

EDDYSTONE

**MARINE
COMMUNICATION
RECEIVERS**

909A & 909A/1

(ALSO COVERING 909A/2)

**STRATTON & CO. LTD.
EDDYSTONE WORKS
BIRMINGHAM 31**

AMENDMENT SHEET NO. 2

NB Amendments marked with an asterisk apply only to receivers from Ser. No. 0276 onwards. Amendment Sheet No. 1. does not apply to Instruction Manuals issued after January 1964.

Page 16. *Change C37 to read:- "20pF Silvered Mica $\pm 10\%$ 350V DC wkg."

Page 16. *Add:- "C74 1800pF Disc Ceramic $+80\%$ -20% 1250V DC wkg."

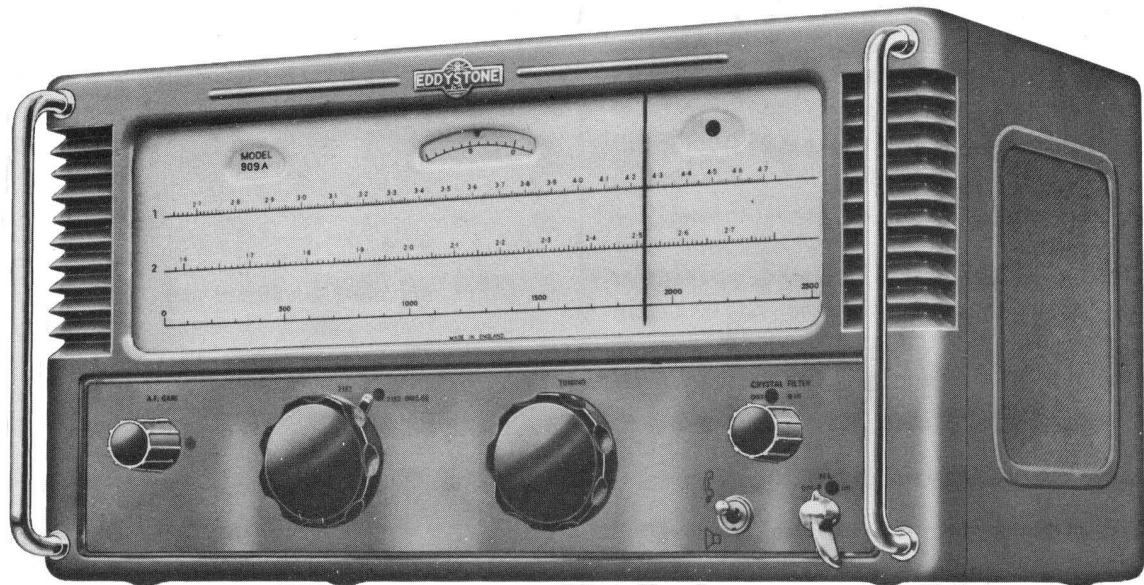
(This component does not appear on the circuit diagram but is connected to earth from the end of the output transformer speaker winding which is wired direct to R33.)

Page 18. XL1/2. Amend to read:- "465 kc/s ± 1000 c/s.
Peak separation 3 kc/s ± 50 c/s.
Part No. 6711P."

Page 18. FS1-4. Amend to read:- "Cartridge type (20mm x 5mm).
Rating as appropriate - see Section on
Installation.
Part Nos.
500mA . . 6710P
1.5A . . 6373P
3A . . 6709P."

EDDYSTONE

MARINE COMMUNICATION RECEIVERS MODELS 909A and 909A/1



Introduction

The EDDYSTONE Model 909A is a single conversion communications superhet receiver designed specifically for marine use in the band 1.6 — 4.7 Mc/s. This coverage is split into two switched ranges and rapid selection of the HF Distress and Calling Channel (2182 kc/s.) is provided in the form of a pre-tuned crystal controlled "spot frequency" selected by the wavechange control. The mode of reception is restricted to amplitude modulated telephony and telegraphy (MCW), there being no requirement for CW reception in the type of service for which the receiver is intended.

The receiver operates directly from all standard AC or DC mains supplies, or, if these are not available, from any source capable of supplying the necessary HT and LT voltages. In the case of the Model 909A/1 receiver, operation is from externally derived HT and LT supplies only, this being the sole difference between the two models.

Both models are fitted with an internal loudspeaker, but this may be switched out if not required and the received signal monitored on a pair of telephones. Signals on the Distress frequency may be relayed via a low impedance output to a monitor speaker located on the ship's bridge or in some other convenient position.

Advanced design, rugged construction and high quality components are employed throughout, the receiver is of a most convenient size and is suitable for continuous operation in all areas regardless of climatic conditions.

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Sole Manufacturers : STRATTON & CO. LTD., EDDYSTONE WORKS, BIRMINGHAM, 31, ENGLAND

TECHNICAL DATA

GENERAL

Frequency Coverage

A nominal coverage of 1.6 — 4.7 Mc/s. is provided in two overlapping ranges.

Range 1 .. 2.7 Mc/s. — 4.7 Mc/s. (nominal)

Range 2 .. 1.6 Mc/s. — 2.7 Mc/s. (nominal)

In addition to manual tuning of the ranges quoted above, crystal controlled reception is provided on the HF Distress and Calling Channel (2182 kc/s.).

Intermediate Frequency

465 kc/s. $\pm$ 1 kc/s.

Stage Sequence

A total of 7 valves is employed (together with one metal rectifier) in a single conversion superhet circuit. When operating from AC mains supplies, HT rectification is provided by a selenium rectifier. The valve line-up is as follows :—

<i>Circuit Ref.</i>	<i>Type</i>	<i>Circuit Function</i>
V1	12BA6 (CV1928)	RF Amplifier
V2	12BE6	Mixer
V3	6C4 (CV133)	Local Oscillator
V4	12BA6 (CV1928)	1st IF Amplifier
V5	12BA6 (CV1928)	2nd IF Amplifier
V6	12AT6	Detector, AGC Rectifier and 1st AF Amplifier.
V7	19AQ5	AF Output
D1	WX3	Noise Limiter
D2*	A101, 367/2	HT Rectifier

* Not fitted in Model 909A/1.

Input and Output Impedances

Aerial Input .. Nominally 75 ohms ; other impedances may be used satisfactorily.

Audio Output .. Internal loudspeaker : 2.5 ohms.
External loudspeaker : 600 ohms.
Telephones : Low level output to suit most values of impedance.

POWER SUPPLY

Mains Operation

The Model 909A may be operated from AC or DC mains supplies in the ranges 100—125 volts and 195—

250 volts. Approximate power consumption is as follows :—

110 volts input 26 watts

200 volts input 48 watts

230 volts input 52 watts

Both poles of the mains input are fused at 500mA using easily replaced cartridge type fuses.

Operation from External HT and LT Supplies

When an AC or DC mains supply is not available, the Model 909A can be operated from externally derived HT and LT voltages.

Reference should be made to the Section dealing with " Installation " for details of the procedure involved in changing from one mode of operation to the other, and also for instructions on adjusting the voltage selector for mains operation.

Voltages required to operate the Model 909A (and also the Model 909A/1) are as follows :—

HT .. 100—150 volts at 70mA (approx.)

LT .. 24 volts at 0.6 Amps.

PERFORMANCE

Sensitivity

Better than 10uV for an output of 500mW with a signal modulated to a depth of 30% (400 c/s.) and a signal-to-noise ratio of 15dB.

Selectivity

Two positions of selectivity are provided, one of which involves the use of a crystal bandpass filter. Typical overall response curves are shown in Fig. 1 and Fig. 2.

Stability

The following figures are typical and indicative of the stability of the Model 909A.

At a test frequency of 2.5 M/cs, the **total** drift during the first hour from " switch-on " does not exceed 1.5 kc/s. In the following hour, drift does not exceed 1000 c/s.

At 5 Mc/s, **total** drift in the first hour is less than 4 kc/s. and not greater than 2 kc/s. in the second hour.

Image Rejection

Greater than 90dB throughout the whole frequency range.

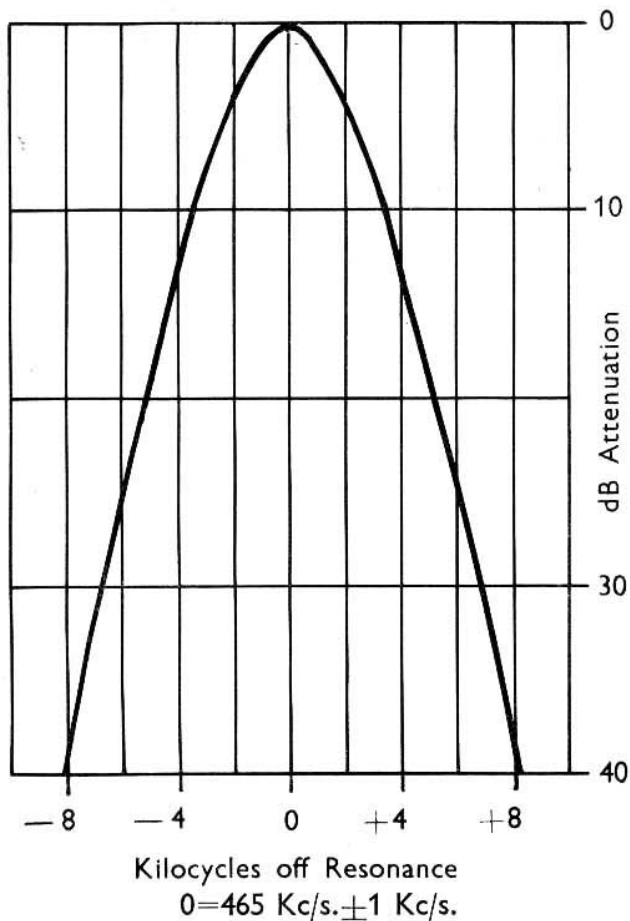


Fig. 1. I.F. response with crystal filter switched "out".

IF Rejection

Greater than 100dB at all frequencies.

Calibration Accuracy

Calibration accuracy is better than 0.5% at all frequencies.

