AUGMENTED

INSTRUCTION BOOK No. 95150R

"ARGOSY" MARINE RECEIVER TYPE MS6 : CR-3A

COMMUNICATIONS RECEIVER TYPE CR-3D

TYPES C95150 & 3C95150

NOTE THAT PAGES MARKED 2-95150R
RELATE TO CR-3D RECEIVER

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INDEX

INDEX

1. GENERAL

1.1 Brief Description.

The "Argosy" Receiver type C95150 is a 14-valve superheterodyne receiver covering frequency ranges of 12 to 60 kc/s. and 100 kc/s to 30.1 Mc/s in 12 bands. Variable selectivity is provided in the I.F. channel, and a noise limiter and crystal calibrator are incorporated in the unit.

The receiver has been approved as complying with the requirements laid down in the British Post Office Specification for a general purpose receiver as called for in the Merchant Shipping (Radio) Rules 1952. In addition to its application as a marine receiver under the type number MS6, the unit is also suitable for general use in fixed stations, in which application it is known as type CR-3A. Minor differences occur in the two types of receiver in order to provide the different time-constant A.G.C. functions required. The differences are detailed in sub-section 3.1.

Two power supply units are available for operating the receiver, one for use on a 24V. D.C. supply and the other for operation on 100V. and 200 to 260V., 40 to 60 cycle A.C. mains. The power supply units are built into matching cabinets and are designed to stand alongside the receiver.

1.2 Frequency Ranges

The twelve frequency ranges incorporated in the receiver are as follows:-

Range	Frequency Limits	Coverage	Ratio
1	12 - 60 Kc/s	48 Kilocycles	5.00
2	100 - 255 Kc/s	155 Kilocycles	2.55
3	250 - 630 Kc/s	380 Kilocycles	2.52
4	625 - 1650 Kc/s	1025 Kilocycles	2.64
5	1.6 - 4.2 Mc/s	2600 Kilocycles	2.63
6	4.0 - 7.9 Mc/s	3900 Kilocycles	1.98
7	7.7 - 11.6 Mc/s	3900 Kilocycles	1.51
8	11.4 - 15.3 Mc/s	3900 Kilocycles	1.34
9	15.1 - 19.0 Mc/s	3900 Kilocycles	1.26
10	18.8 - 22.7 Mc/s	3900 Kilocycles	1.21
11	22.5 - 26.4 Mc/s	3900 Kilocycles	1.17
12	26.2 - 30.1 Mc/s	3900 Kilocycles	1.15

1.3 Summary of performance

Frequency Coverage: 12 to 60 Kc/s and 100 Kc/s to 30.1 Mc/s in twelve ranges. The receiver is capable of receiving type A1, A2, and A3 emissions on all ranges.

Intermediate Frequency:

(a) 85 Kc/s on the first three ranges, covering 12 to 60 Kc/s and 100 to 630 Kc/s.

(b) On the remaining bands the receiver is of the double conversion type; 1st I.F. - 585 Kc/s, 2nd I.F. - 85 Kc/s.

I.F. Channel Selectivity: Four alternative bandwidths are provided and selected by a switch. The characteristics are summarised in table 1 at the end of this subsection

Image Ratio:

12 Kc/s to 4.2 Kc/s	80 db.
4.0 Mc/s to 15.3 Mc/s	60 db.
15.1 Mc/s to 22.7 Mc/s	50 db.
22.5 Mc/s to 30.1 Mc/s	40 db.

I.F. Rejection Ratio:

(a) Not less than 90 db. when the I.F. is 585 Kc/s.

(b) Not less than 60 db. when the I.F. is 85 Kc/s.

Sensitivity: The standard output of 50mW. is obtained with the A.G.C. switch is in the OFF position and with the R.F. and A.F. gain controls in the fully clockwise positions, when the following inputs expressed in db. above 2 μV. are applied.

Frequency	Type A1 Wave		Type A2 Wave	
12 - 160 Kc/s	30 db.	(32 μV.)	----------	
160 - 1500 Kc/s	20 db.	(10 μV.)	30 db.	(32 μV.)
1.5 - 10.0 Mc/s	10 db.	(3.2 μV.)	20 db.	(10 μV.)
10.0 - 30.1 Mc/s	2o db.	(10 μV.)	30 db.	(32μV.)

Signal/Noise Ratio: *

12 to 60 Kc/s. Signal + noise/noise 3 db. for 5 to 10 μV. input.

100 Kc/s to 4 Mc/s. Signal + noise/noise 3 db. for 1 to 3 μV. input. (FILTER switch at "intermediate").

4 to 30.1 Mc/s Signal + noise/noise 5 db. for 1 to 3 μV. input. (Filter switch at "intermediate.")

* The signal/noise ratio of the receiver is measured under the following conditions.

(a) Below 4 Mc/s the dummy aerial is a 400 uuF. Capacitor.

(b) Above 4 Mc/s. the dummy aerial is a 75 ohm non-inductive resistor.

(c) Type A2 signals are modulated 30% at 400 cycles.

(d) Standard output is 1 mW. at the headphone jack.

Automatic Gain Control: The A.G.C. system is such that the output rises by thess than 10 db. for an input change from 10 μV. to 0.1V (80 db.)

This does not apply on range 1 (12 to 60 Kc/s) where A.G.C. is not normally used.

Blocking: The change in the receiver output will not exceed 3 db. under either of the following conditions.

(a) The FILTER switch is set to "intermediate" and the A.G.C. switch ON. The receiver is adjusted for the standard output with a type A2 input signal at a level of 1 mV. At any frequency above 160 Kc/s. A type A1 signal at a level of 100 mV. At 10 Kc/s above or below the original signal is simultaneously applied.

(b) The Filter switch is set to "narrow" and the A.G.C. switch to OFF. The receiver is adjusted for the standard output with a type A1 input signal at a level of 30 μV. at any frequency in the tuning range below 160 Kc/s. A type A1 signal at a level of 30,000 μV. at 5 Kc/s above or below the original signal is simultaneously applied.

Cross Modulation: The receiver will not produce an output level greater than -30 db. under the following conditions.

The FILTER switch is set to "intermediate" and the A.G.C. switch OFF. The receiver is adjusted for the standard output with a type A2 input signal of 1 mV. At a frequency above 160 Kc/s. The modulation is removed and a type A2 signal at a level of 30 mV. 10 Kc/s. above or below the original signal is simultaneously applied.

Intermodulation: The receiver output will not exceed the standard output under the following conditions.

The FILTER switch is set to "intermediate" and the A.G.C. switch to OFF. The receiver is adjusted for the standard output with a type A2 input signal at a level of 30 μV. at any frequency between 160 and 550 Kc/s. This signal is removed and any two interfering signals, one of each type and one of type A2, each at a level of 0.3V. are simultaneously applied. The frequencies of the two signals are such that they give no appreciable output when applied alone, but their frequency sum or difference is equal to the frequency of the original signal.

Fidelity: The A.F. response of the receiver is within 6 db. for frequencies between 330 and 2,500 cycles.

Non-linear Distortion: With the A.G.C. inoperative and the receiver adjusted for the standard output, the harmonic distortion is less than 5% for a signal modulated 30% at 400 cycles and at an input level in the range 30 to 10,000 μV. for 80% modulation under the same conditions the harmonic distortion does not exceed 15%

Radiation: The receiver does not produce a field exceeding 0.1μV./metre at a distance of one mile.

Tuning Drift and Stability:

(a) After the receiver has been switched on for 5 minutes, the frequency drift in any subsequent 5-minute period will not exceed 0.03% for frequencies below 1.6 Mc/s and 0.01% for frequencies above 1.6 Mc/s.

(b) A 5% change in the supply voltage will not cause a frequency drift greater than the figures quoted in (a).

(c) After 1 hours run, a temperature change of 5°C. within the range 0°C. to 50°C. will not produce a frequency change of more than 0.1% for frequencies below 1.6 Mc/s and 0.03% for frequencies above 1.6 Mc/s.

Tuning Accuracy: The backlash in the tuning mechanism does not exceed 0.5 degree at the tuning knob.

Calibrator: Harmonics of a 500 Kc/s crystal oscillator provide checking points at 500 Kc/s intervals from 500 Kc/s to 30.1 Mc/s.

Noise Limiter: The level at which limiting takes place is set to provide the optimum average working conditions.

Audio Output: 1mW. into high-impedence headphones, 100 mW. into a loudspeaker.

TABLE 1

Table of FILTER switch Settings.

Attenuation in db.	Wide	Intermediate	Narrow	Very Narrow
6	± 4.0 Kc/s	± 1.5 Kc/s	± 0.75 Kc/s	± 0.25 Kc/s
30	± 8.9 Kc/s	± 4.0 Kc/s	± 2.0 Kc/s	± 1.0 Kc/s
60	± 16.0 Kc/s	± 8.0 Kc/s	± 4.0 Kc/s	± 2.0 Kc/s
90	± 32.0 Kc/s	±16.0 Kc/s	± 8.0 Kc/s	± 4.0 Kc/s

1.4 Power Requirements

(a) With Power Converter Unit type H95151

Input: 24V. D.C. at 2.9 amperes.

(b) With Power Converter Unit type H95152

Input: 100 to 120V. or 200 to 260V., 40 to 60 cycles.

Power Consumption: 90W. at 240V. 50-cycle input.

1.5 Dimensions and Weights

(a) Receiver type C95150

Height:	12"
Depth:	16" excluding knobs and connectors
Width:	16¼"
Weight:	74 lb.

(b) Power Converter Unit type H95151 or H95152

Height:	12"
Depth:	15"
Width:	6"
Weight:	26 lb.

1.6 Valve and Vibrator Complement

(a)

Valve	Type	Function
V1	6BA6	1st R.F. Amplifier
V2	6BA6	2nd R.F. Amplifier
V3	6AE8	1st Mixer
V4	6C4	1st Oscillator
V5	6BA6	1st I.F. Amplifier
V6	6BA6	2nd I.F. Amplifier
V7	6AU6	3rd I.F. Amplifier
V8	6AL5	Detector and Noise Limiter
V9	6AU6	1st A.F. Amplifier
V10	6C4	2nd A.F. Amplifier
V11	6AE8	2nd Mixer/Oscillator
V12	6AE8	B.F.O. and Buffer Amplifier
V13	6AU6	A.G.C. Amplifier
V14	6AL5	A.G.C. Rectifier

Total Valve Complement for Receiver

4 type 6BA6
2 type 6C4
3 type 6AU6
3 type 6AE8
2 type 6AL5

(b) Power Converter Unit type H95151

V1	Valve type OC3/VR105
VIB.1, VIB.2	Vibrators type V6524

(c) Power Converter Unit type H9152

Valve	Type	Function
V1	5Y3G	Rectifier
V2	OC3/VR105	Voltage regulator

1.7 Mechanical Construction

An unorthodox method of construction has been chosen for this receiver in order to provide a rigid assembly capable of withstanding heavy vibration and mechanical shocks. The open method of construction used provides easy access to all parts of the receiver for maintenance purposes. The main frame, which carries the front pane and controls, slides into a metal case, which is arranged foe screwing onto a wooden desk or table.

(a) Main Frame

The main framework of the receiver consists of two flanged plates held together by four tubes, the tubes being extended forward to provide mountings for the front cover. The front and rear flanged plates provide a mounting for the hollow shaft on which the coil turret revolves, and also for four sub-chassis assemblies as follows:-

(a) Radio-frequency unit.
(b) Four-gang capacitor unit with gearbox and tuning mechanism.
(c) 1st I.F. and 85 Kc/s block filter unit
(d) Main I.F. unit and audio unit

The calibrated frequency scale and all controls are mounted on the forward side of the front plate, while the aerial and power input connectors are mounted on the rear of the plate.

(b) The turret accommodates 12 coil ranges, each range consisting of four coil units. The turret itself consists of a central tube carrying five discs, the space between the discs being further divided by 12 plates to form 48 housings for the coil units. The plates carrying the coil units are attached to the turret by self-tapping screws engaging with the edges of the dividing plates. The eads to the coils are brought out

to sterling silver contact heads fitted in insulating panels riveted to the coil mounting plates. When the turret I rotated these contacts engage with phosphor-bronze contact fingers mounted on the radio-frequency unit.

The coil turret is mounted on a hollow axle, the ends of which pass through the front and rear plates forming the main frame. The axle is held in place by the "U" bolts. When the axle is withdrawn the coil turret can be removed bodily from the receiver.

(c) Turret Drive Mechanism

The turret drive mechanism consists essentially of a modified Geneva movement. A wheel with 12 slots is fixed to the coil turret. The range selector control operates a disc which carries two ball races set at opposite points of the periphery of a circle. These ball races form driving pegs by engaging in the slots of the wheel attached to the coil turret. This form of drive has a high mechanical advantage at the time when the coil contacts are being engaged or broken. The mechanism gives two stop positions for each revolution of the driving shaft. The steel ball which falls into one or the other of the two detents in the periphery of the driving disc. The lifting of the ball when the range selector control is operated is arranged to open two pairs of contacts, which break the H.T. supplies to early stages of the receiver while the turret is moving.

(d) Tuning Capacitor Drive

Four variable capacitors are used to tune the receiver, consisting of a three-gang capacitor mechanically coupled to a single unit. The tuning control is coupled to the ganged capacitor through 20/1 reduction gear chains. Two parallel gear chains are used, and are wound up against each other by a tension spring to provide against backlash. Two small balls embedded in one of the driven gear wheels are arranged force forward a sprag when the ganged units near each end of their travel. This sprag interferes with a peg set in the back of the boss carrying the circular logging scale, and limits the gang rotation to 174 degrees and the rotation of the varying shaft to slightly less than 10 turns. The tuning knob is weighted to give some fly-wheel action, and has a slipping clutch in the form of a spring loaded ball engaging in a V groove.

(e) Radio-Control Unit

This assembly has four sets of fixed contacts which engage with silver studs on the coil units. The chassis is provided with adjustable mounting screws so that the correct pressure on the contacts may be obtained. The correct angular setting of the turret contacts can be achieved by moving the slotted wheel relative to the turret assembly.

(f) 1st I.F. and 85 Kc/s Block Filter Unit

This unit carries two Oak switches. The longer one provides four alternative bandwidths in the block filter. The shorter one is coupled by a flexible stainless

shaft cable to rotate with the coil turret, and bridge the 585 Kc/s I.F. stage into operation on bands 4 to 12 inclusive. A pair of 1:1 gears take the drive from the turret to a small auxiliary shaft mounted through the front plate. The drive to the switch is taken from this auxiliary shaft.

(g) I.F. /Audio Unit

This unit comprises the I.F. amplifier and audio frequency amplifier sections of the receiver, together with the A.G.C. and B.F.O. facilities. The controls for these parts of the receiver are located in other parts of the equipment, which is mounted directly at the front of this section with an extension shaft protruding through the front panel.

(h) Frequency Scales

Twelve frequency scales and a logging scale are printed on a rectangular perspex plate. A vertically displaced pointer traverses these scales. The pointer is driven at each end by a nylon-glass cord wound on a drum in the tuning drive mechanism. The scale corresponding to the selected frequency range is high-lighted by a horizontally-disposed sight board, which moves vertically in sympathy with the rotation of the coil turret. The sight board is driven from the auxiliary shaft mentioned in (f) above via nylon-glass cords. A logging scale is provided, and consists of two parts. The first part is a linear scale with areas marked 0 to 9 displaced immediately below the frequency scales and traversed by the vertical pointer. The second part is a 4-inch disc coupled to the main tuning knob. The disc has a circumferential scale of 100 divisions and is viewed through a window above the knob. The circular scale makes 10 revolutions while the vertical pointer traverses the linear scale. The two scales in combination provide an extended scale of 0 t0 1,000 divisions with an equal length of approximately 125 inches.

These parts of the scales which are occupied by the marine service bands are marked by a thickening of the base line of the scale. A "notch" in the thickened section indicates the approximate portion of that part of the band reserved for calling.

(i) Power Converter Units

These units are constructed on small folded chassis attached to the rear of the front panel. The form of construction is conventional, and the units slide into a steel case similar in styling and finish to that of the receiver unit.

2. INSTALLATION AND OPERATION

2.1 Installation

The receiver and the power converter units are designed for bolting or screwing directly to a wooden desk or plinth. The receiver and the appropriate power converter unit may be mounted side by side, being of the same height and styling. A minimum space of approximately 4 inches should be left behind the units for the connecting cables.

