

An Eddystone 'Cabin Set' – or the 'Neat Case' of the S.870/S.870A Series - by Gerry O'Hara, G8GUH/VE7GUH

Introduction

A set 'Marketed for ocean liner passenger cabins and cult domestic' (QRG, Graeme Wormald, 2005): the diminutive but very cute and appealing S.870 (1956 – 1959) and S.870A (1960 – 1966) were part of the 'baby' Eddystone set line-up that were built into

the 11" wide front panel format first deployed - though without the actual case - on the S.820 FM tuner in 1955 (see the S.820 restoration article on the EUG site), and which was also used in the S.890 series, S.901 and S.930 series, however, the S.870 series is by far the most common. This size of case was actually smaller than the EC10 and EB35/EB36 transistorized sets that superseded it in the early to mid-1960's although the family resemblance is striking. The S.820 was an AC only FM tuner that included a small mains transformer in its power supply, whereas the S.870 series were AC/DC sets designed to be used both on board vessels with DC supplies or on domestic (AC or DC) mains (110-250v) – however, by the time this set hit the market there were few DC mains supplies still in existence... so, its not that a transformer could not have been fitted in a set of this size, but that the DC operating capability was needed for the shipboard use (and it did save a few 'bob' at the same time of course).

The original S.870 (photo, below) had four wavebands, one covering 150kHz-380kHz and three covering 540kHz to 18MHz using a simple 5 valve



The S.870A's simple control panel – note the five wavebands and the 'reverse' tuning

THE SEARCH FOR A NEW MARKET

"In 1955 Arthur Edwards, Eddystone's Sales Director, summoned a meeting with Harold Cox, Technical Director, and myself, Chief Engineer. He was troubled by the Sales Figures, which showed a distinct dip. He suggested that we needed to create a new market with a universal 'midget receiver'.

"The idea of a mini-set based on the 820's front panel was born. At the time research had started on what was to become the 880 super-model (of which more later) and Harold was loath to divert effort from the project.



"The result was that the 870 was designed over the course of about twenty weekends.

"When there was a job to be done at Eddystone the clock went out of the window. But the final problem was deciding the colour to paint it!



An S.870 – note only 4 wavebands on this ‘baby’

other ‘baby’ Eddystone sets, sport the small version of the superlative Eddystone slide rule dial with its precision vernier logging scale, based on the No. 858 dial mechanism – albeit having the tuning ‘reversed’, ie. the lower frequencies at the right hand side of the scale on each band. The later S.870A was similar in construction and appearance, but had five wavebands (see photo on previous page), one covering 150kHz-380kHz and four covering 510kHz to 24MHz. A total of 3,010 S.870’s and some 4,050 S.870’s were produced according to the QRG.

That ‘Dinky’ Case

One outstanding feature of these sets is that they were produced in several ‘liveries’, including ‘plain’ two-tone grey (as per many of the MkII case sets of the

870As

For a while I had just the two. Since the NEC I have acquired another, so that makes three. Two are variations of Green, a darker green and a pretty light ‘pea-green’, and the other is a maroon one.

All very nice lookers, all workers that I enjoy firing up, and they make a nice contrast with the various alien broadcast sets that I own. I saw a nice metallic brown one at the NEC but by then I had spent all of my pocket money and the ‘piggy bank’ machine would not give me any more that day, still I came home with two sets more than I had intended buying !!!

circuit (frequency changer, IF, detector/AGC, AF and rectifier), with an IF of 465kHz.

Controls were simply band change, tuning and volume – no BFO was provided.

The set did however, in common with the

PUT IT TO THE VOTE . . .

“Several of the development models were sprayed in garish colours: pea green, yellow, red, blue . . . and maroon.

“This was Harold Cox’s favourite and declared that an election would take place the next day among the assembly workers to choose the colour of the production version.

“He then passed between the girls on the assembly line murmuring the virtues of discrete colours. And guess what? The maroon won by a clear margin! Harold was tickled pink and production got under way.

“Discussions took place with Cunard and Royal Mail Lines to equip all new liners with an 870 in every cabin, not just the first-class. An international advertising campaign was mounted to sell the set to the general public, based on the quality of the product. Our agent in Coventry sold one to a customer who complained long and loud that the 870 was the worst set he’d ever had! We offered to change it for a new one but that only incensed the customer even more.

“He went into the store, seized an 870, threw it to the ground, jumped on it and walked off . . . I’m not sure to this day who paid for it!

“Otherwise the set went down very well, but by the early sixties customers were asking for the 13 metre DX broadcast band to be included. We couldn’t squeeze the tuning up to that so we added an extra band and called it the 870A. Harold relented and agreed to spray it British Racing Green!

1960’s), two-tone green, as well as a lovely maroon and cream (see the sidebar excerpts

from the extremely informative ‘Cooke Report, p13/14). Occasionally one of the more ‘garish’ coloured sets appears for sale – I spotted a ‘pea green’ S.870 once (though it may not have been its original livery of course...) – see also the clipping from Lighthouse Issue 79, left (courtesy of Ted Moore). These are certainly very appealing little sets on aesthetic grounds alone – an ‘industrial’ design classic in my view, though some may say I

am a little biased. What’s more, Eddystone decided to retain the so-Eddystone chrome handles of its larger brothers, thus retaining that ‘instrumentation’ quality aura. These

handles were missing on the S.820 FM tuner – maybe as a concession to those particular units being destined for the nations more discerning living rooms? The construction of the case is interesting – bear in mind that this set is an AC/DC set housed in an all-metal cabinet. This is not such a good idea really and would not ‘cut the mustard’ in today’s safety-conscious (and litigious) world – expectations were different 50 or so years ago. The problem is that the chassis can become ‘live’ with respect to ground if the set is connected to the mains incorrectly (‘live’ and ‘neutral’ connections get swapped around). To protect the user against this condition, most AC/DC sets were housed in a plastic (or wooden) cabinet, with plastic knobs on the metal control shafts and often an



Above: a ‘plain Jane’ grey-cased S.870 complete with that sometimes elusive mains lead and connector



Above: rather standard appearance of the S.870 case – note ventilation afforded by the perforated steel side panels and two rear panels (however, one of the side panels was occupied by the internal loudspeaker, so the set ran quite warm when used on 240v mains supplies due to the hard-working dropper resistor – although this unit was mounted next the other perforated side panel with an angled metal shield to the inside to assist cooling

case itself (photo, above) was as-used for AC-only MkII cased Eddystones.

The basic circuit did not change significantly through the 1959 – 1966 production run, although there were some minor tweaks noted – see the clipping from Lighthouse on the next page regarding later models.

automatic disconnect of the power supply when the case back was removed. The Eddystone AC/DC sets, including the S.870 series, relied on insulating the metal chassis from the metal case by small phenolic (‘Paxolin’) washers and having a Paxolin rear chassis panel onto which the external connections were mounted – further details of these arrangements are provided later in this article. In all other respects though the

An advertisement for the Eddystone '870' Receiver. On the right is a photograph of the receiver, a compact, boxy device with a dark faceplate and a speaker grille on the right side. To the left of the photo is the slogan "Listen to ENGLAND - or where you will - with this". Below the slogan is the text "EDDYSTONE '870' RECEIVER". To the right of the receiver photo is a block of descriptive text: "You can enjoy news and entertainment from the world wherever you may live—with this new compact Eddystone receiver. It is suitable for any climate, is tropicalised, arranged to operate on A.C. or D.C., 100/120 and 200/250 volts and is fitted with easily replaceable international valves. It has high performance 5-valve superhet circuit, 4 wave-bands (16 to 2,000 metres), smooth gear-driven tuning mechanism, clear horizontal scales, vernier logging device, keen selectivity, built-in mains filter, fine tone and ample volume. Sturdy two-tone metal cabinet, 11 by 8½ by 6½ ins. with chrome relief. This is a fine example of first-class workmanship, traditional with the name Eddystone—it is the set for YOU—the set you must HAVE." Below this text is the contact information: "PLEASE WRITE FOR DESCRIPTIVE LITERATURE AND ADDRESS OF NEAREST SUPPLIER. TELEPHONE PRIORITY 2231-1. STRATTON & CO. LTD. BIRMINGHAM 31 · ENGLAND. CABLES 'STRATNOH' BIRMINGHAM".

