INSTRUCTION MANUAL

EDDYSTONE

COMMUNICATIONS RECEIVER

MODEL 910/1

SERIAL No.

STRATTON & CO. LTD.
EDDYSTONE WORKS
BIRMINGHAM 31

EDDYSTONE COMMUNICATIONS RECEIVER

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INTRODUCTION

The EDDYSTONE Model 910/1 is a double conversion communications superhet receiver covering the HF range 1.5-30 Mc/s and the Marine band 375-525 kc/s. Incremental tuning is provided (fs ± 50 kc/s) and the 1st Local Oscillator may be crystal controlled for high stability single channel reception with up to four selectable crystals in position at any time.

Provision is made for the reception of AM, CW and SSB signals and the equipment is provided with a built-in power unit for operation from all standard AC mains supplies. The receiver can be powered from a 6V accumulator by using the Vibrator Unit Type 687/1 (Marconi Type 1817).

Ease of operation is assured by the logical positioning and convenient dimensions of the major controls while the built-in crystal calibrator together with the wide clearly calibrated frequency scales ensure an extremely high degree of re-setting accuracy.

Audio outputs are available for connection to speaker, lines and telephones, the speaker being disconnected automatically when telephones are in use. The line output is not affected in this way and can be taken at either high or low level as required. The receiver may be desensitised during transmission periods by suitable connection to terminals at the rear.

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 under extreme climatic conditions.

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Illustrations and Circuit Diagram at rear of Manual.

Manufacturers:- STRATTON & CO. LTD., ALVECHURCH ROAD, BIRMINGHAM, 31.

TECHNICAL DATA

Frequency Coverage.

1.5-30 Mc/s and 375-525 kc/s in seven ranges.

Range 1	. .	18-30 Mc/s.
Range 2	. .	11-18 Mc/s.
Range 3	. .	6.7-11 Mc/s.
Range 4	. .	4-6.7 Mc/s.
Range 5	. .	2.5-4 Mc/s.
Range 6	. .	1.5-2.5 Mc/s.
Range 7	. .	375-525 kc/s.

Intermediate Frequencies.

1st IF . . Nominally 1400 kc/s but variable over the range 1350-1450 kc/s to provide the incremental tuning facility.

2nd IF . . Fixed tuned to 85 kc/s with variable selectivity.

Valve Complement.

A total of 13 valves are employed as follows:-

Ref	Type	Circuit Function
V1	6AK5	RF Amplifier.
V2	6BE6	1st Mixer.
V3	6C4	2nd Local Oscillator.
V4	6AK5	2nd Mixer.
V5	6BA6	85 kc/s IF Amplifier.
V6	6AL5	Noise Limiter/Meter Protection.
V7	6AT6	AM Detector/AGC Rect/Audio Amplifier.
V8	5763	Audio Output.
V9	6BA6	Calibrator.
V10	6C4	1st Local Oscillator.
V11	6BE6	CW/SSB Detector.
V12	OA2	Voltage Stabiliser.
V13	5Z4G	HT Rectifier.

Input and Output Impedances.

Aerial Input . . 75 ohms (nominal) balanced or unbalanced.

Audio Output . . Loudspeaker : 2.5 ohms.
Lines : 600 ohms.
Telephones : Nominally 2000 ohms but suitable for a wide range of impedances both high and low.

Power Supply.

Mains Operation . . 100/125V or 200/250V AC (40-60 c/s).

Battery Operation . . 6V DC via Vibrator Unit Type 687/1 (Marconi Type 1817).

Consumption . . Mains : Approximately 75 volt-amperes.
Vibrator : 10A from accumulator.

Fusing . . Receiver : 250 mA fuse in HT negative line.
Vibrator : 10A LT, 100 mA HT.

PERFORMANCE

Sensitivity (AM).

The input required to give a 10dB signal-to-noise ratio is less than 5uV at all frequencies measured with a signal modulated to a depth of 30% (400 c/s).

Sensitivity (CW).

3uV for a 20dB signal-to-noise ratio.

NOTE: Sensitivities measured with a bandwidth of 2.4 kc/s (selectivity control at centre of travel)

Selectivity.

Continuously variable 6dB bandwidth of 1 to 6 kc/s.

Stability.

After a 10 minute warm-up period, drift with free-running oscillator is approximately 25 kc/s in first hour at 28 Mc/s after which time the receiver is substantially stable.

With crystal control of the 1st Local Oscillator, drift from cold does not exceed 1000 c/s over the first thirty minutes of operation.

A mains voltage variation of ± 10% does not affect the tune frequency when using crystal control. When using the free-running oscillator a mains voltage change of ± 5% produces a 500 c/s change in the tune frequency at 28 Mc/s.

Image Rejection.

Image rejection is of the order 34dB at 30 Mc/s increasing progressively as the frequency is lowered. Any given image signal can be removed by adjustment of the incremental control.

IF Breakthrough.

As in the case of images, adjustment of the incremental control provides a means of removing any given IF breakthrough signal. Rejection figures for each band are as follows:-

Range 1	18 Mc/s	greater than 95dB.
Range 2	11 Mc/s	greater than 95dB.
Range 3	6.7 Mc/s	greater than 80dB.
Range 4	4.0 Mc/s	greater than 70dB.
Range 5	2.5 Mc/s	greater than 70dB.

Range 6	. .	1.5 Mc/s	. .	greater than 40dB.
Range 7	. .	525 kc/s	. .	greater than 80dB.

Noise Factor.

Does not exceed 15dB at any frequency.

Calibration Accuracy.

0.5% at all frequencies.

Re-setting Accuracy.

Within 1000 c/s with the receiver standardised and using the incremental control.

AGC Characteristic.

The audio output level does not change by more than 15dB for a carrier level increase of 90dB above 3uV at 8 Mc/s. (Taken with a 6dB bandwidth of 2.4 kc/s.)

Two selectable AGC time constants are available as follows:-

AGC 'FAST'	. .	0.2 secs.
AGC 'SLOW'	. .	2.5 secs.

Audio Output and Response.

A maximum audio output of approximately 3.5W is available at the 2.5 ohm terminals. The line output level is dependent on the presence of the shorting link. The low level output does not exceed 10mW.

The audio response does not fall by more than 6dB over the range 200-10,000 cycles.

Distortion.

Not greater than 5% at 1W output.

CIRCUIT DESCRIPTION

The RF Section.

This portion of the receiver comprises V1, V2 and V10. V1 functions as a low noise high gain RF Amplifier with automatic and/or manual gain control. The latter takes the usual form of a variable resistor (RV1) in the cathode circuit, this normally being returned to chassis via S2a and the link across the desensitising terminals.

When the desensitising facility is in use, the two terminals will be connected to a switch or relay contact arranged so that the terminals are shorted on receive and opened on transmit. A variable resistor connected across the terminals will permit adjustment of the desensitised level when it is desirable to monitor an outgoing transmission.

As mentioned on the previous page, S2a is normally closed. When calibrating, S2a opens introducing R7 and increasing the bias on V1 to prevent interference from outside signals.

AGC is applied via R1.

V1 is coupled to the 1st Mixer Stage (V2) using normal tuned secondary transformer coupling on all ranges except Ranges 6 and 7. On these two ranges the RF Stage is resistance-capacity coupled to the tuned Mixer grid circuit. Additional coupling in the form of C20, C23 and C26 is employed on the three highest ranges (1, 2 and 3).

A 6BE6 pentagrid is used in the 1st Mixer position with injection on g1 from the separate local oscillator V10. AGC is applied to the Mixer via R12. The anode circuit of V2 is tuned by one section of the incremental tuning capacitor C43a, the nominal 1st IF being 1400 kc/s.

The Local Oscillator V10 (6C4) is basically a tuned anode shunt fed oscillator but provision is made for operating the stage as a tuned anode oscillator with crystal control. Up to four crystals may be in position at any time, these being selected by means of the Crystal Selector switch (S5). Output is taken from the anode via C40 and the stage is supplied from the HT2 line (150V stabilised) to prevent frequency changes due to mains voltage variation. The local oscillator tracks on the high side of the signal frequency on all ranges.

The IF Section.

Output from the 1st Mixer is fed direct to the 2nd Mixer (V4), the interstage coupling being tunable in the range 1350-1450 kc/s by means of the INCREMENTAL tuning control. The 2nd Mixer Stage makes use of a 6AK5 with cathode injection from the separate 2nd Local Oscillator which employs a 6C4 triode.

The 6AK5 Mixer is operated under conditions calling for an extremely low level of injection and so allows the local oscillator to be run at low amplitude in the interest of improved frequency stability, this being especially important when the 1st Oscillator is crystal controlled. Radiation problems are reduced by the screened enclosure which houses the complete oscillator and mixer circuitry. All supply leads and the AGC feed to the Mixer are taken via feed-through capacitors to reduce leakage and radiation of the oscillator signal from the external wiring.

The oscillator tracks on the low side of the variable IF range and covers the band 1265-1365 kc/s to give a 2nd IF output of 85 kc/s. As in the case of the 1st Oscillator, stabilised HT is used but the signal output is taken at low impedance via a small coupling coil.

The tunable IF provides two important advantages. Firstly, constant calibrated bandspread is available over any 100 kc/s portion of the entire frequency coverage so allowing frequencies to be read from the scales to a high degree of accuracy. On the higher frequency ranges the Incremental control provides a tuning rate which is comparable to that obtained on the lower frequencies when using the main tuning control.

Secondly, when using crystal control, the actual crystal frequency may be anywhere in the range fs + 1350 kc/s to fs + 1450 kc/s so reducing the number of crystals required for control over a wide range of frequencies. A PEAK RF control is provided and this allows compensation for misalignment of the signal frequency circuits when tuning signals on the Incremental control. The PEAK RF control takes the form of two ganged capacitors of relatively low capacity wired in parallel with the RF and 1st Mixer sections of the main tuning gang. The receiver is aligned with the PEAK RF capacitors at 'half-capacity' so permitting both positive and negative tracking correction when the 1st IF is detuned from its centre frequency of 1400 kc/s.

Output from the 2nd Mixer is taken via T1 to the grid of the 85 kc/s IF Amplifier V5. This stage utilises a 6BA6 operating with automatic and/or manual gain control (RV2). The cathode of V5 (like that of the RF Stage V1) is returned to chassis via the desensitising terminals to further reduce the overall gain when desensitising is in use.

Variable selectivity is provided by physical movement of the primary winding in T1 and also in T2 which feeds the two detectors.

Connections are taken from the screen grid and cathode of V5 and are terminated at SOCKET 'A' for operation of the external carrier level meter (Cat. No. 669). The cathode connection is taken via the diode V6A which provides protection for the meter when the IF Gain control is turned down. (Extreme unbalance in bridge circuit).

One diode of V7 (6AT6 double-diode-triode) serves as the AM Detector. V6B is incorporated in this circuit and functions as a series type noise limiter when S3a is open. Closing S3a short circuits the diode V6B and so takes the limiter out of circuit. The limiter is of the self-adjusting type and audio output is taken from the cathode to the AM side of the Signal Mode switch S4a.

