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 depresses and releases the cruise control engagement switch button located at the end of the directional signal lever. The cruise system immediately takes over speed control and, within engine limitation, maintains this speed regardless of changes in terrain.

The engagement switch button performs these functions:

(a) When depressed to the detent, it engages the system.

(b) When depressed fully and held there, it disengages the system.

(c) When released completely, it holds the system in engagement. (The lowest speed at which the system should be used is 40 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 or the ignition switch turned off.

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 fully depress and slowly release the cruise control engagement switch button. The system re-engages at the higher speed when the button is released through the detent.

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

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, and 3 show the units in the installed position on the three series of vehicles.)

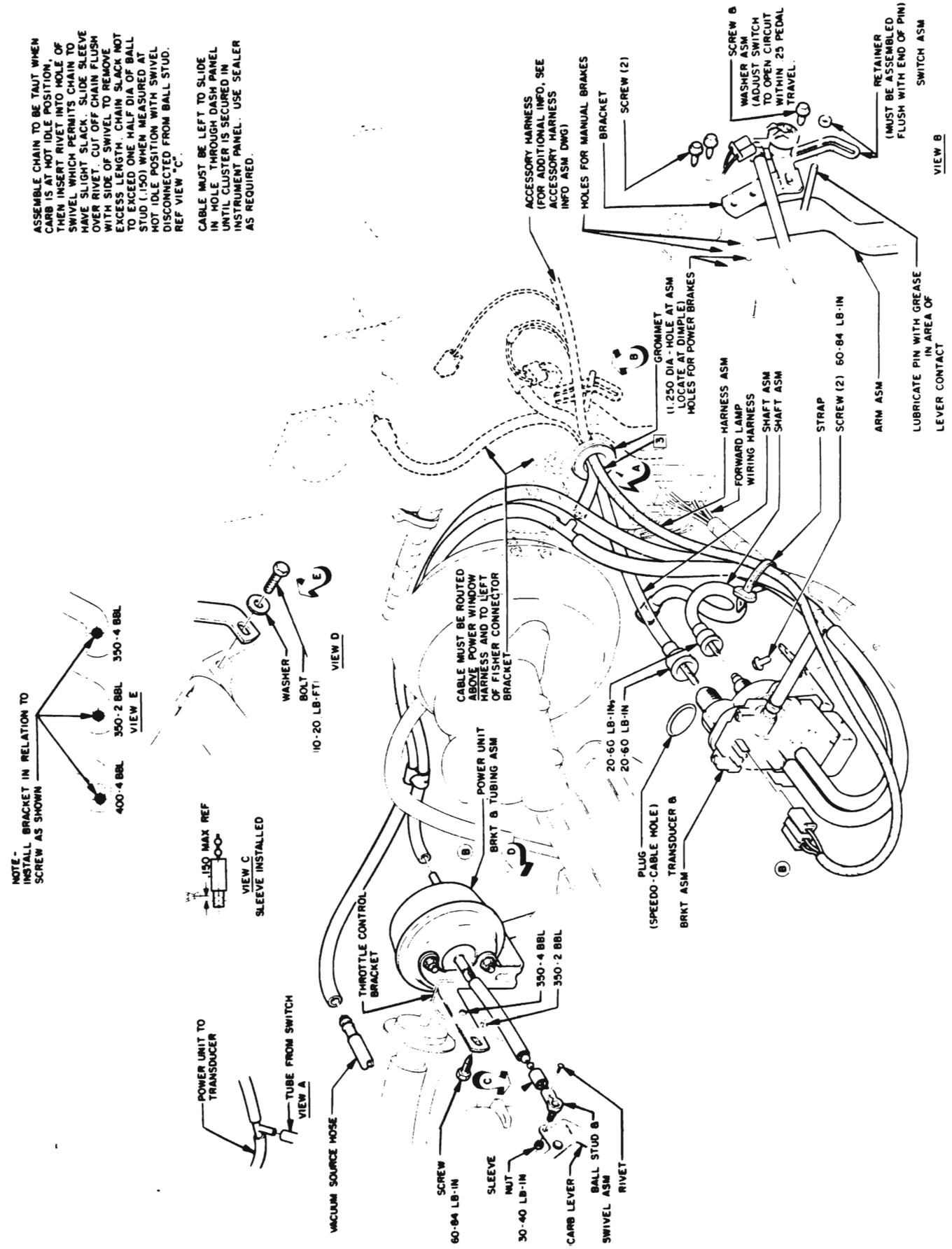

Figure 65-1 - Cruise Master Installation 43-44000 Series