Alternatively the power converter unit may be mounted elsewhere, within the range of the interconnecting cable supplied

Interconnections between the power converter unit and the receiver are carried on a 2' 6" long cable and plug assembly supplied with the equipment. In the case of the Power Converter Unit type H95151, the external connections to the system, excepting the aerial, are carried on a second cable assembly, one end of which carries a plug to mate with the connector CM1 on the unit, while the other end is intended to be connected to a terminal strip on the wall of the station.

Where a Power Converter Unit type H95152 is used, the 6' long three-core mains cable should be plugged into a convenient three-way mains socket. External connections to the system (muting relay energisation and 600 ohm output) should be made through the back of the 12-way plug at the power converter unit end of the interconnecting cable assembly. The unit must be adjusted for the correct input voltage as detailed on Drg. 95152D1.

The aerial feeder should be of type PT11m coaxial cable or similar, and is connected to the socket at the rear of the receiver through a series B50868 coaxial connector supplied with the equipment. The receiver muting relay normally fitted is for operation on 24V D.C. After the installation of the equipment has been completed, the de-sensitising control RT2, which is made accessible by removing a screw in the front panel of the receiver, should be adjusted for satisfactory operation of the listening-through facility.

2.2 Operation

2.2.1 Controls on Power Converter Unit type H915151

OFF/L.T.ON/H.T.ON

Controls the application of power to the unit. A pilot lamp indicates the operation of the two steps of the switch. In the centre position, L.T. only is applied to the receiver, and in the third position H.T. is also applied.

The switch is arranged so that when passing from the L.T. ON position, a starting resistor R1 is momentarily inserted to limit the starting current surge when the vibrator starts up.

VIB.1/VIB.2	This control enables the vibrators installed in the unit to be changed over. The changeover can only be accomplished when the "power" switch is in the OFF positions a shutters closes the hole in the front panel which gives access to the change over switch.

2.2.2 Controls on Power Converter Unit H95152

HEATERS	This switch applies power to the primary of the transformer. L.T. is applied to the receiver and a pilot lamp lights to indicate the function.
H.T.	Controls the application of H.T. to the receiver. In the OFF position, a dummy load is substituted for the load of the receiver. In the ON position, a pilot lamp lights to indicate H.T. ON.

2.2.3 Controls on Receiver type C95150

RANGE	Select the frequency range required. The selected range is highlighted by a white sight board behind the scale.
Tuning Control (Unmarked)	This control operates in conventional manner. Refer to Operating Notes below for further details.
R.F.	This control adjusts the gain of the two R.F. amplifier stages, and the first two I.F. stages.
A.F.	Controls the input to the 1st audio amplifier.
FILTER	Selects one of four alternative bandwidths in the 85 Kc/s filter. Refer to Operating Notes below for further information.
AERIAL	Adjusts the tuning of the aerial input stage. Adjust the control for optimum results when the required station has been tuned in.
A.N.L.	Brings a series-type noise limiter into action. This feature is useful in reducing impulse-type noise such as that caused by electrical machinery. The level at which limiting occurs is fixed.
B.F.O. (switch)	Brings the beat-frequency oscillator into action for the reception of A1 waves
B.F.O. (tuning)	Controls the frequency of the beat note produced by the injection of the beat-frequency oscillator signal.
A.G.C.	Brings automatic control into operation.

CAL.	This switch controls a 500Kc/s crystal oscillator, which is capable of supplying check points at 500 Kc/s intervals from 500 Kc/s to 30.1 Mc/s for purposes of scale calibration.
SPKR.	Enables the loudspeaker to be switched off, leaving headphone reception only available.

2.2.4 Operating Notes.

(a) Power Converter Unit type H95151.

Power input to the vibrator section of this unit is protected by a 2A. cartridge fuse F1. Failure of the receiver to operate, coupled with a failure of the "power on" pilot lamp P1 to light, will probably indicate the breaking of this fuse. A switch S2 with a slotted shaft, accessible through a hole in the front panel of the unit, allows rapid changeover from one vibrator unit to the other. The changeover control is accessible only when the "power" switch is on the OFF position, preventing changeover during full load operation.

The 24V. D.C. input to the receiver is protected by fuse F2, loaded 2A. Failure of the valves in the receiver to light up, coupled with a failure of the "L.T. on" pilot lamp P2, will probably indicate the breaking of this fuse. A slight mauve glow should be present in the gaseous regulator valve V1 at all times when the equipment is operating. Note that running the power converter unit without the receiver or equivalent load connected may cause damage to the unit. Both fuse holders are fitted on the chassis of the unit and are accessible when the unit is withdrawn from its case.

(b) Power Converter Unit type H915152

The A.C. power input to the unit is protected by fuse F1, loaded 3A. The fuse is located on the front panel. A failure of this fuse will remove power to the installation. See the notes in (a) above regarding the gaseous regulator valve and running the unit without a load.

(c) Receiver type C95150

On ranges 1 to 3 the I.F. is 85 Kc/s. On range 1 (12 to 60 Kc/s) the R.F. selectivity is provided by a low-pass filter system with a cut-off frequency of 70 Kc/s. On this range the first oscillator is the only tuned stage. On ranges 2 and 3, only one R.F. stage is used, and two tuned circuits arranged as a band-pass pre-selector are place ahead of the R.F. stage. This is done to increase the protection against intermodulation and harmonic production.

On ranges 4 to 12 inclusive, the receiver is of the double-conversion type, with a first I.F. of 585 Kc/s and a second I.F. of 85 Kc/s.

The tuning scale is calibrated in frequency, and a logging scale is included to assist in identification and resetting, as described in sub-section 1.7 (h). it is suggested that a

permanent record be kept at the station of the logged dial readings for the stations generally used.

As will be seen from sub-section 1.2, the maximum frequency coverage per range is 3,900 Kc/s, on ranges 6 to 12 inclusive. Ten turns of the tuning control are required to transverse the dial, so that each degree of rotation of the control corresponds to 1.083 Kc/s. On the high- frequency ranges, where use is made of the 1,000-division logging scale, the frequency spread of 3,900 occupies an equivalent length of 125", i.e. 1 inch corresponds to 31 Kc/s.

Table 1 in sub-section 1.3 shows the characteristics of the four-position 85 Kc/s block filter. There is no firm rule for the use of such a control, but generally speaking the narrowest possible bandwidth will be used to give the best signal/noise ratio and intelligibility. The four positions will most generally be used as follows:-

Very Narrow	A1 transmissions only
Narrow	A1 and A2
Intermediate	A2 and A3
Wide	A3

The R.F gain control should be set to the position which gives a good signal/noise ratio combined with a good signal level. By controlling the gain in the early stages of the receiver, this control will also decide the point at which the A.G.C. becomes operative. Note that it is not necessary to switch off the A.G.C facility when using the B.F.O.

Always investigate the reason for the operation of a fuse before making replacement and attempting to bring the equipment back into operation.

3. TECHNICAL DESCRIPTION

3.1 Receiver type C95150

The input stages of the receiver consist of two R.F amplifier stages V1 and V2. The first mixer stage V3 follows, and combines the output of the first local oscillator V4 with the incoming signal to produce the first I.F. The first I.F. is 85 Kc/s on ranges 1 to 3 and 585 Kc/s on ranges 4 to 12.

On ranges 1 to 3 (12 to 630 Kc/s), the first I.F. at 85 Kc/s is applied via an 85 Kc/s filter consisting of inductors L1 to L5 and associated components to the first I.F amplifier stage V5. The 85 Kc/s filter regulates the selectivity of the receiver, and is equipped for four bandwidths selected by a switch. Refer to table 1 in sub-section 1.3 for the characteristics of the filter unit.

The R.F. stages are untuned on range 1 (12 to 60 Kc/s), R.F. selectivity being provided by a low-pass filter system with a cut-off frequency of 70 Kc/s together with an 85 Kc/s trap circuit. The only tuned element on this range is the tuning control of the first oscillator V4.

The first R.F amplifier V1 is out of circuit on ranges 2 and 3, only one R.F. stage V2 being used. The input circuit to V2 is arranged as a band-pass pre-selector. This is done to provide increased protection against intermodulation and harmonic production.

On ranges 4 to 12 (625 Kc/s to 30.1 Mc/s) the first I.F. at 585 Kc/s, is applied via a 585 Kc/s filter to the second mixer/oscillator stage V11 for conversion to 85 Kc/s, and is then applied through the 85 Kc/s filter as before. The second oscillator consists of a 500 Kc/s crystal oscillator, the output of which is also used, when the calibrator switch is closed, to provide 500 Kc/s. calibration points over the range from 500 Kc/s to 30.1 Mc/s.

Three I.F. amplifiers precede the detector and noise limiter stage V8. The noise limiter is of the series diode type, the level at which limiting takes place being fixed. The output of the beat oscillator/buffer amplifier valve V12 is mixed with the 85 Kc/s I.F. at the anode of the third I.F. valve V7.

The output of the second I.F. amplifier is applied to V13 in addition to V7. V13 is an A.G.C. amplifier stage, the output being rectified by V14 and applied to the two R.F. amplifier stages and to the first and second I.F. amplifier stages.

A two-stage audio amplifier follows the detector, outputs being provided for a loud speaker and two pairs of high impedance headphones. A Muting relay REL1 operates in conjunction with the desensitising control R2 to mute the receiver when an associated transmitter is keyed, to permit "Listening through". A switch S8 removes H.T. to the early stages of the receiver when the range selector control is used.

Note that when the receiver is used in marine installations the long relaxation time required in the A.G.C. circuit is provided by making the value of resistors R77 and R81 2.2 megohms, whereas in the commercial applications of the receiver, the value of these resistors is 220,000 ohms.

3.2 Power Converter Unit type H95151

This unit consists of a vibrator type H.T. power supply for the receiver, operating from a 24V. D.C. source. The 24V.suuply is filtered before application to the unit and is then switched by switch S1. In the L.T. ON position, the switch applies 24V. via fuse F2 to the receiver to operate the valve heaters. Pilot lamp P2 lights to indicate L.T. ON.

In the H.T. ON position of the switch , H.T. is applied to the receiver. The switch is so arranged that resistor R1 is momentarily inserted as the switch is moved to the H.T. ON position, and functions as a starting resistor. The unit provides a 240V. unregulated and a 105V. regulated supply, the latter being controlled by the gaseous regulator valve V2. Two vibrators are installed in the unit, and a switch S2 permits rapid changeover from one to the other in the event of failure. Switch S2 can only be operated when switch S1 is in the OFF position. The loudspeaker for the receiver is mounted in this unit.

3.3 Power converter Unit type H915152

This unit is a power pack of conventional design for operation on the A.C. mains. The heater supply for the receiver valves is taken from transformer T1 at 24V. to avoid re-arrangement of the heater chain. Two H.T. supplies identical with those available from the H91551 Power Converter Unit are provided. The HEATERS switch S1 applies power to the primary of the transformer T1. The heater supply to the receiver is then available and pilot lamp P1 lights. The H.T. switch S2 controls the application of H.T. to the receiver, switching in a dummy load R1 when receiver H.T is not applied. The H.T. ON condition is indicated by pilot lamp P2. As before, the loudspeaker is incorporated in this unit.

4. MAINTENANCCE

4.1 General

The information given in this section is intended to assist in keeping the receiver in operation and in good condition. The voltage and current analyses will assist in fault-finding, and the other sub-sections deal with the more important mechanical and electrical features of the equipment.

Care should be taken if any of the screened leads in the receiver be replaced that similar cable be used, and that the same length is installed. This is particularly important in the case of the leads to the A.N.L. switch S5. Here the capacitance of the cable plays a large part in determining the audio response of the receiver, and has been allowed for in the design. The leads are wired with type PT9 coaxial cable having a capacitance of 29 uuF. Per foot.

Wafer type rotary switches whose movement has become stiff should receive a drop or two of light oil on the bearing and "clicker" plate. Take care does not reach the contacts or wiring. Contacts may be cleaned by brushing them with a solution of one part of lanoline by volume to twelve parts of carbon-tetrachloride, using the cleaner sparingly and operating the switch while the carbon-tetrachloride dries off. The lanoline remains as a lubricant. Adjustment of the contacts of these switches is not recommended, and the whole switch wafer should be replaced if trouble is experienced.

The muting relay contacts should be cleaned periodically with carbon-tetrachloride (NOT the lanoline solution mentioned above) applied with a fine brush. They may then be burnished by drawing between them a smooth piece of paper. Take care not to distort the contacts. Keep the armature and pole-piece clean.

The gearing in the tuning capacitor drive and the range selecting mechanism should be sparingly lubricated from time to time. Make sure that excess oil does not fall onto wiring or switches. Access to the mechanism and components mounted behind the front panel may be gained by removing the panel in the manner described in paragraph 4.9.1

Transformers and inductors housed in square screening cans have their connecting tags numbered according to the code on Dr. 9510H1. The plate of insulating material through which the tags project carries a coloured dot, the dot indicating tag number 1. The other tags are numbered 2 to 6 in anti-clockwise direction from tag number 1, when the assembly is viewed from the underside of the chassis.

4.2 Voltage Analysis

The voltage listed in this sub-section are typical of the readings which may be expected. They are subject to valve and component tolerances, and are therefore intended mainly as a guide to correct operation.

(a) Typical Voltages. Receiver type C9150

The voltages listed below were measured with a 1000-ohm/volt multimeter from the point listed to chassis, unless otherwise stated. The numbers in parentheses refer to the valve pin and socket numbering.

VALVE	CATHODE		METER RANGE	SCREEN	ANODE	METER RANGE
V1	1.2V.	(2,7)	10V.	95V. (6)	205V. (5)	400V.
V2	1.2V.	(2,7)	10V.	95V. (6)	205V. (5)	400V.
V3	1.5V.	(3,8)	10V.	95V. (1)	230V. (6)	400V.
V4	zero	(7)	----	----	95V. †	400V.
V5	1V.	(7)	10V.	60V. (6)	220V. (5)	400V.
V6	2.9V.	(7)	10V.	85V (6)	230V. (6)	400V.
V7	3.5V.	(7)	10V.	145V (6)	235V. (5)	400V.
V8						
V9	1.5V.	(7)	10V.	40V. (6)	25V. (5)	400V.
V10	8V.	(7)	10V.	----	240V. (1,5)	400V.
V11	zero	(3)	----	90V. (1)	235V. (6) ‡	400V.
V11 Osc.	zero	(3)	----	----	50V. (8) ‡	400V.
V12	6.7V.	(3)	10V.	75V. (1)	230V. (6)	400V.
V12 Osc.	6.7V.	(3)	10V.	----	70V. *	400V.
V13	1.7V.	(7)	10V.	130V.(6)	210V. (5)	400V.
V14A	40V	(5)	400V.	----	----	----
V14B	30V.	(1)	400V.	----	----	----

† Measured at C21.
‡ Measured at C109.
* Range switch on range 4.

(b) Typical Voltages, Power Converter Unit type H95151

T1 secondary	295V. A.C.
Rectifier W1, red terminal	240V. D.C.
C11 positive terminal	245V. D.C.
V1 anode	105V. D.C.

(c) Typical Voltages, Power Converter Unit type H915152

V1, pin 4	240V. A.C.
V1, pin 6	240V. A.C.
V1, pin 8	300V. D.C.
CF1, pin 11	240V. D.C.
CF1, pin 9	105V. D.C.
CF1, pin 12	24V. A.C.