Also fed from the secondary of T2 (via C72) is the CW/SSB Detector V11. This is a product type detector using a 6BE6 pentagrid with the screen fed from the HT2 line in the interest of greater oscillator stability. The screen supply is removed when switched to AM (S4b). The complete detector is housed in a small screening can and extensive decoupling is employed to reduce spurious signals due to harmonics of the beat oscillator. C113 permits adjustment of the beat frequency over the range 85 kc/s ± 6 kc/s. Audio output is taken from the anode via the filter comprising R62, C115 and C116 to the CW/SSB side of the Signal Mode switch (S4a).

The remaining diode in V7 functions as the AGC Rectifier and is fed direct from the anode of V5 via C66. AGC is delayed by the bias across R37 and is applied to V1, V2, V4 and V5. Two AGC time constants and AGC 'OFF' are available at S3b.

The Audio Section and Power Supply.

Audio output from either the AM or CW/SSB Detector is selscted by means of S4a and taken to the AF Gain control (RV3) which feeds the grid of the triode portion of V7. This stage is resistance-capacity coupled to the Audio Output Stage which employs a 5763 beam tetrode. The output transformer T3 is provided with two secondary windings of 2.5 and 600 ohms impedance for connection to speaker and lines while telephones are tapped across a voltage divider (R48/49) fed direct from the anode through C79. The circuit is arranged so that insertion of the telephones automatically disconnects the speaker but does not interrupt the line output. The 600 ohm output can be attenuated by connecting a wire link which introduces R44, R45 and R46 as shown on the Circuit Diagram.

The power supply circuitry is quite conventional, employing the usual full wave 5Z4G rectifier, capacity input smoothing filter and 150V stabiliser V12. The unusual heater connection of V6 is necessary to avoid the introduction of hum in the noise limiter circuit. The heater is maintained at some 10V above ground by the potential divider R66/R67 and this obviates the need for selection of the 6AL5 for use in the noise limiter position.

Both LT supplies are taken via links in the octal plug which mates with SOCKET 'B'. Removing the shorting plug disconnects the transformer heater windings from the heater circuits and facilitates connection of the external LT supply when the receiver is used with the Vibrator Unit Type 687/1.

Calibrator.

V9 (6BA6) functions as a 500 kc/s crystal oscillator to provide calibration markers at half-megacycle intervals throughout the entire coverage. The calibrator HT is applied through S2b while S2a desensitises the RF Stage to prevent interference from external signals whilst calibrating. The calibrator output is capacity coupled to the grid of the 1st Mixer and scale correction is achieved by means of an adjustable cursor.

CONSTRUCTION

Overall Dimensions and Weight.

Width	16¾" (42.5 cm.)	Depth	15" (38.1 cm.)
Height	8¾" (22.2 cm.)	Weight	50 lbs (22.6 kg.)

Cabinet.

The cabinet is stoutly made from rustproofed steel, is provided with a lift-up lid and may be drawn away from the chassis/panel assembly by removal of the four large screws at the rear. In the case of rack mounted units, the cabinet is fitted with angled side plates slotted for standard rack mounting. Adequate ventilation is provided in either type of cabinet and apertures at the rear permit connection to the aerial input, audio outputs etc..

Front Panel.

The front panel is an aluminium diecasting attached to the rear of which are the two chassis supports. All controls are located for operating convenience along the lower half of the panel and an anodised finger plate behind them is labelled with their functions. Chromium plated panel handles are fitted for convenience in lifting the receiver and these also allow it to be placed face-down without damage to the panel controls when the cabinet is removed to allow servicing to be carried out.

Chassis.

The main chassis unit is the rugged diecast coil box which is attached to lugs located centrally on the rear of the front panel casting. Secured to the left-hand side of the coil box and also to the left-hand support bracket is a steel chassis which accommodates the complete power supply section together with the CW/SSB Detector. In the same position, but to the right of the coil unit are the tunable IF, 85 kc/s IF and audio stages. The 2nd Mixer Unit is totally enclosed in a brass screening box provided with removable plates in the top and side which allow access for valve replacement etc..

Main Dial and Drive Assembly.

The main tuning control which drives a spring-loaded split-gear system having a reduction ratio of approximately 140-1 gives a convenient tuning rate on all ranges. The drive is flywheel loaded, substantially free from backlash and ensures consistent re-setting accuracy. Total cursor travel on each range is some 12 inches across clearly calibrated scales on which all crystal calibration points are marked in red. A mechanical adjustment provides independent movement of the cursor to permit correction of scale error when calibrating.

Incremental Tuning.

This control requires approximately four revolutions to cover the complete swing of 100 kc/s so giving an average tuning rate of approximately 25 kc/s per revolution. This drive is also through spring-loaded split-gears and the calibration appears in the window above the control knob.

Calibration in red indicates that the actual frequency is the indicated signal frequency (main dial) plus the number of kilocycles indicated by the incremental scale. Calibration in black indicates that the receiver is tuned lower in frequency than the main dial reading.

Finish.

Cabinet and panel - oyster hammer. All internal metalwork is stoved in grey enamel.

INSTALLATION

MOUNTING

Unless otherwise stipulated, the Model 910/1 is supplied complete with cabinet suitable for table mounting only. An interchangeable cabinet is available to special order and this is fitted with side plates which allow the receiver to be fitted in a standard size rack. The fixing slots conform to the Post Office standard for racks of 19 inch width.

If the receiver is to be table mounted, it may be advantageous in certain situations to have it firmly bolted to the operating table. Fixing plates are available for this purpose and may be ordered separately under the part number 5344P. Two plates are needed and these are supplied complete with fixing screws.

Another useful accessory for table mounting is the Receiver Mounting Block. A pair of these will lift up the front of the receiver and give a more convenient operating position. Cat. No. 774 should be quoted when ordering.

EXTERNAL CONNECTIONS

Mains.

The three-core PVC insulated lead should be terminated in a suitable three-pin plug for connection to the local AC mains supply. The plug should be wired as follows:-

Red lead to live line.
Black lead to neutral line. Green lead to earth.

NOTE: Before connecting to the local mains supply, check that the mains transformer is adjusted for the appropriate voltage.
See 'Mains Voltage Adjustment' later in this Section.

Sockets 'A' and 'B'.

These two octal sockets, located at the rear of the Power Unit chassis allow connection of the Vibrator Unit Type 687/1 and the Signal Strength Meter Type 669/E.

In normal mains operation, the meter is connected to SOCKET 'A' and a shorting plug is fitted in SOCKET 'B' to complete the LT supply to the valve heaters.

Output from the Vibrator Unit Type 687/1 is via two separate cables each of which is terminated with a standard octal plug. The plugs are labelled 'A' and 'B' to correspond with the two sockets at the rear of the receiver. Care should be taken not to insert them in the wrong positions. Plug 'A' carries the HT supply and Plug 'B' the LT.

If use of the Signal Strength Meter is desired when the receiver is running from the Vibrator Unit, it will be necessary to remove the octal plug from the meter lead and make the connections to Plug 'A'.

Circuits of the Signal Strength Meter and Vibrator Unit are shown in Fig. 3. and Fig. 4. respectively.

Aerial.

The aerial terminal strip at the rear of the receiver is arranged to take either balanced or unbalanced inputs, the nominal input impedance being 75 ohms.

When used with single wire aerials, the terminal labelled 'AE' should be earthed and the aerial connected to terminal 'A'. The link which connects terminal 'AE' to the receiver chassis must be in its normal position when the receiver is used in this way.

When a balanced input is required, the screw in the 'AE' terminal should be removed to allow the shorting link to be swung clear of the terminal. This operation removes the earth from the lower end of the aerial coupling coil (see Circuit Diagram) and the aerial feeder should be connected to the 'A' and 'AE' terminals.

Earth.

Although the receiver chassis may be earthed by virtue of the connection to the supply earth, it may be desirable to connect a more direct earth. This should be attached to the 'AE' terminal if this is linked to chassis, or when the receiver is used with a balanced aerial system, to the small nut which provides the chassis connection for the link. The earth lead should be as short as conveniently possible and a heavy gauge conductor is desirable.

Loudspeaker.

Connection should be made to the two terminals labelled 2.5 ohms. The left-hand terminal - looking at the rear of the set - is the earthy side of the output.

A suitable speaker for use with the Model 910/1 is the EDDYSTONE Cat. No. 688. This is recommended since it matches the receiver electrically and is available in a matching finish.

Telephones.

Telephones of almost any impedance may be connected by means of a standard jack plug inserted in the socket at the left-hand side of the front panel. Insertion of the telephone plug disconnects the loudspeaker but does not interrupt the 600 ohm line output.

Line Output.

This output (marked 600 ohms) may be taken at either high or low level dependent on whether or not the link is connected as indicated on the terminal strip. Low level output is obtained with the link connected and reference to the Circuit Diagram will show how connection of the link introduces the line output attenuator.

Desensitising.

NOTE: IT IS ESSENTIAL THAT THE TWO TERMINALS MARKED 'DESENSITISING' ARE SHORTED TOGETHER BY MEANS OF A WIRE STRAP WHEN THE DESENSITISING FACILITY IS NOT REQUIRED.

When the Model 910/1 is used in close proximity to an associated transmitter, it will be necessary to desensitise the receiver during transmission periods to prevent overload, feedback etc.. A relay contact wired across the desensitising terminals (left-hand terminal is earthy) should be arranged to close during reception periods and open when transmitting.

With this arrangement, monitoring of the outgoing transmission will not be possible. If monitoring is considered desirable it will be necessary to have some control over the level to which the receiver is desensitised. This can be arranged quite simply by connecting a 50,000 ohm variable resistor across the desensitising terminals. The variable resistor will function as a combined RF/IF Gain control and allow a wide adjustment of the sensitivity. If the transmitter is rated at more than 250 watts output a further relay should be arranged to short down the aerial input to prevent possible damage to the aerial coils.

THE CAT. NO. 669/E SIGNAL STRENGTH METER

Provision for connection of this accessory is made at the rear of the receiver (SOCKET 'A'). The meter unit is built into a small diecast housing styled and finished to match the receiver and is provided with a lead terminated in an octal plug to mate with SOCKET 'A'.

The circuit of the meter unit is given in Fig. 3. and the operation of the arrangement is as follows.

The meter is connected between the cathode of the IF Stage (V5) and the slider of a potentiometer forming part of a potential divider between the screen grid of the same stage and ground. The potentiometer allows adjustment of the meter needle to zero in the absence of a signal. This condition obtains when the slider is at the same potential as the cathode of V5. On receipt of a signal, the AGC bias applied to the grid of V5 causes its anode and screen currents to fall. The falling cathode voltage and rising screen voltage cause current to flow through the meter and since the voltage changes are dependent on the strength of the incoming signal the meter needle will be deflected more on a strong signal than on a weak one.

To overcome the sluggish action which would occur on weak signals because of the bottom bend characteristic of V6A, the meter needle is mechanically biased backward from its actual zero. V6A is in circuit to prevent damage to the very sensitive meter (200uA f.s.d.) which could result if the IF Gain control is turned down with the meter connected.

To set up the meter, first disconnect the aerial from the receiver and earth the aerial terminal. Now set the receiver controls as follows.

AGC	. .	ON	IF GAIN	. .	MAXIMUM
MODE	. .	AM	SELECTIVITY	. .	MINIMUM
RF GAIN	. .	MAXIMUM			

Set the meter needle to zero by means of the potentiometer at the rear of the meter case and then reconnect the aerial. The meter will now provide accurate readings of comparative signal strength, the calibration being based on a 4dB increase in carrier level for each 'S' point.

