

EDDYSTONE MARINE RECEIVER

Model "670"

Instruction Manual

The Eddystone "670" Receiver has been designed expressly for use on board ship and incorporates a number of special features. It is also, of course, suitable for use on land and the fact that the receiver works equally well off 110 volt or higher voltage mains (either A.C. or D.C.) is often an advantage. The "670" is fully tropicalised and is built to give long and reliable service in any climate.

The four switched ranges cover the principal short wave broadcast bands and the medium waveband. The fifth position of the Selector Switch (marked "G") is for use when playing gramophone records. It renders the radio section of the receiver inoperative.

Band 1	...	30 to 12.8 Megacycles.	(10 to 23.5 Metres).
Band 2	...	13 to 5.8 Megacycles.	(23.1 to 51.7 Metres).
Band 3	...	2.75 to 1.2 Megacycles.	(110 to 250 Metres).
Band 4	...	246 to 575 Metres.	(1220 to 522 Kilocycles).

The recognised broadcast bands are marked off in red, the Amateur bands in green. The special mechanical bandspread arrangement assists fine tuning and is explained in detail overleaf.

Because of their importance, safety precautions have been given special attention. Steps have also been taken to reduce interference to a minimum.

The seven valve superheterodyne circuit employs modern valves, full details being furnished in the circuit diagram. The quality of reproduction is excellent, by virtue of the push-pull output circuit (which also incorporates negative feedback) and the new type of speaker, which has a high flux density permanent magnet.

EDDYSTONE MAINS FILTER UNIT

Due to sparking at the commutator, electrical machinery is liable to cause interference to wireless reception. This trouble is often prevalent on board ship, where the dynamo itself may be a primary cause, with possible aggravation when fans, etc., are brought into use. Such interference can be very considerably reduced, if not entirely eliminated, by fitting a suitable filter unit. The Eddystone Mains Filter Unit has been designed specifically for this purpose and will be found most efficient. It takes the form of a small metal box, finished ripple brown to match the "670" Receiver, and is supplied with the necessary mains plug and socket. The unit is inserted between the mains supply and the receiver and takes but a few minutes to fit.

Cat. No. 732 Price £2 : 15 : 0

EDDYSTONE DOUBLET AERIAL

On board ship the lead-in portion of a single wire aerial must necessarily be brought close to metal work and attention must be paid to providing adequate insulation. Electrical interference radiated off the ship's mains is liable to be picked up by the lead-in wire. The Eddystone Doublet Aerial has several advantages over a single wire aerial. The two arms forming the aerial proper can be strung in any convenient position (as high as possible), and the flexible twin insulated feeder brought in through a ventilator, porthole, etc., without the necessity of any additional insulation. The pick-up of electrical interference will be much reduced and first class reception becomes possible. The aerial may be taken down and re-erected many times with little possibility of damage.

