My Eddystone 'Jewel in the Crown' (S.830/4) 'Re-re-re-visited' – Gerry O'Hara

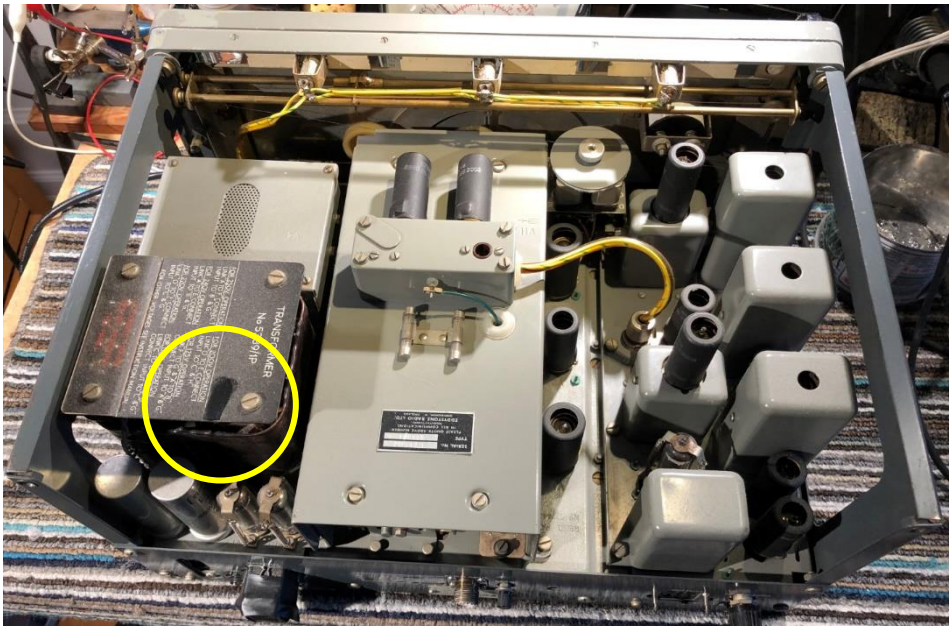
My first foray into working on and using an Eddystone set since the long-ago days of my youth back in the early-1970's was in March 2006, when I impulse-purchased an S.830/4 at a local ham radio fleamarket. I knew nothing about this model when I bought it, but I learned very quickly on the long walk (stagger) back to my car that this was no EC10 I had purchased – it became heavier each step of the way and I was exhausted when I finally placed it in the car. However, I realized the pain was well-worth it as I was soon impressed by the engineering standards of the S.830/4. After a period of initial use, I decided to undertake some refurbishment, and I was equally impressed by the help I received from Graeme Wormald (G3GGL, now 'Silent Key') and others in doing so, along with the information provided in the numerous articles in the EUG Newsletter/'Lighthouse', and a compilation of some of these are appended here. That work was detailed in this article in July 2006, and mainly comprised tidying things up mechanically and electrically, fixing a few faults, including crackling, hiss, hum, unable to zero the S-meter, etc, plus some cosmetic improvements such as powder-coating the case. After a few years of using the set, it developed several annoying faults, including some 'birdies' and heterodynes across the bands, especially on the higher frequencies, poor AGC action on SSB, and poorer than expected frequency stability. I set about an extensive re-cap at that time (June 2011), also replacing some more out of tolerance resistors and a full re-alignment, as detailed in a second article here. That work cured the set of its ailments, however, soon after that (July 2011) the set was back on the bench to be re-aligned again, this time using a wobbulator that I had just modified to accommodate the 100KHz second IF of the S.830/4 (article here). The work undertaken in 2011 made a huge difference to the set's performance and it has remained 'boxed up' (chassis in the case) since that time, used frequently for around five years, and then packed away ready for pending house moves.

Testing

Like my other radios, the S.830/4 was placed in storage before and after the house moves and has only recently been hauled in from the garage. Working my way through the stored Eddystone sets, I finally came to the S.830/4. It powered-up fine (slowly on a Variac) and worked just as I remembered it did over three years ago when it was last used, though it had developed a few minor issues – the usual stuff that appears during periods of non-operation such as scratchy RF/IF and AF gain controls, plus a flickering dial light, a slight crackle when the Incremental tuning control was used in the red section of its travel, a noisy 'Peak RF' control, and the pitch of the SSB signals was no longer equal between upper and lower sidebands. I decided that I had better take the case off and give it a thorough check-over per the other larger Eddystones in my remaining collection.

Electronic Checks, Repairs and Tweaks

After removal of 9 years of dust from the top of the chassis (amazing what can accumulate in 9 years! – note 'swish' mark from my finger on the power transformer cover, circled in the photo below), and a few spider webs from under the chassis (how do they get in there?), a visual inspection quickly identified the cause of the flickering dial light – a poor connection on one of the bulbholders – soon fixed. I also removed the dial light string and cleaned/applied Deoxit to the holders and bulbs. No other obvious mechanical issues were noted, so on with electrical checks.



All Dubilier and Hunts paper caps had been replaced in 2011, together with all electrolytics (some in 2006), with the exception of the Plessey can electrolytics in the power supply (dated August 1968) which tested fine and so were left in place. All other caps are either silver mica or ceramic (tubular or disc), which have a very respectable reliability record. As noted in the above-referenced articles, I had replaced several resistors in 2006 and more in 2011, however, given it was 9 years since I had last checked the set over, I decided to measure each and every one, including some NOS 2W carbon compo ones I had installed in 2006. This is not a quick task in an S.830/4 with its 101 resistors, many of which are hiding in places that are very difficult to access (or even find!), eg. in the 1st Local Oscillator and RF/Antenna compartments, and 'buried' under layers of other components as in the cramped 'forest' of parts in the detector/AF section of the IF/AF compartment.

Referring to my earlier articles, I could tick some of the 101 resistors off the check list – I had refurbished the Product Detector and 2nd Local Oscillator units in 2011 and noted that all resistors had been replaced. I had photos to prove it to myself, though I still ended up taking the cover off the 2nd Local Oscillator to check on some resistors as they were hidden on the photos (photo, left). The 1st Local Oscillator valve base is the

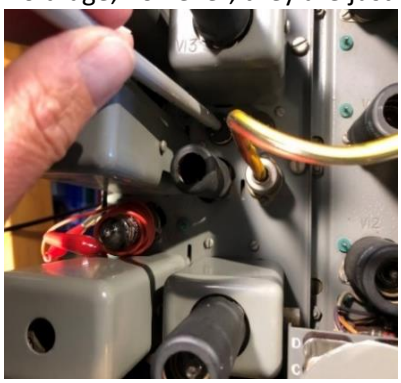
most difficult area to check on the chassis by far. So much so, that I had to use a valve base adapter installed in the valve base above the chassis to check some resistors connecting to it as my thinnest probes could not make reliable contact with some resistor leads under the chassis. All in all, it took me best part of a day to work my way methodically through the receiver testing each resistor. Most can be tested ok in circuit, however, some require one end to be lifted as parallel resistance paths prevent accurate measurements – thankfully Eddystone, for the most part, used a 'lay-on' soldering technique making this task much easier than when component wires have been passed through a solder lug and then wrapped around it several times for good measure (were they expecting their radios to be shaken about that much?). I have never seen an Eddystone 'lay-on' solder joint come apart yet. I think the secret is to have well-dressed leads so there is no strain on the soldered joints.

So, what did I find? Overall, I ended up replacing 33 more resistors, most of these were marginally out of their marked tolerance, though some were significantly out of tolerance, by over 25% and one, in the BFO oscillator (which is varicap diode tuned in the S.830/4), R92, was almost 100% higher than its marked value – no wonder the set was not working so well on USB. The equivalent resistor in the LSB position had drifted also, but only by 20%, still, enough to cause the frequency to be 'off' from when it was last set in 2011. All the resistors in the BFO tuning circuit had been checked in 2006 and again in 2011, and I had previously changed out the ones that tested out of tolerance, so this drift had occurred over the past 9 years. A greater surprise to me was that the two 2W NOS carbon compo resistors I had installed in 2006 (circled in photo, above), and which were well within tolerance then, were now significantly out of tolerance. These still looked like new, but one was now 25% higher than its marked value. I decided to change these out again, plus all the remaining original 1W resistors, even if they tested ok – these all looked like bits of drab grey-painted wooden dowel (several can be seen in the photo, above).

Most of the replaced resistors were in the IF/AF compartment (photo, left, after replacements installed), however, a few resistors in the RF/Antenna and Mixer stages were also changed out, necessitating extraction of the bandswitch shaft – a straightforward operation (loosen one set screw) that provides better access to the valve

bases in all three compartments. The photos, left, show the Mixer compartment access with the shaft in place (top) and with it withdrawn (below). However, even with the shaft extracted and the coupler removed, the components around the 1st Local Oscillator valve base are still not easy to access due to the layered construction. I had replaced all the paper caps in there in 2011 (it took some time as I recall), but I should have changed-out all the resistors while I was at it, though they tested well-within tolerance at that time. Thankfully, all resistors in the 1st Local Oscillator section still tested within tolerance, except R67, the screen dropper resistor for V12A, a 6.8Kohm part. It measured 7.9Kohms, so 16% off its nominal value (6% outside its marked tolerance), R66 (10.8% off nominal) and R75 (12.1% off nominal), these being the grid leaks for V12a and V12b respectively. I consider these fairly minor deviations to be ok for screen dropper and grid leak applications (and I don't use the crystal oscillator, V12b, anyway), so they were left in place given the level of effort to access these, combined with likely disturbance of the alignment on the higher frequency bands. I did, however, removed the crystal calibrator unit and replaced the resistors in that.

Next, I replaced the 10uF 50vw electrolytic on the AGC line that is switched-in to provide 'slow' AGC action (on SSB modes only) that I had installed previously, with a 10uF 25vw tantalum part as specified in the parts list (actually I used 2 x 4.7uF caps in parallel) - tantalum caps generally having less leakage than electrolytics and are therefore more suitable for a high-impedance circuit such as the AGC line. These caps can be seen on the photo at the bottom left of page 3 (blue bodies). I generally do not use tantalum capacitors, as they have a habit of failing short-circuit in their old-age, however, they are just fine in this application. While I had my copious 'cap box' out, I fitted a couple of 0.01uF Y-Class safety caps to the IEC connector as mains-born interference can be an issue at my location.



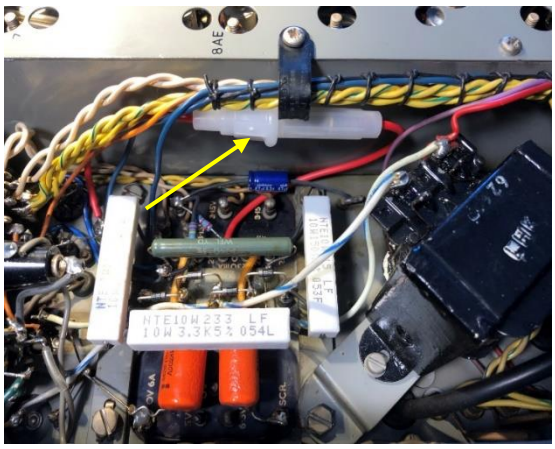
I also took the opportunity to test the valves: all tested good except the 2nd Mixer, V4 (6AK5) and the AF output, V10 (6AQ5) - both on the weaker side, so I replaced these with good NOS valves.

Alignment Checks and BFO Set-up

A check on dial accuracy was carried out, and given this was (amazingly) accurate, I did not undertake a full RF re-alignment – I just tweaked (peaked) the Mixer and RF stage/Antenna trimmers very slightly (most were peaked correctly anyway). I did confirm the IF centre (crystal) frequency and then adjusted the upper and lower sideband carrier insertion frequency pre-sets. I did not use the method as detailed in the manual – instead, I inserted a signal at the 2nd IF frequency by removing the screening can from the 1st 100KHz IF amplifier valve, and wrapping a wire connected to the signal generator output around the valve. I used a Heathkit (audio) signal generator that can be stepped in 1KHz increments. With the signal generator set at the crystal frequency, and with the S.830/4 in CW mode, I checked that the centre mark on the BFO pitch control was zero beat (it was). I then switched the signal generator 1KHz higher, and with the S.830/4 set to USB mode, adjusted the USB trimmer pot for zero beat (photo, above right). Next, I switched the signal generator to 1KHz

below the crystal frequency and, with the S.830/4 in LSB mode, adjusted the LSB trimmer pot for zero beat. This gave nominal 1KHz offsets on the correct sides of the 2nd IF centre frequency on USB and LSB modes. However, the offset should be 1.5KHz - this was achieved by connecting a frequency counter to the audio output and, with the signal generator again set at the 2nd IF centre frequency, adjusting the trimmer pots a little to obtain a 1.5KHz signal. I also adjusted the S-Meter zero as the bridge resistors had all been replaced in that circuit.

I took some time to clean and re-lubricate the main tuning gang, the RF Peak capacitor gang (the noise was due to the capacitor plates in the RF amplifier section contacting – fixed by a slight adjustment of the end bearing screw), various gearwheels and bearings etc. (photo, right), and the pointer guide rods on the dial mechanism. I also decided to fit an in-line fuseholder under the chassis (follow the arrow in photo, left), fitted with a 250mA fuse between the power transformer HT centre-tap and ground - this as an additional protection measure for the power transformer, the set still having its original electrolytics fitted in the power supply.



Cosmetics

Some debris had accumulated behind the dial glass during the past 9 years – mainly stuck in the lower corners of the dial (photo, right - with cheek plates and dial glass removed for access). I removed the dial glass as described in the manual and gently brushed this away, and cleaned the dial glass before re-assembly. I also touched-up the white markings on several of the knobs.

One thing I have never really liked about the S.830 series is the asymmetry of the fingerplate, with the small Tuning and Incremental tuning controls, compared with most other 'dual knob' Eddystone sets. This asymmetry is emphasized on the S.830/4

variant with the metal locking disk on the Tuning knob (and associated clamp and locking screw offset beneath). Yes, I know this is 'original'… but is it? - a photo of a 'development' model of the S.830 (photo, right) shows matching large bandswitch and (main) Tuning control knobs – much better!

While I was rummaging in my Eddystone spares box, I came across two NOS large bandswitch/ tuning knobs. I must have bought these for my S.940 many years ago as the skirts on the knobs on my S.940 were chipped slightly. For whatever reason, I had not fit them then, but did so now (and look good!). Then, following an email exchange with another Canadian Eddystone enthusiast, Dave Whiting (see his article on '*The Eddystone 830/4 in Canadian Government Service*' in Lighthouse Issue 79, June 2003, p28, and '*Letter from South Porcupine*' in Lighthouse Issue 80, August 2003, p4), it was suggested that I try one of the larger knobs (off the S.940) on the S.830/4 in place of the small knob. Well, I did and I like it! – so for now it stays. I tried it with and without the skirt on the knob (centre and lower photos, left: compare with the original locking disc Tuning knob fitted in the top photo). Although the latter better-matched the un-skirted bandchange knob, to me at least, it did not look right, as the rear of the knob was too far from the fingerplate and the spacing cannot be adjusted closer due to the front of the bearing (unless a rebate was machined into the knob). Also, the bandchange knob cannot be fitted with a skirt because of the crystal selector switch lever.

This 'mod' left two threaded holes in the fingerplate to the lower right of the Tuning knob vacated by the screws of the locking mechanism clamp. To blank these off, I fitted a couple of 4BA screws into these holes, with their heads painted grey. Serendipitously, however, at about the same time there was a posting on the EUG website from

Ian Nutt noting that he still had some repro S.830 fingerplates in stock, so one was ordered to cover-up the two holes.

On-Air Comparison Testing

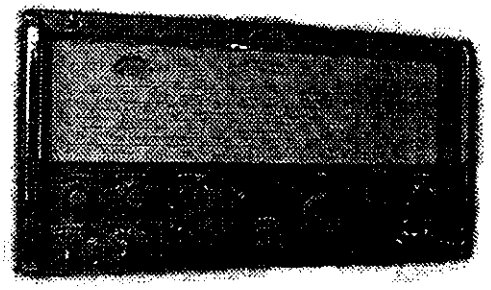
While I had my three remaining ‘heavyweight’ Eddystone sets (S.680/2, S.830/4 and S.940) in the same room, and all working well following the recent work on each, I thought I would undertake a brief on-air comparison using the same 50’ wire antenna strung outside the house, and a 20M internal mag-loop. Perhaps needless to say, the S.830/4 won on sensitivity (though only just), signal to noise ratio (especially over the S.680/2 at higher frequencies), and selectivity (especially over the S.940), though both the S.680/2 and S.940 put in a very decent showing overall. Of course, where the S.830/4 really wins out is in its frequency stability, accuracy and ability to set-up on a desired frequency within 500Hz or so using a combination of the crystal calibrator and its Incremental tuning feature[1], plus its image rejection on the higher frequencies compared with the single conversion sets.

Closure

This experience with my S.830/4, like the work described in my other recent ‘revisited’ articles, proves that refurbishment of a vintage radio, as these valve Eddystones now are becoming[2] is not a ‘do it once and forget’ job – time passes, components continue to age (even if the set is not used), and may need replacing to maintain optimum performance or mitigate a ‘catastrophic’ failure of a hard-to-replace component(s). Of course, biting the bullet and simply ‘shotgunning’ all the capacitors and resistors (replacing them all, whether needed or not at the time of the replacement as a preventative measure) would lessen the likelihood of issues developing in the future. I have done that in many sets, generally excluding silver mica and ceramic capacitors, especially when refurbishing a radio for someone else. But valve radios need routine attention over extended periods of time anyway, such as noisy controls and switches needing cleaning, valves ageing/needing replacement, and alignment checks/adjustments, so its worthwhile spending some time doing a little preventative maintenance at the same time. So, I expect that I will be ‘re-re-re-re-visiting’ my S.830/4 again in a few years time… though its always a pleasure. I only hope I still have the manual dexterity to do any work needed next time!

[1] Though fitting the crystal calibrator and the external DFM to the S.940 has ‘narrowed the gap’ considerably!

[2] My S.830/4 is 52 years ‘young’, the S.940 a little older at 56, and the S.680/2 is approaching a stately 71



This month's featured model

Eddystone 830

BY

SIMON ROBINSON G8POO

Every EUG member must have his or her own favourite receiver. The Eddystone Model 830 in its various guises must rank as number one with many people. It represents one of the last valved receivers ever produced by Eddystone and when introduced during the 1960's cost just under £400-00. That may sound cheap but consider that a Mini Car cost not much more.

With the exception of the 880 which does not 'feel' like a traditional Eddystone and requires Geoff Capes to move it, the 830 offers the finest performance of any of their 'hollow state' receivers.

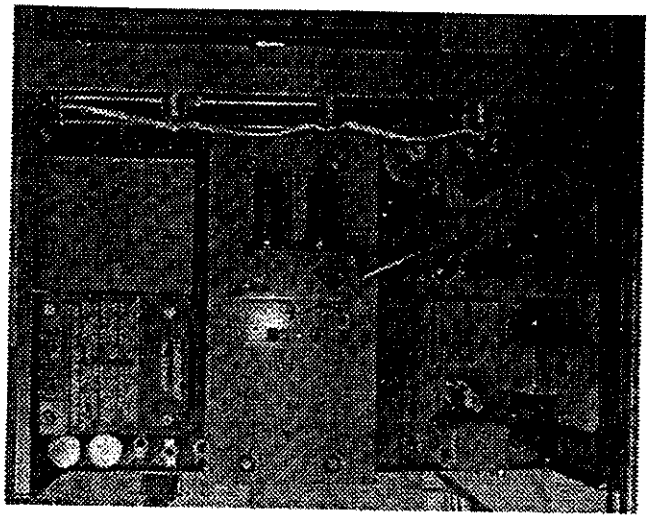
The are several variants of the 830, which I shall briefly cover however most, are very similar to the popular 830/7 on which this article is based. The 830 is a general purpose HF/MF communications receiver covering 300KHz to 30MHz in nine switched bands. Facilities are provided for reception of AM, CW and SSB. An EP20 Panoramic Adapter can be connected to the IF output socket to provide visual analysis of received signals.

The basic design features single conversion on the lower frequencies i.e. up to 1.5MHz and double conversion above. Intermediate frequencies of 1350KHz and 100KHz are utilised to provide good image rejection on the higher bands with the added bonus of incremental tuning on the second oscillator. This allows the use of one of eight crystals in the first oscillator to provide high stability. The second oscillator then tunes +/- 100KHz either side of the front end. Separate detectors are provided for AM and SSB/CW with the latter being a product detector. The audio on a good 830 is truly wonderful to listen to.

It is also possible to crystal control the second oscillator if desired thus giving even better stability. The 830/9 of course can employ a synthesiser for all oscillators and the BFO feed for the ultimate in stability.

The set also features variable selectivity with a crystal filter for CW. A noise limiter is provided, as is a built in crystal calibrator. Audio outputs are available for loudspeaker (normally the plinth type), 600 ohm line and headphones.

One of the best features of the 830 is the use of an ECC189 (6ES8) as a cascode RF amplifier. This is possibly the best configuration of an RF amplifier to give very low noise, sufficient gain and protection against cross modulation.



Top view of 830/7 showing location of main components.

As with all Eddystone receivers this one really was built to last.

The small circular retaining plate towards the top right holds the eight crystals in position.

Valve Complement

Ref	Type	Circuit Function
V1	6ES8 or ECC189	RF amp. - cascode
V2	6AK5 of EF95	1st Mixer
V3	6AJ8 or ECH81	2nd Mixer / isol. Amp.
V4	6C4 or EC90	2nd Local Oscillator
V5	6BA6 or EF93	1st 100KHz IF Amp.
V6	6BA6 or EF93	2nd 100KHz IF Amp.
V7	6AL5 or EB91	AM Noise Limiter
V8	6AU6 or EF94	Cathode Follower IF Out
V9	6AT6 or EBC90	AM Det. / AGC Rec./AF Amp.
V10	6AQ5 or EL90	Audio Output
V11	6AU6 or EF94	Crystal Calibrator
V12	6U8 or ECF82	1st Local Oscillator
V13	6BE6 or EK90	CW / SSB Detector
V14	0A2 or 150C4	HT Stabiliser (1)
V15	0A2 or 150C4	HT Stabiliser (2)
D1/4	DD006	HT Rectifier Note: 2 x DD058 may be fitted in lieu of 4 x DD006

- No or very faint audio - check R45 which is the anode feed to V9 - 270K.
- Meter will not zero - check R32 to R36 although R33 is normally the culprit.
- Other weird faults - change any capacitors in the set with 'HUNTS' written on them. They cause a great number of stock faults.

