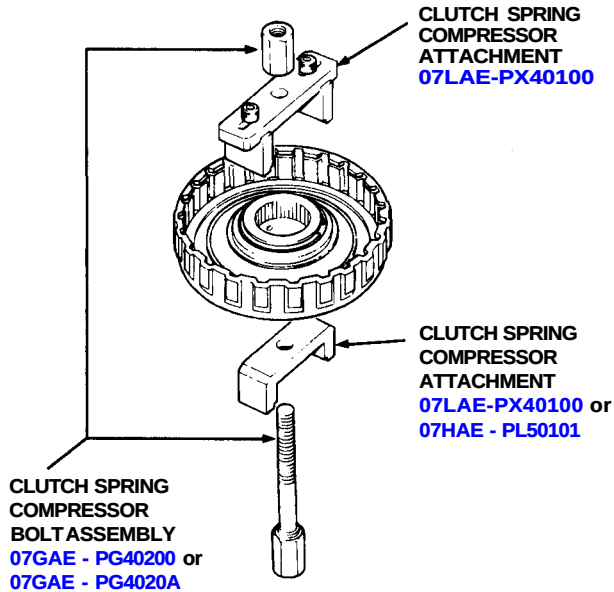


Clutch

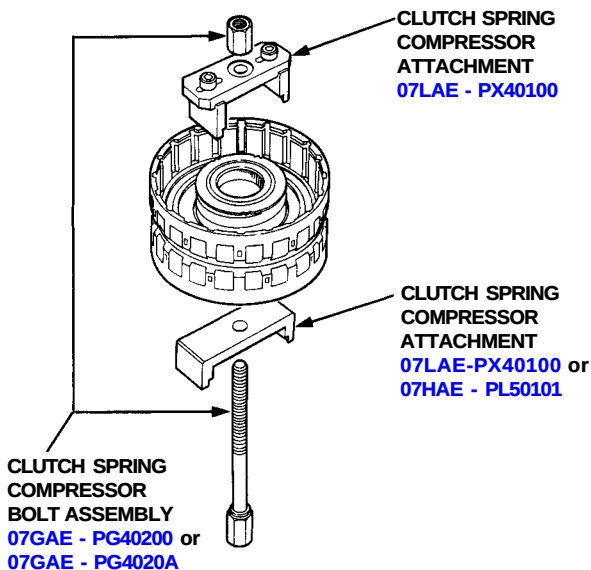
Reassembly (cont'd)

6. Install the special tools as shown.

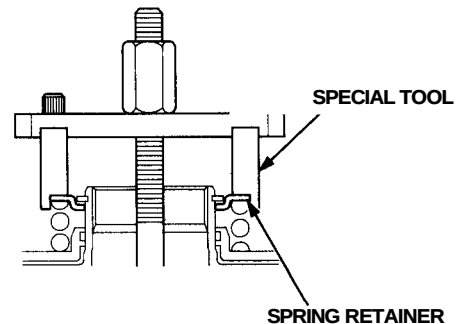
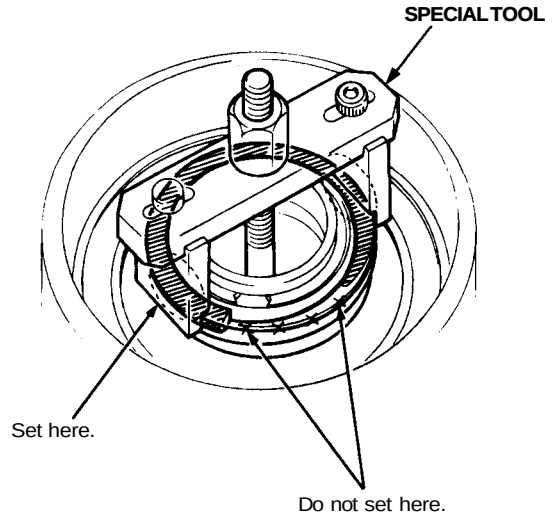
NOTE: For 2nd, 3rd, 1st-hold and reverse clutches



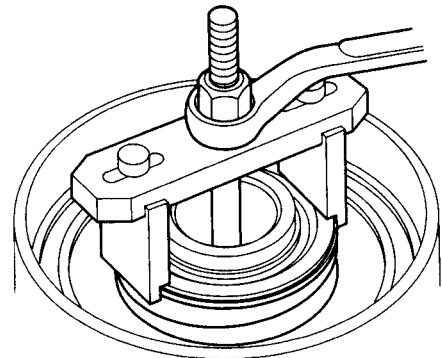
NOTE: For Island 4th clutches



CAUTION: If either end of the special tool is set over an area of the spring retainer which is unsupported by the return spring, the retainer may be damaged. Be sure the special tool is adjusted to have full contact with the spring retainer.

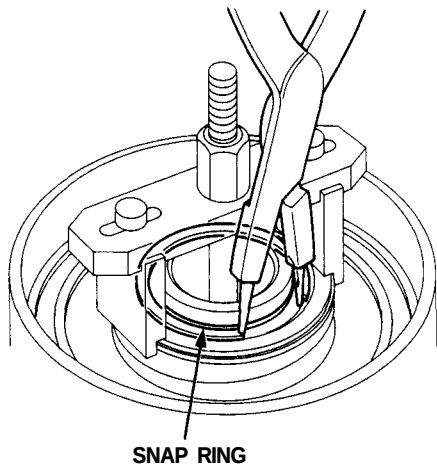


7. Compress the return spring with the special tool.





8. Install the snap ring.



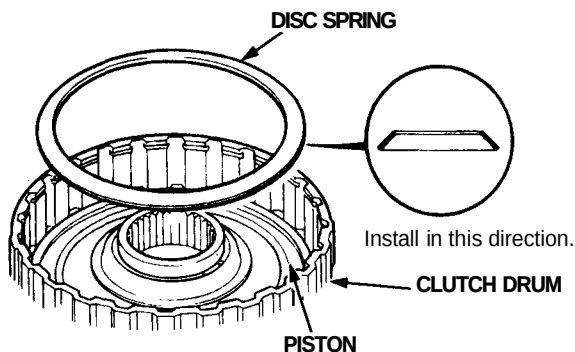
SNAP RING

9. Remove the special tools.

10. Install the disc spring in the direction shown.
NOTE: The 3rd and 4th Clutches on '97 model do not the disc springs.

'96 MODEL: 2ND, 3RD, 4TH and 1ST-HOLD CLUTCHES

'97 - '98 MODELS: 1ST-HOLD CLUTCH



DISC SPRING

Install in this direction.

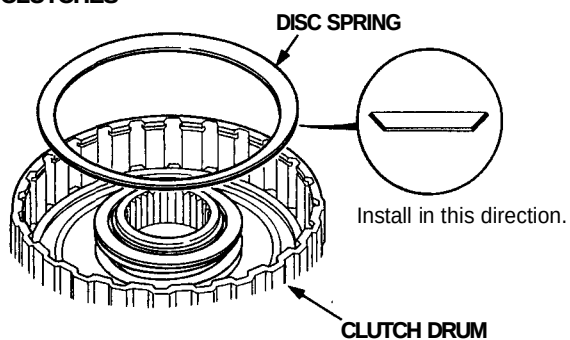
CLUTCH DRUM

PISTON

'96 MODEL: REVERSE and 1ST CLUTCHES

NOTE: Install the 1st clutch disc spring if it was removed from the 1st clutch piston.

'97 - '98 MODELS: 1ST, 2ND and REVERSE CLUTCHES



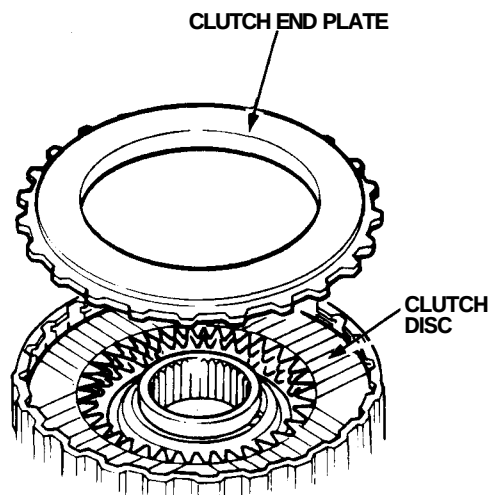
DISC SPRING

Install in this direction.

CLUTCH DRUM

11. Soak the clutch discs thoroughly in ATF for a minimum of 30 minutes.
12. Starting with a clutch plate, alternately install the clutch plates and clutch discs. Install the clutch end plate with the flat side toward the disc.

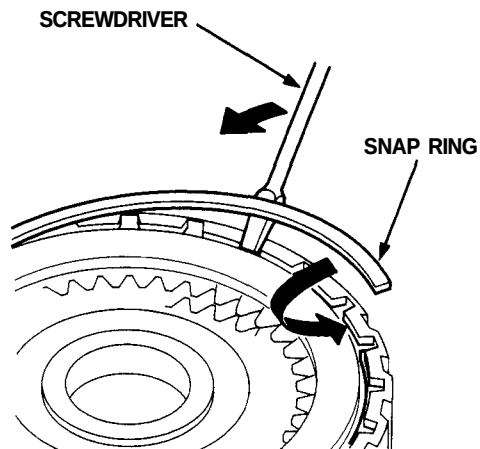
NOTE: Before installing the plates and discs, make sure the inside of the clutch drum is free of dirt and other foreign matter.



CLUTCH END PLATE

CLUTCH DISC

13. Install the snap ring.



SCREWDRIVER

SNAP RING

(cont'd)

Clutch

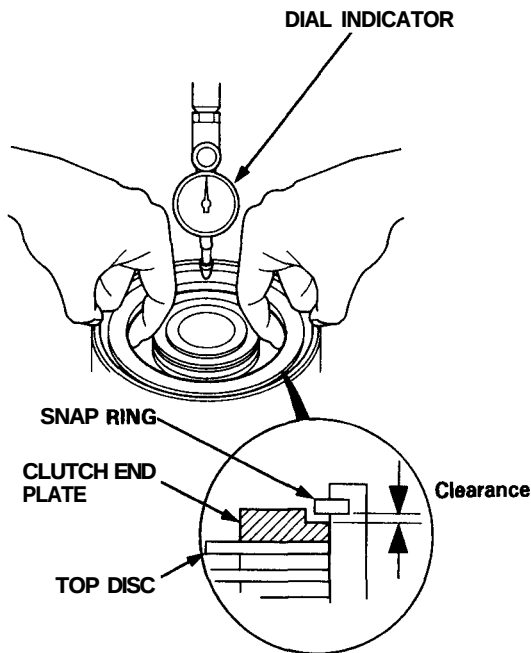
Reassembly (cont'd)

14. Measure the clearance between the clutch end plate and top disc with a dial indicator. Zero the dial indicator with the clutch end plate lowered, and lift it up to the snap ring. The distance that the clutch end plate moves is the clearance between the clutch end plate and top disc.

NOTE: Measure at three locations.

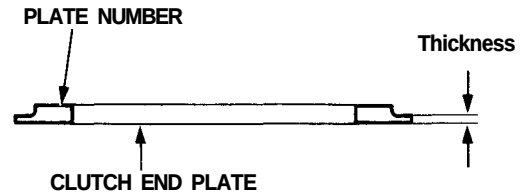
Clutch End Plate-to-Top Disc Clearance:

Clutch	Service Limit
1st	0.65 -0.85 mm (0.026 - 0.033 in)
2nd	0.60 -0.80 mm (0.024 -0.031 in)
3rd	0.60 -0.80 mm (0.024 -0.031 in)
4th	0.50 -0.70 mm (0.020 - 0.028 in)
1st-hold	0.70 -0.90 mm (0.028 - 0.035 in)
Reverse	0.75 -0.95 mm (0.030 - 0.037 in)



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

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



1ST, 2ND, 3RD and 4TH CLUTCH END PLATES

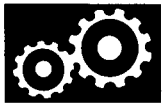
Plate No.	Part Number	Thickness
1	22551 - PY4 - 003	2.1 mm (0.083 in)
2	22552 - PY4 - 003	2.2 mm (0.087 in)
3	22553 - PY4 - 003	2.3 mm (0.091 in)
4	22554 - PY4 - 003	2.4 mm (0.094 in)
5	22555 - PY4 - 003	2.5 mm (0.098 in)
6	22556 - PY4 - 003	2.6 mm (0.102 in)
7	22557 - PY4 - 003	2.7 mm (0.106 in)
8	22558 - PY4 - 003	2.8mm (0.110 in)
9	22559 - PY4 - 003	2.9 mm (0.114 in)

1ST-HOLD CLUTCH END PLATES

Plate No.	Part Number	Thickness
L1	22351 - PY4 - 003	2.1 mm (0.083 in)
L2	22352 - PY4 - 003	2.2 mm (0.087 in)
L3	22353 - PY4 - 003	2.3 mm (0.091 in)
L4	22354 - PY4 - 003	2.4 mm (0.094 in)
L5	22355 - PY4 - 003	2.5 mm (0.098 in)
L6	22356 - PY4 - 003	2.6 mm (0.102 in)
L7	22357 - PY4 - 003	2.7 mm (0.106 in)
L8	22358 - PY4 - 003	2.8 mm (0.110 in)
L9	22359 - PY4 - 003	2.9 mm (0.114 in)

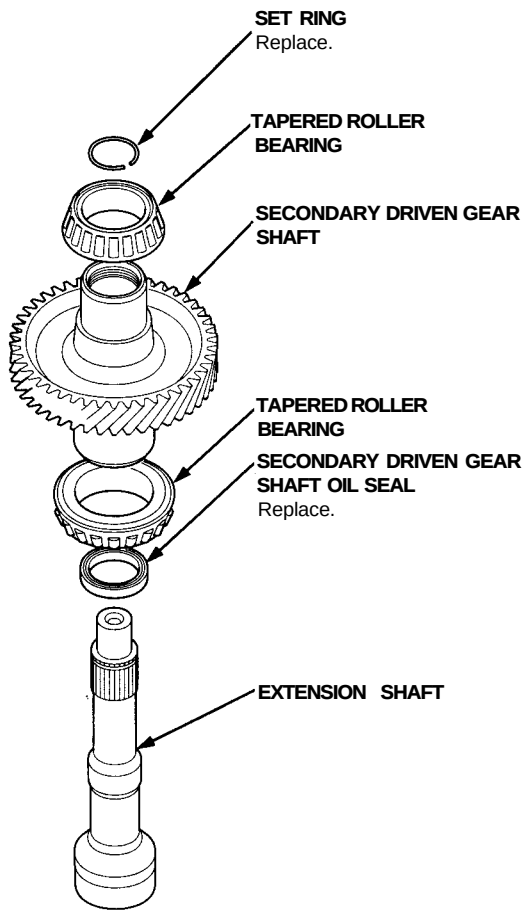
REVERSE CLUTCH END PLATES

Plate No.	Part Number	Thickness
R1	22451 - PY4 - 003	4.1 mm (0.161 in)
R2	22452 - PY4 - 003	4.2 mm (0.165 in)
R3	22453 - PY4 - 003	4.3 mm (0.169 in)
R4	22454 - PY4 - 003	4.4 mm (0.173 in)
R5	22455 - PY4 - 003	4.5 mm (0.177 in)
R6	22456 - PY4 - 003	4.6 mm (0.181 in)
R7	22457 - PY4 - 003	4.7 mm (0.185 in)
R8	22458 - PY4 - 003	4.8 mm (0.189 in)
R9	22459 - PY4 - 003	4.9 mm (0.193 in)



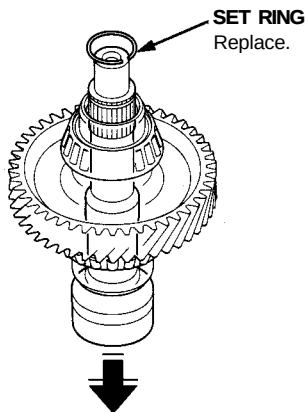
Secondary Driven Gear Shaft

Components



Disassembly

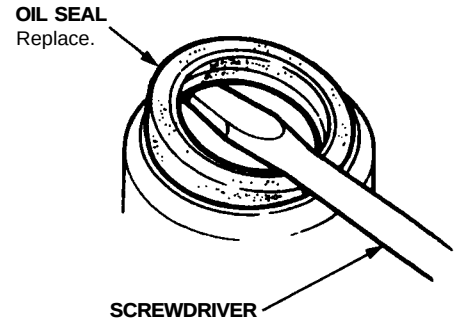
1. Remove the set ring.



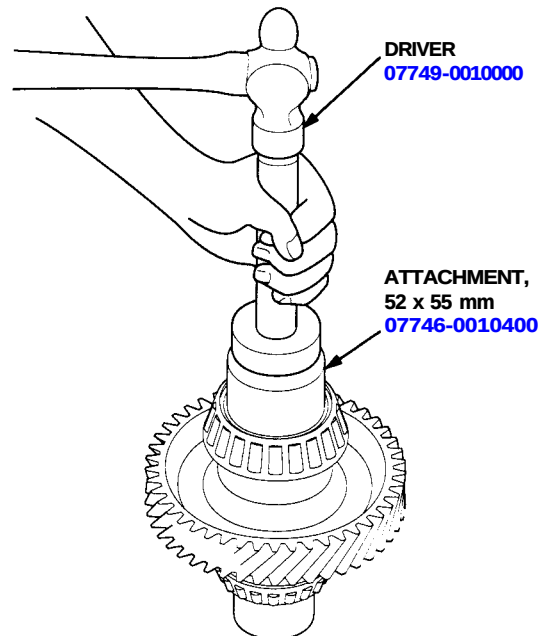
2. Remove the extension shaft from the secondary driven gear shaft.

Oil Seal Replacement

1. Remove the oil seal from the secondary driven gear shaft.



2. Drive the oil seal into the secondary driven gear shaft using the special tools as shown.



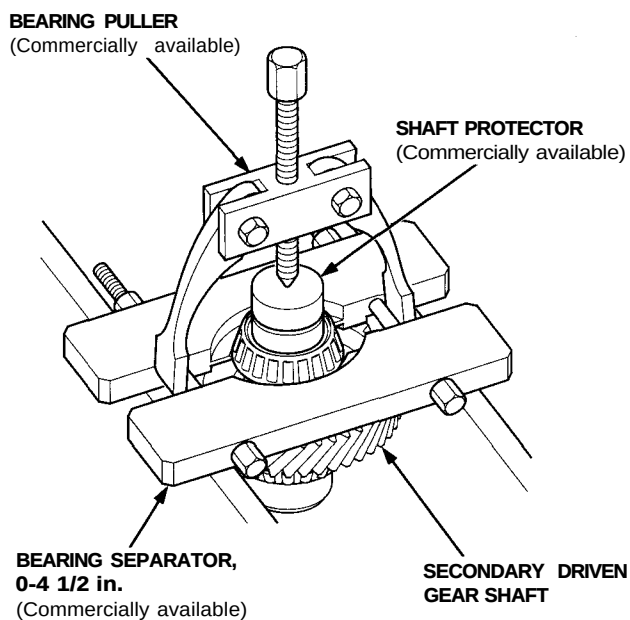
Secondary Driven Gear Shaft

Tapered Roller Bearing Replacement

NOTE:

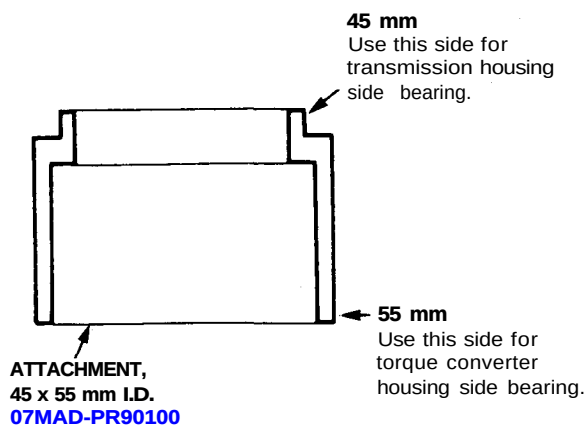
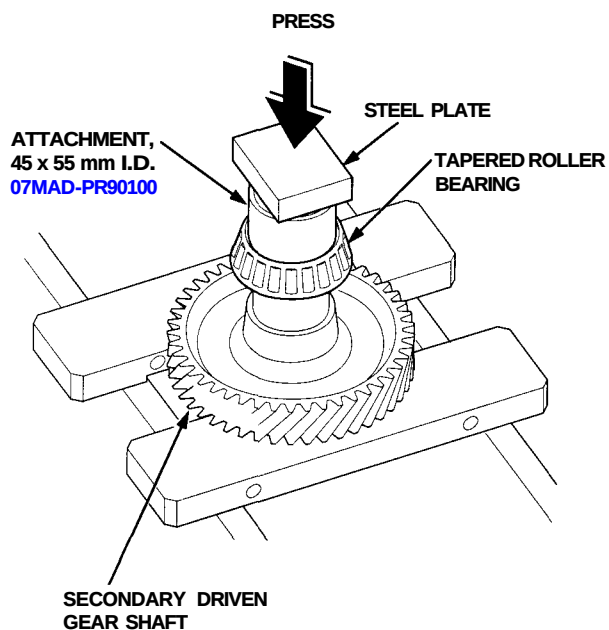
- The bearing and outer race should be replaced as a set.
- If the bearing is replaced, inspect and adjust the bearing preload (see page 14-194).

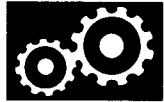
1. Remove the tapered roller bearings from the secondary driven gear shaft using a bearing puller and separator as shown.



2. Install the bearings using the special tool and a press as shown.

NOTE: Press the bearings in squarely until they bottom.





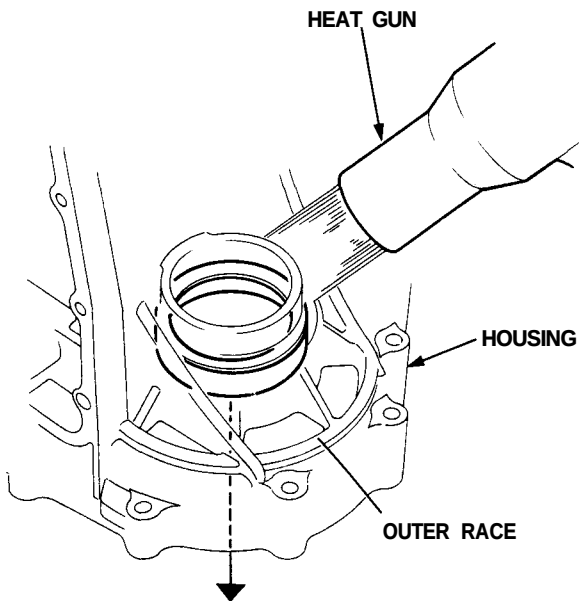
Tapered Roller Bearing Outer Race Replacement

NOTE:

- Replace the bearing with a new one whenever the outer race is replaced.
- Adjust preload after replacing the bearing and outer race.
- Coat all parts with ATF during installation.
- The illustration shows '96 model; '97 - '98 models is similar.

1. Remove the bearing outer race from the transmission housing and torque converter housing by heating the housing to about 212°F (100°C).

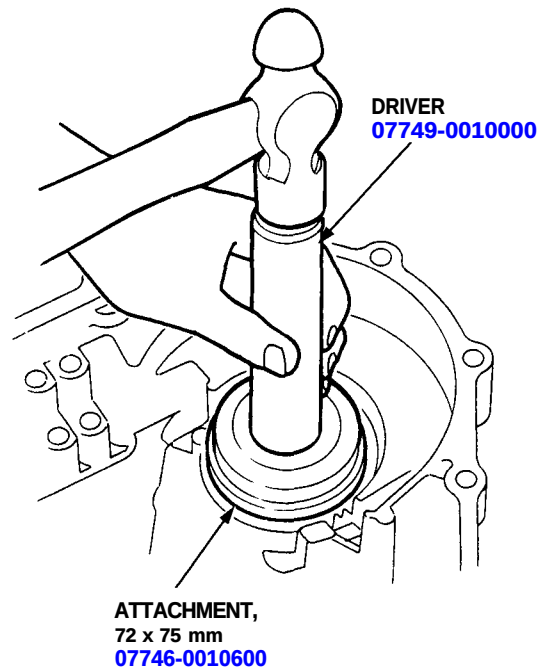
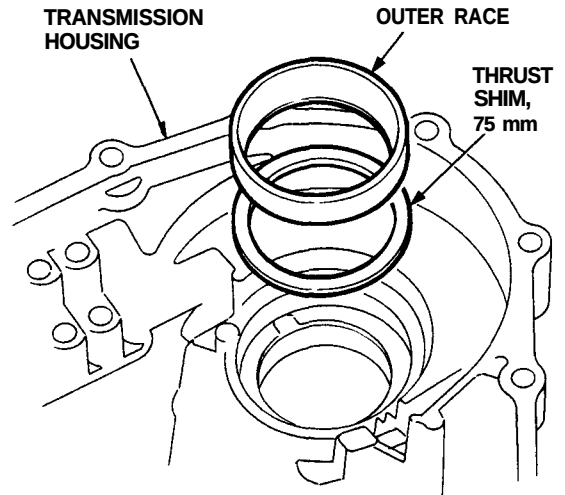
CAUTION: Do not heat the housing in excess of 212°F (100°C).



2. Install the thrust shim and outer race in the transmission housing using the special tools as shown.

NOTE:

- Install the outer race squarely in the transmission housing.
- Check that there is no clearance between the outer race, thrust washer and transmission housing.



(cont'd)

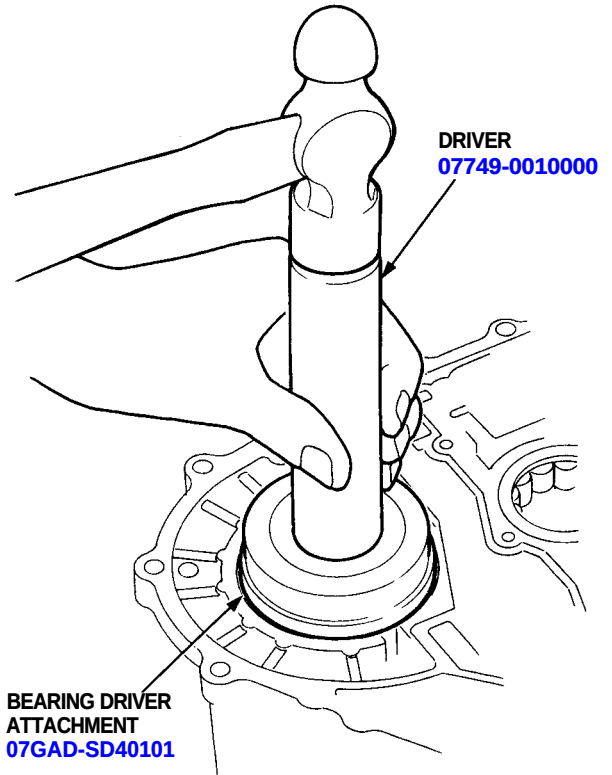
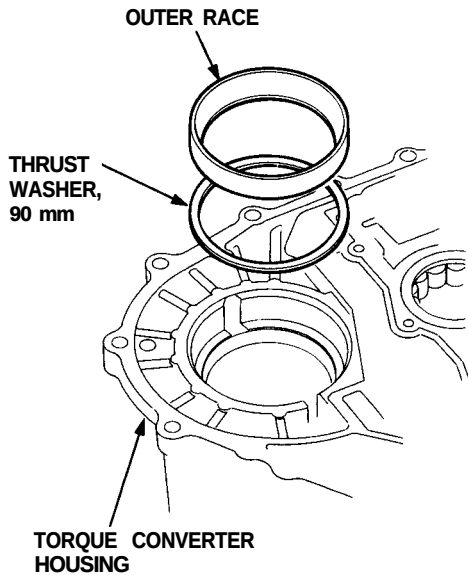
Secondary Driven Gear Shaft

Tapered Roller Bearing Outer Race Replacement (cont'd)

3. Install the 90 mm thrust washer and outer race in the torque converter housing using the special tools as shown.

NOTE:

- The 90 mm thrust washer is used on '96 models with the transmission No. M5HA-1000001 to M5HA - 1014322; '96 models with the transmission No. M5HA-1014323 and above, and '97-'98 models do not use this part.
- Install the outer race squarely in the torque converter housing.
- Check that there is no clearance between the outer race, thrust washer, and torque converter housing.





Tapered Roller Bearing Preload Adjustment

NOTE:

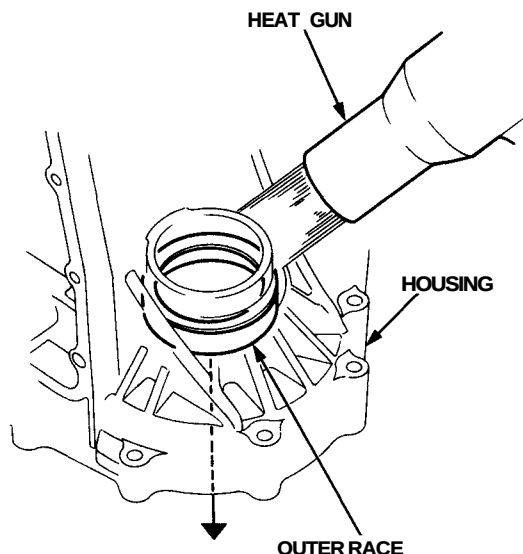
- If the transmission housing, torque converter housing, secondary driven gear shaft, tapered roller bearing, outer race, thrust shim, or thrust washer were replaced, the bearing preload must be adjusted.
- The illustration shows '97 - '98 models; '96 model is similar.
- The 90 mm thrust washer is used on '96 models with the transmission No. M5HA - 1000001 to M5HA - 1014322; '96 models with the transmission No. M5HA - 1014323 and above, and '97 - '98 models do not use this part.

1. Remove the oil seals from both housings.
2. Remove the bearing outer race and thrust shim from the transmission housing by heating the housing to about 212°F (100°C) with a heat gun.

CAUTION:

- **Do not heat the housing in excess of 212°F (100°C).**
- **Replace the tapered roller bearing when the outer race is to be removed.**

NOTE: Let the transmission housing cool to room temperature before adjusting the bearing preload.



3. Select the 1.98 mm (0.078 in) thrust shim from the middle of the table below.

THRUST SHIM, 75 mm

No.	Part Number	Thickness mm (in)
A	23941-P5D-000	1.56 (0.061)
B	23942-P5D-000	1.59 (0.063)
C	23943-P5D-000	1.62 (0.064)
D	23944-PSD-000	1.65 (0.065)
E	23945-PSD-000	1.68 (0.066)
F	23946-P5D-000	1.71 (0.067)
G	23947-P5D-000	1.74 (0.069)
H	23948-P5D-000	1.77 (0.07)
I	23949-PSD-000	1.80 (0.071)
J	23950-P5D-000	1.83 (0.072)
K	23951-P5D-000	1.86 (0.073)
L	23952-PSD-000	1.89 (0.074)
M	23953-P5D-000	1.92 (0.076)
N	23954-PSD-000	1.95 (0.077)
O	23955-P5D-000	1.98 (0.078)
P	23956-PSD-000	2.01 (0.079)
Q	23957-PSD-000	2.04 (0.080)
R	23958-PSD-000	2.07 (0.081)
S	23959-PSD-000	2.10 (0.08)
T	23960-P5D-000	2.13 (0.08)
U	23961-PSD-000	2.16 (0.085)
V	23962-P5D-000	2.19 (0.086)
W	23963-P5D-000	2.22 (0.087)
X	23964-PSD-000	2.25 (0.089)
Y	23965-PSD-000	2.28 (0.090)
Z	23966-PSD-000	2.31 (0.091)
AA	23967-P5D-000	2.34 (0.092)
AB	23968-P5D-000	2.37 (0.093)
AC	23969-PSD-000	2.40 (0.094)
AD	23970-PSD-000	2.43 (0.096)

4. After installing the thrust shim, install the outer race in the transmission housing using the special tools (see page 14-193).

NOTE:

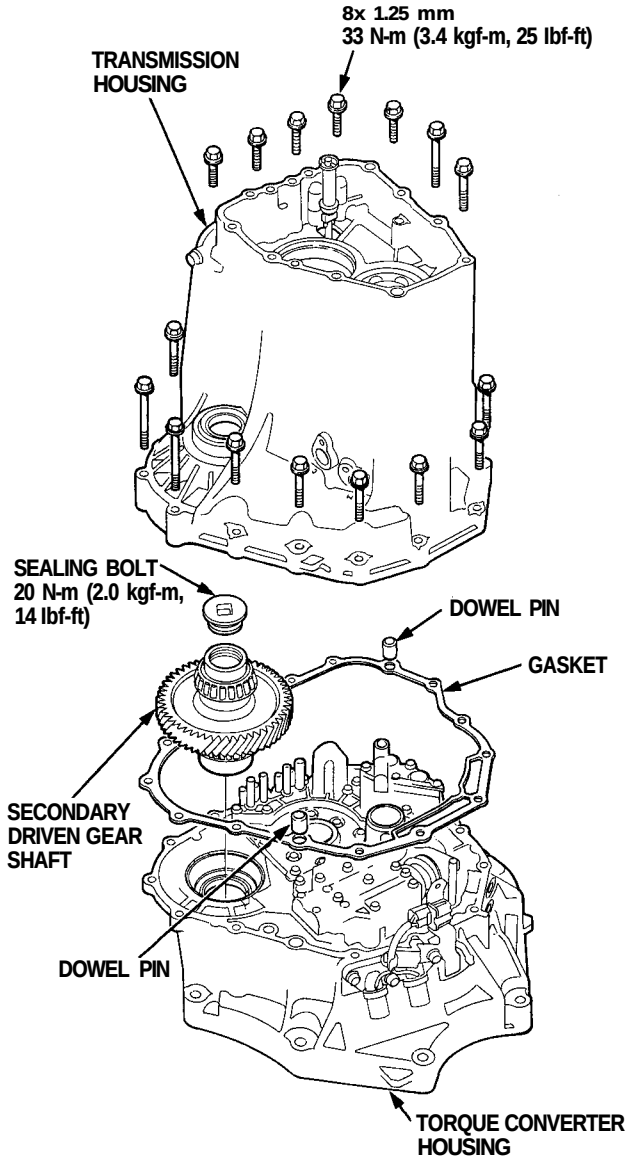
- Install the outer race squarely in the transmission housing.
- Check that there is no clearance between the outer race, shim, and transmission housing.

(cont'd)

Secondary Driven Gear Shaft

Tapered Roller Bearing Preload Adjustment (cont'd)

5. Install the sealing bolt to the secondary driven gear shaft, and torque it to 20 N-m (2.0 kgf-m, 14 lbf-ft).

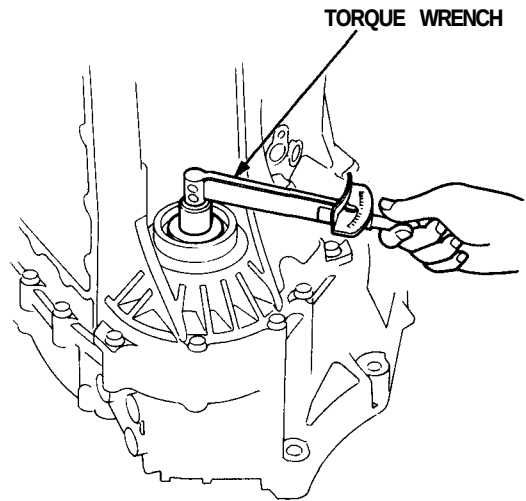


6. With the mainshaft and countershaft removed, install the secondary driven gear shaft, and torque the transmission housing.

NOTE: Install the gasket when checking starting torque.

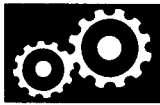
7. Rotate the secondary driven gear shaft in both directions to seat the bearing.
8. Measure the starting torque of the secondary driven gear shaft with a torque wrench.

STANDARD: 3.4-4.4 N-m
(35 - 45 kgf-cm, 30 - 39 lbf-in)



NOTE:

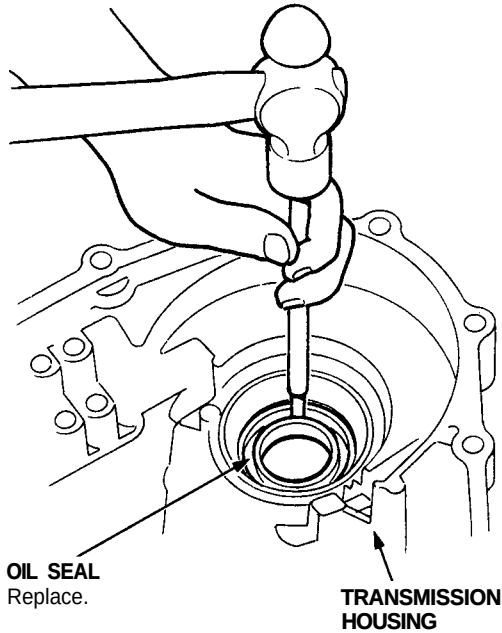
- Measure the starting torque at normal room temperature in both directions.
- Changing the shim to the next size will increase or decrease starting torque about 0.3-0.4 N-m (3-4kgf-cm, 3-4lbf-in).
- To increase the starting torque, increase the thickness of the shim. To decrease the starting torque, decrease the thickness of the shim.



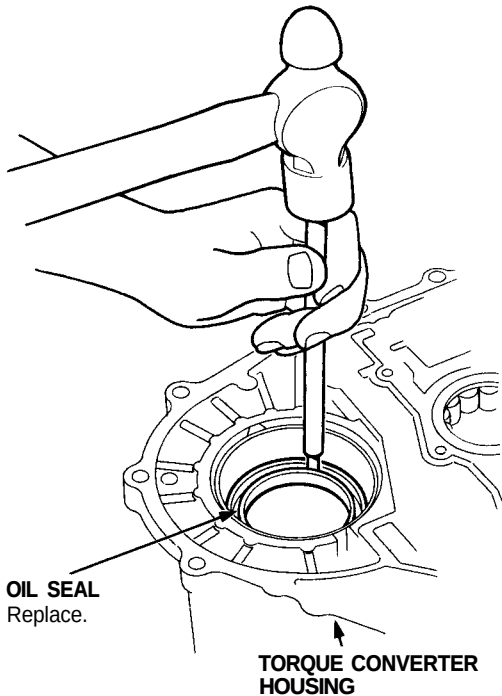
Oil Seals

Removal

1. Remove the oil seal from the transmission housing.

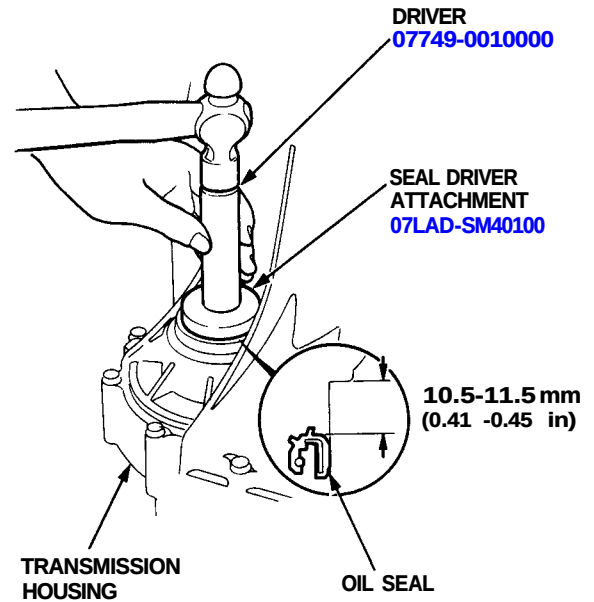


2. Remove the oil seal from the torque converter housing.



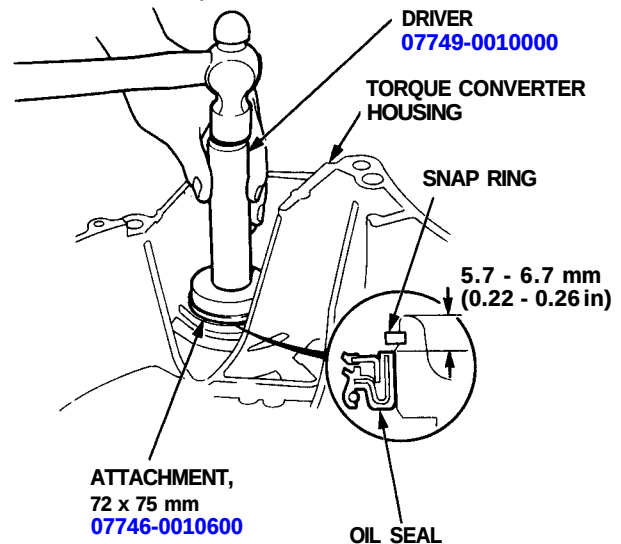
Installation

1. Install the oil seal in the transmission housing using the special tool as shown.



2. Install the oil seal into the torque converter housing using the special tools as shown.
3. Install the snap ring in the torque converter housing ('96 model).

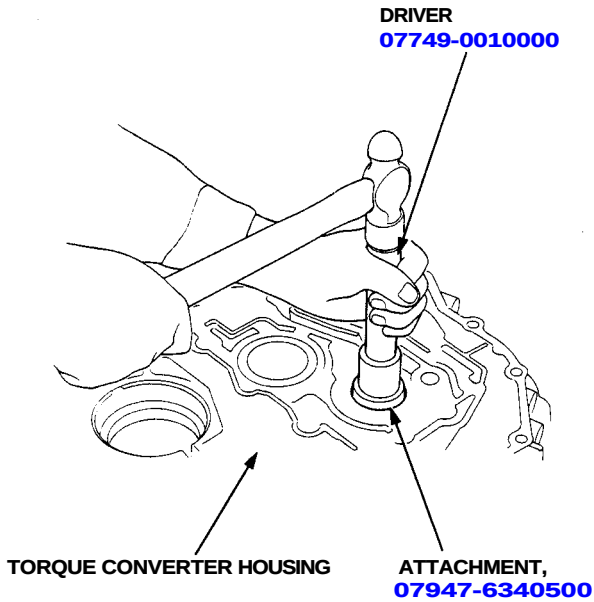
NOTE: The snap ring is used on '96 models with the transmission No. M5HA - 1000001 to M5HA - 1014322; '96 models with the transmission No. M5HA - 1014323 and above, and '97 - '98 models do not use this part.



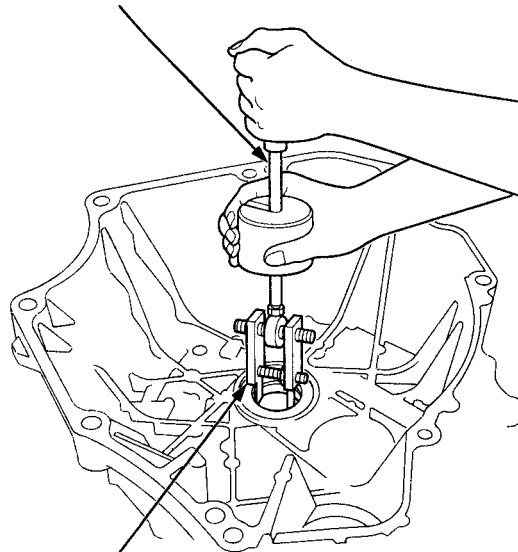
Torque Converter Housing Bearings

Mainshaft Bearing/Oil Seal Replacement

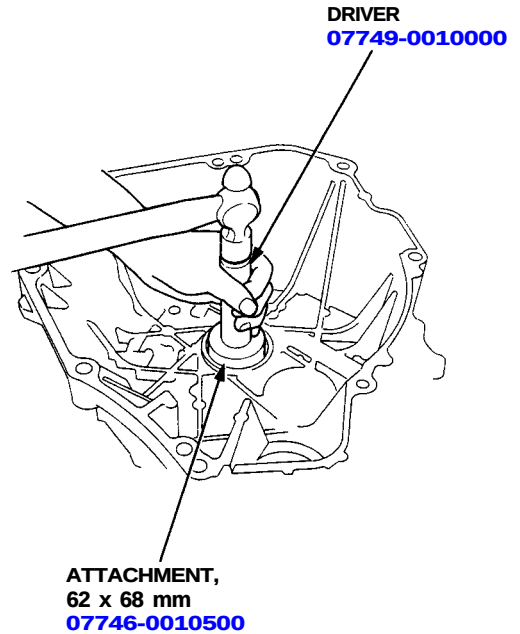
1. Drive out or pull up the mainshaft bearing and oil seal using the special tools as shown.



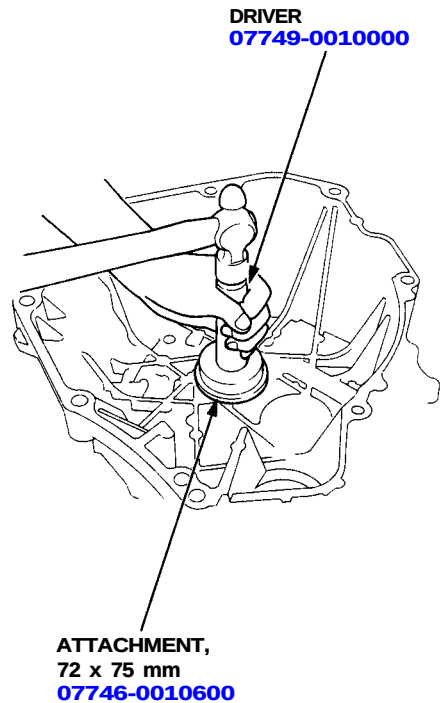
SLIDE HAMMER, 3/8" - 16
(Commercially available)



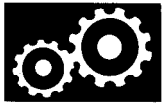
2. Drive in the new mainshaft bearing until it bottoms in the housing using the special tools as shown.



3. Install the new oil seal flush with the housing using the special tools as shown.



Transmission Housing Mainshaft Bearing

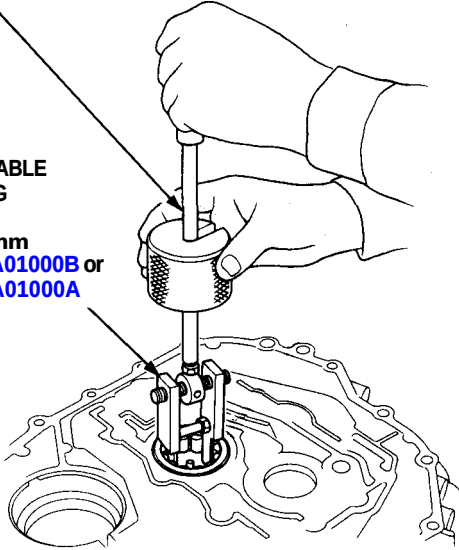


Countershaft Bearing Replacement

1. Remove the countershaft roller bearing using the special tool as shown.

SLIDE HAMMER, 3/8" - 16
(Commercially available)

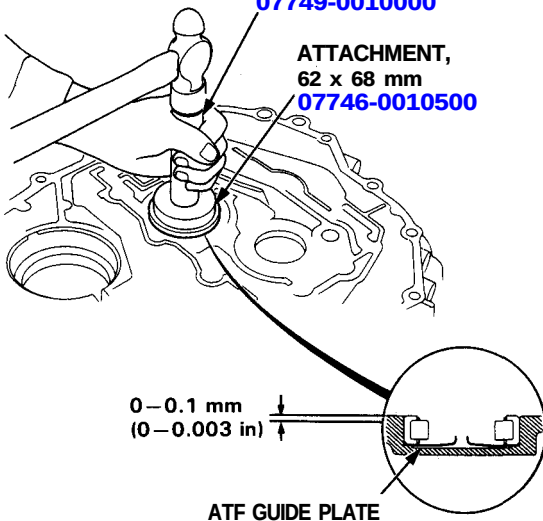
**ADJUSTABLE
BEARING
PULLER,
25-40 mm**
07736-A01000B or
07736-A01000A



2. Install the ATF guide plate.
3. Drive the new bearing into the housing using the special tools as shown.

DRIVER
07749-0010000

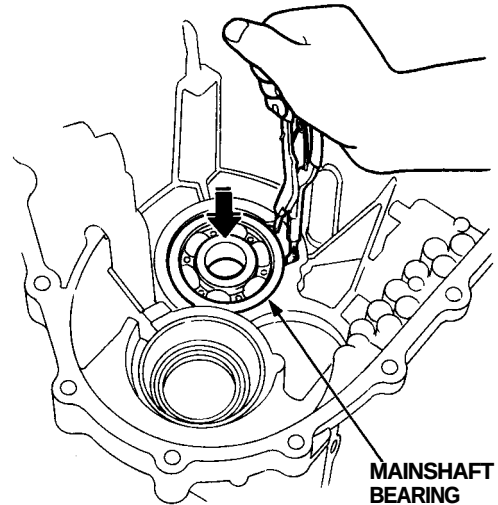
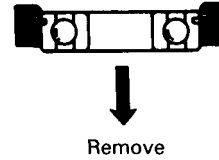
ATTACHMENT,
62 x 68 mm
07746-0010500



Replacement

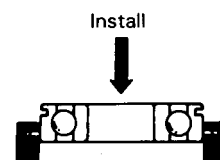
1. To remove the mainshaft bearing from the transmission housing, expand the snap ring with the snap ring pliers, then push the bearing out.

NOTE: Do not remove the snap ring unless it's necessary to clean the groove in the housing.



2. Expand the snap ring with the 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.

NOTE: Install with groove side of the bearing facing inside the transmission housing.

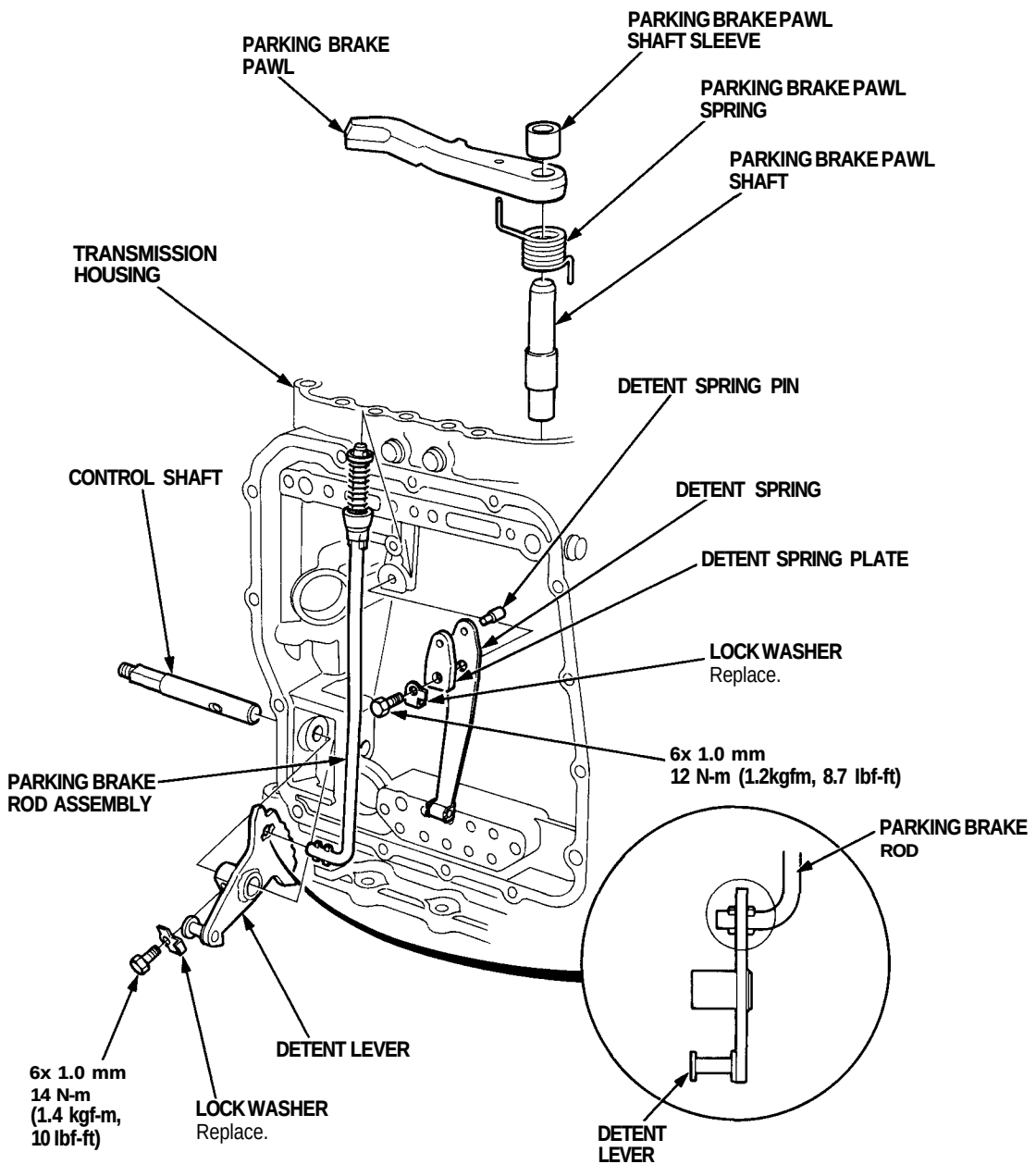


Parking Brake Mechanism

Disassembly/Inspection/Reassembly

1. Remove the parking brake pawl shaft sleeve, parking brake pawl and parking brake pawl spring.
2. Remove the A/T gear position switch (see page [14-201](#)).
3. Remove the bolt securing the detent lever to the control shaft, then remove the control shaft.
4. Remove the detent lever and parking brake rod assembly from the transmission housing.
5. Assemble the parking brake mechanism in the reverse order of disassembly.

NOTE: See page [14-201](#) and [14-202](#) when installing the A/T gear position switch.

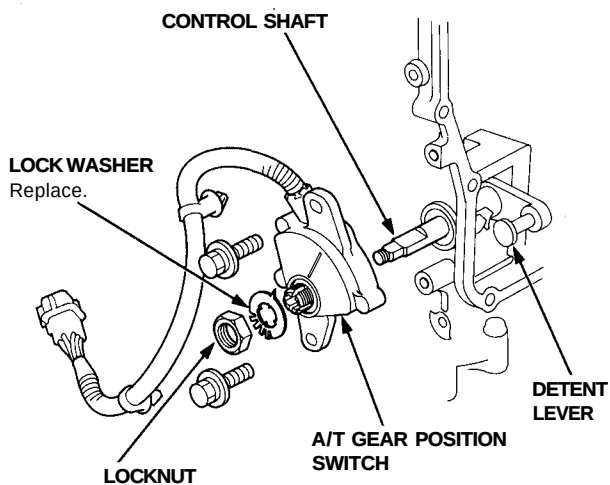




A/T Gear Position Switch

Removal

1. Shift the detent lever to the **P** position.



2. Pry the locktabs on the lock washer, then remove the locknut and lock washer.
3. Remove the bolts securing the A/T gear position switch, then remove the A/T gear position switch.

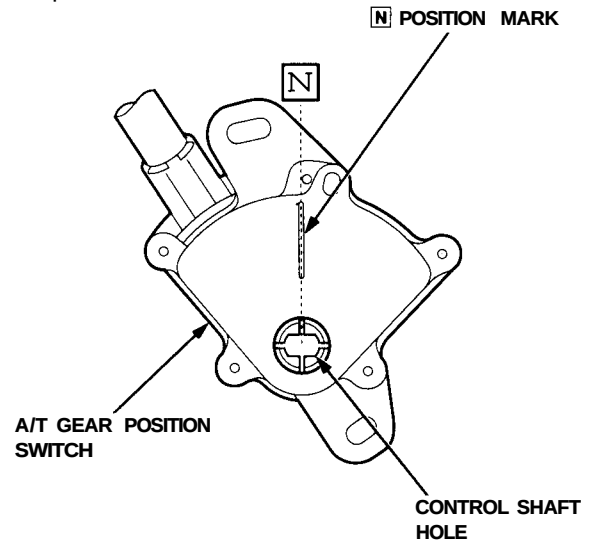


A/T Gear Position Switch

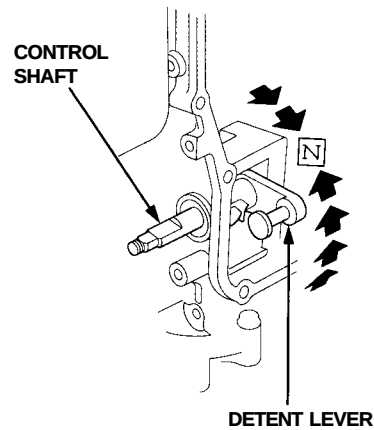
Installation

1. Set the A/T gear position switch to the **N** position as shown.

NOTE: The A/T gear position switch clicks in the **N** position.



2. Shift the detent lever to the **N** position.

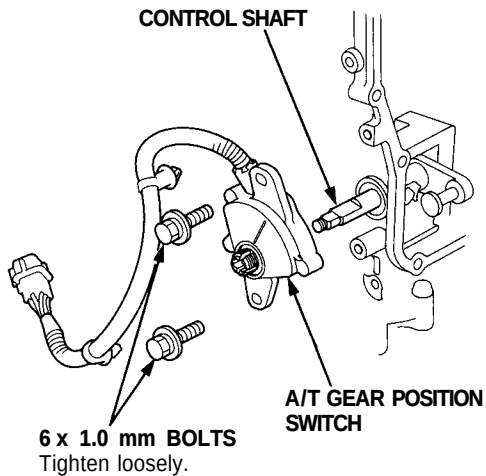


(cont'd)

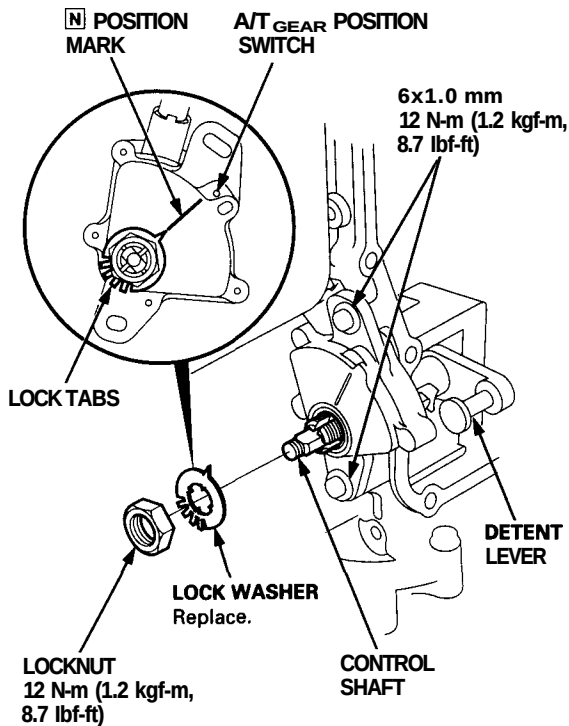
A/T Gear Position Switch

Installation(cont'd)

3. Install the A/T gear position switch on the control shaft, then install the bolts loosely.



4. Install a new lock washer on the A/T gear position switch by aligning its projected tip with the **N** position mark on the A/T gear position switch as shown.



5. Tighten the locknut while holding the detent lever in the **N** position, then bend the lock tabs against the locknut.
6. Tighten the 6 mm bolts to the specified torque.

Transmission

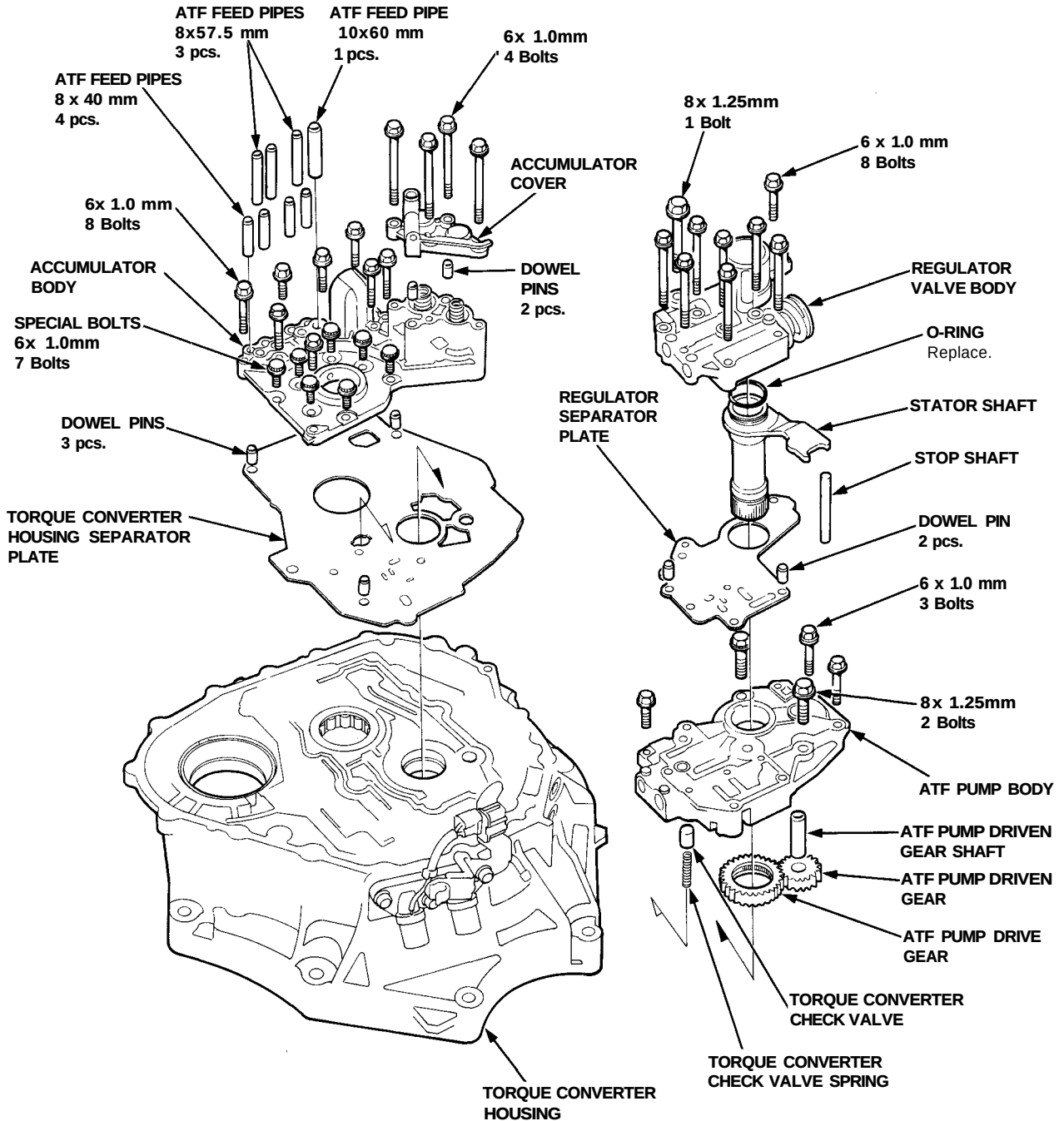
Reassembly

NOTE:

- Coat all parts with ATF.
- Replace the following parts:
 - O-rings
 - Lock washers
 - Gaskets
 - Mainshaft and countershaft locknuts and conical disc springs
 - Sealing washers

TORQUE:

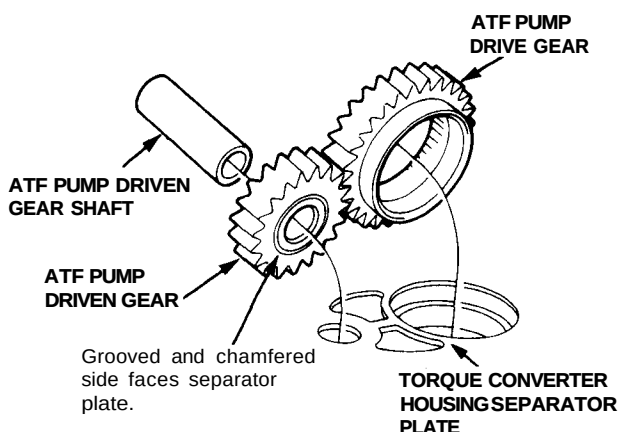
- 6 x 1.0 mm Bolts: 12 N-m (1.2 kgf-m, 8.7 lbf-ft)
- 8 x 1.25 mm Bolts: 18 N-m (1.8 kgf-m, 13 lbf-ft)



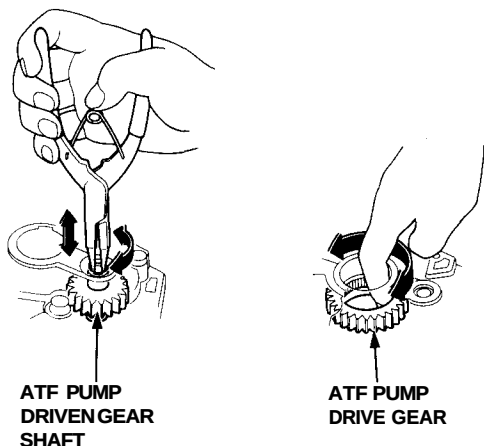


1. Install the torque converter housing separator plate and three dowel pins on the torque converter housing.
2. Install the ATF pump drive gear, ATF pump driven gear, ATF driven gear shaft, torque converter check valve, and spring on the torque converter housing.

NOTE: Install the ATF pump driven gear with its grooved and chamfered side facing down.



3. Loosely install the ATF pump body with two 8 mm bolts and three 6 mm bolts. Make sure the ATF pump drive gear rotates smoothly in the normal operating direction, and the ATF pump driven gear shaft moves smoothly in the axial and normal operating directions.



4. Install the accumulator body (eight bolts and seven special bolts).
 5. Install the two dowel pins on the accumulator body, then install the accumulator cover while pressing it down (four bolts).
 6. Tighten the bolts on the ATF pump body to the specified torque. Make sure the ATF drive gear and the ATF driven gear shaft move smoothly.
 7. If the ATF pump drive gear and ATF driven gear shaft do not move freely, loosen the bolts on the ATF pump body, and remove the accumulator cover and accumulator body.
 8. Realign the ATF pump driven gear shaft, reinstall the accumulator body and the accumulator cover, then retighten the bolts on the ATF pump body to the specified torque. Recheck the ATF drive gear and the ATF driven gear shaft movement.
- CAUTION: Failure to align the ATF pump driven gear shaft correctly will result in seized ATF pump gears or a ATF pump driven gear shaft.**
9. Install the regulator separator plate and two dowel pins on the ATF pump body.
 10. Install the stator shaft with a new O-ring and stop shaft.
 11. Install the regulator valve body (eight 6 mm bolts and one 8 mm bolt).
 12. Install the ATF feed pipes on the accumulator body.
 13. Install the parking brake rod assembly with the detent lever on the control shaft, and install the detent spring on the transmission housing, if necessary (see page [14-200](#)).
 14. Assemble the mainshaft sub-assembly (see page [14-171](#)).
 15. Assemble the countershaft sub-assembly (see page [14-175](#)).
 16. Install the secondary driven gear shaft in the torque converter housing.

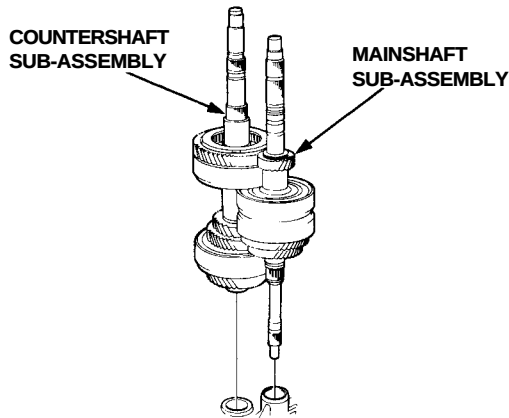
(cont'd)

Transmission

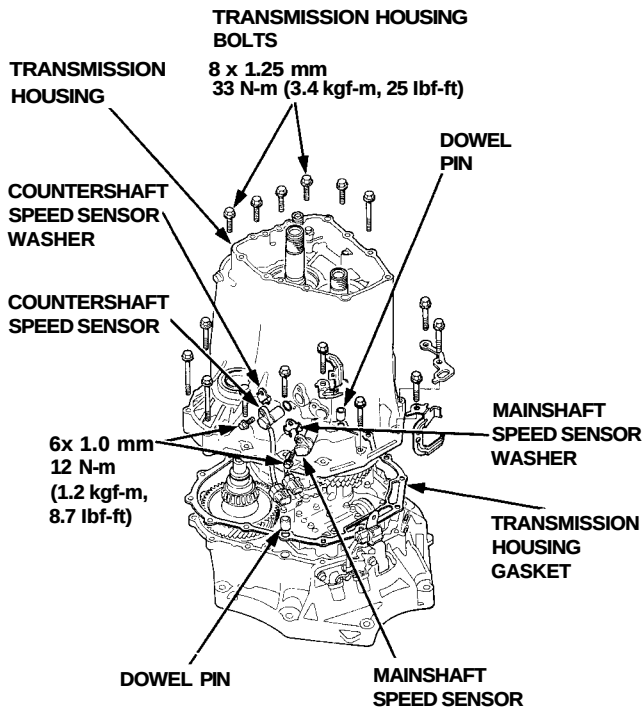
Reassembly (cont'd)

17. Install the mainshaft sub-assembly and the countershaft sub-assembly together in the torque converter housing.

NOTE: Take care to prevent damage to the regulator valve body, when installing the shafts.



18. Install the two dowel pins and a new gasket on the torque converter housing.

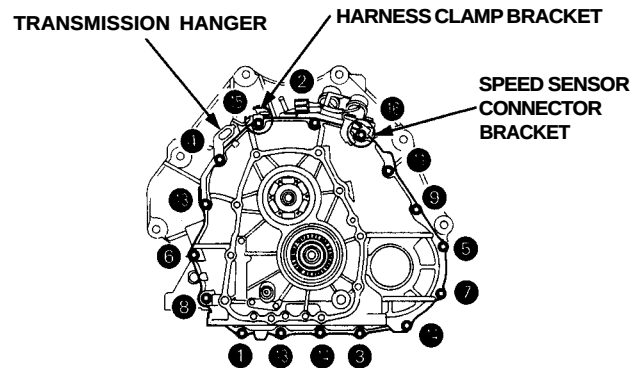


19. Place the transmission housing on the torque converter housing.

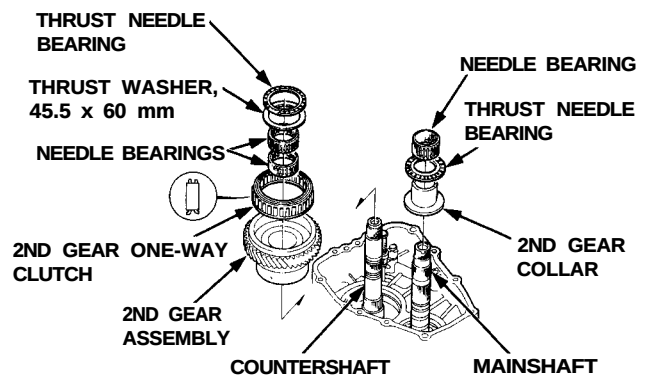
CAUTION: Make sure that the mainshaft and countershaft speed sensors are not installed on the transmission housing before installing the transmission housing on the torque converter housing.

20. Install the transmission housing mounting bolts with the transmission hanger, harness clamp bracket, and speed sensor connector bracket, then tighten them in two or more steps in the sequence shown.

TORQUE: 33 N-m (3.4 kgf-m, 25 lbf-ft)



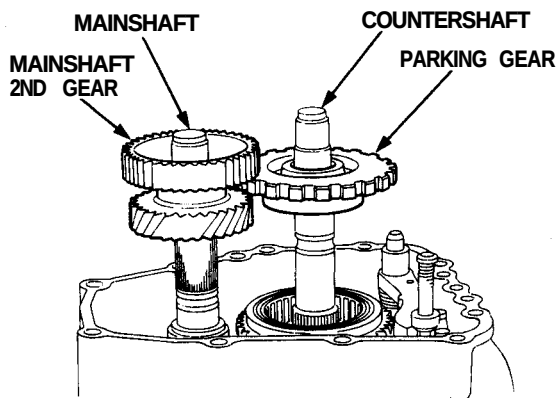
21. Install the mainshaft and countershaft speed sensors with the washers on the transmission housing.
22. Install the countershaft 2nd gear assembly, 2nd gear one-way clutch, needle bearings, thrust washer, and thrust needle bearing on the countershaft.



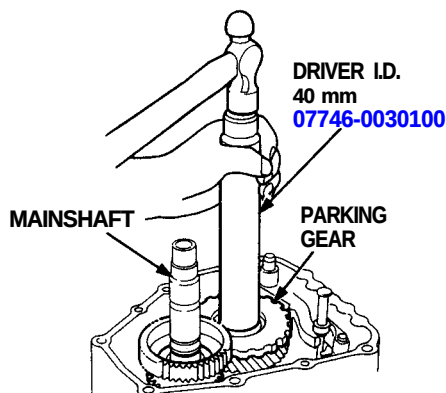
23. Install the 2nd gear collar, thrust needle bearing, and needle bearing on the mainshaft.



24. Combine the mainshaft 2nd gear with the parking gear, then install them on their respective shafts.

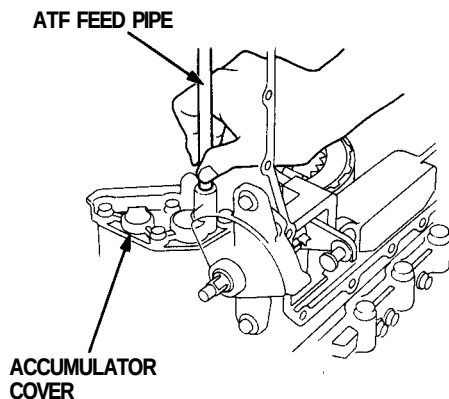


25. Tap the parking gear very lightly to install in the 2nd gear one-way clutch, using the special tool as shown.



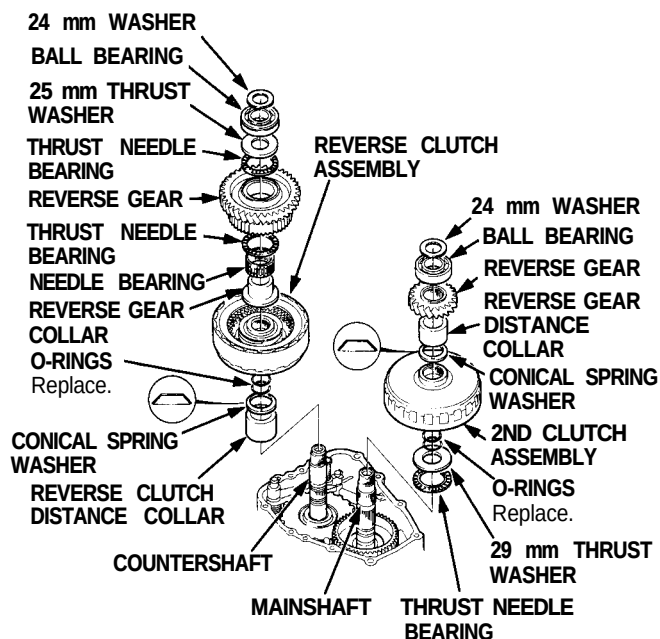
26. Install the parking brake pawl shaft, spring, pawl, and sleeve in the transmission housing (see page 14-200).

27. Install the ATF feed pipe in the accumulator cover.



28. Install the reverse clutch distance collar and a new countershaft conical spring washer on the countershaft.

NOTE: Install the conical spring washers in the direction shown.



29. Install the thrust needle bearing and 29 mm thrust washer on the mainshaft.

30. Install new O-rings on the countershaft and mainshaft.

NOTE: Before installing the O-rings, wrap the shaft splines with tape to prevent damage to the O-rings.

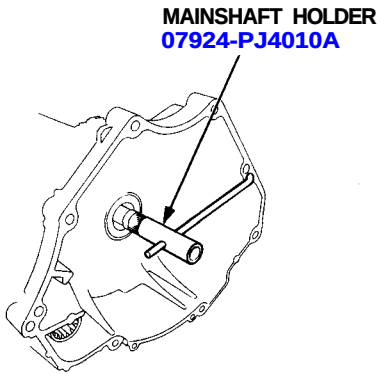
31. Install the 2nd clutch assembly on the mainshaft, then install the reverse clutch assembly, reverse gear collar, needle bearing, thrust needle bearing, reverse gear, thrust needle bearing, 25 mm thrust washer and ball bearing on the countershaft.

32. Install a new mainshaft conical spring washer, reverse gear distance collar, reverse gear and ball bearing on the mainshaft.

Transmission

Reassembly (cont'd)

33. Install the special tool onto the mainshaft as shown.

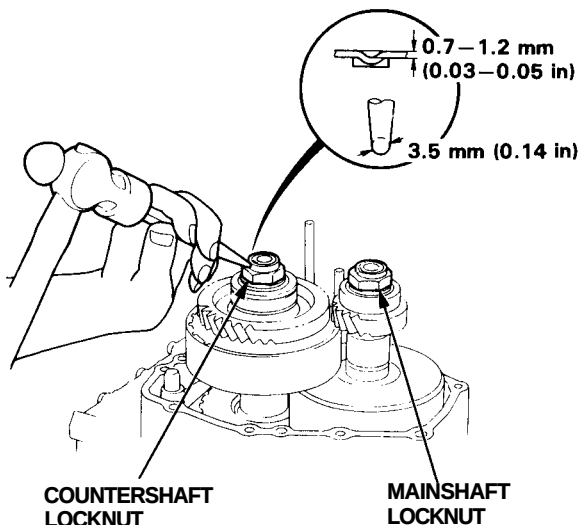


34. Engage the parking brake pawl with the parking gear by moving the detent lever to the **P** position.
35. Coat the 24 mm washers with ATF, then install them and new locknuts on each shaft.
36. Tighten the locknuts to the specified torque using a torque wrench.

TORQUE: 127 N-m (13.0 kgf-m, 94 lbf-ft)

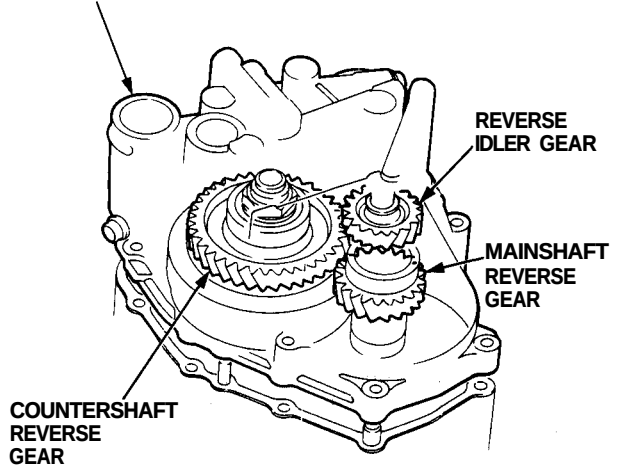
NOTE: Countershaft locknut has left-hand threads.

37. Stake each locknut into its shaft, using a 3.5 mm (0.14 in) punch as shown.



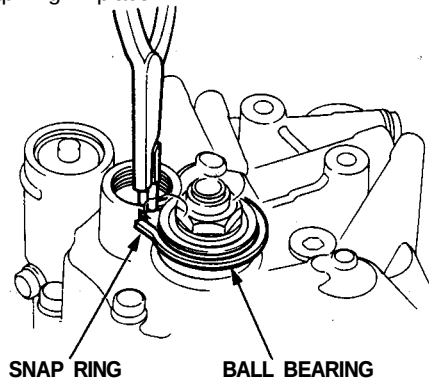
38. Install two dowel pins, four ATF feed pipes with new O-rings, and a new rear cover gasket on the transmission housing.
39. Install the rear cover and engage the reverse gears while rotating the mainshaft.

REAR COVER



40. Push the rear cover with expanding the snap ring with the snap ring pliers until the ring snaps in place around the bearing.

NOTE: Make sure the snap ring fits in place around the bearing. If not, raise the countershaft to fit the snap ring in place.



41. Tighten the bolts on the rear cover (ten bolts).
TORQUE: 26 N-m (2.7 kgf-m, 20 lbf-ft)
42. Apply liquid gasket (P/N 08718 - 0001) to the sealing bolt threads, and install the washer and the sealing bolt on the rear cover.

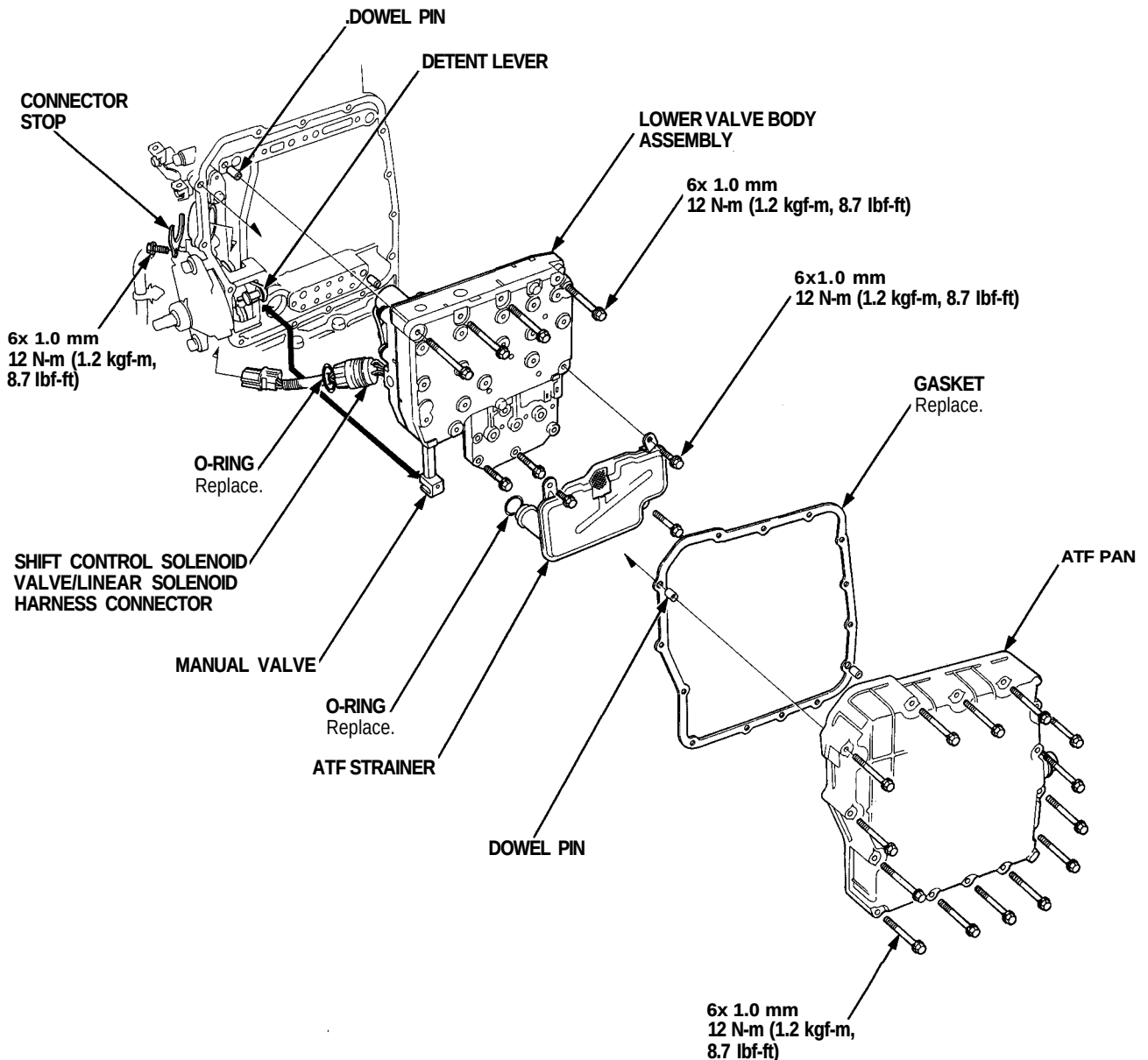
NOTE: The washer on the rear cover is used on '96 models with the transmission No. M5HA - 1021049 and above, and on '97 - '98 models; '96 models with the transmission No. M5HA - 1000001 to M5HA - 1021048 do not have this part.

TORQUE:

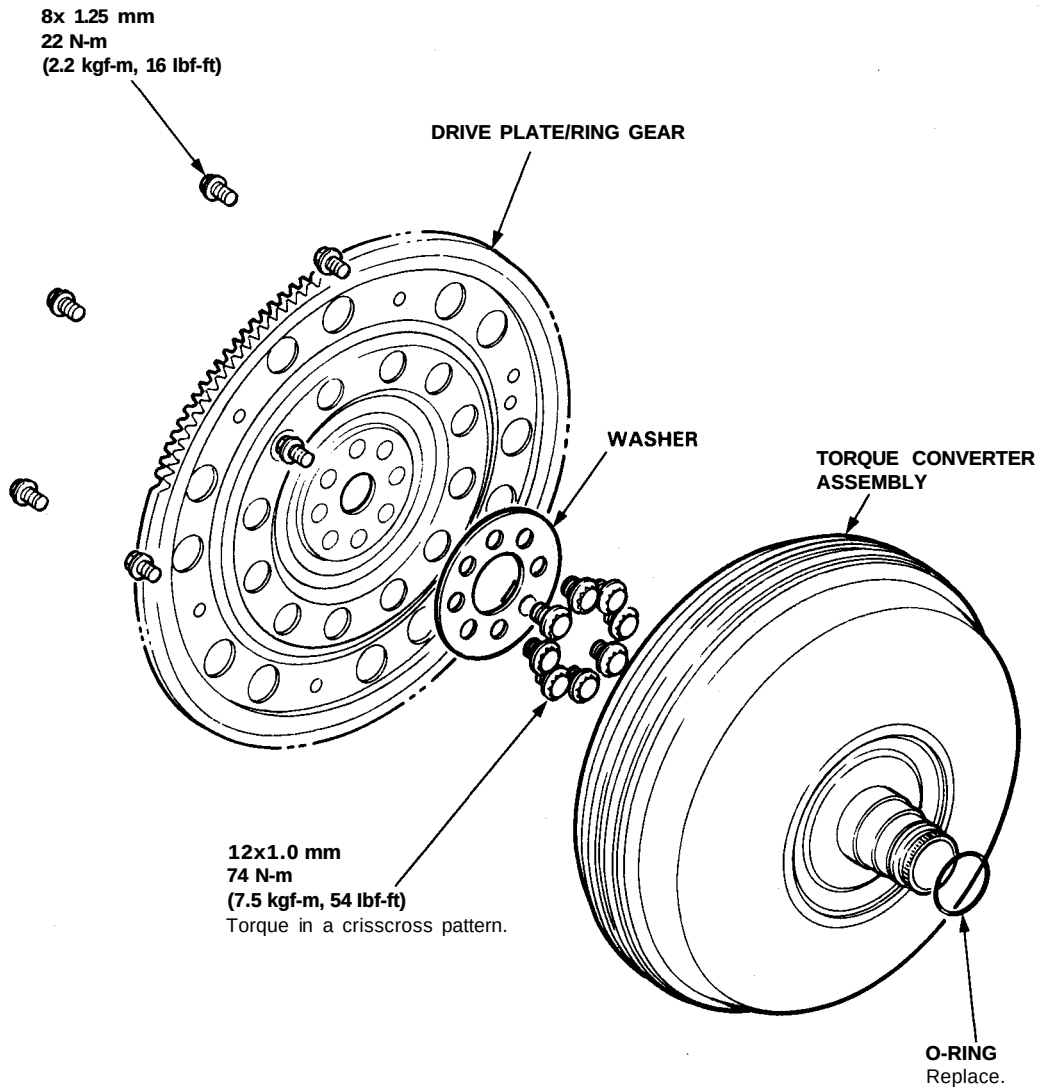
78 N-m (8.0 kgf-m, 58 lbf-ft): '96 models with transmission No. M5HA - 1000001 to M5HA - 1021048
98 N-m (10.0 kgf-m, 72.3 lbf-ft): '96 models with transmission No. M5HA - 1021049 and above, and '97 - '98 models (transmission No. M5HA - 2000001 -)



43. Assemble the lower valve body assembly ('96 model: see page 14-122; '97 model: see page 14-123).
44. Pass the shift control solenoid valve/linear solenoid harness through the transmission housing, and put the manual valve and the detent lever together. Then install the lower valve body assembly (six bolts) with two dowel pins in the transmission housing.
45. Install the ATF strainer (three bolts).
46. Position the connector stop on the shift control solenoid valve/linear solenoid harness connector groove, then tighten the bolt.
47. Install the ATF pan with two dowel pins and a new gasket (fourteen bolts).
48. Install the ATF cooler lines with new sealing washers, then tighten the joint bolts.
49. Connect the transmission sub-harness connector to speed sensor connectors and solenoid connectors.



