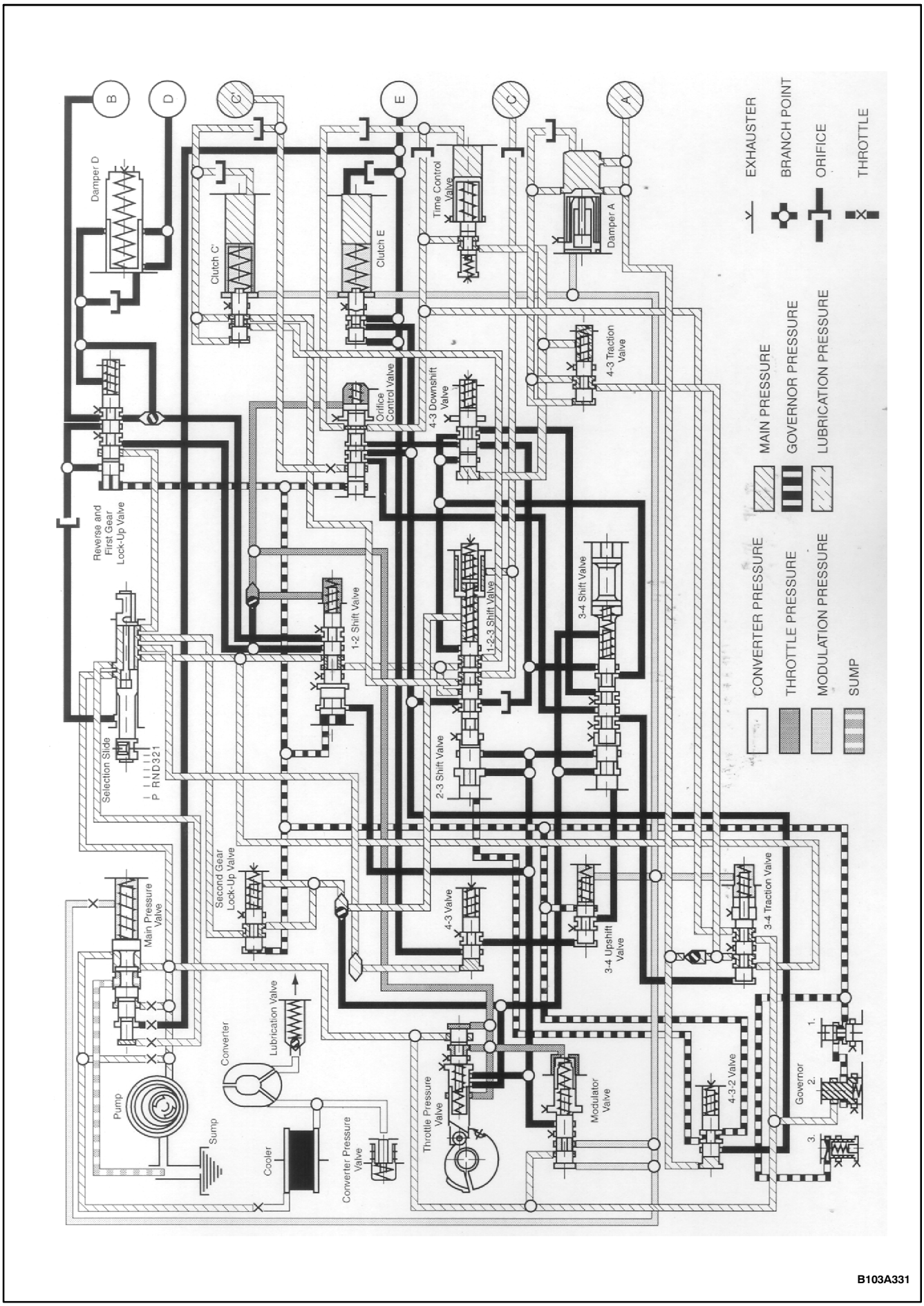
POSITION 1 – SECOND GEAR, IDLING



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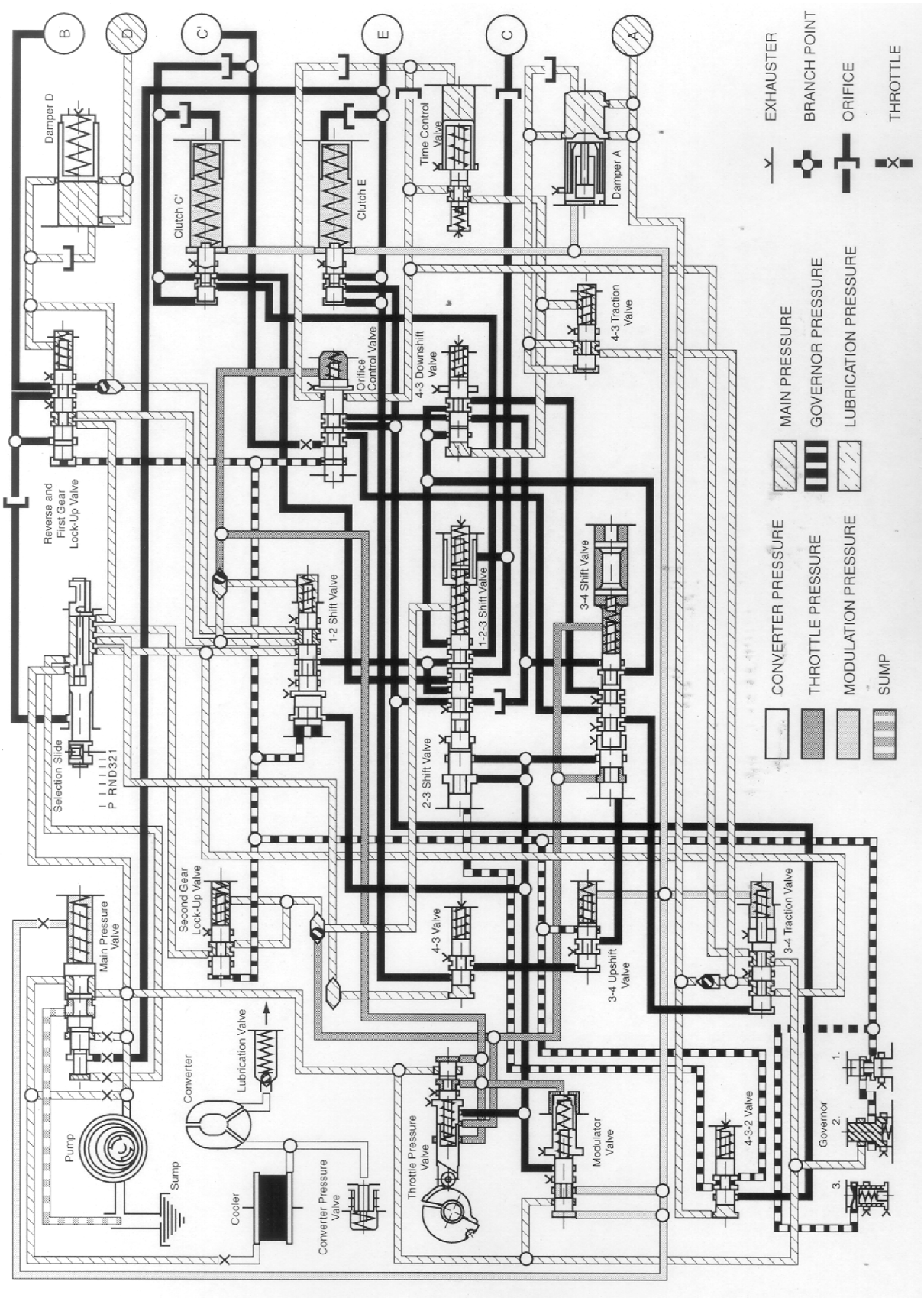
POSITION 1 – FIRST GEAR, FULLY ACCELERATED



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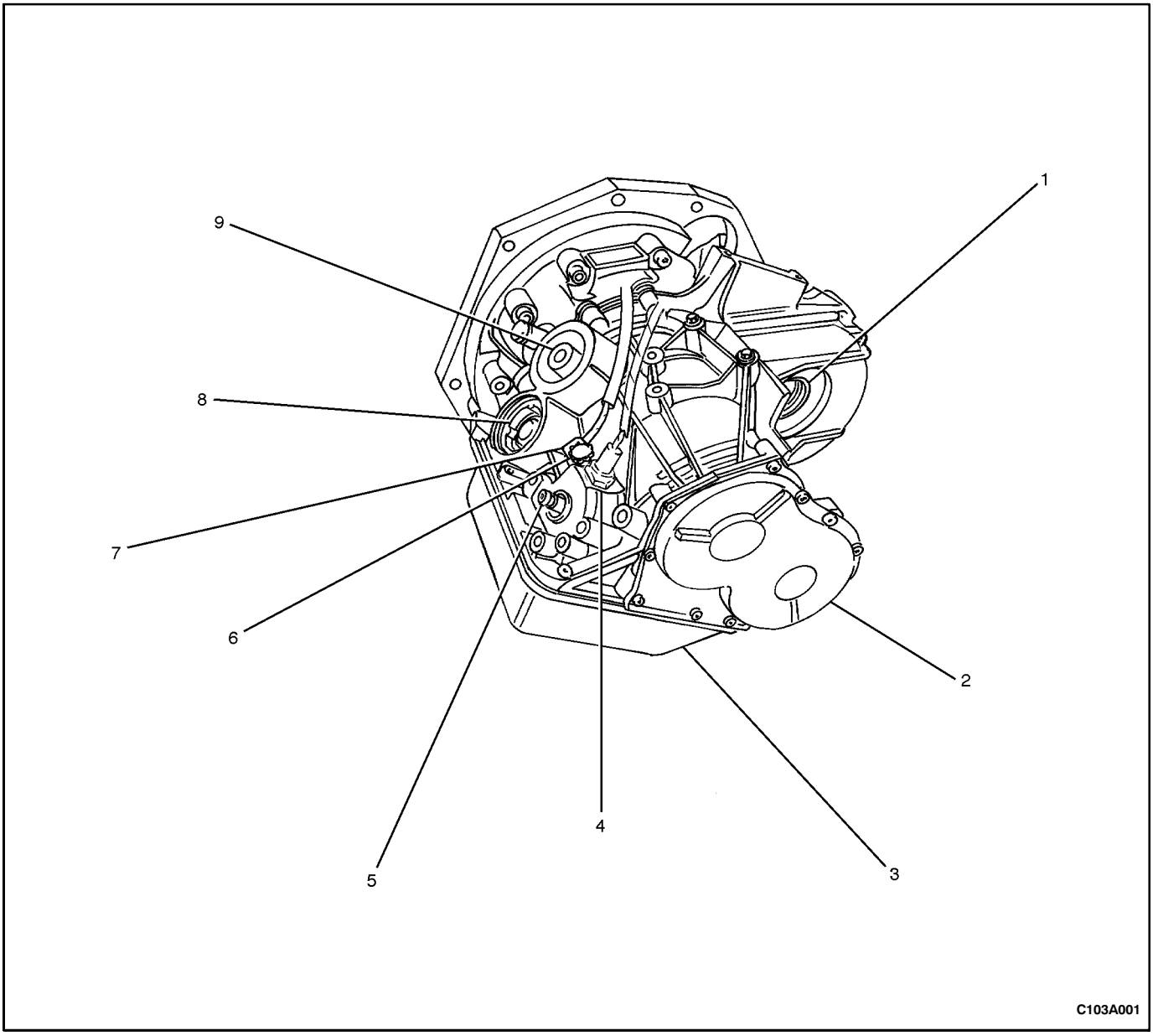
COMPONENT LOCATOR

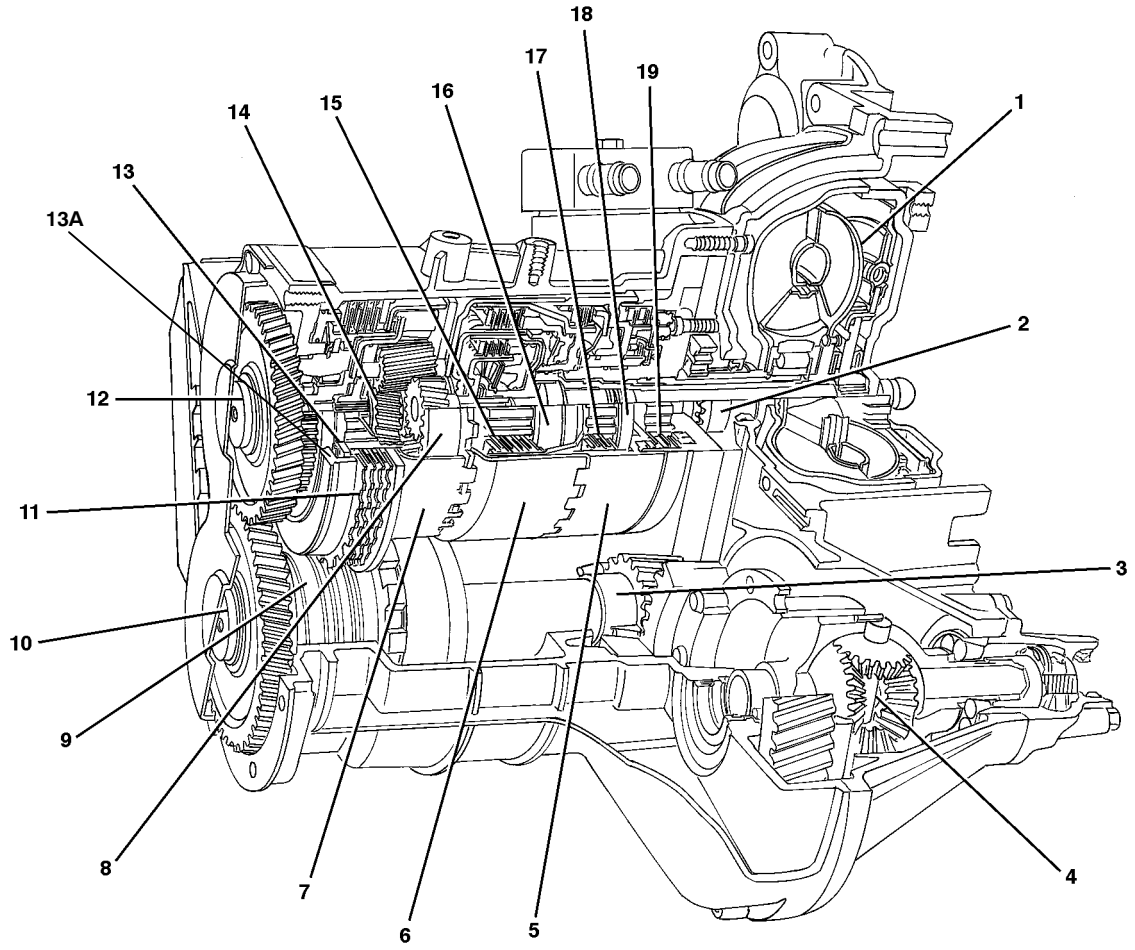
ZF 4 HP 14 AUTOMATIC TRANSAXLE

Exterior Component Locator



1 Differential Output
2 Side Cover
3 Fluid Pan
4 Neutral Start Switch
5 Selector Lever Connection
6 Breather Plug
7 Throttle Valve Cable
8 Brake C′
9 Cooler Pipe Outlet

Interior Component Locator



1 Torque Converter
2 Intermediate Pump/Brake C
3 Output Shaft
4 Differential
5 Clutch B
6 Drive Shell
7 Web Gear
8 Planetary Assembly
9 Governor
10 Large Spur Gear
11 Brake D Assembly
12 Small Spur Gear
13 Blue Diaphragm Spring
13A Piston D (Red Piston)
14 Sun Gear
15 Clutch A Assembly
16 Piston A
17 Clutch B Assembly
18 Piston B
19 Brake C Assembly

DIAGNOSIS

SYMPTOM DIAGNOSIS

PRELIMINARY CHECKS

Checks	Action
Check for the engine running at an incorrect idle speed.	Adjust the idle speed.
Check for a noisy transaxle when driving on curvy roads.	Add transaxle fluid.
Check for the engine spinning without providing power flow to the transaxle.	Add transaxle fluid.
Check for foam at the fluid breather.	Remove some transaxle fluid.
Check for large pieces of metal in the fluid pan.	Replace the transaxle.
Check for an incorrect power flow in forward and reverse.	Adjust the selector linkage.

POSITION P – PARK POSITION DOES NOT ENGAGE OR SLIPS

Checks	Action
Check for an incorrectly adjusted selector linkage or cable.	Adjust the selector linkage or the cable. Replace the selector linkage or the cable as needed.
Check for an incorrect clearance at the stop plate.	Measure and adjust the stop plate to the correct clearance.
Check for incorrectly installed park system components.	Correctly install the park system components.
Check for excessive friction in the parking interlock mechanism.	Clean the parking interlock mechanism parts. Replace the parking interlock mechanism parts as needed.
Check for excessive clearance on the spring plate.	Adjust the spring plate. Replace the spring plate as needed.

POSITION P – ENGINE DOES NOT START

Checks	Action
Check for a faulty starter interlock switch.	Replace the starter interlock switch.
Check for a defective neutral safety switch.	Replace the neutral safety switch.
Check for excessive clearance at the selector shaft.	Adjust the clearance at the selector shaft.

POSITION P – NO SHIFT TO REVERSE

Checks	Action
Check for a faulty brake transaxle shift interlock solenoid.	Replace the brake transaxle shift interlock solenoid.

POSITION P – SHIFT OCCURS WITHOUT ENGAGING BRAKE PEDAL

Checks	Action
Check for a faulty brake transaxle shift interlock solenoid.	Replace the brake transaxle shift interlock solenoid.
Check for short in the circuit between the brake switch and the brake transaxle shift interlock solenoid.	Repair the short in the circuit between the brake switch and the brake transaxle shift interlock solenoid.

POSITION R – NO REVERSE

Checks	Action
Check for an incorrectly adjusted shift control cable.	Adjust the shift control cable. Replace the shift control cable as needed.
Check for a clogged fluid filter.	Replace the fluid filter.
Check for a damaged clutch B.	Replace the clutch B. Replace the transaxle as needed.
Check for a damaged brake D. In this case there is no braking action in position 1, first gear.	Replace the brake D. Replace the transaxle as needed.
Check for a jammed governor.	Replace the governor coupling.
Check for a locking valve 1 and a jammed Reverse.	Replace the locking valve 1 in the lower valve housing of the valve body. Replace the valve body as needed.

POSITION R – SLIPPING OR VIBRATION WHEN MOVING OFF

Checks	Action
Check for a damaged clutch B or a damaged brake D.	Replace the clutch B and/or the brake D. Replace the transaxle as needed.
Check for a leak in the fluid feed of the clutch B.	Replace the rectangular rings on the intermediate plate. Replace the intermediate plate and the pump assembly as needed. Replace the transaxle as needed.

POSITION R – HARD ENGAGING JERK OR DOUBLE JERK

Checks	Action
Check for a faulty damper D.	Replace the damper D restrictor in the fluid channel housing of the valve body. Replace the valve body as needed.

POSITION R – REVERSING LAMP DOES NOT COME ON

Checks	Action
Check for a faulty fuse.	Replace the fuse.
Check for a faulty electrical circuit.	Replace the electrical circuit.
Check for a faulty starter interlock switch.	Replace the starter interlock switch.

POSITION N – ENGINE DOES NOT START

Checks	Action
Check for a faulty starter interlock switch.	Replace the starter interlock switch.

POSITION N – VEHICLE MOVES OR CREEPS FORWARD

Checks	Action
Check for an incorrectly adjusted selector linkage or cable between the selector lever and the transaxle case.	Adjust the selector linkage or the cable between the selector lever and the transaxle case. Replace the selector linkage or the cable as needed.

POSITION D – NO POWER

Checks	Action
Check for an open converter relief valve.	Replace the torque converter.
Check for a clogged fluid filter.	Replace the fluid filter.
Check for a faulty clutch A.	Replace the clutch A. Replace the transaxle as needed.
Check for a slipping first gear freewheel.	Replace the first gear freewheel. Replace the transaxle as needed.
Check for an incorrectly adjusted selector linkage or cable between the selector lever and the transaxle case.	Adjust the selector linkage or cable between the selector lever and the transaxle case.
Check for a jammed 3-4 cable valve.	Replace the 3-4 shuttle valve and the spring in the valve housing of the valve body. Replace the valve body as needed.

POSITION D – NO SHIFT FROM EITHER FIRST TO SECOND OR SECOND TO FIRST

Checks	Action
Check for a dirty governor.	Clean the governor coupling. Replace the governor as needed.
Check for a jammed selector valve 1-2.	Replace the 1-2 change valve in the lower valve housing of the valve body. Replace the valve body as needed.

POSITION D – NO SHIFT FROM FIRST TO SECOND ONLY

Checks	Action
Check for a faulty brake C or C′.	Replace the brake C and/or C′. Replace the transaxle as needed.

POSITION D – NO SHIFT FROM EITHER SECOND TO THIRD OR THIRD TO SECOND

Checks	Action
Check for a dirty governor.	Clean the governor coupling. Replace the governor as needed.
Check for a jammed selector valve 2-3.	Replace the 2-3 shuttle valve and the spring in the valve housing of the valve body. Replace the valve body as needed.

POSITION D – NO SHIFT FROM SECOND TO THIRD ONLY

Checks	Action
Check for a faulty clutch E.	Replace the clutch E. Replace the transaxle as needed.
Check for a leak at the fluid feed of the clutch E.	Replace the clutch E. Replace the transaxle as needed.
Check for faulty rectangular rings on the engine shaft or the turbine shaft.	Replace the rectangular rings on the engine or the turbine shaft. Replace the intermediate plate and the pump assembly. Replace the transaxle as needed.
Check for leaks at the protection cap in the intermediate plate.	Replace the intermediate plate and the pump assembly.

POSITION D – NO SHIFT FROM EITHER THIRD TO FOURTH OR FOURTH TO THIRD

Checks	Action
Check for a dirty governor.	Clean the governor coupling. Replace the governor as needed.
Check for a jammed selector valve 3-4.	Replace the 3-4 shuttle valve and the spring in the valve housing of the valve body. Replace the valve body as needed.

POSITION D – NO SHIFT FROM THIRD TO FOURTH ONLY

Checks	Action
Check for a faulty brake C′ when the 1-2 gearshift is OK.	Replace brake C′. Replace the transaxle as needed.
Check for a brake band C′ that has not been pretensioned.	Adjust brake band C′.
Check for a jammed upshift valve 2-3-4.	Replace the 2-3-4 shuttle valve and spring in the lower valve housing of the valve body. Replace the valve body as needed.
Check for a jammed position 3 valve.	Replace the position 3 shuttle valve and spring in the lower valve housing of the valve body. Replace the valve body as needed.

POSITION D – VEHICLE MOVES OFF IN SECOND

Checks	Action
Check for a jammed governor bushing.	Replace the governor coupling.
Check for a jammed selector valve 1-2.	Replace the 1-2 change valve in the lower valve housing of the valve body. Replace the valve body as needed.
Check for an overly tightened brake band.	Adjust the brake band.
Check for a brake band that does not release.	Replace the brake band.

POSITION D – VEHICLE MOVES OFF IN THIRD

Checks	Action
Check for a faulty middle rectangular ring on the governor flange.	Replace the rectangular ring on the governor flange. Replace the governor coupling.
Check for a jammed governor bushing.	Replace the governor coupling.
Check for a jammed selector valve 1-2 and 2-3.	Replace the 1-2 change valve in the lower valve housing and the 2-3 shuttle valve and the spring in the valve housing of the valve body. Replace the valve body.
Check for a leak at the protective cap in the intermediate flange with the clutch B constantly filled.	Replace the seal at the protective cap in the intermediate flange.

POSITION D – VEHICLE SHIFTS FROM FIRST TO THIRD

Checks	Action
Check for a jammed selector valve 2-3.	Replace the 2-3 shuttle valve and the spring in the valve housing of the valve body. Replace the valve body as needed.
Check for a jammed valve 2-3-4.	Replace the 2-3-4 change-up shuttle valve and the spring in the lower valve housing of the valve body. Replace the valve body as needed.
Check for a jammed valve 1-2-3 at the face end of the 1-2 valve.	Replace the 1-2-3 control shuttle valve and the spring in the valve housing of the valve body. Replace the valve body as needed.

POSITION D – VEHICLE SHIFTS FROM FIRST TO FOURTH

Checks	Action
Check for engine cutout.	Replace the valve body.

POSITION D – ZERO LOAD SHIFT NOT OK

Checks	Action
Check for a dirty governor.	Clean the governor. Replace the governor coupling as needed.
Check for a leak in the area of the governor.	Replace the transaxle.
Check for selector valves that do not move freely.	Replace the valve body.

POSITION D – FULL LOAD SHIFT POINTS NOT OK

Checks	Action
Check for an incorrectly adjusted accelerator cable.	Adjust the accelerator cable.

POSITION D – NO KICKDOWN SHIFT FROM SECOND TO FIRST

Checks	Action
Check for an incorrectly adjusted accelerator cable.	Adjust the accelerator cable.

POSITION D – NO KICKDOWN SHIFT FROM THIRD TO SECOND

Checks	Action
Check for an incorrectly adjusted accelerator cable.	Adjust the accelerator cable.

POSITION D – NO KICKDOWN SHIFT FROM FOURTH TO THIRD

Checks	Action
Check for an incorrectly adjusted accelerator cable.	Adjust the accelerator cable.
Check for an imbalance in the governor.	Replace the governor.

POSITION D – ZERO LOAD SHIFTS TOO HARD

Checks	Action
Check for the damper not operating properly.	Replace the valve body.
Check for a modulation pressure that is too high.	Replace the valve body.
Check for damaged discs.	Replace the transaxle.

POSITION D – FULL LOAD AND KICKDOWN SHIFT TAKES TOO LONG

Checks	Action
Check for a damper not operating properly.	Replace the valve body.
Check for a modulation pressure that is too high.	Replace the valve body.
Check for damaged discs.	Replace the transaxle.

POSITION D – FULL LOAD AND KICKDOWN SHIFT IS TOO HARD

Checks	Action
Check for an improper modulation pressure.	Replace the valve body.
Check for a damper not operating properly.	Replace the valve body.

POSITION D – ENGINE SPEED TOO HIGH WHEN SHIFTING FROM THIRD TO FOURTH

Checks	Action
Check for an incorrectly adjusted accelerator cable.	Adjust the accelerator cable.
Check for a jammed diaphragm control valve in the overrun position.	Replace the valve body.
Check for the cable of valve 3-4 not operating freely.	Replace the 3-4 shuttle valve and the spring. Replace the valve body as needed.
Check for an incorrectly adjusted brake band.	Adjust the brake band.
Check for an inaccurate modulation pressure.	Replace the valve body.

POSITION D – ENGINE SPEED TOO HIGH WHEN SHIFTING FROM FOURTH TO THIRD

Checks	Action
Check for an inaccurate operation of the time control valve and the shiftdown valve.	Replace the valve body.
Check for a damaged clutch A.	Replace clutch the A. Replace the transaxle as needed.
Check for inaccurate operation of the clutch A and the cable of valve 4-3.	Replace the 4-3 shuttle valve and the spring in the valve housing of the valve body. Replace the valve body as needed.
Check for an inaccurate air pressure supply in the turbo version only.	Repair the air supply lines as needed.

POSITION 2 – MANUAL DOWNSHIFT NOT OK

Checks	Action
Check for an inoperative locking valve 2.	Replace the valve body.
Check for an inoperative governor.	Replace the governor coupling.

POSITION 2 – NO ENGINE BRAKING ACTION

Checks	Action
Check for a damaged brake C′.	Replace the brake C′. Replace the transaxle as needed.

POSITION 1 – MANUAL DOWNSHIFT FROM SECOND TO FIRST NOT OK

Checks	Action
Check for an inoperative locking valve of the first and the reverse gears.	Replace the first and the reverse shuttle valve and the spring in the valve housing. Replace the valve body as needed.
Check for an inoperative governor.	Replace the governor coupling.

POSITION 1 – NO ENGINE BRAKING ACTION

Checks	Action
Check for a damaged brake D.	Replace the brake D. Replace the transaxle as needed.

ACCELERATOR CABLE JAMS

Checks	Action
Check for a slipped accelerator cable stop.	Insert a cable stop or replace the accelerator cable.
Check for excessive friction in the sleeve of the accelerator cable.	Replace the accelerator cable.
Check for a jammed governor pressure plunger.	Replace the valve body.

SLIPPING OR VIBRATION WHEN MOVING OFF

Checks	Action
Check for a damaged clutch A.	Replace the clutch A. Replace the transaxle as needed.
Check for a damaged rectangular ring or a damaged O-ring on the turbine shaft seal of the fluid feed of the clutch A.	Replace the rectangular ring or the O-ring on the turbine shaft. Replace the transaxle as needed.
Check for damaged O-rings on the piston A.	Replace the O-rings on the piston A. Replace the piston A as needed. Replace the transaxle as needed.

HARD ENGAGING JERK FROM NEUTRAL TO DRIVE

Checks	Action
Check for a damaged damper A.	Replace the valve body.
Check for a broken spring in damper A.	Replace the valve body.
Check for a damaged clutch A.	Replace the clutch A. Replace the transaxle as needed.
Check for a leak at the ball of cable 3-4.	Replace the valve body.

NOISY OPERATION AND SLUGGISH ENGAGEMENT AFTER LONG TRIP

Checks	Action
Check for a clogged fluid filter.	Replace the fluid filter.

NO POSITIVE ENGAGEMENT FORWARD OR REVERSE, LOUD NOISES

Checks	Action
Check for a damaged driver plate between the converter and the engine.	Replace the driver plate. Replace the transaxle as needed.
Check for a damaged pump driver.	Replace the pump driver. Replace the transaxle as needed.

NOISES IN ALL POSITIONS

Checks	Action
Check for a reduced fluid level.	Correct the fluid level.
Check for a leak at the valve body.	Replace the valve body.

INTAKE NOISES FROM FLUID PUMP

Checks	Action
Check for a clogged fluid filter.	Replace the fluid filter.

NOISES VARY ACCORDING TO SPEED

Checks	Action
Check for an altered or an incorrectly adjusted bearing setting of the spur gear drive.	Adjust the bearing setting on the spur gear drive. Replace the transaxle as needed.
Check for an altered or an incorrectly adjusted bearing setting of the differential.	Adjust the bearing setting on the differential. Replace the transaxle as needed.

LEAK DIAGNOSIS

LINE PRESSURE CHECK PROCEDURE

Hydraulic Test

Measure Line Pressure

1. Remove the transaxle case test plug and mount the oil pressure gauge.
2. Check the four wheels.
3. Fully apply the parking brake.
4. Step down strongly on the brake pedal with your left foot.
5. Step the engine and check the idle speed (idling speed " 850 rpm).
6. Shift into "D" range. Manipulate the accelerator pedal with the right foot, measure the line pressure at the engine speeds specified in the table.
7. Perform the same test in "R" range.

Application			Specification
Line Pressure	Idle	P, N, D, 3, 2, 1	7 ~ 10 kg/cm^2 (995 ~ 1,421 psi)
		R	10 ~ 12 kg/cm^2 (1,421 ~ 1,706 psi)
	Stall	D	10 ~ 13 kg/cm^2 (1,421 ~ 1,848 psi)
		R	10 ~ 12 kg/cm^2 (2,274 ~ 2,843 psi)

Stall Test

Caution : Do not continuously run this test longer than 5 seconds. To Check the overall performance of the transaxle the maximum engine speeds and engine by measuring in "D" and "R" range.

Measure Stall Speed

1. Check the four wheels.
2. Fully apply the parking brake.
3. Step down strongly on the break pedal with your left foot.
4. Start the engine.
5. Shift into "D" range. Step all the way down on the accelerator pedal with your right foot.

   Quickly read the highest engine rpm at this time.

   Stall speed : 2100 ± 150 rpm
6. Perform the same test in "R" range.

   Stall speed : 2100 ± 150 rpm

Application	Specification
D	2100 ± 150 rpm
R	2100 ± 150 rpm

Diagnosis

Result	Possible Cause
Lower than specified value at both "D" and "R" ranges.	● Engine power may be insufficient. ● Stator one way clutch is not operating properly.
Higher than specified at "D" range.	● Line pressure is too low. ● Clutch A (Forward clutch) is slipping. ● One way clutch No. 1 is not operating properly.
Higher than specified at "R" range	● Line pressure is too low. ● Clutch B (Rearse clutch) is slipping. ● Brake D (LO/Reverse brake) is slipping.
Higher than specified at both "D" and "R".	● Line pressure is too low.

LOCATING FLUID LEAKS

General Method

1. Verify that the material leaking is the transaxle fluid.
2. Thoroughly clean the suspected leak area.
3. Allow the transaxle to reach the normal operating temperature of 88°C (190°F).
4. Park the vehicle over a clean paper or a clean cardboard.
5. Shut the engine OFF and look for fluid spots on the paper.
6. Make the necessary repairs to correct the leak.

Powder Method

1. Thoroughly clean the suspected leak area.
2. Apply an aerosol type powder, such as foot powder, to the suspected leak area.
3. Allow the transaxle to reach the normal operating temperature of 88°C (190°F).
4. Shut the engine OFF.
5. Inspect the suspected leak area and trace the leak path through the powder to find the source of the leak.
6. Make the necessary repairs to correct the leak.

Once the leak point is found, the source of the leak must be determined and repaired. Refer to “Leak Diagnosis” in this section.

FLUID DRIPS OUT OF CONVERTER BELL HOUSING

Checks	Action
Check the gasket in the converter bell housing.	Replace the gasket.
Check for a leak at the weld seam of the torque converter.	Replace the torque converter.

LEAK BETWEEN TRANSAXLE HOUSING AND CONVERTER BELL HOUSING

Checks	Action
Check for loosened fastening bolts on the torque converter bell housing.	Tighten the bolts on the torque converter bell housing.

LEAK BETWEEN TRANSAXLE HOUSING AND FLUID PAN

Checks	Action
Check for loosened fastening bolts on the fluid pan.	Tighten the fluid pan bolts. Replace the fluid pan as needed.
Check for a loose fluid pan gasket.	Replace the fluid pan gasket.

LEAK BETWEEN TRANSAXLE HOUSING AND SIDE COVER

Checks	Action
Check for loosened bolts connecting the side cover to the housing.	Tighten the side cover bolts.
Check for a damaged side cover gasket.	Replace the side cover gasket.

LEAK AT FLUID COOLER

Checks	Action
Check for a loose cooler pipe bolt connection on the transaxle and/or the radiator.	Tighten the bolts on the transaxle and/or the radiator.
Check for a damaged gasket at the transaxle connection.	Replace the gasket.
Check for a leak in the cooler.	Replace the radiator.

LEAK AT COVER OF BRAKE C′

Checks	Action
Check for a damaged outer O-ring at the cover of the brake C′.	Replace the O-ring.

LEAK AT THE BRAKE BAND C′ ADJUSTING BOLT

Checks	Action
Check for a damaged O-ring at the pin of the brake band C′.	Replace the O-ring.

LEAK AT RETAINING BOLTS FOR SIDE SHAFT BEARING RING

Checks	Action
Check for any loosened bolts.	Tighten the bolts.
Check for a damaged seal.	Replace the seal.

LEAK AT ACCELERATOR CABLE CONNECTOR

Checks	Action
Check for a damaged O-ring on the connector.	Replace the O-ring. Replace the throttle valve cable as needed.

LEAK AT DIFFERENTIAL

Checks	Action
Check for any damaged shaft seals at the input shafts.	Replace the shaft seals.

LEAK AT DIFFERENTIAL EXTENSION

Checks	Action
Check for a damaged O-ring.	Replace the O-ring.
Check for loosened extension housing bolts.	Tighten the extension housing bolts.

LEAK AT SPEEDOMETER DRIVE

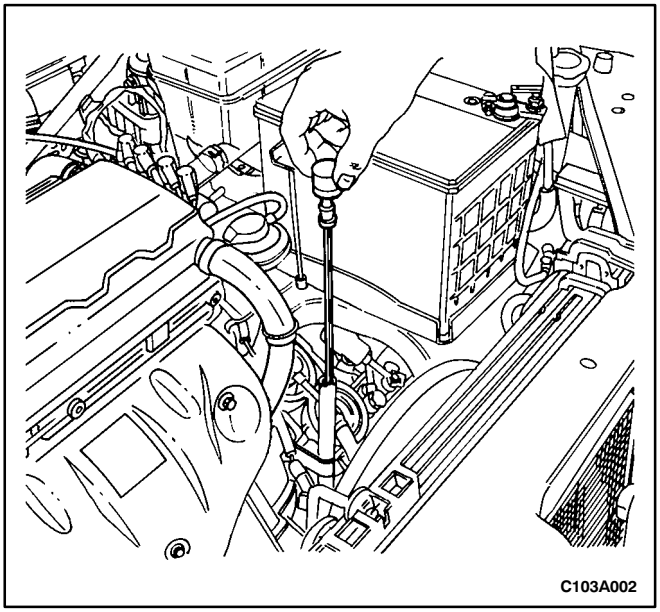
Checks	Action
Check for a damaged O-ring in the speedometer sleeve.	Replace the O-ring.
Check for a damaged shaft seal in the speedometer sleeve.	Replace the speedometer sleeve coupling.

LEAK AT BREATHER

Checks	Action
Check whether the fluid level is too high.	Correct the fluid level.
Check for the wrong grade of transaxle fluid.	Drain the transaxle fluid and replace it with the correct transaxle fluid. Replace the transaxle as needed.

LEAK AT SELECTOR SHAFT

Checks	Action
Check for a damaged selector shaft seal.	Replace the selector shaft seal.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MAINTENANCE AND REPAIR

ON-VEHICLE SERVICE

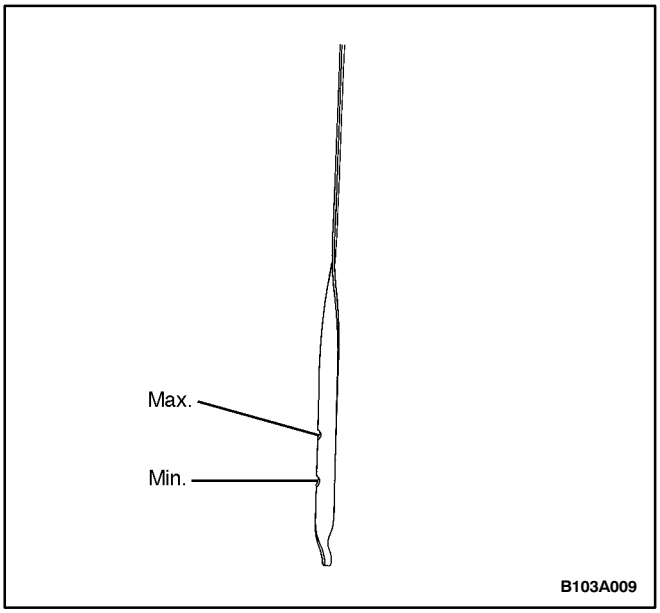
TRANSAXLE FLUID LEVEL CHECKING PROCEDURE

Notice: Check the fluid level when the transaxle temperature is above 80°C (176°F).

1. Make sure the vehicle is level.

Important: During the fluid level check, the selector lever must be in the position P.

2. Place the selector lever in position P.
3. Remove the transaxle fluid dipstick and check the transaxle fluid level.



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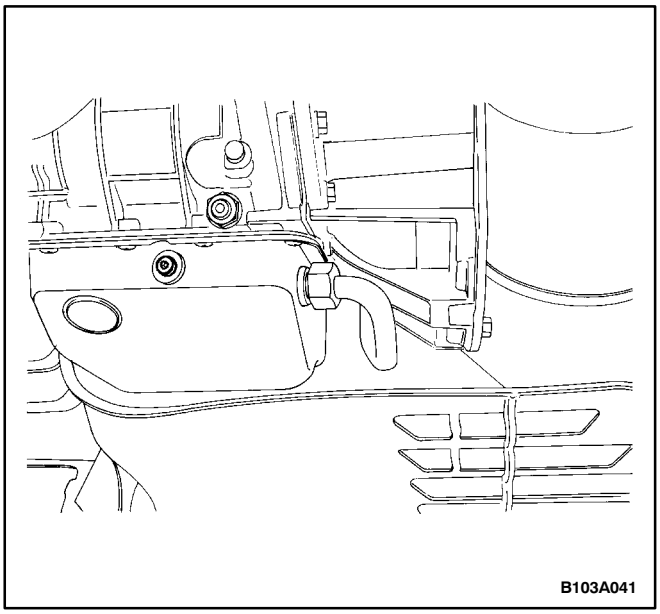
4. The correct fluid level must be between the MIN and the MAX notches on the dipstick.

Notice: When adding fluid or making a complete fluid change, always use recommended automatic transaxle fluid. Failure to use the proper fluid will cause hose and seal damage and fluid leaks.

5. If the fluid level is below the MIN notch, add transaxle fluid through the fluid filler tube and check for leaks in the transaxle.
6. If the fluid is above the MAX notch, the transaxle is overfilled. Drain some fluid through the fluid pan drain plug. Check the transaxle fluid level.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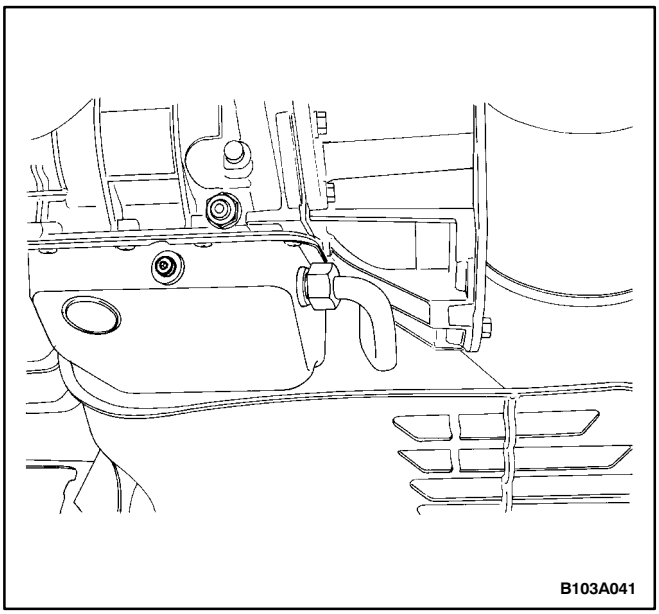
CHANGING FLUID

Removal Procedure

1. Raise and suitably support the vehicle.
2. Place a drain pan under the transaxle.
3. Loosen the fluid pan drain plug. Drain the transaxle fluid.
4. Remove the fluid pan bolts. Remove the fluid pan and the fluid pan gasket. Refer to “Pan and Gasket” in this section.
5. Check the fluid pan flange for distortion. Straighten as needed.
6. Clean the fluid pan, the fluid pan gasket surfaces, and the fluid pan filter with a solvent. All traces of the old gasket material must be removed.
7. Air dry the fluid pan, the fluid pan surfaces that interface with the gasket, and the fluid pan filter.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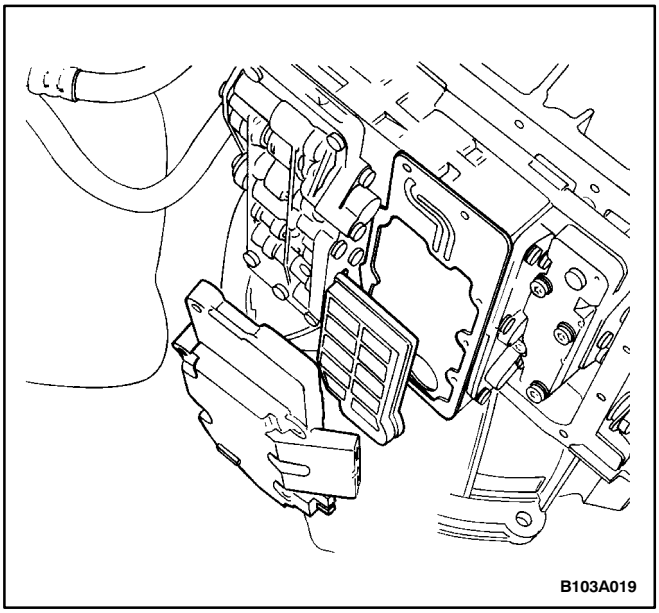
Installation Procedure

1. Install the fluid pan, using a new gasket. Refer to “Pan and Gasket” in this section.
2. Install the fluid pan drain plug.

Tighten

Tighten the fluid pan drain plug to 15 N•m (11 lb-ft).

3. Lower the vehicle.
4. Fill the transaxle with the proper quantity of automatic transaxle fluid. Refer to “Fluid Level Set After Service” in this section.
5. Check the fluid level. Refer to “Transaxle Fluid Level Checking Procedure” in this section.
6. Check the fluid pan for leaks. Refer to “Locating Fluid Leaks” in this section.


B103A019

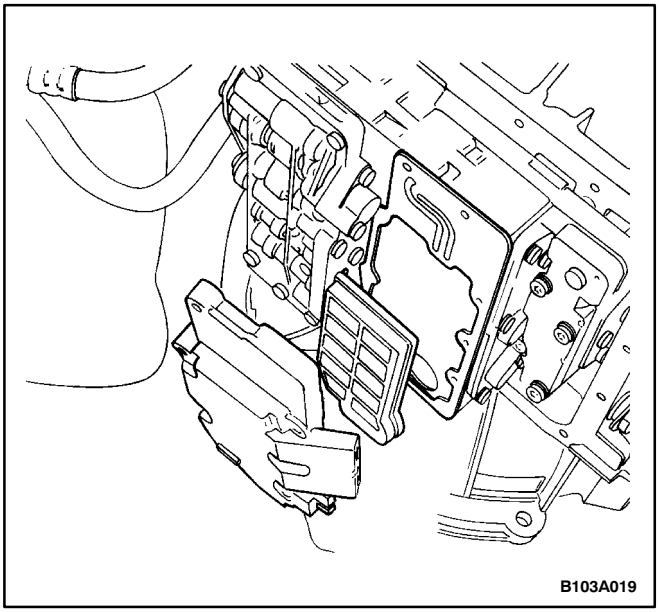
FLUID FILTER AND SEAL

Removal Procedure

1. Raise and suitably support the vehicle.
2. Remove the fluid pan and the gasket. Refer to “Pan and Gasket” in this section.
3. Remove the fluid filter housing cover, the fluid filter, and the fluid filter seal.

Inspection Procedure

Inspect the fluid filter screen and the fluid pan for metal particles, clutch facing material, rubber particles, and engine coolant. If contaminants are found, determine the source and correct it. Refer to “Position R – No Reverse”, “Position D – No Power”, “Noisy Operation and Sluggish Engagement After Long Trip,” and “Intake Noises From Fluid Pump” in this section.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Installation Procedure

1. Install a new fluid filter seal, the fluid filter, and the fluid filter housing cover.
2. Install the fluid filter housing cover attaching bolts.

Tighten

Tighten the fluid filter housing cover attaching bolts to 8 N•m (71 lb-in).

3. Install the fluid pan gasket and the fluid pan. Refer to “Pan and Gasket” in this section.
4. Lower the vehicle.
5. Check the fluid level. Refer to “Transaxle Fluid Level Checking Procedure” in this section.

CASE POROSITY REPAIR

1. Determine the leak area. Refer to “Locating Fluid Leaks” in this section.
2. Clean the leak area with the solvent. Air dry.

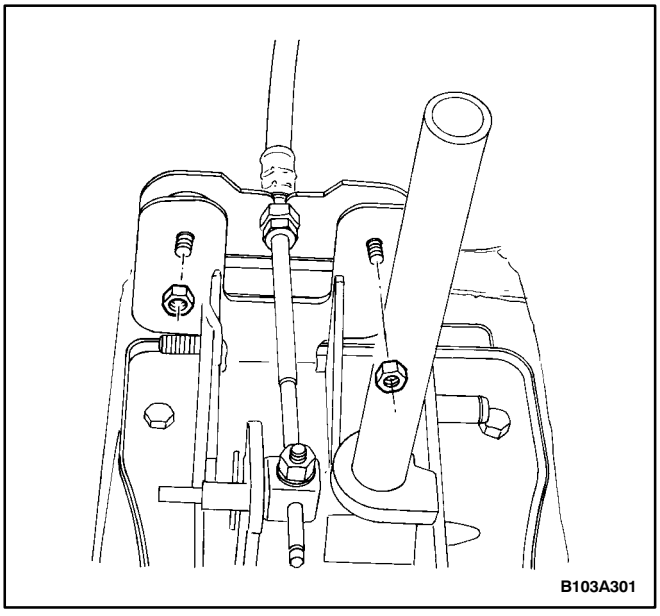
Caution: Epoxy cement may cause skin irritations and eye damage. Read and follow all information on the container label as provided by the manufacturer.

3. Mix a sufficient amount of epoxy cement following the manufacturer’s recommendations.
4. While the transaxle case is hot, apply epoxy cement with a with a clean, dry soldering acid brush.
5. Allow the epoxy cement to cure for 3 hours before starting the engine.

FLUID COOLER FLUSHING

Flushing Procedure

1. Drain the fluid from the transaxle and refill the transaxle with the new transaxle fluid. Refer to “Changing Fluid” in this section.
2. Let the engine idle for 5 minutes.
3. Drain the fluid from the transaxle and refill the transaxle with the new transaxle fluid. Refer to “Changing Fluid” in this section.

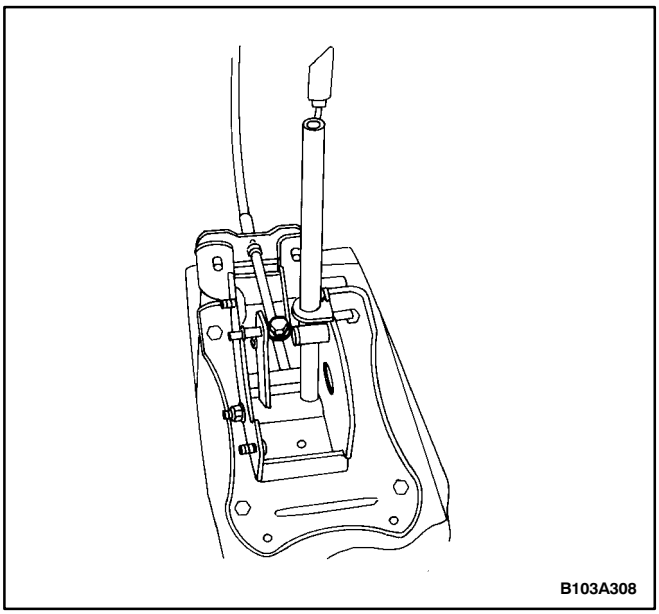


SHIFT CONTROL LEVER

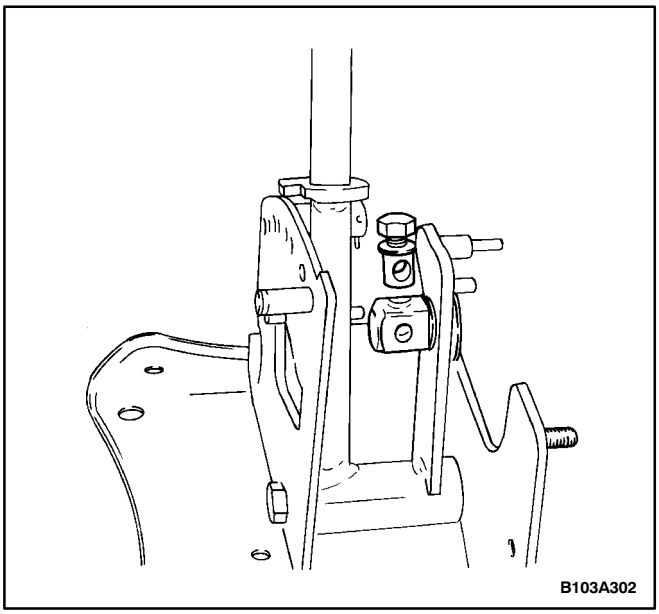
(Left–Hand Drive Shown, Right–Hand Drive Similar)

Removal Procedure

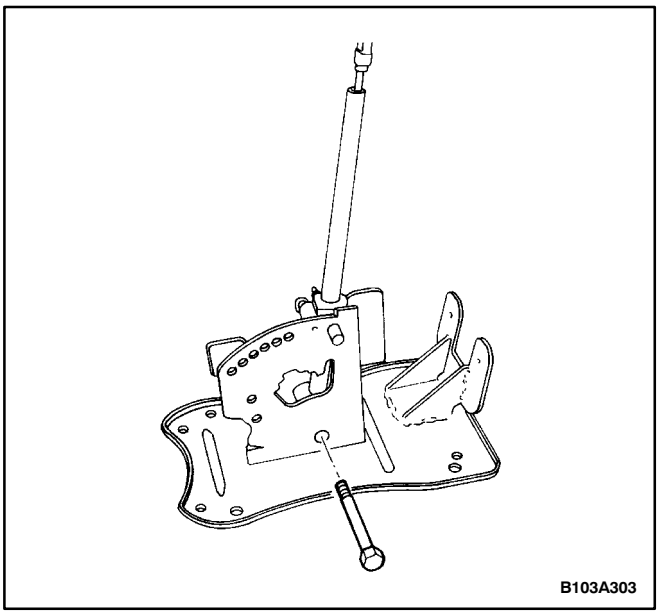
1. Disconnect the negative battery cable.
2. Remove the right and the left front lower trim panels, the shift control panel, and the floor console. Refer to *Section 9G, Interior Trim*.
3. Remove the selector position switch.
4. Remove the nuts from the shift control cable mounting bracket at the front of the shift control assembly.


B103A308

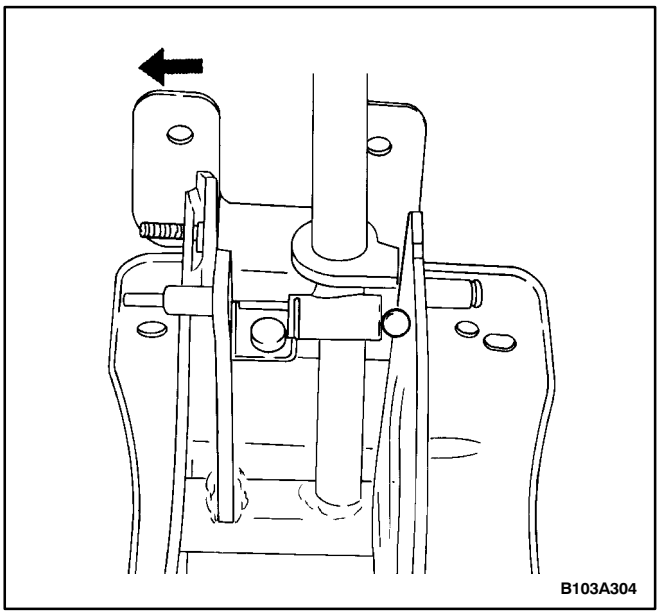
5. Loosen the nut on the shift control cable adjuster pinch bolt.


B103A302

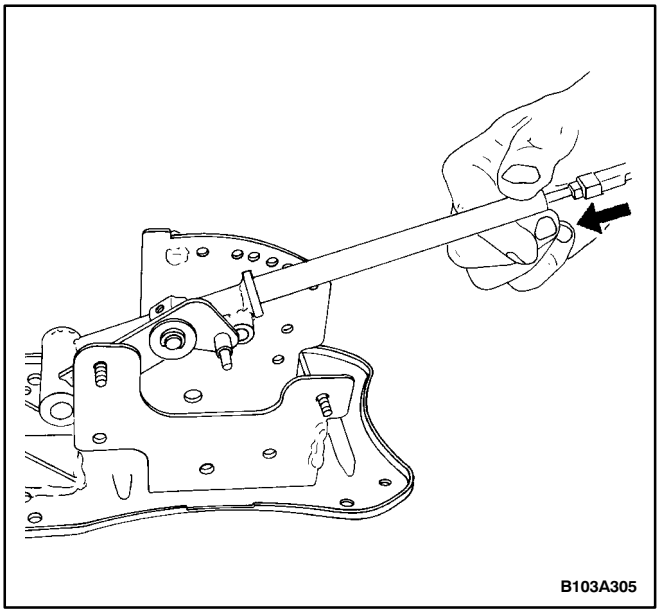
6. Slide the shift control cable out of the shift control cable adjuster and remove the pinch bolt.


B103A303

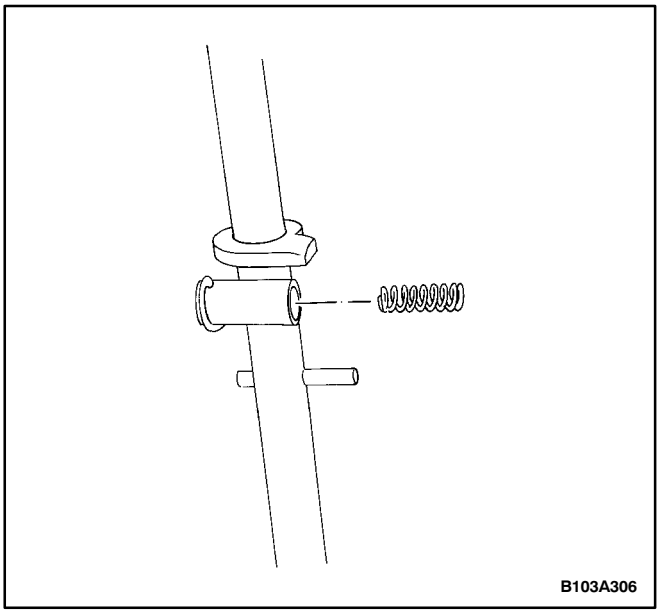
7. Remove the bolt from the bottom of the shift control lever.


B103A304

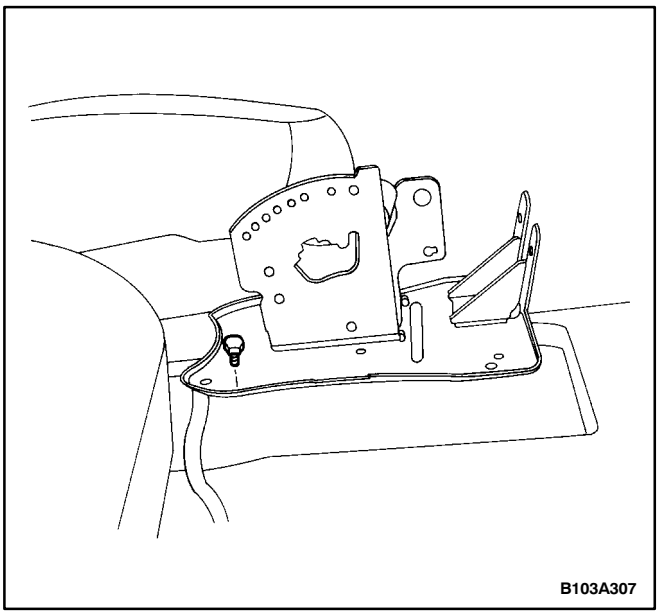
8. Tilt the shift control lever to the left side and remove the spring-loaded detent ball.


B103A305

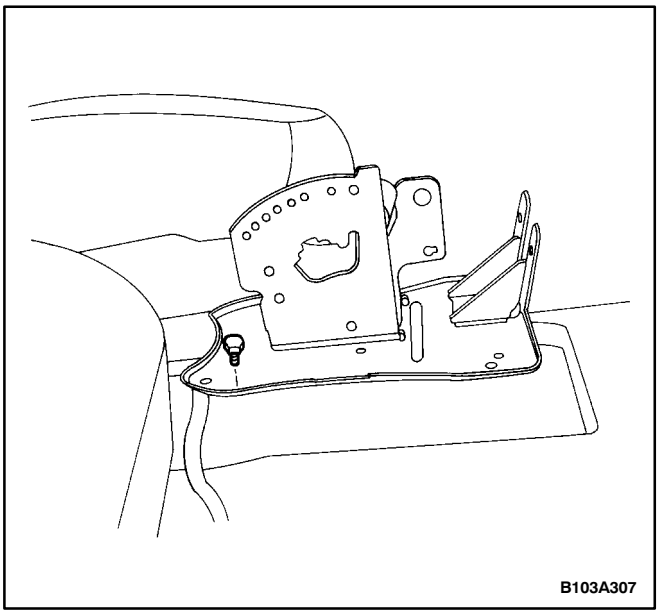
9. Remove the shift control lever by pressing the lock release button while pivoting the bottom of the shift control lever toward the front of the vehicle.


B103A306

10. Slide the detent spring out of the shift control lever.

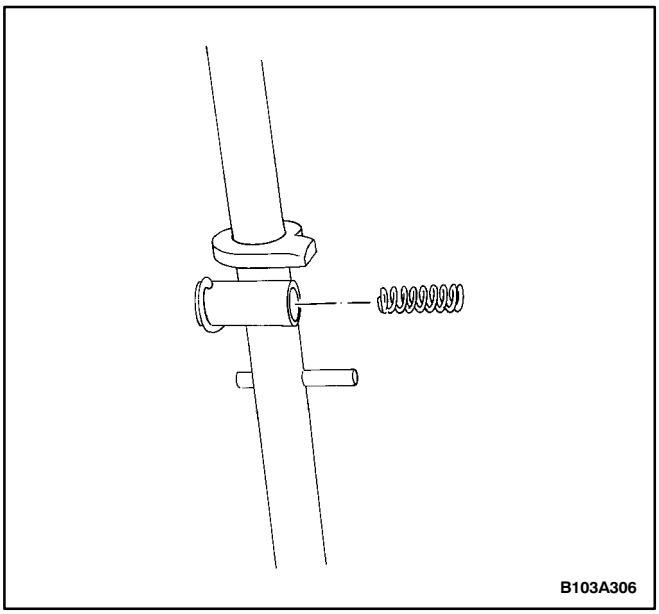

B103A307

11. Remove the bolts holding the shift control assembly to the floor panel.
12. Remove the shift control assembly.

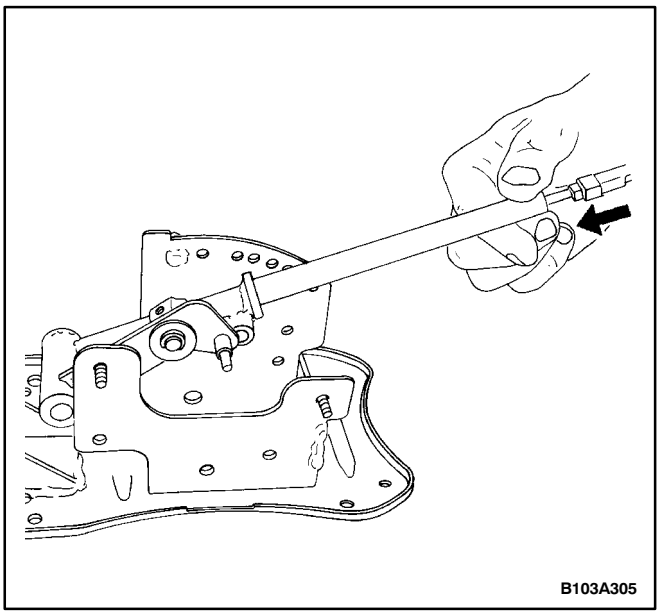

B103A307

Installation Procedure

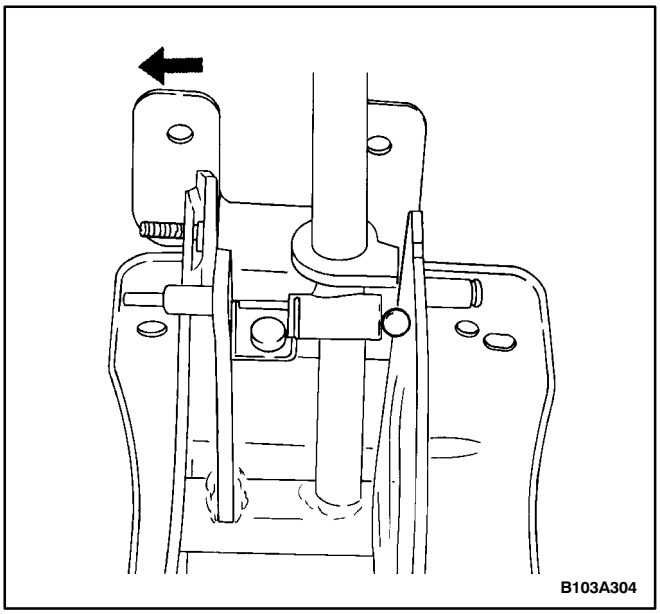
1. Install the shift control assembly in the floor panel with the bolts.


B103A306

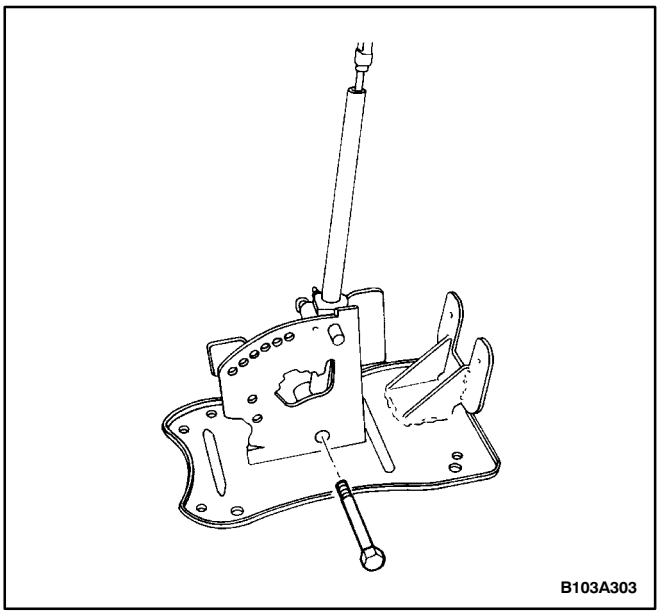
2. Install the detent spring into the shift control lever.


B103A305

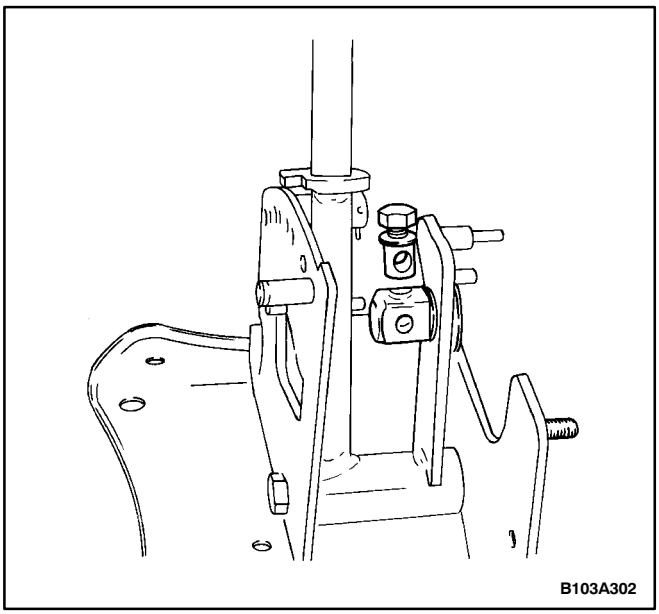
3. Install the shift control lever by pressing the lock release button while pivoting the bottom of the shift control lever toward the rear of the vehicle.


B103A304

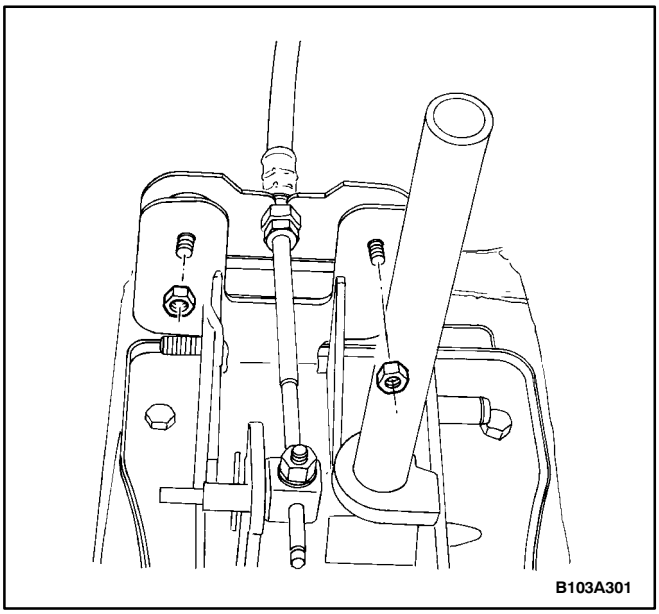
4. Tilt the shift control lever to the left and install the detent ball.


B103A303

5. Install the bolt in the bottom of the shift control lever.


B103A302

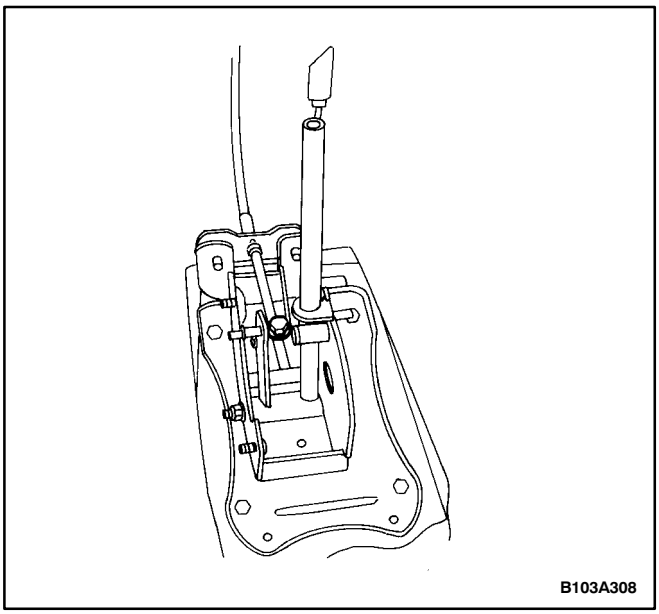
6. Insert the shift control cable adjuster pinch bolt into the shift control assembly and slide the shift control cable into the shift control cable adjuster.


B103A301

7. Attach the shift control cable mounting bracket to the shift control assembly with the nuts.

Tighten

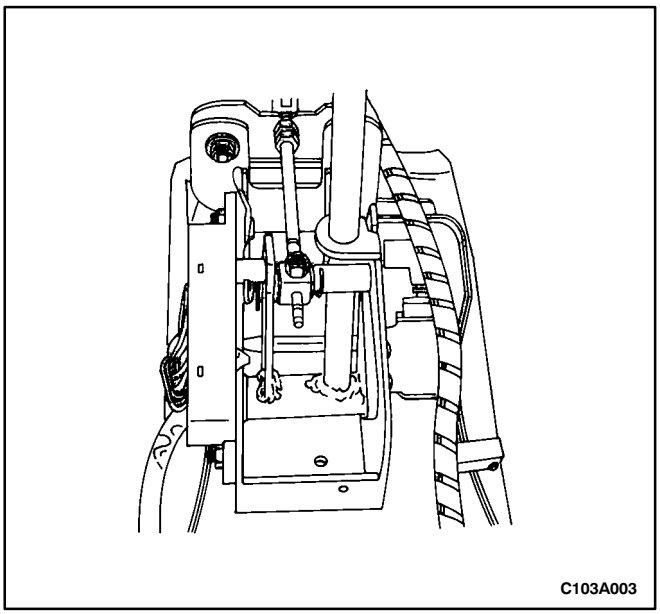
Tighten the shift control cable mounting bracket nuts to 6 N•m (53 lb-in).


B103A308

8. Install the nut on the shift control cable adjuster pinch bolt. Refer to “Control Cable Adjustment” in this section.

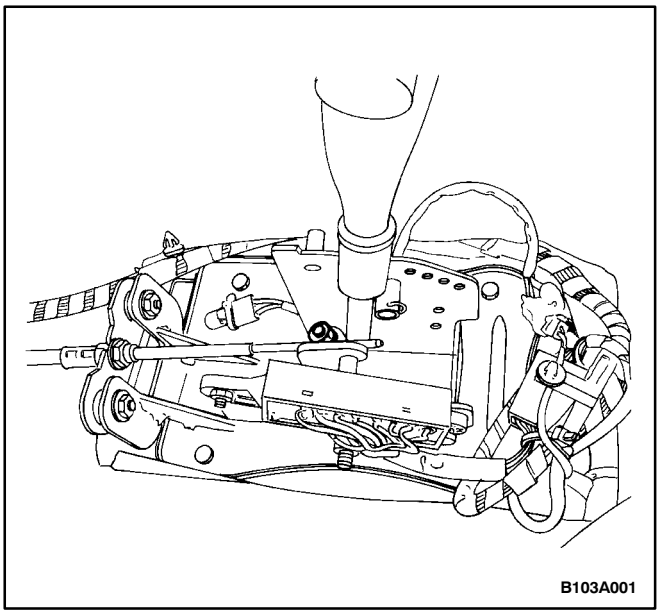
Tighten

Tighten the shift control cable adjuster pinch bolt nut to 8 N•m (71 lb-in).


C103A003

Notice: Make sure the slot in the selector position switch is all the way forward and the shift control lever is in the P position. Failure to do so may damage to the selector position switch and produce a false gear indication.

9. Install the selector position switch on the shift control assembly.
10. Install the floor console, the shift control panel, and the right and the left front lower trim panels. Refer to *Section 9G, Interior Trim*.
11. Connect the negative battery cable.

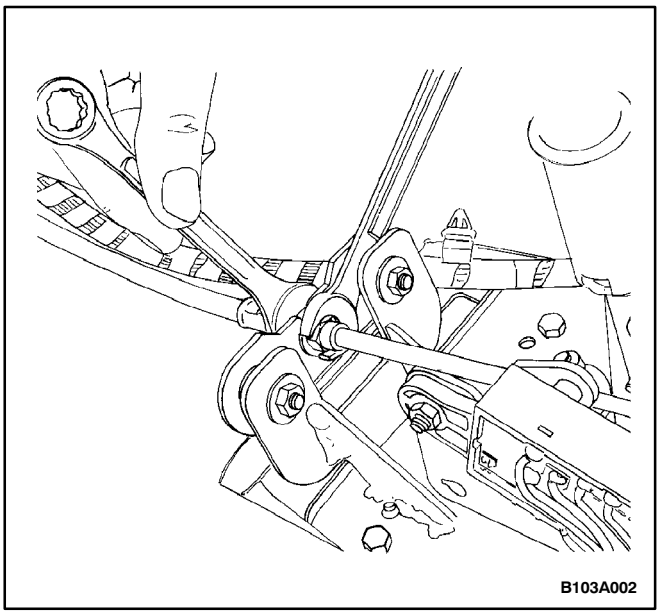

B103A001

SHIFT CONTROL CABLE

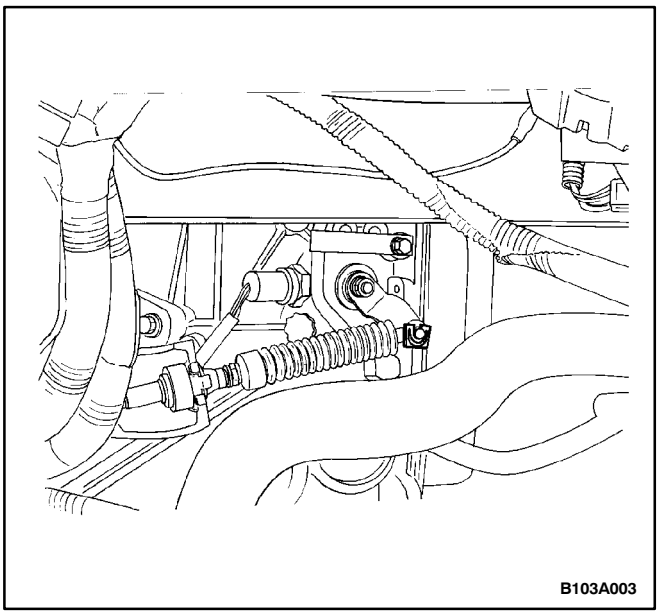
(Left–Hand Drive Shown, Right–Hand Drive Similar)

Removal Procedure

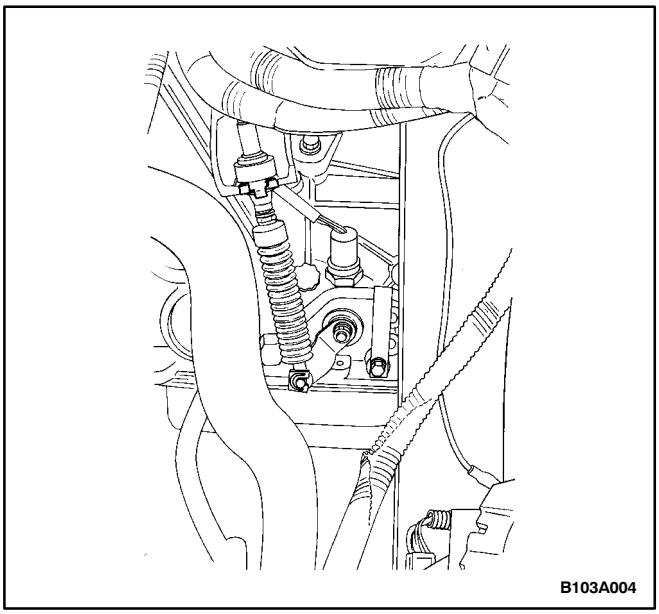
1. Remove the battery and the battery tray.
2. Remove the right and the left front lower trim panels, the shift control panel, and the floor console. Refer to *Section 9G, Interior Trim*.
3. Loosen the pinch bolt nut on the shift control lever.


B103A002

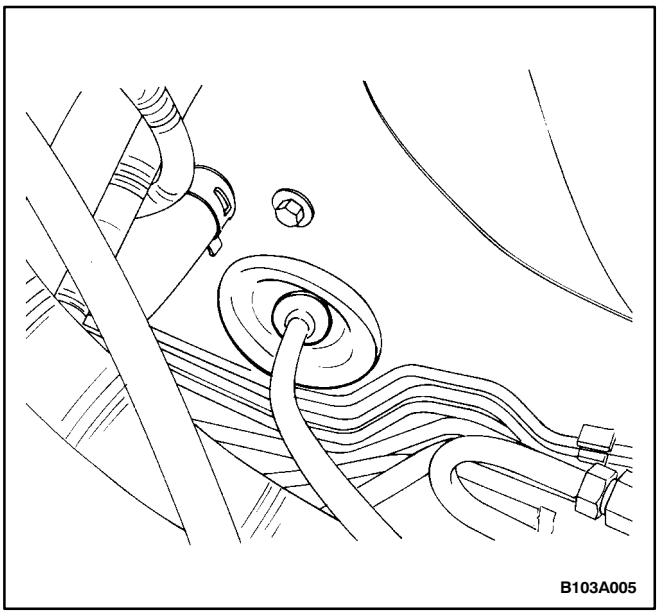
4. Remove the shift control cable from the shift control assembly by holding one nut while loosening the other one.


B103A003

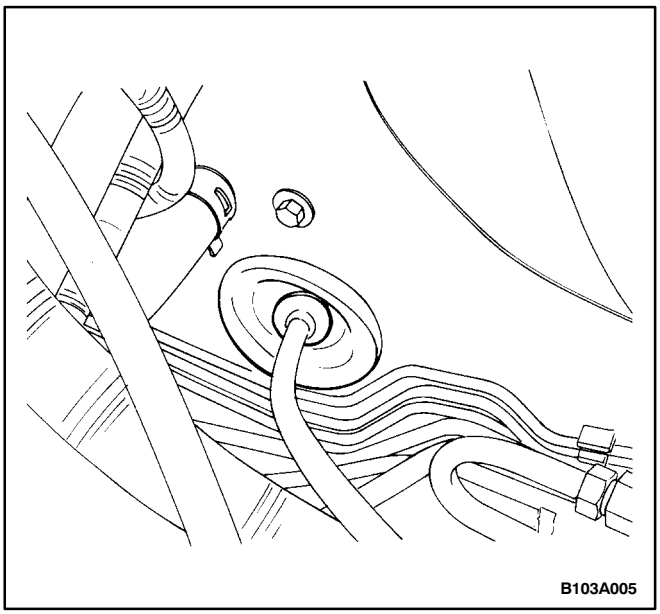
5. Remove the clip from the selector lever connection on the transaxle case and disconnect the shift control cable from the selector lever connection.


B103A004

6. Remove the clip from the shift control cable at the transaxle mount connection.

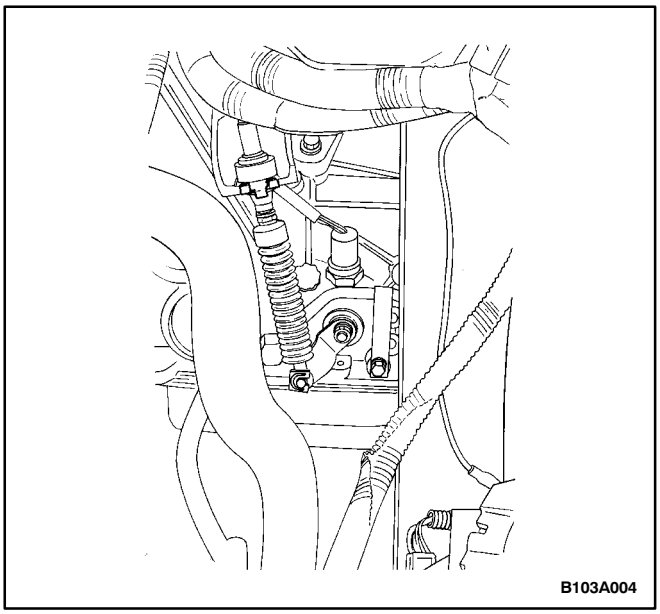

B103A005

7. Remove the shift control cable from the transaxle mount.
8. Pull the shift control cable through the fire wall of the vehicle, bringing the rubber grommet with it.

