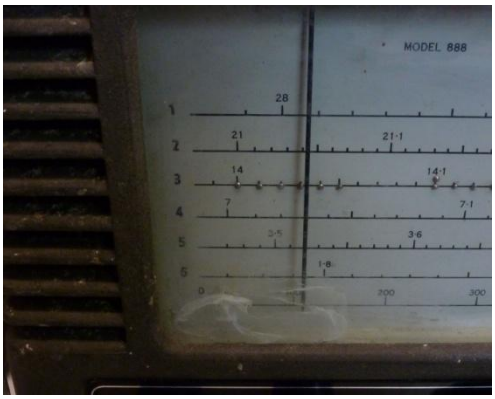
Eddystone 888
Restoration

This article is not a definitive instruction in restoring a historical radio receiver, it is a guide as to what can happen, what can go wrong or go right.

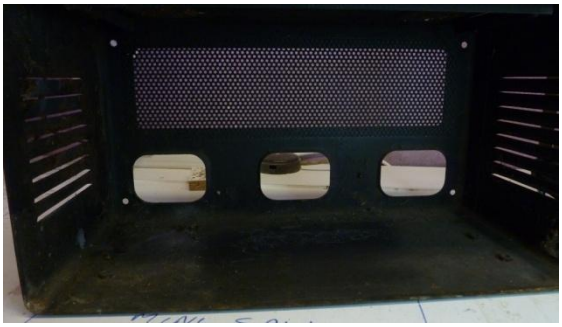
I acquired the Eddystone 888 in late October 2015 from a vendor on Ebay. Not an expensive buy, and I was familiar with its brother the 750, both “dual conversion” receivers.
I thought it would be a relatively easy restoration. How wrong can one person be. It was advertised as a 888 A, but I discovered it was a 888 S. This is the earlier version with some differences to the 888 A, but not anything to cause concern.

The condition was anything but ideal, as can be seen from the photo’s below, it had had families of spiders living in it, it was in awful condition, being stored in a damp garden shed for possibly years.



Part of front panel

Internal view showing rust



Views of cabinet back before restoration

The first job was to evict any previous occupants and their home debris.

The front panel was stripped entirely, not forgetting the Eddystone Logo. All parts were safely stored for cleaning and re assembly.

The metal case was taken to a local metal finishers, who can “bead” blast and powder coat.

The case was returned in two weeks, it could have been earlier, but the bead blast operator was on holiday.

Meanwhile, all the mechanics had to be stripped, de-greased, cleaned and re assembled.

The Eddystone dial drive mechanisms are famous for their quality and smooth operation, enabling the tuning to be virtually back lash free, and a good linear operation, rather than the old “half moon” dials.

If you are intending to “attack” one of these mechanisms, set it to one end, before removal from the front panel, and mark both drive cord gear wheels with an indelible marker and a reference point on the mechanism chassis. Also either photograph or draw, or both, the way the dial drive cord runs, which drum has the most cord and which way it starts on the drums.

There are two large gear wheels that are dual assemblies with small springs to apply pressure, to allow the gears to work against each other, to take up backlash. DO NOT lose these when cleaning.

Clean all the gears and other moving surfaces with a degreaser, and keep in a safe place for re assembly. I cannot say in what order re assembly should take as each receiver can be different, but it should be the reverse of diss-assembly.

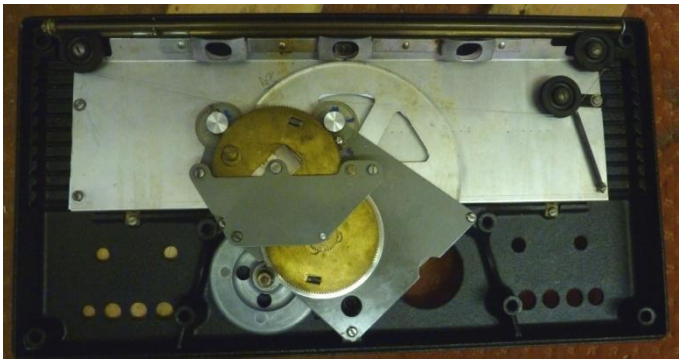
A digital camera is recommended, for each step.