Torque Converter/Drive Plate/Ring Gear

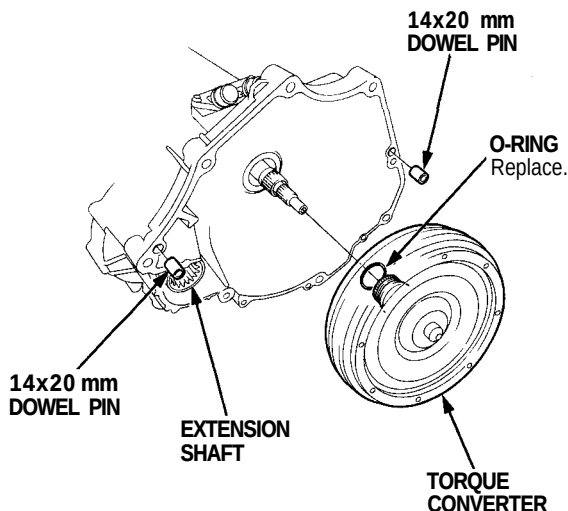




Transmission

Installation

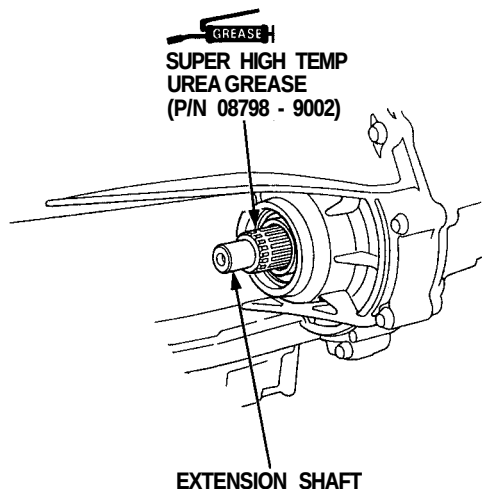
1. Flush the ATF cooler (see flushing procedure in the '95 - '98 Acura 2.5TL Service Manual, 61SW504).
2. Install the torque converter securely with a new O-ring on the mainshaft, and install two 14 x 20 mm dowel pins in the torque converter housing.



3. Clean the extension shaft opening on the differential side.

NOTE: Keep all of the particles out of the extension shaft opening.

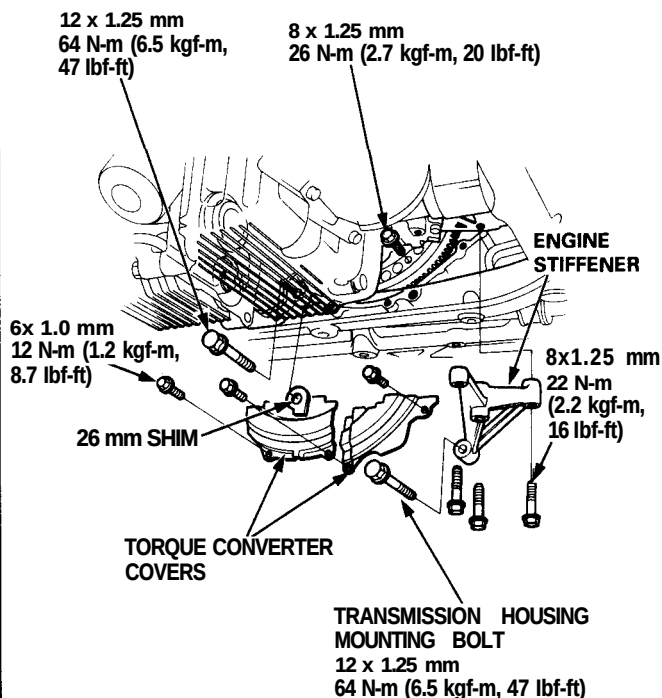
4. Set the extension shaft, and apply Super High Temp Urea Grease (P/N 08798 - 9002) to the shaft splines.



5. Place the transmission on a jack, and raise it to engine level.

6. Attach the transmission to the engine, then install the transmission housing mounting bolt with the 26 mm shim.

NOTE: Do not install the transmission housing bolt on the engine stiffener side.



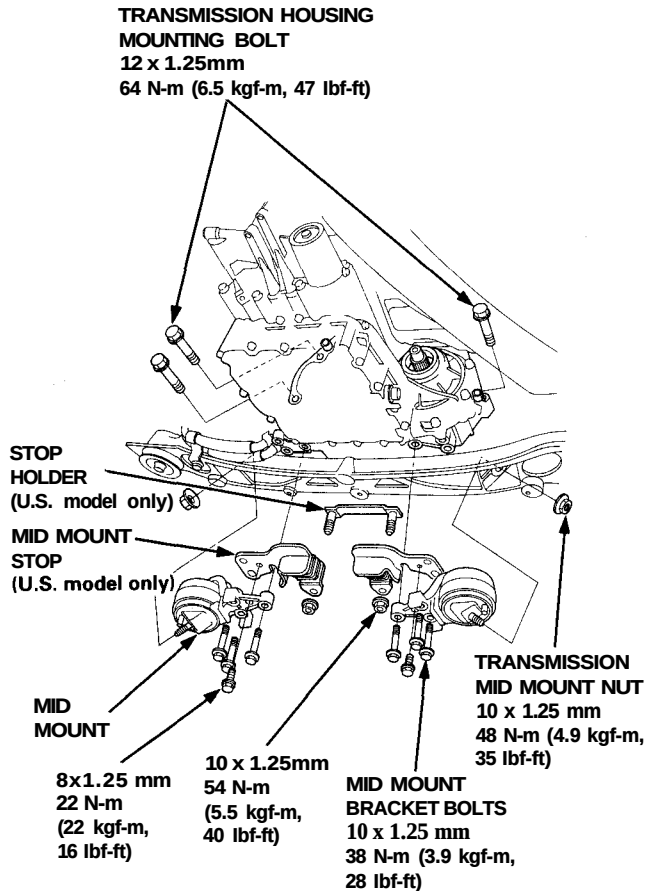
7. Attach the torque converter to the drive plate with six bolts and torque:
Rotate the crankshaft as necessary to tighten the bolts to 1/2 of the specified torque, then to the final torque, in a crisscross pattern. After tightening the last bolt, check that the crankshaft rotates freely.
8. Install the torque converter covers.
9. Install the engine stiffener. Tighten the engine stiffener 8 mm bolts loosely, and tighten the transmission housing mounting bolt to the specified torque, then tighten the 8 mm bolts to the specified torque.

(cont'd)

Transmission

Installation (cont'd)

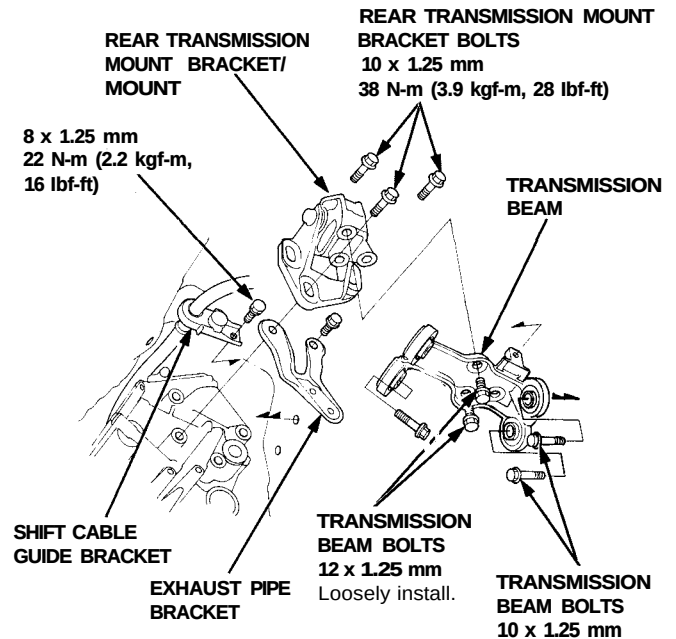
10. Install the transmission housing mounting bolts from the transmission side.



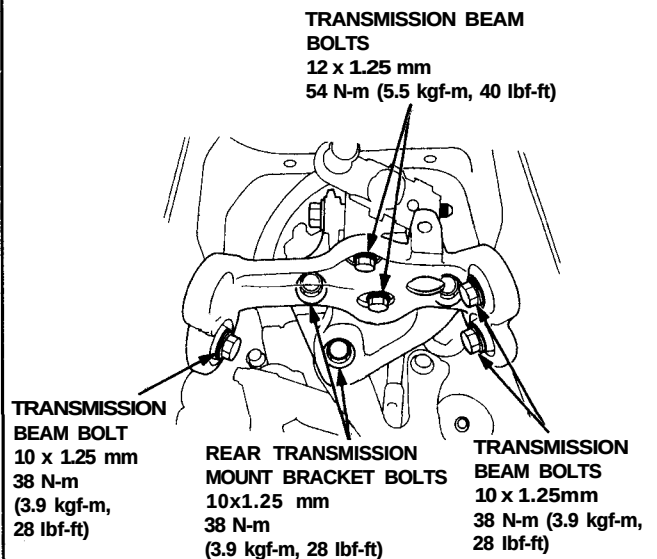
11. Install the mid mounts, mid mount stops and stop holder, then tighten the mid mount bracket bolts, the mid mount stop bolts, the stop holder nuts and the mid mount nuts.

12. Remove the transmission jack from the transmission.

13. Install the transmission beam to the rear transmission mount bracket/mount. Tighten the two bolts loosely, then install them with the exhaust pipe bracket on the rear cover and body.



14. Tighten the transmission beam bolts (three bolts).



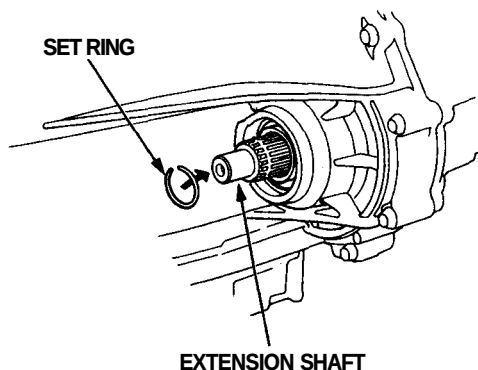
15. Tighten the rear transmission mount bracket bolts (three bolts).

16. Tighten the transmission beam bolts (two bolts) installed loosely in step 13.

17. Install the shift cable guide bracket on the transmission beam.



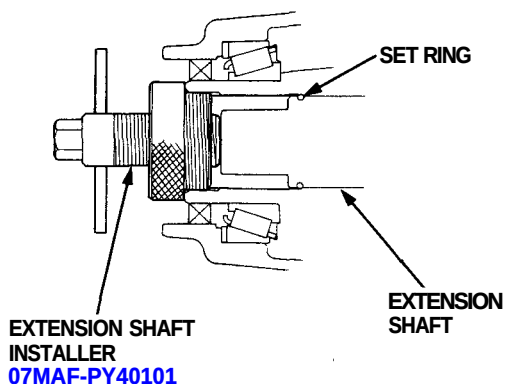
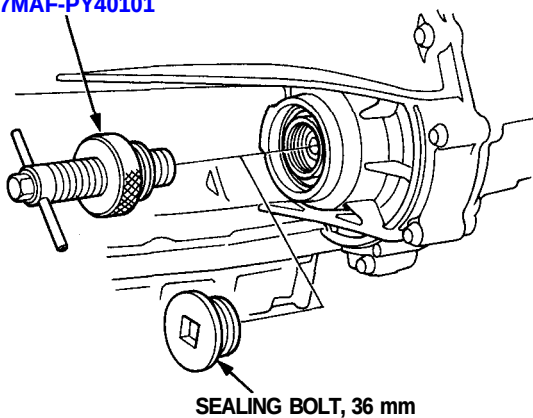
18. Install a new set ring in the extension shaft groove.



19. install the extension shaft using the special tool as shown.

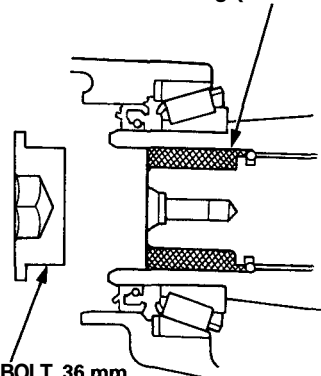
NOTE: Push the extension shaft in the secondary driven gear shaft until the extension shaft stops.

**EXTENSION SHAFT
INSTALLER
07MAF-PY40101**



20. Fill the opening between the secondary drive gear shaft and the extension shaft with High Temp Urea Grease {P/N 08798 - 90002}, as shown.

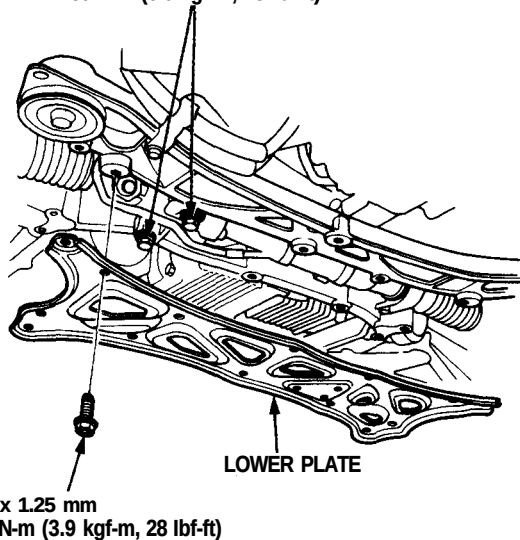
**SUPER HIGH TEMP UREA GREASE
(P/N 08798-9002)
12- 14 g (0.4 -0.5 oz)**



SEALING BOLT, 36 mm
Apply liquid gasket.
**78 N-m
(8.0 kgf-m, 58 lbf-ft)**

21. Apply liquid gasket (P/N 08718-0001) to the 36 mm sealing bolt threads.
22. Shift the transmission to the **P** position by rotating the control shaft.
23. Install the 36 mm sealing bolt.
24. Remove the steering gearbox mounting bolts, then install the lower plate.

Remove these bolts
before installing the lower plate.
**10 x 1.25 mm
59 N-m (6.0 kgf-m, 43 lbf-ft)**



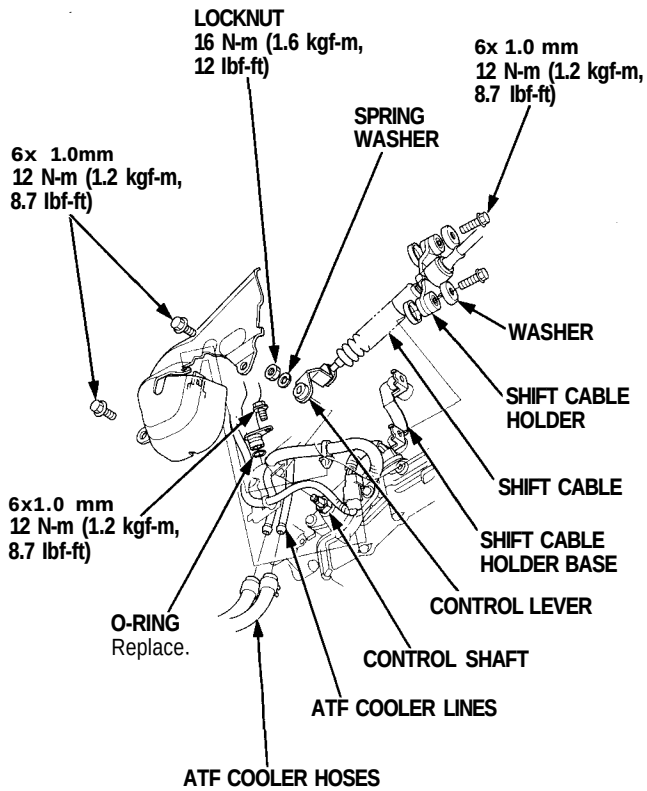
(cont'd)

Transmission

Installation (cont'd)

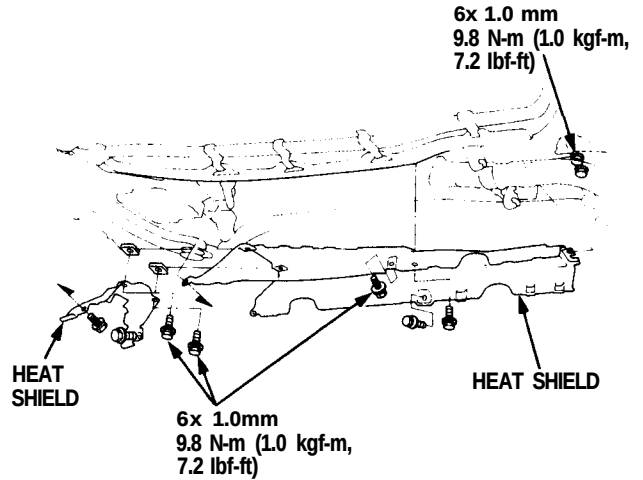
25. Install the control lever on the control shaft.

CAUTION: Take care not to bend the shift cable.

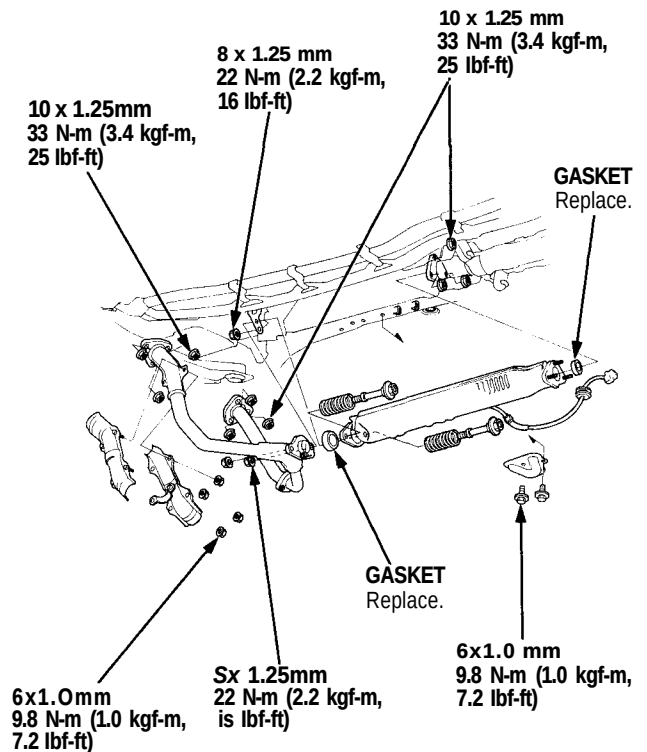


26. Install the shift cable holder on the shift cable holder base.
27. Install the shift cable cover, and install the shift control solenoid valve/linear solenoid harness connector and the A/T gear position switch harness clamp on the shift cable cover, then tighten the bolts.
28. Connect the ATF cooler hoses to the ATF cooler lines (see page 14-216).
29. Install the ATF dipstick pipe with a new O-ring on the torque converter housing.
30. Clamp the transmission sub-harness on the clamp brackets.

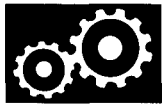
31. Install the heat shields.



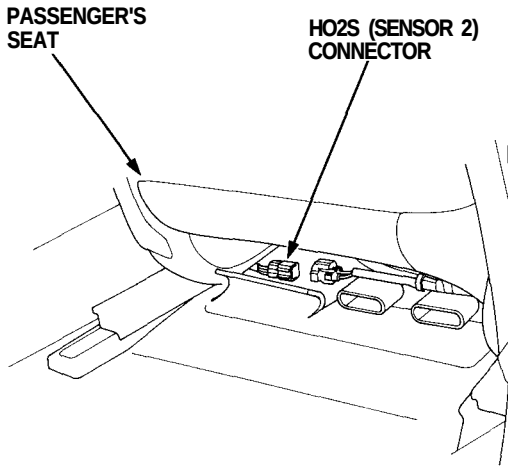
32. Install the exhaust pipe A and the three way catalytic converter, then install the exhaust pipe A cover.



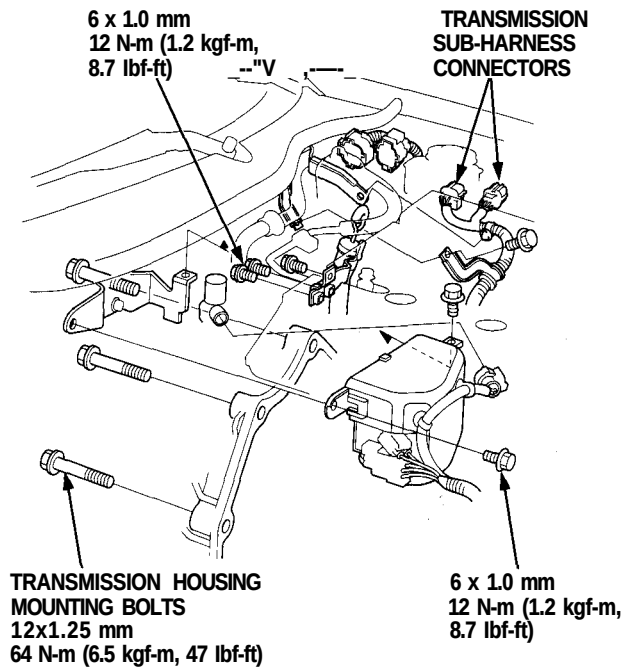
33. Push the H02S (sensor 2) connector into the vehicle, then secure it with the harness grommet.
34. Install the H02S (sensor 2) harness cover.



35. Connect the HO2S (sensor 2) connector.



36. Install the transmission housing mounting bolts.



37. Install the ATF dipstick pipe bracket bolts.

38. Connect the transmission sub-harness connectors.

39. Install the control box.

40. Refill the transmission with ATF (see page [14-112](#)).

41. Connect the battery positive (+) and negative (-) cables to the battery terminals.

42. Set the parking brake. Start the engine, and shift the transmission through all gears three times. Check the shift lever operation and the A/T gear position indicator operation.

43. Let the engine reach normal operating temperature (the radiator fan comes on) with the transmission in the **N** or **P** position, then turn it off and check ATF level.

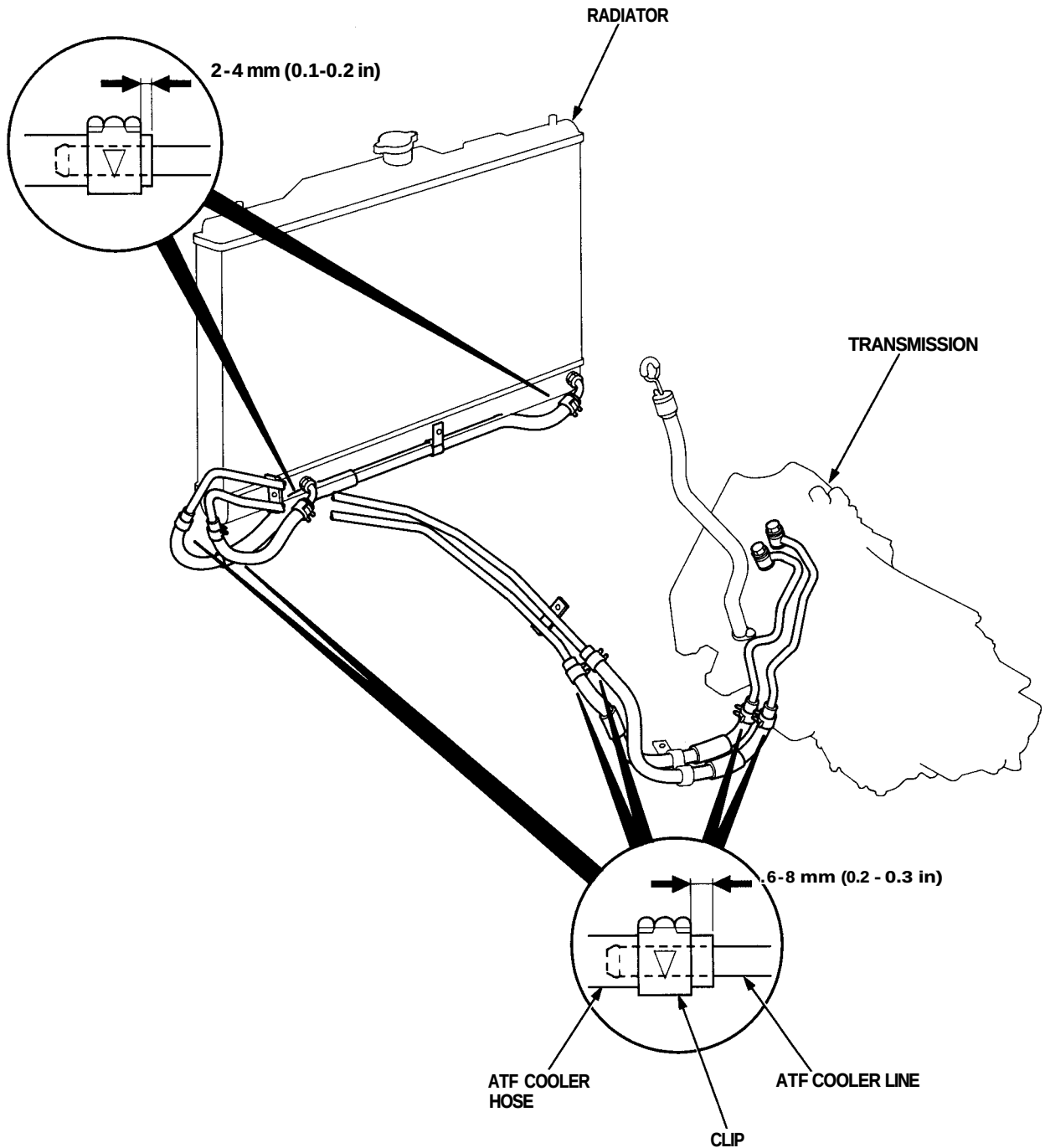
44. Road test as described on pages [14-108](#) thru [14-110](#).

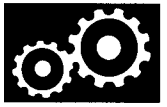
45. Enter the anti-theft radio code for the radio, then enter the customer's radio station presets.

ATF Cooler Hoses

Connection

1. Connect the ATF cooler hoses to the ATF cooler lines, and secure them with the clips as shown.





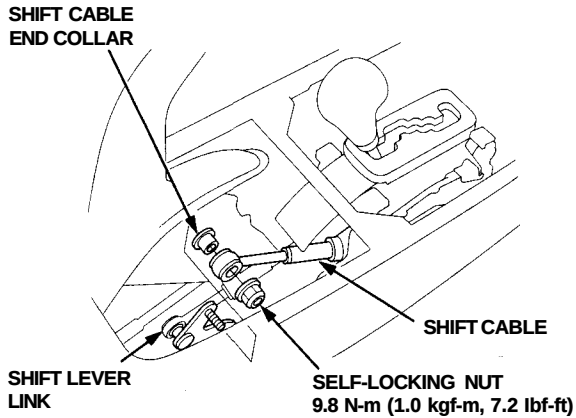
Shift Cable

Replacement

⚠ WARNING

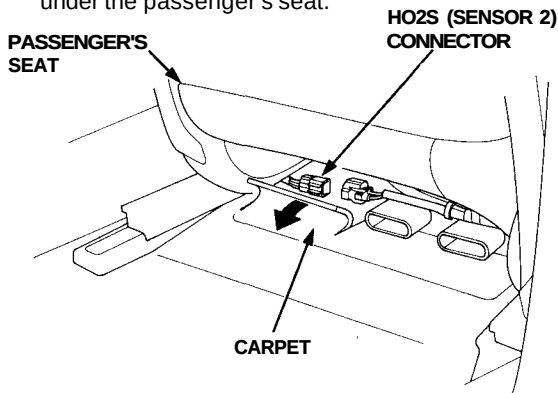
- Make sure lifts, jacks and safety stands are placed properly, and hoist brackets are attached to the correct position on the engine (see [section 1](#)).
- Apply parking brake, and block rear wheels so the vehicle will not roll off stands and fall on you while working under it.

1. Raise the front of the vehicle, and support it with safety stands (see [section 1](#)).
2. Set parking brake, and block both rear wheels securely.
3. Shift the transmission into the **N** position.
4. Remove the center console (see [section 20](#)).
5. Shift the transmission into the **1** position.
6. Remove the self-locking nut and shift cable end collar, then remove the shift cable from the shift lever link.

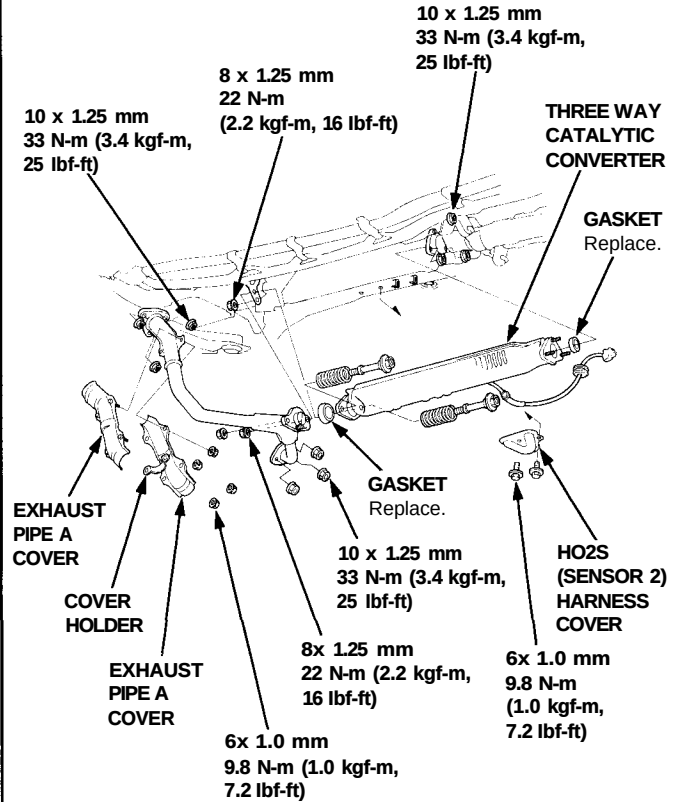


7. Pull the carpet back to expose the HO2S (sensor 2) connector. Disconnect the connector, then push it to outside.

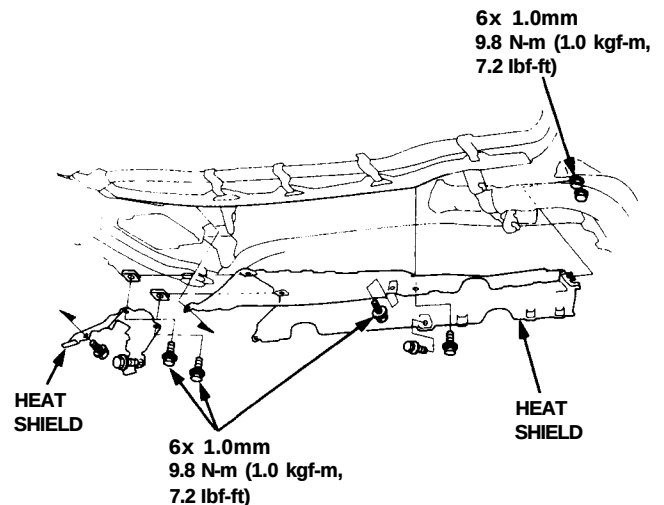
NOTE: The HO2S (sensor 2) connector is located under the passenger's seat.



8. Remove the HO2S (sensor 2) harness cover, then remove the three way catalytic converter.



9. Remove the exhaust pipe A cover, then remove the exhaust pipe A.
10. Remove the heat shields.

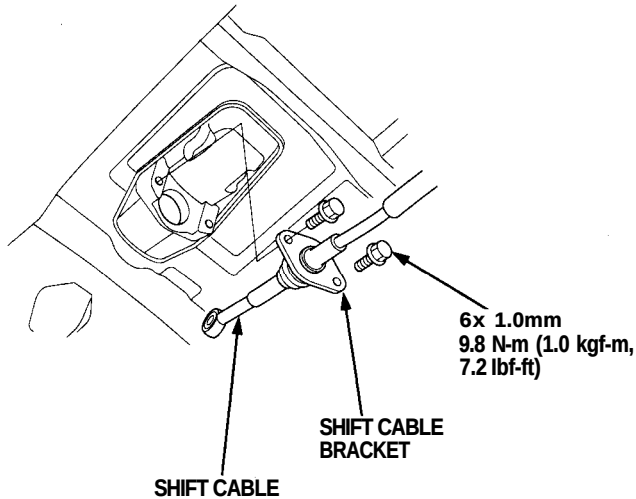


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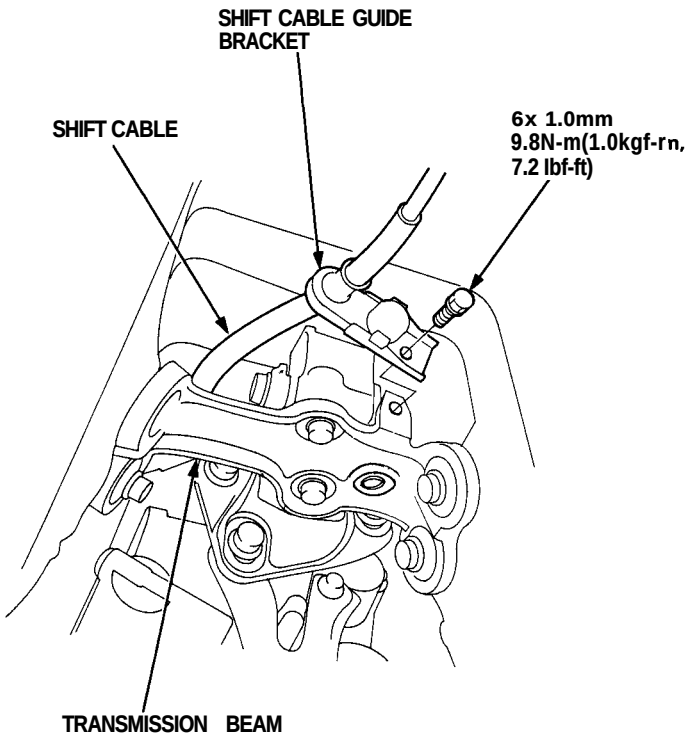
Shift Cable

Replacement (cont'd)

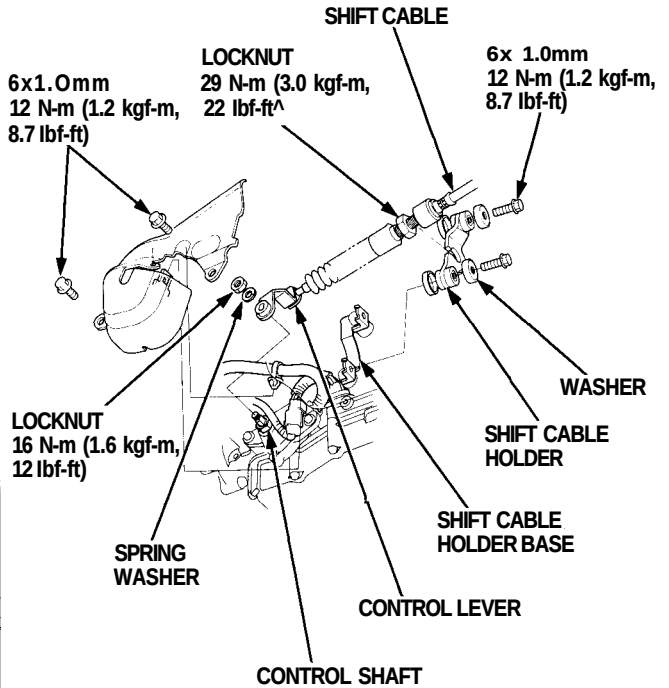
11. Remove the shift cable bracket.



12. Remove the shift cable guide bracket.



13. Remove the shift cable cover mounting bolts.



14. Remove the A/T gear position switch harness clamp and the shift control solenoid valve/linear solenoid harness connector from the shift cable cover.
15. Remove the shift cable cover from the transmission housing.
16. Remove the shift cable holder with the shift cable from the shift cable holder base.
17. Remove the control lever from the control shaft, then remove the shift cable.
18. Remove the shift cable holder from the shift cable, then replace it with a new one.
19. Install the shift cable in the reverse order of removal.

CAUTION: Take care not to bend the shift cable when installing it.

20. Check the shift lever operation after installation.
21. If shift lever adjustment is required, remove the center console (see [section 20](#)), and adjust the link adjuster (see link adjustment procedures in the '95 - '98 Acura 2.5TL Service Manual, 61SW504).

Special Tools

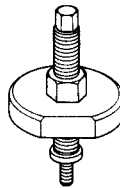
Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAD-SD40101	Bearing Driver Attachment	1	15-15, 15-16
②	07HAA-SF10100	Locknut Wrench, 36 x 41 mm	1	15-8,15-9,15-17,15-19,15-20
③	07LAC-PW50100 or 07LAC-PW50101	Extension Shaft Puller	1	15-5
④	07LAD-PW50500	Pinion Cover Driver Attachment	1	15-19
⑤	07MAD-PR90100	Attachment, 45 x 55 mm I.D.	1	15-13
⑥	07MAD-PR90200	Pilot, 32 x 50 mm	1	15-21
⑦	07MAF-PY40100 or 07MAF-PY40101	Extension Shaft Installer	1	15-25
⑧	07MAF-SP0011A	Tapered Bearing Race Installer A	1	15-15
⑨	07MAF-SP0012A	Tapered Bearing Race Installer B	1	15-15
⑩	07MAF-SP0013A	Installer Shaft	1	15-15
⑪	07746-0010100	Attachment, 32 x 35 mm	1	15-12,15-13
⑫	07746-0030100	Driver, 40 mm I.D.	1	15-14,15-16,15-18
⑬	07746-0030400	Attachment, 35 mm	1	15-14
⑭	07749-0010000	Driver	1	15-15,15-16,15-19,15-21
⑮	07965-SA00600	Driver Attachment	1	15-21



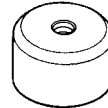
①



②



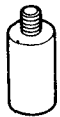
③



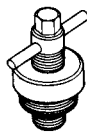
④



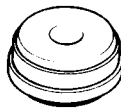
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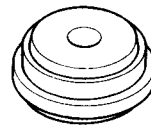
⑥



⑦



⑧



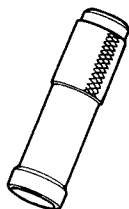
⑨



⑩



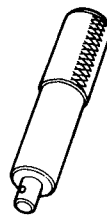
⑪



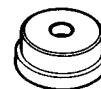
⑫



⑬



⑭



⑮



Differential

Troubleshooting

NOTE: Most problems in the unit are to be diagnosed by identifying noises from the gears or bearings. Care should be taken during diagnosis not to confuse differential noises with those from other drivetrain components.

[Noise symptoms will be most prominent]

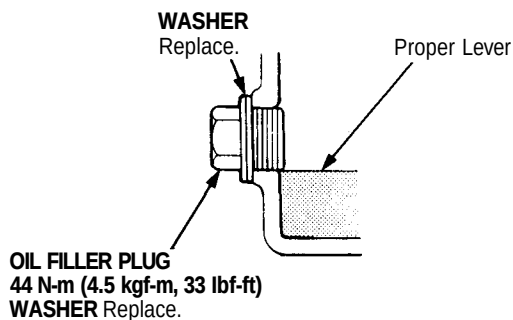
Symptom	Probable Cause	Remedy
Consistent noise during cruising	• Lack of oil • Foreign matter stuck in gears, etc. • Improper tooth contact between ring gear and drive pinion • Worn or damaged side bearing • Deformed ring gear or differential carrier	• Replenish oil • Clean and inspect • Adjust or replace • Replace any damaged or faulty parts
Gear noises while accelerating	• Lack of oil • Foreign matter stuck in gears, etc. • Improper drive pinion preload • Chipped or damaged gears	• Replenish oil • Clean and inspect • Adjust • Replace
Gear noises while coasting or accelerating	• Improper drive pinion preload • Damaged or chipped gears	Adjust or replace
Bearing noises while accelerating or coasting/deceleration	Cracked or damaged drive pinion bearing or side bearing	Replace
Abnormal noises when rounding a curve	• Worn (excessive play) or damaged side bearing • Damaged side gear, pinion, or pinion shaft	Replace
Abnormal noises during acceleration or when first driving away from a stop	• Excessive backlash between ring gear and drive pinion • Improper ring gear or drive pinion preload • Excessive pinion backlash • Worn differential splines • Loose companion flange nuts and other fasteners	• Adjust • Adjust or replace • Recheck torque or replace
Oil leak	• Oil level too high • Clogged breather hole • Loose case cover or inadequate sealing • Worn or damaged oil seal	• Lower to proper level • Clean or replace • Recheck torque or apply sealant • Replace
Overheating	• Lack of oil • Insufficient ring gear-to-pinion backlash • Excessive ring gear or drive pinion preload	• Replenish • Adjust • Adjust or replace

Maintenance

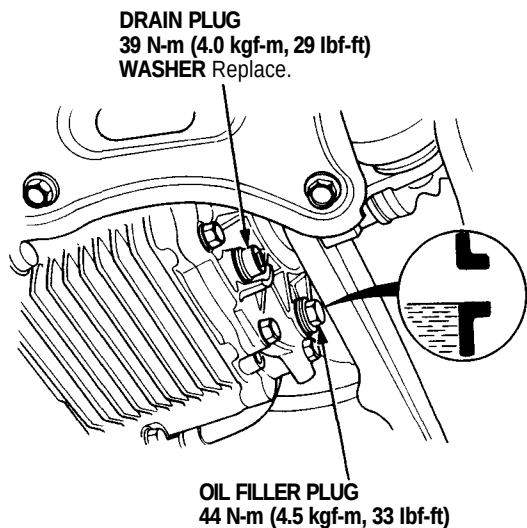
Differential Oil

NOTE: Check the differential oil with engine OFF, and the vehicle on level ground.

1. Remove the oil filler plug, then check the level and condition of the oil.



2. The oil level must be up to the fill hole. If it is below the hole, add oil until it runs out, then reinstall the oil filler plug with a new washer.
3. If the differential oil is dirty, remove the drain plug, and drain the oil.



4. Reinstall the drain plug with a new washer, and refill the differential oil to the proper level.

NOTE:

- The drain plug washer should be replaced at every oil change.
- Clean the drain plug before reinstalling.

5. Reinstall the oil filler plug with a new washer.

Oil Capacity

1.05 ℓ (1.11 US qt, 0.92 Imp qt) at oil change

1.10 ℓ (1.16 US qt, 0.97 Imp qt) at overhaul

Recommended oil:

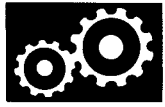
Hypoid gear oil

API Classification GL4 or GL5

viscosity:

SAE 90 above 0°F (-18°C)

SAE 80 W - 90 below 0°F (-18°C)



Differential Assembly

Removal

⚠ WARNING

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

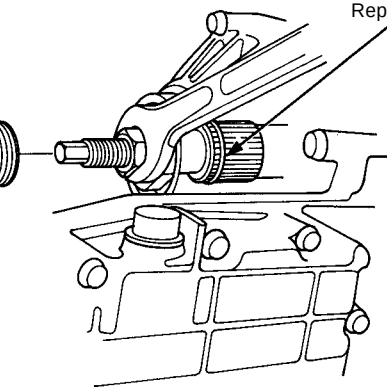
CAUTION: Use fender covers to avoid damaging painted surfaces.

1. Remove the drain plug, and drain the differential oil (see page 15-4).
2. Remove the driveshafts and intermediate shaft (see section 16).
3. Remove the 36 mm sealing bolt, then disconnect the extension shaft from the differential using the special tool.

NOTE: Shift the transmission into the **P** position to lock the secondary gear.

36 mm SEALING BOLT

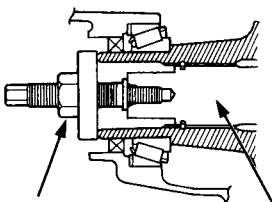
SET RING
Replace.



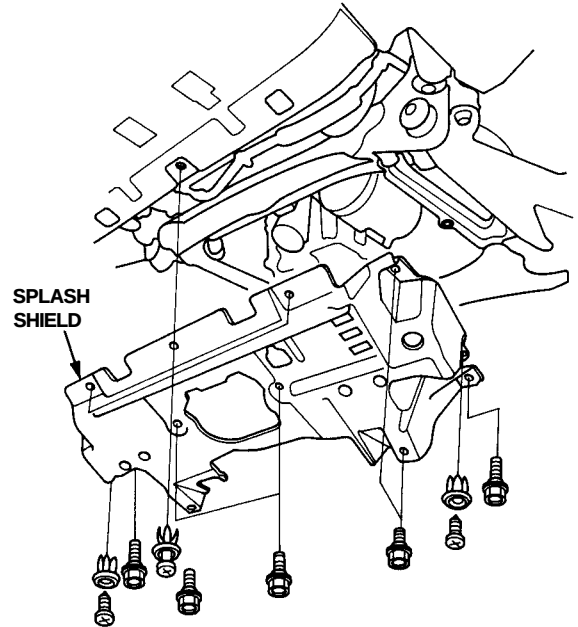
EXTENSION SHAFT PULLER

07LAC-PW50100 or
07LAC-PW50101

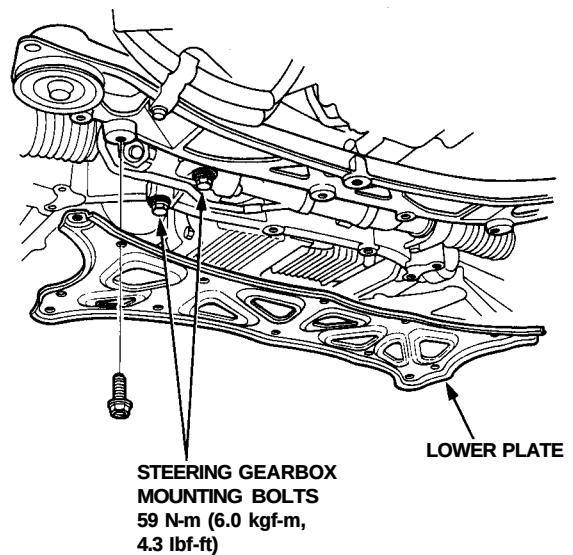
EXTENSION SHAFT



4. Remove the splash shield.



5. Remove the lower plate, then reinstall the steering gearbox mounting bolts.



STEERING GEARBOX
MOUNTING BOLTS
59 N·m (6.0 kgf-m,
4.3 lbf-ft)

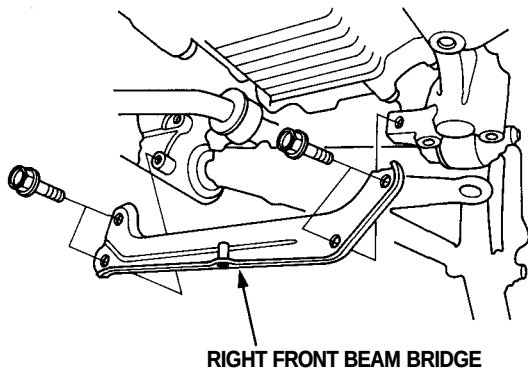
LOWER PLATE

(cont'd)

Differential Assembly

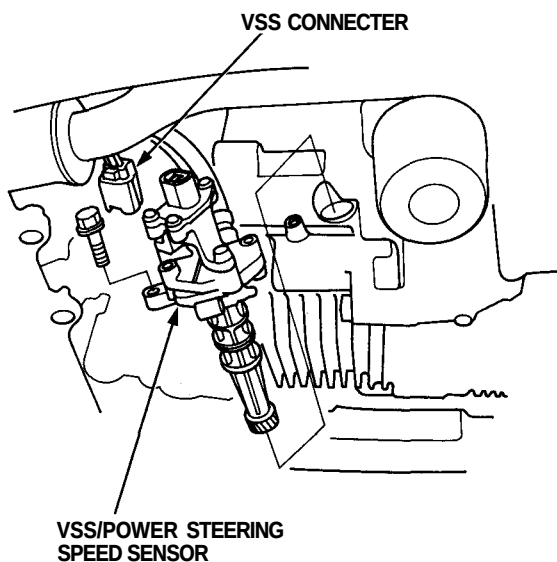
Removal (cont'd)

6. Remove the right front beam bridge.

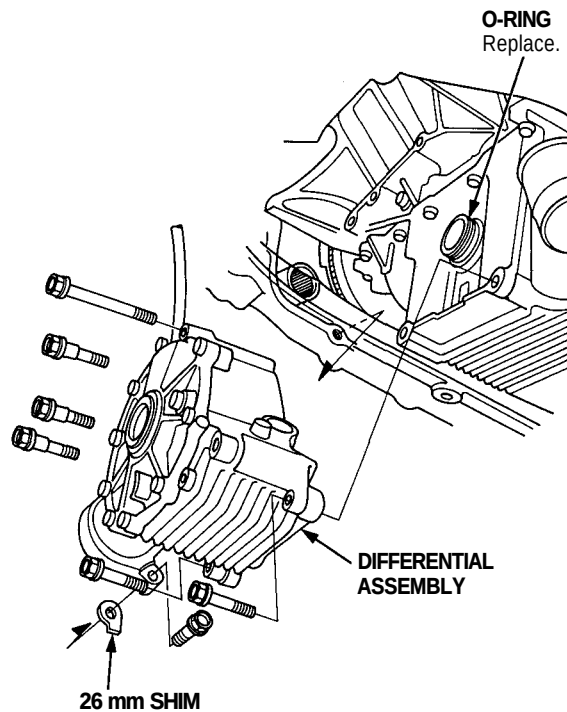


7. Disconnect the vehicle speed sensor (VSS) connector, then remove the VSS/power steering speed sensor.

NOTE: Do not disconnect the hoses.

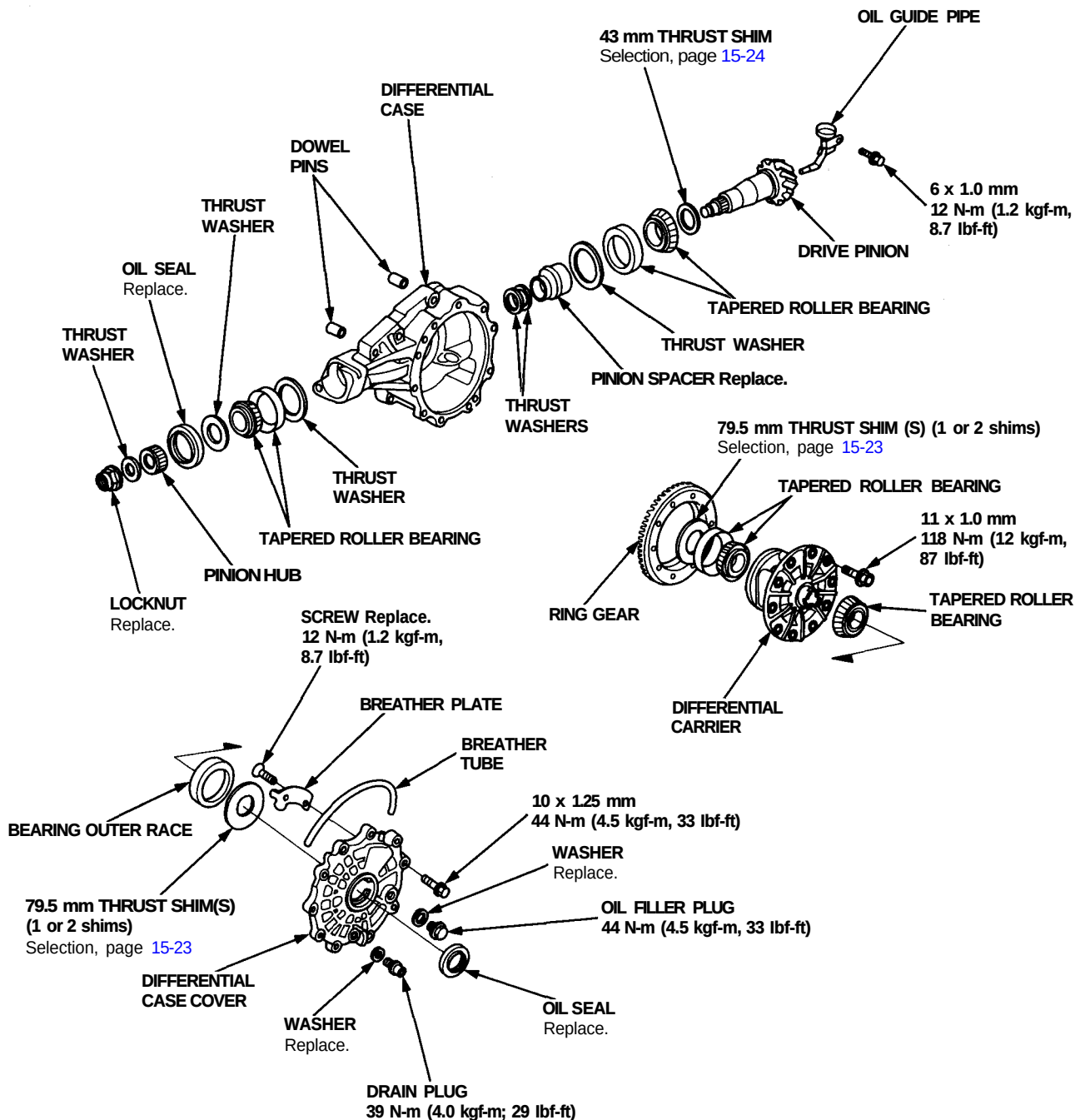


8. Remove the mounting bolts and 26 mm shim, then remove the differential assembly.





Illustrated Index



Differential Assembly

Inspection

To establish a starting point before disassembly, inspect the following:

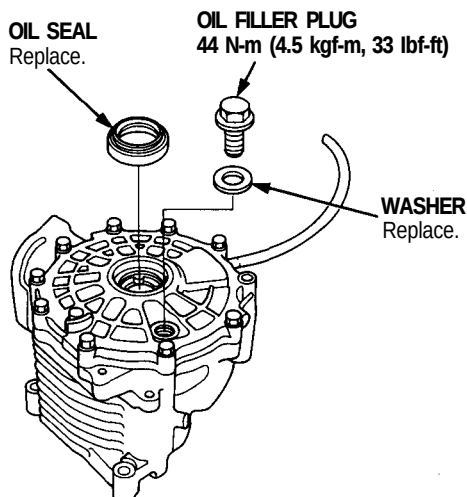
- Ring gear backlash
- Total bearing preload
- Gear tooth contact

NOTE:

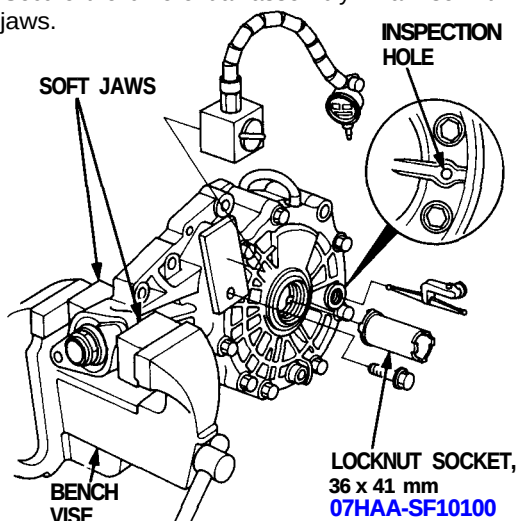
- Be sure the differential is at room temperature before inspecting.
- Record the results of the preliminary inspections. This information will be helpful during reassembly.

Ring gear backlash

1. Remove the oil filler plug and the oil seal.



2. Secure the differential assembly in a vise with soft jaws.

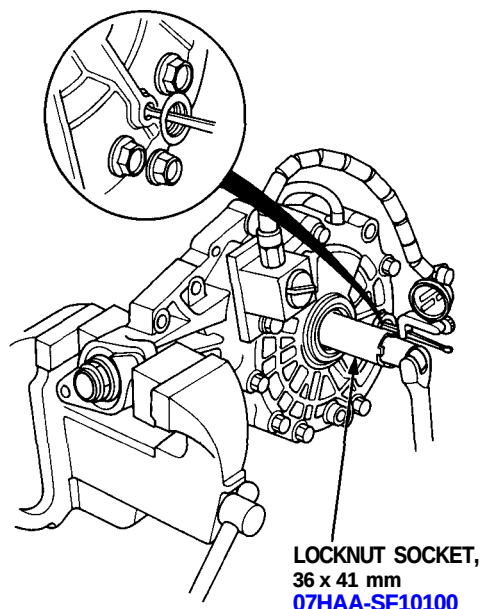


3. Align the differential gear inspection hole with the oil filler plug hole.

4. Measure the backlash of the ring gear on the differential carrier using the special tools as shown. After measuring, remove the dial gauge and turn the differential carrier one full turn, then remeasure the backlash.

Standard: 0.06 - 0.14 mm (0.002 - 0.006 in)

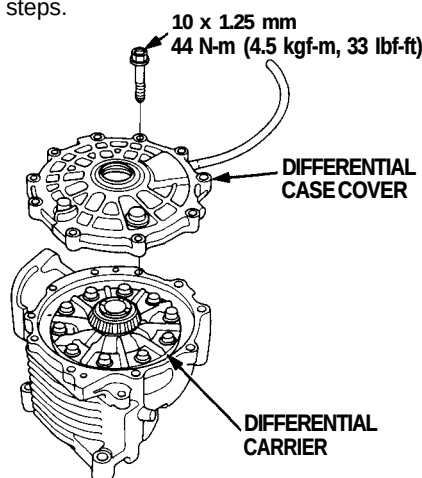
The difference between the two measurements taken must not exceed 0.06 mm (0.002 in).



Total bearing preload

5. Remove the differential case cover and the differential carrier.

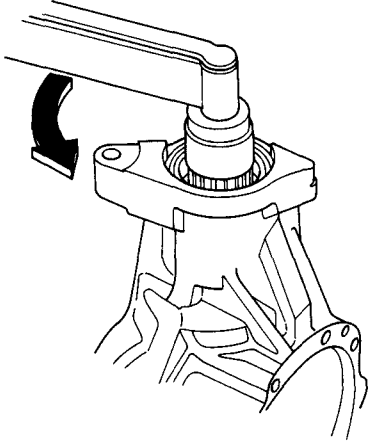
NOTE: Loosen the bolts in a crisscross pattern, in several steps.





6. Use a dial-type torque wrench on the drive pinion to measure the drive pinion bearing preload (Tp).

Standard: 1.42 - 1.91 N-m
(14.5 - 19.5 kgf-cm, 12.6 - 16.9 lbf-in)



7. Reinstall the differential carrier and the differential case cover, then measure the total bearing preload. The total bearing preload should exceed the drive pinion bearing preload (Tp) by:

Standard:
0.94 - 1.07 N-m (9.6 - 10.9 kgf-cm, 8.33 - 9.46 lbf-in)

Example:

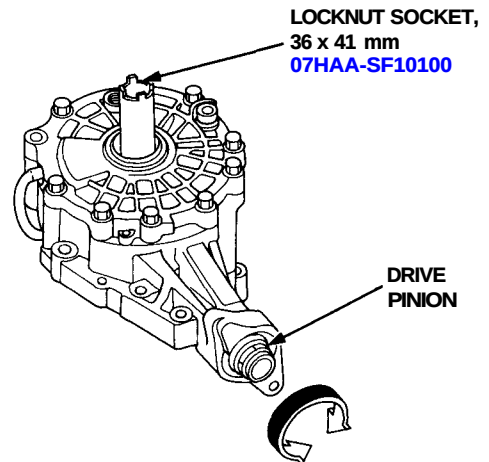
Total bearing preload (from step 7)

- Tp (from step 6)

= 0.94 - 1.07 N-m (9.6 - 10.9 kgf-cm, 8.33 - 9.46 lbf-m)

Geartooth contact

8. Remove the differential case cover and differential carrier. Clean and paint the ring gear teeth lightly and evenly with Prussian Blue (on both sides of each tooth).
9. Reinstall the differential carrier and the differential case cover, then torque the bolts in a crisscross pattern in several steps.
10. Install the special tool as shown, then rotate the drive pinion in both directions so that the ring gear rotate one full turn in both directions. During this operation resistance should be applied to the ring gear.



11. Remove the differential case cover and the differential carrier, then check the tooth contact pattern.

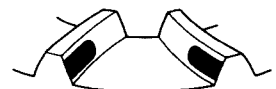
CORRECT TOOTH CONTACT



TOE CONTACT



HEELCONTACT



FLANKCONTACT



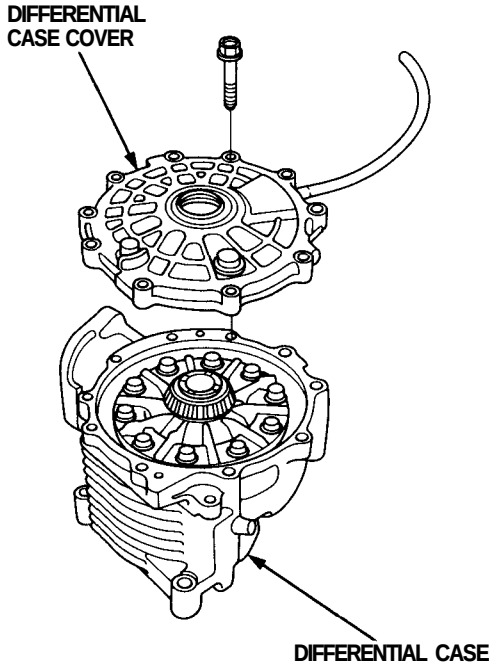
FACECONTACT



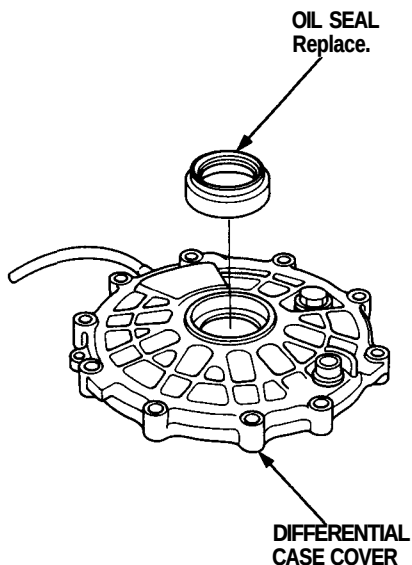
Differential Assembly

Disassembly

1. Remove the bolts in a crisscross pattern, in several steps, then remove the differential case cover.



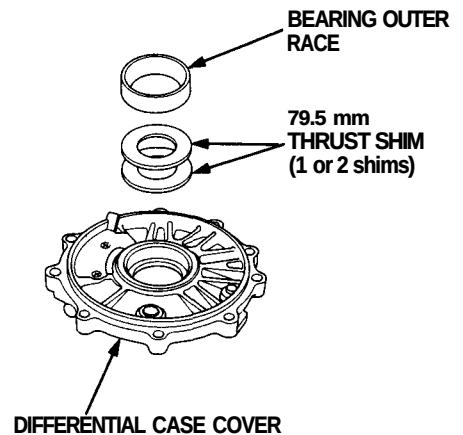
2. Remove the oil seal from the differential case cover.



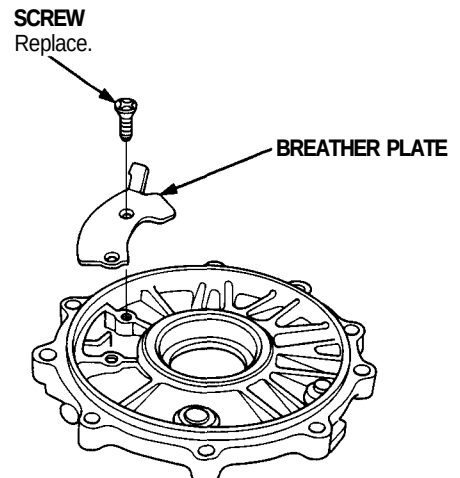
3. Remove the bearing outer race and the 79.5 mm thrust shim(s) from the differential case cover by heating the differential case cover to about 212°F (100°C).

NOTE:

- Do not heat the differential case cover in excess of 212°F (100°C).
- If the bearing outer race was removed by heating, allow the differential case cover to cool to room temperature.
- Replace the tapered roller bearing with a new one whenever the bearing outer race is replaced.

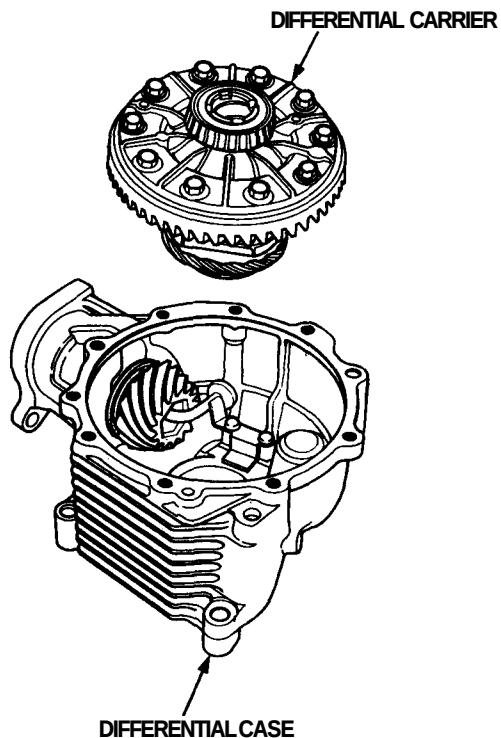


4. Remove the breather plate.

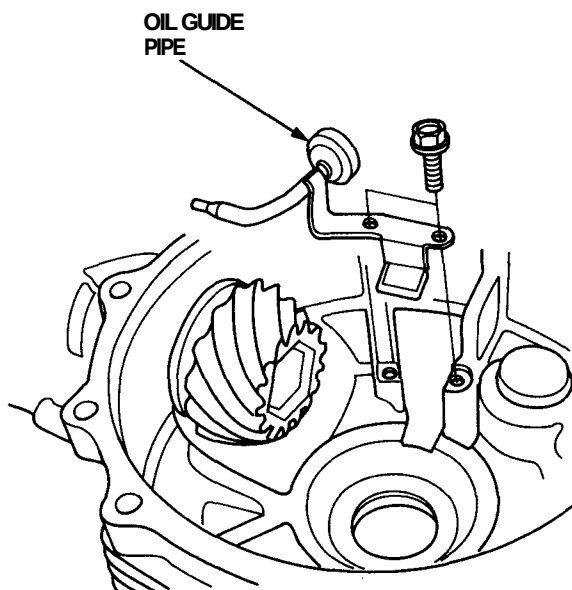




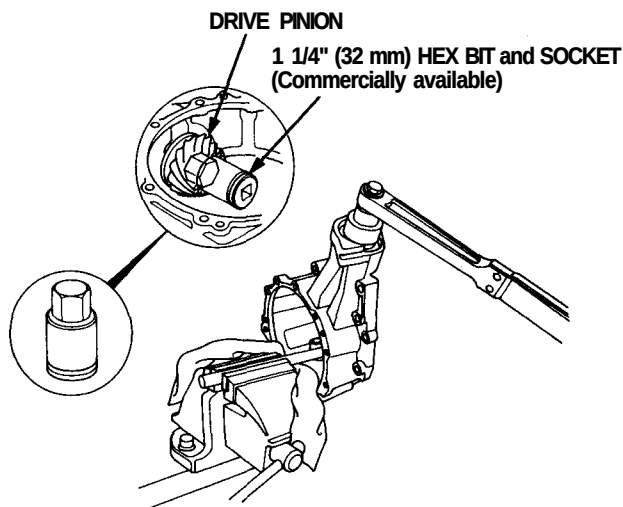
5. Remove the differential carrier from the differential case.



6. Remove the oil guide pipe.

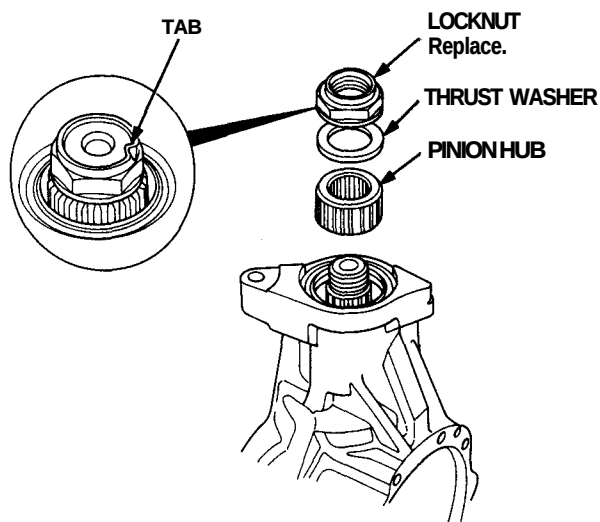


7. Hold the drive pinion with a 1 1/4" (32 mm) hex bit and socket as shown.



8. Raise the locknut tab from the groove of the drive pinion, and remove the locknut, thrust washer and pinion hub.

NOTE: Be sure the tab of the locknut is completely clear of the groove or damage to the threads can occur.

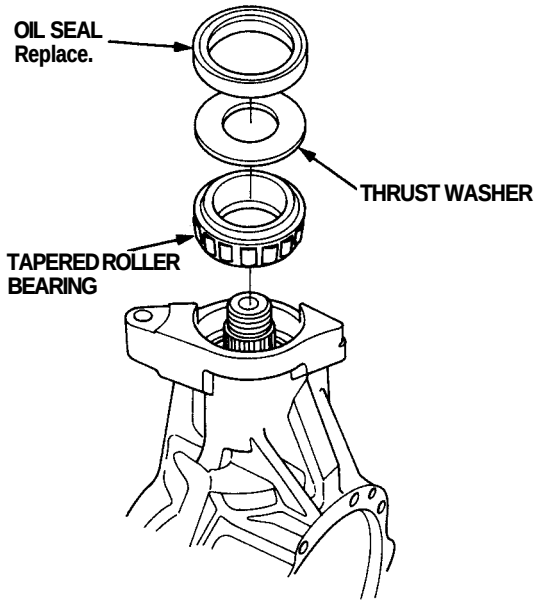


(cont'd)

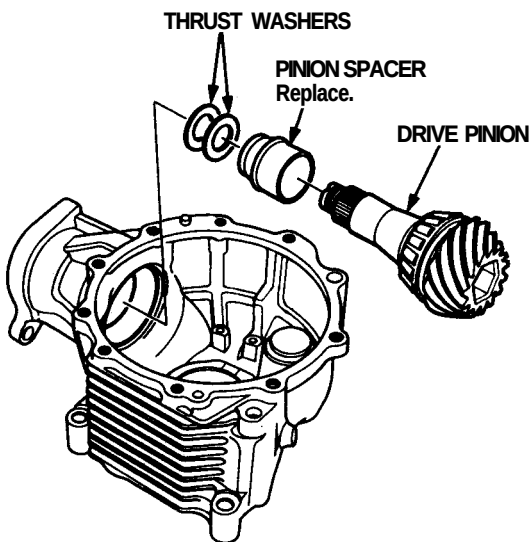
Differential Assembly

Disassembly(cont'd)

9. Remove the oil seal, then remove the thrust washer. Use a plastic hammer to carefully tap the drive pinion out of the tapered roller bearing, then remove the bearing.



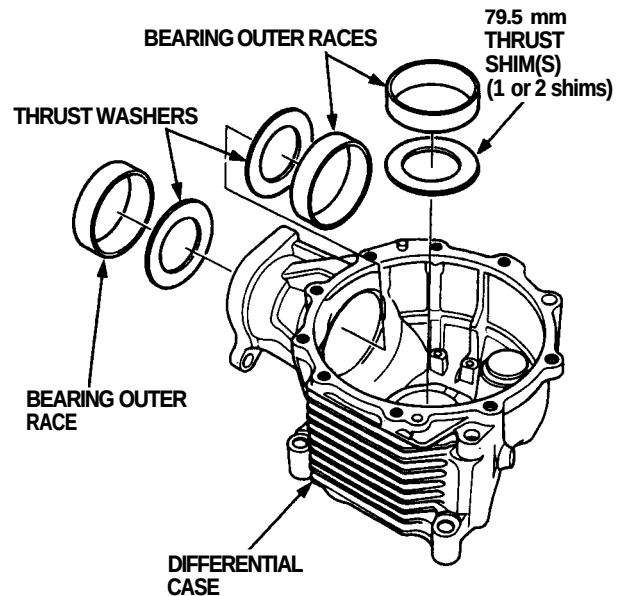
10. Remove the drive pinion, pinion spacer and thrust washers.



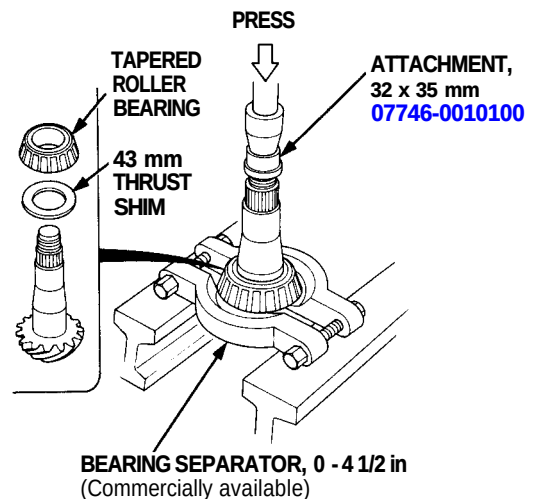
11. Remove the bearing outer races, thrust washers and 79.5 mm thrust shims from the differential case by heating the differential case to about 212°F (100°C).

NOTE:

- Do not heat the differential case in excess of 212°F (100°C).
- If the bearing outer race was removed by heating, allow the differential case to cool to room temperature.
- Replace the tapered roller bearing with a new one whenever the bearing outer race is replaced.



12. Remove the tapered roller bearing and 43 mm thrust shim using a press as shown.



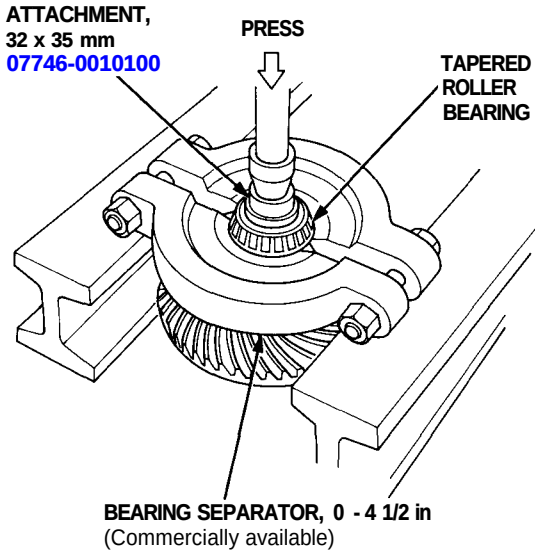


Differential Carrier

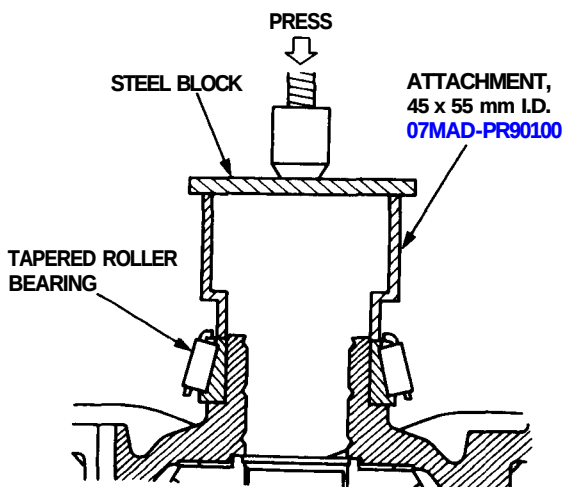
Tapered Roller Bearing Replacement

1. Remove the tapered roller bearings using the bearing separator and a press as shown.

NOTE: Support the differential carrier with your hand so it does not fall and hit the ground when pressed clear.



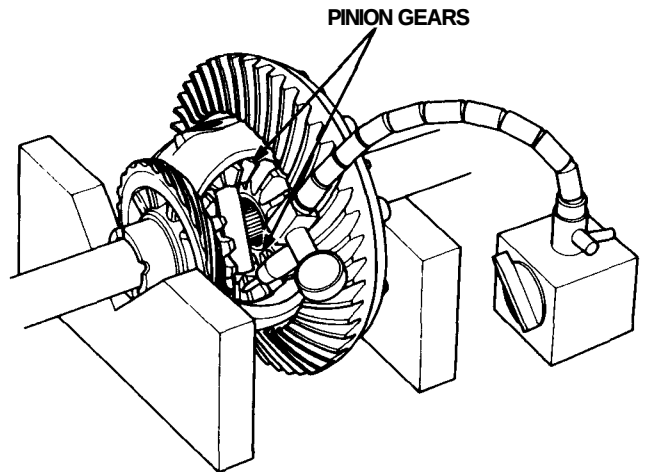
2. Install the both tapered roller bearings using the special tool and a press as shown.



Backlash Inspection

1. Remove the tapered roller bearings (see previous column).
2. Install the left driveshaft and the intermediate shaft in the side gears.
3. Measure the backlash of both pinion gears.

Standard: 0.05 - 0.15 mm (0.002 - 0.006 in)
Service Limit: 0.30 mm (0.012 in)

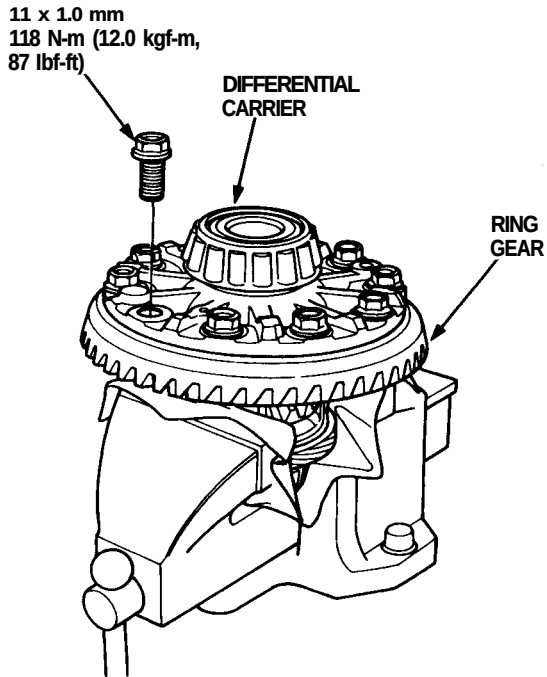


If the backlash exceeds the service limit, replace the differential carrier.

Differential Carrier

Ring Gear Replacement

1. Remove the bolts in a crisscross pattern, in several steps, and remove the ring gear.



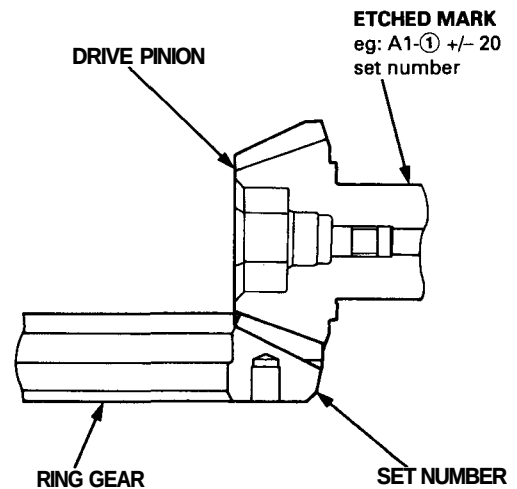
2. Install the ring gear by tightening the bolts in a crisscross pattern, in several steps. If the bolts are difficult to tighten, make sure that the ring gear is going onto the differential carrier correctly.

Differential Assembly

Reassembly

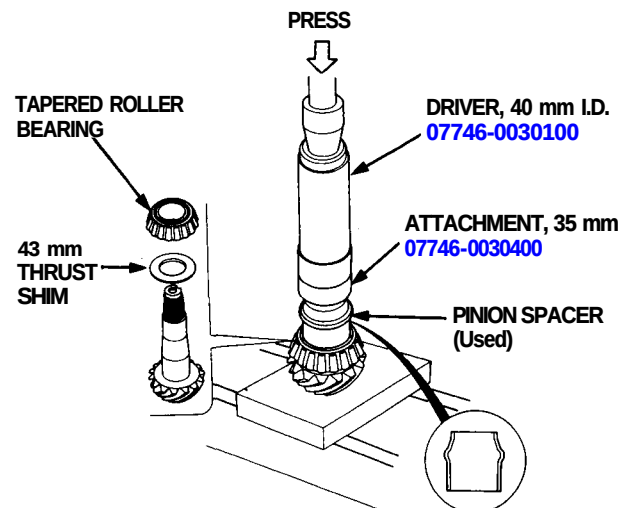
NOTE:

- If replacement is required, always replace the drive pinion and ring gear as a set.
- If the drive pinion and ring gear are replaced, check the height adjustment (see page 15-22).
- If replacement of one of the tapered roller bearings in the drive pinion and in the differential carrier is required, use the same make bearings and replace both bearings at once.



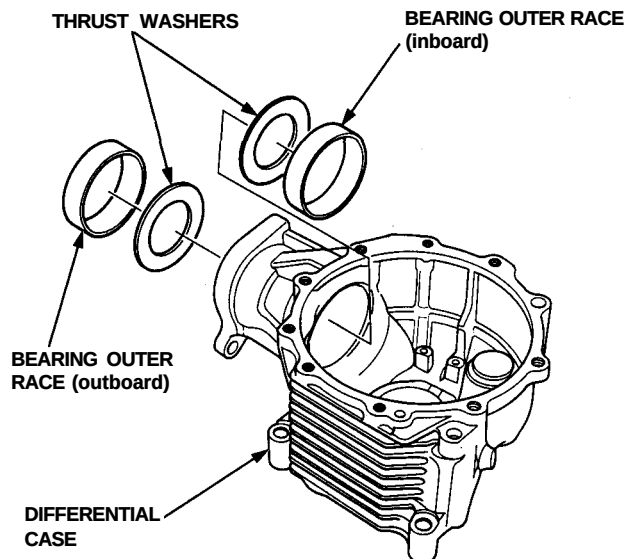
1. Install the 43 mm thrust shim and tapered roller bearing using the special tools and a press as shown.

NOTE: Use a used pinion spacer with the special tool for bearing installation, and then discard the used pinion spacer.

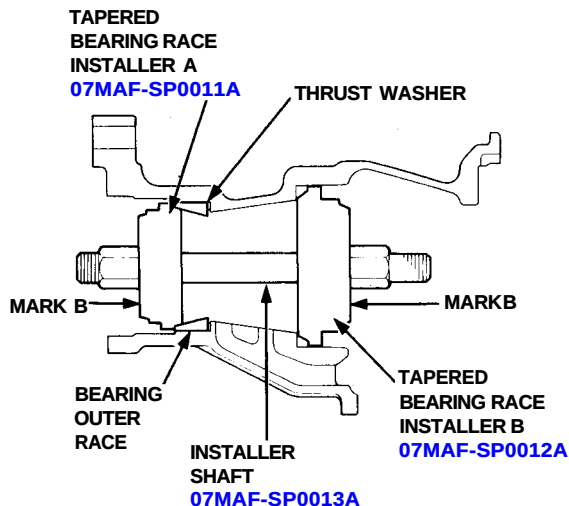




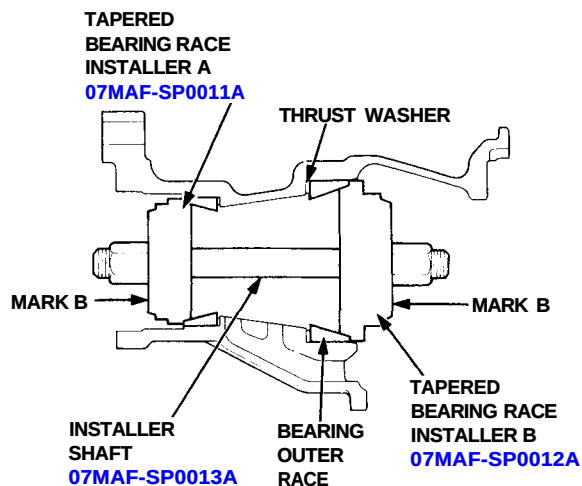
2. Check the differential case bearing surface areas for burrs, and remove as needed. Position the inboard thrust washer into the differential case. Using the sides of the special tools stamped "A", install the outboard bearing outer race as shown. Repeat for the inboard bearing outer race.



- a. First install the outboard bearing outer race.

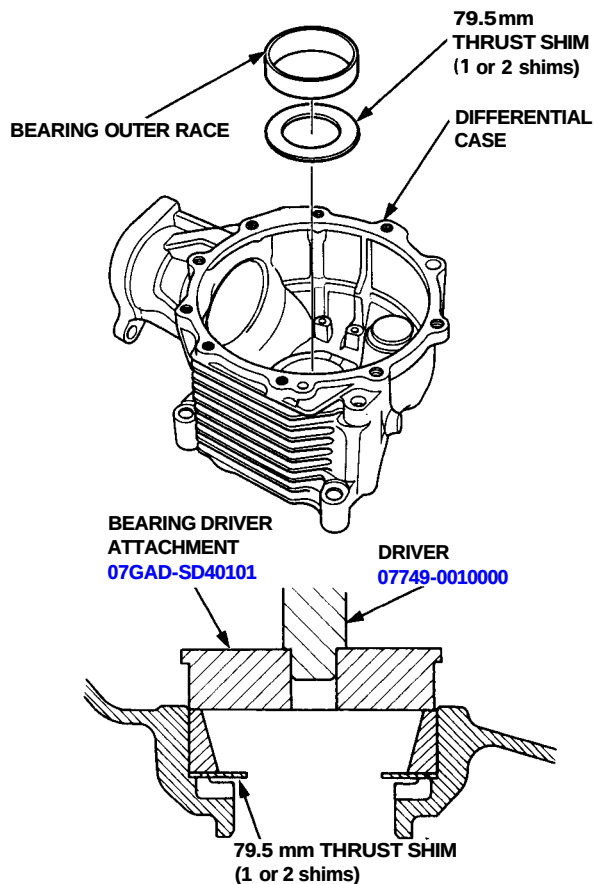


- b. Next install the inboard bearing outer race.



3. Install the 79.5 mm thrust shim(s) and bearing outer race using the special tools as shown.

NOTE: Install the 79.5 mm thrust shim(s) that was removed.