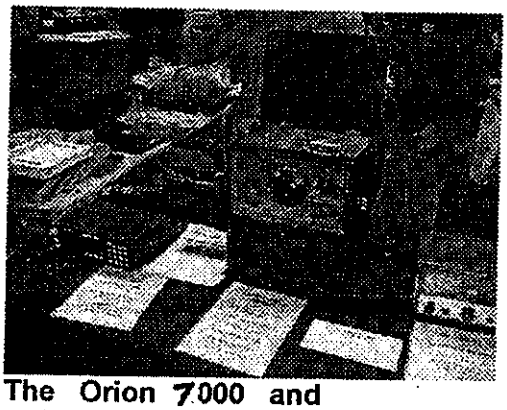
Whilst an individual set can exhibit many faults those mentioned above have regularly been encountered by the author.

Please remember to fit the shorting plug at the back or you could end up with a very dead set. The audio connector must also have the 'mute' shorting link fitted unless using the 830 with a transmitter.

Pictures from an Exhibition

At the recent National Vintage Communications Fair the Eddystone User Group was very much in evidence. Manning the stand were Graeme G3GGL, Ron G8URU, Chris G0EYO and Simon G8POO. The fair was well attended and many members called at the stand to meet the team and pay their subscriptions. We had managed to borrow some receivers from Eddystone before the company was sold on.

The Radio Sonde and Yachtsman



The Orion 7000 and Twin in pride of place.

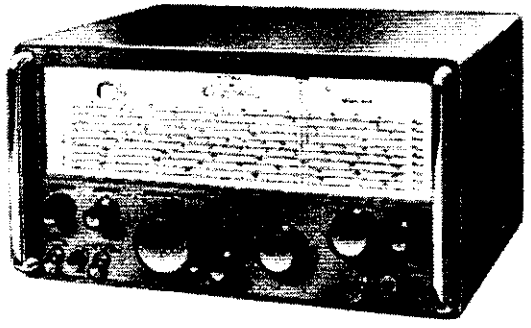
Graeme G3GGL in full swing

The NEC Team - Left to Right Graeme, Simon, Ron and Chris

MYSTERY FAULT ON CANADIAN 830/4 FINALLY SOLVED

Bryan Cauthery, VE3DFC

Readers may recall that some time ago EUGer Bryan in Ontario acquired a Canadian S.830/4 – which is much the same as other 830 models except for the substitution of medium waves by long waves. Whilst he was carrying out routine maintenance, disaster struck!



The Eddystone S.830-series of 1962-73 is a double conversion interpolation-tuned general coverage model. It can be re-set to within 1kc/s on any band without the use of external calibration.

"After replacing the Dubilier grey decoupling capacitors in the coilbox of my 830/4 the set inexplicably went sick! It didn't prevent the radio from working, it just ruined the performance.

It disrupted the AVC; caused the S-meter to non-function; demolished the front end gain and turned the excellent 830/4 into a sorry aggregation of metal and electrical parts of diminished worth.

After puzzling about the Q of the IF transformers I did some tests to check the 100kc/s stage gain. It seemed about right. Then I used another front end from a TMC receiver, connecting it first through the RF input; then into the first mixer; then into the first IF and in that position the whole set burst into life AFTER I REMOVED THE CASCODE RF TUBE AND 6AK5 MIXER TUBE.

When I put the mixer back in place it all died. So next I pulled the operating shaft out of the wave change switch and with the aid of a magnifying glass and lots of light I looked closely at the front end tube sockets.

In about five minutes I saw this tiny solder splash bridging pins 1 & 2, the cathode and control grid pins of the first mixer. It took ten seconds to remove it, put the tubes back in and the 830 was back to robust health.

I must have caused the splash when replacing the capacitors, so correcting one problem created another.

The interesting part of all this was the plethora of problems this short caused, which in combination made it hard to make any sense out of the symptoms."

Bryan Cauthery, Caledon, Ontario.

♠

was for what we then called the Super High Frequencies.

But what was the 'M' as for the original model 770M, or the 'R' in the later version 770R, any ideas please.

The 770CE Receive Unit

No, it doesn't exist. Yes it does exist ! Most decidedly so since Clive has got one. One more for the ORG pal.

Several of these rack mount affairs consisting of an 850/2, an 830/5, a 77CR and a 770U were produced for, or by, the firm of MEGATRON (G.Hullick & Co).

The rack mount set of receivers gave full coverage from VLF of 10 Kc/s up to UHF and several Government Dep'ts took delivery of one. Clive has one such unit but is unable to provide any further info as he inherited this from his Dad.

The audio outputs are all fed to a P.O type jackstrip from where they can be tapped off as required. It would be nice if any EUGer out there can provide further info on these multiple receiver units.

In the past I have seen rack mounted dual 880s and a diversity unit, also rack mounted triple 830/9s with a common synthesiser unit mounted below them but the 770CE is one which has so far evaded me. There was some mention of a similar unit but with an 880 replacing the 830 several years ago in the N/L but we got no further news about it.

Dead 830/7

Switching on one's 830/7 and looking forward to an evening of listening pleasure can be considerably spoiled by that total lack of output - pure unadulterated SILENCE

This was why the 830/7 was delivered to my door last week by a rather upset EUGer. His comment was 'But I didn't do anything. Just switched off one night, then on again the next day'.

The cause of the lack of output was pretty simple. All valves lit up inside but no HT at all. It was found that the series resistors in the silicon diode chain fed from the mains transfo secondary had gone o/c.

Now this can often happen if C209, the 50 muffs is leaky, or even occasionally the 32+32 muffs C207 will cause the same problem.

In this case the fault was even worse since the smoothing choke had gone o/c and this allowed the full, off-load, HT from the rectifiers across C209. This poor thing had given up the ghost and gone short circuit thus allowing the two series resistors to burn out.

It was thought wiser to replace the four diodes too since at the instant of s/c they might have suffered some damage, necessitating a further repair job later on. The choke was replaced with a very similar item from another Eddystone model and so the 830/7 is once more working as it should.

A 'Hummy' 750

Nothing new about this problem. I have had it before and recognise the symptoms immediately.

The 750 had been sent to me as the mains hum from the speaker had become quite objectionably loud.

It was too and I recalled other 750s with the same problem. A scan of the schematic will reveal a simple 6 (Yes Six) puffs condenser going from the anode of the audio output bottle back to its grid. Six puffs - no more ! And yet removing the one and fitting a new condenser cleared up the problem. Best

sample screw which is always of the pozi-drive variety.

It pays to make oneself aware of the various different formats available these days. It makes me cringe when I see a professional engineer using a too-small flat blade driver to turn a large Phillips or Pozidrive type of screw.

Frequency Jumps.

This EUGer has been experiencing poor reception on SSB and CW when using his 830/5 recently.

He must be a bit of an amateur detective since he peered at the regulator valve whilst receiving SSB and noticed that the frequency 'jumps' coincided with an almost complete on/off of the glow in the valve.

A new valve did not help at all, anyway the one in the set had been there less than a year. He began swopping the various components around the regulator valve and having swopped both a condenser and a resistor he has cured his problem.

Unfortunately Fred has not said which ones. Still he now can listen to his 830 again.

I.F. Transformers

James has bought an 840A which has obviously seen better days as the case and front panel casting have been re-painted by hand using a non-original grey gloss.

He has made arrangements for this to be removed and for a more genuine looking paint job to be done for him, professionally.

What he is perplexed by is the fact that the IF transfos are so very obviously NOT of Eddystone origin at all. They are of the type sold by Radiospares in the fifties. He wants to know if any EUGer has any info on the different IF bandwidths, which his set will show, compared with one with original spec IFTS.

The 840A was not designed to be as selective as the real communications receivers but I would expect the Eddystone types to have just a bit more selectivity than those made for replacement purposes in broadcast receivers. Can anybody help him out here ?

A.F. Output Transformers

These are not readily available nowadays, and those that are are usually either made for the very expensive Hi-Fi valve amps or are designed with a step-down ratio to suit semi-conductor amplifiers.

Having had the need to replace an output transformer in a domestic set recently Ken tells me that he began with a half dozen or so transformers of the mains down to 3, 4.5, to 9 volts type and chose the one which gave him the best audio response.

Ken's tip is that you will only get best response if you use a condenser across the primary winding, 0.0005 to 0.01 are good values to start with he says.

If a scope is available then you can check the response for 'ringing' or 'flat-topping' of the audio signal, this is almost always cured by the addition of

(always on a cornflake packet, please).

The only time anybody sent me £2 loose (for a badge) the envelope had been carefully slit in the corner and the money extracted!

Ray Simmonds writes to say he's not too sure about my advice to hard-wire a set as a last resort. He said this should never be done, on safety grounds and asks if members could come up with a way of re-moulding the Black and Decker garden extension connectors.

I suspect that Ray may have misunderstood my suggestion and thought I was recommending hard-wiring the set to the mains socket. No, no, not at all. I was merely suggesting that we do what 99% of all black box appliance manufacturers do.

NON-EDDYSTONE DATA

From time to time members contact me about service information on sets and equipment other than Eddystone.

I don't collect this, of course (with the exception of handbooks for my KW Viceroy and Trio 530), and I always advise them to contact Mauritron Technical Services who claim to have the greatest collection in Christendom.

So they ask me "Where?" and I have to say "I don't know, they've stopped advertising!" Well, EUGer Ron, G8/M3URU, has given me the gen and here I pass it on. Everybody write it down in your diaries/phone books:-

- Cherry Tree Road, Chinnor, Oxon, OX39 4QY
- Tel: 01844 351694
- e-mail enquiries@mauritron.co.uk
- www.mauritron.com

830 ACHILLES HEEL

After my little feature on changing the 'difficult' Bakelite push switch on the 830/7 calibrator for a conventional spring-biased DPDT toggle switch, an e-mail arrived from EUGer John Caines.

He pointed out that his 830/3 already had such a switch, which he assumed was standard because his handbook says that it is fitted with a toggle switch in this position.

So I consulted the handbook for my 830/7 (also covers 830/5 and 830/6). The line drawings of the plan and underside of the set clearly show the 'dodgy' push-button switch.

On page 12 it quotes "The calibrator is brought into operation by pressing the small button switch S2 . . . "

BUT ON PAGE 20 it quotes " This is a double-pole switch with one "make" and one "break" biased to the "off" position. On pressing the toggle, . . ."

Well, well, well! It looks as if they started off with my system at the Bath Tub and then changed it, but forgot to re-write the whole of the Service Manual. I did say it looked as if it should have a toggle switch, didn't I?

Oh, and by the way, John peeped inside his 830/3 and said it all looked like original Bath Tub wiring!

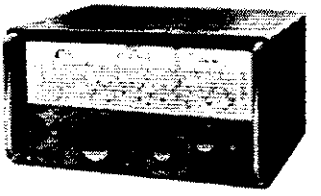
SOLID STATE VALVES

After seeing Ted's item about the solid-state plug-in rectifier replacement, Dave, GØSKE, e-mailed me a feature he found in 'Electronics World' for April 2001.

In it the author states that "Unable to find a replacement 6V6 audio power valve for my radio, I set about making a high voltage MOSFET substitute which works better than the valve it replaced . . ."

Dave manufactured one of these at the time and found it to be an effective alternative . . .

Sideband Snag



By Graeme Wormald G3GGL

The other week I was phoned by a member who had recently acquired one of those great old favourites, a model 830/7. This is one of several classic Eddystone valve sets fitted with a product detector for SSB/CW reception and a traditional diode for AM. Jim came up with a problem which was new to me on any of the models. It set me thinking . . .

"It's working on AM and USB but it's weak on LSB." reported Jim.

Quite frankly this didn't compute in my brain as a logical fault. Browsing a copy of the circuit diagram I confirmed that the only USB/LSB difference in the active part of the product detector was the value of fixed tuning condenser in the oscillator circuit.

"Does the speech resolve properly on LSB, as good as on USB?" I asked Jim. "Oh, yes," he said, "perfectly readable but just very quiet"

This exonerated all the immediate components in the circuit because the first thing to happen with any such problem would be an incorrect local oscillator frequency which would completely mess up the resolution of the speech. Donald Duck would be back in town.

The switch that selects the upper and lower sidebands, AM and CW is S5, a four-way rotary switch (Yaxley-type).

But wait a minute! It's S5e, so what are all the other little S5's doing?

Well S5a selects the output from the AM detector diode and CW/USB/LSB from the product detector. S5b selects slow AGC for SSB and fast AGC for AM/CW. S5c selects HT for SSB/CW for the product detector (no HT for AM).

So what if one of these switch contacts was not up to the mark after thirty or forty years? We know it happens with the very similar wavechange switches. Do we bother to work out which section may be causing that crackling on band 3? No. We spray the lot with *Servisol Super Ten* and give it a wiggle. I told Jim to do the same with all the banks of S5.

He phoned me a couple of days later to say "Abracadabra". Both sidebands were now at the same level. And remember this problem could crop up in the 880-series, the 940 and 888A, as well as any other 830 model. ♦

The Consequences of Good Things coming to an end . . . *the Importance of Silver Linings and an Eddystone 830/4 for $50 (£20 in English)*

By Brian Cauthery VE3DFC

Eddystones are without doubt "good things" and the accuracy of the axiom in the matter of all good things coming to an end . . . well, I suppose that it cannot be doubted. It's just that as I struggled with my mobile rig on November 1st, 2003, in the knowledge that my 40, 50 and 60-year-old gear very seldom gives trouble ---- the imminence of the end of my favourite 830/4 did not enter my head. Four days hence, the evening of November 5th, the 830 would be stricken . . .

November 5th at 8.00pm EST was the Boatanchor Net. A weekly event for which I mobilised the 830 and my Hammarlund HX50 SSB-CW-AM transmitter (owned from new in 1962). At 7.45 I turned the rig on and went back upstairs to make myself a cup of coffee.

The smell of burning which greeted my return to the radio room was overpowering. One could say that the warm-up was well advanced. The ghost of Guy Fawkes was in the rig. Main switch off, leaving lights only.

Smoke pouring from the 830. A flicker of flame from the Eddystone's power supply end and . . . poured the coffee through the ventilation holes . . . flames extinguished to the accompaniment of a smell like a mediaeval rendering plant . . .

I removed the case from the 830 . . . what a mess! The cause? A short to the case by the center dial illumination bulb connection. The LT winding powering the dial lights shorted to ground on one leg. Molten PVC insulation festooned from the green/yellow wires; greasy smoke-stains everywhere. And the 2-amp fuse did not blow.

The overheat problem had been building up for some time. The connection plate below the mains transformer showed severe signs of thermal distress around the connection studs. After removal of the transformer and a detailed examination of the rectification area and connections it was apparent that any connection to the 140 and 3300 ohm wire-wound resistors had been damaged by the conducted heat. The insulation on the base of the stand-off supports was carbonized.

In pursuit of a new or good used 830 transformer, I called into all the swap nets. I visited all the possible transformer sources in and around Toronto. I called the commercial restorers of old radios . . . all without success.

Then one evening three months later I received a call from John Gillespie of the Vintage Radio Hospital in Hamilton, Ontario with the message that Carola Radio in Edmonton, Alberta, had a non-working Eddystone 830/4 in which the mains transformer was undamaged.

A telephone call to Carola Radio confirmed this. The price asked was $50.00 Cdn + freight. During the

conversation it transpired that they also had a Gonset G66B / G77A / PS 3206 mobile receiver, transmitter and power supply which dates from 1956. So I bought the Eddystone and the Gonsets sight unseen.

I have bought six or seven radios over the telephone and upon receipt of them I have always found that the sellers understated the quality of the piece and eight days later when the parcels arrived I was quite delighted with the Eddystone and the Gonsets.

If I had the ability to influence the laws of the universe, I would like to make it policy to have a silver lining after a serious set-back. One could tolerate adversity, strong in the knowledge that the silver lining would soon be at hand.

I opened the parcel containing the well-packed Eddystone 830/4 – the front panel was a little dingy; there was a small dent in IFT 3 case and ½" of grey paint off the coil box cover. All else was as though a few weeks had passed since it was put into service in 1968. The silver lining had begun in earnest ! !

This 830 is a gem. Only one component within the radio had been replaced since new . . . C159, the .05 heavy duty cap across half the mains transformer secondary.

It wouldn't work because there were several dud tubes; C113, the audio feed cap to grid one of V9 had a broken lead; one of the 3.3k wire wound dropper resistors to the 0B2s was open circuit.

Other than the slightest heat staining by the screen droppers to the IF tubes there was no sign of heat distress beyond the power supply area. The stand-offs to which the 140 ohm wire-wounds are connected had carbonized but not bad enough to conduct.

All the above shortcomings were corrected in one evening, at the end of which I connected up the power shorting links plug, antenna, ground and speaker then switched on.

The tuning was stiff from lack of lubrication but the $50 830 worked on all bands! The audio wouldn't reduce to zero but I remembered the 100 mfd at 50 v electrolytic cathode to ground on the 6AT6 and that problem was disposed of.

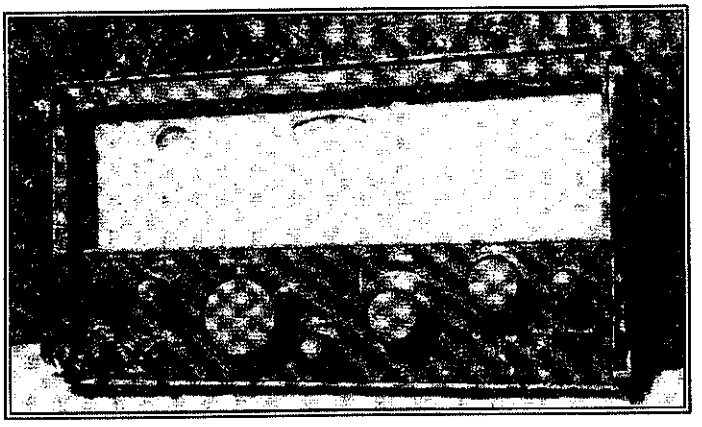
At this point I began a serious look around this 830. The year-month-day production label was missing from the main tuning capacitor cover but a new metal plate on the back panel told me the guarantee was implemented on April 9th 1968 by CRC (no mention of CRA).

So I deduce that the build date was late 1967 or early 1968. The build quality is vastly impressive, the precision and symmetry of the component placing looked like a parade ground. Eddystones are always impressively assembled but this one exceeds any other that I have seen in the orderly nature of its construction.

At this point I realized that the Burgess micro-switch that brings the crystal gate into circuit was intermittent. I replaced this with a spare and a comprehensive test of all tubes resulted in four being replaced. The rest were 90%+ on the tube tester.

All my other 830's have been earlier productions, this one is four or five years later and the differences are . . . well, nice to have. It has Ediswan "Clix" tube bases; green high density polyethylene insulation sleeves on the through-chassis pins which support the B+ (HT) . . . this has higher heat resistance.

The dial plate is pale cream in colour instead of the darker buff of my early 60's 830's; the finger-plate is die-



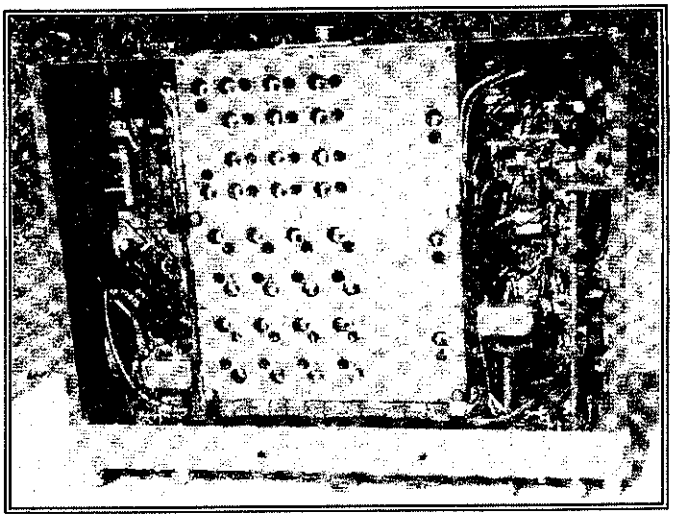
The 830/4 on a brilliant October day. Note the two holes, the SS flange behind the tuning knob and the graticule at ten o'clock.

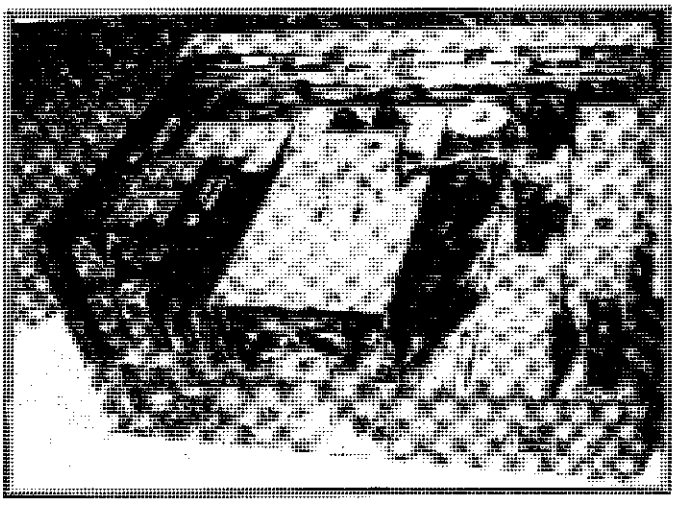
You can just see the rim wear in the sun's reflection caused by the drive system.

The underside . . .

A study in industrial artistry, which deserves an award for good planning-

Not to mention durability.





The rectangular plate bottom centre reads:-

LF MF Tunable Receiver. Type EDY 6713 Serial No 66. Eddystone Radio Ltd.

The stick-on label above left reads:

Guarantee in accordance with CRC 207 Begins April 9 1968.

CRC is a Govt of Canada Dept of Purchasing group, which distributed the Eddystones.

stamped (rather than the silk-screen painted lettering) and the RF and crystal positions are picked out in red.

In the picture of the front panel (see last page) note the unusual tuning knob with the stainless steel backing flange, the white graticule line at ten o'clock and the two holes drilled through the finger-plate with BA tapcons set into the cast frame. The edges of the holes in the finger-plate are painted the same colour as the plate so I conclude that it is an Eddystone modification. But what did these holes support? Marks on the finger-plate indicate that a plinth had been bolted there and the outer edge of he SS flange behind the drive system of some kind . . . could it have been an autotune addition?

I cannot think of anything else which would leave these marks. I have never come across any other 830's with this mark and hole combination or this type of tuning knob. Any ideas?

I noticed that the background noise seems to be a little less than the (already low noise) character of the other 830's and a weak signal comparison on 21 MHz showed that the $50 Eddystone was a rather better performer than even my chronically grungy but excellent 830 purchased about 20 years ago. A VTMV comparison confirmed this. The main fault was the stiff tuning and dusty state of the front panel plus lack of lubricant on the gears. Then the slackness on the stainless steel cursor drive wire and I realized that the cursor wire had been replaced and the front panel had been removed to achieve this.

I removed all the knobs and then the finger-plate. USE A THIN-BLADED KNIFE TO DO THIS AS ANY BENDING WILL CRACK THE PAINT AND YOU WILL NEED A NEW PLATE. This process revealed all sorts of interesting discoveries. The stiffness in the small controls was due to corrosion (tarnishing) of the plated shafts where they pass through a brass bushing. Those with no brass contact were clean. The mounting of the RF trimmer capacitor also showed this blackened tarnish. I polished this off the affected parts with "Trim Brite" and added a small amount of 20/50 oil before re-assembly.

