

VEHICLE SPEED CONTROL SYSTEM

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DESCRIPTION AND OPERATION

SPEED CONTROL SYSTEM

DESCRIPTION

The speed control system is electronically controlled and vacuum operated. The electronic control is integrated into the Powertrain Control Module, located on the left side of the engine compartment next to the air cleaner. The controls are located on the steering wheel and consist of two switches. The ON, OFF, RESUME, ACCEL, SET, COAST, and CANCEL, buttons are located on a spoke of the steering wheel (Fig. 1). For identification and location of the major components (Fig. 2).

The system is designed to operate at speeds above 30 mph (50 km/h).

WARNING: THE USE OF SPEED CONTROL IS NOT RECOMMENDED WHEN DRIVING CONDITIONS DO NOT PERMIT MAINTAINING A CONSTANT SPEED, SUCH AS IN HEAVY TRAFFIC OR ON ROADS THAT ARE WINDING, ICY, SNOW COVERED, OR SLIPPERY.

OPERATION

When speed control is selected by depressing the ON switch, the PCM allows a set speed to be stored in RAM for speed control. To store a set speed,

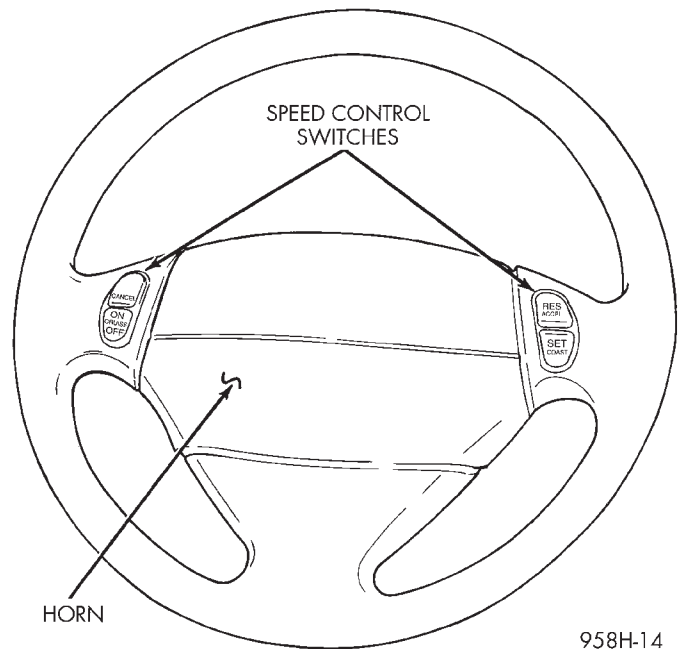


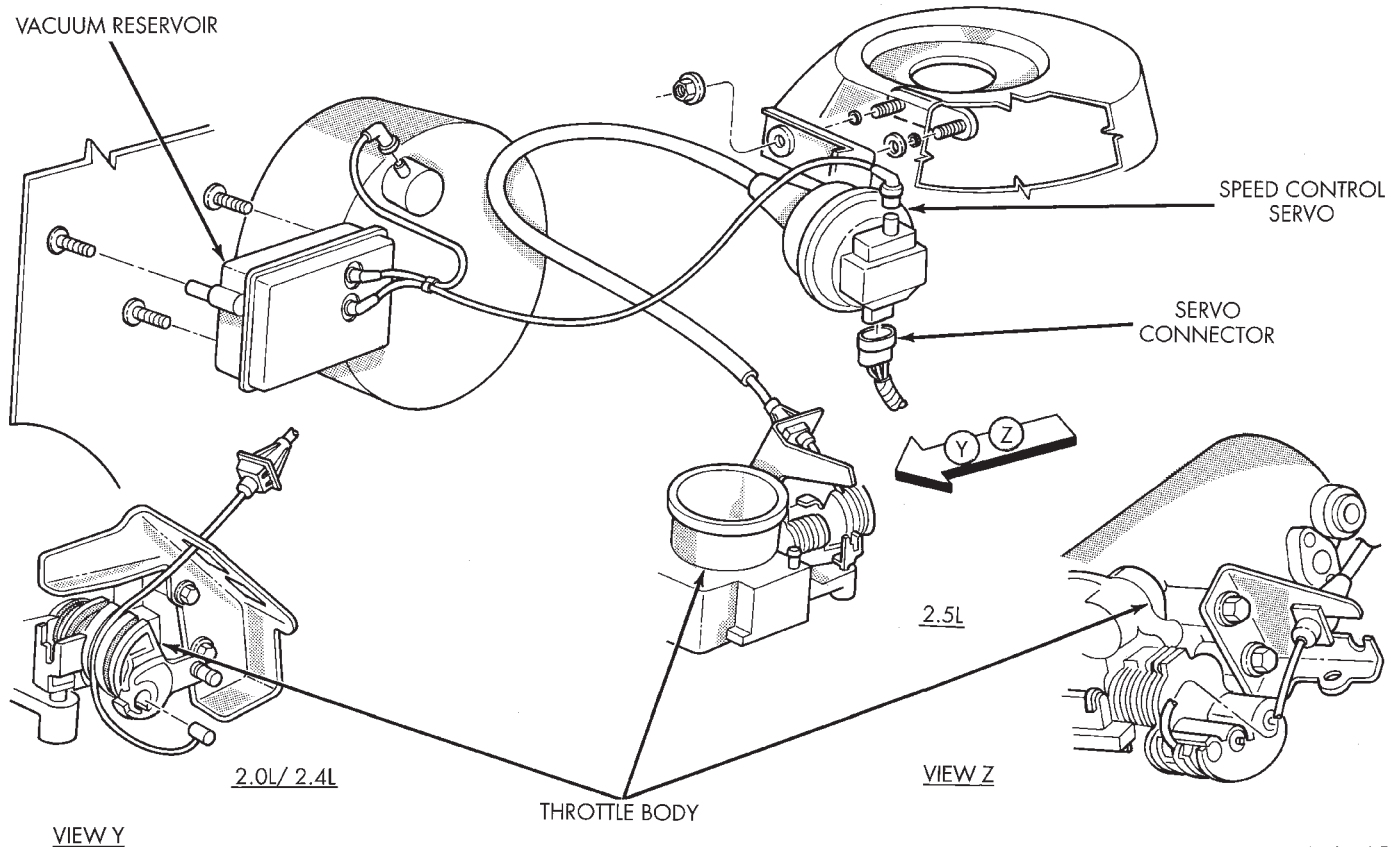
Fig. 1 Speed Control Switch

depress the SET switch while the vehicle is moving at a speed between 30 and 85 mph. In order for the speed control to engage, the brakes cannot be applied, nor can the gear selector be indicating the transmission is in Park or Neutral.

- The speed control can be disengaged manually by:
- Stepping on the brake pedal

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DESCRIPTION AND OPERATION (Continued)



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Fig. 2 Speed Control System

- Depressing the OFF switch
- Depressing the CANCEL switch.
- Depressing the clutch pedal

NOTE: Depressing the OFF switch or turning off the ignition switch will erase the set speed stored in the PCM.

For added safety, the speed control system is programmed to disengaged for any of the following conditions:

- An indication of Park or Neutral