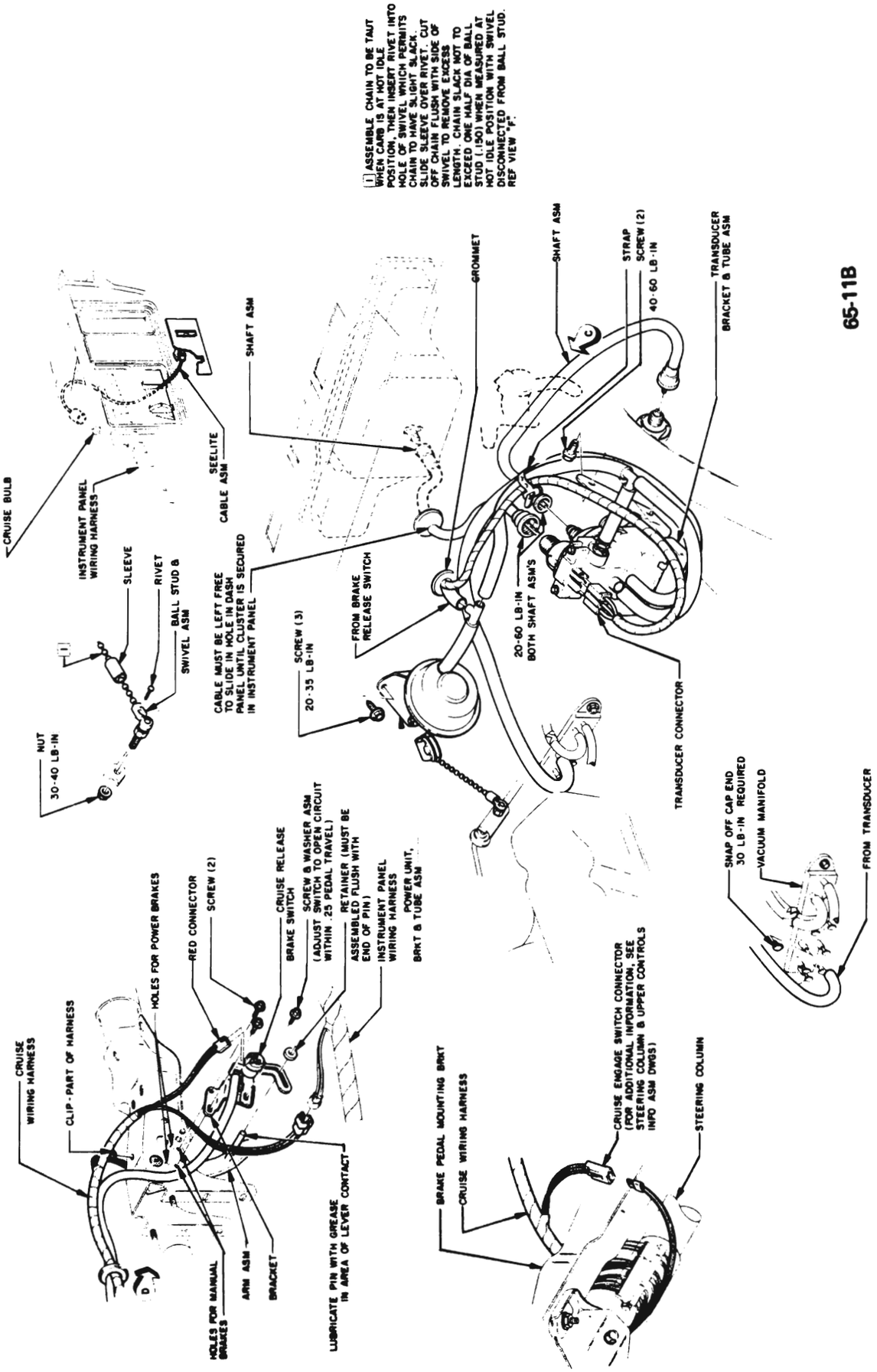

Figure 65-2 - Cruise Master Installation 45-46-48000 Series

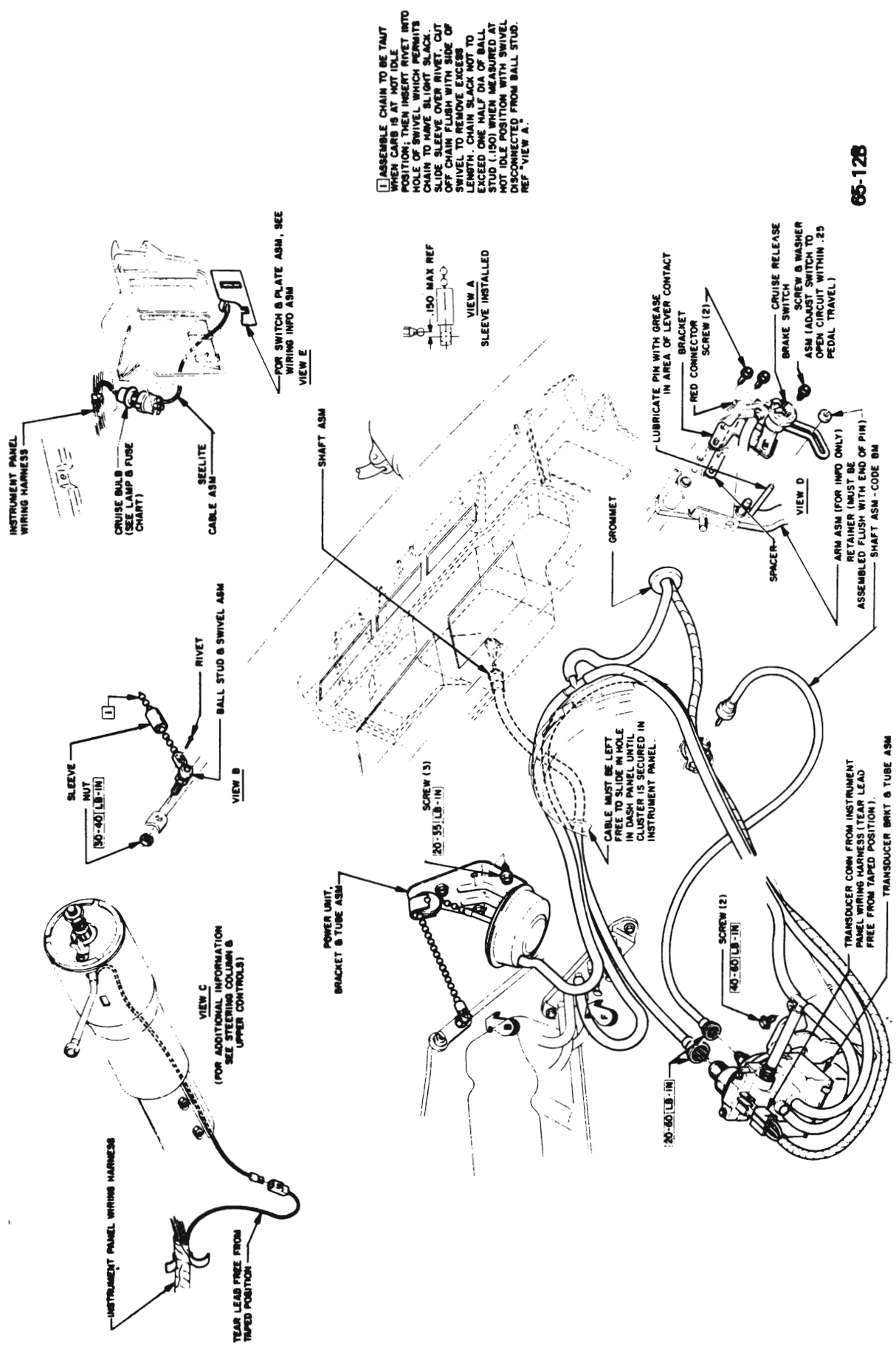

Figure 65-3 - Cruise Master Installation - 49000

1. *The engagement switch,* which is located at the end of the directional signal lever, 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. It also provides a ground path for the indicator lite on upper series cars.

3. *The power unit,* which is mounted under the hood, is connected by a ball chain to the throttle linkage. It opens or closes the throttle as dictated by the speed transducer.

4. *The cruise brake release 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.

d. Operation of Cruise Master

The transducer consists of two subassemblies: 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 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 engages the cruise control engagement switch at speeds above the recommended minimum operating speed of 40 MPH, the electrical circuit to the transducer solenoid is complete 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 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 system is disengaged all voltage is removed from the transducer solenoid. However, after either switch (cruise release brake or cruise control 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 35 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.

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

The transducer is a device which has two primary functions. First, it is a vacuum switch which, when engaged by the driver, supplies vacuum to a "Tee" fitting. Second, it meters a small variable quantity of air to the "Tee" fitting where it blends with vacuum, thus providing the power unit with controlled vacuum which will maintain the selected speed. If the transducer begins to supply less bleed air (vehicle speed decreasing) the vacuum in the chamber increases and the diaphragm moves toward the vacuum port. If the transducer begins to supply more bleed air (vehicle speed increasing) the vacuum in the chamber drops and the diaphragm moves away from the vacuum port. In operation, at cruise speed, a proper balance of air and vacuum is blended at the "Tee" fitting and is imposed upon the power unit to maintain as "On Speed" cruise condition. See Figure 65-4

If the car goes upgrade, there is a tendency for speed reduction. When speed reduction occurs (refer to Figure 65-7) 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