Of the four tapered brass bolts which mount the front panel on the coil-box, one was tight and three were loose . . . That combination is no help in the maintenance of accurate alignment between the chassis and the front panel.

The rack and pinion which drives the Incremental Tuning system had been removed and replaced in such a way that the Red side had about 130 Kc/s swing and the Black side about 65 Kc/s swing. The trunnions on which the rack runs were bone dry.

To solve all this I took the gear system apart, cleaned, lubricated and re-aligned it all and tensioned the backlash springs in the correct direction on the tuning drive gears. Then I put the whole front panel and controls together and mounted it on the four locating bolts.

With the aid of a 90° set-square I determined that a five-thou shim on one anvil face was needed for a correct alignment. Now the tuning is like that of any other Eddystone.

With the removal of the mains transformer from the smoke and flame damaged radio I was able to cut sections out of the insulation between the bottom (Paxolin) connection plate and the actual windings. The damage to the interior of the transformer is serious. The copper wire is brittle and heavily discoloured. This is especially

true of the connection studs on which the 140 and 3300 wire turns are soldered.

In an earlier Lighthouse, a suggestion was made that metal-clad resistor mounted on the side-wall of the power supply area would help – I agree. There is space to lift the transformer itself on .350"-thick washers to give ½" clearance. This would improve the ventilation of the power supply compartment. One must however remember that it has taken 40 years for these problems to arise.

I was at the point of the comfortable knowledge that the repair and restoration process was complete when I realized that Range 1 was suffering from a frequency jump. Every time the radio was touched there was a two to three hundred Kc/s frequency change. I checked the voltages and resistances once more, as before; they were within 10% of those intended by Eddystone radio. Every wire in the oscillator section of the coil pack seemed to cause the frequency shift, especially the bundled ones.

The Range 1 coil mounting screw had been over-tightened and stripped. A new BA screw corrected the twin faults of a loose coil and an intermittent ground connection. I took this opportunity to tighten all the coil mounting screws. Most of them had creep stretch with the passage of time and were easily snugged up half a turn.

The final on-air test revealed a further problem. The Incremental Tuning suffered from "wind-up". The friction within the rack and pinion bearing surfaces was sufficient to cause wind-up, this even after judicious lubrication.

The problem manifests itself as first a stalling in the rotation of the Incremental Tuning Scale, followed by a quick leap in rotation to catch up with the lost motion.

A second removal of the front panel was needed to get to the pinion gears and to their bearing surfaces where I found the same tarnishing and oxidation mentioned earlier. The oxide of brass decreases the clearance between the steel bearing-pin and the bore of the gear, causing a partial seizure. I disassembled the pinion gears, cleaned the bearing surfaces and re-lubricated them. With the problem solved, I re-assembled the mechanical pieces, re-installed the front panel and this time everything functioned correctly . . . My $50 830/4 was like new in all respects. I now realised why the rear part of the radio was so clean and the front panel so dusty and grubby. The set had been in one of Canada's famous OSF (Obsolete Store Facilities) for many years with tons of other wonderful radios.

It had been stored on a shelf where the shelves above and below protected the chassis and back of the radio from the accumulation of the dust and dirt but the front panel was exposed to all the detritus thrown up by the fork-lift trucks running around the aisles.

So, and the end of this fortunate story, the silver lining has provided a wonderful 830, for a very attractive price . . . one which has been great entertainment to overhaul. However I am still in a quandary. I could not possibly take the mains transformer out of the Edmonton 830 (the purpose for which it was purchased) nor can I assign the offensive name "parts set" to the long-serving 830/4 that Barbara bought for me 15 years ago. So does anyone know where I can buy a good mains transformer for an 830? Your price willingly paid.

Brian R. Cauthery, VE3DFC

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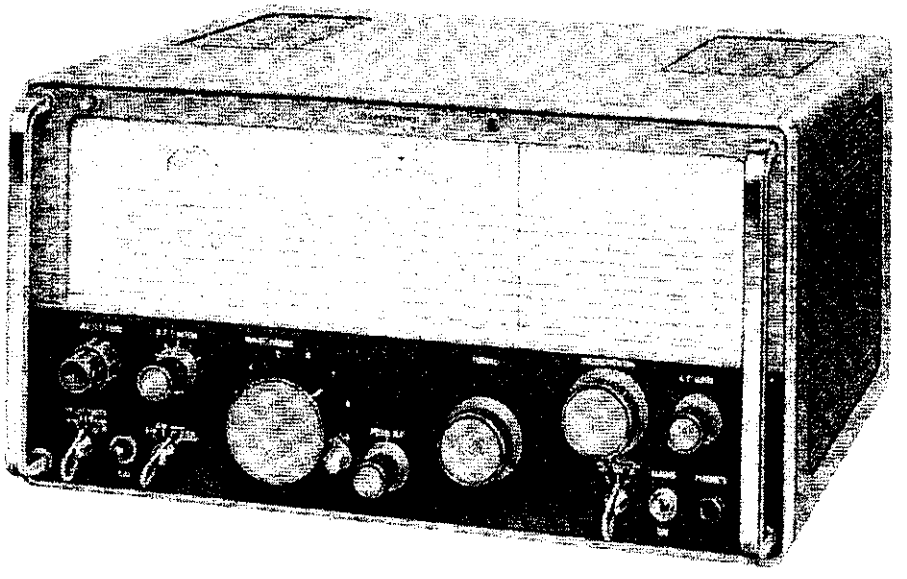


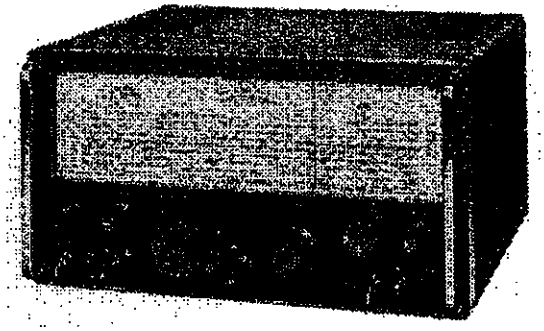
Eddystone Model S830/7
(The last valve model, 1973, always remembered)

830/9 SERVICING AND CONVERSION TO "STANDARD" 830 AM BANDWIDTH

By Jim Duckworth

"It was only when I started to skim through the manual that I realised the extent to which the 830/9 was special, and different from the mainstream of 830's"

I was delighted to be offered an 830/9 by an EUG member who answered my Wanted Ad for an EC10 Mk II and during the conversation mentioned his other sets for sale, including the above. I was a new EUG member at the time but had read enough back-journals to appreciate the 830 family was considered the 'flagship of the fleet' with its near digital frequency resolution achieved by analogue means.



Well, it so happened I had already obtained my 'duff' EC10 at the NEC which I had started to restore, so resisting the temptation to acquire an immaculate one, I carried away the 830/9 with a very comprehensive set of 830 manuals which the owner kindly passed on with the set.

DIFFERENCES BETWEEN THE 830/9 AND THE REST

Although the owner had pre-warned me, it was only when I started to skim through the first manual that I realised the extent to which the 830/9 was special and different from the mainstream of 830's. Principally there was the provision for synthesised oscillator working.

This meant in practice there were special sockets and switches dotted around to enable/disable this, and more prominently, a chrome lever switch around the main band switch which had to be parked in the manual position for normal reception. Then of course there was the Piccolo filter. I knew nothing about the 'Piccolo' system and wasn't about to learn either as the filter had been removed, which was standard Government practice when they were 'demobbed' though my manuals gave the circuit diagram and alignment procedure.

None of this bothered me; to the very contrary, it made it more exciting and special to have this version of the set, 830's don't grow on trees anyway!.

However there were other not-so-obvious circuit differences which had a direct bearing on my main interest of using the set for high performance SW broadcast station Dx, which I will come back to shortly.

GETTING ON THE AIR AND FINDING OUT THE FAULTS.

Once I had got the hang of the controls and cottoned onto the 'manual' setting for the main crystal switch, the set burst into life using a 40ft picture rail aerial going via a balun into the 75ohm socket at the rear. The performance was not great and almost certainly not to spec.

I noticed when tuning slowly through a station that the meter needle drew a graph similar to the Himalayan mountain range. The sound quality on the widest 'AM' selectivity position, which should have made reasonable listening, was 'boxy' and fatiguing.

On the CW, SSB and N (narrow) selectivity positions it was naturally worse still and from the drop in the meter reading there was a lack of system gain, which should easily have been enough to maintain the output constant.

For all selectivity positions the output of the first 100kHz IFT, T1 went straight to the grid of V5 via the 100pf cap. i.e. switches S8, S9 had been dismantled

along with the Piccolo filter. The bandwidth in each position being determined by the mechanical rod and lever system which varied the coupling coefficient of each IF transformer by moving the secondary in and out.

Clearly, there was a major alignment job to be done here or worse!. In addition the incremental tuning knob was unusable, as the large round scale plate was slipping on its spindle. Also the tuning meter could not be zeroed by the pot on the rear panel. I hardly knew where to start!

FIXING THE PROBLEMS

A change of valves made no difference to the gain problem, so I had a go at aligning the 100kHz IF's. I followed the Manual procedure by removing the Crystal calibrator and gang cover to inject the signal at the mixer stator section of the gang. They did tune up, but T3 in the anode of V5 was very flat.

I stopped to investigate the very cluttered valve holder area where you are also impeded by the selectivity rod running the length of the chassis. Bingo!, the cathode decoupling capacitor joint was completely dried out and the cap doing nothing.

Replacing the item brought up the gain and helped smooth out the 'Himalayas'. But it wasn't perfect and the set sounded no better. Resolving to come back to this, I moved on to tackle the other problems starting with the non-functioning incremental tuning system.

It's not at all obvious how to get at the incremental tuning dial but I managed finally by following the procedure to 'Remove and clean the Dial Scale'. Then you need a long Alan key to reach down into the gear box for tightening.

But before that, the second mixer box has to be opened up so the gang and hence the dial can be set in their correct positions for alignment. This is a lengthy procedure to get right, going backward and forward between the 1260kHz (Red alignment point) and 1440 kHz end of the scale (Black alignment point).

I used a portable digital receiver as a frequency meter to get the Sig Gen right. I made it in the end and could then enjoy the pleasure of the 830's tuning system. i.e. Crystal calibrating on a 100khz mark and simply tuning in the remaining kHz on the incremental scale. Great!, but you definitely need the manual for that adjustment!

Next was the non-zeroing tuning meter. This was a much easier fix by comparison, as the 27k R34 had increased to 43k, making the bridge impossible to balance. It dissipates around 850mW strung across the HT so I put three 0.5 watt 82k in parallel which nicely restored the meter zero setting using the pot at the chassis rear.

Other small items included correcting the AGC delay threshold where R50 had increased from 180k to 620k!!... it does happen. Also bearing in mind my hang up about the receiver sound, I checked the frequency response of the AF section, finding it basically flat from 200-9000hz with a good waveform. . . no problem there.

IF BANDWIDTH AND RECEIVER 'SOUND'

Returning to the 100kHz IF's and being intrigued with the mechanical selectivity system I dismantled one transformer for inspection to see how the variable selectivity worked!. Well, it's a rugged system built to last but not a high precision one. I could see for myself what some members have commented on.

When the secondary moves back on its slider, pulled by a 6 B.A. adjustable lever system and operated by the crank-arm/front panel knob, it does not stay in a perfectly horizontal axis with the primary. The small angle of deviation causes a change in flux as if the inductance itself were changing, which causes a small frequency change as the selectivity knob is turned.

Fig (1) 830/9 'Piccolo' version. AM selectivity position has no T2. BW is 4khz

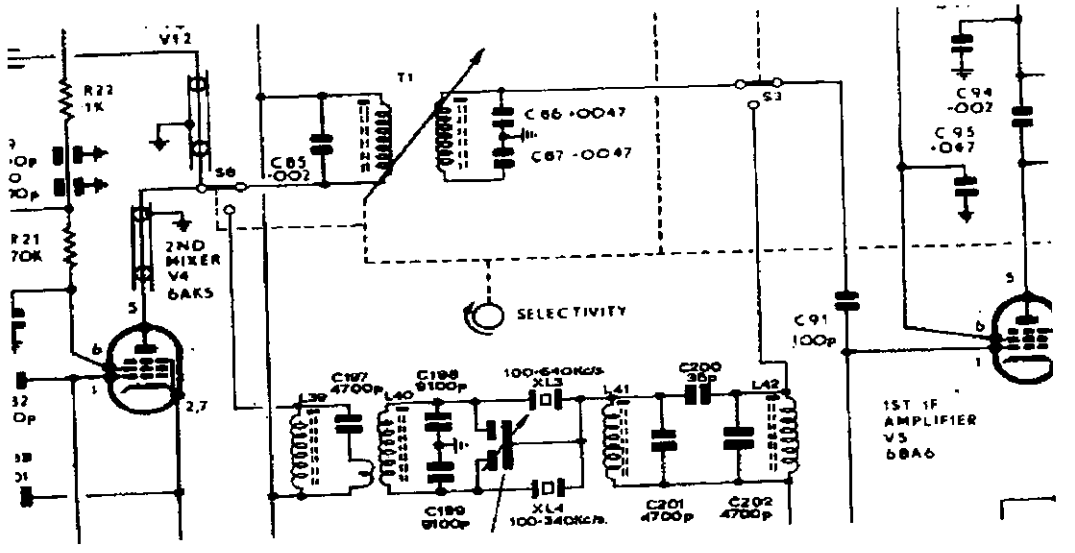


Fig (2) Standard 830. AM selectivity position includes T2. BW is 6khz

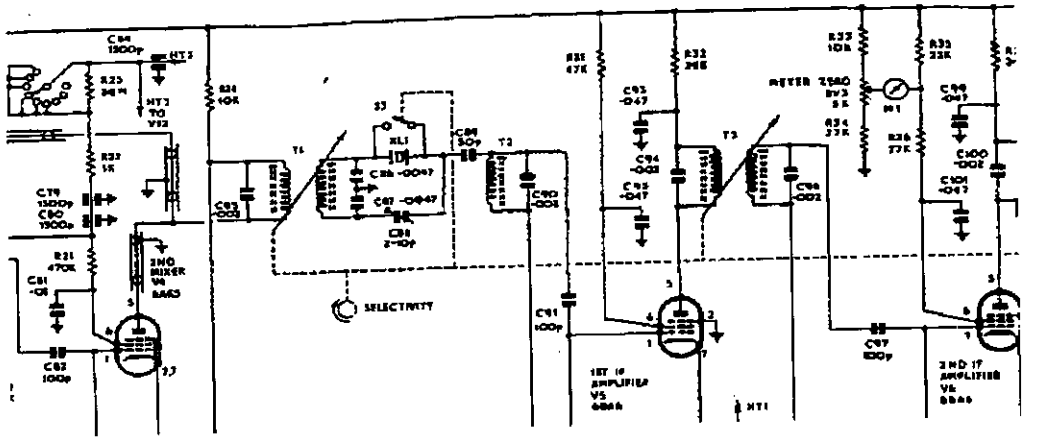
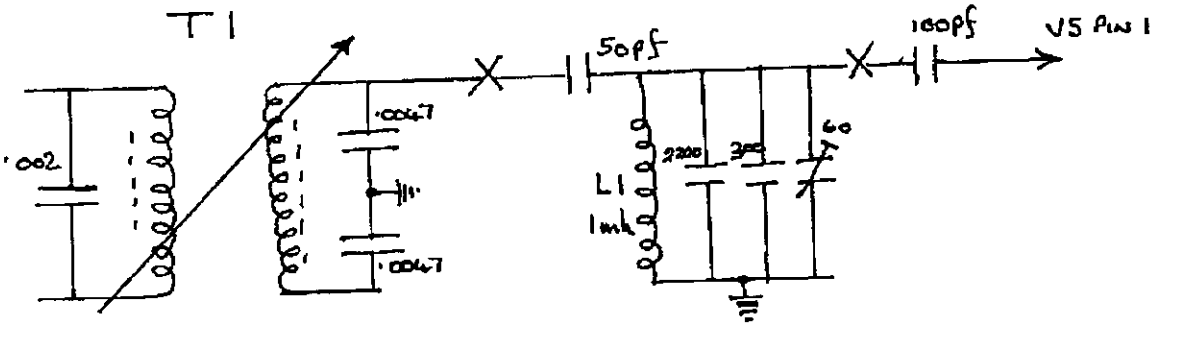


Fig (3) 830/9. Between XX 'T2 Module' is added to spread the Bandwidth to 6khz



However this was not my main concern, I wanted a flatter-topped tuning characteristic and a better sound in the 'AM' position. What was the factory setting for the IF secondary coils in the AM position? Were they critically coupled for a flat top, or what?

Looking more carefully at the circuit diagram I noticed that T4 was top capacity coupled with 12pf in addition to the magnetic flux, so this one was almost certainly overcoupled, which would spread the bandwidth a bit.

To cut a long story short, I lashed up a 100kHz fet oscillator and made it into a wobbulator with part varicap tuning swept by my scope X output. Using this with great care and after a learning curve, I adjusted the 6 B.A. lever setting for each transformer in the AM position, along with the cores to get the best response.

There was now a big improvement tuning through stations (No Himalayas!), but it still didn't sound very good in the AM position. Checking this from my (now working) incremental dial, the bandwidth looked to be no more than around 4khz, but what was the spec for the 830/9 versus the standard version?

BIRTH OF THE 'T2 MODULE'

I put the two handbooks and circuit diagrams side by side, realising I should have done this sooner. The bandwidth spec for the 830/9 was stated as no more than 4khz in the AM position, but for the 830/5,6,7 it was 6khz!. I then spotted the difference.

In addition to the respective Piccolo and standard 830 Xtal circuitry, There is an extra single tuned transformer T2 in the standard version which is (over) coupled to T1 by a 50pf cap, its output then going to the grid of V5 via the 100pf cap. It simply is not there on the 830/9. T1 output couples directly into the grid of V5 via the 100pf!

Figs (1) and (2) show the respective situations for the 830/9 versus the rest. Fig (3) shows my 'bandwidth spreader' T2 module solution to be added to my 830/9 as I could not locate a genuine T2 which could have occupied the absent Piccolo transformer space.

T2 uses 2000pf to tune to 100kHz so the inductance must be 1.27 mh. I got as close as I could with a Toko 1 mh fixed-tuned miniature inductor with a minimum Q of 75, which then required 2533 pf to tune to 100kHz.

This was made up of a 2200 +300+60pf trimmer in parallel with the coil. This module can be very conveniently mounted on the tagstrip next to T1 and V5, which exists to receive the 2nd mixer output from the anode of V4 via a screened cable. There is a central earth connection and one spare tag, which is ideal. One end of C91 the 100pf cap is lifted off T1 and re-routed to the tag strip, where the module connects to T1 and ground as shown.

The trimmer must of course be sturdily mounted, pointing 'outwards' so it can be adjusted at the same time as the IF cores. I aligned the IF strip once again noting with relief that the module 60pf trimmer peaks the extra tuned circuit nicely within band and it works!

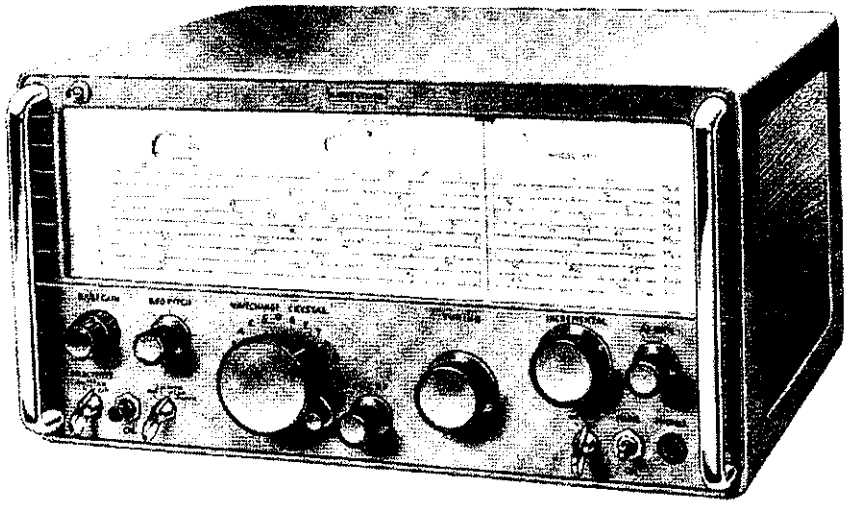
The incremental tuning dial showed the new AM bandwidth to be as close to 6khz as I could tell and it sounded much better!. The Bandwidth on the CW, SSB and 'N' positions was correspondingly narrower as the lever and crank mechanism pulled the main IF coils apart to undercoupled positions, which I use to resolve weak signals sandwiched between strong neighbours . The module can be installed and removed within 5 minutes.

So having an 830/9 is not really the 'short straw'. It's one of the worlds great 'boatanchors'. Mine performs really well after all the work described. However if you want a receiver that's nice to listen to for SW broadcast, and don't want to add either a real or equivalent T2, you should set your sights on one of the others, If of course you can find one.

JD. March 2001

Serious TLC for the Jewel

By Graham Gosling
East Coast Wireless

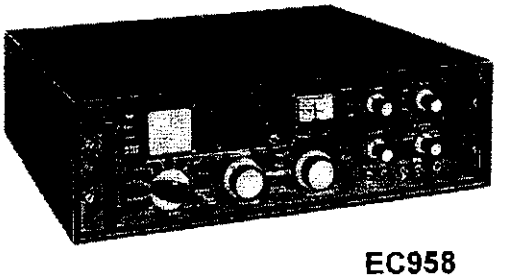


830/7

IN THE BEGINNING

Recently I have completed a very long restoration . . . no, wait . . . re-creation, of an EC958/5 out of three total scrap units from a ship-breaker's yard. Luckily, between them, there was enough to eventually make one really superb looking and sounding set.

I try now to forget the many faulty modules and intermittent faults which plagued my progress, the faulty discs in the turrets etc. etc., yet strangely, not one single failure of the miniature coax cables and connectors which frequently affect the 958.



EC958

No additional materials or components were required and the total cost excluding labour was £30 - just the original cost of the scrap units.

As I now had what many people consider to be Eddystone's finest solid state receiver, surely it was time for the last and best Hollow State set - the 830/7.

As a professional restorer of mainly broadcast receivers, I attend various auctions around the country and although I do see many Eddystones, 830/7s are not exactly stacked high on the auction tables and I expected a long wait to acquire one.

Now as Ted lives only a few wheel rotations of his ever-Eddystone-laden Volvo away from me, he often pops in to the workshop for a chat and I mentioned to him that I was looking for one. To my surprise he said that he was to collect a number of Eddystone receivers in the next week or so and an 830/7 was amongst them.

