

## EDDYSTONE MODEL 770R (Mk.II)

### VHF COMMUNICATION RECEIVER

The EDDYSTONE Model 770R (Mk.II) is a single conversion communication receiver covering the frequency band 19-165 Mc/s in six turret-switched ranges. Provision is made for reception of CW, AM, FM and NBFM signals and the receiver operates directly from all standard AC supplies.

Outputs are available for use with either an external loudspeaker or high impedance telephones, while a line output (600Ω) allows the receiver to be installed at some distance from the listening point. The audio stages are capable of extremely good quality and can be fed with signals derived from an external source.

The receiver can be used in conjunction with the Eddystone Model EP17R Panoramic Display Unit to provide full panoramic facilities over the range 19-165 Mc/s. A low-level wide-band IF output is provided for this purpose and the complete installation which includes a monitor speaker mounted in a base plinth is then referred to as the Model EP26 Panoramic Receiver.

Other facilities which are standard features of the receiver include an extremely efficient muting circuit, a built-in crystal calibrator and a carrier level meter which can also be used as an indicator for accurate tuning of FM signals. A separate noise limiter is fitted for CW/AM reception and the AGC system is operative in all modes except CW.

Surface-mounting or rack-mounting versions are available, the latter being suitable for installation in a standard 19" rack. Rugged construction and high quality components are used throughout and the receiver is suitable for continuous operation under extreme climatic conditions.

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

# TECHNICAL DATA

## GENERAL

### Frequency Coverage.

19-165 Mc/s in six ranges.

Range 1	.. ..	110 - 165 Mc/s.	Range 4	.. ..	37 - 55 Mc/s.
Range 2	.. ..	75 - 114 Mc/s.	Range 5	.. ..	26 - 39 Mc/s.
Range 3	.. ..	54 - 78 Mc/s.	Range 6	.. ..	19 - 27 Mc/s.

### Intermediate Frequency.

5.2 Mc/s with variable selectivity. The BFO is pre-set to give a 1000 c/s beat.

### Valve Complement.

Ref	Type	Circuit Function
V1	EF95 or 6AK5 (CV850)	RF Amplifier.
V2	EF95 or 6AK5 (CV850)	Mixer.
V3	EF95 or 6AK5 (CV850)	Local Oscillator.
V4	EF93 or 6BA6 (CV454)	1st 5.2 Mc/s IF Amplifier.
V5	EF93 or 6BA6 (CV454)	2nd 5.2 Mc/s IF Amplifier.
V6	EF93 or 6BA6 (CV454)	3rd 5.2 Mc/s IF Amplifier.
V7	EF93 or 6BA6 (CV454)	4th 5.2 Mc/s IF Amplifier.
V8	EF94 or 6AU6 (CV2524)	FM Limiter.
V9	EB91 or 6AL5 (CV140)	FM Discriminator.
V10	EB91 or 6AL5 (CV140)	AGC Rectifier/Noise Limiter.
V11	EF94 or 6AU6 (CV2524)	Meter Control.
V12	EF93 or 6BA6 (CV454)	Beat Frequency Oscillator.
V13	EF94 or 6AU6 (CV2524)	Noise Amplifier.
V14	ECC82 or 12AU7 (CV491)	Muting Control/1st Audio Amplifier.
V15	ECC82 or 12AU7 (CV491)	2nd Audio Amplifier/Phase Splitter.
V16	EL91 or 6AM5 (CV136)	Push-pull Audio Output.
V17	EL91 or 6AM5 (CV136)	
V18	150C3 or VR150/30 (CV216)	HF Stabiliser.
V19	GZ30 or 5Z4G (CV2748)	HF Rectifier.
V20	EF91 or 6AM6 (CV138)	Crystal Calibrator.
D1	GEX13 - -	AM Detector.
D2/3	GEX13 - -	Noise Rectifier.

### Input and Output Impedances.

Aerial Input	.. ..	75Ω (nominal) unbalanced.
Audio Input	.. ..	0.1MΩ (approx.).
IF Output	.. ..	75Ω (nominal) unbalanced. (For use with EP17R).
Audio Output	.. ..	Loudspeaker : 2.5/3Ω.
		Lines : 600Ω (balanced or unbalanced).
		Telephones : Nominally 2000Ω but suitable for a wide range of impedances.

### Power Supply.

Single-phase AC mains 100/125V and 200/250V (40-60 c/s). Consumption : 90VA.  
The live side of the input is fused at 1 Amp (standard 1 $\frac{1}{4}$ " cartridge fuse).

## TYPICAL PERFORMANCE FIGURES

### Sensitivity.

Better than  $5\mu\text{V}$  for an output of  $50\text{mW}$  with a s/n ratio of 15dB. (30% mod at 400c/s).

### Image Rejection.

Of the order 20dB down at 165 Mc/s rising to better than 50dB at 25 Mc/s.

### Selectivity.

The following Table gives typical figures for the overall bandwidths at -8dB down and -40dB down relative to the response at 5.2 Mc/s.

Mode	Bandwidth	
	-8dB	-40dB
CW & AM	15 kc/s	100 kc/s
NFM	40 kc/s	160 kc/s
FM	150 kc/s	350 kc/s

### Frequency Stability.

Drift due to temperature changes does not exceed 0.003% per  $^{\circ}\text{C}$ . A 5% change in mains voltage produces a frequency change of less than 0.003%.

### Noise Factor.

Range 1	..	Better than 14dB.	Range 4	..	Better than 6dB.
Range 2	..	Better than 10dB.	Range 5	..	Better than 5dB.
Range 3	..	Better than 8dB.	Range 6	..	Better than 5dB.

### IF Breakthrough.

Of the order -80dB on Range 6 rising to -100dB on Range 1.

### AGC Characteristic.

The audio output level does not change by more than 12dB when the input is varied 70dB above  $10\mu\text{V}$ .

### Muting Level.

The muting adjustment can be set so that a signal of  $5\mu\text{V}$  will release the muting control circuit.

### Audio Output and Response.

The push-pull Audio Output Stage will deliver up to 3 watts of audio power at the 2.5 $\Omega$  terminals. The audio response is level within 3dB from 100 c/s - 10 kc/s.

### Audio Sensitivity.

A signal of 15mV at the Audio Input terminals will produce an output of 50mW.

## CIRCUIT DESCRIPTION

### The RF Section.

This portion of the receiver is built around a miniature 3-gang split-stator capacitor of unique construction associated with which is a six-position coil turret of advanced design. The latter item is built up from substantial diecastings which ensure that the individual coil strips are fully screened. The contacts are self-cleaning and the turret rotating mechanism is extremely robust. Silver-plated brass construction is used for the tuning gang which features specially fabricated valve-holders built into the assembly in such a way that all lead lengths are held to a minimum. The grid capacitors (C111, C8 and C16) are integral with the tuning gang and have a mica dielectric. C2 is of the same construction and ensures a low impedance return for the cathode of the RF Stage.

Use of the miniature high-slope 6AK5/EF95 in all three stages together with the carefully integrated electrical and mechanical design referred to above results in adequate gain and low circuit noise throughout the complete tuning range.

The aerial input socket is arranged to accept unbalanced coaxial feeders of 75Ω impedance. Matching to the input circuit is by means of a tap on the input coil and on Ranges 5 and 6 where random aerials having feed impedances which differ widely from 75Ω are likely to be used, shunt resistors (R98 and R100) are incorporated to avoid possible instability in the RF Stage. A small variable capacitor (C93) serves as the Aerial Trimmer and takes the form of a panel control. It is thus possible to compensate for de-tuning of the input circuit when using aerials of random length.

AGC is applied to the RF Stage in all positions of the Mode Switch except 'CW'. Manual gain control is not applied since this is restricted to the IF and AF Sections of the receiver. The cathode bias resistor is returned to the junction of a potential divider (R106/R107) which is wired directly across the main HT supply. In normal operation, R107 is shorted to earth by one section of the Calibrator switch (S6a) so that the bias applied to the RF Stage is its normal operating bias developed across the 2000 resistor R2. The short is removed from R107 when the Calibrator switch is set to the 'Calibrate' position and the voltage developed across this resistor is applied in series with the normal operating bias to reduce the gain of the RF Stage and so limit interference from outside signals when carrying out a calibration check.

The output from the Crystal Calibrator is applied at the anode of V1 via the small coupling capacitor C131. Check-points are available at 5 Mc/s intervals when the Calibrator is in operation and correction of the scale reading is by means of a mechanical cursor shift. A close tolerance crystal is used in the Calibrator Unit and provision is made for zeroing the crystal against an external standard.

Transformer coupling is used between the RF Stage and the Mixer V2, the secondary windings being tuned by one section of the split-stator gang (C8). Individual trimming capacitors are provided for each of the six Mixer coils and injection from the Local Oscillator is maintained at the optimum level with separate coupling capacitors for each range (C96, C101 etc.).

A triode-strapped EF95 is employed in the Local Oscillator Stage V3. This uses the ultraudion circuit and tracks above the signal frequency on all ranges. Individual trimmers are provided for each range and series tracking capacitors are used on all ranges except Range 1.

All three stages derive their HT supply from the VR150/30 voltage stabiliser and adequate decoupling and filtering are used for both this and the LT supply. The entire RF Section is housed in a screened compartment and the IF output is taken via a coaxial cable to the primary of the 1st 5.2 Mc/s IF transformer. The Calibrator Unit is mounted on top of the RF Section compartment and is housed in a small diecast box. Its supplies are derived from the IF chassis and fed to the unit through a miniature B7G plug and socket.

### Intermediate Frequency Stages.

The 5.2 Mc/s output from the Mixer Stage is coupled via the 1st IF transformer T1 to a four-stage amplifier using vari-mu pentodes of the 6BA6 (EF93) type. The selectivity of the amplifier is controlled by the Mode switch (S1) which adjusts the bandwidth to suit the type of signal being received. Three degrees of selectivity are provided as follows:- 'Wide' for 'FM', 'Intermediate' for 'NFM' (NBFM) and 'Narrow' for 'AM' and 'CW'. Switched tertiary windings and series damping resistors are used to vary the coupling in the transformers, this function being performed by S1a, b, d, e and f. A further section of the switch (S1g) equalises the gain of the amplifier in each position by selecting an appropriate bias resistor (R22, R23 and R24) for the common cathode return of the first two stages V4 and V5.

Manual gain control is applied to these same two stages by returning S1g to earth via the variable resistor R26. This functions as the IF Gain control and is wired in series with the divider network R19/R25 which is fed from the main HT rail. The lower resistor of this network (R25) is normally shorted by one section of the Standby switch (S2a) so that R19 only is in circuit. The purpose of this resistor is to increase the range of adjustment available with R26 by supplying a standing current from the main HT rail. Thus, as more of R26 is brought into circuit, a larger bias is developed than would be the case if the voltage was dependent only on the cathode currents of the two IF valves.

R25 is brought into circuit when S2 is moved to the 'Standby' position, the additional bias developed across it being sufficient to desensitise the receiver at any setting of R26. The other section of S2 (S2b) is wired to a pair of terminals at the rear of the receiver and can be used to control an external relay circuit for transmitter switching etc. The circuit is closed in the 'Standby' position.

AGC is applied to the first three stages via the feed resistors R15, R17 and R28 and though operative for 'AM', 'FM' and 'NBFM' is switched off by S1c when taking 'CW'.

A low-level output at 5.2 Mc/s is provided for feeding the EP17R Display Unit when the receiver forms part of the EPR26 Panoramic Installation. The output is derived from an 82Ω resistor (R105) which is included in the earth return of the decoupling capacitor (C19) in the anode circuit of the Mixer Stage. The output is taken to a coaxial socket at the rear of the receiver.

The final IF Stage feeds V8, V10A, V13 and the germanium diode D1.

### AM Channel, BFO and AGC.

This portion of the circuit comprises the germanium diode D1 (GEX13), the double-diode V10 (EB91/6AL5) and the Beat Oscillator which employs an EF93/6BA6 (V12).

D1 serves as the Detector for 'AM' and 'CW' reception. One diode of V10 (V10B) is incorporated in this circuit and functions as a series type noise limiter which is effective in reducing impulse noise of the type originating in ignition systems etc. A switch is provided on the panel and this allows the limiter to be taken out of circuit when not required.

When taking 'CW' signals, the BFO is brought into operation by S1h which applies stabilised HT to the triode-strapped EF93 which is used in this position. A tuned-anode circuit is employed and the coil (L19) is pre-tuned to give a 1000 c/s beat when the signal lies at the centre of the IF passband. The BFO is built as a separate unit, totally screened and with all supply leads extensively filtered to limit harmonic interference within the tuning range of the receiver.

The other half of V10 (V10A) is fed direct from the anode of V7 and serves as the AGC Rectifier. AGC is applied to V1, V4, V5 and V6 except when receiving 'CW'. A delay is introduced at the cathode of the diode by returning it to the cathodes of the two push-pull output valves. The AGC time constant is fixed.

### FM Channel and Meter Control Circuit.

The FM Channel employs an EF94 (6AU6) high-slope pentode as Limiter (V8) and an EB91 (6AL5) as a Foster-Seeley Discriminator. The Limiter functions effectively even with very weak signals and the Discriminator characteristic is linear over a bandwidth of at least 180 kc/s so that any standard deviation can be accepted without distortion. The circuit features de-emphasis in both FM positions.

Audio from the FM and AM Channels is taken to Slj which selects the appropriate output and routes it via C61 to the AF Gain control. Also present at Slj is a DC voltage proportional in the case of AM signals to the strength of the received carrier and in the case of FM signals proportional to the amount of mistuning. The appropriate voltage is applied via the switch and R88 to the grid of the Meter Control Valve (V11 : EF94/6AU6).

This stage is wired as a cathode follower and has a very sensitive 1 mA meter connected from a point in the cathode circuit to the slider of a potentiometer which forms part of a voltage divider across the stabilised HT supply. The meter circuit is in fact a bridge which is balanced in the AM position of the Mode switch by adjustment of the pre-set control R91. The meter needle (under "no-signal" conditions) therefore takes up a position coincident with the zero of the carrier level scale. On receipt of a signal, the negative voltage developed across R41 and applied to the grid of V11 causes the bridge to become unbalanced due to the reduction in cathode voltage. The meter reading advances by an amount proportional to the voltage applied at the grid and an indication of relative signal level is obtained. The meter can also be used as an aid to accurate tuning.

