SECTION A

CRUISE MASTER

CONTENTS

DIVISION II
DESCRIPTION AND OPERATION

65-1 DESCRIPTION AND OPERATION OF CRUISE MASTER

a. Introduction

Cruise Master is a driver operated cruise control system. It may be either factory or dealer installed.

b. Driver Operation

1. Engagement - The driver accelerates to the speed at which he desires to cruise and momentarily operates the cruise control engagement switch to the ON position. The cruise system immediately takes over speed control and, within engine limitation, maintains this speed regardless of changes in terrain.

The engagement switch performs these functions: (a) When moved past the ON position in the same direction, it disengages the system. (b) During releasing, it engages the system. (c) When released completely, it holds the system in engagement. (The lowest speed at which the system should be used is 30 MPH.)

When the system is engaged the green cruise lamp will light, indicating that the system is engaged.

2. Disengagement - The system automatically disengages whenever the brake is depressed. It may be disengaged by operating the engagement switch to the OFF position.

The cruise lamp will go out, indicating that the system is no longer in use.

3. Speed Adjustment -
(a) Upward - Depress the accelerator pedal to the new desired speed. Then operate the cruise control engagement switch in the ON direction and release.

(b) Downward - Disengage the system by operating the engagement switch fully in the ON direction and holding it there until the car has decelerated to the new desired speed; then release the switch.

4. Override - The accelerator pedal may be depressed at any time to override the cruise system. Release of the accelerator pedal will return the car to the previous cruise speed.

c. Cruise Master Units

(Figures 65-1, 2 & 3 show the units in the installed position on the three series of vehicles.)

1. The engagement switch, which is mounted to the right of the speedometer on the instrument panel, is used to control the system and for upward and downward speed adjustments.

2. The speed transducer, which is mounted in the speedometer cable line, is a combination speed sensing device and control unit. When engaged, it senses vehicle speed and positions the power unit to maintain the selected speed.