Hastily I moved Ted to the kitchen and plied him with coffee and biscuits, after which he promised to deliver same. In due course Ted, Volvo and 830/7 appeared plus, very kindly, a spare 830/9 from his own stock for spares, which turned out to be a godsend.

He told me that the receiver was working but needed some TLC, and that it may have been used by the Diplomatic Wireless Service, as it was fitted with black painted carry handles instead of the standard chromium. Apparently the operators suffered eye strain from the artificial lights reflected from the chromium.

When Ted departed I was left alone to contemplate my new acquisition. Inspection of the internals was easy as I forgot to mention that it came minus its case. Where do they go?

The upper chassis condition was certainly not mint with some corrosion due to poor storage. The under chassis was better although the Power Supply area had a smoky appearance, no doubt caused by some 24/7 operation.

However, I was relieved to see that the phantom twiddler, hole borer and poker-solderer had not reached the set. In fact, only the cathode bias resistor and capacitor on the audio output had ever been changed and all the coils and transformers were undamaged.

The metal calibrator switch and the RF/IF gain knobs match the rest of the knobs, unlike the illustrations and most sets, which are fitted with that pair of strangely mis-matched knobs.

If the Serial No. Plate is to be believed, LY2918 was manufactured in Dec. 1973 so it surely must be among the very last to leave the bathtub. *(Note here from Graeme; Company records tell us that the last 830/7 was completed on 27th January 1973 . . .)*

LET'S GET TECHNICAL

After a check across the mains input and HT lines, an aerial was connected and power applied. The results were not at all impressive and certainly not up to specification. Some signals were apparent on all ranges but bands 4, 5 and 6 seemed very insensitive.

I consoled myself with the hope that it might simply be the result of misalignment. However, as our Editor rightly says, a deaf Eddystone is a sick Eddystone and my more practical pessimistic side told me that there was probably something nasty to be found in these ranges.

Meanwhile the Carrier Meter failed to zero but this is common and would be easy to address. The AGC system was faulty: AGC was obviously ON but could not be turned OFF as no increase in volume or distortion was observed on a very strong local.

The BFO did not work at all and the overall audio quality was poor. Not really distorted, just unpleasant to listen to, with various pops and rustles during the first 15 minutes of operation.

SOME DO's AND DON'T's

.At this point it might be worth mentioning some dos and don'ts with regard to restoration.

Please do not attempt to replace every resistor and capacitor in the set just because it has been there for 30 or 40 years. This is wasteful and time consuming, plus unless you are a professional wireman, you will end up with a receiver which looks a mess with burnt and untidy wiring.

There is also the likelihood of introducing an odd fault or two, as of course, it is necessary to remove some components before reaching others underneath. You will learn nothing from this exercise about the effects of faulty individual components on the

specification.

The application of a signal at 1 KHz across RV4 audio gain control at a level of 28 - 30 mv should give 50 mw on the audio output meter.

The 30mv level can be measured directly with a digital multimeter switched to AC. If you have no audio output meter, then use an AVO 8 on AC. Connect a 0.1 µf capacitor from pin 5 V10 to positive lead, negative lead to chassis. Maintain a load on the secondary of T5, either a loudspeaker or a 3 ohm resistor. 50mw will give approximately 23.5 v.

Note: 1.6mw output will give approximately 3.5v. You will need this latter figure when performing signal to noise ratio checks on the RF stages.

A check and replacement as necessary of R32, R33, R34 and R35 were all that was required to enable the carrier meter to be zeroed.

As we move to the IF stages, I shall avoid tedium by sparing you a blow by blow account, but offer some pointers. Check for out of tolerance resistors. With regard to capacitors, Eddystone will no doubt have used different makes as supplies came to hand.

You may have a different set of caps in your set. Generally speaking any ceramic or silver mica caps are above suspicion and don't warrant extensive testing unless a fault points in their direction.

The paper caps however, are a different proposition and some ruthless surgery may be required. HT decouplers such as C91, C80 etc. .05µf were, in my set, a flat, green-sleeved type made by Erie which tested as excellent and can safely be left in situ.

The grey plastic moulded Dubilier 700 series usually show signs of aging now, resulting in a poor power factor and out of tolerance values.

A bright red tubular type of capacitor by Hunts is also reported to be failing, although there were none in my receiver.

What was lurking however, were many capacitors of a type dreaded and detested by legions of radio engineers over the years. So bad are these caps that it is pointless to attempt repairs, alignment etc. in any set harbouring them. Those of you in the know will have already recognised the infamous Hunts Moldseal type, although mine were actually marked "Erie".

These small tubular caps have a toffee coloured case with white writing. The case is almost always cracked and crumbles to chips on removal, thus destroying the value written thereon. If you are working without a service manual, try to see the value before removal.

Although not usually seriously leaky, they will be found to be distressingly close to open circuit and may be intermittent as well. There is only one rule here - if you see any, however inaccessible they may be, bin them.

MOVING ON

It is a good idea to have a few spare valves (known good ones of course) to hand if you do not have access to a valve tester. They will be useful to substitute for suspects when checking whether a valve really does need replacing.

It is not necessary to re-valve an entire set just because the valves have been there since day one and although adequate spare valves are available they are not, in general, being manufactured now, so do not waste either valuable future resources or your money.

So, assuming our IF strip is working and we have completed the repair and

working of a circuit.

Naturally a number of components will need to be changed and thus we will cover the likely offenders. One or two additional items to your tool kit will be found most useful when servicing the close wiring in your Eddystone.

1. *A magnifying bench lamp*

2. *A temperature controlled soldering iron with a long cone-shaped bit around 25mm long, enabling you to reach the joint without the element melting associated wiring, and temperature controlled because the long bit will not have the same thermal reserve as a normal bit.*

3. *A thin tool with a hook on the end will enable you to pull the lead out wires of components away from the solder joint.*

4. *A pair of locking forceps will enable you to hold one end of a component while soldering the other end deep in the wiring.*

OK, four items then!

AND NOW BACK DO THE BENCH

I decided to see if I could clear the obvious faults before starting a full overhaul in case parts were required, as the donor 830/9 was not complete.

The AGC fault was investigated first. Years of experience directed me to S4, the AGC switch. It did not feel right in operation. On removal of the protective screen all was revealed. The wafer had split in half at its mounting points.

This problem is becoming more common on several Eddystone models and it is not clear whether it is due to over-tightening during manufacture or simply wear and tear. I suspect it might be the former so take care not to over-tighten your replacement. A quick transplant from the 830/9 resulted in AGC which could be turned off.

The BFO valve V13 and circuitry is contained in a small dungeon within the IF Strip. After removing the lid from this dungeon, it was obvious that the occupant had been there for some time as his head had gone all snowy.

A younger replacement with a nice dark head was fitted, the lid slammed shut and power applied. Great - a working BFO, not quite on tweak but that could be aligned later.

The Power Supply only required a minor clean and tidy and the replacement of R97, R98 and C208. These components maintain the heater supply of V7 EB91 at a few volts above ground to prevent hum.

In the audio stage C119 and R57 were replaced in a more proficient manner than they were found, i.e. not hanging about to the full extent of their lead out wires.

Check the value of R48 4.7K V10 screen feed. There should be no positive voltage on the grid of V10. If C116 is anything but a ceramic type, replacement is advised. V10 6AQ5 already runs at finger-licking temperatures so it does not need any assistance to become even hotter!

Around V9 6AT6, a very common failure is of R45 270K, the anode resistor. If very high it results in no audio. Even if you still have audio it is no doubt out of tolerance and in combination with R47 180K, which also ages high, will cause an unpleasant clipping effect due to incorrect biasing. Replace both these resistors for long term reliability.

TAKE IT IN EASY STAGES

One good thing about valves is that you can restore and repair stage by stage, checking the operation of each one as you go. I take no prisoners as far as correct working is concerned, so the equipment has to meet the

replacement up to say, the grid of V2 EF95, it may now be instructive to tune in a few stations while watching the carrier meter, with the selectivity control set to SSB.

The correct tuning point should result in maximum deflection of the carrier meter. Move selectivity to the AM position. This widens the IF bandwidth and there should still be only one peak on the meter. More than one peak when tuning indicates an asymmetric response and really requires realignment.

Yes, I know the service manual states that realignment is rarely required, but this was related to the expected service life of the equipment at the time, say 10 to 15 years. It is unreasonable to expect a receiver, after 40+ years, to be still at optimum alignment.

Components may have been changed or aged and we must not forget the attentions of the phantom twiddler! Those nice big slotted cores are so inviting. In my experience, it is rare for any receiver, broadcast or communication, not to benefit from a realignment.

It should also be noted that Eddystones have a lot of built-in redundancy and will continue to operate in some fashion with many faults and quite serious misalignment.

Think about this - have you a factory fresh one with which to compare it?

IF ALIGNMENT

In considering the alignment of the IF stages, some alternative procedures may be considered regarding the use of the set. The 830/7 incorporates a 100 KHz crystal filter which, when enabled, narrows the IF response to 50Hz. This crystal gate is pre-phased, so unlike previous designs, you cannot use it to notch out interfering signals.

Unless your interest is CW, you are likely to switch to it once, be amazed at how quiet and boxy the voices are and probably never use it again. If this is the case, you can skip the details of finding the crystal frequency and align the strip at 100 KHz.

I think it is fair to say that it is difficult to align the IF strip for optimum results without the use of a sweep generator. Spot frequency alignment as per the manual will result in the response being rather peaky, with the various bandwidths definitely not meeting the specification. In the widest position, double humping and ripple can approach 5dB. No doubt by spending much time plotting output voltages as the frequency is moved plus or minus from its centre value, the response could be improved.

Adjustment of T2 is critical here. I would not advise adjustment of the crystal phasing trimmer C84 on T2. If you must adjust, mark its position before commencing adjustment.

Everything becomes much easier if you have the use of a sweep generator and the following notes will help you achieve the very best performance. Connect the display unit (scope) to the S5A side of C108, not the AF gain side as C108 will introduce a phase error with distortion of the response shape.

Signals via the wobbulator or signal generator should be injected at the relevant points within the IF strip via a matching pad. Although matching is not vital in this instance, it is as well to adopt good working practices as sloppy procedures will catch you out in the future at higher frequencies.

The matching pad consists of only two components. A resistor across the open end of the co-ax which should match the output impedence of your generator i.e. 50 or 75 ohms. A 0.1µf capacitor from the centre of the co-ax.

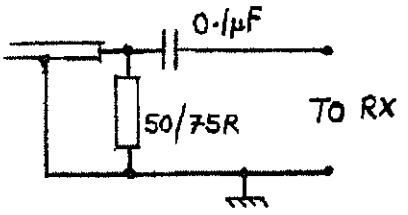


Fig. 1

This 6dB pad halves the applied signal so you will need to double your attenuator settings if making gain checks. Input signals via the antenna socket when aligning the RF stages will not require the matching pad. The output impedance of this generator should match the input impedance of the 830/7, namely 75 ohms. If your signal generator is 50 ohms use a 25 R resistor in series with the centre of co-ax. Attenuator settings will be as indicated on your generator.

First rapidly align the IF strip using the spot frequency method. Note the crystal frequency. It should be within 2 KHz of 100KHz - in practice it is likely to be much closer. Mine was -60Hz.

Make a visual inspection of the selectivity actuators on the IF transformers, both at the threaded adjustment and on the selectivity shaft which runs the length of the IF strip. If these show signs of disturbance, and they may well do, it will be necessary to reset these, otherwise it may impossible to obtain correct responses.

Under no circumstances should you attempt these mechanical adjustments unless using a sweep generator as you are likely to lose the plot altogether.

USING THE SWEEP GENERATOR

To check and align the crystal gate, apply the sweep generator at C59 mixer gang. It is essential to use a very slow sweep rate, between 5 and 10 cycles per second. Reduce the deviation on the generator to make the fine detail on the skirt visible. Adjust T1 and T2 to remove kinks and distortion. Adjust C84 crystal phasing to correct any tilt or loss of symmetry in the response.

Set the selectivity to SSB. Inject the sweep generator via the matching pad to V6 pin 1. Use a marker at the crystal frequency if possible, to keep the response centred on this, or note the centre response on the scope graticule. Adjust T4 for best symmetrical shape. If it is impossible to obtain symmetry, adjust the mechanical settings relevant to T4.

Repeat the above procedure, but with the signal at V5 pin 1 and adjusting T3. Then adjust T1 and T2 with the signal applied to C59 mixer gang capacitor, second from front. It is easier to align stage by stage as we only need to cope with the errors in a single stage. If looking through the complete strip, cumulative errors will make the adjustments unclear initially.

Check the bandwidth by adjusting the marker frequency by + or - 1.5 KHz from the crystal frequency, ensuring that the marker falls on the response skirt at 6dB. It is likely you will need to make small adjustments to widen the bandwidth.

Move the selectivity to its AM position and check the bandwidth as previously outlined but with the marker frequency at + or - 3KHz. Check that double humping and ripple is within 2 dB.T2 is critical here: make small adjustments only.

If all the above seems unnecessarily complicated, just remember that the majority of the receiver's gain and selectivity is achieved within the IF strip, so it deserves more than a quick tweak by ear with an ill-fitting screwdriver. The second IF sensitivity can be checked as per the manual but remember to double those attenuator

settings.

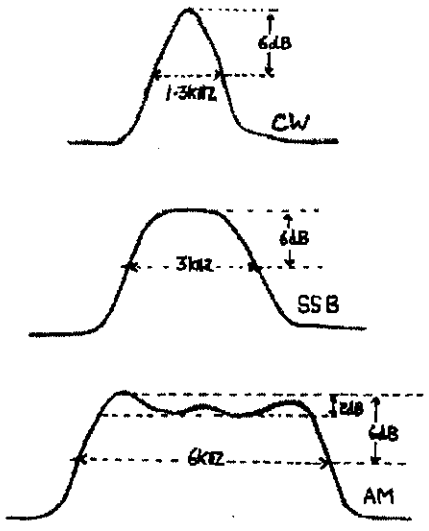


Fig. 2

REMOVING THE BFO

My BFO suffered from some general drift and intermittency which required the removal of the unit from the chassis. I fervently hope you do not need to do this as a great deal of tedious dismantling is required before those Rs and Cs are reached.

After a few replacements, including a new valve holder as the original had a frosted appearance and I definitely did not want to go there again, it was reassembled, refitted and realigned as per the manual.

SECOND MIXER

The second mixer oscillator assembly should have been straightforward but two faults here required attention.

The first consisted of pops and rustles accompanied by a frequency shift, and yes, I did think about the neon stabilisers.

A most useful addition to your test gear is a world band-type digital receiver, preferably with continuous coverage from 150 KHz to 30 MHz. These receivers are dual conversion so do not suffer from spurious problems and unless you are using a synthesised signal generator, it will be more accurate and can be used to calibrate your signal generator.

It can be used to pick up and align the various oscillators in the receiver being aligned or repaired, (completely eliminating the possibility of aligning to an image), by keying in the signal frequency plus the IF on the digital receiver. Adjust the oscillator trimmer or core on the set under repair to produce a dead carrier on the digital receiver. If an SSB facility is available on the digital receiver, with this switched on, you can adjust for zero beat. Your receiver is now aligned to within a few hertz of your required frequency.

Our first fault was traced to C175, a 6pf ceramic capacitor. Placing this on our Marconi bridge and with a soldering iron underneath but not touching, the null meter flicked away from its zero position, indicating that C175 was going partially open circuit. Another fault bites the dust of my waste bin!

The second fault was a high level of noise from V3A, ECH81. On the single conversion ranges: 7, 8 and 9, V3A should not be doing anything. However, in my receiver it had turned into a highly effective noise generator and a replacement quietened things down no end.

SECOND OSC. ALIGNMENT

Alignment of the second oscillator is easy and quick when using a digital receiver. As the second oscillator tracks on the low side of signal, it is necessary to subtract 100KHz from all the frequencies given in the manual, so the red alignment point is now 1160KHz, centre zero is 1250 KHz and the black alignment point is 1340 KHz.

Set a frequency on the digital receiver, set the incremental dial on the 830 and

adjust L36 or C168 as necessary to produce a dead carrier on the digital receiver. It is aligned in minutes!

CRYSTAL CALIBRATOR

Remove the crystal calibrator and check R62. Replace C120 if the type fitted requires this. Refit the unit, key in 300 KHz on your digital receiver with SSB facility on, and adjust C123 on the crystal calibrator for zero beat. L37 does not adjust the frequency but serves to increase the amplitude of the markers at higher frequencies.

To adjust, switch the receiver to range 1, switch on the calibrator, find a marker and adjust for maximum - it is not critical.

THE RF SECTION

We have nearly reached our journey's end, the RF section and for many people, as far as servicing is concerned, accompanying Frodo Baggins into Mordor would be a more enticing prospect. However, servicing these sections is far from impossible. Keep calm. If something is in your way, remove or move it to one side. Make copious diagrams and take your time.

In the RF amp V1 section, remove L15. Fold its connecting wires back and you have masses of space in which to work.

There are only a few components to check but faulty items can have a profound effect on performance. Pay particular attention to R8, R9, R6 and R2. Capacitors C33, C34, C35 and C36. *(Special note here from Graeme: I have always found R8 and R9, the cascode grid bias, 100k each, to be miles out of tolerance, thus ruining the performance of this stage.)*

In the first mixer section around V2, things become a little tighter. Remove coil L24 to gain some space, lift polysleeved wires from coils as necessary and gently fold back. Check R16, C63, C62, R14, R15 and replace as required.

The oscillator section around V12 is the most congested area. Start by removing L33, rotate the range switch to expose the allen keys in the shaft coupler, release the keys and ensure that the coupler is free to move. Now very gently, push the switch shaft rearwards - there is a hole in the rear chassis apron to allow this. Remove the shaft coupler.

Six polysleeved wires run down the centre of this compartment. Lift at coil ends and gently fold back against the casting divisions. There is now plenty of room to check those Rs and Cs. After all this, refit the screening cover on the coil box and we are ready to test and align the RF section.

Ensure the dial cursor adjuster is at mid-travel. Visually check that the RF peak capacitors are at mid-travel. Do not rely on what the control knob indicates. If using your digital receiver to align the oscillator stages, note that the frequencies required will be signal frequency plus 1350 KHz on ranges 1 to 6 and signal frequency plus 100 KHz on ranges 7 to 9. Now with the first oscillator aligned on all ranges we can align the RF and first mixer stages to track the oscillator and provide the high sensitivity and signal to noise ratio that this front end provides.

A quite basic signal generator can be used here but remember, drift can occur on the higher ranges and attenuator settings may be only arbitrary. Again use that digital receiver tuned to your signal generator to ensure that you remain on frequency. Use an audio output meter or the Avo 8 as described earlier. Do not align by ear or from the carrier meter as alignment should be carried out below the AGC threshold with AGC turned off.

Although as I have indicated earlier, it is a good idea to measure sensitivity and gain in the last stages we have worked on, here at the front end it is vital to have a reference point, if only to ensure that we have not made things worse by our efforts.

After repair or realignment of the receiver, do not test on air with an aerial because, unless the receiver was almost totally deaf, you will have no idea how the receiver is really performing will you?

The manual gives the sensitivity as 3µv or less, modulated 30% at 400Hz for 50 mw output at 15dB signal to noise ratio, at all frequencies. Assuming the use of a signal generator with accurate attenuators and calibrated output meter, to quickly find the necessary RF input for a given signal to noise ratio, inject a 3µv unmodulated carrier at the aerial socket, with receiver controls set as in the manual. Adjust the noise level to 1.6mw on output meter. Now apply standard modulation at the generator, i.e. 400Hz at 30%. Adjust the generator's RF output to give 50mw on the output meter.

We can take advantage of the fact that small changes in the input do not appreciably affect the noise output power. The ratio expressed in decibels is 10.log power signal/power noise.

When using a more basic signal generator and Avo as output meter we won't be able to boast actual sensitivity figures to our friends as our RF input level accuracy may be in doubt, but the ratios will still hold true and provide a reference point. The results can be logged for future use in the case of a suspected receiver failure.

To recap, if using the Avo 8 as output meter, 23.5 v approximately equates to 50 mw output and 3.5v approximately equates to 1.6mw. Use the 100v and 30v AC ranges.

DID IT WORK

Enough classroom stuff. How did my actual receiver perform after its RF alignment?

In a single word **- Rubbish.**

It failed to reach the specification at any frequency on any range and with ranges 4, 5 and 6 desperately insensitive.

Do I see despondency lurking close by? Well yes, a bit, but we are not going to give up now, are we!

As intricate surgery had already removed the suspect items, could we have made a wiring error? Well, probably not as it was poor when first checked. A period of thought ensued as I mulled over the symptoms.

Higher frequencies provided better sensitivity which seemed to indicate the RF stage was capable of good results. If faulty we might have expected the reverse. All trimmers and core adjustments were normal and I decided to concentrate on one of the very insensitive ranges, namely 4.

Voltage checks around V1 were correct, no clue here. Check L4/L10 coil continuity, all OK. Remove L4 for inspection or swap and bingo! There was the problem. The primary aerial winding had a barbecued charcoal appearance. Not much inductance here then - just a shorted turn.

L5 and L6 also had barbecued windings. A quick transplant of all three from the 830/9 resulted in a dramatic improvement in sensitivity; still not to specification but now in line with the other ranges.

On a subsequent visit Ted and I ruminated as to what the cause may have been. **A 10KW TX nearby? Lightning?** I think not. I have seen

the results of lightning many times on PMR base stations etc. and coils do not survive at all, with much other damage usually present. Remember, my coils were not O/C.

We concluded that the likely cause was the aerial coming into contact with a supply line, unless of course, the owner connected the aerial input to the output of his transmitter. But no-one would do that surely?

THE FINAL SOLUTION

One fault now remained. Merely that of obtaining, at all frequencies, the sensitivity which Eddystone intended. Time to mull over the symptoms once more.

I have a local medium wave station within a few miles. It is only 300w but sports an impressive aerial which delivers a hefty signal. On the 830, this caused heterodynes up to 200KHz from its frequency. This indicated poor first mixer operation and associated with a general noisy background when receiving even a moderately strong station, it was time to check oscillator injection levels.

Waving a scope probe around V12A anode showed plenty of activity. Connecting the scope to the link wire between pins 2 and 7 on V2 showed less than 50mv P/P.

I had no idea what the level should be but I expected at least 0.5v P/P. As V12B can operate as a separate crystal controlled oscillator, it seemed a good idea to fit a crystal. This gave better results than the manual oscillator but was still not up to spec. With the crystal removed and hence no oscillator in operation, 200mv from a signal generator was applied to V2 cathode pin 2. Remember this frequency must be signal plus IF. Now the receiver was transformed, exceeding the specification at this one frequency.

So here was the reason. Now to find the cause. The likely culprit seemed to be C159. The .01µf capacitor coupling V12A anode to V2 cathode, but hang on - we have already changed all suspect caps haven't we!

Well yes, but we only checked and replaced what we could see. We did not replace against the circuit diagram as we knew there were no wiring errors or incorrect component placements. So where is C159?

