Lighthouse

THE MAGAZINE OF THE EDDYSTONE USER GROUP

ISSUE 66
FEBRUARY 2001

EDDYSTONE "820" RECEIVING UNIT

Stratton's one and only HiFi VHF/FM separate

Wireless World review, July 1955

EDDYSTONE USER GROUP

A non-profit-making group for Eddystone Radio Enthusiasts

Founded in 1990 by Ted Moore Issue 66, April 2001

MEMBERSHIP DETAILS

Annual Subscription for six bi-monthly magazines:-

United Kingdom;	£14
Europe:	£16
Rest of World:	£20

All overseas sent airmail.

Deluxe metal badge: £2 pp (Overseas, 2 for £5 note)

Remittance must be Sterling. (Cash or bank cheque, regret no plastic)

Membership, badges, CD-Roms (back-numbers, see "Radio Ramblings") and features for publication:-
Graeme Wormald G3GGL
15, Sabrina Drive, Bewdley, Worcestershire, DY12 2RJ, England.
Tel (UK) 01299 403372
E-mail g3ggl@euphony.net

Ted Moore's MailBox:
C/o Jim Murphy, 63, Wrose Road, Bradford, BD2 1LN

Service Manuals, Back Numbers (hard copy) and spare parts, contact:
Dave Simmons,
Windana House,
North Aston, Bicester, Oxon OX25 6HX
Tel & fax (UK) 01869-347504

We carry WANTED ads for members only but we carry FOR SALE ads for anybody. All FREE, send to Graeme G3GGL at the above address.

FOR SALE

Eddystone 870, small cabin set, one owner since new, AJ1264 (Jan 1958) Good condx & working order; comp with original Sales sheet, service sheet and 'Better Reception' booklet. Dark Grey with light blue finger plate. Buyer to inspect & collect. Offers to Ken Duke on 01732 810339 (Nr Sevenoaks, Kent).

Eddystone 770R, GWO & Good Condx. £140 ono. Buyer to inspect & collect. Phone John Bragg 01278 83215 (Somerset)

PW and SWM magazines for the years 1996-7-8. Offers plus carriage. Penny, 78A Hearnville Rd, London SW12 8RR, tel 02086 754622.

Eddystone 830/3 Rx VGC & GWO, with original manual & homebrew plinth speaker. Prefer buyer inspects & collects, or R/V arranged (due to weight). Jim McGowan, M5AIP, tel 01708 340304.

Eddystone EC10 with manual, needs attention, £70 o.n.o. Ferrograph Series 5 reel-to-reel tape recorder with 30+ tapes (mainly 7") de-fluxer, microphone, and manual, Excellent condx £80 ono. Call Tony 0771 846 4570 (Hailsham, East Sussex).

Lincompex Model 958/1 £180 Buyer to inspect and collect or part ex for 1837/2. Phone 01752 491517. (Plymouth).

Eddystone 1650, fully loaded with all options. EC964/7 single channel rx. 820 FM tuner. 1560 Marine Rx (great for LW & MW DXing). RadCom from 1947 to present; CQ and 73 magazines from 1960's & 70's. Yaesu FR101/FL101 line up (in original boxes). Yaesu FT901DM with FTV901R transverter, speaker and service manual. Rough 740 needs good home. Call Simon M5POO on 01434-633913 or e-mail simon@nomis.co.uk for further details.

WANTED

2 off Colvern 50kΩ wire-wound pots (or Eddystone type as used in AW2). Eddystone coils: 1x6 Pink; 1x6 Grey; 1x4 Brown; 1x4 Pink; 1x4 Grey; Call Jim McGowan M5AIP, 01708-340304.

LIGHTHOUSE

APRIL 2001 ISSUE 66

The "Lighthouse" just gets better and better doesn't it. I don't know where the guys find the time to produce such a fine magazine.

By the time you read this the Vintage Fair will be upon us and I hope to be able to be there to meet the usual crowd of members who make the journey.

Graeme has put in a little piece about his experiences with the World Space Digital Receiver. In the early days of Digital Audio Radio (DAB), at every conference I attended on the subject, there was usually a presentation by an American called Noah Samara.

He described himself as Chairman and Chief Executive of a body called World Space. They had this plan to use satellites over Africa, Middle East, Caribbean and Far East to deliver digital radio to low cost receivers on the ground.

I distinctly remember them using the phrase "developing middle classes" as being the target audiences. Those of us involved in terrestrial DAB were somewhat dismissive of Mr Samara and his big plans.

We preferred to rely on the certainty that we were on a big winner with a DAB system developed under the EU Eureka 147 initiative.

Well how wrong we were. DAB is installed in a few countries but receivers are still as rare as hen's teeth and twice as expensive.

But here we have World Space with receivers from Hitachi, JVC, Panasonic and Sony available at reasonable prices providing digital quality audio from satellites. I use a Sony Short Wave Receiver when overseas and frankly it is difficult to get good signals in most places with a small portable.

How good it would be to be able to listen to World Service and other English speaking stations in high quality audio anywhere in the world from a low cost receiver. I think I will buy one myself as a treat !

The accompanying data sheet this month is the 1650/8 LF receiver. Eddystone may still sell this as it provides a high performance receiver for LF reception at a reasonable cost.

I believe most of them are used to receive traffic going to and from submarines and are used at shore stations around the world. LF is an ideal medium for round the world communication because the ground wave can be picked up from long wires trailing from submarines thus avoiding them having to surface.

The problem with LF is that the bandwidths are very small which means that only basic Morse can be used which is rather slow. However those nations that use the medium have developed very sophisticated phase quadrature multiplex systems to squeeze an incredible amount of data into a very small bandwidth. I believe these demodulators cost many times the price of the receivers.

I shall be off to the National Association of Broadcasters (NAB) Show held every year in Las Vegas in a couple of weeks time. Something like 100,000 visitors go to make it one of the biggest trade shows held in the town.

Fortunately Las Vegas is particularly well suited to host such events, with plenty of accommodation, and things to keep us interested in the evenings. Anyone know the rules for Craps . . . ?

My best 73's

Chris Pettitt – GØEYO

Patron (chris@g0eyo.freeserve.co.uk)

Eddystone User Group

LIGHTHOUSE ISSUE 66, APRIL 2001

★

Founded and Presented by TED MOORE

Formatting & distribution by Graeme Wormald G3GGL,

Computer processing by Simon Robinson M5POO

EC10 IFT Replacements.

I must say that I'm pleased to see Jim Duckworth's first-class article (see further up the 'Lighthouse') on creating a replacement 465 kc/s IFT for the ubiquitous EC10 (and no doubt it will work for the EB35/6/7 as well).

This very practical exposition uses a pair of readily available TOKO units and should be well within the capabilities of any of our readers who already own a soldering iron! Well done, Jim. TED

Tracking on a 640.

No, not tracking of tuned circuits but tracking as in HT leakage between valve pins/valve socket tags on the AF output and rectifier valves.

The fault showed up as intermittent bursts of AC hum with interruptions in AF output, even a slight burning 'pong' as the set warmed up on one occasion. It was then that the decision was made to remove it from its case and trouble-shoot.

The amount of carbon deposit on the valve sockets for both the 6V6GT and the 6X5 was quite surprising, but possibly understandable given that the shack is the garage which also houses the family jalopy and the lawnmower and sundry other bits of a modern family's worldly goods.

Peter says that he has seen this sort of thing often in the past, as he was in the Signals at Catterick many moons past. The cure was always to clean up all of the carbon with a non-abrasive solvent.

In the old days Carbon Tet was used but this is now Taboo - causes liver damage they say but Peter has used it for donkeys years and is now a healthy 79 year old.

This time he used a spray silicone cleaner together with a small paint brush. This was done to both valve and socket before refitting the valves. All nine valves and sockets got the same treatment before the set was returned to its case and fired up. It is hoped that a couple of years will pass before the treatment is required again. Ted.

Tor's Table

The table prepared by Tor, and presented for us by Graeme, is a truly wondrous thing. In just a few days since acquiring my I have used it umpteen times.

First off though I confess to having

done a fair number of checks on it, picking a model at random and checking the valve complement against Tor's Table.

I have found no errors with the sets that I have checked out. Should anybody find an error then do please tell us so that all can be warned. Who wants to spend precious pocket pennies on an XYZ valve for his Eddystone when it ought to be a ZYX valve? Not me! Be very nice if no errors are found but speaking for myself I still find errors in my stuff even after doubly checking.

Oh yes, before anybody queries the use of an ECH35 in lieu of a 6K8 in such as the 640, no real problem as either works as well as the other. And anyway one Eddystone source does say use an ECH35 and another Eddystone source says to use a 6K8 or ECH35, so take your pick. Graeme has used both and has found little, if any, difference in performance. So much for the versatility of valves. Ted.

Multiple faults on an 830/7

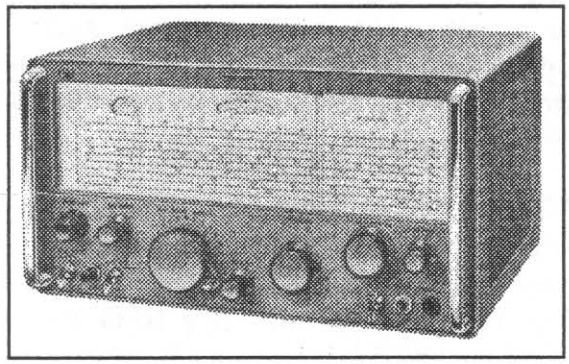
Here we had a set which appeared to have succumbed to a multitude of problems, and all at the same time!

A lot of thought and some careful visual inspection proved that all of the symptoms affecting his 830/7 were caused by the one simple problem.

The bottom end of the AF gain pot; and the case of this pot; are connected together and thence to earth. At the same point the outer screen of the audio feed is also soldered.

This outer screen was still earthed but the wire connecting the bottom of the pot; resistive track and the metal case was disconnected. At the same time it was found that the whole pot was loose and rotated a bit each time the knob was turned.

Metal fatigue had caused the broken tinned copper wire. This left the bottom end of the pot; 'floating'. The three faults that were actually caused by this were, almost uncontrollable audio gain, hum on the audio output, and a degree of microphony when the front panel was rapped with the knuckles.



First step was to remove the knob and to re-tighten the nut holding the pot; in place. Next step was to resolder the lead from the pot case to the chassis earth point. Eureka! the set was back to normal.

The writer says that he HAD noticed the slight looseness of the pot; but being a lazy SOB had not bothered to tighten it. The situation had existed for months and so he had become 'used to it'. But would he be equally lackadaisical if he found a loose wheel on his car ?? Ted.

A 'New' S.358X

A letter from Eddie says that his father bought this 358 more than 40 years ago. It was powered up for test but then returned to the original crate — still marked STRATTONS Ltd.

As Eddie's Dad passed away shortly after this the crate and contents have been left untouched all these years. Eddie has a recently developed interest in amateur radio and will be taking the exam later this year.

His XYL recalled the crate and so it was dug out from under masses of old Christmas decorations and old books. The crate has been opened and the set

is there, complete with coil packs and a psu.

An electrician by trade, Eddie will be reading up on the 358 in the accompanying manual before trying it out. So many years storage can have played havoc with passive components such as paper condensers, yes and even resistors of the carbon rod type. Ted.

The 640 BFO, an Aerial ?

The 640 was produced before the vogue for SSB came in; well before. So for comfortable SSB tuning the wide range of tuning on the 640's BFO is a bit of a liability.

John has read of the various ways to counter this effect, notably by inserting a small value silver mica or ceramic condenser in series with the 640's BFO tuning condenser. However he has also read an ancient SWM with an article documenting problems with the 640 which has an IF of 1600 Kc/s.

When the 640 first came out the Medium Wave Band ended at 1500 Kc/s but later on this Band was extended to 1602 Kc/s to accommodate the many new stations appearing on the air.

Problems were encountered with spurious signals from a QRO station on 1602 Kc/s. It was found that the rotor spindle of the BFO tuning condenser was acting as a mini-aerial with enough pickup from this QRO station for some RF to be fed into the signal paths along with the BFO output.

With this in mind some care was taken to verify that the proposed mod would not aggravate this effect. (The Medium Wave Band now extends upwards to 1710 Kc/s).

The original cure for this problem was to reverse the leads to the rotor and stator of this variable condenser. The decision was made to put a series condenser in between the BFO condenser tag and the junction of C67 and C69.

After a bit of trial and error a 10pF ceramic type was chosen and this was fitted. The BFO sweep was now much reduced and enabled comfortable adjustment of any SSB signal, there was no appreciable difficulty found with using the control as originally intended for sidetone adjustment on CW reception.

This mod has made the 640 a much better proposition for use on today's bands where most Amateur traffic is on SSB mode.

ECR Info Required.

A foreign correspondent who is not in EUG has written to me asking for possible information about previous owners of his rather rare ECR model.

This was made by Strattons just prior to WW II and some went to the War Office and others were sold around the world. This one has turned up in Brazil and Sergio has acquired it for $50 U.S dollars.

He quotes a serial number of GK46 as being hand-stamped onto the model plate. I make this out to be November 1933 and so something is way out here.

The ERA/ECR series did not come out until about 1937-38, another strange anomaly in the Company's numbering system. However even this number can help a former owner or user to identify the particular set if he has previously used it. Any into to me. Ted.

HR100 x 2

This is an odd one. The HR100 is a version of the 750 which was supplied to Marconi. It is sometimes called a 750/2 but I have never soon this anywhere on the HR100 sets I have seen in the past. What has now surfaced is a 24 inch tall, apparently table top rack containing two HR100 receivers one above the other and with a narrow, approximately 2 inch tall unit at the bottom of the rack. This has a number of output

jacks of the Igranic type and a Yaxley type rotary switch. The markings for those are professionally stamped into the aluminium panel and blocked in with white paint. The sockets are marked as Audio 0/P Check, Tape Rec 1, Tape Rec 2, Line 0/P, and for the switch Rec 1, Rec 2, and Com (compare ? or combine ?).

Now John is looking for some information about the use to which this unit was put by Marconi, or a customer. The unit was purchased complete with a 750 manual for £200 at a local club rally. Does anybody recall seeing one of these in the past ? Ted.

(Note here from Graeme: Marconi used the HR101 at coastal stations, not on board ship. This seems to tally with the above unit.)

The 870 — again.

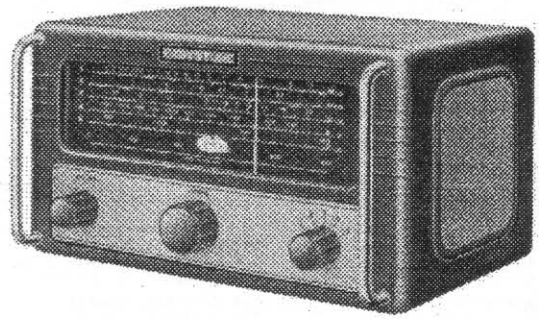
This set was bought sight unseen but with an assurance that it looked to be in very good nick and when powered up there were some stations. For £25 plus postage it was thought to he a worthwhile buy.

When received after 6 days in transit, care of Royal Mail! The 870 did indeed look to be in nice condition and - yes it did work, albeit poorly.

The mains lead was of the old rubber covered variety and was not thought to be original so it was swopped for a modern PVC sheathed version with earth.

Opened up all did indeed seem okay and there looked to have been no interference with either the RF or IF trimming, and yet. The gain was definitely well down compared with the station 840A, both tested on a minimal aerial some twenty foot long hanging down from the first floor window.

This is a pretty basic receiver of what is known as the 4+1 variety. A mixer/oscillator followed by an IF amplifier, the usual DDT AF amplifier plus agc and detector diodes, this followed by a pentode output valve.



The rectifier is a half-wave type and the usual AC/DC system is employed. Strangely the power input is at the right hand rear of the chassis but the dropper resistor and rectifier are at the extreme left hand end of the chassis, still it works okay.

After several months of searching, both my own ideas and those suggested by Ted, the fault is still there, almost every component both active and passive has been tested by substitution to no avail.