- An rapid increase rpm (indicates that the clutch has been disengaged)
- Excessive engine rpm (indicates that the transmission may be in a low gear)
- The speed signal increases at a rate of 10 mph per second (indicates that the co-efficient of friction between the road surface and tires is extremely low)
- The speed signal decreases at a rate of 10 mph per second (indicates that the vehicle may have decelerated at an extremely high rate)

Once the speed control has been disengaged, depressing the RESUME switch when speed is greater than 25 mph restores the vehicle to the target speed that was stored in the PCM.

While the speed control is engaged, the driver can increase the vehicle speed by depressing the ACCEL switch. The new target speed is stored in the PCM when the ACCEL is released. The PCM also has a "tap-up" feature in which vehicle speed increases at a rate of approximately 2 mph for each momentary switch activation of the ACCEL switch. The PCM also provides a means to decelerate without disengaging speed control. To decelerate from an existing recorded target speed, depress and hold the COAST switch until the desired speed is reached, then release the switch.

SPEED CONTROL SERVO

DESCRIPTION

The servo unit consists of a solenoid valve body, and a vacuum chamber.

OPERATION

The PCM controls the solenoid valve body. The solenoid valve body controls the application and release of vacuum to the diaphragm of the vacuum servo. The servo unit cannot be repaired and is serviced only as a complete assembly.

DESCRIPTION AND OPERATION (Continued)

SPEED CONTROL SWITCHES

DESCRIPTION

There are two separate switch pods that operate the speed control system.

OPERATION

The steering-wheel-mounted switches use multiplexed circuits to provide inputs to the PCM for ON, OFF, RESUME, ACCELERATE, SET, DECEL and CANCEL modes. Refer to the owner's manual for more information on speed control switch functions and setting procedures.

The individual switches cannot be repaired. If one switch fails, the entire switch module must be replaced.