One thing that caused me a problem on the 750 was the round bar at the top of the dial, that carries the tuning pointer. It was bent, making the dial pointer very jerky. It took a bit of straightening, but it can be rotated to allow the dial pointer to run on the parallel bars.

Part assembled front panel with dial glass and tuning pointer fitted

Next add the tuning scale, pulleys and gear assembly. All running surfaces were lightly lubricated with sewing machine oil.. To be honest I am not sure if this is recommended, but it works for me.

Part assembled front panel with tuning scale and tuning mechanism assembled

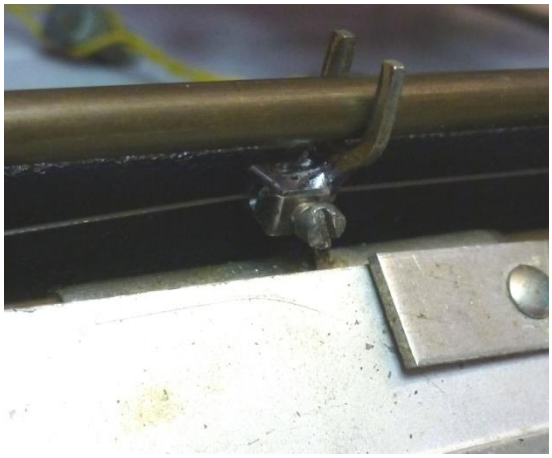


The dial drive cord gear drums had a lot of wear on the internal bearing surface, and one of the drum mounting threads had stripped on diss- assembly.

I was able to make two new parts on my lathe, boring out the nylon gears to remove some eccentricity and as I cannot “thread”, I centred the parts and fitted 3mm threaded studs.

The dial drive cord clamp screws were old and loose, so I drilled and tapped at 3mm.

The dial drive cord was old waxed “string” and was certainly not original. I obtained some 0.5mm multi stranded stainless steel coated wire that jewellery makers use. However this is impossible to solder and it needed to be clamped to the dial pointer.



I removed the dial pointer and soldered a wire clamp from a pcb wire terminal that uses one screw, threaded the dial cord through the hole and clamped with the screw. This allowed great accuracy setting the dial pointer.

It may seem that all the operations were “pre planned”, but not so, there were quite a number of “trial” fittings as it is a complicated assembly.

The tuning scale and the 0 – 100 segmented circular dial were in a poor condition. Way beyond cleaning. Nicotine staining and storage had taken their toll, thus I copied the artworks on my PCB cad software. Now the purist would use a drawing package, but I was not willing to spend time learning how to use software that I did not know, thus I used my pcb design software. The BIG problem was that the dial scale is much larger than A4. As my printer is A4, I had to make the drawing full size and then make two copies, over lapping. Using the “X” and “Y” co ordinates on the software, and a pair of dividers, I was able to make the Main scale and a copy of the rotary dial.

When removing all the control knobs, nearly every grub screw was seized. Fortunately they drilled out without too much damage or effort and metric threads and screws were fitted. The smaller knobs were relined with white paint.

The front panel was refitted to the main chassis, all knobs and switches fitted.

ELECTRONIC RESORATION

As with all old electronic equipment, unless it is used regularly, a lot of the components will need replacing. As this radio was an unknown, I had to assume it was in need of gentle awakening.

First all the variable controls were sprayed with contact lubricant, the Main Tuning capacitor was removed and all the bearings de greased, and lubricated with light oil. All contact points were treated with contact lubricant, and refitted to the chassis.

All valves were removed and the pins cleaned with a “brass” pen, lubricated and re inserted.

The valve screening cans were cleaned and painted with matt black paint.

It is well known that the carbon composite resistors can change value, maybe as much as 25%.... Usually increasing in value. As I have a number of suitable Metal Film Resistors, all accessible parts were changed, irrespective of their current value. It is pointless, in my view, to put so much effort into a job, if it will not last a few years more.

