

Regarding the 490 Motor Maintenance

I would like to take this opportunity to thank everyone for their continued patronage of our Training Weapon. Recently we have been receiving many questions in regards to the maintenance of the 490 motor, therefore in answer to your questions we decided to guide you through the process of 490 type motor maintenance.



1. In regards to the removal and assembly of the TW

Firstly, in order to properly maintain the motor, it is essential to remove the motor from the TW; hence we will guide you through this process.

In regards to the removal and installation of the motor a number of points must be addressed. The majority of the problems experienced with the TW can be attributed to the lack of addressing those areas. Even for those who are experienced with this procedure we highly recommend using this guide as reference.

1:Removal of the Grip End

Remove the four Grip End Screws then remove the Grip End. The Grip End is a vital component that determines the Grip's integrity. We utilize torque screws for the Grip End Screws to ensure a secure fit. Torque pressure for all four screws are equally at 120cN/m. When tightening do so as a pair diagonally across from each other.

Do not exceed the torque pressure as noted above as in doing so may damage the End Bell threading or the hex screw head; likewise if the torque pressure is below the recommended level the grip may feel somewhat loose while firing.



2:Removal of the Grip

The grip of M16 is designed so that the ridgeline of the grip front is 60 degrees of the barrel line.

Naturally, the motor of TW is also installed at the same angle.

When removing the grip always keep in mind this angle when pulling it apart and never overexert any strength while doing this procedure to protect the motor. Furthermore, if this angle is managed properly less strain is exerted thus protecting the motor cord.

If overt pressure is exerted the cord that connects to the Brush Case may warp or be damaged. To deter such a warping we employ the use of high strength stainless steel, however it still cannot resist to extreme stress. In the case of a warped Brush Case what was intended to be a smooth movement of the Motor Brush is interrupted, causing a lack of current transfer and ultimately poor movement of the motor. When removing the Grip please take all precautions and do so carefully.

3:Removal of the Motor Cord

After removing the Grip the next procedure is to remove the Motor Cord. For the Motor Cord, Solder is pre-applied to the Brush Case.

Prior to removing the Cord, remove the Brush and the Brush Spring, then heat the Solder to remove the cord. The reason behind this is that in the event that any run off solder drips in between the Brush and the Brush Case the smooth movement of the Brush will be in jeopardy.

Many of the repair requests that we encounter is the lack of movement to their TW which was found to be because of the lack of this procedure. When performing this procedure please pay attention to the amount of solder used.

4:Removal of the Fixed Motor Pin

Using a pin punch tap out the Fixed Motor Pin. The pin punch must be applied properly when tapping or else damage to the Lower Receiver may occur.

5:Removal of the Motor

After following all of the procedures, the motor can be removed simply by twisting the motor by 90 degrees.

At the time of manufacturer assembly grease was applied to the motor and the lower receiver.

If assembly is found to be difficult, use a 16mm wrench to secure the motor base then gently twist into place.





2. In regards to the consumption of the Carbon Brush

The Brush used in our TW 490 type motor is manufactured with a low sintering density, with a larger content of the softer material silver is used. All of these are to serve one purpose; and that is to secure a large amount of electric current transfer. At one point this motor was in development for the use of the standard AEG, but perhaps out of any other type of motor in comparison to its size and weight it is the performance of this brush that is the foundation for this motor. In addition, due to the softer brush used, the aggressiveness to the commutator is low therefore the brush acts to protect the durability of the motor itself. On the other hand, similar to an automobile using a high quality brake pad, the longevity of the brush itself becomes rather short. We tested the durability of the motor brush using our MAX and noticed that in a 7000 round test the motor brush worn itself to approximately half. Although we are in the process of developing an even more durable yet high yielding electric current brush, the bigger problem is to secure an even more durable motor as a whole.



3. Replacing the Carbon Brush and the Brush Spring

As stated above, in our 7000 round discharge test we noticed significant wear, therefore we came to the conclusion that both the Brush and the Brush Spring should be replaced at the same time after this target amount of discharge. Although the Brush Spring is very hard to distinguish any damage has occurred, due to the large amount of electrical current discharge from the commutator sparks may come about causing damage to the structural integrity of the spring.

A drop in the quality in the material for the spring means a drop in the tension of the spring, that in turn does not secure a consistent and adequate level of electrical current necessary to power the motor. It is because of these reasons we recommend replacing both Brush and the Brush Spring at the same time. As stated earlier, the Brush for the 490 type motor is delicate therefore even the slightest wrong angle upon insertion will cause damage. If installed incorrectly, it is very difficult to discern that the brush has been damaged simply from viewing the outside appearance. If used in that state, not enough electrical current will pass through, causing damage to the motor movement.

“Even though the brush was replaced, the motor still doesn’t work well”; if situations such as these occur the first thing to suspect is the improper installation of the brush.





4. The life expectancy of the 490 Motor –the consumption of the Comutator–

Although due to the flexible nature of the Brush used to buffer the aggressive force against the commutator (which adds to the durability of the motor), particularly in the use of the MAX series TW a constant supply of high electrical current is necessary. As an example, the MAX series employs 3.5 times more electrical current discharge value as opposed to a TW using an M90 Spring / Cylinder Unit. Naturally it goes without saying that this is a very severe situation for the motor.

After replacing the carbon brush multiple times, the commutator may develop deep scarring; that is the indication that the motor itself is at the end of it's life. At that point, replacing the motor will be necessary. The overall life of a motor is dependent upon factors such as the quality of the battery used, as well as the method of usage (firing preferences such as Semi-Auto only will wear out the motor quicker), and other factors make it difficult to specify the exact moment to exchange the motor.



5. Wearing in the Motor

The Carbon Brush Motor turns even in liquid. However, if engaged underwater the brush is worn out extremely quickly. Conversely, by using this characteristic it is possible to wear in the carbon brush with the commutator much quicker. To be specific, remove the brush and the brush spring from the case, then apply a small amount of water to the tip of the brush then reinstall the items together then cycle the motor. When dry cycling, we recommend the use of a low voltage/current battery configuration (i.e. 7.2V / 1.5A). Cycle the motor between two to three minutes, then repeat two or three times. Once the tip of the brush is neatly surrounding the commutator in an arc then this procedure is complete. By performing this procedure after installing the motor the phenomena of skipping (of the motor) is reduced; and due to the smooth contact between the brush and the commutator, the longevity of the rotor is dramatically increased.

There is however another method of simply dry cycling the motor to wear in the brush, although this method does not compare as it's side effect is the additional wear to the rotor. By all means please give this a try.