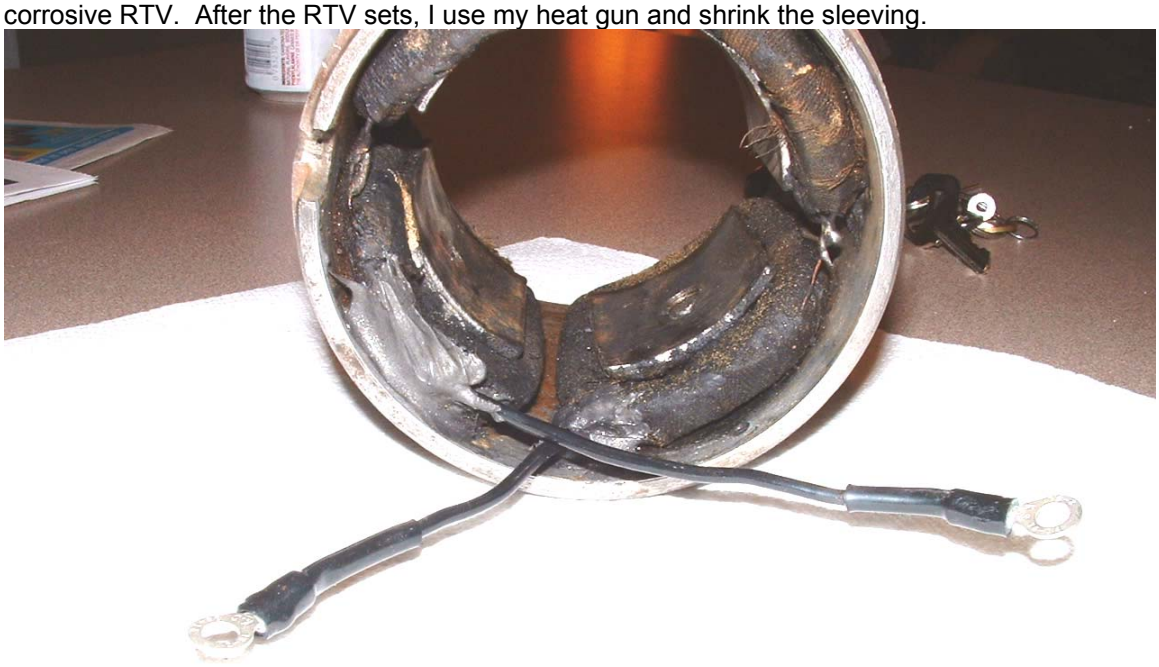
Generator Repair

Things electrical intimidate many people. I know some folks feel they have reached their technical limits if they have installed flashlight batteries correctly but they are really selling themselves short. There is a term used throughout the aviation community known as, “IRAN”. It stands for, **I**nspect, **R**epair **A**s **N**ecessary. When dealing with generators, some folks think they have to have the armature rewound, fields changed, etc. in order for these parts to be reliable and function correctly. I am certainly not one of those. These items have to be checked to ensure they are still serviceable but wholesale replacement is a bit extreme without first testing. Ask yourself this, if the armature checks out good, what do you stand to gain by spending another $75 having it rewound? Same goes for the field windings.

If you have an old T generator lying around, the chances are you can go through it yourself and have an excellent working unit for very little money and effort. Don’t accept defeat before you start, you can do this with basic tools even if you have never worked on one before!

