

FM-5 and AF-6 Cartridge Lamp Replacement ASSEMBLY MANUAL



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Section 1: About This Manual

This manual gives the information you need to build and install a set of two replacement cartridge lamps (dial lights) for either the Dynaco FM-5 or AF-6 tuners. You'll need to harvest the end-caps from the original cartridge lamps for re-use with the new LED based assemblies.

Who Should Attempt these Projects?

You can build this kit if you can:

1. solder (using normal rosin core solder and a soldering iron),
2. use simple hand tools like screwdrivers, wire cutters, and pliers, and
3. Read and follow directions.

It helps if you:

1. know a bit about electronics, or
2. have a friend who knows a bit about electronics
3. can get to YouTube to watch a few helpful videos about the assembly process (not available as of this version of the manual)

Tools and Supplies You'll Need

You'll need the following tools:

1. flat blade screwdrivers for #4 and #6 screws, #2 Philips head screwdriver
2. needle nose pliers (helpful, but not strictly necessary)
3. pencil type soldering iron of 25 to 50 Watts (no huge honking soldering guns or blowtorches)
4. wire cutters and strippers
5. Magnifying glass, if you're over 42!
6. A multi-meter for measuring Ohms and DC volts is handy, but not strictly necessary

Recommended Solder

The kit must be assembled with 60/40 Rosin Core solder. The recommended diameter is 0.032 inches. Among many such sources of solder, I have used Radio Shack part number 64-009. It contains 8 oz. of solder, which is *much* more than you'll need to assemble this kit.

Project Overview

Broadly, the project consists of the following steps:

1. Unplug the tuner.
2. Open the tuner and harvest the original cartridge lamps.
3. Add a capacitor to each cartridge lamp.
4. Solder on the end-caps.
5. Install the replacement lamp assembly into the tuner.
6. Reassembling the tuner.

Important Safety Notes

By purchasing, using, or assembling this kit, you have agreed to hold Akitika, LLC harmless for any injuries you may receive in its assembly and/or use. To prevent injuries:

- Wear safety glasses when soldering to prevent eye injuries.
- Always unplug the power before working on the equipment.
- Large capacitors hold lots of energy for a long time. Before you put your hands into the equipment:
 - Pull the AC plug!
 - Wait 1 full minute for the capacitors to discharge!
- Remove jewelry and rings from your hands and wrists, or anything that might dangle into the amplifier.
- If working in the amplifier, keep one hand in your pocket, especially if you're near the power supply or power supply wires. This can prevent serious shocks.
- Build with a buddy nearby. If you've ignored all the previous advice, they can dial 911 or get you to the hospital.

Section 2: Harvesting the Original Cartridge Lamps

Preparation

- Set up a clear space in which to work.
- Get a soup bowl and a towel. The soup bowl holds the parts as you disassemble the tuner. The towel will be used to rest parts on that might otherwise be scratched.
- **Remove the power plug from the AC wall socket!**

Accessing the Cartridge Lamps

1. Remove the four screws, two on each side of the cover, that hold the cover in place. Put the screws into your soup bowl for safe keeping.
2. Lift off the cover and set it aside.



Figure 1-Loosen the set screws and remove the knobs

3. Use the 1/16" Allen wrench (supplied) to loosen the set screws in the small volume/power knob and the large tuning knob. Remove the knobs and set them in the soup bowl.

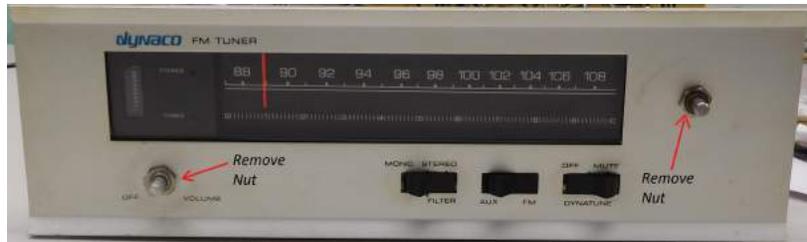


Figure 2-Remove two nuts, then remove front panel

4. Remove the two nuts that hold the front panel in place, one from the volume/power control, and the other from the tuning bushing.



Figure 3-Nuts holding front panel were removed, and front panel has been removed

5. Remove the front panel and set it aside.
6. Remove the dial plexiglass. It is held in place by (probably ancient) masking tape. Peel the masking tape back the plexiglass will come out. This might be a good time to clean this piece. I used Windex and lukewarm water. Please be careful...don't use hot water, or too much elbow grease, as you will certainly damage the lettering. Rinse it well, pat it dry, and set it aside.

If you look under where the masking tape used to be, you'll see two cartridge lamps, one on each side.

