## A Potted History of my 'Radio Life' and the Restoration of an Eddystone S.740 – by Gerry O'Hara, G8GUH

#### My Early 'Radio Life' and my 'First Eddystone'

I first became interested in electronics back in 1968 – mucking about making little preamps with OC71's out of a book by Clive Sinclair (yes, now Sir Clive) - this interest

leaning more towards radio in 1970 when my uncle George, a keen SWL, let me listen to his Murphy B40 which he kept in a fine piece of furniture in his lounge (how did he get my auntie Agnes to agree to that!). I did not have a short wave radio, so he gave me a '19 Set' that he had bought surplus a few years earlier that he did not know how to get working (he wasn't very 'technical'). I remember thinking the set was odd as it was made in Canada with Russian lettering. I spent hours staring at its innards, tracing and drawing out the circuit (I can

still remember the musty smell of the old waxy wiring). I built a psu and

finally got it to receive. Shortly after that I landed a weekend/vacation job at one of the local radio/TV shops in Carlisle and was taught how to fix radios and other domestic electronics 'properly' (sort-of)

by a couple of old-school radio/TV repair guys – both called John (affectionately known as 'little John' and 'Johnny-one-arm' – for obvious reasons). I learned a lot! – and not just about radios...

I used the money I earned to pay for a B40 of my own (available cheap on the surplus market at the time) to cover a wider frequency range than the 19 Set (it took a while as I

earned the princely sum of only 2 pounds a day! – but, of course it was a labour of love). Then I became interested in other things young men become interested in... however, by some strange hand of fate, by girlfriend's dad happened to be a radio amateur (Gordon, G3MNL – now SK). He owned an Eddystone S.640 and an S.770R and used to work at 'the Ministry' (14MU, near Carlisle), maintaining radio sets and other electronic gadgets for the forces. His shack was full of wonderful thermionic 'stuff' – oh, the glow of that 813... He really knew his stuff, especially about valve kit (he despised those 'three

legged fuses') – and he got me interested in getting my ticket: I became G8GUH in 1972.

I loved Gordon's Eddystones and decided to sell my B40 and buy the only Eddystone I could afford – a secondhand EC10Mk1 – to take to university in Sheffield with me in 1973 (there was no way the B40 could have gone with me – it weighed 1cwt!). Although I liked the quality construction and 'feel' of the EC10 – especially the smooth tuning - to be honest, I was a bit disappointed with its performance compared to the B40. Also, it

did not have a 'certain something' that Gordon's valved Eddystone sets had. So, in my youthful enthusiasm (and now with much regret and shame) I 'butchered' it – installing a

Q-multiplier, crystal calibrator, S-meter, fine tuning, NBFM detector, product detector for SSB, 'hot' FET front-end, regulated psu, 2-Meter converter, etc. Amazingly it still worked – and well as I recall! I still have that EC10 – though it is residing in my mother- in-laws garage in the UK (I now live in Canada). One day I will rescue it and try to undo the butchering (I recall that I retained the original fingerplate 'just in case' and replaced it



with one made from a sheet of brushed aluminum - in vogue at the time - I hope I can find the original in my junk box). I became interested in microwaves for a few years and

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was active on 10GHz, but as the years went by I became involved in other things – second degree, career (I am an engineer, but not radio or electronics), work away from home, including a year in the Falklands - immediately post-war – (callsign VP8BDE), then fathering a young family, move to Canada etc., so losing touch with my hobbies.....

#### **More Recent Events**

Then, a couple of years ago I spotted an old brass-faced, mahogany cased, ebony-breadboard construction 5 valve

TRF receiver on a stand at a local flea market. I felt 'sorry' for it – it had seen better days. Forty bucks later I was carrying it home. I started to brush the cobwebs from my mind and refresh my radio knowledge – I found it to be a bit like riding a bike, though my eyesight is not as sharp and my fingers seem much bigger and less supple than they were back in the 1970's! Still, I managed to restore the TRF and it worked quite well (for a 1924 radio). I was amazed that I could buy the tubes (and had a choice of manufacturer, new or used and even envelope shape!). That radio re-kindled my interest in the hobby and since then I have had fun restoring around 15 domestic radios from the 1920's through early 1950's, all wood cased, all US or Canadian-made sets (Philco, GE, Westinghouse, Crossly, Zenith, Detrola etc). I became a member of the local radio museum, known as the Society for the Preservation of Antique Radio in Canada (http://www3.telus.net/radiomuseum/) and attended a flea market where they were selling some radios 'surplus to requirements' to raise funds. They had a couple of Eddystones on the stall and I came away the proud owner of an Eddystone 830/4 (a 'dream machine' of my youth). This had the 'quality feel' I had sought all those years ago – it took a bit of restoring (helped by info from Graeme and Ted from the EUG) and it now works great. Having enjoyed bringing the 830/4 'up to scratch' (maybe another article some day), I was scanning EBay and local radio 'flea markets' and 'swap meets' for an earlier