When the Mode switch is set to the FM positions, the bridge is unbalanced by the operation of Sli (part of the Mode switch) which modifies the cathode connection of the meter circuit. The degree of unbalance is controlled by R89 which is set such that in the absence of a signal, the meter needle takes up a mid-scale position. The meter now serves only as a tuning indicator and signals are tuned so that the meter needle lies on the red line which corresponds with the mid-scale position. This is the condition when the DC output from the Discriminator is zero as is the case when the carrier frequency coincides with the centre frequency of the Discriminator characteristic. If the carrier frequency does not meet this condition there will be a DC voltage at Slj which, when applied to the grid of V11 will cause the meter reading to swing to the left or right depending on the direction of mistuning. In one direction the voltage will be positive and in the other it will be negative.

### Muting Circuit. (Squelch)

Background noise, either between stations when tuning or in the absence of a carrier in single-frequency working can be eliminated by switching in the muting system which is incorporated in the post-IF section of the receiver. The system is arranged so that under "no-signal" conditions, noise voltages at the anode of the final IF Stage are fed to a Noise Amplifier and then rectified by a pair of germanium diodes. The diode voltage is applied to a Muting Control Stage which disables the 1st Audio Amplifier (V14B) and so prevents noise from appearing in the output of the receiver.

The circuit constants of the Noise Amplifier (V13 : EF94/6AU6) are chosen so that only those noise voltages in the band above 15 kc/s are passed to the Noise Rectifier. This latter stage employs two GEX13 diodes (D2/D3) and is arranged as a voltage doubler with a positive output w.r.t. earth.

The grid return of the Muting Control Valve (V14A :  $\frac{1}{2}$ -ECC82/12AU7) is made up of five series-connected resistors which include the load resistor of the Noise Rectifier circuit (R56) and the grid resistor (R44) of the FM Limiter. Under signal conditions, V14A is biased to cut-off by the voltage developed at the grid of the Limiter and the 1st Audio Stage operates normally.

If the signal is tuned out however, the voltage at the grid of the Limiter is no longer maintained and the anode current of V14A increases. There is no AGC under these conditions and in consequence the IF chain operates at full gain to provide a substantial noise voltage at the diodes D2/D3. The resultant voltage developed across R56 causes the anode current of V14A to increase still further with the net result that a considerable voltage is developed across its anode resistor R71. R71 is wired in series with the grid return of the 1st Audio Amplifier (V14B) and the voltage developed across it in the absence of a signal is sufficient to completely cut off this stage to prevent noise being heard in the output of the receiver.

On receipt of a signal, AGC action causes the noise level to drop and the Noise Rectifier output falls rapidly as C68/C69 discharge through R56. The reduced positive bias at the grid of V14A allows its anode current to fall and so decreases the cut-off bias across R71. This action is hastened by the simultaneous production of a negative bias at the grid of the Limiter (i.e. across R44) so that recovery on receipt of a signal is virtually instantaneous.

The level at which V14A cuts off is adjustable by a pre-set control (R59) in the cathode circuit of the Noise Amplifier and the muting circuit can be taken out of operation by the Muting switch S4.

### Audio Section.

Three stages of audio amplification are employed, namely V14B ( $\frac{1}{2}$  ECC82/12AU7), V15 (ECC82/12AU7) and the push-pull output stage V16/17 (2 x EL91/6AM5). Up to 3 watts of audio are available at either the 2.5 or 600 $\Omega$  outputs when these are used independently and the response is substantially level over the range 100 c/s to 10 kc/s. The 600 $\Omega$  winding is electrostatically screened from both the primary and the other secondary. A telephone output is provided and is arranged so that the speaker output but not the 600 $\Omega$  line output is interrupted when telephones are in use. The output will give optimum results with 'phones of 2000 $\Omega$  impedance but can be used satisfactorily with telephones of almost any impedance.

Provision is made for using the audio stages of the receiver with audio signals derived from an external source. Two terminals are provided for this purpose and the overall sensitivity when used in this manner is of the order 15mV for 50mW output. The input can also be used as a low-level output to feed a recording channel (AM and CW only). The AF Gain control operates normally when the terminals are used as an input but is inoperative when feeding a recording channel.

Resistance-capacity coupling is used throughout and the Phase Splitter (V15B) derives its input from the junction of R76 and R30 in the grid circuit of the valve driven by V15A. Negative feedback is applied across the output stage by R75 and R77.

### Power Supplies.

The power supply provides outputs of 225V and 150V together with two 6.3V LT supplies. Full-wave rectification is employed (V19 : GZ30/5Z4G) and the 150V supply is stabilised by V18 (VR150/30 or 150C3). The latter supply is used for the RF Section comprising V1, V2 and V3, the BFO (V12) and the Meter Control circuit (V11).

All stages are fed from the main 6.3V LT supply with the exception of V10. This stage derives its LT from a separate 6.3V winding which has its centre-tap returned to the junction of the divider network R94/R95. This arrangement maintains the heater of V10 at some 4 volts above ground and ensures freedom from hum pick-up in the noise limiter circuit. The main LT supply has one side earthed and is also used to supply the three dial lamps.

Both sides of the mains input are switched and the live line is fused at 1 Amp by a standard  $1\frac{1}{4}$ " cartridge fuse. The power transformer is electrostatically screened and has taps to permit operation on 100/125V and 200/250V (40-60 c/s) AC.

Mechanical bandsread is available in the form of a calibrated vernier scale which makes 25 complete revolutions for a full traverse of the cursor. The reading obtained from the vernier is combined with the reading on the logging scale which is found below the frequency scales on the main dial. Each range can be divided into 2500 divisions for accurate logging of specific stations or for interpolation between adjacent calibration marks on the main scale.

## I N S T A L L A T I O N

### MOUNTING

Unless otherwise stipulated, the 77OR (Mk.II) is supplied complete with a standard cabinet in a form suitable for surface-mounting only. An interchangeable cabinet is available to special order and this has slots to clear the angled brackets which are fitted to allow the receiver to be mounted in a standard 19" rack. Receivers of the 77OR (Mk.II) type supplied initially as rack-mounting units are referred to as the 77OR (Mk.II)/RM. In rack-mounted installations operating at elevated temperatures it may be an advantage to remove the cabinet.

Instructions for installing the 77OR (Mk.II) receiver with the Panoramic Display Unit Model EP17R will be found in the Instruction Manual for the latter unit.

### Converting a Standard 77OR (Mk.II) to 77OR (Mk.II)/RM.

1. Remove the existing cabinet (four large screws at the rear) and store for use in the event of the receiver being required as a surface-mounting unit at a later date.
2. Place the receiver on its left-hand side and remove the two screws that hold the right-hand panel handle (an 18" screwdriver will be found most suitable for this operation).
3. Remove the two spacing washers from between the spacing pillars and the panel and store with the cabinet.
4. Slide one of the two angled brackets behind the outside edge of the panel and re-fit the spacing pillars and handle fixing screws.
5. Turn the receiver up the other way and repeat the operations described above in fitting the angle bracket at the left-hand side of the panel.
6. Fit the replacement cabinet.

NE Part Nos. to be quoted when ordering rack-mounting cabinets and brackets are 5911/1P and 5912P respectively.

### EXTERNAL CONNECTIONS

#### Mains.

The AC mains supply is connected to the socket at the rear using the connector provided with the receiver. The earthing wiper on the side of the connector should be wired to the earth pin on the supply plug.

The mains connector is a non-reversible type and is supplied ready-wired with six feet of mains lead. One end of this is left free so that the user can fit a plug of a type suitable for connection to the local mains supply. The lead is colour-coded as follows:- "Live" : RED, "Neutral" : BLACK, "Earth" : GREEN. If the existing lead proves too short it can easily be replaced with a longer length and the same code should be applied.



## CONSTRUCTIONAL DETAILS

### Dimensions and Weight.

Width	.. .. .	.. ..	16 $\frac{3}{4}$ "	..	42.5 cm.
Width with rack-mounting brackets	.. .. .	.. ..	19"	..	48.3 cm.
Height	.. .. .	.. ..	8 $\frac{3}{4}$ "	..	22.2 cm.
*Depth	.. .. .	.. ..	13 $\frac{5}{8}$ "	..	34.6 cm.
*Depth behind brackets (rack-mounting)	.. .. .	.. ..	11 $\frac{7}{8}$ "	..	30.2 cm.
Weight (standard receiver)	.. .. .	.. ..	60 $\frac{1}{2}$ lb.	..	27.4 kg.
Weight (770R (Mk.II)/RM)	.. .. .	.. ..	61 $\frac{1}{2}$ lb.	..	27.9 kg.
Weight (770R (Mk.II)/RM less cabinet)	.. .. .	.. ..	52 lb.	..	23.6 kg.

\*Excluding projections at rear of cabinet. An extra 2 $\frac{1}{2}$ " (6.35 cm.) should be allowed for plugs, leads etc.

### Cabinet.

The type of cabinet provided with the 770R (Mk.II) depends on the method of mounting which is to be employed. Cabinets are available for rack or surface-mounting. Both types are basically the same but the rack-mounting version has cut-outs along the leading edges of the vertical sides. These cut-outs extend approximately  $\frac{1}{2}$ " back from the panel and give clearance for the two angled brackets which are attached to the rear of the panel to allow the receiver to be mounted in the rack. The brackets are provided with fixing slots which conform to the Post Office standard for racks of 19" width.

Both types of cabinet have extensive perforation to ensure adequate ventilation and three apertures at the rear allow easy access to the aerial input socket, output terminals, pre-set controls etc. The cabinet is made of steel, suitably rust-proofed and enamelled.

### Front Panel.

The front panel is an aluminium diecasting and contributes great mechanical strength to the receiver as a whole. All controls except the mechanical CURSOR SHIFT are located along the lower half of the panel and their functions are indicated on a clearly marked finger plate. The chromium-plated panel handles allow the receiver to be lifted easily and also afford protection to the panel controls when the receiver is placed in a face-down position as for example when removing the cabinet.

### Chassis Assembly.

The RF Section of the receiver is housed in a screened enclosure which is mounted centrally on the rear of a steel support plate located immediately behind the panel. Two sub-chassis are disposed one on either side of the RF Unit and these carry all the IF and Power Supply circuits. The Audio Stages and Muting circuits are at the rear of the RF Unit on a third and smaller sub-chassis.

### Dial and Drive Assembly.

The tuning control, which drives a spring-loaded split-gear system with a reduction ratio of approximately 140:1 provides 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 13 inches and the scales are calibrated directly in terms of frequency. A mechanical CURSOR SHIFT control allows the cursor to be set independently of the TUNING control when checking the scale against the internal crystal calibrator.

The receiver leaves the factory with the Voltage Selector set in the 230V position which is suitable for operation from AC supplies in the range 220-250V. For other voltages the Selector must be set as follows:-

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

The Voltage Selector is located on the side of the power transformer and takes the form of a three-way polarised socket together with an associated shorting plug. The Selector must be adjusted before connecting the receiver to the local supply.

Under no circumstances should the receiver be connected to a DC mains supply.

#### Aerial.

The aerial feeder should be terminated with the coaxial plug provided with the receiver and connected to the coaxial socket located in the centre aperture at the rear of the unit.

General information on aerials for use in the frequency range 19-165 Mc/s will be found in Appendix 'A'.

#### Earth.

The earth terminal should be connected to a suitable earthing point via a short heavy gauge conductor. In rack-mounted installations the terminal would normally be bonded to the frame of the rack.

#### IF Output.

Connection is made with a standard Belling Lee Type L.734 coaxial plug. The socket provides a relatively low-level output (taken from the anode of the Mixer Stage) and is intended for connection to the EP17R Panoramic Display Unit.

#### Loudspeaker.

An external loudspeaker can be connected to the two quick-release terminals which are marked '2.5Ω'. The right-hand terminal, looking at the rear of the set is the earthy side of the output.

Suitable loudspeaker units in the Eddystone range are covered in Data Sheet No.123 a copy of which is available on request.

#### Line Output.

A 600Ω line output is available at the quick-release terminals labelled '600Ω'. The output is electrostatically screened from the loudspeaker output and is for use when it is necessary to connect the receiver output to a distant listening point. If a balanced output is called for, the middle terminal (CT) should be linked to earth at the rear of the receiver.

#### Telephones.

The output provided for telephone use is suitable for a wide range of impedances so that almost any available pair of telephones will give satisfactory results. If optimum performance is required, telephones of 2000Ω (total) impedance should be used. An auxiliary contact on the jack socket is arranged to interrupt the loudspeaker output (but not the line output) when telephones are in use.

### AF Input.

Provision is made for use of the receiver audio stages to amplify externally derived audio signals. Two quick-release terminals are provided for connection, the left-hand terminal being the earthy side of the input. Screened lead should be used for connection and controls must be set as follows when the receiver is used in this manner:-

Mode Switch . . 'AM'      Noise Limiter . . Off .      Muting . . Off  
Standby Switch . . 'Standby' (to prevent interference from signals received  
in the normal manner)

The receiver AF Gain functions normally when the receiver is used in this way and line, telephone and speaker outputs are available as in normal operation.

### External Relay.

The two terminals labelled 'EXT. RELAY' can be wired to control an associated transmitter from the Standby switch on the receiver. The circuit across the terminals is closed when the switch is moved to the 'Standby' position.

## OPERATION

### CONTROL FUNCTIONS

#### Tuning.

This control alters the setting of the ganged tuning capacitors and the cursor on the main tuning dial. Ease of tuning is assured by the large control knob and the high reduction ratio of approximately 140:1. The dial calibration is accurate to within 1% on Ranges 1 and 2 and to within 0.5% on the other ranges.

#### Wavechange.

Rotates the coil turret to select the correct inductances for the range required. Range indication is provided by suitable markings on the finger plate, concentric with the control knob. Positive selection of each position is achieved by the rugged construction and alignment of the turret assembly.

#### Aerial Trimmer.

Provides a means of correctly resonating the aerial input circuit when using aeri-als with feed impedances which differ widely from 75Ω.