It is there on all bands with, for example only Radio 4 audible on Range 4 and that at full volume is barely audible. Other ranges are the same. Voltages are okay, apparently as checked with an Avo 7.

No other test gear is to hand so tests have only been made on air and comparing with the station receiver. Finally in desperation it has been decided to purchase another 870 which has been offered.

This at £40 and needing all new valves may provide the necessary clue. If the valve set from the first 870 is used then possibly that will either incriminate or eliminate them from the equation.

More later.

Tor's/Graeme's Valve Table

It really will become the companion to Graeme's QRG for Rally-goers. I am having it photocopied so that I need not separate it from my N/L. Much more 'portable' that way. Ted.

Cold Casting WARNING

I have already had a letter re the Cold Casting article in Issue 65. This is from one who has tried it with some success for those angled feet and for the speakers.

He warns that both goggles and a mask should be worn, as those resin fillers are toxic. Fumes can cause breathing difficulties and skin or eye contact is dangerous.

He mentions that his twin 940s now have twin round speakers and angled feet to lift the forward edge of the sets. It seems that Do-it-All have furniture 'bits' which are almost exact fits for the chrome 'feet' which hide the fixing screws. Ted.

The 870/870A Series: a Special

A letter re the 870/870A series. Peter says that his 870 is evidently a prototype or pre-prod model with no serial number, with just 4 valves and a selenium metal rectifier unit.

At some time the finned rectifier has gone o/c and a chassis mounted, flat, contact cooled rectifier has been fitted. This still works fine and so will be left in situ. The set appears to be otherwise as per the production version. Ted.

710 or 710/B ?

A letter from the owner of the 710 that was mentioned in the page 10 article in the last issue. He says that I made a boo-boo and that it is in fact a 710/B (for Battery) and not the 710 (no suffix) which was AC/DC and had the usual dropper and halfwave rectifier. Both were however called the All World Six in Company publicity. Ted

(More comment here from Graeme: Ted was quite right. The 710B is a red herring created by Molloy & Poole's "Radio & Television Servicing", in which they describe the "All World Six" as the Model 710/B.

I listed it as such in "QRG Mkl" and was taken to task by Tor, who knows all about these things! Extensive research in Eddystone archives produced no evidence to support the 710/B. It is never mentioned.

The Model 710 A.W.6 was always a 6-volt DC model. It had no AC/DC equivalent. The nearest other model was the AC-only 740, with which it shared an RF/IF circuit. The recent discovery of its original circuit will be the subject of a major feature on the A.W.6 in a forthcoming 'Lighthouse'.)

Eddystone Low Loss Coils.

A letter from a non-EUGer asks for data on these coils. I have sent him a spare copy but for any of you who want complete, and I do mean complete, information on both the four pin and the six pin series then look back to your Issue 57 for October 1999. Page 5 has a reproduction of the original Eddystone data sheet. Sorry that the prices quoted no longer prevail, anyway they would have had to be decimalised in this present PC-mad world. Ted.

The 720 — Yachtsman

My own personal 'Holy Grail' has long been the 720/Yachtsman receiver. This is so far known only from Company promotional photos and text. Some did get made though !

Now it seems as though I might someday soon get my hands on a schematic for this model. No! I am not saying how or from where but be warned that when I do I shall be doing a bit for the Lighthouse, if only we could get an actual receiver. Now that would really be something to celebrate.

I have corresponded with several

EUGers re this model in the past and Jim mentions that given a suitable basket-case donor set, such as a 670, then it might be possible to reproduce a very near facsimile of a 720.

As he says, once one has the front panel, the chassis and the tuning mechanism with other bits then one would need to re-manufacture but a few items.

A new escutcheon copied from info available on the brochure photos would not be too difficult. Ditto with the scale, just black on white lettering with some period station names added to the wavelength/frequency scales.

Replacement valve sockets would be needed since it is certain the 720 utilised the B7G series of miniatures. Given a schematic it ought to be possible. Ted.

(Another note from Graeme: a little bird tells me that a 720 Yachtsman may have surfaced in South America! Keep on watching . . .)

The Eddystone Locomotive.

From Dave we have the info that most libraries will have a stock of reference books dealing with the old steam railway era. There ought to be one somewhere with a photo of the Eddystone loco as mentioned in the last-but-one issue. If anybody does come up with any such book titles then I am willing to print them here — only those which have a mention of this historic loco, please. Ted.

Minimum Component Count.

This is something that has always attracted me, so the letter from Alan has once more brought the subject forward. He comments upon the very low number of components that are required in many, if not all, of the 'older' thermionic valve receivers.

It is common for there to be but one condenser and one resistor per valve stage, and it is rare for there to be more than two of each per stage. Even the advent of screened-grid, i.e. tetrode valves, hardly made any difference since the screened-grid usually went either direct to the full HT or to a tap down on the HT battery.

My personal opinion here is that in those days much more care was paid to gain obtained from carefully designed high-Q tuned circuits and so less care was necessary in attempting to get maximum gain from the valves.

This opinion seems to have been gained in my youth when I discovered just how large a spread in valve characteristics existed due to early manufacturing methods. Again it was often possible to obtain some voltage gain by the use of intervalve transformers.

Alan's final comment is that he wonders whether some of the older circuits might perform better in todays conditions if the valve stages were optimised by 'picking' the best component values to ensure best operating gain ? Ted

The R1224 Receiver

This EUGer has been able to acquire an R.1224 receiver which appears to be in fairly good condition for its age, there is a rubber stamped '1942 A.M' date on the back of the wooden box. He thinks that his swap of two good 6V6 valves for this set was a good deal.

The R.1224 is a 3 valve TRF set and appears to cover from 1.5 to about 7.15 Mc/s, hence it gives some coverage of 40, plus 80 and 160 metres.

(Note from Graeme: the R1224, which was the RAF version of the civilian 'Denco DRX 10', should not be confused with the totally different R1224A, made by 'Ferguson', which was a 5-valve superhet, albeit with a regenera-

tive detector! – See Radio Bygones, Issue 66, Aug/Sept 2000)

At some time most of the original waxy paper condensers have been replaced by pretty modern types and a number of the resistors too have been swopped for later types.

The set works okay on a quick test using a pile of PP3 batteries for a temporary HT supply and one cell of a mo—bike battery. Plans are afoot for a purpose made HT/LT psu to suit this receiver as the sensitivity and selectivity appear quite good.

So what connection has this R.I224 with Eddystone ? The aerial trimmer variable condenser and the calibrated knob/dial have at some time been replaced with Eddystone components; ditto the Reaction condenser and all of the front panel knobs with the exception of the main tuning knob/dial which are original Muirhead type. Ted.

A 'New' S.358

Considering the early I940s manufacture the state of this 358 receiver was much better than normal, but then it had apparently only been in use by two private owners, having been bought new in the '50s from Tottenham Court Road.

A full manual and replacement valve set came with the receiver for the princely sum of £50. Even after so many years the original grease is working well and the whole tuning system, slo-mo dial and variable condenser, work smoothly.

The unique built-in valve (or stage) test facility is a boon too. The solidly built design of both the receiver and its plug-in coilpacks mean that the 358 will still be soldiering on for many years to come. None of the components in the 358 appear to require replacement although the matching psu has required new filter condensers and a previous owner has very professionally fitted these.

One strange thing has been noticed. The use of this set with a pair of modern HiFi type headphones is a definite No-No. Not only is the impedance mismatch responsible for poor speech quality (corrected when a pair of 'Browns' high impedance phones are used), but also the actual audio output level is down too.

These modern HiFi phones are really useless for communications work as they reproduce so much of the unwanted noise that genuine communications phones filter out.

Just try using a pair of 'S.G.Browns' phones to listen to a weak signal on a noisy channel and you will never again use HiFi phones. Ted

Letters for Ted's MailBox should be sent:

c/o Jim Murphy
63 Wrose Road
BRADFORD
BD2 1LN

De-Luxe Eddystone User lapel Badge, 3/4" dia. in chrome and enamel is available for a £2 coin taped to a card and sent to Graeme, G3GGL, at the address on Page 2.
Overseas members may have two sent by airmail for a £5 note.

Have I got News for You !

By Graeme Wormald – G3GGL

I actively discourage members from writing about matters other than Eddystone, but on this occasion I think I may be forgiven for wandering off track. Most of us collect Eddystones with feelings of nostalgia. But that doesn't mean that many of us haven't been in the forefront of technology at some time in our lives. Almost by accident I stumbled into the greatest leap forward in sound radio since the crystal set; World Space Radio! It's worth taking a look at; I mean a listen to . . .

Round about Christmas time (just gone) I was reading my new copy of the "Radio Listeners' Guide", a Readers' Digest-size book which gives extensive details of all domestic broadcasts emanating from the British Isles. It is published annually and has good coverage of all the latest gismos in the world of radio.

This year it featured the new World-Space® digital radio satellites and receivers. To be quite honest, it didn't really sink in with me, possibly because I've been reading about DAB for so long that I'd become over-sceptical about such things.

HITACHI KH-WS1

Then I saw the advert in March's RadCom (page 24) and read Nick Harriss's letter (page 95). My curiosity was aroused.

WORLDSPACE®

Here was a portable, medium wave; short wave; VHF/FM radio which would also receive direct digital stereo transmissions from a satellite 20,000 miles above central Africa. Really? How much? £99.95 delivered!

Curiosity got the better of me and I'm now the proud owner of the little marvel shown on the left. The set-top UHF aerial is detachable, with 10-odd feet of extension cable. It has a built-in AC psu and four internal 'D' cells.

On 'L'-band satellite (1.4gHz) it pulls in over 40 stations, crystal clear, many English-speaking (i.e. BBC World Service, VOA, Maestro Classical, CNN, Up-Country, RIFF Jazz, WRN, etc, etc).

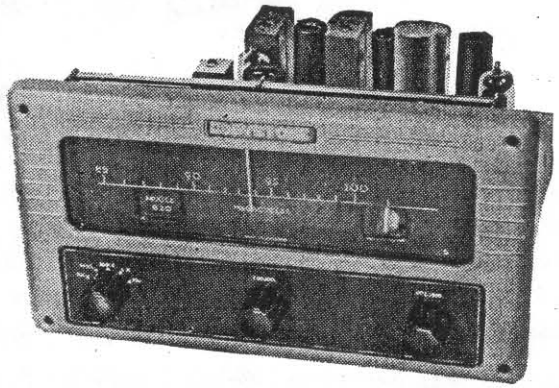
I find it quite breath-taking and can recommend this wonderful new system to any member who wishes to be in the vanguard of 21st century radio.

For a free fact pack phone Lucinda at WorldSpace on 0207 494 8222. She will also advise on special offers.

My set came from Haydon Communications 01708 862524. ★

FM/AM Tuner

Eddystone Model 820 Embodying a Foster-Seeley Discriminator



The large scale window with controls below characterizes the Model 820 f.m./a.m. tuner as an Eddystone product.

WITH so many f.m. tuner units and receivers having almost standardized circuitry it is refreshing to encounter one that is in any way different. The Eddystone Model 820 tuner can perhaps claim this distinction on two counts. In the first case it has a Foster-Seeley discriminator, and secondly it provides the choice of two pre-selected stations in the medium waveband and one in the long. A further distinction is that provision is made also for feeding-in a gramophone output, although there is no actual audio amplification provided.

All three forms of entertainment, f.m. and a.m. broadcasting and records are selected by a single five-position switch.

The tuner has exceptionally high sensitivity and is capable of giving a very satisfactory performance outside the normal service area of a v.h.f. broadcast station.

Following accepted practice the "820" has an r.f. amplifier and all the three associated r.f. circuits, aerial, inter-valve coupling and oscillator, are tuned by a tiny three-gang capacitor designed especially for this unit. It is fitted with a single glass ball-bearing at the rear end of the rotor shaft and this novel innovation has been adopted in order to eliminate loop couplings in the capacitor.

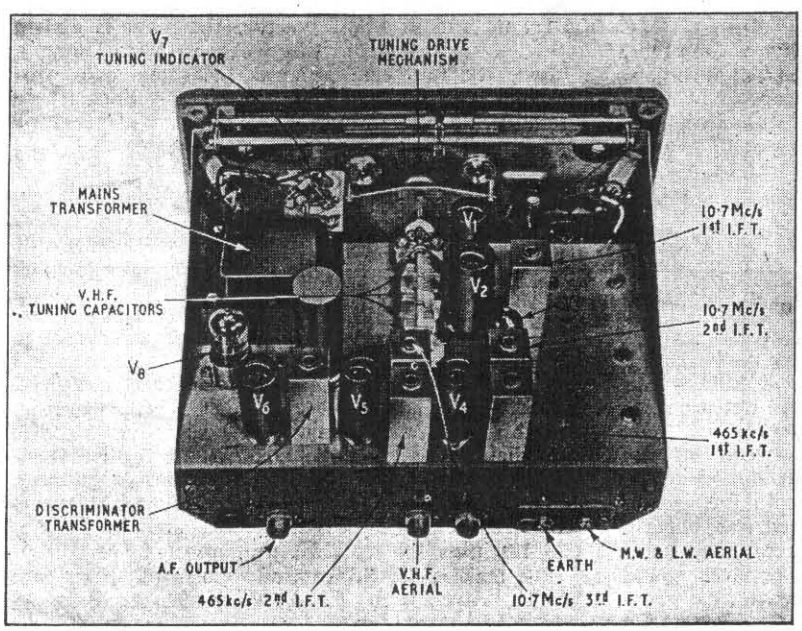
The r.f. valve, (V1), is a 6AM6 r.f. pentode choke-capacitance coupled to the tuned intervalve circuit and followed by a double-triode 12AT7, (V2), functioning as mixer and local oscillator for f.m. reception. The i.f. output from the mixer, which is at 10.7 Mc/s, is fed *via* the f.m./a.m. switch to the grid of the hexode section in an ECH42, (V3), normal frequency changer. For f.m. reception this section functions as the first i.f. amplifier and its accompanying triode is inoperative.

For a.m. reception the hexode section of the ECH42 becomes the mixer with its triode functioning in the usual way as a local oscillator. For this condition of operation an i.f. of 465 kc/s is employed. I.F. transformers of 10.7 Mc/s and 465 kc/s are connected in series in the anode circuit and automatically select, without switching, the correct i.f. signal according to the mode of operation, e.g., as first i.f. at 10.7 Mc/s or mixer at 465 kc/s. Following the ECH42 is another 6AM6, (V4), functioning as second i.f. on 10.7 Mc/s or first i.f. on 465 kc/s as required.

The 10.7-Mc/s signal passes from V4 to another 6AM6, (V5), which is operated at relatively low anode and screen voltages, and behaves as a limiter. Under working conditions the limiter stage has quite an appreciable amount of grid bias derived from a 0.27-MΩ grid resistor. This negative d.c. voltage is used also to operate an EM80 magic-eye tuning indicator, (V7), on f.m. and supplies an a.g.c. voltage to the input grids of V3 and V4.

The 10.7-Mc/s discriminator transformer is in the anode circuit of the limiter, (V5), and is followed by a double diode 6AL5, (V6), arranged as a typical Foster-Seeley discriminator, its a.f. output going *via* a de-emphasis network and f.m./a.m. switch to an output volume control.

For a.m. reception the i.f. signal stops short at the anode of the 6AM6, (V4), following the ECH42, (V3), and is there rectified by a crystal diode and the audio output taken, *via* the f.m./a.m. switch to the aforementioned output volume control. The d.c. voltage derived from the



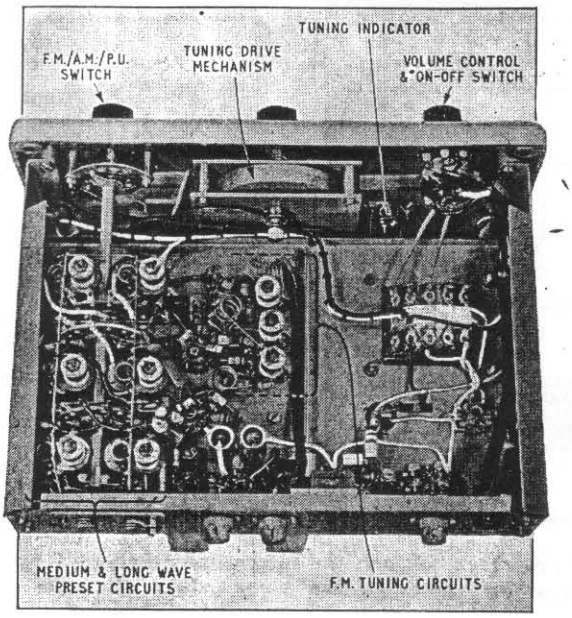
Viewed from the back the positions of the valves, i.f. and mains transformers are clearly seen. Also seen is the tuning mechanism.

