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Replacing a brushless outrunner motor shaft

Replacing an outrunner shaft is not difficult but care must be taken to perform the operation in a clean environment to avoid metallic swarf getting into the bearings or stuck to the motor magnets.

The shafts in all motors are a press fit into the front housing – the part that rotates and holds the magnets. The shafts will not just slide out when the screws or circlips are removed, they need to be pressed out. The ideal tool is a special purpose bearing press but these are expensive. A pillar drill is a suitable alternative, with the front housing of the motor supported in a block of wood. DO NOT attempt to drive the shaft out using a hammer.

The following sequence of steps should be followed:

1. Find a block of wood approx 25mm thick and wide / long enough for the front housing to sit on it while you are holding onto the wood.
2. Drill a hole on the centre line of the wood block large enough to clear the motor shaft – e.g. a 5mm hole for a 3mm shaft or a 8mm hole for a 5mm shaft.
3. Clean your work area and pillar drill platform.
4. Isolate power from the drill – we don't want it to rotate.
5. Place something soft under the drill platform to catch the shaft as it is removed .
6. Select a drill bit 0.2mm to 0.5mm smaller in diameter than the shaft you want to remove (e.g. 2.5mm to 2.8mm for a 3mm shaft 4.5mm to 4.8mm for a 5mm shaft).
7. Mount the drill upside down in the drill chuck – i.e. the blunt end that normally goes into the chuck is now facing down.
8. Remove all shaft retaining grub screws and/or circlips from the motor – place them somewhere safe.
9. Withdraw the front magnet housing from the motor – the shaft should slide out leaving the bearings in the part holding the stator and motor windings.
10. Place the stator / bearing tube assembly somewhere clean and safe.
11. Place the front housing open end down on the block of wood with the shaft through the hole you drilled. Place the block of wood on the drill platform with the shaft and hole over the centre hole in the platform.
12. Centre the upside down drill bit on the shaft and push down firmly with the drill. There will be an initial high resistance and then the shaft will slide out using firm pressure.

The new shaft should be inserted from the front of the housing – i.e. with the magnet housing sitting on the same position on the block of wood as when you removed the shaft. You should be able to partially insert the shaft into the end of the housing and then press in using the drill. Before applying any pressure, make sure that

- the shaft is vertical
- any keyways or slots on the shaft are aligned with grub screw holes