- Late 870A mods; -

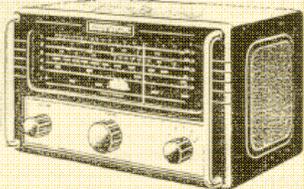
- Official type mods this, not the home-enthusiast, go faster, type. Early versions of the 870A that left the factory did not have a rear panel terminal for using the set with a gramophone pickup. DIY attempts would have come up against the AC/DC circuitry and the need to maintain complete isolation from the mains supply, can't have the 230 volts supply going through the tiny coil of the gram pickup can we now? Oh yes it could happen if the 'bodger' was a bit careless.

- The official mod that was incorporated in all 870As from about November 1963 onwards was designed to exclude just such a sadistic act. Both the earthy side and the 'live' side, or signal side, of the P.U. terminals was decoupled from chassis by a 100 pF mica condenser that was adequately rated at 350 volts DC. This mod made an already good receiver even more versatile in that it could be used with one of the add-on gramo units to play back records via the 870As AF circuitry.

So, all-in all, a very successful little set, still widely used to this day and great for broadcast band listening – although not being of any real use as a communications receiver due to its only moderate sensitivity, mediocre selectivity and lack of a BFO. Its cute looks win through every time in the visual appeal stakes though – I rest my 'case' (groan...).

**Eddystone User Group
Newsletter**
Issue No: 36 April 1996

**Featured Model:
Model 870A General Purpose Receiver**



*A non profit newsletter for Eddystones Users
*Information quoted from Eddystone Literature by kind permission of
Chris Pettitt, G0EYO, Managing Director of Eddystone Radio Limited
*Please address all mail to:
Eddystone User Group
c/o Graeme Wormald, G3GCL
13 Sabrina Drive,
Bewdley,
Worce, DY12 2RJ
Tel:01299 403372

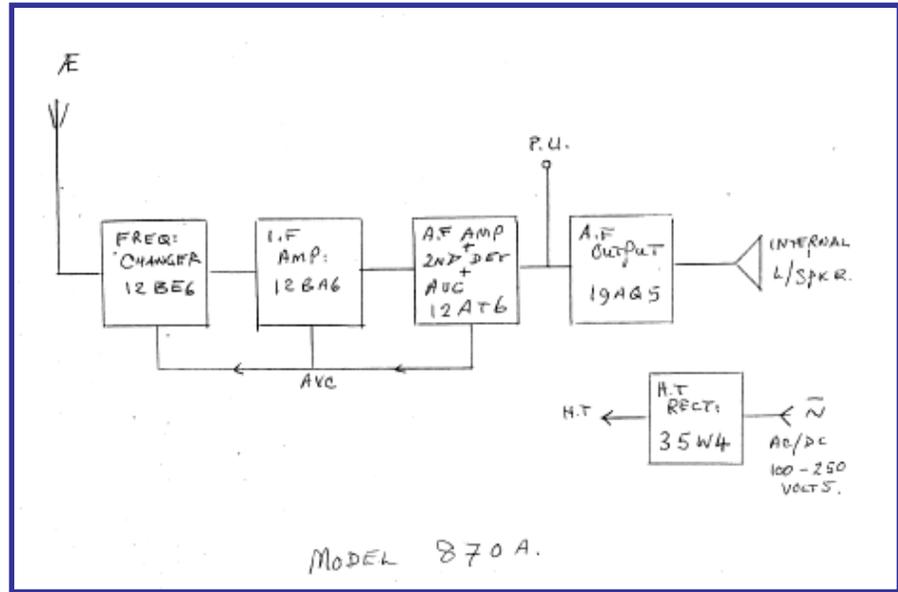
Having got that off my chest, I include some description of the S.870 series circuitry below (largely extracted from other articles of mine) as I felt folks might miss it hidden away in the 2006 'Christmas Tale' and the AC/DC Lore articles.



As Ted says in 'Lighthouse', for such a small and simple set, it generated a disproportionate amount of [Lighthouse] mail and this is reflected in the large number of entries in the Lighthouse Index, included at the end of this article for ready reference. There are many useful tips, suggestions, hints and other nuggets of information hidden in these, so please take the time to explore them...

Circuit and Construction

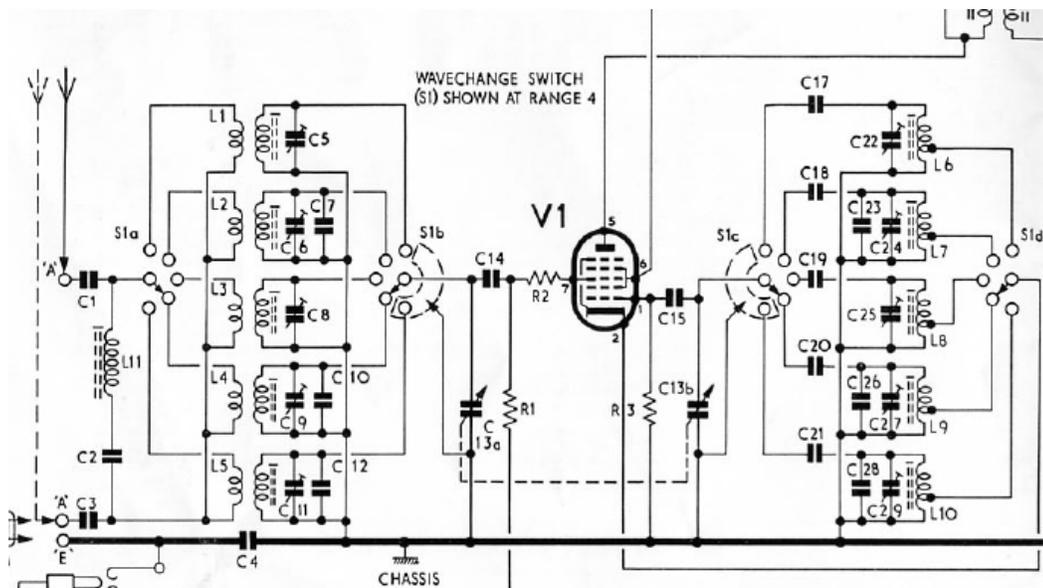
The circuit of the S.870A set was outlined in the AC/DC 'Tech Shorts' article and the full Owners Manual is appended to the end of this article. The rather simple block diagram (lifted from Lighthouse Issue 36 S.870A 'Special') is shown to the right.



Electrically, the set comprises:

- A 12BE6 (V1) mixer-oscillator front end: nothing too extraordinary in the circuit design here – an electron-coupled oscillator circuit ; the

Left: a de-cloaked S.870A – neat little feller inside isn't it? Below: front-end circuitry – note that the chassis is electrically isolated from the ground via C4



aerial and oscillator tuned circuits are switchable for the number of frequency ranges covered by S1 (in the S.870A case shown here, five) and a wave trap is present (C2, L11), designed to reject IF frequencies that may be picked up by the aerial system. However, the main thing that sets it apart from the cheaper AC/DC sets is the quality of the parts used in its construction and its careful layout, designed to allow

useful and reliable operation on short waves up to 25MHz (see underside of chassis photo, below);

