1968

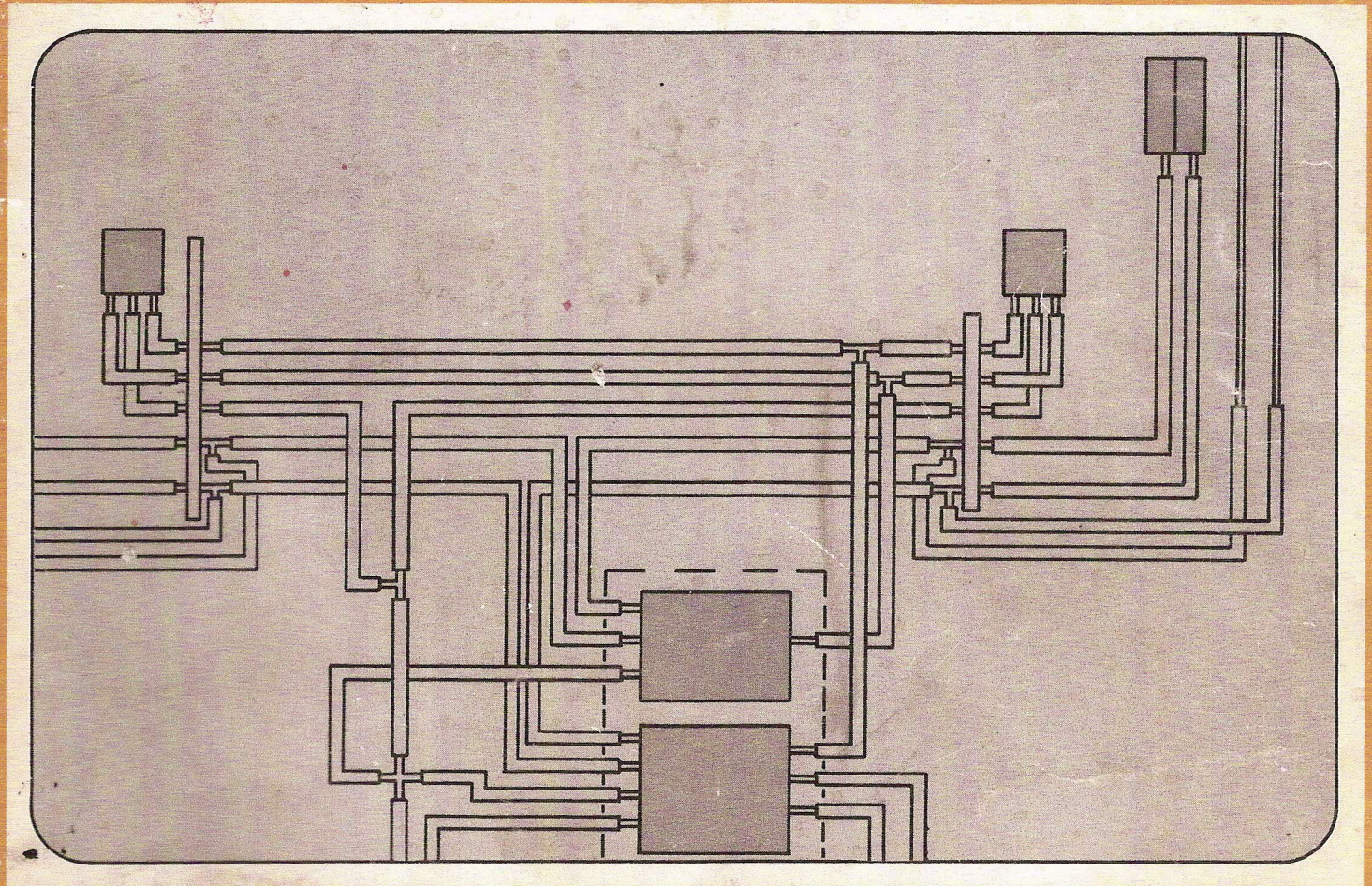
LINCOLN Continental

Mercury

Mercury MONTEGO

Mercury Cougar

VACUUM SYSTEM DIAGNOSIS GUIDE



SERVICE DEPARTMENT

LINCOLN-MERCURY DIVISION

Ford

LINCOLN-MERCURY REGISTERED SERVICE TECHNICIAN

TABLE OF CONTENTS

INTRODUCTION

The purpose of this vacuum system diagnosis guide is to assist dealer registered service technicians in the servicing and handling of vacuum system problems.

In the diagnosis of any type service problem the following five very important steps should be followed:

1. Obtain all the facts from the customer and verify the problem.
2. Isolate the area in which the problem exists.
3. Isolate the problem component.
4. Repair or replace the cause of the problem.
5. Recheck operation of the system to be sure the problem has been corrected.

DIAGNOSIS OF VACUUM SYSTEMS

Diagnosis of vacuum controlled systems is basically similar to electrical diagnosis. That is, the vacuum system must be complete from the source to the vacuum components. A vacuum leak, like a poor connection or a disconnected hose, a cut, kink or obstruction, will make the system inoperative or sluggish. If a leak develops in one of the vacuum systems, one or all of the vacuum systems may be affected as well as engine performance. If the leak is in the vacuum supply, all the systems will be affected. If the leak is in the checked side of the check valve of a specific system, all other systems will operate when the leaking system is off.

When testing a vacuum control system, a minimum of 14 inches of vacuum should be available at all points where vacuum is applied. This test should be made with the engine at idle R.P.M. and the transmission in neutral or park position. Vacuum can be checked with a Rotunda Vacuum and Fuel Pump Tester Gauge (A-RE-345) or its equivalent.

When diagnosing the vacuum systems, first check all vacuum hoses for proper connection and color code where readily accessible. This may be accomplished by visual inspection and checking of the hose connectors for looseness. Next, start the engine and listen for vacuum leaks. Leaking or disconnected hoses can usually be discovered by listening for a hissing sound along the hose routings.

Using the particular system diagnosis procedures proceed to check for vacuum at designated points in the system to locate the cause of the problem.

CHECK FOR VACUUM AND LEAK TEST

Connect the vacuum gauge into the system directly or by means of a tee connector. Start the engine and allow the vacuum gauge reading to stabilize. Any check for vacuum with the gauge should read a minimum of 14 inches of vacuum. Any reading lower than 14 inches indicates a trouble in the system.

1968 MERCURY COUGAR VACUUM SYSTEMS

A schematic of vacuum controlled systems installed on the 1968 Mercury Cougar is illustrated in color on the opposite page.

The description, operation and diagnosis of the major vacuum controlled systems are covered on the following pages.

NOTE: Complete ignition system, IMCO and thermactor vacuum system information is covered in the Vehicle Emission Control System Training Handbook #5000.

