Chapter 1

OVERALL TECHNICAL DESCRIPTION

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LEADING PARTICULARS

Note Throughout this publication the abbreviation AP refers to Admiralty Part numbers (RN) whilst A P refers to Air Publication (R A F)

Frequency range	*100 Mc s to 156 Mc s*
Frequency stability	*1 part in 10⁵*
Power output	*35 watts*
Output impedance T 1131J T 1131K	*75 ohms into coaxial trans mission line*
Output impedance Transmitter 75C	*100Ω to common aerial system*
Modulation	*R/T (Use of tone osc Type 9 (10V/599) will give MCW)*
Percentage Modulation	*100*
Crystal multiplication factor	*18*
Ground to-air range	*100 miles approximately for an aircraft flying at 10 000 ft*
Valves used	*1 CV1052*
	2 CV1079
	4 CV315 or CV1062
	5 CV1932 or CV1067
	4 CV187 CV1072 (RAF equipment only) or CV235
	2 CV1075
	2 CV1076
	1 CV1071

Note The valve Type CV321 can be used in place of Type CV1075 (*para 10*)

Mains supply	*195 to 250 volts 40 to 60 c/s single phase*
power consumption	*1 125 kVA*
Heat dissipation	*1 kW (approx)*
Length	*1 ft 5 in*
Width	*1 ft 9 in*
Height	*6 ft*
Weight	*6 cwt*
Stores reference numbers	*T 1131J 10D/17746*
	T 1131K 10D/17767
	Naval Transmitter 75C AP61606

Introduction

1. This publication describes the R A F trans mitters Type T 1131J and T 1131K as well as the Naval transmitter Type 75C The Type 75C is identical to the T 1131K except that the RF output circuit has been modified to match into the common aerial system necessitated by R N requirements This transmitter is part of the Naval Wireless Set 87Q which includes a Receiver Outfit CDV and an aerial outfit The Receiver Outfit CDV comprises essentially a Receiver Unit 62H (R N reference AP61357) which is described in a separate Naval handbook details of the common aerial working however are given in Chapter 3 of this publication for completeness All references to the T 1131K apply to transmitter 75C unless specifically stated otherwise The T 1131J and K have been developed from the T 1131B and A respectively (A P 2555E) and differ in themselves in the heater circuit of the modulator unit (*para* 6) The difference from the earlier versions lies mainly in the RF output unit the RF driver unit and the crystal oscillator circuit The RF units have been modified to have an extended frequency range i e from 146 Mc/s to 156 Mc/s as well as a higher overall efficiency particularly at the upper end of the frequency range The new crystal oscillator circuit permits the transmitters to be used in accordance with the new 90 kc/s channel spacing requirements The tone oscillator is not now included in all units so that MCW facilities are not always available however the socket into which the tone oscillator plugs has still been retained in all transmitters A general view of a transmitter is given in fig 1

2 The maximum RF output is 35 watts at 100–156 Mc/s into a 75 ohm transmission line the Type 75C has an output impedance of 100 ohms to feed the common aerial system The ground to air range is approximately 100 miles for an aircraft flying at 10 000 feet The input power required is 1 125 watts 40–60 c/s single phase at 195–250 volts For the transmitter 75C this is obtained from AC supply outfits DRD DTC or DTD that is when a suitable supply is not available from existing sources

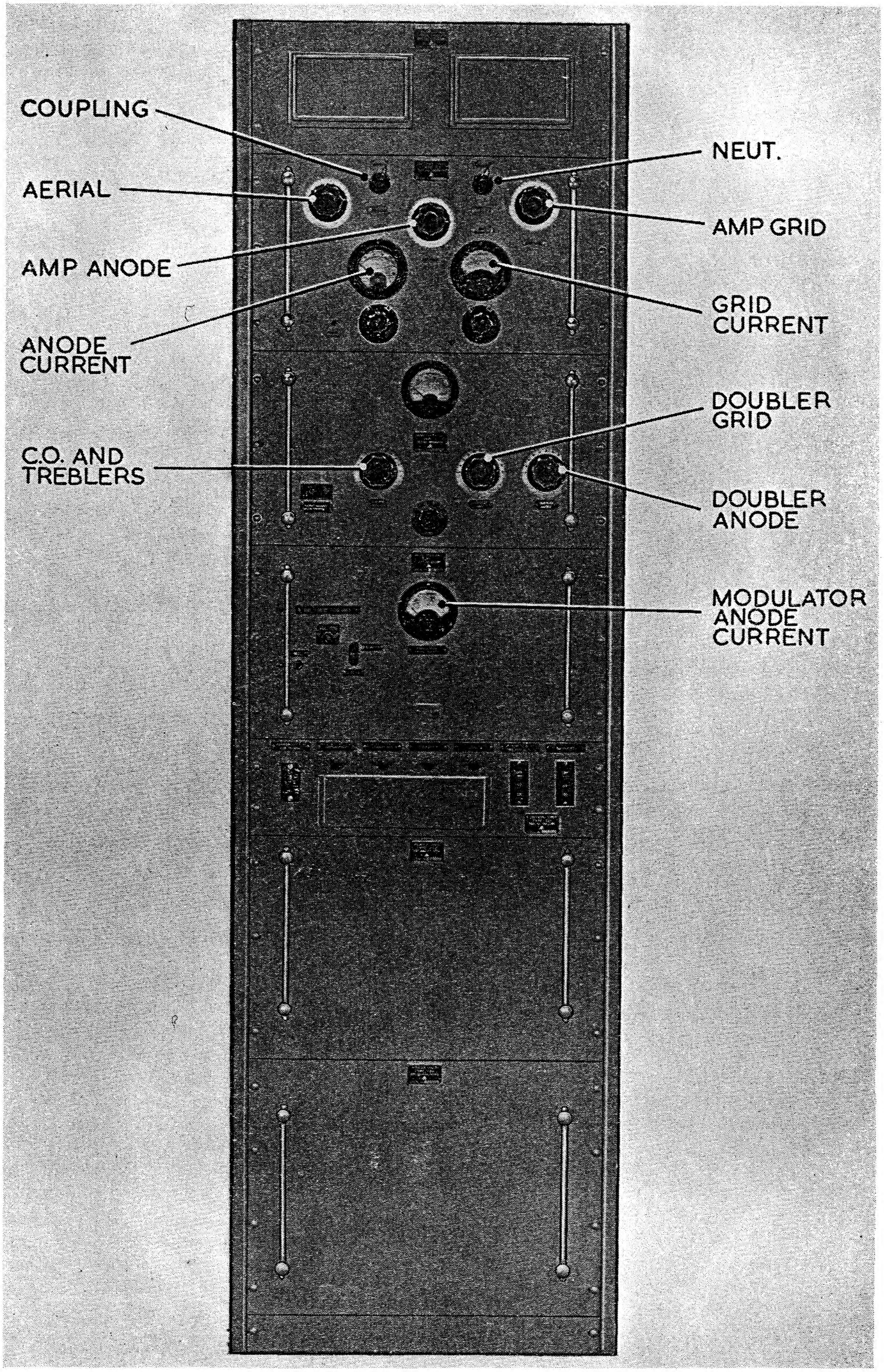


Fig. 1. Transmitters, Type T.1131J and T.1131K—front view

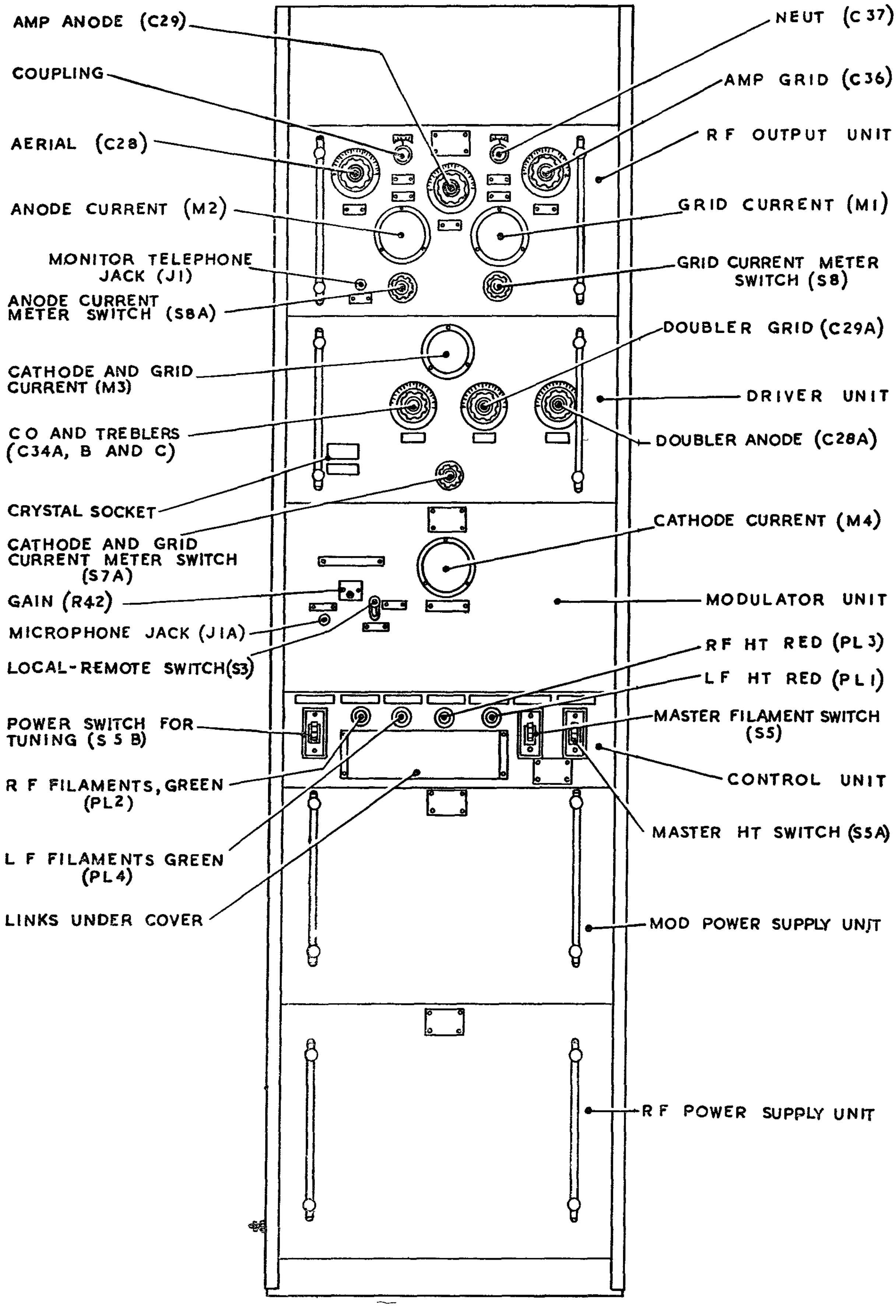


Fig 2 Panel controls

DESCRIPTION

List of units

3 The transmitters are made up from the following units —

(1) T 1131J

Modulator unit Type 132 (without tone oscillator)	10D/17936
Modulator unit Type 1 (with tone oscillator)	10D/12
RF driver unit Type 2	10D/17765
RF output unit Type 47	10D/17766
Modulator power unit Type 425	10K/1901
RF power unit Type 778	10K/16569
Control unit Type 323	10L/186
Tone oscillator Type 179 (if required)	10V/599

(2) T 1131K

		R N Ref AP
Modulator unit Type 132 (without tone oscillator)	10D/17936	
Modulator unit Type 57F (without tone oscillator)		61535
Modulator unit Type 102 (with tone oscillator)	10D/2411	
RF driver Type 2	10D/17765	67931
RF output unit Type 47	10D/17766	67930
Modulator power unit Type 425	10K/1901	
Modulator power unit Type 425A		61607
RF power unit Type 778	10K/16569	
RF power unit Type 778A		61608
Control unit Type 323	10L/186	67933
Tone oscillator Type 179 (if required)	10V/599	

List of valves

4. The valves used in the transmitters are —

V1	CV1052	Pentode	Crystal osc	RF driver unit
V2 V3	CV1079	Kinkless tetrode	Trebler	
V4 V5	CV315 *or* CV1062	VHF power Triode	Doubler	
V6 V7	CV315 *or* CV1062	VHF power Triode	RF amplifier	RF output unit
V8	CV1932 *or* CV1067	Triode	Monitor	
V9 V10	CV187 CV1072* *or* CV235	Diode rectifier	FW rectifier	RF power unit
V11 V12	CV1932	Triode	AF pre amp	Screening box unit
V13	CV1932	Triode	Audio Oscillator	Tone osc (when used)
V14 V15	CV1932	Triode	Push pull driver	Modulator unit
V16 V17	CV1075	Kinkless tetrode	Push pull amp	
V18 V19	CV1076	Triode	Push pull amp	
V20 V21	CV187 CV1072* *or* CV235	Diode rectifier	FW Rectifier	Modulator power unit
V22	CV1071	Duo diode rectifier	FW Rectifier	

Note

The valve CV1072 is not used in the transmitter 75C This is starred (*) in above list

CIRCUITRY

Summary

5 A plug in crystal is used in the fundamental oscillatory circuit Three multiplying stages follow it and drive the output stage which is anode modulated The modulator is fed from a carbon microphone and to develop the necessary power has three push pull amplifying stages following a pre amplifier to reduce distortion negative feed back is introduced in all stages except the output stage Modulation depth is set at 100 per cent by a control in the pre amplifier the pre amplifier uses two triodes in cascade with negative feedback For setting up and servicing a diode monitor and metering facilities are incorporated A complete circuit which also shows the inter unit connection is given in figure 25 at the end of this chapter

Modulator unit

6 To develop the high power necessary for anode modulation of the power amplifier (P A) stage in the RF output unit five amplifying stages are used The first two are single ended, followed by two stages of class AB1 push pull and a final class B push pull stage developing 75 watts of audio power with a total harmonic distortion not exceeding five per cent The circuit is shown in fig 3 In the T 1131J one side of the 6 3V heater supply is earthed whereas in the T 1131K a centre tap earth is used to reduce the final hum level

7 The carbon microphone is connected to the microphone transformer T1 through the LOCAL REMOTE switch S3 details of which are deferred until para 28 as the circuitry is inter related with that of the control unit The secondary of T1 feeds the potential divider made up by the resistor R30 and the potentiometer R42 which is used as a modulation depth control Distortion is reduced in this first stage by current negative feedback across the un bypassed cathode resistor R23B Resistance capacitance coupling to V12 is by C8 and R51 The capacitor C8 has a relatively low value of 500pF so as to provide attenuation of all frequencies below 400 c/s The final stage V12 is similar to V11 and the output is taken via C18 To reduce interference the components of these first two stages are contained in a separate screened unit referred to as the screening box unit The overall frequency response is flat to within +3 dB from 400 c/s to 5 kc/s a rapid attenuation occurs below 400 c/s whereas above 5 kc/s a gradual attenuation occurs

8. The output from C18 is transformer coupled by T2 to V14 and V15 connected in class AB1 push pull R32 R32A and C5AP across the secondary of T2 modify the frequency response characteristic of the transformer Cathode biasing and negative feedback occur across R23 and R23A Coupling to the next stage is by T3

9 The transformer T3 has two separate secondary windings this is so that V16 and V17 grid circuits are separated allowing the valves to have separate but identical anode to grid feedback circuits The valve Type CV1075 is a kinkless tetrode—i e a tetrode having pentode characteristics By using a pair in class AB1 push pull second harmonic distortion is reduced to negligible proportions whilst third harmonic distortion is reduced by the feedback networks R18 C22 and R26 and R18A C22A and R26A Un bypassed cathode bias

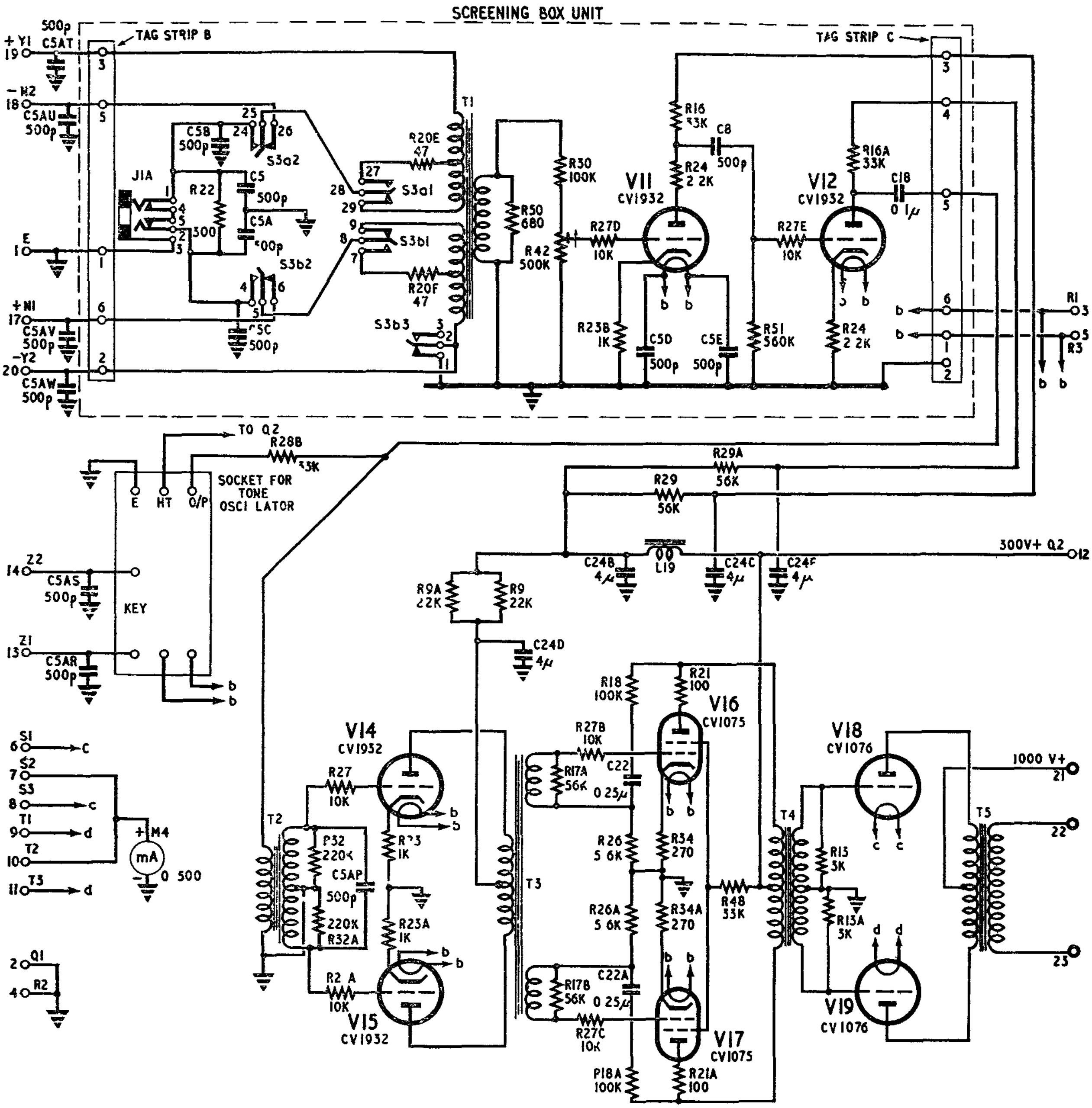


Fig 3 Modulator unit—circuit

resistors R34 and R34A give additional feedback. A variant of the CV1075 exists known as CV321 ; this has slightly different characteristics to the CV1075 but may be used in this circuit as the negative feedback tends to make the frequency response of the circuit less dependent on valve characteristics than would otherwise be the case. The CV321 is not listed for this position in para. 4 as it is now an obsolescent valve—i.e. when existing stocks are exhausted it will become obsolete.

10. The final stage is in class B2 developing 75 watts at less than 5 per cent distortion, it is fed by T4, with R13 and R13A as damping resistors. With the type of valve employed (CV1076), no bias is necessary for class B conditions and, as they are triodes, little harmonic distortion is introduced. Total current consumption is indicated by the meter M4, connected between earth and the centre taps of the filament transformer secondaries. Due to the large anode voltage swing, modulation of the anode current by the AC filament supply is negligible. The output is fed through T5 and, since the anode current of the final RF amplifiers passes through its secondary, modulation of the RF output takes place. The layout of the modulator unit and screening box unit can be seen from figures 4, 5, 6 and 7 which show all essential details for minor servicing.

Note . . .

In some modulators the resistors R9 and R9A (22k each) may be omitted and a 10k 6W vitreous type used instead.

RF driver unit

11. This comprises a crystal oscillator, followed by three frequency multiplying stages operating in Class C. The first two are single valve treblers and the last stage a two valve push-pull doubler. The circuit will be described with reference to fig. 8.

