

## 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).

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

**Notice :** When adding fluid or making a complete fluid change, always use Texaco 1854 automatic transmission fluid. Failure to use the proper fluid will cause hose and seal damage and fluid leaks.

1. Make sure the vehicle is level.
2. Remove the transaxle fluid dipstick and check the transaxle fluid level.
3. The correct fluid level must be between the MIN and the MAX notches on the dipstick.
4. If the fluid level is below the MIN notch, add transaxle fluid through the fluid filler tube and check for leaks in the transaxle.
5. If the fluid is above the MAX notch, the transaxle is overfilled. Drain some of the fluid through the fluid pan drain plug. Check the transaxle fluid level.

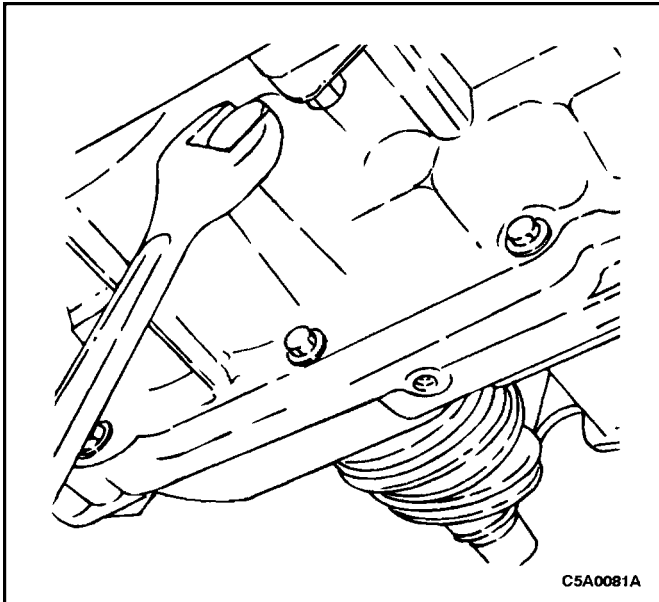
#### FLUID DRAIN PROCEDURE

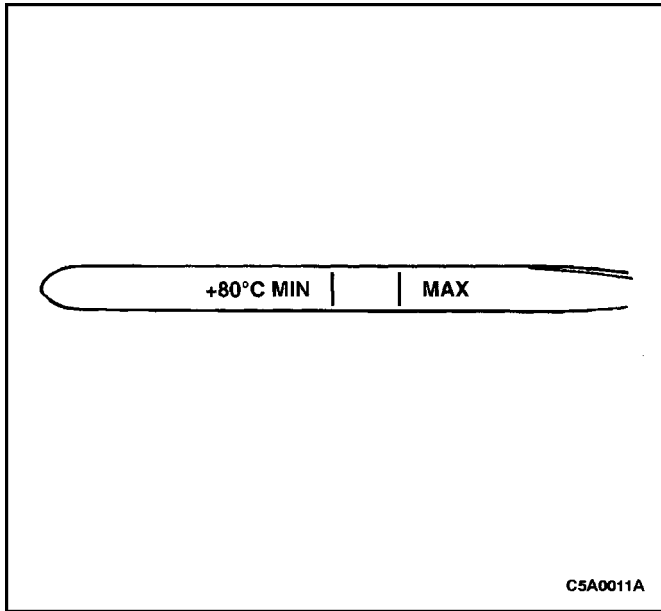
##### Draining Procedure

1. Raise and support the vehicle. Refer to "Vehicle Lifting Procedures," *Section 0B, General Information*.
2. Place a suitable fluid drainage container under the transaxle.
3. Remove the fluid drain plug. Allow the fluid to drain completely.
4. Clean the drain plug threads.
5. Install the fluid drain plug.

##### Tighten

Torque the fluid drain plug to 23–55 N•m (17–40 lb–ft).





### Filling Procedure

1. Remove the drainage container and lower the vehicle.
2. Add three-fourths of the recommended amount of Texaco 1854 automatic transmission fluid.
3. Start the engine and allow it to reach normal operating temperature.
4. Shift the gear selector through all positions.
5. Check the fluid level and add fluid in 0.4 liter (0.5 quart) increments until the dipstick indicates a safe level.

### 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.

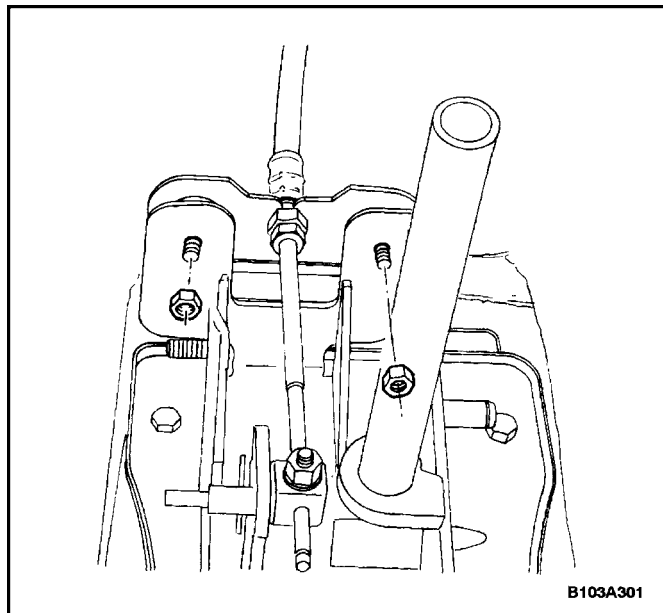
**CAUTION : Epoxy cement may cause skin irritations and eye damage. Read and follow all information on the container label as provided by the manufacturer.**

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 clean, dry soldering acid brush.
5. Allow the epoxy cement to dry for 3 hours before starting the engine.

### FLUID COOLER FLUSHING

#### Flushing Procedure

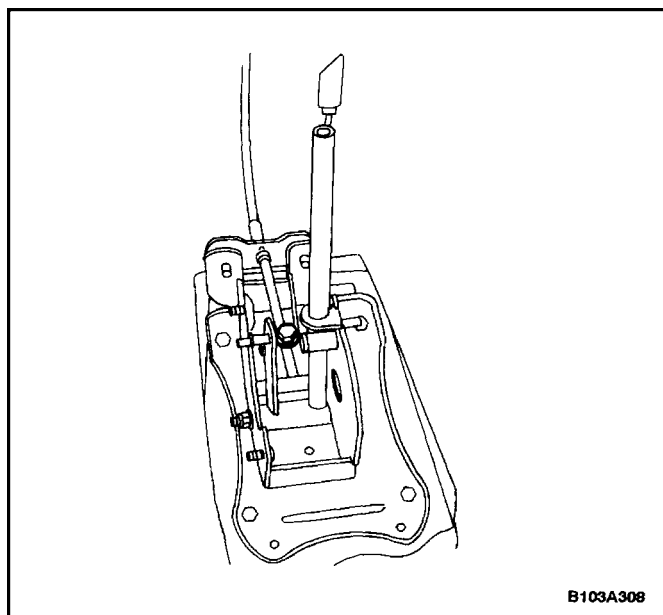
1. Drain the fluid from the transaxle and refill the transaxle with new transaxle fluid. Refer to "Fluid Drain Procedure" in this section.
2. Let the engine idle for 5 minutes.
3. Drain the fluid from the transaxle and refill the transaxle with new transaxle fluid. Refer to "Fluid Drain Procedure" in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



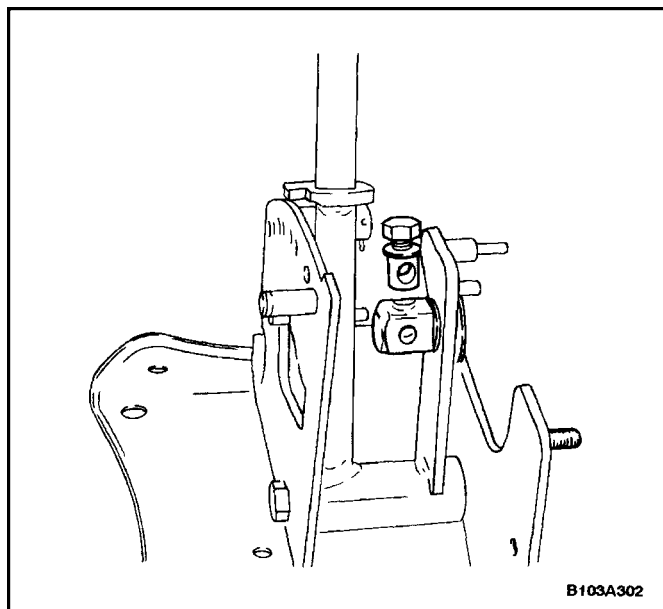
## SHIFT CONTROL LEVER

### Removal Procedure

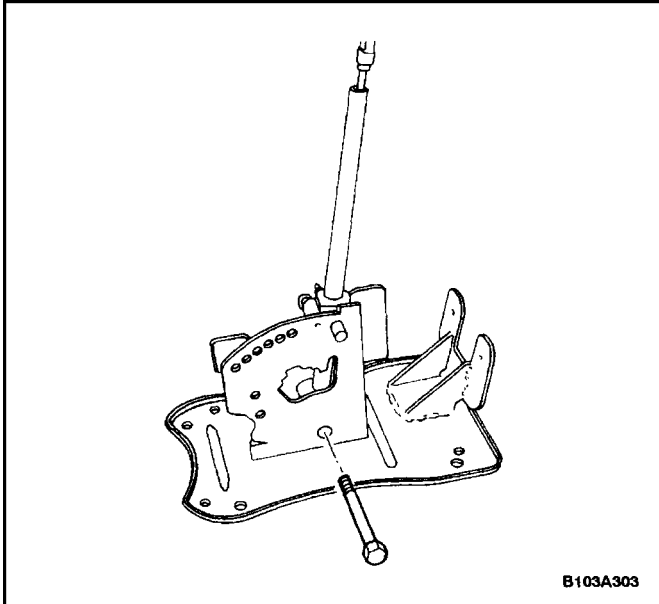
1. Disconnect the negative battery cable.
2. Remove the right and the left front lower trim panels, the shift control panel, and the floor console. Refer to *Section 9G, Interior Trim*.
3. Remove the transmission range (TR) switch.
4. Remove the nuts from the shift control cable mounting bracket at the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



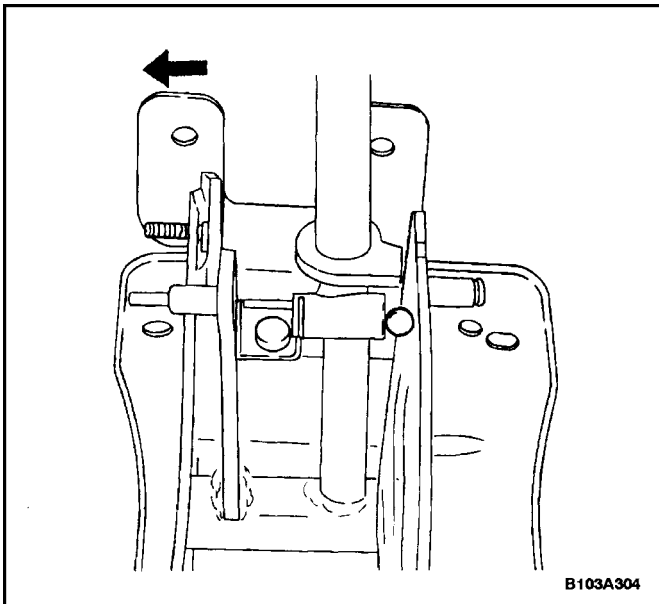
5. Loosen the nut on the shift control cable adjuster pinch bolt.



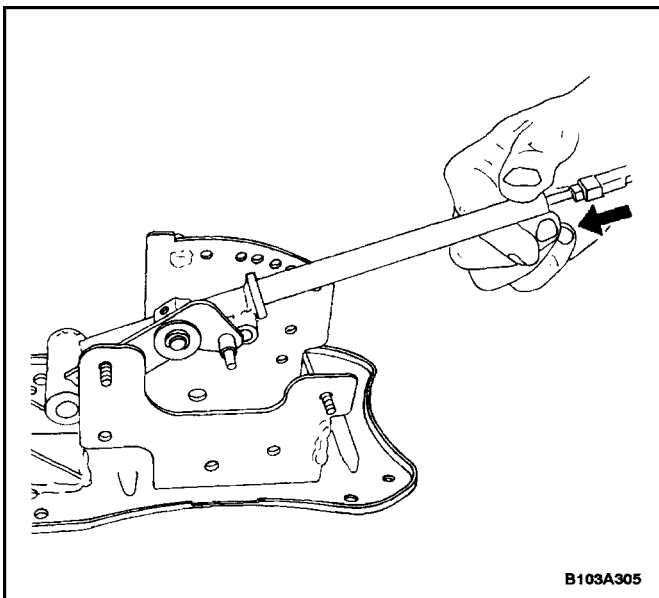
6. Slide the shift control cable out of the shift control cable adjuster and remove the pinch bolt.



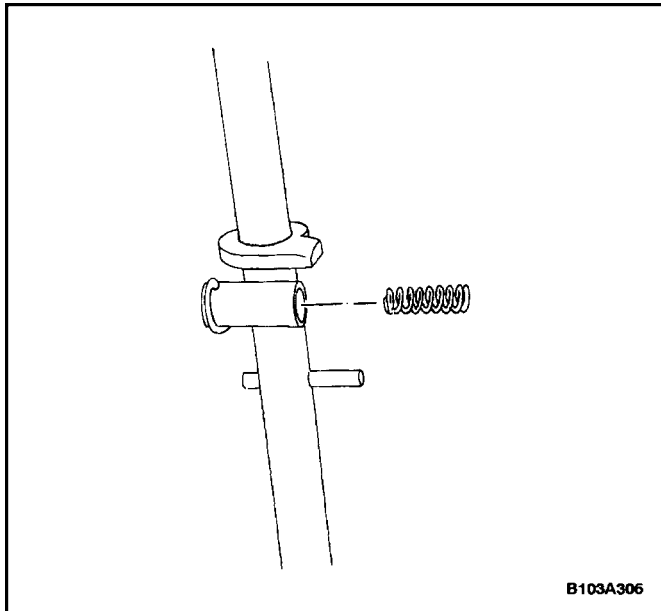
7. Remove the bolt from the bottom of the shift control lever.



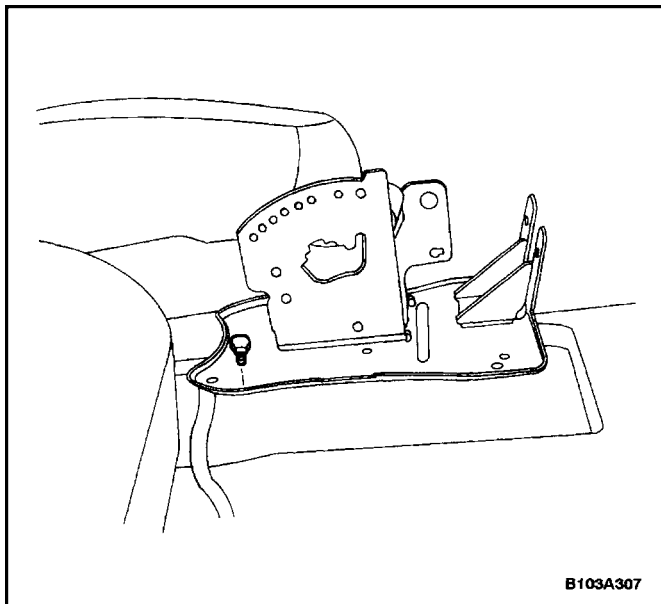
8. Tilt the shift control lever to the left side and remove the spring-loaded detent ball.



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.

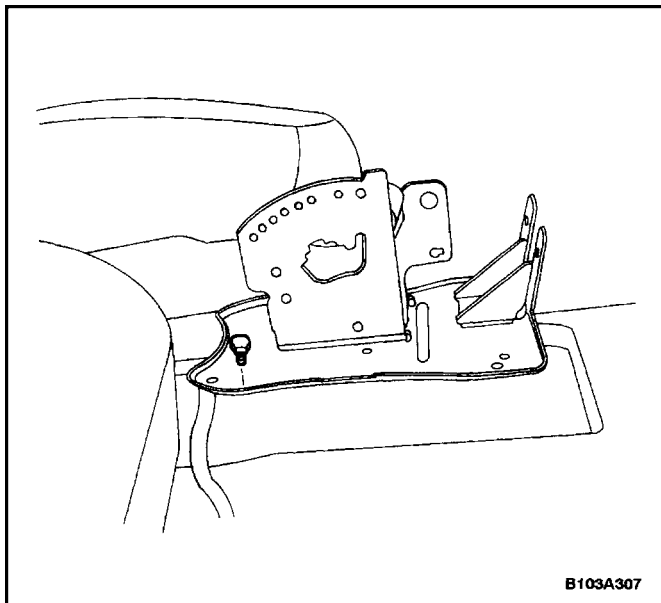


10. Slide the detent spring out of the shift control lever.



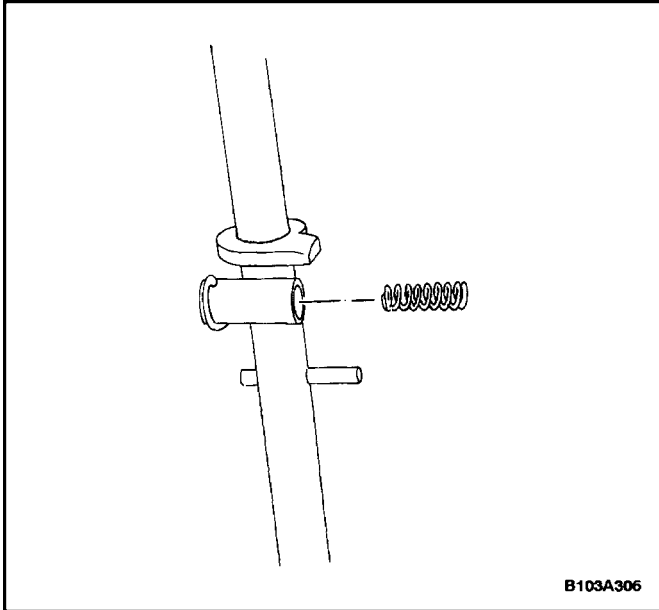
11. Remove the bolts holding the shift control assembly to the floor panel.