3. The power unit, which is mounted under the hood, is connected by a ball chain in upper

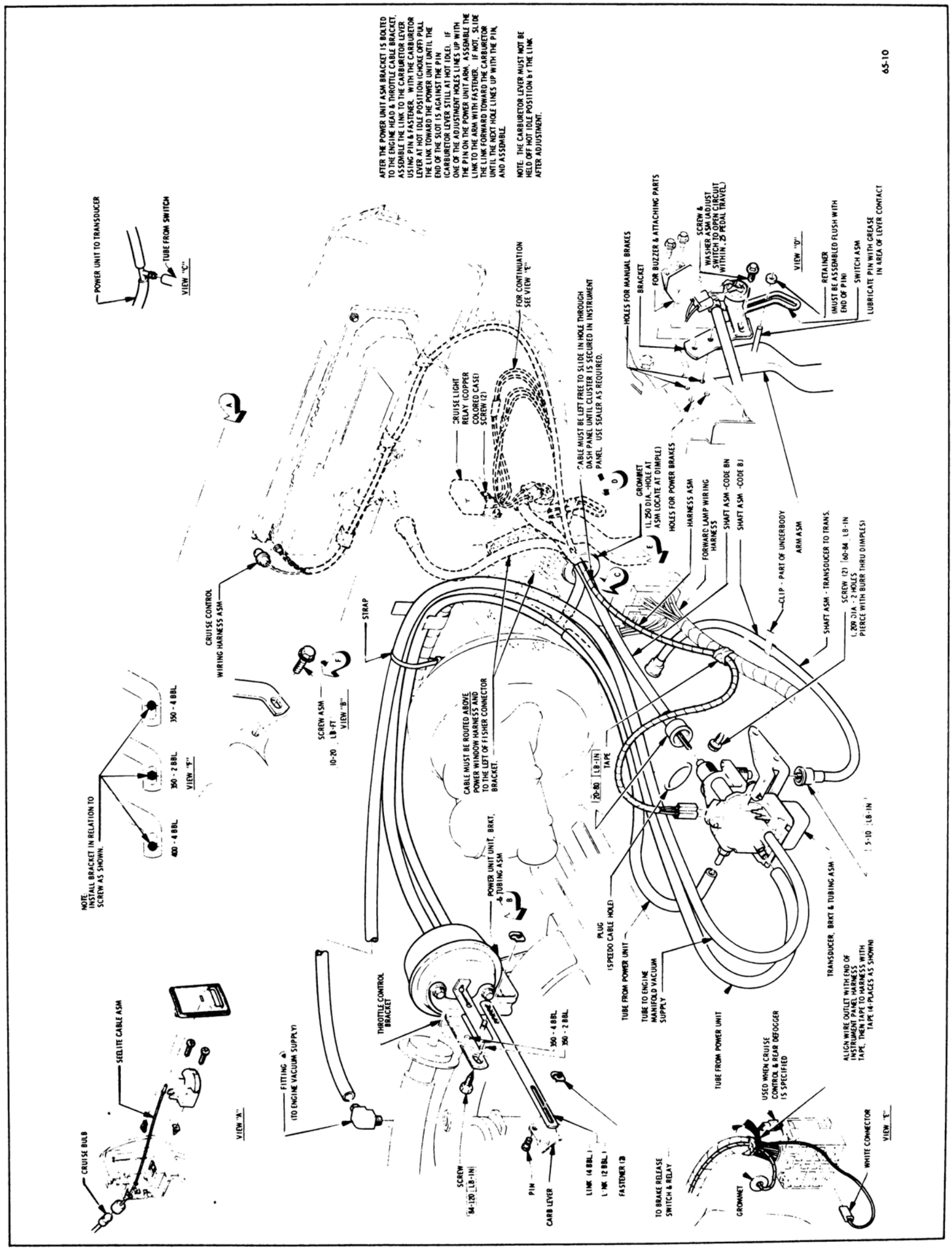

Figure 65-1—Cruise Master Installation 43-44000 Series

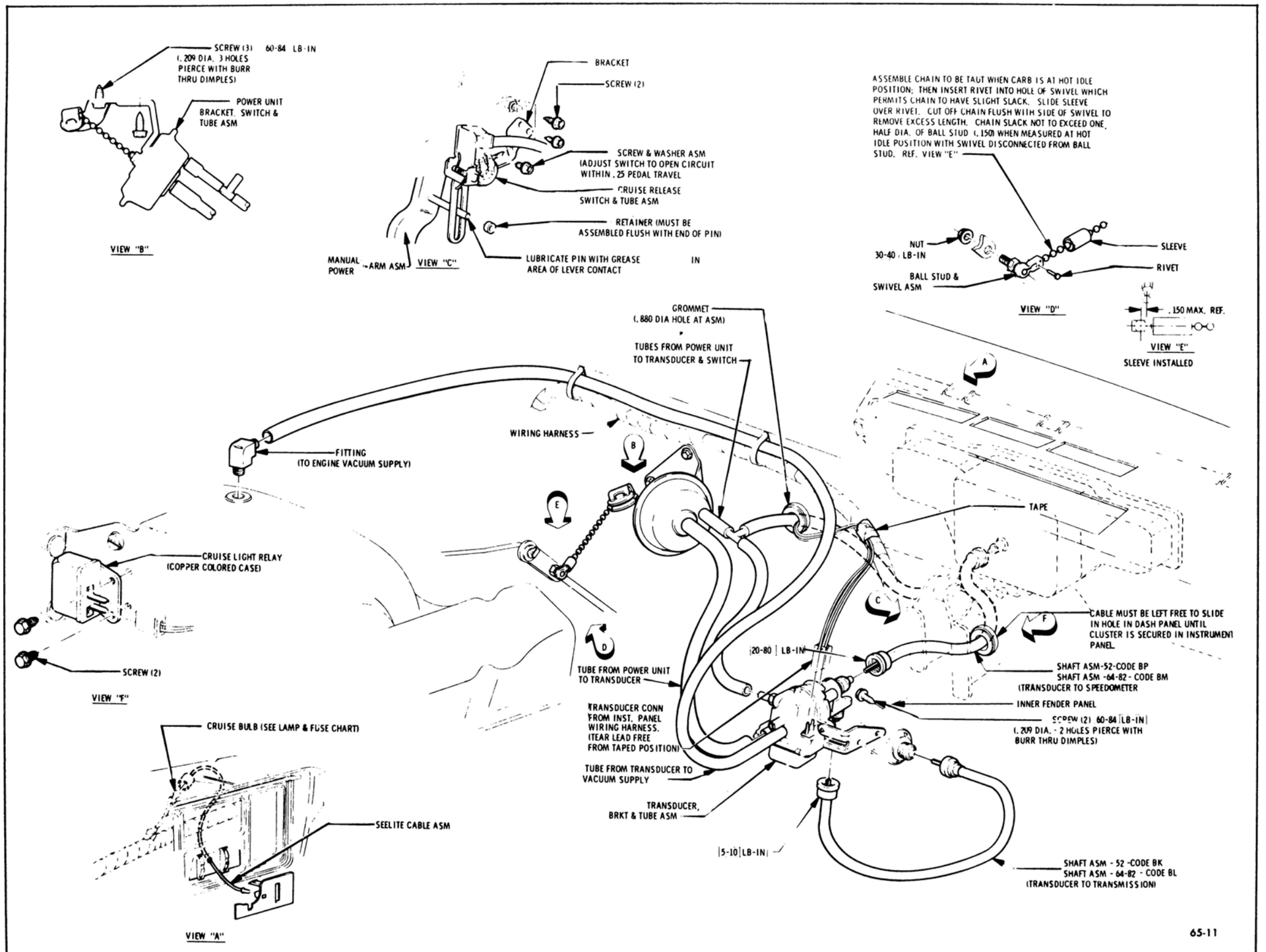

Figure 65-2—Cruise Master Installation 45-46-48000 Series

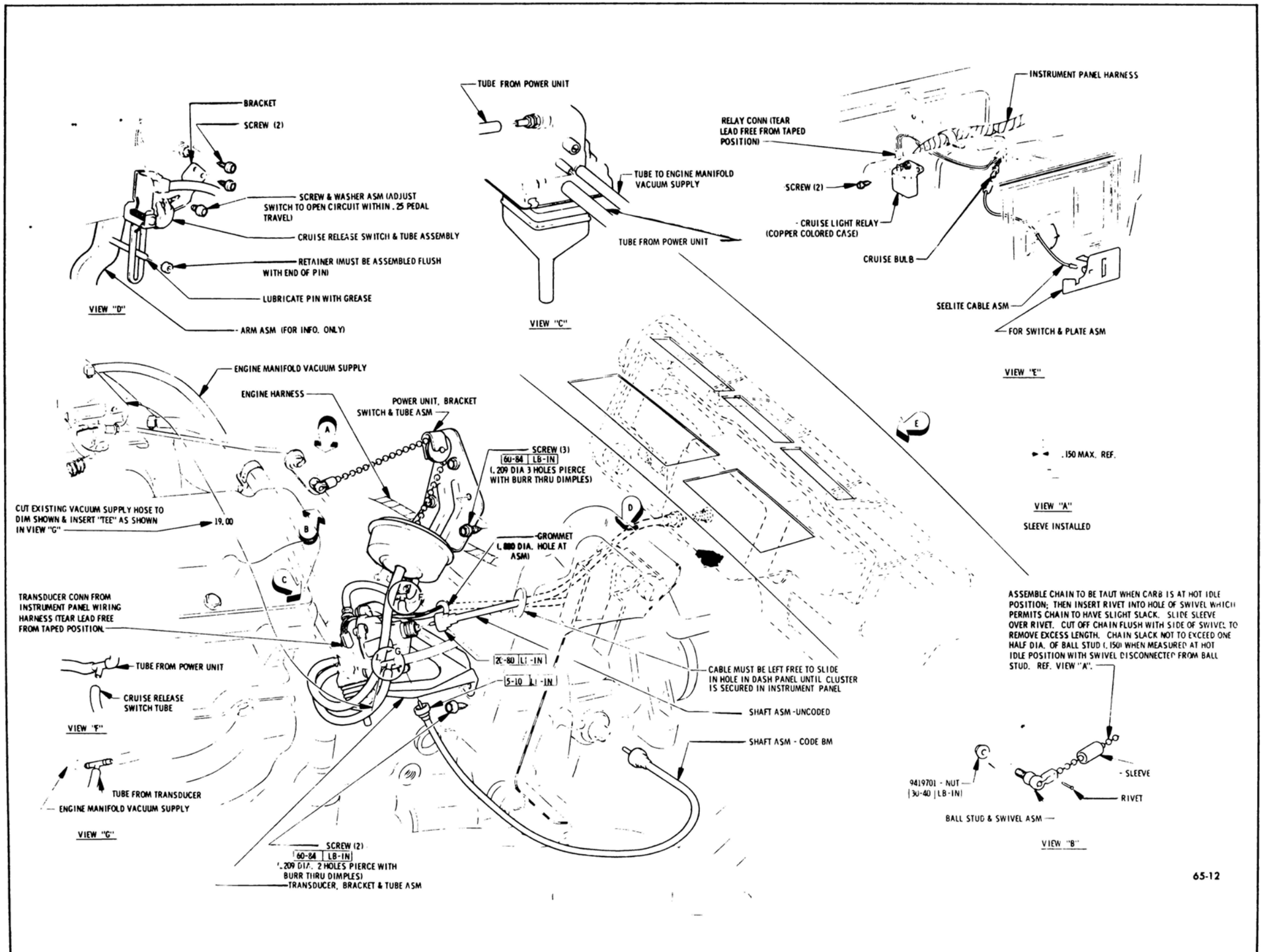

Figure 65-3—Cruise Master Installation - Riviera

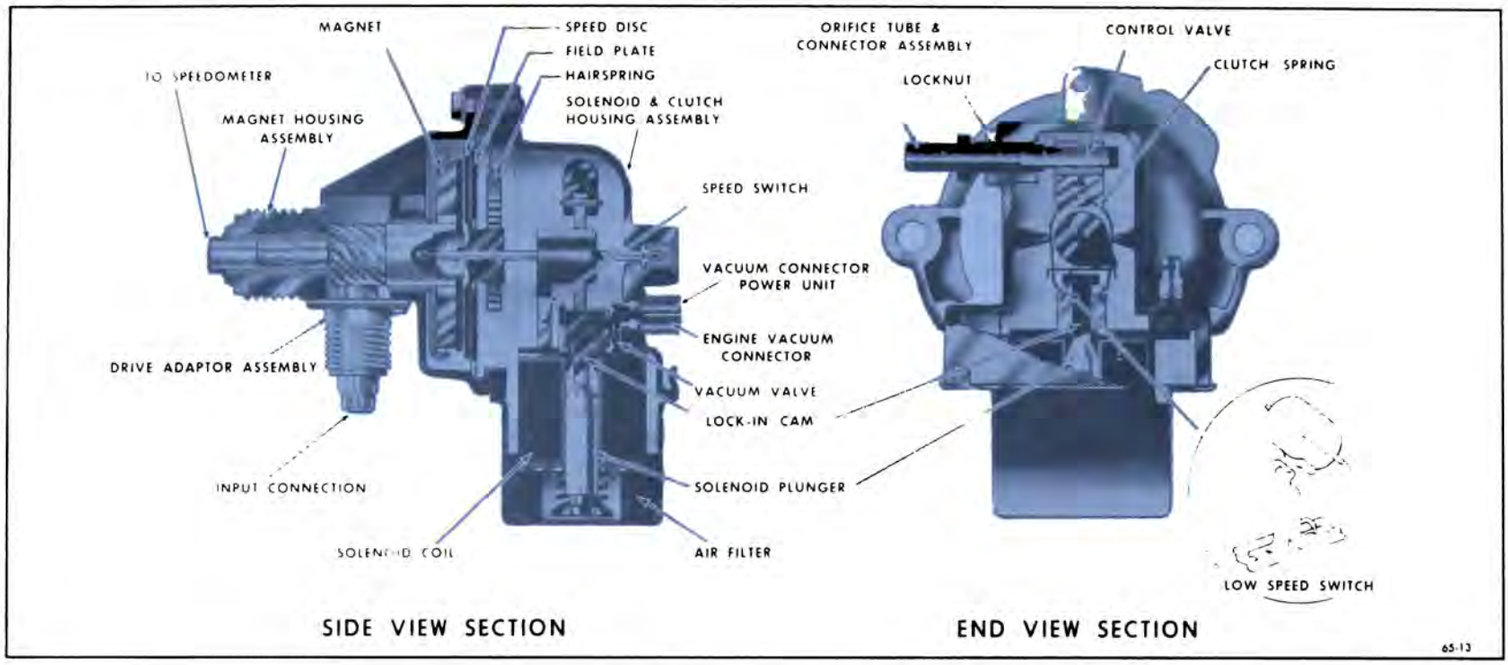

Figure 65-4—Cruise Master Speed Transducer - Section Views

series cars and by a linkage in lower series cars to the carburetor linkage. It opens or closes the throttle as dictated by the speed transducer.

4. The cruise release brake switch, which is mounted on the brake pedal bracket, disengages the system electrically and pneumatically when the brake pedal is depressed.

5. The cable and casing assemblies drive the transducer and speedometer.

6. The lamp relay is used to light the cruise lamp.

d. Operation of Cruise Master

The transducer consists of two sub-assemblies: The magnet housing assembly and the solenoid and clutch housing assembly. The magnet housing assembly contains the drive adapter assembly, magnet and shaft assembly, and the speed disc field plate and spindle assembly. See Figure 65-4.