#### Gain Controls.

Two manual gain controls are provided. These are the IF GAIN which controls the first two IF Stages (V4 and V5) and the AF GAIN which controls the input to the Audio Section of the receiver. This latter control functions normally when the receiver is used with audio signals derived from an external source.

The IF GAIN will prove most useful during CW reception in avoiding overload of the Detector. For AM, FM and NBEM signals, this control should be well advanced to secure efficient AGC action.

#### Signal Mode Switch.

This switch, marked 'CW' - 'AM' - 'NFM' - 'FM' brings about the circuit changes necessary for the desired type of reception.

### Noise Limiter Switch.

The NOISE LIMITER switch is only operative during CW and AM reception. With the switch in the 'ON' position, a series type pulse limiter is introduced into the AM/CW Detector circuit and this will be found effective in reducing impulse noise of the type normally encountered when receiving AM and CW signals on the VHF bands.

### Standby Switch.

One section of this switch applies a large negative bias to V4 and V5, so desensitising the receiver on 'Standby', while the other section short circuits the 'EXT. RELAY' terminals at the rear of the receiver.

HT supplies remain on all stages during standby periods and the receiver functions normally immediately the switch is placed in the 'ON' position (i.e. dolly down). The retention of HT supplies ensures that oscillator drift is negligible during periods when the receiver is not required but must be available for immediate use.

### Muting Switch.

In the 'OFF' position of the switch a large negative bias is applied to the Noise Amplifier so rendering it inoperative. The Muting Control Valve is also disabled by breaking its cathode return. Under these conditions the 1st Audio Amplifier functions normally giving amplification of both signal and background noise.

With the switch to 'ON' and the pre-set MUTING LEVEL control set correctly, background noise will be eliminated both between breaks in transmissions and also when tuning between adjacent channels.

### 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 and at the same time the gain of the RF Stage is reduced to limit interference from outside signals.

Crystal controlled markers are available at 5 Mc/s intervals throughout the tuning range of the receiver.

### Cursor Shift.

This is a small knurled control located above the dial aperture. It provides limited lateral movement of the cursor (independently of the TUNING control) to allow correction of scale errors when calibrating.

### Mains Switch.

Double-pole switch controlling the AC mains input to the unit.

### Pre-set Controls.

In addition to the main panel controls described above there are also three pre-set controls. These are located at the rear of the receiver and are adjusted with a small screwdriver. The three controls are as follows:-

### Muting Level.

This control is located in the cathode circuit of the Noise Amplifier and provides a means of adjusting the level at which the muting is rendered inoperative. The threshold can be set such that signals of 5 $\mu$ V will trip the muting circuit.

### AM Zero.

Adjustment of this control allows the meter reading to be set to zero when it is desired to use the meter for carrier level indication during the reception of AM signals. When setting up the meter adjustments, this control is always adjusted first.

### Centre Zero FM.

When the MODE SWITCH is moved to 'FM' or 'NFM', the meter needle is electrically biased towards the centre of its traverse. The CENTRE ZERO FM control is used to set the meter needle in the dead centre of the meter scale coincident with the vertical red line. This is the correct setting when using the meter as a tuning indicator on FM and NFM.

## TUNING INSTRUCTIONS

### Preliminary.

Check that the AC mains supply is available and ascertain that a suitable aerial is connected to the socket at the rear. Connect a loudspeaker or plug in a pair of telephones and then move the MAINS and STANDBY switches to 'ON'. Check that the dial becomes illuminated indicating that the receiver is operative and allow a short period for 'warming-up'.

### Calibration Check.

Select the appropriate range and tune to the nearest crystal checkpoint to the intended working frequency. (Crystal checkpoints occur at 5 Mc/s intervals, i.e. 100 Mc/s - 105 Mc/s - 110 Mc/s etc.)

Set the MODE SWITCH to 'CW', press the CALIBRATOR switch and then tune to either side of the calibration mark until the crystal marker signal is heard. Tune to zero-beat with the signal, release the CALIBRATOR switch and then adjust the CURSOR SHIFT to position the cursor coincident with the appropriate calibration mark.

The receiver is now ready for use and can be re-tuned to the required channel, at the same time setting the MODE SWITCH to suit the type of signal to be received. Make sure that the AERIAL TRIMMER is set for maximum signal.

### CW Reception.

Placing the MODE SWITCH at 'CW' automatically brings the BFO into operation and disables the AGC circuit. Signals should be tuned to give a 1000 c/s beat and the output level is best adjusted with the AF GAIN well advanced and the IF GAIN backed off to prevent overload of the Detector. The Noise Limiter can be used if required.

### AM Reception.

With the MODE SWITCH at 'AM' the BFO is switched off and the AGC brought into operation. The carrier level meter can be used as an aid to tuning since maximum deflection of the needle coincides with the correct tuning point.

Impulse noise can be reduced by switching in the Noise Limiter. Output level should be controlled by means of the AF GAIN with the IF GAIN well advanced to secure maximum AGC action.

### FM and NBFM Reception.

An entirely separate detection channel is employed for FM reception. All necessary circuit changes are brought about by the MODE SWITCH which in addition to selecting the correct bandwidth for the deviation in use and introducing the FM circuits also modifies the meter circuit so that the needle operates about a centre-zero.

A pre-set control is provided for setting the meter needle to its centre-zero position and the procedure for adjusting this control is described in the paragraphs headed 'Meter Adjustments' which appear below.

When tuning to an FM transmission the meter needle will swing away from centre, back to centre at the correct tuning point, away from centre in the opposite direction as the signal is tuned out and then back to centre when the carrier lies outside the passband of the receiver.

Adjustment of the gain controls when receiving FM signals is the same as for AM reception, i.e. IF GAIN well advanced and the AF GAIN used to control the output level. Noise suppression under carrier conditions is a function of the FM Limiter the diode limiter being inoperative in this mode. Inter-station noise on FM can be eliminated by taking advantage of the internal muting facility. Details on adjustment of the MUTING LEVEL control will be found below.

#### Standby.

The receiver can be desensitised at any time by means of the STANDBY SWITCH which applies a cut-off bias to the first two IF Stages. The receiver functions normally immediately the switch is returned to the 'ON' position, i.e. dolly down.

### ADJUSTMENT OF PRE-SET CONTROLS

#### Meter Adjustments.

The two pre-set meter zero controls are adjusted by following the procedure which is detailed below. This procedure obviates interaction between the adjustments and it will be found that the settings hold good for a prolonged period.

The AM ZERO must be adjusted first. Set the MODE switch to 'AM', the IF GAIN to maximum and tune to the centre of Range 4. Terminate the aerial input socket with a 68Ω resistor and then adjust the AM ZERO so that the meter needle coincides with the zero mark at the left-hand end of the meter scale.

Leave the MODE switch at 'AM' and tune any AM signal for maximum deflection of the meter needle. Change to 'FM', note the meter reading and then adjust the CENTRE ZERO FM control so that the needle takes up a position coincident with the red line at the centre of the meter scale.

#### Muting.

When the 770R (Mk.II) is employed as part of a communications link it may prove advantageous to make use of the built-in muting circuit. This will do much to relieve operator fatigue by eliminating background noise in the absence of a received carrier. A pre-set control (MUTING LEVEL) is provided for adjusting the circuit gain to suit the actual conditions under which the receiver is operated and the procedure for setting this control is as follows:

First tune to the required signal and adjust the gain controls to give a convenient level of output. De-tune slightly to a clear channel so that the only output is background noise. Now move the MUTING SWITCH to 'ON' and without touching the gain controls adjust the MUTING LEVEL control so that the noise just disappears. Tune back to the signal and check that it is of the same strength and that the receiver is effectively silenced when the distant transmitter is switched off.

The initial setting of the IF GAIN must not be disturbed once the muting adjustment has been made. Operation on a different frequency may call for a slight change in the setting of the MUTING LEVEL control.

# MAINTENANCE

## GENERAL

The 770R (Mk.II) receiver is suitable 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. Normal routing maintenance schedules can be drawn up but should be restricted to such tasks as 'cleaning the exterior', 'checking the serviceability of external connections', 'checking that full error correction is possible by use of the cursor shift', etc.

The geared drive system, turret mechanism and other mechanical arrangements will not normally require attention since these are lubricated with a permanent lubricant during initial assembly. If additional lubrication should be thought necessary after the equipment has been in use for a prolonged period of time, this can be carried out with a light mineral oil suited to the temperature conditions under which the receiver is operated.

Receivers can be returned to the manufacturer for advanced servicing should this become necessary.

### Dial Lamp Replacement.

Faulty dial bulbs can be changed quite simply after removal of the cabinet. To free a holder from the support strip, merely squeeze its two sides together and pull away from the strip. The bulbs are standard bayonet types with a rating of 6.5V @ 0.3A.

### Fuse Replacement.

The fuseholder is located at the rear of the set and is accessible without the need for removal of the cabinet. A standard  $1\frac{1}{4}$ " cartridge fuse rated at 1 Amp should be used as a replacement.

### Valve Replacement.

All valves with the exception of V1-V3 are immediately accessible on removing the cabinet. V1-V3 are located in the RF Section and can be replaced quite simply after taking off the small raised cover on top of the RF screening box.

Standard CV valve types are used throughout and no difficulty should be experienced in obtaining replacements. Direct equivalents can be used where necessary and any valve can be changed without necessitating re-alignment of the tuned circuits.

### Cursor Drive Wire Replacement.

Stainless steel stranded wire of exceptional strength is used for the cursor drive and it is most unlikely that this would ever give trouble. If however a wire should break or be damaged in some way, a replacement wire can be obtained from Stratton & Co. by quoting reference SKL77. Fitting a new wire should present no difficulties if the instructions given below are carefully followed step by step. In the instructions, left-hand and right-hand are as viewed from the front of the receiver.

1. The first step is to remove the dial glass and scale plate to gain access to the drive assembly. Proceed as follows:-

- (a) Unscrew the two 4BA screws with long hexagonal heads which retain the two small side castings at the extremities of the dial aperture. The screws are accessible from the rear of the panel and can be turned by hand after slackening with a suitable spanner. The screws are captive to simplify replacement.

- (b) Slacken the four countersunk screws along the top edge of the panel and slide the dial lamp support strip towards the rear. This will free the top edge of the glass which can be removed by tilting backwards and lifting it clear of the lower edge of the aperture.
- (c) Remove the circlip from the right-hand end of the rear cursor guide rod and slide this out through the support bracket at the left-hand side of the panel. This allows the cursor to be swung clear of the scale plate so that this can be removed without obstruction. The cursor should be clear of the meter during this operation.
2. Unsolder the old drive wire from the cursor carrier and then remove the two large drive pulleys by taking out the bearing screws.
  3. Slacken the tie-off screws in the pulleys, remove the old wire and attach the replacement wire to both pulleys. The replacement is of the exact length required and has allowance for one turn round each of the tie-off screws in the pulleys. The wire should be fitted in such a way that it leaves the pulley through the pulley slot.
  4. Rotate the tuning control in a clockwise direction until the end stop is reached. Re-fit the right-hand drive pulley with the slot at approximately one o'clock. Make sure that the bearing screw is fully tightened and then feed the wire into the groove nearest to the front of the pulley such that it runs away from the pulley from left to right.
  5. Set the cursor shift to its mid-travel position, feed the drive wire under the cursor shift pulley and then vertically upwards and over the guide pulley which is mounted concentrically with the cursor shift pivot.
  6. Feed the wire across the dial and then pass it round the sprung jockey pulley at the extreme end of the cursor guide rod. Check that the wire passes under the cursor carrier.
  7. Apply tension to the free end of the wire and then rotate the tuning control in a clockwise direction until the opposite end stop is reached. This operation will wind approximately three turns of wire onto the right-hand drive pulley and tension must be maintained to prevent these turns from slipping out of the pulley grooves.
  8. Feed the wire into the rearmost groove of the left-hand drive pulley and then position the pulley as close to its bearing point as possible without actually engaging the pulley gear. Rotate the pulley to increase the tension on the wire so that the jockey pulley takes up a position just under  $\frac{1}{4}$ " from the cursor guide rod support bracket. Maintain this tension, engage the pulley gear and tighten the bearing screw.
  9. Rotate the tuning control to check that the drive wire runs smoothly and then set the knob to its fully clockwise position.
  10. Replace the scale and then re-fit the cursor guide rod. Set the cursor to 2500 on the logging scale and solder the cursor carrier to the drive wire.
  11. Check the drive and cursor shift for free and normal operation and check the scale accuracy by reference to the internal calibrator.
  12. Replace the dial glass and return the receiver to its cabinet.

#### Cleaning the Dial Glass.

The dial glass can be cleaned with one of the many domestic products which are available for this purpose. The glass can be removed by following the instructions given in paras 1 (a) and (b) above.



## RE-ALIGNMENT

### General.

In the unlikely event of a complete re-alignment being required, the instructions given in the following pages should be followed step by step in full. In the more usual case of partial re-alignment required to compensate for ageing components etc., the relevant instructions can be extracted as required. It must be stressed that alignment adjustments should not be tampered with unless there is a clear indication that alignment is in fact required and furthermore, adjustments should only be carried out by fully skilled technicians equipped with suitable test instruments. It should be noted that all dust cores and trimmers are self-locking.

### Re-alignment of the IF Section.

Test Equipment ..... Standard Signal Generator modulated 30% at 400 c/s having an output impedance in the range 10-75 $\Omega$  covering the intermediate frequency of 5.2 Mc/s.

Output Meter matched to 2.5/3 $\Omega$ .

Centre-zero  $\mu$ Ammeter (50-0-50 $\mu$ A deflection) and 0.1M $\Omega$  resistor.

Small insulated trimming tool (screwdriver type with metal tip).

Switch on the receiver and signal generator and allow half an hour to reach operating temperature. Set the receiver controls as follows:-

MODE SWITCH	..	CW	STANDBY SWITCH	..	On (dolly down)
IF/AF GAINS	..	Maximum	WAVECHANGE	..	Midway between two
NL/MUTING	..	Off			adjacent ranges

The MODE SWITCH is set to 'CW' rather than to 'AM' because this automatically renders the AGC inoperative without the need for using a shorting wire in the IF chassis. Such a wire (unless carefully positioned) could give rise to instability and so affect the shape of the IF response. Interference from the BFO is eliminated by the simple expedient of taking out the BFO valve (V12).

