Eddystone 1830 Receiver – Renovation – Full Alignment - Tests – Review – VK4GV - April 2019

I obtained this receiver in 2005, and have just carried out some work over a period of about a month.

My 1830 Type 1 receiver was built in 1976 and was used as a Technician monitoring receiver for ATC services in Australia.

My receiver was in very good condition and had little service use. I have an original printed Service Manual and a few original spares.

I resolved to renovate the receiver to original specification, and to have one of the last analogue HF receivers made.

I have fully aligned my receiver, after a few fault repairs.

This text is about renovation, repair and alignment, and is not in general a review of design.

It is provided as guidance for other 1830 owners.

I do not claim that this article is totally correct, and you should allow for possible errors.

I have used only “standard and widely used” radio and electronic abbreviations.

How This Text is Arranged

My renovation and test plan was to work from the Power Supply and AF Output stages, towards the RF Stages.

Any faults and issues, initial tests, and some comments are associated in the text of that order of progression of work.

Some individual stages are tested and aligned in progression, and Final Performance Tests are collated later.

Suggestions for others before any renovation work on this receiver type

Readers should have a clear idea of what is the intention of work on the receiver, either to keep the receiver in its heritage state, or to replace any component which is even suspect. A flexible approach is best, as your intentions may change slightly as work progresses. Some original spares are still available.

A definite plan of work is required otherwise disorganisation can set in, disrupting the flow of work, and may mean that some tests are repeated unnecessarily.

The Handbook is available from the Eddystone User Group website. Caution on the various receiver types.

The handbook references in this text are to my original printed Eddystone handbook, “Installation Notes, Operating Instructions and Service Data”, which is Issue 3, dated September 1973. This is a later issue than that presently available on the EUG website in early 2019, but my handbook issue is apparently available on request to EUG.

Read the whole Handbook before any work, and note manufacturer’s changes.

The 1830 receiver is intended for rack or tabletop case mounting, and requires some minor preparatory actions before bench maintenance work, to allow for some physical aspects.

The top and bottom clearance of some parts is virtually nil, and snagging of dial pointers and abrasion of panel paint can occur if the receiver chassis is not raised slightly off the bench with additional temporary rubber feet etc. Also the plastic “diffuser” strip over the top front of the main tuning dial is vulnerable, and I temporarily removed it before work.

Take plenty of photos before and after any work.

Test Equipment

You will require at least one good Signal Generator and a good Frequency Counter, and it makes no sense to do any exacting work without these items, unless you just want to carry out a basic test and rough alignment.

Gather the other usual items of DVM, Oscilloscope, Output Meter or similar, Test Speaker, and something to measure level at 100 KHz, in 75 ohms, whether it is a High Impedance Voltmeter and a 75 ohm load, or even an old Selective Voltmeter, such as a Siemens D2155, inter alia. If you use a Selective Voltmeter, be mindful that you will have to regularly retune it, as the “Selective” channel can be very sharp, of the order of 20Hz, and this will interfere with the alignment of the IF channels. I use normally use mine on “Wideband”, and on “Selective” only if required.

Having a second HF receiver close by is useful at times.

For testing electrolytic capacitors, I use an ESR Meter, mindful of its limitations.

Note that the 1830 Antenna Input Impedance is quoted as a nominal 75 ohms. In my tests I have used signal generators with 50 ohm output impedance. The mismatch error in theory is 0.19 dB, and I have ignored it in my practical tests.

I used an external mains filter when I carried out any work on this receiver. This is not essential.

Tools

The 1830 receiver mostly uses BA screws and the majority of screw heads are Pozidriv, and are of a small physical head size, relative to the BA size.

So, you will need Pozidriv #1 and #2 screwdrivers, and I recommend using a larger size than seems intuitive, to obtain a correct fit. For example use a Pozidriv #2 for 4 BA screws.

You will need a 4BA spanner, although a 1/4 inch AF spanner may be OK. You may have to select one with the required 6.50 mm jaw opening, or slightly enlarge it. I am lucky to have some Britool BA spanners.

Other tools required are a 1/4 AF “spintite” or similar, for hex standoffs, some small flat screwdrivers, and the usual assortment of pliers and cutters for normal bench work.

For the front panel knobs, I use an 11 mm AF or 7/16 inch AF socket with 1/4 inch drive, and with thin socket wall, so that it reaches fully over the clamp nut. You may have to grind down the front outer edge of the socket to a taper before it fits over the clamp nuts. You need an OD of 15mm or less at the front outer of the socket.

Some 4 BA and 5 BA taps and dies are nice to have around, to gently clean up some screws, nuts and nutserts (rivnuts), as clear paint has been used for thread locking in some cases.

The tuning capacitor shaft couplers use grub screws requiring a 1/16 inch AF hex Allen wrench. I didn’t have to do any work on my tuning mechanisms, but I would place a small drop of very light oil on each relevant grub screw, one day before attempting to undo any screw. My grub screws seem to have a lacquer type of surface thread lock, so you may have to take this into consideration first. Caution if you use CRC 2-26 or WD40, especially on any electronic areas. Apply with a small brush not by spray, and clean off when finished.

As the PCBs are a little vulnerable to excess heat, I used a suction based desoldering station to minimise heating effects. I used only 60/40 type solder, not lead free solder.

Some Mechanical Aspects

Two suggestions.

Some assemblies in the 1830 use 4 BA screws and nuts, and are very tight. Use a 4 BA spanner first to loosen the nut.

When re-assembling with screws, whether say 4 or 5 BA, or even with self tapping PK type screws, place the screw lightly into the hole with screwdriver engaged, and then slowly reverse the screwdriver rotation direction until a “click” is felt, then proceed with normal rotation. This procedure aligns the start of thread, and removes most of the possibility of cross threading, or making a new false thread. This procedure will become second nature after a while, and is especially useful with large diameter and high TPI type threads, such as hand assembly “N Type” connectors et alia.

After all work was completed on my receiver, I wiped all external areas (other than the front) of the case and covers with a small amount of spray lanolin, first sprayed onto my wiping cloth, then wiped it all off with a clean cloth, hopefully leaving a very thin coating of protection against corrosion. It feels dry to touch after about an hour.

Trimtools

You will need a selection of flat “radio” trimtools for the various trimmer capacitors and inductors. The RF Section ceramic trimmer capacitors may be slightly stuck, and may require a plastic trimtool with a stiff brass insert. Or, free up the trimmer with a small flat screwdriver first, then use a nylon plus brass trimtool. Spectrol and Bourns make good general purpose trimtools.

The cores in the RF section have the “internal hex” opening, and a long tool is required so as to reach through the top core to the bottom core in some cases. I use (Australian) Jabel brand tool type WT6 with 3.55mm AF tip and with approx 50mm of reduced diameter shank, to allow bottom core adjustment. Eddystone call this a Neosid HS1 tool.

The 100 KHz IF filter cores, and the 100 KHz rejection filter core, are “Vinkors”, and require a specific and now rather rare trimtool, without which adjustment is difficult or impossible. Using a different tool may damage the plastic headed adjustment core, so that it can never be adjusted.

I believe that Eddystone call this Vinkor tool “Mullard DT2047” as mentioned in frontispiece of the HBK for the Eddystone 830.

I use an old (Australian) Jabel brand tool type WT9, which is suitable.

In case you cannot find this rather rare trimtool, here are the measurements of mine, so one can be made.

The tip is made from 0.62 mm thick stiff brass or phosphor bronze strip or sheet, 3.35 mm wide, with 20 mm length protruding from the plastic holder body, so it is probably 35 mm long overall. The tip has a reduced width end section with slight taper to the tip from 10 mm back from the tip.

The taper starts at 1.48 mm wide and ends with 1.30 mm, at 1.00 mm back from the very tip end. See photo.

The tip itself is rounded and the body is smoothed off on all sides, so as to assist entry into the small slot of the plastic ended Vinkor core adjuster.

The original brass strip was probably a nominal 0.025 inch thick, in Imperial measurements of the day. Model shops will have suitable brass strip, eg K&S #8235, (0.025 x 1/4 x 12, all in inches) should be suitable, but check it first.

Eddystone 1830 Series – Trimtool for Vinkor Inductors

Initial Checks On An Unknown Receiver

Clean out any dust etc in an outside well ventilated area.

Visually check for loose items, suspect wiring, and correct issues and problems.

Check for suspect solder joints. I use a torch and magnifying device. Allow for possible work “by others”.

Check for correct mains earth connections. Read the handbook for the way in which Eddystone has isolated the various sections from mains earth, and set this to your requirement. My 1830 has a mains earth connection direct to the rear panel IEC socket, and the Rear Panel Link of “Chassis” and “Earth” is connected. With this link temporarily disconnected for a “galvanic” test, my 1830 separation of earths is intact.

Assuming you are not using DC operation set up for mains operation; consult handbook.

Check that the correct fuses are fitted, and that the transformer primary taps are set for your area mains voltage.

Check for obviously burnt and damaged components and replace as necessary, and with prudence. It might be best to not replace suspected missing components just yet, before a Switch On trial.

Assess the dial cords and restring if required, as per Handbook.

Assess the need for lubrication of tuning assemblies, and for cleaning and lubrication of rotary switches.

My 1830 had just a little “repair work, by others” before I obtained it, and it was almost original. I don’t believe that any alignment of IF or RF had been carried out since factory.

Switch On and First Trial

Turn all rotary controls and switches to their logical position for power up.

Connect a loudspeaker, a test antenna, and a mains lead, but do not switch mains ON yet.

Place a DC voltmeter across the +13 Volt DC line and chassis, stand back, and switch the mains ON, ready for a quick switch OFF.

If the 13 Volts DC are present, and no signs of distress come from the receiver, then proceed to set up the controls and tune the receiver as per normal practice, and obtain a feel for operation and possible faults or shortcomings, noting it all down as you go.

Assessment

Set the controls for normal listening, eg AM, AVC ON, Selectivity AM, NL OFF.

Check the overall receiver performance with an initial sensitivity check on each band. Keep records.

A level of 3uV of 30% AM signal input should give 15 dB S/N across all bands, and adequate audio level should be present for a receiver in OK condition.

My 1830 with initial checks, met Eddystone spec for sensitivity (after an AF Board fix).

Check that the receiver has correct operation “feel”, and note any possible issues for later work, and attempt to assess the AGC action, as any problems here will affect alignment.

Leave switched ON and watched, for four hours, and observe and record any abnormalities after that time.

Determine any possible mechanical problems and issues, especially with the band change and tuning mechanisms.

My receiver had no mechanical or lubrication issues at all and I shall not discuss this as I have no specific experience.

Make a list of maintenance requirements.

Decision Time

Decide to perform minimal renovation with replacement of old suspect components, and with no alignment, or to go further.

Minimal Work

At a minimum, I suggest that you replace those electrolytic capacitors which fail an ESR test. If you don’t have such a test unit, replace any electrolytic capacitors which are bulging, leaking or hot.

There is no need to replace electrolytic capacitors en mass, only if they fail test, or if you have other suspicions.

However, there are some old first generation Tantalum capacitors in this receiver which are operated at over 50% of the rated DC voltage, and which will be undoubtedly stressed, or have failed, and all these should be considered for replacement as a batch. Consult the handbook parts lists for where they are used. I had one unseen “blown” cap in the

Crystal Calibrator Unit. Normally the receiver units will still work OK with blown top (ie open circuit) Tantalum caps, so a visual check is required.

Resistors in this receiver are operated within ratings and most should not be degraded just by time.

Replace resistors, other capacitors, etc, only if individually known to be degraded or faulty on actual test. If you are carrying out a comprehensive renovation, test and check components on each board in turn as you performance test it. Don't forget to remove access covers etc to check for obviously faulty components. All semiconductors in my 1830 are original except the two output AF transistors.

The tuning dial accuracy is always a little bit out, and this is normal, and may not indicate that the RF Sections require alignment. Let the overall sensitivity tests be your guide to determine whether RF and Oscillator alignment is required. Dial calibration is part of alignment and will be addressed later.

The receiver has relatively good frequency stability, within reasonable limits "for its time", so any noticeable "anomalies" may indicate problems.

Renovation Of My Receiver

How This Text is Arranged

My renovation and test plan was to work backwards from the PS and AF board, towards the RF Stages and antenna socket. Any faults and issues and comments are associated in the text as work progresses.

My Initial Fault - Fixed First

I started with a faulty receiver with low DC volts, and low and distorted AF speaker levels, so I fixed this first. The AF board was drawing 500mA quiescent current at the "Test Link" on the board.

TR30 a BD131 was short circuit from C to E. TR31 a BD132 was OK. I replaced these with a BD139 BD140 pair.

Note that the handbook lists types 2N4921, 2N4918 for TR30, TR31. My installed BD131, BD132 looked "factory".

TR30 and TR31, (each with collector electrically connected to a metal part of the device mounting surface) originally had mica washers and no bushes. If this is ex-factory (no bushes), this is a design weakness, as a latent collector to ground short circuit is possible. I drilled and reamed out BD139 BD140 tags, and the heatsink, to take new TO3 type bushes and cut down TO220 silicone heatsink pad. Note that TO220 bushes should be OK also, but still require drilling out.

I started using a 3.5 mm drill to start on the BD139 and BD140 devices, then reaming very slightly to fit bushes. The screws holding the heatsink to side chassis were very tight. I used a tiny amount of CRC 2-26 before screw removal, then cleaned out the "rivnut" with a tap, and cleaned the screw with a BA die, to remove thread lock lacquer. Possibly easier to use spring mounting clips, which will not need drilling, but it will not look original.

I replaced several electrolytic capacitors on this board, and checked the thermistor.

Carefully visually inspected and electrically tested before power up.

I set the output transistors quiescent current at 15 mA OK, whilst checking distortion was OK.

The AF board now had good performance, and the PS DC volts were restored to original "normal".

DC Power Supply

The original dual electrolytic capacitor C328 C329 was in one can, in one chassis hole (different to HBK), and had been replaced earlier “by others” with a single 4700 MF tagged cap in “the hole” and with another 4700 MF with end leads, wired across a new tagstrip, which appears to be non-original, and from the earlier mod.

I measured the current through the BZY93C11 zener D18 at approx 400 mA, and pondered over the rudimentary PSU design, and its effect on receiver stability, especially the RF oscillators, and when receiving SSB.

I decided to make a modification, with easy reversal to original if later required.

I installed a TO220 style 7812 DC regulator with 16 V DC input from “wiring point 164” the positive tag of C329 4700MF cap, common to chassis, and output to the circuit drawing RHS of R249, the 3R3 resistor being left in circuit. Cap C328 was replaced by a 0.1MF ceramic.

I re-arranged the mains transformer primary taps to have “all windings in circuit”, ie set up for 260 V AC, (Australian nominal mains voltage is 250 V AC) so as to lower the DC voltage from the bridge rectifier, and to then make the regulator headroom voltage as low as possible, all to make the 7812 work well with lowest heat generated. My bridge output voltage was now 16 V DC and 400mV peak to peak ripple.

I unsoldered the receiver topside wire to Zener D18 (cathode) and bent it back a little, taking D18 out of circuit, but leaving the diode undisturbed on the chassis, ready for reuse if later required. I did not want to disturb the mica washers on D18. The anode of D18 remains in circuit as a tie point.

