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.

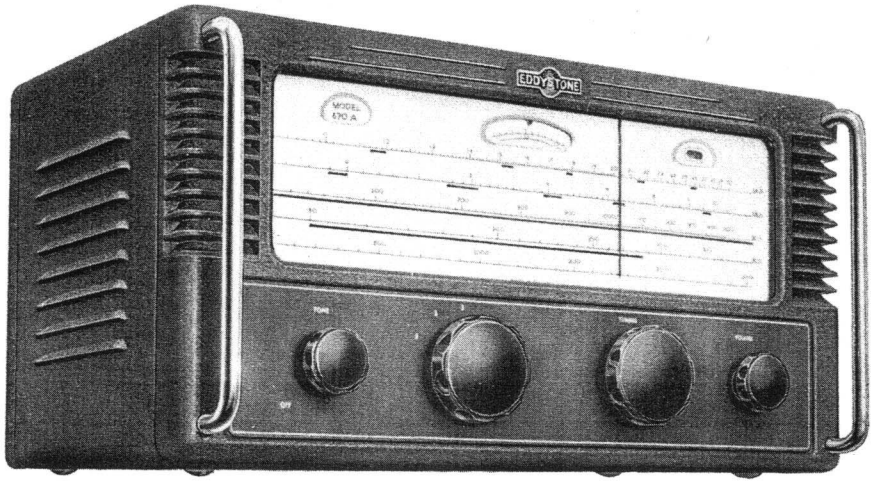
Cat. No. 732 Price £2 : 15 : 0

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 posible), 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

STRATTON & Co., Ltd., West Heath, Birmingham 31
Cables : "STRATNOID" Birmingham Telephone : PRIory 2231-2-3-4



EDDYSTONE MARINE RECEIVER

MODEL "670A"

Instruction Manual

The Eddystone " 670A " 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 " 670A " 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, the medium waveband, and long waves. 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 10.5 Megacycles.	(10 to 28.5 Metres).
Band 2	...	10.6 to 3.7 Megacycles.	(28.3 to 81 Metres).
Band 3	...	1500 to 540 Kilocycles.	(200 to 557 Metres).
Band 4	...	380 to 150 Kilocycles	(789 to 2000 Metres).

The recognised broadcast bands are marked off in red. The special mechanical bandspread arrangement assists fine tuning. Because of their importance, safety precautions have been given special attention. Steps have also been taken to reduce interference to a minimum.

The superheterodyne circuit employs modern valves, full details being furnished in the circuit diagram. The quality of reproduction is excellent and the new type of speaker, which has a high flux density permanent magnet, gives ample volume.

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 "670A" 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. 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, good results can also be secured with a pair of low impedance telephones connected directly to the "L.S." sockets.

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.

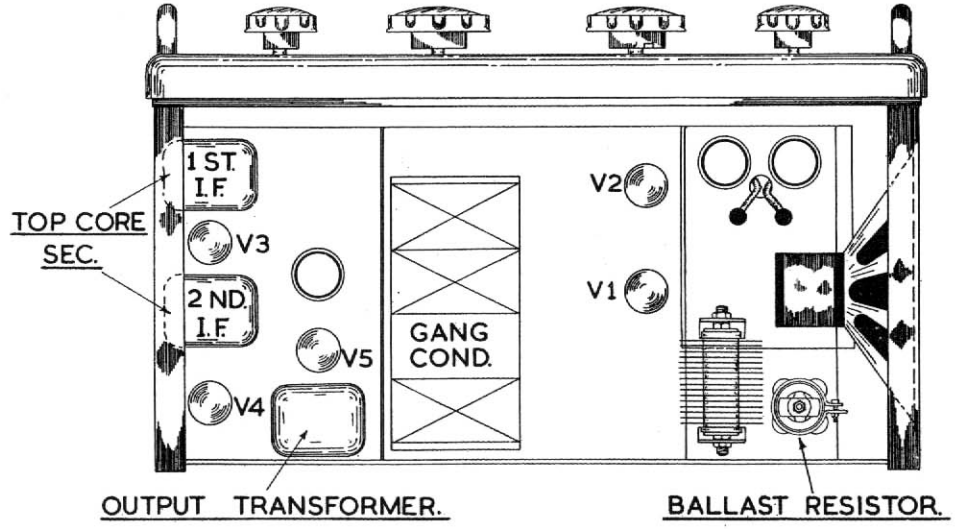
The small black plug between the " A " and " E " sockets at the rear of the receiver should be removed and the two ends of the feeder cable plugged into the two " A " sockets.

