

Drake L4/L4B Blower Fan Repair/Upgrade

By Gene McCalmont, W5DDW

After 30 years of service, my L4B blower “fan” developed terminal cracks at the steel collar where it meets the plastic fan housing. Unable to repair the cracks, I set about finding a suitable replacement.



Figure 1

The “fan” in the L4B is actually known in the industry as a "blower Wheel." The plastic blower wheel was originally manufactured by The Torrington Mfg Co. as a model GA216-108-1 and is now an obsolete part. It is somewhat uncommon in appearance in that the front and back of the wheel are different, as can be seen in figure 1. Its front side dimension is 2 5/8" by 1 1/4" with a 1/4" bore and its blades are set to rotate in a CCW orientation.

The problem with this design is the plastic to metal junction at the steel collar, which attaches the wheel to the motor shaft. Over the years, the plastic becomes brittle. Notice the area where the plastic wheel and inside collar have become separated in figure 1. It is not uncommon for fractures to develop at the steel/plastic junction. As a fractured wheel rotates, it wobbles, further stressing the junction until something actually breaks. Unfortunately, no amount of plastic welding or glueing will permanently solve the problem and repairs can cause an imbalance in the wheel that can lead to other problems.

The blower motor in my L4B is a General Electric Model 5K3M59ASxxxxx (where x is the serial number). It is a brushless, single phase, 60hz motor rated at 115VAC, .33A and rotates its 1/4" motor shaft CCW at 1550rpm. If the sleeve bearings are oiled at least once a year with a good quality lubricant (such as Labelle 107), this motor can last almost forever and with a proper blower wheel, can supply all the cooling the L4B needs in Amateur Radio service. So having a good replacement option for the blower wheel was my best solution.



Figure 2

It helps to know something about the design of the blower assembly before working on it. The back of the L4B as seen in figure 2, shows the opening for the blower wheel assembly, and the surrounding black escutcheon, which covers the 2 3/4" intake hole on the rear panel. The opening of the escutcheon is 2 1/8" and curves inward 3/16" toward the wheel like a venturi, directing air inward. For the purpose of this article, I'll refer to the escutcheon as a Venturi Plate. The distance from the back panel to the inside rear blower housing is 1 11/16". The blower motor shaft is 1/4". It's important to know these dimensions when selecting a replacement blower wheel.

Searching the Internet for a suitable replacement took me to the "Electric Trading Co. of New York, which specializes in all things "blower wheel." Searching their site (www.blowerwheel.com) I found several blower wheels that could serve as a replacement for the original L4B plastic wheel. I even found a plastic Torrington wheel almost identical to the original, except that the collar was now aluminum and the bore was 3/16", too small for the 1/4" motor shaft. Boring the aluminum collar to 1/4" is not recommended because the heat generated could warp the plastic and ruin the wheel, and I didn't want to replicate the original blower design problems.

There were two wheels that could serve as a suitable replacement. Both wheels are of the "AA" design, which is thoroughly explained on the company website. One was made of steel, was slightly narrower in depth than the original, but had more blades and the correct bore size. The other was slightly larger in depth, was made of aluminum but had a bore size of 5/16", which was slightly large, so, I ordered both. It is interesting to note that a replacement wheel from Drake cost 50 cents, which was a fraction of the cost for just one of these new wheels. But if one would work, it would be a permanent fix for a known problem area in the L4/L4B.



Figure 3



Figure 4

Figure 5

Narrower in width than original but with more blades.



The steel wheel shown together with the original in figures 3 through 5, is an “AA” design model number #02160100-008-S-A-CCW-01. It measures 2 1/2" x 15/16" with a 1/4" bore and CCW rotational orientation. It was by far the easiest to install and although about 1/4" narrower in width, see figure 5, than the original, it has extra blades, which supplied ample airflow similar to the original plastic wheel.

Larger wheel presented fitment problems with the venturi plate.

Bore reduction sleeve.

