Checking and cleaning stuck thruster motor brushes

Stuck brushes or brushes that are not completely loose in the brush holder will cause the thruster to run slowly with diminishing power.

This instruction sheet is intended for experienced maintenance personnel. If you are not confident with your abilities the motor can be shipped to Imtra for service. Please contact Imtra at 508-995-7000 for a Return Authorization Number and shipping instructions.

Under no circumstances should a lubricant or cleaning agent be sprayed into the motor. Doing so can cause a fire hazard or voltage leaks.

The thruster motor must be removed from the vessel and brought to a convenient working location to complete this procedure. The motor can be removed from the vessel with the vessel in the water.

1) Shut off dedicated thruster battery switch or remove the fuse from the thruster circuit. Check for voltage across the positive and negative battery cable studs on the motor to ensure battery power to the thruster is not present.
2) Remove Battery cables. Secure the jam nut behind the cable lug when loosening the outer nut. Ideally a thin wrench should be used to hold the jam nut; if one is not available a pair of needle-nose Vise-Grips can be used. If the stud is allowed to turn, internal motor damage can occur.

3) Unplug 4-wire Control Harness.
4) Remove motor mounting bolts. Lift motor off motor bracket.

5) It is recommended to blow the motor out with compressed air to remove as much brush dust as possible prior to servicing.

Caution: Blowing out the carbon dust should be done outside to avoid contaminating an indoor area with carbon dust. Proper respiratory protection must be worn to avoid inhalation of carbon dust. Avoid skin contact with carbon dust; plastic gloves should be worn. If skin contact is unavoidable then wash affected area to remove carbon dust.

6) Remove top cap or brush screen to access the brushes. There are two versions of motors utilized on Side-Power Thrusters; these two motor versions are referred to as “6-digit” or “7-digit” version motors.
6a) 6-digit version motors have a ventilated top cap on the motor that encloses the brush assembly and is held in place by either two or four bolts. 6-Digit motors have four sets of two brushes; each brush holder has two brushes and two brush springs.

6b) 7-digit version motors have a screen wrapped around the brush assembly area of the motor which is held in place with a spring. 7-digit motors have four brushes, one brush in each of four brush holders. Each brush may have either one or two brush springs depending on the thruster model.
7) With a small hook (a small Allen wrench works well), pull back the brush spring to free the brush from tension. Be careful not to let the spring slip and become dislodged. They are not easily re-installed and they can fall into the motor which can require complete motor break-down.

![Image of brush spring being pulled back](image1)

8) Gently pull the brush out of the holder. The brushes must be completely loose in the holder, if there is any friction at all between the brush and the holder the motor will not run properly. The brush and holder will need to be cleaned such that the brush is completely loose.

Note: it is not necessary to unbolt the brush wire to complete this step.

![Image of brush being pulled out of holder](image2)
9) Inspect brushes for damage. If any of the brushes show signs of damage the complete set of brushes will have to be replaced.

If a brush is not easily removed then use pliers to hold the brush so more force can be applied. In such instances the brushes are typically damaged during removal. Use caution to avoid allowing brush debris to get lodged within the motor.

10) After removing the brush the spring can be rested on the holder to avoid it becoming dislodged. If any of the brush springs are corroded or if one brush spring feels weaker than the rest then the complete set of brush springs must be replaced.
11) Use a small wire brush or file to clean the brush holder until the brush fits loosely. If using a file be careful not to file any metal off the holder, use of a file is only intended to remove carbon dust, debris, or corrosion. Pull the brush spring out of the way to access the holder as necessary.

12) On occasion the brush will still not fit loosely in the holder after cleaning the holder. If this is the case the brush can be very gently sanded on a flat surface a small amount just until it fits loosely.

Note: Complete removal of the brush, including unbolting the brush wire, is necessary to complete this step. Only remove the brush or brushes from one holder at a time, this will prevent the brush holder bridge bars from becoming displaced.
13) The commutator surface is often carbonized if one or more brushes are not loose in their holder. The commutator can be cleaned by applying electrical component cleaner to a cloth or cotton swab, hold the cloth against the commutator surface while spinning the motor shaft. Note: Great care is to be taken to avoid contact and damage of the rotating armature commutator with hard tools.

14) Reverse procedures to re-install motor. Remember to use caution when installing battery cables; use a thin wrench or needle nose Vise-Grips to secure the jam nut, torque to 15Nm or 11 lb. /ft.

15) Always check the operating voltage at the thruster motor after servicing. 12 volt thrusters typically run between 9.5v and 10.5v, 24 volt thruster typically run between 19v and 21v. Operating volts below 9v on 12v thrusters and below 18v on 24v thrusters should be addressed. Please contact a qualified marine electrician, your Side-Power dealer, or Imtra if you have low operating volts.