AUTOMATIC SPEED CONTROL OVERSPEED REDUCTION

OPERATION

Transmission control software includes an automatic speed control overspeed reduction feature. This maintains vehicle speed at the selected set point when descending a grade.

The Transmission Control Module (TCM) first senses that the speed control is set. If the set speed is exceeded by more than 4 mph (6.5 km/hr) and the throttle is closed, the TCM causes the transaxle to downshift to THIRD gear. After downshifting, the automatic speed control resumes normal operation. To ensure that an upshift is appropriate after the set speed is reached, the TCM waits until the speed control system opens the throttle at least 6 degrees before upshifting to OVERDRIVE again.

If the driver applies the brakes, canceling automatic speed control operation with the transaxle still in THIRD gear, the TCM maintains this gear until the driver opens the throttle at least 6 degrees to avoid an inappropriate upshift. The upshift is also delayed for 2.5 seconds after reaching the 6 degrees throttle opening in anticipation that the driver might open the throttle enough to require THIRD gear. This will avoid unnecessary and disturbing transmission cycling. If the automatic speed control RESUME feature is used after braking, the upshift is delayed until the set speed is achieved to reduce cycling and provide better response.

STOP LAMP SWITCH

DESCRIPTION

The switch is mounted on the brake pedal mounting bracket under the instrument panel.

OPERATION

Vehicles equipped with the speed control option use a dual function stop lamp switch. The PCM monitors the state of the dual function stop lamp switch. Refer to the Brake section for more information on stop lamp switch service and adjustment procedures.

SERVO CABLE

DESCRIPTION

The speed control servo cable is connected between the speed control vacuum servo diaphragm and the throttle body control linkage.

OPERATION

This cable causes the throttle control linkage to open or close the throttle valve in response to movement of the vacuum servo diaphragm.

POWERTRAIN CONTROL MODULE

OPERATION

The speed control electronic control circuitry is integrated into the Powertrain Control Module (PCM). The PCM is located in the engine compartment. The PCM speed control functions are monitored by the On-Board Diagnostics (OBD). All OBD-sensed systems are monitored by the PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC). The PCM will store a DTC in electronic memory for any failure it detects. The PCM cannot be repaired and must be replaced if faulty.

USE THE DRB SCAN TOOL TO REPROGRAM THE NEW PCM WITH THE VEHICLES ORIGINAL IDENTIFICATION NUMBER (VIN) AND THE VEHICLES ORIGINAL MILEAGE. IF THIS STEP IS NOT DONE A DIAGNOSTIC TROUBLE CODE (DTC) MAY BE SET.

VACUUM RESERVOIR

OPERATION

The reservoir contains a one-way check valve to trap engine vacuum in the reservoir. When engine vacuum drops, as in climbing a grade while driving, the reservoir supplies the vacuum needed to maintain proper speed control operation. The vacuum reservoir cannot be repaired and must be replaced if faulty.

VEHICLE SPEED AND DISTANCE

OPERATION

The 4 speed automatic Transmission Control Module (TCM) supplies the speed input to the PCM. The PCM determines acceleration rates. The speed con-

DESCRIPTION AND OPERATION (Continued)

control software in the PCM uses vehicle speed and acceleration to control to the set speed.

Vehicles with a 3 speed automatic or manual transmission have a Vehicle Speed Sensor (VSS) mounted to an adapter near the transmission output shaft. The sensor is driven through the adapter by a speedometer pinion gear. The VSS pulse signal is monitored by the PCM to determine vehicle speed and to maintain speed control set speed. Refer to the appropriate Powertrain Diagnostic Procedures manual for diagnosis and testing of this component.

DIAGNOSIS AND TESTING

ROAD TEST

Perform a vehicle road test to verify reports of speed control system malfunction. The road test should include attention to the speedometer. Speedometer operation should be smooth and without flutter at all speeds.

Flutter in the speedometer indicates a problem which might cause surging in the speed control system. The cause of any speedometer problems should be corrected before proceeding. Refer to the Instrument Panel and Gauges for speedometer diagnosis.

If a road test verifies a surge following a set and the speedometer operates properly see "Overshoot/Undershoot on speed control set".

If a road test verifies an inoperative system, and the speedometer operates properly, check for:

- A Diagnostic Trouble Code (DTC). If a DTC exists, conduct tests per the Powertrain Diagnostic Procedures service manual.
- A misadjusted brake (stop) lamp switch. This could also cause an intermittent problem.
- Loose or corroded electrical connections at the servo. Corrosion should be removed from electrical terminals and a light coating of Mopar Multipurpose Grease, or equivalent, applied.
 - Leaking vacuum reservoir.
 - Loose or leaking vacuum hoses or connections.
 - Defective one-way vacuum check valve.
 - Secure attachment at both ends of the speed control servo cable.
 - Smooth operation of throttle linkage and throttle body air valve.
 - Conduct electrical test at PCM.
 - Failed speed control servo. Do the servo vacuum test.

