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# Trouble Shooting & Servicing Your Power Tops

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One of the really sticky problems in working on Corvettes is finding out how to maintain and service the soft top mechanisms, including the top mechanism itself, the trunk lid (which when open prevents the soft top from being raised), and the top cover. This article is perhaps the only one in print which spells out what the controls are and where they are located. It is often said that the main reason why the convertible Corvette was not more popular was that no information was available on how to service the top. So here you are: read on and learn. (By the way, most P.T. cars were ordered by women).

## ELECTRICAL SYSTEM

The electrical system of the power-operated folding top consists of one circuit breaker (X40A) located on the engine side of the fire wall above the heater. The X40A is used on all '56-'62 cars equipped with power tops and power windows. Cars not using the X40A have two "dimples" for locating the screws which would otherwise hold the circuit breaker. The electrical system also includes one top control switch, manually operated, one deck lid safety switch, two folding top limit switches, two folding top cover limit switches, one 12V electric motor and hydraulic pump, two folding top solenoids, two folding top cover solenoids, and two 14A fuses. The limit switches used on the '57-'62 models are of the micro type, whereas the '56 model used toggle switches. The '57-'62 electrical circuits are shown in Figure 1 and Figure 2. (See p. 29 for diagrams).

## HYDRAULIC-ELECTRICAL SEQUENCE OF OPERATIONS

When the top is UP and is to be lowered, pushing

the top control switch closes the circuit from the battery (the tan wire) to the motor (the red wire). The motor is grounded to the frame and will operate regardless of the various limit and safety switches. Pushing the top control switch also closes the circuit through the top cover safety switch (the dark blue wire) to the top limit switch (light blue wire). With the top UP, the top limit switch is closed to the top cover limit switch (white wire); with the top CLOSED (or down), the top cover limit switch is closed to the deck lid limit switch (green wire). With the deck lid CLOSED, the deck lid safety switch is closed to the top cover solenoid (light green wire). The top cover solenoid directs oil under pressure to the bottom end of the top cover hydraulic cylinder, raising the top cover. When the top cover is fully open, it contacts the top cover switch, opening the circuit to the top cover solenoid and closing the circuit to the top solenoid (violet wire). The top solenoid directs oil to the top of each of the two folding top cylinders, thereby lowering the top. The top lowers until a top control link contacts the top limit switch, opening the circuit to the top solenoid (white wire) and closing the circuit to the top cover solenoid (red wire). The top cover solenoid directs oil under pressure to the top end of the top cover hydraulic cylinder, closing the folding top cover. There is no limit switch for the closed position of the top cover.

When the top is DOWN and is to be raised, pulling the top control switch closes the circuit from the battery (tan wire) to the motor (red wire). The motor is grounded to the frame and will operate regardless of the position of the various limit and safety switches. Pulling the top control switch also closes the circuit through the top cover safety switch (dark green wire) to the top cover limit

switch (tan wire). With the top down, the top limit switch is closed to the top cover limit switch (orange wire). With the top cover closed, the top cover limit switch is closed to the deck lid safety switch (pink wire). With the deck lid closed, the deck lid safety switch is closed to the top cover solenoid (light green wire). Energizing the green lead of the top cover solenoid directs oil under pressure to the bottom of the top cover hydraulic cylinder, raising the top cover.

When the top cover is fully open, it contacts the top cover limit switch, opening the circuit to the top cover solenoid and closing the circuit to the top solenoid (brown wire). The top solenoid directs oil under pressure to the bottom of each of the two top hydraulic cylinders, raising the top. When the top reaches the full up position, a top control switch, opening the circuit to the top solenoid and closing the circuit to the top cover solenoid (red wire). Energizing the red lead of the top cover 86868 directs oil under pressure to the top of the top cover hydraulic cylinders, closing the top cover. This completes the hydraulic-electrical sequence of operations.

#### FOLDING TOP COVER LIMIT SWITCHES

The two folding top cover limit switches are located under the top cover. The switches on the '57-'62 Corvettes are located at the rear of the top compartment. Removing the sheet metal 86868 reveals two micro switches. Adjustment is made by loosening the two stud nuts and positioning the switches so that the hydraulic cylinder rod striker actuates both switches at the same time. Just before the top cover reaches its upper stop, you should hear a "click-click" at that position. On '56 models, they are located in the truck area behind the truck board and are of the toggle type. Adjustment is made by loosening the lock nuts until you hear the "click-click" when the cover reaches its upper stop (fig. 3A).

