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CHAPTER 1

A.I. MK. IV AND ANCILLARY EQUIPMENT

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CHAPTER 1

A.I. MK. IV AND ANCILLARY EQUIPMENT

INTRODUCTION

1. The equipment described in this document is installed in aeroplanes and has as its purpose the detection of other aeroplanes in flight. Electro-magnetic energy from a transmitter, in the form of high-power pulses of short duration, is radiated from an aerial mounted in the fuselage nose of the searching aeroplane and these pulses are reflected and re-radiated by objects. Returned signals are picked up on two sets of aerials, namely, azimuth and elevation and the voltages induced in them are applied in turn to a receiver where they are amplified and rectified. The resulting voltage pulses are applied to two deflection plates in each of two cathode ray tubes to give indications on their screens. The time between the transmission of a signal pulse and the receipt of the returned signal is used as a measure of the distance of the object from the searching aeroplane. The time interval is measured by means of an exponential scan voltage, triggered off at the same time as the transmitted pulse, and applied to a plate in each cathode ray tube at right angles to those mentioned above. The frequency of the transmitter signals is 193 Mc/s and the pulse recurs at intervals of about 1,200 microseconds, the pulse width being about 2·8 microseconds.

2. The following is a brief outline of the function of the various items of the equipment :—

(i) *Generator, A.C.*—This is engine-driven and its 80-volt output is fed to the control panel, type 3. Type R is fitted to aeroplanes manufactured in this country, type S to those of American manufacture.

(ii) *Control panel, type* 3.—This includes a voltage regulator for controlling the output from the A.C. generator. It also acts as a junction box for the A.C. supply from the above generator and aeroplane D.C. supply.

(iii) *Modulator.*—From this unit are obtained the H.T. pulses for the transmitter, timing pulses for triggering the indicating unit time base, and for suppression purposes for the receiver and I.F.F. set (*see* S.D. 0210 (1), S.D. 0250 (1)).

(iv) *Transmitter.*—For the duration of the H.T. pulses from the modulator, the transmitter oscillates at a frequency of 193 $\pm$ 1 Mc/s. The output from the transmitter is fed to the transmitter aerial, which radiates the R.F. pulses.

(v) *Receiver.*—Signals from the four receiving aerials, by means of a switch, are fed in rotation into the receiving unit, where they are converted into video-frequency pulses. These are fed in rotation along four cables to the indicating unit.

(vi) *Indicating unit.*—The output from the receiver is fed to the appropriate plates of the two cathode ray tubes in this unit, which also incorporates the time base unit supplying the scanning voltage.

GENERAL DESCRIPTION

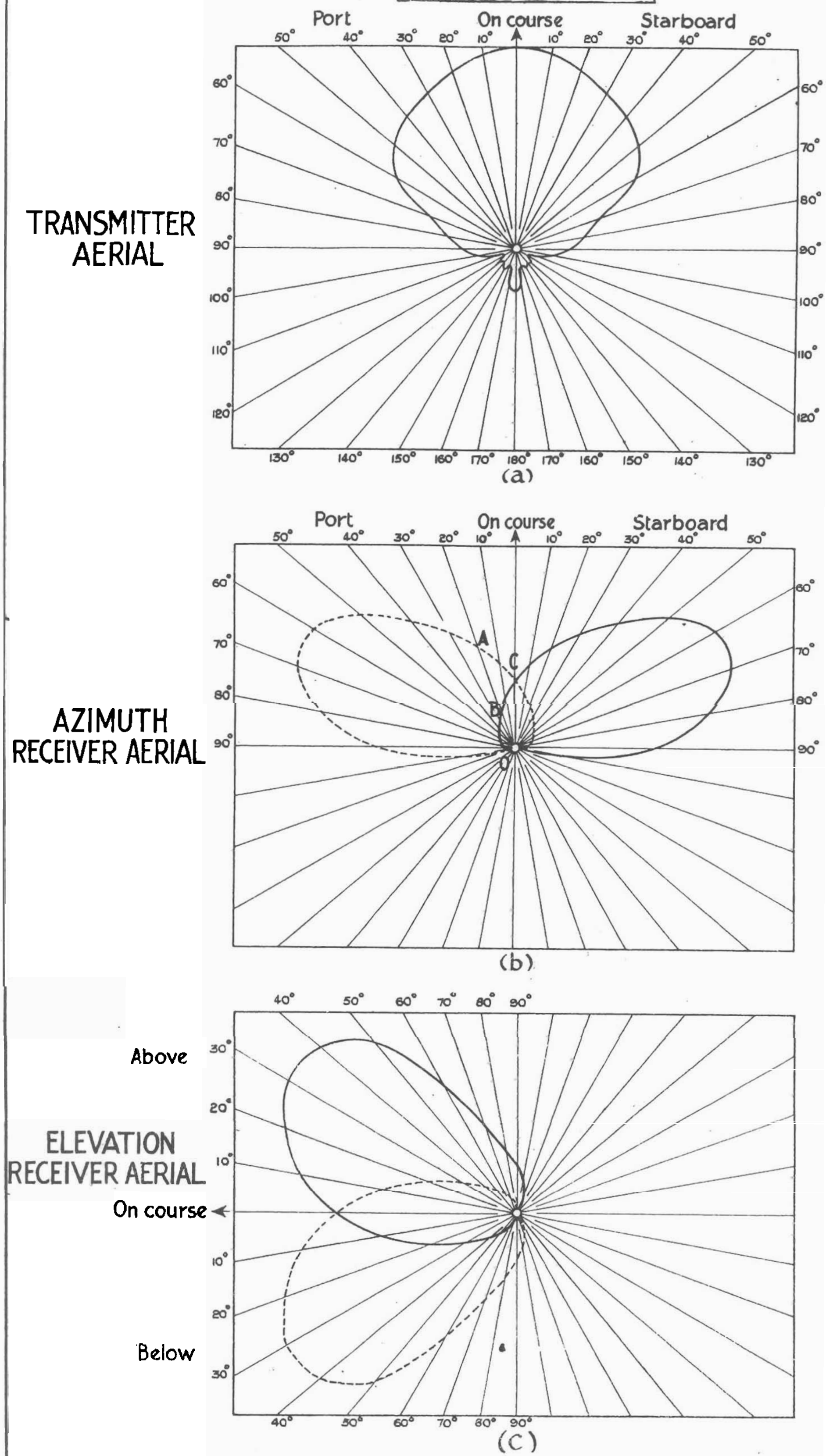
3. In this description the transmitter and receiver aerials are covered first, followed by descriptions of the individual items of equipment, namely, A.C. generator, control panel, modulator, transmitter, receiver and indicating unit (*see* fig. 2). For convenience, the constructional details of each item of equipment are given after the theoretical description. It should be noted that further types of receiver and indicating units have been developed ; in the new receiver, type R. 3102A, acorn valves are no longer used ; in both this receiver and the new indicating unit, type 48A, the mechanical layout is an improvement on the earlier units. The indicating unit, type 20 has been modified to type 48 to enable the cathode ray tube V.C.R. 138 to be used. All indicator units now carry beacon range switches and time base amplitude controls. Perspex scales are fitted to the indicating unit, type 48A, for the screens of the cathode ray tubes.

TABLE OF WEIGHTS AND DIMENSIONS

Item	Weight	Length	Width	Depth
Control panel, type 3	20 lb.	14 in.	8 in.	9 in.
Receiver, type R.3066	37 lb.	22 in.	13¼ in.	9 in.
Transmitter, type T.3065 (including tray).	19 lb.	22 in.	8 in.	10½ in.
Modulator, type 20	25½ lb.	12 in.	9 in.	12 in.
Indicator units, type 20, 48, 48A	16½ lb.	17 in. mask extra 9 in.	16 in.	5 in.
Connectors..	Approx. 50/70 lb. (*e.g.*, Havoc, 53 lb. ; Beaufighter, 70 lb.)			

Aerial systems

4. The transmitting aerials are designed to produce a maximum radiation in front of the aeroplane, with as little as possible to the rear, in order to avoid ambiguous indications. In the case of the receiving aerials, their location on the aeroplane and their design is such that the voltages induced in them by the return signal will enable the position of the detected aeroplane relative to the search aeroplane to be determined, that is, whether it is to port or starboard and above or below the line of flight. Reference to fig. 1 (*b*) will show how the polar properties of the receiving aerials are used to provide direction-finding indications. The curves show the voltages that will be induced in each of the two azimuth receiving aerials by a signal of given amplitude reaching them from various directions. For example, a signal pulse re-radiated from an object and arriving in the direction ABO will induce a voltage proportional to AO in the port aerial and a voltage proportional to BO in the starboard aerial. The corresponding indications on the cathode ray tube are proportional to these induced voltages, thus providing the operator with information on the position of the detected object relative to the searching aeroplane. In the case where the object lies directly ahead, in the direction CO in fig. 1 (*b*), the indications will be equal. Vertically polarized waves are used, as it has been found that satisfactory results are obtained more easily for azimuth indications with vertical aerials fitted to the aeroplane. Vertically polarized waves also assist interrogation with I.F.F. Mk. III (*see* S.D. 0250 (1)). On the other hand, horizontal elevation aerials are more efficient electrically ; hence, in certain aeroplanes it is possible that horizontally polarized waves will be used.



TYPICAL AERIAL POLAR DIAGRAMS

FIG. 1

FIG. 1

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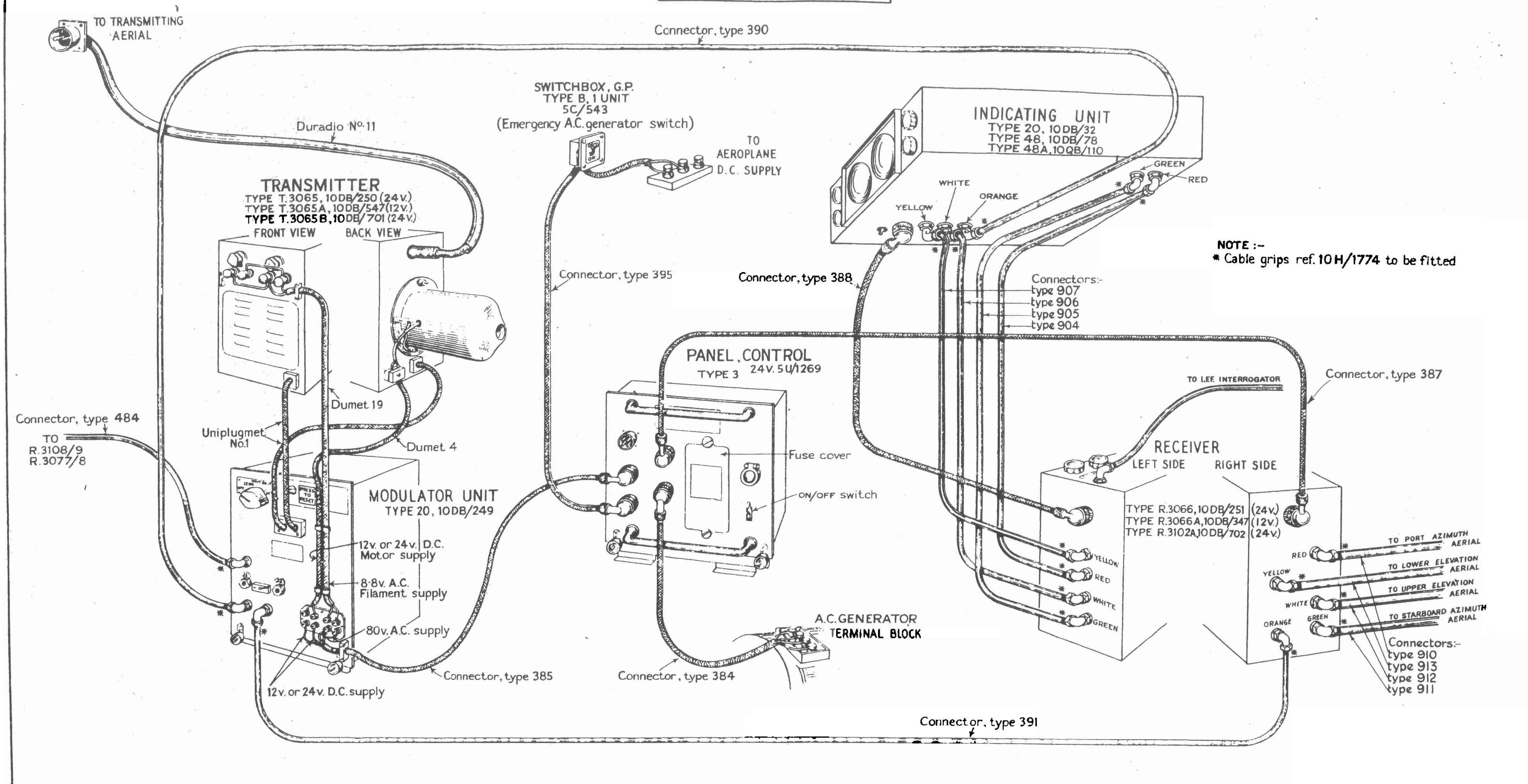

INTERCONNEXION OF UNITS

FIG. 2

FIG. 2

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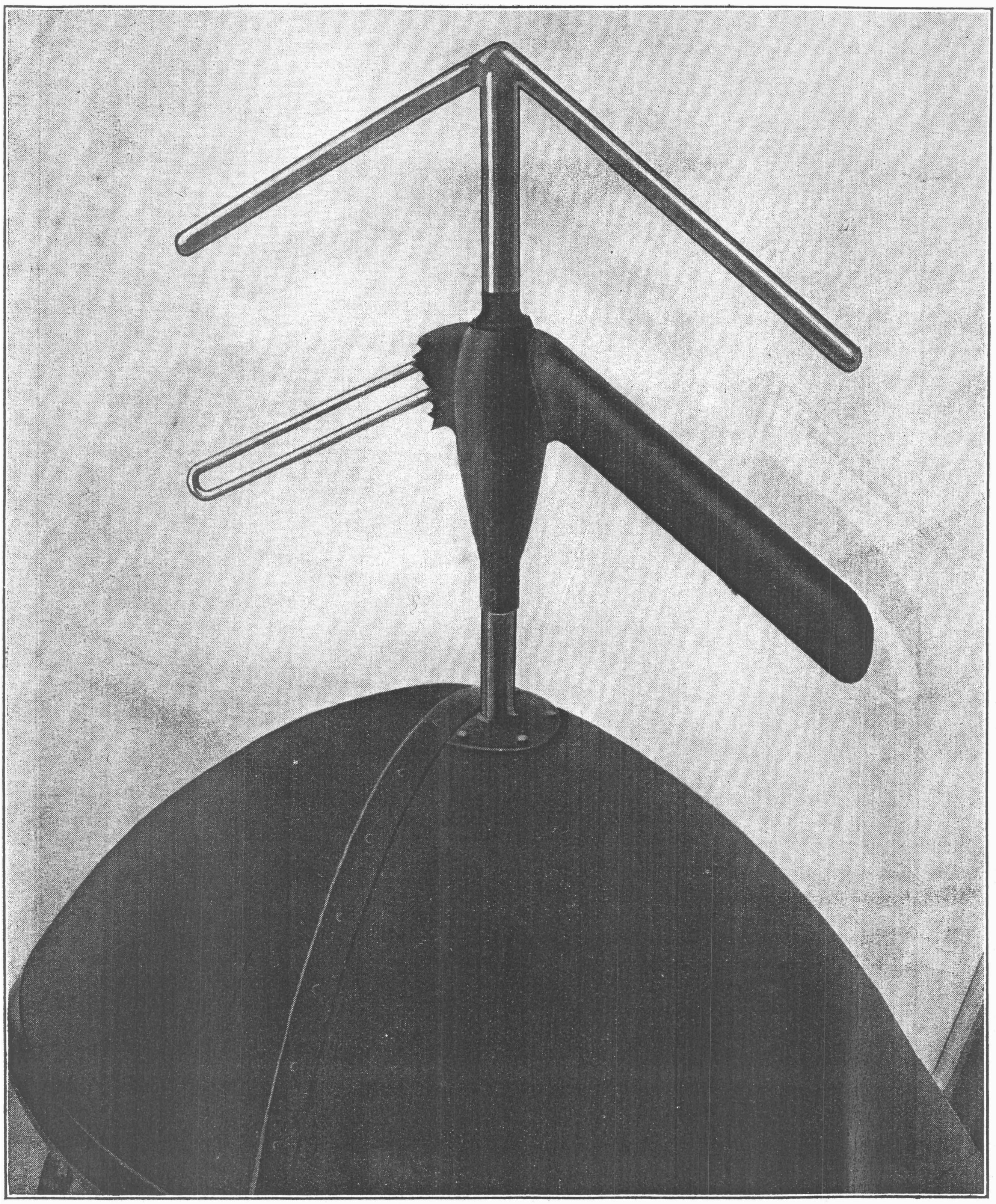

FIG. 3.—Transmitting aerial system.

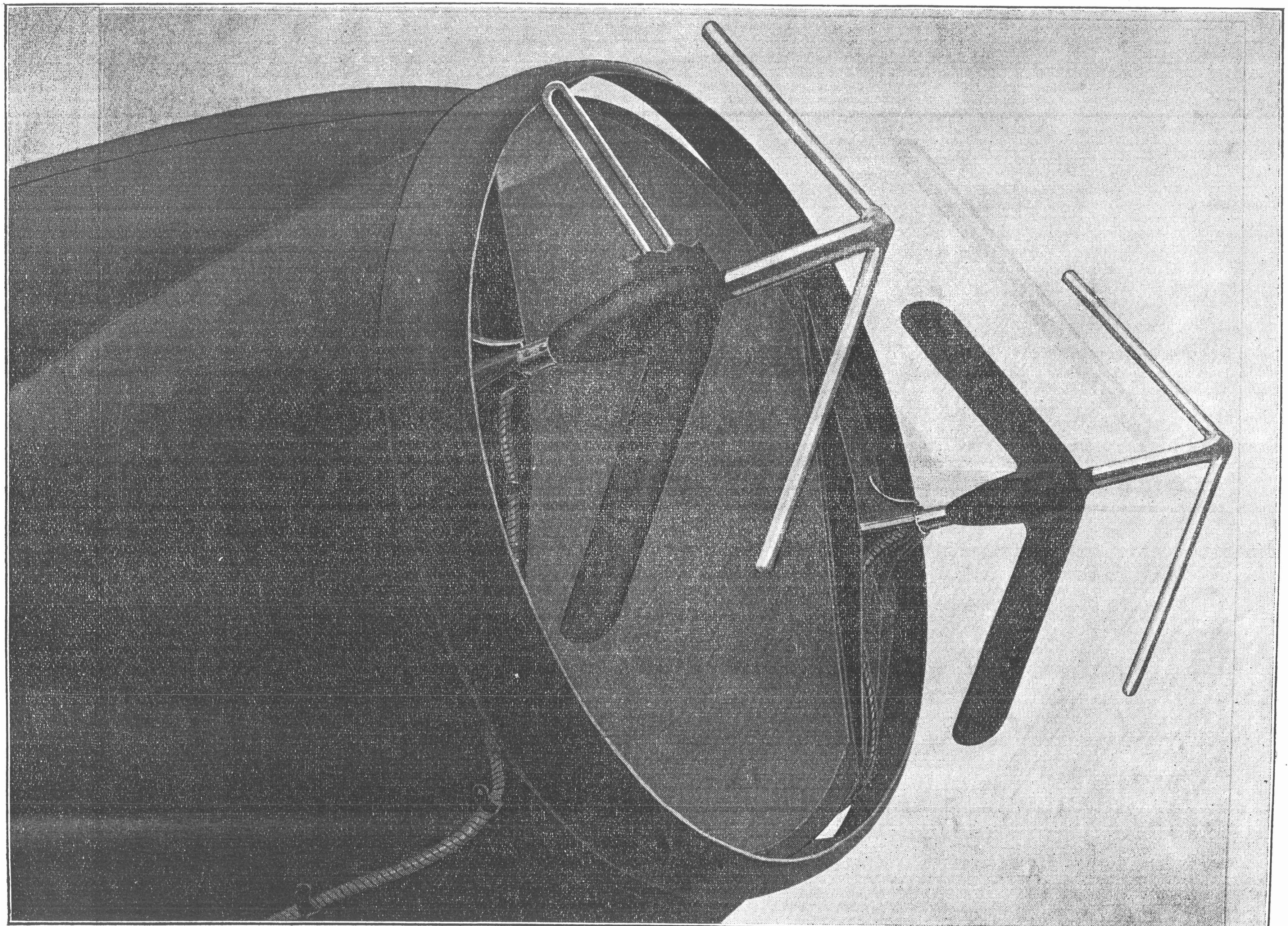

Fig. 4.—Havoc turbinlite transmitting aerial systems.

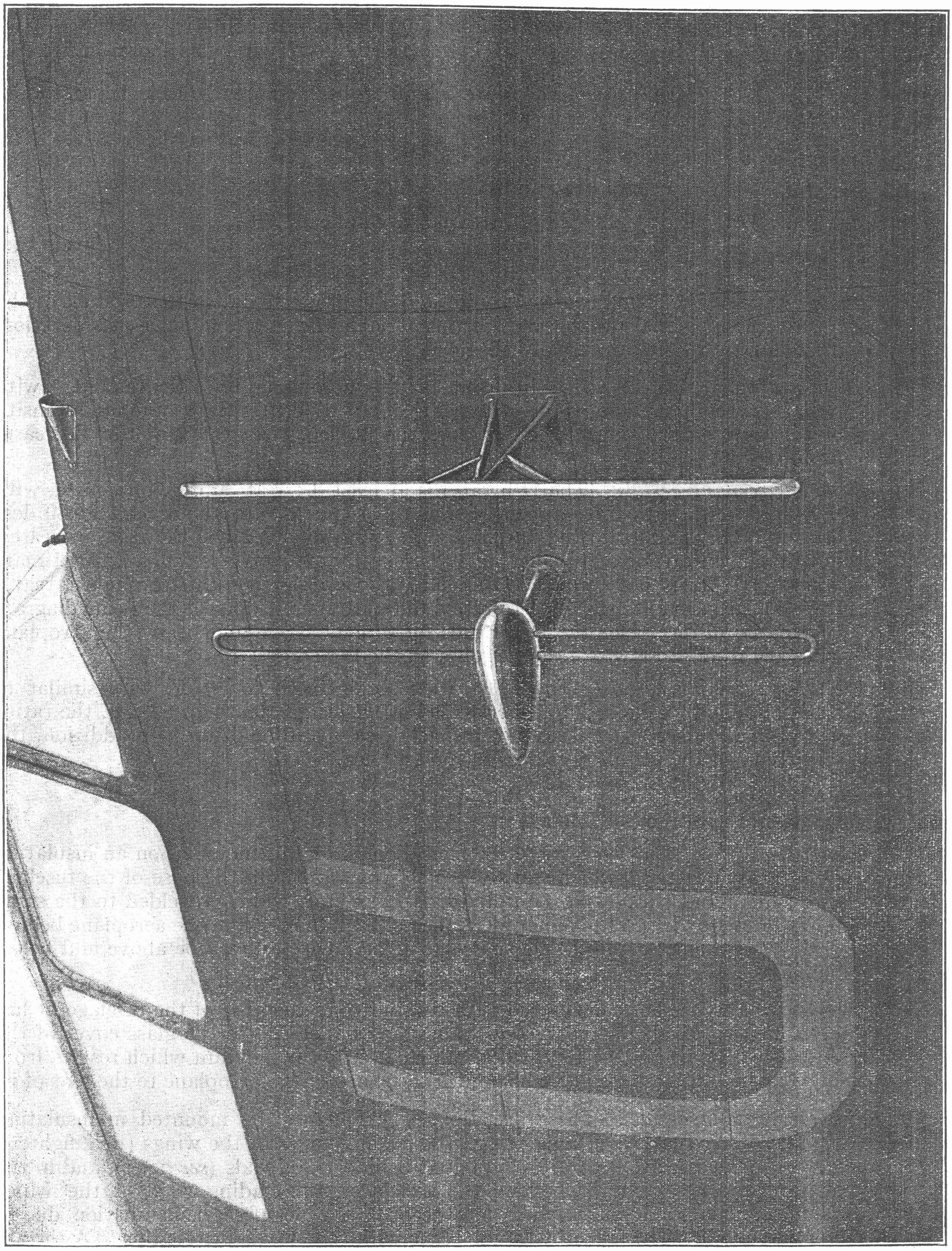

FIG. 5.—Starboard azimuth receiving aerial system on Havoc aeroplane.

5. The details of the aerial systems vary from one type of aeroplane to another, no two types having identical polar diagrams, although in general the form will be as shown in fig. 1.

6. *Polar diagrams and D/F ratios.*—The polar diagrams obtained are a practical compromise between the following conflicting requirements :—

(i) Maximum possible range.

(ii) Maximum cone in which interception is possible.

(iii) Maximum D/F ratio at all angles other than dead ahead.

(iv) Front-to-back ratio to be very large.

7. The magnitude of the signal received by an aerial is proportional to the product of the sensitivities of the receiving aerial and the transmitting aerial in the direction under consideration. In practice, the following results are usually obtained :—

(i) *Transmitting aerials.*—A cone in front of the aeroplane is "illuminated" with radiation, the half-angle of the cone being about 60 deg. ; the maximum intensity of the cone is dead ahead, and outside the 60-deg. cone the radiation decreases rapidly.

(ii) *Azimuth receiving aerials.*—The D/F ratio is at least 3 : 1 at 30 deg. off course, with the target level with the aeroplane. The ratio increases to about 6 : 1 at 80 deg. measured horizontally to the line of flight. Beyond this angle the ratio increases, but the magnitude of the smaller signal is such that the ratio is difficult to estimate accurately. It is not intended, therefore, to be able to estimate angles greater than 60 deg. accurately. As a result of the spatial envelopes of the polar diagram curving in all directions the D/F ratios for targets above and below the aeroplane will vary from those where the target is on the horizontal.

(iii) *Elevation receiving aerials.*—The D/F ratios obtained up to 60 deg. are similar to those obtained for the azimuth aerials. For angles greater than 60 deg. the ratios will probably decrease and are not intended for operational use. In addition, the sensitivity of the aerials decreases beyond 60 deg.

Aerial systems, general constructional details

8. *Transmitting aerial.*—This consists of a folded dipole radiator mounted on an insulating bollard carried on a support tube, which usually projects forward from the nose of the fuselage (*see* fig. 3). In front of and parallel to the radiator is a director, which is welded to the same support tube. The director serves to further focus the field, that portion of the aeroplane behind the radiator acting as a reflector. Both elements are at an angle to the tube above and below the points of support.

9. In the case of Havoc aeroplanes fitted with turbinlites in the nose of the fuselage, it has been necessary to fit two parallel aerial systems mounted at the edge of the glass cover of the light (*see* fig. 4). This has been done to avoid an unbalanced polar diagram which results from the use of a single aerial, due to the sudden change in the shape of the aeroplane to the rear of it.

10. *Azimuth receiving aerials.*—These are dipoles, which may be mounted in insulating bollards on the side of the fuselage (Havoc) or on the leading edges of the wings (Beaufighter). In the former case, reflectors are separately mounted behind the aerials (*see* fig. 5), and in the latter case the directors are mounted beyond the aerials on the leading edge of the wings (*see* fig. 6). At close range, differential fading may occur on the Beaufighter installation, due to poor pick-up on one aerial. This effect does not occur with the Havoc installation. A certain amount of "squint" also is obtained with the Beaufighter installation, due to interaction between the azimuth and elevation aerial systems, which effect is normally of the order of 5 deg.

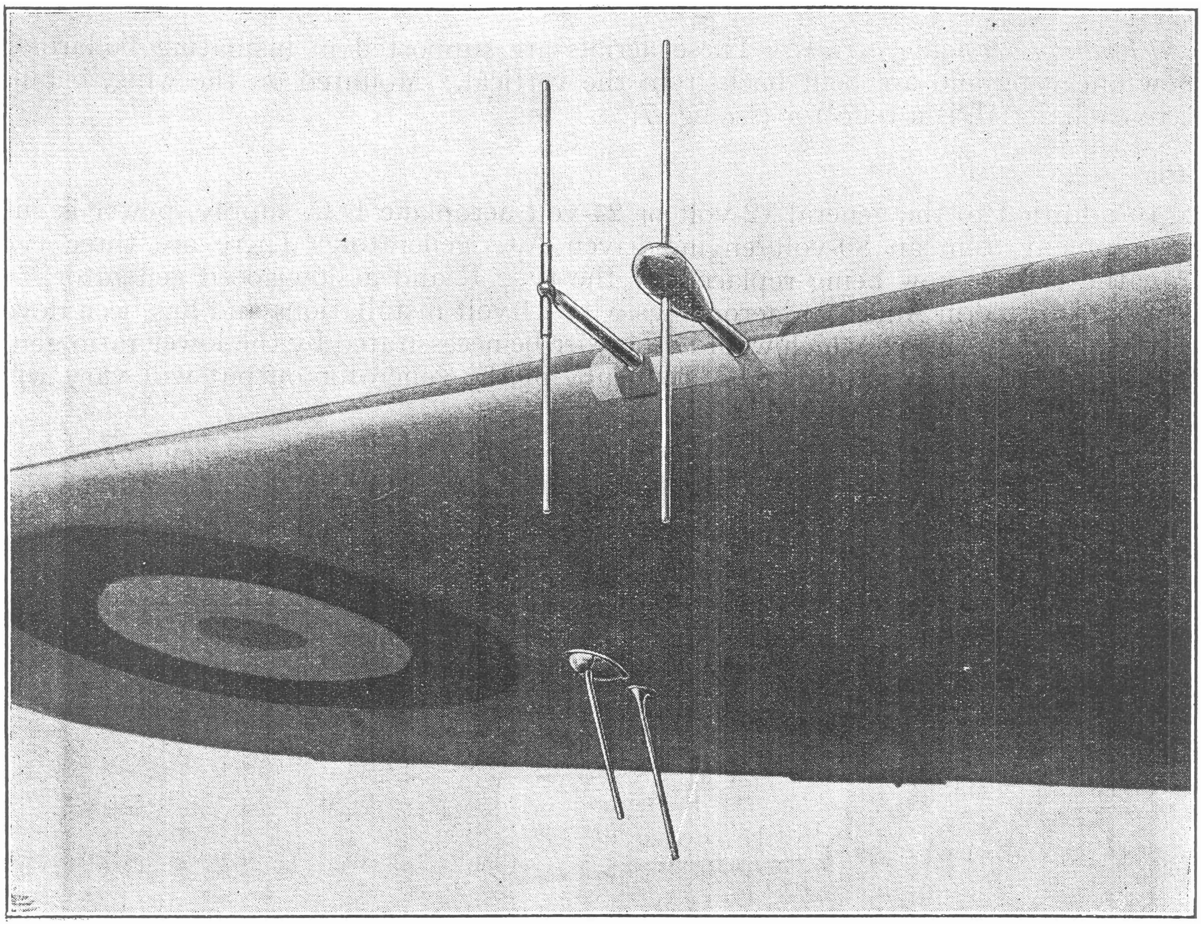

FIG. 6.—Starboard azimuth aerial and lower elevation aerial on Beaufighter aeroplane.

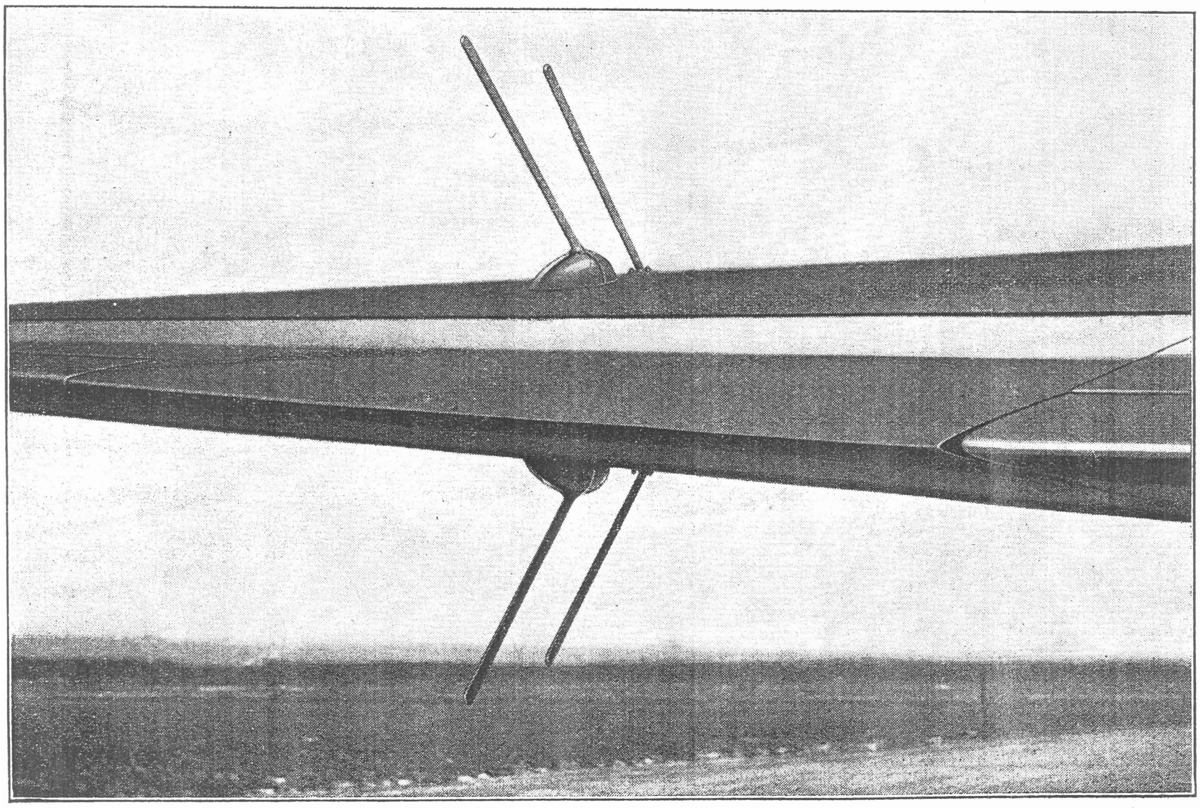

FIG. 7.—Elevation receiving aerial system on Havoc aeroplane.

