VEHICLE SPEED CONTROL SYSTEM

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GENERAL INFORMATION

INTRODUCTION

The speed control system is electronically controlled and vacuum operated. The electronic control is integrated into the powertrain control module, located next to battery. The controls are located on the steering wheel and consist of the ON/OFF, SET, RESUME/ACCEL, CANCEL and DECEL buttons (Fig. 1).

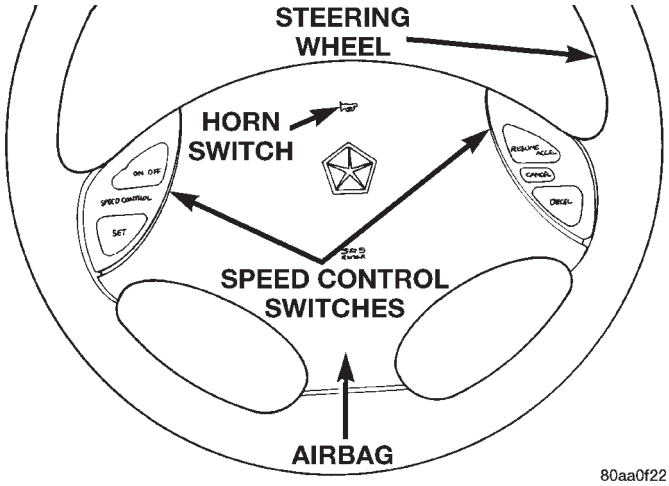

Fig. 1 Speed Control Switches

DESCRIPTION AND OPERATION

SPEED CONTROL SERVO

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

SPEED CONTROL SWITCHES

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

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, 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

DESCRIPTION AND OPERATION (Continued)

- Depressing the OFF switch
- Depressing the CANCEL switch.

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 rpm increase without a VSS signal increase (indicates that the clutch has been disengaged)
- Excessive engine rpm (indicates that the transmission may be in a low gear)
- The VSS 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 VSS signal decreases at a rate of 10 mph per second (indicates that the vehicle may have decelerated at an extremely high rate)
- If the actual speed is not within 20 mph of the set speed

The previous disengagement conditions are programmed for added safety.

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

NOTE: Depressing the OFF switch will erase the set speed stored in the PCM's RAM.

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.

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

AUTOMATIC SPEED CONTROL OVERSPEED REDUCTION

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 8 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 8 degrees to avoid an inappropriate upshift. The upshift is also delayed for 0.5 seconds after reaching the 8 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

Vehicles equipped with the speed control option use a dual function stop lamp switch. The switch is mounted on the brake pedal mounting bracket under the instrument panel. The PCM monitors the state of the dual function stop lamp switch. Refer to Group 5, Brakes for more information on stop lamp switch service and adjustment procedures.

SERVO CABLE

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

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. See On-Board Diagnostic Tests in this group for more information. 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 ORGINAL VEHICLES MILAGE. IF THIS

DESCRIPTION AND OPERATION (Continued)

STEP IS NOT DONE A DIAGONSTIC TROUBLE CODE (DTC) MAY BE SET.

VACUUM RESERVOIR

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

The 4 speed automatic Transmission Control Module (TCM) supplies the speed input to the PCM. The PCM determines acceleration rates. The speed 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. Refer to group 14, Fuel System for Removal/Installation

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 Group 8E, 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.

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.

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.

DIAGNOSIS AND TESTING (Continued)

SPEED CONTROL DIAGNOSTIC TROUBLE CODES

Hex Code	DRB Scan Tool Display	Description of Diagnostic Trouble Code
23	No Vehicle Speed Sensor Signal	No vehicle distance (speed) sensor signal detected during road load conditions.
OF	Speed Control Solenoid Circuits	An open or shorted condition detected in the Speed Control vacuum or vent solenoid circuits.
56	MUX S/C Switch High	Speed Control switch input above the maximum acceptable voltage.
57	MUX S/C Switch Low	Speed Control switch input below the minimum acceptable voltage.
52	S/C Power Relay Or 12V Driver Circuit	Malfunction detected with power feed to speed control servo solnoids.
Check Engine Lamp will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		

Refer to Group 25, for further information and useage of the DRB scan tool and a more complete list of Diagnostic Trouble Code.

