

SPEED CONTROL SYSTEM

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DESCRIPTION AND OPERATION

SPEED CONTROL SYSTEM

DESCRIPTION

The speed control system is electronically controlled and vacuum operated. Electronic control of the speed control system is integrated into the Powertrain Control Module (PCM). The controls consist of two steering wheel mounted switches. The switches are labeled: ON, OFF, RESUME, ACCEL, SET, COAST, and CANCEL.

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 PCM RAM for speed control. To store a set speed, depress the SET switch while the vehicle is moving at a speed between 35 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
- Depressing the OFF switch
- Depressing the CANCEL switch.
- Depressing the clutch pedal (if equipped)

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 disengage 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 coefficient 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 30 mph) restores the vehicle to the target speed that was stored in the PCM.

DESCRIPTION AND OPERATION (Continued)

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.

A "tap down" feature is used to decelerate without disengaging the speed control system. To decelerate from an existing recorded target speed, momentarily depress the COAST switch. For each switch activation, speed will be lowered approximately 1 mph.

SPEED CONTROL SERVO

DESCRIPTION

The servo unit consists of a solenoid valve body, a vacuum servo and the mounting bracket.

OPERATION

The Powertrain Control Module (PCM) controls the solenoid valve body. The solenoid valve body controls the application and release of vacuum to the diaphragm of the vacuum servo. A cable connects the servo with the throttle linkage. The servo unit cannot be repaired and is serviced only as a complete assembly.

SPEED CONTROL SOLENOID CIRCUITS

OPERATION

When all of the speed control parameters are met, and the SET button is pressed, the PCM actuates the vent solenoid and "duty-cycles" the vacuum solenoid to open the throttle and bring the vehicle up to target speed. When the vehicle is at target speed, it will actuate the vent solenoid with the vacuum solenoid de-activated to maintain the vehicle at target speed. When the vehicle is above target speed, the PCM will "duty-cycle" the vent solenoid with the vacuum solenoid still de-activated to close the throttle to return to target speed.

SPEED CONTROL SWITCHES

DESCRIPTION

Two separate speed control switch modules are mounted on the steering wheel to the left and right side of the driver's airbag module. The two switch modules are labeled: ON/OFF, SET, RESUME/ACCEL, CANCEL and COAST. 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 individual switch fails, the switch module must be replaced.

OPERATION

Within the two switch modules, five **momentary** contact switches, supporting seven different speed control functions are used. The outputs from these switches are filtered into one input. The Powertrain Control Module (PCM) determines which output has been applied through **resistive multiplexing**. The input circuit voltage is measured by the PCM to determine which switch function has been selected.

A speed control indicator lamp, located on the instrument panel cluster is energized by the PCM via the J1850 PCI Bus circuits. This occurs when speed control system power has been turned ON, and the engine is running.

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

DESCRIPTION

The Powertrain Control Module (PCM) is located in the engine compartment.

OPERATION

The speed control electronic control circuitry is integrated into the PCM. 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 certain failures it detects. See On-Board Diagnostic Test For Speed Control System

DESCRIPTION AND OPERATION (Continued)

in this group for more information. The PCM cannot be repaired and must be replaced if faulty.

VACUUM RESERVOIR

DESCRIPTION

The vacuum reservoir is a plastic storage tank connected to an engine vacuum source by vacuum lines.

OPERATION

The vacuum reservoir is used to supply the vacuum needed to maintain proper speed control operation when engine vacuum drops, such as in climbing a grade while driving. A one-way check valve is used in the vacuum line between the reservoir and the vacuum source. This check valve is used to trap engine vacuum in the reservoir. On certain vehicle applications, this reservoir is shared with the heating/air-conditioning system. The vacuum reservoir cannot be repaired and must be replaced if faulty.

VEHICLE SPEED SENSOR

The Vehicle Speed Sensor (VSS) is a pulse generator 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 to the speedometer/odometer is monitored by the PCM speed control circuitry to determine vehicle speed and to maintain speed control set speed.

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 system problem 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, damaged 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 of both ends of the speed control servo cable.
- Smooth operation of throttle linkage and throttle body air valve.
- 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.

ON-BOARD DIAGNOSTIC TEST FOR SPEED CONTROL SYSTEM

The Powertrain Control Module (PCM) monitors critical input and output circuits of the speed control system, making sure they are operational. A Diagnostic Trouble Code (DTC) is assigned to each input and output circuit monitored by the On-Board Diagnostic (OBD) system. Some circuits are checked continuously and some are checked only under certain conditions.