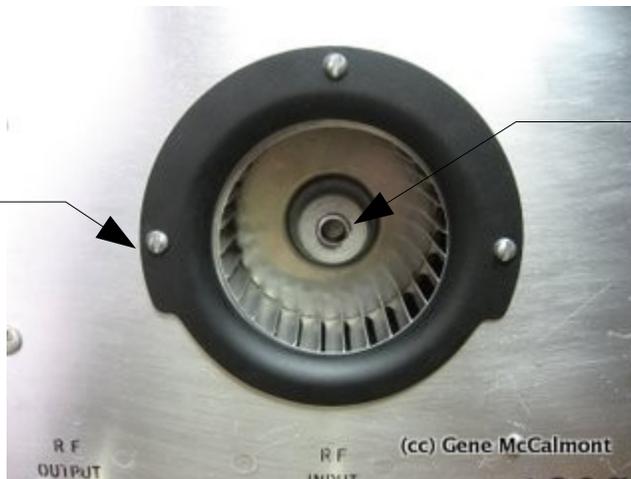


Figure 6

The aluminum wheel shown installed in figure 6, is a similar “AA” design model #02160116-008-A-AA-CCW-01. It measures 2 7/16" x 1 5/16". The wider wheel increased airflow somewhat, over the smaller steel wheel, but the extra depth and bore size presented fitment problems that had to be resolved. Even with the bore sleeved to 1/4", it did not fully seat onto the motor shaft, causing interference with the inside lip of the Venturi Plate. With one 5/64" set screw installed, the wheel wobbled when the motor shaft was spun. Fitting two 5/64" set screws to the collar (threaded holes were already present) solved the wobble problem. Additionally, the thin aluminum wheel and blades were prone to warping if mishandled. The insertion of the bore sleeve caused the rear plate to bend slightly which made fitment problematic. The extra width of the aluminum blower wheel is not really needed unless you plan to operate a lot of RTTY. If so, adding an extra fan(s) on top of the 3-500Zs to exhaust the hot air would be a preferred solution.

Installation:

Installing the steel blower wheel is fairly straight forward if you follow these steps:



Step 1

Remove the Venturi Plate and set aside.



Step 2

Remove the blower wheel set screw with a 5/64" Allen wrench. You may have to cut down the Allen wrench to fit inside the wheel to gain access to the set screw. Remove the blower wheel by grasping the steel collar with a suitable pair of pliers. Applying a small amount of penetrating oil (WD-40 for example) between the inside collar and motor shaft and letting it soak in, will ease removal of the collar. Don't yank on the collar as it may cause damage to the blower motor.



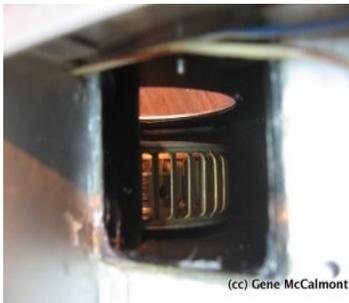
Step 3

Clean the inside of the blower housing and inspect the motor shaft, which should be smooth to the touch. Correct any problems found before installing the new blower wheel.



Step 4

Unscrew the set screw in the new blower wheel just enough to clear it from the wheel bore, then slide the new wheel into place on the motor shaft.



Step 5

Position the wheel as close to the amplifier's rear panel as possible, so that the wheel centers in the blower housing, as viewed from the bottom of the amplifier. It is not critical that the wheel be perfectly centered.

(Notice RTV sealer where blower housing meets amplifier chassis)



Step 6

Tighten the set screw just enough to secure the wheel to the motor shaft. One set screw is sufficient to secure the wheel to the motor shaft.



Step 7

Install the Venturi Plate and inspect the installation to ensure that there is no interference between the wheel and the Venturi Plate. Inspect the blower housing where it vents into the bottom of the amplifier chassis. Applying clear RTV sealer around the blower housing will seal any potential air leaks.



Step 8

Inspect the sealing tape on the bottom cover of the amplifier and replace if necessary. Use 3/16" weather stripping foam tape with a sticky back, available from several big box stores. Sealing the underside of the tube compartment greatly increases airflow past the tubes. Button everything up, plug it in and enjoy your amplifier.

In Conclusion:

The final installation is neat and professional in appearance and with just minor servicing of the blower motor and an occasional cleaning, your amplifier should perform as the original designers intended.

Disclaimer:

I make no claims that the information supplied herein is suitable for any particular purpose and may not predict your outcome. Consult an experienced technician if you need help or are unsure of your ability to effect any repairs to your amplifier. As always, safety first. Always remove all power plugs from the amplifier before attempting any repairs.

Contact:

The author may be reached at w5ddw@gmail.com. Your comments and suggestions are always appreciated but I regret that I will not be able to offer individual help.

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