DELCO POWER WINDOW REGULATOR MOTOR REPAIR

Before you decide to cut the first rivet, maybe you can repair the power window motor in your car. It can actually take less time to repair the motor in place than to drill the mounting rivets, remove the drive mechanism, install and adjust the replacement mechanism, and remount the unit. The other problem with replacement is that many of us don't have access to the ¼" rivet setter required to install the large O.E.M. type rivets. Smaller rivets don't hold adequately, and bolt/nut combinations tend to work loose over time, allowing the unit to rattle in the door and bind against the other door internals. Even thread locking compounds don't help the situation much, since most of the force that loosens the fasteners is from motor torque, not direct pull on the fasteners.

Many failures of the power windows are due to one of three causes:

A defective switch;
A motor that is overheating from excessive load;
Worn brushes in the motor.

A defective switch needs to be analyzed with a meter. The switch provides both +12VDC power and ground to the window motor, and reverses the polarity of the power and ground to reverse the motor direction. If the power is being switched, but not the ground, a test light might indicate power at the motor but the circuit is still not complete.

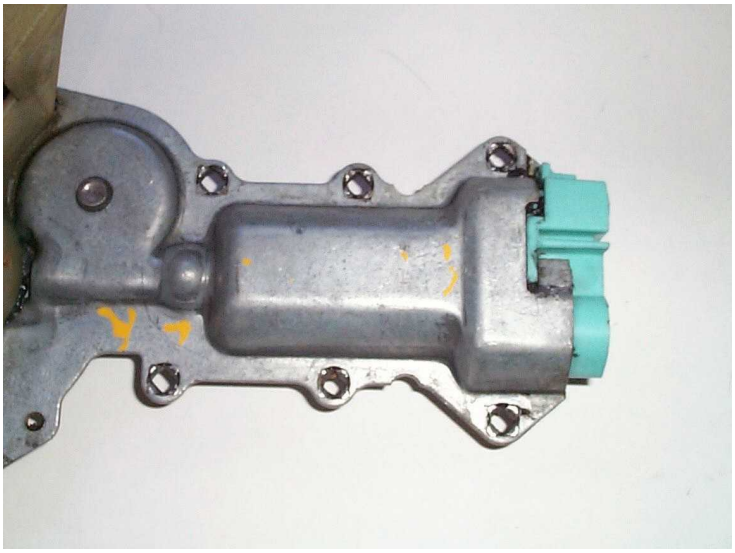
The second cause is more commonly seen when the motor will drive the window part way through its travel, then stop. After a few minutes, the motor will move the window a few more inches, then stop again. Another sign of this is typically very slow movement of the window. This is usually caused by contamination in the window channels, lack of lubrication of the guides and channels, and poor alignment of the window in the door. The motor has a thermal overload element in the housing that stops the motor if current becomes too high from too great a load. This overload will cool after a few minutes, allowing the motor to operate again, but will open again quickly if the overload still exists. A new motor in such an instance will not solve the problem, and perform exactly as the "bad" motor would. This also significantly reduces motor brush life and the resistance from worn brushes will only add to the condition.

The third cause is usually a completely dead motor, and is due to normal wear of the carbon motor brushes. These can be replaced, and the motor returned to original performance.

The fourth, and oddly lees common but most frequently blamed condition, is a failed armature winding in the motor. Excessive current from stick, poorly adjusted windows, worn brushes, and age, can overheat the varnish insulation in the motor and cause an internal short of the armature windings. The thermal overload element in the motor should open before any of this type of damage is done, but a persistent operator can eventually toast a motor bu incessantly holding the switch, waiting for the motor to cool. There is no really easy way to repair this, so replacement is the easiest solution for most of us. Once the damage of this type is done, repair is generally not economically feasible.

This article will outline the procedure for replacing brushes and returning the motor and regulator unit to good operating condition. Window adjustment in the door will not be covered, since the individual adjustment methods vary so widely among vehicles.

The first step in repairing any of these conditions is to remove the interior door trim panel. This can be time consuming in itself, and must be done with care to avoid damage to the trim panel and inner door. Remember, ant scratched paint is a potential source of corrosion. If you scratch a panel in the process of removing the trim or working inside the door, apply a liberal coat of touch up paint of even auto wax before installing the coverings.