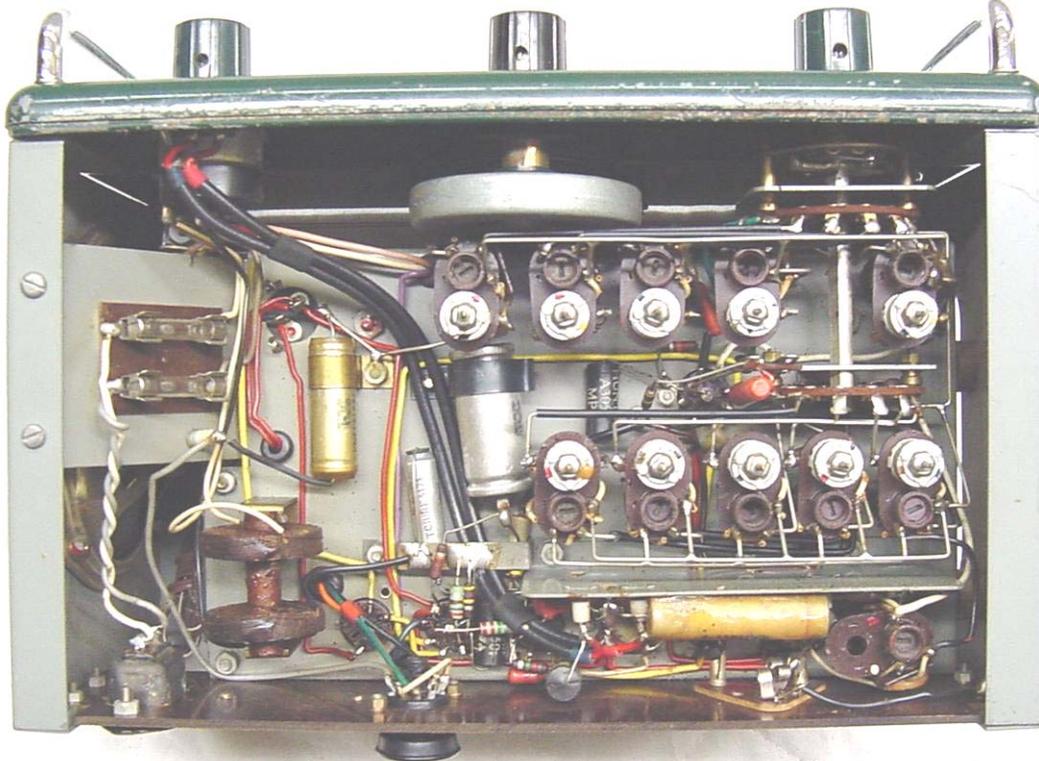
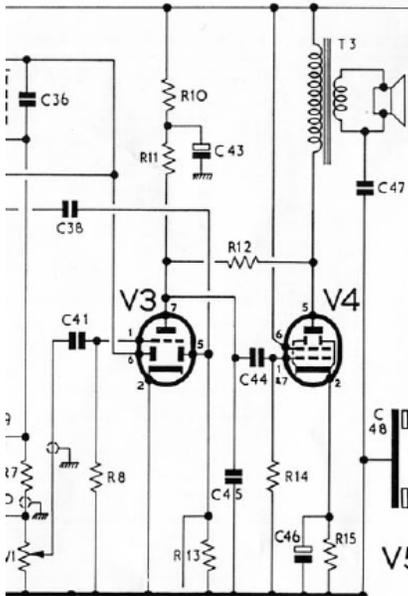
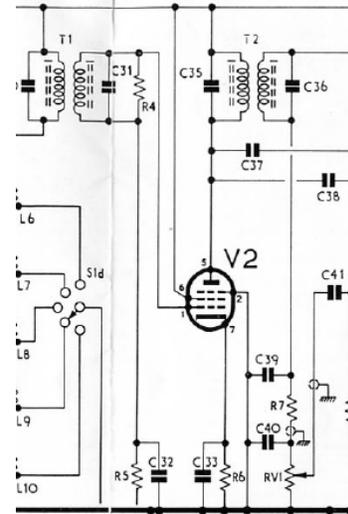
- A 12BA6 IF amplifier, V2

(figure, right): again, nothing extraordinary at all (except for the superior quality of the double-tuned IF transformers);

- A 12AT6 AM detector, AGC and 1st audio amplifier, V3 (figure, left): note that separate diodes are used for detection and AGC circuits (many low-cost sets used a single diode for

these functions);

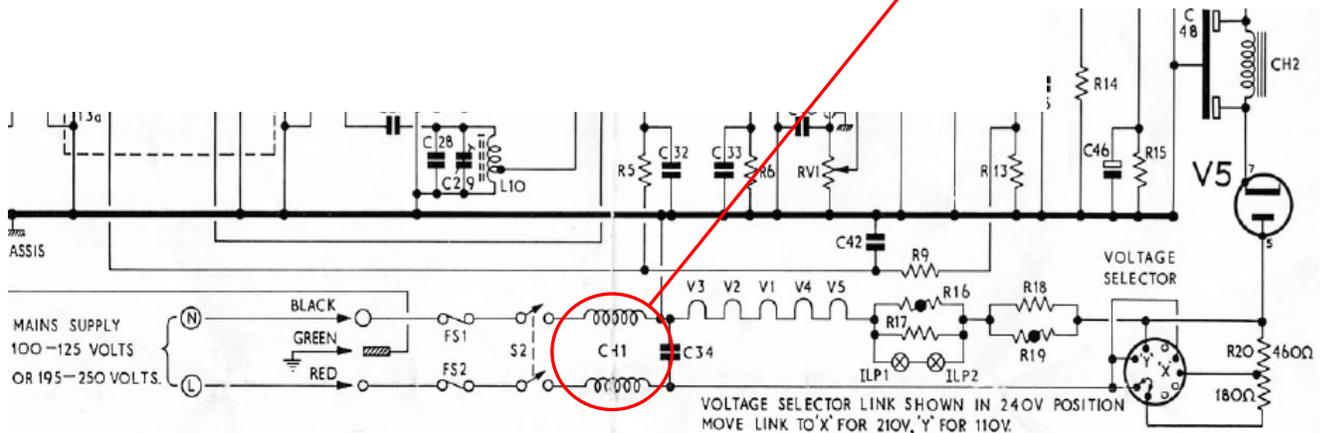
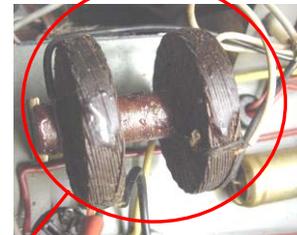
- A 19AQ5 audio output stage (V4 - photo, right) of conventional





design – though the 19A5 valve choice is a bit odd – see article in Lighthouse Issue 92, pp36 for an explanation; and

- A 35W4 half-wave rectifier (V5) in the power supply circuit (figure, below): the main improvements over a standard domestic AC/DC set's supply being the installation of an effective supply-line noise filter (highlighted below) and two thermistors, the latter providing both surge protection and a degree of HT stabilization to the set, this being desirable for improved oscillator stability when the set was used on its higher frequency ranges (up to 25MHz in the S.870A).
- The set designers went to some length to ensure that the chassis was electrically isolated from the case for



safety reasons. This was done by:

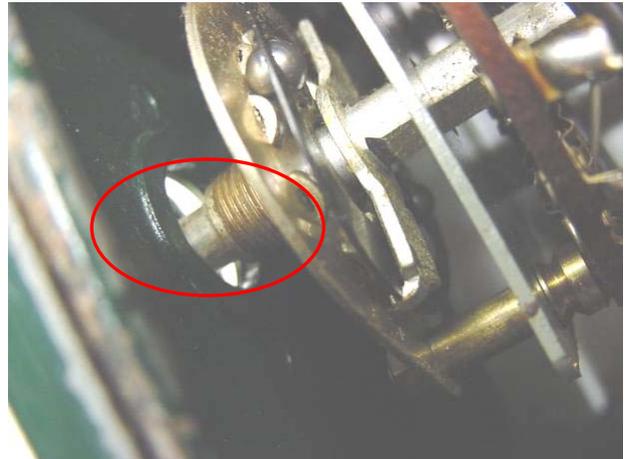
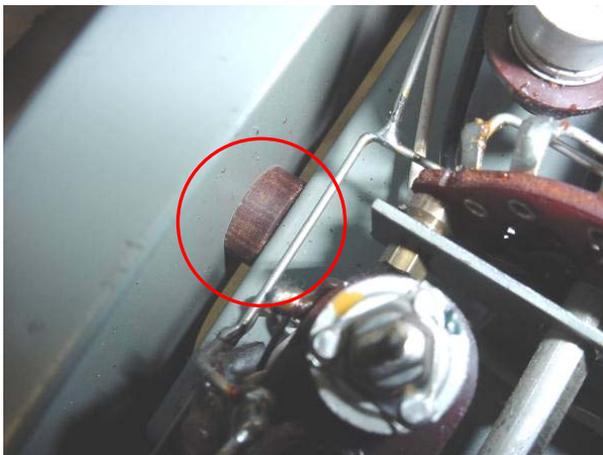
- Installing a Paxolin rear panel - on this are mounted the power socket, voltage selector and the aerial/ground connections (photo, above);

- Placing a strip of Paxolin under the metal plate supporting the fuseholders to one side of the chassis (photo, right);
- Installing two Paxolin insulating washers on the opposite side of the chassis (photo, below left); and
- Ensuring that the control knob shafts did not contact the front panel, the shafts being insulated from the owners fingers by the plastic control knobs (photo, below right).



Although housed in a 'miniature' case, the quality of the tuning mechanism, chassis, front panel, outer case and other components used in the S.870 series were of the usual Eddystone high standard. Thus many of these sets are still in use today and the more unusual and rarer liveried ones have become very 'collectible' for their aesthetic appeal.