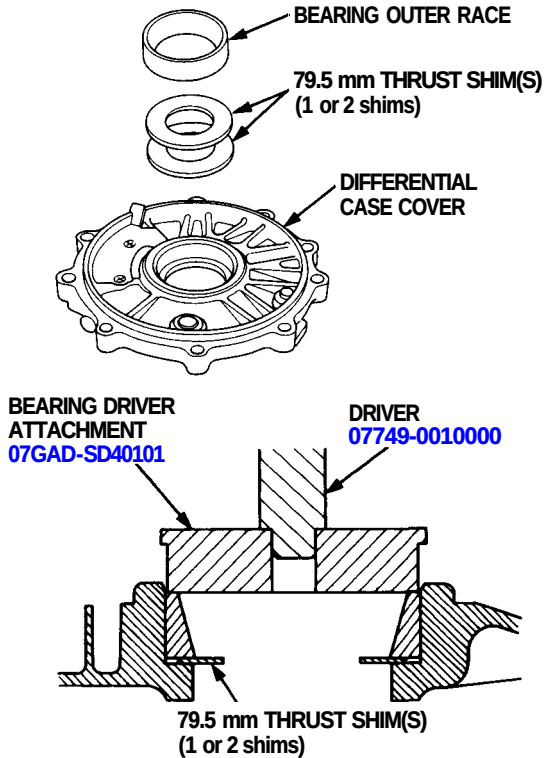
(cont'd)

Differential Assembly

Reassembly (cont'd)

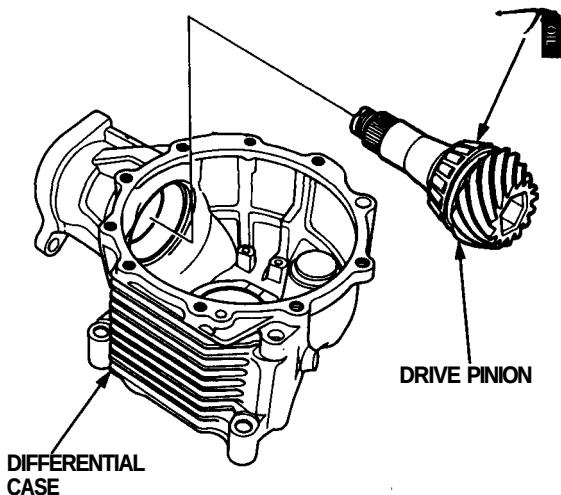
4. Install the 79.5 mm thrust shim(s) and bearing outer race using the special tools as shown.

NOTE: Install the 79.5 mm thrust shim(s) that was removed.

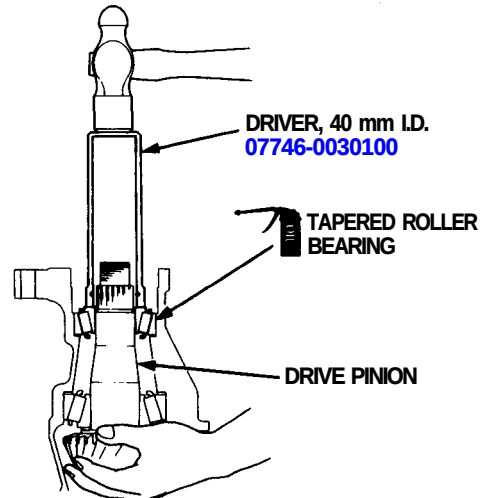


5. Apply lubricant to the tapered roller bearing, then install the drive pinion into the differential case as shown.

NOTE: Do not install the pinion spacer and thrust washers at this time.

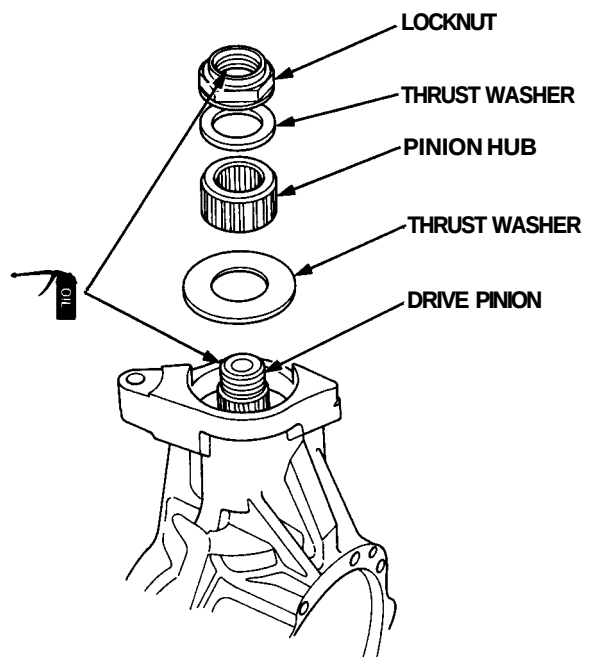


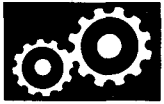
6. Apply lubricant to the tapered roller bearing, then install it using the special tool while holding the drive pinion as shown.



7. Install the large thrust washer, pinion hub, small thrust washer, and a new locknut.

NOTE: Lubricate the locknut and drive pinion threads with gear oil.

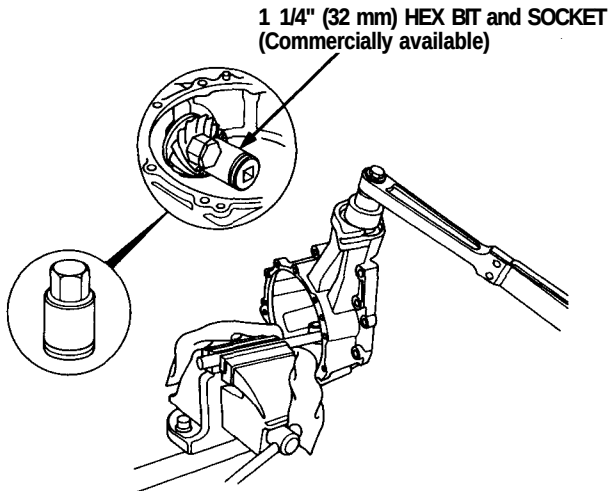




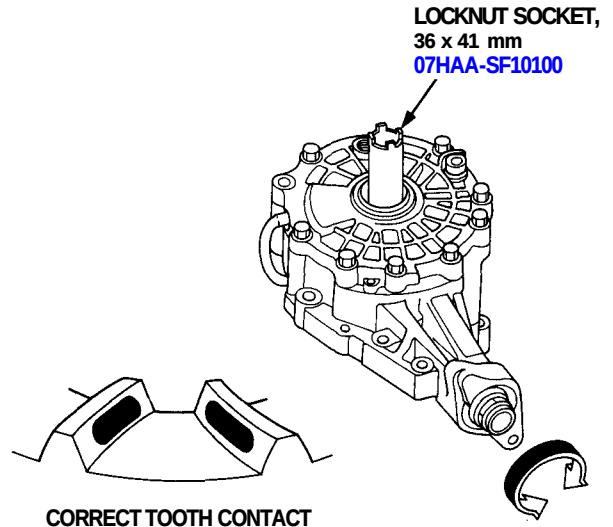
8. Hold the drive pinion with a 1 1/4" (32 mm) hex bit and socket as shown, then carefully tighten the pinion locknut until there is no play in the pinion shaft.

Torque: 20 N-m (2.0 kgf-m, 14 lbf-ft)

CAUTION: To avoid damaging the tapered roller bearing, do not overtighten the locknut.

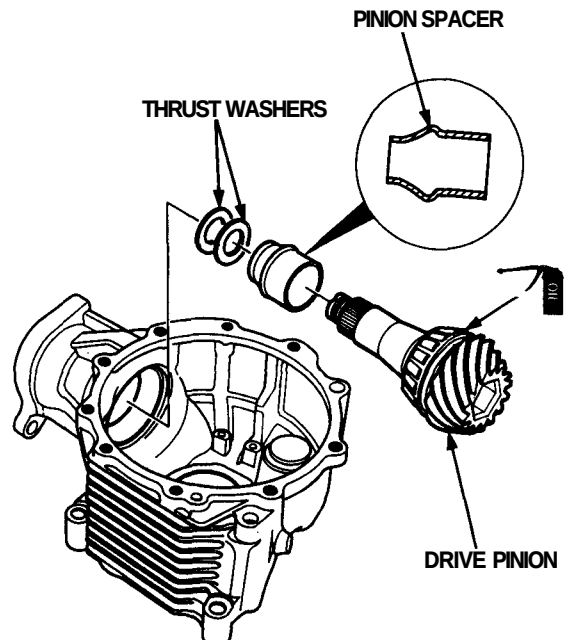
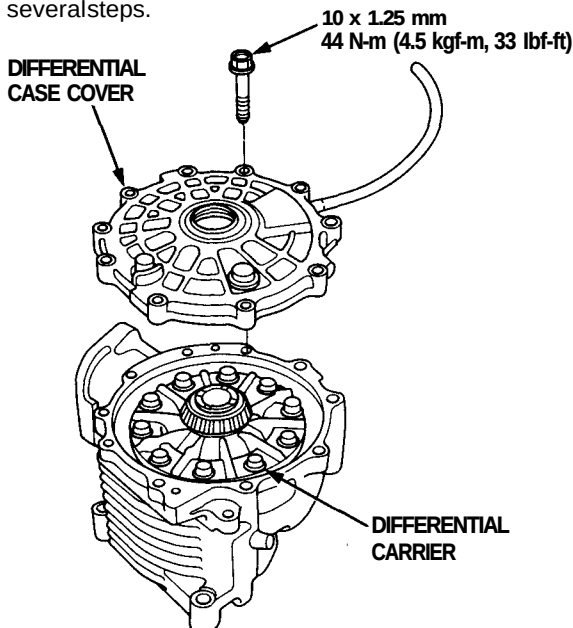


12. Install the special tool as shown, then rotate the drive pinion in both directions so that the ring gear rotate one full turn in both directions. During this operation resistance should be applied to the ring gear.



13. Remove the differential case cover, and check the tooth contact pattern (heel and toe). Adjust the ring gear tooth contact as needed (see page 15-23).
14. After adjusting the ring gear tooth contact, remove the drive pinion, then install a new pinion spacer and thrust washers on the drive pinion.

9. Clean and paint the ring gear teeth lightly and evenly with Prussian Blue (on both sides of each tooth).
10. Apply lubricant to the tapered roller bearings, install the differential carrier into the differential case, then install the differential case cover.
11. Install the bolts and tighten in a crisscross pattern in several steps.

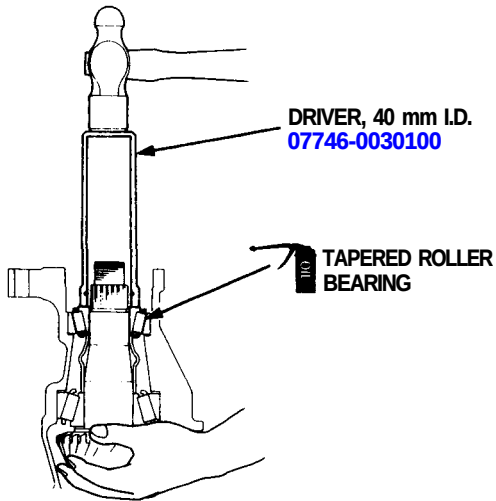


(cont'd)

Differential Assembly

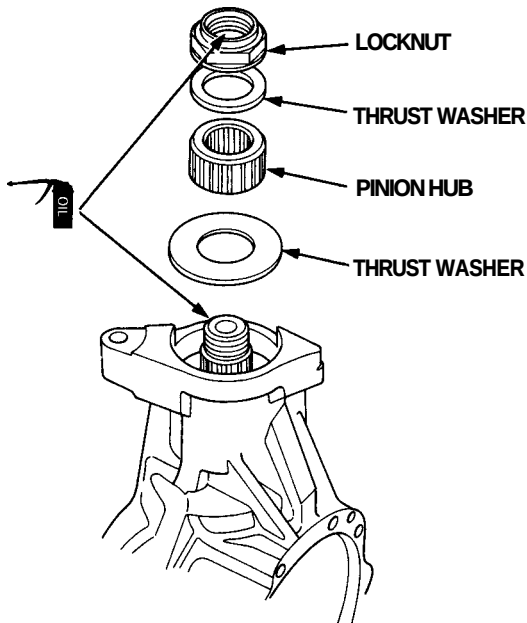
Reassembly (cont'd)

15. Apply lubricant to the tapered roller bearing, then install it using the special tool while holding the drive pinion as shown.

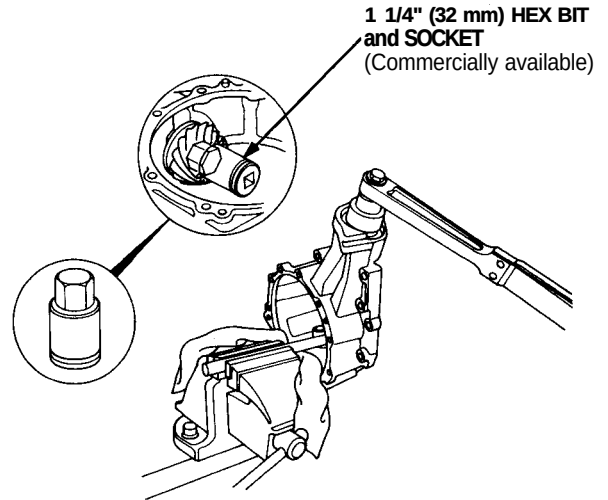


16. Install the large thrust washer, pinion hub, small thrust washer and locknut.

NOTE: Lubricate the locknut and drive pinion threads with gear oil.



17. Hold the drive pinion with a 1 1/4" (32 mm) hex bit and socket as shown.



18. Tighten the locknut to 216 N-m (22 kgf-m, 159 lbf-ft), and measure the tapered roller bearing preload (Tp).

NOTE: Rotate the drive pinion several times to assure proper tapered roller bearing contact.

Standard:

New Bearing: 1.82 - 2.49 N-m
(18.6 - 25.4 kgf-cm, 16.1 - 22.0 lbf-in)

Reused Bearing: 1.42 - 1.91 N-m
(14.5 -19.5 kgf-cm, 12.6 - 16.9 lbf-in)

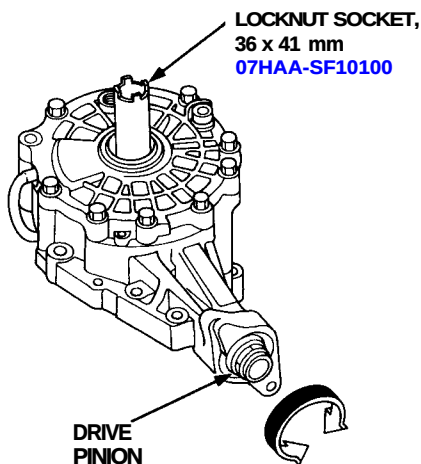
- If the tapered roller bearing preload exceeds the standard, replace the pinion spacer.
- If the tapered roller bearing preload is less than the standard, adjust by tightening the locknut a little at a time, but keep the torque within 216 - 313 N-m (22 - 32 kgf-m, 159 - 231 lbf-ft). If this not possible, replace the pinion spacer.



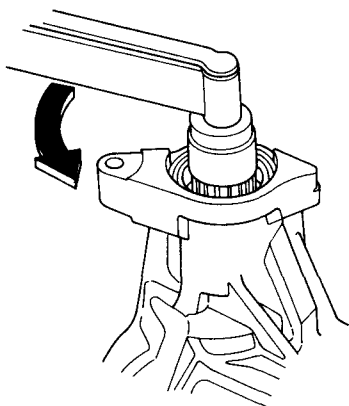
19. Clean and paint the ring gear teeth lightly and evenly with Prussian Blue (on both sides of each tooth).
20. Install the differential carrier into the differential case, and reinstall the differential case cover.
21. Install the bolts and tighten in a crisscross pattern in several steps.

Torque: 44 N-m (4.5 kgf-m, 33 lbf-ft)

22. Install the special tool as shown. Rotate the drive pinion in both directions so that the ring gear rotate one full turn in both directions. During this operation resistance should be applied to the ring gear.



23. Remove the special tool, and use a dial-type torque wrench on the drive pinion to check total bearing preload. The total bearing preload should exceed the drive pinion bearing preload by the amount shown in the next column.



NOTE: Rotate the drive pinion several times to ensure proper bearing contact.

Standard:

New differential carrier tapered roller bearing:

Total bearing preload (from step 23)

-Tp (from step 18)

= 1.04 - 1.26 N-m (10.6 - 12.8 kgfcm, 9.2 - 11.1 lbf-in)

Reused differential carrier tapered roller bearing:

Total bearing preload (from step 23)

-Tp (from step 18)

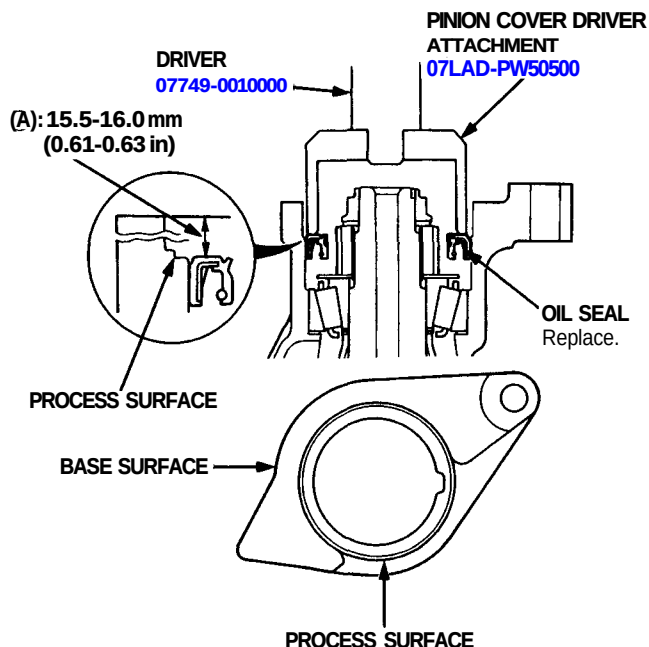
= 0.94 - 1.07 N-m (9.6 - 10.9 kgfcm, 8.33 - 9.46 lbf-in)

If the total bearing preload is not within the standard, correct it by increasing or decreasing the preload on the carrier bearings as needed. If there is too much preload, decrease the shim thickness equal amounts on both sides. If there is not enough preload, increase the shim thickness equal amounts on both sides.

NOTE: Be sure the same amount of shim thickness is added or subtracted from both sides, so that the backlash and tooth contact pattern are not affected.

24. Install the oil seal using the special tools as shown.

NOTE: Make sure that distance (A) is correct.

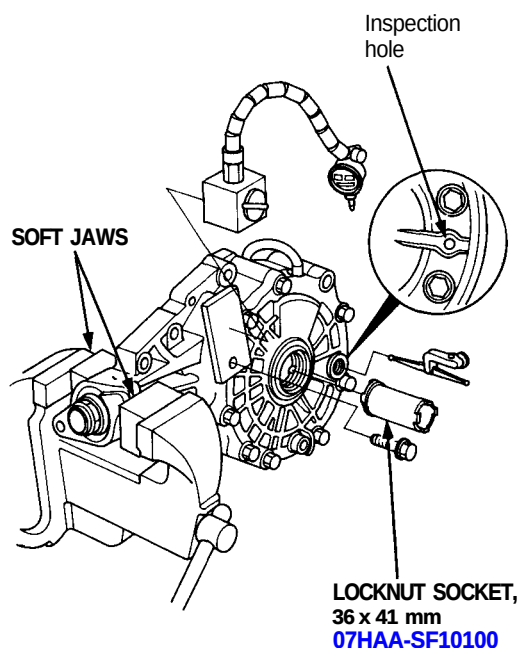


(cont'd)

Differential Assembly

Reassembly (cont'd)

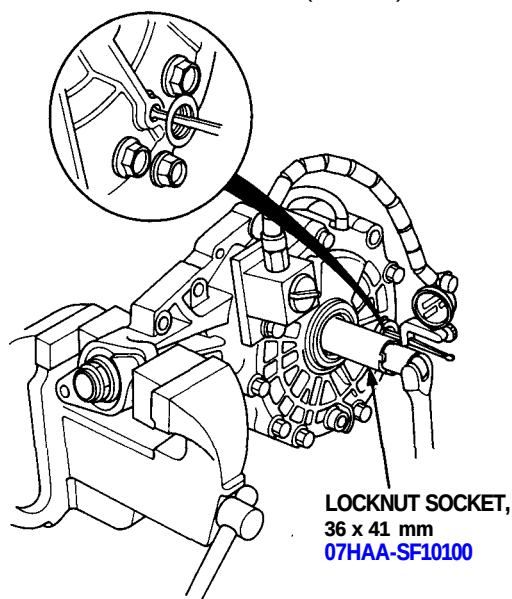
25. Hold the differential assembly using a bench vise with soft jaws as shown.



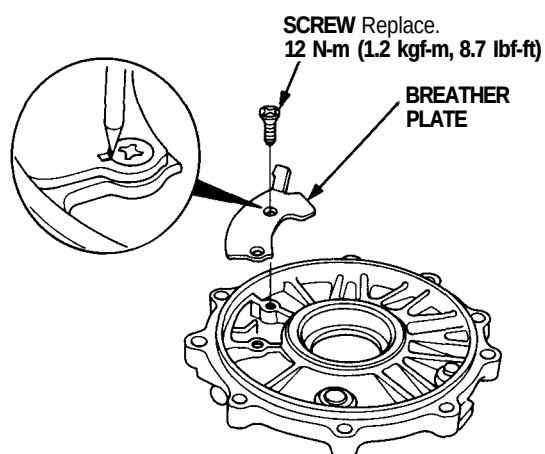
26. Align a backlash inspection hole with the oil filler plug hole, and install the special tools as shown.
27. Measure backlash on the differential carrier using the special tools as shown. After measuring, remove the dial gauge and turn the differential carrier one full turn, then remeasure the backlash.

Standard: 0.06 - 0.14 mm (0.002 - 0.006 in)

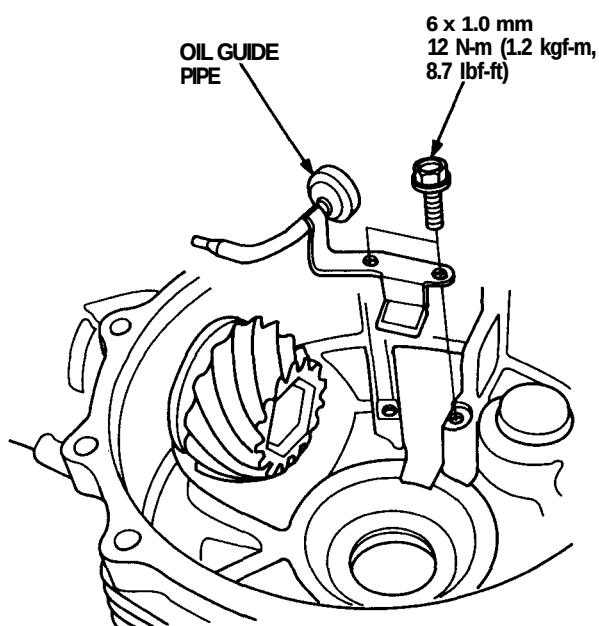
The difference between the two measurements taken must not exceed 0.06 mm (0.002 in).



28. If the backlash is less than the standard, adjust the ring gear backlash (see page 15-23).
29. Remove the differential case cover, and check the tooth contact pattern (face and flank). If the tooth contact is not correct, adjust ring gear contact (see page 15-23).
30. After all adjustments are made, install the breather plate and stake the screw heads in the groove as shown.

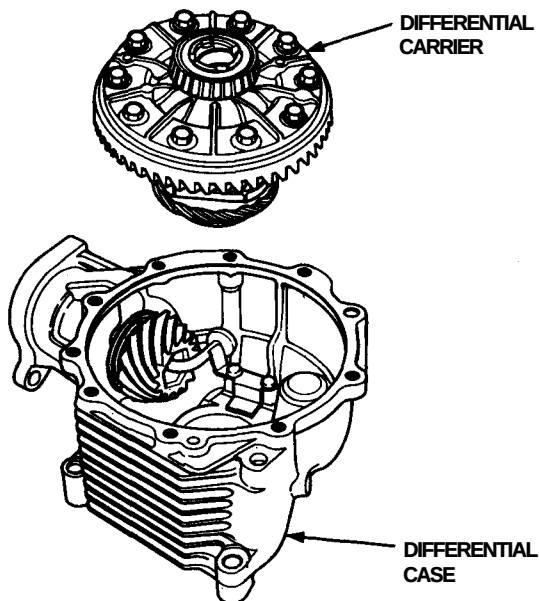


31. Remove the differential carrier, then install the oil guide pipe.





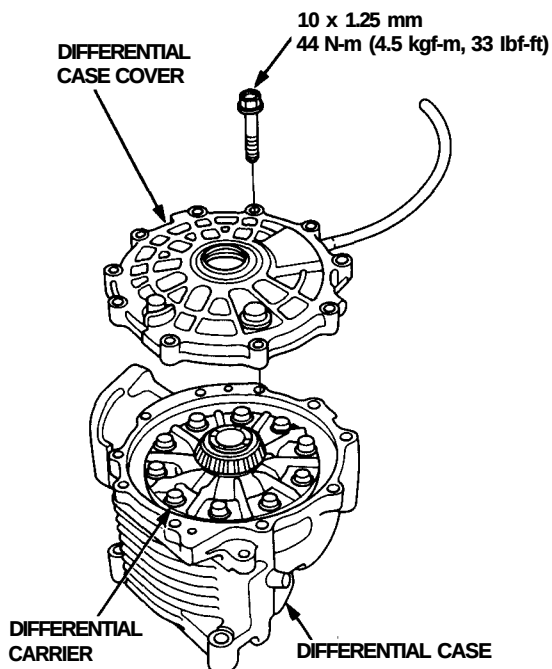
32. Install the differential carrier in the differential case.



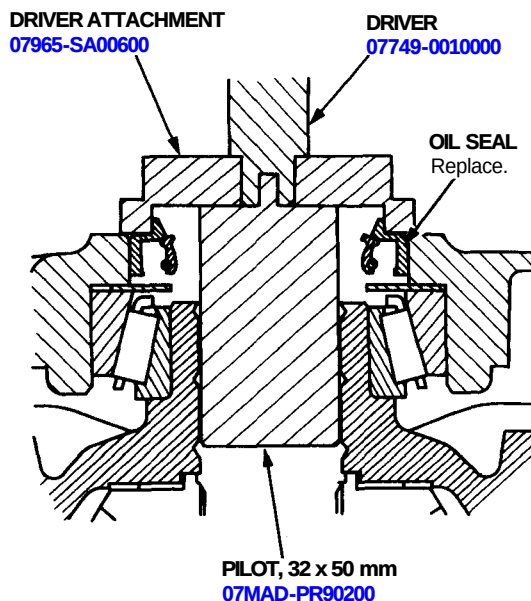
33. Install the differential case cover, and tighten the bolts in a crisscross pattern in several steps.

NOTE:

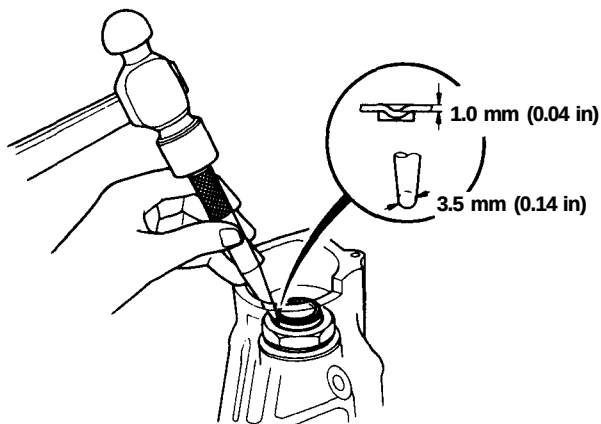
- Use liquid gasket (P/N 08718 - 0001).
- Remove any dirt and oil from the sealing surface.
- If 20 minutes have passed after applying liquid gasket, reapply it, assemble the housings, and allow it to cure at least 20 minutes after assembly before filling differential with oil.



34. Install the oil seal using the special tools as shown.



35. Stake the locknut tab into the groove.



Drive Pinion

Height Adjustment

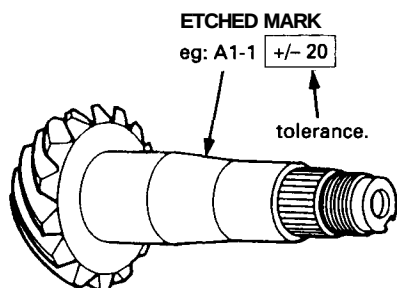
NOTE: If the drive pinion and ring gear are replaced (always as a set), the height has to be adjusted.

Select the proper shim as follows:

First, calculate the difference in size between the old shim and the new pinion.

The last one of the numbers (see ill.) on each pinion is the plus (+) or minus (-) tolerance in thousands of a millimeter. So, a pinion with +20 is 0.02 mm larger and a pinion with -20 is 0.02 mm smaller.

1. If the number on the old pinion is a plus (+), add it to the old shim thickness. If it is a minus (-), subtract it from the old shim thickness.
2. If the number on the new pinion is a plus (+), subtract it from the number you got in step 1. If it is a minus (-), add it to the step 1 number.
3. Select the shim that is closest (but not more than) the final number you got from steps 1 and 2.



Example 1:

Old shim: 2.00 mm thickness
 Old pinion: +20 (0.02 mm)
 New pinion: -10 (-0.01 mm)

$$2.00 + 0.02 + 0.01 = 2.03$$

Select the 2.03 mm (0.0799 in) new shim.

Example 2:

Old shim: 1.70 mm thickness
 Old pinion: -10 (-0.01 mm)
 New pinion: -20 (-0.02 mm)

$$1.70 - 0.01 + 0.02 = 1.71$$

Select the 1.70 mm (0.0669 in) new shim.

43 mm THRUST SHIM

	Part Number	Thickness
A	41410 – P5D or PY4 – 000	1.64 mm (0.0646 in)
B	41411 – P5D or PY4 – 000	1.67 mm (0.0657 in)
C	41412 – P5D or PY4 – 000	1.70 mm (0.0669 in)
D	41413 – P5D or PY4 – 000	1.73 mm (0.0681 in)
E	41414 – P5D or PY4 – 000	1.76 mm (0.0693 in)
F	41415 – P5D or PY4 – 000	1.79 mm (0.0705 in)
G	41416 – P5D or PY4 – 000	1.82 mm (0.0717 in)
H	41417 – P5D or PY4 – 000	1.85 mm (0.0728 in)
I	41418 – P5D or PY4 – 000	1.88 mm (0.0740 in)
J	41419 – P5D or PY4 – 000	1.91 mm (0.0752 in)
K	41420 – P5D or PY4 – 000	1.94 mm (0.0764 in)
L	41421 – P5D or PY4 – 000	1.97 mm (0.0776 in)
M	41422 – P5D or PY4 – 000	2.00 mm (0.0787 in)
N	41423 – P5D or PY4 – 000	2.03 mm (0.0799 in)
O	41424 – P5D or PY4 – 000	2.06 mm (0.0811 in)
P	41425 – P5D or PY4 – 000	2.09 mm (0.0823 in)
Q	41426 – P5D or PY4 – 000	2.12 mm (0.0835 in)
R	41427 – P5D or PY4 – 000	2.15 mm (0.0846 in)
S	41428 – P5D or PY4 – 000	2.18 mm (0.0858 in)
T	41429 – P5D or PY4 – 000	2.21 mm (0.0870 in)
U	41430 – P5D or PY4 – 000	2.24 mm (0.0882 in)
V	41431 – P5D or PY4 – 000	2.27 mm (0.0894 in)



Ring Gear Tooth Contact

Ring Gear Backlash

Adjustment

1) Correct Tooth Contact



2) Toe Contact

- Use a thinner drive pinion shim (43 mm thrust shim) to move the drive pinion away from the ring gear.



3) Heel Contact

- Use a thicker drive pinion shim (43 mm thrust shim) to move the drive pinion toward the ring gear.



4) Flank Contact

- To move the ring gear away from the drive pinion, use a thicker side bearing shim (79.5 mm thrust shim) on the drive pinion side and a thinner one on the ring gear side.

NOTE: Recheck backlash after replacing the side bearing shims. If out of specification, adjust as described under Toe Contact.



5) Face Contact

- To move the ring gear toward the drive pinion, use a thinner side bearing shim (79.5 mm thrust shim) on the drive pinion side and a thicker one on the ring gear side.

NOTE: Recheck backlash after replacing the side bearing shims. If out of specification, adjust as described under Heel Contact.



Adjustment

- If the backlash exceeds the standard, correct by decreasing the shim thickness on one side and increasing the thickness of the other shim the same amount.

NOTE:

- The total thickness of both shims must still equal the total thickness of the original shims.
- If there is too much backlash, move the ring gear toward the drive pinion. If there is not enough backlash, move the ring gear away from the drive pinion.

- After adjustment, recheck backlash (see page 15-8).

Standard: 0.06 - 0.14 mm (0.002 - 0.006 in)

79.5 mm THRUST SHIM

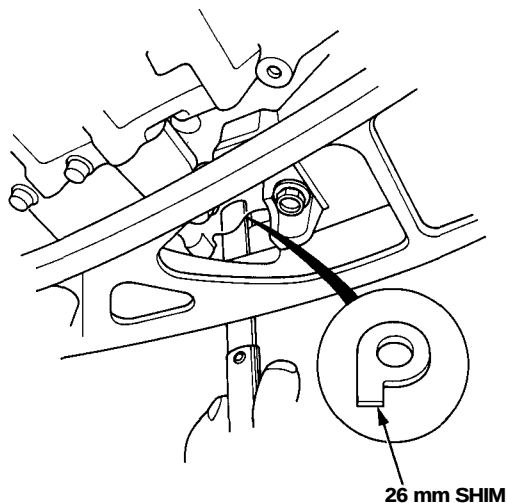
	Part Number	Thickness
AA	41460 – P5D or PY4 – 000	0.66 mm (0.0260 in)
AB	41461 – P5D or PY4 – 000	1.17 mm (0.0461 in)
AC	41462 – P5D or PY4 – 000	1.20 mm (0.0472 in)
AD	41463 – P5D or PY4 – 000	1.23 mm (0.0484 in)
AE	41464 – P5D or PY4 – 000	1.26 mm (0.0496 in)
AF	41465 – P5D or PY4 – 000	1.29 mm (0.0508 in)
AG	41466 – P5D or PY4 – 000	1.32 mm (0.0520 in)
AH	41467 – P5D or PY4 – 000	1.35 mm (0.0531 in)
AI	41468 – P5D or PY4 – 000	1.38 mm (0.0543 in)
AJ	41469 – P5D or PY4 – 000	1.41 mm (0.0555 in)
AK	41470 – P5D or PY4 – 000	1.44 mm (0.0567 in)
AL	41471 – P5D or PY4 – 000	1.47 mm (0.0579 in)
AM	41472 – P5D or PY4 – 000	1.50 mm (0.0591 in)
AN	41473 – P5D or PY4 – 000	1.53 mm (0.0602 in)
AO	41474 – P5D or PY4 – 000	1.56 mm (0.0614 in)
AP	41475 – P5D or PY4 – 000	1.59 mm (0.0626 in)
AQ	41476 – P5D or PY4 – 000	1.62 mm (0.0638 in)
AR	41477 – P5D or PY4 – 000	1.65 mm (0.0650 in)
AS	41478 – P5D or PY4 – 000	1.68 mm (0.0661 in)
AT	41479 – P5D or PY4 – 000	1.71 mm (0.0673 in)
AU	41480 – P5D or PY4 – 000	1.74 mm (0.0685 in)
AV	41481 – P5D or PY4 – 000	1.77 mm (0.0697 in)
AW	41482 – P5D or PY4 – 000	1.80 mm (0.0709 in)
AX	41483 – P5D or PY4 – 000	1.83 mm (0.0720 in)

Differential Assembly

Installation

NOTE: If the differential case is replaced, the 26 mm shim must be adjusted.

- Install the differential assembly.
- Measure the clearance between the differential case and the torque converter housing.

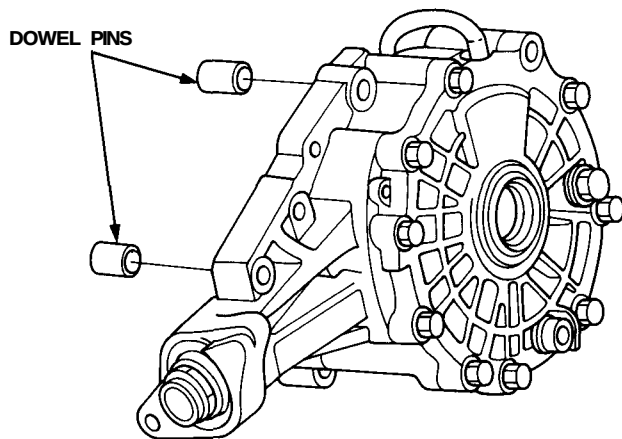


- Select the 26 mm shim from the following table.

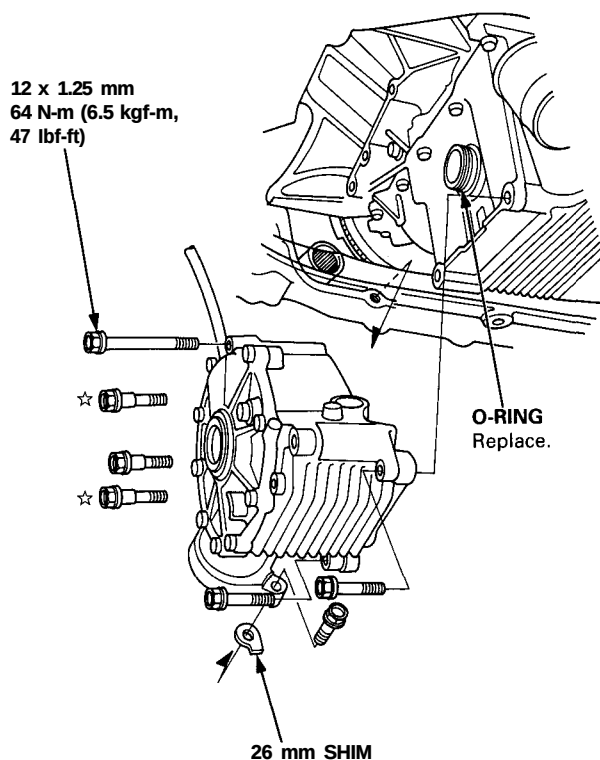
26 mm SHIM

	Part Number	Thickness	Measurement Value
A	41432 - PY4 - 000	1.9 mm (0.0748 in)	1.99 - 1.9 mm
B	41433 - PY4 - 000	2.0 mm (0.0787 in)	2.09 - 2.0 mm
C	41434 - PY4 - 000	2.1 mm (0.0827 in)	2.19 - 2.1 mm
D	41435 - PY4 - 000	2.2 mm (0.0866 in)	2.29 - 2.2 mm
E	41436 - PY4 - 000	2.3 mm (0.0906 in)	2.39 - 2.3 mm
F	41437 - PY4 - 000	2.4 mm (0.0945 in)	2.49 - 2.4 mm
G	41438 - PY4 - 000	2.5 mm (0.0984 in)	2.59 - 2.5 mm
H	41439 - PY4 - 000	2.6 mm (0.1024 in)	2.69 - 2.6 mm
I	41440 - PY4 - 000	2.7 mm (0.1063 in)	2.79 - 2.7 mm
J	41441 - PY4 - 000	2.8 mm (0.1102 in)	2.89 - 2.8 mm
K	41442 - PY4 - 000	2.9 mm (0.1142 in)	2.99 - 2.9 mm
L	41443 - PY4 - 000	3.0 mm (0.1181 in)	3.09 - 3.0 mm

- Install the two dowel pins on the differential assembly.

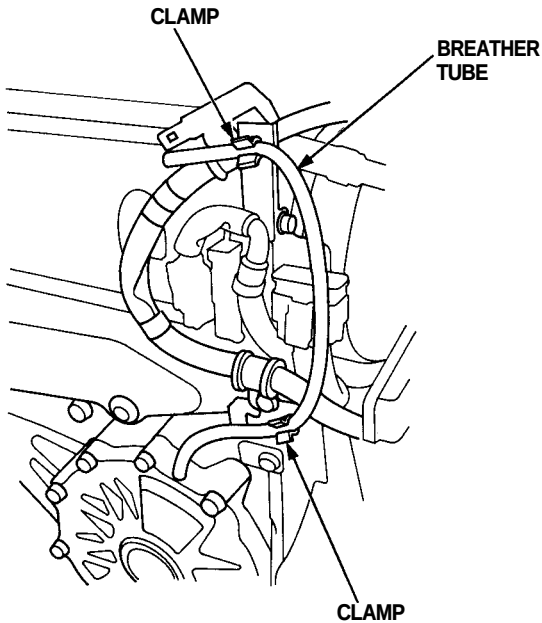


- Attach the differential assembly to the engine, then tighten the two mounting bolts (marked with ☆ in this figure) loosely.
- Install the 26 mm shim, then tighten the mounting bolts to the specified torque.

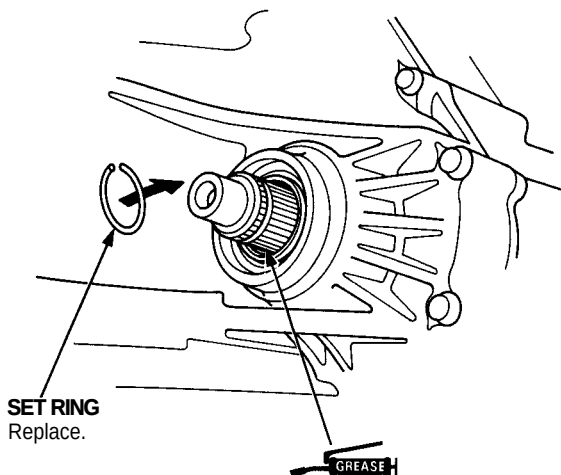




4. Install the breather tube as shown.

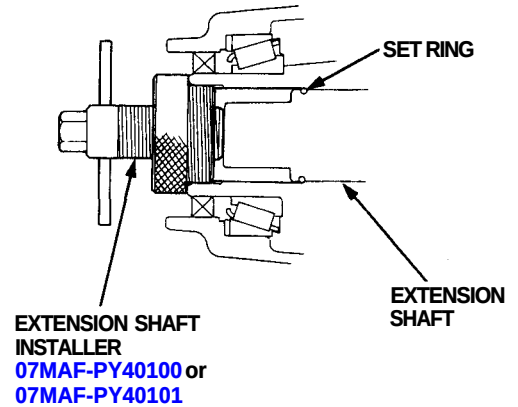


5. Apply Super High Temp Urea Grease (P/N 08798 - 9002) to the splines of the extension shaft, then install the new set ring.



6. Install the extension shaft using the special tool as shown.

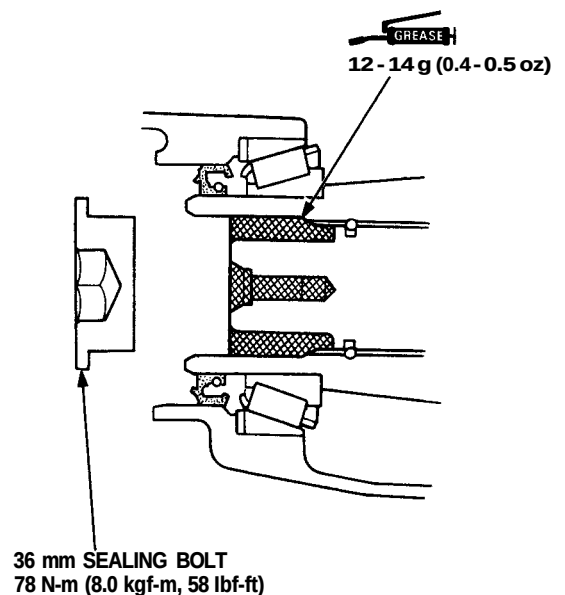
NOTE: Push the extension shaft in the secondary driven gear shaft until the extension shaft stops.



7. Fill the secondary gear with Super High Temp Urea Grease (P/N 08798 - 9002), then install the 36 mm sealing bolt.

NOTE:

- Shift the transmission into the **P** position to lock the secondary gear.
- Apply liquid gasket (P/N 08718 - 0001) to the 36 mm sealing bolt threads.

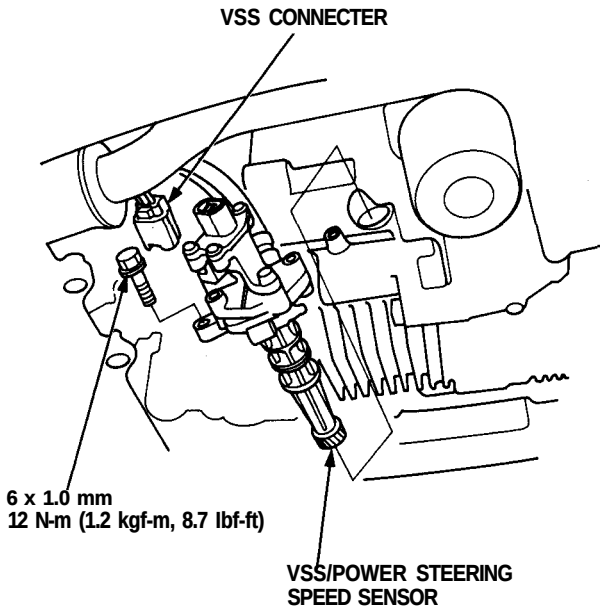


(cont'd)

Differential Assembly

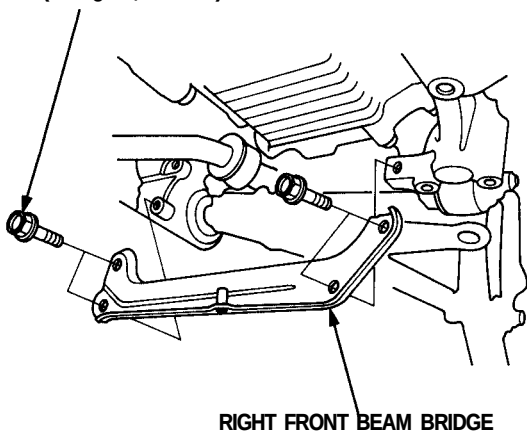
Installation (cont'd)

8. Install the vehicle speed sensor (VSS)/power steering speed sensor, then connect the VSS connector.

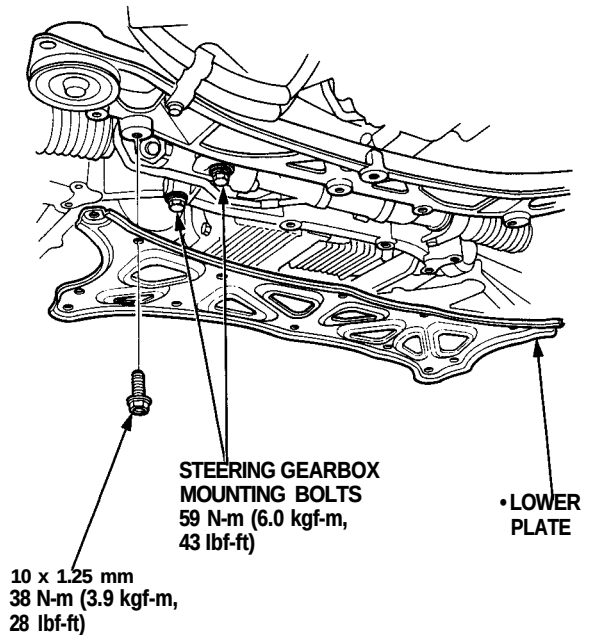


9. Install the right front beam bridge.

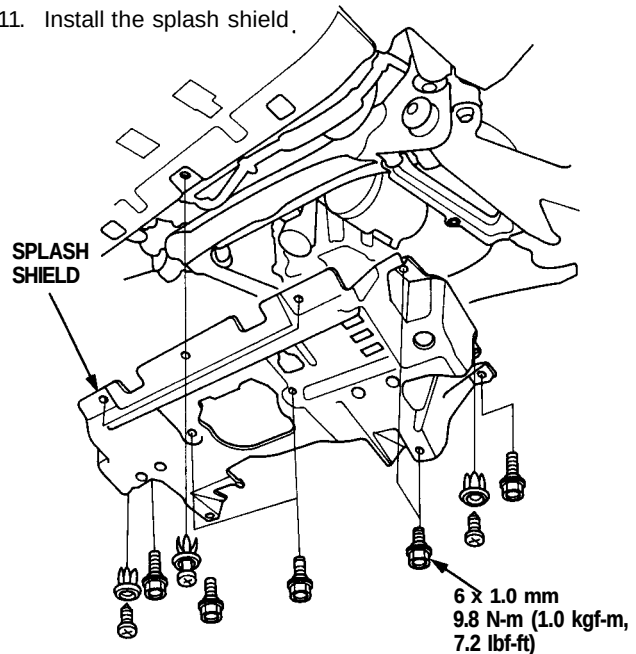
10 x 1.25 mm
38 N-m (3.9 kgf-m, 28 lbf-ft)



10. Remove the steering gearbox mounting bolts, then install the lower plate and the steering gearbox mounting bolts.



11. Install the splash shield.

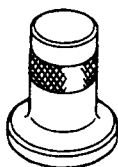


12. Install the driveshafts and the intermediate shaft (see [section 16](#)).
13. Refill the differential with oil (see page [15-4](#)).
14. Check the front wheel alignment (see [section 18](#)).

Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAD-PH70201 or 07GAD-PH70200	Oil Seal Driver	1	16-7
②	07MAD-SP00100	Driver Attachment	1	16-8
③	07746-0010300	Attachment, 42 x 47 mm	1	16-5
④	07746-0010400	Attachment, 52 x 55 mm	1	16-7
⑤	07746-0030100	Driver, 40 mm I.D.	1	16-7
⑥	07749-0010000	Driver	1	16-5 , 16-7 , 16-8

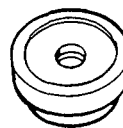
NOTE: Refer to page [16-2](#) of the '95-98 Acura 2.5TL Service Manual, P/N 61SW504, for the items not shown in this sub-section.



①



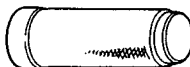
②



③



④



⑤

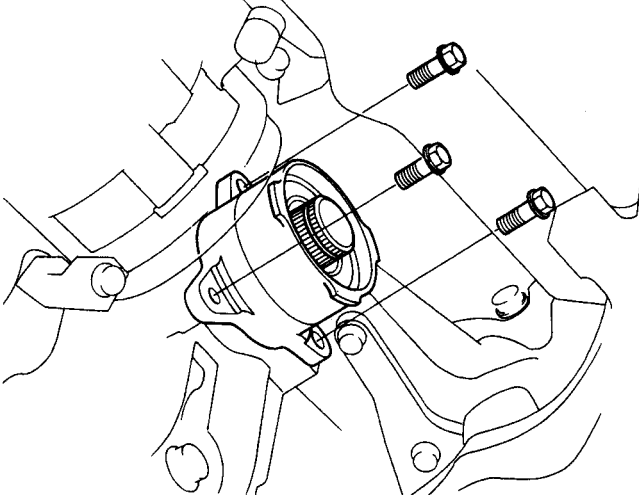


⑥

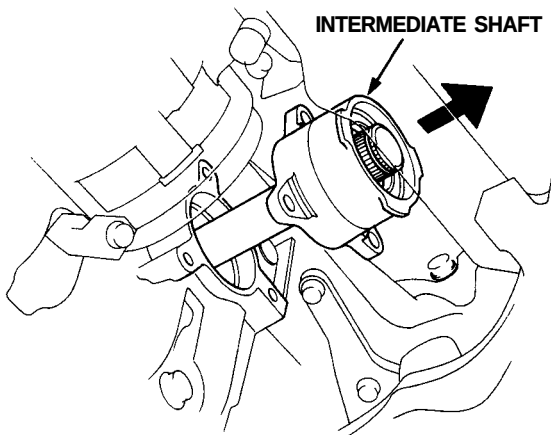
Intermediate Shaft

Removal/Installation

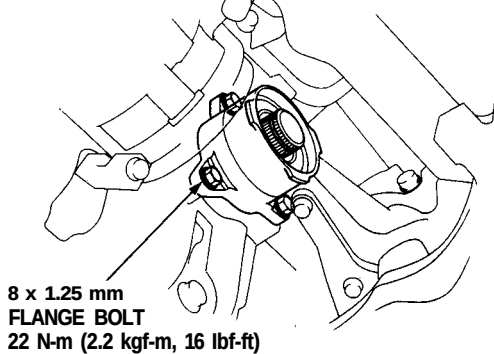
1. Drain the oil from the differential (see [section 15](#)).
2. Remove the left driveshaft assembly (refer to section 16 in the '95 - '98 Acura 2.5TL Service Manual, P/N 61SW504).
3. Remove the three bolts.



4. Remove the intermediate shaft assembly from the oil pan.



5. Install the intermediate shaft in the reverse order of removal.



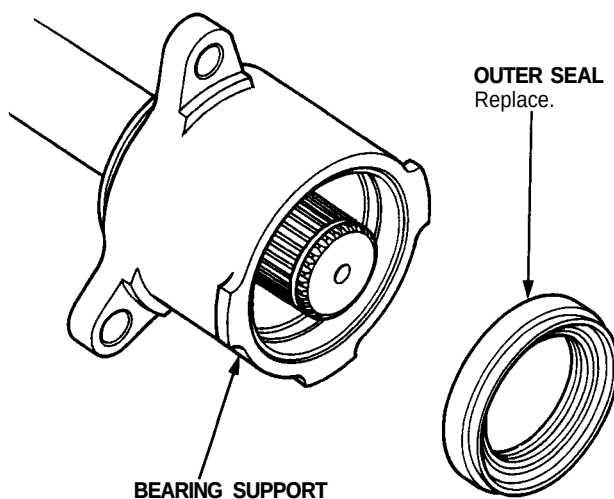
8 x 1.25 mm
FLANGE BOLT
22 N-m (2.2 kgf-m, 16 lbf-ft)

Intermediate Shaft

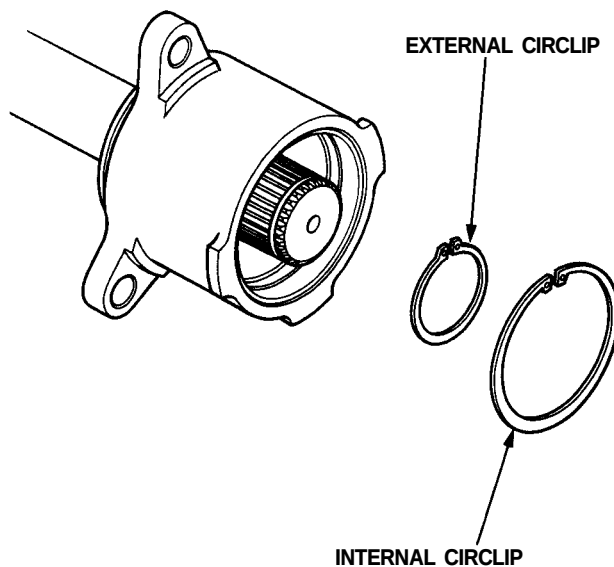
Disassembly

CAUTION: The bearing support and support base are made of aluminum. Be careful not to damage them when servicing.

1. Remove the intermediate shaft outer seal from the bearing support.

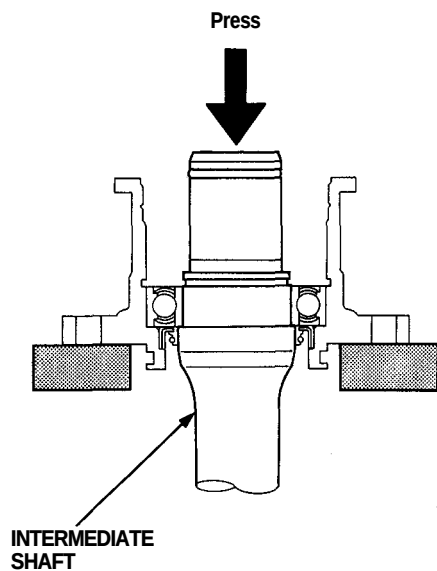


2. Remove the external circlip and the internal circlip.

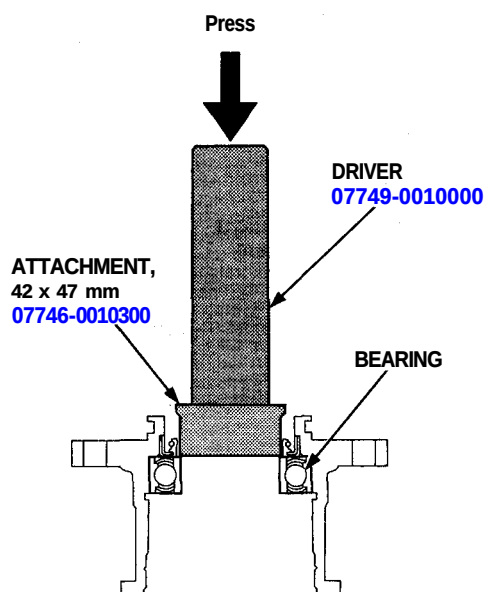




3. Press the intermediate shaft out of the shaft bearing using a press.

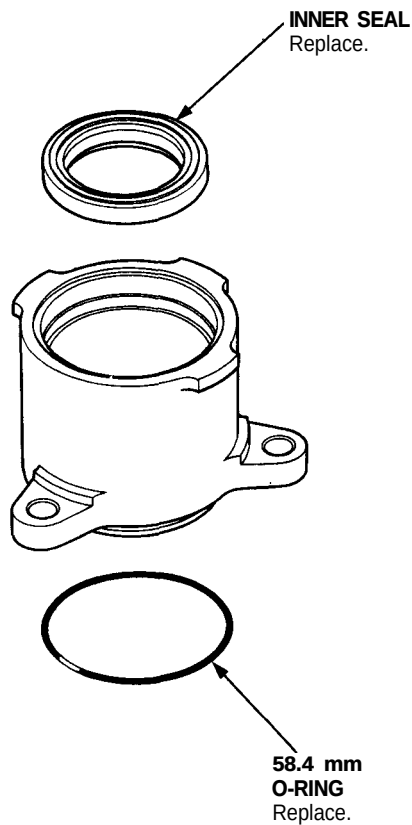


4. Press the intermediate shaft bearing out of the bearing support using the special tools and a press.



5. Remove the intermediate shaft inner seal from the bearing support.

6. Remove the 58.4 mm O-ring.

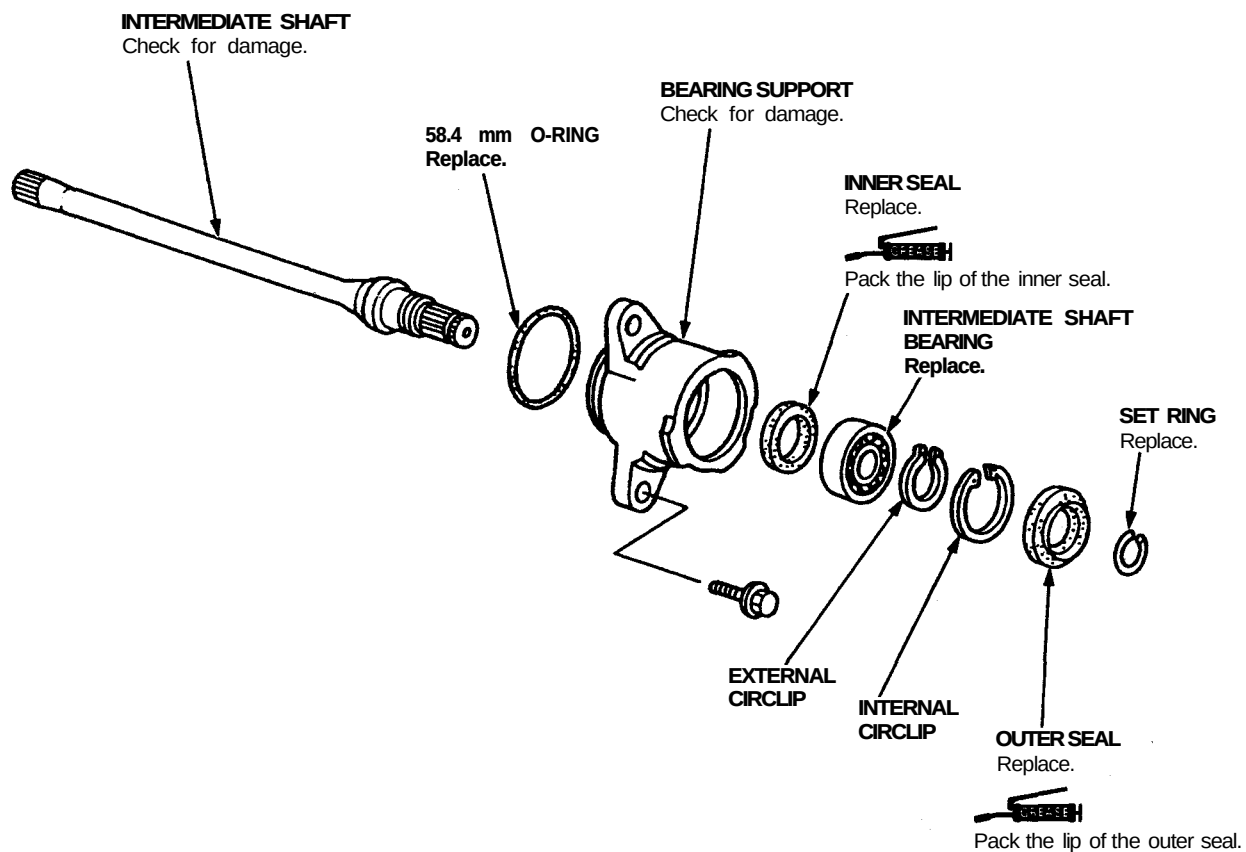


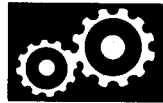
Intermediate Shaft

Reassembly

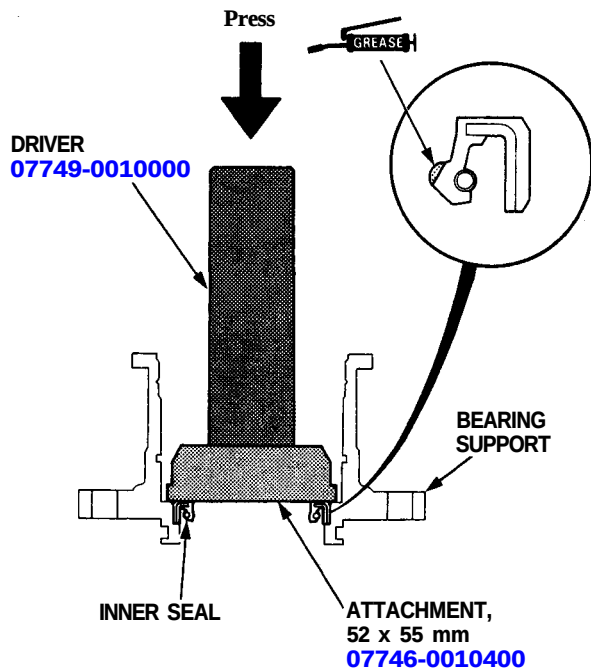
CAUTION:

- The bearing support is made of aluminum. Be careful not to damage it when servicing.
- Do not damage the lip on inner and outer seals during installation.

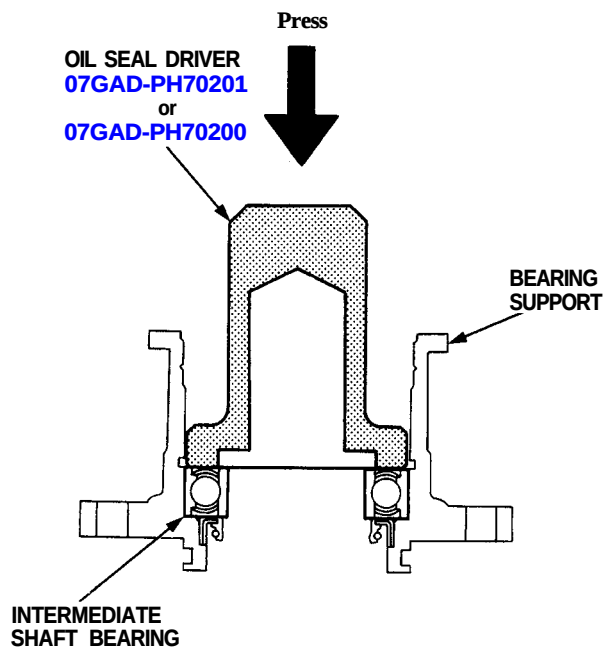




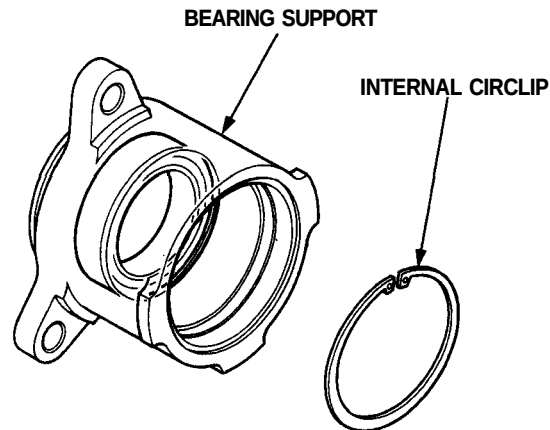
1. Press the intermediate shaft inner seal into the bearing support using the special tools and a press.



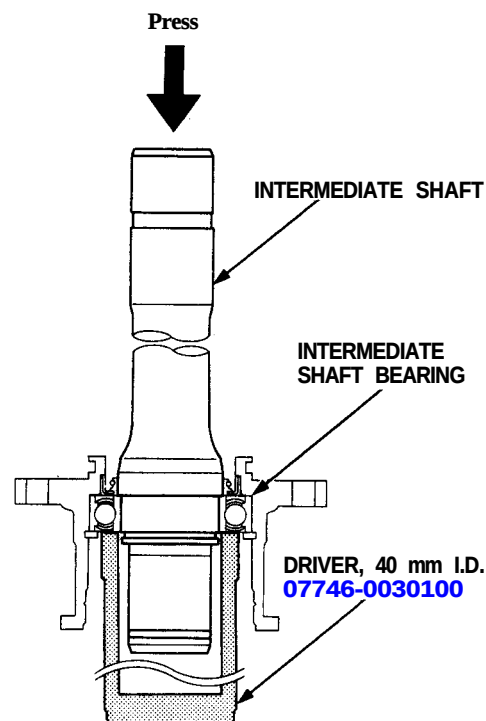
2. Press the intermediate shaft bearing into the bearing support using the special tool and a press.



3. Seat the internal circlip in the groove of the bearing support.



4. Press the intermediate shaft into the shaft bearing using the special tool and a press.

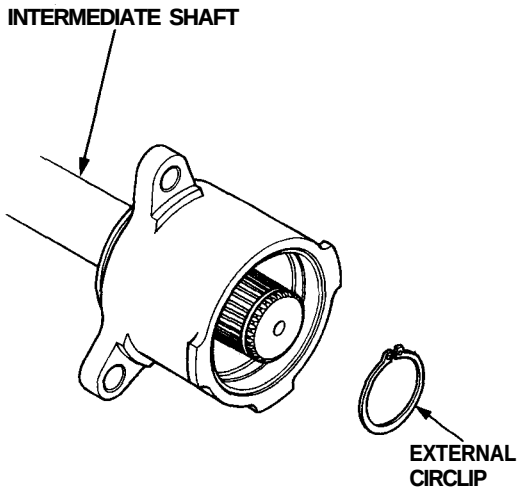


(cont'd)

Intermediate Shaft

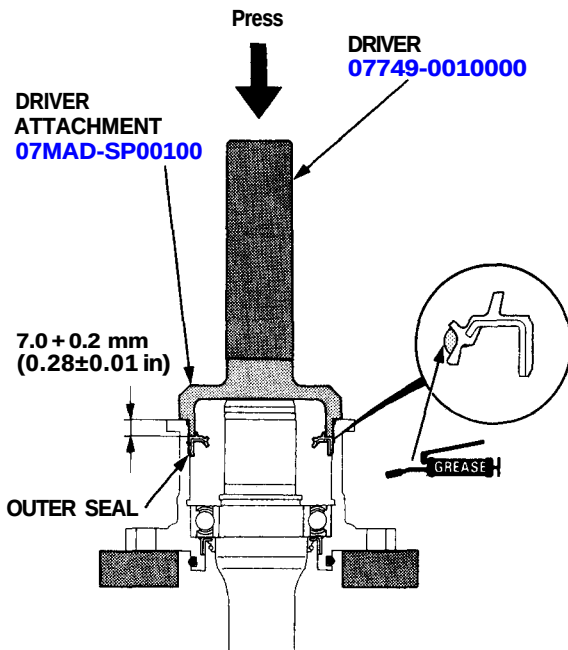
Reassembly (cont'd)

5. Seat the external circlip in the groove of the intermediate shaft.



6. Press the outer seal into the bearing support using the special tools and a press.

NOTE: Drive in the outer seal until it is 7.0 mm (0.28 in) from the end of the bearing support.

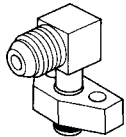


Special Tools

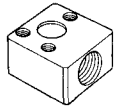
Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAK-SE00112	P/S Joint Adapter (Pump)	1	17-5
②	07GAK-SE00120	P/S Joint Adapter (Hose)	1	17-5
③	*07JGG-001010A	Belt Tension Gauge	1	17-4
④	07LAG-SM40100 or 07LAG-SM4010A	Piston Seal Ring Guide	1	17-16
⑤	07LAG - SM40200 or 07LAG - SM4020A	Piston Seal Ring Sizing Tool	1	17-16
⑥	07MAC - SL00200	Ball Joint Remover, 28 mm	1	17-9
⑦	07NAD - SR3020A	Cylinder End Seal Remover Attachment	1	17-12
⑧	07TAF-SZ50100	Cylinder End Seal Remover Attachment	1	17-13
⑨	07406-0010001	P/S Pressure Gauge	1	17-5
⑩	07725 - 0030000	Universal Holder	1	17-4
⑪	07746-0010100	Attachment, 32 x 35 mm	1	17-16
⑫	07749-0010000	Driver	1	17-16
⑬	07965 - SA50500	Front Hub Dis/Assembly Tool	1	17-25
⑭	07974 - SA50700	Ball Joint Boot Clip Guide	1	17-24

*: Included in the Belt Tension Gauge set, 07TGG - 001000A.

NOTE: Refer to page 17-2 of the '95-98
Acura 2.5TL Service Manual, P/N 61SW504,
for the items not shown in this sub-section.



①



②



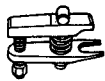
③



④



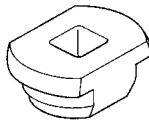
⑤ ⑬



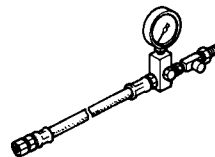
⑥



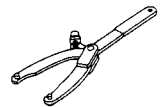
⑦



⑧



⑨



⑩



⑪



⑫



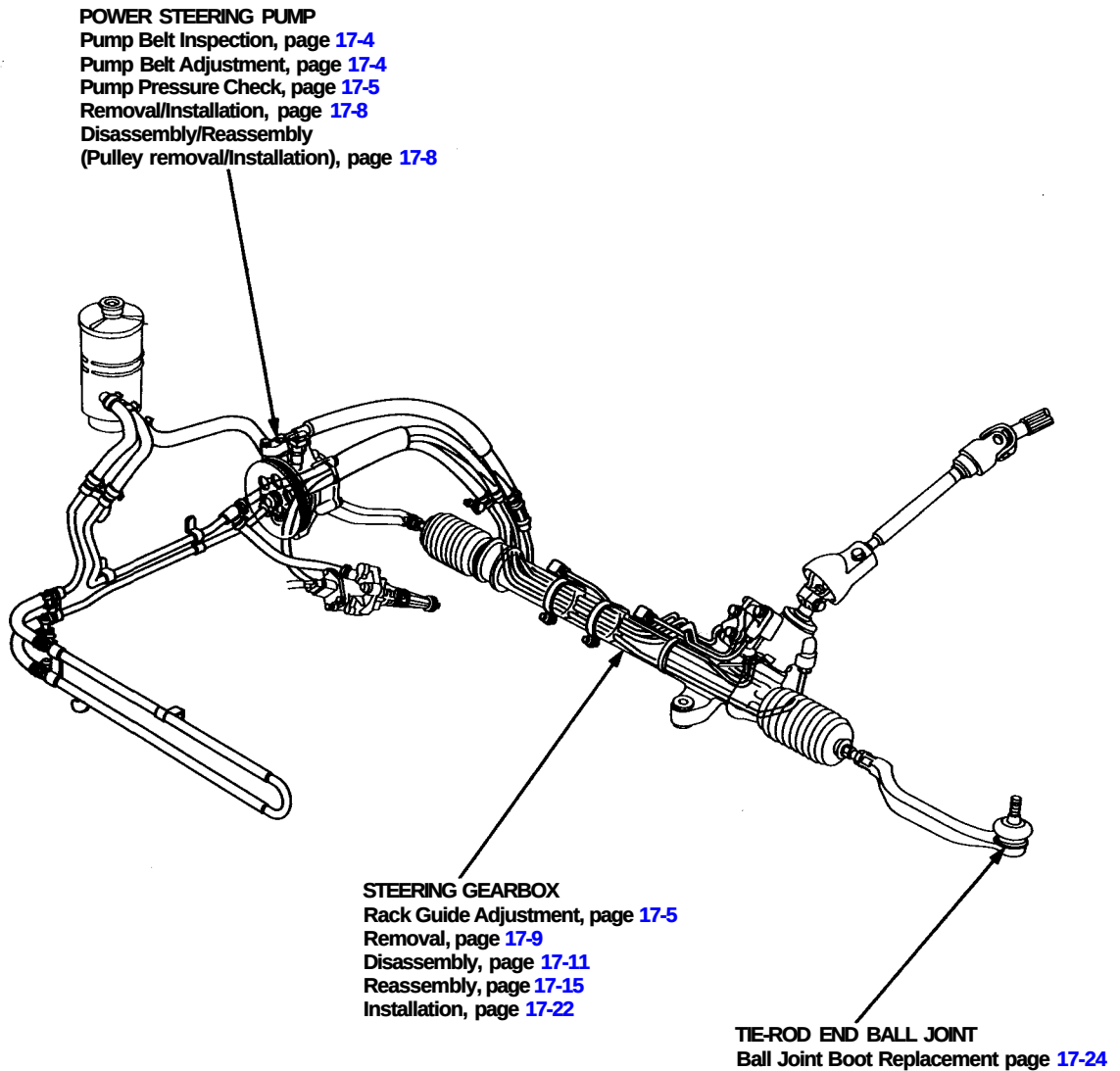
⑭



Component Locations

Index

NOTE: Refer to page 17-3 of the '95-98 Acura 2.5TL Service Manual, P/N 61SW504, for the items not shown in this sub-section.



Inspection and Adjustment

Pump Belt

NOTE: When using a new belt, first adjust the deflection or tension to the values for the new belt, then readjust the deflection or tension to the values for the used belt after running engine for five minutes.

Inspection

Attach the special tool to the belt, and measure the tension of the belt.

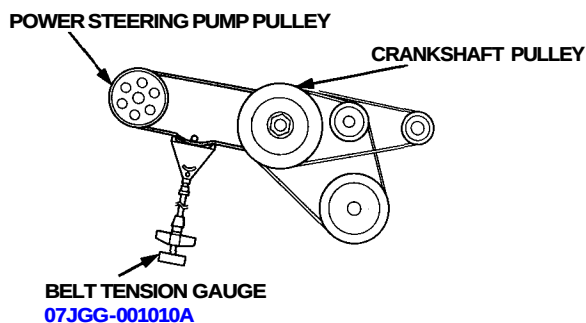
Tension:

Used Belt: 340 - 540 N (35 - 55 kgf, 77 - 120 lbf)

New Belt: 690 - 880 N (70 - 90 kgf, 154-200 lbf)

NOTE:

- If there are cracks or any damage evident on the belt, replace it with a new one.
- Follow the manufacturer's instructions for the tension gauge.



Inspect the pump belt for cracks or any damage. Replace the belt with a new one if necessary.

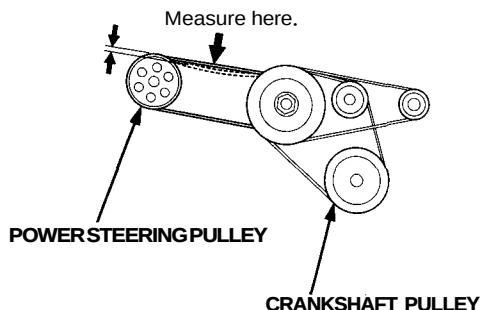
Measurement without Belt Tension Gauge:

Apply a force of 98 N (10 kgf, 22 lbf), and measure the deflection between the power steering pump and the crankshaft pulleys.

Deflection:

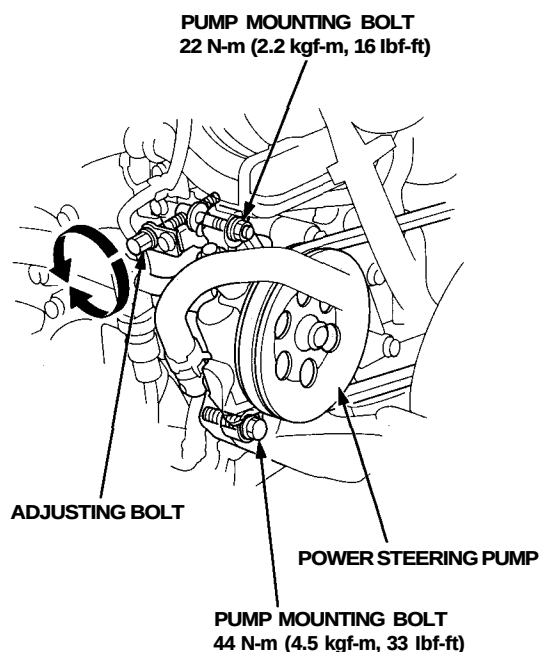
Used Belt: 11.0 - 13.5 mm (0.43 - 0.53 in)

New Belt: 8.0 - 9.5 mm (0.31 - 0.37 in)



Adjustment

1. Remove the air cleaner (ACL).
2. Loosen the power steering pump mounting nut and bolt.
3. Turn the adjusting bolt to get the proper belt tension, then retighten the nut and bolt.
4. Start the engine and turn the steering wheel from lock-to-lock several times, then stop the engine and recheck the deflection of the belt.



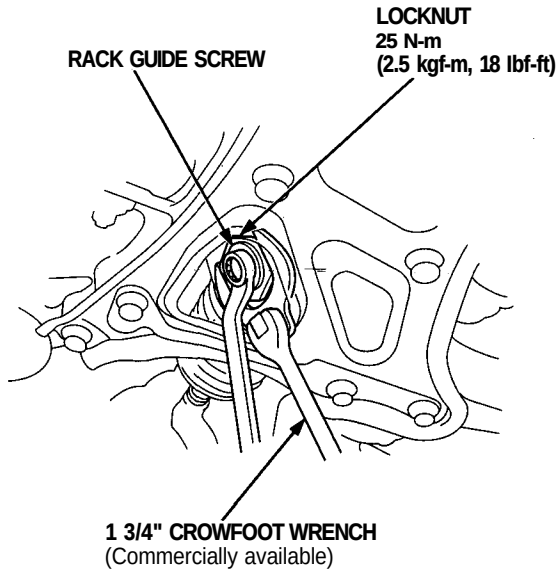
5. Install the air cleaner (ACL).



Rack Guide Adjustment

NOTE: Perform rack guide adjustment with the wheels in the straight ahead position.

1. Loosen the rack guide screw locknut with the special tool, then loosen the rack guide screw.



2. Tighten the rack guide screw to 25 N-m (2.5 kgf-m, 18 lbf-ft), then loosen it.
3. Retighten the rack guide screw to 3.9 N-m (0.4 kgf-m, 2.9 lbf-ft), then back it off to the specified angle.

Specified Return Angle: $20 \pm 5^\circ$

4. Tighten the locknut while holding the rack guide screw.
5. Check for tight or loose steering through the complete turning travel.
6. Perform the following inspections (refer to the '95 - 98 Acura 2.5TL Service Manual, P/N 61SW504):
 - Steering operation.
 - Power assist with vehicle parked.



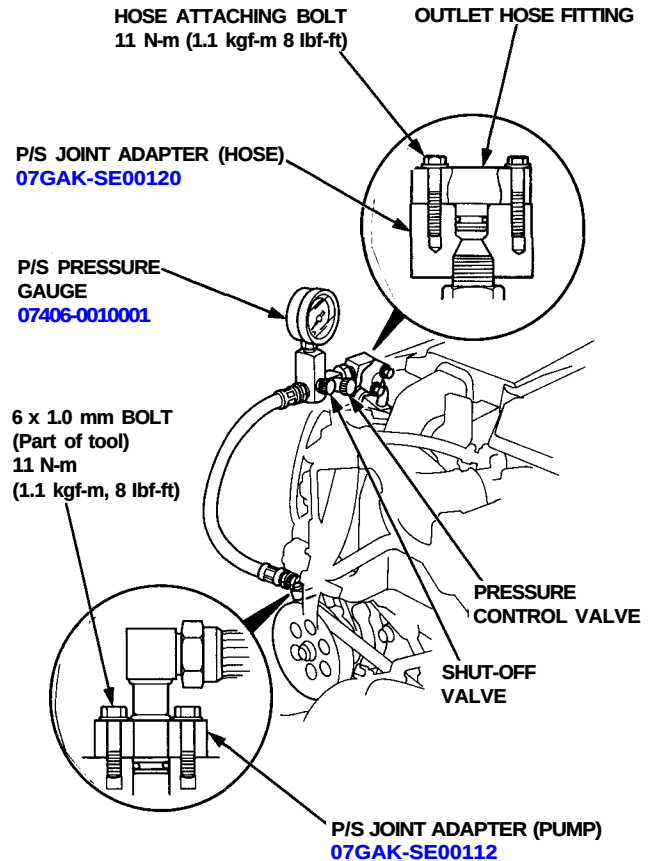
Pump Pressure Check

Check the fluid pressure as follows to determine whether the trouble is in the pump or gearbox.

NOTE: First check the power steering fluid level and pump belt tension.

CAUTION: Carefully disconnect the high pressure hose so the power steering fluid does not leak on the frame and other parts.

1. Remove the air cleaner (ACL).
2. Disconnect the outlet hose from the pump outlet fitting, and install the P/S joint adapter (pump) on the pump outlet.



3. Connect the hose P/S adapter (hose) to the power steering pressure gauge, then connect the outlet hose to the adapter.
4. Connect the power steering pressure gauge to the P/S joint adapter (pump).
5. Open the shut-off valve full.
6. Open the pressure control valve fully.

(cont'd)

Inspection and Adjustment

Pump Pressure Check (cont'd)

7. Start the engine and let it idle.
8. Turn the steering wheel from lock-to-lock several times to warm the fluid to operating temperature.
9. Measure steady-state fluid pressure while idling. If the pump is in good condition, the gauge should read less than 1500 kPa (15 kgf/cm², 213 psi). If it reads high, check the outlet hose or valve body unit (refer to the '95 - 98 Acura 2.5TL Service Manual, P/N 61SW504, for General Troubleshooting).
10. Close the pressure control valve, then close the shut-off valve gradually until the pressure gauge needle is stable. Read the pressure.
11. Immediately open the pressure control valve fully.

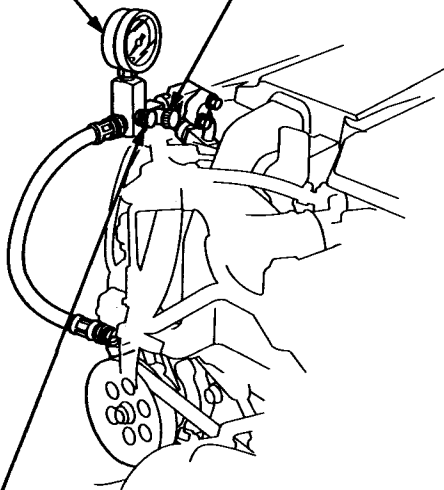
CAUTION: Do not keep the pressure control valve closed more than 5 seconds or the pump could be damaged by over-heating.

If the pump is in good condition, the gauge should read at least 7,800 - 8,800 kPa (80-90 kgf/cm², 1,138 - 1,280 psi). A low reading means pump output is too low for full assist. Repair or replace the pump.

P/S PRESSURE GAUGE
07406-0010001

PRESSURE
CONTROL VALVE

SHUT-OFF VALVE





Power Steering Hoses and Pipes

Replacement

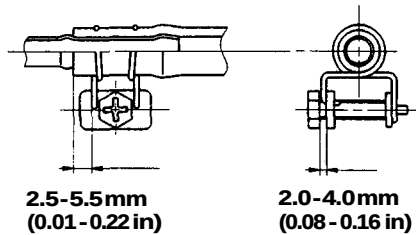
NOTE:

- Slide each hose over the corresponding pipe up to the stop on the pipe. Install the clamp or adjustable clamp at the specified distance from the hose end as shown.
- Add the power steering fluid to the specified level on the reservoir and check for leaks (refer to the '95 - 98 Acura 2.5TL Service Manual, P/N 61SW504).

CAUTION: Check all clamps for deterioration and deformation; replace the clamps with new ones if necessary.

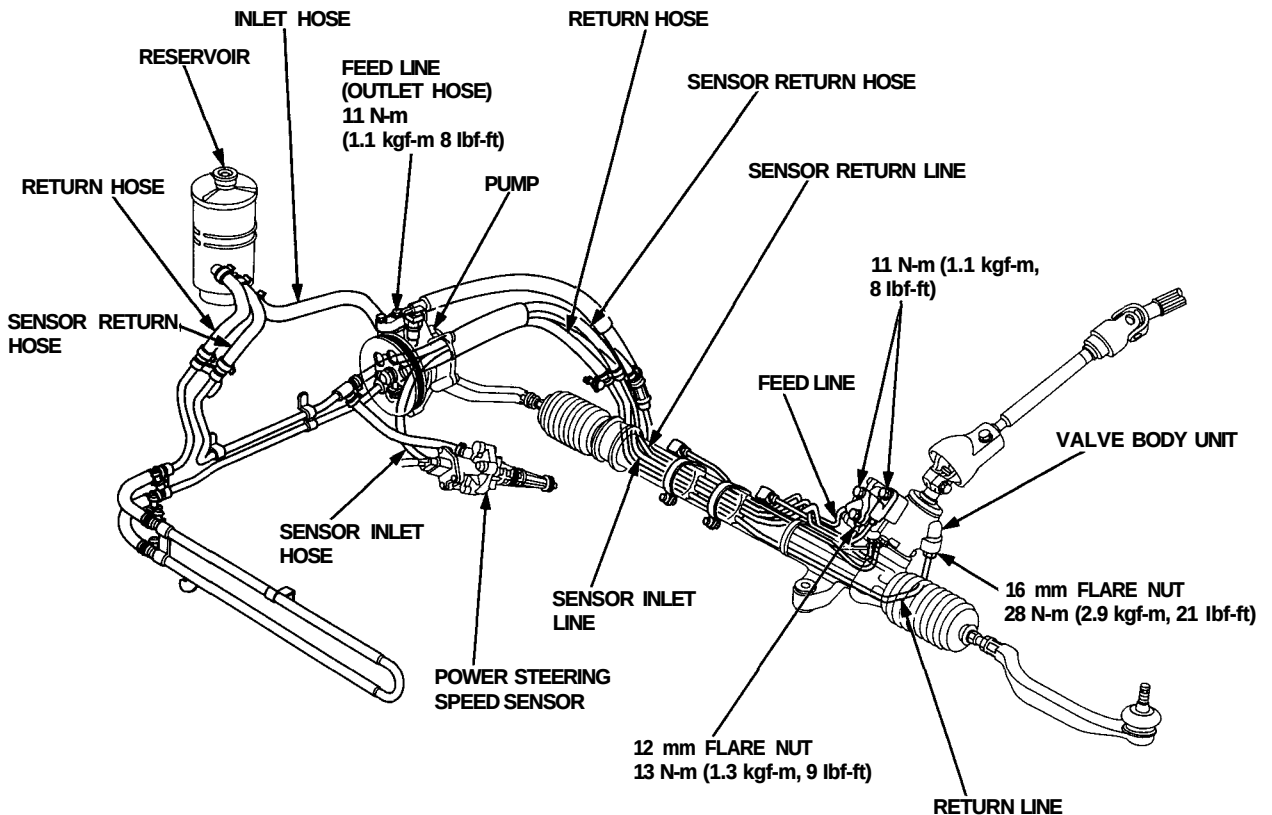
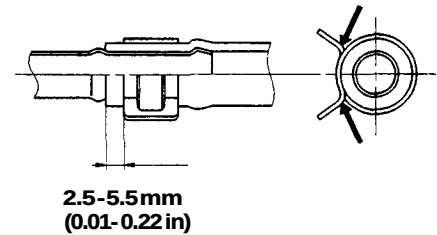
ADJUSTABLE HOSE CLAMP:

Slide the hose over the pipe until it contacts the stop.



