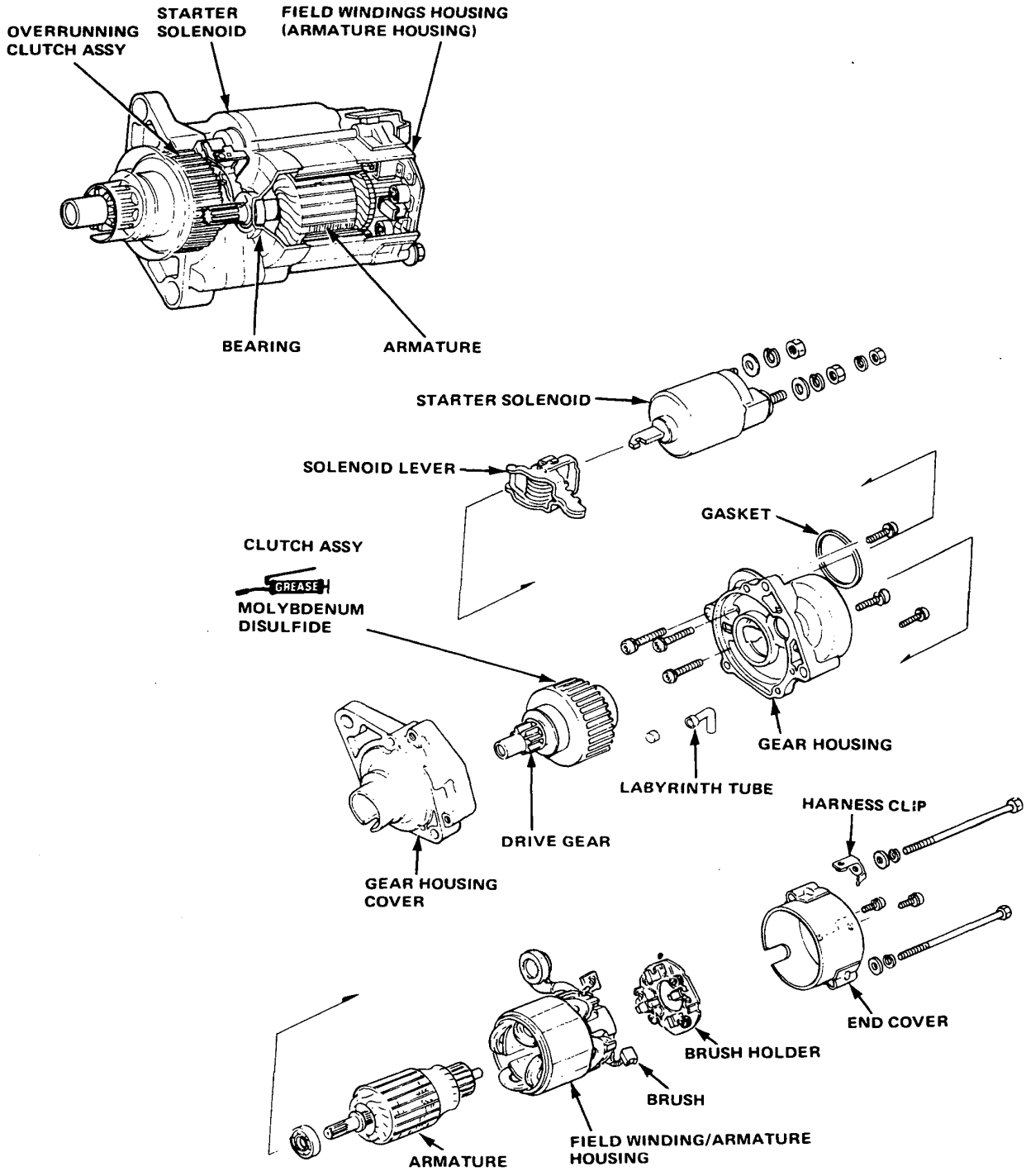
Starting

Starting

Illustrated Index

CAUTION: Disconnect ground cable from battery post before removing starter.