SPEED CONTROL SLOWS DOWN BY ITSELF

Test vehicle speed sensor, refer to group 8E. If sensor fails replace sensor, if it passes perform the following test:

(1) Perform the speed control switch test on the DECEL switch, if it fails replace switch.

(2) If the switch passes, conduct the vacuum supply test.

(3) If it passes, conduct the servo vacuum test. If it fails replace servo.

(4) 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 (Fig. 2).

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)

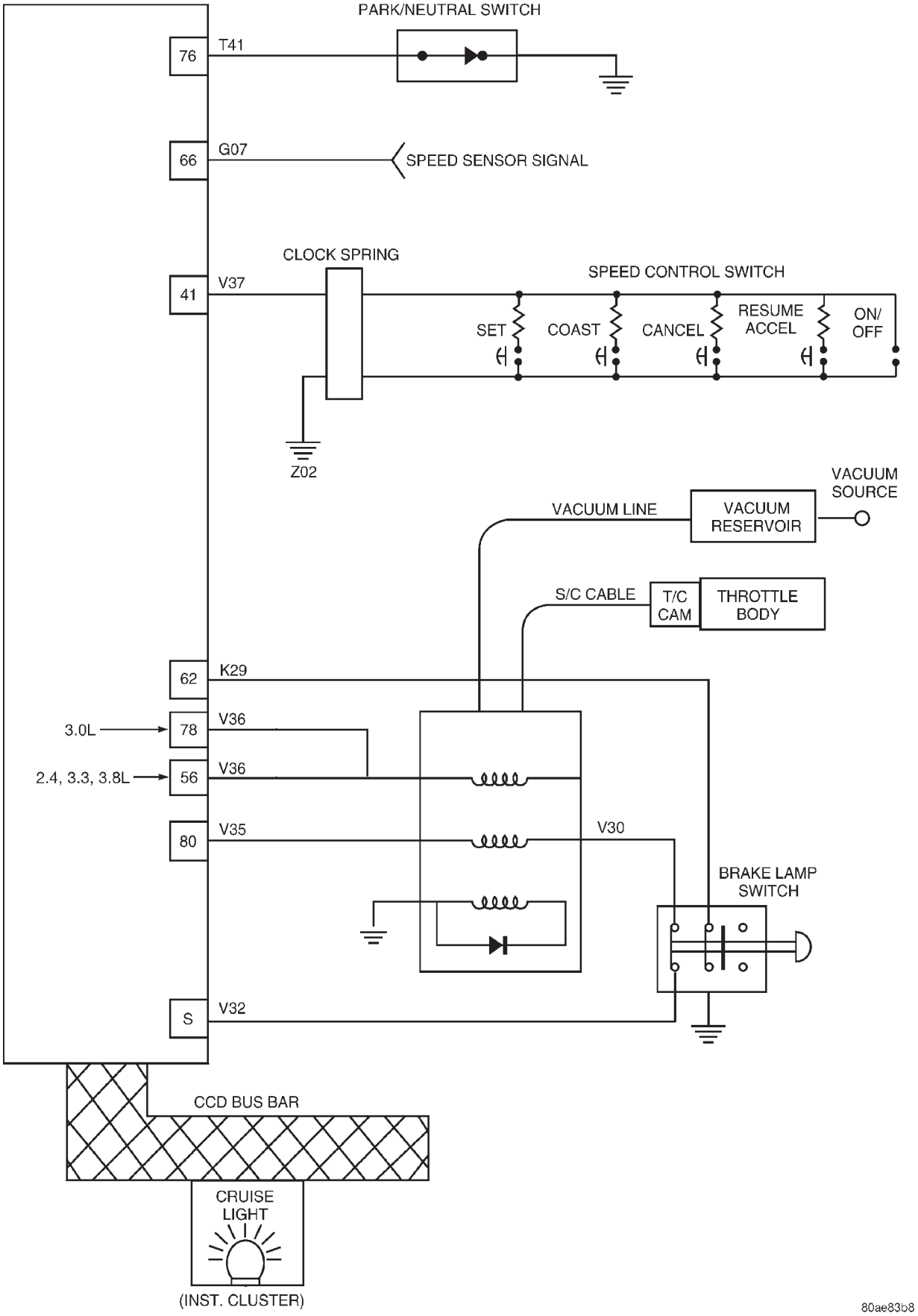

Fig. 2 Speed Control Circuit

DIAGNOSIS AND TESTING (Continued)

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.