11. *Elevation receiving aerials*.—These aerials are supported in insulating bollards above and below one wing and are bent back from the vertical. Mounted on the wing, behind and parallel to each aerial, is a reflector (*see* fig. 7).

Generator

12. In addition to the general 12-volt or 24-volt aeroplane D.C. supply, power is supplied to the equipment from an 80-volt engine-driven A.C. generator. There are three types of generator, the type Q now being replaced by the type R and a slow-speed generator, type S. The last type is fitted in American aeroplanes with 24-volt installations and has been developed to avoid the use of a gearbox, which would otherwise be necessitated by the lower ratio generator drive on these aeroplane engines. The frequency of the generator output will vary with the speed as shown in the table below :—

Generator.	*Speed range in r.p.m.*	*Frequency in c/s.*
Type Q	3,000 to 6,000	1,200 to 2,400
Type R	3,000 to 6,000	1,300 to 2,600
Type S	2,000 to 4,000	866 to 1,732

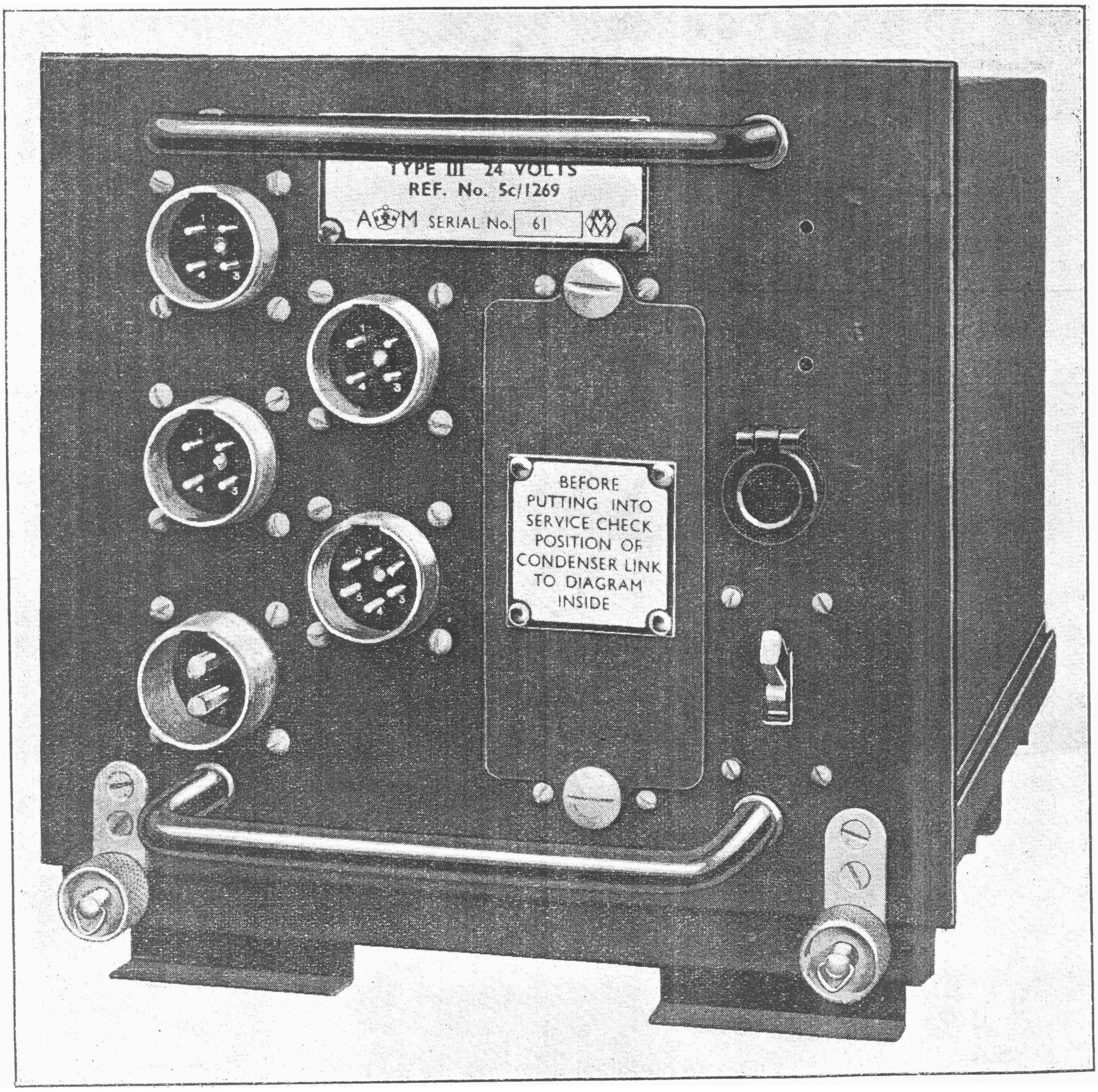

FIG. 8.—Control panel, type 3.

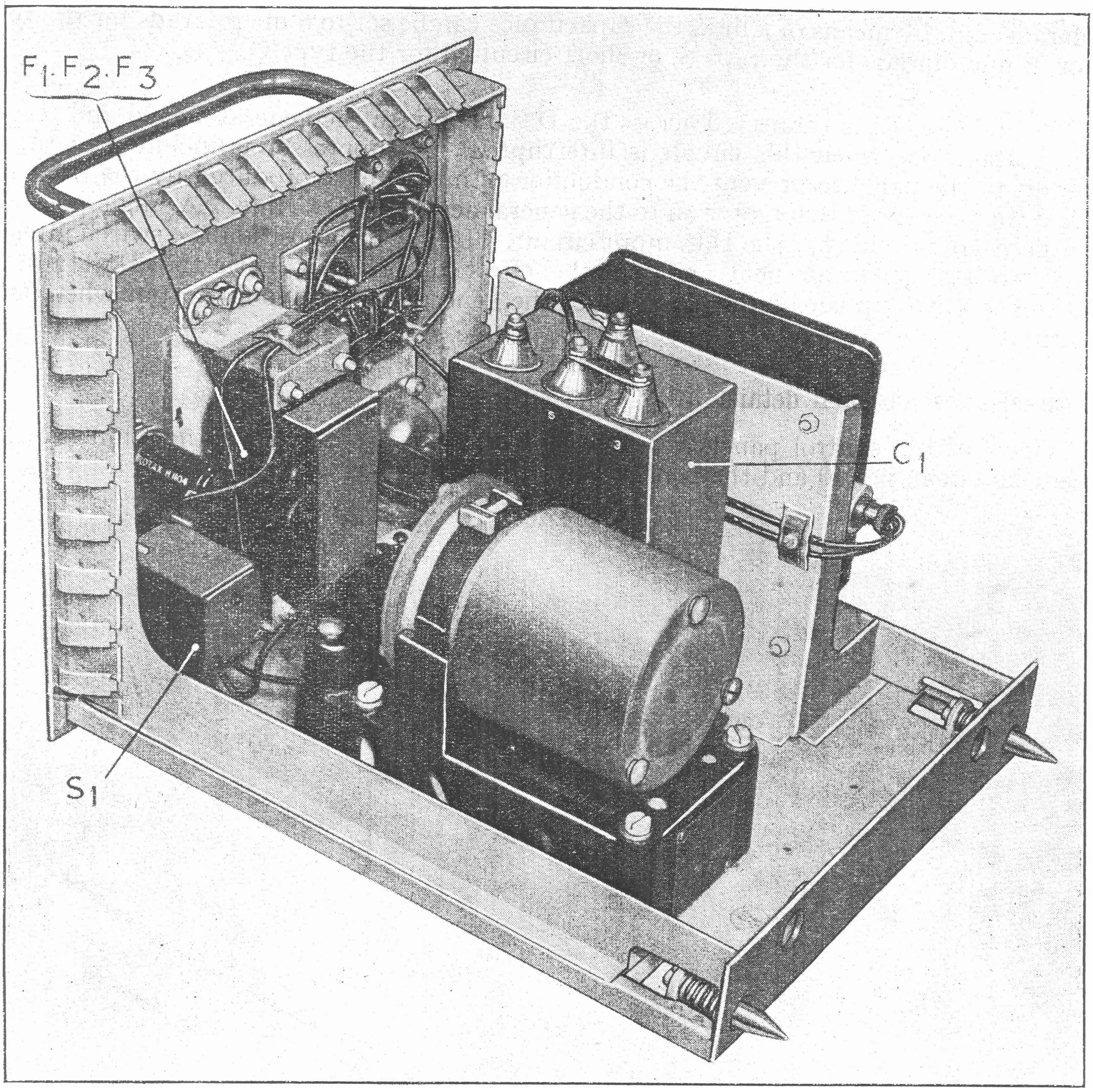

FIG. 9.—Interior of control panel, type 3.

Control panel, type 3

13. Owing to the varying speeds of the generator, its output voltage must be regulated, and this is performed by means of a voltage regulator situated in the control panel. The control panel also functions as a distribution box for the A.C. and D.C. supplies to the equipment, and its circuit diagram is given in fig. 11. The A.C. output from the generator is fed to a full-wave metal rectifier W_1, the output current from which, limited by the resistance R_1, energizes the solenoid L_1. Mechanical pressure is applied by the armature of the solenoid to the carbon pile resistance R_2 in such a way that an increase in current in L_1 results in an increase in the resistance of R_2. Thus, the field excitation current is reduced, resulting in the output voltage returning to the normal 80 volts. The maximum variation of the output voltage from the generator should not exceed 2 volts.

14. On account of the high internal reactance of the types R and S generators, a condenser C_1 (*see* fig. 10) is incorporated in the control panel. This condenser has two sections of 5 and 3 microfarads and, by means of a link, the capacitance can be set to 5 microfarads for the type R generator, 8 microfarads for the type S, or short-circuited for the type Q.

15. A condenser C_2 is connected across the D.C. supply to the generator field and serves to limit the voltage rise when this circuit is interrupted. A suppressor is included in the D.C. input circuit in the panel to prevent the conduction of interference produced by the transmitter blower and the receiver switch motor on to the general aeroplane D.C. line. A single-pole switch and pilot light are provided in the D.C. input circuit. In the OFF position the switch interrupts the supply to the generator field and has the effect of breaking both the D.C. and A.C. supplied to the output plugs of the panel, since the generator will give no output when its field is not excited.

Control panel constructional details

16. Views of the control panel are given in figs. 8 and 9, details of the front panel and component layout in fig. 10 and the bench wiring diagram in fig. 12.

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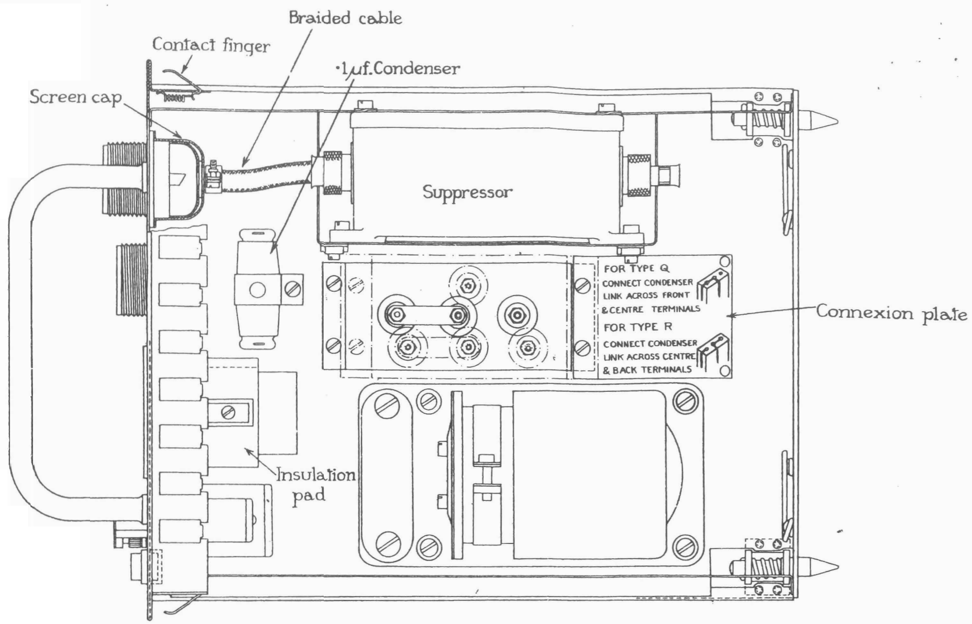
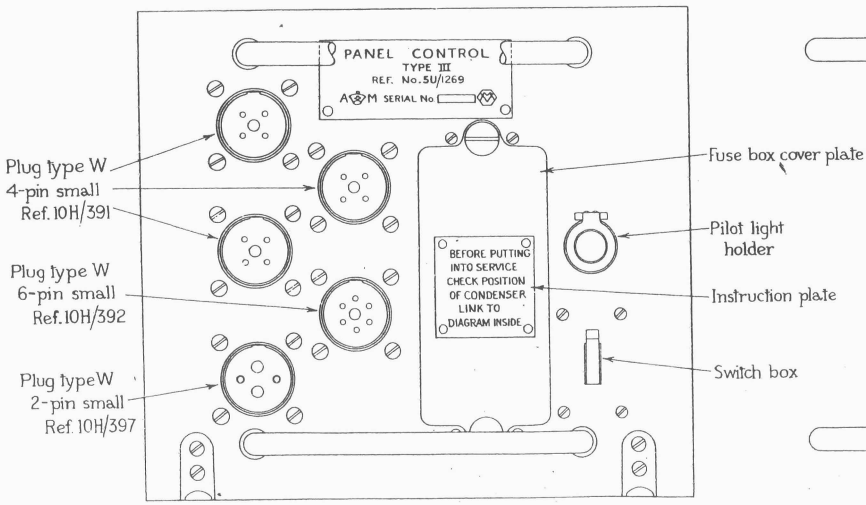
Control panel constructional details

16. Views of the control panel are given in figs. 8 and 9, details of the front panel and component layout in fig. 10 and the bench wiring diagram in fig. 12.





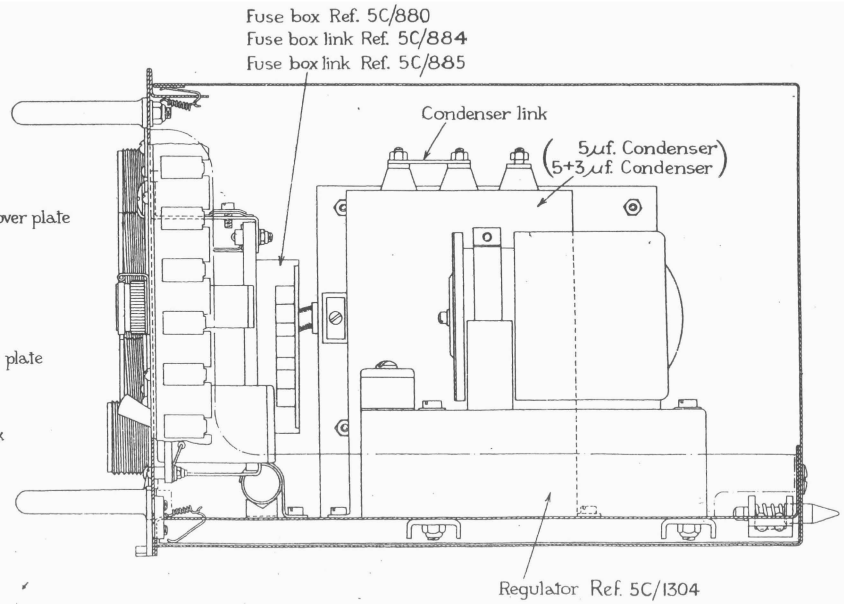
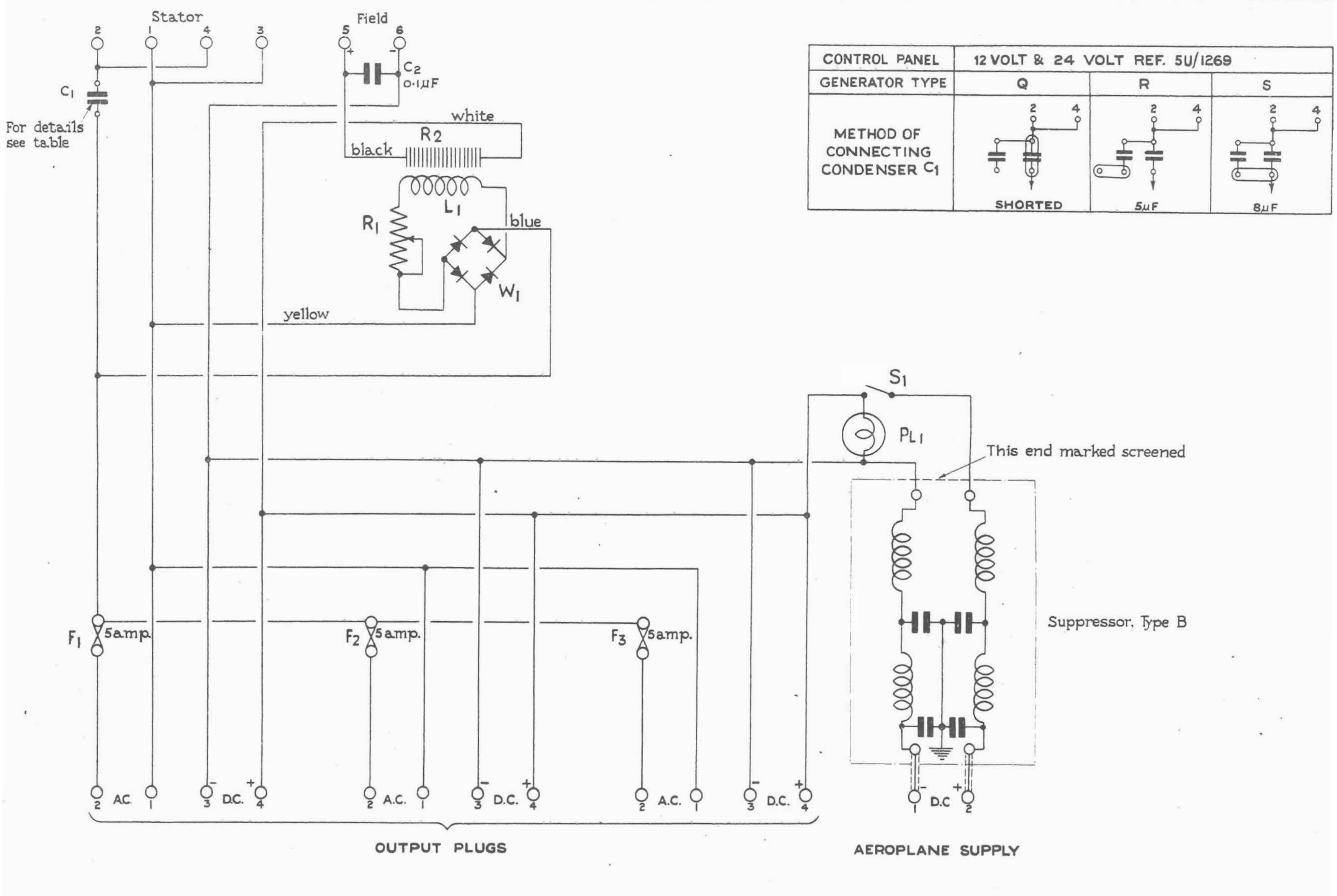


FIG. 10

LAYOUT OF COMPONENTS – CONTROL PANEL TYPE 3

FIG. 10

FIG. 11



CIRCUIT DIAGRAM OF CONTROL PANEL, TYPE 3

FIG. 11

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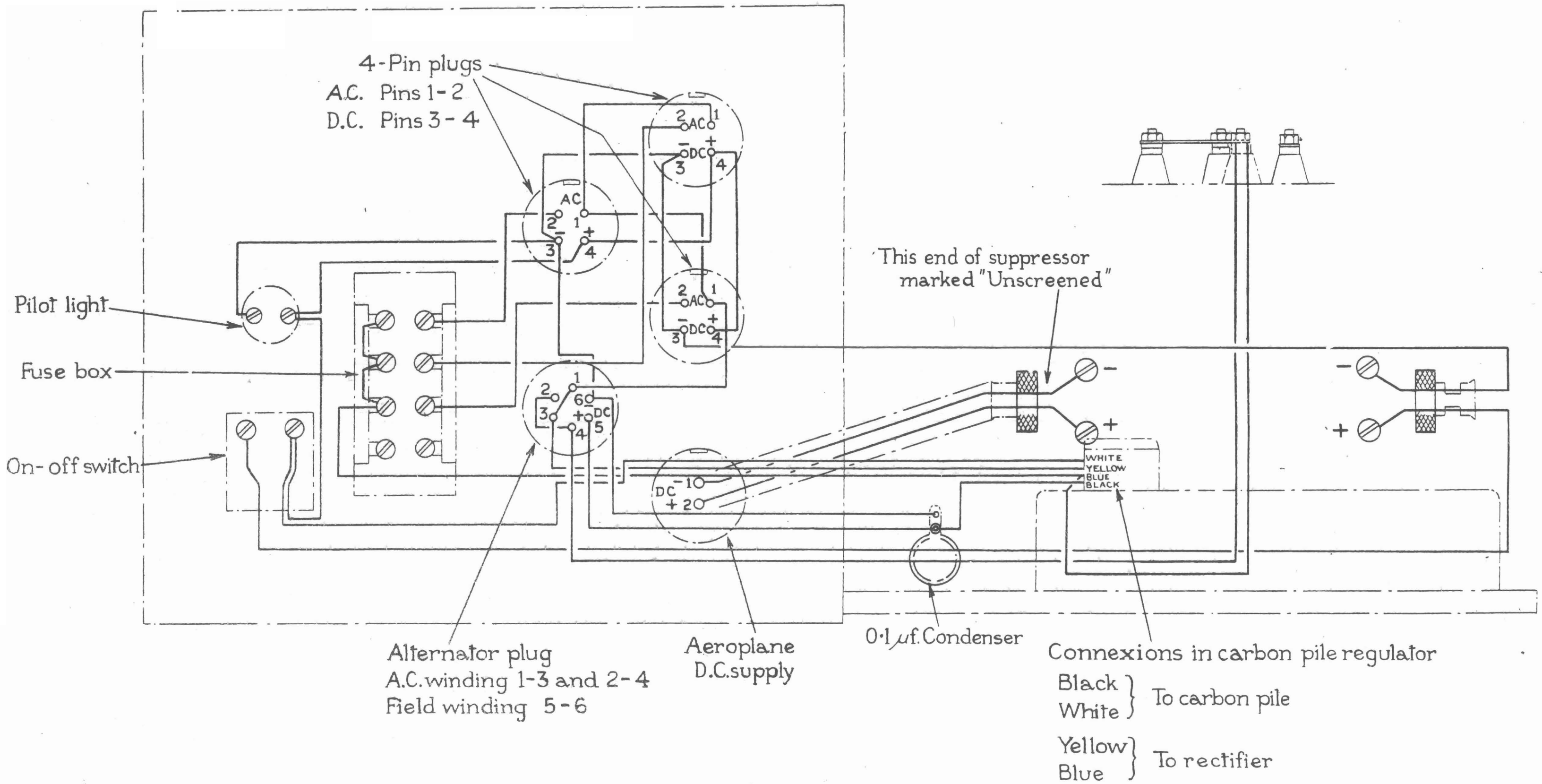


BENCH WIRING DIAGRAM - CONTROL PANEL, TYPE 3

FIG. 12

17. As shown by the illustration in fig. 8, the panel is supported on a tray secured to the aeroplane. The components are carried on a sheet steel base and front panel (*see* fig. 9), a sheet steel screening cover sliding over this chassis ; effective contact for screening purposes is provided by a number of spring-loaded contact fingers round the edge of the panel. The condenser C_1, with the two sections of 5 and 3 microfarads, is situated between the voltage regulator and the interference suppressor ; an instruction plate is provided giving the condenser connections for each type of generator. The wiring and pin connections are clearly shown in the bench wiring diagram in fig. 12. Five plugs are provided on the panel and these have the following functions :—

(i) 2-pin plug for connection to aeroplane D.C. supply.

(ii) 6-pin plug for connection to the engine-driven generator.

(iii) Three 4-pin plugs in parallel for the D.C. and A.C. outputs to the modulator and receiver, one plug being spare.

Modulator, type 20

18. H.T. current for the anodes of the transmitter valves is supplied from this unit in the form of positive pulses of approximately 7,000 volts peak value, and 2·8 microseconds duration, the pulses occurring at intervals of about 1,200 microseconds. Positive pulses, at equal intervals but with a peak value of approximately 400 volts, and delayed 2 microseconds after the anode pulses, are also supplied to the grid circuit of the transmitter, to damp out oscillations after the main anode pulse. The time base of the indicating unit of the equipment is operated by pulses of the same recurrence frequency and with an amplitude of about 16 volts. These pulses are also used to desensitize the receiver during the period that the direct signal from the transmitter is being received, as this signal would otherwise saturate the receiver ; further they are used to suppress the I.F.F. set (*see* S.D. 0210 (1)) during the period of the transmitted pulse and a subsequent period greater than the time required for echoes to be returned from objects 8 miles distant, *i.e.* 80 microseconds. If this were not done, the I.F.F. set would be triggered off, causing interference to appear on the screen of the indicating unit. A description of the suppression action is given in S.D. 0210 (1).

19. The method of producing the pulses entails first generating priming pulses, the duration of which is several times that of the required pulses, these priming pulses being used to build up current in the pulse generating valves, in the common anode of which is an inductance. On the termination of a priming pulse, the pulse generating valves are cut off, and the collapse of the current in the anode inductance produces the required 7,000-volt pulse.

20. *Priming pulse generator.*—This is a cathode-coupled multi-vibrator comprising the valves V_1 and V_2 (*see* the circuit diagram in fig. 13). Suppose that initially the valve V_1 is conducting and V_2 is biased beyond cut-off, due to a charge on C_5 making the grid of V_2 very negative and the cathode potential of V_2 very low. The negative charge on C_5 gradually decreases through the resistance R_{12} until the potential of the grid of V_2 relative to the cathode rises above cut-off and the valve V_2 passes current. As a result, the cathode potential above earth of V_2 is raised and with it the cathode potential of V_1, since its cathode is coupled to that of V_2. The grid of V_1 can be considered to be at a fixed potential with respect to earth and the rise in cathode potential will cause a fall in the current through V_1 which, in turn, will result in a rise in the anode potential of V_1, causing V_2 to conduct still more, due to this increase being applied to the grid of V_2 through the condenser C_5. The process continues rapidly until the valve V_1 is cut-off. The cathode potential of V_2 now remains constant, but that of V_1 falls as the cathode coupling condenser C_7 discharges through the cathode resistances R_9 and R_{10}, until V_1 once more conducts. This results in a fall in the grid potential of V_2 until V_2 ceases to conduct, reassuming its initial conditions. The cycle is then repeated.

21. The interval between the pulses depends both on the amplitude of the pulse at the grid of V_2, as this determines the amount of charge on C_5, and on the time constant of the grid circuit of V_2, since this determines the rate of loss of the charge on C_5. The duration of the pulse depends on the pulse amplitude at the cathode of V_2, as this determines the charge on C_7, and on the time constant of the cathode circuit of V_1, which determines the rate of loss of charge on C_7. By means of the adjustable resistance R_{10}, the cathode resistance of the valve V_1 can be adjusted to set the priming pulse duration to 20 microseconds. It is desirable to be able to make this adjustment without greatly altering the anode current of V_1, since such an alteration would result in a change of signal amplitude at the anode of V_1, which in turn would affect the interval between pulses. For this reason, the grid of V_1 is connected through the high resistance R_3 to a potential of about 300 volts, so that V_1 passes an amount of anode current which is independent of the relatively small changes of anode potential.

22. The purpose of the condenser C_1, in shunt with the resistance R_3, is to transmit a positive pulse to the grid of V_1 when the H.T. supply is switched on ; this ensures the starting of the multivibrator.

23. The output of the priming pulse generator is fed from a reversing transformer in the anode of V_2, the signal at the secondary of this transformer is a positive pulse of about 400 volts peak value.

24. *Pulse generating stage.*—Four pentode valves, type V.T. 75A, V_5 to V_8, which are specially selected for high emission and treated to withstand the high anode voltage, are connected in parallel. The positive priming pulses are fed to the grids of these valves, grid bias, resulting from grid current, being supplied by the condenser C_{10} shunted by the resistance R_{23} in the common grid lead. The positive excursion of the peaks of the pulses is thereby made about 50 volts as shown on the waveform diagram in fig. 14 (*a*).

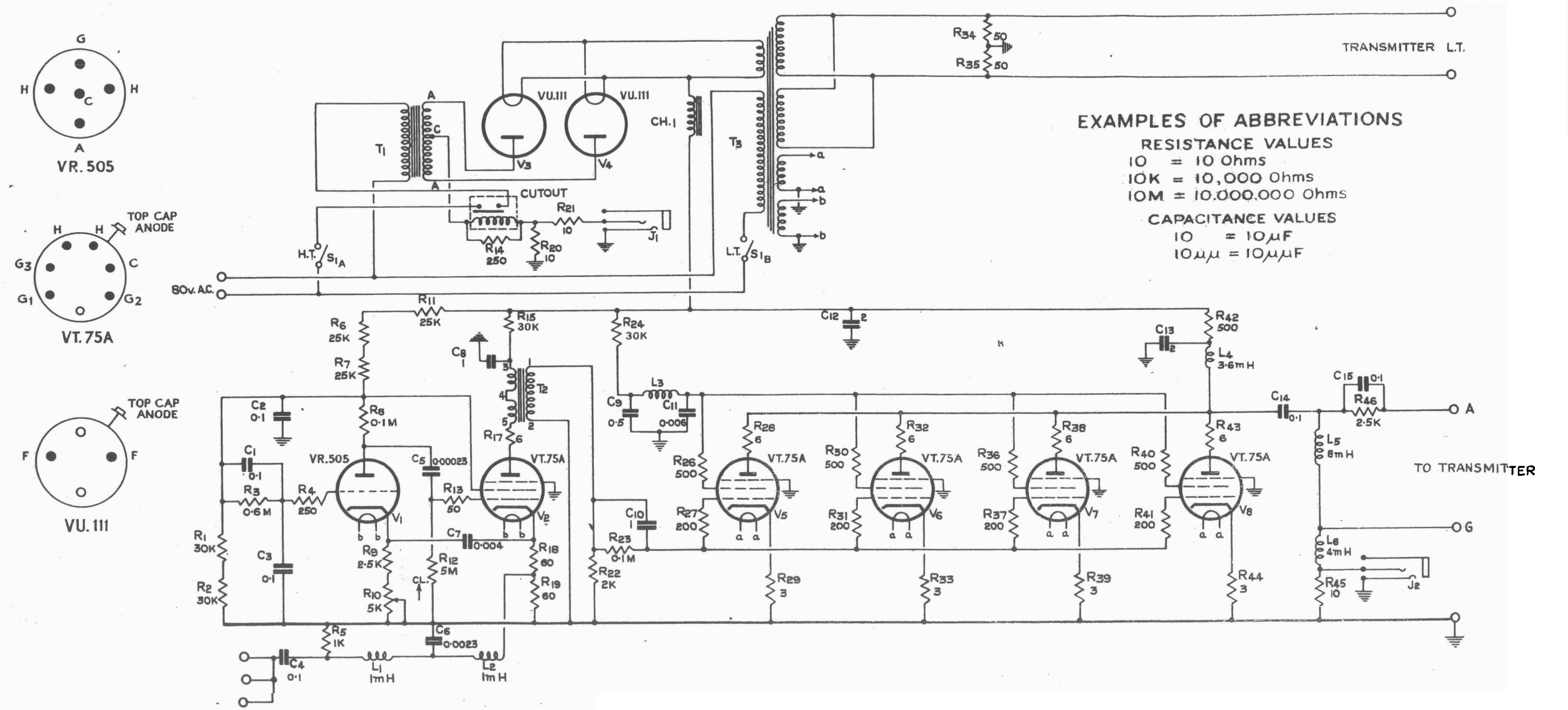
25. In the absence of priming pulses, the pulse generating valves would operate without grid bias and it has therefore been necessary to incorporate a cut-out in the main H.T. circuit, to prevent damage to valves or components, which failure of the multivibrator would otherwise cause.

26. The anodes of the valves are connected through an inductance L_4 of 3·6 millihenries to the H.T. supply and through a condenser to two inductances L_5 and L_6 of 8 and 4 millihenries respectively, which are connected in series to earth.

27. The potential at the anodes of the pulse generating valves for the period preceding the priming pulse is about 1,000 volts. When the valves are switched on by the priming pulse, the change of current in the inductance, as the valves conduct, causes a potential to build up across the inductance, so that the anode potential of the valves falls to practically zero. As the rate of increase of anode current falls off, the anode potential increases again, until at the end of 20 microseconds it has reached about 500 volts, a suitable condition for obtaining maximum anode current from the valves. The total peak anode current immediately before the end of the priming pulse is about 5 amperes, and at the end of the priming pulse this current falls to zero and the collapse of the current in the inductance produces the high-voltage pulse at the anodes.

28. When, at the start of the priming pulse, the anode potential falls to a low value, the cathode current passes through the screen grids. Resistances R_{26}, R_{30}, R_{36} and R_{40} are inserted in the screen leads and limit the screen current. The fall in screen volts produced by these resistances economises in cathode current during the early part of the priming pulse.