NOTE: The RF and IF Gain controls must be left at maximum when making comparative checks on the strength of received signals.

MAINS VOLTAGE ADJUSTMENT

This adjustment will be found on the side of the mains transformer and takes the form of a 'three-way' polarised socket together with an associated shorting plug. When despatched, the plug is set in the 230V position which is suitable for AC mains voltages in the range 220-250V.

For other voltages the plug should be set as follows:-

100-125V . . . . . . 110V position.
200-220V . . . . . . 200V position.

UNDER NO CIRCUMSTANCES SHOULD THE RECEIVER BE CONNECTED TO A DC SUPPLY

OPERATION

CONTROL FUNCTIONS

Main Tuning.

This control is conveniently positioned to the right of centre and alters the setting of the RF Section tuning capacitors and also the cursor on the main tuning scale. Ease of tuning is assured by the large control knob which operates a flywheel-loaded drive having a reduction ratio of approximately 140 : 1.

Wavechange Switch.

Selects the necessary inductances for the range in use; all disused coils are short circuited to prevent absorption effects. Range indication is provided by means of suitable marking on the finger plate concentric with the control knob.

Crystal Selector Switch.

This is located behind the Wavechange switch and has five positions. In the first position 'M' (Manual) the 1st Local Oscillator operates normally without crystal control. The remaining positions introduce the crystals in sockets 1, 2, 3 and 4 respectively.

Incremental Tuning.

Provides a swing of 50 kc/s above and below the selected signal frequency by varying the 1st IF from its nominal value of 1400 kc/s. The calibration disc is marked 50 - 0 - 50 (kc/s) and should be set to '0' for general tuning or otherwise the main scale calibration will be in error.

Calibration in red indicates that the receiver is tuned to a frequency HF of the indicated signal frequency (main scale) by the number of kilocycles on the incremental scale. The receiver will be LF of the indicated frequency when the calibration appears in black.

The average tuning rate of approximately 25 kc/s per revolution which is maintained throughout the entire coverage of the receiver will be found extremely useful when using Ranges 1 and 2.

Peak RF Control.

This permits accurate peaking of the RF and 1st Mixer grid circuits when the 1st IF is detuned from its nominal value by means of the Incremental Tuning control. The value of the two ganged capacitors has been kept as low as possible to avoid too sharp a tuning characteristic on Range 1. As a result, full correction is only possible at frequencies above 2 Mc/s (Range 6).

Gain Controls.

Three independent gain controls are provided as follows:-

RF Gain (RV1)	.. ..	controls V1
IF Gain (RV2)	.. ..	controls V5
AF Gain (RV3)	.. ..	controls level of audio input to V7.

The RF and IF Gains are operated by means of concentric control knobs; the red knob is the RF control.

Signal Mode Switch.

Selects audio output from either the AM or CW/SSB Detector as required. HT is removed from the screen of the product detector during AM reception.

BFO Adjustment.

Varies the pitch of the audio beat note when receiving CW signals. The control may be set so that the injected frequency from the oscillator lies on either side of the IF passband so providing a means of 'single-signal' CW reception with attenuation of either the HF or LF adjacent channel as required.

For SSB reception the BFO should be set to correspond with the side-band in use and once set correctly should require no further adjustment unless the transmitting station switches sidebands.

Selectivity.

The chromium plated knob at the lower right-hand corner of the finger plate provides continuously variable selectivity by physical movement of the 85 kc/s IF coils.

For SSB reception the control should be set approximately half way between the 'maximum' and 'minimum' positions, being slightly closer to minimum than maximum.

AGC and Noise Limiter Switch.

This has five positions arranged as follows. Position 1 is fully anti-clockwise.

POSITION	AGC	N.L.
1	Slow	Off
2	Fast	Off
3	Off	Off
4	Slow	On
5	Fast	On

NOTE: The Noise Limiter is only operative when the Mode switch is at AM.

Calibrator Switch.

This is a double-pole switch with one 'make' and one 'break' contact. On pressing the plunger, HT is applied to the Calibrator Unit while the RF Stage (V1) is desensitised to prevent breakthrough from outside signals.

Crystal controlled markers are available at all half-megacycle points throughout the entire coverage of the receiver.

The Cursor Adjustor.

Provides limited movement of the cursor (independently of the main tuning control) to allow correction of scale errors when calibrating.

Mains Switch.

Breaks both live and neutral lines to the receiver.

TUNING INSTRUCTIONS

Preliminary.

Check that the AC mains supply or external HT and LT supplies (from Vibrator Unit) are available. Check all external connections and ascertain that an aerial suitable for the frequencies to be used is connected to the terminals at the rear. Either connect a loudspeaker (2.5 ohm terminals), or, if speaker reception is not required, plug in a pair of telephones at the socket on the left-hand side of the front panel. Next, place the MAINS switch (or Vibrator SUPPLY switch) to 'ON'.

Manual Tuning.

Place the CRYSTAL SELECTOR switch to 'M' (Manual) and select the appropriate range by means of the WAVECHANGE switch. Set the INCREMENTAL tuning control to '0' and the main TUNING control to the crystal check point (marked in red) nearest to the frequency to which the receiver is to be tuned.

Put the MODE switch to CW/SSB, set the BFO (pitch) control to '0' and switch on the calibrator. Tune in the calibration marker, adjusting the main TUNING control for zero beat and then set the cursor exactly onto the red calibration mark by means of the CURSOR ADJUSTOR.

Once the scale calibration has been checked as described above, the receiver can be set accurately to the desired frequency either by use of the main tuning alone or by using the main and incremental controls in conjunction with one another. The latter method is recommended when the desired frequency falls either on Range 1 or Range 2.

Use of the Incremental Tuning Control.

First tune (using the main TUNING control) to the nearest 0.1 Mc/s calibration mark to the desired channel. This may be above or below the required frequency but will in any case be within 50 kc/s (0.05 Mc/s) of it.

EXAMPLE

For a desired channel of 7455 kc/s, the main TUNING is set to 7.5 Mc/s. Altering the INCREMENTAL setting to 45 kc/s on the black scale brings in the signal on 7455 kc/s. Under these conditions the RF and 1st Mixer tuning circuits are out of alignment because the main TUNING is at 7.5 Mc/s. Correction of this misalignment is obtained by adjusting the PEAK RF control for maximum signal.

If desired, the INCREMENTAL control can be used as a normal band-spread adjustment. In this case coverage of any 100 kc/s band is possible throughout the entire coverage of the receiver. Complete tracking compensation (PEAK RF control) is only possible above 2 Mc/s.

Crystal Controlled Operation.

The first step is to calculate the nominal crystal frequency by application of the formula:-

NOMINAL CRYSTAL FREQUENCY = fs + 1400 kc/s.

The actual crystal used can have any frequency in the range 50 kc/s above or below the nominal value obtained from the formula.

EXAMPLE

For crystal controlled reception on 7016 kc/s.

Nominal crystal frequency = 7016 + 1400 kc/s.

= 8416 kc/s.

The range of possible crystal frequencies is therefore:-

(8416 - 50) kc/s to (8416 + 50) kc/s.

= 8366 kc/s to 8466 kc/s.

Injection to the 1st Mixer at any of the frequencies in this range will convert a 7016 kc/s signal to produce an output within the coverage of the variable IF (Incremental). The exact setting of the Incremental control will of course depend on the crystal frequency employed and whether this is higher or lower than the nominal value (in this case 8416 kc/s).

The exact setting is easily calculated by finding the difference between the NOMINAL and ACTUAL values, tuning on the black portion of the scale if the ACTUAL value is higher than the NOMINAL value or on the red portion if the NOMINAL value is the greater.

Continuing the example above, assume that a crystal with frequency 8375 kc/s is available and that this is in position in holder No. 1.

The Incremental control should be set to (8416 - 8375) = 41 and since the crystal frequency is below the NOMINAL value, the RED portion of the scale must be used. In effect a positive correction is applied to compensate for the crystal being lower than the nominal value.

The variable IF is now of the correct value (actually 1359 kc/s) for the crystal in use and tuning may proceed bearing in mind that the main scale will be in error by 41 kc/s (positive).

With the CRYSTAL SELECTOR switch at 'M', tune to 6975 kc/s (7016 minus 41 kc/s) and adjust the PEAK RF control for maximum signal or background. Switch to CRYSTAL 1 and tune higher in frequency on the main TUNING to fire the crystal. Once the crystal is oscillating, tune back towards the correct channel taking care not to tune too far LF or otherwise the crystal will cease to oscillate.

Now peak the signal frequency circuits by means of the PEAK RF control and then if necessary make a slight adjustment to the INCREMENTAL setting for best reception of the wanted station.

It is suggested that a small card is made up as follows for the convenience of the operator in setting up the receiver on pre-determined frequencies.

POSITION	SIGNAL FREQ. kc/s	MAIN DIAL kc/s	INCREMENTAL SETTING	CRYSTAL kc/s
1	7016	6975	41 RED	8375
2				
3				
4				

MAINTENANCE

GENERAL

The Model 910/1 is intended for continuous operation in all areas under extreme 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 it 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 are of the self-cleaning type and will therefore require no attention. Moving parts are lubricated with a permanent lubricant (molybdenum disulphide) so that regular lubrication is not required. If, however, after a long period of use lubrication is thought necessary, a light mineral oil of good quality may be used. This should be suited to the temperature conditions under which the receiver is used. Care must be taken to prevent oil collecting on the drive discs.

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

Marks on the exterior of the cabinet and the scale window can be removed with slightly moistened cloth. A final polish with a soft dry cloth will remove all traces of moisture and help retain the original finish.

DIAL LAMP REPLACEMENT

A faulty bulb can be replaced quite simply after removal of the cabinet. Merely squeeze together the two sides of the holder and pull away from the metal support. The bulbs are rated at 6.5V 0.3A and are of the standard bayonet fitting type.

Care should be exercised in removing bulb holders to avoid dislodging the pointer drive wire from the drive pulleys.

FUSE REPLACEMENT

A faulty fuse can be replaced by removing the cabinet to reveal the fuse holder which is situated between the rectifier and stabiliser tubes at the rear of the Power Unit chassis.

The correct replacement is a standard 1¼" cartridge type rated at 250mA (Mag Nickel preferred).

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, immediate steps should be taken to ascertain the cause.

VALVE REPLACEMENT

Of the 13 valves used in the equipment, 11 can be changed without the need for removing the cabinet. The other two are inside the 2nd

Mixer Unit to which entrance is provided by means of a removable top plate easily accessible when the cabinet is removed.

All valves are standard types and no difficulty should be encountered in obtaining replacements.

RE-ALIGNMENT

Although instructions for full alignment are given below it is doubtful whether this task need ever be performed completely. Partial alignment is recommended should it be necessary to change a valve or component associated with one of the tuned circuits. The procedure involved can be extracted from the full instructions which follow.

Re-alignment of the 85 kc/s circuits and BFO.

Connect a monitor speaker and output meter matched to 2.5 ohms across the loudspeaker terminals. Remove the top cover from the 2nd Mixer Unit and connect the output lead from the signal generator (85 kc/s, 30% mod, 400 c/s) between pin 1 of V4 (6AK5) and chassis.