(Footnote from Graeme: about 1,000 Model 820's were produced.)

crystal current is used for a.g.c. This a.m. grid-bias (or a.g.c. voltage) is not applied to the tuning indicator which is not operative on the pre-set a.m. stations.

The tuner has its own a.c. power supply unit and this comprises a double-wound mains transformer, an EZ41 full-wave h.t. rectifier, (V8), a 500-ohm smoothing resistor and two 32-μF smoothing capacitors.

A coaxial socket is provided at the back of the unit for a 70-ohm feeder from the v.h.f. aerial and a screw terminal for a random-length aerial for a.m. reception. Two other coaxial sockets are included at the back; one is the a.f. output, the other is for a gramophone input. There is also an earth terminal.



The chassis has a metal base plate which when removed gives access to the tuning circuits, small components and wiring.

In view of the potential high sensitivity of the tuner, tests were carried out at some distance from Wrotham and in a rather poor location from the point of v.h.f. reception on the south coast. As the tuner was designed in Birmingham and reputed to put up a good performance there it was felt this would be a good way of testing its merits.

A further handicap was imposed by using a loft aerial, since no other of the right type was available at the time. It was a single dipole and the direct "line-of-sight" to Wrotham was interrupted by high ground up to 600 to 700ft about 3 miles away. The receiving aerial was just under 200ft above sea level.

The tuner put up a most satisfactory performance, signals being strong enough to give good limiting and entirely suppress the background and all but the most severe interference from passing motor cars.

Aircraft flying in the vicinity of the receiving site are a great nuisance on the v.h.f. bands and while the "820" put up a stout effort in resisting the greater part of the signal flutter they produced it could not cope with the worst kind. So severe can this be at times that it is doubtful if any f.m. receiver would cope with it under all conditions; however, it is possible a better aerial would make a great deal of difference. Provided the signal is maintained above the limiting level the audio output remains quite steady, despite quite violent "throbbing" of the magic-eye.

Used with a good amplifier and loudspeaker there is a crispness in the reproduction that is rarely possible on other bands owing to the necessity to restrict the receiver's bandwidth in order to keep out interference from stations on nearby wavelengths. Apart from this the most impressive thing about the reception, especially to anyone continuously plagued by whistles, "monkey chatter," and crackles of many kinds, that prevail almost anywhere south of London in the U.K., is the delightfully quiet background.

First impressions may be that not enough de-emphasis is provided, but this will generally prove groundless as greater familiarity is gained with f.m. reception. However, a little tone-correction can generally be applied in the audio amplifier if thought desirable.

The tuning control is delightfully smooth and free of backlash and the "sponginess" sometimes associated with cord drives. Actually the cord drive in the "820" tuner operates the pointer only and the gang capacitor is driven through a combination of spring-loaded gears and friction discs giving an overall reduction of about 76 to 1. A heavy flywheel smooths out any little irregularities in the system.

The tuning scale is just over 6in long and is traversed by a long pendant pointer. It is directly calibrated and covers 85 to 101 Mc/s with points at every megacycle and figures every 5 Mc/s. Viewing is made easy by employing white for figure markings and the pointer and a chocolate-coloured background. The tuning indicator is viewed through a cut-out in the background plate and is enclosed by the scale window. This measures $8\frac{1}{2} \times 2\frac{3}{8}$in and takes up the whole of the top half of the front panel. The three controls: AM/FM/PU switch, tuning and volume/on-off, in this order from left to right, are spaced out equidistant below.

The a.m. side of the tuner has been rather ignored so far, but it is well up to the performance of a mixer-i.f.-detector combination. In the MW1 position of the switch any station between 960 and 1,550 kc/s can be set up and in MW2 position the range is 610 to 960 kc/s. The range on long waves is 150 to 250 kc/s.

Since the f.m. side provides the three main programmes, Light, Home and Third, the stations set up on the pre-tuned circuits could with advantage be a regional which sometimes has a programme of local interest, or one's favourite Continental stations.

The tuner is supplied in chassis form as illustrated and measures $11 \times 6\frac{1}{4} \times 8\frac{1}{4}$in. The front is a sturdy light-alloy casting and forms a rigid support for the chassis which is braced by side members giving good mechanical rigidity; this rigidity is essential for good frequency stability. High praise can be given to the "820" tuner in this respect as the drift from cold to working temperature is comparatively small for v.h.f. equipment, while the long-term stability is very good indeed. After any initial correction has been made—and this is only necessary if the station is tuned-in immediately the set is switched on—no further attention is needed unless one wants another programme.

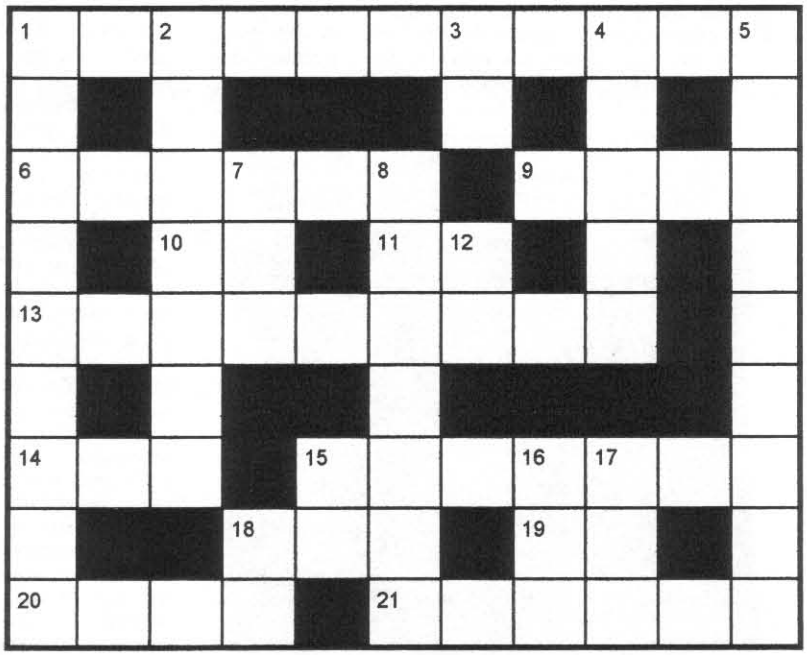
The tuner is supplied with all necessary fixing screws, coaxial sockets and trimming tools, and the price is £28 10s, plus £9 10s U.K. purchase tax.

The makers are Stratton and Co., Ltd., Eddystone Works, Alvechurch Road, West Heath, Birmingham, 31.

E.U.G. PRIZE CROSSWORD No.1

COMPILED BY COLIN CRABB G4HNH

The first correct entry to be opened on 20th May, 2001, will receive one year's free subscription to the Eddystone User Group. You may photo-copy this page or just write out the answers, so as not to spoil your copy. Send your entries to Graeme Wormald, G3GGL at 15 Sabrina Drive, Bewdley, Worcestershire DY12 2RJ. The Editor's decision will be final.



ACROSS

1 Important property of the "Leyden Jar". (11)

6 A meter, on the face of it. (6)

9 A bitter disappointment in the bar at the local amateur radio rally. (4)

10 Initials of test equipment capable of analysing complex waveforms and displaying the result on a crt. (2)

11 Front end of the alc. (abbr.) (2)

13 Negatively charged subatomic particles found in all atoms. (9)

14 Digital "help". (abbr.) (3)

15 Of, relating to, or caused by a form of energy closely associated with 13 across. (7)

18 Government body with current over-all control of radio licensing. (Abbr.) (3)

19 End of Morse message. (Abbr.) (2)

20 High Q circuits tend to do this for a short time after being stimulated by a signal, particularly when a single crystal filter is used in the position of max selectivity. (4)

21 Original customers for the pre-war 100 watt Eddystone VHF base station transmitters. (6)

DOWN

1 Bygone radio component name, associated with 1 across. (9)

2 Skeletons in the radio cupboard. (7)

3 Not too many valved Eddystones are capable of this. (Abbr.) (2)

4 Essential components of an indoor "picture hook" antenna system. (5)

5 Famous radio company whose sets were perhaps ideal for the "light" programme. (9)

7 Three letter prefix of a famous Bush domestic receiver, circa 1949. (3)

8 Integral earpiece accessory. (7)

12 Essential superhet stage. (Abbr.) (2)

15 Alien on the mobile phone. (Abbr.) (2)

16 Front panel control on an oscilloscope that continually varies the gain between the individual fixed settings of the volts/div switch. (Abbr.) (3)

17 Latin/Greek prefix indicating "three" or "three times", used extensively in radio and electronics. (3)

18 Lord Reith's other title. (Abbr.) (2)

★

A replacement double-tuned IF module for the EC10

By Jim Duckworth

A long felt need

As correspondence to the Newsletter has shown over the years, the EC10 IF's are easily damaged and impossible to replace with original items.

The coil formers are particularly 'thin skinned' and you don't have to be especially kak-handed to plunge a screwdriver through them (That's my story anyway, after damaging mine!).

About two years ago I discussed this problem with Graeme at the NEC and made some general committal noises about having a go at a replacement module.

I had just completed an add-in ceramic IF filter option for the EC10 (featured around then in the journal), and so was very familiar with the standard IF circuit board.

A double tuned module based on coupling up two standard single tuned IF's in their cans, is a well established concept using 'top capacity' coupling.., no rocket science needed here!

Several large American manufacturers such as Zenith and Philco used such modules in high end portables as did our own Perdio for a first IF in their 'Super Seven' series.

I viewed the problem as perhaps more of a mechanical engineering one than electrical, i.e how to get them mounted in the same space as the long thin standard ones in a way which allowed easy access for alignment and connection to the same PCB pads.

In recent correspondence with Graeme I received a gentle 'prod' on the subject so I got to work and here is the result.

A bit of background info and theory

It's as well to understand the basic workings of the double tuned bandpass circuit and the device it's hooked up to. i.e. the OC171, so we can select suitable single tuned ones to do the same job as the original.

Valve broadcast receivers used double tuned IF's universally, normally critically coupled to give the superior flat top response and steep side 'skirts' for adjacent channel rejection (compared with a single tuned circuit). These benefits were well worth the effective halving of the anode load and 6db insertion loss thus incurred.

Furthermore the very high/infinite grid impedance on the secondary and the high values of an RF pentode AC output resistance (Ra) - typically 1 meg ohm or greater - on the primary, modified the basic transformer response very little. Also the extremely low anode to grid internal feedback capacitor (Cga) did not need neutralising.

The arrival of the transistor changed all of this! The 0C44/45 generation had input and output resistances of around 1K and 25k respectively meaning both the collector and obviously the base, had to be tapped into the transformer windings to preserve any reasonable selectivity characteristic and the high collector to base feedback capacitor (cbc around l0pf) needed neutralising.

Unfortunately this 'tapping in' incurred huge insertion losses on the collector side making a double tuned transformer unaffordable for gain, also for space reasons (in pocket radios). So single tuned IF's became the norm.

The arrival of the diffused base OC170

series of Germanium transistors with very useful gain up into the VHF band, and a very high collector AC resistance of around 500k ohms at standard broadcast IF frequencies, brought double tuned IF transformers back into use.

The combination of two double tuned and one single tuned transformer in the EC10 is typical of better designs of that time. There was a twist in all this however! Although the OC171 collector to base feedback capacity was low at around 2pf, it was still too high to allow all of the primary winding to be in circuit without instability.

To avoid neutralising this small amount, it became standard practice to 'mismatch the transistor for stability', so the collector was tapped into the primary winding to achieve this and I chose a replacement transformer bearing this in mind.

The base resistance was only a little higher than the 0C45 at around 1.5k ohm so needing a low impedance secondary winding as before.

With the standard transformer design of the EC10, coupling between the primary and secondary takes place via mutual inductance inside the can. The two windings would be spaced to typically achieve a slightly higher than critical coupling where the two humps just appear, allowing the single tuned third IF to neatly plug the gap in the middle.

We can achieve exactly the same effect by using a small capacitor to couple the energy between the the windings in two separate screened cans. The value to achieve critical coupling is approximately the main IF tuning cap value divided by the 'Q' ,which for the chosen Toko IFT's would give us around 3-4pf as a starting point.

On with the job!

So the chosen transformer was from the Toko 10EZ range - see 'notes' on sheet (1) for exact details. It is available off the shelf (or was at the time of writing) for only 70p from the UK major Toko Distributor, BEC, who gave me a good service and only operate a £5 minimum order charge.

I bought enough for the two double tuned positions with some spares. If single tuned IFT3 fails then one suitable for matching the detector must be chosen (or scavenged from an old Tranny!), which is relatively straightforward and not considered in this article.

My design is suitable for both the first and second IF positions. IFT1 in the mixer collector has an extra large stability margin as the output and input frequencies are different, but this is worthwhile as too high a mixer gain will often kick the others into instability.

The connection diagram for the two Toko transformers is shown in sheet (1), along with the transformer orientation sketch. The mechanical design and assembly is shown in the sheet (2) pictures.

I pondered at great length over this, toying at first with the idea of retaining the existing IFT base with its pins and somehow mounting the two new IF's horizontally on a new vertical chassis attached to this base.

However, I could not make this sufficiently rugged — the paxolin base is very flimsy. Instead I decided to mount the two cans vertically on each side of a small matrix board chassis, designed to plug into the PCB holes for the can lugs and with an integral bolt going through the central core adjustment hole.

Also to orientate the cans and 'extend' their leads to go exactly through the existing holes for correct connections. This arrangement has the added bonus of tuning both IF cores from the top.

The pictures in sheet (2) show how it's done.

Fig 1 shows the basic chassis. This is cut from 0.1" matrix board with an array of 6x9 holes available for use (no copper — a useful size piece is available from Maplin for 99p). The sturdy mounting wires on each side of the board which go through the PCB IF screening-can lug holes are 20SWG tinned copper.

The central attaching bolt is 4mm, with its slot deepened and widened slightly with a standard hacksaw, so the board pushes firmly into it and is cemented with a small fillet of Araldite. This is a nice fit through the PCB core adjustment hole but you must make up a cardboard insulating washer to stop the nut shorting on the PC board track side.

Figs 2-4 show the cans mounted with lugs bent at right angles to attach them with 24swg wire - one piece going through the board for each side, soldered in the middle onto the main earth pin wire, which is 'bowed out' to allow this. In addition each can is mounted with double sided sticky tape on the board side.

This retains them nicely and allows for future removal if necessary. Take great care to use the orientation as shown, and if you crop the unused secondary pins on the primary side, as I did, check at least three times before doing it.

24SWG wires are attached to the pins in use, which should be carefully crimped before soldering and positioned to line up with the appropriate board holes. Done carefully this assembly is very sound electrically and mechanically.

On the prototype I made provision for two pins on the matrix board, see Fig 4, to attach a small air spaced trimmer to determine the final value of the coupling capacitor. You need not do this, rather soldering the small fixed final capacitor value 4.7 or 5pf between pins (1) on each transformer.

Installation and alignment

Fig 5, sheet (2), shows the module in situ on the EC10 circuit board. It is first secured with the central bolt then soldered in. I preset the variable coupling trimmer to a measured 4pf and switched on.

Hey presto, I was straight on the air with good alignment as my set had previously been at 455kHz to suit my ceramic filter module (now completely removed), which seemed to suit the realignment of the Toko transformers.