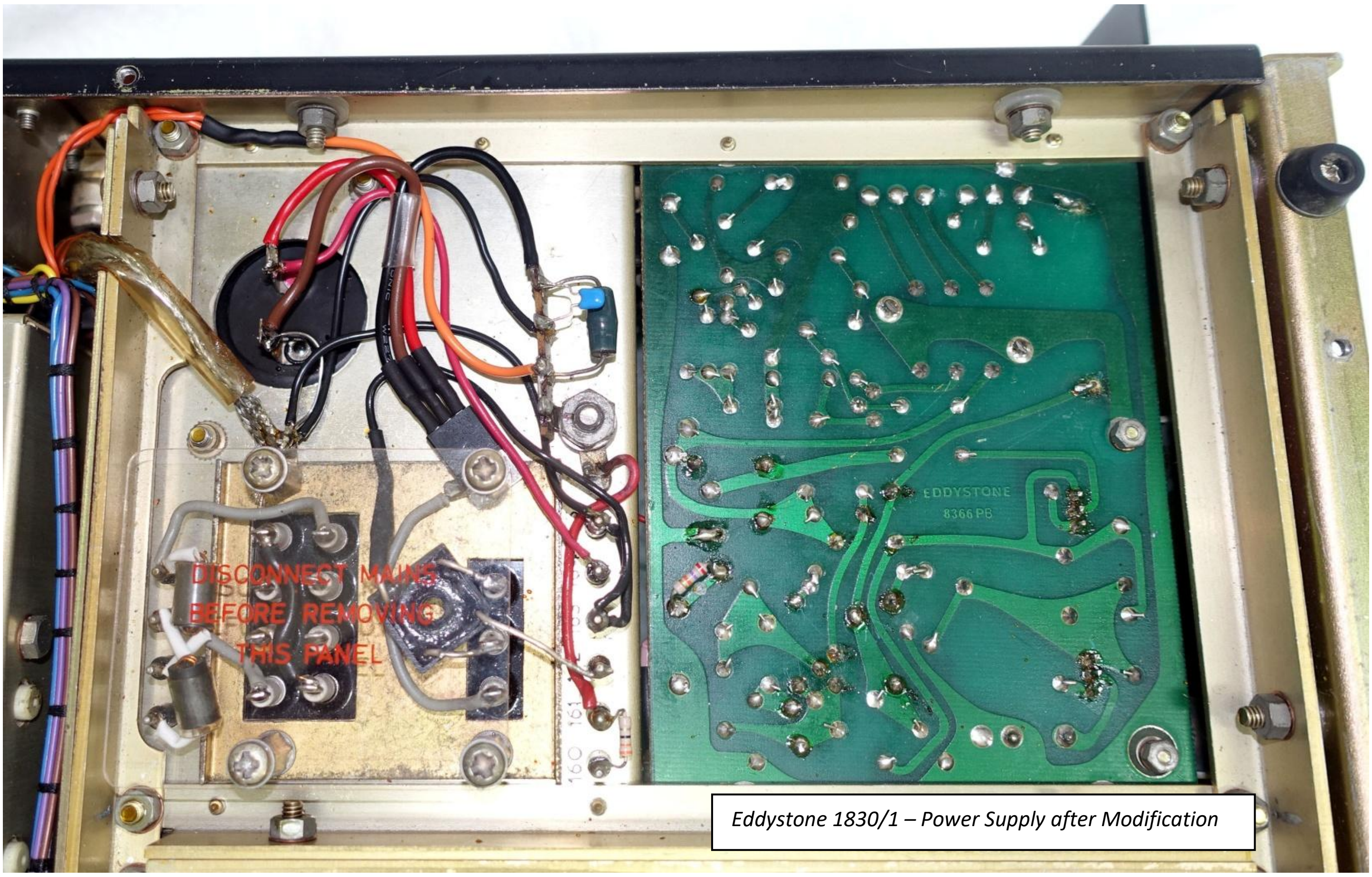
My DC voltages were now 12.0 V DC regulator output, the 11 V line was actually 11.5 V at “WP 161”. The 10 V supply to the IF Amp at “WP 160” was 10.8 V. Total DC current through the regulator is now 140 mA, with the AF board on idle, and no dial lamps connected.

I rewired the AF board DC to be supplied from “WP 161”.

The 7812 regulator tag was placed under a hex metal standoff on the mains transformer, and now the regulator and transformer run very cool, whereas before, the transformer ran quite warm. A separate regulator “common” wire was connected to chassis earth, so as not to rely on the common tag electrical connection.

This is only the first of two modifications I made to my receiver, and this one is highly recommended, if you agree with this approach. See photo.

Incidentally, the “DC Operation” polarity protection diode D19, originally a Lucas type DD006, is a 1N4004 type on my receiver, and is mounted on the rear panel, near the top DC fuse. And C327, a 400MF electrolytic cap is mounted on the IF Amp board in my receiver, and not near the PS as inferred on circuit.



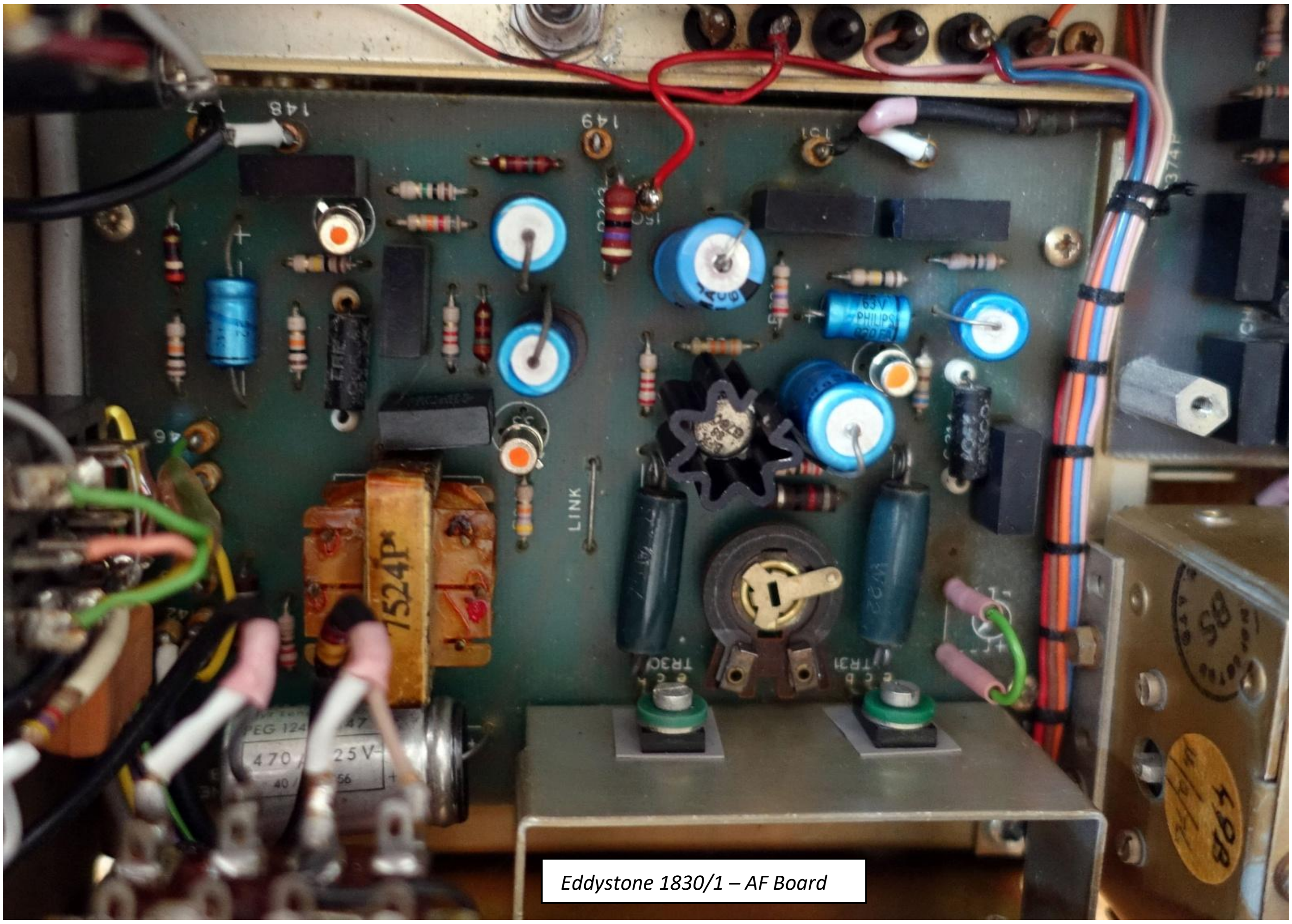
Eddystone 1830/1 – Power Supply after Modification

Audio Board

My Audio Board has one extra 27K 1/4 W resistor, now R244, across a cut in the PCB track between “WP151” and the input side of C310, which in effect, places the resistor and capacitor in series between “WP151” and TR28 Base. Refer to the circuit drawing BP1289 ISS 2, and in the box designated “Circuit Modification Record”, at bottom LHS of drawing.

I tested my audio board and it was OK and in specification. Distortion on a CRO was less than 5% and noise was very low. Frequency response was – 7dB at 300 Hz, -4.5dB at 400 Hz, 0dB at 1000 Hz, -5dB at 3000 Hz, all in spec.

My AF Volume control pot was OK, but I obtained an “insurance” spare from Ian Nutt in UK, as it is a high usage special dual pot (paired with IF Gain).



Eddystone 1830/1 – AF Board

Line Out Audio Board

My board proved to be OK, had minimal distortion and noise, and I later set the output level to be 0 dBm into 600 ohms on 1000 Hz received test tone, using the rear panel level control.

I measured the board output driving impedance, nominally 600 ohm, to be actually 340 ohms, which is quite OK.

IF Sensitivity Test and Alignment

Initial test.

The sensitivity of the 1350 KHz "Incremental IF" was 4.5uV of 1350 KHz 30% AM into the "Main" mixer TR7 at the stator tag of variable capacitor C94 for 10 dB S/N AF output, and an MDS of 0.5uV on AM . The band switch should be on Range 1 to 5 for this test. This was prior to any IF or RF adjustment. This test measures the sensitivity of both the 1350 KHz Tuneable IF and the 100 KHz IF channels together, when the 1830 is in double conversion mode.

Tuning across the centre frequency of the 1350 KHz IF with the Sig Gen, showed that the IF pass band characteristics and symmetry seemed to be OK for most Selectivity Switch selections, but that the "VN" selection was very sharp, low in AF output, and sounded "different" to what I expected to hear.

At this point, due to suspicions about AGC action, I replaced the AGC capacitors C268 and C269, as the Tantalum 1MF was suspect. I used a new Tantalum for C268 and a new 105 deg electrolytic for C269. These caps are located directly on the AGC switch S7 on the front panel. This improved the "Short" AGC action slightly.

Rationale of 100 KHz IF Alignment

Eddystone has included a selection of IF Selectivity, using a single crystal as a pass band filter in position "VN" as well as using a tuned and top coupled LC filter for the three other selections of "Narrow, SSB, and AM Wide".

This use of the crystal means that all IF filters and the IF Amp really must be aligned to the centre frequency of the crystal pass band.

This frequency is found by adjusting the Sig Gen frequency for peak IF response when in "VN" mode, and best indicated at the IF Output, not via speaker or AF output.

Setup as in HBK.

My crystal filter was centred on 100.056 KHz, which can be adjusted very slightly by IF Filter inductance adjustment, and by the "symmetry" adjustment capacitor C198 (it is not a "phasing" control per se), found in the IF Filter Unit, and accessed on the side of the 1830 case.

Incidentally, if you have a Sig Gen with incremental frequency steps of a minimum of say 10 Hz, this may not be satisfactory to check the crystal frequency peak. I double checked mine with an analogue Sig Gen and freq counter.

I strongly suggest that if you do not have appropriate test equipment which is accurate and has high stability, it might be worth considering to leave the 100 KHz IF Filter adjustment totally alone, and to just peak the adjustments on the 100 KHz IF Amp Board.

The 100 KHz IF Filter adjustment is fiddly and takes time to do accurately, and really requires a Sweep Generator for best overall adjustment. A very stable Sweep Gen at 100 KHz with 100Hz sweep and say 1.0 Hz Centre Frequency long term stability is not normally found in home workshops. I am currently constructing such an instrument.

Use of AGC in Alignment.

Traditionally AGC was turned OFF in conventional receiver alignment.

My 1830 has an AGC which has "onset" ie starts to affect overall sensitivity, at about 4.0 uV input.

Always mindful of this, I often used AGC ON and the Eddystone suggested level of 3.0 uV receiver input level for alignment, which is just below AGC onset and doesn't seem to significantly affect alignment "tuning for peaks".

100 KHz IF Amp Board

Caps on my board tested OK, and note that C327 is mounted from "WP97" to chassis lug, whereas the circuit infers that the cap is in the PS area.

My Amp Board has two extra components on the bottom of the PCB.

An extra 100K 1/4 W resistor is from "WP99" to junction of R149 and R150, and a small ceramic cap marked "15KN" is soldered from TR20 Source to TR20 Drain. Refer to the circuit drawing BP1289 ISS 2, and in the box designated "Circuit Modification Record".

The test arrangement in the HBK injects 100 KHz into the "Main" mixer TR7 at C94, when the 1830 is switched to band 7, and when the 1830 is using only the 100 KHz IF in single conversion mode.

The 1350 KHz IF channel is adjusted later, when the 1830 is switched to band 5, and is then configured as double conversion.

If you find that your 1830 IF Amp has a tendency to be unstable or oscillate, then you might consider lowering the +10V DC volts a little by altering R248, or by adding an extra discrete 7809 voltage regulator. Not fully tried on my 1830. Check all IF Amp Board PCB bypass capacitors before deciding to alter the +10 V line.

Setup as per HBK page 37 and 38.

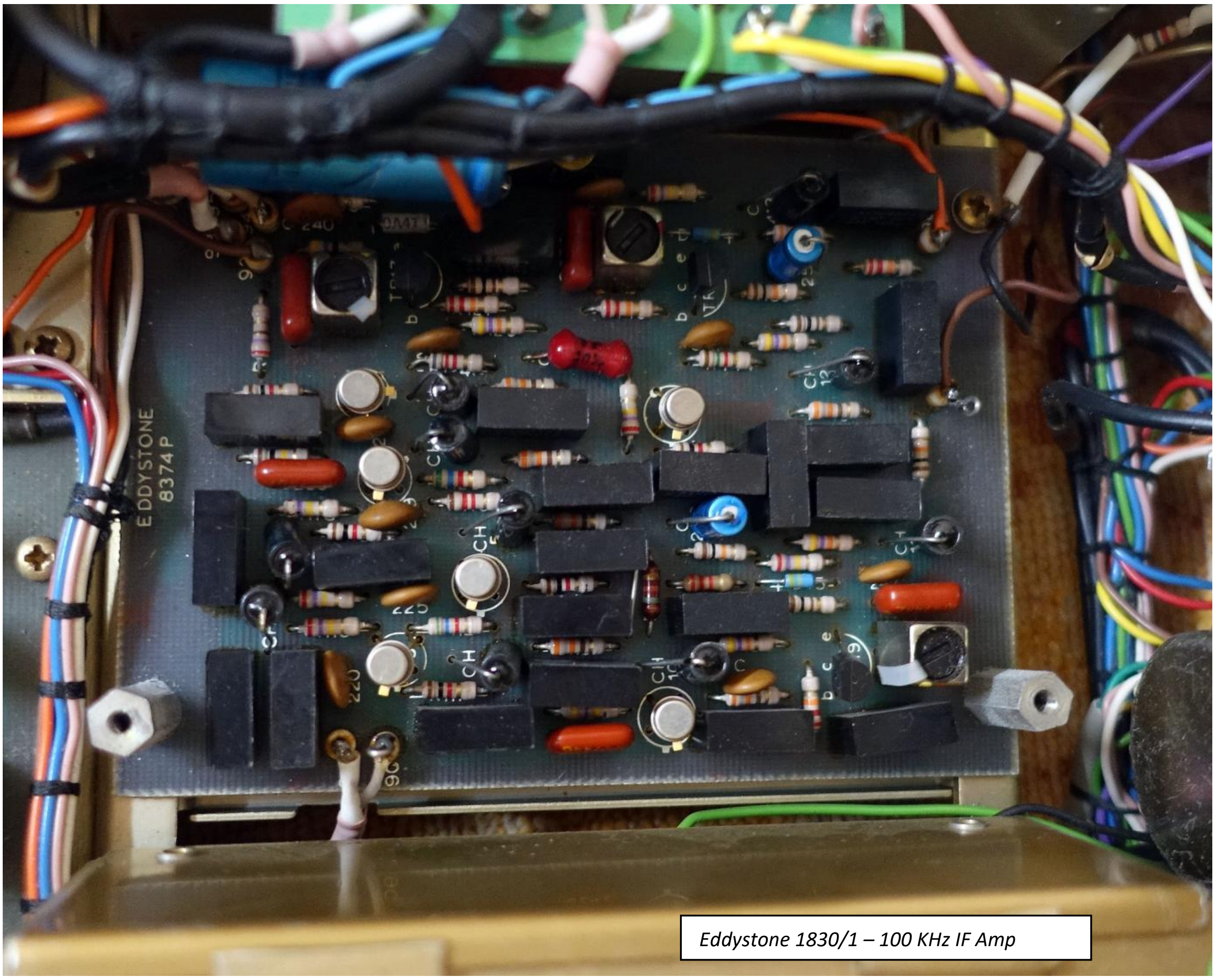
Regularly check that the Sig Gen frequency is set to your crystal freq.

Adjusts OK.

The AM Detector tuning L40 adjusts OK.

The AGC Detector L42 adjusts (dips) OK.

The high level AGC detector L41 adjusts OK (dips) and requires a higher RF input level for a dip adjustment; I used 1000uV, and confirmed operation at the higher RF level of 10mV.



