

EDDYSTONE
COMMUNICATIONS RECEIVER
TYPE 504

OPERATING INSTRUCTIONS

SERIAL No. 9X0014

EDDYSTONE COMMUNICATIONS RECEIVER

TYPE 504

General.

This instrument is a 9 valve superheterodyne, with two R.F. stages, designed to meet all the requirements for a first grade Communications Receiver. The coverage of 30,000 to 600 kilocycles (10 to 500 metres) is provided in five switched bands, as follows:-

Range 1	13.2 to 30.5	Mc/s
Range 2	6.25 to 13.4	Mc/s
Range 3	2.9 to 6.5	Mc/s
Range 4	1.34 to 2.9	Mc/s
Range 5	580 to 1340	Kc/s

The tuning dial has five calibrated scales with an inner logging scale, marked 0-100 degrees, concentric with which is a fine tuning scale, traversed by a small pointer having a 1 to 20 ratio to the main pointer. The latter has an approximate reduction ratio to the tuning control knob of 1 to 140. At the top left hand corner of the dial is situated the waveband indicator. The signal strength meter is fitted at the top right hand corner. It is permanently in circuit and is operative to an extent governed by the setting of the R.F. gain control. A zero adjuster for the meter is fitted at the rear of the cabinet and is indicated in Fig. 2. Also at the rear are the mains input plug, aerial socket, and jacks for the loudspeaker and telephones.

The receiver operates from 40 to 60 cycle A.C. mains of 200/230 or 110 volts, the total consumption being 65 watts.

Circuit.

Fig. 3 gives the complete circuit diagram. Two pentode R.F. stages are followed by a triode-hexode frequency changer. Two I.F. amplifier stages follow, the first of which incorporates a switched band pass crystal filter. The next valve operates as signal rectifier, A.V.C. rectifier and first audio amplifier. The output valve is of the beam pentode type, giving up to 3 watts output. Separate valves are used for the functions of beat frequency oscillator and noise limiter. A power rectifier valve completes the circuit.

Valves.

The positions of the valves are shown in Fig. 1 and the types used are as follows:-

V.1.	EF39	Mullard	1st R.F. amp.
V.2.	EF39	"	2nd R.F. amp.
V.3.	ECH35	"	Frequency Changer
V.4.	EF39	"	1st I.F. amp.
V.5.	EF39	"	2nd I.F. amp.
V.6.	EBC33	"	Set. A.V.C. & 1st A.F. amp.
V.7.	6V6GT	Brimar	Output
V.8.	5Z4	S.T. & C.	Rectifier.
V.9.	EB34	Mullard	Noise Limiter.
V.10.	EF39	"	B.F.O.

Controls.

All controls are on the front of the receiver and their functions are clearly indicated. They consist of:-

Wavechange. In addition to the five position switch, this control also operates the waveband indicator mounted on the tuning dial.

Tuning

R.F. gain.

A.F. gain.

Tone and power on-off combined.

Crystal in-out.

Noise limiter on-off.

Phone - C.W.

When this switch is at "CW" the B.F.O. is switched on, the A.V.C. is automatically rendered inoperative, and vice-versa when the switch is in the "phone" position.

B.F.O.

For adjustment of the audio note.

Receive-Stand by

When in the stand-by position, this breaks the H.T. supply to all except the R.F. frequency changer and B.F.O. valves, leaving all heaters switched on. The latter valves are left in operation in order to maintain frequency stability.

Installation.

The receiver has been aligned, calibrated and thoroughly tested before despatch and the only adjustment that may be necessary is the mains input voltage. A voltage tapping panel is provided on the mains transformer and the screw is normally fitted in the 230 volt position, where it may remain for input voltages between 220 and 250 volts. If the mains voltage is between 195 and 215 volts, the 200 volt tapping should be used.

Access to the transformer is obtained by removing the four screws at the rear of the cabinet, when the cover can be removed completely.

External connections to the receiver are indicated in Fig.2. Supplied with it are a mains input lead fitted with a socket to match the plug on the receiver, a coaxial plug for aerial connection and two telephone type plugs for attachment to the loud speaker and telephones. An output transformer is fitted in the receiver and the loudspeaker speech coil impedance should be 3ohms. Telephones, if used, should be of high impedance type.

Operation.

It is recommended that operation of the receiver should not be attempted before reading the following instructions, which will serve as a guide in obtaining maximum results.