I did a standard sig gen alignment around 465kHz. The Toko transformers aligned beautifully with no trace of instability. They will cover 470kHz at their limits but I preferred to inset this. I then turned loose my custom IF aligner/calibrator/wobbulator unit recently fabricated using fets (in an old Eddystone diecast box of course!) to determine the final value of the coupling capacitor.

Wobbulators can mislead unless used with very great care, but mine had been run in on a variety of other sets confirming a slow sweep speed of 200Hz as the best to use along with a very low input signal.

I quickly established that a small degree of overcoupling gave the best-shaped response and output using a coupling capacitor value of around 5pf. So I hard wired this value in place, see Fig 5. You can use 4.7 pf if buying from new.

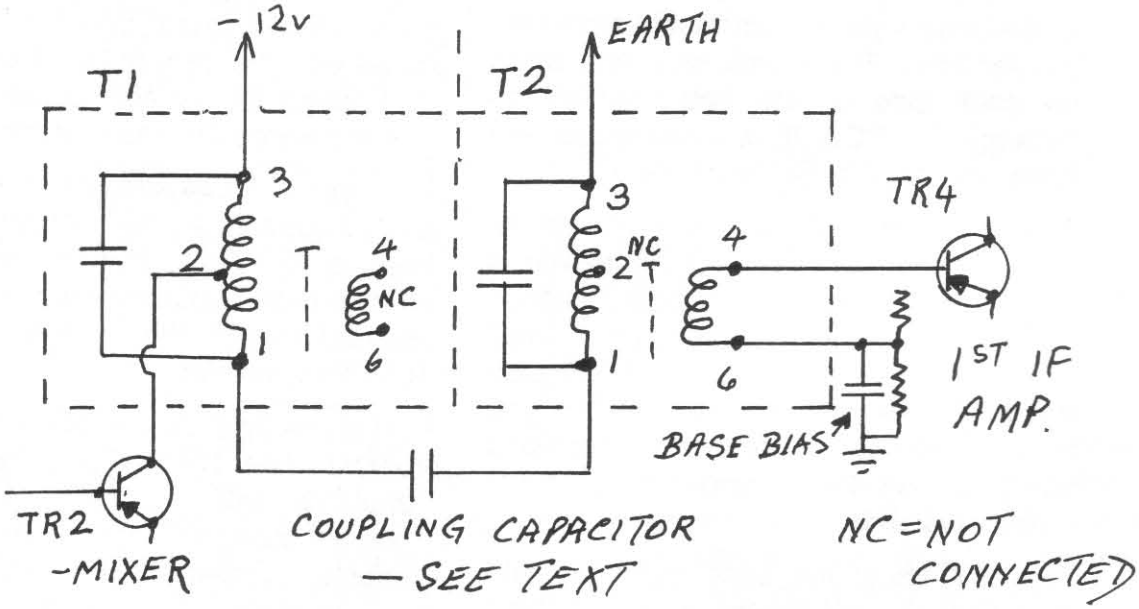
In practical use, tuning across the bands, the selectivity and tuning characteristic was excellent, at least as good, if not better than before. So I can recommend this solution. Don't let your EC10 sit there mute for want of a double tuned IF transformer!

JD. March 2001

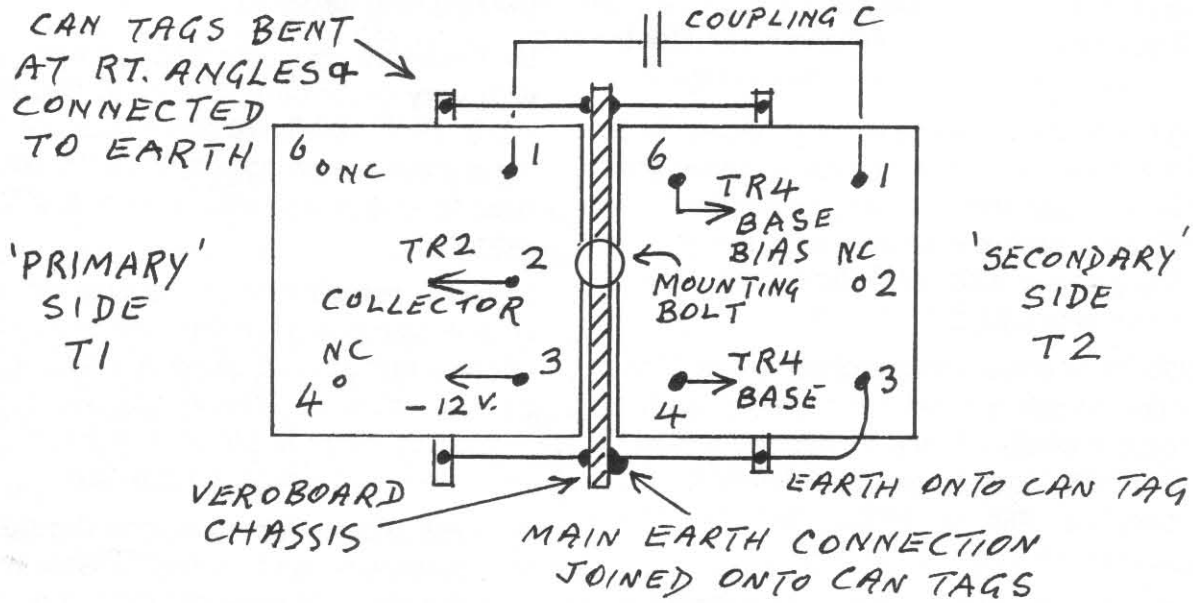
PICS →

SHEET (1)

CIRCUIT DIAGRAM AND CONNECTIONS OF T1, T2 TO MAKE A REPLACEMENT DOUBLE-TUNED I.F. MODULE



UNDERSIDE MODULE VIEW SHOWING ORIENTATION OF T1, T2 (not to scale)



NOTES

- T1 & T2 are TOKO type RLC-252142NO 10EZ.
- BEC product code 352142. BEC Distribution, phone – 01753 549502
- VERROBOARD chassis is standard 0.1 matrix board – no copper
- Main earth pin wire is 20 swg, the rest is 24 swg
- See TOKO products on BEC website: www.bec.co.uk

J.D. 3/01

EC10 Double Tuned IFT module assembly

Sheet (2)

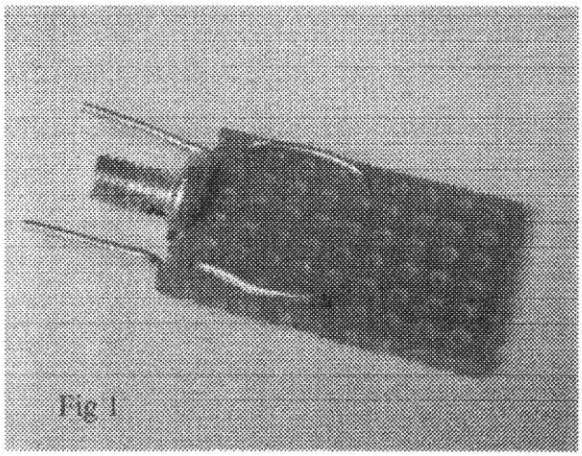


Fig 1

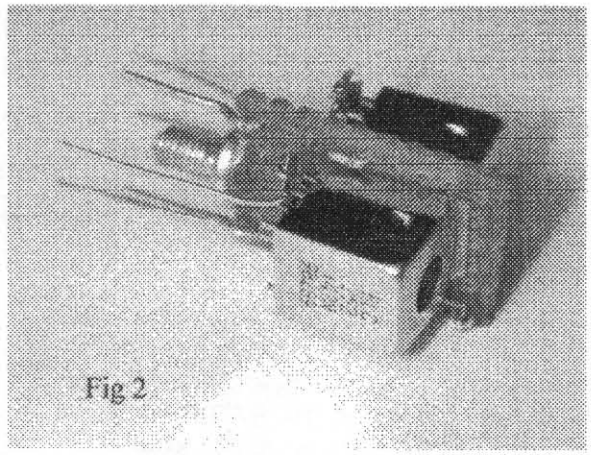


Fig 2

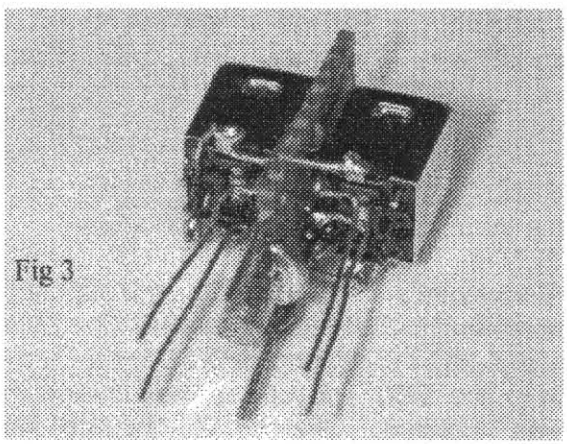


Fig 3

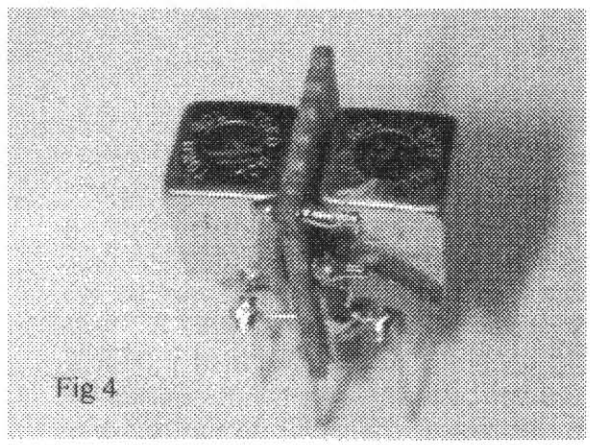


Fig 4

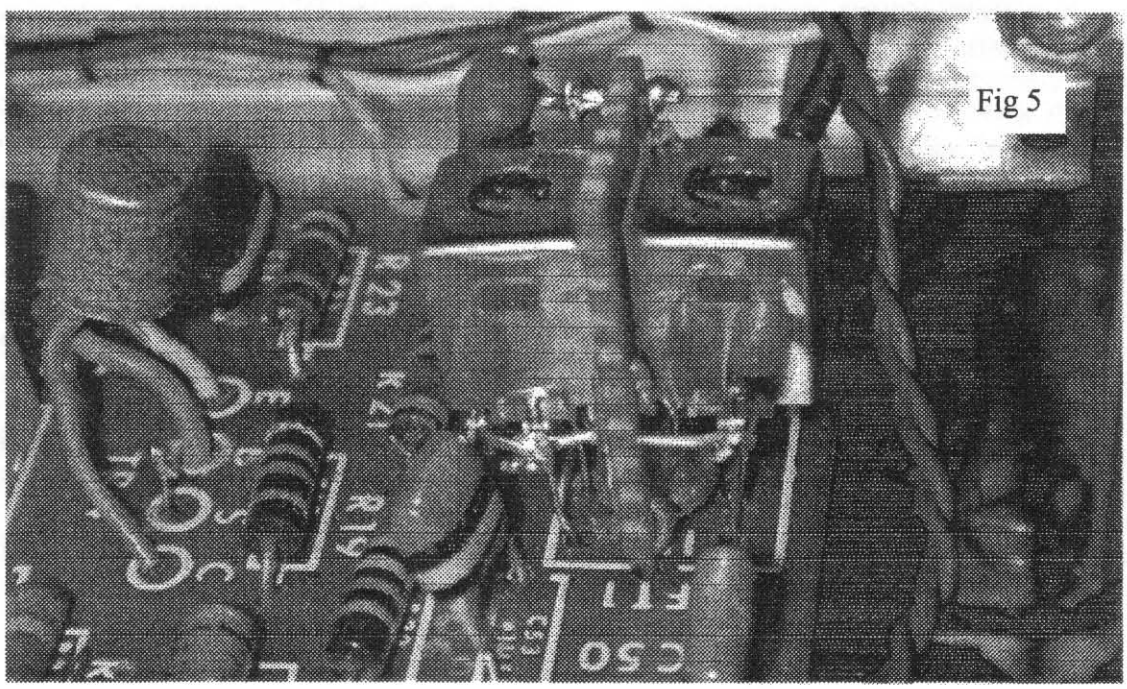


Fig 5

Profile Eddystone 1969

In our last Issue we presented the first part of a most interesting feature, discovered by Tom Toth, G4ORF, in 'New Electronics' magazine. The history of the company was reviewed from pre-war days until the fifties. We continue now with the first VHF sets made since 1945 and new high-stability models.

The move to VHF started when the company detected a demand for a search receiver tuning continuously from 19MHz to 165MHz, and produced the S770R. A later model, the S770U, which is still available, took the frequency range up to 500MHz.

Filling the Gap

Eddystone receivers were now available covering the spectrum 10kHz to 500MHz, but there was a gap remaining which cried out to be filled. A new demand was emerging for very high stability receivers, and this was met by the S880 which came along in 1957-8. Re-setting accuracy was better than 1,000Hz, and overall stability was of the order of 20Hz. Moreover, the S880 had exceptional screening, giving low external radiation, so low in fact that it was virtually undetectable. This receiver was a "natural" for the Diplomatic Wireless Service and for the Admiralty. It was also well sold to foreign governments and even found a use in Interpol.

Marconi adopted the S880 and marketed it as the Marconi H2301. But why not, asked Marconi, tune the second oscillator over a narrow band and substitute crystal oscillators at will? Fine, said Eddystone engineers, and produced the S910 search receiver which became the Marconi HR101. It was from the S910 that the S830 was developed, a major advance that had incremental tuning which is still in demand.

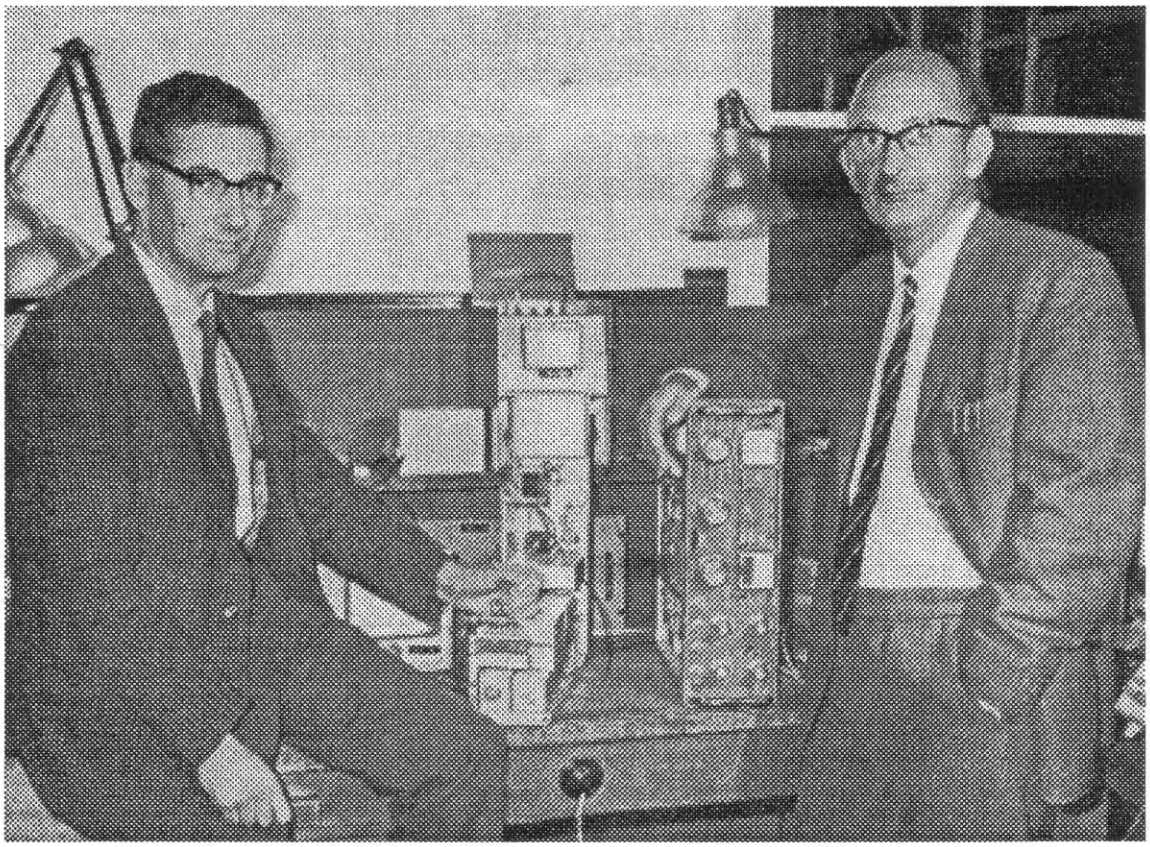
Into the 'Sixties

The present decade has been exciting for Eddystone. The year 1960 saw the development and first production of panoramic receivers and spectrum analysers, in which the GPO took an immediate interest for interference detection. This was the period, too, when the company had to look towards greater sophistication, the switch from discrete wiring to printed circuits, and the transition the thermionic valve to the solid state.