Has anyone outside the Bathtub ever found it? The hunt was on. At V12 pin 6, a thin yellow wire disappeared ominously into a piece of black systoflex. At V2 pin 2 a yellow wire curved away towards V12. It seemed that C159 was buried underneath S1F, S1E range switch.

Nobody would put a cap under there would they? Oh yes they would. Even with my bench magnifier light I could not spot it and only the use of a very bright small torch revealed the unmistakable shape and colour of a Hunts Moldseal.

Fig. 3

To gain access, we removed L17 and unsoldered the thick co-ax from atop S1F wafer. After unsoldering C159's connections, it was teased out from its hiding place. With yet more surgical dexterity, a replacement was fitted.

Note: In this operation, do ensure that your sleeving is hard up against the capacitor body or you will get an HT short at the point where it passes through the casting.

FINALLY

Time now to check the oscillator injection level at V2 pin 2. Success! It is now 1.4v peak to peak on range 9 and the receiver meets or exceeds the specification at all frequencies.

The faulty C159 was then placed on the capacitance bridge for testing. Instead of (.01µf) 10.000pf, it read a minuscule 15pf.

So ... how many 830s are there out there with a faulty cap and poor results? I seem to remember an item in the Lighthouse concerning an 830 where V2, the first mixer, was changed to a different valve because of a high noise level, also necessitating a valve holder change. Was C159 responsible here?

With apologies to Graeme W's well-known little saying, I will just comment that **'a noisy Eddystone is also a sick Eddystone'**

Well, the electronics are finished and there is only the front panel to respray. Oh, and I still need a case but that is a minor consideration, since the set is an absolute joy to use just as it is.

I do hope that you have found these adventures with my 830/7 of interest and that it has been helpful and instructive in helping you to obtain the very best from one of the best valved Eddystones ever.

♠

Thank you, Graham, for your excellent and far-reaching exposition. There are lessons here for anybody with an 830-series Eddystone. Especially the bit about C159!

I shall examine my "Jewel in the Crown" in a very different light next time it has its turn on the desk.

- Graeme G3GGL

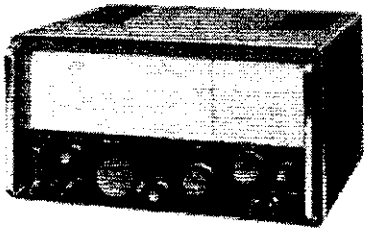
Graham Gosling examines an Eddystone 990R in his well-equipped professional laboratory

The Eddystone 830/4 in Canadian Government Service

By David W Whiting

In response to the article by Joe LeKostaj, K9LA, on the Eddystone 830/4 and his request for information on its use I will try to shed a little light on this particular receiver's use in Canada.

Its career here pretty well coincided with mine as a Radio Operator for the Canadian Government.



After passing my 2nd Class Certificate of Proficiency in Radio (same as the old UK PMG 2nd Class) I started work as a radio operator for the Canadian Department of Transport, (D.O.T.) (Now Ministry of Transport M.O.T.), Telecommunications and Electronics Branch, in 1965 and retired in 1995.

The Eddystone 830/4 receivers were phased into service during 1966 and lasted in the D.O.T. until well into the '80s, perhaps the '90s at some sites before being disposed of. So I had a fairly long acquaintance with these receivers and can honestly say that I put several thousand hours operating time on them myself.

These receivers were purchased by the Canadian D.O.T. who were (and are) responsible for marine, aviation (aero) and fixed point-to-point official Government communications as general-purpose receivers.

The Canadian military did not acquire this model so far as I know, as they had larger budgets, especially during those Cold War years. They tended towards more expensive and exotic offerings from the likes of Racal, Plessey, Collins and the Canadian Marconi Company, to name a few.

The D.O.T. used these receivers across Canada and afloat for a variety of tasks in aeradio, marine, marine-aeradio stations and Coast Guard ships.

With the introduction of SSB in the mid '60s, especially to domestic and international air-ground HF use, most of our general purpose HF receivers then in use (mostly WW2 vintage RCA AR88LF and Canadian Marconi CSR-5A models, but lots of others too) were rapidly becoming obsolete as well as old and worn.

The D.O.T. purchased several hundred 830/4 models -- actually to be technically correct they were probably 830/4/RM models as all the receivers I ever saw had the end-plates fitted and were rack mounted.

These sets were up-to-date in all respects, including SSB capability with the coveted product detector stage

using a 6BE6/EK90 tube (V13), and much improved frequency readout capability.

The specially specified LF bands, 120-560kHz, were needed for monitoring the status of aero and marine non-directional beacons (NDBs) and radio ranges, *(note from Graeme:- these latter dated from the early '30s and were the origin of radio beam flying; simple and effective.)*, and also for LF point-to-point CW reception, as some of our isolated Northern stations had ITU-allocated LF CW frequencies as well as HF for point-to-point working.

LF was supposedly less affected by auroral disturbances (not totally 100% true!) in the higher northern latitudes. One station in Northern Quebec at which I worked had a pre-WW2 RCA TX on 153kHz with 3kW output!

Yes, we did hear the LF broadcast stations from Europe quite often, though we used as narrow selectivity as possible for CW reception! Another northern Quebec station had 163 or 173 kz I believe. These LF frequencies were generally very reliable.

The MF aero and marine beacons were monitored every 30 minutes and a particular D.O.T. station might have monitoring responsibility for several of these, about 6 being typical.

This meant a lot of tuning back and forth and switching on ranges 7 and 8 of the bandswitch. It was very unlikely that all the beacons would be on the same band! In fact, this was one of the most common faults with the 830/4 – the whole bandswitch assembly becoming loose and having to be serviced, hopefully caught early enough that no damage to the wafer contacts had occurred!

As well as beacon monitoring, an aeradio station would use the 830/4 to receive WWV or CHU time signals (station clocks kept to rigid tolerance as per regulations), and monitoring of any requested or special HF frequencies as might be specified.

Possibly they would be kept on 5680kHz, the world-wide search and rescue (SAR) frequency which was also used as a general communication frequency in isolated northern areas as per ITU/ICAO regulations.

This was especially so in some stations where I worked, as the 830/4 was better than the *(probably more expensive)* dedicated fixed-frequency xtal-controlled receiver that was supposed to guard 5680.

At Frobisher Bay Radio/VFF (now Iqaluit Radio/VFF) a combined marine-aeradio on Baffin Island, and one of our largest northern stations we had at least eight 830/4's.

This station did just about everything, including international air-ground, marine point-to-point, Hudsons Bay Company radio circuit and Aeradio Advisory Service.

At a typical operating position there in the mid '60s each operator would have several HF frequencies to use. Each transmitter was controlled via landline from a remote receiver site which was widely separated (in miles) from the transmitters site, the remote receivers being perhaps Collins 51N-7's or Plessey PR-51C's.

Each of the operating positions, plus the supervisor's position, also had what we called a 'floater' receiver, which was right in front of the operator and connected by co-axial cable to a multicoupler-fed 35ft. whip antenna located at the operations site.

This is where the 830/4's were used, and they replaced the older AR88's, CSR-5's, etc., in these positions. They were able to take over any of the fixed-frequency receivers' jobs if necessary

or any other assigned frequencies as required. They were much easier to put on assigned frequency than the older receivers, especially if you did not have a TX to key on the frequency to set you up!

The smaller Domestic Aeradio Stations (now called Flight Service Stations) at airports in populated and remote areas each had at least one G.P. receiver, and that would have eventually been an 830/4.

Their main task was beacon monitoring and Time Signals as most voice communication there was on VHF/UHF. They were also used as backup for 5680 and 3023.5 if necessary.

Incidentally the Australian AWA CR-6B receiver seems to have been designed for and used for exactly the same tasks as the 830/4 in Canada. I wonder what what used in UK aero stations? *(Answers, please, to Graeme at Lighthouse magazine.)*

I am not familiar with the smaller Canadian Marine Stations and don't know how many 830/4's they may have had. But they monitored lots of NDB's (marine and some aero) and had to guard the 2MHz marine SSB voice frequencies including 2182kHz, so the receivers must have been well used there as well.

Afloat, all the Coast Guard icebreakers with which I was familiar had an 830/4 aboard. I was a Radio Officer for one of the Arctic Re-supply Seasons, being 'loaned' (at my request) from Air to Marine Services for the trip.

I was assigned to CCGS *(Canadian Coast Guard Ship)* "d'Iberville" (callsign CGSM), a full sized icebreaker which, incidentaly, had represented the Canadian Coast Guard at the Spithead Review during the Coronation Ceremonies for Queen Elizabeth II !

The ship at that time was brand new, having just been launched and commissioned.

She normally carried one Radio Officer for work in the Gulf of St Lawrence, but all Icebreakers took on three R.O.'s for continuous watch when operating in Northern Arctic waters. Each ship had its normal MF/HF CW Marine installation (Marconi, RCA or Mackay, depending on the ship) plus each one had an 830/4 and a separate HF SSB/CW TX.

Ours was a Redifon 1.5 kw unit, which I think put out 800-1200 watts on CW ! We had no trouble with HF communications during the four-month trip (never did use it on SSB, though).

So you can see from my humble experiences that the 830/4 was used for just about every receiving job going and performed admirably in all of them.

My only 'gripes' with the 830/4, which are very minor, was my dislike (perhaps too strong a word), of the 'springy' RF Peak control *(I'd call it 'spongy' – Graeme)* and the spring-loaded Calibration toggle switch.

Most (if not all) professional receivers I had used were capable of one-handed operation (the other one is usually occupied doing something else when things were busy), and I would have preferred an ordinary on/off Calibration switch with no spring.

Also, after several hours of much frequency changing, as in some types of monitoring or surveylance work, the Incremental Tuning got to be a mite tiresome. I longed for the simpler, single control of my 940's tuning *(but it doesn't have the reseting accuracy, does it? – Graeme)*.

This is where, I suspect, the model 880 excelled (and why GCHQ had same), with the frequency readout accuracy of the 830 or better, and with the tuning

ease of the single flywheel tuning knob!

However, for its price at that time it would have been pretty hard to beat the 830 series and I don't think anybody else did, cost-effectivewise.

I also liked its sensitivity. Most valve receivers at that time (mid-'60s), seemed to run out of steam around 20MHz or so, but the 830/4 and its cousins with the same high-gain 1st RF stage (ECC189/6ES8 cascode) worked well right up to the top end.

I did a fair amount of tube (oops, valve) testing in those days as part of radio maintenance duties and it seemed the ECC189/6ES8's were great for a while, but when tested after a few months or so, the Gm of one of the triode sections had dropped quite a bit, although still serviceable. The other side was 'as new'.

I don't know if this affected the high-end sensitivity or not as we didn't do much above 20MHz anyway. Still, I wonder if this was normal or particular to the brand of tube in use. My 940 is the same, but it is also fitted with the same brand of tube I believe. Does anyone have any comment on this?

Anyway, the 830/4's were operated continually (24/7 as they say nowadays) for years and years with not much TLC I'm afraid. It's gratifying to know that some have survived, hopefully in their senior years to get some TLC and serve their new owners for many more years.

When delivered new, if I remember correctly, the 830/4 came with two Instruction Manuals and a spare parts kit. This included a spare steel wire dial cord and plastic control knobs. I suspect all the manuals ended up in the Technician's library and the spares kits in 'technical stores', never to be seen again! I guess it would be a minor miracle if a spares kit, or manual even, ever paired up with one of the 830/4's when they were disposed of!

On the control knob theme, does anyone out there know why a high percentage of the Eddystone plastic two-tone control knobs had cracks in the grey plastic around the set-screw holes? A good percentage of the new 830/4 knobs had these cracks, even the unused ones in the spares kits (I know, I've seen them) and I've been wondering why for over 35 years!

The knobs on the model 940 which I bought new in 1964 were all OK, but I was always wondering if they would eventually crack on their own. They haven't so far, so I guess that's a good sign. Perhaps something a bit awry in the manufacturing process?

(note from Graeme:- I've never seen these cracks in the knobs on an 830/7 – or any other set with the same pattern knobs. Could there have been a speciall specification for the Canadian model? Seems unlikely. Any memories from the lads at the Bath Tub? Bill, Stan, Terry?)

The 830/4's were a quantum leap ahead of most of the receivers they replaced (although I liked the AR88's) and held their own for many years of sterling service.

So, in retrospect, it seems the Canadian D.O.T. made a very wise decision in buying several hundreds of the 830/4 model Eddystones.

David W Whiting
South Porcupine
Ontario

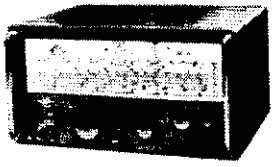
We sometimes think England has some quaint place-names, but it takes something to beat David's QTH!

Any comments or observations to David via 'Lighthouse' office, Bewdley, please, so we can all see them.

♦

Letter from Ontario

By Brian Cauthery, VE3DFC



Brian is one of our good friends and a regular contributor to "Lighthouse" This month he writes to us about the Canadian 'Special' 830/4 – the one which covers the LF NDBs and aeronautical radio 'ranges'. He answers some of Joe LeKostaj's questions (I suggest you re-read Joe at this point!) We have had a series of items about this most favourite classic model and Brian continues with his contribution.

I thought that Joe LeKostaj's (K9LA) write-up on the 830/4 was excellent. *(Lighthouse issue 78,April, 2003, page 19)* With my two 830/4s, one had the problem of inability to turn the audio down to silence.

I cured that with a few new components and an alcohol rinse of the volume control track. USE ONLY 99% ALCOHOL, NONE OF THAT 70% STUFF DESIGNED FOR BABIES' BOTTOMS!

(Note from Graeme about the above fault: John Gomer, G8UNZ, tells me that replacing the two electrolytics (C110 & C111) in the cathode circuit of the first LF stage will go a long way to reduce this problem. They are 10mfd (12V) and 25mfd (25V) respectively).

Now the plate on the 830's rump. One of mine has the same plate. I think it was an RCAF *(Royal Canadian Air Force)* identification system. I draw this conclusion from the colour of the plate background.

My scruffy 830/4 which is a stunning electronic performer belonged to the RCMP *(Royal Canadian Mounted Police)* counter intelligence and has no plate.

The plate on my other 830 is identical to that on Joe's except that the Serial Number is 48. I have asked about 25 hams if they know of the plate and especially the way to interpret CRC/CRA.

At this point I should tell you that my RCA CR91A (the last of the AR88 series) has a sticker with the same nomenclature except that it reads "Type CRC/CRA-01" and "RCA Radio Corporation Inc., Montreal." Since RCA is 01, the CRC/CRA program began in the very early 1950s or even late 1940s.

However, nobody I asked had the definite identification for the CRC/CRA, other than Dave, VE3ORP, who is one of the leading lights at the Military Communications Museum in Kingston, Ontario.

He thought that CRC is "Communication Research Centre". I have a problem with that. I am sure that the CRC/CRA are the initials in English and French of the organisation which authored the plate and CRC *en français* would be "Centre Researches Communication"

BUT the word "Centre" was not used in Quebec French 40 years ago in the

sense of a BUSINESS CENTRE, it would have been used in the geographic or geometric interpretation.

After a discussion with Louis VE2AJ we concluded that the word "Agencie" was the most probable translation in the early 1960s for the English word "Centre". That suits the "A" of CRA, but in gramatically correct French, it would be ARC . . . . . we are not at the answer yet!

Now the Modification Label. It is stuck on all of the communications, repair and maintenace equipment used by the RCAF.

Modification #1 relative to the 830/4 is the installation of the chrome-plated spring-loaded toggle switch to operate the Crystal Calibrator in place of the black plastic push-button on the other 830's. *(As described by Graeme in the February Issue of Lighthouse! - No77, page 26.)*

I will keep going on this plate matter, somebody must know. After all, it's only four decades old and they're not yet all in the hereafter!

♠

Re Chris Morgan's Product Detector instability . . . *(from June, p.41)*

Graeme asked for suggestions and so here are some faults which I have met, albeit rarely, which may have been the cause.

By Alan Robinson

1) Low emission or the valve gone soft, the valve struggling to maintain oscillations.

2) Corrosion of the valve pins/socket, causing high resistance or leaky variacap diode type connections.

3) External tracking between pins and across top of socket, caused by contamination.

4) Internal tracking between pins. In some long-used valves I have noticed a dark film-like deposit in the base area, similar to that seen in a used light bulb. When measuring the resistance between pins, instead of the expected infinity, I get an eratic high resistance.

5) Faulty spot-welds in the valve structure, or more likely faulty welds to the pins. The faults may be visible through a magnifier.

6) Valve top-cap connectors can become corroded and brittle, and the connection between the top-cap and the electrode can become intermittent.

Before switching on a set which has not been used for some time, or whose history is unknown, it is worth checking the valve pins and sockets, as well as switches etc., for cleanliness, but I expect I'm teaching grandmothers to suck eggs . . .

NOT AT ALL, ALAN. HOW MANY OF US, HOWEVER TIME-SERVED, CAN PUT HAND ON HEART AND SAY WE ALWAYS CHECK THESE LITTLE DETAILS ? WE WANT TO SEE IF THE SET WORKS AND THEN, IF WE FIND IT BEHAVING ODDLY, BLAME THE DESIGNER !

♠

Notes on the Refurbishing of an Eddystone 830/4 Receiver

Reported by: Joel Balogh, AB3J
Landenberg, Pennsylvania, USA

An Eddystone 830/4 Receiver was purchased through eBay from a seller in Canada. This transaction took place in August 2001. It was advertised as a working receiver. The following notes were written in November 2001 after the following problems were corrected. *('caveat emptor' -- Graeme)*

1. Flexible coupling on the main tuning capacitor shaft.

Someone had managed to use a steel disk to rebuild this flexible coupling. The main tuning knob had a very stiff action when rotated, and there was considerable backlash between the tuning knob and the cursor that moves across the front dial.

The entire main tuning capacitor bank (four sections) had to be removed from the chassis to gain access to the front coupling. It became obvious why the original flexible coupling had failed - the shaft at the front of the tuning capacitor assembly was offset by almost 1/8-inch horizontally from the shaft which extended from the rear of the dial mechanism.

This put a great deal of stress in the flexible coupling linking these two shafts. This condition was corrected by elongating the holes in the brackets that mount the tuning capacitor assembly onto the chassis, and shifting this assembly sideways to align the two shafts.

A new ceramic flexible coupling was fitted to the two mating shafts, and the supports under the capacitor bank were adjusted to obtain good mechanical alignment. The ball bearings that support the capacitor's shaft had to be tightened to remove some play in these bearings. The main tuning knob now has a very smooth feel when it is rotated, and there is no backlash.

2. A pair of small flexible couplings on the Peak R.F. capacitor shaft.

Someone had replaced the front small coupling with a hollow shaft that was cemented to the small diameter (1/8-inch) shaft. The next small coupling in line had been lashed together with some copper wire.

A new pair of small flexible couplings was obtained from Dave Simmons. *(EUG spares supplier; see Page 2).* These were easily installed, but then the receiver went dead when the Peak R.F. capacitor bank was half way meshed.

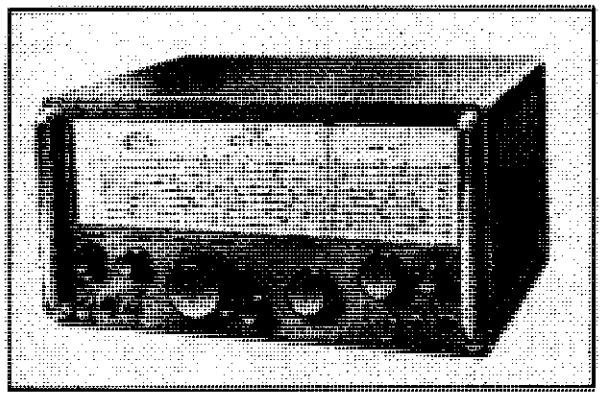
This was determined to be caused by a short circuit between the rotating and stationary plates of these capacitors.

The construction of these capacitors allowed me to make a small shift of the rotating plates so that they no longer shorted to the stationary plates when meshed.

3. A noisy mixer tube.

The original first mixer (6AK5 sharp cut-off pentode) was determined to be the major source of noise on the higher short-wave bands. This was replaced with a 6EH7 remote cut-off frame-grid pentode.

The 6EH7 has triple the conversion transconductance and one-third the equivalent noise resistance as exhibited by the 6AK5. The original 7-pin socket was replaced with a 9-pin socket for the new tube. This required the careful use of a large round file to enlarge the hole for the socket in the thick aluminum chassis.



The Eddystone 830/4 was a 'special' produced for the Canadian Government. Its main difference from the rest of the acclaimed 830 family is its frequency coverage, having Long Waves in place of Medium Waves (120-560 kc/s and 1.5-30Mc/s). It is virtually unknown in Europe but the handbook may be obtained from EUG (Dave Simmons, page2).

It was later determined that the control grid of this mixer was the source of a negative bias which was on the AGC bus - apparently the local oscillator voltage injected at the cathode of this mixer was large enough to cause grid current to flow to the AGC bus.

The grid-to-AGC bus resistor was moved to ground (instead of the AGC bus). This eliminated the (unwanted) negative bias, and resulted in a big jump in the apparent gain of the entire receiver. The 6EH7 was replaced with a sharp cut-off frame-grid 6EJ7 pentode at this time.

4. Audio pulsations on the AGC bus.

The signal-strength meter responds to the bias on the AGC bus. It was noticed that the AGC bus was pulsating in response to modulation on AM signals - this produces an undesired counter-modulation of the received signal. It was corrected by increasing the AGC decoupling capacitor from .1 microfarad to 3.3 microfarad. Now the signal-strength meter responds to varying signal strength and not to the modulation on the received signal.

5. The volume control did not turn off the audio when set for minimum level.

This was corrected by using a large (100 microfarad at 12 VDC) capacitor to bypass the cathode of the 6AT6 audio amplifier directly to ground.

6. Low-Q RF tuned circuits.

Re-alignment of this receiver was straight forward, but disconcerting was the apparent low-Q (or broadband) nature of Band 2 which covers 11-to-18 MHz. This was also noticeable as a reduced sensitivity on this band.

Graeme had mentioned in an early e-mail that the .047 microfarad red Hunt capacitors might be the cause of low-Q circuits. I lifted one end of the Hunt capacitor that is used to bypass the HT supply to the primary coils found in the output of the cascode-triode R.F.

amplifier. This capacitor had no leakage and measured to be .06 microfarad on my capacitance bridge.

Years ago, I learned to look at a capacitor as a series circuit consisting of the actual capacitor and the inductance of its leads. Typical tinned wire used on these capacitors has a self-inductance of 22 milli-micro-henry per inch.

Thus, a capacitor of .06 microfarad and a total of 1 ½ inch leads (33 x 10 minus 9 henry) has a series resonant frequency of 3.6 Mhz. This circuit is inductive at frequencies higher than the series resonant frequency.

The proper design is to use a bypass capacitor that has a series resonant frequency that is slightly ABOVE the highest frequency encountered in the circuit.