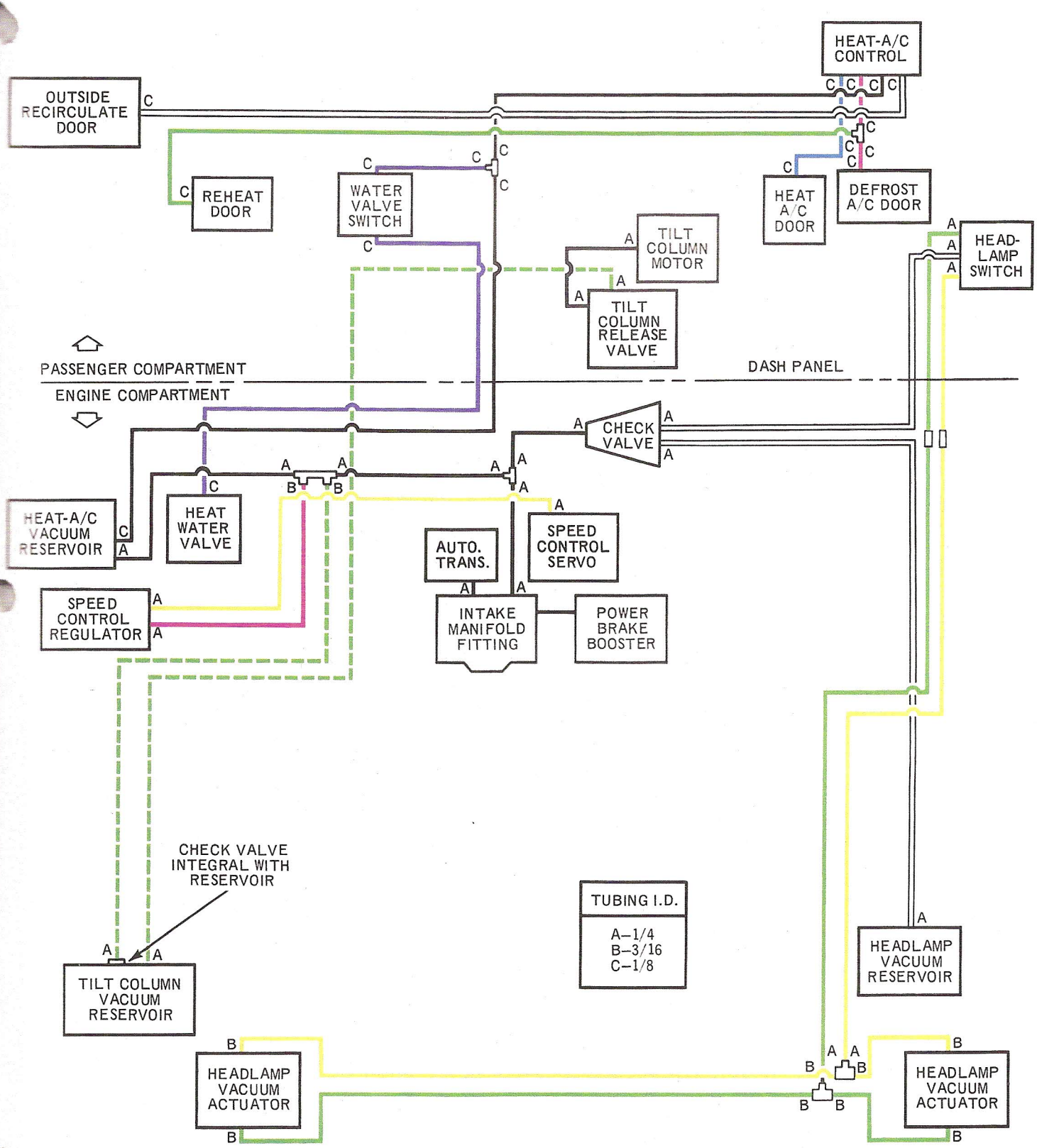


Fig. 33 – 1968 Mercury Cougar Vacuum System Schematic

VACUUM OPERATED HEADLAMP DOORS

DESCRIPTION AND OPERATION

Retracting headlamp doors are standard equipment on all Cougars (Refer to Fig. 34). Under normal (daytime) driving conditions, the headlamp doors are closed and the grille extensions, attached to the doors, assist in giving the appearance of a full width grille across the front of the vehicle.

When the headlamp switch is turned ON, the doors are retracted to the open position exposing the headlamps. As long as the headlamp switch is in the ON position, the headlamp doors will stay open.

When the headlamp switch is moved to the PARK or OFF position, the headlamp doors will close.

In the event of a system malfunction (on early production vehicles), the doors may be opened manually after the headlamp switch is turned to the ON position. Over center springs will hold the doors in this position.

On later production vehicles, revised spring loaded vacuum motors are employed. This system is designed so that if a complete loss of vacuum occurs with the headlamp doors closed, the doors should open. Also, if a complete loss of vacuum occurs with the doors open, they should remain open. Vehicles with the revised system can easily be identified by the absence of springs on the headlamp doors. Regardless of whether the old or revised system is used, the doors should not close due to a system malfunction with the headlamp switch in the ON position.

SYSTEM COMPONENTS

The vacuum system is composed of a vacuum source, check valve, vacuum reservoir, a vacuum switch located on the rear of the headlamp switch, door actuator motors, headlamp doors and the necessary vacuum hoses to connect the components. All vacuum hoses are black, and are identified by a colored stripe. The colored stripe on the hose corresponds to the paint dab color on the connector of the port to which the hose is attached.

VACUUM SYSTEM OPERATION

Vacuum from the engine intake manifold is routed through a black-white hose to a check valve. (Refer to Figs. 34 and 35.) Vacuum is routed from the check valve through black-white hoses to a reservoir and also to the headlamp switch. The check valve and reservoir are installed in the system to assure a supply of vacuum under all operating conditions.

When the headlamps are turned ON, the vacuum switch attached to the headlamp switch is repositioned and directs vacuum (black-green hose) to the open (lower) side of the right and left door actuator motors. Vacuum applied to the actuator motors pull the headlamp doors to the retracted (open) position. When the vacuum switch is repositioned, vacuum from the close side (black-yellow hose) of the system is exhausted through the vacuum switch.