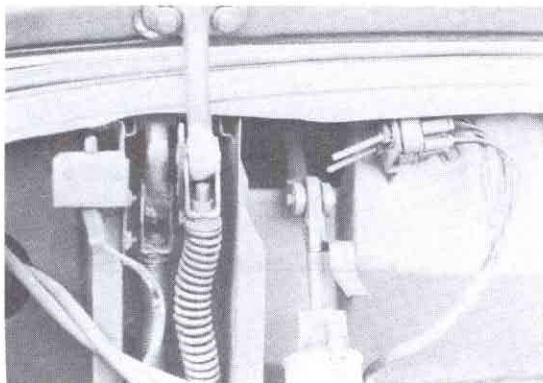


Figure 3A

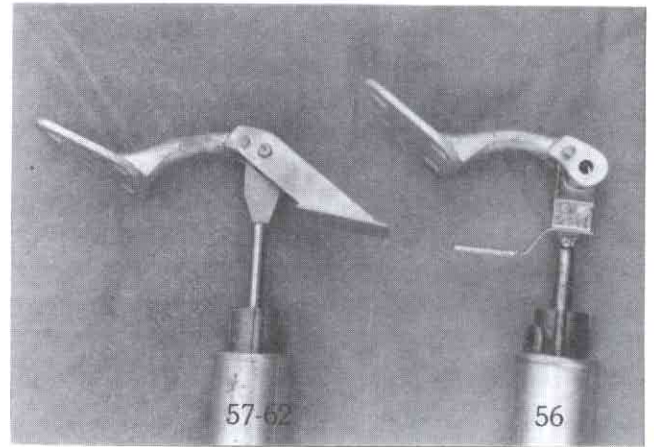


Figure 3B

Left-lid cycle and bracket is 57-62, striker plate is removable. Right-cycle and bracket is 56, striker plate is rivited.