AGC Characteristic

The AGC is permanently in operation and its perform-

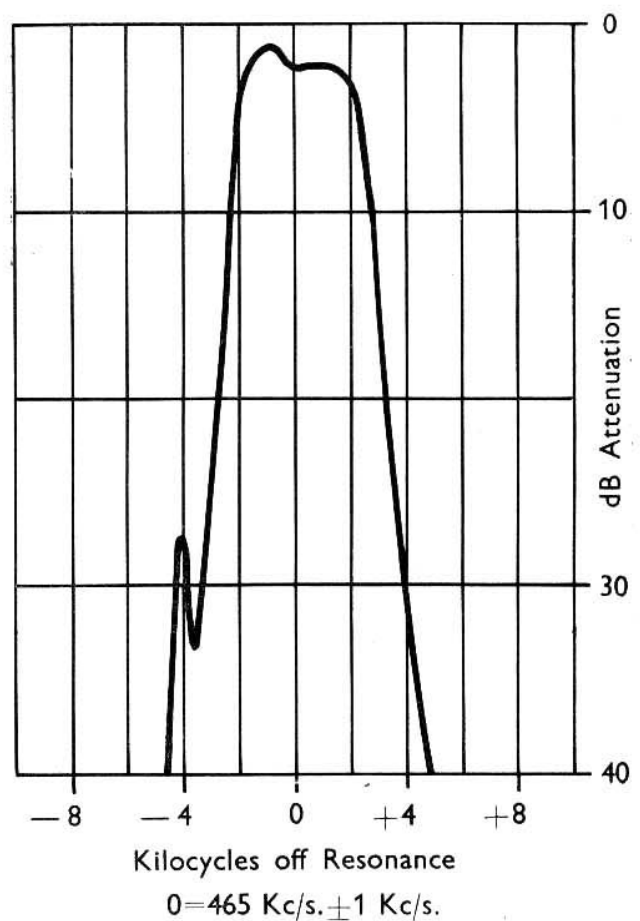


Fig. 2. I.F. response with crystal filter switched "in".

ance is such that the output will change by no more than 14dB when the input carrier is varied 80dB above 10 μ V.

Audio Output and Response

The audio output to either loudspeaker exceeds 500mW at maximum volume, while the telephone output is attenuated to a level not exceeding 10mW.

The audio response is substantially level from 400—4000 c/s. and a typical response curve is shown in Fig. 3.

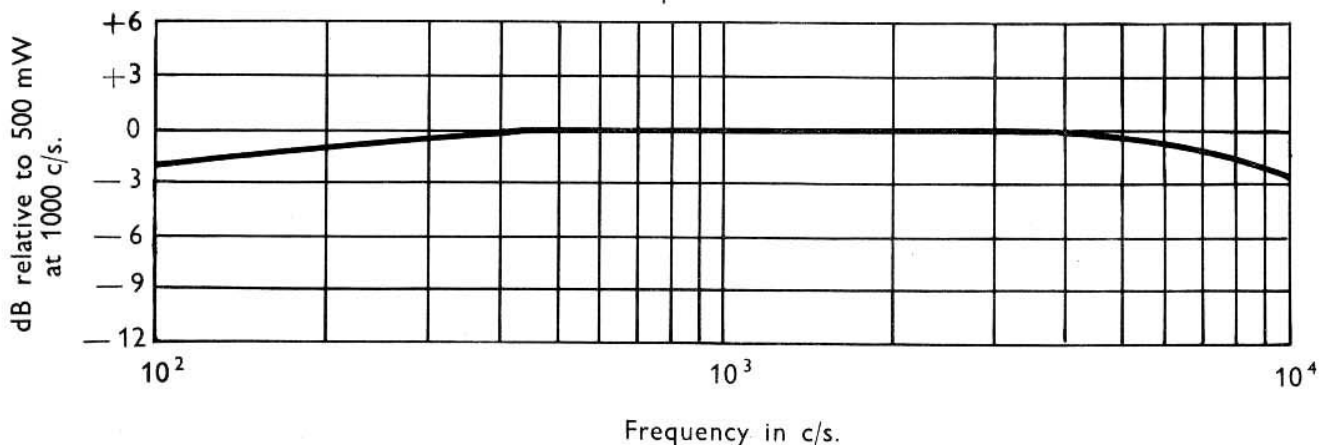


Fig. 3. Graph showing Audio Response — Model 909A

CIRCUIT DESCRIPTION

The Model 909A is a 7 valve AC/DC single conversion superhet receiver having a single stage of RF amplification and two IF Stages. Miniature B7G type valves are used throughout and provision is made for operation from externally derived HT and LT supplies should a normal mains supply not be available. The Model 909A/1 is a variant of the Model 909A and differs in that operation is from external HT and LT supplies only.

Two main tuning ranges are provided covering the band 1.6 — 4.7 Mc/s., while two further positions of the wavechange switch provide crystal controlled reception on 2182 kc/s. In one of these positions output is available to the internal loudspeaker and/or telephones, while in the other position the internal speaker is disabled and an output made available for the external loudspeaker. The fifth position of the wavechange switch is not used and a mechanical stop is fitted to prevent selection.

THE RF SECTION

The RF Stage (V1) employs a 12BA6 vari-mu RF pentode fed from the aerial via a bandpass coupled tuning circuit. This type of coupling provides an extremely high degree of image attenuation — a very desirable characteristic in a receiver of this type, likely to be used in close proximity to vessels or coast stations radiating strong signals on or near the image frequency.

Precautions have been taken to ensure that the aerial will not become "live" through direct connection to the chassis, while static "build-up" in the aerial during electrical storms is fed to earth via the two static "leaks" R1 and R2.

Selection of the correct input circuits is achieved by the first five sections of the wavechange switch (S1a — S1e). When either of the two crystal controlled positions are selected, pre-tuned input circuits are brought into

use so obviating the need for adjustment of the tuning control. By virtue of this feature, the receiver may be returned to any previously selected frequency merely by moving the wavechange switch to the appropriate range.

Automatic gain control is applied to V1 and also to the Mixer Stage V2 which follows it. A 12BE6 is used in this position with tuned secondary transformer coupling from the previous stage. Range switching arrangements are similar to those in the RF Stage and are performed by S1f — S1h.

V3 functions as a separate Local Oscillator Stage employing a tuned grid series fed circuit on the two manually tuned ranges and a tuned anode circuit when crystal control is selected.

Output from the local oscillator (6C4, triode) is fed to g_1 of V2 via the coupling capacitor C69. The oscillator operates 465 kc/s. higher than the signal frequency on all ranges, a 2647 kc/s. crystal being used for reception on 2182 kc/s.

Provision is made for removing the HT supplies from V1, V2 and V3 when an associated transmitter is in operation. An external switch or relay contact connected to pins 5 and 6 of the eight way connector at the rear of the receiver should be arranged to open when the receiver is to be muted. If the facility is not required, pins 5 and 6 should be joined by means of a wire strap.

THE IF/AF SECTION

Output from the Mixer Stage is taken via the 1st IF transformer to the first of the two IF Amplifiers, V4 and V5. 12BA6 vari-mu RF pentodes are employed in these stages both of which are fed from the AGC line.

The input to V4 is switched (S2a — S2c) to introduce a crystal bandpass filter which provides good adjacent

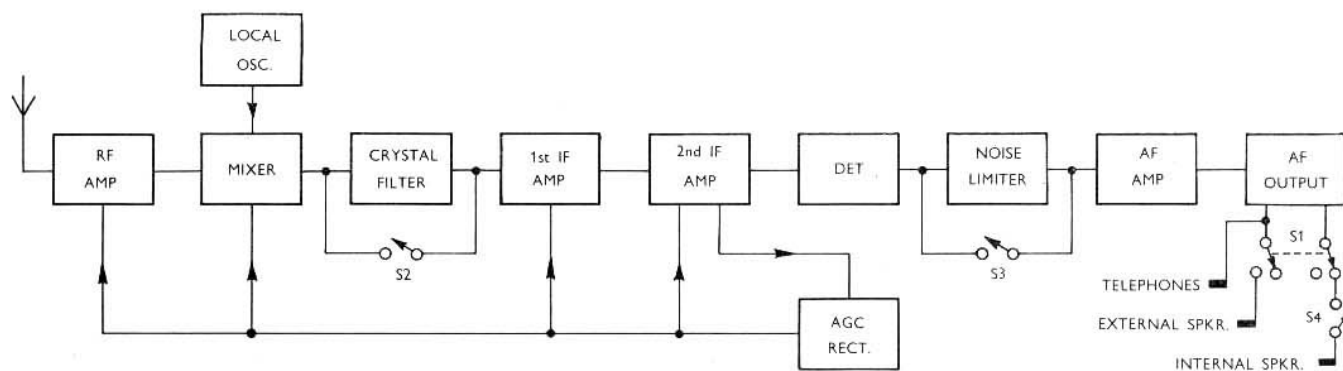


Fig. 4. Block schematic diagram — Model 909A.

channel selectivity when reception is marred by strong signals close to the desired channel. The performance of the filter is such that the overall bandwidth is only some 10 kc/s. at 40dB down.

The second IF Stage, V5 feeds the two diodes of the double-diode-triode, V6. One diode is used as signal detector in conjunction with the copper oxide rectifier D1 which functions as a series type noise limiter. D1 may be taken out of circuit when noise limiting is not required, the performance of the detector remaining sensibly constant regardless of the position of S3. The other diode — fed via C58 — rectifies the incoming carrier to provide AGC bias for V1, V2, V4 and V5. The AGC bias is delayed by the voltage drop across the cathode resistor of V6.

Output from the signal detector circuit is applied to the AF Gain Control (RV1) which feeds the triode portion of the 12AT6 used in the V6 position. V6 is resistance capacity coupled to the AF Output Stage V7 (19AQ5 beam tetrode).

The output transformer (T5) is provided with two separate secondary windings — one of 2.5 ohms and the other of 600 ohms impedance. The latter is electrostatically screened from the primary and 2.5 ohm secondary windings. The 2.5 ohm winding feeds the internal speaker when the range switch is in either of the first three positions, but at position 4, the internal speaker is automatically disconnected by S1m*, while S1n connects the 600 ohm winding to pins 1 and 2 of SKT3. A 600 ohm line connected to these points may

be used to feed an external speaker provided with a suitable matching transformer.

The 600 ohm winding is also connected to pins 7 and 8 (SKT3), a 6,800 ohm resistor being in series with the lead to pin 8. This resistor reduces the output to a suitable level for connection to telephones, and these may be used regardless of the position of S1.

THE POWER SUPPLY SECTION

The power supply circuitry of the Model 909A is basically conventional for an AC/DC receiver, having the usual half wave rectifier and series heater chain. However, to allow the receiver to be operated from external HT and LT supplies, a link system is incorporated so that the heaters may be changed to a series/parallel network for operation from a 24V DC supply. At the same time, the HT rectifier and smoothing filter are taken out of circuit to simplify connection of the external HT supply.

Fig. 5 shows a simplified circuit giving the arrangement of the valve heaters, etc., when the links are set for operation from an AC or DC mains supply.

Two thermistors are included in the heater chain ; R40 provides a relatively high resistance to limit the initial current surge at "switch-on," while R38 will heat rapidly should the indicator lamp fail. Under these conditions, the valves will continue to function normally so obviating the need for immediate replacement of ILP1.

The HT circuit is conventional and requires no special comment, but it should be noted that an efficient filter is fitted to reduce background noise in the form of mains borne interference. This filter is made up

* The switch S4 may be used to disable the internal speaker at any time. In the "OFF" position, a loading resistor (R33) is connected across the 2.5 ohm winding.