All the 100nF 400V capacitors were also replaced, again irrespective of current status.

One of the Main Smoothing caps was also replaced, as it was physically suspect.

The mains switch was replaced for a 2 pole version. Unfortunately when it came to re fitting the Headphone socket adjacent to the mains switch, there was no room. Thus the mains switch had to re fitted, but with suitable insulation on the terminals…. Not heard of 50 years ago.

Power was applied using a mains variac, keeping an eye on voltage and current.

To reduce heating it has been suggested that the 5Z4 rectifier could be replaced with 2 X silicon diodes “1N4007”, however even with series resistors (56R) 7W, the HT is up at 285V . Thus the 5Z4 has been refitted, and the HT reduced to 260V.

In the 888 frequency drift due to local heating, in my view, should not be as much a problem, as the tuning range on each band is full scale, and thus the overall percentage is much lower.

In the 750, which is a “General coverage” receiver, local heating is more of a problem, thus I fitted a “ex computer PSU” fan above the RF section. This certainly helps reduce drift in this receiver.

Some of the valves were tested for emission, however my valve tester is too old for some, such as the 6BA6's and ECH42's. Which.. Lets face it are the most important. However I purchased 1 x ECH42 and 2 x EF91 (6BA6). For "just in case" from ebay.

Alignment was the next thing. There are two I.F frequencies, the 1st being 1.62 Mhz and the second 85 Khz. I found the data sheet from the Eddystone user group most helpful in this, and I recommend these are downloaded. I.F injection points, etc are noted.

RF Alignment. I am fortunate to have 2 x Marconi 2022 signal generators, and these are configured to combine the outputs to one lead.

Each generator is set to the end of band points, e.g 1.8 Mhz and 2.0 Mhz, the levels are set to be identical, thus there is little confusion when performing alignment.

General problems.

As this radio is over 50 years old I did not expect "trouble free" operation, and have found quite a few problems along the way.

BFO. The BFO injection level was way lower than expected, i.e the "beat tone" level was very low level compared with the 750. After replacing the valve, which had no effect, I removed the BFO can and changed the passive components, "resistors and caps", but found none that I could suspect as being the cause of the problem.
The fault was found to be a valve pin that had never been soldered which was the suppressor grid. This was floating. Another fault, although it had no bearing on the outcome, was the screen decoupling capacitor was grounded to a heater pin, rather than ground.
Replacement showed the fault had been removed and the BFO now works correctly.

Valve pins. It is normal, when restoring older equipment to clean the valve pins and sockets. I cleaned the actual valve pins with a brass pen. Pushing each pin in turn into the brass a few times, using a propriety contact cleaner. When each valve is cleaned the pins are "lubed" and inserted into the socket up and down a few times, "NEVER ROTATED". Unfortunately due to its age and possible storage conditions two valve bases had broken "female" pins. One base is in the Diecast RF chassis. Without a full removal of the wavechange switch shaft, it is impossible to replace the base or even pins, thus with the aid of a needle, I was able to gently re spring the part that had not broken. The other valve base was V5 which is accessible. Just the broken pins were replaced from a spare valvebase.

WAVECHANGE SWITCH.

The sensitivity on the 15 Metre band was very poor, approx 40 db down on the other ranges, plus the fact that the mixer stage was not peaking correctly.

Fortunately I have a Spectrum analyser with tracking generator. The local oscillator valve was removed and RF from the tracking generator was fed into the aerial terminal, and the output of the mixer stage was monitored by the analyser.