Eddystone's first transistorised communications receiver the S960, never really got off the ground. Orders were taken from the BBC and others, but the project was dropped. Instead, a decision was made to go for volume production and the modestly-priced EC10 emerged, which, with its variants – including an emergency shipboard receiver for the Swedish market – is still in production, with more than 10,000 already in service. Eddystone chiefs admit that it was a mistake to abandon the S960. It could still have been in the catalogue today and selling well.

A wise decision, however, was to go ahead with the development of a high stability transistorised communications receiver, and this has now come into full production as the EC958, which made a stir at the RECMF exhibition in London this year. Giving complete coverage from 10kHz to 30MHz it is virtually equivalent to two

(Below) Ed Green, chief of test, and Don Ford development group chief, who was responsible for the design of the EC958 receiver.



receivers and employs single, double or triple conversion, depending on the tuning range employed.

Projection Dial

Frequency display is by a light projection system, and the basic circuit uses 39 transistors, 43 diodes and seven integrated circuits. Stability is better than 20Hz over the range 1.6MHz to 30MHz on standard models and "specials" can be provided with stability an order of magnitude better.

Another recent development, stimulated by the new marine specifications relating to S.S.B. operation, is a skipper-operated receiver designated the EC964. First production models have already left the plant, destined for Sweden. It is a 52-channel receiver covering the marine bands, and meets BPO TSC 102 and TSC 105 specifications.

The current catalogue lists a dozen receivers and two panoramic display units which, between them, blanket the great majority of the market in communications. But although solid-state equipment is taking prominence there is no intention to abandon valved receivers, which are still in demand and for which many repeat orders are obtained, mostly specified by overseas navies.

In next month's final part of this most interesting dissertation we read of Eddystone joining the great Marconi empire and becoming more commercially-orientated. Dick Carroll is appointed 'prime mover'.

RADIO RAMBLINGS

Jottings from my Notebook

By Graeme Wormald G3GGL

APRIL 2001

Spring Greetings to you all, or, conversely, Autumnal Greetings to our members in the southern hemisphere. So far, at the EUG office here in Bewdley, the traditional April weather continues to excel itself with extra precipitation. I'm told that parts of North America have had less than half their seasonal ration. Well, I can tell them where it is! However, the pundits say that we are in for an exceeding hot and dry summer. We shall see.

LIST OF MEMBERS, ETC

With our last issue of 'Lighthouse' we included a questionnaire concerning members' holdings and the publishing of names & addresses, etc.

So far 79 replies have been received, out of a possible 320 *(our other members are corporate bodies, etc., to whom this doesn't apply.)* This is a little marginal for meaningful calculations, so I'll ask those of you who put the bright orange page in the pending tray to fish it out and mark it accordingly! Thank you. *(When we did this exercise three years ago I was still getting replies a year later . . .)*

DO IT YOURSELF

From time to time members ask me about doing a feature on repairing Eddystone radios! This is easier said than done; our members vary from "just about able to change a plug" to Chartered Engineers. Although I am giving thought to a series of generic "standard faults", space is a little limited at present.

In the meantime may I make the following suggestions: In the forthcoming rally season (and from second-hand book dealers such as Chevet (01253 751858) keep your eyes open for a copy of "Foundations of Wireless", published by Iliffe.

It was my primer in 1947, and I am an entirely self-taught radio-man. To follow on, look out for "The Radio Laboratory Handbook", also by Iliffe.

These two pocket-size books were favourites in the 1940s and '50s and cover just the sort of circuitry used in Eddystone valve sets.

RAPID RADIO REPAIR

Those of you who would like something published today will find that Chas.E.Miller of "Radiophile" fame is able to supply books from a series he has just written with the above title. Book One is sub-titled "Standard Superhets" and Book Two is entitled "Alignment".

In his Foreword, Charles quotes: ". . . To save time we'll assume that you know the basic theory of valve receivers and that you have an Avometer and a signal generator (and, of course a tool kit).

"Second, if you are serious about learning how to repair sets you will dismiss completely the thought of replacing all the paper condensers as a matter of course. People who do this might just be lucky and make a set work but they will never become skilled in fault diagnosis. *Mutatis mutandis* and no more!"

These two books are available post free at £3.60 each from Radiophile Publications, "Larkhill", Newport Road, Woodseaves, Stafford, ST20 0NP.

EC10 REPORT

For months now I've been pleading shortage of time as an excuse for not producing the goods on the EC10 series.

There are two areas of contention; one is using 'cleaner' transistors in place of the original OC171's. The other is creating replacement IF transformers as all existing 'new' stock has dried up.

The former is a more academic argument, because you can still buy 'new' OC171's (Birkett of Lincoln being a favourite source). But because they were made donkeys years back some consider that the ageing process may have degraded them.

The question of replacement IFTs is a more pressing matter, because if you have a problem your set is dead! Chris Morgan, G3XFE, our First Sunday net controller, first addressed the problem with TOKO coils, the only known new (and cheap) source of 465kc/s inductors.

I also considered the matter but became rather brain-addled when I discovered they produced (at least) 27 different 450/470 kHz single-tuned IFTs. So I promised to copy Chris's project (which was actually carried out on an EB35) on an EC10 and report back.

But events have overtaken me, and Jim Duckworth (who produced a ceramic filter design for us back in Issue 57, October 1999) – has produced for us the ultimate replacement IFT feature for the EC10.

Well done, Jim! At the first reading I found it a little over-powering. At the second reading it was crystal clear. In fact, simplicity itself, it is so well described.

I'm quite sure that it will transfer into the EB35/6/7 series also; it's virtually the same circuit.

EUG 'FIRST SUNDAY' HF NET

First of all may I thank members who send in listener reports from time to time. They tend to be more objective than those from participants!

The 40-meter experiments have shown the band to be a mixed blessing. In fact, not really a blessing at all. It's too good!

I must apologise for banging on about this, but I'll say it again. Forty was the best band we ever had (7,000-7,300 kc/s). I spent all my first couple of licensed years on it with no more than five watts to a dipole (66 ft, fits anywhere), CW and AM.

Then we in Europe became a victim of the cold war, and we lost 2/3 of it to the broadcasters. All the other Zones kept it, which is probably why we don't hear the Hams of the World complaining!

Its daylight range is much better than 80 but still without the lost skip zone of 20. When we moved over to 40 on the March net our weaker stations in Wales and the northern boarder came up remarkably. So did the signals of our Gallic friends! The whole net was swamped by QRM from 'nos chers amis'. Listeners confirm this. The band is just not big enough for us all. Sorry!

Here's hoping the sad report from Switzerland will have some favourable fall-out and let us have our band back. I must say that I'm green with envy over our antipodean cousins, who not only have the full band but also have no near neighbours to crowd it. It's no wonder home-brew AM flourishes in the land of the Kiwi! *(Headquarters of 'S.P.A.M.' – the Society for the Preservation of Amplitude Modulation)*

Last weekend we stayed on 80 and found it in a remarkable condition. It was actually so 'down' that all the interfering nets had gone home and left the band to us! And with no QRM I was able to read our members better than usual!

TEETHING TROUBLES?

Readers will recall from last year that Anthony Richards, GW4RYK, invented a system for replacing broken cogs on Eddystone type "B" and "C" sets. This is a way of grafting new cogwheels onto the drive-cord spiral pulleys. Believe me, it works!

Anthony, well-known on the EUG "First Sunday" net (and the Saturday Vintage AM net), has just advised me that he is now down to the last seven cogs and is unlikely to have any more.

The reason? Well, Anthony needed some for himself, and having an inventive turn of mind he devised a workable system. (He also does vintage cars . . .) For an outlay of nearly £100 he acquired a batch of less than fifty, hand made by specialist craftsmen. After doing his own repairs he offeres the remainder to members. Price £2 each or £5 a pair, complete with instructions.

Send your remittance with SAE to Anthony at : "Castell Forwyn", Abermule, Montgomery, Powis SY15 5HF.

WHAT A BIND!

Since we started "magazine binding" our newsletter I have discovered that some members are still using ring-binders to store them.

Cheap and easy this may be, but in my humble opinion ring-binders are the worst way to keep them and most inconvenient to browse. Various magazine binders may be used, such as those offered by "Practical Wireless", which have nylon spines through which you slide your copy of "Lighthouse". These are called "Unibinder", made by M.C.(Services)Ltd., Brighton, BN2 4JE, but I have no details.

A good alternative is the "Criterion" magazine binder available from the "Partners" chain-store of stationers. These are standard A4, with 14 stout wires within, thus holding two years' worth of "Lighthouse" together with indices. The spine is three inches wide, which is about right, and the price is £5.49. The cheaper alternative is the "Collecta" (or similar rivals) A4 magazine box at about £1.99, but it won't keep them in order!

I MISS, MY SWISS (♫ my Swiss Miss misses me ♫)

A sign of the times arrived last week in the form of a letter to EUG from Swiss Radio International (SRI). It is headed "Replacement of radio programmes by on-line service."

To cut a long story short, shortwave broadcasting to the Western part of North and Central America, together with Australia, ceased last month. Europe, Asia, and the remainder of North and Central America ceases on 27th October, 2001.

And finally broadcasting to the Near East and Africa, together with South America, will cease at the end of 2004. And that's that. Finito!

My spys tell me that the BBC World Service is set to follow the same pattern. Daventry – which started the full Empire Service in 1932 – ceased shortwave transmission in 1992.

Skelton Pastures, (near Carlisle) the BBC's largest shortwave station when it was built in 1943 (18 x 100kW transmitters, 52 beams) is to cease shortwave Tx shortly. It will be rebuilt by the MoD as a VLF facility . . .

All I can say is: read "Have I Got News for You!" in this issue. It doesn't help our favourite brand, though.

COAST GUARD AHOY

An e-mail received this week from a prospective member in New Mexico states "In 1955 when I was in the Air

Force stationed on the island of Adak (Alaska) I visited the U.S. Coast Guard station. They were using 3 or 4 Eddystone receivers and they really liked them. I told myself that one day I too, would own 3 or 4 Eddystone receivers . . . "

Well, how about that! A very early record of Eddystones being used by Uncle Sam. I presume they would be 680X's . . . But on reflection they could be 750's alias MIMCO HR100, I suppose. Anybody out there know?

SNAIL MAIL RECORDS

When the last Issue of "Lighthouse" was posted, I despatched the overseas destinations earlier at 3pm (Bewdley time) on the Friday. Printed Paper Rate. (Half price).

When I arose from my couch the following Tuesday morning an e-mail awaited me from EUGer Peter Lankshear in New Zealand. He told me that his copy had arrived at Invercargill at 10pm (Bewdley time) the previous day.

That makes 3⅓ days door-to-door for 12,000 miles. Not so dusty!

Another communication from Bryan Cauthery in Ontario thanks Dave Simmons at the EUG technical publications department (see page 2) for a manual for his new Eddystone S.640. Bryan had telephoned Dave with his order and the handbook arrived four days later.

Bryan makes the point that a first-class letter mailed to him in Ontario, from line-of-sight Toronto takes TEN DAYS by Canada Post! Can Royal Mail be sending stuff direct by intercontinental rocket, we ask ? ★

BACK NUMBERS OF MAGAZINES ON CD-ROM

In our Christmas Issue we announced the availability of back-numbers on CD-Rom as a cheap and convenient way of acquiring early EUG material. The price is £5 for each Volume (inc p&p) or £6 overseas airmail. Order from Graeme, G3GGL, (QTH is given on page two) and they will be despatched direct within the week.

LIGHTHOUSE Volume 1.
QRG 1998; QRG 2000;
Post-war Servicing 1946-56
Indices Issues 1-42, 43-48;
49-54; 55-60

LIGHTHOUSE Volume 2.
EUG Newsletters 55-60
With index
(All ROMs have Adobe© Reader prog included)

LIGHTHOUSE Volume 3.
EUG Newsletters 49-54
With Index
(All ROMs have Adobe© Reader prog included)

LIGHTHOUSE Volume 4.
EUG Newsletters 43-48
With Index

LIGHTHOUSE Volume 5.
EUG Newsletters 37-42
NO INDEX

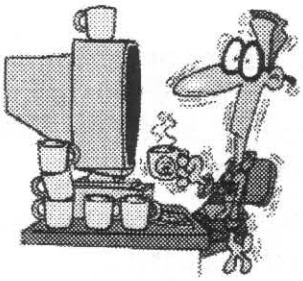
LIGHTHOUSE Volume 6.
EUG Newsletters 31-36
NO INDEX

LIGHTHOUSE Volume 7.
EUG Newsletters 16-30
NO INDEX

LIGHTHOUSE Volume 8.
EUG Newsletters 1-15
INDEX 1-6

LIGHTHOUSE Volume 9.
Available November 2001
(In course of preparation)

These CDs have been prepared for members by David Oakden G3UFO/VK6GDO. Any profits will be devoted to EUG funds to keep subscriptions down. Members are asked to note that Volume 1 has a full set of indices as well as other interesting material. Volume 8 contains early Newsletters which are of very poor print quality but are included for historical completeness.



POO'S PONDERINGS

'Stray thoughts from an absent mind!'
by Simon Robinson M5POO

As I write "Ponderings" this month, Spring has definitely 'sprung'. It's freezing cold, wet and windy! The last two months have been quite busy and positive reports have been received worldwide on the Website. It will continue to grow and I would ask anyone who has a GOOD photograph of a particular receiver, especially scarce ones, to let us feature it on the site in the "models" section.

Don't try this at home!

'POO enjoys the delights of culinary activity from time to time and recently decided to make a "Chili" using real chilies. Having carefully chopped up the little red beasties and set the pan simmering suddenly had an itch. Upon rubbing the offending left eye with a finger that was on hand (argh!) a brief spell of relief ensued. Some three seconds later the type of indescribable searing pain last felt by evil Ancient Egyptian priests as they were mummified alive shot through 'POO's face. Several gallons of cold water were needed to restore normal functions and uncensored speech.

The following day proved just as much fun. Remember those nice safe solid-state sets such as the EC10, EB35 etc... that run from low DC volts? We all know that the mains power units are all cased up to prevent accidents. Having finished off the EB35 mentioned below, 'POO decided to connect the mains power pack to the set. WHAM! 'POO will keep forgetting that the innocent looking four pin internal power plug bites. After all it does carry 240VAC to and from the mains switch! I haven't felt so vibrant and awake in some weeks, the metallic taste left over as a reminder to UNPLUG the power unit when working on the set.