RESISTANCES	R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17 R18 R19 R20 R21 R22 R23 R24 R26 R27 R28 R29 R30 R31 R32 R33 R34 R35 R36 R37 R38 R39 R40 R41 R42 R43 R44 R45 R46
CONDENSERS	C1 C2 C3 C4 C5 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15
MISCELLANEOUS	S T1 L1 V1 L2 V3 T2 V2 V4 CH.1 L3 T3 S V5 V6 V7 L4 V8 L5 L6



EXAMPLES OF ABBREVIATIONS

RESISTANCE VALUES

10 = 10 Ohms
10K = 10,000 Ohms
10M = 10,000,000 Ohms

CAPACITANCE VALUES

10 = 10μF
10μμ = 10μμF

CIRCUIT DIAGRAM OF MODULATOR, TYPE 20

FIG.13

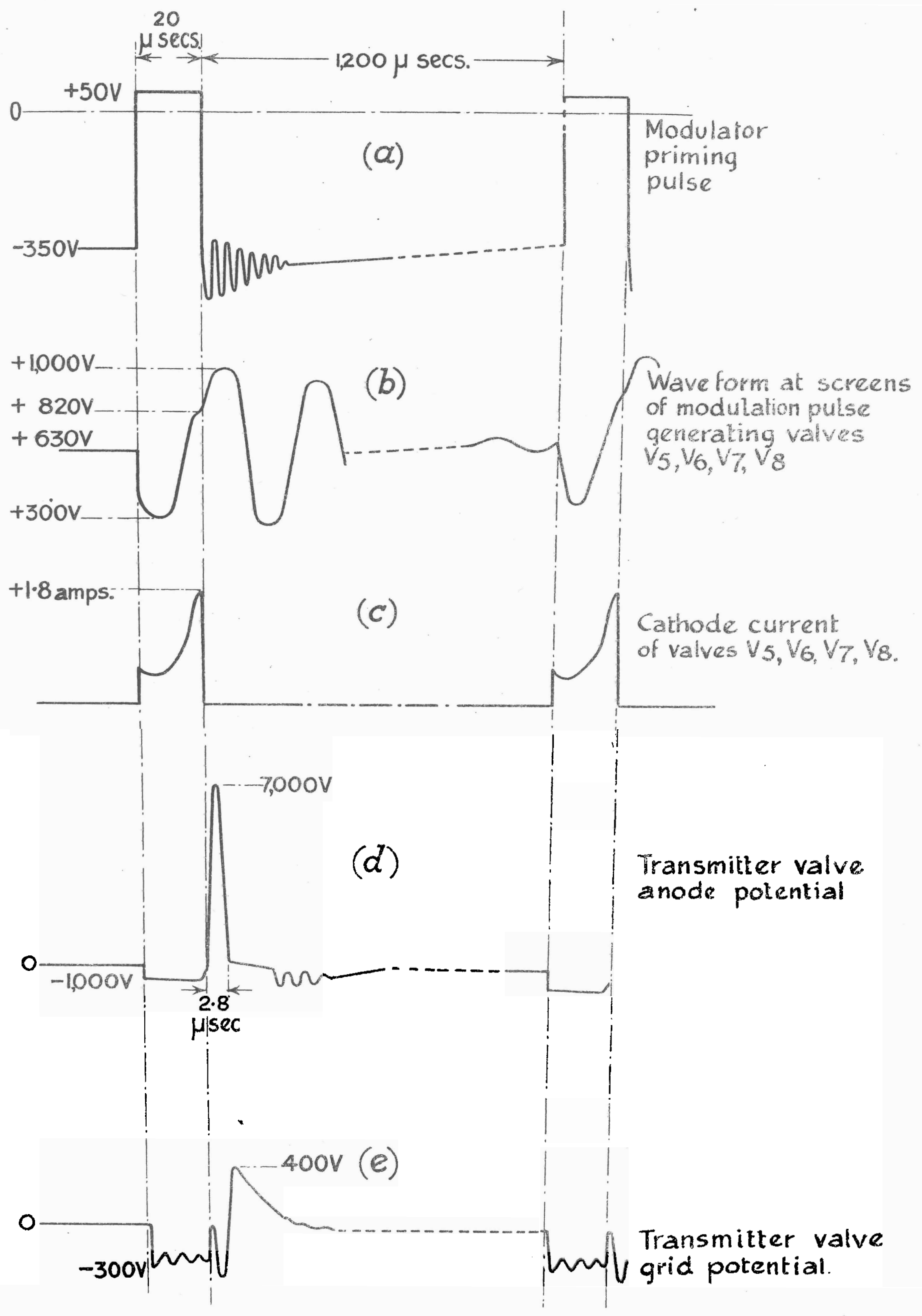


FIG. 14 WAVEFORMS FIG. 14

29. The anode current of the valves is required to build up to a maximum at the end of the priming pulse and therefore, in order to make the screen potential rise towards the end of the priming pulse, an inductance L_3 of 3 millihenries is inserted in the common screen lead, and this is tuned with a 0·006 microfarad condenser C_{11} to earth to such a frequency that the screen volts reach a maximum 20 microseconds after the start of the priming pulse. The waveform at the screens of V_5 to V_8 is shown in fig. 14 (*b*).

30. Resistances, each of 3 ohms, R_{29}, R_{33} and R_{34}, in each cathode circuit, enable the cathode current waveform to be examined with a monitor to ascertain that all the valves are operating correctly. The waveform of the cathode current is shown in fig. 14 (*c*) ; the peak cathode is a little under 2 amperes for each valve.

31. *Output to anodes of transmitter valves.*—The high voltage pulse generated by the pulse generator valves is applied through a condenser to the anodes of the transmitter valves to produce pulses of high-frequency energy from the transmitter. The transmitter is a self-oscillator and imposes a load on the output of the modulator approximately equal to a 1,750-ohm resistance shunted by a 150 micro-microfarad condenser (most of the capacitance is provided by the lead connecting the modulator to the transmitter). This capacitance, added to the capacitance of the modulator output circuit, tunes with the anode inductance at a frequency of about 215 kc/s, so that the duration of a half-cycle is about 2·3 microseconds. The effect of the resistive component of the lead is to reduce the amplitude of the pulse and to increase its duration to about 2·8 microseconds. At the end of the pulse a negative anode bias is obtained from the condenser C_{15}, shunted by the resistance R_{46}, which has been charged while the transmitter valves are conducting. **The object of this is described in para. 41. The waveform at** transmitter anodes is shown in fig. 14 (*d*).

32. *Output to grids of transmitter valves.*—In order to increase the rate of decay of the transmitter oscillator, it is arranged to increase the transmitter grid circuit damping, during the decay of the anode pulse, by driving the grids positive as the potential of the anodes approaches zero. A delayed positive pulse is therefore derived from the anode pulse at the junction of the inductances L_5 and L_6 ; this pulse, with a peak value of about 400 volts, is applied to the grids of the transmitter valves.

33. *Output to receiver and indicating unit.*—The radiation from the transmitter takes place immediately after the end of the priming pulse and lasts for approximately 2·8 microseconds, and it is necessary to desensitize the receiver during this period. A fraction of the positive priming pulse about 16 volts in amplitude is tapped from the junction of the cathode resistors R_{18} and R_{19}, delayed by means of a 2-microsecond delay network comprised of the inductances L_1 and L_2, and used for this purpose. The remainder of the necessary 2·8 microseconds delay takes place in the receiver, where the circuits are such as to provide a delay adjustable from approximately 0·3 microsecond to 1·5 microseconds. The gain then gradually increases, reaching full value in about 5 microseconds. In this way the production of spurious signals, which would be generated by the high-frequency components of a sharply rising wavefront, is avoided. A parallel connection from the delay network is used for the triggering of the time base of the indicating units.

34. *L.T. supply.*—L.T. for the modulator and for the transmitter valves is supplied from a transformer T_3, the primary of which is connected through switch S_{1B} to the 80-volt A.C. supply terminals. Two secondary windings of the transformer T_3 are connected in parallel and supply the 8·8-volt, 7·5-ampere current for the transmitter valves. Two 50-ohm resistances across this supply are centre-connected to the chassis to give an earth-return for the transmitter H.T. supply. The filaments of the rectifier valves V_3 and V_4 are supplied by another secondary winding giving 2 amperes at 4·0 volts. The heater winding for the valves of the multivibrator gives 3 amperes at 4·4 volts, and the heater winding for the remaining valves V_5, V_6, V_7 and V_8, 8 amperes at 4·4 volts.

35. *H.T. supply*.—The primary of the H.T. transformer T_1 is connected through the switch S_{1A} to the 80-volt A.C. supply terminals. S_{1A} and S_{1B} are parts of the same rotary switch, S_{1B} being first closed. The two rectifier valves are connected to form a full-wave rectifier, the output being fed through the choke CH_1 and then further smoothed by the condenser C_{12}. The decoupling resistance R_{42} and condenser C_{13} prevent any pulse feed back. The centre tap on the secondary of the transformer T_1 is connected through a cut-out, shunted by R_{14}, and metering resistance R_{20} to earth. Part of the H.T. current passes through the cut-out winding ; should the total H.T. current exceed 180 milliamperes, the cut-out breaks the 80-volts A.C. supply lead to the primary of the transformer.

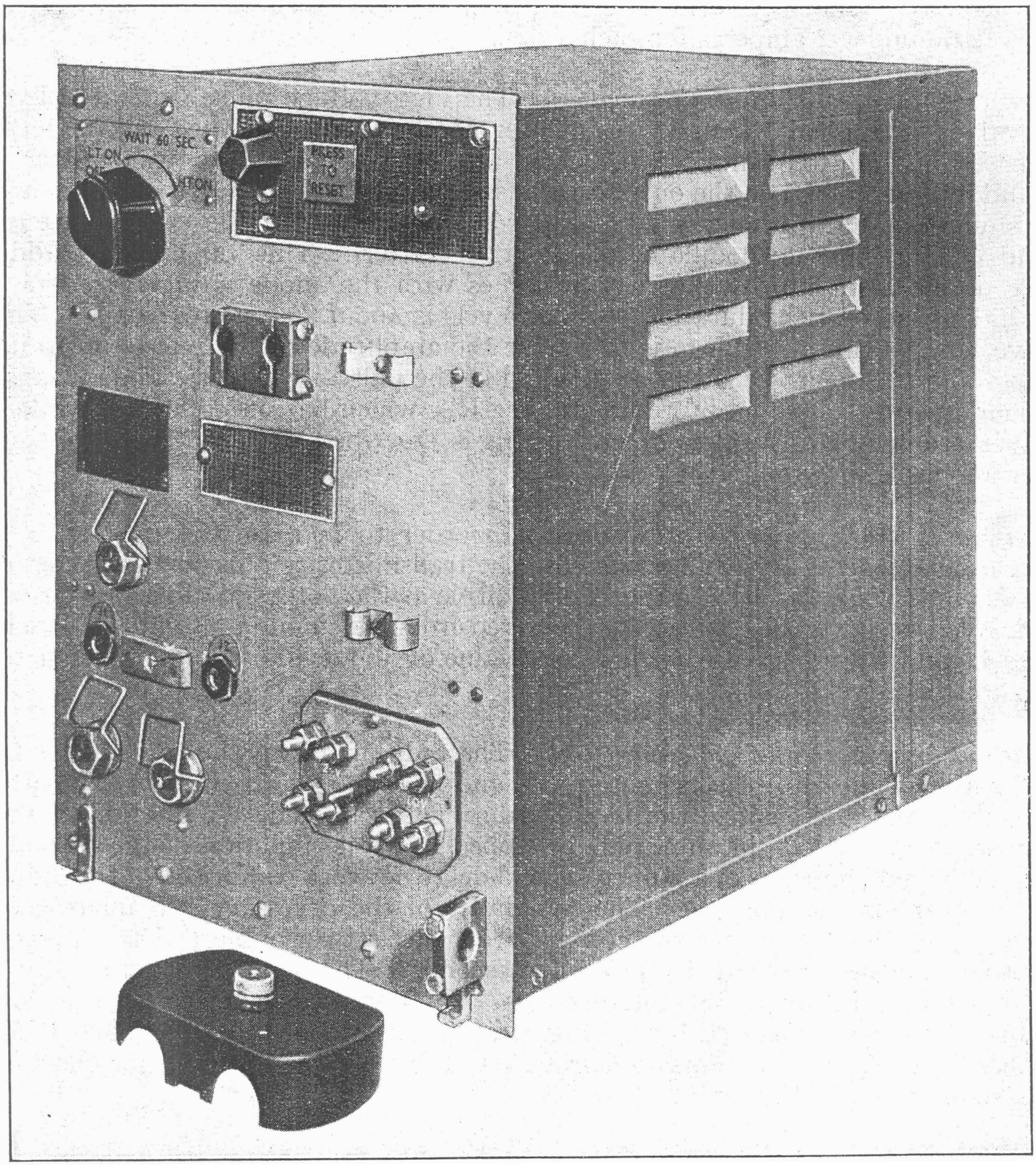
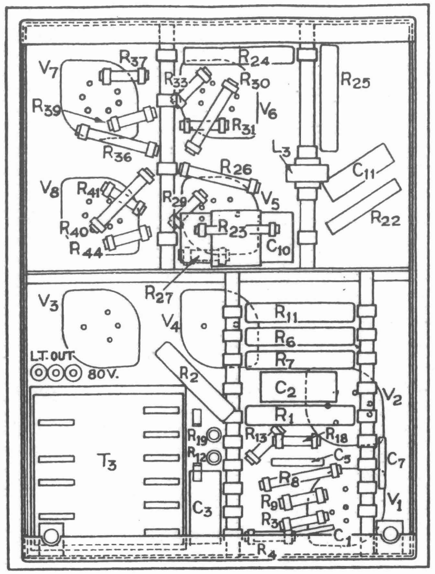


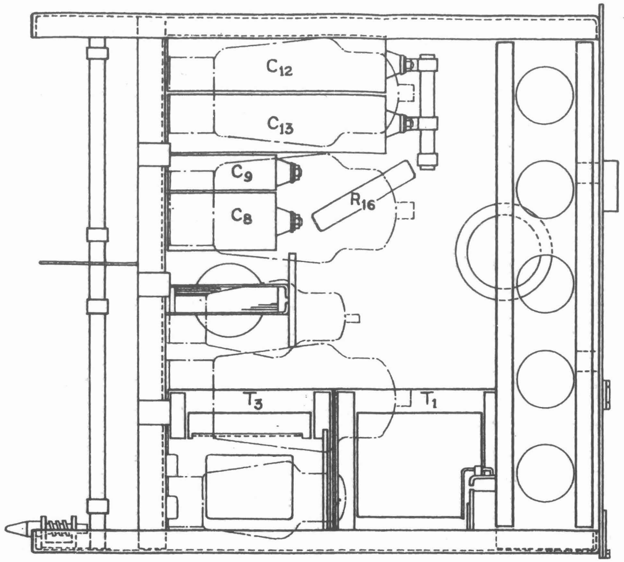
FIG. 15.—Modulator, type 20.

Modulator constructional details

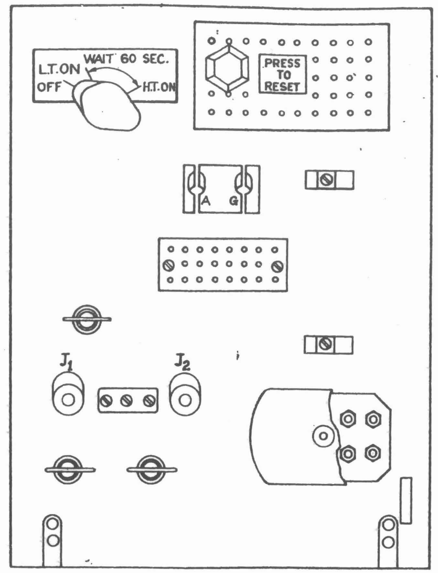
36. A front view of the unit is given in fig. 15 and the layout of the components in fig. 16, the annotations being the circuit references from fig. 13. The black cover shown in the foreground in fig. 15 normally covers the terminal board on the front of the panel to which the D.C.



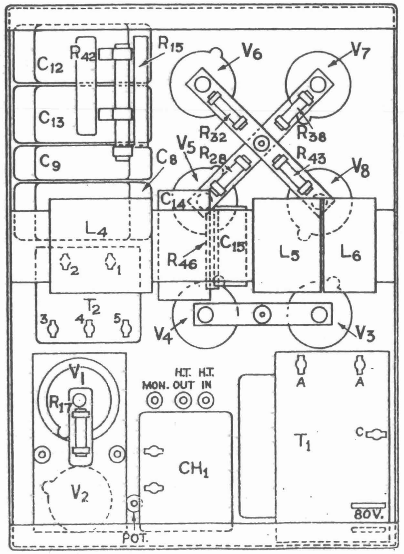
REAR OF CHASSIS



SIDE VIEW

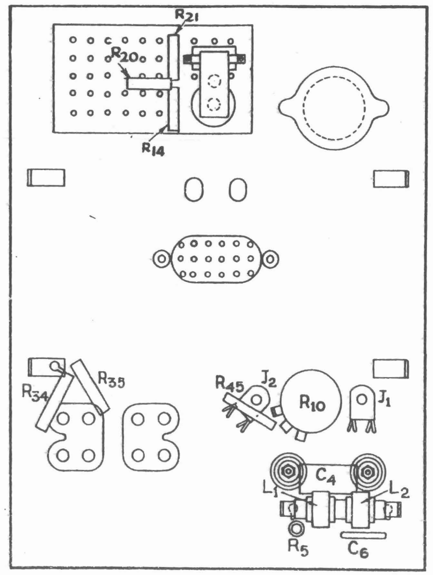


FRONT PANEL



FRONT OF CHASSIS

NOTE.
For values of components see circuit diagram of modulator.



REAR OF FRONT PANEL

LAYOUT OF MODULATOR, TYPE 20

FIG 16

FIG 16

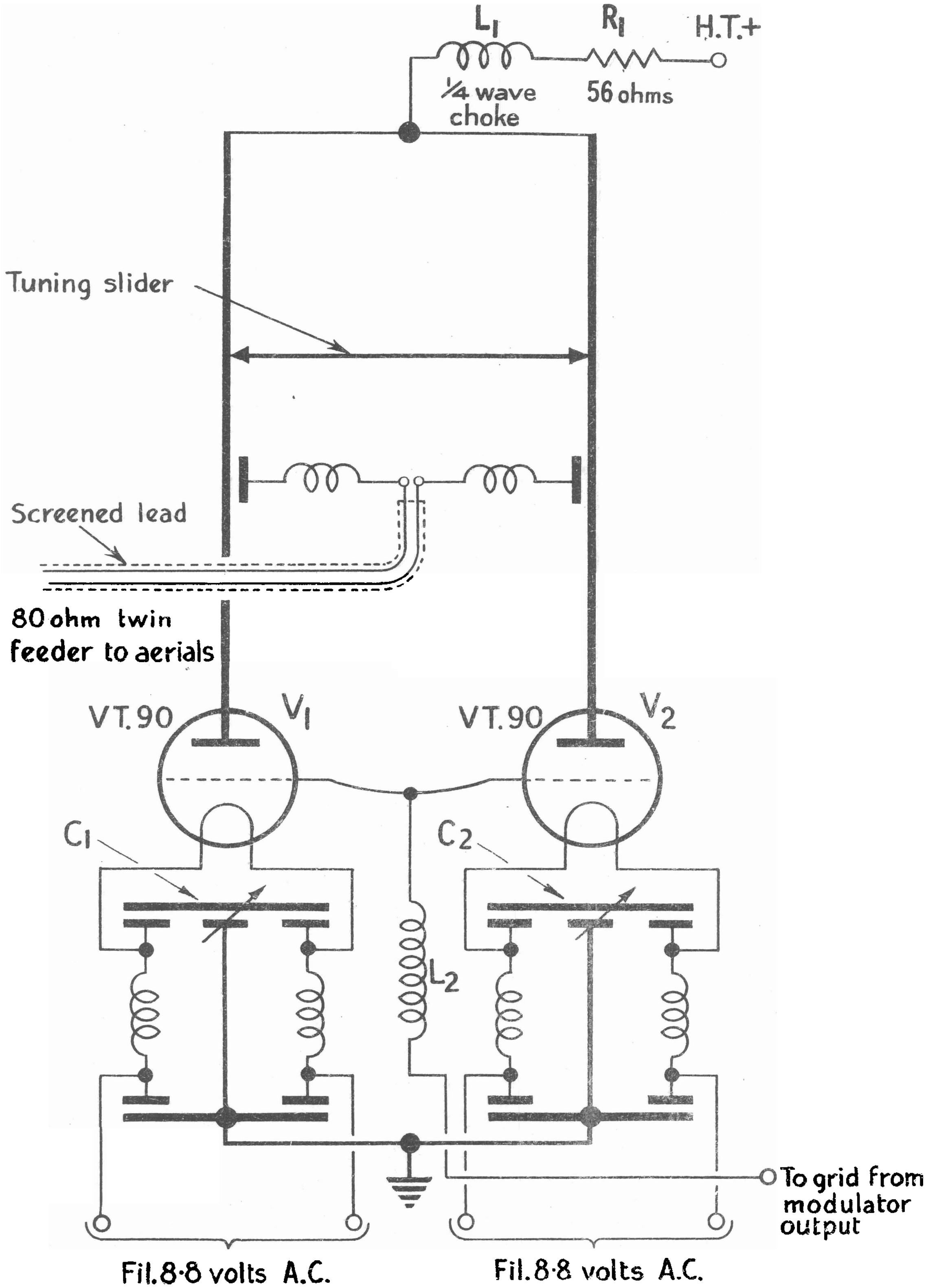


FIG. 17

CIRCUIT DIAGRAM OF TRANSMITTERS, TYPES T3065, T3065A, & T3065B

FIG. 17

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and A.C. supplies from the control panel, type 3, are carried; from this board are taken the A.C. filament supply for the transmitter valves and the D.C. supply to the transmitter blower motor. At the top of the front panel are the 3-position switch, for the L.T. and H.T. supplies in the unit, and the reset knob of the cut-out in the H.T. supply. Ventilating perforations are provided at the back of this knob and below it in the front panel of the modulator.

37. The co-axial plugs, for the pulse connectors leading to the receiver and indicating unit and to the I.F.F. set are situated on the left, and below them are the jacks labelled J_1 and J_2, used when metering the total modulator feed and the sum of the grid and anode feeds to the transmitter valves. Between the jacks is seen the clamp securing the slotted spindle of the potentiometer R_{10}, used to set the duration of the priming pulse to 20 microseconds; this should not normally require adjustment. At the base of the front panel are seen the two lugs which are used to secure the unit to its mounting in the aeroplane.

38. Access to the interior of the unit is obtained by removing the rear panel and sides, which are screwed to the chassis on the underside. A screen separates the pulse generating components from the remainder and this is also used to support the low-capacitance rod mountings of the components.

Transmitters, types T.3065, T.3065A and T.3065B

39. These transmitters are very similar, types T.3065 and T.3065A being hand made and 24-volt and 12-volt types respectively. Transmitter, type T.3065B is the mass production 24-volt type. The circuit diagram is given in fig. 17.

40. The transmitter self-oscillates for the periods during which high-tension pulses from the modulator, type 20, are fed to the anodes of the two transmitting valves. These valves are connected together in a push-pull circuit, in which none of the electrodes of the valves are at earth potential. Lecher lines form the low-decrement tuned circuit in the anode circuit and largely determine the frequency of transmission. A shorting slider across these lines is used to tune the circuit to a frequency of 193 Mc/s, the filament tuning condensers C_1 and C_2 and the position of the aerial coupling having a minor effect on this. The aerials are capacitance-coupled to the anode lines by means of cylindrical elements encircling the latter co-axially. The loading of the transmitter is adjusted by moving the cylindrical elements along the anode lines.

41. At the commencement of the modulator priming pulse, the potential at the modulator valve anodes falls from 1,000 volts to nearly zero. At the termination of the priming pulse, it rises to about 8,000 volts and then decays to 1,000 volts. As the transmitter valve anodes are connected to the modulator valve anodes through a condenser, the 1,000-volt D.C. component is removed; the potential at the transmitter valve anodes falls from zero to —1,000 volts at the start of the priming pulse (*see* fig. 14 (*d*)), rises to about 7,000 volts at the end of the priming pulse and then decays to a slightly negative value, due to the action of the condenser C_{15} in the modulator output circuit, thus obtaining a clean cessation of the pulse (*see* fig. 14 (*d*)). This negative potential is then discharged through the resistance R_{46} in shunt with the condenser, the final anode potential being zero.

42. The initial negative pulse is stepped down by inductances L_5 and L_6 to about 2,000 volts and fed to the transmitter valve grids; it is delayed by these inductances, which form a delay network with the capacitances of the transmitter valve (*see* fig. 14 (*e*)). When the potential at the transmitter valve anodes suddenly rises, the grid potential is carried positive, due to the capacitance existing between the grids and anodes of the valves. When the anode potential reaches a certain value, the valve oscillates and grid current is generated, making the grids negative. As the anode potential falls, the grids are then driven about 400 volts positive due to the delayed anode pulse supplied from the modulator, the valve damping thereby being increased sufficiently to stop the oscillation. The duration of the positive grid pulse is about 9 microseconds, and during this time the anodes are held at a negative potential by the charge on C_{15}, thus making it impossible for the valves to oscillate, since the anodes are less positive than the grids. The charge on C_{15} leaks away *via* R_{46} before the next positive anode pulse appears, when it is renewed.

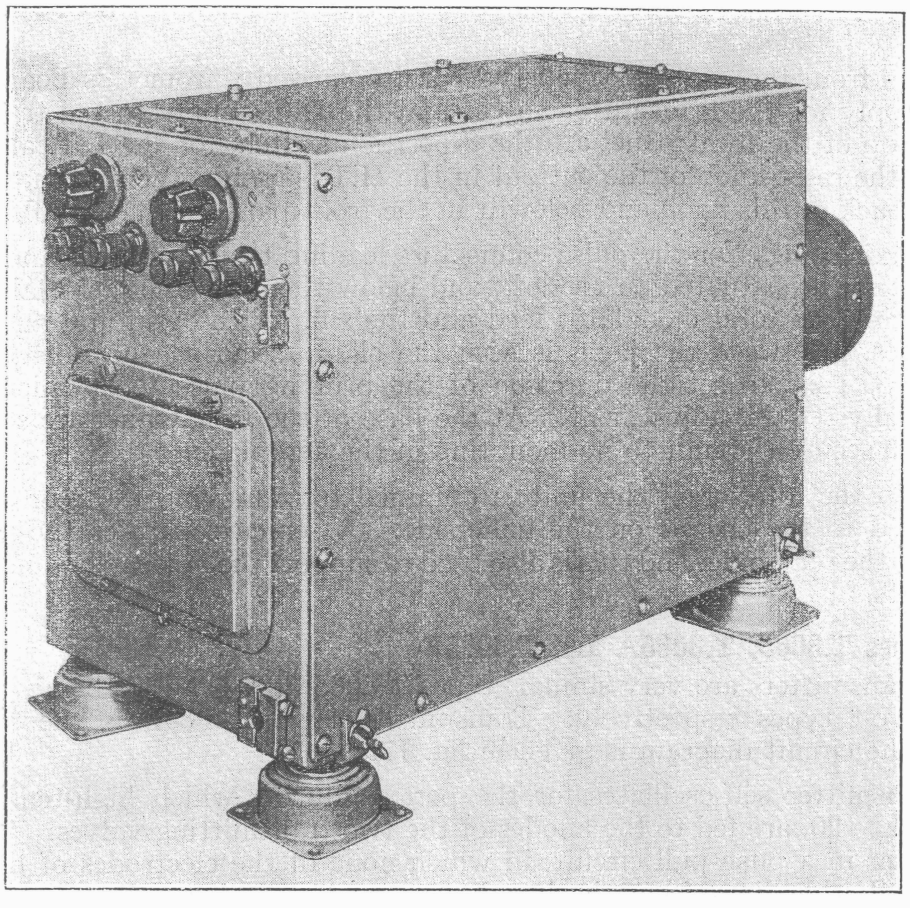

FIG. 18.—Transmitter, type T.3065B.

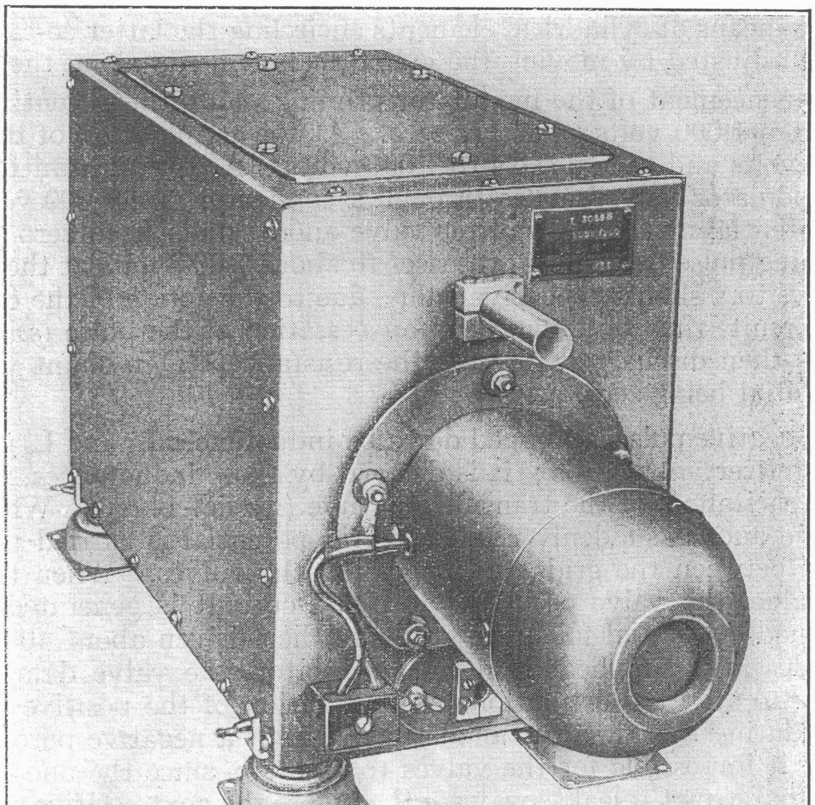

FIG. 19.—Rear view of transmitter, type T.3065B.

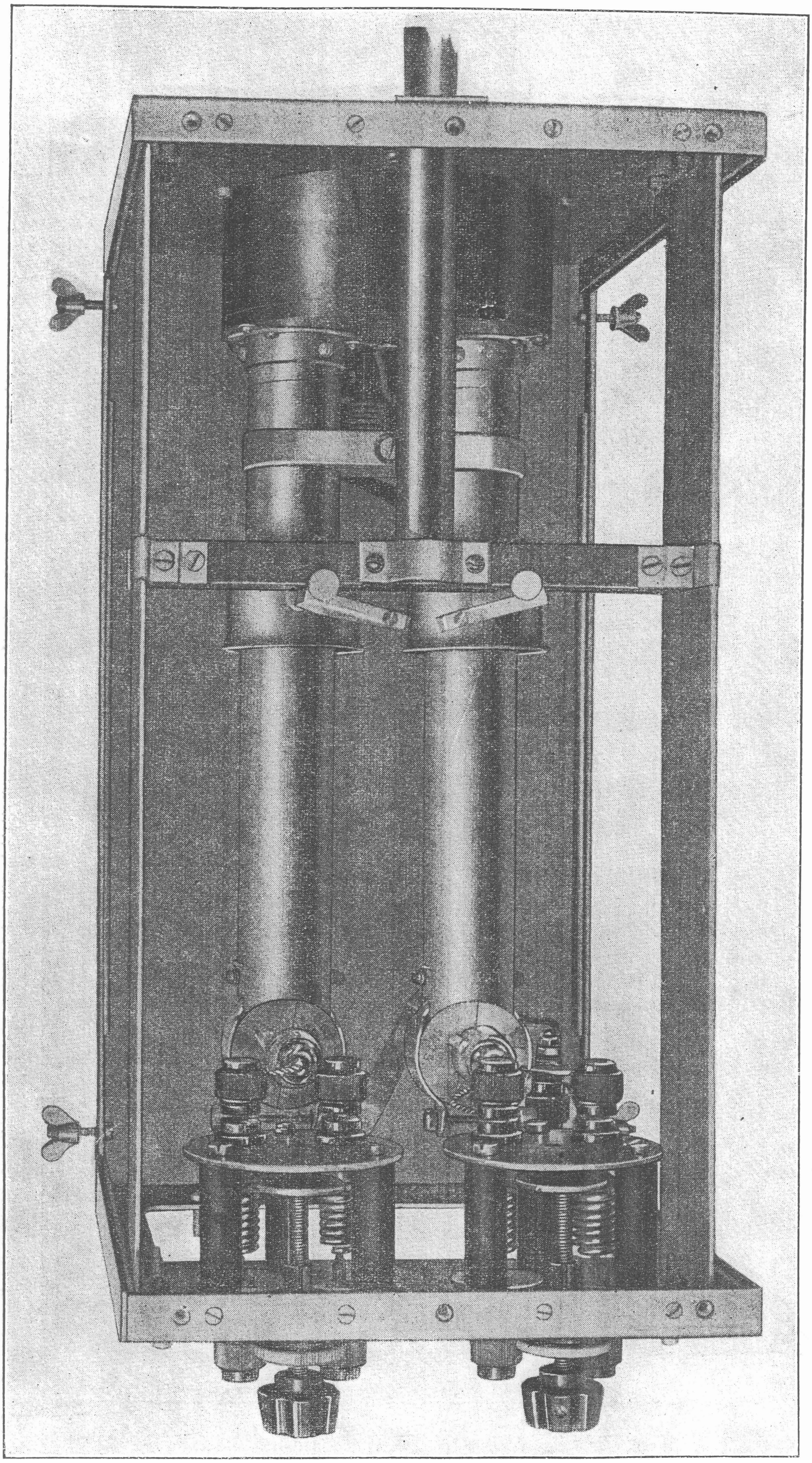

FIG. 20.—Interior top view of transmitter, types T.3065, T.3065A and T.3065B.