Eddystone 'classic' to give some TLC to (the problem with EBay is the shipping cost for sets from the UK, on top of the purchase price and import duty, is really prohibitive and stateside sets are few and far between). Then I spotted an advert on the EUG website for a 'free to a good home' S.740, placed by Cedric (CT3FT), located in Madeira. A few emails and a phone call later and the set was boxed up and winging its way to Vancouver! Cedric had bought the set new in Belfast in 1952, used it for several years before acquiring an S.888. The S.740 was packed away and not used again, but not before Cedric had replaced the finger plate with a brand new one... excellent - no wear!

So, I thought the story of restoring this fine radio to its former glory might be of some



interest to EUG folks. I have kept the description in brief 'bullet' form as I find this is easier for folks to digest and have added a few photos to help visualize...

Cedric's S.740 on arrival, outside...



...and inside, through the 'lid'.

#### **Basic Preparation and Safety Checks**

- Vacuum-cleaned the chassis and case, using a small paintbrush to penetrate nooks and crannies. I wiped case and front panel with cotton wool wipes and warm soapy water and wiped the chassis with alcohol (using Q-tips and cloths) to remove grime. I used lighter

fluid to dissolve stubborn areas of melted wax. The dial was then cleaned with lenscleaner (I have not yet cleaned the inside, marked side of the dial - it is fairly clean anyway).



Case removed. Chassis top after initial clean – I know its feeling much better already...

- Removed the knobs: the grub screws were very tight, especially in the tuning and band selector knob. I applied penetrating oil and left for a day. The screws were eventually removed with much careful effort and selection of well-fitting screwdriver tip. The grub screws were found to be rusty and some were gnarled. I cleaned them with wire brush, applied light oil and reinstalled. The gnarled grub screws were filed down and their slots re-cut.
- Cleaned dial drive train gears with alcohol and more Q-tips. Applied light machine oil (not '3-in-One') to the various metal bearings (very sparingly).



- Re-wired the transformer primary for 120v operation (using the 110 and 230 volt taps to give 120v, rather than use the 0v and 110v tap) our supply is 117v here.
- Installed a quick-blow in-line mains fuse in the psu compartment. Also, installed a slow-blow fuse in a chassismounted fuseholder wired into the mains transformed centre tap.
- Checked the general electrical safety of the psu unit, including non-Eddystone mains filter caps/chokes (I think installed by Cedric at some time in the dim and distant past) and the power transformer for continuity and insulation (all good).
- Installed a new mains lead and chassis grommets. Replaced dial lamps.

- Noted that the on/off switch (ganged with tone control) was intermittent in operation (more of an on/off/off/on/off/off/off switch really). I sprayed its innards with some 'De-Oxit' this is wonderful stuff, if you haven't already, try it out it is much better than regular contact cleaner (<a href="http://store.caig.com/s.nl/sc.2/category.188/.f">http://store.caig.com/s.nl/sc.2/category.188/.f</a>). The control now worked ok.
- Removed all valves, wiped them clean and cleaned up their pins with crocus paper and 'De-Oxit'.
- Applied power to the set, slowly increasing to 117v through a variac. Checked the transformer secondary voltages all good.
- Time to find out if the set will work...