The solenoid and clutch housing contains the orifice tube and connector assembly, the control valve, the engagement clutch spring, the low speed switch, the engagement solenoid assembly, and the air filter assembly.

The power unit consists of a diaphragm, metering rod, and return spring. The vacuum level of the sealed chamber is controlled by the transducer. The ball chain connects directly to the throttle linkage to control carburetor throttle position. See Figure 65-5.

When the driver operates the cruise control engagement switch in the ON direction at speeds above the recommended minimum operating speed of 30 MPH, the electrical circuit to the transducer solenoid is completed through pins 2 and 3, thus energizing the solenoid and engaging the cruise system. See Figure 65-6. When the switch is released, it returns to its normal position and the electrical circuit to the solenoid is completed through pins 2 and 1. Note that in

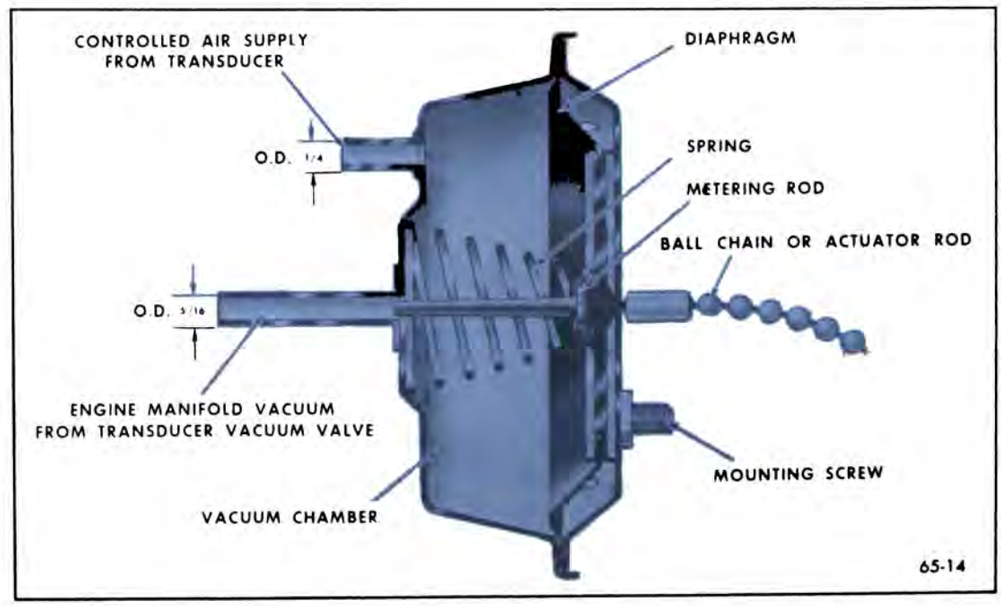

Figure 65-5—Power Unit

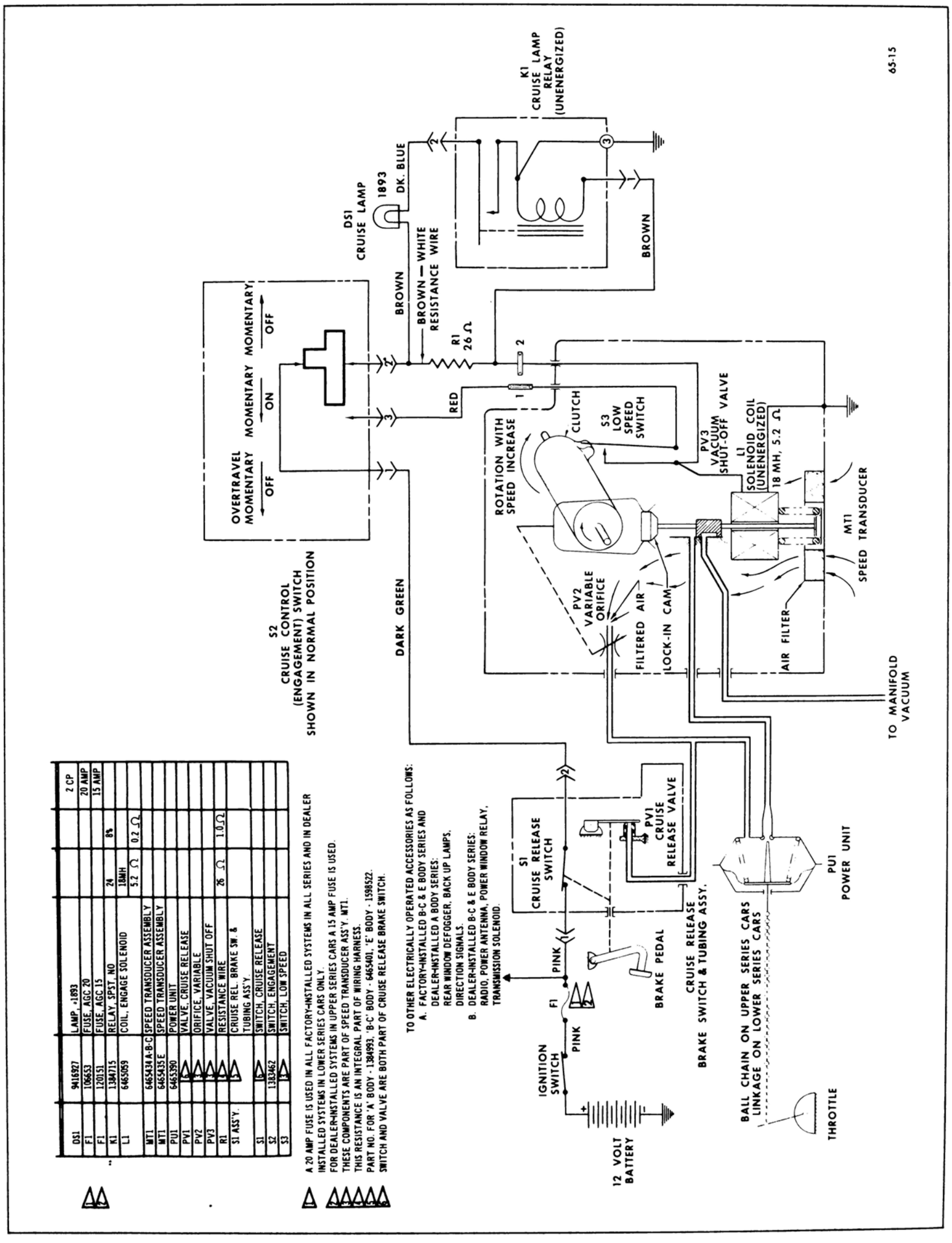

Figure 65-6—Cruise Master Electric - Vacuum Schematic

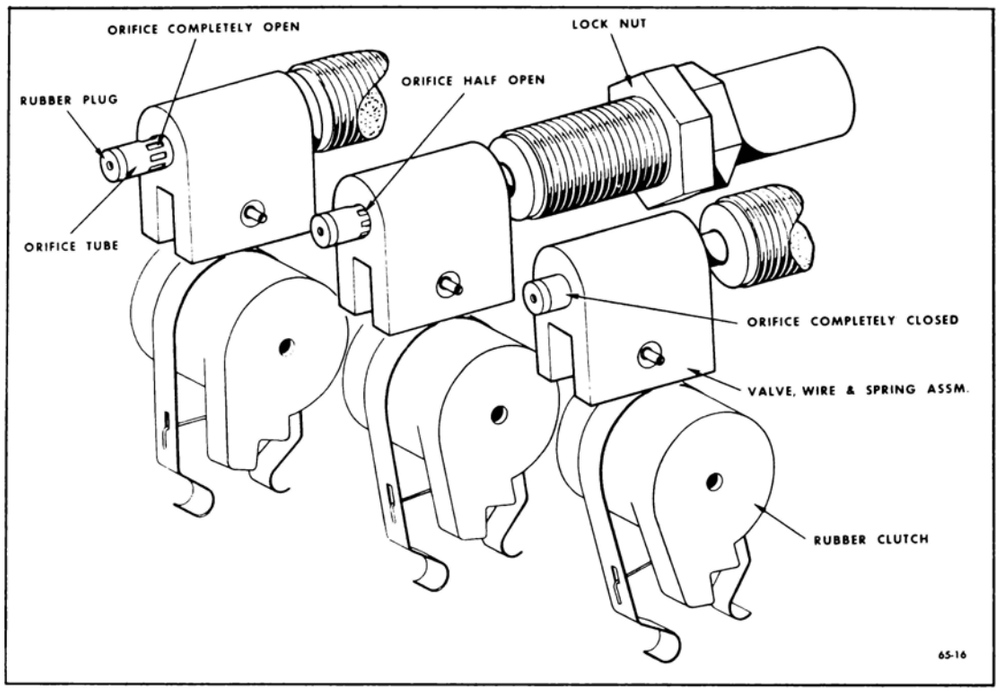

Figure 65-7—Transducer Air Bleed Orifice Openings

this position the only circuit to the solenoid is through resistance R1. The current flow through the resistor is not sufficient to engage the solenoid, but it is sufficient to hold the solenoid in the engaged position, once it has been engaged through the other circuit.

When the switch is operated fully in the ON direction to the overtravel "momentary off" position and held, such as when the driver desires to make a downward speed adjustment, there is no connection between pin 1 and pins 2 or 3. Thus, the system is de-energized. As the switch is released an electrical connection is first made between pins 1 and 3, which engages the solenoid and then through pins 1 and 2 which holds the solenoid as previously described.

When the system is disengaged by either the cruise release brake switch (by depressing the brake pedal) or by moving the cruise control engagement switch to the OFF position, all voltage is removed from the transducer solenoid. However, after either switch is returned to the normal position (and the ignition switch is on), there is current flowing through pins 1 and 2 of the engagement switch. This current is not high enough to engage the solenoid because of the limiting action of resistance R1.