12. Remove the shift control assembly.

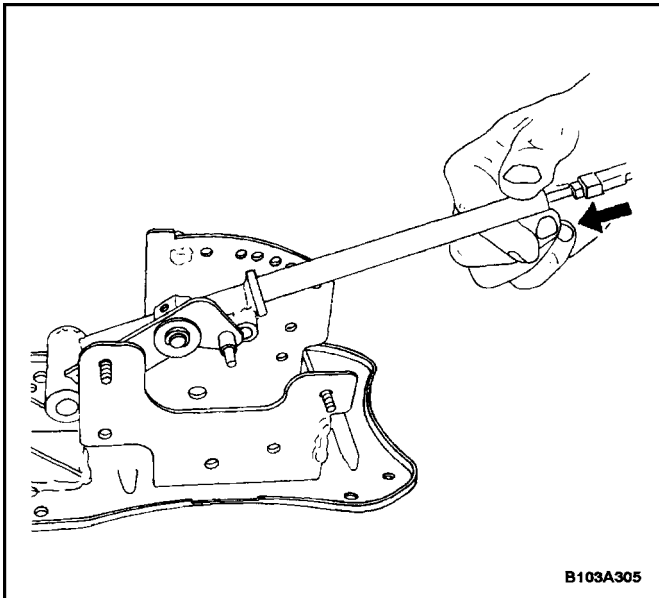


## Installation Procedure

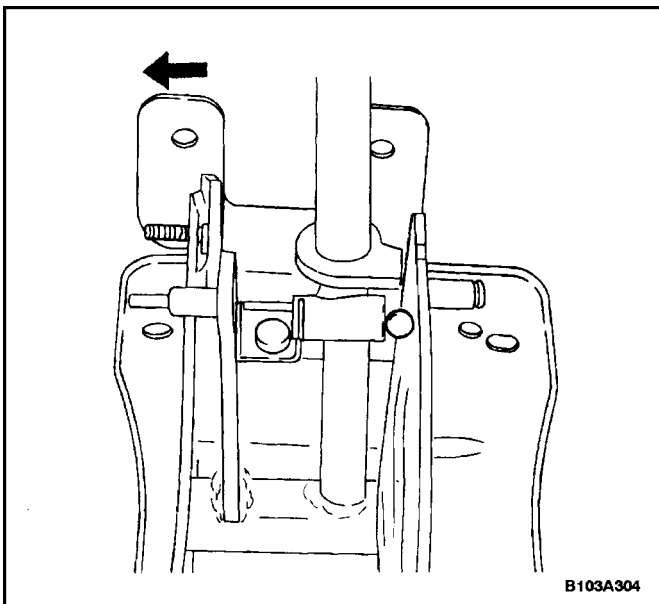
1. Install the shift control assembly in the floor panel with the bolts.



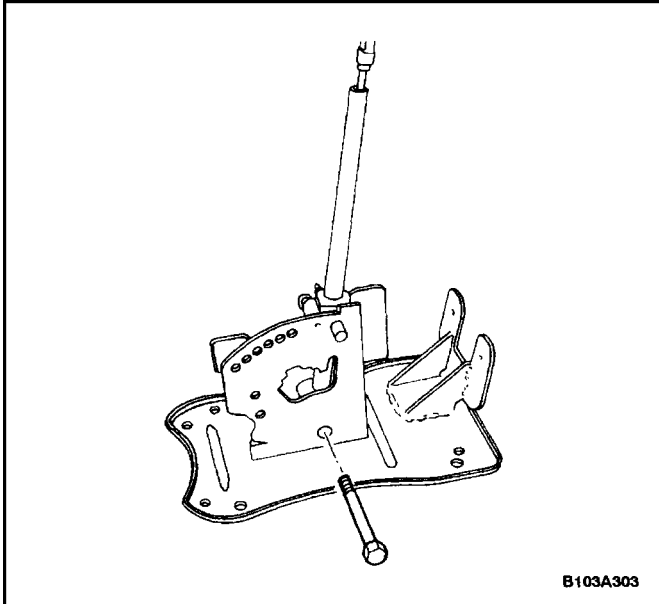
2. Install the detent spring into the shift control lever.



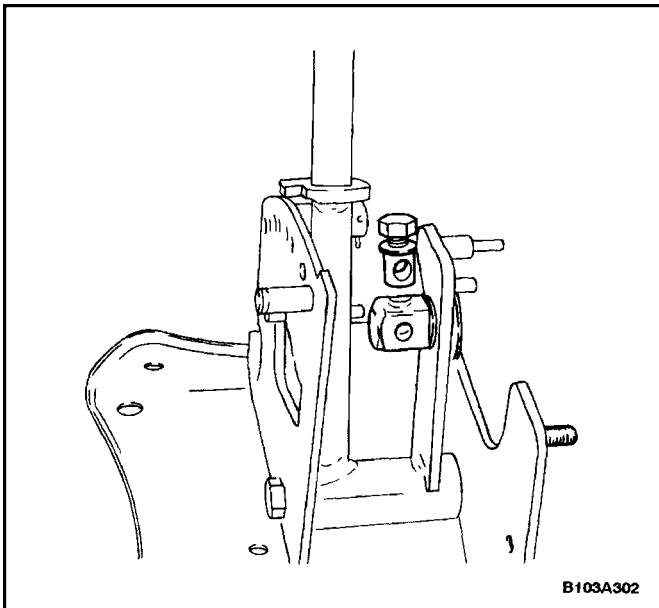
3. Install the shift control lever by pressing the lock release button while pivoting the bottom of the shift control lever toward the rear of the vehicle.



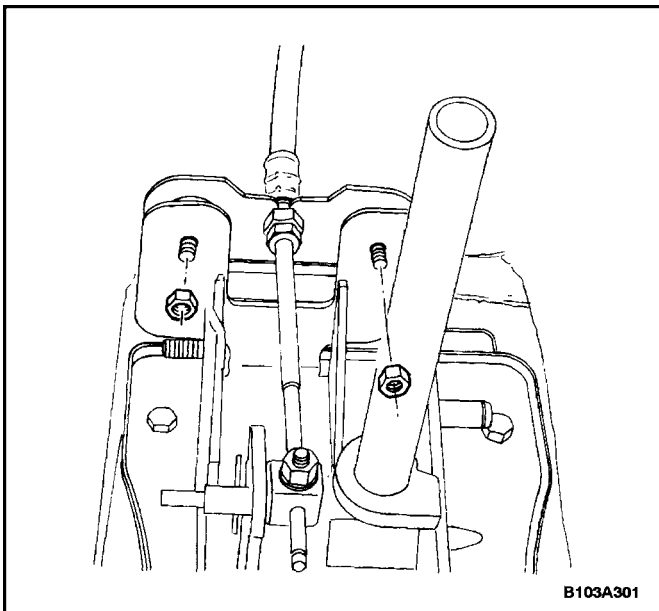
4. Tilt the shift control lever to the left and install the detent ball.



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



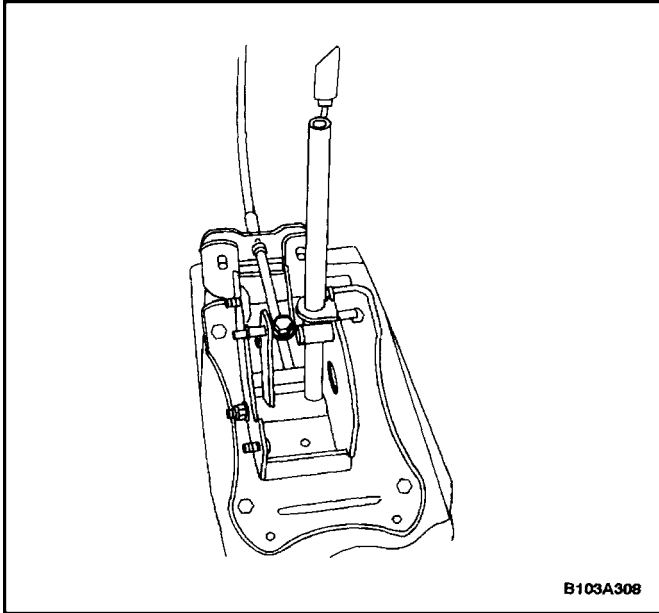
6. Insert the shift control cable adjuster pinch bolt into the shift control assembly and slide the shift control cable in to the shift control cable adjuster.



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

### **Tighten**

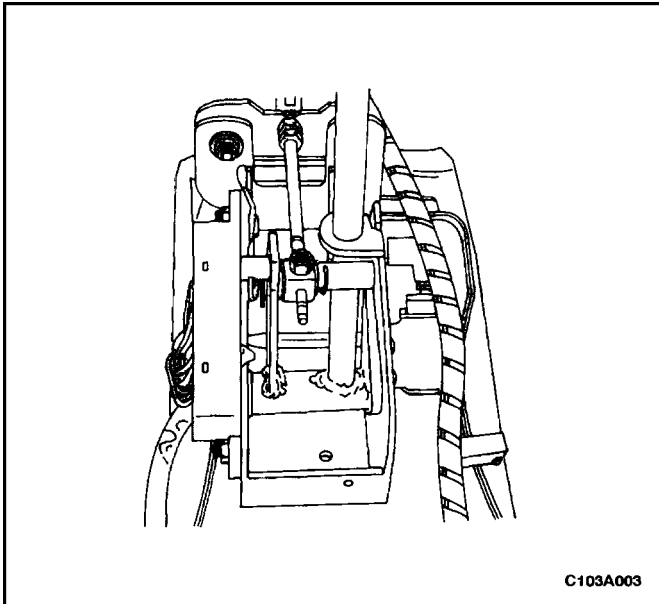
Tighten the shift control cable mounting bracket nuts to 53 lb-in (6 N•m).



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

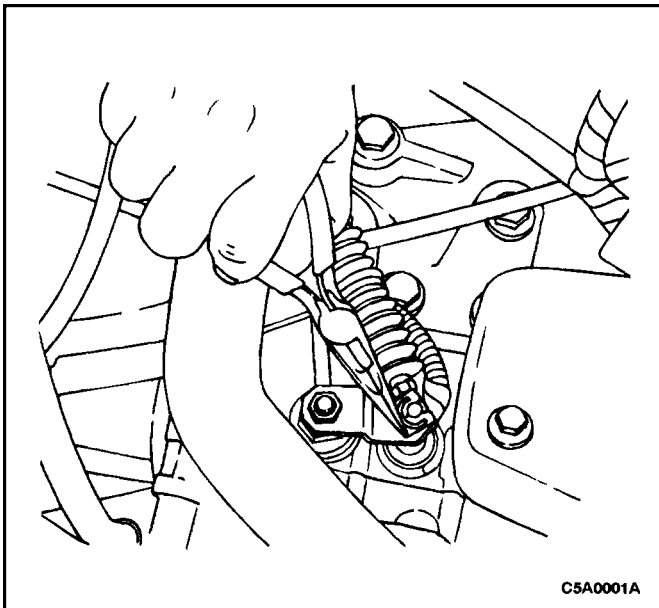
### Tighten

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



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

9. Install the TR 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.

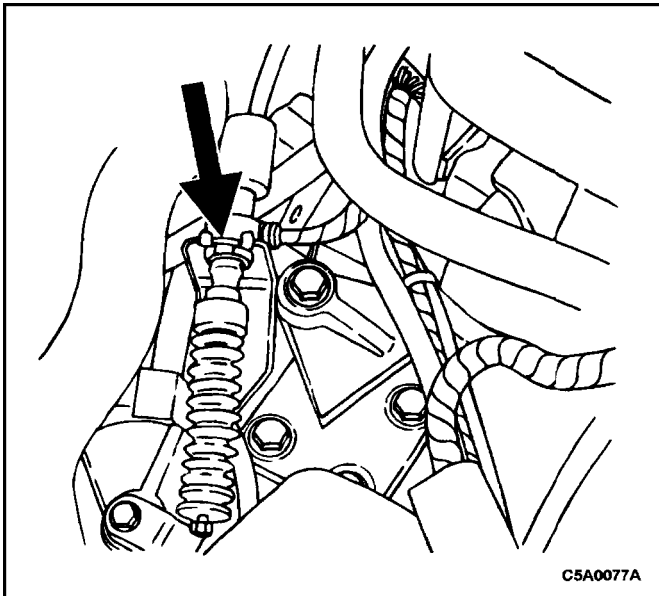


## SHIFT CONTROL CABLE

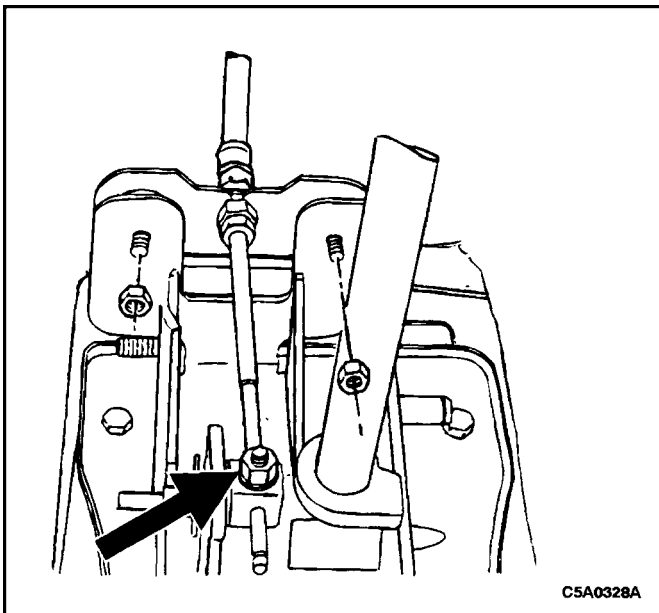
### Removal Procedure

1. Remove the battery and the battery tray. Refer to *Section 1E, Engine Electrical*.
2. Remove the retaining clip on the park/neutral position switch, (PNP switch).

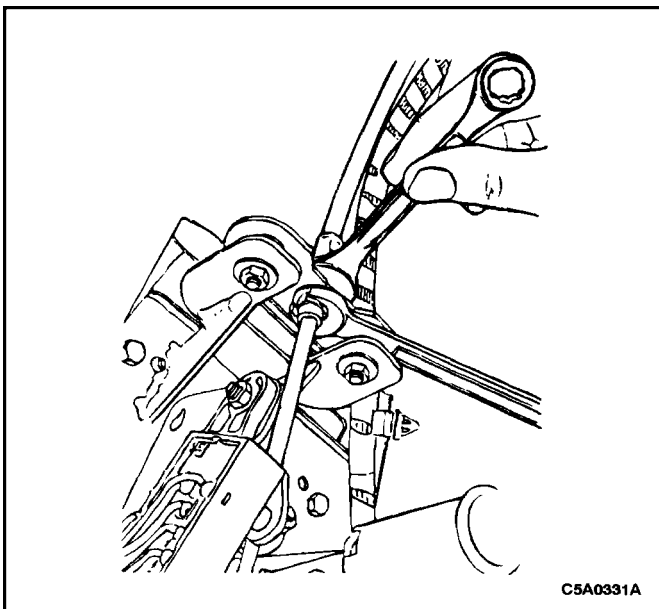




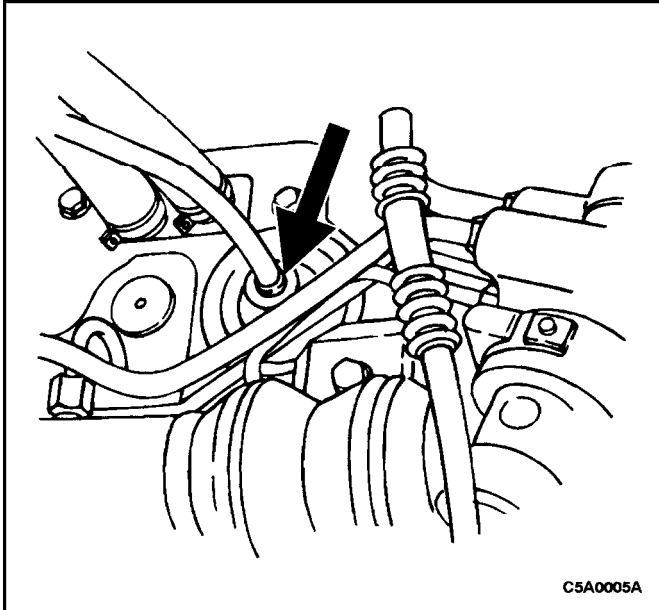
3. Remove the clip on the transaxle case bracket.
4. Remove the shift control cable from the transaxle case bracket.
5. Remove the trim panel from the floor console. Refer to *Section 9G, Interior Trim*.