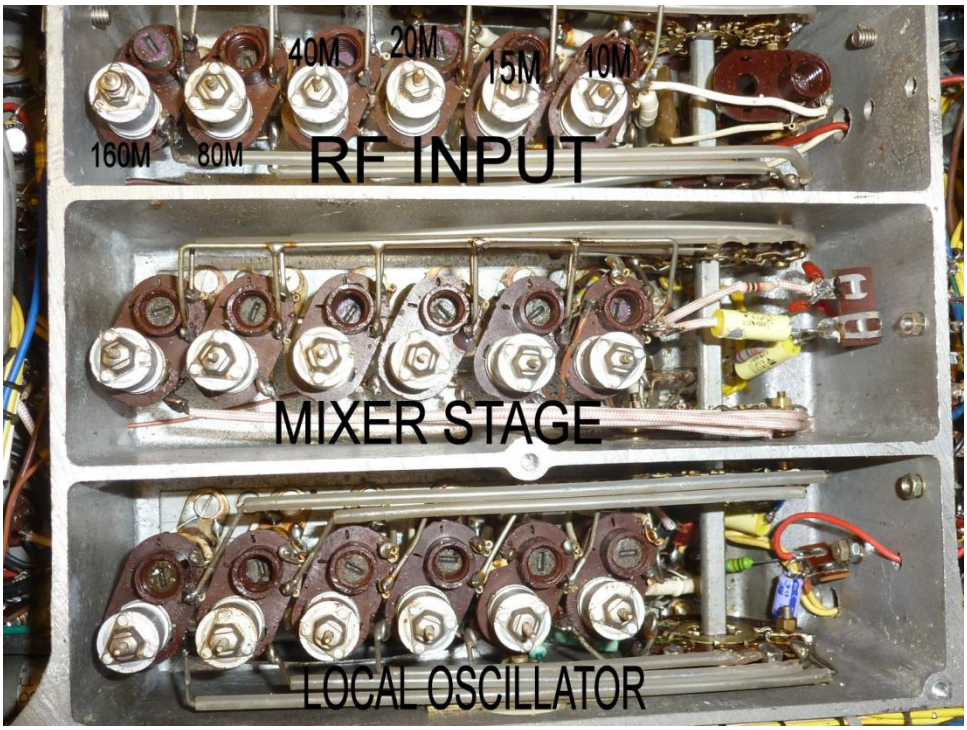
On other ranges the analyser showed a nice peak, as expected, however on 15 M there was no peak and low gain. Slightly rotating the wave change switch, showed the correct result, thus a close inspection of the mixer input select wafer, showed the 15M switch contact had disappeared.

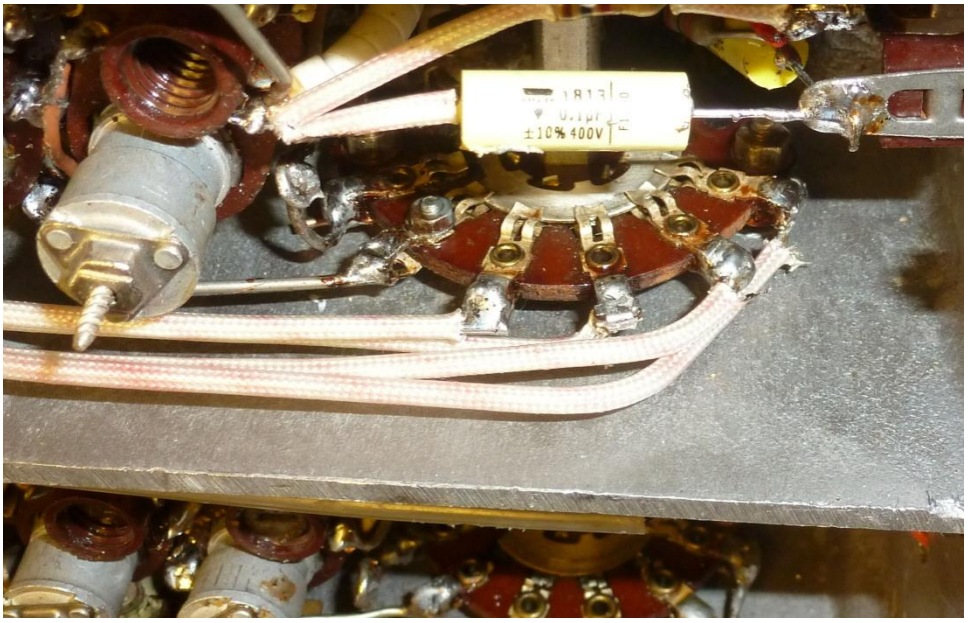
It is quite a challenge to repair the wave change switch, but to make the 888 fully functional, it needed to be done.