Set the receiver controls as follows and then adjust the level of output from the generator to obtain a convenient reading on the output meter.

RF GAIN	..	MINIMUM	SELECTIVITY	..	MAXIMUM
IF GAIN	..	MAXIMUM	MODE SWITCH	..	AM
AF GAIN	..	MAXIMUM	NL/AGC	..	OFF

ENSURE THAT THE DESENSITISING TERMINALS ARE SHORTED AND THAT THE 600 OHM LINK IS OPEN.

Adjust the cores in the top and bottom of the 85 kc/s transformers T1 and T2 (see Fig. 2.) for maximum reading on the output meter. An input of approximately 200uV at the grid of V4 should give an output of 50mW at the 2.5 ohm terminals when the loudspeaker is disconnected.

To accurately align the beat oscillator, cut the generator modulation and place the receiver Mode switch at CW/SSB. With the BFO pitch capacitor set to half-capacity check that the knob marking lies at 12 o'clock and then adjust the core on the underside of the BFO Unit (L26) for zero beat.

Re-alignment of the 2nd Mixer Unit.

REPLACE THE 2ND MIXER UNIT TOP COVER PLATE BEFORE COMMENCING ALIGNMENT.

Leaving all the controls as previously set, but switching back to AM, tune the signal generator to 1345 kc/s (modulation on) and connect the output lead to the stator of the middle section of the <u>main</u> tuning gang (i.e. to the grid of the 2nd Mixer V2). It may be noted here that the gang cover can be removed without the need for taking off the calibrator unit.

The signal generator calibration should be checked against a reliable crystal controlled harmonic generator.

Set the receiver Wavechange switch to Range 6, tune frequency to 1.5 Mc/s and Crystal Selector switch to any vacant crystal position to disable the 1st Local Oscillator.

Set the Incremental control to 55 'RED' and adjust the core in the oscillator coil L24 to tune in the signal.

NOTE: This coil, the trimmer C47 and the interstage coils L22 and L23 can be adjusted after removing the outer cover plate on the right-hand side of the Unit. The inner cover which is provided with holes for trimming is secured by the same four screws and these should be replaced to hold the cover in place during alignment. Alignment should not be carried out with the cover removed.

Retune the signal generator to 1450 kc/s and set the Incremental control to 50 'BLACK'. Tune in the signal by using the small air trimmer C47. Repeat again at 55 'RED' with the generator on 1345 kc/s to compensate for any possible interaction between the two adjustments.

Next, check the calibration accuracy at intervals of 10 kc/s throughout the range of the Incremental tuning. The accuracy should be within one kilocycle.

Now retune the generator to 1400 kc/s, set the Incremental control to Ø and peak the interstage coils L22 and L23 for maximum output. An input signal of approximately 30uV to the grid of V2 should provide an output of 50mW.

Finally, check the sensitivity throughout the range of the Incremental and ensure that it is substantially the same as at the centre frequency.

Re-alignment of the RF Section.

The first step in re-alignment of the RF Section is a check on the calibration accuracy. This is easily carried out by using the built-in crystal calibrator. It is suggested that a wire link is temporarily soldered across S2b to obviate the need for continually pressing the calibrator plunger. The RF valve (V1) can be removed if there is any troublesome breakthrough at the signal frequency.

Before commencing to check the calibration, the cursor must be set to the centre of its travel. Once this has been done, checks can be carried out at all the calibration points marked in red. If the calibration is within its original tolerance of 0.5% it will be possible to correct all errors by means of the cursor and re-alignment of the oscillator circuits will not be required.

If it proves impossible to achieve complete correction by means of the cursor it will be necessary to re-align the oscillator circuits as follows. The procedure is quite straightforward and is best carried out using an accurate frequency meter. In the absence of such an instrument, a standard signal generator can be used but provision should be made for checking its calibration accuracy at least at each 100 kc/s point. Alignment adjustments should be made at the following frequencies.

RANGE	TRIMMING	PADDING
1	29.5 Mc/s .. C87	18.5 Mc/s . L15
2	17.5 Mc/s . C90	11.5 Mc/s . L16
3	10.5 Mc/s . C93	7.0 Mc/s . L17
4	6.3 Mc/s . C95	4.2 Mc/s . L18
5	3.85 Mc/s . C98	2.6 Mc/s . L19
6	2.45 Mc/s . C101	1.6 Mc/s . L20
7	515 kc/s . C104	375 kc/s . L21

All trimmers and cores are easily accessible without the need for removal of the coil box cover and the appropriate holes can be identified by reference to Fig. 2. Each adjustment should be repeated at least twice to ensure cancellation of the interaction between the trimming and padding changes.

Once the calibration accuracy has been verified and corrected if necessary, alignment of the signal frequency circuits can be commenced. Control settings are as follows, the signal generator (75 ohm output) being connected to the aerial/earth terminals and the output meter and monitor speaker to the 2.5 ohm output.

RF GAIN . . MAX	SELECTIVITY . . MAX	INCREMENTAL . . Ø
IF GAIN . . MAX	MODE SWITCH . . AM	PEAK RF to half-capacity.
AF GAIN . . MAX	NL/AGC . . OFF	(check that white spot is vertical at this setting)

Tune the signal generator (modulated 30% at 400 c/s) and the receiver to each of the frequencies listed below. Adjust the appropriate trimmers and cores for maximum output.

RANGE	TRIMMING			PADDING		
	FREQ	RF	MIXER	FREQ	RF	MIXER
1	29.5 Mc/s	C2	C22	18.5 Mc/s	L1	L8
2	17.5 Mc/s	C4	C25	11.5 Mc/s	L2	L9
3	10.5 Mc/s	C6	C28	7.0 Mc/s	L3	L10
4	6.3 Mc/s	C8	C30	4.2 Mc/s	L4	L11
5	3.85 Mc/s	C10	C32	2.6 Mc/s	L5	L12
6	2.45 Mc/s	C11	C34	1.6 Mc/s	L6	L13
7	515 kc/s	C13	C37	375 kc/s	L7	L14

Finally, disconnect the loudspeaker and carry out a sensitivity check at the centre frequency of each range. An input of less than 5uV should give an output of 50mW for 10dB s/n. (selectivity in mid position)

APPENDIX 'A'

LIST OF COMPONENT VALUES TOLERANCES AND RATINGS

Capacitors.

C1	40 pF Silvered Mica ± 10% 350V DC wkg.
C2	3-30 pF Air Trimmer.
C3	50 pF Silvered Mica ± 10% 350V DC wkg.
C4	3-30 pF Air Trimmer.
C5	50 pF Silvered Mica ± 10% 350V DC wkg.
C6	3-30 pF Air Trimmer.
C7	20 pF Silvered Mica ± 10% 350V DC wkg.
C8	3-30 pF Air Trimmer.
C9	50 pF Silvered Mica ± 10% 350V DC wkg.
C10	3-30 pF Air Trimmer.
C11	3-30 pF Air Trimmer.
C12	80 pF Silvered Mica ± 5% 350V DC wkg.
C13	3-30 pF Air Trimmer.
C14	3 gang 12-230 pF.
C15	2 gang 3.5-54 pF.
C16	100 pF Silvered Mica ± 10% 350V DC wkg.
C17	0.05 mfd Tubular Paper ± 20% 350V DC wkg.
C18	0.05 mfd Tubular Paper ± 20% 350V DC wkg.
C19	0.05 mfd Tubular Paper ± 20% 350V DC wkg.
C20	20 pF Tubular Ceramic ± 10% 350V DC wkg.
C21	40 pF Silvered Mica ± 10% 350V DC wkg.
C22	3-30 pF Air Trimmer.
C23	6 pF Tubular Ceramic ± 10 % 350V DC wkg.
C24	40 pF Silvered Mica ± 10% 350V DC wkg.
C25	3-30 pF Air Trimmer.
C26	6 pF Tubular Ceramic ± 10% 350V DC wkg.
C27	40 pF Silvered Mica ± 10% 350V DC wkg.
C28	3-30 pF Air Trimmer.
C29	20 pF Silvered Mica ± 10% 350V DC wkg.
C30	3-30 pF Air Trimmer.
C31	40 pF Silvered Mica ± 10% 350V DC wkg.
C32	3-30 pF Air Trimmer.
C33	6 pF Tubular Ceramic ± 10% 350V DC wkg.
C34	3-30 pF Air Trimmer.
C35	6 pF Tubular Ceramic ± 10% 350V DC wkg.
C36	80 pF Silvered Mica ± 5% 350V DC wkg.
C37	3-30 pF Air Trimmer.
C38	100 pF Silvered Mica ± 10% 350V DC wkg.
C39	0.05 mfd Tubular Paper ± 20% 350V DC wkg.
C40	10 pF Tubular Ceramic ± 10% 350V DC wkg.

C41	0.05 mfd Tubular Paper ± 20% 350V DC wkg.
C42	1500 pF Tubular Ceramic Feed Through ± 20% 350V DC wkg.
C43	3 gang 8-44 pF.
C44	160 pF Silvered Mica ± 2% 350V DC wkg.
C45	160 pF Silvered Mica ± 2% 350V DC wkg.
C46	0.05 mfd Tubular Paper ± 20% 350V DC wkg.
C47	3-30 pF Air Trimmer.
C48	150 pF Silvered Mica ± 1% 350V DC wkg.
C49	100 pF Silvered Mica ± 10% 350V DC wkg.
C50	100 pF Silvered Mica ± 10% 350V DC wkg.
C51	0.01 mfd Tubular Paper ± 20% 150V DC wkg.
C52	1500 pF Tubular Ceramic Feed Through ± 20% 350V DC wkg.
C53	0.05 mfd Tubular Paper ± 20% 350V DC wkg.
C54	100 pF Tubular Ceramic ± 10% 350V DC wkg.
C55	0.01 mfd Tubular Paper ± 20% 150V DC wkg.
C56	0.01 mfd Tubular Paper ± 20% 150V DC wkg.
C57	1500 pF Tubular Ceramic Feed Through ± 20% 350V DC wkg.
C58	800 pF Silvered Mica ± 2% 350V DC wkg.
C59	800 pF Silvered Mica ± 2% 350V DC wkg.
C60	0.05 mfd Tubular Paper ± 20% 350V DC wkg.
C61	0.05 mfd Tubular Paper ± 20% 350V DC wkg.
C62	0.05 mfd Tubular Paper ± 20% 350V DC wkg.
C63	0.05 mfd Tubular Paper ± 20% 350V DC wkg.
C64	800 pF Silvered Mica ± 2% 350V DC wkg.
C65	800 pF Silvered Mica ± 2% 350V DC wkg.
C66	20 pF Silvered Mica ± 10% 350V DC wkg.
C67	100 pF Tubular Ceramic ± 10% 350V DC wkg.
C68	100 pF Tubular Ceramic ± 10% 350V DC wkg.
C69	0.05 mfd Tubular Paper ± 20% 350V DC wkg.
C70	2 mfd Metallised Paper ± 20% 200V DC wkg.
C71	0.01 mfd Moulded Mica ± 20% 350V DC wkg.
C72	100 pF Tubular Ceramic ± 10% 350V DC wkg.
C73	30 mfd Tubular Electrolytic 15V DC wkg.
C74	0.5 mfd Metallised Paper ± 20% 250V DC wkg.
C75	500 pF Moulded Mica ± 20% 350V DC wkg.
C76	0.01 mfd Moulded Mica ± 20% 350V DC wkg.
C77	32 + 32 mfd Tubular Electrolytic 350V DC wkg.
C78	6 pF Tubular Ceramic ± 10% 350V DC wkg.
C79	0.01 mfd Moulded Mica ± 20% 350V DC wkg.
C80	4 mfd Tubular Electrolytic 350V DC wkg.
C81	30 mfd Tubular Electrolytic 15V DC wkg.
C82	0.01 mfd Tubular Paper ± 20% 350V DC wkg.
C83	20 pF Silvered Mica ± 10% 350V DC wkg.
C84	10 pF Tubular Ceramic ± 10% 350V DC wkg.
C85	3-23 pF Air Trimmer.
C86	2350 pF Silvered Mica ± 1% 350V DC wkg.
C87	3-30 pF Air Trimmer.
C88	40 pF Silvered Mica ± 10% 350V DC wkg.
C89	2000 pF Silvered Mica ± 1% 350V DC wkg.
C90	3-30 pF Air Trimmer.