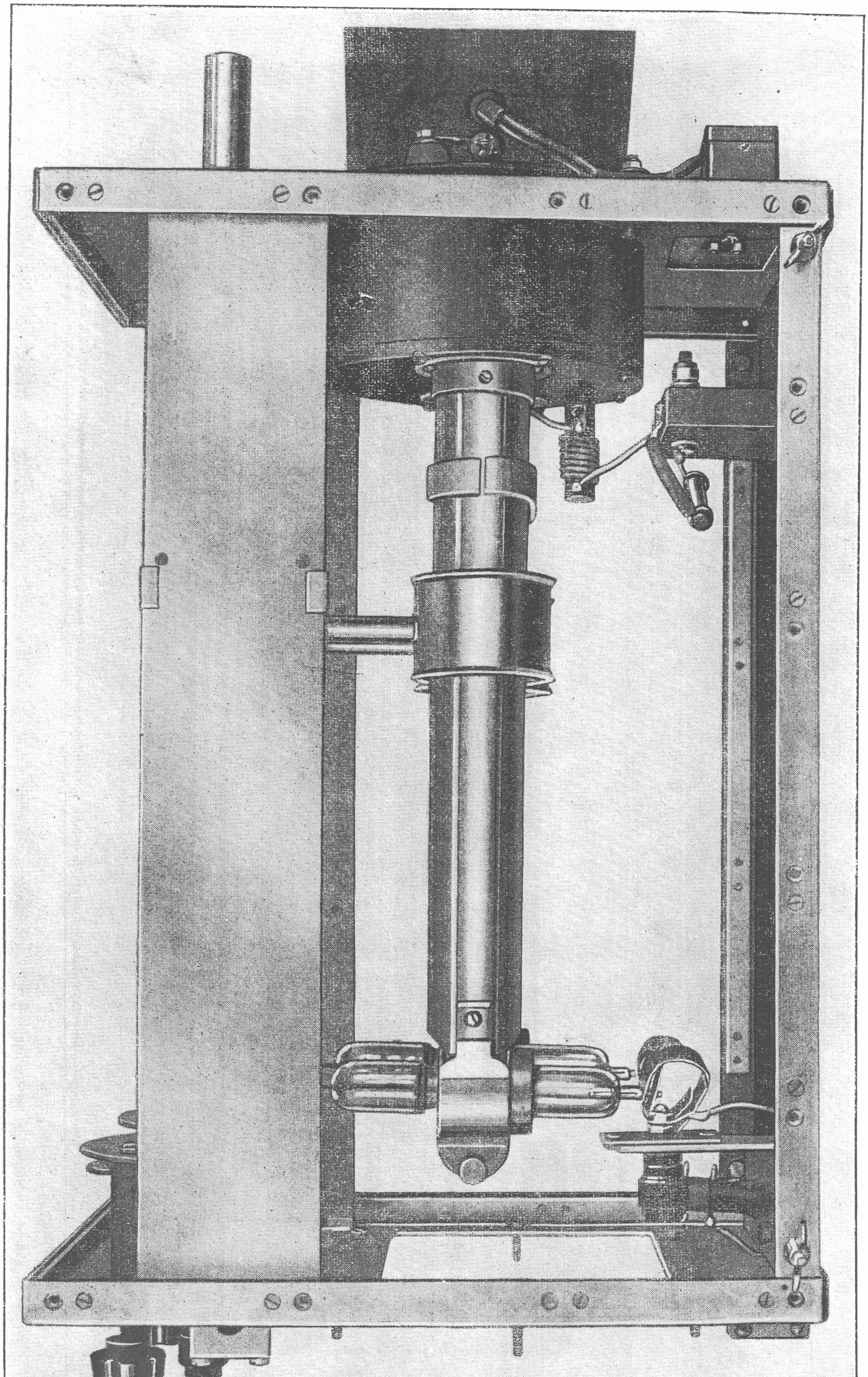

FIG. 21.—Interior side view of transmitter, types T.3065, T.3065A or T.3065B.

Transmitter constructional details

43. Views of the front and rear of the unit are shown in figs. 18 and 19. The louvres on the front are shaded by light screws to prevent the light from the transmitter valves being observed by the enemy in night interceptions. On the front of the unit are the two controls which are used to vary the capacity of the condenser of the filament tuning units, and below these controls are the two pairs of terminals for the filament heating supply. On the rear of the unit is mounted the blower supplying the cooling air to the anodes of the valves through the tubular anode lecher lines inside the unit. The blower comprises a D.C. motor (12-volt or 24-volt, depending on the aeroplane D.C. supply) and a fan, the fan intake aperture being provided with a wire gauze screen. Above the blower casing is seen the screening tube through which runs the twin aerial feeder cable from the transmitter aerial junction box.

44. The interior of the unit is shown in figs. 20 and 21. As shown in fig. 20, the aerial feeder screening tube enters the rear of the unit and is clamped to an insulating crossbar, on which the cylindrical aerial coupling condensers are carried. The crossbar is mounted by clips on the side bars of the chassis, thus enabling its position to be adjusted to vary the coupling between the aerial condensers and the anode lines. Mounted on the inside of the front of the unit are the two filament tuning units and below them are the transmitting valves. The distances between the disc-shaped condenser plates and the large circular plates in the filament tuning units are varied by the control knobs on the front of the transmitter to tune the filament units to give maximum impedance. Circular milled locking nuts are provided on the screwed spindles of the condensers, beneath the control knobs, to secure these in position after setting-up. In fig. 21 the anode lecher lines are shown mounted on the cylindrical blower duct, and at their other extremities they carry the transmitting valves, by means of clips round the cooling fins on the anodes. The H.T. cable is brought through the rear panel underneath the blower and connected to the terminal block mounted on the base of the unit, shown on the right of fig. 21. Adjacent to this block are seen the 56-ohm resistance and the choke in series with the H.T. lead, the choke being connected to the base of the lecher lines. The input suppression lead to the grids of the transmitter valves is brought through the front panel and connected to a terminal ; this terminal is connected through a choke to the centre point of the grid loop.

Receivers

45. There are two types of receiver, the earlier developed type being R.3066 and the later R.3102A. Both types incorporate a switch unit and are interchangeable.

Receiver, type R. 3066

46. *Receiving unit, type 26.*—This is a superheterodyne receiver and as seen from the circuit diagram of this receiver in fig. 22, has one radio-frequency stage, tuned to 193 Mc/s, a mixer stage into which the local oscillator feeds, four intermediate-frequency band-pass stages followed by a detector stage and a compensated cathode follower stage. Acorn pentode valves are used for the radio-frequency and mixer stages and an acorn triode in the oscillator position in order to give amplification at the frequencies used. For the remainder of the receiver, type V.R. 91 valves are used.

47. As described in para. 33, a positive pulse is supplied from the modulator, type 20, and this pulse is used to desensitize the receiver, by preventing the local oscillator from operating during the period of the transmitter pulse, since the direct signal from the transmitter would otherwise saturate the receiver. The positive pulse is applied through the terminal coloured ORANGE to the grid of the gas-filled relay valve V_4, and, on its arrival, V_4 conducts and the potential of the anode of V_4, which is that of the junction of the resistances R_{13} and R_{14}, falls to merely zero value. The cathode of the oscillator V_3, is maintained at a potential sufficiently below that of the anode to maintain the oscillations previous to the suppression (*see* fig. 23).

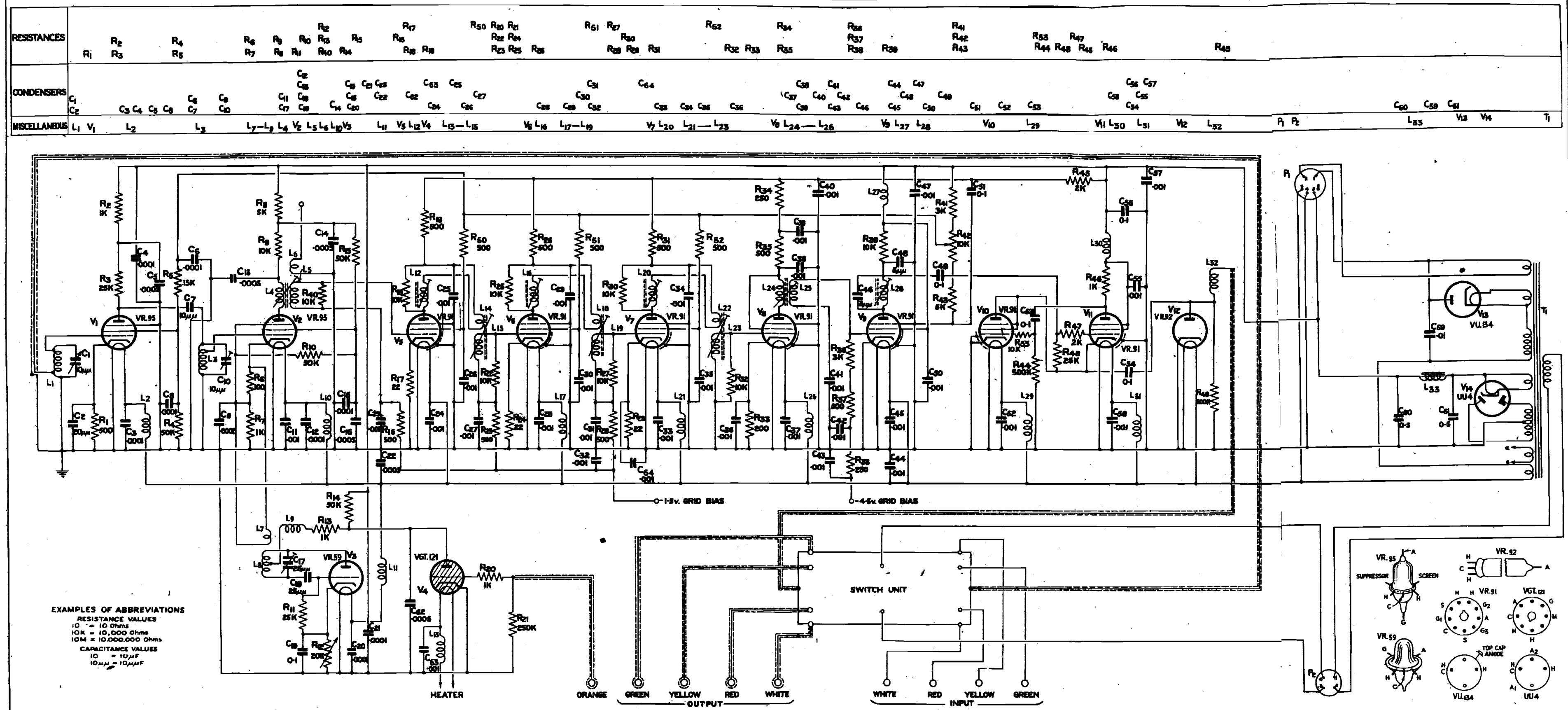

FIG. 22

CIRCUIT DIAGRAM OF RECEIVER TYPE R.3066

FIG. 22

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When the anode potential of V_4 and the potential at the junction of R_{14} and R_{13} falls, V_a the potential at the anode of V_3 will also fall to nearly zero; the positive potential at the cathode of V_3 is maintained by the condenser C_{19}, thus the potential of the cathode of V_3 will be above that of the anode and oscillation will cease. At the conclusion of the positive suppression pulse, the valve V_4 will cease to conduct and the potential at its anode will rise as the condenser C_{62} is charged. When the potential of the anode of V_3 is sufficiently above that of the cathode, V_3 will once more oscillate; the potential of the cathode can be varied by adjusting R_{12}; it will thus be apparent that R_{12} can be used to determine the point at which oscillations can start subsequent to the positive pulse. By this means, a delay equal to 0·8 microsecond can be introduced, the exponentially rising voltages in C_{32} governing the gain for a further 5 microseconds.

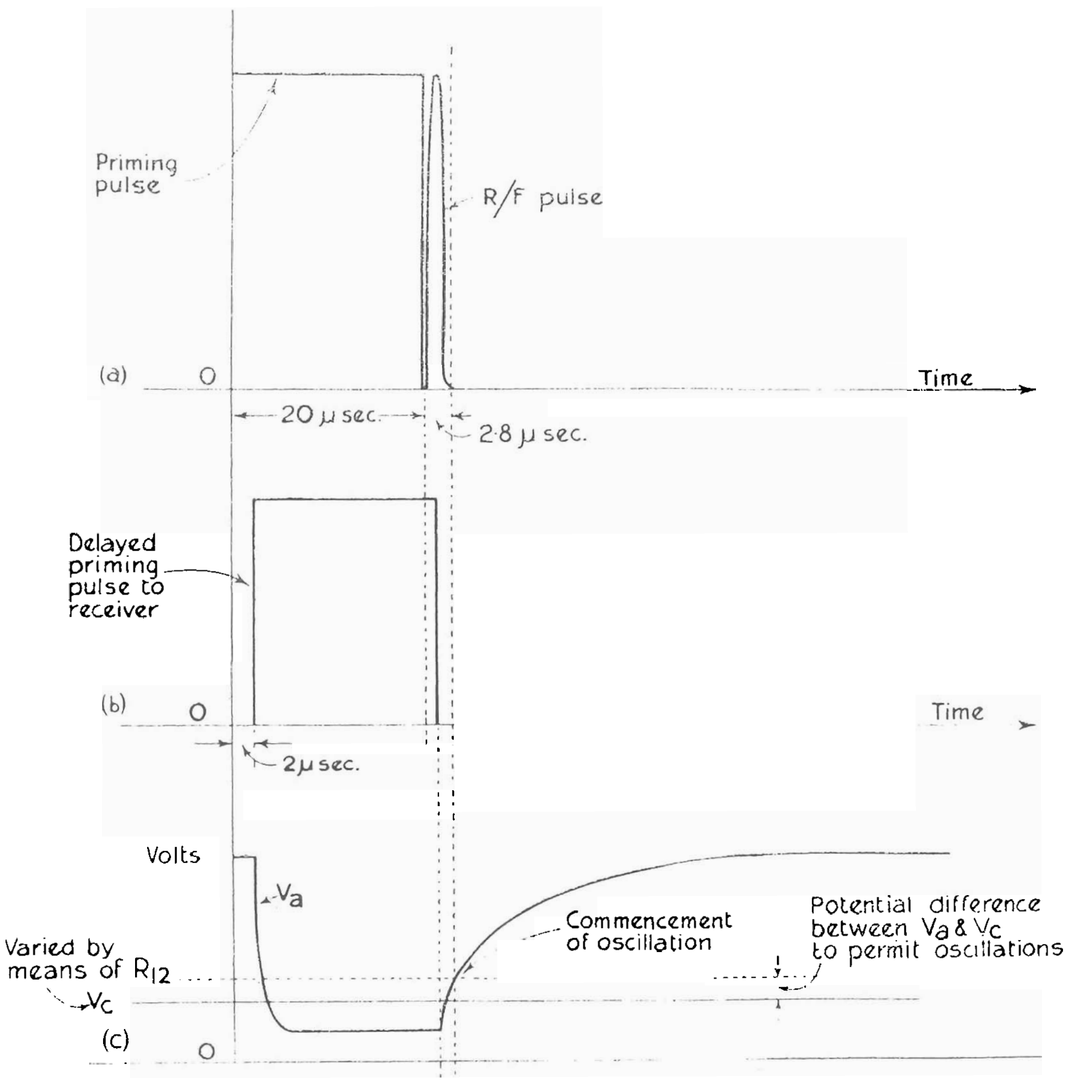


FIG. 23.—Suppression action in receiver type R.3066.

48. The chokes L_2, L_{10}, L_{11}, L_{13}, L_{17}, L_{21}, L_{26}, L_{29}, L_{31} with their associated by-pass condensers in the filament circuits of the valves V_1, V_2, V_3, V_4, V_6, V_7, V_8, V_{10} and V_{11}, form filter circuits to prevent regeneration and self-oscillation in the receiver. The inductance L_{28}, in parallel with the condenser C_{46}, forms a tuned filter circuit, at intermediate frequency, in the anode circuit of the anode bend detector V_9; similarly, the chokes L_{27}, L_{30} with their associated by-pass condensers in the anode circuits of valves V_9 and V_{11} prevent I.F. regenerative currents forming in the H.T. lead; resistances R_2, R_8, R_{19}, R_{26}, R_{31} and R_{34} with their smoothing

condensers serve a similar purpose for the remaining valves. The inductance L_9 in the H.T. lead of the oscillator valve V_3 prevents the centre tap of the oscillator coil L_8 becoming " earthy " through the condenser C_{62}. The gain in the receiver is controlled by means of the potentiometer R_{42}, from which the H.T. is fed to the screens of the R.F. and I.F. stages ; this is necessary as otherwise signals returned from near objects would saturate the receiver, in which case the output voltages for the four input signals would be equal, and the discrimination required for direction-finding would be impossible.

49. The four intermediate-frequency stages are adjusted to give a bandwidth of 1·5 Mc/s (± 750 kc/s) for 3 db. down, the intermediate frequency being 45 Mc/s. The valve V_9 is biased back nearly to cut-off and functions as already mentioned as an anode-bend detector. It feeds into the cathode-follower stage, where the valves V_{10}, V_{11} function in series. A coil L_5 is coupled to the first I.F. coils L_3 and L_4 and the input taken from an uncoloured plug on the front panel of the receiver for I.F.F. interrogation.

50. *Power unit, type* 77.—In addition to two power windings, separate secondary windings are provided on the power transformer T_1 (*see* fig. 22) for the heaters of the two rectifier valves, the 6·3-volt supply for the valves of the receiver and indicating unit, the 4-volt supply to the thyratron valve V_4 in the receiver and the 4-volt supply to the heaters of the cathode ray tubes. The half-wave rectifier V_{13} provides the 1,200-volt negative H.T. supply for the cathode ray tubes ; one of the heater leads for the cathode ray tubes is used for this connection, as shorting trouble was experienced between the pins 5 and 6 of the 6-pin socket when a separate connection was made to pin 6. A smoothing system comprising a choke and the condensers C_{62} and C_{63} is connected across the full-wave rectifier V_{14}, which provides the 300-volt H.T. supply for the valves of the receiver and indicating unit.

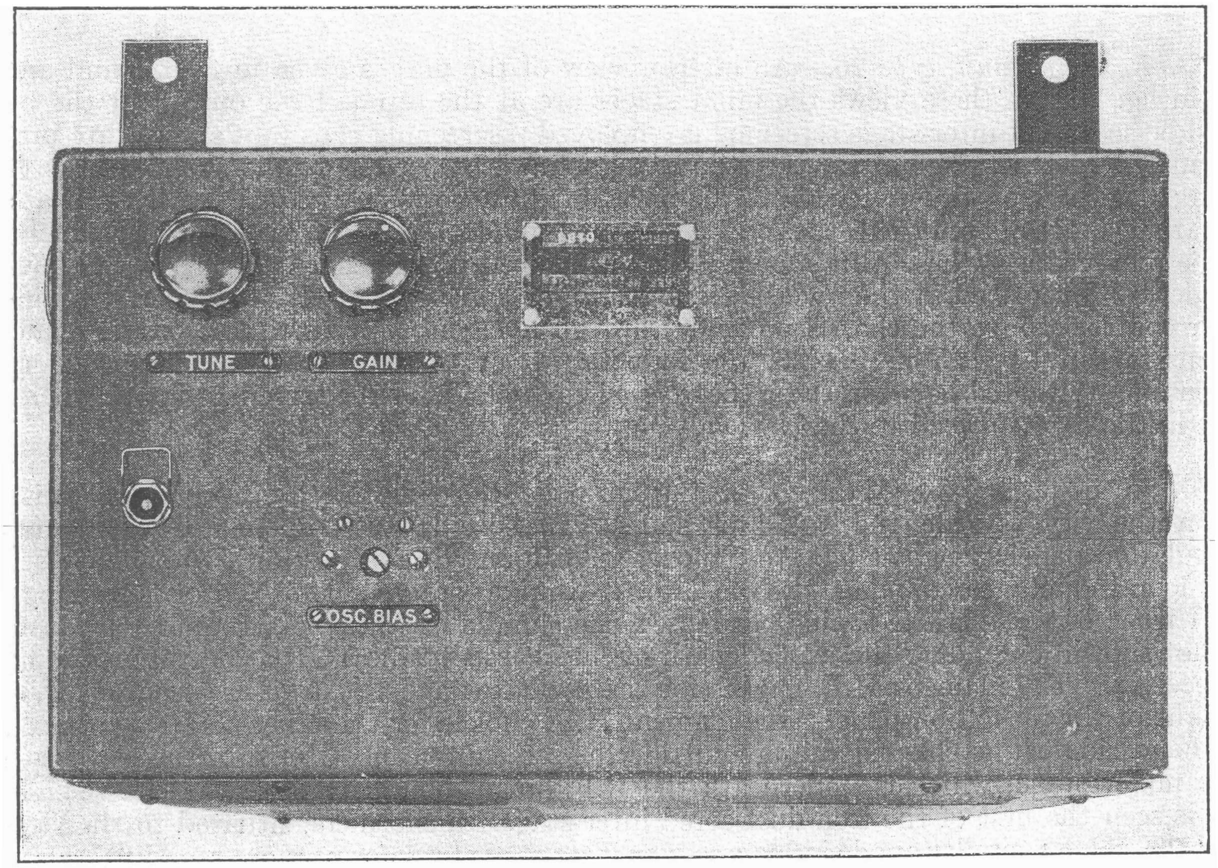


FIG. 24.—Receiver, type R.3066.

Receiver, type R.3066 constructional details

51. A view of the front of the unit is given in fig. 24. It is mounted with the screwdriver control of the oscillator bias potentiometer, the control knob of the oscillator tuning condenser, labelled TUNE, the control knob marked GAIN of the potentiometer controlling the H.T. supply to the three intermediate-frequency stages, and the uncoloured co-axial input plug for I.F.F. Mk. III interrogation purposes. The various other inputs to the receiver are taken through plugs on the right-hand side of the container in fig. 24 and the outputs from those on the left-hand side. The two brackets fastened to the upper side of the sheet steel container support it in the aeroplane.

52. The louvred cover on the underside of the container is removed to give the interior view shown in fig. 25 in which the receiving unit chassis is shown on the right with the rectifier valves V_{13} and V_{14}, power transformer T_1 and switch unit mounted on the left. A terminal board is mounted on the top of the transformer, the terminals being labelled with the colours of the leads to facilitate reconnection. As is seen, the signal input leads are taken from the plugs on the left-hand side of the container and are connected to the four input plugs, situated at right-angles to each other, on the upper switch casing. The fifth plug on the upper switch casing is connected to the radio-frequency stage, shown towards the upper end of the receiving unit chassis. On a sub-panel attached to the upper end of the receiving unit chassis is seen the thyratron valve V_4, to which the suppression pulse lead is connected; this lead runs across the rear of the container from the input plug. The output lead from the receiver runs up the centre of the container and connects a plug on the lower casing of the switch to the output from the diode D.C. restorer valve V_{12}, which is mounted on the sub-panel attached to the lower end of the receiving unit chassis. The remaining leads, seen on the base of the container, connect the four output plugs on the lower switch casing to the four plugs mounted on the right-hand side of the container. The supplies to the indicating unit are taken through the 6-pin plug seen below the four output sockets.

53. *Receiving unit, type* 26.—An interior view of the unit is given in fig. 25 and an under view in fig. 26; in these views the input stages are at the top and the output at the bottom. It will be seen that inter-stage screening is employed; screening cans (not shown) are provided, the can on the R.F. stage above the unit being secured by screens to the flange on the vertical screen; the cans on the underside of the chassis clip in between vertical screens; if access to the various stages is required, the local oscillator tuning drive rod from the front panel should first be removed and these cans should then be removed in sequence, starting at the bottom in this view and replaced in the reverse sequence. The R.F. and mixer stage preset tuning condenser controls above the chassis protrude through holes in the can; these controls and their condensers can be seen in fig. 26, the inductances of these stages being mounted on the condensers. Situated between these controls on the outside of the screening is a filament H.F. choke in the filament lead to the R.F. valve V_1.

54. In the under view of the chassis the sub-panel carrying the thyratron valve V_4 is at the top on the right beside the oscillator stage. The oscillator components are mounted on an insulation panel at right-angles to the chassis. Mounted on a post on this panel is seen the single-loop inductance coupling, the oscillator and mixer stages, the oscillator coil being below it; in front of these is the tuning condenser, the spindle of which is rotated by an insulation rod (not shown) extending the whole length of the chassis to the TUNE control on the front of the receiver. The filament H.F. chokes for the oscillator and thyatron are seen below, and to the right of the insulation panel; the filament H.F. chokes for the other stages are seen on the right-hand side of the chassis, and are outside the screening cans. Next to the oscillator stage is the mixer stage, which is underneath the R.F. stage mounted above the chassis. In this stage is seen the first of the iron-dust-cored inter-stage transformers, situated to the right and below the valve; similar anode inductances or inter-stage transformers are seen in the following stages. A slot is provided in the top of the iron-dust-cores, which screw into the polysyrene formers; the position of these cores is adjusted to tune the inductance and the cores are then

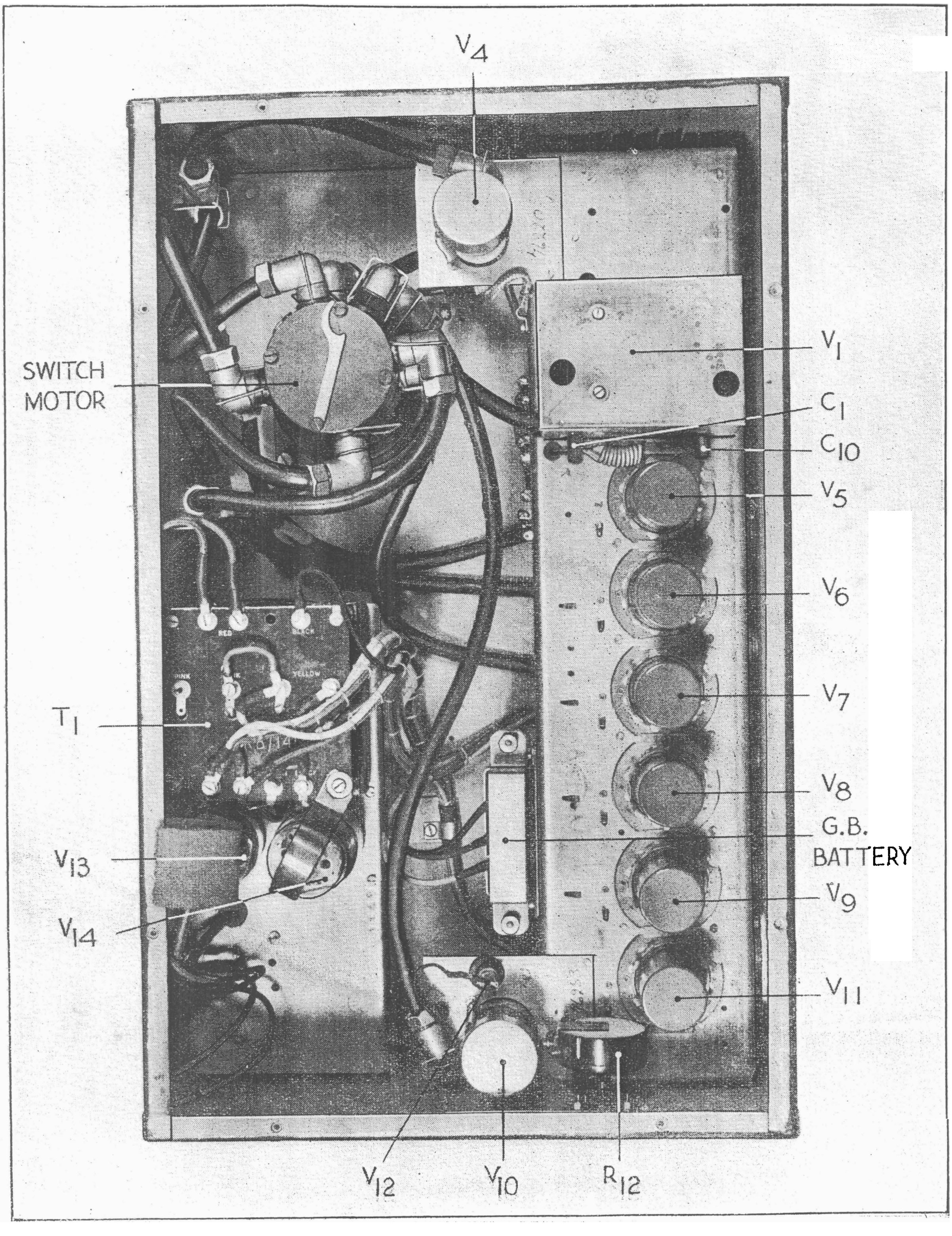


FIG. 25.—Interior of receiver, type R.3066.

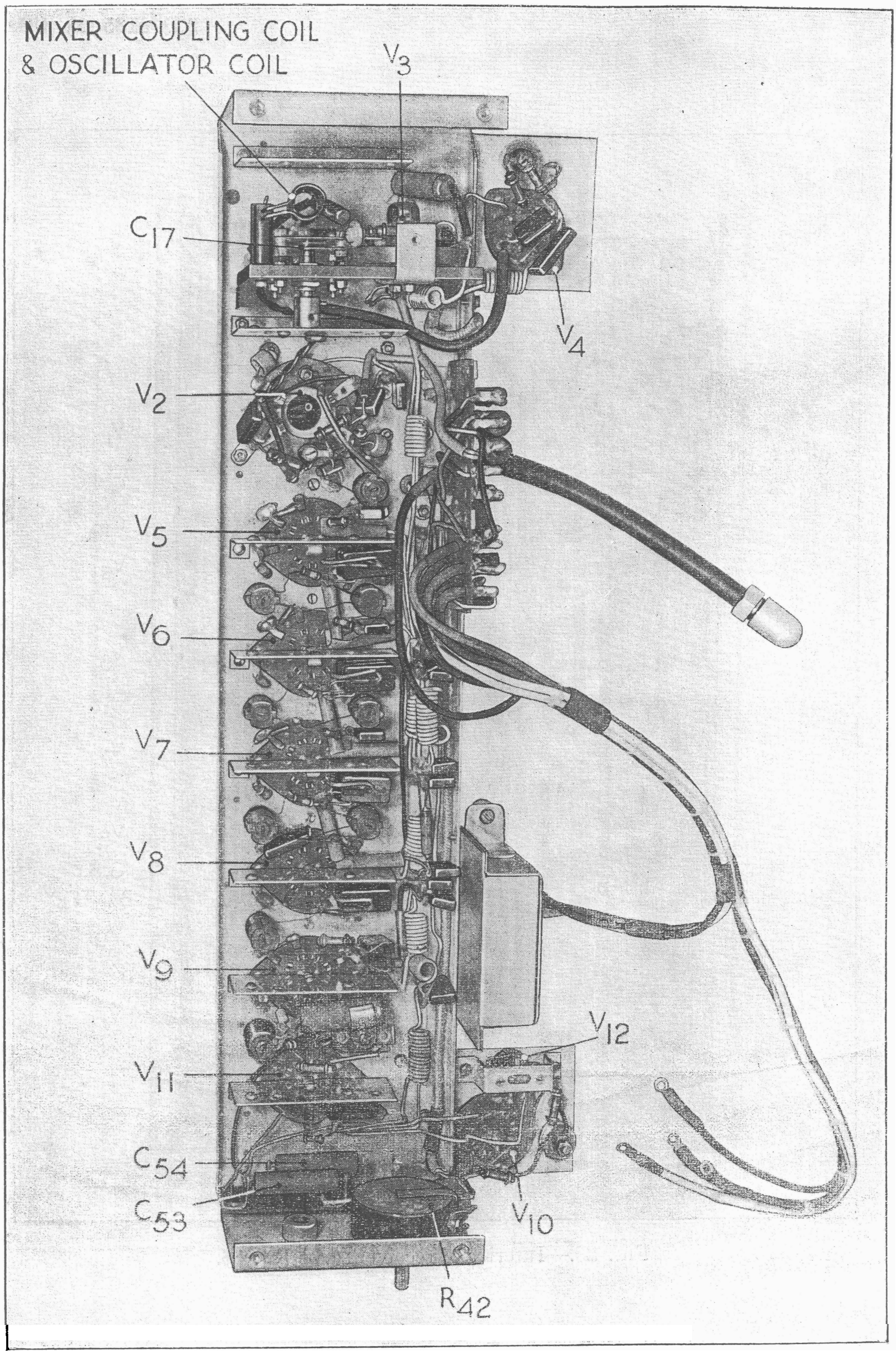
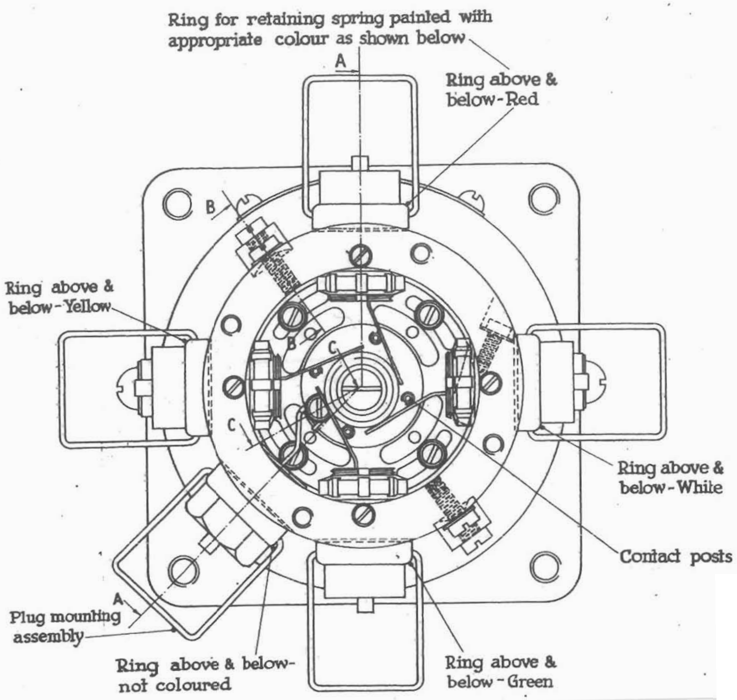
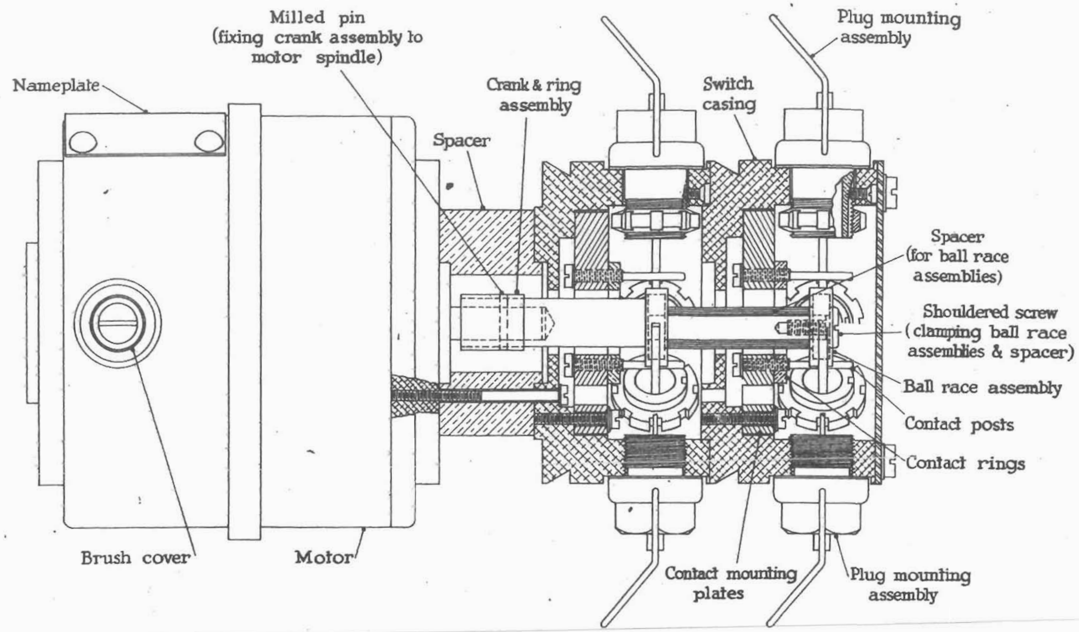


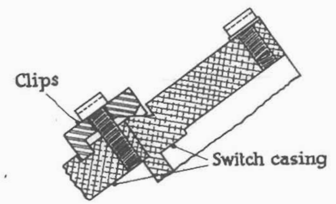
FIG. 26.—Underview of receiving unit, type 26.