A brief description of the panel controls is given, followed by information relating to the reception of C.W. and telephony signals. Care in the handling of the receiver controls is well worth while. Correct operation will result in more satisfactory reception generally, and will enable weak signals to be received at readable strength, which incorrect operation would render difficult if not impossible. A receiver of this type requires some experience in securing maximum results from it.

Tuning and Wave change.

The tuning control knob on the right operates a four gang variable condenser through the medium of a high precision geared drive, the operating frequency being read off against the appropriate dial scale. By noting the readings of the inner and vernier scales, it is possible to return to any particular signal.

The wave change switch is operated by the large left hand knob, the band selected being shown on the indicator.

Tone Control and on/off Switch.

Rotation of the tone control clockwise results in increased high note response. A switch is incorporated, connected in series with the transformer primary.

R.G. Gain.

Clockwise rotation increases the gain of the R.F. section of the receiver and the correct adjustment is related to the type of signal being received, since it also controls the amount of A.V.C. applied to the R.F. valves.

A.F. Gain.

Adjustment of this control enables the audio output to be set at any desired level. It is independent of any adjustments made to other controls.

Crystal In-Out.

With the crystal switched out, the selectivity is 30 dB down at 5 Kc/s off resonance. With the crystal in, the selectivity is considerably increased, the band width being 500 cycles at 30 dB off resonance.

Noise Limiter.

The noise limiter is particularly useful when local electrical or car ignition interference is prevalent and should be switched into circuit in such cases.

Phone - C.W.

In the C.W. position, H.T. is applied to the B.F.O. valve and the resulting oscillation beats with the I.F. output to produce audible

signals. It is necessary to cut out A.V.C. when the B.F.O. is operating and this is automatically accomplished.

In the telephony position, A.V.C. action is restored and the receiver is in the correct condition to receive modulated signals.

B.F.O.

This control varies the pitch of the note produced by interaction of the signal and B.F.O. It is only operative with the phone - C.W. switch in the C.W. position.

Receive-Standby.

When a transmitter is in use alongside the receiver, the latter is likely to be overloaded. During the periods of transmission, this control should be in the "standby" position, when H.T. is removed from the majority of the valves, but the heaters remain on. Upon switching to "receive", the receiver is operative immediately.

Reception of Telephony Signals.

With the Phone/C.W. switch in the "Phone" position, the Crystal Switch "out" and the R.F. gain rotated fully clockwise, telephony signals can be tuned in, the volume being adjusted by the A.F. Gain Control. A.V.C. will now be fully operative and will tend to counteract fading. The strength of the carrier (but not the modulation) will be indicated on the "S" meter and the tuning should be set to give maximum deflection of the needle.

Reception of C.W.

Move the "Phone/C.W." switch to "C.W." and set the B.F.O. control with the white spot at the top, in which position the B.F.O. oscillation is of identical frequency (450 Kc/s) to the intermediate frequency. If the receiver is correctly tuned to the desired signal, the beat note produced will then be zero. By rotating the B.F.O. control in either direction, the pitch of the beat note will increase. A suitable beat note should not be obtained by variation of the tuning control with the B.F.O. set at zero, as such detuning results in loss of sensitivity and selectivity. An interfering signal may be reduced by discriminate use of the B.F.O. control, trying first one side of zero and then the other.

Because of the high sensitivity of the receiver a strong signal will tend to cause overloading and it will then be necessary to reduce the R.F. gain.

The band pass crystal filter will be found very effective in reducing interference when several stations are operating in adjacent frequencies. Because of the high selectivity and narrow band width, careful adjustment of the B.F.O. control is necessary when the crystal is switched into circuit.

EDDYSTONE COMMUNICATIONS RECEIVER.TYPE 504.COMPONENT VALUES. (See Fig. 3.)RESISTORS.

<u>CIRCUIT REF.</u>	<u>RESISTANCE.</u>	<u>WATTAGE.</u>	<u>QTY.</u>
R.2.	330 or 300 ohms.	$\frac{1}{2}W$	4
R.3.	.47 or .5 megohm.	"	5
R.4.	4,700 or 5,000 ohms.	"	3
R.5.	47,000 or 50,000 ohms.	"	2
R.7.	.27 or .25 megohm.	"	3
R.8.	1 megohm.	"	1
R.9.	1,000 ohms.	"	3
R.10.	0.1 megohm.	"	6
R.14.	47 or 50 ohms.	"	2
R.15.	560 or 500 ohms.	"	5
R.25.	22,000 or 20,000 ohms.	"	1
R.59.	27,000 or 30,000 ohms.	"	1
R.61.	200 ohms.	"	1
R.62.	.5 megohm Pot. 3136P.	-	1
R.63.	10,000 ohm Pot. 2326P0.	-	1
R.86.	22,000 or 20,000 ohms.	1W	1
R.87.	27,000 or 30,000 ohms.	"	1
R.89.	12 ohm.	$\frac{1}{2}W$	1
R.90.	50,000 ohm Pot. with switch 3137P.	-	1
R.91.	50,000 ohm	2W	1
R.92.	600 ohm Pot.	-	1
R.93.	25 ohm Wire Wound (D940)	-	1

CONDENSERS.