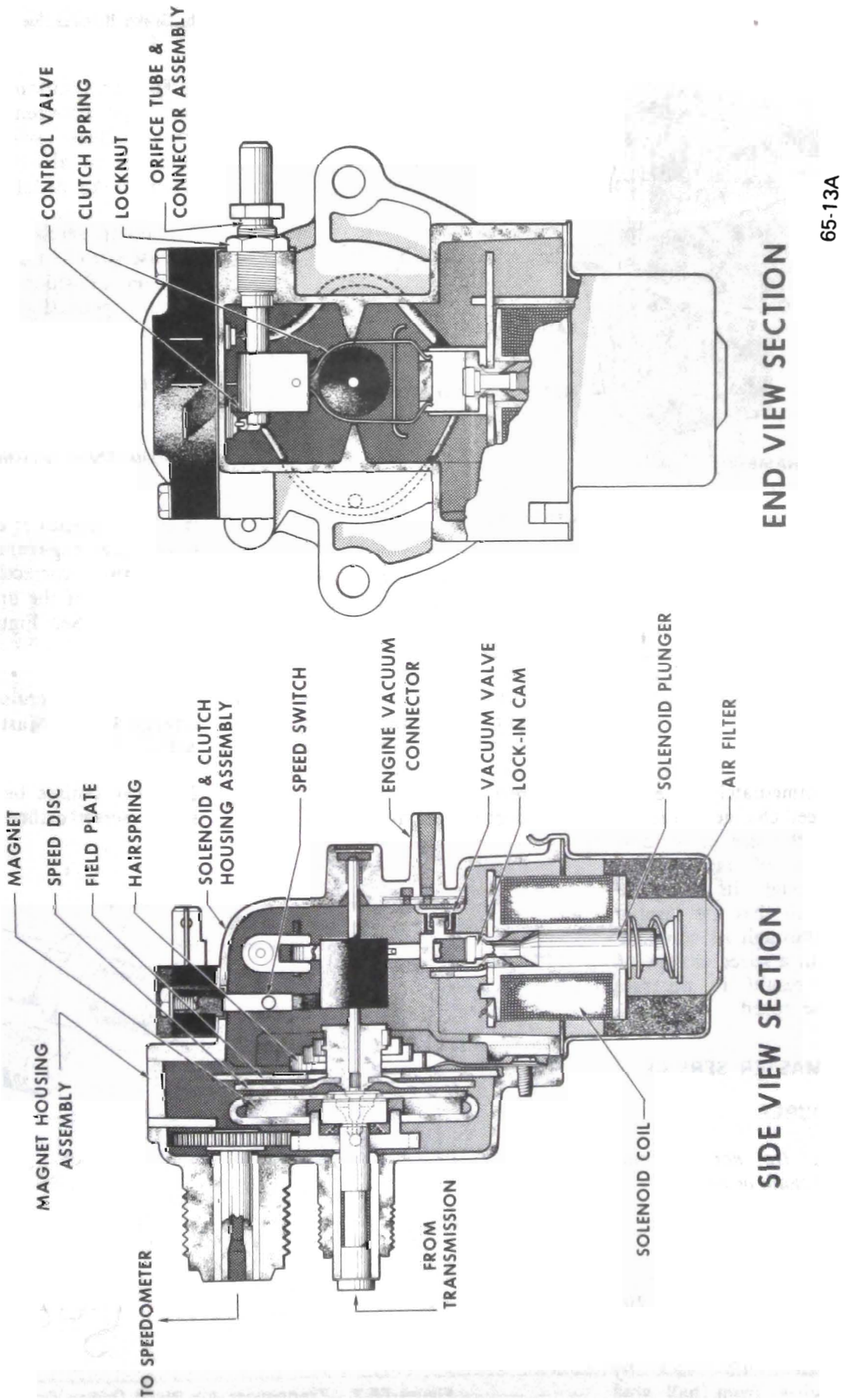

Figure 65-4 - Cruise Master Speed Transducer - Section Views

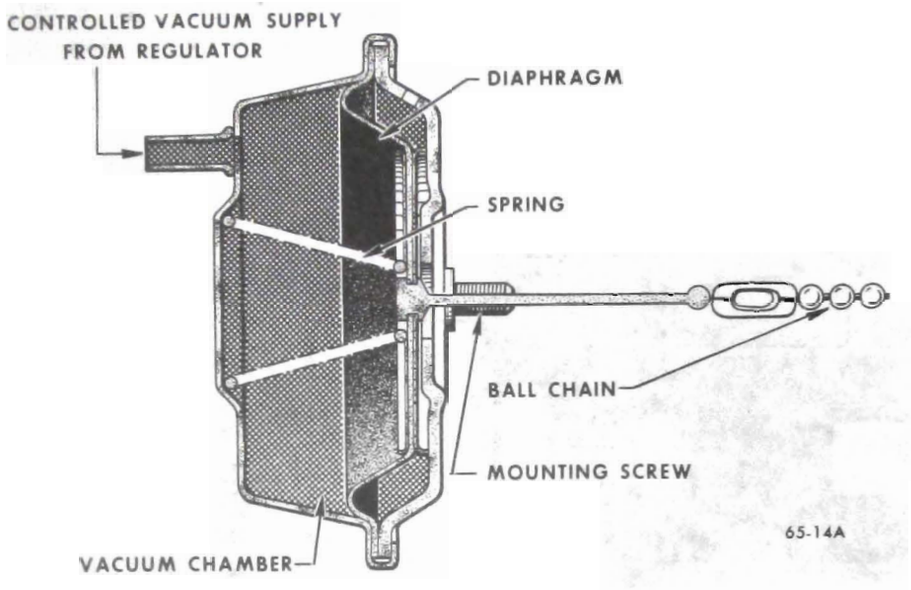

Figure 65-5--Power Unit

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 under normal terrain conditions.

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.

65-2 CRUISE MASTER SERVICE PROCEDURES

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

a. Power Unit Bead Chain Adjustment

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 65-1, 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. 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.

c. 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.