Cat. No. 731 (50 ft. feeder) Price £2 : 17 : 9

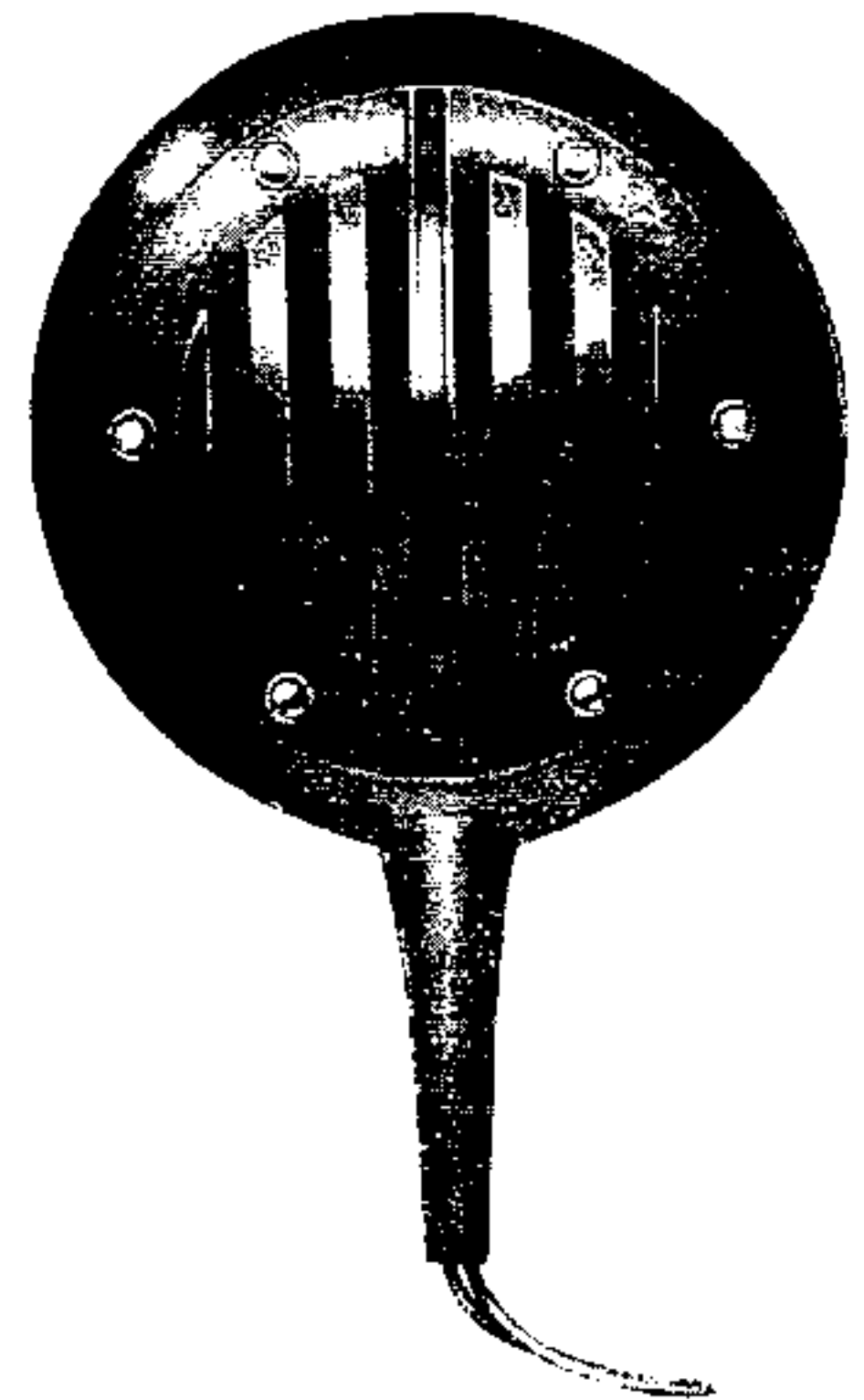
Cat. No. 731/1 (100 ft. feeder) Price £3 : 3 : 3

EDDYSTONE PILLOW SPEAKER

This speaker, illustrated here, is a special type. It takes the form of a smooth, flat bakelite grille, approximately $4\frac{1}{2}$ ins. diameter with $1\frac{1}{16}$ ins. maximum depth. When slipped under a pillow, speech and music can be heard by a resting person with extraordinary clarity but will not be audible to other occupants of the room.

The speaker is supplied complete with matching transformer, insulated two-pin plug, and a length of flat flex.

Cat. No. 1419 Price £3 : 14 : 3



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

Cables : "STRATNOID" Birmingham

Telephone : PRlory 2231-2-3-4

INSTALLATION DETAILS

The first essential is an aerial—and the better the aerial, the better the results you will obtain. The "Eddystone Doublet Aerial" is the ideal, and instructions regarding its installation are given opposite.

An ordinary single wire aerial may be used. It can be of any length up to 60 feet, erected as clear as possible of wire halyards and other metalwork. Attention should be paid to adequate insulation at all supporting points and at the lead in.

The aerial is connected to the socket marked "A" at the rear of the receiver, the small plug between the other "A" socket and the "E" socket being left in place.

When the Eddystone Mains Filter Unit is used, the following connections should be made **BEFORE MAKING ANY CONNECTION TO THE MAINS SUPPLY.**

The short flexible lead in the unit is plugged into the mains input socket on the receiver. The earth lead is connected to the socket marked "Earth" on the Filter Unit. A connection is made with a short piece of insulated wire between the "E" socket on the receiver and the socket marked "Receiver Earth" on the Filter Unit. Finally, the mains lead may be plugged into the socket on the Filter Unit. If the Filter Unit is not used, the earth lead is plugged directly into the "E" socket on the receiver.

The "670" Receiver is of the Universal type and may be operated equally well off either D.C. or A.C. mains. Power rectification (when using A.C.) is by means of a selenium rectifier.

At the rear of the receiver will be seen a voltage selector panel marked "110, 200, 230." The small plug should be placed in the socket most nearly corresponding to the voltage of the mains supply. A variation of plus or minus 10% from the marked voltage is permissible. In actual fact, good results will be secured with a voltage as low as 80.