4.3 Continuity Checks, receiver type C95150

FROM	TO	RESISTANCE	CONDITION
Aerial Socket	Chassis	100,000	Range 1
Aerial Socket	Chassis	2,200	Range 2
Aerial Socket	Chassis	1,000	Range 3
Aerial Socket	Chassis	330	Range 4
Aerial Socket	Chassis	150	Range 5
Aerial Socket	Chassis	Very low	Ranges 6 - 12
CM1 pin 6	CM1 Pin 8	Very low	----
CM1 Pin 1	CM1 pin 2	15.3	----
CM1 pin 3	CM1 pin4	70	----
V1 pin 1	Chassis	470,000 912,000 ‡	A.G.C. off A.G.C. on
V1 pins 2,7	Chassis	100-3,100	Operate R.F. gain
V1 pin 5	H.T. + 240V.	6,700	Range 1
V1 pin 5	H.T. + 240V.	4,700	Ranges 2 - 12
V1 pin 6	H.T. + 105V.	4,700	----
V2 pin1	Chassis	470,000 917,000 ‡	A.G.C. off A.G.C. on
V2 pins 2,7	Chassis	100-3,100	Operate R.F. gain
V2 pin 5	H.T. + 240V.	6,700	Range 1
V2 pin 5	H.T. + 240V.	4,700	Ranges 2 - 12
V2 pin 6	H.T. + 105V.	4,700	----
V3 pin 1	H.T. + 105V.	4,700	----
V3 pin 2	Chassis	2,700	Range 1
V3 pin 2	Chassis	Very low	Ranges 2 - 12
V3 pins 3,8	Chassis	220	----
V3 pin 6	H.T. + 240V.	4,700	----
V3 pin 7	Chassis	35,200	----
V4 pins 1,5	H.T. + 105V.	4,700	----
V4 pin 6	Chassis	35,200	----
V4 pin 7	Chassis	Zero	----
V5 pin 1	Chassis	100,000	A.G.C. off
V5 pin 2	Chassis	Zero	----
V5 pin 5	H.T. + 240V	4,700	----

FROM	TO	RESISTANCE	CONDITION
V5 pin 6	H.T. + 240V.	50,000	----
V5 pin 6	Chassis	50,000	----
V5 pin 7	Chassis	100-3,100	Operate R.F. gain
V6 pin 7	Chassis	108,000	A.G.C. off
V6 pin 2	Chassis	Zero	----
V6 pin 5	H.T. + 240V.	4,700	----
V6 pin 6	H.T. + 240V.	50,000	----
V6 pin 6	Chassis	50,000	----
V6 pin 7	Chassis	680-3, 680	Operate R.F. gain
V7 pin 1	Chassis	8,000	----
V7 pin 2	Chassis	Zero	----
V7 pin 5	H.T. + 240V.	4,700	----
V7 pin 6	H.T. + 240V	100,000	----
V8 pin 1	Chassis	1,520,000	A.G.C. off
V8 pin 1	Chassis	38,000	A.N.L. on
V8 pin 2	Chassis	68,000	----
V8 pin 5	Chassis	Zero	----
V8 pin 7	Chassis	38,000	----
V9 pin 1	Chassis	0-500,000	Operate R.F. gain
V9 pin 2	Chassis	Zero	----
V9 pin 5	H.T. + 240v.	320,000	----
V9 pin 6	H.T. + 240V.	680,000	----
V9 pin 7	Chassis	2,200	----
V10 pin 1,5	H.T. + 240V.	380	----
V10 pin 6	Chassis	470,000	----
V10 pin 7	Chassis	820	----
V11 pin 1	H.T. + 105V.	4,700	Ranges 4 - 12
V11 pin 2	Chassis	133,000	----
V11 pin 3	Chassis	Zero	----
V11 pin 6	H.T. + 240V.	4,700	Ranges 4 - 12
V11 pin 7	Chassis	133,000	----
V11 pin 8	H.T. + 105V.	38,000	CAL. On
V12 pin 1	H.T. + 105V.	100,000	----
V12 pin 2	Chassis	Zero	----
V12 pin 3	Chassis	22,000	----
V12 pin 6	H.T. + 240V.	4,700	----
V12 pin 7	Chassis	1,022,000	----
V12 pin 8	H.T. + 105V.	33,000	B.F.O. on
V13 pin 1	Chassis	8,000	----
V13 pin 5	H.T. + 240V.	4,700	----
V13 pin 6	H.T. + 240V.	47,000	----
V13 pin 7	Chassis	220	----
V14 pin 1	Chassis	22,000	----
V14 pin 1	H.T. + 240V.	65,000	----
V14 pin 2	Chassis	220,000 *	A.G.C. on
V14 pin 5	Chassis	32,000	----

FROM	TO	RESISTANCE	CONDITION
V14 pin 5	H.T. + 240V.	69,000	----
V14 pin 7	Chassis	220,000 *	A.G.C. on

* 2.2 M. ohm in marine applications.
‡ 2.9 M. ohm in marine applications.

4.4 R.F. Sensitivity Check

Table II lists typical input levels required in the R.F. stages of the receiver to produce specified outputs as measured on an 0-100uA. meter plugged into monitor point CF2. The meter should have an internal resistance of 1,600 ohms, and should be shunted by a 2,000 ohm resistor. The receiver should be set up with R.F. and A.F gain controls in the fully clockwise positions and with B.F.O., CAL., and A.G.C. switches in the OFF positions. The input signals should be modulated 30% at 400 c/s.

Inputs are given in the table for the grids of valves V1 to V3 inclusive. The average input voltages at the aerial socket for the corresponding reading on the meter at the monitor point CF2 are as follows:-

Range 1	14 Kc/s, aerial input 30 uV.
	40 Kc/s and 60 Kc/s, aerial input 10 uV.
Range 2 and 3	Aerial input 3 uV.
Ranges 4 to 12	Aerial input 1 uV.

The oscillator grid current reading as measured on 0-100 uA. Meter of 1,600 ohms internal impedance plugged into monitor point CF1 is also given. On ranges 1 to 5 inclusive, a 400 uuF. capacitor used as a dummy aerial, and a 75-ohm non-inductive resistor is used on the other ranges.

The figures given are average figures only, and case may be found where a receiver will operate satisfactorily even when the figures vary considerably from those quoted. These figures should be regarded merely as a guide to correct operation. Average stage gains may be deduced from these figures.

TABLE II

Sensitivity figures. R.F. Stages

Range	Frequecy	Filter	Osc. Ig. At CF1	Mixer	RF1	RF2	Meter at CF2
1	14 Kc/s	N	250	150	----	----	17
1	40 Kc/s	N	290	150	----	----	16
1	60 Kc/s	N	300	120	----	----	13
2	110 Kc/s	N	460	160	8.5	----	30
2	180 Kc/s	I	490	210	9	----	36
2	240 Kc/s	I	500	180	7	----	36
3	270 Kc/s	I	320	160	11	----	27
3	450 Kc/s	I	370	160	11	----	30
3	610 Kc/s	I	450	180	9	----	32
4	680 Kc/s	I	260	120	19	3.2	48
4	1140 Kc/s	I	330	200	25	4.2	75
4	1600 Kc/s	W	330	200	27	4	74
5	1.7 Mc/s	W	230	75	13	2.6	30
5	2.8 Mc/s	W	320	120	21	3.5	50
5	4.0 Mc/s	W	475	230	30	4.7	73
6	4.2 Mc/s	W	220	110	26	6	30
6	6.0 Mc/s	W	290	200	39	8.1	63
6	7.6 Mc/s	W	340	300	48	7.8	75
7	7.9 Mc/s	W	250	120	25	6.5	33
7	9.7 Mc/s	W	310	140	32	7	41
7	11.3 Mc/s	W	350	200	33	6	68
8	11.6 Mc/s	W	210	50	17	5.2	17
8	13.4 Mc/s	W	260	50	16	5.8	17
8	15.0 Mc/s	W	290	90	16	5	27
9	15.3 Mc/s	W	240	150	33	7.5	48
9	17.1 Mc/s	W	270	115	30	5.8	47
9	18.7 Mcv/s	W	300	170	30	5.0	66
10	19.0 Mc/s	W	290	100	24	3.3	40
10	21.0 Mc/s	W	320	90	20	4.2	40
10	22.5 Mc/s	W	390	100	22	3.6	42
11	22.7 Mc/s	W	250	130	28	3.3	62
11	24.6 Mc/s	W	260	160	28	4.1	72
11	26.1 Mc/s	W	280	150	27	5.2	76
12	26.4 Mc/s	W	220	100	20	2.8	55
12	28.4 Mc/s	W	250	100	16	3.1	58
12	29.8 Mc/s	W	260	100	22	3.8	73

4.5 Checking the A.G.C. and Limiting

The A.G.C. and limiting should be checked by the following means after alignment of the receiver has been carried out, or if the operation of these functions is unsatisfactory.

(i) Disconnect the headphones, and switch off the loudspeaker (switch S7). Connect a 600-ohm non-inductive resistor across contacts 1 and 2 of connector CM1.

(ii) Connect a high-resistance A.C. voltmeter across the 600-ohm resistor.

(iii) Place the R.F. gain control to the fully clockwise position and the B.F.O. and Cal. switches to the OFF position.

(iv) Apply a type A3 signal to the receiver at a level of 10 uV. at any frequency within the tuning range of the receiver, except range 1.

(v) Adjust the A.F. gain control so that the output meter reading is 1.0V.

(vi) Increase the level of the input signal by 80 db. (to 0.1V.) The output should not increase by more than 10 db., corresponding to an output meter reading of 3.16V.

(vii) Change the input signal to type A1 at a level of 20 uV.

(viii) Place the A.G.C. switch to the OFF position.

(ix) Adjust the A.F. gain control so that the output meter reading is 1.0V.

(x) Increase the level of the input signal by 60 db. (to 0.02V.) The output should not increase by more than 19 db., corresponding to an output meter reading of 3.16V .

4.6 Typical I.F. and A.F. Signal Input Levels.

Signal levels in the receiver to produce an output of 50 mW. as described in sub-section 4.4 are listed below. Signals should be applied to the points listed through a 1,000 uuF. silver mica or silver ceramic capacitor. Signal levels were taken with the R.F. and A.F. gain controls in the fully clockwise positions, and with the B.F.O., CAL. And A.G.C. switches in the OFF positions.

Input Point	Frequency	Level	Condition
V9 grid (pin 1)		-30 dbm Ø	
V7 grid (pin 1)	85 Kc/s	14,000 uV.	
V6 grid (L7, pin 1)	85 Kc/s	10,000 uV	
V5 grid (pin 1)	85 Kc/s	360 uV.	
V11 grid (pin 2)	585 Kc/s *	2,000 uV.	
V3 grid (pin 6)	85 Kc/s #	18 uV.	Filter WIDE
V3 grid (pin 6)	585 Kc/s *	9 uV.	Filter NARROW

* Range 5 only, L.F. end.
\# Range 3 only.
Ø This test requires the use of a gain measuring attenuator such as the A.W.A. series P8030.

4.7 Complete Alignment Procedure

The procedure for the complete alignment of the receiver is detailed in the following paragraphs. The standard output used in these adjustments is that used throughout in connection with this receiver, viz., 50 mW. into 600 ohms. This corresponds to a voltage of approximately 5.45V. across a 600-ohm dummy load resistor connected to contacts 1 and 2 of connector CM1. A reading of approx. 7.5 uA. On an 0-100uA. Meter of 1,600 ohms internal resistance plugged into the signal diode monitor point CF2 corresponds to an output of 50 mW. Input signals are modulated 30% at 400 cycles. On no account should the alignment be attempted unless the correct facilities are available.

APPARATUS REQUIRED

(i) Signal generator covering the frequency range of 12 Kc/s to 30.1 Mc/s.

(ii) 0-100 uA. Meter of 1,600 ohm internal resistance (or a meter of lower internal resistance plus an external resistor to make 1,600 ohm.)

(iii) 0-10V. A.C. meter of high internal resistance.

(iv) 75 and 600 ohm ¾-Watt non-inductive resistors.

(v) 400-uuf. silver-mica or silver-ceramic capacitor.

(vi) Alignment tool(s) of correct dimensions.

WARNING

An insulated tool of correct design must be used to carry out alignment adjustments. The use of a metal-bladed screwdriver on the inductor slugs is inadvisable and may cause damage to the equipment.

4.7.1 Alignment of I.F. and A.G.C. Stages

The I.F. amplifier has wide-band characteristics and therefore only slight peaks will be obtained while carrying out the alignment procedure. The alignment of the stages should be carried out in the following manner.

(i) If possible, check the operation and gain of the audio stages of the receiver according to the information given in sub-section 4.6.

(ii) Disconnect the headphones and switch off the receiver (S7). Connect a 600-ohm non-inductive resistor across contacts 1 and 2 of connector CM1.

(iii) Connect a high-resistance A.C. voltmeter across the 600-ohm resistor.

(iv) Place the R.F. and A.F. gain controls to the fully clockwise positions and B.F.O., CAL. And A.G.C. switches to the OFF positions.

(v) Plug the 0-100 uA. Meter into the signal diode monitor point CF2.

(vi) Apply an 85 Kc/s signal modulated 30% at 400 cycles from the signal generator to the grid (pin 1) of valve V7, via a 1,000 uf. Capacitor.

(vii) Adjust the input signal level for an indication of approximately 20 uA. meter at the signal monitor point CF2.

(viii) Adjust the two slugs in transformer T4 for maximum reading on the uA. meter, resetting the input level progressively as required.

(ix) Transfer the signal input to the grid (pin 1) of valve V6, correct the input level as necessary, and adjust the slugs in inductors and maximum redaing on the uA. meter.
L9 & L8

(x) Transfer the signal input to the grid (pin 1) of valve V5, correct the input level as required, and adjust the slugs in inductors L7 and L6 for maximum reading on the uA. meter.

The alignment of the I.F. amplifier is now complete. The bandwidth of the amplifier at +3 db. (1.4 times signal input) is approximately ±8 Kc/s, tuning from 77 to 93 Kc/s. The signal input voltages for the specified output of 50 mW. are given in sub-section 4.6.

(xi) With the signal input still applied to the grid of valve V5, transfer the uA. meter from monitor point CF2 and plug it into one of the monitor points CF3 and CF4, and adjust the signal input level as required. Adjust the slug in inductor L10 for maximum reading on the uA. meter.

The readings obtained at the monitor points CF3 and CF4 will depend on whether the receiver is adjusted for marine or for commercial applications. The signal inputs to

the grid of valve V5 for a reading of 20 uA. on the uA. meter when plugged into sockets CF3 and CF4 are given below.

Socket	Marine	Commercial
CF3	15 mV.	6 mV.
CF4	8mV.	3.6 mV.

4.7.2 Alignment of 85 Kc/s Filter

For alignment of the 85 Kc/s filter, the receiver should be set up as described in steps (ii) to (iv) of paragraph 4.7.1. If the filter is badly out of alignment, carry out the entire procedure which follows. If this is not the case, then steps (ii) to (vii) may be omitted.

(i) Place the FILTER switch to the VN position.

(ii) Apply an 85 Kc/s signal modulated 30% at 400 cycles from the signal generator to the junction of capacitors C63 and C68, via a 1,000 uuF. series capacitor.

(iii) Adjust the input signal so that the output meter reads approximately 5.45V., and re-adjust during the ensuing operations to keep the meter reading at approximately that level.

(iv) Adjust the slug in inductor L5 for maximum meter reading.

(v) Transfer the signal generator output to the junction of capacitors C55 and C63, and adjust the slug in inductor L4 for maximum output meter reading.

(vi) Transfer the signal generator output to the junction of C47 and C55, and adjust the slug in inductor L3 for maximum output meter reading.

(vii) Transfer the signal generator output to the junction of capacitors C39 and C47, and adjust the slug in inductor L2, for maximum output meter reading.

(viii) Apply an 85 Kc/s signal modulated 30% at 400 cycles from the signal generator to pin 6 of valve V3, via a 1,000 uuf. series capacitor.

(ix) See step (iii)

(x) Set the RANGE switch to the range 3 position (290-630Kc/s)

(xi) Adjust slugs in inductors L1 to L5 in turn for maximum output meter reading.

(xii) An input signal of approximately 18 uV. should now produce an output of approximately 5.45V. across the 600-ohm load resistor, with the FILTER switch in the WIDE position.

4.7.3 Adjustment of B.F.O.

The B.F.O. may now be adjusted, following the procedure detailed below, and with the receiver set up as described in steps (ii) to (iv) of paragraph 4.7.1

(i) Place the FILTER switch to the VN position

(ii) Apply a modulated signal at exactly 85 Kc/s from the signal generator to the junction of capacitors C63 and C68, via a 1,000 uuf. capacitor. Tune the receiver and adjust the input level so that a reading of approximately 10 uA. is obtained on the 0-100 ua. meter plugged into the second detector monitor point CF2. Switch off the modulator on the injected signal.

(iii) Set the B.F.O. tuning capacitor to the half-meshed position. Make sure that the control knob now has the engraved spot uppermost.

(iv) Switch on the B.F.O. and adjust the slug in transformer T3 for zero beat note in the receiver output.

4.7.4 Alignment of 585 Kc/s I.F. Channel

To align the 585 Kc/s I.F. channel, set up the receiver as described in steps (ii) to (iv) of paragraph 4.7.1 Then follow the procedure below.

(i) Place the FILTER switch to the VN position

(ii) Apply a 585 Kc/s signal modulated 30% at 400 cycles from the signal generator to pin 6 of valve V3, via a 1,000 uuf. series capacitor.

(iii) Set the RANGE switch to the range 5 position, (1.6 - 4.2 Mc/s) with the pointer at the L.F. end of the scale.

(iv) Adjust the input signal level so that the output meter reads approximately 5.45V., and re-adjust during the ensuing operations to keep the meter reading at approximately that level.

(v) Adjust the slugs in the transformer T1 and T2 in turn for maximum output meter reading. Repeat the adjustment.