Removing the Cartridge Lamps

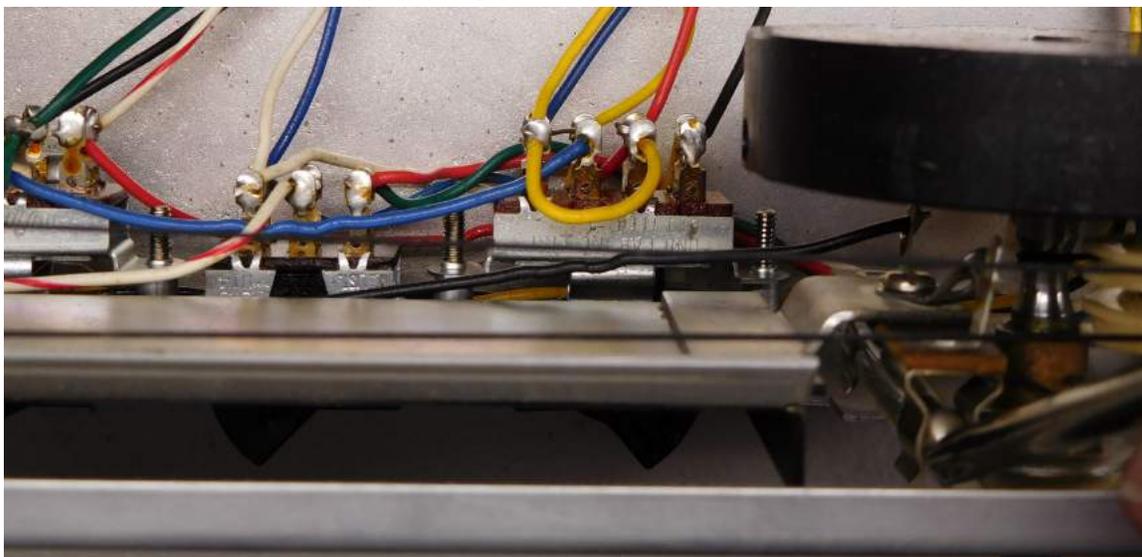


Figure 4-Push down, then finagle back, to remove the cartridge lamps

Here's the easy way to do it. Take a Phillips head screw driver and push down onto the top cartridge lamp cap. Go slowly, and use some care. The cartridge lamp will drop down out of the top holder bracket. By a combination of downward and backward force, you'll be able to finagle the old lamps out of their holders without needing to disassemble anything.

Harvesting the End Caps



Figure 5-Harvesting and de-soldering the end caps

The end caps on the cartridge lamps will likely fall off as you remove the lamps from the tuner. If they haven't, removing the end caps is easy:

1. Apply the tip of your soldering iron to the tip of the end-cap.
2. Use tweezers or needle-nose pliers to pull the end-cap off the glass while the end-cap is heated.
3. Be careful as you remove the end-caps...don't bend them, and be careful that they don't fly across the room!
4. There's a small hole in the pointed end of the end-cap. If you can't see daylight through it, you'll have to de-solder it. Here's how:
 - a. Hold the end-cap with needle-nosed pliers.
 - b. Heat the pointed end of the end cap.
 - c. Rap the end cap down on the table. When it hits the table, the end-cap stops suddenly, but the solder continues on, clearing the hole.

Installing the Capacitor

For each of the two cartridge lamp assemblies:

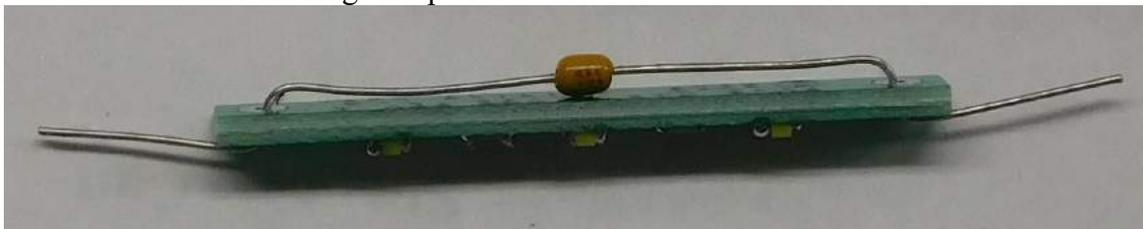


Figure 6-insert the capacitor and form the leads

Locate the small PCB's with the surface mount resistors and LED's.

1. Bend the leads of the 0.1 uF capacitor at 90 degrees, at a distance of 1.3". Try to make it symmetrical.
2. Insert the capacitor onto the back side of the board and bend the leads as shown in Figure 6.
3. Solder the capacitor lead where it passes through the PCB (two places).