On A.C. mains, the receiver will work with the power supply plug either way round, but it may be found that hum will be present with the plug inserted one particular way. If this is so, the plug should be reversed, when the receiver will be found to function normally. On D.C. mains it will be necessary to ensure correct polarity of the supply leads. In any case, the valve heaters and the dial lamp will glow but if, after the normal 30 seconds warming up period, the set remains lifeless, the power plug should be reversed.

The large left hand knob selects the desired wave range and the two smaller knobs control tone and volume. Stations are tuned in with the large right hand knob.

A gramophone pick up (of the medium impedance type) may be connected, when desired, to the sockets marked "P.U.," using screened wire. When a pick up is in use, the wave change switch should be moved to the "G" position.

If desired, an extension speaker having an impedance of about 3 ohms may be used by removing the plug which will be found inserted in the socket marked "L.S.," at the rear of the receiver, and plugging in the extension speaker leads. Alternatively, the EDDYSTONE Pillow Speaker (Cat. No. 1419—see rear page) may be plugged in and good results can also be secured with a pair of low impedance telephones connected directly to the "L.S." socket.

INSTALLATION OF EDDYSTONE DOUBLET AERIALS.

The Eddystone Doublet Aerial is supplied ready for immediate use. The insulators attached to the aerial wires should be fixed between convenient supports, as clear as possible of other metal objects. The special feeder cable is then run in to the cabin through any convenient aperture, no additional insulation being necessary. Mechanical protection—a wrapping of insulating tape—may be advisable in some instances.

If too long, the feeder cable should not be cut. The surplus can easily be made into a neat roll and tucked behind the receiver.

The small black plug between the "A" and "E" sockets at the rear of the receiver should be removed and the two ends of the feeder cable plugged into the two "A" sockets.

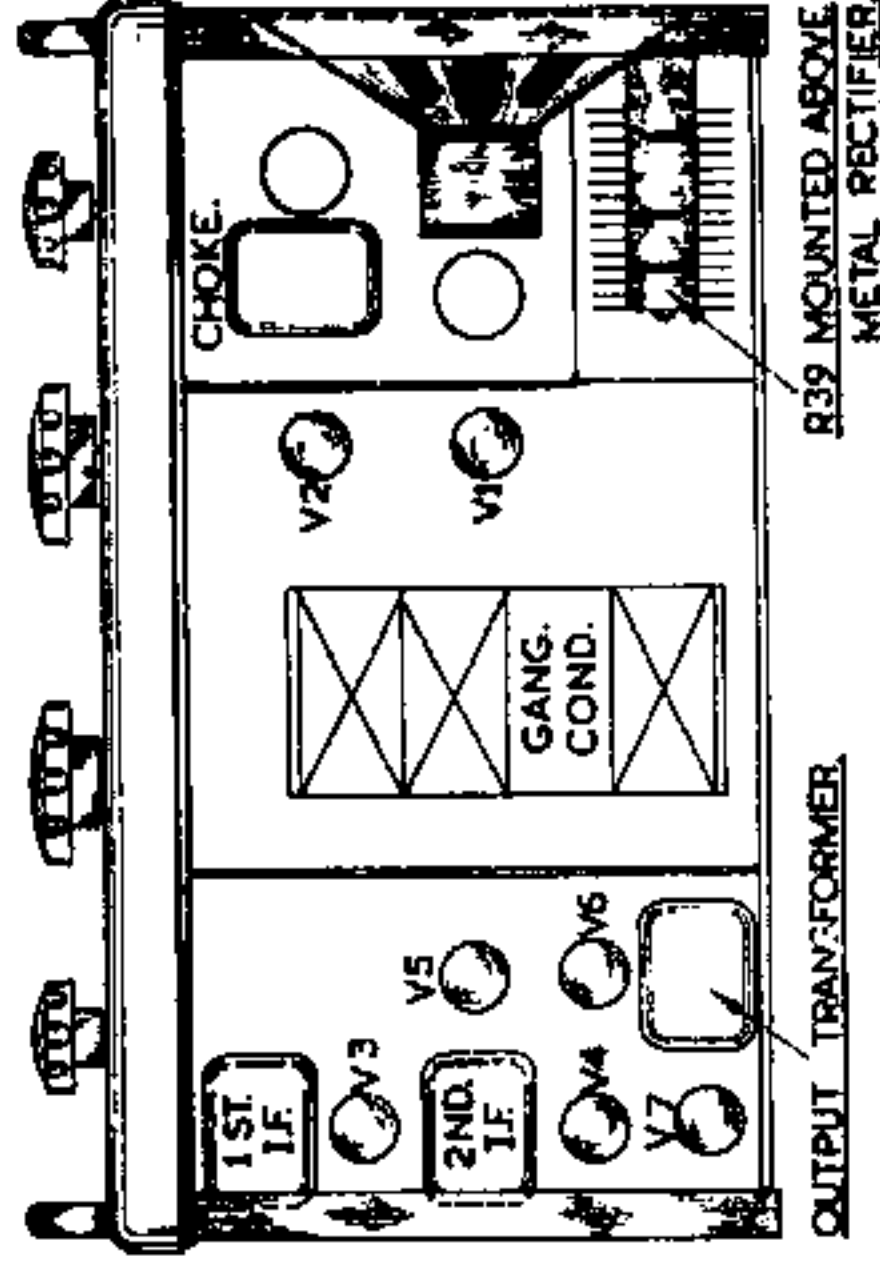
FINE TUNING INDICATOR.