(vi) An input of approximately 9 uv. should now produce an output of approximately 5.45V. across the 600-ohm load resistor, with the FILTER switch set to the NARROW position.

TABLE III

Table of Alignment Frequencies

RANGE	A	B	C	D	E
1	60 Kc/s	12 Kc/s	---	---	---
2	255 Kc/s	100 Kc/s	240 Kc/s	110 Kc/s	180 Kc/s
3	630 Kc/s	250 Kc/s	610 Kc/s	270 Kc/s	450 Kc/s
4	1650 Kc/s	625 Kc/s	1600 Kc/s	680 Kc/s	1140 Kc/s
5	4.2 Mc/s	1.6 Mc/s	4.0 Mc/s	1.7 Mc/s	2.8 Mc/s
6	7.9 Mc/s	4.0 Mc/s	7.6 Mc/s	4.2 Mc/s	6.0 Mc/s
7	11.6 Mc/s	7.7 Mc/s	11.3 Mc/s	7.9 Mc/s	9.7 Mc/s
8	15.3 Mc/s	11.4 Mc/s	15.0 Mc/s	11.6 Mc/s	13.4 Mc/s
9	19.0 Mc/s	15.1 Mc/s	18.7 Mc/s	15.3 Mc/s	17.1 Mc/s
10	22.7 Mc/s	18.8 Mc/s	22.5 Mc/s	19.0 Mc/s	21.0 Mc/s
11	26.4 Mc/s	22.5 Mc/s	26.1 Mc/s	22.7 Mc/s	24.6 Mc/s
12	30.1 Mc/s	26.2 Mc/s	24.8 Mc/s	26.4 Mc/s	28.4 Mc/s

Column A: Oscillator H.F. end (trimmer) adjustment.

Column B: Oscillator L.F. end (slug) adjustment.

Column C:. R.F. and AERIAL H.F. end (trimmer) adjustment.

Column D: R.F. and AERIAL L.F. end (slug) adjustment.

Column E: Mid-scale check frequency.

4.7.5 Alignment of R.F. and Oscillator Stages.

Set the receiver up as described in steps (ii) to (iv) of paragraph 7.4.1 Apply the signal generator output to the aerial socket via a dummy aerial, consisting of a 400 uuf. capacitor on ranges 1 to 5 inclusive, and a 750-ohm non-inductive resistor in the case of ranges 6 to 12 inclusive. The input level, except when tuning the trap circuits, should be such that the output is of the order of 50 mW. (5.45V. across the 600-ohm dummy load resistor). Input signals should be modulated 30% at 400 cycles.

Table III details the alignment frequencies for the receiver, and should be read in conjunction with the following paragraphs, which lay down the procedure to be followed. At each spot frequency the AERIAL control should be adjusted for optimum output meter reading. The inductor slugs and trimmer capacitors by which alignment is achieved are accessible through holes in the inductor mounting plates on the turret.

Due to the interaction of the high and low frequency end adjustments, and the fact that the movement of the slugs alters self-capacity of the inductors, it will be necessary on each range to repeat the adjustments in sequence until no appreciable improvements results. Care must be taken as with all receivers not to align on an image or other spurious frequency. This trouble will be evidenced by the fact that the receiver will not track correctly. In cases where two adjustments of the oscillator section are found to produce an output, that adjustment which requires the lower capacity, or the adjustment requiring the smaller insertion of the tuning slug, is the correct one.

(a) Range 1 (12 to 60 Kc/s)

The oscillator inductor only is tuned on this range, the R.F. inductor assemblies forming a low-pass filter arrangement. 85 Kc/s trap circuits are incorporated in the "R.F. 1" and "R.F.2" inductor assemblies, and these are tuned for maximum rejection of an 85 Kc/s signal. Align the range as follows.

(i) Inject a signal at 12 Kc/s. Set the FILTER switch to the W position

(ii) Set the pointer to read the same frequency on the tuning scale and adjust "OSC." trimmer capacitor for maximum output meter reading.

(ii) Inject a signal at 60 Kc/s.

(iv) Set the pointer to read the same frequency on the tuning scale and adjust the "OSC." inductor slug for maximum output meter reading.

(v) Repeat the adjustments until no appreciable improvements results, and the calibration is correct.

(vi) Set the receiver to mid-scale and inject an 85 Kc/s signal. It may be necessary to increase the output of the signal generator at this stage.

(vii) Adjust the slugs in the "R.F. 1" and "R.F.2" inductor assemblies for MINIMUM output meter reading.

(b) Ranges 2 and 3 (100 to 630 Kc/s).

On these ranges only one R.F. amplifier stage is used, and the "AERIAL" and "R.F. 1" inductor assemblies are used as a band-pass pre-selector. Align the ranges in turn as follows:-

(i) Inject a signal at the frequency indicated in column A of the table. Set the FILTER switch to the W position.

(ii) Set the pointer to read the same frequency on the tuning scale and adjust the "OSC." trimmer capacitor for maximum output meter reading.

(iii) Inject a signal at the frequency indicated in column C of the table.

(iv) Set the pointer to read the same frequency on the tuning scale and adjust the "R.F.1" and "R.F.2" trimmer capacitors for maximum output meter reading.

(v) Inject a signal at the frequency indicated in column B of the table.

(vi) Set the pointer to read the same frequency on the tuning scale and adjust the "OSC." inductor slug for maximum output meter reading.

(vii) Inject a signal at the frequency indicated in column D of the table.

(viii) Set the pointer to read the same frequency on the tuning scale and adjust the "R.F.1" and "R.F.2" inductor slug for maximum output meter reading.

(ix) Carry out a mid-scale check at the frequency indicated in column E of the table.

(x) Repeat the adjustment until no appreciable improvement results, and the calibration and tracking are correct.

(c) Range 4 (625 to 1650 Kc/s)

On this range the receiver arrangement is normal, with two R.F. amplifier stages. The aerial circuit however incorporates a 585 Kc/s trap circuit, tunes for maximum rejection of a 585 Kc/s signal. Align the range as follows:-

(i) Carry out steps (i) to (ix) as detailed in (b) above.

(ii) Set the receiver to mid-scale and inject a signal at 585 Kc/s. It may be necessary to increase the output of the signal generator at this stage.

(iii) Adjust the variable capacitor in the "AERIAL" inductor assembly for MIMIMUM output meter reading.

(iv) Repeat the adjustments until no appreciable improvement results, and the calibration and tracking are correct.

(d) Ranges 5 to 12 (1.6 to 30.1 Mc/s).

The receiver arrangement is normal on these ranges and they should therefore be aligned in turn following the procedure detailed in steps (i) to (x) of (b) above.

4.8 Checking the I.F. Response Ratio.

The I.F. response ratio may be checked, carrying out the following procedure.

(i) Disconnect the headphones and switch off the loudspeaker (switch S7). Connect a 600-ohm non-inductive resistor across contacts 1 and 2 of connector CM1.

(ii) Connect a high-resistance A.C. voltmeter across the 600-ohm resistor.

(iii) Place the B.F.O., CAL., and A.G.C. switches to the OFF position.

(iv) Inject a type A3 signal at a frequency of 135 Kc/s.

(v) Tune the receiver and adjust for an output meter reading of 5.45V. Note the input signal level.

(vi) Inject a type A3 signal at a frequency of 85 Kc/s and adjust the input level so that the output meter reading is 5.45V. The input level should be not less than 85 db. above the level noted in step (v).

(vii) Inject a type A3 signal at 630 Kc/s.

(viii) Tune the receiver and adjust for an output meter reading 5.45V. Not the input signal level.

(ix) Inject a type A3 signal at a frequency of 585 Kc/s and adjust the input lvel so that the output meter reading is 5.45V. The input level should not be less than 76 db. above that noted in step (vii).

(x) Inject a type A3 signal at a frequency of 670 Kc/s.

(xi) Tune the receiver and adjust for an output meter reading of 5.45V. Note the input signal level.

(xii) Inject a type A3 signal at a frequency of 585 Kc/s. and adjust the input level so that the output meter reading is 5.45V. The input level should not be less than 91 db. above that noted I step (x).

4.9 Replacing Drive Cords

4.9.1 Removing the front panel and scale

Access to the three drive cords and to components fitted between the front panel and the false front of the receiver can be gained by removing the front panel. Remove the eight control knobs and the chromium-plated hollow nuts at the bottom corners of the panel. These are the nuts through which the screws pass to hold the receiver in the case. Remove the two ¼" Whit. Chromium-plated screws and washers at the top corners. These screws release the panel, which may now be placed aside.

To remove the scale and dial backing plate, place the pointer to the L.H. end of the scale and sight board against the lowest range (range 12). Unscrew the four 6BA cheese-head screws holding the scale and dial locking plate in position. Note carefully the disposition of the washers and spacers so that they may be replaced in the same positions. It will be possible to slide out the dial side and dial backing plate towards the top R.H. corner without disturbing the pointer and sight board.

When replacing the front panel and control knobs, the knobs on the B.F.O. tuning control and the AERIAL trimmer control must be fitted so that dots on the knobs are uppermost when the associated capacitors are half meshed. This is controlled by flats on the shafts of the controls.

The drive cards should be replaced following the ensuing instructions, and referring to Drg. 95150G2, which shows a schematic layout of the drive cards and pulleys.

4.9.2 Pointer Drive

A length of approximately 8'6" of nylon-glass cord is required to renew the drive. The renewal should be carried out as follows.

(i) Lay the receiver less cabinet on its back, remove the front panel, scale and dial backing plate as described in paragraph 4.9.1, and turn the tuning control so that the tuning controls are fully meshed.

(ii) As there is no anchor for the start of this cord. A loop may be formed in one end and passed over the toggle of switch S6, (CAL).

(iii) Pass the cord through a 3/8" length of 1/8" outside diameter copper tube, and then over the rear (large) pulley at the bottom R.H. corner. The copper tube should remain at the R.H. side of the pulley.

(iv) Lay the cord over the rear (large) pulley at the bottom L.H. corner and then up to the rear one of the two large pulleys at the top L.H. corner.

(v) Carry the cord across the front of the receiver and over the rear one of the two large pulleys at the top R.H. corner.

(vi) The cord then travels down and around the driving drum in the tuning capacitor drive mechanism. Take the cord down around the R.H. side of the drum viewed from the front, and 2.1/2 times around the drum, winding towards the rear.

(vii) Bring the cord up over the front of one of the two large pulleys at the top R.H. corner, over the front, and around the front one of the two large pulleys at the top L.H. corner.

(viii) Free the "start" end of the cord from the toggle switch of switch S6 and bring it up to meet the other end of the cord.

(ix) Pass the "finish" end of the cord through the copper tube and take up the slack. Crimp the tube in a position approximately ½" from the bottom R.H. pulley. While there should be no undue slackness in the drive cord, it should be possible to move the centre of the diagonal run of the cord approximately ½" in a sideways direction without straining the cord. Too tight an adjustment will effect the operation of the tuning mechanism. Remove excess cord.

(x) Mount the pointer on the cord so that with the tuning capacitors still fully meshed, the pointer passes through the calibration marks at the L.F. side of the scale. The scale may now be laid position to check the alignment of the pointer. Note the method of anchoring the cord in the ends of the pointer, as shown on Drg. 95160G2.

(xi) Check the operation of the tuning control and the pointer. Replace the dial backing plate, scale and front panel.

4.9.3 Sight Board Drive

A length of approximately 4'6" of nylon-glass cord is required to renew this drive. The renewal should be carried out as follows:-

(i) Lay the receiver less cabinet on its back, remove the front panel, scale and dial backing plate as described in paragraph 4.9, and turn the range selector control to range 1.

(ii) Clamp one end of the cord under the self-tapping screw at the position marked "Start" on Drg. 95150G2.

(iii) Pass the cord around the clamping post and under the "U" shaped clamping plate. Do not tighten the plate down.

(iv) Pass the cord through the slot in the edge of the driving drum and once around the drum in a clockwise direction viewed from the front.

(v) Lay the cord around the smaller pulleys in the order shown in the drawing. (top R.H., bottom R.H., bottom L.H.)

(vi) Pass the cord through the slot in the edge of the driving drum and under the "U" shaped clamping plate.

(vii) Pull the cord up tight and then tighten down the clamping plate. Remove excess cord.

(viii) Mount the sight board on the cord in the position corresponding to range 1. The scale may be laid in the position to check the alignment. Note the method of anchoring the cord in the ends of the sight board, as shown in Drg. 95150G2

(ix) Check the operation of the range selector control and sight board. Replace the dial backing plate, scale and front panel.

4.9.4 Switch S1 Drive

A length of approximately 3' of stainless steel flexible cable is required to renew this drive. The renewal should be carried out as follows.

(i) Lay the receiver less cabinet on its back, remove the front panel, scale and dial backing plate as described in paragraph 4.9.1, and turn the range selector control to range 1.

(ii) Anchor one end of the cable under the self-tapping screw at the position marked "Start" on Drg. 95150G2.

(iii) Pass the cable around the clamping post and under the "U" shaped clamping plate. Do not tighten the plate down.

(iv) Pass the cable through the slot in the edge of the driving drum and thence to the rear of the two drums at the front centre of the receiver.

(v) Lay the cable once around the drum in an anti-clockwise direction.

(vi) Take the cable through the slot in the edge of the drum, pass it through the eye riveted to the drum, once around the outside of the eye, and then out through the slot again.

(vii) Take the cable half a turn around the drum in an anti-clockwise direction and then back to the first (switch) drum.

(viii) Lay the cable 1½ times around the drum in an anti-clockwise direction.

(ix) Pass the cable through the slot in the edge of the drum and under the "U" shaped clamping plate. Pull the cable up tight and tighten down the plate. Remove excess cable.

(x) Check the correct operation of the range selector central and switch S1. Replace the dial backing plate, scale and front panel.

4.10 Coil Units

The coil turret carries 48 coil assemblies to provide the 12 frequency ranges. There are four coils to each range, and in each range the coils units are disposed in the turret in order from the rear "Aerial", "R.F. 1", "R.F. 2" AND "OSC". These designations agree with those shown on Drg. 95150H1. In the case of ranges 2 and 3, where a band-pass input arrangement is used, the 'R.F. 1" and "R.F. 2" positions become the "Grid" and "R.F." positions respectively., This nomenclature coincides with that used on Drg. 95150H1 and 95150G1.

Any individual coil assembly can be removed from the turret by rotating the turret to a favourable position, and then loosening two and removing two of the four self-tapping screws which hold the coil mounting plate in place. The coil assembly can now be withdrawn, with the exception of the "GRID" and "R.F." units on ranges 2 and 3. In these cases it is also necessary to unsolder a lead running outside the turret, connecting the number 6 contacts on the adjacent units. Care must be taken when replacing these particular coil units that the short lead outside the turret is laid down in the groove provided for it, so that it does not foul the earthing wipers contacting the turret.

Table IV gives a list of the 48 coil assemblies included in the coil turret. These assemblies include in some cases capacitors and resistors, the descriptions of which will be found in the component schedule listed under the appropriate assembly number.

TABLE IV.

List of Inductor Assemblies.

Range	"AERIAL"	"R.F. 1"	"R.F. 2"	"OSC."
1	4V57962	16 V57962	16 V57962	1V57954
2	5 V57962	80 V57962	17 V57962	2 V57954
3	6 V57962	81 V57962	18 V57962	3 V57954
4	7 V57962	19 V57962	19 V57962	4 V57954
5	8 V57962	20 V57962	20 V57962	5 V57954
6	9 V57962	21 V57962	21 V57962	6 V57954
7	10 V57962	22 V57962	22 V57962	7 V57954
8	11 V57962	23 V57962	23 V57962	8 V57954
9	12 V57962	24 V57962	24 V57962	9 V57954
10	13 V57962	25 V57962	25 V57962	10 V57954
11	14 V57962	26 V57962	26 V57962	11 V57954
12	15 V57962	27 V57962	27 V57962	12 V57954

The coil turret is secured to its driving wheel by screws passing through elongated holes. The screws are accessible through holes in the front flanged plate forming part of the main frame of the receiver, when the turret is in a favourable position. This adjustment enables the turret to be given a slight angular adjustment with respect to the drive mechanism, in order to bring the contact studs under the leaf contacts when the turret is at rest.

The R.F chassis is held in the main frame or the receiver by screws passing through elongated holes in the front and rear flanged plates. This permits adjustment of the chassis position to secure the correct "lift" of the leaf contacts.

4.12 Location of Components

Drawings 95150C2, 95150C3 and 95150C4 show the layout of the three main sections of the receiver, the components being labelled with their circuit reference numbers. These drawing show the location of all components except these listed below.