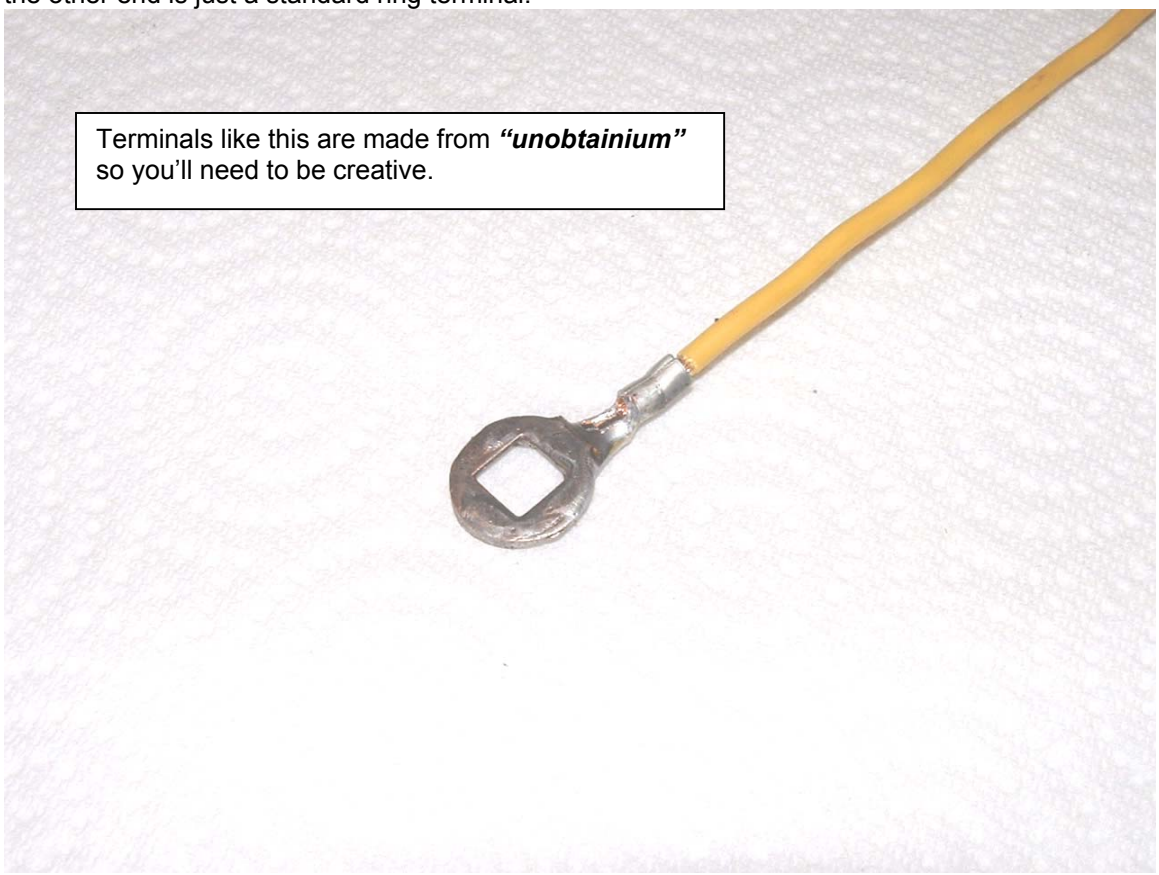
There are a few common faults that cause problems with the T generator that need to be checked. You will need an ohmmeter to make a couple of test and you can pick up an el-cheapo from Harbor Freight for around $10 if you don’t own one. These are for the little analog style meter; I don’t care for the digital ones. Basically, all model T’s should have one of these in the tool kit anyway.

One major area of trouble is in the leads coming out of the field. These were originally insulated with a cotton fabric, which is often in worse shape than your favorite pair of blue jeans. The fix for these is to cut off the terminals and slide heat shrink tubing over the wire (after you have crumbled all the cotton away). Then it is just a matter of crimping on new terminal ends. It is almost impossible to get the heat shrink to the very end so I insulate the ends using a non-corrosive RTV. After the RTV sets, I use my heat gun and shrink the sleeving.



Using your ohmmeter, check to see that there is continuity between the two terminals shown. If your meter doesn’t move then the fields are open and need replacing. Then, check to see that there is no continuity between either terminal and the generator housing. If the needle moves during this check the fields are shorted and need replacing. Obviously, you want to make these checks before you go through the effort of repairing the insulation.

Now that you have that accomplished, there is another lead that is sometimes a problem but it is better to make a new one if badly disintegrated. The lead going to the positive brush often has rotten insulation as well. One of the terminals on that lead has a square hole in it. I have never found these but instead cut the "washer" portion of the old terminal and solder it on to the new one. I use # 14 wire to make this lead, as that is what I believe the old one was. The terminal on the other end is just a standard ring terminal.



When these cars were new folks understood the generator bearings needed oil from time to time. These are often neglected and by the time a bearing is making enough noise to let you know it needs oil, it's too late. Modern sealed ball bearings can be had for $5 each. Don't buy the stock bearings that the vendors sell (unless you just like oiling them).

Before pressing on new bearings, take the armature to a generator shop. You can test it for shorts with your ohmmeter but you'll need a growler to check it for opens. The generator shop will also turn and polish the armature and undercut the mica segments all for around $15.

If you have an armature that you want tested, I'll do them for postage. Ask real nice and I'll true it on the lathe and polish it for you. This may cost you a Coke one day!

This armature is ready to install with new bearings. Truing the commutator (if needed) and polishing will ensure the new brushes make full contact after initial seating in.

One of the most common problems is with the brush holder assembly. The insulators become brittle and often, the third brush will ground itself out as it has been over tightened somewhere along the line. The age old fix has been to cut a piece of insulator and replace just the bad portion. While this is still a valid fix, it is no more work to repair it permanently. Many of the vendors now sell the good insulators made from electrical grade fiberglass. This is the only type to consider buying! They are riveted in place and you don't cut them.