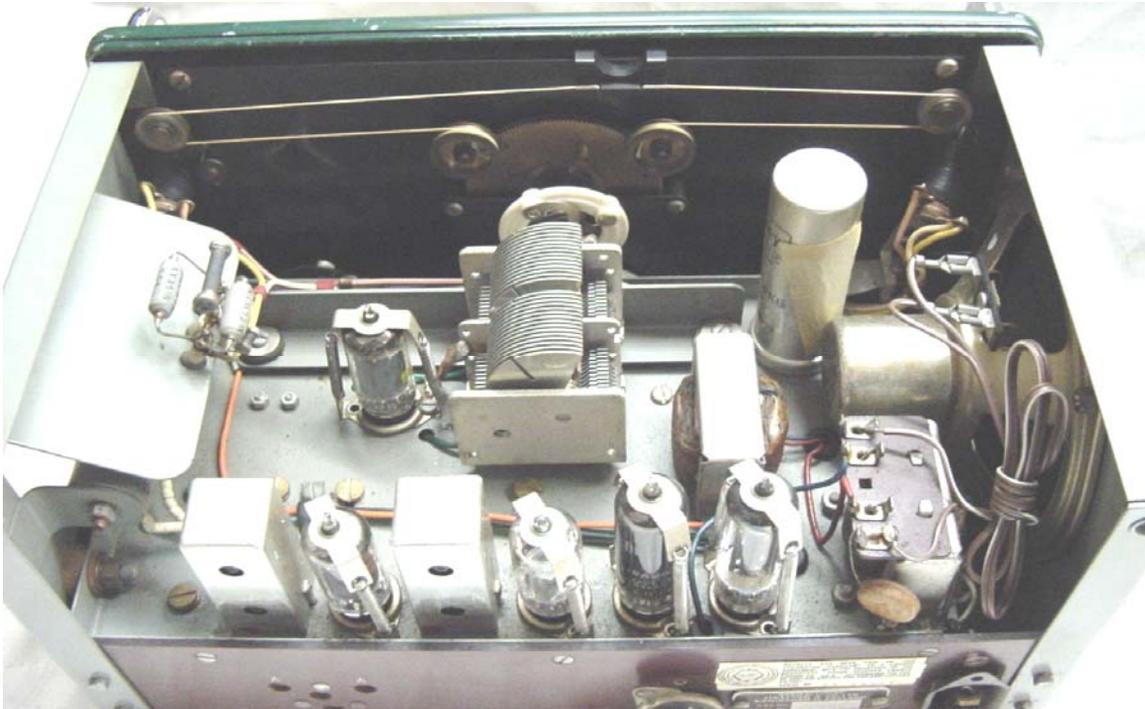
© Gerry O'Hara, G8GUH/VE7GUH, Vancouver, BC, Canada, February, 2008



Above left: Paxolin insulating washer between the chassis and inner case sides; Above right: Band change switch shaft isolated from front panel

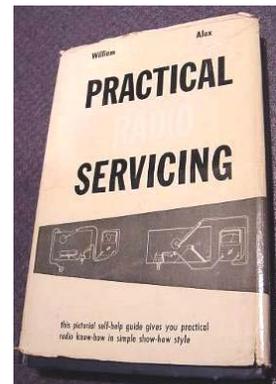


The mains dropper (ballast), R20, switched into the power supply circuit on 210v and 240v supply positions



Some Useful References

- The S.870A manual downloaded from the EUG web site (attached) and various articles in Lighthouse (listed below)
- 'Eddystone Christmas Tale' (can be downloaded from the EUG site)
- 'Eddystone AC/DC Set Lore' (can be downloaded from the EUG site)
- 'Use of an Eddystone '898' Drive Unit in an HBR 13C Homebrew Receiver' (can be downloaded from the EUG site)
- Practical Radio Servicing, W Markus and A Levy, 1st Ed. 1955 (this book is devoted entirely to servicing AC/DC radios – all 559pp of it! – this type of radio was just so prevalent in those days...)
- Radio Servicing Made Easy, L.C. Lane, Vol. 2, 1962, (esp. Ch.s 6 & 10, a figure reproduced in this article)
- Elements of Radio Servicing, W Markus and A Levy, 1955 (2nd Ed. esp. Ch. 18)
- Profitable Radio Troubleshooting. W. Marcus and A Levy, 1956
- Radio and Television Receiver Troubleshooting and Repair, Ghirardi & Johnson, 1952, (esp. Ch. 7, some figures reproduced in this article)
- Radio and Television Receiver Circuitry and Operation, Ghirardi & Johnson, 1951 (esp. Ch. 10)
- Radio and Audio Servicing Handbook, G.K. King, 2nd Ed., 1970 ('Procedure Charts' #1 to #3 reproduced in this article)
- <http://www.qth.at/oe7opj/eddystone/index.html>



References to the 870/870A sets in 'Lighthouse':

870

advert	52.....	15
Strattons.....	59.....	33
Antarctic, used in (Peter Chisholm).....	59.....	32
bfo, fitting of	17.....	12
brief description	30.....	7
choke, burnt out.....	22.....	5
condenser, faulty	14.....	11
deafness, possible causes	67.....	10
fault, elusive	66.....	7
featured receiver	24.....	3
full specifications	84.....	30
IF core problem	83.....	19
i.f. rejection circuit.....	16.....	15
mobile use (Austin A40)	23.....	20
models acquired (Ted Moore)	79.....	15
modifications, factory, late models	40.....	26
owned by US member	48.....	4
overheating, rectifier.....	8.....	3
prototype found ?	66.....	8
reception, improving	49.....	3
restoration	22.....	13
.....	24.....	7
.....	25.....	9
.....	46.....	19
.....	47.....	16
Dick King.....	41.....	9
after transistor conversion	23.....	11
Roger Bebbington	82.....	10i
scale reversed on these models.....	75.....	10
signals, lack of.....	14.....	12
transistor conversion, inferiority of.....	25.....	14
valves		
number, early sets.....	50.....	31
rectifier, failure.....	47.....	3
used	25.....	18
comments on (Ross Paton).....	91.....	7
19AQ5 valve, discussion (Peter Lankshear)	92.....	36

870A

acquired (Ted Moore).....	70.....	17
advert	52.....	31
audio, distorted	35.....	13
brief description	30.....	7
broadcast reception, transatlantic	34.....	11
condenser, electrolytic, failure of.....	42.....	10
drifting, cured.....	90.....	24
dropper resistor, replaced by transformer	56.....	5
eBay	93.....	26
.....	86.....	26
.....	86.....	39
.....	90.....	16
fault, intermittent (dry joint).....	13.....	4

870A (cont)

featured receiver	36.....	25
in use	40.....	17
.....	62.....	8
isolation transformer mod.....	71.....	13
modifications		
mains transformer	88.....	59
to improve (Andy).....	41.....	3
output transformer, substitute.....	21.....	8
power supply details.....	90.....	32
QRM, eliminates	90.....	21
realignment, aerial tuning stage	12.....	13
receiving ssb signals	74.....	11
rejuvenated by Ted Moore	76.....	11
reliability & general comments	46.....	1
resistors replaced	53.....	12
restoration	7.....	7
.....	29.....	9
.....	41.....	27
selectivity improvement mod.....	31.....	22
ssb reception mod	32.....	7
valve failure	94.....	44
.....	94.....	48
WVS, obtained from	28.....	10



Above An S.870A next to a (slightly worse-for-wear and modded/bits missing) EC10 MkI - note that the S.870A is significantly smaller than its younger and solid state sibling





EDDYSTONE

MODEL "870A" RECEIVER

Introduction

The EDDYSTONE Model 870A is a high performance receiver designed primarily for personal use in situations calling for compactness and wide coverage. The receiver tunes the long, medium and short wave bands, has an internal loudspeaker and may be operated from any standard AC or DC mains supply. Ease of tuning is assured by the gear driven drive mechanism which is provided with a vernier bandspread device for accurate station logging. Troublesome mains borne interference is reduced to a minimum by an extremely efficient internal filter circuit not normally found in receivers of this type.

The receiver may be used in all areas regardless of climatic conditions and this feature together with the small size of the unit makes it particularly suited for cabin use aboard ship.