<u>CIRCUIT REF.</u>	<u>CAPACITY.</u>	<u>TYPE.</u>	<u>QTY.</u>
C.3.	10pfd.	Ceramic	5
C.6.	.01mfd.	Tub. Paper.	8
C.9.	0.1mfd.	" "	17.
C.10.	.0005mfd.	Moulded Mica.	2
C.18.	25mfd. 25V.	Tub.	2
C.34.	.01mfd.	Moulded Mica.	1
C.40.	3.5 - 20pf.	Trimmer Ceramic.	5
C.42.	2000pfd.	Silvered Mica.	1
C.44.	100pfd.	Ceramic.	9
C.45.	3-20pfd.	Trimmers Air.	15
C.46.	16mfd.	Tub. Elect.	1
C.47.	8 mfd.	" "	1
C.49.	315pfd	Silvered Mica.	1

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COMPONENT VALUES. (See Fig. 3.)

CONDENSERS (Contd.)

<u>CIRCUIT</u> <u>REF.</u>	<u>CAPACITY.</u>	<u>TYPE.</u>	<u>QTY.</u>
C.50.	640pfd.	Silvered Mica.	1
C.51.	1425pfd.	" "	1
C.52.	20pfd.	Ceramic	2
C.53.	3pfd.	"	5
C.54.	3000pfd.	Silvered Mica.	1
C.55.	510pfd.	Ceramic.	6
C.56.	12.5pfd-212.5pfd.	Four Section Gang.	1
C.57.	5.2pfd.	Trimmer (D925).	1

VOLTAGE VALUES.

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Refer to the circuit Fig.3. Voltages are between the point indicated and chassis. The receiver was set at 14 Mc/s on range 1 with the aerial shorted out, R.F. and A.F. gain controls at maximum, crystal and noise limiter switched out, the phone/CW switch at "phone", send/receive switch at "receive" and tone control fully clockwise. Two sets of values were taken, using different meters as shown:-.

CIRCUIT
REF.

VOLTS.

	<u>WESTON</u> <u>1000 ohms/volt.</u>	<u>AVO</u> <u>MODEL 40.</u>
A.	200	200
B.	70	28
C.	1.4	0.7
D.	3.2	0.68
E.	180	175
F.	90	90
G.	65	65
H.	2.5	2.5
I.	175	170
J.	95	80
K.	2.25	2.25
L.	180	170
M.	75	60
N.	2.2	2.0
O.	50	45
P.	235	235
Q.	195	195
R.	1.65	1.7
S.	9.5	8.7
T.	205	205