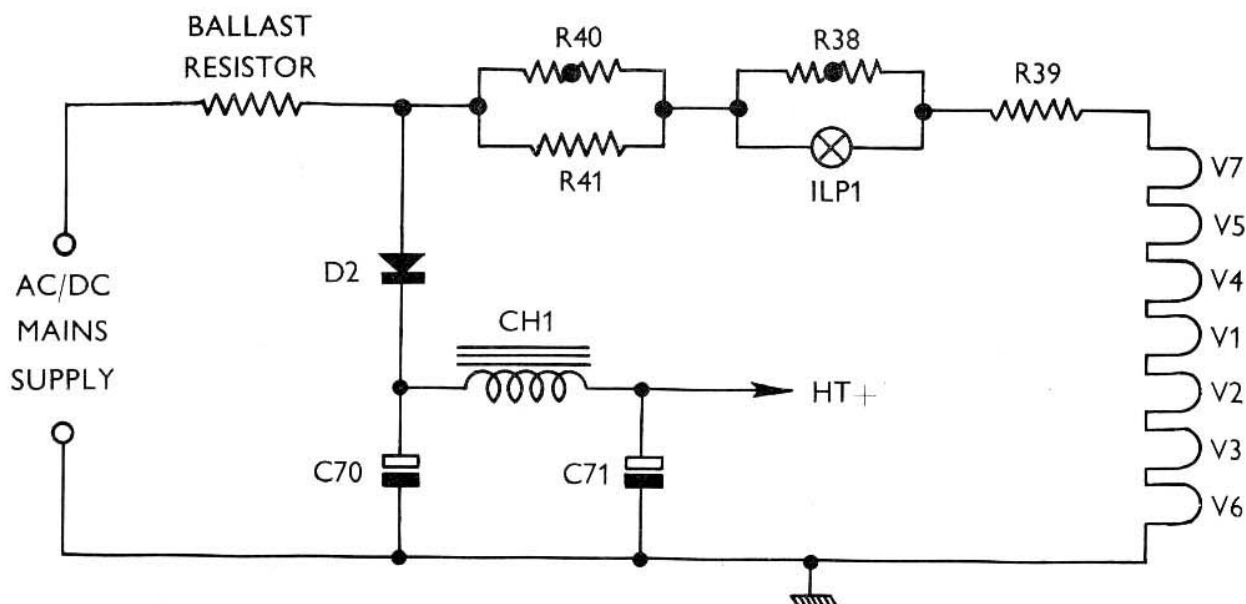


Fig. 5. Simplified drawing of power supply circuit applicable to mains operation.

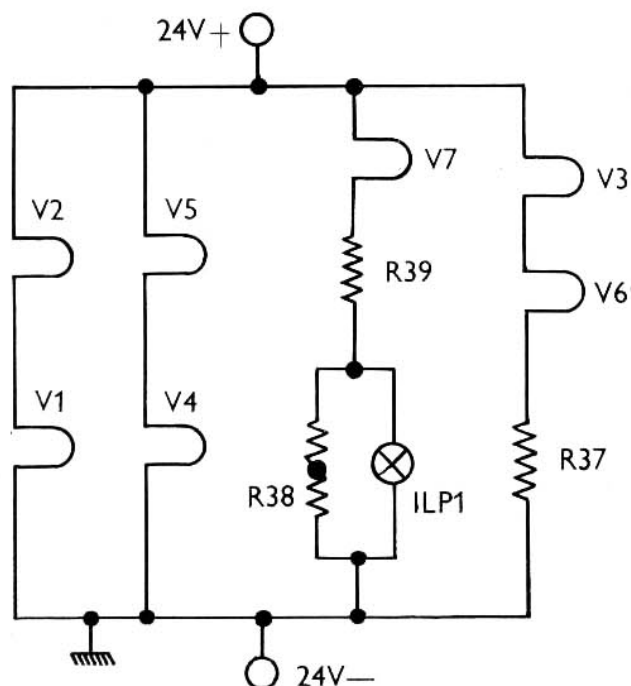


Fig. 6. Simplified drawing of heater circuit for 24 volt operation.

of the two chokes CH2 and CH3 together with the associated capacitors C72 and C73. (Refer to circuit diagram at rear of manual).

For operation from externally derived HT and LT supplies, the links are re-arranged so that the valve heaters are connected in a series/parallel network for operation from a 24V supply. A simplified circuit is shown in Fig. 6 and this will be found self explanatory.

In the case of the Model 909A/1, the heater circuit is permanently linked as for a Model 909A running from external HT and LT supplies, but the following components — normally located on the power unit chassis — are omitted.

1. The Ballast Resistor and Voltage Selector.
2. The Thermistor (R40) together with the shunt resistor (R41).
3. The HT rectifier and its associated smoothing circuit.

In addition to the above, CH2 and CH3 are replaced by CH4 and CH5, these having a lower DC resistance than the chokes normally fitted.

MECHANICAL FEATURES

GENERAL

Overall Dimensions and Weight

Width	..	..	16 $\frac{3}{4}$ " (43 cm.).
Depth	..	..	10" (25 cm.).
Height	..	..	8 $\frac{3}{4}$ " (22 cm.).
Weight	..	..	30 lbs. (14 kgs.).

Cabinet

The cabinet is stoutly made from rustproofed steel, is provided with perforated areas in the rear and one side to ensure adequate ventilation, and apertures at the rear for the eight way connector, aerial and earth.

The cabinet may be drawn away from the chassis by unscrewing the knurled finger screws at the rear. These screws are of the captive type to prevent loss.

Front Panel

The front panel is an aluminium diecasting to which are bolted the chassis supports. All controls are located for operating convenience along the lower half of the panel and an anodised aluminium finger plate behind them is labelled with their functions.

Chromium plated panel handles are fitted, and these — besides their normal use in lifting the receiver —

allow it to be placed "face down" without risk of damage to the panel controls.

Chassis

Sub-chassis construction is employed throughout, the main chassis unit being the central coil box. This unit is an aluminium diecasting attached to the front panel by means of four large "lugs." Paxolin insulating pieces form part of the fixing arrangements so that there is no connection between the panel and the coil unit or the two other sub-chassis supported by it. These chassis — the IF/AF and Power Supply chassis — make direct connection to the coil unit. They are also supported by the end plate and protecting rail fixed to the rear of the panel, an insulating fixing being used at each point of attachment.

NOTE : The cabinet is in direct contact with the panel but makes no direct connection with the chassis. The earthing arrangements are such that the cabinet (and panel) are directly earthed while the chassis is earthed via a suitable capacitor. The same construction is of course applied to the Model 909A/1 in the interest of standardisation.

Tuning Dial and Drive Mechanism

The tuning dial is directly calibrated in terms of frequency to an accuracy of 0.5% and the wide horizontal

scales make for ease in reading the frequency to which the receiver is tuned.

A well designed gear drive mechanism providing a reduction ratio of approximately 140-1 is used to operate the ganged tuning capacitors. This drive is flywheel loaded, free from backlash and ensures consistent re-setting accuracy.

The vernier bandsread device is used in conjunction

with the bottom horizontal scale to provide 2500 "logging" divisions on each of the manually tuned ranges. By use of this feature, each scale is expanded to the equivalent of 34 feet.

FINISH

All parts are suitably plated or rustproofed and stove enamelled in Admiralty Grey.

INSTALLATION

MOUNTING

The Model 909A is supplied in a metal cabinet which, besides affording protection to the receiver, also reduces the ingress of dust, dirt, etc. The receiver may be placed "loose" — i.e. without fixing — or may be screwed down to the operating table as desired. In the latter case, Fixing Plates (Part No. 5344P) must be fitted and these are available to separate order, being supplied complete with screws to match the hank bushes fitted to the base of the cabinet.

If it is preferred to incline the front panel to give a more convenient operating position, Receiver Mounting Blocks may be fitted. These are available separately under Cat. No. 774.

EXTERNAL CONNECTIONS

Aerial

The aerial feeder should be terminated with a coaxial plug type PL259A suitable for connection to the coaxial socket mounted at the rear of the receiver.

Good performance will be obtained with random lengths of wire, but for optimum results the aerial feed impedance should be close to 75 ohms.

Earth

The earth socket (SKT2) should be connected to a suitable earthing point via a short heavy gauge conductor.

It should be noted that leaving the earth lead disconnected will prevent operation of the static leaks in the aerial input circuit. This should be avoided in the interest of safety to human life.

The Eight-way Connector (SKT3)

Reference to the circuit diagram at the rear of the manual will show that this connector is used to feed "power" to the receiver, and to allow connection of the external loudspeaker, telephones and standby switch (or relay).

Connection of the last three items is identical whether the receiver is a Model 909A or a 909A/1, viz :—

External speaker line	..	pins 1 and 2
Telephones	..	pins 7 and 8
Switch or relay contact	..	pins 5 and 6

The output available across pins 1 and 2 is of 600 ohms impedance and will deliver a maximum audio signal of 500mW when the range switch is set to "2182 BRIDGE."

Suitable cable should be used to feed a transformer providing an accurate match to the loudspeaker. The transformer should be mounted close to the speaker, preferably in the speaker case.

The telephone output can conveniently be wired to a jack socket mounted in a suitable position for connection to the telephones. This output is arranged to attenuate the audio to a level suitable for telephone use. Telephones having a wide range of impedances may be used satisfactorily.

The standby switching is arranged so that it removes the HT supply from V1, V2 and V3 when an associated transmitter is in operation. A switch or relay contact connected across pins 5 and 6 should open to close down the receiver which will function normally immediately the circuit is closed again. If the standby switching is not required, a wire strap should be connected across pins 5 and 6 to permanently complete the HT supply for V1-3.

It is recommended that screened lead is used for all connections to the Alpha plug. Power supply connections are as follows :—

Model 909A (Mains operation)

AC or DC mains supplies should be connected to pins 3 and 4. In the case of DC mains, the positive pole must be connected to pin 3, and this is the "live" connection when AC supplies are used.

It should be noted that no provision is made for switching the mains input in the receiver itself and this facility must be arranged externally.

The mains supply should not be applied to the receiver until the following visual checks have been carried out.

1. Ascertain that the link panel is set for mains operation.
2. Check that the voltage selector is adjusted to the appropriate position.
3. Ensure that fuses are fitted and that these are rated at 500mA.

The voltage selector has three positions, namely 110V, 200V and 230V. The movable shorting plug should be set to comply with the following voltage ranges.

100-125V		110V position
195-220V		200V position
220-250V		230V position

For mains operation, the link board should be fitted with links as follows :—

“E” to “F”	..	Shorts out R37 which is only required for 24V operation.
“G” to “H”	..	Completes mains to voltage selector.
“J” to “K”	..	Connects the HT output from smoothing filter to HT “rail.”

Model 909A (Operation from external HT and LT supplies)

By suitably re-arranging the links on the link board, a Model 909A may be powered from external HT and LT supplies. Voltages and consumption are as follows:—

HT	..	100-150V at 70mA approx.
LT	..	24V at 0.6A (600mA).

The voltages are introduced at SKT3 (Alpha connector) and are connected as follows :—

HT	..	positive to pin 5, negative to pin 4.
LT	..	positive to pin 3, negative to pin 4.

