

Inspecting and Replacing Brushes in Bodine Type 33A, 42A, and 32A (PMDC) Motors or Gearmotors

The permanent magnet DC (PMDC) motors and gearmotors manufactured by **Bodine Electric Company** are unique compared to other DC motors and gearmotors in many ways. This is because the primary objectives in the design of all Bodine products are *long life*, *quiet operation*, and *no lubricant leakage*.

With regard to long brush life, the Bodine type 33A, 42A, and 32A motors and gearmotors employ a unique method of maintaining a constant force on the brushes inside the motor. A roll-type spring is used instead of the more common coiled spring. The roll-type spring puts a constant force on the brushes even as they wear and get shorter. By contrast, the force exerted by a coiled spring diminishes as the brushes get shorter and the spring approaches its uncompressed length. Reduced force on the brushes can cause them to “hop” on the commutator and wear faster. The roll-type spring is a superior design.



Installing the roll-type springs correctly is critical in order to obtain optimal performance from your Bodine motor or gearmotor. Incorrect installation can cause brushes to wear faster, or ultimately could damage the product.

By following these instructions when inspecting and replacing the brushes in a Bodine type 33A, 42A, or 32A motor or gearmotor, the user can be assured of long brush life, and desired motor or gearmotor performance.

TOOLS NEEDED:



Large slotted
tip screwdriver



Medium size
slotted tip
screwdriver



Small
screwdriver with
any type of tip



Pair of long nose
pliers



Safety glasses

STEP #1 – Disconnect Power

Disconnect the motor wires from the power source before working on the motor. The motor or gearmotor should be cooled off to room temperature.



Failure to disconnect the motor wires from the power source before inspecting or replacing brushes can result in personal injury.

STEP #2 – Remove Two Brush Caps

Refer to Figure 1 for the location of the two brush caps. The plastic brush caps are held in place with screw threads. Unscrew the brush caps using the largest possible slotted screwdriver tip and remove them.

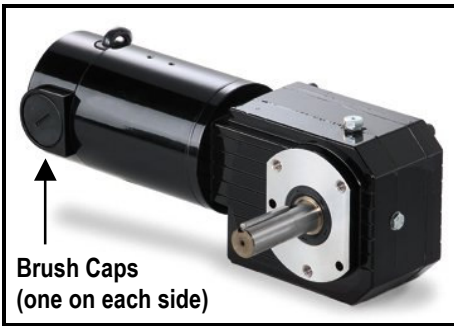


Figure 1 – Location of the Brush Caps



Figure 2 – Use a large screwdriver.

CAUTION

The brush caps are made of plastic and are installed tightly. Using a small screwdriver to remove them will damage the slot.

STEP #3 – Remove Brush Springs

After the brush caps are removed from each side of the motor, the brush box assemblies can be seen inside each of the two openings. The brushes are retained by constant-force, roll-type springs. The springs must be removed before the brushes can be removed. To remove a spring, first locate the flat part of the spring, which points outward (see Figure 3). **WARNING: Wear safety glasses!**

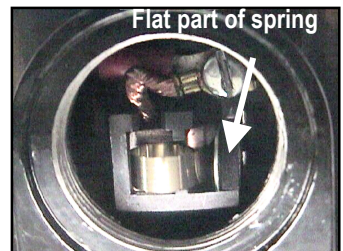


Figure 3 – Flat part of spring.

Then grasp the flat part of the spring with a pair of long nose pliers (Figure 4). There is a hook at the other end of the spring (see Figure 5) that must be disengaged from the bottom edge of the brush box. Press inward on the spring to unhook the spring. The spring may “pop” out. Otherwise, pull it out. Repeat the procedure for the spring on the other side of the motor or gearmotor.

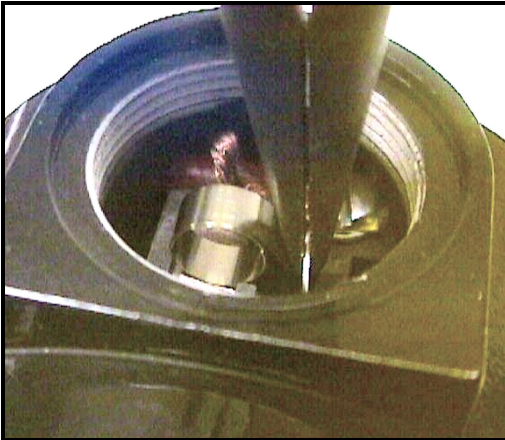


Figure 4 – Grasp spring with pliers.



Figure 5 – Push in; pull out.