The five frequency ranges are as follows :—

Range 1	..	7.5 Mc/s. to 24 Mc/s.	(40 to 12.5 metres).
Range 2	..	3.2 Mc/s. to 7.5 Mc/s.	(93.9 to 40 metres).
Range 3	..	1.3 Mc/s. to 3.5 Mc/s.	(230.7 to 85.7 metres).
Range 4	..	510 kc/s. to 1400 kc/s.	(588.2 to 214.3 metres).
Range 5	..	150 kc/s. to 380 kc/s.	(2000 to 789.4 metres).

INSTALLATION

MAINS VOLTAGE ADJUSTMENT. The Model 870A may be operated equally well from either AC or DC mains supplies, but before making connection to the supply it is important to check that the voltage selector at the rear of the unit is adjusted to suit the mains voltage.

When despatched from the factory, the selector is placed in the 240 volt position which is correct for operation from AC or DC supplies in the range 230 to 250 volts. If the local mains voltage is in the range 200/230 volts, the selector (which is a captive plug) should be pulled forward and then rotated until the "210" marking is opposite the dot on the backplate. Pushing home the selector will now link the appropriate socket connections. The "110" position is suitable for supplies in the range 100 to 125 volts.

EARTHING. The method of earthing the receiver will depend on whether the unit is supplied from a two-pin or a three-pin mains socket. In the case of the latter, the earth is made by means of the green wire connected to the thick pin of the mains plug. If a two-pin connector is used, a good reliable earth must be connected to the earth plug which mates with the socket "E" at the rear of the receiver.

NOTE : When earthing is via a three-pin plug, the earth plug ("E") must be in position even though there will be no lead connected to it. This is necessary to complete the internal chassis earth.

CONNECTION TO THE MAINS. In order to simplify installation of the Model 870A, the mains input is taken to a small socket at the rear, so that should the lead provided prove too short, a longer length may be fitted without the need for jointing or making connections within the receiver itself. In most cases the normal lead will be of adequate length, its free end being left so that the user may fit a plug of a type suitable for connection to the local mains supply. When it is necessary to fit a two-pin plug in lieu of the more usual three-pin type, the green lead should be cut off short and then pushed back into the sleeving of the cable. With three-pin plugs the green lead should be connected to the thick pin.

Assuming that the wiring of the **supply socket** is correct, then the red lead should be connected to the plug pin that engages with the right-hand socket of the wall fitting. If the latter is wired incorrectly (as is occasionally the case) it may be necessary to reverse the red and black leads when the receiver is first tested. On DC mains supplies for example, the receiver will not function if these leads are the wrong way round. When an AC supply is used the receiver will function with the leads either way round, but one method of connection may result in a hum appearing in the output. If this is the case, reversal of the connections will clear the trouble.

THE AERIAL. Although numerous signals can be received with but a short length of wire "draped round the picture rail," far better results will be obtained if some thought is given to the installation of a more ambitious aerial.

Any length up to some 30 feet or so will be suitable and this should be erected well clear of obstructions taking care to keep the lead-in portion reasonably short. If it is not possible to attain a height exceeding 15 feet, the length may be increased (possibly to 50 feet) to compensate for the lowness of the aerial. Height rather than length however, is the main objective if really good results are to be obtained.

When the installation is on board ship any metalwork will have a marked effect on the performance of the aerial and every endeavour should be made to keep clear of rails, deckhouses, ventilators, etc.

Single wire aerials are connected to the socket marked "A" by means of the plug provided. The shorting plug must be in position when using unbalanced aerials of this type.

In installations suffering from direct pick-up of local interference, the simplest solution is

to use a dipole aerial which is of "T" formation and has a twin lead-in. The advantages of this type of aerial are that the lead-in does not act as a pick-up source, can be of any length and may be run close to obstructions without affecting the performance of the aerial proper. This means that the aerial itself (the top portion of the "T") can be placed clear of obstructions and noise sources so giving a definite improvement in reception. A disadvantage of the dipole is that its length determines the frequency band over which optimum results will be obtained.

To connect a dipole aerial to the Model 870A, merely remove the shorting plug and connect the two feeder wires to the two sockets marked "A."

The Model 870A is an extremely sensitive receiver and it is inadvisable to use too long an aerial or trouble may be experienced with overloading especially from strong local medium and long wave stations.

OPERATION

The receiver is switched on by rotating the volume control (left-hand side of panel) in a clockwise direction. A short period of time will elapse during which the dial lamps will illuminate the scale and then the receiver will become fully operative.

The right-hand knob selects the appropriate waveband as indicated by the figures at the left-hand end of the tuning scales. Tuning is by means of the centre knob. This control has a fine balance and the smoothness of tuning will be found a valuable asset when selecting stations on the short wave bands.

Volume is controlled by the knob at the left-hand side of the panel and adequate volume is available for listening in a normal sized room.

The mechanical bandspread scale in the centre of the main scale is read in conjunction with the lowest straight line scale to provide scale readings of great accuracy for station logging.

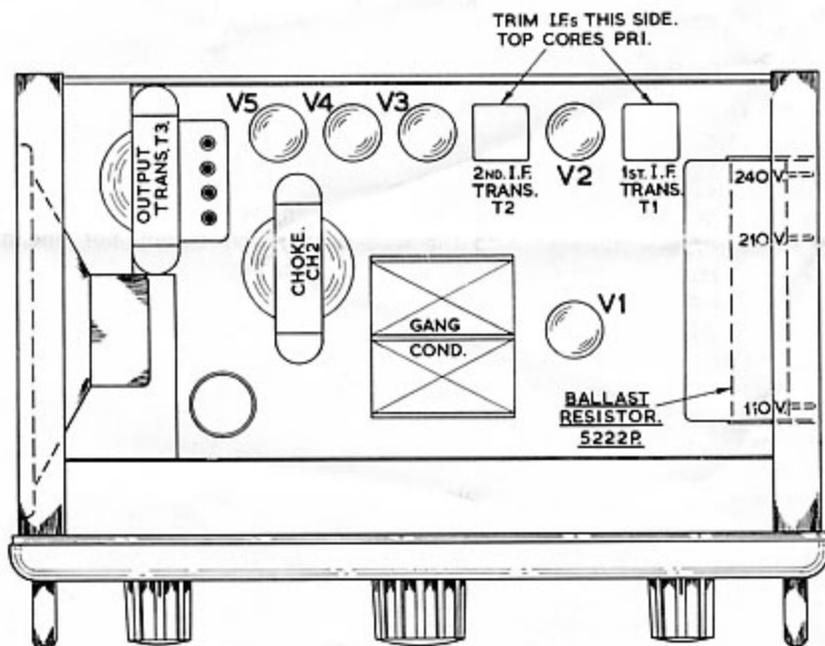


Fig. 1. Plan view of the "870A" receiver showing location of valves and major components.

SERVICING INSTRUCTIONS

Caution. The Model 870A is a Universal type and great care should be exercised when carrying out tests with the cabinet removed. When running from AC supplies it is advisable to ensure that the chassis is connected to the neutral pole of the supply. Alternatively, an isolation transformer may be used to feed the receiver.

Should the receiver fail in operation, first check that all external connections are correctly made and also that mains voltage is available at the supply point. Next check the fuses. These are fitted internally, but the cabinet is easily removed after taking out the four screws at the rear. Any slight difficulty experienced in freeing the cabinet from the panel can be overcome by applying leverage to the slots on the underside.

The two fuses are located beneath the chassis on a small insulated panel adjacent to the volume control and are standard $\frac{1}{2}$ Amp. cartridge type. Visual inspection will reveal whether or not they have failed.

Assuming a blown fuse is changed and the replacement burns out immediately, it is an indication that some component has broken down. In this case the receiver should be taken to the nearest EDDYSTONE agent who will rectify the trouble at a reasonable charge.

Should it be necessary to take the receiver to an engineer who is not familiar with EDDYSTONE equipment, take this instruction sheet with the set. It contains information that will be of value to the engineer and may enable him to clear the fault more rapidly than would otherwise be the case.

CIRCUIT DESCRIPTION.

The Model 870A is a superhet receiver employing modern miniature type valves. Size has been kept to a minimum by omitting an RF Stage, but the performance is maintained at a high level by means of the carefully designed coil unit associated with the Frequency Changer. The Local Oscillator is of the electron coupled type and the Mixer is followed by a single stage of IF amplification at 465 kc/s. Detection is provided by one diode of V3 while the other diode functions as the AGC Rectifier, this being fed direct from the anode of V2 via the coupling capacitor C38. The triode portion of V3 is fed from the volume control (RV1) and functions as the Audio Amplifier driving the Audio Output Stage V4.