Before applying these supplies to the receiver, first check that the link board is set for this type of operation ; links should be in position only as detailed below :—

“B” to “D” and “D” to “G” Connects the positive side of the 24V supply to the positive side of the series/parallel connected heaters.

“A” to “C” and “C” to “F” Connects the negative side of the heater circuit to chassis (i.e. LT negative).

Next, short out the two filter chokes CH2 and CH3. These have a resistance of 4.2 ohms each and will therefore introduce a serious voltage drop if left in circuit. Taking the chokes out of circuit in this way will have no adverse effect unless noise is introduced to the receiver via its supply leads. If this is the case, special low resistance chokes (as fitted to the Model 909A/1) should be ordered and fitted in place of the existing ones.

Since the heater current is some 600mA, the 500mA fuses fitted for mains operation should be replaced by similar ones rated at 1½ Amps.

The LT supply may be taken direct from either a 24V accumulator or a suitable combination of 6V and/or 12V units connected to provide the required voltage and capacity. HT may be obtained from any convenient source, e.g. a vibrator pack, transistor pack, motor generator, etc. No provision is made for switching these supplies internally so that arrangements should be made for switching at their source.

Model 909A/1

Power supplies and connections are as for the Model 909A with external HT and LT supplies. Special chokes of low resistance are used in place of CH2 and CH3 in the input filter.

If desired, a small HT power unit — designed for 24V operation — may be installed in the space normally occupied by the mains power unit. In this case, the 24V input for the HT unit should be taken from terminal “G” on the link board (24V positive) and chassis (24V negative). The HT output should have its negative side earthed direct to chassis and its positive pole connected to terminal “J” on the link board. The 24V input should be connected to pins 3 and 4 (SKT3) in the usual manner. The input fuses should be rated at 3 Amps.

OPERATION

CONTROL FUNCTIONS

Tuning

This control alters the setting of the ganged tuning capacitors, the main tuning pointer and the vernier bandsread dial. Ease of tuning is assured by the high reduction ratio of approximately 140-1, while accurate logging of stations is possible when the vernier scale is read in conjunction with the bottom scale on the main dial. The dial calibration is accurate to within 0.5% on both ranges.

Wavechange

This control has four positions as follows :—

1 .. 2 .. "2182" .. "2182 BRIDGE"

Coverage of 1.6 — 2.7 Mc/s. is obtained at position 2, 2.7 — 4.7 Mc/s. at position 1. The first position of "2182" (kc/s.) permits reception of the HF Distress and Calling Channel on either the internal speaker or on telephones. In the "2182 BRIDGE" position, the internal speaker is disabled and an output made available for an external speaker usually located on the ship's bridge. The receiver may be monitored locally by means of the telephones when it is used in this way.

AF Gain

Although the receiver is provided with an automatic gain control circuit, the audio output level must be adjusted by means of the AF Gain Control. All three outputs are controlled simultaneously.

Noise Limiter Switch

In the "ON" position, an efficient limiting circuit is introduced which is effective in reducing impulse noise when the receiver is subject to this type of interference.

Crystal Filter Switch

Brings into circuit a selective bandpass crystal filter which will provide greater discrimination against interfering signals on adjacent channels.

Internal Speaker/Telephone Switch

With the switch in the "down" position, the internal loudspeaker functions in all positions of the wavechange control except the fourth. If the internal speaker is not required, the switch should be moved to the "up" position. Reception may be carried out normally using telephones or the earpiece of a combined telephone type handset. Switching of the external speaker is not affected by this control.

TUNING INSTRUCTIONS

Ascertain that all external connections are correctly made and apply "power" to the receiver. No supply switching is provided within the receiver itself so this facility will be found externally. The method of switching will no doubt vary from one installation to another, the receiver being wired — in most cases — to suit an existing arrangement.

An indication that the receiver LT supply is available is given by the green indicator lamp at the top right hand side of the main tuning dial. This lamp will, of course, become illuminated even if the external standby switch (or relay) is in the standby position.

While the receiver is "warming up" select the required range and tune approximately to the desired frequency.

NOTE : If "2182" or "2182 BRIDGE" is required, no adjustment of the tuning control will be necessary. It should be borne in mind however, that the internal speaker is not operative in the latter position. It may therefore be preferred to set up in the first position ("2182") and then switch to "2182 BRIDGE" when the other adjustments have been completed.

The internal speaker or telephone output should next be selected by means of S4 and the AF Gain adjusted so that the background noise is just audible. Now accurately tune in the required signal and re-adjust the AF Gain to a suitable level. Impulse noise, if troublesome, may be reduced by placing the Noise Limiter Switch to the "ON" position, while adjacent channel interference will be attenuated when the crystal filter is switched "IN." This latter operation, making the receiver more selective, may call for a slight re-adjustment of the tuning control to ensure correct tuning ; no adjustment is required in either of the crystal controlled positions.

It will be noticed that certain control settings are marked in red. These markings indicate the settings for the appropriate controls for reception of the Distress and Calling Channel on the external loudspeaker. No adjustment of the tuning control or internal speaker switch is required for this mode of reception.

MAINTENANCE

GENERAL

The Model 909A is intended for continuous operation in all areas regardless of climatic conditions and should require very little in the way of maintenance over long periods of use.

In common with most pieces of electronic equipment, the 909A will accumulate its share of dust, etc., and this should be removed periodically, taking care not to dislodge any of the pre-set adjustments.

All switches used in the receiver are of the self cleaning type and should therefore require no attention. All moving parts are lubricated with a permanent lubricant (molybdenum disulphide) so that regular lubrication is unnecessary. If, however, after long periods of use, lubrication is thought necessary, a light mineral oil may be used. This should be of good quality and suitable for the temperature conditions under which the receiver is used.

External connections should be checked from time to time to ensure complete serviceability.

WARNING Make sure that the receiver is disconnected from the mains supply before attempting to change either the indicator lamp or the input fuses.

INDICATOR LAMP REPLACEMENT

Should the indicator lamp (ILP1) fail, it may be changed quite simply after removal of the cabinet. Merely squeeze together the two sides of the holder and pull away from the paxolin supporting piece. The bulb is a standard Swedish type rated at 0.2 Amps. (other types can be fitted to special order).

Care should be exercised in changing bulbs to prevent damage to the thermistor mounted on the lamp holder.

FUSE REPLACEMENT

A faulty fuse may be changed by removing the cabinet to reveal the two fuse holders located at the rear of the chassis to the right hand side of the tuning gang. The value of the replacement fuse will depend on whether the receiver is operated from the mains or from external HT and LT supplies. Values are as follows :—

Mains operation	..	..	$\frac{1}{2}$ Amp each
External HT and LT	..	..	1½ Amps each*

If after replacing a fuse it burns out as soon as the receiver is switched on, or alternatively fuses fail regularly over short periods of operation, steps should be taken to ascertain the cause.

VALVE REPLACEMENT

Any one of the seven valves is easily removed should replacement be necessary. The valves are all standard types and no difficulty should be experienced in obtaining spares.

FAULT LOCATION

Should the receiver fail in operation, standard fault finding techniques may be applied to locate and clear the cause of the trouble. Most components, especially those on the IF/AF and Power Supply chassis are readily accessible and replacement if necessary should present no problems. Suspect valves may be checked by substitution.

In the case of a receiver having its valve heaters arranged in series for operation from mains supply voltages, a faulty heater will of course break the chain and remove the LT supply from all valves and the indicator lamp ILP1. Continuity checks carried out at the link panel to the right of the tuning gang will simplify location of the faulty valve. Lack of continuity between "A" and "B" indicates V7 or R39 open circuit ; V4 and V5 should be suspected if an open circuit reading is obtained between "B" and "C", while the same indication across "C" and "D" indicates a broken heater in V1 or V2. Similarly, a check across "D" and "E" will show whether the heaters of V3 and V6 are continuous.

NOTE : Should ILP1 go O/C, R37 will maintain correct current to all the valves.

When the receiver is set up for operation from a 24 volt LT supply, a visual check will reveal which valve(s) is/are extinguished.

If both HT and LT are lacking in a mains operated installation, the most likely causes are (1) blown fuse(s), (2) CH2 and/or CH3 O/C and (3) Ballast Resistor, R42 burnt out.

In the case of the receiver appearing "dead" and assuming all voltages to be sensibly correct, standard signal tracing should be attempted.

The audio stages may be checked by applying an AF signal between the red side of the NL diode and chassis. (the diode is wired directly across the NL switch wafer and is therefore easily located) Similarly, the IF Section can be tested by introducing a modulated 465 kc/s. signal at pin 1 of V5, pin 1 of V4 and then to the stator of the Mixer section of the tuning gang (C8c). In this latter position the range switch should be set to Range 2.

* 3 Amps with internal HT pack.

It should be borne in mind that the Model 909A is basically an AC/DC receiver and it is therefore possible for the chassis to become "live" when operating the set from AC mains supplies. It is suggested, in the interest of safety, that an isolation transformer is used when working on an AC powered 909A with the cabinet removed. Should an isolation transformer not be available, the mains connections should be reversed if necessary to ensure that the chassis is connected to the neutral side of the mains. Connections to signal generators, etc., should be made via suitably rated blocking capacitors.

POINTER DRIVE CORD REPLACEMENT

In the unlikely event of the drive cord breaking or slipping out of the pulley grooves, replacement will be simplified, even when the cord is undamaged, if a new length is obtained. This can be made longer than the length actually required, approximately 3' 6" (915 mm.), and will therefore be easier to handle. Replacement will present no difficulties if the instructions given below are carefully followed.

NOTE : In the following instructions, left-hand and right-hand are as viewed from the rear of the receiver.

1. Remove the cabinet after loosening the retaining screws at rear.
2. Take off the old drive cord by slackening the 6BA screws let into the drive pulleys.
3. Set the tuning control so that the tuning gang is fully meshed.
4. Take the new drive cord and secure to screw in left hand drive pulley. Feed cord through pulley slot and into groove nearest panel (cord leaving pulley from right to left).
5. **Without** winding cord round drive pulley, pass it under the indicator bulb, around the left-hand guide pulley and across the dial between the pointer guide rods.
6. Move the pointer to the right-hand side, nearest speaker, and slide cord up and over retaining spring. The spring may be pressed down slightly to simplify this operation.
7. Take cord over the right-hand guide pulley, under the jockey pulley and across towards the right-hand drive pulley. Sufficient tension should be applied to cause the jockey pulley to take up a position approximately half way through its full travel.
8. Lay the cord in groove nearest panel (right-hand drive pulley) and wind three complete turns in an anti-clockwise direction. Ensure that the cord lies in the pulley grooves and that correct tension is maintained at the jockey pulley.

9. Holding the free end of the cord reasonably tight, rotate the tuning control to unmesh gang, stopping when the 6BA screw in the right-hand drive pulley lies at "2 o'clock." This moves the screw into an accessible position.
10. Press cord into pulley slot, round 6BA screw and secure.
11. Check that jockey pulley is correctly tensioned and then cut off the surplus cord at the right-hand drive pulley.
12. Move gang to fully meshed position and set pointer to "0" on logging scale. Check drive system for free and normal operation.
13. Check calibration using a suitable frequency standard.
14. Replace cabinet and tighten retaining screws.