CAUTION: When test probing for voltage or continuity at electrical connectors, care must be taken not to damage connector, terminals or seals. If these components are damaged, intermittent or complete system failure may occur.

CHECKING FOR DIAGNOSTIC CODES

When trying to verify a speed control system electronic malfunction: Connect a DRB scan tool if available to the data link connector. The connector is located at left side of the steering column, and at lower edge of the panel.

(1) A speed control malfunction may occur without a diagnostic code being indicated.

For further information and usage of the DRB scan tool and a more complete list of Diagnostic Trouble Code and No Trouble Codes, refer to the Powertrain Diagnostic Manual.

SPEED CONTROL SLOWS DOWN BY ITSELF

Test the vehicle speed sensor/output speed sensor. If sensor fails replace sensor, if it passes perform the following test:

- (1) Check for transmission DTC.
- (2) Perform the speed control switch test on the DECEL switch, if it fails replace switch.
- (3) If the switch passes, conduct the vacuum supply test.
- (4) If it passes, conduct the servo vacuum test. If it fails replace servo.
- (5) If continuity, replace the PCM.

SPEED CONTROL ELECTRICAL TEST

Electronic speed control systems may be tested using two different methods. One involves use of a DRB. If this test method is desired, refer to the Powertrain Diagnostic Test Procedures for charging and speed control system manual.

The other test method uses a volt/ohm meter. The volt/ohm meter method is described in the following tests.

If any information is needed concerning wiring, refer to Group 8W, Wiring Diagrams.

CAUTION: When test probing for voltage or continuity at electrical connectors, care must be taken not to damage connector, terminals, or seals. If these components are damaged, intermittent or complete system failure may occur.

When electrical connections are removed, corrosion should be removed from electrical terminals and a light coating of Mopar Multi-Purpose Grease, or equivalent, applied. Inspect connectors for damage terminals.

A poor connection can cause a complete or intermittent malfunction and is also the only connection in the circuit, that can not be tested. For this reason, a loose connection may be misdiagnosed as a component malfunction.

DIAGNOSIS AND TESTING (Continued)

OVERSHOOT/UNDERSHOOT FOLLOWING SPEED CONTROL SET

If the operator repeatedly presses and releases the set button with their foot off of the accelerator (a "lift foot set" to begin speed control operation), the vehicle may accelerate and exceed the desired set speed by up to 5 MPH (8 km/h) and then decelerate to less than the desired set speed before finally achieving the desired set speed.

The Speed Control has an adaptive strategy that compensates for vehicle-to-vehicle variations in speed control cable lengths. When the speed control is set with the vehicle operators foot off of the accelerator pedal, the speed control thinks there is excessive speed control cable slack and adapts. If the lift foot sets are continually used, the speed control overshoot/undershoot condition will develop.

To "unlearn" the overshoot/undershoot condition, the vehicle operator has to press and release the set button while maintaining the desired set speed with the accelerator pedal (not decelerating or accelerating), and then turn the cruise control switch to the OFF position (or press the CANCEL button if equipped) after waiting 10 seconds. This procedure must be performed approximately 10-15 times to completely unlearn the overshoot/undershoot condition.

SERVO VACUUM TEST

- (1) Turn ignition switch to the ON position without starting engine. Activate speed control ON switch.
- (2) Disconnect the four-way electrical connector and the vacuum harness at the servo (Fig. 3).
- (3) Connect a jumper wire from Pin 3 of the servo to Pin 3 of the wire connector.
- (4) Ground Pins 2 and 4 in the servo. Do not connect pin 1.
- (5) Connect a hand held vacuum pump to the vacuum nipple and apply 10 - 15 inches of vacuum.
- (6) If servo pulls cable, replace servo.
- (7) Ground Pin 1 on servo.
- (8) Check that the throttle cable pulls in and holds as long as the vacuum pump is connected. After one minute, check if cable is still holding. If cable does not hold replace the servo.
- (9) Disconnect jumper from pin 3. Cable should return to rest position. If not, replace servo.
- (10) Connect 4 way electrical connector and vacuum harness to servo.