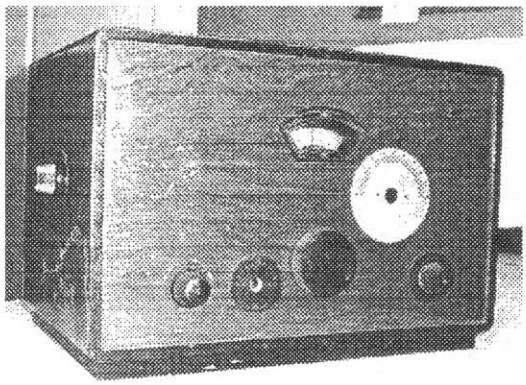
The Biggest EB35 on the planet

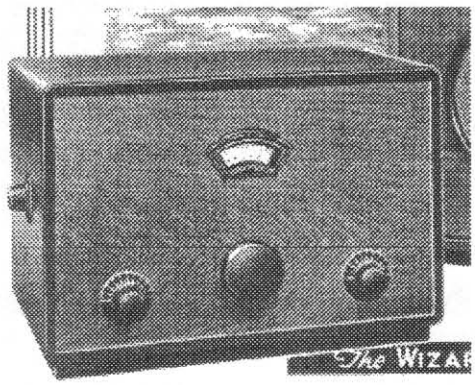
In early March I took a call from a friend who said he'd bought me a fairly clean EB35 and would I like to come and collect it. "Oh" he said, don't forget to bring your estate car – empty! An EB35 is the size of a shoebox so what was I to expect. On arrival outside the auction rooms my jaw dropped, the Lot I had bought included: two three foot high Goodmans speakers, a Sony amplifier and tuner, a full size record deck, a Sony reel-to-reel deck, a Sony cassette deck, a "Tape Control Centre" and last but not least the sideboard the original owner had built the equipment in to. It all JUST fitted in the back of my car. The auctioneer had apparently thought the whole lot was purely junk and put it all together. I thought the EB35 was cheap too!

Recent Finds

After some incredible bidding on the Internet recently 'POO obtained a quite uncommon Model 840. It's all there and not in bad condition. When I finish the set I'll post a story on the Website but in the meantime, if anyone needs information about the 840 (half moon dial) please get in touch.

Upon arriving home one afternoon I had a number on my "Callminder" I did not immediately recognize. When I called the number I knew the voice instantly. "I came across an old Eddystone Overseas Four whilst clearing a shack, I saw your callsign on it immediately, would you be interested?" Me? No! We agreed a price and the set duly arrived complete but with rather poor woodwork.





The left hand picture shows my Overseas 4 complete with extra holes! And the right hand picture is from the sales brochure. It's a neat little set and worthy of proper restoration. Can anyone help with information on a) what is the best way to fill the two holes so as to hide them, b) what type of wood is the set made from and c) what sort of varnish would be used? Any help would be much appreciated with this set as it IS rare and I would not want to spoil its authenticity.

How to get MORE wrinkles!

Many Eddystone sets are painted using black wrinkle (also known as crackle) finish paint. I have a local company who do this for me by stove enameling however you can do it yourself, if you can get the paint that is! I recently received a catalogue from Frost who may be contacted on 01706 – 658619 or at www.frost.co.uk. They supply 400ml spray cans of black (or red) wrinkle for just £7-00 plus carriage and V.A.T. The code is P110 for black and P111 for red. It even says *"great for old radio cabinets"*.

A Call for help from Canada

Most members will remember when Hammond purchased the die cast box business from GEC about two years ago. I received an e-mail from Rob Hammond asking if we could help locate any old tooling for him. Rather than prattle on myself, I'll let you read the message:

"Good evening from Canada

Stuart, G8GTW, provided your name as a result of an inquiry I sent to the lighthouse

Our company had the good fortune to purchase the Eddystone diecast box and component business from GEC about two years ago.

We have been corresponding with Bill Cooke, who we have known for years and for whom we have a great deal of respect, and anyone else in an attempt to track down the 'lost' tools that were used for the popular knobs and perhaps the plastic boxes.

We found some limited bits at Charlesworth but I do recall more products from our association in the 70's

If you can help us at all, we would really appreciate your thoughts

The UK trading is done from Basingstoke and the MD is Roger Kent.

Sincerely

Rob Hammond
VE3EIL"

If anyone can help I will be pleased to forward any information to Rob and Roger.

Feedback on the Piccolo Filter

Last issue I featured information on the "lost" Piccolo filter used by Eddystone in the 830/9. I received a very nice letter from Michael O'Beirne who pointed out that one would make an excellent filter for CW with about 320Hz passband - quite good for CW. He further points out that with different crystals an excellent SSB filter could be constructed.

As Michael says, the cost of new crystals to fit in the existing cans would be, to put it mildly, 'inappropriate'. I might well give one a try on CW. When I do I'll keep you posted.

Don't forget to call at the NEC on April 29th – we'll be there. Hopefully I'll hear you all on the "net" next month? *VY 73, Simon 'POO*

The Conquest of the Eddystone Rock

By G. Long, F.R.G.S.

The Eddystone is the highest summit of a vast Reef of Rock, About Fourteen Miles South-west of Plymouth

There are few more splendid examples of human skill, courage, and inventive genius than the building of the Eddystone lighthouses. The work was one of enormous difficulty and danger, and even when completed, disaster again and again overwhelmed the slender tower in the midst of the waters, but in spite of this there has been a warning beacon on this deadly reef for nearly three centuries, and thousands of lives have been saved thereby.

The Eddystone is the highest summit of a vast reef of rocks, which lies in deep water right in the track of shipping, about fourteen miles south-west of Plymouth.

When the wind blows up the Channel these rocks become the centre of a frightful vortex of raging waters from which no ship could hope to escape.

The need for a lighthouse was fully understood for many years before a man could be found with the skill and the courage to build one.

Difficulties

The difficulty was twofold. The lower part of the tower had to be built below high-water level, and even at low water the rocks are swept by rollers which completely cover it, so that the workmen had to wear life-belts, and cling to iron stanchions for dear life. Only three hours' work a day is possible at this stage of the work, and that only in very calm weather. If in spite of all this the foundations were successfully laid, they would immediately be subjected to a stupendous battering from the waves.

Recent pictures of the Lighthouse postage stamps from New Zealand, and of "Smeaton's Tower" at Plymouth have prompted sharp-eyed EUGer Gordon Huxtable, (G7HFU) to send us this feature from 'Practical Mechanics' of 1937

Great waves rush in at a speed of sixty miles an hour and exert an enormous pressure on the work. On the coast of the mainland a pressure of three and a half tons to the square foot has been recorded, and there is reason to think that this tremendous figure has been exceeded on the exposed Eddystone reef.

The first of the Heroes of Eddystone was Henry Winstanley, a country gentleman living at Littlebury, Essex. He was an amateur scientist, and an eccentric genius who loved practical jokes, as his friends knew to their cost.

A guest kicked an old slipper on his bedroom floor, and immediately a ghost rose before him. In another room there was a trick chair, which flung out its arms and held fast the visitor who sat in it.

It was no doubt owing to this eccentric twist in his character that we owe the remarkable shape of Wistanley's Lighthouse, which, as can be seen in the illustration, is more like a Chinese pagoda than anything.

Started in 1696

He started in the summer of 1696, and succeeded in fixing twelve iron tie-rods in the rock

efore the autumn gales stopped all work. The next summer a solid, round pillar was constructed, 12 ft. high and 14 in. in diameter, and bound to the tie-rods.

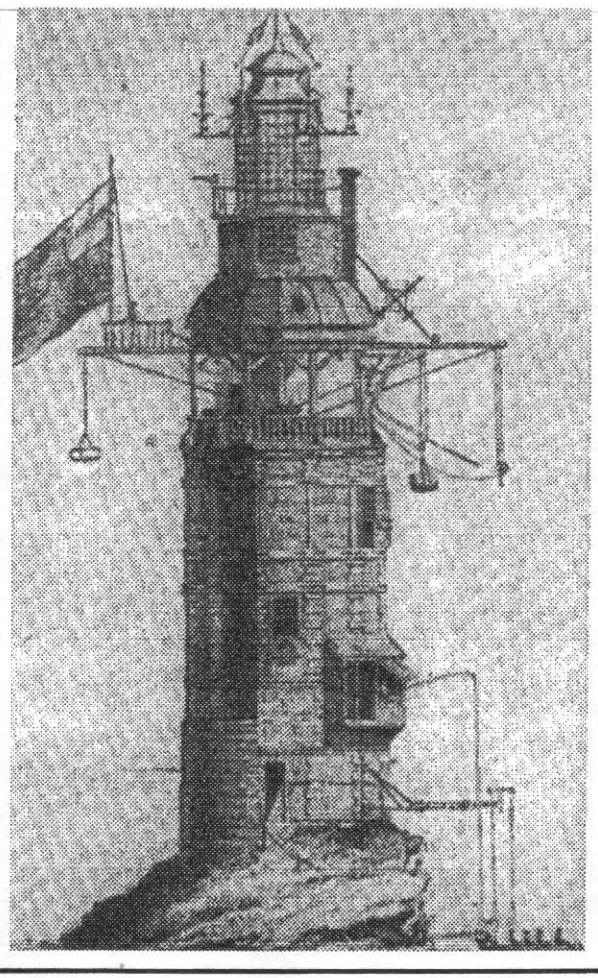
In the third summer the pillar was enlarged by two feet at the base, and carried up to a height of sixty feet. Supposing that this was lofty enough for safety, Winstanley and his men determined to remain on the tower to finish the work, but the waves rose to the summit of the tower, so that they were almost drowned and their provisions were all spoiled.

They were rescued eleven days later. The fourth year was spent in enlarging the structure, but its wide, open galleries and fantastic projections could not resist a great gale. In spite of all this it stood for seven years, and the builder was so proud of his work and so confident in its strength that he rashly said he would like to be beneath its roof in the greatest storm that ever blew.

His wish was fulfilled in November 1703. A frightful gale raged all night, and Winstanley and the keepers were swept away. No vestige of the tower remained.

A Constructive Genius

Three years later John Rudyerd began another. Although he was a silk mercer by trade, he seems to have been a constructive genius. He determined to build a tower which should offer as little resistance to the wind as possible, so instead of a polygon he chose a circle for his plan and made the exterior of the tower quite smooth.



The first offshore lighthouse in the world was built by Henry Winstanley in 1696. It was swept away in a great storm in 1703, taking the designer and crew with it.

It was 92 ft. high and took four years to build. Instead of twelve tie-rods he had thirty-six, each sunk from twenty to thirty inches in the rock. The rods were perforated with holes, 252 in all, by which they were clamped to the timbers with jagged spikes.

The lower part of the tower consisted of oak beams and courses of stone, all joined to each other by iron clamps. The upper part was all timber.

Rudyerd's Lighthouse was an absolute success so far as resisting the winds and waves was concerned, but it was destroyed by another element — fire.

It was completed in 1709, and in December 1755 the top of the building caught fire through some mishap with the candles used for lighting. The keepers tried to extinguish the flames with buckets of water, but it is no easy task to carry water to the top of a ninety-two-foot tower.

They were driven down stage by stage, and finally had to get on the rock whence they were rescued by a boat which put off from Plymouth when the fire was observed.

One of the keepers died twelve days after, and when a post-mortem examination of his body was made, a mass of lead weighing nearly half a pound was found in his stomach. He had swallowed the molten lead when trying to put out the fire.

John Smeaton

The third lighthouse on the Eddystone Rock was built by John Smeaton, and work began a year after the second had been destroyed.

Smeaton decided that the two previous towers

had been deficient in weight, and he announced his intention of building a tower so solid that the seas should give way to the lighthouse, and not the lighthouse to the sea.

Also it must be fireproof, and so it would be built of *stone*.

It might be mentioned that Smeaton's ideas were so successful that all modern lighthouses are built on the same plan. When working out his design he kept before his mind the outline of a stately oak tree.

Every foundation stone was dove-tailed to the rock and also its neighbours, and as the course rose every stone was locked to its fellow and a hard plug of marble projected into the course above.

As the foundation and lower part of the tower were constantly swept by the waves before the cement could dry, Smeaton's greatest fear was that the cement might be washed out of the joints before it could set.

He overcame this difficulty by two clever ideas. In order to make certain that no stone could be moved by the utmost force of the waves, he inserted a number of oak wedges in grooves between the stones, which when wetted by the seawater would lock everything solid.

All joints were filled up with cement and covered outside with plaster of Paris, which set hard quickly and kept the water out of the cement.

During the first summer nine courses of masonry were laid, and at the end of the next the solid part of the tower was completed, 35 ft. above the base.

The whole job was finished during the fourth summer, the lantern being 72 ft. above high-water level.

Smeaton had three narrow escapes during the progress of the work. Once he was nearly drowned when his boat was caught in a tremendous storm, once he fell over the rock and dislocated his thumb, and finally he was almost smothered.

A charcoal fire was being used within the tower for melting lead, and Smeaton was overcome by the fumes. Fortunately his men found him, and dragged him into the open air, where he was revived with buckets of cold water.

Smeaton's Lighthouse still stands, but it is no longer on the Eddystone Rock.

Rocked Dangerously

It successfully resisted the wind and waves until 1882, when it had become unsafe through the undermining by the waves of the rock upon which it stood.

The tower remained solid but the rock was breaking away, and the lighthouse rocked dangerously in gales.

A bigger and better Eddystone Lighthouse was then built by Mr. J. N. Douglas, Chief Engineer to Trinity House, who had already built the magnificent "Wolf" and "Bishop" lighthouses.

Mr. Douglas had the advantage of working in the age of steam machinery, and so easily surpassed Smeaton's great achievement.

The new Eddystone Lighthouse contains 2,171 stones; that is, 4,668 tons of masonry. Smeaton's contained only 988 tons, and had four living-rooms. The new tower has nine-living rooms, each larger than those on the old tower, and is 130 ft. high, as against 70.

Lighting Facilities

Electric light was proposed, but was rejected because it was thought there was insufficient space for the engines and dynamos, and it was feared that the vibration would endanger the tower.

Oil lamps were installed in 1882, with an illuminating power of 250,000 candles, or about six thousand times as much as Smeaton's original light.

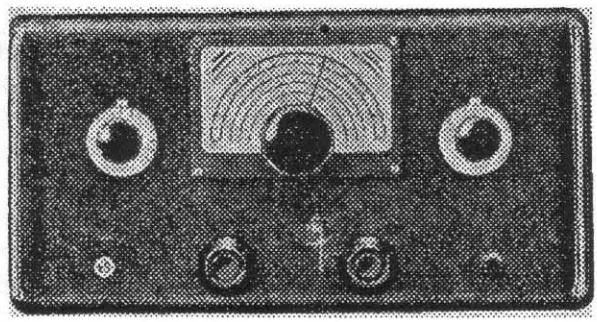
If we stand on Plymouth hoe to-day and look far out to sea, we can on a clear day see the slender pencil of the New Eddystone rise above the water, and if we turn shorewards we can see Smeaton's old lighthouse standing on the historic Hoe.

The lower part, or solid stump, remains on the reef, but the upper part has been carefully rebuilt on shore and is a favourite venue for visitors, who can climb to the top for a penny and see for themselves how magnificently the stone have been dove-tailed together, so that after nearly two centuries it is as solid as when it was built.

THANK YOU, GORDON, FOR A GOOD READ. ★

Band Spread All-Dry Four Receiver

INTRODUCTION.



This versatile short wave receiver caters for the needs of both the general short wave listener and for the amateur who requires full bandspread facilities. To obviate the use of accumulators, it has been designed around a set of 1·4 volt valves and is capable of giving really excellent results. The receiver is easy to handle, reaction is smooth, the R.F stage gives effective gain over the whole range of frequencies covered and the output is adequate for loud speaker use on the stronger broadcasting stations.

Eddystone plug-in high efficiency coils are used in the R.F and detector stages and enable frequencies of from approximately 33 megacycles to 1100 kilocycles to be received, thereby including all the normal amateur bands. Stations in the broadcast band can also be received by using type 6G Coils although the tuning condensers are on the small side for this purpose. Room for the batteries is allowed for on the chassis, thus making the receiver completely self contained.

CIRCUIT.

Fig. 1, consists of a tuned R.F stage, followed by a detector stage which incorporates band-setting and band-spreading tuning condensers. The two larger capacity condensers are controlled by small slow motion dials and the band spreading condenser, on which the fine tuning will be done, is controlled by a Full Vision Dial Cat. No. 598. The capacity ratios are so chosen that very effective band-spreading results.