In some cases it may be possible to replace the original cord without having to free it from the drive pulleys. This will prove satisfactory if the cord is undamaged but should not be attempted if the cord is even only slightly severed.

RE-ALIGNMENT

It is most unlikely that complete re-alignment of the Model 909A would be required. Partial re-alignment, however, should be implemented if a component associated with one of the tuned circuits has been replaced; adjustments should be restricted to the stage or unit affected. Suitable test equipment must be available, and the relevant procedure for re-alignment of any section of the receiver may be extracted from the instructions given below. Location of all trimming adjustments will be found in Fig. 7.

Re-alignment of the IF Section

Since this section of the receiver incorporates a crystal bandpass filter, accurate alignment can only be performed by using a sweep generator in conjunction with an oscilloscope to present a visual display of the response curve.

The sweep generator output should be connected to the stator of C8c with the receiver range switch set to Range 2. Output to the "Y" plates of the oscilloscope can be taken between the red end of D1 and chassis. The generator is adjusted to a sweep of 465 kc/s. ± 15 kc/s. at as slow a sweep speed as possible, the oscilloscope controls being adjusted as necessary to obtain a good display on the face of the tube.

The curve should show a reasonably square-topped steep-sided contour with only very small subsidiary humps rising from the bottom corners of each side. Should these humps be of excessive amplitude, adjust-

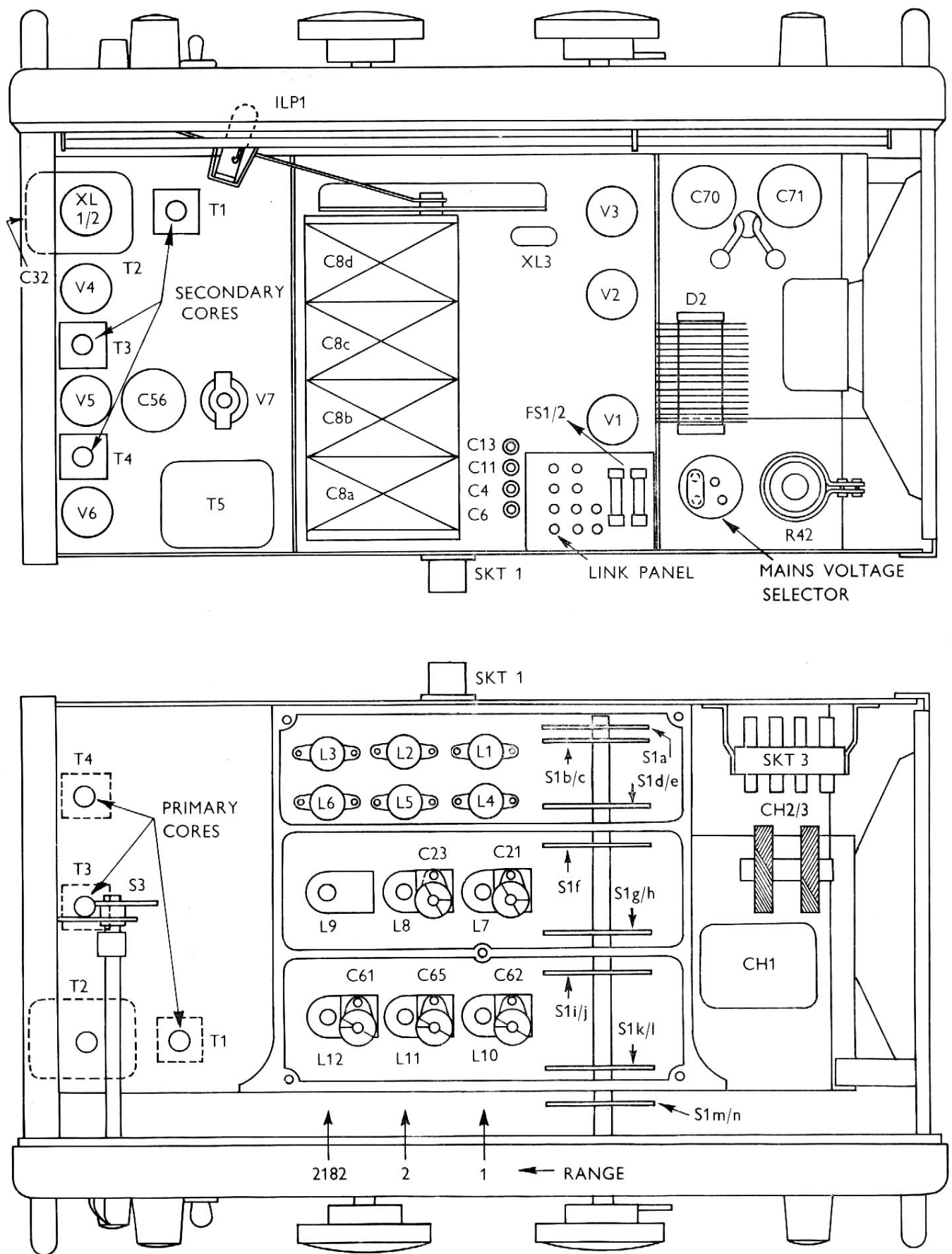


Fig. 7. Plan and underside views of 909A showing trimming adjustments and major components.

ment of the phasing capacitor (C32) will suppress them, but suppression should not be overdone or the square-top will be badly upset. It is preferable that a trace of these humps should be left. The top and bottom cores in the three IF transformers and the bottom core in the crystal filter unit should be adjusted to give as great a height to the display as possible consistent with preserving the square and balanced top.

To check the sensitivity of the IF Section, disconnect the sweep generator and oscilloscope and connect a suitable standard signal generator to C8c. An output meter of 600 ohms impedance should be connected to pins 2 and 7 of SKT3 and the receiver controls set as follows :—

AF Gain	..	..	..	Maximum
Crystal Filter	..	..	..	Out
Noise Limiter	..	..	..	Off

With the generator set to 30uV output, alter its tuning control for maximum deflection in the output meter. A reading of $50\text{mW} \pm 2\text{dB}$ indicates normal IF sensitivity. If the reading is considerably lower than this value, the signal generator output should be applied first to pin 1 of V5 and then to pin 1 of V4. No components need be disconnected and the following sensitivities should be obtained.

V5	..	..	10mV for 50mW output
V4	..	..	75uV for 50mW output

Re-alignment of the Local Oscillator Stage

The first step in re-alignment of the RF Section of the receiver is a check on the accuracy of the dial calibration.

The calibration check is carried out using a modulated crystal controlled harmonic generator with its output connected to SKT1. Harmonics should be available at 100 kc/s. intervals throughout the tuning range of the receiver which should be allowed adequate time to reach operating temperature before commencing the check.

Provided that the dial calibration is within 0.5% (± 20 kc/s. at 4 Mc/s.), no adjustment of the local oscillator will be required; greater errors should be corrected by adjustment of the appropriate trimmers, etc., as detailed below.

First select Range 1 and set the receiver tuning at 2.7 Mc/s. according to the scale: an output meter matched to 600 ohms should be connected to pins 2 and 7 of SKT3. Adjust L10 (see Fig. 7) until the marker signal is heard. Carefully peak for maximum output by means of L10 only. Now re-tune so that the scale pointer is accurately set to 4.5 Mc/s. Tune in the

calibrator signal by means of C62, peaking carefully for maximum output. Return to 2.7 Mc/s. and adjust L10 if necessary to correct any slight shift caused through adjustment of C62. A further check should now be made at 4.5 Mc/s. followed by a check at each 100 kc/s. point throughout the entire range.

The same procedure should be adopted on Range 2, adjusting L11 at 1.6 Mc/s. and C65 at 2.7 Mc/s. As before, a final check should be made at each 100 kc/s. point.

Switch to "2182" and connect a voltmeter across R9, i.e. between pin 2 of V2 and chassis. Adjust L12 for minimum voltage reading. The pre-set trimmer, C61, mounted on top of L12 is connected in parallel with the crystal and should not be touched. It has been carefully set up during initial alignment and it is doubtful whether test equipment of sufficient accuracy will be available for re-adjustment in the unlikely event of this being necessary.

Re-alignment of the RF and Mixer Stages

Having corrected any errors in the dial calibration, the next stage is to accurately align the signal frequency circuits.

The crystal calibrator may be used for this part of the alignment, only if it has an output matched to 75 ohms; if this is not the case, a standard signal generator having a 75 ohm output should be used.

Set the receiver wavechange control to Range 1 and tune to 2.7 Mc/s. Swing the generator tuning control around 2.7 Mc/s. until a signal is heard, then peak L1, L4 and L7 for maximum reading in the output meter. The receiver controls should be set as when checking IF sensitivity and the signal may be kept at a convenient level by adjusting the generator output.

NOTE: To ensure accurate alignment of the band-pass coupled circuits, a 1000 ohm resistor should be connected across one circuit while the other is adjusted, i.e. shunt L1 while adjusting L4 and vice versa.

Change to 4.5 Mc/s. and adjust C4, C11 and C21 for maximum output. Repeat at 2.7 Mc/s. since the trimmer adjustments may call for slight re-adjustment of the inductors.

Now select Range 2, adjust L2, L5 and L8 at 1.6 Mc/s. and then C6, C13 and C23 at 2.7 Mc/s.

Finally, switch to "2182," tune generator to receiver and peak L3, L6 and L9 for maximum output.

Once the alignment is completed, the overall sensitivity may be checked. This should be better than 10uV for an output of 500 mW. Modulation 30% at 400 c/s and signal-to-noise 15dB.

APPENDIX “A”

COMPARISON OF MODELS 909, 909A AND 909A/1

The Models 909, 909A and 909A/1 are all identical in so far as the signal circuits are concerned and only differ in their power supply arrangements.

The Model 909, from which the other two Models are derived, is an AC/DC receiver suitable for operation from mains voltages in the ranges 100–125 and 195–250 volts.

In the later version, the Model 909A, a linking system is provided so that the receiver may be operated from external HT and LT supplies when normal AC or DC mains supplies are not available. The voltages required to operate the receiver under these conditions are as follows :—

HT	100–150 volts (70mA approx.).
LT	24 volts (0.6 Amps).

The Model 909A/1 is basically a Model 909A permanently wired for operation from external HT and LT supplies, the mains power unit being omitted.

All Models employ the same valve “line-up” and have identical performance. Externally, a Model 909A may be differentiated from a Model 909 by reference to the Model number at the top left hand side of the main dial. A Model 909A/1 is marked Model 909A in this position, but Model 909A/1 on the serial number plate at the rear of the receiver.