VERNIER TUNING.

The mechanical bandspread scale will be found invaluable for making a log of the exact settings of preferred stations, for future reference. It is read in conjunction with the lowest scale on the main dial.

TUNING INDICATOR.

The green fluorescent light is an aid to correct tuning. With no signal the glow will extend to its full length. When a signal is received the glow contracts and the correct setting is when it is at a minimum.



PLAN VIEW OF "670A" RECEIVER IN OUTLINE

SERVICING INSTRUCTIONS

NOTE WELL that the "670A" 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.

Everything being normal, the tuning indicator will glow soon after switching on. If this does not happen, a fault exists and the continuity of the heater chain should first be checked, to ascertain if there is an open circuit heater or fuse.

When testing valves by substitution, it is necessary that the full number of valves are in the holders, because the heaters are series connected. Note there is a resistor (R37) in parallel with the heater of the DM70 Tuning Indicator, to equalise the current.

If the tuning indicator glows normally but the receiver is otherwise lifeless, a check should be made of the speaker connections and of the output transformer windings.

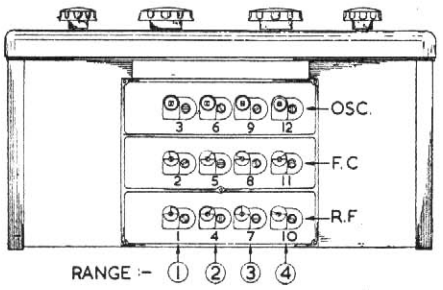
ALIGNMENT.

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 *u*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 "U"). Set switch to Band 4. Short out aerial to earth. Set volume control at maximum and the tone control fully clockwise.

Values are given for A.C. inputs of 110 and 230 volts, using two types of meter. It will be evident that the actual voltage indicated depends upon the particular meter employed. A tolerance of ± 5% should be allowed on the values given.

Circuit Ref.	230 V. AC. Input		110 V. AC. Input	
	20,000 ohms per volt	Avo. 40	20,000 ohms per volt	Avo. 40
A.	180	180	117	116
B.	70	47	50	35
C.	1·7	1·5	1	·9
D.	180	180	117	116
E.	94	80	62	55
F.	2·7	2·4	1·7	1·6
G.	90	80	64	58
H.	176	175	117	116
J.	70	48	48	35
K.	1·9	1·6	1·1	1
L.	42	15	28	10
M.	40	13	25	9
N.	2	1	1·3	·7
P.	168	167	114	113
Q.	11·4	11	7·5	7·5
R.	180	180	119	118
S.	193	193	129	128
T.	192 AC	192 AC	109 AC	109 AC
U.	12 AC	11·7 AC	12·2 AC	11·5 AC
V.	56	12	42	6

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 12 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 12 Mc/s, the frequency may be plus or minus 120 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.

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 4 Mc/s. and trim Core No. 6. Then proceed to adjust Core No. 9 on Band 3 at 600 kc/s., and Core No. 12 on Band 4 with the Sig. Gen. at 160 kc/s.

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 9 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 setting.

	Band	Frequency	Osc.	F.C.	R.F.
CORES	1	12 Mc/s	3	2	1
	2	4 Mc/s	6	5	4
	3	600 kc/s	9	8	7
	4	160 kc/s	12	11	10
TRIMMERS	1	28 Mc/s	3	2	1
	2	9 Mc/s	6	5	4
	3	1·3 Mc/s	9	8	7
	4	320 kc/s	12	11	10