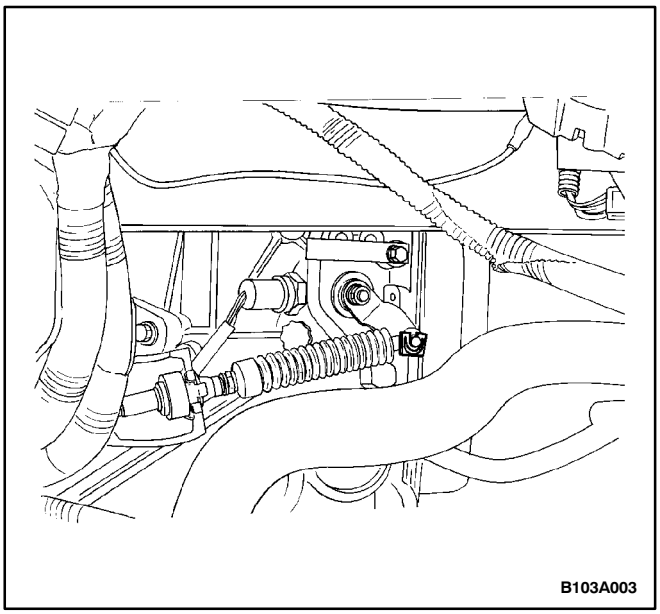

B103A005

Installation Procedure

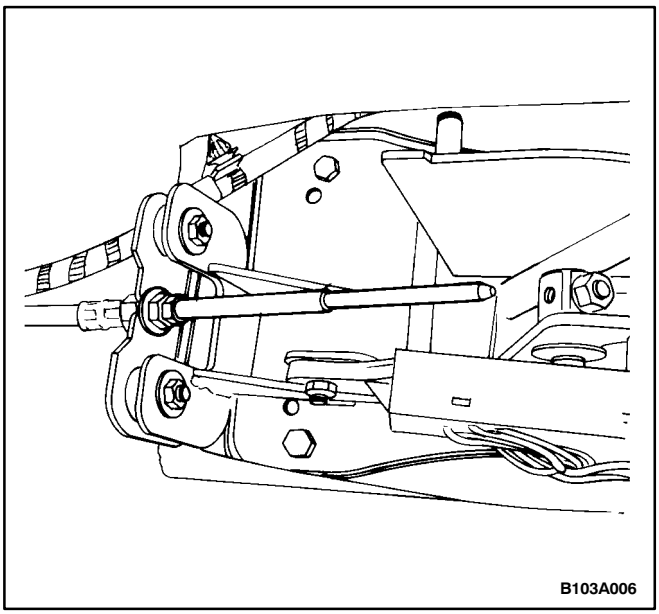
1. Push the shift control cable through the fire wall of the vehicle.
2. Install the rubber grommet into the fire wall.


B103A004

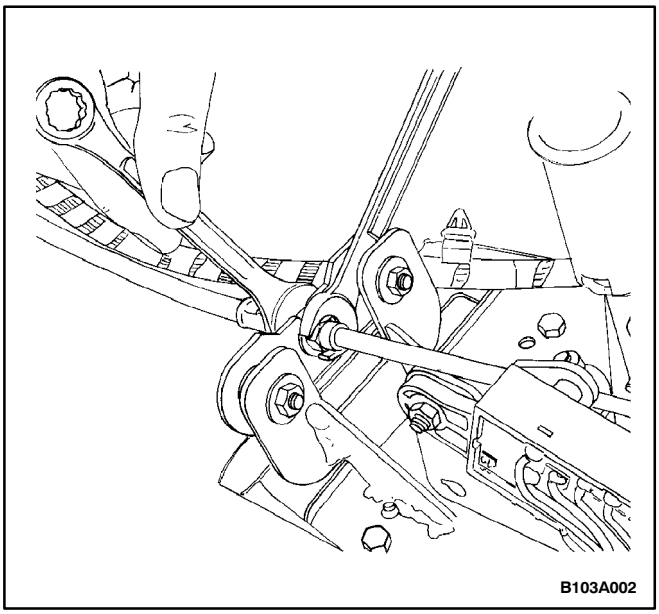
3. Install the shift control cable into the transaxle mount.
4. Install the clip onto the shift control cable at the transaxle mount connection.


B103A003

5. Connect the shift control cable onto the selector lever connection.


B103A006

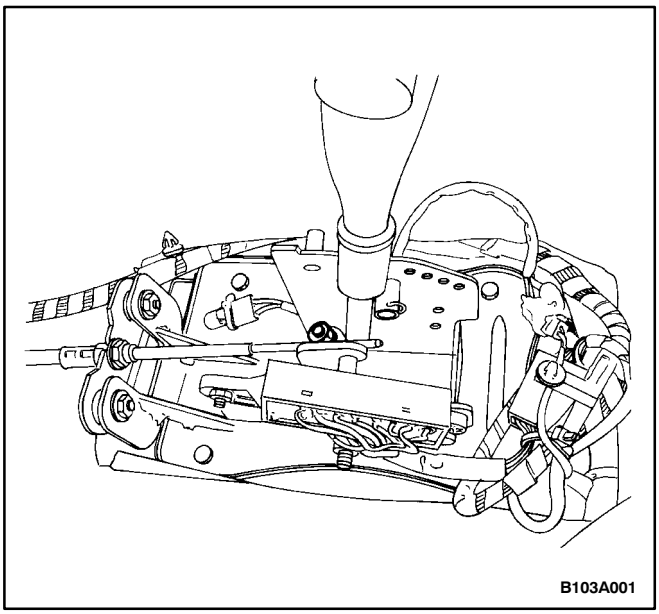
6. Install the clip onto the shift control cable at the selector lever connection on the transaxle case.
7. Install the brass housing and the nut onto the opposite end of the shift control cable.


B103A002

8. Install the shift control cable into the shift control assembly.
9. Install the shift control attachment nut onto the shift control assembly.

Tighten

Tighten the shift control cable attachment nut to 6 N•m (53 lb-in).


B103A001

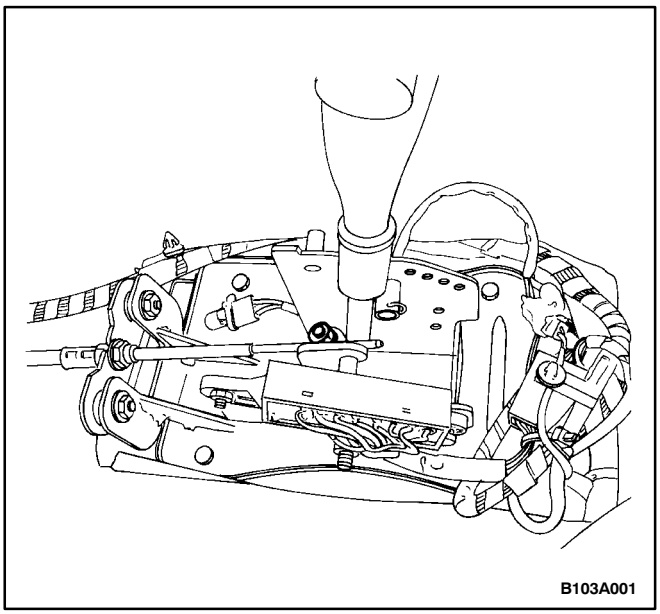
Important: Be sure the shift control lever is in the P position and the selector lever selector is all the way forward before connecting the shift control cable to the shift control lever.

10. Insert the shift control cable into the connecting slot on the shift control lever and secure it with the pinch bolt and nut.

Tighten

Tighten the shift control cable adjustment pinch bolt nut to 8 N•m (71 lb-in).

11. Install the floor console, the shift control panel, and the right and the left front lower trim panels. Refer to *Section 9G, Interior Trim*.
12. Install the battery and the battery tray.


B103A001

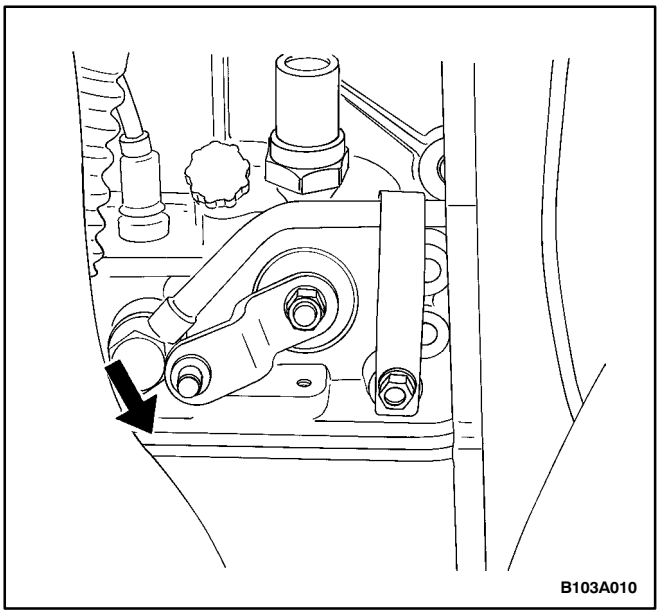
CONTROL CABLE ADJUSTMENT

(Left–Hand Drive Shown, Right–Hand Drive Similar)

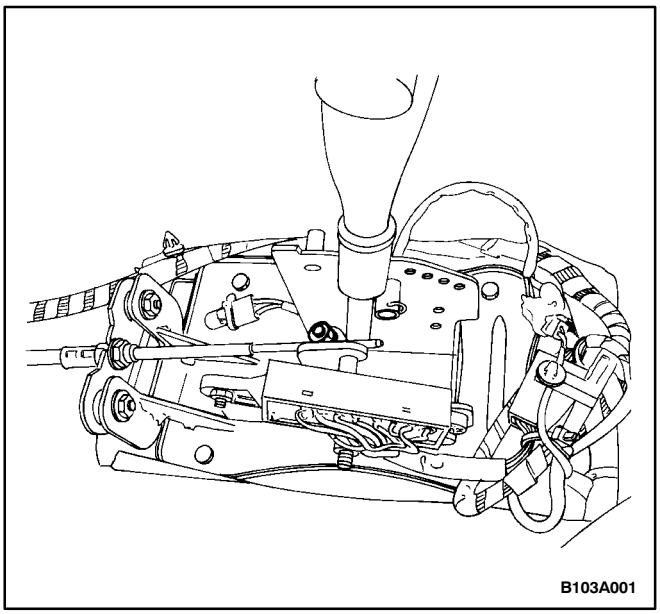
Adjustment Procedure

It is very important to match the shift control lever correctly with the selector lever connection. Place the shift control lever in the P position and check the selector lever connection to see if it is all the way forward. If it is not, proceed with the following adjustment.

1. Remove the battery and the battery tray.
2. Remove the right and the left front lower trim panels, the shift control panel, and the floor console. Refer to *Section 9G, Interior Trim*.
3. Place the shift control lever in the P position.
4. Loosen the pinch bolt nut on the shift control lever.


B103A010

5. Place the selector lever connection all the way forward on the transaxle case.

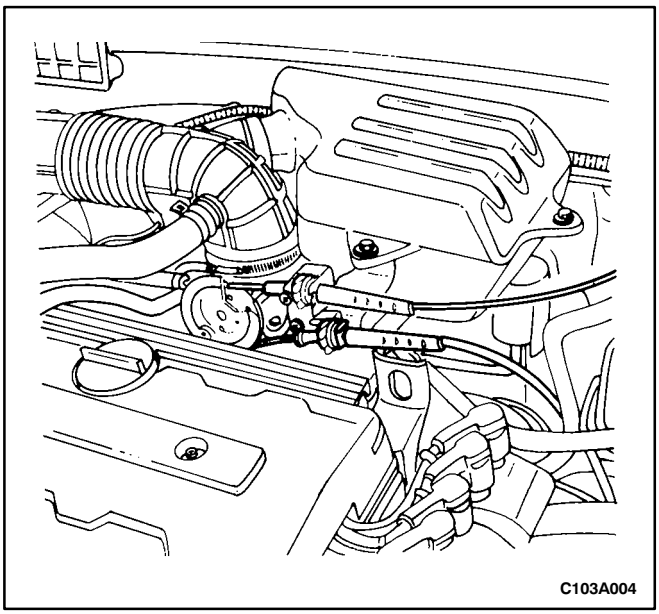

B103A001

6. Insert the shift control cable into the shift control lever tightly.
7. Secure the shift control cable with the shift control cable adjuster pinch bolt and nut.

Tighten

Tighten the shift control cable adjuster pinch bolt nut to 8 N•m (71 lb-in).

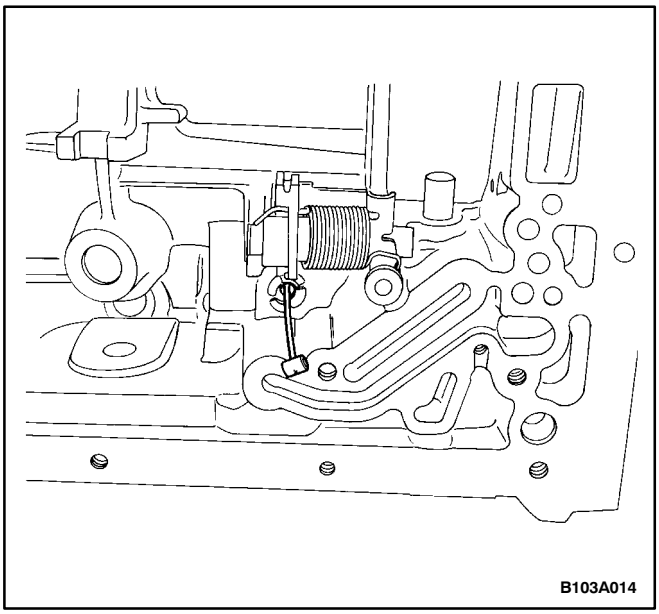
8. Install the floor console, the shift control panel, and the right and the left front lower trim panels. Refer to *Section 9G, Interior Trim*.
9. Install the battery and the battery tray.


C103A004

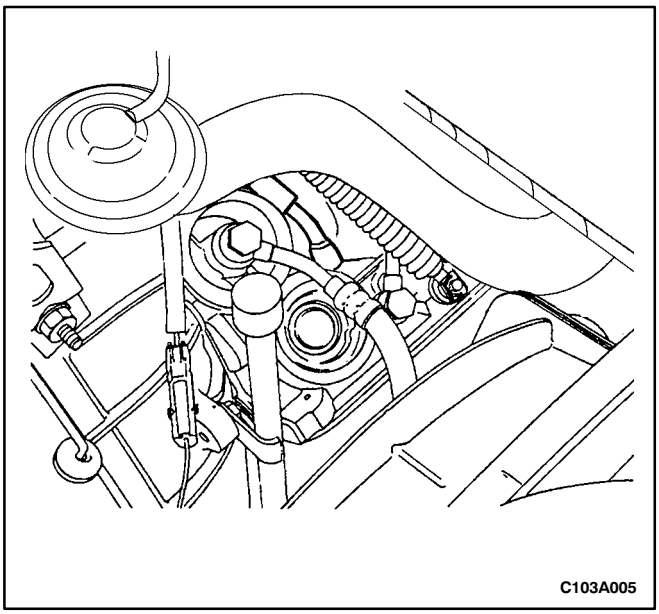
THROTTLE VALVE CABLE

Removal Procedure

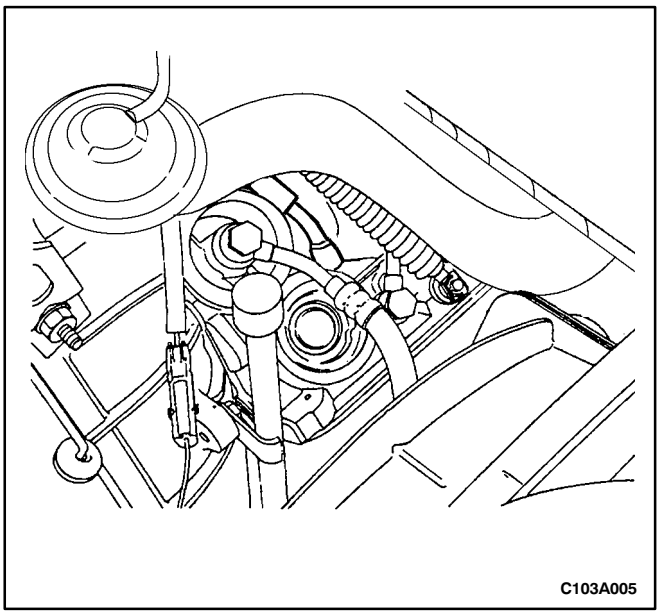
1. Disconnect and remove the battery and the battery tray.
2. Remove the upper cable stop from the throttle cable wheel.


B103A014

3. Raise and suitably support the vehicle.
4. Remove the fluid pan and the gasket. Refer to “Pan and Gasket” in this section.
5. Remove the valve body. Refer to “Valve Body” in this section.
6. Turn the throttle valve cable cam and remove the cable stop from the cam.

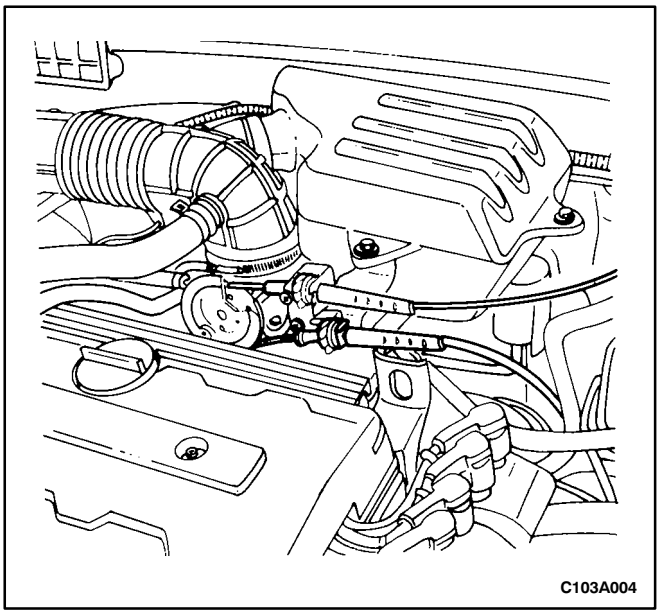

C103A005

7. Lower the vehicle.
8. Remove the throttle valve cable from the transaxle case.

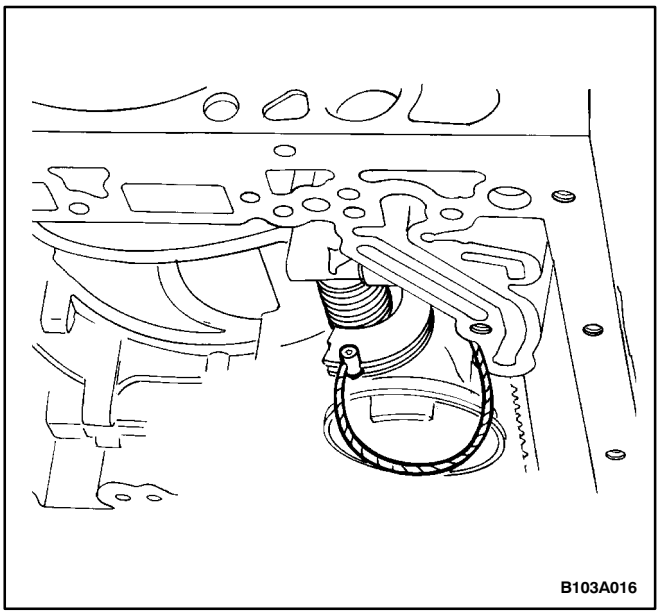

C103A005

Installation Procedure

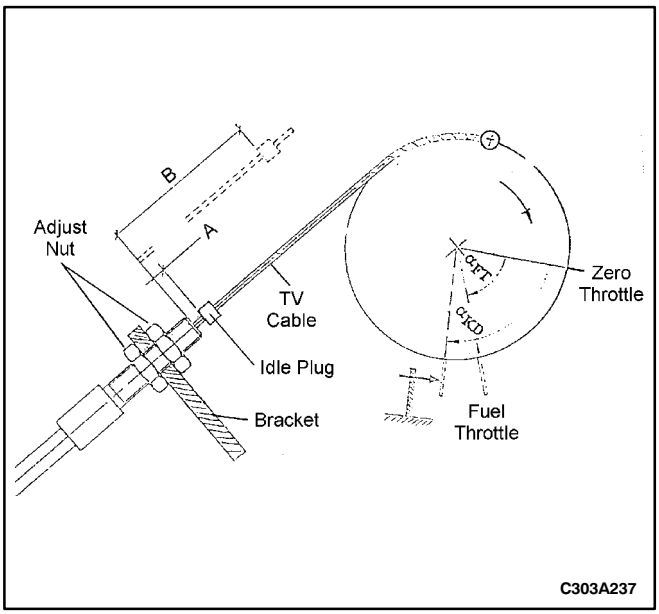
1. Install the throttle valve cable into the transaxle case.


C103A004

2. Connect the upper cable stop to the throttle cable wheel.


B103A016

3. Raise the vehicle.
4. Turn the cable cam once to allow for a spring load and fit the lower cable stop into the cam seat.
5. Install the valve body. Refer to “Valve Body” in this section.
6. Install the lower fluid pan and the gasket. Refer to “Pan and Gasket” in this section.
7. Lower the vehicle.
8. Install the battery tray and the battery and connect the battery.



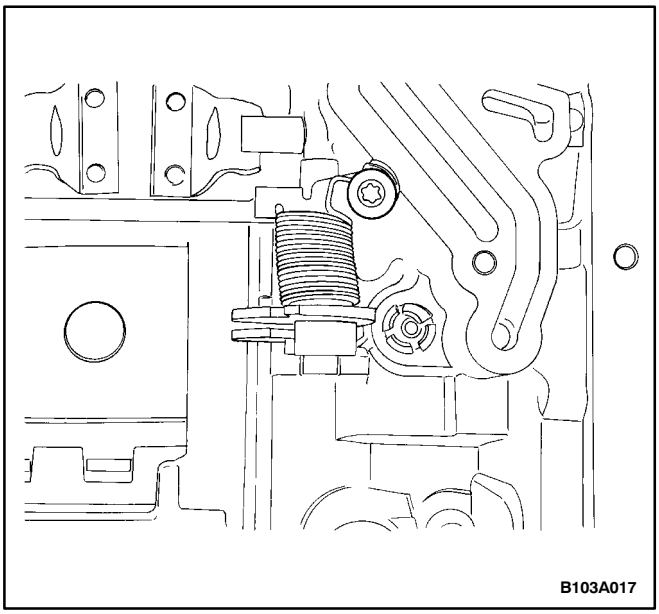
ADJUCT THROTTLE VALVE CABLE

Removal Procedure

1. Adjust the gap (“A”) between idle plug and end of adjusting thread.

   Specification : 0 ~ 1 mm
2. Full the throttle valve cable to full throttle position.

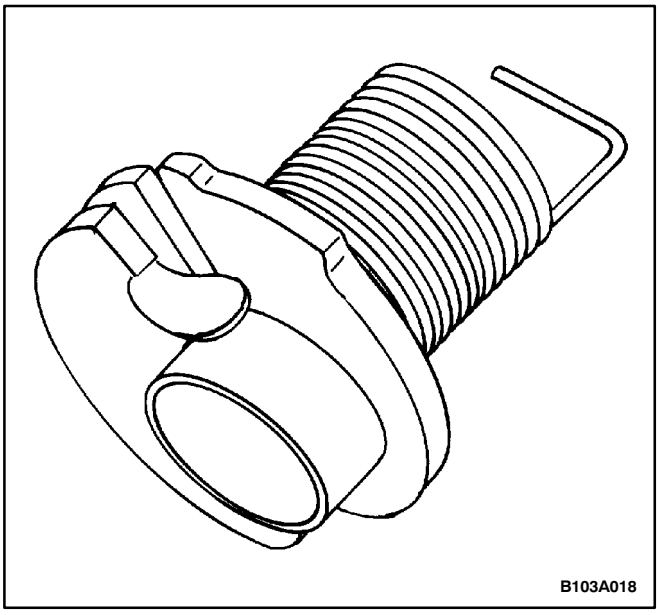
   Specification : 39.0 ~ 40 mm
3. If the stroke were out of spec adjust using adjust nuts.



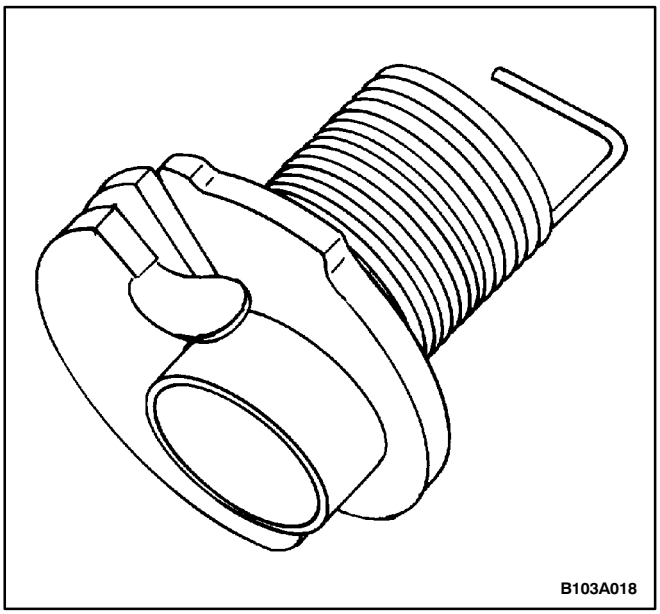
THROTTLE VALVE CABLE CAM

Removal Procedure

1. Raise and suitably support the vehicle.
2. Remove the fluid pan. Refer to “Pan and Gasket” in this section.
3. Remove the valve body. Refer to “Valve Body and Converter” in this section.
4. Remove the throttle valve cable from the cam. Refer to “Throttle Valve Cable” in this section.
5. Remove the detent screw holding the cam onto the transaxle case and remove the throttle valve cable cam.

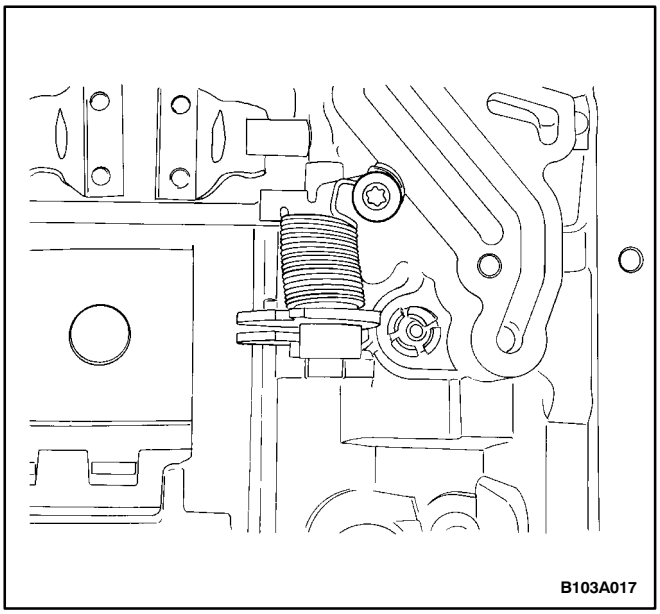


6. Remove the spring from the body of the cam.


B103A018

Installation Procedure

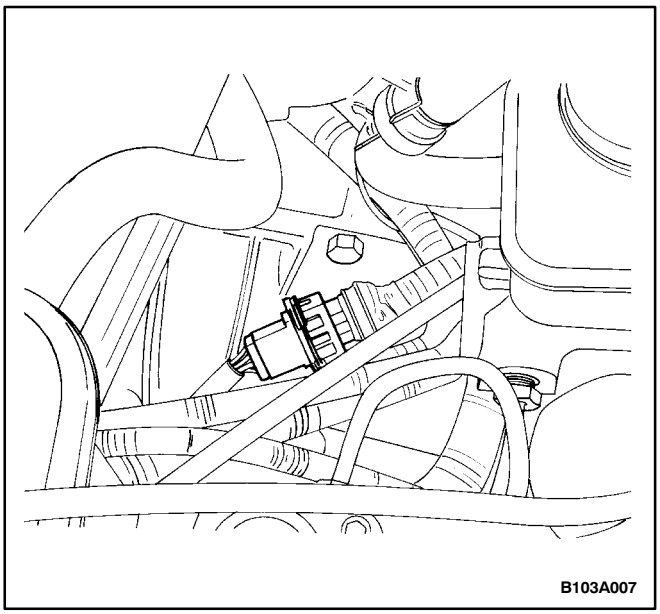
1. Install the spring onto the body of the throttle valve cable cam.


B103A017

2. Install the throttle valve cable cam and secure it to the transaxle case with the detent screw.

   Tighten

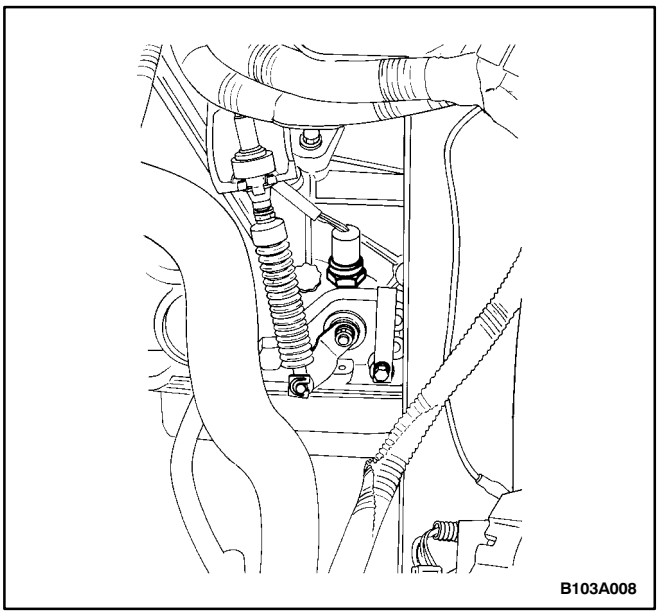
   Tighten the throttle valve cable cam detent screw to 10 N•m (89 lb-in).
3. Install the throttle valve cable. Refer to “Throttle Valve Cable” in this section.
4. Install the valve body. Refer to “Valve Body and Converter” in this section.
5. Install the fluid pan. Refer to “Pan and Gasket” in this section.
6. Lower the vehicle.


B103A007

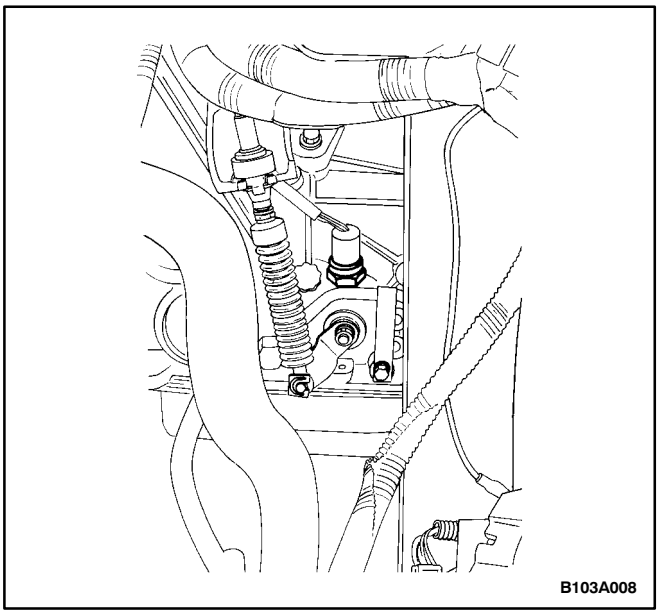
NEUTRAL START SWITCH

Removal Procedure

1. Disconnect the negative battery cable.
2. Disconnect the neutral start switch from the wiring harness.


B103A008

3. Loosen the connecting nut of the neutral start switch on the transaxle case.
4. Remove the neutral start switch.

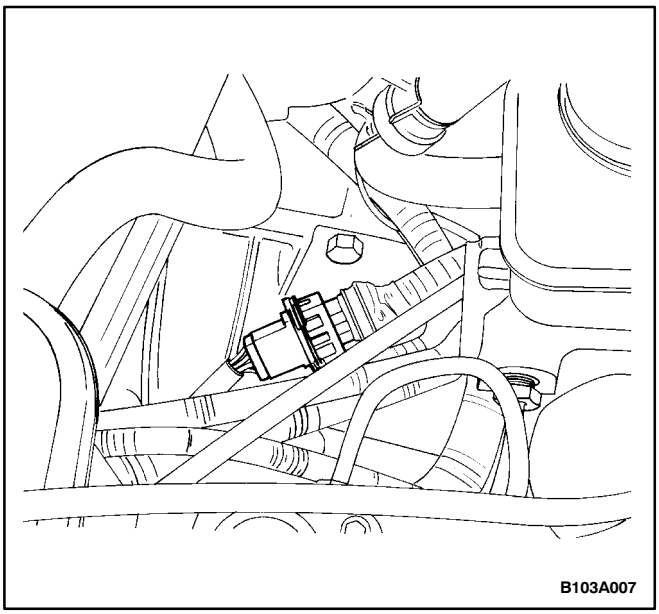

B103A008

Installation Procedure

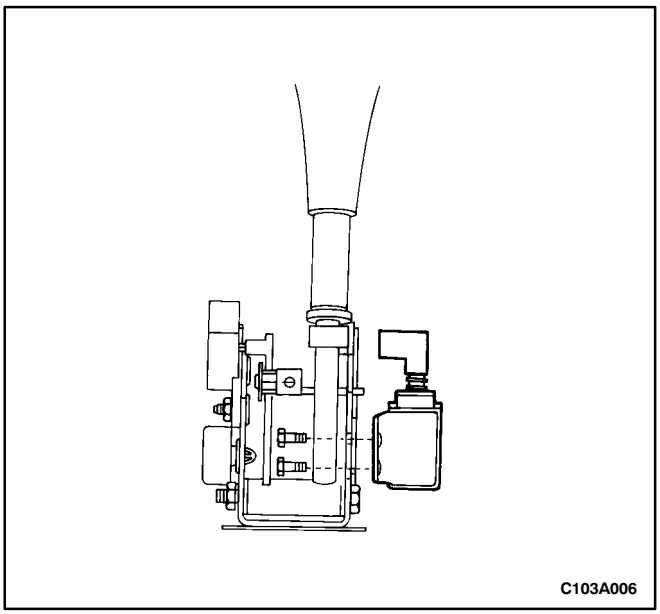
1. Install the neutral start switch and secure it to the transaxle case with the connecting nut.

Tighten

Tighten the neutral start switch connecting nut to 40 N•m (30 lb-ft).


B103A007

2. Connect the neutral start switch to the wiring harness.
3. Connect the negative battery cable.

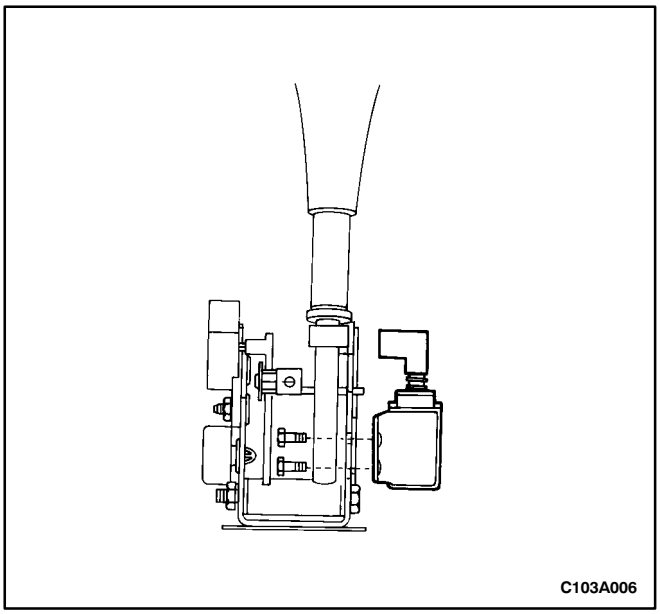

C103A006

BRAKE TRANSAXLE SHIFT INTERLOCK

(Left–Hand Drive Shown, Right–Hand Drive Similar)

Removal Procedure

1. Disconnect the negative battery cable.
2. Remove the center console. Refer to *Section 9G, Interior Trim.*
3. Disconnect the electrical connector from the shift interlock solenoid.
4. Remove the shift interlock solenoid bolts and remove the shift interlock solenoid.

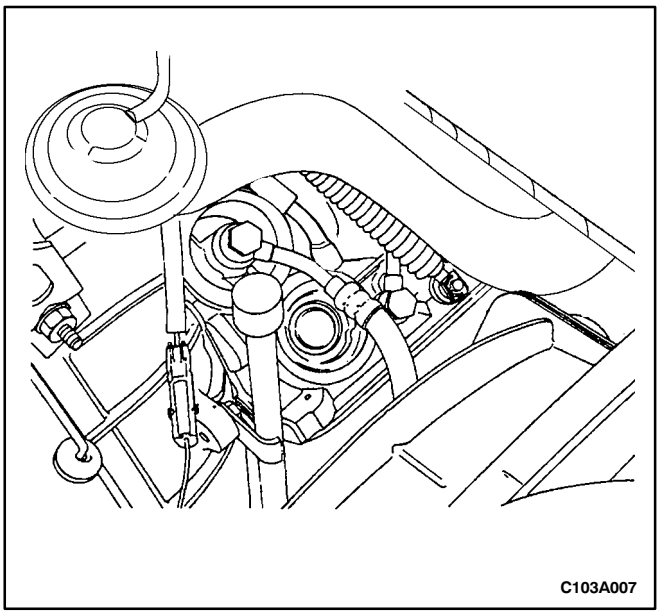

C103A006

Installation Procedure

1. Install the shift interlock solenoid and the shift interlock solenoid bolts.

   Tighten

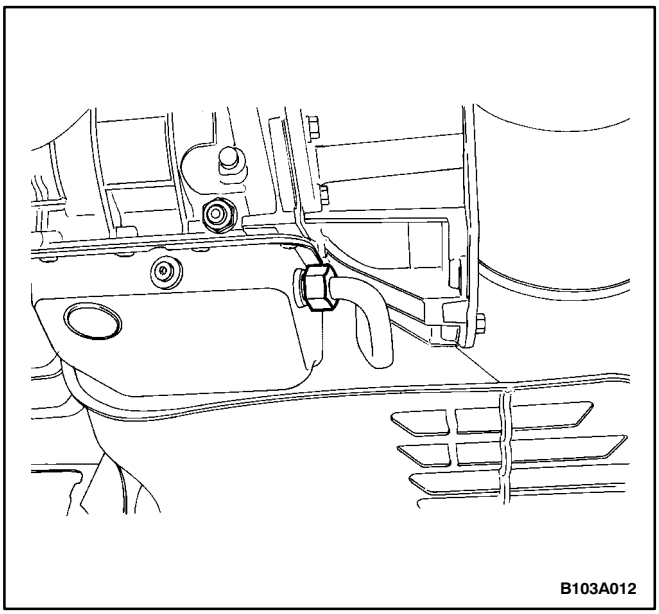
   Tighten the shift interlock solenoid bolts to 8 N•m (71 lb-in).
2. Connect the electrical connector to the shift interlock solenoid.
3. Install the center console. Refer to *Section 9G, Interior Trim.*
4. Connect the negative battery cable.


C103A007

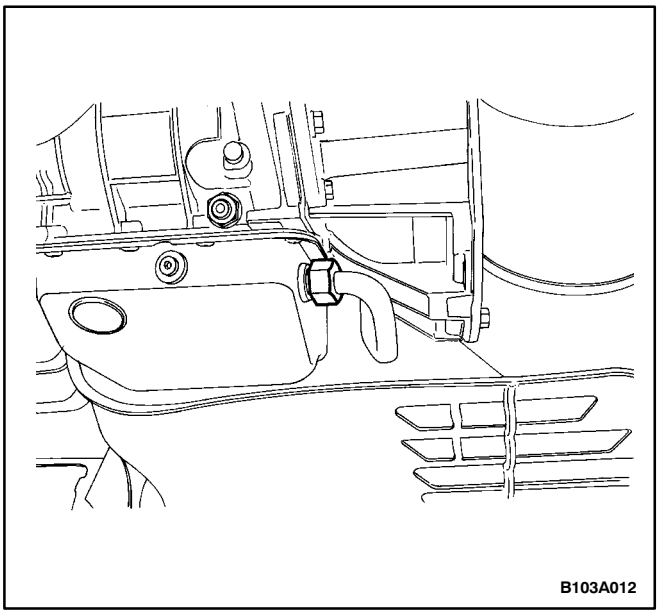
FLUID FILLER TUBE

Removal Procedure

1. Disconnect and remove the battery and the battery tray.
2. Raise and suitably support the vehicle.
3. Drain the fluid out of the transaxle. Refer to “Changing Fluid” in this section.
4. Remove the upper fluid filler tube attachment bolt.


B103A012

5. Remove the lower fluid filler attachment nut and remove the fluid filler tube.

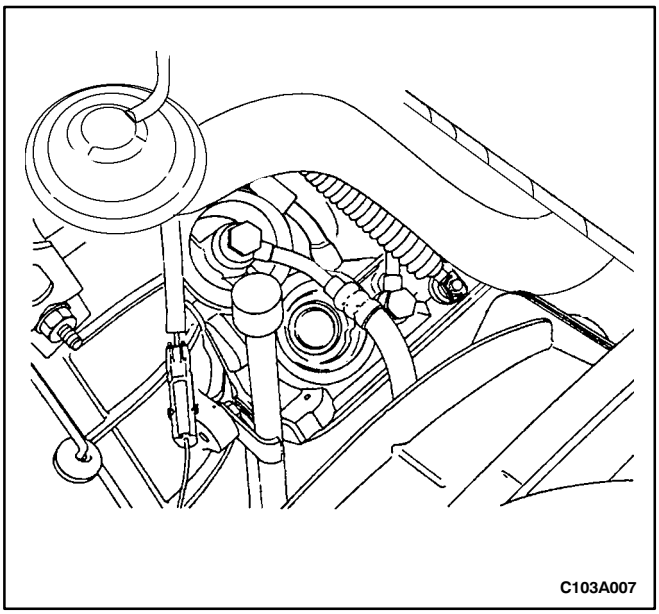

B103A012

Installation Procedure

1. Install the fluid filler tube with the lower fluid filler tube attachment nut.

Tighten

Tighten the lower fluid filler tube attachment nut to 15 N•m (11 lb-ft).

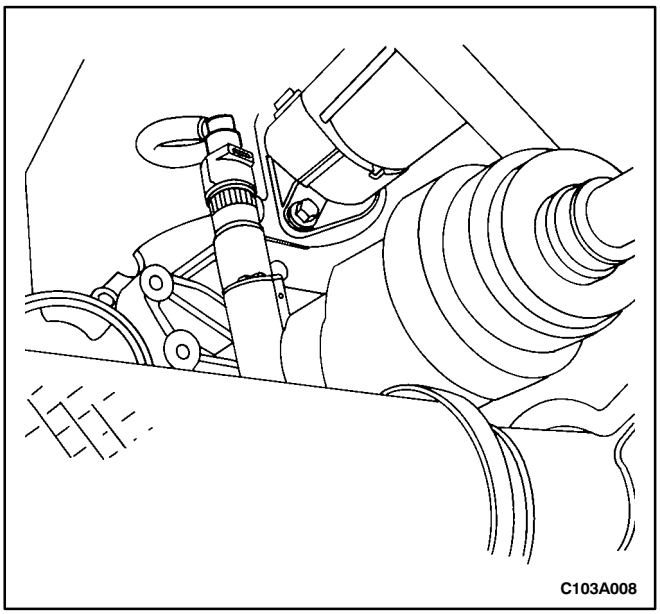

C103A007

2. Install the upper fluid filler tube attachment bolt.

Tighten

Tighten the upper fluid filler tube attachment bolt to 20 N•m (15 lb-ft).

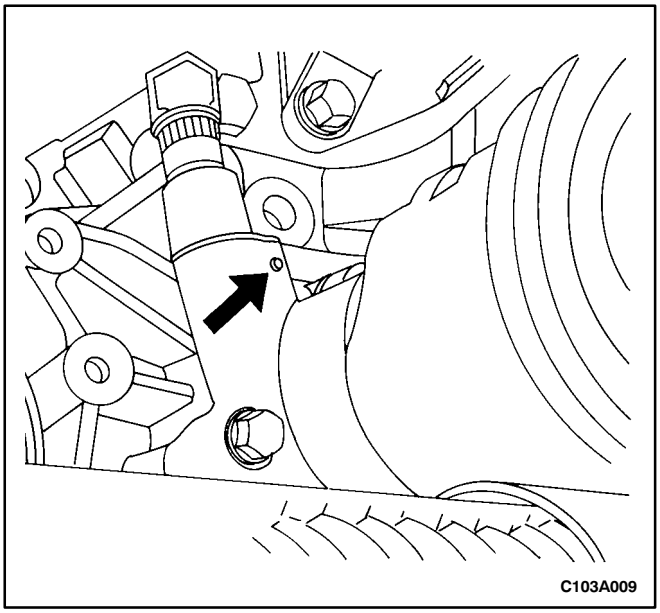
3. Lower the vehicle.
4. Refill the transaxle with the appropriate amount of automatic transaxle fluid. Refer to “Fluid Level Set After Service” in this section.
5. Install the battery tray and the battery.


C103A008

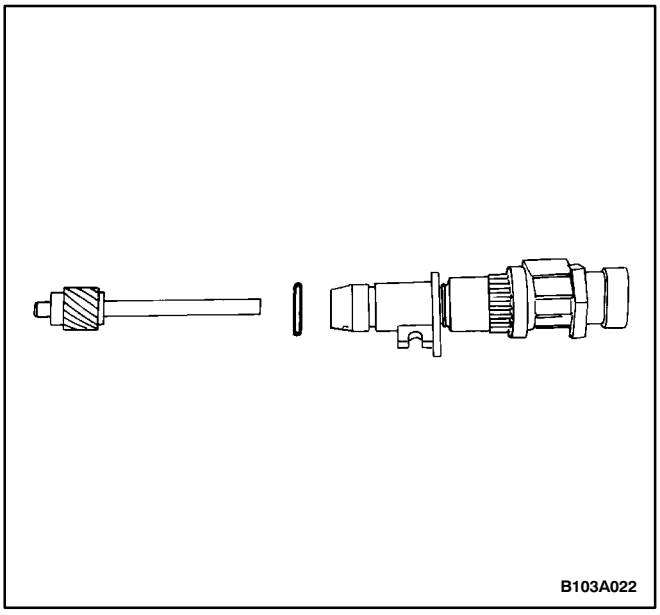
SPEED SENSOR

Removal Procedure

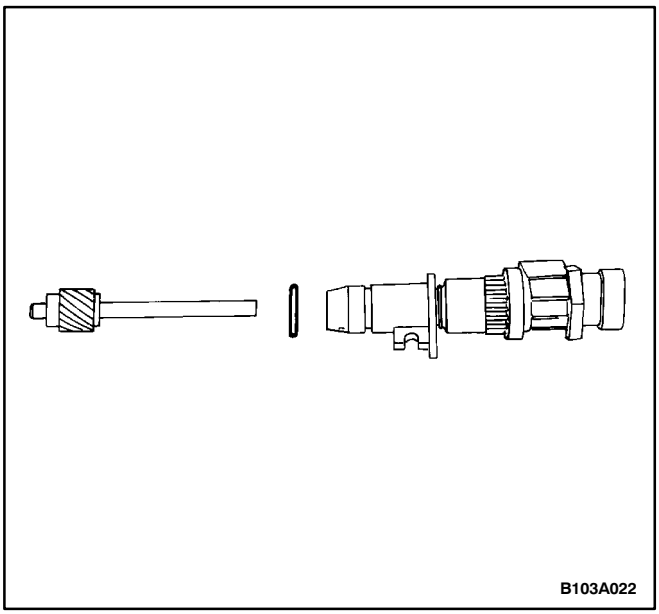
1. Disconnect the negative battery cable.
2. Raise and suitably support the vehicle.
3. Remove the speed sensor electrical connector.


C103A009

4. Remove the speed sensor from the extension case by removing the roll pin.

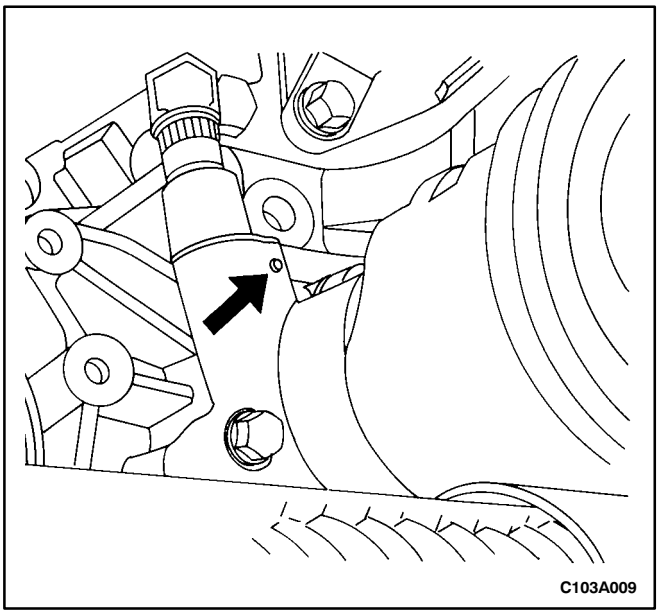

B103A022

5. Remove the O-ring from the speed sensor.

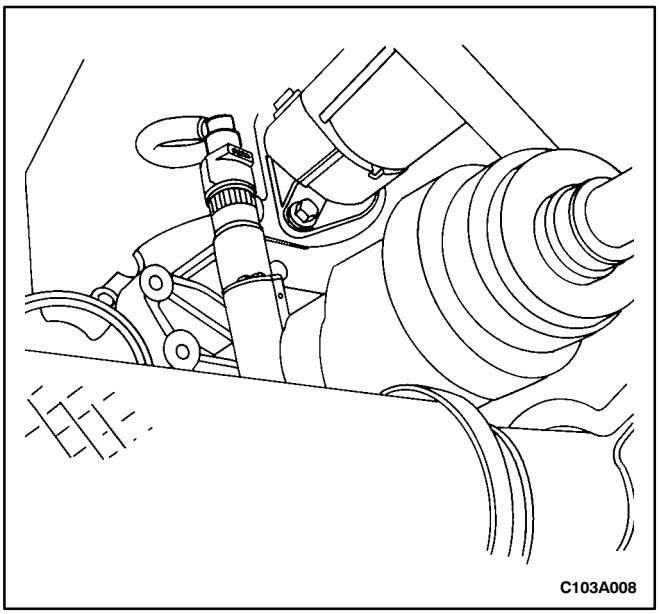

B103A022

Installation Procedure

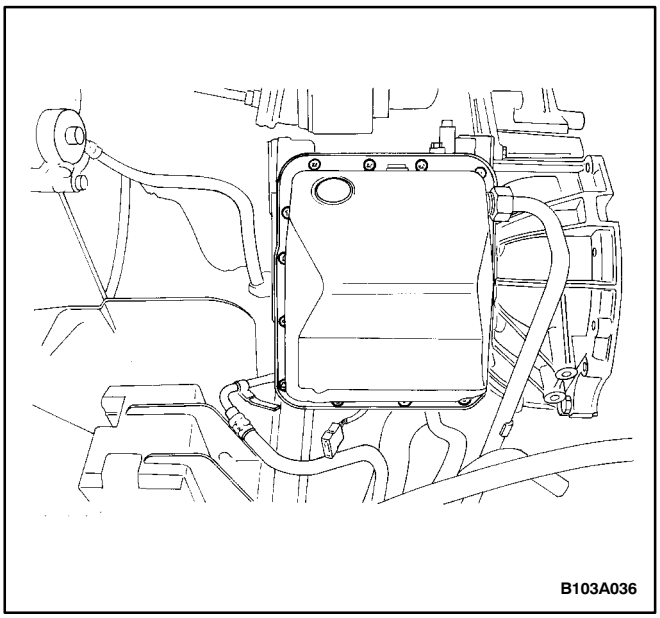
1. Install the O-ring onto the speed sensor.


C103A009

2. Install the speed sensor into the extension case and secure it with a roll pin.


C103A008

3. Install the speed sensor electrical connector.
4. Lower the vehicle.
5. Connect the negative battery cable.


B103A036

PAN AND GASKET

Removal Procedure

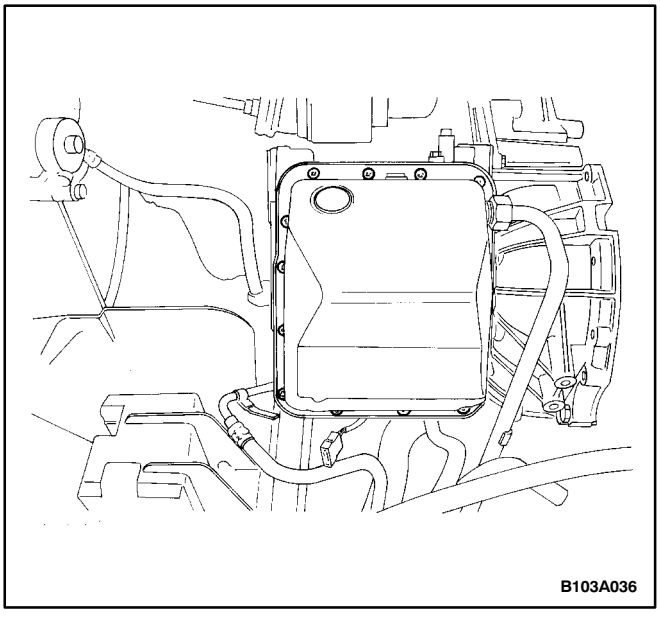
1. Raise and suitably support the vehicle.
2. Remove the engine under covers. Refer to *Section 9N, Frame and Underbody.*
3. Drain the transaxle fluid from the transaxle. Refer to “Changing Fluid” in this section.

Notice: Take care not to damage the mating surfaces of the fluid pan and the case. Such damage can result in fluid leaks in this area.

4. Remove the fluid pan connecting bolts.
5. Remove the fluid pan and gasket.

Inspection Procedure

Inspect the fluid pan for metal particles, clutch facing material, rubber particles, and engine coolant. Inspect the pan flange for distortion. Correct as needed.


B103A036

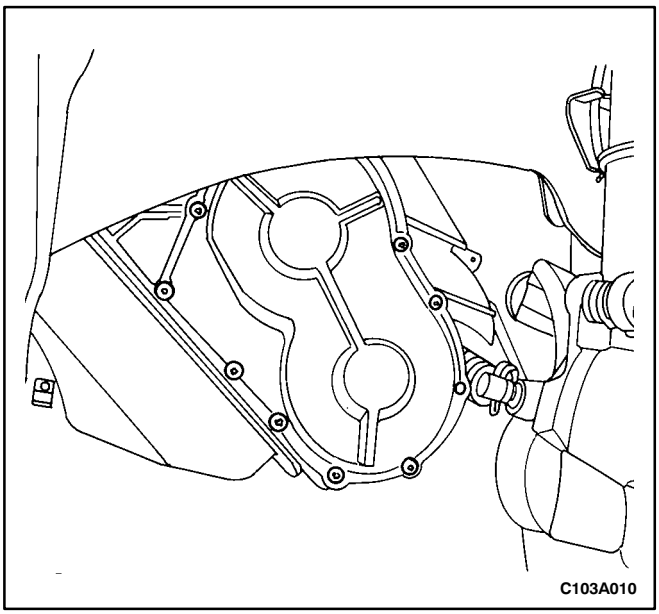
Installation Procedure

1. Install the new transaxle pan gasket.
2. Install the fluid pan with the fluid pan connecting bolts.

Tighten

Tighten the fluid pan connecting bolts to 10 N•m (89 lb-in).

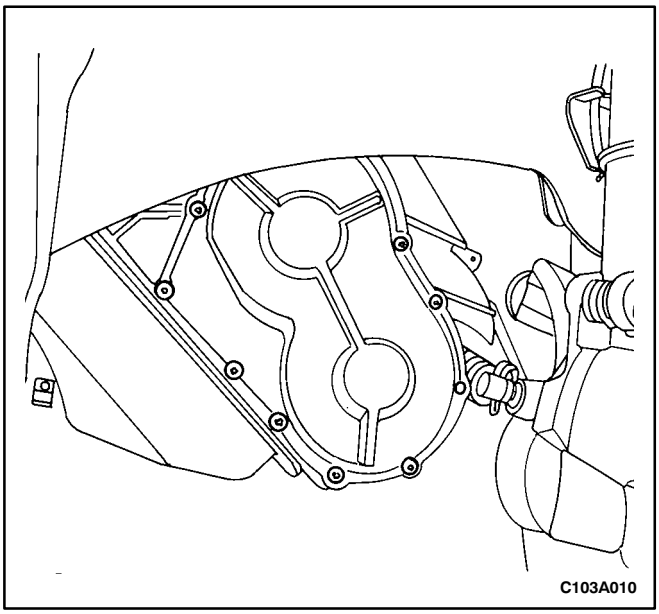
3. Install the engine under covers. Refer to *Section 9N, Frame and Underbody.*
4. Lower the vehicle.
5. Refill the transaxle with the appropriate amount of automatic transaxle fluid. Refer to “Fluid Level Set After Service” in this section.
6. Check the fluid level. Refer to “Transaxle Fluid Level Checking Procedure” in this section.


C103A010

CASE SIDE COVER PAN AND GASKET

Removal Procedure

1. Raise and suitably support the vehicle.
2. Remove the left tire and wheel assembly. Refer to *Section 2E, Tires and Wheels*.
3. Drain the fluid from the transaxle. Refer to “Changing Fluid” in this section.
4. Remove the side cover pan connecting bolts.
5. Remove the side cover pan and the gasket.

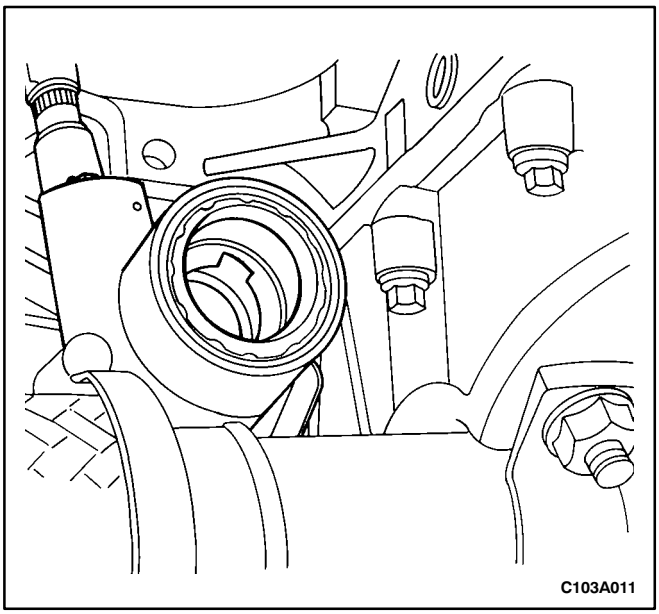

C103A010

Installation Procedure

1. Install a new side cover pan gasket.
2. Install the side cover pan with the connecting bolts.

   Tighten

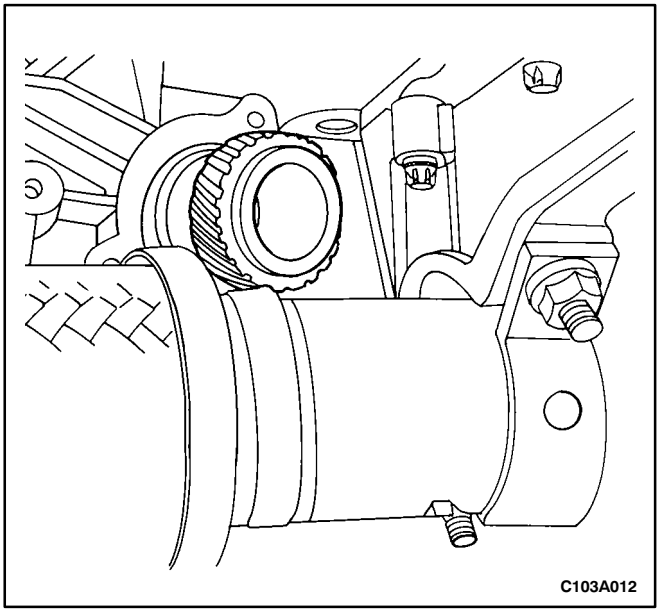
   Tighten the side cover pan connecting bolts to 10 N•m (89 lb-in).
3. Replace the automatic transaxle fluid. Refer to “Fluid Level Set After Service” in this section.
4. Lower the vehicle.


C103A011

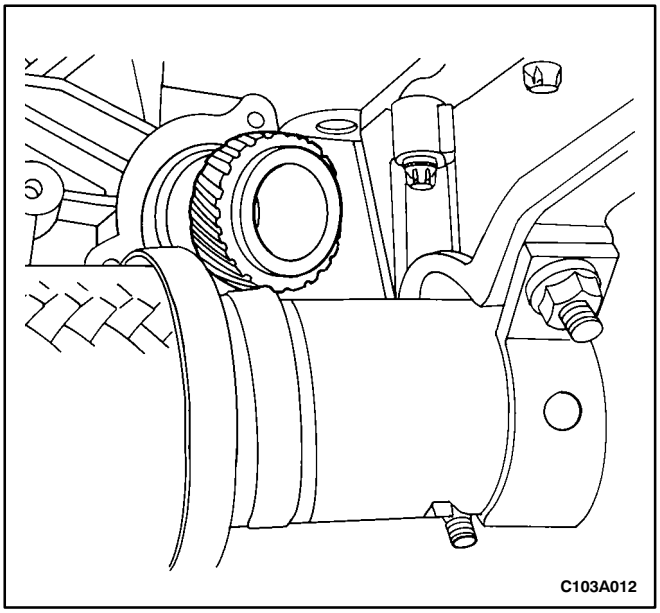
CASE EXTENSION HOUSING

Removal Procedure

1. Disconnect the negative battery cable.
2. Disconnect the vehicle speed sensor connection. Refer to “Speed Sensor” in this section.
3. Remove the case extension housing attachment bolts and the case extension housing.

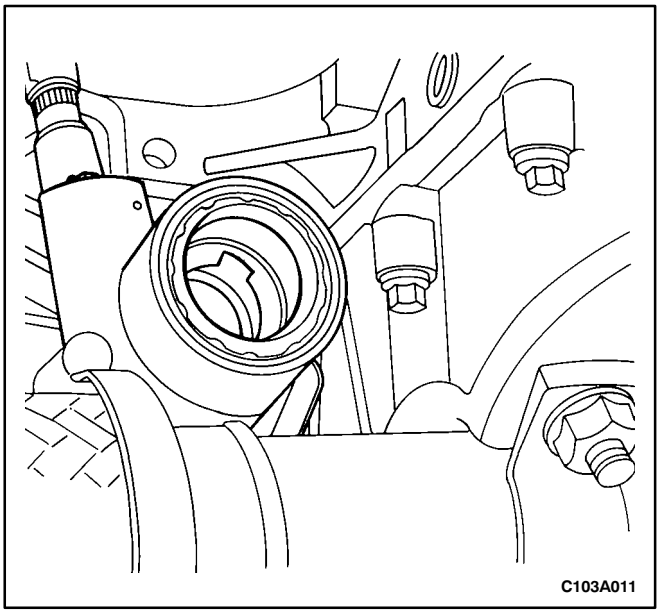

C103A012

4. Remove speed sensor rotor.


C103A012

Installation Procedure

1. Install the speed sensor rotor.

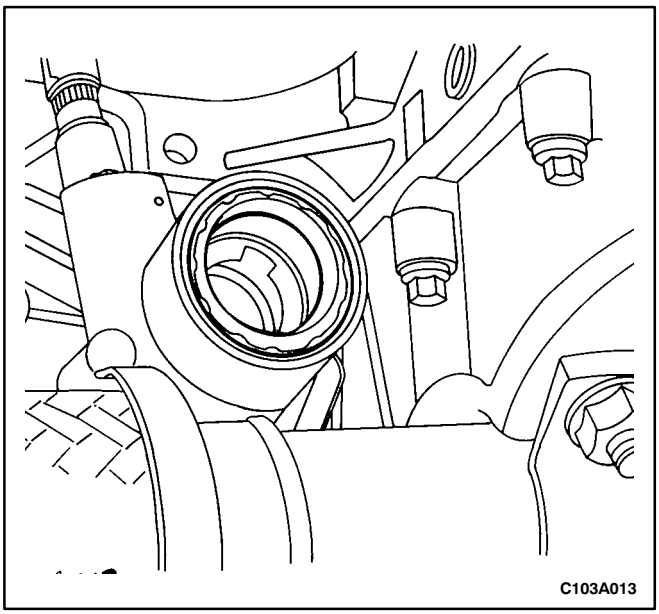

C103A011

2. Install the case extension housing with the attachment bolts.

Tighten

Tighten the case extension housing attachment bolts to 43 N•m (32 lb-ft).

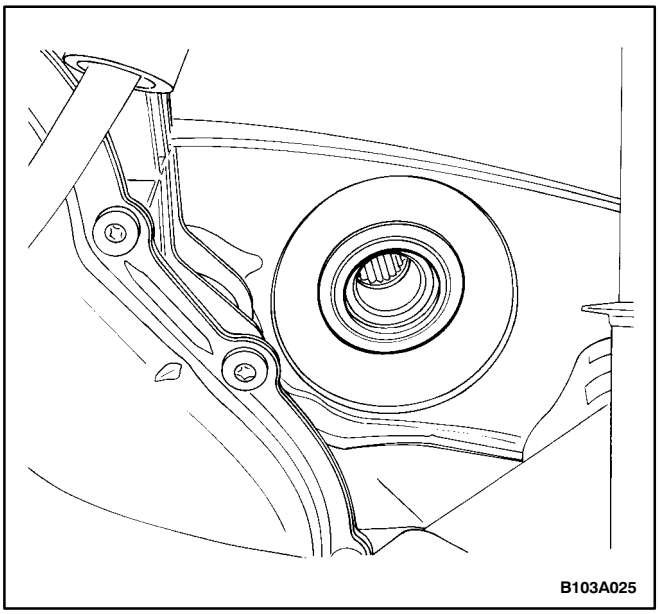
3. Attach the vehicle speed sensor connection. Refer to “Speed Sensor” in this section.
4. Connect the negative battery cable.


C103A013

DRIVE AXLE FLUID SEALS

Removal Procedure

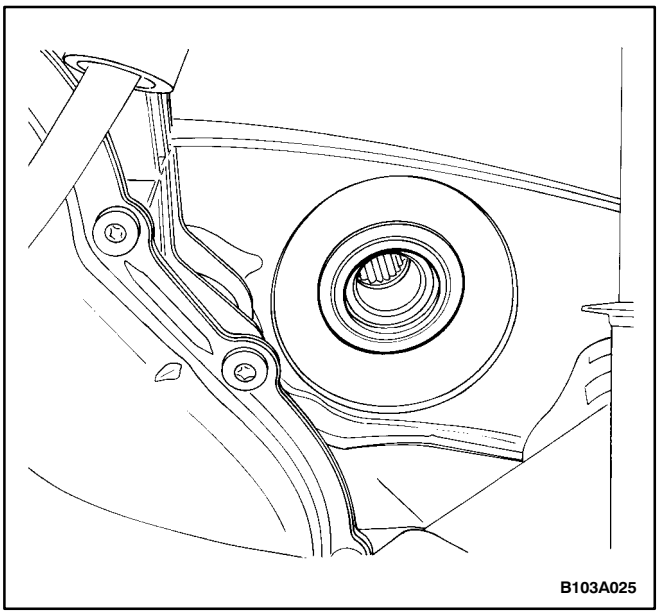
1. Raise and suitably support the vehicle.
2. Remove the wheels. Refer to *Section 2E, Tires and Wheels*.
3. Disconnect the automatic transaxle drive axles from the automatic transaxle. Refer to *Section 3A, Automatic Transaxle Drive Axle*.
4. Remove the right side drive axle fluid seal.

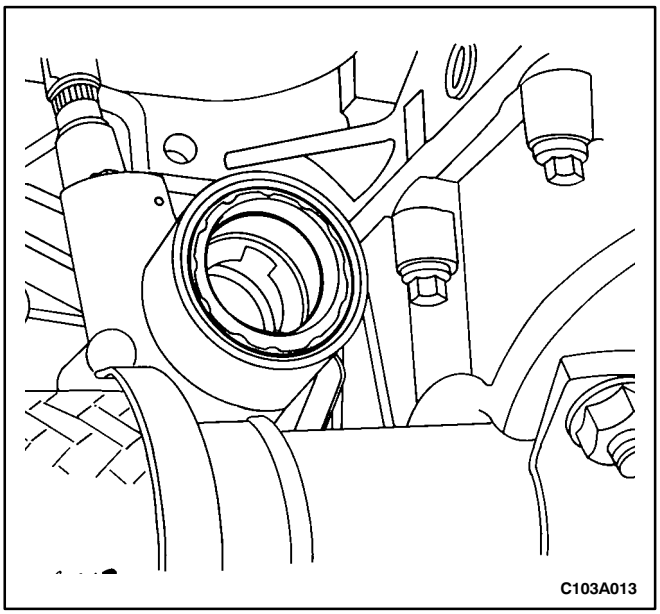

B103A025

5. Remove the left side drive axle fluid seal.

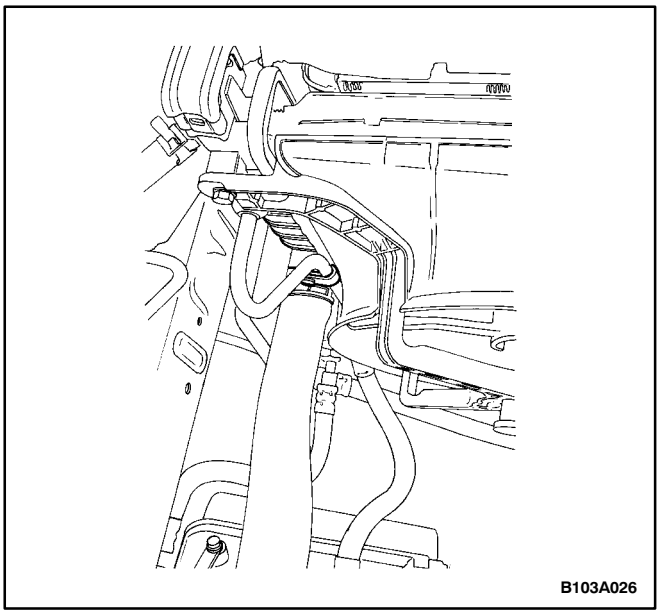
Installation Procedure

1. Install the left side drive axle fluid seal.


B103A025


C103A013

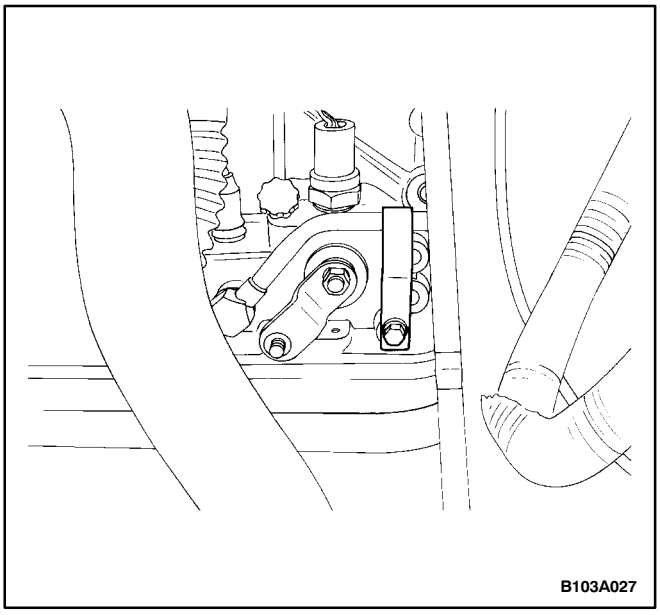
2. Install the right side drive axle fluid seal.
3. Connect the automatic transaxle drive axles to the automatic transaxle. Refer to *Section 3A, Automatic Transaxle Drive Axle.*
4. Install the wheels. Refer to *Section 2E, Tires and Wheels*.
5. Lower the vehicle.


B103A026

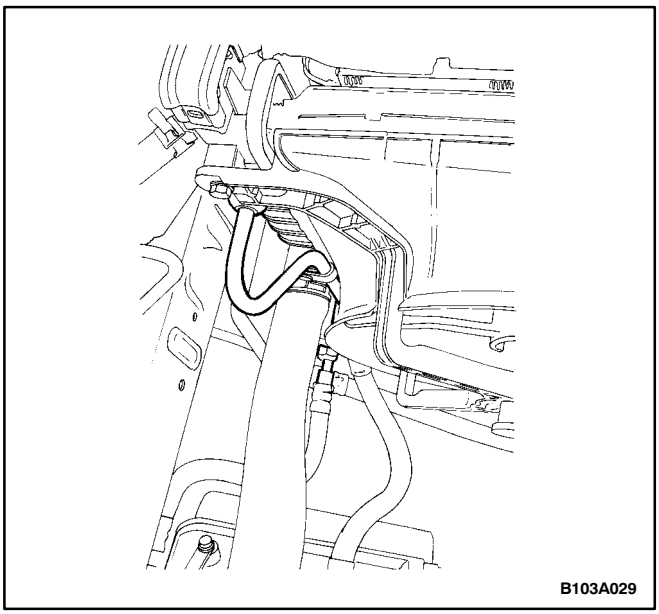
FLUID COOLER PIPES AND HOSES

Removal Procedure

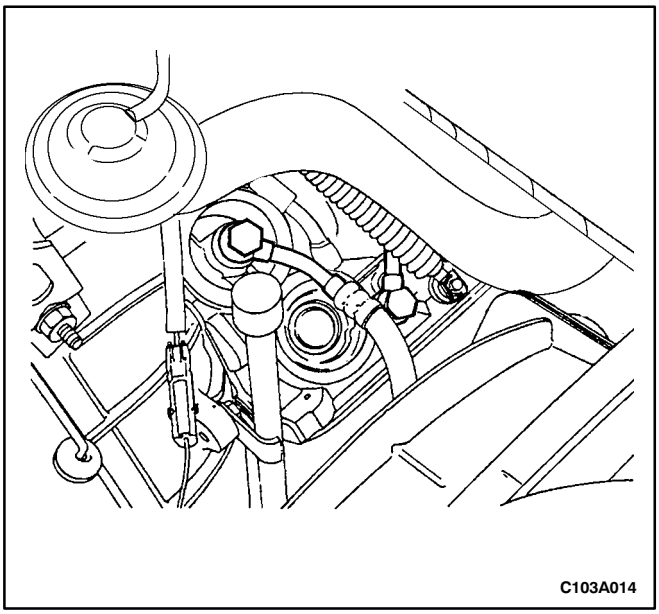
1. Remove the battery and the battery tray.
2. Place a pan under the vehicle to catch any leaking fluid.
3. Remove the securing fastener from the cooler pipe on the radiator.


B103A027

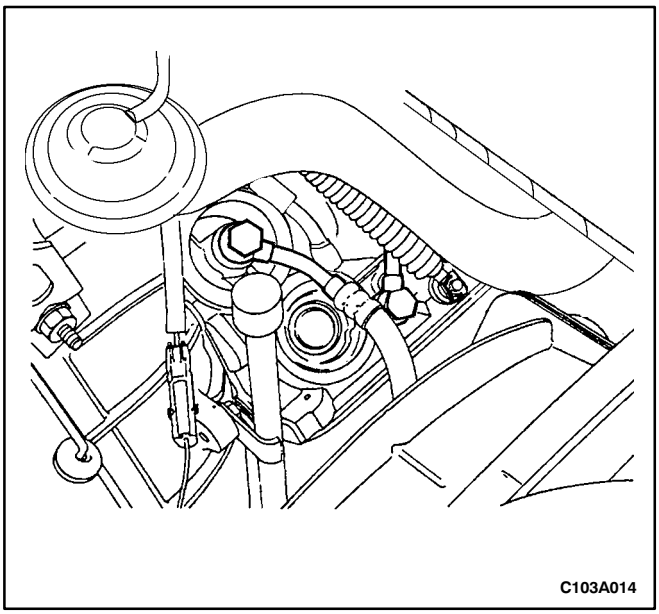
4. Remove the securing fastener from the cooler pipe on the transaxle case.


B103A029

5. Loosen the cooler pipe connections on the radiator.


C103A014

6. Loosen the cooler pipe connections on the transaxle case.
7. Remove the cooler hoses and the cooler pipes.

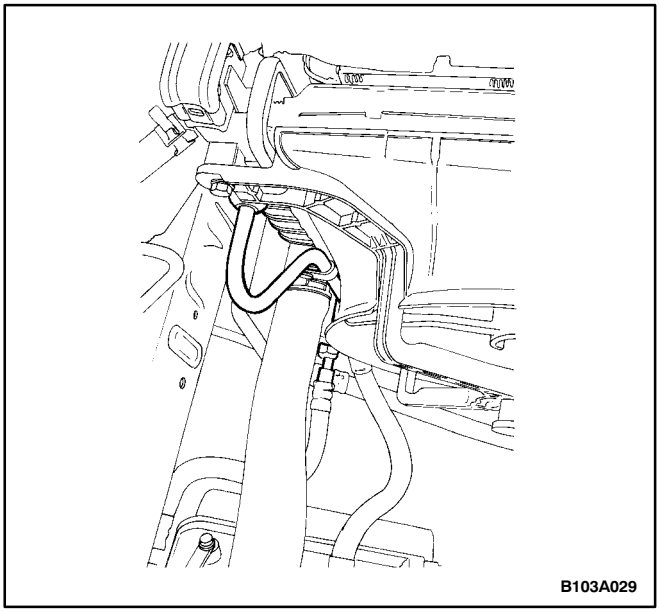

C103A014

Installation Procedure

1. Install the cooler hoses and the cooler pipes.
2. Secure the cooler pipe connections onto the transaxle case with the bolts.

Tighten

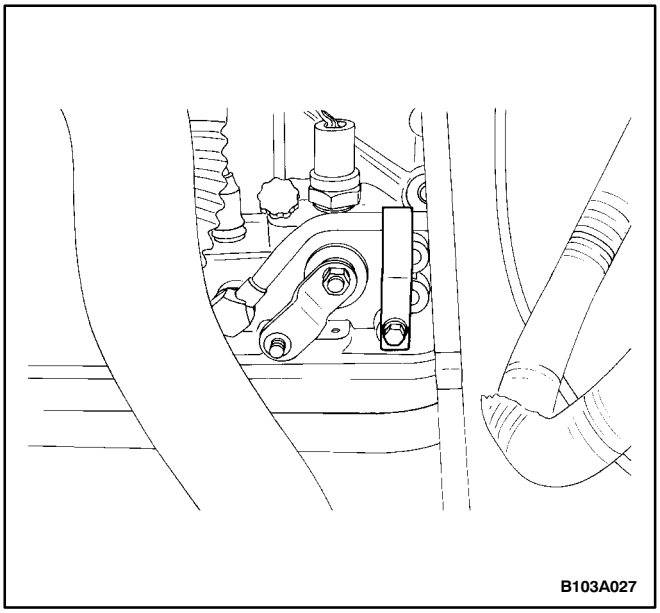
Tighten the cooler pipe-to-transaxle case bolts to 22 N•m (16 lb-ft).


B103A029

3. Secure the pipe connections onto the radiator with the nuts.

Tighten

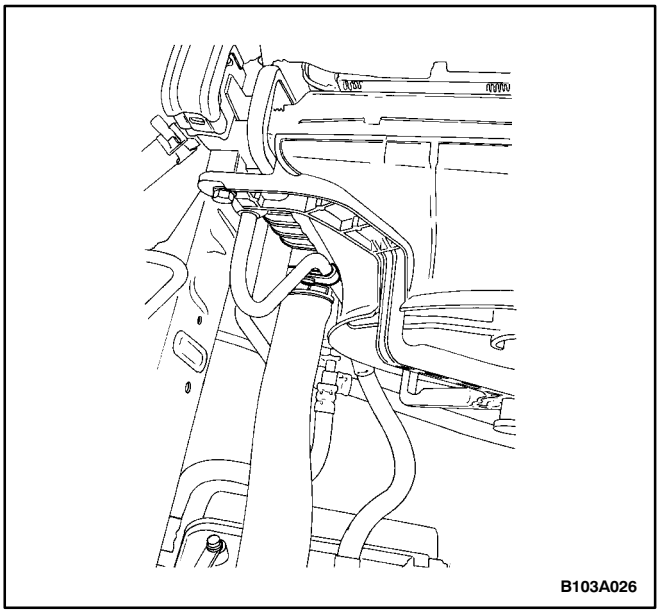
Tighten the cooler pipe-to-radiator nuts to 22 N•m (16 lb-ft).