Remove the RF Section top cover together with the Calibrator Unit and take out the RF and Local Oscillator valves (V1 and V3). The RF valve is removed to prevent damage which could be caused by running it without its anode supply for a lengthy period as would be the case with the WAVECHANGE control in a neutral position. Removing V3 is the simplest way of disabling the Local Oscillator Stage.

Connect the output lead from the signal generator to the grid (pin 1) of the Mixer valve V2 and attach the leads from the output meter to the two terminals labelled 2.5 $\Omega$ . The generator (with modulation at a depth of 30% at 400 c/s) should be tuned to 5.2 Mc/s and checked against a reliable frequency standard before commencing the alignment procedure. The speaker can be connected in parallel with the output meter leads to provide aural monitoring but must be disconnected when checking sensitivities.

Vary the output from the generator to obtain a suitable reading on the output meter and then peak the cores in T1, T2, T3, T4 and T5. The top core in each case trims the secondary winding. Each core has two tuning points and the correct one to use in each case is that which occurs when the core is furthest from the opposite coil (commonly referred to as the 'outer' peak). One exception to this rule is that the primary core of T1 is adjusted to the second or 'inner' peak. All adjustments should be repeated at least twice to ensure freedom from interaction. The symmetry of the response should be checked by detuning the generator to either side of the centre frequency and noting the output reading. Once set correctly in the 'CW' position, no further adjustment is required to give a symmetrical response in the other positions of the MODE SWITCH.

On completion of the alignment, sensitivity measured from the grid of the Mixer Stage should be of the order  $3\mu\text{V}$  for an output of 50mW. If a lower figure is obtained, stage by stage checks should be made by applying the generator at the grid of each IF Stage in turn. The figures below are typical of the sensitivities to be expected in each case.

Generator to grid of V7	. . . .	30mV for 50mW output.
Generator to grid of V6	. . . .	2mV for 50mW output.
Generator to grid of V5	. . . .	$300\mu\text{V}$ for 50mW output.
Generator to grid of V4	. . . .	$30\mu\text{V}$ for 50mW output.

NOTE If the receiver forms part of the EPR26 Panoramic Display Installation, the EP17R Display Unit can be used for visual alignment of the 5.2 Mc/s Stages. Instructions will be found in the Manual supplied with the Display Unit.

#### BFO Alignment.

If alignment of the RF Section is to be carried out, adjustment of the BFO should be left until this has been completed. This obviates the need for replacement of V12 at this stage since the MODE SWITCH must remain at 'CW' during RF alignment in order to keep the AGC off.

Alignment of the BFO is quite straightforward. An unmodulated 5.2 Mc/s signal is applied to the grid of V2 (Mixer) and, with V12 in position, the core of L19 is adjusted to give a 1000 c/s beat note.

A period of some 10 to 15 minutes should be allowed after replacing V12 to allow the circuit to stabilise against drift.

#### Discriminator Alignment.

All the controls are set as for IF alignment with the exception of the MODE SWITCH which should be placed at 'FM'.

The signal generator is adjusted to give an unmodulated output of one volt at a frequency of 5.2 Mc/s (checked against an accurate standard) and is connected via a  $0.01\mu\text{F}$  capacitor to the grid (pin 1) of the FM Limiter V8. The centre-zero  $\mu\text{A}$ mmeter is used as an indication of Discriminator output and is connected from the junction of R47 and R48 to chassis via a  $0.1\text{M}\Omega$  resistor.

Set the secondary (top) core of T6 so that it is flush with the top of the screening can and adjust the primary core for maximum deflection on the meter. The secondary core controls the centre-frequency of the characteristic and should now be adjusted for zero reading on the meter. Now check the linearity by detuning the generator by equal amounts above and below the centre-frequency. Any unbalance which may be noted can be cancelled by adjustment of the primary core which controls the linearity of the output. If it should prove impossible to correct the linearity, change the double-diode V9 and repeat the adjustments detailed above.

#### Re-alignment of the RF Section.

Test Equipment	Standard Signal Generator modulated 30% at 400 c/s having an output impedance of $75\Omega$ and covering the frequency band 19-165 Mc/s.
.....	Crystal controlled harmonic generator providing markers at 1 Mc/s intervals throughout the range 19-165 Mc/s.
	Output Meter matched to $2.5/3\Omega$ .
Trimming Tools.	(1) Insulated screwdriver type with narrow metal tip.
	(2) Insulated screwdriver type with $5/32"$ blade.

Initial factory alignment of the RF Section calls for adjustment of all the pre-set trimmers and cores in each of the six coil units which make up the turret assembly. On the two highest frequency ranges the coils are air-cored and accurate adjustment of the inductance value is achieved by altering the turn spacing. Each coil unit is built into a diecast housing having suitably positioned holes for adjustment of the pre-set trimmers. Other holes are provided for adjustment of the cores and these are accessible by taking out two 2BA screws and removing the coil unit adjacent to the one being aligned.

Experience shows that adjustment of the coil is seldom necessary during re-alignment, slight correction of the trimmer setting being all that is required. It should not be necessary therefore to remove coil units when carrying out re-alignment and any reference to adjustment of the coils in the instructions which follow can be ignored unless there is a clear indication that such adjustment is essential.

On the assumption that IF alignment has just been completed, it is necessary to replace V1 and V3 before proceeding. Some 10-15 minutes should be allowed for the Local Oscillator to stabilise against drift.

The first step is to check the accuracy of the dial calibration by making use of the built-in 5 Mc/s Crystal Calibrator. The top cover of the RF Section on which the Calibrator is mounted can be replaced temporarily so that the Calibrator can be connected into circuit. The check should be carried out with the MODE SWITCH at 'NFM' using the built-in meter as an indication of correct tuning.

Verify all the check points on each range in turn, noting the settings of the CURSOR SHIFT control relative to its mid-travel position. If full correction is obtained with the control close to mid-travel, re-alignment of the Local Oscillator circuits will not be required and it will be in order to proceed immediately with alignment of the RF and Mixer Stages. Inability to correct the calibration by use of the CURSOR SHIFT indicates that re-alignment of the appropriate circuits is required and the relevant instructions can be extracted from the paragraphs which follow.

Remove the 5 Mc/s Calibrator and connect an external crystal controlled 21 Mc/s harmonic generator at the aerial input. Set the CURSOR SHIFT to its mid-travel position and select Range 6. Tune to approximately 26 Mc/s and locate the 26 Mc/s marker signal. Note whether the cursor setting is above or below the alignment frequency and then adjust the TUNING control so that the cursor lies on the 26 Mc/s calibration mark. Now adjust the pre-set trimmer C128 to bring in the signal from the marker generator. The capacity of C128 must be increased if the initial cursor setting lay below the correct calibration point and decreased if it was above. Adjust the trimmer very carefully while observing the meter and when set correctly, re-tune to 21 Mc/s and identify the 21 Mc/s marker signal. Adjust the core in L18 to correct any scale error which may be evident.

The adjustment of C128 and L18 should be repeated several times until trimming one does not affect the tuning point of the other. At this point alignment can be considered complete and it only remains to verify that the scale accuracy (with the CURSOR SHIFT at mid-travel) is within 0.5% at each megacycle point throughout the range.

Now continue with alignment of the other ranges using the alignment points and trimming adjustments given in the Table on the following page. Bear in mind that on Ranges 1 and 2 dust cores are not fitted and that the scale accuracy is better than 1% and not 0.5% as on the other ranges.

Once the scale accuracy has been checked and corrected as necessary, alignment of the signal frequency circuits can be commenced. Disconnect the crystal calibrator from the aerial input and connect in its place a standard signal generator having an output impedance matched to 75Ω. Set the MODE SWITCH to 'CW', connect an output meter to the 2.5Ω terminals and then set the tuning to 26 Mc/s.

# OSCILLATOR ALIGNMENT FREQUENCIES AND ADJUSTMENTS

Range	Trimming Freq.	Trimmer	Padding Freq.	Core	Scale Accuracy
1	160 Mc/s	C98	120 Mc/s	L3*	1%
2	110 Mc/s	C104	86 Mc/s	L6*	1%
3	76 Mc/s	C110	60 Mc/s	L9	0.5%
4	53 Mc/s	C116	42 Mc/s	L12	0.5%
5	38 Mc/s	C122	29 Mc/s	L15	0.5%
6	26 Mc/s	C128	21 Mc/s	L18	0.5%

\*Adjust turn spacing.

Tune the generator to 26 Mc/s (modulation 30% at 400 c/s) and then peak the AERIAL TRIMMER (panel control) for maximum output. Check that the trimmer tuning point falls well within its capacity swing and then peak the appropriate pre-set Mixer trimmer (C124) for maximum output.

Now tune the receiver and generator to 21 Mc/s and adjust the core in L17 for maximum output. Check the tuning point of the AERIAL TRIMMER and if found to lie near to the extremity of its swing, adjust L16 for maximum output with the trimmer at its half-capacity setting. Re-align at both alignment points until interaction between the adjustments is eliminated. The sensitivity can now be checked at both frequencies and should be of the order given in the Table below.

Select each of the other ranges in turn, repeating the procedure detailed above using the alignment frequencies etc. given in the Table which follows. Noise factor measurements can be made on completion, typical figures being given on page 3.

## RF/MIXER ALIGNMENT FREQUENCIES AND ADJUSTMENTS

Range	Trimmers				Cores			
	Freq.	RF*	Mixer	Sens.†	Freq.	RF	Mixer	Sens.†
1	160 Mc/s	-	C95	4μV	120 Mc/s	L1 <sup>+</sup>	L2 <sup>+</sup>	5μV
2	110 Mc/s	-	C100	2μV	86 Mc/s	L4 <sup>+</sup>	L5 <sup>+</sup>	2μV
3	76 Mc/s	-	C106	2μV	60 Mc/s	L7	L8	2μV
4	53 Mc/s	-	C112	2μV	42 Mc/s	L10	L11	2μV
5	38 Mc/s	-	C118	2μV	29 Mc/s	L13	L14	2μV
6	26 Mc/s	-	C124	2μV	21 Mc/s	L16	L17	2μV

\*Panel control. †For 50mW output. <sup>+</sup>Adjust turn spacing.

## APPENDIX 'A'

### AERIALS FOR USE WITH THE 770R RECEIVER

The choice of aerial for use with a VHF receiver is dependent on the reception facilities required and the manufacturer can do no more than suggest a number of possible approaches to the problem. Final selection of the most suitable antenna must necessarily rest with the user.

It must be decided at the outset whether reception is required throughout the complete frequency coverage of the receiver or only within a few restricted bands. In the latter case advantage can be taken of the many possible high gain aerial designs which must be avoided when general coverage is required.

Considering first the two low frequency ranges which cover the band 19-39 Mc/s. Standard HF aerial techniques can be applied within this band giving a choice of many different types of aerial of which the dipole and folded dipole are perhaps the most convenient. Where directional reception is required, two-element beam arrays are very suitable for frequencies up to 25/30 Mc/s while above 30 Mc/s three or even four elements can be used to secure additional gain and directivity.

Good all-round (omni-directional) reception is possible when simple ground plane aerials are used, but unless special precautions are taken, reception will be optimum only over a small band of frequencies above and below the design frequency. Folded ground planes will give a broader response and can be made with one element of smaller diameter than the other to simplify the matching problem.

Any of the aerial systems mentioned above can be used for frequencies above 39 Mc/s (Ranges 1-4) but their limitations will become more obvious as the frequency increases. For general coverage of this range the most suitable aerial is the 'Discone'. Where omni-directional reception with vertical polarisation is required this aerial will function with a low s.w.r. over a frequency band having a ratio as high as 5:1 (viz. 33-165 Mc/s). For horizontal polarisation, 'Biconical dipoles' will provide similar coverage and like the 'Discone' are ideal for use in areas of average signal strength.

Where reception is required from distant stations operating at low power (either in the interest of circuit security or by virtue of the equipment in use) high gain directional aerial systems will provide good results when accurately matched to the receiver. Such arrays must of necessity be designed for operation within restricted frequency bands but their low cost makes them ideal for short-term projects.

By far the simplest design mechanically is the 'Yagi' array. This antenna will provide far more gain and directivity (on the basis of mechanical complexity and weight) than any other VHF system. Design data for the 'Yagi' and other systems for VHF use will be found in any good aerial handbook, the 'Beam Antenna Handbook' and the 'VHF Handbook' published by Radio Publications Inc. (Danbury Road, Wilton, Conn., USA) being specially recommended.

At frequencies above about 50 Mc/s attention should be paid to the type and length of coaxial feeder employed since this will attenuate the signal voltage available at the aerial. The shortest possible feeder run should be arranged using a good quality low loss cable, preferably of the semi-air-spaced type.

Positioning of the aerial is an important consideration and it will be well to try the aerial in several different positions in an endeavour to obtain the greatest signal pick-up.

Further general information on aerials for use in both the VHF and UHF regions is contained in a separate publication, copies of which can be obtained on request.

# APPENDIX 'B'

TABLE OF VOLTAGE VALUES

The following 'Table of Voltage Values' will prove useful in the event of the receiver developing a fault which makes it necessary to carry out voltage checks. All readings are typical and were taken with a meter having a sensitivity of 20,000 $\Omega$ /V and an applied mains voltage of 240V. A nominal tolerance of 10% will apply to readings taken with a meter of the sensitivity quoted and this tolerance should be increased accordingly if readings are taken with a meter of lower sensitivity.