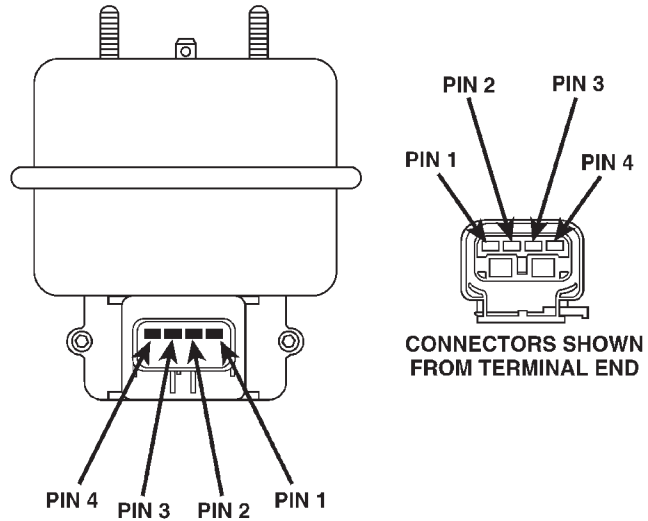


Fig. 3 Servo Harness Connector

SPEED CONTROL SWITCH TEST

Refer to the appropriate Powertrain Diagnostic Manual for switch test values.

STOP LAMP SWITCH TEST

(1) Remove the stop lamp switch refer to Stop Switch Removal/Installation in this section. Disconnect connector from stop lamp switch (Fig. 4). Using an ohmmeter, switch continuity may be checked as follows:

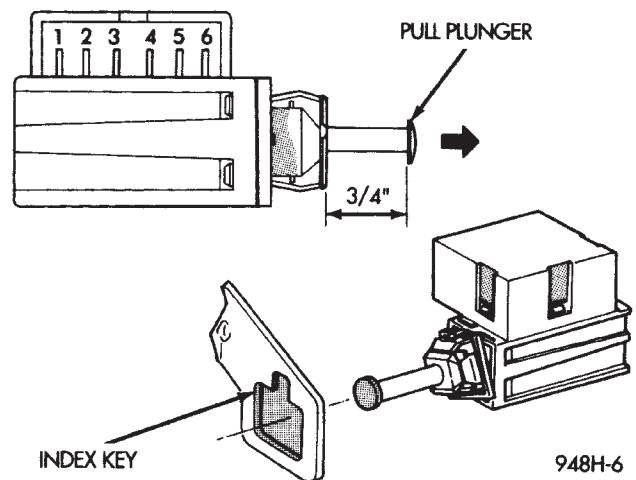


Fig. 4 Stop Lamp Wiring

DIAGNOSIS AND TESTING (Continued)

(2) With switch plunger released, there should be continuity between Pin 5 and Pin 6.

(3) With switch plunger depressed, there should be continuity:

- Between Pin 1 and Pin 2.
- Between Pin 3 and Pin 4.

(4) If the above results are not obtained, the stop lamp switch is defective or out of adjustment.

(5) Stop lamp switch adjustment is detailed in the Brake section.

ELECTRICAL TESTS AT POWERTRAIN CONTROL MODULE

(1) Unplug the GRAY 40-way connector from the Powertrain Control Module (PCM), (Fig. 5).

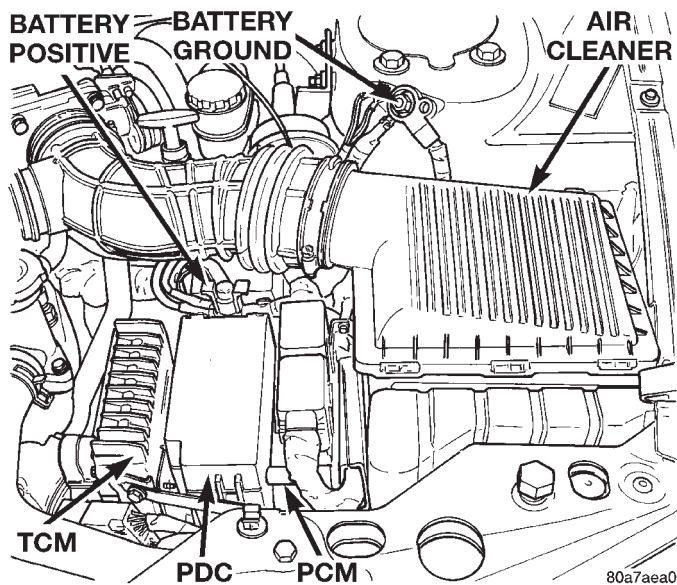


Fig. 5 Powertrain Control Module Location

(2) Remove both steering wheel speed control switches and disconnect the wire connectors.

(a) Using an ohmmeter, check for continuity between cavity 41 of the PCM connector and cavity 1 of each speed control switch connector (Fig. 6).