C91	25 pF Silvered Mica ± 10% 350V DC wkg.
C92	2300 pF Silvered Mica ± 1% 350V DC wkg.
C93	3-30 pF Air Trimmer.
C94	1425 pF Silvered Mica ± 1% 350V DC wkg.
C95	3-30 pF Air Trimmer.
C96	20 pF Silvered Mica ± 10% 350V DC wkg.
C97	850 pF Silvered Mica ± 1% 350V DC wkg.
C98	3-30 pF Air Trimmer.
C99	80 pF Silvered Mica ± 5% 350V DC wkg.
C100	500 pF Silvered Mica ± 1% 350V DC wkg.
C101	3-30 pF Air Trimmer.
C102	60 pF Silvered Mica ± 5% 350V DC wkg.
C103	340 pF Silvered Mica ± 1% 350V DC wkg.
C104	3-30 pF Air Trimmer.
C105	400 pF Silvered Mica ± 1% 350V DC wkg.
C106	10 pF Tubular Ceramic ± 10% 350V DC wkg.
C107	100 pF Tubular Ceramic ± 10% 350V DC wkg.
C108	0.01 mfd Tubular Paper ± 20% 150V DC wkg.
C109	100 pF Silvered Mica ± 10% 350V DC wkg.
C110	0.01 mfd Tubular Paper ± 20% 150V DC wkg.
C111	100 pF Silvered Mica ± 10% 350V DC wkg.
C112	30 mfd Tubular Electrolytic 15V DC wkg.
C113	4-60 pF Air Spaced Variable.
C114	200 pF Silvered Mica ± 2% 350V DC wkg.
C115	500 pF Tubular Paper ± 20% 350V DC wkg.
C116	500 pF Tubular Paper ± 20% 350V DC wkg.
C117	5000 pF Tubular Paper ± 20% 250V DC wkg.
C118	30 mfd Tubular Electrolytic 15V DC wkg.
C119	50 mfd Tubular Electrolytic 450V DC wkg.
C120	1500 pF Tubular Ceramic Feed Through ± 20% 350V DC wkg.
C121	0.01 mfd Tubular Paper ± 20% 150V DC wkg.
C122	0.01 mfd Tubular Paper ± 20% 150V DC wkg.
C123	0.01 mfd Tubular Paper ± 20% 150V DC wkg.
C124	0.01 mfd Tubular Paper ± 20% 150V DC wkg.
C125	1500 pF Tubular Ceramic Feed Through ± 20% 350V DC wkg.
C126	0.01 mfd Tubular Paper ± 20% 150V DC wkg.
C127	0.01 mfd Tubular Paper ± 20% 150V DC wkg.
C128	0.25 mfd Metallised Paper ± 20% 150V DC wkg.
C129	0.25 mfd Metallised Paper ± 20% 150V DC wkg.

Potentiometers.

RV1	10,000 ohms wirewound.
RV2	10,000 ohms wirewound.
RV3	500,000 ohms carbon.

Resistors.

R1	0.47 Megohm ± 10% ½ watt.
R2	12 ohms ± 10% ½ watt.
R3	33,000 ohms ± 10% ½ watt.
R4	2,200 ohms ± 10% ½ watt.
R5	0.1 Megohm ± 10% ½ watt.
R6	200 ohms ± 10% ½ watt.
R7	47,000 ohms ± 10% ½ watt.
R8	560 ohms ± 10% ½ watt.
R9	470 ohms ± 10% ½ watt.
R10	150 ohms ± 10% ½ watt.
R11	270 ohms ± 10% ½ watt.
R12	0.47 Megohm ± 10% ½ watt.
R13	12 ohms ± 10% ½ watt.
R14	0.1 Megohm ± 10% ½ watt.
R15	150 ohms ± 10% ½ watt.
R16	4,700 ohms ± 10% ½ watt.
R17	2,200 ohms ± 10% ½ watt.
R18	22,000 ohms ± 10% ½ watt.
R19	10,000 ohms ± 10% ½ watt.
R20	2,200 ohms ± 10% ½ watt.
R21	15,000 ohms ± 10% ½ watt.
R22	47,000 ohms ± 10% ½ watt.
R23	1 Megohm ± 10% ½ watt.
R24	0.47 Megohm ± 10% ½ watt.
R25	270 ohms ± 10% ½ watt.
R26	0.47 Megohm ± 10% ½ watt.
R27	0.1 Megohm ± 10% ½ watt.
R28	47,000 ohms ± 10% ½ watt.
R29	2,200 ohms ± 10% ½ watt.
R30	100 ohms ± 10% ½ watt.
R31	0.1 Megohm ± 10% ½ watt.
R32	0.1 Megohm ± 10% ½ watt.
R33	1 Megohm ± 10% ½ watt.
R34	2 Megohm ± 10% ½ watt.
R35	27,000 ohms ± 10% ½ watt.
R36	0.27 Megohm ± 10% ½ watt.
R37	3,300 ohms ± 10% ½ watt.
R38	0.47 Megohm ± 10% ½ watt.
R39	0.47 Megohm ± 10% ½ watt.
R40	0.1 Megohm ± 10% ½ watt.
R41	0.18 Megohm ± 10% ½ watt.
R42	4,700 ohms ± 10% ½ watt.
R43	47 ohms ± 10% ½ watt.
R44	5,200 ohms ± 10% ½ watt.
R45	680 ohms ± 5% 3 watt.
R46	680 ohms ± 10% ½ watt.
R47	120 ohms ± 10% ½ watt.
R48	33,000 ohms ± 10% ½ watt.
R49	3,300 ohms ± 10% ½ watt.
R50	3 Megohms ± 10% ½ watt.
R51	22,000 ohms ± 10% ½ watt.
R52	0.1 Megohm ± 10% ½ watt.
R53	1 Megohm ± 10% ½ watt.
R54	330 ohms ± 10% ½ watt.
R55	22,000 ohms ± 10% ½ watt.
R56	1,000 ohms ± 10% ½ watt.
R57	10,000 ohms ± 10% ½ watt.
R58	0.47 Megohm ± 10% ½ watt.
R59	47 ohms ± 10% ½ watt.
R60	33,000 ohms ± 10% ½ watt.
R61	10,000 ohms ± 10% ½ watt.
R62	47,000 ohms ± 10% ½ watt.
R63	22,000 ohms ± 10% ½ watt.
R64	220 ohms ± 10% ½ watt.
R65	2,700 ohms ± 5% 6 watt.
R66	0.1 Megohm ± 10% ½ watt.
R67	6,800 ohms ± 10% ½ watt.

NOTE: A special screening can is fitted to the CW/SSB Detector (V11) to prevent hum pick-up from the mains transformer. The can is coloured red and should not be used in any other position.