STEP #4 – Inspect Brushes

It is not necessary to disconnect the brush wires just to inspect the brushes. Insert a small screwdriver under the brush wire and pull the brush out of the brush box. With the brush wire still connected to the brush box, measure the length of the brush from the point where the wire merges with the brush to the end of the brush that contacts the commutator inside the motor.

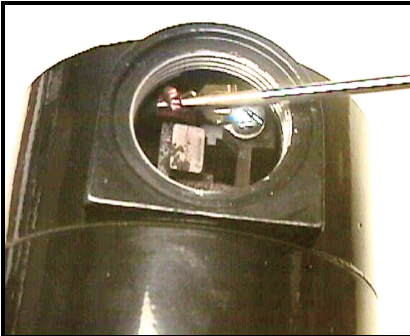


Figure 6 – Pull brush out.

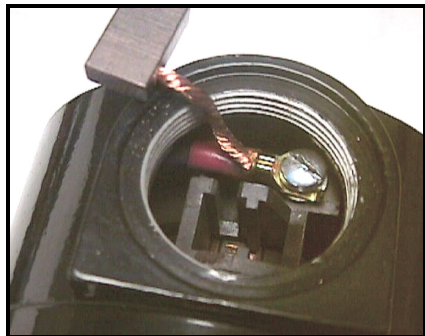


Figure 7 – Leave brush connected.

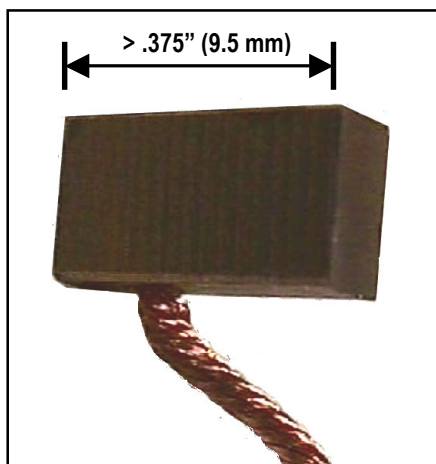


Figure 8 – Measure brush.

Brush wear rate varies, depending on the individual application's duty cycle, and should be inspected at frequent intervals to determine an appropriate inspection schedule. Brushes should be replaced before the total length is less than **.375 inch (9.5 mm)**. See Figure 8.

Repeat the inspection procedure for the other brush.

If new brushes are required, record the motor type and serial number from the motor nameplate. Contact your supplier, any Authorized Bodine Distributor, or our Service Department. You will find more information on how to contact us on Bodine Electric's website at: www.bodine-electric.com

STEP #5 – Remove Old Brushes

Using a medium size slotted screwdriver, loosen the screw that holds the brush wire by four turns (do not remove). Slide the brush wire terminal out from under the holding screw head and remove the brush.

Repeat this procedure for the other brush.

STEP #6 – Clean Out Brush Dust

Excessive carbon dust will accumulate inside the motor endshield over time and should be removed periodically to allow normal operation. Partial disassembly and cleaning is best. However, carefully applying compressed air alternately through each of the open brush cap holes may provide adequate cleaning. Do not use solvents as they may damage non-metallic parts and adversely affect subsequent brush commutation.

STEP #7 – Install New Brushes

Position the terminal of the new brush fully under the screw head on the brush box and tighten the screw (Figure 9). Next, observe that there is a slot in the base of each brush box. Position and insert each brush so that the wire attached to the brush aligns with the slot in the brush box and can "feed" into the brush box slot as the brush wears down. The brush wire must be capable of moving freely in the slot. See Figure 10.

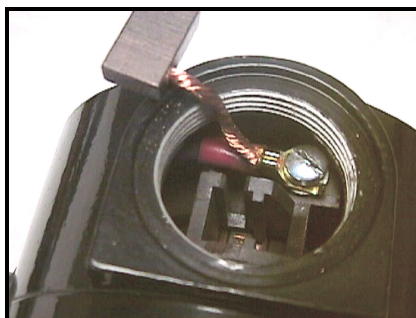


Figure 9 – Connect brush terminal.

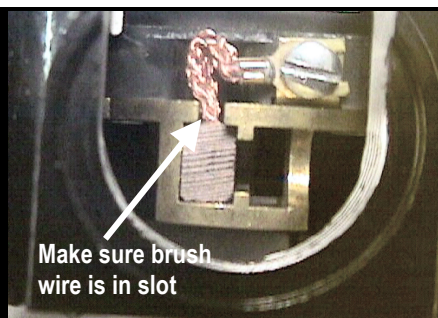


Figure 10 – Put brush wire in slot.

CAUTION

Make sure the brush wire is capable of moving freely in the slot in the brush box. Failure to do so may cause the brush to get stuck in the brush box and will result in poor motor performance.