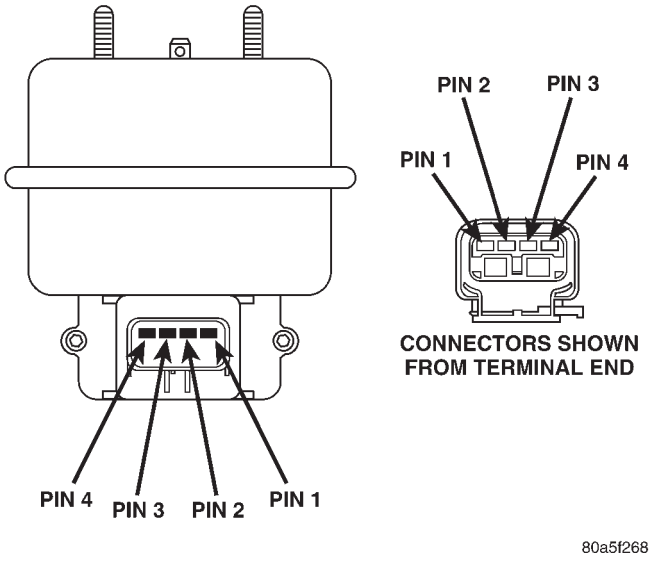

Fig. 3 Servo Harness Connector

SPEED CONTROL SWITCH TEST

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

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:

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

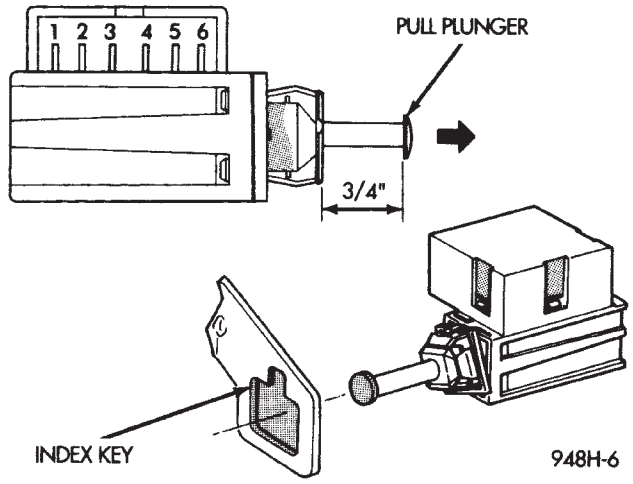

Fig. 4 Stop Lamp Wiring

(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 Group 5, Brakes.

ELECTRICAL TESTS AT POWERTRAIN CONTROL MODULE

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

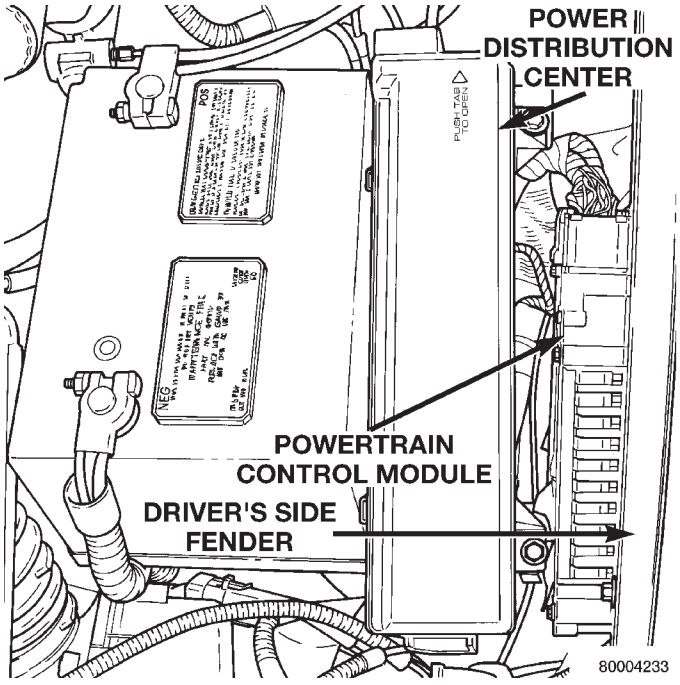

Fig. 5 Powertrain Control Module Location

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

DIAGNOSIS AND TESTING (Continued)

(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.