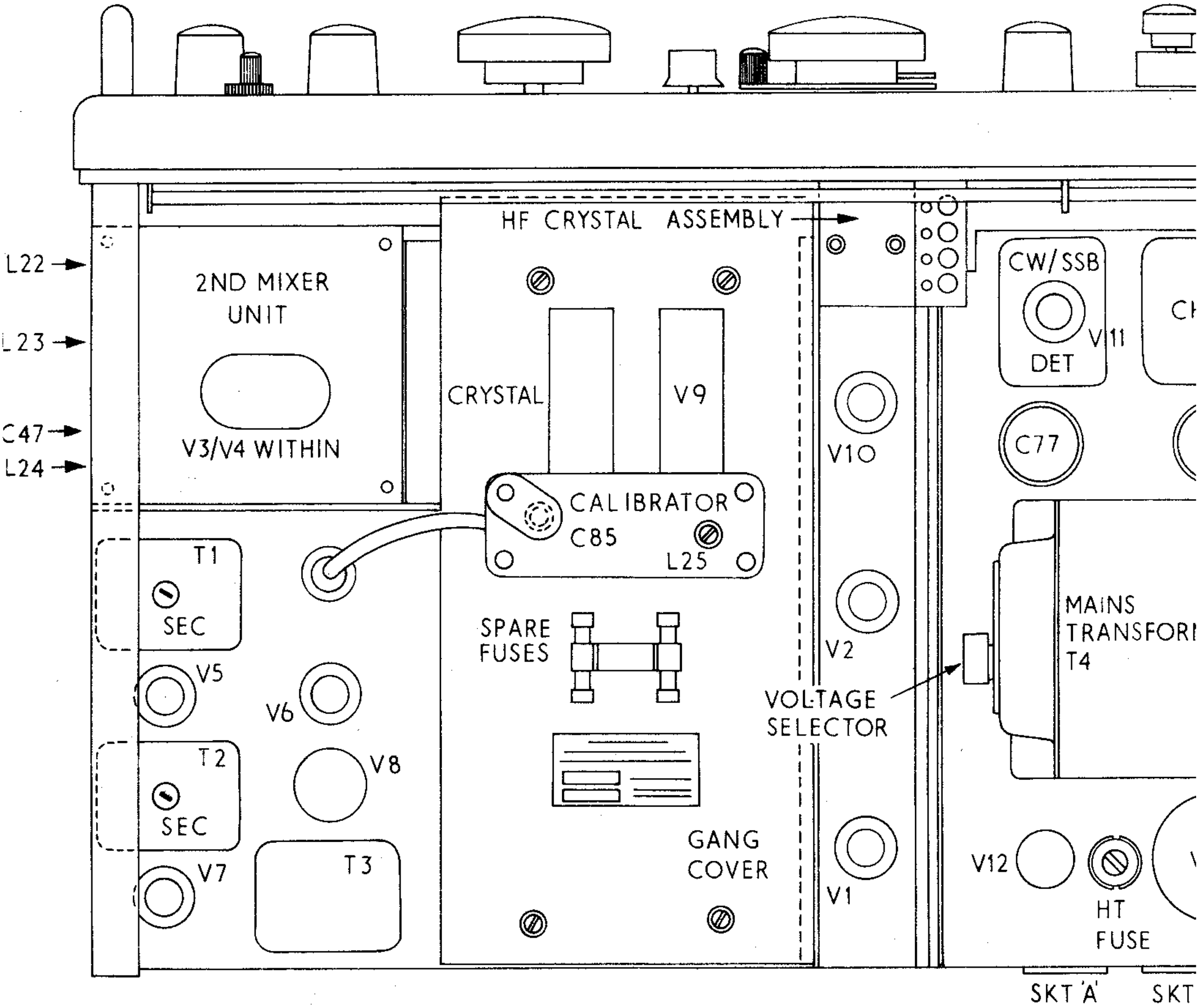
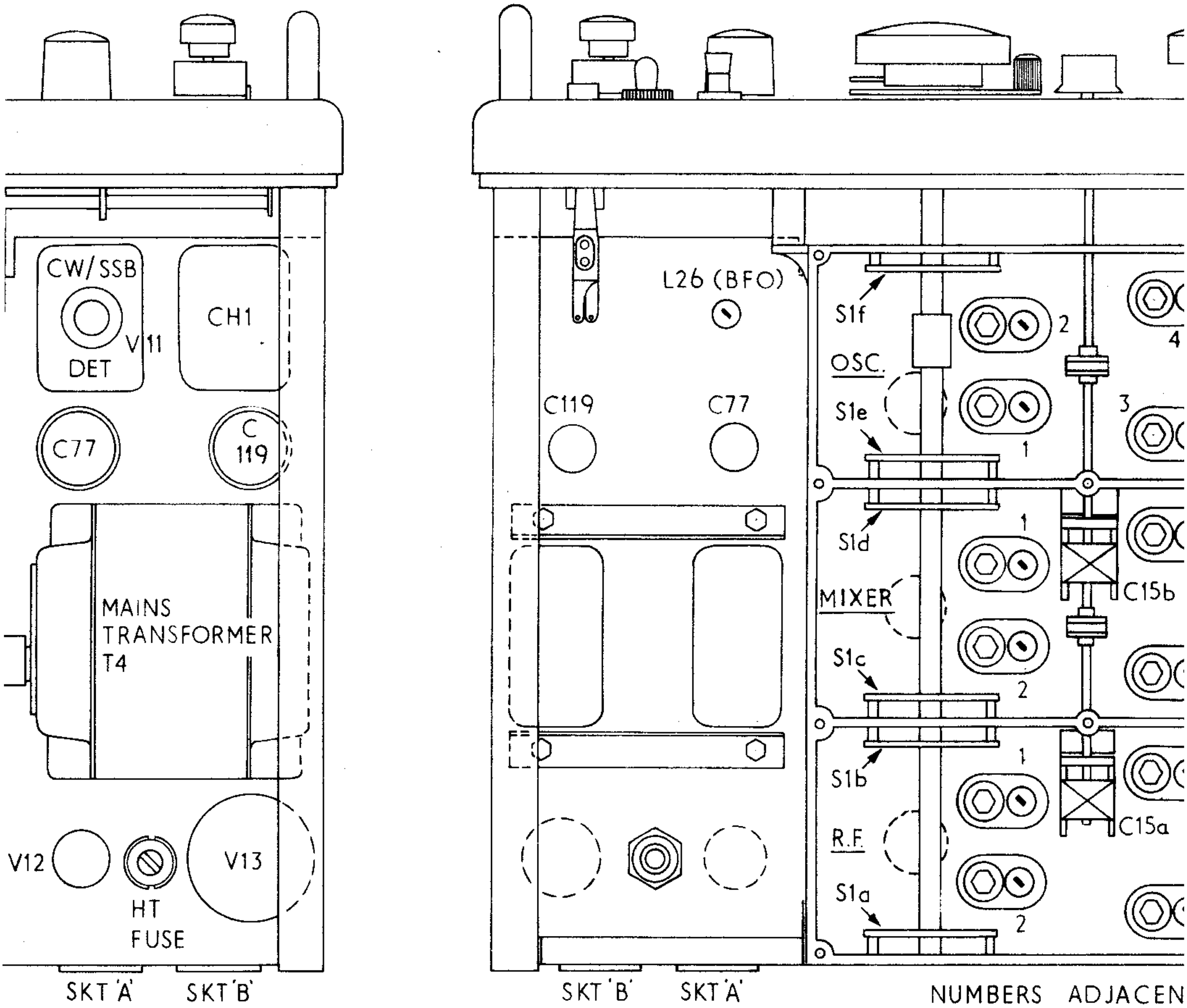


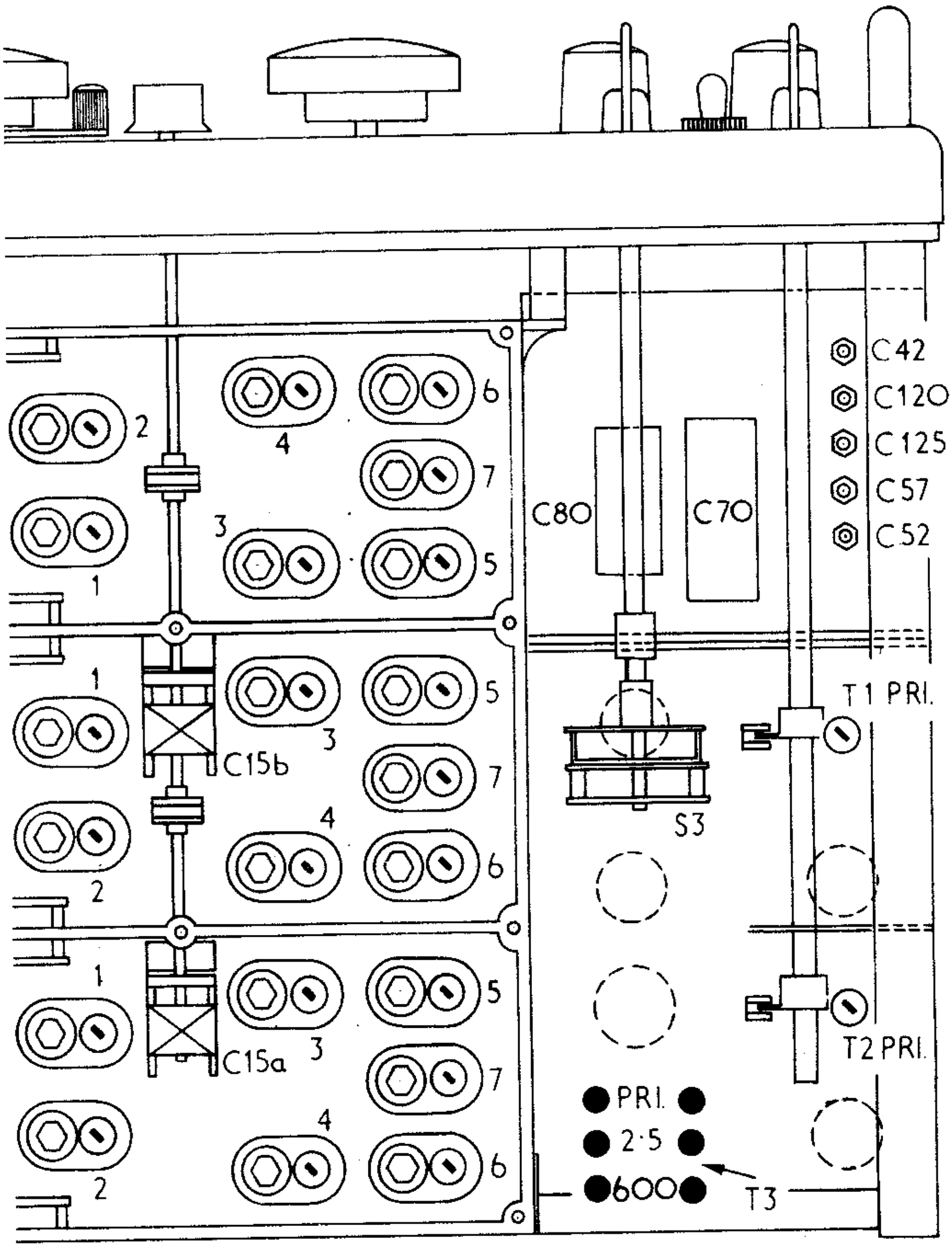
FIG. 2. PLAN AND UNDERSIDE VIEWS OF MODEL 910/1 SHOWING LOCATION O
TRIMMING ADJUSTMENTS AND MAJOR COMPONENTS.