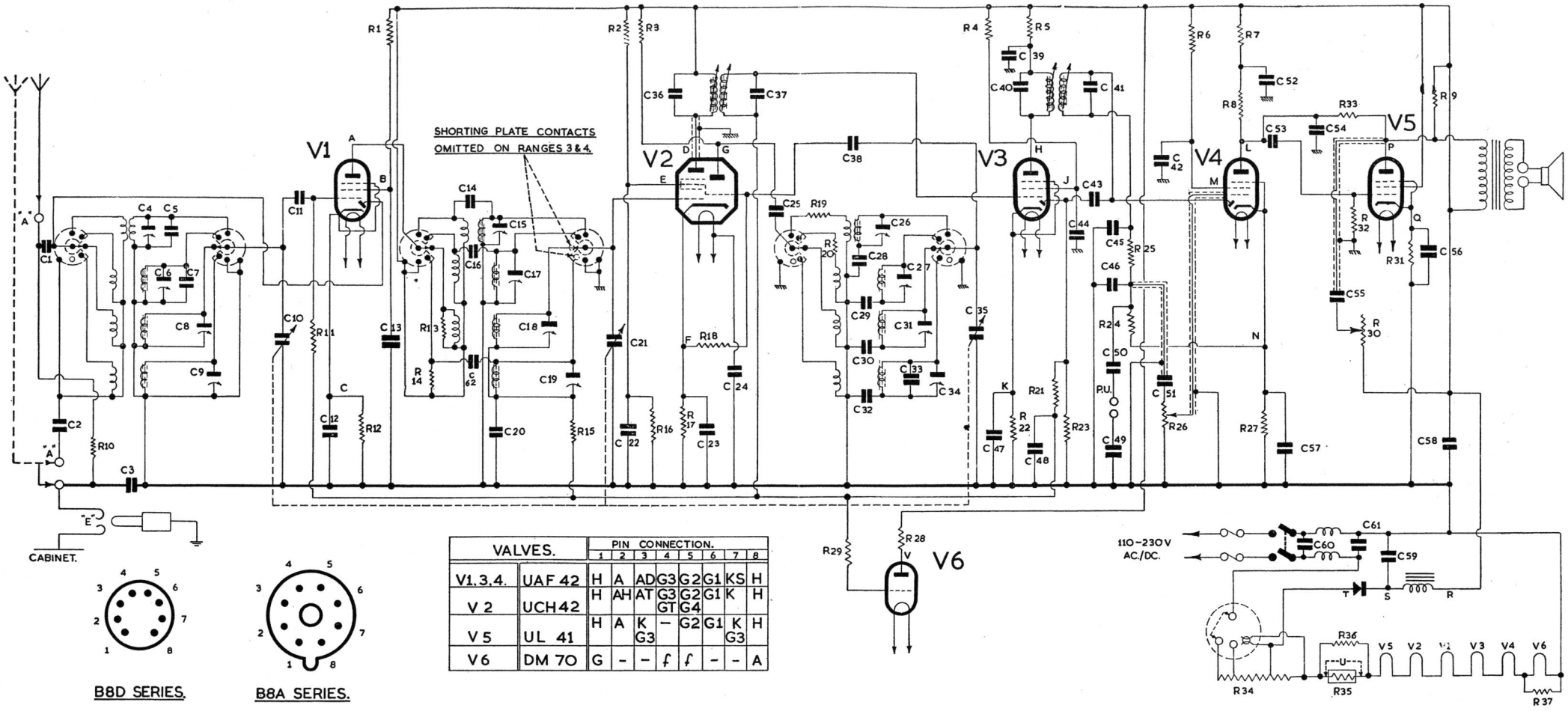
The adjustments of the cores and trimmers affect each other slightly and it is therefore advisable to repeat the foregoing procedure once or twice.

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 160 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 320 kc/s. 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.



VALVES.		PIN CONNECTION. 1	2	3	4	5	6	7	8
V1,3,4.	UAF 42	H	A	AD	G3	G2	G1	KS	H
V 2	UCH42	H	AH	AT	G3 GT	G2 G4	G1	K	H
V 5	UL 41	H	A	K G3	–	G2	G1	K G3	H
V 6	DM 70	G	-	-	f	f	-	-	A

B8D SERIES.

B8A SERIES.