Eddystone 1830/1 – 100 KHz IF Amp

100 KHz IF Filter

This filter uses one crystal, multiple tuned circuits, and variable top coupling, and is all a veritable compromise. The concept is used in other Eddystone receivers, and requires careful adjustment. Adjustments are interactive, and it becomes tedious, and best adjustment tends to be difficult.

Initial tests before any adjustments.

The selectivity selections seemed OK on listening tests. With a Sig Gen, it seemed to have just a little but acceptable pass band ripple.

When Selectivity “VN” was selected on my 1830, at times it would have lower level response, and it seemed that tuning of signals “sounded” different on AF, and the selectivity was very sharp with a slight tendency to “ring”. I thought that the requirement to have such a sharp filter response was unnecessary, and that the “N” selection was more than adequate for CW modes. This era in history has passed.

100 KHz IF response centre Frequencies – “VN” 100.06 KHz, “N” 100.06 KHz, “SSB” 100.07 KHz, “AM Wide” 101.99 KHz.

I wanted to see if any tuning improvement to IF Filter was possible, and to investigate if the ringing on “VN” could be reduced.

I opened up the 100 KHz IF Filter box and had a long close inspection. This is a very cramped environment, and difficult to check components, let alone replace anything. I found suspect solder joints on cap C189 and another adjacent cap, to the sheet metal earth shield. Repaired OK with a hot 1/4 inch soldering iron tip and a quick action. Oddly, no performance change was noted after this.

If you are removing the side metal cover on the crystal, do not disturb the two screws in the middle of the cover, which are for the crystal mount clips. Only remove the cover peripheral screws.

I removed the cover on the 100 KHz crystal unit to find all OK except that the crystal mounting foam had disintegrated.

I made a very careful total cleanup with methylated spirits (alcohol). I made a new foam mount from 3.0 mm thick, soft poly foam, 13x60mm. My foam mount is free floating under the crystal, with about 0.5 mm compression. The original foam was adhesive backed, and if deteriorated, cleans up well with the methylated spirits.

I found that C198 across the crystal adjusted the symmetry OK and shifted the peak about +/- 20 Hz, and its adjustment is useful. Use an insulated trimtool here as C198 is all above ground.

After much experiment, I found that the tendency to “ring” could be reduced somewhat by adding a 47K loading resistor across the IF Filter output when in “VN” (only), similar to loading on the other selections. I was mindful of the higher impedances associated with the “crystal channel”, and the possibility of ruining the “VN” characteristics. I was also mindful of the fact that I had earlier slightly raised the PS volts to the 100 KHz IF Amp from 10.5 to 10.8 V DC, after installing the 7812 regulator. I experimented with a temporary reduction of the +10 V Line to the IF Amp, but with no less tendency to “ring”.

I added my extra 47K resistor across C211 to chassis, inside the IF Filter box enclosure.

I came to the conclusion that the HBK adjustment procedure was a good compromise of all parameters, if indeed all selections of selectivity were to be available.

The 100 KHz filter alignment requires about three repeats of peaks on each inductor to minimise interactions.

During alignment, regularly check that the Sig Gen frequency is set to your crystal freq.

Alternative 100 KHz IF Alignment Approaches

Users can also chose to ignore the “VN” position, or to accept whatever the “VN” result is in practice, and adjust for peak IF on “SSB” or “AM”. I found that if I was to accept whatever the “VN” result was, or to ignore it, it was better to align for IF peak on “SSB” which is close to the peak for “VN”, “N” and is acceptable on “AM”.

The difficulty with obtaining the best possible alignment of the 100 KHz IF Filter is a lack of a Sweep Gen for the crystal position. I have decided to construct a device, and I will revisit this section later. In the meantime, I settled on best compromise using the HBK method.

I tested the 100 KHz IF Filter bandwidths after all visual checks for problems, and after “compromise” adjustments.

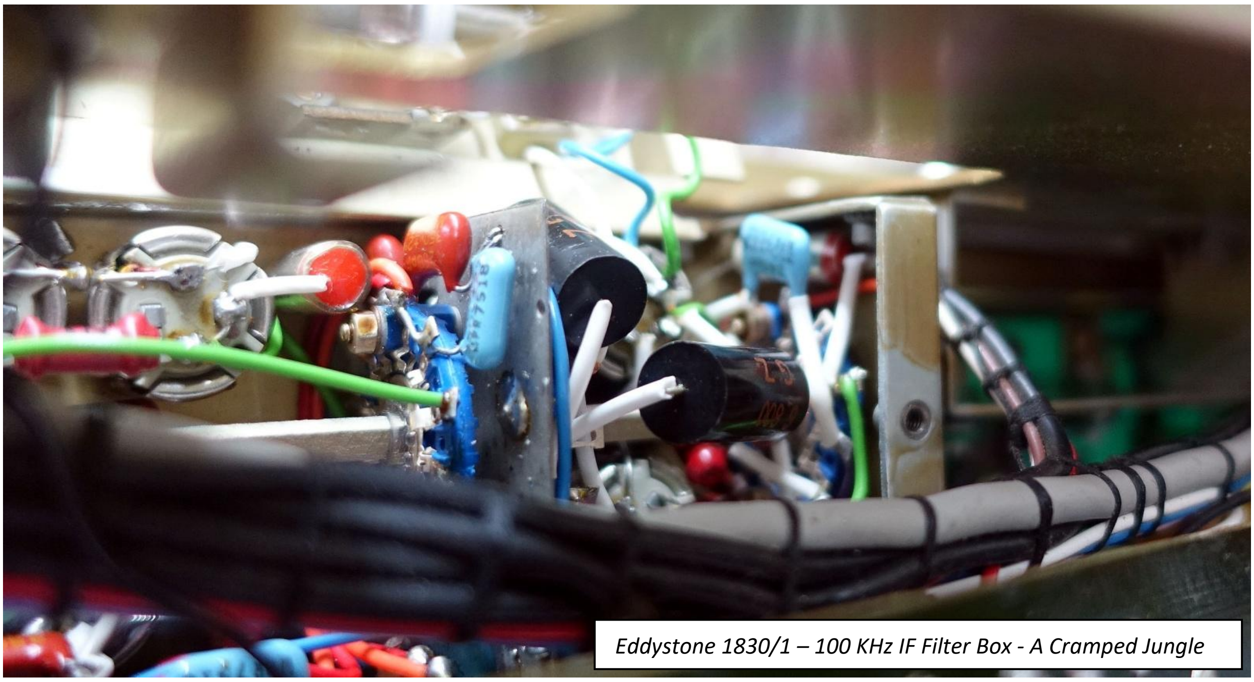
Selectivity at -6.0 dB was "VN" 60Hz, "N" 0.6KHz, "SSB" 3.5KHz, "AM Wide" 6.0 KHz , all a little different to spec. There was some ripple in the various pass bands, and which I find difficult to quantify without a Sweep Gen.

The above was first carried out at 25uV CW signal level to minimise noise effects, then reducing to 5 uV for final tests.

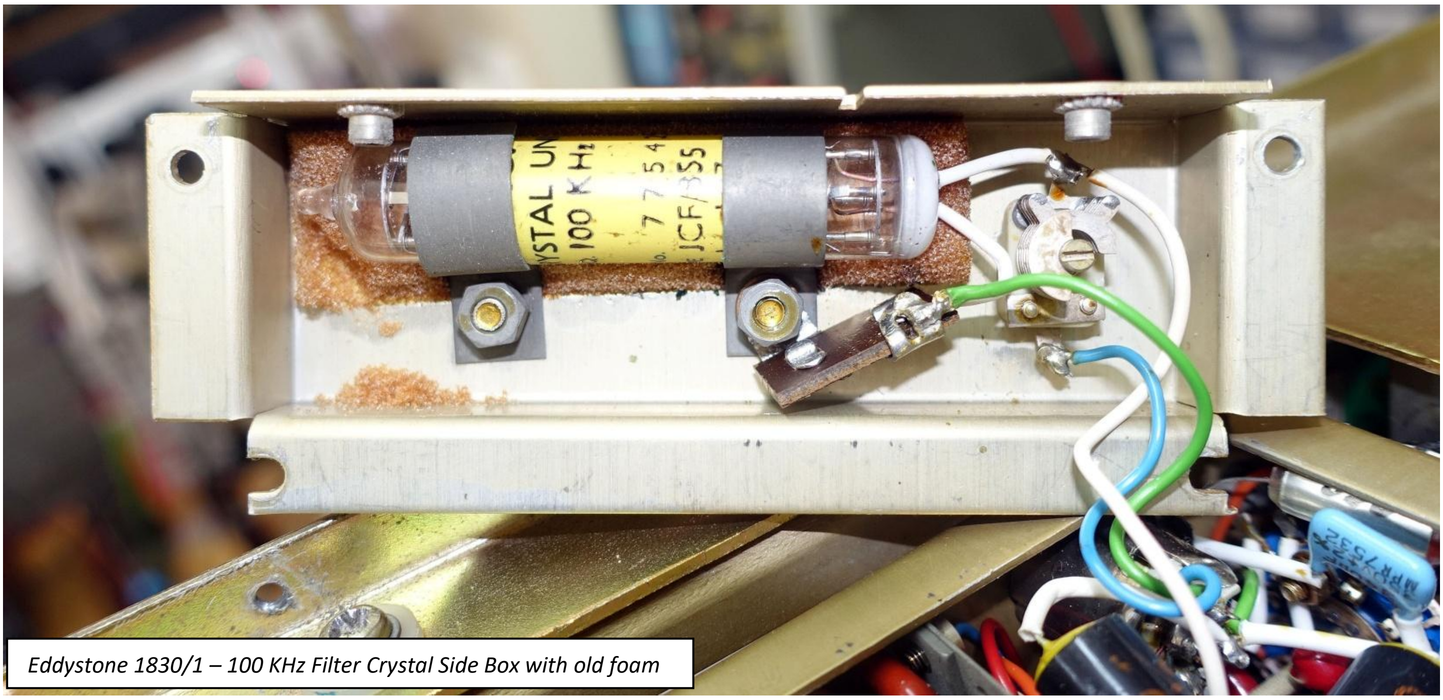
Caution if feeding a Sig Gen into the 100 KHz IF Filter at "WP80" as this is DC live (connected to FET TR10 on the Incremental IF Amp Board).

Lastly I need to mention that there is a distinct knack to engaging the special trimtool in the slot of the Vinkor adjustment slug, and there is a need for gentle action here or it may be damaged, with possible destruction of the slug. It may be possible to completely remove the slug for repair, but this has not been tried.

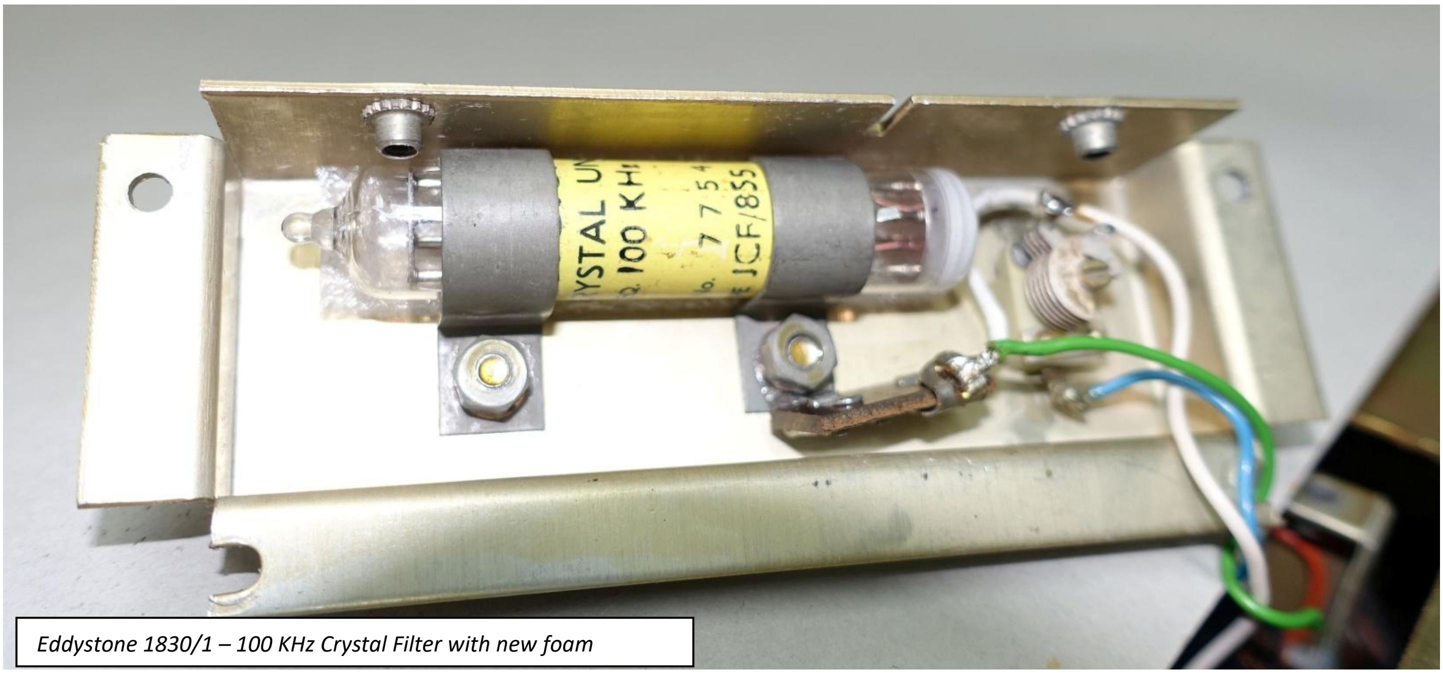
These Vinkors, and the slugs, are becoming rather rare.



Eddystone 1830/1 – 100 KHz IF Filter Box - A Cramped Jungle



Eddystone 1830/1 – 100 KHz Filter Crystal Side Box with old foam



Eddystone 1830/1 – 100 KHz Crystal Filter with new foam

CW/SSB Detector Board and BFO Adjustment

This is a 100 KHz BFO.

My “8368P” board has an extra undocumented 220R resistor from “WP107” in series with a BZY88 C9.1V zener diode to PCB ground.

The original PCB track from “WP 107” to the junction of CH14, R178 and C299, has been cut. The zener cathode is connected to the junction of CH14, R178 and C299. This mod allows the whole PCB to have a 9.1 V DC zener supply. This may be “factory” as it is very neat, has white spaghetti, and the diode has an “orange” dot.

My board also has an extra undocumented 3K3 resistor across existing R177 (5K6), and mounted on the PCB track side.

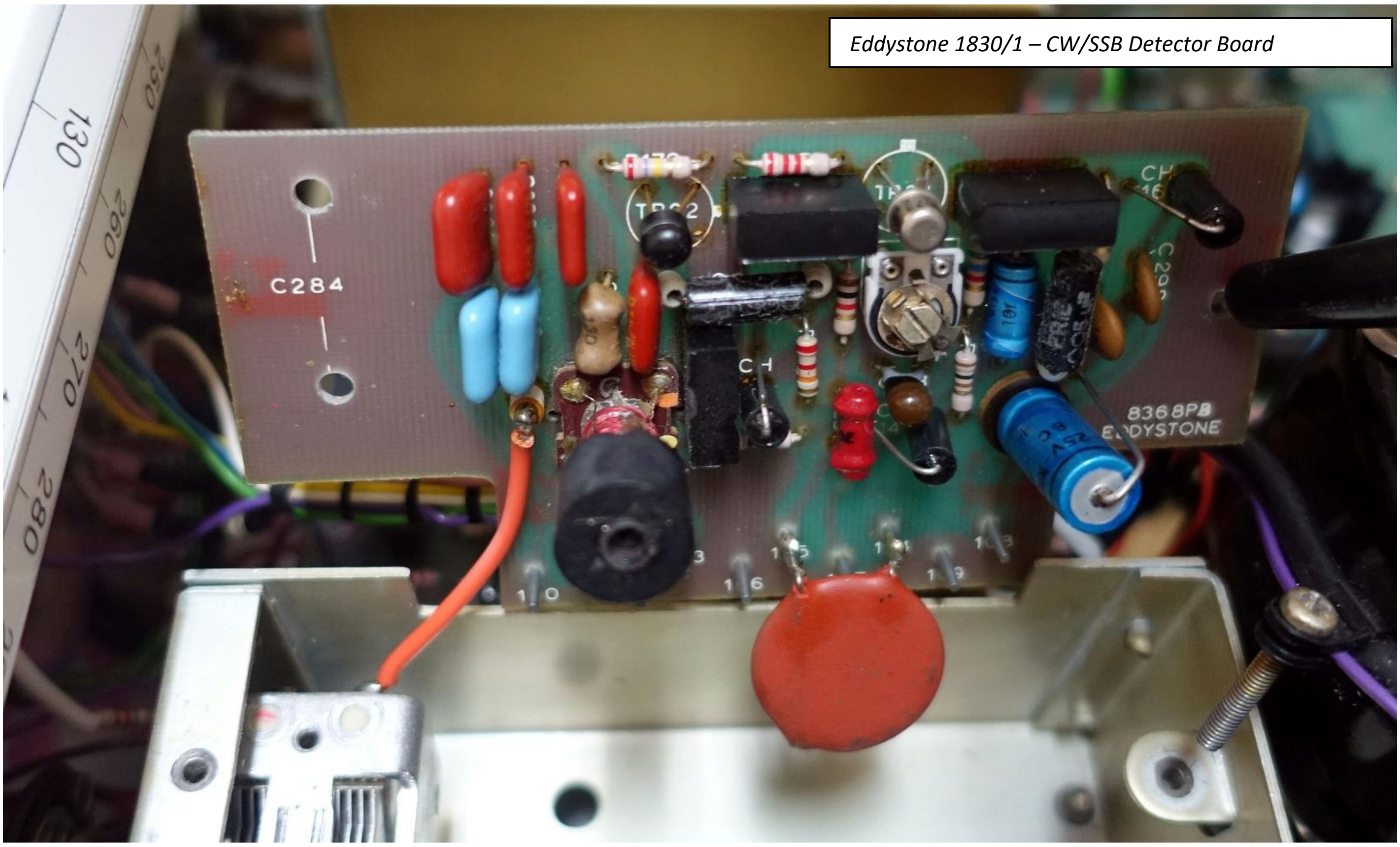
I have left the two mods undisturbed.