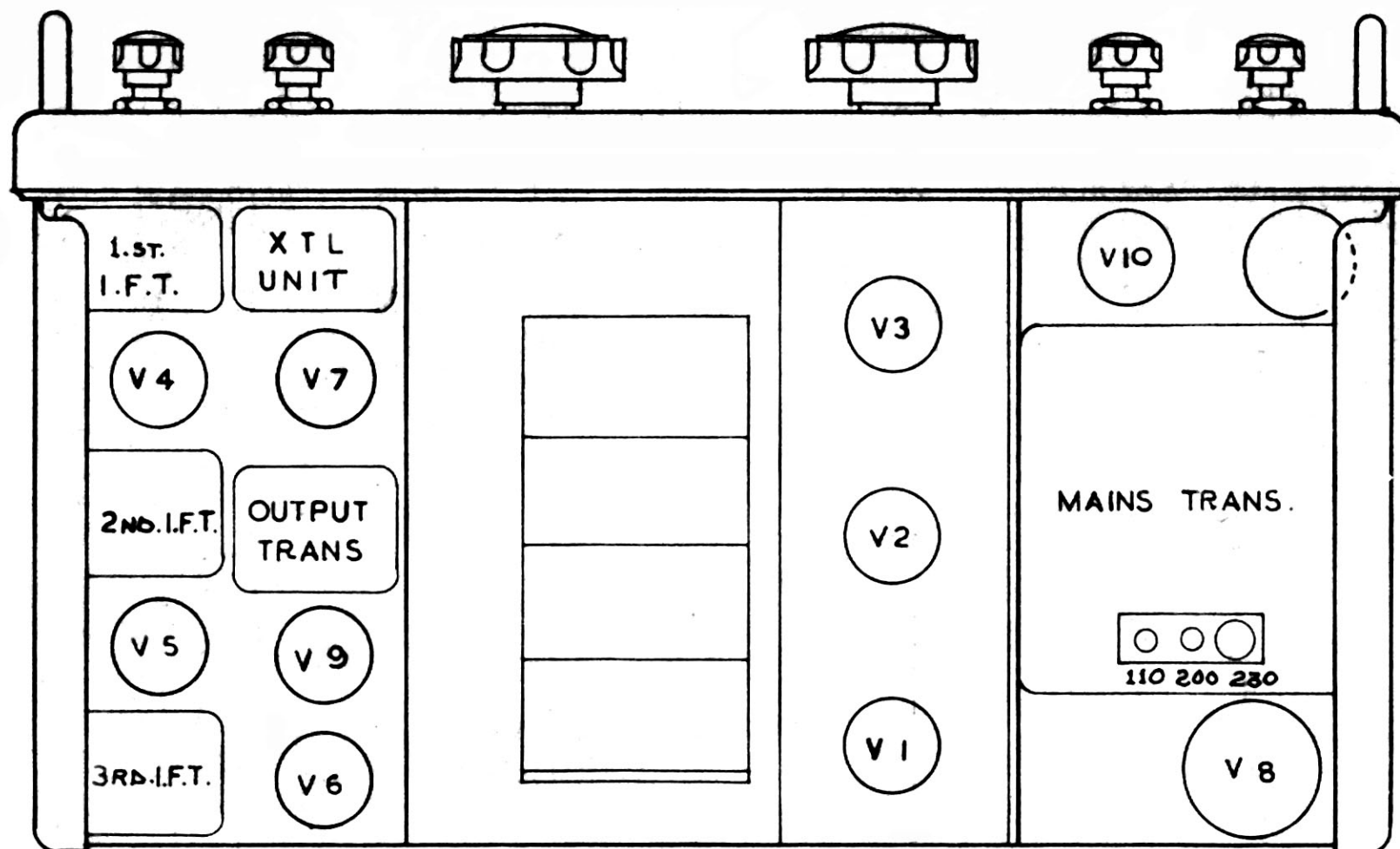


FIG. 1.
PLAN VIEW OF RECEIVER
SHOWING VALVE POSITIONS.