The power supply is quite conventional, thermistors being included to protect the series connected valve heaters from the surge at switch-on and also to maintain the correct heater current in the event of the dial lamps going open-circuit.

OSCILLATOR TRACKING FREQUENCIES AND ADJUSTMENTS.

Range	Trimming Frequency	Trimmer	Padding Frequency	Core
1	22 Mc/s.	C22	8 Mc/s.	L6
2	7.5 Mc/s.	C24	3.3 Mc/s.	L7
3	3.5 Mc/s.	C25	1.35 Mc/s.	L8
4	1350 kc/s.	C27	550 kc/s.	L9
5	350 kc/s.	C29	160 kc/s.	L10

NOTE : The oscillator tracks on the "high" side of the signal. On Ranges 1 and 2 it may be possible to find two tuning points with trimmer and core. That occurring with minimum C or L is the correct one.

Once the dial calibration has been checked, it is in order to proceed with alignment of the aerial input circuits.

The signal generator should be connected to the Aerial/Earth sockets via a suitable dummy aerial, or, where this is not available, via a 400 ohm, non-inductive resistor. Isolation capacitors should be connected in series with both generator leads, a 1 Megohm resistor being wired directly across the Aerial/Earth sockets.

Tune to the frequencies given in the Table below and adjust the appropriate trimmers and cores for maximum reading in the output meter.

AERIAL INPUT ALIGNMENT FREQUENCIES AND ADJUSTMENTS.

Range	Trimming Frequency	Trimmer	Padding Frequency	Core
1	22 Mc/s.	C5	8 Mc/s.	L1
2	7.5 Mc/s.	C6	3.3 Mc/s.	L2
3	3.5 Mc/s.	C8	1.35 Mc/s.	L3
4	1350 kc/s.	C9	550 kc/s.	L4
5	350 kc/s.	C11	160 kc/s.	L5

IF REJECTOR CIRCUIT.

An IF Rejector circuit is placed across the input circuit to minimise breakthrough at the intermediate frequency. To check, a modulated signal at 465 kc/s. is applied from the signal generator across the Aerial/Earth sockets and the core in L11 is then adjusted until the output meter reading is at a **minimum**.

RE-ALIGNMENT : GENERAL.

Close tolerance capacitors and precision wound coils are employed in the IF and Oscillator Stages so that the initial factory alignment will hold good for a long period of time. Trimming adjustments should not be tampered with unless the symptoms clearly indicate that re-alignment is in fact required.

The instructions given below are for initial alignment and are given in full for the convenience of the service engineer. In most cases only minor adjustments will be necessary to compensate for ageing of components.

RE-ALIGNMENT OF THE IF TRANSFORMERS.

First disable the local oscillator by shorting out the forward section of the tuning gang. Set the range switch to 5, volume at maximum and connect the signal generator output across the rear section of the gang. Adequately rated blocking capacitors (0.01 mfd. capacity) should be connected in series with each lead from the generator. Disconnect the internal speaker and connect an output meter (matched to 2.5 ohms.) to the secondary of the output transformer T3.

After allowing a ten minute warming up period, tune the generator to 465 kc/s. with modulation at a depth of 30% (400 c/s.). Adjust the attenuator for a convenient output reading and then peak the cores of T1 and T2 for maximum reading in the meter. An insulated trimming tool should be used and the EDDYSTONE Cat. No. 122T will be found eminently suitable. Increase the attenuation as the alignment proceeds and ensure that on completion a sensitivity of less than 90 microvolts for a 50 milliwatt output is obtained. If it is not possible to achieve this figure, replacement of V2 may effect some improvement.

Having completed the IF alignment, disconnect the test equipment from the receiver, remove the short from the gang and reconnect the internal speaker.

RF ALIGNMENT.

The first step in the alignment of the RF Section of the receiver is a check on the accuracy of the dial calibration to ascertain whether or not any adjustments are required in the oscillator stage. Such a check is best carried out by using a modulated crystal controlled harmonic generator since the calibration accuracy of the average signal generator—being of the order 1%—2%— is inferior to the accuracy required. At least three spot frequencies should be checked on each range, the oscillator tracking being corrected if necessary as detailed below.

With the standard signal introduced at the Aerial/Earth sockets and an output meter connected across the speaker to give a visual indication of the correct tuning point, set the receiver dial to the trimming frequency applicable to the range in use (see Table at head of next column). Tune in the standard by means of the appropriate trimmer and then alter the receiver dial to the padding frequency. Tune in the standard by means of the oscillator core and re-check the trimming frequency, making any readjustments that may be necessary due to interaction between the trimmer and core.

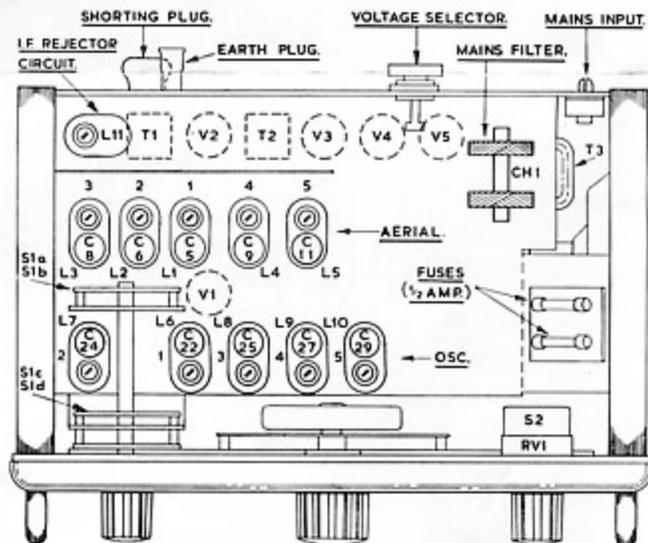


Fig. 2. Location of trimming adjustments and major components on the underside of the B70A receiver.

VALVE TYPES

V1	..	..	..	..	..	12BE6
V2	..	..	..	..	..	12BA6
V3	..	..	..	..	..	12AT6
V4	..	..	..	..	..	19AQ5
V5	..	..	..	..	..	35W4

TABLE OF VOLTAGE VALUES.