The low-speed switch is open at speeds below 24 MPH, making the system inoperative since the circuit from pin 3 of the engagement switch to the speed transducer solenoid is open and the solenoid cannot be energized.

The cruise lamp relay closes whenever the driver operates the cruise control engagement switch in the ON direction at speeds above 24 MPH. The cruise lamp relay is energized through pins 1 and 3 of the engagement switch, terminal 1 of the transducer, the transducer low-speed switch, terminal 2 of the transducer, and terminals 1 to 3 of the relay. When the relay coil is so energized, the resultant magnetic field closes the armature contact. The cruise lamp circuit is then complete from relay terminal 2 to ground through the relay mounting bracket. See Figure 65-6.

Energization of the transducer solenoid, positions a lock-in cam which allows the clutch spring of the valve, wire, and spring assembly to grasp the rubber clutch fixed to the speed disc spindle assembly.

Theoretically the rubber clutch behaves as does a speedometer pointer - that is, it moves either clockwise or counterclockwise in proportion to the speed of the rotating magnet. Since the control valve is mechanically connected to the clutch spring, the valve moves either to the right or to the left, proportional to the speed of the rotating magnet. This motion of the control valve changes the size of the openings in the orifice tube. Also, energizing the transducer positions the vacuum valve within the transducer to connect engine vacuum directly to the power unit. See Figure 65-6.

At the moment of engagement, engine manifold vacuum is applied to the power unit diaphragm chamber through the metering rod aperture. At the same time, air entering through the transducer filter is metered through the window openings in the orifice tube. The balance of these two forces (manifold vacuum and atmospheric air) in the power unit provides the initial throttle positioning.