Reference	Value	Location
C2(a), (b), (c)	12-435 uuF	Tunning gang aerial & R.F. section
C3	6.8 uuF	Adjacent to aerial terminal
C22	12-435 uuF	Tuning gang, oscillator section
C99	1,000 uuF	A.N.L. switch, behind front panel
C107	0.01 uF	Component assembly behind front panel
C127	25 uF	Component assembly behind front panel
C133 to C147	0.01 uF	On power plug
R1	3,000 ohm	Behind front panel
R3	3,000 ohm	Behind front panel
R60	470K. ohm	A.N.L. switch
R61	500 K. ohm	Behind front panel
R68	22 K. ohm	Component assembly behind front panel
R69	100 K. ohm	Component assembly behind front panel
R89	40 ohm	Pilot lamp bracket

5. COMPONENT SCHEDULE

This section contains component schedules for the receiver and for the power converter units designed to operate with it. The component schedule for the receiver is divided into two sections, the first of which deals with the receiver itself, and the second of which deals with individual coil units which go to make up the coil turret assembly. Reference should be made to Sub-section 4.10 and Table IV for details of the coil units for various ranges.

When ordering replacement parts, please state all the information given below for the particular components required, together with the type number of the unit for which the replacement is required.

5.1 Receiver type C915150

5.1.1 Receiver (Drg. 95150H1)

Circ Ref. No.	Description	A.W.A Type Number (unless otherwise stated)
C1	3.8-50 uuF., air-spaced, variable	Polar type C8-04
C2 A,B,C	12-43 uuF., 3 gang variable, air spaced	Part. 18386
C3	6.8 uuF. ±1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C4	1000uuF., ± 5%, 500V.W. silver mica	Simplex type SS
C5	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C6	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C7	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C8	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C9	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C10	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C11	1000 uuF., ± 5%, 500V.W. silver mica	Simplex type SS
C12	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C13	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C14	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C15	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C16	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C17	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C18	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C19	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C20	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C21	0.01 uF., ± 10%, 500V.W. mica	Simplex type SM
C22	12-435 uuF., variable air spaced, single-gang	95150V427B
C23	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C24	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C25	500 uuF., ± 5%, 500V.W. silver mica (Part of T1, assembly 1V57943)	Simplex type SS
C26	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C27	500 uuF., ± 5%, 500V.W. silver mica (Part of T1, assembly 1V57943)	Simplex type SS

C28	15 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C29	500 uuF., ± 5%, 500V.W. silver mica (Part of T2, assembly 1V57943)	Simplex type SS
C30	500 uuF., ± 5%, 500V.W. silver mica (Part of T2, assembly 1V57943)	Simplex type SS
C31	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C32	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C33	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C34	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C35	0.01 uF., 20%, 350V.W. metal cased paper	U.C.C. type CP32N
C36	47 uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT11
C37	47 uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT11
C38	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C39	4000 uuF., ± 5%, 500V.W. silver mica	Simplex type SM
C40	900 uuF., ± 2 ½ % 500V.W. silver mica	Simplex type SS
C41	15 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C42	25 uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT11
C43	68 uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C44	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C45	25 uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT11
C46	15 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C47	10 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C48	15 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C49	25 uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT11
C50	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C51	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C52	25 uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT11
C53	15 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C54	1800 uuF., ± 2 ½ % 500V.W. silver mica	Simplex type SS
C55	10 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C56	15 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C57	25 uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT11
C58	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C59	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C60	25 uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT11
C61	15 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C62	1800 uuF., ± 2 ½ % 500V.W. silver mica	Simplex type SS
C63	10 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C64	15 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C65	25 uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT11
C66	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C67	180 uuF., ± 2 ½ % 500V.W. silver mica	Simplex type SS
C68	10 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C69	68uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12
C70	25 uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT11
C71	15 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C72	15 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C73	900 uuF., ± 2 ½ % 500V.W. silver mica	Simplex type SS

C74	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C75	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C76	200 uuF., ± 5% 500V.W. silver mica (part of L6, assembly 2V57957)	Simplex type SS
C77	320 uuF., ± 5% 500V.W. silver mica	Simplex type SS
C78	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C79	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C80	320 uuF., ± 5% 500V.W. silver mica	Simplex type SS
C81	200 uuF., ± 5% 500V.W. silver mica (part of L7, assembly 2V57957)	Simplex type SS
C82	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C83	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C84	200 uuF., ± 5% 500V.W. silver mica (part of L8, assembly 2V57957)	Simplex type SS
C85	320 uuF., ± 5% 500V.W. silver mica	Simplex type SS
C86	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C87	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C88	320 uuF., ± 5% 500V.W. silver mica	Simplex type SS
C89	200 uuF., ± 5% 500V.W. silver mica (part of L9, assembly 2V57957)	Simplex type SS
C90	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C91	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C92	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C93	160 uuF., ± 5% 500V.W. silver mica (Part of T4, assembly 1V57942)	Simplex type SS
C94	160 uuF., ± 5% 500V.W. silver mica (Part of T4, assembly 1V57942)	Simplex type SS
C95	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C96	200 uuF., -0+100% 500V.W. silver ceramic	U.C.C. type SPG1
C97	200 uuF., -0+100% 500V.W. silver ceramic	U.C.C. type SPG1
C98	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C99	1000 uuF., ± 10%, 500V.W. mica	U.C.C. type CM20
C100	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C101	100 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type SPG1
C102	25 uF., 40V.P. electrolytic	Ducon type EE10779
C103	0.1 uF., ± 20% 350V.W. metal cased paper	U.C.C. type CP37N
C104	1000 uuF., ± 20% 500V.W. mica	U.C.C. type VM20
C105	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C106	25 uF., 40V.P. electrolytic	Ducon type EE10779
C107	0.01 uF., ± 20% 350V.W. metal cased paper	U.C.C. type CP32N
C108	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C109	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C110	630 uuF., ± 5% 500V.W. silver mica (Part of T3, assembly 1V57958)	Simplex type SS
C111	4.8-10 uuF., variable, air-spaced	Polar type C8-04
C112	10 uuF., ± 1uuF., 500V.W. silvered ceramic	U.C.C. type SCT11
C113	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C114	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C115	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB

C116	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C117	160 uuF., ± 5% 500V.W. silver mica (Part of T3, assembly 1V57958)	Simplex type SS
C118	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C119	100 uuF., -0+100% 500V.W. silvered ceramic	U.C.C. type
C120	100 uuF., -0+100% 500V.W. silvered ceramic	U.C.C. type
C121	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C122	0.05 uF., ± 20%, 350V.W. metal cased paper	U.C.C. type CP35N
C123	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C124	0.05 uF., ± 20%, 350V.W. metal cased paper	U.C.C. type CP35N
C125	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C126	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C127	25 uF., 40V.P. electrolytic	Ducon type EE10779
C128	0.1 uF., ± 20%, 350V.W. tubular paper	U.C.C. type PMB
C129	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C130	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C131	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C132	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C133	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C134	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C135	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C136	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C137	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C138	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C139	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C140	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C141	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C142	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422
C143	0.01 uF., -0+100% 500V.W. silvered ceramic	U.C.C. type CTH422

(b) Connectors

CF1	2-point female	S52776
CF2	2-point female	S52776
CF3	2-point female	S52776
CF4	2-point female	S52776

(c) Inductors

L1	85 kc/s, filter inductor	65V57962
L2	85 kc/s, filter inductor	1V57962
L3	85 kc/s, filter inductor	1V57962
L4	85 kc/s, filter inductor	1V57962
L5	85 kc/s, filter inductor	65V57962
L6	85 kc/s, filter inductor (includes capacitor C76)	2V57962
L7	85 kc/s, I.F. inductor (includes capacitor C81)	2V57957
L8	85 kc/s, I.F. inductor (includes capacitor C84)	2V57957
L9	85 kc/s, I.F. inductor (includes capacitor C89)	2V57957
L10	85 kc/s, I.F. inductor (includes capacitor C117)	2V57957

(d) Jacks

J1	Jack, telephone single-point	Bulgin type J2
J1	Jack, telephone single-point	Bulgin type J2

(e) Lamps

P1	Lamp-holder, B.C. Lamps, 28V. B.C. tubular lamps	Hoelle type H155 Pt. No. 428180
P2	As 1	

(f) Relays

REL1	Relay, aerial tuning	Pt. No. 33518

(g) Resistors

R1	3K ohms, variable potentiometer, wire wound	I.R.C. type 2W
R2	3K ohms, variable potentiometer, wire wound	I.R.C. type 2W
R3	470K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R4	100 ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R5	10 ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R6	4.7K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R7	4.7K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R8	470K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R9	100 ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R10	10 ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R11	4.7K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R12	4.7K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R13	4.7K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R14	220 ohms, ± 10%, ¼ W. carbon	I.R.C. type BTS
R15	4.7K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R16	33 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R17	2.2 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R18	4.7K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R19	33 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R20	33 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R21	4.7K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R22	4.7K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R23	33 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R24	100 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R25	100 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R26	33 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R27	4.7K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R28	100 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R29	100 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R30	100 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R31	100 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS

R32	100K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R33	100 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R34	100 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R35	47 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R36	4.7 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R37	220 ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R38	68 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R39	68 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R40	100 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R41	47 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R42	10 K ohms, ± 10%, ¼ W., carbon (Receiver type MS6)	I.R.C. type BTS
	33 K ohms, ± 10%, ¼ W., carbon (Receiver type CR-3A)	I.R.C. type BTS
R43	47 K ohms, ± 10%, ¼ W., carbon (Receiver type MS6)	I.R.C. type BTS
	4.7 K ohms, ± 10%, ¼ W., carbon (Receiver type CR-3A)	I.R.C. type BTS
R44	4.7 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R45	68 ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R46	68 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R47	68 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R48	4.7 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R49	10 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R50	100 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R51	47 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R52	4.7 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R53	2 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R54	15 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R55	15 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R56	33 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R57	4.7 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R58	470 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R59	1 M ohm, ± 10%, ¼ W., carbon	I.R.C. type BTS
R60	470 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R61	500 K potentiometer	
R62	100 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R63	220 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R64	2.2 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R65	680 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R66	470 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R67	220 ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R68	22 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R69	100 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R70	33 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R71	1 M ohm, ± 10%, ¼ W., carbon	I.R.C. type BTS
R72	22 K ohms, ± 10%, ¼ W., carbon (Receiver type MS6)	I.R.C. type BTS
	6.8 K ohms, ± 10%, ¼ W., carbon (Receiver type CR-3A)	I.R.C. type BTS
R73	100 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R74	4.7 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R75	220 ohm, ± 10%, ¼ W., carbon	I.R.C. type BTS
R76	47 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS

R77	2.2 M ohms, ± 10%, ¼ W., carbon (Receiver type MS6)	I.R.C. type BTS
	220 K ohms, ± 10%, ¼ W., carbon (Receiver type CR-3A)	I.R.C. type BTS
R78	2.2 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R79	220 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R80	220 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R81	2.2 M ohms, ± 10%, ¼ W., carbon (Receiver type MS6)	I.R.C. type BTS
	220 K ohms, ± 10%, ¼ W., carbon (Receiver type CR-3A)	I.R.C. type BTS
R82	4.7K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R83	220 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R84	10 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R85	22 K ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS
R86	40 ohms, ± 10%, 3W., wire wound, ctg.C	I.R.C. type AA
R87	40 ohms, ± 10%, 5W., wire wound, ctg.C	I.R.C. type AA
R88	40 ohms, ± 10%, 3W., wire wound, ctg.C	I.R.C. type AA
R89	40 ohms, ± 10%, 5W., wire wound, ctg.C	I.R.C. type AA

(h) Sockets

V1	7-pin miniature, ceramic	S55375
V2	7-pin miniature, ceramic	S55375
V3	9-pin miniature, ceramic	S55372
V4	7-pin miniature, ceramic	S55375
V5	7-pin miniature, ceramic	S55375
V6	7-pin miniature, ceramic	S55375
V7	7-pin miniature, ceramic	S55375
V8	7-pin miniature, ceramic	S55375
V9	7-pin miniature, ceramic	S55375
V10	7-pin miniature, ceramic	S55375
V11	9-pin miniature, ceramic	S55372
V12	9-pin miniature, ceramic	S55372
V13	7-pin miniature, ceramic	S55375
V14	7-pin miniature, ceramic	S55375
X1	2-pin, female, crystal	S52776

(i) Switches

S1	Oak "H" type	95150V135
S2	Oak "H" type	95150V134
S3	D.P.S.T., 240V, 3A	Cutler Hammer 8372/K8
S4	S.P.S.T., 240V, 3A	Cutler Hammer 8372/K7
S5	Oak "H" type	95150V99
S6	D.P.S.T., 240V, 3A	Cutler Hammer 8372/K8
S7	D.P.S.T., 240V, 3A	Cutler Hammer 8372/K8
S8	Contact assembly, receiver muting	95150V291A

(j) Transformers

T1	585 kc/s, I.F. transformer assembly (Includes capacitors C25, C27)	1V57943

T2	585 kc/s, I.F. transformer assembly (Includes capacitors C29, C30)	1V57943
T3	B.F.O. transformer assembly	1V57958
T4	85 kc/s, I.F. transformer assembly (Includes capacitor C110)	1V57942
T5	Output transformer	1XA57870

5.1.2 Coil Units (Drg. 95150G1)

Circ. Ref. No.	Description	A.W.A. Type No. (Unless otherwise stated)
	Assembly 1V57954 (Range 1 Oscillator, 12-60 kc/s)	
Winding only		57954V1
Capacitors		
C1	3-25uuF., air-cored trimmer	Philips type 82755/25E
C2	80uuF., ± 5%, 500V.W., silver mica	Simplex type SS
C3	486uuF., ± 2 ½%, 500V.W., silver mica	Simplex type SMX
	Assembly 2V57954 (Range 2 Oscillator, 100-255 kc/s)	
Winding only		57954V2
Capacitors		
C1	3-25uuF., air-cored trimmer	Philips type 82755/25E
C2	22uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
C3	523uuF., ± 2 ½%, 500V.W., silver mica	Simplex type SS
	Assembly 3V57954 (Range 3 Oscillator, 250-620 kc/s)	
Winding only		57954V3
Capacitors		
C1	3-25uuF., air-cored trimmer	Philips type 82755/25E
C2	22uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
C3	1250uuF., ± 2 ½%, 500V.W., silver mica	Simplex type SS

Assembly 4V57954 (Range 4 Oscillator, 625-1650 kc/s)

Winding only		57954V4
Capacitors		
C1	3-25uuF., air-cored trimmer	Philips type 82755/25E
C2	22uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
C3	463uuF., ± 2 ½%, 500V.W., silver mica	Simplex type SS

Assembly 5V57954 (Range 5 Oscillator, 1.6-4.2 Mc/s)

Winding only		57954V5
Capacitors		
C1	3-25uuF., air-cored trimmer	Philips type 82755/25E
C2	22uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
C3	1124uuF., ± 2 ½%, 500V.W., silver mica	Simplex type SS

Assembly 6V57954 (Range 6 Oscillator, 4-7.9 Mc/s.)