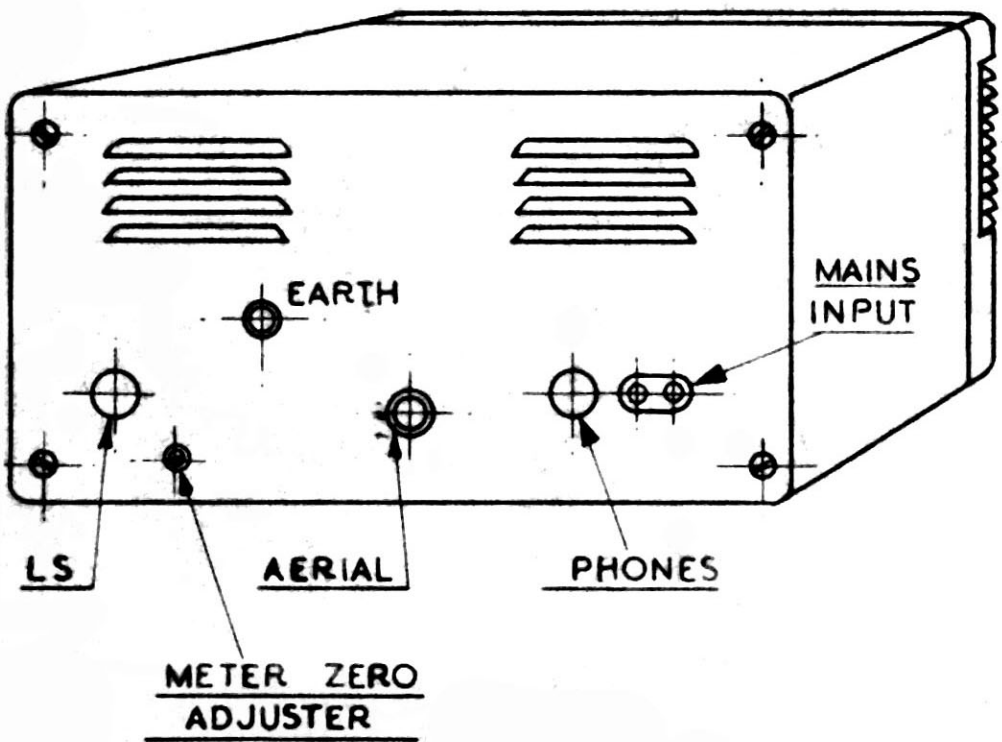
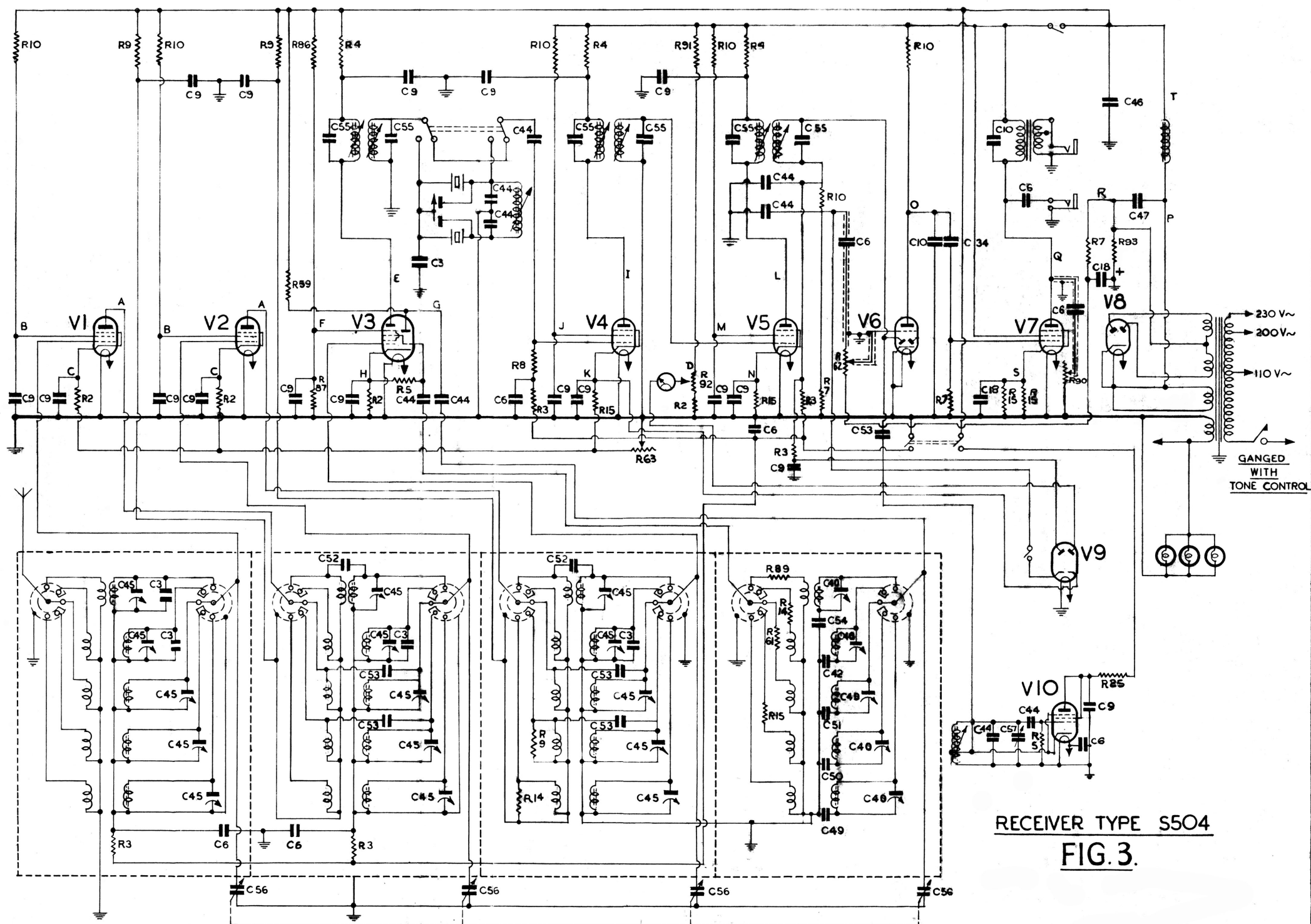


FIG.2.
REAR VIEW OF RECEIVER
SHOWING EXTERNAL CONNECTIONS.



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FIG. 3.