The Fine Tuning Indicator will be found valuable for making a permanent log of the exact settings of preferred stations, for future reference.

The Indicator is read in conjunction with the inner semi-circular scale, which is traversed by the main pointer and reads from "0" to "9." The principle of operation is as follows: With the main pointer knob at zero (extreme left hand side of the dial) the scale will also show zero. On rotating the main tuning knob, it will be seen that the major figures at the top of the F.T.I. scale progressively increase until figure "0" again appears. The main pointer will then coincide with "1" on the inner scale.

The fine lines on the F.T.I. scale are sub-divided into single units. As the scale rotates, the hair line registers against the intersections of the horizontal marks and vertical lines. In effect, the inner scale reads "hundreds," the numbers at the top of the F.T.I. scale "tens," and the horizontal lines single units, giving a total number of 900 units for a complete swing of the main pointer from one end to the other.

An example will make the foregoing clearer. Suppose a station is tuned in at approximately mid-scale on Band 1, representing a frequency near 19 Mc/s. The main pointer knob will be between figures "4" and "5" on the inner scale, indicating that the final number will be between 400 and 500. The hair line indicator will intersect the curved line marked "60" at the top. It may actually intersect against the second horizontal marker down, giving an exact figure of 62. The final reference number will then be 462.



PLAN VIEW OF 670 RX. IN OUTLINE.

SERVICING INSTRUCTIONS

NOTE WELL that the "670" Receiver is of the Universal type and great care should be exercised when carrying out tests with the cabinet removed, since the interior metal-work may be "alive." If at any time, the receiver fails to function, first ensure that all connections at the rear are firm and that the mains are plugged in correctly. When using a Mains Filter Unit, temporarily remove it and plug the mains supply directly into the receiver, to ensure that the fault does not lie in the Filter Unit.

Further work entails removal of the cabinet, which is secured by the four large screws at the rear.

Under normal conditions, the pilot bulb should light about 15 seconds after switching on. Failure to do so will indicate an open circuit, which may be in the fuses, bulb or valves. Tests should be carried out, in that order, to ascertain which component is at fault.

When testing valves by substitution, always ensure that the full complement are inserted. The valve heaters are wired in series-parallel and if any one valve shows a much brighter heater glow than the others, it is almost certain that the second valve of the pair (except V2, see circuit and note R40) is at fault.

If the pilot light glows normally but the receiver remains lifeless, check the speaker connections and test the output transformer for continuity.