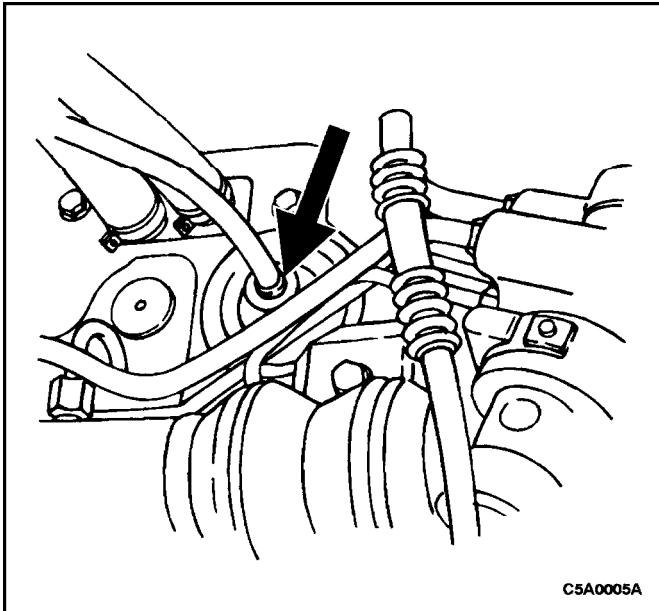
6. Loosen the pinch bolt on the shift control lever.



7. Remove the shift control cable from the shift control assembly by holding one nut with a wrench while loosening the other with a wrench.

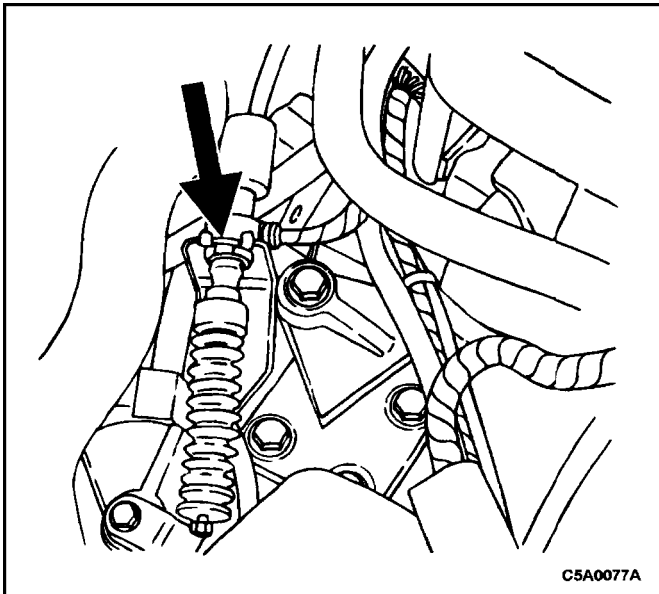


8. Pull the shift control cable through the firewall along with the grommet from beneath the vehicle.

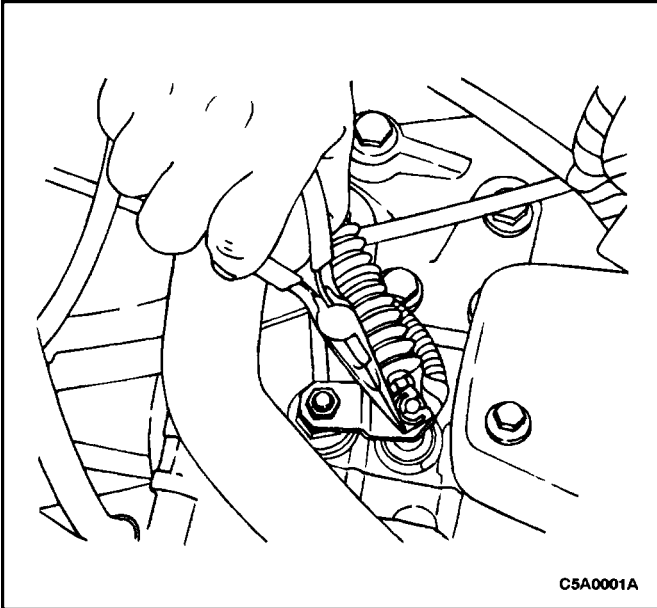


### Installation Procedure

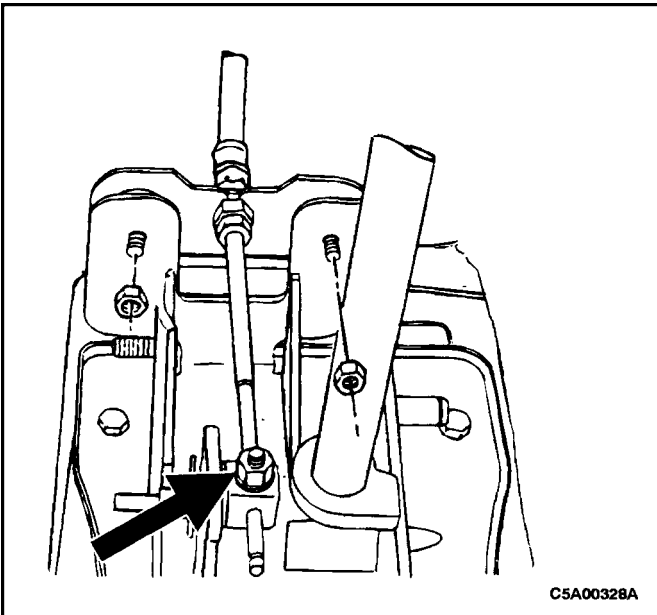
1. Push the shift control cable through the firewall into the passenger compartment. Seat the rubber grommet in the firewall. (Hint: use foaming glass cleaner to ease installation).
2. Move the transaxle shift lever to the park position, then install the shift control cable into the transaxle mount bracket.



3. Install the clip onto the shift control cable at the transaxle mount bracket.
4. Snap the shift control cable onto the transaxle shift control lever.



5. Install the retaining clip onto the transaxle shift control lever.



6. Move the shifter forward until it contacts the stop, then install the shift control cable at the selector in the vehicle.

#### **Tighten**

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

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

#### **Tighten**

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

8. Install the floor console trim panel. Refer to *Section 9G, Interior Trim*.
9. Install the battery tray and the battery. Refer to *Section 1E, Engine Electrical*.

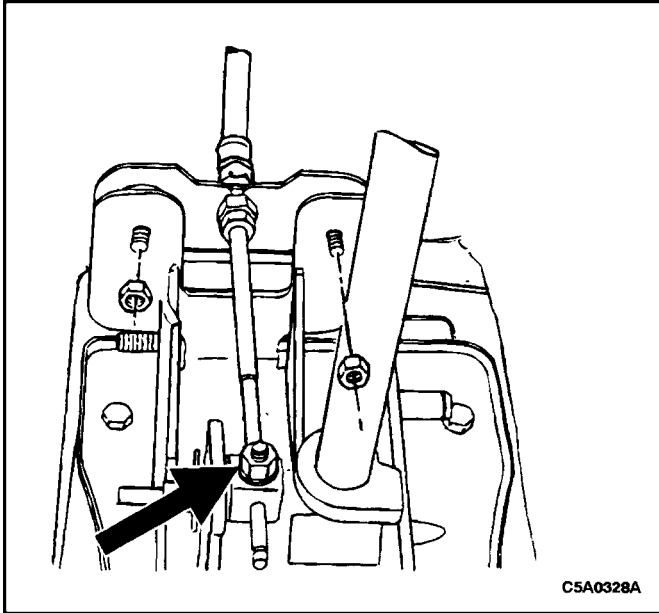
## **CONTROL CABLE ADJUSTMENT**

### **Adjustment Procedure**

The various shift control cable positions must match at the shift control lever in the vehicle and at the selector lever on the transaxle to provide proper transaxle shifting.

Place the shift control lever in the PARK position and check the selector lever connection to verify that it is in the forward most position. If it is not, the following adjustment must be performed:

1. Place the shift control lever in the PARK position.
2. Remove the trim panel from the floor console. Refer to *Section 9G, Interior Trim*.

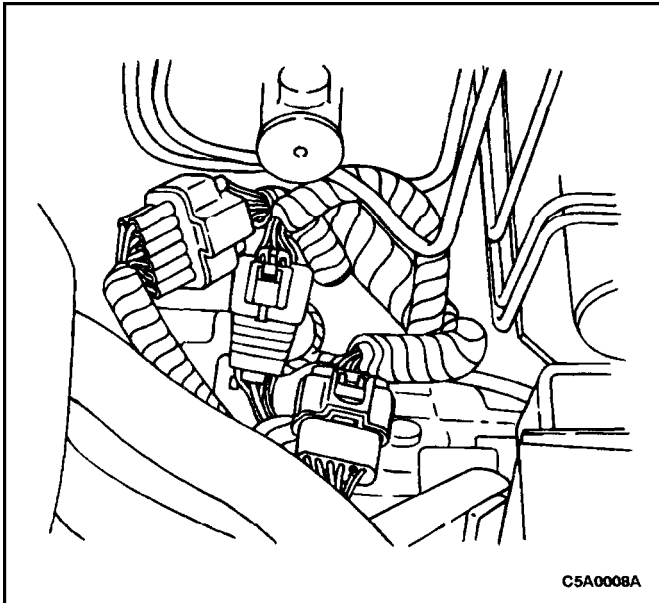


3. Loosen the pinch bolt nut on the shift control lever.
4. Move the transaxle shift lever forward toward the front of the vehicle.
5. Verify that the shifter is in the PARK position, then tighten the shift control cable adjuster pinch bolt and nut.

### Tighten

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

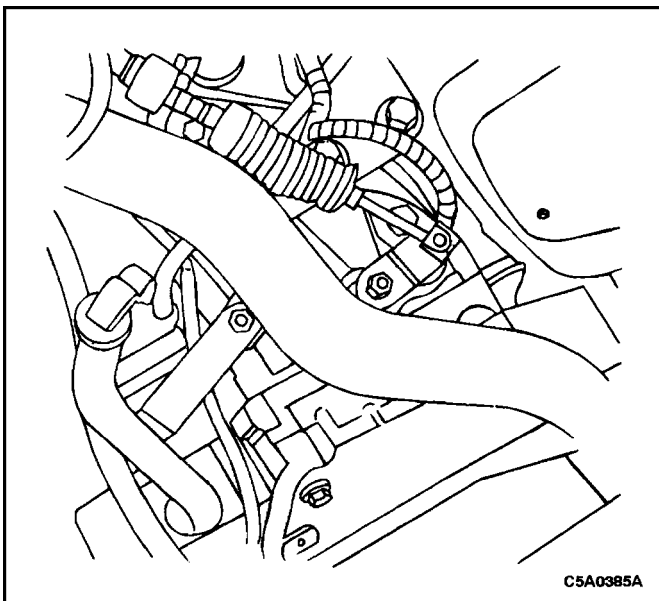
6. Install the floor console trim panel. Refer to *Section 9G, Interior Trim*.



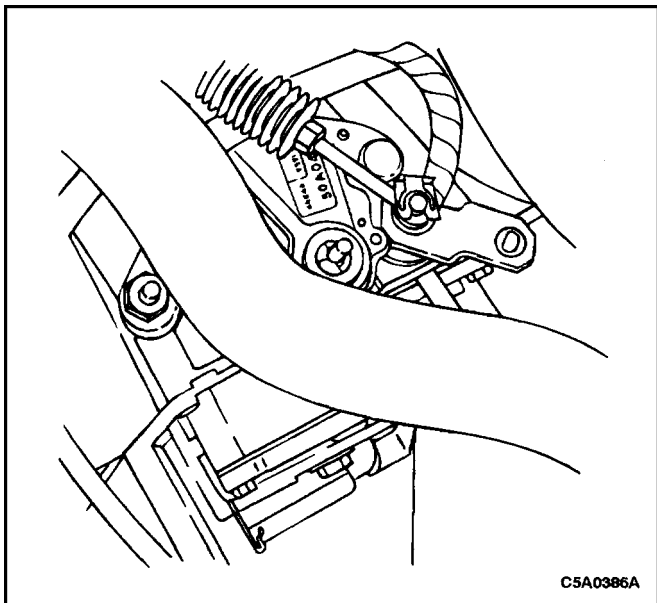
## PARK/NEUTRAL POSITION (PNP) SWITCH

### Removal Procedure

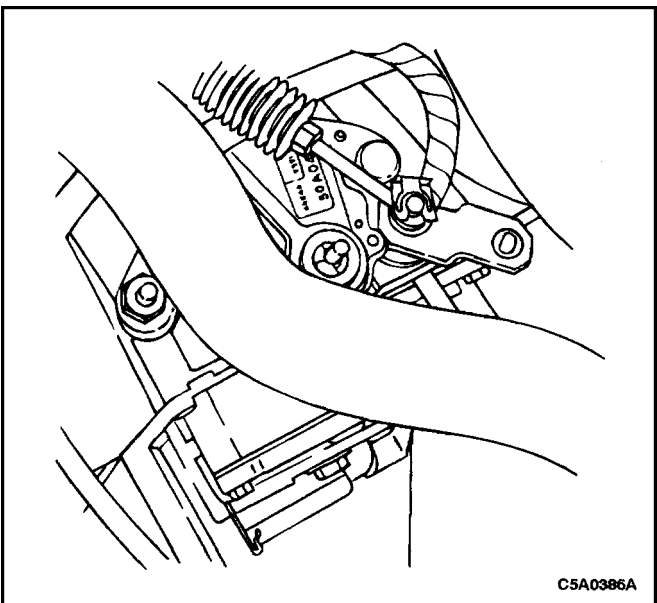
1. Remove the battery and battery tray. Refer to *Section 1E, Engine Electrical*.
2. Disconnect the park/neutral position (PNP) switch electrical connector from the wiring harness.



3. Remove the nut retaining the shift control cable linkage to the PNP switch and the nut retaining the fluid filler tube to the PNP switch stud bolt.



4. Remove the bolt, nut and washer and stud bolt retaining the PNP switch to the transaxle case, then remove the PNP switch.



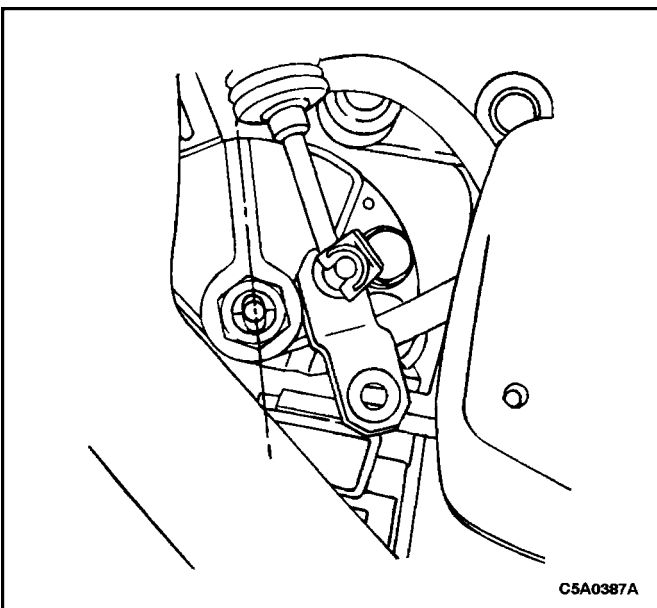
### Installation Procedure

1. Install the park/neutral position (PNP) switch, then install the stud bolt, bolt and nut and washer hand tight.

#### **Tighten**

Tighten the retaining nut to 53–71 lb–ft (6–8 N•m).

2. Place the shift control lever in the Neutral (N) position.

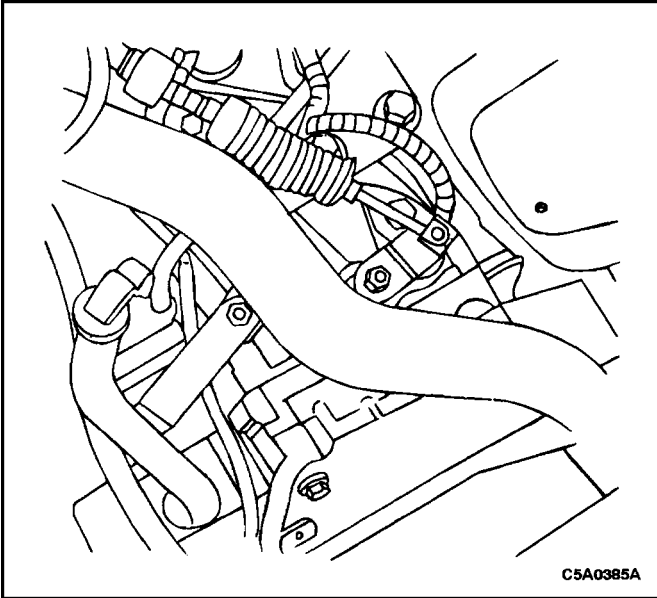


3. Align the neutral basic line on the PNP switch with the flat on the manual detent lever.

#### **Tighten**

Tighten the stud bolt to 14–22 lb–ft (20–29 N•m).

Tighten the bolt to 7–11 lb–ft (10–16 N•m).