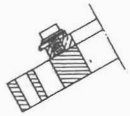
View with cover removed



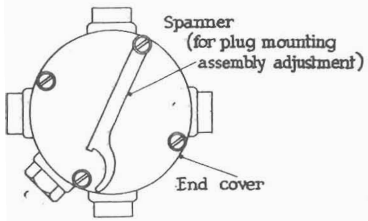
Part section AA.



Part section BB. showing method of clamping the two sections of the switch together.



Part section CC. showing method of clamping wire from plug mounting assembly



SWITCH UNIT, TYPE 39

FIG. 27

FIG. 27

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sealed in position by pitch. On the right of the lower part of the chassis in this view is the grid bias battery for the I.F. and the second detector valves, and below this is the sub-panel carrying under a bracket the diode D.C. restorer. At the lower end of the chassis is the gain control potentiometer.

Receiver, type R.3102A

55. This is a superheterodyne receiver with two radio-frequency stages tuned to 193 ± 1 Mc/s, a mixer stage into which the oscillator feeds, three intermediate-frequency band pass stages followed by a diode detector, a video-amplifier, cathode follower and D.C. restorer. The circuit diagram is given in fig. 28.

56. The delayed 20-microsecond priming pulse from the modulator, type 20, used to suppress the receiver during the period of the transmitter pulse, is fed in through the plug marked ORANGE to the grid of the valve V_{12}. Prior to the arrival of the pulse, this valve is cut-off, and on the arrival of the pulse it passes current and its anode potential falls. The anode is coupled by the condenser C_{13} to the junction of the resistances R_3 and R_{13} in the H.T. supply to the local oscillator valve V_4 and the fall in the anode potential of V_{12} stops oscillation. The valve V_{12} is driven into grid current by the pulse from the modulator, the grid thus being at zero potential when the pulse terminates. The falling side of the pulse will reduce the potential of the condenser C_4 (*see* fig. 13) in the modulator, to about 80 volts negative. This condenser will then slowly become charged through the resistance R_6 across the grid of V_{12}, thus applying negative bias to the valve during intervals between the positive pulses from the modulator.

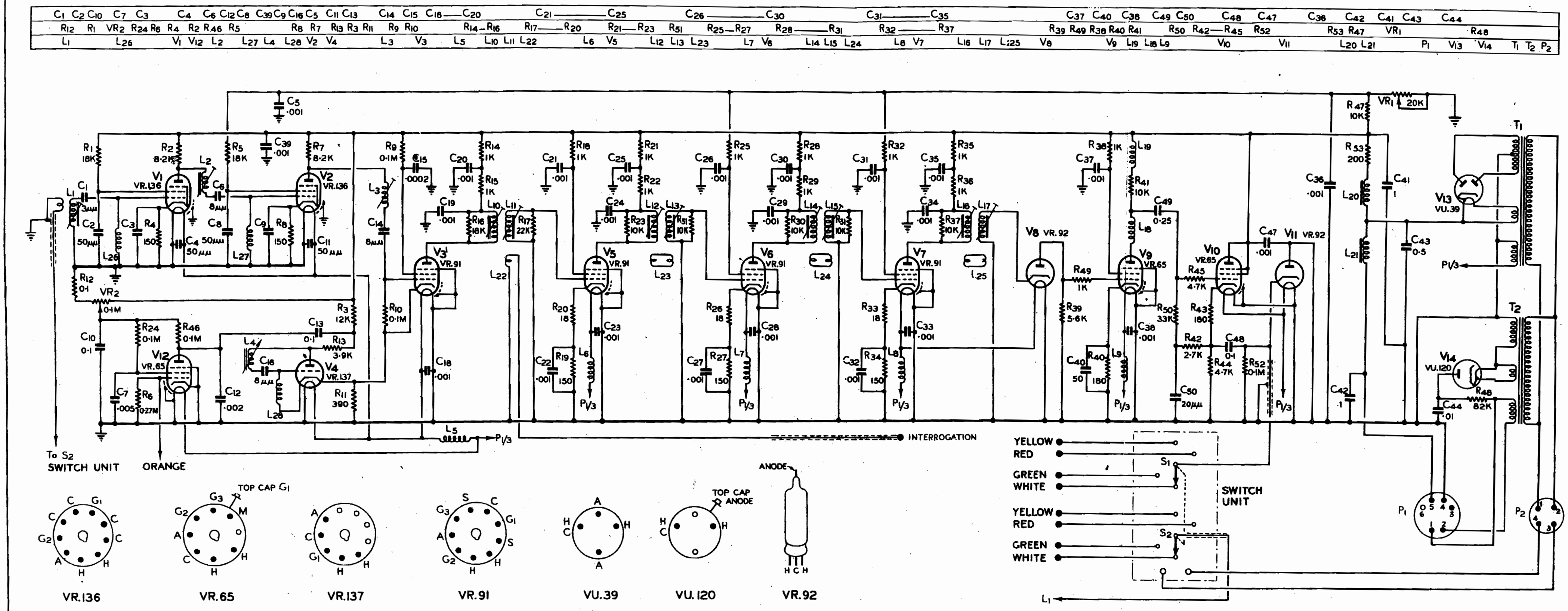
57. As soon as the valve V_{12} is cut off, the potential at the anode of V_4 rises exponentially due to the charging of the condenser C_{12} through the resistance of R_3 (the potential across C_{13} being small) until the voltage across the valve V_4 is sufficient for oscillation to commence. The condenser C_{12} is also fed through the resistance R_{46} and from a point on the resistance VR_2, which, in series with R_{12}, is connected across the H.T. supply. Before V_{12} conducts, this serves to tie down its anode potential and therefore the potential across C_{12}. The exponential charging curve of C_{12} will depend on this initial potential and thus VR_2 can be used to regulate the interval elapsing between the cessation of the suppressor pulse from the modulator and the commencement of oscillation in V_4.

58. Brass cores are used in the inductances L_1, L_2, L_3 and L_4, the tuning of the radio-frequency, mixer and oscillator stages being effected by adjusting the position of these cores. An intermediate-frequency of 45 Mc/s is employed, the I.F. stages being aligned by means of the dust-cored coils L_{10} to L_{15} and L_{17}, L_{19}, to give a bandwidth of $\pm$ 750 kc/s for 3 db. down.

59. The coil L_{22} coupling with L_{11} is fed from an uncoloured plug on the front panel of the receiver for I.F.F. interrogation purposes.

60. The second detector V_8 is a diode (V.R.92) the negative signal from its anode being fed to an amplifier V_9, across which the cathode follower V_{10} is connected. The positive output from the cathode of V_{10} is subjected to D.C. restoration by V_{11} and taken through the motor-driven switch to the four output plugs of the receiver. The feeds from the switch to the output plugs differ from those in the receiver, type R.3066, in that the present receiver employs a negative output signal and it is required to make the receivers interchangeable.

61. *Power unit.*—The 300-volt supplies for the valves of the receiver and indicating unit are taken from the transformer T_1, separate windings on the transformer T_2 providing the heater and E.H.T. supplies for the cathode ray tubes of the indicating unit. Separate smoothing is provided by L_{20} and C_{14} for the 300-volt supply to the receiver and L_{21}, C_{42} for that to the indicating unit.



CIRCUIT DIAGRAM OF RECEIVER, TYPE R.3102A

FIG. 28

FIG. 2

Receiver, type R.3102A : constructional details

62. This unit is illustrated in fig. 29. At the bottom of the front panel is the knob labelled OSC. BIAS, which adjusts the point at which the receiver becomes sensitive subsequent to the transmitter pulse and is coupled to the potentiometer VR_2. It is so labelled to conform with the receiver R.3066, where the suppression control is obtained by varying the oscillator bias, and that labelled GAIN for adjusting the potentiometer VR_1 across the H.T. supply to the screen grids of the valves V_2, V_6 and V_7. On the left of these knobs is the co-axial plug used for I.F.F. interrogation purposes. At the top of the front panel is the oscillator circuit tuning coil labelled TUNE, on the left of which are the three preset screwdriver controls tuning the R.F. stages normally covered by small covers. The front panel is extended at right angles and carries, as shown in fig. 28, the 4-pin plug for connection to the control panel, type 3, on the right-hand side, the left-hand side carrying the 6-pin plug for connection to the indicating

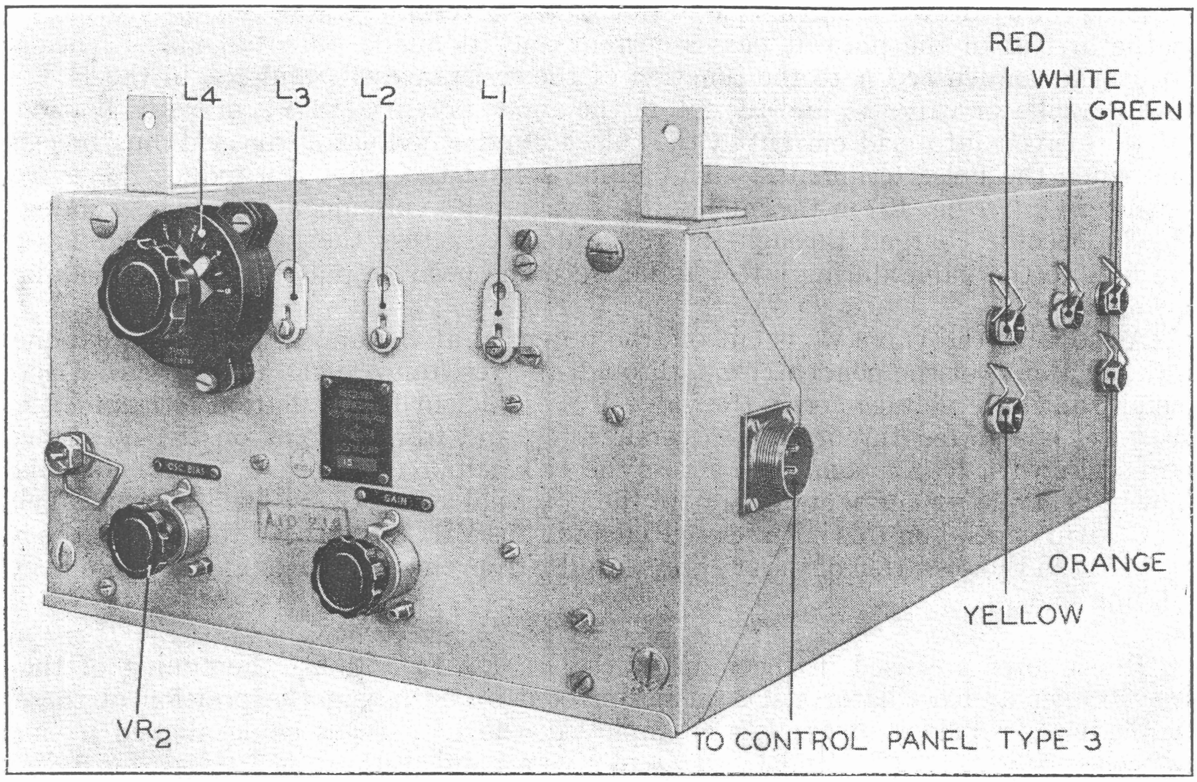


FIG. 29.—Receiver, type R.3102A.

unit. On the right-hand side of the receiver chassis are the four input co-axial plugs connected to the aerials, the four output co-axial plugs connected to the indicating unit being mounted in line behind the 6-pin plug in the order yellow, red, white, green. On removing the cover over the underside of the receiver, secured by four Dzus fasteners, the view shown in fig. 30 is obtained. To enable the chassis to be withdrawn from the container, it is necessary to undo the four Dzus fasteners in the corners of the front panel. Screws soldered to the screening cans enable them to be secured to the chassis. The cans have been removed in the view shown in fig. 31.

Switch units

63. In addition to the switch unit, type 39, a further switch unit, type 39A, is being developed, with which it will be interchangeable.

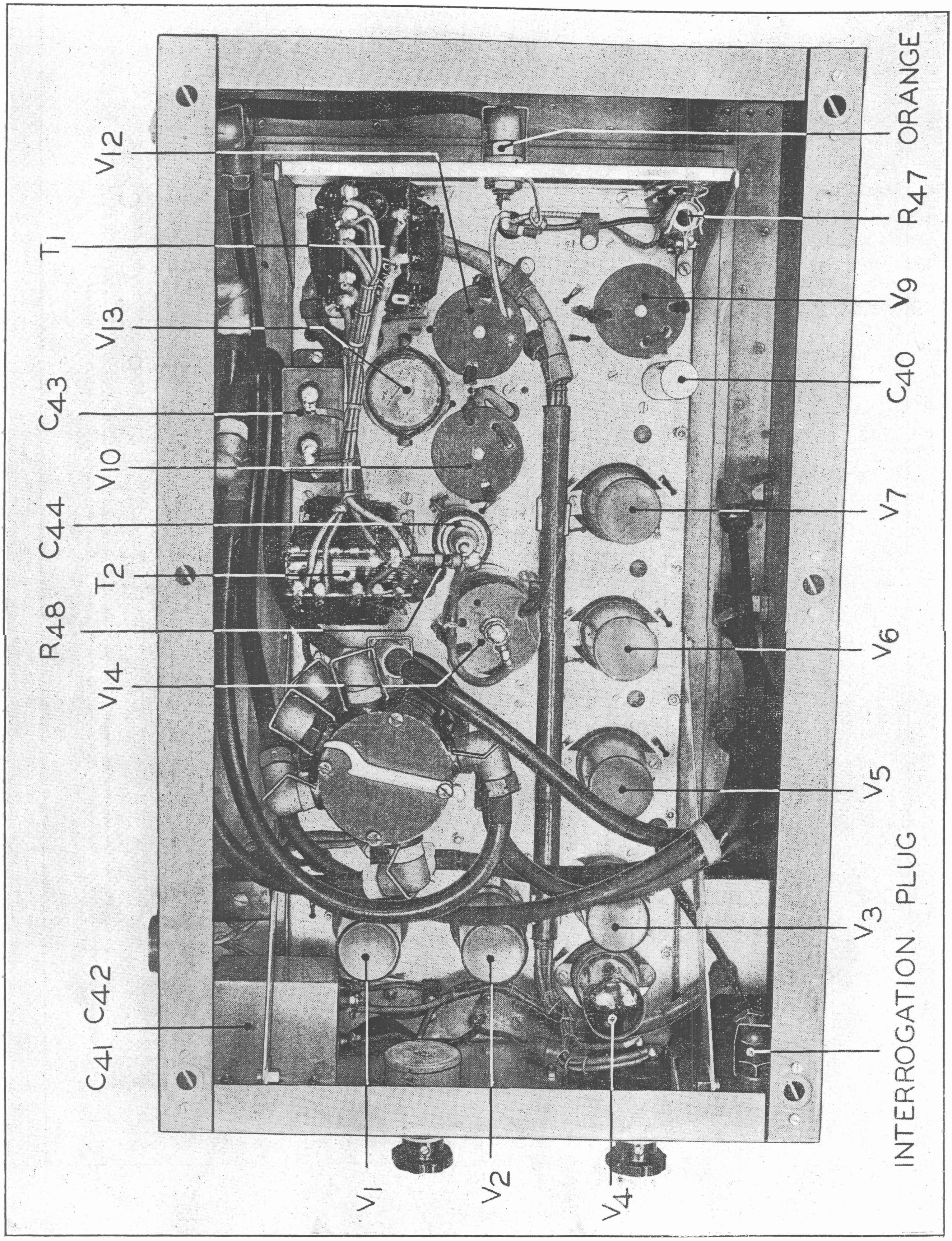


FIG. 30.—Interior of receiver, type R.3102A.

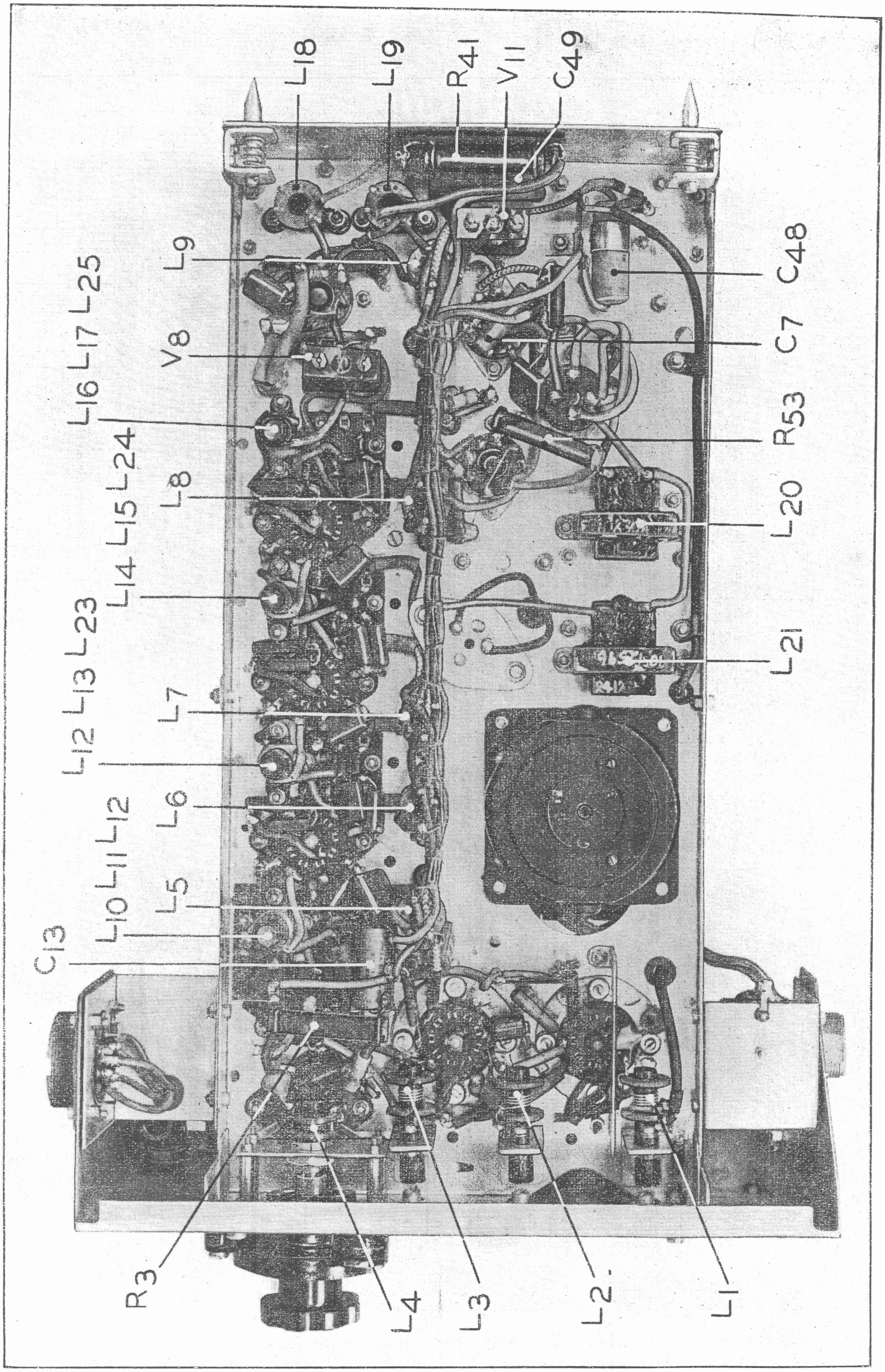


FIG. 31.—Underview of receiver, type R.3102A.

64. *Switch unit, type* 39.—A sectional view of the switch is shown in fig. 27. Signals received on the two elevation and two azimuth aerials are fed separately into the four upper plugs on the switch unit in the receiver. By means of this switch the aerials are connected in sequence to the receiving unit, a short open-circuit period being allowed between each of the connection periods. The contacts are operated by a rotating crank through a ball race mounted with an insulation bush ; the crank is driven round by a shunt-wound D.C. motor supplied from the aeroplane D.C. supply. The crank rotates at about 1,750 r.p.m., which is high enough to avoid a flicker effect in the final visual indication. Each aerial contact should close for 80 $\pm$ 5 deg. and the corresponding output contact for 65 $\pm$ 5 deg., the centre points of the periods of closing being as nearly as possible coincidental. The output from the receiving unit is fed into the switch unit and thence in sequence through the four lower plugs on the switch to the indicating unit. The input and output plugs are coloured as shown in the sectional view of the switch and in the circuit diagram of the receiver.

65. *Switch unit, type* 39 *: constructional details.*—The switch motor is a shunt-wound D.C. motor running at a constant speed of 1,750 $\pm$ 250 r.p.m. Removal of a small cover on the motor casing at the end further from the switch casings will reveal an aperture giving access to the commutator. There are two types of motors in use ; in the one, the supply leads run into the motor casing, where they are connected to the brushes ; in the other type the leads are connected to tags secured on the outside to the brush-holders. As seen in the sectional view in fig. 31, a spacer separates the inner switch casing from the motor casing to which it is secured ; the outer switch casing is clamped to the inner casing as shown in the small sketch in fig. 27. Four plugs in the side of each casing are each provided with spring contacts which rest on insulation rings carried on the outer races of two ball bearings. The bearings are separated by a spacer and are mounted on an eccentric shaft extension (termed the crank) of a shaft coupled to the end of the motor spindle by a collar secured by a milled pin. As the eccentric shaft revolves, the spring contacts from the four plugs in each switch casing are allowed to make contact in sequence with contact posts. These contact posts are screwed into metal rings, secured in spigots in the casing by screws through slots in the rings. The rings are connected by means of a lead to the fifth plug in the side of each switch casing, as shown in the end view of the switch in fig. 27.

Notes on cathode followers

66. Without the cathode-follower valve, the capacitance of the output leads to the indicating unit would be in parallel with the anode load resistance. This would result in a distorted output waveform, as both the build-up and decay time of the output circuit would be increased. This is due to the fact that the time constant of the circuit comprising the load resistance and the capacitance of the output leads might be greater than the input pulse width, and the output voltage would not then have time to reach its maximum value, thus both distortion of the output pulse shape and loss of peak output would result. It is to overcome these defects that the cathode-follower stage is introduced.

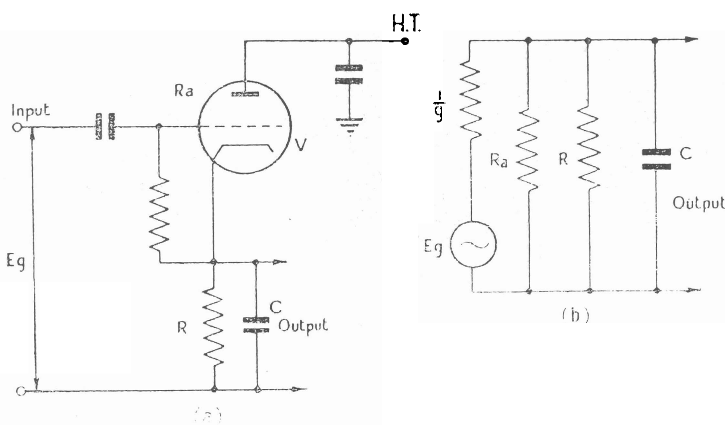


FIG. 32.—Cathode follower circuit diagrams.

67. In fig. 32(*a*) the circuit diagram of a cathode follower is shown with a cathode load resistance R and shunt capacitance C. The equivalent circuit to this is shown in fig. 32(*b*), in which E_g is the input voltage, R_a the anode A.C. resistance of the valve, and g the mutual conductance of the valve. The effective resistance across the output is $R_e = \dfrac{1}{g+\dfrac{1}{R_a}+\dfrac{1}{R}}$ and CR_e is the time constant of the output circuit. This equation, however, only applies as long as the current through R and C is increasing. When the current decreases, *i.e.*, when the input potential to the grid of the valve goes in a negative direction, the time constant is always greater than CR_e, since current cannot flow in a negative direction through the valve, and the capacitance C can therefore only discharge through R. Any anode current flowing will tend to prevent C discharging, and therefore the effective time constant of discharge of C may be greater than CR and never less. In the case where a type V.R.91 valve is used, g equals 6 mA/V, R_a equals approximately 400,000 ohms and R is chosen to be about 4,000 ohms, C being of the order of 200 $\mu\mu$F.

Then

$$R_e = \frac{10^3}{6+\dfrac{1}{400}+\dfrac{1}{5}} = 160 \text{ ohms, approximately.}$$
$$CR_e = 3{\cdot}2 \times 10^{-8} \text{ seconds.}$$
$$CR = 0{\cdot}1 \times 10^{-6} \text{ seconds.}$$

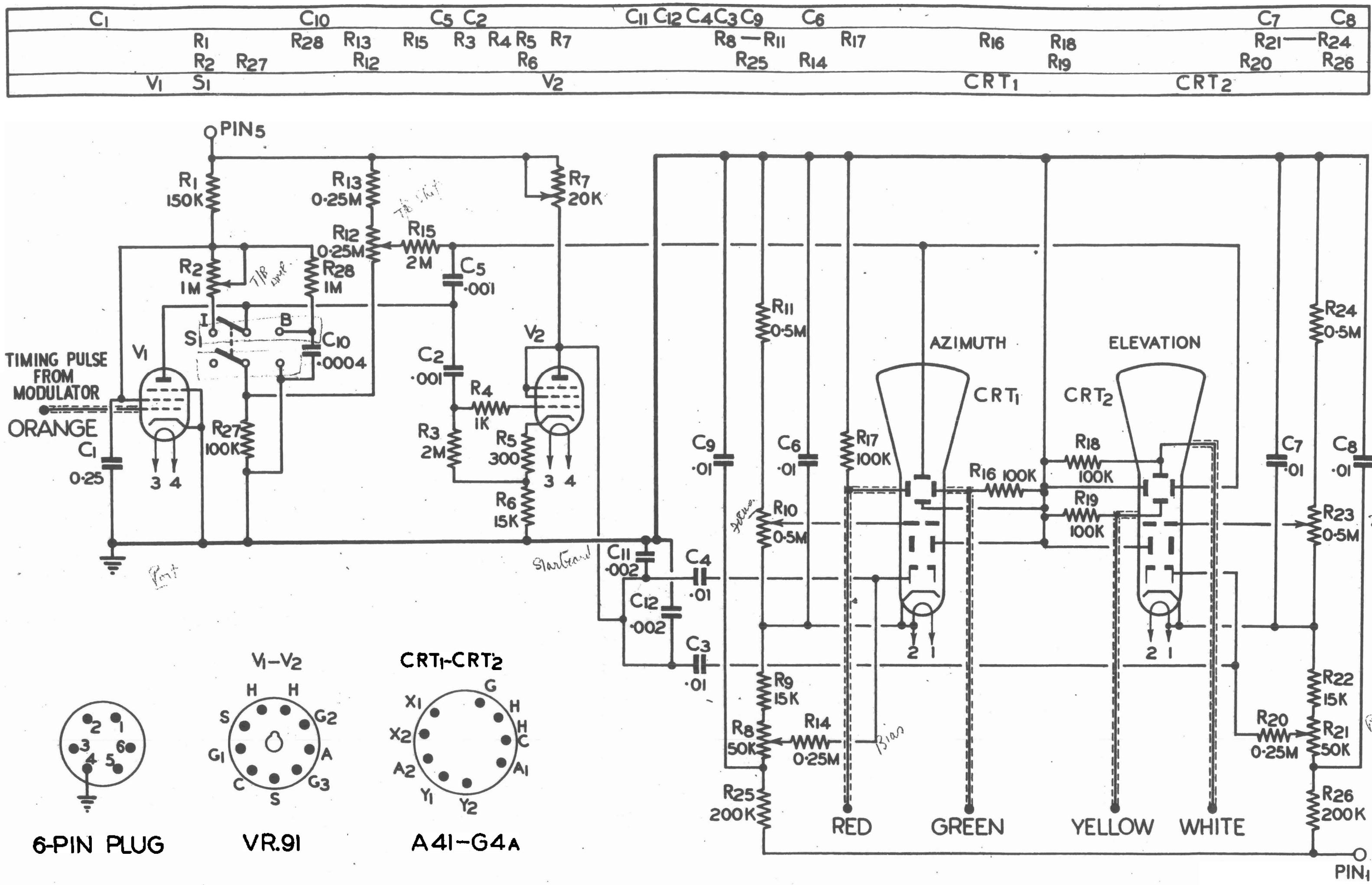
68. The potential between grid and cathode is normally zero. If a large negative signal with a large wavefront is applied to the grid, the resulting cathode waveform will have a much less steep front for the reason given above. For example, in 0·5 microseconds, which is approximately the time of rise of a normal received pulse, the voltage across the output capacitance C will only have decreased to $e^{-0.5}$, *i.e.* 0·6 of its initial value.

Indicating units, types 20, 48 and 48A

69. The circuit diagrams of these units are given in figs. 33 and 34. The chief differences between the types are given in paras. 73 and 74.

70. The positive timing pulse used to trigger the indicating unit is the delayed priming pulse from the modulator, type 20, being introduced to the indicating unit through the ORANGE terminal to the grid of the time bias valve V_1 and causing this valve to pass current. Prior to the arrival of the pulse, the grid of V_1 is held negative by grid current and the voltage at its anode is at a maximum.

71. *Interception range.*—With the switch S_1 in the position I, the positive pulse on the grid of V_1 causes the valve to discharge the capacitance across the valve formed by circuit strays. On the termination of the pulse, this capacitance becomes charged through the anode resistance R_1 and the potentiometer R_2, the charging curve being exponential (*see* fig. 35). The rate of charge is governed by the potentiometer R_2, which therefore functions as a velocity control. It is labelled TB. AMP., as it acts as an amplitude control in the following way.