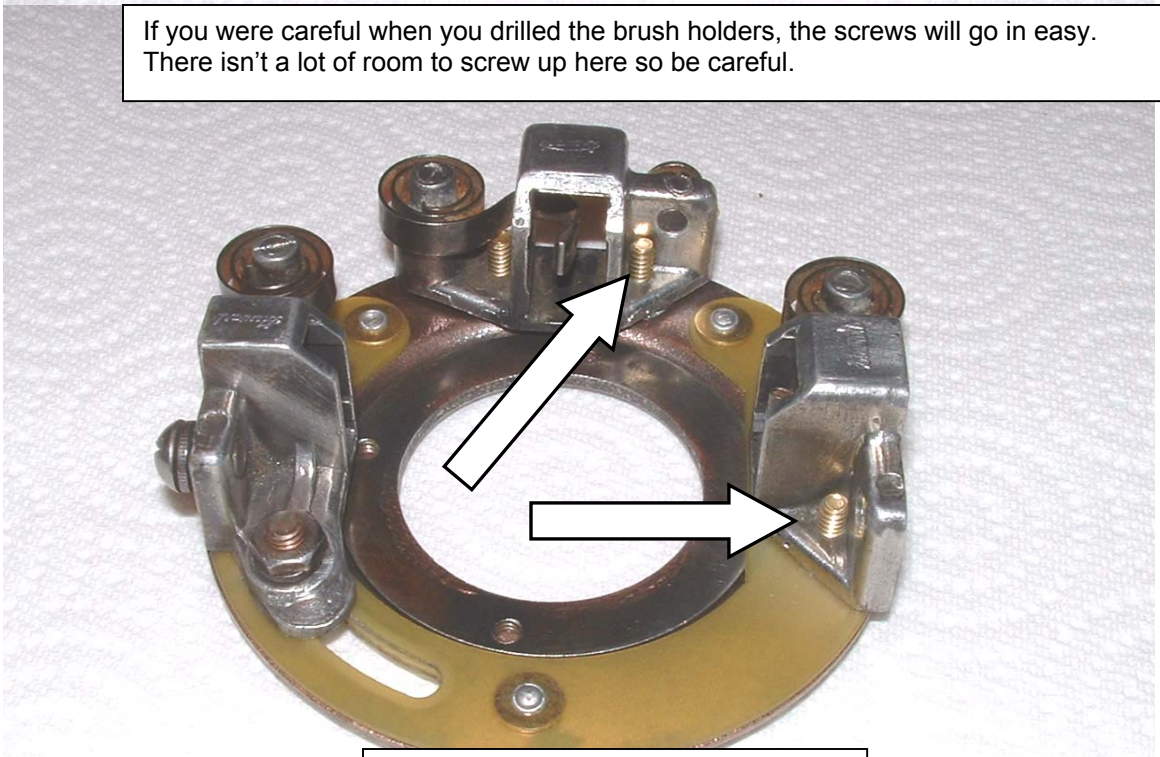
To replace the insulators, you will have to remove the positive brush and then drill out the three rivets that hold the two insulation portions on. Place the two segments on and using 1/8 X 1/8 pop rivets and one thin #6 washer per rivet, rivet them in place. You can also use 1/8 diameter rivets X 3/16 length rivets. I use the aluminum rivets with the aluminum mandrels to keep from hurting anything. This type rivet sets with not a lot of pressure.

Inspect the springs that hold pressure on the ends of the brushes. If these are touching the sides of the holder then they aren't applying pressure to the ends of the brush. Bend the springs as necessary.

I like to install new brushes in generators (starters are a different story, different article). New brushes should be checked to ensure they make full contact with the armature. I wrap 600 paper around the armature and turn it back and forth to correctly contour the brushes. This ensures they seat correctly.

Pop rivets installed from rear side. The brush holders themselves are tapped for 6/32 screws, drill them with a # 36 drill bit. I use a # 10 washer under countersunk screws when installing if the original assemble didn't have a backing plate. The washer will self-center the screw. Ensure the screw head is low enough that is won't ground out in the end cap.

If you were careful when you drilled the brush holders, the screws will go in easy. There isn't a lot of room to screw up here so be careful.



6 washer to prevent rivet from ruining insulator.

Once you have the generator put back together and have set the brushes to neutral, you can test it (sort of) even without a test bench for generators. I use my battery charger connecting the positive lead to the output terminal and ground the negative lead to the generator housing. I set my charger to six volt and once you turn it on it should run like a motor drawing four to six amps.

Now on the car, adjust the 3rd brush to so the generator is putting out around 8-10 amps (assuming you have a six volt battery) with the engine running at a speed equal to 25-30 MPH. If your running 12 volt, reduce the output by half. The reason is the T generator will only dissipate about 100 watts of energy before it starts tossing solder. 12 volt at 10 amps = 120 watts, reduce a 12 volt T to 4-5 amps.

Now, you have about $ 25 - $ 40 in fixing up this unit. If you insist on running the standard Ford cutout, you'll get to put more into it eventually. If the cutout ever goes open, the generator will self-destruct. Put one of the electronic regulators on it or at least a diode to replace the cutout. Your battery will last longer as well using a regulator, as the generator won't be trying to boil the water out of it.

You should be able to fix a generator now that is plagued with the most common problems. Even if you still feel intimidated by them, ask a club member to help you with one. Look at it this way, your really just making small mechanical repairs along with a couple of minor electrical test. Remember, there is only one moving part. You will see there is nothing to it and your confidence level will go way up.

Gary