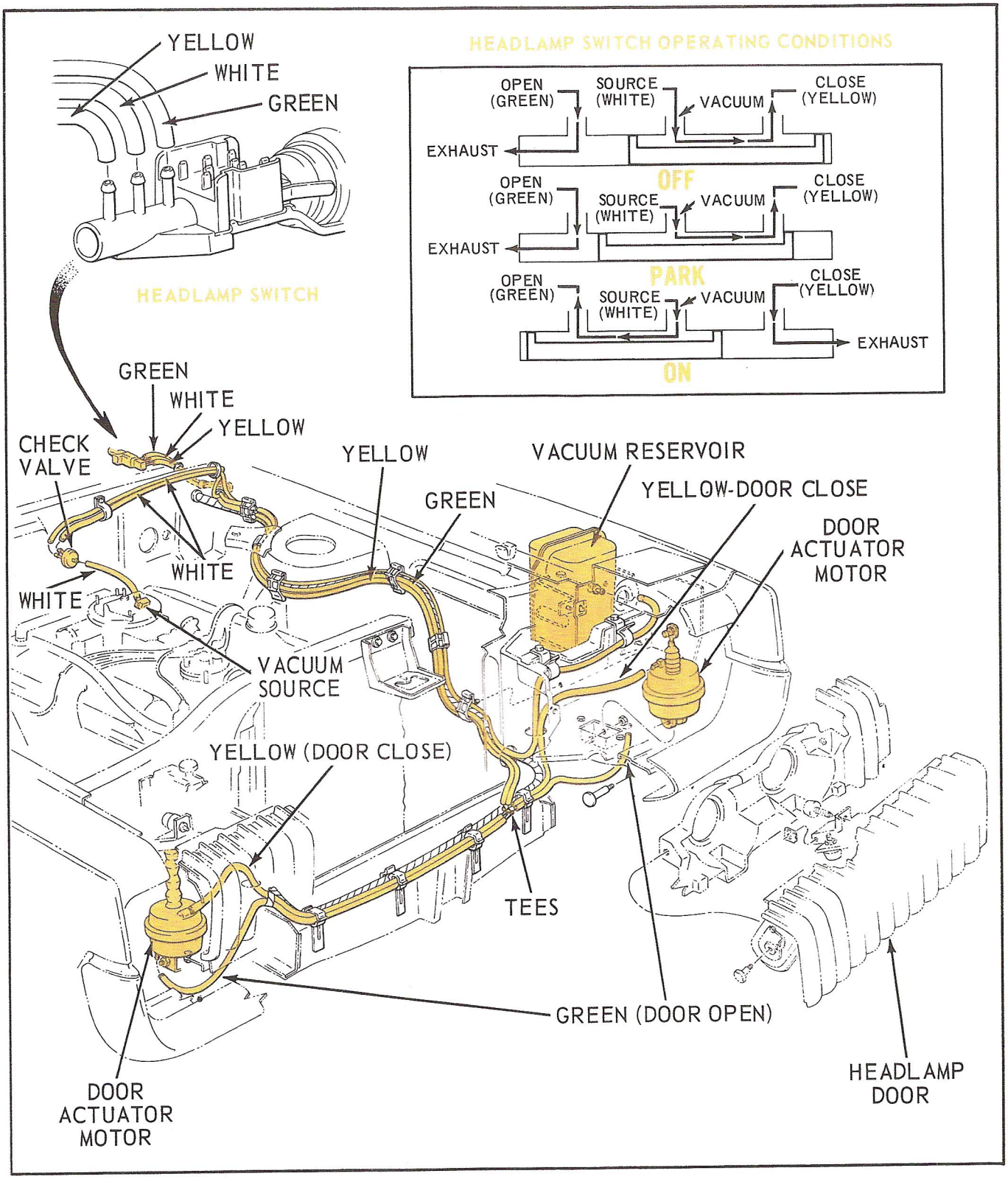


Fig. 34 – 1968 Cougar Vacuum Operated Headlamp Doors

VACUUM SYSTEM OPERATION (CONT.)

When the headlamp switch is moved to the PARK or OFF position, the vacuum switch is repositioned and directs vacuum (black-yellow hose) to the close (top) side of the right and left door actuator motor. Vacuum applied to the close side of the actuator motors pull the headlamp doors to the closed position. When the vacuum switch is repositioned, vacuum from the open side (black-green hose) of the system is exhausted through the vacuum switch.

Diagnosis information for the vacuum operated headlamp doors is given on Page 75.