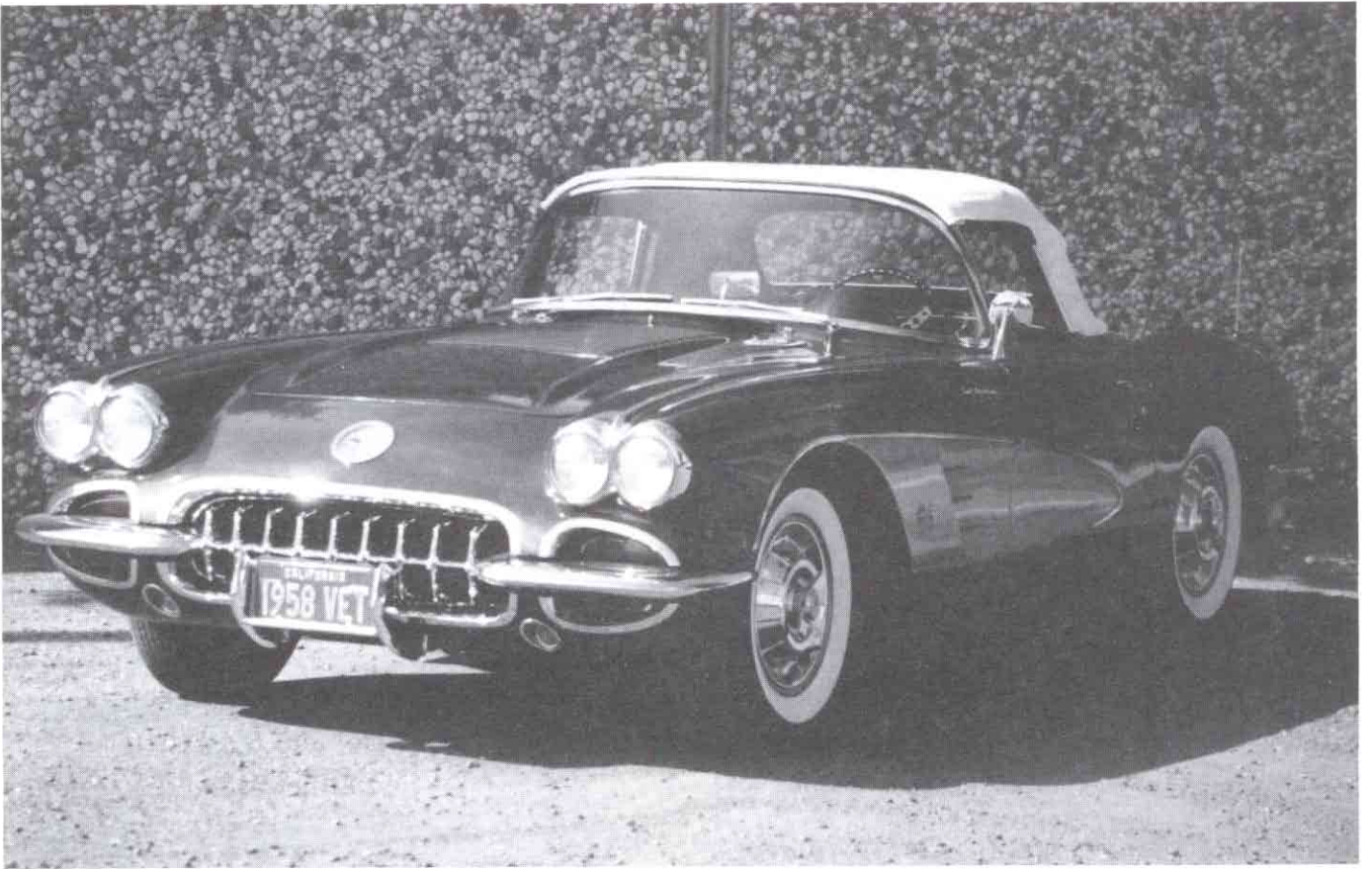


Figure 4

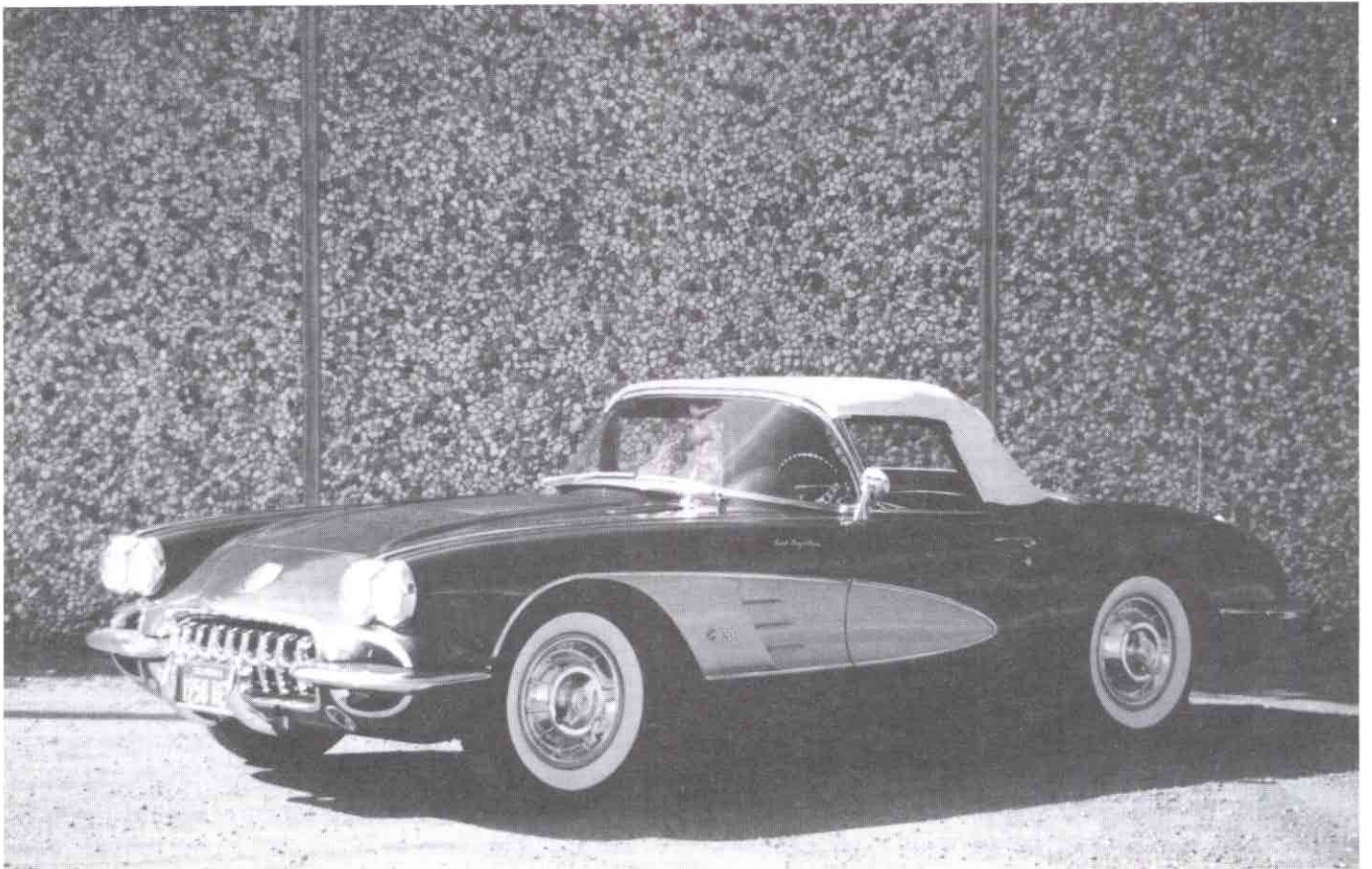
#### FOLDING TOP FRAME LIMIT SWITCHES