HOSE CLAMP:

Slide the hose over the pipe until it contacts the stop.



Power Steering Pump

Removal/Installation

NOTE: Before disconnecting the hoses from the pump, place a suitable container under the vehicle.

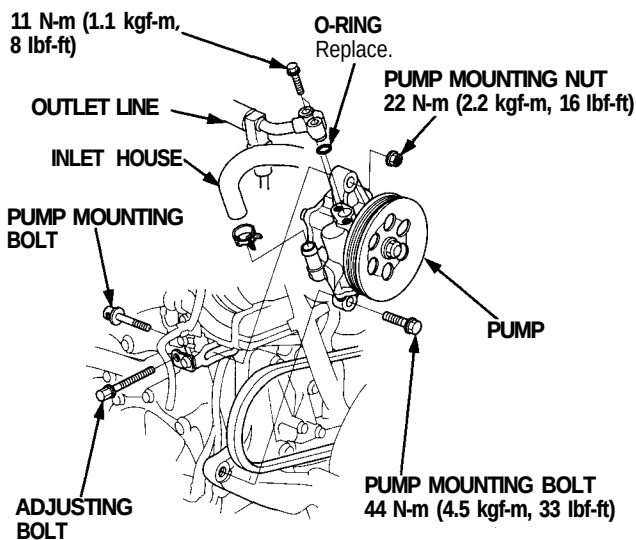
1. Remove the air cleaner (ACL).
2. Remove the belt by loosening the pump adjusting bolt, mounting bolts.
3. Disconnect the inlet hose and the outlet line from the pump them, plug.

NOTE: Take care not to spill the fluid on the body or parts. Wipe off any spilled fluid at once.

4. Remove the pump mounting bolts, then remove the pump.

NOTE:

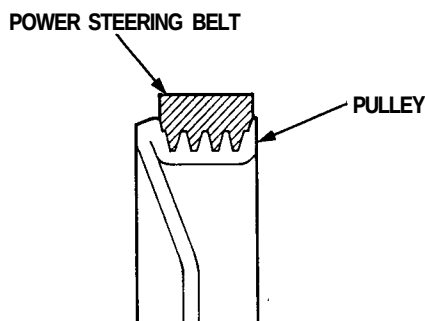
- Do not turn the steering wheel with the pump removed.
- Wrap the opening of the pump with a piece of tape to prevent foreign material from entering the pump.



5. Install the pump in the reverse order of removal.

CAUTION:

- Make sure that the power steering belt is positioned properly on the pulley.
- Do not get power steering fluid or grease on the power steering belt or pulley faces. Clean off any fluid or grease before installation.

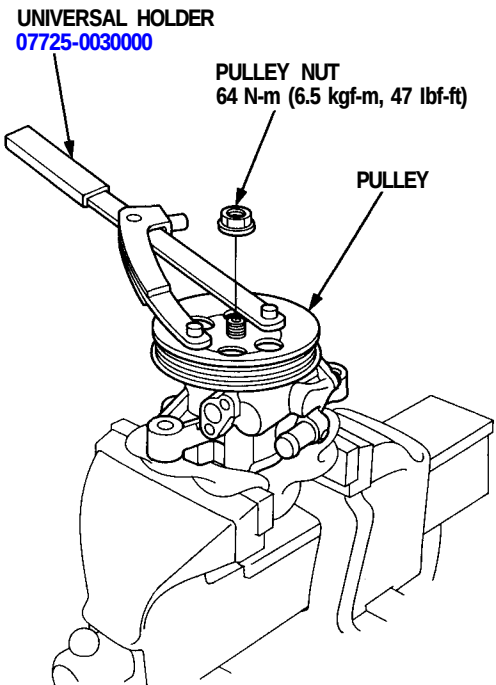


Disassembly/Installation

Pulley Removal/Installation

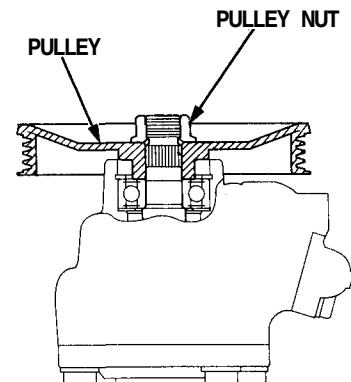
1. Drain the fluid from the pump.
2. Hold the steering pump in a vise with soft jaws, hold the pulley with the special tool, and remove the pulley nut and pulley.

CAUTION: Be careful not to damage the pump housing with the jaws of the vise.



3. Install the pulley in the reverse of removal.

NOTE: Install the pump pulley as shown, then install the pulley nut.





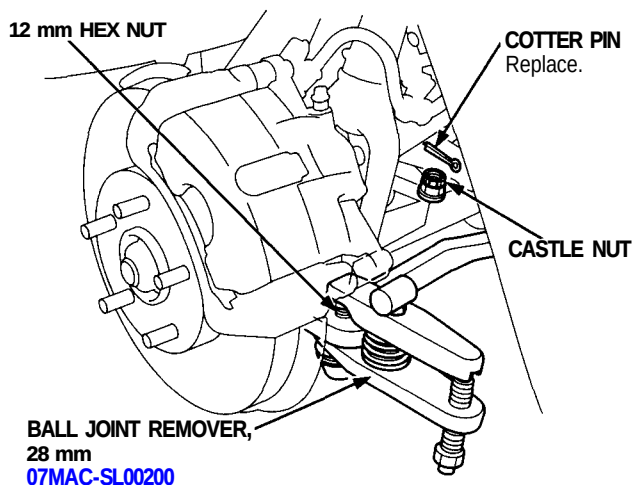
Steering Gearbox

Removal

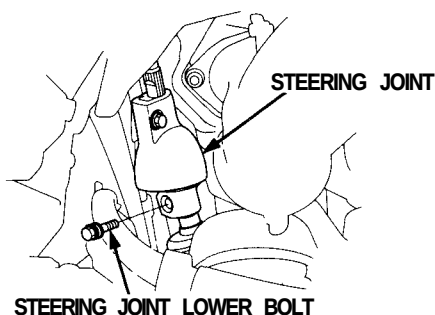
NOTE: Use solvent and a brush to wash off any oil and dirt from the valve body unit, its lines, and the end of the gearbox. Blow dry with compressed air.

1. Drain the power steering fluid (refer to the '95 - 98 Acura 2.5TL Service Manual, P/N 61SW504).
2. Raise the front of vehicle, and support it on safety stands in the proper locations.
3. Remove the front wheels.
4. Remove the driver's airbag assembly and steering wheel (refer to the '95 - 98 Acura 2.5TL Service Manual, P/N 61SW504):
5. Remove the cotter pin from the castle nut, and remove the nut.
6. Install the 12 mm hex nut on the ball joint. Be sure that the 12 mm hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the special tool.
NOTE: Remove the ball joint using the Ball Joint Remover, 28 mm (07MAC - SL00200). Refer to page 18-8 for how to use the ball joint remover.
7. Separate the tie-rod ball joint and knuckle using the special tool.

CAUTION: Avoid damaging the ball joint boot.

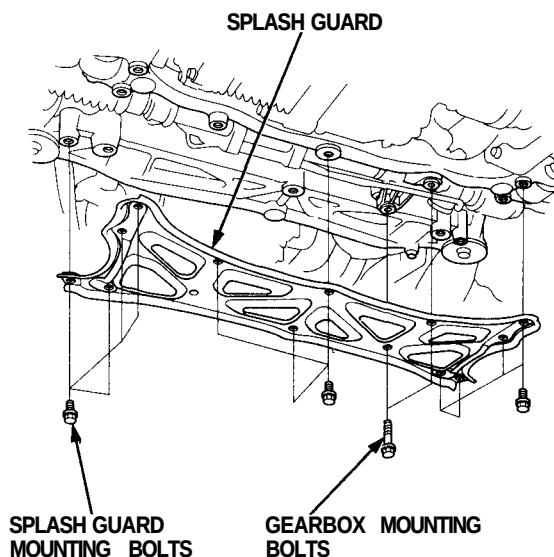


8. From the engine compartment, remove the steering joint lower bolt, and move the joint toward the column.

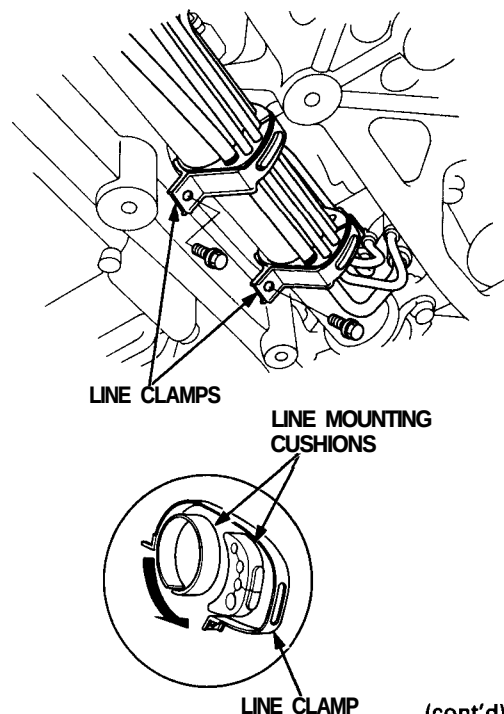


9. Remove the splash guard.

NOTE: Some splash guard mounting bolts are also used as gearbox mounting bolts. The gearbox will tilt to the side when these bolts are removed.



10. Remove the line clamps and line mounting cushions from the gearbox.



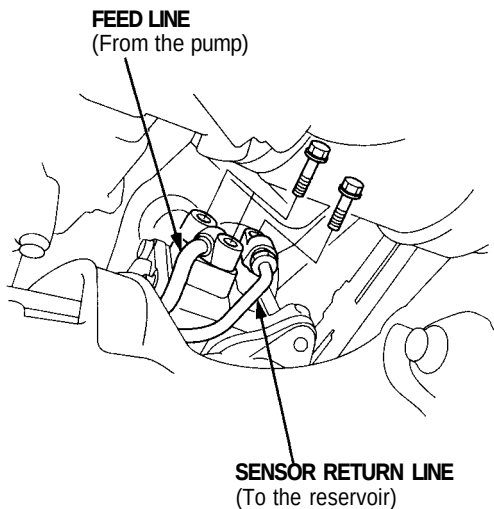
(cont'd)

Steering Gearbox

Removal (cont'd)

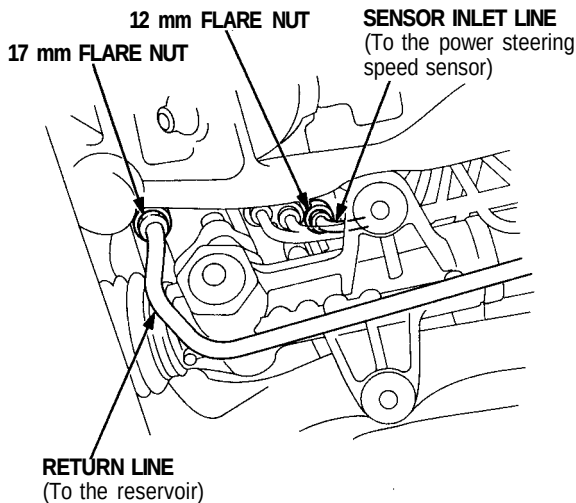
11. Disconnect the two lines (feed line and sensor return line) from the valve body unit upper side.

CAUTION: After disconnecting the pipes, plug or seal the line fittings with a piece of tape or equivalent to prevent foreign materials from entering the valve body unit:



12. Disconnect the two lines (sensor inlet line and return line) from the valve body unit lower side.

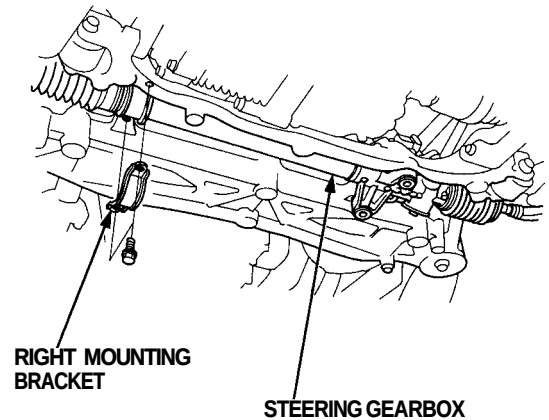
NOTE: It is not necessary to loosen cylinder lines A and B between the valve body unit and the cylinder, (see page 17-11)



13. Remove the right mounting bracket and steering gearbox.

NOTE: Before removing the gearbox, place a jack stand under the gearbox.

CAUTION: Be careful not to bend or damage cylinder lines A and B when removing the steering gearbox.





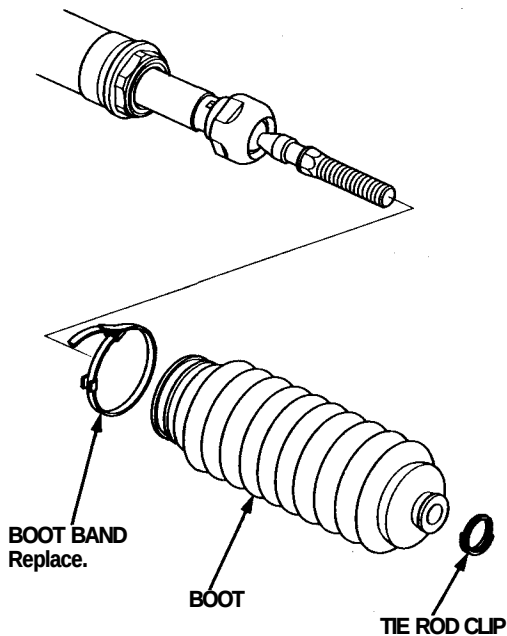
Disassembly

Steering Rack Disassembly

NOTE:

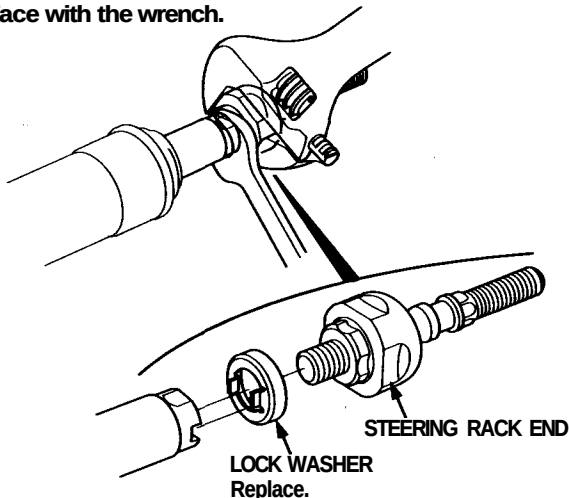
- Before disassembling the gearbox, wash it off with solvent and a brush.
- Do not dip seals and O-rings in solvent.

1. Remove the steering gearbox (see page 17-9).
2. Remove the tie-rod end and locknut.
3. Remove the boot bands and tie-rod clips. Pull the boots away from the ends of the gearbox.

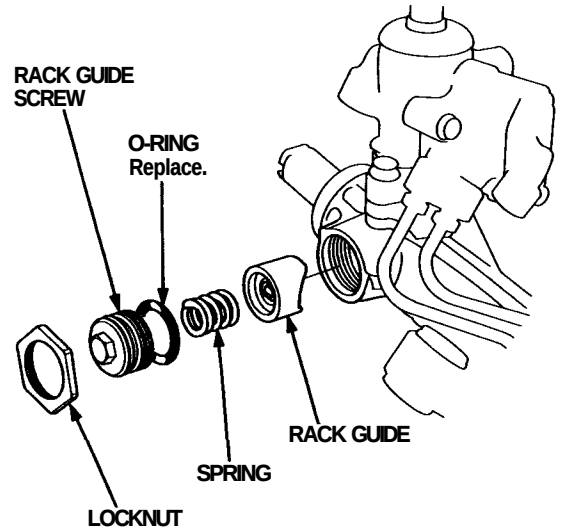


4. Hold the steering rack with a wrench, and unscrew the rack end with another.

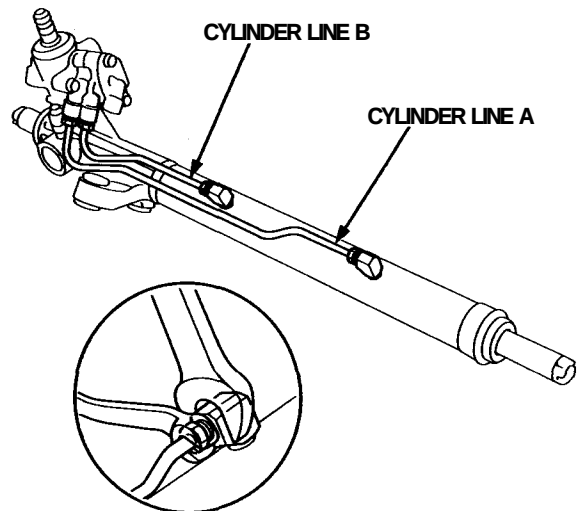
CAUTION: Be careful not to damage the rack surface with the wrench.



5. Loosen the locknut and remove the rack guide screw.
6. Remove the spring and rack guide from the gearbox housing.



7. Remove cylinder lines A and B from the gearbox.



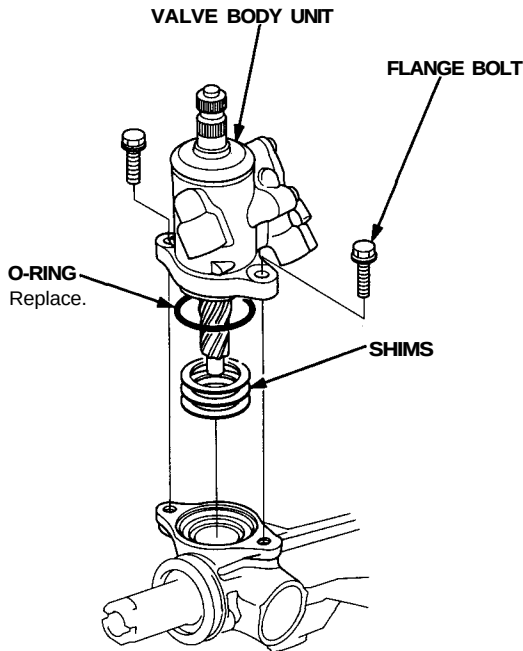
8. Drain the fluid from the cylinder fittings by slowly moving the steering rack back and forth.

(cont'd)

Steering Gearbox

Disassembly (cont'd)

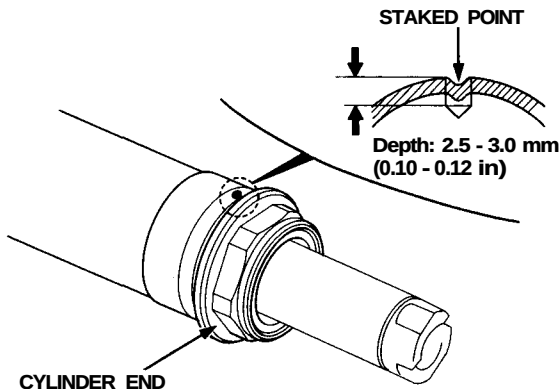
9. Remove the two flange bolts, then remove the valve body unit from the gearbox (refer to the '95 - 98 Acura 2.5TL Service Manual, P/N 61SW504).



10. Drill a 3 mm (0.12 in) diameter hole approximately 2.5 - 3.0 mm (0.10 - 0.12 in) in depth in the staked-point on the cylinder.

NOTE:

- Do not allow metal shavings to enter the cylinder housing.
- After removing the cylinder end, remove any burrs at the stake point.



11. Install the special tool to the steering gearbox housing. Clamp the tool in a vise with soft jaws as shown, then loosen and remove the cylinder end.

CAUTION: Do not clamp the cylinder housing.

PULLER YOKE:

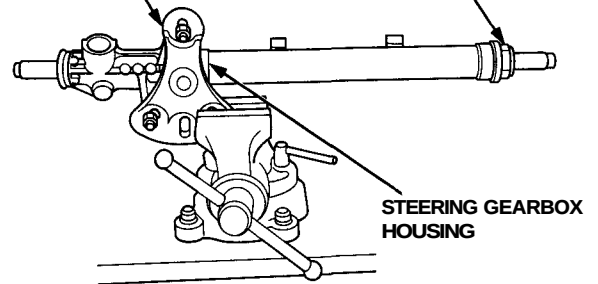
(Commercially available)

Snap-On® T/N CJ123-1

OTC® T/N 7372
or equivalent

CYLINDER END

Check the rubber stop in the cylinder end for damage or deterioration. If the rubber stop is damaged, replace the cylinder end.



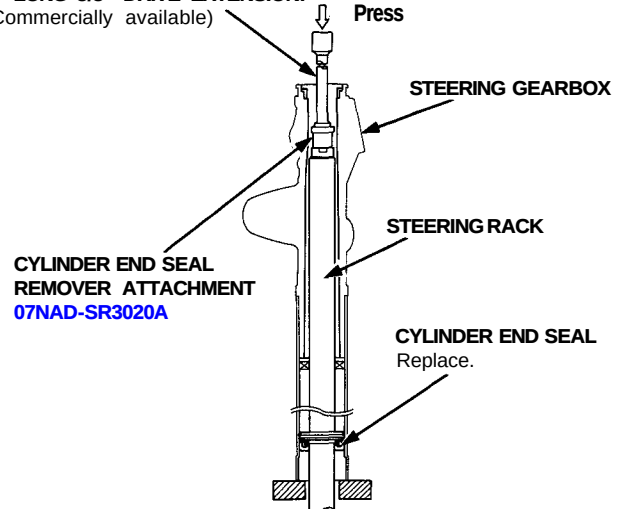
12. Set the steering gearbox in a pressbox so the gearbox housing points upward.
13. Insert a 6" long, 3/8" drive extension into the special tool.
14. Press the cylinder end seal and steering rack out of the gearbox.

NOTE: Hold the steering rack to keep it from falling when pressed clear.

CAUTION: Be careful not to damage to inner surface of the cylinder housing with the tool.

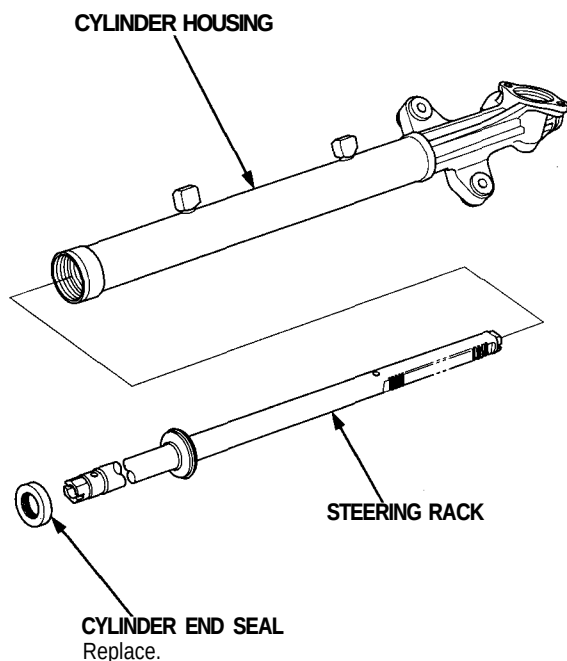
6" LONG 3/8" DRIVE EXTENSION:

(Commercially available)



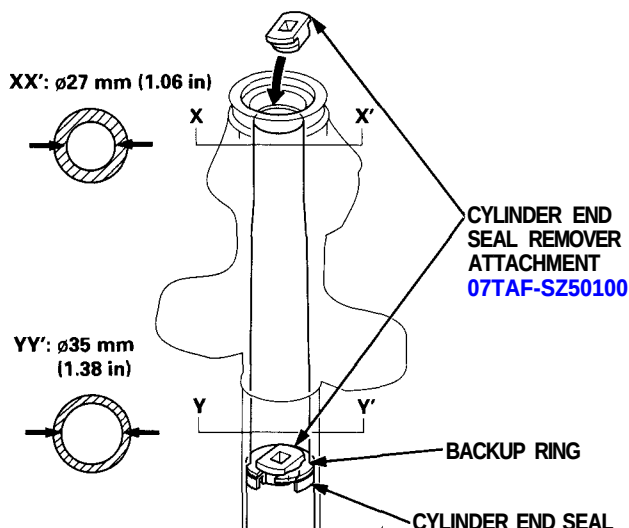


15. Remove the cylinder end seal from the steering rack.



16. Turn the special tool so it will fit through the end of the gearbox housing, then position special tool on the backup ring as shown below.

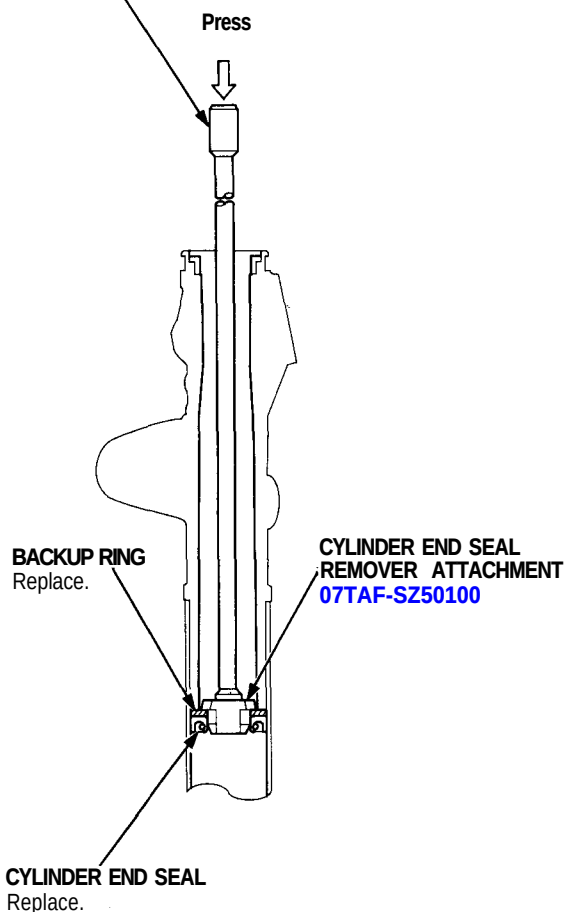
NOTE: Make sure that the special tool is securely positioned on the backup ring edges.



17. Insert a 24" long 3/8" drive extension into the cylinder and the special tool from the gearbox side.

CAUTION: Be careful not to damage the inside surface of the housing with the tools.

24" LONG 3/8" DRIVE EXTENSION
(Commercially available)



18. Set the steering gearbox in a press, then press out the cylinder end seal and backup ring from the gearbox.

CAUTION:

- Keep the tool straight to avoid damaging the cylinder wall. Check the tool angle, and correct it if necessary, when removing the cylinder end seal.
- Use a press to remove the cylinder end seal. Do not try to remove the seal by striking the tool. It will break the backup ring, and the cylinder end seal will remain in the gearbox.

(cont'd)

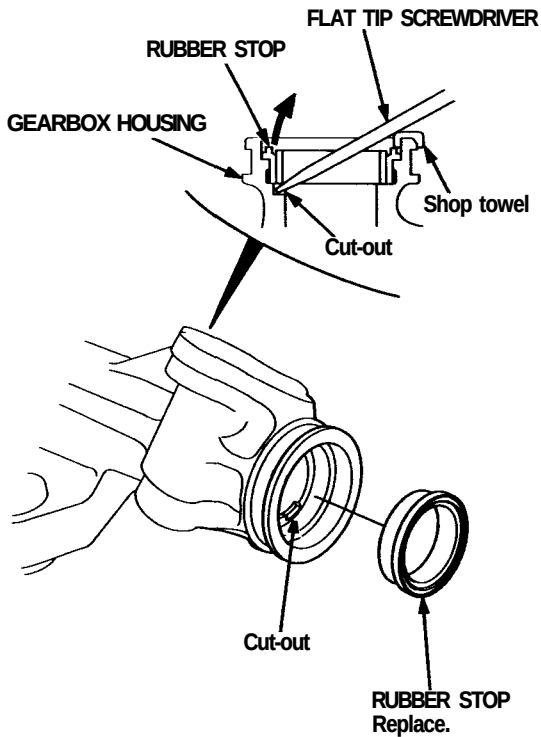
Steering Gearbox

Disassembly (cont'd)

19. Check the rubber stop for damage or deterioration if OK, go on step 20; if not, replace the rubber stop, step as shown below:

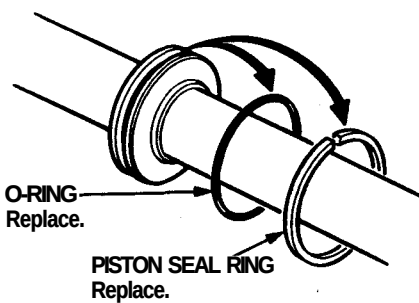
Remove the rubber stop by prying it out of the gearbox housing with a flat tip screwdriver.

CAUTION: Protect the pry point on the gearbox housing with shop towel.



20. Carefully pry the piston seal ring and O-ring off the rack/piston.

CAUTION: Be careful not to damage the inside of seal ring groove and piston edges when removing the seal ring.

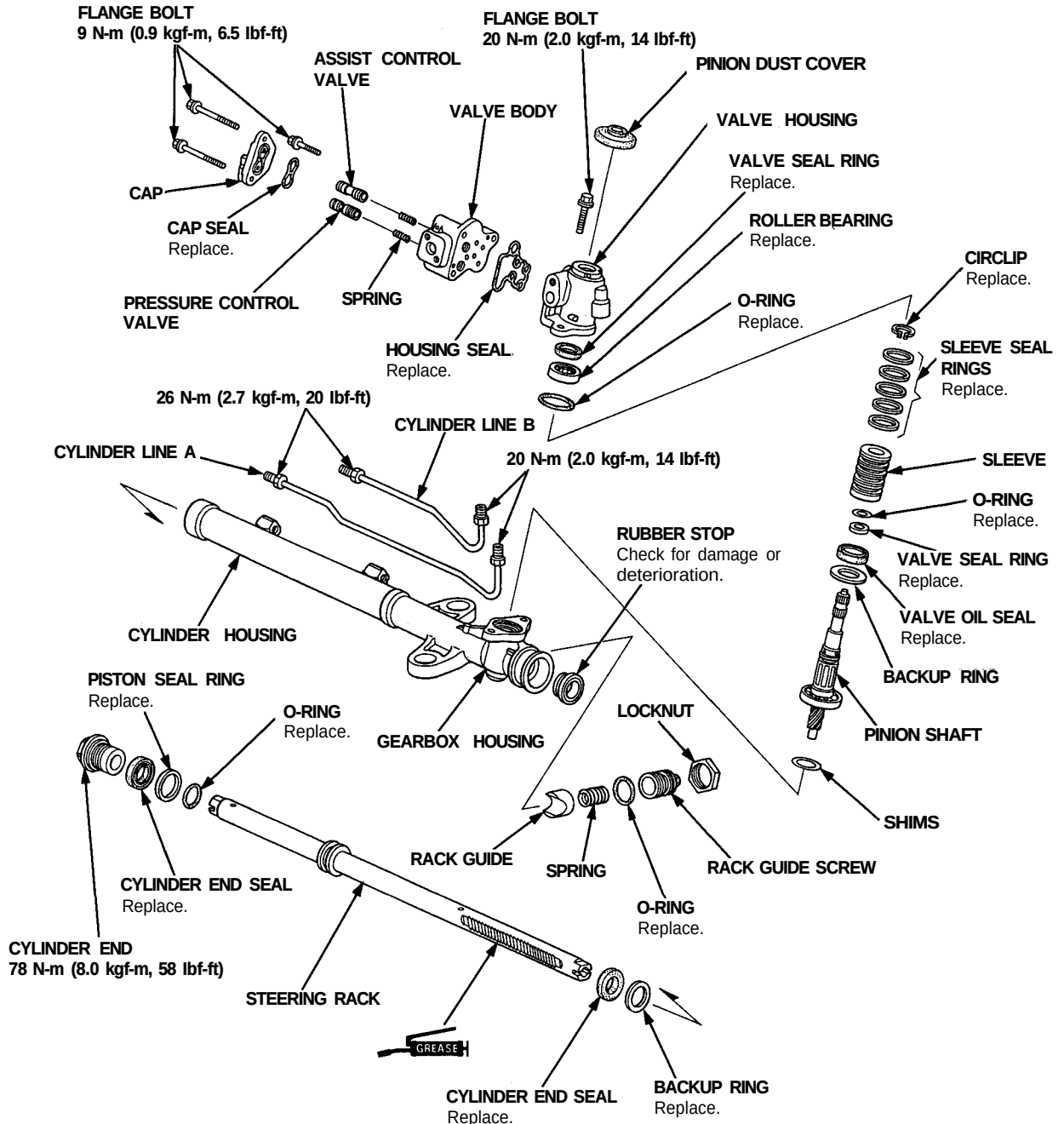




Reassembly

NOTE:

- Clean the disassembled parts with a solvent, and dry them with compressed air. Do not dip the rubber parts in a solvent.
- Always replace the O-rings and rubber seals with new ones before assembly.
- Apply the recommended power steering fluid to the parts indicated in the assembly procedures.
- Do not allow dust, dirt, or other foreign materials to enter the power steering system.
- Use the appropriate special tools where necessary.



(cont'd)

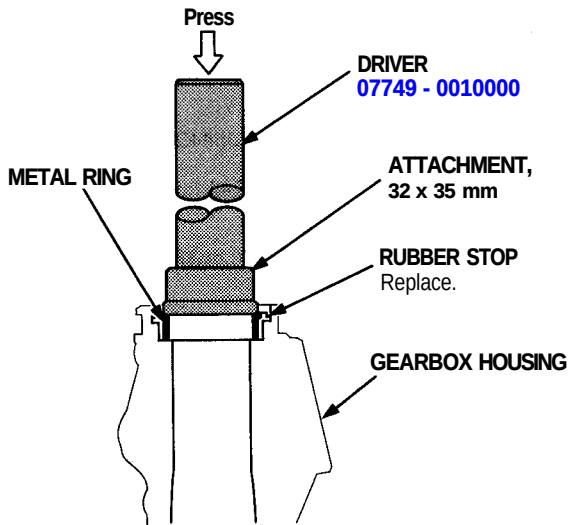
Steering Gearbox

Reassembly (cont'd)

Steering Rack Installation

1. If removed the rubber stop; position the new rubber stop in the gearbox housing, then press it in using a hydraulic press and the special tools as shown.

NOTE: Make sure that the special tool presses against the metal portion of the rubber stop.

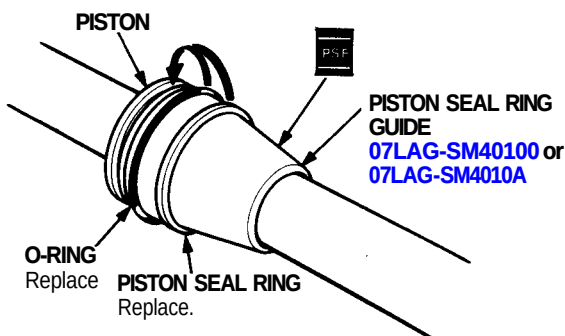


2. Coat the piston seal ring guide with power steering fluid, and slide it onto the rack, big end first.
3. Position the new O-ring and new piston seal ring on the special tool, then slide them down toward the big end of the tool.

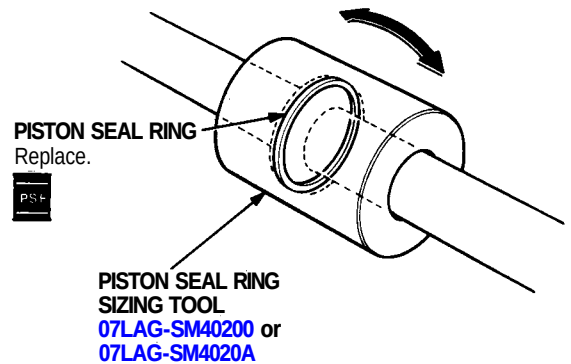
NOTE:

- Do not over expand the resin seal rings. Install the resin seal rings with care so as not to damage them. After installation, be sure to contract the seal ring using the special tool (sizing tool).
- Replace piston's O-ring and seal ring as a set.

4. Pull the O-ring off into the piston groove, then pull the piston seal ring off into the piston groove on top of the O-ring.

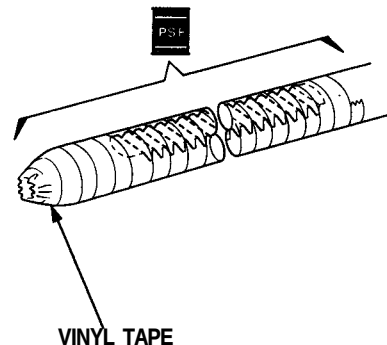


5. Coat the piston seal ring and the inside of the special tool with power steering fluid.
6. Carefully slide the tool onto the rack and over the piston seal ring.
7. Move the special tool back and forth several times to make the piston seal ring fit snugly in the piston.



8. Wrap vinyl tape around the rack teeth and rack end edges, and coat the surface of the tape with the power steering fluid.

NOTE: Make sure that the vinyl tape is wrapped carefully so that there is no stepped portion.

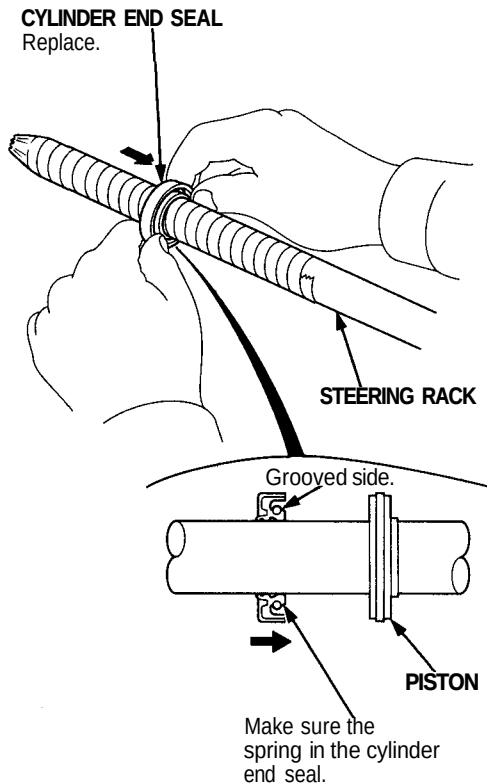




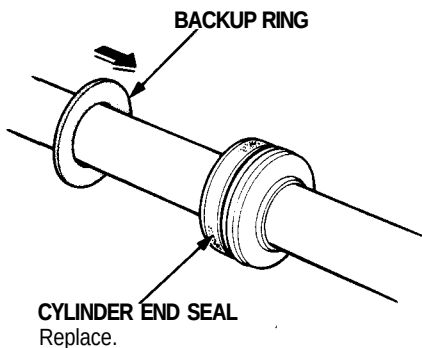
9. Coat the inside surface of the new cylinder end seal with power steering fluid.

10. Install the cylinder end seal onto the steering rack with its grooved side toward the piston.

CAUTION: When installing the cylinder end seal, be careful not to damage the sealing lip face of the seal with the edges or teeth of the steering rack.

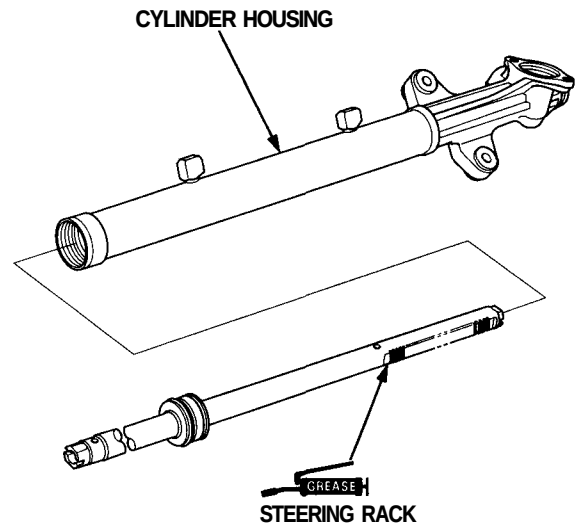


11. Remove the vinyl tape from the steering rack. Remove any residue of tape adhesive.
12. Install the new backup ring on the steering rack, then place the cylinder end seal to piston.

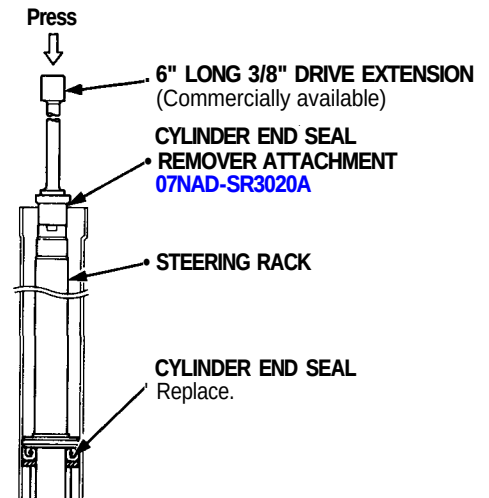


13. Grease the steering rack teeth, then insert the steering rack into the cylinder housing.

CAUTION: Be careful not to damage to inner surface of the cylinder housing with the rack edges.



14. Insert 6" long 3/8" drive extension and the special tool into the steering rack as shown.



15. Install the cylinder end seal into the bottom of the cylinder by pressing on the tool with a press as shown.

CAUTION: Do not push on the tool with excessive force as it may damage the cylinder end seal.

(cont'd)

Steering Gearbox

Reassembly (cont'd)

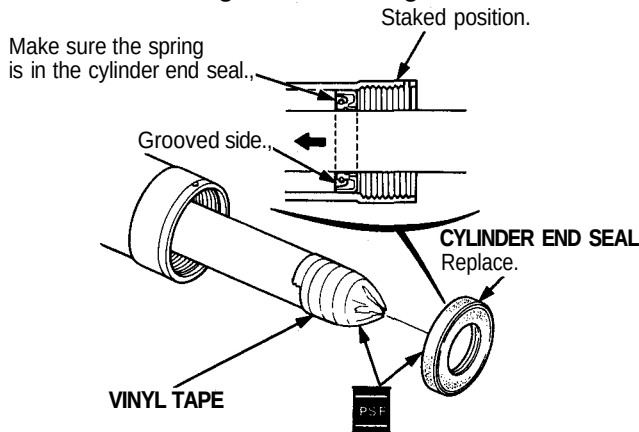
16. Wrap vinyl tape around the rack end edges, and coat the surface of the tape with the power steering fluid.

NOTE: Make sure that the vinyl tape is wrapped carefully so that there is no stepped portion.

17. Coat the inside surface of the new cylinder end seal with power steering fluid.

18. Install the cylinder end seal onto the steering rack with its grooved side toward the piston.

CAUTION: When installing the cylinder end seal, be careful not to damage the sealing lip face of the seal with the edges of the steering rack.



19. Remove the vinyl tape from the steering rack, then push in the cylinder end seal with your finger.

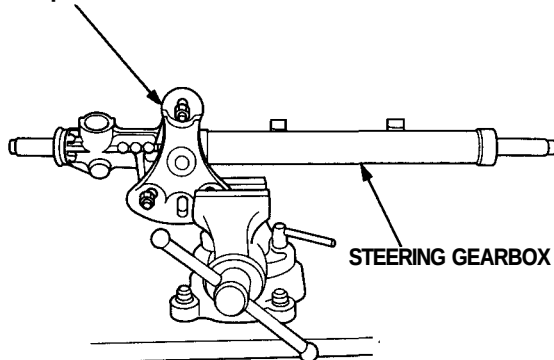
NOTE:

- Remove any residue of tape adhesive.
- Take care not to damage the cylinder end seal with the threads and burrs at the staked position of the gearbox.

20. Install special to the steering gearbox, then clamp the tool in a vise with soft jaws as shown.

CAUTION: Do not clamp the cylinder housing.

PULLER YOKE:
(Commercially available)
Snap-On® T/N CJ123-1
OTC® T/N 7372
or equivalent

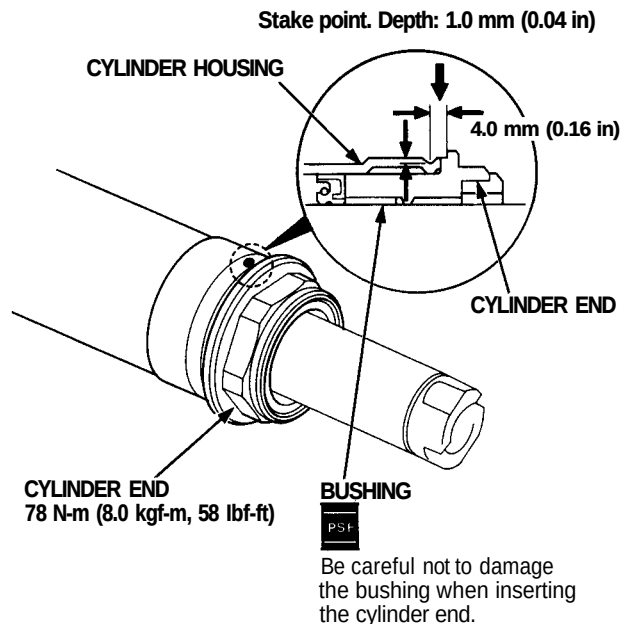


21. Coat the inside surface of the cylinder end with power steering fluid, then install the cylinder end by screwing it into the cylinder housing.

22. Remove the puller yoke from the steering gearbox.

23. After tightening the cylinder end, stake the point of the cylinder housing shown below.

NOTE: Stake the cylinder in the position opposite from where the stake was removed during disassembly.





24. Select the 44 mm shim(s).

NOTE: Only reinstall the original 44 mm shim(s) when the steering gearbox is reassembled without replacing the pinion shaft, valve housing, and gearbox housing with new ones.

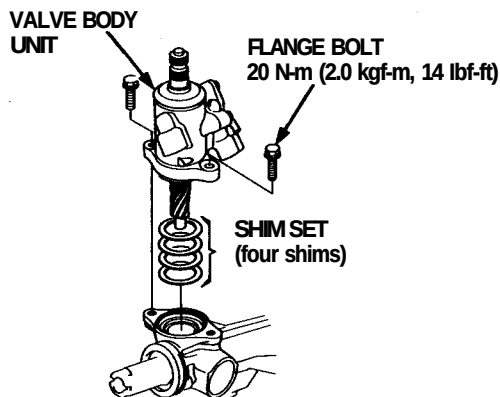
If the pinion shaft, valve housing, and gearbox housing are replaced, select the new shim(s) as follows.

Shim selection:

- a. Set the four 44 mm shims on the bearing surface of the gearbox housing. Total thickness of the four shims should equal no more than 0.70 mm.
Shim set: four 44 mm shims (Thickness: 0.10 mm, 0.15 mm, 0.20 mm, 0.25 mm respectively)

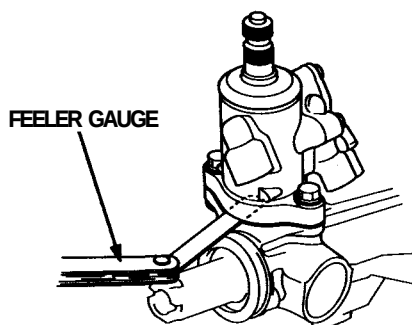
CAUTION: The four 44 mm shims do not have thickness identification marks. Measure the thickness of each shim using a micrometer, and mark the shim for identification.

- b. Install the valve body unit on the gearbox, and tighten the flange bolts to the specified torque.



- c. Measure the clearance between the gearbox and valve body unit using a feeler gauge as shown.

NOTE: Measure the clearance at the point midway between the two mounting bolts.



- d. Determine the required thickness of the 44 mm shims by subtracting the clearance obtained in the step - 3 from the total thickness of the four shims. (Total thickness of the 4 shims) - (Clearance) = Required thickness of the shims

NOTE: Select the shims so that the total thickness is close to, but less than the required thickness.

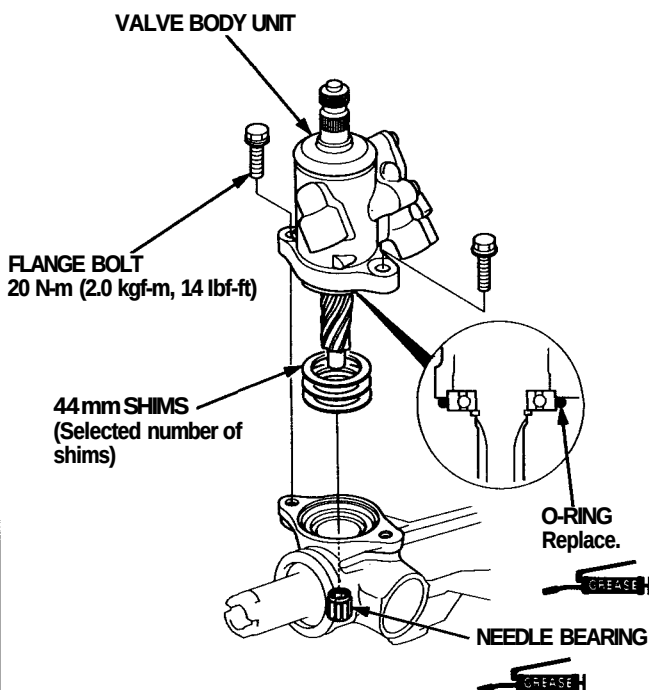
Example:

Measurement is 0.28 mm (0.011 in):
 $0.07 - 0.28 = 0.42 \text{ mm}$ ($0.028 - 0.011 = 0.017 \text{ in}$)

The selected shims should be 0.25 mm (0.010 in) and 0.15 mm (0.006 in) in thickness.

If the required shim thickness is 0.10 mm or less, no shims are necessary.

25. Set the selected 44 mm shims on the bearing surface of the gearbox housing.
26. Coat the new O-ring with grease, and carefully fit it on the valve housing.
27. Apply grease to the needle bearing in the gearbox housing.
28. Install the valve body unit on the gearbox housing by engaging the gears.
NOTE: Note the valve body unit installation position (direction of line connection).
29. Tighten the flange bolts to the specified torque.



(cont'd)

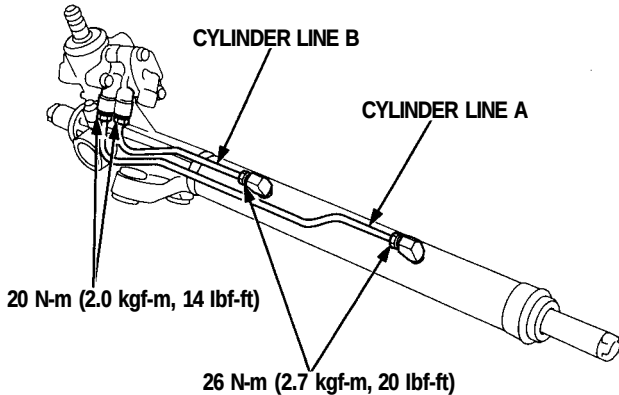
Steering Gearbox

Reassembly (cont'd)

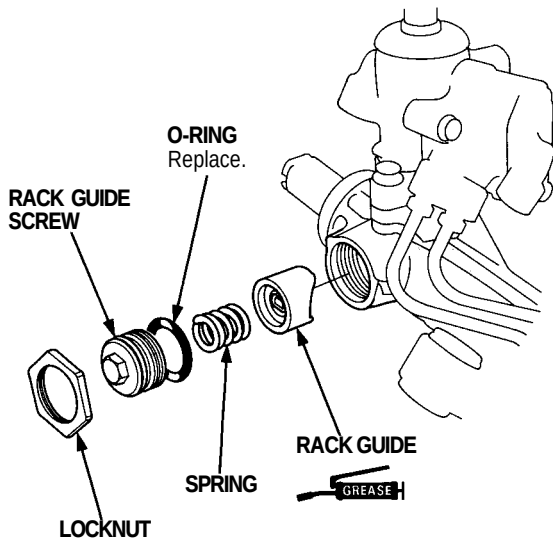
30. Install cylinder lines A and B.

NOTE:

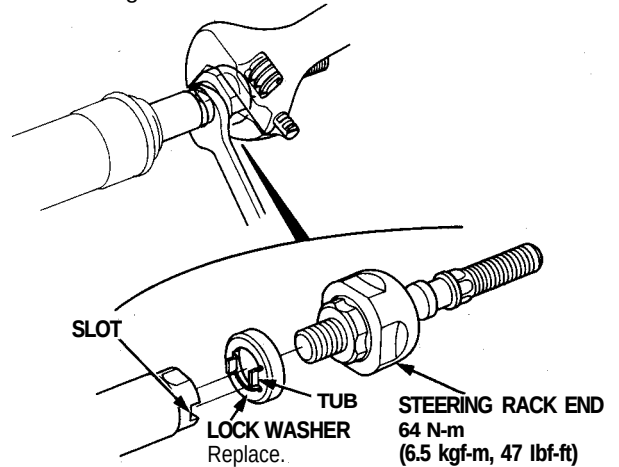
- Clean the joints of cylinder lines A and B thoroughly. The joints must be free of foreign material.
- Install cylinder lines A and B by lighting the flare nuts by hand first, then tighten the flare nuts to the specified torque.



31. Grease the sliding surface of the rack guide, and install it onto the gearbox housing.
32. Apply a thin coat of grease to the new O-ring, and install it on the rack guide screw.
33. Install the spring, rack guide screw and locknut on the gearbox housing.
34. Adjust the rack guide screw (see page 17-5).
- NOTE:** After adjusting, check that the rack moves smoothly by sliding the rack right and left.



35. Install the new lock washer in the groove in the steering rack.



36. Screw each rack end into the rack.
37. Hold the steering rack with a wrench, and tighten the rack end with another.

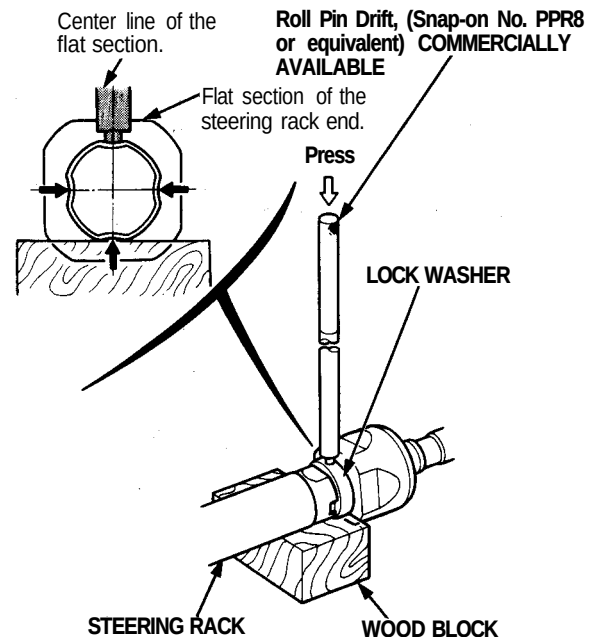
CAUTION: Be careful not to damage the rack surface with the wrench.

38. After tightening the rack, end, stake the four section of lock washer with the tool and a hydraulic press.

NOTE:

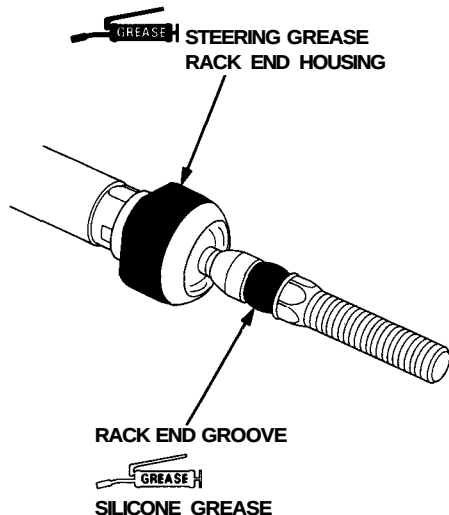
- Place the wood block on the press table, then set the lock washer section of the rack end on the wood block securely.
- Be sure the tool is aligned with the flat sections of the steering rack end before pressing.
- Stake the lock washer in the center of the flat section of the steering rack end.

STAKE POINT "←"





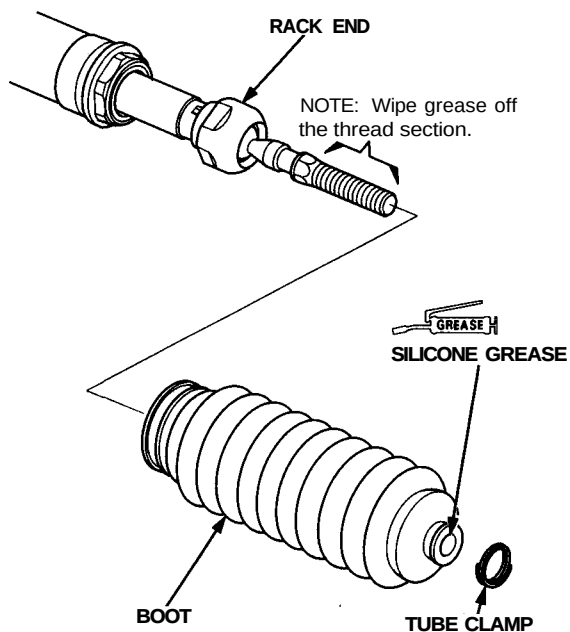
39. Apply steering grease to the circumference of the rack end housing.



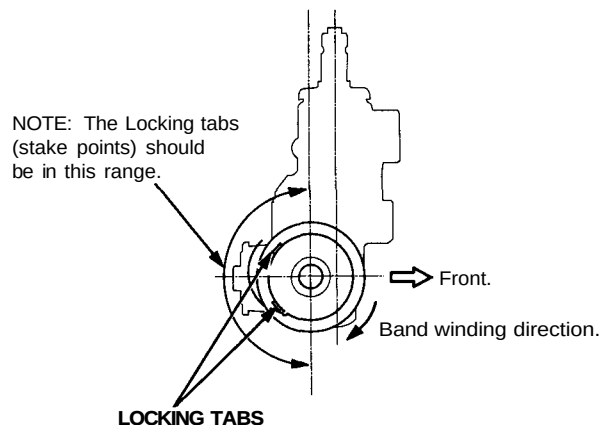
40. Apply a light coat of silicone grease to the boot grooves on the rack ends.

41. Install the boots in the rack end with the tube clamps.

NOTE: Install the boots with the rack in the straight ahead position (right and left tie-rods are equal in length).



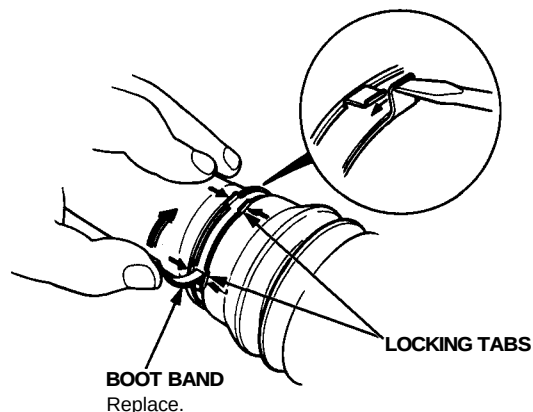
42. Install the new boot bands on the boots as shown.



43. Bend both sets of locking tabs.

44. Lightly tap on the doubled-over portions to reduce their height.

CAUTION: Stake the band locking tabs firmly.



45. Slide the rack right and left to be certain that the boots are not deformed or twisted.

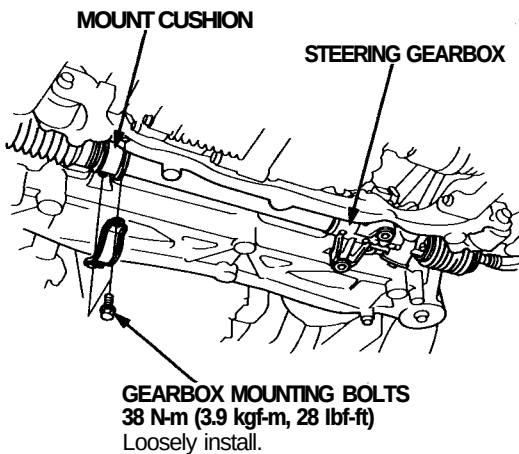
46. Loosely install the tie-rod locknuts and tie-rod ends on the rack ends.

Steering Gearbox

Installation

CAUTION: Be careful not to bend or damage cylinder lines A and B or the four fluid lines when installing the gearbox.

1. Install the mount cushion on the right side.
2. Loosely install the mounting bracket on the cushion with the two gearbox mounting bolts.



3. Center the steering rack within its stroke.

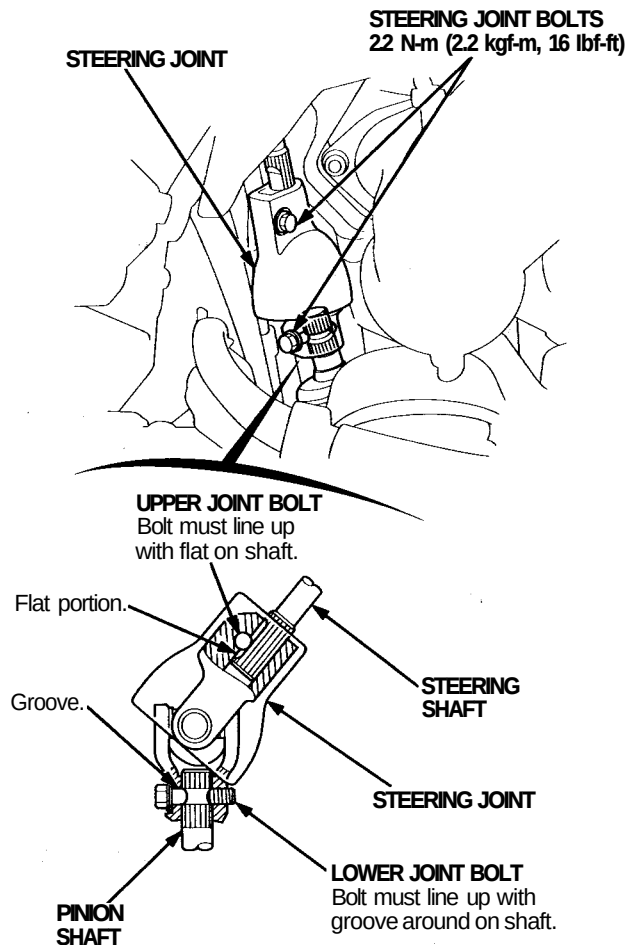
4. Install the steering joint, and reconnect the steering shaft and pinion shaft.

NOTE: Make sure the steering joint is connected as follows:

- a. Insert the upper end of the steering joint onto the steering shaft (line up the bolt hole with the flat on the shaft), and loosely install the upper joint bolt,
- b. Slip the lower end of the steering joint onto the pinion shaft (line up the bolt hole with the groove around the shaft), and loosely install the lower joint bolt.

Be sure that the lower joint bolt is securely in the groove in the pinion shaft,

- c. Pull on the steering joint to make sure that the steering joint is fully seated. Then tighten the joint bolts.

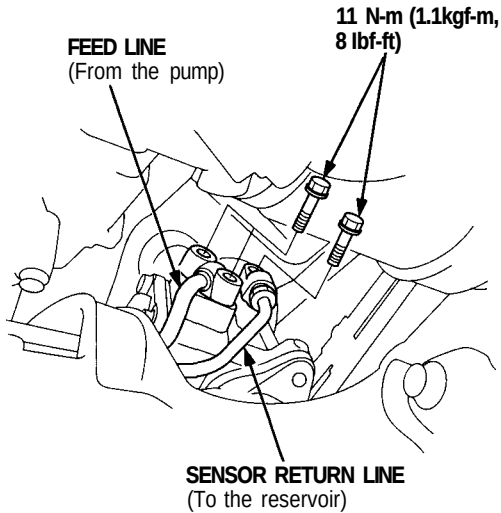


5. Center the cable reel by first rotating it clockwise until it stops. Then rotate it counterclockwise (approximately two turns) until the arrow mark on the label points straight up.

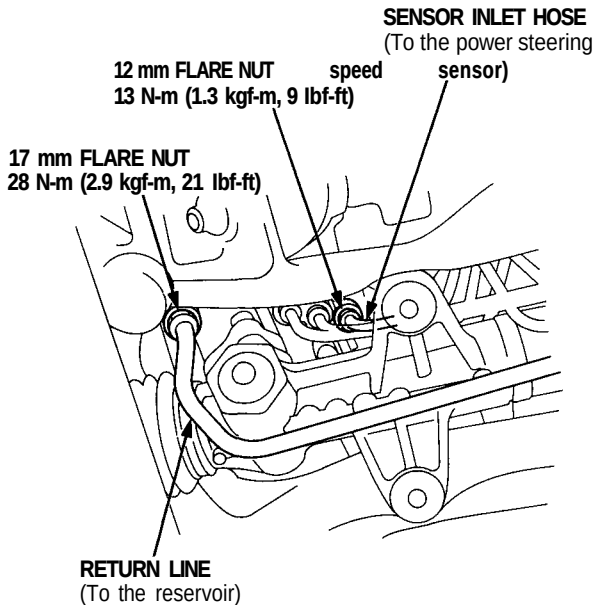
Reinstall the steering wheel (refer to the '95 - 98 Acura 2.5TL Service Manual, P/N 61SW504):



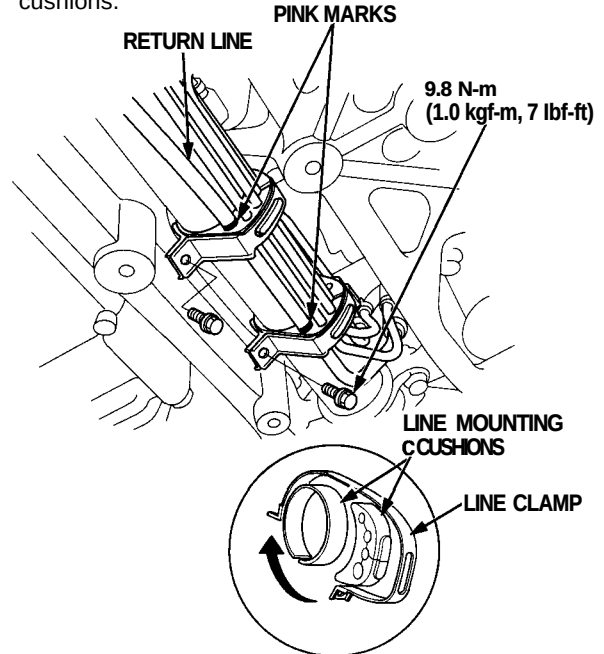
6. Reconnect the two lines (feed line and sensor line) to the upper side of the valve body unit.



7. Reconnect the two lines (sensor inlet line and return line) to the lower side of the valve body unit.



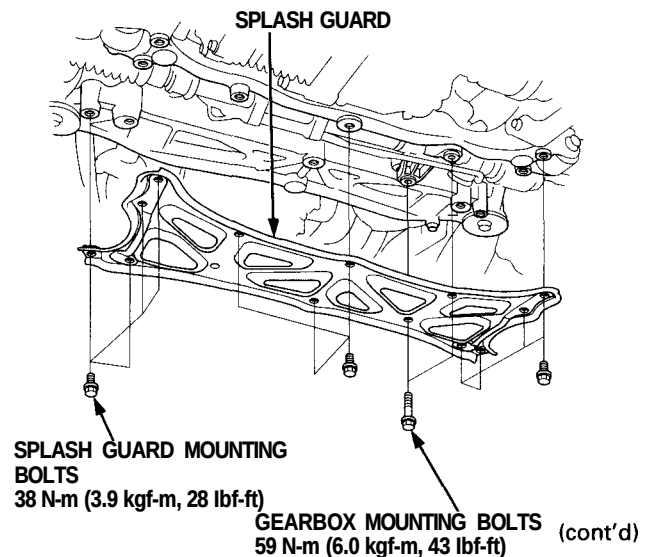
8. Install the line mounting cushions by aligning the pink marks on the return line (large diameter line).
NOTE: After installing the pipe mounting cushions, make sure that there is no interference between the lines and rear beam.
9. Install the two line clamps on the line mounting cushions.



NOTE: Make sure that there is no interference between the fluid lines, the rear beam or any other parts.

10. Tighten the two gearbox mounting bolts on the right side that were loosely installed in step 2.
11. Install the splash guard with the two gearbox mounting bolts on the left side.
12. Tighten the splash guard attaching bolts.

NOTE: Install the bolts loosely first, then tighten



Steering Gearbox

Installation (cont'd)

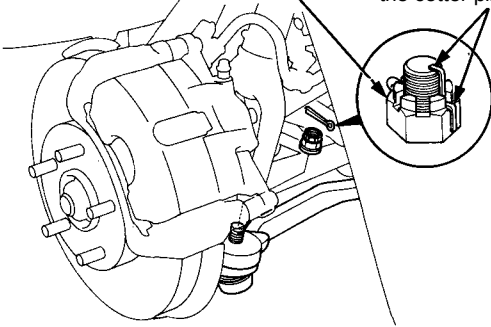
13. Reconnect the tie-rod ends to the steering knuckles, tighten the castle nut to the specified torque, and install new cotter pins.

NOTE: Before connecting the tie-rod ends, check the ball joint pin tapered section and threads section for grease contamination, and wipe it if necessary.

CAUTION: Torque the castle nut to the lower torque specification, then tighten it only far enough to align the slot with the pin hole. Do not align the nut by loosening.

CASTLE NUT
49-59N·m
(5.0 - 6.0 kgf-m, 36 - 43 lbf-ft)

COTTER PIN
Replace.
On reassembly, bend
the cotter pin as shown.



14. Install the front wheels.
15. Fill the system with power steering fluid, and bleed air from the system (refer to the '95 - 98 Acura 2.5TL Service Manual, P/N 61SW504).
16. After installation, perform the following checks.
 - Start the engine, allow it to idle, and turn the steering wheel from lock-to-lock several times to warm up the fluid. Check the gearbox for leaks.
 - Adjust the front toe (see [section 18](#)).
 - Check the steering wheel spoke angle. Adjust by turning the right and left tie-rods, if necessary.

NOTE: Turn the right and left tie-rods equally.

Steering Gearbox

Ball Joint Boot Replacement

'95 - '97 models:

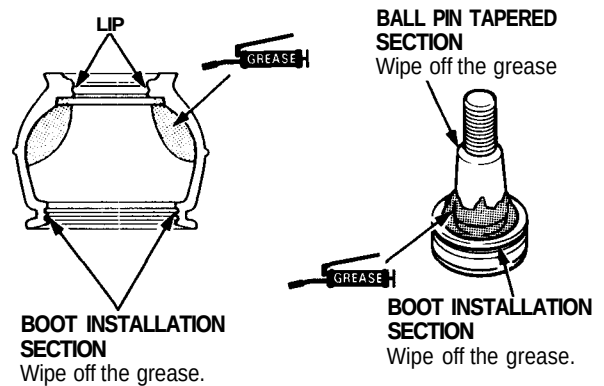
1. Remove the boot set ring and the boot.

CAUTION: Do not contaminate the boot installation section with grease.

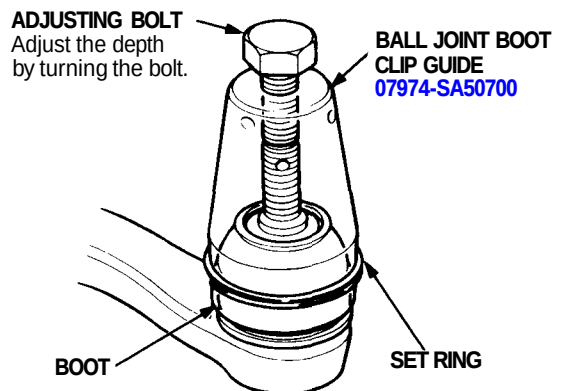
2. Pack the interior of the boot and lip with grease.
3. Wipe the grease off the sliding surface of the ball pin, then pack the lower area with fresh grease.

CAUTION:

- Keep grease off the boot installation section and the tapered section of the ball pin.
- Do not allow dust, dirt, or other foreign materials to enter the boot.



4. Install the boot in the groove of the boot installation section securely, then bleed air.



5. Adjust the special tool with the adjusting bolt until the end of the tool aligns with the groove on the boot.
Slide the set ring over the tool and into position .

CAUTION: After installing the boot, check the ball pin tapered section for grease contamination and wipe it if necessary.



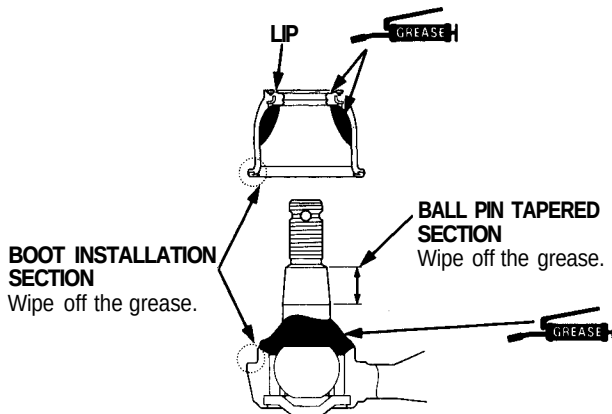
'98 model:

CAUTION: Do not contaminate the boot installation section with grease.

1. Remove the boot from the tie-rod end, and wipe the old grease off the ball pin.
2. Pack the lower area of the ball pin with fresh grease.
3. Pack the interior of the new boot and lip with fresh grease.

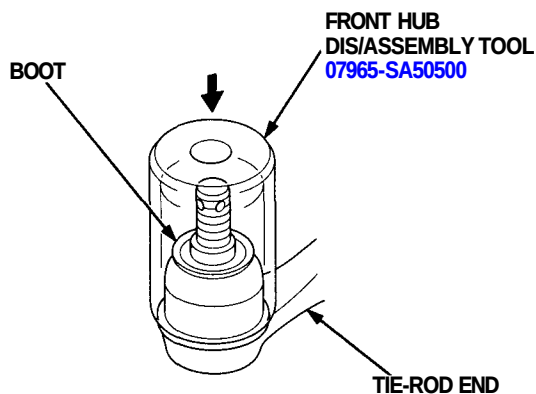
CAUTION:

- Keep grease off the boot installation section and the tapered section of the ball pin.
- Do not allow dust, dirt, or other foreign materials to enter the boot.



4. Install the new boot using the special tool as shown below.

NOTE: The boot must not have a gap at the boot installation sections.



CAUTION: After installing the boot, check the ball pin tapered section for grease contamination, and wipe it if necessary.

Special Tools

Ref. No.	Tool Number	Description	Qty	Page Reference
①	07GAF - SD40700	Hub Dis/Assembly Base	2	18-10
②	07GAF-SE00100	Hub Dis/Assembly Tool	1	18-10
③	07MAC-SL00100	Ball Joint Remover, 32 mm	1	18-9
④	07MAC - SL00200	Ball Joint Remover, 28 mm	1	18-8, 18-9
⑤	07746-0010300	Attachment, 42 x 47 mm	1	18-11
⑥	07746-0010600	Attachment, 72 x 75 mm	1	18-10, 18-11
⑦	07GAD-SD40101	Driver Attachment, 78 x 90 mm	1	18-11
⑧	07965-SD90100	Support Base	1	18-11
⑨	07965 - 6920201	Support Base	1	18-11

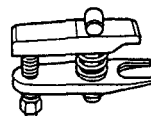
NOTE: Refer to page [18-2](#) of the '95-98 Acura 2.5TL Service Manual, P/N 61SW504, for the items not shown in this sub-section.



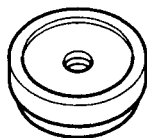
①



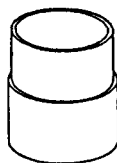
②



③ ④



⑤ ⑥ ⑦



⑧ ⑨



Component Locations

Wheel Alignment

Index

Front Suspension:

FRONT DAMPER

- Removal, page 18-12
- Disassembly/Inspection, page 18-12
- Reassembly, page 18-14
- Installation, page 18-14

FRONT UPPER ARM

Removal, page 18-5

STABILIZER BAR

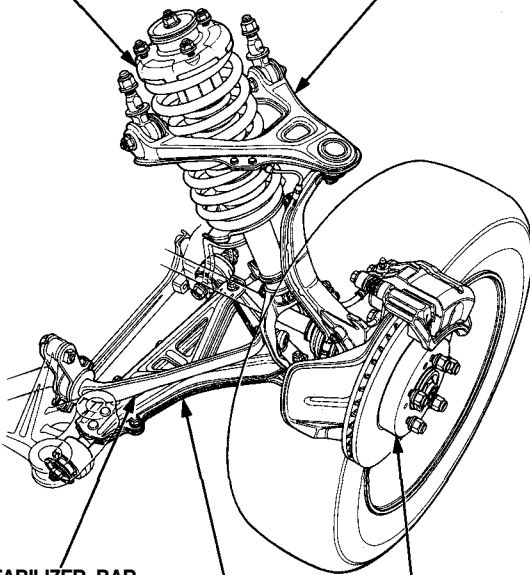
Removal, page 18-5

FRONT LOWER ARM

Removal, page 18-5

KNUCKLE/HUB

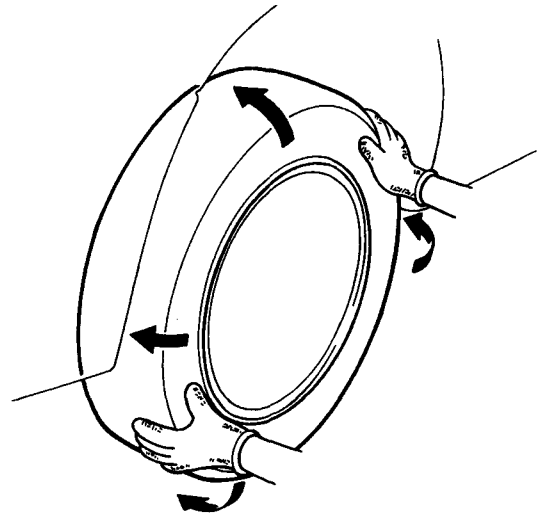
- Replacement, page 18-6
- Bearing Replacement, page 18-9



Caster

NOTE: For proper inspection/adjustment of the wheel alignment, check and adjust the following before checking the alignment.

- Check that the suspension is not modified.
- Check the tire size and tire pressure.
- Check the runout of the wheels and tires.
- Check the suspension ball joints. (Hold a wheel with your hands, and move it up and down and right and left to check for wobbling.)



Inspection

NOTE: Use commercially available computerized four wheel alignment equipment to measure wheel alignment (caster, camber, toe, and/or turning angle). Follow the equipment manufacturer's instructions.

1. Check the steering wheel angle; if significantly off center, it may be necessary to remove the steering wheel and reposition it on the splines. Turn the steering wheel to the straight ahead position.

2. Check the caster angle.

Caster angle: 3 40' ± 1°

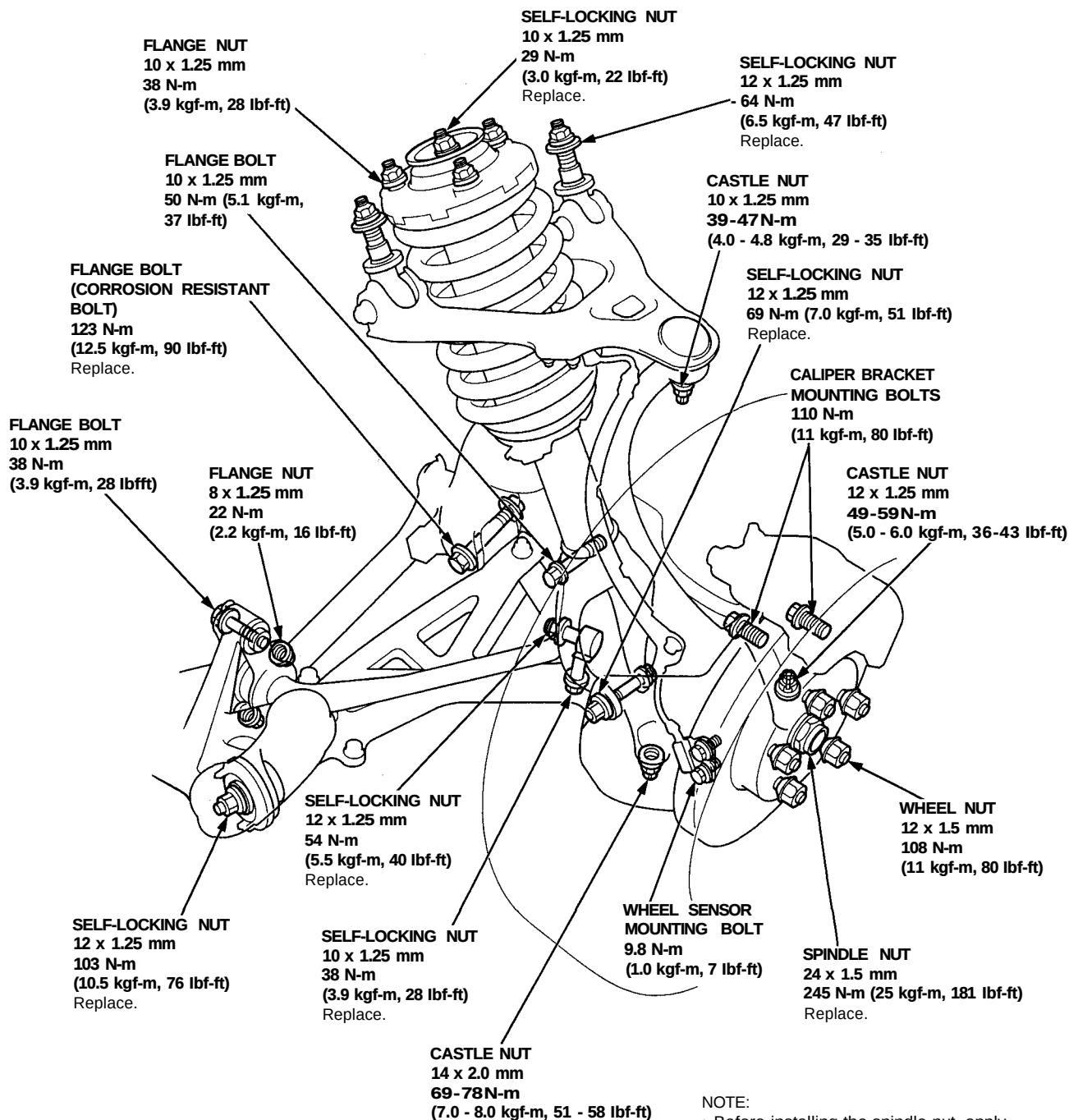
3. If out of specification, check for damaged suspension components.

Torque Specifications

CAUTION:

- Replace the self-locking nuts after removal.
- The vehicle should be on the ground before any bolts or nuts connected to rubber mounts or bushings are tightened.
- Torque the castle nut to the lower torque specification, then tighten it only far enough to align the slot with the pin hole. Do not align the nut by loosening.

NOTE: Wipe off the grease before tightening the nut at the ball joint.



NOTE:

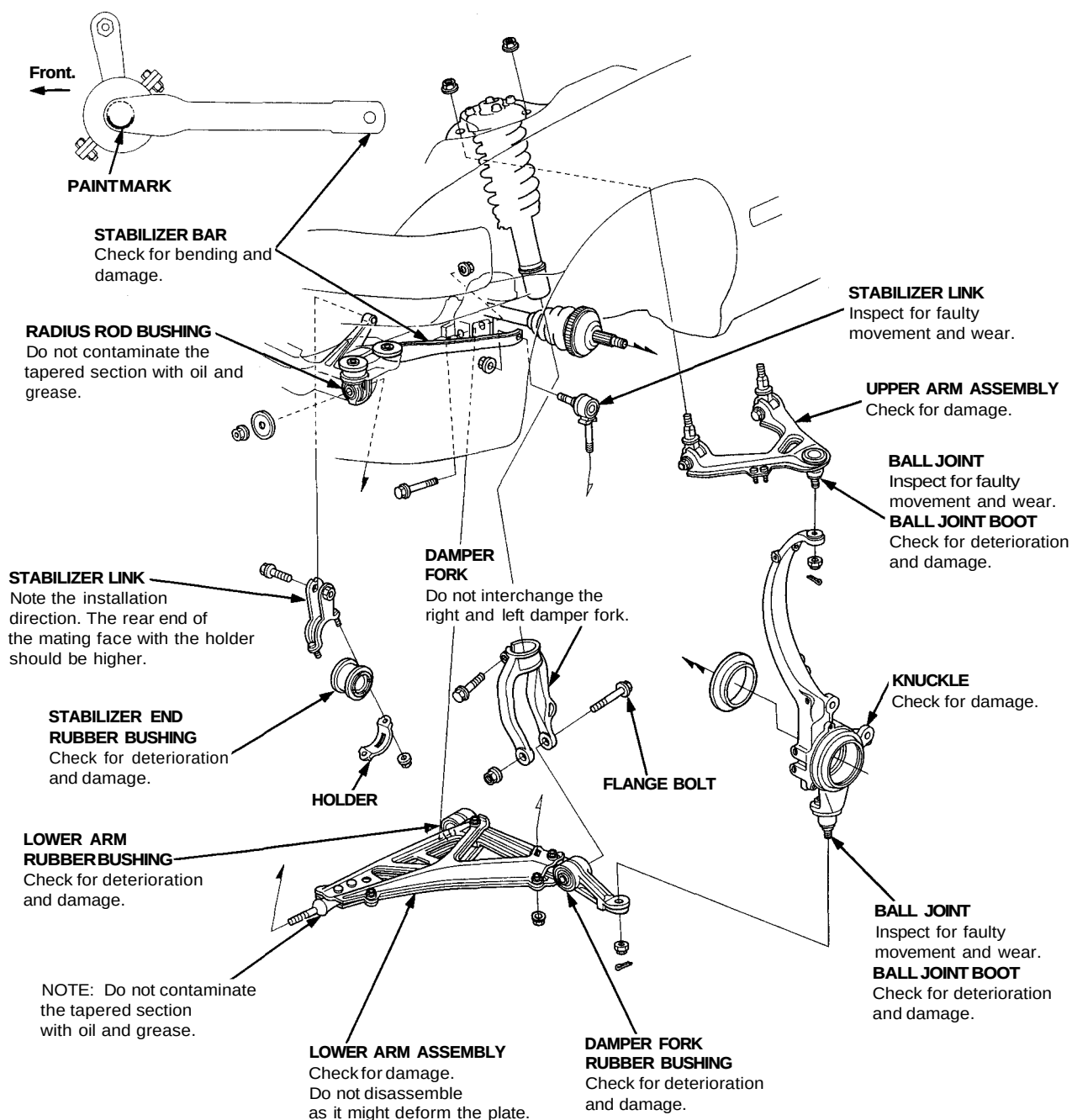
- Before installing the spindle nut, apply engine oil to the seating surface of the nut.
- After tightening, use a drift to stake the spindle nut shoulder against the spindle.



Illustrated Index

NOTE:

- Wipe off the grease before tightening the nut at the ball joint.
- Torque specifications, see page 18-4. The right and left stabilizer springs are symmetrical. Install with the paint mark facing down.
- The right and left damper forks are not symmetrical. The left damper fork is marked with "Z5L" while the right damper fork is marked with "Z5R". Do not interchange them.
- The right and left upper arms are not symmetrical. The left upper arm is marked with "LP" while the right arm is marked with "RP". Do not interchange them.