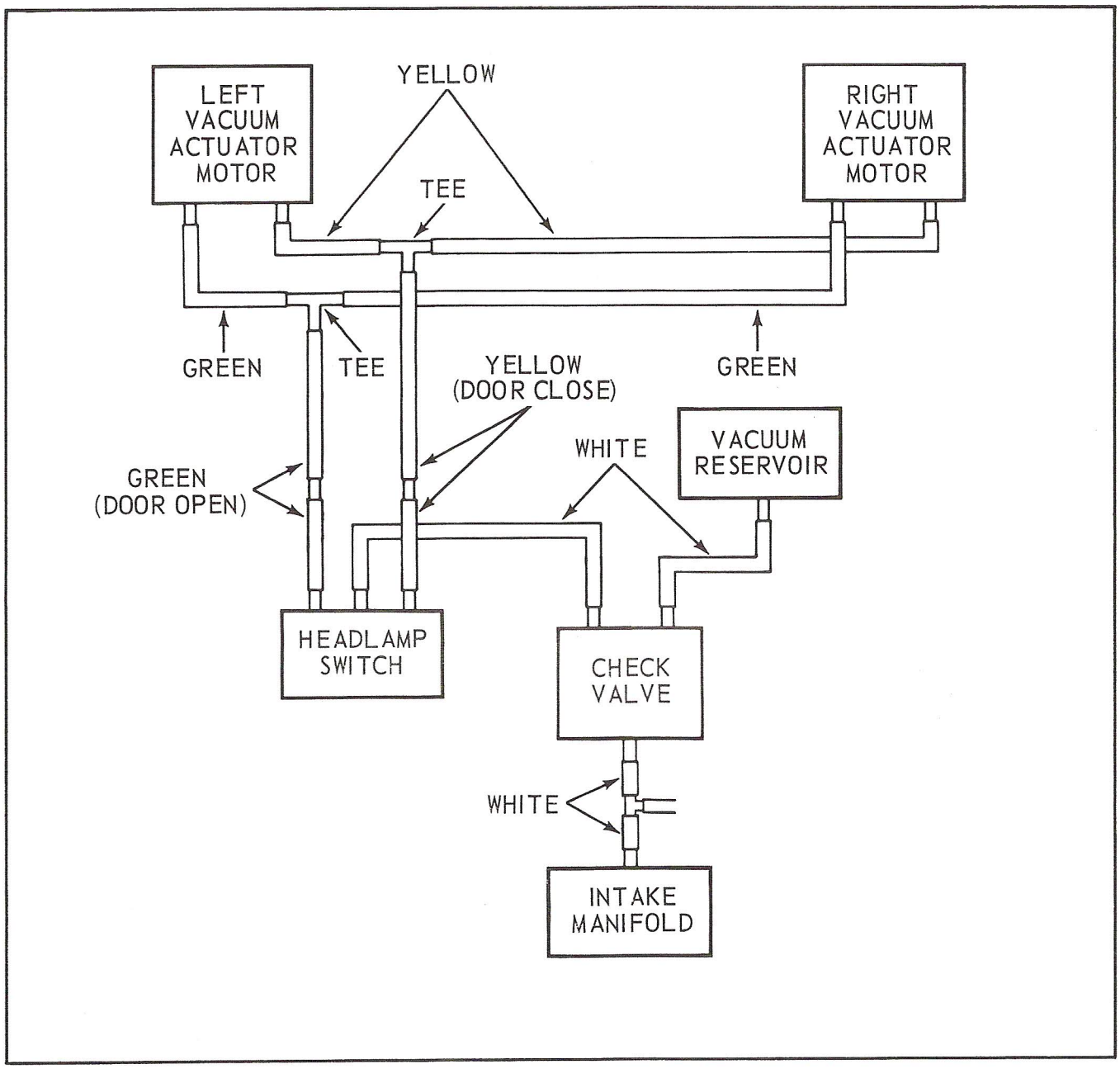


Fig. 35 – 1968 Cougar Vacuum Operated Headlamp Doors (Vacuum Schematic)

VACUUM OPERATED HEADLAMP DOORS (CONT.)

DIAGNOSIS

1. Check all vacuum hoses for proper connection and color code at the component connections.

2. Start the engine. Check for vacuum in the white hose at the headlamp vacuum switch. If there is no vacuum, check the supply circuit from the intake manifold, through the check valve to the vacuum switch.

3. If there is supply vacuum to the vacuum switch, reconnect the white hose. Disconnect the two other hoses (yellow and green) from the vacuum switch. Operate the vacuum switch. If there is vacuum at the green port with the headlamp switch ON and vacuum at the yellow port with the headlamp switch in the PARK and OFF position, the vacuum switch is OK. If there is vacuum to the vacuum switch in the white hose, but none at either the green or yellow port when the headlamp switch is operated, replace the headlamp switch.

4. Check for vacuum at the tee connectors in the front sheet metal area, which supply the headlamp door actuators. With the headlamp switch on, vacuum should be available at the green hose. When the switch is pushed in, vacuum should be available in the yellow hose. If vacuum is not available, check the vacuum hoses between the vacuum switch and the connector.

5. Check for vacuum at each door actuator. With the headlamp switch on, vacuum should be available in the green hose to the bottom side of each actuator. When the switch is pushed in, vacuum should be available in the yellow hose to the top side of each actuator. If vacuum is not available as specified, check the vacuum hoses between the connector and the actuators. If vacuum is available as specified, the actuators may be defective. Check the mechanical movements for any binding of the linkage. Replace any parts that are defective. Lubricate all moving parts.

HEATER-AIR CONDITIONER

Complete system description, operation, and electrical circuit diagrams are covered in the 1968 Shop Manual. Complete owner usage instructions are given in the 1968 Owner's Manual.

SYSTEM COMPONENTS

The heater-air conditioner vacuum control system consists of a vacuum supply reservoir, with an integral check valve, instrument panel control assembly, four vacuum motors, a water valve, a water valve vacuum switch, and the necessary hoses to connect the components. See Figure 36.

The heater-air conditioner engine compartment and passenger compartment installation views are shown in Figures 37 and 38 on pages 78 and 79. Diagnosis procedures and chart are included on pages 80 and 81.

OPERATION

Vacuum from the engine manifold is routed (black hose), through a check valve in the reservoir. Vacuum is routed from the reservoir (black hose) through the dash panel to the passenger compartment. Inside the passenger compartment vacuum is routed (black hose) to the instrument panel control vacuum regulator assembly. The left control lever actuates a vacuum regulator which directs vacuum to the vacuum motors which control operation of the outside-recirculating air door, reheat air door, A/C-Heat air door and the A/C-Defrost air door. Air door operation and vacuum operating characteristics for all control lever positions are given in chart III on page 81.