(b) If no continuity, repair as necessary.

(c) Using an ohmmeter, check for continuity between cavity 41 of the PCM connector and ground.

(d) If continuity, repair as necessary.

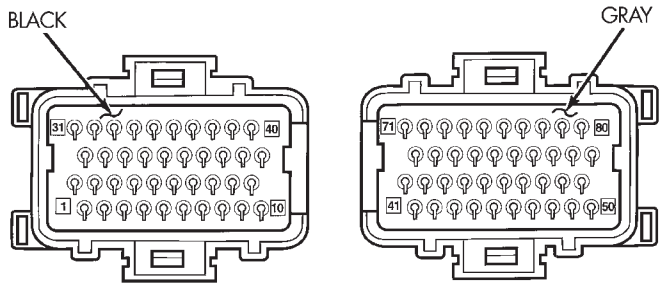
(e) If no continuity, perform the Switch Test.

(f) Plug GRAY 40 way connector into PCM.

(g) Plug switch connectors back into switches.

(3) Unplug speed control servo electrical connector.
 (4) Place ignition switch in the ON position and turn on the speed control system, for the following tests.

(a) Using a voltmeter, measure voltage from cavity 3 of servo connector to ground. Voltmeter



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Fig. 6 PCM 40—Way Connectors

should read ignition voltage. If voltage is low, skip to Step 7.

(b) Turn speed control and ignition switch OFF. Using an ohmmeter, place positive lead on pin 3 and negative lead on pin 4 on the speed control servo. Check continuity from pin 3 to pin 4.

(c) If no continuity, replace the speed control servo. If continuity is greater than 49 ohms, clean terminals.

(d) Using an ohmmeter, place positive lead on pin 3 and negative lead on pin 2 on the speed control servo. Check continuity from pin 3 to pin 2.

(e) If no continuity, replace the speed control servo. If continuity is greater than 49 ohms, clean terminals.

(f) Using an ohmmeter, place positive lead on pin 3 and negative lead on pin 1 on the speed control servo. Check continuity from pin 3 to pin 1.

(g) If no continuity, replace the speed control servo. If continuity is greater than 49 ohms, clean terminals.

(h) Using an ohmmeter at the servo connector, place positive lead on cavity 4 and negative lead on ground. Check continuity from cavity 4 to ground. If no continuity, repair open circuit

(i) Unplug 2 40-way PCM connectors

(j) Using an ohmmeter, check continuity from cavity 1 of servo connector to cavity 56 on PCM connector. If no continuity, repair open circuit

(k) Using an ohmmeter, check continuity from cavity 1 of servo connector to ground. If continuity, repair as necessary.

(l) If continuity is OK, check continuity from cavity 2 of servo connector to cavity 80 of PCM connector. If no continuity, repair open circuit

(m) Using an ohmmeter, check continuity from cavity 2 of servo connector to ground. If continuity, repair as necessary.

(n) Using an ohmmeter, check continuity from cavity 1 of servo connector to cavity 2 of servo connector. If continuity, repair as necessary.

(o) Reconnect the 4 way connector to servo.

DIAGNOSIS AND TESTING (Continued)

(5) Using an ohmmeter, check continuity from cavity 62 of the PCM connector to ground. If continuity is OK with brake pedal in unpressed position, proceed to Step 6.

(a) If no continuity, perform the Stop Lamp switch test. Replace or adjust switch as required.

(b) If switch passes test, check continuity from cavity 62 of the PCM connector to cavity 1 of the stop lamp switch connector. Repair open circuit as required.

(c) If continuity is OK between cavity 62 and cavity 1, repair open circuit between cavity 2 of the stop lamp switch connector and ground.

(6) Using an ohmmeter, check continuity from cavity 76 on PCM connector to ground with the transmission in park or neutral. If no continuity, test TRS/Park-Neutral switch and switch wiring

(7) Turn speed control and ignition switch OFF.

(8) Unplug the BLACK 40-way connector from the Powertrain Control Module (PCM)

(9) Using an ohmmeter, check continuity from cavity 3 of servo connector to cavity 5 on the PCM connector.

(a) If continuity is OK, replace PCM. Check circuit for short to ground before replacing PCM.

(b) If no continuity, remove stop lamp switch and conduct Stop Lamp Switch Test. If test fails, adjust or replace as necessary.

(c) If switch passes, measure continuity from cavity 4 of stop lamp switch connector to cavity 3 of servo connector. Repair open circuit if necessary.

(d) If continuity is OK, measure continuity from cavity 3 of stop lamp switch to cavity 5 of PCM connector. Repair open circuit as necessary.