Setup as per HBK page 38.

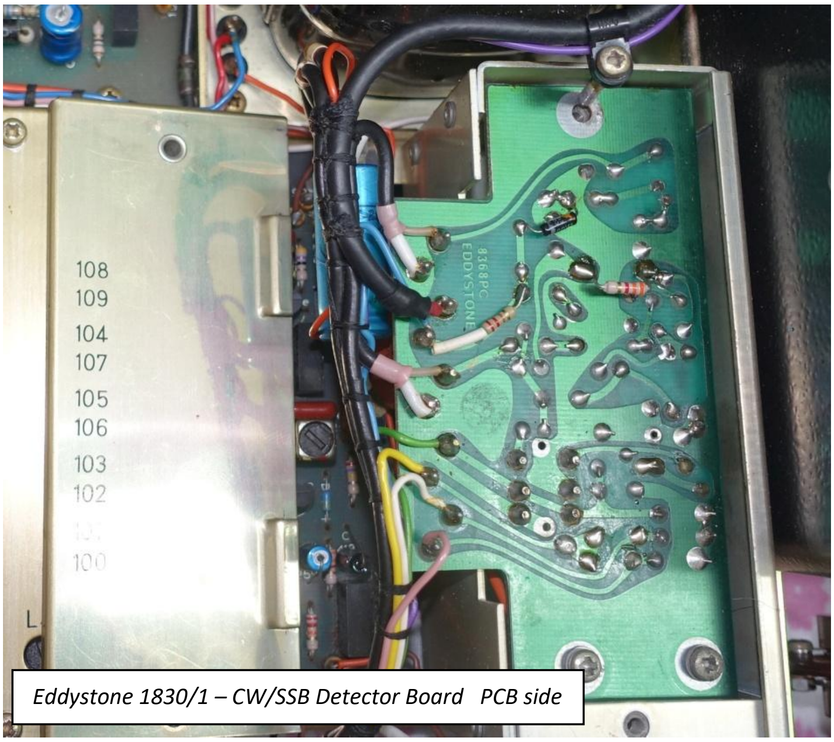
Adjusts OK as per HBK.

Consider this alternative adjustment arrangement.

If the HBK adjustment is OK for CW, then with Front Panel control at centre, adjust L43 for equal AF output tone frequencies measured on a Freq Counter, when switching from USB to LSB and back again. This will give a compromise CW zero beat, but I prefer this method for later actual listening to SSB.



Eddystone 1830/1 – CW/SSB Detector Board



Eddystone 1830/1 – CW/SSB Detector Board PCB side

Adjustment of Equalisation of Audio Output for CW/SSB and AM

Not fitted on some types, and if so, then levels were set by fixed resistors at manufacture.

This is not in the list of adjustments for Alignment in the Handbook, but is described on page 13 in the Description of the board.

With the 1830 in AM mode, inject an RF test signal AM with 30% mod, and monitor the audio output on a meter.

Turn the Sig Gen Mod OFF, switch 1830 Mode to SSB, retune the 1830 for a 1000 Hz audio signal, then adjust RV7 on the CW/SSB Detector Board for the same audio output level as in AM Mode.

Adjusts OK.

Incremental IF Amp (Tuneable IF Board 1300-1400 KHz)

Initial test.

The sensitivity of the 1350 KHz "Incremental IF" was 4.5uV of 1350 KHz 30% AM into the "Main" mixer TR7, at the stator tag of variable capacitor C94, for 10 dB S/N AF output, and an MDS of 0.5uV on AM .

My Incremental Tuning was 10.0 KHz out of dial frequency calibration.

Switch to Bands 1-5 to enable this IF Amp, otherwise it is DC switched OFF by the Range Switch.

My unit had the optional crystal fitted, and it is shorted for tuneable operation by a soldered link.

My unit also had a weird modification ("by others") bypassing inductor choke CH22 for an unknown reason, and this was reverted to original circuit arrangements. The modification did not look like "factory".

Setup as per HBK page 39.

It is not essential to only use the procedure as per page 39 of the handbook with an Harmonic Generator. This is being suggested by Eddystone to check and set the Incremental Dial Calibration with high accuracy and linearity. A normal Sig Gen is all that is required for a very good calibration.

Check Incremental dial pointer is correctly physically positioned on the cord.

Check dial frequency calibration at 1300, 1350, 1400 KHz, adjusting for a peak IF output with Sig Gen input. The dial calibration of centre frequency on 1350 KHz is critical.

Adjust L 34 at 1300 KHz and C158 at 1400 KHz for oscillator tracking, repeating until best compromise achieved, and 1350 KHz is exactly correct.

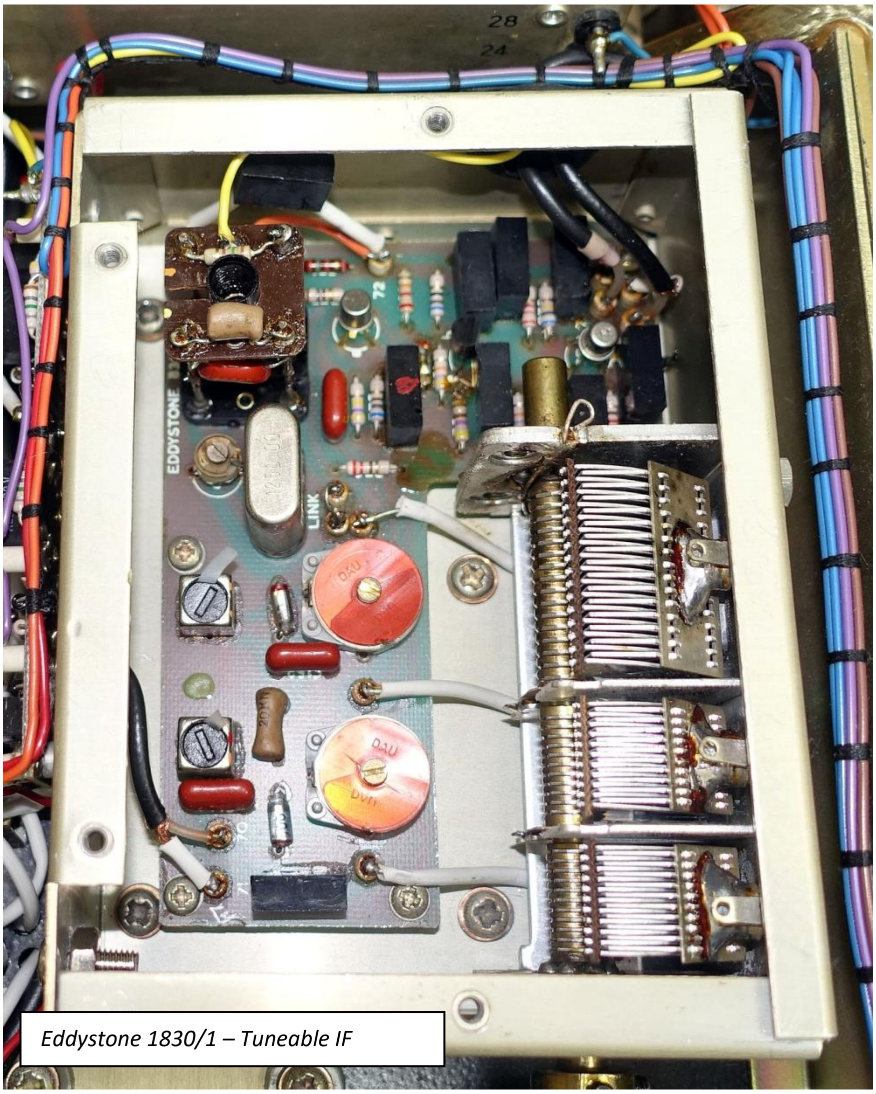
If this adjustment process does not provide sufficient calibration accuracy compromise for your 1830, then consider alignment at 1310, 1350, 1390 KHz, or even at 1320, 1350, 1380 KHz. You will only need to readjust L34 and C158, as the IF input circuit will be affected. Ensure the Dial Calibration is exactly correct at 1350 KHz.

My 1830 has very good Dial Accuracy of the Incremental Tuning frequency, better than 2 KHz across the band.

My 1830 required just a slight tweak of L32 C146, and L33 C150, and then L34 and C158.

After tweaking, my 1830 Tuneable IF sensitivity was unchanged, and met spec, although my opinion is that the sensitivity should be slightly better.

Note the suggestion in Handbook appendix "E" page 65, of not disturbing the cores of inductors L30 and L31 which are fitted in some receivers, although not in mine.



Eddystone 1830/1 – Tuneable IF

RF Stages, Mixer, RF Amp, RF Oscillator Issues and Alignment

Before my alignment, I started to routinely use the 500 KHz CAL function, and found that it was 63 Hz high, and I decided to fix this first.

I could not adjust the CAL oscillator frequency below +50 Hz, and tried an extra 10pF across the trimmer C4 to no avail. I then replaced the actual crystal. The original crystal was wire ended, and my new crystal was HC6 style, so I just added a socket and crystal OK. The Crystal is located in the “Calibrator Relay Unit”, mounted on the rear panel, and to the rear of the Main Tuning variable capacitor.

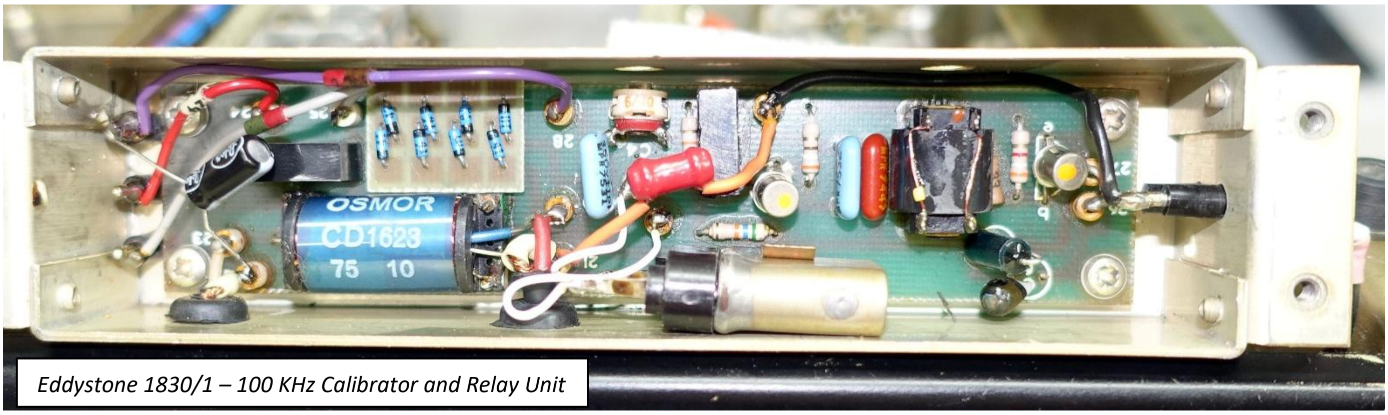
Inductor L1 is adjusted for peak and then backed off a little on the “slow side” of peak, to ensure consistent start up of the oscillator each time the Calibrator is switched ON. Trimmer capacitor C4 adjusts frequency OK.

I have left the protection diode pack PC1 (2x4x1N4148) in circuit in my 1830, but this may introduce spurious signals if the receiver is operated near high power Broadcast Stations. Assess for your specific location. Disconnect if required.

I also replaced Tantalum capacitor C6 which had a “blown top”. Because conventional component replacement of “through hole” items on this PCB is very time consuming and requires de-soldering of coax cables around the antenna switching relay, I decided to cut one leg of the old capacitor, and mount the new item between “WP22” and “WP28”. A more comprehensive repair will be carried out if ever the actual PCB is removed from the unit enclosure.

There is an extra component C8 of 1000pF across “WP21” to “WP27”, (red tubular cap in photo) not on circuit but mentioned on the circuit drawing BP1289 ISS 2, and in the box designated “Circuit Modification Record”.

This unit is a little awkward to work on, and even worse is the “Switch Box Attached to the Rear of RF Assembly” as described and drawn on the circuit. This “switch box” is under the 500 KHz CAL Unit. Remove rear panel for service.



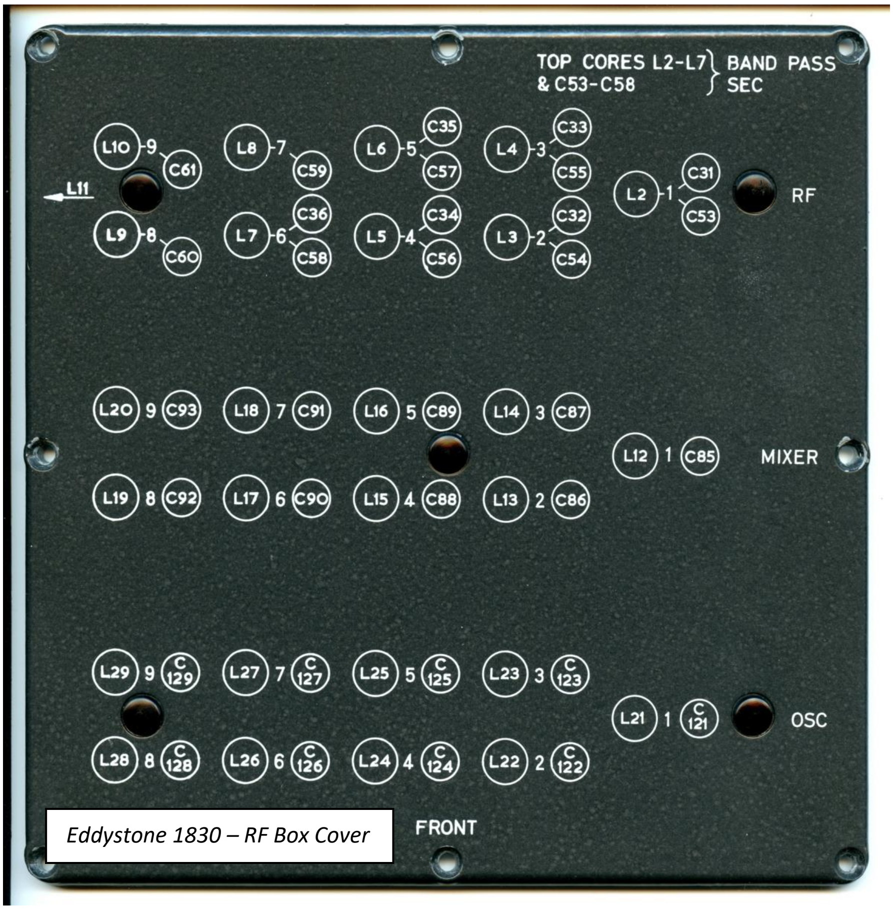
Eddystone 1830/1 – 100 KHz Calibrator and Relay Unit

Initial Sensitivity Tests (after IF Alignment but before RF alignment).