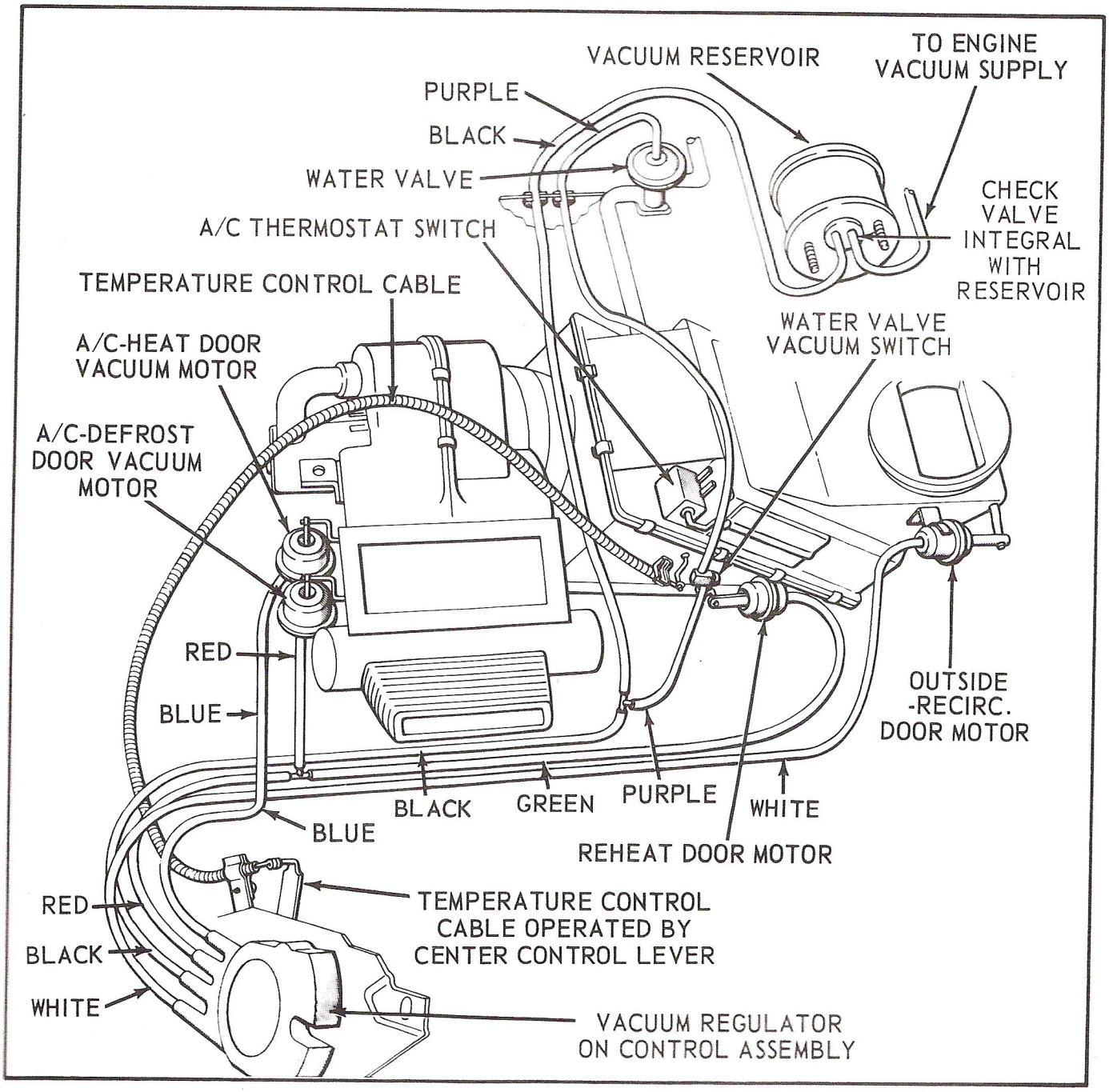


Fig. 36 – 1968 Cougar Heater-Air Conditioner

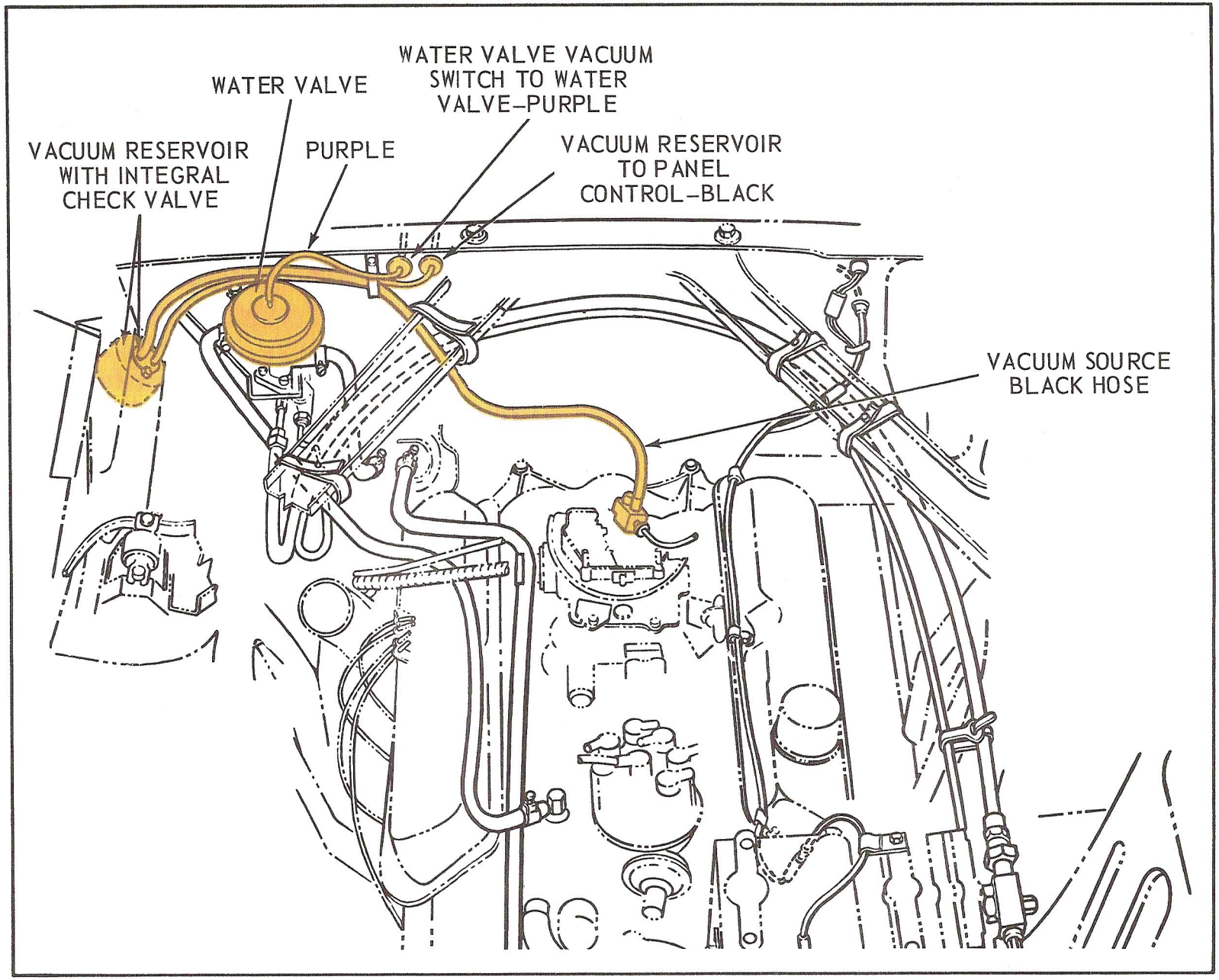


Fig. 37 – 1968 Cougar Heater-Air Conditioner Engine Compartment Installation

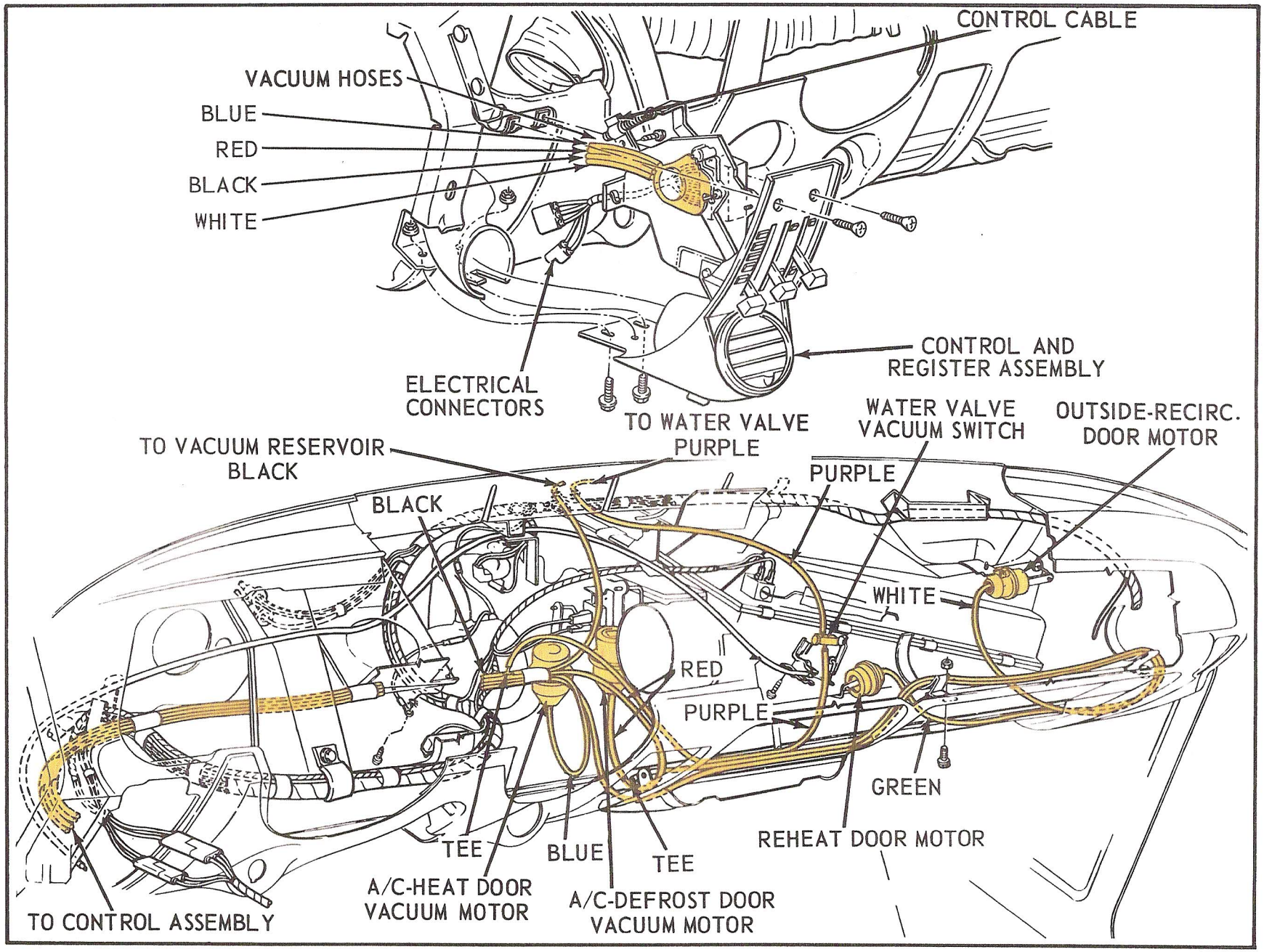


Fig. 38 – 1968 Cougar Heater-Air Conditioner-Passenger Compartment Installation

DIAGNOSIS

1. Check all vacuum hoses for proper connection and color code at the vacuum motors, control assembly and components in the engine compartment.

2. With the engine running, operate the functional control lever through all system conditions. Note operation of all air doors, and vacuum at the respective vacuum motors and water control valves using chart III shown on the accompanying page.

3. If no air door operation or vacuum readings are obtained, check the vacuum supply system. Check for vacuum supply at the instrument panel control assembly (Black hose figure 36). If vacuum is not available, check vacuum lines from supply tank to the control.

4. If vacuum is available to the control valve, but is not directed to the red, blue and white ports when the control lever is moved through the various positions, replace the control valve.

1968 COUGAR HEATER-AIR CONDITIONER CONTROL SETTING

CHART III

The following table can be used to determine any of the system component conditions for any given control lever position. The vacuum schematic will aid in the diagnosis.

A/C – Heater Control System		Functional Control Lever Position				
		A/C		OFF	HEAT	
		MAX.	FRESH		HEAT	DEFROST
AIR DOORS	Outside Recirc. White	Open to Recirc. V	Open to Outside NV	Open to Recirc. V	Open to Outside NV	
	A/C Heat Blue	A/C Position V		Heat Position NV		A/C Position V
	A/C Defrost Red	A/C Position NV			Defrost Position V	
	Reheat Green	Blend Position (Closed) NV			Heat Position (Open) V	
Clutch Switch		On – (by A/C-Defrost Door Arm)			Off – (by A/C-Defrost Door Arm)	
Blower Switch		Manually On – L-M-H	On – L-M-H Off – Ram Air #	Off On *	On – L-M-H Off – Ram Air	
Water Valve Vacuum Switch Purple	Cool	Open (by Temp. Blend Door Arm)				
	Mod Warm	Sealed (by Temp. Blend Door Arm)				
Water Valve Purple	Cool	Closed V				
	Mod Warm	Open NV				
TEMP. DOOR BOWDEN CABLE CONTROLLED	Cool	All Cold Air Bypasses Heater Core			Outside Air Bypasses Heater Core	
	Mod	Cold Air Passes Thru and Around Heater Core Then Mixed			Outside Air Passes Thru and Around Heater Core Then Mixed	
	Warm	All Cold Air Passes Thru Heater Core			Outside Air Passes Thru Heater Core	

L – Low
M – Medium
H – High

V – Vacuum
NV – No Vacuum
MOD – Modulated