Unfortunately due to the need to complete the repair quickly, there were no photographs of the actual switch repair. However I hope to give a reasonable description of the process.

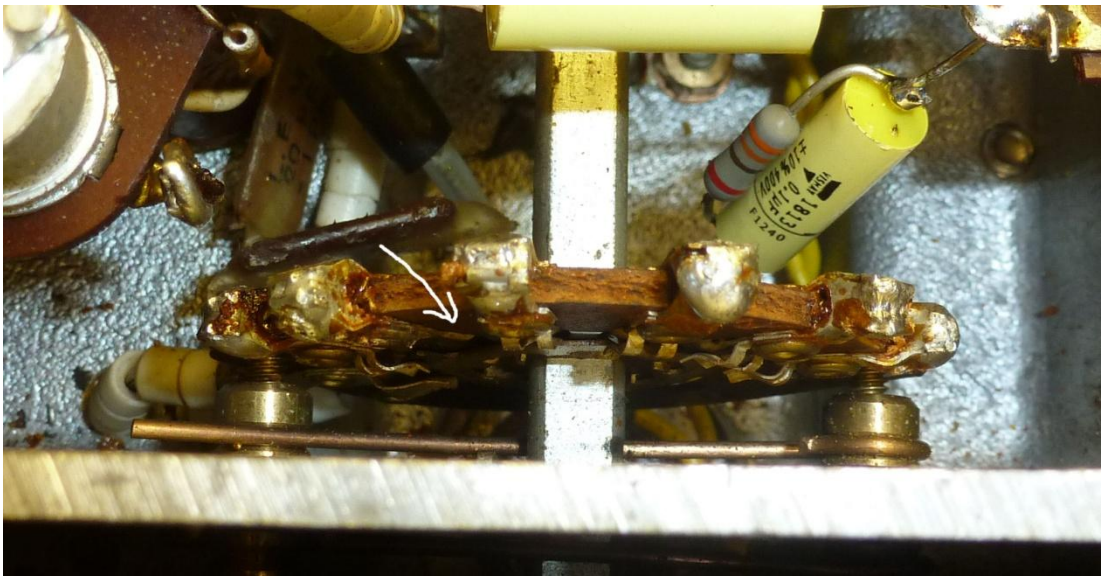
As the case of the 888 had been painted and treated, it was decided to remove the front. This lightened the assembly and gave better access.

The switch mechanism was then removed, by taking out the two 6 BA bolts holding the mechanism..... Making note of the spacers and were they are.. The nice thing about the 888 is all the switch wafers are held in position by the die cast case, thus the switch shaft could be withdrawn carefully. In some wafer locations there are tension springs across the shaft, some face up and some face down.