B103A027

4. Install the cooler pipe securing fastener onto the transaxle case with the fastener bolt.

Tighten

Tighten the cooler pipe-to-transaxle case fastener bolt to 25 N•m (18 lb-ft).

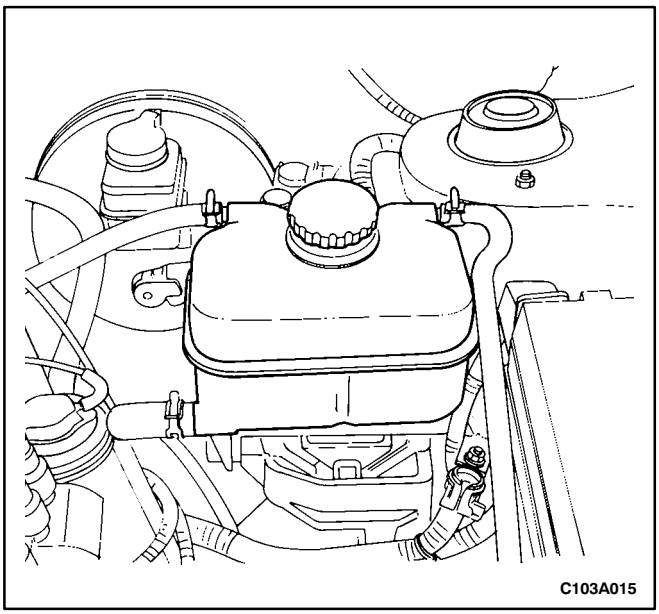

B103A026

5. Install the cooler pipe securing fastener onto the radiator with the fastener bolt.

Tighten

Tighten the cooler pipe-to-radiator fastener bolt to 25 N•m (18 lb-ft).

6. Check the transaxle fluid level. Replace the fluid as needed. Refer to “Fluid Level Set After Service” in this section.
7. Install the battery tray and the battery.


C103A015

TRANSAXLE LEFT MOUNT

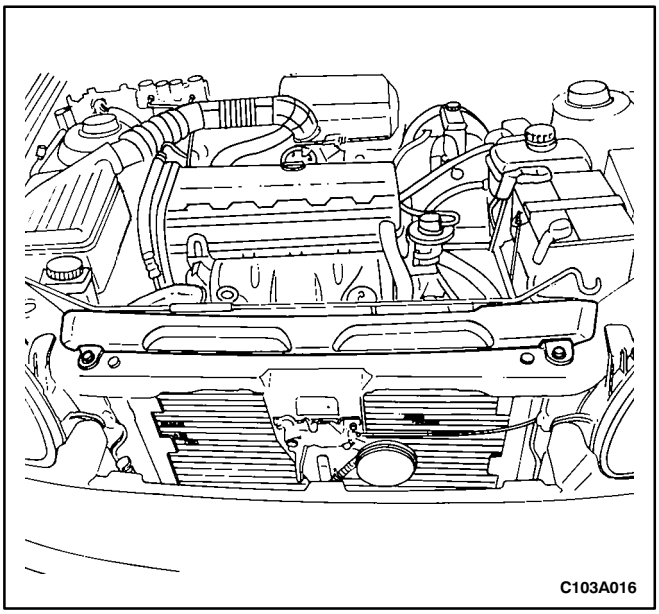
(Left–Hand Drive Shown, Right–Hand Drive Similar)

Tools Required

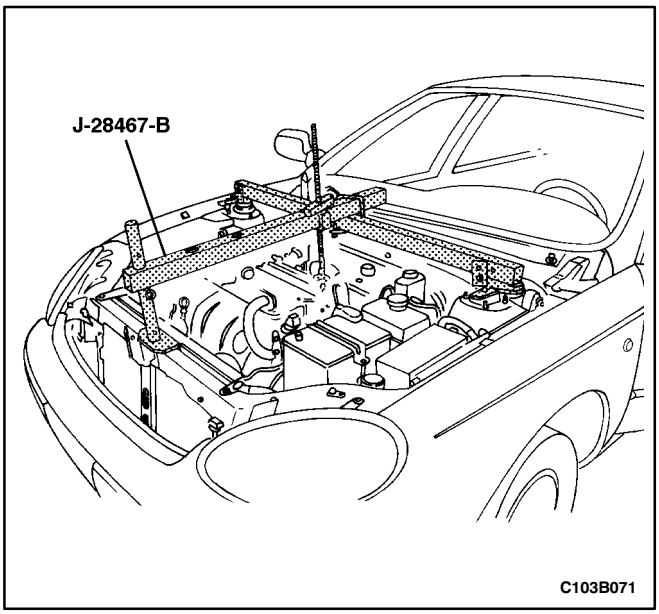
J-28467-B Engine Support Fixture

Removal Procedure

1. Disconnect the battery. Remove the battery and the battery tray.
2. Remove the coolant surge tank.

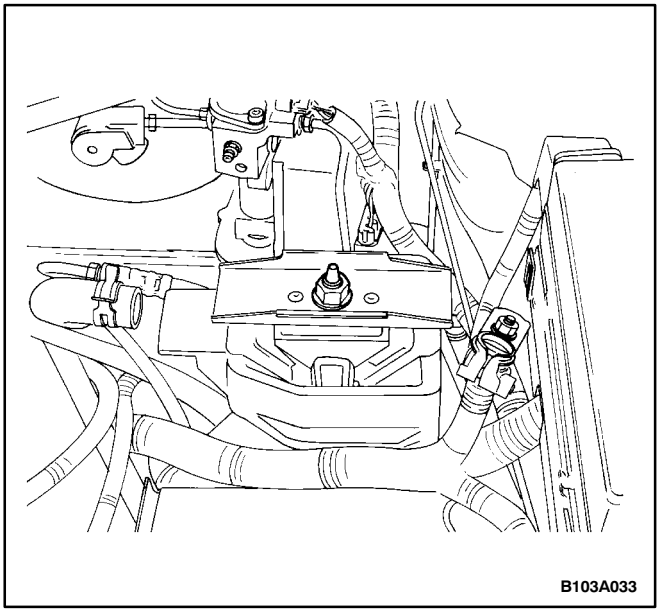

C103A016

3. Remove the upper radiator cover.

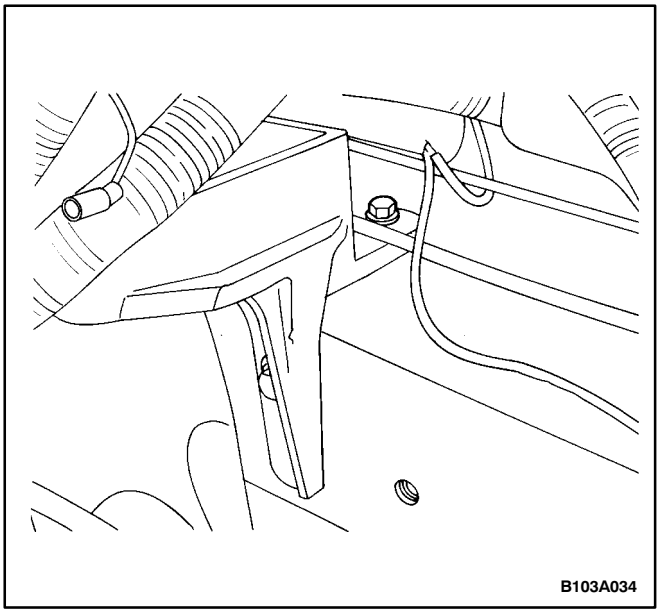


C103B071

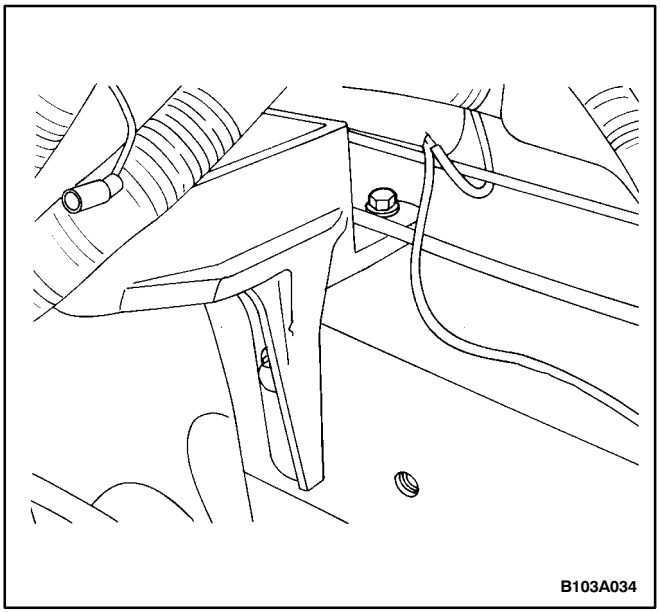
4. Attach the engine support fixture J-28467-B to the right side of the engine. Refer to “Engine Support Fixture” in this section.
5. Support the engine with the engine support fixture J-28467-B.


B103A033

6. Remove the bolt that connects the transaxle left mount to the left transaxle bracket.


B103A034

7. Remove the bolts that connect the transaxle left mount to the vehicle. Two bolts are on each side of the mount.
8. Remove the transaxle left mount.

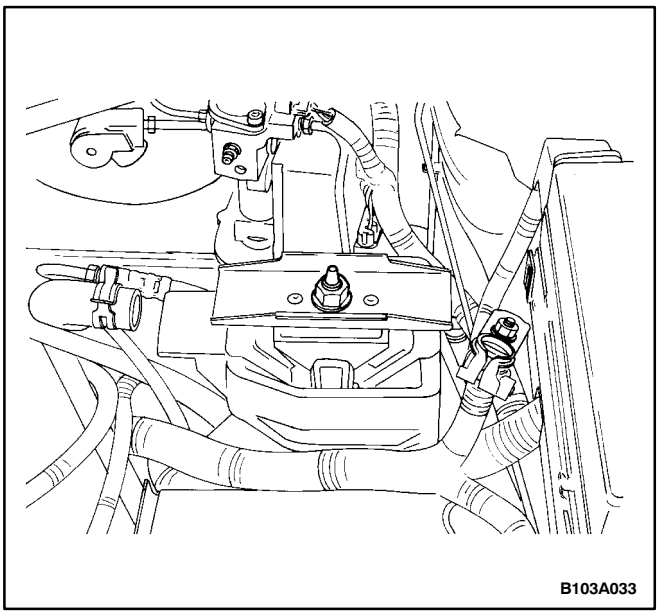

B103A034

Installation Procedure

1. Install the transaxle left mount.
2. Install the bolts that connect the transaxle left mount to the vehicle.

Tighten

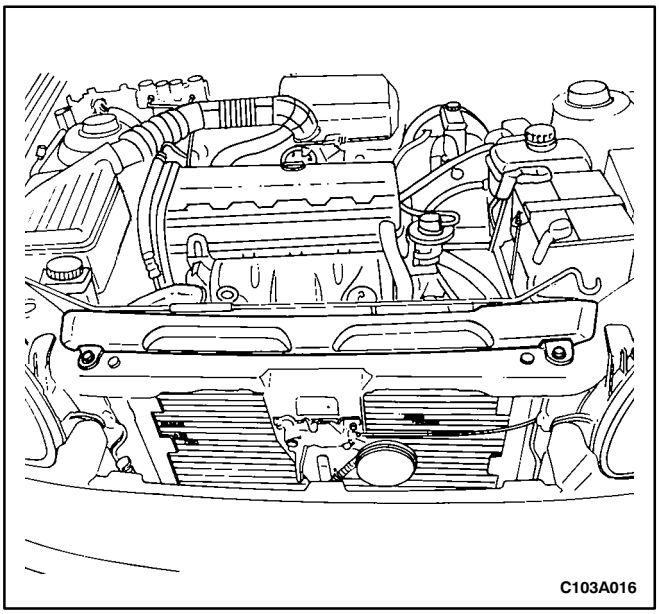
Tighten the transaxle left mount-to-body connecting bolts to 58 N•m (43 lb-ft).


B103A033

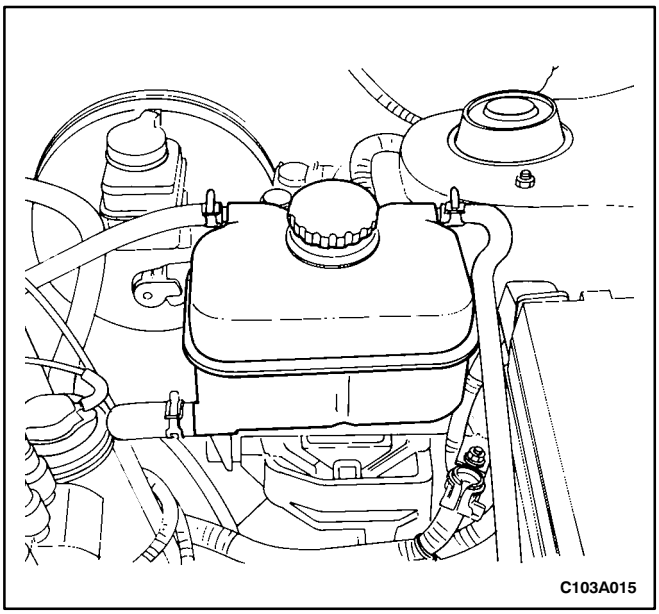
3. Install the bolt that connects the transaxle left mount to the transaxle left bracket.

Tighten

Tighten the transaxle left mount-to-transaxle left bracket connecting bolt to 48 N•m (35 lb-ft).


C103A016

4. Remove the engine support fixture J-28467-B from the engine.
5. Install the upper radiator cover.

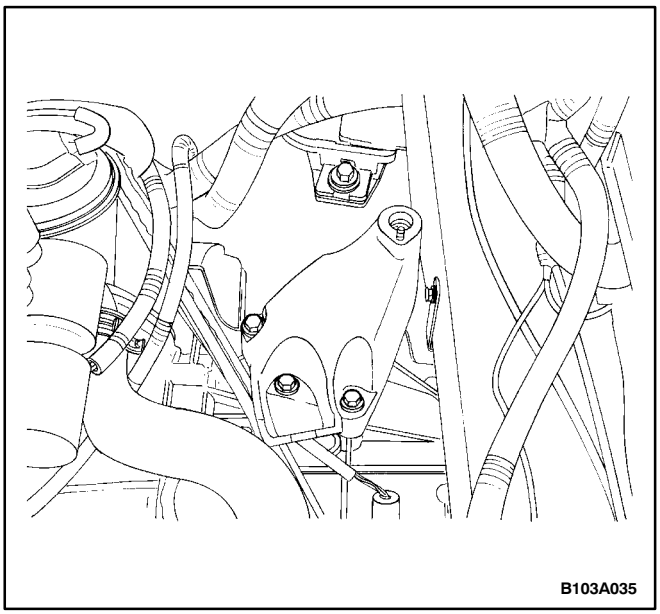

C103A015

6. Install the coolant surge tank with the bolts.

Tighten

Tighten the coolant surge tank mounting bolts to 25 N•m (18 lb-ft).

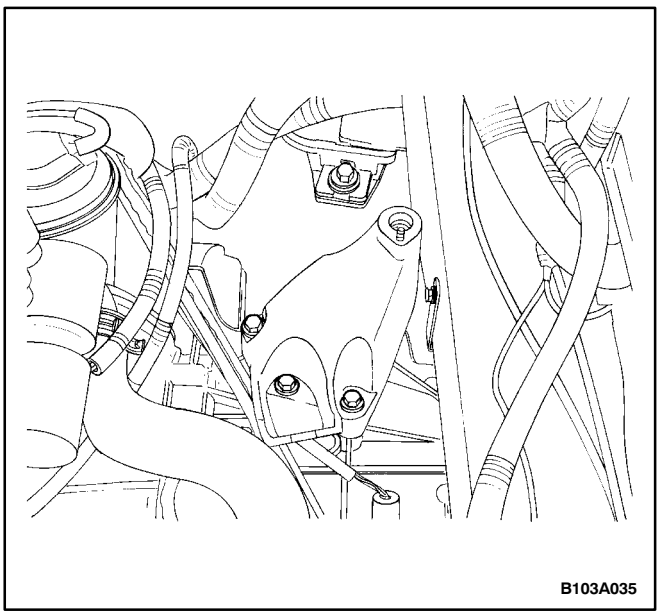
7. Install the battery tray and the battery. Connect the battery.


B103A035

TRANSAXLE LEFT BRACKET

Removal Procedure

1. Remove the battery and the battery tray.
2. Remove the transaxle mount. Refer to “Transaxle Mount” in this section.
3. Disconnect the shift control cable from the transaxle left bracket.
4. Disconnect the shift control cable from the selector lever. Refer to “Shift Control Cable” in this section.
5. Remove the bolts that connect the transaxle to the transaxle left bracket.
6. Remove the transaxle left bracket.


B103A035

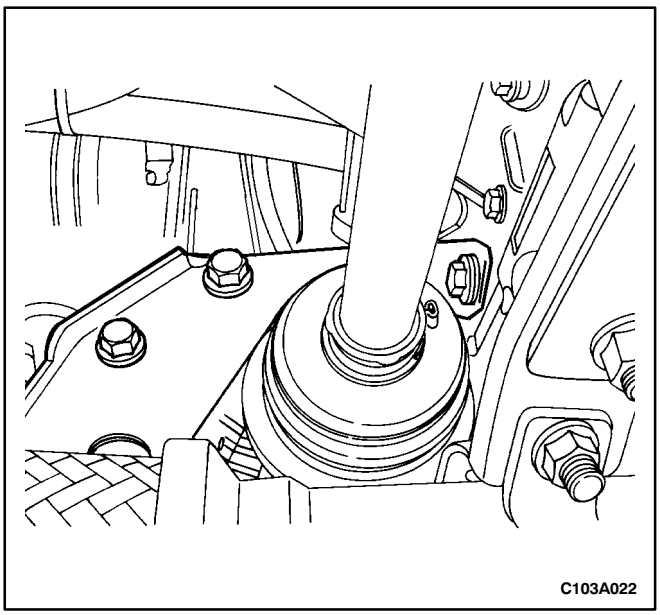
Installation Procedure

1. Install the transaxle left bracket.
2. Install the bolts that connect the transaxle left bracket to the transaxle.

Tighten

Tighten the transaxle left bracket connecting bolts to 48 N•m (35 lb-ft).

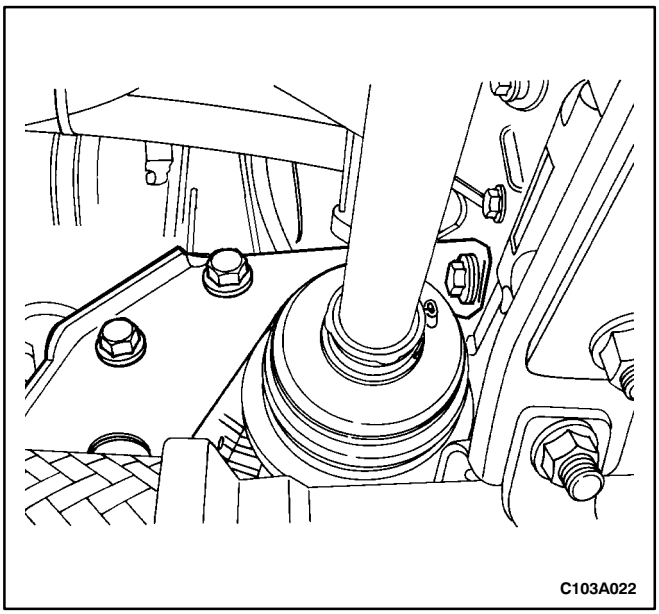
3. Install the transaxle mount. Refer to “Transaxle Mount” in this section.
4. Connect the shift control cable to the selector lever.
5. Connect the shift control cable. Refer to “Shift Control Cable” in this section.
6. Adjust the shift control cable. Refer to “Control Cable Adjustment” in this section.
7. Install the battery tray and the battery.


C103A022

TRANSAXLE CENTER BRACKET

Removal Procedure

1. Remove the center member from the vehicle. Refer to *Section 9N, Frame and Underbody.*
2. Remove the bolts that connect the transaxle center bracket to the transaxle.
3. Remove the bolt that connects the transaxle center bracket to the engine.
4. Remove the transaxle center bracket.


C103A022

Installation Procedure

1. Install the transaxle center bracket to the transaxle with the bolts.

Tighten

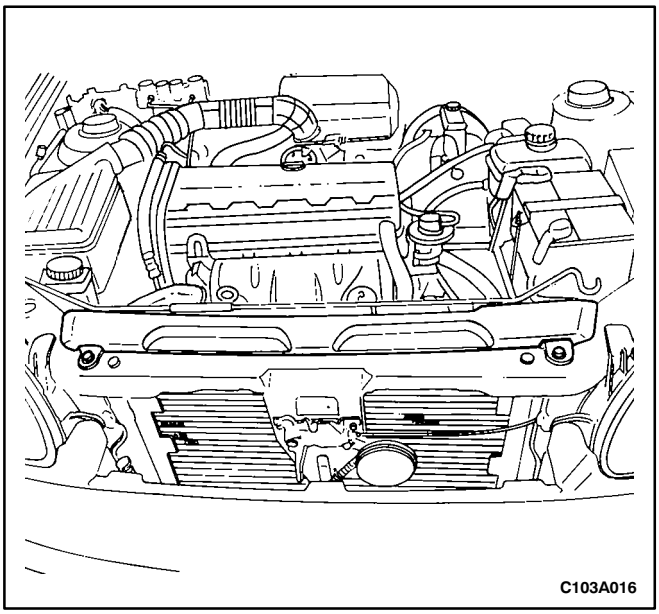
Tighten the transaxle center bracket-to-transaxle bolts to 90 N•m (66 lb-ft).

2. Install the transaxle center bracket to the engine with the bolt.

Tighten

Tighten the transaxle center bracket-to-engine bolt to 90 N•m (66 lb-ft).

3. Install the center member into the vehicle. Refer to *Section 9N, Frame and Underbody.*


C103A016

TRANSAXLE ASSEMBLY

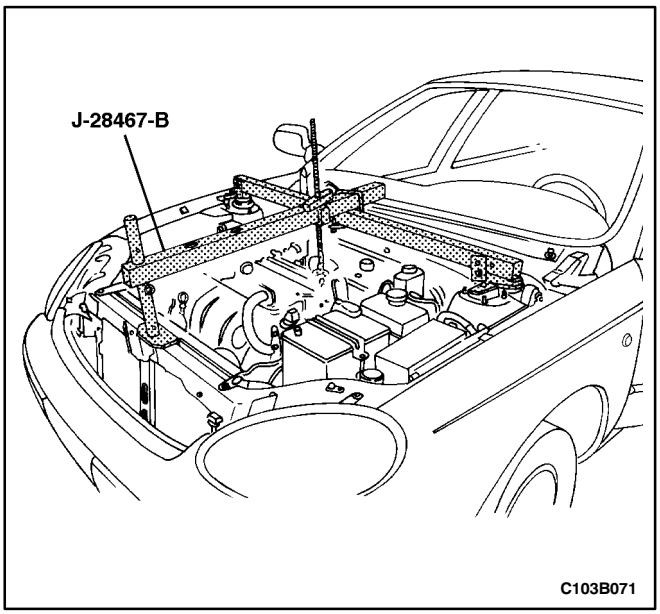
(Left–Hand Drive Shown, Right–Hand Drive Similar)

Tools Required

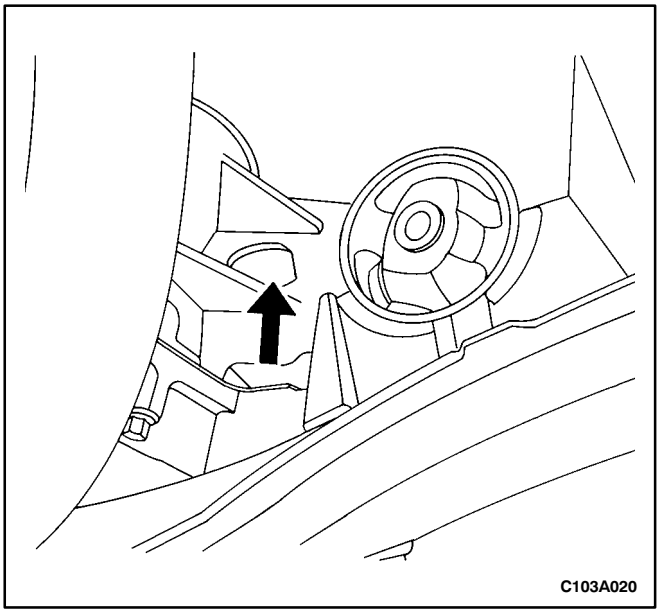
J-28467-B Engine Support Fixture

Removal Procedure

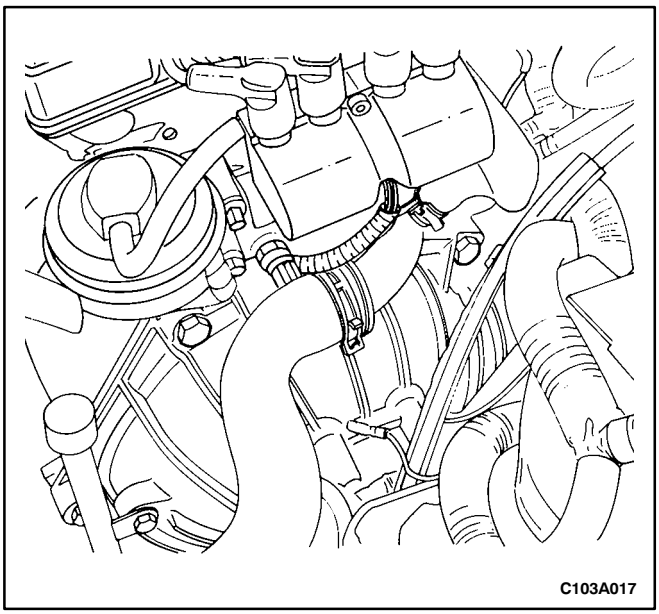
1. Remove the battery and the battery tray.
2. Disconnect the shift control cable from the transaxle bracket.
3. Disconnect the shift control cable from the selector lever. Refer to “Shift Control Cable” in this section.
4. Disconnect the neutral start switch from the wiring harness. Refer to “Neutral Start Switch” in this section.
5. Disconnect the throttle valve cable from the throttle cable wheel. Refer to “Throttle Valve Cable” in this section.
6. Remove the upper radiator cover.



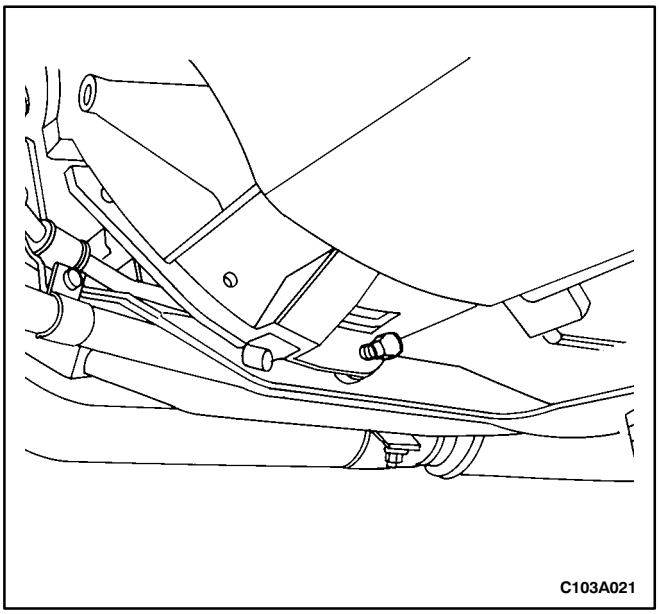
7. Attach the engine support fixture J-28467-B to the right side of the engine. Refer to “Engine Support Fixture” in this section.
8. Support the engine with the engine support fixture J-28467-B.
9. Disconnect the transaxle from the transaxle bracket. Refer to “Transaxle Bracket” in this section.
10. Raise and suitably support the vehicle.
11. Remove the engine under covers. Refer to *Section 9N, Frame and Underbody*.
12. Drain the transaxle fluid. Refer to “Changing Fluid” in this section.
13. Disconnect the vehicle speed sensor electrical connector. Refer to “Speed Sensor” in this section.
14. Lower the vehicle.
15. Remove the fluid cooler hoses and the cooler pipes from the transaxle case. Refer to “Fluid Cooler Pipes” in this section.
16. Remove the bolts that connect the transaxle to the transaxle bracket. Refer to “Transaxle Bracket” in this section.
17. Raise the vehicle.
18. Remove the wheels. Refer to *Section 2E, Tires and Wheels*.
19. Disconnect the automatic transaxle drive axles from the automatic transaxle. Refer to *Section 3A, Automatic Transaxle Drive Axle*.
20. Remove the forward engine mount. Refer to *Section 1B, SOHC Engine Mechanical* or *Section 1C, DOHC Engine Mechanical*.



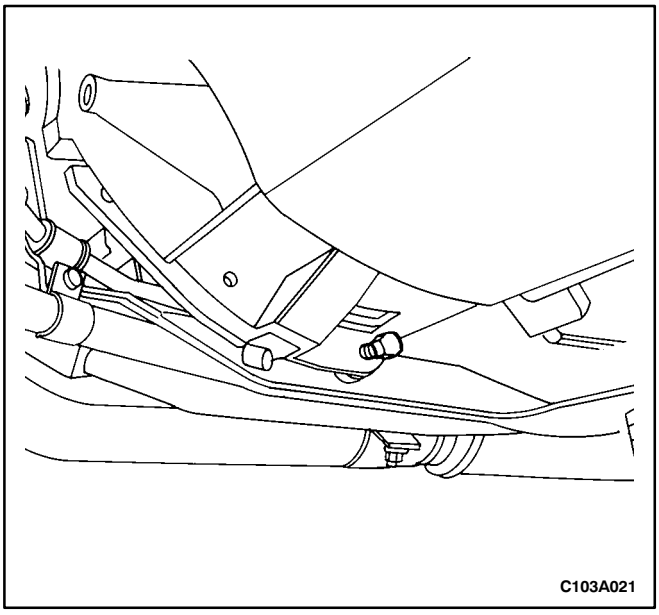
21. Rotate the flex plate through the hole at the bottom of the transaxle to gain access to all the torque converter bolts through the hole at the side of the engine.
22. Remove the torque converter bolts from the flex plate.


C103A017

23. Lower the vehicle.
24. Remove the bell housing upper bolts.


C103A021

25. Raise the vehicle.
26. Support the transaxle from below with a transaxle jack.
27. Remove the bell housing lower bolts.
28. Remove the bolts that connect the transaxle center bracket to the transaxle. Refer to “Transaxle Center Bracket” in this section.
29. Lower the transaxle and remove it from the vehicle.

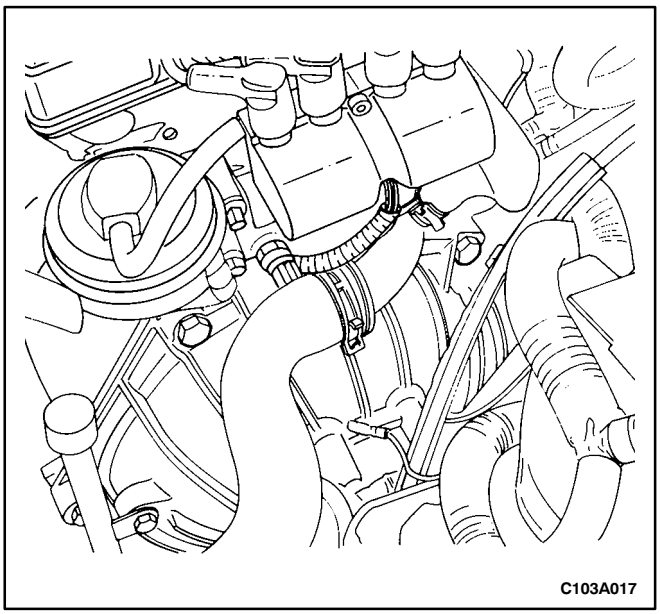

C103A021

Installation Procedure

1. Install the transaxle into the vehicle with the transaxle jack.
2. Install the bell housing lower bolts.

Tighten

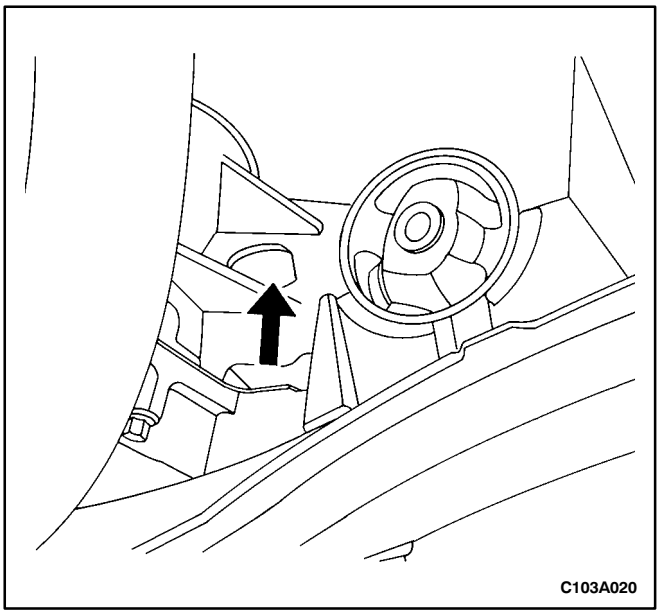
Tighten the bell housing-to-engine lower bolts to 75 N•m (55 lb-ft).


C103A017

3. Remove the transaxle jack and lower the vehicle.
4. Install the bell housing upper bolts.

Tighten

Tighten the bell housing-to-engine upper bolts to 75 N•m (55 lb-ft).

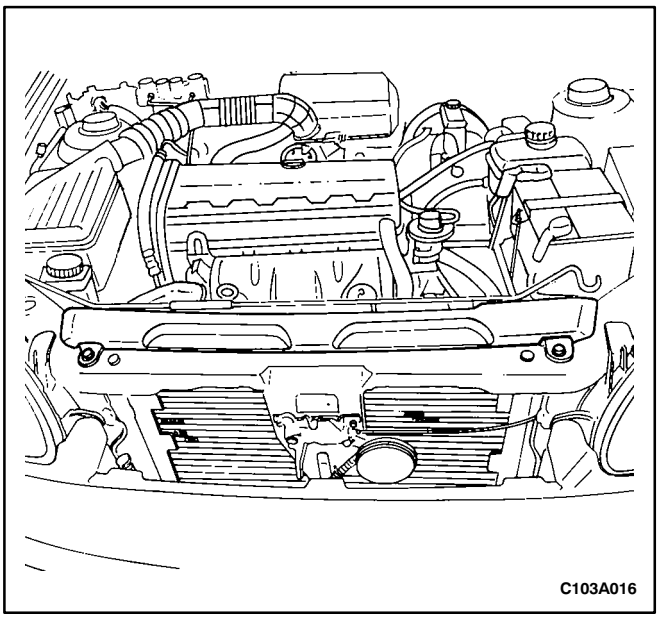

C103A020

5. Raise the vehicle.
6. Install the torque converter bolts that connect the flywheel and the torque converter. Rotate the flywheel to install all the torque converter bolts.

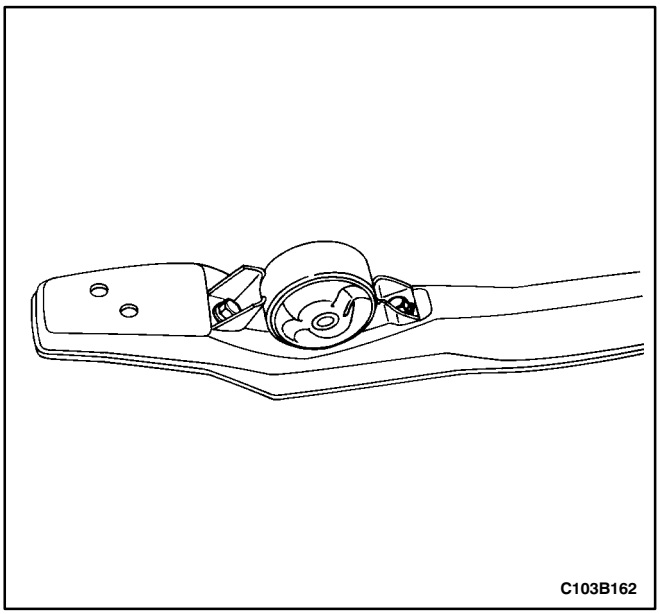
Tighten

Tighten the torque converter-to-flywheel bolts to 60 N•m (44 lb-ft).

7. Install the forward engine mount. Refer to *Section 1B, SOHC Engine Mechanical* or *Section 1C, DOHC Engine Mechanical*.
8. Install the bolts that connect the transaxle to the transaxle center bracket. Refer to “Transaxle Center Bracket” in this section.


C103A016

9. Connect the speed sensor electrical connector. Refer to “Speed Sensor” in this section.
10. Connect the automatic transaxle drive axles to the automatic transaxle. Refer to *Section 3A, Automatic Transaxle Drive Axle*.
11. Install the wheels. Refer to *Section 2E, Tires and Wheels*.
12. Lower the vehicle.
13. Install the bolts that connect the transaxle bracket to the transaxle. Refer to “Transaxle Bracket” in this section.
14. Remove the engine support fixture J-28467-B from the engine.
15. Install the fluid cooler hoses and the cooler pipes onto the transaxle case. Refer to “Fluid Cooler Pipes” in this section.
16. Install the upper cable stop to the throttle cable wheel. Refer to “Throttle Valve Cable” in this section.
17. Connect the neutral start switch to the wiring harness. Refer to “Neutral Start Switch” in this section.
18. Connect the shift control cable to the transaxle bracket.
19. Connect the shift control cable to the selector lever. Refer to “Shift Control Cable” in this section.
20. Install the upper radiator cover.
21. Install the battery tray and the battery.

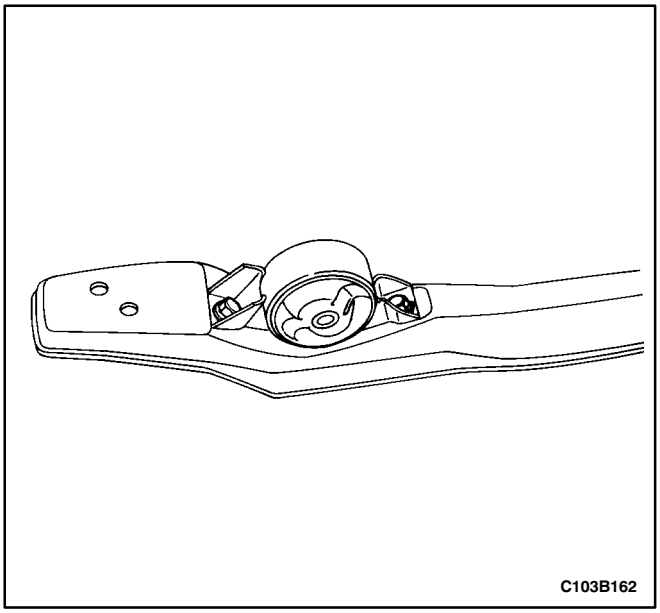

C103B162

UNIT REPAIR

TRANSAXLE CENTER MOUNT

Disassembly Procedure

1. Remove the center member from the vehicle. Refer to *Section 9N, Frame and Underbody*.
2. Remove the transaxle center mount-to-center member bolts.
3. Remove the transaxle center mount.

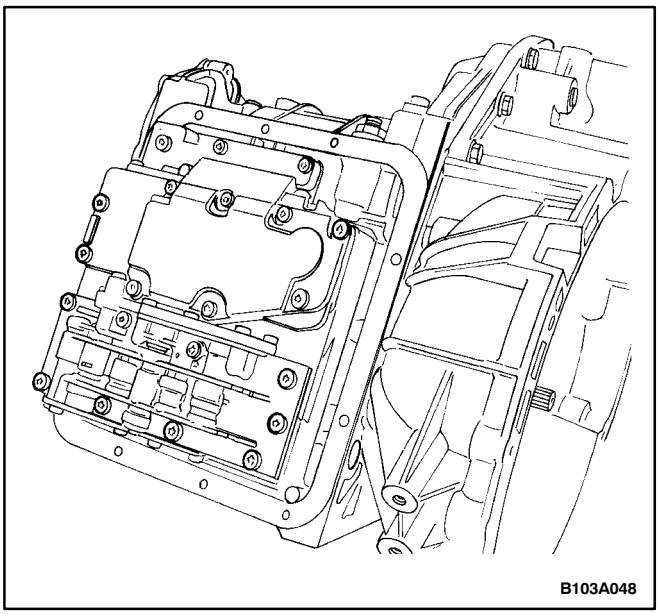

C103B162

Assembly Procedure

1. Install the transaxle center mount.
2. Install the transaxle center mount-to-center member bolts.

   Tighten

   Tighten the transaxle center mount-to-center member bolts to 65 N•m (48 lb-ft).
3. Install the center member into the vehicle. Refer to *Section 9N, Frame and Underbody*.


B103A048

MAJOR COMPONENT DISASSEMBLY

Tools Required

J-26941 Outer Ring Puller Ring Remover

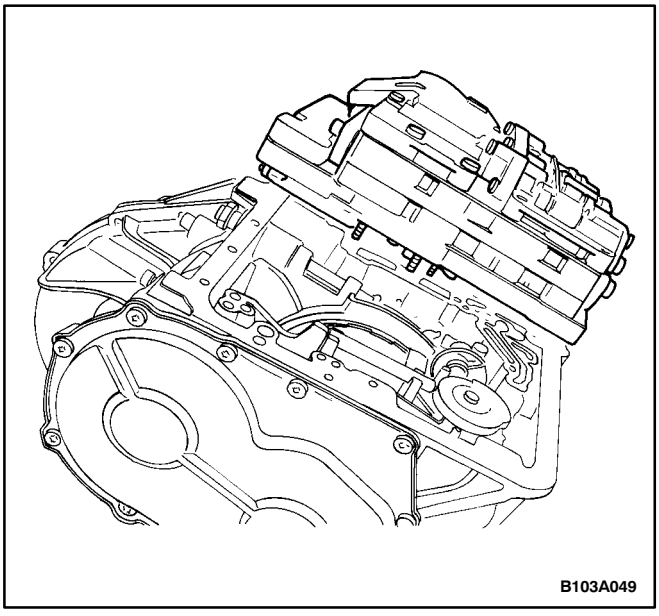
KA-001-023 Bolt Remover

KA-000-155 Grooved Nut Socket

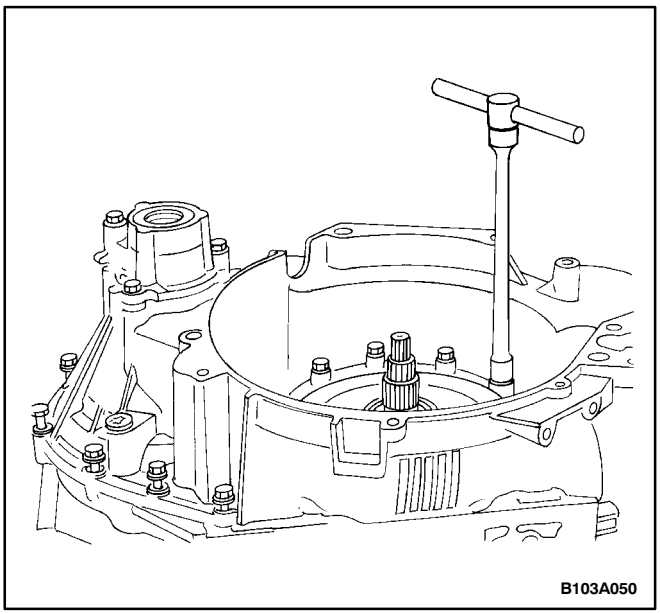
KA-000-288 Side Shaft Retainer

Disassembly Procedure

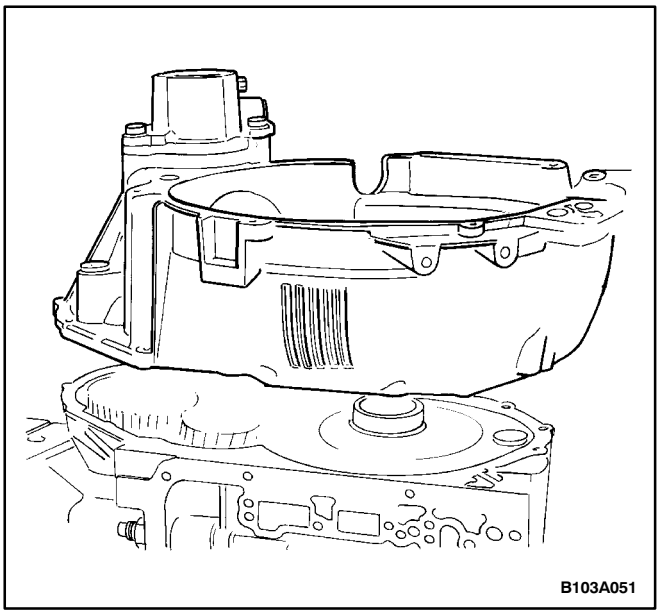
1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the torque converter from the transaxle assembly.
3. Secure the transaxle to a bench holding device so the transaxle can rotate through 180 degrees.
4. Start with the fluid pan in the UP position.
5. Remove the fluid pan and the fluid pan gasket. Refer to “Pan and Gasket” in this section.
6. Remove the largest bolts attaching the valve body to the transaxle.


B103A049

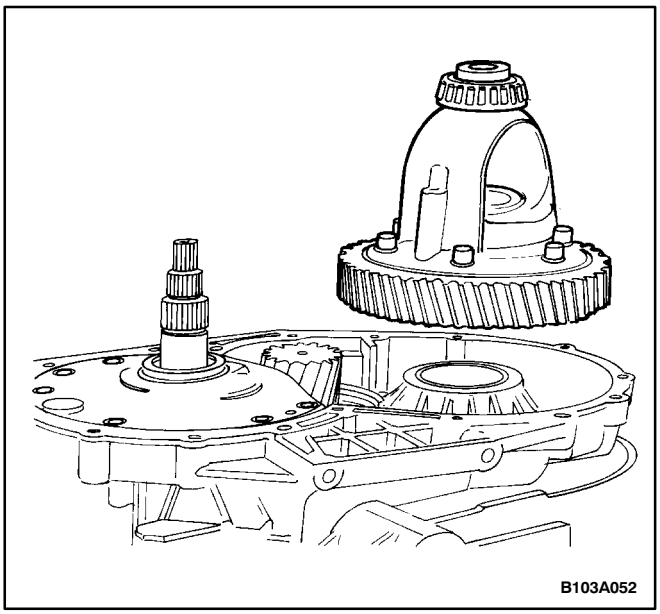
7. Remove the valve body.


B103A050

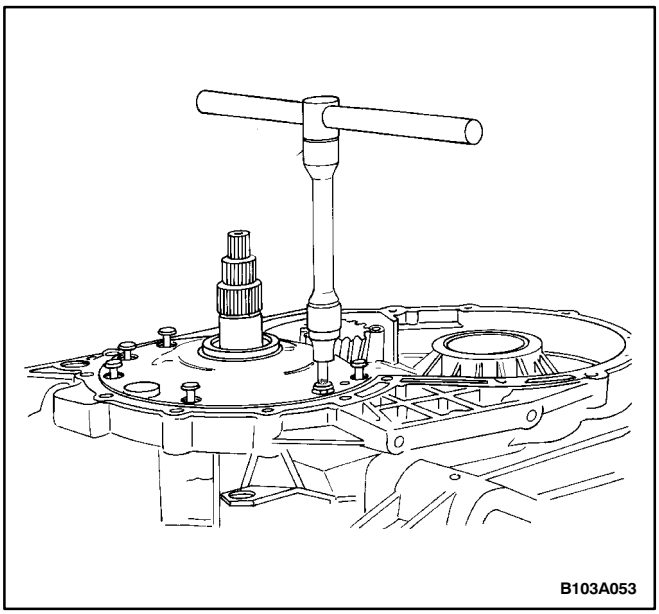
8. Rotate the transaxle 90 degrees so the bell housing is in the UP position.
9. Remove the bolts holding the bell housing to the transaxle case.


B103A051

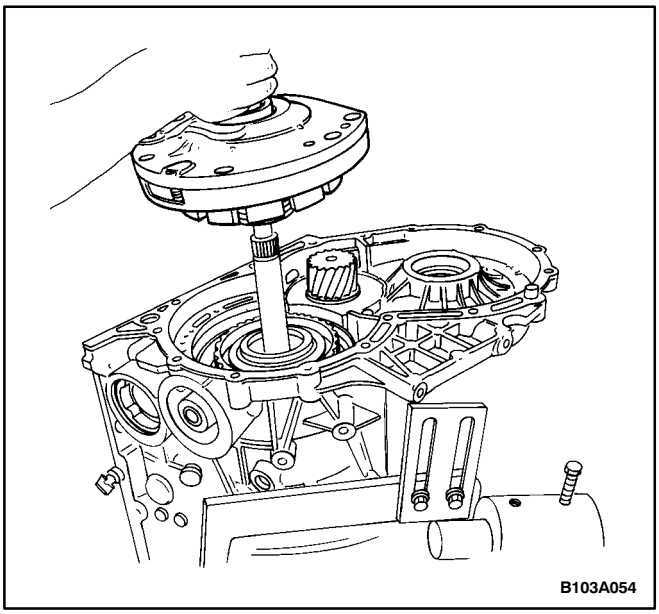
10. Remove the bell housing and the gasket. Remove the speedometer gear from the bell housing.


B103A052

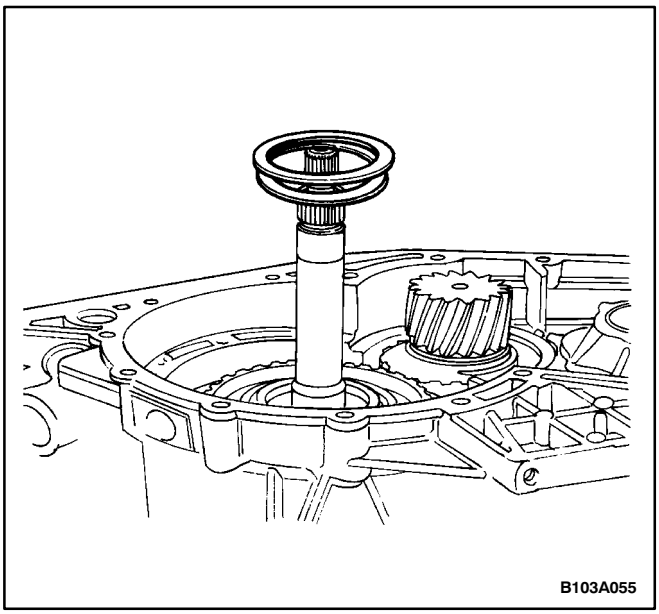
11. Remove the differential gear assembly.


B103A053

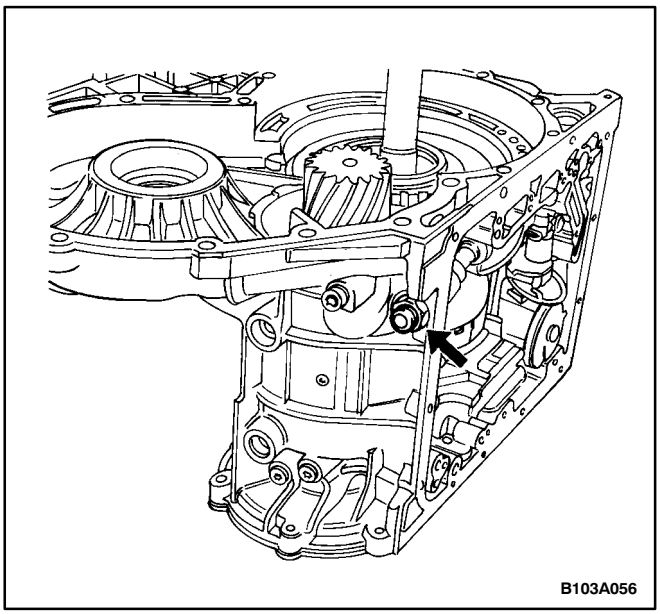
12. Remove the intermediate plate bolts.


B103A054

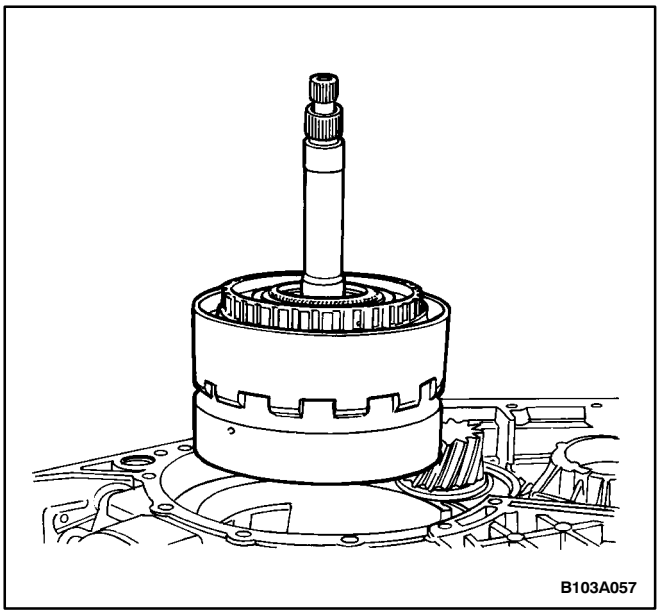
13. Remove the intermediate plate, the pump, and the brake C assembly.


B103A055

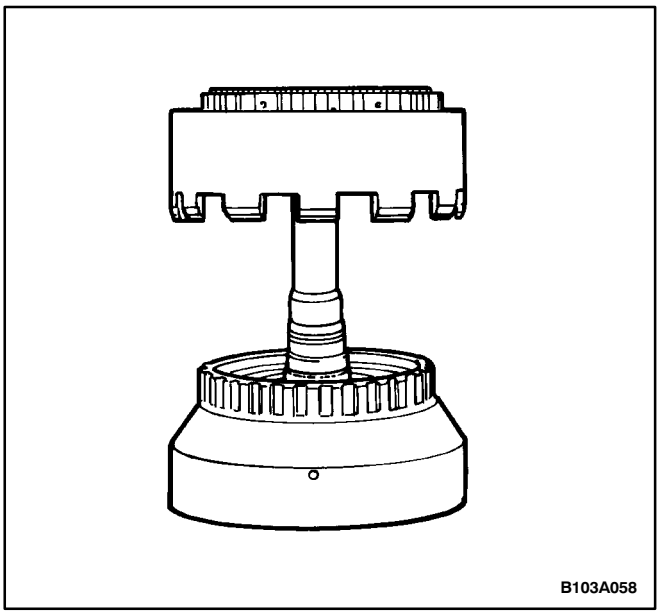
14. Remove the thrust washer and the adjustment washers.


B103A056

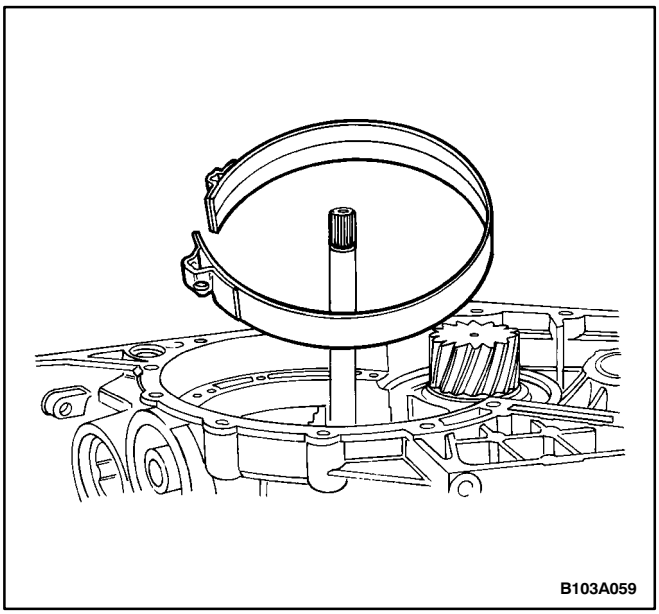
15. Loosen the band C′ by loosening the lock nut and turning the bolt counterclockwise.


B103A057

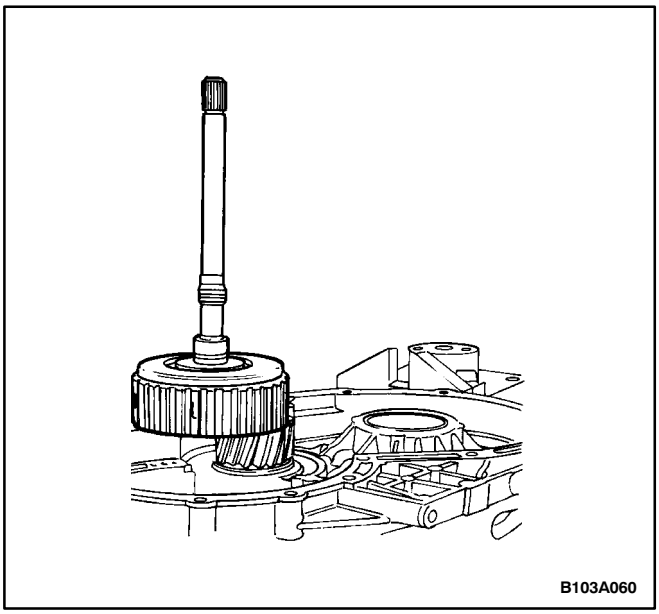
16. Remove the clutch A, the clutch B, and the second freewheel as a unit.


B103A058

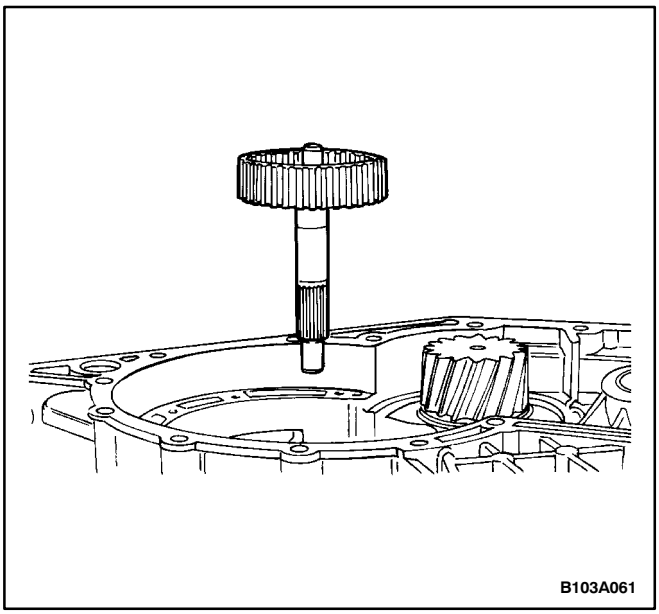
17. Remove the clutch A from the clutch B.


B103A059

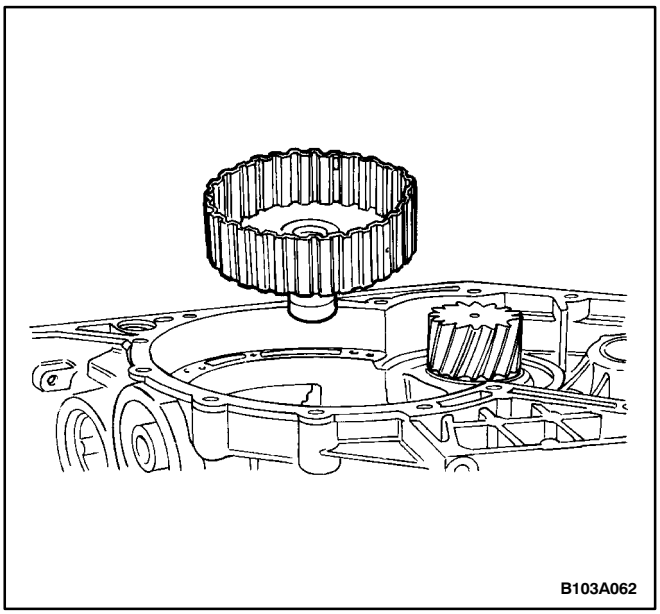
18. Remove the band C′. Do not bend it.


B103A060

19. Remove the motor shaft together with the clutch E assembly.

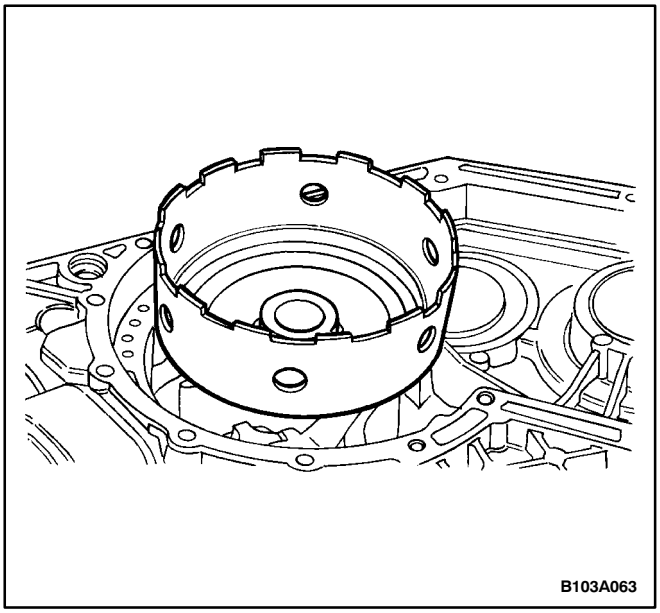

B103A061

20. Remove the intermediate shaft with the clutch E carrier and the bearing.



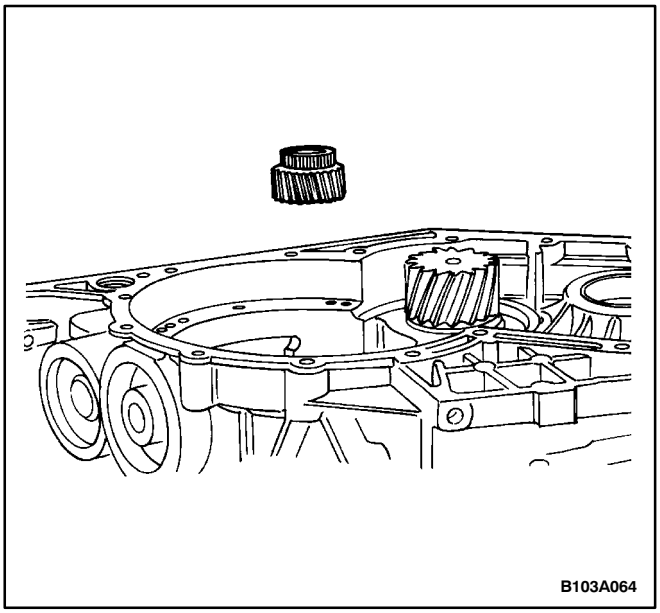
B103A062

21. Remove the sun shaft with the carrier A, the washer, and the bearing as a complete unit.



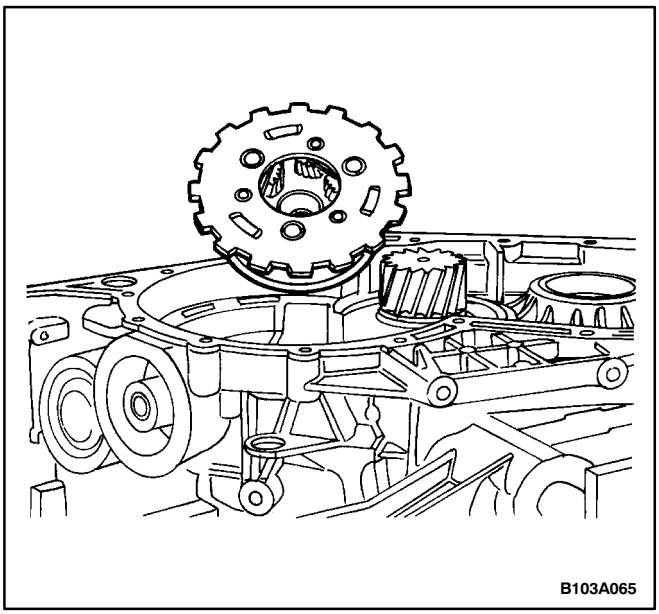
B103A063

22. Remove the drive shell and the bearing as an assembly.

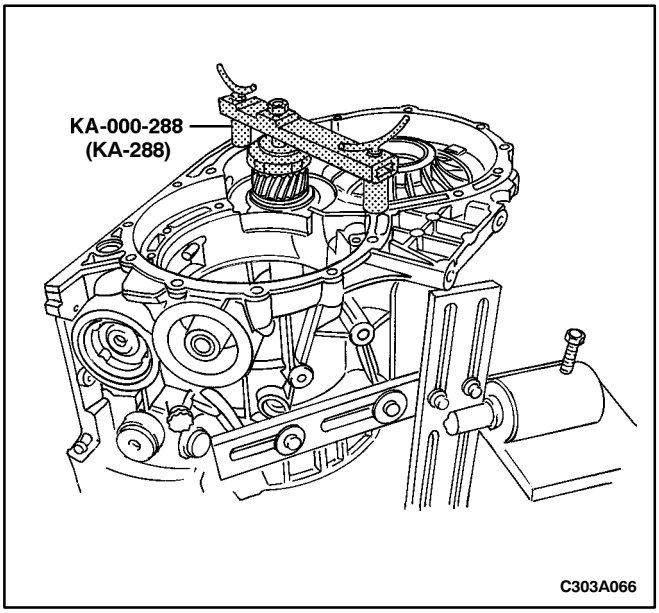


B103A064

23. Remove the sun gear.

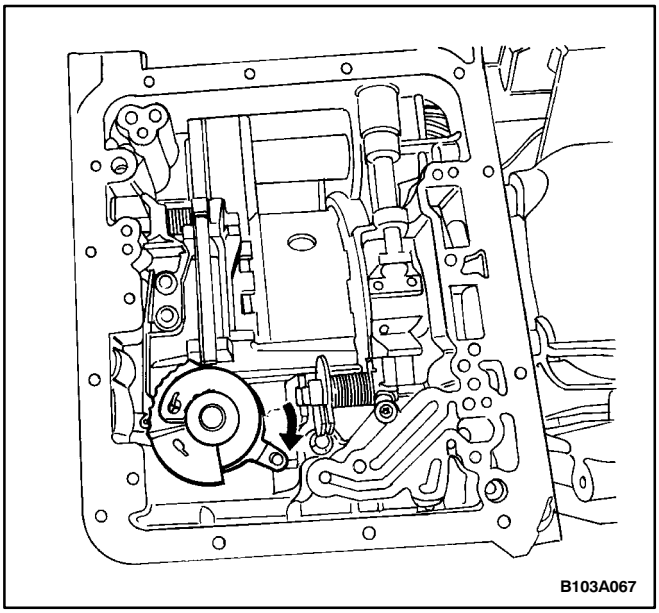

B103A065

24. Remove the planetary assembly and the needle bearing.

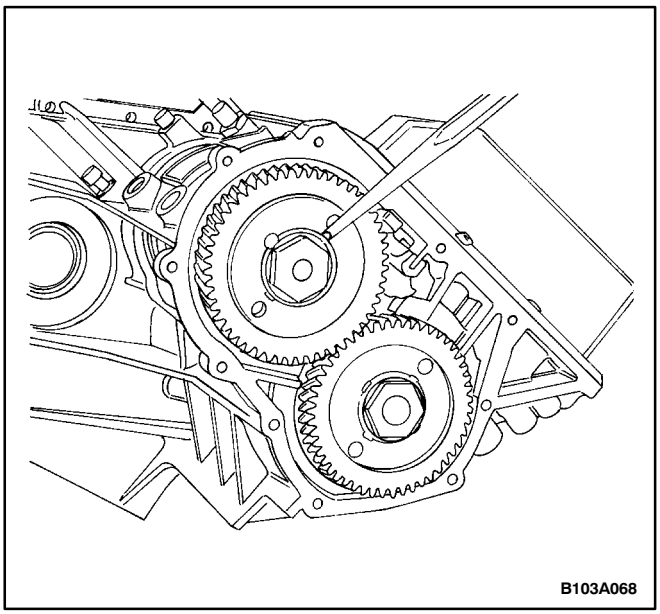


C303A066

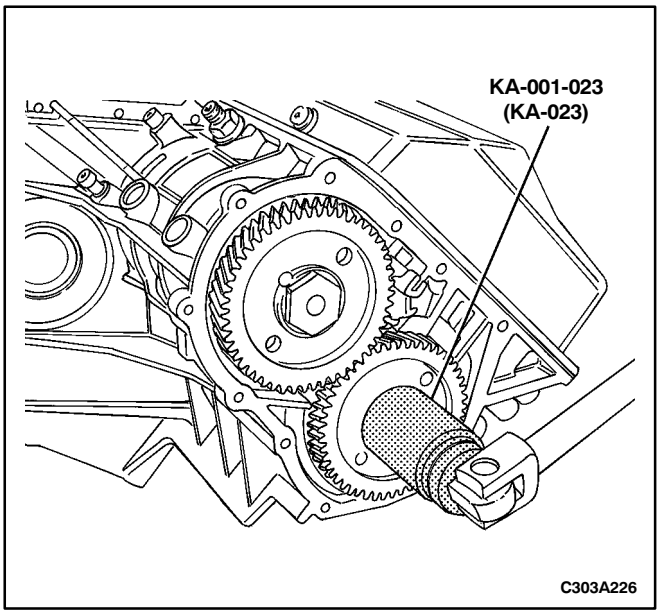
25. Use the side shaft retainer KA-000-288 (KA-288) to hold the side shaft in place.


B103A067

26. Rotate the transaxle 90 degrees so the PARK/LOCK components are in the UP position.
27. Remove the side cover bolts, the side cover, and the gasket. Refer to “Case Side Cover Pan and Gasket” in this section.
28. Make sure the gear selector is in the PARK position.

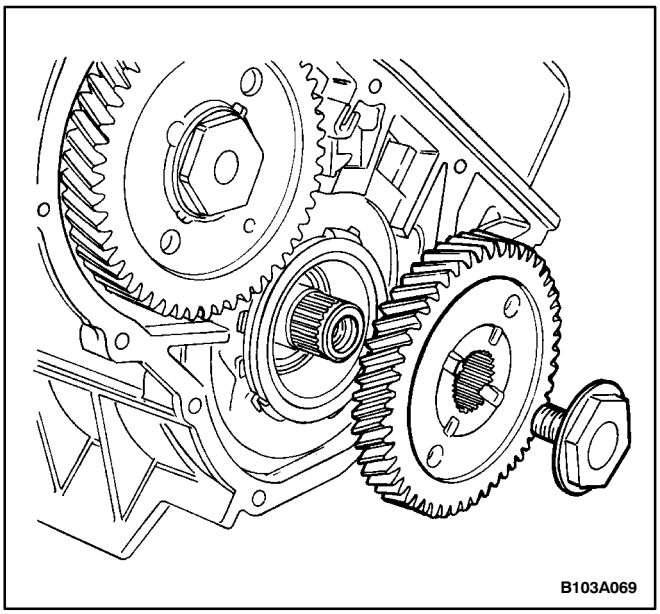

B103A068

29. Bend the locking tabs on the spur gear securing bolts.

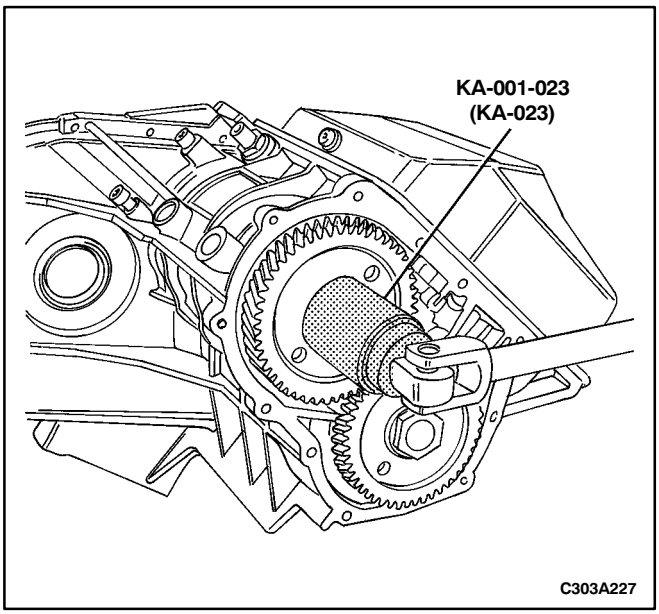


C303A226

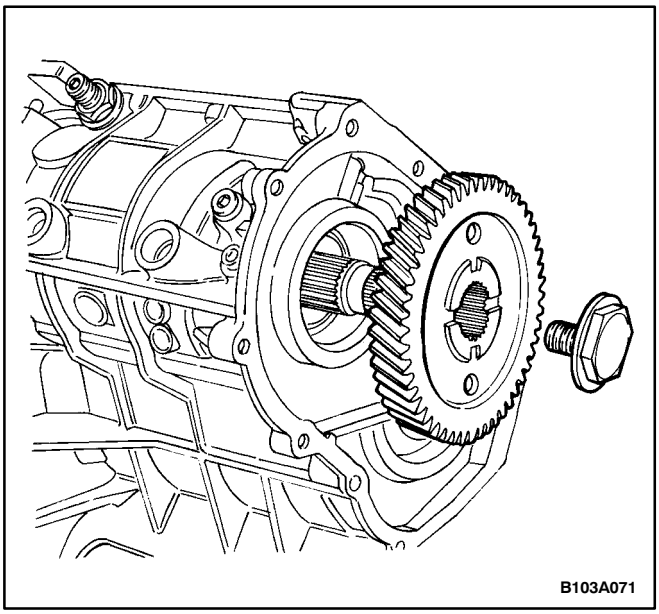
30. Loosen the small spur gear bolt with the bolt remover KA-001-023 (KA-023).


B103A069

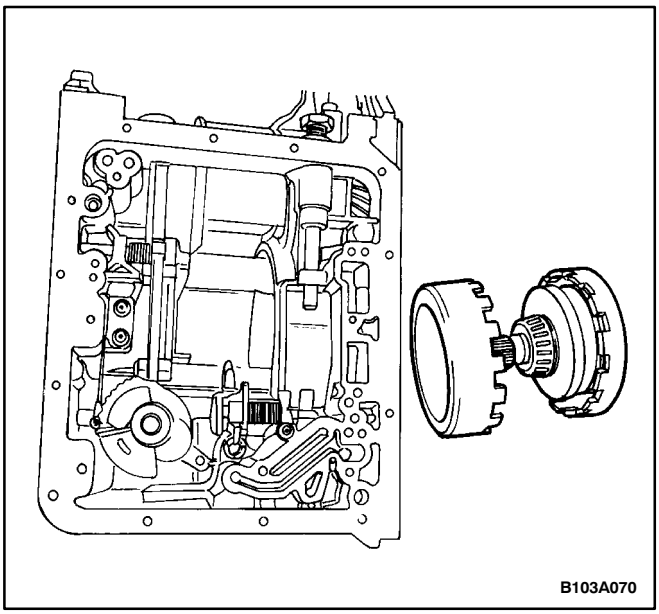
31. Remove the securing bolt on the smaller spur gear and remove the small spur gear.



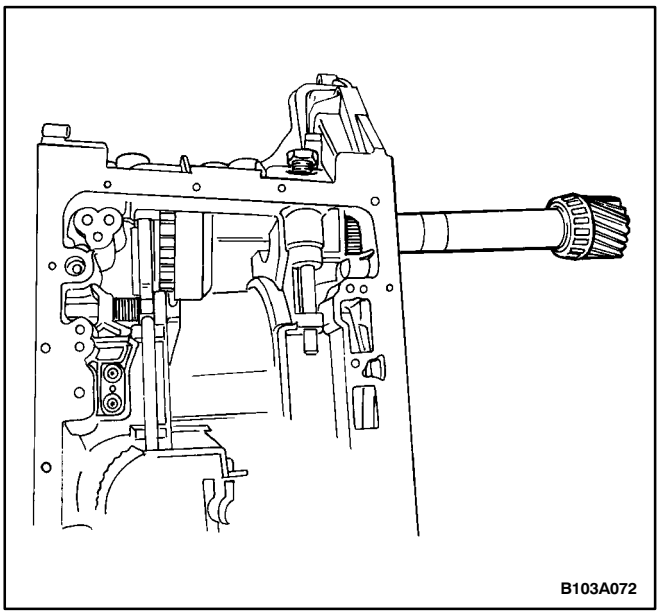
32. Loosen the large spur gear bolt with the bolt remover KA-001-023 (KA-023).



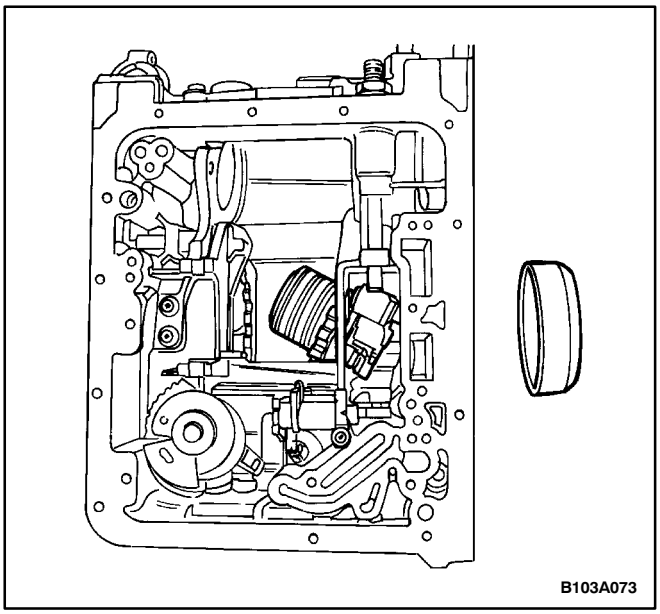
33. Remove the securing bolt on the larger spur gear and remove the large spur gear.



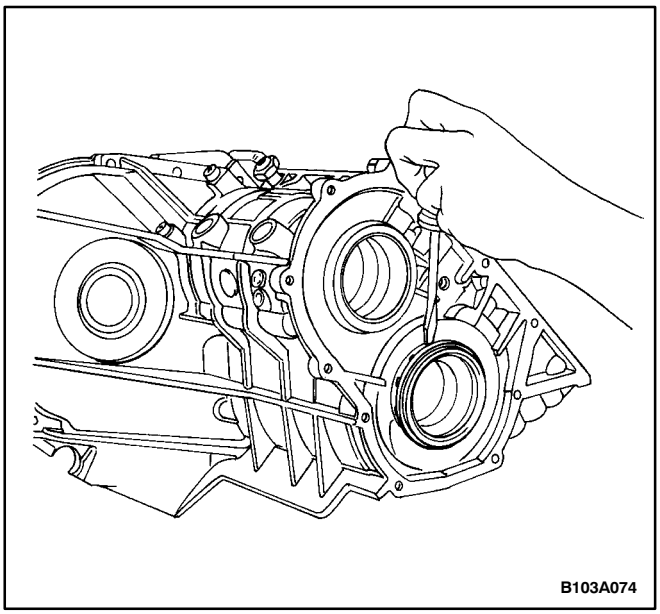
34. Remove the output shaft and the hollow gear together with the web gear.


B103A072

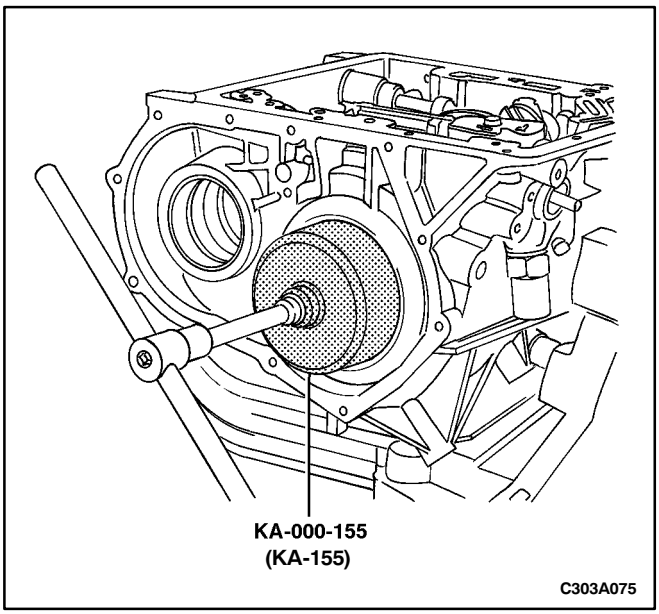
35. Remove the side shaft retainer KA-288 from the side shaft gear.
36. Remove the side shaft.