Readings should be taken under 'no-signal' conditions with the receiver controls set as follows:-

MODE SWITCH	.. ..	AM	MUTING SWITCH	.. ..	On
WAVECHANGE	.. ..	Range 6	MUTING LEVEL	.. ..	Max c/wise.
IF/AF GAINS	.. ..	Maximum	STANDBY	.. ..	On

Ref	Anode		Screen		Cathode		Note
	Pin	Reading	Pin	Reading	Pin	Reading	
V1	5	137V	6	90V	7	1.5V	NOTE 1
V2	5	146V	6	23V	7	-	NOTE 2
V3	5	110V	6	110V	7	-	NOTE 3
V4	5	212V	6	145V	7	3.4V	NOTE 4
V5	5	212V	6	145V	7	3.4V	NOTE 4
V6	5	207V	6	98V	7	1.0V	
V7	5	207V	6	98V	7	1.0V	
V8	5	30V	6	30V	7	-	
V9	-	-	-	-	-	-	
V10	-	-	-	-	1	12.0V	
V11	5	150V	6	150V	7	2.6V	
V12	-	-	-	-	-	-	NOTE 5
V13	5	98V	6	98V	7	0.4V	
V14A	1	26V	-	-	3	-	
V14B	6	212V	-	-	8	35.0V	
V15A	6	96V	-	-	8	4.0V	
V15B	1	96V	-	-	3	4.0V	
V16	5	218V	7	224V	2	12.0V	
V17	5	218V	7	224V	2	12.0V	
V18	5	150V	-	-	2	-	
V19	4/6	242V AC	-	-	8	262V	
V20	5	170V	7	165V	2	-	NOTE 6

- NOTE 1. Anode voltage is measured on wire to C131.  
Screen voltage is measured at end of 33K resistor.
- NOTE 2. Anode voltage is measured at T1 on IF chassis.  
Screen voltage is measured at end of 1M $\Omega$  resistor feeding pin 6.
- NOTE 3. Anode/screen voltage is measured at end of 10K resistor nearest to panel.
- NOTE 4. Readings will vary with adjustment of IF GAIN control.
- NOTE 5. Not accessible for direct voltage checks. HT to unit can be measured at R84 (68K nominal) on underside of unit. With MODE at CW, HT = 56V.
- NOTE 6. Calibrator must be freed from RF cover to allow readings to be taken.

APPENDIX 'C'

VALVE BASE CONNECTIONS

B7G Types.

Type	Pin Connections						
	1	2	3	4	5	6	7
EB91/6AL5	K'	A''	H	H	K''	S	A'
EF91/6AM6	G1	K	H	H	A	G3, S	G2
EF93/6BA6	G1	G3, S	H	H	A	G2	K
EF94/6AU6	G1	G3, S	H	H	A	G2	K
EF95/6AK5	G1	K, G3, S	H	H	A	G2	K, G3, S
EL91/6AM5	G1	K, G3	H	H	A	NC	G2

B9A Type.

Type	Pin Connections								
	1	2	3	4	5	6	7	8	9
ECC82/12AU7	A''	G''	K''	H	H	A'	G'	K'	H <sub>tap</sub>

Octal Types.

Type	Pin Connections							
	1	2	3	4	5	6	7	8
GZ30/5Z4G	NC	H	NP	A''	NP	A'	NP	H/K
150C3 or VR150/30	NC	K	J	NC	A	NP	J	NC

APPENDIX 'D'

LIST OF COMPONENT VALUES, TOLERANCES AND RATINGS

Capacitors.

Ref	Value	Type	Tolerance	Wkg. V.
C1	90 + 90pF	Split-stator (part of gang)	-	-
C2	40pF	Mica (integral with gang)	-	-
C3	500pF	Metallised Paper	20%	600V
C4	3000pF	Metallised Paper	20%	250V
C5	500pF	Metallised Paper	20%	600V
C6	91pF	Tubular Ceramic Feed Through	20%	750V
C7	500pF	Metallised Paper	20%	600V
C8	40pF	Mica (integral with gang)	-	-
C9	90 + 90pF	Split-stator (part of gang)	-	-
C10	91pF	Tubular Ceramic Feed Through	20%	750V
C11	91pF	Tubular Ceramic Feed Through	20%	750V
C12	91pF	Tubular Ceramic Feed Through	20%	750V
C13	40pF	Tubular Ceramic	10%	750V
C14	1500pF	Tubular Ceramic Feed Through	20%	500V
C15	91pF	Tubular Ceramic Feed Through	20%	750V
C16	40pF	Mica (integral with gang)	-	-
C17	90 + 90pF	Split-stator (part of gang)	-	-
C18	500pF	Metallised Paper	20%	600V
C19	0.01μF	Metallised Paper	20%	150V
C20	100pF	Polystyrene	5%	125V
C21	100pF	Polystyrene	5%	125V
C22	0.01μF	Metallised Paper	20%	150V
C23	0.01μF	Polyester	10%	400V
C24	100pF	Polystyrene	5%	125V
C25	100pF	Polystyrene	5%	125V
C26	0.01μF	Polyester	10%	400V
C27	0.01μF	Metallised Paper	20%	150V
C28	0.01μF	Metallised Paper	20%	150V
C29	0.01μF	Metallised Paper	20%	150V
C30	0.01μF	Polyester	10%	400V
C31	0.01μF	Polyester	10%	400V
C32	100pF	Polystyrene	5%	125V
C33	100pF	Polystyrene	5%	125V
C34	0.01μF	Metallised Paper	20%	150V
C35	0.01μF	Metallised Paper	20%	150V
C36	0.01μF	Polyester	10%	400V
C37	0.01μF	Polyester	10%	400V
C38	100pF	Polystyrene	5%	125V
C39	100pF	Polystyrene	5%	125V
C40	10pF	Tubular Ceramic	10%	750V
C41	3pF	Silvered Mica	10%	350V
C42	0.01μF	Polyester	10%	400V
C43	100pF	Polystyrene	5%	125V
C44	100pF	Polystyrene	5%	125V



Ref	Value	Type	Tolerance	Wkg. V.
C45	100pF	Tubular Ceramic	10%	750V
C46	0.01 $\mu$ F	Polyester	10%	400V
C47	1pF	Silvered Mica	0.5pF	350V
C48	100pF	Tubular Ceramic	10%	750V
C49	0.01 $\mu$ F	Metallised Paper	20%	150V
C50	50pF	Silvered Mica	10%	350V
C51	0.01 $\mu$ F	Metallised Paper	20%	150V
C52	0.1 $\mu$ F	Polyester	10%	400V
C53	0.01 $\mu$ F	Metallised Paper	20%	150V
C54	100pF	Polystyrene	5%	125V
C55	51pF	Polystyrene	5%	125V
C56	50pF	Silvered Mica	5%	350V
C57	50pF	Tubular Ceramic	10%	750V
C58	100pF	Tubular Ceramic	10%	750V
C59	500pF	Metallised Paper	20%	600V
C60	100pF	Tubular Ceramic	10%	750V
C61	0.01 $\mu$ F	Metallised Paper	20%	150V
C62	0.01 $\mu$ F	Metallised Paper	20%	150V
C63	100pF	Tubular Ceramic	10%	750V
C64	0.005 $\mu$ F	Metallised Paper	20%	250V
C65	0.005 $\mu$ F	Metallised Paper	20%	250V
C66	0.01 $\mu$ F	Metallised Paper	20%	150V
C67	0.01 $\mu$ F	Metallised Paper	20%	150V
C68	0.005 $\mu$ F	Metallised Paper	20%	250V
C69	0.005 $\mu$ F	Metallised Paper	20%	250V
C70	0.1 $\mu$ F	Polyester	10%	400V
C71	4 $\mu$ F	Tubular Electrolytic	+100% -20%	350V
C72	0.01 $\mu$ F	Polyester	10%	400V
C73	5 $\mu$ F	Tubular Electrolytic	+100% -20%	50V
C74	0.01 $\mu$ F	Metallised Paper	20%	150V
C75	0.01 $\mu$ F	Metallised Paper	20%	150V
C76	0.01 $\mu$ F	Polyester	10%	400V
C77	0.01 $\mu$ F	Polyester	10%	400V
C78	500pF	Metallised Paper	20%	600V
C79	0.01 $\mu$ F	Polyester	10%	400V
C80	0.01 $\mu$ F	Polyester	10%	400V
C81	0.01 $\mu$ F	Polyester	10%	400V
C82	0.01 $\mu$ F	Polyester	10%	400V
C83	100pF	Silvered Mica	10%	350V
C84	100pF	Silvered Mica	10%	350V
C85	0.01 $\mu$ F	Metallised Paper	20%	150V
C86	400pF	Silvered Mica	2%	350V
C87	0.01 $\mu$ F	Metallised Paper	20%	150V
C88	0.01 $\mu$ F	Metallised Paper	20%	150V
C89	0.01 $\mu$ F	Metallised Paper	20%	150V
C90	0.01 $\mu$ F	Metallised Paper	20%	150V
C91	50 $\mu$ F	Tubular Electrolytic	+50% -20%	450V
C92	50 $\mu$ F	Tubular Electrolytic	+50% -20%	450V
C93	3-12pF	Air Trimmer	-	-
C94	8pF	Tubular Ceramic	10%	750V

Ref	Value	Type	Tolerance	Wkg. V.
C95	2-12pF	Air Trimmer	-	-
C96	1pF	Tubular Ceramic	0.5pF	750V
C97	20pF	Silvered Mica	1%	350V
C98	2-12pF	Air Trimmer	-	-
C99	10pF	Tubular Ceramic	10%	750V
C100	2-12pF	Air Trimmer	-	-
C101	1pF	Tubular Ceramic	0.5pF	750V
C102	12pF	Silvered Mica	1pF	350V
C103	970pF	Silvered Mica	2%	350V
C104	2-12pF	Air Trimmer	-	-
C105	500pF	Metallised Paper	20%	600V
C106	2-12pF	Air Trimmer	-	-
C107	3pF	Tubular Ceramic	0.5pF	750V
C108	770pF	Silvered Mica	2%	350V
C109	12pF	Silvered Mica	1pF	350V
C110	2-12pF	Air Trimmer	-	-
C111	40pF	Mica (integral with gang)	-	-
C112	2-12pF	Air Trimmer	-	-
C113	3pF	Tubular Ceramic	0.5pF	750V
C114	770pF	Silvered Mica	2%	350V
C115	12pF	Silvered Mica	1pF	350V
C116	2-12pF	Air Trimmer	-	-
C117	0.01μF	Metallised Paper	20%	150V
C118	2-12pF	Air Trimmer	-	-
C119	3pF	Tubular Ceramic	0.5pF	750V
C120	500pF	Silvered Mica	2%	350V
C121	12pF	Silvered Mica	1pF	350V
C122	2-12pF	Air Trimmer	-	-
C123	500pF	Metallised Paper	20%	600V
C124	2-12pF	Air Trimmer	-	-
C125	3pF	Tubular Ceramic	0.5pF	750V
C126	200pF	Silvered Mica	2%	350V
C127	12pF	Silvered Mica	1pF	350V
C128	2-12pF	Air Trimmer	-	-
C129	10pF	Tubular Ceramic	10%	750V
C130	0.01μF	Metallised Paper	20%	150V
C131	1pF	Tubular Ceramic	0.5pF	750V
C132	3-23pF	Air Trimmer	-	-
C133	10pF	Tubular Ceramic	10%	750V
C134	0.01μF	Polyester	10%	400V
C135	100pF	Tubular Ceramic	10%	750V

# Resistors.

Ref	Value	Tol.	Rating
R1	12Ω	10%	$\frac{1}{8}$ watt
R2	200Ω	10%	$\frac{1}{8}$ watt
R3	33,000Ω	10%	$\frac{1}{8}$ watt
R4	1,000Ω	10%	$\frac{1}{8}$ watt
R5	1MΩ	10%	$\frac{1}{8}$ watt
R6	-	-	-
R7	0.47MΩ	10%	$\frac{1}{8}$ watt
R8	22,000Ω	10%	$\frac{1}{8}$ watt
R9	10,000Ω	10%	$\frac{1}{8}$ watt
R10	1,000Ω	10%	$\frac{1}{8}$ watt
R11	1,000Ω	10%	$\frac{1}{8}$ watt
R12	33,000Ω	10%	1 watt
R13	1,000Ω	10%	$\frac{1}{8}$ watt
R14	22Ω	10%	$\frac{1}{8}$ watt
R15	0.47MΩ	10%	$\frac{1}{8}$ watt
R16	68Ω	5%	$\frac{1}{8}$ watt
R17	0.47MΩ	10%	$\frac{1}{8}$ watt
R18	1,000Ω	10%	$\frac{1}{8}$ watt
R19	33,000Ω	10%	1 watt
R20	0.27MΩ	10%	1 watt
R21	68Ω	5%	$\frac{1}{8}$ watt
R22	390Ω	10%	$\frac{1}{8}$ watt
R23	220Ω	10%	$\frac{1}{8}$ watt
R24	270Ω*	10%	$\frac{1}{8}$ watt
R25	47,000Ω	10%	1 watt
R26	10,000Ω†	-	-
R27	68Ω	5%	$\frac{1}{8}$ watt
R28	0.47MΩ	10%	$\frac{1}{8}$ watt
R29	1,000Ω	10%	$\frac{1}{8}$ watt
R30	33,000Ω	10%	1 watt
R31	22Ω	10%	$\frac{1}{8}$ watt
R32	0.47MΩ	10%	$\frac{1}{8}$ watt
R33	0.47MΩ	10%	$\frac{1}{8}$ watt
R34	0.47MΩ	10%	$\frac{1}{8}$ watt
R35	68Ω	5%	$\frac{1}{8}$ watt
R36	1,000Ω	10%	$\frac{1}{8}$ watt
R37	33,000Ω	10%	1 watt
R38	200Ω*	10%	$\frac{1}{8}$ watt
R39	200Ω*	10%	$\frac{1}{8}$ watt
R40	0.1MΩ	10%	$\frac{1}{8}$ watt
R41	0.1MΩ	10%	$\frac{1}{8}$ watt
R42	1MΩ	10%	$\frac{1}{8}$ watt
R43	2MΩ	10%	$\frac{1}{8}$ watt
R44	0.27MΩ	10%	$\frac{1}{8}$ watt
R45	22,000Ω	10%	$\frac{1}{8}$ watt
R46	0.47MΩ	10%	$\frac{1}{8}$ watt
R47	68,000Ω	10%	$\frac{1}{8}$ watt
R48	68,000Ω	10%	$\frac{1}{8}$ watt
R49	0.1MΩ	5%	$\frac{1}{8}$ watt