Gain control is by variation of screen potential to the R.F valve whilst reaction is controlled by the variable potentiometer R7. The detector valve is resistance capacity coupled to a first audio stage, the latter being transformer coupled to a pentode output stage. To reduce H.T. consumption, a resistor has been inserted in the screen of the output valve but if it is intended to use the receiver with a loud speaker, this resistor R11 and its associated condenser C14 should be omitted.

CONSTRUCTION.

The receiver is built on a Cat. No. 641 Chassis, which fits into a Cat. No. 609 metal cabinet, on the front of which are mounted the tuning dials and other controls. Two chromium plated 8" handles, fitted to the front panel, enhance the appearance of the set and also serve to protect the dials.

The photograph of the top deck of the chassis, Fig. 2, and the one of the sub-chassis, Fig. 3, give a good idea of the layout and general construction. Details of the positions, spacing, etc., of the major components are set out in the chart, page 3, and from this information the constructor should have no difficulty in building an exact duplicate of the receiver.

As advocated in other articles in this Manual, it would be well to start by cutting from stiff cardboard a dummy chassis top and panel, on which the positions of the components can be accurately marked out. The cardboard dummies may then be used as templates for marking out the actual chassis and cabinet front.

Two metal screens are required, one above and one below the chassis, and details of these are included in the chart. A midget insulator is required near the R.F tuning condenser bracket and another near the detector coil (three chassis holes for each).

The positions of the tag boards, L.F transformer, etc., beneath the chassis, are not critical but all the holes necessary for securing them should be made before everything is assembled prior to wiring up. A $\frac{1}{4}$" hole is required near V3 to take the screened lead to the grid top cap of this valve and another near V2 for the lead from R5 to L.T positive.

The front panel should be carefully marked out with the positions of the holes to agree with those on the front of the chassis and the tuning condenser spindles. The bushes of the switch, potentiometers and jack pass through both the panel and the chassis and their fixing nuts, together with the metal handles, serve to hold the two parts together firmly.

The aerial socket fitted to the rear of the chassis serves for the connection of either a coaxial feeder or an open aerial. A suitable hole should be made

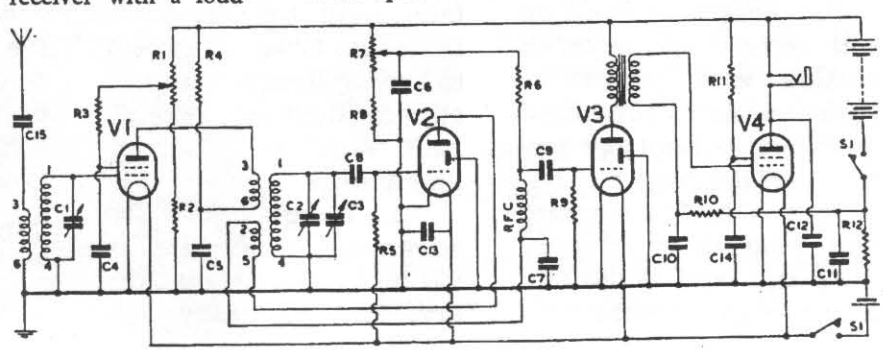


FIG. 1.

in the rear of the cabinet to allow the aerial to be connected when cabinet and chassis are assembled.

WIRING.

The wiring throughout, except for the screened lead to V3 and possibly the battery leads, may be carried out with 20 s.w.g. tinned copper wire enclosed in insulating sleeving. All R.F and detector circuit wiring must be kept as short as possible and this point applies very particularly to the top grid of the DAC32 detector valve. Both the grid condenser C8 and the grid leak R5 should be soldered extremely close to the top cap — otherwise static hum and other undesirable effects may be encountered.

The top cap of V1 and the stator of C1 are connected to a tag on the midget insulator, from the underside of which a wire is taken through the chassis to pin 4 of the coil base.

Similarly, the grid condenser C8 and the stators of both C2 and C3 are connected to the other midget insulator and detector coil socket. All tuning condensers are earthed with short leads from the tags provided to tags fitted under the bracket bolts.

Resistors R10 and R12 and condenser C10 are soldered to the group board and the associated interconnections made before the board is fixed to the rear of the chassis. The other small components are held in the wiring, 5-way tag strips being fixed on available projecting bolts, for anchoring purposes and to enable H.T wiring, etc., to be commoned up. C4 and C12 are soldered directly from the appropriate valve pins to an earth tag, and condensers C5 and C7 similarly from the detector coil base.

The double pole switch connects the L.T and H.T batteries simultaneously. If a non self-shorting telephone jack is employed, be careful not to disconnect the telephones whilst the set is working. L.T leads are taken up through the chassis from the switch and a chassis earthing tag and H.T leads from the switch and the right hand tag strip to the batteries clipped to the rear of the chassis.

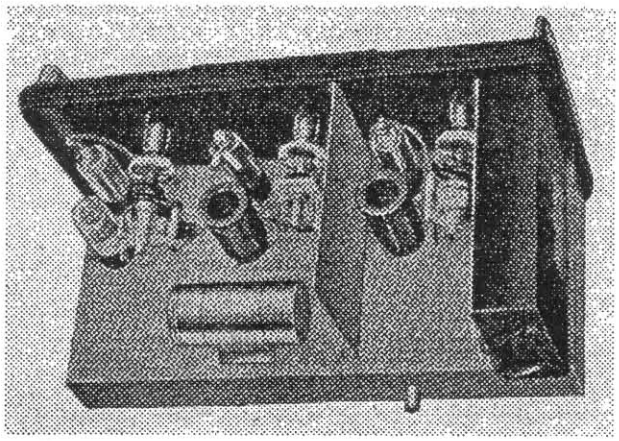


Fig. 2. Illustrating the lay-out of the receiver. Due to the addition of side brackets, it is necessary to transpose the positions of the batteries.

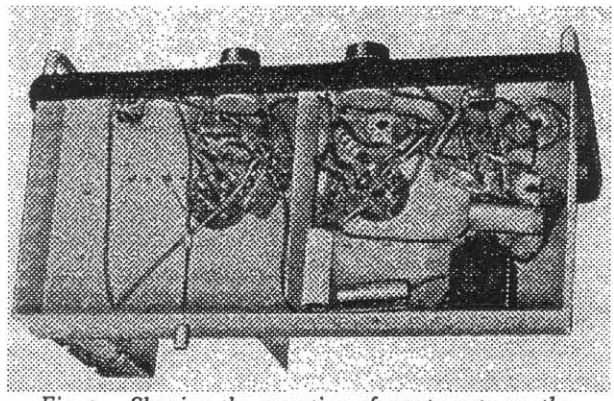


Fig. 3. Showing the mounting of components on the underside of the chassis.

OPERATION.

Before connecting the H.T battery, ensure that the correct voltage is shown across the filament pins (2 and 7) of any one valve, to avoid possible damage through an inadvertent error in wiring up.

On advancing the reaction control from minimum, a point will be reached at which oscillation commences, indicated by the usual slight increase in noise. The receiver is most sensitive when just oscillating — advancing the reaction control too far will cause violent oscillation. The R.F tuning condenser should be kept in tune with the detector stage — signals will increase in strength considerably at the proper setting.

The frequency ranges, band-spread of amateur bands, etc., are set out in the table below and close agreement will be found in a receiver built to the layout and instructions given above. In the case of the 6BB coils, oscillation ceases at approximately 28° on the band-set dial, due to the inductance capacitance ratio becoming too low but there is still an overlap with the 6LB coil. As will be seen, the coverage is complete from approximately 35 Mc/s. to 990 Kc/s., using the six coils specified. The amount of bandspread on each amateur band is fully adequate and makes the receiver a pleasure to handle. The noise level is extremely low and weak signals can be tuned in, held and read with ease.

An earthing terminal, on the rear of the chassis, will be an asset but, to be effective, the earth lead itself must be short, particularly when the receiver is being operated on the higher frequencies.

The aerial employed will, of course, depend upon local circumstances. For general use, a wire of a length between 50 and 100 feet, suspended as high and clear as possible, connected directly to the aerial socket, will prove very effective on all ranges. For restricted frequencies, e.g., any one amateur band, an aerial cut specially to the appropriate length and fed to the receiver by either low or medium impedance feeder will ensure particularly good reception on that particular frequency band, although directional effects may be noticeable.

The consumption from the batteries is very low — ·25 amperes L.T and 8·5 milliamperes H.T.

PANEL OF FREQUENCIES.

Coil.	Frequency Range		Amateur Bands.			Coil.	Frequency Range		Amateur Bands.		
	Max. Mc/s.	Min. Mc/s.	Band Set Dial.	Frequency Kc/s.	Band Spread Dial.		Max. Mc/s.	Min. Mc/s.	Band Set Dial	Frequency Kc/s.	Band Spread Dial.
6 BB	35·6	27·2 (28°)	18°	30000 28000	15° 89°	6 R	8·8	3·65	13°	7300 7000	30° 60°
6 LB	27·4	12	68°	14400 14000	15° 88°	6 W	4·65	1·92	13°	4000 3500	0° 100°
6 Y	15·85	7·05	—	—	—	6 P	2·45	·99	16°	2000 1800	10° 90°

CHART OF POSITIONS OF MAJOR COMPONENTS, DIMENSIONS, ETC.

CHASSIS (looking at front).

Top Chassis Screen 5" high, 7" long plus ¼" fixing flange, mounted 6½" from L.H. side, 9½" from R.H. side, fixing flange on right.

Sub Chassis Screen 2" high, 7" long plus ¼" flange, mounted 7¾" from R.H. and 8½" from L.H. side.

Adjustable brackets all 2¾" from front (fixing centres). R.F. condenser bracket 2" from L.H. side, detector bracket 3" from R.H. side, Band spread bracket 1½" to right of screen (i.e., dead central). All condensers 2¾" up from chassis top.

V.4 valveholder 1½" from R.H. side, 3½" from front.

V.3 valveholder 1½" from R.H. side, 1½" from front.

V.2 valveholder 5½" from R.H. side, 1½" from front.

V.1 valveholder 5½" from L.H. side, 1½" from front.

R.F. coil base 5½" from L.H. side, 3½" from front.

Det. coil base 5½" from R.H. side, 3½" from front.
(Both are fitted with pins 1 and 4 to the right).

Reaction control 6" from R.H. edge (⅜" dia. hole).

R.F. Gain Control 6" from L.H. edge (⅜" dia. hole).

Switch 3½" to left of R.F. Control (½" dia. hole).

Jack 3½" to right of Reaction Control (7/16" dia. hole).

Aerial Socket 5" from L.H. side.

PANEL.

Three ¼" holes for dial bosses, plus two 4BA. holes per dial, vertically above and below large hole and 1¼" apart. Holes for jack, switch and potentiometers as for chassis. Aerial socket and earth terminal holes at rear of cabinet.

LIST OF PARTS.

1 General Purpose Chassis Eddystone No. 641
1 General Purpose Cabinet 609
2 Metal Handles 8" 608
2 Microdensers, 100 pF (C1, 3) 1130
1 Air Dielectric Trimmer, 15 pF (C2) .. 580
1 Full Vision S/M Dial 598
2 Precision S/M Dials, 2" Silver 639
2 6-pin Coil Bases 964
2 6-pin Coils, 6BB 959
2 6-pin Coils, 6LB 959
2 6-pin Coils, 6Y 959
2 6-pin Coils, 6R 959
2 6-pin Coils, 6W 959
2 6-pin Coils, 6P 959
1 R.F. Choke 1010
2 Skirt Knobs 1¼" 2416
3 Large Flexible Couplers 1009

3 Adjustable Insulated Brackets .. 1007
2 Midget Stand-off Insulators .. 1019
1 Valve type DF 33 (V1) .. .. Mullard
2 Valves type DAC 32 (V2, 3) .. Mullard
1 Valve type DL 35 (V4) .. .. Mullard
4 Octal Ceramic Valveholders.
1 Intervalve Transformer 3·5: 1 Niclet Varley
1 D.P.S.T. Toggle Switch, S.88 .. Bulgin
1 Insulated Closed Circuit Jack .. Igranic
1 Aerial Socket type L373/Skt. Belling-Lee
1 Aerial Plug type L.373/P.8 Belling-Lee
3 Mica Condensers ·001 mF (C4, 5, 13).
2 Mica Condensers ·0003 mF (C7, 12).
1 Ceramic Condenser, 100 pF (C8).
1 Ceramic Condenser, 20 pF (C15).
1 Paper Condensers ·5 mF (C11).
1 Paper Condenser ·01 mF (C9).

2 Paper Condensers ·1 mF (C10, 14).
1 Electrolytic Condenser 8 mF (C6)
1 Resistor, ½ watt, 5,000 ohm (R3).
2 Resistors, ½ watt, 1,000 ohm (R4, 12).
2 Resistors, ½ watt, 2 megohm (R5, 9).
1 Resistors, ½ watt, 50,000 ohm (R6).
2 Resistors, ½ watt, 20,000 ohm (R2, 8).
1 Resistor, ½ watt, 100,000 ohm (R10).
1 Resistor, ½ watt, 10,000 ohm (R11).
2 Potentiometers, 100,000 ohm (R1, 7).
1 x 5-way Group Board ; 3 x 5-way Tag Strips.

NOTE.—The stated values of resistance are not critical and the nearest preferred value, 20% tolerance, will be suitable.

ERRATA IN EDDYSTONE MANUAL NO.5.

INSIDE FRONT COVER (Valve Base Data)

DF33 Top Cap Grid. Not pin 8.

DF33 Pin 1 Metallising (to be earthed)

DAC32 " " " " "

N.B. Type EF.54 Pins 4,5,7,& 8, are internally connected to the Cathode, Screen and suppressor grid

Page 2

Top Cap of V1 & Stator of C1 to Pin 1 of Coil base (not pin 4.)

Page 10

Three holes for connection to H.T., LT, & anode of V1, via C8. (not EF 50 suppressor grid)

Page 11

With Oscillator frequency lower than signal, coverage will be from 51.4 to 61.4. Mc/s (not 60.6 Mc/s) -

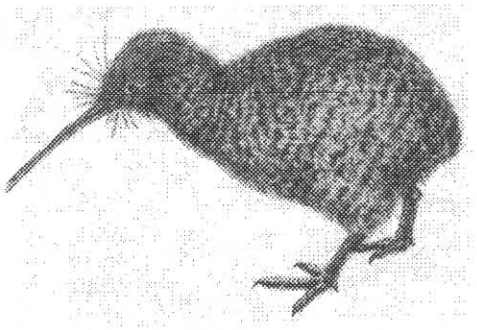
N.B. Due to alteration in design & consequent increase in inductance values, a 3 turn coil should be substituted for a 4 turn coil in the oscillator stage.

Page 14

For "Putting the Converter into Operation." read "Putting the Preselector into operation"

KIWI COLUMN

ROSS PATON'S LATEST LETTER FROM AUCKLAND



Dear Graeme – Enclosed is the completed questionaire which came with the last "Lighthouse". Yours and Tor Marthinsen's valve listings were a pretty impressive effort, but one or two errors and omissions are noted as follows, first page 24: -

The Osram X65 is not an equivalent to the ECH35, it is in fact equivalent to the US type 6J8G. Yes, I know the R1155 used the X66, which appears to be the same as the X65, known as the VR99 and also the VR99A which is the ECH35 without metalising, but they are still not direct equivalents.

Also, another equivalent to the EF91 series is the Ediswan/Mazda 6F12.

While the 0A2, 0D3, etc., are US type numbers, so are the VR type numbers, e.g. VR150-30 for the 0D3. The 0D3 is also known as the 150C1K (Dutch Philips).

A couple of really good books for anyone interested in valve equivalents is "Radio, Television, Industrial Tube, Diode and Transistor Equivalents Manual" by B.B. Babani (Bernards Publishers No. 158) published 1960 (general editor, Clive Sinclair!). And "Tube Lore" by Ludwell Sibley. The last-named is a recent American book, I got my copy through Antique Electronics Supply *(6221 South Maple Avenue, Tempe, AZ 85283, USA – they do a nice catalogue – Graeme.)*

Both books have the odd boo-boo, the most notable one in the Babani book is the lumping together of 6V6, 6F6 and related types along with 6AG6G, KT61, 6P25 and related types. The 6F6 and KT63 are not exactly the same as the 6V6, and EL33, 6AG6G, KT61, 6P25 are electrically different from either type. It also lists the 7J7 with the ECH42 instead of the 7S7.