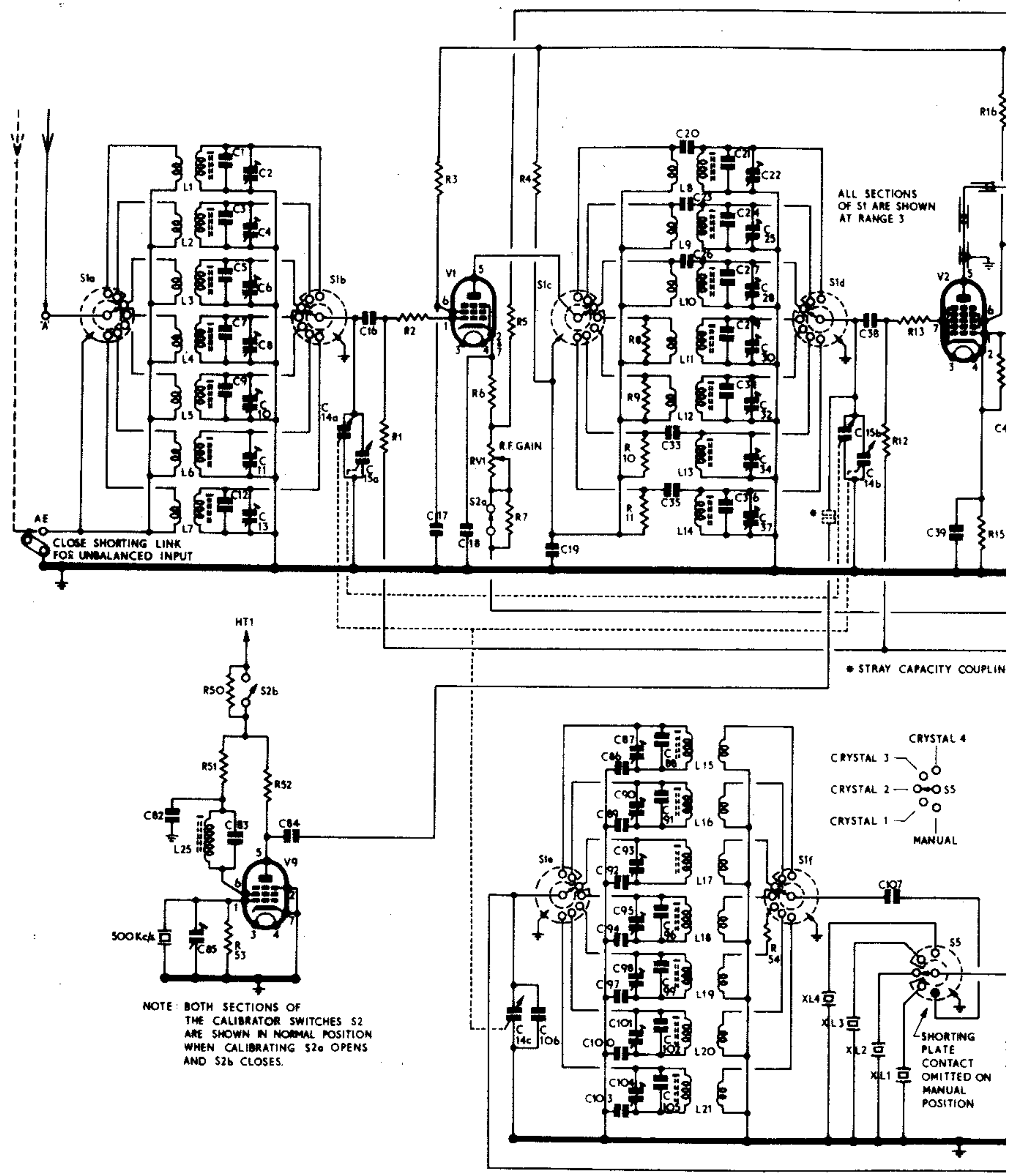
NUMBERS ADJACEN

WING LOCATION OF

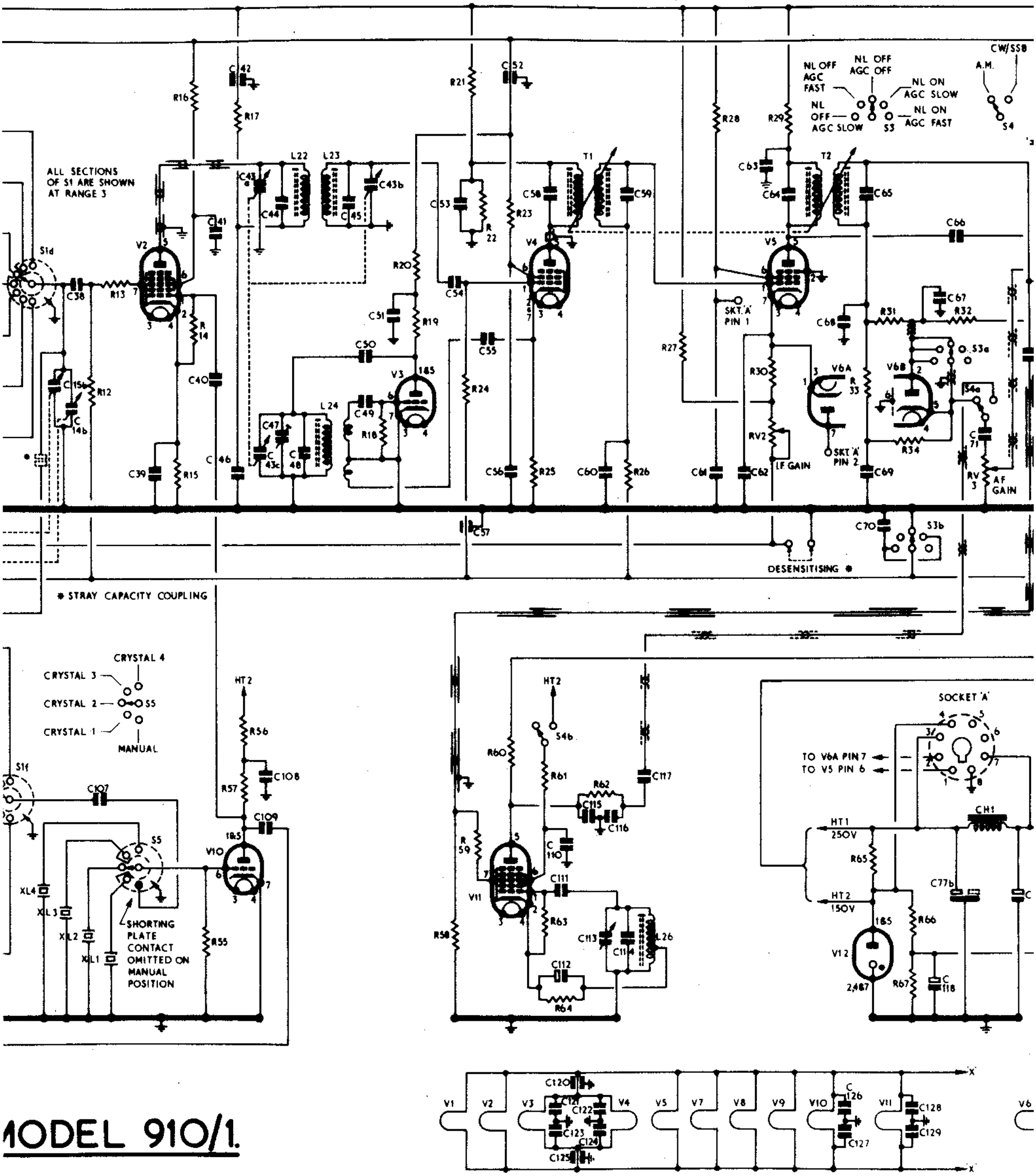
ITS.



JMBERS ADJACENT TO COILS INDICATE RANGE

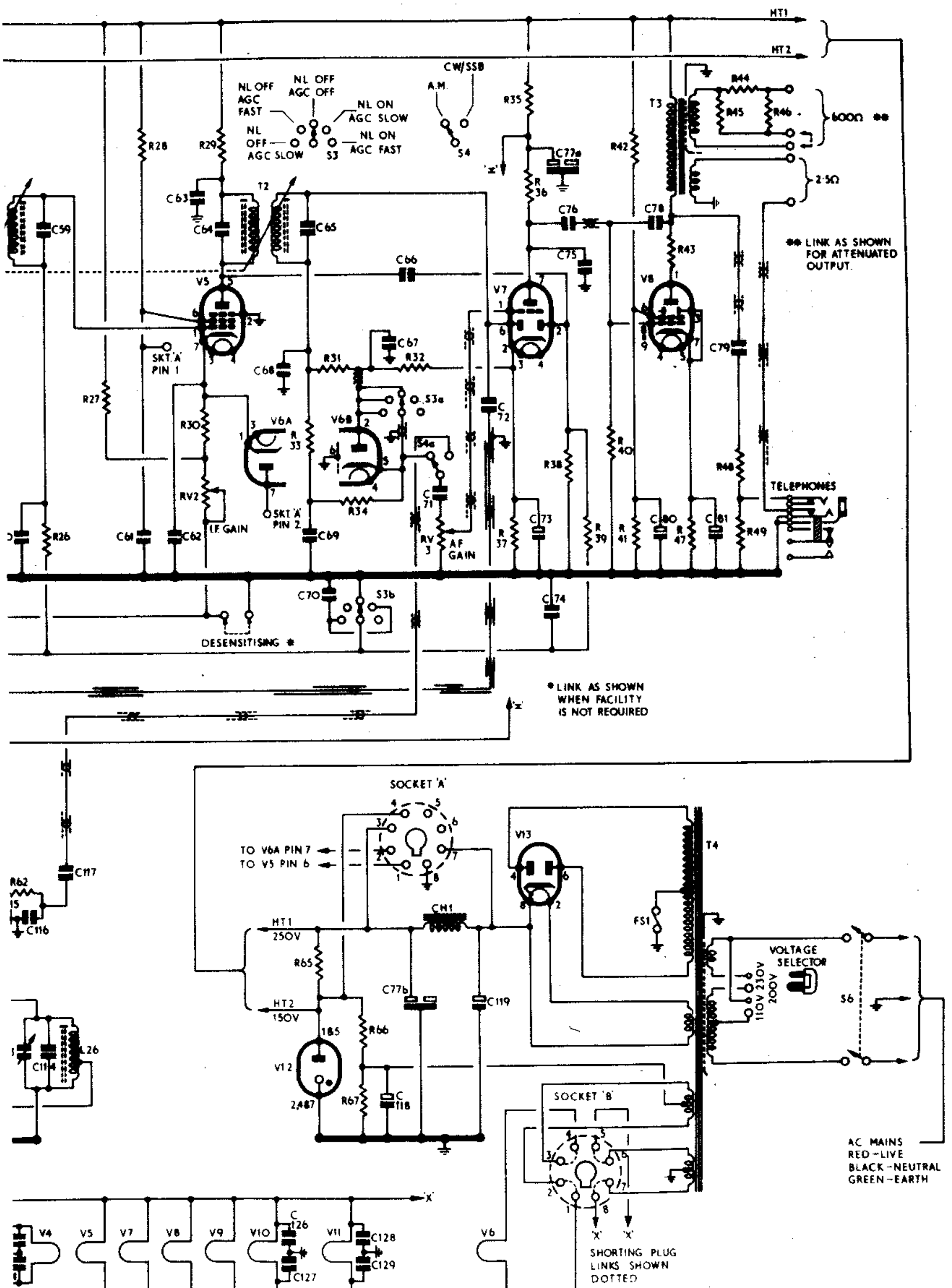


COMMUNICATIONS RECEIVER - MODEL 91C



ALL SECTIONS OF S1 ARE SHOWN AT RANGE 3
NL OFF AGC FAST
NL OFF AGC OFF
NL ON AGC SLOW
NL OFF AGC SLOW
NL ON AGC FAST
S3
CW/SSB
A.M.
S4
SKT.'A' PIN 1
SKT.'A' PIN 2
LF GAIN
AF GAIN
DESENSITISING *
* STRAY CAPACITY COUPLING
CRYSTAL 4
CRYSTAL 3
CRYSTAL 2
CRYSTAL 1
MANUAL
S5
SHORTING PLATE CONTACT OMITTED ON MANUAL POSITION
HT2
SOCKET 'A'
TO V6A PIN 7
TO V5 PIN 6
HT1 250V
HT2 150V
CH1

MODEL 910/1.



HT1
HT2
CW/SSB
A.M.
S4
NL OFF
AGC OFF
NL OFF
AGC FAST
NL ON
AGC SLOW
NL
OFF
AGC SLOW
S3
NL ON
AGC FAST
R35
R28
R29
R42
T3
R44
R45
R46
600Ω **
2·5Ω
C77a
C63
T2
C64
C65
C59
R36
C76
C78
R43
C75
** LINK AS SHOWN FOR ATTENUATED OUTPUT.
C66
V5
V7
V8
SKT.'A' PIN 1
C67
C68
R31
R32
C79
R27
R30
V6A
R33
V6B
S3a
C72
S4a
R34
C71
R38
R40
R48
TELEPHONES
RV2
I.F. GAIN
SKT.'A' PIN 2
RV3
AF GAIN
R37
C73
R39
R41
C80
R47
C81
R49
R26
C61
C62
C69
C70
S3b
C74
DESENSITISING *
* LINK AS SHOWN WHEN FACILITY IS NOT REQUIRED
SOCKET 'A'
TO V6A PIN 7
TO V5 PIN 6
V13
T4
C117
R62
C116
HT1
250V
CH1
FS1
R65
HT2
150V
C77b
C119
VOLTAGE SELECTOR
110V 230V 200V
S6
185
V12
R66
2,487
R67
C118
L26
C114
SOCKET 'B'
AC MAINS
RED - LIVE
BLACK - NEUTRAL
GREEN - EARTH
V4
V5
V7
V8
V9
V10
C126
C127
V11
C128
C129
V6
SHORTING PLUG LINKS SHOWN DOTTED