Ref	Value	Tol.	Rating
R50	0.1MΩ	5%	$\frac{1}{8}$ watt
R51	0.1MΩ	10%	$\frac{1}{8}$ watt
R52	1MΩ	10%	$\frac{1}{8}$ watt
R53	0.27MΩ	10%	$\frac{1}{8}$ watt
R54	47,000Ω	10%	1 watt
R55	0.82MΩ	10%	$\frac{1}{8}$ watt
R56	1MΩ	10%	$\frac{1}{8}$ watt
R57	1MΩ	10%	$\frac{1}{8}$ watt
R58	150Ω	10%	$\frac{1}{8}$ watt
R59	5,000Ω†	-	-
R60	0.5MΩ†	-	-
R61	10,000Ω	10%	$\frac{1}{8}$ watt
R62	0.47MΩ	10%	$\frac{1}{8}$ watt
R63	1MΩ	10%	$\frac{1}{8}$ watt
R64	1MΩ	10%	$\frac{1}{8}$ watt
R65	27,000Ω	10%	$\frac{1}{8}$ watt
R66	47,000Ω	10%	1 watt
R67	0.1MΩ	10%	$\frac{1}{8}$ watt
R68	0.1MΩ	10%	$\frac{1}{8}$ watt
R69	0.1MΩ	10%	$\frac{1}{8}$ watt
R70	3,300Ω	10%	$\frac{1}{8}$ watt
R71	0.27MΩ	10%	$\frac{1}{8}$ watt
R72	6,800Ω	10%	$\frac{1}{8}$ watt
R73	0.47MΩ	10%	$\frac{1}{8}$ watt
R74	3,300Ω	10%	$\frac{1}{8}$ watt
R75	3MΩ	10%	$\frac{1}{8}$ watt
R76	0.47MΩ	10%	$\frac{1}{8}$ watt
R77	3MΩ	10%	$\frac{1}{8}$ watt
R78	620Ω	10%	$\frac{1}{8}$ watt
R79	3,300Ω	10%	$\frac{1}{8}$ watt
R80	68,000Ω	5%	$\frac{1}{8}$ watt
R81	0.47MΩ	10%	$\frac{1}{8}$ watt
R82	47,000Ω	10%	1 watt
R83	4,700Ω	10%	$\frac{1}{8}$ watt
R84	68,000Ω*	10%	$\frac{1}{8}$ watt
R85	2,700Ω	10%	$\frac{1}{8}$ watt
R86	22,000Ω	10%	1 watt
R87	47,000Ω	10%	$\frac{1}{8}$ watt
R88	2MΩ	10%	$\frac{1}{8}$ watt
R89	600Ω†	-	-
R90	560Ω	10%	$\frac{1}{8}$ watt
R91	600Ω†	-	-
R92	47,000Ω	10%	1 watt
R93	1,800Ω†	5%	6 watt
R94	0.27MΩ	10%	1 watt
R95	6,800Ω	10%	$\frac{1}{8}$ watt
R96	0.27MΩ	10%	$\frac{1}{8}$ watt
R97	10,000Ω	10%	$\frac{1}{8}$ watt
R98	220Ω	10%	$\frac{1}{8}$ watt
R99	22,000Ω	10%	$\frac{1}{8}$ watt

Ref	Value	Tol.	Rating
R100	150 $\Omega$	10%	$\frac{1}{2}$ watt
R101	22,000 $\Omega$	10%	$\frac{1}{2}$ watt
R102	0.27M $\Omega$	10%	$\frac{1}{2}$ watt
R103	0.47M $\Omega$	10%	$\frac{1}{2}$ watt
R104	200 $\Omega$	5%	$\frac{1}{2}$ watt
R105	82 $\Omega$	10%	$\frac{1}{2}$ watt
R106	0.27M $\Omega$	10%	$\frac{1}{2}$ watt

Ref	Value	Tol.	Rating
R107	47,000 $\Omega$	10%	$\frac{1}{2}$ watt
R108	3.3M $\Omega$	10%	$\frac{1}{2}$ watt
R109	0.1M $\Omega$	10%	$\frac{1}{2}$ watt
R110	0.1M $\Omega$	10%	$\frac{1}{2}$ watt
R111	22,000 $\Omega$	10%	$\frac{1}{2}$ watt
R112	0.22M $\Omega$	10%	$\frac{1}{2}$ watt

\*Nominal value (may be adjusted during test).

†Potentiometer.

+Wirewound.

#### APPENDIX 'E'

##### SPARES

The following list details all major spares for the Model 770R (Mk.II) receiver. Spares should be ordered by quoting the Circuit Ref. (where applicable), the written description given in the list and the Part No. in the right-hand column. The Serial No. of the receiver should be stated in all communications.

All orders should be addressed to:-

Stratton & Co., Ltd., Sales and Service Dept., Alvechurch Rd., Birmingham, 31.

In cases of extreme urgency, ring PRIory 2231/4, cable 'Stratnoid', Birmingham or use Telex 33708.

##### RF Coil Units.

Range 1.	110 - 165 Mc/s	..	..	..	..	..	D1921A
Range 2.	75 - 114 Mc/s	..	..	..	..	..	D1922
Range 3.	54 - 78 Mc/s	..	..	..	..	..	D1923
Range 4.	37 - 55 Mc/s	..	..	..	..	..	D1924
Range 5.	26 - 39 Mc/s	..	..	..	..	..	D1925
Range 6.	19 - 27 Mc/s	..	..	..	..	..	D1926

NOTE Spare coil unit contacts are available if required. When ordering, please quote 4564P for large contacts, 4556P for small contacts and 4569P for earthing wipers.

##### Chokes and Transformers.

CH1	RF Choke	..	..	..	..	..	D1855
CH2	RF Choke	..	..	..	..	..	D1855
CH3	HT Smoothing Choke	..	..	..	..	..	D2049
T1	1st 5.2 Mc/s IF Transformer	..	..	..	..	..	D2814
T2	2nd 5.2 Mc/s IF Transformer	..	..	..	..	..	D2814
T3	3rd 5.2 Mc/s IF Transformer	..	..	..	..	..	D2814
T4	4th 5.2 Mc/s IF Transformer	..	..	..	..	..	D2814
T5	5th 5.2 Mc/s IF Transformer	..	..	..	..	..	D1906B
T6	5.2 Mc/s Discriminator Transformer	..	..	..	..	..	D2815
T7	Output Transformer (600 $\Omega$ CT and 2.5/3 $\Omega$ )	..	..	..	..	..	D1791A
T8	Power Transformer	..	..	..	..	..	3937P

### Crystals.

XL1	5 Mc/s Style 'E' $\pm 0.005\%$ , 30pF	. . . . .	6565P
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### Switches.

S1	Mode Switch: Wafers	. . . . .	4593PA
	Control spindle/clicker plate	. . . . .	4651PC
	Extension spindle	. . . . .	4344/1P
S2	Standby Switch (DPDT with long dolly)	. . . . .	4772/1PC
S3	Noise Limiter Switch (SPST)	. . . . .	4771PB
S4	Muting Switch (DPDT)	. . . . .	4772PC
S5	Mains Switch (DPDT)	. . . . .	4772PC
S6	Calibrator Switch (push-button type)	. . . . .	6364P

### Potentiometers.

R26	IF Gain (10,000 $\Omega$ )	. . . . .	4814PA
R60	AF Gain (0.5M $\Omega$ )	. . . . .	4103PB
R59	Muting Level (5,000 $\Omega$ pre-set)	. . . . .	6123P
R91	Zero AM (600 $\Omega$ pre-set)	. . . . .	6566P
R89	FM Centre Zero (600 $\Omega$ pre-set)	. . . . .	6566P

### Plugs.

Standard coaxial plug (as used for aerial input)	. . . . .	6079P
Mains plug (non-reversible with earth connection) complete with 6' cable		D2311/1
Calibrator supply plug (B7G type)	. . . . .	6100P
Telephone plug	. . . . .	6567P

### Sockets.

Standard coaxial socket (as used for aerial input)	. . . . .	6087P
Mains socket (polarised with earth contact)	. . . . .	D2310
Calibrator supply socket (B7G type)	. . . . .	6086P
Telephone socket	. . . . .	6090P

### Drive Assembly.

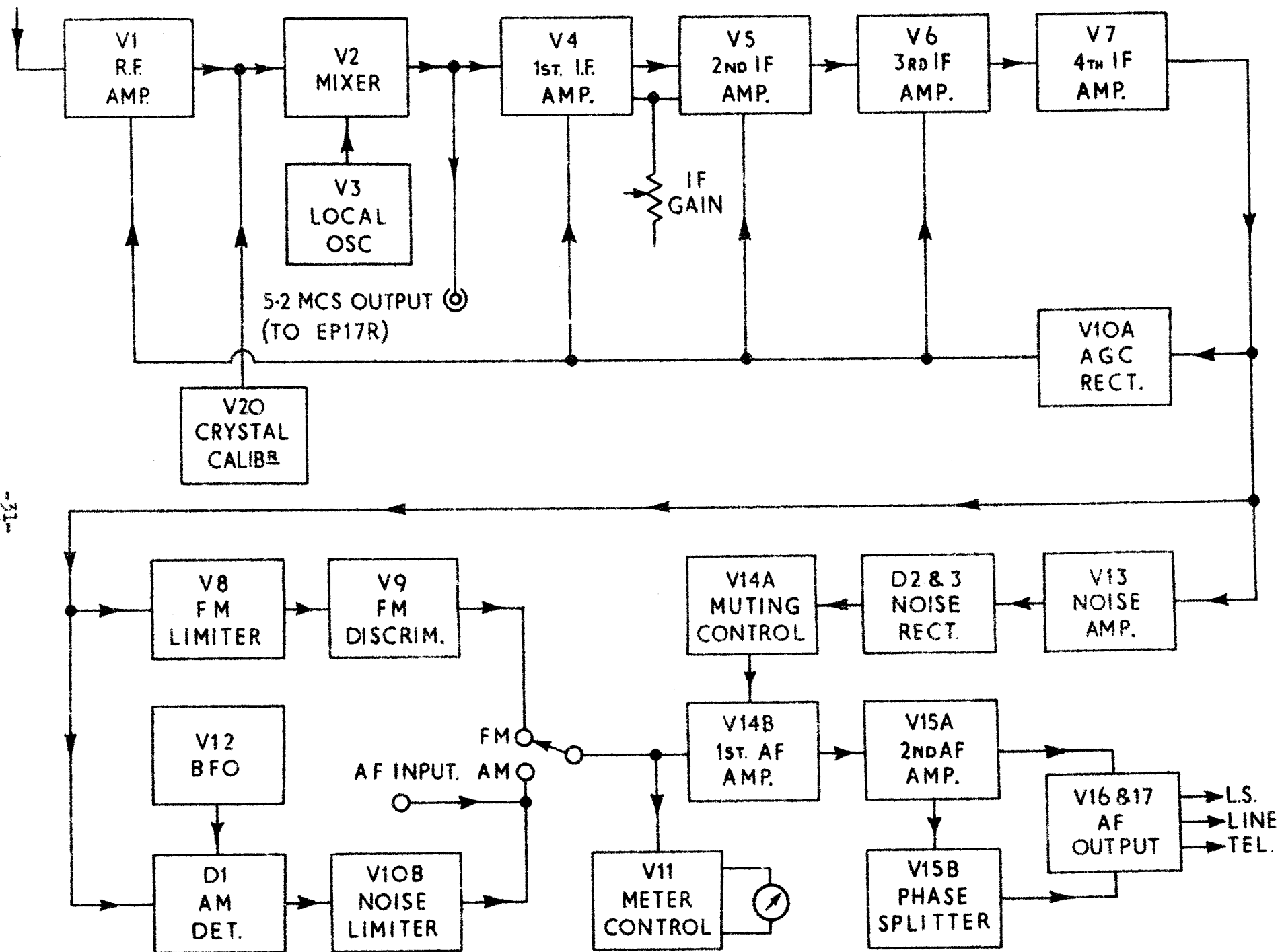
Main drive unit	. . . . .	LP2092
Control spindle and bearing assembly	. . . . .	6429P
Flywheel	. . . . .	5174P
Screw for flywheel	. . . . .	1484P
Stainless steel driving disc with associated gear	. . . . .	D1559/1
Vernier gear	. . . . .	D1562/1
Condenser gear	. . . . .	D2077
Drive pulley	. . . . .	3954PA
Bearing screw for drive pulley	. . . . .	3958P
Guide pulley	. . . . .	6125P
Cursor guide rod	. . . . .	5801P
Cursor assembly	. . . . .	D3087
Length of steel drive wire	. . . . .	SKL77
Cursor shift assembly (less concentric pulley)	. . . . .	D3233
Vernier dial with hub	. . . . .	D1633

