19
HORN REBUILDING AND/OR REPAIRING

THEORY OF OPERATION

Horns are nothing more than a buzzer with a diaphragm. If you are not familiar with how a buzzer works, an explanation is in order. A buzzer consists of a magnetically operated, normally closed, switch and an electromagnet - basically, a relay! The switch is wired in series with the electromagnet coil. Current flows through the switch into the coil, creating a magnetic field which opens the switch. This causes the field to collapse, closing the switch, at which time the field is again built up, opening the switch, which collapses the field, closing the switch, etc, etc, etc. This happens very rapidly, producing a buzzing sound. By placing a diaphragm on the switch, the sound is magnified and the tone improved. **Figure 1** below shows a relay used as a buzzer. The **A** side shows the relay with the NC contact closed and the **B** side shows the NC contact opened by the relay coil. As long as the on-off switch is closed, the relay will open and close repeatedly, as described above. In a pinch, a relay makes a quite acceptable buzzer.

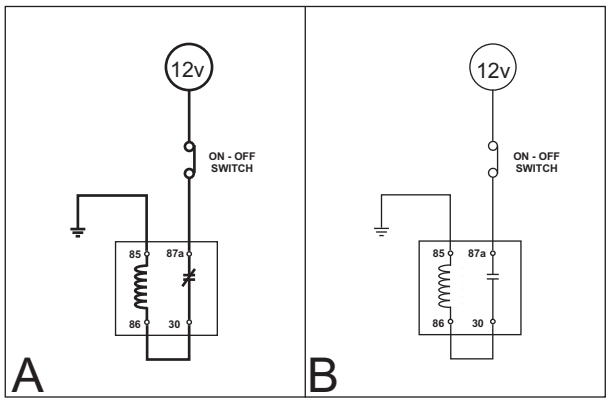

FIGURE 1

Internally, a horn has three primary components - a solenoid, a diaphragm, and a switch. **Figure 2**, opposite, is a simple diagram of the internals of a horn. The switch is wired in series with the solenoid, and the diaphragm is fastened to the solenoid plunger. When the solenoid is energized, the plunger is pulled into the solenoid, and the diaphragm moves downward. Attached to the plunger is an actuator that mechanically operates the switch. When the plunger reaches the end of its travel, the actuator opens the switch and current to the solenoid is interrupted. The plunger/diaphragm then retracts, the switch re-closes, and the cycle starts over again. The design of the assembly is such that the in/out movement is rapid enough to create the high pitched sound we hear.

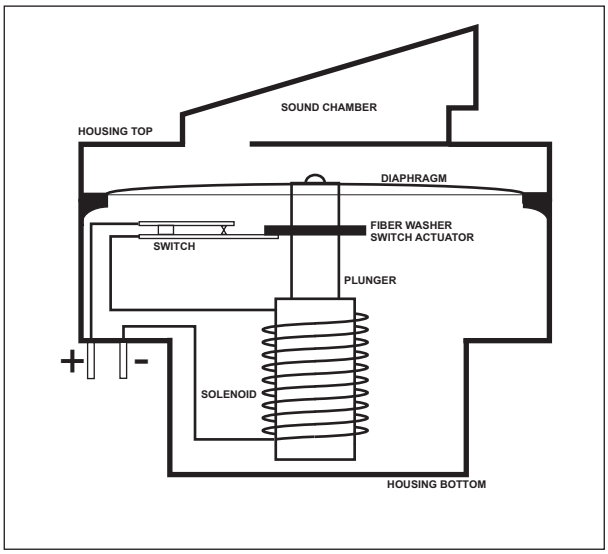

FIGURE 2

ADJUSTMENT PROCEDURE

The function of the adjustment screw (the large one with the lock washer) is to limit the forward movement of the plunger. If the movement is too limited, the plunger will not move far enough to open the switch. If it is allowed to move too far, the frequency of the sound will be too low, and the volume too soft. Physically, the adjustment screw goes into the core of the solenoid from the opposite end from the plunger.

The smaller screw is a left handed thread, and physically bends the fixed arm of the switch, increasing the rearward travel of the plunger before the switch re-opens.

CURRENT DRAW

Since the switch operates in an ON-OFF cycle, the average current is less than the maximum current, in the ratio of the ON time to the OFF time. The ON-OFF ratio will depend on the adjustment setting, and the tone of the horn, but assuming 50-50, the average current will be ½ of the max. For this reason, a horn that is misadjusted such that the switch doesn't open, or if the switch sticks closed, may appear to be shorted, based on the apparent excessive current draw. At a 50 - 50 ratio, a 2 amp horn would draw 4 amps. If the ratio were to be 20-80, a horn that would draw

2 amps when working would draw 10 amps if the switch remains closed.