Winding only		57954V6
Capacitors		
C1	3-25uuF., air-cored trimmer	Philips type 82755/25E
C2	22uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
C3	436uuF., ± 2 ½%, 500V.W., silver mica	Simplex type SS

Assembly 7V57954 (Range 7 Oscillator, 7.7-11.5 Mc/s)

Winding only		57954V7
Capacitors		
C1	3-25uuF., air-cored trimmer	Philips type 82755/25E
C2	33uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT12
C3	196uuF., ± 2 ½%, 500V.W., silver mica	Simplex type SS

Assembly 8V57954 (Range 8 Oscillator, 11.4-15.3 Mc/s)

Winding only		57954V8
Capacitors		
C1	3-25uuF., air-cored trimmer	Philips type 82755/25E
C2	47uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
C3	130uuF., ± 2 ½%, 500V.W., silver mica	Simplex type SS

Assembly 9V57954 (Range 9 Oscillator, 15.1-19 Mc/s)

Winding only		57954V9
Capacitors		
C1	3-25uuF., air-cored trimmer	Philips type 82755/25E
C2	47uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT12
C3	99uuF., ± 2 ½%, 500V.W., silver mica	Simplex type SS

Assembly 10V57954 (Range 10 Oscillator, 18.8-22 Mc/s)

Winding only		107954V5
Capacitors		
C1	3-25uuF., air-cored trimmer	Philips type 82755/25E
C2	68uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT12
C3	81uuF., ± 2 ½%, 500V.W., silver mica	Simplex type SS

Assembly 11V57954 (Range 11 Oscillator, 22.5-26.4 Mc/s)

Winding only		117954V5
Capacitors		
C1	3-25uuF., air-cored trimmer	Philips type 82755/25E
C2	68uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT12
C3	69uuF., ± 2 ½%, 500V.W., silver mica	Simplex type SS

Assembly 12V57954 (Range 12 Oscillator, 26.2-30.1 Mc/s)

Winding only		127954V5
Capacitors		
C1	3-25uuF., air-cored trimmer	Philips type 82755/25E
C2	68uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT12
C3	61uuF., ± 2 ½%, 500V.W., silver mica	Simplex type SS

Assembly 4V57962 (Range 1 Aerial, 12-60 kc/s)

Winding only		57962V4
Capacitors		
C1	Not used	
C2	200uuF., ± 5%, 500V.W., silver mica	Simplex type SS
Resistors		
R1	100K ohms, ±10%, ¼ ., carbon	I.R.C. type BTS
R2	10K ohms, ±10%, ¼ ., carbon	I.R.C. type BTS

Assembly 5V57962 (Range 2 Aerial, 100-255 kc/s)

Winding only		57962V5
Capacitors		
C1	Not used	
C2	22uuF., ± 5%, 500V.W., silver ceramic	U.C.C. type SCT11
Resistors		
R1	2.2K ohms, ±10%, ¼ ., carbon	I.R.C. type BTS
R2	68 ohms, ±10%, ½ W., carbon	Erie type 9

Assembly 6V57962 (Range 3 Aerial, 250-630 kc/s)

Winding only		57962V6
Capacitors		
C1	Not used	
C2	22uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
Resistors		
R1	1K ohms, ±10%, ¼ ., carbon	I.R.C. type BTS
R1	68 ohms, ±10%, ½ W ., carbon	Erie type 9

Assembly 7V57962 (Range 4 Aerial, 625-1650 kc/s)

Winding only		57962V7
Capacitors		
C1	3-25 uuF., air-spaced trimmer	Philips type 82755/25E
C2	180uuF., ± 5%, 500V.W., silver mica	Simplex type SS
C3	22uuF., ± 20%, 500V.W. silvered ceramic	U.C.C. type SBG1
Resistors		
R1	330 ohms, ±10%, ¼ ., carbon	I.R.C. type BTS

Assembly 8V57962 (Range 5 Aerial, 1.6-4.2 Mc/s)

Winding only		57962V8
Capacitors		
C1	33uuF., ± 5%, 500V.W. silvered ceramic	U.C.C. type SCT12

Resistors

R1	150 ohms, ±10%, ¼ ., carbon	I.R.C. type BTS

Assembly 9V57962 (Range 6 Aerial, 4-7.9 Mc/s)

Winding only		57962V9
Capacitors		
C1	33uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT12
C2	636uuf., ± 5%, 500V.W., silver mica	Simplex type SS

Assembly 10V57962 (Range 7 Aerial, 7.7-11.6 M Mc/s)

Winding only		57962V10
Capacitors		
C1	47uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT12
C2	214uuf., ± 5%, 500V.W., silver mica	Simplex type SS

Assembly 11V57962 (Range 8 Aerial, 11.4-15.3 Mc/s)

Winding only		57962V11
Capacitors		
C1	47uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT12
C2	135uuf., ± 5%, 500V.W., silver mica	Simplex type SS

Assembly 12V57962 (Range 9 Aerial, 15.1-19 Mc/s)

Winding only		57962V12
Capacitors		
C1	47uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT12
C2	102uuf., ± 5%, 500V.W., silver mica	Simplex type SS

Assembly 13V57962 (Range 10 Aerial, 18.8-22.7 Mc/s)

Winding only		57962V12
Capacitors		
C1	47uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT12
C2	83uuf., ± 5%, 500V.W., silver mica	Simplex type SS

Assembly 14V57962 (Range 11 Aerial, 22.5-26.4 Mc/s)

Winding only		57962V14
Capacitors		
C1	68uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT12
C2	71uuf., ± 5%, 500V.W., silver mica	Simplex type SS

Assembly 15V57962 (Range 12 Aerial, 26.2-30.1 Mc/s)

Winding only		57962V15
Capacitors		
C1	68uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT12
C2	62uuf., ± 5%, 500V.W., silver mica	Simplex type SS

Assembly 16V57962 (Range 1 R.F.1 and R.F.2, 12-60 kc/s)

Winding only		57962V16
Capacitors		
C1	Not used	
C2	0.01uf., ± 10%, 500V.W., mica	Simplex type SM
C3	1135uuF., ± 5%, 500V.W., silver mica	Simplex type SMK
C4	2270uuF., ± 5%, 500V.W., silver mica	Simplex type SMK
C5	1775uuF., ± 5%, 500V.W., silver mica	Simplex type SMK
C6	1515uuF., ± 5%, 500V.W., silver mica	Simplex type SMK
Resistors		
R1	2K ohms, ± 10%, ½ W., carbon	I.R.C. type BTS
R2	2K ohms, ± 10%, ½ W., carbon	I.R.C. type BTS

Assembly 17V57962 (Range 2 R.F.1 and R.F.2, 100-255 kc/s)

Winding only		57962V17
Capacitors		
C1	3-25uuF., air-spaced trimmer	Philips type 82755/25E
C2	22uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
Resistors		
R1	470 ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS

Assembly 18V57962 (Range 3 R.F.1 and R.F.2, 250-680 kc/s)

Winding only		57962V18
Capacitors		
C1	3-25uuF., air-spaced trimmer	Philips type 82755/25E
C2	22uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
Resistors		
R1	470 ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS

Assembly 19V57962 (Range 4 R.F.1 and R.F.2, 625-1650 kc/s)

Winding only		57962V19
Capacitors		
C1	3-25uuF., air-spaced trimmer	Philips type 82755/25E
C2	33uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
Resistors		
R1	470 ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS

Assembly 20V57962 (Range 5 R.F.1 and R.F.2, 1.6-4.2 Mc/s)

Winding only		57962V20
Capacitors		
C1	3-25uuF., air-spaced trimmer	Philips type 82755/25E
C2	33uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
Resistors		
R1	470 ohms, ± 10%, ¼ W., carbon	I.R.C. type BTS

Assembly 21V57962 (Range 6 R.F.1 and R.F.2, 4-7.9 Mc/s)

Winding only		57962V21
Capacitors		
C1	3-25uuF., air-spaced trimmer	Philips type 82755/25E
C2	33uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
C3	636uuF., ± 2 ½ %, 500V.W. silver mica	Simplex type SS

Assembly 22V57962 (Range 7 R.F.1 and R.F.2, 7.7 - 11.6 mc/s)

Winding only		57962V22
Capacitors		
C1	3-25uuF., air-spaced trimmer	Philips type 82755/25E
C2	47uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
C3	214uuF., ± 2 ½ %, 500V.W. silver mica	Simplex type SS

Assembly 23V57962 (Range 8 R.F.1 and R.F.2, 11.4 - 15.3 mc/s)

Winding only		57962V23
Capacitors		
C1	3-25uuF., air-spaced trimmer	Philips type 82755/25E
C2	68uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
C3	135uuF., ± 2 ½ %, 500V.W. silver mica	Simplex type SS

Assembly 24V57962 (Range 9 R.F.1 and R.F.2, 15.1 - 26.4 mc/s)

Winding only		57962V24
Capacitors		
C1	3-25uuF., air-spaced trimmer	Philips type 82755/25E
C2	68uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
C3	102uuF., ± 2 ½ %, 500V.W. silver mica	Simplex type SS

Assembly 25V57962 (Range 10 R.F.1 and R.F.2, 18.8 - 22.7 mc/s)

Winding only		57962V25
Capacitors		
C1	3-25uuF., air-spaced trimmer	Philips type 82755/25E
C2	68uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
C3	83uuF., ± 2 ½ %, 500V.W. silver mica	Simplex type SS

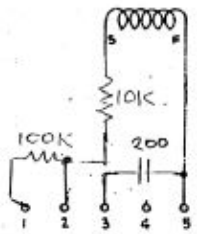
Assembly 26V57962 (Range 11 R.F.1 and R.F.2, 22.5 - 26.4 mc/s)

Winding only		57962V26
Capacitors		
C1	3-25uuF., air-spaced trimmer	Philips type 82755/25E
C2	68uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
C3	71uuF., ± 2 ½ %, 500V.W. silver mica	Simplex type SS

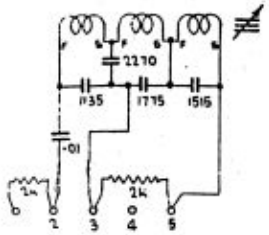
Assembly 27V57962 (Range 12 R.F.1 and R.F.2, 26.2 - 30.1mc/s)

Winding only		57962V27
Capacitors		
C1	3-25uuF., air-spaced trimmer	Philips type 82755/25E
C2	68uuF., ± 5%, 500V.W., silvered ceramic	U.C.C. type SCT11
C3	62uuF., ± 2 ½ %, 500V.W. silver mica	Simplex type SS
C4	10uuf	

RANGE 1



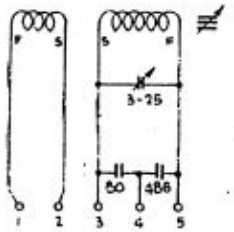
Type 4V57962
Aerial
Freq. 12-60 Kc/s



Type 16V57962
R.F.1
Freq. 12-60 Kc/s

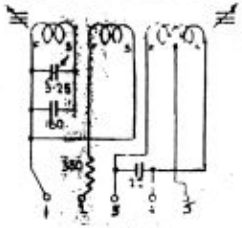
R.F.2

Same as R.F.1

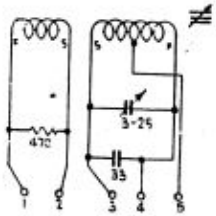


Type 1V57954
Osc.
Freq. 12-60 Kc/s

RANGE 4



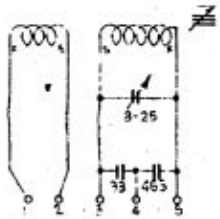
Type 4V57962
Aerial
Freq. 12-60 Kc/s



Type 16VB57962
R.F.1
Freq. 12-60 Kc/s

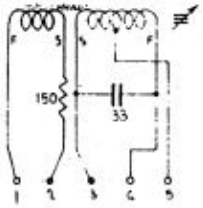
R.F.2

Same as R.F.1

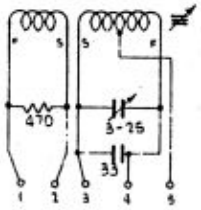


Type 4V57954
Osc.
Freq. 626-1600 Kc/s

RANGE 5



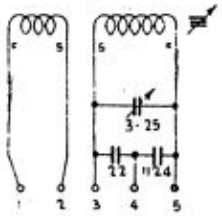
Type 8V57962
Aerial
Freq. 1.6-4.2 Mc/s



Type 20V57962
R.F.1
Freq. 1.6-4.2 Mc/s

R.F.2

Same as R.F.1

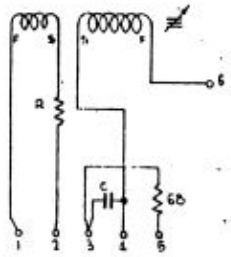


Type 5V57954
Osc.
Freq. 1.6-4.2 Mc/s

RANGES 2 & 3

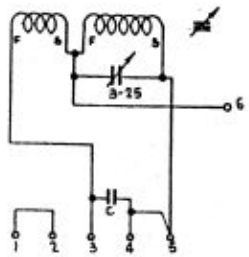
AERIAL

Range	Freq. Kc/s	Coil type	Value of C	Value of R
2	100-255	5V57962	22 uuF	2.2 K
3	250-630	6V57962	22 uuF	1K



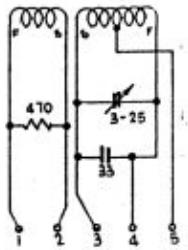
GRID

Range	Freq. Kc/s.	Coil Type	Value of C
2	100-255	80V57962	22 uuF
3	250-630	81V57962	22 uuF



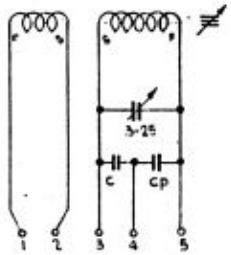
R.F.

Range	Freq Kc/s	Coil Type
2	100-255	17V57962
3	250-630	15V57962



OSCILLATOR

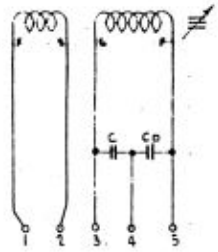
Range	Freq. Kc/s.	Coil Type	Value of C	Padder
1	100-255	2V57954	22 uuF	523 uuF
2	250-630	3V57954	22uuF	1251 uuF



RANGES 6 TO 12 INCL.

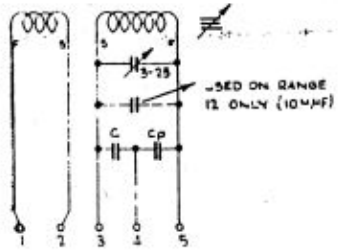
AERIAL

Range	Freq Mc/s	Coil Type	Value of C	Padder CP
6	4-7.79	95V57962	33 uuF	536 uuF
7	7.7-11.6	10V57962	47 uuF	214 uuF
8	11.4-15.3	11V57962	47 uuF	133 uuF
9	15.1-19.0	12V57962	47 uuF	102 uuF
10	18.8-22.7	13V57962	47 uuF	53 uuF
11	22.5-26.4	14V57962	68 uuF	71 uuF
12	26.2-30.1	15V57962	68 uuF	62 uuF



GRID

Range	Freq Mc/s	Coil Type	Value of C	Padder CP
6	4-7.79	21V57962	33 uuF	636 uuF
7	7.7-11.6	22V57962	47 uuF	214 uuF
8	11.4-15.3	23V57962	68 uuF	135 uuF
9	15.1-19.0	24V57962	68 uuF	102 uuF
10	18.8-22.7	25V57962	68 uuf	83 uuF
11	22.5-26.4	26V57962	68 uuf	71 uuF
12	26.2-30.1	27V57962	68 uuf	62 uuF



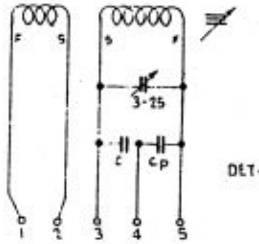
R.F.2

SAME AS

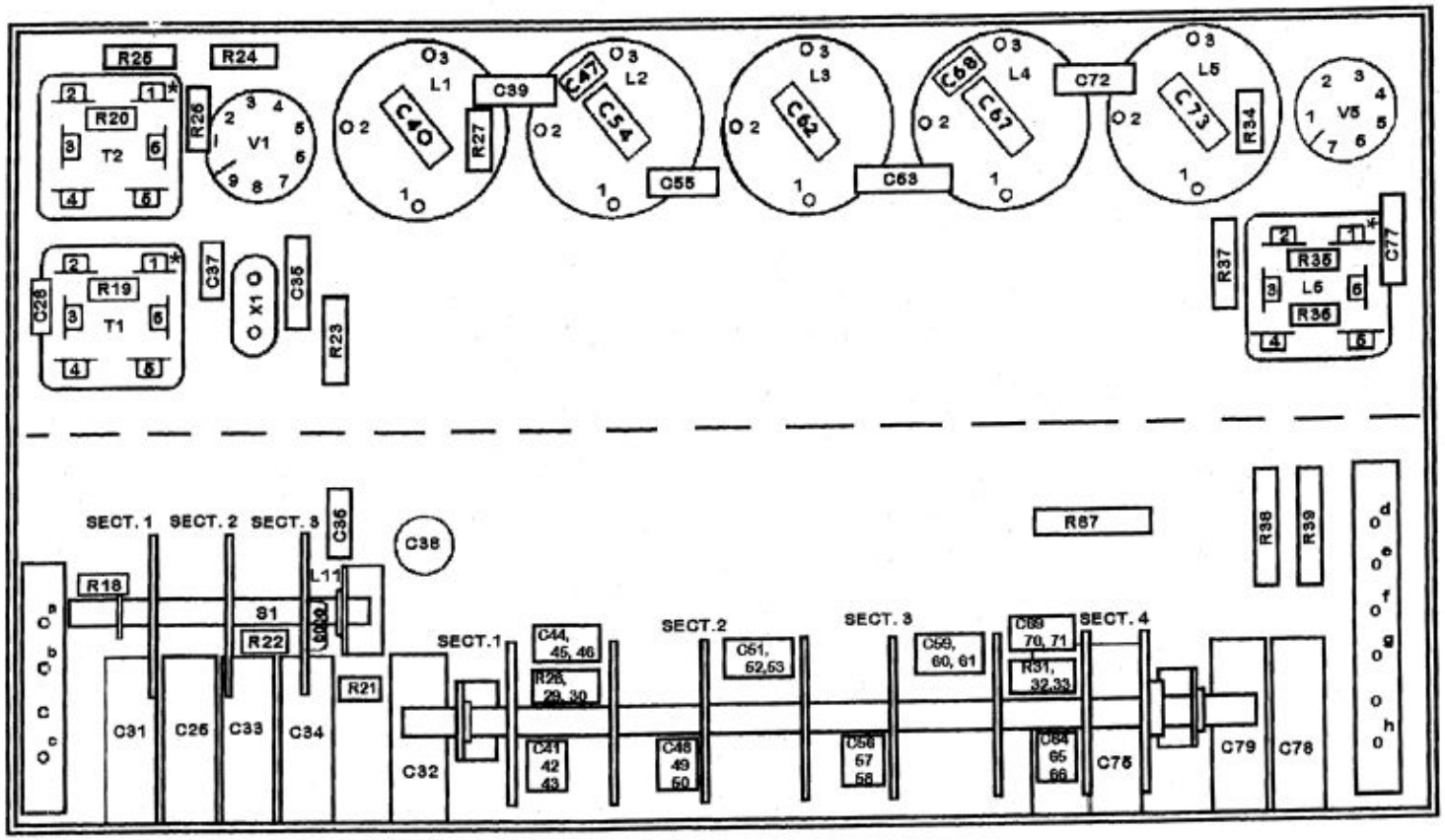
R.F. 1

OSCILLATOR

Range	Freq Mc/s	Coil Type	Value of C	Padder CP
6	4-7.79	6V57954	22 uuF	636 uuF
7	7.7-11.6	7V57954	33 uuF	196 uuF
8	11.4-15.3	8V57954	47 uuF	130 uuF
9	15.1-19.0	9V57954	47 uuF	99 uuF
10	18.8-22.7	10V57954	68 uuF	81 Uuf
11	22.5-26.4	11V57954	68 uuF	69 uuF
12	26.2-30.1	12V57954	68 uuF	61 uuF