* Recirculated Air – Not Recommended. Please note that under the conditions specified in the chart in the OFF position and the blower switch is turned on, it is possible to receive cooled air out of the heater duct, depending upon the position of the temperature blend door.

Under the conditions specified under the A/C FRESH position and with the blower switch turned off, it is possible to receive outside ram air through the A/C registers. This will be ambient air if the temperature blend door is in the COOL position or partially or fully heated air if the temperature blend door is in the MOD or WARM position.

TILT AWAY STEERING COLUMN

DESCRIPTION AND OPERATION

A dual-action (tilt-away type) steering column features nine driving positions (four up and four down from a center position) and a tilt-away position that is automatically accomplished when the ignition key is turned to the OFF position and the left door is opened. This completes an electrical circuit through a relay, mounted with the vacuum release valve and tilt column vacuum motor to the right of the steering column and switch in the left door jamb. See Figure 39. The vacuum release valve is connected to a vacuum reservoir located on the right side of the dash panel in the engine compartment and to a vacuum motor located on the lower end of the steering column tube by vacuum hoses. When the vacuum release valve is energized electrically, it opens a valve and allows reservoir vacuum to act on the vacuum motor diaphragm to pull the pawl out of the lower flange at the upper end of the column. Spring tension then moves the steering wheel upward and to the right at approximately a 45° angle (tilt-away position). The column will remain in the tilt-away position until the driver manually moves the column to the drive position after the left door has been closed.

A starter safety switch enclosed in the vacuum motor prevents the engine from being started while the steering wheel is in the tilt-away position. The starter safety switch is actuated by the vacuum motor. The motor diaphragm is drawn down to open the switch, opening the starter motor circuit when the wheel is in the tilt position. When the steering wheel is placed in the drive position, the diaphragm moves upward and allows the switch plunger to move inward and close the circuit.

DIAGNOSIS

1. Check vacuum hoses for proper connection and color code at the component connections. (Refer to figure 39.)

2. Disconnect the vacuum release valve supply hose at the valve (Black/Green and White stripe) and connect to a vacuum gauge. Start engine and check for vacuum at the hose. If there is no vacuum, check supply circuit from the engine to the valve.