APPENDIX “B”

VALVE BASE CONNECTIONS

All valves (and the dual IF crystal) are B7G types. Connections are as follows :—

Type	Pin connections						
	1	2	3	4	5	6	7
6C4	A	NC	H	H	A	G	K
12BA6	G1	G3, S	H	H	A	G2	K
12BE6	G1	K, G5	H	H	A	G2, G4	G3
12AT6	G	K	H	H	D''	D'	A
19AQ5	G1	K, BP	H	H	A	G2	G1
XL1/2	XL1	—	XL2	—	XL2	—	XL1

APPENDIX "C"

COMPONENT VALUES, TOLERANCES AND RATINGS

Capacitors

C1	1800 pF Isolator Ceramic $\pm 80\%$ -20% 1250V Peak wkg.	C37	3 pF Silvered Mica $\pm \frac{1}{2}\%$ 350V DC wkg.
C2	1800 pF Isolator Ceramic $\pm 80\%$ -20% 1250V Peak wkg.	C38	0.05 mfd Tubular Paper $\pm 20\%$ 250V DC wkg.
C3	0.01 mfd Tubular Paper $\pm 20\%$ 600V RMS wkg.	C39	400 pF Silvered Mica $\pm 2\%$ 200V DC wkg.
C4	2-22 pF Ceramic Tube Trimmer.	C40	400 pF Silvered Mica $\pm 2\%$ 200V DC wkg.
C5	20 pF Silvered Mica $\pm 10\%$ 350V DC wkg.	C41	0.05 mfd Tubular Paper $\pm 20\%$ 250V DC wkg.
C6	2-22 pF Ceramic Tube Trimmer.	C42	0.05 mfd Tubular Paper $\pm 20\%$ 250V DC wkg.
C7	20 pF Silvered Mica $\pm 10\%$ 350V DC wkg.	C43	0.01 mfd Tubular Paper $\pm 20\%$ 150V DC wkg.
C8	4 gang air spaced tuning capacitor 11.5-366 pF per section.	C44	0.05 mfd Tubular Paper $\pm 20\%$ 250V DC wkg.
C9	100 pF Silvered Mica $\pm 2\%$ 350V DC wkg.	C45	0.05 mfd Tubular Paper $\pm 20\%$ 250V DC wkg.
C10	100 pF Silvered Mica $\pm 2\%$ 350V DC wkg.	C46	0.05 mfd Tubular Paper $\pm 20\%$ 250V DC wkg.
C11	2-22 pF Ceramic Tube Trimmer.	C47	400 pF Silvered Mica $\pm 2\%$ 200V DC wkg.
C12	10 pF Silvered Mica $\pm 10\%$ 350V DC wkg.	C48	400 pF Silvered Mica $\pm 2\%$ 200V DC wkg.
C13	2-22 pF Ceramic Tube Trimmer.	C49	100 pF Silvered Ceramic $\pm 10\%$ 750V DC wkg.
C14	10 pF Silvered Mica $\pm 10\%$ 350V DC wkg.	C50	100 pF Silvered Ceramic $\pm 10\%$ 750V DC wkg.
C15	100 pF Silvered Mica $\pm 10\%$ 350V DC wkg.	C51	0.05 mfd Tubular Paper $\pm 20\%$ 250V DC wkg.
C16	100 pF Silvered Mica $\pm 2\%$ 350V DC wkg.	C52	0.01 mfd Tubular Paper $\pm 20\%$ 150V DC wkg.
C17	100 pF Silvered Mica $\pm 2\%$ 350V DC wkg.	C53	0.01 mfd Moulded Mica $\pm 20\%$ 350V DC wkg.
C18	0.01 mfd Tubular Paper $\pm 20\%$ 350V DC wkg.	C54	30 mfd Tubular Electrolytic 15V DC wkg.
C19	0.05 mfd Tubular Paper $\pm 20\%$ 250V DC wkg.	C55	200 pF Silvered Mica $\pm 1\%$ 350V DC wkg.
C20	0.05 mfd Tubular Paper $\pm 20\%$ 250V DC wkg.	C56	50 mfd Tubular Electrolytic 450V DC wkg.
C21	3-23 pF Air Trimmer.	C57	0.01 mfd Moulded Mica $\pm 20\%$ 350V DC wkg.
C22	110 pF Silvered Mica $\pm 1\%$ 350V DC wkg.	C58	20 pF Silvered Ceramic $\pm 10\%$ 750V DC wkg.
C23	3-23 pF Air Trimmer.	C59	30 mfd Tubular Electrolytic 15V DC wkg.
C24	100 pF Silvered Mica $\pm 2\%$ 350V DC wkg.	C60	100 pF Silvered Mica $\pm 10\%$ 350V DC wkg.
C25	100 pF Silvered Mica $\pm 10\%$ 350V DC wkg.	C61	3-23 pF Air Trimmer.
C26	100 pF Silvered Mica $\pm 2\%$ 350V DC wkg.	C62	3-23 pF Air Trimmer.
C27	0.01 mfd Tubular Paper $\pm 20\%$ 350V DC wkg.	C63	120 pF Silvered Mica $\pm 1\%$ 350V DC wkg.
C28	0.05 mfd Tubular Paper $\pm 20\%$ 250V DC wkg.	C64	3525 pF Silvered Mica $\pm 1\%$ 350V DC wkg.
C29	0.05 mfd Tubular Paper $\pm 20\%$ 250V DC wkg.	C65	3-23 pF Air Trimmer.
C30	400 pF Silvered Mica $\pm 2\%$ 200V DC wkg.	C66	130 pF Silvered Mica $\pm 1\%$ 350V DC wkg.
C31	400 pF Silvered Mica $\pm 2\%$ 200V DC wkg.	C67	1900 pF Silvered Mica $\pm 1\%$ 350V DC wkg.
C32	2-10 pF Air Spaced Trimmer (differential).	C68	0.05 mfd Tubular Paper $\pm 20\%$ 250V DC wkg.
C33	800 pF Silvered Mica $\pm 2\%$ 200V DC wkg.	C69	10 pF Silvered Ceramic $\pm 10\%$ 750V DC wkg.
C34	800 pF Silvered Mica $\pm 2\%$ 200V DC wkg.	*C70	50 mfd Tubular Electrolytic 450V DC wkg.
C35	10 pF Silvered Mica $\pm 10\%$ 350V DC wkg.	*C71	50 mfd Tubular Electrolytic 450V DC wkg.
C36	100 pF Silvered Mica $\pm 10\%$ 350V DC wkg.	C72	0.05 mfd Tubular Paper $\pm 20\%$ 500V DC wkg.
		C73	0.05 mfd Tubular Paper $\pm 20\%$ 500V DC wkg.

*Not fitted on Model 909A/1.

Resistors

R1	2.2 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R2	2.2 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R3	0.47 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R4	68 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R5	3,300 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R6	1,000 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R7	2,200 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R8	0.47 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R9	150 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R10	0.1 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R11	3,300 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R12	1,000 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R13	0.47 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R14	68 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R15	0.47 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R16	3,300 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R17	1,000 ohms $\pm 10\%$ $\frac{1}{2}$ watt.

R18	3,300 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R19	1,000 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R20	68 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R21	0.1 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R22	0.1 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R23	1 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R24	2.2 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R25	22,000 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R26	0.47 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R27	10,000 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R28	0.47 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R29	0.47 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R30	0.47 Megohm $\pm 10\%$ $\frac{1}{2}$ watt.
R31	270 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R32	68,000 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R33	5 ohms $\pm 10\%$ 6 watt wirewound.
R34	6,800 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R35	22,000 ohms $\pm 10\%$ $\frac{1}{2}$ watt.

R36	1,000 ohms $\pm 10\%$ $\frac{1}{2}$ watt.
R37	43 ohms $\pm 5\%$ 3 watt wirewound.
R38	Thermistor Type CZ3. 0.2 Amp max. current. Resistance at max. current — 35 ohms.
R39	10 ohms $\pm 10\%$ 3 watt wirewound.
*R40	Thermistor Type CZ1. 0.3 Amp max. current. Resistance at max. current — 44 ohms.
*R41	560 ohms $\pm 10\%$ 6 watt wirewound.
*R42	Ballast Resistor. 500 ohms tapped at 125 and 350 ohms. (see circuit diagram).

*Not fitted on Model 909A/1.

Potentiometers

RV1 0.5 Megohm, carbon.

Inductors

NOTE : L1-L6 diameter $\frac{9}{32}$ " (7.1 mm.), L7-L12 diameter $\frac{13}{32}$ " (10.3 mm.).

L1	..	..	..	..	..	..	..	..	..	Primary "Q" :	45 at 5.5 Mc/s. with 50 pF.
										Secondary "Q" :	115 at 4.5 Mc/s. with 150 pF.
L2	..	..	..	..	..	..	..	..	..	Primary "Q" :	35 at 4.26 Mc/s. with 50 pF.
										Secondary "Q" :	110 at 2.5 Mc/s. with 200 pF.
L3	..	..	..	..	..	..	..	..	..	Primary "Q" :	35 at 4.26 Mc/s. with 50 pF.
										Secondary "Q" :	100 at 2.7 Mc/s. with 70 pF.
L4	..	..	..	..	..	..	..	..	..	"Q" :	130 at 4.5 Mc/s. with 150 pF.
L5	..	..	..	..	..	..	..	..	..	"Q" :	140 at 2.6 Mc/s. with 150 pF.
L6	..	..	..	..	..	..	..	..	..	"Q" :	115 at 2.7 Mc/s. with 70 pF.
L7	..	..	..	..	..	..	..	..	..	Primary "Q" :	35 at 3.5 Mc/s. with 70 pF.
										Secondary "Q" :	115 at 2.7 Mc/s. with 480 pF.
L8	..	..	..	..	..	..	..	..	..	Primary "Q" :	55 at 6.4 Mc/s. with 60 pF.
										Secondary "Q" :	128 at 1.6 Mc/s. with 480 pF.
L9	..	..	..	..	..	..	..	..	..	Primary "Q" :	50 at 4.5 Mc/s. with 200 pF.
										Secondary "Q" :	110 at 2.2 Mc/s. with 150 pF.
L10	..	..	..	..	..	..	..	..	..	Primary "Q" :	50 at 11.75 Mc/s. with 200 pF.
										Secondary "Q" :	80 at 3.5 Mc/s. with 480 pF.
L11	..	..	..	..	..	..	..	..	..	Primary "Q" :	45 at 4.5 Mc/s. with 200 pF.
										Secondary "Q" :	50 at 2.2 Mc/s. with 480 pF.
L12	..	..	..	..	..	..	..	..	..	"Q" :	30 at 3.5 Mc/s. with 50 pF.

APPENDIX “D”

TABLE OF VOLTAGE VALUES

The following “Table of Voltage Values” will prove useful in the event of the receiver developing a fault which necessitates the carrying out of voltage checks.