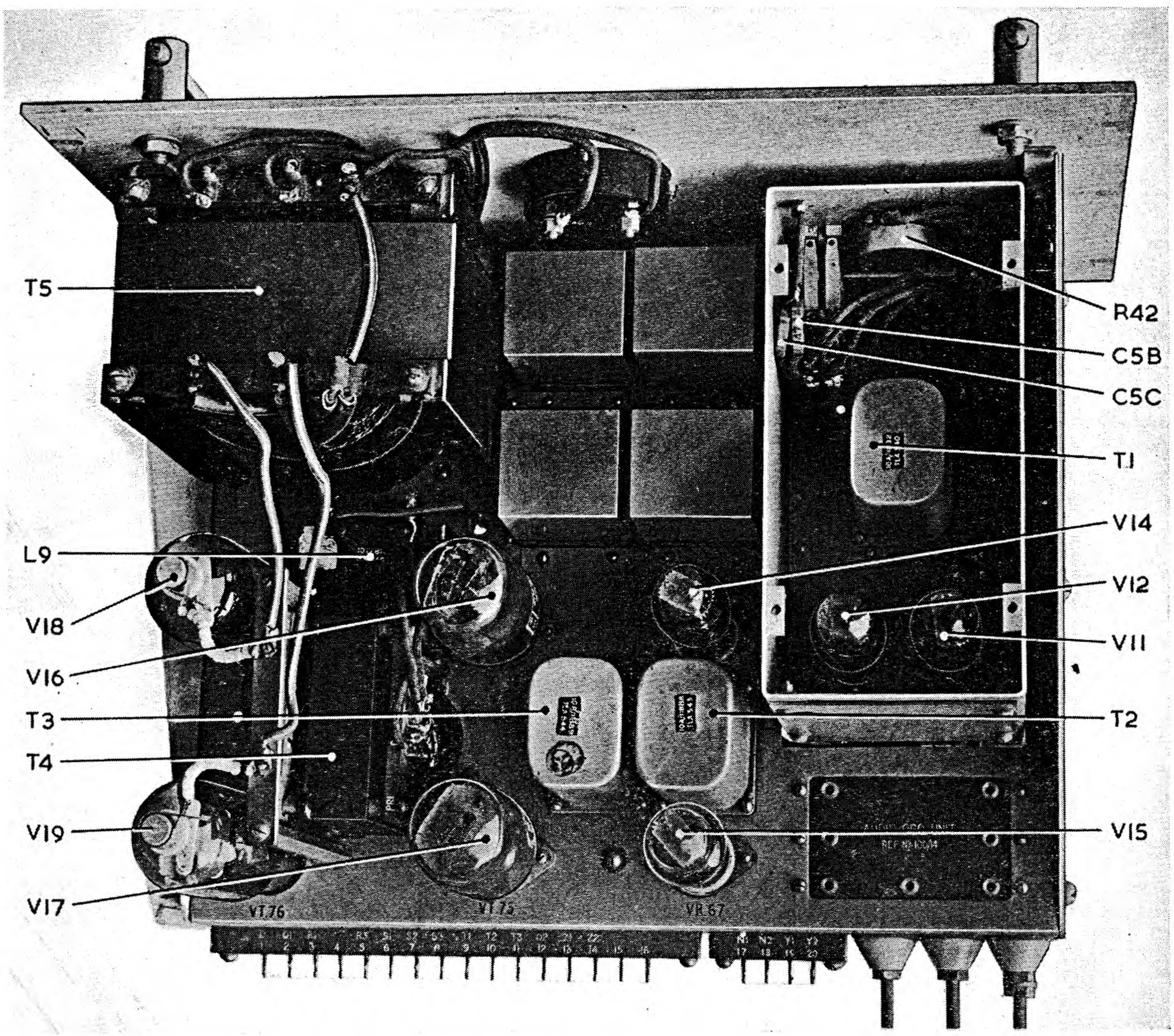


Fig. 4. Modulator unit—top view

Oscillator

12. The oscillator is of the crystal controlled type with the crystal circuit feeding the control grid of V1 ; the resulting grid current flowing through R28A provides bias for the valve. Current negative feedback is obtained by the use of the resistor R12 in the cathode circuit, so making the oscillator frequency less susceptible to variation with supply voltage changes. In the anode circuit, the parallel tuned circuit, C14, C34A, C35 and L27, resonates at the crystal frequency ($\frac{1}{18}$th of the carrier frequency). The circuit is coupled to the grid of the next stage by C6 and through the filter R20C and L5 ; this filter is used to prevent parasitic oscillations occurring. L1A is a choke to prevent RF feedback through the HT line.

Frequency multipliers

13. The first stages, V2 and V3, are similar to each other and use kinkless tetrodes, operating in Class C, as treblers. RF decoupling of each anode circuit is effected by the chokes and condensers L1B, C15, L1C and C15C for V2 and V3 respectively. The anode tuning coil of V2, L28, is tapped for correct matching and is coupled to V3 through the capacitor C6A. The choke L6 and the damping resistor, R20D, prevent parasitic oscillations. The anode coil of V3, L29, is tuned by the third section of the 3-gang condenser C34—i.e. C34C ; this circuit is link-coupled by L30 and L31 to the input of the push-push doubler V4 and V5. This stage has fixed neutralization by anode to grid feedback through C39. To effect biasing with the directly heated filaments, the bias resistors R45 and R45A are each joined to the junction of two resistors across the respective filaments. This junction is at the same potential as the electrical centre of the filament so that the current flowing through the bias resistor is equal to the anode current of the valve. The p.d. across it and the metering resistor R10H provides bias in exactly the same way as a conventional cathode bias resistor (for instance R1 in V2 cathode). The important controls are the grid tuning condenser C29A and the anode tuning condenser C28A. The output is coupled by L34 through the link to the RF output unit.

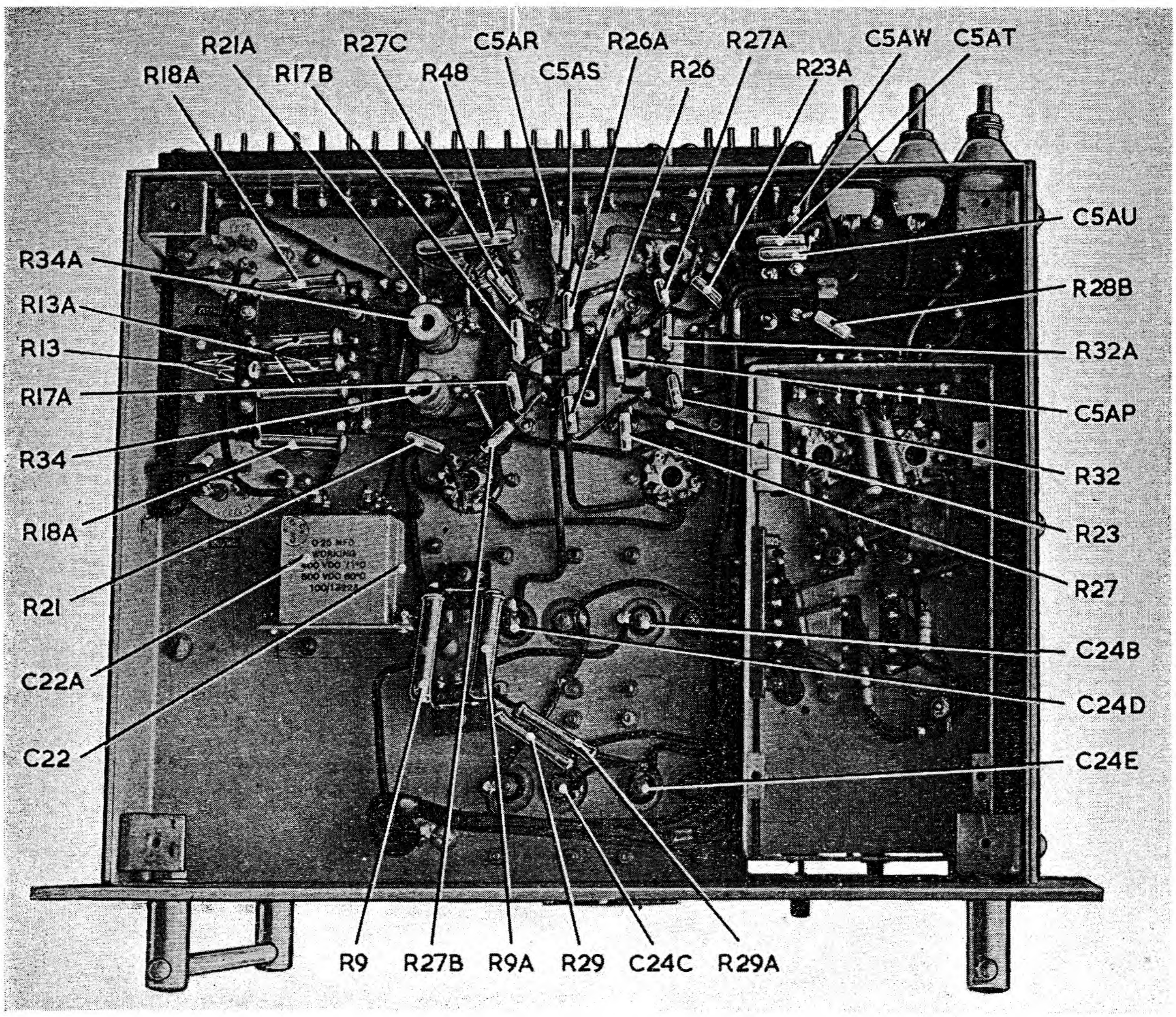


Fig. 5. Modulator unit—underside view

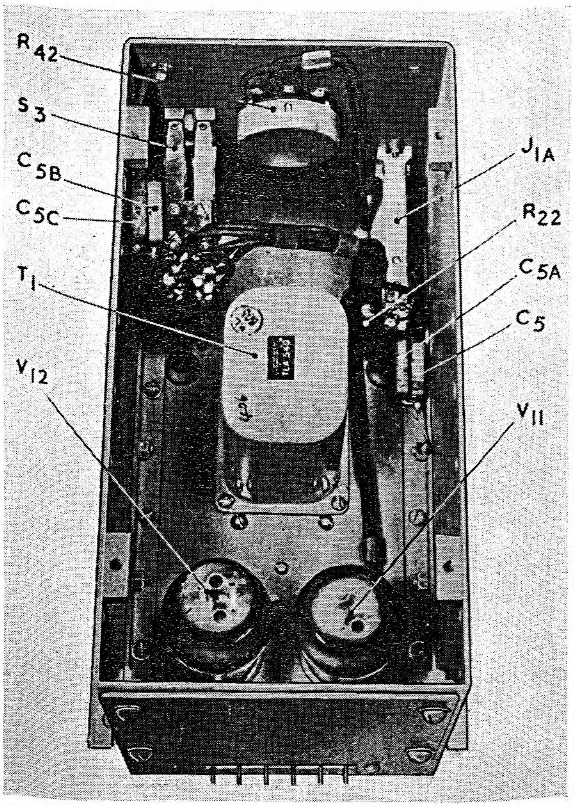


Fig. 6. Screening box—top view

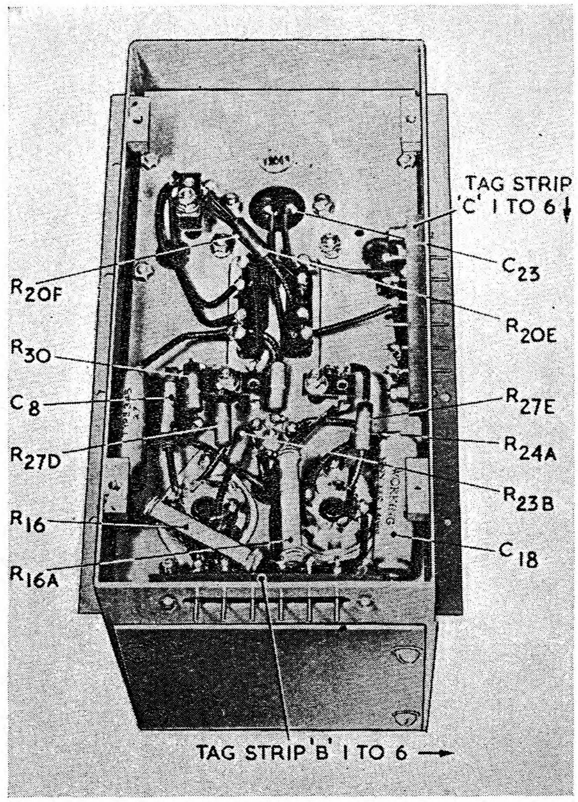


Fig. 7. Screening box—underside view

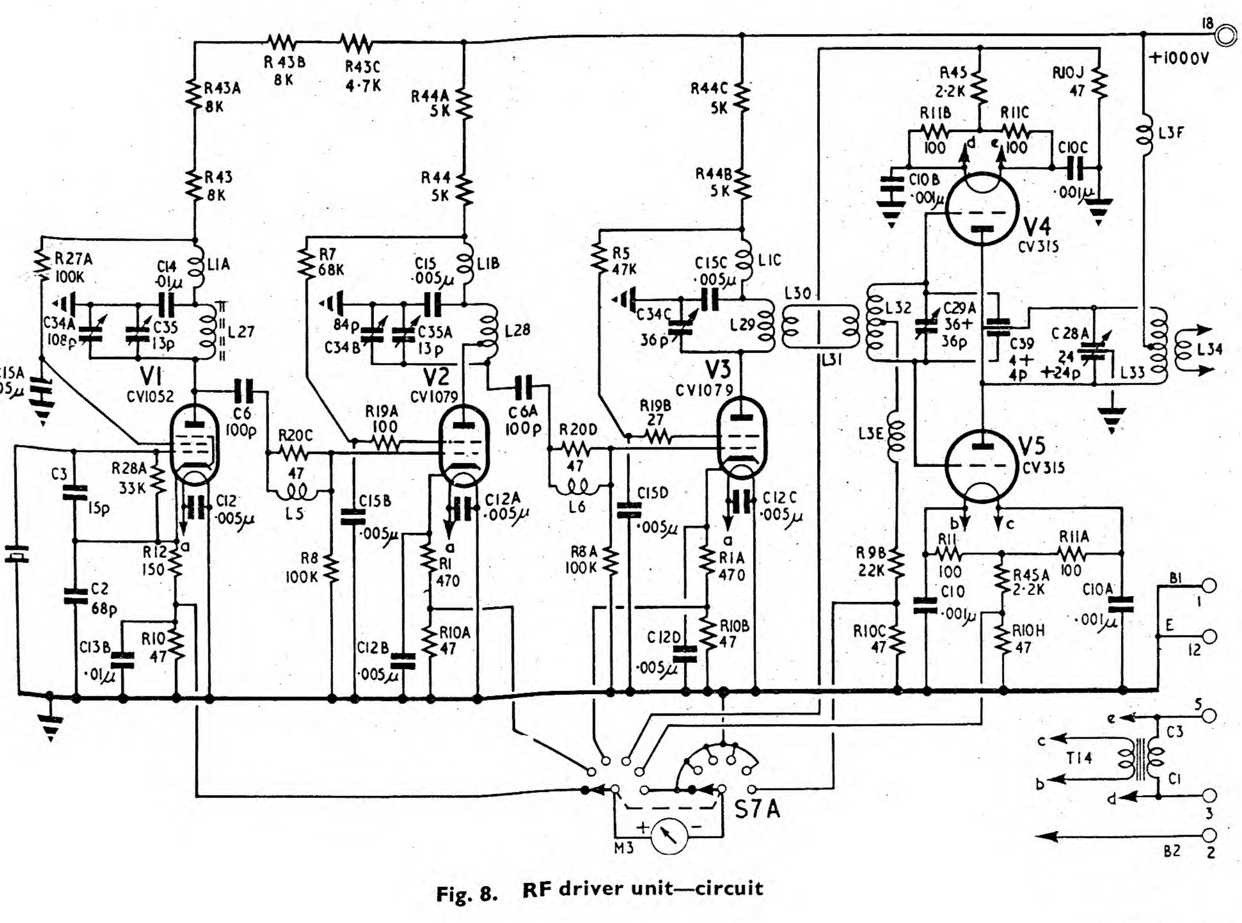


Fig. 8. RF driver unit—circuit

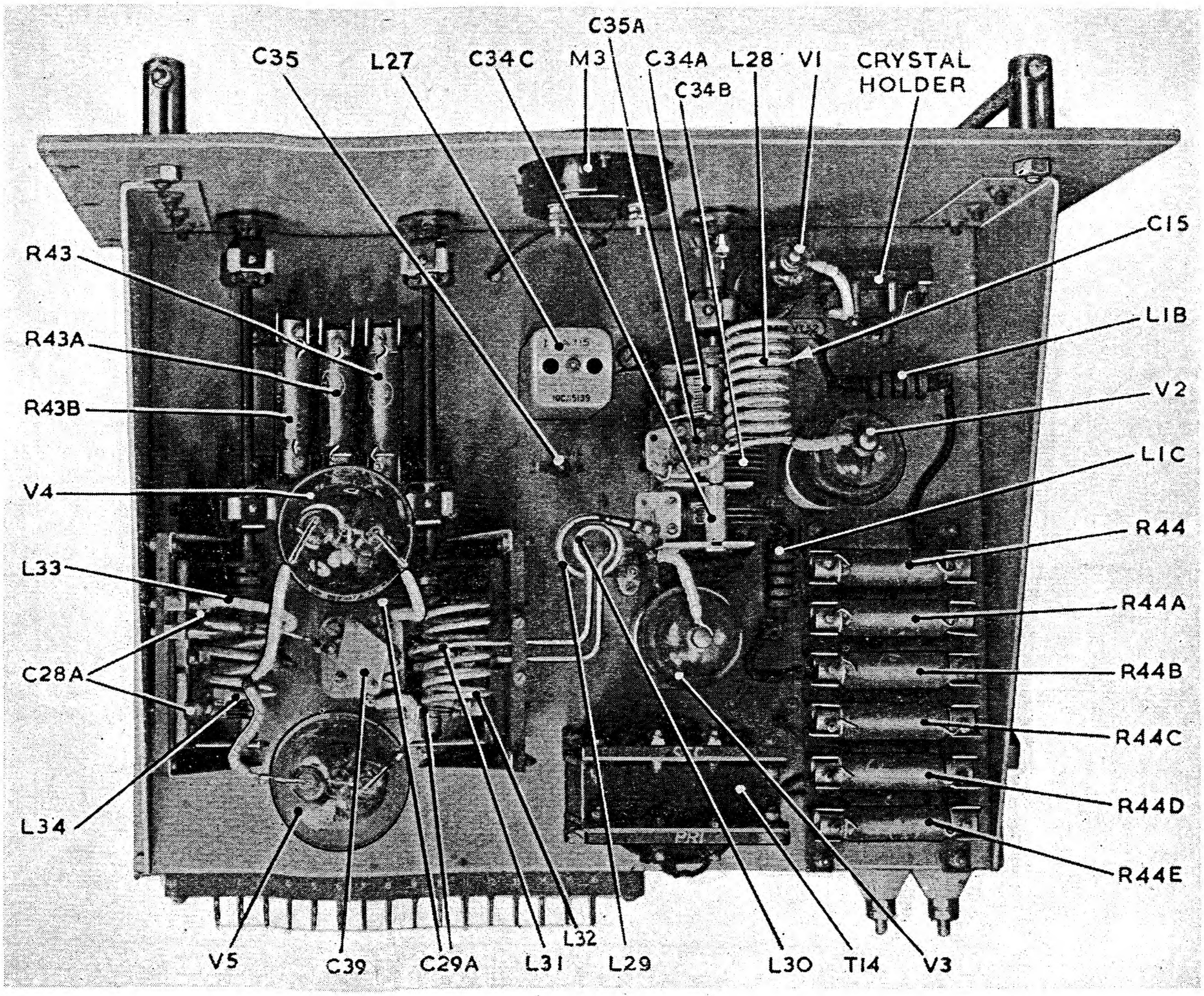


Fig. 9. RF driver unit—top view

Metering

14. To assist setting-up, a meter, M3, can be switched into the cathode circuit of each valve, so measuring the individual cathode currents. The location of all components for servicing can be found from fig. 9 and 10.

RF output unit

15. The RF output stage is an orthodox Class C push-pull amplifier (*fig.* 11) with automatic grid bias. Neutralization is effected by feedback from the anode of one valve to the grid of the other, through the ganged condensers C37 and 37A. The output is coupled, by an adjustable link coil, to the balance-to-unbalance matching transformer L39 and L17, which feeds the 75-ohm coaxial transmission line. In the transmitter Type 75C the aerial output is modified to present an impedance of 100Ω to the common aerial system. *The alternative arrangement shown dotted in fig.* 11 *and* 25 *applies only to this transmitter.* In all transmitters a diode monitor is fitted for use during setting-up.

Metering and monitoring

16. Meter M1 measures the grid current by connection across either of the grid resistors R20 and R20A; similarly M2 is switched across R10D or R10E to measure the anode current. To check the quality of the output from the transmitter, a diode detector—actually a triode with grid and anode joined—is inductively coupled to the coil L39. The output is taken through a conventional RF filter to the MONITOR TELEPHONE jack J1. The component layout is given in figures 12, 13 and 14.

Modulator power unit

17. The modulator power unit supplies 1kV to the output stage of the modulator and 300 volts to the other stages; the heaters are also fed by this unit. Four transformers are used, each with a tapped primary, so allowing for differences in local mains supplies (195V to 250V). The circuit is described in conjunction with fig. 15.

HT supplies

18. The HT and EHT voltages are derived from T10 (350–0–350, 110mA) and T7 (1125–0–1125, 145mA) respectively. Rectification is by valves V22 (HT) and V20 and V21 (EHT). The HT has a normal capacitance—input smoothing circuit, whilst the EHT has a two-stage choke input filter. Should any excessive voltage occur across the first choke L24, the spark gap, X1, flashes over so preventing damage to the choke. The second winding on T10 lights the RF HT lamp (PL1), indicating the completion of the time delay in the control unit. The function of the double-wound primary on T7 is explained in para. 27.

Heater supplies

19. These are taken from T8 and T9.

(1) T8 2×4 volts for V20 and V21

(2) T9 4 volts for pilot lamp PL4 in control unit (LF FILAMENTS)
5 volts for V22
6·3 volts for all valves in the modulator, except V18 and V19
2×7·5 volts for output valves V18 and V19

Component location can be ascertained from fig. 16 and 17.

RF power unit

20. The RF power unit supplies EHT and heater current to the RF driver and output units. It employs three transformers, each of which have tapped primaries to take input voltages from 195 volts to 250 volts, in five-volt steps. The circuit is shown in fig. 18.