Another approach is to use two or more bypass capacitors at the same location. The Eddystone designers used this later approach when they used two bypass capacitors from grid-to-ground on the output triode of the R.F. amplifier, as well as from screen-grid-to-ground on the first mixer.

This second location uses .047 as well as .001 microfarad capacitors. A capacitor of .001 microfarad with a total lead length of 1⅛ inches has a series resonant frequency of 27 Mhz. I installed a 1000 picofarad silver mica capacitor in parallel with the original .047 Hunt capacitor to cure this low-Q problem.

7. Resistors out-of-tolerance.

I have had to replace about eight of the large gray-body 1-watt resistors that were out of tolerance. These were in the signal-strength meter circuit and the BFO circuits. Whenever possible, I used metal-film resistors which should have longer life then the standard carbon-composition resistors.

8. Trying to use low-impedance earphones with this receiver.

The original circuit design, which was used to drive a pair of earphones, assumed that the earphones would have a high impedance load (several thousand ohms). Most earphones available on the market now are designed for a low-impedance stereo source.

I found that using one-half of the 600-ohm audio output winding worked just fine for driving the stereo earphones. I ended up putting a 1200-ohm resistor is series with the earphone jack to cut down the audio level in the phones to nearly match the audio level heard from my speaker.

I also use an external plug/jack adaptor to convert the stereo plug on the earphones to interface with the monaural jack.

9. Missing shield plate. ***(Coilbox cover)***

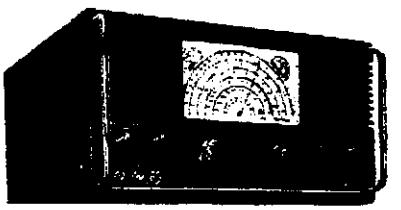
When the receiver is upside-down, there should be a metal shield plate covering the many adjustable tuning coils and capacitors, which are used for aligning the nine different bands.

This receiver is missing this plate - unwanted coupling may occur between the various tuned circuits that are active on any one band. I have a friend who is getting me a piece of 1/32-inch brass plate for this application. Then I will have the fun of locating and drilling the 78 holes that allow the alignment process to be done with the shield plate in place.

Postscript: This receiver is now a pleasure to use. Indeed, it is a crown jewel!

Joel Balogh, AB3J

The Mysterious Disappearing Fault



By Peter Lanksheer NZBC (Retired)

Recently my Eddystone 680 seemed lacking in "sparkle" and in the time honoured manner, I played with the switches to see if the problem was a bit of dirt on a contact. However, before I got much further, the receiver "died" and there was the unmistakable waft of smoke and the smell from a burning resistor.

With the cabinet removed and the chassis upended, the offender was soon located and identified as the H.T. feed resistor to the second I.F. stage. The thoroughly "cooked" condition indicated that it was the victim of a complete short circuit.

Suspicion naturally fell on the associated bypass capacitor C69, a chassis mounted metal cased TCC type as the likely culprit, although this type is normally about as reliable as they come.

However, quick check with a test meter showed that any short circuit had now disappeared, but to be sure I connected a fresh capacitor, along with a replacement resistor.

I don't like unconfirmed faults, but a check whilst the chassis was still inverted indicated that voltages were normal, and I prepared to find out why performance was still below par.

Disaster! With the chassis the right way up the dreaded smoke reappeared as soon as the rectifier cathode was warm. Once again, with the chassis inverted, nothing appeared wrong, but a bit of juggling showed that righting the chassis immediately created problems.

At about this stage I began to wish for a hoist such as motor mechanics use when working on the underside of a vehicle, but with the aid of some "clippy" leads I was able to confirm that there was a short circuit which vanished when the chassis was inverted!

I had removed the 2nd I.F. valve in the vain hope that there had been an anode short, so the 3rd I.F. transformer itself now under suspicion.

As anyone who has worked on Eddystone receivers will know, to achieve stability and efficiency, sections of the receivers were built in layers, and some dismantling is often necessary to access components. This is the case with variable selectivity models where the I.F. transformer connections and their mounting screws are located under the selectivity switch.

Partial dismantling of the switch was required before I could disconnect the I.F. transformer and undo its mounting screws. A further complication was caused by the variable coupling driving rod which first had to be disconnected from the switch. This is best done by undoing a split pin.

With the transformer finally free of the chassis, something inside was rattling, and when its base was removed three

small pieces of fibre and a 6BA bolt and washer fell out. Still inside and loose was the primary winding whose connecting leads had obviously been causing the mayhem by shorting on to the metalwork.

A bit of quiet study revealed how the system works. The actuating rod is supposed to move the lower or primary coil up or down on a pair of rails. The pieces of fibre form one of a pair of 'H' shaped shoes bolted to the coil base, with the lower shoe being connected to the arm.

The bolt holds the assembly together but in my case the bolt, fibre strips, coil base, coil terminal and arm had become disconnected. How this could have happened is not certain, but there was the missing nut whose absence may have been responsible.

If this is so, it took 50 years for the bolt to come completely loose! (The indications were that the transformer had never previously been apart, and furthermore, without the modification I am about to describe, it would have been very difficult to undo a nut.)

The problem now was to put it all together again. As can be seen from the photograph the frame of the transformer is a folded brass strip which restricts access. There was no way to get the bolt into position from outside, and I was not about to dismantle the entire unit. The solution was to drill a hole in the brass frame, sufficiently large to clear the head of the 6 B.A. bolt. It would have been very patience-testing to position the three components of the shoe plus all the other bits at the same time as getting the nut started, so I assembled the three pieces of the shoe first and glued them together by putting a speck of epoxy resin on each. Reassembling was then straightforward enough, and after realignment of the transformer the 680 was back in operation.

Hopefully this problem won't arise for anyone else, but it is possible that another possible problem could occur in Eddystone receivers with variable selectivity. It will be noted from the photograph that the connecting leads are in the form of single conductor loops.

They are almost certainly made of a spring alloy such as phosphor bronze, but it is possible that one could break, resulting in a very dead receiver. My advice though, is to make very sure that an internal fault is confirmed before setting about repairing an I.F. transformer from an Eddystone with variable selectivity. However, if the worst happens these notes should hopefully be of help in the procedure.

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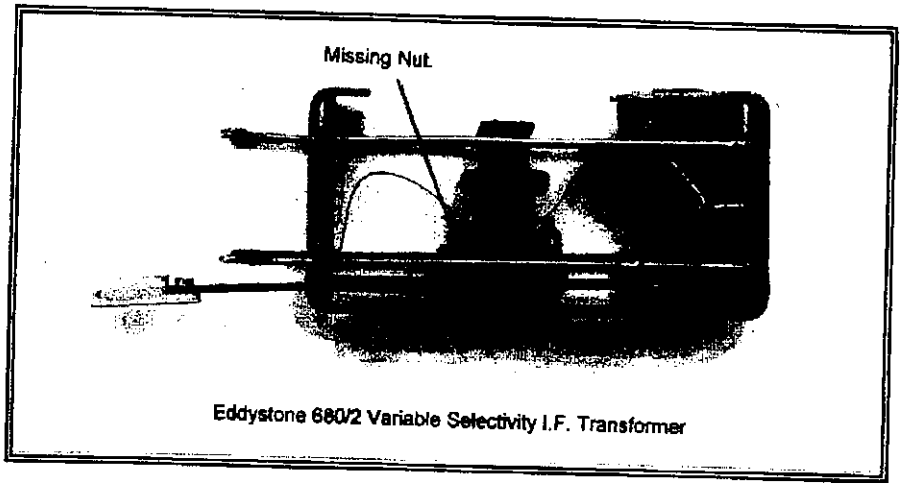
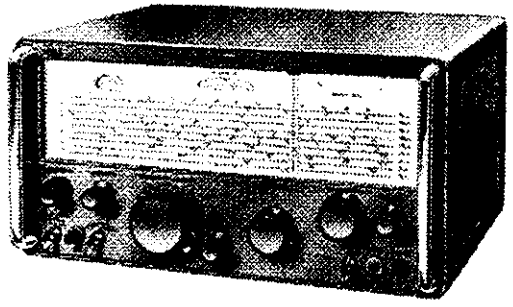


Eddystone 680/2 Variable Selectivity I.F. Transformer

the battery box fitted to my EB35 MkIII had come from a 40A. **Ted.**

Special 830

A non-EUGer has written to me from Holland to ask for information on his 830/5 which was bought several years ago after the scrapping of a badly fire-damaged coaster. Whilst it appears to be a fairly ordinary Eddystone 830 in that it is two tone with light and dark grey but has normal control knobs in place of the chromed levers used on some 830 controls.



Eddystone S.830 Series

There is also the matter of a BNC aerial socket fitted as original spec; on this /5 variant. There is a plate on the rear which identifies this as one of a special order supplied to a Swedish Company - RADIOBYRAN. I have never personally come across one of this variant before but have heard tell of them and know that another 'tell-tale' is that they do not have a mains socket fitted on the rear but have a free socket on the end of a permanently and internally wired mains lead. In all other respects, ranges and circuitry, they remain as per the 830, some do have a built-in keying choke. Ted.

940 & 940HF

Jerry writes in to ask whether there were two different versions of the 940 receiver. He sends in some photo copied ads for that era where the model is sometimes described as the 940 (no suffix) and at other times as the 940HF.

My personal opinion here is that this difference existed only in the sales brochures and adverts, there was just the one version of the set. Can anybody tell me otherwise ? **Ted.**

(I agree with Ted. I think the copywriter missed the gap between '940' and 'HF Receiver'! – Graeme.)

Ubiquitous EF91/6AM6

Not bad going this ! An 888 Amateur Bands-only model has been happily purring away for at least the last three years with two extra EF91/6AM6 bottles plugged into the chassis in lieu of a 6AT6/DH77 and a 6AL5/EB91 in the V6 and V7 positions.

When the set was bought from a Silent-Key sale some three years ago it had been working up until the day it was bought. It was taken home and plugged in and worked okay as a standby receiver, the main station Rx is an EA12. Only recently when a small win on ERNIE was utilised to buy a stock of spare valves was the existence of the alien valves discovered. Strange just how versatile this bottle is.

A Hybrid EC10

Having owned and used the EC10 for a number of years it has been a severe shock to this EUGer to discover that it is not a complete and pedigree EC10.

What went wrong was a lack of signals anywhere up near the HF end of Range 1. Tune up this range and all appeared well until about 17 Mc/s, and then SILENCE ! He described it as sounding as if the whole Broadcasting establishment had gone off the air.

Since this happened after some of this year's worst thunderstorms it was felt that some kind of static discharge may have damaged the RF transistors.

He was right too ! It was soon found that a replacement TR1 cured the loss of HF end signals but then constemation set in.

Whereas the EC10 circuit depicts an IF and AF board configured for a transformer fed loudspeaker, this IF/AF board had a typical 1960s type of transformerless AF output stage. A bit of research and it was found that whereas the RF board and circuit were pure EC10 the IF/AF board and circuitry was that of an EB35.

Even the PCB number tallied with that of a pal's EB35. Differences in the wiring and soldering techniques show that this

- B.F.O drifting on an 830/8.-

- A real baddy this one, it persisted despite the usual checks and changes. Normal drift of course from warm up but then it would occasionally recommence to drift again after several hours of use.

- Since it happened on all positions of the mode switch I ignored the tuned circuits, which switch in various combinations of capacity for CW, USB & LSB.

- Waiting until the set had been on for some hours and the drift had begun I found that C184, the kathode bias electrolytic in V13 circuit had gone from being a condenser to being a low value resistor of some 30 ohms. Since this is taken - together with the 220 ohm kathode resistor - to the tap on the BFO coilits change would affect the frequency. I replaced this and powered up again, drift continued for a while after the normal warm up period, no doubt the forming process in the electrolytic I had fitted, but then after about two hours the BFO was once more rock solid, I left the 830 on, with gain down, tuned to a volmet signal and next morning there had been virtually no drift.

- I can recall an 830/7 some years back where the drift on BFO was traced to a 100 Kohms in the screen circuit which gradually went up from its coded value to a half megohm. Drift was not any where near excessive, just enough to be a nuisance on long overs of a SSB QSO.

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Tape Recorder feed on a 670C ? It's built in.

- Needing a low level feed point from my 670C - I was intending to record some CW signals at $7\frac{1}{2}$ ips and play them back at $3\frac{3}{4}$ - my CW speed is very low. A look at the schematic for this set showed me that my needs had already been catered for, well almost.

-Provision is made for a pickup input to the audio driver stage via the volume control. Since this facility is never used I decided that it was ideal for my needs, a fixed level of audio at millivolt level which is not varied by the volume control. The only mod I needed to perform was a soldered link between the 'tip' contact of the socket and the break contact. No BFO on the 670C you say ? I have fitted a self contained kit built to run from a PP3 battery it is mounted on the underside of the chassis near to V3 and feed to this stage is via a wire probe.

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Letter from South Porcupine

By David W Whiting

Over the past six months we have had much ongoing and absorbing comment about the Eddystone 830-series ("The Jewel in the Crown"). In our last issue (#79, June 2003) David wrote for us a very interesting piece on the 830/4 in Canadian Govt service. This month he fills us in with his afterthoughts . . .

Dear Graeme,

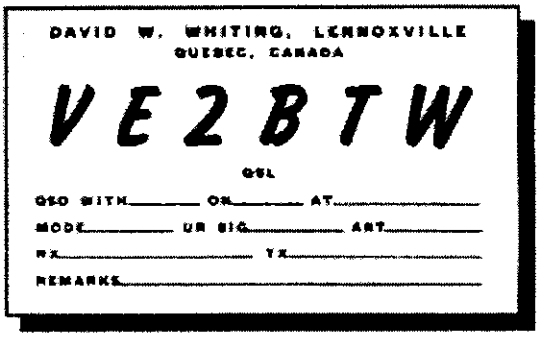
Received my June 'Lighthouse' today, and just wanted to send along this note regarding my input on the CDN 830/4 receiver.

First of all, TYVM for tidying up my English composition to make the article more readable, although I've never seen the word 'surveylance' (page 30) for surveillance, which is commonly used in N. America. HIHI Maybe our American friends will be wondering about that one. *(Actually, David, it's an old Bewdley way of spelling it (!). Has anybody noticed that 'Bewdley' is derived from Norman French? Have a go and anybody who gets the original meaning correct will get a special mention. – Graeme.)*

I guess the town name 'South Porcupine' is a bit strange. It was apparently the name of one of the original gold mining camps (along with Porcupine and several others) in the big Timmins gold mining area.

We just live here because it's now just a suburb of Timmins, and my XYL is still working at Timmins airport. I'm originally from the Sherbrooke, Lennoxville, area of Quebec. (Now there's some good old English names you can sink your teeth into HIHI!).

Enclosed is one of my old homebrew QSL cards from 1964 when I first got my ham licence (I was then in the process of studying for my 2nd Class PMG).


DAVID W. WHITING, LENNOXVILLE
QUEBEC, CANADA

VE2BTW

QSL

QSO WITH_____ ON_____ AT_____
MODE_____ UR SIG_____ ANT_____
RX_____ TX_____
REMARKS_____

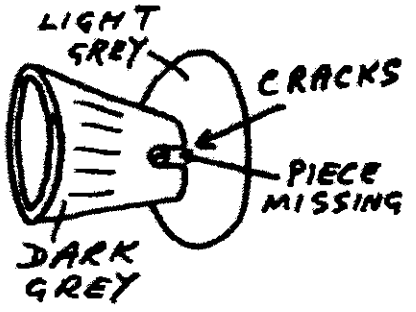
My only other comments are on the 830/4 spares kit and the control knobs cracks.

The spares kit contained quite a bit more than the dial cord and a few spare knobs. After thinking about it for a while I remember there were two spare aluminium can electrolytics and two green porcelain-covered resistors (140 ohms for the power supply surge limiters), two small electrolytics, a spare set of dial lamp bulbs and fuses as well as the dial cord and knobs and a few more items I can't recall.

I don't remember there being any valves, though. But we'd got hundreds of thousands of our own so they probably weren't needed.

The control knob cracks were a very minor thing and I never heard anyone

else even mention it. Perhaps no-one else but me (a receiver fanatic) ever noticed. I just thought it strange for brand-new merchandise to have an imperfection like this, unimportant though it may have been.



The knob that probably first caught my attention had two cracks and the piece of dark grey plastic between the cracks had fallen out and disappeared. That made me look at the other knobs and check out other 830/4s (all basically new).

I think 50% of the knobs I looked at had at least one crack, with a few having two cracks (as shown above). Nothing serious, but it made me wonder why (especially as I owned a 940 with identical-looking knobs).

As the receivers were all from the same batch with probably even more or less consecutive serial numbers, the knobs were maybe made that way too and localised more or less to that production run of receivers.

Maybe the plastic hardened too much and became too brittle, or maybe too much pressure was used to assemble the two-tone knobs themselves. Maybe some feedback will explain all!

I would like to see some articles appear from users of the 880, 850/2/4, and the newer 1830, 1837/38 and 1650 receivers in commercial or marine service, and the old 730/4 in Army service. There must be some more retired R.O.s out there with experience of these and other Eddystone models!

Thanks again, Graeme, and I will try to respond to any queries or questions or whatever that might turn up, perhaps from other 830-series users in other parts of the world.

(David then goes on to say that he doesn't necessarily expect any of this to be printed in 'Lighthouse' and that it's mainly for my info and database, in case anyone ever asks.

Let me say that 'Lighthouse' IS my database and such letters are the very stuff of it.

Come on anybody, can you fill in David's request for User's Experience, please. --- Graeme)

More from Graeme:- My own observations of about 100 of these 830/940/840C knobs is that I've only ever seen one crack such as David describes.

I have, however, seen some identical cracks on the larger but contemporary knobs from a 670C/1 (Mimco 'Elettra', see QRG/3 page 29).

Tom Toth, G4ORF writes to say . . .

" . . . it is very unusual, but in my official line of duty I have seen cracked control knobs on a number of occasions and thought to share my ideas:-

Most of the cracks occurred on knobs that had a thin (1-2 mm) outer plastic material on a brass centre portion. Some plastics are known to shrink with ageing, metal doesn't. Knobs with a substantial plastic body, e.g. the early grey ones on the EC10 didn't seem to suffer the same fate.

Last word from Graeme: The word from the ex-Bath Tub chaps is that it was due to shrinkage of the plastic provoked by the hole. The 'collet' type of knob was adopted afterwards. ♠

LETTER FROM PENNSYLVANIA

Joel Balogh, AB3J, reports on latest events.

eBay listings . . .

I read with interest the report in the last issue of 'Lighthouse' on the eBay sales of Eddystone equipment. I look for Eddystone listings on eBay every day here in the U.S. and failed to see most of the items in that list. Evidently, there is a different tabulation of equipment for the two different continents. A few items that I have seen are being offered in the U.K. with prices shown in Pounds Sterling, but this is the exception.

Eddystone 830/4 Power Supply Failure

My Eddystone 830/4 Receiver started blowing its power-line fuse yesterday during normal use. Below are listed things that I found while trouble-shooting this failure.

a. C195 located across one-half of the high voltage secondary of the power transformer was found to be shorted. It was a Hunt .05 mfd @ 500 VDC. I replaced it and C196 with polystyrene .01 mfd @ 630 VDC capacitors. The replacement developed a short within seconds after I turned on the 120 VAC power.

b. I removed these two capacitors as well as the 140-ohm R100 and R101 resistors from the transformer's secondary terminals. It was discovered that one-half of the high voltage secondary winding was open-circuited. This was the secondary connected from ground to C196 and R101.

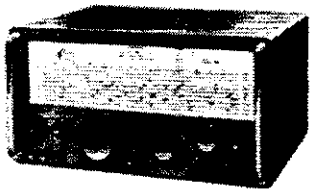
c. The high-voltage secondary was originally constructed with taps that would provide reduced output voltages. I found that the tapped-down secondary winding was NOT open-circuited, so I connected the 140-ohm R100 and R101 resistors (which are in series with the silicon rectifiers) to these terminals. I did not replace capacitors C195 and C196 since these are not normally found in full-wave rectifier circuits using silicon rectifiers.

d. The resulting HT1 voltage is now 230 VDC instead of the 240 VDC that shows on the schematic diagram. I never did log the value of HT1 when I was working on this receiver two years ago.

In summary, I am very happy with this repair since I did not have to replace the power transformer. Maybe the secondary winding opened up due to old age? It sure is hard to figure out why the capacitor on the 'good' side of the secondary went bad when the other side of the secondary winding opened up.

73 de Joel, AB3J, Landenberg, PA.

Sideband Snag



By Graeme Wormald G3GGL

The other week I was phoned by a member who had recently acquired one of those great old favourites, a model 830/7. This is one of several classic Eddystone valve sets fitted with a product detector for SSB/CW reception and a traditional diode for AM. Jim came up with a problem which was new to me on any of the models. It set me thinking . . .

"It's working on AM and USB but it's weak on LSB." reported Jim.

Quite frankly this didn't compute in my brain as a logical fault. Browsing a copy of the circuit diagram I confirmed that the only USB/LSB difference in the active part of the product detector was the value of fixed tuning condenser in the oscillator circuit.

"Does the speech resolve properly on LSB, as good as on USB?" I asked Jim. "Oh, yes," he said, "perfectly readable but just very quiet"

This exonerated all the immediate components in the circuit because the first thing to happen with any such problem would be an incorrect local oscillator frequency which would completely mess up the resolution of the speech. Donald Duck would be back in town.

The switch that selects the upper and lower sidebands, AM and CW is S5, a four-way rotary switch (Yaxley-type).

But wait a minute! It's S5e, so what are all the other little S5's doing?

Well S5a selects the output from the AM detector diode and CW/USB/LSB from the product detector. S5b selects slow AGC for SSB and fast AGC for AM/CW. S5c selects HT for SSB/CW for the product detector (no HT for AM).

So what if one of these switch contacts was not up to the mark after thirty or forty years? We know it happens with the very similar wavechange switches. Do we bother to work out which section may be causing that crackling on band 3? No. We spray the lot with *Servisol Super Ten* and give it a wiggle. I told Jim to do the same with all the banks of S5.

He phoned me a couple of days later to say "Abracadabra". Both sidebands were now at the same level. And remember this problem could crop up in the 880-series, the 940 and 888A, as well as any other 830 model. ♠

830/7

WIDE RANGE COMMUNICATIONS RECEIVER

The Eddystone 830/7 was the most popular of the Company's "classic" series of valve receivers. It was conceived in the Model 910 of 1957, a double superhet with tuneable first I.F., which was marketed by Marconi as the HR101 in the early 1960s. The 830-Series appeared in 1962 and was in continuous production until January 1973. It was the last valve set to come out of the Bath Tub. Contemporary Company literature states that it was phased out, not through lack of demand, but due to the impossibility of sourcing components. It continues to be the model 'most wanted' by most E.U.G. members. The Service Handbook is available from Dave Simmons (ibid.) but the sales leaflet is very rare. We reproduce it here for members' information and enjoyment.