If the car goes upgrade, there is a tendency for speed reduction. When speed reduction occurs (refer to Figure 64-7) the valve, wire and spring assembly moves in the direction which makes the window openings smaller, reducing the amount of atmospheric air to the power unit thereby increasing the vacuum level in the power unit. This draws in the diaphragm, thus increasing the carburetor throttle opening via the connecting ball chain or linkage and maintaining cruise speed.

Conversely, if the car goes down grade, there is a tendency to exceed the set speed. In this case, the valve moves in the direction which increases the size of the window openings. This admits a

larger volume of air to the power unit, reducing its vacuum level and in turn allowing the diaphragm to move out and reduce the carburetor throttle opening, thereby maintaining cruise speed.

Both overspeed and underspeed tendencies are immediately corrected since 3 MPH speed change will result in a change in the size of window openings capable of moving the power unit through its complete range. This means that the throttle will be moved through its complete cruise range with a speed change of 3 MPH. This results in accurate control of cruise speed.

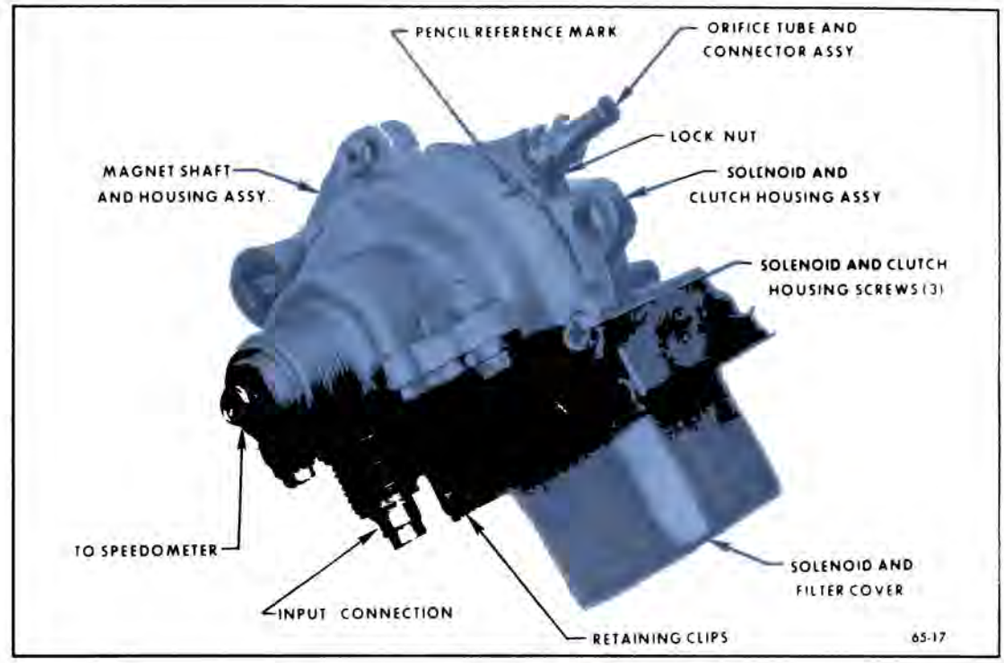

Figure 65-8—Speed Transducer

65-2 CRUISE MASTER SERVICE PROCEDURES

IMPORTANT: Do not lubricate power unit bead chain or its pully.

a. Power Unit Bead Chain Adjustment (Upper Series Cars)

1. Adjust engine hot idle speed and mixture, then shut off engine.

2. Check bead chain slack by unsnapping swivel from ball stud and holding chain taut at ball stud; center of swivel should extend 1/8 inch beyond center of ball stud. See Figure 65-2 or 3.

3. Adjust bead chain slack, if necessary, by sliding sleeve back on chain and removing loose rivet. Move swivel on ball chain until slack is correct, reinstall rivet and again slide sleeve over rivet.

b. Power Unit Linkage Adjustment (Lower Series Cars)

1. Adjust engine hot idle speed and mixture, making sure that carburetor lever is not held off hot idle position by the cruise control link. Shut off engine.

2. To make sure there isn't excessive slack, check to see that carburetor lever pin is within 1/8 inch of end slot in cruise control link. See Figure 65-1.

3. Adjust linkage slack, if necessary, by removing fastener from pin at power unit end of link and removing link from pin. Shorten link as much as possible without moving carburetor lever from hot idle position and reinstall on power unit pin. Reinstall fastener on pin and recheck for proper cruise control linkage slack.

c. Brake Release Switch Adjustment

1. Turn on ignition switch. Connect a test light between one terminal of brake release switch and ground; select terminal where light goes out when brake pedal is depressed.

2. Loosen screw that retains brake release switch to brake pedal support bracket. Position switch so that circuit opens (light goes out) when brake pedal is depressed 1/4 inch.

3. Tighten screw and recheck brake release switch adjustment.

d. Cruise Speed Adjustment

If the car cruises at a speed above or below the engagement speed, this error can be corrected with a simple adjustment of the orifice tube in the transducer. See Figure 65-8.

1. To check cruise speed error, engage Cruise Master at exactly 60 MPH.

2. If car cruises below engagement speed, screw orifice tube outward.

3. If car cruises above engagement speed, screw orifice tube inward.

NOTE: Each 1/4 turn of the orifice tube will change cruise speed approximately one MPH. Snug-up lock nut after each adjustment before testing.

e. Transducer Air Filter Replacement

1. Replace the transducer air filter each 12,000 miles. More frequent replacement is recommended if cruise system is operated in extremely dusty conditions. When making the replacement:

(a) Place polyurethane filter in bottom of solenoid and filter cover. Note rectangular shape of filter and cover. See Figure 65-9.