B103A073

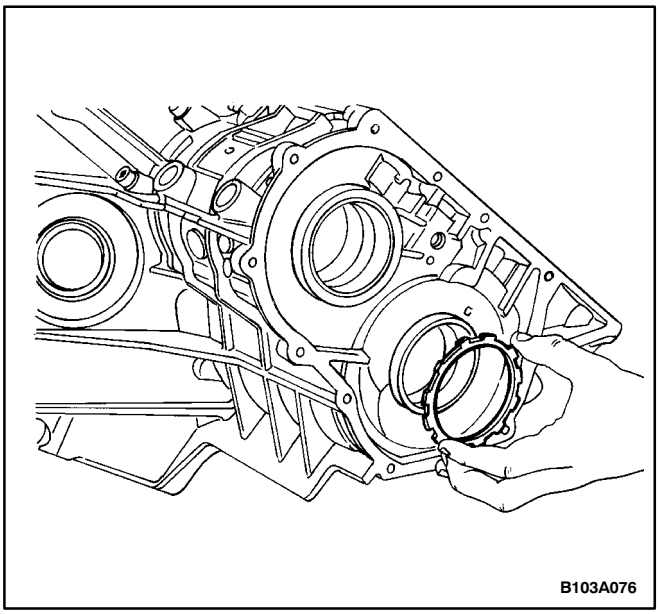
37. Disengage the PARK position and remove the cover plate and the governor assembly.


B103A074

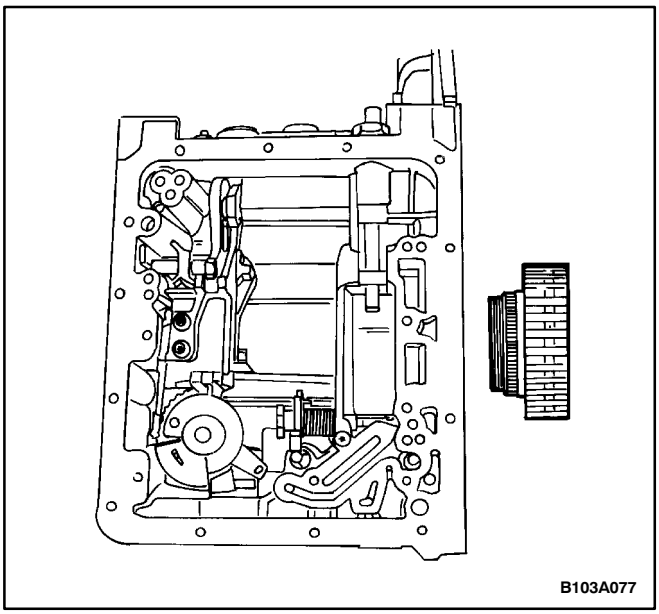
38. Bend the locking tabs on the first freewheel locknut washer.



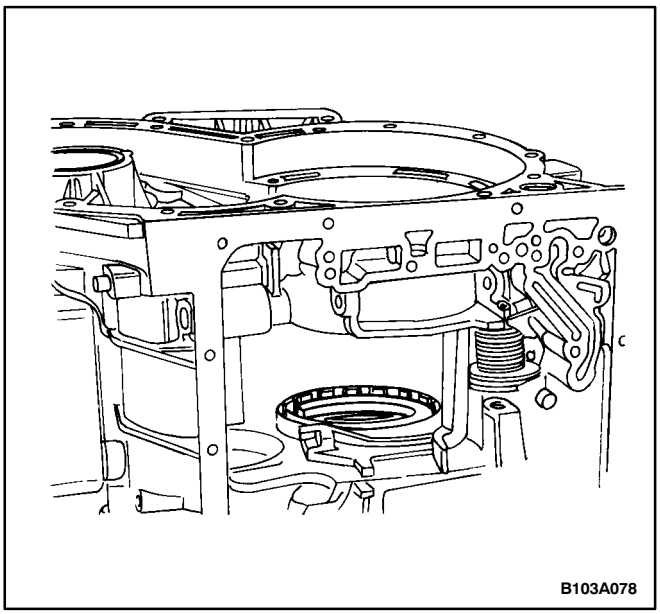
39. Loosen the first freewheel locknut washer using the grooved nut socket KA-000-155 (KA-155).



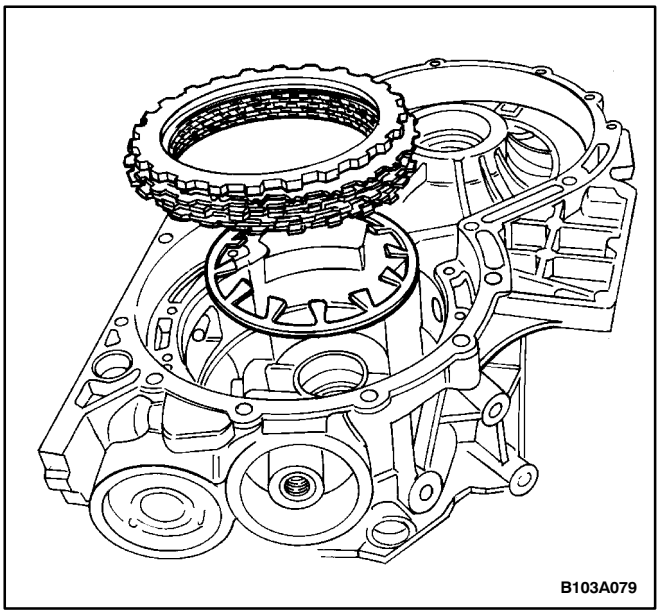
40. Remove the first freewheel locknut washer and the first freewheel ring.



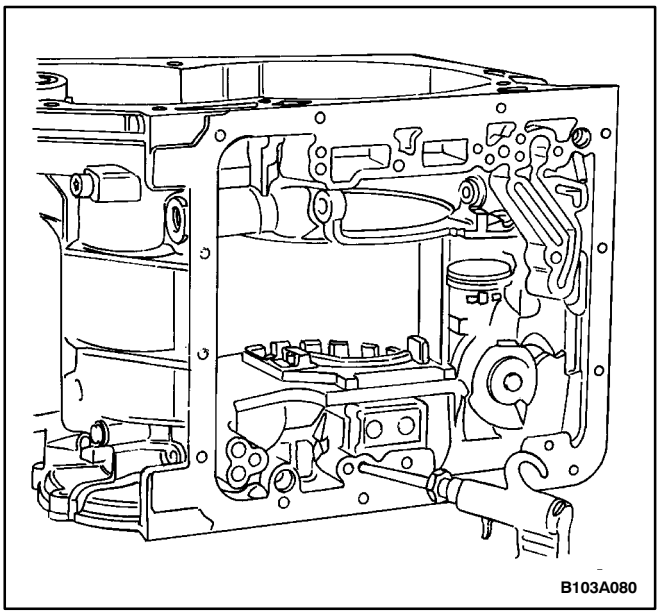
41. Remove the first freewheel.


B103A078

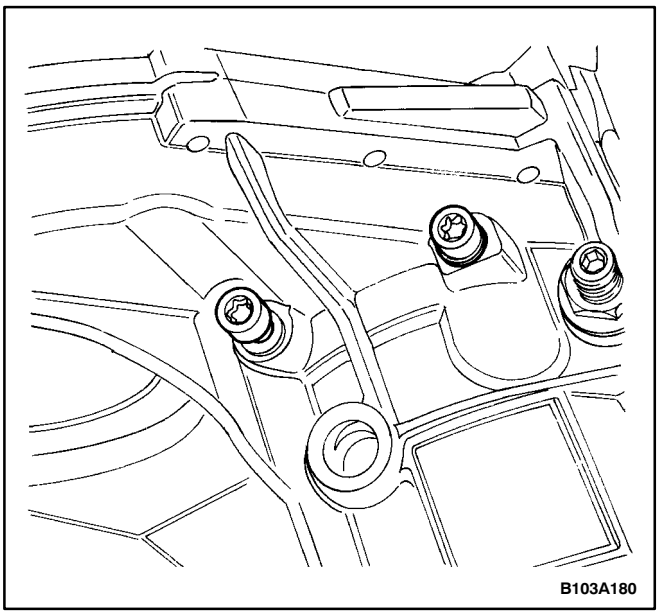
42. Rotate the transaxle 90 degrees so the side shaft outer ring is in the UP position.
43. Remove the brake D snap ring from inside the case.


B103A079

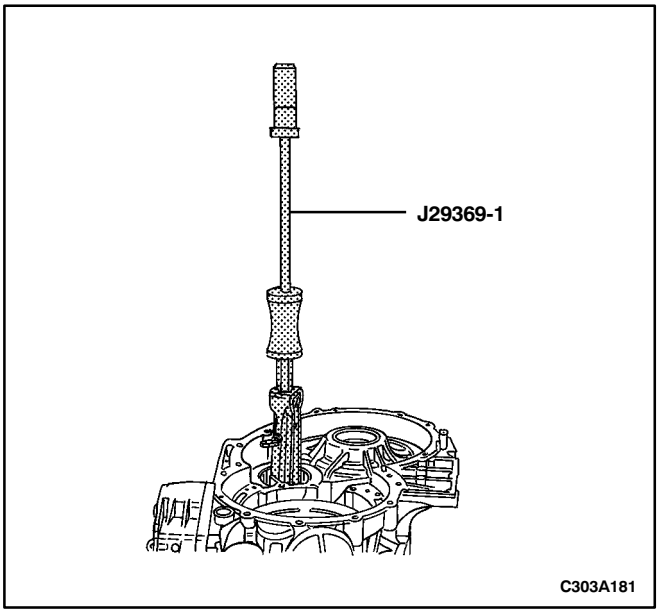
44. Remove the brake D assembly and the plate spring.


B103A080

45. Remove the brake D piston by injecting air into the fluid feed hole with an air gun.

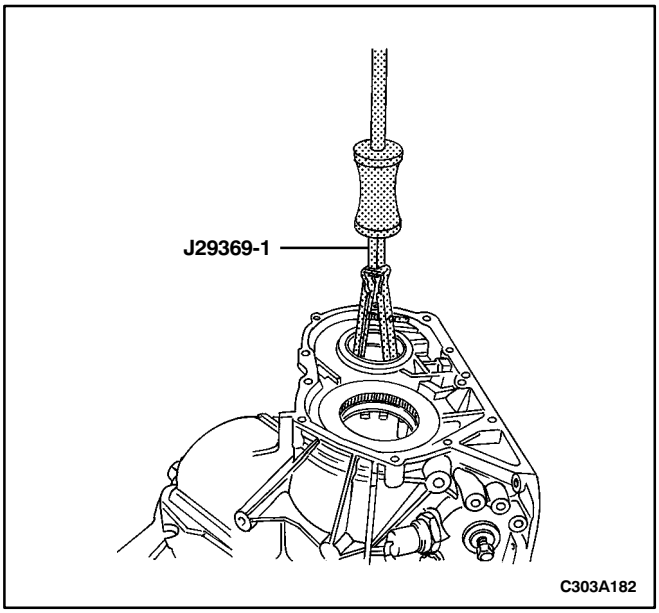

B103A180

46. Remove the securing bolts from the side shaft outer ring.



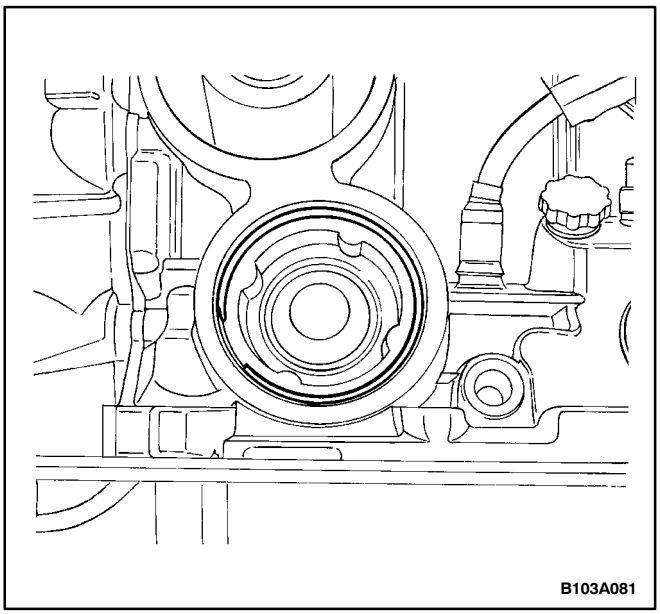
C303A181

47. Remove the side shaft outer ring with the ring puller J29369-1.



C303A182

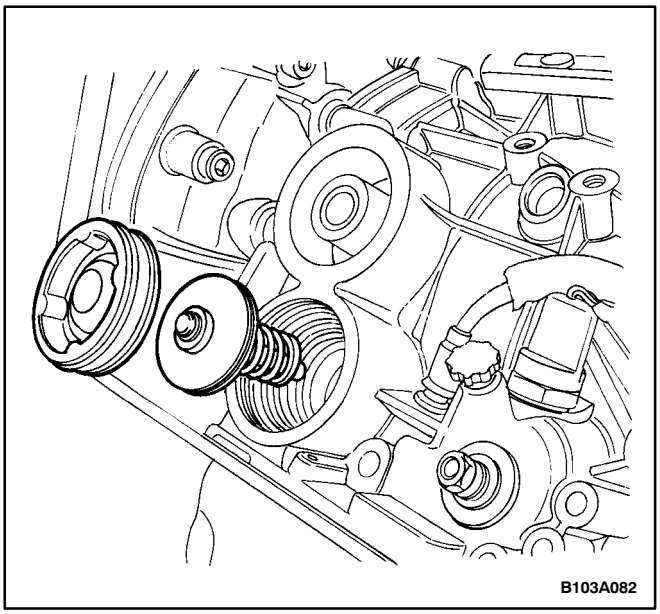
48. Remove the small spur gear con bearing outer ring with the ring puller J29369-1.
49. Inspect and clean the transaxle housing.


B103A081

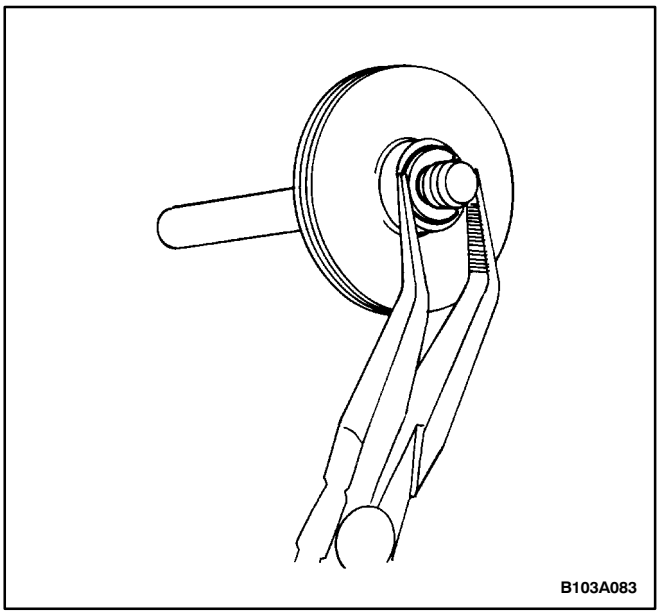
BRAKE C′

Disassembly Procedure

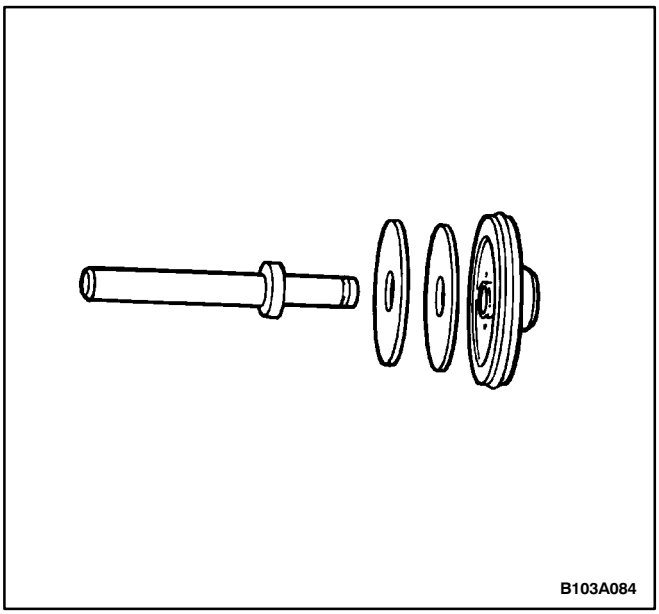
1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the band C′. Refer to “Major Component Disassembly” in this section.
3. Remove the retaining ring holding the piston C′ cover.


B103A082

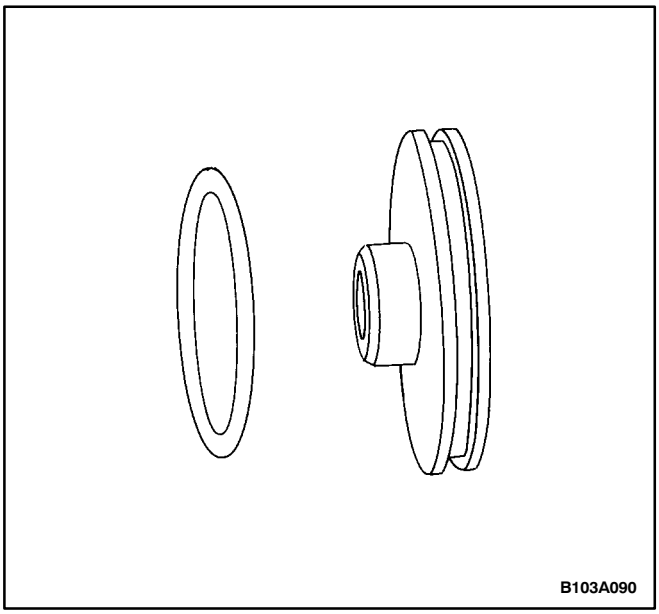
4. Remove the piston C′ cover and the piston C′.


B103A083

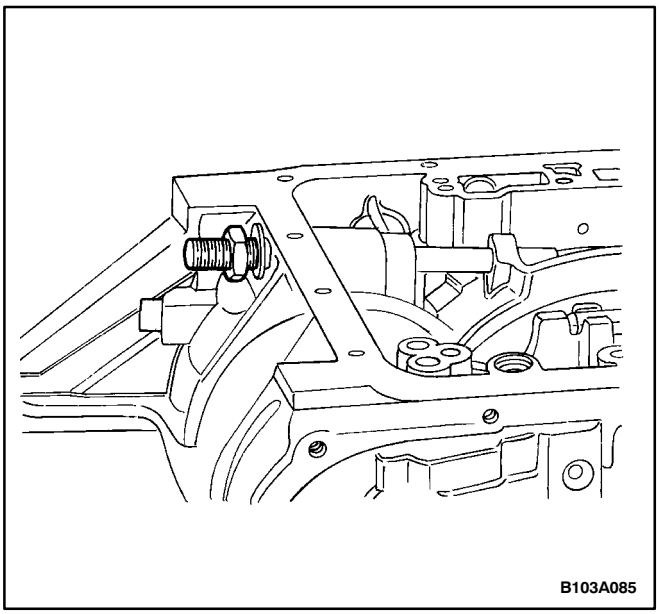
5. Remove the security clip from the piston C′.


B103A084

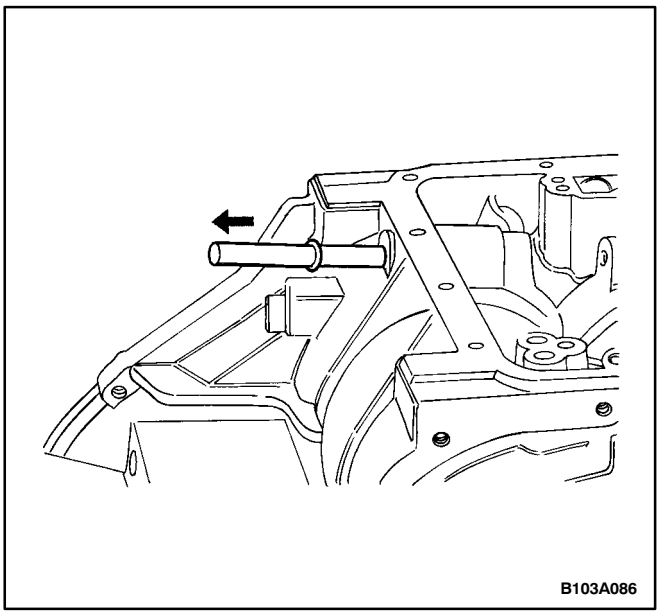
6. Separate the piston C′, the piston rod, and the plate washers.


B103A090

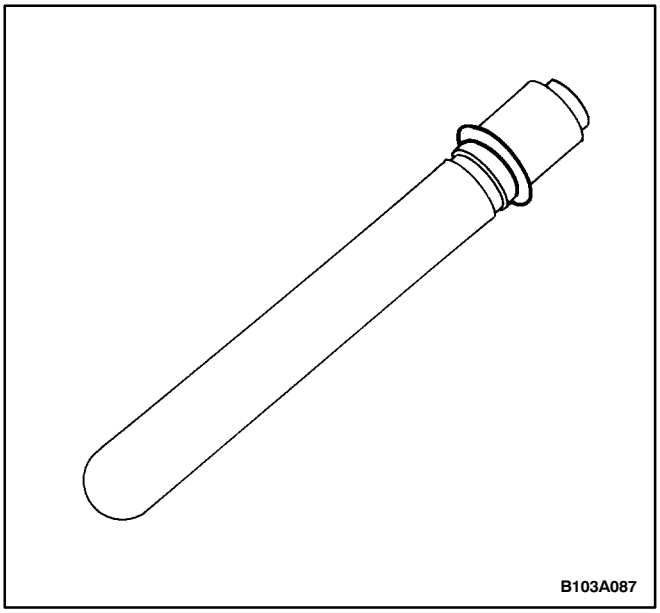
7. Remove the O-ring from the piston C′.


B103A085

8. Loosen the locknut and unscrew the adjusting bolt.

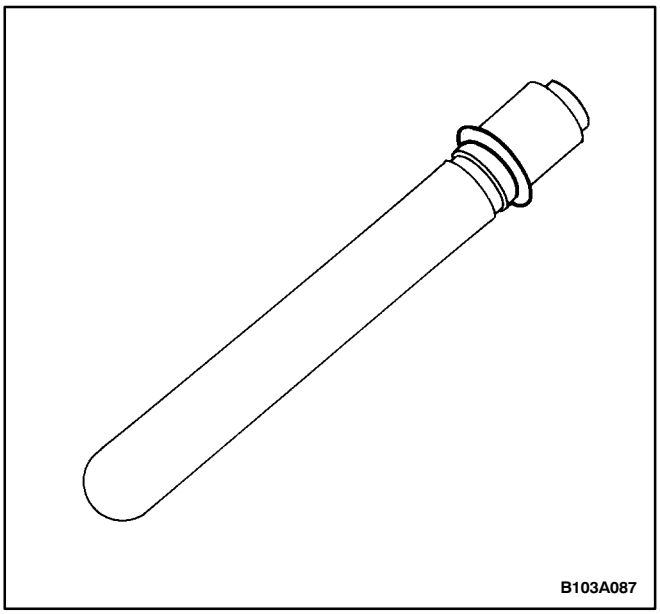

B103A086

9. Remove the band C′ shaft from the transaxle housing.

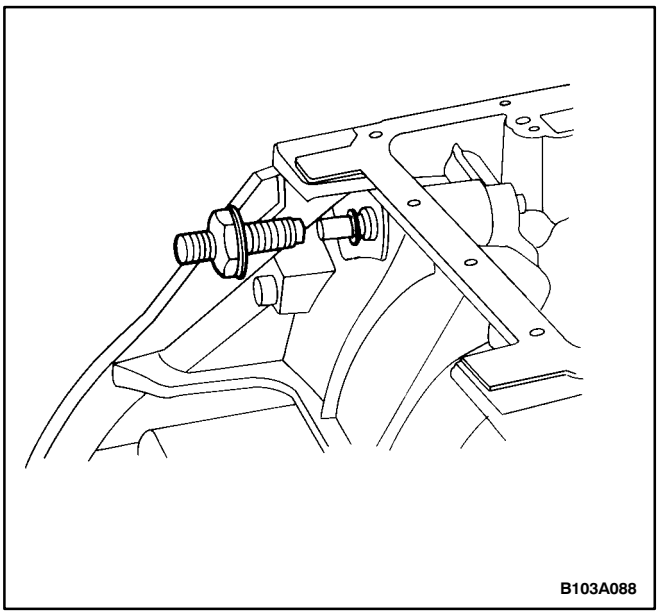

B103A087

10. Remove the O-ring from the band C′ shaft.

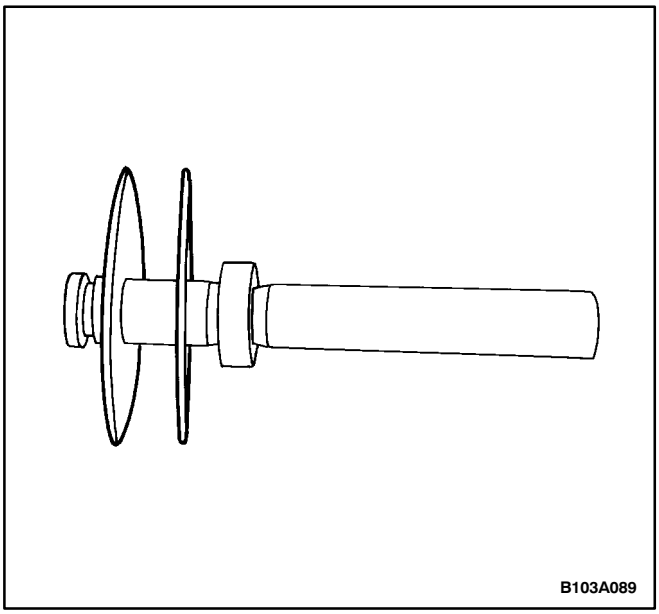
Assembly Procedure


B103A087

1. Install the O-ring onto the band C′ shaft.

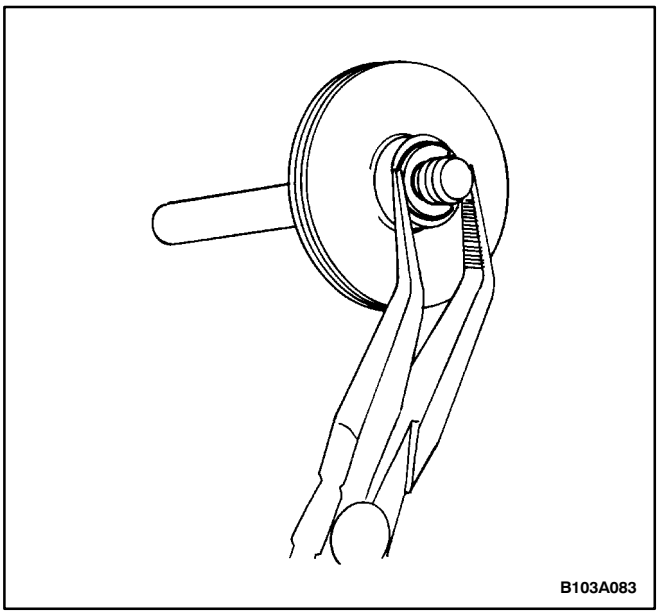

B103A088

2. Insert the band C′ shaft into the transmission housing. Assemble the adjusting bolt, the washer, and the nut. Screw the assembly half of the way into the transmission housing.

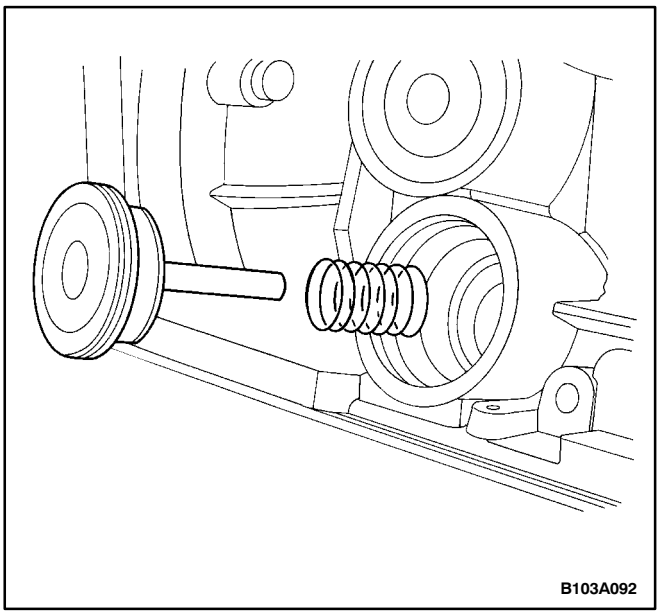

B103A089

Important: Both plate washers are convex. They should face each other as they are assembled on the piston rod, or the brake will not work properly.

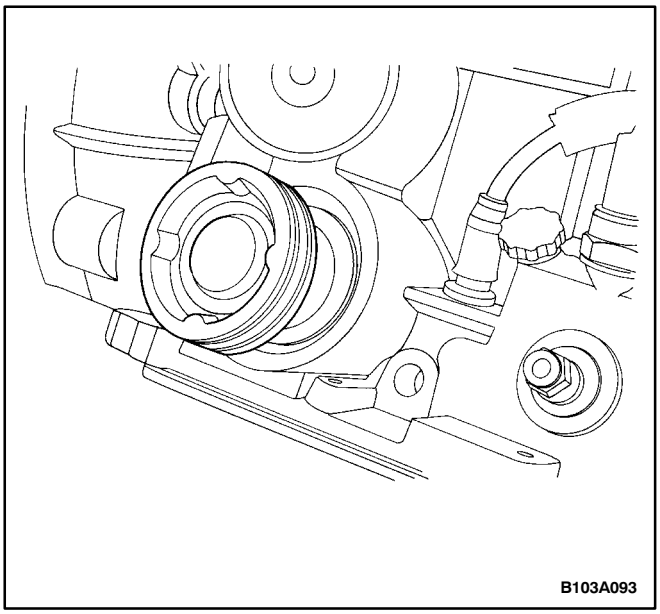
3. Install the plate washers onto the piston rod. The thick one goes on the piston rod before the thin one.


B103A083

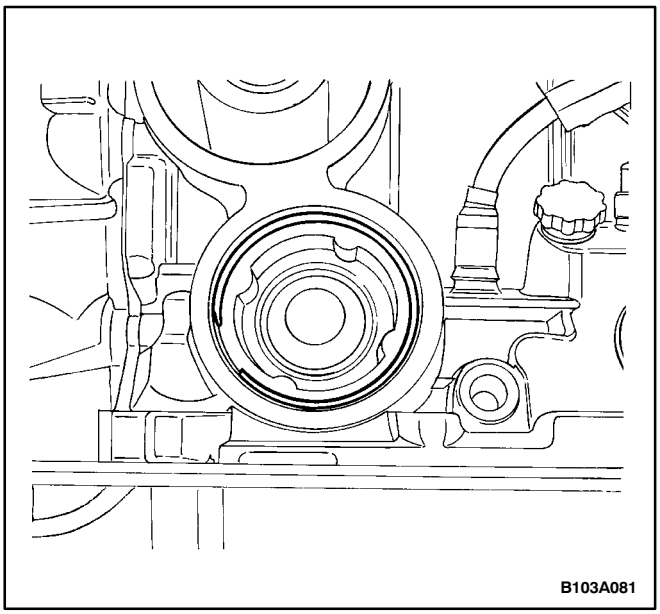
4. Install a new O-ring onto the piston C′ and install the piston C′ onto the piston rod. Install the security clip onto the piston rod.


B103A092

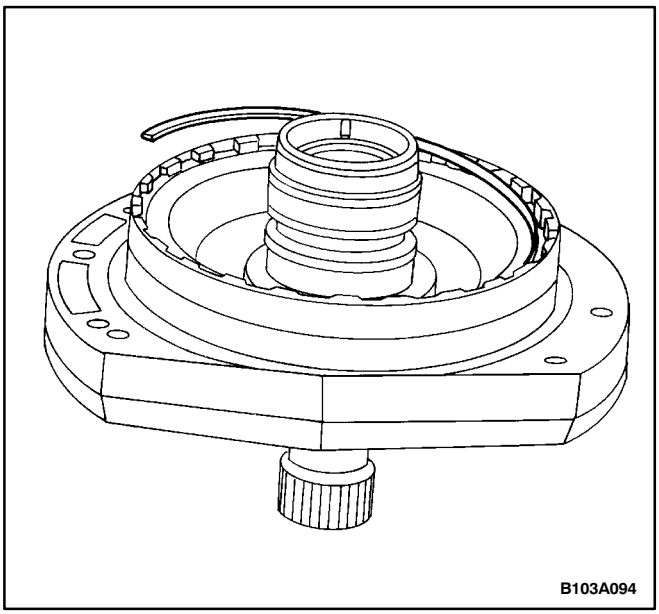
5. Install the spring onto the piston rod and insert the piston C′ into the transaxle housing.


B103A093

6. Install the piston C′ cover.


B103A081

7. Install the retaining ring.
8. Install the band C′. Refer to “Major Component Assembly” in this section.
9. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.


B103A094

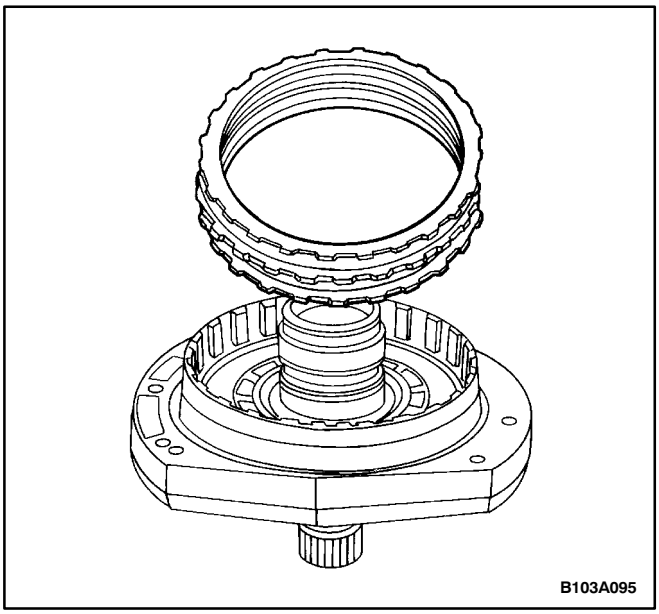
INTERMEDIATE PLATE WITH BRAKE C AND PUMP

Tools Required

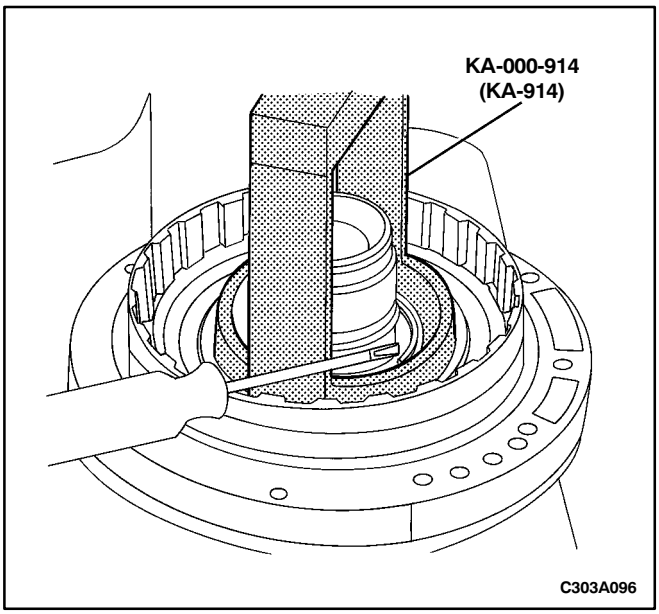
KA-000-914 Compression Adapter

Disassembly Procedure

1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the intermediate plate with the brake C and the pump. Refer to “Major Component Disassembly” in this section.
3. Remove the snap ring that secures the brake C assembly.

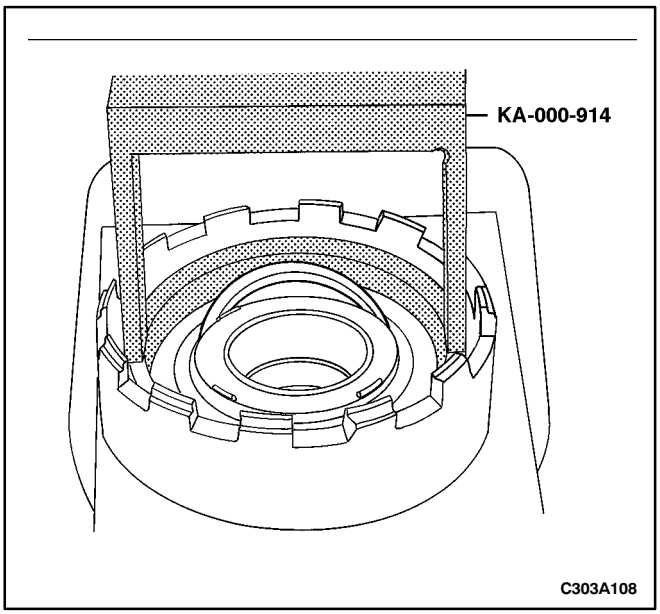

B103A095

4. Remove the brake C assembly.

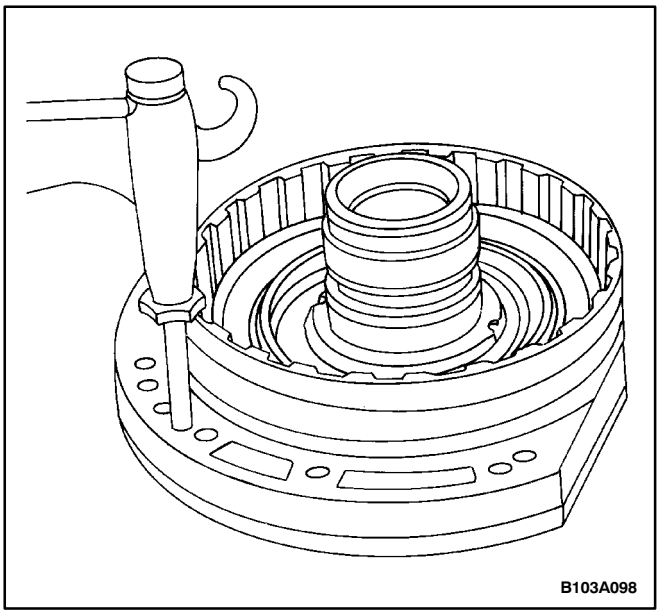


C303A096

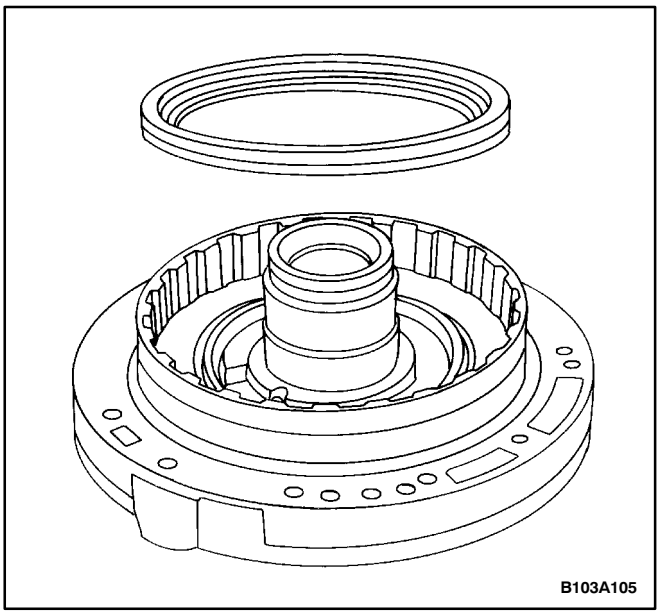
5. Press down the plate spring with the compression adapter KA-000-914 (KA-914) and remove the snap ring with a screwdriver.



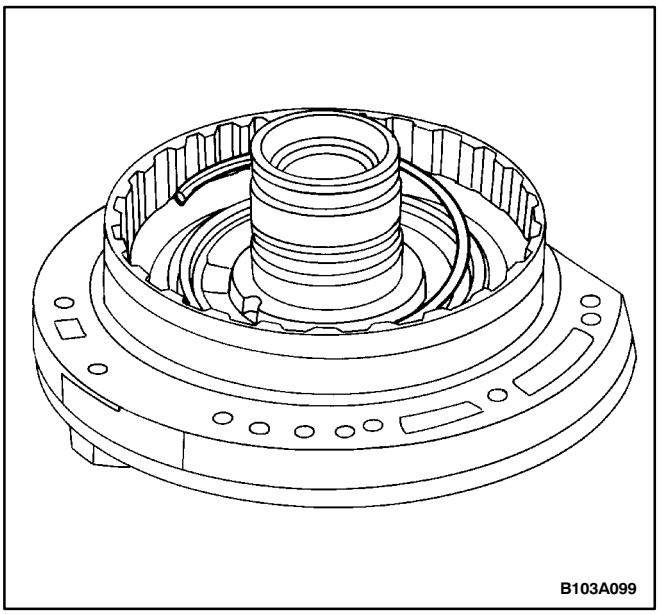
6. Remove the plate spring, the pressure plate, and the retainer ring.



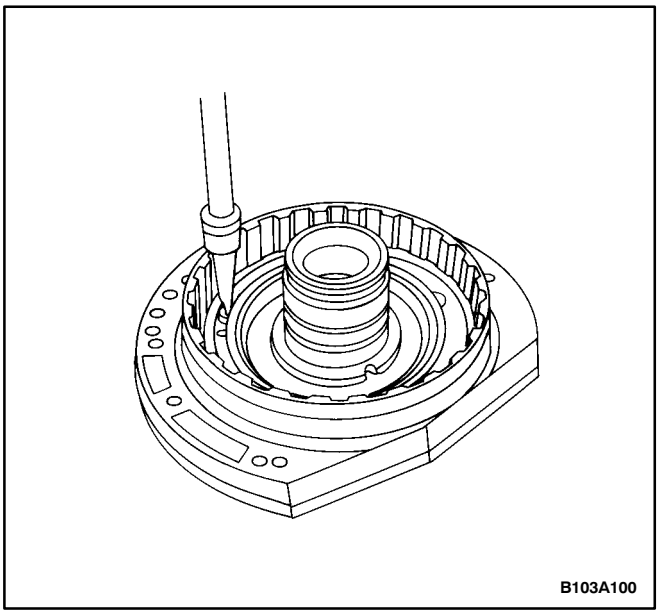
7. Insert an air gun into the fluid feed hole and use air pressure to free the piston C.



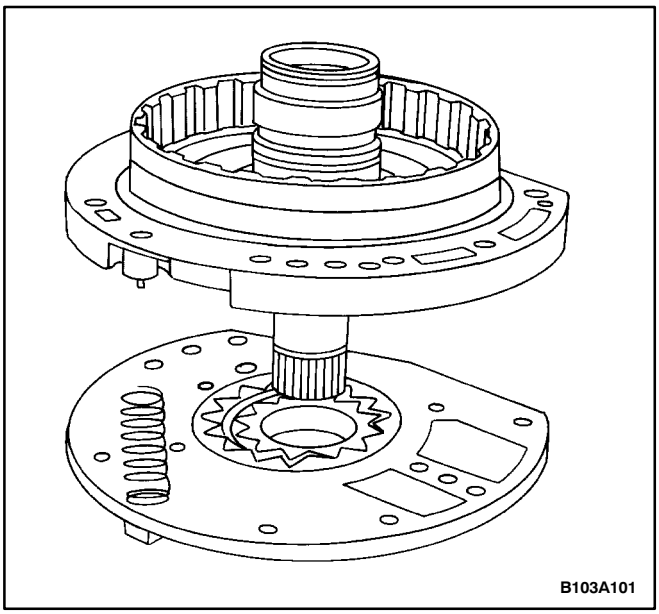
8. Remove the piston C.


B103A099

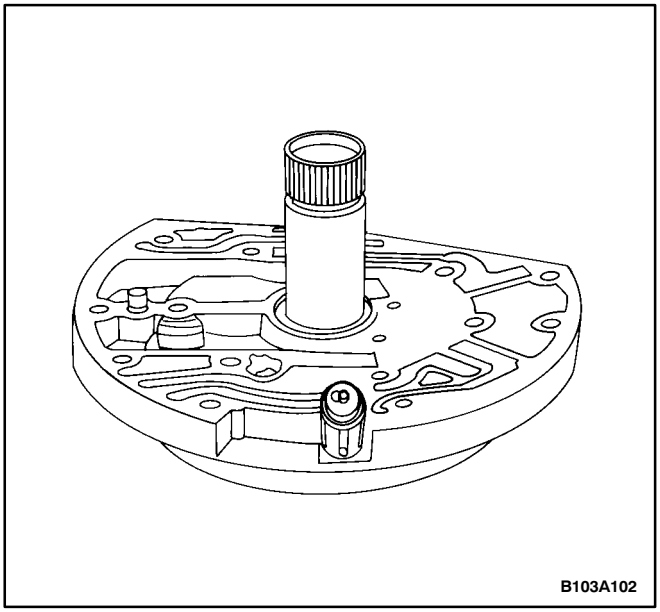
9. Remove the intermediate ring snap ring and the intermediate ring. Replace the O-ring on the intermediate ring as needed.


B103A100

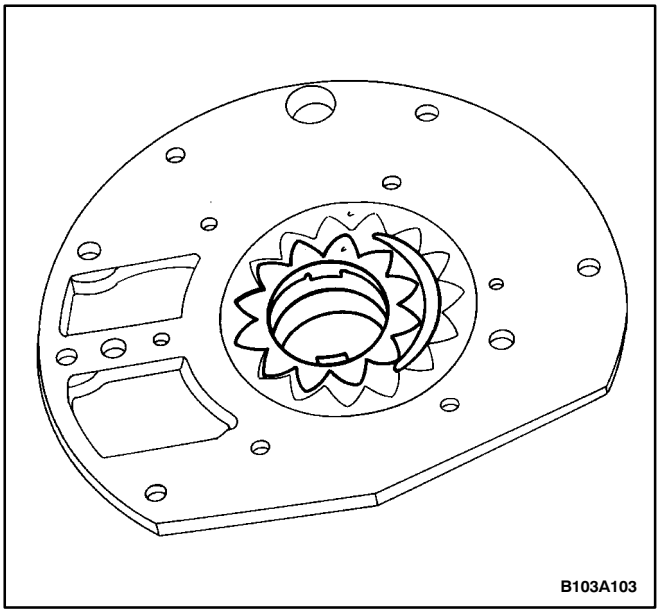
10. Remove the intermediate plate connecting bolts from the pump assembly.


B103A101

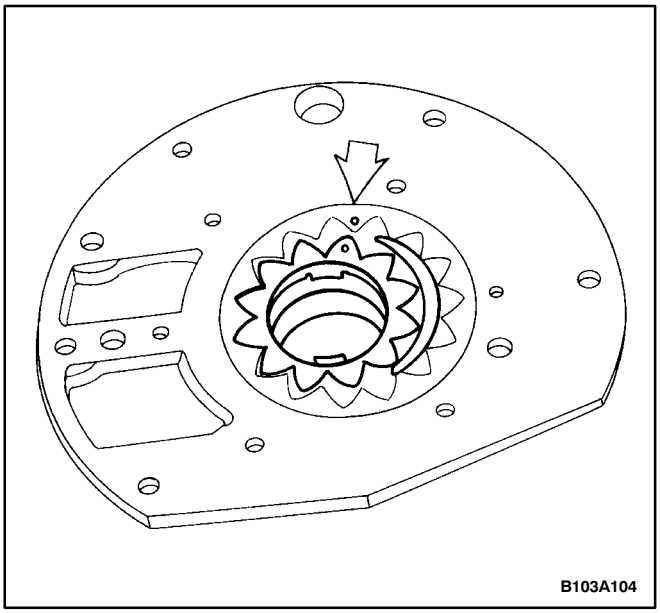
11. Separate the intermediate plate from the pump assembly. Use a plastic hammer for disassembly.


B103A102

12. Remove the spring, the torque converter valve, and the cap.

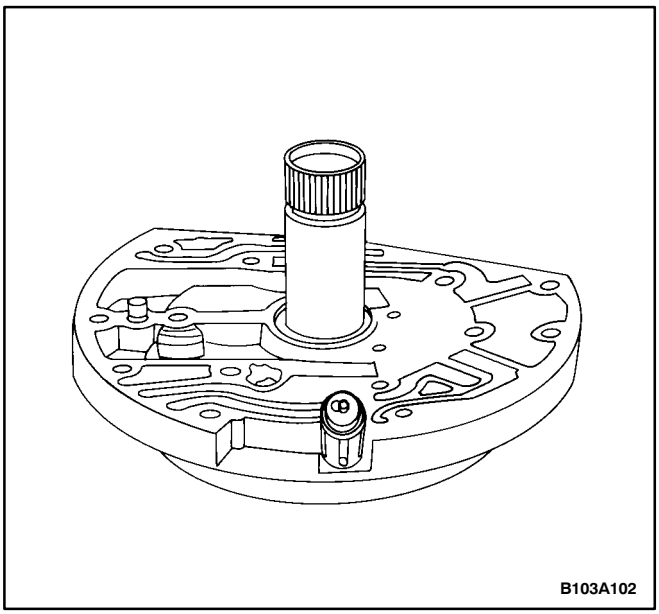

B103A103

13. Remove the pump hollow gear and the pump gear from the pump housing.

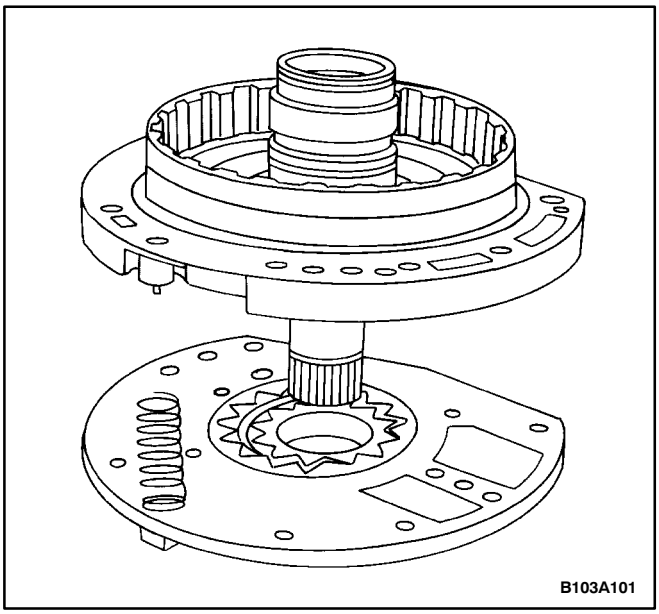

B103A104

Assembly Procedure

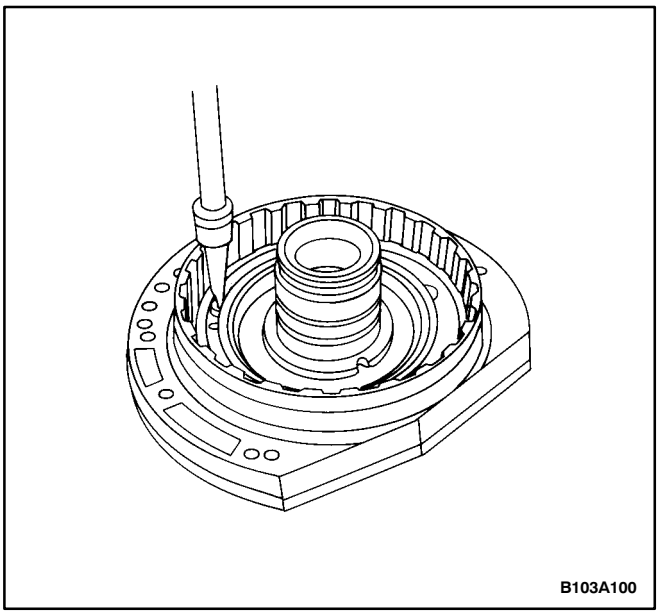
1. Install the pump hollow gear and the pump gear into the pump housing with the marked side of the gears facing upward.


B103A102

2. Install the spring, the torque converter valve, and the cap.


B103A101

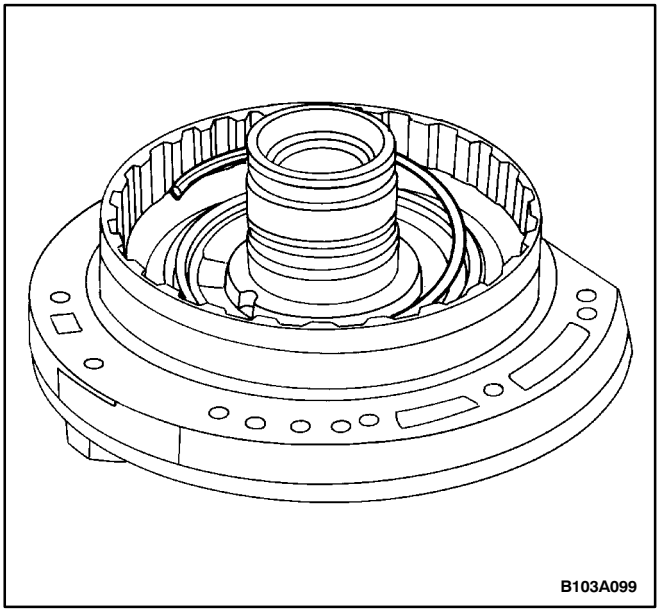
3. Insert the spring into the open gap and align the intermediate plate onto the pump housing.


B103A100

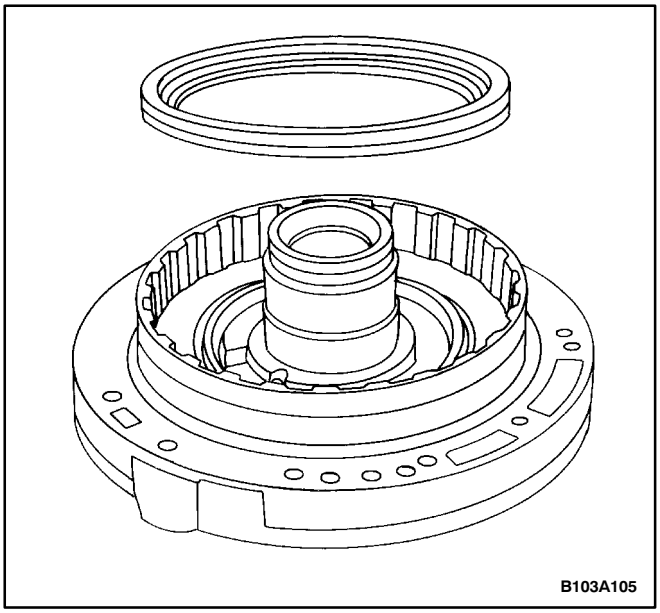
4. Install the intermediate plate connecting bolts into the pump assembly.

Tighten

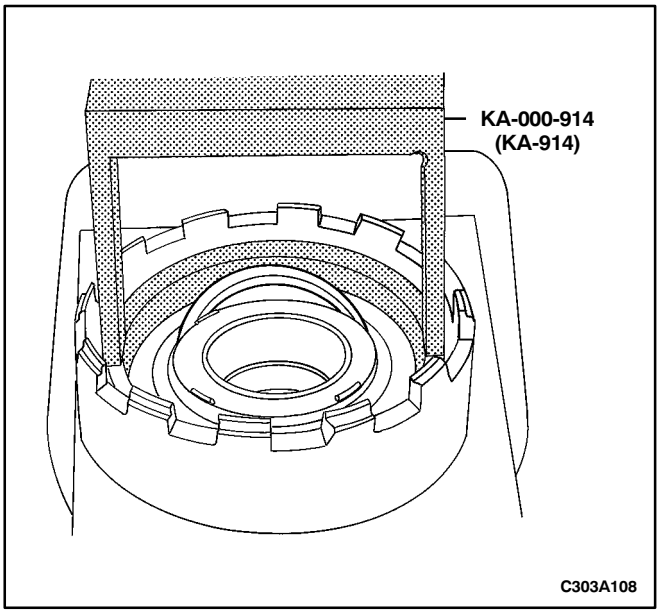
Tighten the intermediate plate-to-pump assembly connecting bolts to 10 N•m (89 lb-in).


B103A099

5. Install the intermediate ring and secure it with the intermediate ring snap ring.

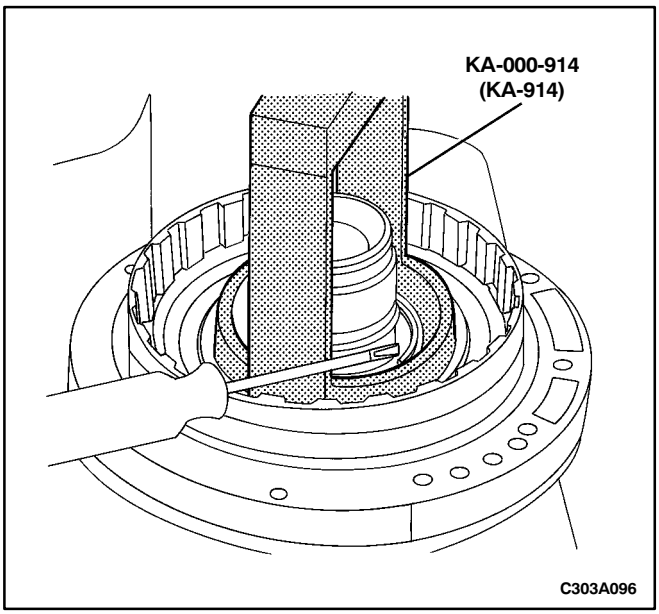

B103A105

6. Install the piston C.

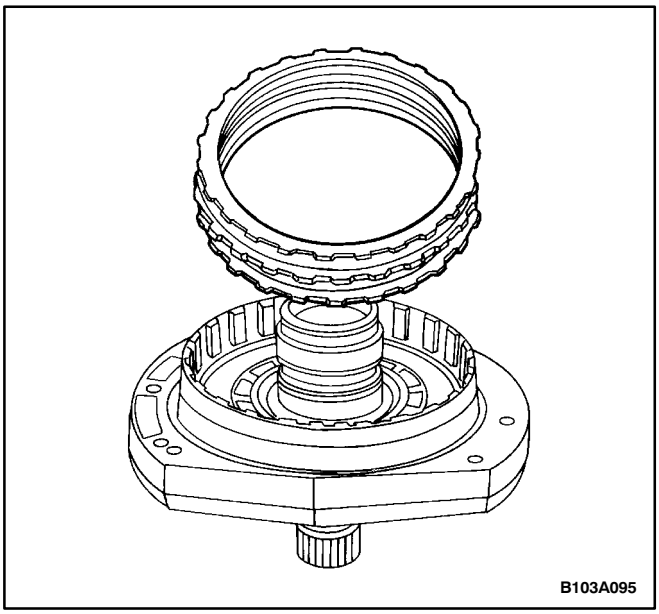


C303A108

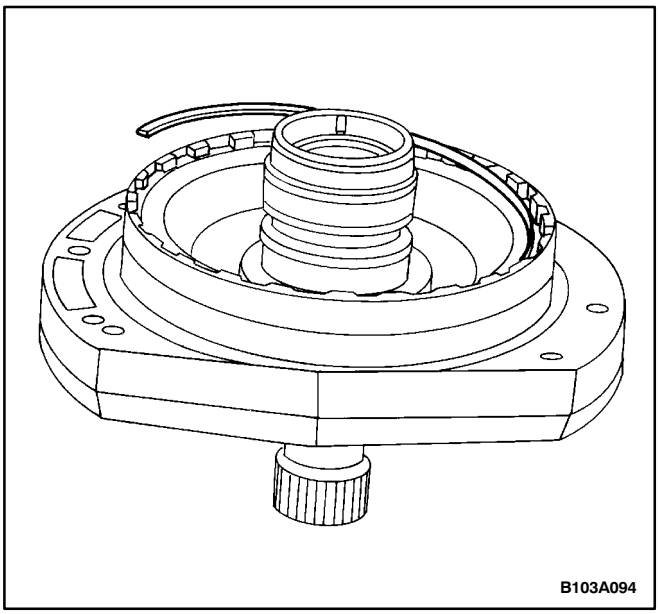
7. Install the plate spring, pressure plate, and the retainer ring.



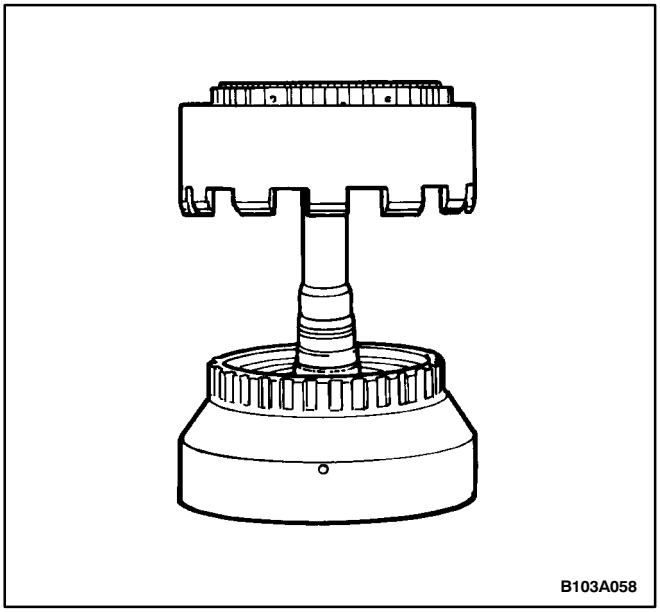
8. Press down the plate spring with the compression adapter KA-000-914 (KA-914) and install the snap ring.



9. Install the brake C assembly.



10. Install the snap ring that secures the brake C assembly.
11. Install the intermediate plate with the brake C and the pump. Refer to “Major Component Assembly” in this section.
12. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.


B103A058

CLUTCH B WITH FREEWHEEL SECOND GEAR

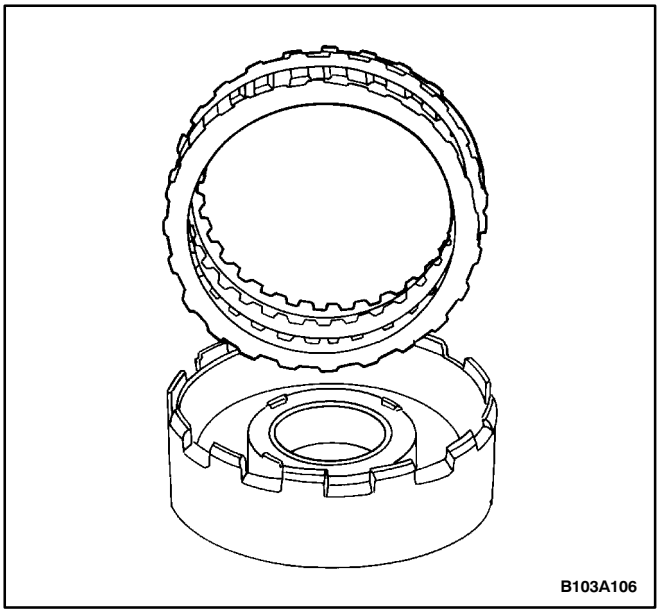
Tools Required

KA-000-914 Compression Adapter

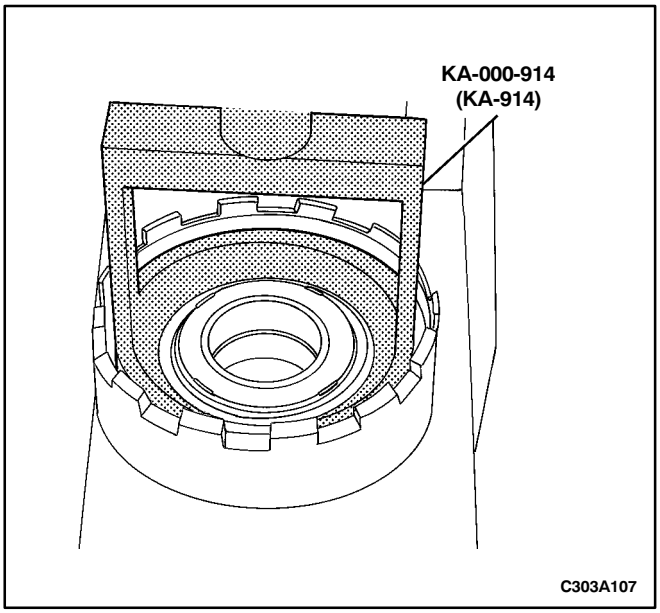
Disassembly Procedure

Important: The freewheel second gear should not be disassembled. Replace this part as a unit.

1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the clutch A, the clutch B and the freewheel second gear assembly from the transaxle housing. Refer to “Major Component Disassembly” in this section.
3. Separate the clutch A from the clutch B and the freewheel second gear assembly.

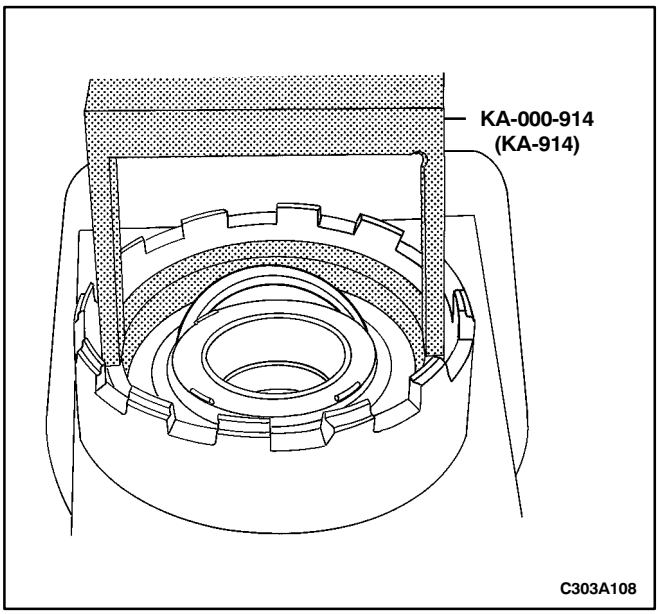

B103A106

4. Remove the snap ring and the clutch B assembly.

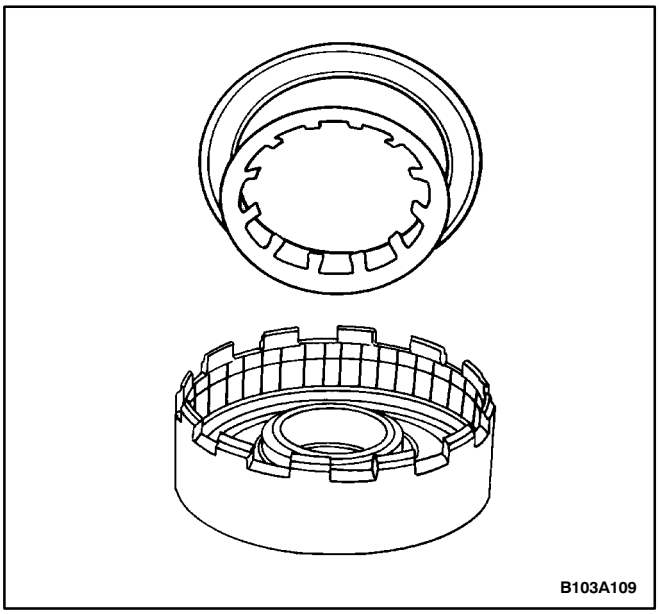


C303A107

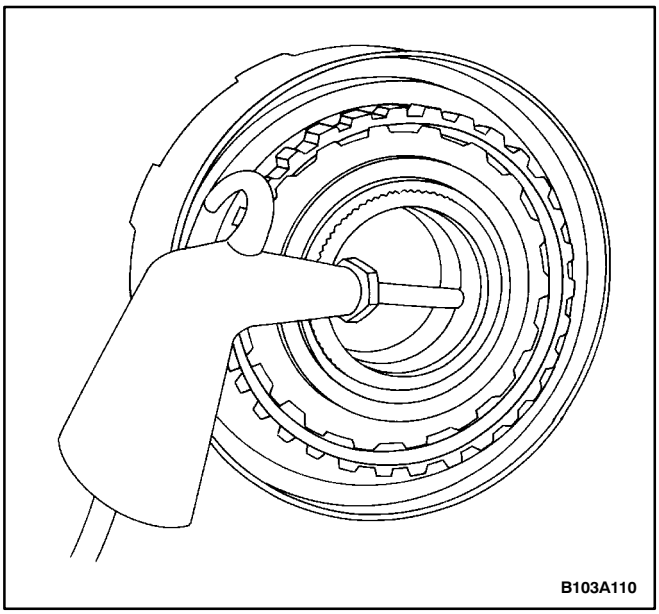
5. Compress the pressure plate using the compression adapter KA-000-914 (KA-914).



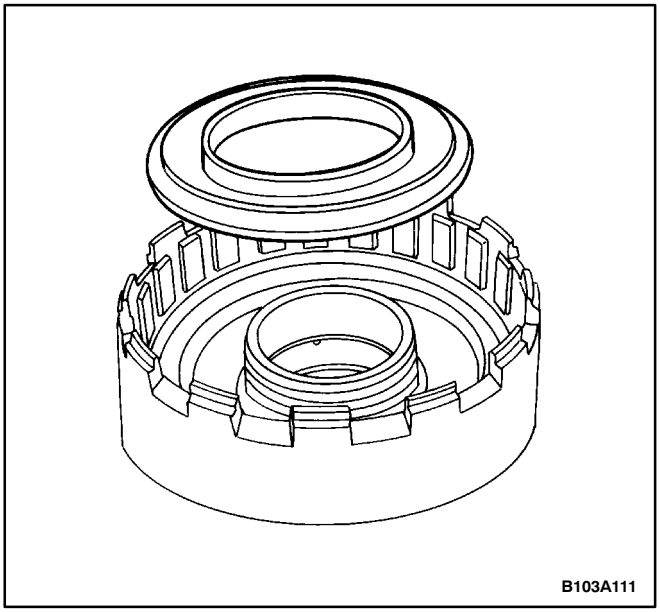
6. Remove the retainer rings and the thrust washers.



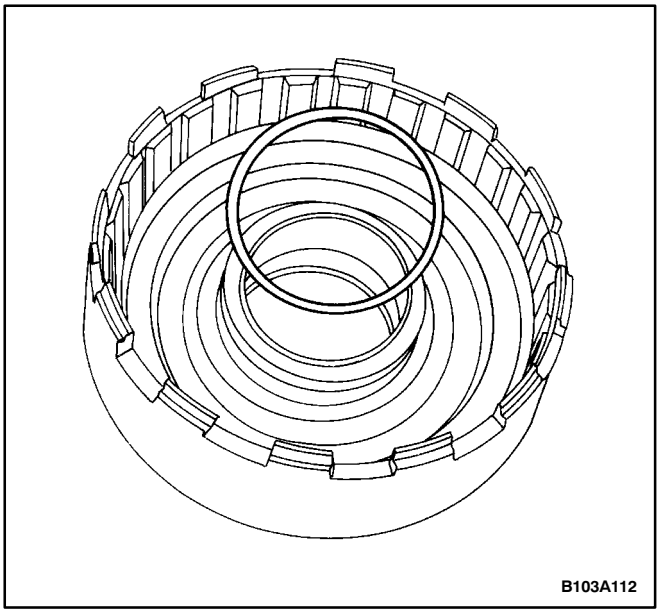
7. Remove the compression adapter KA-000-914.
8. Remove the plate spring and the pressure plate.



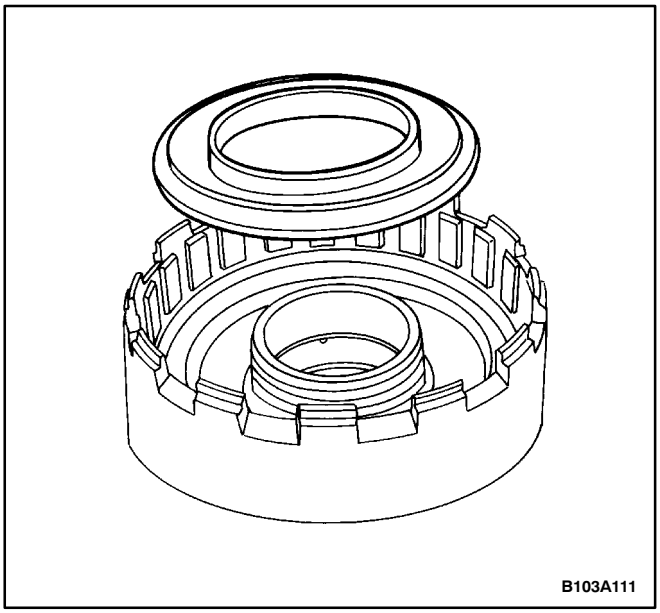
9. Insert compressed air into the fluid feed hole for the removal of the piston B.


B103A111

10. Remove the piston B. Replace the O-ring as needed.

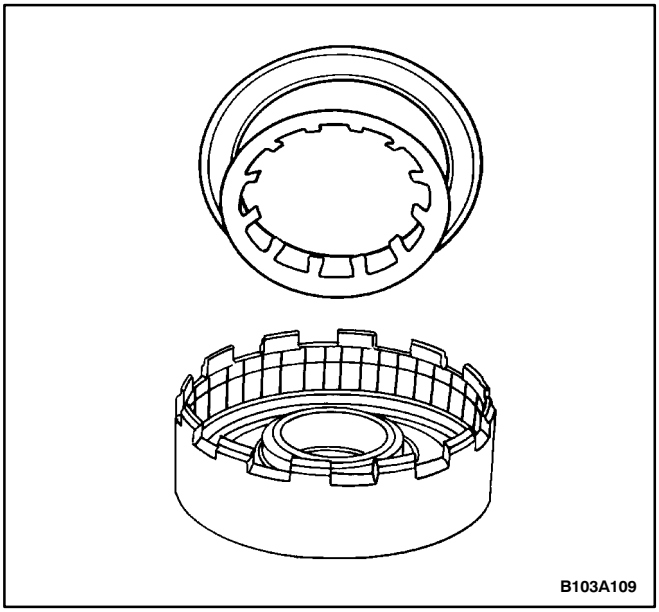

B103A112

11. Replace the cylinder B O-ring as needed.

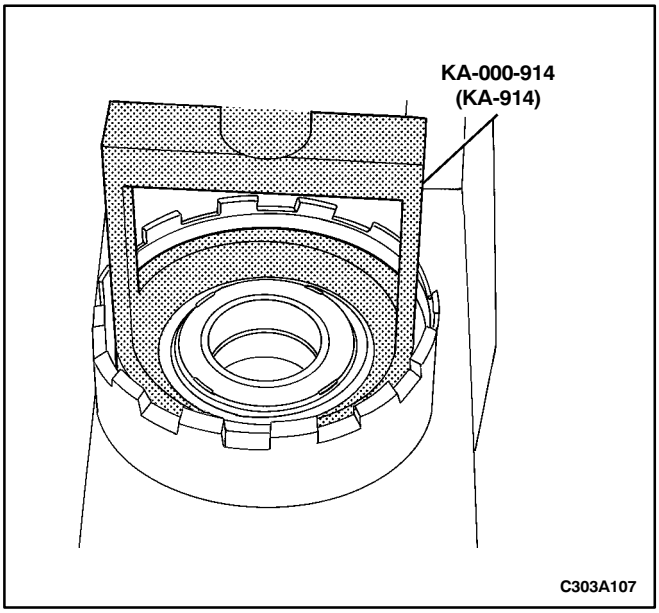

B103A111

Assembly Procedure

1. Install the piston B.

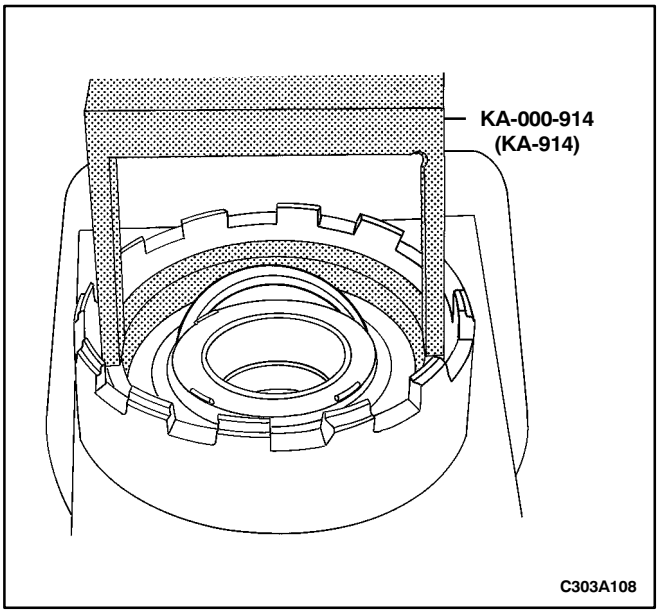

B103A109

2. Install the plate spring and the pressure plate.



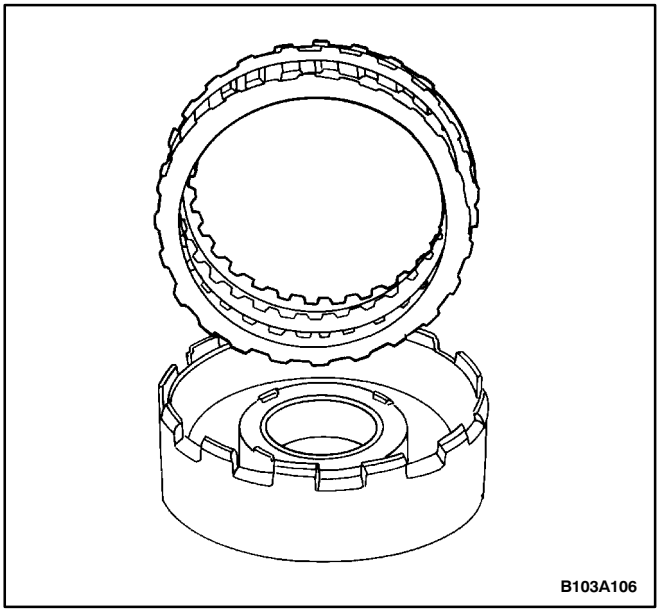
C303A107

3. Compress the pressure plate using the compression adapter KA-000-914 (KA-914).

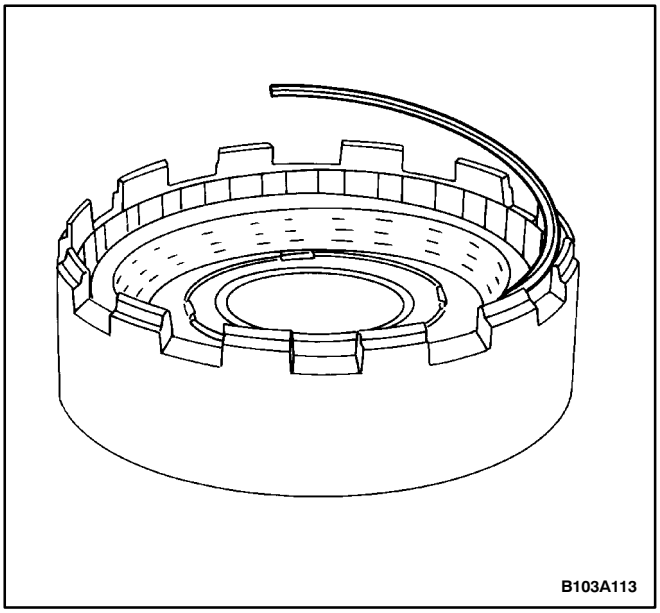


C303A108

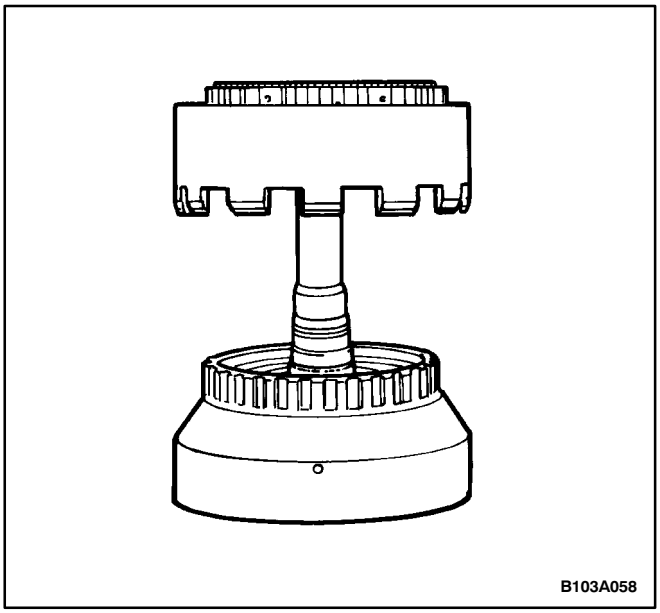
4. Install the retainer rings and the thrust washers.