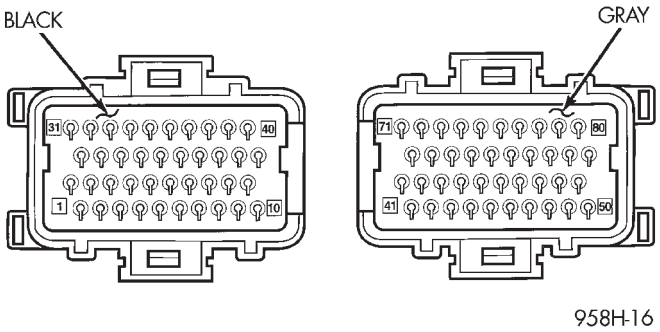

Fig. 6 PCM 40—Way Connectors

(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 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 (2.4, 3.3, 3.8L) or cavity 78 (3.0L) 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.

(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 drive. If 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 no continuity, skip to Step 10.

(b) If continuity is OK, check continuity from pin 5 of PCM connector to ground. If continuity, repair short to ground. If no contunity, replace PCM. Jump to Step 11.

(10) Remove stop lamp switch and conduct Stop Lamp Switch Test. If test fails, adjust or replace as necessary.

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

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

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

DIAGNOSIS AND TESTING (Continued)

VACUUM SUPPLY TEST

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

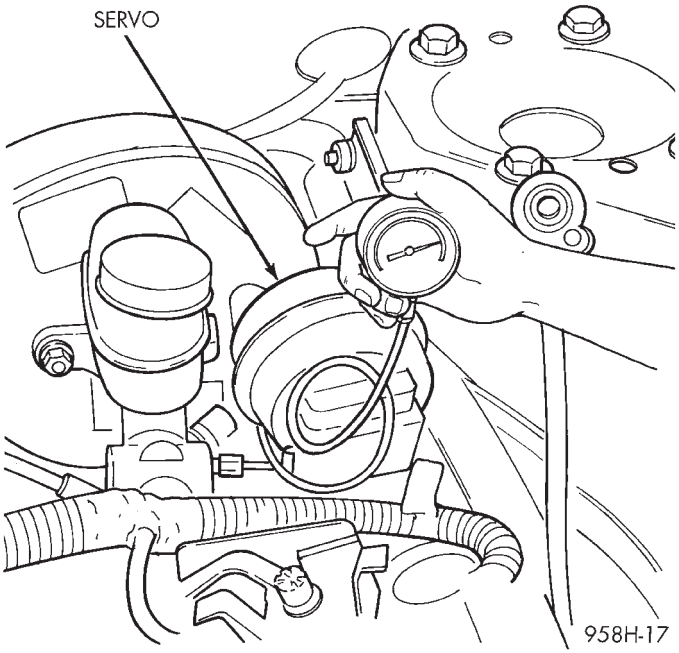

Fig. 7 Vacuum Gauge Test

(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.

VEHICLE SPEED SENSOR

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

REMOVAL AND INSTALLATION

SPEED CONTROL SERVO

REMOVAL

(1) Release hood latch and open hood.

(2) On vehicles with 3.3/3.8 L engine, remove air cleaner resonator. Refer to Group 14, Fuel System for proper procedure.

(3) Disconnect the throttle and speed control cable ends from throttle body (Fig. 8).

(4) Depress lock tabs holding speed control cable casing to cable mount bracket (Fig. 9).