Regarding the 6BJ5, the only one of these that I've seen is an Osram N78, rebranded by Amalgamated Wireless Valves in Australia with their "radiotron" trademark. A lot of European and British valves were given "American" style type numbers; many of them were apparently RMA registered but were not made by any US valve manufacturer, eg the rimlock series. *(otherwise known as B8A – Graeme)*

I suppose that this was done to penetrate the US market, though with only limited success, I imagine.

Page 23: the Brimar "Trustworthy" equivalent to the 6BR7/8D5 is the 6059. You're certainly right about the British valve market being a bit of a dog's breakfast. Before WW2 one of the things that helped the US radio industry and Philips and the German radio industry to cut manufacturing costs and export their radios to world markets was the standardisation of valve types.

There was a lot of prejudice in the radio service trade in NZ against British radios on account, mainly, of their use of "funny" valve types, which could sometimes be very difficult to get replacements for in NZ, e.g. the Mazda Octal types.

Also, on page 20, you forgot to list the EZ35 which is a direct equivalent to the 6X5GT, likewise the Osram U70 and U147. Likewise the Cossor OM series, OM3=EB34, OM4=EBC33, OM6=EF39, OM7=EF39, OM10=ECH35, OM9=EL32.

Also during WW2 RCA in the USA made equivalents to certain Mullard types, viz:- 1638=EB34; 1637=EL32; 1639=EBC33. I have some 1638's. They look like an EB34 but painted black and carrying RCA Radiotron branding. These 1638's have turned up on the local surplus market within the last few years, they appear to be NZ navy surplus. ★

Many thanks, Ross, for your sharp eye! I remember as a schoolboy in the late 'forties, we used to call the publisher of the 'Babani' publications 'Bernard Banana' — there were so many boo-boos! But I must take you up on the 6J8G; this is no more an equivalent to the X65 than the 6K8G or ECH35 (but they all work in Eddystones!)

— Graeme.

Carbon Tracking on Valves & Valve Holders

By Ted Moore

My item in the last issue re the 840C which had tracking on the V2 base has drawn an amazing three letters, just ten days after publication!

This appears to have become a common problem on older valve sets and is not confined to Eddystone models, one letter actually mentions the AR88 as being prone to this problem — they are OLD, and they DO get very hot in use.

Ian's letter re the AR88 states that he had completely stripped the chassis of all valves whilst doing a clean-up job with the hoover. He then applied a liberal dose of a proprietary brand of switch cleaner to each valve holder topside before refitting the valves. All had been carefully marked as Vl, V2, etc; as they were removed. This is a very necessary task with a multi-valve job as one's memory can play tricks.

Well all went well, the set was fine for several months and many happy pipes of 'baccy' were consumed over the long winter eves whilst listening to the old 'Ack Arr 88'.

It was the week before Xmas when the receiver began playing up, first thing was that gain appeared to be low on HF and there were many unexplained 'ticks' on the AF output, almost akin to nearby lights being switched on and off. Now this set weighs a metaphorical ton and the decision to get it out on the worktable needed desperate manoeuvres, with the help of a neighbour.

A few valves were removed as a first visual inspection and all showed that a brown gummy deposit had formed on both the valve socket and the bottom of the valve around the pins. On the AF output valves this had turned to black carbon. The neighbour who is a non-smoker sniffed one of the valves and said immediately TOBACCO.

The greasy nature of this goo made Ian realise that switch cleaner has an added lubricant.!!! Combine this with the residue of tobacco smoke and hence the goo. Several suggestions were made but all, even WD4O have added lubricant of some kind and this is what binds the tobacco smoke residue.

In the end some pure trichlorethane was used, making sure the window was open and that the wind was ventilating the room. Hopefully the problem has been cured for good, it has certainly disappeared since the AR88 was re-boxed. ★

Life at Quartz Hill Fifty Years Ago (part 2)

By Peter Lankshear, Broadcast Engineer, NZBS (Retired)

APOLOGY from GRAEME: This feature was scheduled to appear in our last edition of 'Lighthouse', but I overlooked it. Due, no doubt, to an extended festive season! Sorry Folks (Sorry Peter).

In the December edition of 'Lighthouse' I described how New Zealand had become increasingly dependent on short wave communication during the 1930's due to the deteriorating world political situation. When World War Two broke out immediate steps were taken to improve these facilities. A new receiving station was built at the southern end of the Makara land, centred on an area known as Quartz Hill, named after its white silica outcrops. I arrived there in 1950 and was involved, among other things, in monitoring the BBC Overseas transmissions. One day the new Eddystones arrived . . .

Being situated near the antipodes, we could receive many European transmissions not specifically aimed at the Pacific. This led to another factor. These transmissions often did not come from the expected direction, which is one reason for our having so many receiving aerials.

Generally, during darkness, the BBC transmissions come from the north, but at about 8.00 am, often within the space of a few minutes, they switched 180 degrees to come over the South Pole. At times they could come from just about any direction.

As well as continually checking the BBC, other transmissions including services from Canada, Australia, and India were reported on. It will be apparent that the operators' search receivers came in for a lot of work, and mechanical ruggedness and stability were essential.

It was therefore, a memorable day when we uncrated a pair of Eddystone 680/2 receivers. Strattons, by the way, record these as having been supplied to the New Zealand Post Office. This point I originally questioned, but eventually found that the disparity is explained by the fact that at that time the NZPO acted as the purchasing agent for all New Zealand Government departments, of which the NZBS was one.

The Eddystones proved to be admirable search and monitoring receivers and one in particular withstood several years of continuous work. The second 680/2 was in a secondary monitoring position and did not get quite the same amount of "hammering" as its mate.

In my original story (see EUG N/L No 37, June 1996) I related how I repaired the filter choke on this receiver. On preparing this article I was struck by a possibility of a further coincidence. I checked my own 680/2 carefully and sure enough, there on the bottom of the choke case is the unmistakable evidence of my own handiwork.

Although I obtained it many years later, I now own one of those two Quartz Hill Eddystones!

The Engineer's Car.

As with any operation of this nature,

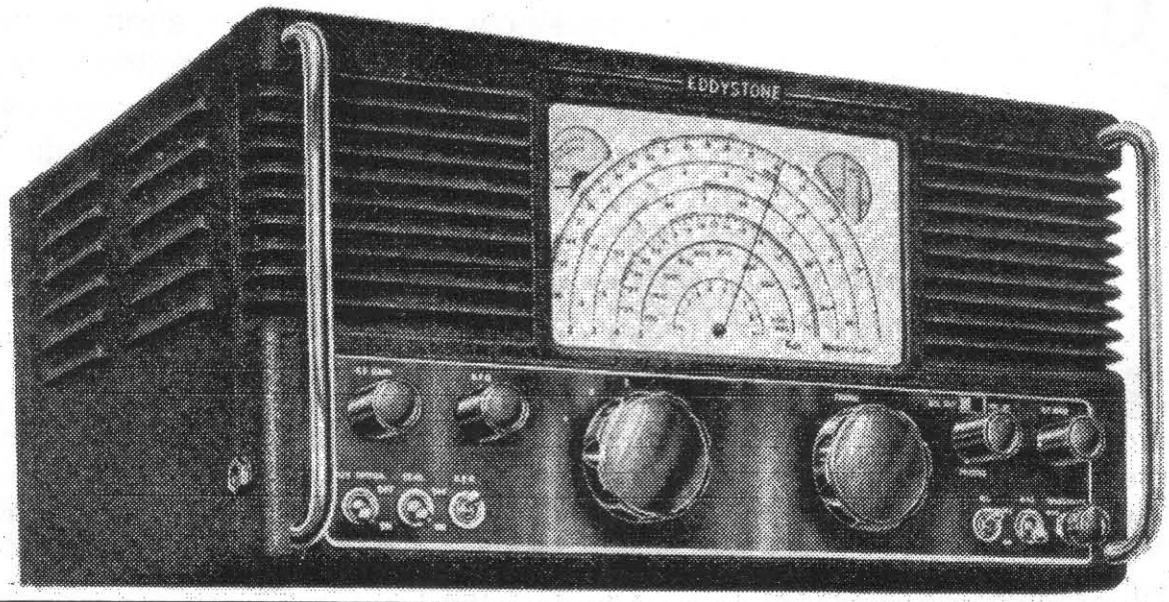
life had its lighter moments. One that comes to mind is the new car belonging to the Station Engineer, who had the habit of driving unannounced up to the station at odd times to the possible embarrassment of the duty operator whose nose might not be firmly pressed to the grindstone.

The isolation and the absence of overhead power wires created wonderfully quiet receiving conditions. Great care was taken to preserve this situation and all motor vehicles had to be fitted with ignition interference suppressers. This even extended to the motor of the caretaker's lawn mower!

Our Engineer was extremely proud of his new Citröen car and was reluctant to do anything to mar its performance. During a tea break shortly after he had acquired the Citröen the Boss casually mentioned that he hoped that fitting suppressors wouldn't be detrimental to its performance. One quick-thinking young technician suggested that we should conduct a trial to see if suppressors really were necessary on so distinguished a vehicle.

The Engineer quickly agreed and with the search Eddystone duly connected to a suitable aerial and tuned to a clear spot on the dial, the Citroen was driven around while a few checks were made. Sure enough, there was a barrage of ignition noise as the car approached the aerial, but when the Boss returned, assurances were given that suppression was not required!

Thereafter, whenever an unannounced visit would be unwelcome, a receiver was left tuned to a clear frequency and connected to an aerial that crossed the road about a kilometre from the station.



The Eddystone S.680 was Stratton's first successful post-war professional receiver. The earlier Model S.504 was only in production for about 8 months in 1946 and was considered a bit of a stop-gap. The original S.680 was announced prematurely in 1947, but was dogged by development problems and was not released (much improved) until 1949. It was advertised as the 'NEW 680', but is sometimes referred to as the 680/2, to avoid confusion with the 680 that never was! With two RF stages, two variable bandwidth IF stages, crystal filter, and a complement of fifteen valves it retailed at £89-5-0 in the UK (£89.25). Using the price of a first-class stamp (1p in 1949) as the yardstick this gives a 2001 price of around £2,300. It is fairly uncommon these days. It was superseded in 1952 by the slide-rule dial version, S.680X which remained as a top model until 1962 and is fairly common.

The Bells of Moscow.

Short-wave propagational conditions vary seasonally, and hourly and we found that there was generally some part of the day that signals from the BBC were very noisy.

During the early 1950's the Cold War was at its chilliest, with anything to do with Moscow anathema, and to broadcast anything that originated in Russia would be equivalent to a capital offence.

An important news broadcast for New Zealand was received at 11.00 GMT (11.00pm local time) and this was rebroadcast directly by the National Programme. At the time of this episode, reception during the evening was usually pretty marginal, but at 11.00pm a new transmission (from memory on 15.26mHz) opened up with a solid signal and was invariably used for the news rebroadcast.

As Graeme will recall, in these circumstances, there was no preliminary identification, just a carrier which appeared a few minutes before the scheduled time. The first modulation was the chimes of Big Ben. Our practice was to line up the transmission immediately prior to 11.00pm and feed it to Broadcasting House in readiness for the news. Usually this system worked well, but on the night in question there was a disaster.

Right alongside the BBC transmission, Radio Moscow had a channel, and they also generated a good signal for a programme that also opened at 11.00pm. They too opened with bells, but instead of the measured Westminster Chimes, they used the Kremlin Bells playing the opening cadence of the very familiar tune Stenka Razine.

As readers will by now have anticipated, on this particular night, I had tuned to the Russian transmission instead of the BBC. By the end of the first bar, after a record dash across the control room, the on line receiver had been hurriedly retuned and Big Ben was in charge. Although I had missed only the first four notes, next day I had an "explain why" to deal with and some fast talking to do.

Early Tape Recorders

All major news broadcasts were recorded, initially with Presto recording lathes and acetate covered aluminium discs. This was an expensive exercise, and the swarf from the cutter head was an extreme fire hazard.

It was therefore with some pleasure that we took delivery of a pair of the first generation EMI professional tape recorders. These were large machines, standing nearly chest high and operating at the remarkable tape speed of 30" per second! This in turn required spools 10" in diameter, which for some unexplained reason, were single sided.

Unlike the Mylar used today, the early tapes were very brittle, and with the fast recording speed involved, breakages were common. This would have been bad enough with conventional spools, but with no restraint on one side the tape usually flew into a massive tangle. Unraveling the resultant mess could take an hour and a fair degree of profanity.

A Lost Yacht.

Not all our work was confined to monitoring broadcasters. Our superior reception facilities were recognised by other organisations and from time to time the Police and Search and Rescue authorities called on us for assistance.

As followers of the America's Cup will know, New Zealand is a very active yachting country and it is not uncommon for vessels to get into trouble. On one such an occasion, during an ocean race in heavy weather, a yacht called the Argo went missing off the East Coast of New Zealand.

An air and sea search was organised, but nothing was found. The vessel had been equipped with radio, but the

marine radio stations could not hear them. Amateurs and eventually Quartz Hill were asked to help by monitoring the Argo's frequency in the 2 mHz marine band. We could hear nothing, but several amateurs insisted that they could hear faint signals on the yacht's frequency.

This caused some argument until finally, we were able to provide the answer. Separated by only a few kHz, taxis in Sydney, Australia, had a channel and it was this that the amateurs could hear faintly. At Quartz Hill, we were able to hear the taxis clearly enough to identify them and resolve the issue. Unfortunately, the Argo was never found.

Frequency Measurements.

The ability to measure frequency accurately brings to mind another story. Not unexpectedly, many of the staff at Makara and Quartz Hill were hams and from time to time one would want to upgrade his license to permit him to operate on the 40 and 20 metre bands.

The Post Office, who were the licensing authority, had quite sensibly delegated the testing and examining of candidates to a senior and experienced ham – ZL2AB. The chief requirements were that the applicant should be able to send and receive Morse at 20wpm and measure frequency reasonably accurately. In practice, '2AB communicated with the applicant in Morse of appropriate speed and asked him to check the frequency of the '2AB transmitter.

I mentioned earlier that Makara had a primary frequency measuring facility. What would be better than to use it for measuring '2AB's frequency? This was generally the case when one of the local lads "sat" his ticket, but with the precaution that the last few decimal places were omitted so as not to arouse too much suspicion.

Some time after I left Quartz Hill, I was visiting in a country district when I observed that the school house sported an impressive Zepp 80 metre aerial. I duly knocked on the door to say hello and discovered that the ham was the head teacher and was non other than '2AB. He made me welcome and showed me his very tidy installation and home built 100-watt transmitter.

The main receiver was an Eddystone 640 but I was intrigued to find that there was a standby receiver, which could be useful for receiving code in difficult conditions. This receiver was a simple 0-V-1 using a pair of type 30 triodes!

The conversation got round to the Makara station and I hinted that some of the frequency measurements for high frequency permits might have been done on borrowed equipment. '2AB laughed and said "I know quite well that the Makara boys use the frequency standard. It's a handy check that my own transmitter is within limits and anyway there is no rule that says that the applicant must own the frequency meter he uses."

The satellite reigns supreme.

Quartz Hill and Makara have both gone the way of the dinosaurs. Communications are rapidly disappearing from the shortwave bands. Satellites and fibre optic cables have seen to that.

In contrast to the short-wave A.M. transmissions, that Graeme played a part in sending out and which were never free from fading and phase distortion, now practically daily I view BBC TV transmissions sent via satellite. The quality is indistinguishable from local transmissions.

Despatch of this article is another illustration of today's advances in communications in my own lifetime. Before 1950, sent to England as a letter, it would have taken at least 6 weeks in transit. But I will send it as an e-mail attachment to Graeme in a few seconds, without leaving my desk and for a cost of about 1 penny.

★