MITSUBA (REDUCTION TYPE) 1.4 kw



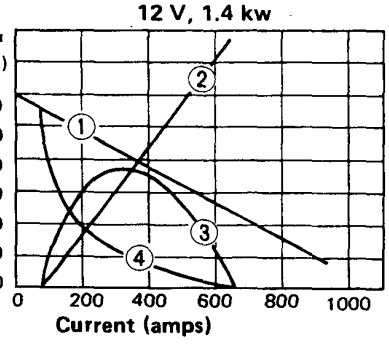
Specifications

	MITSUBA 1.4 kw
Type	SM302-08
Normal output	1.4 kw
Nominal voltage	12 V
Hour rating	30 seconds
Direction of rotation	Clockwise as viewed from pinion gear side
Weight	3.7 kg (8.2 lb)

			MITSUBA 1.4 kw
No load	Terminal voltage	V	11.5
	Current	A	90 max.
	Draw speed	min^{-1} (rpm)	3,500 min.
Load	Terminal voltage	V	8.5
	Torque	N·m (kg-m, lb-ft)	13.5 (1.35, 9.8)
	Current	A	350 max.
	Draw speed	min^{-1} (rpm)	1,000 min.
Braked	Terminal voltage	V	2.4 at 20°C (68°F).
	Current draw	A	450 max.
	Torque	N·m (kg-m, lb-ft)	11 (1.1, 7.9) min.

STARTER PERFORMANCE CURVES ① Voltage ② Torque ③ Output ④ min^{-1} (rpm)

①	②			③	④
V	N·m	lb-ft	kg-m	kW	min^{-1} (rpm)
12	24	17.4	2.4	2.4	6000
10	20	14.5	2.0	2.0	5000
8	16	11.6	1.6	1.6	4000
6	12	8.7	1.2	1.2	3000
4	8	5.8	0.8	0.8	2000
2	4	2.9	0.4	0.4	1000
0	0	0	0	0	0

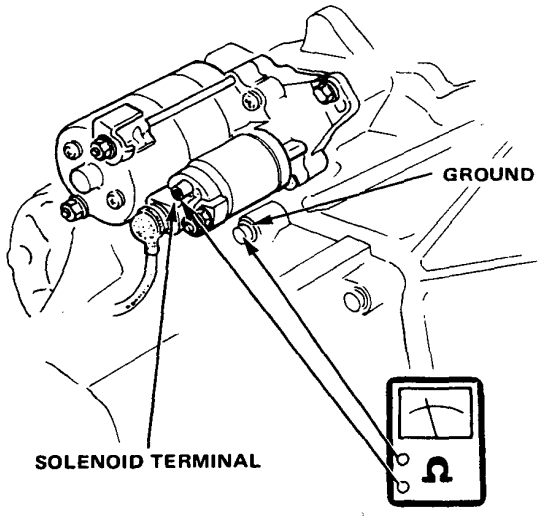


Standard and Service Limit (MITSUBA 1.4 kw)

MEASUREMENT	STANDARD (NEW)	SERVICE LIMIT
Commutator runout	0–0.02 mm (0–0.0008 in.)	0.05 mm (0.002 in.)
Commutator O.D.	28 mm (1.10 in.)	27.5 mm (1.08 in.)
Mica depth	0.4–0.5 mm (0.016–0.020 in.)	0.15 mm (0.006 in.)
Brush length	14.3–14.7 mm (0.56–0.58 in.)	9.3 mm (0.37 in.)

Starter Solenoid Check

1. Check pull-in coil continuity between the solenoid terminal and any convenient ground. Coil is OK if there is continuity.



2. Check hold-in coil continuity between the solenoid terminal and motor terminal on the solenoid.

   Coil is OK if there is continuity.

MITSUBA 1.0 kw and 1.4 kw