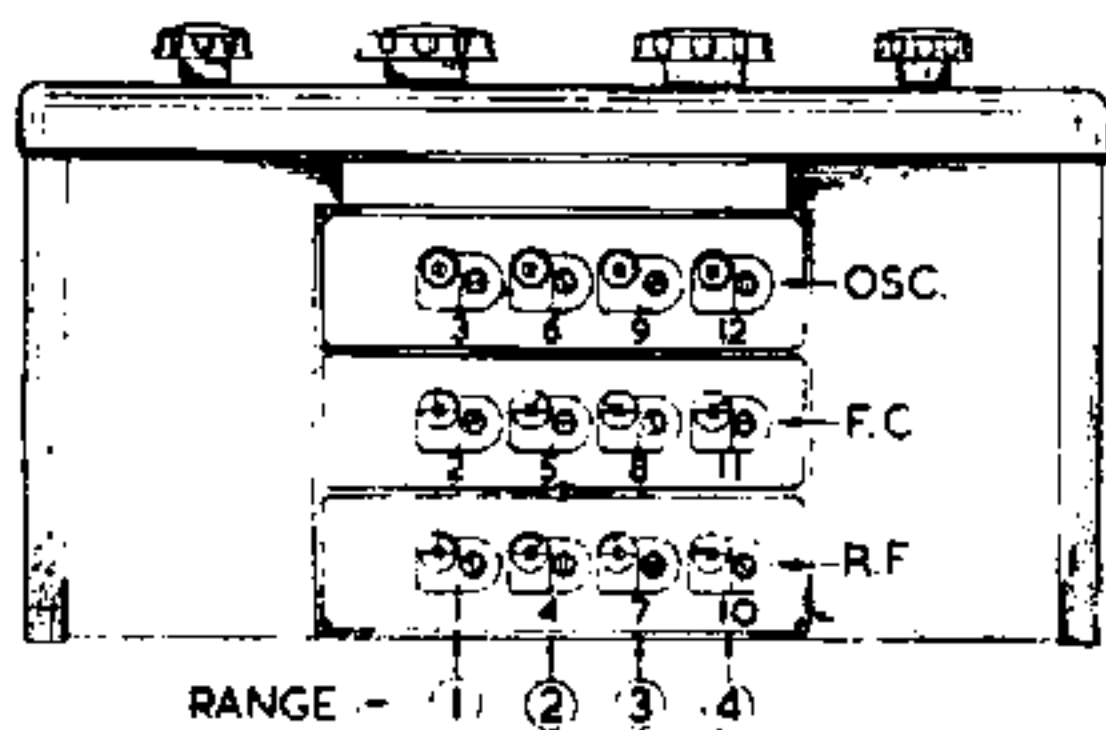
ALIGNMENT.

The following instructions are based on the assumption that the receiver has suffered no major misalignment.

Although minor adjustments may be carried out without them, it is definitely more satisfactory, for proper alignment, to use test instruments, the following being essential:—

1. A Signal Generator, fitted with a calibrated attenuator and having internal modulation. The frequency range should cover that of the receiver and the intermediate frequency. The Signal Generator should preferably be isolated with .01 μ F condensers, a 1 megohm resistor being connected across the leads, on the receiver side, to ensure D.C. continuity. For the sake of brevity the Signal Generator is referred to in the following notes as the Sig. Gen. When aligning the R.F. stages, a dummy aerial, suitable for high frequencies, should be interposed between the direct output of the generator and the aerial terminals of the receiver. Should no dummy aerial be supplied with the generator, a 400 ohm carbon resistor will serve, fitted in series with the high potential lead.
2. An audio output meter, calibrated in milliwatts and decibels to match an impedance of 2.5 ohms.
3. A non-metallic trimming tool, with a screwdriver shaped end, for adjusting coil cores, etc. The Eddystone Cat. No. 122T tool is suitable.

The receiver should be removed from its cabinet (by unscrewing the four screws at the rear) and stood on its left-hand end, face to the operator, taking care not to damage the speaker. Connect the output meter across the speaker terminals, leaving the speaker connected, as this is helpful.



VOLTAGE VALUES

The voltages are between the points indicated and chassis (except point "T"). Set switch to Band 4. Short out aerial to earth. Set volume control at maximum and the tone control fully clockwise.

Two sets of values are given for an A.C. input of 110 volts using different meters as shown. It will be evident that the actual voltage indicated depends upon the particular meter employed. A tolerance of plus or minus 5% should be allowed on the values given.

	Weston Circuit Ref. 1,000 ohms/Volts.	Avo model 40.
A.	105	106
B.	55	30
C.	0.6	0.6
D.	104	100
E.	48	35
F.	0.7	1.0
G.	70	57
H.	106	98
J.	55	30
K.	0.7	1.0
L.	15	8
M.	10	5
N.	1.1	0.5
O.	104	102
P.	108	104
Q.	6	5.8
R.	108	107
S.	118	117
T.	14	12

I.F. CIRCUITS.

The intermediate frequency is 450 Kc/s. The I.F. Transformers are well designed and constructed and are unlikely to drift off frequency over long periods.

Before commencing alignment, allow the receiver and the Sig. Gen. to warm up for at least ten minutes, to minimise frequency drift. Set the Tone and Volume Controls fully clockwise and Selector Switch to Band 4.

The Sig. Gen. leads should be clipped, one to the stator of the centre section of the gang condenser, the other to the coil box casting. The Sig. Gen. should be adjusted to a frequency of 450 Kc/s., 30% modulated, with the attenuator set to give an output in the region of 100 microvolts.

Then proceed to adjust, with the insulated trimming tool, the cores in the I.F. Transformers. The Sig. Gen. output should be reduced as necessary. When maximum output has been secured the attenuator should indicate less than 70 microvolts for a 50 milliwatt output, as shown on the meter with the speaker disconnected. Should the attenuator reading be higher than this, it is possible that the valve emission is beginning to fail.