All readings given are typical and were taken with an AVO Model 8 Testmeter having a sensitivity of 20,000 ohms/volt. The mains input voltage was 110V AC. The receiver should be operating under no-signal conditions with its controls set as follows :—

Wavechange Switch Range 1
 AF Gain Control Maximum
 Crystal Filter.. .. . Out
 Noise Limiter Off

Valve	Pin					
	1	2	3/4	5	6	7
V1	—	—	12	102	101	0.98
V2	—	1.38	12	110	92.5	—
V3	106	—	6	106	—	—
V4	—	—	12	100	97	1.15
V5	—	—	12	102	100	1.02
V6	—	1.05	12	—	—	60
V7	—	5.1	19	110	112.5	—

All voltages are DC and are taken between the point indicated and chassis, except the heater voltages (AC) which are taken between pins 3 and 4 in each case. The following readings may also prove useful :—

Voltage across C70 125V
 Voltage across C71 113V
 Voltage across R40/41 17.5V (AC)

APPENDIX "E"

SPARES

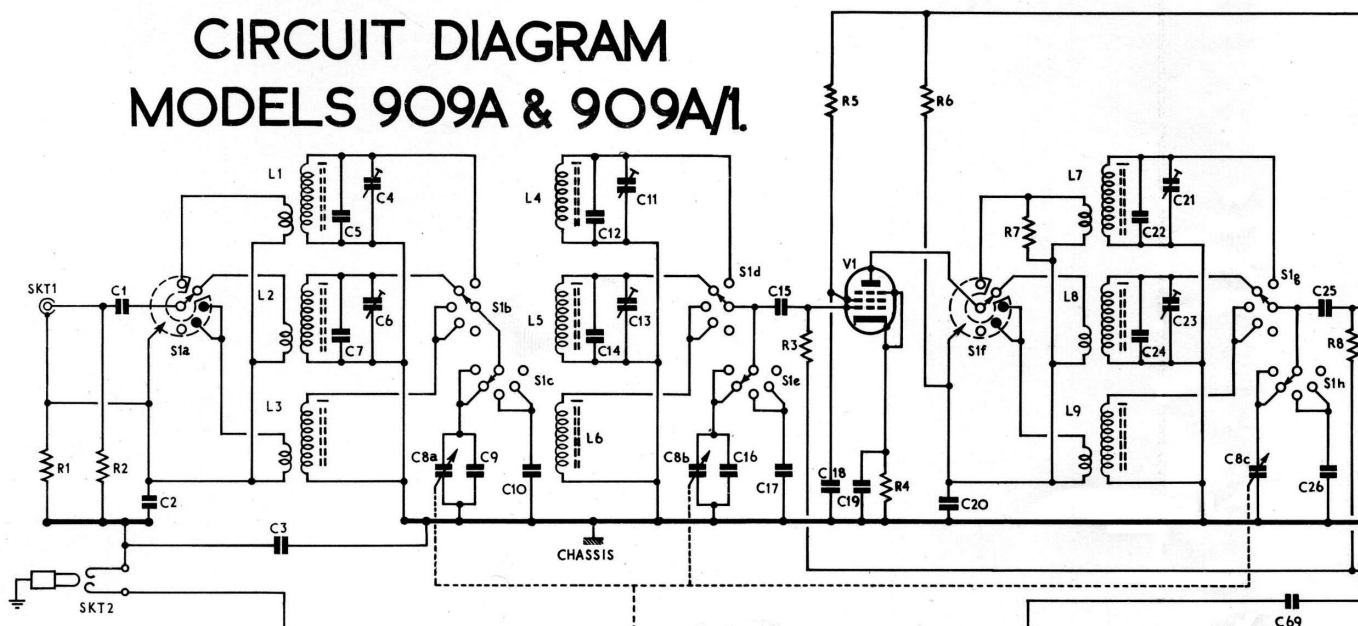
The following list contains items that can only be obtained from the manufacturer. Resistors, capacitors, etc., can be supplied if these are not available locally. Where direct equivalents are not available, a suitably rated component will be supplied in lieu.

RF Inductors													Part No.
L1	Range 1 Aerial coil	..	..	..	..	..	..	..	..	..	..	..	D2340
L2	Range 2 Aerial coil	..	..	..	..	..	..	..	..	..	..	..	D2342
L3	" 2182 " Aerial coil	..	..	..	..	..	..	..	..	..	..	..	D2344
L4	Range 1 RF coil	..	..	..	..	..	..	..	..	..	..	..	D2341
L5	Range 2 RF coil	..	..	..	..	..	..	..	..	..	..	..	D2343
L6	" 2182 " RF coil	..	..	..	..	..	..	..	..	..	..	..	D2345
L7	Range 1 Mixer coil	..	..	..	..	..	..	..	..	..	..	..	D2334
L8	Range 2 Mixer coil	..	..	..	..	..	..	..	..	..	..	..	D2336
L9	" 2182 " Mixer coil	..	..	..	..	..	..	..	..	..	..	..	D2338
Oscillator Inductors													
L10	Range 1 Oscillator coil	..	..	..	..	..	..	..	..	..	..	..	D2335
L11	Range 2 Oscillator coil	..	..	..	..	..	..	..	..	..	..	..	D2337
L12	" 2182 " Oscillator coil	..	..	..	..	..	..	..	..	..	..	..	D2339
Transformers													
T1	1st IF Transformer	..	..	..	..	..	..	..	..	..	..	..	D2324
T2	Crystal Filter Unit	..	..	..	..	..	..	..	..	..	..	..	D2326
T3	2nd IF Transformer	..	..	..	..	..	..	..	..	..	..	..	D2324
T4	3rd IF Transformer	..	..	..	..	..	..	..	..	..	..	..	D2324
T5	Output Transformer	..	..	..	..	..	..	..	..	..	..	..	D1697
Chokes													
CH1	HT Smoothing Choke	..	..	..	..	..	..	..	..	..	..	..	D2001
CH2/3	Mains Filter Chokes (combined assembly)	..	..	..	..	..	..	..	..	..	..	..	D2024
CH4/5	Battery Filter Chokes (combined assembly)	..	..	..	..	..	..	..	..	..	..	..	D1520
Variable Capacitors													
Main Tuning Gang	..	..	..	..	..	..	..	..	..	..	..	..	5392P
Trimming Capacitors (C4, C6, etc.)	..	..	..	..	..	..	..	..	..	..	..	AC	2002/22
Trimming Capacitors (C21, etc.)	..	..	..	..	..	..	..	..	..	..	..	..	3909P
Switches													
Wavechange — switch spindle and clicker plate	..	..	..	..	..	..	..	..	..	..	..	..	D2347
extension spindle	..	..	..	..	..	..	..	..	..	..	..	..	5431/1P
coupler	..	..	..	..	..	..	..	..	..	..	..	..	5428P
wafers (S1a and S1f)	..	..	..	..	..	..	..	..	..	..	..	..	D1333
wafers (remainder)	..	..	..	..	..	..	..	..	..	..	..	..	4593P
Crystal Filter (complete)..	..	..	..	..	..	..	..	..	..	..	..	..	5178P
Noise Limiter (less extension spindle and coupler)	..	..	..	..	..	..	..	..	..	..	..	..	5405P
Internal Speaker Switch (toggle)	..	..	..	..	..	..	..	..	..	..	..	..	4772P

Control Knobs													Part No.
Wavechange	..	..	..	..	..	..	..	..	..	..	..	..	3146/1P
Indicator for above	..	..	..	..	..	..	..	..	..	..	..	..	4672P
Tuning	..	..	..	..	..	..	..	..	..	..	..	..	3146/1P
AF Gain and Crystal Filter Switch	..	..	..	..	..	..	..	..	..	..	..	..	4984P
Noise Limiter Switch	..	..	..	..	..	..	..	..	..	..	..	..	3872P
Drive Assembly													
Drive Assembly Unit (less flywheel, drive control spindle and associated bearing)	..	..	..	..	..	..	..	..	..	..	..	..	LP2213/1
Drive control spindle and associated bearing	..	..	..	..	..	..	..	..	..	..	..	..	4055P
Flywheel	..	..	..	..	..	..	..	..	..	..	..	..	5174P
Screw for flywheel	..	..	..	..	..	..	..	..	..	..	..	..	1484P
Condenser gear assembly	..	..	..	..	..	..	..	..	..	..	..	..	D2077
Vernier gear assembly	..	..	..	..	..	..	..	..	..	..	..	..	D1562
Stainless steel driving disc with associated gear	..	..	..	..	..	..	..	..	..	..	..	..	D1559
Drive pulleys (for cord drive)	..	..	..	..	..	..	..	..	..	..	..	..	3954P
Screw for above	..	..	..	..	..	..	..	..	..	..	..	..	3958P
Guide pulleys (including jockey pulley)	..	..	..	..	..	..	..	..	..	..	..	..	3537P
Screw for above	..	..	..	..	..	..	..	..	..	..	..	..	3966P
Length of white Terylene drive cord (0.018")	..	..	..	..	..	..	..	..	..	..	..	..	M123
Vernier Dial with hub	..	..	..	..	..	..	..	..	..	..	..	..	D2250
Scale (calibrated)	..	..	..	..	..	..	..	..	..	..	..	..	5396P/D2004/1
Perspex window	..	..	..	..	..	..	..	..	..	..	..	..	5445P
Window clips	..	..	..	..	..	..	..	..	..	..	..	..	4439P
Pointer	..	..	..	..	..	..	..	..	..	..	..	..	3969P
Pointer carrier	..	..	..	..	..	..	..	..	..	..	..	..	4443/1P
Sleeve for pointer carrier	..	..	..	..	..	..	..	..	..	..	..	..	4447P
Pointer guide rods	..	..	..	..	..	..	..	..	..	..	..	..	3968P
Miscellaneous													
Finger plate	..	..	..	..	..	..	..	..	..	..	..	..	5398PB
*Voltage Selector	..	..	..	..	..	..	..	..	..	..	..	..	D1334
*Lamp holder	..	..	..	..	..	..	..	..	..	..	..	..	75/354
*Loudspeaker	..	..	..	..	..	..	..	..	..	..	..	..	6K/16
*Potentiometer (0.5 Megohm carbon)	..	..	..	..	..	..	..	..	..	..	..	..	4103PB
*Fuseholders	..	..	..	..	..	..	..	..	..	..	..	..	F267/PC
Chromium plated panel handles	..	..	..	..	..	..	..	..	..	..	..	..	3138P
*Valveholders — V1–V6 (B7G) Type XM7/UC1 (can type 4/5)	..	..	..	..	..	..	..	..	..	..	..	..	—
V7 (B7G) Type XM7/U (no can)	..	..	..	..	..	..	..	..	..	..	..	..	—
*Retainer assembly for V7	..	..	..	..	..	..	..	..	..	..	..	..	5311P
*Pilot bulb (6.5V 0.2A)	..	..	..	..	..	..	..	..	..	..	..	..	3703
*Coaxial socket (SKT1)	..	..	..	..	..	..	..	..	..	..	..	..	S0239
Earth socket (SKT2)	..	..	..	..	..	..	..	..	..	..	..	..	D2350A
*Eight way connector (SKT3)	..	..	..	..	..	..	..	..	..	..	..	..	H833

* Items marked with an asterisk may be available locally but can be supplied by Stratton & Co. Ltd.