Heater supplies

21. These are supplied by T12 and T13.

(1) T12 2×4 volts for V9 and V10

(2) T13 4 volts for pilot lamp PL2, in control unit (RF FILAMENTS)
2×6·3 volts for V1 to V3 in driver unit and V8 in output unit
3×7·5 volts for remaining valves in the RF units

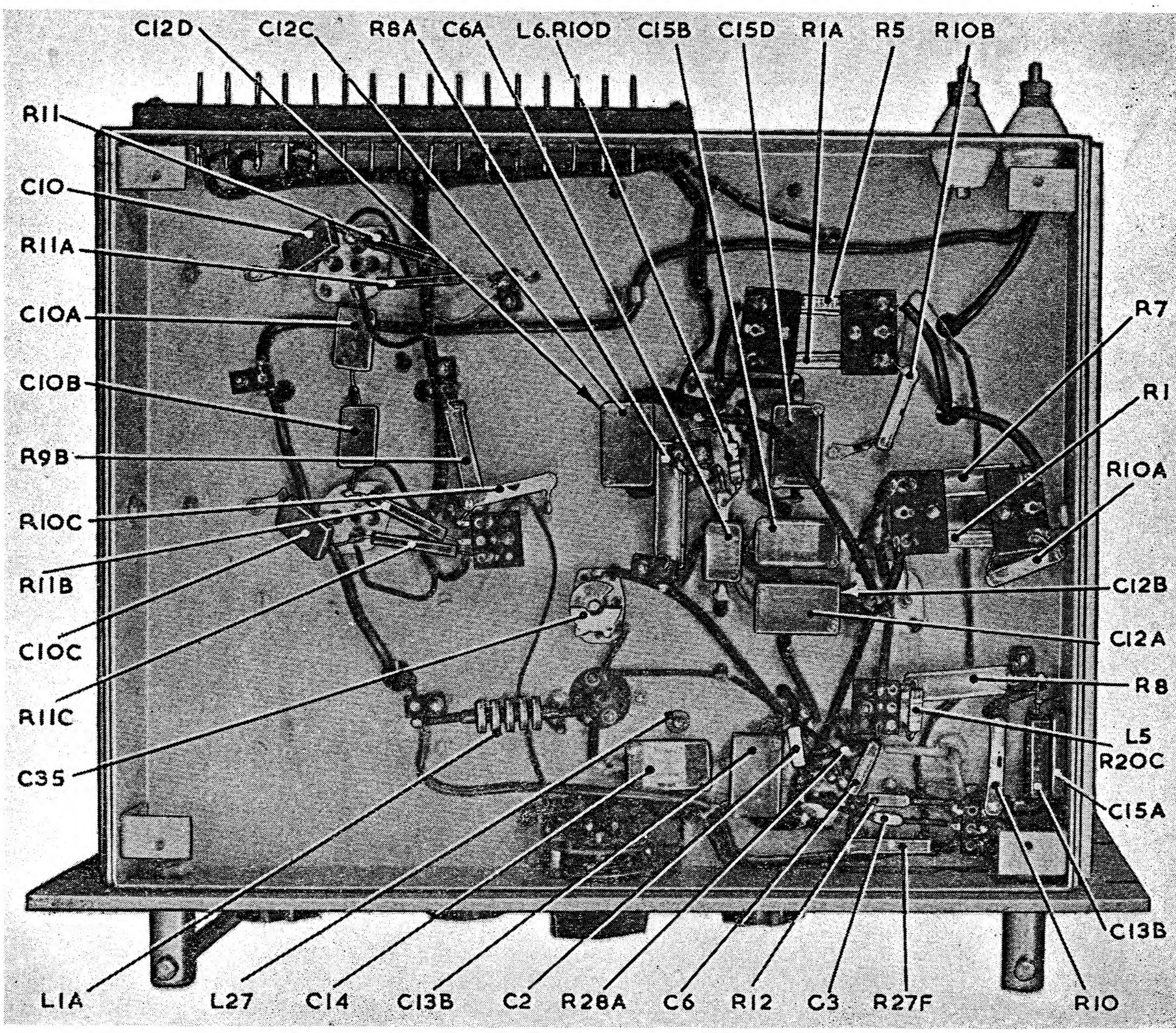


Fig. 10. RF driver unit—underside view

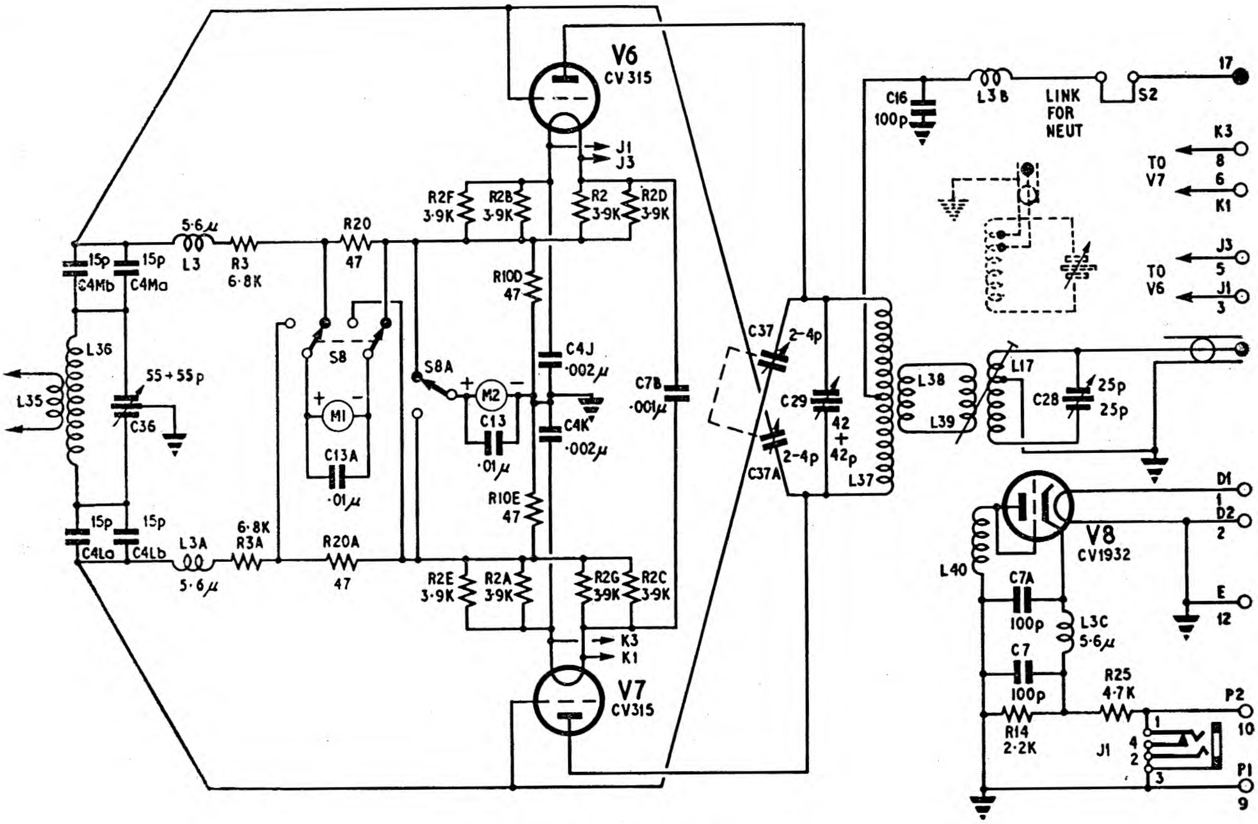


Fig. 11. RF output unit—circuit

EHT supplies

22. The 1kV EHT voltage is taken from the full-wave rectifier circuit consisting of T11 (1200–0–1200, 220 mA) together with V9 and V10; the power smoothing circuit is similar to the one in the modulator supply unit. The second winding on T11 supplies 4 volts to the RF HT pilot lamp PL3.

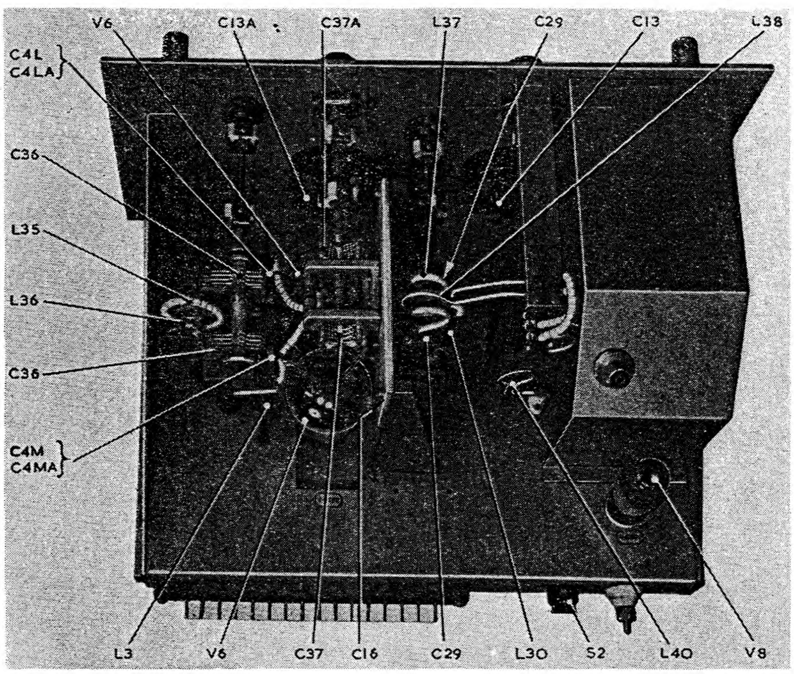


Fig. 12. RF output unit—top view

23. When adjusting the transmitter, reduced EHT and HT are applied to the RF units and final modulator stage; this decreases the power to the valves, so preventing excessive dissipation and consequent damage. To effect this reduction the POWER SWITCH FOR TUNING (S5B), in the control unit, should be set at LOW. The circuit changes brought about are discussed in para. 27. The location of all components is given in fig. 19 and 20.

Note . . .

Whilst the transformer primaries are tapped for a range of input voltages, they are all set at the manufacturers' works for 230V input.

Control unit

24. The control unit contains all the switches and relays for controlling the transmitter power supplies. A delay circuit is incorporated to ensure that EHT can not be applied until about one minute after closing the MASTER FILAMENTS switch S5A; this delay is to prevent damage to the valves. A second safety device is the POWER SWITCH FOR TUNING S5B; when, during tuning, it is set at LOW, certain valves have less power supplied; this prevents their being damaged by over-loading. The control unit is self-contained with regard to power supplies for its relays ; the same supply feeds the microphone circuit.

25. The operation of the control unit, especially the time delay, may appear somewhat complex at first, so a full description is given with reference to fig. 21. Assuming S6 at the back of the RF power unit is closed and that all fuses are inserted, then when the MASTER FILAMENTS switch S5 is placed in the ON position, the green pilot lamps—RF FILAMENTS and LF FILAMENTS—will light up at once. At the same time, the mains are applied to T6 and 24 volts DC is therefore supplied to the thermal delay (REL G) ; this takes about 30 seconds to warm up and the strip S then makes with contact H. Relay $\frac{A}{3}$ comes in, contact A1 opens and breaks the heating coil circuit of the thermal delay ; the relay is held in by the change-over contact B4 and the hold-on contact A3. When a further 30 seconds has elapsed, the thermal delay has cooled down and the strip S makes with the original contact C, bringing in relay $\frac{B}{4}$ via contact A2. The change-over contact B4 switches out relay $\frac{A}{3}$ and acts as a hold-on contact for relay $\frac{B}{4}$; the contact B1 ensures that the delay heater circuit is broken.

26. This one minute delay, before the HT and EHT are supplied, allows time for the cathodes to warm up ; if there were no delay, the high anode to cathode p.d. would tend to remove the emissive coating on the cathode. To complete the HT and EHT transformer circuits, not only must the MASTER HT switch (S5A) be closed, but terminals Y1 and Y2 (24 and 23) must be joined by a suitable DC patch. This path is the microphone circuit (shown dotted) and, when it is completed, the relays $\frac{D}{1}$ and $\frac{E}{2}$ are operated via contact B2 (*para.* 28—30). Contact E1 closes and the contactor CON. 1 comes in, so that when the MASTER HT switch is closed, the primaries of the HT and EHT transformers are connected to the mains. To indicate that the remote microphone circuit is made, the contact D1 completes the 24-volt supply line to a pilot lamp at the remote control point. This facility is not required in transmitter 75C ; the relay D1 can thus be ignored when dealing with this equipment. Contact E2 brings in the smoothing condensers C27B and C27C ; these are to prevent variations in current (due to speech in the microphone circuit) passing through relays

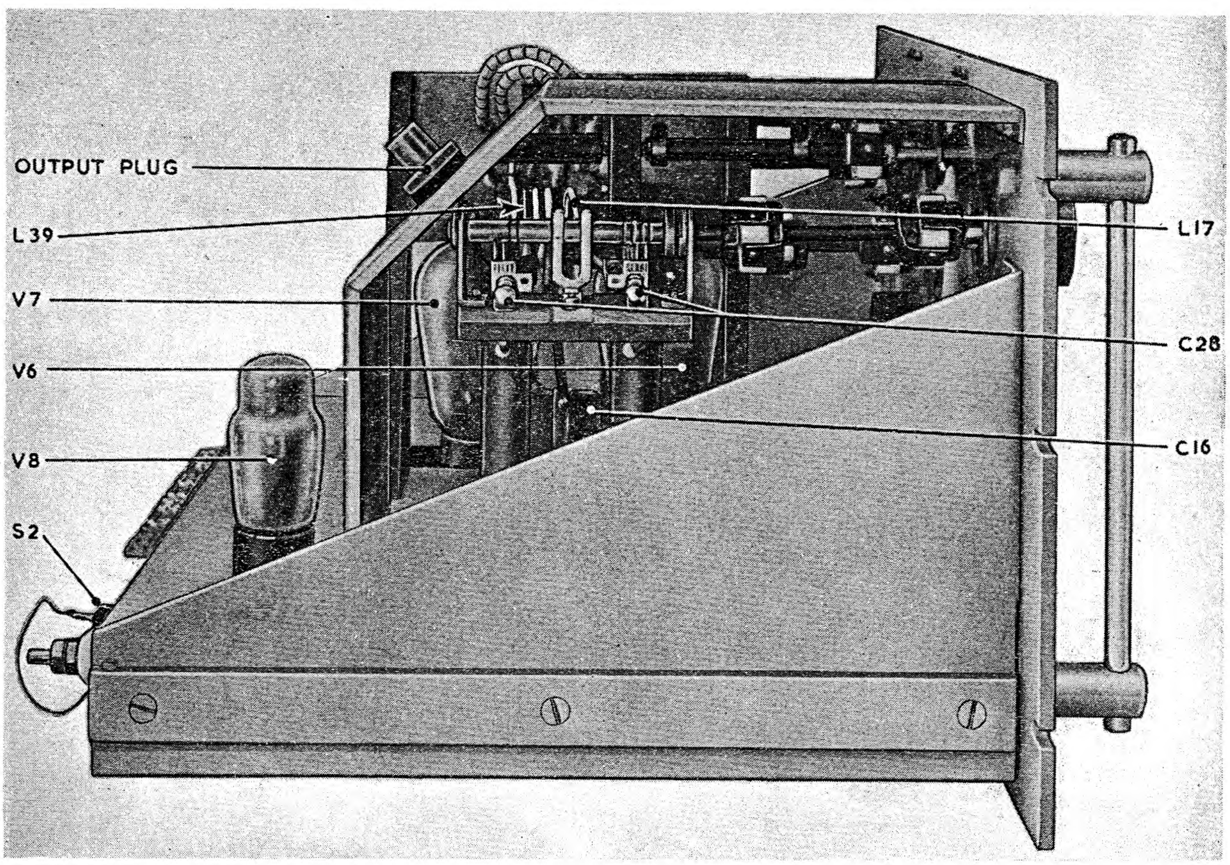


Fig. 13. RF output unit—side view

$\frac{D}{1}$ and $\frac{E}{2}$ and causing vibrations in the relay armature—i.e. chattering. The positions of all major components are shown in fig. 23 and 24.

Note . . .

Relay G is mounted on the same frame as relay $\frac{D}{1}$. *Consequently they are regarded as one relay from the point of view of the numbering of the tags.*

POWER SWITCH FOR TUNING—S5B

27. As stated in para. 24, this reduces the HT and EHT during tuning, so avoiding damage to the valves due to excessive power dissipation. The operation of the switch in conjunction with T11 will be described first (*fig.* 22). When full power is required, the primary has the full mains voltage across it. When low power is required, the choke L23 is in series with T11 primary. As the impedances are approximately the same, T11 has only half the mains voltage across its primary, and the voltage developed across the secondaries is consequently halved. For T7 and T10 however, the operation is slightly different. The primary of T10 is always connected across one half of the primary of T7. The mains are applied across either the whole of the primary of T7, or across the half which is in parallel with T10. In the former condition the secondary voltages are about half of those in the latter, so giving the necessary reduction on low power.

LOCAL-REMOTE SWITCH—S3

28. When the LOCAL-REMOTE switch S3 is set at LOCAL, the DC path for relays $\frac{D}{1}$ and $\frac{E}{2}$ is from Y2 through one part of T1 primary to R20F, then via the contacts S3b1 and S3b2 to J1A (*fig.* 25). Here current may flow through either the shorting loop across terminals 4 and 5 on the jack J1A or, if the microphone is inserted, the microphone and R22 in parallel. The path is finally completed via S3a1 ; R20E and T1 to Y1.

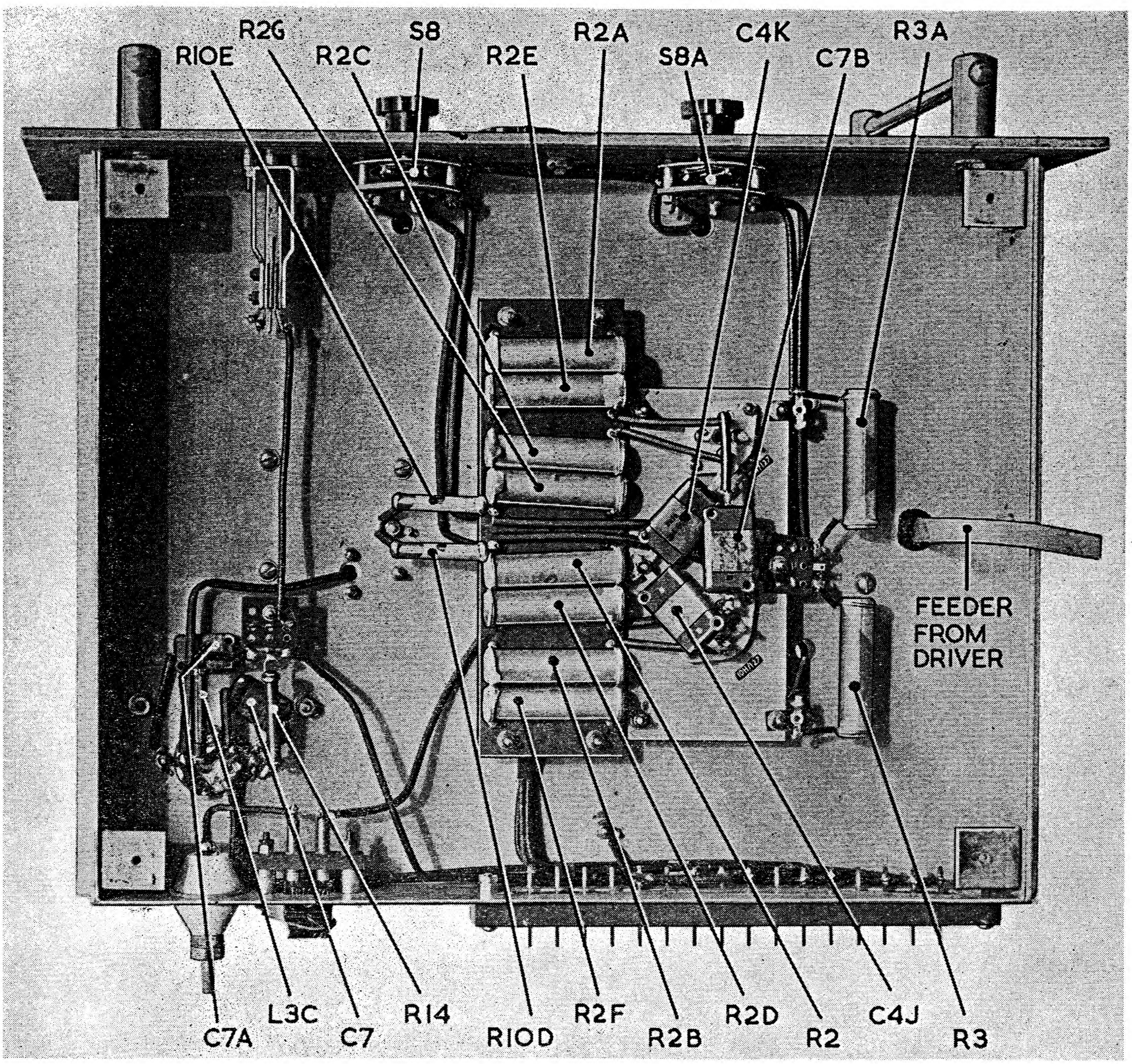


Fig. 14. RF output unit—underside view

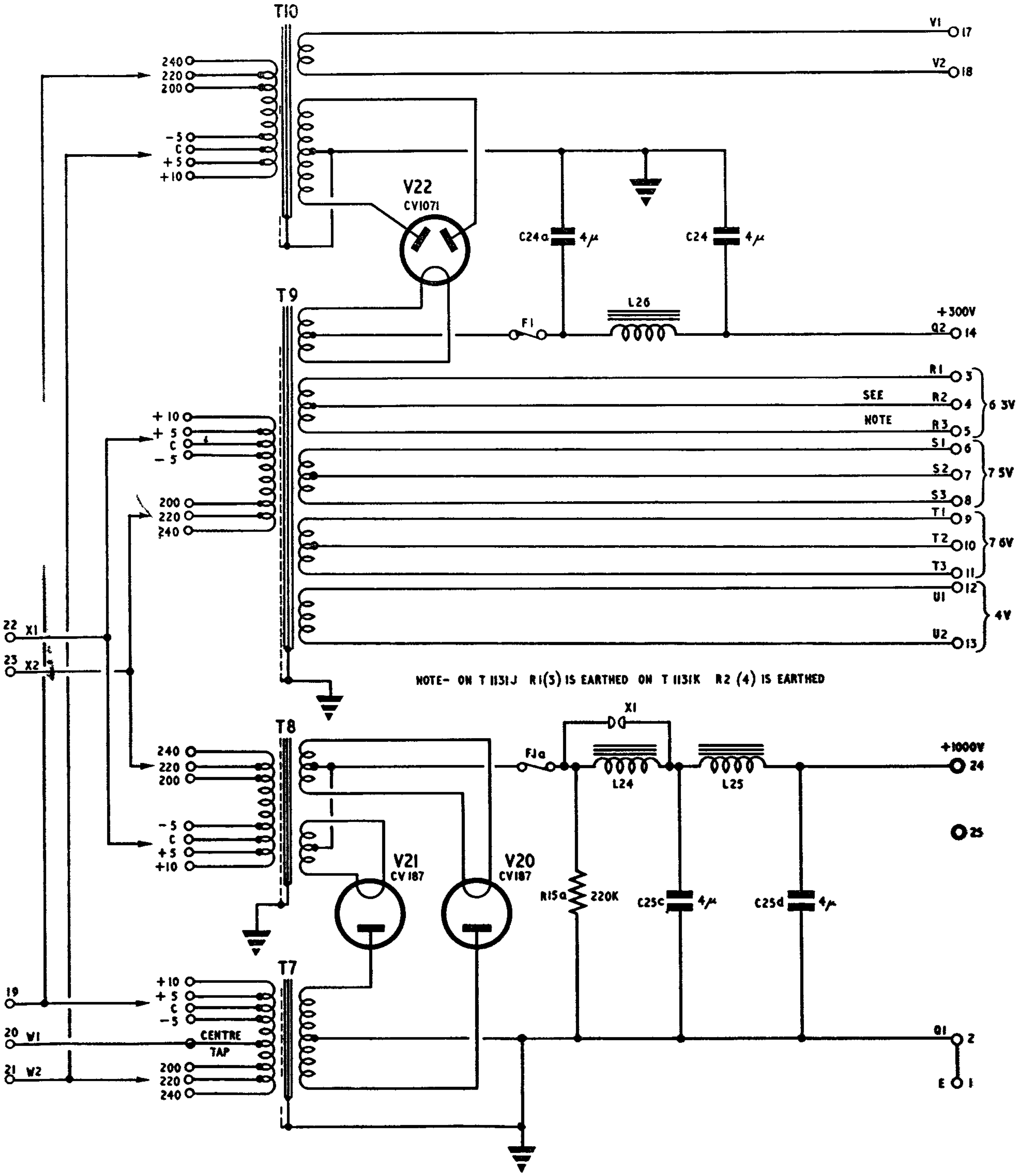


Fig 15 Modulator power unit—circuit

29. When the switch is at REMOTE Y2 is joined to N1 via one half of T1 primary and Y1 to N2 via the second half. N1 and N2 are the remote line terminals and, at the far end, are connected to a microphone in series with a single pole switch.