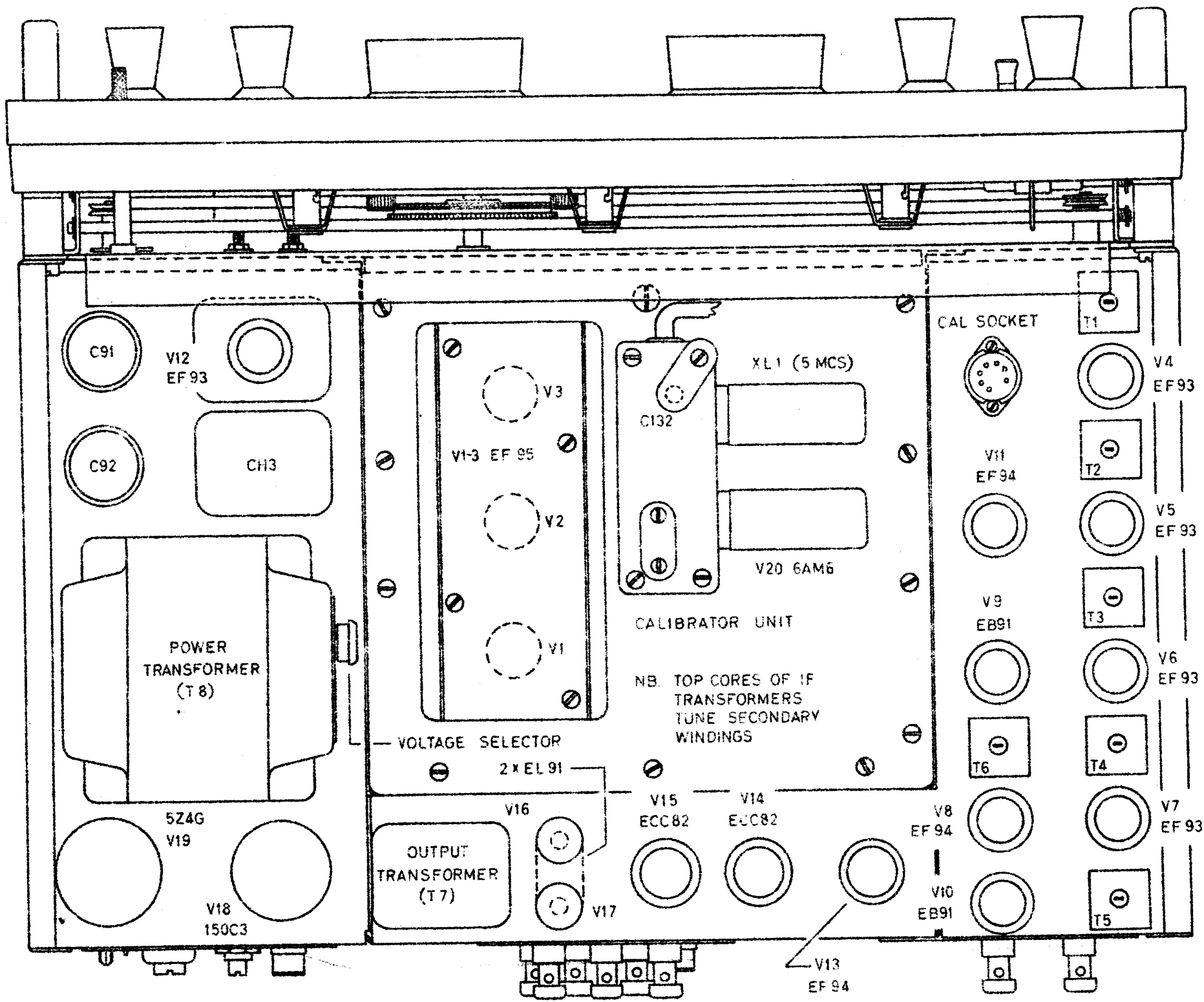
### Knobs.

Tuning	. . . . .	5817P
Wavechange	. . . . .	D3234
Small knobs as used for IF Gain etc.	. . . . .	5816P

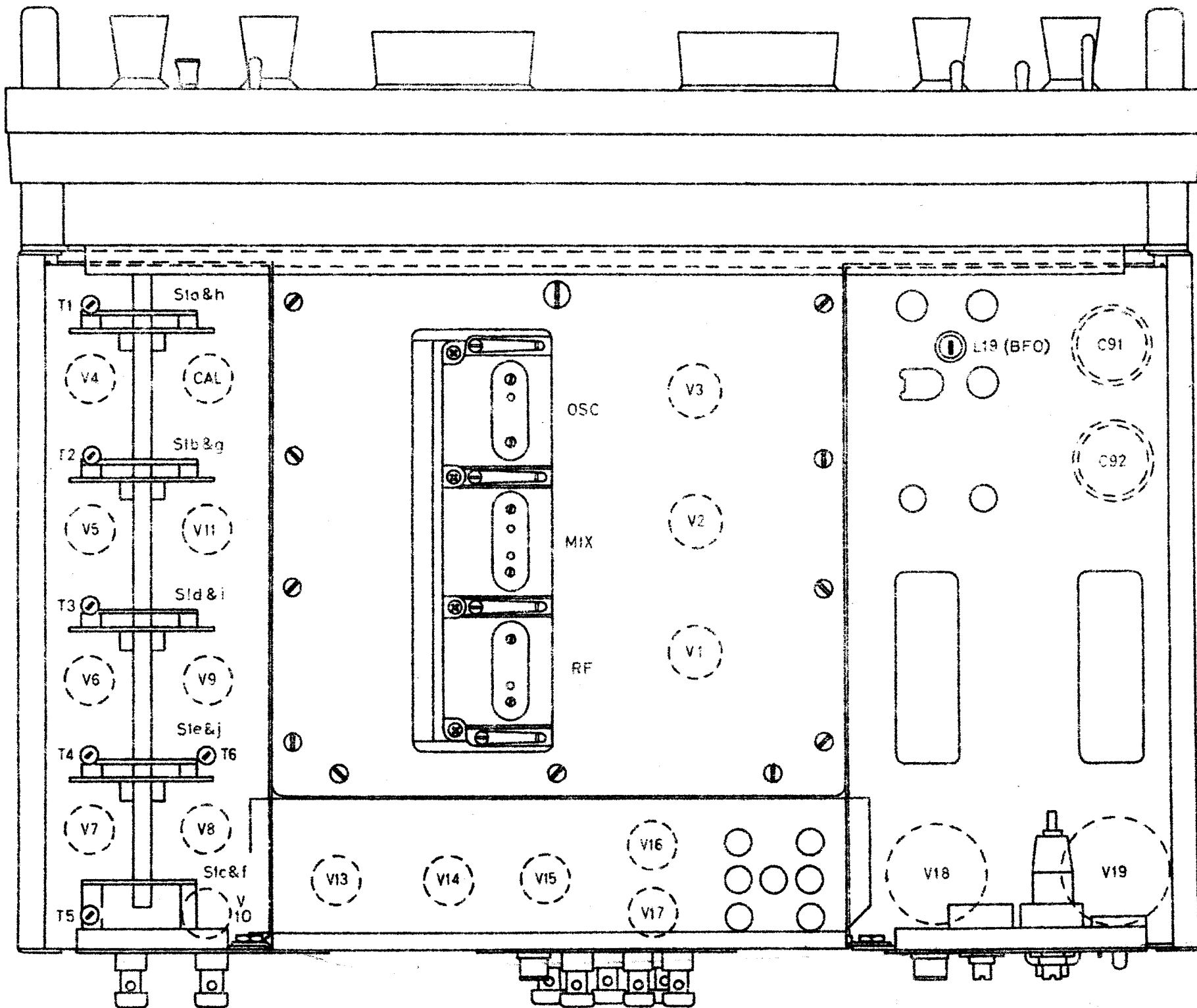
# Miscellaneous.

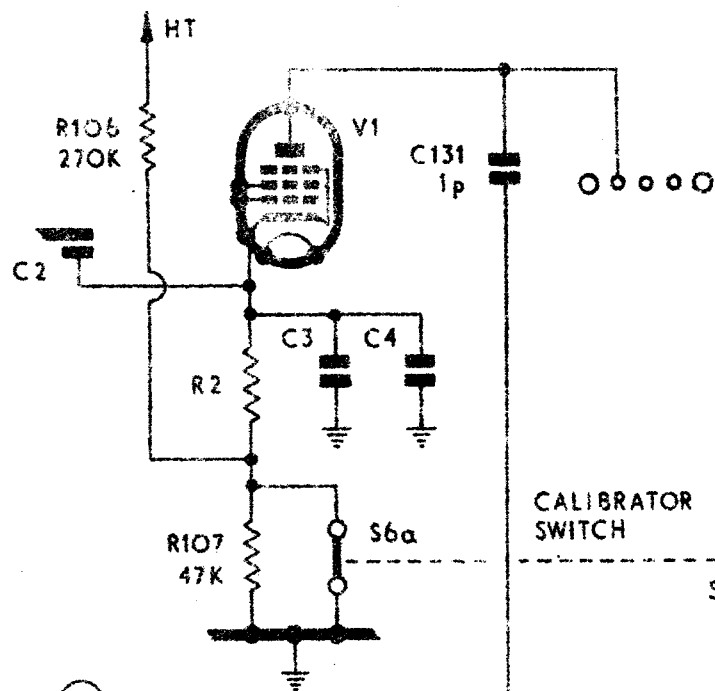
BFO Unit (less valve)	. . . . .	LP1976/1
Calibrator Unit (less valve/crystal)	. . . . .	LP2633
Chromium plated panel handles	. . . . .	5826P
Cover fixing screws	. . . . .	3405PC
Dial glass retaining strip	. . . . .	6261P
Dial lamps	. . . . .	3131P
Dial lamp holder	. . . . .	6374P
Dust core : 8x1.25x17/900 (as used in RF coils)	. . . . .	6097P
Dust core : 6x1x12.7/900 (as used in IF transformers)	. . . . .	6568P
Dust core : 8x1.25x17/500 (as used in BFO)	. . . . .	6097/1P
Finger plate	. . . . .	6442P
Flexible coupler	. . . . .	LP2199
Fuse (1A, 1 $\frac{1}{4}$ " )	. . . . .	6124P
Fuseholder	. . . . .	6103P
Gang assembly (with valveholders, contacts and all wiring etc.)	. . . . .	D2971/1
Glass window	. . . . .	5847P
Scale plate	. . . . .	6438P
Terminals	. . . . .	6102P
Tuning meter	. . . . .	5888P
Valveholders (special)	. . . . .	D1875A
	V1 RF Amp (modified B7G)	D1847A
	V2 Mixer (modified B7G)	D1846A
	V3 Osc (modified B7G)	D2360
Valve retainer (V16/V17)	. . . . .	6126P
Valve screening can (B7G)	. . . . .	6127P
Valve screening can (B9A)	. . . . .	D2362/1
Wavechange mechanism	. . . . .	



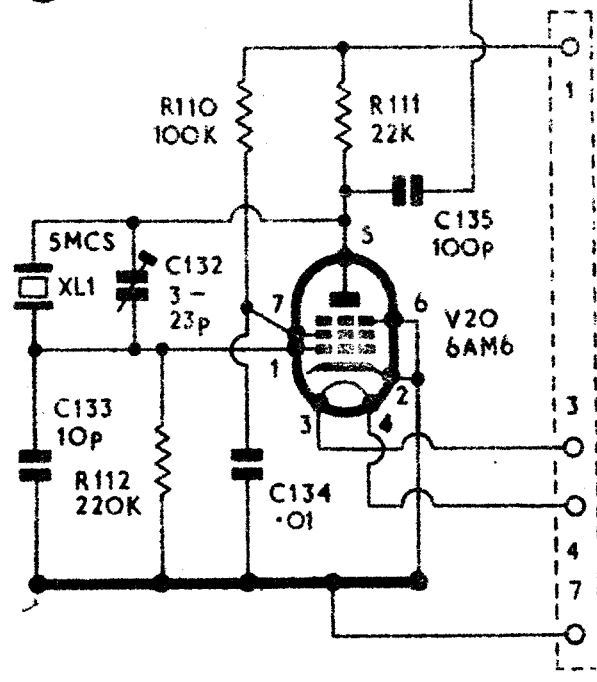








(1)



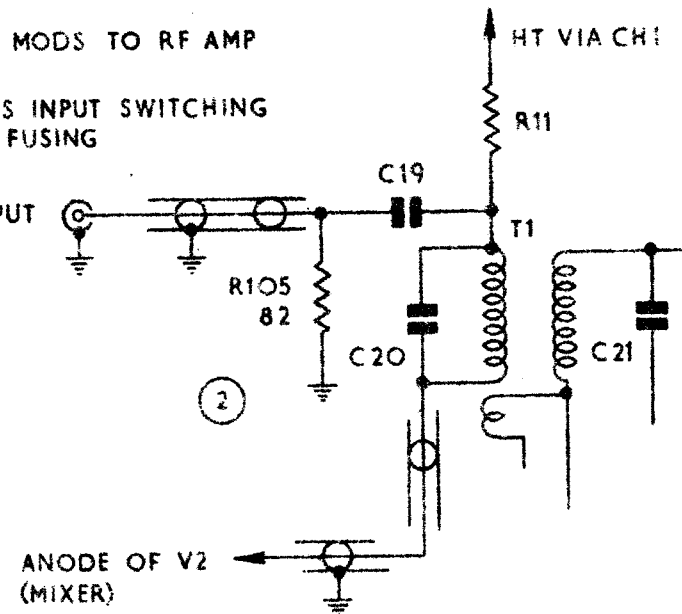
(1) CALIBRATOR CIRCUIT & MODS TO RF AMP

(2) IF OUTPUT.

(3) MAINS INPUT SWITCHING AND FUSING

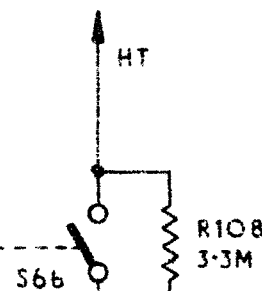
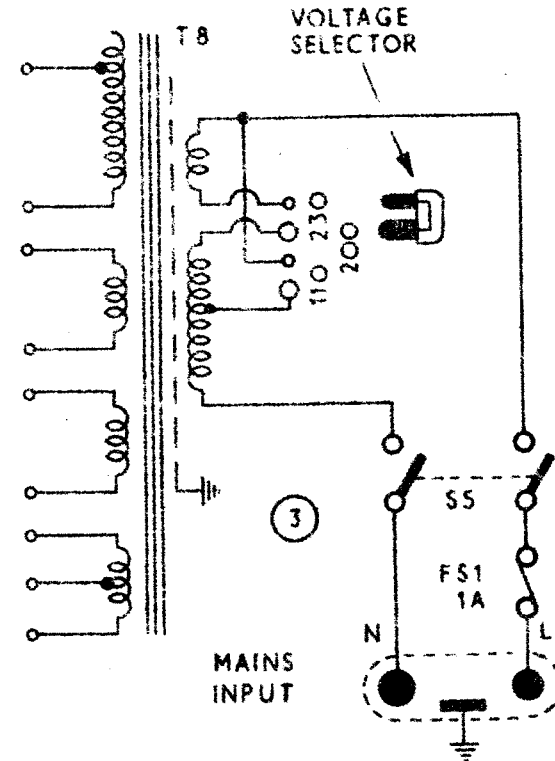
5.2 MCS OUTPUT

ANODE OF V2 (MIXER)



(2)

VOLTAGE SELECTOR



CALIBRATOR CONNECTOR (B7G TYPE)

X (LT)

EXISTING COMPONENTS ARE SHOWN BY REFERENCE ONLY  
NEW ITEMS ARE INDICATED BY REFERENCE AND VALUE

MAINS INPUT

AMENDMENT SHEET NO. 1

- General. References to STRATTON & CO. LTD. should be amended to read:-  
 "EDDYSTONE RADIO LTD."  
 The address, telephone and telex numbers given on page 28 are correct.  
 Cables should be addressed "EDDYSTONE BIRMINGHAM."
- Page 3. Amend paras as follows:-  
Audio Output and Response.  
 The push-pull Audio Output Stage will deliver up to 3 watts of audio power at the 2.5Ω terminals. The audio response is level within  $\pm 4\text{dB}$  ( $0\text{dB} = 1000 \text{ c/s}$ ) from 100 c/s to 10 kc/s. AF Gain control at maximum setting.
- Audio Sensitivity.  
 A signal of less than 30mV at the Audio Input terminals will produce an output of 50mW. (1000 c/s)
- Page 7. Amend audio sensitivity to read 30mV.
- Page 24. Amend C11 to read:- "1500pF Tubular Ceramic F/Through 20% 500V."
- Pages 24/26. The following capacitors are now Tubular Paper in lieu of Polyester. Tolerance 20% and working voltage 400V.  
 C23, C26, C30, C31, C36, C37, C42, C46, C52, C70, C72, C76, C77, C79, C80, C81, C82 and C134.
- Page 29. The following Part Nos. should be amended:- (all under "Drive Assy.")  
 Control spindle and bearing assembly . . . . . 6429/1P.  
 Cursor assembly . . . . . D3087/1.  
 Vernier dial with hub . . . . . D2250.