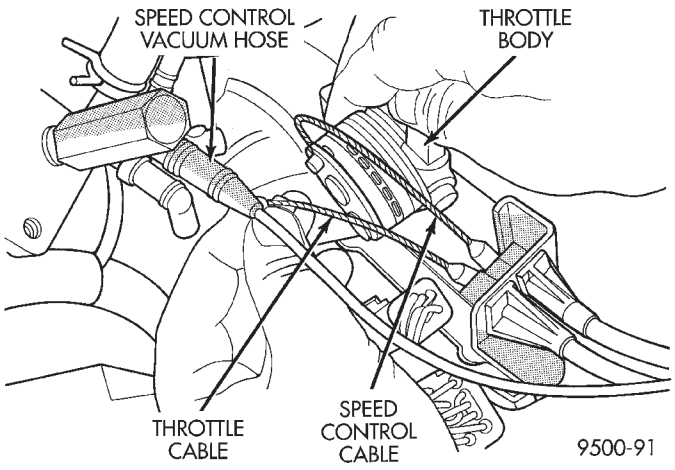

Fig. 8 Speed Control Cable End

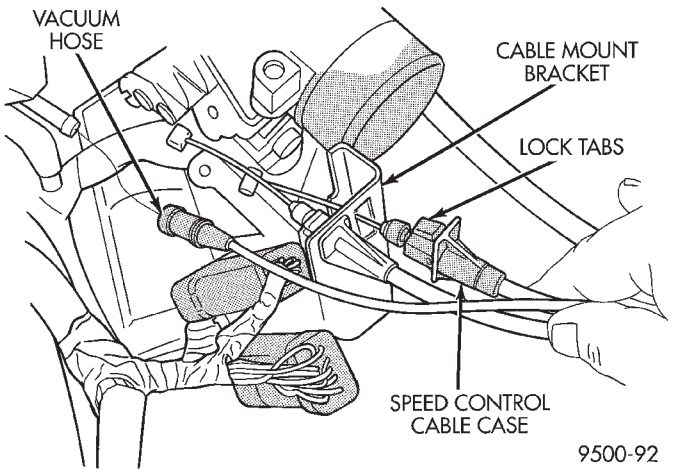

Fig. 9 Speed Control Cable Case and Vacuum Line—Typical

(5) Disconnect vacuum line from nipple on air intake plenum.

(6) Remove tie wrap holding vacuum line, throttle cable, and speed control cable together.

(7) Remove bolt holding speed control servo to side of battery tray/vacuum reservoir (Fig. 10).

(8) Remove speed control servo from battery tray.

(9) Disconnect wire connector from speed control servo.

(10) Disconnect vacuum line from speed control servo that leads to the battery tray/vacuum reservoir.

(11) Remove speed control servo.

REMOVAL AND INSTALLATION (Continued)

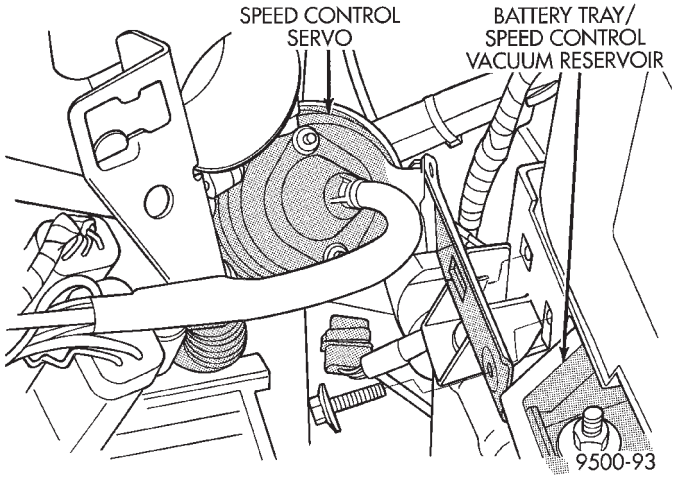

Fig. 10 Speed Control Servo

INSTALLATION

Transfer speed control cable to replacement speed control servo. Reverse the preceding operation.

SPEED CONTROL SWITCHES

REMOVAL

(1) Release hood latch and open hood.

(2) Disconnect battery negative cable.

(3) Remove airbag/horn pad from steering wheel, refer to Group 8M, Restraint Systems for proper procedures.

(4) Disconnect wire connector from horn switch, airbag, and speed control switches.

(5) Remove screws holding speed control switch to airbag/horn pad (Fig. 11).

(6) Separate speed control switch from airbag/horn pad.