COMPONENT VALUES

RESISTORS,

R1	...	·1 megohms.
R2	...	22,000 ohms.
R3	...	15,000 ohms.
R4	...	·1 megohms.
R5	...	1,000 ohms.
R6	...	·73 megohms.
R7	...	22,000 ohms.
R8	...	·2 megohms.
R9	...	·1 megohms.
R10	...	2·7 megohms.
R11	...	·47 megohms.
R12	...	330 ohms.
R13	...	1,000 ohms.
R14	...	1,000 ohms.
R15	...	·47 megohms.
R16	...	47,000 ohms.
R17	...	220 ohms.
R18	...	22,000 ohms.
R19	...	220 ohms.
R20	...	47 ohms.
R21	...	·47 megohms.
R22	...	330 ohms.
R23	...	·47 megohms.
R24	...	·1 megohms.
R25	...	22,000 ohms.
R26	...	·5 megohm Pot.
R27	...	2,700 ohms.
R28	...	1·5 megohms.
R29	...	6·8 megohms.
R30	...	50,000 ohms. Pot.
R31	...	200 ohms.
R32	...	·47 megohms.
R33	...	2·7 megohms.
R34	...	Ballast Resistor. W.W.
R35	...	Thermistor.
R36	...	560 ohms.
R37	...	16 ohms.

CONDENSERS,

C1	...	1,800 pf.	Isolator.
C2	...	1,800 pf.	Isolator.
C3	...	·01 mfd.	Tub. Paper.
C4	...	3–23 pf.	Air Trimmer.
C5	...	10 pf.	Silvered Mica.
C6	...	3–23 pf.	Air Trimmer.
C7	...	6 pf.	Silvered Mica.
C8	...	3–23 pf.	Air Trimmer.
C9	...	3–23 pf.	Air Trimmer.
C10	...	11·5–366 pf.	R.F. Sect. (3 Gang)
C11	...	100 pf.	Silvered Mica.
C12	...	·1 mfd.	Tub. Paper.
C13	...	·1 mfd.	Tub. Paper.
C14	...	20 pf.	Silvered Mica.
C15	...	3–23 pf.	Air Trimmer.
C16	...	6 pf.	Silvered Mica.
C17	...	3–23 pf.	Air Trimmer.
C18	...	3–23 pf.	Air Trimmer.
C19	...	3–23 pf.	Air Trimmer.
C20	...	·01 mfd.	Tub. Paper.
C21	...	11·5–366 pf.	Mixer Sect. (3 Gang)
C22	...	·1 mfd.	Tub. Paper.
C23	...	·1 mfd.	Tub. Paper.
C24	...	·0005 mfd.	Moulded Mica.
C25	...	100 pf.	Ceramic.
C26	...	3–23 pf.	Air Trimmer.
C27	...	3–23 pf.	Air Trimmer.
C28	...	3625 pf.	Silvered Mica.
C29	...	2825 pf.	Silvered Mica.
C30	...	400 pf.	Silvered Mica.
C31	...	3–23 pf.	Air Trimmer.
C32	...	150 pf.	Silvered Mica.
C33	...	20 pf.	Silvered Mica.
C34	...	3–23 pf.	Air Trimmer.
C35	...	11·5–366 pf.	Osc. Sect. (3 Gang)
C36	...	100 pf.	Silvered Mica.
C37	...	100 pf.	Silvered Mica.
C38	...	100 pf.	Ceramic.
C39	...	·1 mfd.	Tub. Paper.
C40	...	100 pf.	Silvered Mica.
C41	...	100 pf.	Silvered Mica.
C42	...	·1 mfd.	Tub. Paper.
C43	...	20 pf.	Silvered Mica.
C44	...	·1 mfd.	Tub. Paper.
C45	...	100 pf.	Ceramic.
C46	...	100 pf.	Ceramic.
C47	...	·1 mfd.	Tub. Paper.
C48	...	·01 mfd.	Tub. Paper.
C49	...	·05 mfd.	Tub. Paper.
C50	...	·005 mfd.	Tub. Paper.
C51	...	·01 mfd.	Tub. Paper.
C52	...	50 mfd.	Elect. 450V. Wkg.
C53	...	·01 mfd.	Moulded Mica.
C54	...	50 pf.	Silvered Mica.
C55	...	·1 mfd.	Tub. Paper A.C. Wkg.
C56	...	30 mfd.	Elect. 15V. Wkg.
C57	...	30 mfd.	Elect. 15V. Wkg.
C58	...	50 mfd.	Elect. 450V. Wkg.
C59	...	50 mfd.	Elect. 450 V.Wkg.
C60	...	·05 mfd.	Tub. Paper.
C61	...	·05 mfd.	Tub. Paper.
C62	...	1 pf.	Silvered Mica