

Motor Maintenance
12V DC – 32V DC

After removal of the motor standard maintenance procedure.

You will require the following tools and supplies.

1. Set of hex allen wrenches specifically 1/8" and 1/4" hex wrenches.
 2. 7/16" 3/8 drive socket tool
 3. Flat blade fine tip screw driver and a flat standard screw driver
 4. A medium heat source (Hair dryer, heat shrink gun or a small flame torch)
 5. Tube of GE clear silicone
 6. Two (2) 6203 RS sealed bearings
 7. An amount of Scotch brite pad, for cleaning purposes
 8. Any mild solvent or ISO alcohol, for cleaning purposes
 9. A brass, aluminum or dead blow rubber mallet
 10. One 2" PVC pipe coupling or a piece of 2" / 2 1/2 " non magnetic tubing 3" to 4" in length
 11. Four (4) straightened paper clips or straight stiff wire 2" long x .060 dia.
- A Remove the two socket head cap screws on the top of the black adapter housing. Using a heat source raise the temperature of the adapter housing until the silicone bond is broken and the adapter housing can be removed. Clean old silicone from all surfaces, adapter housing as well as top of motor.
- B At the other end of the motor is the urethane motor terminal cover. Remove the large clamp, which goes around the cover, and slide the motor Terminal cover off. Clean any silicone sealant from the motor terminal cover.
- C There are two 7/16" head bolts which go through the length of the motor and clamp the motor together by screwing into the threaded motor end cap, remove these (turning counter clockwise) screws and withdraw them from the motor.

- D The motor end caps are now ready to separate from the middle field case. By striking the motor shaft with a soft mallet and holding onto the center motor case the brush holder end plate will be dislodged and the upper motor end plate can be removed from the top of the motor.

With the top removed you can view the armature, at this point the brush holder end cap is still secured to the other end and held in place by the spring pressure of the brushes to the commutator. Do not remove the brush holder mechanism yet.

- E Place the PVC pipe coupler or non magnetic tube against the exposed armature and over the shaft end of the motor and place your other hand on the brush plate end, so as to hold the parts in column. The case will be held to the armature by the magnetic field. While holding the parts together in column, turn them vertically with the non-magnetic tubing placed on a flat substantial surface. Using both hands grab the field case and slide down over the non-magnetic tube. The armature can now be separated from the magnetic field with the brush holder still attached.

You will see four holes visible externally from the end of the brush holder end cap, you may remove the silicone, which is now filling these holes as they are the means of maintaining tension on the brush springs during reassembly. Please take note of the brush spring and how it functions in its retainer and its orientation.

Using the four (4) straightened paper clips, insert them into the holes we just described. Retract the brushes all the way back in their brush retainers and push the paper clips through to engage the holes in the brush holder, thereby retaining the brushes under tension. The end cap can now be removed. Note: if the bearing stays mated to the armature, if it will not slide off, it can be removed using a small bearing puller. It is a slight interference fit, requiring minimal force to remove from either end of the armature. Make certain you do not loose the wave spring under the bearing.

Clean the armature using a mild solvent or electrical cleaner. It is suggested but not essential to replace the motor bearings when a motor is disassembled, these bearings are a rubber sealed 6203 or 6203 ZZ style bearing, both bearings are identical. The shaft that the bearing fits to is .6693" or 17mm so piece of 3/4" plastic pipe or 3/4" ID soft material can be used to relocate the bearings on the armature.

With the four straightened paper clips holding the retracted brushes against the springs, blow or remove any dust from the brush holder

mechanism. If corrosion is experienced in the brush holder mechanism. Removing the paper clip retainers and remove brush springs, then immerse in white vinegar or a mild acid until corrosion is gone. Then, rinse, dry and reassemble brush holder plate. Install brush holder mechanism on armature, making certain that wave spring is placed in bearing receptacle before bearing is inserted. Once brushes plate mechanism is installed on armature one can remove brush retaining paper clips. However, you can wait until final assembly to remove clips.

Apply a bead of silicone to the mating surface of the brush holder/case Junction.

- F Clean the magnet case of dust and inspect magnets for any cracking or looseness. If you find a loose magnet, mark its orientation in the case and glue it back in place using epoxy. Be certain to hold it against the case in the same position it was removed being mindful of its north/south orientation. Once the case is cleaned it can be painted and the covering reapplied using contact cement as the adhesive.
- G The reassembly is just the previous procedure reversed taking care to use silicone sealant between mating surfaces, such as between the adapter housing and top of motor. Re plugging w/silicone the holes in the brush holder end which we used for the paper clips and sealing on the urethane boot prior to clamping in place. When re installing motor on down tube seal the down tube to motor joint.