CIRCUIT DIAGRAM OF INDICATING UNIT, TYPE 20

FIG. 33

FIG. 33

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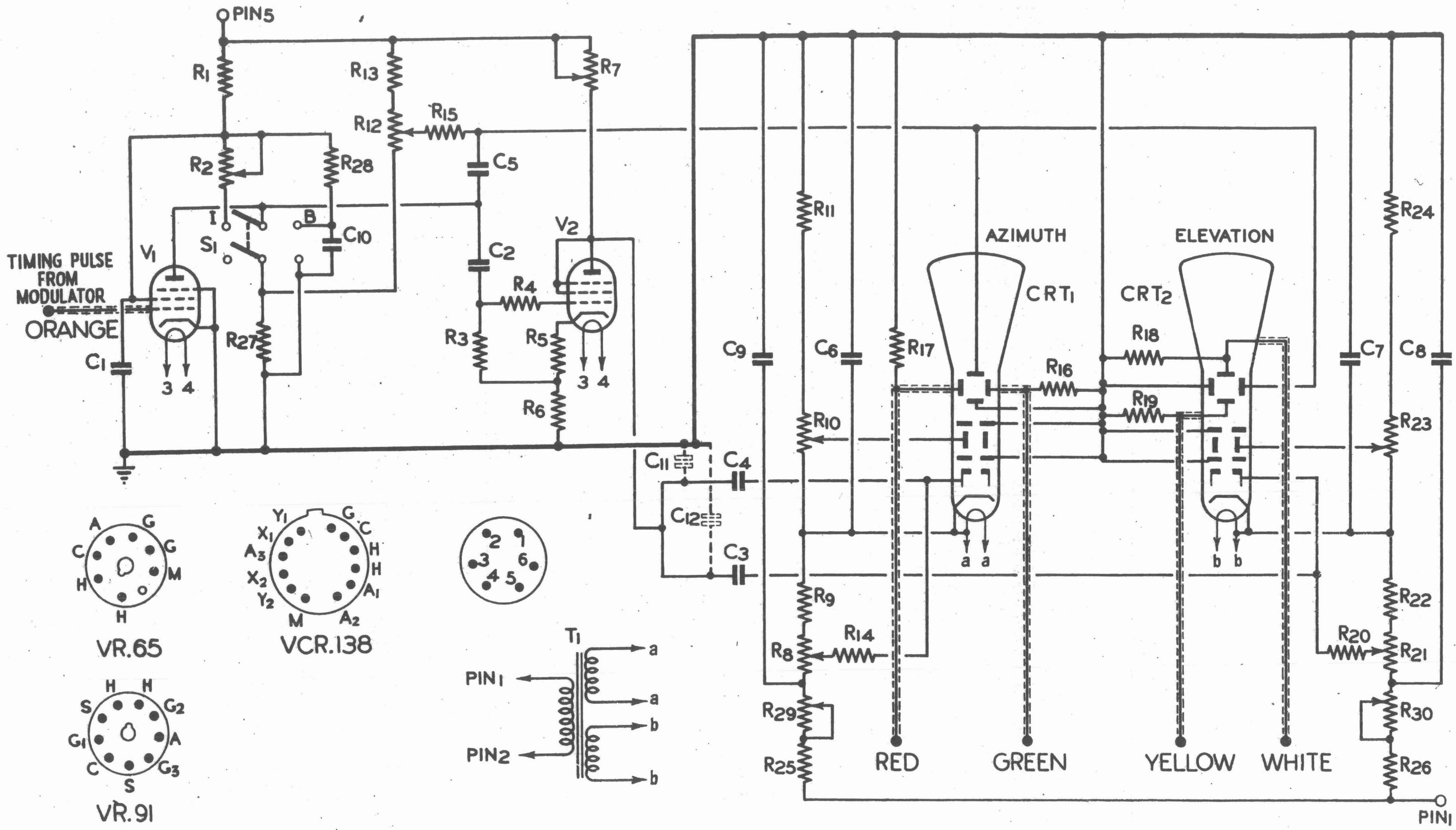
C1 | C10 | C5 C2 | C11 C12 C4 C3 C9 | C6 | C7 | C8
R1 R2 | R28 | R13 R12 | R15 | R3 | R4 R5 R6 | R7 | R8 — R11 | R29 R25 | R17 | R14 | R16 | R18 R19 | R21 — R24 | R20 R30 | R26
V1 S1 | R27 | T1 | V2 | CRT1 | CRT2



VALVES	TYPE 48	TYPE 48A
V1	VR.91	VR.65
V2	VR.91	VR.65
V3	VCR.138	VCR.138
V4	VCR 138	VCR 138

CONDENSERS	TYPE 48	TYPE 48A
C1	0·25	0·1
C2	·001	·002
C3	·01	·01
C4	·01	·01
C5	·001	·001
C6	·01	·01
C7	·01	·01
C8	·01	·01
C9	·01	·01
C10	·0004	·0004
C11	·002	——
C12	·002	——

RESISTANCES	TYPE 48	TYPE 48A
R1	0·15M	0·1M
R2	1M	1M
R3	2M	2·2M
R4	1K	1K
R5	300	330
R6	15K	15K
R7	20K	20K
R8	50K	50K
R9	2·5K	2·7K
R10	0·5M	0·5M
R11	0·5M	0·56M
R12	0·25M	0·25M
R13	0·25M	0·27M
R14	0·25M	0·27M
R15	2·1M	2·2M
R16	50K	47K
R17	50K	47K
R18	50K	47K
R19	50K	47K
R20	0·25M	0·27M
R21	50K	50K
R22	2·5K	2·7K
R23	0·5M	0·5M
R24	0·5M	0·56M
R25	0·3M	0·15M
R26	0·3M	0·15M
R27	0·1M	0·1M
R28	1M	1M
R29	——	0·25M
R30	——	0·25M

FIG. 34 CIRCUIT DIAGRAM OF INDICATING UNITS, TYPES 48 AND 48A FIG. 34

5190

In fig. 35 the dotted line is the scan voltage curve for another setting of R_2, and it is seen that for times between the start and end of the charging curve, the scan potential has been increased. Thus for an object at any range, say 4 miles, the effective length of the time base will be increased.

72. *Beacon range.*—With the switch S_1 in the position B, the timing pulse causes the condenser C_{10} to discharge through the valve V_1. Subsequent to the termination of the pulse, the condenser is charged through the resistances R_1 and R_{28}, giving a time base scan potential which is independent of R_2, the range covered being more than 60 miles. The waveform at the anode of V_1 is applied through the condenser C_5 to the time base plates of the cathode ray tubes. This waveform is also applied through the condenser C_2 and grid stopper resistance R_4 to the grid of the valve V_2 across the resistance of R_3 and R_6 This valve acts as a phase-reverser and its positive output is fed through the condensers C_3 and C_4 to the grids of the cathode ray tubes, causing the potential of these grids to vary in opposite phase to the time base voltage. The effect of this is to brighten up the trace on the screen of the tubes in proportion to the speed, resulting in more uniform brightness over the length of the trace. This effect is controlled by the potentiometer R_7.

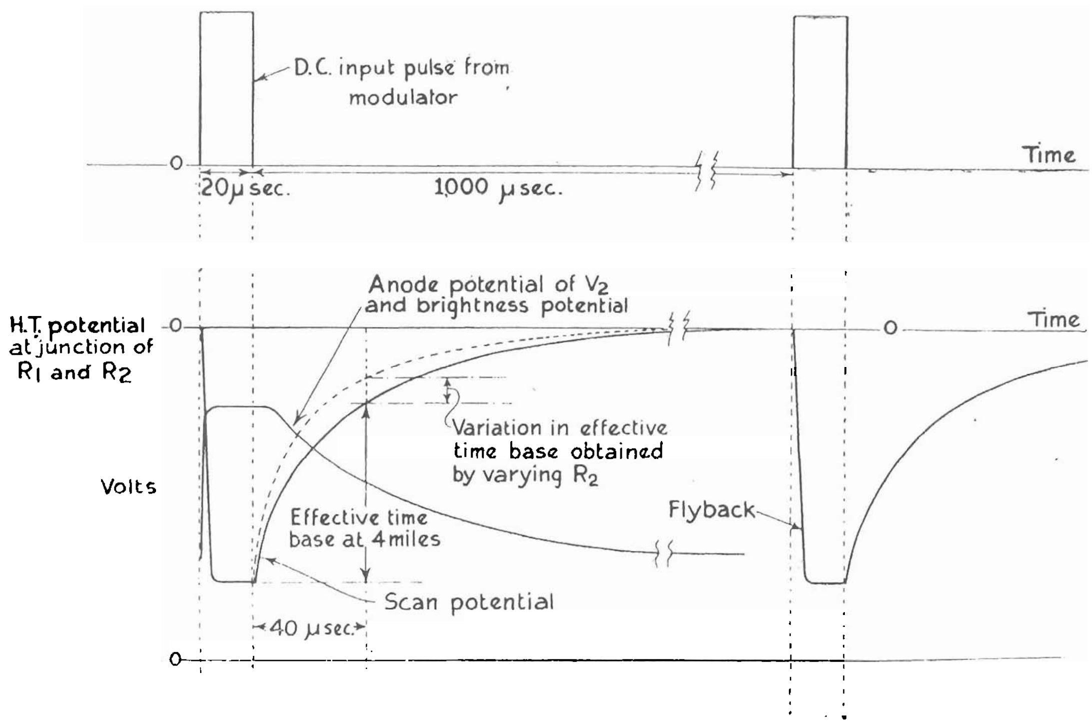


FIG. 35.—Time base action.

73. A shift potential is applied to the time base plate of each tube through the potentiometer R_{12}, which is connected in series with R_{13} and R_{27} across the H.T. supply to the valves of the unit. The mean brightness of the trace is varied by means of the potentiometer R_8 or R_{21}. The potentials on the second anodes are varied for focusing purposes by means of the potentiometers R_{10} and R_{23}, which are connected positively with respect to the cathodes. The second anodes are connected to the common earth return, to which the third anodes of the type V.C.R. 138 tubes are also connected. The differences between indicating units, types 48 and 48A lie chiefly in the component layout and wiring and it is due to improved layout that the condensers C_{11} and C_{12} are not needed in the indicating unit, type 48A. Attention is also drawn to the absence of the amplitude control potentiometers R_{29} and R_{30} in the indicating unit, type 20, where they are not necessary, due to the closer limits to which the type A41.G.4A tubes were manufactured. In the case of the type V.C.R. 138 the sensitivity limits are wider and these time base amplitude

potentiometers (labelled SCAN LENGTH) enable the scan lengths to be adjusted to fit the range scales on the screens of the instruments. The deflection sensitivities of the type A41.G.4A tube are for the X-plates, 0·31 mm./V. and for the Y-plates, 0·40 mm./V ; those of the type V.C.R. 138 are for the X-plates, 0·25 to 0·38 mm./V. and for the Y-plates, 0·55 to 0·75 mm./V.

Indicating units, constructional details

74. Views of the units are given in figs. 36, 37, 38 and 39. In the front view in fig. 36 the left-hand tube is the elevation tube, the screens being shaded by one rubber visor clipping into the flange around them. Perspex range scales are fitted within the flange to facilitate estimation of the range of the target. The differences between the various types of unit outlined in the

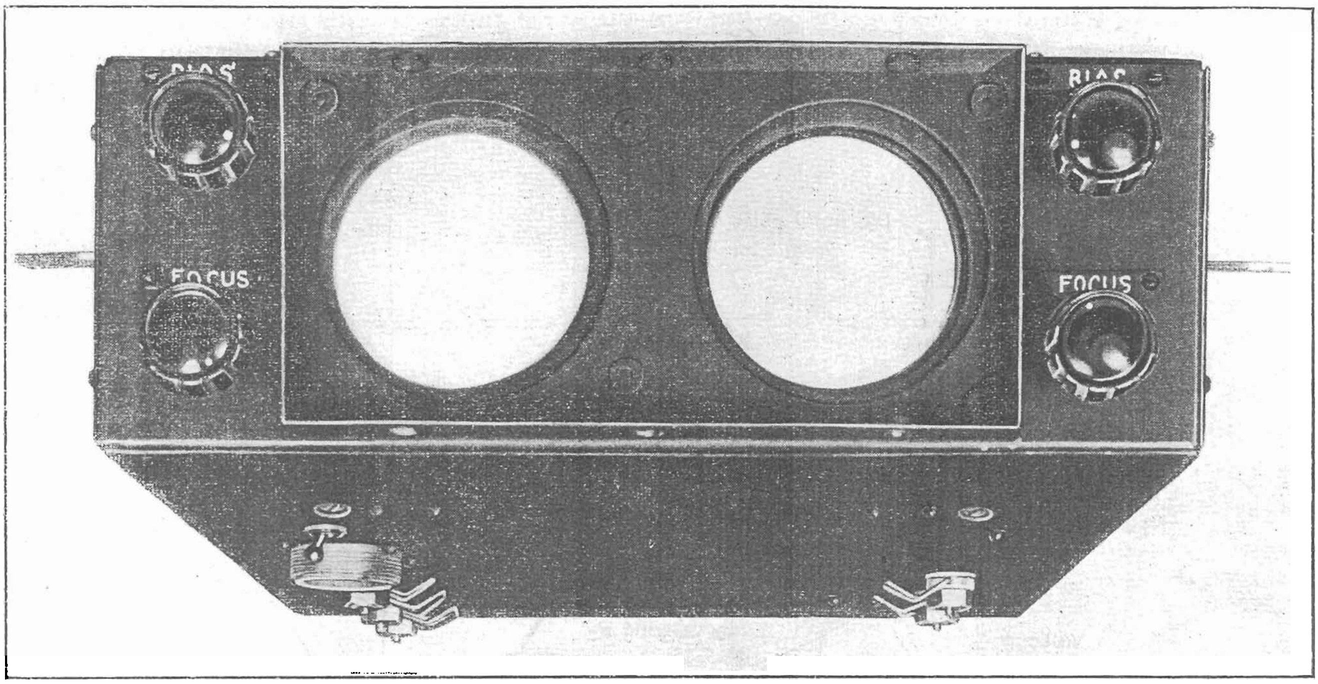


FIG. 36.—Indicating units, types 20 and 48.

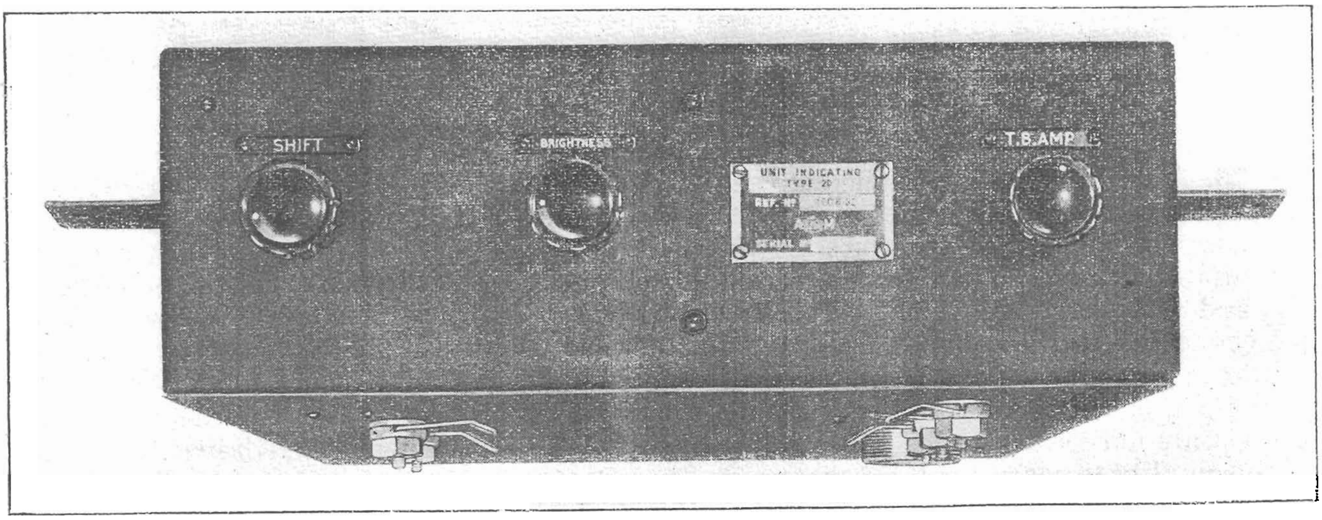


FIG. 37.—Rear view of indicating units, types 20 and 48.

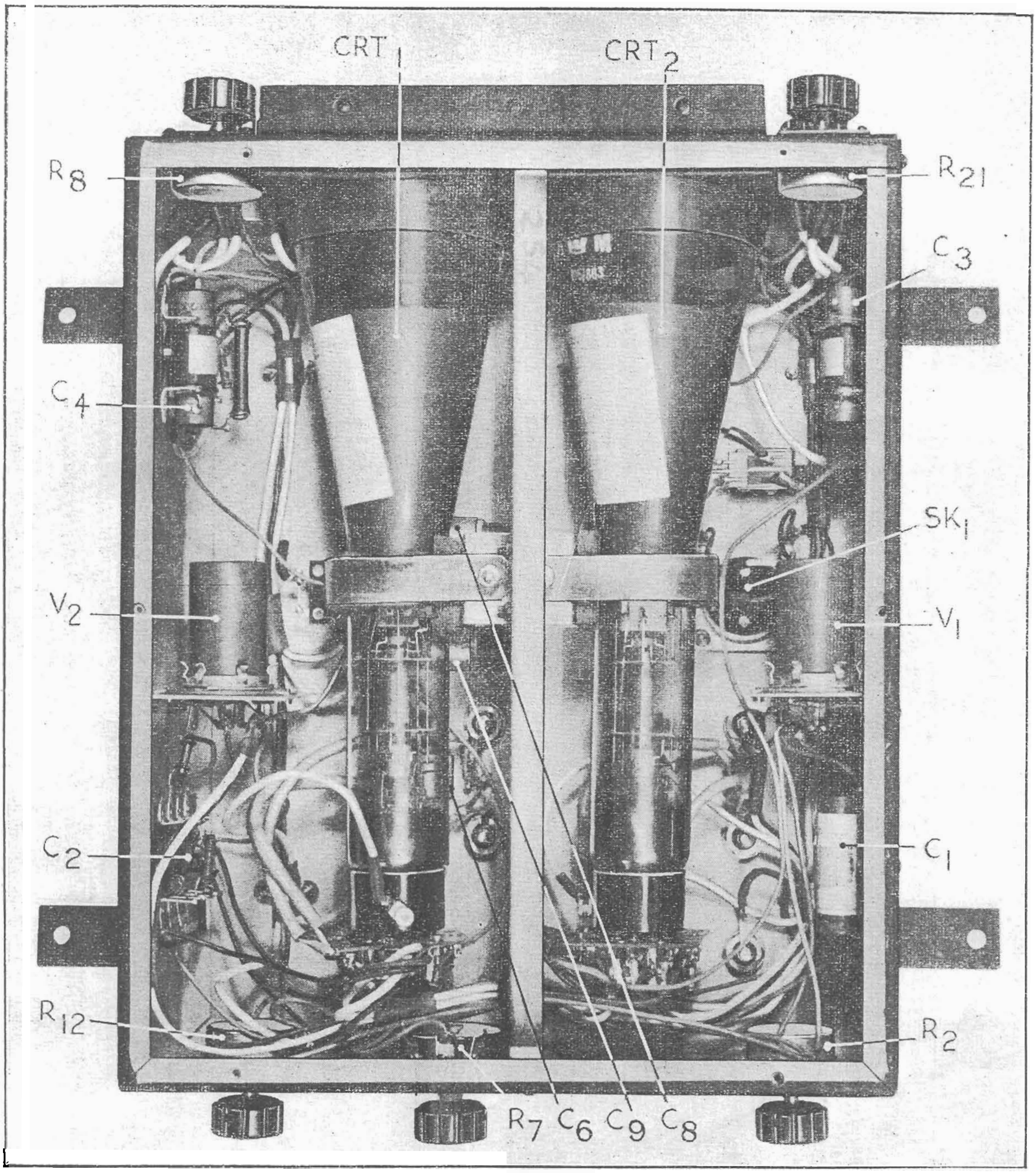


FIG. 38.—Interior of indicating unit, type 20.

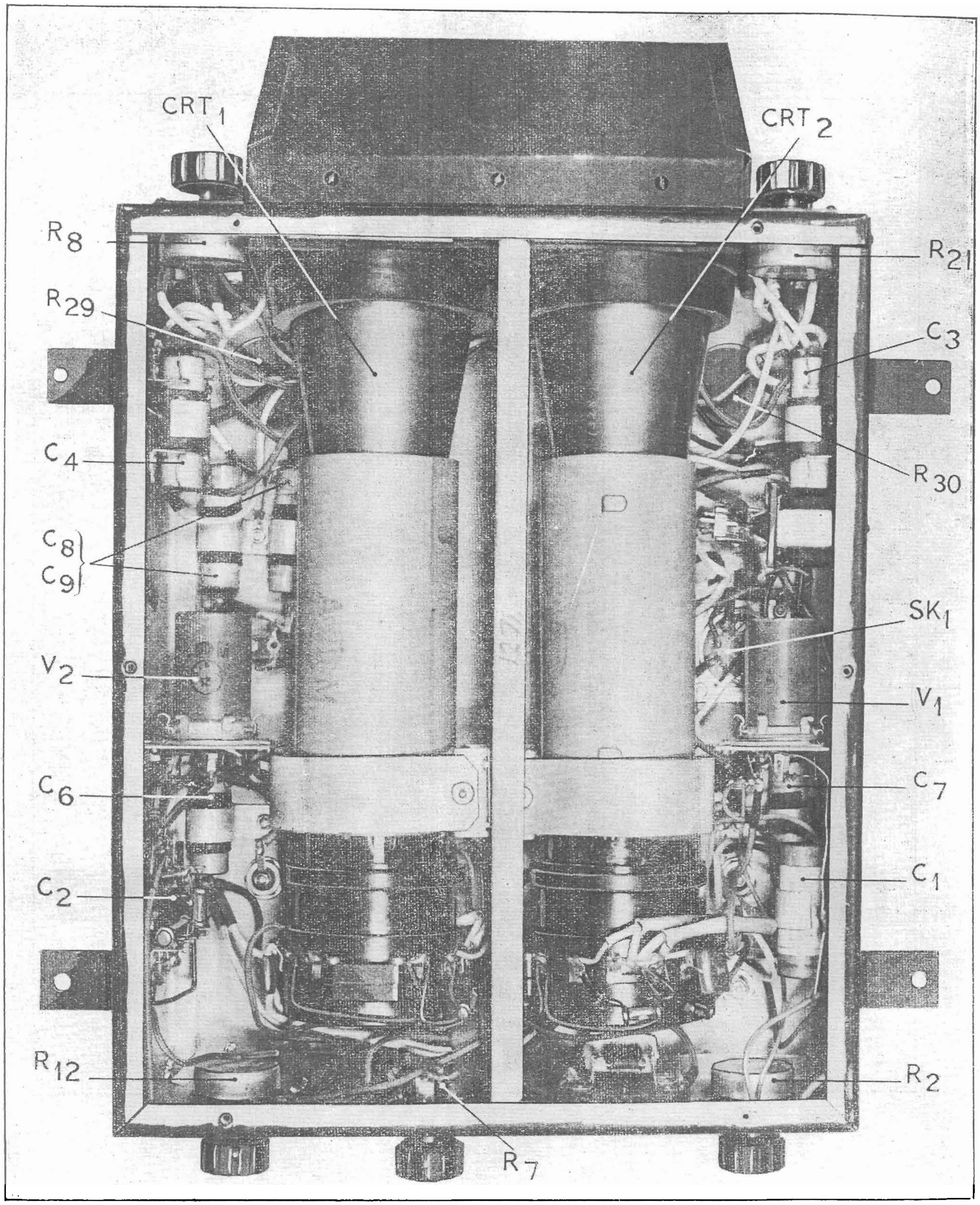


Fig. 39.—Interior of indicating unit, type 48.

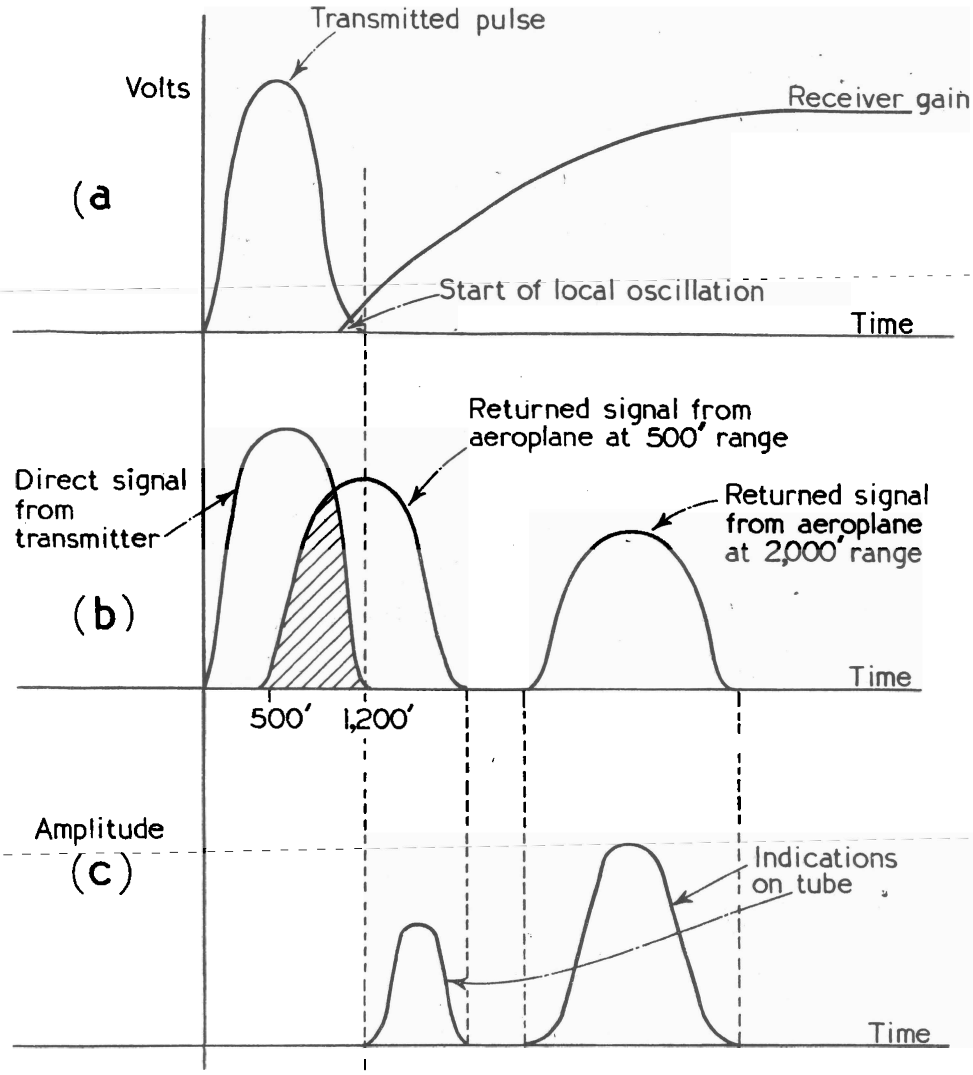


FIG. 41 MINIMUM RANGE INDICATIONS

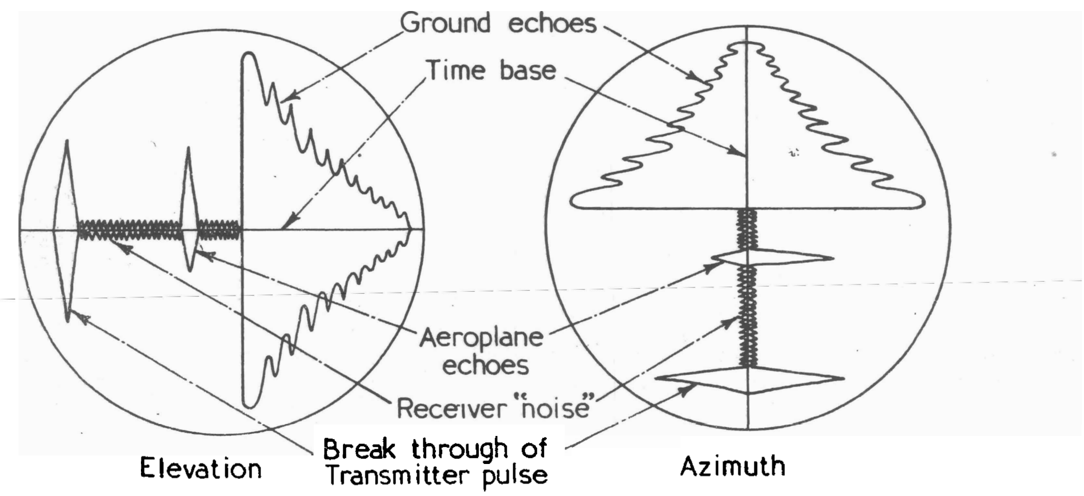
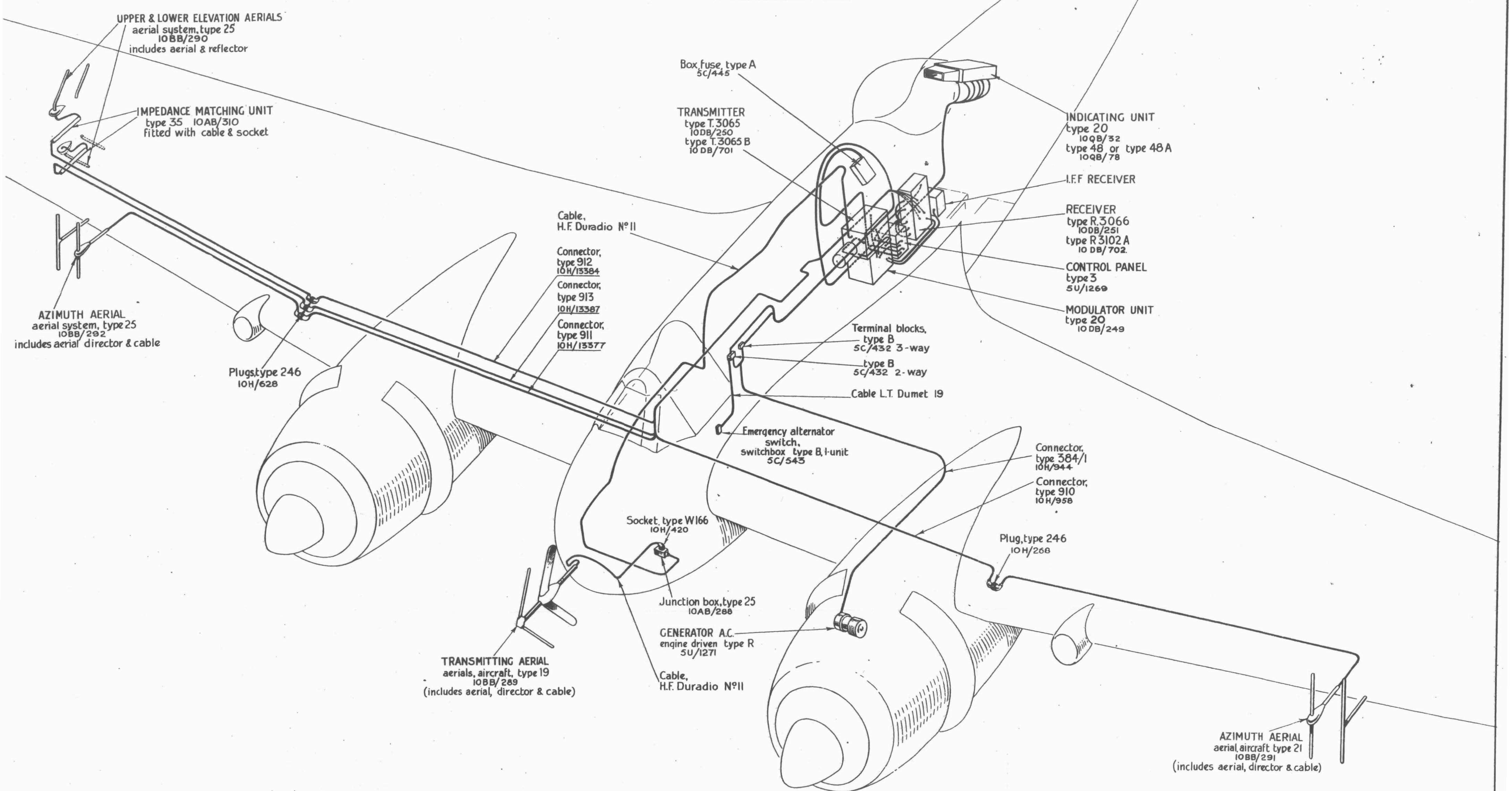


FIG. 40 TYPICAL INDICATIONS

FIGS. 40-41



LAYOUT OF EQUIPMENT IN BEAUFIGHTER AEROPLANE

FIG. 42

previous paragraph are shown in the plan views. Situated beneath the indicating units, types 48 and 48A are the screwdriver controls labelled SCAN LENGTH, which are used to set the time base lengths when new tubes, type V.C.R. 138, are inserted. The holes in the base of the container for these controls are normally filled by rubber bungs. The range switch S_1 is on the underside on the left in the front view, behind which is the 6-pin power input plug. The other plugs on the underside of the container are the signal input plugs, which are suitably coloured. On the rear of the units are the controls common to both tubes, labelled SHIFT BRIGHTNESS and T.B. AMP which are used, respectively, to centralize the time base line, to make the brightness of the trace uniform over its length, and to set the length of the trace. On the front of the units are the two sets of BIAS and FOCUS controls each situated next to their respective tube screens, the former being used to control the brightness of the trace. The brackets seen on each side of the unit support it in the aeroplane. Removal of the top cover gives access to the interior.

75. In the indicating unit, type 20 straps padded with sponge rubber and situated below the conical portions of the tubes, secure them in position. India-rubber masks, fitted over the screen ends of the tubes, locate them in the front of the unit.

Indications

76. Typical indications obtained on the screens of the cathode ray tubes in the indicating unit are shown in fig. 40. The time bases are seen as lines across the screens ; on the elevation tube the time base runs from left to right, on the azimuth tube from bottom to top. As shown in fig. 40, the time base scan is exponential and this must be taken into account when estimating the distance away of the detected aeroplane. The indications at the start of the time base scan are due to the break-through of the direct signal from the transmitter, since the suppression described in paras. 47, 56 and 57 is not quite complete. The large " echoes " towards the ends of the scans are echoes from the ground vertically beneath the aeroplane, and from houses, trees and any irregularities of the terrain. The echoes half-way along the time base are those due to another aeroplane ; since the echo on the right-hand side of the time base is greater than that on the left-hand side of the azimuth tube, the target aeroplane is to starboard of the searching aeroplane. Similarly, the elevation indication shows that the target is above the searching aeroplane. It will be seen that the maximum range of detection of a target aeroplane is limited to the height of the searching aeroplane above the ground, since the ground echoes are very much larger than aeroplane echoes.

77. On approaching the target, the amplitude of the indications would increase, until the reflected signal was so strong that it would saturate the receiver. If this took place, no further increase in the size of the indications would occur and it would not be possible to effect a fair comparison of the amplitudes on either side of the time base line for direction-finding purposes. It is necessary, therefore, to reduce the amplitude of the echoes on either side of the time base scans to about 3 cm., by turning the gain control on the receiver counter-clockwise ; subsequently the gain must be restored as, otherwise, indications from distant objects will not be observed. As the indication closely approaches that due to the direct signal from the transmitter, a drop in amplitude will be noticed. This is due to the lower gain of the receiver following upon the suppression applied during the period of the transmitter signal (*see* para. 47 and figs. 23 and 41 (*a*)).

78. When the target aeroplane is at a smaller range than the distance corresponding to the transmitted pulse width, *i.e.* about 1,200 ft., the echo will overlap the direct pulse received as shown in fig. 41 (*b*). An indication is still given, however, by the portion of the reflected pulse which is not overlapping, and which occurs while the heterodyne voltage is still being built up.

after the suppression of the local oscillator ; thus the indication does not move along the time base scan as the distance between the aeroplanes is decreased, but remains at the point where the local oscillator is permitted to oscillate again. The amplitude and width of the echo both decrease, however, as the mean heterodyne voltage decreases, and the portion of the pulse used becomes so narrow that the signal does not have sufficient time to build up to a maximum amplitude. It is therefore possible to gain some idea of the range, since for distances below 1,000 ft. the echoes fall fairly rapidly until at about 500 ft. the echo disappears completely. It is necessary for the control labelled OSC. BIAS on the receiver to be adjusted correctly, since this determines the minimum range obtainable with the equipment ; if the local oscillator does not start sufficiently soon, the minimum range is larger than need be, and if too soon, the direct signal from the transmitter may be received and give a very wide indication.