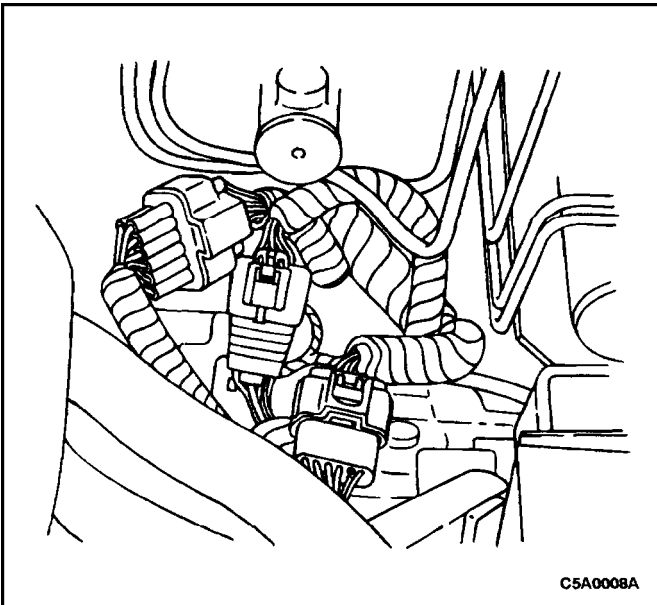


4. Position the fluid filler tube bracket on the stud bolt and the shift control cable linkage on the manual detent lever stud. Install the shift control cable linkage and fluid filler tube bracket retaining nuts.

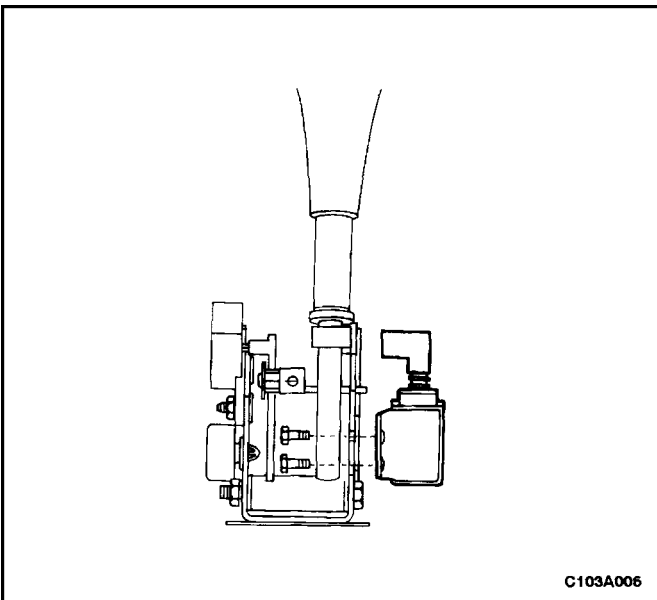
### **Tighten**

Tighten the shift control cable linkage retaining nut to 11 lb–ft (15 N•m).

Tighten the fluid filler tube bracket retaining nut to 11 lb–ft (15 N•m).



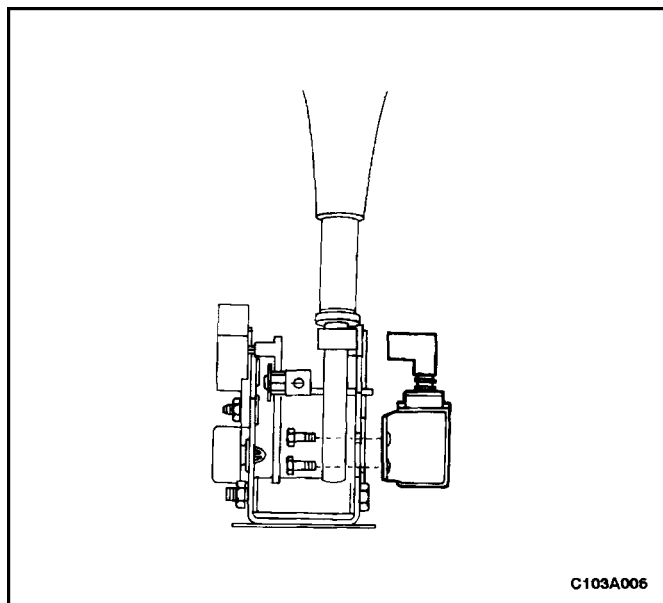
5. Connect the PNP switch electrical connector to the wiring harness.
6. Install the battery and battery tray. Refer to *Section 1E, Engine Electrical*.



## **BRAKE TRANSAXLE SHIFT INTERLOCK**

### **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 the shift interlock solenoid.



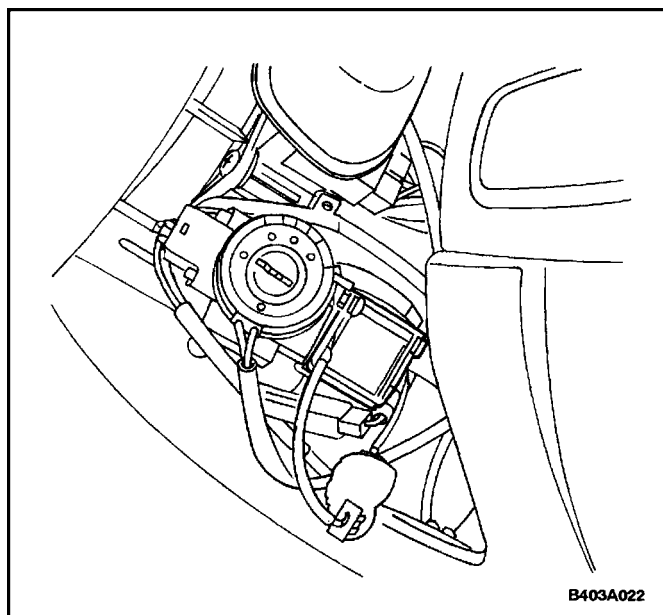
## Installation procedure

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

### Tighten

Tighten the shift interlock solenoid bolts to 35 lb-in (4 N•m).

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.



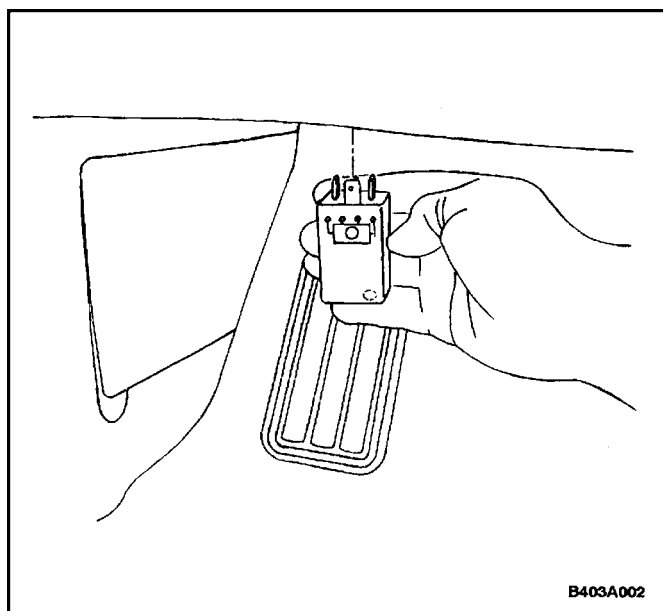
## KEY INTERLOCK

### Removal Procedure

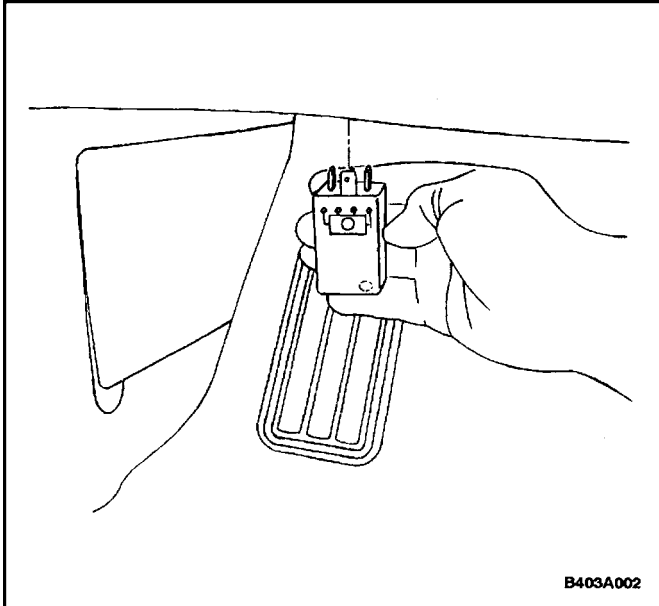
1. Disconnect the negative battery cable.
2. Remove the upper and the lower steering column cover panels. Refer to *Section 6E, Steering Wheel and Column*.

**Notice :** Be careful when removing the key interlock solenoid. There is a plunger with a spring attached that can become easily lost.

3. Disconnect the key interlock solenoid electrical connector and remove the key interlock solenoid screws and the key interlock solenoid.

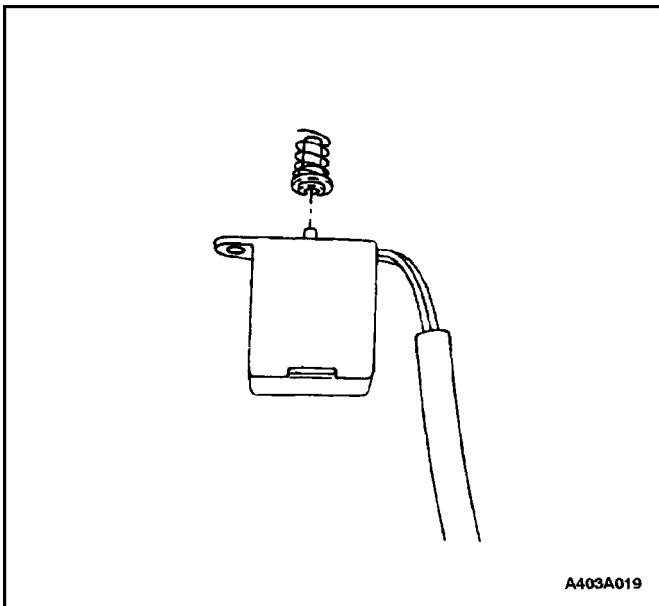


4. Remove the key interlock unit. It is located to the left of the steering column behind the driver knee bolster.

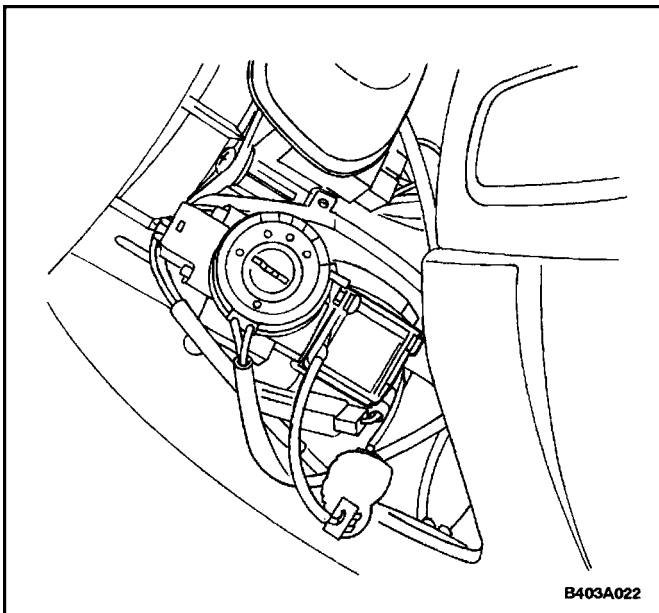


## Installation Procedure

1. Install the key interlock unit.



2. Place the spring and the plunger on the key interlock solenoid.



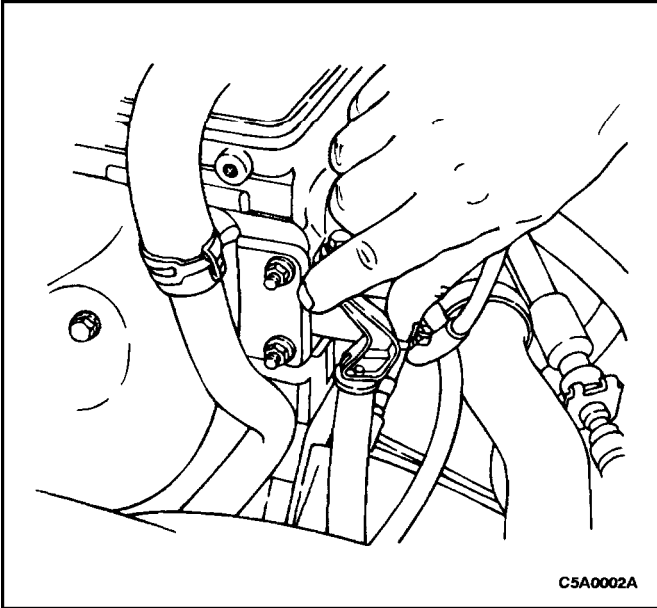
3. Install the key interlock solenoid and the solenoid screws.

### Tighten

Tighten the key interlock solenoid screws to 18 lb-in (2 N•m).

4. Install the upper and the lower steering column cover panels. Refer to *Section 6E, Steering Wheel and Column*.
5. Connect the negative battery cable.





## FLUID FILLER TUBE

### Removal Procedure

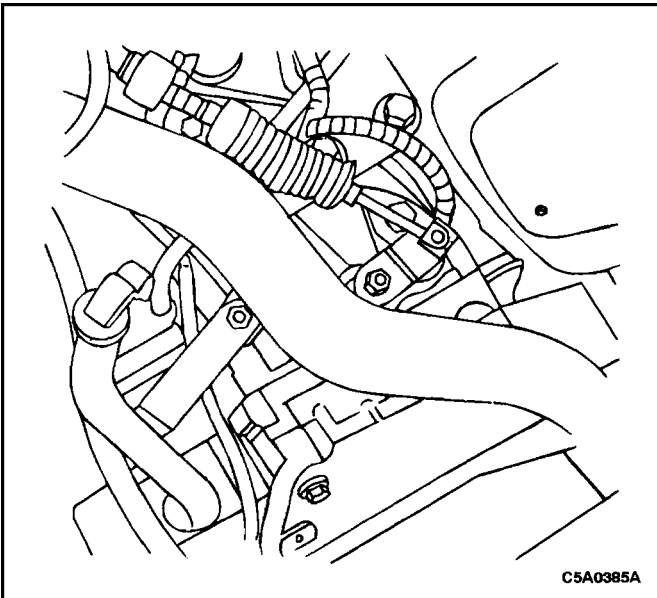
1. Remove the transaxle oil dipstick.
2. Remove the fluid filler tube nut from the park/neutral position (PNP) switch stud.
3. Grasp the body of the fluid filler tube, then pull it out of the transaxle case.

### Installation Procedure

1. Install a new O-ring on the fluid filler tube.
2. Lubricate the O-ring with Texaco 1854 automatic transmission fluid.
3. Install the fluid filler tube into the transaxle case.
4. Install the fluid filler tube nut on the stud on the PNP switch.

### Tighten

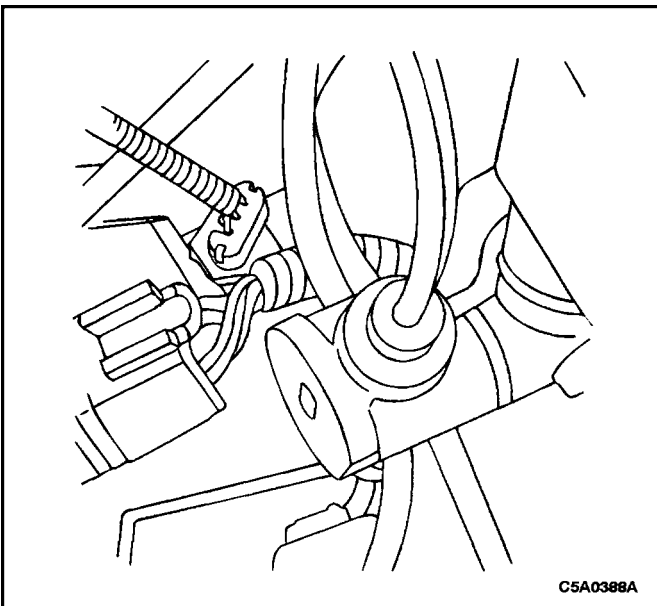
Tighten the fluid filler tube nut to 11 lb–ft (15 N•m).