30. On switching to LOCAL, the HT is controlled solely by the MASTER HT switch ; on switching to REMOTE the HT is controlled by the MASTER HT switch and by the remote station, through the microphone switch controlling relay $\frac{D}{1}$, but not independently. Hence for HT to come on both switches must be at ON ; in practice, the MASTER HT switch is left at ON and the microphone switch used to switch the HT on and off.

Safety interlock switch—S6

31. The switch is at the back of the RF power unit and all the power supplies pass through this switch to the transmitter. The switch is spring-loaded so that it is normally off ; when the door of the transmitter is closed however, S6 is forced into the ON position. Thus, on opening the door, the transmitter is immediately switched off. However, to be absolutely certain that it is safe to carry out adjustments inside the transmitter, the mains supply must be broken externally to the transmitter.

INSTALLATION

WARNING

NEVER operate the transmitter with the door open and the safety switch held in. ALWAYS switch off at the external mains switch before making any internal adjustment.

Precautions

32. Full power should only be applied to the transmitter when it is correctly set up.

Preliminaries

33. Access to the transmitter is through the door at the rear of the cabinet. Connect the local AC supply to the MAINS INPUT terminals at the back of the RF power unit and check that all

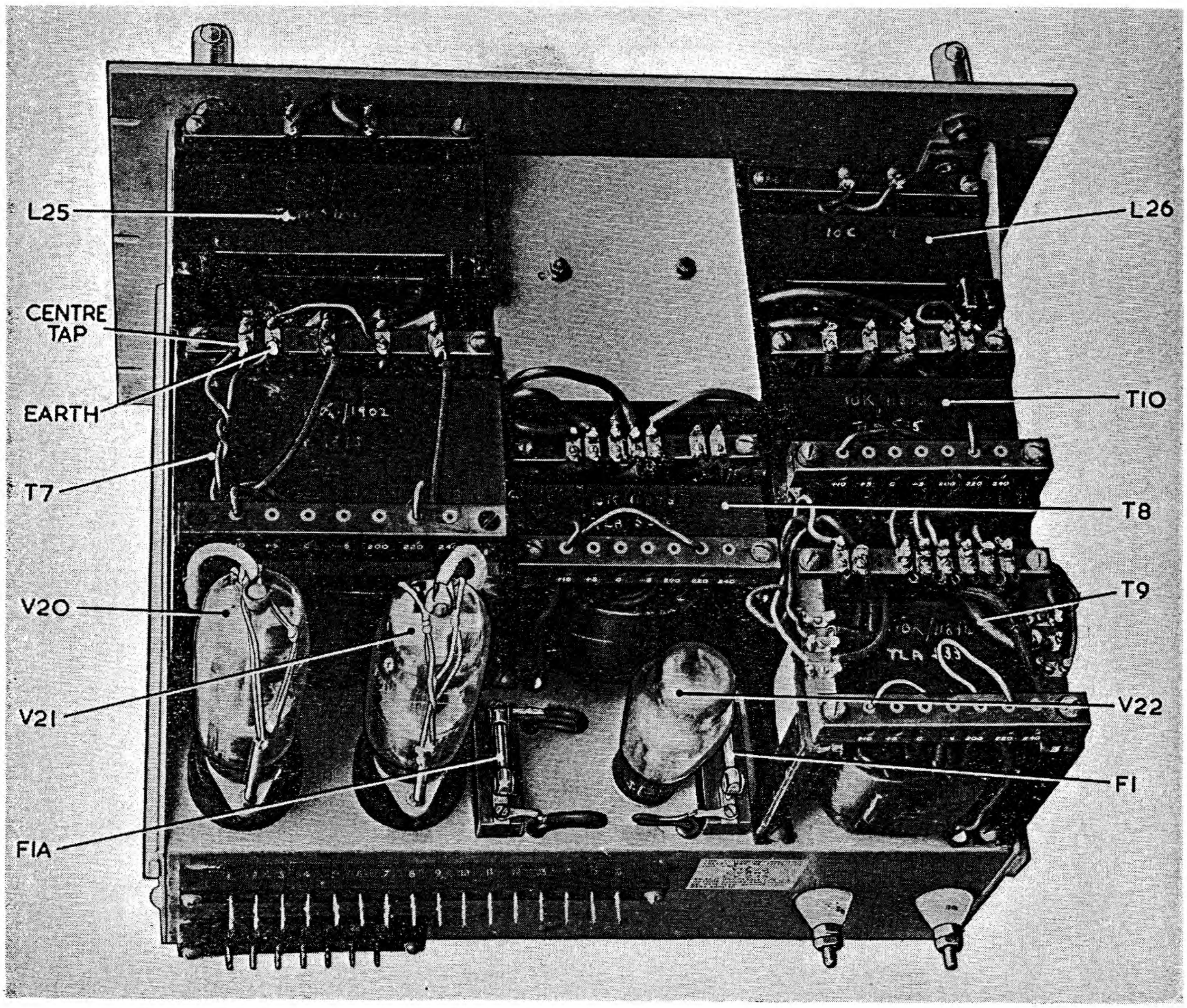


Fig. 16. Modulator power unit—top view

transformer tappings are set at the appropriate point for the supply. Ensure that the correct valve types are fitted (*illustrations and para.* 4) and that the top caps are secure. Insert fuses, or fuse wire as appropriate, of correct values; these are as specified in the following table :—

TABLE 1
Fuse values

Circuit Ref.	*Rating*	*Type*	*Stores Ref.*
F1	1 amp.	Cartridge fuse type 27	10H/130
F1A	1 amp.	Cartridge fuse type 27	10H/130
F1B	1 amp.	Cartridge fuse type 27	10H/130
F2	10 amp.	Fuse wire	5E/2902
F2A	10 amp.	Fuse wire	5E/2902
F2B	5 amp.	Fuse wire	5E/2900
F2C	5 amp.	Fuse wire	5E/2900
F2D	5 amp.	Fuse wire	5E/2900
F2E	5 amp.	Fuse wire	5E/2900

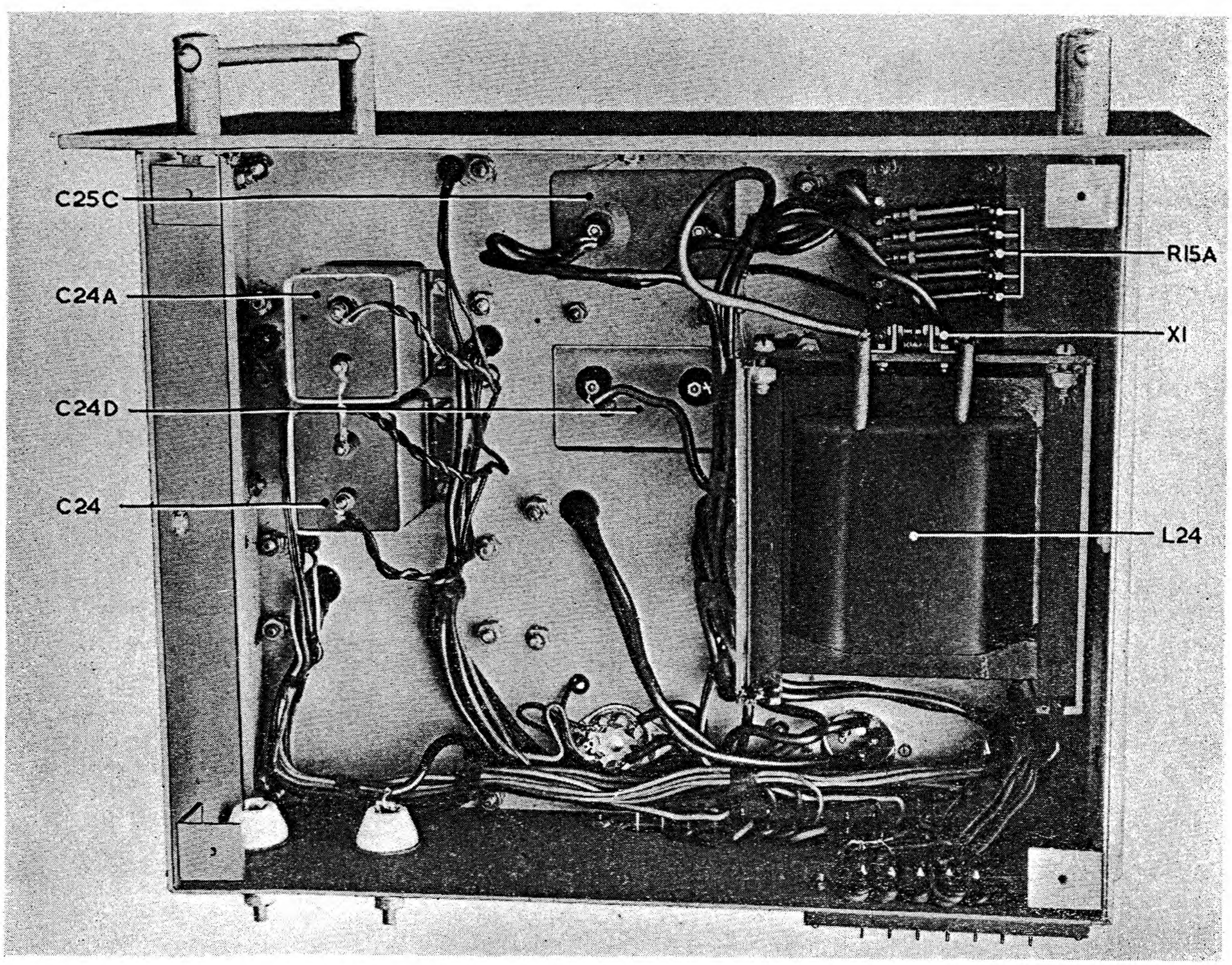


Fig. 17. Modulator power unit—underside view

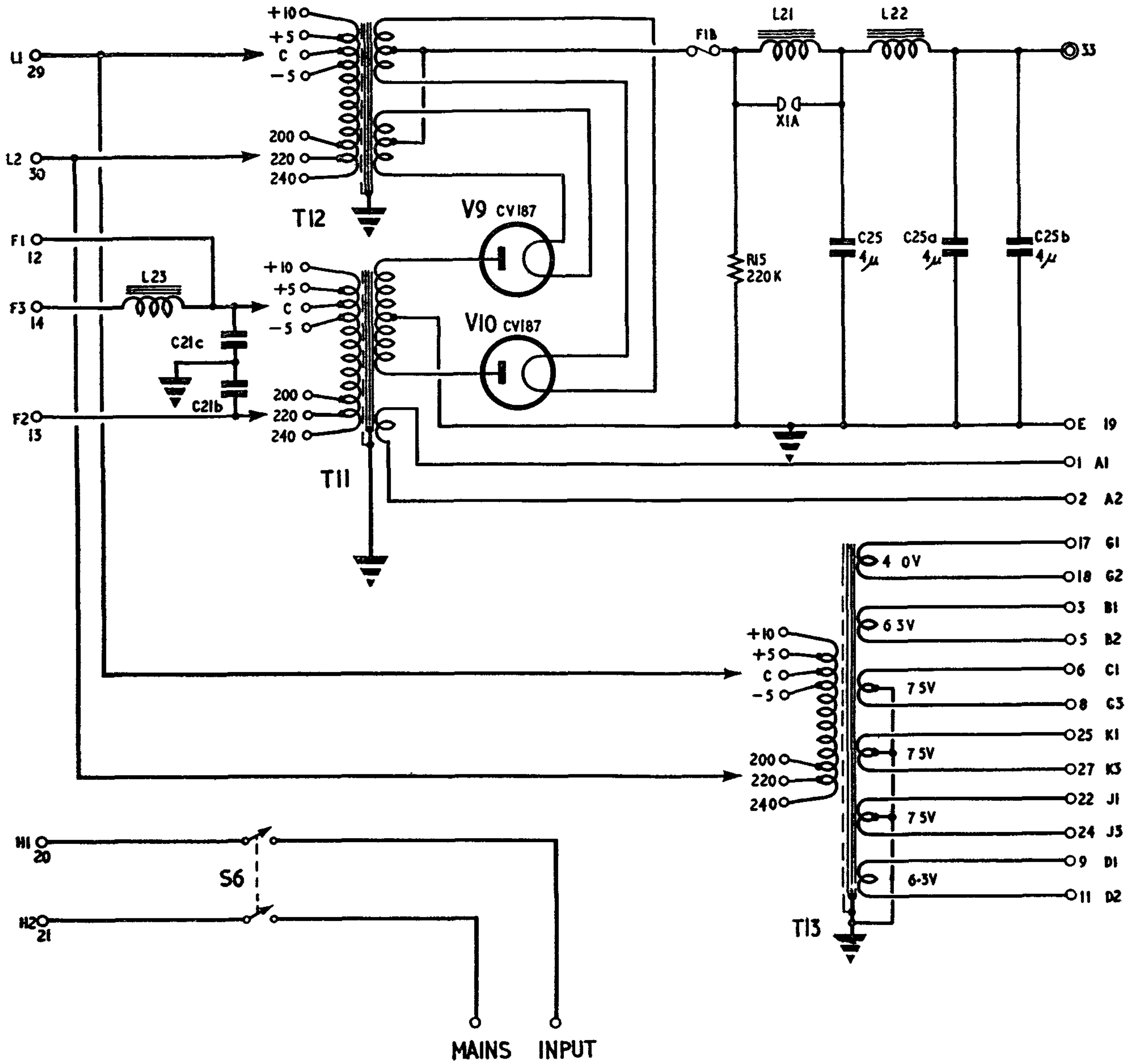


Fig 18 RF power unit—circuit

For remote control operation of the T 1131J and T 1131K the following connections should be made to the terminal strip on the RF power unit

34 and 35 Signal lamp circuit (35 earthed)

36 and 37 To microphone circuit

38 and 39 To monitoring unit (38 earthed)

Note

Remote control operation of the Type 75C transmitter is not required

The connection to the aerial plug at the top of the output unit must be made securely if it is desired to use a dummy aerial during the setting up of a T 1131J or T 1131K transmitter and no suitable lamp is to hand details for the construction of a suitable load can be found in Appendix F of Volume 2 Part 2 The use of a dummy aerial with the transmitter 75C is described in Chapter 3 of this publication

34 Before actually setting up it is advisable to check all static meter readings Make sure the transmitter door is closed remove the crystal and set the POWER SWITCH FOR TUNING at LOW Readings should be about half of those in Table 2

TABLE 2
Static meter readings

Drive unit switch S7A	Meter M2A readings mA (DC)	R/F Output switch S8/8A	Meter M1/2 readings mA (DC)	Modulator unit	Meter M1A readings mA (DC)
CO	20–25	A1	50–65	Cathode current	50–70
T1	46–56	A2	50–65		
T2	48–58	G1	0		
D1	27–38	G2	0		
D2	27–38				
D (Grid)	0				

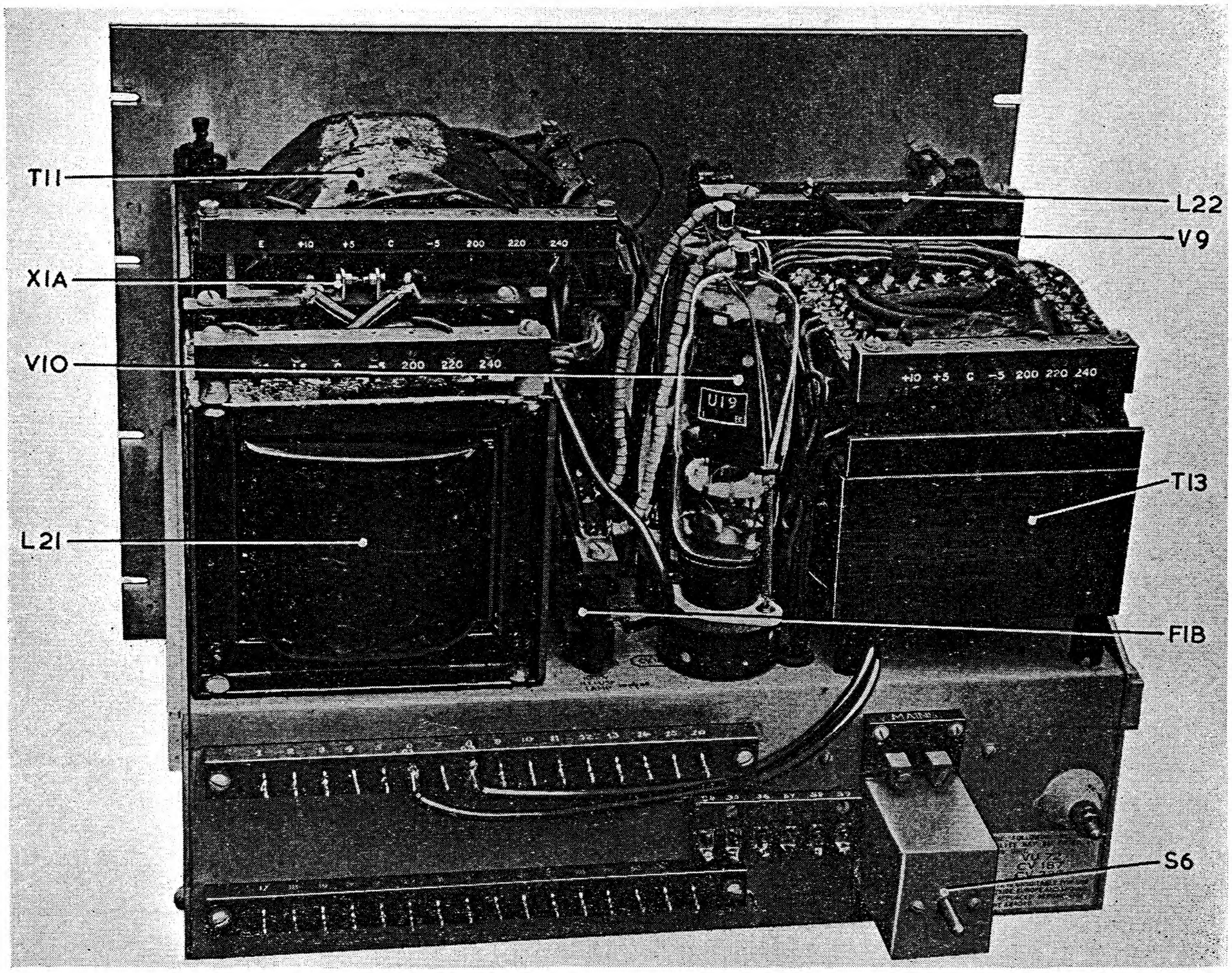


Fig. 19. RF power unit—top view

Setting-up procedure

35. The position of all controls can be seen in fig. 2.

Note . . .

All initial adjustments must be made on LOW *power.*

(1) Open the door and remove LINK FOR NEUT. at the back of the RF output unit.

(2) Close the door and switch on the mains supply to the transmitter.

(3) Set MASTER FILAMENTS switch ON.

(4) Plug a suitable crystal into the socket on the front of the RF driver unit.

(5) Set POWER SWITCH FOR TUNING at LOW.

(6) Set tuning controls as in Table 3. Interpolate for frequencies not given.

Note . . .

Table 3 provides all the information necessary to plot a set of tuning graphs to cover the spread from one transmitter to another.

(7) Set LOCAL-REMOTE switch at LOCAL.

(8) Put the MASTER HT switch ON, wait until red pilot lamps glow faintly.