3. If vacuum is available shut off engine. Vacuum should hold. If vacuum decreases check reservoir tank and check valve.

4. Reconnect valve supply hose. Operate engine to assure vacuum supply in reservoir. With the ignition key in the "off" position and the left door open, disconnect the release valve outlet hose (Black) at the valve. Vacuum should be available at the release valve outlet port.

DIAGNOSIS (CONT.)

5. If vacuum is not available, check the electrical circuit and the release valve.

6. If vacuum is available, check operation of the vacuum motor. If the vacuum motor operation is satisfactory, and the column will not tilt-away, trouble probably is in the column mechanical area.

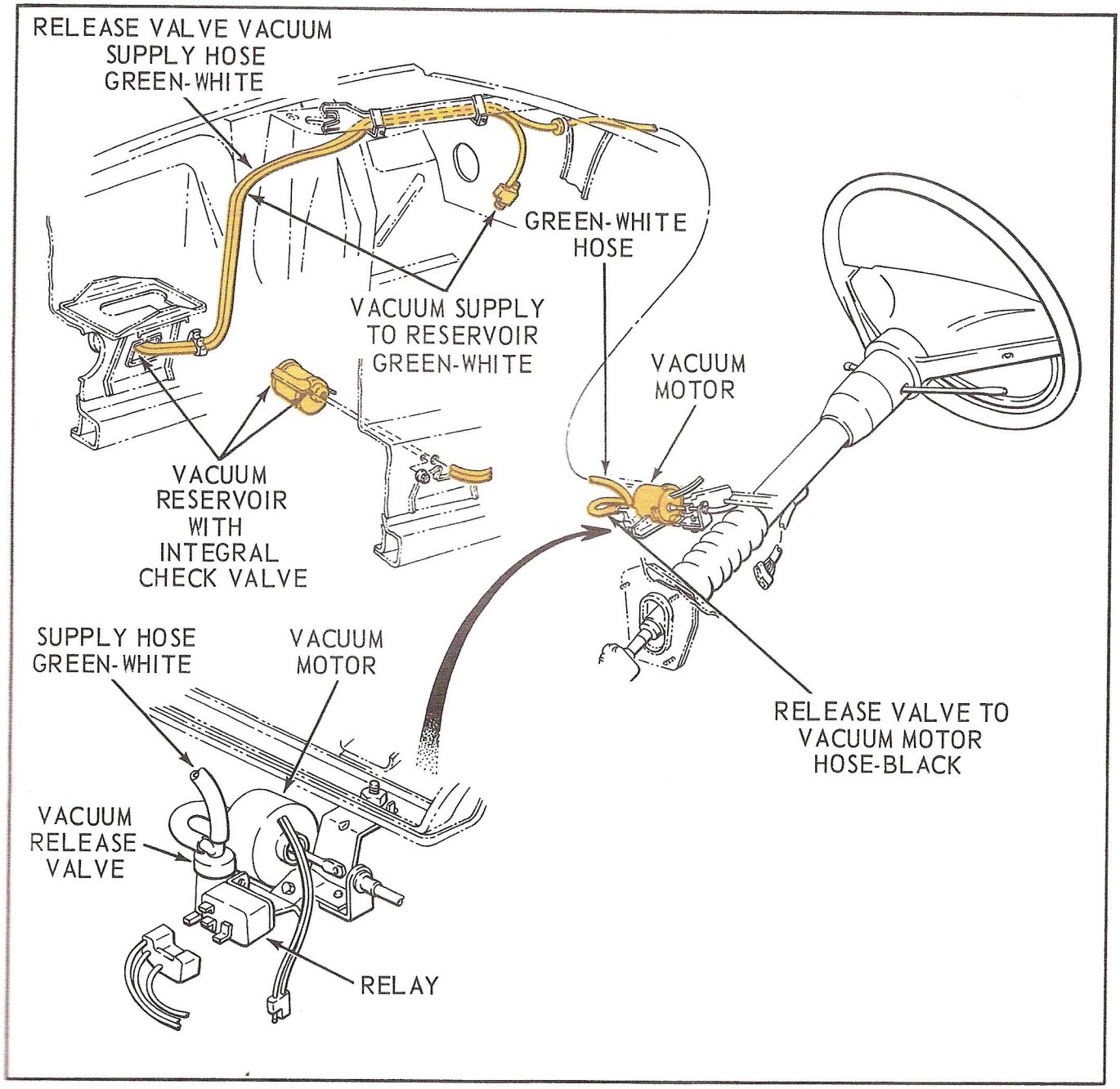


Fig. 39 – 1968 Cougar Tilt-Away Steering Column

SPEED CONTROL

DESCRIPTION

Complete system description, operation diagnosis test procedures and electrical circuit diagrams are covered in the 1968 Shop Manual. Owner usage is given in the 1968 Owner's Manual.

The vacuum system components of the 1968 Cougar Speed Control are the speed control regulator assembly, the bellows (servo) assembly and the necessary vacuum hoses. (Refer to the illustration on the opposite page.)

To check out the vacuum portion of the Speed Control System use the following procedure:

VACUUM SUPPLY HOSE

With the engine at idle speed, disconnect the vacuum supply hose (Black/Red) from the speed control regulator assembly. Vacuum reading should be at least 14 inches at the regulator end of the supply hose. If the vacuum supply is below 14 inches, check for the following problems and repair as required.

A. Leaking and/or kinked vacuum supply hose.

B. Poor hose connections at the vacuum source.

C. Poor engine vacuum supply.

BELLOWS (SERVO ASSEMBLY AND VACUUM HOSE)

Disconnect the bellows supply (Black/Yellow) vacuum hose from the speed control regulator assembly. Manually compress the bellows assembly and close the end of the vacuum hose. If the bellows does not remain compressed, with the vacuum hose closed, check for the following problems and repair as required.