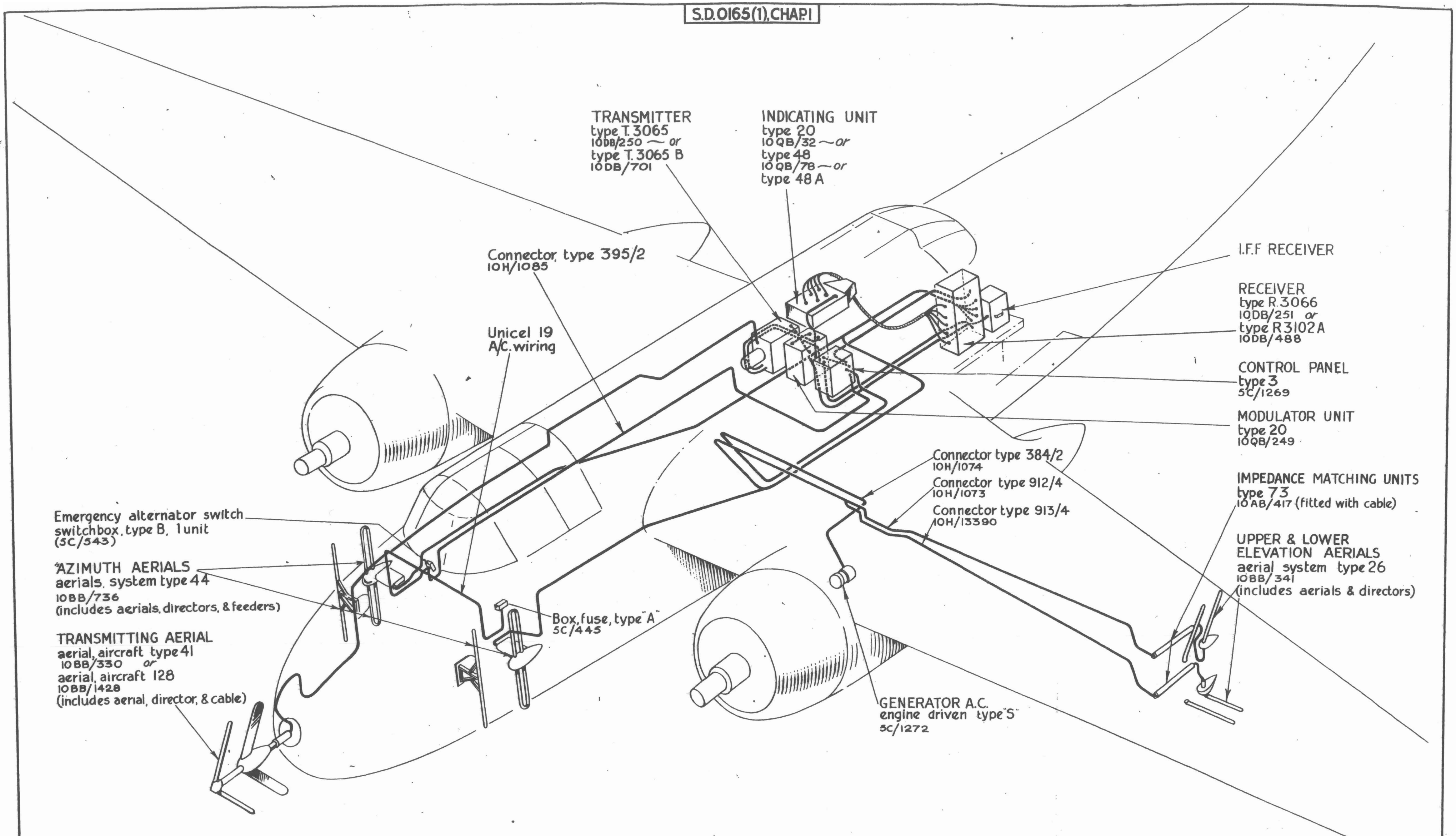
79. It is absolutely necessary for the searching aeroplane to be in level flight before using the indications to obtain the position of the target aeroplane. Should the searching aeroplane be banking when the screens are viewed, *the relative position of the target aeroplane at that moment will be given* ; what is required, however, is its position in terms of azimuth and elevation.

Installation

80. Besides consideration of space and weight distribution, the position of various units in the aeroplane must be such that the operator is able to view the screens of the indicating unit and be able to reach the controls of the receiver and the reset button on the modulator. In addition, the distance between the receiver and indicating unit should not exceed 7 ft., as the output stage of the receiver is designed to deal with the capacitance of the cable up to this length ; the cable, Uniradio No. 6, employed for the four signal leads between the receiver and indicating unit possesses the lowest capacitance compatible with the requisite mechanical strength. The length of the H.T. cable from the modulator should not exceed 2 ft., as excessive capacitance resulting from a longer cable would affect the pulse width.

81. In the Beaufighter aeroplane (*see* fig. 42) it was felt necessary to have a look-out aft of the aeroplane, and for this reason the operator faces aft with the indicating unit in front of him, *i.e.*, with the screens of the unit looking forward. The transmitter is mounted above the modulator on a common crate secured to the floor of the plane, this being necessary due to considerations of space. The crate carrying the transmitter and modulator is removable, in order that the T.1154/R.1155 can replace the present equipment when the aeroplane is required for long-range operations.

82. In the Havoc and Boston aeroplane (*see* figs. 43 and 44) a second control column is provided in the rear cockpit and it was thought possible foı the operator to employ this to guide the aeroplane into the correct path ; in this case, therefore, the operator sits facing forward, with the indicating unit at eye level in front of him. It is mounted on the deck beneath the cowling. The remainder of the equipment is situated forward of the bulkhead in front of the rear cockpit. There are four circular holes in the bulkhead which enable the operator to reach the controls ; these holes are normally screened by black-out curtains. When necessary, removal of the units, other than the indicating unit, is performed by standing inside the open bomb compartments ; the transmitter and modulator are tied together by wiring and carried on separate trays on a common plywood base ; these units would therefore be removed together, after slackening the knurled nuts securing them to the trays.

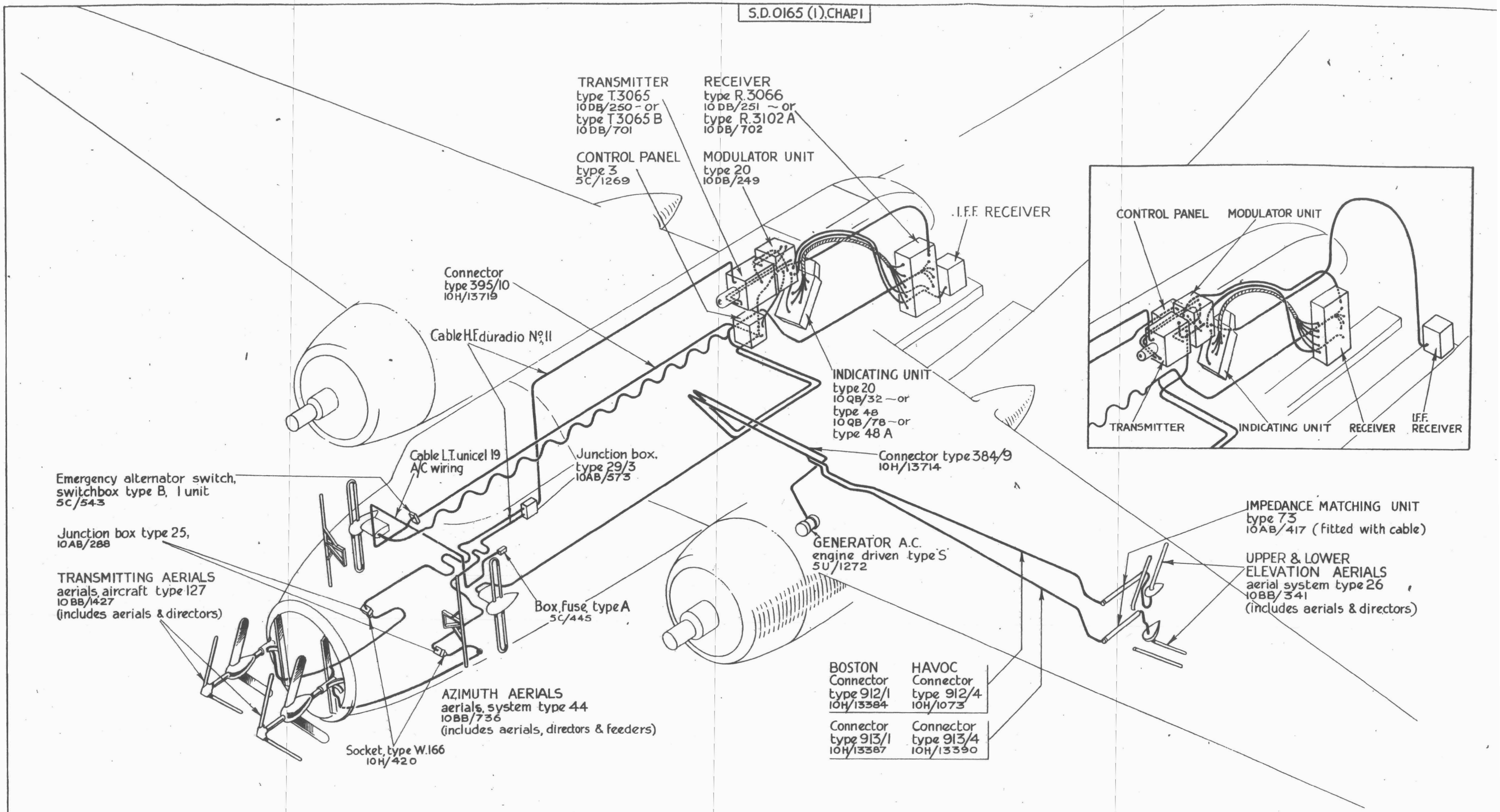


LAYOUT OF EQUIPMENT IN HAVOC AEROPLANE

FIG. 43

FIG. 43

5190



LAYOUT OF EQUIPMENT IN HELMORE TURBINLITE AEROPLANES

INSTRUMENT LAYOUT — Larger drawing **HAVOC I & II**; Inset ——— **BOSTON III**

FIG. 44

5190

83. The A.C. generator on the Beaufighter and Havoc aeroplanes is situated to the rear of the port engine. Screening of the equipment is complete. The D.C. leads from the A.C. generator are connected to the suppressor situated in the control panel, which eliminates any " noise " coming from the D.C. supply. Other possible sources of interference, such as the ignition system, are either screened or filtered ; the bonding of the ignition screening should be sound. The aerial leads are not bonded over their length, since they are rubber-covered and removal of this cover would result in deterioration of the insulation ; the braiding is, of course, earthed at the ends of the leads and wherever plugs and socket occur.

84. *Colour identification.*—The various plugs and sockets of the equipment are normally identified by suitable colours, as listed below. In order to avoid confusion with regard to the leads and terminating sockets, each lead should bear the same colour as that of the appropriate plug to which it is normally connected. Units should therefore examine all plugs to ensure that they bear some sort of colour identification, and, secondly, they should examine the leads and terminating sockets, ascertaining whether the lead bears a similar colour to that of its appropriate plug. Where no such colour identification is present, units should provide it, using suitable paint.

(i) Signal leads :—

Port azimuth .. .. Red
Starboard azimuth .. .. .. Green.
Upper elevation .. .. . White.
Lower elevation .. .. .. Yellow.

(ii) Pulse lead from modulator .. .. Orange.

In certain aeroplanes variations from the above system may exist. For example, in the Havoc aeroplane the indicating unit is mounted upside down (*see* fig. 43) and the aerial connectors to the receiver are therefore changed over.

85. *Connector sets.*—The set of connectors for each particular type of aeroplane is given a type and reference number, *e.g.*, A.R.I/5003/P for the A.I. Mark IV installation in the Beaufighter, the type number consisting of the installation number affixed by a letter or letters relating to that particular aeroplane installation.

86. *Connectors.*—Type numbers of individual connectors contain a basic number denoting the function, *e.g.*, receiver to azimuth aerial port, followed by a number for each design of connector fulfilling this function. Certain connectors may be in one length on some types of aeroplane installation and in two or more lengths on others. When in sections, each will have the same basic type and the suffixes will be in three groups as below, determined by the differences in identification sleeves, as given in the " Key of Connectors."

Suffix	Application
/1 to /49	Connector in one length or instrument to junction.
/50 to /69	Intermediate action (if used).
/70 to /99	Junction to destination.

KEY TO CONNECTORS

Basic type	Function	Colour code	Marking of connector sleeves				
			Suffixes /1 to /49		Suffixes /70 to /99		Remarks
			End A	End B	End A	End B	
384	Panel, control to A.C. supply.	—	Panel control	Alternator (or junc.)	Junc.	Alternator	
385	Panel, control to modulator unit.	—	Panel control	Mod. unit (or junc.)	Junc.	Mod. unit	
387	Panel, control to receiver.	—	Panel control	Receiver	Junc.	Receiver	
388	Receiver to 1st indicating unit.	—	Receiver	1st indic. (or junc.)	Junc.	1st indic.	
390	Modulator unit to 1st indicating unit.	Orange	Mod. unit	1st indic. (or junc.)	Junc.	1st indic.	
391	Modulator unit to receiver.	Orange	Mod. unit	Receiver (or junc.)	Junc.	Receiver	
395	Panel, control to D.C. supply.	—	Panel control	D.C. (or junc.)	Junc.	D.C.	
484	Modulator unit to R.3077 or R.3078.	Violet	Mod. unit	R.3077–8 (or junc.)	Junc.	R.3077–8	
904	Receiver to 1st indicating unit.	Red	Receiver	1st indic. (or junc.)	Junc.	1st indic.	All formerly type 389
905	Receiver to 1st indicating unit.	Green					
906	Receiver to 1st indicating unit.	White					
907	Receiver to 1st indicating unit.	Yellow					
910	Receiver to azimuth aerial, port.	Red	Receiver	AZ. AE. port (or junc.)	Junc.	AZ. AE. port	Both formerly type 396, 398 or 402
911	Receiver to azimuth aerial, starboard.	Green	Receiver	AZ. AE. stbd (or junc.)	Junc.	AZ. AE. stbd.	
912	Receiver to impedance matching unit, elevation, upper.	White	Receiver	Elev. AE. IMU upper (or junc.)	Junc.	Elev. AE. IMU upper	Both formerly type 398 or 403
913	Receiver to impedance matching unit, elevation, lower.	Yellow	Receiver	Elev. AE. IMU lower (or junc.)	Junc.	Elev. AE. IMU lower	

OPERATION IN THE AIR

Switching-on and adjustment

87. The equipment should not be switched on until the aeroplane is in flight and should be switched off before landing. *Before switching on, check that the connectors between the units are connected.*

(i) Switch on the control panel ; this should switch on the receiver, indicating unit and the blower on the transmitter. Verify that the blower is drawing in air by placing the fingers over the inlet.

(ii) Turn the switch on the modulator to the position L.T. ON, wait 60 seconds and turn it to the position H.T. ON. See that the transmitter valves are alight by looking through the louvres in the lid of the transmitter. Reset the knob on the modulator, labelled PRESS to RESET, if it jumps forward.

(iii) After about 3 minutes, look at screens on indicating unit ; a horizontal time base with some vertical indication should be seen on one screen and a vertical time base with some horizontal indications on the other. If no indications are seen, adjust the controls marked BIAS on the indicating unit until they appear. *Do not have the indications too bright.* Now adjust the controls marked FOCUS to make these indications sharp.

(iv) If the time base scans are not central, make them so by means of the control labelled SHIFT, on the rear of the indicating unit ; if necessary, adjust the length of the scans by means of the control labelled T.B. AMP. and make the brightness of the indication uniform over its length by means of the control labelled BRIGHTNESS.

(v) Turn the control labelled GAIN on the receiver until the fine lines (receiver " noise ") on either side of the central time base scan are about $\frac{1}{8}$ in. wide (*see* para. 77 for further details of use of gain control).

(vi) Turn the control labelled TUNE on the front of the receiver to increase the amplitude of the " ground echoes," visible at right angles to the central time base scan, to a maximum.

Switching-off

88. (i) If the apparatus is to be used again after a short time, turn the switch on the modulator to the position L.T. ON.

(ii) When finally switching off, turn the switch on the modulator to the OFF position and switch off the control panel.

Precautions in operation

89. (i) The modulator must not be switched on unless it is connected to the transmitter and the transmitter is connected to the aerial.

(ii) The control panel should not be switched on unless it is connected to the receiver.

(iii) If the receiver is provided with an ON–OFF switch, this should be left permanently in the ON position.

FAULT-FINDING CHART

FAULT	INSPECTION AND REMEDY
Indications	
1. Time base scan normal, receiver " noise " normal on both tubes :—	
(i) Echoes absent on both tubes ..	(i) Check with a screwdriver for " sparks " on the transmitter aerials, or see that neon lamp lights. (ii) If no sparks are obtainable or neon lamp fails to light, check as in item 29. (iii) Check transmitter aerial, feeder and W-plug in nose of fuselage. (iv) Inspect the input lead to the receiving unit from the switch unit and its associated plugs and sockets. Test by connecting external aerial direct to receiver. (v) Inspect R.F. trimmers. These may be out of adjustment or screwed down tightly.
(ii) Echoes absent on one side of the time base scan on one tube.	(i) Check corresponding receiving aerial and feeder for continuity and insulation. (ii) Examine the appropriate input contact in the switch unit in the receiver.
2. Time base normal, " noise " normal on both tubes :—	
(i) Echoes weak on both tubes	(i) Check transmitter aerial and feeder and W-plug in nose of fuselage for continuity and insulation. (ii) *See* item 28 (ii). (iii) Tune R.F. and mixer stages in the receiver. (iv) Faulty receiver, *see* item 30 (ii).
(ii) Echoes weak on one side of time base scan on one tube.	(i) Check insulation and continuity of corresponding receiving aerial and feeder. (ii) Examine the corresponding input contact in the switch unit in the receiver.
3. Time base normal, noise and echoes absent :—	
(i) On both tubes	(i) See that all valves are correctly heated. (ii) Test for continuity from output from cathode follower to switch motor and to output leads. (iii) Check tuning of R.F. and mixer stages. (iv) Check for faulty receiver as in item 30 (ii).
(ii) On one side of scan of one tube ..	(i) Check lead from switch unit to indicating unit. (ii) Check corresponding output contact on switch unit. (iii) Check the leads inside the indicating unit to the cathode ray tube.
4. Long time base	(i) Check setting of time base amplitude control. (ii) Check high-voltage rectifier in receiver (V_{13} in fig. 22, V_{14} in fig. 28). (iii) Check delayed priming pulse leads from modulator to receiver.
5. Short time base . ..	(i) Check setting of time base amplitude control. (ii) Test for leakage across all delayed priming pulse leads from modulator to receiver, indicating unit and I.F.F. set. (iii) Check time base valve in indicating unit (V_1 in figs. 33 and 34). (iv) Check that time base amplitude control is fully clockwise.
6. Very short time base	–

FAULT-FINDING CHART—*continued*

FAULT	INSPECTION AND REMEDY
7. Distortion of time base	(i) Suspect stray magnetic fields. (ii) Check value of grounding resistors on signal plates of cathode ray tubes.
8. Time base distorted to figure-of-eight	(i) Check cathode follower valves in R.3066 (V_{10} and V_{11}, *see* fig. 22).
9. Time base absent, but spot or line visible. Time base amplitude control has no effect on beacon range (" B " position of switch) on both tubes :—	
(i) On both tubes	(i) Test for radiation with neon lamp or screwdriver on transmitter aerial. (ii) If radiation is poor, *see* item 28 (i). (iii) Check leads and socket from modulator unit to receiver and indicating unit carrying delayed priming pulse. (iv) Check supply leads and voltages from receiver to indicating unit. (v) Check full-wave rectifier valve in receiver (V_{14} in fig. 22, V_{13} in fig. 28). (vi) Check time base valve (V_1 in figs. 33 and 34).
(ii) On one tube	(i) Examine wiring and components associated with time base valve and cathode ray tube concerned.
10. Split time base	(i) Check grid bias battery in R.3066. (ii) Check for non-rectification by D.C. restoration diode (V_{11} in fig. 27, V_{12} in fig. 22). (iii) See that 6·3-volt diode is used for D.C. restorer. (iv) Microphony due to aeroplane vibration in second detector in R.3066 (V_9 in fig. 22) which may not show under steady conditions. (v) Oscillation of cathode follower load valve in R.3066 (V_{10} in fig. 22). (*See* Memo. 29, Radio Department/R.A.E.).
11. No indications at all :—	
(i) On both tubes	(i) Turn bias controls fully clockwise. (ii) Check 80-volt A.C. supply to receiver. (iii) Check cable from receiver to indicating unit. (iv) Check supply voltages for the cathode ray tubes at the 6-pin plug on the receiver. (v) Check reservoir condenser and rectifier valve in receiver (C_{59} and V_{13} in fig. 22, C_{44} and V_{14} in fig. 28) and smoothing condensers in the indicating unit (C_8 and C_9 in figs. 33 and 34).
(ii) On one tube	(i) Check cathode ray tube concerned. (ii) Short circuit in external high tension supply to cathode ray tube, indicated by overheating of resistors R_{25} or R_{26} in indicating unit (*see* figs. 33 and 34).
12. Poor focus at beginning of the trace	(i) Excessive brightening due to incorrect setting of BRIGHTNESS control.
13. Insufficient brightness on interception (" I ") range.	(i) Incorrect setting of BRIGHTNESS control. (ii) Check phase-reversing valve (V_2 in figs. 33 and 34).
14. " Ghost image " or fixed echo, even obtainable in flight.	(i) Mismatch of valves in transmitter. (ii) Incorrect adjustment of filament tuning chokes in transmitter. (iii) Check transmitter aerial, feeder and W-plug in the nose of fuselage.

FAULT-FINDING CHART—*continued*

FAULT	INSPECTION AND REMEDY
15. Faint mirror images occurring on both sides of the time base.	(i) Due to overlapping of output and input contacts in switch unit (*see* para. 64).
16. Jitter	(i) Check switch motor speed. (ii) Check supply voltage to switch motor. (iii) Check A.C. supply and carbon pile voltage regulator in control panel, type 3, for any signs of hunting (can sometimes be heard). (iv) Check connections on 80-volt A.C. generator.
17. Bands parallel to time base (C.W. oscillation due to instability of R.F. and I.F. stages).	(i) Check decoupling condensers in all R.F. and I.F. stages. (ii) Check seating of all R.F. and I.F. valves.
18. Intermittent indications on tubes	(i) Maladjustment of switch motor contacts. (ii) Check that all co-axial sockets are firmly connected.
19. Some echoes not as brilliant as others.. ..	(i) Incorrect angles of contact on switch unit, type 39 (*see* para. 61).
20. Flickering echoes in (i) amplitude or (ii) brilliancy.	(i) Dirty contacts in switch unit at the input section. (ii) Dirty contacts in switch unit at the output section.
21. Periodic interference at regular 6-second intervals at minimum range.	(i) Ascertain that I.F.F. receiver is set correctly. (ii) Check delayed priming pulse lead to I.F.F. receiver (orange connector and plug).
22. Excessive noise	(i) Check for noisy R.F. and I.F. valves. (ii) Check to see if oscillator coupling is too tight. (iii) Interference may be caused by switch motor (*see* item 31 (ii)).
23. Inability to suppress direct transmitter pulse..	(i) Check delayed priming pulse lead to receiver. (ii) Check suppression stage in receiver. (iii) Faulty suppressor valve (V_4 in fig. 22, V_{12} in fig. 28).
24. Poor maximum range	(i) Incorrect adjustment of transmitter. (ii) Check current at J_1 (80 mA.) and J_2 (40 mA.) on modulator. (iii) Check transmitter aerial, feeder and W-plug in nose of fuselage.
Aerials	
25. Aerial squint	(i) Check aerial spacing with template. (ii) Inspect aerial bollards for fracture and presence of moisture. (iii) Check contact continuity in switch motor and connections to switch motor. (iv) Check all co-axial plugs and sockets, including those at wing root. (v) Check earthing clip on support tube. (vi) Inspect for mechanical heat and moisture damage of aerial feeder cables. (vii) Check bonding on skin of aeroplane and on matching tubes.
26. Voltage varying with engine speed	(i) Check control panel voltage regulator.
Control panel	
27. Extreme difficulty in adjusting carbon pile ..	(i) Check to see that correct type of A.C. generator is fitted. (ii) See that condenser C_1 (*see* fig. 11 and para. 14) is set correctly for type of alternator. (iii) See if arcing is occurring between carbon discs of voltage regulator. (iv) Inspect carbon pile for presence of moisture.

FAULT-FINDING CHART—*continued*

FAULT	INSPECTION AND REMEDY
Modulator	
28. (i) No transmitter output	(i) Check current with high resistance voltmeter at plug J_1 (100 mA. is equivalent to 1 volt). The current should be 80 mA. (ii) Check current at the plug J_2. This should be 40 mA.
(ii) Low transmitter output	(i) Check transmitter, transmitter aerial, feeder and W-plug in nose of fuselage. (ii) Measure currents at plugs J_1 (80 mA.) and J_2 (40 mA.) on modulator. If these currents are low, the condensers C_9 or C_{11} on screens of modulator valves V_3 to V_8 (*see* fig. 13) may have broken down.
(iii) Cut-out keeps tripping. (When making tests, remove high-tension leads from the screen grids of type V.T.75A valves and connect grids to earth).	(i) Check transmitter, transmitter aerial, feeder and W-plug in nose of fuselage. (ii) Check type V.T.75A valves in modulator (V_5 to V_8 in fig. 13). (iii) Check coil assembly, particularly condenser C_{14}. (iv) See if there is a fractured connection on $0 \cdot 004 \mu F$. condenser (C_7 in fig. 13) in multivibrator. (v) Check for negative voltage of 300 volts on grids of type V.T.75A valves.
Transmitter	
29. (i) Poor or no output	(i) Test for output by means of neon lamp held near transmitter aerial or by holding screwdriver to obtain sparks from aerial, with equipment switched on. (ii) See that blower operates when control panel is switched on. (iii) With modulator switch in the position " L.T. ON " look through louvres of the transmitter to see that valves are alight. (iv) If time base is obtained on indicating unit but transmitter is not oscillating, there may be a short on the leads from modulator to transmitter. (v) If the above leads are found to be satisfactory, the transmitting valves may have become soft. Measure current taken by the transmitter with a low-resistance milliammeter or a high-resistance voltmeter (100 mA. is equivalent to 1 volt) at plug J_2. The current should be 40mA. If valves are soft, current will be high.
(ii) Frequency instability	(i) Check transmitter valves. (ii) Check adjustment of filament tuning chokes. (iii) Check aerial feeder for moisture and heat and mechanical damage, and W-plug in nose of fuselage. Replace feeder, if oxide has formed on braid. (iv) Ensure that shorting bar is clean and making good connection. (v) Check length of transmitter feeder. If length is correct, add 4 in. long section. If no improvement is noted, short lengths (TOTALLING NOT MORE THAN 7 IN.) may be removed to produce stable results. Care should be exercised in this operation to avoid scrapping feeder.

FAULT-FINDING CHART—*continued*

FAULT	INSPECTION AND REMEDY
Receiver	
30. (i) Low " noise " level on indications	(i) Check supply voltages to the receiver. (ii) Check tuning of R.F. and mixer stages. (iii) Replace R.F. valve or valves (V_1 in fig. 22 or V_1 and V_2 in fig. 28). (iv) Replace local oscillator (V_3 in fig. 22, V_4 in fig. 28). (v) Check video-amplifier in R.3102A (V_9 in fig. 28).
(ii) No " noise " even with maximum gain on indications.	(i) Check that connections to indicating unit are satisfactory. (ii) Check H.T. and L.T. supplies to receiver. If no H.T. verify that there is not a short to earth. (iii) Check rectifier valve (V_{14} in fig. 22, V_{13} in fig. 28). (iv) Scratch grid lead of mixer valve (V_2 in fig. 22 and V_3 in fig. 28) with a screwdriver. If flickers are obtainable the I.F. and detector portions of the receiver are serviceable. (v) Check R.F. valve or valves (V_1 in fig. 22 and V_1 and V_2 in fig. 28) and local oscillator valve (V_3 in fig. 22, V_4 in fig. 28). (vi) Inspect wiring and check potentials at valve tags of R.F. and local oscillator valves. (vii) If no flicker is obtainable in test in sub-para. (iv), check valves in I.F. and detector stages. (viii) Inspect wiring and check potentials of the I.F., detector and cathode follower stages.
(iii) No four-point tuning on receiver, type R.3066.	(i) Incorrect spacing of local oscillator coil in receiver, type R.3066 (L_8 in fig. 22). (ii) Incorrect frequency setting of transmitter.
Switch unit	
31. (i) Switch not running	(i) See that D.C. supply is reaching switch. (ii) See that mica is not proud of copper segments.
(ii) Interference due to switch	(i) Clean commutator. (ii) See that mica is not proud of copper segments.
Indicating unit	
32. Indications, poor or absent	(i) Check voltages at pins of cathode ray tube. If H.T. supply is faulty, see that there is no short to earth in indicating unit or receiver before replacing rectifier valve (V_{13} in fig. 22, V_{14} in fig. 27). (ii) Check high-voltage condensers C_8 and C_9 (figs. 33 and 34). (iii) Check insulation to earth of all potentiometers.

APPENDIX 1

NOMENCLATURE OF PARTS

The following list of parts is issued for information only. In ordering spares the appropriate section of AIR PUBLICATION 1086 must be used. Where components are peculiar to one type of unit this is indicated under "Remarks." The references in column four are to the circuit diagrams in this publication.

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	AIRBORNE RADIO INSTALLATION 5003. ITEMS COMMON TO ALL INSTALLATIONS			
	Panel, control, type 3, 12 and 24 volts.	1	Fig. 10	Voltage regulating
	Panel, control, type 3 (contd.) .. Comprising :—			
5U/1304	Voltage regulator, type E1 .. Consisting of :—	1		
5U/1014	Armature and spring sub-assembly.	1		
5U/1019	Pile tube	1		
5U/1022	Carbon terminal worker top and bottom.	2		
5U/1020	Core locking screws ..	2		
5U/1016	Insulating washer and bushes.	1 set		
5U/1021	Carbon resistance workers	1 set		
5U/304	Operating coil, voltage regulator.	1	L_1	
5U/305	Rectifier		W_1	
5U/306	Semi-adjustable ballast resistance.	1	R_1	
5C/870	Suppressor, radio-interference, type B, No. 1.	1		
5C/543	Switch box, type B (single unit)	1		
5C/883	Box fuse, type F, 4-way ..	1		
5C/880	Fuse, type S (5 amp.) ..	6		
5C/884	Link, end for fuse box ..	1		
5C/885	Link, middle for fuse box ..	1		
5U/1555	Condenser, 8μF., 65–127 volts working.	1	C_1	
10H/391	Plug, type W.198, 4-pin ..	3		
10H/392	Plug, type W.199, 6-pin ..	1		
10H/397	Plug, type W.204, 2-pin ..	1		
5C/1552	Lamp holder	1		
5A/1928	Lamp, filament, M.E.S. cap	1		
10C/10554	Condenser 0·1μF.	1		
	Accessory			
10AB/232	Mounting, type 77 ..	1		
10DB/249	Modulator unit, type 13 .. Consisting of :—	1	Fig. 13	
10C/2940	Choke, L.F., type 101 ..	-	CH_1	Laminated iron core, 2,000 turns of 33 s.w.g. enamelled copper wire D.C. resistance 70–100 ohms. Test 3,000 volt R.M.S. Tropical

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Modulator unit, type 13 (contd.)			
	Consisting of (contd.) :—			
10C/2941	Choke, H.F., type 131 ..	1	L_1	Lessona wound coil on tufnol former, 3 mH, 580 turns of 34 D.S.C. wire, $\frac{7}{8}$ in. O/D by $\frac{5}{16}$ in. I/D by $\frac{3}{8}$ in. thick
10C/2942	Choke, H.F., type 132 ..	1	L_2, L_3	2 Lessona wound coils on tufnol former 1 mH. Less brackets.
10C/2943	Choke unit, type 8 ..	1	L_4, L_5, L_6	2 coils on bakelite former
	Fitted with :—			
10C/4823	Condenser, type 2554 ..	1	C_{14}	0·1 μF. ± 20 per cent., 1,500 volt D.C. working, paper, tubular.
10C/4182	Condenser, type 2138 ..	1	C_{15}	0·1 μF. ± 20 per cent., 450 volt D.C. working, paper, tubular, waxed
10C/7303	Resistance, type 7303 ..	1	R_{46}	2,500 ohms, ± 20 per cent., 12 watts, wire-wound
10AB/297	Cover, type 23	1		Moulded, complete with clamping nut. For terminal board
	Condenser :—			
10C/4824	Type 2555	2	C_{12}, C_{13}	2 μF. ± 20 per cent., 1,000 volt D.C. working, paper, jelly impregnated metal case
10C/4865	Type 2557	1	C_8	1 μF. ± 20 per cent., 1,000 volt D.C. working, paper, jelly impregnated metal case
10C/4864	Type 2556	1	C_9	0·5 μF. ± 20 per cent., 1,000 volt D.C. working, paper, jelly impregnated metal case
10C/4866	Type 2558 ..	1	C_{11}	0·006 μF. ± 20 per cent., 1,000 volt D.C. working, paper, tubular
10C/4867	Type 2559	1	C_7	0·004 μF. ± 5 per cent., 350 volt D.C. working, moulded, mica
10C/4871	Type 2563	1	C_{10}	1 μF. ± 20 per cent., 350 volt D.C. working, paper, tubular, waxed
10C/4182	Type 2138	3	C_2, C_3, C_4	0·1 μF. ± 20 per cent., 450 volt D.C. working, paper, tubular waxed
10C/4256	Type 2201	1	C_1	0·005 μF. ± 20 per cent., 350 volt D.C. working, moulded, mica
10C/4193	Type 2149	1	C_6	0·0023 μF. ± 5 per cent., 500 volt D.C. working, moulded, mica, waxed, wire ends
10C/4872	Type 2564	1	C_5	0·00023 μF. ± 2 per cent., 350 volt D.C. working, moulded, silvered mica, waxed
	Holder, valve :—			
10H/1051	Type 122	5		British, 7-pin
10H/1052	Type 123	1		British, 5-pin
10H/1053	Type 124	2		British, 4-pin
10H/1049	Jack, type 17	2		
10A/11839	Knob, type 11	1		
10H/528	Plug, type 229	3		1-way
	Resistance :—			
10C/1643	Type 1643		R_{10}	5,000 ohms, potentiometer, linear, spindle length " A " = $\frac{3}{4}$ in., slotted, $\frac{1}{16}$ in. by $\frac{1}{16}$ in.