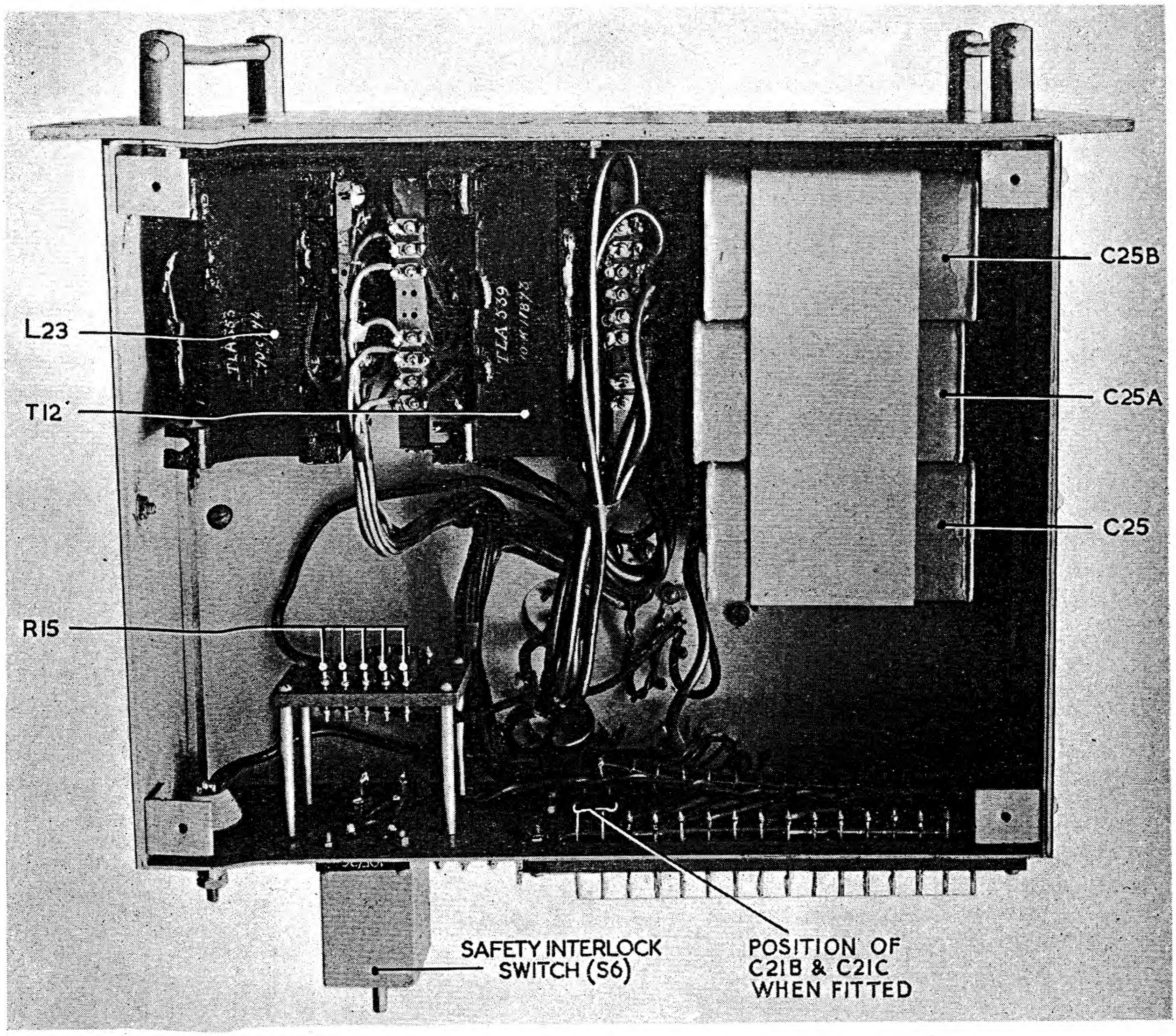


Fig. 20. RF power unit—underside view

TABLE 3

Calibration charts (suitable for preparation of tuning graph)

CRYSTAL FREQUENCY (kc/s)	5550	5850	6050	6250	6500	7000	7500	8110	8670
CARRIER FREQUENCY (Mc/s)	100	105	109	113	117	126	135	146	156
WAVELENGTH (λ) (Metres)	3	2·86	2·75	2·65	2·56	2·48	2·22	2·06	1·94
RF DRIVER UNIT									
CO and treblers	90–94	82–87	80–83	71–76	65–70	55–60	40–45	25–30	17–20
Doubler grid	93–96	85–89	80–83	75–78	68–72	68–62	42–46	27–31	8–12
Doubler anode	80–85	72–77	70–75	62–67	55–60	45–50	35–40	20–25	6–11
RF OUTPUT UNIT									
Amplifier grid	94–98	85–89	83–87	74–78	68–73	60–65	43–48	30–35	15–20
Amplifier anode	75–80	69–84	66–70	60–65	55–60	15–50	32–37	15–20	5–10
Aerial tuning	85–90	76–81	74–78	65–70	60–65	50–55	47–52	30–35	20–25

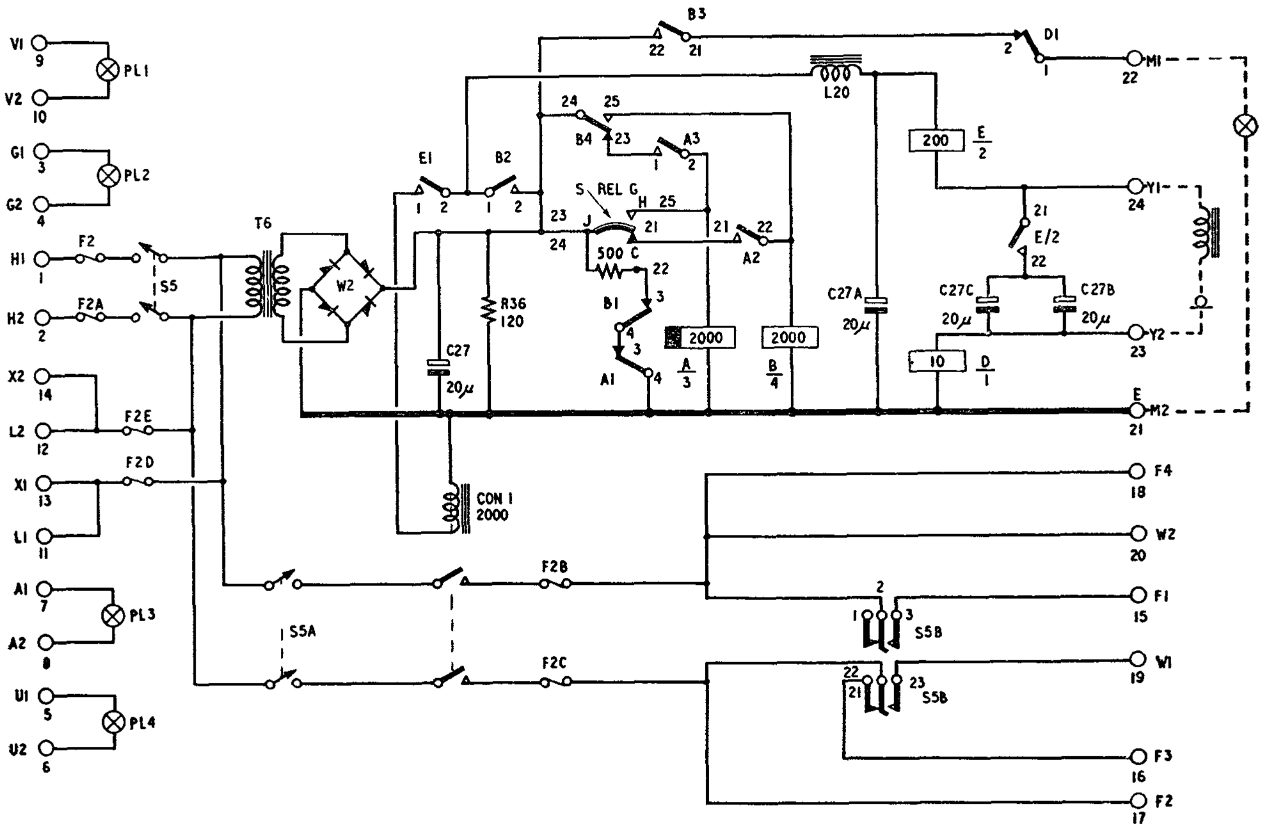


Fig 21 Control unit—circuit

RF driver unit

36. (1) Set the meter switch to T1 Rotate the C O AND TREBLERS control until the lowest reading is reached on the meter (about 20 mA)

(2) Switch to D1 and set the DOUBLER GRID control for the highest reading (about 24 mA)

(3) Now set DOUBLER ANODE control for the lowest meter reading (approx 20 mA)

(4) Check that a similar reading is given with switch at D2

RF output unit—preliminary adjustment

37. (1) Put GRID CURRENT meter switch at G1 Set AMP GRID control for greatest meter reading (3–4 mA)

(2) Repeat with switch at G 2

(3) Reset to G1 and check that readings do not differ by more than 2 mA

(4) Put POWER SWITCH FOR TUNING at FULL and check that brightness of the red pilot lamps increases

(5) Put COUPLING control to minimum (i e pointer at extreme left of scale)

(6) Set AERIAL control at zero

(7) Re adjust RF driver and output units as in para 36 and para 37 sub para (1) (2) and (3) An increase in grid current will probably be obtained

(8) Rotate AMP ANODE control If a sharp dip in meter reading is obtained the stage will have to be neutralized as below

Procedure for neutralizing the P A

38.

Note

The T 1131J and K are much more difficult to neutralize than the T1131A and B as the control positions are very critical When the P A valves are incorrectly neutralized the power output is considerably reduced the procedure must therefore be repeated if any doubt exists as to whether or not the valves are fully neutralized

(1) Rotate the AMP ANODE control through its full range observing the GRID CURRENT meter Dips should occur for various positions of the control

(2) Alter NEUT control by one position so as to increase the grid current

(3) Repeat (1) dips should be less pronounced

(4) Reset AMP GRID control as in para 37 (1) (2) and (3)

(5) Repeat above (1) to (4) until the number of dips in grid current is reduced to zero As the final setting of the NEUT control is critical it will be necessary to sub divide a division on the scale to find the optimum position

(6) Switch off MASTER HT Put POWER SWITCH FOR TUNING at LOW

(7) Replace LINK FOR NEUT

(8) Switch on MASTER HT.

(9) Set ANODE CURRENT meter switch to A1. Adjust AMP. ANODE control for lowest reading.

(10) Switch to FULL on POWER SWITCH FOR TUNING.

(11) Adjust AMP. ANODE control and see whether the anode current meter indicates the lowest value when grid current is at its highest value. If so proceed as below, if not repeat as in para. 37 and para. 38 (1) to (11).

(12) Check that with switch in positions A1 and A2 the ANODE CURRENT meter gives reading within 6 mA of each other and within the range 40 to 50 mA.

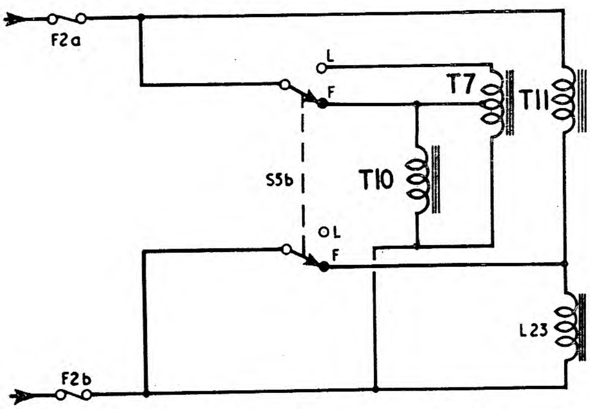


Fig. 22. Control unit—low power switch

Coupling adjustment

39. (1) Adjust AERIAL control for highest value of anode current.

(2) Increase COUPLING until anode current reaches about 60 mA.

DO NOT INCREASE BEYOND THIS VALUE.

(3) Adjust AMP. ANODE control for lowest anode current reading.

(4) Repeat (1) to (3) but with the anode current at least 70 mA.

(5) Check that A1 and A2 give readings which add up to 140 mA and are equal to within 6 mA.

Final adjustment of RF units

40. (1) Set POWER SWITCH FOR TUNING at LOW.

(2) Insert crystal for an output frequency of approximately 100 Mc/s ; tune the driver unit for maximum output making sure that the grid current in the doubler stage is not less than 2 mA.

(3) Tune AMP. GRID for maximum grid current.

(4) Switch to full power ; tune AMP. ANODE for lowest reading and AERIAL for highest reading on the meter.

(5) Re-check all control settings, ensure that maximum grid current occurs when minimum anode current occurs.

(6) Switch to low power and replace the crystal by one giving an output frequency of approximately 150 Mc/s.

(7) Repeat (2) to (5), but the grid current reading in (2) must be above 5 mA.

Note . . .

WHEN TUNING at 156 Mc/s the anode current must not be increased initially above 60 mA. The final setting however, should be as quoted in para. 39 (5).

Adjustment of tuning coils

41. Should any circuit not cover the full frequency range, slacken the securing nuts on the appropriate coil and bend it to increase or decrease inductance as necessary. Opening the coil will increase the resonant frequency ; closing will decrease it. *This adjustment should only be done on installation if found necessary.*

Note . . .

Great care must be taken not to break the insulators.

42. The RF stages are now set up correctly and typical readings to be expected are given in Table 4 for normal working and Table 2 for static cases.

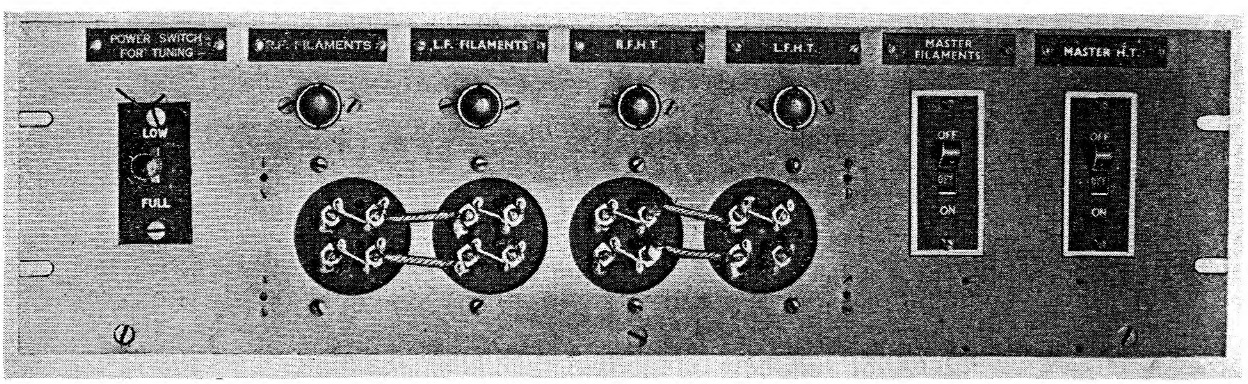


Fig. 23. Control unit—panel layout

TABLE 4
Working meter readings

	Selector switch position	Crystal Frequency in Kc/s						
		8670	8110	7500	7000	6500	6050	5550
Drive unit	C O	20–25	20–25	20–25	20–25	20–25	20–25	20–25
	T 1	44 52	44–52	44–52	44 52	44–52	44–52	44–52
	T 2	50–60	50–60	50–60	50–60	50–60	50–60	50–60
	D 1	44 54	44 54	44–54	40–50	40–50	40–50	40–50
	D 2	40–50	40–50	40–50	40–50	40–50	40–50	40–50
	D grid	3–5	3–5	3–5	3 5	3–5	3–5	3–5
Output unit	G 1	5 10	5–10	5–10	5–10	6–10	6–10	6–10
	G 2	5–10	5–10	6–10	6–10	6–10	6–10	6–10
	A 1	64–72	64–72	64–72	68–76	68–76	68–76	64–74
	A 2	64 72	64–72	64 72	60–70	68–76	68–76	64–74
	A 1 (unloaded) Dip	42 50	42–50	42–50	35–50	35–45	35–45	35–45
	A 2 (unloaded) Dip	42–50	42 50	42–50	35–50	35–45	35–45	35–45

Note

When the RF circuits are tuned to resonance and modulation applied the anode currents are lower than when off resonance Hence when the circuits are off tune the power dissipated in the valve anodes is above normal if the POWER SWITCH FOR TUNING *is set at high under these conditions the maximum permissible valve ratings may be exceeded When checking static readings and the transmitter is known to be tuned up correctly it is permissible to remove the crystal and apply full power Under no circumstances can full power be applied when the transmitter is untuned*

43. When the transmitter is neutralized at the mid band frequency it will be virtually correct for all frequencies hence on setting up at some other frequency the full neutralizing procedure need not be followed instead check that when the dip in anode current occurs the grid current is at its peak value Alter NEUT control very slightly if necessary

Modulator unit

44. The depth of modulation should be set in the following manner —

(1) Switch on the transmitter—use low power

(2) Speak into the microphone and check that the MODULATOR ANODE CURRENT meter reading fluctuates

(3) Adjust VOL CON (i e modulation depth control) until the peak reading on the meter is —

 (a) T 1131J 100 mA

 (b) T 1131K 85 mA

(4) Switch to full power and ensure that the peak reading is 175 mA or 200 mA according to whether the transmitter is a K or a J

(5) The transmitter is now set up for 100 per cent modulation on peaks of speech monitor the output from the transmitter by plugging a pair of headphones into the jack marked MONITOR TELEPHONE The reproduced speech must be clear and undistorted if over modulation is taking place excessive clipping of the peaks will result so causing the speech quality to deteriorate very markedly To remedy such a condition reduce the modulation depth by turning down the VOL CON , whilst monitoring the output until no objectionable distortion is audible

(6) The transmitter is now completely set up and is ready for use

SERVICING

Ganging of condensers C34A, B and C

45. Normally it is not necessary to adjust these condensers unless the driver unit has been mishandled The procedure for re ganging is as follows —

(1) Set the ganged condenser control to 18

(2) Set the trimmers C35 and C35A so that a quarter of the moving vanes is meshing with the fixed ones

(3) Insert a crystal which oscillates at about 8 67 Mc/s

(4) Switch on full power and MASTER HT

(5) Set the meter switch at the C O position and vary C35 As this is done a minimum reading will be noticed in the cathode current when C35 is at a certain setting When C35 is altered in one direction the current increases rapidly whereas when it is altered in the opposite direction the current increases slowly The final setting for this condenser is such that a current of 1 5–2 mA greater than the minimum value is obtained the condenser being rotated in that direction which gives a slow increase of current

(6) Switch to T1 and adjust L28 for resonance, by stretching or compressing the coil.

(7) Switch to T2 and adjust L29 for resonance.

(8) Replace the crystal with one having a resonance frequency of about 5·55 Mc/s.

(9) Switch to T1 and tune with C.O. AND TREBLERS control. Repeat (5) and (6). Any change that may be required will be slight.

(10) Switch to T2 and ensure that resonance occurs at 90±2 divisions.

(11) Set the meter switch at DOUBLER GRID and tune the grid circuit for resonance.

(12) Switch to T1 and note the scale reading for resonance. If the value differs from that for T2 by more than one division, compress or stretch the coil L28 until the readings are inside the above limits (*para.* 41).

(13) Re-insert the first crystal. Switch to T2 and T1, tuning for resonance in both cases. If these differ by more than one division, C35A needs to be adjusted. If the T1 reading is greater than the T2 reading, decrease the value of C35A ; if less than the T2 reading, increase C35A. The final setting of C35A must be such that the T1 and T2 settings are equal to within a division.

(14) Re-insert the second crystal. Check that T1 and T2 are within the limits stated in sub-para. (12).

(15) Re-insert the first crystal. Tune for resonance for the T1 and T2 stages. Adjust C35 so that the cathode current is greater than the minimum value by 1·5 mA. C35 is rotated in the direction that gives a gradual increase in current.

(16) Re-insert the second crystal and ensure that the circuit oscillates properly.

(17) If, after carrying out the above procedure, the oscillator stage will not function for any position of C35, it should be suspected that the iron core of L27 has become misplaced. If this is so (*see note*), set the C.O. AND TREBLERS control at 18 and screw C35 a quarter of the way in. Adjust the iron core by the screw which juts out through the bottom of the can and chassis until oscillations start. The final position should be the one giving a current about 1·5 to 2 mA greater than the minimum value. The current increases rapidly if the core is adjusted in one direction but only slowly in the other ; it is in this second direction that it should be altered from the minimum value to give the final value.

Note . . .

The core of L27 must not be moved unless it is certain that the value of L27 has altered.