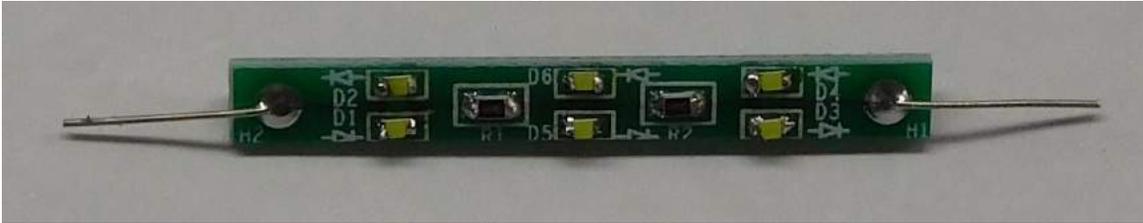


Figure 7-Solder the capacitor

Installing the End Caps

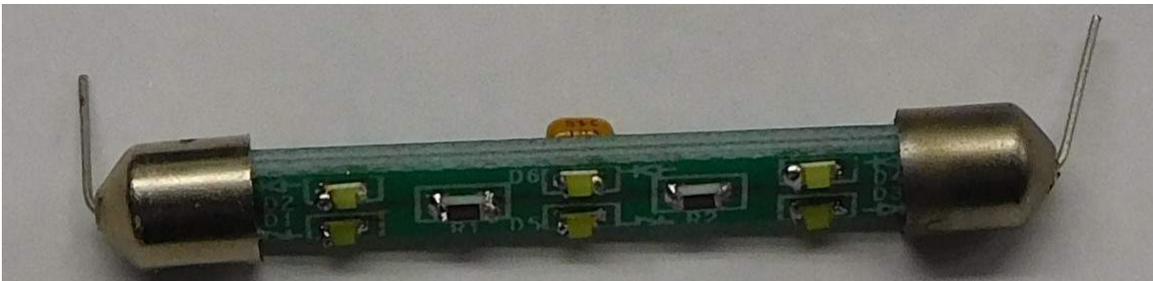


Figure 8-Replace the end caps and bend the wires

For each of the two cartridge lamp assemblies:

1. Slide one end cap over the end of the PCB/capacitor assembly.
2. Thread the capacitor lead through the hole in the end cap.
3. Make sure that the end cap bottoms on the end of the capacitor board.
4. Bend the capacitor lead at a 90-degree angle to retain the end cap.
5. Solder the lead to the end cap in the vicinity of the hole. Try to keep the solder on the sloped part of the end cap, and off its cylindrical walls.
6. Clip the extra lead, don't clip it flush.
7. Install the other end cap in the same manner on the other side of the PCB/capacitor assembly by repeating steps 1 through 6.

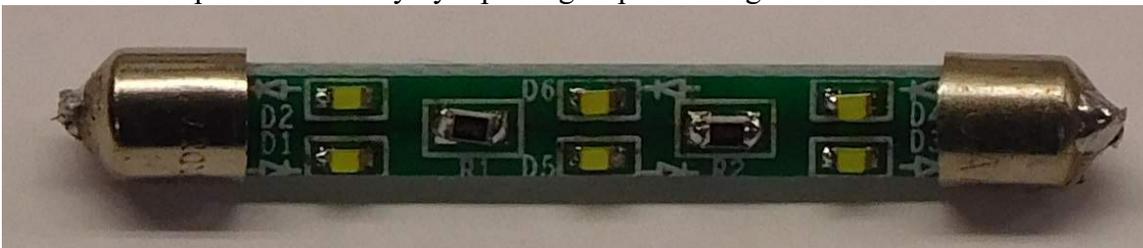


Figure 9-Complete LED based cartridge lamp replacement

Installing the Completed Cartridge Lamp Assembly

It helps to visualize the result you want before you begin. You want the side of the PCB with the LEDs to face toward the center of the dial, angled just slightly toward the front panel of the tuner. Got it?

Now, working from above the tuner:

1. Push the bottom end-cap through the top fuse clip. It may help to spring the clip open a bit using a small screw-driver at the open end of the clip.
2. Carefully guide the end-cap/PCB assembly through the top clip until it rests on top of the bottom clip.
3. Make sure that you like the angle it makes with the front panel.
4. If you like the angle, then continue to push the assembly into the bottom clip.



Figure 10-Angling the new lamp assembly

If the lamp ended up turned at a funny angle, you can continue to push it through and finagle it back to remove it in the same way as you removed the original cartridge lamps.

Repeat this installation procedure for the second lamp.

Reassemble the Tuner

You may want to test the result before you re-assemble the tuner. Please be careful and stay far away from any energized wires in the tuner.

1. Make sure the power cord is unplugged.
2. Put the dial-plexiglass back in place. Use a piece of masking tape on each side to hold it in place.
3. Slide the front panel over the volume/power and tuning shafts.
4. Use the accompanying nuts to fasten the front panel in place.
5. Return the knobs back to their shafts using the supplied 1/16" Allen-key to tighten then up.
 - a. The volume/power switch should be at 7 o'clock when fully counter clockwise.
 - b. The orientation of the tuning knob doesn't matter.
6. Replace the cover on the chassis. Make sure the cover and chassis holes on the side match up.
7. Screw in the four screws that hold the cover to the chassis.