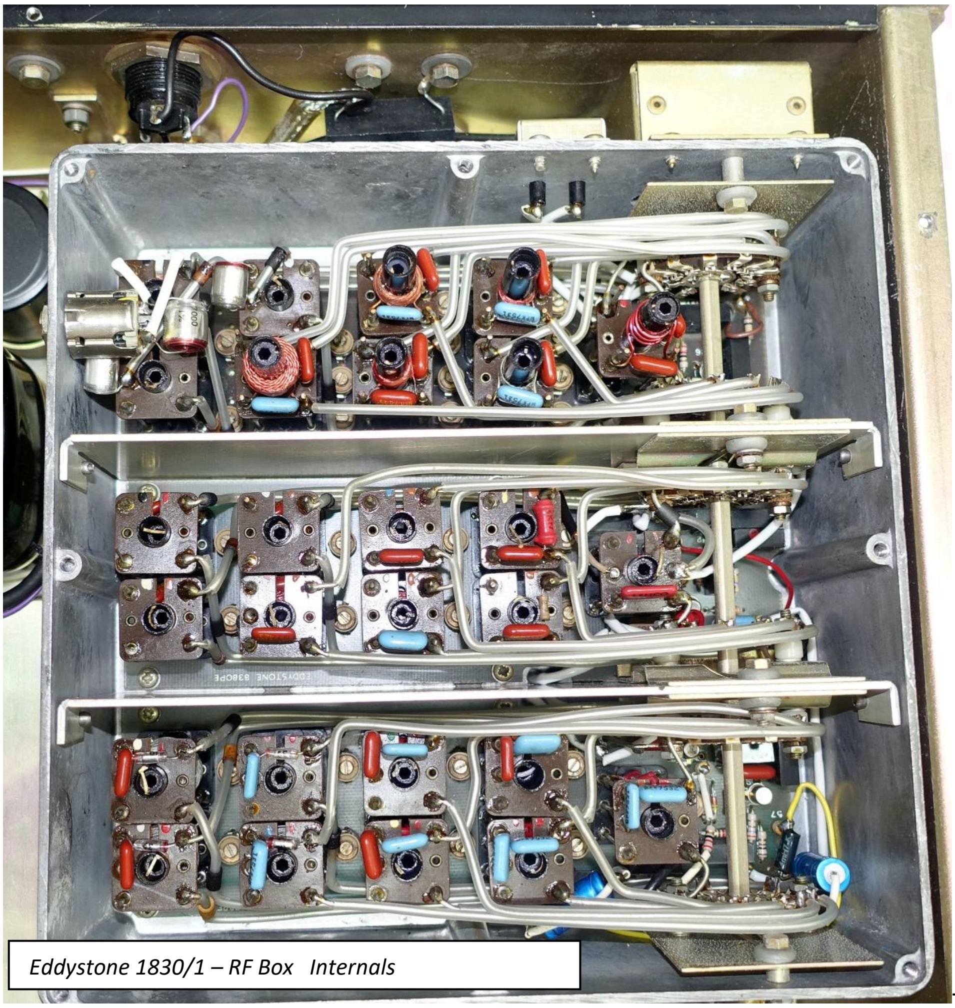
Band	Freq Range	Freq low	Freq mid	Freq high
1	18-31 MHz	8	9	10
2	10-19 MHz	4	4	5
3	5.5-10 MHz	10	9	2
4	2.9-5.5 MHz	10	10	9
5	1.5-2.9 MHz	6	10	6
6	920-1750 KHz	8	9	10
7	480-950 KHz	10	9	5
8	240-480 KHz	12	12	14
9	120-250 KHz	10	14	10

The table results are original Signal to Noise ratios for an Antenna Input Level of 1.0 uV in AM Mode.

“Low, med, high” are convenient test frequencies on the dial. Above are my results, which are OK for now.



Eddystone 1830 – RF Box Cover



Eddystone 1830/1 – RF Box Internals

RF Alignment

Checks before RF Adjustment or Alignment

If your initial sensitivity checks are not roughly as expected, then you may have to search out and fix any faults or issues first, before RF Alignment.

If your initial sensitivity checks are in spec, then not you might decide to omit this RF Alignment.

Ensure all work on tuning system mechanical parts is complete.

Ensure that IF alignment is completed and meets spec, and that all IF and AGC works have been completed.

Remove RF Box Cover. It has little effect on the end results. The RF Oscillator is very slightly affected.

Check very carefully with a magnifying glass for dry joints in the RF Box, especially with the thicker wires.

Check two electrolytic capacitors in the RF Box. If you have to replace these items, then it is a major repair issue, due to the way that the RF section is constructed, and you have to carry this out first. Use this opportunity to very carefully examine all other components on the PCB that you remove. Refer HBK for removal method.

Check that the RF Box PCB attachment screws are firm.

Check for loose pieces of coil core locking “rubber” and especially from within core “hex” which might hinder trim tool entry.

Check Main Tuning dial pointer for correct position on dial cord; see HBK.

Check Main “Dial Calibrator” is at mid position of travel, and do not touch again until all Main Oscillator work is finished.

Check that the “RF Peak” front panel control is centre, and do not touch again until all RF alignment is finished.

Set the Incremental Tuning exactly to 1350 KHz, although slight tuning off centre frequency is OK during Mixer and Antenna alignment.

Place a 75 ohm load on the antenna socket, leave the top cover and RF Box cover both OFF, and tune through each band to see if there is any breakthrough from radio stations or interfering devices, and make a list to avoid those frequencies during test and alignment.

Read the handbook for Eddystone’s suggested alignment schedule and setup.

RF Alignment Preparation and Plan

Align RF Oscillator, then Mixer, then Antenna (inductors and tuned circuits), in that order. There is no need to repeat alignment if it is done carefully.

I tested the Crystal Locked Oscillator function later.

Set up an output meter on AF, an analogue meter measuring IF Output level, and preferably a CRO in parallel with the IF Output to observe peaks and unusual responses, eg oscillations, noise, squegging etc.

I used the RF box cover lid, with its inductor and capacitor layout drawing, and a pointer made from plastic insulation tape, to act as a visual prompt as to where I was in the sequence of adjustment.

Decide on a “standard RF level” for adjustment; the HBK uses 3.0 uV for various tests, refer page 7. This is a good starting level. The handbook is not quite specific about receiver setup, but I used AM Mode, SSB selectivity, IF gain max, AGC ON, NL OFF, RF Peak centre, AGC Short. As a 3.0 uV signal input is just on AGC threshold, it is OK for AGC ON, but turn it OFF and IF Gain down a little, if you find AGC interferes with alignment peaking.

I think using the IF Output level on an analogue meter is by far the best indicator for alignment.

Allocate sufficient time to align the whole RF box in one episode.

Take records of each stage.

Setup as per HBK and previous comments.

Note that some antenna circuits are double tuned a single former, and with top and bottom cores, access from top only, and adjust top core first.

Caution with possible Broadcast Band pickup in Bands 6 and 7.

Results and comments for my 1830 are in the following tables.

RF Alignment of the Main Tuning Oscillator

Band	Freq Range	Comment
1	18-31 MHz	Adjustment touchy for L and C
2	10-19 MHz	Worst dial tracking accuracy of all bands, but OK
3	5.5-10 MHz	
4	2.9-5.5 MHz	Investigate possible touchy trimmer capacitor C124 at later date
5	1.5-2.9 MHz	
6	920-1750 KHz	
7	480-950 KHz	
8	240-480 KHz	
9	120-250 KHz	

RF Alignment of the Mixer Stage

Band	Freq Range	Comment
1	18-31 MHz	OK no real change
2	10-19 MHz	OK slight improvement
3	5.5-10 MHz	OK very slight improvement
4	2.9-5.5 MHz	OK nil improvement
5	1.5-2.9 MHz	OK very slight improvement
6	920-1750 KHz	OK slight improvement
7	480-950 KHz	OK no real change
8	240-480 KHz	OK slight improvement
9	120-250 KHz	OK slight improvement

RF Alignment of the Antenna Circuit and RF Amp Stage

Band	Freq Range	Comment
1	18-31 MHz	OK, C31 broad, very little improvement
2	10-19 MHz	L3 bottom core firm but loosened OK, very little improvement
3	5.5-10 MHz	OK, very little improvement
4	2.9-5.5 MHz	L5 bottom core remains firm but close to peak, moderate improvement
5	1.5-2.9 MHz	L6 top core firm, cut away degraded rubber, OK, very little improvement
6	920-1750 KHz	Moderate change to C58, OK, moderate improvement
7	480-950 KHz	OK, slight improvement
8	240-480 KHz	OK, slight improvement
9	120-250 KHz	Moderate change to L10, OK, moderate improvement
IF Rejector	100 KHz	OK, see HBK for method, use signal input level of 7.5 mV

Notes on RF Box Ferrite Cores

My cores are threaded M6x1.0 and are 12mm long.

My cores had thin square rubber type of locking, and the rubber goes hard with age.

In some cases in my 1830, the old rubber almost locked the core in the former, and in two cases, it had entered the hex adjustment slot, gone hard, making use of a trimtool difficult. I cut out some with a very small scalpel type knife, and dissolved out some more. I experimented with various solvents and concluded that methylated spirit was best. It would soften the old rubber after two hours quite well, but the rubber would go hard again after two days. I fully removed two cores and used meths and a hex tuning tool as a “broach” to fully remove all traces of rubber.
Caution if you use other solvents on cores in the coil formers. I can add that WD40 and turpentine had no effect on the rubber over 24 hours. If you really must use a spray type lubricant on the core and former to loosen a stuck core, try one or two micro drops of spray lanolin or silicone into the core thread where it meets the former, using a small hypodermic syringe to deliver the drop, never spray it.

With the cores which were only slightly stuck in the former, I found that using a long nylon hex trim tool, and tensioning it by rotation, first one way, holding it in tension, then the other, and repeating, usually overcame most resistance.

I had one very loose core, and used Teflon tape to lightly restrain it. I had one very tight core.

Crystal Controlled Operation

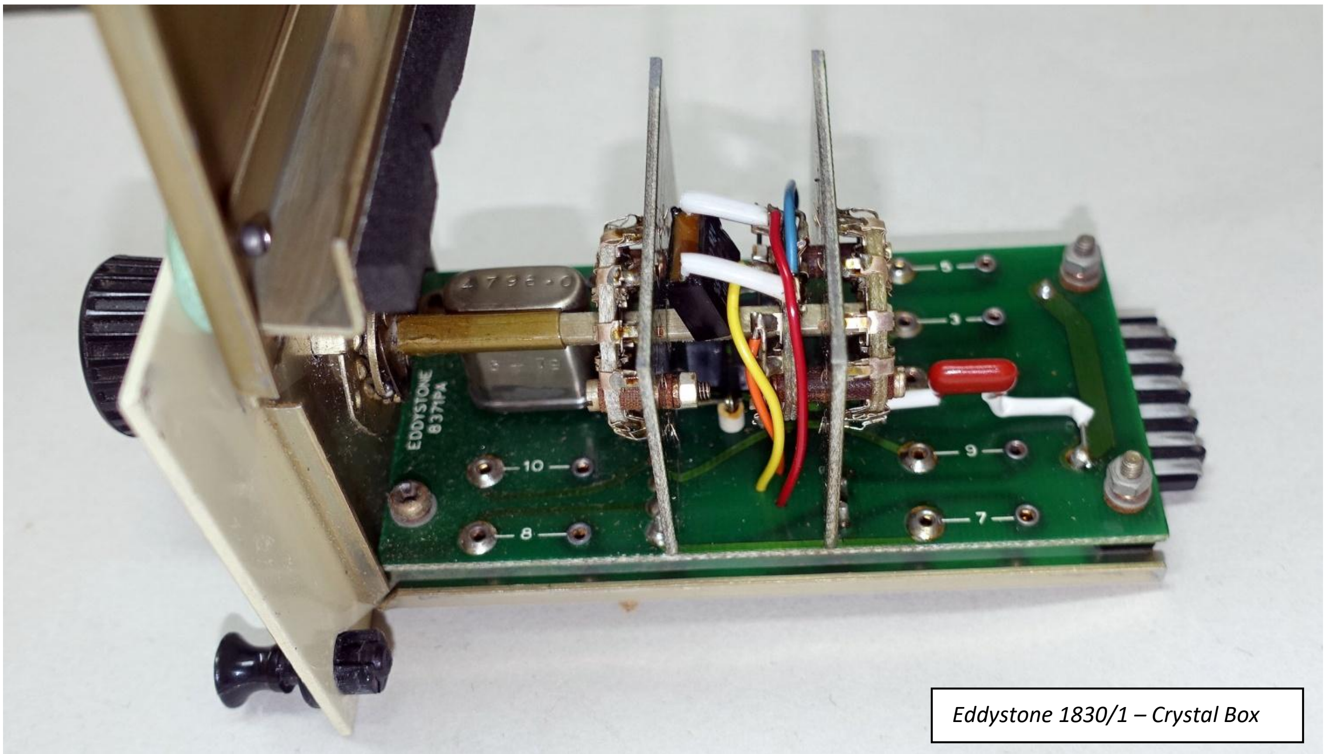
Crystal Controlled First IF 1350 KHz.

My 1830 had the optional HC6 style 1250 KHz crystal fitted, and it functions OK, although the crystal frequency trimmer was a little touchy. The Incremental Tuning must be on “0” in this mode.

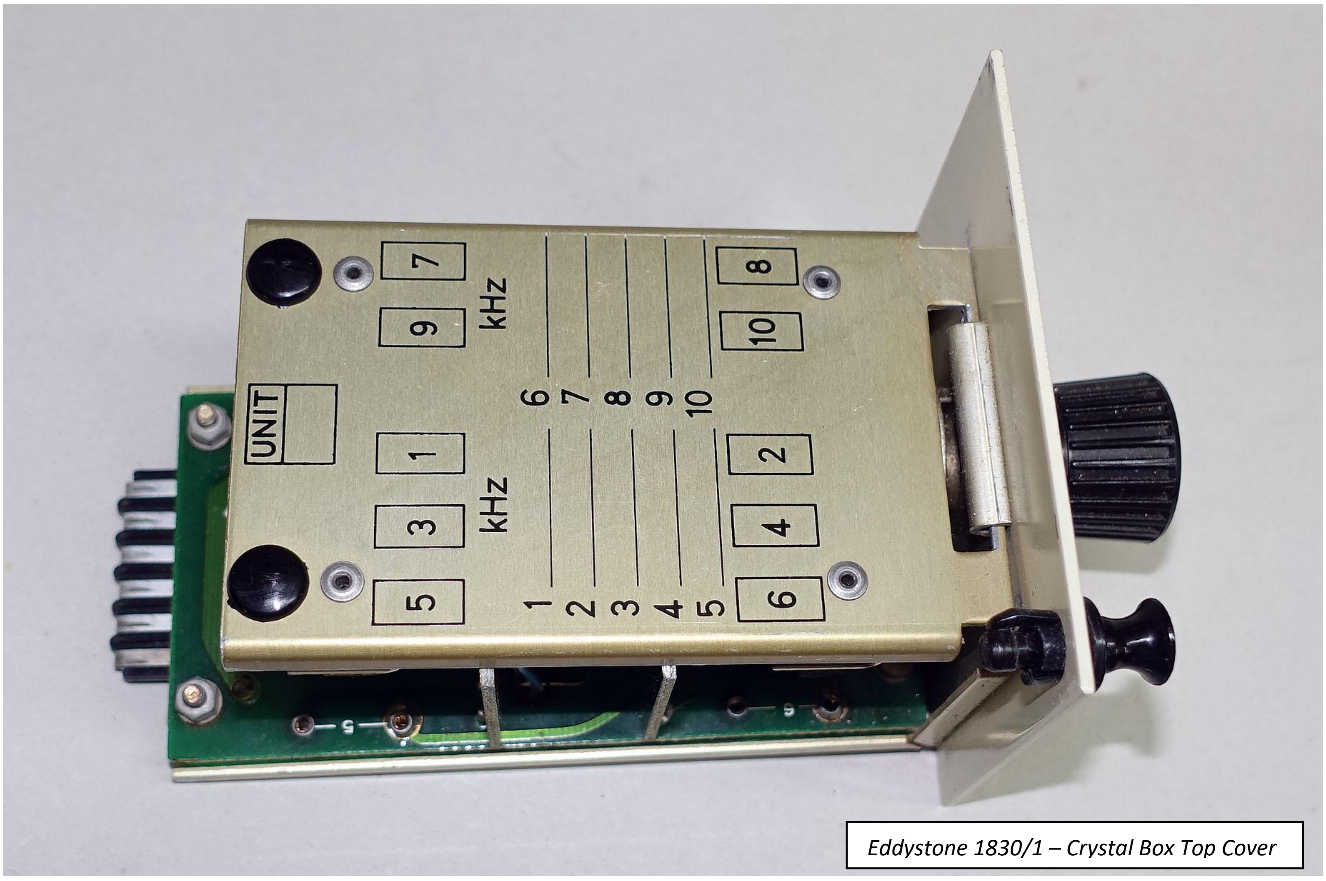
Crystal Controlled First Oscillator.