R.F. AND OSCILLATOR RE-ALIGNMENT.

For the sake of completeness, the instructions which follow give the whole procedure for re-alignment of the radio frequency, frequency changer and oscillator sections. It is emphasised, however, that usually all that will be necessary is slight adjustment of the trimmer condensers and this operation can be carried out without removing the cover of the coil box. In the first place, therefore, only those instructions in the following paragraphs dealing with trimmer adjustment should be attended to. If the alignment is still not wholly satisfactory, the coil cores may be adjusted, but considerable care is called for to ensure that proper tracking is maintained.

OSCILLATOR STAGES.

On each band, the oscillator frequency is 450 Kc/s. higher than the signal frequency.

The Sig. Gen. leads are connected, via the dummy aerial, to the aerial and earth terminals. Remove the lid of the coil box, taking care not to drag it across the small trimmer condensers, to avoid damage to the small vanes.

Adjust the tuning to 13 Mc/s. on Band 1, and set the Sig. Gen. to give an output of 50 microvolts (or less) on the same frequency.

It is desirable to point out here that very few Signal Generators are calibrated to an accuracy of better than 1%, which means in practice that, at a setting of 13 Mc/s., the frequency may be plus or minus 130 Kc/s. in error. If only a small discrepancy is found between the Sig. Gen. calibration and the receiver calibration, it will be well not to readjust the oscillator frequency. To ensure absolutely correct calibration, it is necessary to use a Crystal Calibrator, incorporating a close tolerance 1000 Kc/s. Crystal, for the final setting of the oscillator circuit.

Calibrator, incorporating a close tolerance 1000 Kc/s. Crystal, for the final setting of the oscillator circuit.

If found necessary, therefore, proceed to adjust Core No. 3 until the signal is audible and maximum output is indicated. Next, change to Band 2, adjust Sig. Gen. and tuning pointer to a frequency of 6 Mc/s. and trim Core No. 6. Then proceed to adjust Core No. 9 on Band 3 at 1.3 Mc/s., and Core No. 12 on Band 4 with the Sig. Gen. at 600 Kc/s. and Receiver dial at 500 metres.

A similar procedure is followed at the higher frequency end of each band, using the frequencies set out in the panel below, but this time adjusting the Trimmer Condensers. On Bands 1 and 2 (at 28 and 12 Mc/s.) it may be possible to find two settings of the trimmers at which the signal is audible — the correct one is with the trimmer capacitance at its lowest, i.e., with the black line on the rotor nearest to the front of the receiver.

	Band	Frequency	Osc.	F.C.	R.F.
CORES	1	13 Mc/s	3	2	1
	2	6 Mc/s	6	5	4
	3	1.3 Mc/s	9	8	7
	4	600 Kc/s (500 metres)	12	11	10
TRIMMERS	1	28 Mc/s	3	2	1
	2	12 Mc/s	6	5	4
	3	2.6 Mc/s	9	8	7
	4	250 metres (1200 Kc/s)	12	11	10