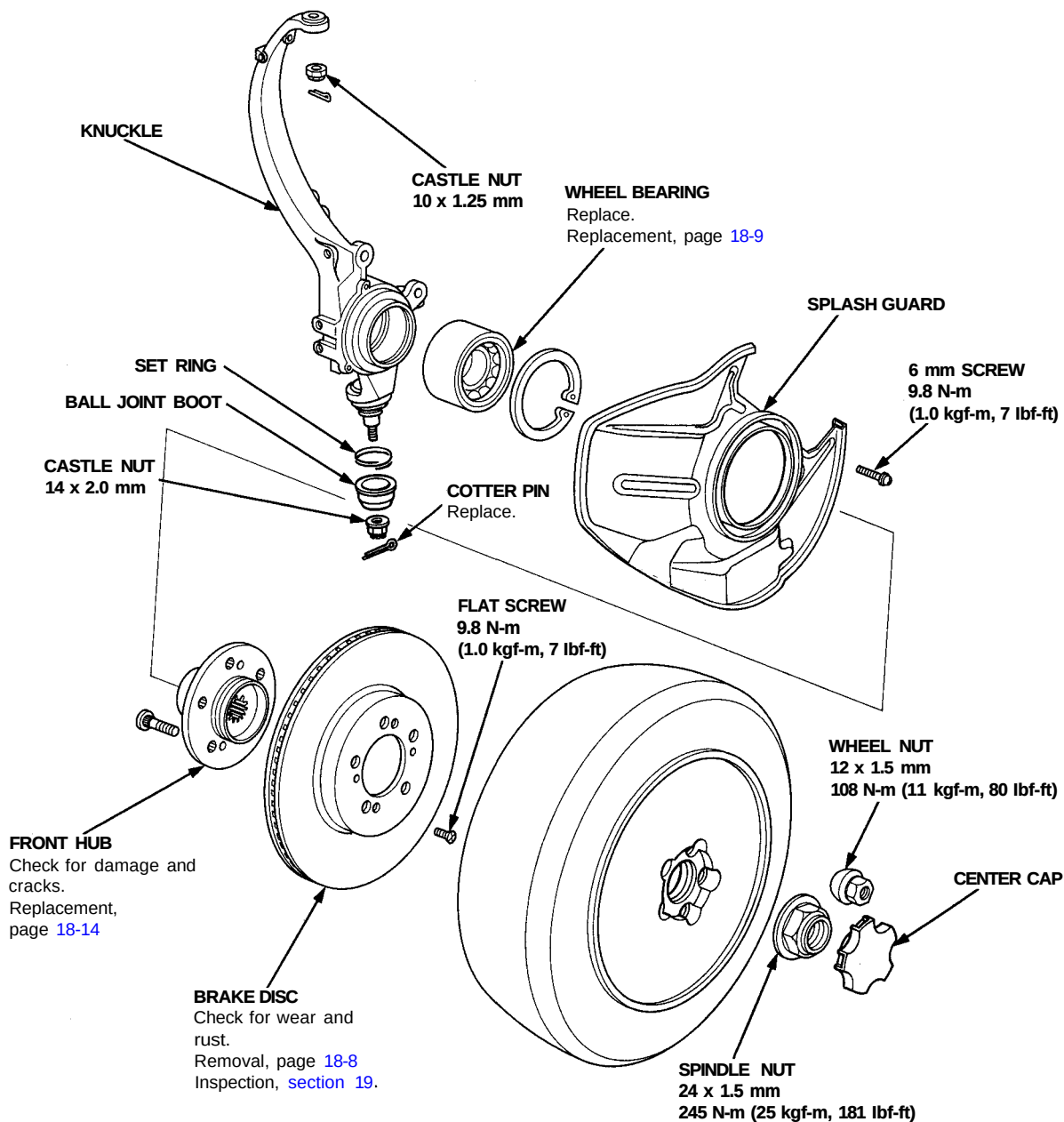


Front Suspension

Knuckle/Hub Illustrated Index

NOTE:

- Use only genuine Honda wheel weights for aluminum wheels. Non-genuine wheel weights may corrode and damage aluminum wheels.
- Before installing the wheel, clean the mating surface of the brake disc and inside of the wheel.



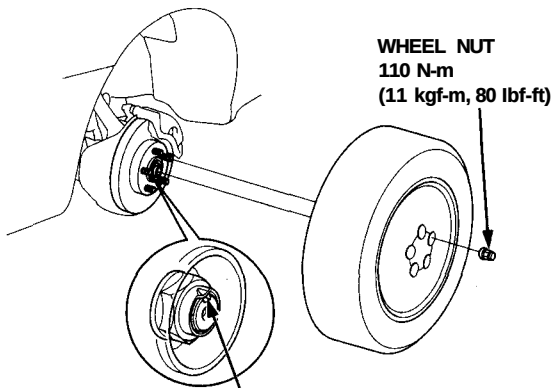
NOTE:

- Before installing the spindle nut, apply engine oil to the seating surface of the nut.
- After tightening, use a drift to stake the spindle nut shoulder against the spindle.



Knuckle Removal

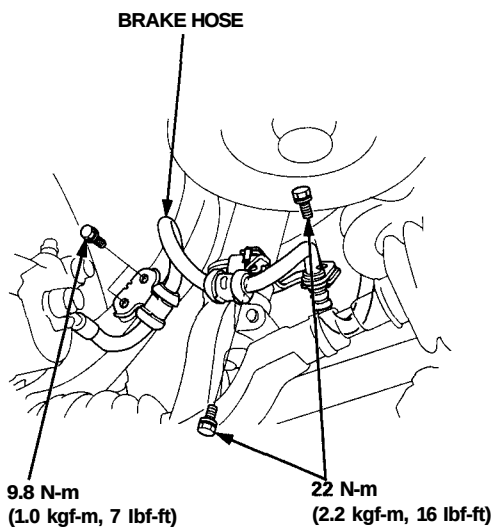
1. Loosen the wheel nuts slightly.
2. Raise the front of the vehicle, and support it with safety stands in the proper locations (see [section 1](#)).
3. Remove the wheel nuts and front wheel.
4. Raise the locking tab on the spindle nut, then remove the nut.



NOTE:

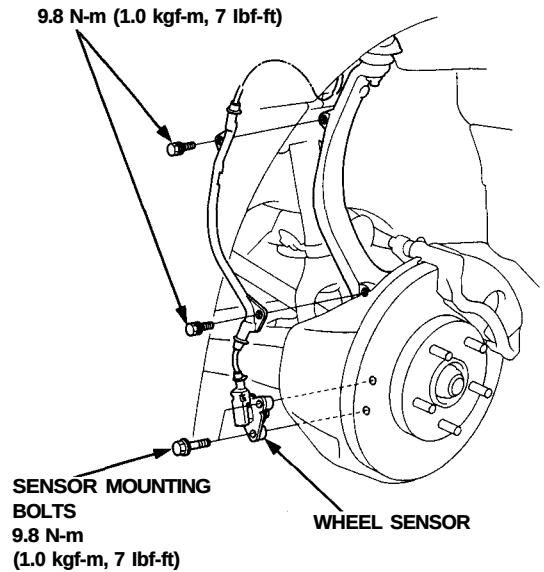
- Before installing the spindle nut, apply engine oil to the seating surface of the nut.
- After tightening, use a drift to stake spindle shoulder against the spindle.

5. Remove the brake hose mounting bolts.



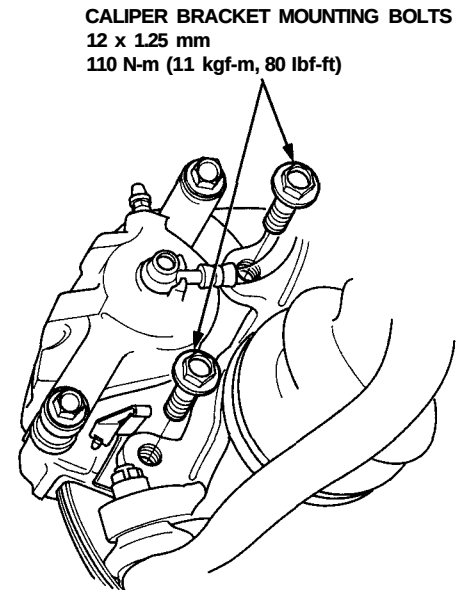
6. Remove the wheel sensor from the knuckle.

NOTE: Do not disconnect the wheel sensor connector.



7. Remove the caliper bracket mounting bolts, and hang the caliper assembly to one side.

CAUTION: To prevent accidental damage to the caliper or brake hose, use a short piece of wire to hang the caliper from the under-carriage.



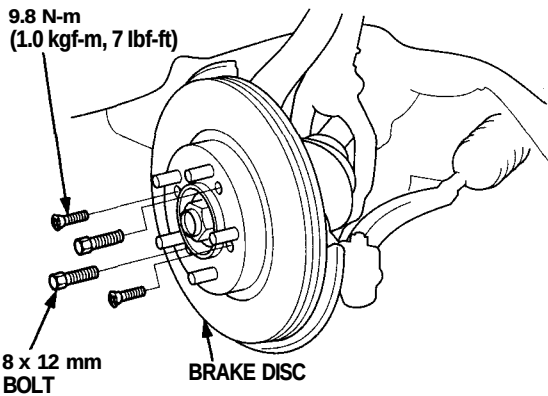
(cont'd)

Front Suspension

Knuckle/Hub Replacement (cont'd)

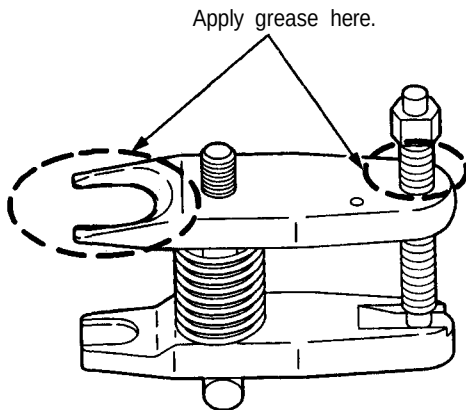
8. Remove the 6 mm brake disc retaining screws.
9. Screw two 8 x 12 mm bolts into the disc to push it away from the hub.

NOTE: Turn each bolt two turns at a time to prevent cocking the disc excessively.



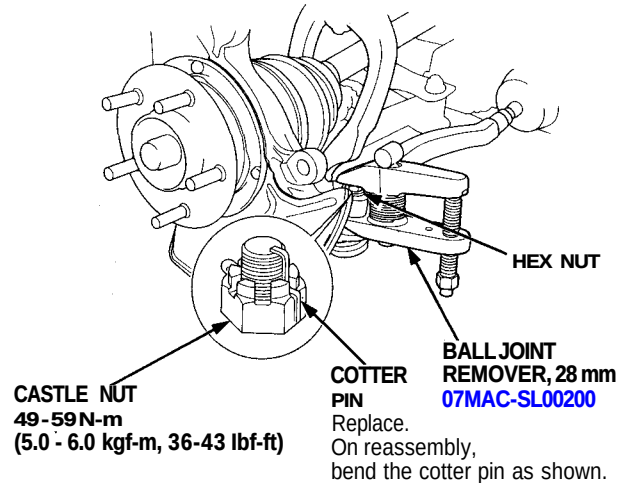
CAUTION: Be careful not to damage the ball joint boot.

10. Clean any dirt or grease off the ball joint.
11. Remove the cotter pin from the ball joint castle nut, and remove the nut.
12. Install a 12 mm hex nut on the ball joint. Be sure that the 12 mm hex nut is flush with the ball joint pin end to prevent damage to the threaded end of the ball joint.
13. Apply grease to the special tool on the areas shown. This will ease installation of the tool and prevent damage to the pressure bolt threads.

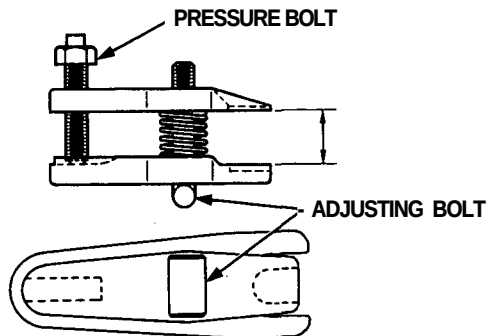


14. Install the special tool as shown. Insert the jaws carefully, making sure you do not damage the ball joint boot. Adjust the jaw spacing by turning the pressure bolt.

NOTE: If necessary, apply penetrating type lubricant to loosen the ball joint.



15. Once the tool is in place, turn the adjusting bolt as necessary to make the jaws parallel. Then hand-tighten the pressure bolt, and recheck the jaws to make sure they are still parallel.



NOTE: After making the adjustment to the adjusting bolt, be sure the head of the adjusting bolt is in this position to allow the jaw to pivot.

16. With a wrench, tighten the pressure bolt until the ball joint shaft pops loose from the steering arm.

⚠ WARNING Wear eye protection. The ball joint can break loose suddenly and scatter dirt or other debris in your eyes.

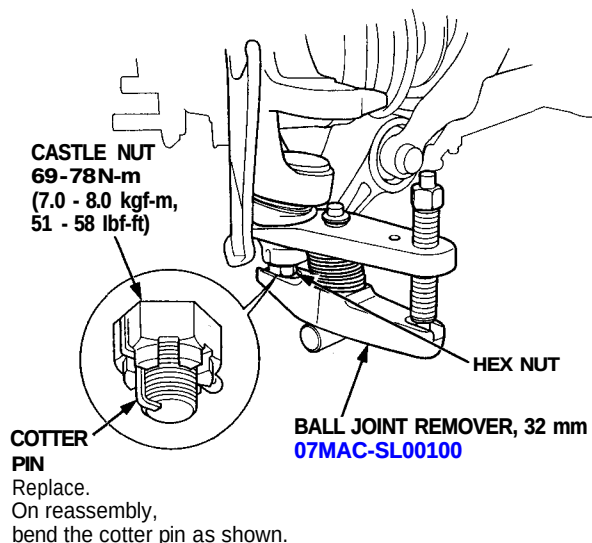
17. Remove the tool, then remove the nut from the end of the ball joint, and pull the ball joint out of the steering/suspension arm. Inspect the ball joint boot, and replace it if damaged.



18. Remove the cotter pin and lower arm ball joint nut.
19. Install a 14 mm hex nut on the ball joint. Be sure that the 14 mm hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.

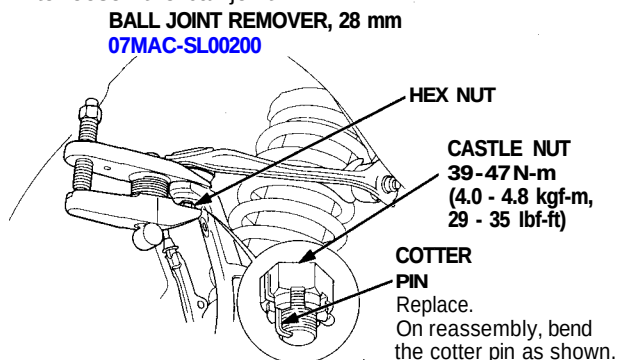
20. Use the special tool as shown on page 18-8 to separate the ball joint and lower arm.

NOTE: If necessary, apply penetrating type lubricant to loosen the ball joint.

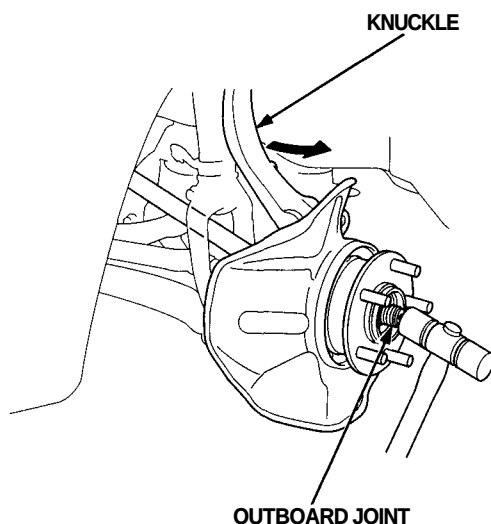


21. Remove the cotter pin and the upper ball joint nut.
22. Install a 10 mm hex nut on the ball joint. Be sure that the 10 mm hex nut is flush with the ball joint pin end, or the threaded section of the ball joint pin might be damaged by the ball joint remover.
23. Use the special tool as shown on page 18-8 to separate the ball joint and knuckle.

NOTE: If necessary, apply penetrating type lubricant to loosen the ball joint.



24. Pull the knuckle outward, and remove the driveshaft outboard joint from the knuckle by tapping the driveshaft end with a plastic hammer, then remove the knuckle.



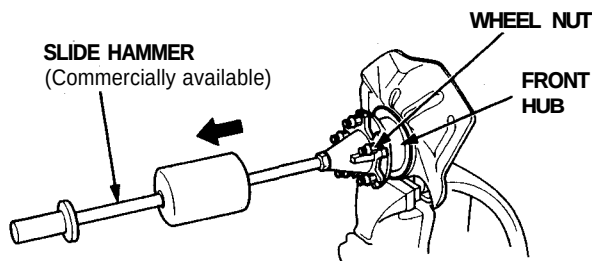
Wheel Bearing Replacement

NOTE: Replace the bearing with a new one after removal.

25. Carefully clamp the caliper bracket mount section of the knuckle in a vise with soft jaws.
26. Separate the hub from the knuckle using a commercially available hub puller.

CAUTION:

- Hold the knuckle securely so it does not slip out of the vise from the impact.
- Take care not to distort the splash guard.

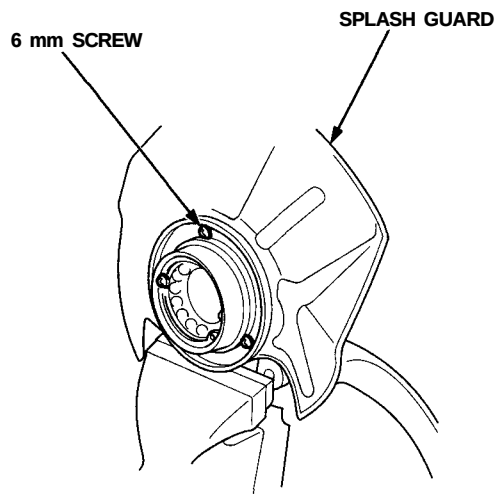


(cont'd)

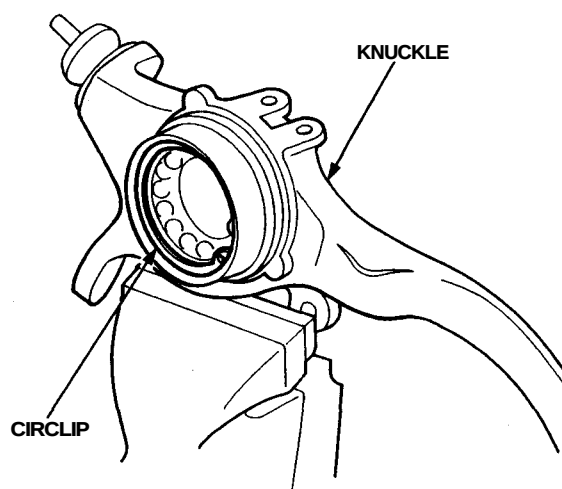
Front Suspension

Knuckle/Hub Replacement (cont'd)

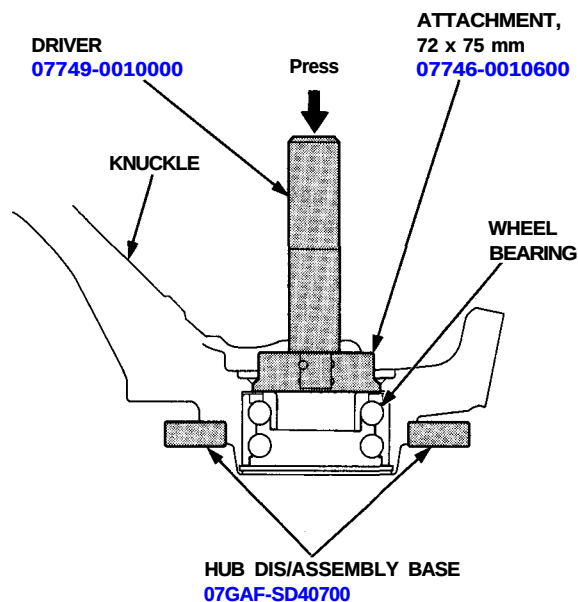
27. Remove the splash guard.



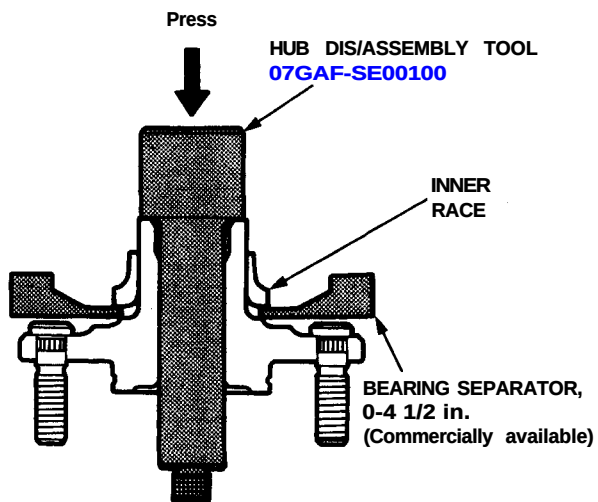
28. Remove the circlip from the knuckle.



29. Press the wheel bearing out of the knuckle using the special tools and a press.



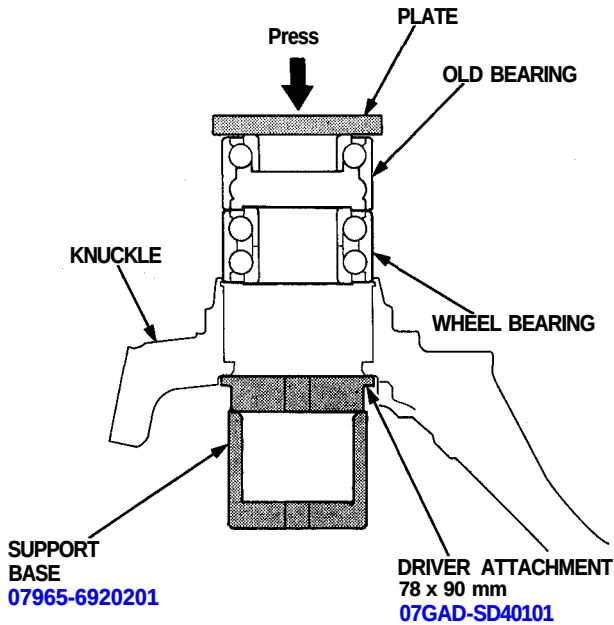
30. Remove the outboard bearing inner race from the hub using the special tools and a commercially available bearing separator.



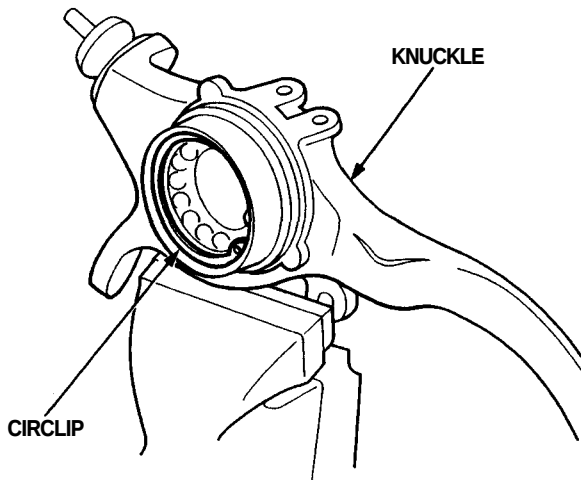


NOTE: Wash the knuckle and hub thoroughly in high flash point solvent before reassembly.

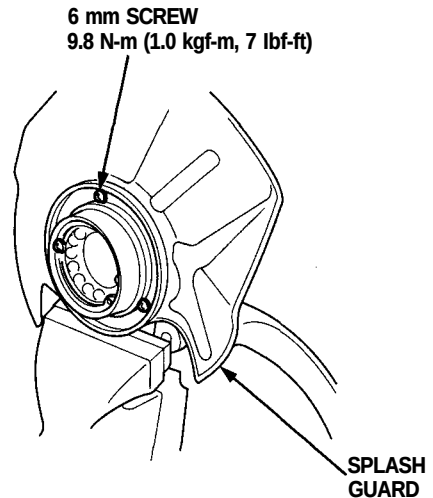
31. Press a new wheel bearing into the knuckle using the old bearing, plate and a press.



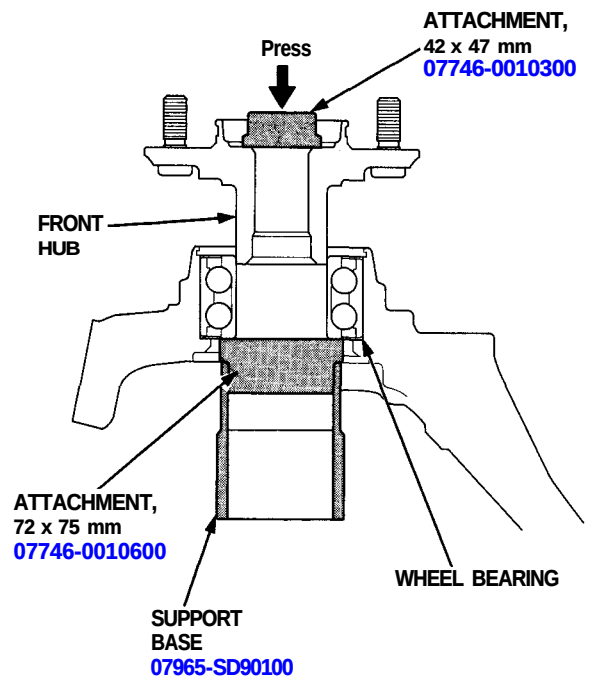
32. Install the circlip securely in the knuckle groove.



33. Install the splash guard and tighten the screws.



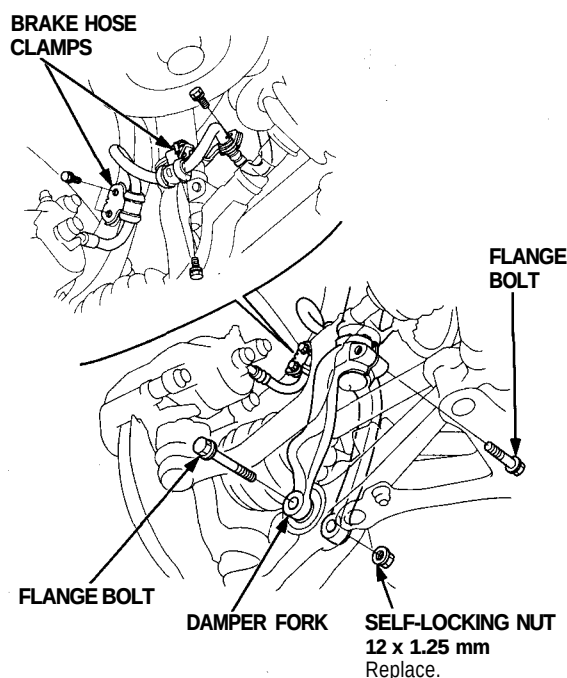
34. Place the front hub in the special tool fixture, then set the knuckle in position, and apply downward pressure using the special tools and a press.



Front Damper

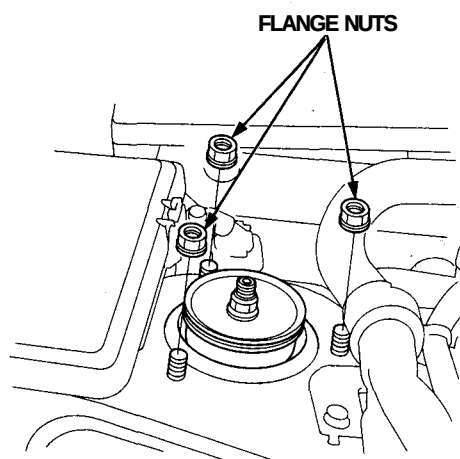
Removal

1. Remove the brake hose clamps from the damper.
2. Remove the flange bolt.
3. Remove the flange bolt and self-locking nut, then remove the damper fork.



4. Remove the damper by removing the three flange nuts.

NOTE: Mark the right and left dampers or store them separately. Do not confuse them on installation.



Disassembly/Inspection

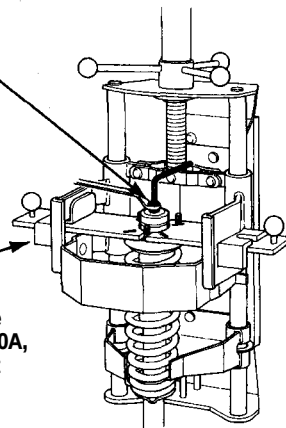
Disassembly

1. Compress the damper spring with the spring compressor according to the manufacturer's instructions, then remove the self-locking nut.

CAUTION: Do not compress the spring more than necessary to remove the nut.

SELF-LOCKING NUT
10 x 1.25 mm
Replace.

STRUT SPRING
COMPRESSOR:
Commercially Available
BRANICK® T/N MST-580A,
T/N 7200, or equivalent

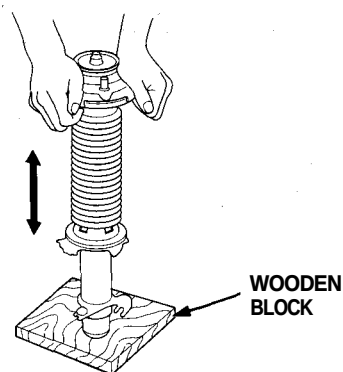


2. Remove the damper from the spring compressor, then disassemble the damper as shown on the next page.

Inspection

1. Reassemble all parts, except the spring.
2. Push on the damper as shown.
3. Check for smooth operation through a full stroke, both compression and extension.

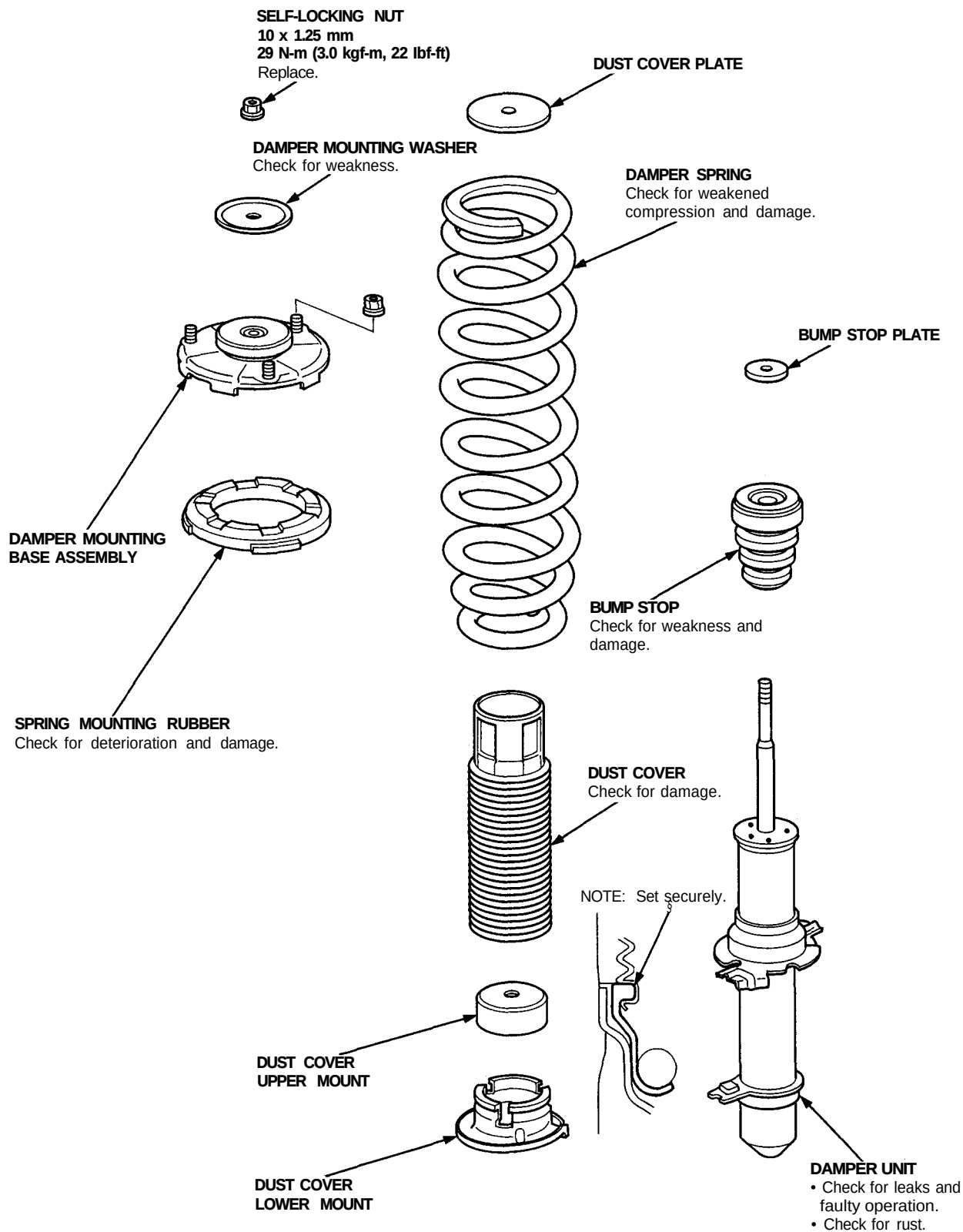
NOTE: The damper should move smoothly. If it does not (no compression or no extension), the gas is leaking and the damper should be replaced.



4. Check for oil leaks, abnormal noises or binding during these tests.



Inspection



NOTE: Mark the right and left dampers or store them separately. Do not confuse them on installation.

FrontDamper

Reassembly

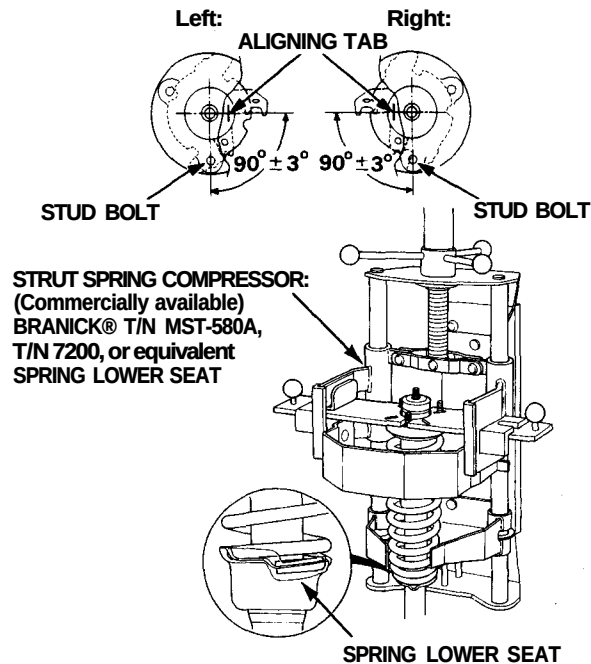
1. Install the damper unit on a spring compressor.

NOTE: Follow the manufacturer's instructions.

2. Assemble the damper in reverse order of disassembly except the damper mounting washer and self-locking nut.

NOTE: Align the bottom of damper spring and spring lower seat as shown.

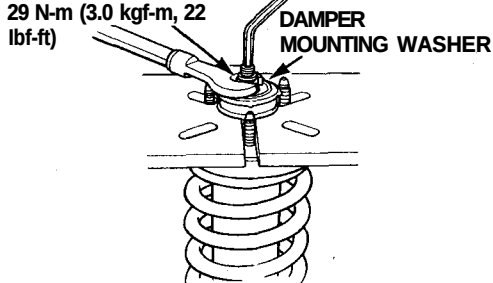
3. Position the damper mounting base on the damper unit as shown.



4. Compress the damper spring with the spring compressor.
5. Install the damper mounting washer, then loosely install a new self-locking nut.
6. Hold the damper shaft with a hex wrench, and tighten the self-locking nut.

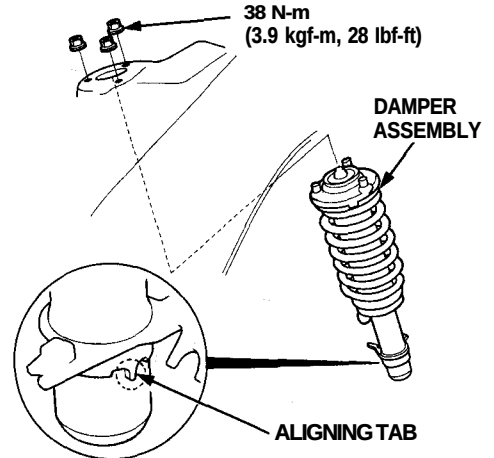
SELF-LOCKING NUT
Replace.

10 x 1.25 mm
29 N-m (3.0 kgf-m, 22 lbf-ft)



Installation

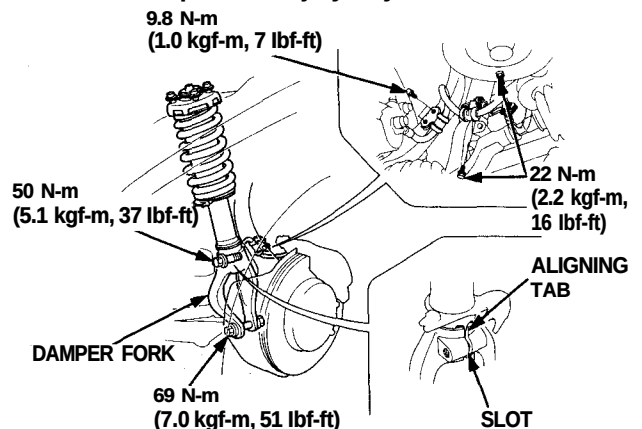
1. Loosely install the damper on the frame with the aligning tab facing inside, then loosely install the three flange nuts.



2. Install the damper fork over the driveshaft and onto the lower arm. Install the damper in the damper fork so the aligning tab is aligned with the slot in the damper fork.
3. Hand-tighten the bolts and nuts.
4. Raise the knuckle with a floor jack until the car just lifts off the safety stand.

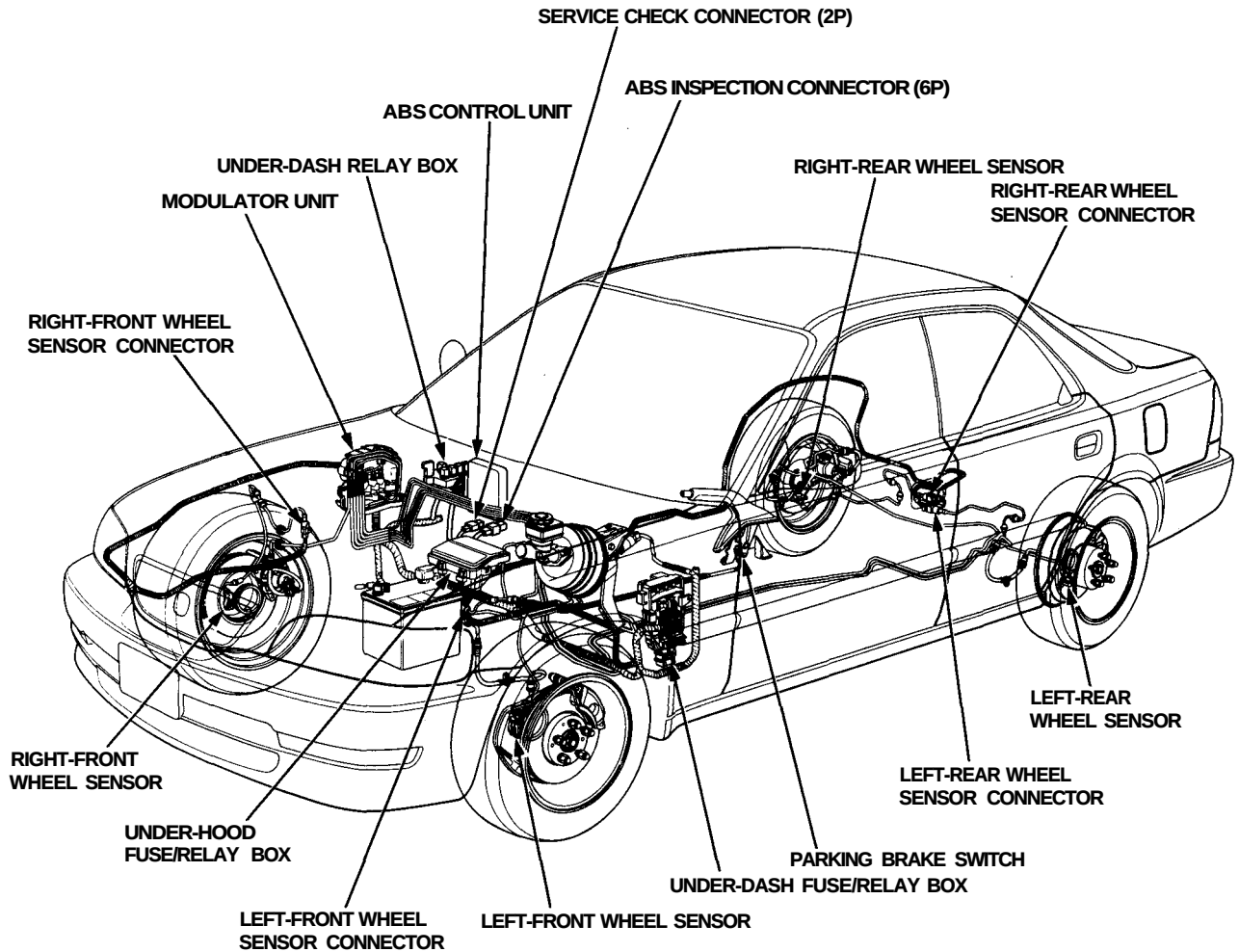
NOTE: The bolts and nuts should be tightened with the vehicle's weight on the damper.

⚠ WARNING The floor jack must be securely positioned or personal injury may result.

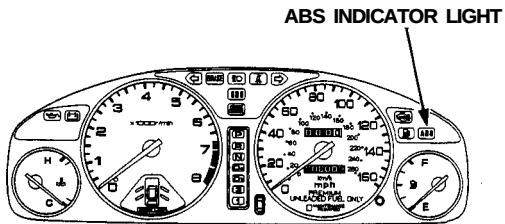


5. Tighten the flange bolt.
6. Tighten the flange bolt with a new self-locking nut.
7. Tighten the damper to the frame with the flange nuts.
8. Install the brake hose clamps.

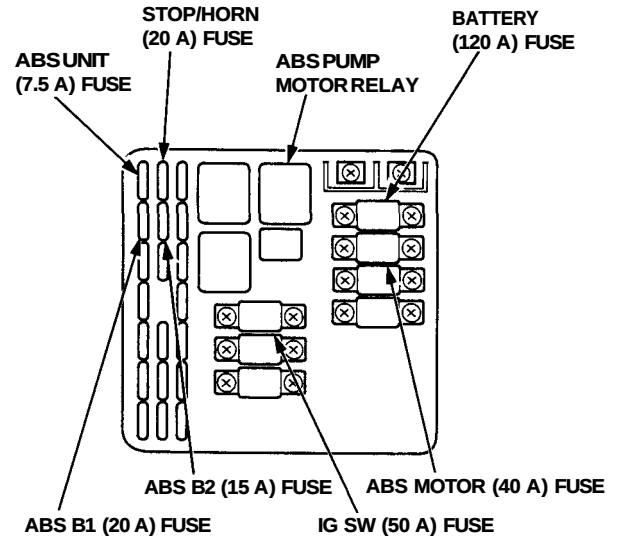
Component Locations



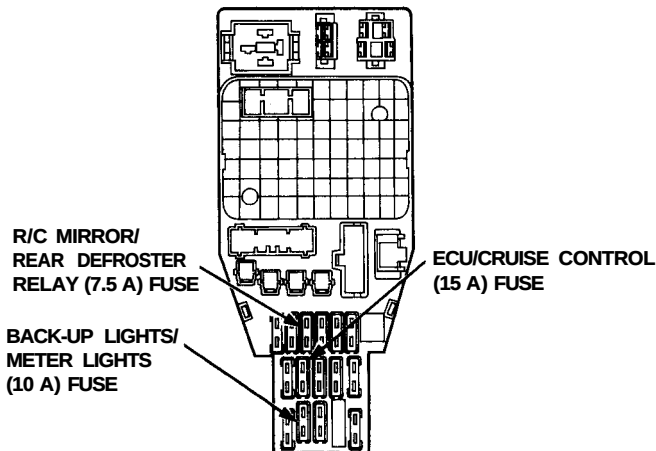
GAUGE ASSEMBLY



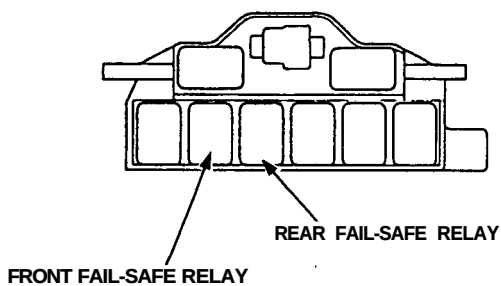
UNDER-HOOD FUSE/RELAY BOX



UNDER-DASH FUSE/RELAY BOX

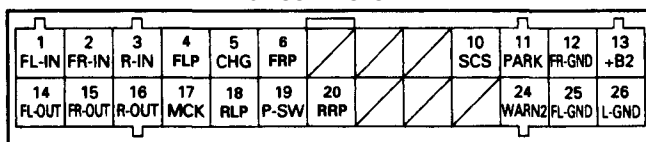


UNDER-DASH RELAY BOX



ABS Control Unit Terminal Arrangement

26P CONNECTOR



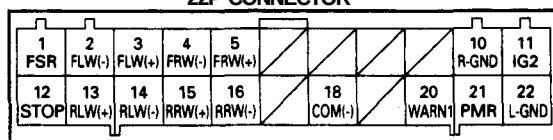
TERMINAL SIDE OF MALE TERMINALS

26P CONNECTOR

NOTE: Standard voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal					
1	RED/BLU	FL-IN (Front-left inlet solenoid valve)	Drives left-front inlet solenoid valve.	Engine	ON	Solenoid	ON	0 V	
2	RED/BLK	FR-IN (Front-right inlet solenoid valve)	Drives right-front inlet solenoid valve.				OFF	12 V	
3	RED/WHT	R-IN (Rear inlet solenoid valve)	Drives rear inlet solenoid valve.		(Ignition Switch ON (II))		0 V		
4	GRN/BLU	FLP (Front-left pulse)	Send the signal from left-front wheel sensor to TCS control unit.	When the wheel is turned: 5 V ↔ 0 V					
5	WHT/BLU	CHG (Charge)	Detects engine operation. (Activates ABS control unit with engine ON.)	Engine running: 12 V Engine stopped: 0 V					
6	GRN/BLK	FRP (Front-right pulse)	Send the signal from right-front wheel sensor to TCS control unit.	When the wheel is turned: 5 V ↔ 0 V					
10	ORN	SCS (Service check signal)	Detects service check connector signal (diagnostic trouble code indication).	Connected: 0 V Disconnected: 5 V					
11	GRN/RED	PARK (Parking brake)	Detects parking brake switch signal. (ABS indicator light is turned on when driving with signal ON.)	ON: 0 V OFF: 12 V					
12	BLK	FR-GND (Front-right solenoid valve ground)	Ground for the right-front inlet and outlet solenoid valves.						
13	WHT/BLK	+B2 (+B2 power source)	• Power source for ABS control unit control circuit. • Power source for diagnostic trouble code memory.	12 V at all times					
14	YEL/BLU	FL-OUT (Front-left outlet solenoid)	Drives left-front outlet solenoid valve.	Engine	ON	Solenoid	ON	0 V	
15	YEL/BLK	FR-OUT (Front-right outlet solenoid valve)	Drives right-front outlet solenoid valve.				OFF	12 V	
16	YEL/WHT	R-OUT (Rear outlet solenoid valve)	Drives rear outlet solenoid valve.		(Ignition Switch ON (II))		0 V		
17	GRN	MCK (Motor check)	Detects pump motor drive signal. (ABS indicator light is turned on if there is open or short circuit.)	Motor			ON: 12 V OFF: 0 V (Open): 12 V		
18	LT BLU	RLP (Rear-left pulse)	Send the signal from left-rear wheel sensor to TCS control unit.	When the wheel is turned: 5 V ↔ 0 V					
19	YEL	P-SW (Pressure switch)	Detects pressure switch signal. (Switch turns ON at approx. 22,000 kPa, 220 kgf/cm ² , 3,100 psi and pump motor is stopped.)	ON: 0 V OFF: 12 V					
20	GRN/YEL	RRP (Rear-right pulse)	Send the signal from right-rear wheel sensor to TCS control unit.	When the wheel is turned: 5 V ↔ 0 V					
24	BLU/RED	WARN 2 (Warning lamp)	Drives ABS indicator light. (Shuts off the indicator light ground circuit inside the ABS control unit to turn off the light when the system is normal.)	Light ON: 0 V Light OFF: 12 V					
25	BLK	FL-GND (Front-left solenoid valve ground)	Ground for the left-front inlet and outlet solenoid valves.						
26	BLK	L-GND (Logic ground)	Ground for the ABS control unit control circuits.						

22P CONNECTOR



TERMINAL SIDE OF MALE TERMINALS

22P CONNECTOR

NOTE: Standard voltage is 12 V.

Terminal number	Wire color	Terminal name	Description	Signal	
1	YEL/GRN	FSR (Fail-safe relay)	Drives fail-safe relay. (Fail-safe relay is turned OFF to shut off the power source to the solenoid when problem occurs.)	ON: 12 V OFF: 0 V	
2	BRN	FLW (–) (Front-left wheel sensor, negative)	Detects left-front wheel speed. (Ground level)	No. 2 – 3 terminals	When the wheel is turned at 1 turn/second: 70 mV or above on digital tester (AC range)
3	GRN/BLU	FLW (+) (Front-left wheel sensor, positive)	Detects left-front wheel speed.		
4	GRN	FRW (–) (Front-right wheel sensor, negative)	Detects right-front wheel speed. (Ground level)	No. 4 – 5 terminals	(Reference) 200 mVp-p or above on oscilloscope
5	GRN/BLK	FRW (+) (Front-right wheel sensor, positive)	Detects right-front wheel speed.		
10	BLK	R-GND (Rear solenoid valve ground)	Ground for rear inlet and outlet solenoid valves.		
11	YEL/BLK	IG2 (IG2 power source)	Detects ignition switch IG2 signal. (When IG2 is input, +B2 power source is switched to the power source for the ABS control unit (Vcc). Also IG2 monitors P-SW and MCK lines, and drives fail-safe relay.)	ON: 12 V OFF: 0 V	
12	GRN/WHT	STOP (Foot brake)	Detects brake switch signal. (Prevents unnecessary ABS operation when the brake pedal is not depressed)	ON: 12 V OFF: 0 V	
13	LT BLU	RLW (+) (Rear-left wheel sensor, positive)	Detects left-rear wheel speed. (Ground level)	No. 13 – 14 terminals	When the wheel is turned at 1 turn/second: 70 mV or above on digital tester (AC range)
14	GRY	RLW (–) (Rear-left wheel sensor, negative)	Detects left-rear wheel speed. (Ground level)		
15	GRN/YEL	RRW (+) (Rear-right wheel sensor, positive)	Detects right-rear wheel speed.	No. 15 – 16 terminals	(Reference) 200 mVp-p or above on oscilloscope
16	BLU/YEL	RRW (–) (Rear-right wheel sensor, negative)	Detects right-rear wheel speed. (Ground level)		
18	BLK/WHT	COM (–) (Common negative)	Ground for ALB checker when it is connected.		
20	BLU/RED	WARN 1 (Warning lamp)	Drives ABS indicator light. (Shuts off the indicator light ground circuit inside the ABS control unit to turn off the light when the system is normal.)	Light ON: 0 V Light OFF: 12 V	
21	YEL/RED	PMR (Pump motor relay)	Drives pump motor relay. (Pump motor relay is turned ON to drive the pump motor when P-SW OFF signal is detected.)	ON: 0 V OFF: 12 V	
22	BLK	L-GND (Logic ground)	Ground for the ABS control unit control circuits.		

Troubleshooting Precautions

ABS Indicator Light:

The ABS indicator light comes on for three seconds and then goes off when the control unit detects no problem during the initial diagnosis right after the engine starts. However, the ABS indicator light can stay on for up to 40 seconds when the control unit starts to check for pump overrun, etc. during the initial diagnosis. The ABS indicator light comes on, and the ABS control unit memorizes the diagnostic trouble code (DTC) under certain conditions.

- The parking brake is applied for more than 30 seconds while the vehicle is being driven. (DTC 2-1)
- The transmission downshifted excessively. (DTC 4-1, 4-2)
- The vehicle loses traction, and the front wheels spin for more than one minute when starting from a stuck condition on a muddy, snowy, or sandy road. (DTC 4-8)
- Tire adhesion is lost due to excessive cornering speed. (DTC 5, 5-4, 5-8)
- The vehicle is driven on an extremely rough road. (DTC 8-1)
- The vehicle is interfered by strong radio waves (noise), for example, illegal radio, etc. (DTC 8-2)

NOTE: If there is any trouble in the system, the ABS indicator light comes on during driving.

Diagnostic Trouble Code (DTC):

- When the control unit detects a problem and the ABS indicator light comes on, the control unit memorizes the DTC.
- The control unit has three memory registers. When a problem occurs, the control unit stores the DTC in the first memory register. If another problem occurs, or the same problem occurs again, the control unit moves the first DTC to the next memory register, and stores the second DTC in the first register. If there's a third problem occurrence, the two existing DTCs are moved up one register, and the third DTC is stored in the first register. If problems continue to occur, the oldest problem is moved out of the last register and lost, and the most recent problem is stored in the first register. When the same problem occurs three times, the same DTC is stored in all memory registers. (Refer to the Symptom-to-System Chart for diagnostic period.)
- The most recent DTC is indicated first, and the oldest DTC is indicated last.
- The DTCs are erased from the control unit when the ABS control unit +B2 power supply or connector is disconnected.
- The control unit's memory can be erased by disconnecting the ABS B2 fuse for more than three seconds.

Self-diagnosis:

- There are three self-diagnoses described below.
 - ① Initial diagnosis: Performed right after the engine starts until the ABS indicator light goes off.
 - ② Regular diagnosis: Continuously performed (under some conditions) after the ABS indicator light goes off until the engine stops.
 - ③ Individual part/system diagnosis: Diagnosis about a specific part/system under its operating conditions.
- The CPU (central processing unit) controls the following when it detects a problem during self-diagnosis:
 - ① Turns the ABS indicator light ON.
 - ② Turns the front and rear fail-safe relays off.
 - ③ Stops the ABS control.
 - ④ Stops the ABS pump. (The pump may work under some conditions.)
 - ⑤ After the DTC is stored in the control unit, the CPU stops self-diagnosis.



Kickback and Pump Operation:

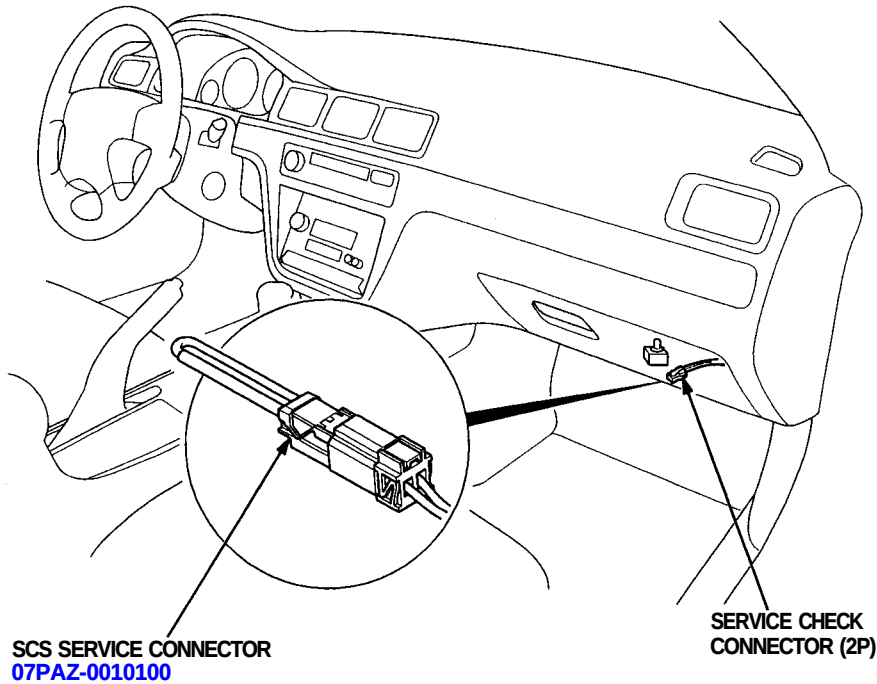
- When the engine is started, the ABS control unit begins the initial diagnosis and operates the solenoid valve one time. The kickback may be felt when the brake pedal is depressed.
- When the ABS control unit detects the pressure switch OFF signal during the initial diagnosis, it operates the pump motor, and performs the pump motor over-run diagnosis and pump motor diagnosis. Therefore, there are two cases where the pump motor operates or does not operate after the engine is started.
- Normally, after the initial diagnosis, the pump motor operates based on the pressure switch signal, regardless of the vehicle speed.

Troubleshooting:

- When two or three DTCs are stored in the control unit, perform troubleshooting for the DTC that appears first.
- When a customer's reported problem cannot be verified on the car, ask the customer about the conditions when the ABS indicator light came ON, and test-drive the car under those conditions, if possible. When the ABS indicator light does not come ON during the test, check for loose terminals and check by shaking the harnesses and connectors while following the flowchart.
- The connector terminal numbers are viewed from the wire side for the female terminals, and from the terminal side for the male terminals.
- After the repair is completed, test-drive the car and check that the ABS indicator light does not come ON again during the test. (Refer to the Symptom-to-System Chart for diagnostic period.)

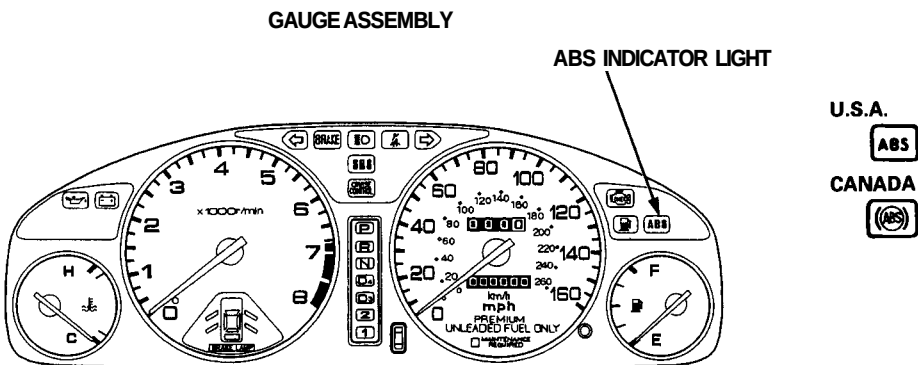
Diagnostic Trouble Code (DTC) Indication

1. Connect the SCS service connector to the service check connector under the glove box.

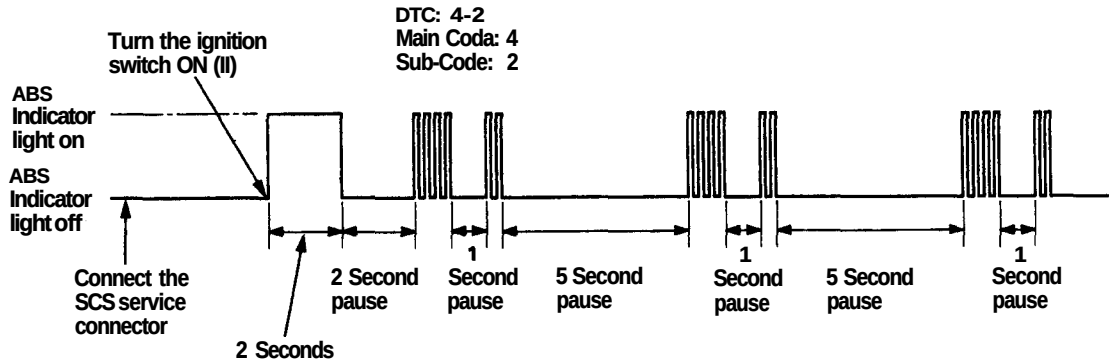


2. Turn the ignition switch ON (II), but do not start the engine.
3. Record the blinking frequency of the ABS indicator light. The blinking frequency indicates the diagnostic trouble code (DTC).

NOTE: Check the DTC carefully and record it. The memory of the DTC is erased if the connector is disconnected from the ABS control unit.



DTC Indication Pattern (When the ABS control unit detected a problem three times.):



- Turn the ignition switch ON (II). The ABS indicator light comes on for two seconds to check the bulb.
- The ABS control unit indicates the DTC three times.
- If you miscount the blinking frequency or if you recheck the blinking frequency, turn the ignition switch OFF then turn it ON (II) to cycle the ABS indicator light again.

4. Remove the SCS service connector.

NOTE: The Malfunction Indicator Lamp (MIL) will stay on after the engine is started if the SCS service connector is connected.

5. Remove the ABS B2 (15 A) fuse in the under-hood fuse/relay box for at least three seconds to erase the ABS control unit's memory.



Diagnostic Troubleshooting Code (DTC)

Symptom-to-System Chart

DIAGNOSTIC TROUBLE CODE (DTC)		DIAGNOSIS/ SYMPTOM	DIAGNOSTIC PERIOD			PROBLEM LOCATION	PROBABLE CAUSE
MAIN CODE	SUB-CODE		INITIAL DIAGNOSIS	INDIVIDUAL DIAGNOSIS	REGULAR DIAGNOSIS		
—	—	ABS indicator light does not come on when ignition switch is turned ON (II)					• Blown BACK-UP LIGHTS/METER LIGHTS (10 A) fuse • Open circuit between the BACK-UP LIGHTS/METER LIGHTS (10 A) fuse and ABS indicator light • Blown ABS indicator light bulb • Open circuit between the ABS indicator light and ABS control unit • Open circuit between the ABS control unit and body ground • Poor body ground • Faulty ABS control unit
		ABS indicator light does not go off after engine is started (No DTC)					• Blown R/C MIRROR/REAR DEFROSTER RELAY (7.5 A) fuse • Open circuit between the under-dash fuse/relay box and ABS control unit • Open circuit between the battery and under-hood fuse/relay box • Blown ABS B2 (15 A) fuse • Open circuit inside the under-hood fuse/relay box • Open circuit between the under-hood fuse/relay box and ABS control unit • Faulty alternator • Open circuit between the alternator and ABS control unit • Short to body ground in the WARN circuit between the ABS indicator light and ABS control unit • Faulty ABS control unit
①	—	ABS pump motor over-run	○	○			• Air mixed in the ABS brake fluid. • Pressure switch stuck OFF • Open circuit between the pressure switch and ABS control unit • Open circuit in the P-SW circuit between the pressure switch and body ground, or a poor ground • Drop in pump discharge volume • Leaking outlet valve • Leaking relief valve • ABS brake fluid leakage • Faulty ABS control unit
	②	Pump motor	○		○		• Open circuit or short to body ground between the R/C MIRROR/REAR DEFROSTER RELAY (7.5 A) fuse and under-hood fuse/relay box • Open circuit or short to body ground in the PMR circuit inside the under-hood fuse/relay box • Faulty pump motor relay • Open circuit or short to body ground in the PMR circuit between the under-hood fuse/relay box and ABS control unit • Open circuit between the battery and under-hood fuse/relay box • Blown ABS MOTOR (40 A) fuse • Blown ABS UNIT (7.5 A) fuse • Open circuit or short to body ground in the motor drive circuit and MCK circuit inside the under-hood fuse/relay box • Open circuit or short to body ground in the MCK circuit between the under-hood fuse/relay box and ABS control unit • Open circuit or short to body ground between the under-hood fuse/relay box and pump motor • Faulty pump motor • Open circuit between the pump motor and body ground or poor ground • Faulty ABS control unit
	③	High-pressure leakage			○		• Leaking outlet valve • Leaking relief valve • Poor contact in pressure switch circuit
	④	Pressure switch	○				• Short to body ground between the ABS control unit and pressure switch • Pressure switch stuck ON • Faulty ABS control unit
	⑧	High-pressure system	○				• Accumulator gas leakage • Changed relief valve set pressure • Rear outlet solenoid valve late to close • Changed pressure switch set pressure
②	①	Parking brake			○		• Low fluid level in the master cylinder reservoir • Open circuit between the BACK-UP LIGHTS/METER LIGHTS (10 A) fuse and brake system light • Blown brake system light bulb • Open circuit or short to body ground between the brake system light and ABS control unit • Parking brake switch stuck ON • Short to body ground between the brake system light and parking brake switch • Brake fluid level switch stuck ON • Short to body ground between the brake system light and brake fluid level switch • Faulty ABS control unit

PROBABLE CAUSE WHEN SYMPTOM DOES NOT REAPPEAR	DESCRIPTION OF DIAGNOSIS	REFER TO PAGE
		19-16
		19-18
	• The ABS indicator light is turned on when the pump motor relay ON signal is detected for more than 40 seconds while the ABS is not functioning.	19-21
• Intermittent interruption in the MCK circuit • Intermittent interruption in the pump motor relay drive circuit • Intermittent interruption in the pump motor drive circuit	• The ABS indicator light is turned on when battery voltage is detected at the MCK terminal while the pump motor relay OFF signal is detected. • The ABS indicator light is turned on when the 0 V is detected at the MCK terminal while the pump motor relay ON signal is detected.	19-23
• Intermittent interruption in the pressure switch • Intermittent interruption in the pressure switch circuit	• The ABS indicator light is turned on when the frequent ON/OFF cycle of the pressure switch signal is detected while the engine is running. The count is erased when the ABS functions.	19-29
	• The ABS indicator light is turned on when the pressure switch ON signal is always detected at every initial diagnosis. The count is erased when the ABS control unit detects the pressure switch OFF signal.	19-31
• The ABS indicator light may not come on in normal climate when it comes on in very cold climate.	• This diagnosis is performed when the pressure switch is OFF at the initial diagnosis. The pump motor is operated to turn the pressure switch ON, then the solenoid valve is momentarily activated. The ABS indicator light is turned on if the pressure switch signal changes from ON to OFF.	19-32
• Driving with the parking brake applied—(No problem)	• The ABS indicator light is turned on when the parking brake ON signal is detected for more than 30 seconds while driving.	19-33

(cont'd)

Diagnostic Troubleshooting Code(DTC)

Symptom-to-System Chart (cont'd)

DIAGNOSTIC TROUBLE CODE (DTC)		DIAGNOSIS/ SYMPTOM	DIAGNOSTIC PERIOD			PROBLEM LOCATION	PROBABLE CAUSE
MAIN CODE	SUB-CODE		INITIAL DIAGNOSIS	INDIVIDUAL DIAGNOSIS	REGULAR DIAGNOSIS		
3	1	Pulser			○	Right-front	- Chipped pulser gear - Improperly installed wheel sensor
	2					Left-front	
	4					Right-rear	
	8					Left-rear	
	12	Different diameter tire			○		Different diameter tire installed
4	1	Wheel sensor		○	○	Right-front	- Open circuit, internal short or short to body ground in the wheel sensor - Open circuit or short to body ground in the positive (+) wire between the wheel sensor and ABS control unit - Open circuit or short to body ground in the negative (-) wire between the wheel sensor and ABS control unit Positive (+) wire shorted to the negative (-) wire between the wheel sensor and ABS control unit - Loose connector or poor contact of terminals - Improper wheel sensor air gap - Faulty ABS control unit - Missing pulser - Modulator does not decrease pressure properly
	2					Left-front	
	4					Right-rear	
	8					Left-rear	
5	—	Rear wheel lock			○	Right/Left	- Open circuit, internal short or short to body ground in the wheel sensor system - Rear brake drag - Modulator does not decrease pressure properly - Faulty ABS control unit
	4					Right	
	8					Left	
6	—	Fail-safe relay	○			Front/rear	- Short to power in the relay drive circuit between the fail-safe relay and ABS control unit - Faulty relay drive transistor (ON) in the ABS control unit - Fail-safe relay stuck ON - Short to power in the solenoid drive circuits between the fail-safe relay and ABS control unit
	1					Front	
	4					Rear	
7	1	Solenoid	○		○	Right-front	- Fail-safe relay stuck OFF - Open circuit in the solenoid drive circuit between the under-hood fuse/relay box and ABS control unit - Short to body ground in the solenoid drive circuit between the solenoid and ABS control unit - Faulty solenoid drive transistor (ON) in the ABS control unit - Short to power in the solenoid drive circuit between the solenoid and ABS control unit - Faulty solenoid drive transistor (OFF) in the ABS control unit - Short to power in the drive circuit inside the solenoid - Short to the outlet circuit in the inlet circuit between the solenoid and ABS control unit
	2					Left-front	
	4					Rear	
8	1	ABS function			○		- Wheel sensor signal disappears at speeds of 6 mph (10 km/h) or less - Faulty ABS control unit
	2	CPU comparison	○		○		Faulty ABS control unit
	4	IC Integrated Circuit	○		○		Faulty ABS control unit

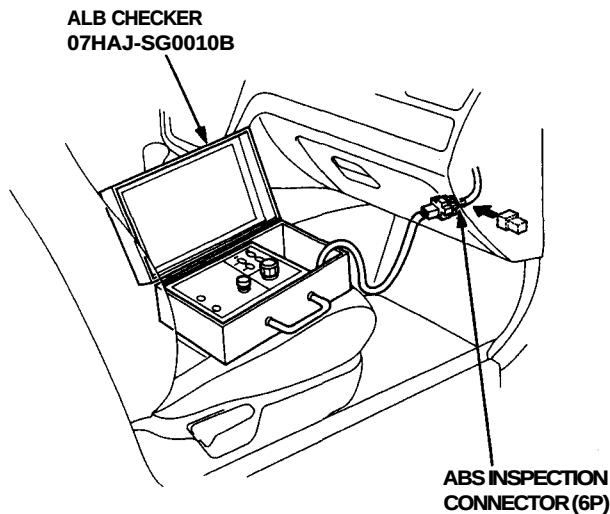
PROBABLE CAUSE WHEN SYMPTOM DOES NOT REAPPEAR	DESCRIPTION OF DIAGNOSIS	REFER TO PAGE
Intermittent interruption in the wheel sensor	The ABS indicator light is turned on when the wheel sensor signal is periodically missing during driving.	19-37
(No problem)	The ABS indicator light may be turned on while driving when one, two or three different diameter tires are installed. This diagnosis is not performed when the parking brake switch is ON.	19-37
- Intermittent interruption in the wheel sensor - Wheel spin of both front wheels (only for DTC 4-8) — (No problem) - The transmission downshifted excessively (only for DTC 4-1 and 4-2) — (No problem)	The ABS indicator light is turned on when the wheel sensor signal is missing at speeds of 6 mph (10 km/h) or more. This diagnosis is not performed when the parking brake switch is ON.	19-38
- Intermittent interruption in the wheel sensor - Wheel spin by operating the parking brake while the parking brake switch is stuck OFF - Car spun-out — (No problem)	The ABS indicator light is turned on when either or both rear wheels lock and the wheel sensor signal is missing during driving. This diagnosis is not performed when the parking brake switch is ON.	19-41
	The ABS indicator light is turned on when battery voltage is detected at the solenoid terminal before the fail-safe relays are turned on at the initial diagnosis.	19-42
		19-44
		19-47
- Intermittent interruption in the solenoid valve drive circuit - Intermittent interruption in the solenoid valve ground circuit - Intermittent interruption in the fail-safe relay circuit	- Each solenoid valve is momentarily activated at the initial diagnosis and when the car starts off. The ABS indicator light is turned on when battery voltage is detected at the solenoid terminal. - The ABS indicator light is turned on when 0V is detected at the solenoid terminal while the solenoid OFF signal is detected at the regular diagnosis.	19-49
		19-53
		19-59
- Intermittent interruption in the wheel sensor - Rough road driving — (No problem)	The ABS indicator light is turned on when the ABS functions continuously.	19-66
(No problem)	The ABS indicator light is turned on when there is a difference between the CPU data.	19-67
(No problem)	The ABS indicator light is turned on when there is a abnormality in the IC at the regular diagnosis.	19-67

ABS Function Test

1. Raise the car off the ground, and support it with safety stands.
2. Check that there is no brake drag.
3. Turn the ignition switch ON (II), and confirm that the ABS indicator light comes on.
 - If the ABS indicator light does not come on, follow the troubleshooting on page 19-16.

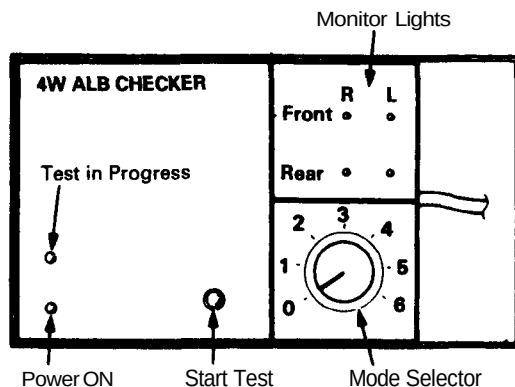
4. **Honda PGM Tester:** Connect the PGM Tester as described in the PGM Tester Anti-Lock Brake System (ABS) Vehicle System Supplement. Follow the tester's prompts instead of steps 5 through 11 of this procedure.

ALB Checker: With the ignition switch OFF, disconnect the ABS inspection connector (6P) from the connector cover located under the glove box, and connect it to the ALB checker. Continue with steps 5 through 11 of this procedure.



5. Shift the transmission to **P** position.
6. Start the engine and release the parking brake.

7. Turn the Mode Selector switch to "1".



8. Push the Start Test switch.
 - The ABS indicator light should not come on while the Test in Progress light is on.
 - If the ABS indicator light comes on, confirm the DTC and perform the appropriate troubleshooting for the code.

NOTE: Do not turn the Mode Selector switch when the Test in Progress light is on. Damage to the ALB checker can result.

9. Turn the Mode Selector switch to "2".
10. Depress the brake pedal firmly, and push the Start Test switch. The ABS indicator light should not come on while the Test in Progress light is on. There should be kickback on the brake pedal.

Have the assistant check that the wheel controlled by the ABS can be rotated by hand when there is kickback on the brake pedal.

- If the ABS indicator light comes on, confirm the DTC and perform the appropriate troubleshooting for the code.
- If the ABS indicator light does not come on and the wheel controlled by the ABS cannot be rotated, check the connection of the modulator wire harness connectors. If the connections are OK, replace the modulator unit.

NOTE: The kickback should occur approximately 20 seconds after the Start Test switch is pushed. The ABS can be checked with a brake tester, too, by checking the brake torque fluctuation of the wheel controlled by the ABS.

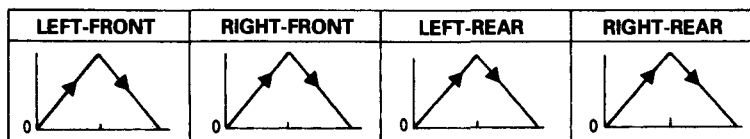
11. Turn the Mode Selector switch to "3", "4" and "5". Perform step 10 for each of the test mode positions.

Operation Sequence Simulated by Modes of ALB Checker

NOTE: The wheel sensors and sensor wire harnesses are not checked by the ALB checker.

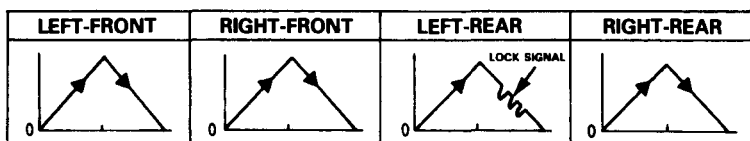
Mode 1: Sends the simulated driving signal 0 mph (0 km/h) → 113 mph (180 km/h) → 0 mph (0 km/h) of each wheel to the ABS control unit to check the system under the normal driving. There should be no kickback.

SIMULATED DRIVING SIGNAL



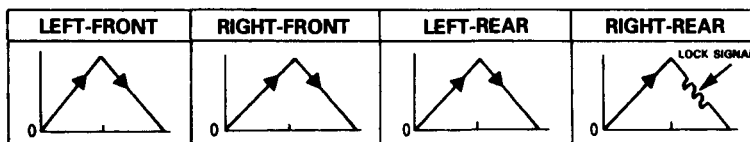
Mode 2: Sends the driving signal of each wheel, then sends the lock signal of the left-rear wheel to the ABS control unit to check the system under left-rear wheel lock. There should be kickback.

SIMULATED DRIVING SIGNAL



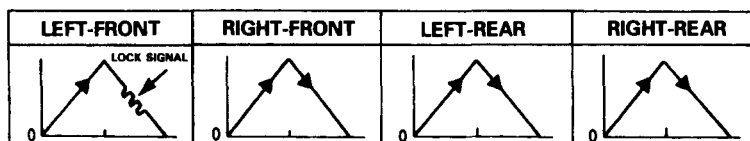
Mode 3: Sends the driving signal of each wheel, then sends the lock signal of the right-rear wheel to the ABS control unit to check the system under right-rear wheel lock. There should be kickback.

SIMULATED DRIVING SIGNAL



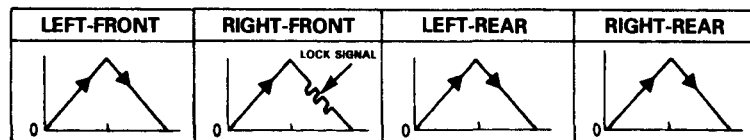
Mode 4: Sends the driving signal of each wheel, then sends the lock signal of the left-front wheel to the ABS control unit to check the system under left-front wheel lock. There should be kickback.

SIMULATED DRIVING SIGNAL



Mode 5: Sends the driving signal of each wheel, then sends the lock signal of the right-front wheel to the ABS control unit to check the system under right-front wheel lock. There should be kickback.

SIMULATED DRIVING SIGNAL



Inspection Points

If the ABS indicator light comes on and the system stops during the inspection, confirm the DTC and perform the appropriate troubleshooting for the code.

If there is no kickback in modes 2 through 5, and the ABS indicator light does not come on, the following items are probable causes:

- Pressure switch stuck ON
- Clogged or stuck solenoid outlet valve
- Modulator wire harness connectors improperly connected

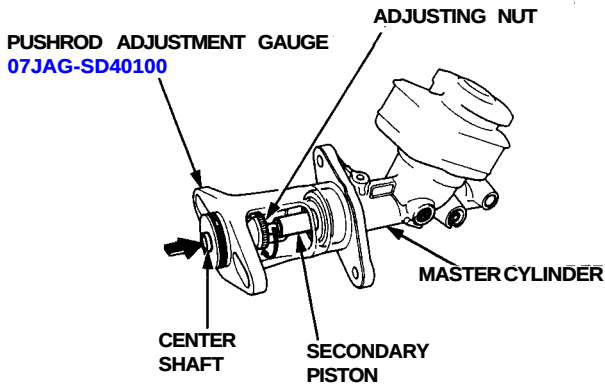
Master Cylinder

Pushrod Clearance Adjustment

NOTE: Master cylinder pushrod-to piston clearance must be checked and adjustments made, if necessary, before installing master cylinder.

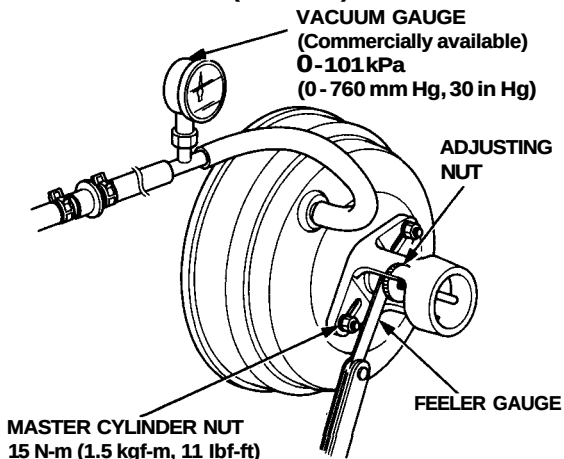
1. Set the special tool on the master cylinder body; push in the center shaft until the top of it contacts the end of the secondary piston by turning the adjusting nut.

NOTE: '96 model is shown.



2. Without disturbing the center shaft's position, install the special tool 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 - 101 kPa (0-760 mmHg, 30 in Hg) to the booster's engine vacuum supply, and maintain an engine speed that will deliver 66 kPa (500 mmHg, 20 in Hg) vacuum.
5. With a feeler gauge, measure the clearance between the gauge body and the adjusting nut as shown.

Clearance: 0 - 0.2 mm (0 - 0.01 in)

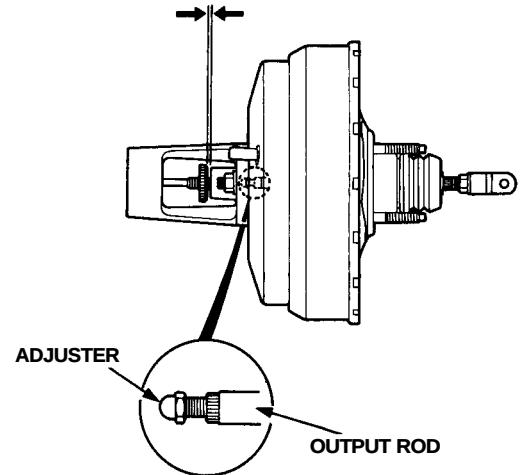


NOTE: If the clearance between the gauge body and adjusting nut is 0.2 mm (0.01 in), the pushrod-to-piston clearance is 0 mm. However, if the clearance between the gauge body and adjusting nut is 0 mm, the pushrod-to-piston clearance is 0.2 mm (0.01 in) or more. Therefore, it must be adjusted and rechecked.

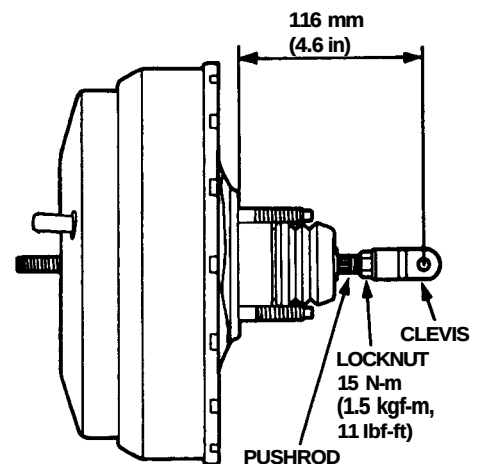
6. If the clearance is incorrect, remove the special tool and adjust the clearance by turning the adjuster in or out while holding the output rod.

NOTE: Adjust the clearance while the specified vacuum is applied to the booster.