B103A106

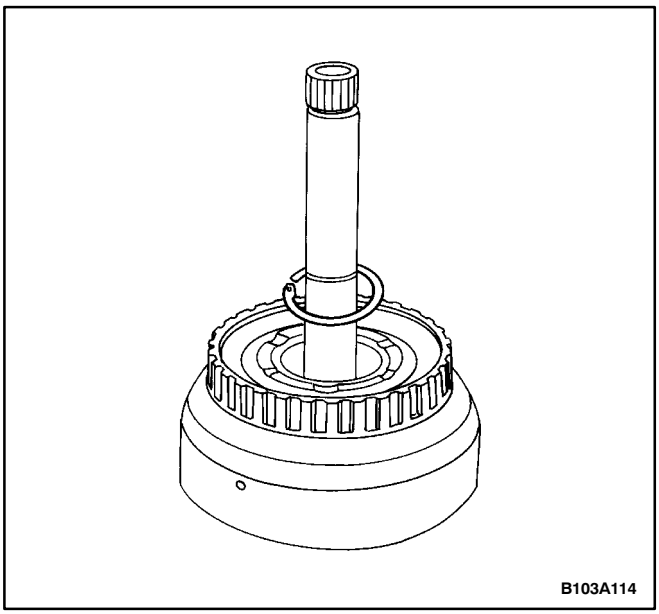
5. Install the clutch B assembly.


B103A113

6. Install the clutch B assembly snap ring.


B103A058

7. Join the clutch A, the clutch B, and the freewheel second gear into an assembly.
8. Install the clutch A, the clutch B, and the freewheel second gear assembly into the transaxle housing. Refer to “Major Component Assembly” in this section.
9. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.


B103A114

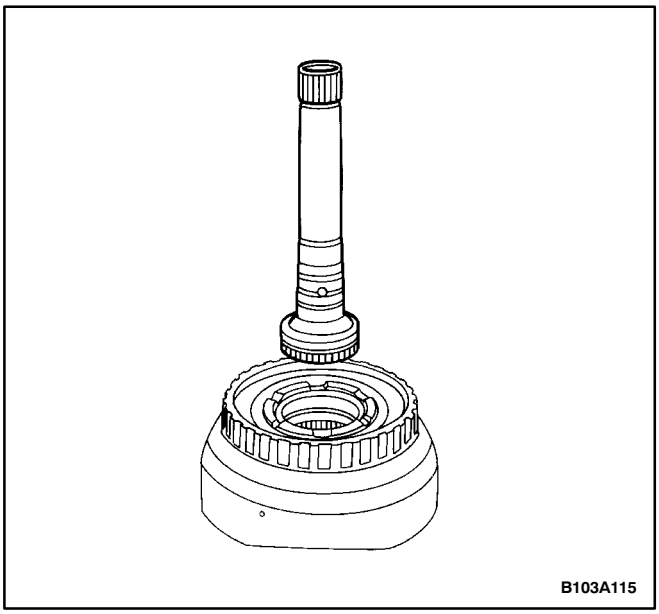
CLUTCH A

Tools Required

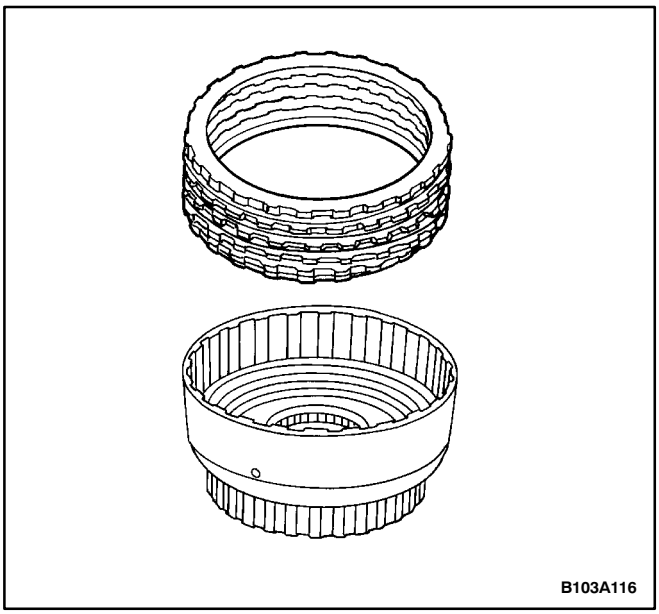
KA-000-913 Compression Adapter

Disassembly Procedure

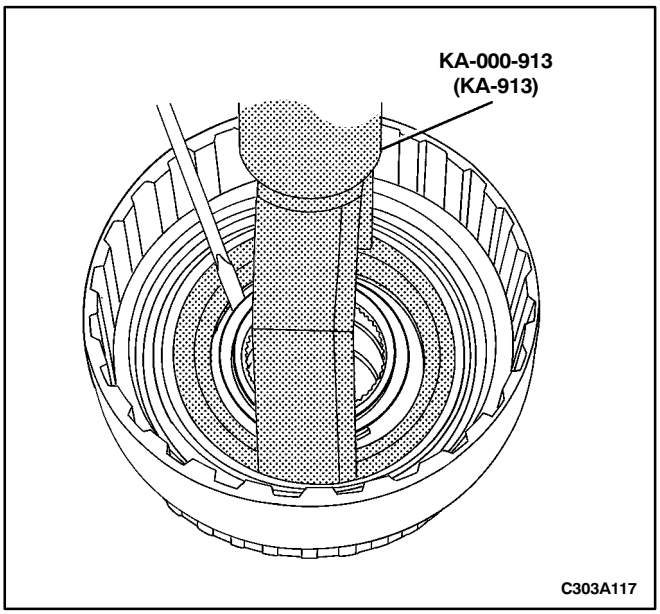
1. Remove the transaxle form the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the clutch A from the transaxle housing. Refer to “Major Component Disassembly” in this section.
3. Remove the clutch A snap ring.


B103A115

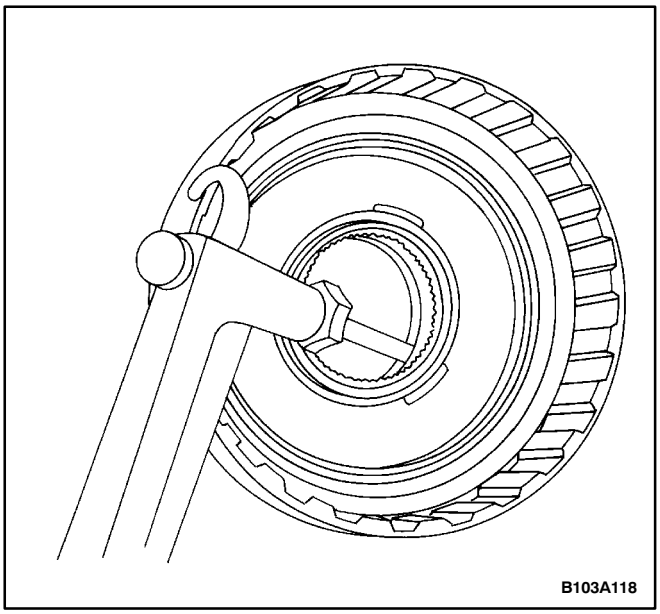
4. Remove the turbine shaft.


B103A116

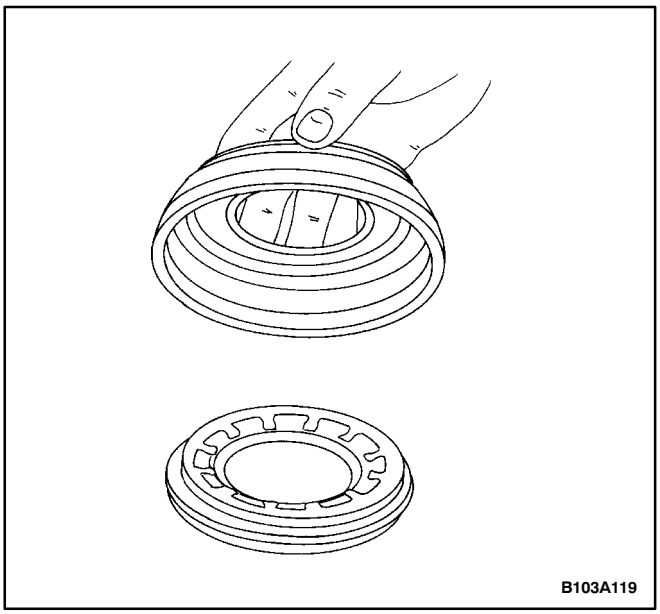
5. Remove the snap ring and the clutch A assembly.



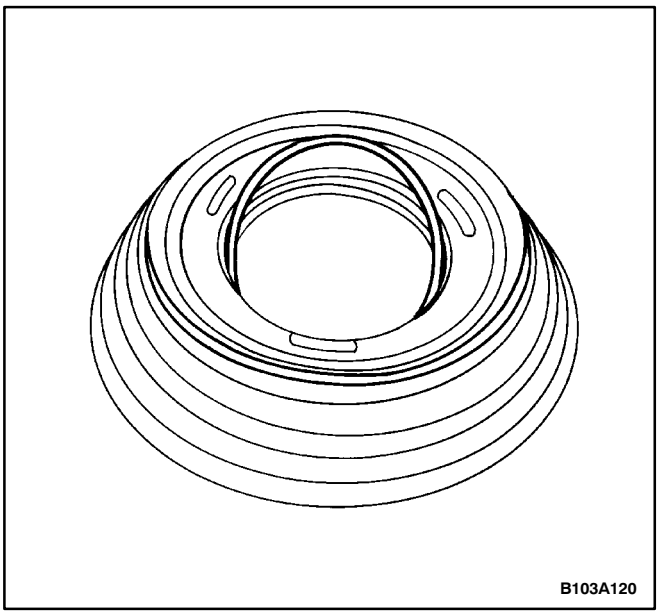
6. Compress the piston with the compression adapter KA-000-913 (KA-913) and remove the snap ring.



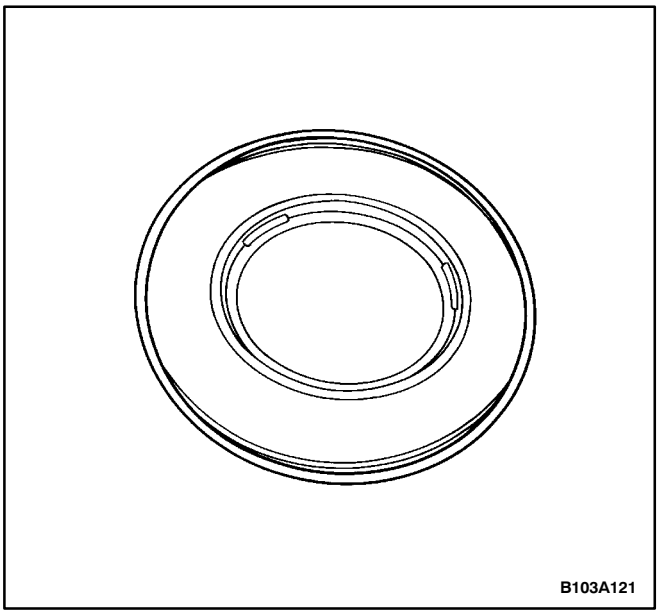
7. Insert compressed air into the fluid feed hole to free the accumulation piston assembly from the clutch A cylinder.



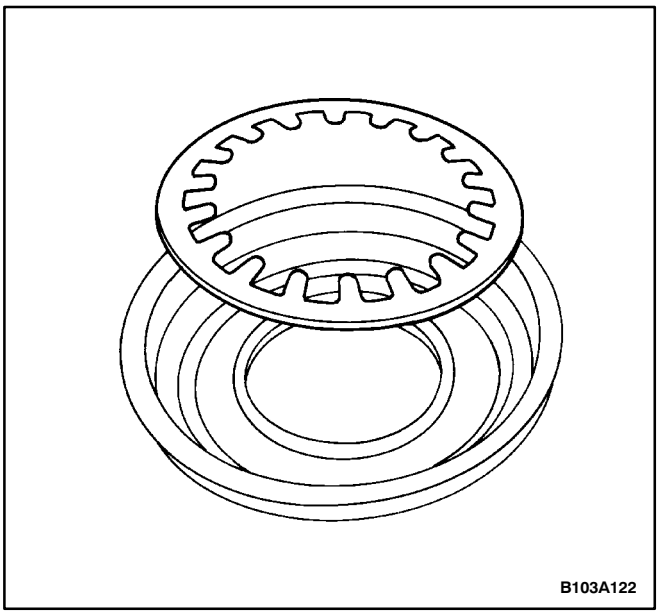
8. Hit the accumulation piston on the work bench lightly to remove the piston A and the plate spring.


B103A120

9. Replace the O-rings on the accumulation piston as needed.

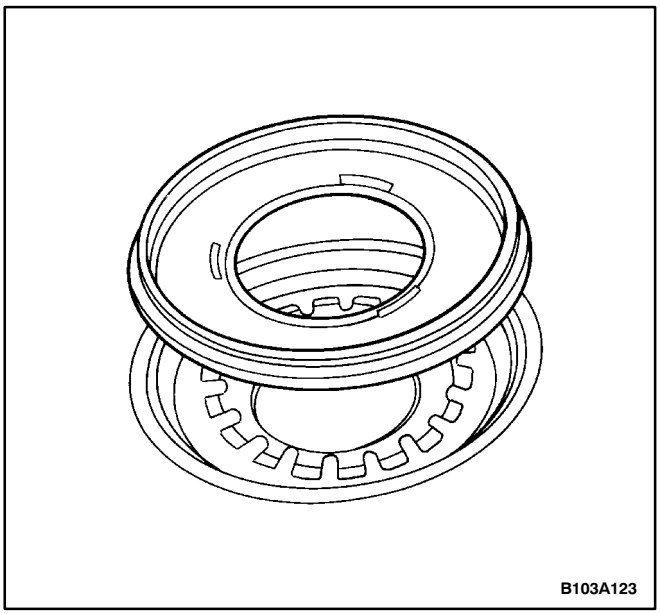

B103A121

10. Replace the O-ring in the piston A as needed.

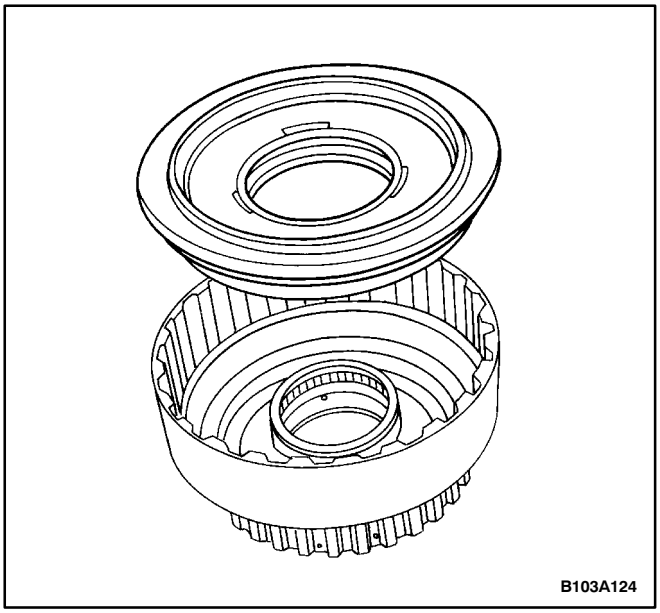

B103A122

Assembly Procedure

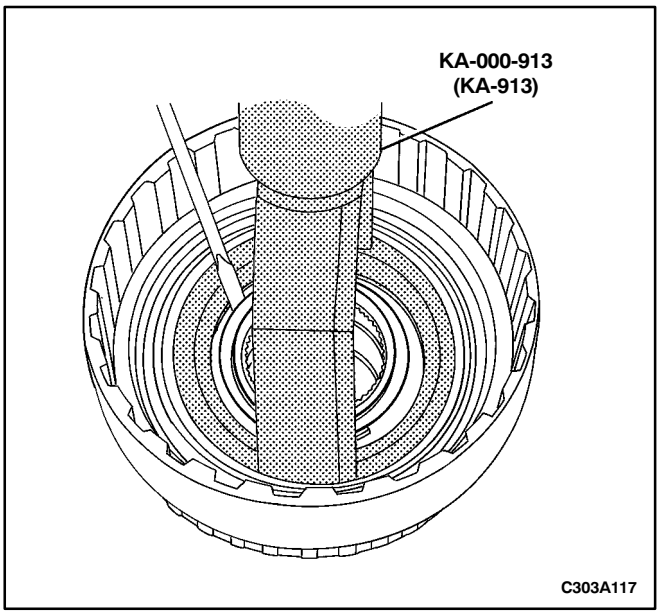
1. Install the plate spring into the accumulation piston.


B103A123

2. Install the piston A into the accumulation piston.

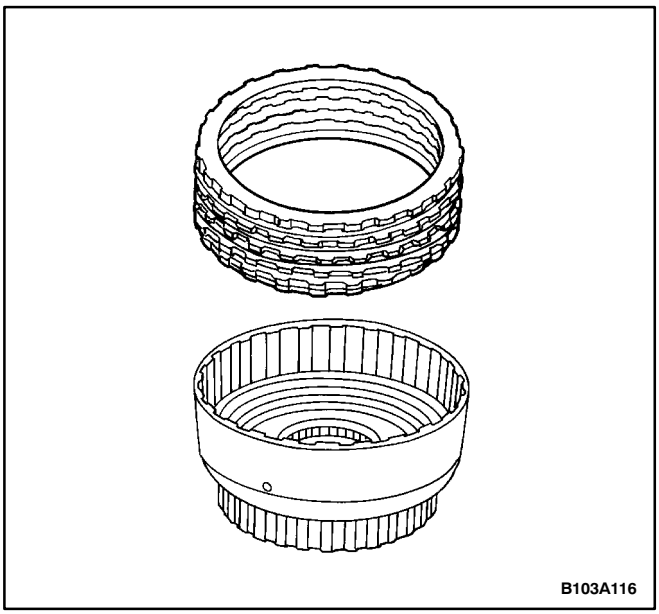

B103A124

3. Install the accumulation piston into the clutch A cylinder.

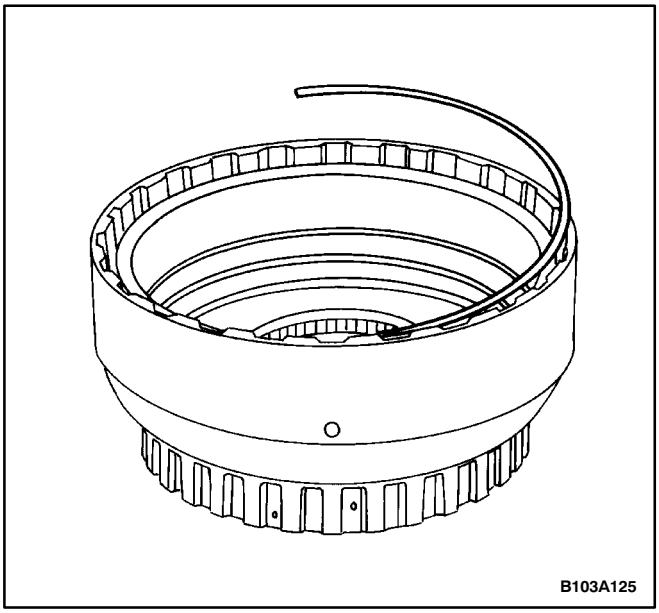


C303A117

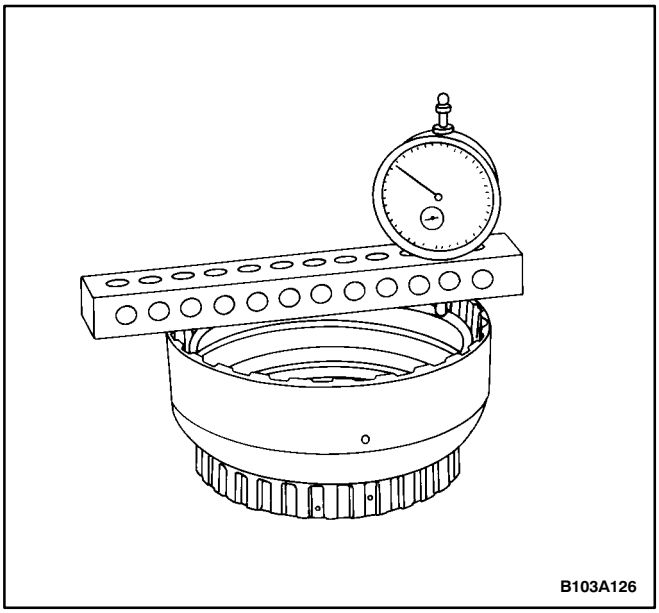
4. Compress the piston with the compression adapter KA-000-913 (KA-913) and install the snap ring.


B103A116

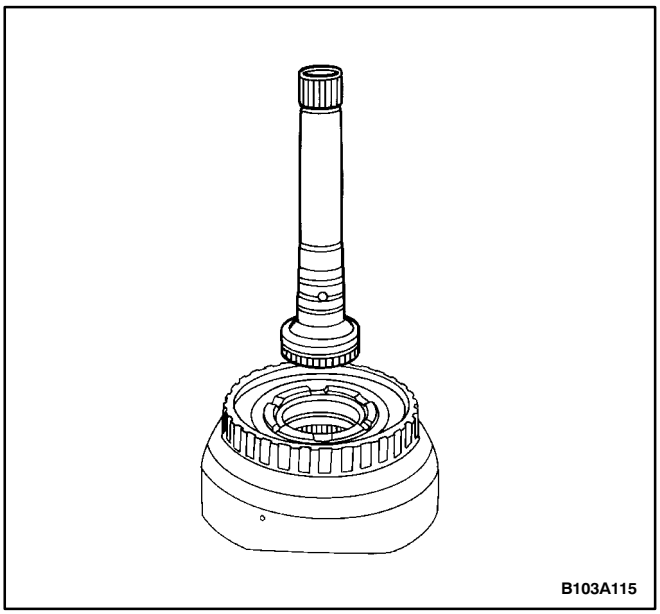
5. Install the clutch A assembly.


B103A125

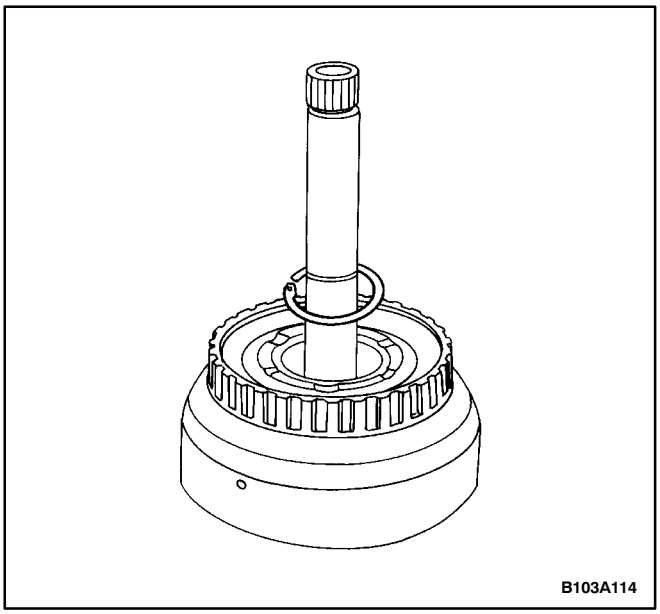
6. Install the clutch A assembly snap ring.


B103A126

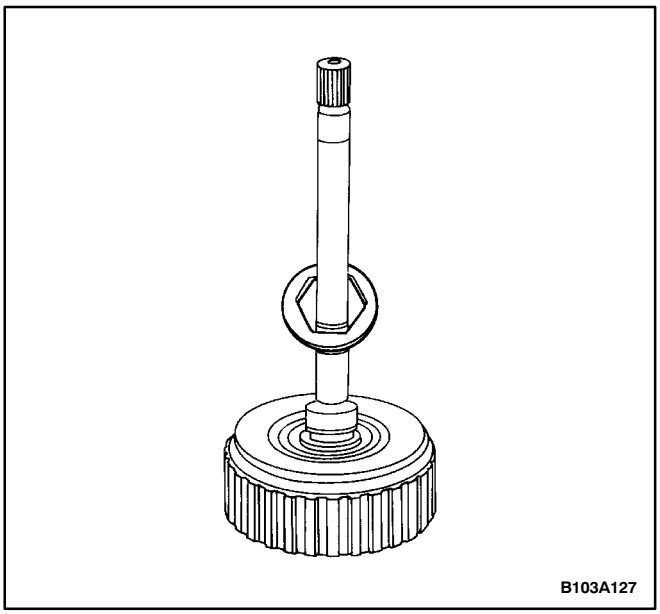
7. Check the clutch A assembly clearance by placing a measuring gauge on top of the clutch A cylinder.
8. Lift the clutch package upward to read the clutch clearance. The clearance should be 1.8-2.0 mm (0.7-0.8 inch).
9. If the measurement does not meet these specifications, replace the snap ring with one that is either thinner or thicker.


B103A115

10. Install the turbine shaft.


B103A114

11. Install the clutch A snap ring.
12. Install the clutch A into the transaxle housing. Refer to “Major Component Assembly” in this section.
13. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.


B103A127

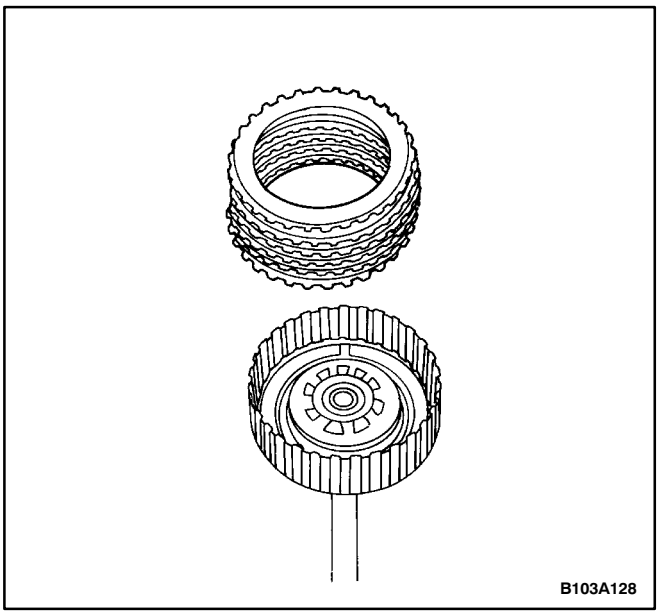
CLUTCH E

Tools Required

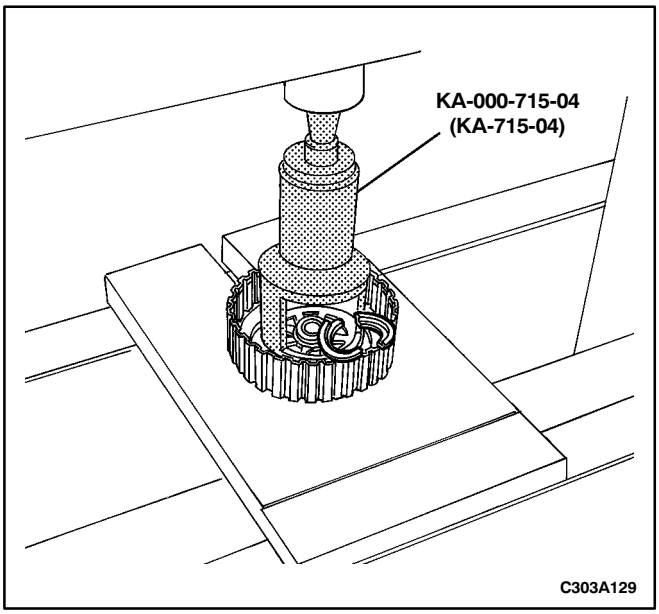
KA-001-715-04 Bearing Remover

Disassembly Procedure

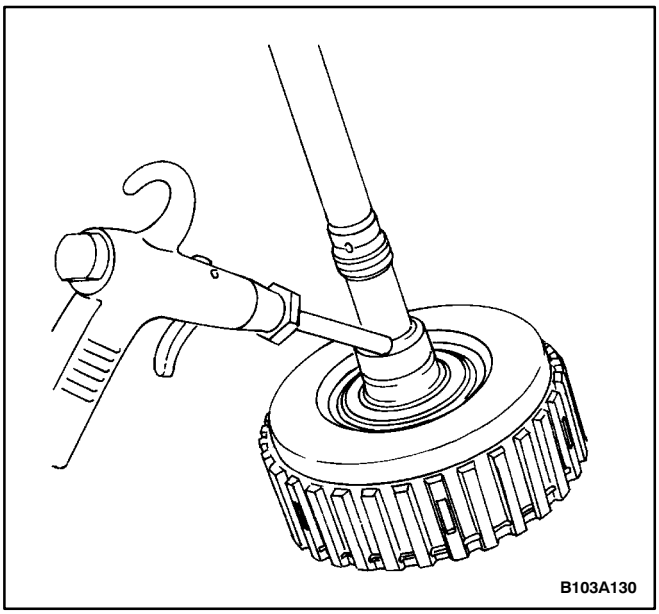
1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the clutch E assembly from the transaxle housing. Refer to “Major Component Disassembly” in this section.
3. Remove the thrust washer from the motor shaft.



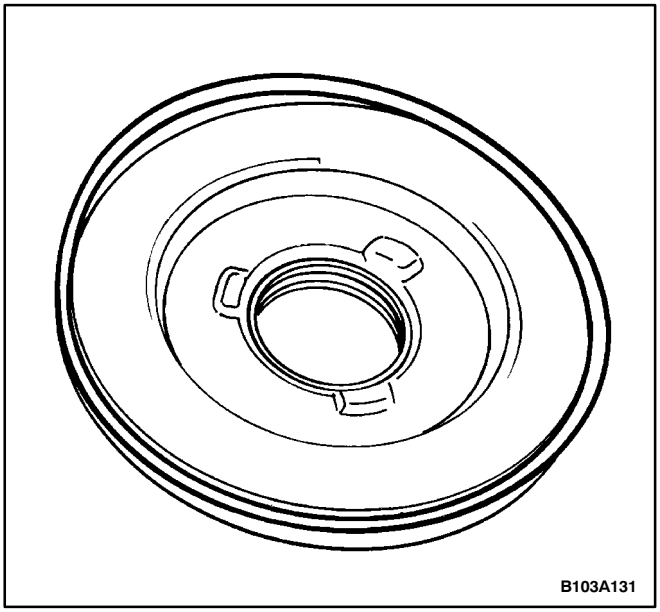
4. Remove the snap ring and the clutch E assembly.



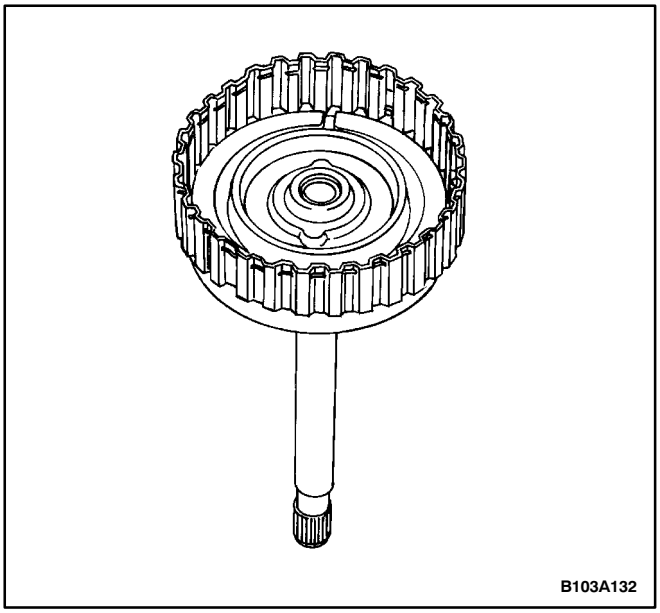
5. Compress the piston E using the bearing remover KA-001-715-04 (KA-715-04).
6. Remove the retainer rings and the plate spring.



7. Insert compressed air into the fluid feed hole.

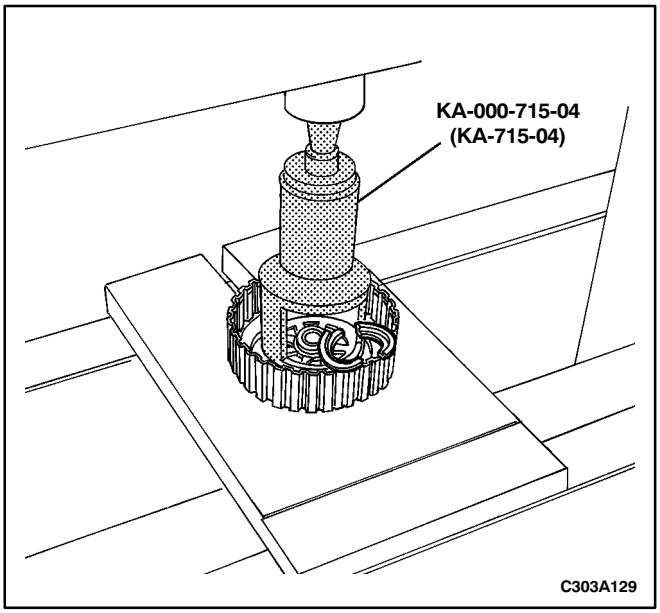

B103A131

8. Remove the piston E.
9. Replace the O-ring as needed.


B103A132

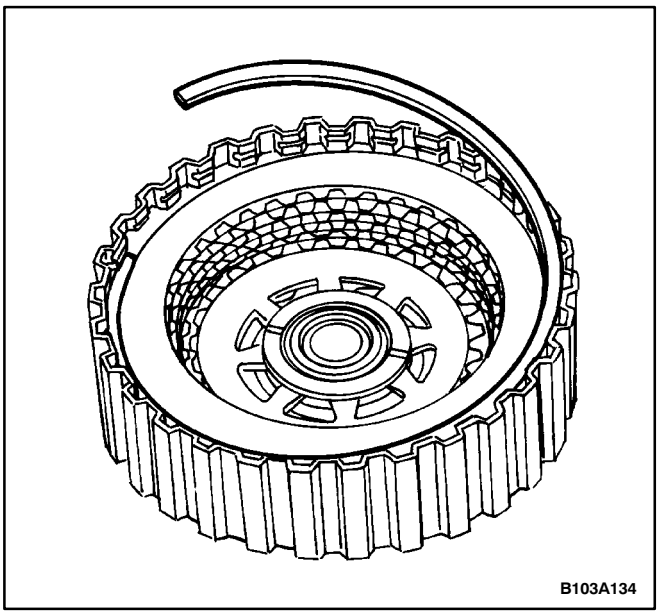
Assembly Procedure

1. Push the piston E into the cylinder of the motor shaft.

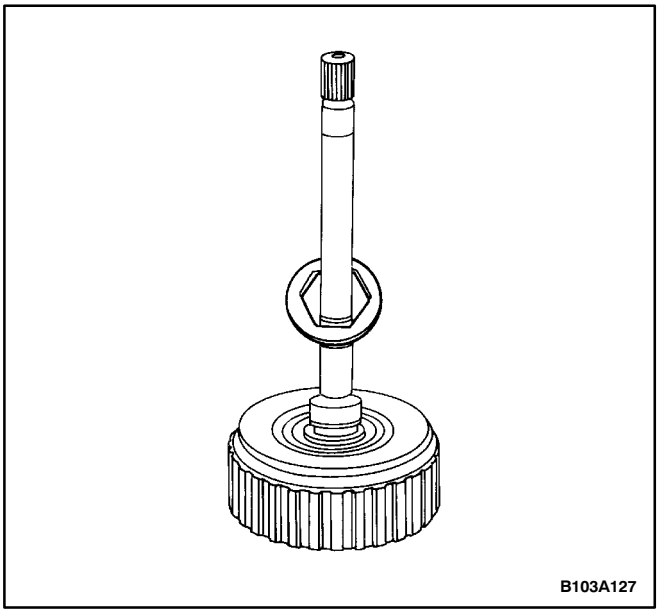


C303A129

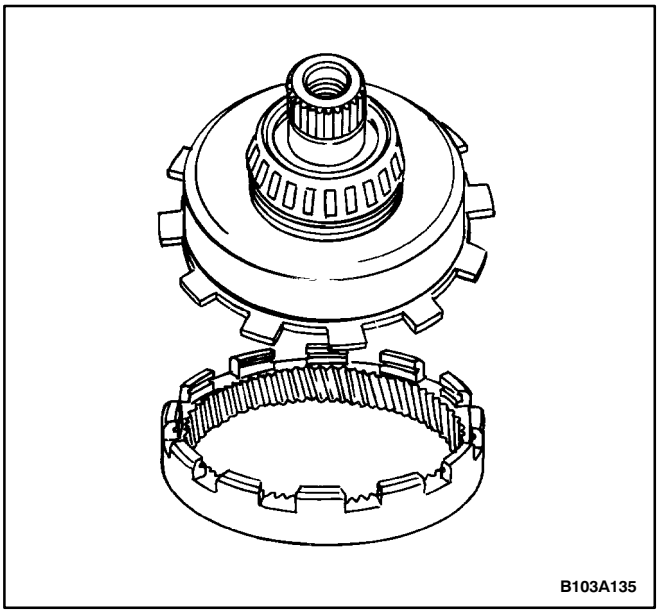
2. Compress the piston E using the bearing remover KA-001-715-04 (KA-715-04).
3. Install the retainer rings and the plate spring.


B103A134

4. Install the clutch E assembly and the snap ring.


B103A127

5. Install the thrust washer onto the motor shaft.
6. Install the clutch E assembly into the transaxle housing. Refer to “Major Component Assembly” in this section.
7. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.


B103A135

OUTPUT SHAFT AND FREEWHEEL FIRST GEAR

Tools Required

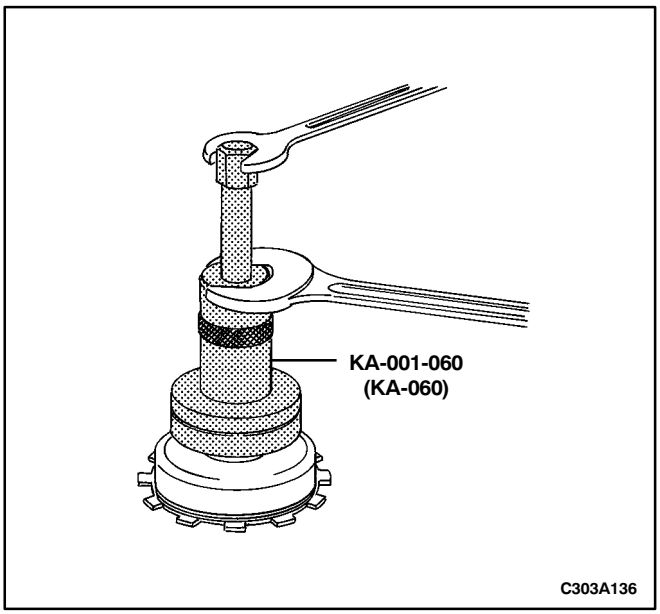
KA-001-060 (KA-060) Bearing Remover

KA-000-232 (KA-232) Bearing Remover

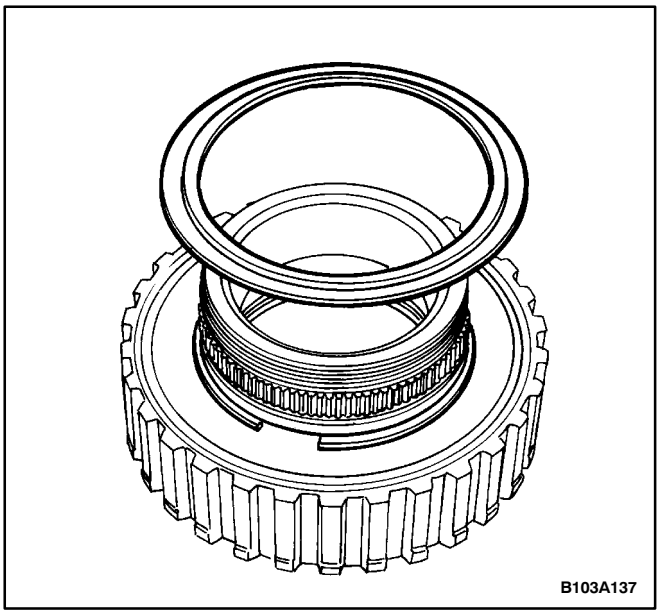
KA-000-300 (KA-300) Bearing Installer

Disassembly Procedure

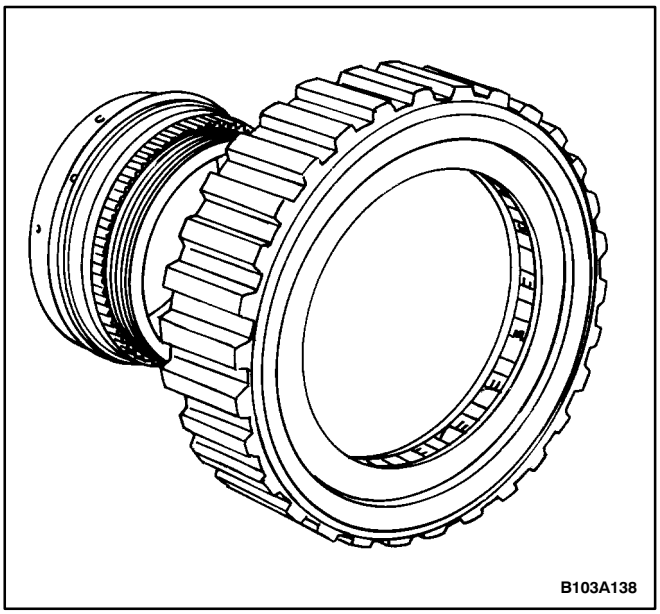
1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the output shaft and the freewheel first gear from the transaxle housing. Refer to “Major Component Disassembly” in this section.
3. Remove the output shaft snap ring.
4. Separate the output shaft and the hollow gear.



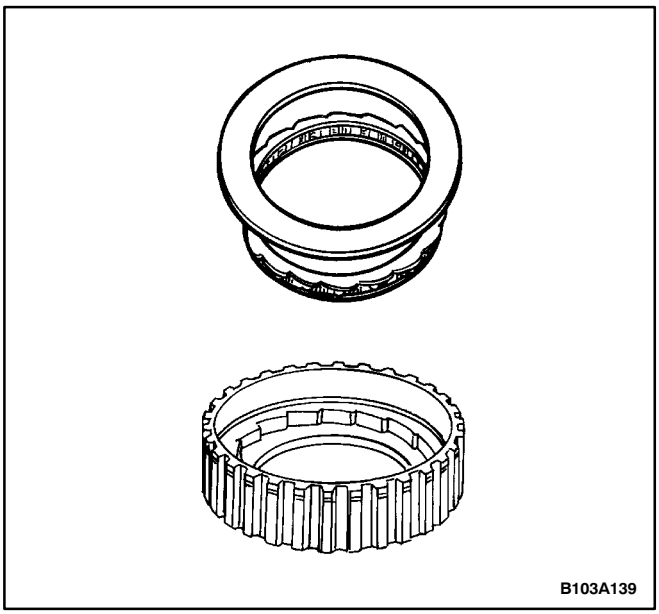
5. Remove the con bearing from the output shaft using the bearing remover KA-001-060.



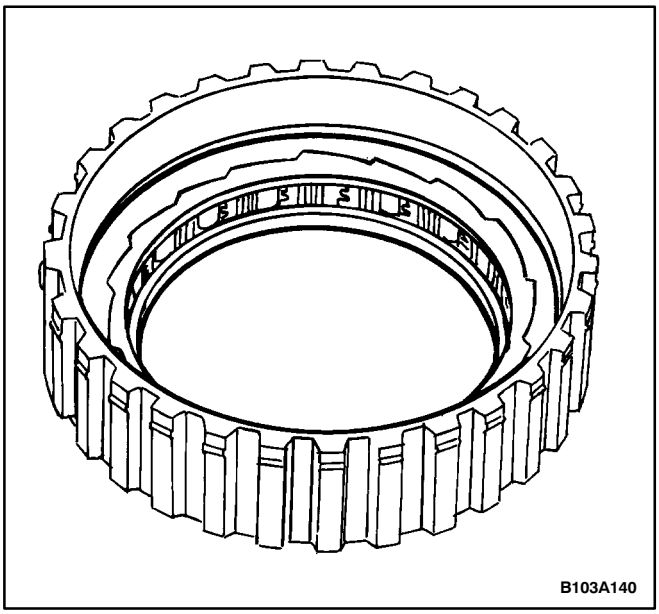
6. Remove the retainer ring and the snap ring.



7. Remove the inner freewheel ring.

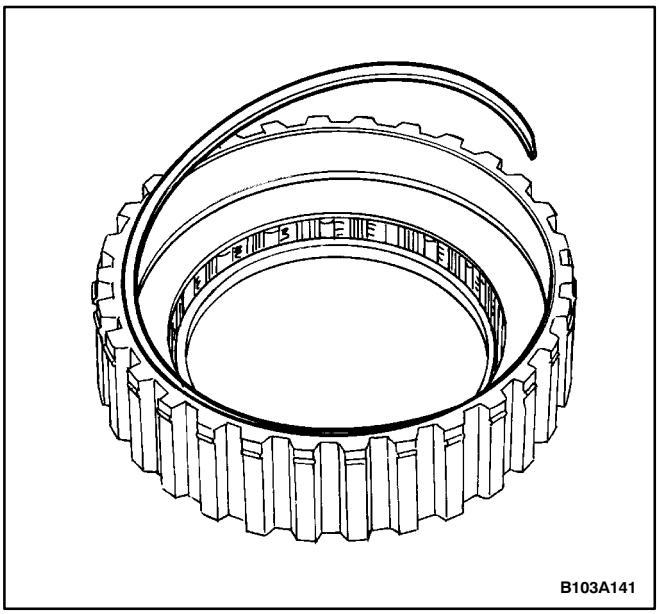

B103A139

8. Remove the snap ring from the freewheel inner ring.
9. Separate the cover plate and the freewheel cage.

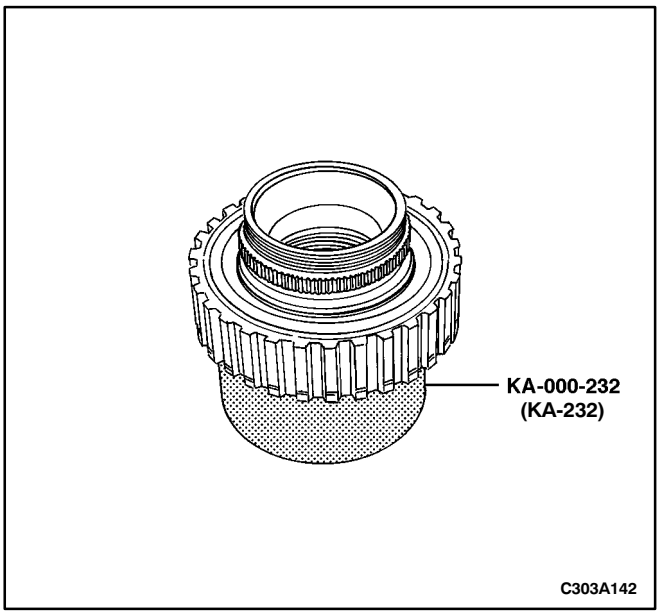

B103A140

Assembly Procedure

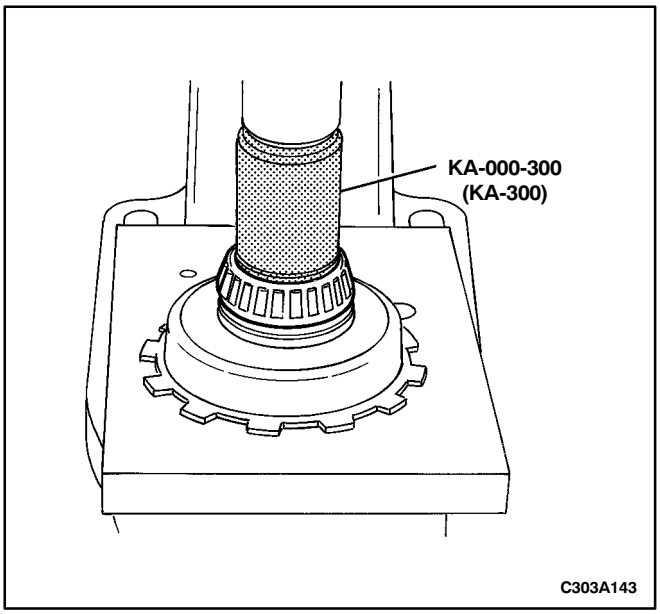
1. Insert the freewheel cage carefully into the freewheel outer ring. For correct assembly, align the teeth of the cage with the openings of the outer ring.
2. Push the freewheel cage downward.


B103A141

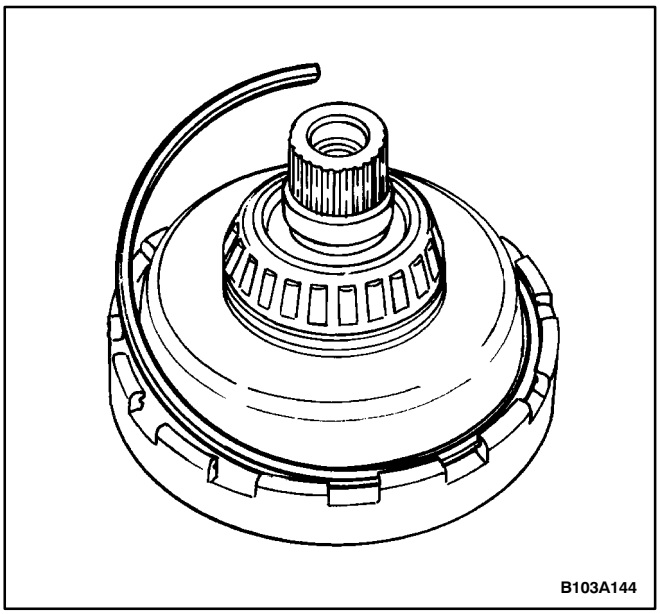
3. Install the freewheel inner ring snap ring.



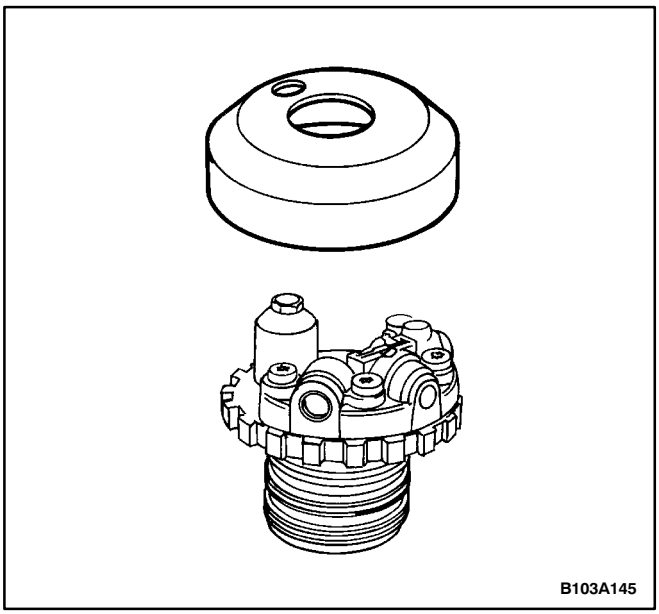
4. Install the bearing ring into the freewheel inner ring and push down to the STOP point.
5. Place the freewheel assembly on the bearing remover KA-000-232 (KA-232) and install the snap ring and the retainer ring.



6. Install the con bearing onto the output shaft using the bearing installer KA-000-300 (KA-300).



7. Join the output shaft and the hollow gear.
8. Install the output shaft snap ring.
9. Install the output shaft and the freewheel first gear into the transaxle housing. Refer to “Major Component Assembly” in this section.
10. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.


B103A145

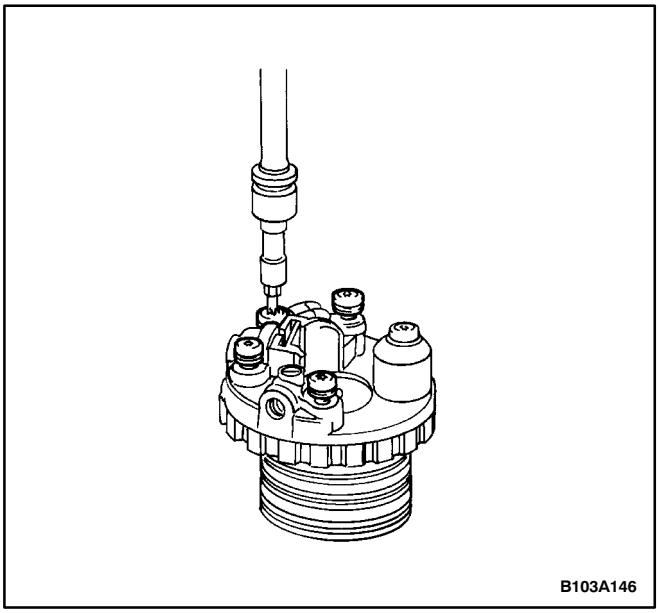
SIDE SHAFT AND GOVERNOR

Tools Required

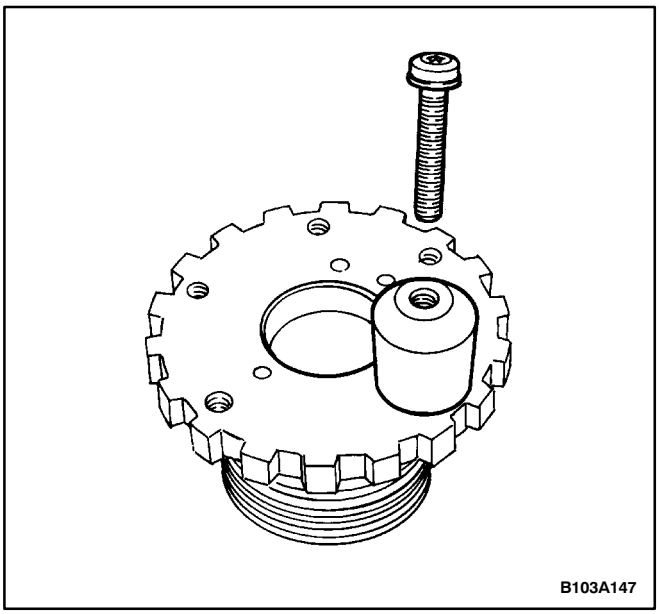
KA-000-232 (KA-232) Bearing Remover

Disassembly Procedure

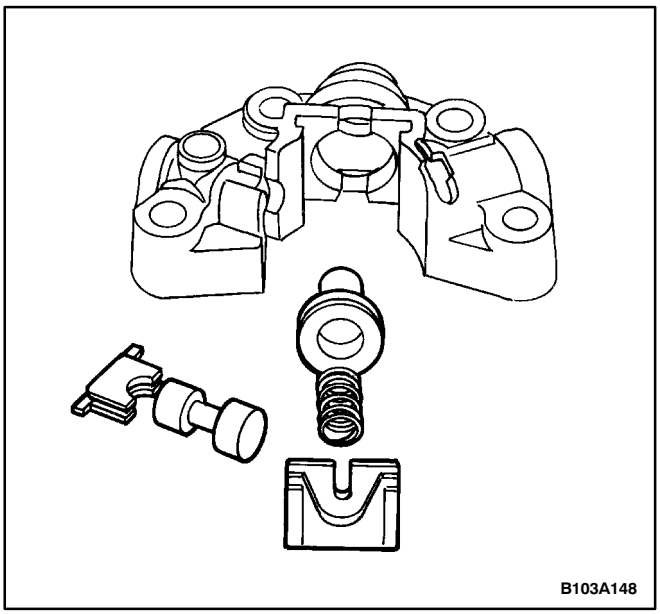
1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the side shaft and the governor assembly from the transaxle housing. Refer to “Major Component Disassembly” in this section.
3. Remove the governor screen sheet.


B103A146

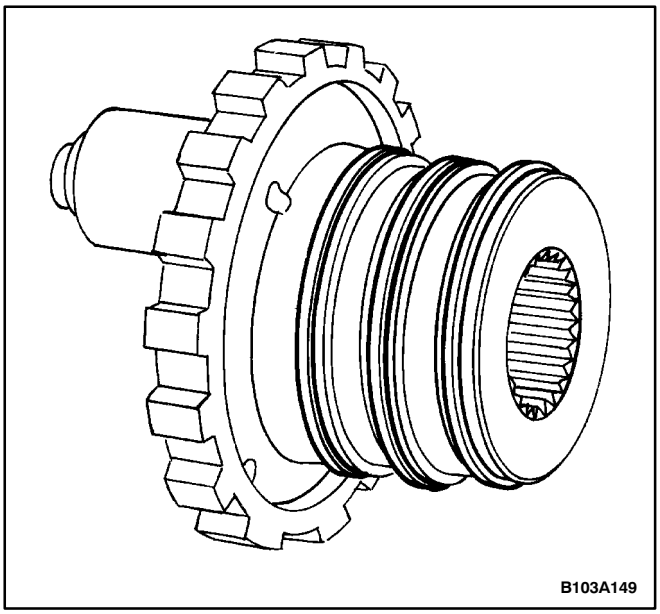
4. Remove the governor housing bolts and the governor housing.


B103A147

5. Remove the governor counterweight bolt and counterweight.

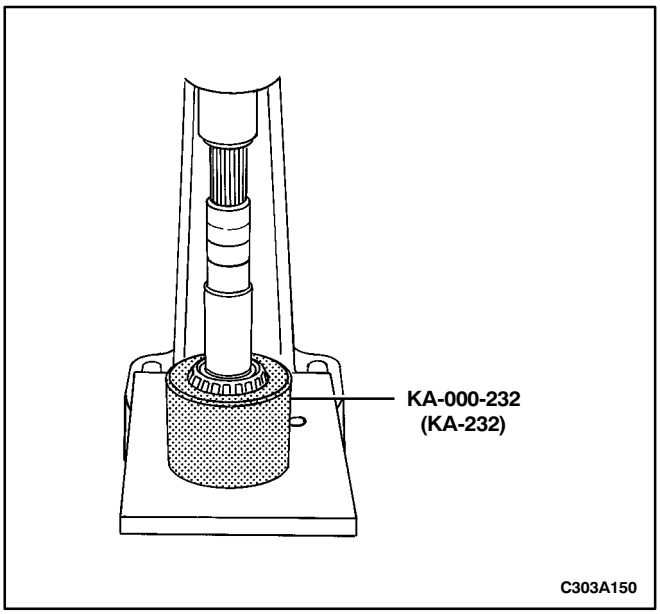

B103A148

6. Remove the stage one push piston and the stage two spring and the piston.


B103A149

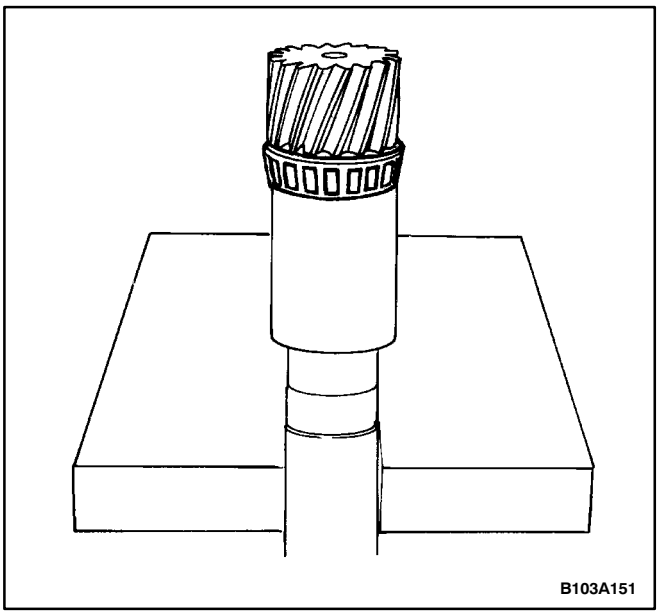
Notice: Inspect the governor housing for damage and replace it if it is damaged.

7. Replace the piston ring and the sealing rings on the governor flange as needed.



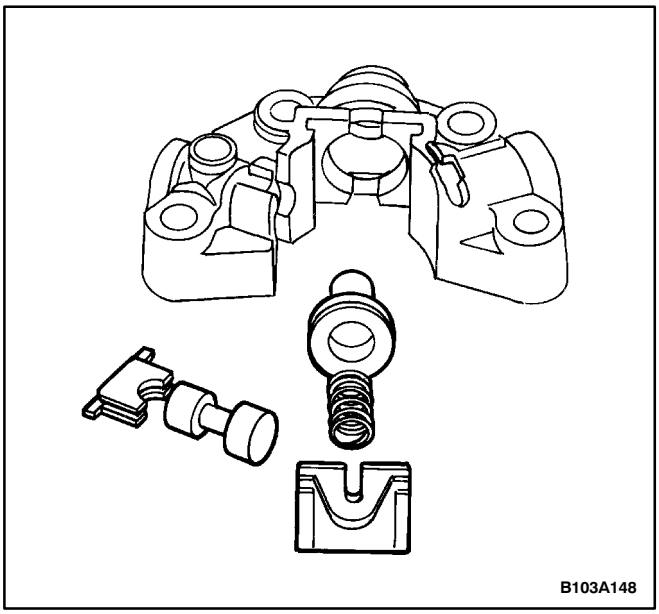
C303A150

8. Remove the con bearing from the side shaft using the bearing remover KA-000-232 (KA-232).

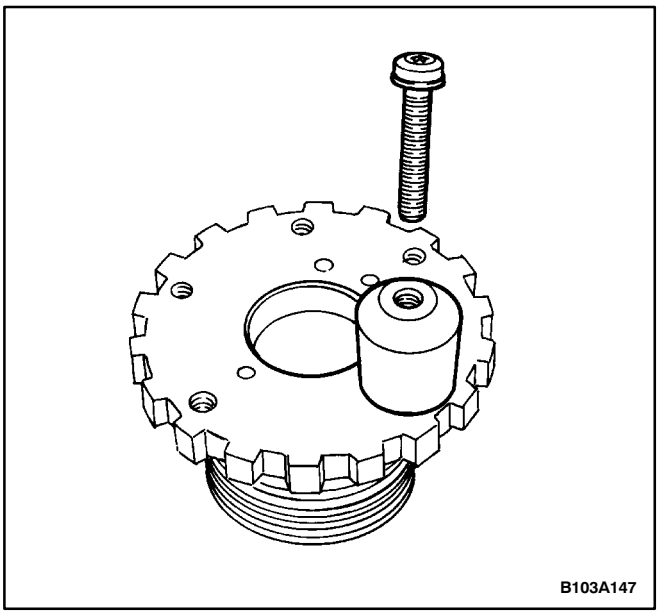

B103A151

Assembly Procedure

1. Press the con bearing onto the side shaft using an arbor press and a 44.5 mm (1.75 inch) outside diameter steel tube with a wall thickness of 3.2 mm (0.13 inch) or a schedule 40 steel pipe, 32 mm (1.3 inch) nominal size.


B103A148

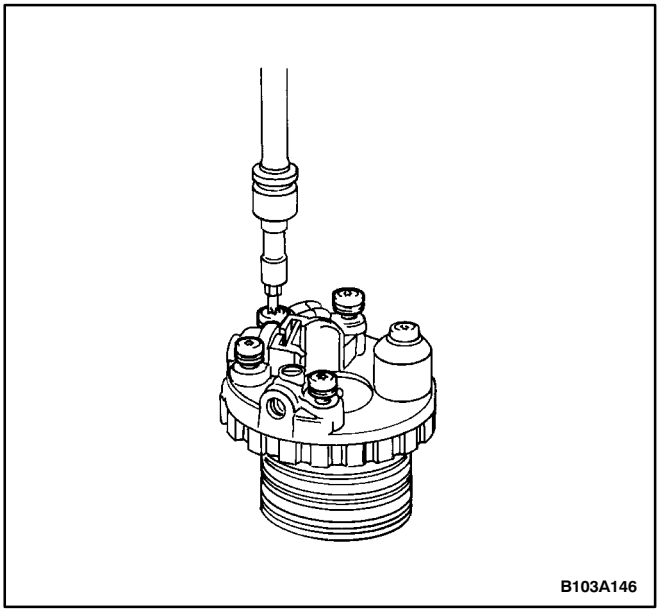
2. Install the stage two spring and the piston and the stage one push piston.


B103A147

3. Install the governor counterweight and the counterweight bolt.

Tighten

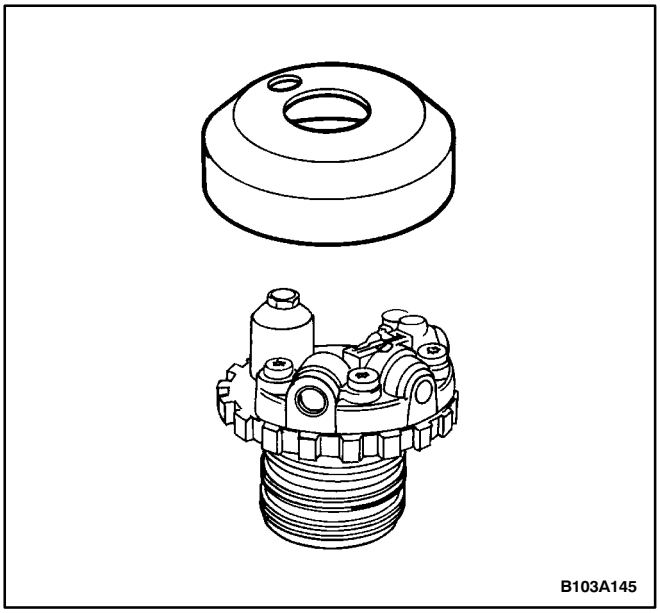
Tighten the counterweight bolt to 10 N•m (89 lb-in).


B103A146

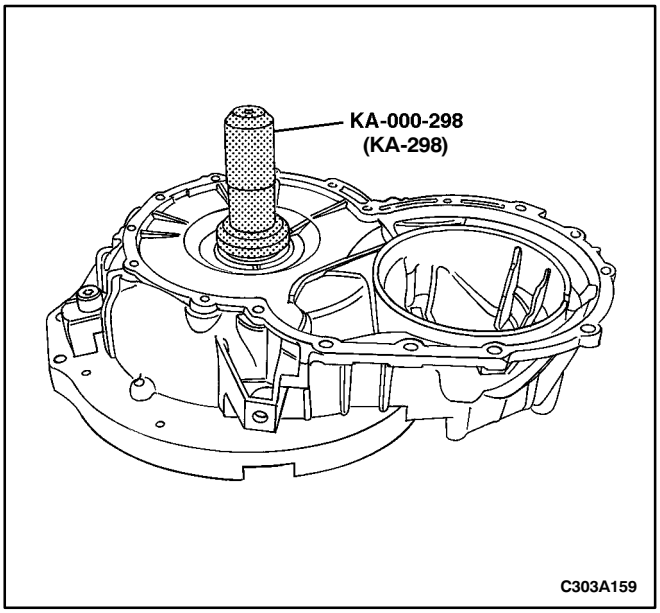
4. Install the governor housing and the governor housing bolts.

Tighten

Tighten the governor housing bolts to 10 N•m (89 lb-in).


B103A145

5. Install the governor screen sheet.
6. Install the side shaft and the governor assembly from the transaxle housing. Refer to “Major Component Assembly” in this section.
7. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.



C303A159

HOUSING

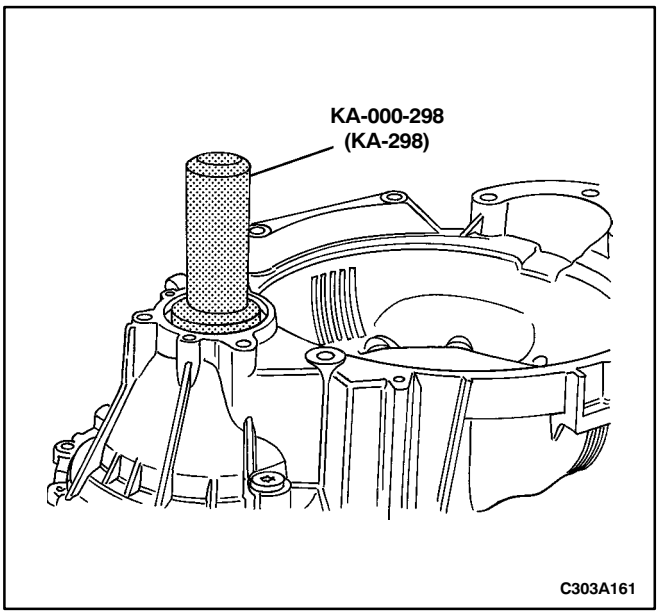
Tools Required

KA-002-111 (KA-111) Bearing Race Installer

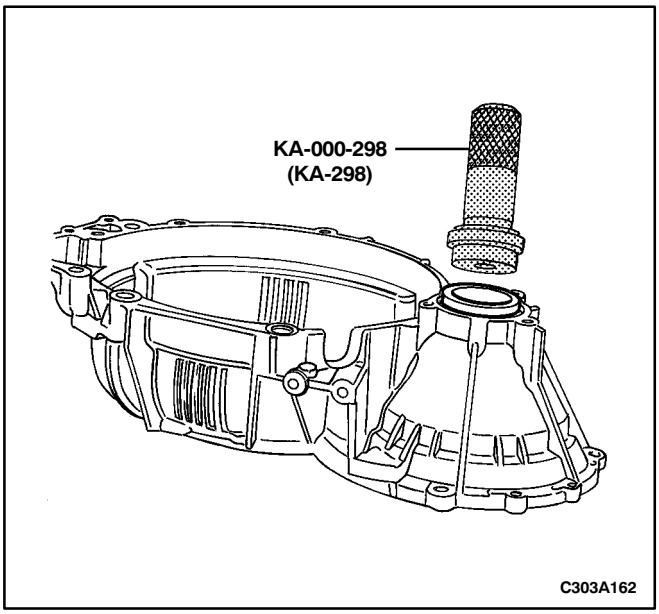
KA-000-298 (KA-298) Bearing Ring Remover/Installer

Disassembly Procedure

1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the bell housing from the transaxle. Refer to “Major Component Disassembly” in this section.
3. Remove the seal ring from the bell housing using the bearing ring remover/installer KA-000-298.

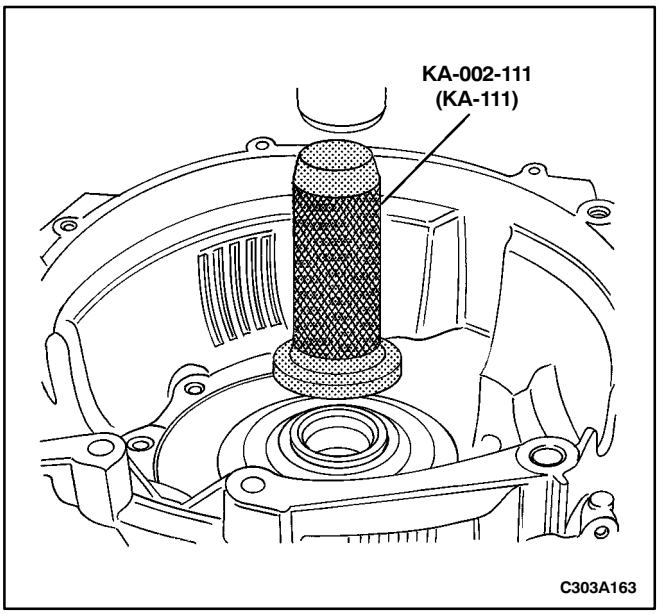


4. Remove the extension housing. Refer to “Case Extension Housing” in this section.
5. Remove the outer ring of the con bearing in the differential area of the housing using the bearing ring remover/installer KA-000-298 (KA-298).

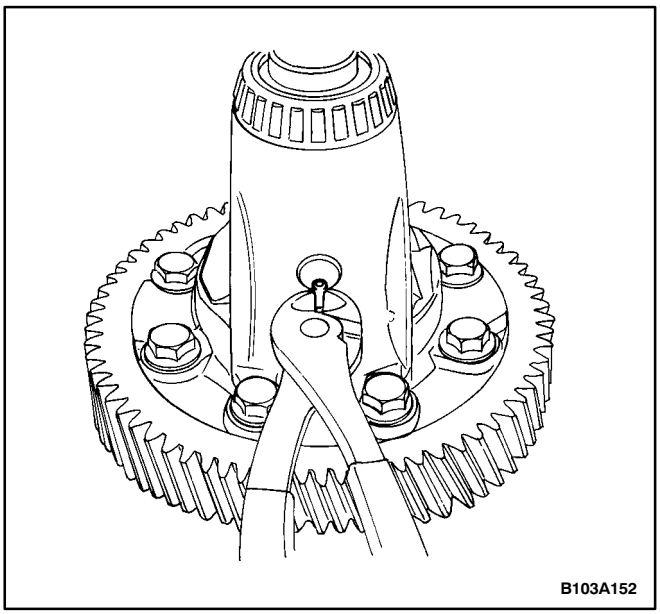


Assembly Procedure

1. Install the outer ring of the con bearing in the differential area of the housing using the bearing ring remover/installer KA-000-298 (KA-298).



2. Install the extension housing. Refer to “Case Extension Housing” in this section.
3. Install the outer ring of the con bearing using the bearing race installer KA-002-111 (KA-111).
4. Install the bell housing into the transaxle. Refer to “Major Component Assembly” in this section.
5. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.


B103A152

DIFFERENTIAL

Tools Required

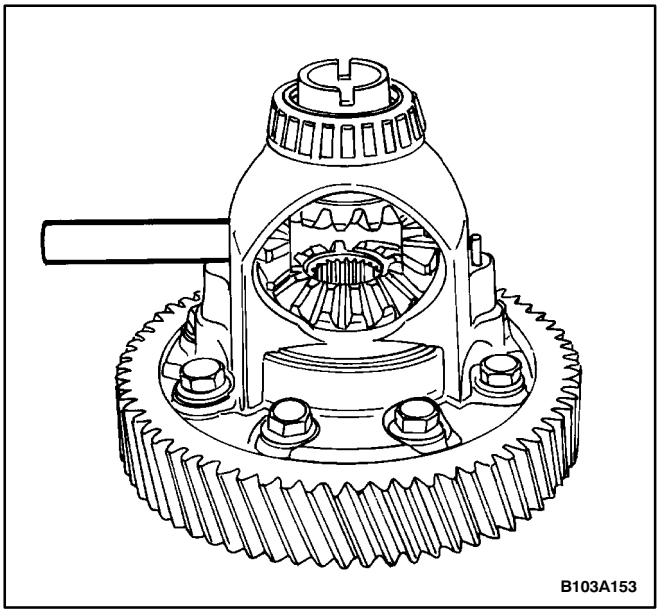
KA-001-060 (KA-060) Bearing Remover

KA-000-299 (KA-299) Seal Ring Installer

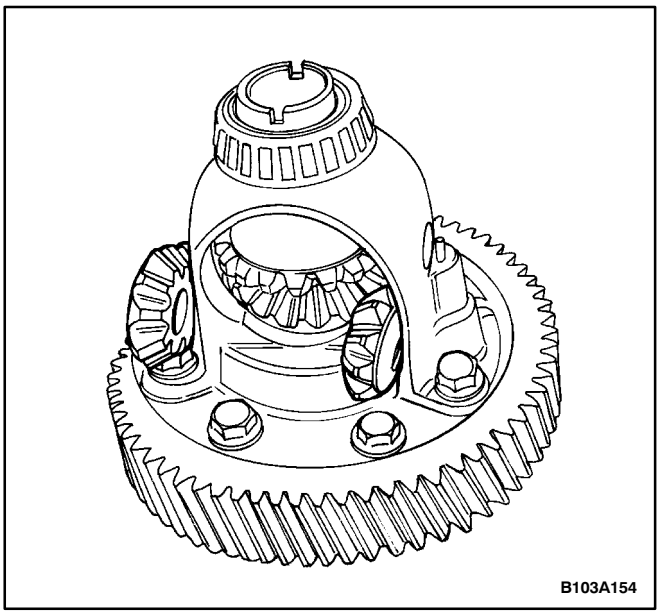
KA-000-300 (KA-300) Bearing Installer

Disassembly Procedure

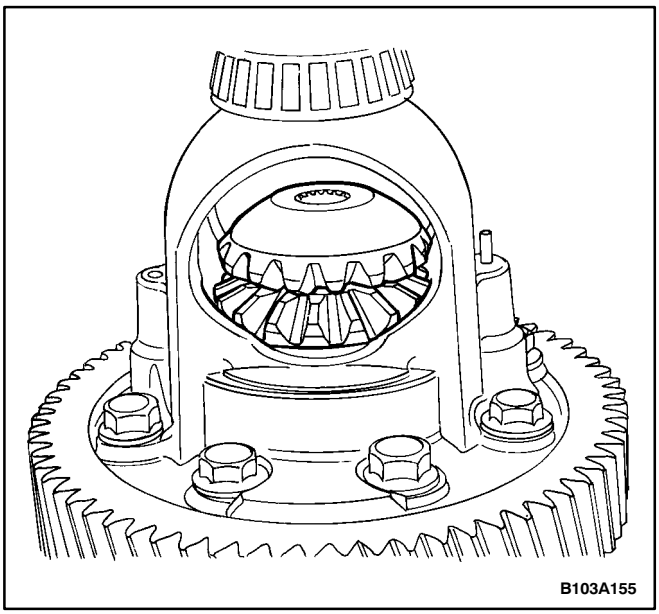
1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the differential from the transaxle. Refer to “Major Component Disassembly” in this section.
3. Remove a roll pin from one side of the differential.


B103A153

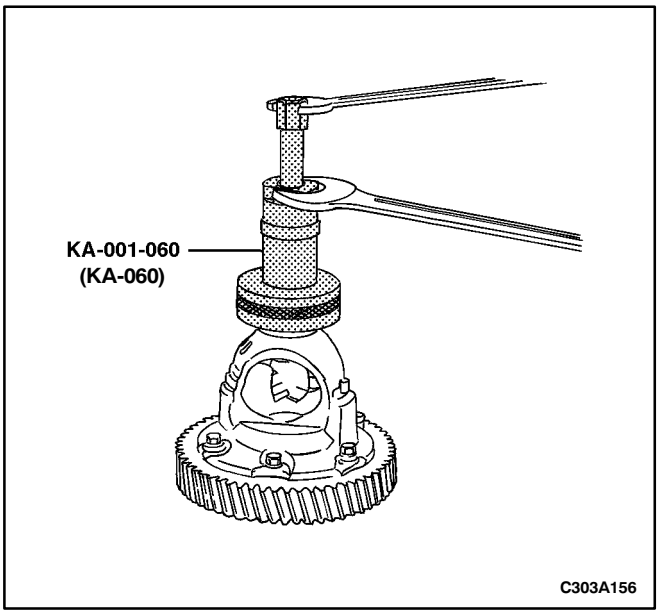
4. Remove the differential push pin.