For DTC information, refer to Diagnostic Trouble Codes in Group 25, Emission Control System. This will include a complete list of DTC's including DTC's for the speed control system.

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.

SPEED CONTROL SWITCHES

To perform a complete test of the speed control switch circuits, refer to the appropriate Powertrain Diagnostic Procedures manual.

STOP LAMP SWITCH

For continuity checks and switch adjustment, refer to Group 5, Brakes.

VACUUM SUPPLY TEST

- (1) Disconnect vacuum hose at speed control servo and install a vacuum gauge into the disconnected hose.
- (2) Start engine and observe gauge at idle. Vacuum gauge should read at least ten inches of mercury.
- (3) If vacuum is less than ten inches of mercury, determine source of leak. Check vacuum line to

DIAGNOSIS AND TESTING (Continued)

engine for leaks. Also check actual engine intake manifold vacuum. If manifold vacuum does not meet this requirement, check for poor engine performance and repair as necessary.

(4) If vacuum line to engine is not leaking, check for leak at vacuum reservoir. To locate and gain access to reservoir, refer to Vacuum Reservoir Removal/Installation in this group. Disconnect vacuum line at reservoir and connect a hand-operated vacuum pump to reservoir fitting. Apply vacuum. Reservoir vacuum should not bleed off. If vacuum is being lost, replace reservoir.

(5) Verify operation of one-way check valve and check it for leaks.

(a) Locate one-way check valve. The valve is located in vacuum line between vacuum reservoir and engine vacuum source. Disconnect vacuum hoses (lines) at each end of valve.

(b) Connect a hand-operated vacuum pump to reservoir end of check valve. Apply vacuum. Vacuum should not bleed off. If vacuum is being lost, replace one-way check valve.

(c) Connect a hand-operated vacuum pump to vacuum source end of check valve. Apply vacuum. Vacuum should flow through valve. If vacuum is not flowing, replace one-way check valve. Seal the fitting at opposite end of valve with a finger and apply vacuum. If vacuum will not hold, diaphragm within check valve has ruptured. Replace valve.

SPEED CONTROL SERVO

For complete speed control system diagnosis, including the speed control servo, refer to the appropriate Powertrain Diagnostic Procedures manual.

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 accelerat-

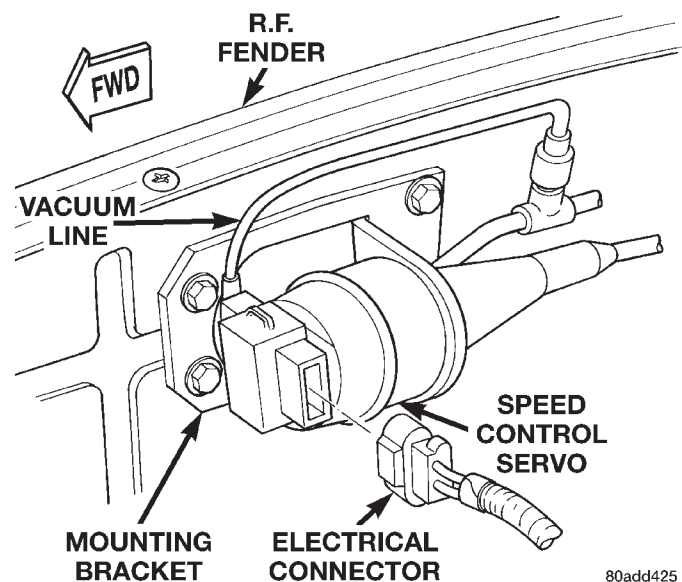
ing), and then turn the cruise control switch to the OFF position (or press the CANCEL button if equipped) after waiting 10 seconds. This procedure must be performed approximately 10-15 times to completely unlearn the overshoot/undershoot condition.

REMOVAL AND INSTALLATION

SPEED CONTROL SERVO

REMOVAL

- (1) Disconnect negative battery cable at battery.
- (2) Disconnect vacuum line at servo (Fig. 1).
- (3) Disconnect electrical connector at servo.
- (4) Disconnect servo cable at throttle body. Refer to Servo Cable Removal/Installation in this group.
- (5) Remove 2 mounting nuts holding servo cable sleeve to bracket (Fig. 2).
- (6) Pull speed control cable sleeve and servo away from servo mounting bracket to expose cable retaining clip (Fig. 2) and remove clip. Note: The servo mounting bracket displayed in (Fig. 2) is a typical bracket and may/may not be applicable to this model vehicle.