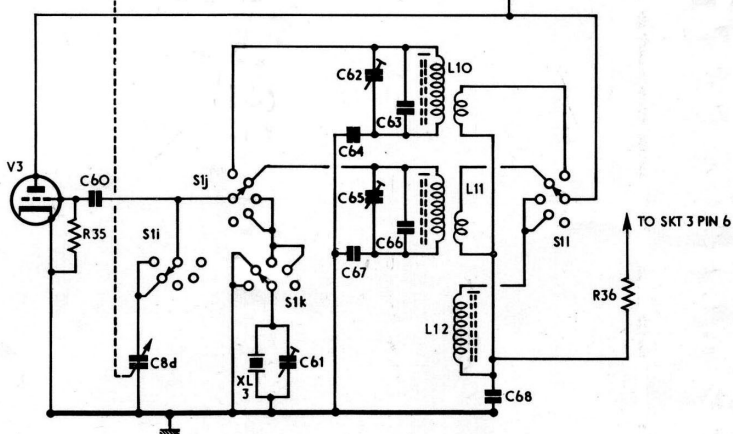
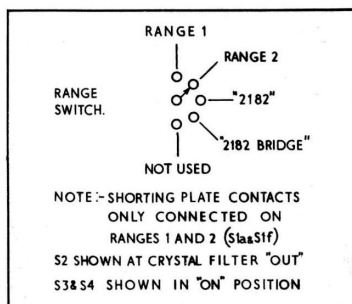
CIRCUIT DIAGRAM MODELS 909A & 909A/1



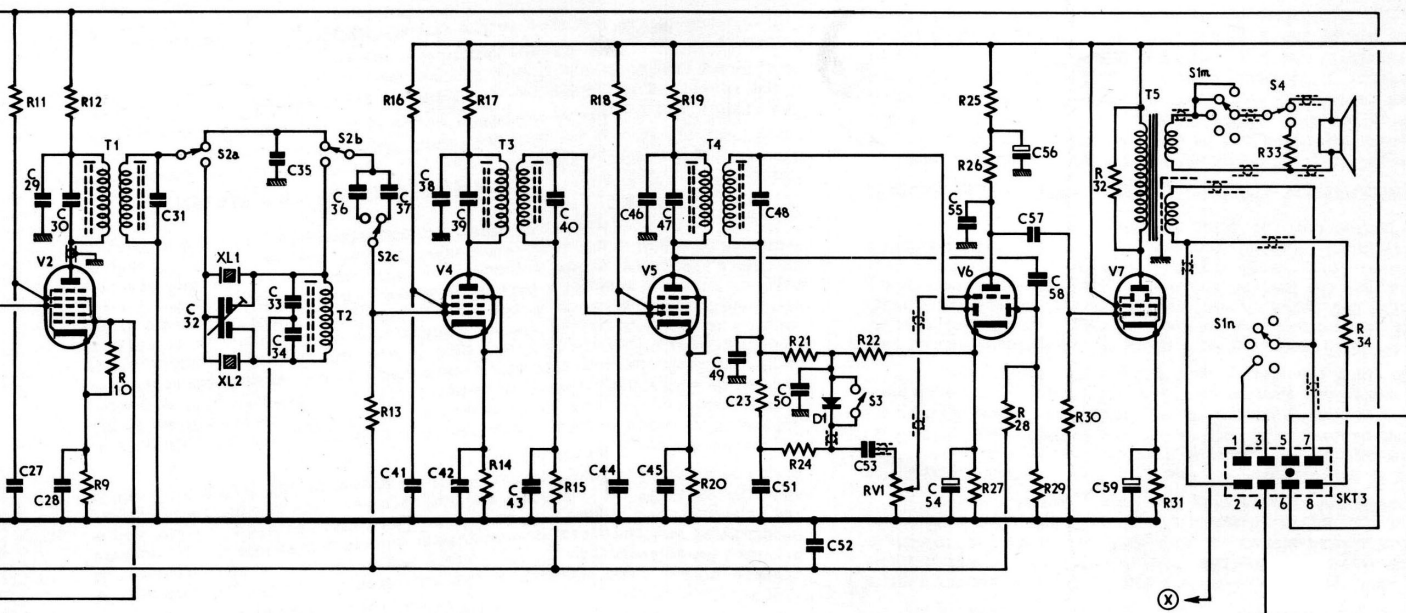
CONTROL FUNCTIONS

REF	FUNCTION
S1	RANGE SWITCH
S2	CRYSTAL FILTER SWITCH
S3	NOISE LIMITER SWITCH
S4	INTERNAL SPEAKER SWITCH
C8	TUNING GANG
RV1	AF GAIN CONTROL.

SWITCH POSITIONS



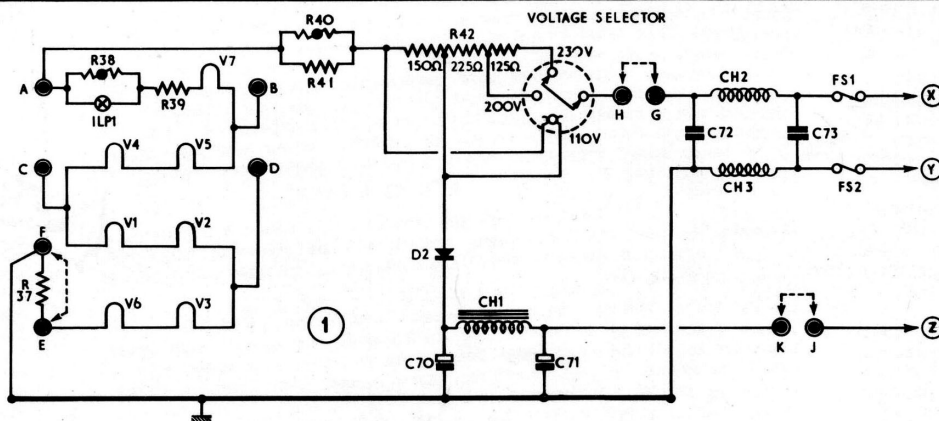
- 1 POWER SUPPLY CIRCUIT, MODEL 909A. LINKS ARE SHOWN SET FOR MAINS OPERATION. FOR OPERATION FROM EXTERNAL HT AND LT SUPPLIES REMOVE EXISTING LINKS AND LINK A-C-F & B-D-G.
- 2 POWER SUPPLY CIRCUIT, MODEL 909A/1. LINKS ARE PERMANENTLY CONNECTED AS SHOWN.
- 3 ALPHA CONNECTOR WIRED FOR USE WITH MODEL 909A OPERATED FROM AC/DC MAINS SUPPLY.
- 4 ALPHA CONNECTOR WIRED FOR USE WITH MODEL 909A/1 OR MODEL 909A POWERED BY EXTERNAL HT & LT SUPPLIES.



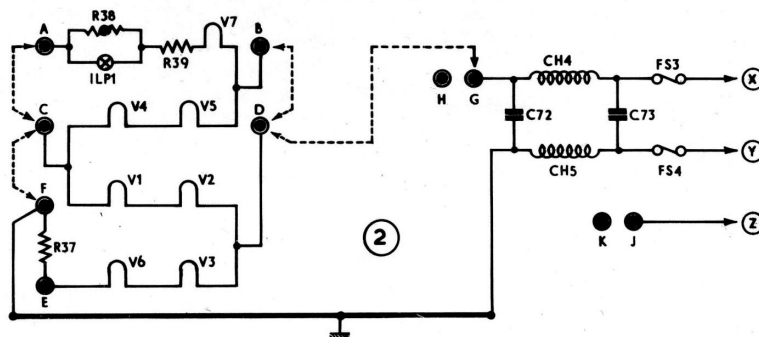
(X)

(Y)

(Z)

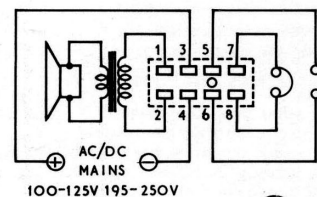
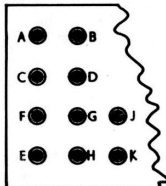


(1)

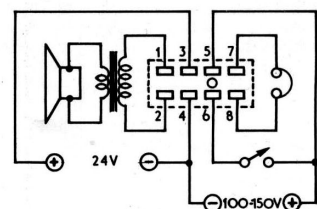


(2)

ACTUAL LAYOUT
OF LINK BOARD.



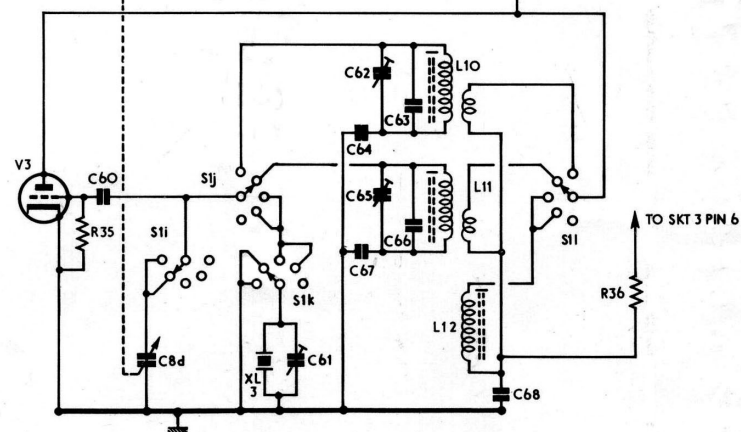
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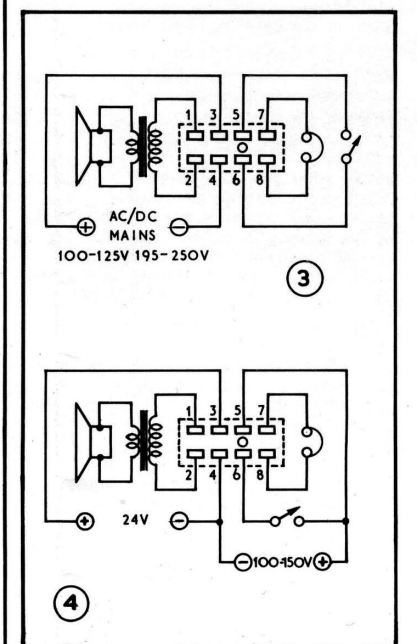
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[illegible]

REF	FUNCTION
S1	RANGE SWITCH
S2	CRYSTAL FILTER SWITCH
S3	NOISE LIMITER SWITCH
S4	INTERNAL SPEAKER SWITCH
C8	TUNING GANG
RV1	AF GAIN CONTROL.



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- Figure 1 is a schematic diagram of the power supply and voltage selector circuit. The circuit includes a transformer (R37) with taps A, C, F, and E. A bridge rectifier consists of diodes V1, V2, V3, V4, V5, and V6. The rectifier output is filtered by capacitor C70 and inductor CH1. A voltage selector switch (237V) is connected to the filter output, with taps H and G. The selector switch is controlled by a 200V tap. The output of the selector switch is connected to a series of capacitors (C72, C73) and switches (FS1, FS2) to provide different output voltages (X, Y, Z).





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