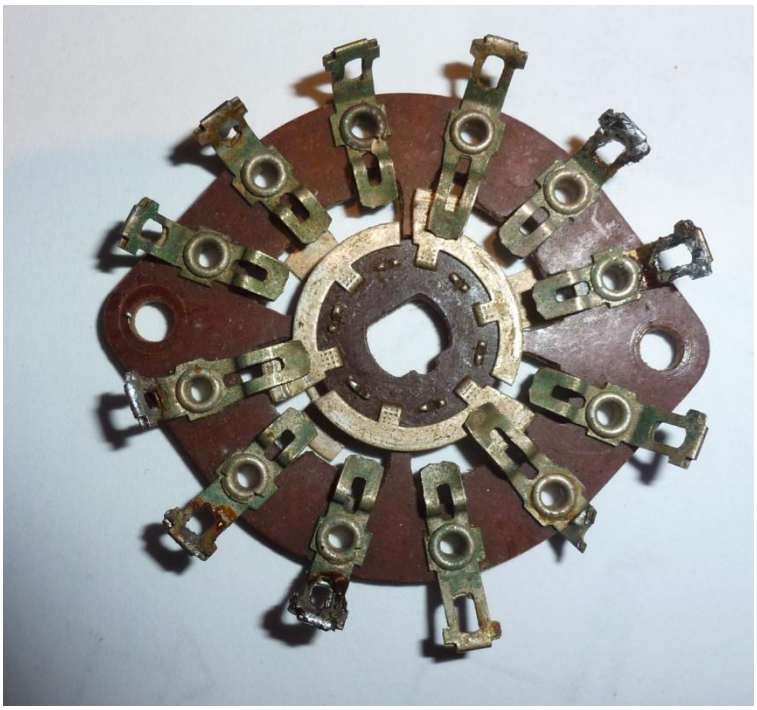


As can be seen from the photo above, it is quite crowded, I removed all the coil connecting wires, BOTH ends....I also replaced the polythene wire coatings with fabric systoflex insulation tubing. All the switch wafers in the 888 are double sided. One side is a normal 6 way single pole, and the other side is a 6 way SHORTING switch. On my switch it was a select contact that was broken. See photo below



The wafer was de mounted from the die cast wall, making note of the spacers and the rotation of the tension spring. With care you can use a small screw driver through the front switch wafer shaft hole and a 6 BA spanner.

Now comes the hard part. When the top wires have been removed there are components and wires to the wiper contacts, both sides of the wafer. These must be carefully removed “de soldered”. And a note to know which came from where.
Once these are removed, the wafer is free to be lifted out.



As can be seen from the photo above the contacts are held in place with “holed” rivets . I used a small drill in a modellers power drill to carefully remove the rivet head. That released the TOP contact, however due to the mechanics of riveting , the body of the rivet will spread and fill the hole, thus great care is needed to remove the rest of the rivet. Remember these switches can be over 50 years old and the switch material is weakened with age.
After successfully removing both contacts “Only one may need replacing”, fit the new contact in position. To hold the contacts in place, unless you are skill full with a rivet inserter I suggest using a 2.5mm Set screw and nut, preferably with a spring washer.

Check the switch rotation and that the wiper does not “crash” into the new contact/s, slight adjustment may be needed.

I salvaged some switch contacts from an old wafer switch, If the switch is of the same dimensions the contacts should be the same length, or a few “thou” shorter but work ok.

Once the wafer has been repaired it should be cleaned with switch cleaner and.... I used a fibreglass pen.

Now comes the hard part. Resoldering the components to the switch wiper contacts, it takes quite a lot of patience, but if the Eddystone assemblers can do it, you can.

Once resoldered, fix the wafer back into place, in a reverse procedure of dis assembly.

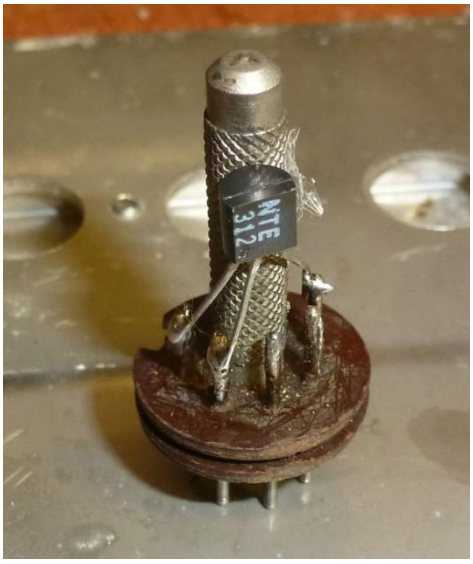
Next the shaft should be replaced carefully, I used a piece if 16 SWG wire with a hook on the end to guide the tension springs upwards and a screw driver to guide the other springs downward. Once the shaft is in place, refit the switch mechanism. Oh yes...ensure the switch mechanism is in the same rotation as when it was removed, do NOT Fit 180 degrees out of sync.