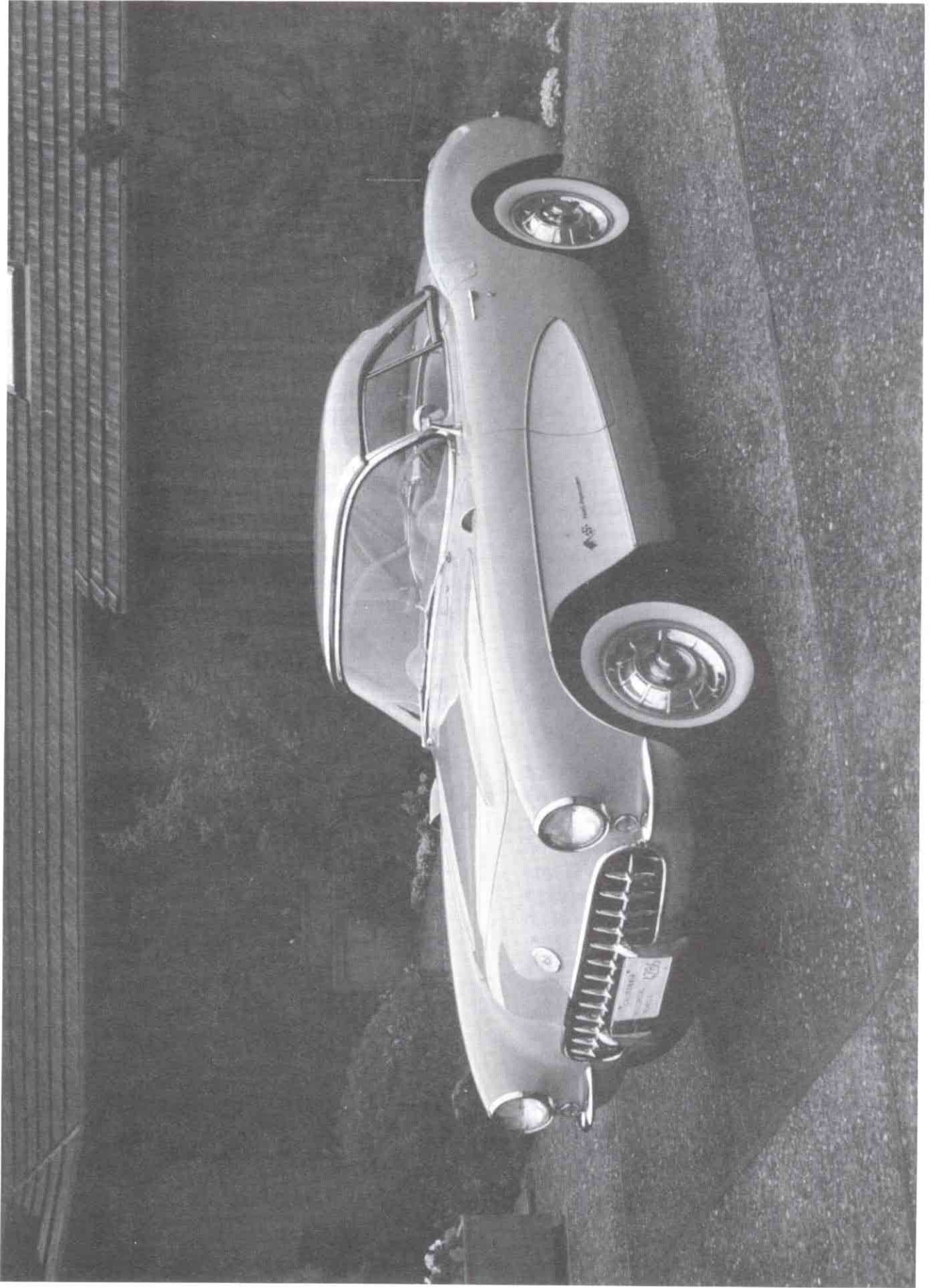
On the '57-'62 cars the two folding top limit switches are located at the lower right side of the passenger seat (fig. 4).

