Yaesu FT-767GX

Lamp replacement Mod

www.wykeradio.org

The Yaesu FT-767GX was produced in the mid eighties. Most of these transceivers will see another decade or two before parts become scarce or the financial viability of repair becomes impractical.

One of the most common items to "go" inside one of these radios is the meter illumination lamps. This document will guide you through the replacement of these lamps with LED parts. Before we go any further, I would like to explain that you should take your time, read this document carefully and follow the steps fully before moving onto the next.

In order to replace the lamps you will need to first choose a suitable replacement. If you are fortunate enough to find some 14volt 30 to 40ma (milliamp) filament lamps, these will do just fine. Please bear in mind that if you cannot find filament lamps, you can now ponder upon the choice of colour LED you wish to fit.

We need to know a few things before we can plan any further. We need to know about the LED replacements that you have sourced. When shopping around or making your purchase, please ask the supplier what the forward voltage (we need this later) and current rating is.

We need to know these details so that we can work out the value of the current resistor.

You do NOT require a current resistor if:

1. You have a 12 or 14 volt filament lamp
2. You have a 12 volt LED

You will require a current limiting resistor if

1. Your LED is rated at less than 12 or 14 volts

If you are uncertain about this then please do not proceed any further. Consult a qualified person or contact your nearest ham radio operator.

So what about this resistor then?

If we know what the forward voltage of the LED is we can work out what value of resistor is that we require. As a general rule of thumb the following equation should give you the correct answer.

R=(Vs-Vf)/I

Vs is the supply voltage to the LED. If you haven't measured the voltage that is going to the old filament lamps, you will find it around 13volts.

Vf is the forward voltage of the LED. This is the amount of voltage required for the LED to actually light.

I is the current that you want to allow through the LED. Remember, the brighter it is the shorter it lives. Most LED's within the manufacturers specifications can be lit continuously for 30years! The average lifespan of an incorrectly connected LED can be as short as 1 millionth of a second.

R is the value of the resistor in Ohms.

Ok, lets run some figures through that equation. If your mathematical skills are weak please see the chart later in this document.

We know that the LEDs we purchased have a forward voltage of between 1.7 and 2.2 volts. We are going to do both figures and take the middle to be absolutely safe. We also want 20ma to flow through the LED.

R=(Vs-Vf)/I becomes R=(13 – 1.7) / .020
13-1.7 = 11.3 thus 11.3 / .020 = 565 Ohms.

Now assume 2.2 volts for forward voltage so: R=(13 – 2.2) / .020
13 – 2.2 = 10.8 so 10.8 / .020 = 540 Ohms. You would use a 560 Ohm in this application.

Right, if you are still unsure about what resistor you should be using then please go ahead and try 470 or 560 Ohms. The lower the value the more current flows and thus brighter the LED. There is a limit though and you should not assume that you have much more than 80ma available.

I have used 470 Ohm resistors (x 2) in this document. This seems to be a sensible choice for what we are trying to achieve.

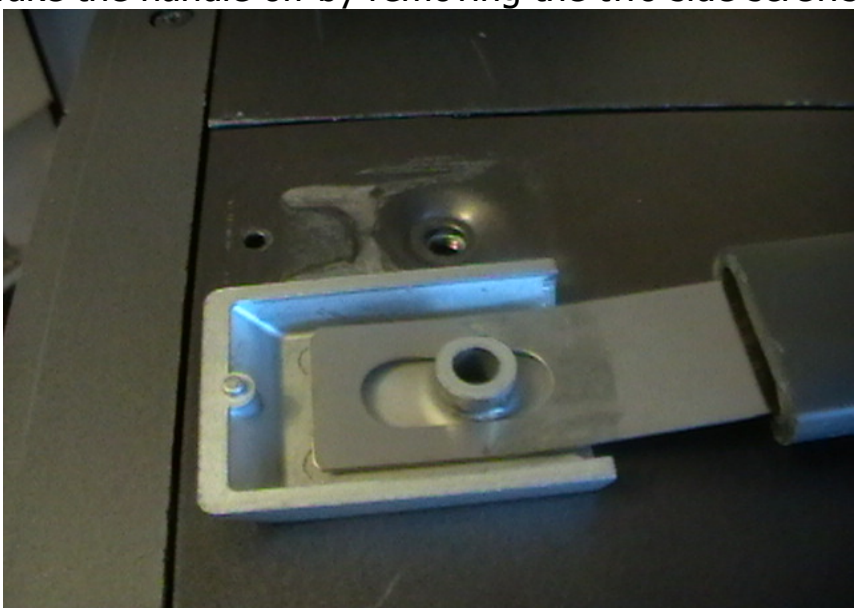
Ok, we now know and have the LEDs (x2) and 470 Ohm resistors (x2)

