

## Changing the WPS Starter Polarity

by DMadigan

The starter polarity is changed by moving the six magnets one position around inside the case. Start by unbolting the motor cable from the solenoid, then unbolt the two outer through bolts in the motor end plate. The inner bolts hold the brush plate to the end plate, do not loosen these. Pull the motor off the adapter plate whilst tilting the motor end plate up.



There is a steel ball that serves as a thrust bearing for the shaft inside the gearbox. Be sure that it does not fall into the planetary gears. The gearbox may come out with the motor. This is not a problem as the gearbox has to be removed from the motor anyway. The gearbox pulls straight off the end of the motor.



Push the armature and end plate out the end of the casing by pushing on the end of the motor shaft. Do not pull on the end plate or you will pull the brushes off the end of the armature. Getting the brushes back on the armature requires unbolting the brush plate from the end plate, inserting a thin ring to hold the brushes outward while re-inserting the armature. This is difficult to do without a holding ring.



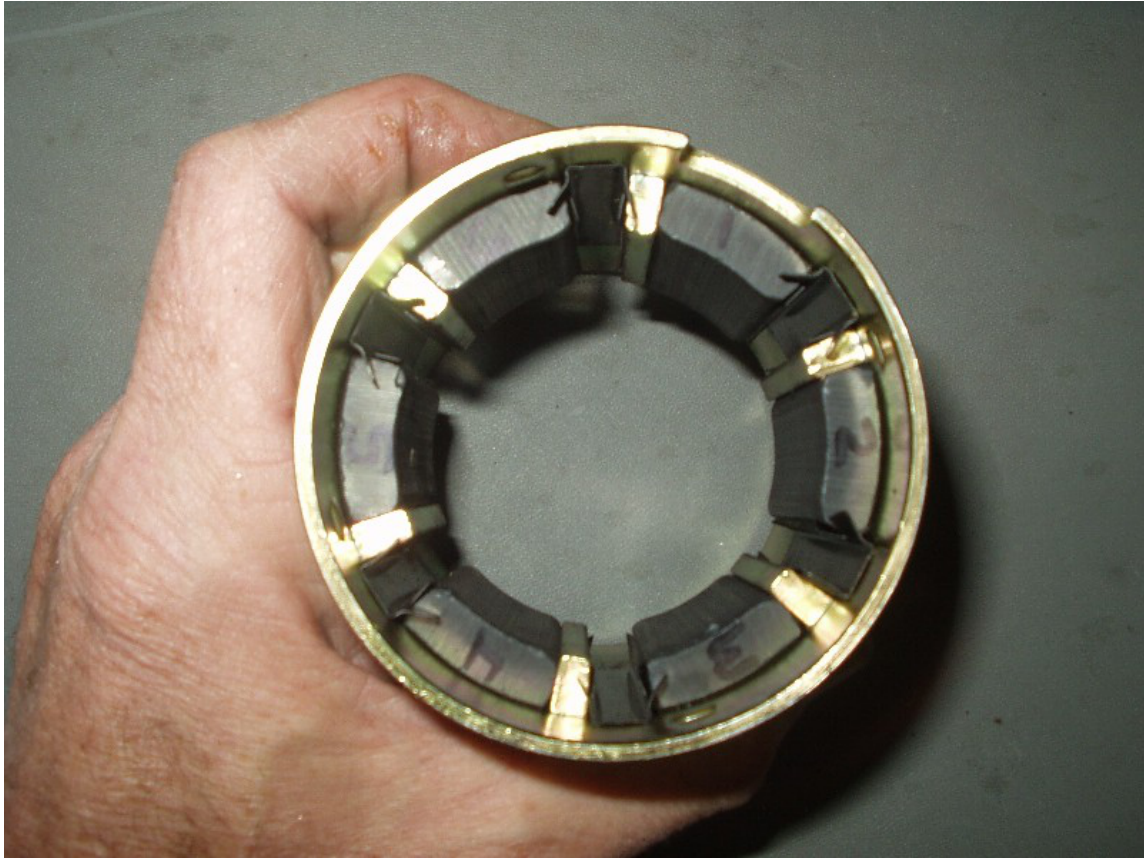


Set the armature and end plate aside. Using a pair of needle nose pliers, bend the magnet side of the spring clip tab on the brush end of the case just far enough to clear the magnets. Do not bend the spring clips too many times or they will break.