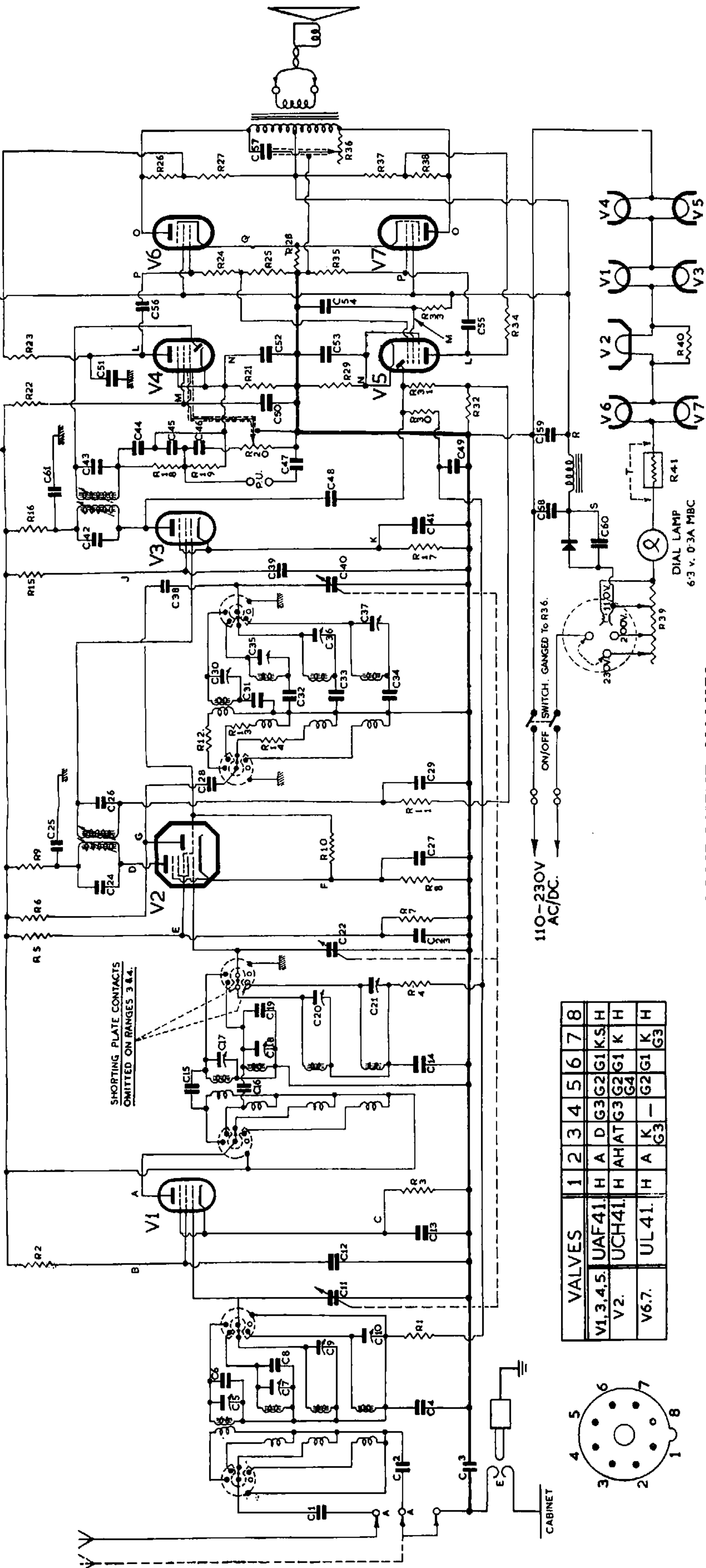
The adjustments of the cores and trimmers affect each other slightly and it is therefore advisable to repeat the foregoing procedure once or twice.

R.F. AND F.C. STAGES.

The procedure adopted in trimming the radio-frequency and frequency changer input circuits is very similar to that described above for the oscillator stage. For example, on Band 4, the receiver is tuned for maximum output on the meter with the Sig. Gen. set at 600 Kc/s., the attenuator being adjusted to provide a reasonable reading. Cores No. 11 (F.C.) and 10 (R.F.) are then moved until maximum output is indicated.

At the high frequency end of Band 4, a frequency of 1.2 Mc/s. (250 metres) is employed and Trimmers Nos. 11 and 10 adjusted for peak output. As with the oscillator, the process should be repeated.

Replacing the lid of the coil box will cause a very slight alteration of frequency at the high frequency end of the bands but it will only be appreciable on Bands 1 and 2. A further slight re-adjustment of Trimmers 3 and 6 will correct this — the trimmers are accessible through holes in the lid after it has been screwed in position.



COMPONENT VALUES

RESISTORS.

R1	470,000 ohms.
R2	47,000 ohms.
R3	330 ohms.
R4	470,000 ohms.
R5	20,000 ohms.
R6	10,000 ohms.
R7	47,000 ohms.
R8	200 ohms.
R9	1,000 ohms.
R10	22,000 ohms.
R11	1 Megohm.
R12	12 ohms.
R13	47 or 50 ohms.
R14	560 or 500 ohms.
R15	47,000 ohms.
R16	1,000 ohms.
R17	330 ohms.
R18	22,000 ohms.
R19	100,000 ohms.
R20	500,000 ohms.
R21	2,700 ohms.
R22	1 W.
R23	1 W.
R24	1 W.
R25	5% Tolerance
R26	5%
R27	1 W.
R28	1 W.
R29	1 W.
R30	1 W.
R31	1 W.
R32	1 W.
R33	1 W.
R34	1 W.
R35	1 W.
R36	1 W.
R37	1 W.
R38	1 W.
R39	1 W.
R40	1 W.
R41	1 W.

CONDENSERS.