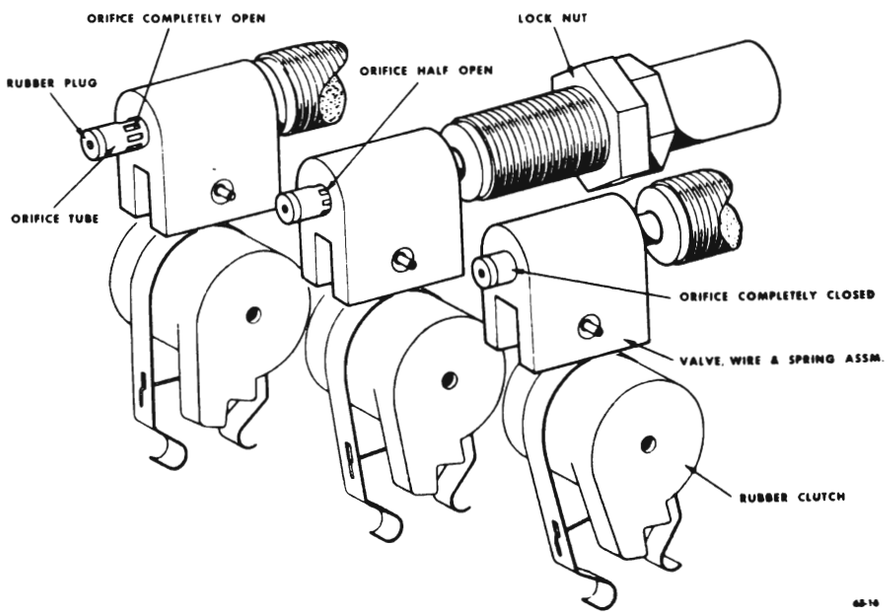

Figure 65-7 - Transducer Air Bleed Orifice Openings

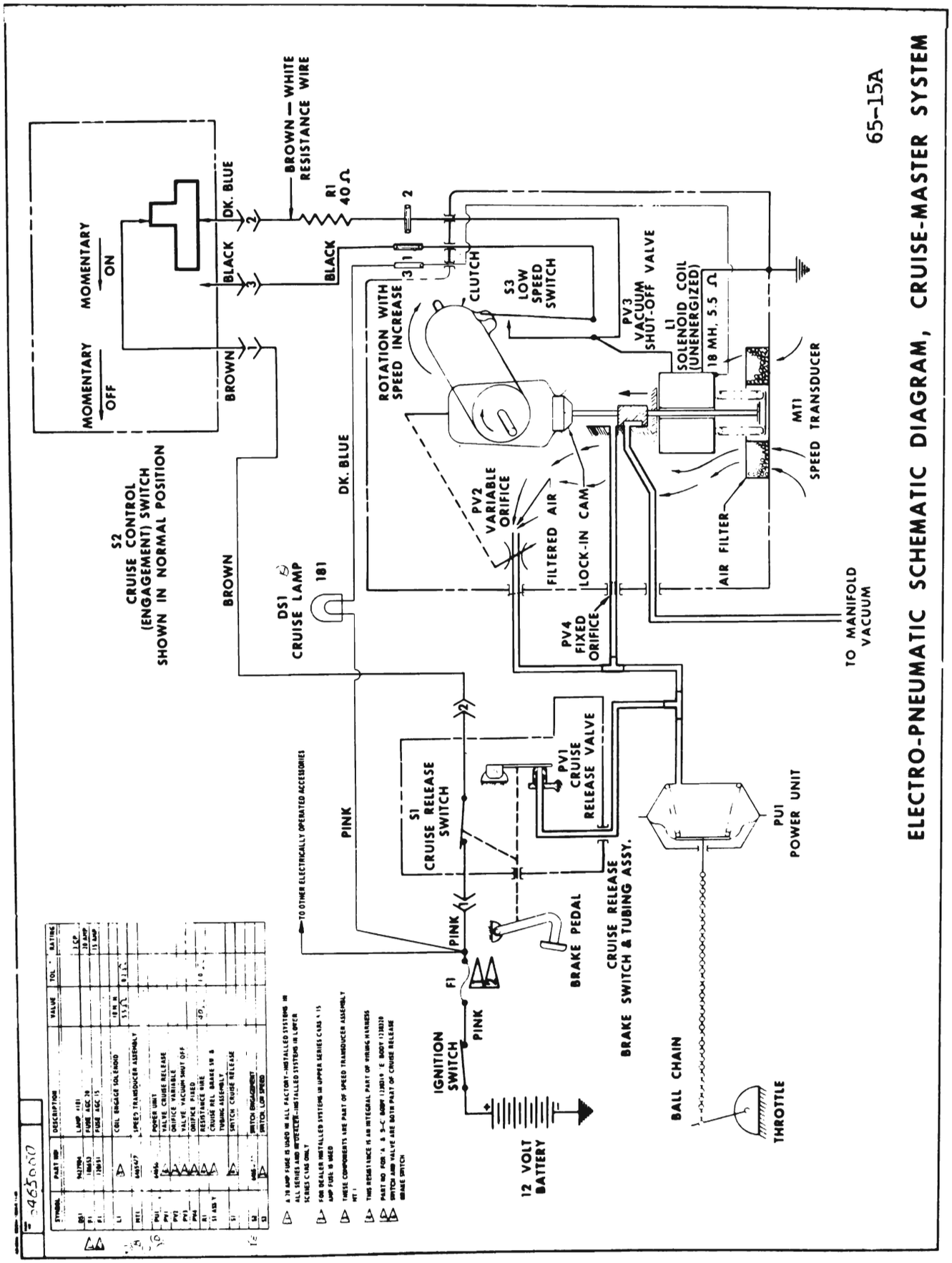

Figure 65-6-Cruise Master Electric - Vacuum Schematic

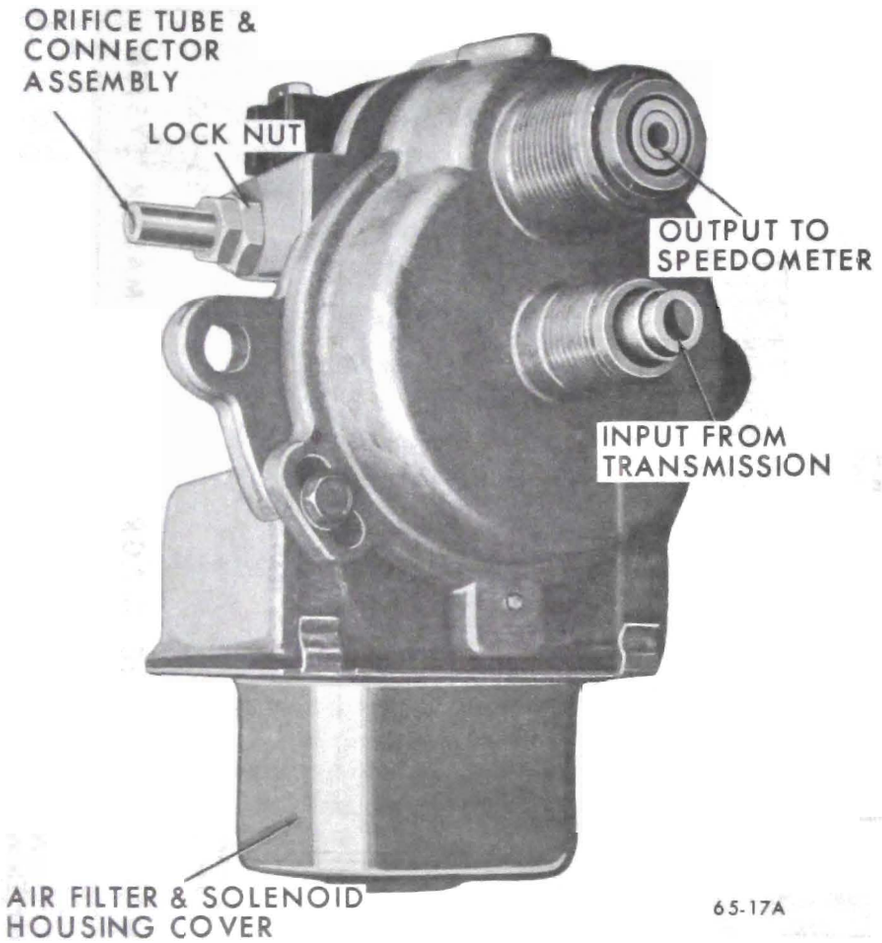

Figure 65-8 - Speed Transducer

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.*

d. Tranducer Air Filter Replacement

1. Replace air filter when it becomes contaminated. 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.

(b) 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.

e. Removal of Cruise Master Actuating Engagement Switch

NOTE: *Shift Lever must be in low*

1. Remove horn actuator and steering wheel.

2. Remove cover plate (three screws).

3. Remove turn signal lever screw and conduit from wire assembly.

4. Attach fine pliable wire through hole in connector. Tape end of wire and connector.

5. Pull switch and wire assembly through column. (Threading pliable wire).

6. Attach and tape wire to new connector.

7. Pull connector and wire through column.

8. Replace conduit on wire assembly.

9. Install turn signal lever screw.

10. Install cover plate.

11. Install steering wheel and horn actuator.

65-3 CRUISE MASTER TROUBLE DIAGNOSIS

a. Cruise Master Quick Check

Refer to Trouble Diagnosis Chart in rear of section.

b. Electrical Check Out

1. Check all fuses and connections.

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

3. Check cruise control engagement switch as follows:

(a) Disconnect switch connector from wiring harness at lower part of steering column (refer to Figure 65-6 for location of terminal numbers and for circuit function) as required perform the following test.

Test 1 - **Connect ohmmeter between terminal 1 (brown wire) and terminal 2 (blue wire). Continuity shall be maintained until switch is depressed all the way in.**

Test 2 - **Connect ohmmeter between terminal 1 (brown wire) and terminal 3 (black). No continuity shall be shown; however, when the button is depressed to the detent, continuity shall be indicated. When the button is pressed all the way down, no continuity shall be shown.**