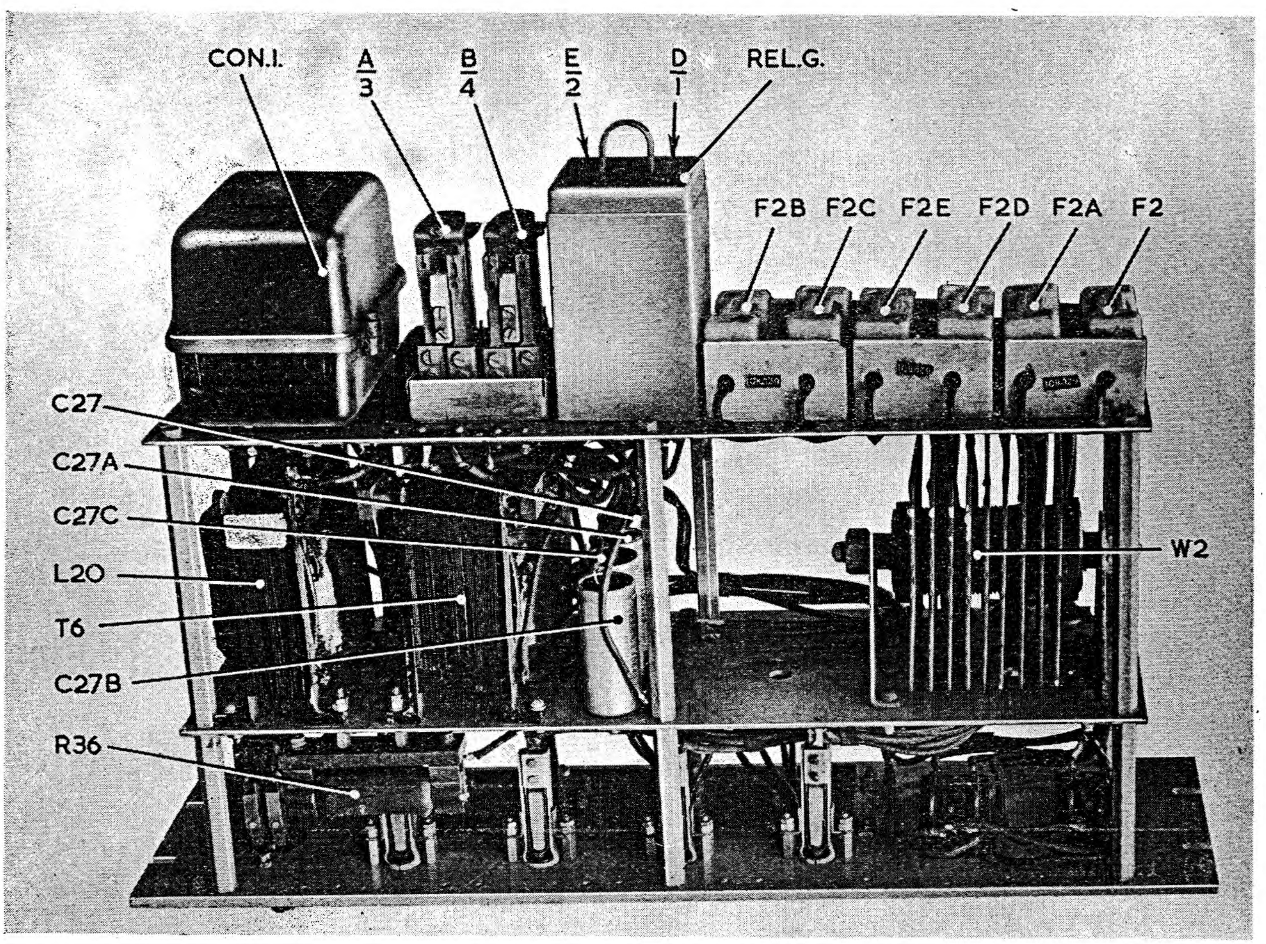


Fig. 24. Control unit—side view

46 It must be realised that the second trebler circuit is not provided with a trimming condenser consequently the inductance is the only component that can be adjusted to effect correct tracking It follows that this circuit must be adjusted first and the others brought into line with it By following this procedure no difficulty should be experienced in covering the full frequency range (i e 100 to 156 Mc/s) with resonance points for all three circuits lying between scale settings of 18 and 90

Note

An additional indication of the accuracy of alignment of the oscillator and treblers stages is given by a 100 volt 15 watt lamp connected across the output of the doubler stage in place of the low impedance feeder to the RF output unit

Adjustment of link coupling

47. The output of the V4 V5 stage is coupled to the grid circuit of the RF output valves V6 and V7 by a low impedance link Although the degree of coupling is not critical it may require adjustment when the transmitter is installed Only the coil on the driver unit need be adjusted

48 Vary the position of the grid coupling coil L34 until the double anode current and the amplifier grid current have the values given in Table 4 If the coupling is further increased the doubler anode current will increase whilst the amplifier grid current remains constant also there will be a less pronounced minimum in the doubler anode current at resonance These two factors are a good guide for indicating the optimum setting of L34

Adjustment of neutralizing condenser vanes

49. If the procedure for neutralizing the trans mitters as detailed in para 35 and 36 does not give satisfactory results it is possible that the condenser vanes have slipped relative to the knob If so the grub screws securing the extension spindle to the slow motion drive should be loosened and the knob set at its mid position relative to the scale Alter the condenser setting by rotating it until the output stage is almost fully neutralized Finally tighten the grub screws and complete the neutralization in the normal manner

WARNING

If the modulator power unit is to be removed for servicing, the valves V20 and V21 should first be extracted from their valve holders Otherwise, due to the valves standing quite high, they will jam against the front of the rack

Fault finding

50. Most of the simple faults which may develop in the transmitter can be traced by reference to the following fault location chart

FAULT LOCATION CHART

Transmitters, Types T 1131J, T 1131K and 75C

Note

Most faults will be indicated by deviations from the the correct meter readings Those obtained for the T 1131J and K only are to be compared with the normal readings written in R A F form 4070 for the particular trans mitter before fault location is attempted

	Symptom	Fault	Remedy
1	No filament alight No glow from green fila ment lamps	No filament supplies (a) Door switch not making con tact (b) Main fuses F2 and F2A on extreme left hand side at rear of the control unit U/S (c) Filament fuses F2D and F2E centre fuses at rear of the control unit U/S	 (a) Close door correctly (b) Check continuity of fuses Renew 10 amp fuse wire (Stores Ref 5E/2902) (c) Check fuses for continuity Renew if faulty with 5 amp fuse wire (Stores Ref 5E/2900)
2	Filaments light No glow from green filament lamps	Lamps U/S	Check lamps Renew if faulty with lamps filament G P O No 2 6V (Stores Ref 5LX/959101) Remove lamp caps with tool lamp cap extracting (Stores Ref 110G/239) and lamps with tool lamps extracting (Stores Ref 110G/238)

	Symptom	Fault	Remedy
3	No readings on meters red HT lamps fail to glow	(a) LOCAL/REMOTE switch to REMOTE (when testing from LOCAL position) (b) HT contactor CON 1 fails to operate No volts across CON 1 coil (located at the rear of the control unit)	(a) Set LOCAL/REMOTE switch to LOCAL (b) Check operation of contacts B2 and E1 on relays $\frac{B}{4}$ and $\frac{E}{2}$
4	Readings on meters No glow from red HT lamps	Lamps U/S	Check lamps Renew if faulty with lamps filament G P O No 2 6V (Stores Ref 5LX/959101)
5	No meter readings on meters of drive unit or output unit Red HT lamps fail to glow	No HT supplies from RF power unit Type 778 (a) HT fuses F2B and F2C on extreme right hand side at rear of control unit U/S (b) HT contactor CON 1 not made	(a) Check continuity of fuses Renew if faulty with 5 amp fuse wire (Stores Ref 5E/2900) (b) Check operation of thermal delay circuit (*fault No* 7)
6	No meter readings in drive unit or output unit meters Red HT lamps glow	(a) HT fuse F1B on RF power unit U/S (b) Rectifier valves V9 and V10 in RF power unit U/S	(a) Check continuity of fuse Renew if faulty with 1 amp cartridge fuse Type 27 (Stores Ref 10H/130) (b) Replace valves with a serviceable CV187 CV235 or CV1072
7	No meter readings	No HT supplies Thermal delay fails to operate (a) Contact A1 or B1 not making (b) Relay $\frac{A}{3}$ not made (c) Relay $\frac{A}{3}$ fails to hold in (d) Relay $\frac{B}{4}$ not made	(a) Examine contacts (b) Ensure that strip S makes to H on thermal relay (c) Examine contact A3 (d) Ensure that strip S makes to C on thermal relay Examine contacts A2 and B4

Note

Relays $\frac{A}{3}$ *and* $\frac{B}{4}$ *are located at rear of the control unit* (*fig* 24)

	Symptom	Fault	Remedy
8	No change in cathode current of oscillator valve for any position of C O / TREBLERS control	Crystal oscillator valve V1 fails to oscillate (a) Defective crystal (b) Defective oscillator valve	(a) Renew crystal (b) Renew valve with CV1052
9	No oscillator valve cathode current	Defective oscillator valve V1	Renew valve with CV1052
10	No 1st trebler valve cathode current	Defective 1st trebler valve V2	Renew valve with CV1079
11	No change in 1st trebler cathode current as C O / TREBLERS control is rotated		
12	No 2nd trebler valve cathode current	Defective 2nd trebler valve V3	Renew valve with CV1079
13	No change in 2nd trebler cathode current as C O / TREBLERS control is rotated	Defective 2nd trebler valve V3	Renew valve with CV1079

Fault Location Chart *(continued)*

Symptom	Fault	Remedy
14 No doubler grid current	(a) Defective doubler valve or valves V4 and V5 (b) Coupling link L30/L31 between 2nd trebler and doubler stage out of position or disconnected	(a) Replace both valves with a matched pair of serviceable CV315 s and re neutralize (b) Place in correct position or re connect
15 No doubler cathode current	Defective doubler valve or valves V4 and V5	Replace both valves with a matched pair of serviceable CV315 s and re neutralize
16 No amplifier grid current	(a) Defective amplifier valve or valves V6 and V7 (b) Coupling link L34/L35 between doubler and amplifier stages disconnected	(a) Replace both valves with serviceable CV315 s as in 15 (b) Re connect link
17 Unequal amplifier grid current readings for positions G1 and G2 of the GRID CURRENT meter switch	(a) Unmatched amp valves (b) Amplifier valves not neutralized correctly	(a) Check and replace if necessary with serviceable CV315 s (b) Check neutralizing
18 No amplifier anode current	LINK FOR NEUT removed from socket at rear of the output unit	Insert link in socket
19 Aerial circuit fails to load	(a) Coaxial cable disconnected (b) Coupling coil L38/L39 disconnected	(a) Re connect (b) Re connect
20 No reading on anode current meter on modulation unit Red HT lamps fail to glow	No HT supply from the modulator power unit (a) HT fuses F2B and F2C on extreme right hand side at rear of the control unit U/S (b) HT contactor CON 1 not made	 (a) Check continuity of fuses Renew if faulty with 5 amp fuse wire (Stores Ref 5E/2900) (b) Check operation of thermal delay circuit (*Fault* 7)
21 No reading on anode current meter on modulator unit Red HT lamps glow	(a) HT fuse F1A on modulator power unit U/S (located adjacent to rectifier valves) (b) Rectifier valves V20 and V21 in modulator power unit U/S	(a) Check continuity of fuse Renew if faulty with 1 amp cartridge fuse Type 27 (Stores Ref 10H/130) (b) Replace valves with serviceable CV187 CV235 or CV1072
22 Incorrect static modulator anode current	Defective modulator output valves V18 and/or V19	Replace valve or valves with a serviceable CV1076
23 No variation in reading on anode current meter on modulator unit when microphone is being used	(a) Fuse F1 on modulator power unit U/S (located adjacent to rectifier valves) (b) Rectifier valve V22 in modulator power unit U/S	(a) Check continuity of fuse Renew if faulty with 1 amp cartridge fuse Type 27 (Stores Ref 10H/130) (b) Replace valve with a serviceable CV1071

	Symptom	Fault	Remedy
24	No variation in reading on anode current meter on modulator unit when microphone is being used Static meter reading normal	No output from modulator (a) LOCAL/REMOTE switch in wrong position	(a) Set to correct position
		(b) Microphone U/S or not correctly connected	(b) Renew microphone or check connection
		(c) Defective valve in modulator unit	(c) Check all modulator valves for serviceability Renew if faulty
		(d) VOL CON turned fully to the left	(d) Adjust VOL CON
		(e) Faulty control lines	(e) Check and rectify
25	No signal in monitor telephones when transmitter is modulated but meter readings normal	(a) Telephones U/S	(a) Renew telephones
		(b) Monitor valve V8 in output unit U/S	(b) Replace valve with a serviceable CV1067
		(c) Monitor telephone jack faulty	(c) Check contact springs on jack

Chapter 2

THE TONE OSCILLATOR

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

APPENDIX

Cırcuıt descrıptıon

1 The tone oscıllator used to be a standard unıt ın the earlıer versıons of the transmıtters Type T 1131J and T 1131K—vız the T 1131 T 1131A and T 1131B—but ıt ıs now obsolescent As ıt may be encountered ın some of these transmıtters a descrıptıon ıs gıven

2 The unıt ıs used to provıde tone modulatıon and plugs ınto a socket ın the modulator unıt The maın parts are an oscıllator a keyıng relay and a metal rectıfier to supply DC to the relay

3 The oscıllator ıs a 1000 c/s shunt fed Hartley cırcuıt as shown ın fig 1 The tuned cırcuıt L18 and C20 ıs effectıvely across anode and grıd of the oscıllator sınce the condensers C17C and C19 are used for DC blockıng The tappıng on L18 ıs taken to earth to complete the AF path Bıasıng ıs partıally automatıc usıng C19 and R28 and partıally by R23C ın the cathode of V13 Some current feedback takes place across thıs latter resıstor as ıt ıs not by passed thıs can be regarded as havıng a stabılızıng actıon as ıt reduces the tendency of the frequency to vary wıth alteratıons ın HT voltage The output ıs applıed across the resıstor R32C and the potentıometer R41 C17B ıs a DC stopper and R41 ıs used to set the modula tıon depth (usually 100 per cent) The valves V11 and V12 ın the screenıng box unıt are not used when MCW ıs employed because the output from the tone oscıllator ıs fed to the prımary of the transformer T2

4 The cırcuıt ıs arranged so that the oscıllator ıs ınoperatıve durıng RT modulatıon thıs ıs effected by contact J2 on relay $\frac{J}{2}$ whıch ıs energızed from the valve heater supply through the half wave metal rectıfier W1 An electrolytıc condenser C26 smooths the output so reducıng the tendency of the relay to chatter

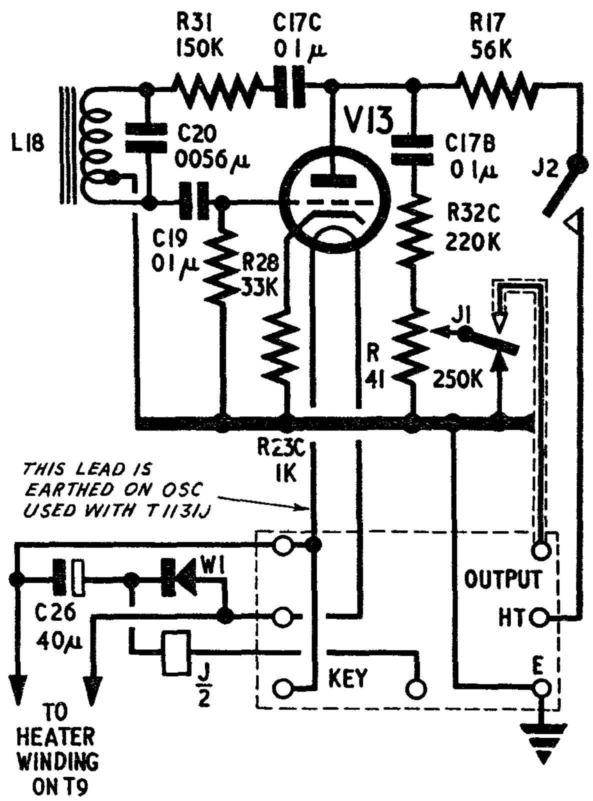


Fıg 1 Tone oscıllator—cırcuıt

5. A tone oscillator used in a T.1131J must have one side of the heater earthed (*fig.* 1), whereas in the oscillator used for the T.1131K the centre-tap is earthed in the power supply.

6. The layout for servicing purposes is quite simple and is shown in fig. 2 and 3.

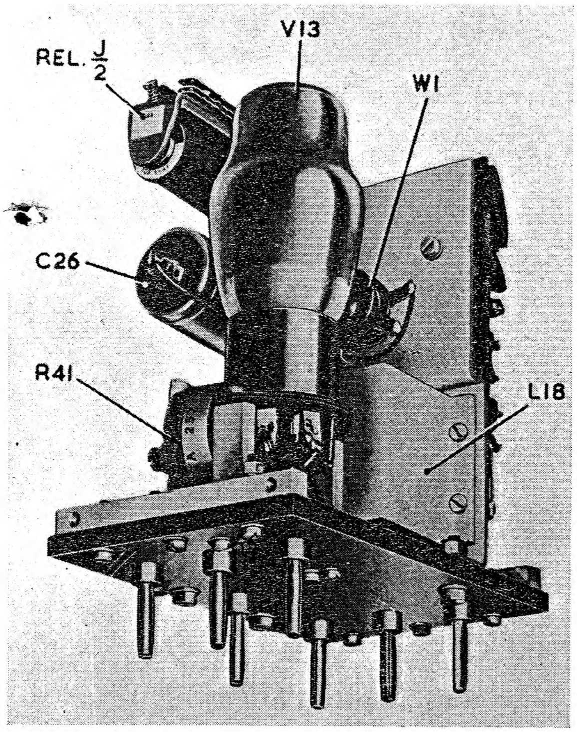


Fig. 2. Tone oscillator—front view

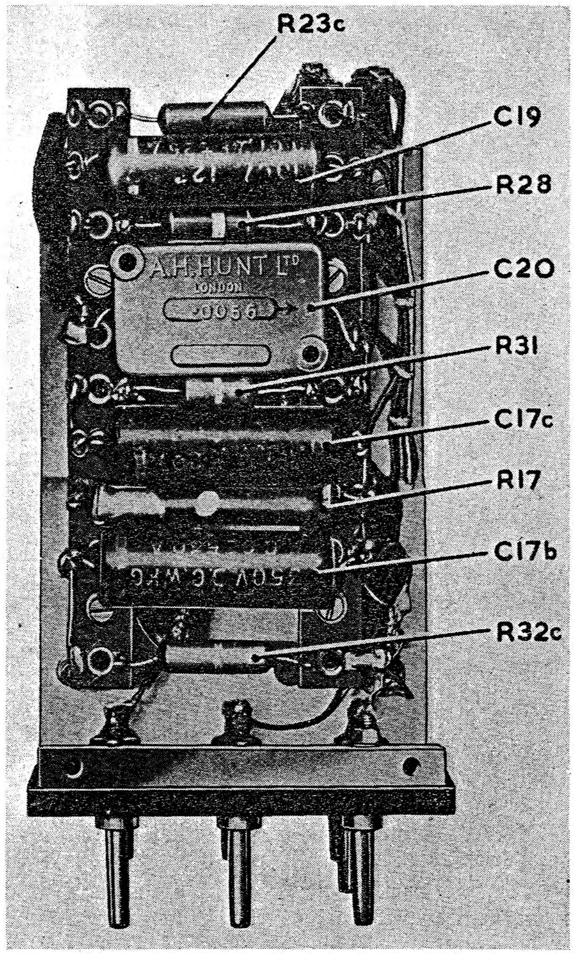


Fig. 3. Tone oscillator—rear view

Chapter 3

TRANSMITTER TYPE 75C—COMMON AERIAL WORKING

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

General description

1. 'Common aerial working' (CAW) is the name given to a system which enables a number of VHF transmitters up to a maximum of eight to be fed into a single aerial Similarly up to eight receivers can be fed from another single aerial

2. As the maximum number of transmitters or receivers which may be connected to a single aerial is eight it is necessary to provide additional aerials when the number of either exceeds the maximum for a single aerial

3. When however a VHF installation consists of less than eight transmitters or receivers and the installation is divided into two groups in offices at opposite ends of the ship it will be necessary to provide aerials to each of the offices It is not practicable to connect transmitters or receivers fitted in a forward office to a common aerial sited aft or vice versa

Method of obtaining CAW

4. The transmitters or receivers are fed to or from their respective common aerials via a multi way junction box through a resonator tuning unit using a single resonator for each transmitter and a double one for each receiver Each resonator is tuned to the frequency of its associated transmitter or receiver Three way five way or nine way junction boxes are available (*fig* 1 *and* 2)

5. Flexible connections between transmitter and resonator and receiver and resonator should be as short as possible In aircraft carriers all flexible connections should be of Pattern 13831 cable in capital ships and cruisers of Pattern 13821 cable If it is necessary to use alternative cable the characteristic impedances should be 100 ohms and 70 ohms respectively

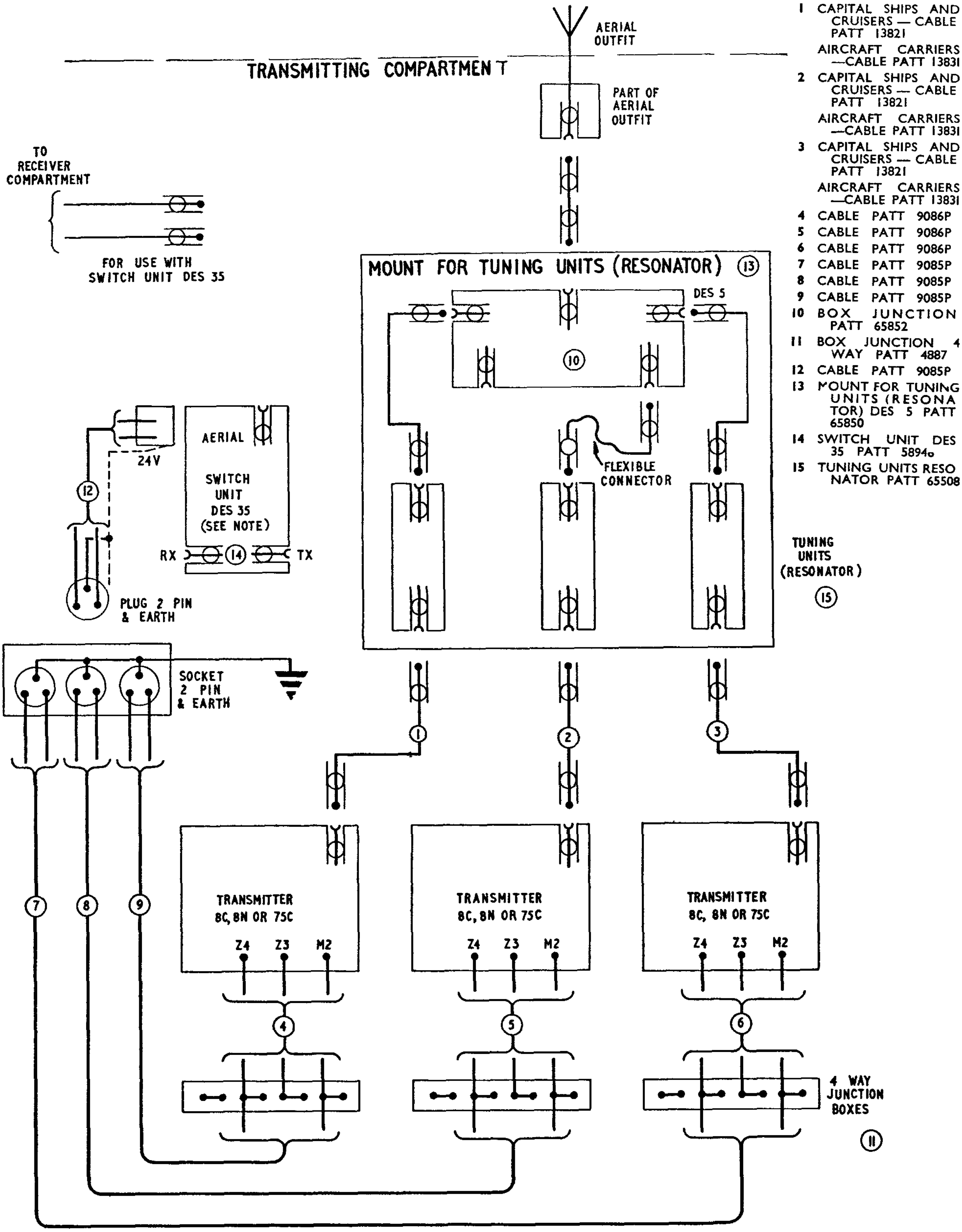
6. The flexible connectors Pattern 65768 used between resonators and junction boxes should be one quarter wavelength in length at mid band frequency The lengths of internal connections in resonators and junction boxes are to be included in the quarter wavelength measurement