DETAILS OF COIL RANGES
RECEIVER C95150
DRG 95150 G1



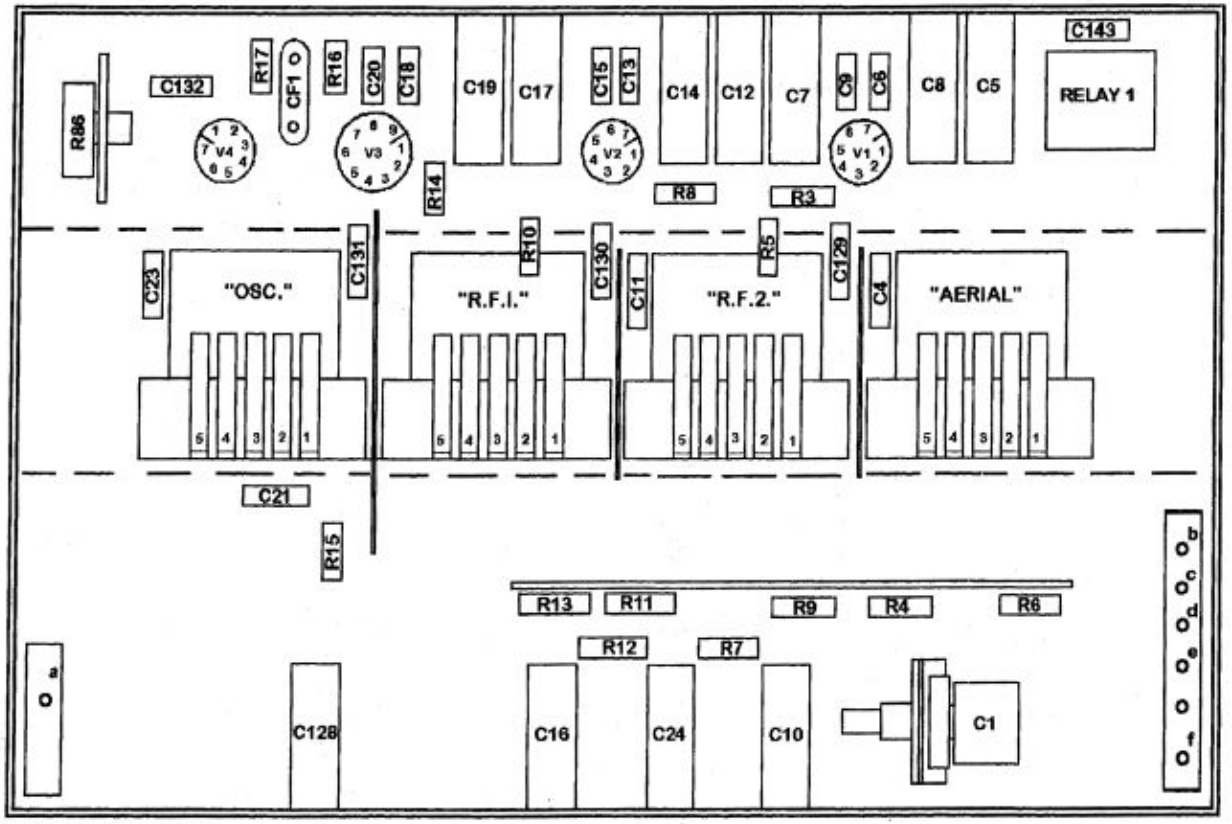
FRONT OF RECEIVER

CONNECTIONS TO CHASSIS

a. CAL. SWITCH.
b. I.F. AMP. A.G.C.
c. CAL. SWITCH
d. +24V.
e. -24V.
f. +240V.
g. +105V.
h. R.F. GAIN GAIN CONTROL

* COLOURED DOT INDICATES POSITION OF TAG No.1.

COMMUNICATIONS RECEIVER TYPE C95150
LAYOUT OF 85 kc/s. FILTER/585 kc/s.
I.F. AMP. CHASSIS
DRG. 95150 C2

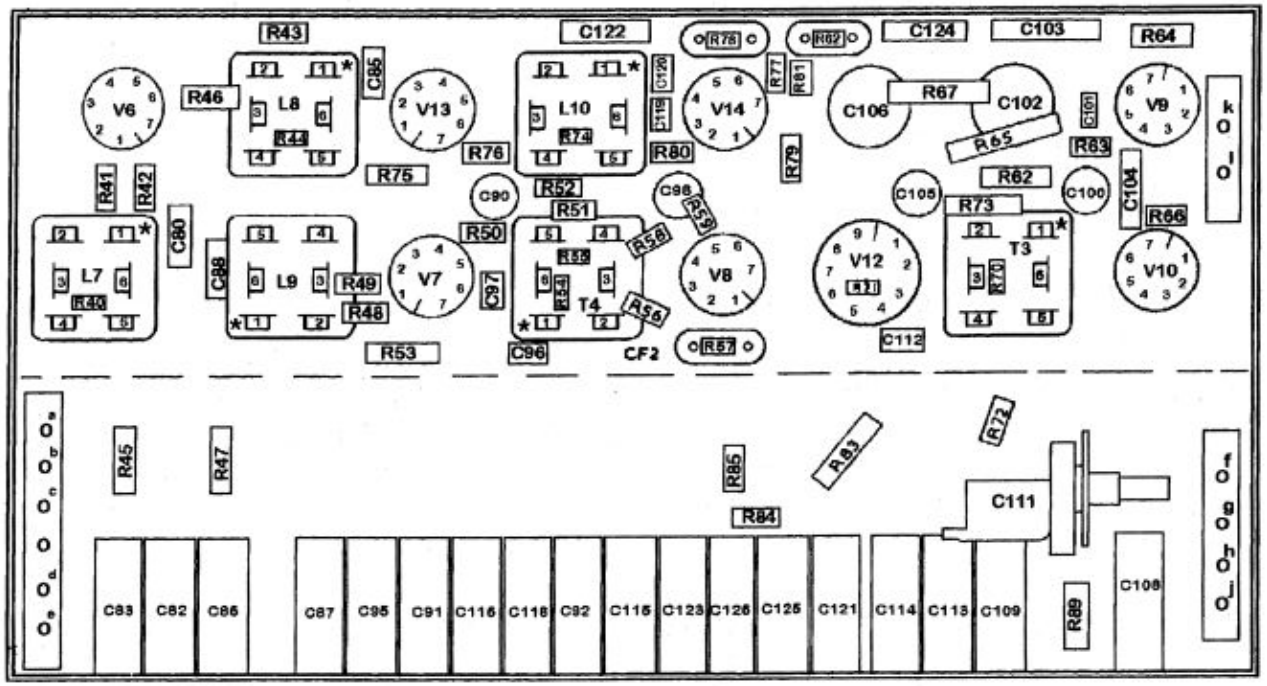


FRONT OF RECEIVER

CONNECTIONS TO CHASSIS

a. R.F. A.G.C.
b. + 24 V
c. - 24 V
d. + 240 V
e. + 105 V
f. R.F. GAIN CONTROL

COMMUNICATION RECEIVER TYPE C95150
LAYOUT OF R.F. AMPLIFIER CHASSIS
DRG. 95150 C4



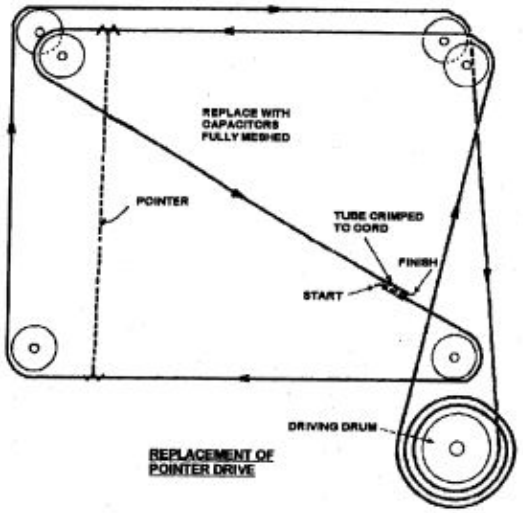
FRONT OR RECEIVER

CONNECTIONS TO CHASSIS

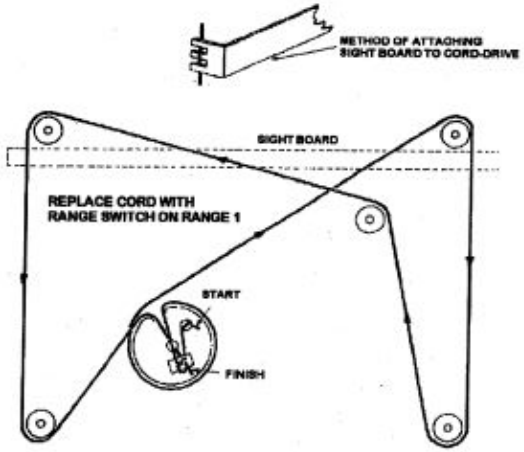
a. + 24 V
b. -24 V
C. +105 v
d. +240V
e. R.F. GAIN CONTROL
f. A.G.C. to I.F. AMP.
g. A.F. GAIN CONTROL
h. B.F.O. SWITCH
j. A.G.C. TO R.F. AMP.
k., l. A.N.L. SWITCH