Now refit the coil connections to the switch.

If you are unlucky to have a contact broken, I hope this part has given you the confidence to attempt a replacement.

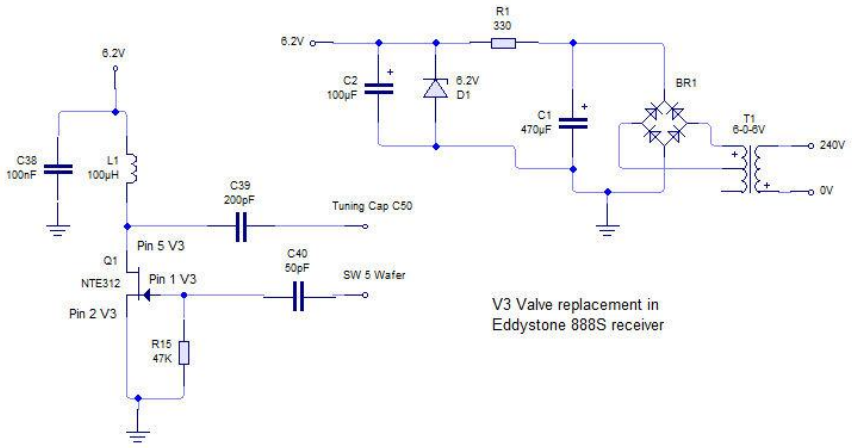
LOCAL OSCILLATOR UPGRADE.

The local oscillator valve V3 in the 888S is a 6AM6 (EF91), however it is triode connected. In the 888A it is a 6C4 triode.
As thermal drift can be an issue, a FET can be a possible replacement. There are certain conditions that must be met, mostly the RF insertion voltage to the mixer. I took measurements on all ranges, and there were variations of level from 3.5V PP on 10M, 4.4V PP on 15M, 7.6V PP on 20M, 17V PP on 40M, 35 V PP on 80M, and 40V PP on Top band.
Initially I replaced the anode load resistor (22K) with a 100 uH choke, potted down the HT to +12V DC and fitted a FET as the photo below, using a B7G valve plug.



The FET used is a NTE312, similar to a 2N3819 but more modern and better.
However I had a device failure and noted that the PP Voltage on the drain was 40V PP. This is much to high, thus the supply voltage was reduced to 6.2V DC. This dropped the voltage to a more manageable level, and no failure.

The oscillator had a tendency to stop on the 160 and 80 bands. I noted that the grid bias resistor was 22K. This was raised to 47 K and now works on all bands.



Now to supply the Local oscillator. This was more difficult than was thought. You can "pot" down the +150V from the VR150. This was tried , using 14K and a 6.2V zener, however the heat loss was too high, and one of the reasons to do this modification was to lower the heat generated not increase . Another idea tried was to use the 6.3V ac Heater supply. This is not as simple as it sounds, as the heater winding is tapped and grounded. If you remove the ground tap, yes you can get 6.4V DC via a bridge rectifier, but an audible hum from the output stage.
The end result was the purchase of a 2VA 6-0-6 transformer from Maplins This was fitted in the power supply section of the chassis... See photo below

Yes I know.... You do not use a bridge rectifier with a 6-0-6 V transformer, but as it was fitted I used one half of the transformer, as only 10 m/A was required and the bridge was already fitted.

FUTURE MODIFICATIONS
The BFO is another suitable candidate, for heat reduction and that will be tried in the near future.

The Eddystone 750 is another candidate for the modifications made on the 888, I feel that the modifications on the 750 will pay well in reducing frequency drift.

EPILOGUE

I Hope this article has given you some thoughts on restoring or modifying what, in its day was a benchmark in receivers, but today is a bit lacking in performance.

About the author**.** I have held an amateur radio licence since 1968 and my callsign is G8BZY. I have been in the electronics industry all of my working life, mainly in Television production and in later years technical manager for a TV and other goods import company. Retired in 2013 after 50 years at the “coal face” now enjoying “playing” rather than working at electronics.