Use of Type M switch with CAW (emergencies only)

7. When CAW is installed a Type M switch modified to Pattern 58946 switch unit Design 35 is to be fitted or retained in each VHF office containing transmitters This is only for emergency use when the number of effective aerials available for the dual function of transmission and reception is reduced to one only

8. Under this condition the aerial available is taken direct to the AERIAL socket of the switch unit and the RF output from the selected transmitter is taken direct to the TRANSMITTER socket of the switch unit There is also a 24 volt DC socket on the switch unit for the 24 volt supply from the transmitter in use The aerial socket of the receiver common aerial junction box should be connected to the RECEIVER socket of the switch unit by means of the feeder cable link provided By this arrangement eight receivers and one transmitter may be kept in operation with only one aerial available

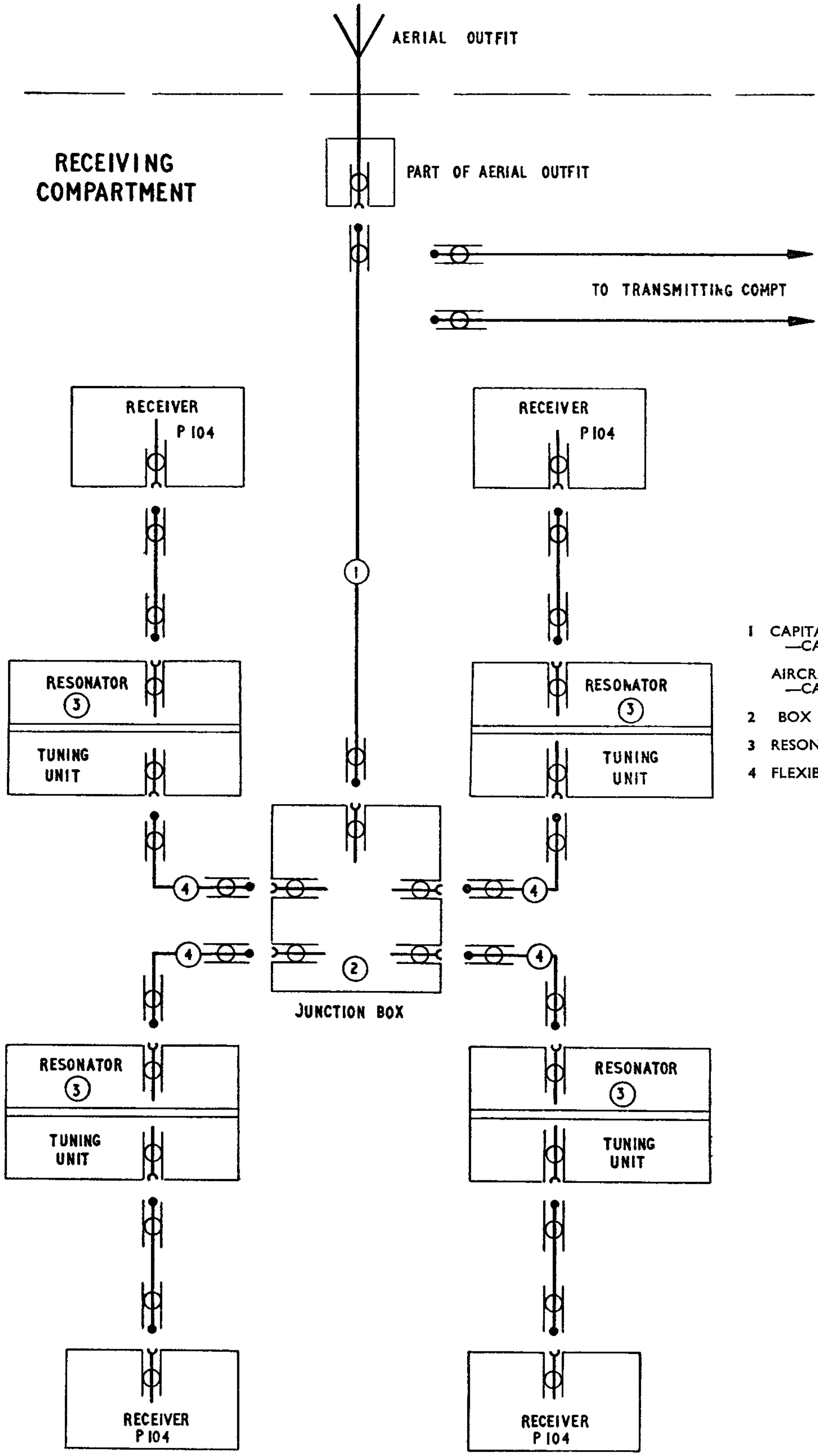
9. It will be seen that with this arrangement for transmission and reception on one aerial only the receivers will be completely cut off during transmission due to the change over action of the Type M switch when the send receive switch is closed



NOTE — SWITCH UNIT DES 35 2-PIN PLUG & SOCKETS AND 4-WAY JUNCTION BOXES ARE FOR EMERGENCY USE ONLY

NUMBERS SHOWN THUS — (5) REFER TO KEY

Fig 1 Common aerial working (transmitters)



1 CAPITAL SHIPS AND CRUISERS —CABLE PATT 13821

AIRCRAFT CARRIERS —CABLE PATT 13831

2 BOX JUNCTION PATT 65852

3 RESONATOR PATT 53293

4 FLEXIBLE CONNECTION PATT 65768

NOS SHOWN THUS (5) REFER TO KEY

Fig 2 Common aerial working (receivers)

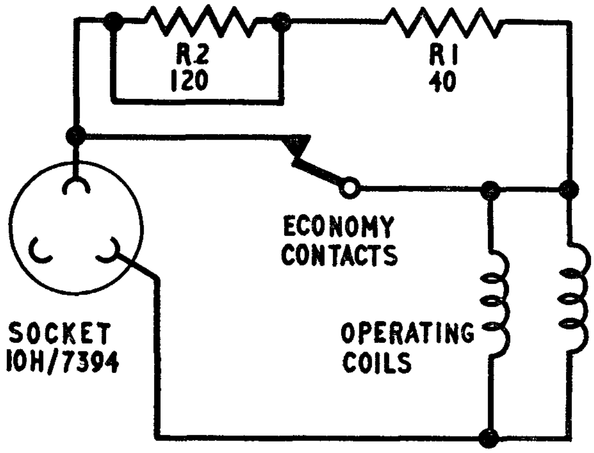


Fig 3 Type M switch (12V) (Pattern 58946)

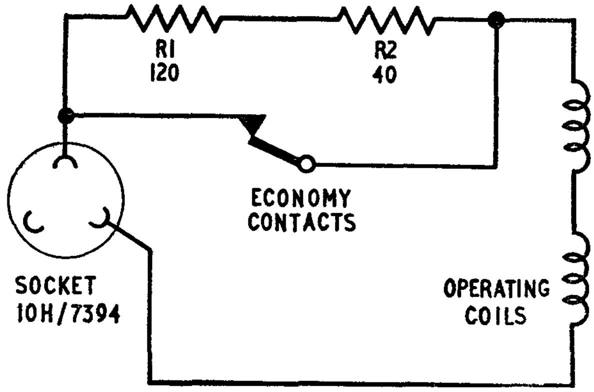


Fig 4 Type M switch (24V) (Pattern 58946)

Note

The feeder cable run between the aerial proper and transmitter 75C *via the common aerial outfit or Type M switch is to be kept as short as possible and is in no case to exceed* 120 *ft With receiver outfit CDU* 150 *ft is allowed*

Pattern 58946 switches

10. When Pattern 58946 switches are not available a Type M switch (Stores Ref 10F/166) and box of parts for modifying them to Admiralty Pattern 58946 should be demanded (box of parts Pattern 57991 complete with modifying instructions) (*fig* 3 *and* 4)

11. Type M switches are normally supplied wired for 12V working but a Pattern 58946 switch unit is a Type M switch that has been modified and also had its coils and economy resistor connected for 24V operation In either case care should be taken to see that whichever unit is supplied it is wired for the voltage on which it is intended to be operated Normally with common aerial working for Type 87Q the switch is used on 24V and for Type 87M on 12V

12. For 12V operation the coils are wired in parallel and connected in series with an economy resistor of 40 ohms the 120 ohms being shorted (*fig* 3)

13. When used on 24V the coils are in series and the short removed from the 120 ohm resistor thereby (*fig* 4) increasing the resistance in the circuit to 160 ohms the resultant wattage consumption remains the same i e 3 watts but approximately 14 watts is required for initial operation

Common aerials

14. The aerials which may be used in CAW are —

87M	APH* ARU* ANC‡ ANZ‡
87P	AJD* ANC‡ ANZ‡

*—yardarm or spur mounting
‡—masthead mounting

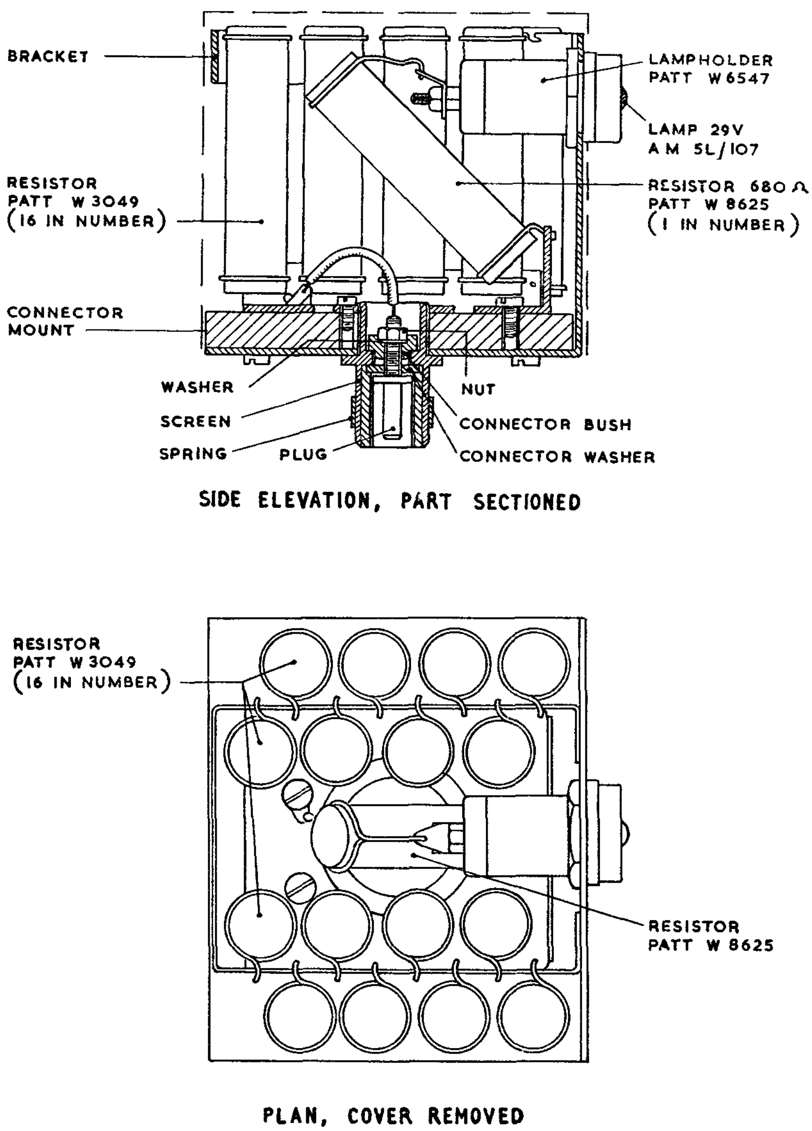


Fig 5 Dummy aerial load (Pattern 57818)

Methods of tuning

15. Using any common aerial outfit the method of tuning is as follows —

(1) With resonator set to high frequency end of range tune transmitter 75C in accordance with instructions given in Chap 1

(2) Put power switch for tuning to FULL

(3) Check adjustments of driver unit and power amp grid turning dials

(4) Check for correct neutralization

(5) Slightly increase aerial coupling Aerial dial when tuned should give an approximate reading of 70mA anode current

(6) Tune accurately for a dip in anode current Where it is impossible to sight the anode meter an Avometer connected to Patt 7150 lead with plug should be inserted into the MONITOR JACK of the RF output panel and placed in a position where it can be clearly sighted from the resonator position Select range of Avometer to read DC 0 012 amps Tune resonator for dip and then securely lock in position

(7) Re tune aerial dial for maximum reading of anode current then load by increasing coupling until a total anode current of 140mA is obtained

Note

After carrying out instruction (6) under no circumstances should resonator be re adjusted except as necessary to completely re check starting from instruction (1)

16. Using dummy aerial load (Pattern 57818) (*fig* 5) —

(1) Remove the transmitter connector from the CAW junction box and plug the dummy load into the end of the connector

(2) Repeat all previous instructions given in para 15 above

(3) On completion remove the dummy load replace the connector in junction box and when opportunity offers check aerial tuning by adjustment of aerial tuning dial and loading (coupling) in accordance with paragraph 15 instruction (7)

Note

Both methods outlined in para 15 and 16 give the same degree of accuracy but it should be clearly understood that the first method (para 15) cannot be used during W/T silence and in the second method only the aerial dial needs re checking when the aerial is connected

17. Receiver resonators in any one channel are tuned in accordance with the procedure outlined in BR 1422

Spare equipment and quarter-wave connectors (Pattern 65768

18. When a spare transmitter or receiver i permanently connected to a common aerial outfit its associated resonator must not be left tuned t any frequency to which one of the remaining set may require to be tuned Two resonators tuned t the same frequency share the power between them Spare resonators should therefore be de tuned t around 156 Mc/s

19 Since the loss incurred in CAW depends o the number of channels connected to the commo junction box spare resonators not attached to receiver or transmitter should be disconnecte from the junction box in order to reduce losse as much as possible Further it is essential t ensure that the quarter wave connectors Patter **65768 are not left attached to the common junctio box unterminated by a resonator,** or the complet failure of the system will result This eventualit can be avoided by making sure that a resonator i never disconnected until its associated connecto has been disconnected from the junction box

Common aerial outfits (CAO)

20. A brief description of the common aeria outfits and the number of transmitters an receivers used are as follows —

Common aerial outfit EAA	(Two transmitters 8C or 8N
EAB	(Three or four transmitters 8C or 8N)
EAC	(Five to eight transmitters 8C or 8N)
EAD	(Two receiver outfit CDU or CDV)
EAE	(Three or four receiver outfits CDU or CDV)
EAF	(Five to eight receiver outfits CDU or CDV)

Dummy aerial load (Pattern 57818) (*fig* 5)

21. The dummy aerial load referred to in para 1 has been introduced to enable Type 87P an Type 87Q and 87M/MS to be tuned withou radiating It consists of the following components —sixteen resistors Pattern W3049 1 20 ohms 2½W one resistor Pattern W8625 680 ohms 3W one lamp Stores Ref 5L/107 29V 3W a lampholder and plug The lamp and the 680 ohm resistor in series are connected in parallel wit the sixteen 1 200 ohm resistors (which are als joined in parallel)

22. The lamp in the circuit is provided as a chec that power is being injected into the dumm load The lamp can be seen through vents in th side panel

23. For tuning with the dummy load a spring clip enables the dummy load to be connected into the aerial socket of the Type 87P 87Q or 87M/MS transmitter

Note

Pattern 65628 *dummy aerial load for transmitter 7BP may be used in place of Pattern* 57818 *the spring clip having first been transferred from the inside to the outside of the outer conductor of the dummy load But when using Pattern* 65628 *dummy load* only HALF POWER should be used *a transmitter radiating* FULL POWER *on Pattern* 65628 *will seriously damage the load*

Instructions for maintenance of switch unit Type M

24. The switch contacts are to be cleaned at intervals of about one month or when bad contact is suspected or known The cleaning is to be done only with AP55945 solution cleaning and lubricant for switch contacts applied with the dropper AP55946 On no account must emery paper or a file be used Remove the lid of the switch unit and open the cover of the contacts Place the dropper about a $\frac{1}{4}$ in in the cleansing solution Before removing the dropper put finger over the top aperture Hold the end that was immersed over the contacts and remove finger The contact cover and lid must be left open about fifteen minutes and the switch given several operations If switch is satisfactory replace covers and screw on lid If not satisfactory proceed as follows —

> With the adjusting tool provided slacken the lock nut of the Rx contact and by means of the slotted insulated bush screw the contact until the tongue is free Press over tongue towards Tx contact by means of the insulated portion of the relay operating arm and see if Tx contact is in the centre of the contact on the tongue If tongue appears to be too short, release pressure, slacken lock nut and rotate tongue in a clockwise direction by means of the insulated bush lying in the aperture at the base of the tongue Conversely if tongue is too long rotate in a counter clockwise direction until centre of tongue contact is in line with Tx contact Lock tongue in position by screwing the lock nut down hard on to the sleeve Rotate cover over aperture Unlock the Tx contact and adjust gap between Tx contact and tongue to 0 125 in (diameter of tool is 0 125 in) Lock the Tx contact in position Now screw up Rx contact to press the tongue over until the gap between tongue and Tx contact is 0 05 in The flat end of the adjusting tool is 0 05 in When this has been completed lock Rx contact in position

External connections

25 The following connections all made to the RF power supply unit are used for normal shipboard remote control for Type 87M 87P and 87Q

M2 to Lamps common (L C)

Z3 (i) Remote red light (L B)
(ii) Aerial switch
(iii) Receiver noise suppressor

Z4 Remote white light (L R)

N1 Microphone feed

N2 Microphone feed

Y2 and E to be connected

26. If required the following additional connections may be used —

RF power supply unit

P1 to Remote monitor

P2 Remote monitor

Z2 Remote key

E , Remote key

APPENDIX I

Modulator unit circuit (fig 3)

Circuit Ref	Value	Tolerance per cent	Rating	Description	Inter Services Ref No	Manufacturers Number
C5 C5A C5AP C5AR C5AS C5AT C5AU C5AW C5B C5C C5B C5D C5E	500pF	15	350 VDC	Condensers moulded mica Type 609 Dubilier Type 635	Z 125479	—
C8	500pF	10	350 VDC	Condensers moulded mica Type 132 Dubilier Type 691	Z 123769	—
C18	0 1μF	20	500 VDC	Condensers paper tubular Type 3363	Z 115507	—
C22 C22A	0 25μF	20	500 VDC(140°F) 400 VDC(160°F)	Condensers metal cased Type 4272	—	—
C24B C24C C24D C24E L19	4μF	10	500 VDC(140°F) 400 VDC(160°F)	Condensers metal cased Type 4284	—	—
R9 R9A	22kΩ	10	2 watts	Resistors fixed composition	Z 22245	—
	or 1×10kΩ	10	6 watts	Resistors fixed wirewound ERG Type 17 Pattern TC2	Z 244098	—
R13 R13A	3kΩ (3×1kΩ in series)	10	1 watt	Resistors fixed composition Erie RMA1	Z 222229	—
R16 R16A	33kΩ	10	$\frac{3}{4}$ watt	Resistors fixed composition Erie RMA2	Z 212193	—
R17A R17B	56kΩ	10	$\frac{3}{4}$ watt	Resistors fixed composition Erie RMA2	Z 223009	—
R18 R18A	100kΩ	10	$\frac{3}{4}$ watt	Resistors fixed composition Erie RMA2	Z 223039	—
R20E R20F	47Ω	10	$\frac{1}{2}$ watt	Resistors fixed composition Erie RMA8	Z 221069	—
R21 R21A	100Ω	10	$\frac{1}{2}$ watt	Resistors fixed composition Erie RMA8	Z 221111	—
R22	300Ω	10	$\frac{1}{2}$ watt	Resistors fixed composition Erie RMA8	Z 221174	—
R23A R23B	1kΩ	10	$\frac{1}{2}$ watt	Resistors fixed composition Erie RMA8	Z 222006	—
R24 R24A	2 2kΩ	10	$\frac{1}{2}$ watt	Resistors fixed composition Erie RMA8	Z 222048	—
R26 R26A	5 6kΩ	10	$\frac{1}{2}$ watt	Resistors fixed composition Erie RMA8	Z 222102	—

Circuit Ref	Value	Tolerance per cent	Rating	Description	Inter Services Ref No	Manufacturers Number
R27 R27A R27B R27C R27D R27F	10kΩ	10	½ watt	Resistors fixed composition Erie RMA8	Z 222132	—
R29 R29A	56kΩ	10	½ watt	Resistors fixed composition Erie RMA8	Z 223008	—
R30	100kΩ	20	½ watt	Resistors fixed composition Erie RMA8	Z 223030	—
R32 R32A	220kΩ	20	½ watt	Resistors fixed composition Erie RMA8	Z 223080	—
R34 R34A	270kΩ	10	6 watts	Resistors fixed wirewound ERG Type 16	Z 243138	—
R46	47Ω	10	½ watt	Resistors fixed composition RMA8	Z 221068	—
R47 R47A	5Ω	5	—			
R48	33kΩ	10	12 watts	Resistors fixed wirewound	Z 244141	—
R50	680Ω	10	½ watt	Resistors fixed composition	Z 221215	—
R51	560kΩ	10	½ watt	Resistors fixed composition Erie RMA8	Z 223134	—
RV42	500kΩ	20	3 watts	Resistors variable composition	—	TLA 793
S3	—	—	—	Key black handle Ref P102	10D/62 *or* 10F/3	C 509
T1	—	—	—	Transformers Type 1866	10K/11895 10K/1885	TLA 540
T2	—	—	—	Transformers Type 96	10K/11888	TLA 543
T3	—	—	—	Transformers Type 97	10K/11889	TLA 544
T4	—	—	—	Transformers Type 94	10K/11886	TLA 541
T5	—	—	—	Transformers Type 1940	10K/11887 10K/1989	TLA 542
V11 V12 V13 V14	—	—	—	Valves type CV1067	10CV/1067	—
V16 V17	—	—	—	Valves type CV1075	10CV/1075	—
V18 V19	—	—	—	Valves type CV1076	10CV/1076	—