B103A154

5. Remove the bevel side gears.

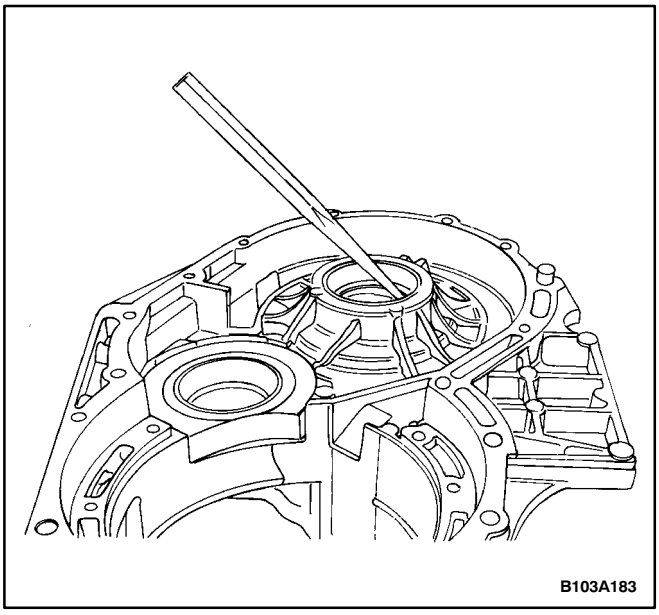

B103A155

6. Remove the bevel upper gear and the bevel lower gear.

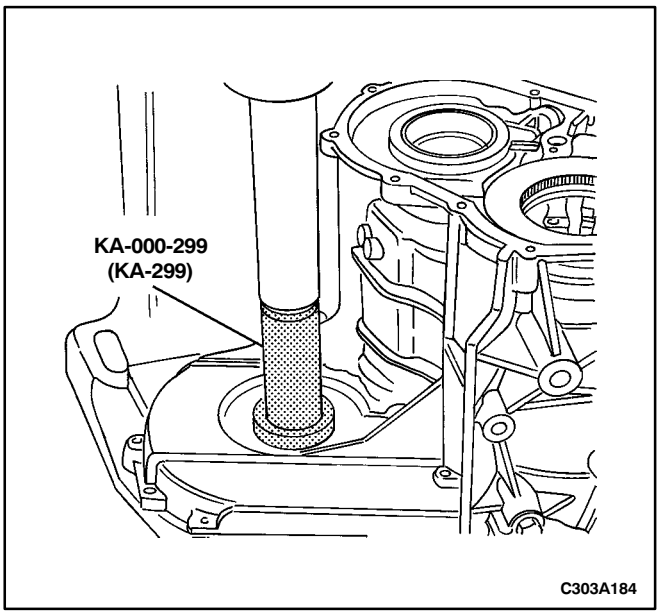


C303A156

7. Remove the upper tapered roller bearing using the bearing remover KA-001-060 (KA-060).

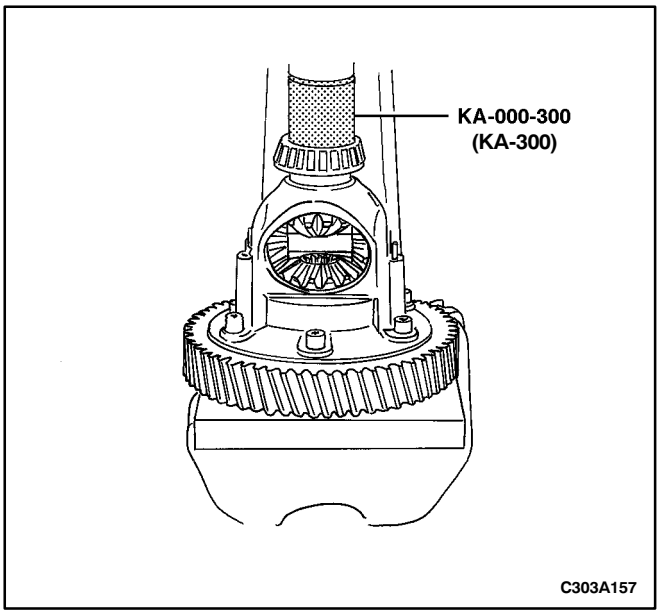

B103A183

8. Remove the housing seal ring in the differential area.

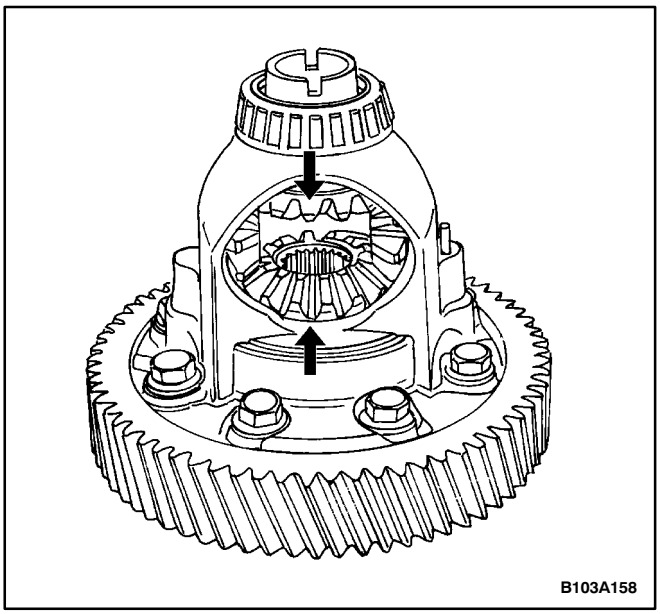


Assembly Procedure

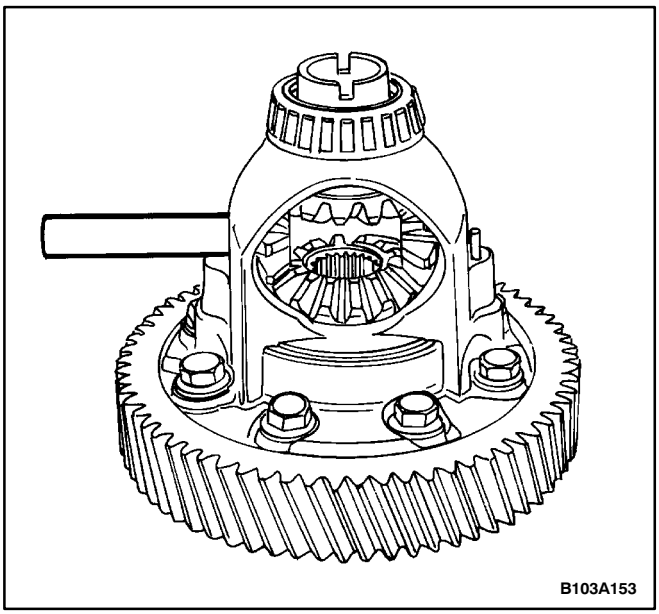
1. Install the housing seal ring in the differential area using the seal ring installer KA-000-299 (KA-299).



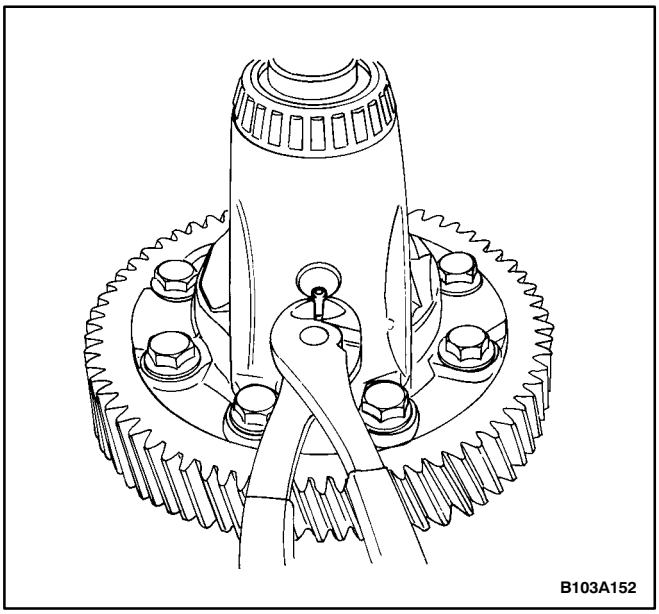
2. Install the upper tapered roller bearing using the bearing installer KA-000-300 (KA-300).



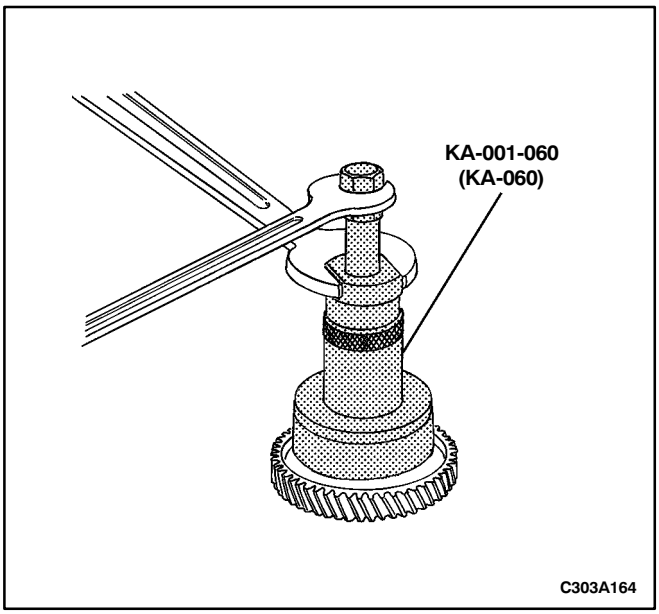
3. Install the upper, the lower, and the side bevel gears. The teeth of the upper gear must align with the spaces in the lower gear in order to install the side, the upper, and the lower bevel gears properly.


B103A153

4. Install the differential push pin.


B103A152

5. Install the roll pin.
6. Install the differential into the transaxle. Refer to “Major Component Assembly” in this section.
7. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.



C303A164

SMALL SPUR GEAR

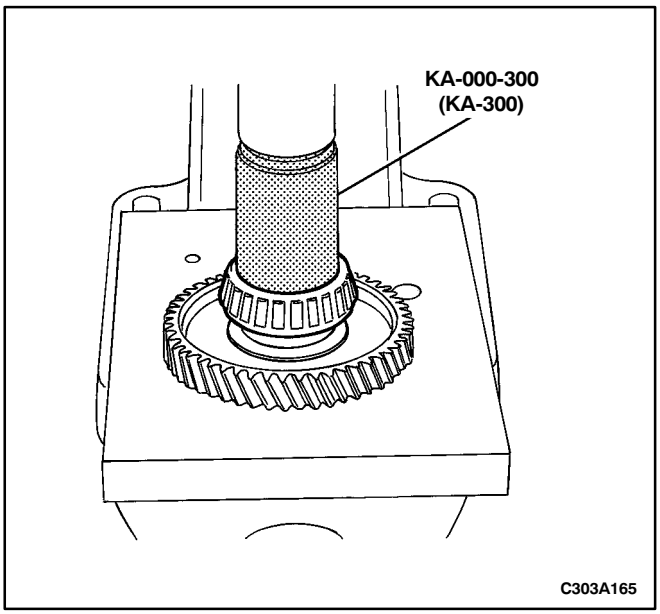
Tools Required

KA-001-060 (KA-060) Bearing Remover

KA-000-300 (KA-300) Bearing Installer

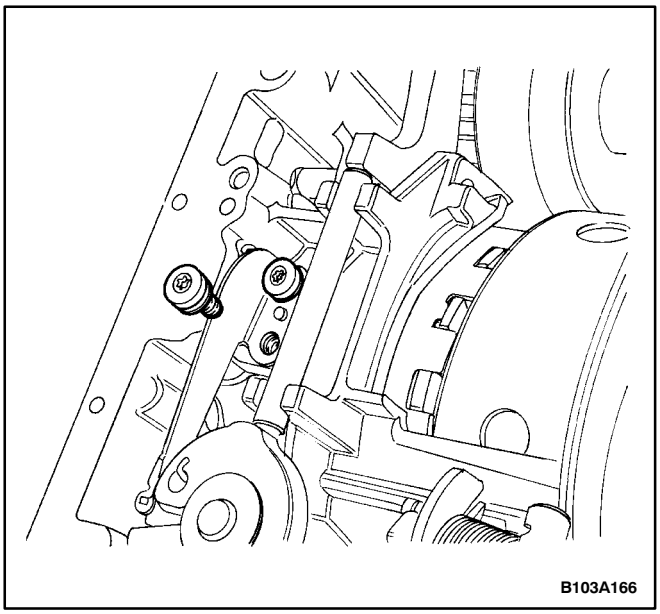
Disassembly Procedure

1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the small spur gear from the transaxle. Refer to “Major Component Disassembly” in this section.
3. Remove the con bearing from the small spur gear using the bearing remover KA-001-060 (KA-060).



Assembly Procedure

1. Install the con bearing onto the small spur gear using the bearing installer KA-000-300 (KA-300).
2. Install the small spur gear into the transaxle. Refer to “Major Component Assembly” in this section.
3. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.



PARK SYSTEM COMPONENTS

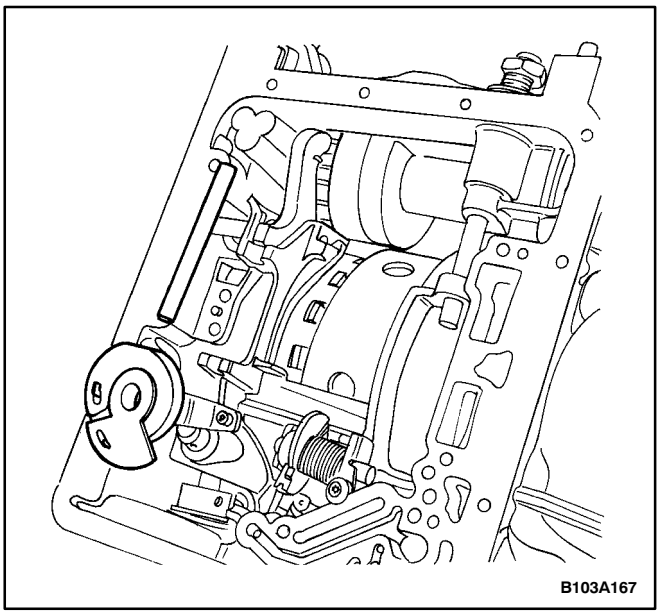
Tools Required

KA-000-187 (KA-187) Seal Ring Punch

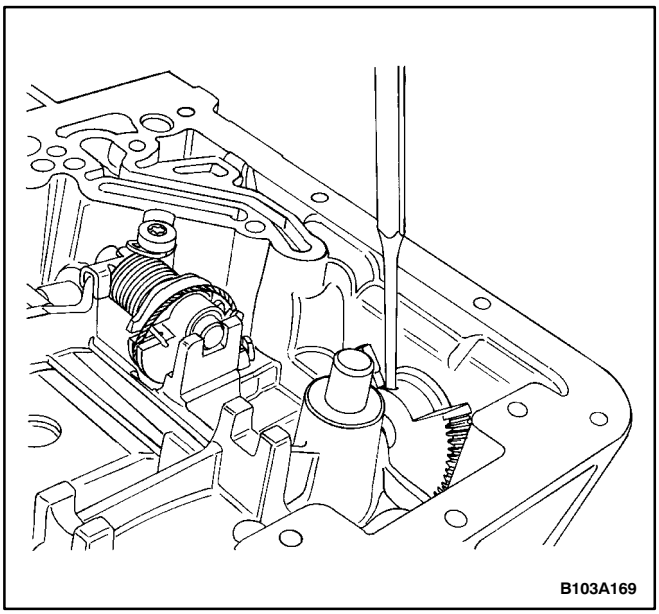
KA-000-287 (KA-287) Securing Device

Disassembly Procedure

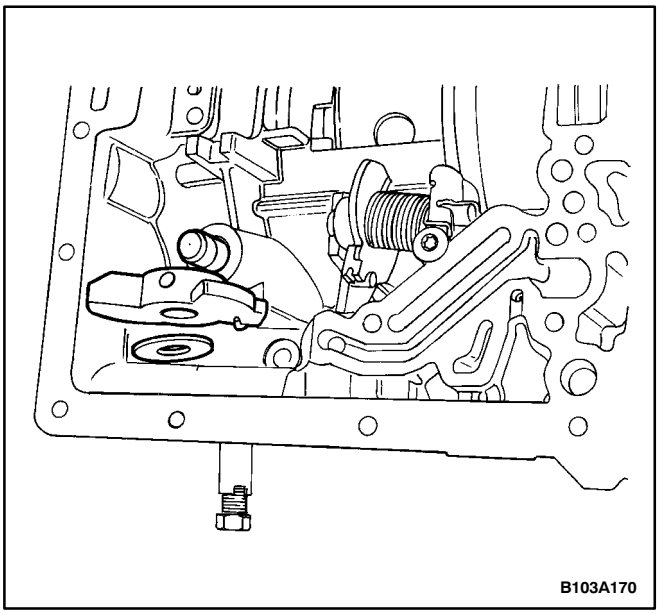
1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the fluid pan cover and the gasket. Refer to “Pan and Gasket” in this section.
3. Remove the valve body. Refer to “Valve Body” in this section.
4. Remove the side cover and the gasket. Refer to “Case Side Cover Pan and Gasket” in this section.
5. Remove the detent screws that secure the spring plate.



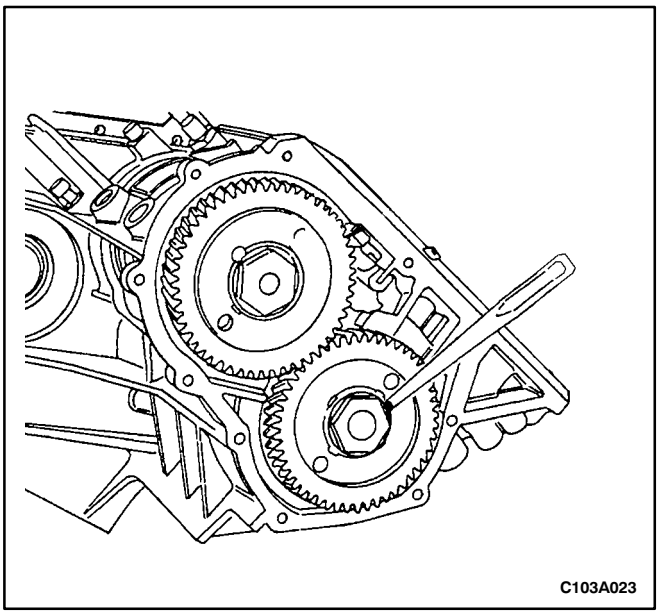
6. Remove the connecting rod and the PARK cam.


B103A169

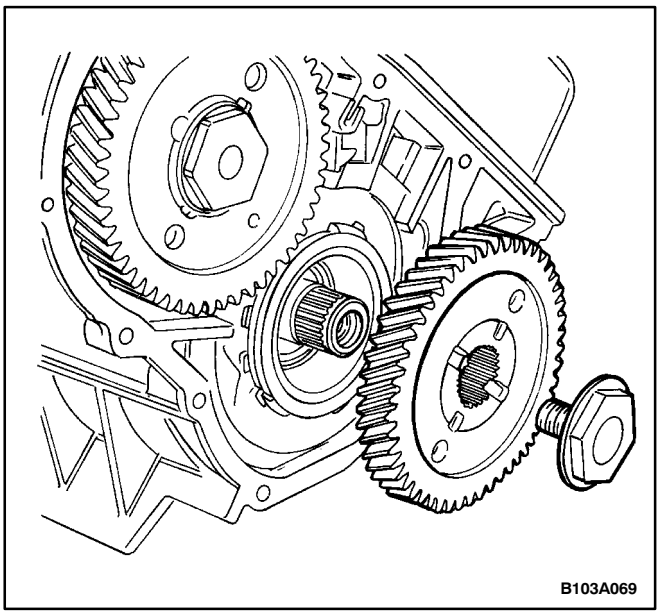
7. Remove the selector shaft roll pin.


B103A170

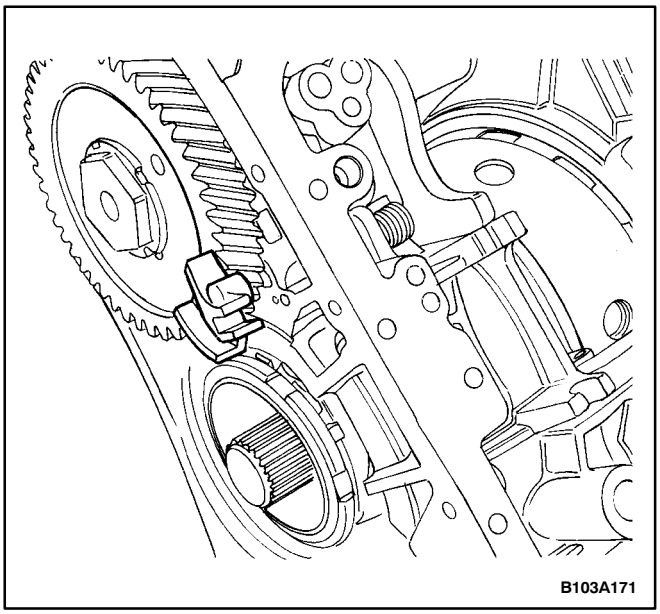
8. Remove the selector shaft, the selector shaft cam, the adjustment washer, and the cam pin.


C103A023

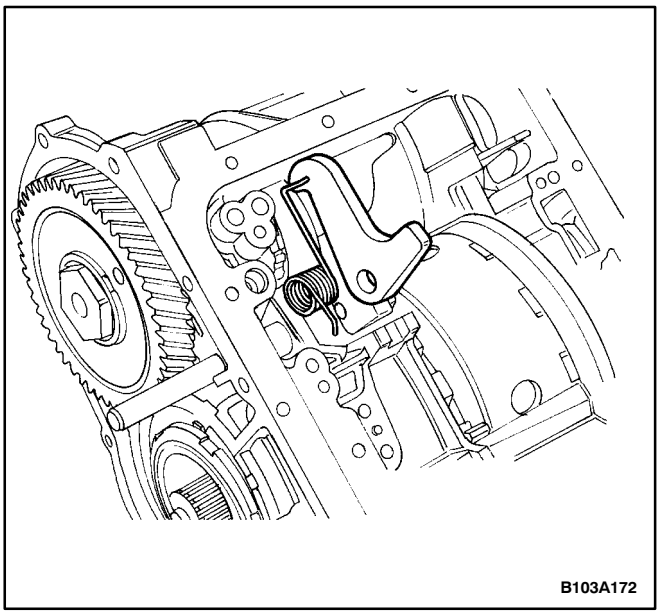
9. Bend the locking tabs on the small spur gear securing nut.


B103A069

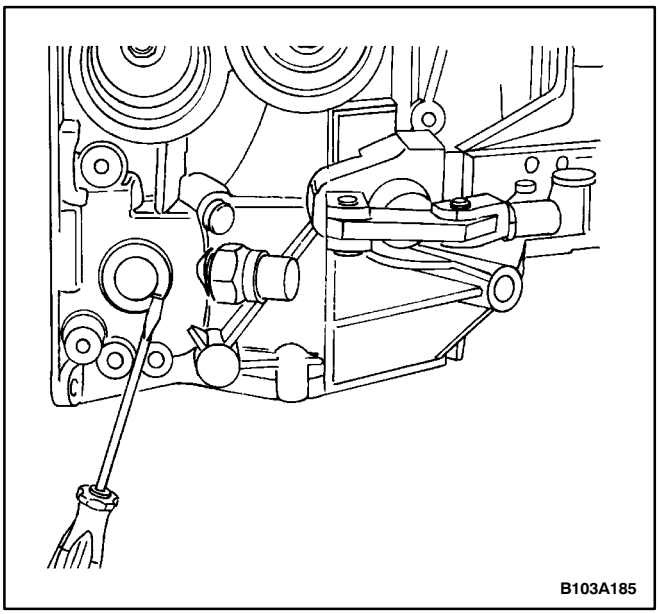
10. Remove the securing bolt on the smaller spur gear and remove the small spur gear.


B103A171

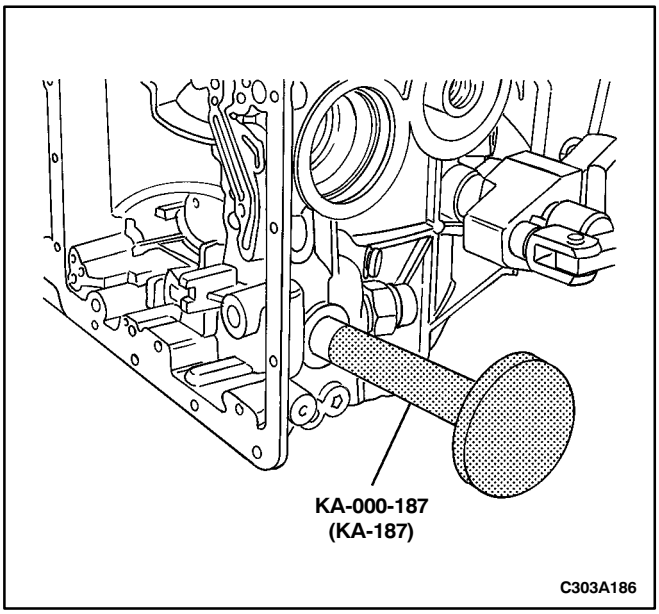
11. Remove the plastic holding fixture.


B103A172

12. Push the PARK pawl pin out of the housing and remove the BRAKE pawl along with the leg spring.


B103A185

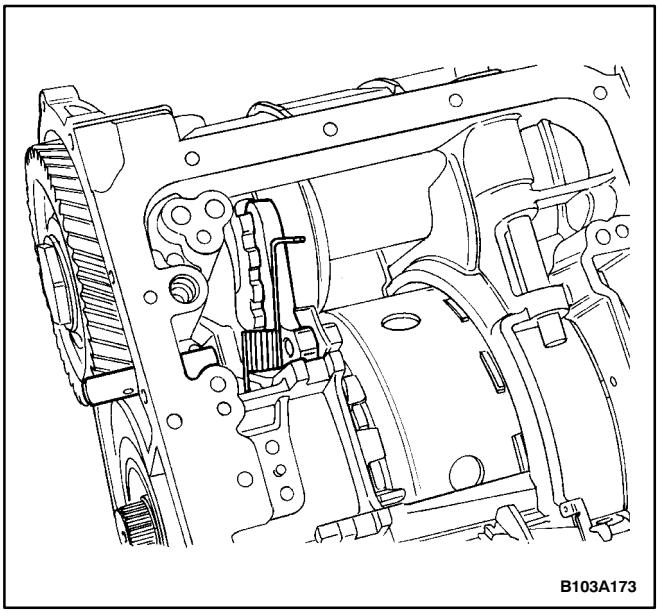
13. Remove the selector shaft seal ring.



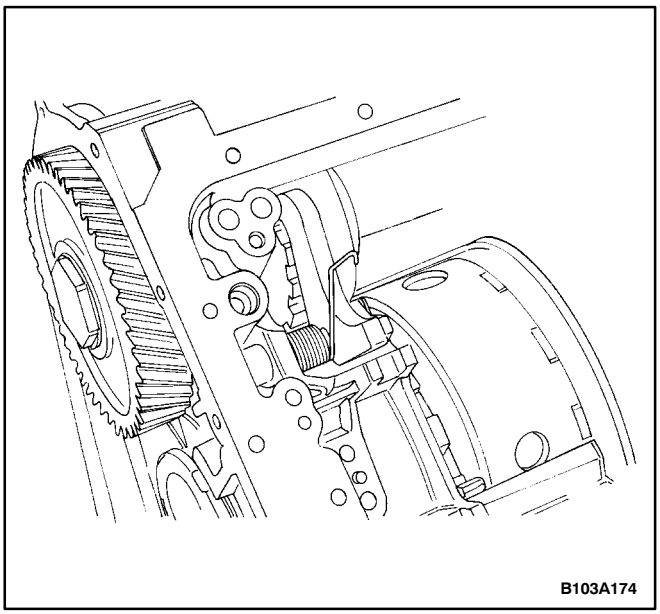
C303A186

Assembly Procedure

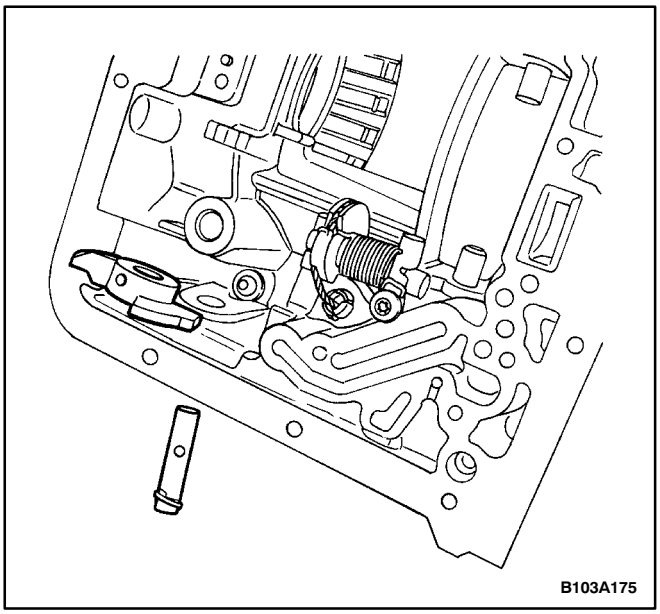
1. Install the selector shaft seal ring using the seal ring punch KA-000-187 (KA-187).


B103A173

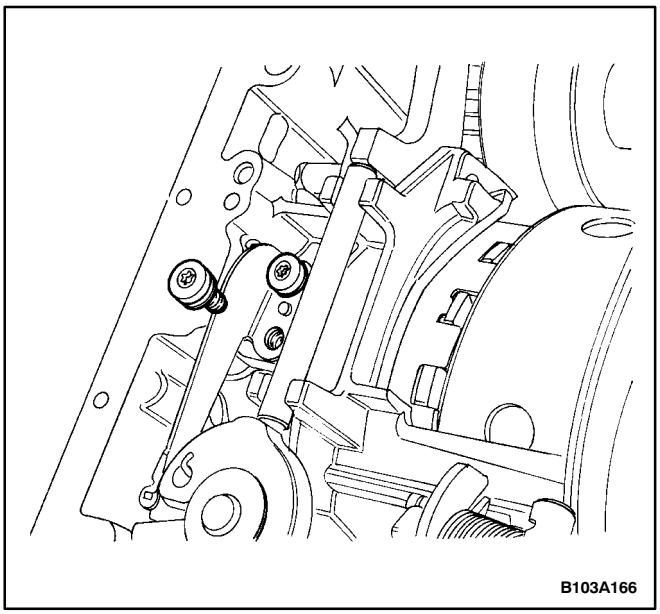
2. Insert the PARK pawl pin approximately half of the way into the transmission case in order to install the leg spring and the PARK pawl.


B103A174

3. Push the shaft to the STOP point and place the leg spring under the PARK pawl.


B103A175

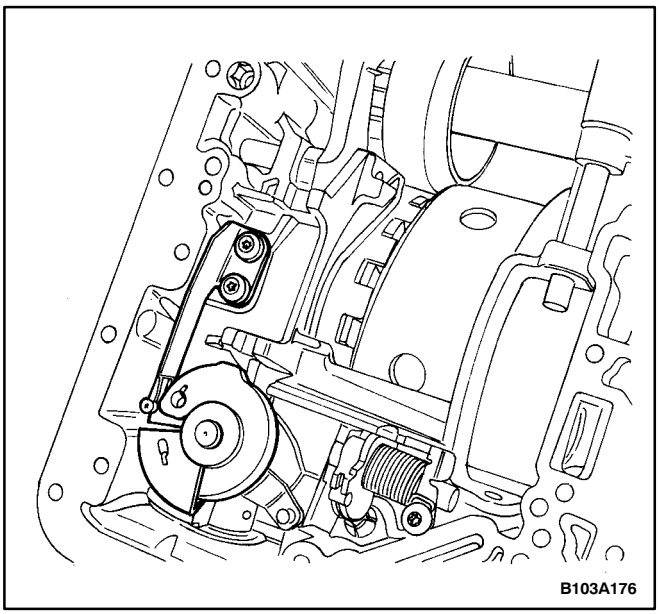
4. Insert the selector shaft half of the way into the transmission case, fit the selector shaft cam onto the shaft, and push the selector shaft to the STOP point.


B103A166

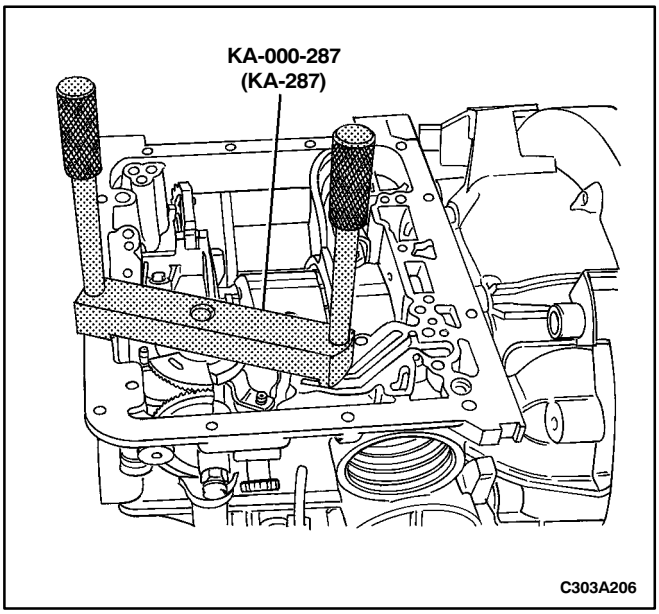
5. Install the spring plate into the housing and secure the spring plate with the detent screws.

Tighten

Tighten the spring plate detent screws to 10 N•m (89 lb-in).

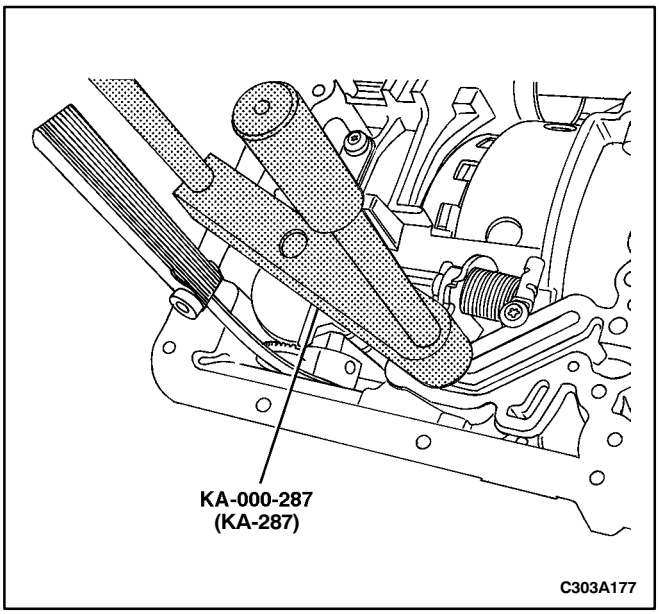

B103A176

6. Install the PARK cam onto the cam pin and connect the spring plate.



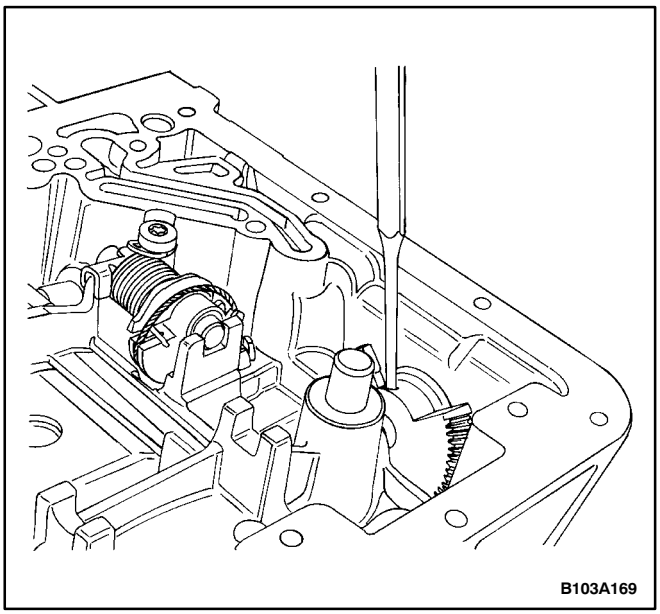
C303A206

7. Push the selector shaft cam up against the PARK cam as tightly as possible. Secure the PARK cam with the securing device KA-000-287 (KA-287).

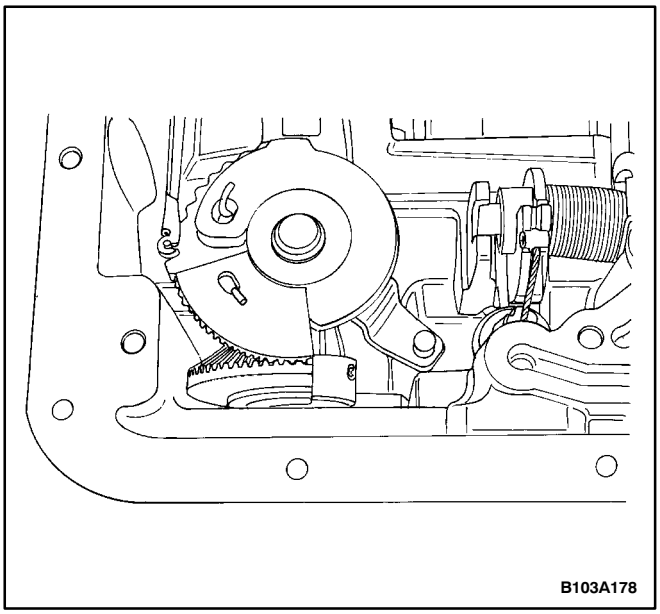


C303A177

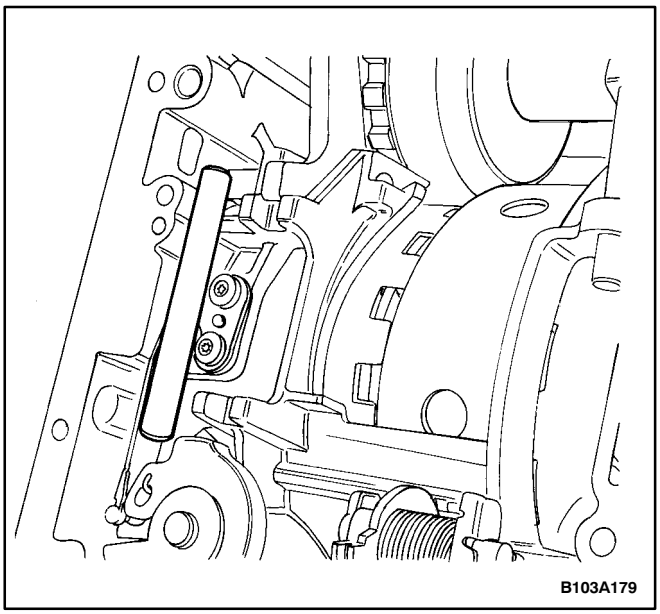
8. Measure the clearance between the selector shaft cam and the transaxle case with a gauge. Determine the size washer to fit into this clearance by subtracting 0.10 mm (0.39 inch) from the clearance measurement.


B103A169

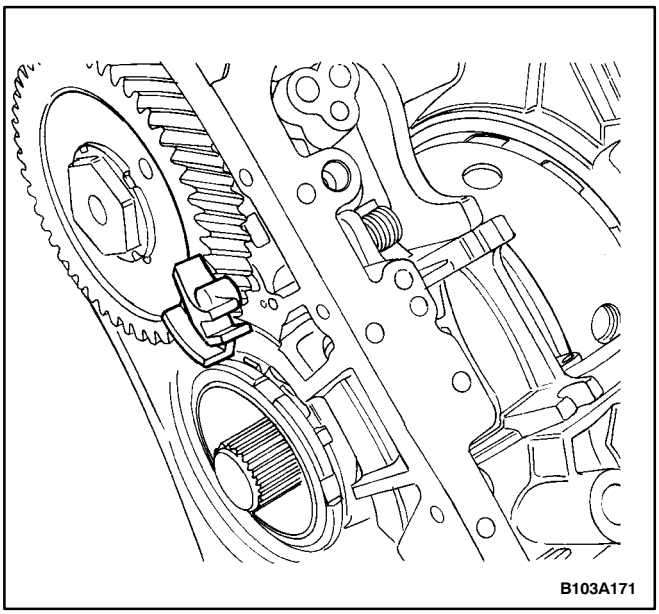
9. Remove the spring plate and pull out the selector shaft as far as needed to insert the washer between the selector shaft cam and the transmission case.
10. Once the selector shaft is back in place, install the roll pin.


B103A178

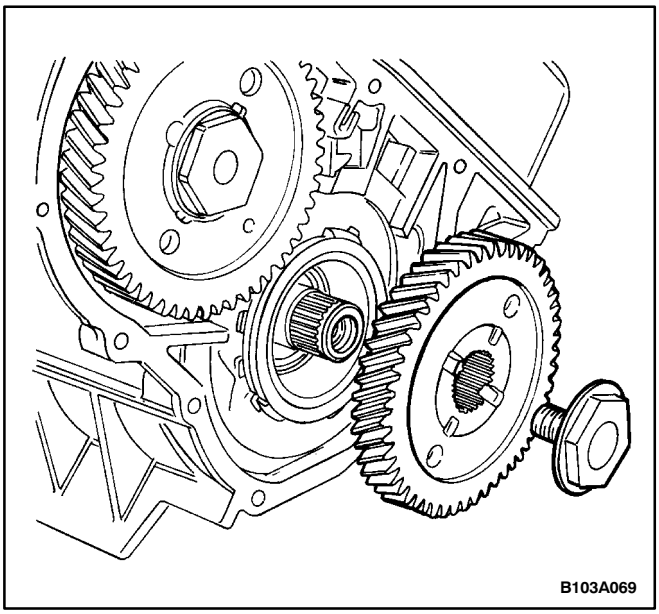
11. The teeth of the PARK cam and the selector shaft cam must be aligned properly.


B103A179

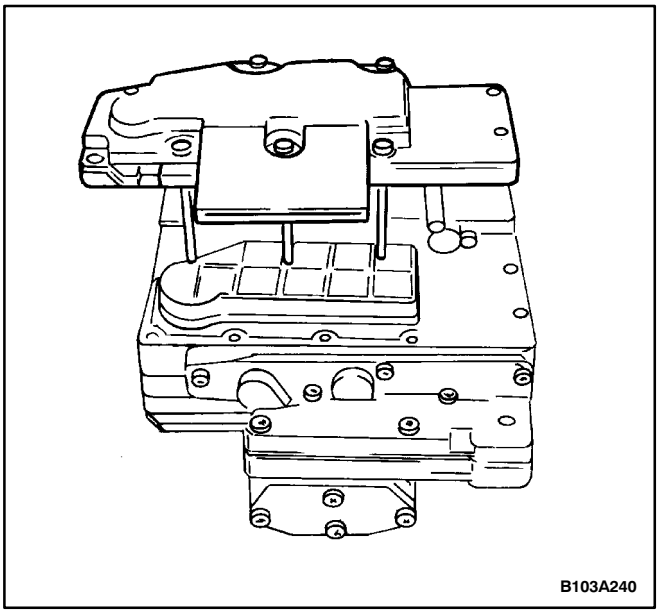
12. Install the connecting rod.


B103A171

13. Install the plastic holding fixture.


B103A069

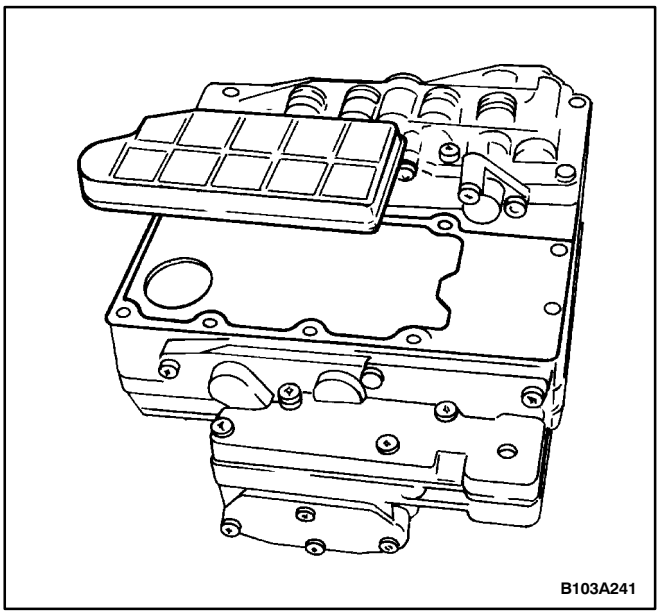
14. Install the small spur gear. Install the securing bolt onto the smaller spur gear.
15. Adjust the clearance on the output shaft. Refer to “Major Component Assembly” in this section.
16. Install the side cover gasket and the side cover. Refer to “Case Side Cover Pan and Gasket” in this section.
17. Install the valve body. Refer to “Valve Body” in this section.
18. Install the fluid pan cover gasket and the fluid pan cover. Refer to “Pan and Gasket” in this section.
19. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.


B103A240

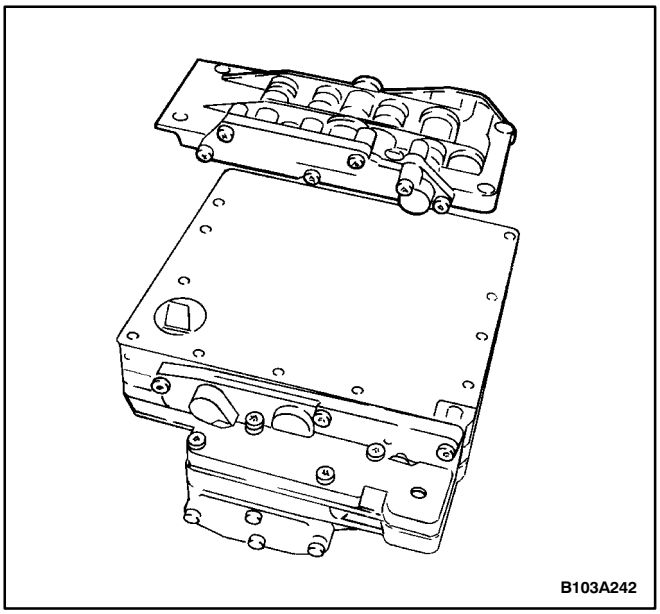
VALVE BODY

Disassembly Procedure

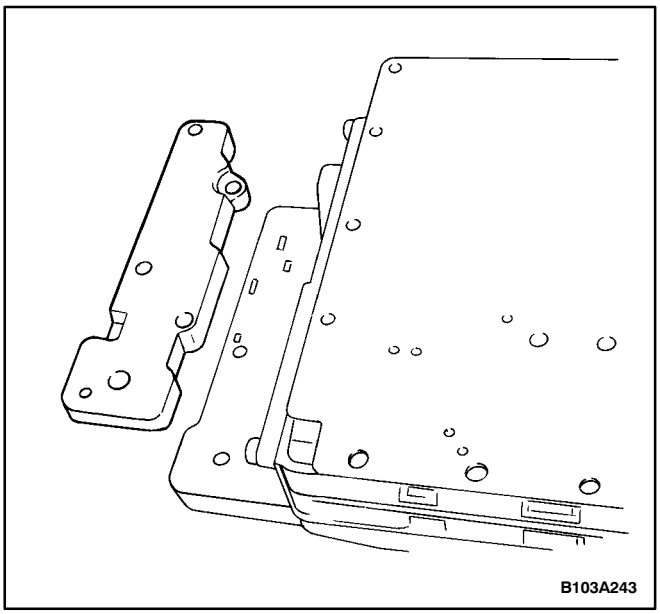
1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the valve body from the transaxle. Refer to “Major Component Disassembly” in this section.
3. Remove the fluid filter housing.



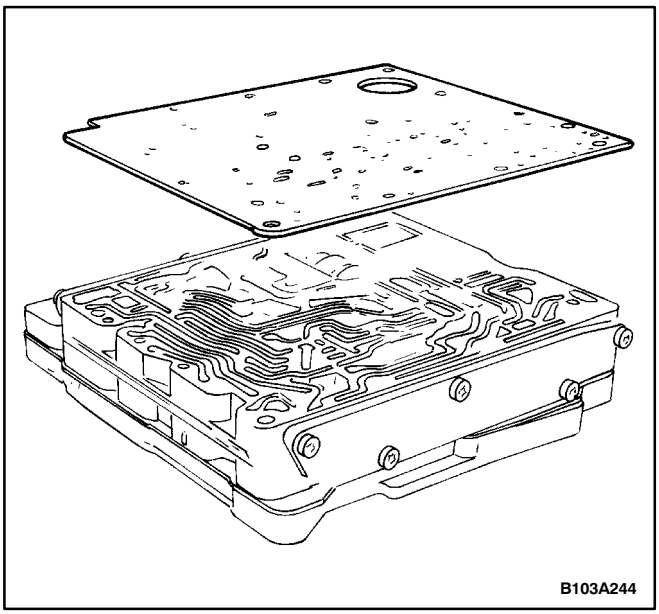
4. Remove the fluid filter and the gasket.



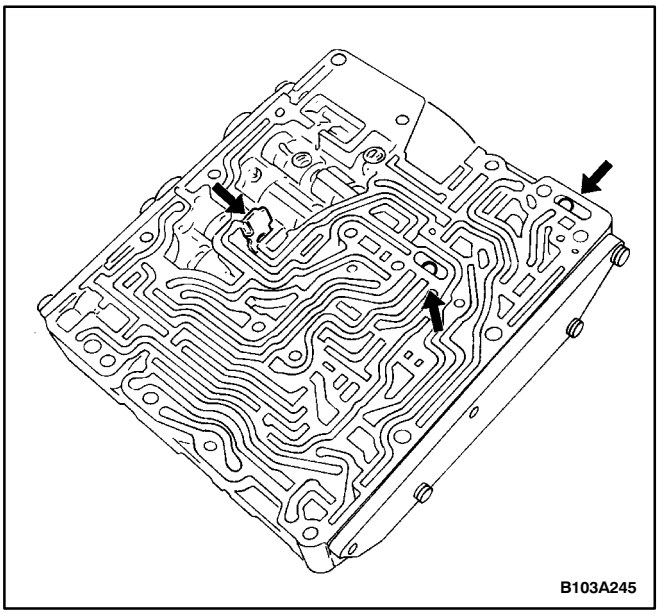
5. Remove the lower valve housing bolts and remove the lower valve housing.



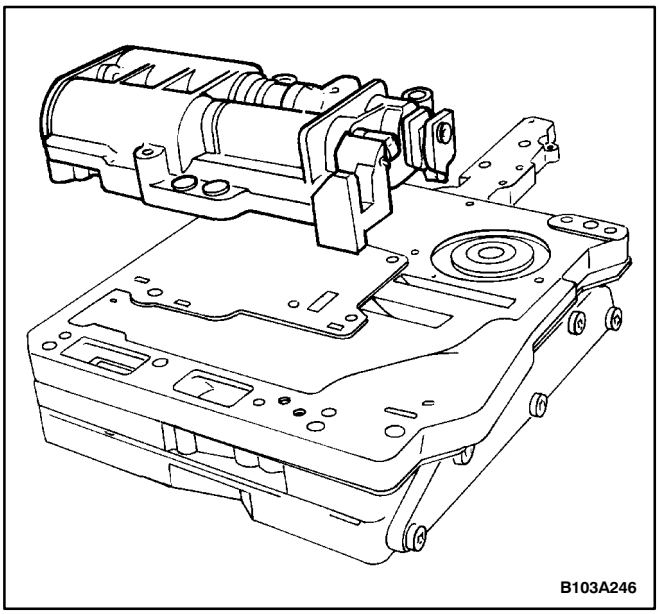
6. Remove the lower cover.


B103A244

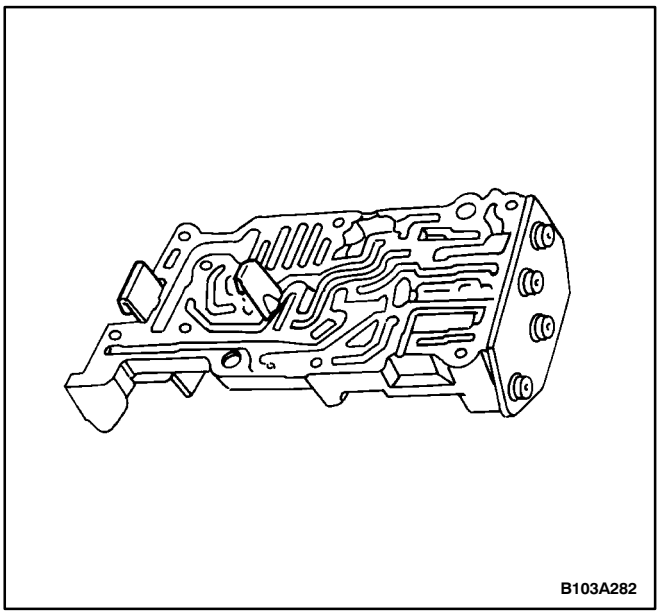
7. Remove the lower intermediate plate.


B103A245

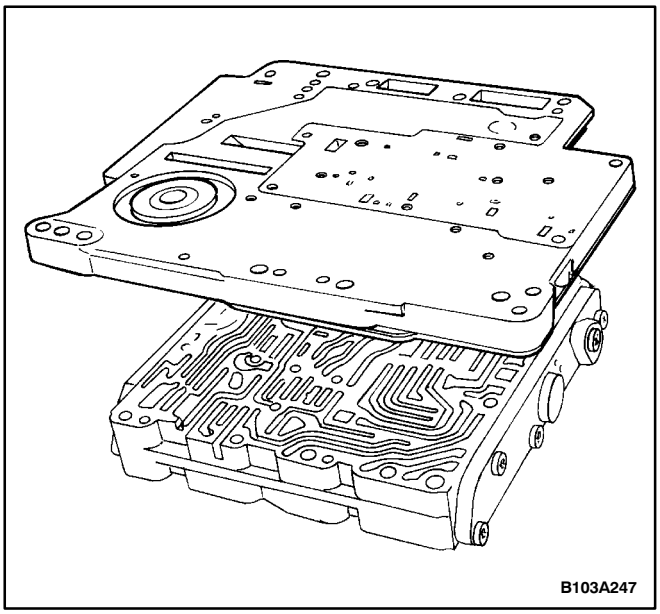
8. Remove the change valve balls and the clip from the lower side of the valve housing.


B103A246

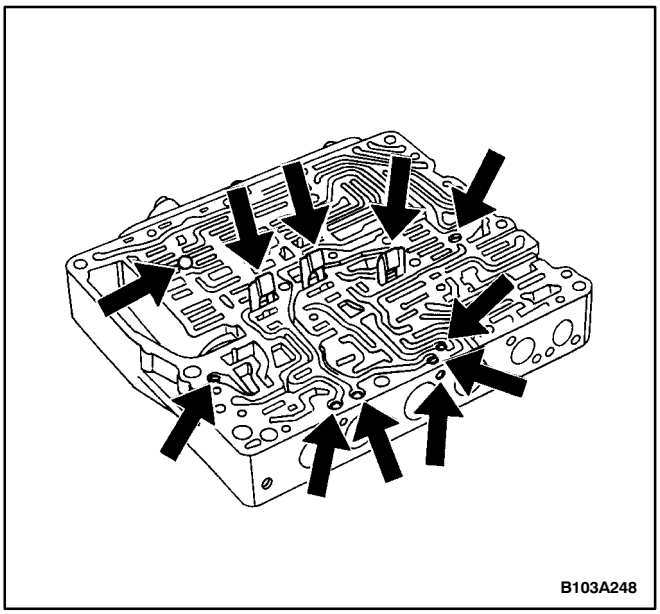
9. Turn the valve body over.
10. Remove the clutch A and the brake D housing.


B103A282

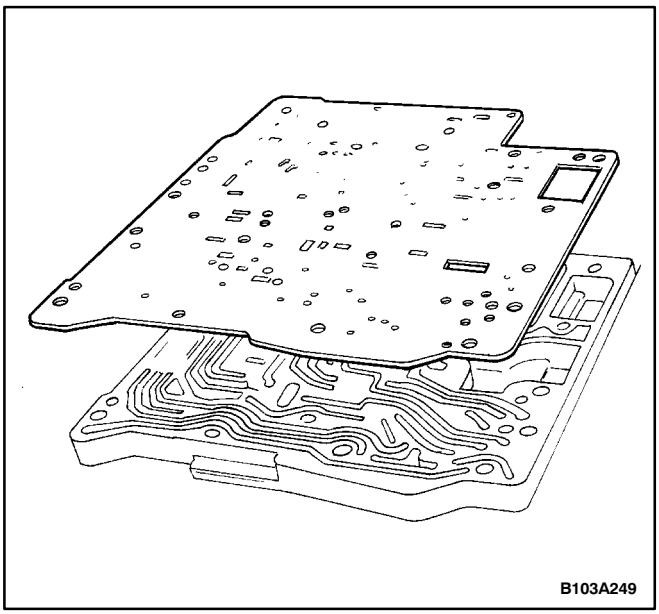
11. Replace the clips on the under side of the housing, if necessary.


B103A247

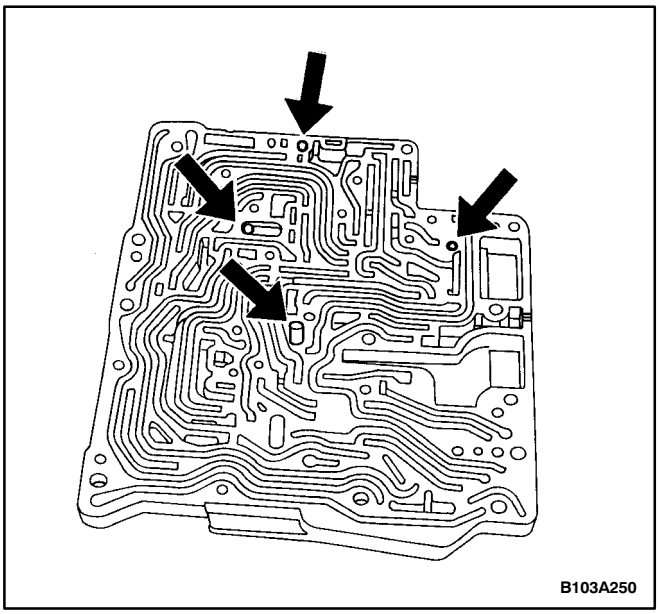
12. Keep the fluid passage plate and the upper intermediate plate together, separating them as a unit from the upper side of the valve housing. Turn them over before placing them on the table.


B103A248

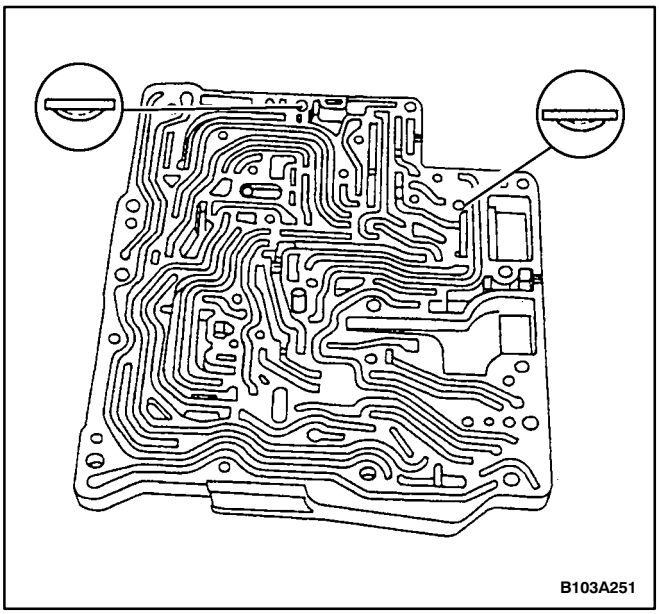
13. Remove the breather ball, the clips, and the restrictors from the upper side of the valve housing.


B103A249

14. Separate the upper intermediate plate from the fluid passage plate.


B103A250

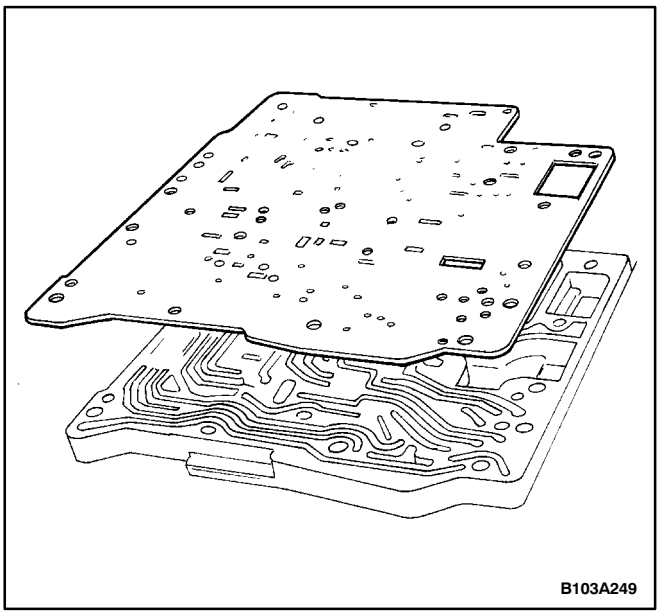
15. Remove the restrictors, the centralizing pin, and the supply ball from the fluid channel housing.


B103A251

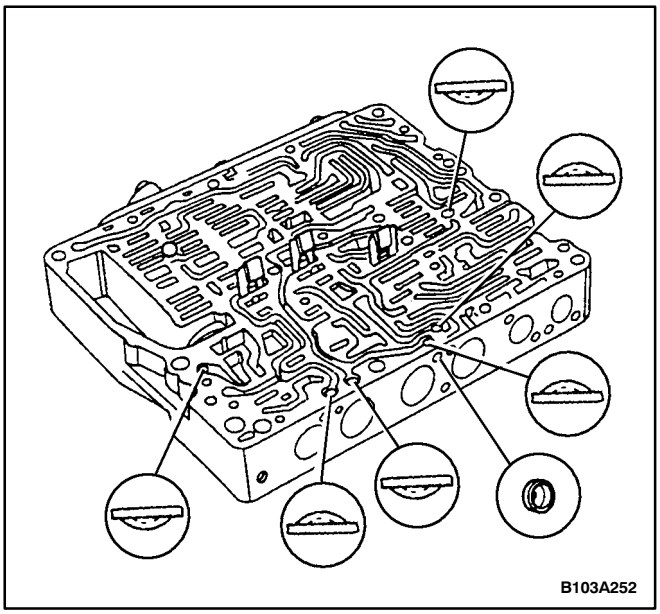
Assembly Procedure

Important: The restrictors go into the housings in a certain orientation. Be sure to seat properly each restrictor.

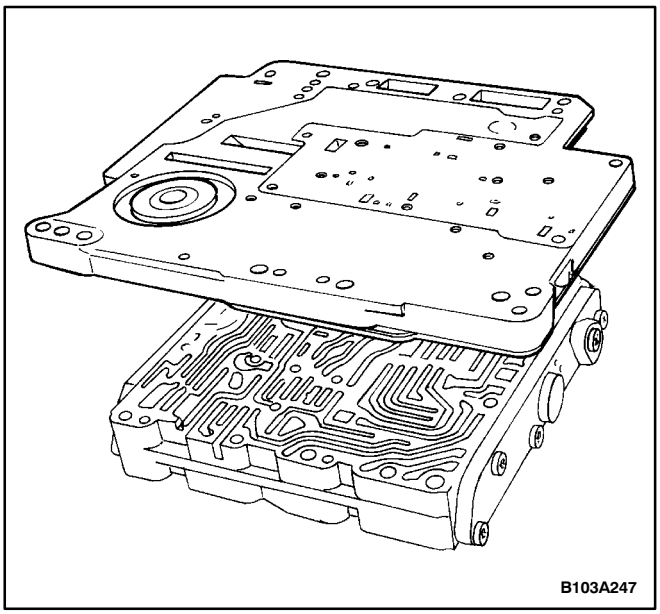
1. Install the centralizing pin, the supply ball, and the damper restrictors into the fluid channel housing.



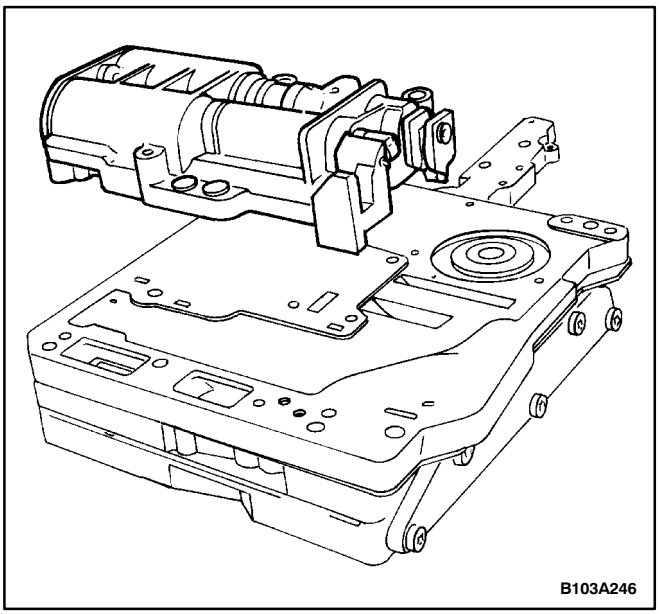
2. Place the upper intermediate plate onto the fluid passage plate.



3. Install the breather ball, the clips, and the restrictors into the upper side of the valve housing.



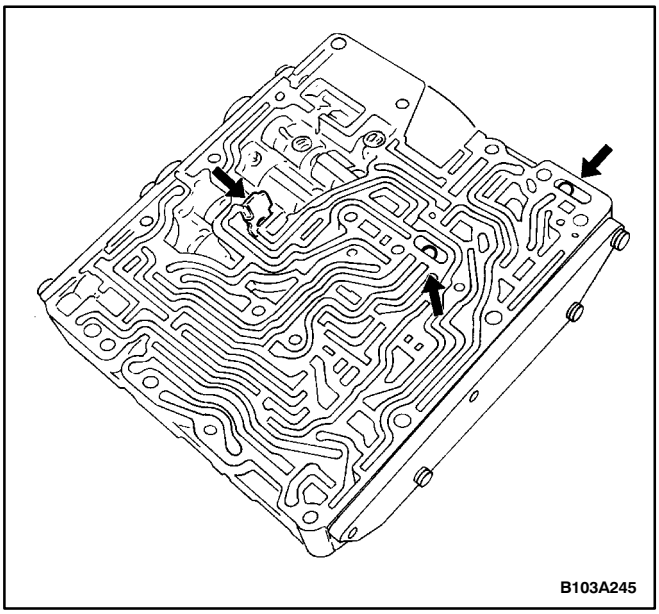
4. Holding the upper intermediate plate to the fluid passage plate, turn them over and place them on the upper side of the valve housing.


B103A246

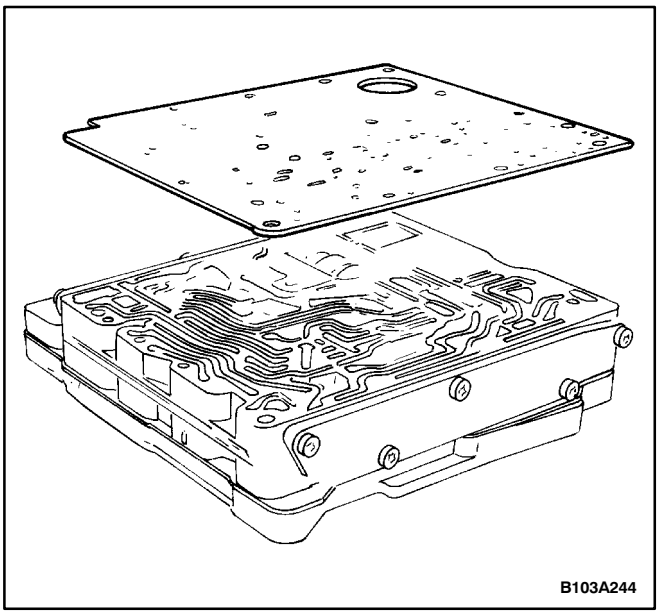
5. Install the clips into the clutch A and the brake D housing.
6. Install the clutch A and the brake D housing with the bolts.

Tighten

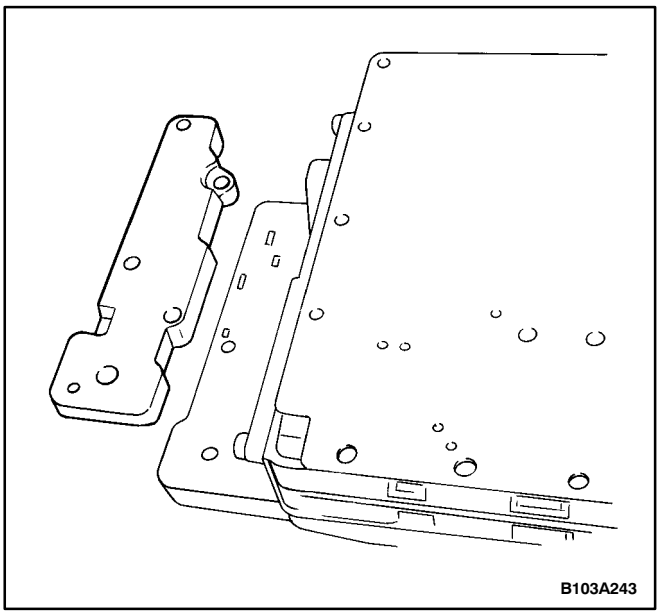
Tighten the clutch A and the brake D housing attachment bolts to 8 N•m (71 lb-in).


B103A245

7. Turn over the valve body.
8. Install the change valve balls and the clip them into the lower side of the valve housing.


B103A244

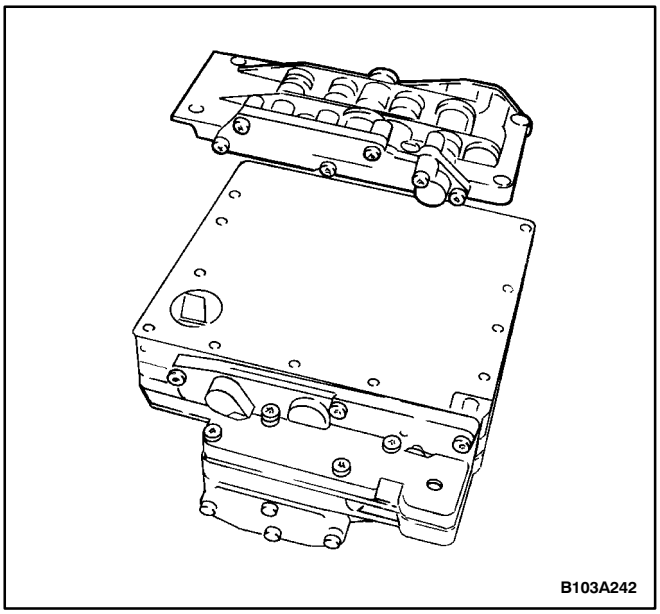
9. Install the lower intermediate plate.


B103A243

10. Install the lower cover with the bolts.

Tighten

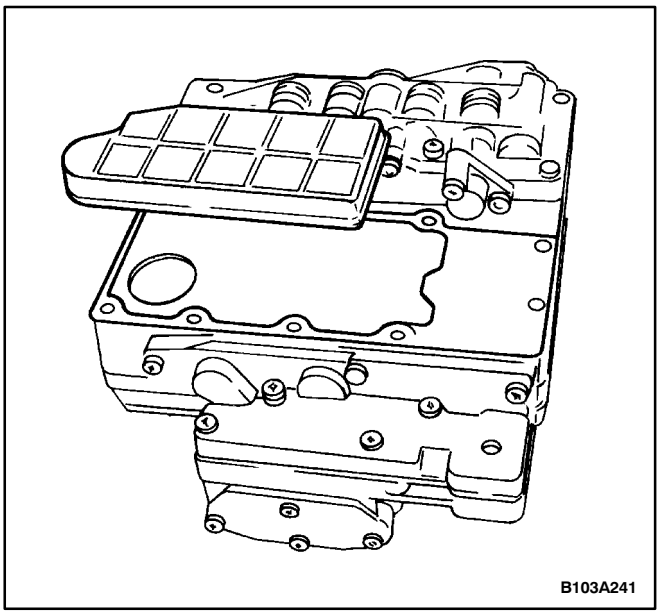
Tighten the lower cover attachment bolts to 8 N•m (71 lb-in).


B103A242

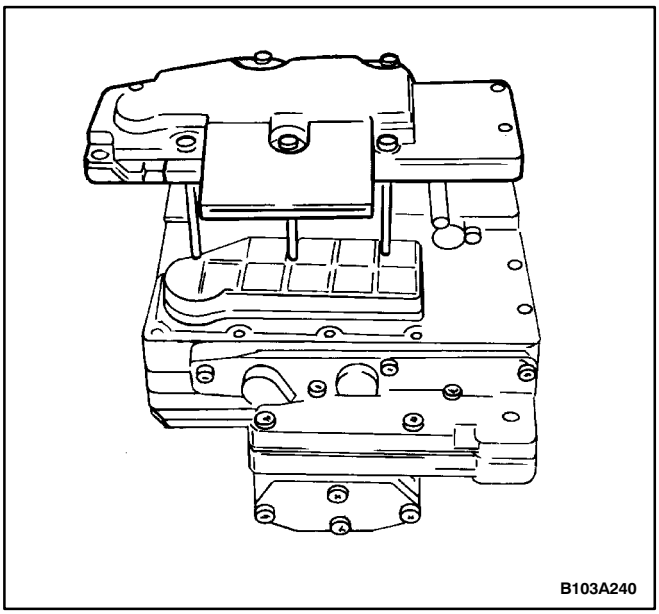
11. Install the lower valve housing with the bolts.

Tighten

Tighten the lower valve housing attachment bolts to 8 N•m (71 lb-in).


B103A241

12. Install the fluid filter and the gasket.

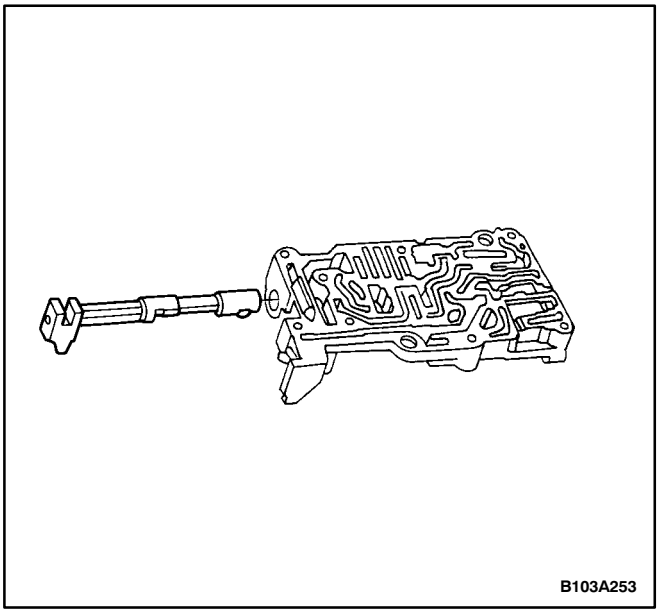

B103A240

13. Install the fluid filter housing with the bolts.

Tighten

Tighten the fluid filter housing cover attaching bolts to 8 N•m (71 lb-in).

14. Install the valve body into the transaxle. Refer to “Major Component Assembly” in this section.
15. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.

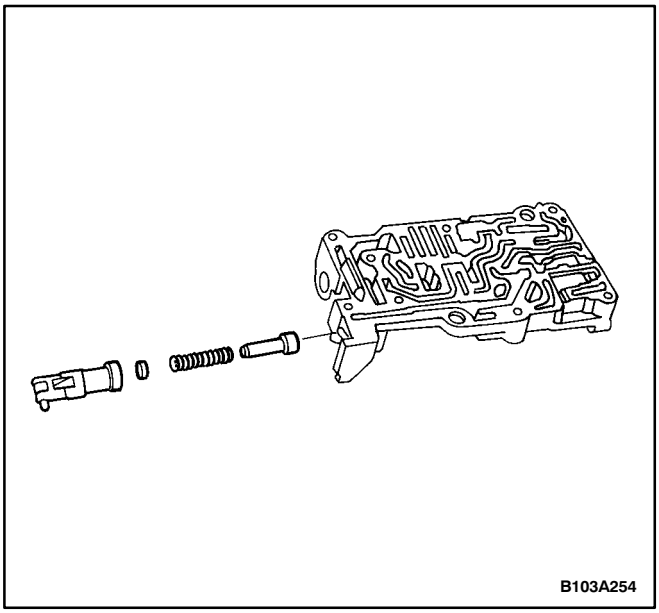

B103A253

CLUTCH A AND BRAKE D HOUSING

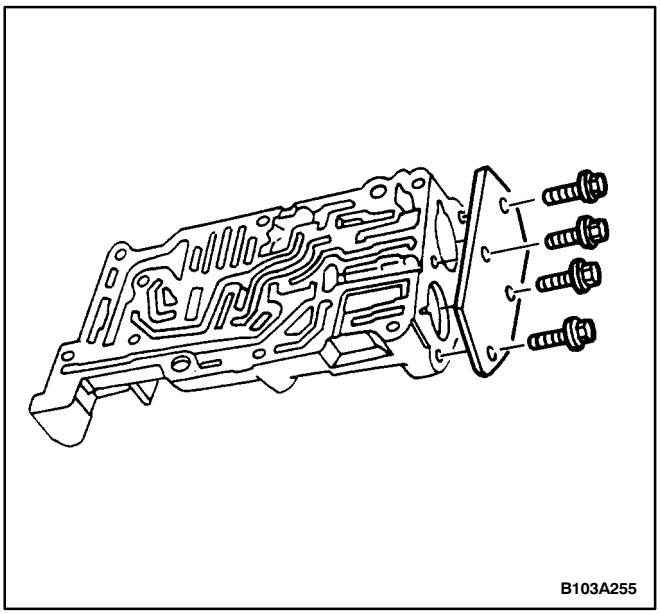
Disassembly Procedure

Important: Use caution when removing the covers from the housing as the valve springs can get lost easily.

1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the valve body from the transaxle. Refer to “Major Component Disassembly” in this section.
3. Remove the clutch A and the brake D housing from the valve body. Refer to “Valve Body” in this section.
4. Remove the selection shuttle valve.

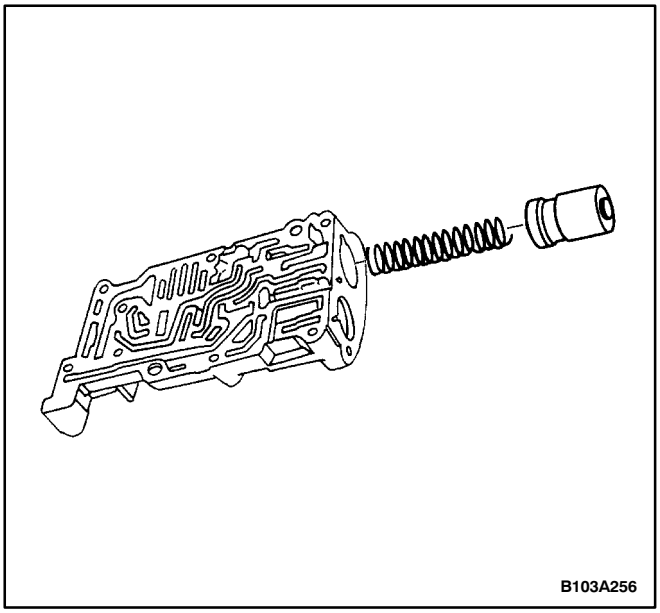

B103A254

5. Remove the load correction pressure shuttle valve and the spring.



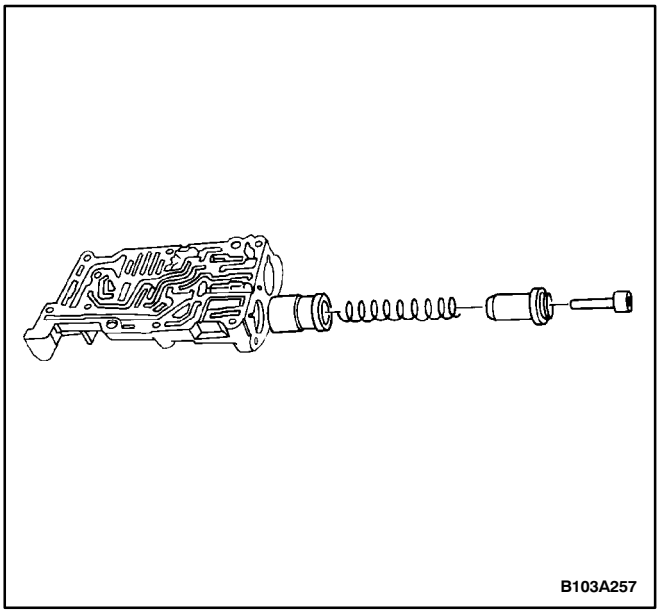
B103A255

6. Remove the shuttle valve cover from the clutch A and the brake D housing.



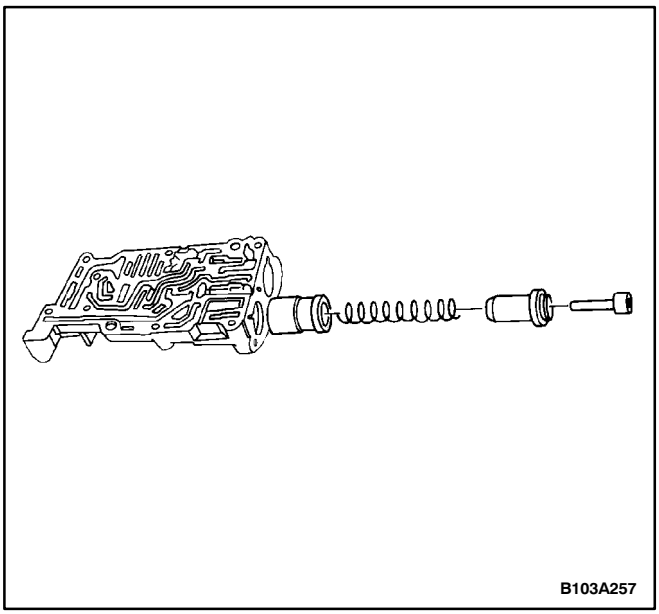
B103A256

7. Remove the brake D shuttle valve and the spring from the housing.



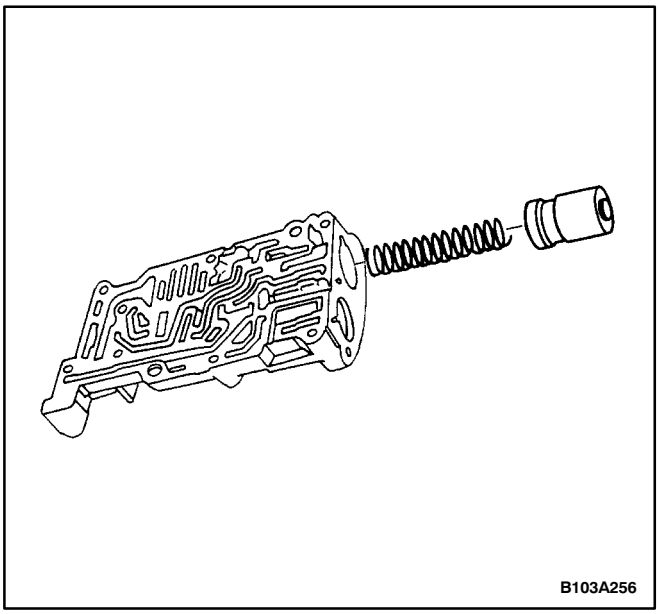
B103A257

8. Remove the clutch A shuttle valve and the spring from the housing.

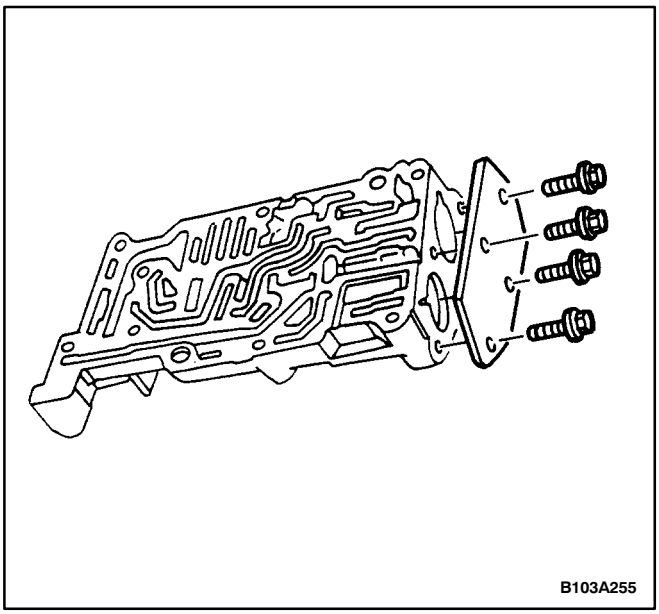

B103A257

Assembly Procedure

1. Install the clutch A shuttle valve and the spring into the housing.


B103A256

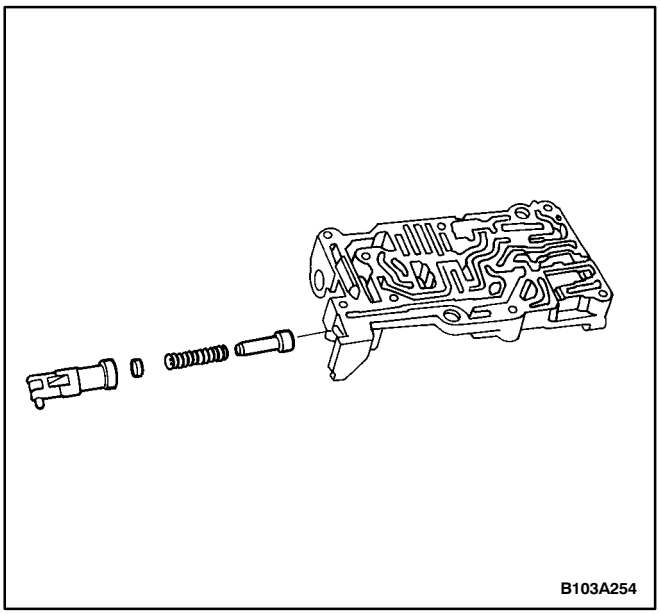
2. Install the brake D shuttle valve and the spring into the housing.