Eddystone Model 830/7 (Retail price £275-£442)

The Eddystone "830/7" is a high-grade general purpose HF/MF communications receiver covering from 300 kc/s to 30 Mc/s in nine ranges. It is of compact dimensions and both rack-mounting and table versions are available. Operation is from any standard AC mains supply and provision is also made for using external power supplies.

Modes of Reception encompassed are CW, AM and SSB. Selectivity is continuously variable and the bandwith appropriate to a given signal can be readily selected. On SSB, a separate detector is used, a panel switch permits adjustment to upper and lower sideband, and a fine tuning control is available. A crystal filter with a very narrow bandwith reduces interference with reception of CW signals.

The Circuit is single conversion on frequencies below 1.5 megacycles, and double conversion, with a tunable first intermediate frequency, on frequencies above 1.5 megacycles. An incremental coverage of 100 kc/s each side of any selected signal frequency is available when using double conversion. The first and second oscillator circuits can be crystal-controlled for high-stability operation on frequencies above 1.5 Mc/s.

Tuning arrangements are particularly versatile. With the main tuning scale standardised against the internal crystal calibrator, the incremental control allows accurate tuning to within one kilocycle (1.5 Mc/s to 30 Mc/s). A switch on the panel provides instant changeover to crystal-controlled operation, with rapid selection of up to eight spot frequencies. Flexibility is afforded by the fact that any crystal within 100 kc/s of the nominal value called for can be used in conjunction with the incremental tuning facility.

Performance is of a high order, as a study of the technical characteristics given later will confirm. A design feature of importance is the low level of oscillator radiation, which makes the "830/7" suitable for use in installations where a number of receivers are operated in close proximity.

Ease of operation has received special attention. The panel controls are laid out for maximum convenience of the operator; the wide and well illuminated scales allow the frequency to be read with a high degree of accuracy; and the finely engineered, gear-driven slow motion mechanism permits smooth, precise control of the tuning.

Construction follows the traditional Eddystone pattern. The receiver is robust and well able to stand up to arduous service. Components, workmanship and finish are of the highest grade, ensuring inherent reliability.

Frequency Coverage

Nine ranges give the following coverage :--

Range 1	18 to 30 Mc/s
Range 2	11 to 18 Mc/s
Range 3	6.7 to 11.0 Mc/s
Range 4	4.0 to 6.7 Mc/s
Range 5	2.5 to 4.0 Mc/s
Range 6	1.5 to 2.5 Mc/s
Range 7	860 to 1500 kc/s

Range 8	480 to 860 kc/s
Range 9	300 to 520 kc/s

Intermediate Frequencies

First IF nominally 1350 kc/s. Variable over the range 1250 kc/s to 1450 kc/s to provide incremental tuning. Second IF 100 kc/s, with variable selectivity and crystal filter.

Valve Complement

V1 6SE8/ECC189 (CV5331)
Cascode RF amplifier

V2 6AK5/EF95 (CV850)
First Mixer

V3 6AJ8/ECH81 (CV2128)
2nd Mixer/2nd Osc isolation amp

V4 6C4/EC90 (CV133)
Second local osc.

V5 6BA6/EF93 (CV454)
First 100 kc/s IF amp

V6 6BA6/EF93 (CV454)
Second 100 kc/s IF amp

V7 6AL5/EB91 (CV140)
Noise Limiter

V8 6AU6/EF94 (CV2524)
Cathode follower IF
Output (100 kc/s)

V9 6AT6/EBC90 (CV452)
AM Det/AGC Rect/Audio amp.

V10 6AQ5/EL90 (CV1862)
Audio output

V11 6AU6/EF94 (CV2524)
Crystal calibrator

V12 6U8/ECF82 (CV5065)
First local oscillator

V13 6BE6/EK90 (CV453)
CW/SSB detector

V14 0A2/150C4 (CV1832)
HT stabiliser 1

V15 0A2/150C4 (CV1832)
HT stabiliser 2

D2/5 DD006 (or two DD058 diodes)
HT rectifier

Scale Presentation

The main tuning scales are calibrated to an accuracy within 0.5%. Using the crystal calibrator in conjunction with the cursor adjuster, a high order of accuracy is obtainable.

The incremental tuning is indicated on a separate scale, directly calibrated in kilocycles. The whole dial is well and evenly illuminated.

Controls

Wavechange switch and crystal selector; Main tuning, with 140/1 precision reduction drive; incremental tuning; peak RF; independent RF, IF and AF gains; selectivity; mode switch, selecting AM—CW—SSB upper—SSB lower; BFO pitch; combined AGC/NL switch; crystal calibrator; cursor adjuster; mains switch. Meter adjuster at rear.

Carrier Level Meter

On the front panel is fitted a carrier level meter, marked in arbitrary divisions over a scale of naught to ten. It is useful as a tuning meter and for making comparative measurements of signal strength.

Desensitising

When desensitising is a requirement, terminals at the rear (normally shorted out) can be brought into use, leads being easily taken either to an external switch or to contacts on a relay.

Noise Limiter

The series-diode type of noise limiter is effective against ignition and similar pulse types of electrical interference.

Power Supplies

Mains operation: adjustable to accept 100/125 volts and 200/250 volts AC, 40/60 cycles. Consumption 85 VA.

External Supplies: when mains are not available, supplies required are 6.3 volts, 4.8 amps (approx.) and 250 volts 160 mA.

Accessory supplies: when the receiver is working from AC mains, the following are available; 250 volts, 15 mA (unsmoothed) and 6.3 volts at 1.2 amps (earthed centre tap).

Construction

The receiver is housed in a strongly made, well finished steel cabinet of convenient dimensions and in standard form is supplied for table mounting. A rack-mounting version, the "830/7/RM", is available for fitting into a standard 19" rack, in which it occupies a height of 8¾". The table version can be converted to rack mounting by fitting special angle brackets and a modified cabinet. The finish is two tone grey.

Robust construction and high quality components lead to excellent reliability, and the receiver is intended for continuous use under all normal climatic conditions.

Physical Details

Width	16¾" (42.5 cm)
Depth	15" (38.1 cm) (including rear projection)
Height	8¾" (22.2 cm)
Weight	49 lb. (22.2 kg)

Sensitivity

With an IF bandwidth of 3 kc/s, the sensitivity is better than 3 microvolts for a 15 dB signal-to-noise ratio, throughout the range.

IF Selectivity

The overall bandwidth is continuously variable within the limits of 1.3 kc/s and 6 kc/s (6 dB points) and is narrowed to 50 c/s when using the 100 kc/s crystal filter. The selectivity control is marked "CW—SSB—AM", a click stop being provided for positive selection of the correct bandwidth for SSB. The crystal filter is introduced when the control is moved to the extreme right-hand position.

Typical overall bandwidths are as follows, the crystal phasing being pre-set to give a symmetrical response.

Positions	6 dB bandwidth	50 dB bandwidth
Crystal	50 c/s	2 kc/s
CW	1.3 kc/s	5 kc/s
SSB	3 kc/s	8 kc/s
AM	6 kc/s	12 kc/s

Spurious Responses

Image rejection :--

300 kc/s to 1.5 Mc/s greater than 50 dB

1.5 Mc/s to 10 Mc/s greater than 70 dB

10 Mc/s to 30 Mc/s greater than 50 dB

IF breakthrough—

at the first intermediate frequency, better than 70 dB except at 1.5 Mc/s on range 6 where the figure is greater than 60 dB. At the second intermediate frequency, greater than 85 dB at all frequencies except on range 9 where the figure is greater than 60 dB.

Frequency Stability

After a ten minute warm up period, drift with the free-running oscillator is approximately 12 kc/s in the first hour, at 28 Mc/s. After a further thirty minutes operation, drift at any frequency will not exceed four parts in 10^4.

With the first oscillator crystal controlled, drift during the first thirty minutes does not exceed one kilocycle. After this period, drift will be less than 500 cycles in any one-hour period.

AGC Characteristic

The audio output does not change by more than 9 dB when the carrier level is increased 90 dB above 3 microvolts (figure taken at 8 Mc/s with a 3 kc/s bandwidth). The normal AGC discharge time constant is 0.15 second and is changed to 10 seconds when the Mode switch is in an SSB position. The AGC delay is also reduced for SSB reception. The AGC potential is brought out to a socket at the rear of the receiver, for diversity and other purposes.

Audio Output and Response

The audio output stage will deliver a maximum of 2.5 watts at either the 2.5 ohm speaker terminals or the 600 ohm line terminals when used independently. The audio response is level within 6 dB from 200 cycles to 6000 cycles and distortion at 1000 cycles does not exceed 5% at an output of one watt. Hum level is 50 dB down at 2.5 watts. A jack accepting a standard telephone plug is fitted to the front panel.

Aerial Input

Nominally 75 ohms unbalanced to a coaxial socket.

In the interests of continued improvement, we reserve the right to amend this specification without notice.

EDDYSTONE RADIO LIMITED

ALVECHURCH ROAD,
BIRMINGHAM 31, ENGLAND

Telephone PRIORY 2231

Cables EDDYSTONE, BIRMINGHAM

Telex 33708

Issued November, 1967

The Achilles Heel of the 830-series

Graeme Wormald G3GGL

The revered 830-series may have been top of the line for a decade, but it had one component which was a poor choice in the original design – at least, it was in my humble opinion (Bill Cooke please look the other way!). Let's see what can be done about it . . .

Elsewhere in this issue, in *"Tales from the Workbench"*, I described how my old favourite 830/7 was brought out from a period of rest and was found to have a duff anode load resistor.

Whilst the set was out of its case – (I hate taking these Eddystones out of their tight-fitting cases) – I decided to check over the calibration. So I pressed the little black CAL button and went for the nearest 100Kc/s mark. The first couple of goes were fine but then the operation caused a bit of a crashing sound in the speaker when the button was released.. Mmmm

So what do you do with a scratchy switch? Well, the first thing you do is wriggle it. Clear the dust.

I pushed it in and out half a dozen times and the crashing got louder. Then the switch started smoking. Honestly!

I peered at the back of this rather odd little open black switch and it was GLOWING RED! Oh dear.

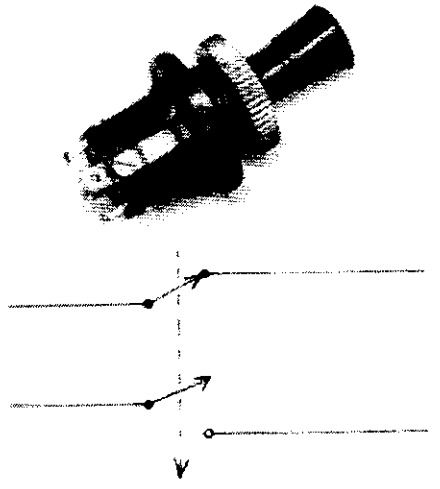
By now the crashing had stopped. So had the set. I switched off, pulled out the mains plug and scratched my head.

The black Bakelite CAL button.

I once had to change one of these on a member's set some years ago. The threaded body of the switch is all Bakelite and the projection through the heavy die-cast panel is only just enough to get the nut on a couple of turns. It's easy to strip if you tighten it, and somebody had.

I managed to install a replacement after using up a lot of nervous energy. It's a bit of a fiddle as the diminutive switch terminals are used as soldering points for components. It really needs the skill of a time-served Stratton apprentice to do it justice.

However, persistence prevailed and success was achieved. But the memory of that struggle remained in my information store, and when the above fire-brigade situation happened my heart sank.



Original Equipment Painton Switch

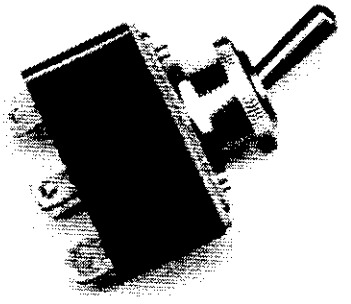
Now these switches are a four-terminal device; actually two independent single pole single throw switches. One is open whilst the other is closed. All the switch contacts are open to the air, and I, for one, don't believe they're rated for 250-volt use.

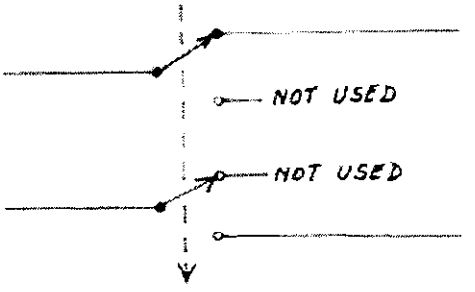
They just have the maker's name "Painton" moulded in them; no ratings are given. Now Painton was (is?) a perfectly respectable manufacturer, but I don't honestly think they're up to keeping 250 volts and earth apart!

The double-pole change-over spring-biased toggle switch is a standard item, and, of course, will do duty as the above by ignoring the opposite poles.

At my next rally I bought one, brand new and gleaming, for 90p. Its mounting diameter was 0.5 mm less than the original black Bakelite. (12mm instead of half-an-inch?) And the soldering tags were bigger.

A sketch was made of the components connected to each tag and the fire hazard was removed. It was found to have carbon tracking between two opposite poles, i.e. from the HT to the R.F. Gain pot. Not a recommended combination. This confirmed my inclination not to use a replacement of the original pattern "Painton" push-switch, but to use my new 250v 3a "N.S.F." spring toggle switch.





Robust Spring Toggle Switch

It fitted like a dream, easier to wire up, and the nut was tightened to perfection. The set sprang to life at first go and the CAL worked perfectly. No damage done by the fire, thank heavens. And, do you know, the shiny chromium toggle switch looks as if it was meant to be there. Just look at the picture in the previous page; isn't the legend "CAL" intended to have a toggle switch, not a push?

One last word here; the Models 888, 888A, 770R MkII and 770U MkII use the same dodgy switch for the same purpose (maybe others, for all I know).

♠

EDDYSTONE 830/3 (Or is it?)

By Chris Morgan G3XFE

I read an article recently about old valve radios, it subsequently prompted a discussion about the previous owners of old radio equipment. The point being that few of us can say for certain who has, or how many have, owned a set before it came into our possession.

Whenever I acquire another Eddystone I always enthusiastically give it the once over with a signal generator or whatever I deem to be necessary under the circumstances making allowances for my limited knowledge but ever-increasing confidence. There is no reason to assume that we don't all follow a similar course of action. There are those who take it a step further and make alterations. Others, in an honestly held belief that they are 'improving' the set, will attempt serious changes to the design. I wholeheartedly concur with the article in the last issue of "Lighthouse" rebutting the need for drastic changes to a 940.

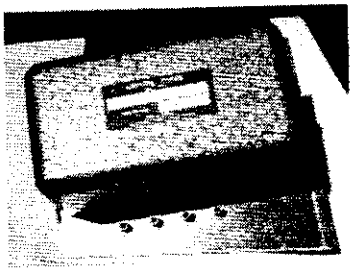
All of these points have been raised from time to time in back issues of the Lighthouse. My point is that most likely, every owner will have 'fiddled' with the radio at some time or another and if 10 people have had their hands on it since it left the manufacturers 50 years ago, heaven only knows what modifications or approximate components have been fitted to the point of making the internal circuitry barely resembling the original design.

I well remember a long write up in one of the other magazines that described 'Restoring an HRO'. The owner had ripped out all valves/sockets, replaced them with B9A valves, altered the circuitry to suit, inserted a different filter arrangement and completely altered the output circuitry...why? He had fitted a HRO tuning knob and continued to refer to it as an HRO receiver. Nothing about it resembled an 'HRO'.

This brings me to my reason for authoring this article. A year ago I collected an 1830/1. Along with it came the 'baggage' of a defective and rather scruffy 830 (which cost nothing other than the fuel to go and collect them both). I had wanted one for a long time but wasn't prepared to pay the usual 200 quid asking price for an 830, I work on the premise that sometimes things may comes to those who can wait.

As soon as I got it home I cleared the workbench and set to work on it. I established it was a /3 model which Graeme assures me is quite rare. The inside was clean and appeared to be alright. The exterior was scruffy but Dave Simmons promptly supplied a new main dial and incremental scale by return of post. There was an unusual Marconi filter, not Piccolo, fitted that made the selectivity pin sharp. It was

permanently in circuit, no switching had been fitted to bypass it, instead the method was to unplug the 2 lengths of miniature coax going to the filter assembly and connect them together directly. It didn't have a T2 and the output from the filter was passed directly to the grid of V5 (1st IF) via a 2000pF capacitor.



Once I had established that the mechanics were sound I tried to align it. By carefully following the handbook I aligned the 2nd IF(100kc/s). When it came to sorting out the 2nd oscillator I noticed that by the time the dial reached plus or minus 50, the performance had dropped off so much it was as if the oscillator had stopped working because the receiver was stone dead but it peaked again when I zeroed the incremental tuning. Yes I did peak the RF Peak control as I tuned away from zero.

It took me a long time to try and work out the relationship between the 2nd oscillator actual frequency and exactly how the mixing process should work. This was because no matter how I tried to align the tracking it never was remotely near the calibrations on the IRT dial and the receiver still died after the 50 markers. In the end I resolved to never use the incremental tuning, set it to zero then peaked everything there and used the receiver by tuning the main tuning only.

There the story ended for about a year because out of sheer despondency I shelved the radio having wasted so much time getting nowhere. Meantime I put out a number of requests for some spare parts to try and construct a T2. I had it in mind that I would settle for an old BFO can with a B7G base on top into which I could substitute the valve for a crystal and suitably changed the components to make up the full crystal gate circuit as shown in the 830 diagram. Eventually my plea was heard on the EUG Sunday net and I drove some distance to collect another 'Free' 830. This time it was an 830/9, even scruffier than my /3.

I manufactured a pseudo T2, used a spare B7G 100kc/s crystal that I had put by for this occasion and fitted it. The microswitch conveniently mounted adjacent to the selectivity spindle and was switched by the cam that operated the crank arm to T1 variable selectivity slider as it was rotated to maximum.

I changed the R's and C's in the 2nd oscillator and 1st IF circuit in the enclosed box on the right of the set. I gleefully switched on and waited for the meteoric rise in output as I was sure I had addressed what was causing the poor tracking etc.. Not a bit of it. The set was just as poor as before. There remained only one course of action because I refused to let it get the better of me after all, I had set my sights on an 830 for a long time, so I put it to one side for a few days so that I could return to it with a clear head and renewed vigour otherwise I find I end up going around in circles.

I started at the aerial input and painstakingly inched my way through the set referring to every component by

checking it with the circuit. I made sure each component was the correct value and that it was where it should be. I learnt this from a similar encounter with a Collins TCS Tx/Rx a few years ago that had been wired it up incorrectly. When I reached the 2nd oscillator stage I noticed that several components were missing. This was not by my own hand as I had simply replaced like for like but with modern components. The 1st IF had also been wired incorrectly in one place. I spoke to the previous owner about it, he said 'Well you know the circuits are different for each of the sets' don't you.

I double-checked that I was indeed working on a /3 (serial/model number plate on rear) and that I was holding an 830/3 circuit, which I was. When I finally looked at a handbook with circuits for all models, he was right, the 2nd osc and 1st IF circuitry differed substantially. My 830/3 2nd oscillator and 1st IF stage had been wired up as if it was an 830/5. I hazard a guess that at some time in the past an owner hadn't checked that there were these differences and had simply made the adjustments to the circuit that he had on the assumption that all models were pretty much the same but then wondered why nothing would track properly so gave it up as a bad job. I am also aware that according to Graeme many sets were designed to meet the individual requirements of certain clients and that at their disposal at the end of their service 'special' mods were removed. Sometimes alterations were put in to distract the curious amongst us to throw us off the scent (Is that right Graeme?). *(You tell me !!)*

I continued my checking process and found nothing else untoward having returned the previously mentioned stages to an 830/3. I now knew it would work, there was nothing else it could be. I still had trouble finding where the 2nd oscillator was actually tuned so resorted to a loop on some coax placed nearby acting as an aerial into my main base station transceiver. I found the signal and 'tracked' the edges to roughly 1150 kc/s and 1350 kc/s. Returning to the 830 I fine-tuned it to the scale reading with no problems at all and the readout is exact up to plus/minus 90 but drops a division before 100. The set is great and I use it much of the time and it is certainly a worthy addition to the shack despite its earlier problems.

The moral of the story here is NEVER assume that the radio is everything it should be and that it does have its full complement of components, expect that someone at some stage has altered something for reasons best known to him at the time. 'Beware of the phantom twiddler/fiddler' is a phrase I once heard and never has a truer phrase been ringing in my ears. My guess is that I acquired the set for nothing as did the previous owner because they saw it as a dead duck. It is surprising what a bit of time and patience can do when you set your mind to a particular endeavour and if you can be bothered to put all the parts back with the right values exactly as Eddystone intended then it must work.....indeed it did!

I hope this is of interest Graeme and may be of interest to our readers.

73 Chris G3XFE.

Model 830 "Help Report"

Joe LeKostaj K9LA

Hello, Graeme.

Just wanted to let you know that I enjoyed the "830 Special" issue of Lighthouse very much. The 830 is my favorite among the receivers in my small collection. It's a pleasure to operate and its styling is very pleasing. To me, it looks just the way a professional shortwave receiver ought to look!

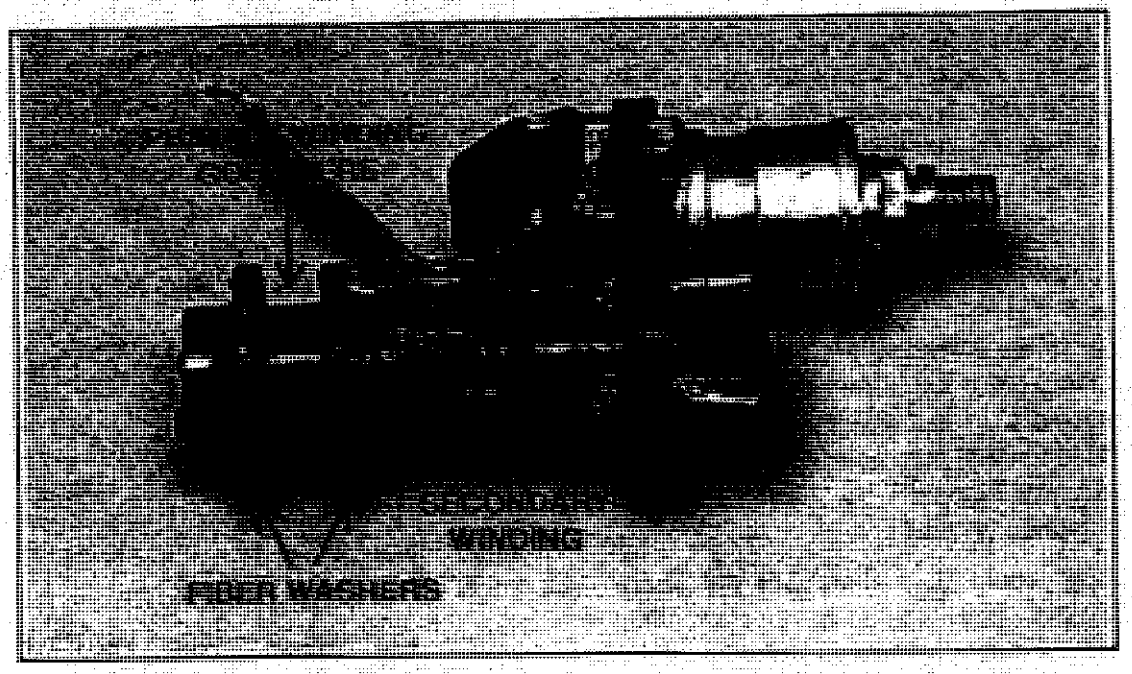
Having restored a sad-looking 830/4 last year, I'd like to report two tips that other 830 owners might find useful.