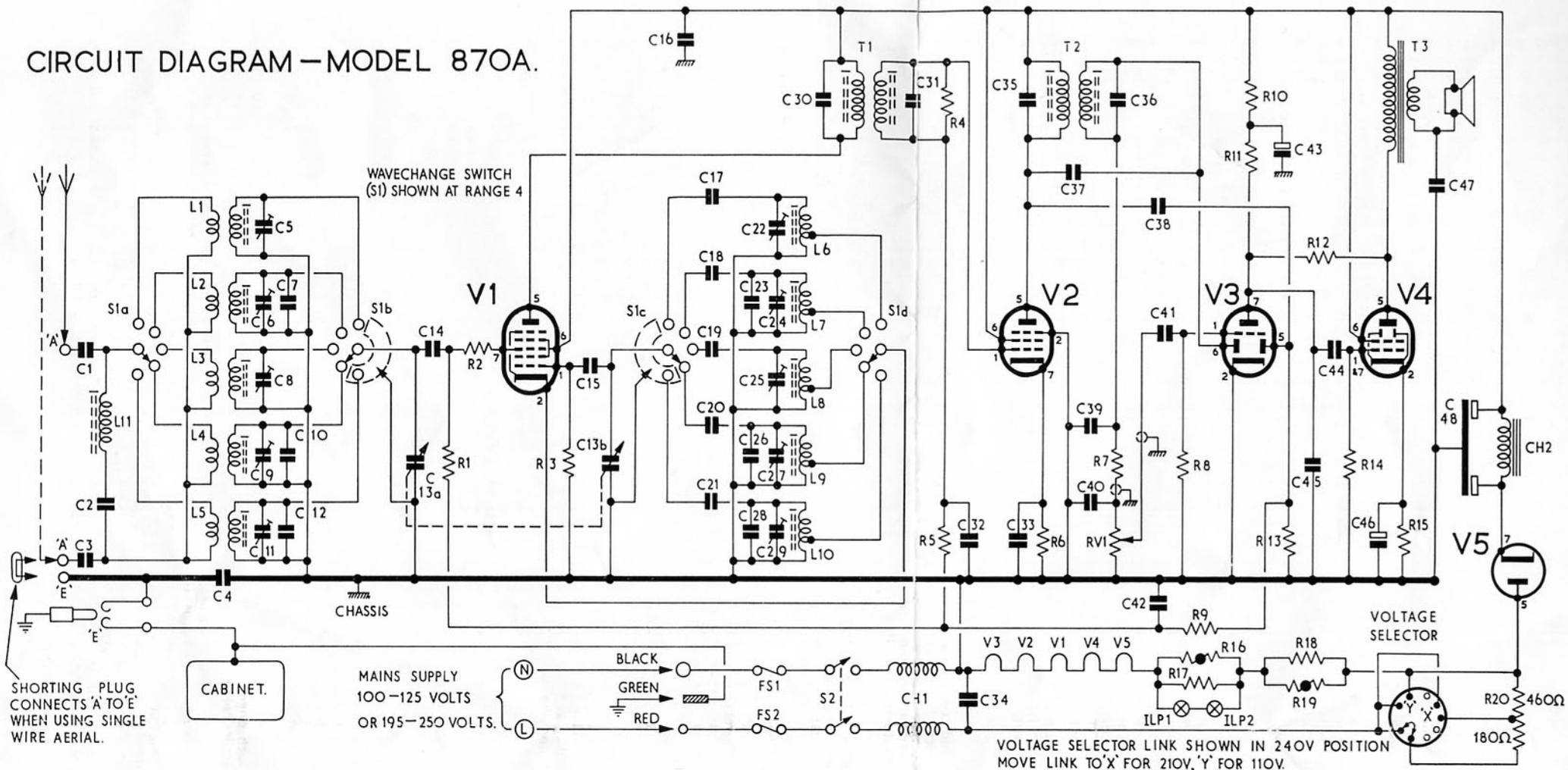
Valve	Anode	Screen	Cathode
V1	100/93	101/94	—
V2	100/93	101/94	0.65/0.5
V3	43/30	—	—
V4	98/95	101/94	4/3.7
V5	115/110*	—	105/98

*AC. All other readings are DC and are taken between the point indicated and chassis. Readings are substantially correct for any applied mains voltage.

In each case, the first reading is that obtained using a meter of 20,000 ohms. per volt; the second 600 ohms. per volt. A variation of $\pm 5\%$ should be allowed.

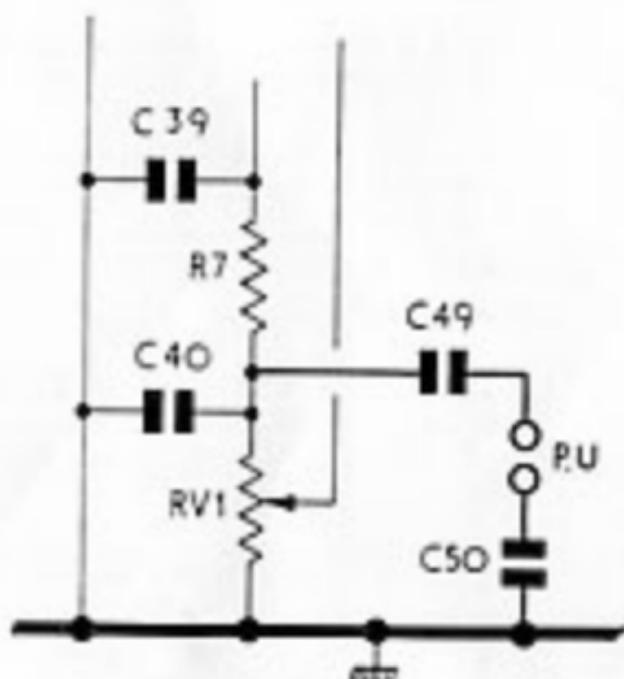
Readings taken on Range 5 with volume at maximum and aerial input earthed, i.e. no signal conditions.

CIRCUIT DIAGRAM—MODEL 870A.



COMPONENT VALUES

CAPACITORS.			RESISTORS.		
<p>C1 ... 1800 pf. Ceramic $\pm 80\%$—20% 1250V. Peak wkg.</p> <p>C2 ... 200 pf. Mica $\pm 5\%$ 350V. DC wkg.</p> <p>C3 ... 1800 pf. Ceramic $\pm 80\%$—20% 1250V. Peak wkg.</p> <p>C4 ... 0.01 mfd. Paper $\pm 20\%$ 600V. RMS wkg.</p> <p>C5 ... 3-33 pf. Air Trimmer.</p> <p>C6 ... 3-33 pf. Air Trimmer.</p> <p>C7 ... 25 pf. Mica $\pm 10\%$ 350V. DC wkg.</p> <p>C8 ... 3-33 pf. Air Trimmer.</p> <p>C9 ... 3-33 pf. Air Trimmer.</p> <p>C10 ... 20 pf. Mica $\pm 10\%$ 350V. DC wkg.</p> <p>C11 ... 3-33 pf. Air Trimmer.</p> <p>C12 ... 10 pf. Mica $\pm 10\%$ 350V. DC wkg.</p> <p>C13 ... 2-gang air spaced variable. 13-446 pf. each section.</p> <p>C14 ... 200 pf. Ceramic $\pm 20\%$ 350V. DC wkg.</p> <p>C15 ... 100 pf. Ceramic $\pm 20\%$ 350V. DC wkg.</p> <p>C16 ... 0.01 mfd. Paper $\pm 20\%$ 350V. DC wkg.</p>	<p>C17 ... 4400 pf. Mica $\pm 1\%$ 350V. DC wkg.</p> <p>C18 ... 2000 pf. Mica $\pm 1\%$ 350V. DC wkg.</p> <p>C19 ... 680 pf. Mica $\pm 1\%$ 350V. DC wkg.</p> <p>C20 ... 440 pf. Mica $\pm 1\%$ 350V. DC wkg.</p> <p>C21 ... 200 pf. Mica $\pm 1\%$ 350V. DC wkg.</p> <p>C22 ... 3-33 pf. Air Trimmer.</p> <p>C23 ... 20 pf. Mica $\pm 10\%$ 350V. DC wkg.</p> <p>C24 ... 3-33 pf. Air Trimmer.</p> <p>C25 ... 3-33 pf. Air Trimmer.</p> <p>C26 ... 20 pf. Mica $\pm 10\%$ 350V. DC wkg.</p> <p>C27 ... 3-33 pf. Air Trimmer.</p> <p>C28 ... 50 pf. Mica $\pm 10\%$ 350V. DC wkg.</p> <p>C29 ... 3-33 pf. Air Trimmer.</p> <p>C30 ... 100 pf. Mica $\pm 2\%$ 350V. DC wkg.</p> <p>C31 ... 100 pf. Mica $\pm 2\%$ 350V. DC wkg.</p> <p>C32 ... 0.05 mfd. Paper $\pm 20\%$ 250V. DC wkg.</p> <p>C33 ... 0.05 mfd. Paper $\pm 20\%$ 250V. DC wkg.</p> <p>C34 ... 0.05 mfd. Paper $\pm 20\%$ 500V. DC wkg.</p> <p>C35 ... 100 pf. Mica $\pm 2\%$ 350V. DC wkg.</p> <p>C36 ... 100 pf. Mica $\pm 2\%$ 350V. DC wkg.</p>	<p>C37 ... 1 pf. Mica $\pm 1\%$ 350V. DC wkg.</p> <p>C38 ... 2) pf. Mica $\pm 10\%$ 350V. DC wkg.</p> <p>C39 ... 10) pf. Mica $\pm 10\%$ 350V. DC wkg.</p> <p>C40 ... 10) pf. Mica $\pm 10\%$ 350V. DC wkg.</p> <p>C41 ... 0.05 mfd. Paper $\pm 20\%$ 250V. DC wkg.</p> <p>C42 ... 0.05 mfd. Paper $\pm 20\%$ 250V. DC wkg.</p> <p>C43 ... 4 mfd. Electrolytic 350V. DC wkg.</p> <p>C44 ... 0.05 mfd. Paper $\pm 20\%$ 250V. DC wkg.</p> <p>C45 ... 20) pf. Mica $\pm 5\%$ 350V. DC wkg.</p> <p>C46 ... 30 mfd. Electrolytic 15V. DC wkg.</p> <p>C47 ... 180) pf. Ceramic $\pm 80\%$—20% 1250V. Peak wkg.</p> <p>C48 ... 32+32 nfd. Twin Electrolytic 350V. DC wkg.</p>	<p>R6 ... 68 ohms. $\pm 10\%$ $\frac{1}{2}$ watt.</p> <p>R7 ... 22,000 ohms. $\pm 10\%$ $\frac{1}{2}$ watt.</p> <p>R8 ... 8.2 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.</p> <p>R9 ... 0.47 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.</p> <p>R10 ... 22,000 ohms. $\pm 10\%$ $\frac{1}{2}$ watt.</p> <p>R11 ... 0.47 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.</p> <p>R12 ... 2.2 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.</p> <p>R13 ... 0.47 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.</p> <p>R14 ... 0.47 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.</p> <p>R15 ... 270 ohms. $\pm 10\%$ $\frac{1}{2}$ watt.</p> <p>R16 ... Thermistor Type CZ3. Res. at max. current (0.2A) 35 ohms.</p> <p>R17 ... 330 ohms. $\pm 10\%$ 6 watt wirewound.</p> <p>R18 ... 1500 ohms. $\pm 10\%$ 6 watt wirewound.</p> <p>R19 ... Thermistor Type CZ2. Res. at max. current (0.3A) 38 ohms.</p> <p>R20 ... Ballast Resistor. 640 ohms. tapped at 180 ohms.</p> <p>RV1 ... AF Gain. 0.5 Megohm carbon. (double pole switch).</p>		