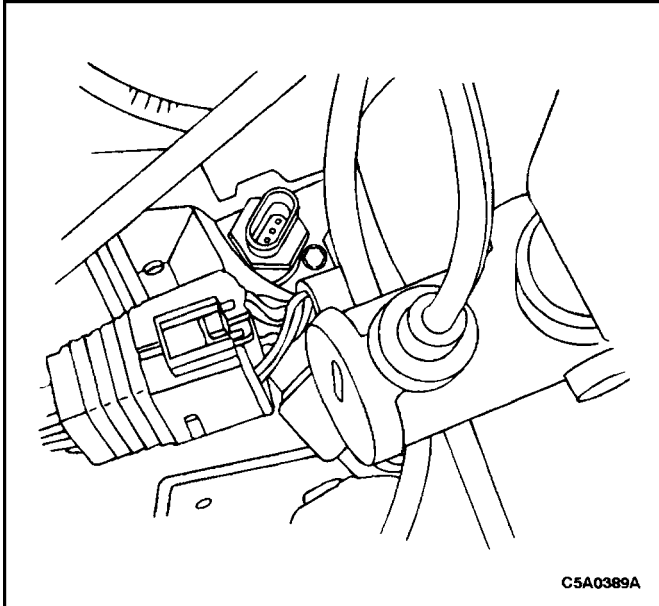


## VEHICLE SPEED SENSOR (VSS)

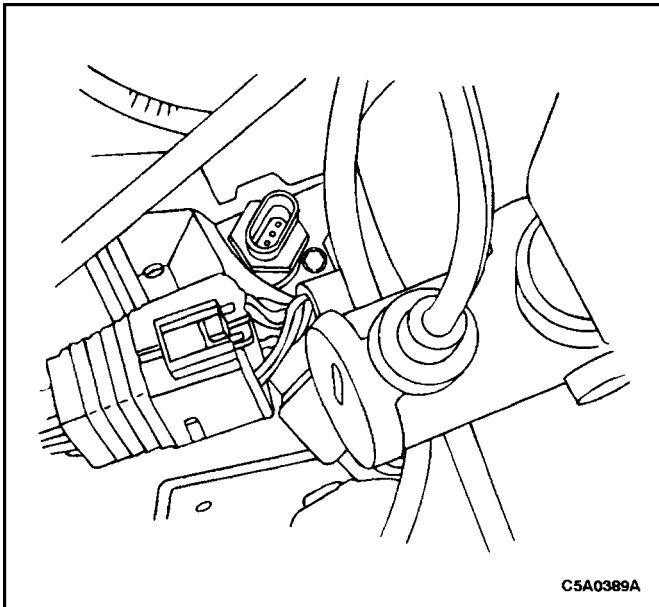
### Removal Procedure

1. Disconnect the negative battery cable.
2. Disconnect the vehicle speed sensor (VSS) electrical connector.





3. Remove the VSS retaining bolt, then the VSS.
4. Remove and discard the O-ring from the VSS.



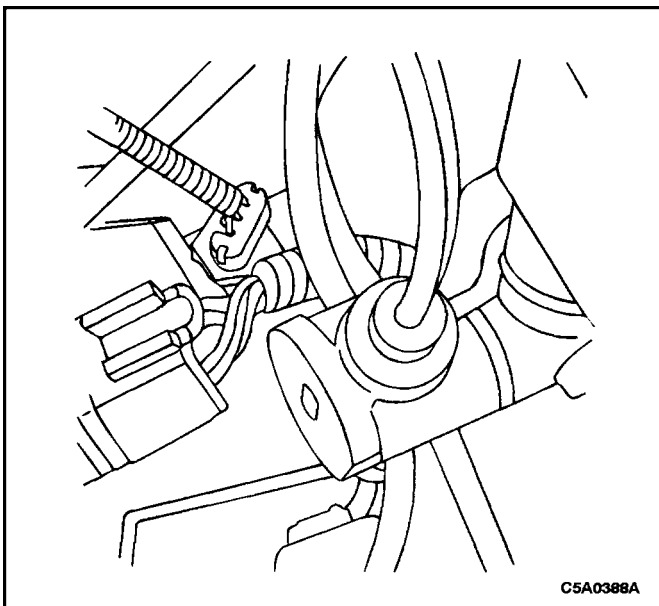
### Installation Procedure

**Notice :** Lubricate the O-ring with Texaco 1854 automatic transmission fluid.

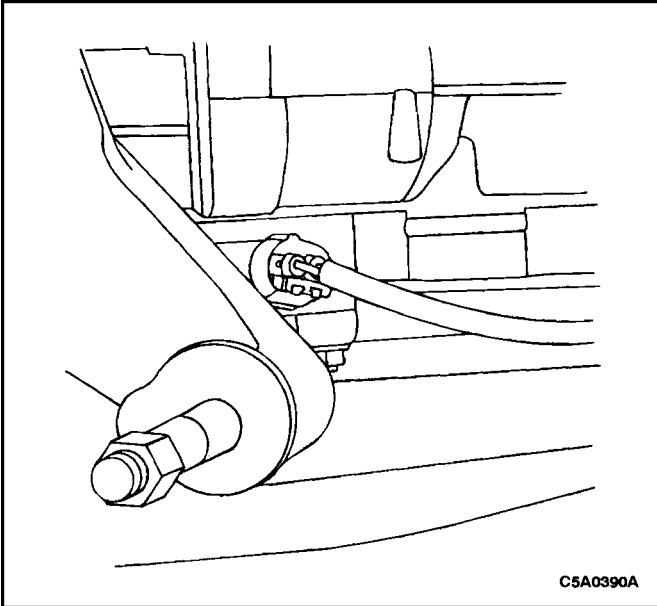
1. Install a new O-ring onto the vehicle speed sensor (VSS).
2. Install the VSS into the transaxle case, then install the retaining bolt.

#### **Tighten**

Tighten the retaining bolt to 35–62 lb-in (4–7 N•m).



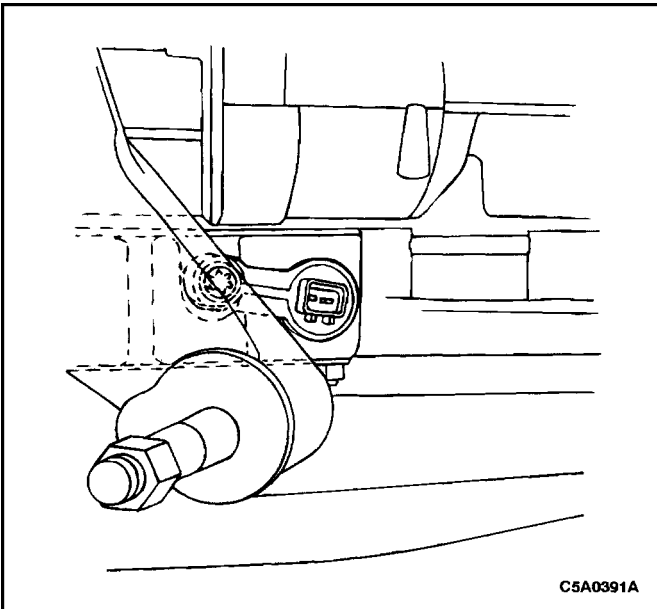
3. Connect the VSS electrical connector.
4. Connect the negative battery cable.



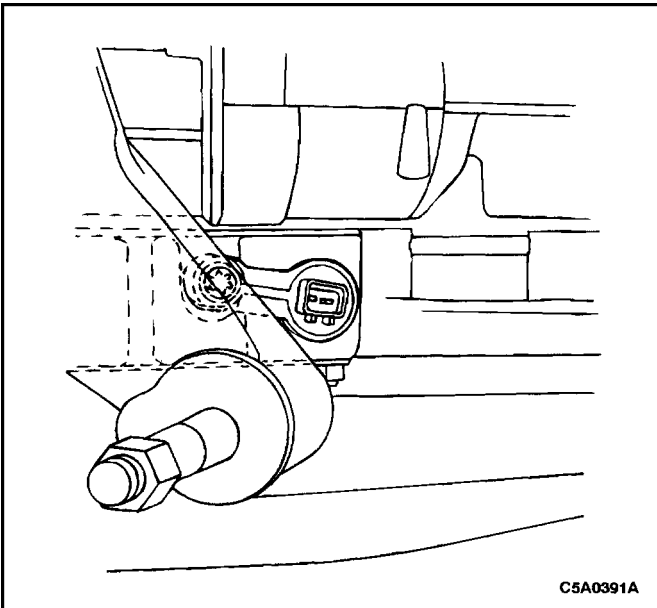
## INPUT SHAFT SPEED (ISS) SENSOR

### Removal Procedure

1. Remove the transaxle left bracket. Refer to "Transaxle Left Bracket" in this section.
2. Disconnect the input shaft speed (ISS) sensor electrical connector.



3. Using the appropriate Torx® fastener tool, remove the ISS sensor retaining bolt, then grasp the body of the ISS sensor and remove it from the transaxle.



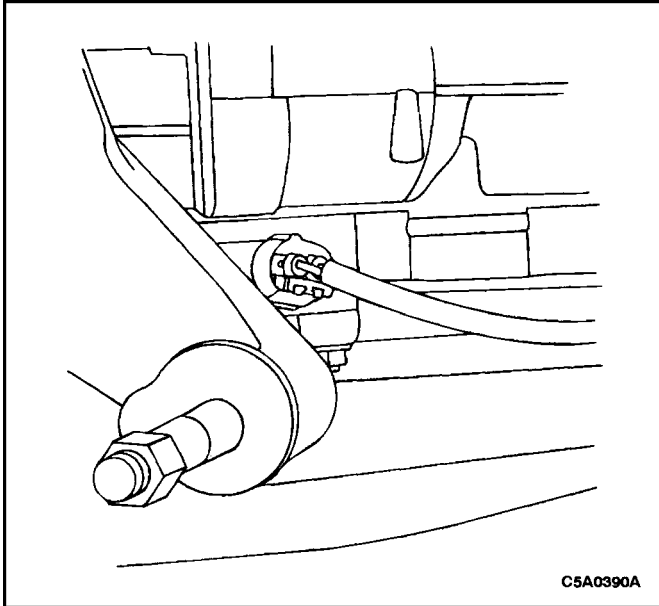
### Installation Procedure

**Notice :** Lubricate the O-ring with Texaco 1854 automatic transmission fluid.

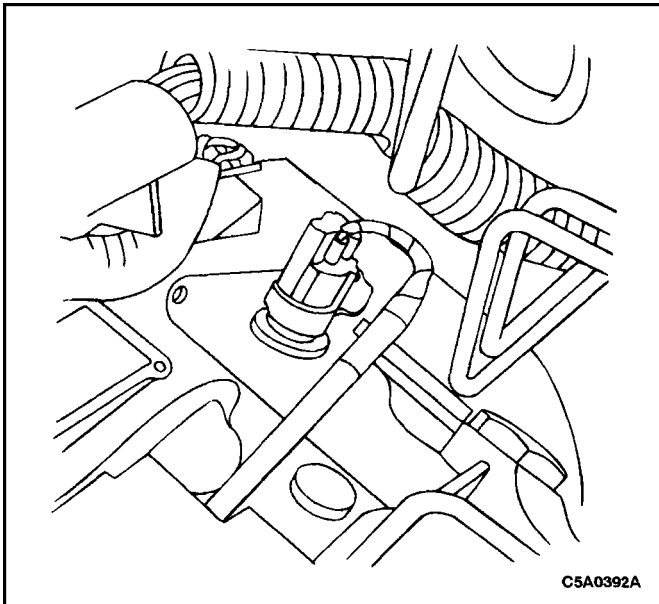
1. Install a new O-ring on the ISS sensor.
2. Install the ISS sensor and retaining bolt into the transaxle case.

#### **Tighten**

Tighten the ISS sensor retaining bolt to 35–62 lb-in (4–7 N•m).



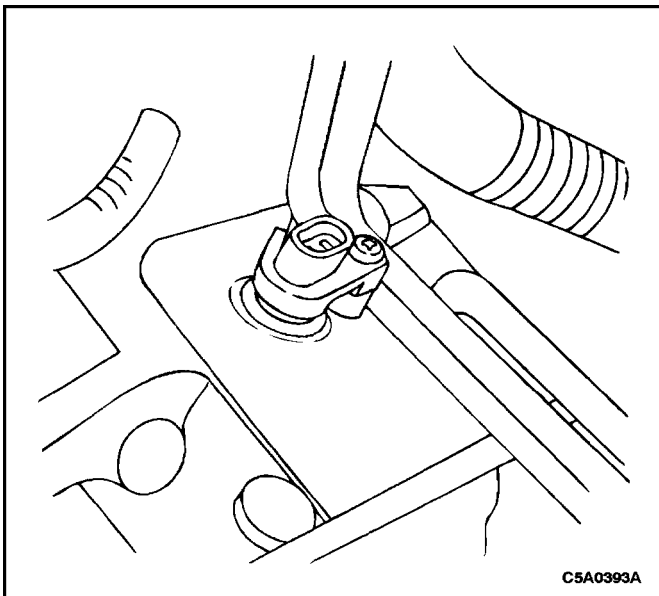
3. Connect the ISS sensor electrical connector.
4. Install the transaxle left bracket. Refer to "Transaxle Left Bracket" in this section.

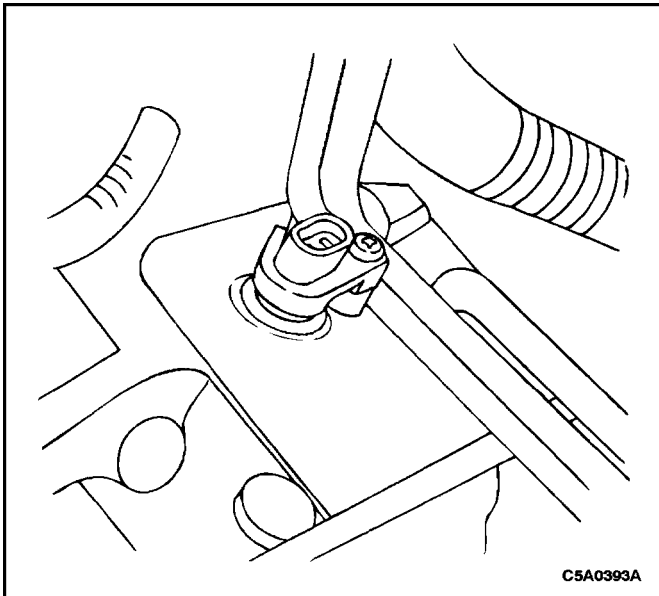


## OUTPUT SHAFT SPEED (OSS) SENSOR

### Removal Procedure

1. Disconnect the output shaft speed (OSS) sensor electrical connector.
2. Using the appropriate Torx® fastener tool, remove the OSS sensor retaining bolt, then grasp the body of the OSS sensor and remove it from the trans-axle.





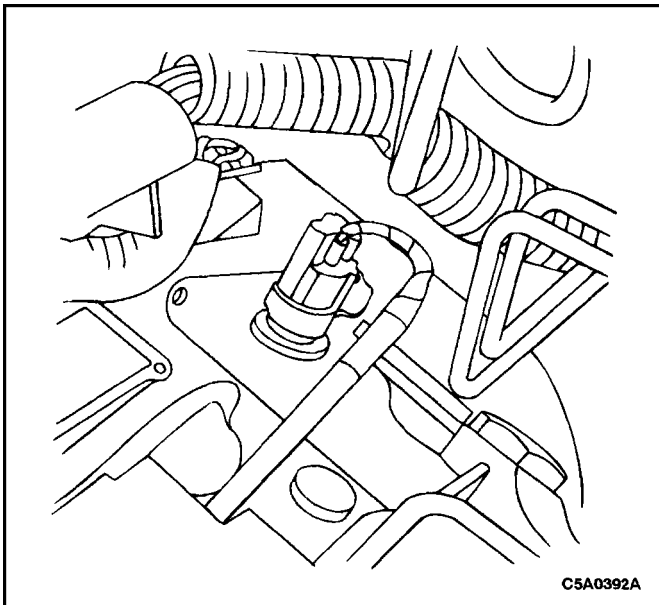
## Installation Procedure

**Notice :** Lubricate the O-ring with Texaco 1854 automatic transmission fluid.

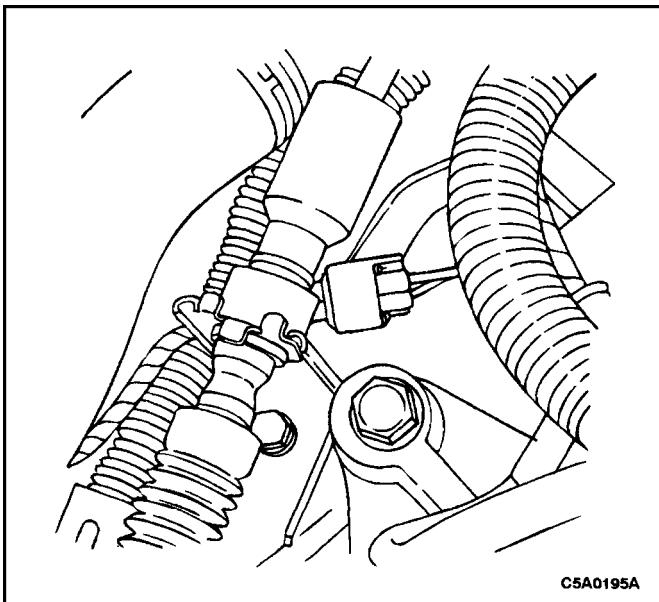
1. Install a new O-ring on the output shaft speed (OSS) sensor.
2. Install the OSS sensor and retaining bolt into the transaxle case.

### Tighten

Tighten the OSS sensor retaining bolt to 35–62 lb-in (4–7 N•m).



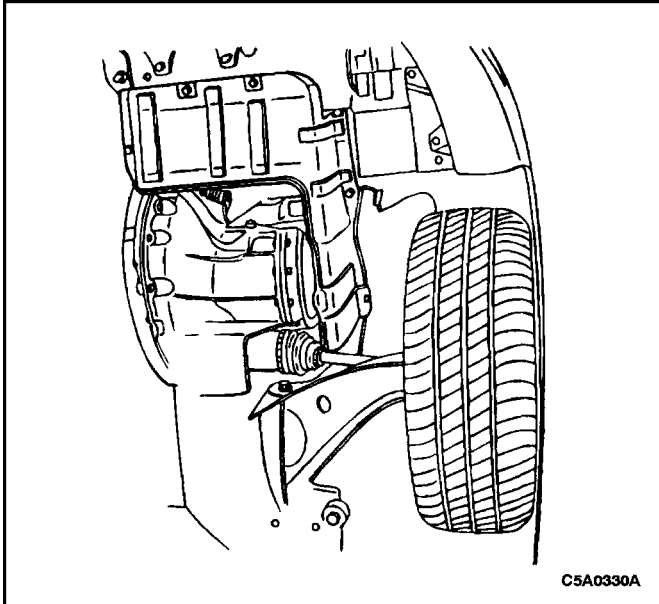
3. Connect the (OSS) sensor electrical connector.