#### **Electronic Testing and Repairs**

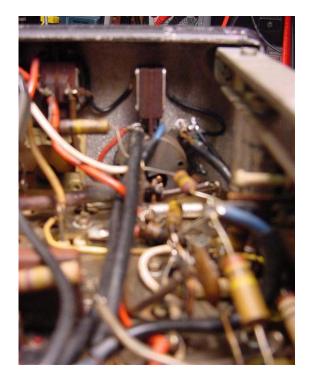
- I could not check the valves out of circuit as neither my Precision or Heathkit testers (and those in the local radio museum) have B8A sockets fitted I am considering making an adapter for my Precision tester (strangely the valves are listed in the Precision tester handbook and all the settings are there!). I have not yet sourced a B8A valve socket, so I might make one from another type. Cleaned up the valve sockets in the set using 'De-Oxit'.
- Resistance checks on the psu filter caps indicated almost short-circuit. I decided to try to re-form these rather than install replacements (for authenticity). The caps were reformed over 1 day period by slowly increasing voltage from variac supply, monitoring HT current draw (all valves removed except the EZ40 rectifier) increasing the voltage in stages, holding for up to an hour and also switching off/on a couple of times at each stage. As current draw fell off at each voltage increment, I increase the applied voltage by 25v, up to the full HT volts of ~250v. Leakage current at the end of re-forming was acceptably low on all caps.
- Undertook resistance checks on by-pass caps and AGC line cap all appeared ok.
- Re-installed the remaining valves. Slowly brought the set up on the variac over around 15 minutes. Audio was heard though very weak and distorted. The set tuned on all bands, though some crackling was noticed while tuning. The BFO was not functioning.
- I undertook a simple ("poor man's") signal trace: the 2<sup>nd</sup> audio stage was working ok (finger on output valve grid gave loud 'buzz'), however, the 1<sup>st</sup> audio stage was very weak (finger on pentode grid gave very low output) therefore I suspected this stage as a culprit. I checked the voltages around the 1<sup>st</sup> audio stage: the screen voltage was very low and the cathode voltage almost zero. The screen dropper resistor (2.0M ohms) was

checked and found to be open-circuit (the by-pass cap was re-checked and found to be ok). I replaced the resistor. The stage now worked well and the audio was loud (almost deafening) with no distortion, however, the AF gain had no effect on the volume! I checked the AGC line with a VTVM – it was working well.



The innocent-looking culprit exposed! – not even a scorch mark...

- Careful inspection under front panel indicated that the earth lead to the AF gain pot had corroded and broken off (the control was a little loose on the panel which had flexed the wire). This was repaired with a new lead, and the control tightened. The AF gain control now functioned but was very noisy - fixed by spraying with 'De-Oxit'.



New ground lead (black) to BFO switch, and AF gain pot



My \$70 variac – a most useful gadget

- The set was then configured for voltage checks as per the handbook. With the exception of the BFO and the mixer cathode (0.4v low), all were within tolerance using 20k ohm/volt meter shunted by an appropriate resistance to give ~1000 ohm/volt as per the voltage chart in handbook. As the mixer was working, I focused on the BFO.
- I found that there was no voltage on the BFO unit HT tag when the BFO was switched on. I checked the BFO on/off switch. It was found to be not working (always off). Also, the other half of the same switch, which shorts the AGC line to earth when the BFO is on, was found to be open-circuit. I considered replacing the switch, but only non-authentic-looking ones were to hand. Instead, or at least until I can locate a similar good switch, I applied 'De-Oxit' several times into the switch toggle (with the switch facing upwards) and worked the switch toggle several times. It now functioned.
- There was now HT on to BFO unit and AGC line shorted to earth when the BFO was switched on. Although the BFO functioned, the pitch control was not working properly. I cleaned up the variable cap (corroded) and applied 'De-Oxit'. The BFO tuning cap now functioned smoothly.
- Checked HT current draw at ~55mA with BFO in-circuit. This was within tolerance.

- I cleaned the main tuning cap (suspected source of crackling while tuning): used 'De-Oxit' on the rotor contacts and re-packed the ball bearings with grease. The crackling was cured.
- Soak tested the set for 1 day. All seemed to be ok.
- I washed the outer case in warm soapy water and dried it with a hairdryer. Slight scratches and scuffs on the front panel and case were touched-up with black permanent marker and the face place cleaned with alcohol.
- Cleaned the knobs (with alcohol) and polished them using "Armor-All' (plastic polish for car interiors). Re-installed knobs.
- During air testing, I noticed that the tuning knob had a slight 'backlash' feel to it when spun and an intermittent slight metallic grating noise. I traced this to a loose flywheel. I could not tighten the flywheel grub screw sufficiently. On close inspection of the flywheel and shaft, the flywheel seemed to have been glued to the shaft at some point in the past, indicating perhaps this was a persistent problem. I applied penetrating oil to the grub screw and left it overnight. I managed to remove the grub screw the next day with some coaxing, but the screw was gnarled badly. The grub screw was cleaned and re-cut. The flywheel then tightened up ok.



I then checked the dial calibration accuracy using a signal generator and frequency meter – close enough not to need adjustment. I decided not to re-align (for now) as the set was functioning well and is quite sensitive/selective considering its simple design.

One of those pesky grub screws after refurbishing (this one is from the flywheel)

That's it really – a pretty straight forward exercise in fault-finding and repair – cost of restoring effectively 'zero' (the resistor was from my junk box – cost a few cents to buy) and some very enjoyable hours spent in my workshop. The set was then 'boxed up' and



is being enjoyed. I must say, its performance, looks and that all-important 'feel' are all pretty good for a set manufactured in August, 1951 (S/N HC0500) - exactly 4 years to the month before I was born! Thank you very much for this opportunity Cedric!

