

Rebuilding Mustang Horns

by Joe Sikora

Working, date-code-correct Mustang horns are getting harder and harder to come by. If you can get yours to work by some combination of chanting, beating, or soaking, you're lucky. Otherwise, the options aren't pretty. It's not that it's all that hard to find a similar-looking working horn, but most passenger car substitutes mount incorrectly. The process of grinding off the old bracket and welding on a new one to get the correct orientation will usually result in creating yet another non-working "Mustang" horn. Replacement horns don't look anything like the originals and professional horn restoration is, well, expensive. Kits are available from many suppliers for do-it-yourself rebuilds. Other than being time consuming (about four hours each), it isn't particularly difficult or expensive.

This article is directed specifically at first generation Mustang horns, but should be useful for rebuilding almost any horn from the mid '60s through the '70s.

Horns 101

Fundamental to fixing anything is an understanding of how it works. A horn operates pretty much like a doorbell buzzer. It consists of a set of points, a coil, a diaphragm, and a trumpet. The points are normally closed. When you apply power to a horn, the points energize the coil. The coil produces a magnetic field that attracts a plunger in the center of the diaphragm much like a solenoid or relay. As the diaphragm moves downward, it presses on a

small lever that opens the points. The magnetic field collapses and the diaphragm moves upward. This closes the points and re-energizes the magnetic field, the diaphragm is pulled downward, and the process repeats itself. The diaphragm vibration is magnified by the trumpet and makes sound.

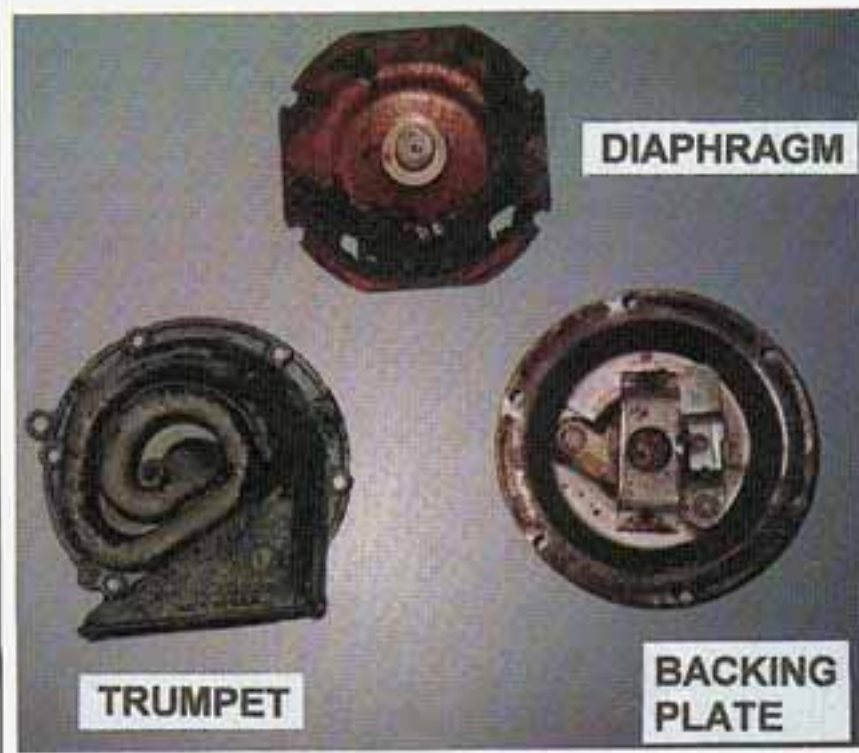
Horns generally don't work for one or two simple reasons — either the diaphragm has rusted out or the points have corroded. The coil could also be bad, but generally one of the first two fails before the coil burns out (unless you already melted it by trying to weld on a new mounting bracket).

It is probably wise for the do-it-yourselfer to approach horn rebuilding from the perspective of disturbing as little as possible with the exception of what's actually necessary to repair the horn. Most of the problems revealed by other amateur horn rebuilds were simply the result of an over-energetic restorer trying to do a "good job". A glass-beaded, ospho-prepped, Rustoleum-painted horn may look great before you reassemble it, but if it works at all it will probably sound like a cow in heat. You may have done so much internal damage that even a professional can't fix it. For all your good intentions and hard work, all you've ended up accomplishing is destroying an otherwise rebuildable horn.