AMENDMENT SHEET NO. 2

Circuit Modifications.

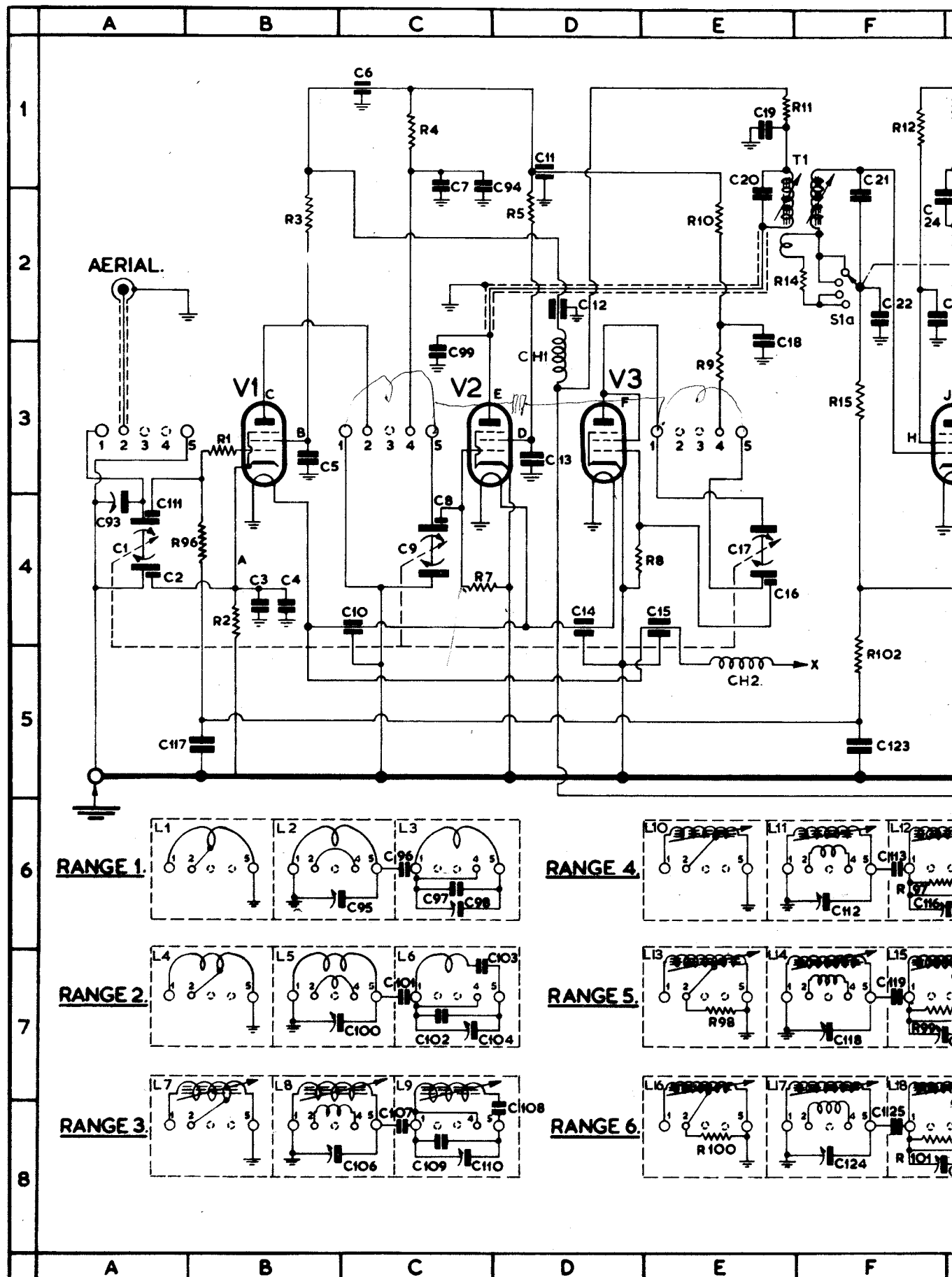
- (1) Add CH4 (small ferrite-cored RF Choke) in series with the AGC line. The actual position at which this component should be drawn is immediately to the left of C49 which will be found below V6 on the Main Circuit Diagram.
- (2) Add C136 (Circuit No. 1. on page 34). This capacitor is wired directly in parallel with R107 and its value is 500pF.

Page 26.

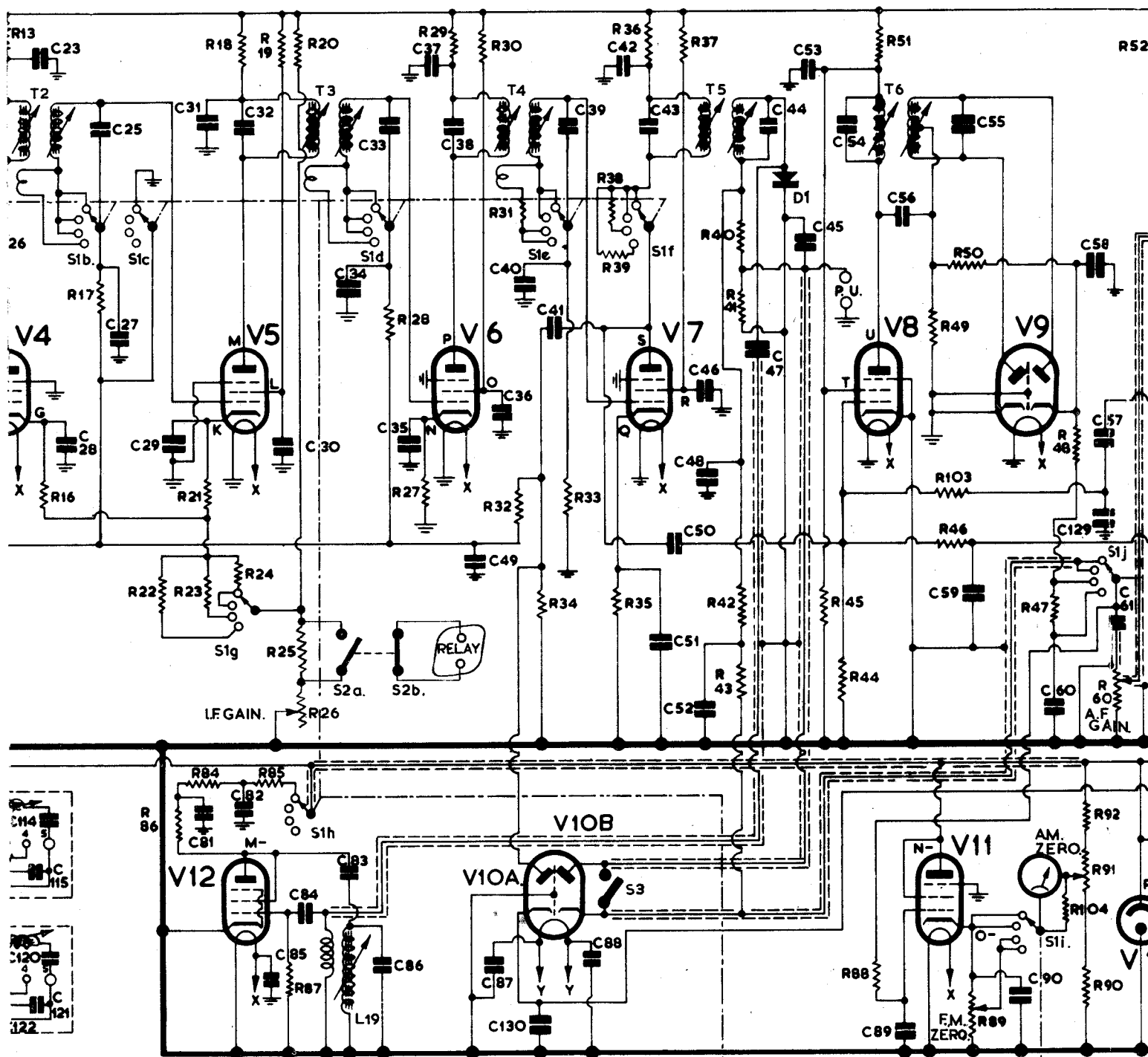
Add:- "C136 500pF Metallised Paper  $\pm$  20% 600V DC wkg."

Page 28.

Add:- "CH4 RF Choke (ferrite-cored) . . . . D2854."



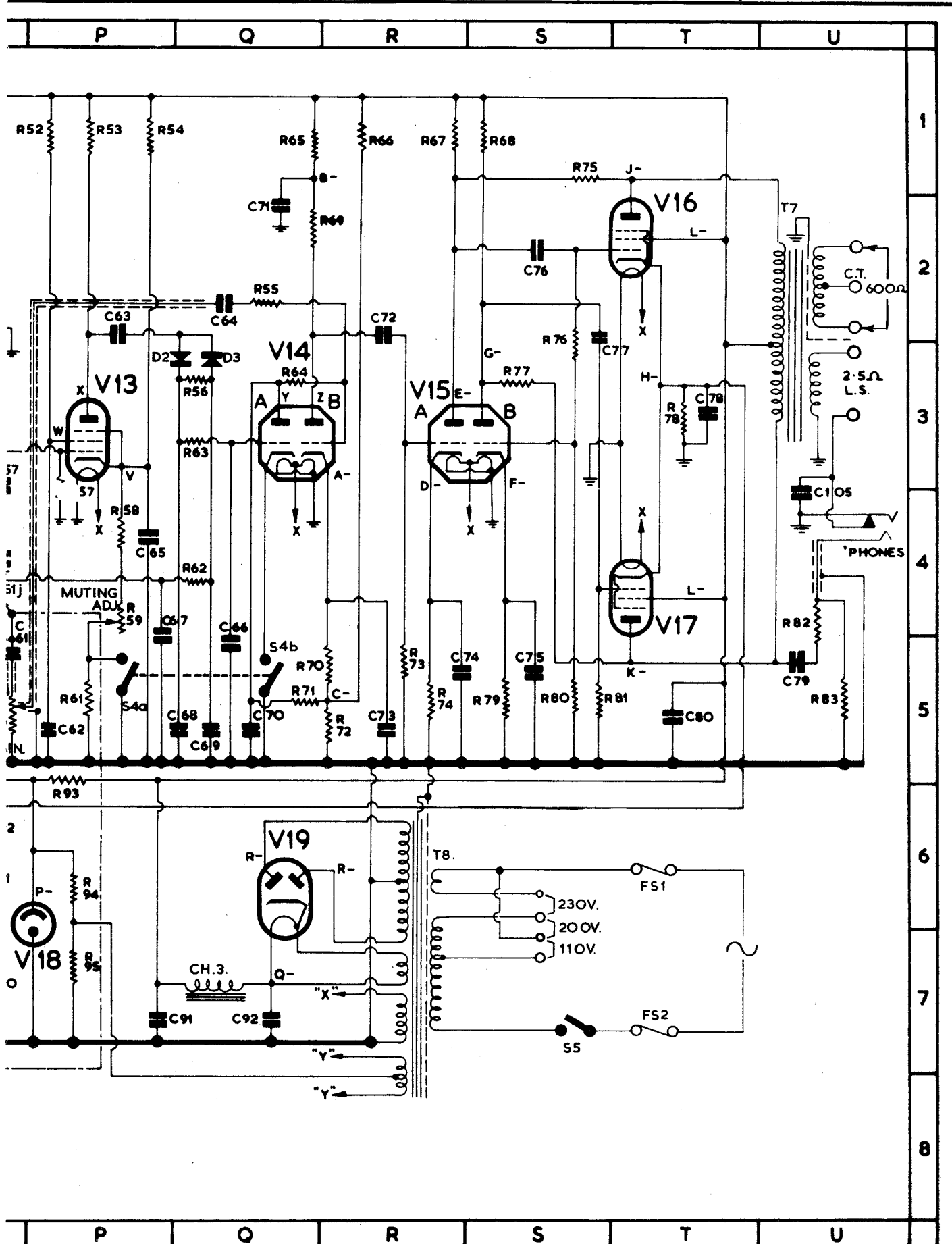
G	H	J	K	L	M	N
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MODE SWITCH (S1) SHOWN IN "C.W." POSITION.  
 STAND BY SWITCH (S2) SHOWN IN "STANDBY" POSITION.  
 NOISE LIMITER SWITCH (S3) SHOWN IN "ON" POSITION.  
 MUTING SWITCH (S4) SHOWN IN "OFF" POSITION.  
 MAINS SWITCH (S5) SHOWN IN "OFF" POSITION.

G	H	J	K	L	M	N
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# V.H.F. COMMUNICATIONS RECEIVER. (TYPE 7)



E 77OR.)