B103A255

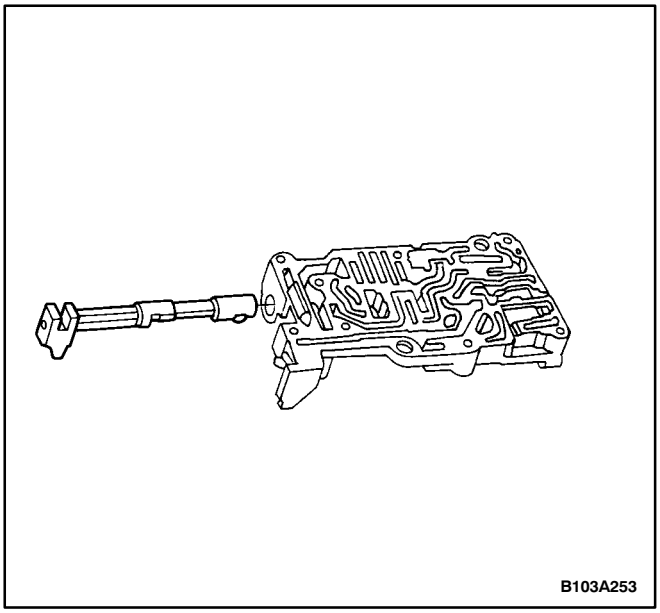
3. Install the shuttle valve cover onto the clutch A and the brake D housing with the bolts.

Tighten

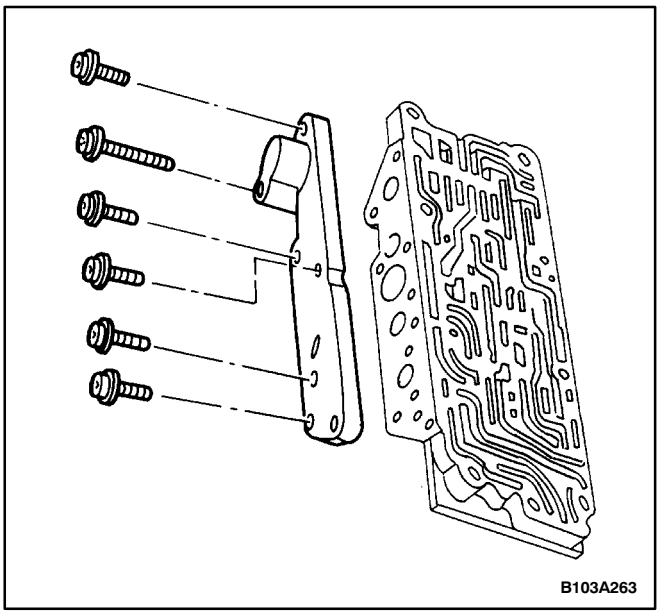
Tighten the shuttle valve cover attachment bolts to 8 N•m (71 lb-in).


B103A254

4. Install the load correction pressure shuttle valve and the spring.


B103A253

5. Install the selection shuttle valve.
6. Install the clutch A and the brake D housing onto the valve body. Refer to “Valve Body” in this section.
7. Install the valve body into the transaxle. Refer to “Major Component Disassembly” in this section.
8. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.

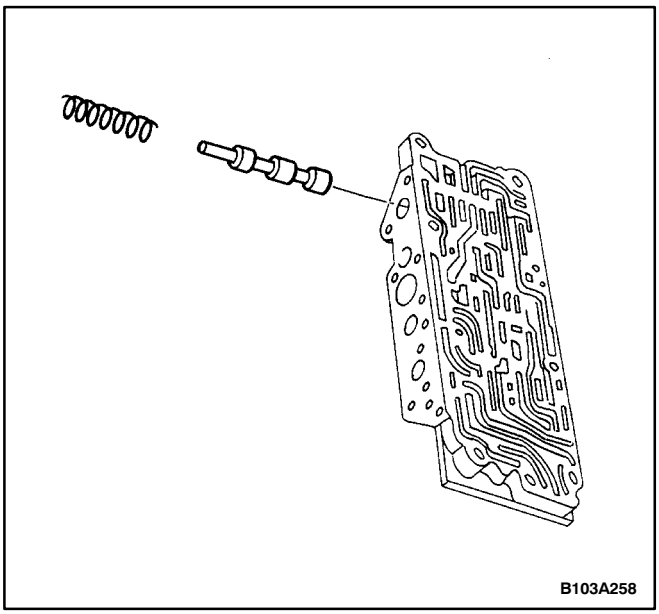

B103A263

LOWER VALVE HOUSING

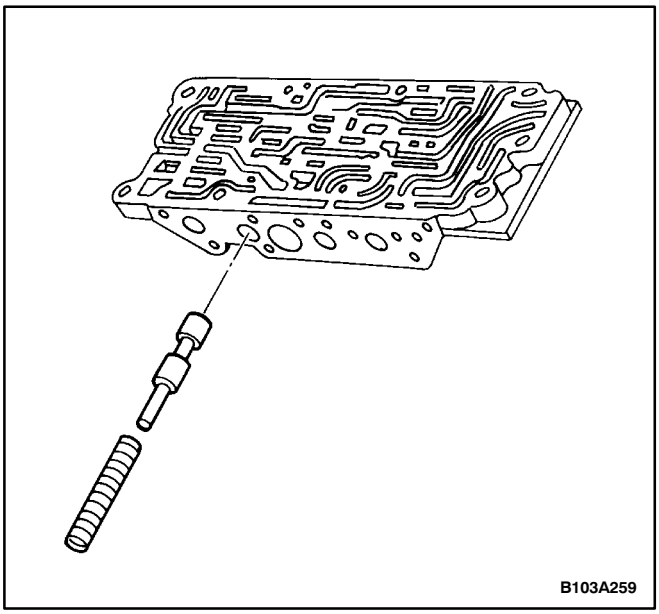
Disassembly Procedure

Important: Use caution when removing the covers from the sides of the housing as the valve springs can get lost easily.

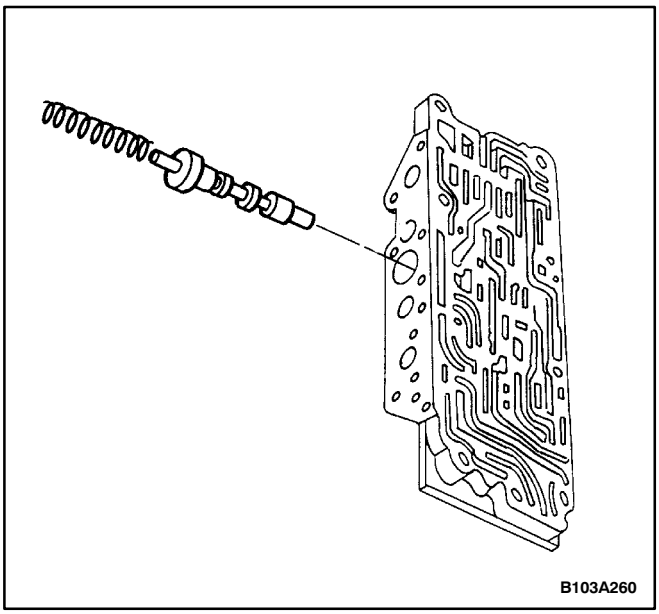
1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the valve body from the transaxle. Refer to “Major Component Disassembly” in this section.
3. Remove the lower valve housing. Refer to “Valve Body” in this section.
4. Remove the lower valve housing exterior cover bolts and the exterior cover.


B103A258

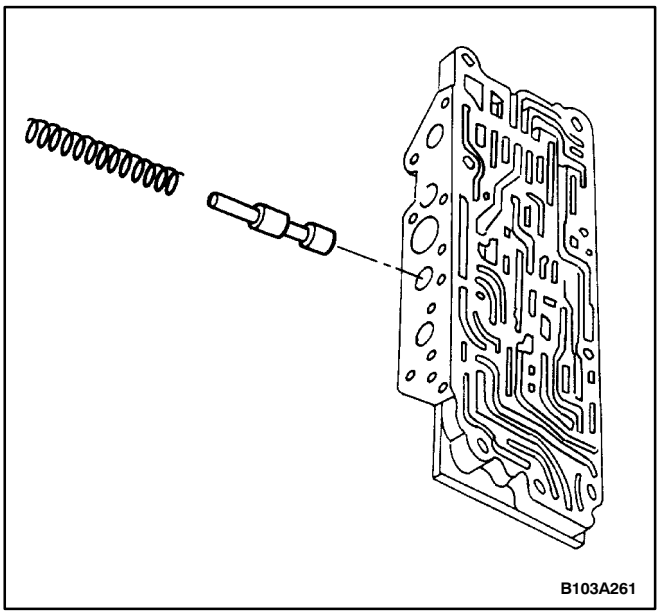
5. Remove the first-second speed change shuttle valve and spring.


B103A259

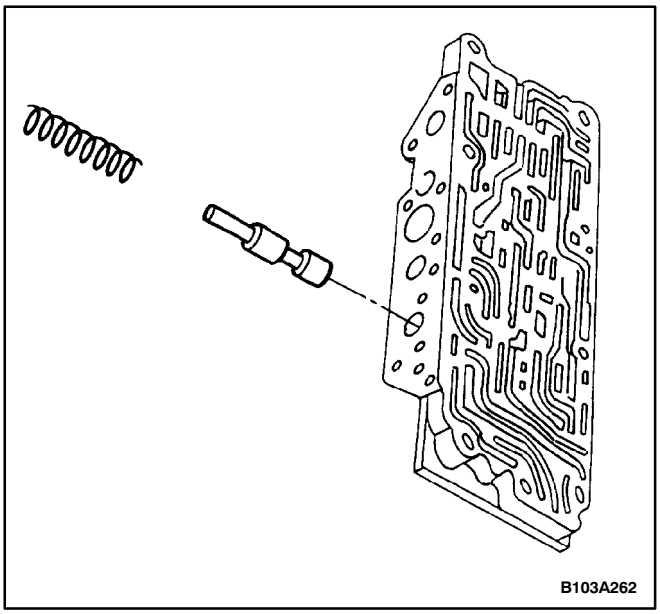
6. Remove the second speed lock shuttle valve and spring.


B103A260

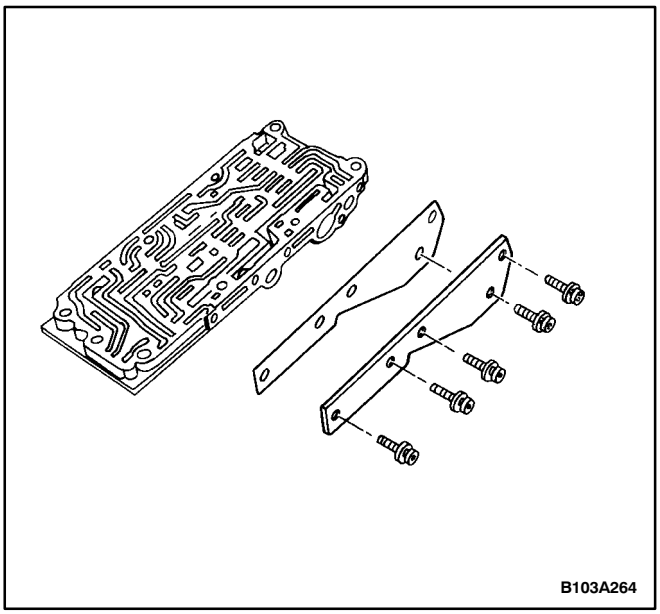
7. Remove the control shuttle valve and the restrictor C′ spring.


B103A261

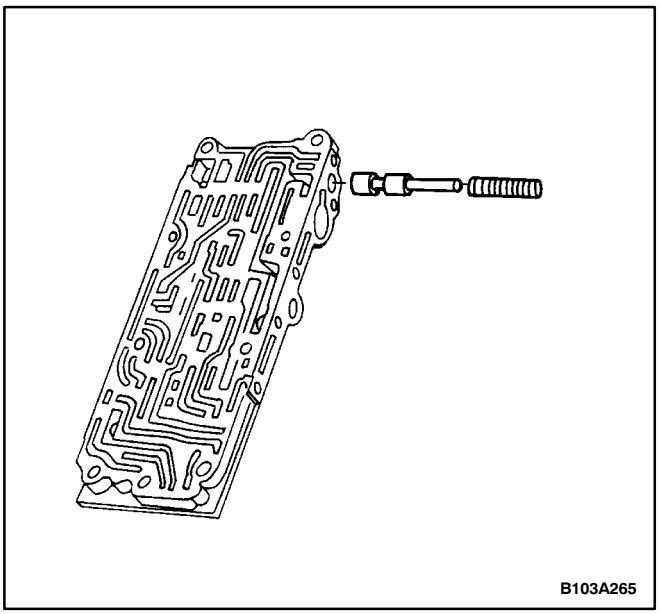
8. Remove the position 3 shuttle valve and the spring.


B103A262

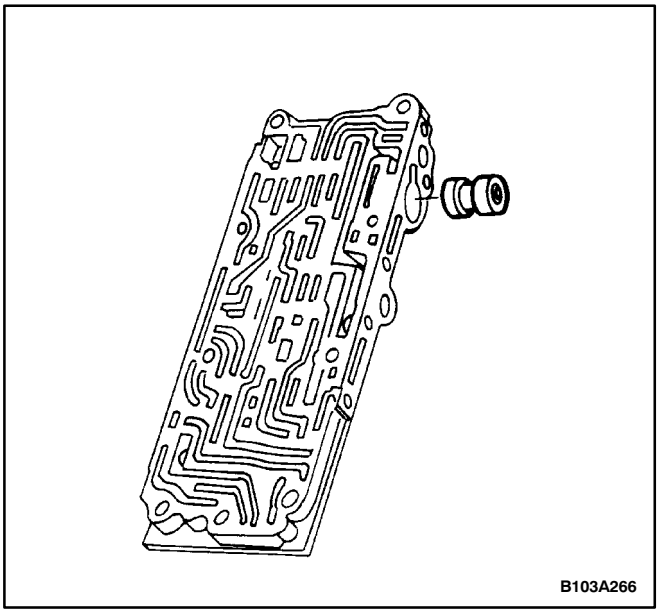
9. Remove the 4-3-2 shuttle valve and the spring.


B103A264

10. Remove the lower valve housing interior cover bolts, the lower valve housing interior cover, and the joint.

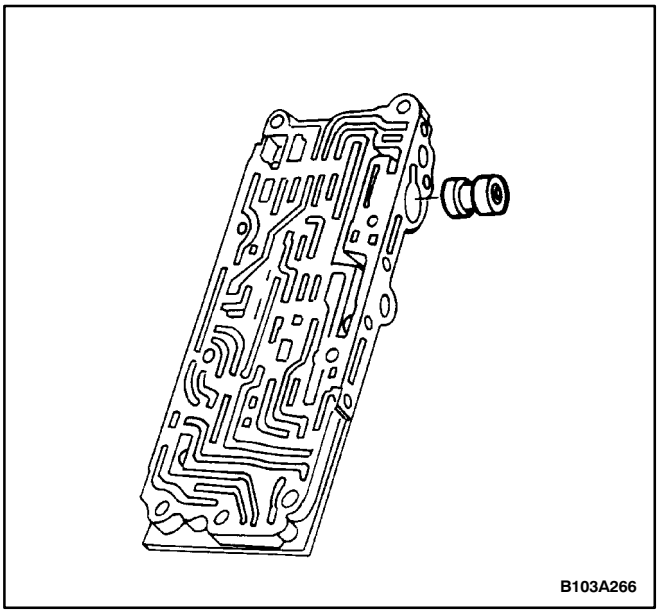

B103A265

11. Remove the 2-3-4 change up shuttle valve and the spring.

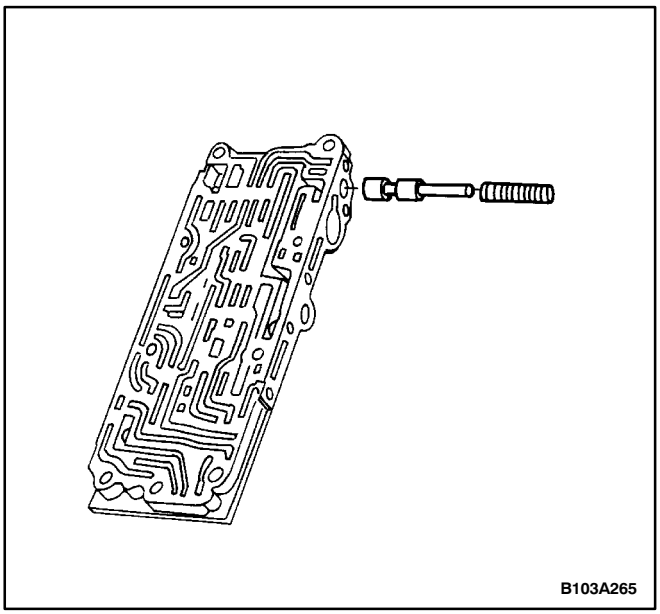

B103A266

12. Remove the 1-2 change valve.

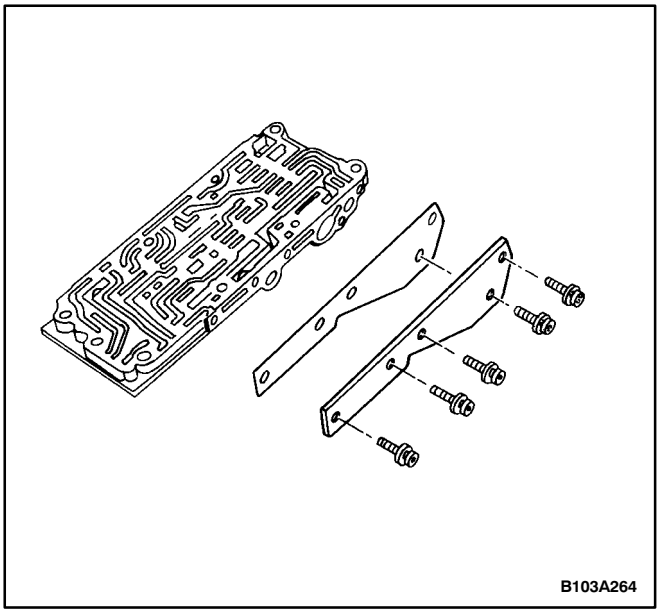
Assembly Procedure


B103A266

1. Install the 1-2 change valve.


B103A265

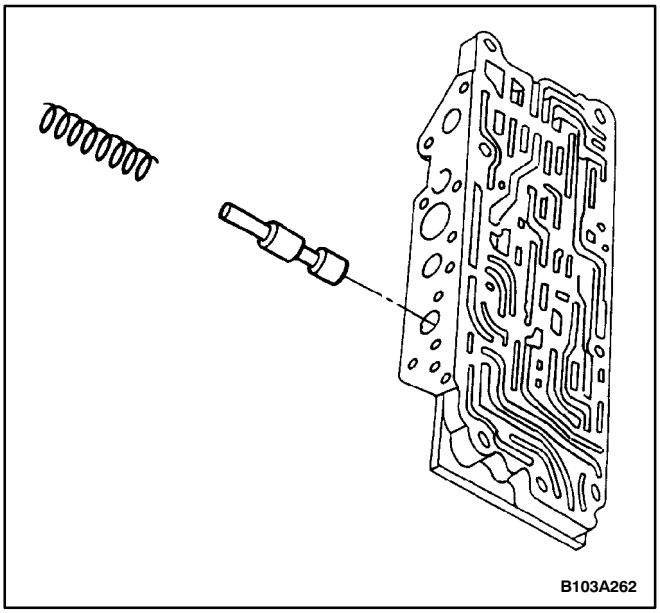
2. Install the 2-3-4 change up shuttle valve and the spring.


B103A264

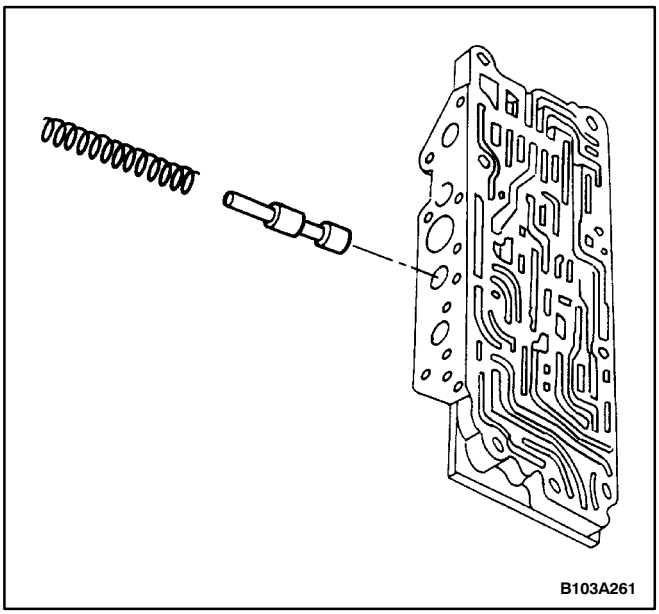
3. Install the lower valve housing interior cover and the joint with the bolts.

Tighten

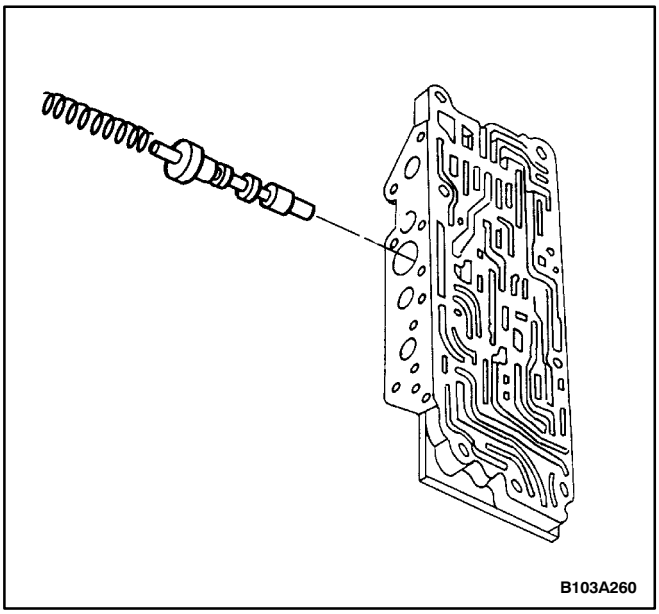
Tighten the lower valve housing interior cover bolts to 8 N•m (71 lb-in).


B103A262

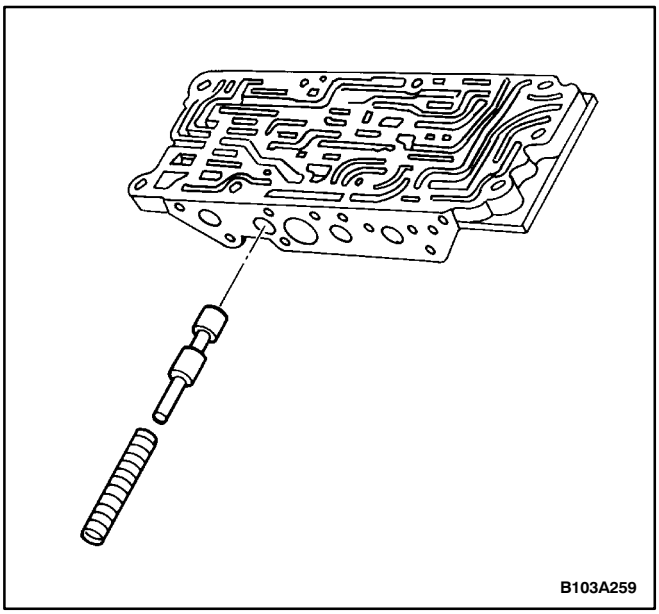
4. Install the 4-3-2 shuttle valve and the spring.



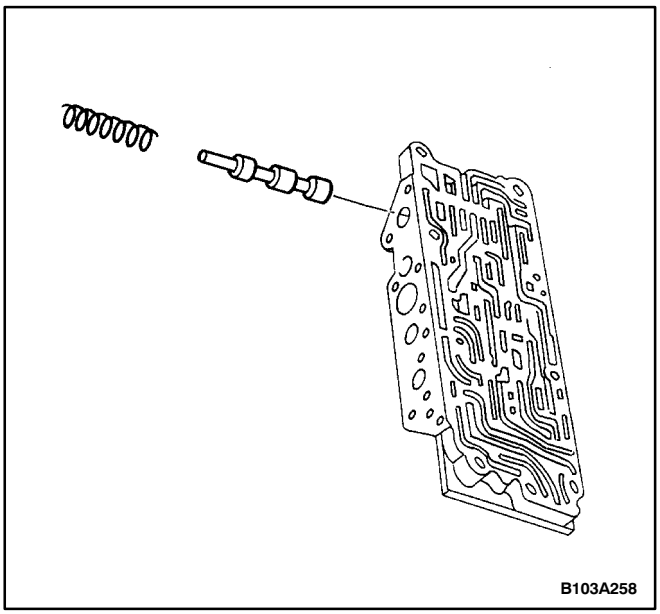
5. Install the position 3 shuttle valve the spring.



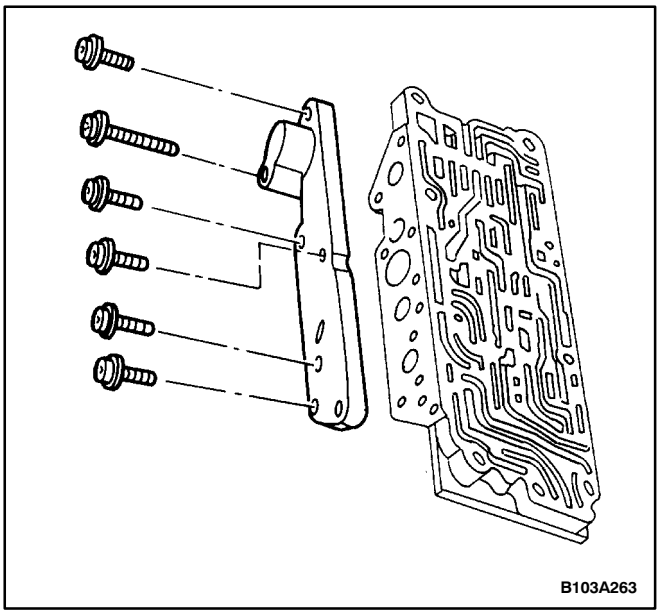
6. Install the control shuttle valve and the restrictor C′ spring.



7. Install the second speed lock shuttle valve and the spring.


B103A258

8. Install the first-second speed change shuttle valve and the spring.

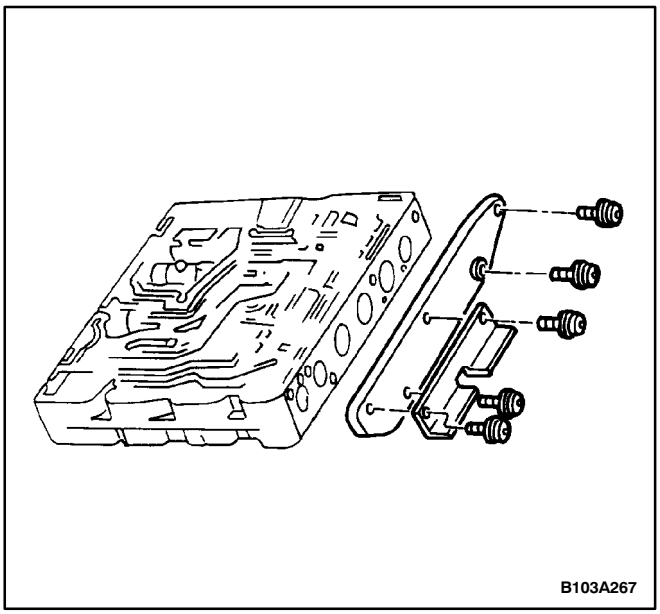

B103A263

9. Install the lower valve housing exterior cover with the bolts.

Tighten

Tighten the lower valve housing exterior cover bolts to 8 N•m (71 lb-in).

10. Install the lower valve housing. Refer to “Valve Body” in this section.
11. Install the valve body onto the transaxle. Refer to “Major Component Assembly” in this section.
12. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.

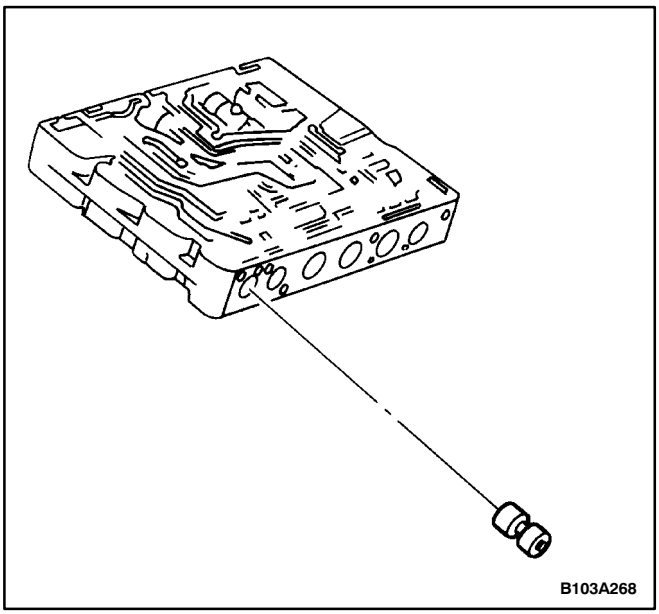

B103A267

VALVE HOUSING

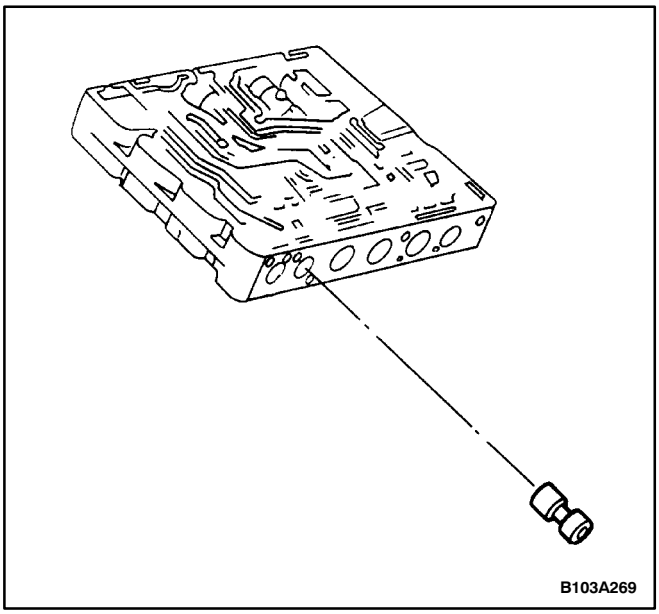
Disassembly Procedure

Important: Use caution when removing the covers from the sides of the housing as the valve springs can get lost easily.

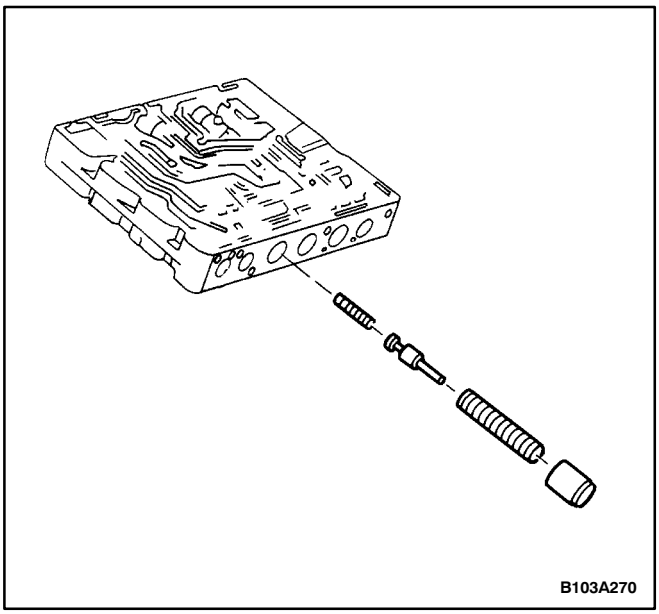
1. Remove the transaxle from the vehicle. Refer to “Transaxle Assembly” in this section.
2. Remove the valve body from the transaxle. Refer to “Major Component Disassembly” in this section.
3. Remove the valve housing. Refer to “Valve Body” in this section.
4. Remove the valve housing damper valve side cover bolts and the valve housing damper valve side cover.



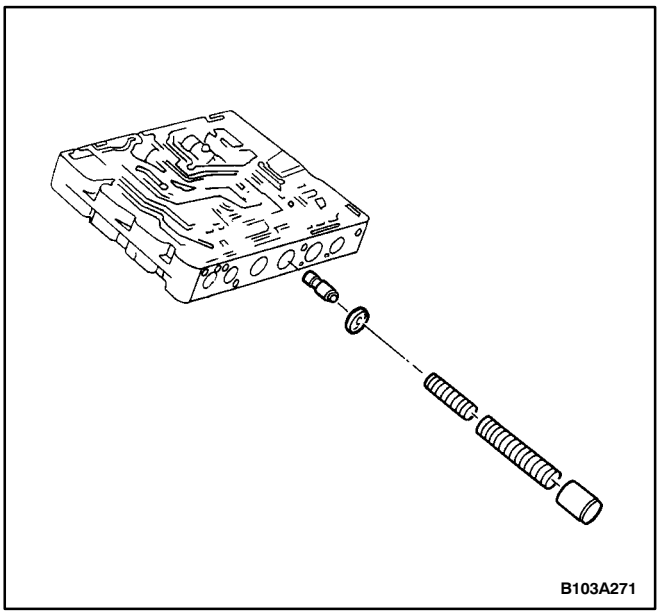
5. Remove the 3-4 change valve.



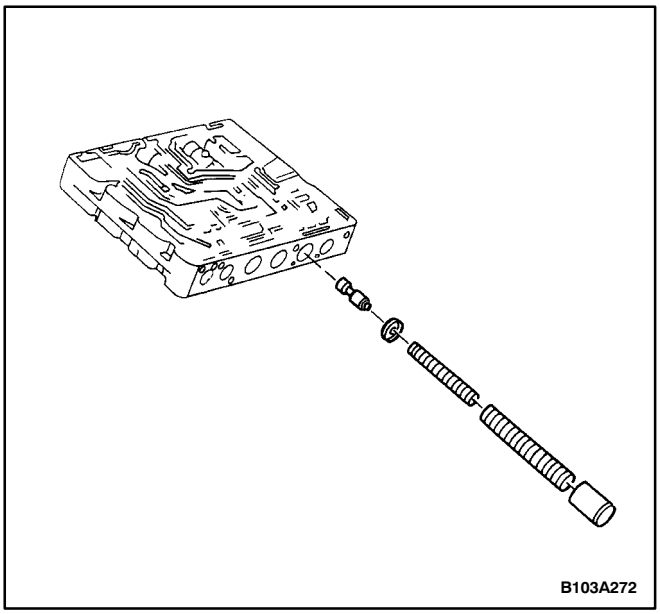
6. Remove the 2-3 change valve.



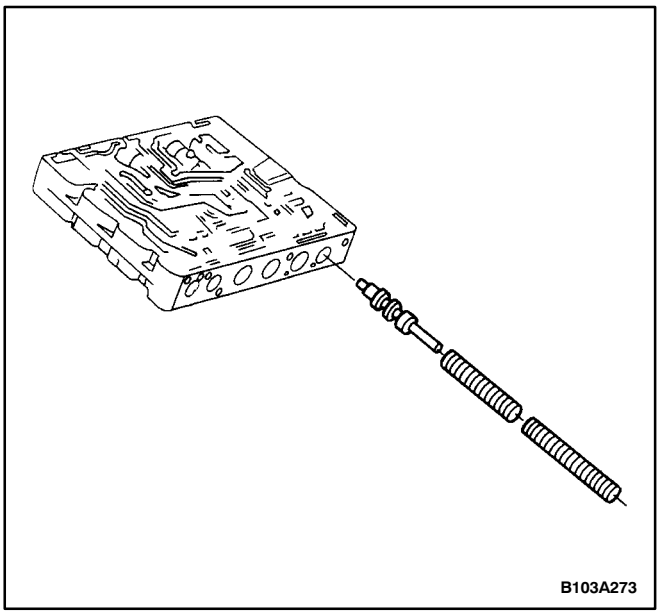
7. Remove the delay shuttle valve and the delay shuttle valve inner and the outer spring.



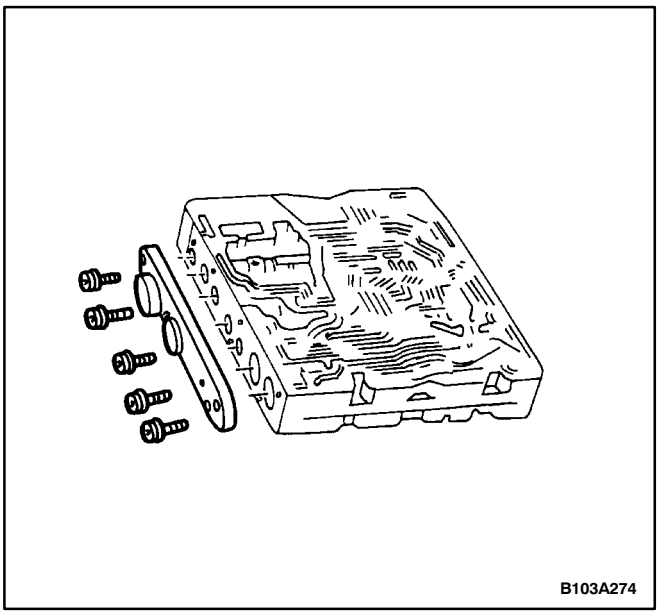
8. Remove the brake C′ damper shuttle valve and the brake C′ damper shuttle valve inner and the outer spring.



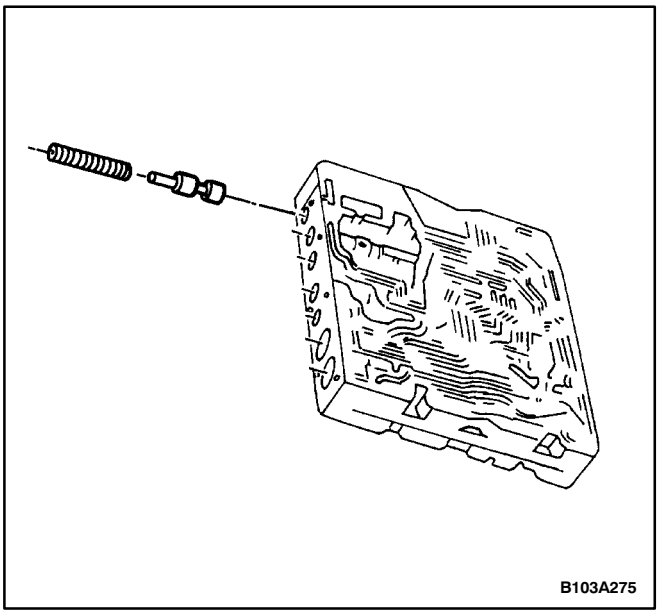
9. Remove the clutch E shuttle valve and the clutch E shuttle valve inner and the outer spring.



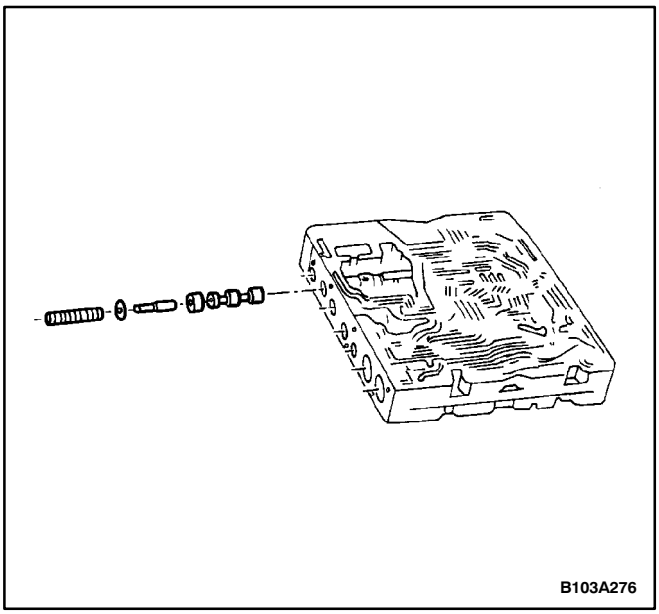
10. Remove the main pressure shuttle valve and the main pressure shuttle valve inner and the outer spring.


B103A274

11. Remove the valve housing control valve side cover attachment bolts and the valve housing control valve side cover.


B103A275

12. Remove the 4-3 change shuttle valve and the spring.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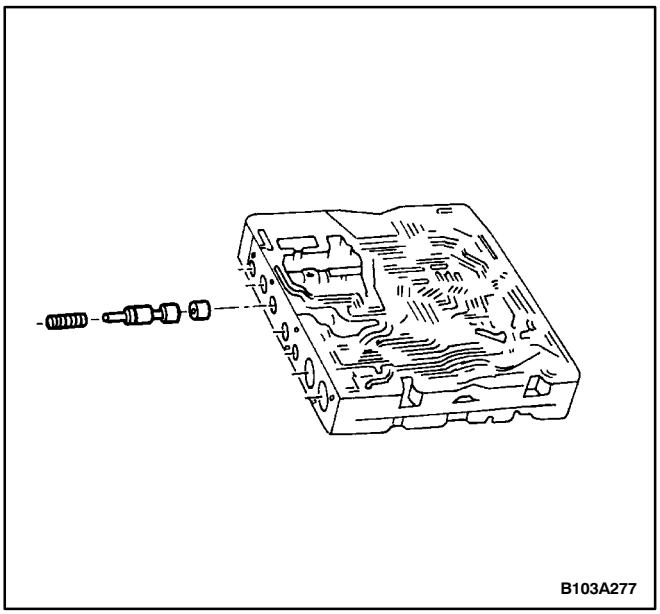
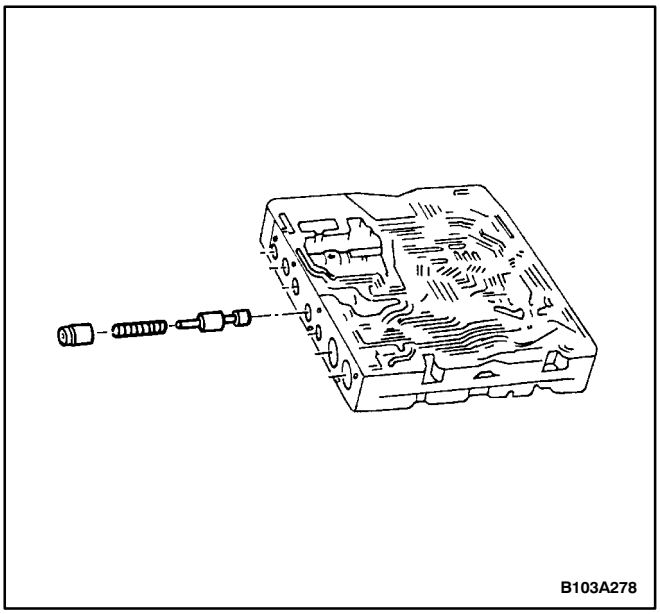
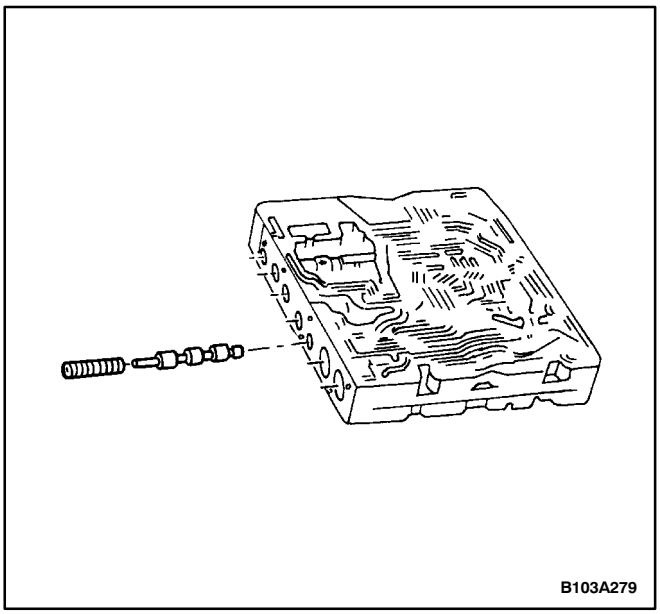
13. Remove the 3-4 change shuttle valve and the spring.


B103A277

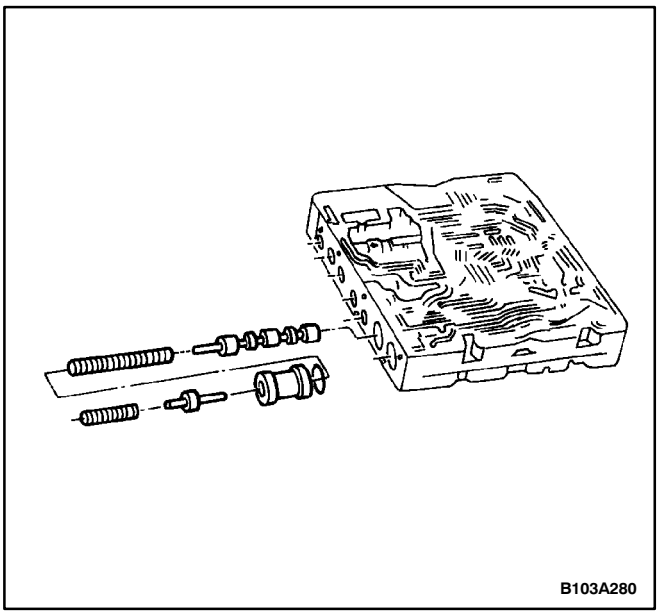
14. Remove the 4-3 kickdown shuttle valve and the spring.


B103A278

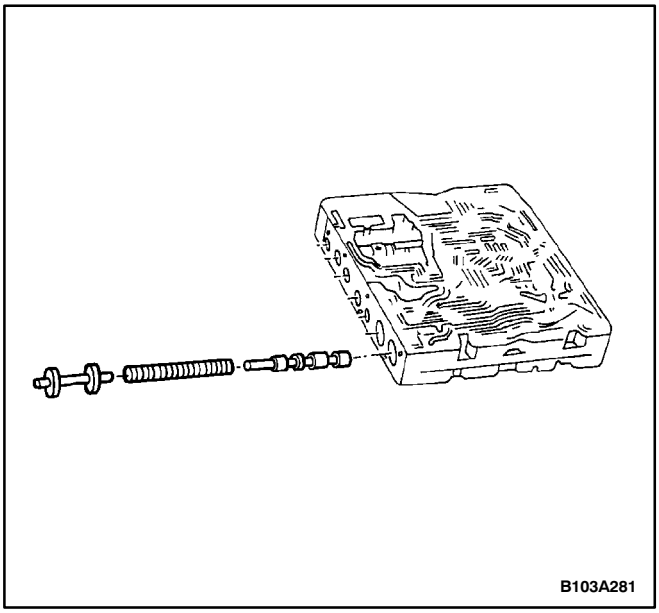
15. Remove the modulation pressure shuttle valve and the spring.


B103A279

16. Remove the first and the reverse lock shuttle valve and the spring.


B103A280

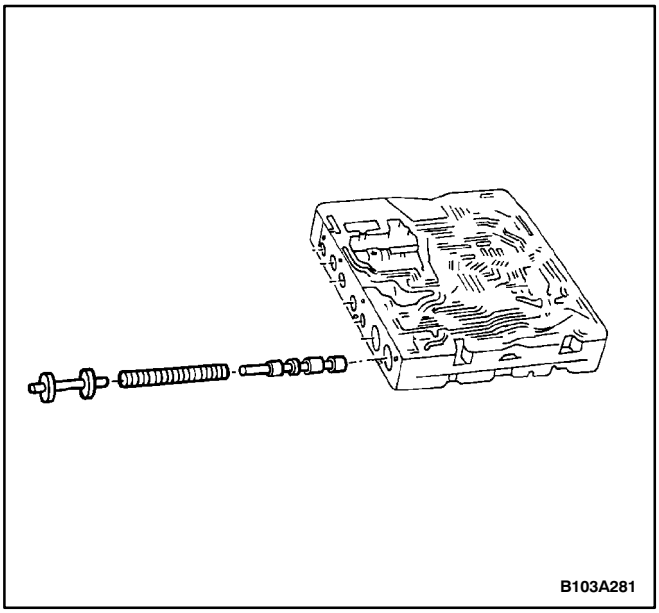
17. Remove the 1-2-3 line control shuttle valve and the spring.
18. Remove the 2-3 line change shuttle valve and the spring.


B103A281

19. Remove the 3-4 change shuttle valve and the spring.

Assembly Procedure

1. Install the 3-4 change shuttle valve and the spring.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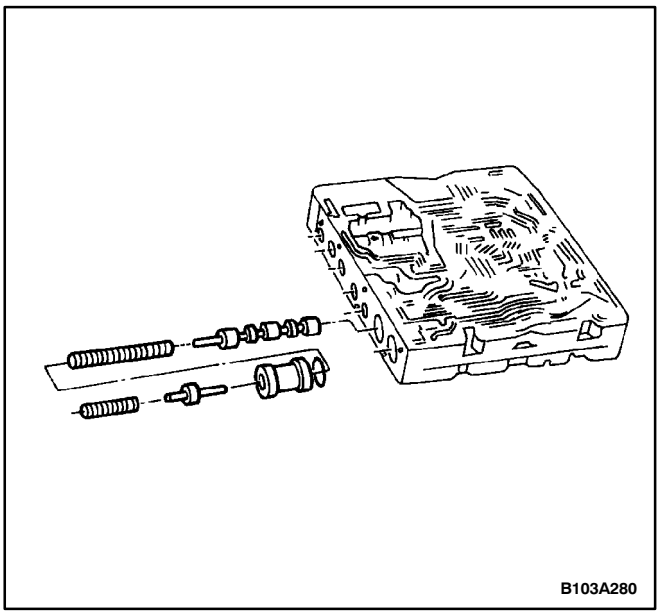
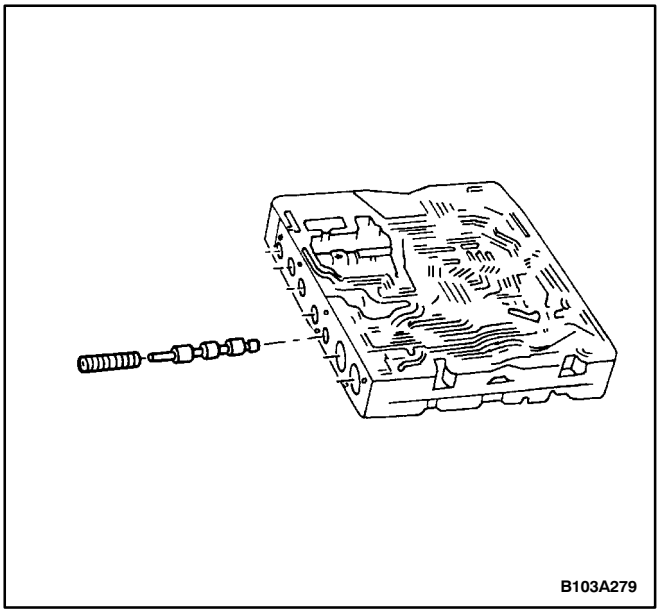

B103A280

2. Install the 1-2-3 line control shuttle valve and the spring.
3. Remove the 2-3 line change shuttle valve and the spring.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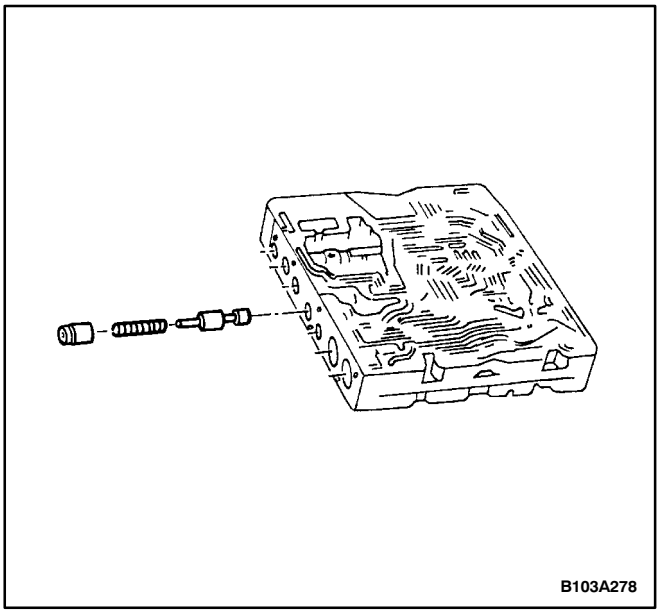
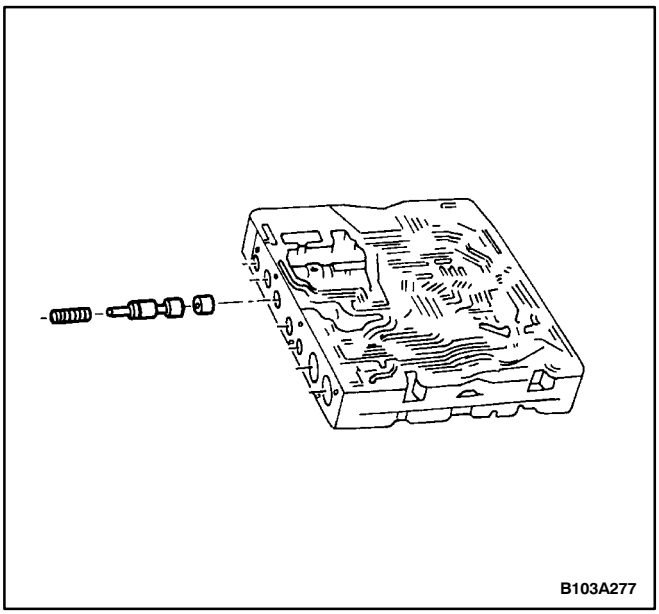
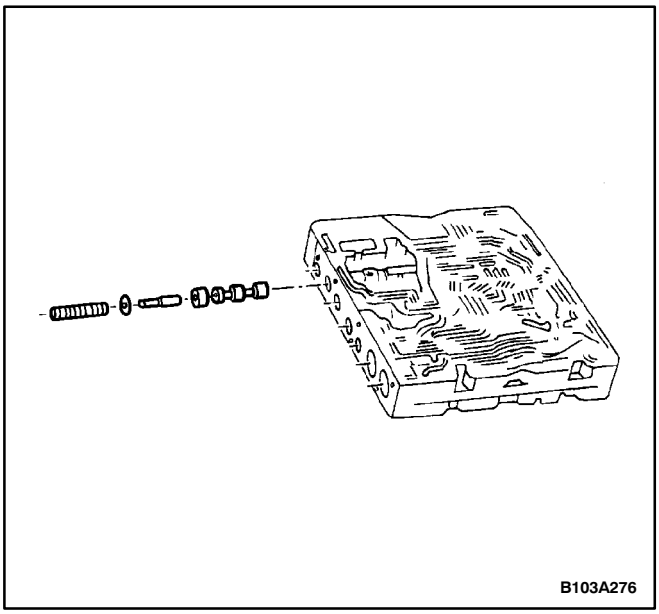
4. Install the first and the reverse lock shuttle valve and the spring.


B103A278

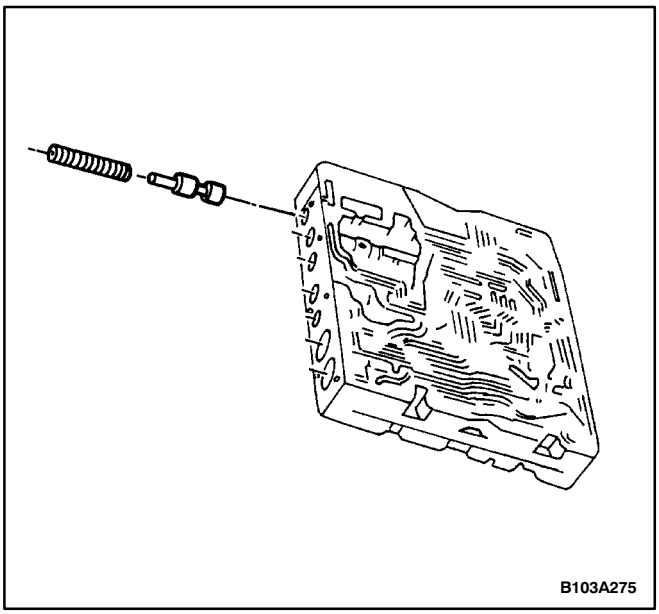
5. Install the modulation pressure shuttle valve and the spring.


B103A277

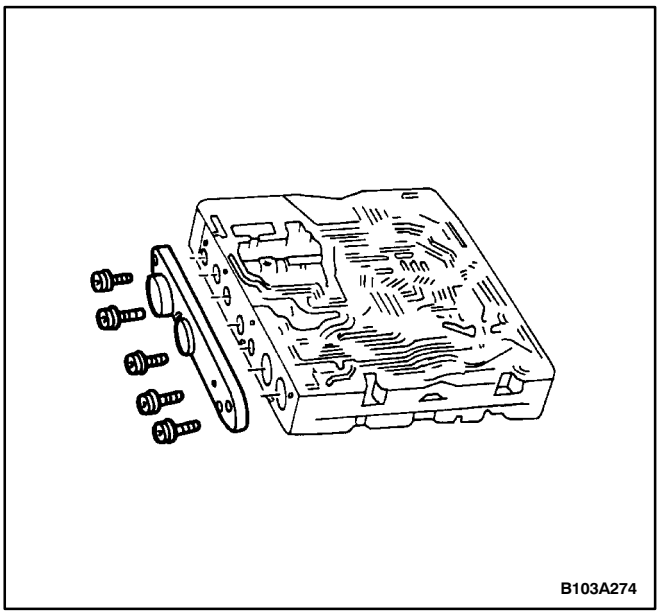
6. Install the 4-3 kickdown shuttle valve and the spring.


B103A276

7. Install the 3-4 change shuttle valve and the spring.


B103A275

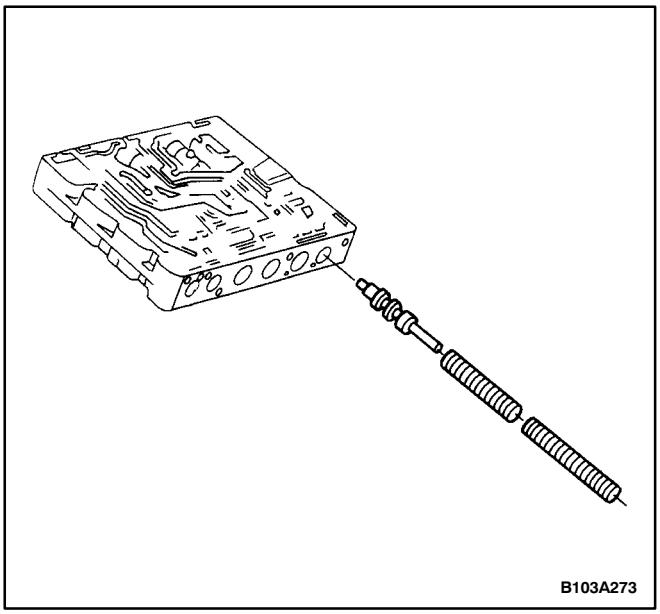
8. Install the 4-3 change shuttle valve and the spring.


B103A274

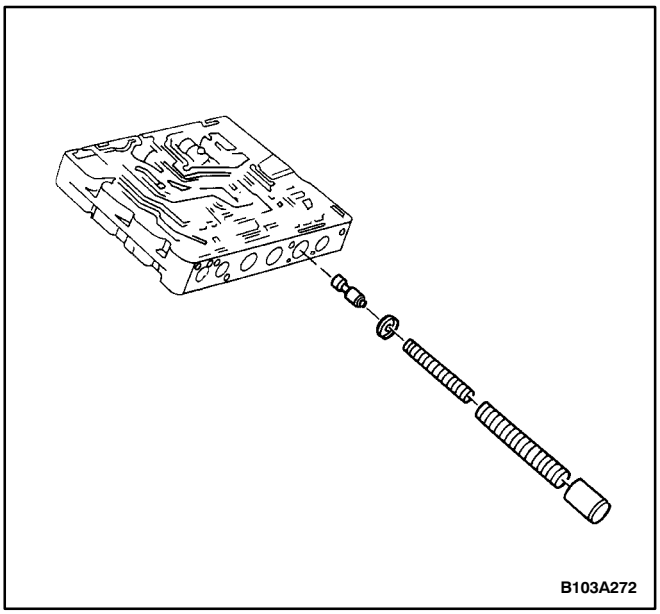
9. Install the valve housing control valve side cover with the bolts.

Tighten

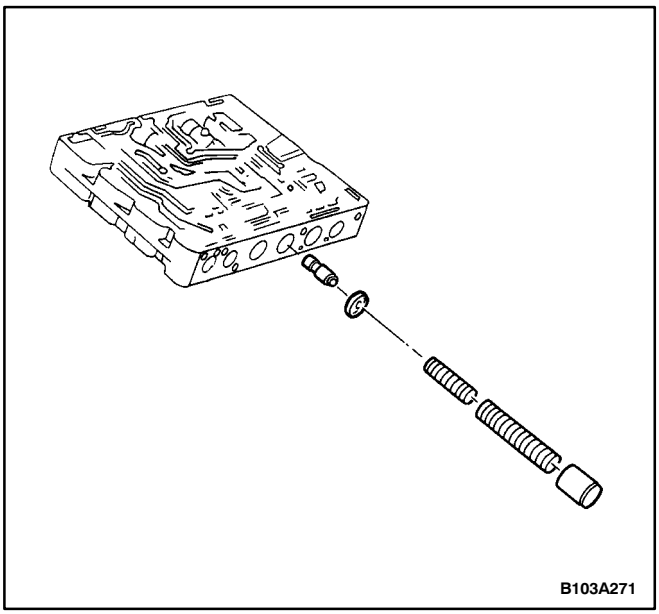
Tighten the valve housing control valve side cover attachment bolts to 8 N•m (71 lb-in).


B103A273

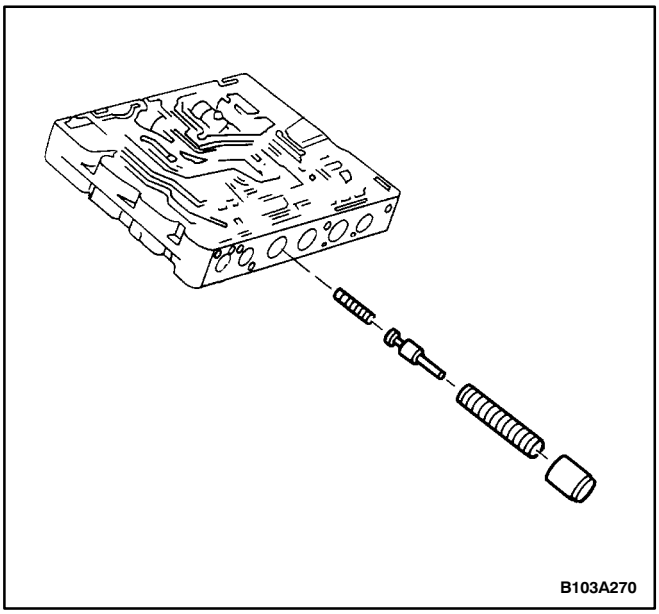
10. Install the main pressure shuttle valve and the main pressure shuttle valve inner and the outer spring.


B103A272

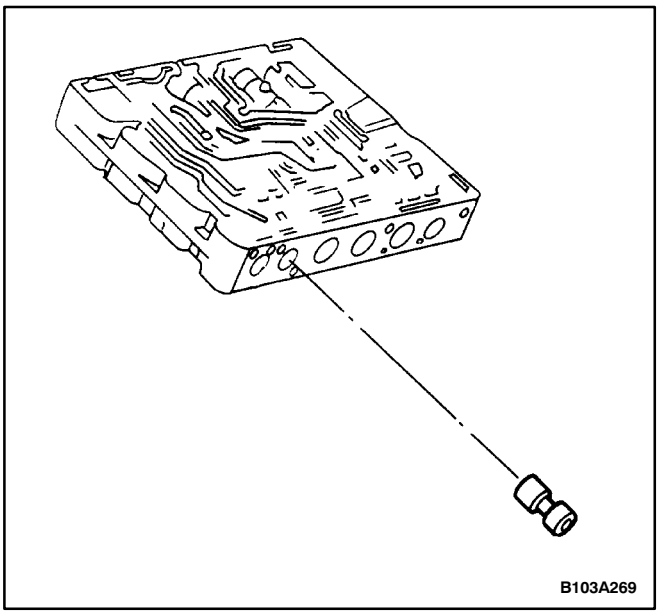
11. Install the clutch E shuttle valve and the clutch E shuttle valve inner and the outer spring.



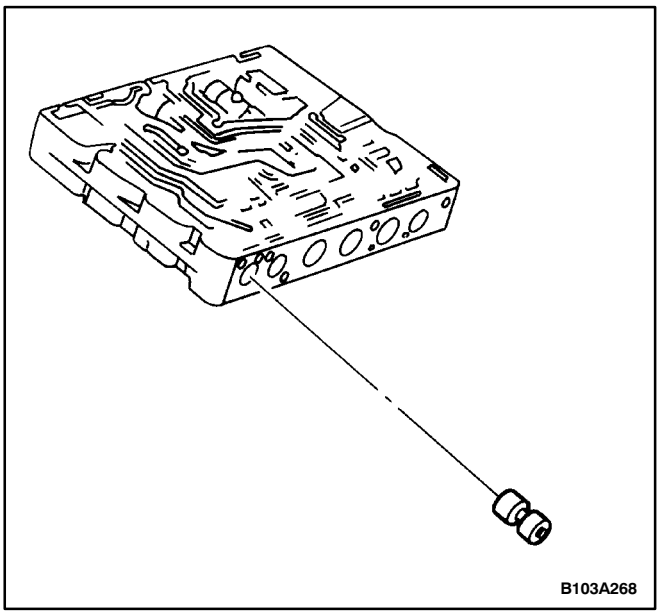
12. Install the brake C′ damper shuttle valve and the brake C′ damper shuttle valve inner and the outer spring.



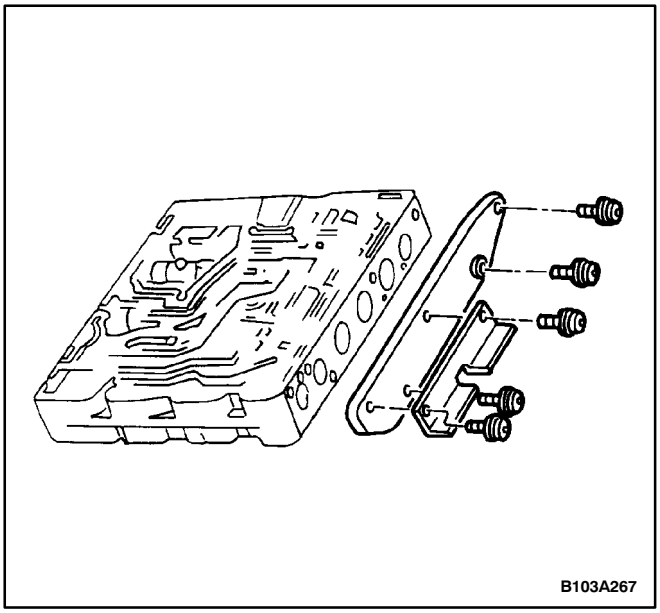
13. Install the delay shuttle valve and the delay shuttle valve inner and the outer spring.



14. Install the 2-3 change valve.


B103A268

15. Install the 3-4 change valve.

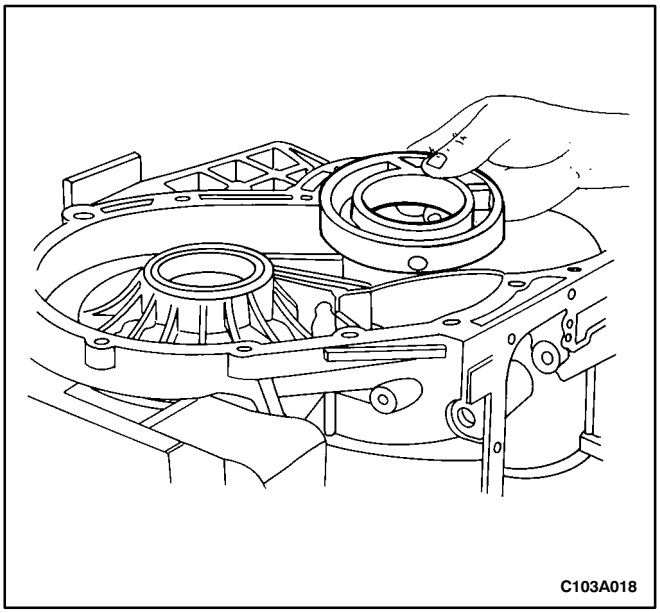

B103A267

16. Install the valve housing damper valve side cover with the bolts.

Tighten

Tighten the valve housing damper valve side cover attachment bolts to 8 N•m (71 lb-in).

17. Install the valve housing. Refer to “Valve Body” in this section.
18. Install the valve body into the transaxle. Refer to “Major Component Assembly” in this section.
19. Install the transaxle into the vehicle. Refer to “Transaxle Assembly” in this section.


C103A018

MAJOR COMPONENT ASSEMBLY

Tools Required

KA-002-088 (KA-088) Differential Adjustment Tool

KA-000-155 (KA-155) Grooved Nut Socket

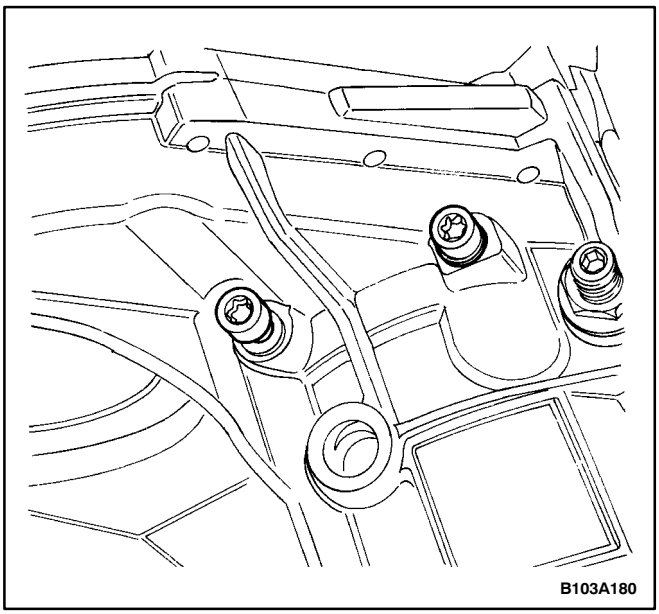
KA-000-288 (KA-288) Side Shaft Retainer

KA-001-483 (KA-483) Axial Clearance Measurement Tool

KA-001-655 (KA-655) Spur Gear Clearance Measurement Tool

Assembly Procedure

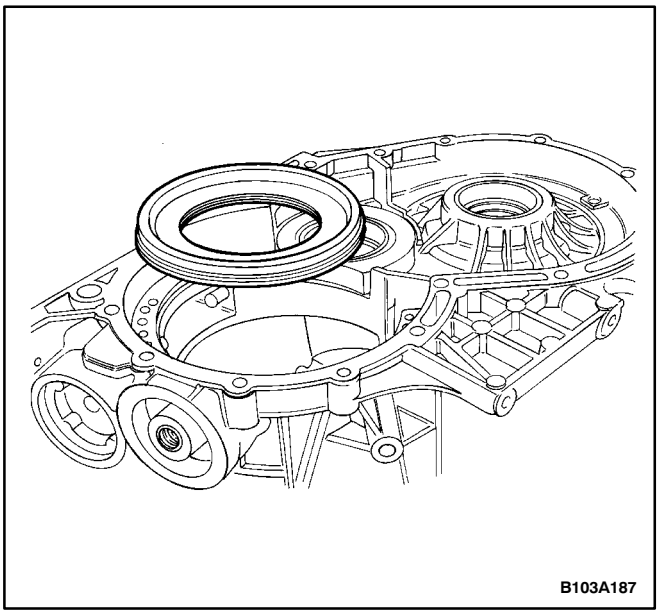
1. Install the side shaft outer ring.


B103A180

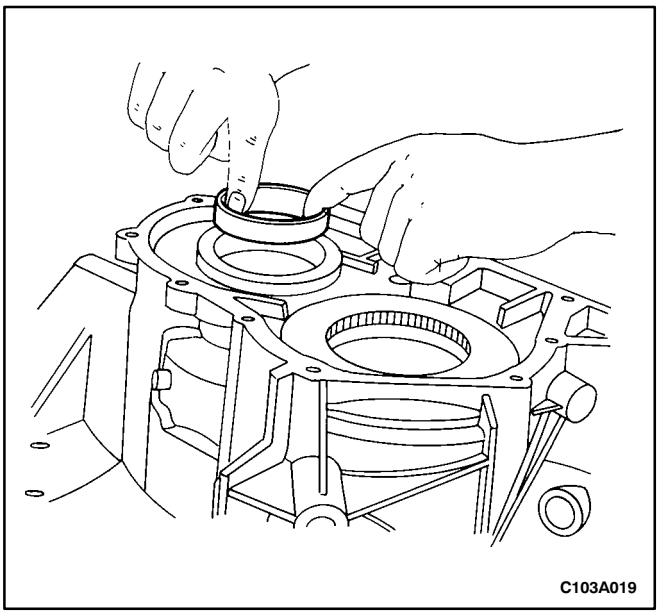
2. Install the side shaft outer ring securing bolts.

Tighten

Tighten the side shaft outer ring securing bolts to 20 N•m (15 lb-ft).


B103A187

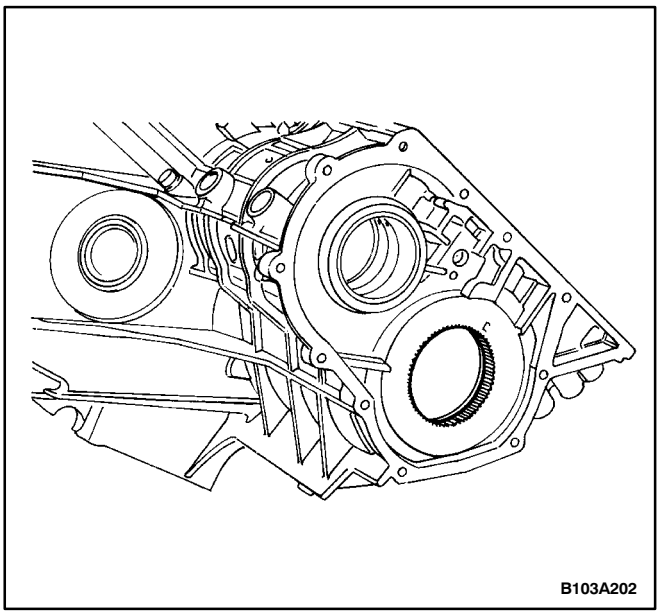
3. Lubricate the piston D seal with the transaxle fluid.
4. Install the piston D into the transaxle case.


C103A019

5. Rotate the transaxle 180 degrees so the side shaft access hole is in the UP position.

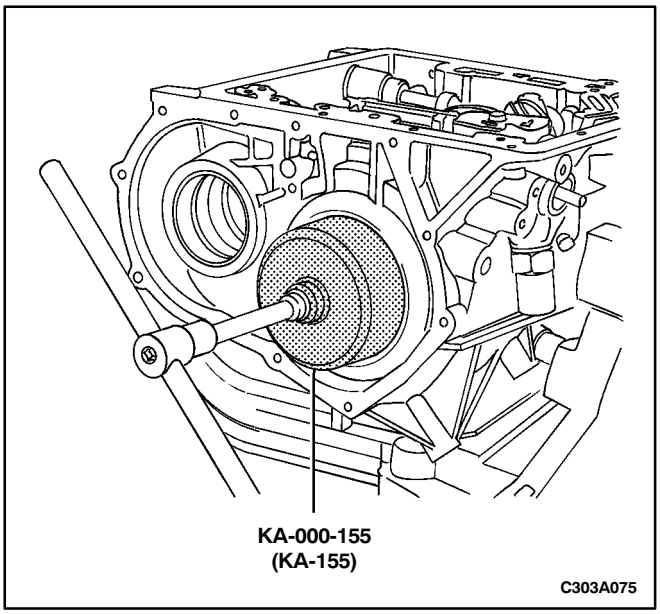
Important: Preheat the transaxle case to 70°C (158°F) to facilitate the installation of the small spur gear con bearing outer ring.

6. Install the small spur gear con bearing outer ring.



B103A202

7. Rotate the transaxle 90 degrees so the PARK/LOCK components are in the UP position.
8. Fit the first freewheel into the teeth on the inside of the transaxle case.