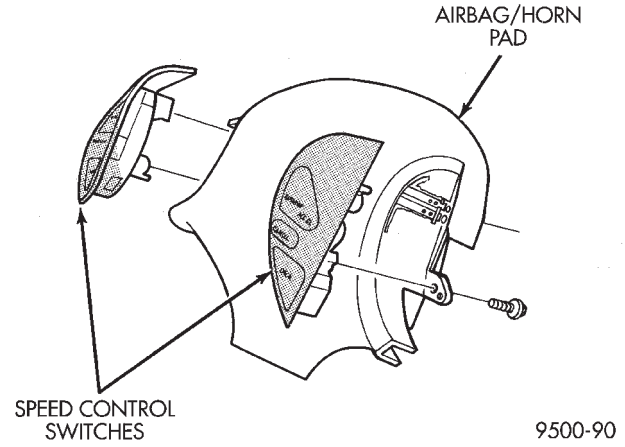

Fig. 11 Speed Control Switches

INSTALLATION

Reverse the preceding operation.

STOP LAMP SWITCH

REMOVAL

Remove the switch from the bracket by depressing the brake pedal and rotating the switch in a counterclockwise 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 CABLE

REMOVAL

(1) Release hood latch and open hood.

(2) On vehicles with 3.3/3.8 L engine, remove air cleaner resonator. Refer to Group 14, Fuel System for proper procedure.

(3) Disconnect throttle and speed control cable ends from throttle body (Fig. 8).

(4) Depress lock tabs holding speed control cable casing to cable mount bracket (Fig. 12).

(5) Remove tie wrap holding vacuum line, throttle cable, and speed control cable together.

(6) Remove nuts holding speed control cable case to servo.

(7) Remove cable case from servo.

(8) Remove hairpin clip holding cable end to servo diaphragm (Fig. 12).

(9) Remove speed control cable.

INSTALLATION

Reverse the preceding operation.

POWERTRAIN CONTROL MODULE

For Removal/Installation refer to Powertrain Control Module in Group 14, Fuel Injection System.

USE THE DRB SCAN TOOL TO REPROGRAM THE NEW PCM WITH THE VEHICLES ORIGINAL IDENTIFICATION NUMBER (VIN) AND THE ORGINAL VEHICLES MILAGE. IF THIS

REMOVAL AND INSTALLATION (Continued)

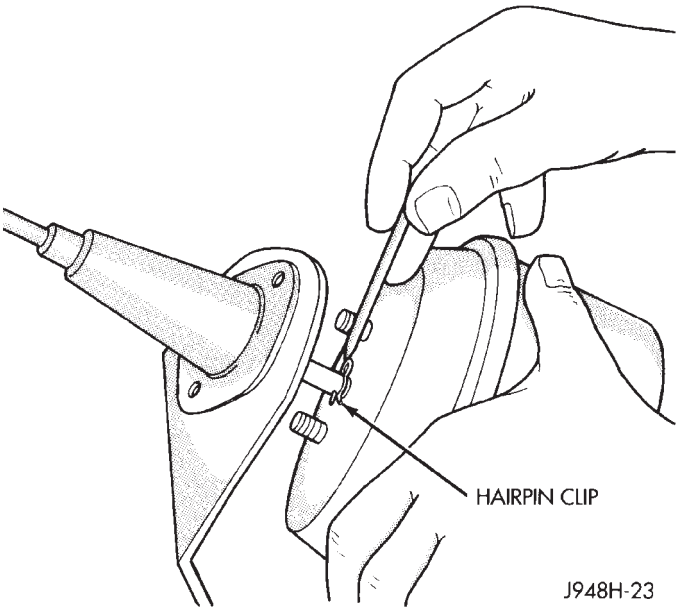

Fig. 12 Speed Control Cable

STEP IS NOT DONE A DIAGONSTIC TROUBLE CODE (DTC) MAY BE SET.

VACUUM RESEROIR

REMOVAL

(1) Disconnect negative cable from battery.
(2) Remove battery, Refer to Group 8B, for Battery Removal/Installation
(3) Remove battery tray.
(4) Disconnect vacuum hoses from vacuum reservoir

INSTALLATION

(1) Connect vacuum hoses to vacuum reservoir.
(2) Install battery tray
(3) Install battery, Refer to Group 8B, for Battery Removal/Installation.
(4) Connect negative cable to battery.

VEHICLE SPEED SENSOR

For Removal/Installation, refer to Vehicle Speed Sensor in Group 14, Fuel Injections.