A sheet metal shield is used to protect the switches. The upper switch should be adjusted to actuate just as the top header strikes the windshield header during the top raising cycle. Similarly, the lower switch should actuate when the top reaches its full down or stack position. The '56 limit switches are of the toggle type and are located behind the passenger seat on top of the gas tank cover. One



Lucy '58 Fl. Auto, P.W., P.T. "Treasurer"





Roy Braatz, Jr. FI. Auto, P.W., P.T.

switch is contacted by the top frame assembly for full down position; the other has a wire that connects the switch to the frame for the full up position (fig. 5).

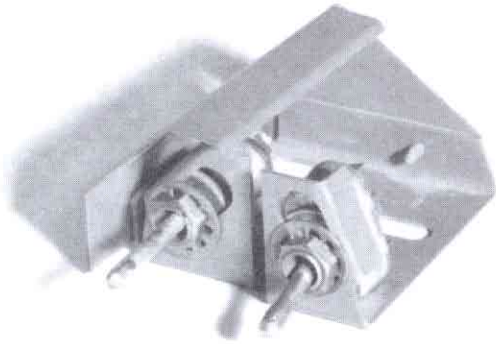


Figure 5

### TRUCK LID SAFETY SWITCH

The truck lid safety switch is a protective device, used to prevent operation of the top if the truck lid is in its up position. The protection is necessary because of possible interference between the truck lid and the folding top cover. The switch is adjustable vertically and should be set so that the truck lid will close the circuit switch when the truck lid is fully closed.

On the '56 Corvettes the switch is located in the trunk, on the left side. In the '57-'62 cars, the switch is located in the trunk, on the right side.

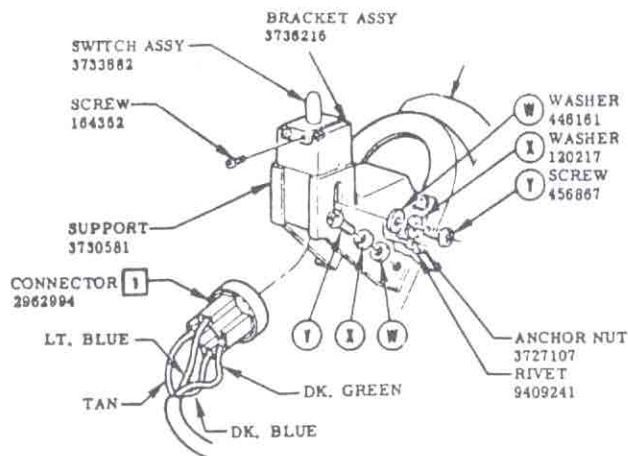


Figure 6

### FOLDING TOP COVER SAFETY SWITCH

The folding top cover safety switch is included in the circuit to prevent operation of the folding top cover solenoid and hydraulic cylinders when the top cover is in the latched position. The switch is adjustable vertically and should be set to prevent operation of the top when the top cover is latched, and to allow operation of the top cover when the top cover is unlatched. All models, '56-'62, are the same and incorporate the installation of the safety switch in the design of the latch bracket (fig. 6).

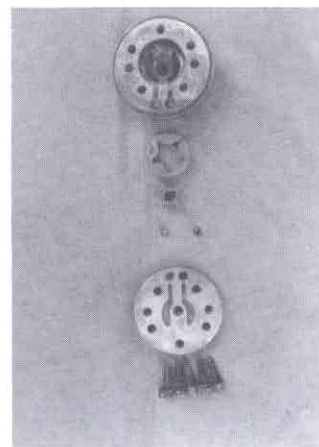
### MOTOR UNIT

To check the operation of the motor, connect the red lead wire directly to a hot wire from the battery, and then check to make sure the motor ground lead is grounded well. Low voltage at the motor will indicate a poor connection of the wire harness and/or a poor ground.