0-0.2 mm (0-0.01 in)

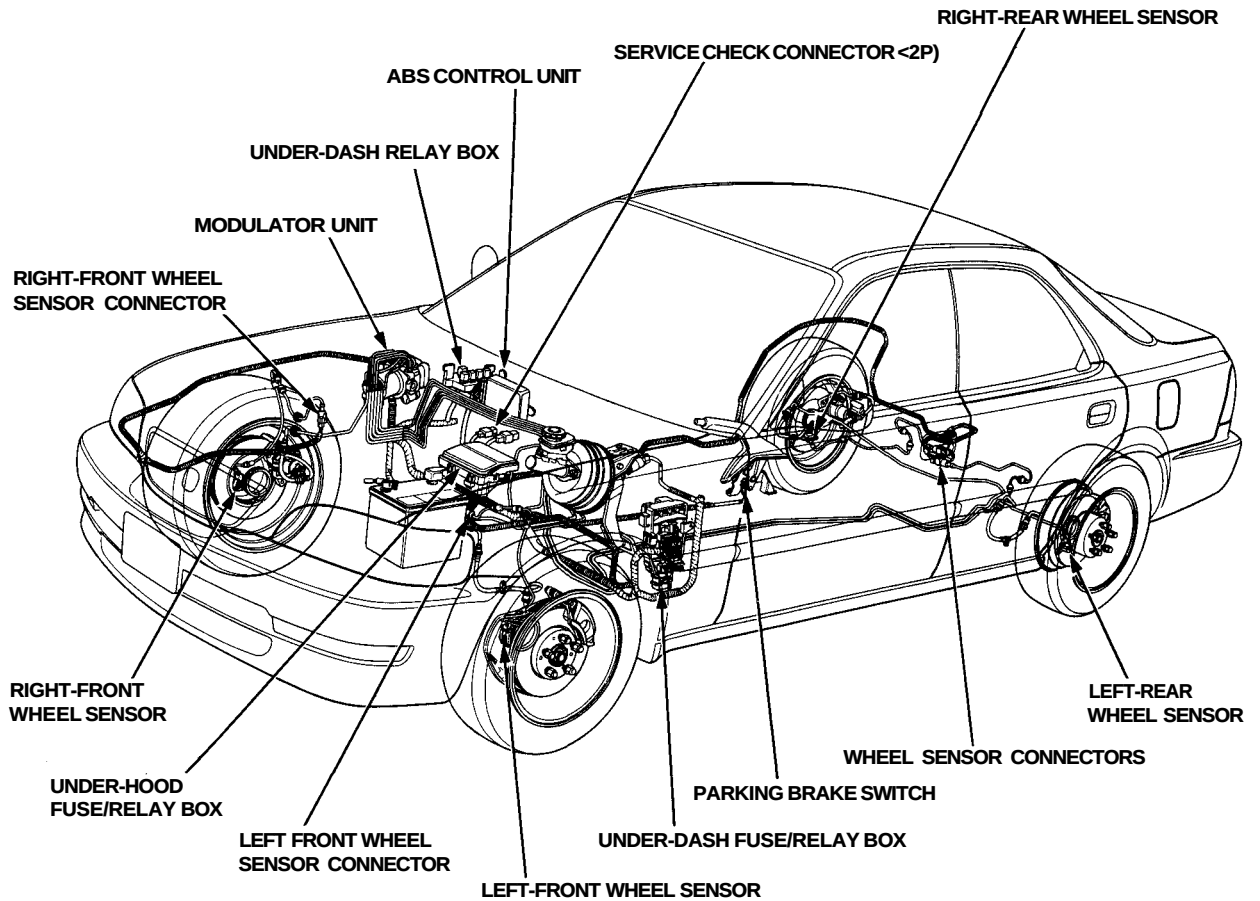


7. Adjust the pushrod length as shown if the booster is removed.

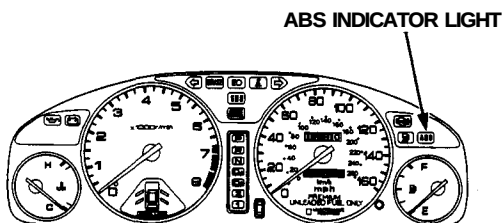


8. Install the master cylinder (refer to the '95 - 98 Acura 2.5 TL Service Manual, P/N 61SW504).

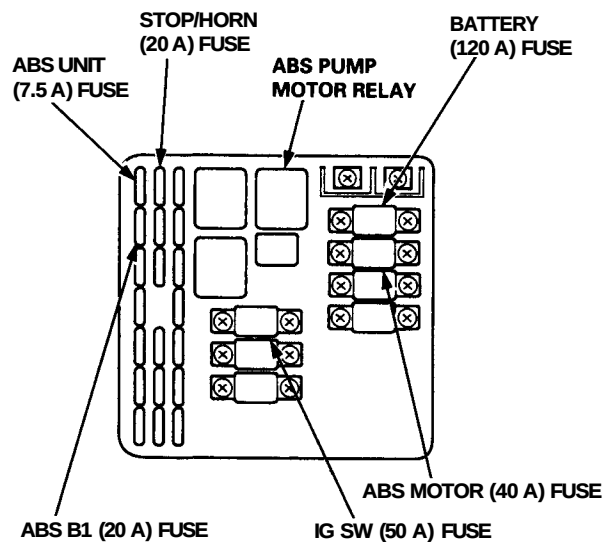
Component Locations



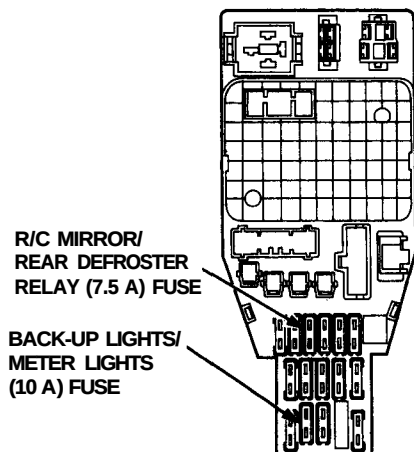
GAUGE ASSEMBLY



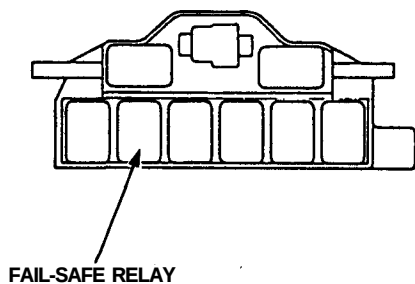
UNDER-HOOD FUSE/RELAY BOX



UNDER-DASH FUSE/RELAY BOX

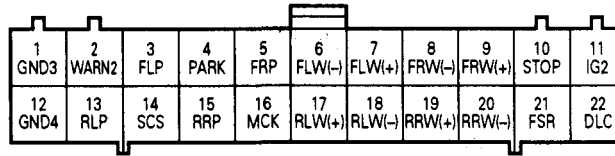


UNDER-DASH RELAY BOX



ABS Control Unit Terminal Arrangement

ABS CONTROL UNIT 22P CONNECTOR



Wire side of female terminals

VB: Battery Voltage

Terminal number	Wire color	Terminal sign (Terminal name)	Description	Measurement				
				Terminal	Conditions (Ignition switch ON (II))		Voltage	
1	BLK	GND3 (Ground 3)	Ground	1-GND	————		Below 0.3 V	
2	BLU/RED	WARN2 (Warning 2)	Drives ABS indicator light (Turns the indicator light drive transistor to OFF, then turns off the indicator light)	2-GND	ABS indicator light	ON	Below 1.0 V	
						OFF	VB	
3	GRN/BLU	FLP (Front-left pulse)	Outputs left-front wheel sensor signal	3-GND	Turns wheel slowly		5 V ↔ 0 V	
4	GRN/RED	PARK (Parking)	Detects parking brake switch signal	4-GND	Parking brake	Pulled	Below 0.3 V	
						Released	VB	
5	GRN/BLK	FRP (Front-right pulse)	Outputs right-front wheel sensor signal	5-GND	Turns wheel slowly		5 V ↔ 0 V	
6	BRN	FLW (–) (Front-left wheel negative)	Detects left-front wheel sensor signal	6-7	Wheel	Turns slowly	AC: 0.053 V or above (Reference) Oscilloscope: 0.15 Vp-p or above	
7	GRN/BLU	FLW (+) (Front-left wheel positive)						
8	GRN	FRW (–) (Front-right wheel negative)	Detects right-front wheel sensor signal	8-9		Stops		0.25 – 1.15 V
9	GRN/BLK	FRW (+) (Front-right wheel positive)						
10	GRN/WHT	STOP	Detects brake switch signal	10-GND	Brake pedal	Depressed	VB	
						Released	Below 0.3 V	
11	YEL/BLK	IG2 (Ignition 2)	Power source for activating the system	11-GND	Ignition Switch	ON (II)	VB	
						Start (III)	Below 0.3 V	

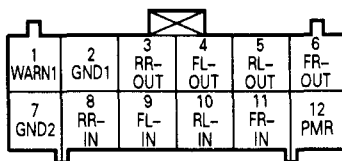


VB: Battery Voltage

Terminal number	Wire color	Terminal sign (Terminal name)	Description	Measurement				
				Terminal	Conditions (Ignition switch ON (II))		Voltage	
12	BLK	GND4 (Ground 4)	Ground	12-GND	————		Below 0.3 V	
13	LT BLU	RLP (Rear-left pulse)	Outputs left-rear wheel sensor signal	13-GND	Turns wheel slowly		5 V ↔ 0 V	
14	ORN	SCS (Service check signal)	Detects service check connector signal (DTC indication or DTC erasure)	14-GND	SCS service connector	Connected	Below 0.3 V	
						Disconnected	Approx. 5 V	
15	GRN/YEL	RRP (Rear-right pulse)	Outputs right-rear wheel sensor signal	15-GND	Turns wheel slowly		5 V ↔ 0 V	
16	GRN	MCK (Motor check)	Detects pump motor drive signal	16-GND	Pump motor	ON	VB	
						OFF	Below 0.3 V	
17	LT BLU	RLW (+) (Rear-left wheel positive)	Detects left-rear wheel sensor signal	17-18	Wheel	Turns slowly	AC: 0.053 V or above (Reference) Oscilloscope: 0.15 Vp-p or above	
18	GRY	RLW (–) (Rear-left wheel negative)						
19	GRN/YEL	RRW (+) (Rear-right wheel positive)	Detects right-rear wheel sensor signal	19-20		Stops		0.25 – 1.15 V
20	BLU/YEL	RRW (–) (Rear-right wheel negative)						
21	YEL/GRN	FSR (Fail-safe relay)	Drives fail-safe relay (Fail-safe relay is turned OFF to shut off the power source to the solenoid and pump motor relay when problem occurs.)	21-GND	ABS indicator light	ON	Below 0.3 V	
						OFF	VB	
22	LT BLU	DLC (Data link connector)	Communicates with Honda PGM Tester	22-GND	————		————	

ABS Control Unit Terminal Arrangement

ABS CONTROL UNIT 12P CONNECTOR



Wire side of female terminals

VB: Battery Voltage

Terminal number	Wire color	Terminal sign (Terminal name)	Description	Measurement					
				Terminal	Conditions (Ignition switch ON (II))			Voltage	
1	BLU/RED	WARN1 (Warning 1)	Drives ABS indicator light (Turns the indicator light drive transistor to OFF, then turns off the indicator light)	1-GND	ABS indicator light		ON	Below 1.0 V	
							OFF	VB	
2	BLK	GND1 (Ground 1)	Ground	2-GND				Below 0.3 V	
3	YEL/WHT	RR-OUT (Rear-right outlet)	Drives right-rear outlet solenoid valve	3-GND	ABS indicator light	OFF		VB	
4	YEL/BLU	FL-OUT (Front-left outlet)	Drives left-front outlet solenoid valve	4-GND					
5	BLK/ORN	RL-OUT (Rear-left outlet)	Drives left-rear outlet solenoid valve	5-GND		ON	Below 0.3 V		
6	YEL/BLK	FR-OUT (Front-right outlet)	Drives right-front outlet solenoid valve	6-GND					
7	BLK	GND2 (Ground 2)	Ground	7-GND				Below 0.3 V	
8	RED/WHT	RR-IN (Rear-right inlet)	Drives right-rear inlet solenoid valve	8-GND	ABS indicator light	OFF		VB	
9	RED/BLU	FL-IN (Front-left inlet)	Drives left-front inlet solenoid valve	9-GND					
10	YEL	RL-IN (Rear-left inlet)	Drives left-rear inlet solenoid valve	10-GND		ON	Below 0.3 V		
11	RED/BLK	FR-IN (Front-right inlet)	Drives right-front inlet solenoid valve	11-GND					
12	YEL/RED	PMR (Pump motor relay)	Drives pump motor relay	12-GND	ABS indicator light	OFF	Pump motor	ON	Below 0.3 V
								OFF	VB
						ON		Below 0.3 V	



Troubleshooting Precautions

ABS Indicator Light

1. If the system is OK, the ABS indicator light goes off two seconds after turning the ignition switch ON (II) without starting the engine. After starting the engine, the ABS indicator light comes on again and goes off after two seconds. This occurs because the ABS control unit is activated by the IG2 power source.
2. The ABS indicator light comes on when the ABS control unit detects a problem in the system. However, even though the system is normal, the ABS indicator light comes on, too, under the following conditions. To determine the actual cause of problem, question the customer about the problem, talking the following conditions into consideration.
 - Only drive wheels rotate
 - One wheel stuck of drive wheels
 - Vehicle spin
 - ABS operate condition continue for long time
 - Signal disturbance
3. When a problem is detected and the ABS indicator light comes on, there are cases when the indicator light stays on until the ignition switch is turned OFF, and cases when the indicator light goes off automatically when the system returns normal. For the DTC 61 and 62, the indicator light goes off automatically when the system returns normal. For all other codes, the indicator light stays on until the ignition switch is turned OFF.
4. For DTCs 12, 14, 16, 18, 21, 22, 23, 24, 51, 52 and 53, the indicator light goes off when the vehicle is driven again and the signals are OK after the ignition switch is turned from OFF to ON (II). However, if the DTC is erased, the CPU is reset and the indicator light goes off right after the engine is started if the signals are OK.

Diagnostic Trouble Code (DTC)

1. The DTC is not memorized if the CPU cannot be activated or the CPU fails and the indicator light comes on.
2. The memory can hold any number of DTCs. However, when the same DTC is detected more than once, the later one is written over the old one. Therefore, when the same problem is detected repeatedly, it is memorized as one DTC.
3. The DTCs are indicated in the order of ascending number, not in the order they occur.
4. The DTCs are memorized in the EEPROM (non-volatile memory). Therefore, the memorized DTCs cannot be canceled by disconnecting the battery. Perform the specified procedures to erase the DTCs.

Self-diagnosis

1. The self-diagnosis can be classified into two categories.
 - Initial diagnosis: Performed right after the engine starts and until the ABS indicator light goes off.
 - Regular diagnosis: Performed right after the initial diagnosis until the ignition switch is turned OFF.
2. When a problem is detected by self-diagnosis, the system
 - Turns the ABS indicator light ON
 - Memorizes the DTC
 - Turns the fail-safe relay OFF
 - Stops ABS control

Troubleshooting Precautions

Kickback

1. The motor operates when the ABS is functioning, and fluid in the reservoir is forced out to the master cylinder causing kickback at the brake pedal.

Pump Motor

1. The pump motor operates when the ABS is functioning.
2. The ABS control unit checks the pump motor operation during initial diagnosis and vehicle starts. You may hear the faint operation sound at this time, but it is normal.

Brake Fluid Replacement/Air Bleeding

1. Brake fluid replacement and air bleeding procedures are the same as vehicles without ABS. To case bleeding, start with the front wheels.

Troubleshooting

1. The troubleshooting flowcharts procedures assume that the cause of the problem is still present and the ABS indicator light is still on. Following the flowchart when the ABS indicator light does not come on can result in incorrect judgment.
2. Question the customer about the conditions when the problem occurred, and try to reproduce the same conditions for troubleshooting.
Find out when the ABS indicator light came on, such as during initial diagnosis, during ABS control, after ABS control, when the vehicle started, when vehicle speed was at 19 mph (30 km/h), when the problem continued for a few seconds or a few minutes, etc.
3. When the ABS indicator light does not come on during the test-drive, but the troubleshooting is performed based on the DTC, check for the loose connectors, poor contact of terminals, etc, before troubleshooting.
4. After troubleshooting, erase the DTC and test-drive the vehicle. Be sure that the ABS indicator light does not come on.
5. The connector illustrations show the female connectors with a single outline and the male connectors with a double outline.

Diagnostic Trouble Code (DTC)

Diagnostic Trouble Code (DTC) Indication (SCS Mode)

NOTE: This operation can also be done with the Honda PGM Tester.

1. Connect the SCS service connector to the service check connector (2P) under the glove box.
2. Turn the ignition switch ON (II) without brake pedal depressed.

NOTE: If the brake pedal is depressed when turning the ignition switch ON (II), the system shifts to MES mode.

3. The blinking frequency indicates the DTC.

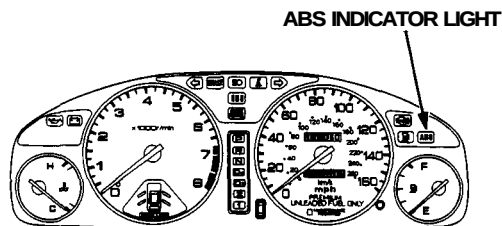
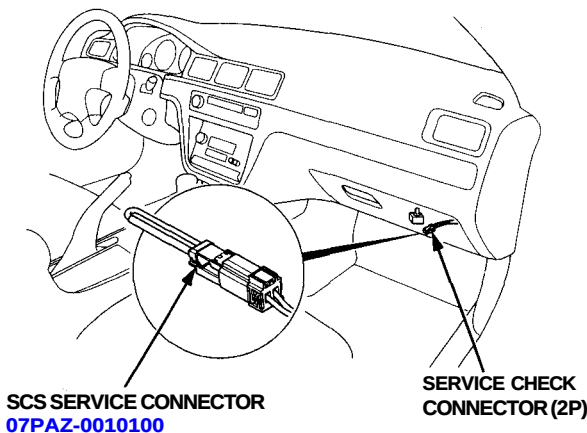
NOTE: If the DTC is not memorized, the ABS indicator light goes off for 3.6 seconds and then stays on.

4. Turn the ignition switch OFF, and remove the SCS service connector.

NOTE: The Malfunction Indicator Lamp (MIL) will stay on after the engine is started if the SCS service connector is connected.

Conditions for DTC indication

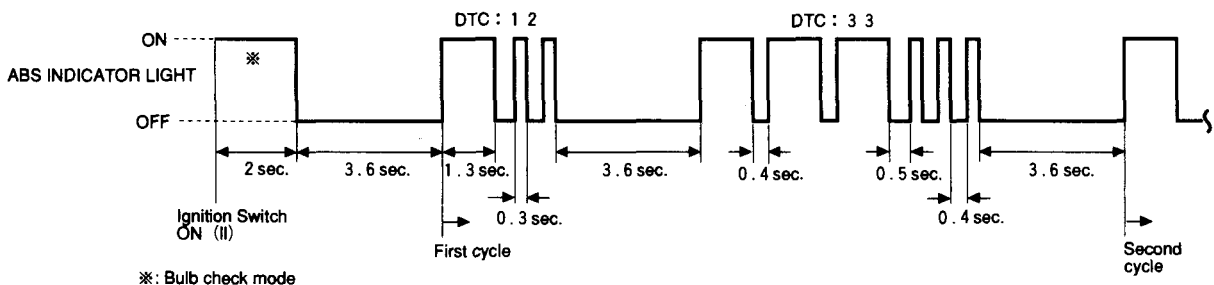
- The vehicle is at 10 km/h or less.
- The SCS service connector is connected before the ignition switch is turned ON (II).
- The brake pedal is released.



U.S.A.



CANADA



- When ignition switch is turned ON (II), the ABS indicator light comes on for two seconds to check the bulb. Do not count this as a DTC.

Diagnostic Trouble Code (DTC)

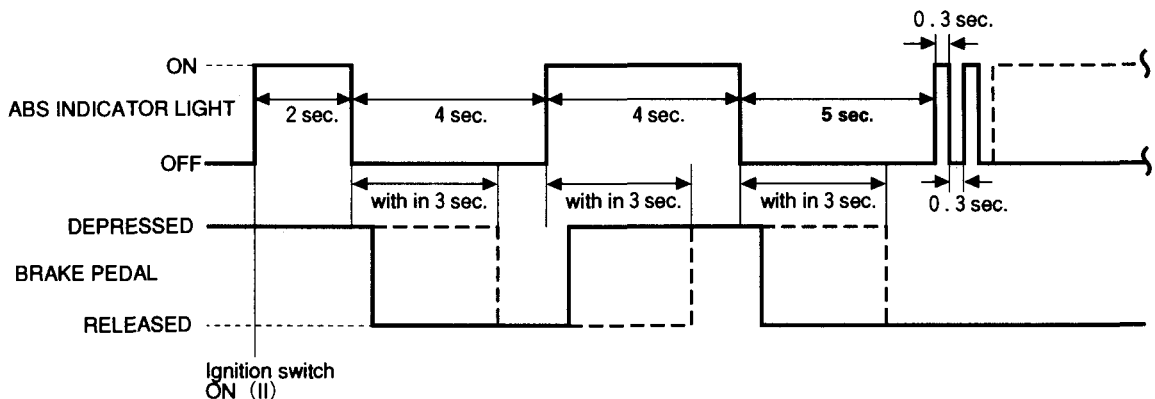
DTC Erasure (MES Mode)

NOTE: This operation can also be done with the Honda PGM Tester.

1. Connect the SCS service connector to the service check connector (2P) under the glove box.
2. Depress the brake pedal.
3. Turn the ignition switch ON (II) while keeping the brake pedal depressed.
4. After the ABS indicator light goes off, release the brake pedal.
5. After the indicator light comes on, depress the brake pedal again.
6. After the indicator light goes off, release the brake pedal again.
7. After few seconds, the indicator light blinks twice and the DTC is erased. If the indicator light does not blink twice, repeat steps 1 through 6. If the indicator light stays ON after the indicator light blinks twice, check the DTC because a problem was detected during initial diagnosis before shifting to MES mode.
8. Turn the ignition switch OFF, and remove the SCS service connector.

Conditions for DTC erasure

- Vehicle speed is at 6 mph (10 km/h) or less.
- The SCS service connector is connected before the ignition switch is turned ON (II).
- The brake pedal is depressed before the ignition switch is turned ON (II).





Troubleshooting Index

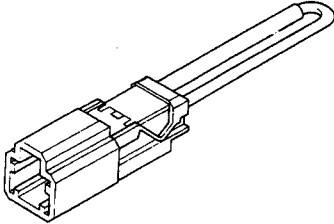
NOTE: This operation can also be done with the Honda PGM Tester.

DTC	ABS INDICATOR LIGHT	DIAGNOSIS/SYMPTOM	DETECTION TIMING		PROBLEM LOCATION	REFER TO PAGE
			INITIAL DIAGNOSIS	REGULAR DIAGNOSIS		
No DTC	OFF	ABS indicator light does not come on when ignition switch is turned ON (II).				19-84
	ON	ABS indicator light does not go off after engine is started (No DTC).				19-86
11	ON	Wheel sensor (open/short to body ground/short to power)	○	○	FR	19-87
13					FL	
15					RR	
17					RL	
12	ON*1	Wheel sensor (electrical noise/intermittent interruption)		○	FR	19-88
14					FL	
16					RR	
18					RL	
21	ON*1	Pulser		○	FR	19-89
22					FL	
23					RR	
24					RL	
31	ON	Solenoid (short to body ground/short to wire)	○	○	FR-IN	19-90
32					FR-OUT	
33					FL-IN	
34					FL-OUT	
35					RR-IN	
36					RR-OUT	
37					RL-IN	
38					RL-OUT	
41	ON	Wheel lock		○	FR	19-93
42					FL	
43					RR	
44					RL	
51	ON	Motor lock		○		19-94
52	ON	Motor stuck OFF		○		19-95
53	ON	Motor stuck ON	○	○		19-98
54	ON	Fail-safe relay	○	○		19-100
61	ON*2	Ignition voltage		○		19-102
62						
71	ON	Different diameter tire		○		19-103
81	ON	CPU	○	○		19-103

*1: When the problem is detected and ABS indicator light comes on, the indicator light will stay on until the ignition switch is turned from OFF to ON (II), and the control unit confirms that the system is OK when the vehicle starts.

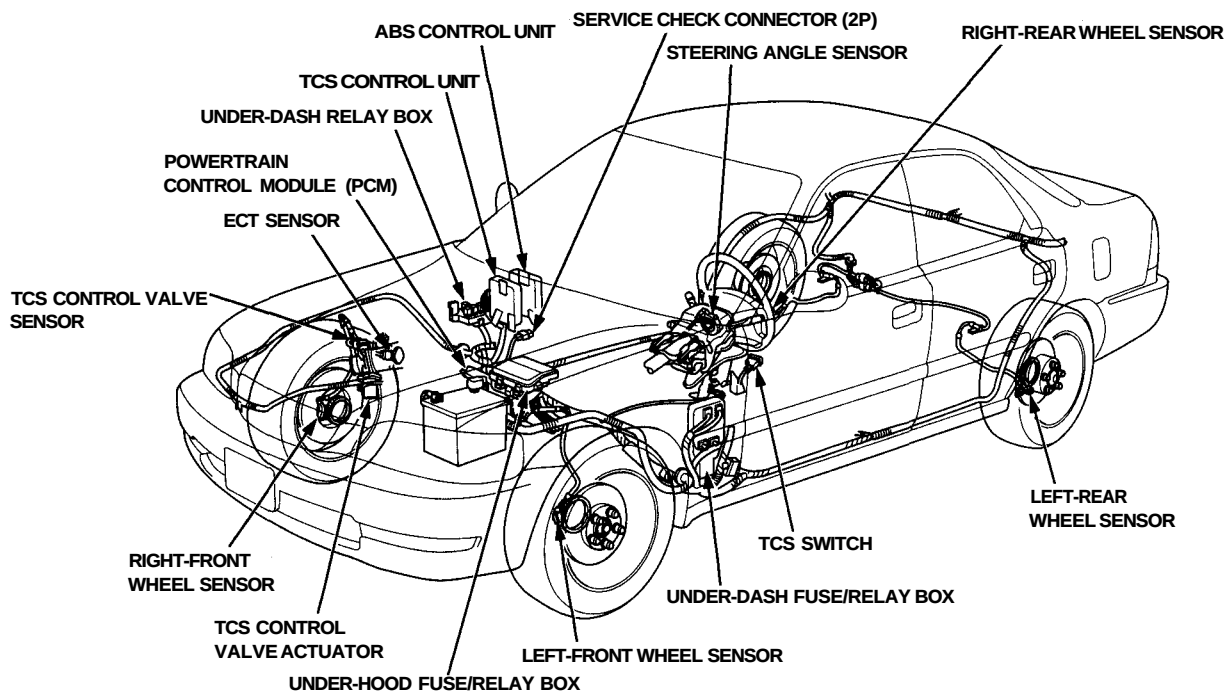
*2: When voltage returns normal, the ABS indicator light goes off.

Special Tools

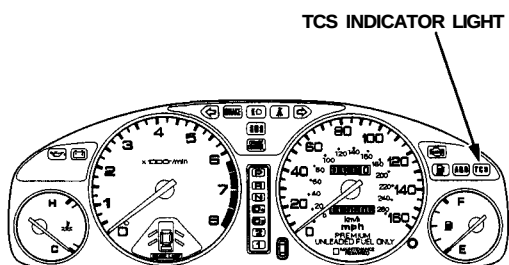
Ref. No.	Tool Number	Description	Qty	Page Reference
①	07PAZ-0010100	SCS Service Connector	1	19-117 , 19-81 , 19-10
 ①				



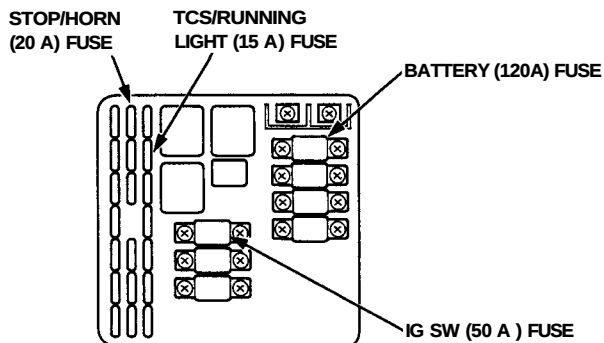
Component Locations



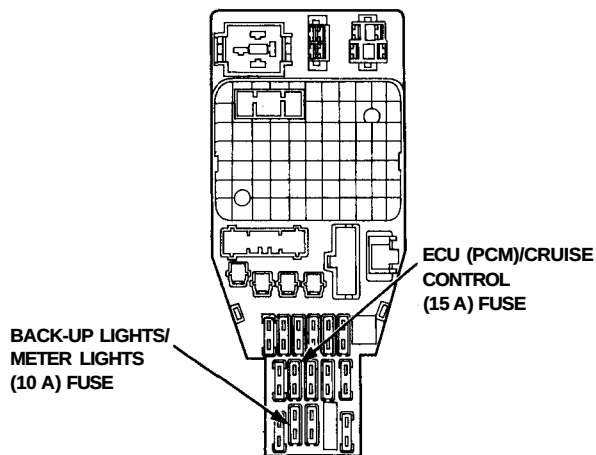
GAUGE ASSEMBLY



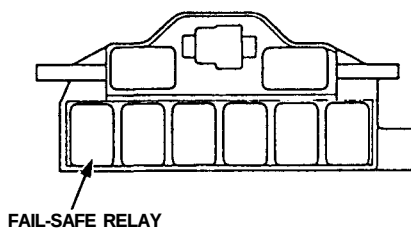
UNDER-HOOD FUSE/RELAY BOX



UNDER-DASH FUSE/RELAY BOX



UNDER-DASH RELAY BOX



System Description

Outline

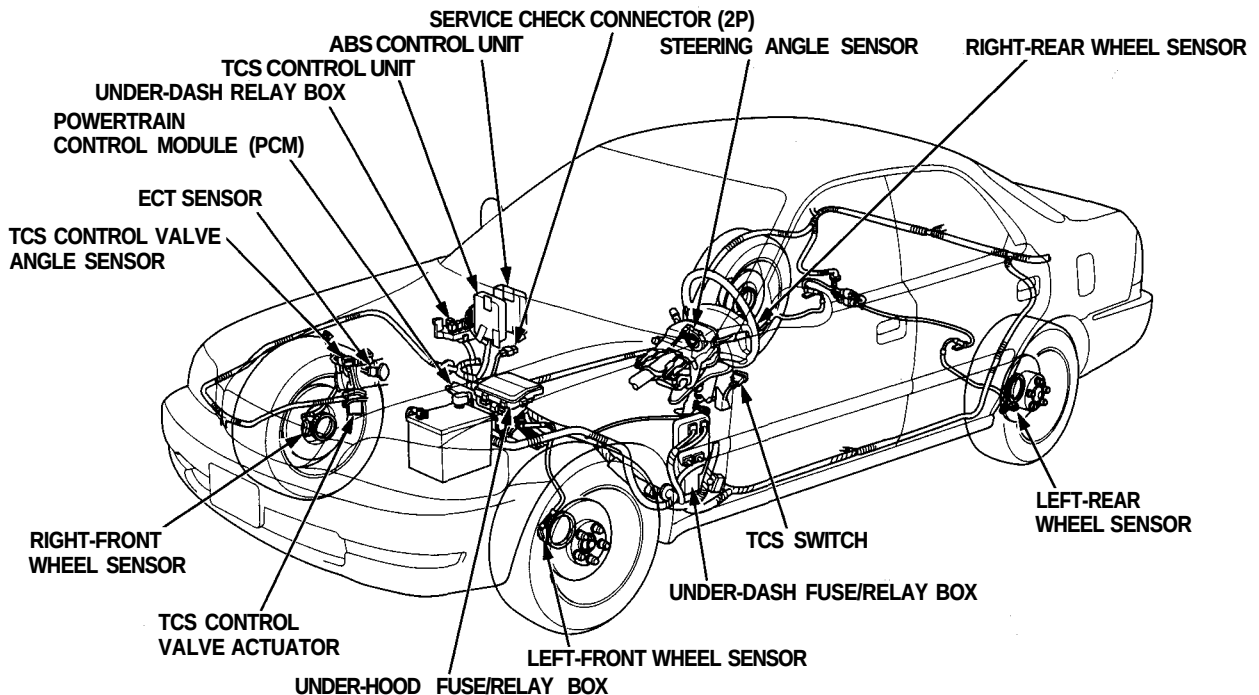
Role of System

The traction control is a variable system designed to enhance traction during acceleration and cornering. It does so by determining the optimum amount of wheel spin for any given driving situation, then suppressing surplus engine power accordingly.

Construction and Function

The TCS control unit gets signals about the vehicle's speed, direction, and road conditions from sensors at the wheels and the steering column. Based on these signals, the control unit will determine the optimum amount of wheel spin. Because the system is variable, the control unit may determine, depending on the driving conditions, that some wheel spin is beneficial (thus enhancing straight-line acceleration), or that no wheel spin is beneficial (thus enhancing cornering). For any given driving situation, the control unit will determine the amount of wheel spin best suited to the driver's needs and, if necessary, will then signal the TCS control valve actuator and Powertrain Control Module (PCM) to reduce engine power.

The system is automatically "ready" whenever the engine is started, but can be manually canceled with the TCS switch. However, once activated, the system cannot be canceled until it is once again in the ready state.



Components:

- Wheel sensors: The TCS "shares" the wheel sensors with the ABS. The wheel sensors transmit wheel speed signals to the TCS through the ABS control unit.
- Steering angle sensor: The steering angle sensor signals the TCS control unit about the amount of steering angle.
- TCS control valve sensor: The TCS control valve sensor signals the TCS control unit about the amount of TCS control valve angle.
- TCS control valve actuator: The actuator gets signals from the TCS control unit and closes the TCS control valve accordingly.
- TCS control unit: The TCS control unit detects the driving condition signals from the sensors and, if necessary, signals the Powertrain Control Module (PCM).



Construction and Function

TCS Control unit

Driving Control

When the drive wheel speed exceeds the vehicle speed by a given amount, the TCS control unit judges that the drive wheels are slipping, and it outputs the traction control signal to reduce engine power.

Handling Control

Based on signals about right and left driven wheel rotational speeds, the control unit calculates the vehicle's "yaw" rate (the turn rate of the vehicle's body). Based on signals from the steering angle sensor, the control unit also calculates the yaw rate expected by the driver. If the difference between actual and expected yaw rates is substantial — that is, if the direction of the vehicle's body will exceed the driver's expected line — the control unit signals the TCS control valve actuator and PCM, thus reducing engine power and maintaining the expected line.

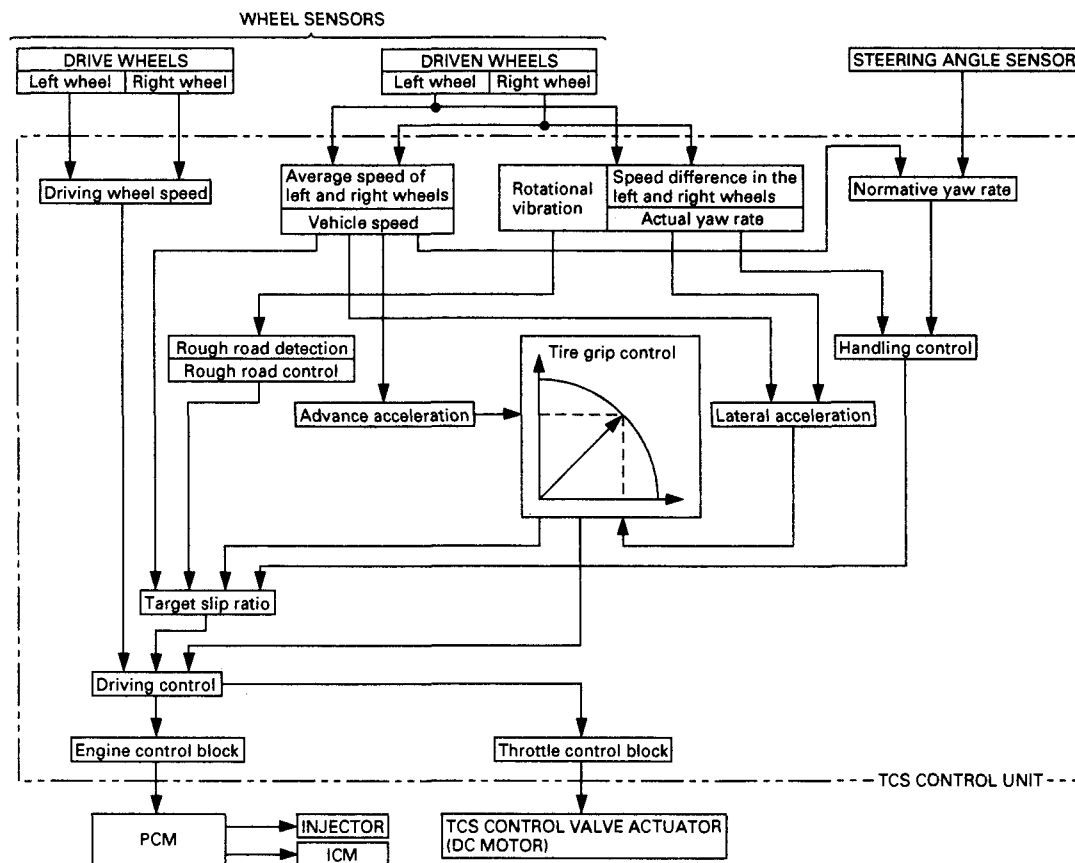
Rough Road Control

Based on signals from the wheel sensors, the control unit detects a rough road based on frequency of wheel rotational vibration. The control unit then signals the TCS control valve actuator and PCM to relax engine power, thus improving acceleration efficiency.

Grip Control

Based on signals about wheel speed and yaw rate, the control unit determines the efficiency of the grip of the tires on the road and signals the TCS control valve actuator and PCM to relax engine power, if necessary, thus improving grip.

Main Control Block



System Description

Fail-Safe Function

If the control unit detects an abnormality, it shuts the traction control system off and causes the TCS indicator light to come on. However if the abnormality is detected while the TCS is activated, the control unit first establishes the appropriate wheel spin velocity, then shuts the system down, thus preventing excessive wheel spin.

Self-Diagnosis Function

If the control unit detects an abnormality, it records a Diagnostic Trouble Code (DTC) which can be used to diagnose the problem. The DTC is shown at the TCS indicator light when the Service Check connector terminals are connected with the SCS service connector.

Steering Angle Detection

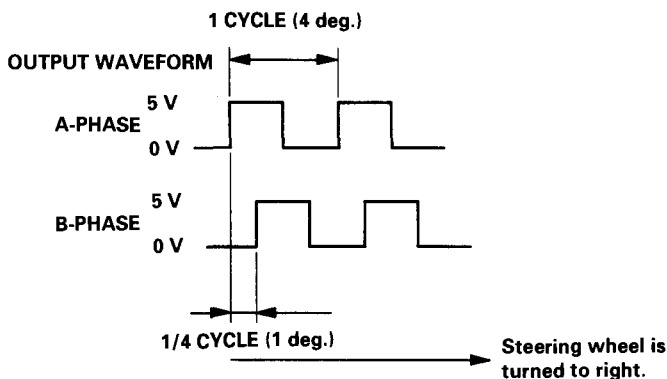
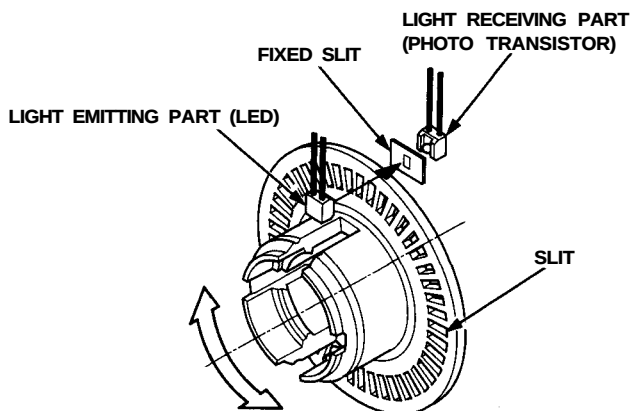
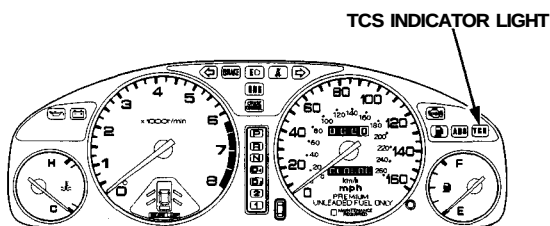
Steering angle is detected by the steering angle sensor. The disc with the slits of the regular pattern is provided between the facing parts of the light emitting part (LED), and the light receiving part (photo transistor). As the disc rotates, it passes and shuts off the light from the LED. The light which passed through a slit is converted into the electric current by the photo transistor, and the waveform of this electric current is shaped by the comparator to output the disc rotation as the rectangular signal.

The analysis performance of the system is improved by providing the fixed slit in front of the LED, and thereby identifying the brightness and darkness of the light which is received at the photo transistor clear.

The output signal is the 2-phase output (A-phase and B-phase), and the steering wheel turning angle and the turning direction are calculated by the TCS control unit.

Vehicle Speed Detection

Wheel rotation speed is detected by the wheel sensors, located at each wheel. The signals are sent to the control unit, which compares each wheel's speed and determines whether traction control is required.

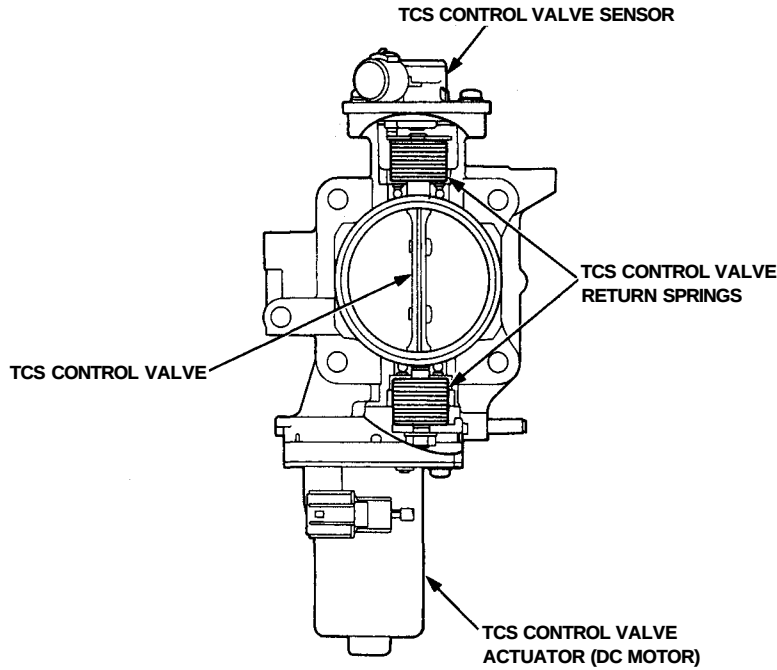




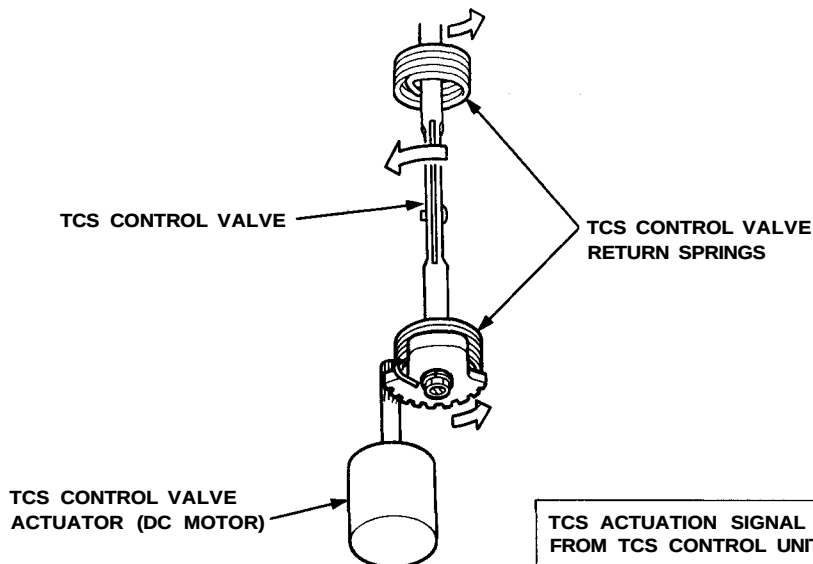
Engine Output Control

When the TCS is activated, the TCS control unit signals the TCS control valve actuator and PCM. The actuator is linked to the TCS control valve which is normally returned to fully open position by the two return springs.

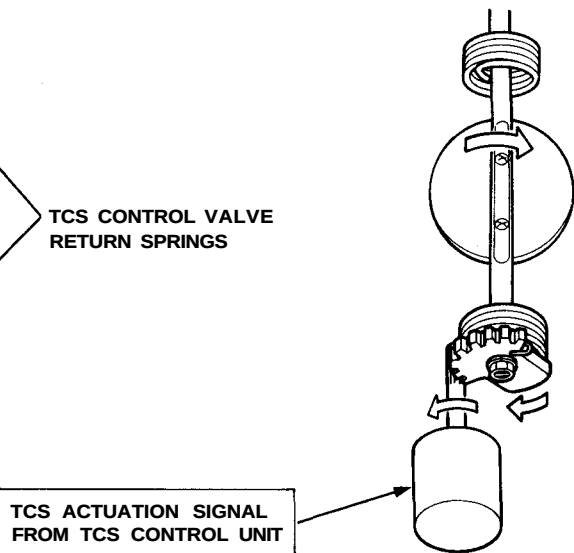
Although the throttle valve is still within the driver's control, the engine output is relaxed by the TCS control valve and PCM to achieve optimum traction.



DURING NORMAL DRIVING:

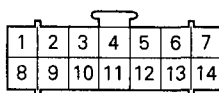


DURING TCS ACTUATION:



TCS Control Unit Terminal Arrangement

TCS CONTROL UNIT HP CONNECTOR



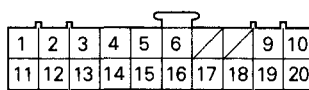
WIRE SIDE OF FEMALE TERMINALS

VB: Battery Voltage

Terminal number	Wire color	Terminal sign (Terminal name)	Description	Voltage		
				Measurement terminals	Conditions (Ignition Switch ON (III))	Output voltage
1	GRN/BLK	FRP (Front right pulse)	Detects right-front wheel sensor signal.	1-GND	Rotate the right-front wheel.	0 V ↔ 5 V
2	GRY/BLK	WARN1 (Warning 1)	Drives TCS indicator light (The indicator light comes on by the self-bias).	2-GND	Indicator light ON	Approx. 2 V
					Indicator light OFF	VB
3	GRN/BLU	FLP (Front left pulse)	Detects left-front wheel sensor signal.	3-GND	Rotate the left-front wheel.	0 V ↔ 5 V
4	BRN/BLK	LG1 (Logic ground1)	Ground for the logic circuit.	4-GND		Below 0.3 V
5	GRN/YEL	RRP (Rear right pulse)	Detects right-rear wheel sensor signal.	5-GND	Rotate the right-rear wheel.	0 V ↔ 5 V
6	BLU/GRN	θ TCV (θ traction control valve)	Detects TCS control valve sensor signal.	6-GND	TCS control valve is full close.	Approx. 0.5 V
					TCS control valve is full open.	Approx. 4.5 V
7	LT BLU	RLP (Rear left pulse)	Detects left-rear wheel sensor signal.	7-GND	Rotate the right-rear wheel.	0 V ↔ 5 V
8	LT GRN/BLK	TC-INH (Traction control inhibit)	FI → TCS, TCS operation permission signal.	8-GND	Permission (normal)	Approx. 2.5 V (5 V. Duty 50)
					Inhibition (the coolant temperature is 0°C or below)	Approx. 5 V
					Failure (TCS and/or PCM is failure)	Approx. 0 V
9	GRY	STR-B (Steering B)	Detects steering angle sensor signal B.	9-GND	Rotate the steering wheel.	5 V ↔ 0 V
10	LT BLU	TC-STB (Traction control standby)	TCS → FI, TCS operation start signal	10-GND	TCS is functioning.	0 V
					TCS is not functioning.	Approx. 5 V
11	WHT/BLK	TC-SW (Traction control switch)	Detects TCS switch signal.	11-GND	Push the TCS switch.	VB
					Release the TCS switch.	0 V
12	BLU	VREF (Voltage reference)	Reference voltage for the sensors of the PGM-FI system.	12-GND		Approx. 5 V
13	WHT	STR-A (Steering A)	Detects steering angle sensor signal A.	13-GND	Rotate the steering wheel.	5 V ↔ 0 V
14	RED/BLK	TPS (Throttle position sensor)	Detects throttle position sensor signal.	14-GND	Throttle valve is fully closed.	Approx. 0.5 V
					Throttle valve is fully open.	Approx. 4.5 V



TCS CONTROL UNIT 20P CONNECTOR



WIRE SIDE OF FEMALE TERMINALS

VB: Battery Voltage

Terminal number	Wire color	Terminal sign (Terminal name)	Description	Voltage		
				Measurement terminals	Conditions (Ignition Switch ON (III))	Output voltage
1	BLK/YEL	IG1 (Ignition 1)	Detects ignition switch IG1 signal.	1-GND		VB
2	GRN/RED	PARK (Parking)	Detects parking brake switch signal.	2-GND	Pull the parking brake lever up.	Below 0.6 V
					Release the parking brake lever.	VB
3	ORN	SCS (Service check signal)	Detects service check connector signal (Diagnostic trouble code indication).	3-GND	SCS service connector connected.	0 V
					SCS service connector disconnected.	5 V
4	BLU	STR-GND (Steering ground)	Ground for the steering angle sensor.	4-GND		Below 0.3 V
5	BLU/RED	AT-SHIFT (AT shift)	Detects A/T shift position signal.	5-GND	Shift the transmission to P position, then start the engine.	Approx. 4 V (5 V ↔ 0 V)
6	RED/BLK	FSR (Fail safe relay)	Drives fail-safe relay.	6-GND		VB
					Start the engine.	0 V
9	BLK	PMG (Power motor Ground)	Power ground for the TCS control valve actuator motor.	9-GND		Below 0.3 V
10	BRN/WHT	VPM (Voltage power motor)	Power source for the TCS control valve actuator motor.	10-GND		0 V
					Start the engine.	VB
11	GRN/WHT	STOP (Stop)	Detects brake switch signal.	11-GND	Brake pedal depressed.	VB
					Brake pedal released.	0 V
12	BLU	NEP (Engine speed pulse)	Detects engine speed signal.	12-GND	Engine idling	Approx. 6 V (12 V ↔ 0 V)
13	ORN/RED	BARO (Barometric)	Detects barometric sensor signal.	13-GND		Approx. 3 V
14	GRY/GRN	TC-FC (Traction control fuel cut)	TCS → FI, Fuel cut (torque down) signal	14-GND	TCS is functioning. (maximum fuel cut)	Approx. 1.5 V
					TCS is not functioning.	Approx. 4.5 V (5 V, PWM)
15	BRN/BLK	LG2 (Logic ground 2)	Ground for the logic circuit.	15-GND		Below 0.3 V
16	WHT/GRN	STR-VCC (Steering power supply)	Power source for the steering angle sensor.	16-GND		Approx. 5 V
17	GRY/BLK	WARN2 (Warning 2)	Drives TCS indicator light (The indicator light comes on by the self-bias).	17-GND	Indicator light ON	Approx. 2 V
					Indicator light OFF	VB
18	BLK	SH-MOT (Shield motor)	Shield for the TCS control valve actuator motor.	—	—	—
19	BLU/BLK	MOT + (Motor +)	Drives TCS control valve actuator motor.	19-20	TCS is functioning.	VB
					TCS is not functioning.	0 V
20	BLU/YEL	MOT – (Motor –)	Drives TCS control valve actuator motor.	20-19	TCS is functioning.	VB
					TCS is not functioning.	0 V

TroubleshootingPrecautions

1. In any of these cases, the TCS indicator light may come on or stay on even the TCS system is normal.
 - The coolant temperature is 32°F (0°C) or below.
 - The parking brake is applied for more than 30 seconds while the vehicle is being driven.
 - The tire pressure is not at the specified pressure.
 - The wheel sensor signal is interrupted during driving at the speed of 6 mph (10 km/h) or above due to, for example, the vehicle spinning.
 - The MAP sensor, coolant temperature sensor, ICM or the atmospheric pressure sensor system of the PGM-FI system is faulty.
2. TCS does not function when the TCS indicator light is ON.
3. When both the TCS indicator light and the MIL are ON, troubleshoot the PGM-FI system first.
4. When both the TCS indicator light and the ABS indicator light are ON, troubleshoot the ABS first.
5. The DTC 4-9 (ABS down) is memorized when the ABS control unit cannot output the wheel speed signal due to, for example, a missing or blown ABS B2 (15 A) fuse. If you fail to erase the DTC of the TCS after troubleshooting the ABS, the DTC remains in the TCS control unit memory. Therefore, be sure to test-drive the vehicle and check the TCS indicator light before starting the troubleshooting the TCS.



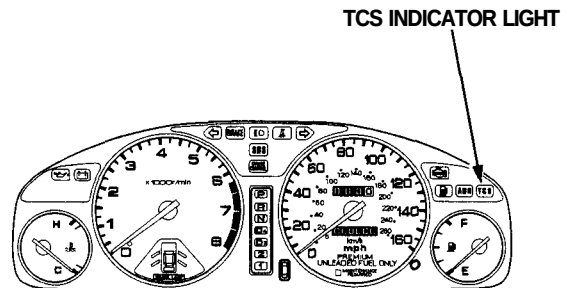
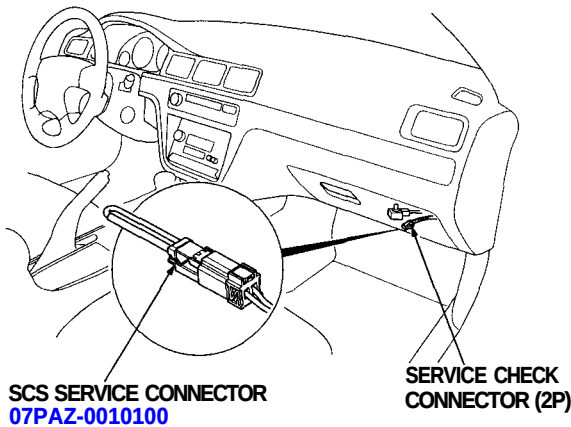
Diagnostic Trouble Code (DTC)

Diagnostic Trouble Code (DTC) Indication

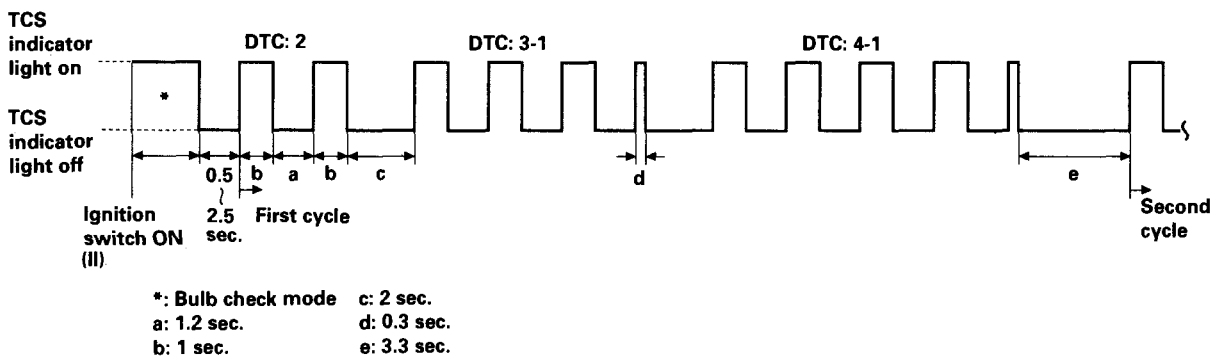
1. Connect the SCS service connector to the service check connector under the glove box.
2. Turn the ignition switch ON (II), but do not start the engine.
3. Record the blinking frequency of the TCS indicator light. The blinking frequency indicates the diagnostic trouble code (DTC).
4. Turn the ignition switch off, and remove the SCS service connector.

NOTE: The Malfunction Indicator Lamp (MIL) will stay on after the engine is started if the SCS service connector is connected.

5. Perform the DTC erasure.



DTC Indication Pattern



- Turn the ignition switch ON (II). The TCS indicator light comes on to check the bulb. Do not count it as a DTC.
- The TCS control unit can memorize up to three DTCs.
- A new DTC is not memorized again when the TCS control unit has already memorized the same DTC.
- The TCS control unit indicates the DTC repeatedly at intervals of 3.3 seconds.
- If you miscount the blinking frequency or if you recheck the blinking frequency, turn the ignition switch OFF then turn it ON (II) to cycle the TCS indicator light again.

Diagnostic Trouble Code (DTC)

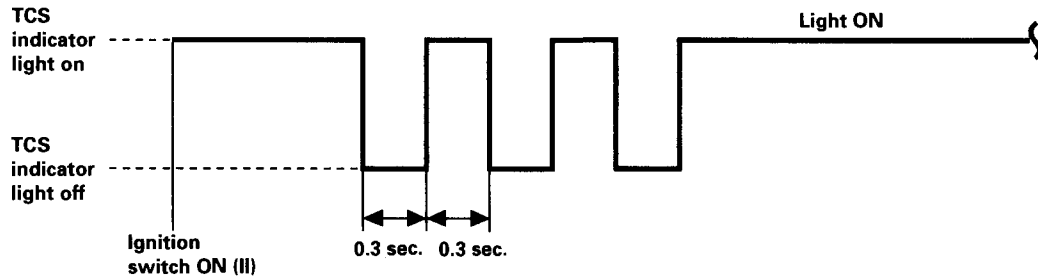
DTC Erasure

1. Pull the parking brake lever up.
2. Push and hold the TCS switch, then turn the ignition switch ON (II).
3. Hold the TCS switch pushed for four seconds (do not release the TCS switch), then release the TCS switch for less than six seconds.
4. After three seconds, the TCS indicator light go off three times, then turn it on. It means that the DTC is erased.

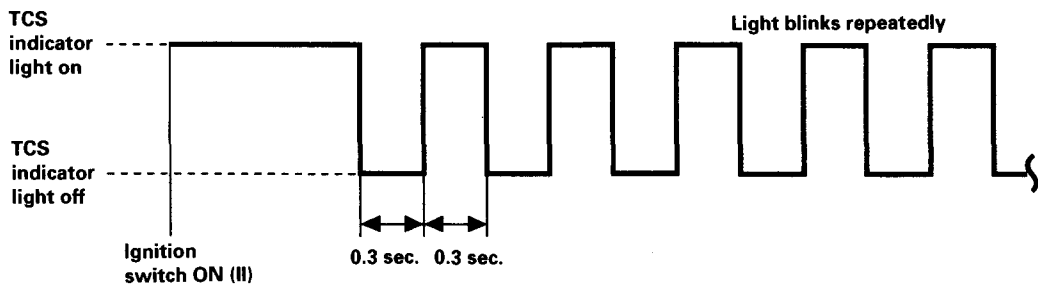
NOTE:

- Follow these steps exactly. If you connect the SCS service connector and/or release the parking brake lever during these steps, the DTC will not be erased.
- If the TCS indicator light blinks repeatedly, replace the TCS control unit.

Standard Indication Pattern



Abnormal Indication Pattern





Troubleshooting Guide

Diagnostic Trouble Code (DTC)	System Indicated	Related components											Refer to page
		BACK-UP LIGHTS (10 A) fuse	ECU (15 A) fuse	TCS (15 A) fuse	Parking brake switch	Steering angle sensor	TCS control valve sensor	TCS control valve actuator	Fail-safe relay	Powertrain Control Module (PCM)	ABS control unit	Wire harness	
—	TCS indicator light does not come on when ignition switch is turned ON (II)	○									○	○	19-120
—	TCS indicator light does not go off after engine is started		○								○	○	19-122
2	Parking brake				○						○	○	19-123
2-1	Steering angle sensor					○					○	○	19-126
3-1	TCS inhibition TC-INH signal PGM-FI DTC: 35 PGM-FI DTC: 36									○		○	19-129
3-2	Engine speed signal (NEP)									○		○	19-134
3-4	Reference voltage signal (VREF)									○		○	19-135
3-5	Barometric pressure signal (BARO)									○		○	19-136
3-6	Throttle position sensor signal (TPS)									○		○	19-137
3-7	TCS control valve sensor signal (θ TCV)						○			○		○	19-138
4-1	Right-front wheel sensor signal (FRP)										○	○	19-140
4-2	Left-front wheel sensor signal (FLP)												
4-4	Right-rear wheel sensor signal (RRP)												
4-8	Left-rear wheel sensor signal (RLP)												
4-9	ABS down									○	○	○	19-142
5-1	Fail-safe relay stuck on							○			○	○	19-143
5-2	Ignition switch signal (IG1)												19-144
5-3													
5-4	TCS control valve actuator	Initial motor operation											19-145
5-5		Motor operation (1)											
5-6		Motor operation (2)											
5-7		Over limit motor current											
5-8		FET is full duty											
5-9		Under limit motor current											
5-10		FET stuck on											
6-1	A/T shift position signal (AT-SHIFT)									○		○	19-148



Electronic Components

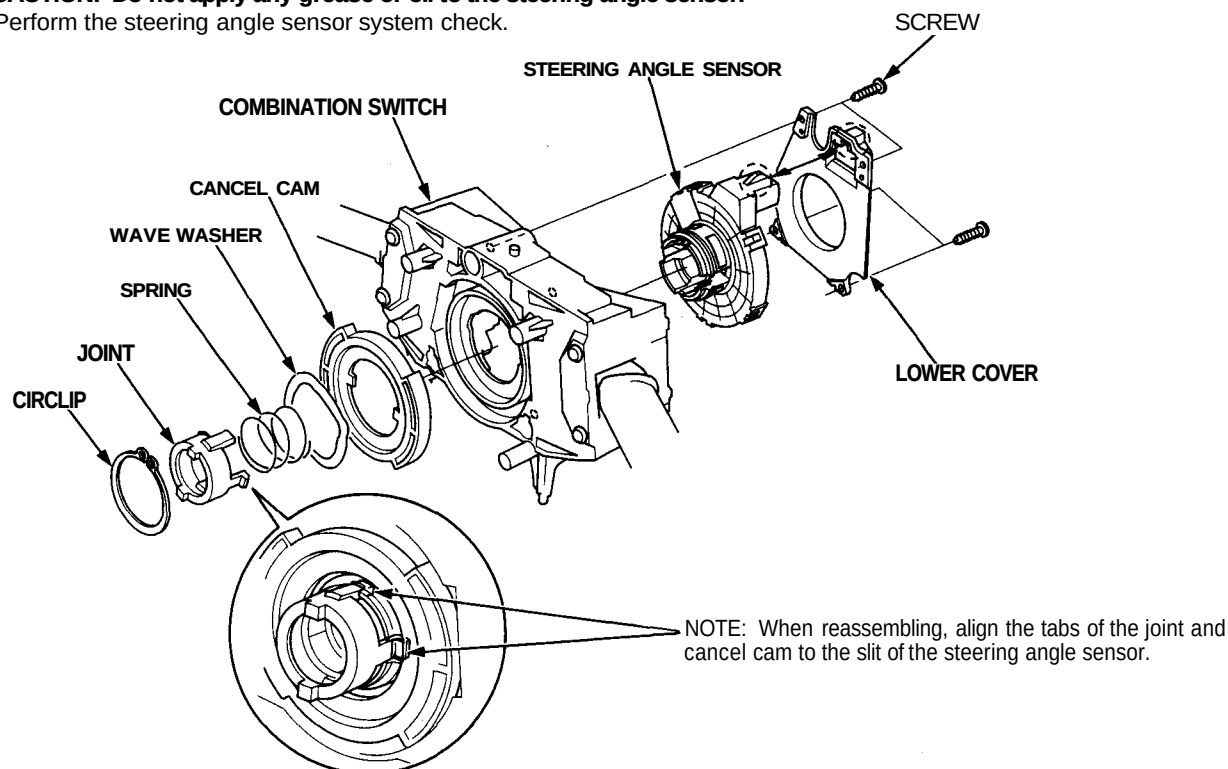
Steering Angle Sensor Replacement

CAUTION: Do not damage or drop the steering angle sensor as it is sensitive.

1. Remove the combination switch (refer to [section 17](#) in the '95 - '98 Acura 2.5TL service manual, P/N 61SW504).
2. Remove the circlip and screw, then remove the steering angle sensor from the combination switch.
3. Installation is in the reverse order of removal.

CAUTION: Do not apply any grease or oil to the steering angle sensor.

4. Perform the steering angle sensor system check.



Steering Angle Sensor System Check

1. Start the engine.
2. Push the TCS switch three times within three seconds.
NOTE: Always maintain the same number of rotations.
3. Slowly turn the steering wheel from clockwise more than 1.5 turns.
NOTE:
 - Start checking after the steering wheel moves at least 1.5 turns.
 - Turn the steering wheel slowly, no faster than one turn in four seconds.
4. Push the TCS switch twice within three seconds.
NOTE: Always maintain the same number of rotations.
5. Slowly turn the steering wheel counterclockwise, and check the number of times the TCS indicator light flashes after the wheel has moved approximately one turn.
NOTE:
 - Start counting after the steering wheel moves one turn.
 - Turn the steering wheel slowly, no faster than one turn in four seconds.

**Standard number of times the TCS indicator light flashes: 2 times ('96 model)
: 4 times ('97 model)**

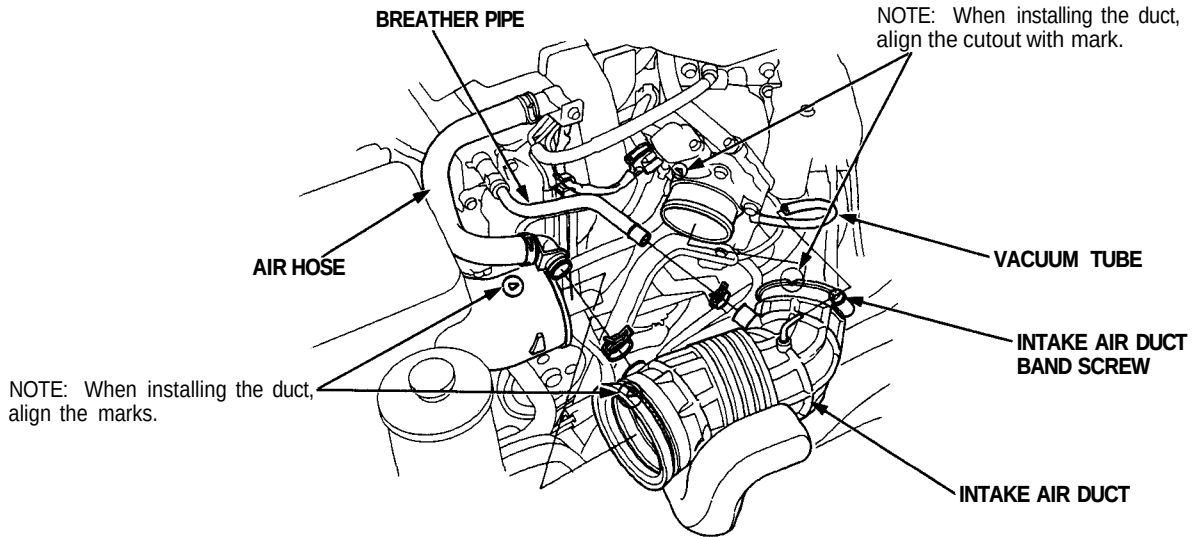
6. If there is an abnormality, check the troubleshooting flowchart (see page [19-126](#)).

Electronic Components

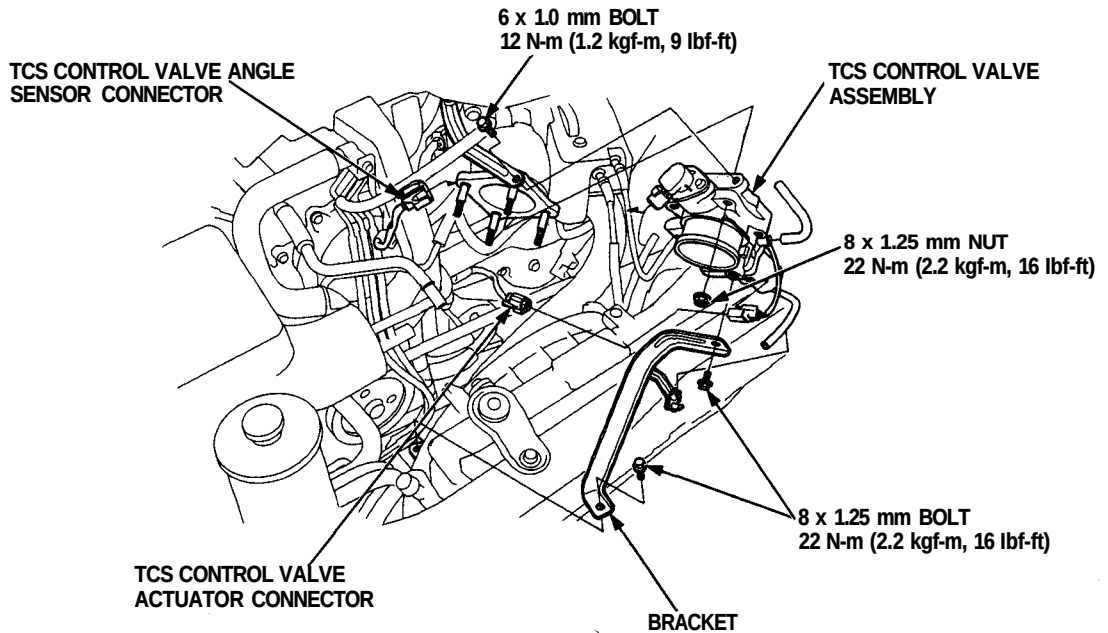
TCS Control Valve Assembly Replacement

CAUTION: Be careful not to damage the TCS control valve when handling the TCS control valve assembly.

1. Disconnect the vacuum tube, breather pipe and air hose from the intake air duct.
2. Loosen the intake air duct band screws, then remove the intake air duct.



3. Disconnect the TCS control valve angle sensor connector and actuator connector.
4. Remove the TCS control valve assembly and bracket.
5. Install the TCS control valve assembly in the reverse order of removal.





TCS Switch Inspection

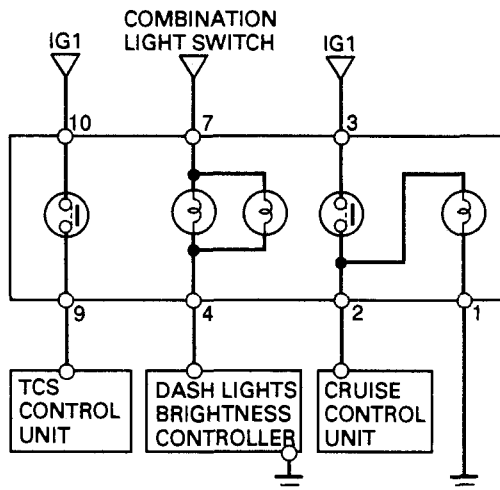
1. Remove the TCS switch.
2. Check for continuity between terminals No. 9 and No. 10.

There should be continuity when the switch is pushed, and there should be no continuity when the switch is released.

TCS SWITCH CONNECTOR

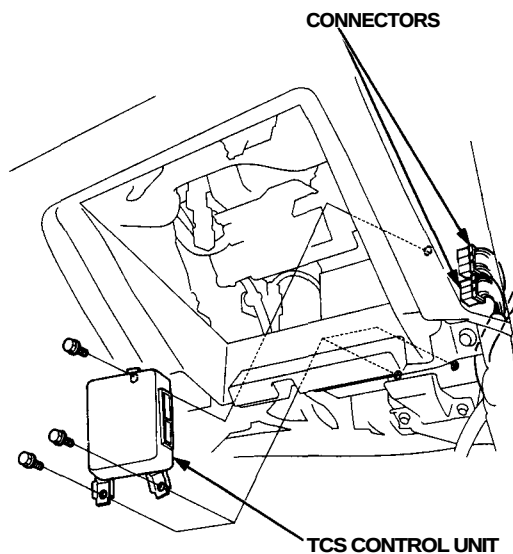


WIRE SIDE OF FEMALE TERMINALS



TCS Control Unit Replacement

1. Remove the glove box (refer to [section 20](#) in the '95 - '98 Acura 2.5TL service manual, P/N 61SW504).
2. Remove the ABS control unit (refer to page [19-121](#) or [19-163](#) in the '95 - '98 Acura 2.5TL service manual, P/N 61SW504).
3. Disconnect the TCS control unit connectors.
4. Remove the TCS control unit.



5. Install the TCS control unit in the reverse order of removal.

Center Console

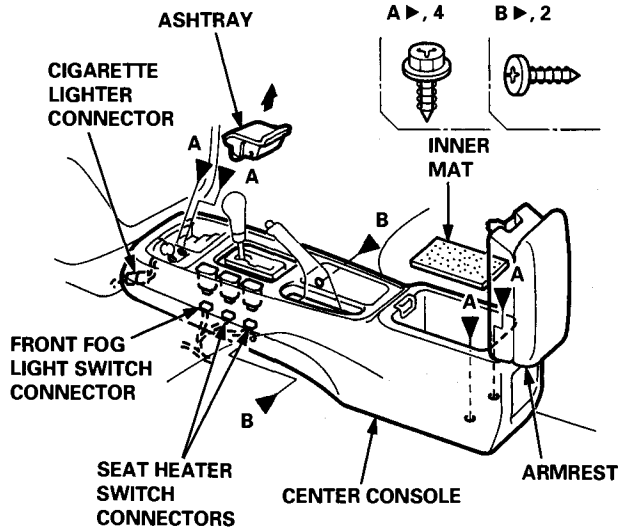
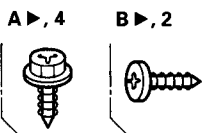
Replacement

CAUTION: When prying with a flat tip screwdriver, wrap it with protective tape to prevent damage.

NOTE: Take care not to scratch the center console, front seat and related parts.

1. Slide the front seats backward fully.
2. Remove the A/T gear position indicator trim, and disconnect the indicator light.
3. Open the armrest, then remove the inner mat and remove the ashtray.

►: Screw locations



4. Remove the screws, then remove the center console. Disconnect the cigarette lighter connector, front fog light switch connector and seat heater switch connectors.
5. Installation is the reverse of the removal procedure.

NOTE:

- Make sure the wire harnesses are not pinched.
- Make sure the connectors are connected properly.

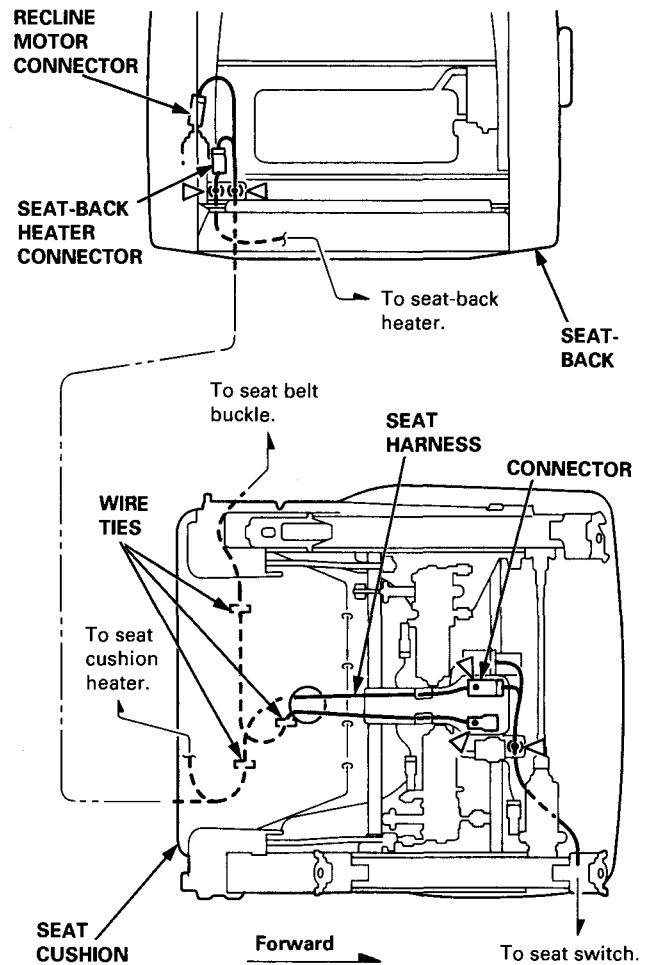
Front Seat

Seat Harness Wiring Locations (With Seat Heater)

NOTE: Replace the seat cover, seat heater and wire harness as an assembly.

8-way power adjustable:

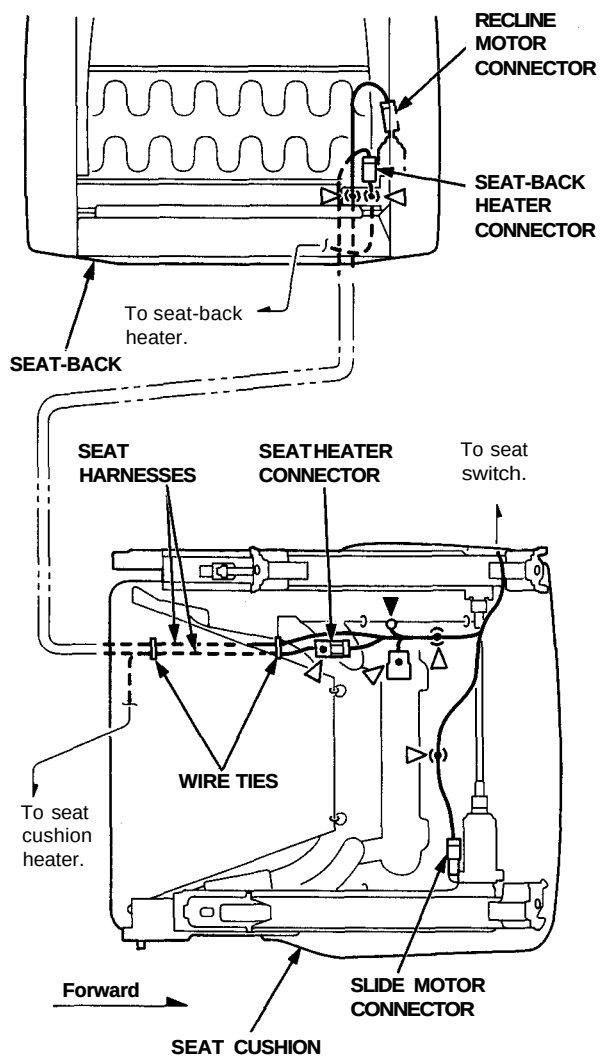
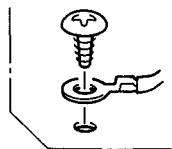
▷: **Clip locations, 5**



**4-way power adjustable:**

▷: Clip locations, 6

▷: Screw location



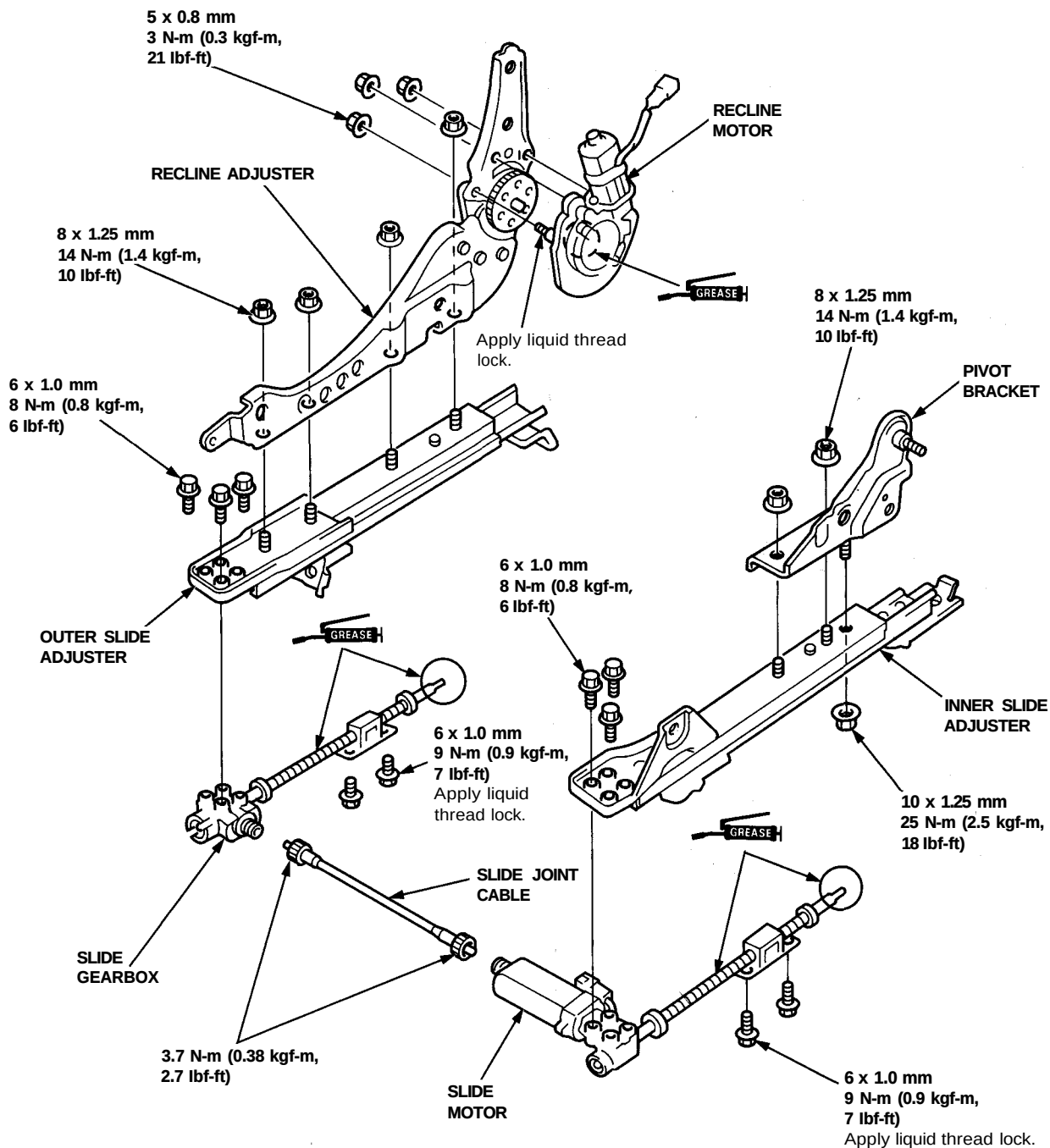
Front Seat

Seat Linkage (4-way Power Adjustable) Replacement

The slide joint cable, recline motor, slide motor and slide gearbox replacement procedures are the same as the 8-way power adjustable seat.

NOTE:

- Grease the slide lead screws and gear portion of the recline motor.
- Check the slide motor, slide gearbox and recline motor operations.

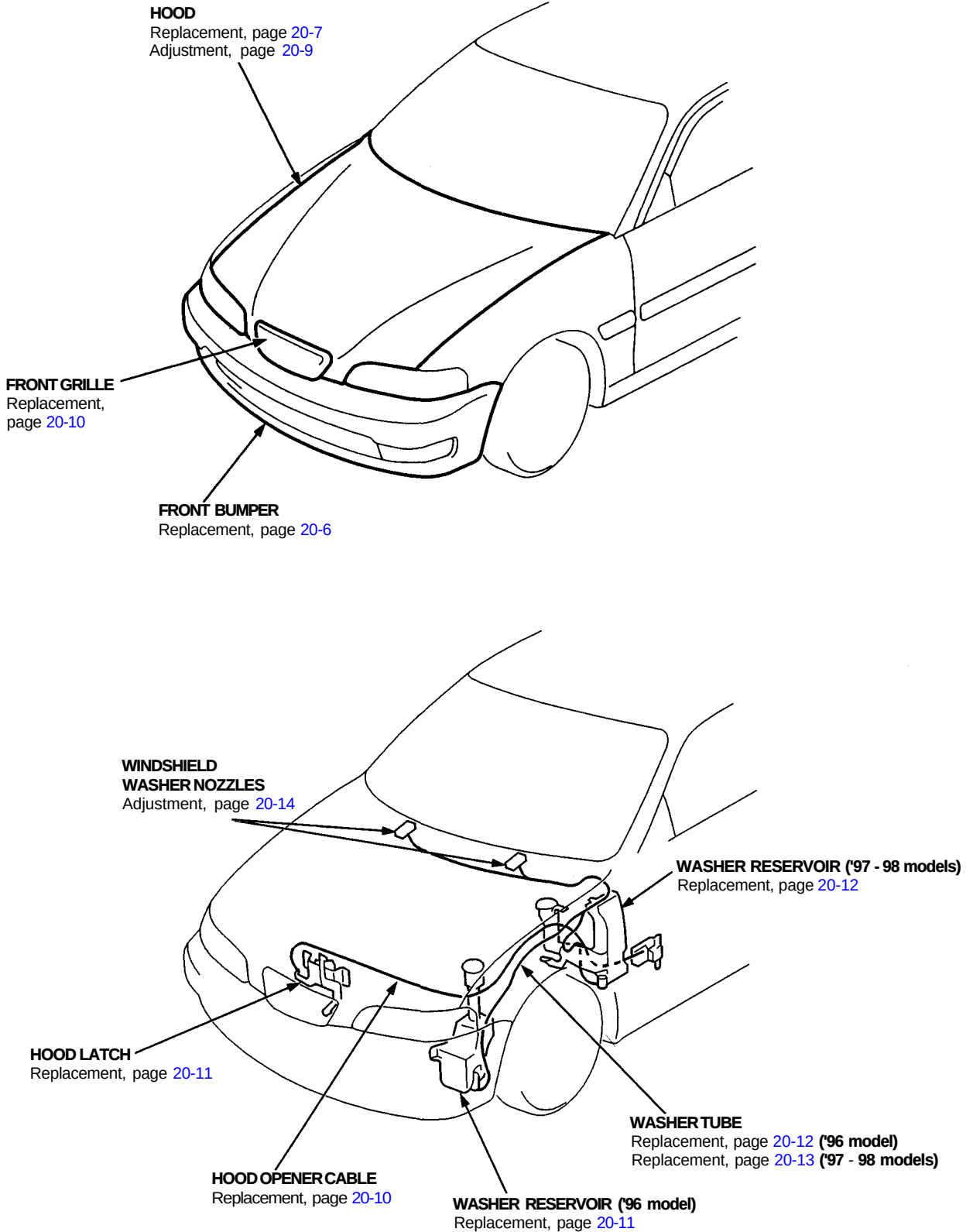




Exterior/Opener Cable/Washer

Component Location Index

NOTE: Refer to page 20-94 of the '95-98 Acura 2.5TL Service Manual, P/N 61SW504, for the items not shown in this sub-section.



Front Bumper

Replacement

CAUTION: Wear gloves to remove and install the front bumper.

NOTE:

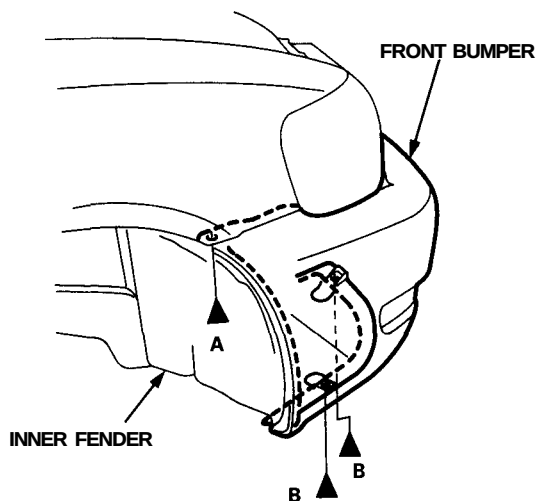
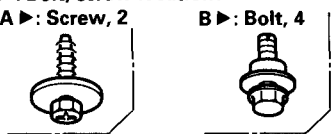
- An assistant is helpful when removing the front bumper.
- Take care not to scratch the front bumper and body.
- Open the hood.

1. Remove the bolts and screw from each side.

►: Bolt, screw locations

A ►: Screw, 2

B ►: Bolt, 4

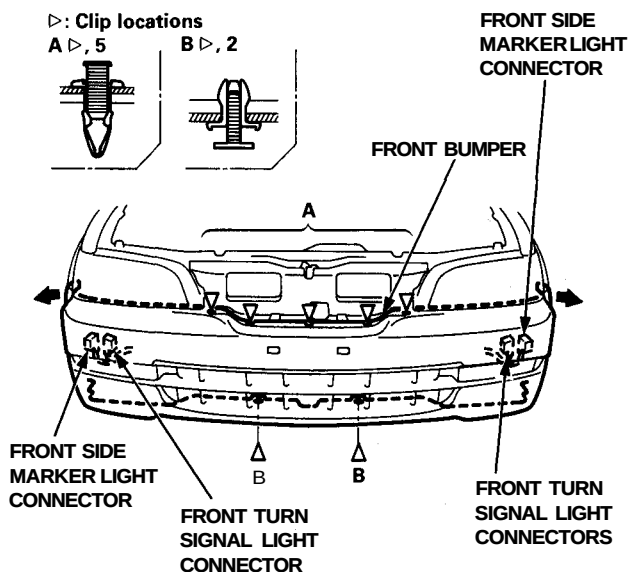
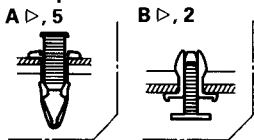


2. Remove the clips. Remove the front bumper, then disconnect the connectors.

▷: Clip locations

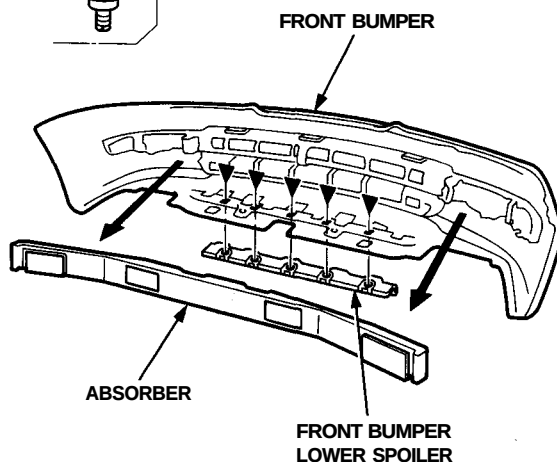
A ▷, 5

B ▷, 2



3. Remove the absorber and front bumper lower spoiler from the front bumper.

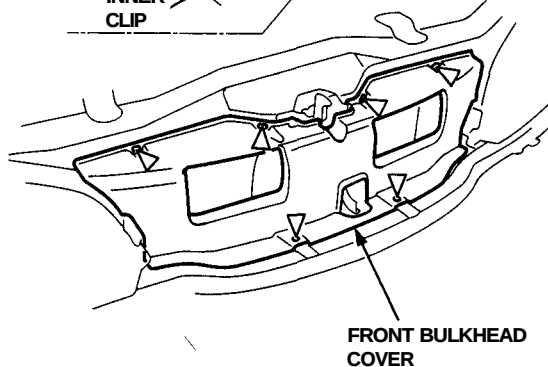
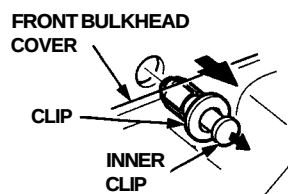
►: Bolt locations, 5



4. Remove the front bulkhead cover.

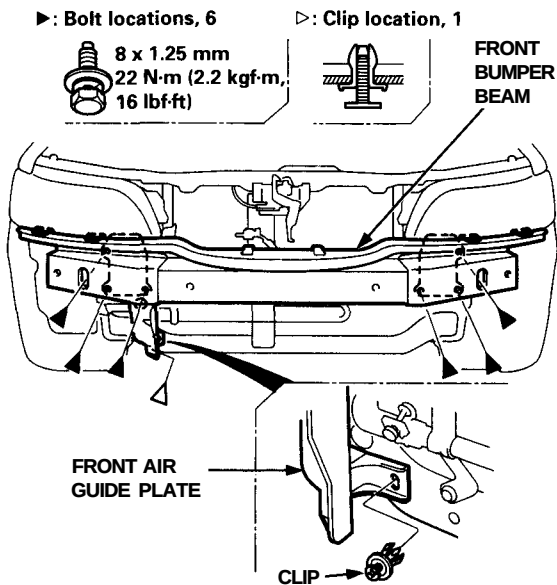
NOTE: After pulling the inner clips out, remove the front bulkhead cover with the clips.