Lets go ahead and drop the front panel from the radio.

Remember to remove the mains power lead from the radio before removing any covers. Failure to do so can result in death by electrocution. Ensure your licence allows modification from the manufacturers specifications.

Place the radio on its side. Remember to put some paper or cloth under it to avoid scratching the surface. (Unlike here)

Take the handle off by removing the two side screws.



Note the indent used to align the handle when you put this back together.

Turn the radio over and remove the other side screws.

The feet are simply pushed in so dont panic should one fall out.

Place the radio on its top and remove the 4 screws near the rubber feet.
Remove the cover and place radio right side up.

You should now loosen (dont remove) the TWO screws located at the front bottom. Here you can see one in the slot which stops the front panel coming off and the retainer screw just to the right of it.

Remove the two screws from the top front edge. One is in front of the speaker grille and the other in front of the text printed on the top right front of the radio. Gently pull the top towards you and allow the panel to drop. You may find a lead on the right hand side as you pull the panel towards you that may require a little care. Some of these leads might be a little tight.

If all has gone according to plan, you will now have access to the meter lamps. The lamps are fitted inside plastic light diffusers that allow the light to travel through the plastic and onto the face of the meter.

Gently pull back the white cover that protects the existing soldered joint. Carefully unsolder the existing filament lamps but NOTE which wire is the positive 13volt feed. You dont want to get this far just to blow your LED!

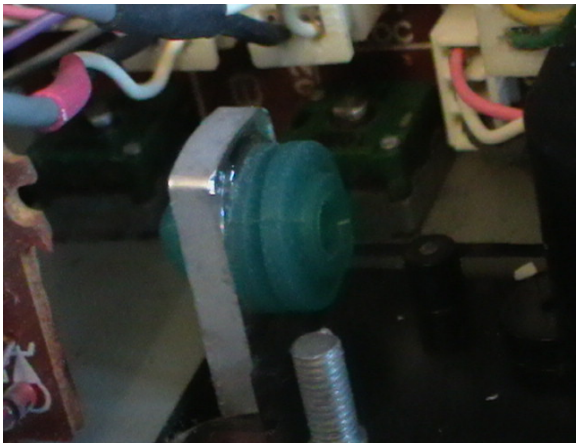
The damaged lamp.

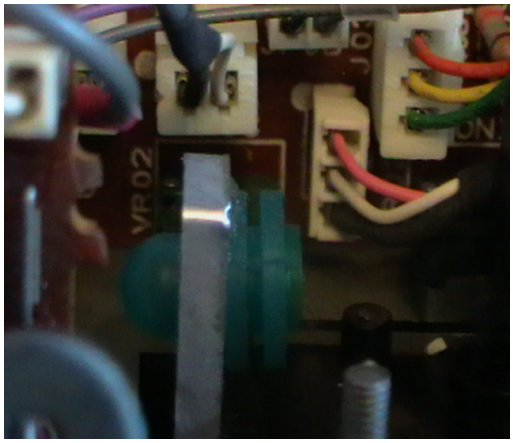
Ok, the holders can either be left in situ or removed. This depends on what size LED you have. I have used a 3mm high brightness LED in mine. I could of used a standard 6mm LED that would fit in place of the holder but I happened to have a large quantity of 3mm in one of my boxes.

I chose to remove the holders and carefully checked the plastic frame that they sit in, for cracks or damage. I was fortunate to have no problems.