If the motor checks out all right, then the hydraulic system should be checked. Failure of the hydraulic system can be caused by lack of fluid in the system, leak(s) somewhere in the system, obstructions or kinks in the hydraulic lines, frozen cylinders, bad solenoids, or a malfunctioning pump. These troubles and perhaps others can be located readily by using a pressure gauge. When connected, the pressure should be between 240 psi. and 380 psi. (Fluid system is self-bleeding).

### CHECKING AND CLEANING CONTROL VALVES

To check and clean the control valves, the first thing to do is to remove them from the trunk and to disassemble them.



Top to Bottom—  
top motor pump  
housing-aluminum  
driven gear-steel  
drive gear-steel  
relief balls  
cover  
bolts

Figure 7

When they are disassembled, sandpaper the inside of the steel cups that hold the coils to assure a good ground between the coils and the cups. If the coil's rubber seals are bad, fluid will drip out from a small hole at the bottom of each cup. Also clean the bottom of each coil and check the operation of each by grounding it. Then, with a hot wire, touch the red or black wire to see if the plunger is pulled down. If not, pull the clip and plunger out and clean them. The top aluminum housing has two steel needles that act like the needles in a carburetor. If the needles are stuck, fluid will not pass by, allowing pressure to the cylinders. Because the housing is made of aluminum, use a hand torch and heat the housing, and then with pliers remove the frozen needles and clean them. Next, using air pressure, blow out all fluid canals to clean them and remove any foreign material.

Notice that the steel needles are three-faced; this permits the needles to rotate as the pressure builds and the needles are pulled down by the coil. One coil and needle routes the fluid to the top of one cylinder, while the other coil and needle routes the fluid to the bottom of the cylinder. Beside the hose outlet locations, these units are interchangeable (fig. 7).

### CHECKING AND CLEANING THE CYLINDERS

The first step in checking and cleaning the cylinders is to remove them. When they are removed, use compressed air to blow into both the top and bottom of each cylinder. As you do so, twist the cylinder shaft. This will aid in freeing the seal inside. Repeat air pressure from the top to bottom to remove old contaminated fluid. After the cylinders are cleaned, place each in a container of water to check for air or fluid leaks. If there is a leak, discard that cylinder; they are not serviceable. An O-ring is used at each hose connection—check them!

Now is a good time to blow out all the hoses to remove any blockages. Cover the free end of the hose with a cloth or rag so that no brake fluid will come in contact with the body paint.

### CHECKING AND CLEANING THE PUMP

To check and clean the pump, it must be removed

Top to Bottom—  
control valve  
needles  
clips  
coil plungers  
coil plunger springs  
washers  
rubber seals  
coils

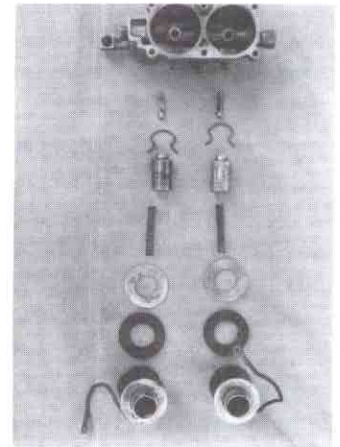


Figure 8

from the trunk. Using the breakdown drawing, Figure 8, disassemble the pump.

Notice that the motor shaft drives the pump. To remove the motor from the pump, disconnect the fluid reservoir, remove five pump bolts, and using needle-nose pliers, remove the small drive gear. Now with a fine wire, push the very small steel ball out the recessed hole at the end of the motor shaft. Next, remove the two motor bolts and twist the pump off the motor shaft. If the large drive gear is frozen in the housing, heat the aluminum housing with a hand torch until you can twist and remove the large driven gear. Then clean all the parts and reassemble the unit. Be sure to replace the steel ball and the small o-ring to the shaft. Test the motor by grounding it to the battery and touch the red wire to the positive post of the battery. If the motor does not work, it is probably burned out. Replace it with any 12V Ford or GM motor, be sure to clip off the reverse wire so that the motor can run in only one direction, clock-wise, as stock Corvette motors do.

Many Corvette owners do much or all of the needed maintenance work on their cars even if they are not usually skilled mechanics. And many other wish they could do their own work—mainly because they find few commercial mechanics who are skilled enough to do good work on Corvettes and even fewer who care enough about their cars to find out how to do good work on them. This article, and others to follow, may help both groups of owners in the effective maintenance and repair of their Corvettes; we certainly hope so.