Lovely 'half-moon' dial (before cleaning)



Checking the coil box



Looking good and working a treat!

#### **Postscript**

I am building a replica S-meter unit to go with the set as per Lighthouse Issue 95 (I tried a rough hook-up with a 1mA meter and it worked well). The case will be a challenge...

I hope this article was of some interest to EUG folks and I hope more of you will be encouraged to contribute to the excellent EUG website in this way (remember to always keep your camera handy when fixing stuff!). My next project is a bit more daunting – a 1960 S.770R that seems to have been dropped at some point in its career.

I would be pleased to discuss this article or any other radio-related topics with EUG folks, either by email, the EUG forum or phone (I am on 'Skype'). Remember though, I am not a radio 'pro' – just a radio enthusiast still 'Eddystone crazy after all those years...'

73's

Gerry O'Hara, G8GUH (gerryohara@telus.net), Vancouver, BC, Canada, June, 2006

PS – check out my Falklands RAE letter on the next page (only one question: do you want to pay 10 pounds or be limited to 2 metres only?... yes, it is authentic!). PPS – S.740 technical info follows.



The original 1952 vintage S.740 Instruction Manual arrived in Vancouver with the set from sunny Madeira



The original 1955 vintage author, Gerry O'Hara, arrived in Vancouver on a sunny day in 1997 (regrettably, without an Eddystone...) Your Ref:

Our Ref: HAM/30/1

The Post Office, Stanley, Falkland Islands.

.29th November ... 1984...

Mr G C O'Hara LMA JV Mount Pleasant Airfield P O Box 60 Stanley

Dear Mr O'Hara

I enclose copies of the Conditions attaching to Amateur Radio (Sound) Licences issued in the Falkland Islands and the Special 2-metre Licence.

The amateur licence is the one you require and this is issued to any resident or British subject virtually on demand without any kind of technical qualification. We do expect licence holders to operate in the spirit of the amateur radio fraternity and to avoid causing interference with other services.

The fee for a licence is £10.00 per annum covering the calendar year - a licence issued now does not require renewal until 1st January, 1986. If you do wish to take out a licence please remit £10.00 and I will arrange for one to be issued at once.

Yours sincerely

W A Etheridge Postmaster General Description: Eight-valve (including rectifier), four-waveband communications receiver with noise limiter. Released 1950.

Power Supplies: A.C. mains, 110 and 200-250 volts. Consumption

45 watts. A socket is provided for vibrator power unit.

Intermediate Frequency: 450 kc/s. Oscillator frequency is higher than signal frequency on all ranges.

Valves: (V1) EAF42; (V2) ECH42; (V3) EAF42; (V4) EAF42; (V5)

EL42; (V6) EAF42 (B.F.O.); (V7) EB41 (noise limiter); (V8) EZ40.

Notes: Input impedance (aerial terminals) 400 ohms nominal. The standby switch desensitises the receiver without breaking the H.T. supply. Undistorted audio output 1.2 watts, maximum output 3 watts. A separate loudspeaker is required, impedance 2.5 ohms. The R.F. gain control affects the R.F. and I.F. amplification. Switching on the B.F.O. automatically cuts out A.V.C. action.

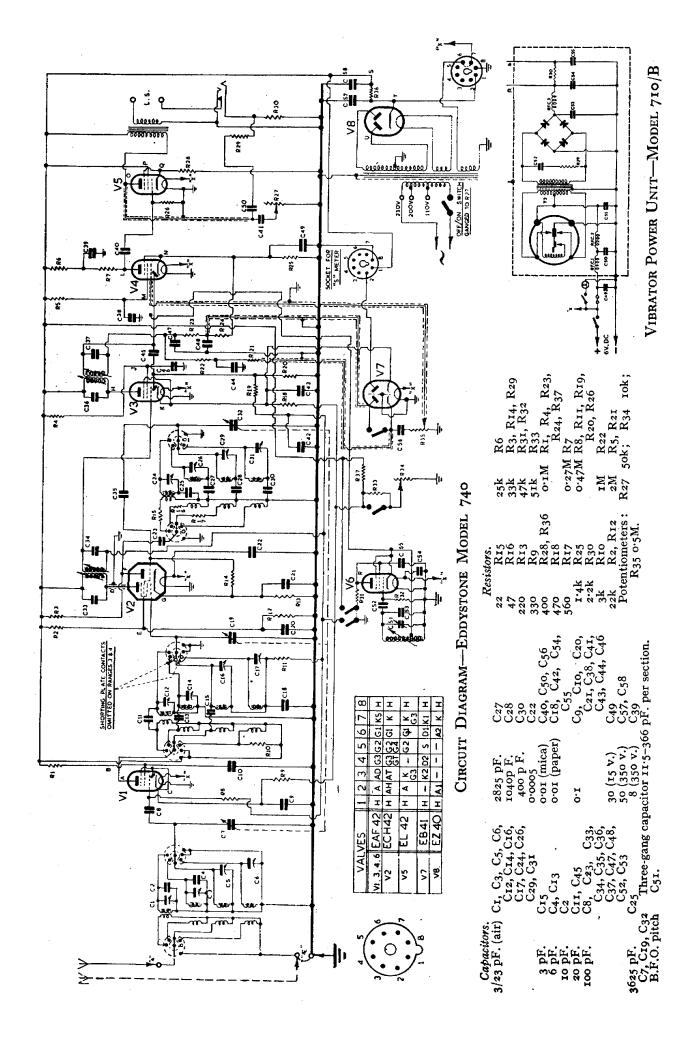
Alignment Procedure: Alignment frequencies are given on page 492.