* COLOURED DOT INDICATES POSITION OF TAG No. 1

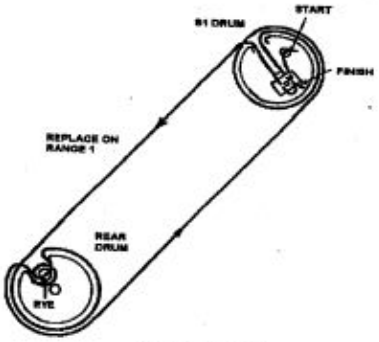
COMMUNICATION RECEIVER TYPE C95150
LAYOUT OF I.F./AUDIO CHASS
DRG. 95150 C3



REPLACEMENT OF
POINTER DRIVE

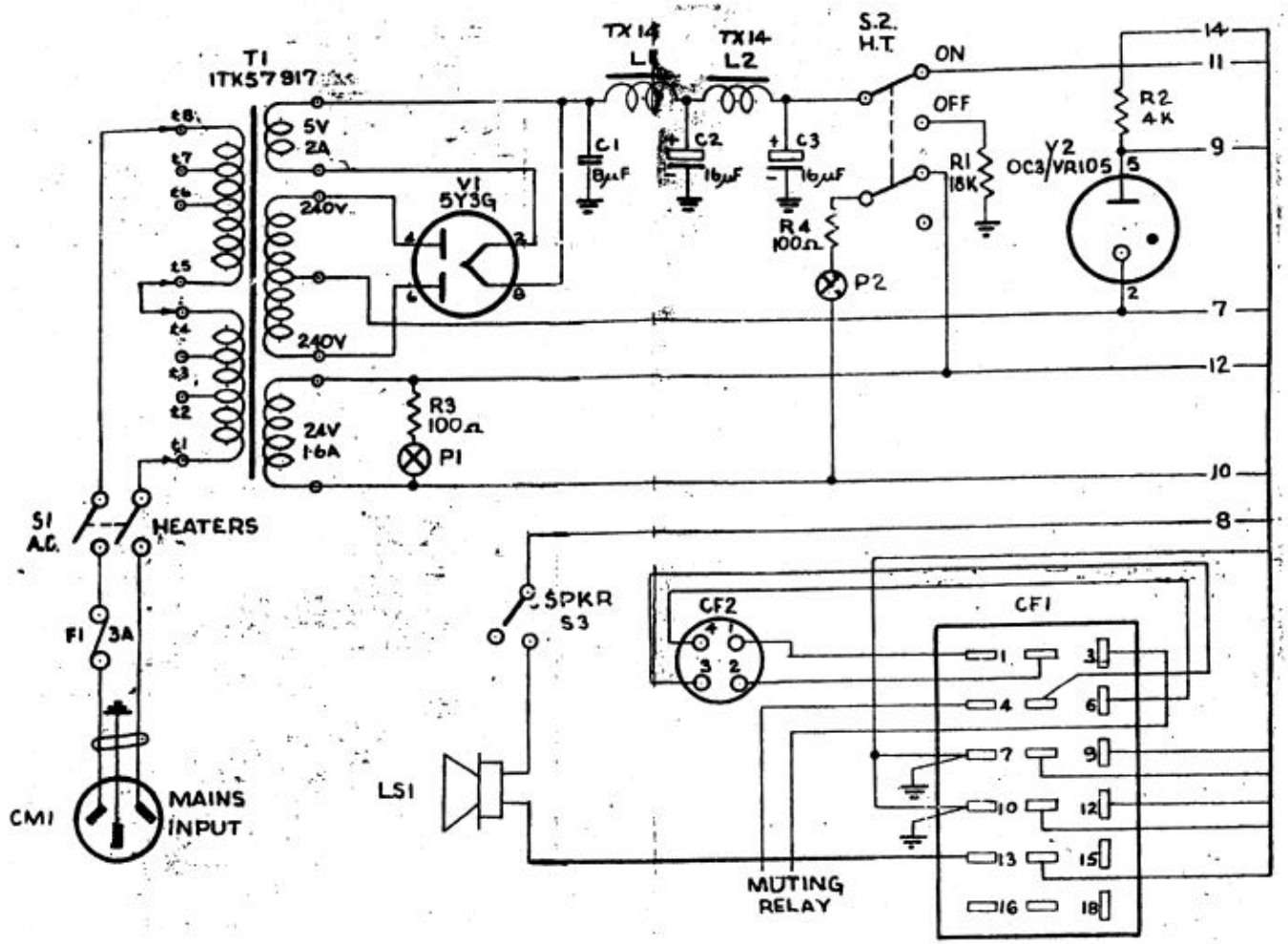


REPLACEMENT OF
SIGHT BOARD DRIVE



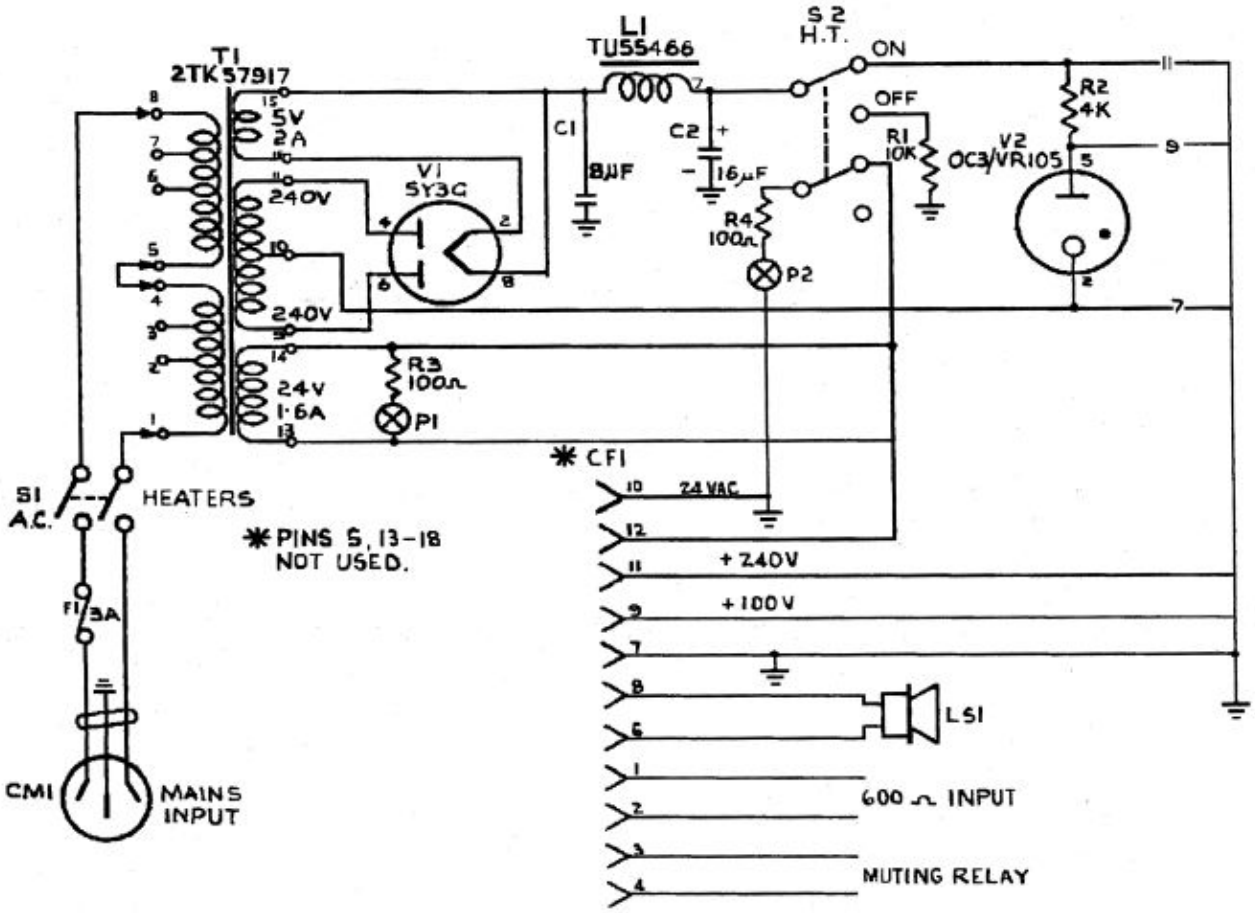
REPLACEMENT ON
S1 DRIVE

DRIVE CORD REPLACEMENTS ON
COMMUNICATION RECEIVER,
TYPE C95150
DRG. 95150G2



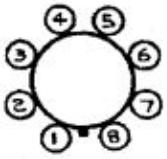
FOR	100V	INPUT	BRIDGE	T1&T5,T2&T6.	CONNECT	A.C.	INPUT	TO	T1 &T2
"	120V	"	"	T1&T5,T4&T8	"	"	"	"	T1 & T4
"	215V	"	"	T3&T5	"	"	"	"	T1 & T7
"	240V	"	"	T4&T5	"	"	"	"	T1 & T8

CONNECTORS VIEWED FROM WIRING SIDE



FOR 100V INPUT	BRIDGE	1-5, 2-6	CONNECT	A.C. INPUT	TO	1 & 2
" 120V "	"	1-5, 4-8	"		"	1 & 4
" 220V "	"	4-5	"		"	1 & 6
" 240V "	"	4-5	"		"	1 & 8

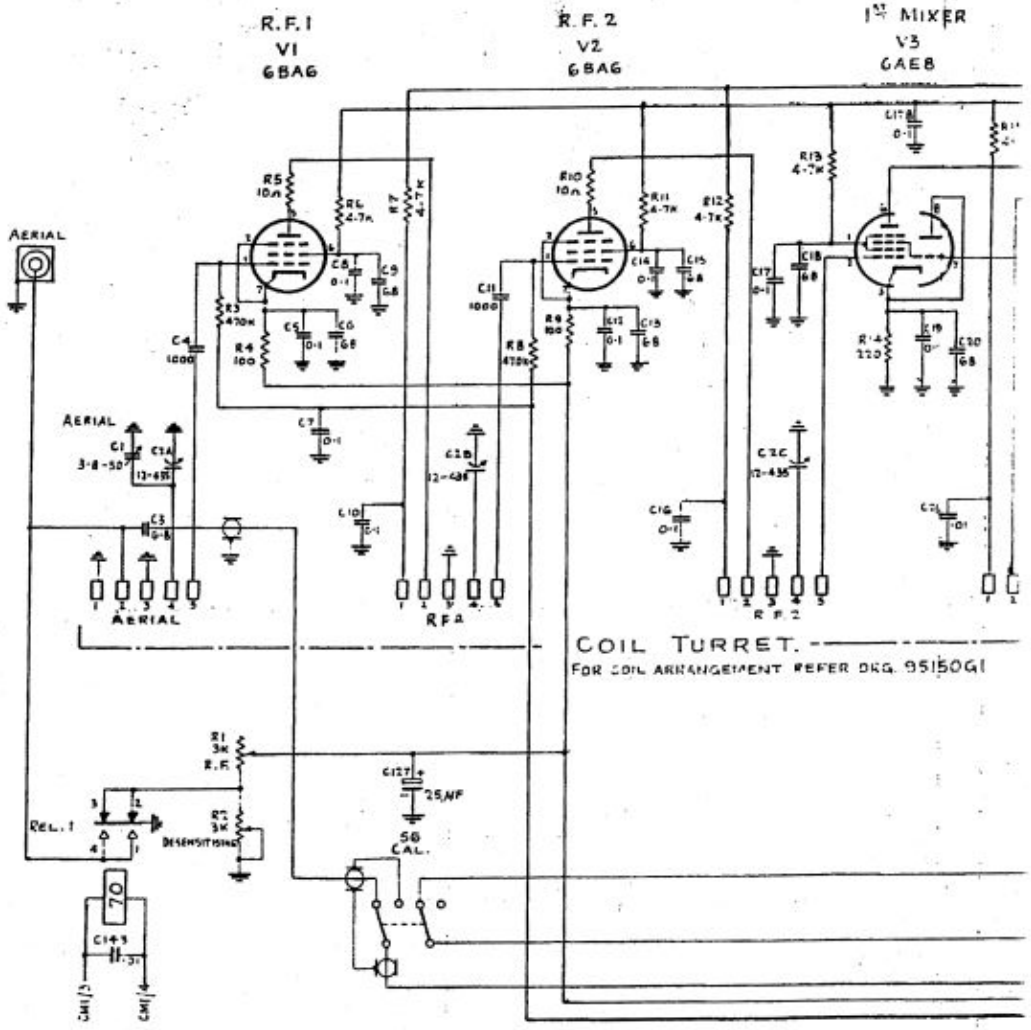
BOTTOM VIEW OF SOCKETS

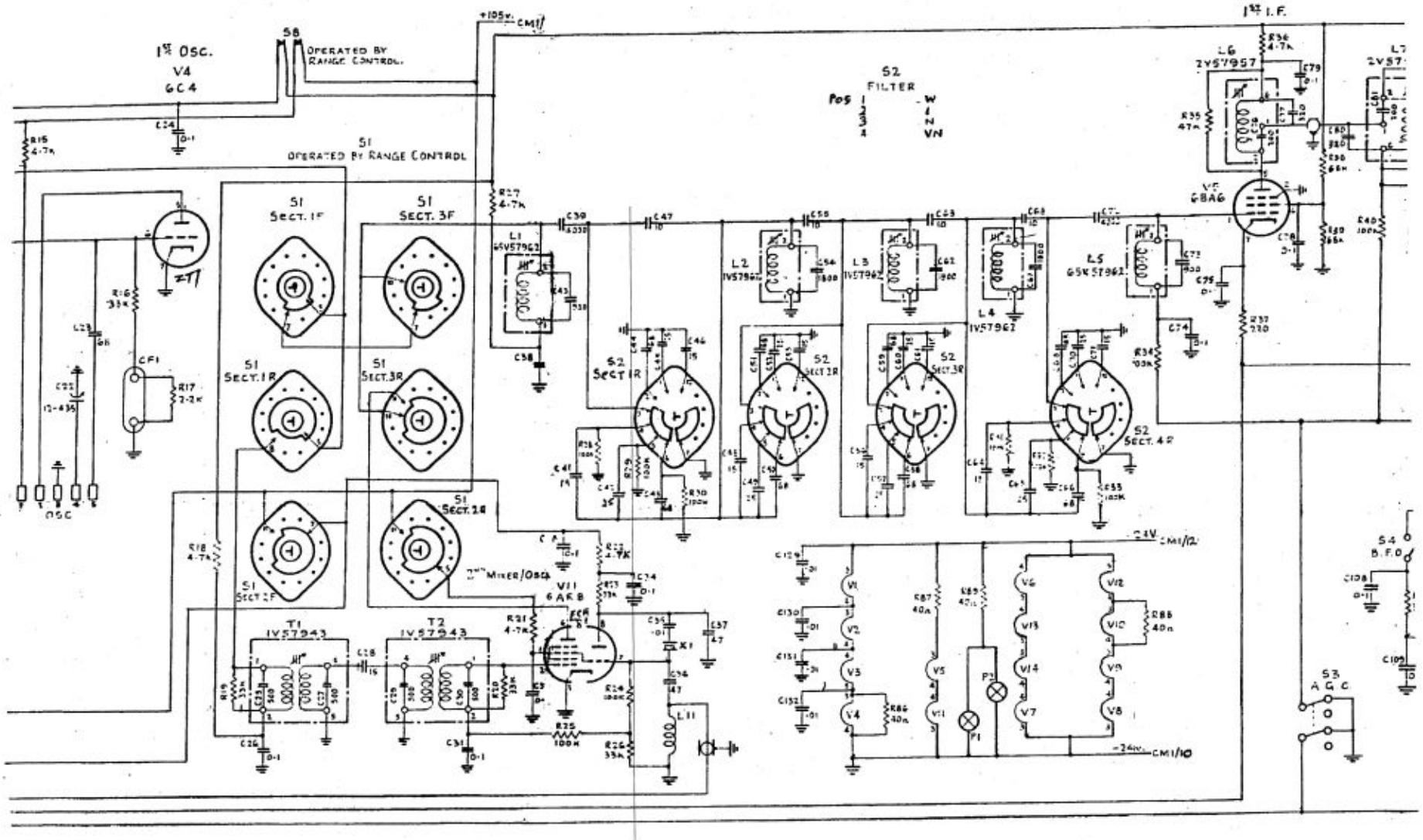


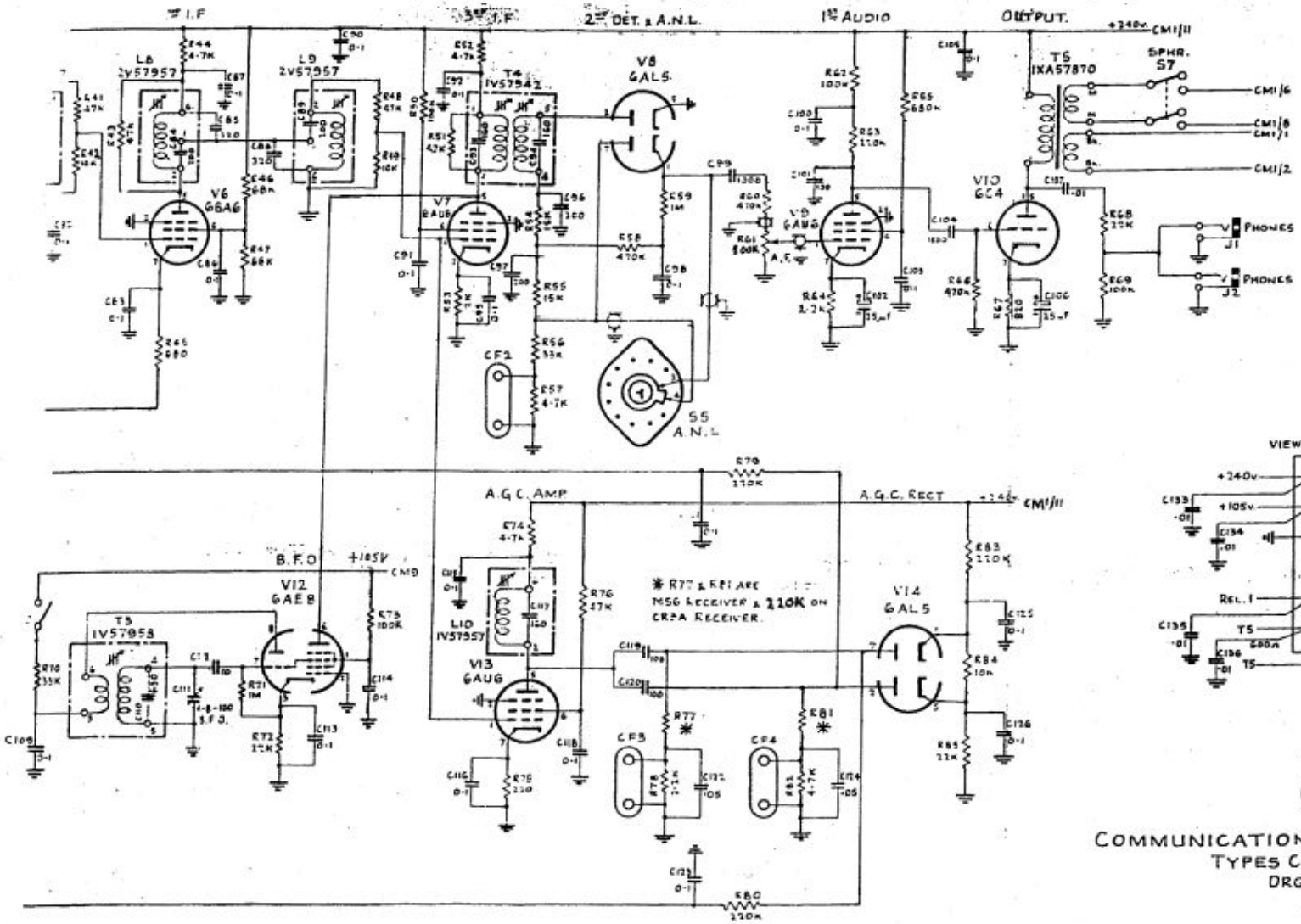
V1, V2.

FOR SER. Nº 242 UPWARDS.

POWER CONVERTER UNIT H95152
110-240V A.C. INPUT
DRG. 95152 D1


R.F.1
V1
6BA6
R.F.2
V2
6BA6
1st MIXER
V3
6AE8
AERIAL
AERIAL
AERIAL
RFA
R.F.2
COIL TURRET.
FOR COIL ARRANGEMENT REFER DRG. 95150G1
R1
3K
R.F.
R2
3K
DESENSITISING
REL. 1
70
C127
25μF
SB
CAL.


1st OSC.
V4
6C4
S8
OPERATED BY RANGE CONTROL.
S1
OPERATED BY RANGE CONTROL
S1 SECT. 1F
S1 SECT. 3F
S1 SECT. 1R
S1 SECT. 3R
S1 SECT. 2F
S1 SECT. 2R
S2
FILTER
Pos
W
N
VN
S2 SECT. 1R
S2 SECT. 2R
S2 SECT. 3R
S2 SECT. 4R
1st I.F.
L6
2V57957
V6
6BA6
L1
6SV5962
L2
1V57962
L3
1V57962
L4
1V57962
L5
6SK5962
T1
1V57943
T2
1V57943
2nd MIXER/OSC.
V11
6AK8
X1
L11
S3
A.G.C.
S4
B.F.O.
OSC
CF1
+105v.
CM1/1
-24V
CM1/12
-24v.
CM1/10



COMMUNICATION RECEIVER C95150
TYPES CR-3A & MSG.
DRG. 95150H1.