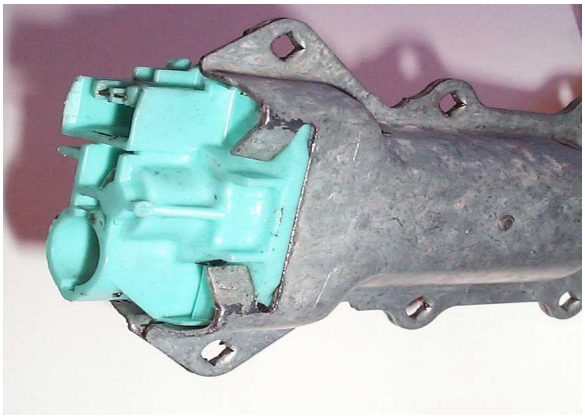


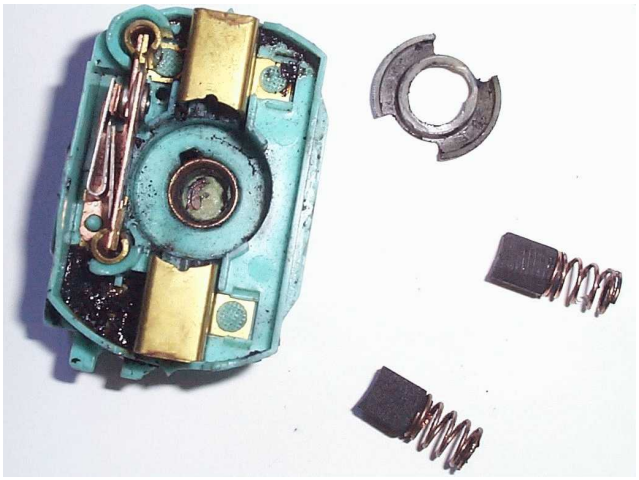
Once the interior panel is removed, you should be able to see the window regulator motor clearly. It should look something like this, depending on your year and model:

The area we will be most interested in is the plastic cap at the end of the motor. This is the place that the electrical connector from the switch plugs to, and comprises the connector, motor end bearing, brush holder, and thermal overload element in the motor. Almost everything you need is in this piece, and it is easily removed.

There are several metal tabs holding the end cap in place. You can easily bend back the metal tabs and slide the plastic end cap out of the motor housing. The tabs on the rear of the motor look like this:

Depending on the particular vehicle and application, the orientation of the motor may differ from the photo, but the retainers for the motor end cap should be very similar.



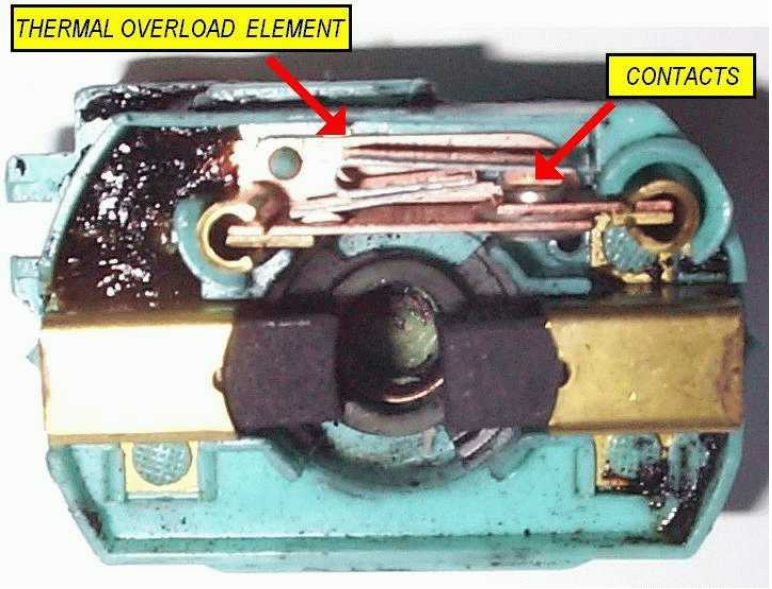


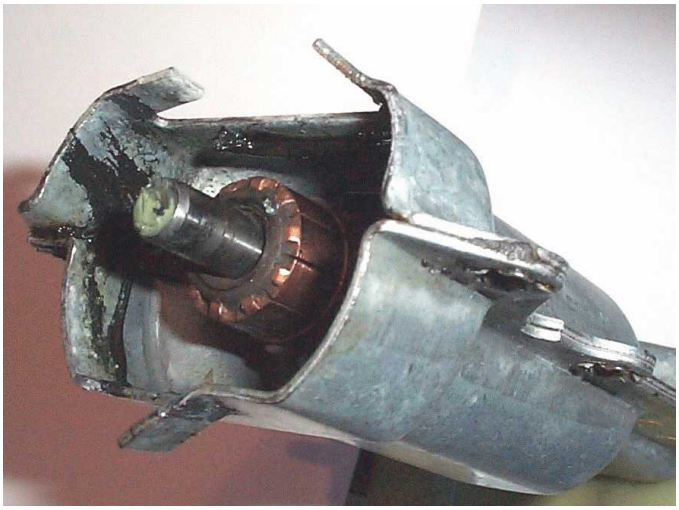
Remove the end cap carefully to avoid losing any of the small parts that may fall and disappear into the dark recesses of the door. The cap contains two carbon brushes, which may be almost non-existent, two brush springs, and a flat/round brush retainer. There will also likely be a lot of carbon dust inside the cap and motor housing, along with the remnants of the original lubricating grease.

If you were lucky (or really careful) the entire end cap assembly will come out with all parts intact . If you are like the rest of us, you should at least have all of these parts at this point:

Once the cap is off and all parts are secured, use a vacuum to remove any loose carbon. Compressed air will clean the carbon away from the motor commutator end, but will also likely drive it farther into the motor and gear case. Remove the excess grease and contaminants with paper towels or shop towels. This area doesn't have to be operating-room clean, but try to get as much of the deposit as you can out of the motor housing. You can also clean the commutator and end of the shaft with electromotive spray cleaner once the majority of large deposits are removed.