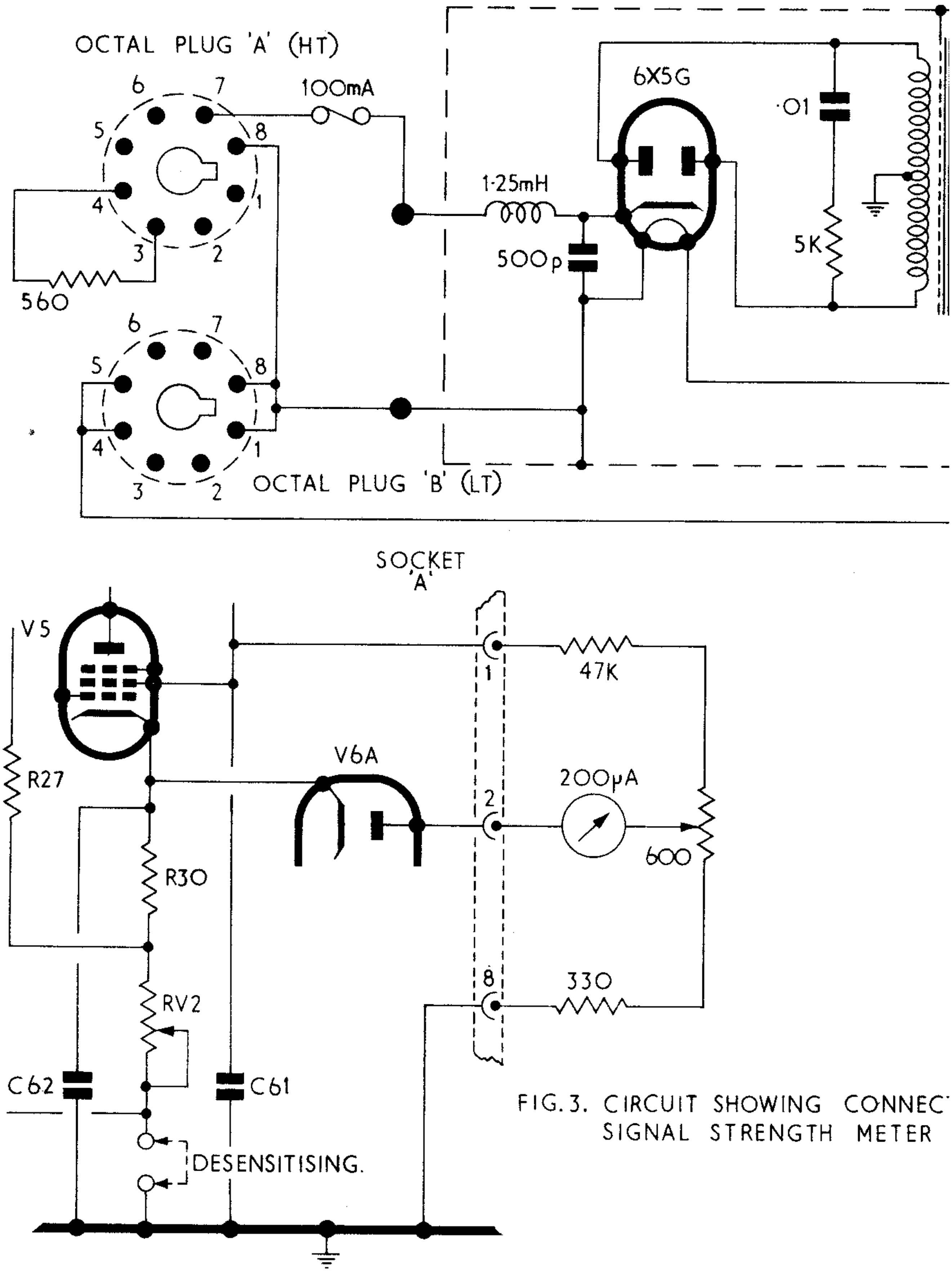


FIG. 3. CIRCUIT SHOWING CONNEC
SIGNAL STRENGTH METER

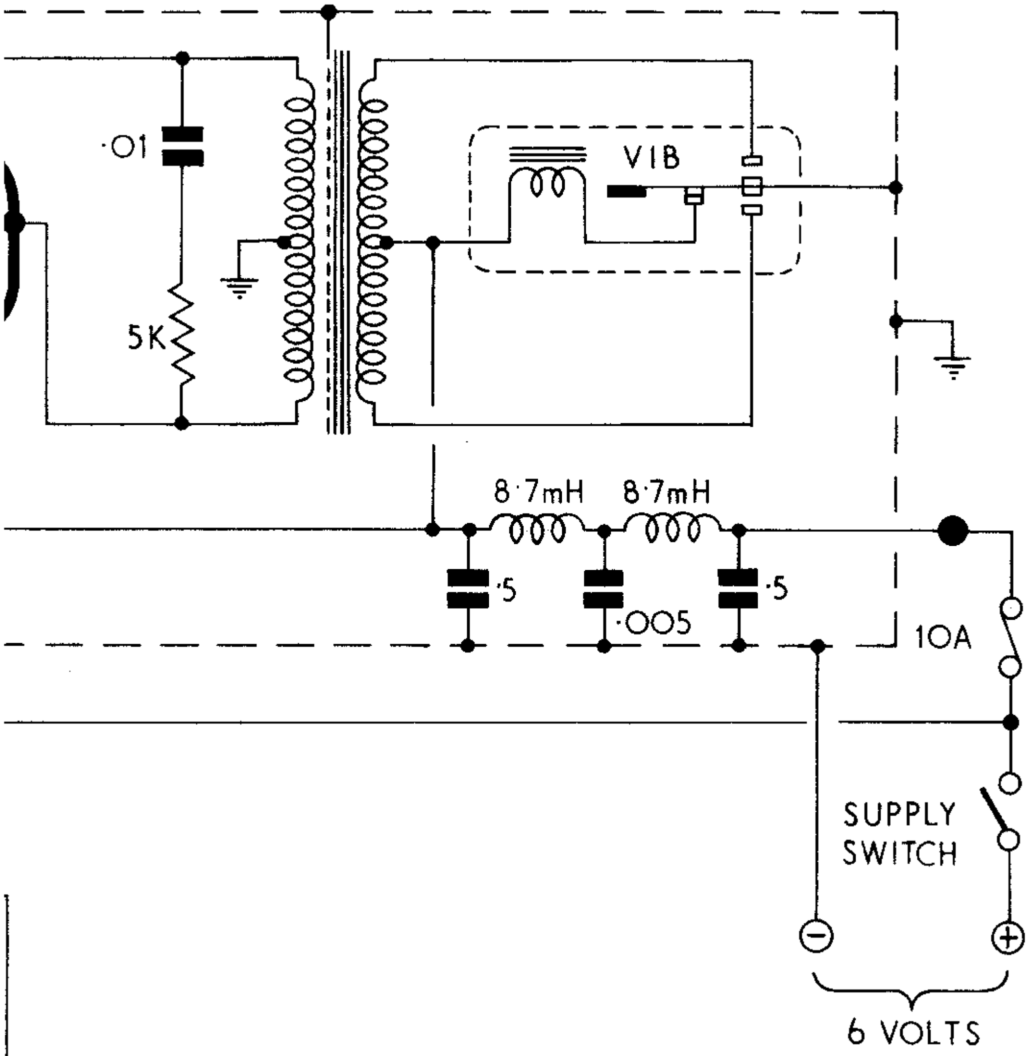


FIG. 4. CIRCUIT OF VIBRATOR UNIT
TYPE 687/1 (MARCONI 1817)

SHOWING CONNECTIONS TO EXTERNAL
STRENGTH METER (CAT. No. 669)

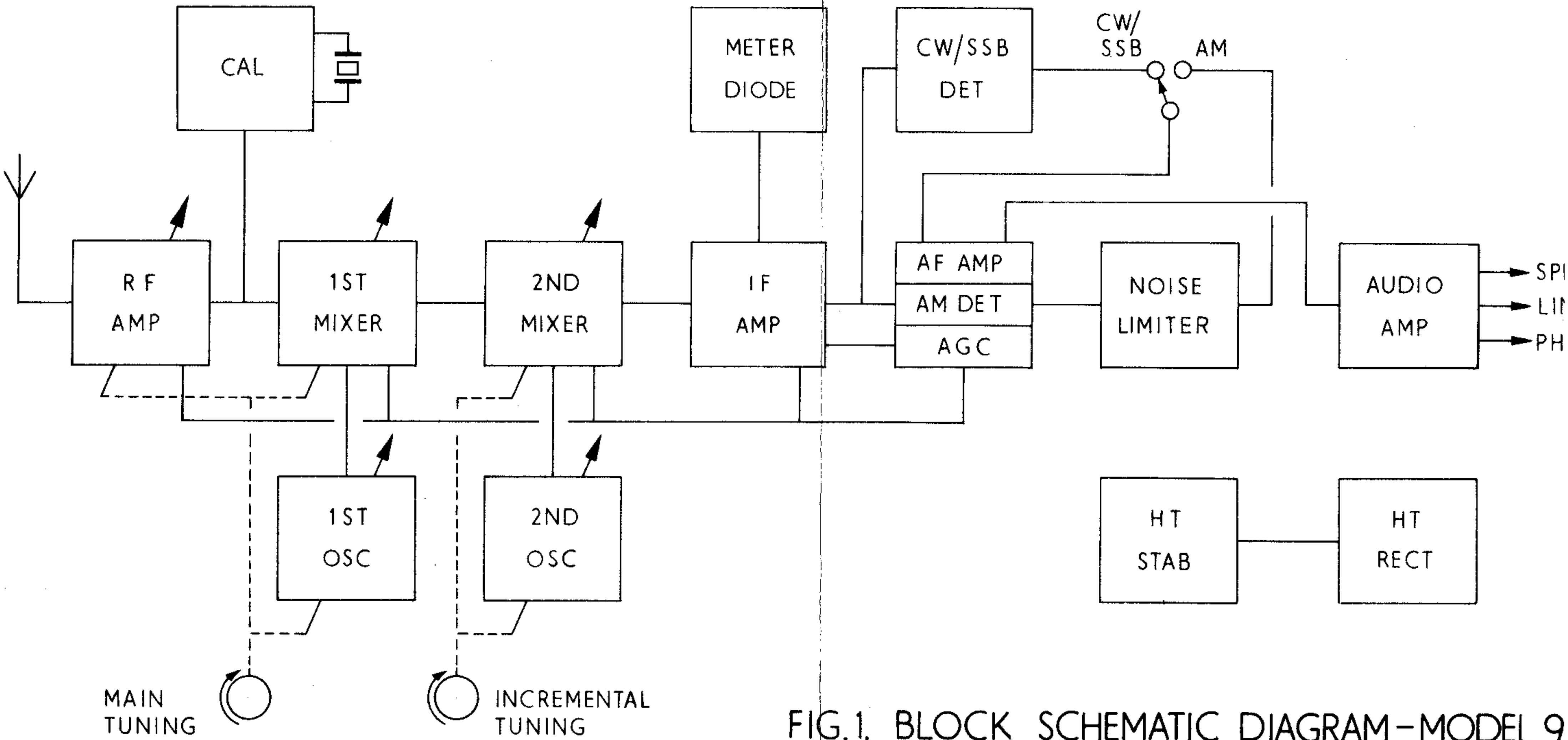


FIG. 1. BLOCK SCHEMATIC DIAGRAM – MODEL 9