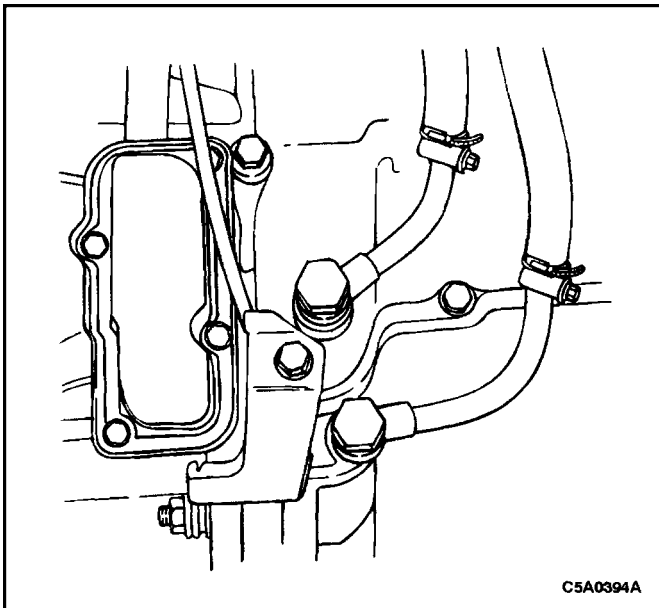
## TRANSMISSION FLUID TEMPERATURE (TFT) SENSOR

### Removal Procedure

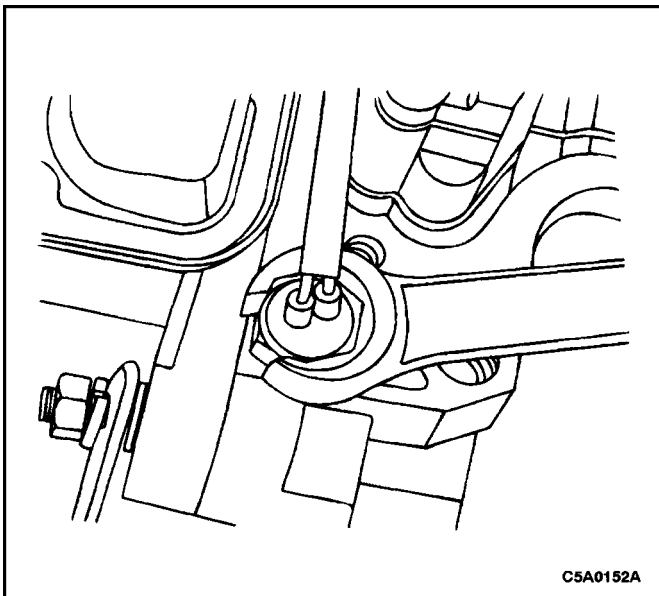
1. Disconnect the transmission fluid temperature (TFT) sensor electrical connector.
2. Raise and support the vehicle. Refer to *Section 0B, General Information*.
3. Drain the transaxle fluid. Refer to "Fluid Drain Procedure" in this section.



4. Remove the engine undercover.

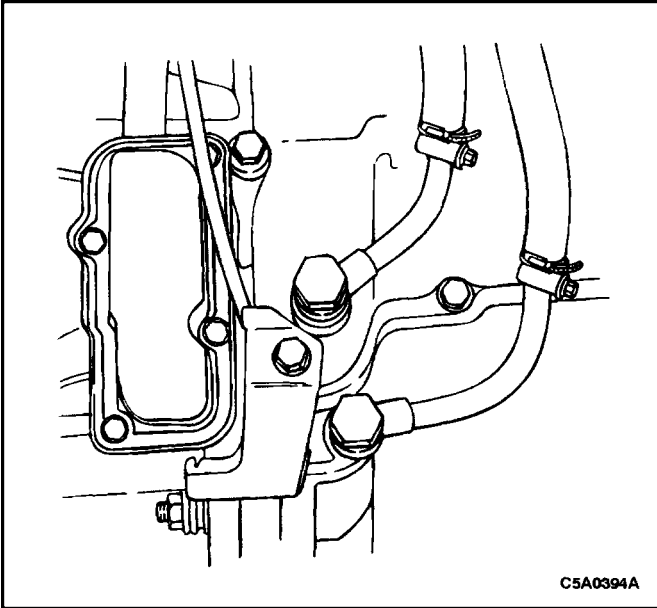


5. Remove the nut and bolt from the TFT sensor protector bracket, then remove the bracket.



**Notice :** Discard the TFT sensor O-ring.

6. Remove the TFT sensor.



## Installation Procedure

**Notice :** Lubricate the TFT sensor O-ring with Texaco 1854 automatic transmission fluid.

1. Install a new O-ring on the transmission fluid temperature (TFT) sensor.
2. Install the TFT into the transaxle case hand tight.

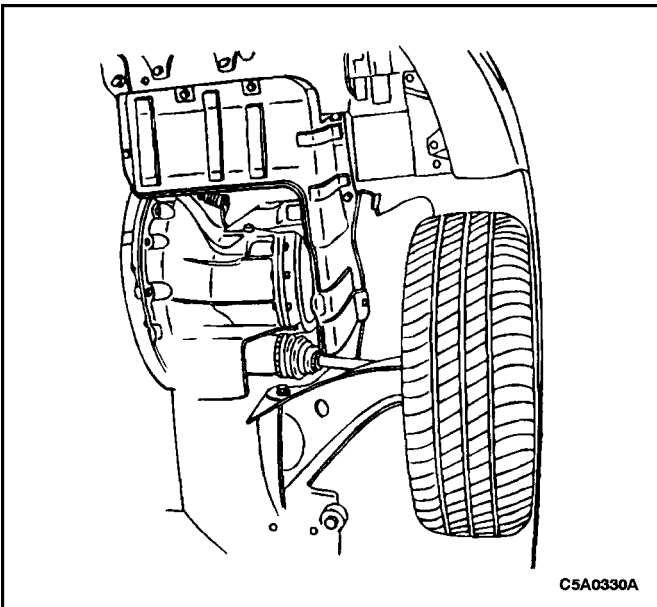
### Tighten

Tighten the TFT sensor to 62–115 lb-in (7–13 N•m).

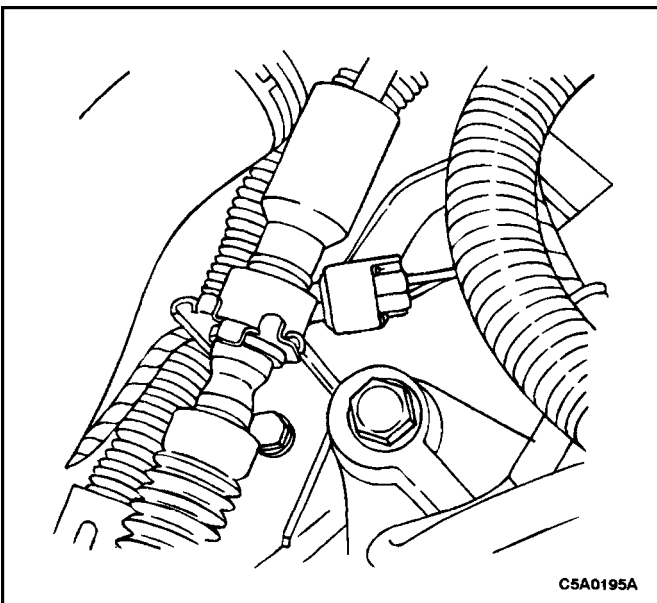
3. Install the TFT sensor protector and nut and bolt.

### Tighten

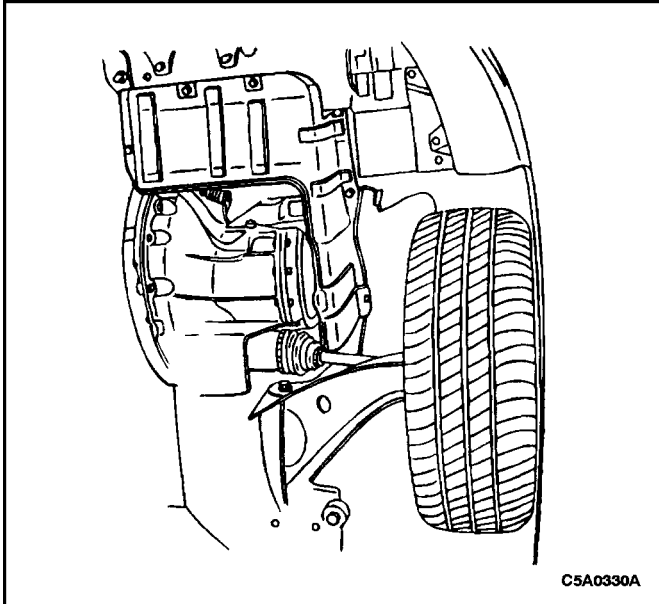
Tighten the nut and bolt to 15–22 lb-ft (20–29 N•m).



4. Install the engine undercover.
5. Lower the vehicle.



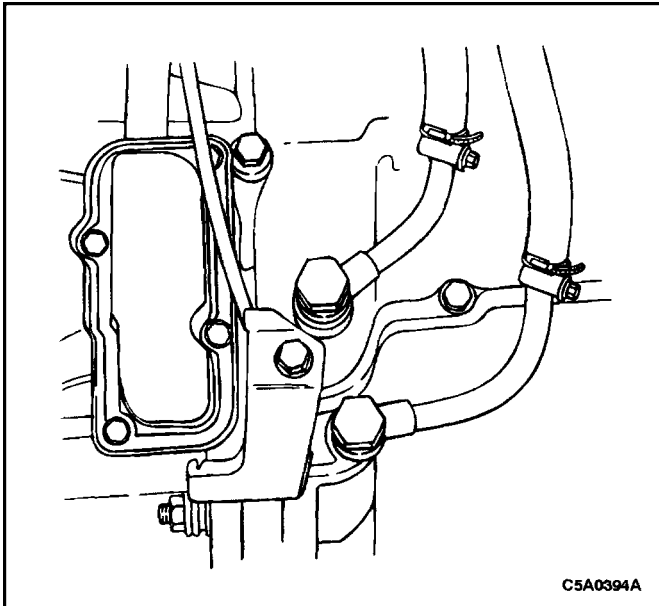
6. Connect the TFT sensor electrical connector.
7. Refill the transaxle. Refer to "Fluid Drain Procedure" in this section.



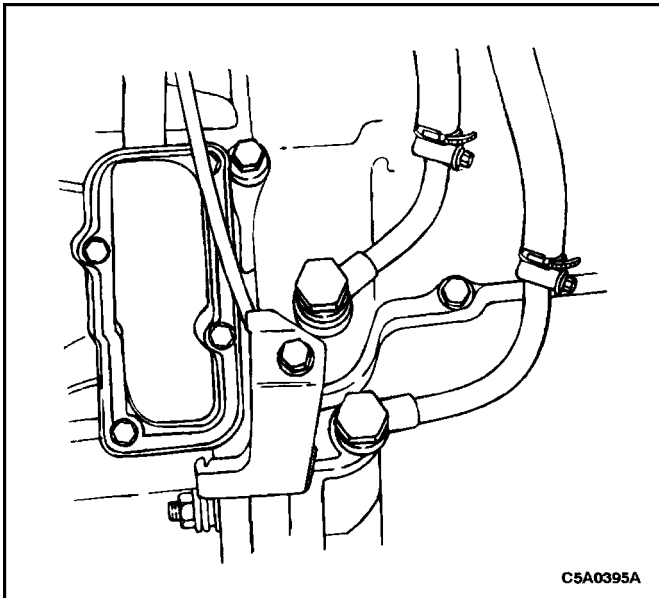
## VALVE BODY SOLENOIDS

### Removal Procedure

1. Disconnect the negative battery cable.
2. Raise and support the vehicle. Refer to *Section 0B, General Information*.
3. Drain the transaxle fluid. Refer to "Fluid Drain Procedure" in this section.
4. Remove the engine under cover.

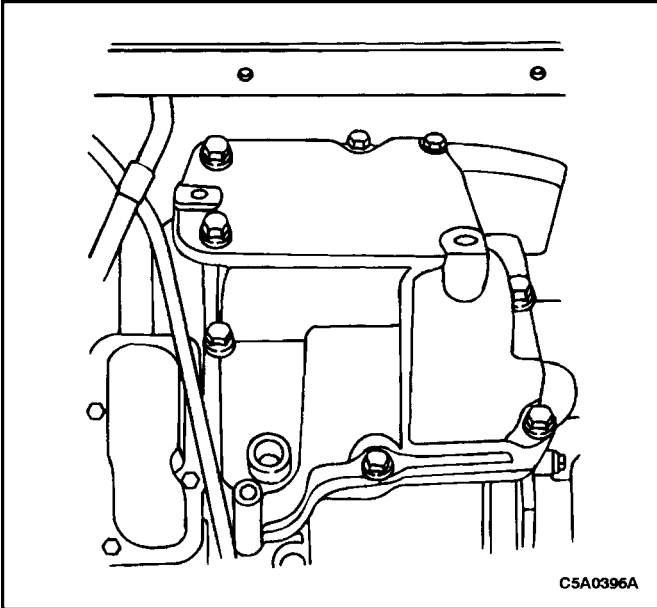


5. Remove the nut and bolt from the transmission fluid temperature (TFT) sensor protector bracket, then remove the bracket.

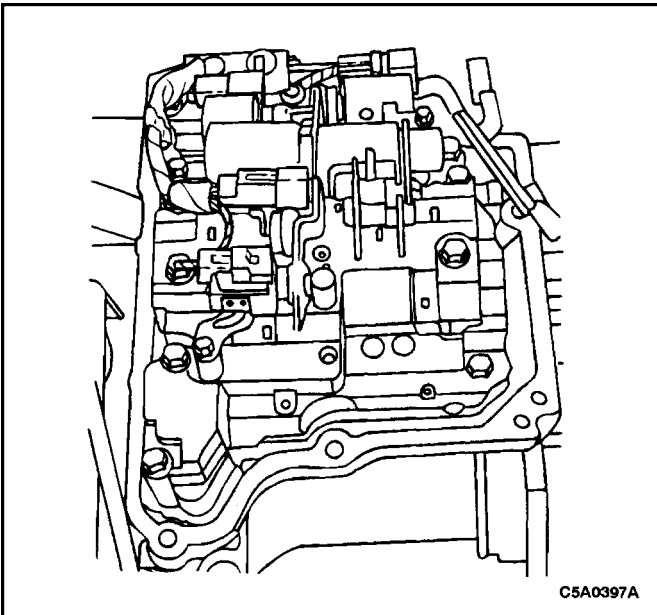


6. Disconnect the fluid cooler pipes at the valve body cover and allow the fluid to drain, then position the pipes aside.

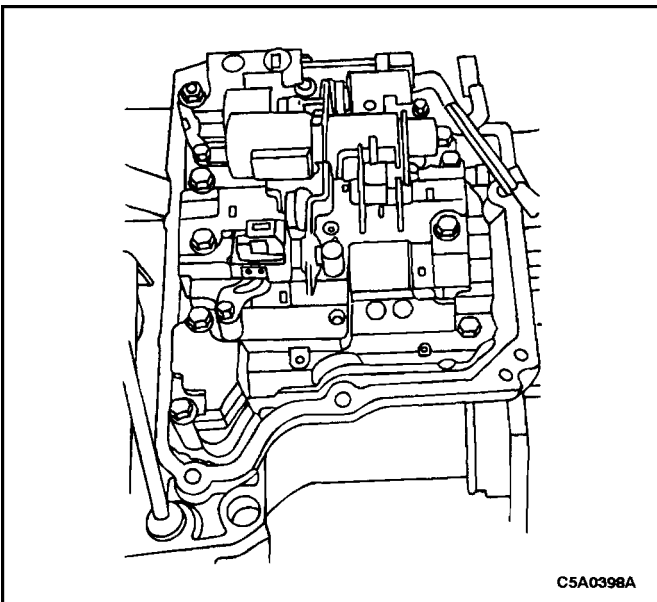




7. Remove the eight bolts from the valve body cover, then remove the cover.



8. Disconnect the electrical connectors from shift solenoid 1 (SS1), shift solenoid 2 (SS2), the pressure control solenoid (PCS) and the lockup solenoid.



**Notice :** Discard the SS1 O-ring.

9. Remove the retaining bolt, clamp and SS1.

**Notice :** Discard the SS2 O-ring.

10. Remove the retaining bolt and SS2.

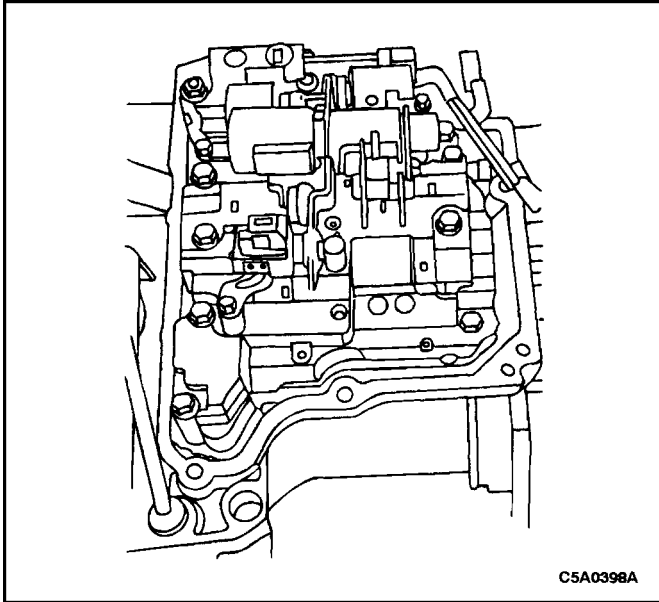
11. Remove the valve body bolt located to the left of the linear solenoid.