At this point, I would like to suggest that if yours happens to be cracked, you can make it flat and drill (carefully) a 3mm hole into what's left. This of course is a last resort and for those not scared of diving in.

I used a small amount of superglue™ on mine to hold it in place. You can of course use hot glue or something safe to use on plastics.

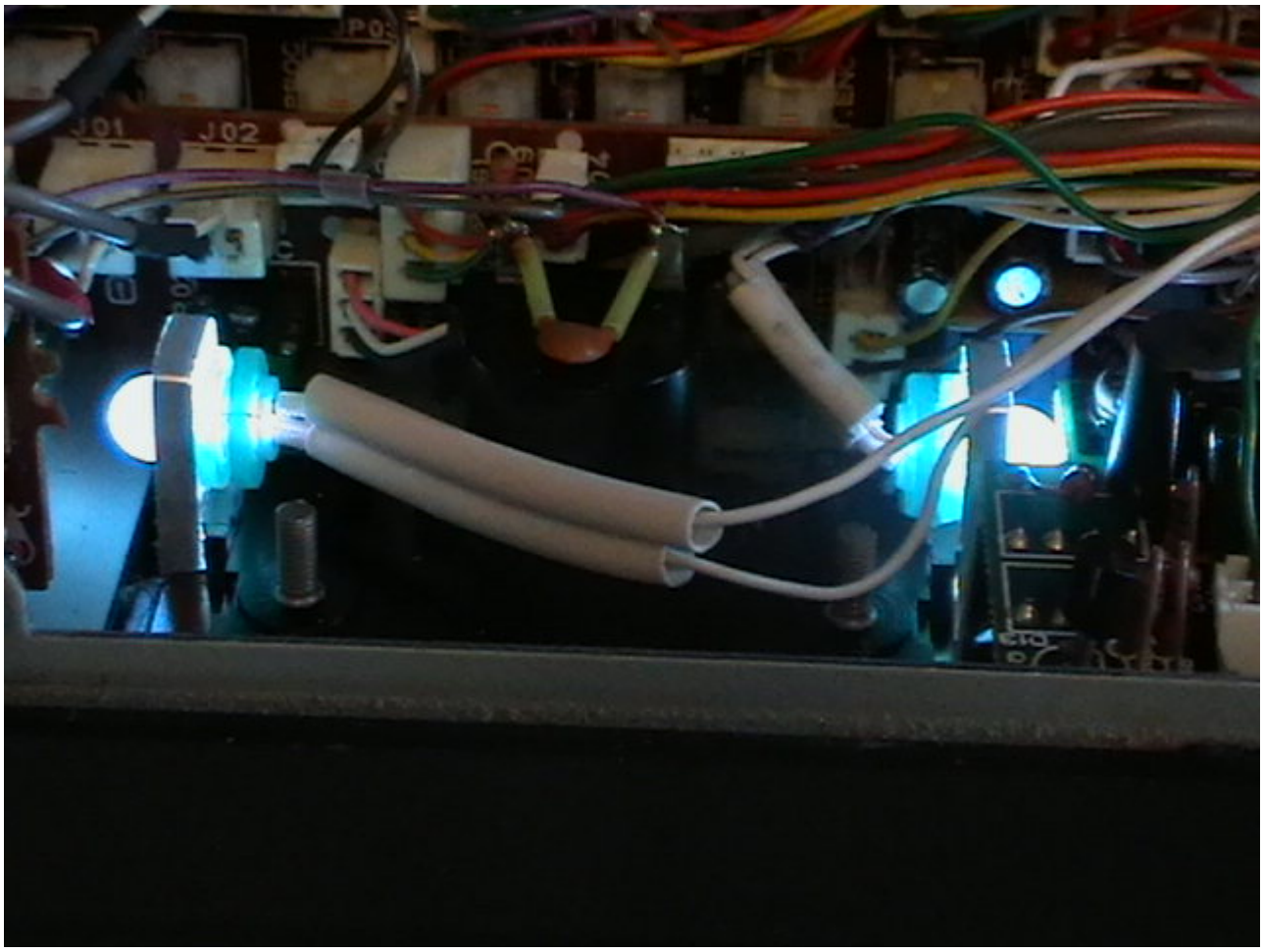




It is now time to solder the resistor onto the LED. It doesn't matter which leg you solder this to so long as it is there! The photo below demonstrates what you want to achieve. I have used a small length of tube to help protect the LED wiring from touching anything else. The sleeve also covers the resistor although this is not necessary, I find it tidier. The longer lead is normally the positive lead. Short lead is normally ground.