This receiver is now provided with "Pick-up" sockets which allow it to be used as an amplifier in conjunction with a standard high impedance gramophone unit.

The diagram shows the circuit addition involved and the values of the extra capacitors are as follows :

C49 0.01 mfd Ceramic
 $\pm 25\%$ 500V DC wkg.

C50 0.02 mfd Ceramic
 $\pm 25\%$ 500V DC wkg.

External connections should be made with screened cable terminated in suitable plugs. The screening should be connected to the left-hand socket.

DIAL LAMPS

The dial lamps are 5V M. E. S. types rated at 0.15 Amps. Stratton Part No. is 6484P.

TRANSFORMERS.

T1 ... 1st IF Transformer.
 T2 ... 2nd IF Transformer.
 T3 ... Output Transformer 5267P.

CHOKES.

CH1 ... Mains Filter. D2024.
 CH2 ... Smoothing. 5268P.

INDUCTANCES.

L1	...	Aerial coil Range 1.	D2453.
L2	...	" " " 2.	D2455.
L3	...	" " " 3.	D2457.
L4	...	" " " 4.	D2459.
L5	...	" " " 5.	D2264.
L6	...	Oscillator coil Range 1.	D2454.
L7	...	" " " 2.	D2456.
L8	...	" " " 3.	D2458.
L9	...	" " " 4.	D2460.
L10	...	" " " 5.	D2265.
L11	...	IF Rejector coil.	D2266.

SALES AND SERVICE DEPOTS FOR EDDYSTONE "870A" RECEIVERS

Port of London :

WEBB'S RADIO
14, Soho Street, London, W.1.
Telephone : Gerrard 2089

Tilbury Area :

G. T. WILSON
12 Queen Street, Gravesend
Telephone : 4194

North Eastern Ports :

WILLINGS & Co.
73, Church Street, West Hartlepool
Telephone : Hartlepool 2668

A. L. WILLINGS & Co.
14, Marton Road, Middlesbrough
Telephone : 46205

Southampton Area :

SOUTHERN MARINE RADIO
Town Quay, Southampton
Telephone : Southampton 22721

Clydeside :

CAMPBELL & ISHERWOOD LTD.
1039/1041, Argyll Street, Glasgow, C.3
Telephone : Central 5455

Merseyside Area :

JAMES MCKENZIE LTD.
25, Oxton Road, Birkenhead
Telephone : Claughton 4833

Cardiff :

PEMBERTON & DOTCHON LTD.
35, Mount Stuart Square
Telephone : Cardiff 6507

Falmouth :

G. R. ENNOR
The Moor, Falmouth
Telephone : 321

Grimsby :

THE GREAT GRIMSBY COAL, SALT
& TANNING Co. Ltd.
Fish Dock Road,
Telephone : 5346

Swansea :

LARS KNUTSEN & SONS Ltd.
5 & 6, The Strand, Swansea
Telephone : 52412/3

Aden :

SAID AHMED O. BAZARA & BROS.
Section "A", Streets Nos. 3 & 15, Aden Camp
Telephone : 246 Cables : "Aletihad"

Australia :

R. H. CUNNINGHAM PTY. Ltd.
2-8 Bromham Place, Richmond, Melbourne, E.1
Telephone : 42 1614 Cables : "Cunnig"

29, Gibbes Street, Chatswood, Sydney
Telephone : 40 0218

43, Bowen Street, Brisbane
Telephone : 2 3755

205, Seacombe Road, Brighton, Adelaide
Telephone : 96 8755

King's Place (off King Street), Perth
Telephone : 21 2126

Bahrain :

BAHRAIN WORKSHOP, P.O. Box 404, Manama
Telephone : 3289 & 3862

Canada :

GABRIEL AERO-MARINE INSTRUMENTS Ltd.
126 Hollis Street, Halifax, N.S.
Telephone : 3-6627 & 2-4519 Cables : "Gamihaix"
Branches at North Sydney, N.S. and Saint John, N.B.

CONWAY ELECTRONIC ENTERPRISES Ltd.

1514, Eglinton Avenue West, Toronto 10, Ontario
Telephone : 787-0176 (3 lines) Cables : "Conlectron"

FREDERICK GOERTZ Ltd.

1328 West Pender Street, Vancouver 5, B.C.

Denmark :

RUDOLPH SCHMIDT A/S
P.O. Box 363, 66 NY Carlsbergvej, Copenhagen V
Telephone : Central 5165 Cables : "Schmidtusa"

Eire :

A. A. TURNEY
Beechurst, Killarney Road, Bray, Co. Wicklow
Telephone : 3267

Fiji :

STINSONS Ltd.
G.P.O. Box 240, Suva
Telephone : 3877 & 2372 Cables : "Stinstud"

Finland :

OY ASEKO AB.
Vuorikatu 22, Helsinki
Telephone : 625953 Cables : "Aseko"

Gibraltar :

MENAHM SERRUYA (1953) Ltd.
Irish House, Irish Town
Telephone : A 3347 Cables : "Serafim"

Holland :

SARNECKI-BROTHER INTERNATIONAL Ltd.
601, Vondelinenweg, Rotterdam
Telephone : 01800-75200 Cables : "Sarneckibro"

Hong Kong :

LUEN TAT TRADING CORPORATION Ltd.
87, Wing Lok Street, 2nd Floor
Telephone : 26114 Cables : "Luencorp"

Israel :

ALHOITYAM Ltd.
P.O. Box 1963, Zone A, Block 264, Haifa Port
Telephone : 6404/6166 Cables : "Wireless"

Norway :

HEFRO TEKNISK A/S
Wm. Thransesgt 1, Oslo
Telephone : 60 10 90 Cables : "Hefro"

New Zealand :

ARNOLD & WRIGHT Ltd.
171/173 Taranaki Street, Wellington, C.3
Telephone : 54-078 (3 lines) Cables : "Arnrrite"
25 Cross Street, Auckland P.O. Box 2153
10, Walker Street, Christchurch P.O. Box 1076
130, Great King Street, Dunedin P.O. Box 841

Singapore :

M. & E. NATHAN
25/29, Orchard Road, Amber Mansions
Telephone : 4073 Cables : "Emandee"

South Africa :

S.M.D. TELECOMMUNICATIONS (PTY.) Ltd.
66, Bay Terrace, Durban
Telephone : 23914 & 24140 Cables : "Radar"

Sweden :

AKTIEBOLAGET TRAKO
Tejnergatan 4, Stockholm
Telephone : 23 35 60 Telex : 10058
Cables : "Trako"

LUNDEVALL ELECTRONIK

Husargatan 35, Gothenburg

Tanganyika :

SOUZA JUNIOR DIAS (RADIO) Ltd.
P.O. Box 50, Dar Es Salaam
Telephone : 22129 Cables : "Junior"

STRATTON & Co. Ltd., West Heath, Birmingham 31

Cables : "STRATNOID" Birmingham Telex : 33708 Telephone : PRlory 2231-2-3-4