**Notice :** Discard the linear solenoid O-ring.

12. Remove the retaining bolt and the linear solenoid.

**Notice :** Discard the lockup solenoid O-ring.

13. Remove the retaining bolt and the lockup solenoid.



## Installation Procedure

**Notice :** Lubricate the SS1, SS2, linear solenoid and lock-up solenoid O-rings with Texaco 1854 automatic transmission fluid..

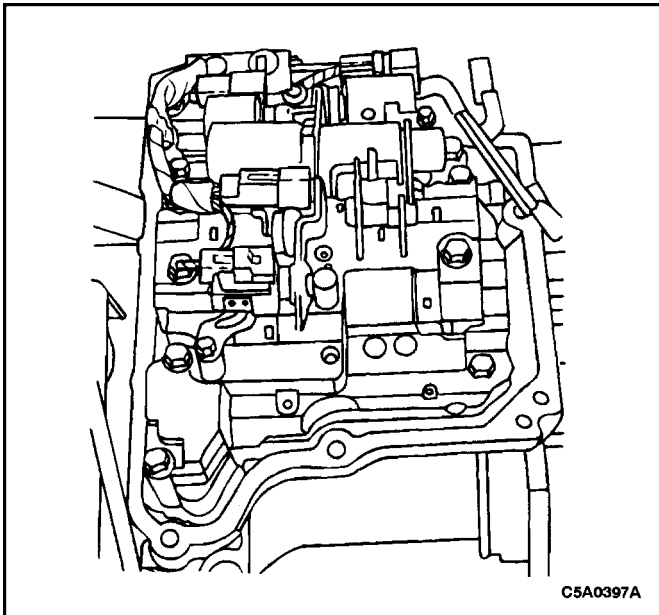
1. Install new O-rings on shift solenoid 1 (SS1), shift solenoid 2 (SS2), the linear solenoid and the lockup solenoid.
2. Install SS1, SS2, the linear solenoid and the lockup solenoid into the valve body, then install the solenoid retaining bolts and clamp and the valve body bolt.

### Tighten

Tighten the SS1, SS2, the linear and the lockup solenoid retaining bolts to 53–62 lb-in (6–7 N•m).

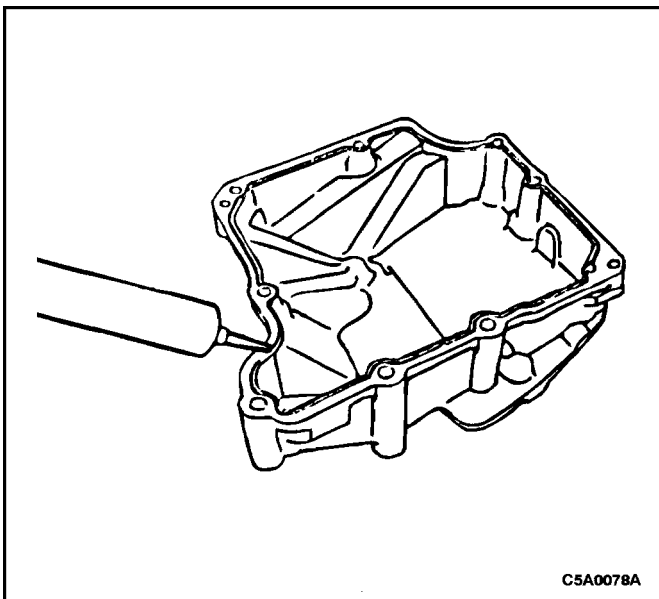
Tighten the valve body bolt to 53–62 lb-in (6–7 N•m).

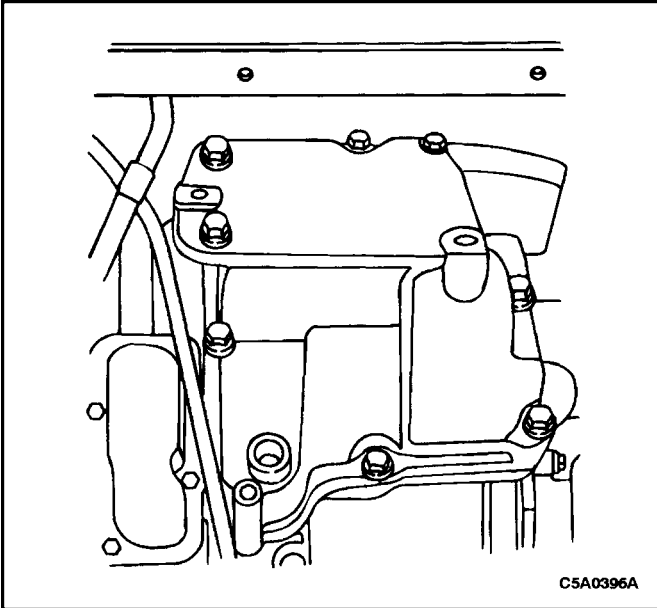
3. Connect the SS1, SS2, the linear and the lockup solenoid electrical connectors.



**Notice :** Remove the old gasket material from the valve body cover and mating surface of the transaxle.

4. Apply a bead of silicone sealant on the valve body cover.

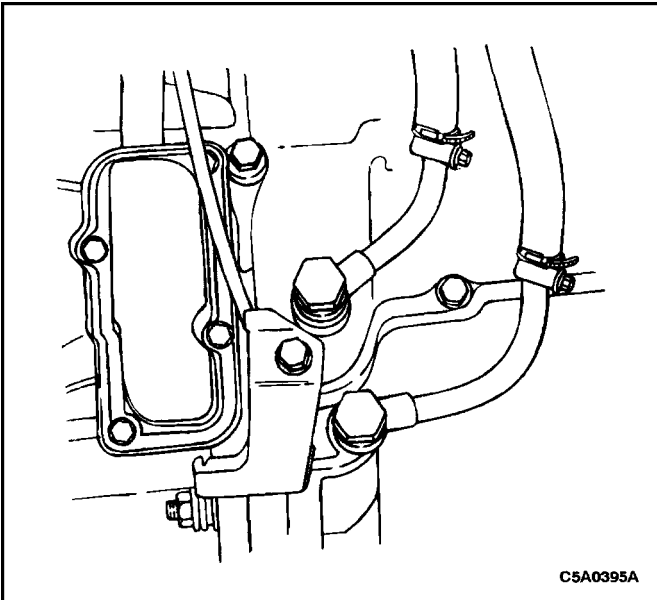




5. Install the valve body cover and the eight bolts.

**Tighten**

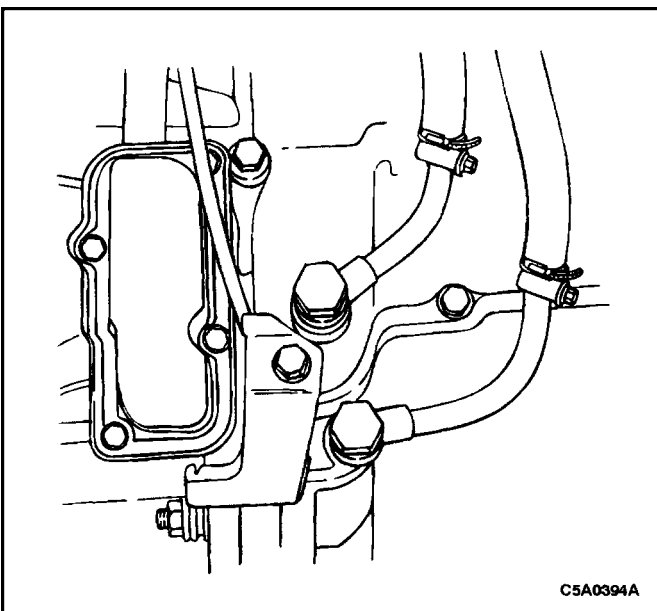
Tighten the valve body cover bolts to 14–22 lb–ft (20–30 N•m).



6. Connect the fluid cooler pipes at the valve body cover.

**Tighten**

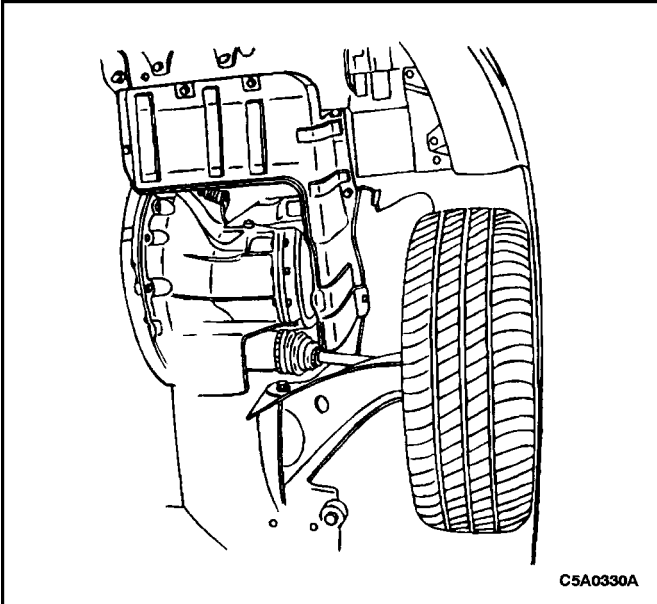
Tighten the fluid cooler pipe bolts to 35 N•m (26 lb–ft).



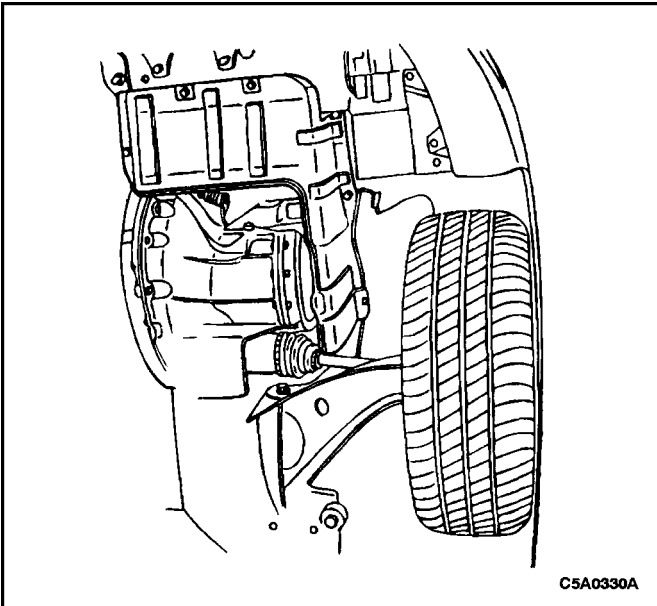
7. Position the transmission fluid temperature (TFT) sensor protector bracket, then install the nut and bolt.

**Tighten**

Tighten the TFT sensor protector bracket nut and bolt to 15–22 lb–ft (20–29 N•m).



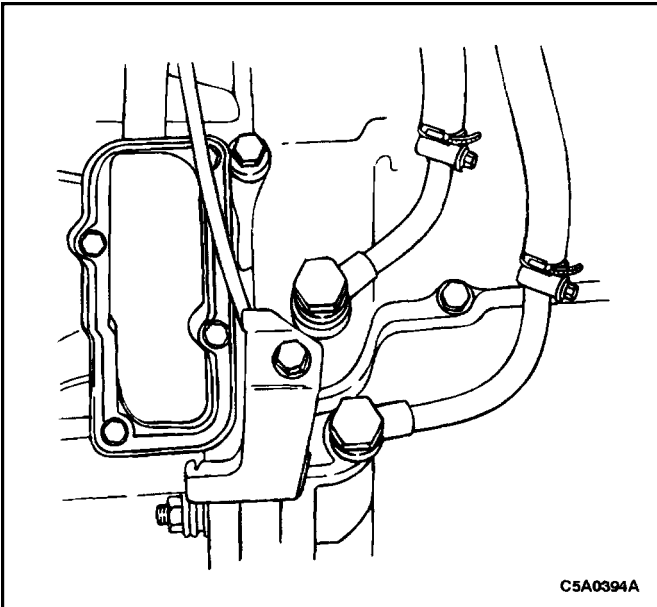
8. Install the engine under cover.
9. Lower the vehicle.
10. Connect the negative battery cable.
11. Fill the transaxle with fluid. Refer to "Fluid Drain Procedure" in this section.

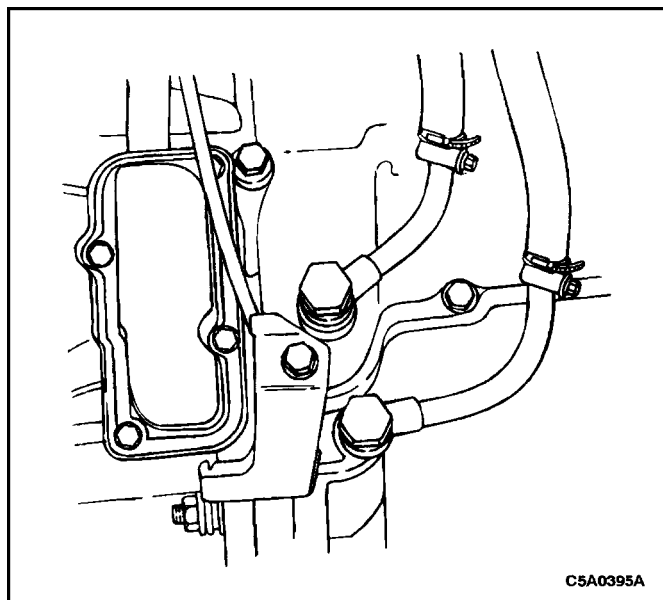


## VALVE BODY

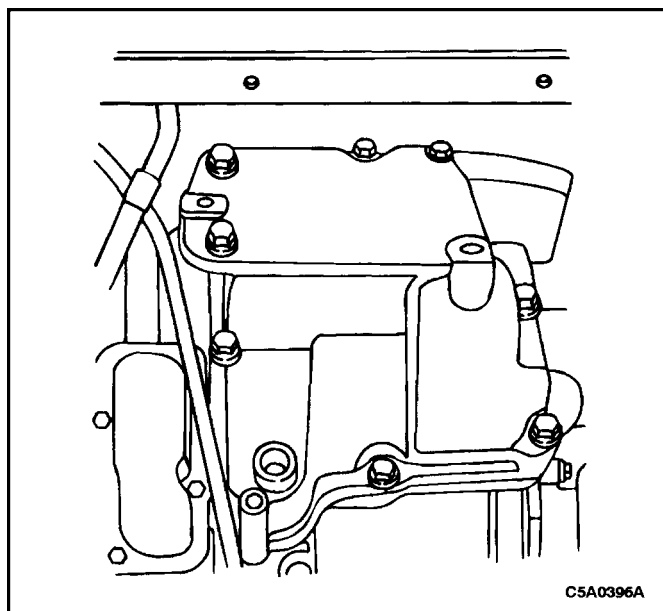
### Removal Procedure

1. Disconnect the negative battery cable.
2. Raise and support the vehicle. Refer to "Vehicle Lifting Procedures," *Section 0B, General Information*.
3. Drain the transaxle fluid. Refer to "Fluid Drain Procedure" in this section.
4. Remove the engine under cover.
5. Remove the nut and bolt from the transmission fluid temperature (TFT) sensor protector bracket, then remove the bracket.

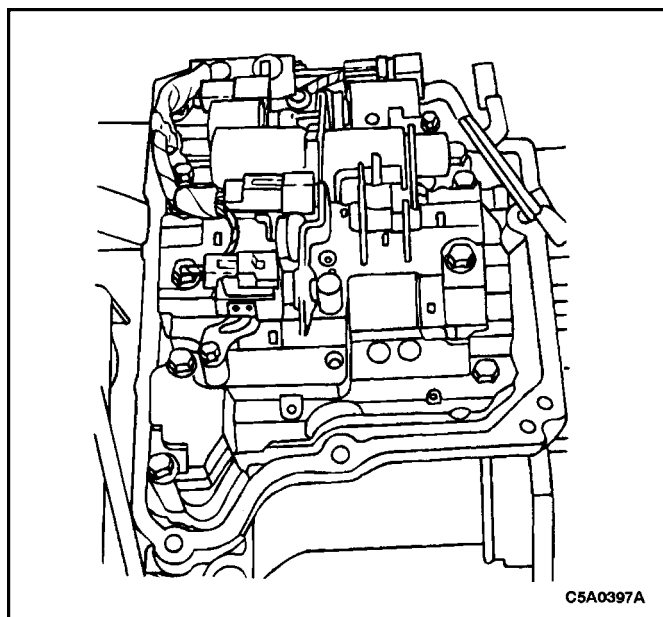




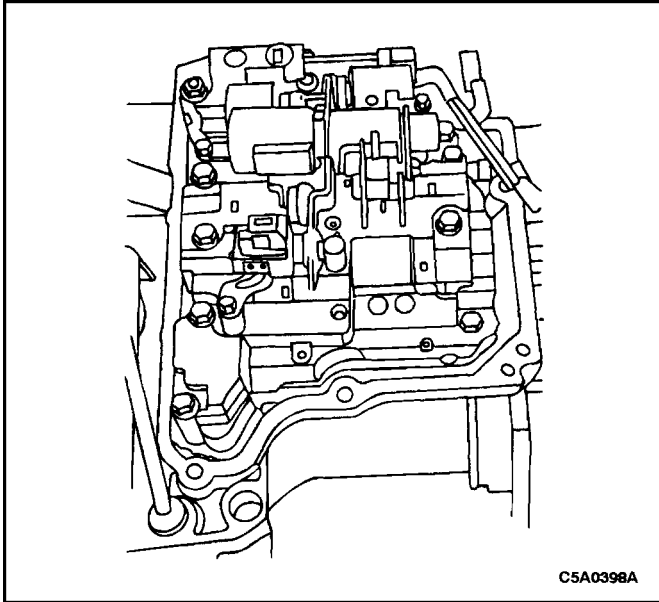
6. Disconnect the fluid cooler pipes at the valve body cover and allow the fluid to drain, then position the pipes aside.