My 1830/1, with ten available positions, had one HC6 style crystal fitted for historical 3446 KHz AM operation. The crystal was date stamped 1979. There is no frequency adjust trimmer.

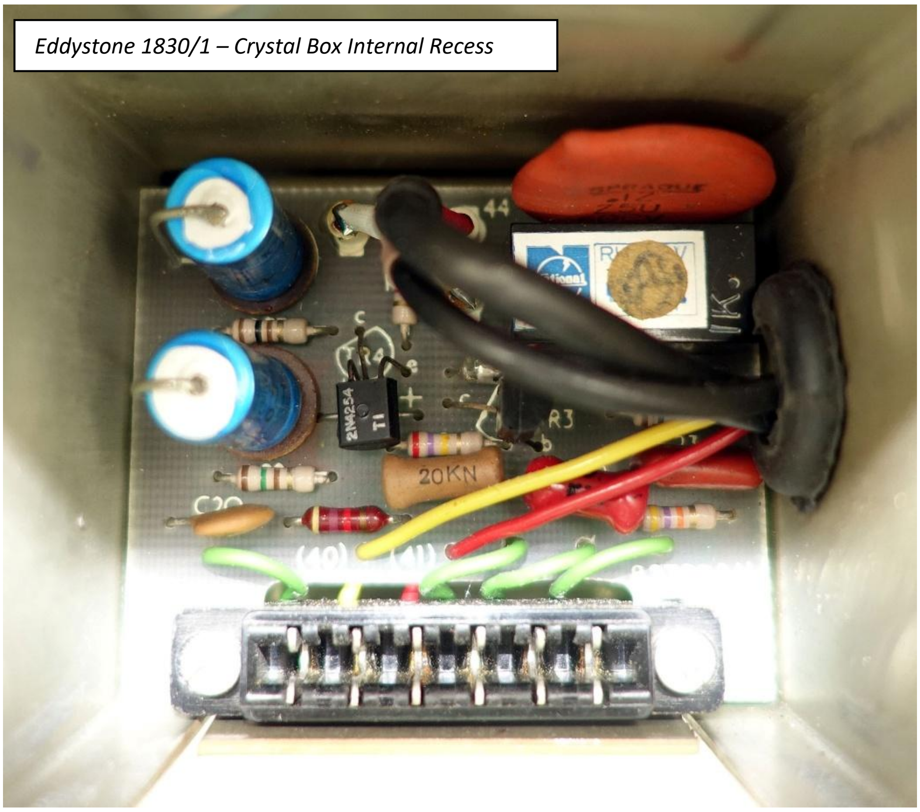
It all functions OK. The Main Tuning “peaks” the RF and Mixer stages, and the RF Peak Control functions as per normal tuning. Receiver sensitivity was checked to be that same as when using variable oscillator, marked “NORMAL” on the Crystal Box.



Eddystone 1830/1 – Crystal Box



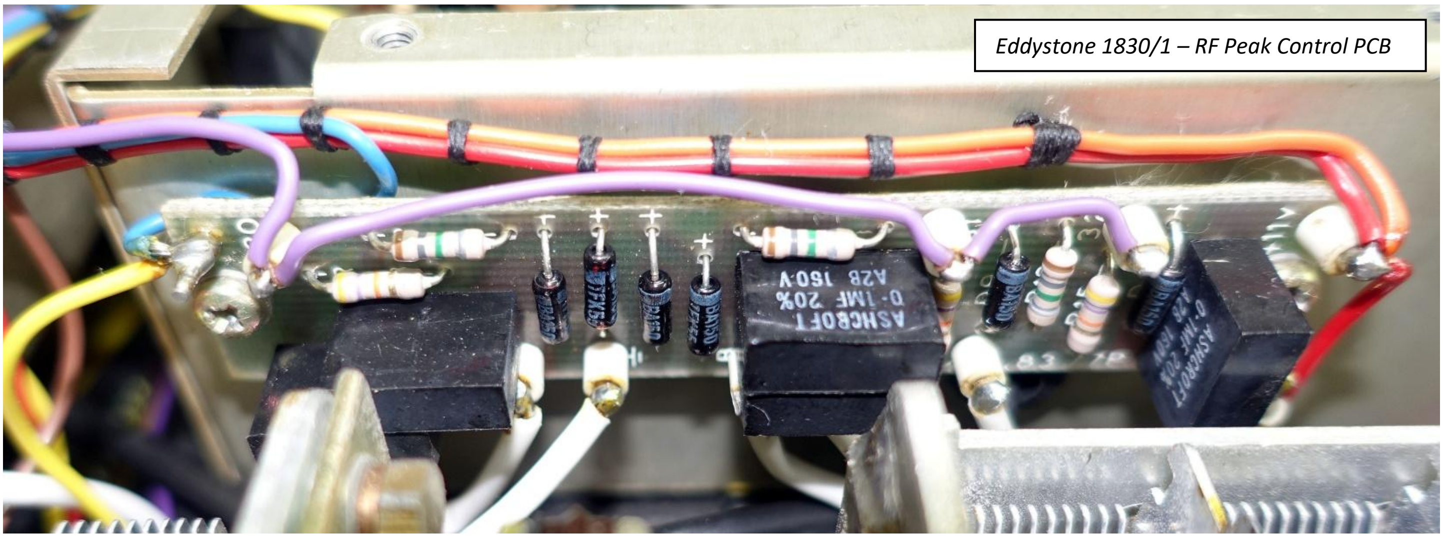
Eddystone 1830/1 – Crystal Box Top Cover


Eddystone 1830/1 – Crystal Box Internal Recess

RF Peak Control

After RF alignment, my RF Peak Control peaks up at all frequencies on all bands, and all within 45 degrees of control centre, and mostly within 20 degrees. It “feels” to have “a certain symmetry” of control, which probably infers that all varicap diodes are functional.

There is no separate test for this mini board.


Eddystone 1830/1 – RF Peak Control PCB

Overall Performance Tests

After all work and alignment is completed, and with all covers in place.

In the order as listed in the Handbook, starting on page 6, and using Handbook descriptions of the test.

These use "standard" setups, or as noted in the HBK, or as listed here.

These are the results of my 1830 receiver.

Note that the antenna protection diodes are in circuit for my 1830, and may have very slightly added to receiver input stage nonlinearities, and with possible resultant Intermodulation products. Effects are unknown and untested.

Sensitivity

AM Mode – better than 3uV for 15 dB S/N – easily met spec on all bands

SSB Mode – better than 1 uV for 15 db S/N – easily met spec on all bands

Additional Sensitivity Tests

Band	Freq Range	Freq low	Freq mid	Freq high
1	18-31 MHz	10	12	14
2	10-19 MHz	10	12	15
3	5.5-10 MHz	10	10	11
4	2.9-5.5 MHz	12	12	15
5	1.5-2.9 MHz	14	12	14
6	920-1750 KHz	11	13	12
7	480-950 KHz	14	12	10
8	240-480 KHz	10	14	10
9	120-250 KHz	13	12	12

The above table results are final Signal to Noise ratios for an Antenna Input Level of 1.0 uV in AM Mode.

"Low, med, high" are convenient test frequencies on the dial. Above are my results, which are satisfactory.

"Tune Through" MDS Minimum "Discernible To The Ear" Signal

Band	Freq Range	AM Mode	CW/SSB Mode
1	18-31 MHz	0.2 uV	0.15uV
2	10-19 MHz	0.1 uV	0.1uV
3	5.5-10 MHz	0.1uV	0.1uV
4	2.9-5.5 MHz	0.1uV	0.1uV
5	1.5-2.9 MHz	0.1uV	0.1uV
6	920-1750 KHz	0.1uV	0.1uV
7	480-950 KHz	0.1uV	0.1uV
8	240-480 KHz	0.1uV	0.1uV
9	120-250 KHz	0.1uV	0.1uV

Tested at mid band, minimum RF input in uV to "discern" an AM 30% Mod signal, or a CW "tone", with Mod OFF on Sig Gen, SSB Selectivity, AGC ON.

Rock the 1830 Frequency Tuning through the fixed Sig Gen frequency to hear an AM modulated signal, or a CW/SSB signal with no mod.

This test is the reverse operation of tuning in a weak signal, and hearing modulation on that minimal signal.

This is not strictly a traditional MDS, but it is an effective test.

There is some Measurement Uncertainty when using very low RF levels lower than -110 dBm.

IF Selectivity

Refer previous notes for these interim test figures.

Selectivity at -6.0 dB was "VN" 60Hz, "N" 0.6KHz, "SSB" 3.5KHz, "AM Wide" 6.0 KHz , all a little different to spec. There was some ripple in the various pass bands, and which I find difficult to quantify without a Sweep Gen.

Image Rejection

Band	Freq Range	F rx KHz	F osc KHz	F image KHz	Image Ratio in dB and Comment
1	18-31 MHz	25000	26350	27700	56
2	10-19 MHz	12000	13350	14700	76
3	5.5-10 MHz	6000	7350	8700	86
4	2.9-5.5 MHz	3500	4850	6200	Not in tuning range
5	1.5-2.9 MHz	1600	2950	4300	Not in tuning range
6	920-1750 KHz	1000	1100	1200	76
7	480-950 KHz	500	600	700	68
8	240-480 KHz	250	350	450	72
9	120-250 KHz	130	230	330	Not in tuning range; "signal" heard at 90dB

Standard signal input is 3.0 uV AM 30%.

The Sig Gen is operated at the Image Frequency.

The Image Ratio normally only has meaningful results if the Image is located within the Band being tested.

I carried out the test on Bands 4, 5 and no image could be heard. I cannot yet explain the finding on Band 9.

IF Breakthrough

Band	Freq Range	IF KHz	F rx KHz	F sig gen	Signal Lvl dBm	Comment
1	18-31 MHz	1350	23000	1350	-13	
2	10-19 MHz	1350	14000	1350	-11	
3	5.5-10 MHz	1350	7000	1350	-21	
4	2.9-5.5 MHz	1350	4000	1350	-25	
5	1.5-2.9 MHz	1350	2000	1350	-25	
6	920-1750 KHz	100	1150	100	No signal heard	Not able to be measured
7	480-950 KHz	100	650	100	-13	
8	240-480 KHz	100	320	100	-21	
9	120-250 KHz	100	160	100	-21	
5	1.5-2.9 MHz	1350	2000	100	N.A.	100 KHz breakthrough was nil

Actual IF frequency signal level AM 30% Mod to have the same AF Output as a Standard RF Signal of 3uV AM 30% mod.

The Sig Gen is at IF frequency of either 100 or 1350 KHz, depending on band.

Cross Modulation

Band	Freq Range	F KHz	Level of Unwanted Signal above Wanted Signal
1	18-31 MHz	25000	35 dB
2	10-19 MHz	13000	32 dB
3	5.5-10 MHz	8000	33 dB
5	1.5-2.9 MHz	2100	37 dB

Two signals are combined, and test is carried out with the 1830 in AM Mode, SSB Sel, AGC ON.

I used a resistive combiner, with 6 dB loss allowed for.

Sig Gen #1 – Freq F CW, at a level of 1000 uV (+60 dBuV) as the "wanted signal"

Sig Gen #2 – Freq F+20 KHz , mod AM 30%, as the "unwanted signal"

Increase SG2 RF level above SG1 level, until AF output is the same as with SG1 only.

Blocking

Band	Freq Range	F KHz	Level of Unwanted Signal above Wanted Signal
1	18-31 MHz	25000	98 dB
2	10-19 MHz	13000	90 dB
3	5.5-10 MHz	8000	94 dB
5	1.5-2.9 MHz	2100	110 dB

Two Sig Gens Combined As Before.

Sig Gen #1 – Freq F, 1000uV mod AM 30% , as the "wanted signal"

Sig Gen #2 – Freq F+20 KHz, level 1000uV CW, as the "unwanted signal"

Increase Sig Gen #2 RF level until the AF Output is reduced by 3 dB.

My test results are just a little below specification, but the Measurement Uncertainty is a factor at these RF levels.

Intermodulation

I found that the Eddystone handbook gave no specific method for test, so I used the following setup and test.

Two Sig Gens with a resistive combiner. Allow for 6 dB combiner loss (4.5 dB for a transformer type) for the level of each Sig Gen.

Receiver on 8000 KHz, AM, SSB selectivity, AGC ON, NL OFF. Monitor the IF Output level.

Sig Gen #1 8000 KHz CW with an RF level to give MDS or a suitable IF Output test level, which was – 92 dBm for mine.

Sig Gen #2 8020 KHz CW with an RF level same as Sig Gen #1.

Confirm MDS or suitable IF Output level both on 8000 and 8010 KHz.

With the Incremental Tuning, Tune to 8040 KHz and increase the level of both Sig Gens in turn, say in steps of 5 dB, until a signal is found, rocking the receiver tuning around 8040 KHz, and tune for peak. You can temporarily turn on the AM mod with one Sig Gen to identify the distortion product at 8040 KHz, then turn off again as required.

Reduce each Sig Gen's RF level in finer steps until the minimum level is found that both Sig Gens, with the same output level, produce a signal at 8040 KHz of the same IF Output level or MDS previously found at 8000 and 8020 KHz. You may need to do this a few times to find a minimum. This was -42 dBm for my receiver.

The IMD (third order) figure is the difference in level between the two situations of MDS with one Sig Gen at 8000 KHz, and MDS with two Sig Gens at 8000 and 8020 KHz, and tuning to 8040 KHz.

Repeat the test with the receiver tuned to 7080 KHz. The result on my receiver was much the same as at 8040 KHz.

Repeat the test with the receiver tuned to 1100 KHz for a test with the 1830 in single conversion mode.

I obtained results of approximately 50 dB for 8 MHz, and 53 dB for 1100 KHz.

You can also measure the "next removed in frequency" IMD product (fifth order) at 8060 KHz or 7060 KHz, which on my receiver were another 20 dB down, or giving an IMD figure of 70 dB.

The above tests may not be exactly technically correct, but are repeatable tests with ordinary test equipment.

The ability of the 1830 receiver to fully separate the signals of two Sig Gens of -20 dBm with 20 KHz separation at 8 MHz is excellent.

AGC Characteristics

1 –AF Level Change.

My 1830 has excellent AGC level characteristics. Listening checks mask this a little in practice.

If your AGC seems bad, then you may have a fault.

The AGC is IF derived, and has a second "Delayed AGC" action for strong signals.

I changed both AGC time constant capacitors; refer earlier text.

Setup #1 (AM Mode) is RF signal 8MHz, AM 30%, 1830 in AM Mode, SSB Sel, NL OFF, RF level 3uV for Standard AF Output Level.

My 1830 AF Output had 2.0 dB change for 90dB RF level increase above -97dBm (3uV), which is very good.

Setup #2 (SSB Mode and not specifically described in HBK), 8MHz, CW, 1830 in SSB Mode, RF Level 3uV for Standard AF Out (tone 1-2 KHz , as adjusted as convenient by receiver BFO).

My 1830 AF Output had 4.0 dB change for 90dB above -97dBm (3uV), which is very good.

2 - AGC Onset

My 1830 AGC starts at an RF Signal level of approx 4uV, when 1830 is in AM Mode.

3 – AGC Time Constants

The 1830 AGC Time Constants seem correct for a subjective test. The LONG setting seems "very long" on actual reception, but seems to work well.

Audio Outputs

My 1830 met spec for both AF Speaker and Line Output, and for both level and distortion at Standard AM RF level.

Loudspeaker output with less than 5% AF distortion was 520 mW in 4 ohms resistive.

Headset Output source impedance was measured to be 2600 ohms.

Headphone level was very satisfactory for listening and had a maximum of 600 mV RMS in 2400 ohms resistive.

Line Output, with a separate AF channel, was adjusted OK and set at 0dBm in 600 ohms.

Audio Frequency response was – 7dB at 300Hz, -4.5dB at 400Hz, 0dB at 1000Hz, -5dB at 3000Hz, all in spec.

The original Internal Loudspeaker in my 1830 was open circuit, and was replaced by a standard miniature speaker from a local parts provider.

IF Output

The IF output level was 20mV in 75 ohms (-22.75 dBm75) for an input 4MHz CW signal of 25 uV and with AGC ON .

The IF Output source impedance was measured at 135 ohms, which is OK.

Radiation

How Eddystone carry out this test is unknown; readers can speculate.

The test figure of less than 400pW has little meaning without further explanation.

I do not have suitable test equipment.