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Fig. 1 Speed Control Servo Location

- (7) Remove servo from mounting bracket. While removing, note orientation of servo to bracket.

INSTALLATION

- (1) Position servo to mounting bracket.
- (2) Align hole in cable connector with hole in servo pin. Install cable-to-servo retaining clip.
- (3) Insert servo mounting studs through holes in servo mounting bracket.

REMOVAL AND INSTALLATION (Continued)

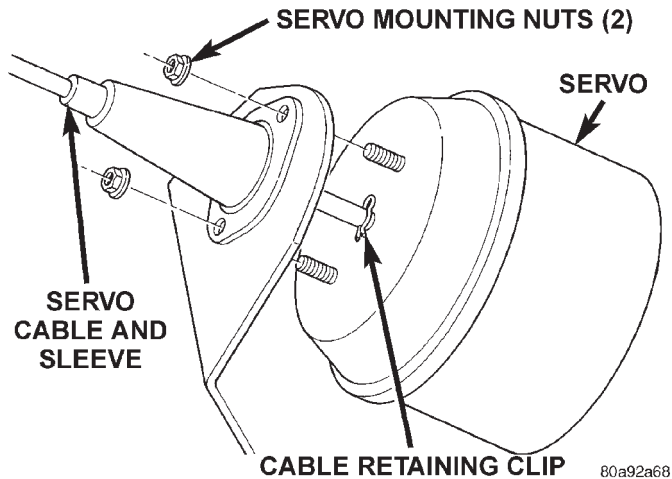


Fig. 2 Servo Cable Clip Remove/Install—Typical

- (4) Install servo mounting nuts and tighten to 8.5 N·m (75 in. lbs.).
- (5) Connect vacuum line at servo.
- (6) Connect electrical connector at servo.
- (7) Connect servo cable to throttle body. Refer to Servo Cable Removal/Installation in this group.
- (8) Connect negative battery cable to battery.
- (9) Before starting engine, operate accelerator pedal to check for any binding.

SPEED CONTROL SWITCH

WARNING: BEFORE ATTEMPTING TO DIAGNOSE, REMOVE OR INSTALL ANY AIRBAG SYSTEM OR RELATED STEERING WHEEL AND STEERING COLUMN COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. WAIT 2 MINUTES FOR SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

REMOVAL

- (1) Disconnect and isolate negative battery cable from battery.
- (2) Remove airbag module. Refer to Group 8M, Passive Restraint Systems for procedures.
- (3) From underside of steering wheel, remove speed control switch mounting screw (Fig. 3).
- (4) Remove switch from steering wheel and unplug electrical connector.

INSTALLATION

- (1) Plug electrical connector into switch.
- (2) Position switch to steering wheel.
- (3) Install switch mounting screw and tighten to 1.5 N·m (14 in. lbs.) torque.

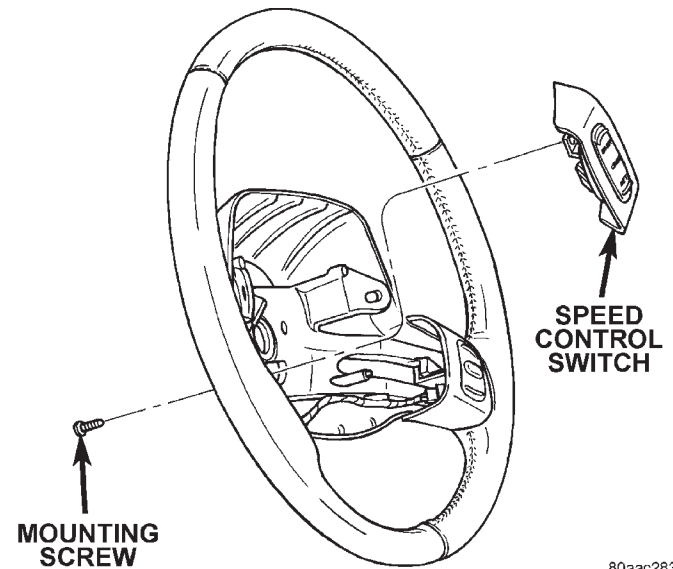


Fig. 3 Speed Control Switch Remove/Install

- (4) Install airbag module. Refer to Group 8M, Passive Restraint Systems for procedures.
- (5) Connect negative battery cable to battery.