(e) Install PCM connectors onto PCM and speed control servo connector to servo.

VACUUM SUPPLY TEST

(1) Disconnect vacuum hose at the servo and install a vacuum gauge in the hose (Fig. 7).

(2) Start engine and observe gauge at idle. Vacuum gauge should read at least ten inches of mercury. Shut off engine, the vacuum should continue to hold 10 inches of mercury.

(3) If vacuum does not meet this requirement, check and correct the following vacuum leaks in the vacuum lines, check valve, vacuum reservoir or poor engine performance.

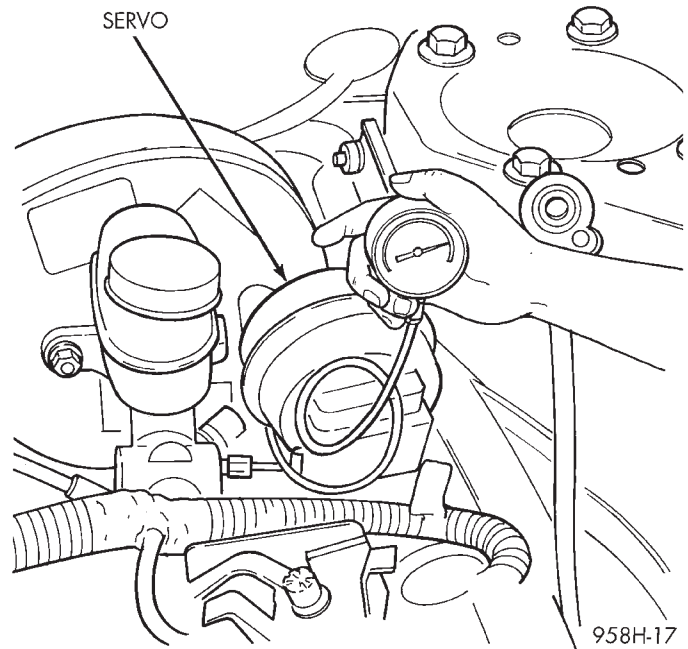


Fig. 7 Vacuum Gauge Test

VEHICLE SPEED SIGNAL

For diagnosis and testing of the Vehicle Speed Signal (VSS), refer to the appropriate Powertrain Diagnostic Procedures service manual. Also refer to the DRB scan tool.

REMOVAL AND INSTALLATION

SERVO

REMOVAL

- (1) Remove two nuts attaching speed control cable and mounting bracket to servo.
- (2) Remove servo from the mounting bracket.
- (3) Disconnect electrical connectors and vacuum hose.
- (4) Remove cable from thottle cam. Refer to Speed Control Servo Cable Removal/Installation in this section.
- (5) Remove clip attaching cable to servo.

REMOVAL AND INSTALLATION (Continued)

INSTALLATION

- (1) Install servo cable to servo and install clip.
- (2) Install speed control cable to throttle cam.
- (3) Connect vacuum hose to servo.
- (4) Connect electrical connector.
- (5) Insert servo studs through holes in speed control cable and mounting bracket.
- (6) Install nuts, tighten to 7 N·m (60 in. lbs.).

SPEED CONTROL SWITCH

The speed control switches are mounted in the steering wheel and wired through the clock spring device under the airbag module (Fig. 1).

WARNING: IF REMOVAL OF AIRBAG MODULE IS NECESSARY, REFER TO THE RESTRAINT SYSTEMS.

REMOVAL

- (1) Turn off ignition.
- (2) Remove two screws from side of each switch.
- (3) Rock switch away from airbag and steering wheel.
- (4) Disconnect two-way electrical connector.
- (5) Repeat for the other switch.

INSTALLATION

- (1) Install switches.
- (2) Connect two-way electrical connector.
- (3) Install two screws to the side of each switch.
- (4) Install airbag, refer to the Restraint Systems

STOP LAMP SWITCH**REMOVAL**

Remove the switch from the bracket by depressing the brake pedal and rotating the switch in a counter-clockwise direction approximately 30 degrees. Pull the switch rearward and remove from bracket. Disconnect wiring harness connector.

INSTALLATION

Before installing the switch, reset the adjustable switch plunger by pulling on the plunger head until the plunger reaches the end of its travel. A ratcheting sound will be heard during this procedure.

Connect the wiring harness to the switch. Mount the switch into the bracket by holding the switch with the plunger facing forward in car. There is an index key on the switch that mates with the bracket slot at the top of the square hole. Align key and push switch into square hole in bracket while depressing the brake pedal. Once the switch is seated in the hole, rotate clockwise approximately 30 degrees to lock into place. The switch will automatically adjust when the pedal is released. Pull back on the pedal to assure correct adjustment.