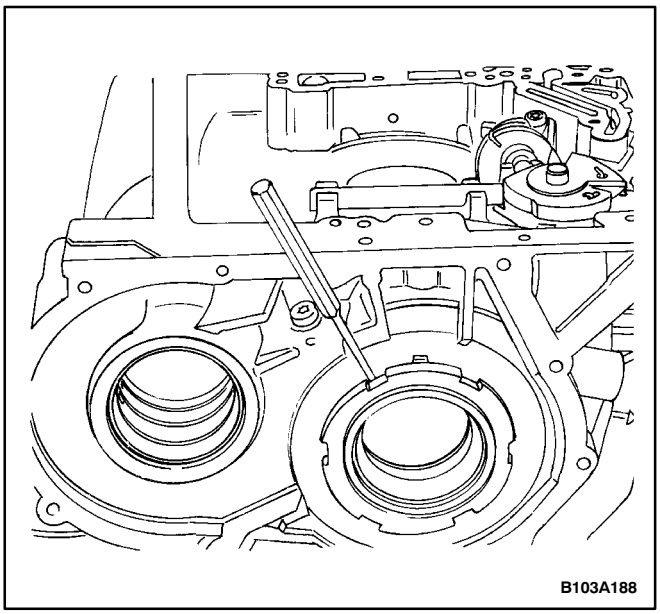


C303A075

9. Install the security plate and the grooved nut onto the first freewheel using the grooved nut socket KA-000-155 (KA-155).

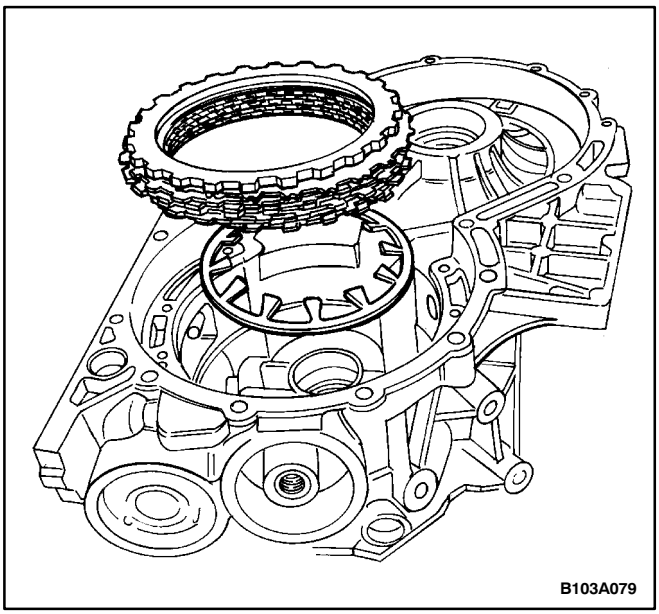
Tighten

Tighten the grooved nut to 50 N•m (37 ft-lb).

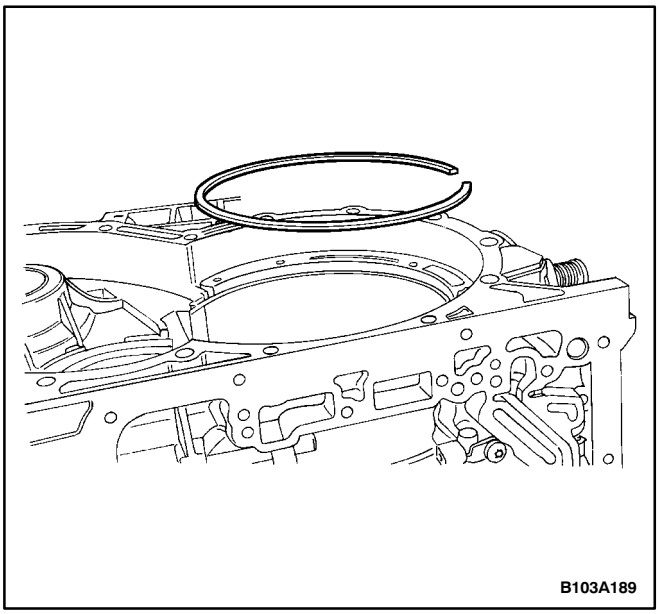


B103A188

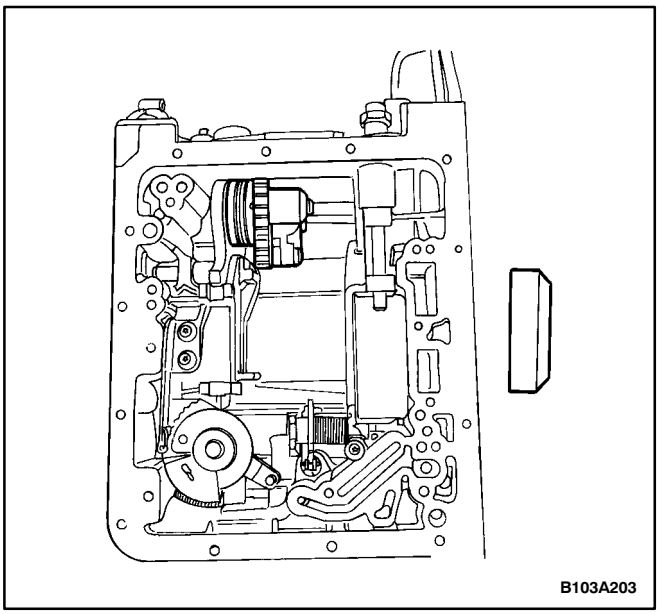
10. Using a punch, bend the tabs on the security plate to lock the grooved nut in place.


B103A079

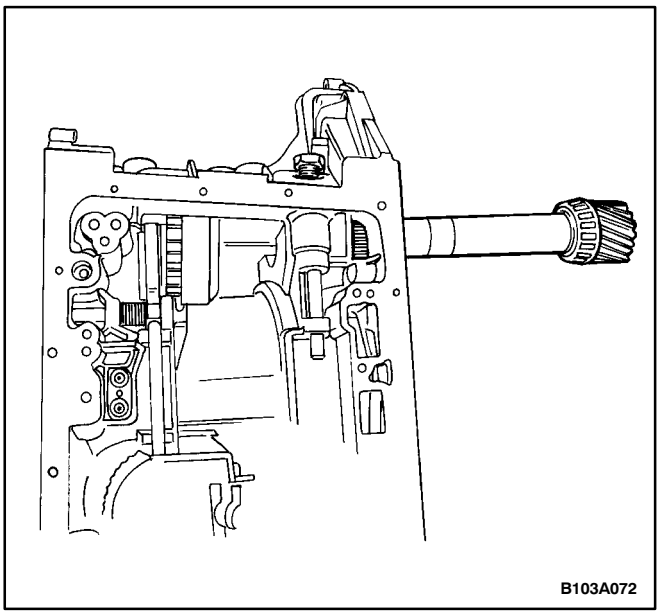
11. Rotate the transaxle 90 degrees so that the bell housing bolt holes are in the UP position.
12. Install the brake D assembly and the plate spring.


B103A189

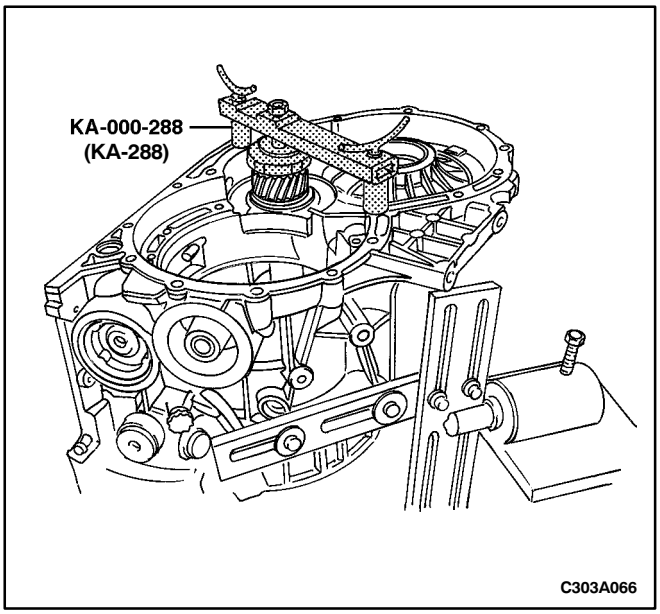
13. Install the snap ring into the case.


B103A203

14. Rotate the transaxle 90 degrees so the PARK/LOCK components are in the UP position.
15. Install the governor and the cover plate.

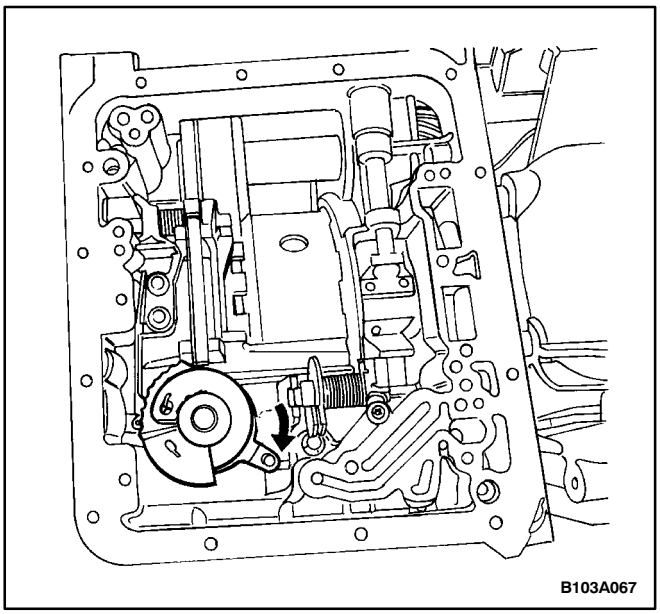

B103A072

16. Install the side shaft.

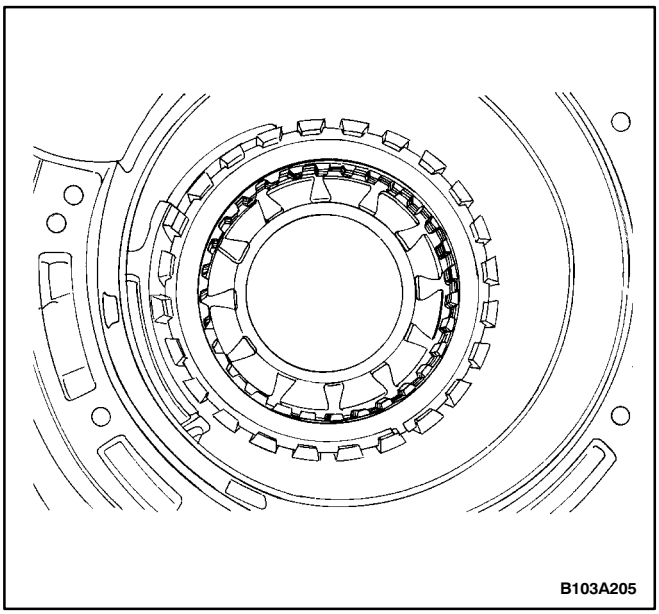


C303A066

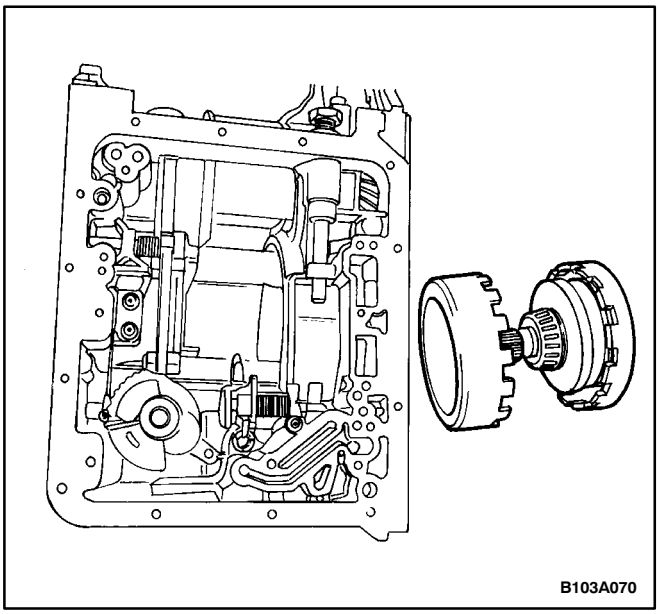
17. Use the side shaft retainer KA-000-288 (KA-288) to hold the side shaft in place.


B103A067

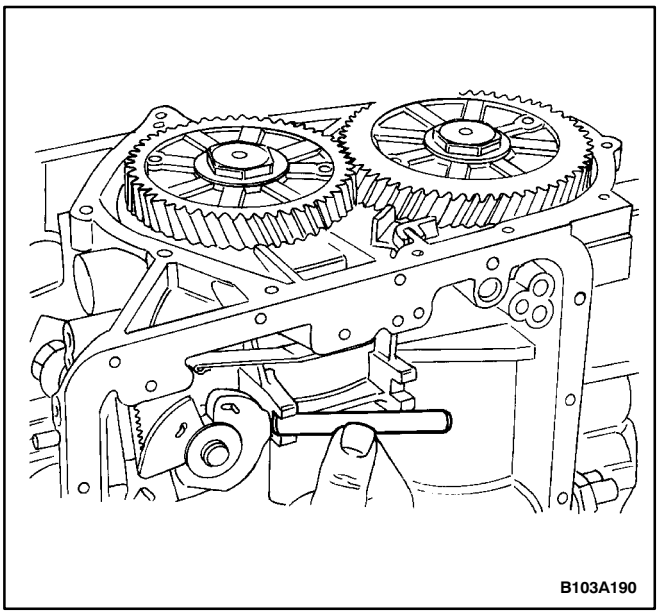
18. Make sure the gear selector is in the PARK position.


B103A205

19. Align the brake D assembly rings.


B103A070

20. Install the web gear onto the outer ring of the freewheel. Install the output shaft/hollow gear assembly into the transansaxle case.

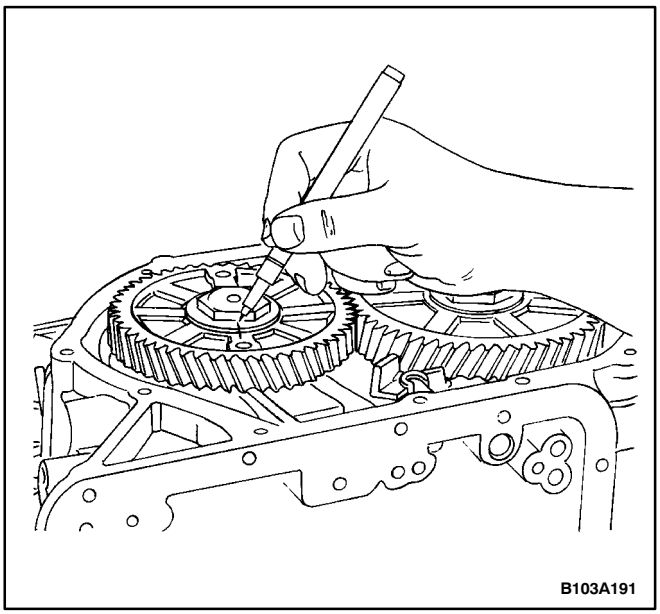

B103A190

21. Install the large spur gear with a 1.75 mm (0.069 inch) washer under it and the securing bolt.
22. Install the small spur gear and the securing bolt.
23. Rotate the transaxle 90 degrees so the spur gears are in the UP position.

Tighten

Tighten the small spur gear securing bolt for its first torque to 10 N•m (89 lb-in).

24. Remove the connecting rod and rotate the gears more than three around.

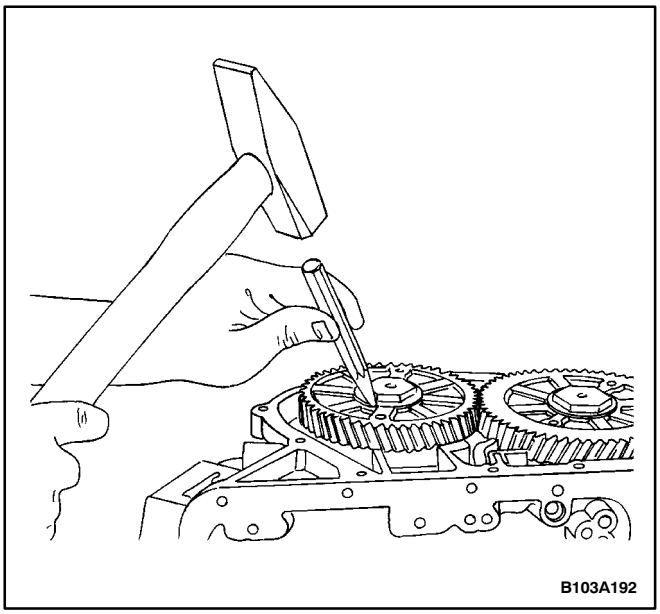

B103A191

25. Insert the connecting rod.

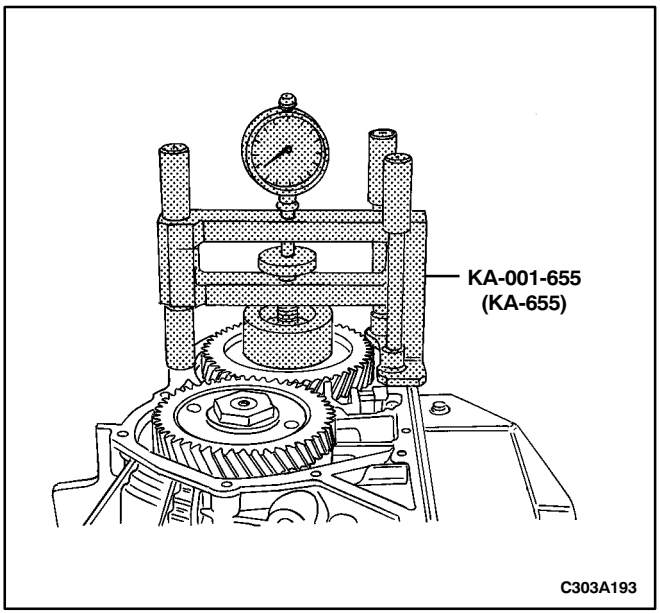
Tighten

Tighten the small spur gear securing bolt for its second torque to 20 N•m (15 lb-ft).

26. Mark the bolt and the gear.


B103A192

27. Turn the bolt 12 mm (0.5 inch) counterclockwise and bend the locking tabs on the securing bolt.

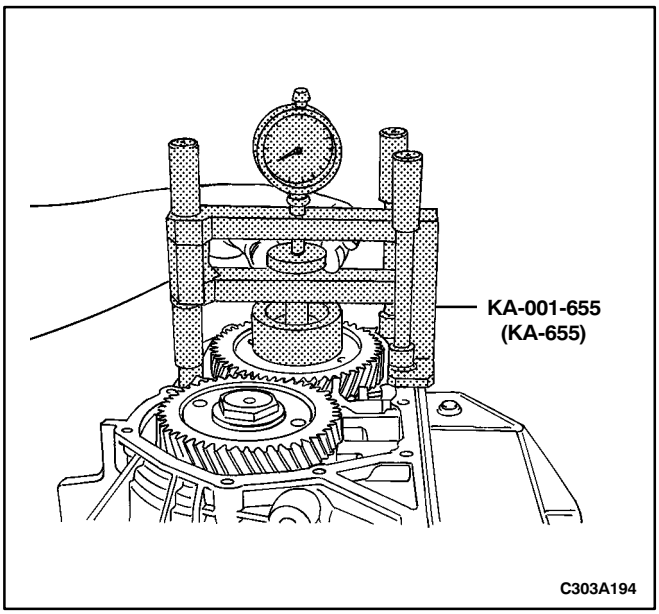


C303A193

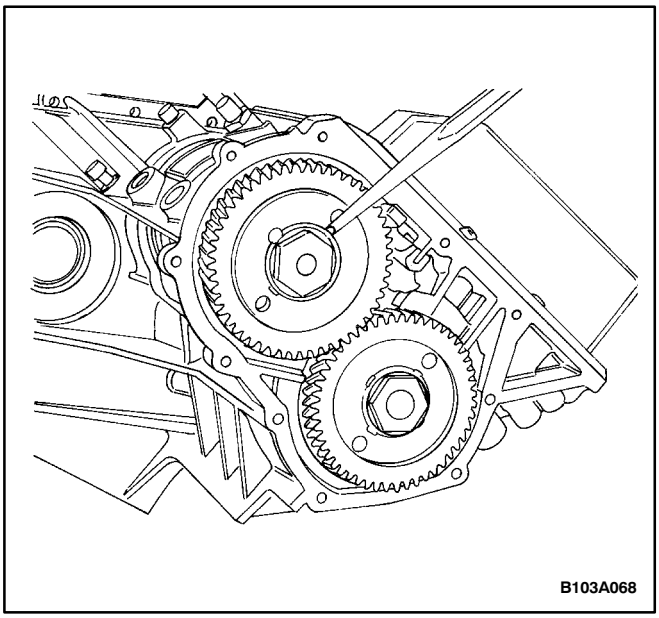
Tighten

Tighten the large spur gear securing bolt to 150 N•m (110 lb-ft).

28. Remove the connecting rod.
29. Install the spur gear clearance measurement tool KA-001-655 (KA-655).



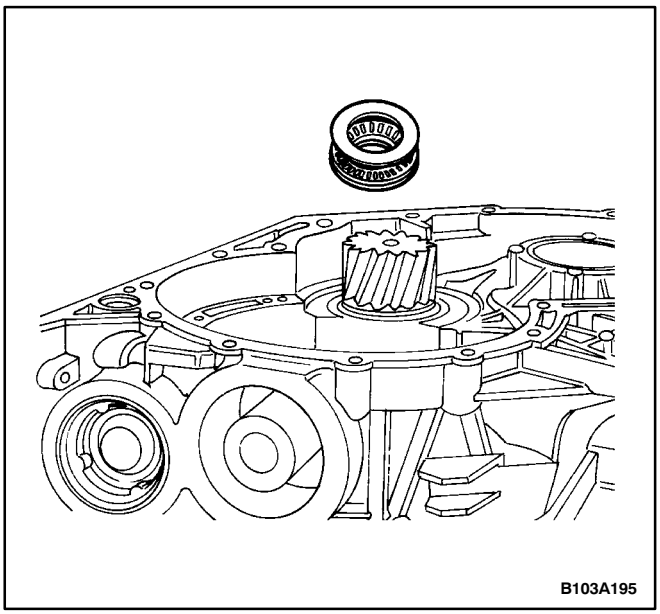
30. Turn the adjusting bolt down until the indicator of the gauge starts to move.



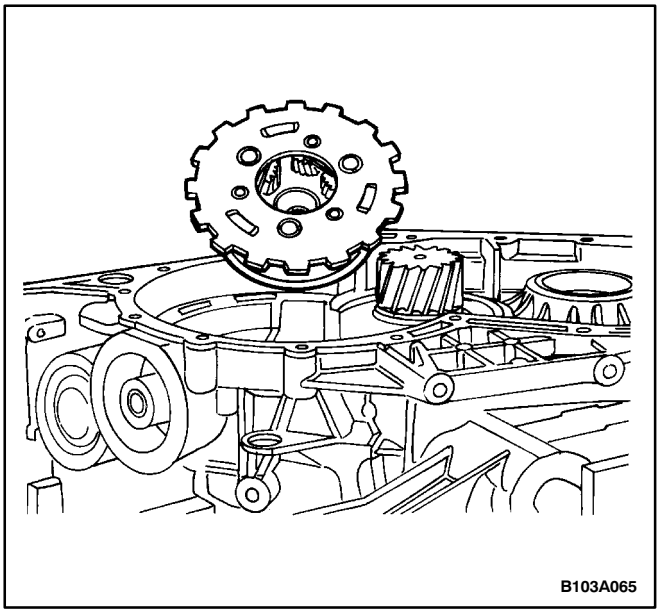
31. Turn the gears to bring the gauge back to point zero.
32. Remove the side shaft retainer KA-000-288 (KA-288) from the side shaft.
33. Turn the adjusting bolt 270 degrees counterclockwise, then turn the gears until the indicator on the gauge has been adjusted. Read the measurement (X) in millimeters.
34. Install the washer under the large spur gear. Determine the thickness of the washer (S) to be inserted under the large spur gear by the formula: S = 1.75 mm - (X mm - 0.06 mm), or S = 0.069 inch – (X inch - 0.002 inch).

Example: If the dial indicator measurement is 0.46 mm (0.018 inch), determine the washer thickness by subtracting 0.06 mm (0.002 inch) from 0.46 mm (0.018 inch) and then subtracting the difference from 1.75 mm (0.069 inch). In this case, S = 1.75 mm – (0.46 mm - 0.06 mm), i.e. S = 1.35 mm, or S = 0.069 inch – (0.018 inch - 0.002 inch), i.e. S = 0.052 inch. The washer thickness to be placed under the spur gear is equal to 1.35 mm (0.052 inch).

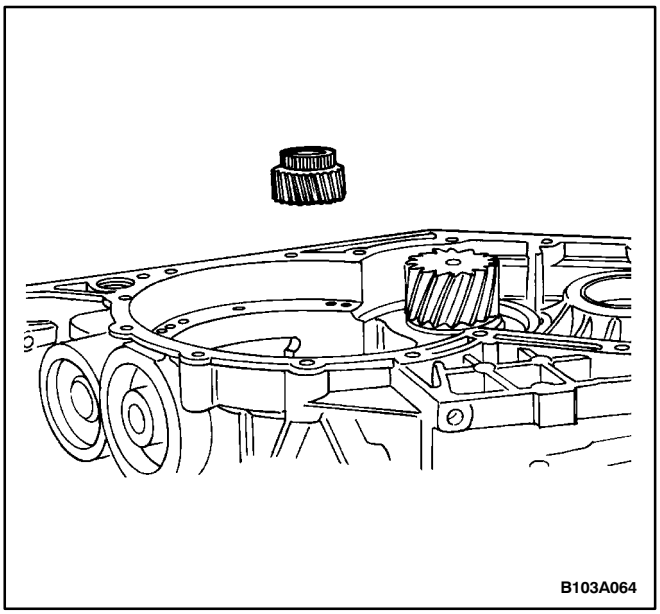
35. Remove the measuring device KA–001–655 (KA-655) and replace the washer under the large spur gear, if necessary.
36. Secure the spur gear bolt by bending the locking tabs.


B103A195

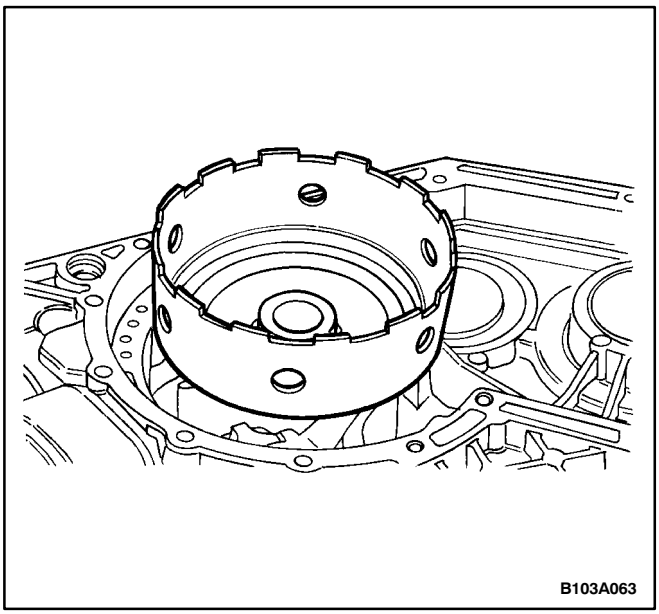
37. Install the side cover. Refer to “Case Side Cover Pan and Gasket” in this section.
38. Rotate the transaxle 180 degrees so the differential bearing race is on the top.
39. Install the washer, the axle cage, and the thrust washer.


B103A065

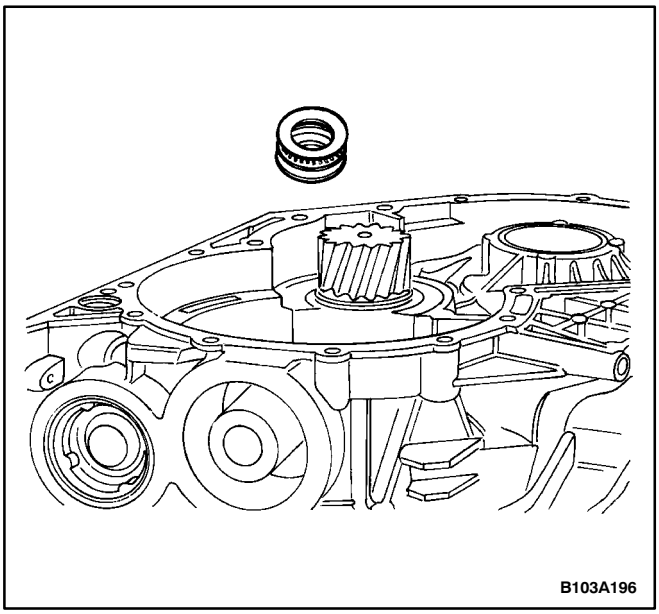
40. Install the planetary assembly into the housing case.


B103A064

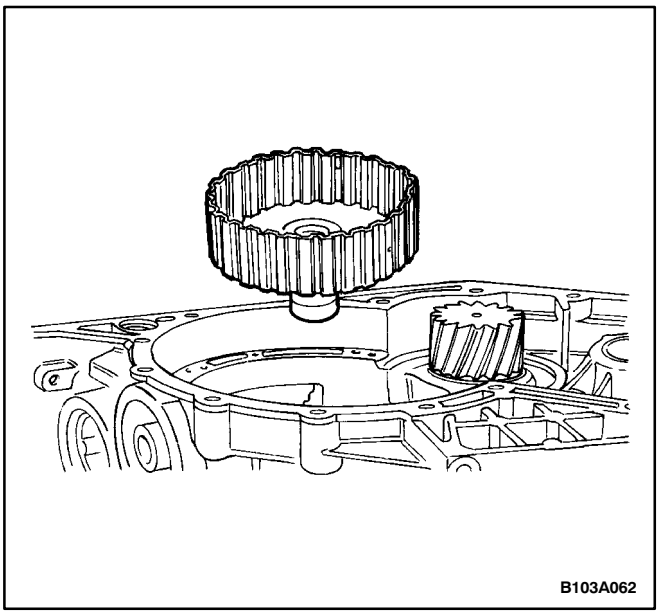
41. Install the sun gear into the planetary assembly.


B103A063

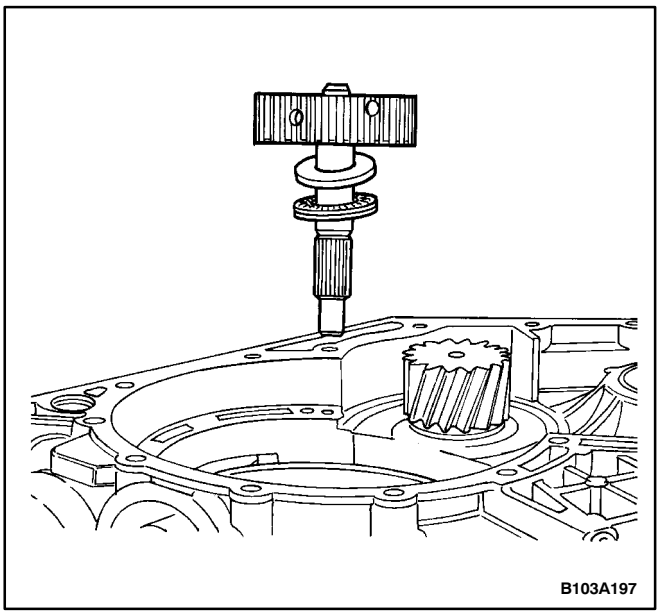
42. Install the inner teeth of the drive shell into the outer teeth of the sun gear.


B103A196

43. Install the washer, the thrust bearing, and the thin axle washer into the drive shell.


B103A062

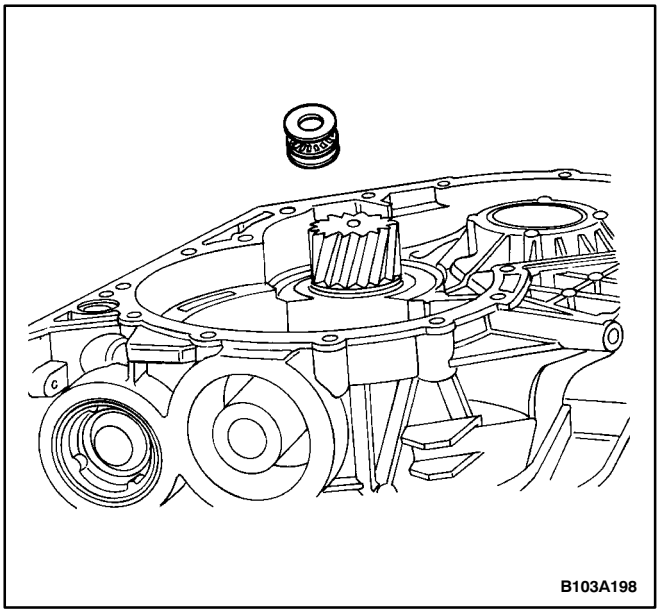
44. Install the sun gear shaft into the housing case.



B103A197

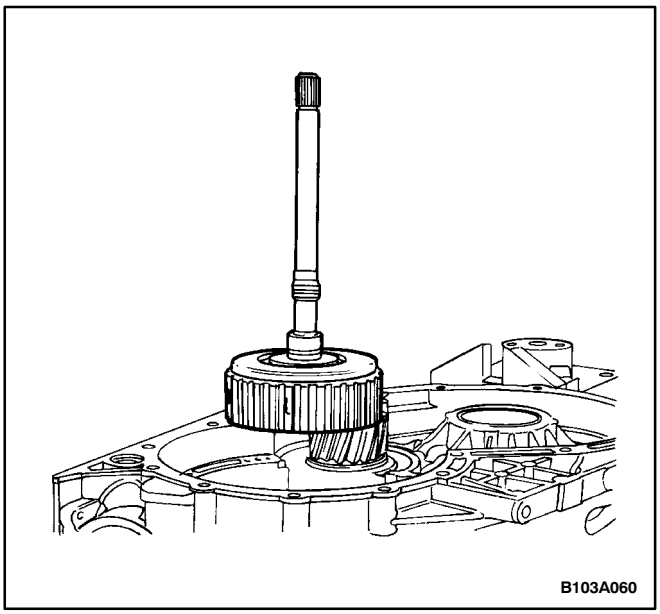
Important: If the sun gear assembly has been installed correctly, the drive shell will turn toward the sun gear in one direction only.

45. Install the washer, the axle cage, and the thrust washer onto the intermediate shaft and install the intermediate shaft assembly into the housing.



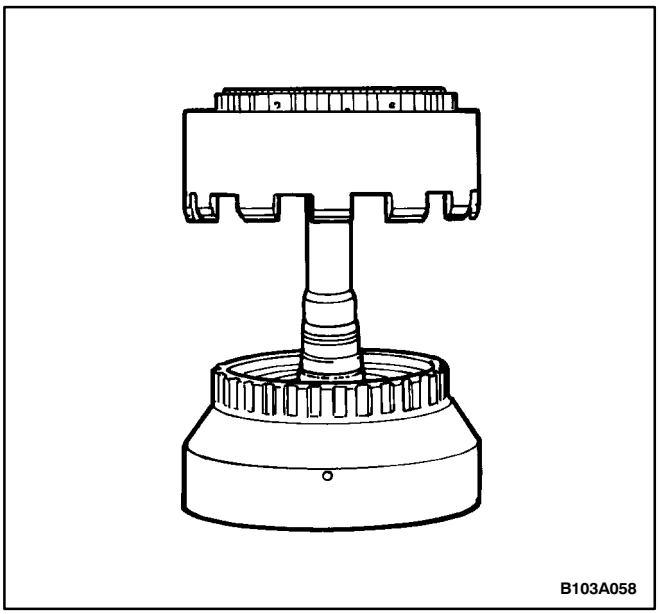
B103A198

46. Install the washers and the axle cage onto the intermediate shaft.

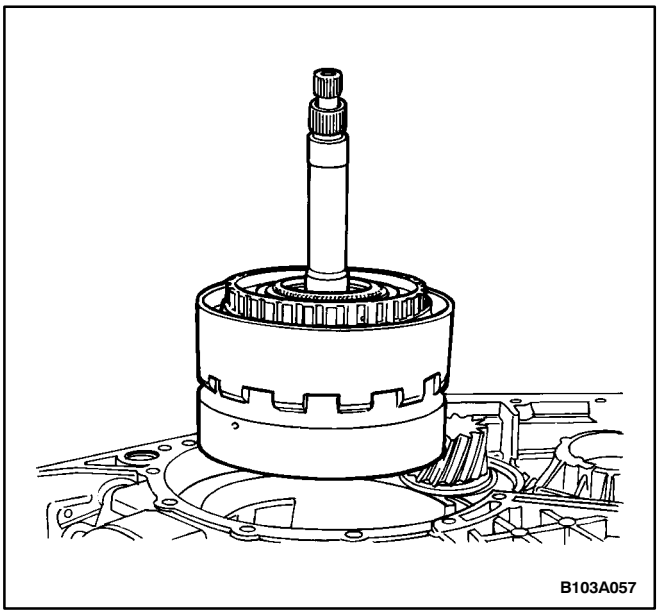


B103A060

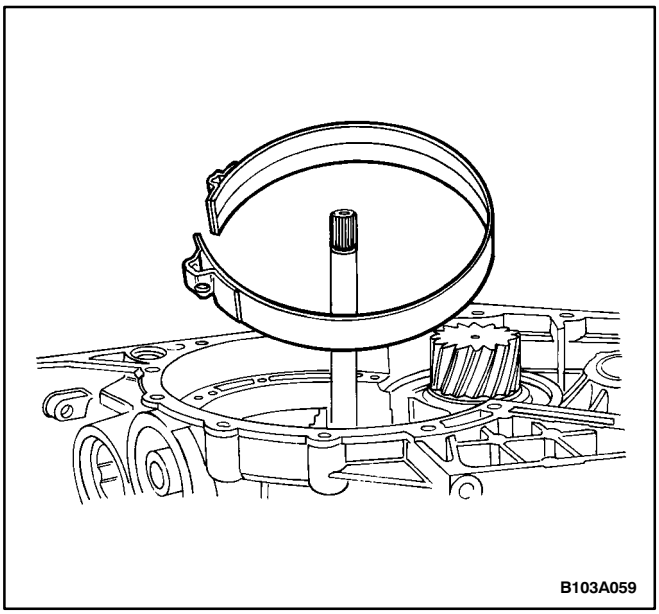
47. Install the motor shaft assembly into the case using a turning motion. The motor shaft is correctly installed when the cylinder E is aligned with the edge of the sun shaft carrier.


B103A058

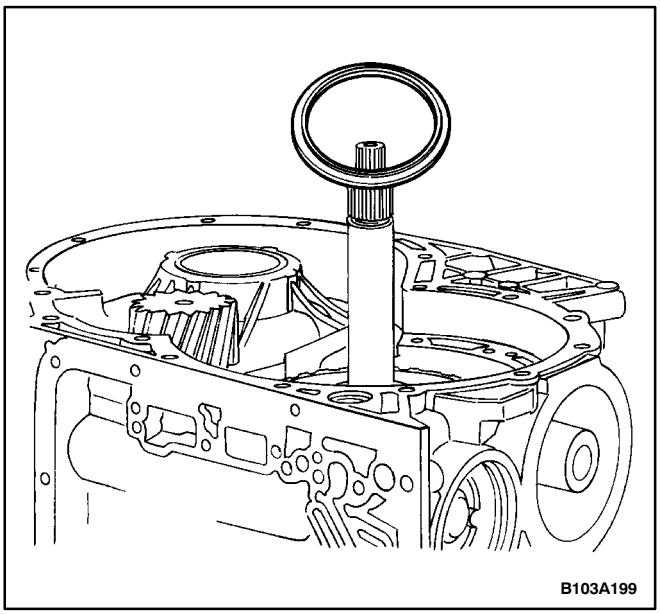
48. Join the clutch A and the clutch B.


B103A057

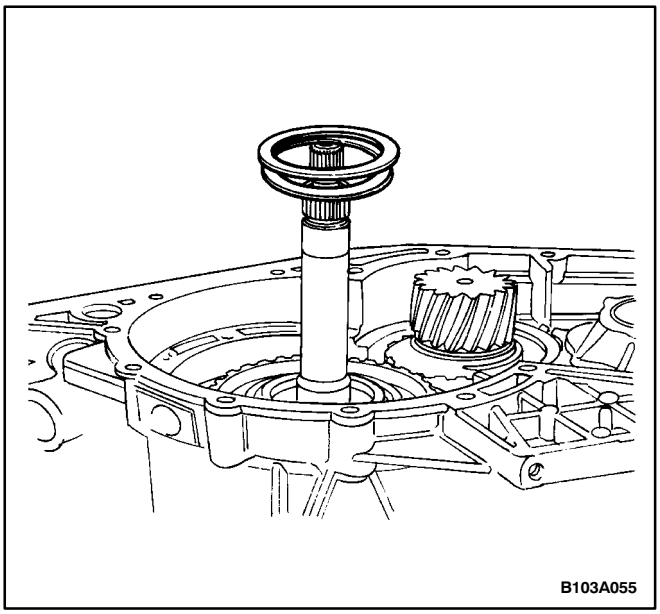
49. Install the clutch A and B assembly into the transaxle case using a twisting motion.


B103A059

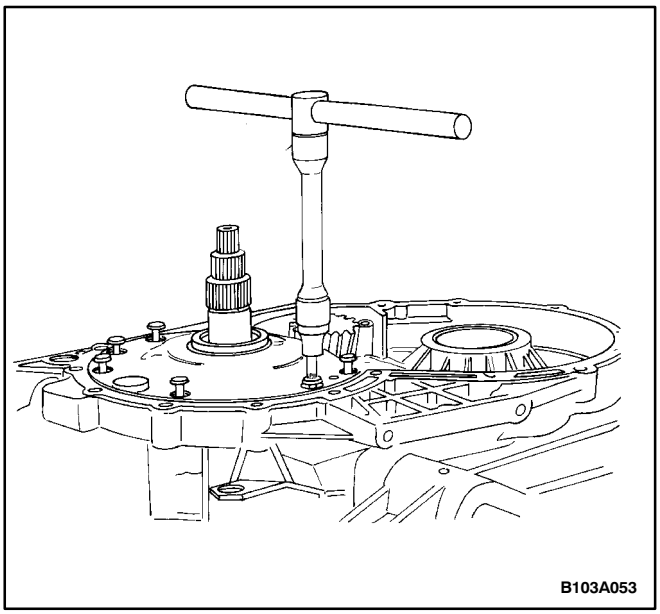
50. Install the band C′.


B103A199

51. Install the holding ring on top of the security washer on the second freewheel.


B103A055

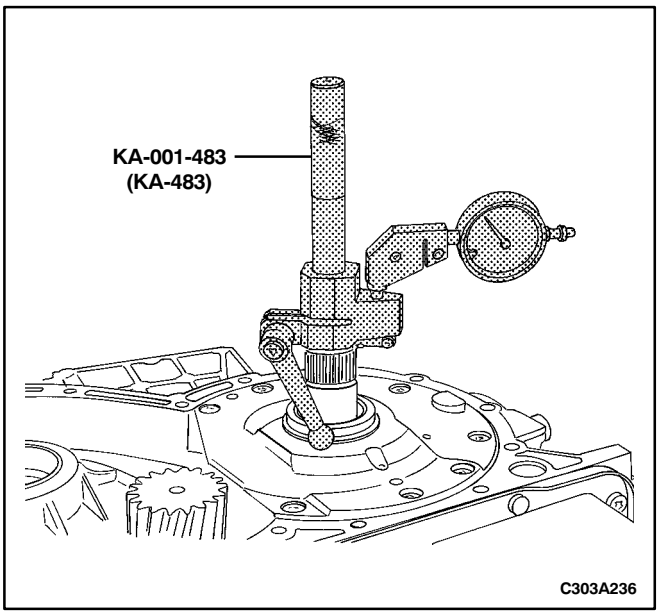
52. Install the adjustment washers and the thrust washer onto the motor shaft.


B103A053

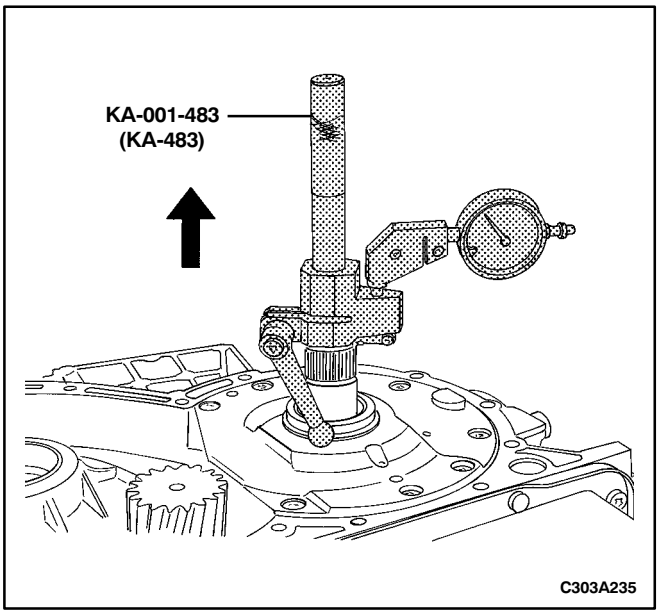
53. Install the pump assembly into the transaxle case with the bolts.

Tighten

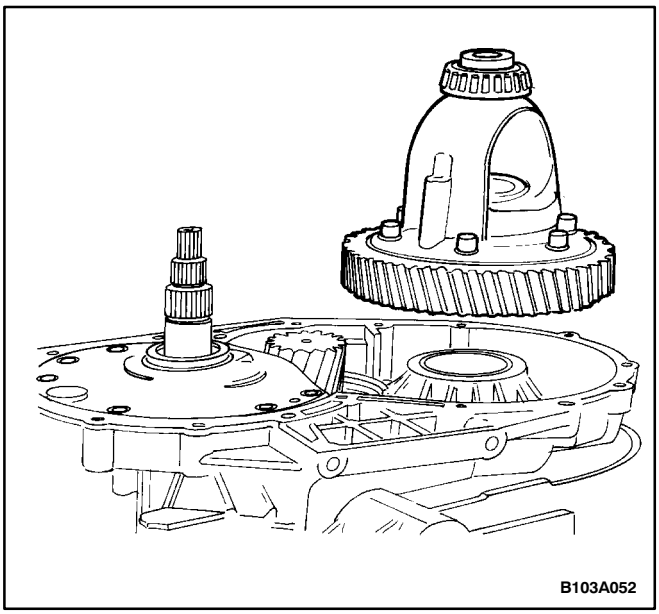
Tighten the intermediate plate-to-housing bolts to 10 N•m (89 lb-in).



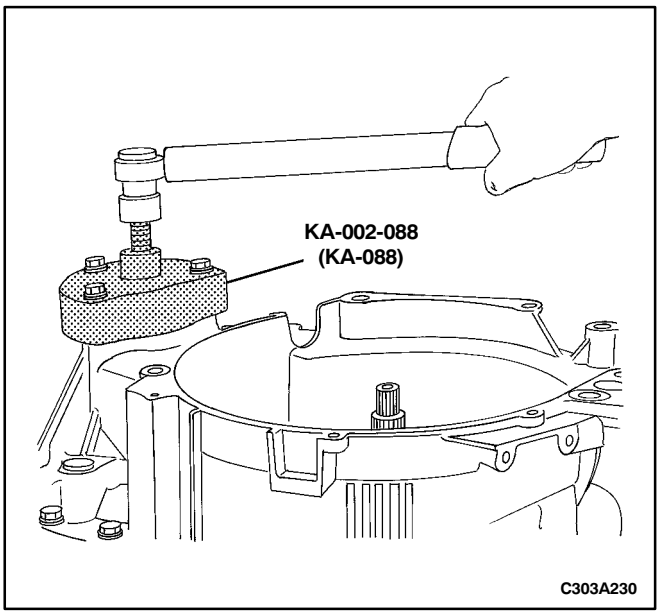
54. Install the axial clearance measurement tool KA-001-483 (KA-483).



55. Place the indicator gauge at zero and pull up on the device.



56. Clearance should be between 0.1 mm (0.004 inch) and 0.3 mm (0.01 inch). A thicker or thinner washer can be used to bring the clearance within tolerance.
57. Install the differential assembly into the transaxle housing.

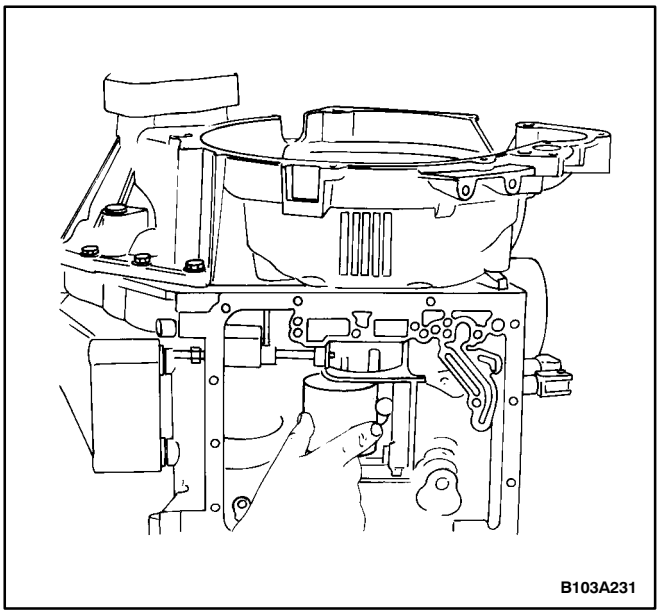


Important: Remove the valve body and the extension housing from the transaxle in order to adjust the differential.

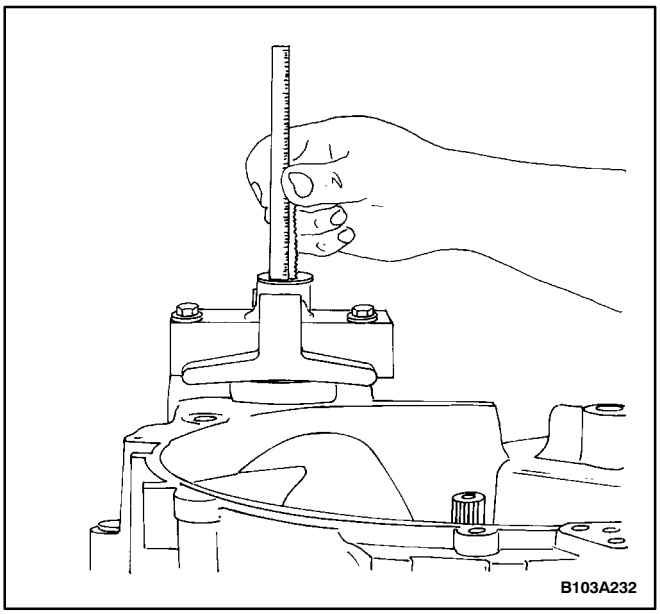
58. Install the differential adjustment tool KA-002-088 (KA-088).

Tighten

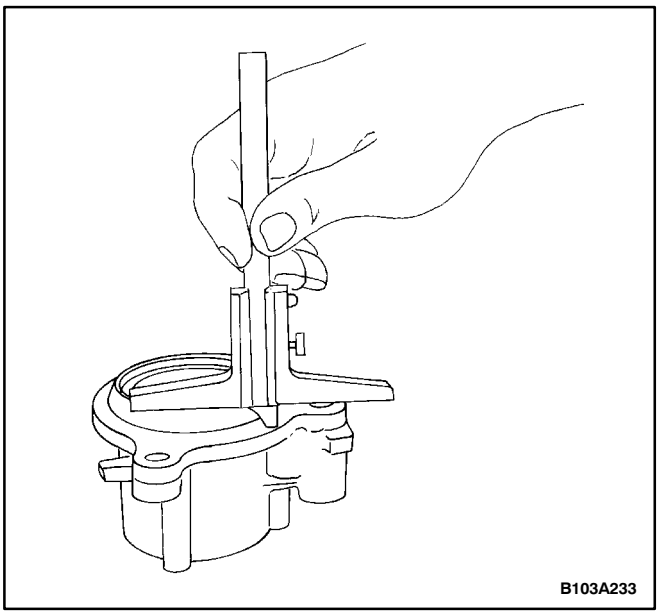
Tighten the differential adjustment tool to 7 N•m (62 lb-in).



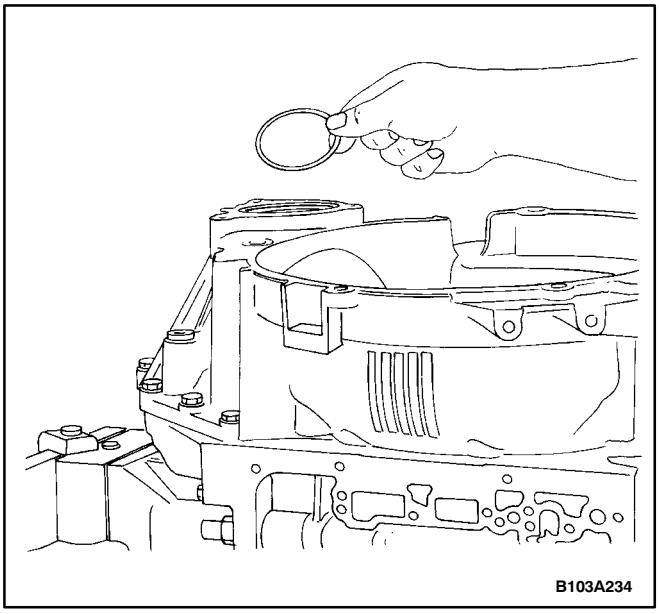
59. Turn the drive shell clockwise to settle the bearings. Check the torque again.



60. Use a depth gauge to determine the distance (A) between the bearing outer ring and the top of the bell housing.

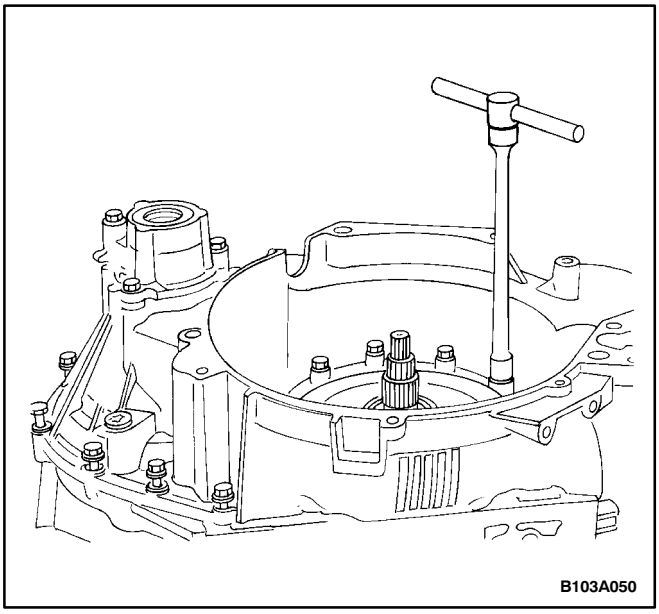

B103A233

61. Use a depth gauge to determine the distance (B) between the top of the extension housing and the bolt flange.


B103A234

62. Depending on the measurement results, insert one or two washers between the top of the differential and the extension housing. Select different washer thicknesses to obtain the best result. The washer thickness (S) can be determined by the formula S=A-B+0.1 mm, or S=A-B+0.004 inch.

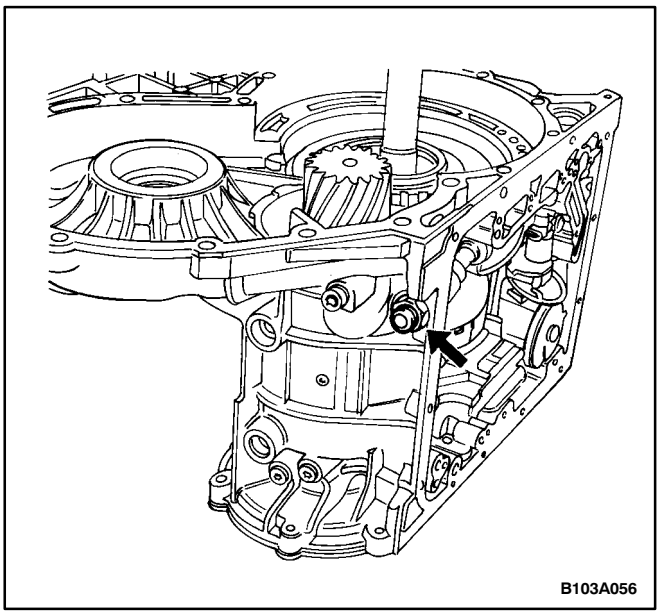
Example: The distance between the bearing outer ring and the top of the bell housing is 10.2 mm (0.40 inch). The distance between the top of the extension housing and the bolt flange is 8.65 mm (0.341 inch). The washer thickness can be determined by subtracting 8.65 mm (0.341 inch) from 10.2 mm (0.40 inch) and then adding 0.1 mm (0.004 inch). In this case, the washer thickness is equal to 1.65 mm (0.039 inch).


B103A050

63. Install the gasket and the bell housing assembly with the bolts.

Tighten

Tighten the bell housing bolts to 23 N•m (17 lb-ft).


B103A056

64. Lubricate the cylinder B with the transaxle fluid.

Tighten

Tighten the band C′ adjusting bolt to 10 N•m (89 lb-in).

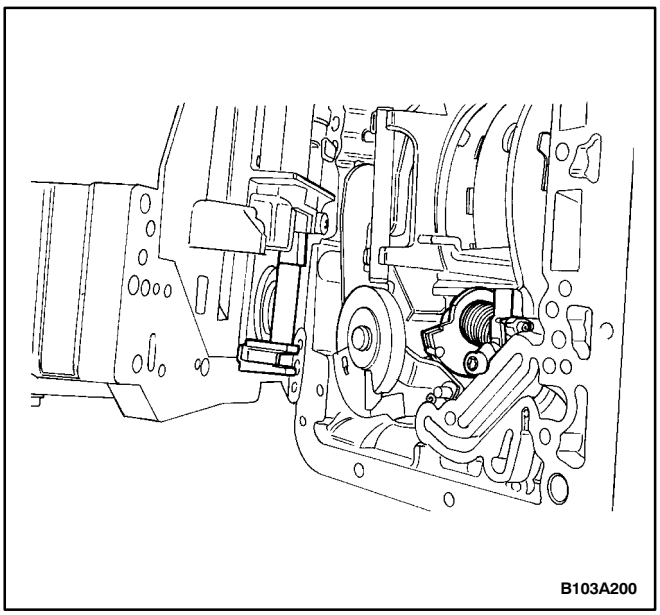
Important: Turn the cylinder B while tightening the band to ensure correct settlement.

65. Turn the adjusting bolt counterclockwise 3 mm (0.1 inch).

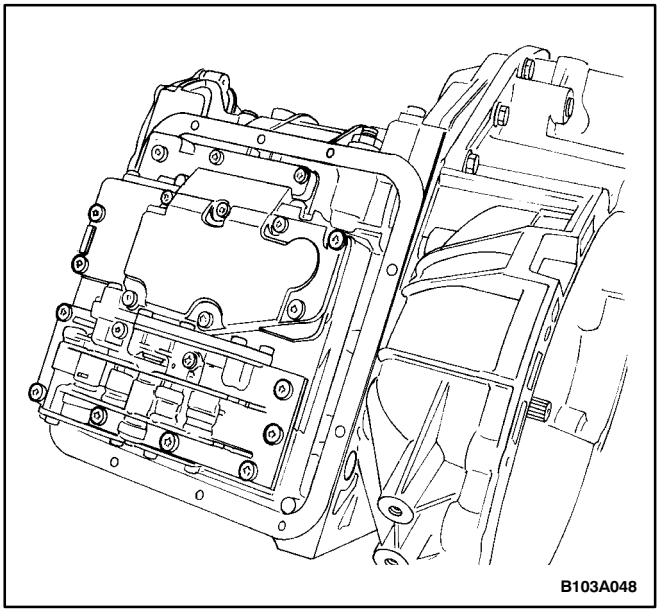
IMPORTANT : The clearline between the adjusty bolt and band is 0.9mm ~ 1.2 mm.

Tighten

Tighten the band C′ locking nut to 80 N•m (59 lb-ft).


B103A200

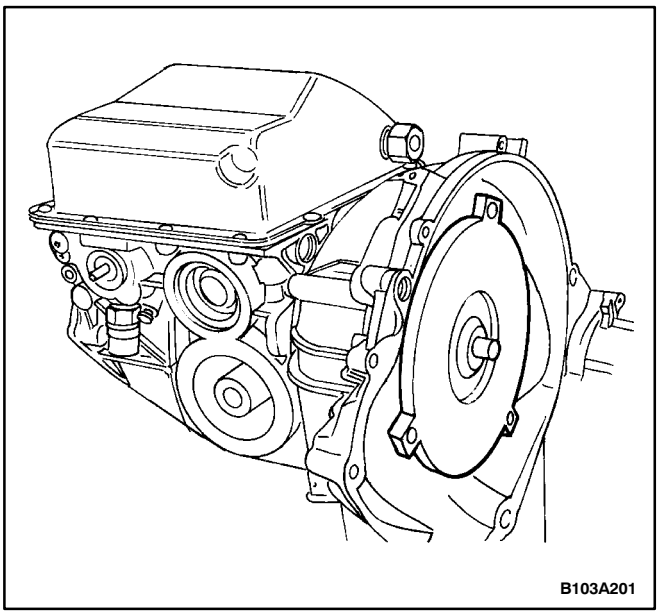
66. Rotate the transaxle 90 degrees so the PARK system components are in the UP position.
67. Install the valve body into the case, making sure the manual and throttle levers are positioned properly.


B103A048

68. Install the valve body bolts.

Tighten

Tighten the valve body bolts to 8 N•m (71 lb-in).


B103A201

69. Install the fluid pan gasket and the fluid pan. Refer to “Pan and Gasket” in this section.
70. Install the torque converter assembly, making sure the converter engages the input shaft, the stator support, and the pump drive gear.
71. Install the transaxle in the vehicle. Refer to “Transaxle Assembly” in this section.

GENERAL DESCRIPTION AND SYSTEM OPERATION

ZF 4 HP 14 AUTOMATIC TRANSAXLE

The ZF 4 HP 14 is a four-speed automatic transaxle designed for cars with front-wheel drive and a transversely mounted engine. The transmission consists of a hydrodynamic, hydrokinetic torque converter with an integrated torsional damper and a four-speed planetary unit. Power transfer is transferred from two spur gear sets and a countershaft to the differential built into the transaxle housing.

In first, second and reverse gear, power is transferred from the engine to the gear box by the use of the torque converter. In third gear, the transaxle works according to the power-splitting principle. Approximately 40 percent of the input power is transmitted hydraulically through the torque converter. Approximately 60 percent of the input power is transmitted mechanically through the converter cover, the integrated torsional damper, and a shaft. In fourth gear, 100 percent of the power is transmitted mechanically through the converter cover, the integrated torsional damper, and a shaft.

The control elements used are hydraulically activated clutches or brakes and freewheel units.

A selector level controls the automatic transaxle. The hydraulically controlled shift points are dependent on the accelerator pedal position and the road speed of the vehicle.

TORQUE CONVERTER

The torque converter transmits power hydraulically from the engine to the transaxle and increases the input torque, particularly when the vehicle is pulling away.

The torque converter is connected to the turbine shaft.

The pump, the turbine, and the stator are contained in an enclosed housing which is completely filled with fluid under pressure. Rotation and power are transmitted by the kinetic energy of the flowing fluid. The torque converter sustains no wear, as there is no mechanical connection between the driving and the driven sections.

The engine-driver impeller induces the fluid to spin. Centrifugal force causes the fluid to flow outward toward the periphery of the impeller, causing the fluid to flow at a higher velocity to the turbine.

In the turbine, the kinetic energy of the fluid is converted to mechanical energy. The fluid then flows through the stator and deflects at an angle which is favorable to the impeller.

The stator is connected to the torque converter housing across the freewheel. By deflecting the fluid, the stators are subjected to torque which, in turn, causes an increase in the turbine torque. The input engine torque is thereby increased approximately twofold as the vehicle pulls away.

The relationship between the turbine torque and the impeller torque is known as the torque multiplication or conversion. The greater the speed difference between the impeller and the turbine, the greater the multiplication or conversion. Maximum torque multiplication is reached when the turbine is stationary. With an increase of the output shaft speed, torque multiplication or conversion decreases until it reaches a ratio of 1:1. The stator then rotates freely in the flowing fluid and the torque converter acts purely as a fluid-coupling device.

The torsional damper which is integrated into the converter minimizes the torsional oscillations and the load change shocks which occur in the third and the fourth gears because of the mechanical power transfer. The torsional damper is connected to the engine shaft which transmits the power mechanically between the engine and the transaxle.

FLUID PUMP

The fluid pump is located between the torque converter and the transaxle case and is driven directly by the torque converter. The pump sucks the fluid through a filter and delivers it to the main pressure regulator valve of the control system. Excess fluid flows back to the pump.

The fluid pump fulfills the following functions:

- Generates line pressure.
- Delivers fluid under pressure to the torque converter, thus preventing air bubbles in the fluid.
- Induces a flow of fluid through the torque converter in order to eliminate heat.
- Supplies fluid pressure to the hydraulic control system.
- Supplies fluid pressure to the shift components.
- Lubricates the transaxle with fluid.

PLANETARY GEARS

The ZF 4 HP 14 automatic transaxle is equipped with a Ravigneaux planetary gear set which consists of the following elements:

- Two sun gears of different sizes, each equipped with three planetary gears.
- One planet carrier.
- One annulus or ring gear.
- Different ratios are obtained by transmitting power through some gears in the planetary gear set while locking other gears.

Power to the drive shafts is always transmitted by means of the annulus, or the ring gear. Refer to “Power Flow” in this section.

CONTROL ELEMENTS

A freewheel consists of an outer ring and an inner ring with rollers or rockers, also known as sprags, fitted between them. A freewheel can transmit torque in one direction only and rotates freely in the opposite direction. The function of the freewheel is to achieve smooth, jerk-free gear shifting.

The ZF 4 HP 14 uses the sprag-type clutch for both the freewheel first gear, associated with the brake D, and the freewheel second gear, associated with the brake C.

Sprag-Type Freewheel

When the sprag type freewheel is in the rotation direction, the sprags are arranged between the inner and the outer rings so that the two rings can turn together easily.

When the sprag-type freewheel is in the locking direction, the asymmetrical sprags are located between the inner and the outer rings which are pushed into an upright position when the rings try to rotate in opposite directions. As a result, they lock between the inner and the outer rings, which prevents the rings from rotating in opposite directions.

The sprags are contained in a special retainer cage.

Plate Clutches and Brakes

These gear-shifting elements consist of the following parts:

- A cylinder.
- A piston.
- A plate set of inner, intermediate, and outer plates.
- The Belleville spring rings.

The gear-shifting elements are locked hydraulically by fluid pressure applied between the cylinder and the piston. When the pressure is reduced, the Belleville spring ring pushes the piston back to its original position.

The function of the gear-shifting elements is to carry out gear shifting under load. In this case the plate clutches A, B, and E transmit the engine power to the planetary gear set. The plate disk brakes C and D serve as supports for the planetary gear set elements in the transaxle case.

Because of the hydraulic operation and the continuous lubrication, energy is transmitted virtually without wear. The gear-shifting elements are not subjected to mechanical wear and require no periodic adjustment.

Brake Bands

A hydraulic piston activates Brake band C and acts via the cylinder B and the drum as a brake for sun gear 1.

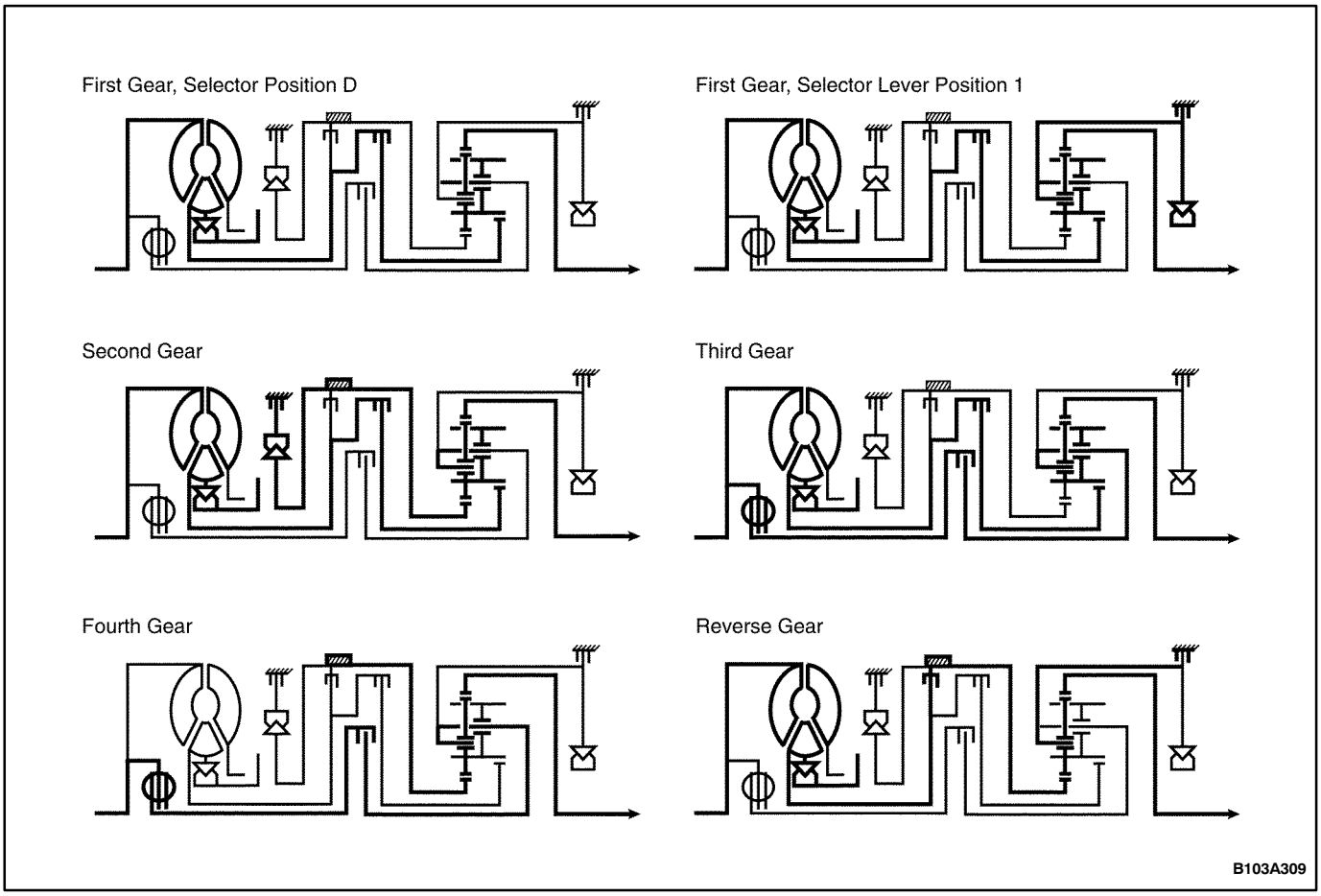
This brake band is unusual in that it sustains no wear and, therefore, needs no periodic adjustment.

Brake Band	First Gear	Sec-ond Gear	Third Gear	Fourth Gear	Reverse
Clutch A	a	a	a	–	–
Clutch B	–	–	–	–	a
Brake C	–	a	b	b	–
Brake Band C	–	a	–	a	–
Brake D	a	–	–	–	a
Clutch E	–	–	a	a	–
Free-wheel First	a	–	–	–	–
Free-wheel Second	–	a	–	–	–

a = Power Transmitting Elements

b = Elements in Waiting Position

POWER FLOW



First Gear, Position D

Power is transmitted through the torque converter turbine and the turbine shaft to the clutch A. This drives the sun gear 2 via the sun gear shaft.

The freewheel first gear locks the planet carrier in counterclockwise rotation.

The sun gear 2 drives the planet gear 2, which drives the planet gear 1. These, in turn, drive the ring gear which is connected to the output shaft.

First Gear, Position 1

The brake D is now also applied. The planet carrier is locked. The overrun braking will be obtained when the accelerator pedal is released.

Second Gear

Power is transmitted through the torque converter turbine and the turbine shaft to the clutch A. This drives the sun gear 2 via the sun gear shaft.

The sun gear 1 is locked by the brake C and the brake band C.

The freewheel second gear is in the traction position.

The planetary gear 2 drives the planetary gear 1, which rolls on the stationary sun gear 1. The power flow then continues, as in the first gear, through the ring gear.

Third Gear

Approximately 40 percent of the power is transmitted hydraulically between the engine and the transaxle.

Power is transmitted through the torque converter turbine and the turbine shaft to the clutch A. This drives the sun gear 2 via the sun gear shaft.

Approximately 60 percent of the power is transmitted mechanically between the engine and the transaxle.

Power is transmitted through the engine shaft to the applied clutch E. The inner clutch plate disk holder E is meshed with the planet carrier.

As the sun gear 2 and the planet carrier are driven simultaneously, the ratio of the planetary gear set is 1:1. The output shaft is driven via the annulus.

Fourth Gear

Power is transmitted through the engine shaft and the clutch E to the planet carrier. The sun gear 1 is locked by the drum of the brake band C. The planet gear 1 thus runs on the sun gear 1 and drives the output shaft via the annulus.

Reverse Gear

The clutch B is applied and transmits power from the turbine shaft, through the drum to the sun gear 1.

The clutch D is applied and locks the planet carrier. As a result, the planet gear 1 reverses the direction of rotation between the sun gear 1 and the annulus, which now drives the output shaft counterclockwise.

PARKING BRAKE

The parking brake is applied when the selector lever is moved to position P. The parking brake acts as a mechanical latch which prevents the vehicle from rolling away.

The parking safety pawl engages the teeth of the parking interlocking gear which is connected to the side shaft of the transaxle. This locks the driving wheels of the vehicle.

When the selector lever is in position P, a pre-loading spring ensures that the parking pawl engages the interlock gear as soon as the car starts to roll.

A locking cone prevents inadvertent release of the parking pawl, even if the vehicle has a heavy trailer hitched to it and is parked on a steep grade.

The parking pawl cannot be engaged inadvertently. At high speeds, it slides over the top of the parking gear teeth. It can be engaged only at lower speeds.

Position P should only be selected when the vehicle is stationary. The parking pawl would be subjected to excessive stress if it were engaged while the vehicle was moving.

HYDRAULIC CONTROL SYSTEM

The hydraulic control system is affected by the following:

- The selector lever position or the line pressure.
- The accelerator pedal position or the throttle pressure.
- The speed of the vehicle or the governor pressure.

Selector Valve

The selector valve routes the fluid flow, depending on the selector lever setting, from the line pressure valve through the shift and the lockup valves, to the clutches, and to the brakes.

Line Pressure Regulator Valve

The line pressure regulator valve opens when the pressure rises to a certain value, thus returning the fluid back to the suction side of the pump. This valve acts as a variable pressure-limiting valve and operates relative to the modulator.

The line pressure controls the system pressure in the valve body. The modulator pressure, the throttle pressure, the governor pressure, and the torque converter pressure are all generated from the line pressure.

Lubrication Valve

Fluid flows from the torque converter through the lubrication valve into the transaxle case.

Torque Converter Pressure Relief Valve

The torque converter pressure relief valve limits the fluid pressure in the torque converter.

Modulator Valve

The modulator pressure simulates the engine torque, to which the gear shifting, carried out by the control elements, must be adjusted.

At low engine torque, the closing pressure for engaging the control elements is low.

At high engine torque, the closing pressure is high. Since the engine torque may be high even at low engine speeds, the function of the modulator pressure is to boost the closing pressure in the control elements during this stage.

The modulator valve operates in three stages.

Stage One

The accelerator pedal is pressed. The modulator valve adjusts the pressure relative to the throttle pressure.

Stage Two

Since pressure boosting is no longer required, the modulator valve serves as a pressure-reducing valve and thus maintains a constant pressure. The modulator valve spring determines the level of this pressure. This stage starts only when the modulator valve piston reaches the STOP in the passage.

Stage Three

At a suitable ignition setting, the modulator pressure can be reduced on kickdown.

Throttle Pressure Valve

The throttle pressure valve is a pressure-reducing valve which adjusts the throttle pressure relative to the following accelerator pedal positions.

Idling Position

The accelerator pedal is not pressed. The throttle pressure valve piston is in its starting position, but there is not yet any throttle pressure.

Part-Throttle Position

The accelerator pedal is slightly pressed. This stage exists from the idling position until the throttle pressure valve piston has reached passage 1 to generate the throttle pressure.

Full-Throttle Position

The accelerator pedal is pressed to the full-throttle position and the throttle cam is moved to the kickdown position. This stage exists from the point at which the passage 1 opens until the throttle pressure valve piston has reached the passage 2.

Kickdown Position

The accelerator pedal is pressed past the full-throttle position and the throttle cam is moved past the kickdown position. The passage 2 is open in this stage.

Shift Valves

There is a shift valve for each gear-shifting stage. These shift valves initiate upshift (1-2, 2-3, 3-4) or downshift (4-3, 3-2, 2-1) by exposing or closing the valve body passages used for routing the fluid pressure to the control elements. This takes place when the valves change over from the position 1 to the position 2 in response to the incoming signals from the line pressure, the governor pressure, or the throttle pressure.

Accumulators

The accumulators prevent the control elements from being subjected to fluid pressure surges. They also ensure a smooth pressure rise which prevents jerky gear shifting.

Accumulators With Clutch Valves

The accelerator pedal position or the engine torque controls the performance of these dampers. They employ the modulated pressure. The clutch valve acts as a variable pressure-reducing valve and controls the clutch pressure during the gear shifting.

Volume Accumulators

These accumulators are operational regardless of the pressure. They are not subjected to the modulated pressure. Damping is carried out only by means of a spring.

First and Reverse Lockup Valve

The first and reverse lockup valve has two functions:

1. It prevents shifting into reverse above a certain speed and blocks the fluid supply to the clutch B and the brake D. The governor pressure and the line pressure control this valve function.
2. In selector lever position 1, it prevents an upshift to the second gear by applying the line pressure to the 1-2 shift valve, which is thus blocked in the first position.

The valve prevents a manual downshift from the position 2 to the position 1 above a certain road speed by blocking the fluid supply to the brake D.

Second Lockup Valve

In the selector lever position 2, the second lockup valve prevents an upshift from the second gear to the third gear by applying the line pressure to the 2-3 shift valve which is thus locked in the position 2.

On a manual downshift from the third gear to the second gear, the second lockup valve prevents a downshift to the second gear above a certain road speed by blocking the fluid supply to the brake C.

2-3-4 Upshift Sequencing Valve

The 2-3-4 valve ensures a sequential 2-3-4 upshift by releasing the governor pressure to the 3-4 valve after the third gear is engaged. An upshift from the second gear to the fourth gear cannot take place because of the clutch A-to-the brake C overlap.

4-3-2 Valve

The 4-3-2 valve ensures a sequential 4-3-2 downshift by applying the line pressure to the 2-3 shift valve and maintaining the 3 position until the third gear has actually been engaged. A downshift from the fourth gear to the second gear cannot take place because of the clutch A-to-the brake C overlap.

3-4 Traction Valve

The 3-4 traction valve operates in the fourth gear as a shift valve for the line pressure supply to the clutch A. On a 3-4 upshift, the clutch A is vented through this valve. The venting takes place only when the brake C is capable of transmitting the engine torque.

4-3 Traction Valve

The 4-3 traction valve serves as the supply valve for the accumulator A. Its function is to prefill the clutch A on a 4-3 downshift.

4-3 Downshift Valve

The 4-3 downshift valve serves as a clutch pressure-retaining valve for the brake C until the clutch A has been filled. The brake C is also vented through the 4-3 downshift valve.

Time Control Valve

On overlap control, the time control valve regulates the delay time between the clutch being released and the clutch being applied. The delay time corresponds to the operating time of the accumulator at the time control valve. The time control valve disconnects the 4-3 traction valve and the 4-3 downshift valve.

Orifice Control

The orifice control valve senses the engine load and controls the pressure supply to the time control valve and to the brake C through a shorter or a longer operating time.

CENTRIFUGAL GOVERNOR

The centrifugal governor is mounted in the side shaft of the gearbox and serves as a sensor for the road speed of the vehicle. The rotation speed is converted to a speed-dependent pressure signal which is supplied to the hydraulic control unit.

Three-Stage Governor

Stage 1

The line pressure is supplied unchanged through the stage 3-2 valve to the stage 1 valve. The valve in the stage 1 is opened by a centrifugal force. The pressure on the differential area of the valve counteracts the centrifugal force, thus reducing the line pressure to the governor pressure.

Stage 2

Above a certain speed, the value for the stage 1 is moved fully outward by the centrifugal force. This provides a free flow path. The line pressure increases with the rotation speed and presses the valve for the stage 2 inward against the centrifugal force and the spring force, thus reducing the line pressure to the governor pressure.

Stage 3

When the centrifugal force has moved the valve for the stage 2 to its STOP, it functions as a free-flow valve. The line pressure presses the valve for the stage 3 inward against the centrifugal force and the spring force, thus reducing the line pressure to the governor pressure.