▷: Clip locations, 6





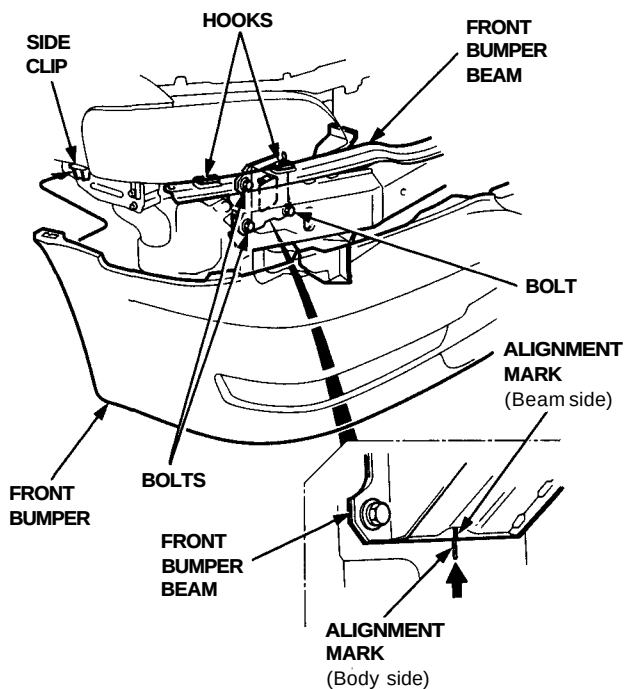
5. Remove the front bumper beam.



6. Installation is the reverse of the removal procedure.

NOTE:

- When installing the front bumper beam, align it with both alignment marks on the body, then tighten the bolts.
- Align the front bumper with the front fender and headlight properly.



(cont'd)



Hood

Replacement

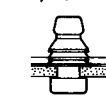
NOTE:

- An assistant is helpful when removing the hood.
- Take care not to damage the hood and body.
- When removing the clips, use a clip remover.
- Open the hood.

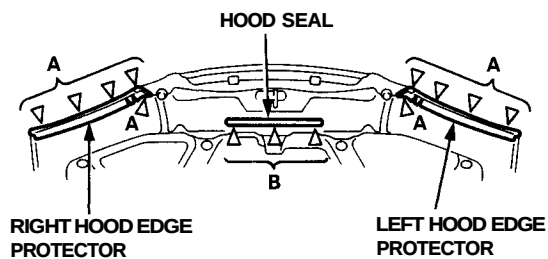
1. If necessary, remove the hood edge protector, hood seal and hood insulator.

▷ : Clip locations

A ▷, 10



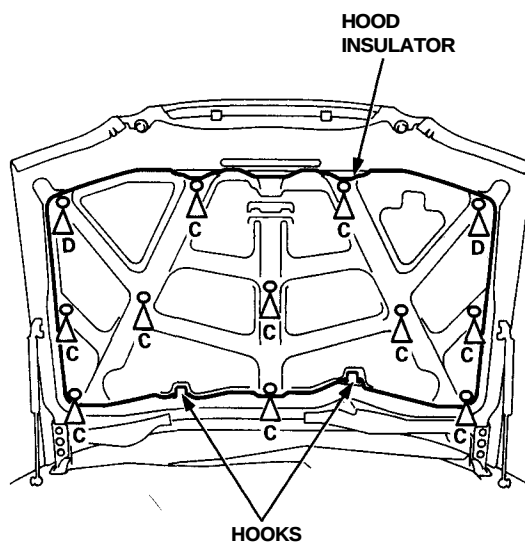
B ▷, 3



C ▷, 10



D ▷, 2



(cont'd)

Hood

Replacement (cont'd)

2. Disconnect the washer tube at the L-joint, and detach the clip from the hood hinge.
3. Remove the support strut and bolts on each side while holding the hood, then remove the hood.

NOTE: If necessary, remove the support strut.

► Bolt locations

A ►, 4

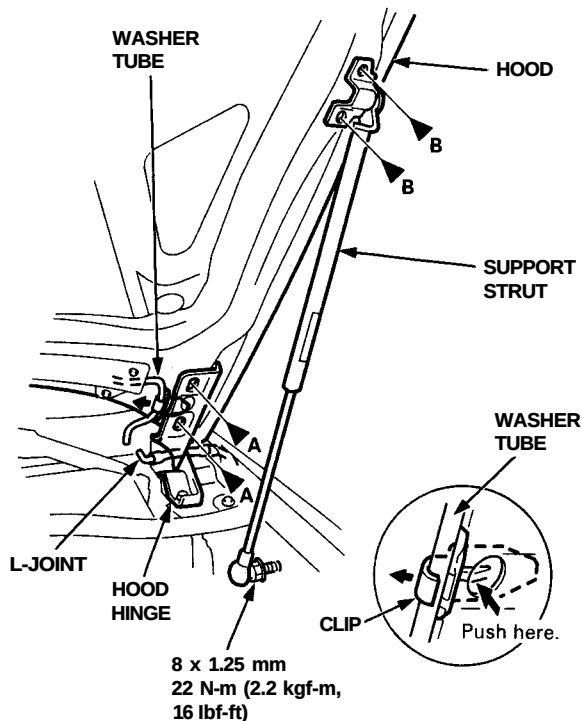
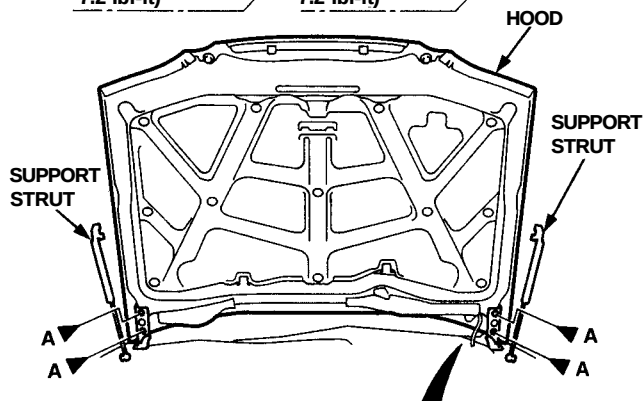


6 x 1.0 mm
9.8 N-m (1.0 kgf-m,
7.2 lbf-ft)

B ►, 4



6 x 1.0 mm
9.8 N-m (1.0 kgf-m,
7.2 lbf-ft)



4. Installation is the reverse of the removal procedure.

NOTE:

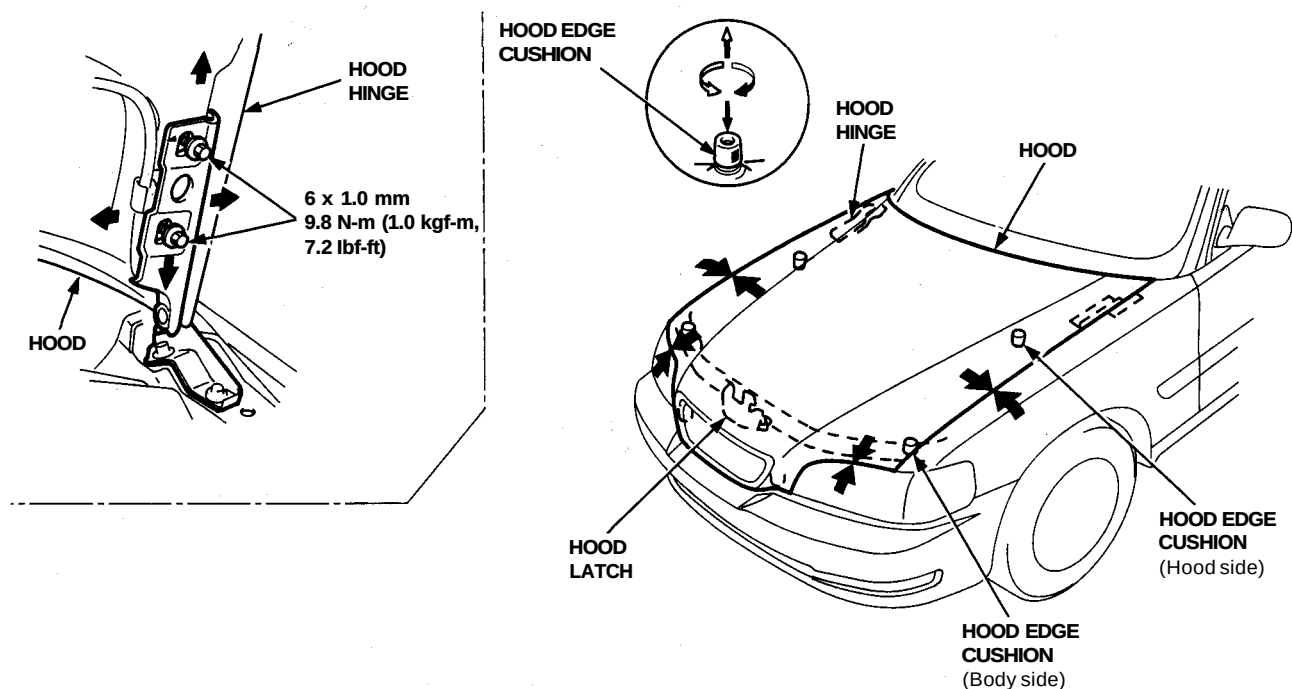
- If necessary, replace any damaged clips.
- Make sure the hood opens properly and locks securely.
- Adjust the hood alignment.
- Adjust the aim of the windshield washer nozzles (see page 20-14).



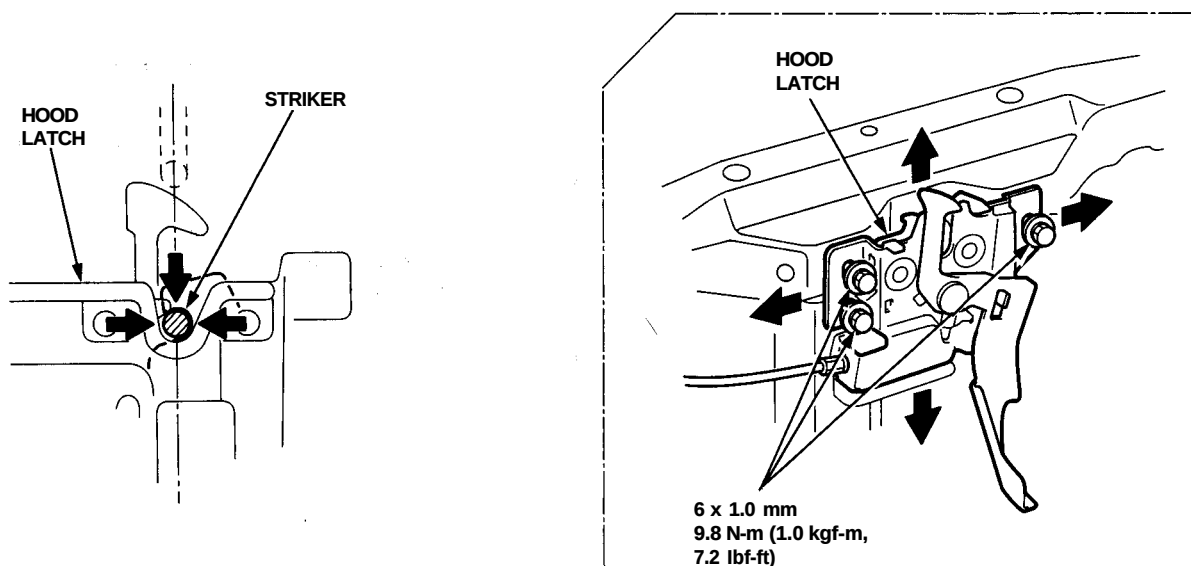
Adjustment

NOTE: Before adjusting the hood, remove the support strut on each side from the hood, and loosen each hood mounting bolt slightly.

1. Adjust the hood right and left, as well as fore and aft, by using the elongated holes on the hood hinge.
2. Turn the hood edge cushions, as necessary, to make the hood fit flush with the body at front and side edges.
3. Adjust the hood latch to obtain the proper height at the forward edge.
4. After adjustment, tighten each bolt securely.



NOTE: Move the hood latch right or left until the striker is centered in the hood latch as shown.



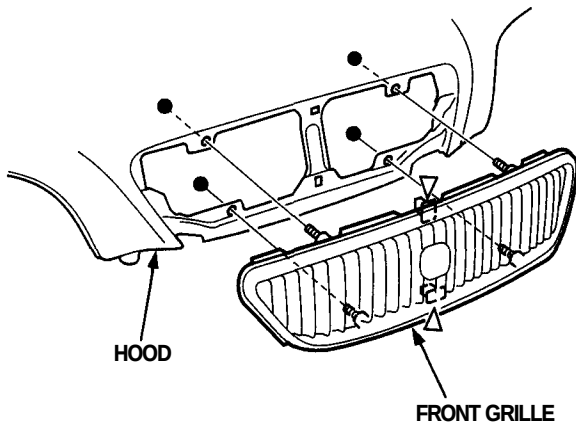
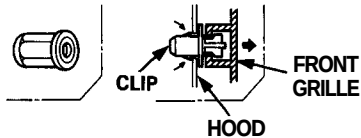
Front Grille

Replacement

NOTE: Take care not to scratch the hood.

1. Open the hood, then remove the nuts.
2. Detach the clips, then remove the front grille.

●: Nut locations, 4 ▷: Clip locations, 2



3. If necessary, disassemble the front grille.
4. Installation is the reverse of the removal procedure.

NOTE: If necessary, replace any damaged clips.

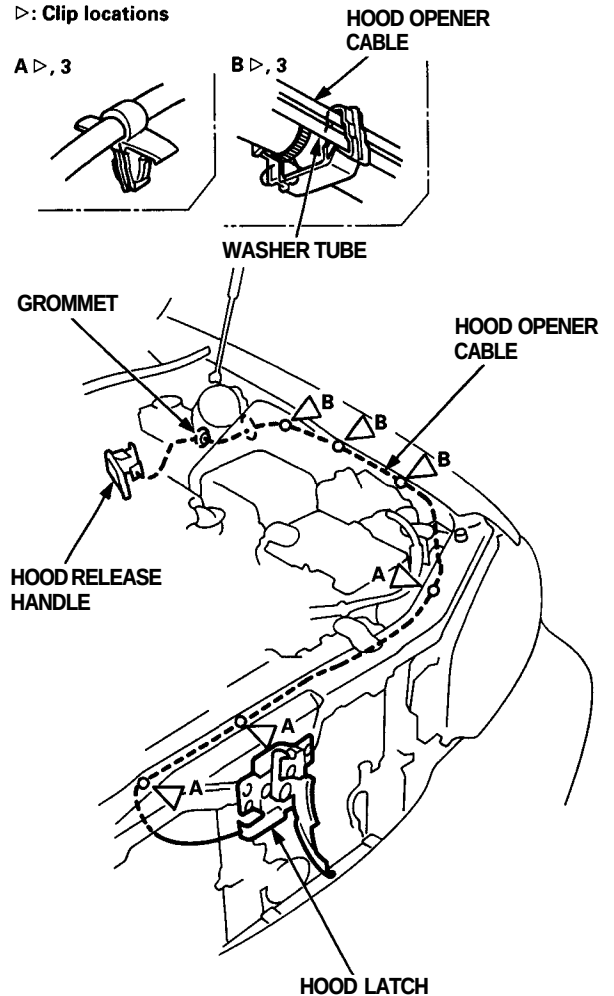
Hood Opener Cable

Replacement

NOTE:

- When removing the clips, use a clip remover.
- Take care not to bend the hood opener cable.
- Open the hood, and remove the front bulkhead cover (see page 20-6).
- Remove the inner fender.

▷: Clip locations



Installation is the reverse of the removal procedure.

NOTE:

- Make sure the hood opener cable is routed and connected properly.
- Make sure the hood opens properly.



Washer Reservoir

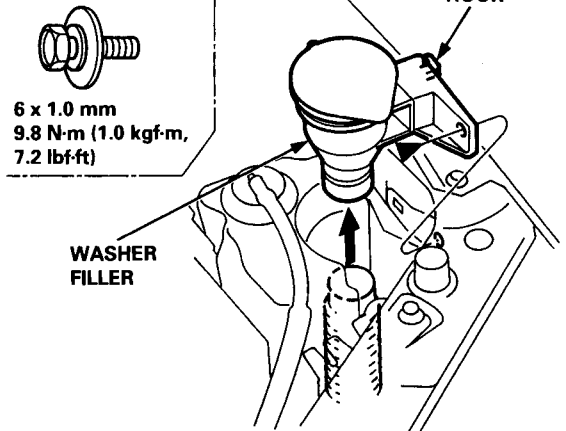
Replacement

CAUTION: Wear gloves to remove and install the washer reservoir.

'96 model:

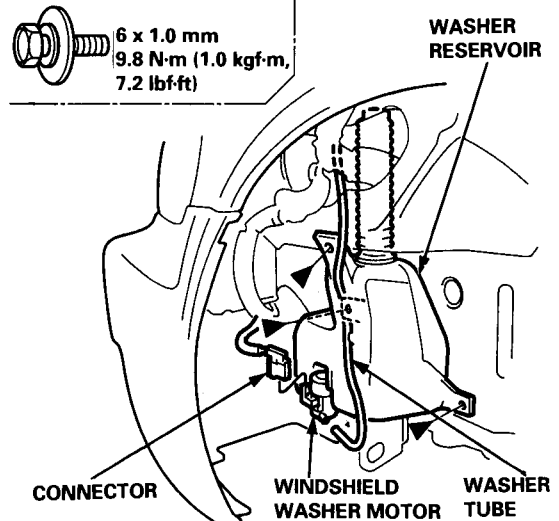
1. Open the hood.
2. Remove the bolt, then pull out the washer filler.

►: Bolt location, 1



3. Pull away the inner fender as necessary.
4. Disconnect the washer tube and windshield washer motor connector.

►: Bolt locations, 3



5. Remove the bolt, then remove the washer reservoir.
6. Installation is the reverse of the removal procedure.

NOTE:

- Make sure the windshield washer motor connector and washer tube are connected properly.
- Check the windshield washer motor operation.

(cont'd)

Washer Reservoir

Replacement (cont'd)

CAUTION: Wear gloves to remove and install the washer reservoir.

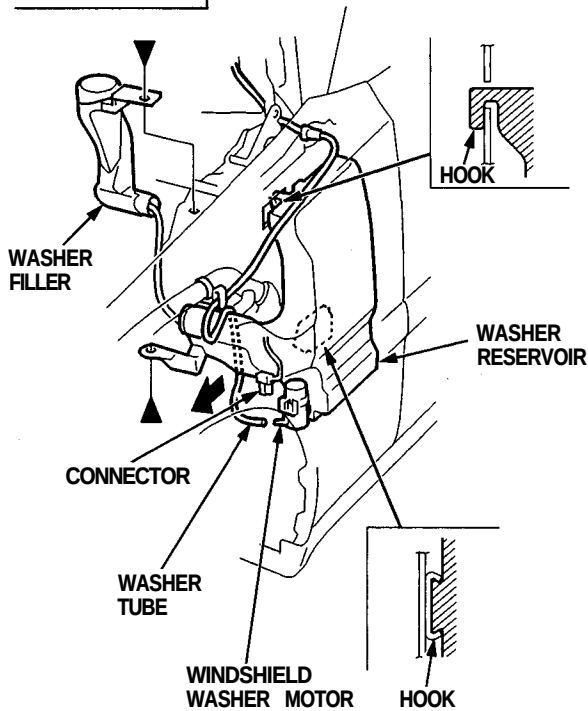
'97 - 98 models:

1. Open the hood.
2. Remove the bolt, then pull out the washer filler.

►: Bolt location, 1



6 x 1.0 mm
9.8 N-m (1.0 kgf-m,
7.2 lbf-ft)



3. Pull away the inner fender as necessary.
4. Disconnect the washer tube and windshield washer motor connector.
5. Remove the bolt, then remove the washer reservoir by sliding it forward.
6. Installation is the reverse of the removal procedure.

NOTE:

- Make sure the windshield washer motor connector and washer tube are connected properly.
- Check the windshield washer motor operation.

Washer Tube

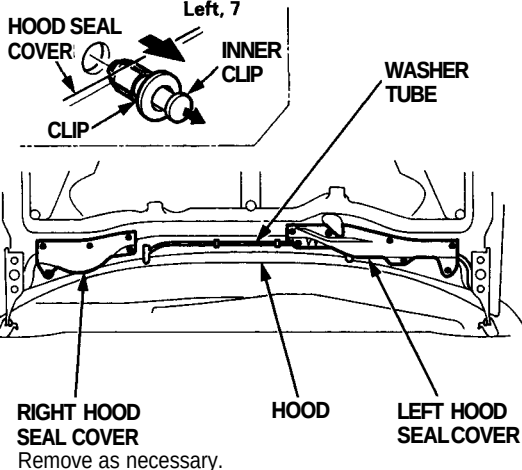
Replacement

'96 model:

1. Open the hood.
2. Remove the left hood seal cover from the hood.

NOTE: After pulling the inner clips out, remove the hood seal cover with the clips.

●: Clip locations Right, 6
Left, 7



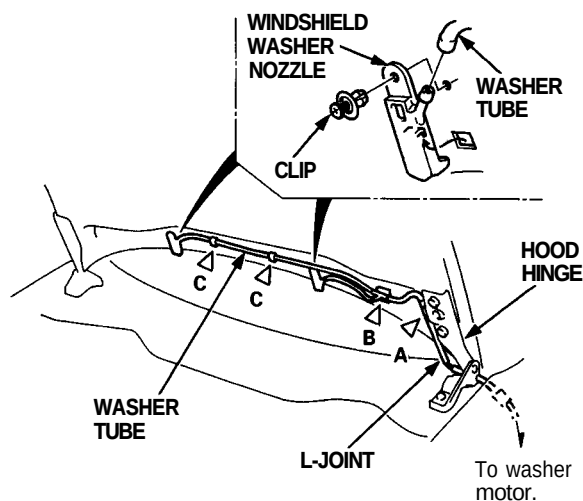
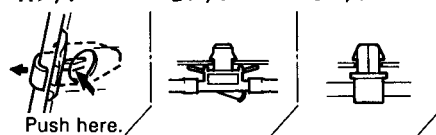
3. Detach the clips, and remove both windshield washer nozzles. Disconnect the washer tube at the L-joint, then remove the washer tube from the hood.

▷: Clip locations

A▷, 1

B▷, 1

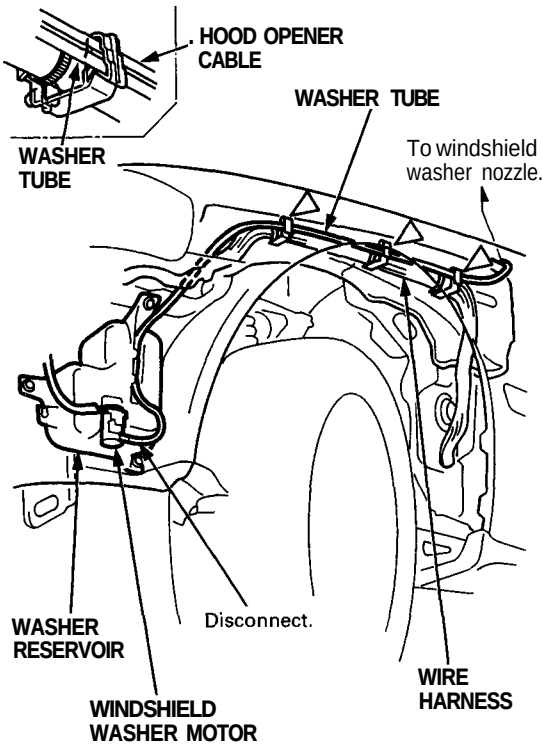
C▷, 2





4. Remove the inner fender.
5. Disconnect the washer tube from the washer motor. Detach the washer tube from the clip, then remove the washer tube.

▷: Clip locations, 3



6. Installation is the reverse of the removal procedure.

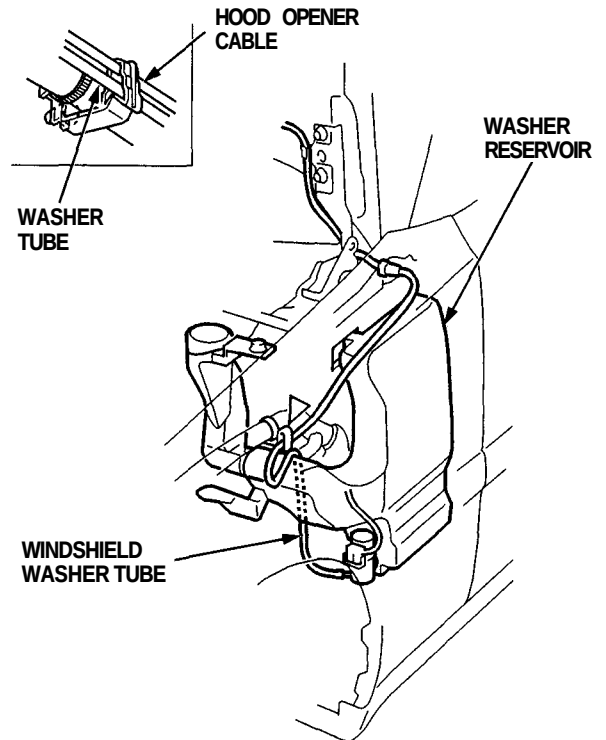
NOTE:

- Take care not to pinch the washer tube.
- If necessary, replace any damaged clips.
- After installing, adjust the aim of the windshield washer nozzles.

'97 - '98 models:

Remove the left inner fender.

▷: Clip location, 1



Installation is the reverse of the removal procedure.

NOTE:

- Take care not to pinch the washer tube.
- If necessary, replace any damaged clips.

Washer Nozzles

Emblems

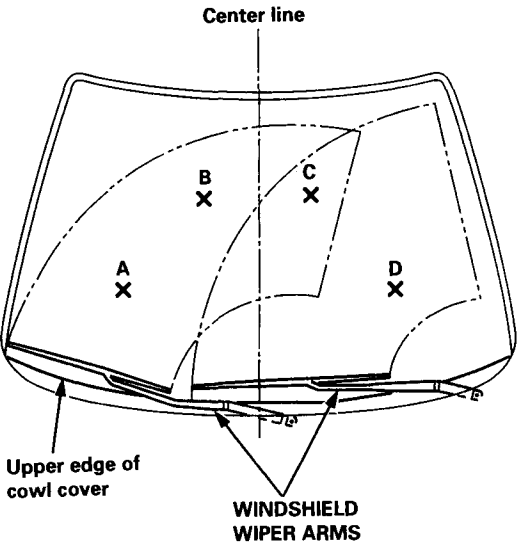
Adjustment

By inserting a tack and moving it as necessary, adjust the washer nozzles so that they aim at positions A, B, C, and D shown in the illustration.

NOTE: The fluid jets should hit within a 50 mm (2.0 in) radius around each of points A, B, C, and D.

Distance Nozzle aim	from center line	from upper edge of air scoop
A	375 mm (14.8 in)	366 mm (14.4 in)
B	216 mm (8.50 in)	529 mm (20.8 in)
C	216 mm (8.50 in)	529 mm (20.8 in)
D	375 mm (14.8 in)	366 mm (14.4 in)

View from front to rear



Installation

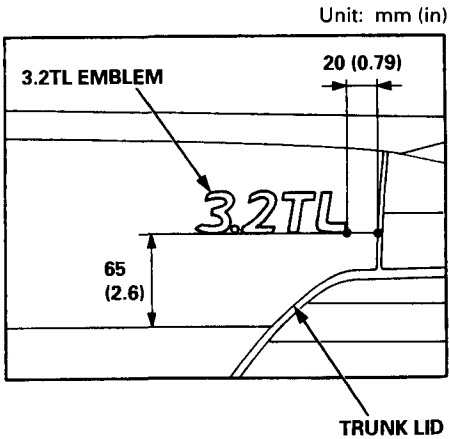
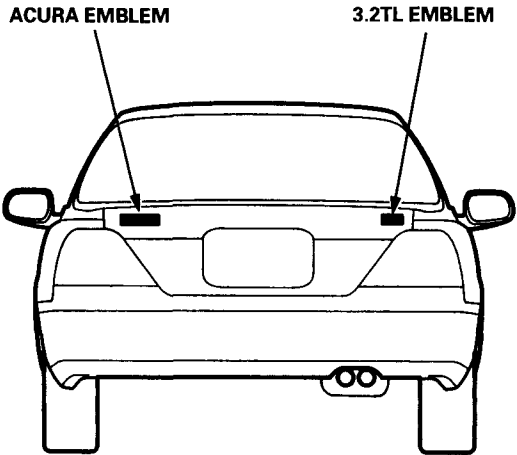
Apply the emblems where shown.

NOTE:

- Before applying, clean the trunk lid surface with a sponge dampened in alcohol.
- After cleaning, keep oil, grease and water from getting on the surface.

NOTE: Refer to page 20-120 of the '95-98 Acura 2.5TL Service Manual, P/N 61SW504, for the items not shown in this sub-section.

Attachment Points (Reference):

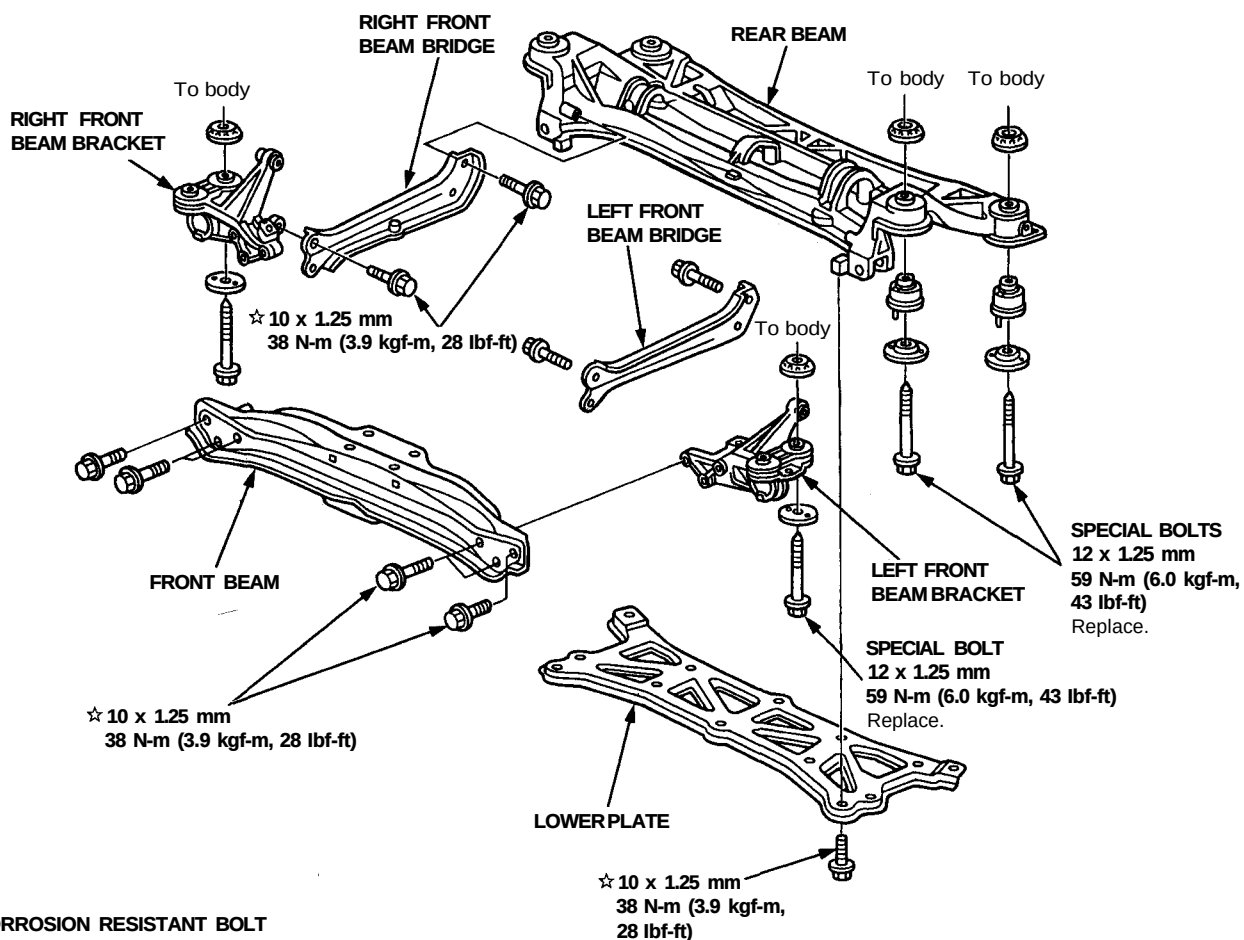
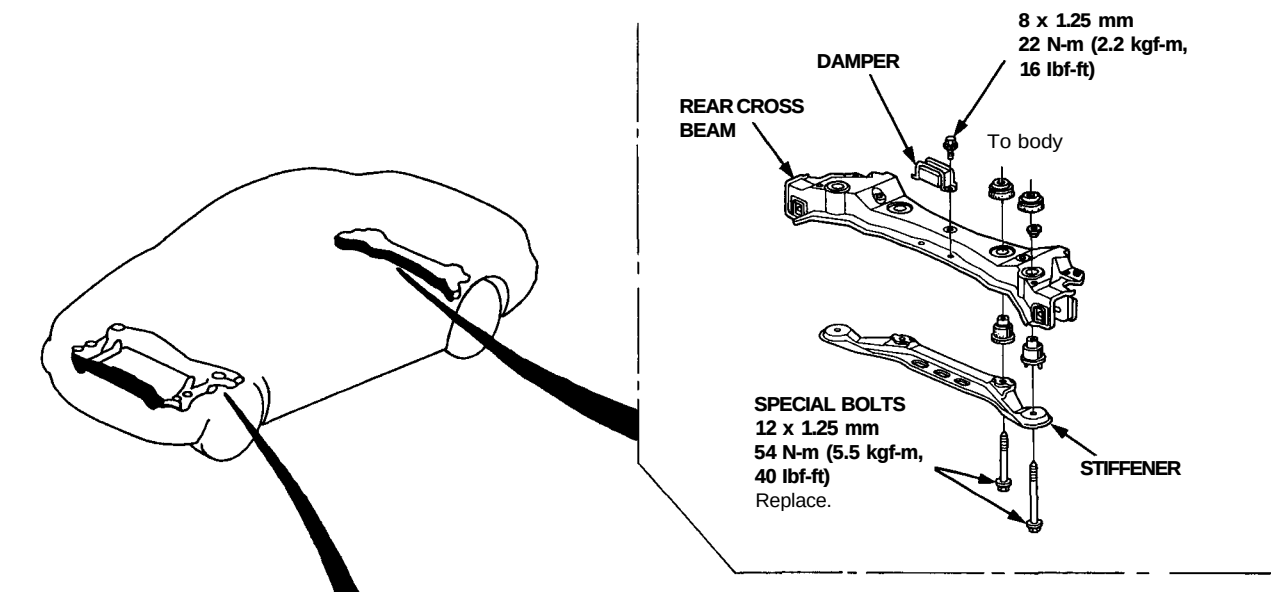




Sub-frame

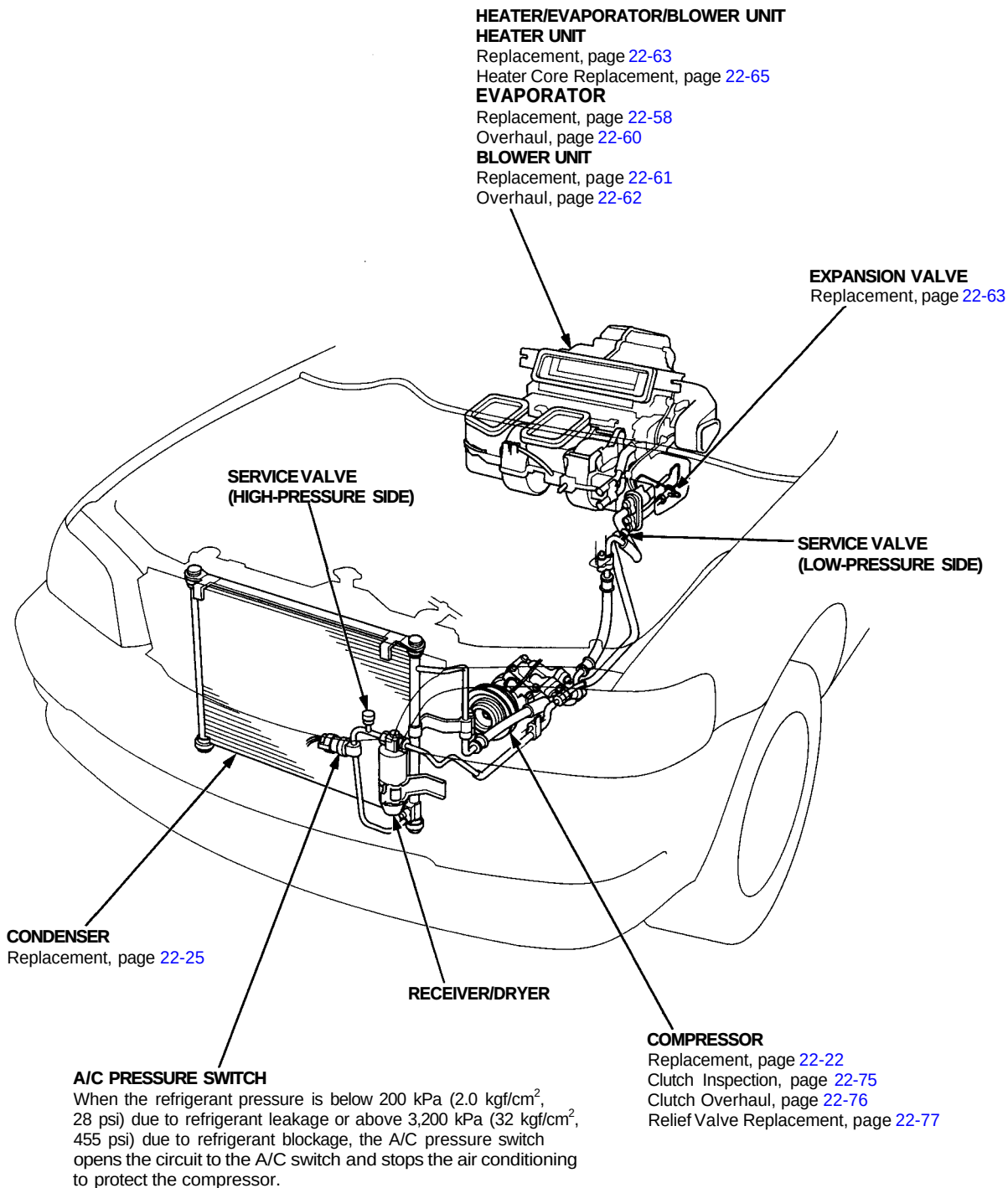
Sub-frame Torque Sequence:

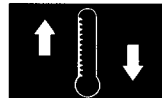
CAUTION: After loosening the sub-frame mounting bolts, be sure to replace them with new ones.



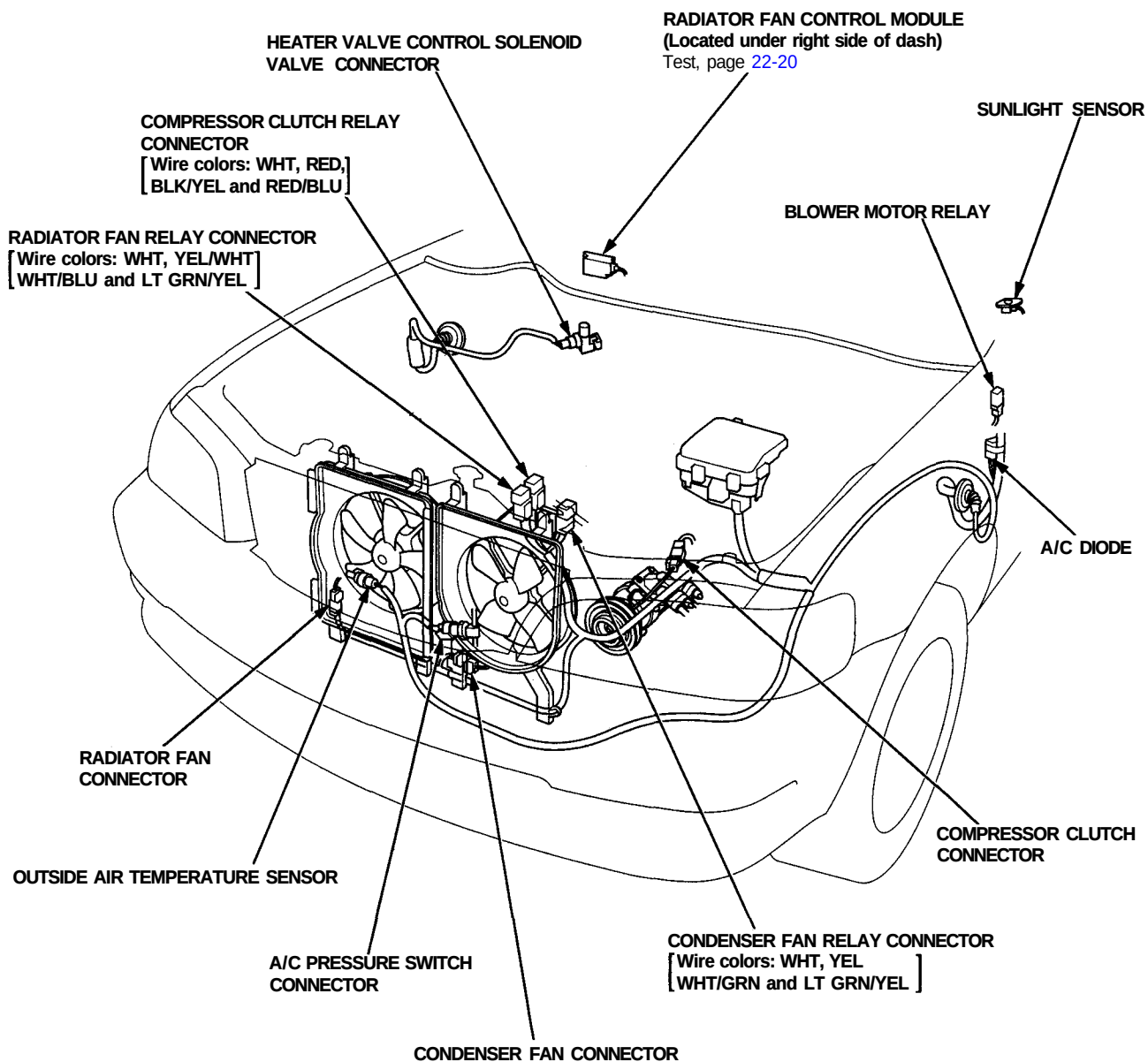
☆ CORROSION RESISTANT BOLT

Illustrated Index





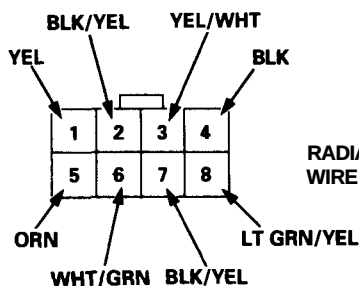
Wiring/Connector Locations



Troubleshooting

Radiator Fan Control Module Input Tests

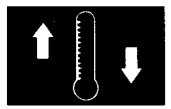
NOTE: Perform the following tests with the radiator fan control module 8P connector connected, the ignition switch ON (II), and the A/C switch OFF. If you find the cause of a problem, correct it before you continue.



**RADIATOR FAN CONTROL MODULE 8P CONNECTOR
WIRE SIDE OF FEMALE TERMINALS**

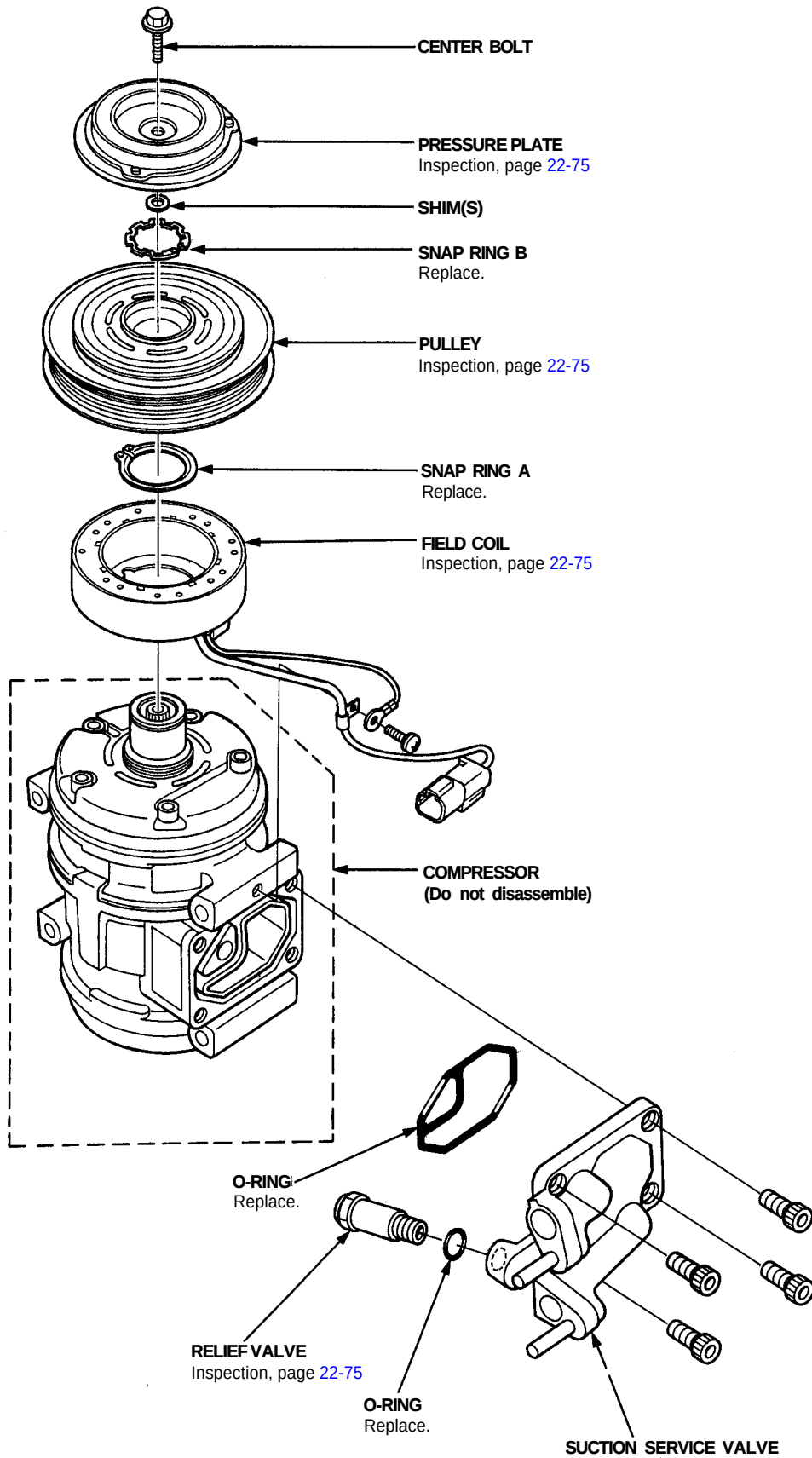
Terminal No.	Wire color	Test condition	Desired results	Corrective action if desired results are not obtained
4	BLK	Check for voltage to body ground.	There should be less than one volt.	Repair open to body ground.
6	WHT/GRN	Check for battery voltage:	There should be battery voltage.	Check No. 56 (10 A) fuse in the under-hood fuse/relay box; if OK, repair open in the WHT/GRN wire.
7	BLK/YEL	Check for battery voltage: Ignition switch - ON (II)		Check No. 4* fuse in the under-dash fuse/relay box; if OK, repair open in the BLK/YEL wire.
2	BLK/YEL	Check for battery voltage: Ignition switch - ON (II)		Check No. 7 (7.5 A) fuse in the under-dash fuse/relay box; if OK, repair open in the BLK/YEL wire.
3	YEL/WHT	Check for battery voltage: Ignition switch - ON (II)		Replace the radiator fan control module. Before you connect the new radiator fan control module, disconnect both fan relays. Check for continuity between the YEL/WHT (or YEL) wire and ground, using the 20 k Ω scale on your ohmmeter. There should be no continuity. If there is continuity, the new radiator fan control module will be damaged when you connect it.
1	YEL	Check for battery voltage: Ignition switch - ON (II)		
8	LT GRN/YEL	Connect to body ground: Ignition switch - ON (II)	Condenser fan and radiator fan should come on.	Check for an open in the LT GRN/YEL wire between the radiator fan control module and the condenser fan relay or the radiator fan relay. If OK, check for an open in the YEL/WHT wire between the radiator fan control module and the radiator fan relay, or the YEL wire between the radiator fan control module and the condenser fan relay. If OK, test the condenser fan relay or the radiator fan relay.
5	ORN	Check for voltage.	Approx. 11 V (engine oil temperature below 198°F [92°C])	Faulty engine oil temperature switch, short to body ground, or faulty radiator fan control module.

*No. 4 (15 A): '96 model
No. 4 (20 A): '97 and '98 models



Compressor

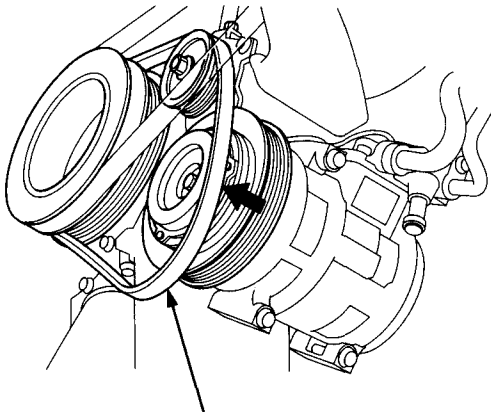
Illustrated Index



Compressor

Replacement

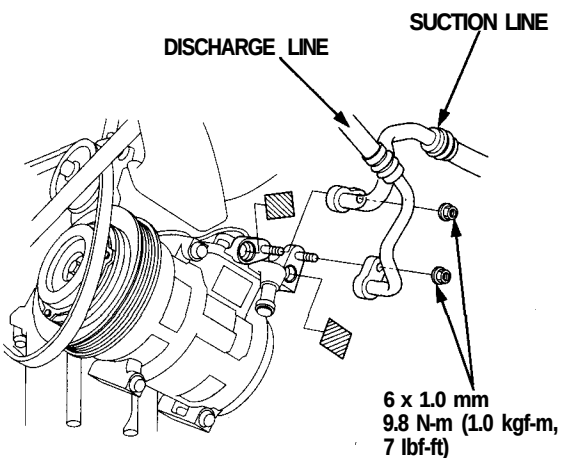
1. If the compressor is marginally operable, run the engine at idle speed, and let the air conditioner work for a few minutes, then shut the engine off.
2. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's pre-set buttons.
Disconnect the negative cable from the battery.
3. Recover the refrigerant with a Recovery/Recycling/Charging System.
4. Loosen the A/C compressor belt (see page 22-24).



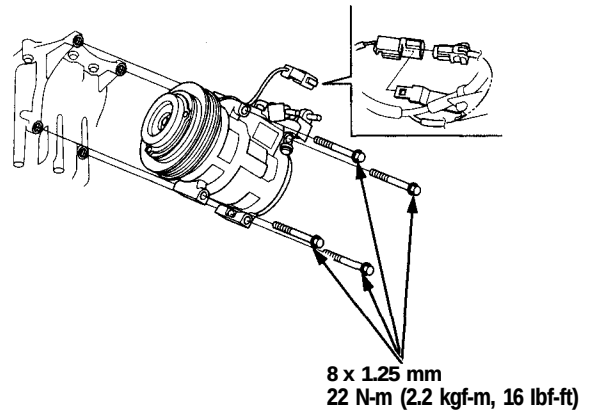
A/C COMPRESSOR BELT

5. Remove the nuts, then disconnect the suction line and the discharge line from the compressor.

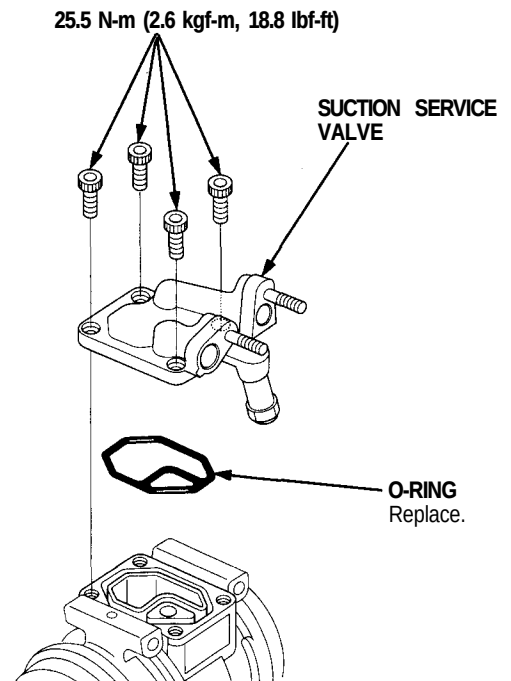
NOTE: Plug or cap the lines immediately after disconnecting them to avoid moisture and dust contamination.

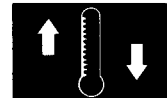


6. Remove the four mounting bolts and the compressor.

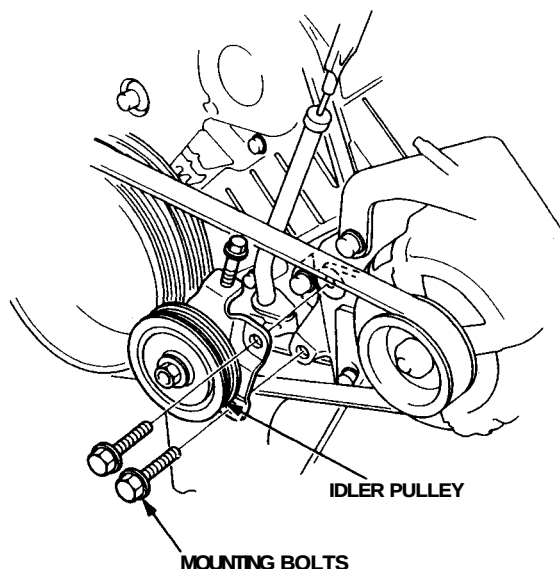


7. Remove the four bolts and the suction service valve from the compressor.

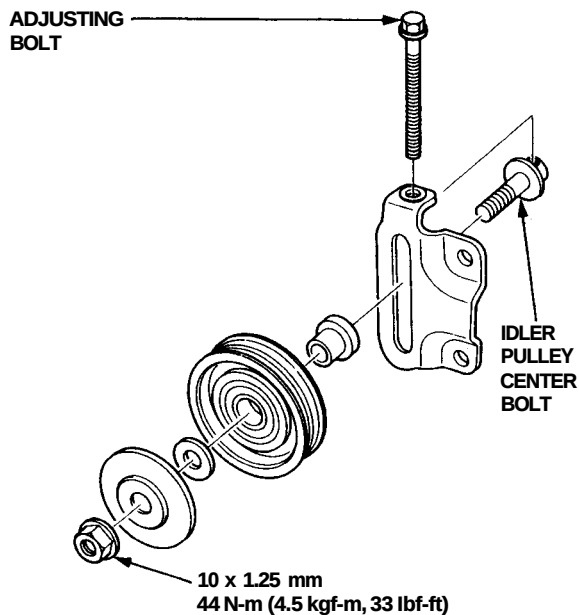




8. If necessary, remove the idler pulley.



9. Check the idler pulley bearing for play and drag. Replace it with a new one if it's noisy or has excessive play or drag.



10. Install in the reverse order of removal. Make note of the following items.

- If you're installing a new compressor, drain all the refrigerant oil from the removed compressor, and measure its volume. Subtract the volume of drained oil from 140 ml (4 1/3 fl-oz, 4.9 Imp-oz); the result is the amount of oil you should drain from the new compressor (through the suction fitting).
- Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil before installing them.
NOTE: Be sure to use the right O-rings for HFC-134a (R-134a) to avoid leakage.
- Use refrigerant oil (ND-OIL 8) for R-134a DENSO piston type compressors only.
- To avoid contamination, do not return the oil to the container once dispensed, and never mix it with other refrigerant oils.
- Immediately after using the oil, replace the cap on the container, and seal it to avoid moisture absorption.
- Do not spill the refrigerant oil on the vehicle; it may damage the paint; if the refrigerant oil contacts the paint, wash it off immediately.
- Be careful not to damage the radiator fins when installing the condenser fan shroud and the compressor.
- Adjust the A/C compressor belt (see page 22-24).
- Charge the system (see page 22-30), and test its performance (see page 22-28).
- Enter the anti-theft code for the radio, then enter the customer's radio station presets.

A/C Compressor Belt

Adjustment

Deflection Method

1. Apply a force of 98 N (10 kgf, 22 lbf), and measure the deflection between the A/C compressor and the crankshaft pulley.

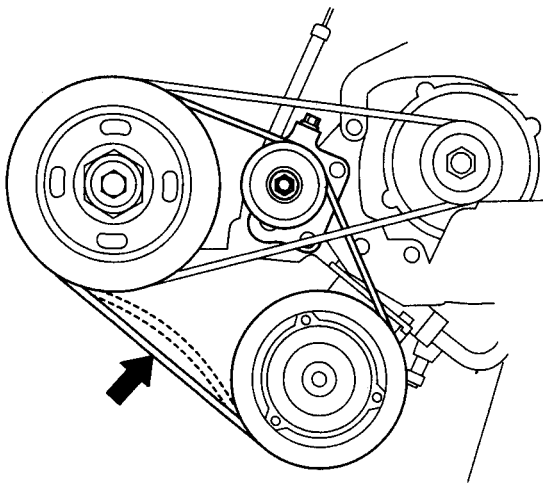
A/C Compressor Belt

Used Belt: 8.0 - 9.5 mm (0.31 - 0.37 in)

New Belt: 5.0 - 6.0 mm (0.20 - 0.24 in)

NOTE:

- If there are cracks or any damage evident on the belt, replace it with a new one.
 - "Used belt" means a belt which has been used for five minutes or more.
 - "New belt" means a belt which has been used for less than five minutes.
2. Loosen the center nut of the idler pulley.
 3. Turn the adjusting bolt to get proper belt tension, then retighten the center nut.
 4. Recheck the deflection of the A/C compressor belt.



Tension Gauge Method

1. Attach the special tool to the A/C compressor belt as shown below, and measure the tension of the belt.

A/C Compressor Belt

Used Belt: 390-590 N

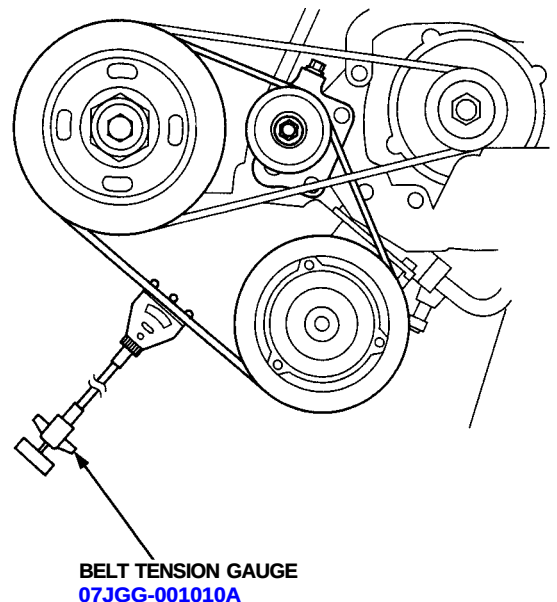
(40 -60 kgf, 88 -130 lbf)

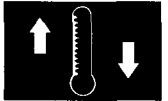
New Belt: 830 - 1,030 N

(85-105 kgf, 190-230 lbf)

NOTE:

- If there are cracks or any damage evident on the belt, replace it with a new one.
 - Follow the manufacturer's instructions for the belt tension gauge.
 - "Used belt" means a belt which has been used for five minutes or more.
 - "New belt" means a belt which has been used for less than five minutes.
2. Loosen the center nut of the idler pulley.
 3. Turn the adjusting bolt to get proper belt tension, then retighten the center nut.
 4. Recheck the tension of the A/C compressor belt.

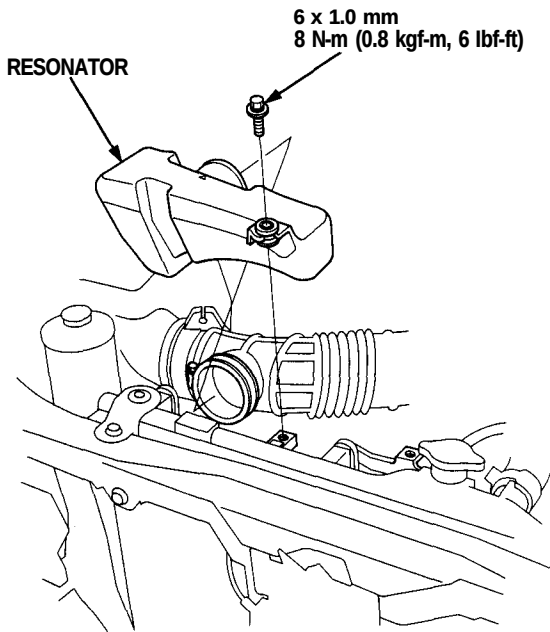




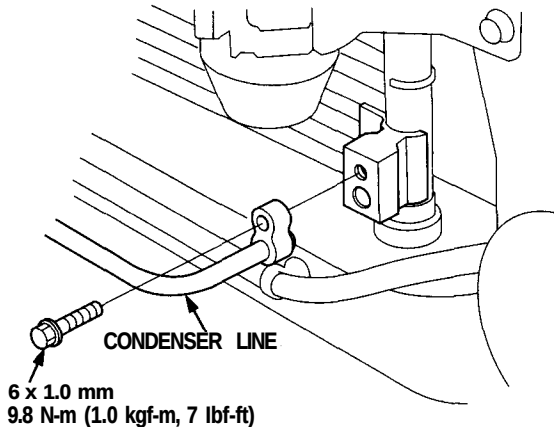
Condenser

Replacement

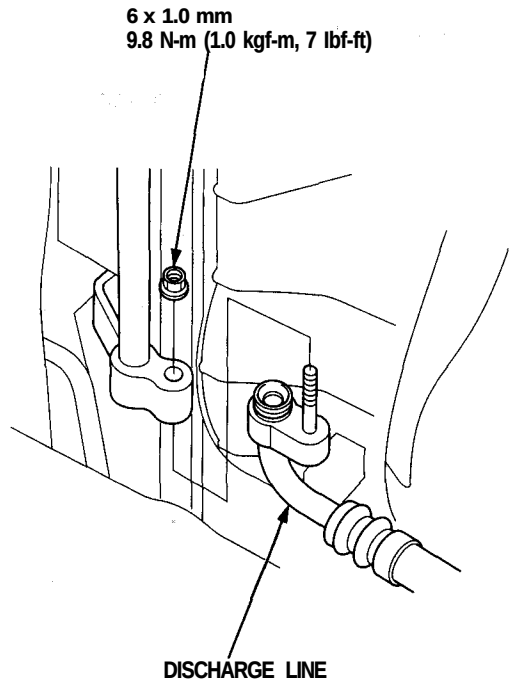
1. Recover the refrigerant with a Recovery/Recycling/Charging System.
2. Remove the battery and the battery base (see [section 5](#)).
3. Remove the bulkhead cover (see [section 20](#)).
4. Remove the resonator.



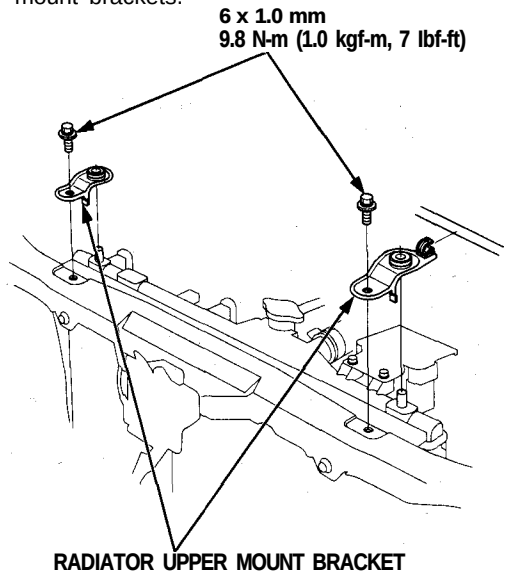
5. Remove the bolt, and disconnect the condenser line from the condenser.



6. Remove the nut, and disconnect the discharge line from the condenser.



7. Remove the two bolts, and the two radiator upper mount brackets.



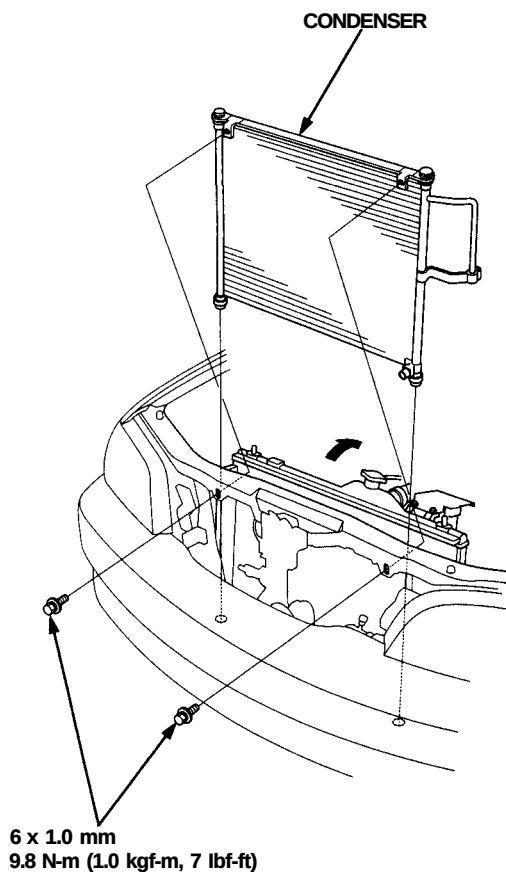
(cont'd)

Condenser

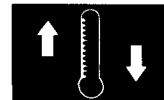
Replacement (cont'd)

8. Remove the two mounting bolts, and lift out the condenser as shown.

NOTE: Do not damage the radiator and condenser fins when removing the condenser.



9. Install in the reverse order of removal. Make note of the following items.
 - If you're installing a new condenser, add refrigerant oil (ND-OIL 8) (see page [22-27](#)).
 - Replace the O-rings with new ones at each fitting, and apply a thin coat of refrigerant oil (ND-OIL 8) before installing them.
NOTE: Be sure to use the right O-rings for HFC-134a (R-134a) to avoid leakage.
 - Do not damage the radiator and condenser fins when installing the condenser.
 - Be sure to install the condenser mount cushions securely into the holes.
 - Charge the system (see page [22-30](#)), and test its performance (see page [22-28](#)).



A/C Service Tips and Precautions

The air conditioner system uses HFC-134a (R-134a) refrigerant and polyalkyleneglycol (PAG) refrigerant oil*, which are not compatible with CFC-12 (R-12) refrigerant and mineral oil. Do not use R-12 refrigerant or mineral oil in this system, and do not attempt to use R-12 servicing equipment; damage to the air conditioner system or your servicing equipment will result.

*DENSO ND-OIL 8:

- P/N 38897 - PR7 - A01AH: 120 ml (4 fl-oz, 4.2 Imp-oz)
- P/N 38899 - PR7 - A01: 40 ml (1 1/3 fl-oz, 1.4 Imp-oz)

Use only service equipment that is U.L.-listed and is certified to meet the requirements of SAE J2210 to remove R-134a from the air conditioner system.

CAUTION: Exposure to air conditioner refrigerant and lubricant vapor or mist can irritate eyes, nose and throat. Avoid breathing the air conditioner refrigerant and lubricant vapor or mist.

If accidental system discharge occurs, ventilate work area before resuming service.

R-134a service equipment or vehicle air conditioner systems should not be pressure tested or leak tested with compressed air.

WARNING Some mixtures of air and R-134a have been shown to be combustible at elevated pressures and can result in fire or explosion causing injury or property damage. Never use compressed air to pressure test R-134a service equipment or vehicle air conditioner systems.

Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

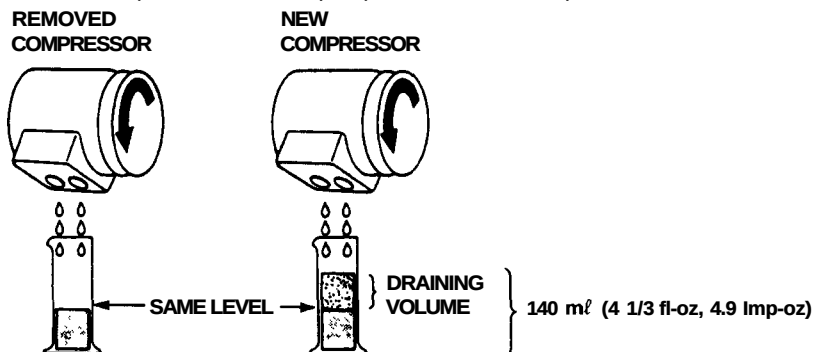
1. Always disconnect the negative cable from the battery whenever replacing air conditioning parts.
2. Keep moisture and dust out of the system. When disconnecting any lines, plug or cap the fittings immediately; don't remove the caps or plugs until just before you reconnect each line.
3. Before connecting any hose or line, apply a few drops of refrigerant oil to the O-ring.
4. When tightening or loosening a fitting, use a second wrench to support the matching fitting.
5. When discharging the system, use a R-134a refrigerant Recovery/Recycling/Charging System; don't release refrigerant into the atmosphere.
6. Add refrigerant oil after replacing the following parts:

NOTE:

- To avoid contamination, do not return the oil to the container once dispensed, and never mix it with other refrigerant oils.
- Immediately after using the oil, replace the cap on the container, and seal it to avoid moisture absorption.
- Do not spill the refrigerant oil on the vehicle; it may damage the paint; if the refrigerant oil contacts the paint, wash it off immediately.

Condenser	25 ml (5/6 fl-oz, 0.9 Imp-oz)
Evaporator.....	50 ml (1 2/3 fl-oz, 1.8 Imp-oz)
Line or hose	20 ml (2/3 fl-oz, 0.7 Imp-oz)
Receiver/Dryer	15 ml (1/2 fl-oz, 0.5 Imp-oz)
Leakage repair	25 ml (5/6 fl-oz, 0.9 Imp-oz)
Compressor	For compressor replacement, subtract the volume of oil drained from the removed compressor from 140 ml (4 1/3 fl-oz, 4.9 Imp-oz), and drain the calculated volume of oil from the new compressor: 140 ml (4 1/3 fl-oz, 4.9 Imp-oz) — Volume of removed compressor = Volume to drain from new compressor.

NOTE: Even if no oil is drained from the removed compressor, don't drain more than 50 ml (1 2/3 fl-oz, 1.8 Imp-oz) from the new compressor.



A/C System Service

Performance Test

The performance test will help determine if the air conditioner system is operating within specifications.

Use only service equipment that is U.L.-listed and is certified to meet the requirements of SAE J2210 to remove HFC-134a (R-134a) from the air conditioner system.

CAUTION: Exposure to air conditioner refrigerant and lubricant vapor or mist can irritate eyes, nose and throat. Avoid breathing the air conditioner refrigerant and lubricant vapor or mist.

If accidental system discharge occurs, ventilate work area before resuming service.

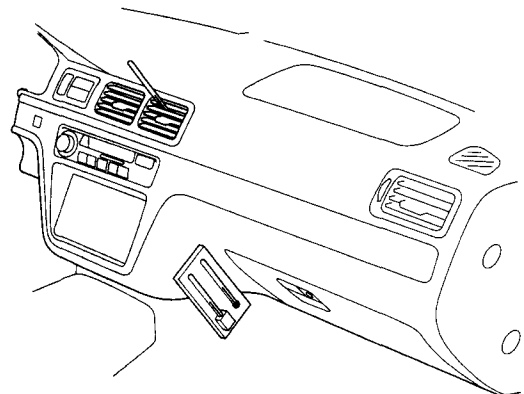
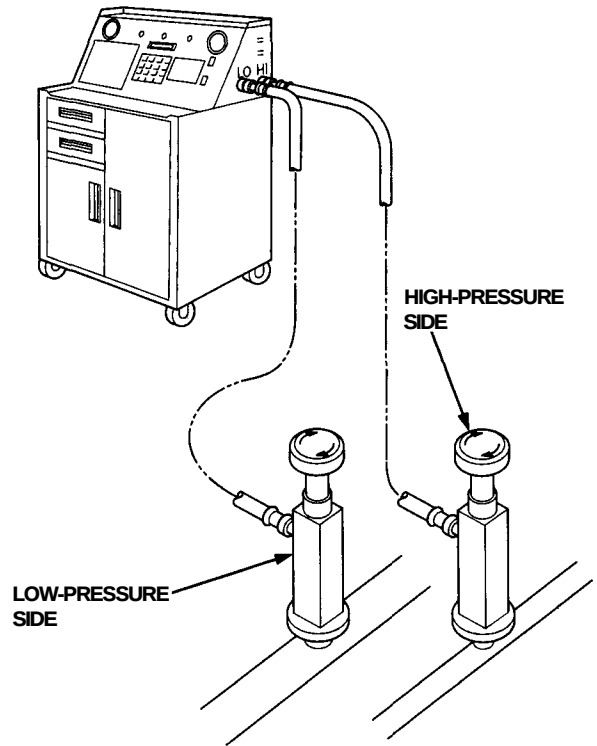
R-134a service equipment or vehicle air conditioner systems should not be pressure tested or leak tested with compressed air.

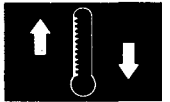
⚠ WARNING Some mixtures of air and R-134a have been shown to be combustible at elevated pressures and can result in fire or explosion causing injury or property damage. Never use compressed air to pressure test R-134a service equipment or vehicle air conditioner systems.

Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

1. Connect a R-134a refrigerant Recover/Recycling/Charging System to the vehicle, as shown, following the equipment manufacturer's instructions.
2. Insert a thermometer in the center vent outlet. Determine the relative humidity and air temperature.
3. Test conditions:
 - Avoid direct sunlight.
 - Open hood.
 - Open front doors.
 - Set the temperature control dial on MAX COOL, the mode control switch on VENT and the recirculation control switch on RECIRCULATE.
 - Turn the A/C switch on, and the fan switch on MAX.
 - Run the engine at 1,500 rpm.
 - No driver or passengers in vehicle
4. After running the air conditioning for 10 minutes under the above test conditions, read the delivery temperature from the thermometer in the dash vent and the high and low system pressure from the A/C gauges.

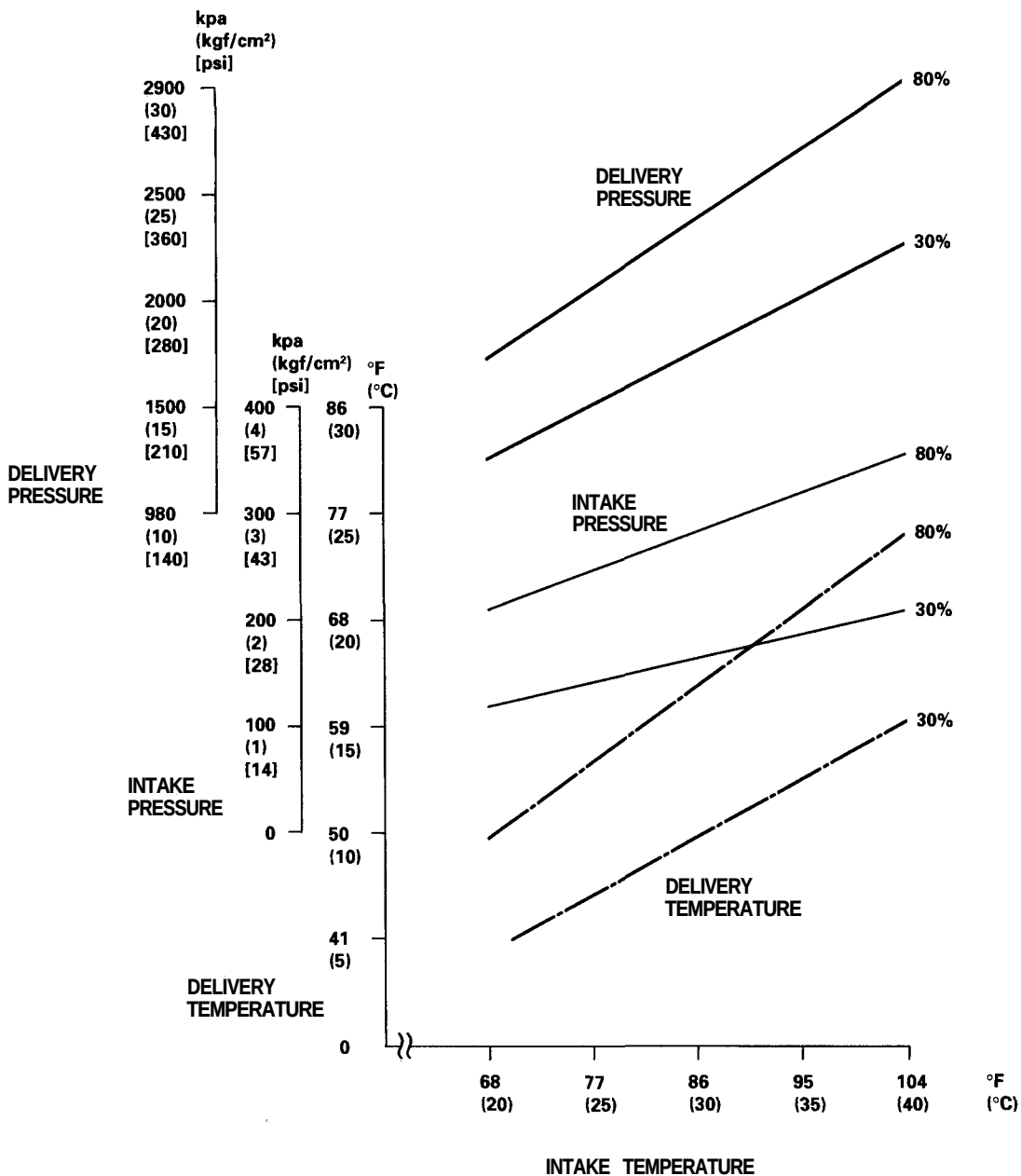
Recovery/Recycling/Charging System





5. To complete the charts:

- Mark the delivery temperature along the vertical line.
- Mark the intake temperature (ambient air temperature) along the bottom line.
- Draw a line straight up from the air temperature to the humidity.
- Mark a point one line above and one line below the humidity level (10% above and 10% below the humidity level).
- From each point, draw a horizontal line across the delivery temperature.
- The delivery temperature should fall between the two lines.
- Complete the low side pressure test and high side pressure test in the same way.
- Any measurements outside the line may indicate the need for further inspection.



A/C System Service

Charging

Use only service equipment that is U.L.-listed and is certified to meet the requirements of SAE J2210 to remove HFC-134a (R-134a) from the air conditioner system.

CAUTION: Exposure to air conditioner refrigerant and lubricant vapor or mist can irritate eyes, nose and throat. Avoid breathing the air conditioner refrigerant and lubricant vapor or mist.

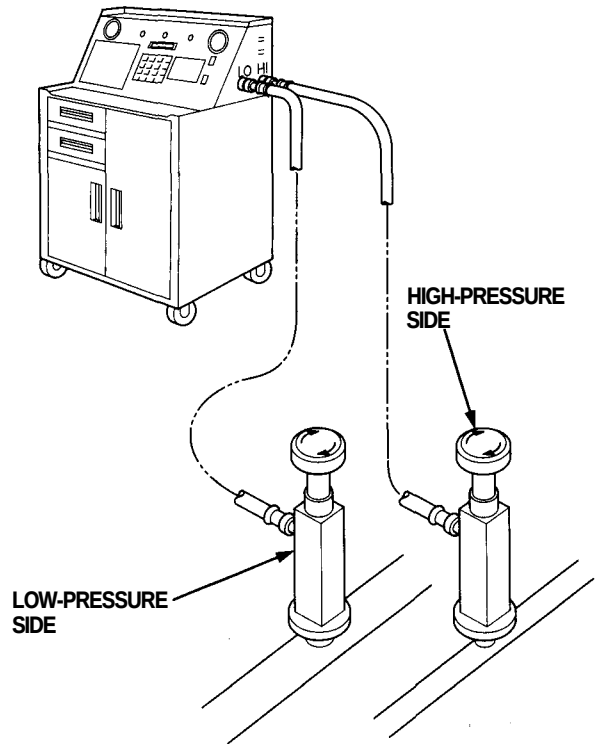
If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

Refrigerant capacity: 750^{+9}_{-50} g ($26.5^{+1.8}_{-1.8}$ oz)

CAUTION: Do not overcharge the system; the compressor will be damaged.

Connect a R-134a refrigerant Recovery/Recycling/Charging System to the vehicle, as shown, following the equipment manufacturer's instructions.