REPAIR PROCEDURE:

There are three types of failures with horns:

1. The contacts corrode together, preventing the switch from opening

2. Corrosion builds up on the contacts, preventing current flow through the coil

3. The coil wire or connections break.

By drilling out the rivets, shown in **photo 1**, below, you can get to the contacts to clean them. It will be self evident what needs to be done. The success rate for this repair is fairly good. If the coil wire is broken, it can be fixed, but finding someone who knows how to do it is very unlikely, and probably very expensive.

You can, however, with a little care and patience, repair the coil yourself. If the wire is broken where it is visible, a bit of solder will usually do the trick, provided the insulation (a lacquer or enamel coating) is removed from the wire first. If the break is inside the coil, you will have to unwind the coil, and rewind it with the correct type and size of wire. As you unwind the wire, make careful note of the number of turns used, and the general arrangement of the wire.

Take a piece of the wire to an electric motor repair shop, and ask them for enough wire of the same size to rewind your coil. Most shops will be happy to sell you the small amount of wire needed, but some will insist on selling you an entire spool - enough to wire every TR250/TR6 horn in existence. Even so, the cost is not high, but probably more than it would be worth, considering you can buy after market horns, with a louder sound, for under $25 per pair. In as much as the horns are not seen, repair versus replace is mostly a matter of esthetics. Some folks prefer to remain original if at all possible, regardless of the cost or effort.

I've attached a few photos of Triumph horns, both assembled and disassembled, to help you visualize the process of repair.

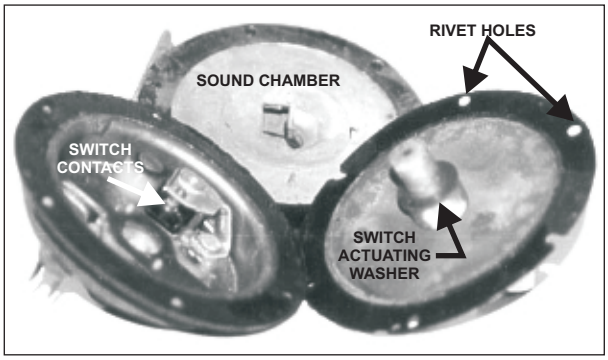

PHOTO 1

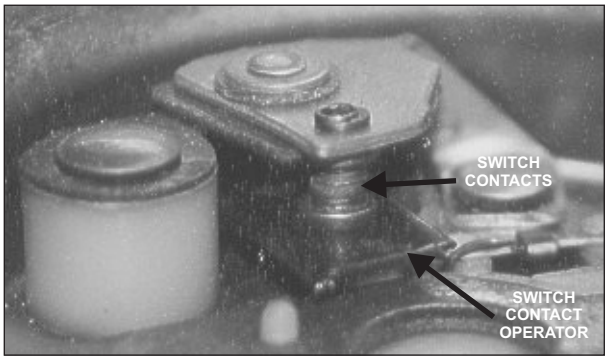

PHOTO 2

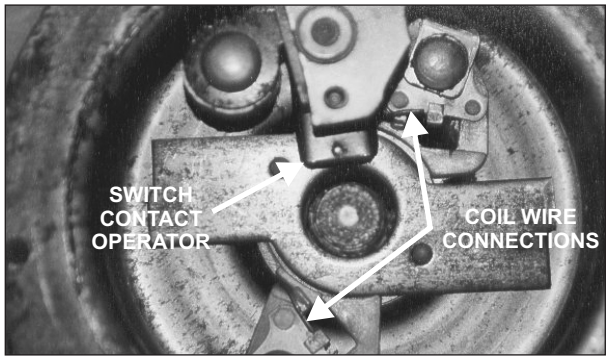

PHOTO 3

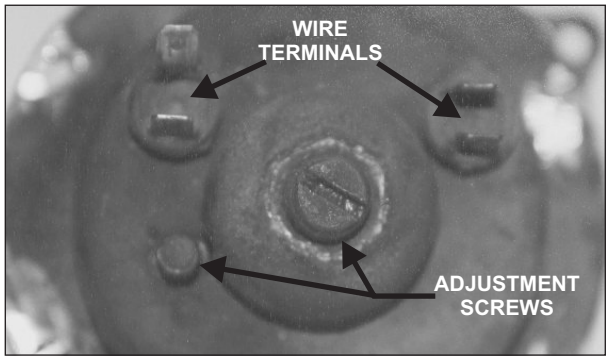

PHOTO 4