STOP LAMP SWITCH

Refer to Stop Lamp Switch in Group 5, Brakes for removal/installation and adjustment procedures.

SERVO CABLE

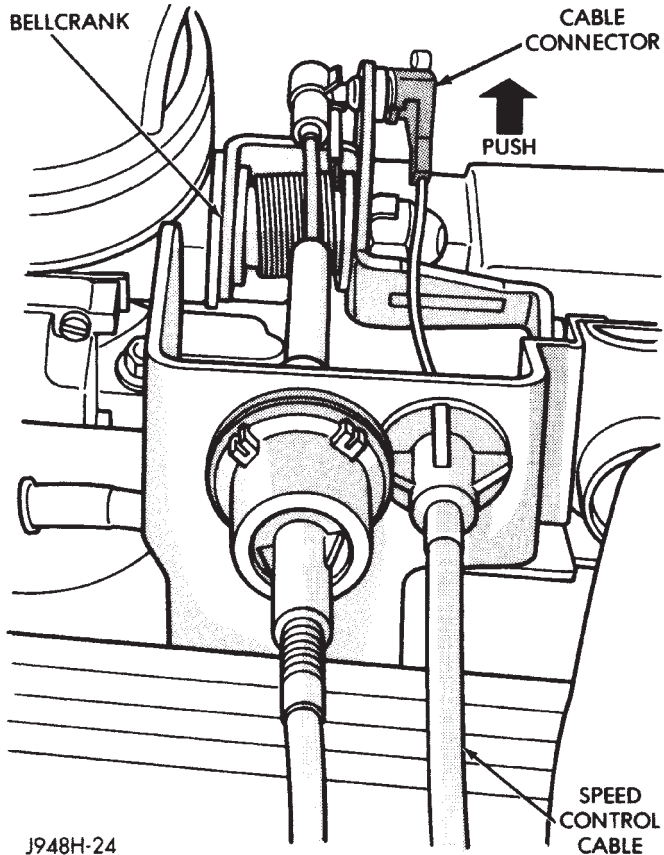
REMOVAL

- (1) Disconnect negative battery cable at battery.
- (2) Using finger pressure only, remove cable connector by pushing connector off the throttle body bellcrank pin (Fig. 4). **DO NOT try to pull cable connector off perpendicular to the bellcrank pin. Connector will be broken.**
- (3) Two squeeze tabs are located on sides of speed control cable at cable locking plate (Fig. 5). Squeeze the tabs together and push cable out of cable locking plate.
- (4) Unclip cable from cable guide at valve cover (Fig. 5).
- (5) Disconnect servo cable at servo. Refer to Speed Control Servo—Removal/Installation.

INSTALLATION

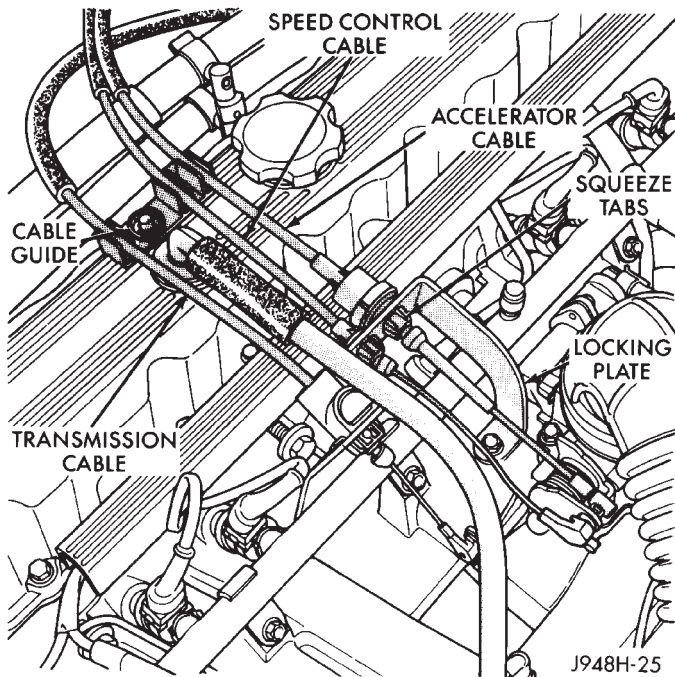
- (1) Attach end of cable to speed control servo. Refer to Speed Control Servo Removal/Installation.
- (2) Install cable into cable locking plate (snaps in).
- (3) Install cable connector at throttle body bellcrank pin (snaps on).
- (4) Clip cable to cable guide at valve cover.
- (5) Connect negative battery cable to battery.
- (6) Before starting engine, operate accelerator pedal to check for any binding.