SPEED CONTROL SERVO CABLE**REMOVAL**

- (1) Remove throttle control shield, if equipped (Fig. 8).
- (2) Remove throttle cable clasp from the throttle body cam.
- (3) Remove speed control cable from throttle cam by sliding clasp out hole used for throttle cable.
- (4) Compress the retaining tabs on the cable and slide cable out of bracket.
- (5) Remove 2 nuts retaining bracket to servo.
- (6) Remove retaining clip holding cable to servo.

INSTALLATION

- (1) Install retaining clip to cable at servo.
- (2) Slide cable bell housing over servo mounting studs.
- (3) Install 2 nuts at cable to servo and servo bracket, tighten to 7 N·m (60 ins. lbs.).
- (4) Slide cable into throttle cable bracket and engage retaining tabs.
- (5) Rotate the throttle cam forward to the wide open position and install speed control cable clasp.

REMOVAL AND INSTALLATION (Continued)

- (6) Rotate the throttle cam forward to the wide open position and install throttle cable clasp.
- (7) Install throttle control shield, if equipped.

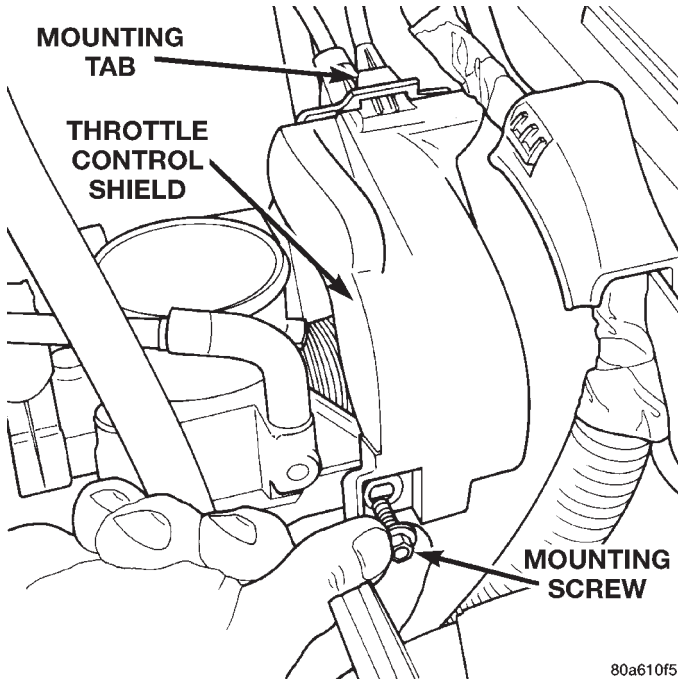


Fig. 8 Throttle Control Shield

VACUUM RESERVOIR

The vacuum reservoir is located on the dash panel next to the brake booster.

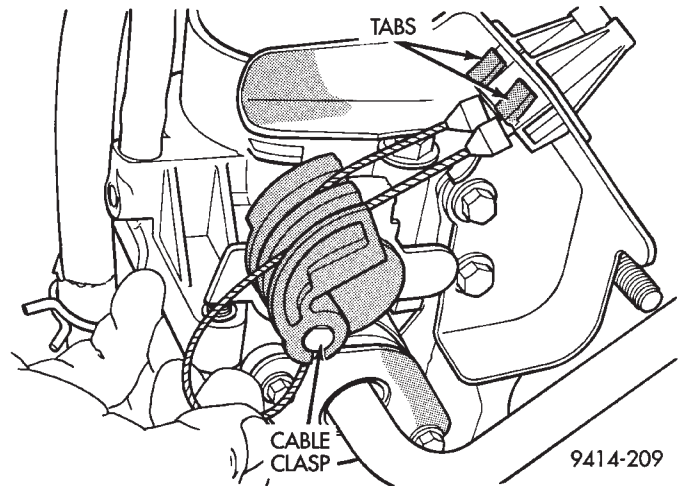


Fig. 9 Disconnecting Throttle Cable—Typical

REMOVAL

- (1) **2.5L ONLY** Remove the intake manifold, refer to the Engine section.
- (2) Disconnect vacuum hoses from reservoir.
- (3) Pull vacuum reservoir from dash panel.

INSTALLATION

- (1) Push reservoir onto dash panel.
- (2) Connect hoses to reservoir.
- (3) **2.5L ONLY** Install intake manifold, refer to the Engine section.