Oscillator Leakage from Antenna Socket

Band	Freq Range	F rx	F osc	Leakage Level
1	18-31 MHz	22000	23350	-41 dBm
2	10-19 MHz	13000	14350	-52 dBm
3	5.5-10 MHz	7000	8350	-51 dBm
4	2.9-5.5 MHz	4000	5350	-75 dBm
5	1.5-2.9 MHz	2000	3350	-82 dBm
6	920-1750 KHz	1200	1300	-65 dBm
7	480-950 KHz	600	700	-75 dBm
8	240-480 KHz	300	400	-76 dBm
9	120-250 KHz	150	250	-77 dBm

Using another HF receiver (with "S" meter) directly connected to the 1830 Antenna Socket by coax cable, and using the other receiver as a transfer instrument, and a Sig Gen to confirm the level into the other receiver.

Replace all receiver covers before test.

Levels are equivalent to actual 1850 RF Oscillator Leakage power levels in dBm, emanating from the 1830 Antenna Socket.

Dial Calibration Accuracy

My 1830 Dial Accuracy is very good, but variable, and error is a little difficult to quantify.

The Dial Calibrator has to be used on each band, even after RF Alignment of the Oscillator.

The 500 KHz calibrator crystal (after replacement) has very good frequency stability, and can be adequately heard or "used" at all frequencies and on all Ranges.

Miscellaneous Tests

Noise Limiter

Described on page 13 in handbook. Not described in "Typical Performance" page 6, nor in Alignment.

This is a peak clipper type, working at AF level, and it works rather well in practice.

I loosely coupled noise impulses into the antenna socket from a 10 V DC buzzer type generator whilst receiving a Standard 3uV RF AM Signal at 8 Mhz.

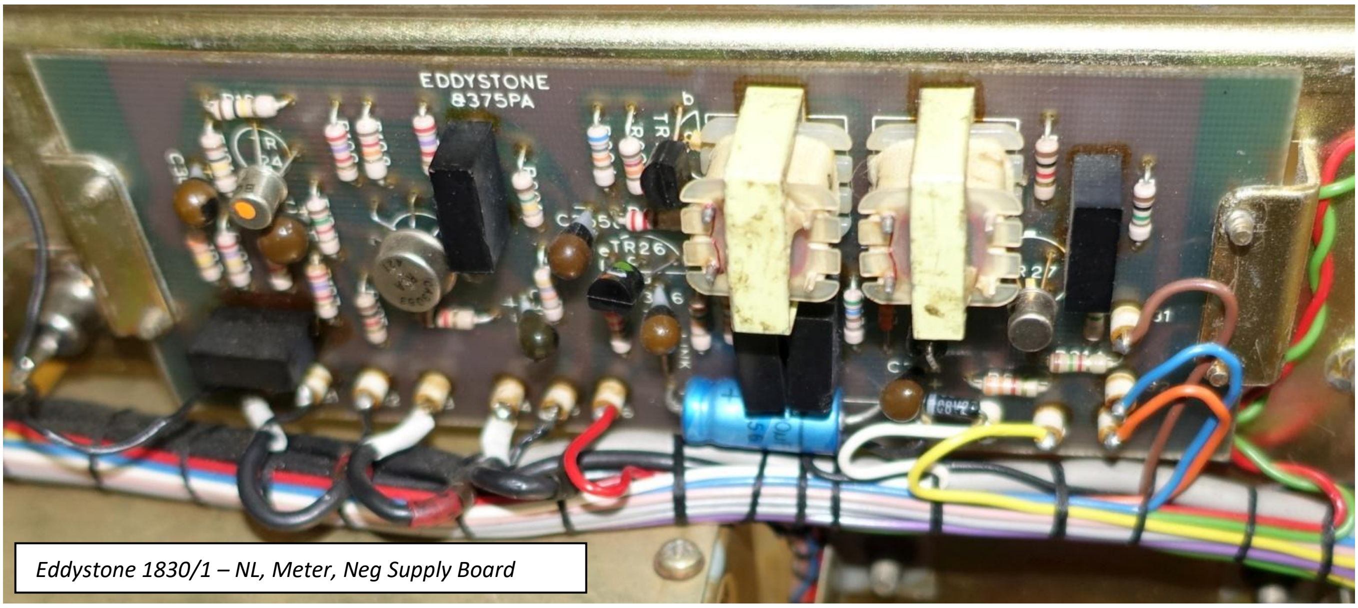
The AF Output level is reduced 6 dB on my 1830 with NL ON, and noise impulses are clipped on both polarities.

Negative Supply and Meter

Check the Tantalum capacitors (4) and one tubular electrolytic, in the Negative 8V DC Supply.

My 1830 Negative DC output was 7.8 VDC with 20mV pk to pk (approx 400Hz) ripple at "WP128".

The Signal Strength Meter was adjusted OK for meter zero with antenna removed, and on mid tuning range of Band 4. Use the control pot on rear panel.



Eddystone 1830/1 – NL, Meter, Neg Supply Board

Dial Lamps

My original lamps are still OK.

If you cannot obtain original lamps of this small style, consider using tubular wedge (slide) style 12 V telephone lamps, with the side sheet metal contacts removed to access the bulb wires.

The plastic lamp clips will probably be found to have degraded, and some substitute replacement should be considered to avoid lamp vibration causing early breakage of the lamp connection wires.

Not in Handbook.

Antenna Input Impedance measurement at the BNC socket was attempted with an RF Impedance Bridge, at various frequencies on several Bands, with the 1830 ON, but results were not constant, and mostly gave a quite low resistive component below 10 ohms.

Spurious Signals

I didn't notice any spurious signals which affected my general listening. If I go looking with the 1830 in SSB Mode and with the antenna socket terminated, I can find "beats" from the occasional very weak spurious signal on the higher bands.

Other Stuff

A Little Bit Hard to Find

My 1830 has a date of manufacture paper label on the rear of the 100 KHz IF Filter Box. Mine is marked 24 Feb 1976.

Clunky Design or not

The Crystal Oscillator box at first seems quite clunky, but it is very practical in use for fixed coms.

RF Box

I have a high resolution (600 dpi) scan of the RF Box Cover designations. This may be of use to others for use with a possible repaint of a damaged cover.

Good Intentions

I intended to experiment with new selected transistors in the front end, to perhaps reduce noise, but access is more difficult and tedious than I originally expected. If ever I have a failure of any RF Box component requiring PCB removal, I have resolved to remove the FETs and solder in transistor "mini-sockets", obtained from a low profile 14 pin DIL IC socket (made with round pins). This will enable quick change of FETs, and should not introduce any instability or performance issues.

Review and Comment

The 1830 is a "General Purpose" HF receiver, and my 1830/1 receiver met all specifications.

It was more probably installed as an emergency or reserve receiver in professional radio service.

It is easy to use in practice, and has a very nice "feel" indeed when tuning across a range. Tuning from say 8 MHz to 10 MHz is very fast, and some younger listeners may not have had the pleasure of the better aspects of an analogue receiver.

The Front Panel controls are intuitive and well laid out, and are functional in control range eg BFO range. Tuning Controls are smooth in operation. The Incremental Tuning takes just a little time to become familiar with its operation. I would have preferred the IF and AF Gain controls to be separated. For reception on SSB Mode, I tend to leave the BFO alone, and just retune for drift with the Incremental Tuning. I would have preferred individually adjusted preset BFO frequency settings for LSB and USB instead of the present fixed resistor settings, which are not quite correct for resolution, at least for me.

The ability to tune to a particular frequency is good for Bands 9 to 4, worse on higher frequencies, tending to be almost unworkable above 10 MHz. Considering its era, it is satisfactory for general listening, but the stability and frequency setting of crystal locked operation is really required for fixed communication service.

It is a stable receiver, frequency wise, and a minimum of retuning is required for short term listening. There is some frequency drift, but it doesn't present a real problem when actually listening. I can listen to an SSB signal on 8176 KHz, switch the receiver OFF, wait five seconds, and turn ON again, and the SSB signal is still on frequency, and resolved. The installation of a 7812 voltage regulator, and the resultant lower heat, must contribute to better medium term frequency stability

Selectivity is adequate, although I question the need for such a narrow single crystal filter, when the Narrow selection is sufficient. Mechanical filters would have been more appropriate for the intended purpose of the receiver.

The AGC action is very good indeed, and doesn't even "seem" to be working whilst you are listening; quite a design feat.

After a few weeks of regular daily general listening use, I found that I mostly left the Mode switch in USB Mode, the Selectivity in SSB, IF Gain on Max, BFO on centre, and I used the Incremental Tuning for resolving SSB. The CAL function is used constantly, but for most of the time I don't use the Dial Cal Set.

I wonder if the 1830 would be better if The Incremental Tuning range was 0 to 100 KHz, and the Calibrator Crystal was 100 KHz as it was in early 1830 receivers. I am now fully comfortable with the -50, 0,+50 concept, which is perhaps a little more accurate in setting frequency, but a little less intuitive in operation, at least for those brought up with 0 to 100 type band spread.

I find that the 1830 is a little "noisy" and not quite as sensitive as other receivers. The 1830 IF sensitivity is not quite as good as some other receivers of similar type.

Construction quality is very good, and I found no dry joints and only one "suspect soldered joint".

I cannot personally bear the AF Level knob "Infill" being a garish red colour, or having a red line pointer. My knob originally had no infill. I have used grey instead. Probably in a dim Radio Room at 3 am, operators might have preferred red.

Renovation of an 1830 receiver is relatively easy, but access to some areas is a little difficult.

Quality components have been used throughout, and so I had relatively few replacements due to age. Some original parts are still available. All semiconductors are readily available.

The Eddystone Handbook is very good, but does not describe fully some alignments or some test setups. I did not notice any errors.

This has been a very pleasant journey for me, stirring fond memories of my yesteryears.

Comment on this text is most welcome, and please advise any errors.

Abbreviations

AF – Across Flats, eg of a nut or hex tool

AF – Audio Frequency

cap - Capacitor

MDS – here means Minimum Discernible Signal, but traditionally was Minimum Detectable Signal