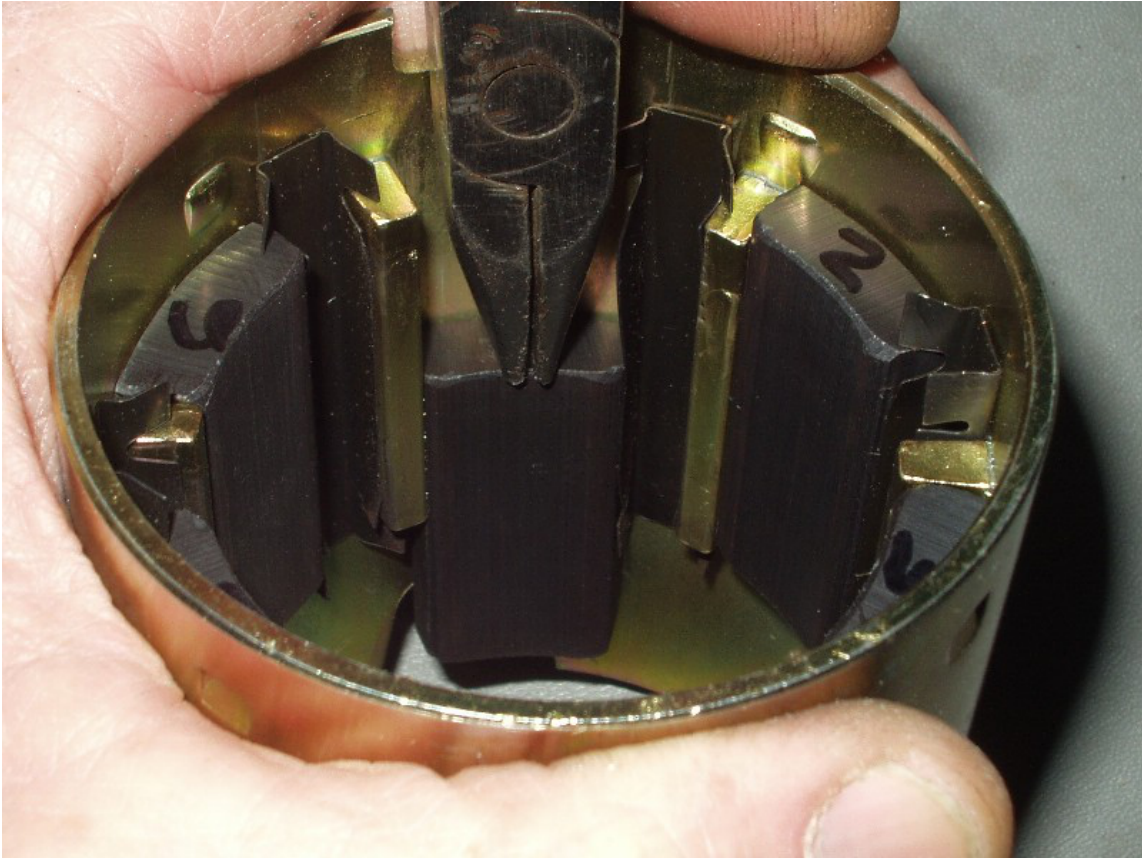




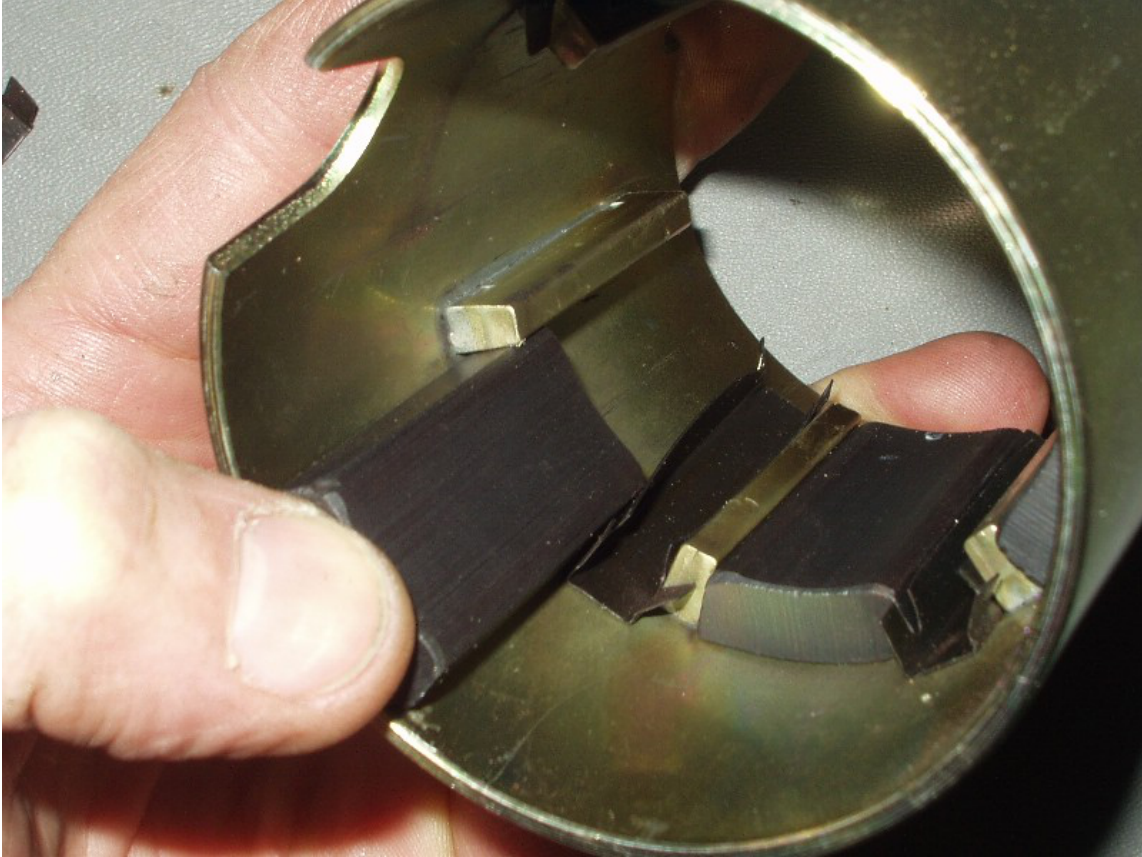
Mark each magnet in order. The magnets will be moved one place either clockwise or counter clockwise. I use the notch for the power wire as the #1 reference. Be sure the magnets do not jump onto each other or a steel plate. They are brittle and can break.



Push the magnets out one at a time from the gearbox end and replace it with the previous magnet. I keep the clips in their original position but there is no need to.



When pushing the magnet in, push the magnet against the spring clip until the opposite side is past the retaining bar. You might have to use a pair of needle nose pliers to bend the edge of the spring clip away from the leading edge of the magnet as you push the opposite edge alongside the retaining bar in the case. The magnet should be pushed up just past the top of the stop bar.