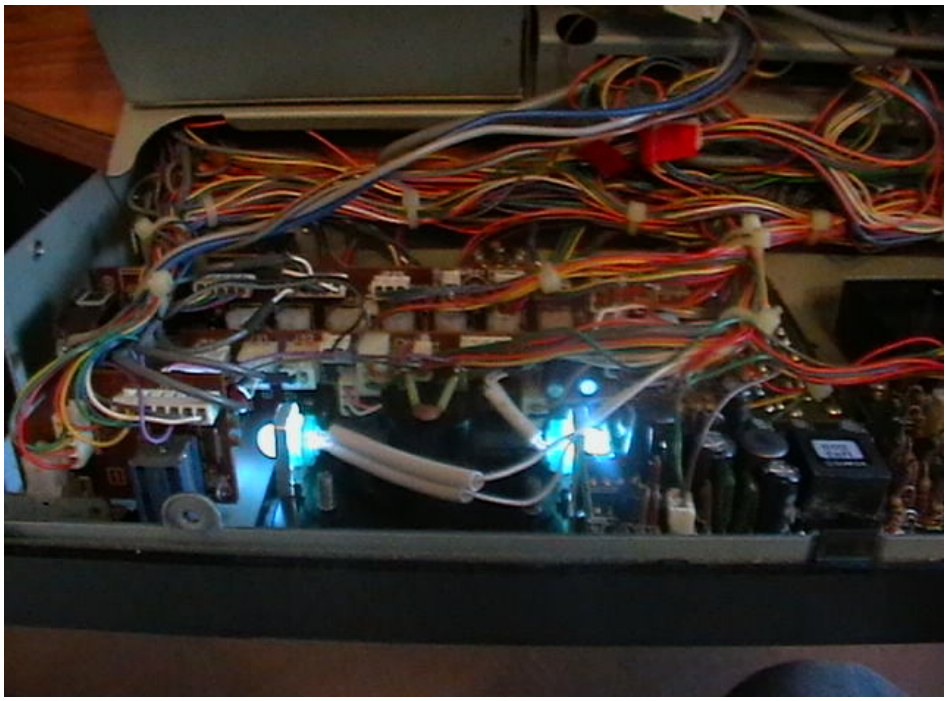
I like to check each LED as I go. It helps to avoid going back and putting it right later on. When you have finished soldering, check your work, then double check. You have the connections covered. You remembered to solder the resistors in-line with the LED's, if so, great. Go ahead and apply the power. Hopefully you will see something like this:

If not, turn off the power and double check that you haven't done something silly like connecting the LED to both negative lines or the wrong way. If you hear a pop, you will shortly smell your first failure. Remember this smell as it will be in the back of your mind there after.



Before you fix your new LED's in place, you should adjust the depth that they enter the housing as this will dictate how much light will reach the front panel. Gently adjust each one whilst checking for maximum light output at the meter. When you have correctly adjusted them, fix them in place with a very small amount of adhesive or good quality tape.

Refit the covers in reverse.
Your modification is now complete.



LED Chart

R=(Vs – Vf) / I

Resistor required = Supply voltage – Forward voltage / current

Assume 2v forward voltage for standard LED

Supply Voltage = Vs	Current Required (ma)	Resistor Value (Ohms)
3	20	50
5	20	150
6	20	200
8	20	300
10	20	400
12	15	666
12	20	500
12	30	333
24	20	1100
36	20	1700

You should always use the next value up. 1700 Ohms would use a 1800 Ohm value as 1700 Ohm resistors do not exist.

Note that it is preferable to use not more than 60% of the resistor wattage rating for safety and reliability purposes.