Disassembly

Part of the problem of horn restoration is that the darned things were never intended to be rebuilt in the first place. Before you start working on your Mustang horns, take apart a sacrificial passenger car horn. You can develop a little technique and you may end up needing the diaphragm for the actual horn rebuild. Don't worry if you've already removed the tuning screw as part of a previous last-ditch effort to get your horn to work. It is used to adjust the mechanical tolerances of the points and diaphragm and will need to be set for the new clearances in the rebuilt horn. Horn tone is controlled by the shape of the trumpet.

Wipe the horn down in lacquer thinner and match-mark the trumpet and backing plate before you take the assembly apart (no, you won't remember how they went). Glass-beading is not recommended until after you have finished the rebuild to avoid possible distortion of the horn assembly. Be careful when drilling out the six housing rivets. This is probably the longest



and is certainly the most tedious part of the entire rebuild. Center punch the back side of each and drill a 3/32" pilot hole far enough into its center so as to extend into the head of the rivet. Use a 1/4" drill bit and carefully remove the mushroomed portion of the rivet being careful not to drill into the backing plate of the horn. Drill the blind rivet in the trumpet muzzle all the way through with the 3/32" bit. It will have to be drilled for a clearance hole for the new fastener and ground flat on the muzzle side for the new fastener later. Do not pry the backing plate away from the trumpet or tap out the rivets. Wiggle out the rivets by grabbing their heads with vise grips. This will eliminate the possibility of cracking the pot metal trumpet.

Rebuilding

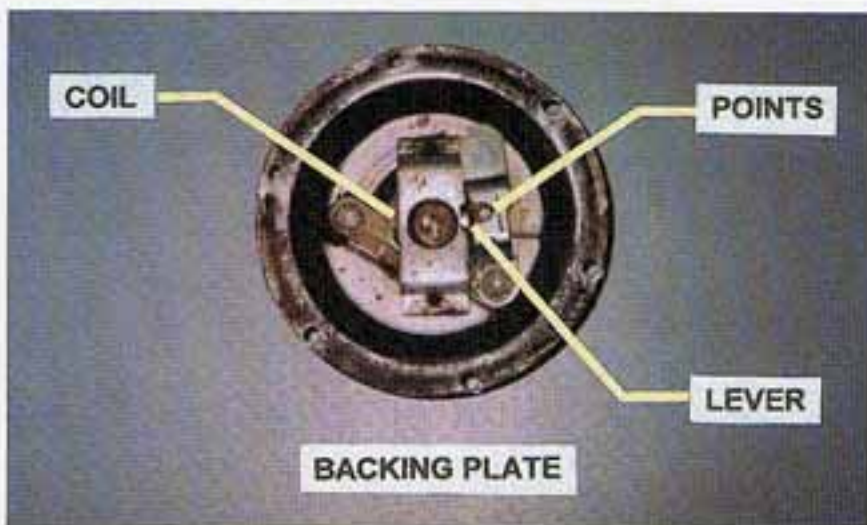
Fold several pieces of 150 grit sandpaper (about the size of a stick of gum) in half long-wise, rough side out, and work them one at a time back and forth through the point gap until the points are clean. Verify good electrical contact between the points by checking the electrical continuity between the backing plate and the horn's electrical terminal before you start reassembly. Use a multimeter or hook up a battery's positive terminal to the horn's electrical terminal and a test light between the backing plate and the battery's negative terminal. The test light will light up when there is good electrical contact between the points.

Do not glass-bead the diaphragm as instructed with some rebuild kits. Glass-beading will cause residual surface stress that will cause the diaphragm to fatigue crack and may warp the diaphragm or affect the sound of the horn. Clean the gasket sealing surfaces of the trumpet, backing plate, and both sides of the diaphragm by hand with a gasket scraper and a stiff wire brush. Do not tamper with the mating surfaces of the backing plate and trumpet; they are already perfectly matched to each other.

You can glass-bead and paint the exterior of the horn to your heart's content after the rebuild, but don't worry about cleaning or painting the inside. Once the horn is assembled, it's pretty much sealed from the environment and you'll probably do more harm than good. Just blow out any dust/debris with an air nozzle.