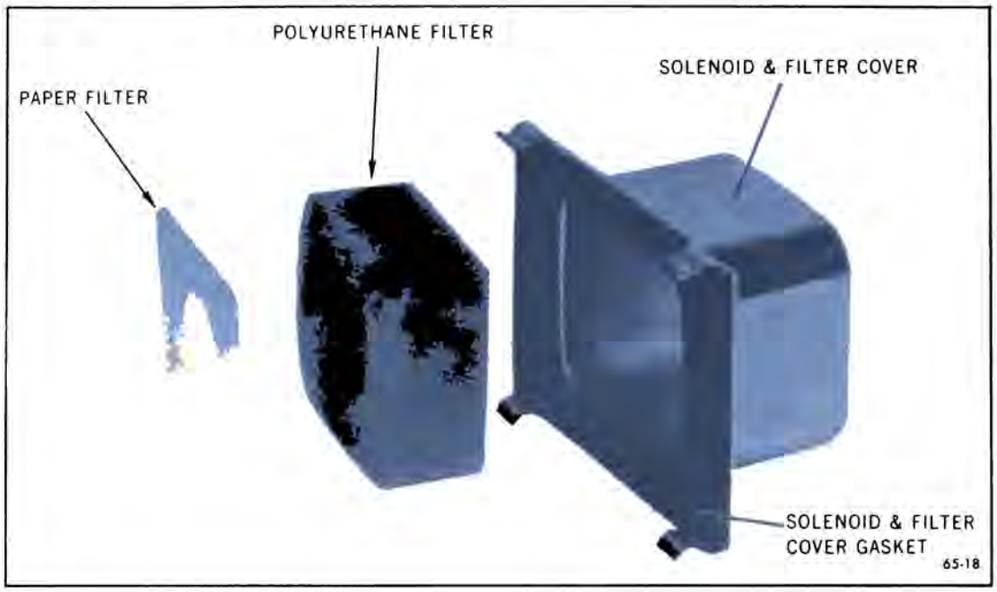

Figure 65-9—Replacing Cruise Master Air Filter

(b) Place paper filter on top of polyurethane filter with the side marked by a red stripe towards the polyurethane filter. This will place the side with the impression of a fine screen towards the solenoid casting.

(c) Position the solenoid and filter cover and its rubber gasket to the solenoid housing casting and secure with the cover retaining clips. Use care to insure that a tight gasket seal is obtained.

65-3 CRUISE MASTER TROUBLE DIAGNOSIS

a. Electrical Check Out

1. Check all fuses and connections.

2. Check adjustment of cruise release brake switch. See paragraph 65-2,c.

3. Check cruise control engagement switch as follows:

(a) Remove the plate and lens assembly which covers the switch body on the front of the instrument panel.

(b) Remove switch and check out using ohmmeter or test lamp. Refer to Figure 65-6 for location of terminal numbers and for circuit function. Replace switch as required.

4. With the cruise control engagement switch removed as in Step 3, above, disconnect battery and check wiring harness and circuitry as follows:

(a) Connect an ohmmeter at appropriate terminals and junction points as indicated in the schematic diagram of Figure 65-6 to measure the following resistances:

(1) Harness brown-white resistance wire, R1, which is 26 ± 1 ohms.

(2) Transducer solenoid coil resistance, which is 5.2 ± 0.2 ohms.

(3) Cruise lamp relay coil resistance which is 24 ohms ± 2 ohms.

Note that these resistance values are given for parts at normal room temperatures of 68-72°F. Use care to disconnect relay and transducer as needed to eliminate possible parallel paths to ground when making resistance checks. Except for the brown-white resistance wire, all harness wires shall indicate zero resistance (continuity) when checked per the schematic of Figure 65-6. If values of resistance other than those indicated above occur, take corrective action and repair or replace as required.

(b) Check cruise lamp bulb if indicated. Replace if required.

(c) Replace cruise control switch and reconnect battery.

b. Power Unit and Vacuum System Check Out

1. Disconnect ball chain or linkage from throttle.

2. Seal the 1/4 inch side fitting on the power unit. See Figure 65-5.

3. Apply either engine vacuum or vacuum from an independent supply source to the 5/16 inch (center) fitting.

4. The diaphragm must pull in when vacuum is applied. Apply a vacuum of approximately 14 inches of mercury to the diaphragm. Then seal off the hose from the engine or vacuum source to the 5/16 inch power unit fitting. The vacuum should not leak down more than five inches of mercury in one minute.

NOTE: Since the power unit cannot be disassembled, excessive leakage indicates the assembly must be replaced. The cruise release valve on the cruise release brake switch, with its connecting tubing, can be checked in a like manner.