The location of trimmers and cores is the same as for Model 670.

Voltage Values: Voltages given below are between the points indicated and chassis. Receiver at 28 Mc/s., on Range 1. Aerial shorted out; tone, R.F. and A.F. gain controls fully clockwise. The voltage indicated depends on the internal resistance of the meter employed. A tolerance of plus or minus 5 per cent should be allowed. Total H.T. current 57 mA.

Note: When checking Point R, "A.V.C." Switch must be set to "B.F.O."

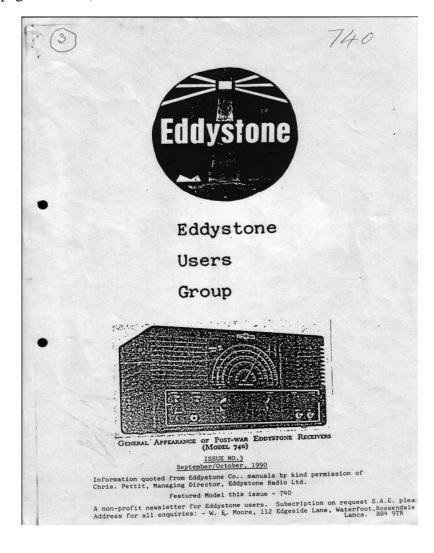
Circuit	1000 ohms/volt	333 ohms/volt	Circuit	1000 ohms  volt	333 ohms/volt
Reference	Testmeter	Testmeter	Reference	Testmeter	Testmeter
A B C D E F G H J	240 0 v. 83 0 v. 2 0 v. 240 0 v. 92 0 v. 93 0 v. 2 0 v. 240 0 v. 87 0 v. 2 5 v.	240.0 v. 70.0 v. 2.0 v. 238.0 v. 84.0 v. 77.0 v. 2.0 v. 238.0 v. 72.0 v.	L M N O P Q R S T	35.0 v. 18.0 v. 0.9 v. 235.0 v. 240.0 v. 10.5 v. 80.0 v. 240.0 v. 250.0 v. (A.C.)	32.0 v. 15.0 v. 0.7 v. 233.0 v. 240.0 v. 10.5 v. 75.0 v. 240.0 v. 260.0 v.



#### Some Eddystone S.740 References in EUG Newsletter/Lighthouse

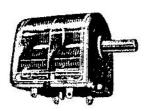
- Issue 3 'S.740 Featured Model'
- Issue 12 'S.740 fixes' (p15)
- Issue 15 're-wiring job' (p10)
- Issue 26 'S.740 motorboating' (p4)
- Issue 27 'diode rectifier mod' (p12)
- Issue 29 'psu mods' (p150, 'Q-fiver' (p17)
- Issue 32 'S/740 fixes' (p16)
- Issue 33 'S.740 repairs and mods' (p19), 'speakers' (p24)
- Issue 35 'S.740 blown valves' (p11)
- Issue 45 'overheating' (p7)
- Issue 46 'problems and fixes' (p6), 'panadapter mod' (p22)
- Issue 50 'valve substitutions' (p19)
- Issue 51 'agc problems' (p37), 'S-meter' (p32)
- Issue 59 'aerial impedance' (p6)
- Issue 78 'power transformer problem' (p17)
- Issue 88 'comments on S.740' (p20)

(Page numbers are pdf references – there may be a page or two discrepancy with the paper copy page numbers)



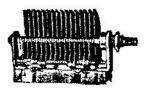
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