A. Leaking vacuum hose.

B. Loose vacuum hose connection at the bellows assembly.

C. Leaking bellows assembly.

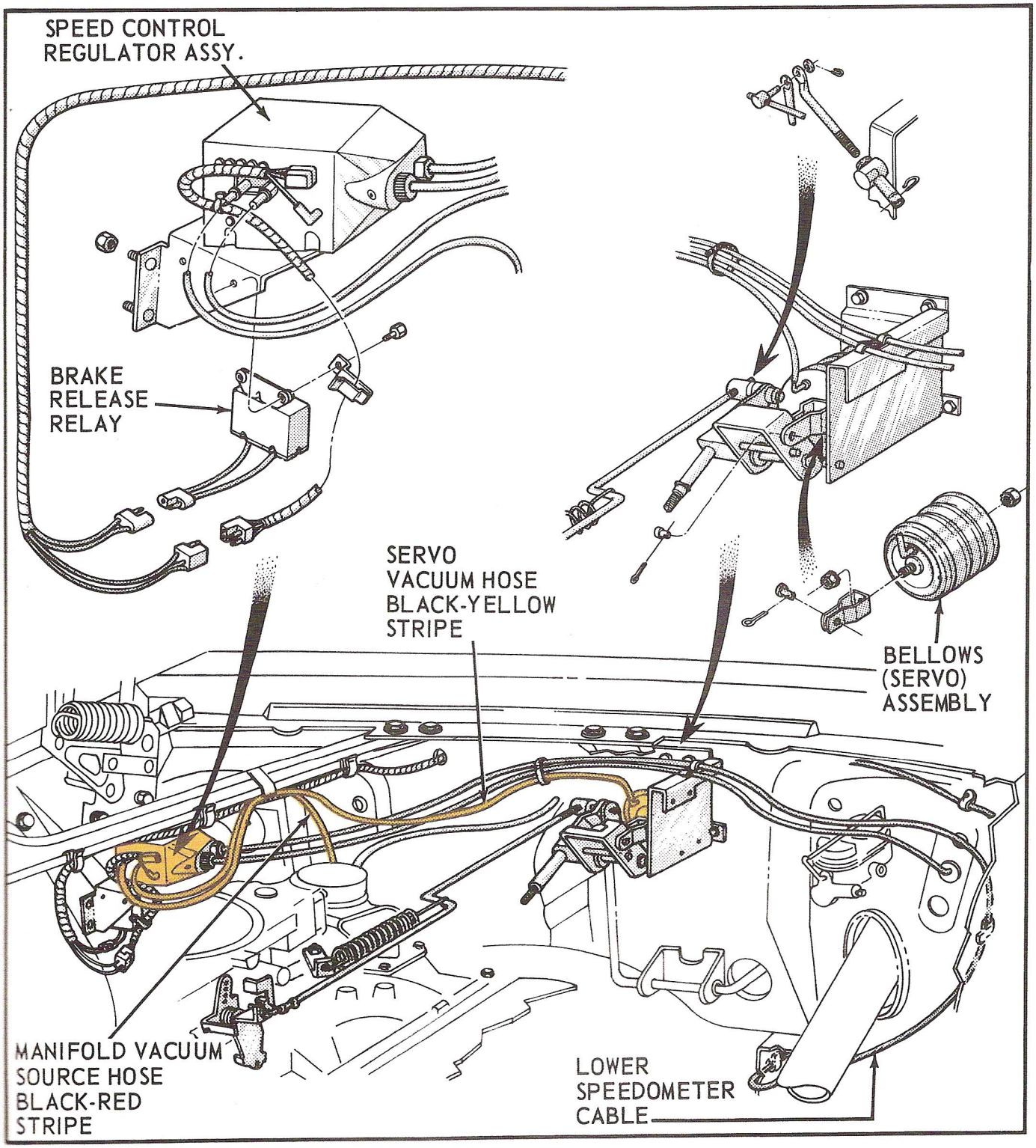
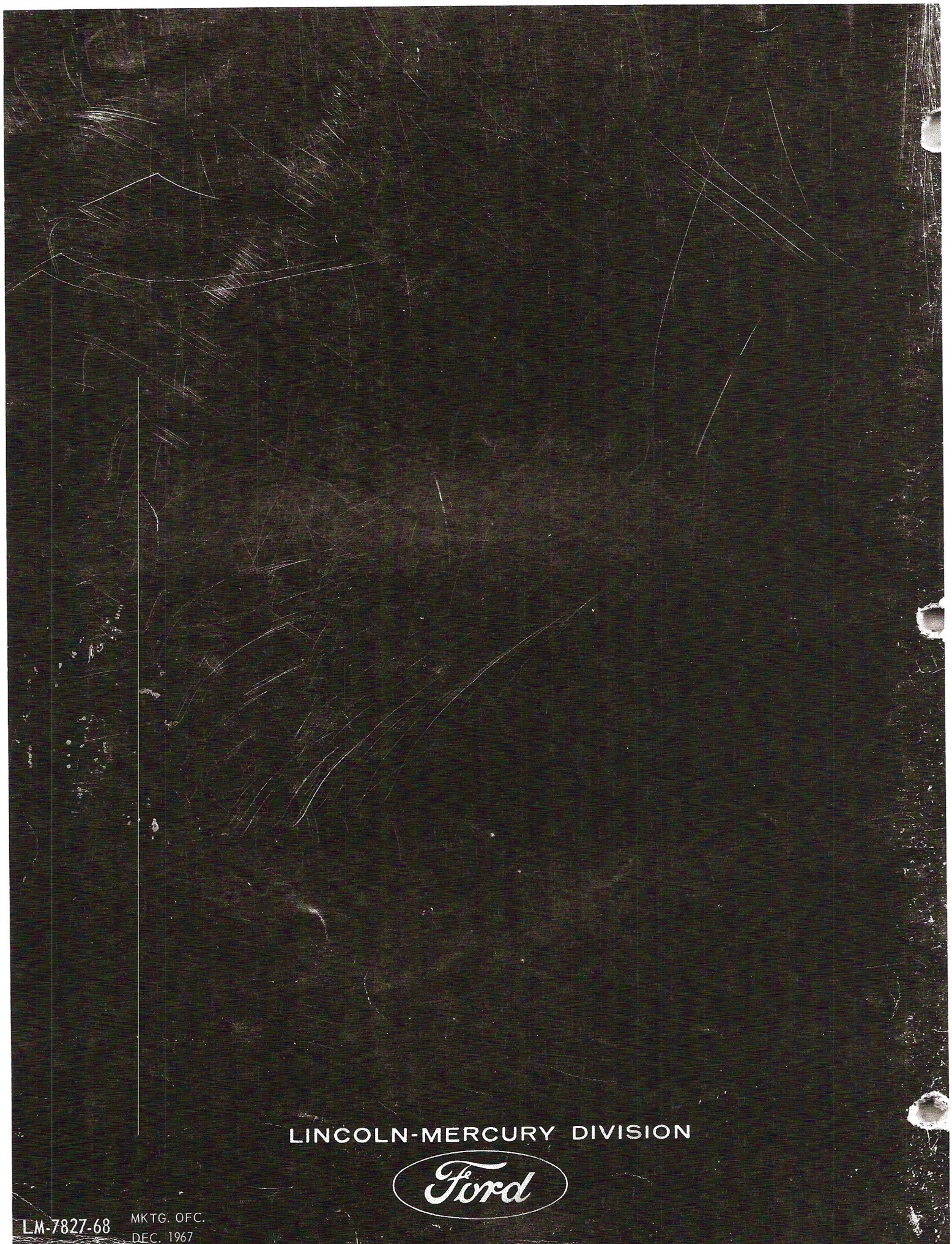


Fig. 40 – 1968 Cougar Speed Control



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