Once you have disassembled the commutator end cap, you can also clean the cap with electromotive spray cleaner that is safe for plastics. Do not clean the brushes with any solvent, since most solvent do just that - dissolve carbon. If you want to have a good pattern for matching the brushes, don't dissolve yours. They are supposed to be black, anyway. The chances of the brushes being bad or non-existent are pretty good. You can clean out the motor with electromotive cleaner, let it dry, and install new brushes with a very high success rate.



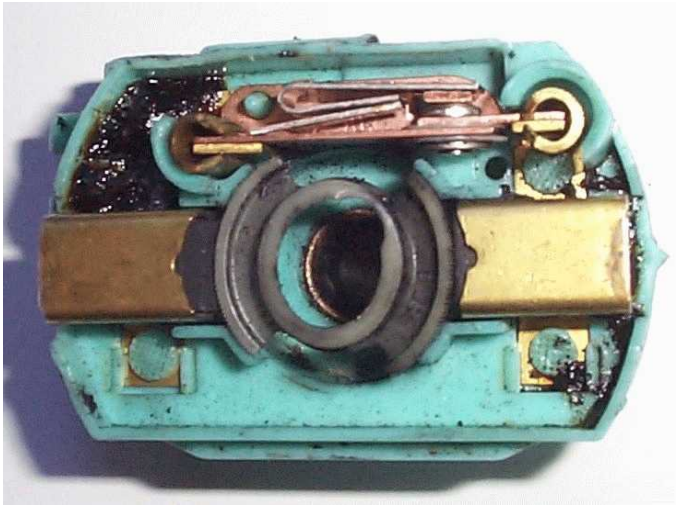


The commutator is the key at this point. If the commutator looks very blackened and pitted after cleaning, or if the wiring on the armature looks heavily burned, you may have a motor that is not repairable. That is not very common, but does happen. If you find the brushes are O.K. and need to replace the motor, you haven't lost anything but time.

If your armature is damaged, there is no point in continuing since motor replacement is probably your best option. If the armature is serviceable, it should have a light copper/tan appearance at the commutator and a dull copper appearance of the windings.

If the commutator appears undamaged, concentrate on the brush cap/motor end. Inspect the contact points of the thermal overload switch in the end cap. If they appear blackened and pitted, the motor has been subjected to numerous overloads. You can clean this pitting with a burnishing board or very fine emery cloth. Regular sandpaper can leave grit and contaminants which will interfere with the electrical contact of these points. If the contact points are clean and untarnished, leave them alone. Test the resistance of the contacts with your meter. There should be zero ohms.

If everything is good to this point, you can install the replacement brushes and reassembly the motor. Finding brushes may not be as difficult as you might imagine. The brushes are 5/16" square w/ spring shoulder, and can be up to ½" long. The brushes have two corners removed from the outer end, and close inspection of the remnants of the original brushes or the brush holders will reveal the mating shape of the holders. If you have difficulty finding motor brushes for this application, you can use a Delco alternator bush set with the pigtails removed and sand them to shape, or use Ford Motorcraft alternator bushes, which are a little closer to the correct size. If you search through the auto suppliers brush selection, you will find a size that is very close to the original and will be adequate.



The brushes will tend to spring back inward when installed in their holders. This would make assembly difficult if it were not for the retainer that was left in the end cap by the original assemblers. The flat/round plastic piece should have been found at the rear of the cap, right next to the end bearing for the motor shaft. Assemble the brushes and springs into the holders, then place the retainer between the brushes. The retainer will allow the brushes to clear the commutator when the unit is assembled, then push back into the recess where you found it once the end cap is seated in the motor housing.

When the brushes are retained and ready, apply a dab of clean grease to the end of the motor shaft, orient the end cap as it was originally, insert it into the motor housing, and bend the metal tabs back to their original positions to complete the assembly.

Plug the electrical connector back onto the motor end cap connector and test run the motor for several cycles. The motor may operate a little slowly for the first several cycles, since the brushes may not be seated to the curvature of the commutator. The motor speed and operation should improve as it is used and the brushes wear into the commutator better. If the motor does not operate at this point, something is not connected correctly, the overload contacts are not closed fully, or there is damage to the motor armature. You should be able to read resistance across the electrical connector contacts on the motor end cap, Expect between two and ten ohms.

If you can replace the brushes and get the motor working, the rest of the installation will remain as good as stock. The original rivets stay intact, so the motor doesn't work its way loose and begin to rattle in the door later.

Before you install the interior door trim, this is also a very good opportunity to clean and regrease the guides with white lithium grease. This should make life easier for the motor for the next ten years or so.

If the window now operates but operates very slowly in one direction, or if you observe the window twisting in the guides as it moves, you may need to adjust the guides at this time. This procedure varies widely depending upon vehicle model and year, but some time spent studying the mechanism makes the necessary adjustments fairly obvious.

Happy Motoring!

Vader 03/01