mod - Modification

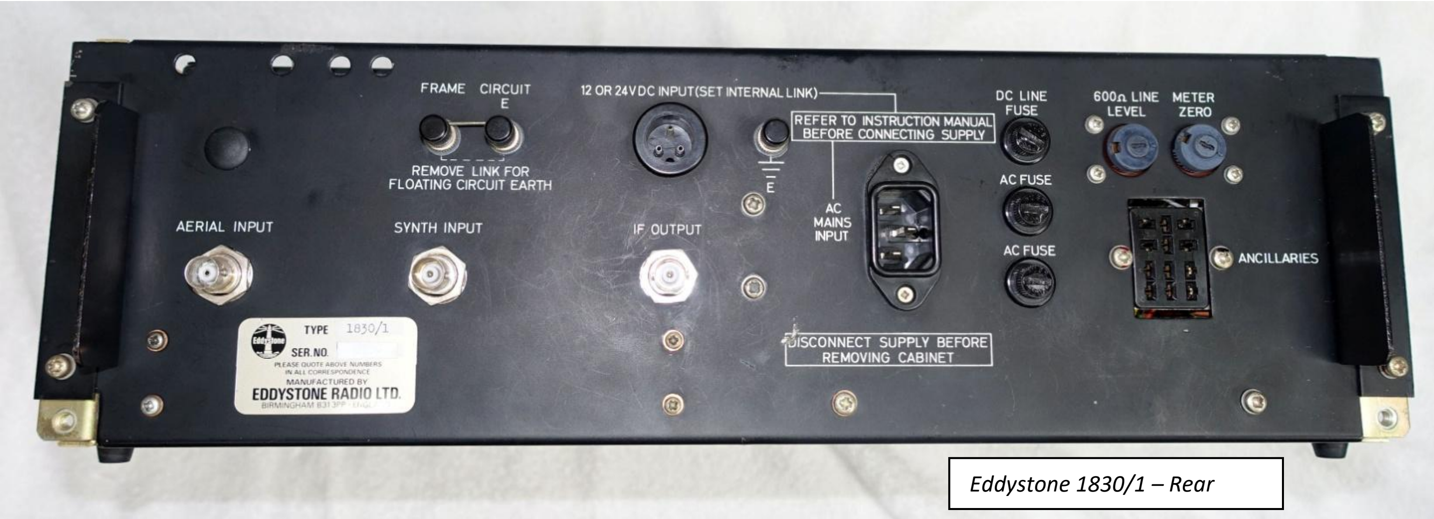
PS – Power Supply

Sig Gen – Signal Generator

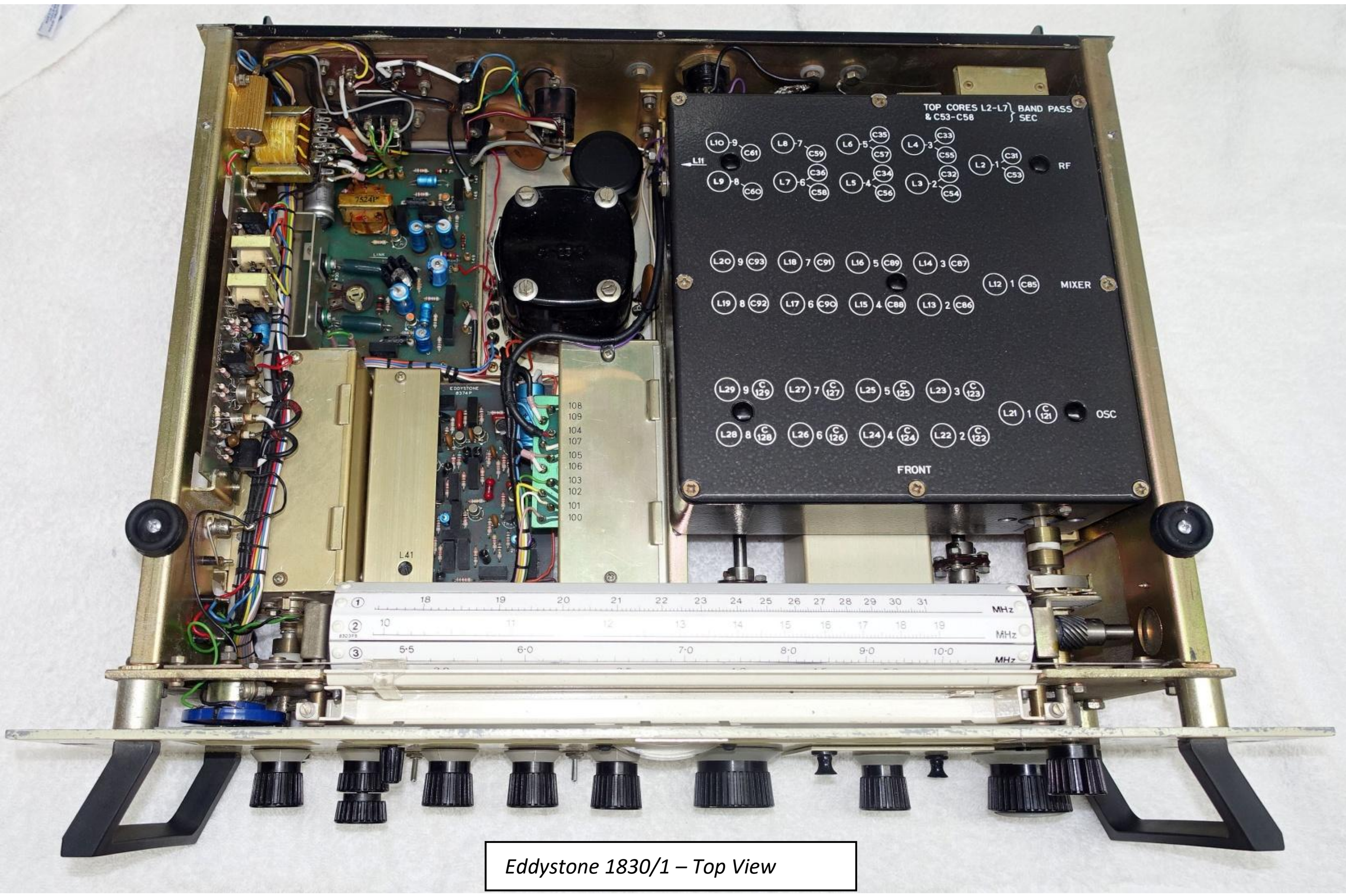
Spec - Specification

WP – Wiring Point

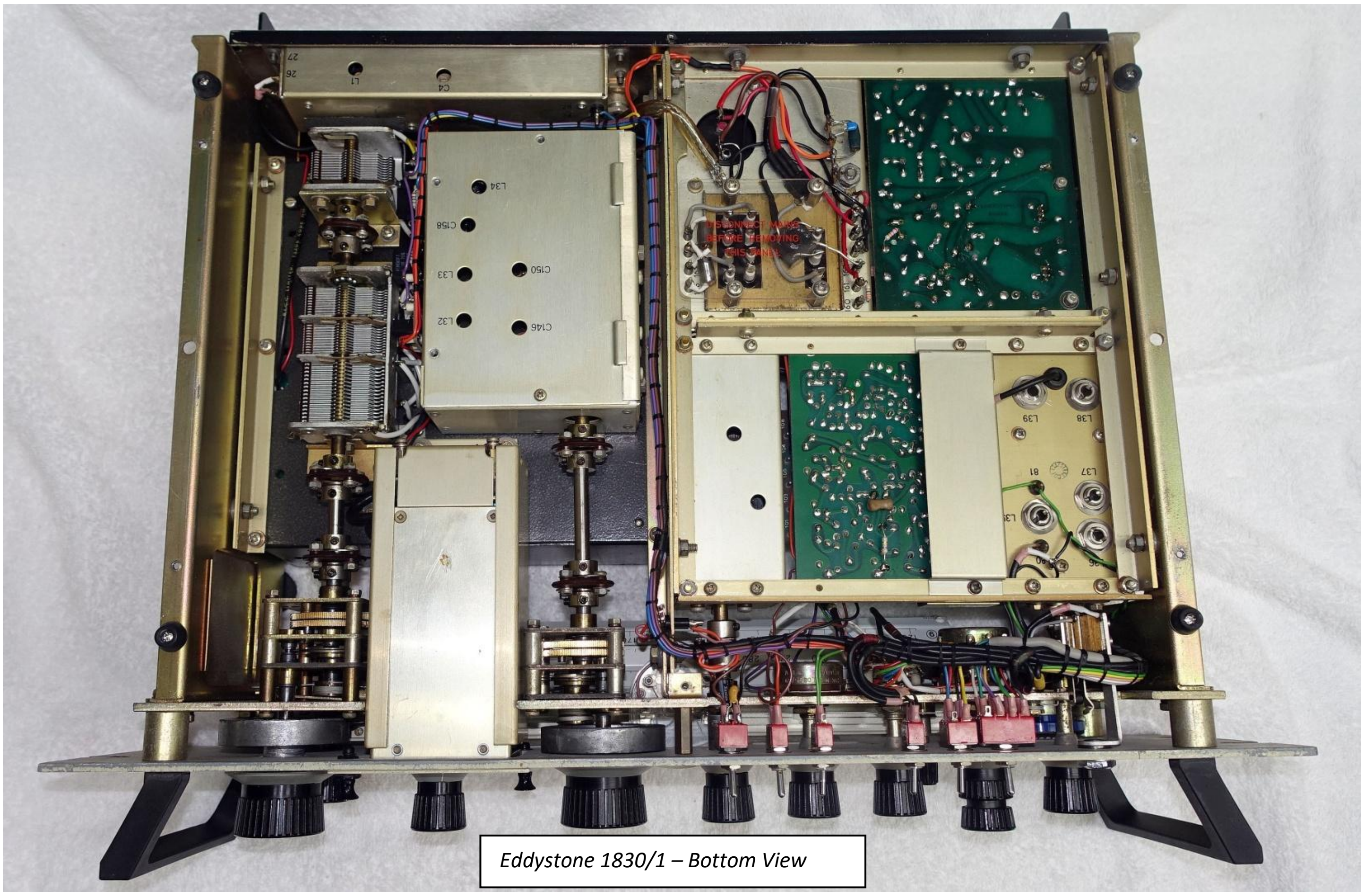
Additional Photos



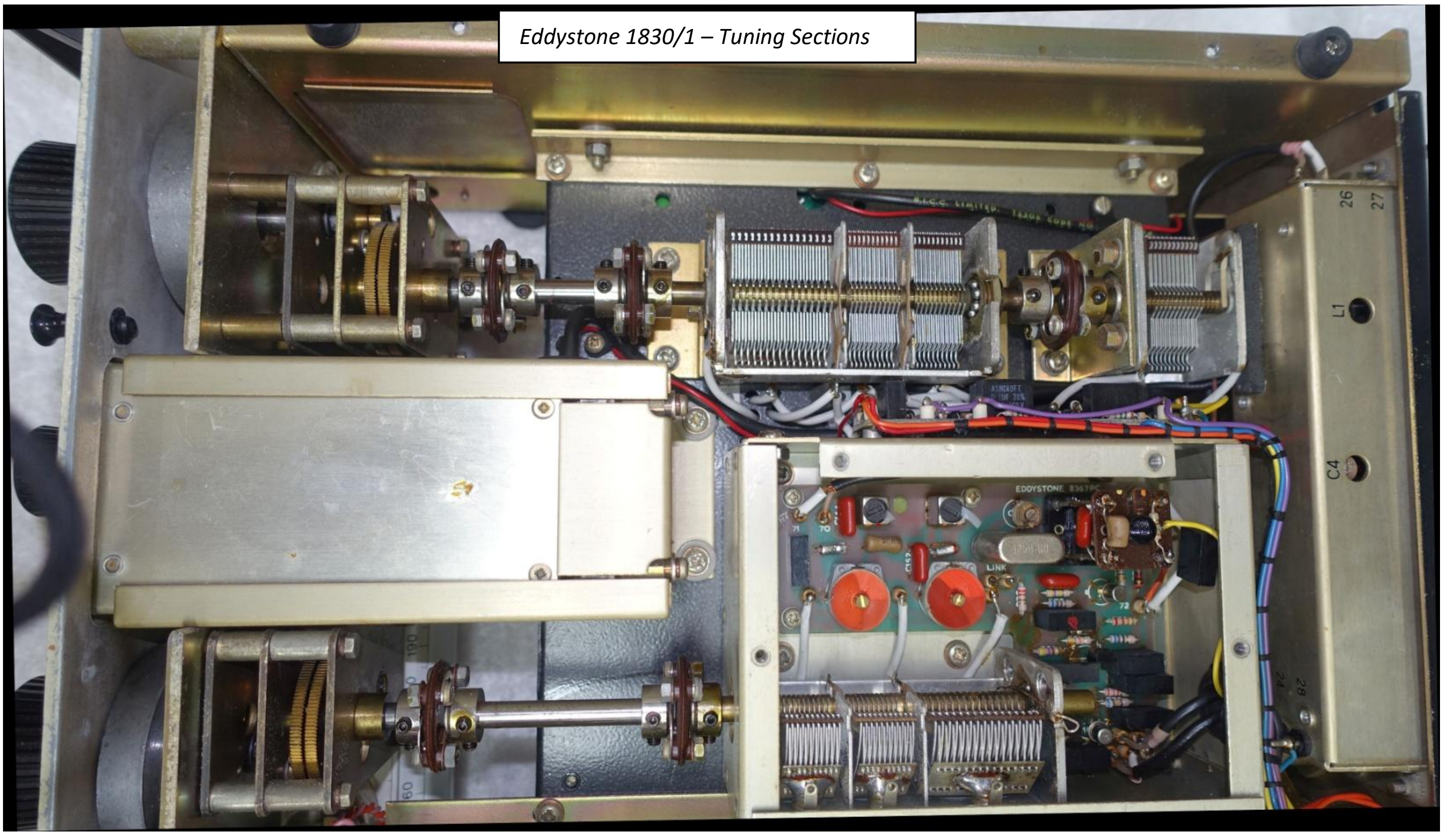
Eddystone 1830/1 – Rear



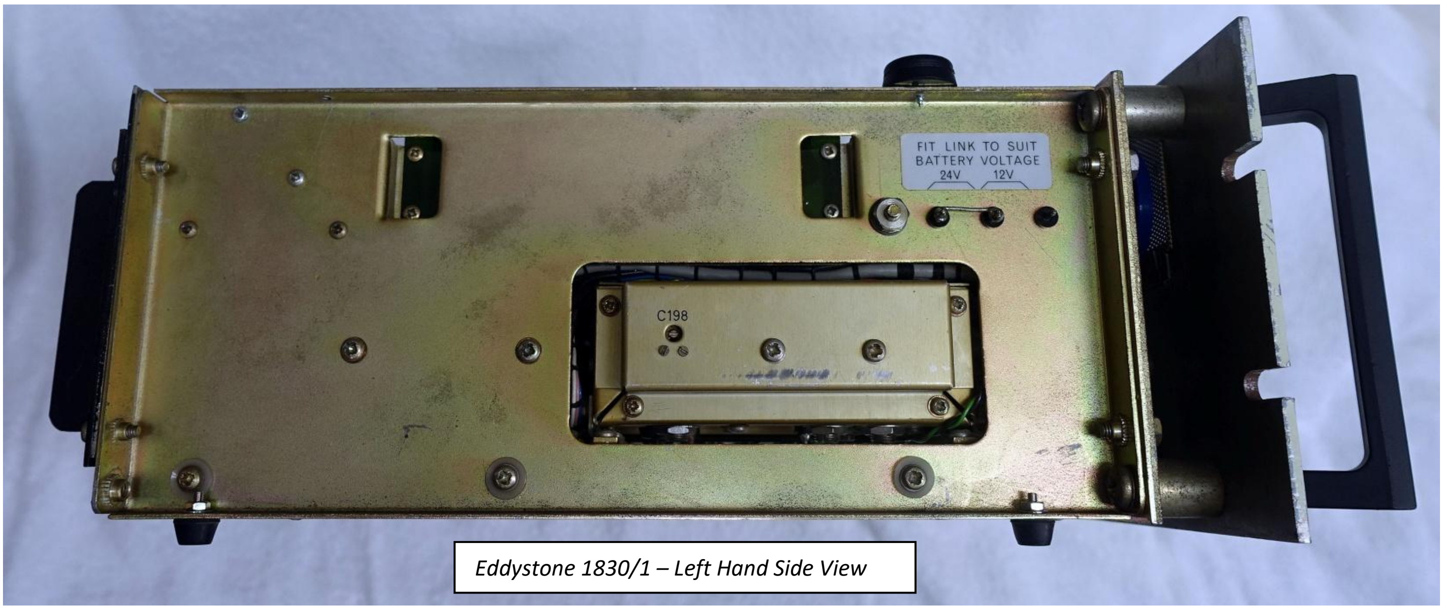
Eddystone 1830/1 – Top View



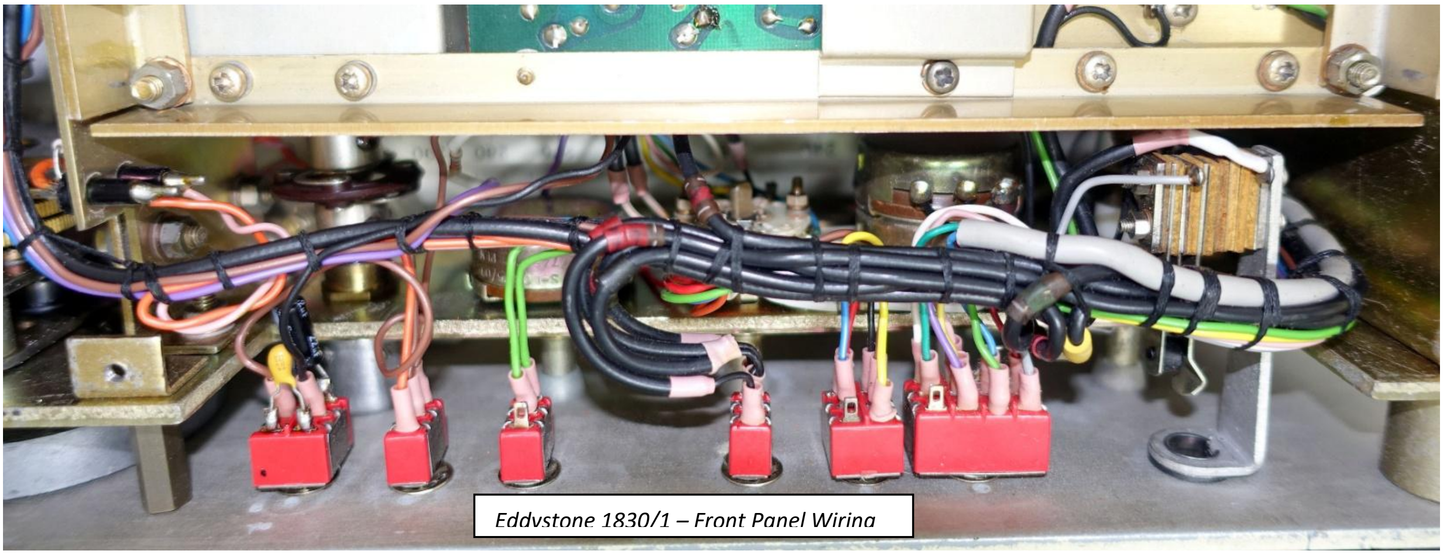
Eddystone 1830/1 – Bottom View



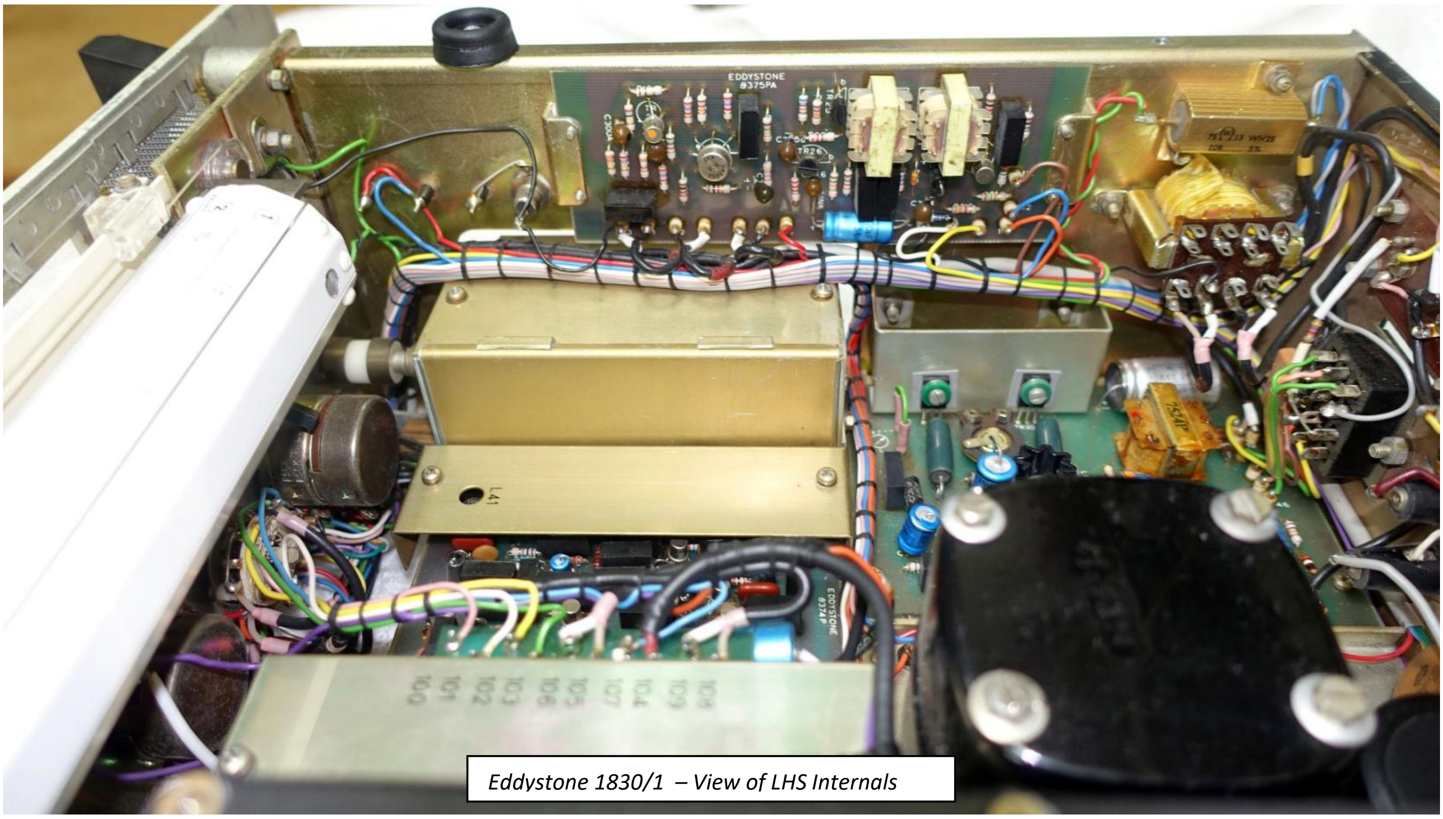
Eddystone 1830/1 – Tuning Sections



Eddystone 1830/1 – Left Hand Side View



Eddystone 1830/1 – Front Panel Wiring



Eddystone 1830/1 – View of LHS Internals