One of the first things I noticed when the receiver arrived was that the coil box cover was missing and there were two jumper wires kludged in between the RF and mixer sections. Not a good sign!

I proceeded with the typical repairs first, such as replacing a dud filter capacitor in the power supply and replacing many out-of-tolerance resistors.

When the time came to apply power, the receiver sprang to life and was very sensitive except on ranges 2 and 3 which were quite deaf. Probing with the voltmeter revealed that V1 (RF amp) plate voltage was nearly zero on those two bands.

Ohmmeter checks eventually revealed that the primary windings of mixer coils L17 and L18 were open. Then I realized that the two kludged-in wires were a previous owner's attempt to jumper around these faulty coils.



I carefully removed the two coils from the diecast coil box, hoping to find the primary windings had simply broken off at the solder lugs. Unfortunately this was not the case; the breaks were buried within the windings!

At this point I felt kind of down, as these coils obviously were not off-the-shelf items that could easily be replaced. However, I figured that I couldn't do any more harm to the coils if I attempted to repair them myself

So I started to carefully unwind the primary winding, writing down the number of turns for rewinding later. The break in one of the coils was nearly at the innermost end of the winding (of course!), while the other coil had three breaks.

As I recall, one coil had about 85 turns and the other had over a hundred turns. The wire diameter was measured as 0.005 inch, (this is about #40 Imperial s.w.g or #36 American w.g.) and I soon obtained a small spool of it from a mail order company.

Then the task was to try to rewind the neatly made pi-wound coil which minimizes the distributed capacitance of the winding. But how to do this by hand?

Before unwinding the primary I measured and recorded its dimensions and the spacing between it and the secondary winding on the coil former. Using coil dope, I then affixed two fiber washers to the coil former to act as "bookends" between which the new primary could be wound. (See attached photo.)

This would guarantee that my hand-wound coil would have the same height and thickness as the original.

I quickly found it impossible to make the pi-wound pattern by hand. So I simply scramble-wound the wire over the form between the two fiber washers and hoped for the best.

Then L I7 and L I8 were carefully re-installed into the coil box. Now came the final test! The receiver was warmed up, and the alignment procedure was performed on range 2 and 3.

I was very gratified to see the sensitivity return to full spec compliance. Now the 830/4 was back to normal sensitivity on all 9 bands! This goes to show that even the failure of a specialized part can often be overcome.

The other tip I'd like to offer was found after a few weeks of enjoying the newly-restored 830/4.

While listening to SSB or CW, I noticed a slow but annoying frequency drift even after the receiver had been running for an hour or more. To trace the origin of the drift, I grabbed my Sony ICF-200 I shortwave radio.

A modern frequency synthesized radio such as this serves double duty as a handy piece of test equipment! I tuned the Sony (in SSB mode) to pick up the first local oscillator signal leaking from the 830/4, and found it was steady as a rock.

Then I tuned in the 830's second local oscillator signal; also rock-solid. The only other possible source of drift was the 100 kc BFO, so I tuned the Sony to 300 kc (3rd harmonic of the 100 kc BFO). Bingo, there was the source of the 830's annoying drift!

I found it difficult to work on the BFO just by taking off its shield can, so I

removed the whole BFO assembly from the chassis.

I had already replaced some out-of-tolerance resistors a few weeks earlier, so I focused instead on capacitors C 173, C 178, and C 179. This turned out to be the wrong path. Replacing these parts did not stop the drift.

This left the oscillator coil L38 and tuning diode DI as suspects. If DI was at fault, what could I replace it with? Its metal "top hat" package led me to think this diode was probably just a common (for 1966) power rectifier diode pressed into service as a tuning diode.

So I replaced it with a plastic 1N4005 rectifier diode from the junk box. No more drift! After a slight touch-up of the USB and LSB calibration trimmers, the 830/4 was then back in service.

As much as I enjoy using the 830/4, there are still two small quirks that I'd like to fix if possible:

1) On range 1 (18-30 Mc), turning the Peak RF control pulls the first L.O. by about 5 kc. This doesn't happen on other ranges, not even at the high end of range 2 which overlaps with the low end of range 1.

2) There seems to be leakage of the AM audio detector into the AF preamp, with the result that you can still hear audio even when the AF gain control is turned fully down. I suspect this is a limitation of the 6AT6 which incorporates the AM detector, AGC rectifier, and audio preamp all in one tube.

Any suggestions on how to fix these quirks?

By the way, my 830/4 came from Canada as you'd expect for this model. There is a nomenclature plate on the rear of the chassis with the following wording:

TUNABLE RECEIVER
TYPE CRC/CRA-09
SERIAL NO. 131
EDDYSTONE RADIO LTD.

There is also an adhesive sticker titled:

M.O.T. FIELD MODIFICATIONS COMPLETED

followed by 99 boxes that can be ticked. Only box #1 is ticked on this 830/4. Perhaps one of your Canadian readers can suggest what type of service this receiver was used in.

OK Graeme, that's all for now. Keep up the good work with Lighthouse!

Best regards.

Joe K9LY

Notes from Graeme; -

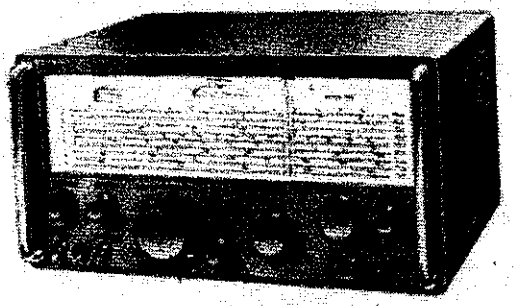
Thank you, Joe, for a first-class practical lesson in repair-work which is not only applicable to any version of the 830, it's applicable to **ANY** post-war Eddystone general coverage valve receiver (with the exception of the very specialised 880 series).

Can any of our Canadian members (or anybody else for that matter!) give us an insight into the use of the 830/4? It was a special model made to a Canadian Govt spec, which had LF bands instead of the MF bands.

As far as Joe's small quirks go, I think they are inherent in the 830. They are in mine. What about anybody else? Check up and see if you can confirm or refute this!

♠

'Working Perfectly!'



From John Gillespie
Hamilton, Ontario

Hello Graeme, this is just a short note to say "Our 830/4 is finally working Perfectly".

We originally bought this set in non-working condition at a local ham flea market. Through your assistance and with the help of the Eddystone User Group we were able to sort out the main problems.

First, the mute jumper was missing from PL4. Then we restored many horrifying problems in the power supply, along with several out-of-spec resistors and a new finger-plate from Dave Simmons.

But one problem remained. I had never seen a radio with separate RF and IF gain controls. When the AGC was on the radio broke into oscillation if either control was advanced on strong signals but OK on weak signals.

I wrote to you asking if this was a design problem with the model but you said "No, not at all, it's most abnormal!" *(Note from Graeme – remember the old adage: a poor Eddystone is a sick Eddystone!)*

Well, recently we decided to take a break from restoring other people's radios and do a bit of our own. The 830/4 was at the top of our list. Well, do I ever feel silly ! As I read my own writing it's obvious in hindsight that we had an AGC problem.

The solution, I think, is interesting. The AGC capacitor, C117, 0.1 mfd wasn't open circuit or shorted, it was missing completely!

From all appearances it had been gone for some time; no cut wires or solder re-work. No hint that it was ever in the set. Someone must have removed it long ago.

There's a moral in here somewhere. Don't give up, keep looking. And that means looking with the schematic in your hand. Don't overlook anything. Parts may not just be out of spec. They may be out of the set entirely!

Once the capacitor was replaced, what a difference it made. You could put the RF and IF controls at maximum with the AGC on, whilst receiving a really strong signal. Wow!!

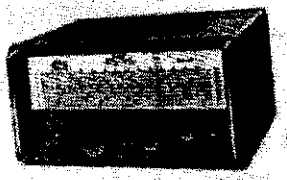
Now the set looks fantastic and works even better, thanks to your assistance and the Eddystone User Group. Keep up the great work, it's much valued out here in the trenches.

Sincerely, ***John Gillespie.*** ♠

Lighthouse Issue 80, August 2003

Letter from Ontario

By Brian Cauthery, VE3DFC



Brian is one of our good friends and a regular contributor to "Lighthouse" This month he writes to us about the Canadian 'Special' 830/4 – the one which covers the LF NDBs and aeronautical radio 'ranges'. He answers some of Joe LeKostaj's questions (I suggest you re-read Joe at this point!) We have had a series of items about this most favourite classic model and Brian continues with his contribution.

I thought that Joe LeKostaj's (K9LA) write-up on the 830/4 was excellent. *(Lighthouse issue 78,April, 2003, page 19)* With my two 830/4s, one had the problem of inability to turn the audio down to silence.

I cured that with a few new components and an alcohol rinse of the volume control track. USE ONLY 99% ALCOHOL, NONE OF THAT 70% STUFF DESIGNED FOR BABIES' BOTTOMS!

(Note from Graeme about the above fault: John Gomer, G8UNZ, tells me that replacing the two electrolytics (C110 & C111) in the cathode circuit of the first LF stage will go a long way to reduce this problem. They are 10mfd (12V) and 25mfd (25V) respectively).

Now the plate on the 830's rump. One of mine has the same plate. I think it was an RCAF *(Royal Canadian Air Force)* identification system. I draw this conclusion from the colour of the plate background.

The plate on my other 830 is identical to that on Joe's except that the Serial Number is 48. I have asked about 25 hams if they know of the plate and especially the way to interpret CRC/CRA.

At this point I should tell you that my RCA CR91A (the last of the AR88 series) has a sticker with the same nomenclature except that it reads "Type CRC/CRA-01" and "RCA Radio Corporation Inc., Montreal." Since RCA is 01, the CRC/CRA program began in the very early 1950s or even late 1940s.

However, nobody I asked had the definite identification for the CRC/CRA, other than Dave, VE3ORP, who is one of the leading lights at the Military Communications Museum in Kingston, Ontario.

He thought that CRC is "Communication Research Centre". I have a problem with that. I am sure that the CRC/CRA are the initials in English and French of the organisation

sense of a BUSINESS CENTRE, it would have been used in the geographic or geometric interpretation.

After a discussion with Louis VE2AJ we concluded that the word "Agencie" was the most probable translation in the early 1960s for the English word "Centre". That suits the "A" of CRA, but in gramatically correct French, it would be ARC . . . . . we are not at the answer yet!

Now the Modification Label. It is stuck on all of the communications, repair and maintenace equipment used by the RCAF.

Modification #1 relative to the 830/4 is the installation of the chrome-plated spring-loaded toggle switch to operate the Crystal Calibrator in place of the black plastic push-button on the other 830's. *(As described by Graeme in the February Issue of Lighthouse! - No77, page 26.)*

I will keep going on this plate matter, somebody must know. After all, it's only four decades old and they're not yet all in the hereafter!

♠

Re Chris Morgan's Product Detector instability . . . *(from June, p.41)*

Graeme asked for suggestions and so here are some faults which I have met, albeit rarely, which may have been the cause.

By Alan Robinson

1) Low emission or the valve gone soft, the valve struggling to maintain oscillations.

2) Corrosion of the valve pins/socket, causing high resistance or leaky variacap diode type connections.

3) External tracking between pins and across top of socket, caused by contamination.

4) Internal tracking between pins. In some long-used valves I have noticed a dark film-like deposit in the base area, similar to that seen in a used light bulb. When measuring the resistance between pins, instead of the expected infinity, I get an eratic high resistance.

5) Faulty spot-welds in the valve structure, or more likely faulty welds to the pins. The faults may be visible through a magnifier.

6) Valve top-cap connectors can become corroded and brittle, and the connection between the top-cap and the electrode can become intermittent.

Before switching on a set which has not been used for some time, or whose history is unknown, it is worth checking the valve pins and sockets, as well as switches etc., for cleanliness, but I expect I'm teaching grandmothers to suck eggs . . .

NOT AT ALL, ALAN. HOW MANY OF US, HOWEVER TIME-SERVED, CAN PUT HAND ON HEART AND SAY WE ALWAYS CHECK THESE LITTLE DETAILS ? WE WANT TO SEE IF THE SET WORKS AND THEN, IF WE FIND IT BEHAVING ODDLY, BLAME THE DESIGNER !

♠

CASCODE CATASTROPHE

Graeme Wormald G3GGL

Those of us who were on the two-metre scene fifty years ago will recall the appearance of the cascode (or cascaded triode) RF amplifier. It provided low noise and high stability and was totally reliable. It was adopted for VHF TV. Then in the 1960's Stratton's started using it on HF . . .

In the 1920's triodes were used for HF amplifiers (and IF's too, for that matter) simply because the tetrode and pentode were still waiting to be invented.

The big problem with triodes was that they suffered from 'Miller Effect'. That was the capacity between the grid and anode and was enough to cause spontaneous oscillation.

This was fine if you wanted an oscillator, but no good at all if you wanted an amplifier. So the solution was to feed a signal from the anode to the grid in antiphase (ie at 180° to the grid signal). This was called neutralisation and was easier said than done, especially in a tuneable stage as opposed to a fixed intermediate amplifier.

The screengrid, rapidly followed by the pentode, was the answer to the set designers' prayer. For the next two decades the pentode reigned supreme. But it had one snag. At VHF it could operate as a noise generator. A triode was much quieter. But, oh, the neutralising!

One answer was to use it in a grounded grid circuit. This doesn't need neutralising, but the gain is low. Then around 1950 some bright spark decided that if you inserted a grounded grid triode after a conventional one the phase was changed in the middle and it was stable, with the low noise of a triode and the higher gain of a pentode.

We'd better leave the technical discussion at that stage and find the problems. Instead of returning the grid of the second triode to cathode (like we hams used to do) Stratton decided to return it to a fixed potentiometer across the HT supply. And what happens when you have high-value 40-year-old carbon composition resistors with constant current flowing? Trouble.

The 830, 940 and EA12 use virtually the same circuit. I have an example of each model and they all worked . . . But, and I'll say it again; most top-class Eddystones will work to a degree with quite major faults. And in each of my sets the cascode (V1) had a major fault. The 100k resistors had risen to values varying from 250k to open circuit. All of them!

Now they are very fiddly to change, being located in the notorious coil-box, which was wired by pigmys. But you must bite the bullet. Take the cover off and locate the offending resistors.

First of all find pin 2 of V1, the

ECC189 (alias 6ES8). This is rather oversized and will have four wires attached, two for the 100k resistors and two for the grounding capacitors (one is a 0.1 and the other is a .003 mfd, they seem to be reliable).

They're all hell to get at but to prove the point first locate the HT lead into the part of the coil box. This circuitry is slightly different between the models, but the entry of HT is quite clear.

Unsolder one end of the feed resistor and lift it away from the HT feed-through soldering point. Now get out your multimeter and set it on the highest ohms range.

Measure the resistance of these two 100k (very small) resistors. I'll bet you the price of a large pint that they're absolutely nothing like 100k. And I'll bet you that they're nothing like equal, either.

This means the poor old stage is struggling to even give you leaky pen, let alone amplification.

Once you've discovered the awful truth, you'll realise that something has to be done. If you're a dentist or a brain surgeon then you have a flying start.

The rest of us have to take a deep breath and closely examine the local layout. The 940 is the most cramped, and I once isolated all the components and drew the valve-holder out with all the tails flying. But now I know better read on.

Here's the first breakthrough: although the ends of the two 100k resistors which DON'T go to pin 2 are connected to tags which you can't reach, these tags are in turn connected to the 'cold' ends of the coils in the following tuned stage. Take a look at the circuit diagram.

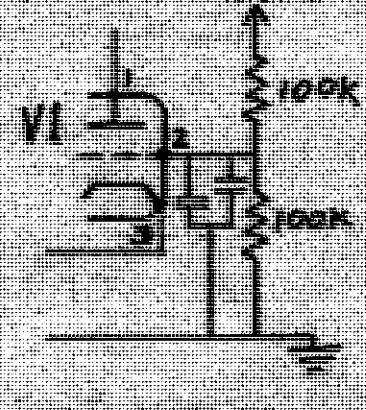
You'll see the top of the upper 100k is actually routed to the strapped unturned coldpack primaries.

The bottom of the lower 100K resistor is attached to an invisible earthing point, but so are the cold ends of the tuned secondaries.

Both these surrogate connecting points are easily accessible on the tags of the coil former nearest the valve.

So that covers those, what about pin 2? Well, make sure your toolbox contains a very small pair of sidecutters. The flat pressed variety, not the chunky cast ones. And make sure it contains a pair of long forceps, the sort commonly used at rallies. Oh yes, and I nearly forgot! A nice, slender, but hot soldering iron.

Locate the valve-base end of each resistor, grip its wire in the forceps and unsolder. Lift both of them off. Now snip them free at the other ends, making sure that the lost ends aren't shorting to anything.



Take two new 100k 0.5w resistors. Twist one end of each to the other, side by side, and lightly solder.

Holding in the forceps, offer this twisted pair up to pin 2 and solder it, making very sure it's firm and solid.

The two leads that are now sticking back out of the coilbox should carefully be soldered to the coil tags as described above. Either way, it doesn't matter. Reconnect the HT feed. Check for shorts. You're back in business!

TALES FROM THE WORKBENCH

Graeme Wormald G3GGL

There are two main kinds of problems with valve radio receivers. The first is due to failure of a thirty- to sixty-year-old component; resistors and condensers in particular. The second is due to human agency, of which the most common is the phantom fiddler. This month we'll take a look at some of each.

TOP OF THE RANGE

My 830/7 had been sitting on a top shelf in the shack for about a couple of years. Well, you can't toss them around like Heathkits at my age, so the resting cycle tends to become a little extended.

Anyway, when it went up there it was working perfectly, so why worry? I got the junior op to help me get it down and the next day fired it up. Everything lit up fine, the S-meter flew across to the end stop (as it does, regardless of what people *think* it should do), and I waited for the rest of it to warm up.

After about five minutes it became apparent that it never would. Hope springs eternal in the Wormald breast, but it was pretty obvious that I was on to a loser. But honestly, it really was working perfectly when it went on the shelf !

Placing my left lug-'ole against the speaker a faint hum could be detected, as befits a well-smoothed power supply. Tuning to the local MF transmitter (Droitwich, BBC Five Alive, 150 kW, 10 miles away) sent the S-meter end-stopping again. Mmmm.

Off with the case.

Something adrift between the detector and the output stage grid ? Not a true diagnosis but a calculated guess. (A feeling in the bones.) Take the easiest option first and see if there's any HT on the first audio amplifier; (V9, 6AT6, double diode-triode, anode is pin-7.) One of the easiest pins to reach in an 830. But no volts present. Mmmm.

I pulled out the mains plug (always!) and checked the continuity of the V9 anode load resistor, R48, 270k. Nothing. Absolutely open circuit. And that happened while it was sitting on a shelf in a centrally heated shack.

It was carefully replaced with a new item (thank goodness Eddystone didn't tie knots in the wire before soldering). Checked for dry joints and solder bridges. All OK. Powered up.

This time it warmed up pronto and my head was blown off. (I'd left the A.F. gain control flat out !) So you see; these pesky little high-value DC droppers can turn their toes up even when on a shelf. This fault can happen to ANY Eddystone valve set, ANY time.

OH NO! NOT AGAIN . . .

Quite recently a member bought a 680X from a second-hand dealer. He wasn't too happy with it.

"What's wrong?" I asked.

"Well," he replied, "It's working but it doesn't seem all that lively. Was the

680X a good set?"
Was the 680X a good set ! It never fails to amaze me how people sometimes think any post-war Eddystone might have been a bit deaf since birth. Let's make it quite clear: Eddystones were not deaf. If they are, then there's something wrong! Got it?

Anyway, our member's 680X was put on the bench and plugged in. The first thing I noticed was that the power lead was flat twin, as was common with the old Bush DAC91 connector (which, of course, is common to most 'fifties Eddystones). A mains earth wasn't accommodated on the 2-pin non-polarised connector. It should be arranged separately via the earth terminal near the aerial connector.

But in this case there was NO earth terminal. Somebody had removed the aerial/earth panel, blanked it over and fitted a Belling Lee 75-ohm television co-ax socket. Ooohhh !

All this provides at least two faults before we start. First of all, without efficient mains earth the set will be 'live'. Not enough to electrocute you, but enough to strike a neon lamp from the chassis to your hand! Or to one of those little electricians' screwdrivers with a neon polarity tester built in.

Depending on which way round the power is connected the 'live cabinet' effect will show itself either when the set is switch on, or, alternatively, switched off. Confusing? Yes, but to be avoided. Use a three-core mains cable with the earth flying out and firmly bolted to the chassis.

Next. The aerial input impedance of a 680X is 400 ohms. If fed with 75 (or 50) ohm coax for more than a foot or two the signal will be siphoned off.

But worse; the 680X is supplied with a balanced input for twin feeder. If a single ended aerial is used then a shorting link must be connected from the other aerial terminal to earth. Had the fiddler taken this into account?

A quick check with the AVO showed an open circuit from the co-ax socket centre to chassis. Oh-Oh!

Out from the case and off with the coil-box cover. A sharp intake of breath on my part; how CAN people leave a good set in this state ? The other aerial lead was floating loose in the coil-box!

After clamping it firmly to the nearest chassis-bolt the set needed re-aligning. The fiddler must have lined it up without the benefit of inductive input coupling, just a bit of stray capacity.

The result was a fine 680X, well up to original spec.

MY 'NEW' 670C UP TO TRICKS . . .

In our last issue I told you how thrilled I was to acquire a 'perfect' 1962 670C after hunting for three years. After a slight contretemps with the mains input filter condensers it worked fine.

Until one day, that is, when I switched it on and got the most awful growling audio from it. Just like that. It had been perfect the night before. This seems to be a bit of a habit!

So I look in the usual place (same as the 830/7!!). The anode load of the first AF stage. Lo and behold! The anode load of the first audio stage had increased from its specified 220 k to 720k. All by itself in the middle of the night. The result, of course, was that the auto-bias was so low that the stage was drawing grid-current, resulting in flat-topping of the audio wave-form.

This was confirmed by turning the AF gain down to a low level, when the sound was heard to be perfectly 'clean'.

Remedy: replace it, instant cure. And don't forget, never take anything for granted. The little people are always working to baffle us humans. ♠