C1	0.1 mfd.
C2	0.1 mfd.
C3	0.1 mfd.
C4	0.1 mfd.
C5	3-20 pf.
C6	10 pf.
C7	3-20 pf.
C8	10 pf.
C9	3-20 pf.
C10	3-20 pf.
C11	11.5-210.6 mmfd.
C12	0.1 mfd.
C13	0.1 mfd.
C14	0.1 mfd.
C15	20 pf.
C16	6 pf.
C17	3-20 pf.
C18	3-20 pf.
C19	8 pf.
C20	3-20 pf.
C21	3-20 pf.
C22	11.5-210.6 mmfd.
C23	0.1 mfd.
C24	100 pf.
C25	0.1 mfd.
C26	100 pf.
C27	0.1 mfd.
C28	100 pf.
C29	0.1 mfd.
C30	3-5-20 pf.
C31	3000 pf.
C32	2000 pf.
C33	640 pf.
C34	280 pf.
C35	3-5-20 pf.
C36	3-5-20 pf.
C37	100 pf.
C38	0.1 mfd.
C39	11.5-210.6 mmfd.
C40	100 pf.
C41	0.1 mfd.
C42	100 pf.
C43	100 pf.
C44	100 pf.
C45	0.1 mfd.
C46	0.05 mfd.
C47	10 pf.
C48	0.1 mfd.
C49	0.1 mfd.
C50	0.1 mfd.
C51	0.1 mfd.
C52	30 mfd.
C53	30 mfd.
C54	0.1 mfd.
C55	0.1 mfd.
C56	0.05 mfd.
C57	50 mfd.
C58	50 mfd.
C59	50 mfd.
C60	0.1 mfd.
C61	0.1 mfd.

VALVES

V1	UAF41
V2	UCH41
V3	UL41
V4	UAF41
V5	UCH41
V6	UL41
V7	UL41

RESISTORS.

R1	470,000 ohms.
R2	47,000 ohms.
R3	330 ohms.
R4	470,000 ohms.
R5	20,000 ohms.
R6	10,000 ohms.
R7	47,000 ohms.
R8	200 ohms.
R9	1,000 ohms.
R10	22,000 ohms.
R11	1 Megohm.
R12	12 ohms.
R13	47 or 50 ohms.
R14	560 or 500 ohms.
R15	47,000 ohms.
R16	1,000 ohms.
R17	330 ohms.
R18	22,000 ohms.
R19	100,000 ohms.
R20	500,000 ohms.
R21	2,700 ohms.
R22	1 W.
R23	1 W.
R24	1 W.
R25	5% Tolerance
R26	5%
R27	1 W.
R28	1 W.
R29	1 W.
R30	1 W.
R31	1 W.
R32	1 W.
R33	1 W.
R34	1 W.
R35	1 W.
R36	1 W.
R37	1 W.
R38	1 W.
R39	1 W.
R40	1 W.
R41	1 W.

CONDENSERS.

C1	0.1 mfd.
C2	0.1 mfd.
C3	0.1 mfd.
C4	0.1 mfd.
C5	3-20 pf.
C6	10 pf.
C7	3-20 pf.
C8	10 pf.
C9	3-20 pf.
C10	3-20 pf.
C11	11.5-210.6 mmfd.
C12	0.1 mfd.
C13	0.1 mfd.
C14	0.1 mfd.
C15	20 pf.
C16	6 pf.
C17	3-20 pf.
C18	3-20 pf.
C19	8 pf.
C20	3-20 pf.
C21	3-20 pf.
C22	11.5-210.6 mmfd.
C23	0.1 mfd.
C24	100 pf.
C25	0.1 mfd.
C26	100 pf.
C27	0.1 mfd.
C28	100 pf.
C29	0.1 mfd.
C30	3-5-20 pf.
C31	3000 pf.
C32	2000 pf.
C33	640 pf.
C34	280 pf.
C35	3-5-20 pf.
C36	3-5-20 pf.
C37	100 pf.
C38	0.1 mfd.
C39	11.5-210.6 mmfd.
C40	100 pf.
C41	0.1 mfd.
C42	100 pf.
C43	100 pf.
C44	100 pf.
C45	0.1 mfd.
C46	0.05 mfd.
C47	10 pf.
C48	0.1 mfd.
C49	0.1 mfd.
C50	0.1 mfd.
C51	0.1 mfd.
C52	30 mfd.
C53	30 mfd.
C54	0.1 mfd.
C55	0.1 mfd.
C56	0.05 mfd.
C57	50 mfd.
C58	50 mfd.
C59	50 mfd.
C60	0.1 mfd.
C61	0.1 mfd.

VALVES

V1	UAF41
V2	UCH41
V3	UL41
V4	UAF41
V5	UCH41
V6	UL41
V7	UL41

UAF42 and UCH42 valves are equally suitable.