REMOVAL AND INSTALLATION (Continued)



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Fig. 4 Servo Cable to Bellcrank—Remove/Install



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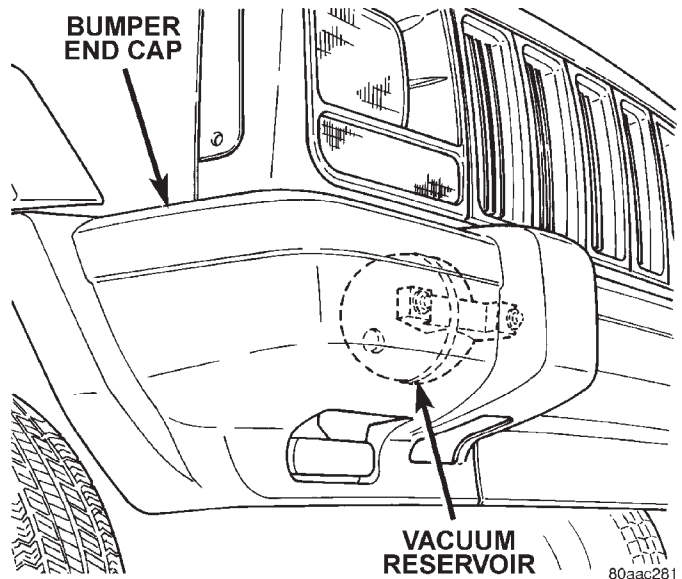
Fig. 5 Squeeze Tabs at Cable Locking Plate

VACUUM RESERVOIR

REMOVAL

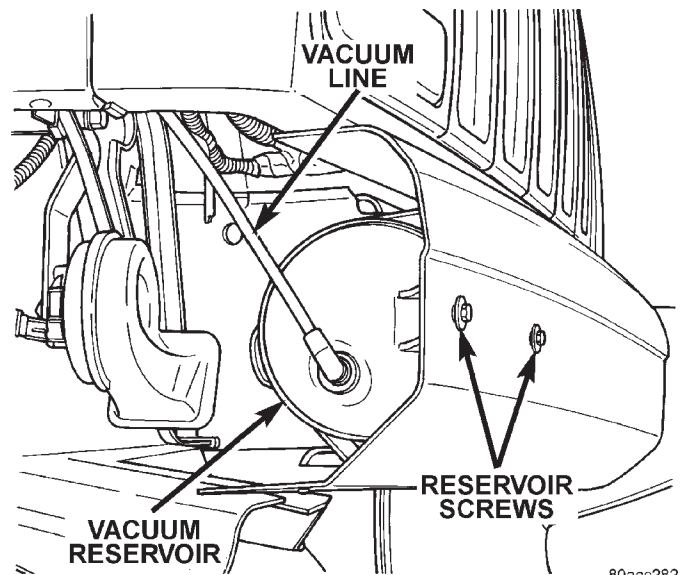
The vacuum reservoir is located behind right front bumper end cap on vehicles equipped with LHD (Left Hand Drive) (Fig. 6). It is located behind left front bumper end cap on vehicles equipped with RHD (Right Hand Drive).

- (1) Remove front bumper end cap. Refer to Front Bumper End Cap in Group 23, Body for procedures.
- (2) Remove vacuum line at reservoir (Fig. 7).
- (3) Remove 2 reservoir mounting screws.
- (4) Remove reservoir from bumper bar.



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Fig. 6 Vacuum Reservoir Location



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Fig. 7 Vacuum Reservoir Removal/Installation

REMOVAL AND INSTALLATION (Continued)

INSTALLATION

(1) Position reservoir to bumper bar and install mounting screws. Tighten screws to 8 N·m (72 in. lbs.) torque.

(2) Install vacuum line to reservoir

(3) Install front bumper end cap. Refer to Group 23, Body for procedures.

SPECIFICATIONS

TORQUE CHART

Description	Torque
Servo Mounting Bracket-to-Servo Nuts	8.5 N·m (75 in. lbs.)
Servo Mounting Bracket-to-Body Bolts	2 N·m (20 in. lbs.)
Speed Control Switch Mounting Screws . . .	1.5 N·m (14 in. lbs.)
Vacuum Reservoir Mounting Bolts	8 N·m (72 in. lbs.)