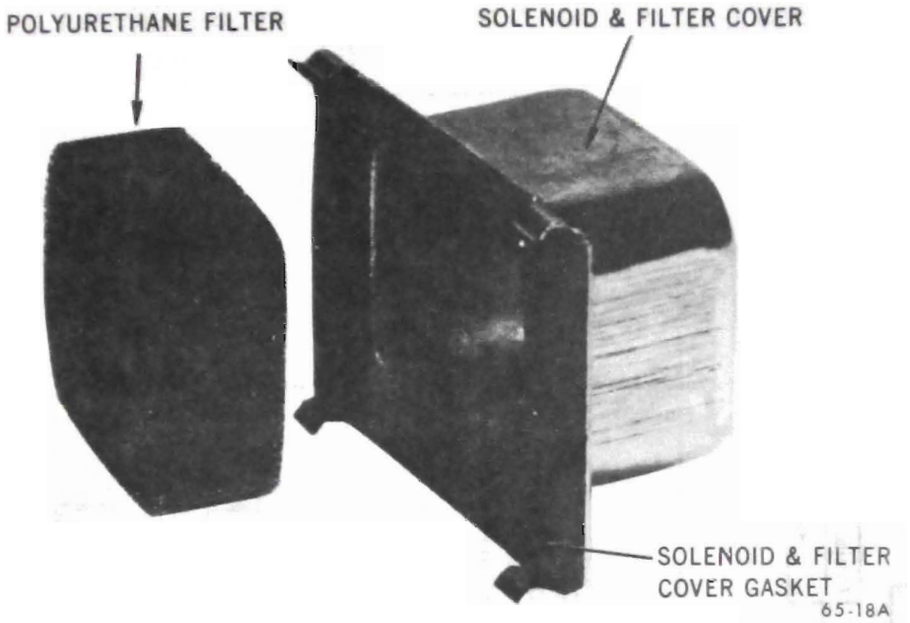

Figure 65-9--Replacing Cruise Master Air Filter

Test 3 - **Connect ohmmeter between terminal 2 (blue wire) and terminal 3 (black). Button released, no continuity; however, when the button is depressed partially and fully, continuity shall be shown.**

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 approximately 40 ohms.

(2) Transducer solenoid coil resistance, which is 5.2 + or - 0.2 ohms.

Note that these resistance values are given for parts at normal room temperatures of 68-72° F. Use care to disconnect 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.

Buick Cruise Master Quick Checks
Check 1 - For inoperative systems.
Check 2 - For systems with erratic cruise performance.
Make all tests with transmission selector in "Park" and parking brake on except where indicated otherwise.
Reconnect any disconnected hoses and/or electrical connectors in proper manner at completion of test.
For detailed information, refer to the Service Manual.

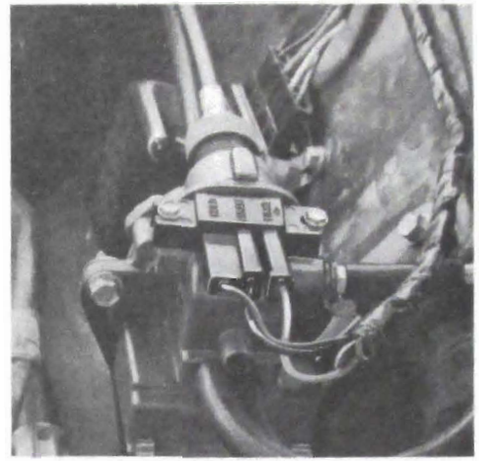

FIGURE 1

CHECK 1

Preliminary inspection - Make physical inspection of all components. Check for electrical (see Figure 1) or mechanical disconnections, pinched, misrouted or disconnected vacuum hoses. If no defects are found, proceed as follows:

1. Unplug two terminal connector at Transducer.
2. Reconnect connector as per Figure 2.
3. Turn "on" ignition key, (do not start engine) and depress engage switch to detent and hold at detent.

Cruise Lamp Light
"Thunk" is heard

Cruise Lamp Does Not Light
"Thunk" is heard

1. Ground harness light connector with ignition on.
   a. If light comes on, replace transducer.
   b. If no light, check wiring harness, light bulb, and fibre optic.

Cruise Lamp Does Not Light
No "Thunk" is heard

a. Check fuse and brake switch (65-2).
b. Check transducer circuit between "hold" blade terminal and ground. It should read 4-6 Ohms.
c. Check engagement switch (Par. 65-3).
d. Check black wire in harness assembly for battery voltage (12 volts) with engagement switch "on".

If all above conditions are o.k. and no "thunk" is heard in transducer, replace unit.

Normal Result
Transducer engages with audible "thunk"

Start Engine, car in "park", Engage switch on "on".

Engine Accelerates

Engine Does Not Accelerate

a. Check to see that approx. two threads of the orifice tube are showing.
b. Pinch orifice tube hose at transducer. If required, disconnect it at transducer and plug it with pencil.

Cruise Lamp Lights
Continue if all original symptons are not corrected.

Check brown/white stripe wire by either of the following methods:

1. For Ohmmeter check, refer to Par. 65-3.
2. With ignition "on", voltmeter must read battery voltage at the disconnected brown/white wire terminal at Transducer connector.

If 1 or 2 are OK, replace transducer.

Engine running, Engage switch "on".

Normal Result

Engine accelerates.

Engine Does Not Accelerate

a. Vacuum leak or restriction is indicated. Disconnect orifice tube hose at transducer and plug with a pencil. Start engine and hold engage switch on "on".
b. Disconnect large tube connected to the "tee" fitting at transducer and check for vacuum at transducer fitting.

No Vacuum

Remove engine manifold vacuum supply tube at transducer. Check for vacuum at tube

Vacuum

Replace transducer

No Vacuum

Check tube and vacuum fitting at engine.

Vacuum

a. Reinstall large tube at transducer.
b. Remove tube at power unit. Check for vacuum at end of tube.

Vacuum

Replace power unit.

No Vacuum

a. Check tubes and fittings back to transducer.
b. Check brake release tube and valve.