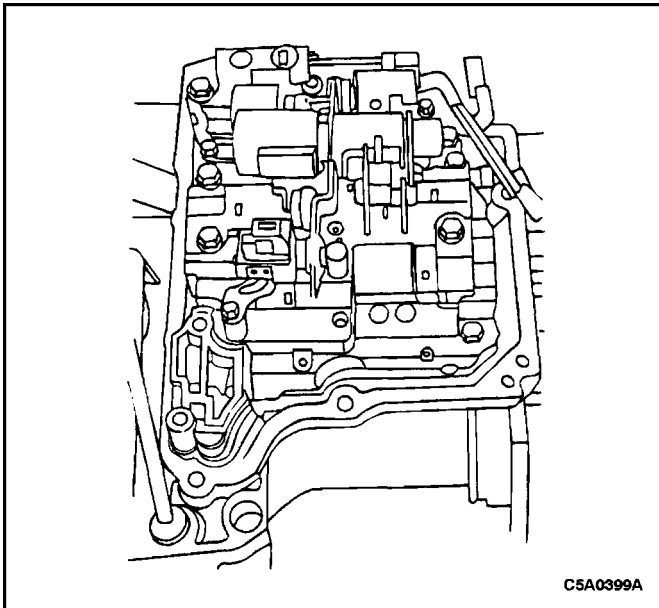
7. Remove the eight bolts from the valve body cover, then remove the cover.



8. Disconnect the electrical connectors from shift solenoid 1 (SS1), shift solenoid 2 (SS2), the linear solenoid and the lockup solenoid.

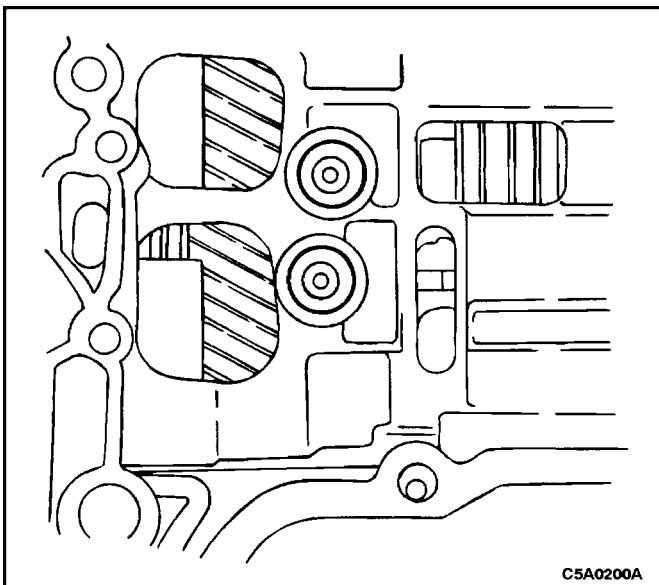


9. Remove the two suction cover retaining bolts and the suction cover.

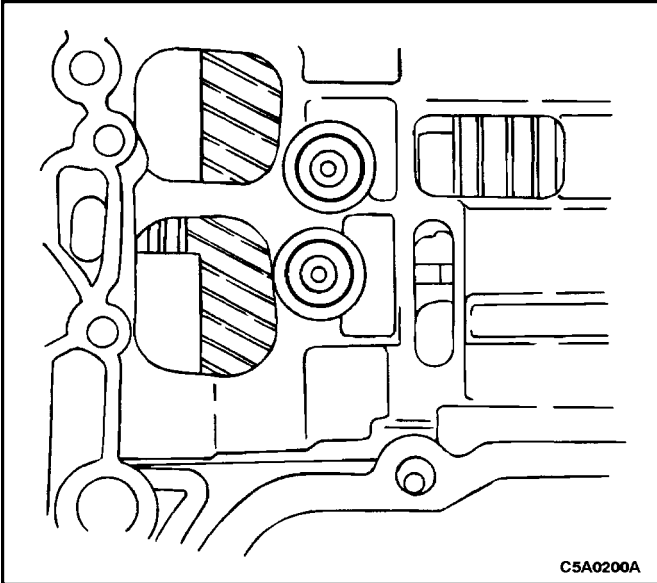


**CAUTION :** Use care not to damage the manual valve connecting rod or the lever.

10. Loosen the seven valve body retaining bolts and remove six of the bolts. Support the valve body and remove the seventh bolt. Continue to support the valve body and carefully disconnect the manual valve connecting rod from the lever. Remove the valve body.



11. Remove and discard the two valve body apply seals.



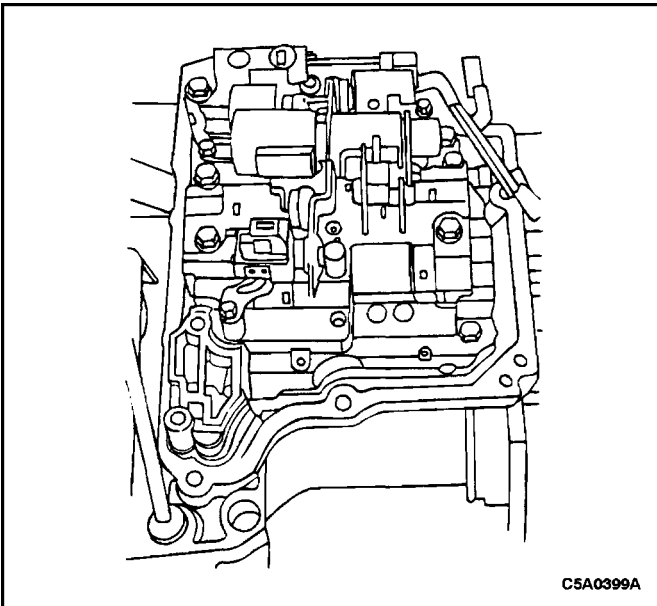
## Installation Procedure

**Notice :** Lubricate the valve body apply seals with Texaco 1854 automatic transmission fluid.

1. Install two new valve body apply seals.

**CAUTION :** Use care not to damage the manual valve connecting rod or the lever.

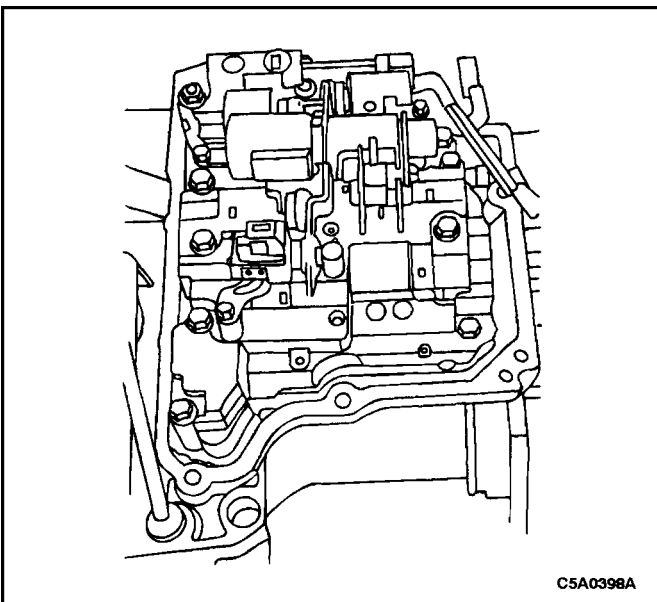
2. Support and position the valve body onto the trans-axle case. While supporting the valve body, carefully connect the manual valve connecting rod to the lever and install one of the valve body bolts hand tight. Install the remaining six valve body retaining bolts hand tight.

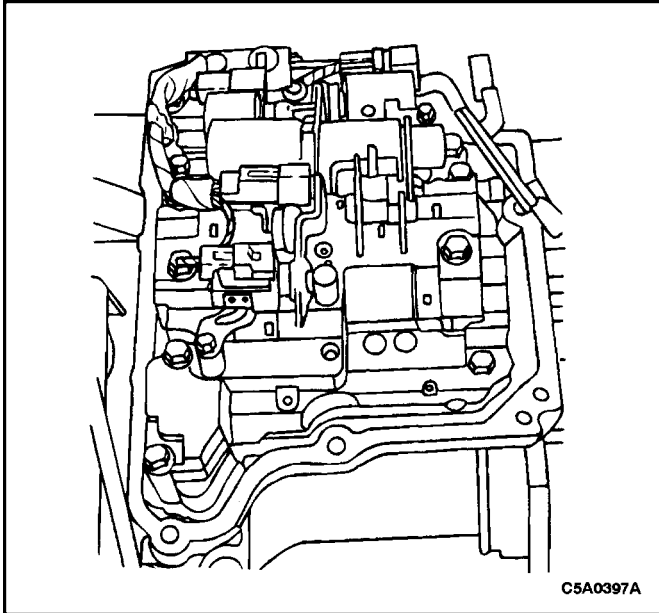


3. Install the suction cover and suction cover retaining bolts hand tight.

### Tighten

Tighten the valve body and suction cover retaining bolts to 53–62 lb-in (6–7 N•m).

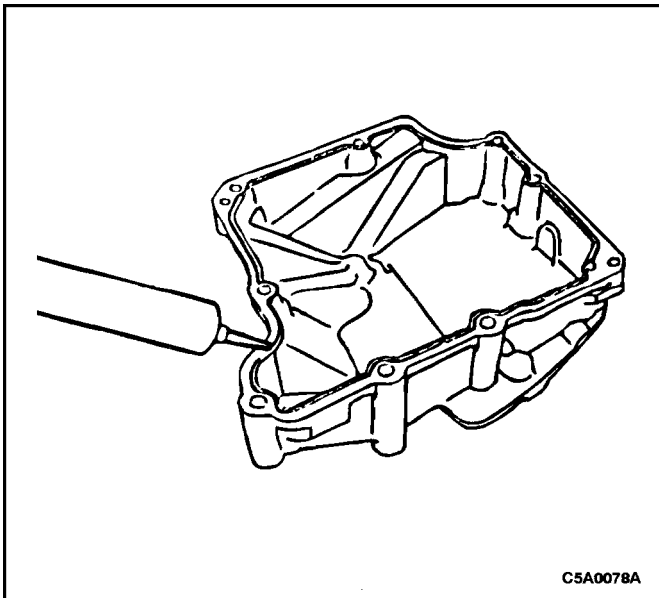




4. Connect the four valve body solenoid electrical connectors.

**Notice :** Remove the old gasket material from the valve body cover and mating surface of transaxle.

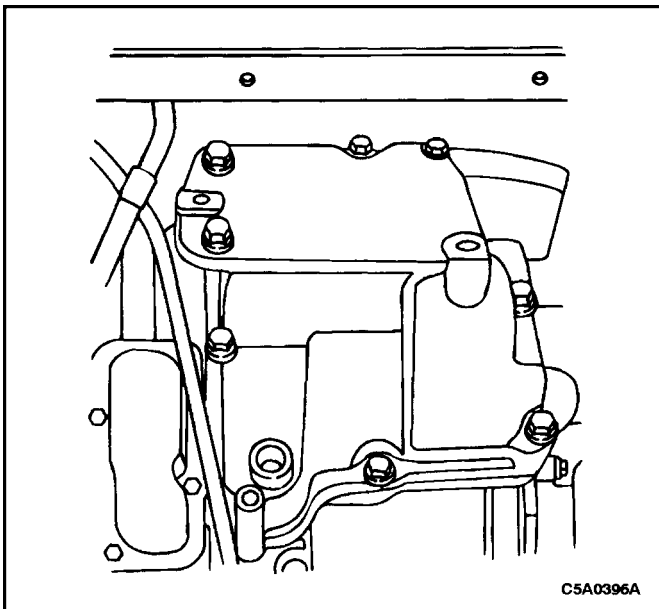
5. Apply a bead of silicone sealant on the valve body cover.



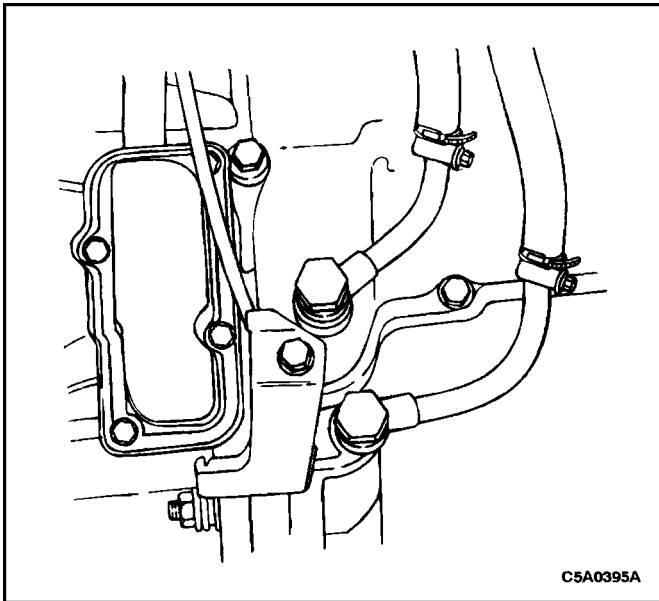
6. Install the valve body cover and the eight bolts.

**Tighten**

Tighten the valve body cover bolts to 15–22 lb–ft (20–30 N•m).



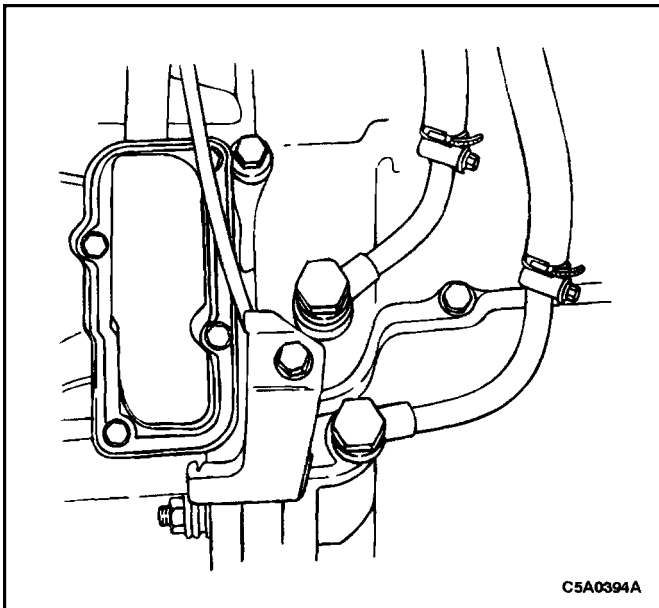




7. Connect the fluid cooler pipes at the valve body cover.

**Tighten**

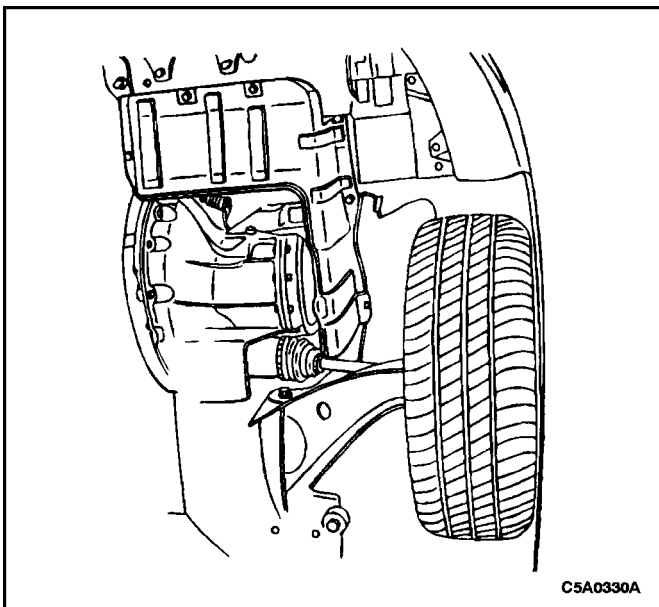
Tighten the fluid cooler pipe bolts to 15–22 lb–ft (20–29 N•m).



8. Position the transmission fluid temperature (TFT) sensor protector bracket, then install the nut and bolt.

**Tighten**

Tighten the TFT sensor protector bracket nut and bolt to 15–22 lb–ft (20–29 N•m).



9. Install the engine under cover.
10. Lower the vehicle.
11. Connect the negative battery cable.
12. Fill the transaxle with fluid. Refer to "Fluid Drain Procedure" in this section.