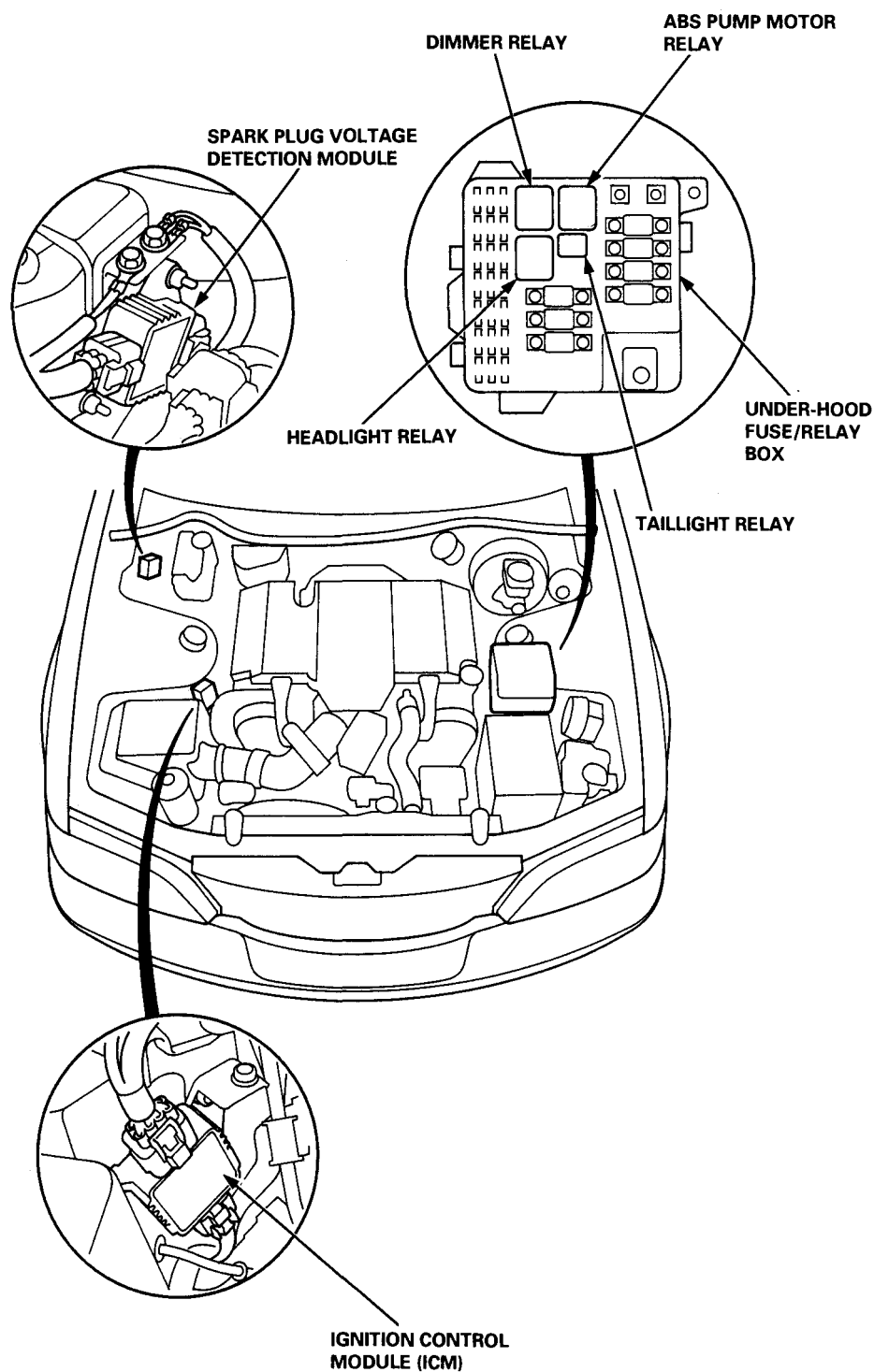
Recovery/Recycling/Charging System





Relay and Control Unit Locations

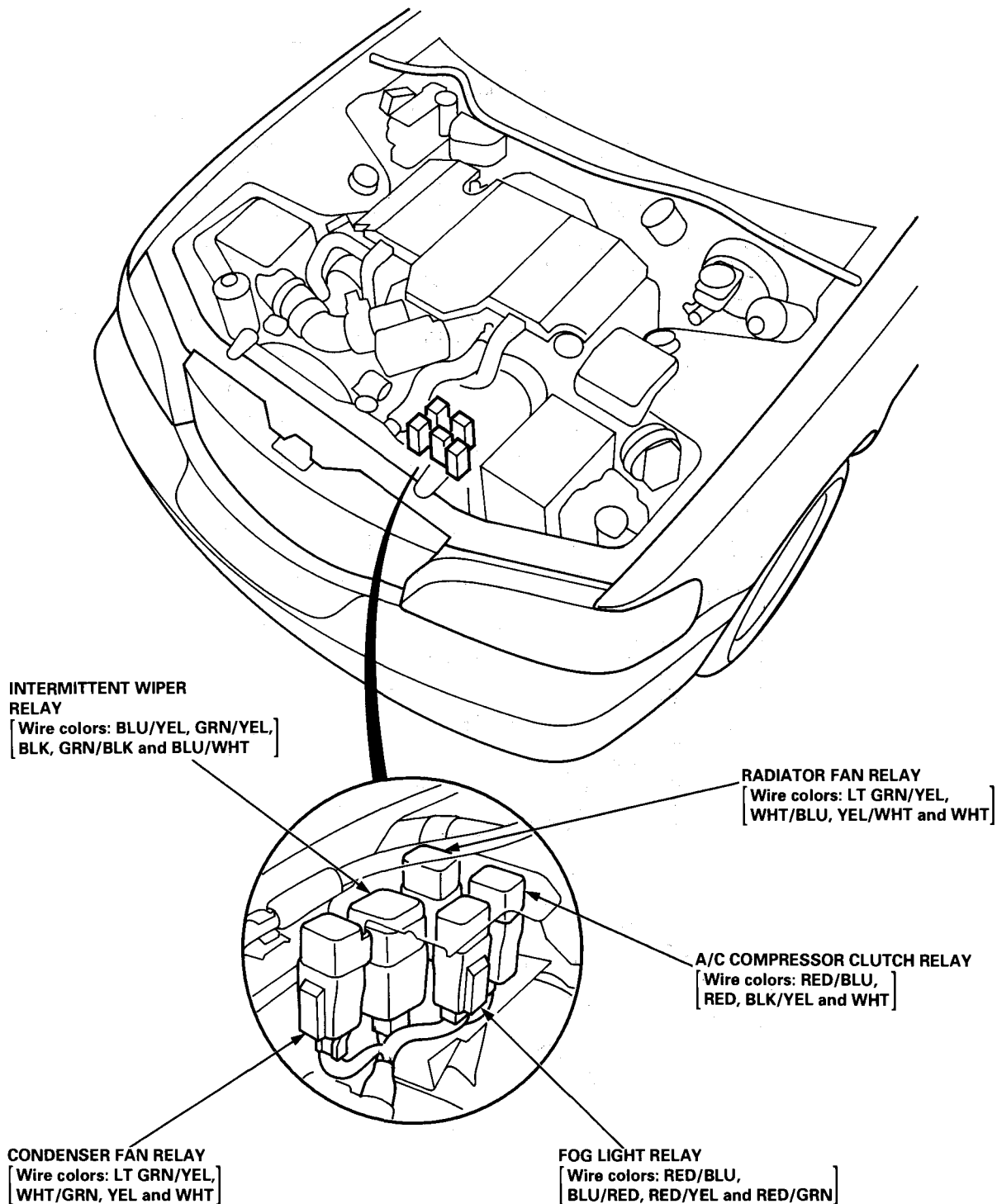
Engine Compartment



(cont'd)

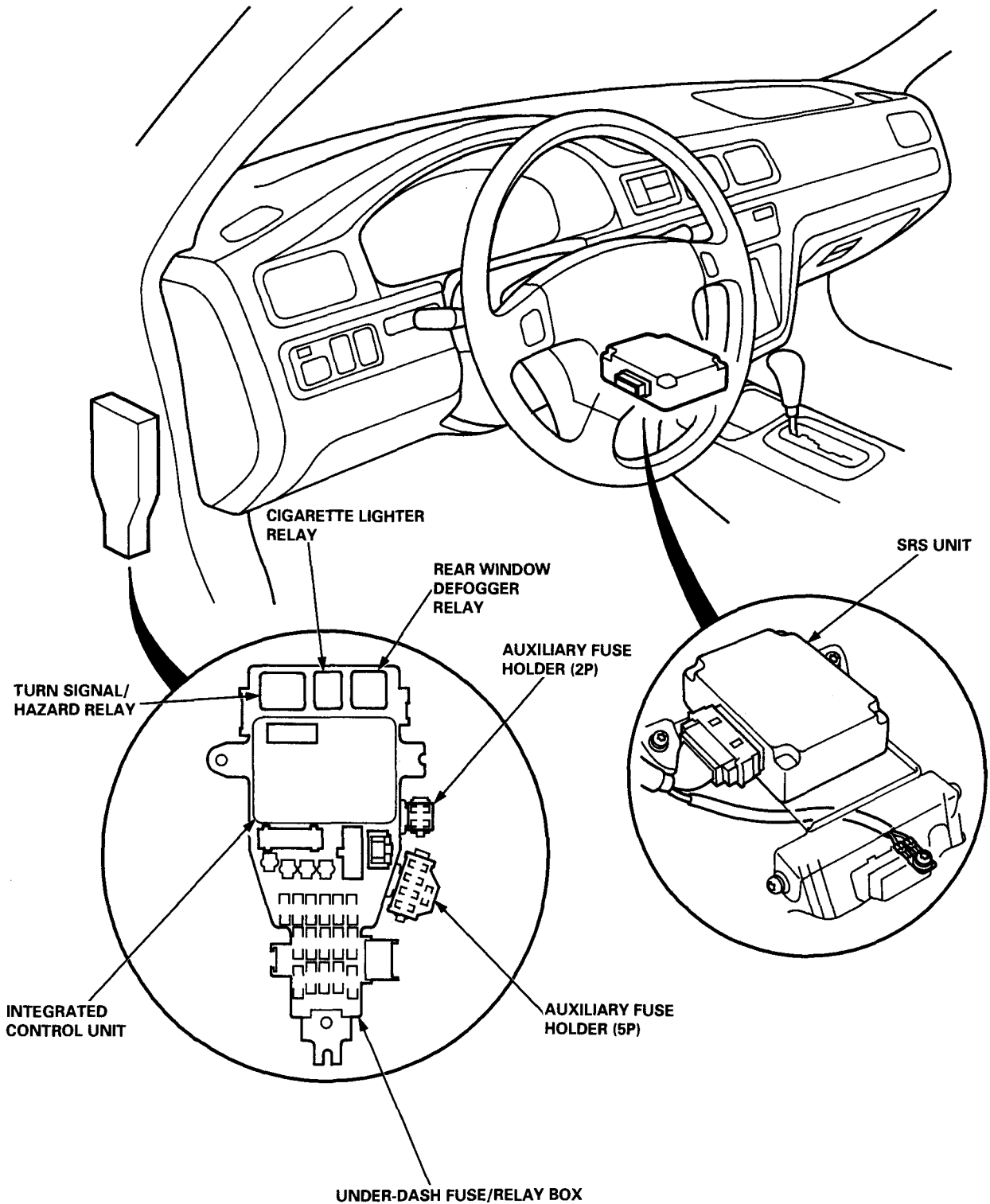
Relay and Control Unit Locations

Engine Compartment (cont'd)





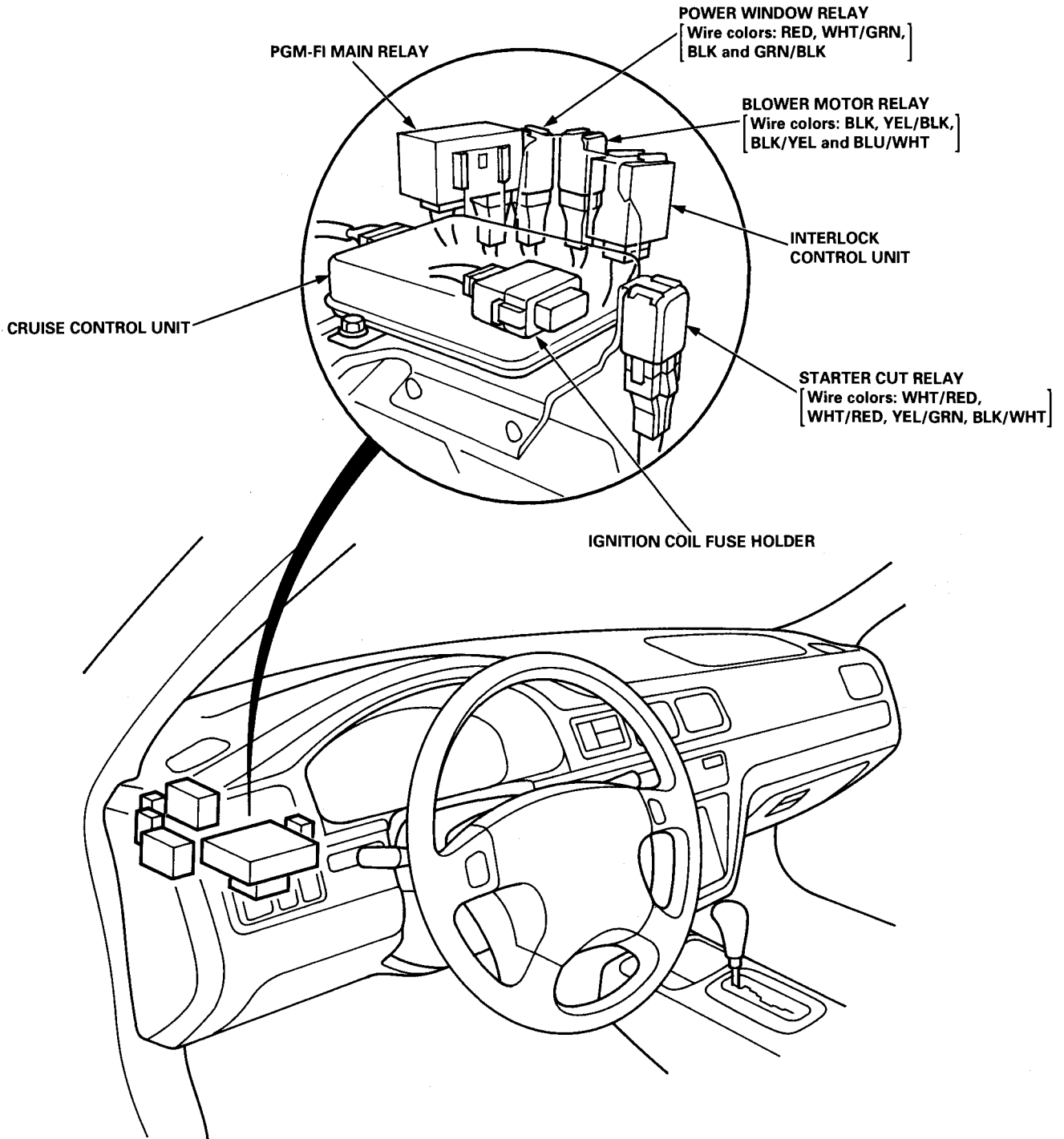
Dashboard

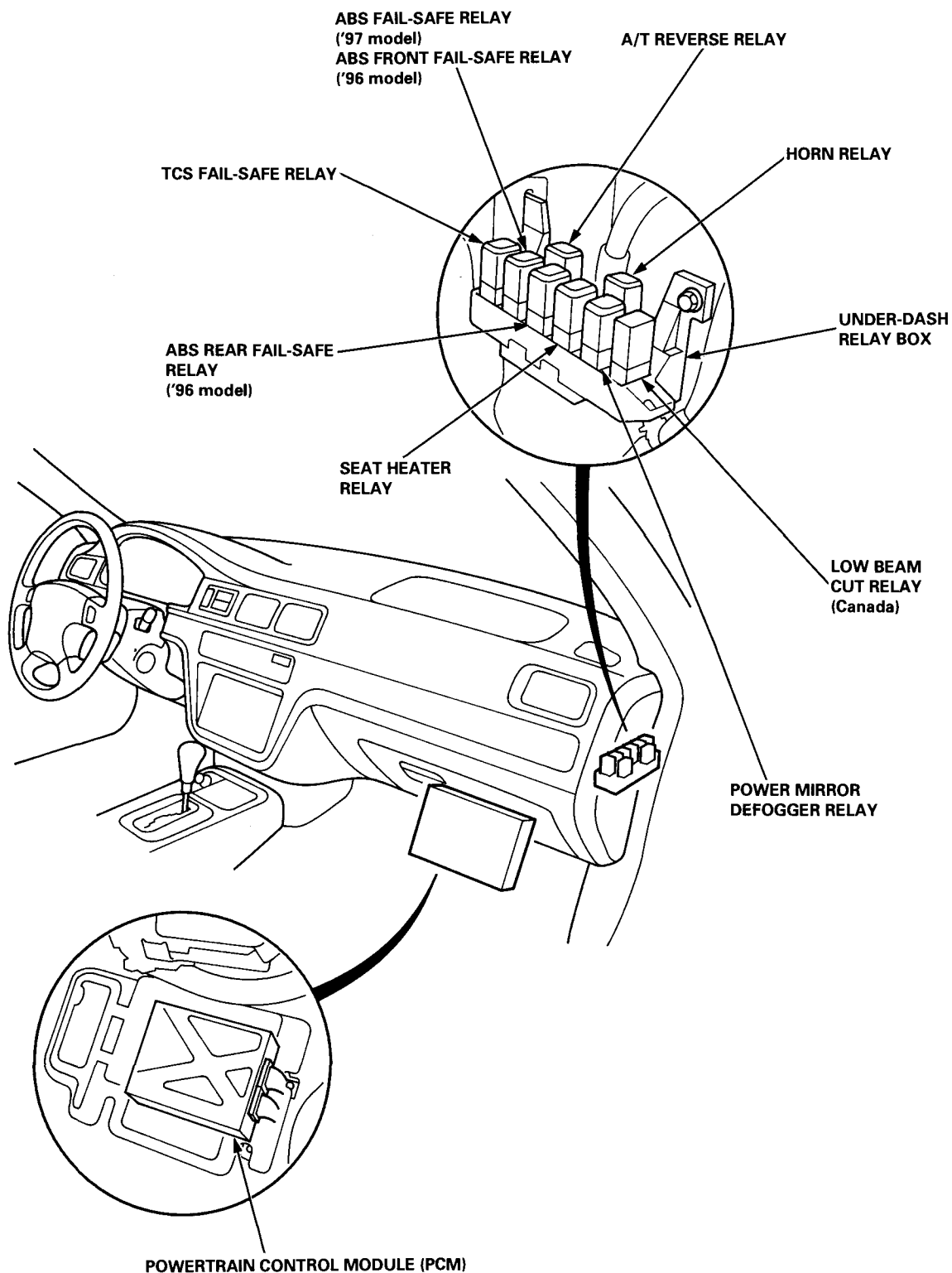


(cont'd)

Relay and Control Unit Locations

Dashboard (cont'd)

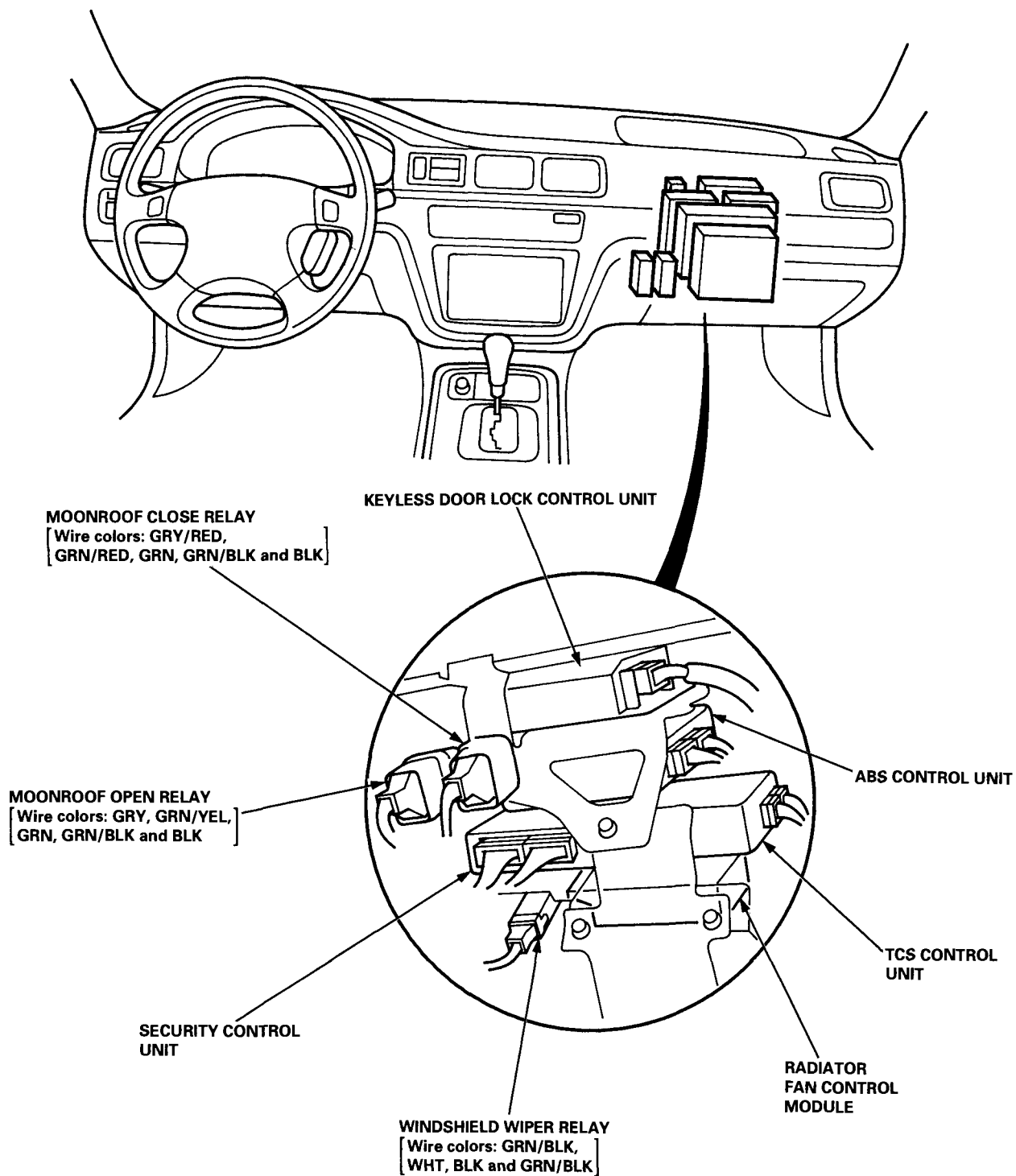




(cont'd)

Relay and Control Unit Locations

Dashboard (cont'd)



Battery

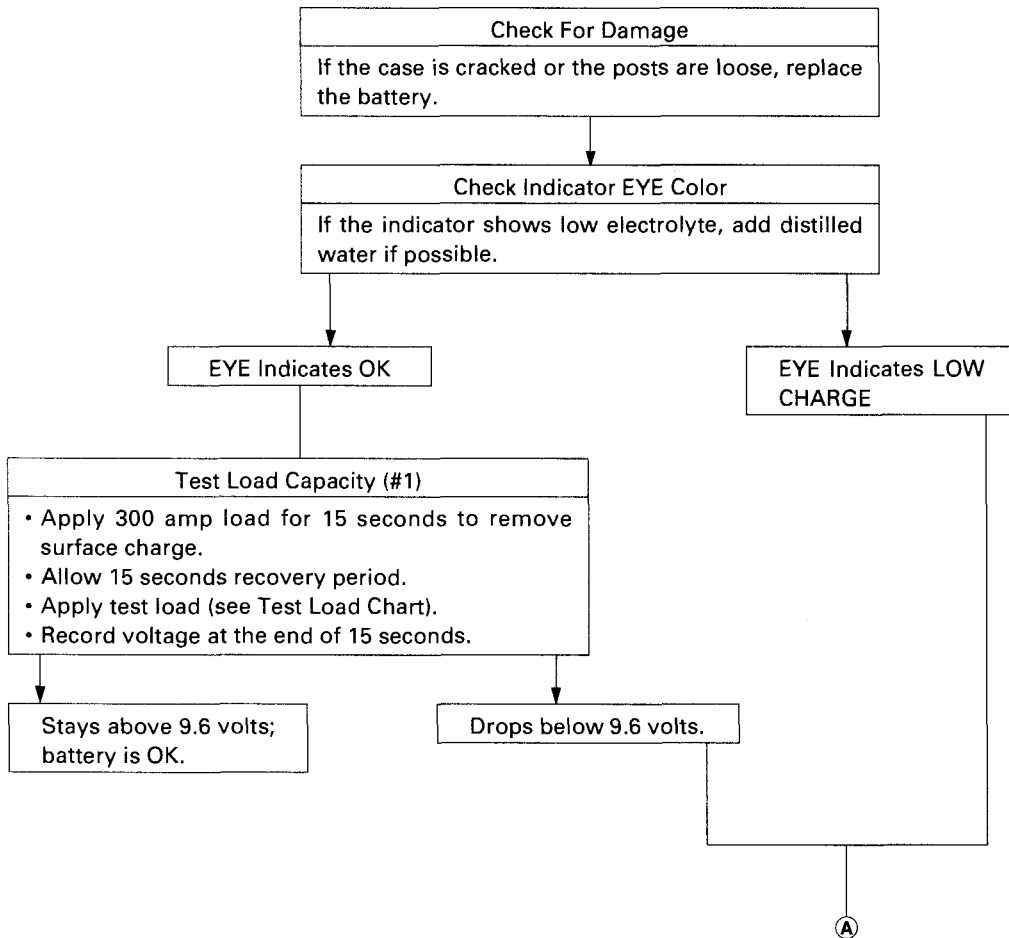
Test

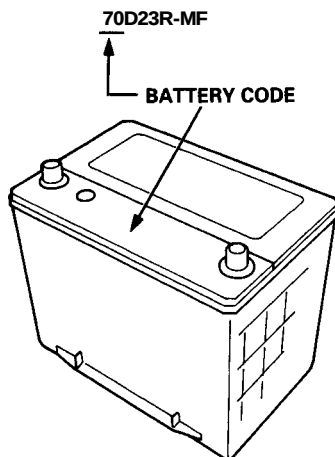
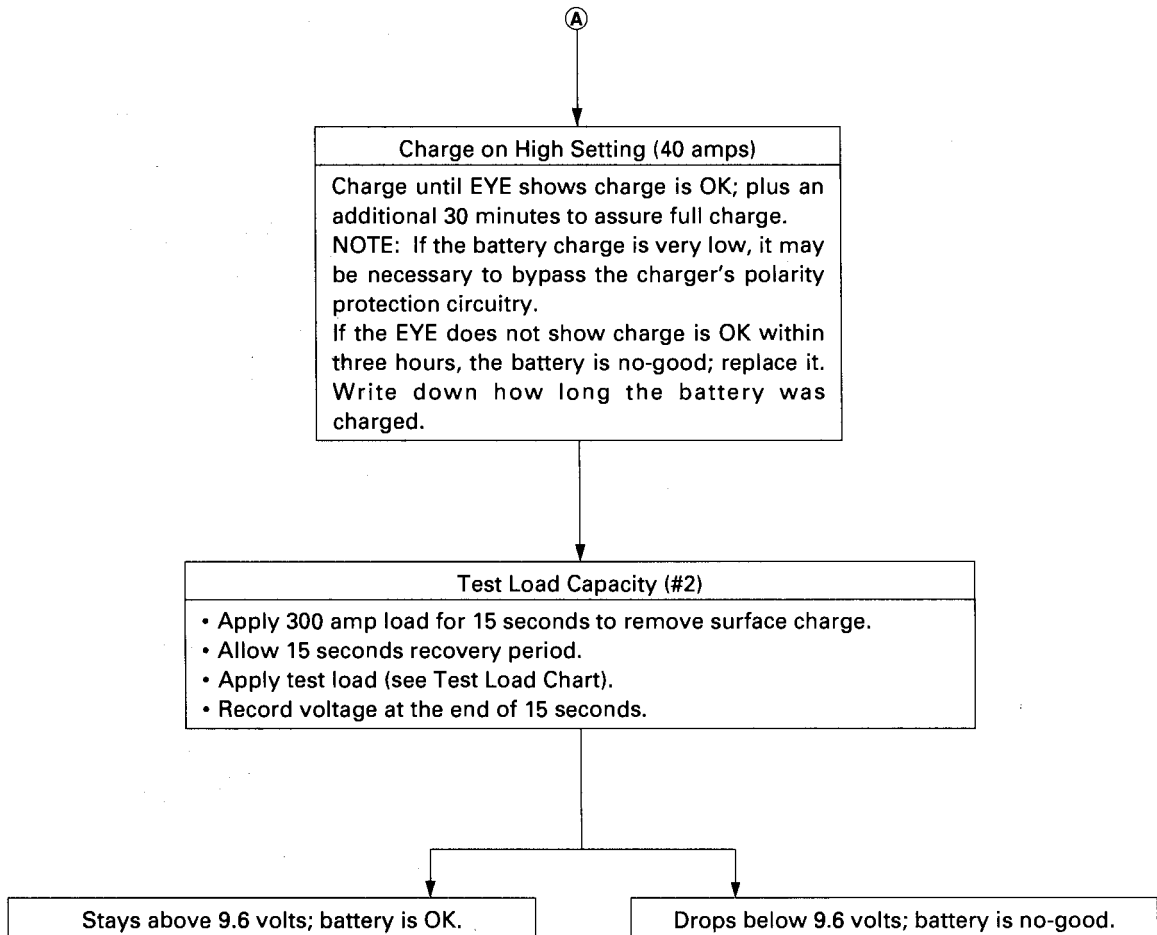
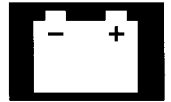
⚠ WARNING

- **Battery fluid (electrolyte) contains sulfuric acid. It may cause severe burns if it gets on your skin or in your eyes. Wear protective clothing and a face shield.**
 - If electrolyte gets on your skin or clothes, rinse it off with water immediately.
 - If electrolyte gets in your eyes, flush it out by splashing water in your eyes for at least 15 minutes; call a physician immediately.
- **A battery gives off hydrogen gas. If ignited, the hydrogen will explode and could crack the battery case and splatter acid on you. Keep sparks, flames, and cigarettes away from the battery.**
- **Overcharging will raise the temperature of the electrolyte. This may force electrolyte to spray out of the battery vents. Follow the charger manufacturer's instructions, and charge the battery at a proper rate.**

Use either a JCI or Bear ARBST tester, and follow the manufacturer's procedures. If you don't have one of these computerized testers, follow this conventional test procedure:

To get accurate results, the temperature of the electrolyte must be between 70°F (21°C) and 100°F (38°C).





TEST LOAD CHART		
Use the test load or 1/2 the cold cranking amps (CCA) printed on the label on the top of the battery. If neither is indicated, use the information below:		
BATTERY CODE	COLD CRANKING AMPS (CCA)	LOAD (amps)
70	440	220

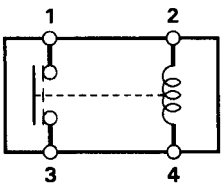
PowerRelays

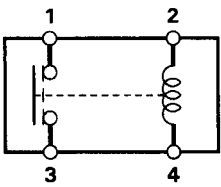
RelayTest

NOTE: Refer to page 23-62 in the '95 - 96 Acura 2.5TL Service Manual, P/N 61SW500, for the items not shown in this sub-section.

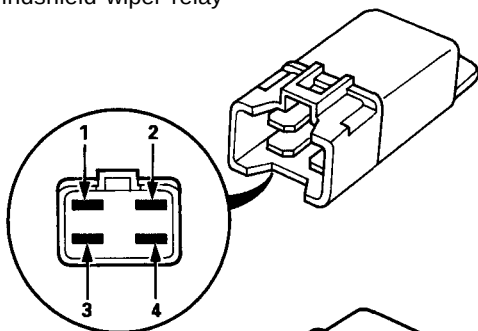
Normally-open type:

1. Check for continuity between the terminals.
 - There should be continuity between the No. 1 and No. 3 terminals when power and ground are connected to the No. 2 and No. 4 terminals.
 - There should be no continuity between the No. 1 and No. 3 terminals when power is disconnected.

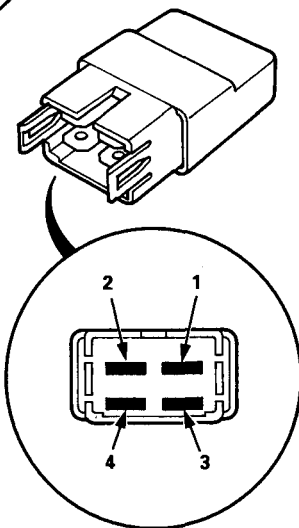
Terminal	1	3
Power (No. 2 - No. 4)		
Disconnected		
Connected		



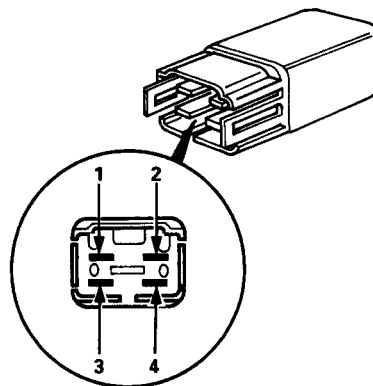
- Power window relay
- Blower motor relay
- Windshield wiper relay



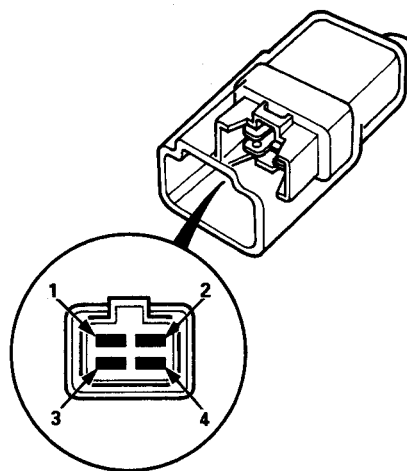
- Taillight relay



- A/T reverse relay
- Seat heater relay
- TCS fail-safe relay



- Fog light relay

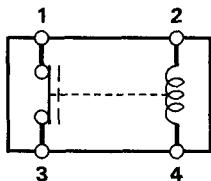




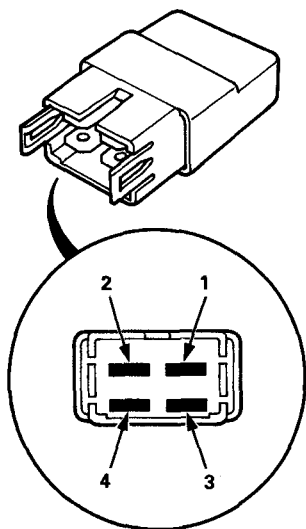
Normally-closed Type:

1. Check for continuity between the terminals.
 - There should be no continuity between the No. 1 and No. 3 terminals when power and ground are connected to the No. 2 and No. 4 terminals.
 - There should be continuity between the No. 1 and No. 3 terminals when power is disconnected.

Terminal	1	3
Power (No.2 – No.4)		
Connected		
Disconnected		

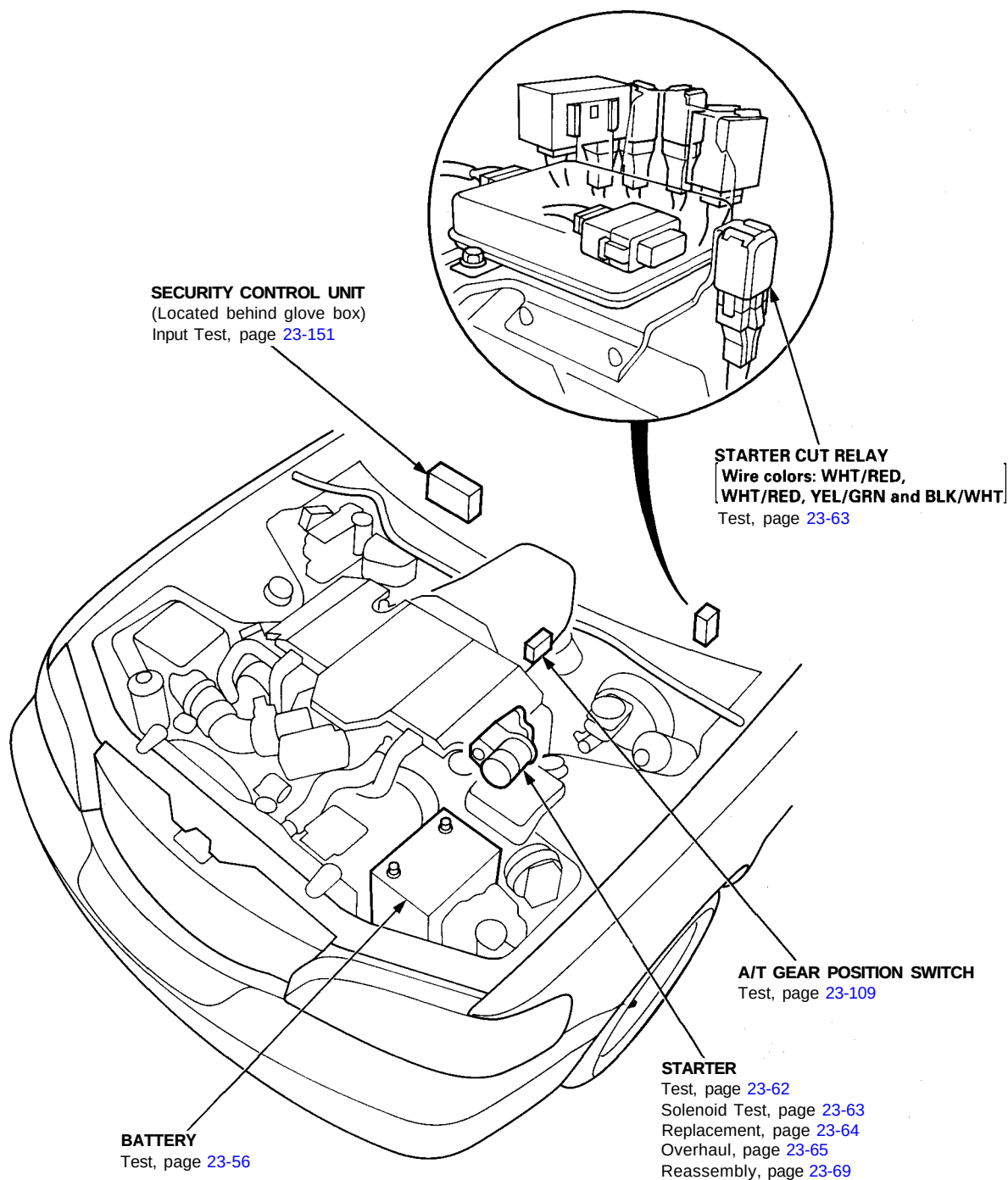


- Low beam cut relay (Canada)



Starting System

Component Location Index



Starting System

Starter Test

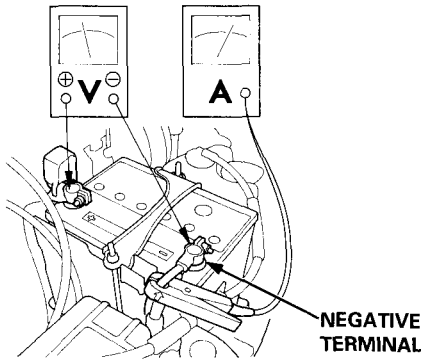
NOTE: The air temperature must be between 59 and 100°F (15 and 38°C) before testing.

Recommended Procedure:

- Use a starter system tester.
- Connect and operate the equipment in accordance with the manufacturer's instructions.
- Test and troubleshoot as described.

Alternate Procedure:

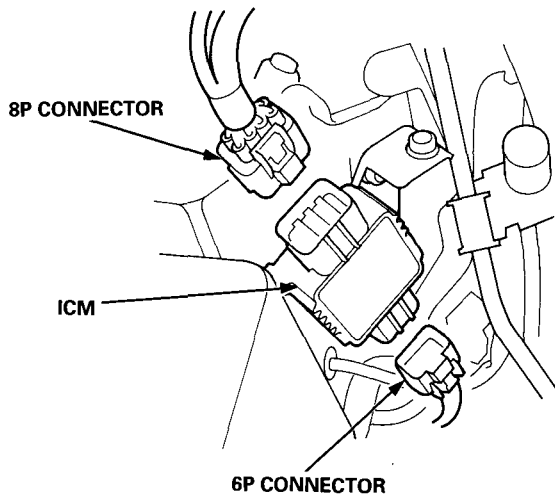
- Use following equipment:
 - Ammeter, 0-400 A
 - Voltmeter, 0-20 V (accurate within 0.1 volt)
 - Tachometer, 0-1,200 rpm
- Hook up a voltmeter and ammeter as shown.



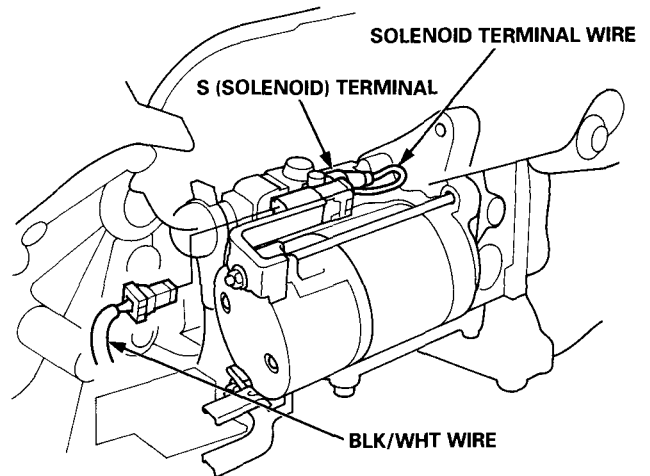
NOTE: After this test, or any subsequent repair, reset the PCM to clear any codes (see [section 11](#)).

Check the Starter Engagement

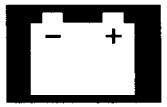
1. Disconnect the 8P and 6P connector from the ICM.



2. With the shift lever in **P** or **N**, turn the ignition switch to START (III).
 - The starter should crank the engine. If the starter does not crank the engine, go to step 3.
 - If it cranks the engine erratically or too slowly, go to "Check for Wear and Damage" on the next page.
3. Check the battery, battery positive cable, ground, starter cut relay, security control unit, and the wire connections for looseness and corrosion. Test again. If the starter still does not crank the engine, go to step 4.
4. Unplug the connector (BLK/WHT wire and solenoid terminal) from the starter. Make sure the shift lever is in **P** or **N**, then connect a jumper wire from the battery positive (+) terminal to the solenoid terminal. The starter should crank the engine.



- If the starter still does not crank the engine, remove it, and diagnose its internal problem.
 - If the starter cranks the engine, go to step 5 and continue the test.
5. Check the ignition switch.
 6. Check the starter cut relay.
 7. Check the A/T gear position switch (see page [23-109](#)).
 8. Check the security control unit.
 9. Check for an open in the WHT/RED wire between the ignition switch and starter cut relay, and check for an open in the BLK/WHT wire between the starter cut relay and starter.

**Check for Wear and Damage**

The starter should crank the engine smoothly and steadily. If the starter engages, but cranks the engine erratically, remove it, and inspect the starter drive gear and torque converter ring gear for damage.

- Check the drive gear overrunning clutch for binding or slipping when the armature is rotated with the drive gear held. If the clutch is damaged, replace the clutch assembly.

Check Cranking Voltage and Current Draw

Cranking voltage should be no less than 8.0 volts. Current draw should be no more than 450 amperes.

If cranking voltage is too low, or current draw too high, check for:

- Dead or low battery
- Open circuit in starter armature commutator segments
- Starter armature dragging
- Shorted armature winding
- Excessive drag in engine

Check Cranking rpm

Engine speed during cranking should be above 100 rpm.

If speed is too low, check for:

- Loose battery or starter terminals
- Excessively worn starter brushes
- Open circuit in commutator segments
- Dirty or damaged helical spline or drive gear
- Defective drive gear overrunning clutch

Check Starter Disengagement

With the shift lever in **[P]** or **[N]**, turn the ignition switch to "START (III)", and release to "ON (II)". The starter drive gear should disengage from the flywheel ring gear when you release the key.

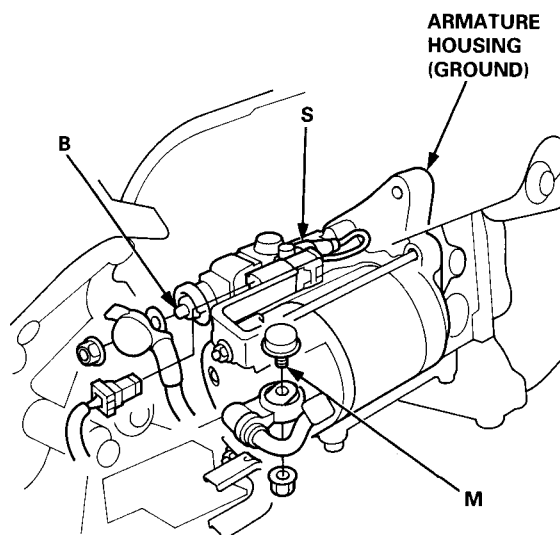
If the drive gear hangs upon the flywheel ring gear, check for:

- Solenoid plunger and switch malfunction
- Dirty drive gear assembly or damaged overrunning clutch

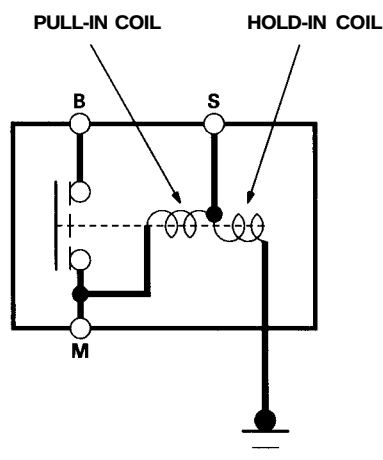


Starter Solenoid Test

1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
2. Disconnect the battery negative cable, then disconnect the positive cable.
3. Check the hold-in coil for continuity between the S terminal and the armature housing (ground). The coil is OK if there is continuity.



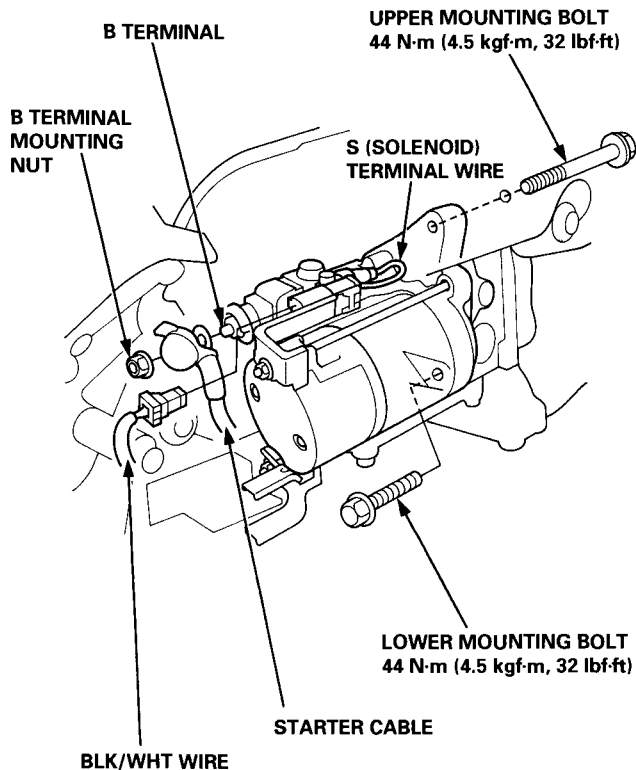
4. Check the pull-in coil for continuity between the S and M terminals. The coil is OK if there is continuity.



Starting System

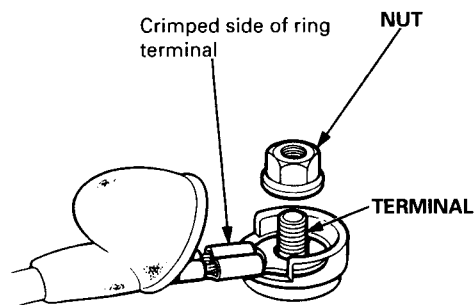
Starter Replacement

1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
2. Disconnect the battery negative cable, then disconnect the positive cable.
3. Remove the left drive shaft.
4. Remove the exhaust pipe A.
5. Disconnect the starter cable from the B terminal on the solenoid, then disconnect the BLK/WHT wire from the S (SOLENOID) terminal wire.



6. Remove the two bolts holding the starter, then remove the starter.
7. Install in the reverse order of removal.

NOTE: When installing the starter cable, make sure that the crimped side of the ring terminal is facing out.

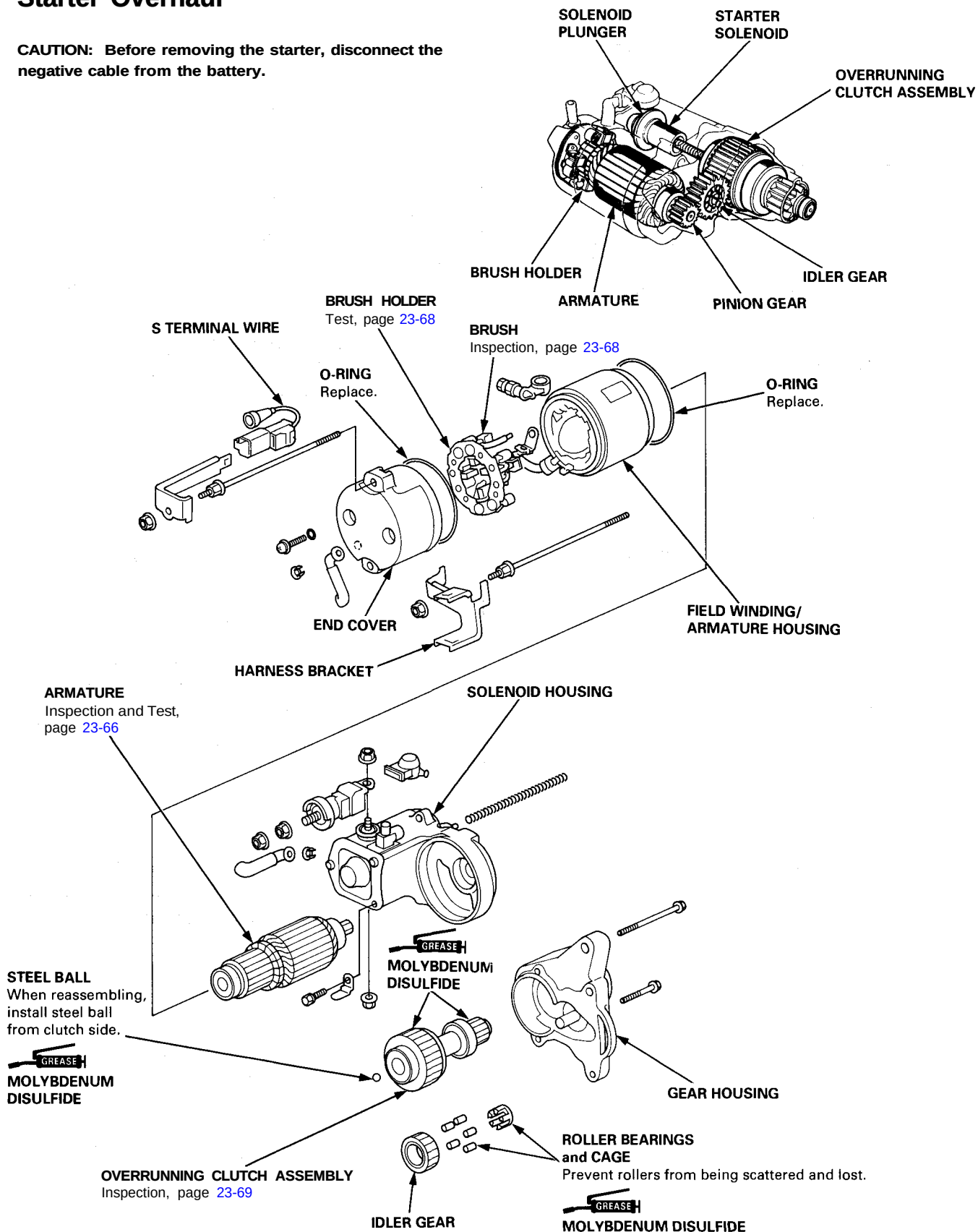


8. Connect the battery positive cable and negative cable to the battery.
9. Enter the anti-theft code for the radio, then enter the customer's radio station presets.



Starter Overhaul

CAUTION: Before removing the starter, disconnect the negative cable from the battery.

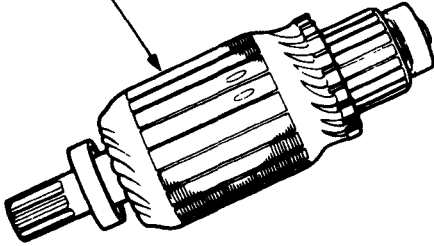


Starting System

Armature Inspection and Test

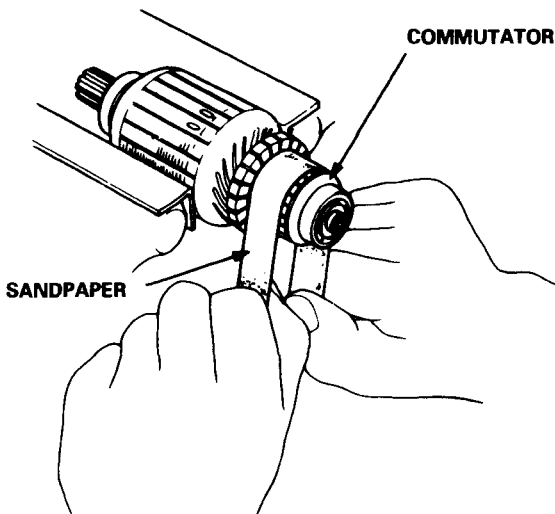
1. Inspect the armature for wear or damage due to contact with the permanent magnet. If there is wear or damage, replace the armature.

Inspect for damage



2. Check commutator surface and diameter.

- If the surface is dirty or burnt, resurface with emery cloth or a lathe within the following specifications, or recondition with #500 or #600 sandpaper.

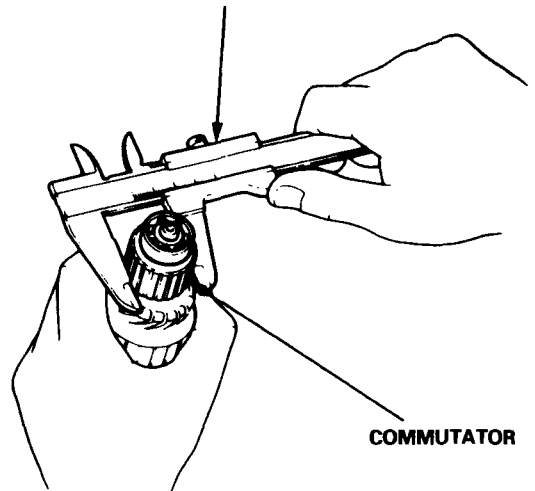


- If commutator diameter is below the service limit, replace the armature.

Commutator Diameter

Standard (NEW)	Service Limit
34.9 – 35.0 mm (1.374 – 1.378 in)	34.0 mm (1.338 in)

VERNIER CALIPER



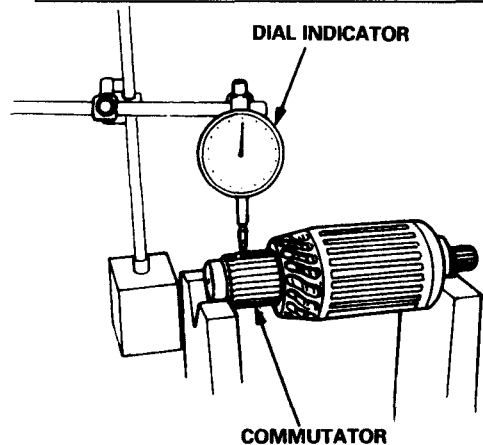
3. Measure the commutator runout.

- If the commutator runout is within the service limit, check the commutator for carbon dust or brass chips between the segments.
- If the commutator runout is not within the service limit, replace the armature.

Commutator Runout

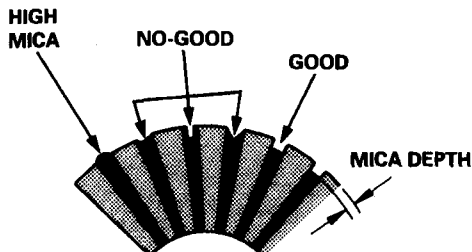
Standard (NEW)	Service Limit
0 – 0.02 mm (0 – 0.0008 in)	0.05 mm (0.002 in)

DIAL INDICATOR





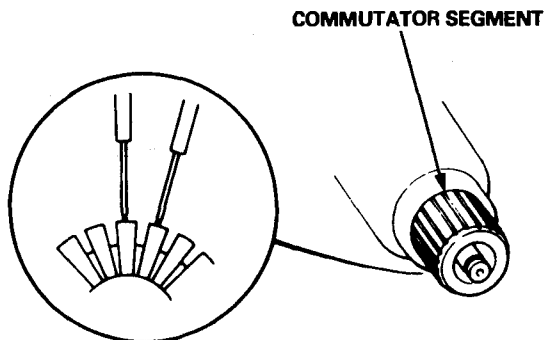
4. Check for mica depth. If necessary, undercut the mica with a hacksaw blade to achieve proper depth. If the service limit cannot be maintained, replace the armature.



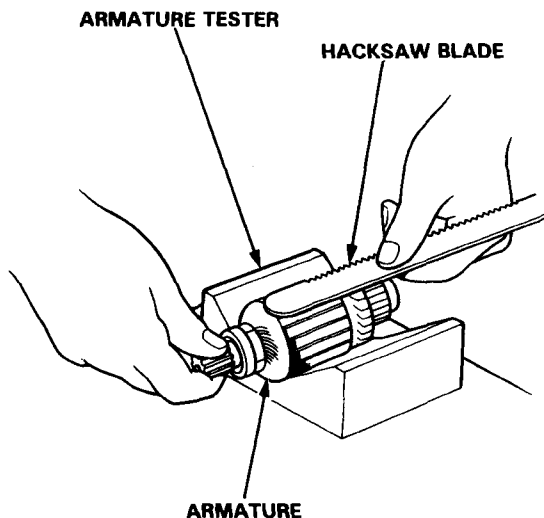
Commutator Mica Depth

Standard (NEW)	Service Limit
0.55 – 0.85 mm (0.022 – 0.034 in)	0.20 mm (0.008 in)

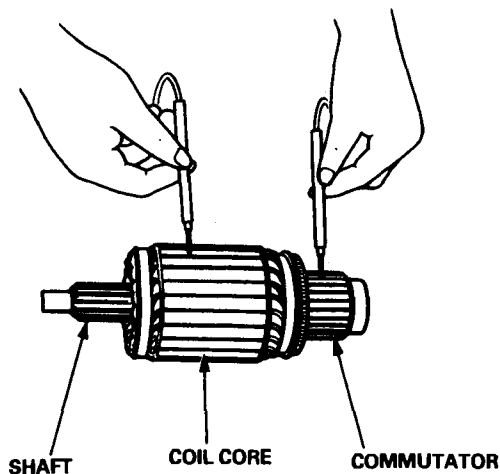
5. Check for continuity between the segments of the commutator. If an open circuit exists between any segments, replace the armature.



6. Place the armature on an armature tester. Hold a hacksaw blade on the armature core. If the blade is attracted to the core or vibrates while the core is turned, the armature is shorted. Replace the armature.



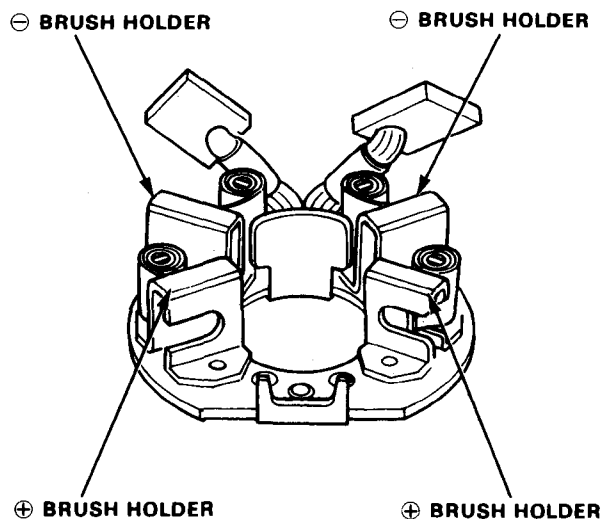
7. Check with an ohmmeter that no continuity exists between the commutator and armature coil core, and between the commutator and armature shaft. If continuity exists, replace the armature.



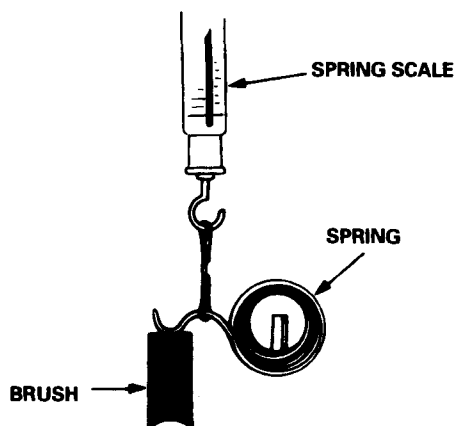
Starting System

Starter Brush Holder Test

1. Check that there is no continuity between the ⊕ and ⊖ brush holders. If there is continuity, replace the brush holder assembly.



2. Insert the brush into the brush holder, and bring the brush into contact with the commutator, then attach a spring scale to the spring. Measure the spring tension at the moment the spring lifts off the brush.



Spring Tension

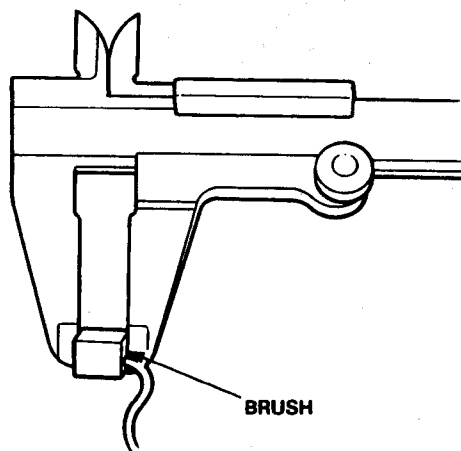
22 – 28 N (2.2 – 2.8 kgf, 4.9 – 6.2 lbf)

Starter Brush Inspection

Measure the brush length. If it is not within the service limit, replace the brush holder assembly.

Brush Length

Standard (NEW)	Service Limit
15.0 – 15.5 mm (0.59 – 0.61 in)	9.0 mm (0.35 in)

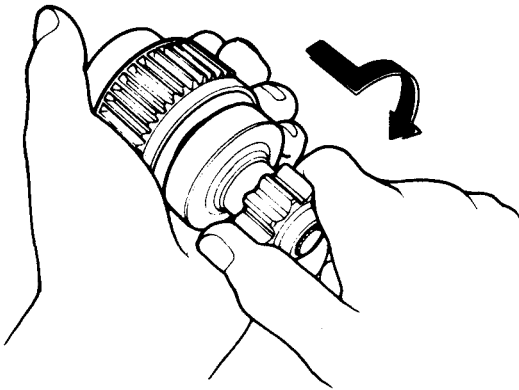


NOTE: To seat new brushes after installing them in their holders, slip a strip of #500 or #600 sandpaper, with the grit side up, over the commutator, and smoothly rotate the armature. The contact surface of the brushes will be sanded to the same contour as the commutator.



Overrunning Clutch Inspection

1. Slide the overrunning clutch along the shaft. Does it move freely? If not, replace it.
2. Rotate the overrunning clutch both ways. Does it lock in one direction and rotate smoothly in reverse? If it does not lock in either direction or it locks in both directions, replace it.

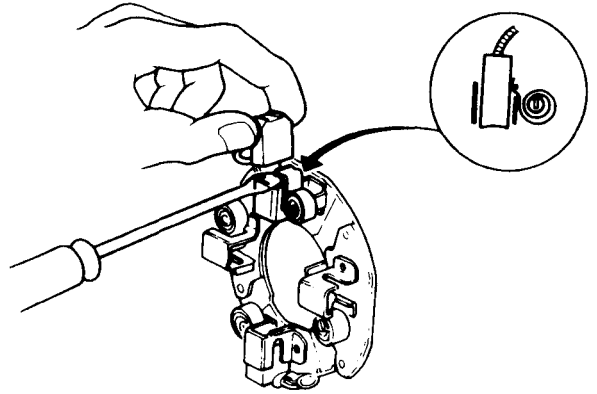


3. If the starter drive gear is worn or damaged, replace the overrunning clutch assembly; the gear is not available separately.
4. Check the condition of the torque converter ring gear if the starter drive gear teeth are damaged.

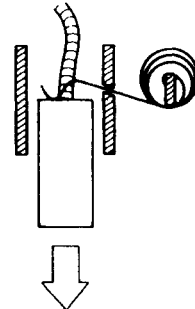
Starter Reassembly

NOTE: Use the illustration on page [23-65](#) as reference for reassembly.

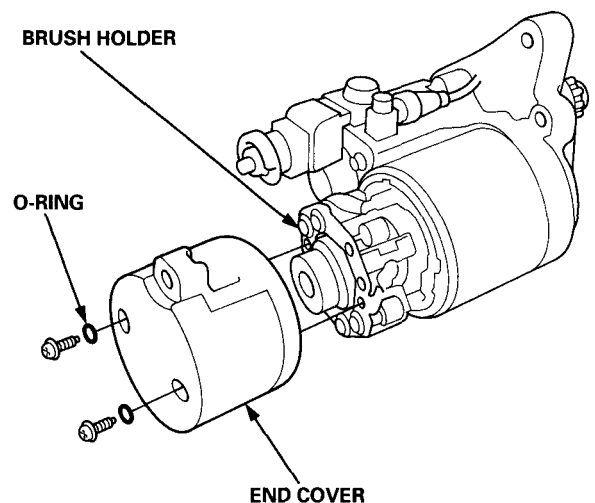
1. Pry back each brush spring with a screwdriver, then position the brush about halfway out of its holder, and release the spring to hold it there.



2. Install the armature in the housing. Next, pry back each brush spring again, and push the brush down until it seats against the commutator, then release the spring against the end of the brush.



3. Install the end cover on the brush holder.



Starting System

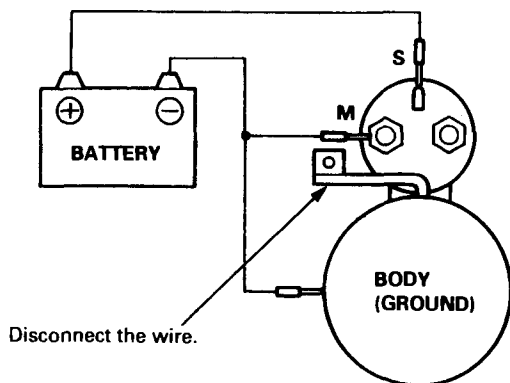
Performance Test

NOTE: Before starting the following checks, disconnect the wire from terminal M, and make a connection as described below using as heavy a wire as possible (preferably equivalent to the wire used for the car).

Pull-in Coil Test:

Connect the battery as shown. If the starter pinion pops out, it is working properly.

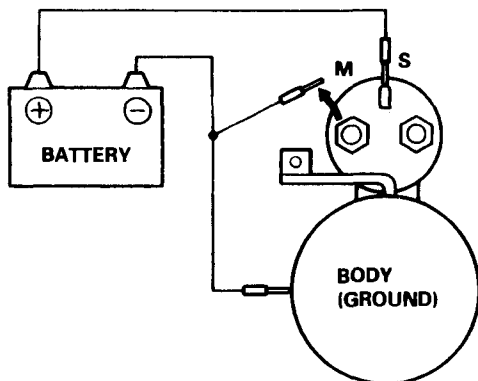
CAUTION: Do not leave the battery connected for more than 10 seconds.



Hold-in Coil Test:

Disconnect the battery from the M terminal. If the pinion does not retract, the hold-in coil is working properly.

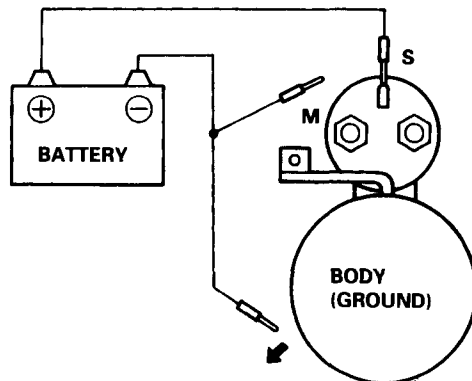
CAUTION: Do not leave the battery connected for more than 10 seconds.



Retracting Test:

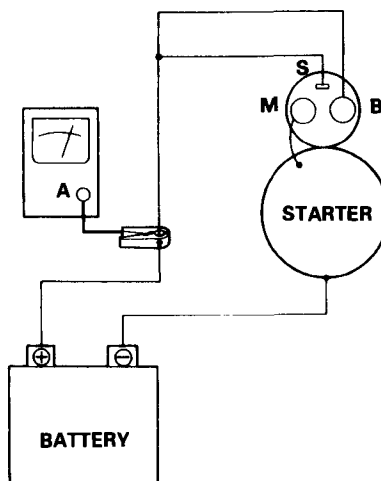
Disconnect the battery also from the body. If the pinion retracts immediately, it is working properly.

CAUTION: Do not leave the battery connected for more than 10 seconds.



Starter No-load Test:

1. Clamp the starter firmly in a vise.
2. Connect the starter to the battery as shown in the diagram below, and confirm that the motor starts and keeps rotating.



3. If the electric current and motor speed meet the specifications when the battery voltage is at 11.5 V, the starter is working properly.

Specifications:

- 100 A or less current draw
- 2,500 rpm or more rpm

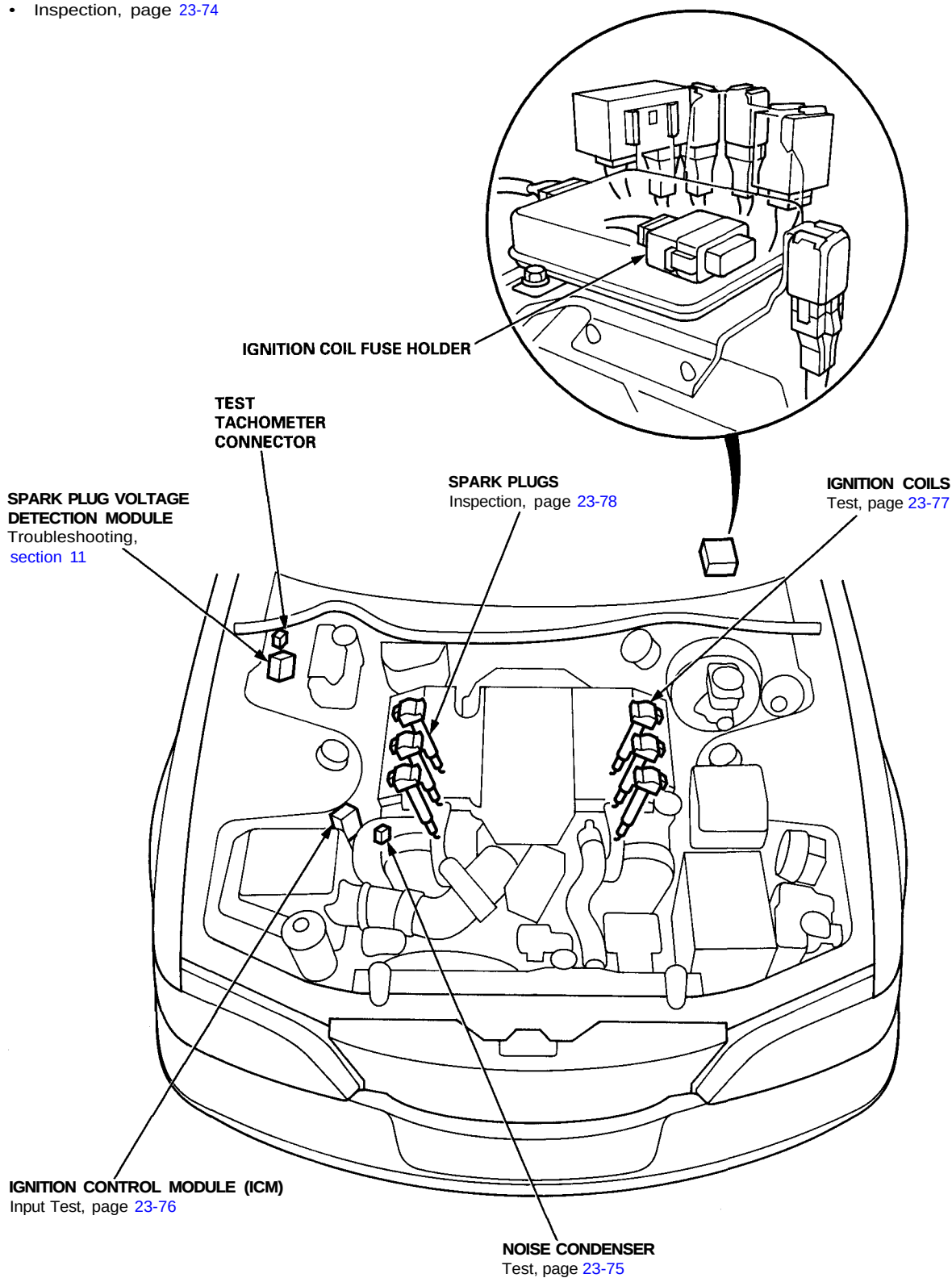


Ignition System

Component Location Index

IGNITION TIMING CONTROL SYSTEM

- Description, page [23-72](#)
- Inspection, page [23-74](#)

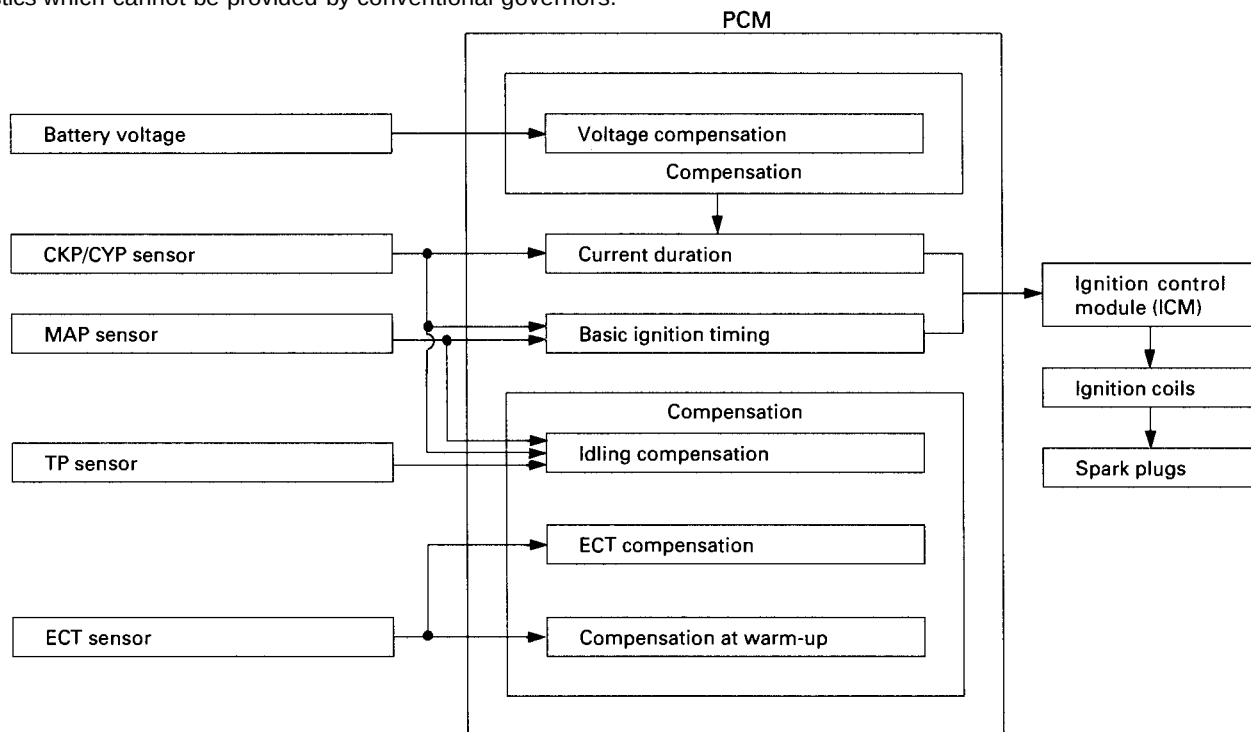


Ignition System

Description

Ignition Timing Control

The programmed ignition system on this engine provides optimum control of ignition timing. A microcomputer determines the timing based on information about engine speed and intake manifold vacuum, which is transmitted by signals from the CKP/CYP sensor, throttle position (TP) sensor, engine coolant temperature (ECT) sensor, and MAP sensor. This system, which is not dependent on a governor or vacuum diaphragm, is capable of providing ignition advance characteristics which cannot be provided by conventional governors.



Basic Control

The PCM has stored within it the basic ignition timing for operating conditions based upon engine speed and intake manifold vacuum. With the compensating signals from sensors, the system determines optimum ignition timing and duration for ambient conditions and sends voltage pulses to the ICM.

Compensation of ignition timing:

Compensation Item	Related Sensor and Information	Description
Idling	CKP/CYP sensor MAP sensor	Ignition timing is controlled to the target speed with compensation according to the idle speed.
Compensation at warm-up	ECT sensor	Timing is adjusted in accordance with warm-up conditions to bring about a good balance between operating performance and exhaust gas level.
ECT compensation	ECT sensor	Compensation for timing at low and high engine coolant temperatures.

Control at Start

Ignition timing is fixed at 5° BTDC for cranking. The cranking is detected by the CKP sensor (cranking rpm) and starter signal.

Misfiring Detection

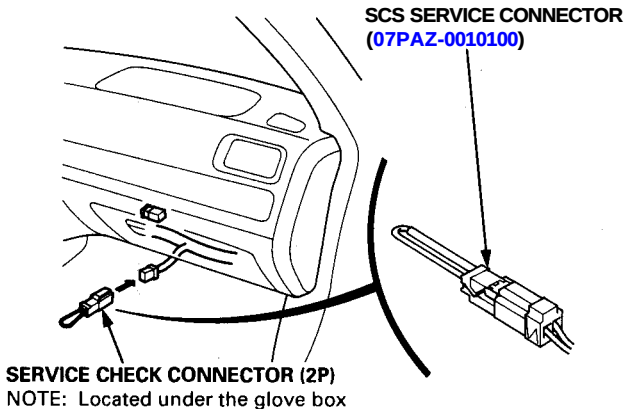
As part of the OBD II misfiring detection system, each of the ignition coil has a built-in spark plug voltage sensor. This sensor detects the long duration high voltage which occurs in case of unfavorable combustion or misfiring. (For details, see [section 11](#)).

Ignition System

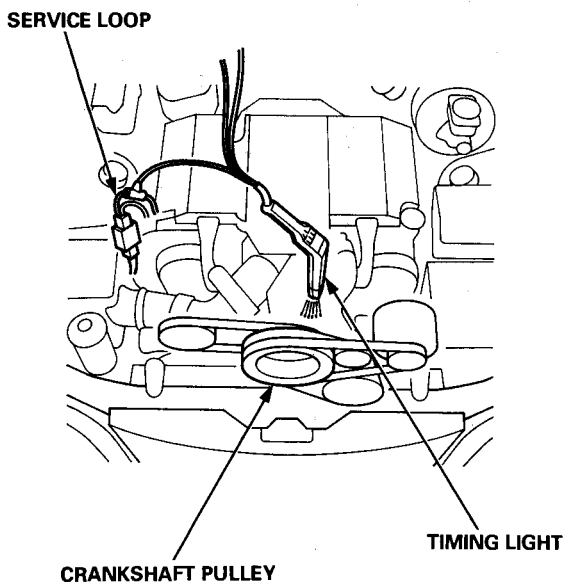
Ignition Timing Inspection

SRS components are located in this area. Review the SRS component locations, precautions, and procedures in the SRS (section 24) before performing repairs or service.

1. Start the engine. Hold the engine at 3,000 rpm with no load (shift lever in **N** or **P** position) until the radiator fan comes on, then let it idle.
2. Pull out the service check connector located under the glove box. Connect the GRN/BLU and ORN wire terminals with the special tool.



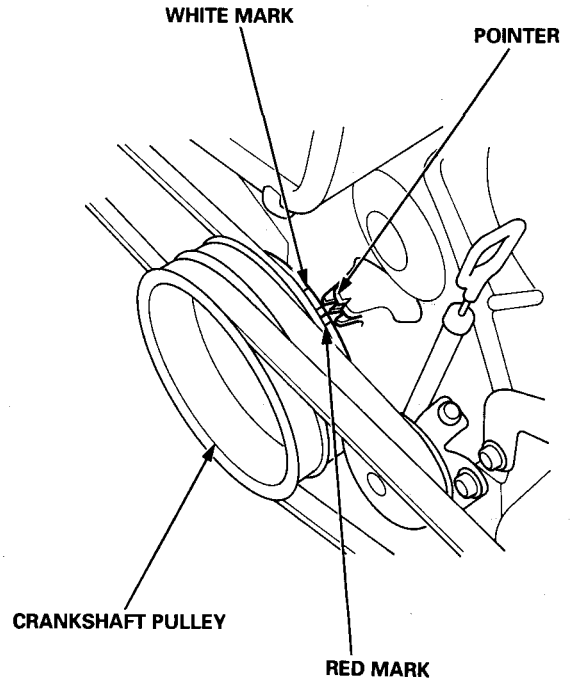
3. Check the idle speed (see page 23-75).
4. Connect a timing light to the service loop; while the engine idles, point the light toward the pointer on the timing belt cover.



5. Inspect ignition timing at idle speed.

Ignition Timing:

15 ± 2 BTDC (RED) at 640 ± 50 rpm with shift lever in **N or **P** position and electrical systems turned off.**

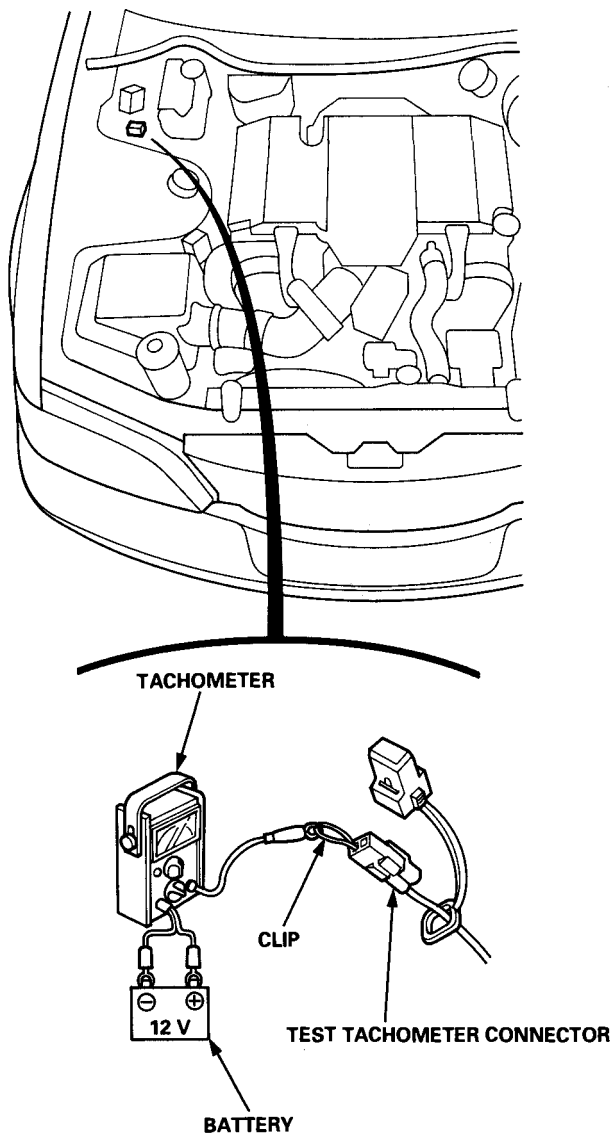


6. If the ignition timing is incorrect, replace the PCM (there is no way to adjust ignition timing).
7. Disconnect the special tool from the service check connector.



Idle Speed Check

1. Start the engine. Hold the engine at 3,000 rpm with no load (shift lever in **N** or **P**) until the radiator fan comes on, then let it idle.
2. Connect a tachometer to the test tachometer connector.



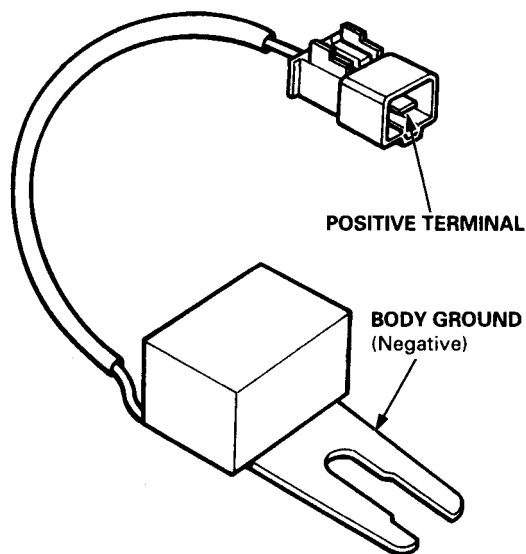
Idle speed: 640 ± 50 rpm with shift lever in position **N or **P** and electrical systems turned off.**

3. Adjust the idle speed if necessary (see [section 11](#)).

Noise Condenser Capacity Test

1. Use a commercially available condenser tester. Connect the condenser tester probes and measure the condenser capacity.

Condenser capacity: 0.47 ± 0.09 microfarads (μF)



NOTE: The noise condenser is intended to reduce ignition noise. However, condenser failure may cause the engine to stop running.

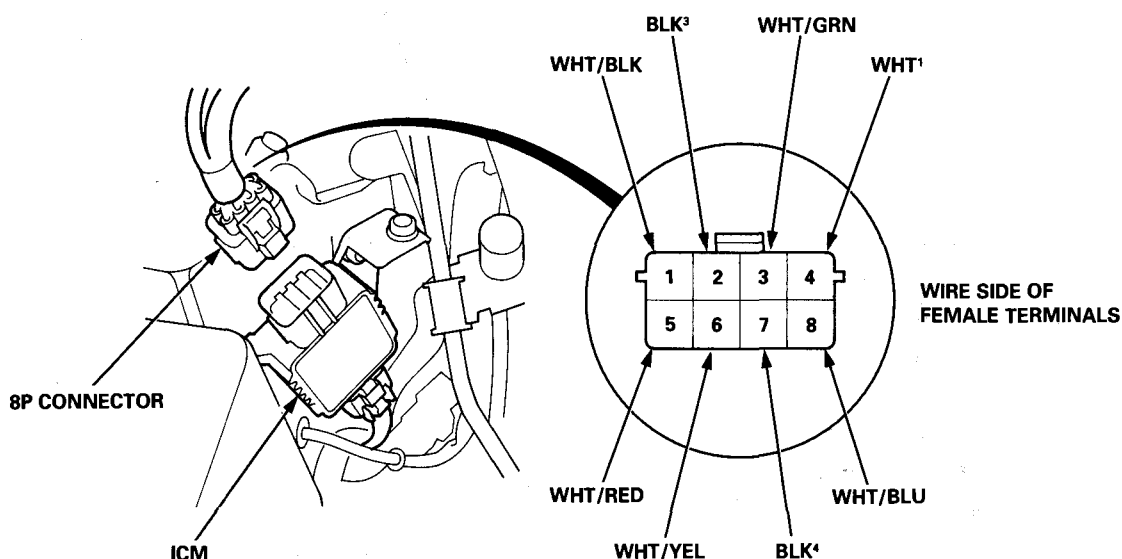
2. If not within the specifications, replace the noise condenser.

Ignition System

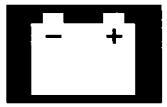
Ignition Control Module (ICM) Input Test

NOTE: See [section 11](#) if the malfunction indicator lamp (MIL) blinks. Disconnect the 8P connector from the ignition control module (ICM). Inspect the connector and socket terminals to be sure they are all making good contact.

- If any terminals are bent, loose or corroded, repair them as necessary, and recheck the system.
- If the terminals look OK, make the following input tests at the connector.
 - If a test indicates a problem, find and correct the cause, then recheck the system.
 - If all the input test prove OK, the ICM must be faulty; replace it.



Trml	Wire	Test condition	Test: Desired result	Possible cause if result is not obtained
2	BLK ³	Under all conditions	Check for continuity to ground: There should be continuity.	• Poor ground (G102) • An open in the wire
7	BLK ⁴			
4	WHT ¹	Ignition switch ON (II)	Check for voltage to ground: There should be battery voltage.	• Blown 30 A fuse in the ignition coil fuse holder • Faulty ignition coil • An open in the wire
3	WHT/GRN			
1	WHT/BLK			
8	WHT/BLU			
6	WHT/YEL			
5	WHT/RED			

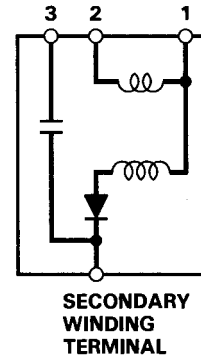
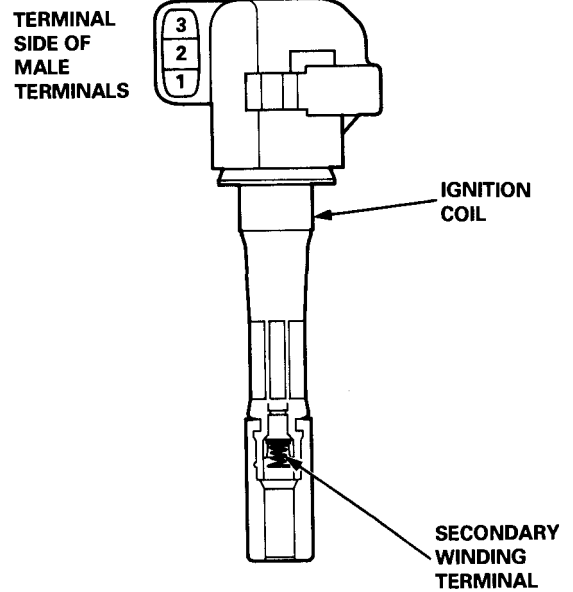


Ignition Coil Test

1. With the ignition switch OFF.
2. Remove the engine cover, then remove the ignition coil.
3. Using an ohmmeter, measure resistance between the terminals. Replace the coil if the resistance is not within specification.
NOTE: Resistance will vary with the coil temperature; specification is at 77°F (25°C).

Primary Winding Resistance (between the No. 1 and No. 2 terminals) 0.9-1.1 ohms

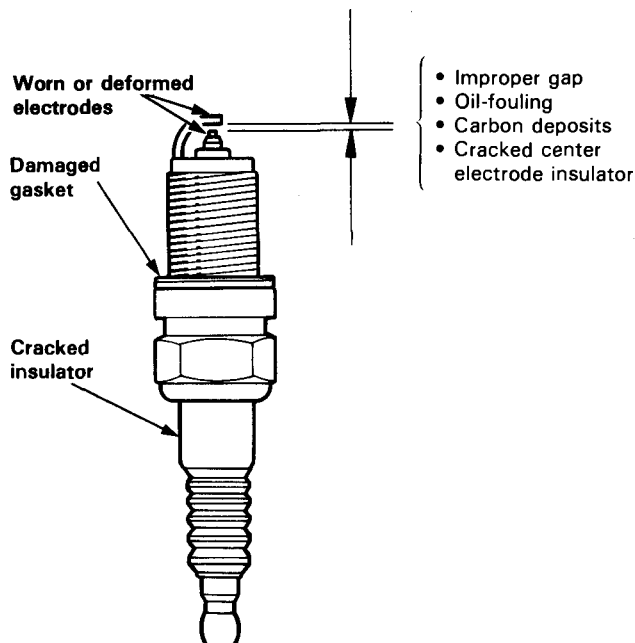
- If the resistance is not within specification, replace the coil.
- If the resistance is OK, but other troubleshooting doesn't reveal the cause of the problem, substitute a known-good ignition coil and check engine operation again.
If the engine then runs OK, replace the original coil.



Ignition System

Spark Plug Inspection

1. Inspect the electrodes and ceramic insulator for:



Burned or worn electrodes may be caused by:

- Advanced ignition timing
- Loose spark plug
- Plug heat range too low
- Insufficient cooling

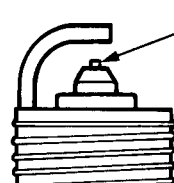
Fouled plug may be caused by:

- Retarded ignition timing
- Oil in combustion chamber
- Incorrect spark plug gap
- Plug heat range too high
- Excessive idling/low speed running
- Clogged air cleaner element
- Deteriorated ignition coil or ignition wires

2. Do not adjust the gap of platinum tip plugs; replace the spark plug if the gap is out of specification or if the center electrode is rounded.

Electrode Gap:

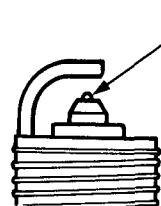
Standard	1.1 $\begin{smallmatrix} +0 \\ -0.1 \end{smallmatrix}$ mm (0.043 $\begin{smallmatrix} +0 \\ -0.004 \end{smallmatrix}$ in)
Service Limit	1.3 mm (0.051 in)



Platinum tip plug:

Do not adjust the gap; replace the spark plug if the gap is out of specification or if the center electrode is rounded.

3. Replace the plug at the specified interval, or if the center electrode is rounded as shown below:



ROUNDED ELECTRODE

NOTE: Use only the spark plugs listed below.

Spark Plugs

PFR5L-11 (NGK)
PK16PR-L11 (DENSO)

4. Apply a small quantity of anti-seize compound to the plug threads, and screw the plugs into the cylinder head finger-tight. Then torque them to 18 N-m (1.8 kgf-m, 13 lbf-ft).