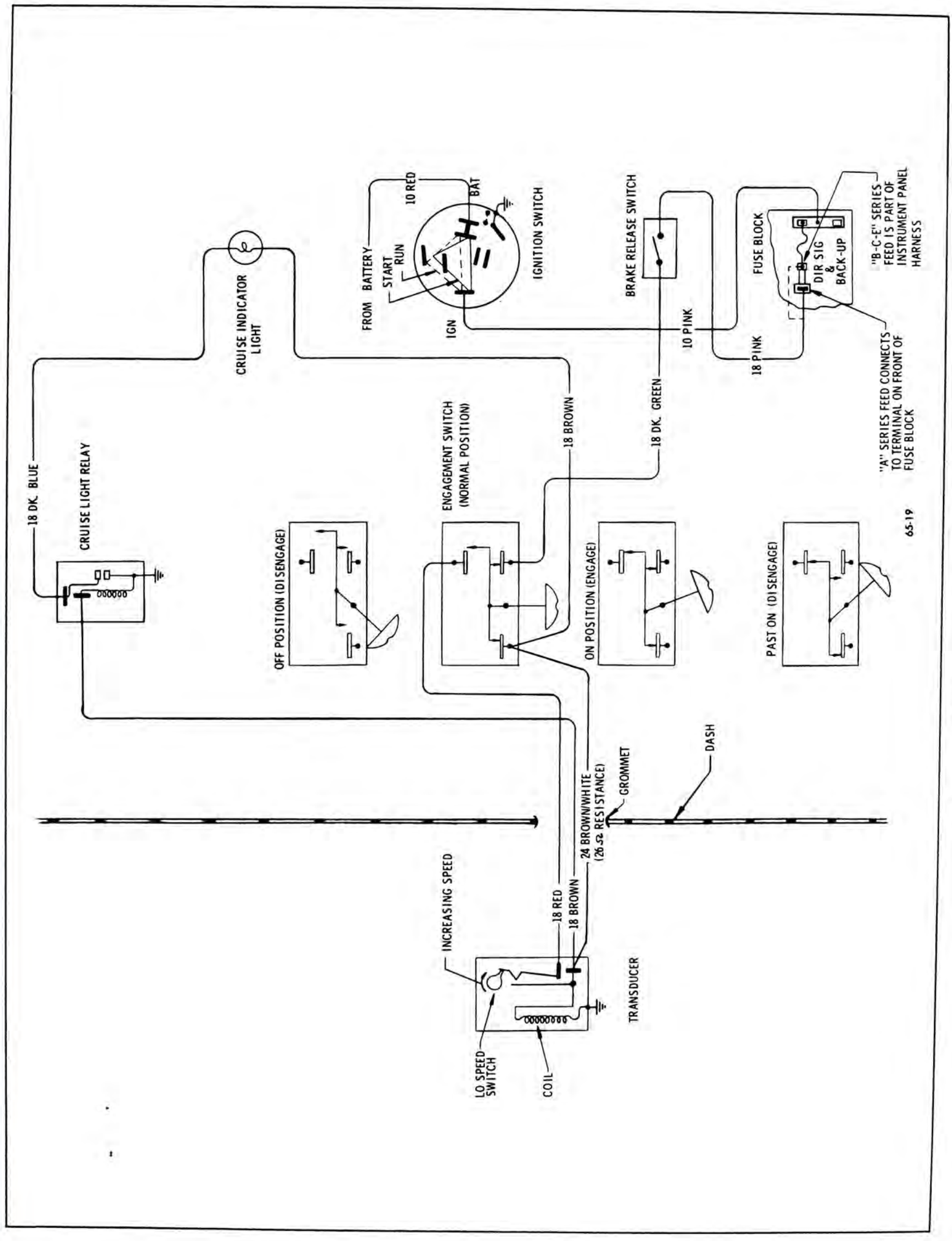

Figure 65-10—Cruise Master Wiring Diagram

Problem	Cause	Correction
Will not engage-System Inoperative	Brake Switch Circuit Open	Check connections - adjust or replace switch. Refer to Electrical Check Out.
	Fuse blown or missing	Check connections - Replace fuse-if it blows again, check for: 1. Engage Switch stuck in the center of travel- Refer to Electrical Check Out. 2. Incorrect wiring - Refer to Electrical Check Out. 3. Short to ground - Refer to Electrical Check Out. 4. Defect in other electrical accessory operating on same fuse. See schematic. Note differences between OEM and dealer installations. Make necessary corrections.
	Defective Engage Switch	Replace as needed - Refer to Electrical Check Out.
	Vacuum leak in Power Unit and/or Brake Switch and connecting lines. Vacuum hose not connected Cruise release valve.	Vacuum test and repair or replace as needed. Refer to Power Unit and Vacuum System Check Out.
	Cruise release brake switch misadjusted (always open)	Readjust switch.
	Crossed vacuum & air hose at transducer.	Reroute hoses.
	Open in wiring harness	Repair or replace as needed.
	Defective transducer	Replace transducer.
Will not engage-system inoperable but cruise lamp lights when ignition switch turned on.	Harness not connected to transducer.	Check connections to transducer
	Corroded terminals or open in transducer coil circuit.	Clean terminals or replace transducer as indicated.
Does not cruise at engagement speed.	Orifice Turb misadjusted	Adjust as required.
System hunts, pulses, or surges	Ball chain or power unit linkage loose.	Tighten chain or linkage as required. Clean orifice tube and valve.
	Kinked or deteriorated hoses (air leak)	Repair or replace.
	Dirty Air Filter	Service as required.
	Defective and/or improperly positioned Drive Cables and/or Casing Assemblies.	Repair or replace as needed.
	Hoses reversed at Power Unit	Reposition as required.
	Defective transducer	Replace transducer.
System does not disengag - with brake pedal	Cruise release brake switch misadjusted or defective	Adjust or replace as required. Refer to Power Unit and Vacuum System Check Out and Electrical Check Out.
System steadily accelerated or applies full throttle when engaged	Hoses interchanged at Power Unit. Manifold vacuum connected directly to outboard tube of Power Unit.	Reroute hose to transducer vacuum valve.
	Defective transducer.	Replace transducer.
	Pinched or plugged air hose that if connected to the outboard tube of Power Unit or defective tee to cruise release line	Free or replace hose. Repair or replace tee.
Cannot adjust speed downward with Engage Switch.	Defective Engagement Switch or Wiring	Replace as needed. Refer to Electrical Check Out.
Does not engage or engages lower than limits referred to in "Driver Operation"	Defective transducer.	Replace transducer.
Slow throttle return to idle after brake is depressed	Pinched air tube at cruise release valve.	Free or replace tubing.
System operates correctly, but constant vacuum bleed when system is disengaged.	Crossed vacuum hoses at regulator.	Reroute hoses.
High engine idle speed-independent of carburetor adjustments. Constant air bleed through system.	Tight Power Unit Chair or linkage	Loosen chain or linkage adjustment.
	Manifold vacuum connected directly to center tube of Power Unit.	Reroute tubing.
Constant drain on battery.	Power lead connected to "Fused Battery" terminal of fuse block.	Reroute to "Fused Acc." terminal.
System can be engaged at idle by depressing switch, but will drop out when switch is released. Solenoid can be heard when switch is depressed when the vehicle is standing still.	Wires reversed at transducer.	Reverse wires.

Figure 65-11—Cruise Master Trouble Diagnosis Chart