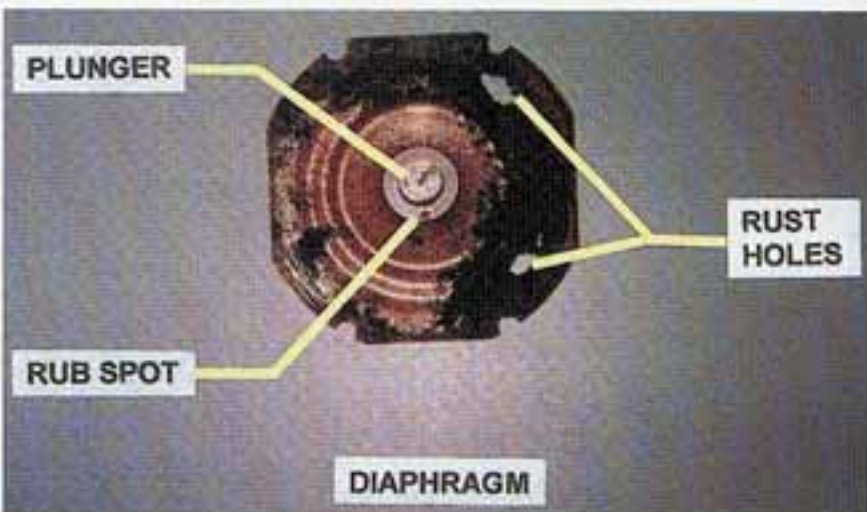
Reassembly and Tuning

The rebuild kit we purchased included four gaskets, exactly 12 new rivets (nice reproductions), a points file, and instructions at a cost



of around \$15. The gaskets were too thin, two rivets were ruined learning how to install them properly, the points file was too fine to cut through the oxidized build-up on the points, and the directions were misleading. We suggest that you get two kits so you have enough rivets to get through the "technique developing stage" plus you may need the extra gaskets to approximate the thickness of your original gaskets.

Place the diaphragm in its original orientation for reassembly (there is a small rub spot on the diaphragm's insulating washer where it touches the lever of the points contact). Carefully center the diaphragm in the assembly by evenly spacing its outer edge with the rivet hole circle. The instructions with our kit said to use a gasket on either side of the diaphragm. Our horns had a single gasket on the backing plate side of the diaphragms only and the original gaskets were much thicker than the replacements. When the horns were assembled as instructed, the diaphragms couldn't be adjusted far enough to close the points (remember, if the points aren't closed, the horn can't blow). If you experience this problem, place both gaskets on the backing plate side of the diaphragm. With the gaskets in this position, our horns worked fine but the tuning screws had to be adjusted almost completely in. If you



bought two rebuild kits, you can stack up three or four gaskets to approximate the thickness of the original gasket and bring the tuning screw to its mid range.

We don't recommend using sealer as instructed with some kits. It will only make it difficult to disassemble the horn in the future. Temporarily fasten the horn assembly together with 8-32 x 3/4" screws and nuts. Use fasteners at all six locations and tighten snugly. Do not install the rivets until the horn has been tuned and you are certain that it is working properly. Back the tuning screw all the way out and turn it clockwise until the points just close. Use a multimeter or hook up a battery's positive terminal to the horn's electrical terminal and a test light between the backing plate and the battery's negative terminal. The test light will light up when the points close.

At this point you are ready to test the horn. Hook up a battery's positive terminal to the horn's electrical terminal and the backing plate to the battery's negative terminal. The horn will probably sound like it is trying to blow. You may even get a treat and actually hear the horn! Adjust the tuning screw to minimize vibration and produce the clearest trumpet sound. Replace the fasteners one by one with rivets so you do not disturb the horn assembly. Duplicate the look of the original rivets by placing a flat piece of steel over the head of one of the jaws of a vise to protect the head of the rivet, and letting the knurled face of the other jaw bite into the backside of the rivet as it mushrooms. Finally, lightly

glass-bead the exterior of the horn and top it off with a coat of black paint from your favorite spray bomb.

Conclusions

We toyed around with several "improvements" (including an access hole for cleaning the points and a small condenser across the points), but the adage "if it ain't broke, don't fix it" sounded loud and clear. Horns work pretty dog-gone well just the way they are. There are plenty of 30-plus year-old working originals around to attest to that fact.

It is recommended that #8 x 3/4" Allen-head cap screws and Keps nuts (nuts with integral star washers) be used rather than the rivets from the rebuild kit. (Use a #8 x 1/2" Allen-head cap screw in the trumpet muzzle.) The cap screws have a very similar appearance to the original large head rivets and are much easier to disassemble for subsequent horn repair. The Keps nuts will not come loose from horn vibration and have a neat "factory look".

To avoid the use of rebuild kits try the fasteners listed above and custom cut your own gaskets from stock the desired thickness. However, if you are a kit kind of person, premium rebuild kits, which include new diaphragms, are available.

Horns are simple, rugged, low-cost electrical devices, but at the same time, they are precision-built, electro-mechanical machines. Keep in mind their basic operating principles and these few simple guidelines to ensure a successful rebuild.