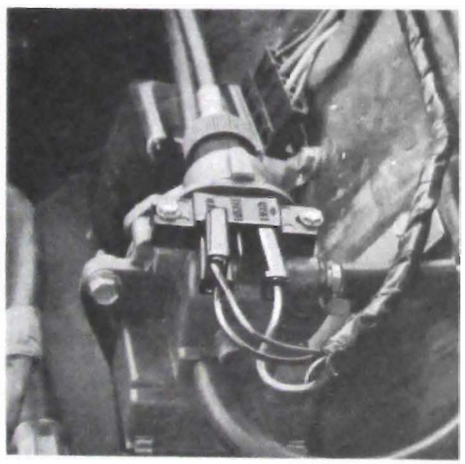

FIGURE 2

CHECK 2

1. Check bead chain -- at hot idle bead chain must be snug, but no so tight as to effect idle speed.
2. Check for pinched, plugged, damaged tubes or fittings and their routing.
3. Check cable routing -- they must not be kinked or have too sharp a turning radius. Check drive cables for kinks or bent tips. Ferrules must be snug.
4. Check for a binding throttle linkage condition.
5. Check adjustment of brake release switch (Par. 65-2).
6. If Steps 1 thru 5 do not solve the problem, replace Transducer.

Special note pertaining to engagement-cruising speed zeroing.

(Preliminary check - approximately two threads should be shown on orifice tube adjacent to lock nut.) If the car cruises below engagement speed, screw the orifice tube outward. If the car cruises above the engagement speed, screw the orifice tube inward. Each 1/4 turn will change the car speed approximately one MPH. Engagement accuracy testing to be done at 60 MPH. Snug up lock nut after each adjustment.

65-20A1

Figure 65-10 - Cruise Master Trouble Diagnosis Chart

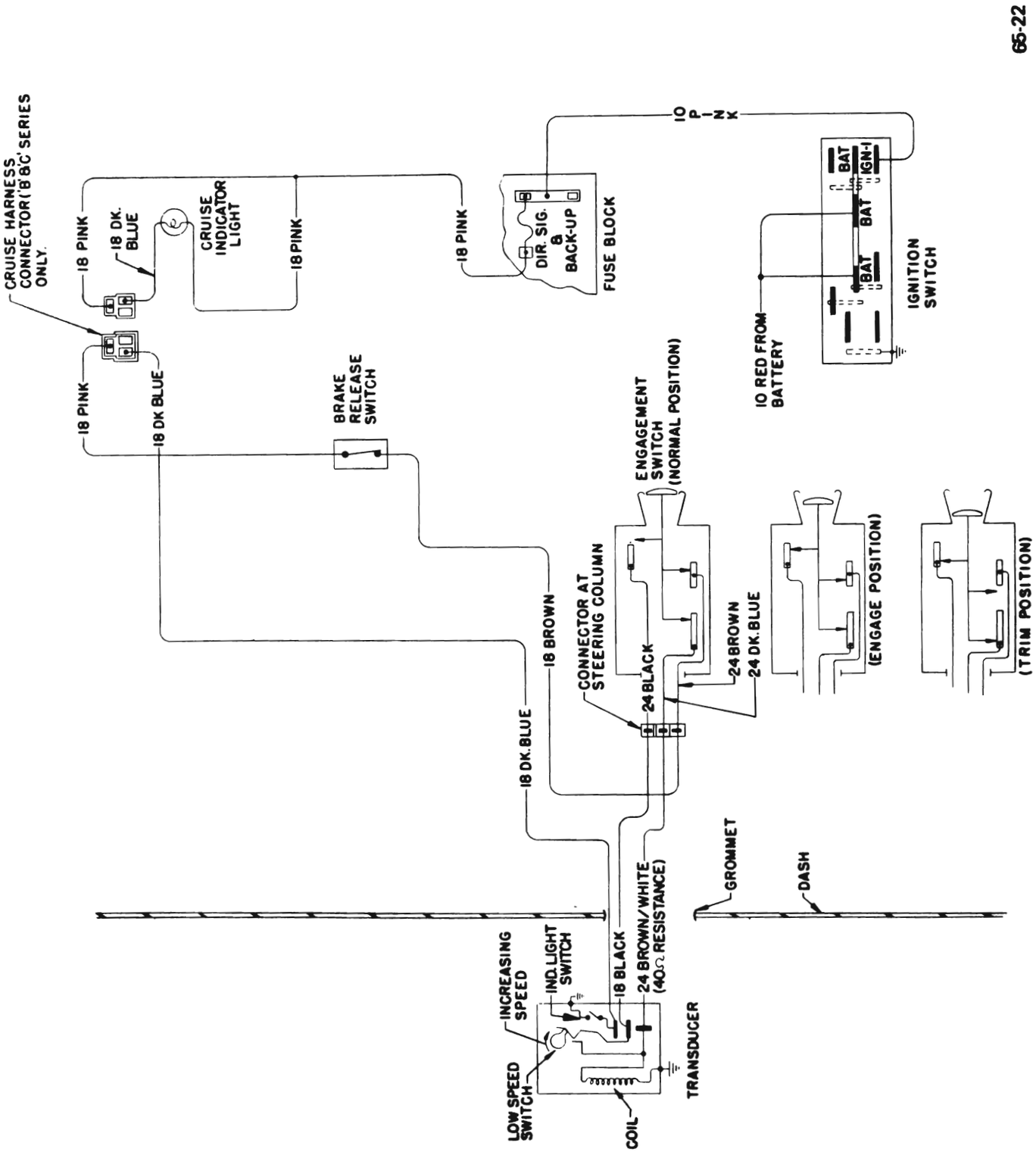

Figure 65-11 - Cruise Master Wiring Diagram - All Series