The motor frame ground wire is connected to the same screw as one of the brush wires. If the ground wire was removed, make certain that it is securely reconnected. Failure to do so may result in personal injury.

STEP #8 – Inspect Springs

Inspect the springs to make sure they weren't damaged during their removal. If they are uncoiled or otherwise damaged, record the product type and serial number from the motor nameplate. Contact your supplier, any Authorized Bodine Distributor, or our Service Department. You will find more information on how to contact Bodine Electric at: www.bodine-electric.com

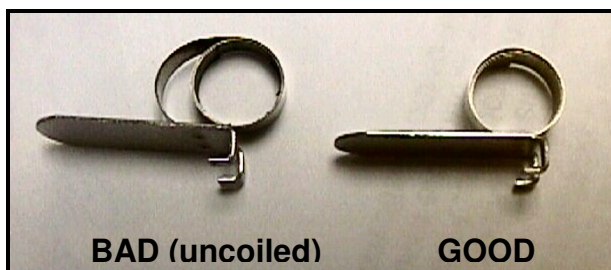


Figure 11 – Comparison of bad and good springs.

STEP #9 – Install Springs

Correct replacement of brush springs is critical to assure optimum drive performance. Grasp the tip of the spring bracket such that the coil of the roll-type spring will be on the “brush side” of the brush box, and resting on the brush when the brush spring is brought up to the brush box (see Figure 12). Push the spring bracket slowly into its slot while letting its two attaching hooks slide on the wall of the brush box. Stop, but do not release the spring bracket when its hooks slip around the edge of the brush box. While still grasping the spring bracket with the pliers, slowly bring the bracket back out of the brush box until the hooks latch around the edge of the brush box. Release the pliers. If the spring bracket is properly seated it will be lying flat against the brush box wall. If it is “cocked” to one side, it is improperly seated – release the spring and reassemble it again. Important: As a final check, apply slight pressure on the spring bracket in the direction away from the brush with the tip of the pliers – the bracket not “popping” out indicates proper latching of the hooks. See Figure 14 for additional illustration of how the spring should be installed in the brush box.

CAUTION

Make certain that the coil of the springs is centered directly on the brushes (see Figure 13). Failure to do so will result in poor motor performance.



Figure 12 – Grasp spring.



Figure 13 – Coil centered directly over brush.

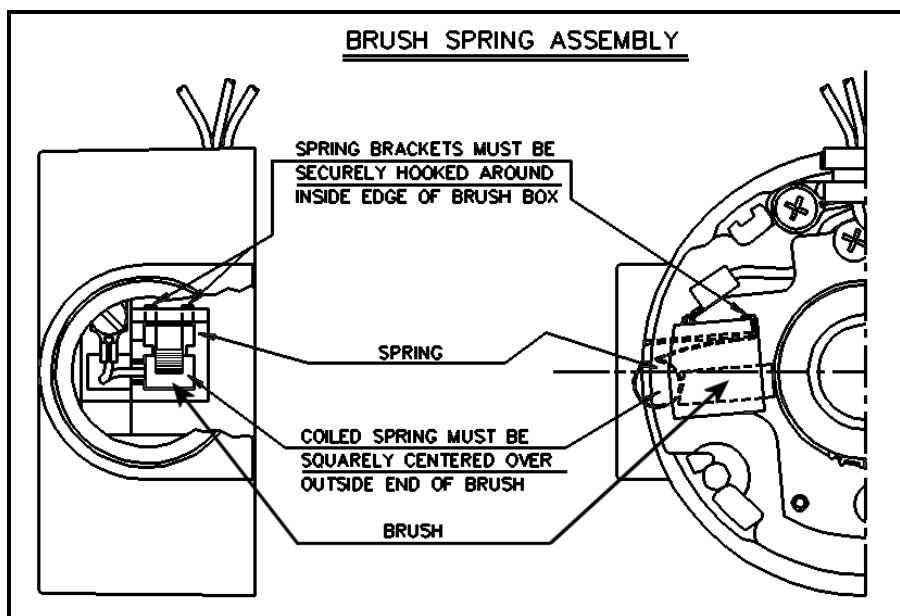


Figure 14 – Drawing of how spring should be installed in brush box.

STEP #10 - Install Brush Caps

If the brush caps were damaged during their removal and need to be replaced, record the motor type and serial number from the motor nameplate. Contact your supplier, any Authorized Bodine Distributor, or our Service Department. You can find more information on how to contact Bodine Electric at:

www.bodine-electric.com

Screw brush caps back into the end shield using largest possible screwdriver.

STEP #11 – Connect to Power

Reconnect the drive to the power source, and test for proper operation. New brushes may be seated by running the motor or gearmotor in at no load. Proper seating is required for lowest brush noise level.

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