

## REPLACING THE BEARINGS IN A SHUGART 851 FLOPPY DISK DRIVE

Martin Eberhard 11 March 2018

If your Shugart 851 disk drive is noisy when it's on, the likely cause is that the grease in the bearings has dried out. Unfortunately, the bearings that Shugart used have pressed-in dust covers, and are therefore not serviceable. Fortunately, they used common types of bearings that are still available today.

It takes about 30 minutes to replace all 5 bearings in the spindle system. If you follow this procedure, replacing these bearings won't mess up the head alignment.

There are 5 bearings in the entire spindle mechanism of the Shugart 851. All bearings should have dust shields on both sides, or be the fully-sealed type. The original bearings are stainless steel, and stainless steel replacements would be best, but are not mandatory. (Stainless steel bearings typically have an 'S' prefix.)

- The cone has one 1/4"x5/8"x0.196" deep groove ball bearing with flange, for example the KDG type FR4ZZ
- The upper spindle bearing is also a 1/4"x5/8"x0.196" deep groove ball bearing with flange, for example the KDG type FR4ZZ
- The lower spindle bearing is a 1/4"x5/8"x0.196" deep groove ball bearing without a flange, for example the KDG type R4ZZ, or the Minebea R4-HH
- The spindle motor has two 5/16"x7/8"x0.275" deep groove bearings without flanges, such as the generic 608ZZ bearings (commonly used in skateboards).

To replace the bearings:

- 1) With the diskette door open, unscrew the 2 screws holding the cone cover in place (the flat aluminum plate in the center of the disk). There is a spring beneath this plate that will push it up. There is also a black plastic piece in the right-rear of this plate that will be pushed by another spring. Neither spring is strong.
- 2) Remove the cone assembly from beneath this plate. It disassembles in the obvious way - replace the bearing and reassemble. Don't put it back on the drive yet though.
- 3) Remove the PCBA. Remove the clear plastic head protector. Unscrew the 2 screws holding the entire head-lifter assembly to the frame, and swing the assembly out of the way. (This allows you to swing the door frame up further, giving you access to the spindle.)
- 4) Loosen (don't remove) the 2 screws that hold the door onto the door frame, and slide the door off. Just leave it sitting in place when it's removed.
- 5) Remove the belt. Then hold the spindle (on the top side of the drive), and unscrew the screw in the center of the pulley (on the bottom side of the drive). Pull the pulley off. You might need to pry it (or use a wheel puller), but it's not on very tight.
- 6) Slide the spindle with its shaft out.
- 7) Remove the 2 screws that hold the top-side bearing in place.
- 8) The bearing on the top side has a flange. The one on the other end does not. There is a spring between these bearings that might push the pulley-side bearing out, but sometimes they are stuck. You can use a small bearing puller to pull these bearings out if they are stuck. Since you are replacing these bearings, it's okay if you bugged them up a little while removing them :-)
- 9) Replace the spindle-side bearing with a flanged bearing, and screw it down. Slide the spindle and its shaft in place, replace the tubular spacer and spring, and install the no-flange bearing on the pulley side.

- 10) Slide the pulley on, and hold down (compressing the spring) by hand. Reinstall the screw and washers in the center of the pulley. Hold the spindle and tighten this screw snugly.
- 11) Set the cone and its spring in place, put the black plastic piece in place in the right-rear corner, hold the aluminum cover in place, and screw it down.
- 12) Reinstall the head lifter. (Be sure to slip its arm beneath the arm on the head!).
- 13) Reattach the door.
- 14) Reinstall the clear plastic head protector.
- 15) Remove the motor, loosen the set screw on its pulley, and remove the pulley.
- 16) use two stiff putty knives (or similar) to gently pry the black plastic fan of the shaft. (It' just pressed on.)
- 17) Remove the 4 long screws and open the motor. Catch the spring-washer that's behind the back-end motor bearing. Remove the rotor.
- 18) The bearings are stuck (probably glued) onto the rotor shaft. They come off easily with a small wheel puller.
- 19) replace the bearings. (No glue needed.)
- 20) reassemble the motor. Don't forget the spring washer at the rear of the motor.
- 21) push the fan all the way onto the motor shaft, then slide the pulley on and tighten the set screw into the flat part of the motor shaft.
- 22) Reinstall the motor, and reinstall the belt. Reinstall the PCBA.

Done!