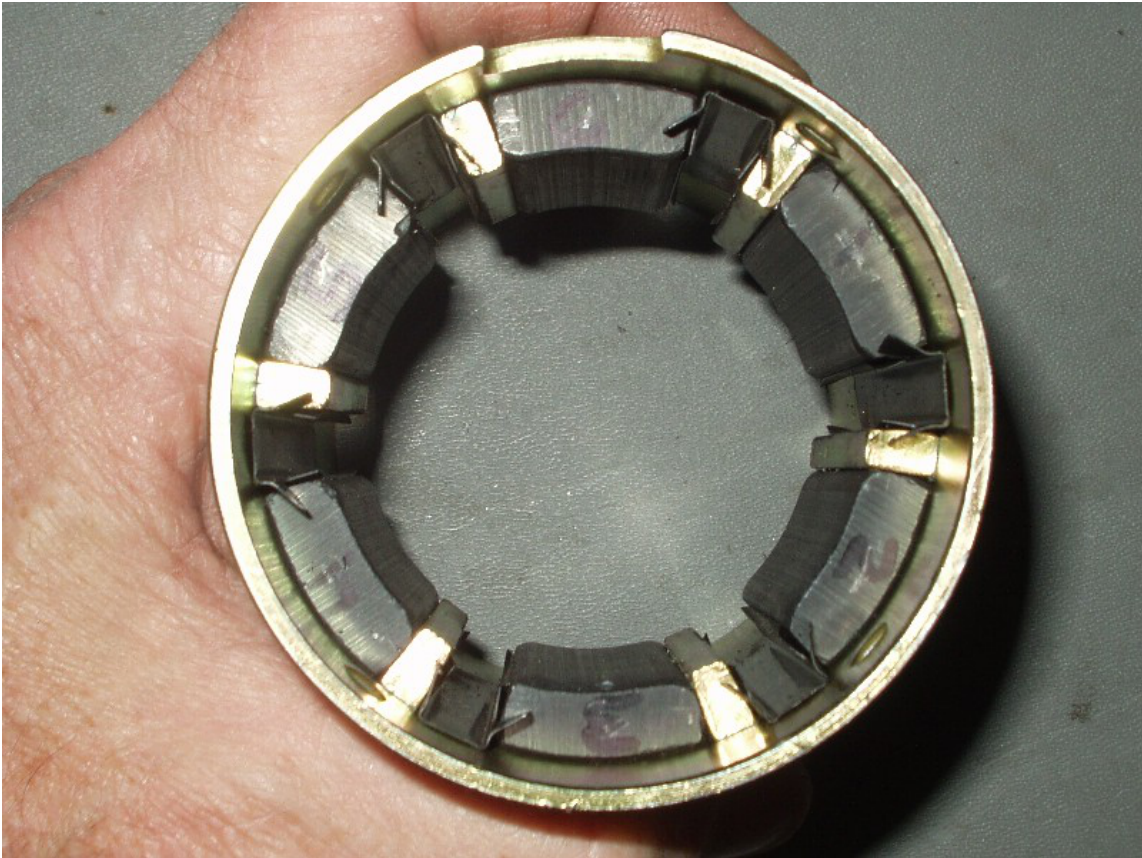




The edges of the spring clips are sharp so use pliers to push on the magnets. Push the magnet down level with the end of the retaining bar on the gearbox end of the case and then push the spring clip down. The magnet end should be at the same height as the retaining bar and the ends of the spring clip should overlap both the magnet and retaining bar.



After the magnets are back in, bend the end of the spring clips back over the end of the magnets. The magnets are now one place around from their original positions.



When inserting the armature back in the case, place a finger inside the case and on the end of the shaft to control the armature. If you hold the armature by the end plate, the magnets will pull the armature off the brushes. The motor wire faces the notch in the case and the solenoid. The gearbox has two flats on its sides. One flat has to face the notch in the motor case.





Push the motor into the adapter ring, aligning the pins in the gearbox with the holes in the adapter ring. Be sure the two 1/4" mounting screws that are trapped by the adapter ring are in their holes before mounting the motor to the adapter. Start the through bolts by hand. The through bolts are tightened to 5 in-lbs (about a medium twist force on a screw driver). Replace the motor wire on the solenoid. Check the rotation direction by connecting battery jumper cables to the case and solenoid battery terminal. Touch the solenoid's relay terminal to the battery terminal. The shaft should turn clockwise when viewed from the brush end of the starter.