APPENDIX 2

RF driver unit—circuit (fig 2)

Circuit Ref	Value	Tolerance per cent	Rating	Description	Inter Services Ref No	Manufacturers Number
C3	15pF	5	350 VDC	Condenser fixed ceramic	Z 123014	—
C4	68pF	5	350 VDC	Condenser fixed ceramic	Z 123118 or Z 132295	—
C6 C6A	100pF	15	1000 VDC	Condenser fixed moulded mica TCC Type M	Z 123166	—
C10 C10A C10B C10C	00μF	5	350 VDC	Condenser fixed moulded mica TCC Type M30	Z 124020 or Z 124003	—
C12 C12A C12B C12C C12D	005μF	15	350 VDC	Condenser fixed moulded mica TCC Type M30	Z 124300	—
C13B	01μF	15	350 VDC	Condenser fixed moulded mica TCC Type M30	Z 124380	—
C14	01μF	15	750 VDC	Condenser fixed moulded mica TCC Type M4	Z 124382	—
C15 C15B C15C C15D	005μF	15	750 VDC	Condenser fixed moulded mica TCC Type M4	Z 124306	—
C28A	24 + 24pF	—	—	2 gangsplit stator 24 + 24pF swing	10C/18200	TLA 557B and QDA 3158/7
C29A	36 + 36pF	—	—	2 gang split stator 36 + 36pF swing	10C/18119	TLA 557B and QDA 3158/6
C34A C34B C34C	108pF 84pF 36pF	—	—	3 gang variable 108pF + 84pF + 36pF	10C/18302	93373/R74
C35 C35A	13pF	—	—	Air spaced trimmer for tuning gang	10C/15140	9262/6
C39	4 + 4pF	—	—	Fixed split stator (neutralizing)	10C/15142	LDA 110

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Circuit Ref	Value	Tolerance per cent	Rating	Description	Inter Services Ref No	Manufacturers Number
R9B	22kΩ	10	1 watt	Resistor fixed composition Erie RMA2	Z 212173	—
R10 R10A R10B R10C R10H R10J	47Ω	10	¾ watt	Resistor fixed composition Erie RMA2	Z 221069 or Z 221067	—
R11 R11A R11B R11C	100Ω	10	¾ watt	Resistor fixed composition Erie RMA2	Z 221111	—
R12	150Ω	10	¾ watt	Resistor fixed composition Erie RMA2	Z 217051 or Z 215443	—
R19A	100Ω	10	½ watt	Resistor fixed composition Erie RMA8	Z 221110	—
R19B	27Ω	10	½ watt	Resistor fixed composition Erie RMA8	Z 221153 or Z 221039	—
R20C R20D	47Ω	10	½ watt	Resistor fixed composition Erie RMA8	Z 221069	—
R27F	100kΩ	10	¾ watt	Resistor fixed composition Erie RMA2 (Early transmitters had 10 k resistor)	Z 223039 or Z 223038	—
R28A	33kΩ	10	½ watt	Resistor fixed composition Erie RMA8	Z 222194 or Z 222195	—
R43 R43A R43B	8 2kΩ	5	15 watts	Resistor fixed wirewound Painton Type M	Z 242133	—
R43C	47kΩ	5	15 watts	Resistor fixed wirewound Painton Type M	Z 242098	—
R44 R44A R44B R44C	5kΩ	5	15 watts	Resistor fixed wirewound Painton Type M	Z 242104	
R45 R45A	2 2kΩ	5	15 watts	Resistor fixed wirewound Painton Type M	Z 242050 or Z 242044	—
L1A L1B L1C L1D	1 85mH (11Ω)	—	—	Choke damped RF Type 53 (or Type 914)	10C/79 or 10C/19350	TLA 668/A
L3E L3F	5 6μH (1 3Ω)	—	—	Choke RF Type 93	10C/2185	TLA 7668/C
L5	—	—	—	Choke RF Type 329 (or Type 915)	10C/19351	TLA 516A
L6	—	—	—	Choke RF Type 330 (or Type 856)	10C/5613 or 10C/18309	TLA 516A
L27	5 8mH	—	—	Inductor Type 1310 Osc tuning	10C/15139	LDA 115

Circuit Ref	Value	Tolerance per cent	Rating	Description	Inter Services Ref No	Manufacturers Number
L28	—	—	—	Inductor Type 1598 (or 1593) 1st trebler tuning	10C/18197 or 10C/18191	LDA 176 or QDA 3158/14
L29	—	—	—	Inductor Type 1596 2nd trebler tuning	10C/18194	QDA 3158/15
L30 L31	—	—	—	Inductor Type 1599 Link coupling coils	10C/18198	QDA 3158/9
L32	—	—	—	Inductor Type 1594 Doubler input tuning	10C/18192	QDA 3158/11
L33	—	—	—	Inductor Type 1595 Output tuning	10C/18193	QDA 3158/12
L34	—	—	—	Coupling coil	10D/2571	LDA 1423
M3	0–100mA DC	—	—	Meter DC 0–100mA M C 0–1mA f s d	5Q/1504	DCD WT 1600
S7A	—	—	—	Switch Yaxley Type KDG 4391/M (2 pole 6 way 1 bank) Switch Type 1596	10F/2736	4391/M
T14	—	—	—	Filament isolating transformer	10K/16565 or 10K/1988	LDA 078
V1	—	—	—	Pentode oscillator CV1062	10CV/1052	—
V2 V3	—	—	—	Tetrode trebler CV1079	10CV/1079	—
V4 V5	—	—	—	VHF triode CV315	10CV/315	—

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APPENDIX 3

RF output unit—circuit (fig 11)

Circuit Ref	Value	Tolerance per cent	Rating	Description	Inter Services Ref No	Manufacturers Number
C4J C4K	002μF	15	250 VDC	Capacitors fixed mica	Z 124153	—
C4L C4LA C4M C4MA }	15pF	2	350 VDC	Capacitors fixed ceramic	Z 132073	—
C7 C7A	100pF	10	350 VDC	Capacitor fixed mica	Z 123156	—
C7B	001μF	10	350 VDC	Capacitor fixed mica	Z 124034	—
C13 C13A	01μF	15	350 VDC	Capacitor fixed mica	Z 124380	—
C16	100pF	15	25k VDC	Capacitor fixed mica	Z 123173	—
C28	25+25pF	—	—	Capacitor Type 5137	10C/15136	TLA 557B
C29	42+42pF	—	—	Capacitor Type 5138	10C/1830	TLA 557B
C36	55+55pF	—	—	Capacitor Type 5136	10C/15137	TLA 557/D1
C37 C37A	2 4pF	—	—	Capacitor Type 5135 Gang neutralizing	10C/15134	LDA 139
J1	—	—	—	Jacks Type 1	10H/1739	CPZ 1211
L3 L3A	5 6μH	—	—	Choke RF Type 93	10C/2185	1011
L3B L3C	—	—	—	Choke RF Type 855	10C/18196	QDA 3158/4
L17	—	—	—	Aerial coil	10C/5614	TLD 2827
L35	—	—	—	Inductor Type 1598 (or Type 1597) Input coupling coil	10C/18197	QDA 3158/3
L36	—	—	—	Inductor Type 1853 Grid tuning coil	10C/19349	LD 1491
L37	—	—	—	Inductor Type 1597 Anode tuning coil	10C/18195	QD 3158/5 or LDA 1492
L38	—	—	—	Fixed link coupling coil	10D/2572	LD 1494
L39	—	—	—	Inductor Type 1606	10C/18307	LD 1495
L40	—	—	—	Monitor coupling coil	10D/2574	LDA 143
M1	0–30mA DC	—	—	Meter moving coil 0–30mA DC Grid current meter	5Q/7123	DCD WT 1600

Circuit Ref	Value	Tolerance per cent	Rating	Description	Inter Services Ref No	Manufacturers Number
M2	0–100mA DC	—	—	Meter moving coil 0 100mA DC Cathode current meter	5Q/1504	DCD WT 1600
R2 R2A R2B R2C R2D R2E R2F R2G	3 9kΩ	10	6 watts	Resistor fixed wirewound ERG Type TCL 17	Z 244058	—
R3 R3A	6 8kΩ	10	6 watts	Resistors fixed wirewound ERG Type TCL 17	Z 244082	—
R10D R10E	47Ω	10	$\frac{3}{4}$ watt	Resistors fixed composition Erie RMA2	Z 221069	—
R14	2 2kΩ	10	$\frac{3}{4}$ watt	Resistors fixed composition Erie RMA2	Z 222048	—
R20 R20A	47Ω	10	$\frac{3}{4}$ watt	Resistors fixed composition Erie RMA2	Z 221069	—
R25	47kΩ	10	$\frac{3}{4}$ watt	Resistors fixed composition Erie RMA2	Z 222090	—
S2	—	—	—	Plugs type 149 Link for neut	10H/131	Q 900175
S8 S8A	—	—	—	Switches Type 1592 2 pole 2 way 1 bank Yaxley Type KDG 4393/M	10F/2735	4393/M
V6 V7	—	—	—	Valves Type CV315 RF triodes	10CV/315	—
V8	—	—	—	Valves Type CV1067 Triode	10CV/1067	—

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APPENDIX 4

Modulation power unit—circuit (fig 15)

Circuit Ref	Value	Tolerance per cent	Rating	Description	Inter Services Ref No	Manufacturers Number
C24 C24A	4μF	20	400 VDC(160°F) 500 VDC(140°F)	Capacitors Type 4079 TCC paper metal box Type 82	10C/12776	LDA 256
C25 C25C	4μF	20	1 5kV (160°F) 2 0kV (140°F)	Capacitors Type 4701 TCC paper metal box Type 131B	10C/14249	LDA 254
F1 F1A	—	—	1 amp	Fuses Type 27 Glass cartridge Type	10H/130	C102A C103A
L24	35H (50mA)	—	—	Chokes LF Type 500 Swinging choke	10C/13784	TLA 548B
L25	13 5H (300mA)	—	—	Chokes LF Type 30 Smoothing choke	10C/76	TLA 549
L26	19H (180mA)	—	—	Chokes LF Type 917 Smoothing choke	10C/18799 or 10C/77 }	TLA 550
R15A	220kΩ (10×22kΩ)	10	¾ watt	Resistors fixed composition Erie RMA2	Z 222174 or Z 212172 }	—
T7	1 125–0–1 125	—	145mA	Transformers Type 1878 E H T transformer	10K/1902 10K/11877	T969 TLA 536
T8	—	—	—	Transformers Type 2621 Filament transformer for E H T rectifiers	10K/16563 10K/11875	TLA 534
T9	—	—	—	Transformers Type 7037 Filament transformer for external units	10K/17080 10K/11874	TLA 533
T10	350–0–350	—	110mA	Transformers Type 91 H T transformer	10K/11876	TLA 535
V20 V21	—	—	—	Valves Type CV187 or CV235 High voltage diode rectifier	10CV/187 10CV/235	—
V22	—	—	—	Valves Type CV1071 Full wave rectifier	10CV/1071	—
X1	—	—	—	Gaps spark Type 6 Sparkgap for L24	10A/17326	LDA 142

APPENDIX 5

RF power unit—circuit (fig 18)

C rcu t Ref	Value	Tolerance per cent	Ratıng	Descr pt on	Inter Serv ces Ref No	Manufacturers Number
C21B C21C	0 1μF	20	1k VDC	Capacıtors fixed paper TCC Type CP31–N	Z 115508	—
C25 C25A C25B	4μF	20	1 5k VDC(160°F) 2 0k VDC(140°F)	Capacıtors Type 4701 TCC paper metal box Type 131B	10C/14249	LDA 254
F1B	—	—	1 amp	Γuses Type 27 Glass cartrıdge type	10H/130	C103A
L21	8 12H (500mA 34Ω)	—	—	Chokes LF Type 499 Swıngıng choke	10C/13783	TLA 552B
L22	11 6H (500mA 92Ω)	—	—	Chokes LΓ Type 26 Smoothıng choke	10C/72	TLA 551
L23	520mH (1 6Ω 900mA)	—	—	Chokes LΓ Type 28 Maıns reducıng ınductor on low power	10C/74	TLA 553
R15	220kΩ (10 × 22kΩ)	5	¾ watt	Resıstors fixed composıtıon RMA2	Z 212169 or Z 212172	—
S6	—	—	—	Swıtches Type 1841 Safety swıtch 2 pole rod operated	10F/16794 or 10F/26	WTB 102764 or TLA 530
T11	1 200–0–1 200	—	220mA	Transformers Type 87 E H T (RF unıts) transformer	10K/11872	TLA 538
T12	—	—	—	Transformers Type 88 Rectıfier filaments transformer	10K/11873	TLA 539

This leaf issued with A L No 1 October 1953

APPENDIX 6

Control unit—circuit (fig 21)

Circuit Ref	Value	Tolerance per cent	Rating	Description	Inter Services Ref No	Manufacturers Number
C27 C27A C27B C27C	20μF	—	50 VDC	Capacitors Type 3231	10C/5883	MA 10603
CON 1	2kΩ	—	24 VDC	Relays magnetic Type 643 Supersedes original contactor 1	10F/1729	P71BS/ 9038D/2
F2 F2A F2B F2C F2D F2E	—	—	10 amp	Carriers Fuse Type 1 Neata cut out Type GEC S339 Porcelain	10H/14085 or 10H/129	S339 or C103A
L20	—	—	—	Chokes LF Type 32 Smoothing choke for relay supplies and microphone polarizing current	10C/78	TLA 547
PL1 PL3	—	—	—	Caps Lamp Type 29 Red pilot lamp cover	10A/12016	C101C
PL2 PL4	—	—	—	Caps Lamp Type 28 Green pilot lamp cover	10A/12015	C101B
PL1 PL2 PL3 PL4	6V	—	24 watts	Lamps Filament G P O No 2	5LX/959215	—
R36	120Ω	5	15 watts	Resistors fixed wirewound	Z 241158	—
RL A/3	2kΩ	—	—	Relays magnetic Type 66	10F/81	TLA 676
RL B/4	2kΩ	—	—	Relay magnetic Type 67	10F/82	TLA 677
RL D/1	10Ω	—	—	Relays magnetic Type 69	10F/84	TLA 679
RL E/2	200Ω	—	—	Relays magnetic Type 68	10F/83	TLA 678

APPENDIX I

Tone oscillator—circuit (fig I)

Circuit Ref	Value	Tolerance per cent	Rating	Description	Inter Services ref number	Manufacturers number
C17B C17C	0 1μF	20	350 VDC	Condensers paper tubular	Z 115506	—
C19	01μF	25	10k VDC	Condensers paper tubular	Z 115503	—
C20	0056μF	25	1 0k VDC	Condensers paper tubular	Z 115502	—
C26	40μF	—	12 VDC	Condensers electrolytic	10C/5946	MA 10550
L18	—	—	—	Transformers Type 883	10K/783	TLA 545
R17	56kΩ	10	$\frac{3}{4}$ watt	Resistors fixed composition Erie RMA2	Z 223009	—
R23C	1kΩ	10	$\frac{1}{2}$ watt	Resistors fixed composition Erie RMA8	Z 222005	—
R28	33kΩ	10	$\frac{1}{2}$ watt	Resistors fixed composition Erie RMA8	Z 222195	—
R31	150kΩ	10	$\frac{1}{2}$ watt	Resistors fixed composition Erie RMA8	Z 223059	—
R32C	220kΩ	10	$\frac{1}{2}$ watt	Resistors fixed composition Erie RMA8	Z 223080	—
RL J/2	—	—	—	Relays magnetic Type 410 (PO Type 60)	10F/16839 10F/1141	—
RV41	250kΩ	10	—	Resistors variable composition	10W/8358	TLA 794
V13	—	—	—	Valves Type CV1067	10CV/1067	—

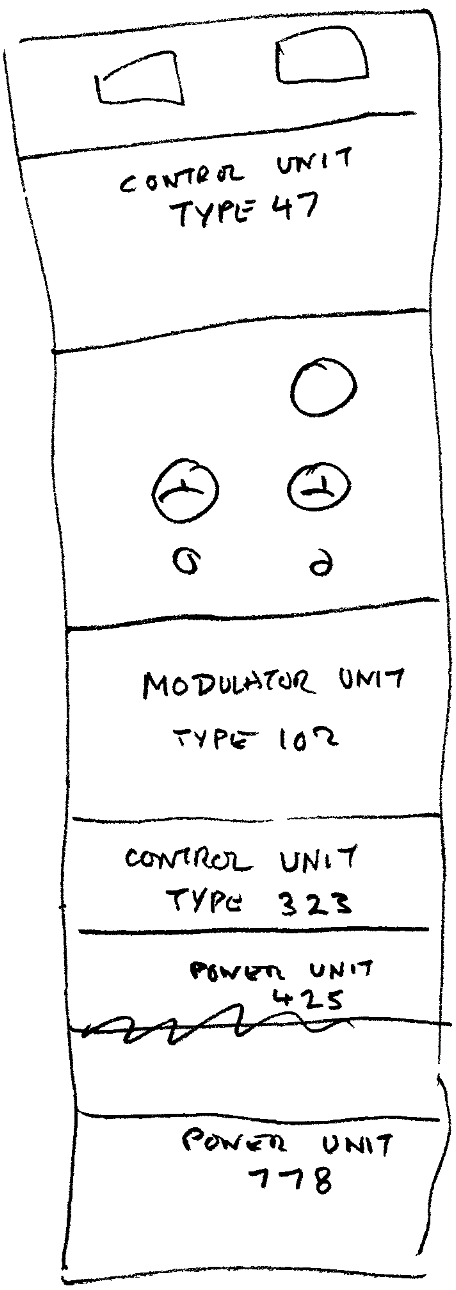
AP1194 5631/4615 11/53 2100 D&C

692 lbs.

MOD. DATS
1951- 56

T 1131 GROUND TRANSMITTER

OUTPUT UNIT TYPE 47 10D/17766	DRIVE UNIT TYPE 3 10D/ 17765	MOD^R UNIT TYPE 102 10D/2411
CONTROL UNIT TYPE 323 10L/186	POWER UNIT TYPE 425 10K/1901	POWER UNIT TYPE 778 10K/16569



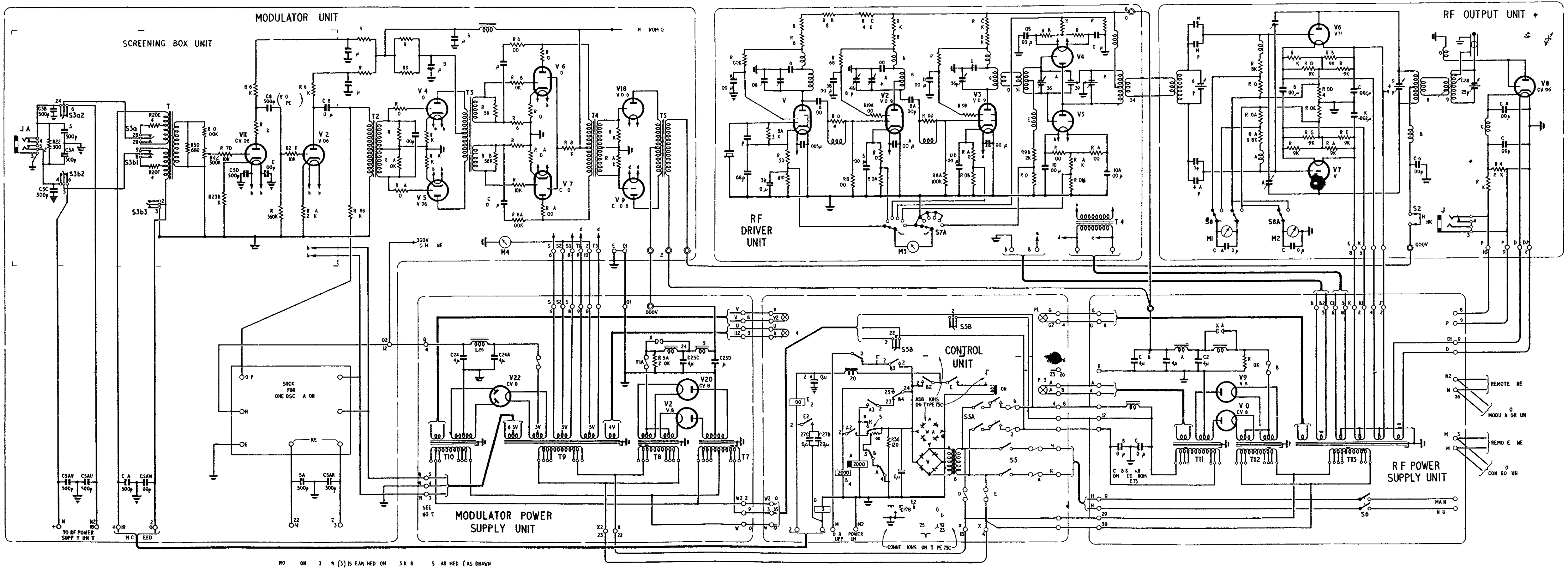


Fig 25 Transmitters Type T 1131 J & K and Naval Type 75C– circuit & inter unit connections Fig 25

BC 640 B 591 LBS

T1131 10D/17769

VHF
TR ~~1142~~,
~~1131~~

PN-8-B →
(OUTPUT UNIT TYPE 5001A)

OSCILLATOR PANEL
PN-9-B →
(DRIVER UNIT TYPE 5001A)

MODULATOR PANEL
PN-10-B
(MODULATOR UNIT TYPE 5001A) →

CONTROL PANEL →
PN-11-A
(CONTROL UNIT TYPE 5008) →

POWER SUPPLY PANEL
PN-12-A
(POWER UNIT TYPE 5008/9) →

POWER CONTROL PANEL
PN-13-B
(POWER CONTROL PANE