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Modulator unit, type 13 (contd.) *Consisting of* (contd.) *Resistance* (contd.) :—			
10C/1661	Type 1661	2	R_1, R_2	30,000 ohms ± 5 per cent., 20 watt, wire wound
10C/7305	Type 7305	1	R_{42}	500 ohms ± 20 per cent., 12 watt, wire wound
10C/1663	Type 1663	3	R_6, R_7, R_{11}	25,000 ohms ± 5 per cent., 20 watt, wire wound
10C/7338	Type 7338	1	R_{15}	30,000 ohms ± 5 per cent., 2 watt, carbon
10C/7355	Type 7355	1	R_{24}	30,000 ohms ± 5 per cent., 25 watt, wire wound
10C/1660	Type 1660	1	R_{46}	2,500 ohms ± 5 per cent., 12 watt, wire wound
10C/7311	Type 7311	1	R_{22}	2,000 ohms ± 20 per cent., 12 watt, wire wound
10C/7309	Type 7309	1	R_{14}	250 ohms ± 20 per cent., 6 watt, wire wound
10C/7684	Type 7684	3	R_{20}, R_{21}, R_{45}	10 ohms ± 2 per cent., 6 watt, wire wound
10C/6823	Type 6823	1		10 ohms ± 20 per cent., 6 watt, wire wound.
10C/7310	Type 7310	2	R_{34}, R_{35}	50 ohms ± 20 per cent., 6 watt, wire wound
10C/1644	Type 1644	1	R_8	100,000 ohms ± 5 per cent., 2 watt, carbon
10C/7312	Type 7312	1	R_{23}	100,000 ohms ± 20 per cent., 2 watt, carbon
10C/7314	Type 7314	4	R_{26}, R_{30}, R_{36}, R_{40}	500 ohms ± 20 per cent., 2 watt, carbon
10C/1670	Type 1670	1	R_{12}	5 megohms ± 5 per cent., ½ watt, carbon
10C/1671	Type 1671	1	R_3	600,000 ohms ± 5 per cent., ½ watt, carbon
10C/1641	Type 852	1	R_9	2,500 ohms ± 10 per cent., ½ watt, carbon
10C/7317	Type 7317	1	R_4	250 ohms ± 20 per cent., ½ watt, carbon
10C/7685	Type 7685	4	R_{27}, R_{31}, R_{37}, R_{41}	200 ohms ± 20 per cent., ½ watt, carbon
10C/1675	Type 1675	2	R_{18}, R_{19}	60 ohms ± 5 per cent., ½ watt, carbon
10C/6676	Type 6676	1	R_{13}	50 ohms ± 20 per cent., ½ watt, carbon
10C/7318	Type 7318	5	R_{17}, R_{28}, R_{32}, R_{38}, R_{43}	6 ohms ± 20 per cent., ½ watt, carbon
10C/1677	Type 1677	4	R_{29}, R_{33}, R_{39}, R_{44}	3 ohms ± 5 per cent., ½ watt, carbon
10C/1678	Type 1678	1	R_5	1,000 ohms ± 5 per cent., ½ watt, carbon
10F/667	Relay, magnetic, type 244	1		Relay operated reset switch, operates at approx. 180 mA.
10F/668	Extension spindle ..	1		
10F/492	Switch, type 443	1	S_1	1 wafer, 5 position
	Transformer :—			
10K/142	Type 339	1	T_3	L.T. mains
10K/143	Type 340	1	T_1	H.T.
10K/144	Type 341	1	T_2	Inter-valve

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Modulator unit, type 13 (contd.) *Consisting of* (contd.) :—			
	Valve :—			
10E/388	Type VR.505	1	V_1	
10E/387	Type VT.75A	5	V_2, V_5, V_6, V_7, V_8	V_2 may be replaced by a valve VT.75B, Ref. No. 10E/472. Spec. No. D.C.D. W.T.1254
10E/19	Type VU.113	2	} V_3, V_4	
	or			
10E/146	Type VU.111	2		
10DB/250	Transmitter, type T.3065 ..		Fig. 17	80 volt A.C. with 24-volt D.C. blower
	Consisting of :—			
10K/12084	Blower, air, type C ..	1		24-volt operation
	Fitted with :—			
10A/12475	Grommet, type 1	5		
10A/13670	Gasket, type 18	1		Soft rubber, 4 in. outside dia. by 3 in. inside dia. by 0·312 in. thick
5C/430	Block, terminal, 2-way, No. 1	1		
10DB/748	Bracket and tag plate assembly	1		Bracket, complete with terminal
10C/2945	Choke-unit, type 9 ..	1		Grid choke. *Used on Serial Nos.* 11–610 *only*
	Fitted with :—			
10C/5278	Choke, H.F., type 302 ..	1	L_2	16 turns of 30 s.w.g. D.S.C. wire on tufnol former
10C/5279	Grid line	2		Nickel silver strip
10C/52812	Mounting panel ..	1		Tufnol sheet
10C/3615	Choke unit, type 11 ..	1		Grid choke. *Used on Serial Nos.* 611 *onwards*
	Fitted with :—			
10C/5278	Choke, H.F., type 302 ..	1	L_2	16 turns of 30 s.w.g. D.S.C. wire on tufnol former
10C/5279	Grid line	2		Nickel strip
10AB/601	Clamp, type 15	4		Spring clip slotted to fit shank of terminal. Clamps lead from valve, type VT.90, to terminals on the filter unit, type 13, 10PB/23
	Cover :—			
10AB/1225	Type 122	1		Dust cover, less louvred top plate. Used on Serial Nos. 11–610 only
10AB/1226	Type 123 ..	1		Louvred top plate. Used on Serial Nos. 11–610 only
10AB/371	Type 30	1		Light tight covers to fit over louvres on front of instrument. Used on Serial Nos. 11–610, only
10AB/376	Type 33	1		Light tight covers to fit over louvres on top of instrument. Used on Serial Nos. 11–610 only
	or			
10AB/506	Type 52	1		Dust cover
10AB/507	Type 53	1		Top cover plate
10AB/508	Type 54	1		Louvred light shield to fit on front of instrument

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Transmitter, type T.3065 (contd.) *Consisting of* (contd.) *Cover* (contd.) :—		Fig. 17	
10AB/1227	Type 124	1		$3\frac{1}{8}$ in. long by $1\frac{5}{8}$ in. wide by 0·080 in. thick
10C/2946	Resistance unit, type 105..	1		Comprises tufnol panel
	Fitted with:—			
10C/1105	Resistance, type 1105 ..	1	R_1	56 ohms ± 10 per cent., 1 watt, carbon rod type
10DB/359	Coupling unit, type 9 ..	1		Aerial lecher assembly
	Fitted with:—			
10DB/750	Aerial coupling assembly	1		Silver-plated rings, mounted on support rods
10DB/751	Aerial coupling assembly	1		Silver-plated rings, mounted on support rods
10DB/752	Tube	2		$\frac{3}{16}$ in. long by 0·140 outside dia. by 0·105 inside dia. split longitudinally
10DB/753	Spacing block	1		Loaded ebonite, $6\frac{3}{4}$ in. by 1 in. by $\frac{1}{2}$ in.
10DB/754	Guide	4		Steel angles, cadmium plated
10AB/1228	Clamp, type 62	1		$1\frac{5}{8}$ in. by $\frac{1}{2}$ in. wide, $1\frac{1}{4}$ in. fixing centres to fit tube $\frac{11}{16}$ in. dia.
10AB/1229	Link, type 3	1		Brass strip, silver-plated, $\frac{1}{8}$ in. by $\frac{1}{4}$ in. wide
10DB/755	Ferrule	2		$\frac{1}{2}$ in. by $\frac{9}{16}$ in. outside dia. by $\frac{1}{2}$ in. inside dia.
10DB/503	Coupling unit, type 18 .	1		Anode lecher assembly
	Fitted with:—			
10DB/756	Air chamber ..	1		Moulded bakelite
10DB/757	Anode lecher assembly	2		Silver-plated, complete with flange riveted and soldered on to form gland
10DB/758	Valve clip assembly ..	2		Tapped 4 B.A. for thumb screw
10DB/759	Valve clip assembly ..	2		Drilled to clear 4 B.A.
10DB/760	Thumb screw	2		4 B.A. knurled head $1\frac{13}{32}$ in. long overall, $\frac{3}{8}$ in. dia. head
10DB/761	Bridge, top section ..	1		Brass pressing
10DB/762	Bridge, bottom section..	1		Brass pressing, fixed to top section by 2 B.A. rd. hd. brass screw
10DB/763	Tube support ..	2		Moulded bakelite, $3\frac{5}{8}$ in. by $\frac{11}{16}$ in. dia.
10C/2944	Choke, H.F., type 133 ..	1		H.T. input, comprising 7 turns of 20 s.w.g. D.S.C. wire covered with sleeving on tufnol former.
10AB/23	Filter unit, type 13 ..	2		Filament filter
	Fitted with:—			
10A/12348	Knob, type 35	1		Moulded black for $\frac{1}{4}$ in. spindle
10PB/46	Locknut	1		Knurled, to clamp knobs, type 35
10DB/764	Panel assembly	1		Chassis, comprises front and back panels and base
10DB/765	Backing strip assembly ..	2		Mild steel, $13\frac{1}{8}$ in. by $\frac{3}{8}$ in. by $\frac{3}{32}$ in. with two 4 B.A. by $\frac{7}{8}$ in. ch. hd. screws welded in, fitted inside flanged edge of base of panel assembly

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Transmitter, type T.3065 (contd.) *Consisting of* (contd.) :—		Fig. 17	
10DB/766	Backing strip	2		Mild steel, $6\frac{1}{2}$ in. by $\frac{3}{8}$ in. by $\frac{3}{32}$ in., fitted inside flanged edge of back and front panels at top.
10DB/767	Backing strip ..	4		Mild steel, $9\frac{9}{16}$ in. by $\frac{3}{8}$ in. by $\frac{3}{32}$ in.
10DB/768	Supporting strap	2		Side members of chassis
10DB/769	Rubber sleeve	2		1 in. long by $\frac{7}{32}$ in. outside dia. by $\frac{5}{32}$ in. inside dia.
10DB/770	Screw (special)	10		Flat cheese head 4 B.A. by 0·460 in. long overall
10DB/771	Circlip	10		$\frac{1}{8}$ in. inside dia. 20 s.w.g. wire
10DB/772	Tube	1		Brass $\frac{11}{16}$ in. dia. by 8 in. long slotted one end
10AB/1230	Clamp, type 63	1		Brass, dull nickel-plated
10E/97	Valve, type V.T.90 ..	2	V_1, V_2	
10DB/547	Transmitter, type T.3065A ..	1		80 volt A.C. with 12 volt D.C. blower. Identical with transmitter, type T.3065, except that blowers, air, type B (Ref. No. 10K/12083), 12 volt, replaces type C (Ref. No. 10K/12084), 24 volt
10DB/701	Transmitter, type T.3065B ..	1		80 volt A.C. with 24 volt D.C. blower. Improved version of transmitter, type T.3065. Louvred top cover replaced by plain cover, wing nuts replaced by cheese headed screws, black finish replaced by french-gray finish. Fitted with blowers, air, type C (Ref. No. 10K/12084), 24 volt
10DB/251	Receiver, type R.3066	1	Fig. 22	80 volt A.C. with 24 volt D.C. switch unit
	or			
10DB/347	Receiver, type R.3066A ..	1		80 volt A.C. with 12 volt D.C. switch unit
	Consisting of :—			
10H/13245	Connector, type 901 ..	5		Cable, uniradio No. 4, 12 in
	Fitted with :—			
10H/701	2 sockets, type 213 ..			S.P. concentric
10H/13246	Connector, type 902 ..	5		Cable, uniradio No. 6, $17\frac{1}{2}$ in.
	Fitted with :—			
10H/529	2 sockets, type 187 ..			S.P. concentric
10AB/1375	Cover, type 141	1		Sheet steel dust cover, $19\frac{15}{16}$ in. by $12\frac{11}{32}$ in. by 20 B.G., louvred
10A/12308	Knob, type 34	2		Moulded black, for $\frac{1}{4}$ in. spindle, engraved with white spot
	Plug :—			
10H/391	Type W.198	1	P_2	4 pin.
10H/394	Type W.201	1	P_1	6 pin
10H/628	Type W.246	9		S.P. concentric, double ended
10KB/140	Power unit, type 77 ..	1		
	Consisting of :—			
10KB/516	Base plate assembly ..	1		Sheet steel, 4·3 in. wide by 10 in. by $2\frac{1}{2}$ in. high by 18 B.G.

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Receiver, type R.3066 or R.3066A (contd.) *Consisting of* (contd.) *Power unit, type 77* (contd.) *Consisting of* (contd.) :—			
10A/12390	Cap, valve, type 4 ..	1		
10C/2061	Choke, L.F., type 57	1		Smoothing, 2½ in. by 1½ in. by 1¼ in. overall. Duplicate of Chokes, L.F., type 87, Ref. No. 10C/2592
10C/2590	Condenser, type 1228	1	C_{59}	0·01 μF. ± 10 per cent., 3,000 volt, D.C. working, paper, tubular
10C/2037	Condenser, type 941 ..	2	C_{60}, C_{61}	0·5 μF. ± 15 per cent., 450 volt, D.C. working, paper, tubular, wire ends
10H/483	Holder, valve, type 69	1		2¼ in. by 4¼ in. by 1/16 in. bakelite panel with 2–4 pin valve holders (Pye 75162) riveted to it
	Pad, rubber :—			
10A/13836	Type 9	1		Dunlopillo rubber, ½ in. thick by 1½ in. square
10A/13837	Type 10	1		Dunlopillo rubber, ½ in. thick by 1½ in. square with ½ in. dia. hole in centre
10A/13838	Retainer, valve, type 52	1		Strip phos. bronze 24 s.w.g. by ⅝ in. wide (spring)
10KB/141	Transformer, type 288	1	T_1	Mains, with tag plate assembled
	Valve :—			
10E/100	VU.134	1	V_{13}	British 4-pin, 4 volt heater
10E/157	UU.4	1	V_{14}	British 4-pin
10PB/25	Receiving unit, type 26 ..	1		
	Consisting of :—			
5J/1383	Battery, dry 4·5 V. .	1		Grid bias
5E/2204	Cable, uniradio No. 4	13 in. approx.		Telcon P.T.5.C. Used in wiring. Bulk supply
10C/5401	Choke, H.F. type 315	1		46 turns of 36 s.w.g. wire wound on ¼ in. dia. former (31556)
	Coil :—			
10VB/40	Link	1	L_7	1 turn of 16 s.w.g. silver plated Cu. wire
10DB/694	Aerial	1	L_1	4 turns of 14 s.w.g. silver plated Cu. wire
10DB/695	Anode	1	L_3	3 turns of 14 s.w.g. silver plated Cu wire
10DB/693	Oscillator (78304) ..	1	L_8	6 turns of 16 s.w.g. En. Cu. wire. This Ref. No. was originally given to Choke, H.F. type 315, 10C/5401
10DB/688	T.R.F. (78230) ..	3	L_{12}, L_{16}, L_{20}	8 turns of 26 s.w.g. plus 3 turns of 26 s.w.g. (coupling) wound on former 1·25 in. by ·58 in. dia. (55276) with dust iron wire (72540)
10DB/689	T.R.F. (78231) ..	3	L_{15}, L_{19}, L_{23}	10 turns of 26 s.w.g. wound on former as above
10DB/690	T.R.F. (78232) ..	1	L_{24}, L_{25}	Primary. 7 turns. Secondary : 7 turns of 26 s.w.g. wound on former as above

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Receiver, type R.3066 or R.3066A (contd.) *Consisting of* (contd.) *Receiving unit, type 26* (contd.) *Consisting of* (contd.) *Coil* (contd.) :—			
10DB/691	T.R.F. (78233) ..	1	L_{28}	26 turns of 26 s.w.g. wound on former as above
10DB/692	T.R.F. (78311) ..	1	L_4, L_5	16 turns of 26 s.w.g. wound on former as above
	Condenser :—			
10C/19	Type 575	1	C_9	0·0002μ F. ±15 per cent., 750 volt, D.C. Test, 250 volt, D.C. working, moulded, mica, end wires
10C/2025	Type 935	32	C_{11}, C_{23} to C_{45}, C_{47}, C_{50}, C_{52}, C_{55}, C_{57}, C_{58}, C_{63}, C_{64}	0·001μF.+infinity−25 per cent. 350 volt, D.C. working, mica, moulded, side wires
10C/94	Type 609	6	C_5, C_{13}, C_{14}, C_{16}, C_{22}, C_{62}	0·0005μ F., ±15 per cent., 350 volt, D.C. working, mica, moulded
10C/2026	Type 936	1	C_{46}	3μμF., ±20 per cent., 500 volt, D.C. working, ceramic, disc, wire ends
10C/2027	Type 937	1	C_{48}	5μμF., ±10 per cent., 500 volt, D.C. working, ceramic cup
10C/226	Type 627	6	C_{19}, C_{49}, C_{51}, C_{53}, C_{54}, C_{56}	0·1μF., ±15 per cent., 350 volt, D.C. working, paper, tubular
10C/10569	Type 425	8	C_3, C_4, C_6, C_8, C_{12}, C_{15}, C_{20}, C_{21}	100μμF., ±2 per cent., 500 volt, D.C. working, ceramic cup
10C/10394	Type 404	1	C_7	10μμF., ±2 per cent., 500 volt, D.C. working, ceramic disc
10C/10948	Type 429	1	C_2	20μμF., ±5 per cent., 500 volt, D.C. working, ceramic disc
10C/10975	Type 430	1	C_{18}	25μμF., ±2 per cent., 500 volt, D.C. working, ceramic disc
	Holder, valve :—			
10H/799	Type 101	6		9-pin, without earthing clip, for VR.91
10H/485	Type 71	3		Ceramic, for VR.59 and VR.95.
10A/12308	Knob, type 34 ..	2		Moulded black, engraved with white spot, for ¼-in. dia. spindle
	Plug :—			
10H/478	Type 222	1		Wander, engraved : "Grid−1"
10H/479	Type 223	1		Wander, engraved : "Grid−2"
10H/480	Type 224	1		Wander, engraved : "Grid+"
	Resistance :—			
10C/1217	Type 1217	1	R_{45}	2,000 ohms, ±10 per cent., 6 watt, wire wound, vitreous
10C/1553	Type 1553	1	R_{41}	3,000 ohms, ±10 per cent, 2 watt, carbon
10C/9633	Type 271	1	R_{43}	5,000 ohms, ± 10 per cent, 1 watt, carbon
10C/1012	Type 1012	1	R_6	100 ohms, ±10 per cent., 1/10 watt, carbon
10C/1015	Type 1015	7	R_{18}, R_{22}, R_{25}, R_{27}, R_{30}, R_{32}, R_{40}	10,000 ohms, ±10 per cent., 1/10 watt, carbon

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Receiver, type R.3066 or R.3066A (contd.) *Consisting of* (contd.) *Receiving unit, type 26* (contd.) *Consisting of* (contd.) *Resistance* (contd.):—		Fig. 22	
10C/1014	Type 1014	12	R_1, R_{16}, R_{19}, R_{23}, R_{26}, R_{28}, R_{31}, R_{35}, R_{37}, R_{50}, R_{51}, R_{52}	500 ohms, ±10 per cent., $\frac{1}{10}$ watt, carbon
10C/6872	Type 6872	1	R_{33}	200 ohms, ±10 per cent., $\frac{1}{10}$ watt, carbon
10C/1021	Type 1021	3	R_3, R_{11}, R_{48}	25,000 ohms, ±10 per cent. $\frac{1}{4}$ watt, carbon
10C/1011	Type 1011	3	R_{17}, R_{24}, R_{29}	22 ohms, ±10 per cent., $\frac{1}{10}$ watt, carbon
10C/816	Type 922	3	R_4, R_{10}, R_{15}	50,000 ohms, ±10 per cent., $\frac{1}{4}$ watt, carbon
10C/9634	Type 272	1	R_{14}	50,000 ohms, ±10 per cent., 1 watt, carbon
10C/1017	Type 1017	4	R_2, R_7, R_{13}, R_{46}	1,000 ohms, ±10 per cent., $\frac{1}{4}$ watt, carbon
10C/1019	Type 1019	1	R_{36}	3,000 ohms, ±10 per cent., $\frac{1}{4}$ watt, carbon
10C/1454	Type 1454	1	R_5	15,000 ohms, ±10 per cent., $\frac{1}{4}$ watt, carbon
10C/812	Type 918	2	R_9, R_{53}	10,000 ohms, ±10 per cent., $\frac{1}{4}$ watt, carbon
10C/811	Type 917	1	R_8	5,000 ohms, ±10 per cent., $\frac{1}{4}$ watt, carbon
10C/1033	Type 1033	2		250 ohms, ±10 per cent., $\frac{1}{2}$ watt, wire wound
10C/1214	Type 1214	1	R_{39}	10,000 ohms, ±10 per cent., 6-watt, wire wound
10C/1025	Type 1025	1	R_{42}	10,000 ohms, potentiometer, wire wound, 1 in. spindle by $\frac{1}{4}$ in. dia. tolerance, ±20 per cent.
10C/7872	Type 7872	1	R_{12}	20,000 ohms, ±10 per cent., potentiometer, wire wound, $\frac{9}{16}$ in. spindle by $\frac{1}{4}$ in. dia.
10H/701	Socket, type 213 ..	1		S.P. concentric
	Screen :—			
10A/13839	Type 48	1		Tinplate 26 B.G. 3·88 in. by 2·78 in. by $3\frac{1}{4}$ in.
10A/13840	Type 49	1		Tinplate 26 B.G. 3·88 in. by 2·78 in. by $3\frac{1}{4}$ in.
10A/13841	Type 50	1		Tinplate 26 B.G. 3 in. by 3·36 in. by $1\frac{3}{4}$ in.
10A/13353	Type 37	5		Tinplate 26 B.G. 1·88 in. by 3 in. by $1\frac{3}{4}$ in.
10PB/49	Thyratron bracket assembly.	1		Sheet steel bracket 16 B.C. (45630)
	Fitted with :—			
10A/13842	Cap, valve, type 30	1		Pressed from 26 s.w.g. M.S. for V.G.T. 121
	Condenser :—			
10C/94	Type 609 ..	1	C_{62}	0·0005μ F., ± 15 per cent., 350 volt, D.C. working, mica, moulded

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Receiver, type R.3066, or R.3066A (contd.) *Consisting of* (contd.) *Receiving unit, type 26* (contd.) *Consisting of* (contd.) *Thyratron bracket assembly* (contd.) *Fitted with* (contd.) *Condenser* (contd.)		Fig. 22	
10C/2025	Type 935 ..	1	C_{63}	0.001μF., + infinity − 25 per cent. 350 volt. D.C. working, mica, moulded, side wires
10H/15	Holder, valve, type 32	1		British octal, for V.G.T. 121 1½ in. fixing crs.
10H/528	Plug, type 229 ..	1		S.P. concentric, front mounting
	Resistance :—			
10C/819	Type 925 ..	1	R_{21}	250,000 ohms, ± 10 per cent., ¼ watt, carbon
10C/1017	Type 1017 ..	1	R_{20}	1,000 ohms, ± 10 per cent., ¼ watt, carbon
10AB/296	2 springs, type 4 ..			Tension 31 turns, ·17 in. d. (Int.) 1·04 in. centres. Rust proofed
10PB/50	Valve (V.R.91) Plate Assembly	1		Sheet steel bracket 2½ in. by 3½ in. by 16 B.G. (45581)
	Fitted with :—			
10A/13842	Cap, valve, type 30	1		Pressed from 26 s.w.g. M.S. for V.R. 91
	Holder valve :—			
10H/150	Type 40	1		Small diode with clip for V.R. 92
10H/379	Type 62	1		9-pin, with earthing clip for V.R. 91
10H/528	Plug, type 229 ..	1		S.P. concentric, front mounting
	Resistance :— ..			
10C/1018	Type 1018 ..	1		2,000 ohms, ±10 per cent., ¼ watt, carbon
10C/1097	Type 1097 ..	2	R_{44}, R_{49}	½ megohm, ±10 per cent., ¼ watt carbon
	Valve :—			
10E/92	Type V.R. 91 ..	7	V_5, V_6, V_7, V_8, V_9, V_{10}, V_{11}	9-pin, screened pentode
10E/11452	Type V.R. 59 ..	1	V_3	6·3-volt heater, acorn, triode
10E/95	Type V.R. 95 ..	2	V_1, V_2	6·3-volt heater, acorn, pentode
10E/164	Type V.G.T. 121 ..	1	V_4	British octal, thyratron
10E/101	Type V.R. 92 ..	1	V_{12}	6·3-volt heater, diode
10FB/202	Switch unit, type 42 ..	1		12-volt, motor-driven, complete. R.3066 only
	or			
10FB/198	Switch unit, type 39 ..	1		24-volt, motor-driven, complete. R.3066A only
	Fitted with :—			
10FB/393	Contact assembly ..	8		Spring contact, complete with concentric plug (1-pin)
10FB/394	Blacknut (special) ..	8		For use with contact assemblies. 10FB/393
10FB/395	Contact ring	2		
10FB/396	Contact post	8		

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Receiver, type R.3066A (contd.) *Consisting of* (contd.) *Switch unit, type 39* (contd.) *Fitted with* :—		Fig. 22	
10FB/397	Ball race with insulating ring or	2		Hoffman ball race No. 4666
10DB/702	Receiver, type R.3102A	1	Fig. 27	80-volt A.C. with 12-volt D.C. switch unit
	Consisting of :—			
5C/430	Block, terminal, type B, 2-way, No. 1	1		Moulded black, $1\frac{1}{2}$ in. by 1 in.
	Cover :—			
10A/13784	Type 136	1		Case body assembly, with louvred end panel
10A/13785	Type 137	1		Louvred dust cover assembly, complete with 6 Dzus fasteners
10A/13786	Type 138	3		Fitted over pre-set spindle holes on front panel, 0·048-in. M.S. plate
	Choke, H.F. :—			
10C/5371	Type 309	2	L_{26}, L_{28}	0·5 μH, 8 turns of 22 s.w.g. D.C.C. cu. wire, $\frac{5}{16}$ in. inside dia. by $\frac{3}{8}$ in. mix. length, air core
10C/3592	Type 310	2		1·3 μH, 15 turns of 22 s.w.g. D.C.C. cu. wire, air core
10C/3220	Type 150	5	L_5 to L_9	Filament
	Choke, L.F. :—			
10C/2596	Type 89	1	L_{21}	Smoothing (indicator)
10C/3221	Choke, H.F., type 151 ..	1	L_{18}	
10C/2595	Choke, L.F., type 88 ..	1	L_{20}	Smoothing
	Clip :—			
10H/13694	Type 81	1		Condenser (10C/2634) clip, 1 in. i.d., 0·032 in. M.S.
10H/13695	Type 82	2		Clip for tube (cable), Ref. No. 10A/13817 Phos. bronze, $\frac{15}{16}$ in. high by $\frac{5}{8}$ in. wide
	Coil :—			
10DB/800	I.F. (Grid)	3	L_{11}, L_{13}, L_{15}	Moulded bakelite former wound with 10 turns of 26 s.w.g. D.S.C. cu. wire retained by paxolin collar
10DB/801	I.F. (Diode)	1	L_{17}	As coil I.F. (Grid), but wound with 16 turns of 24 s.w.g. D.S.C. cu. wire. Marked with 2 orange spots
10DB/802	I.F. (Anode)	4	L_{10}, L_{12} L_{14}, L_{16}	As coil, I.F. (Grid), but wound with 15 turns of 24 s.w.g. D.S.C. cu. wire. Marked with 2 black spots
10DB/803	Aerial and bracket assembly	1	L_1	Moulded bakelite former fitted with 2 paxolin collars wound with $4\frac{1}{2}$ turns of s.w.g. silver plated cu. wire, 5/6 of a turn of 7/33 rubber covered grade "E" yellow wire. Marked with 2 green spots

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Receiver, type R.3102A (contd.) *Consisting of* (contd.) *Coil* (contd.) :—		Fig. 27	
10DB/804	1st R.F. and bracket assembly	1	L_2	As coil, aerial above but fitted with 2 flanges, and wound with $3\frac{3}{4}$ turns of 22 s.w.g. silver plated cu. wire. Marked with 1 line of blue paint
10DB/805	2nd R.F. and bracket assembly	1	L_3	As coil, 1st R.F. above, but wound with 4 turns of 22 s.w.g. silver plated cu. wire
10H/13697	Connector, type 1021 ..	1		Cable, uniradio 6 (12 in.) $11\frac{1}{2}$ in. between centres of sockets, angle " E " = 270 deg., colour code : Orange
	Fitted with :—			
10H/529	Socket, type 187 ..	2		Concentric
10H/14036	Connector, type 1116 ..	1		Cable, P.T.9C ($9\frac{3}{4}$ in.) 7 in. from centre of socket to end of outer sheath, remainder fanned out
	Fitted with :—			
10H/2246	Socket, type 370 ..	1		Concentric
10H/14037	Connector, type 1117 ..	1		Cable, P.T.9C ($13\frac{3}{4}$ in.), 11 in. from centre of socket to end of outer sheath, remainder fanned out
	Fitted with :—			
10H/2246	Socket, type 370 ..	1		Concentric
10H/13698	Connector, type 1022 ..	1		Cable, uniradio 4 (16 in.), fitted with 2 sockets, type 213 (10H/701), $15\frac{1}{2}$ in. between centres of sockets, angle " E " = 0 deg., colour code: Yellow
	Fitted with :—			
10H/701	Socket, type 213 ..	2		Concentric
10H/13705	Connector, type 1023 ..	1		Cable, uniradio 4 (16 in.) $15\frac{1}{2}$ in. between centres of sockets, angle " E " = 270 deg., colour code : Red
	Fitted with :—			
10H/701	Socket, type 213 ..	2		Concentric
10H/13706	Connector, type 1024 ..	1		Cable, uniradio 4 (16 in.) $15\frac{1}{2}$ in. between centres of sockets, angle " E " = 180 deg., colour code : White
	Fitted with :—			
10H/701	Socket, type 213 ..	2		Concentric
10H/13707	Connector, type 1025 ..	1		Cable, uniradio 4 (16 in.), $15\frac{1}{2}$ in. between centres of sockets, angle " E " = 180 deg., colour code : Green
	Fitted with :—			
10H/701	Socket, type 213 ..	2		Concentric
10H/13708	Connector, type 1026 ..	1		Cable, uniradio 6 ($17\frac{1}{2}$ in.) 17 in. between centres of sockets, angle " E " = 180 deg., colour code : Green
	Fitted with :—			
10H/529	Socket, type 187 ..	2		Concentric
10H/13709	Connector, type 1027 ..	1		Cable, uniradio 6 (15 in.), $14\frac{1}{2}$ in. between centres of sockets, angle " E " = 0 deg., colour code : Yellow

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Receiver, type R.3102A (contd.) *Consisting of* (contd.) *Connector* (contd.)		Fig. 27	
	Fitted with :—			
10H/529	Socket, type 187 ..	2		Concentric
10H/13710	Connector, type 1028 ..	1		Cable, uniradio 9 (15½ in.), 15 in. between centres of sockets, angle "E" = 0 deg., colour code : Red
	Fitted with :—			
10H/529	Socket, type 187 ..	2		Concentric
10H/13711	Connector, type 1029 ..	1		Cable, uniradio 6 (13½ in.), 13 in. between centres of sockets, angle "E" = 180 deg., colour code: White
	Fitted with :—			
10H/529	Socket, type 187 ..	2		Concentric
10H/14038	Connector, type 1118 ..	1		Cable, P.T.9C (15¼ in.) 12½ in. from centre of socket to end of outer sheath remainder fanned out
	Fitted with :—			
10H/2246	Socket, type 370 ..	1		Concentric
10C/5420	Condenser, type 2926 ..	2		0·0004 to 0·0005μF.
	Fitted with :—			
10C/5421	Condenser ring (top)	1		2·188 in. outside dia. by 1·438 in. inside dia. by 0·064 in. thick, silver-plated brass, 4 holes 0·257 in. dia.
10C/5422	Condenser ring (bottom)	1		As condenser ring (top), but drilled with 4 holes 0·120 in. dia.
10C/5423	Insulator (condenser ring)	1		Mica, 2·188 in. o.d. by 1·438 in. i.d. by 0·004 in. thick, 4 holes 0·120 in. dia.
10C/5424	Bushes (condenser rings)	4		Moulded bakelite, ⅜ in. o.d. drilled 0·120 in. dia.
	Condenser :—			
10C/2635	Type 1257	1	C_{43}	0·5μF.—10+25 per cent., 450-volt D.C. working, paper, rectangular metal case, terminals.
10C/5328	Type 2878	1	C_{41}, C_{42}	1·0μF. + 1·0μF., — 10 + 25 per cent., 500 volt D.C. working, paper, rectangular metal case, fixing lugs on side
10C/2025	Type 1249	1	C_{44}	0·01μF.±15 per cent., 2,500 volt D.C. working, paper, rectangular metal case
10C/2636	Type 1258	18	C_{18} to C_{35}	0·001μF.±25 per cent., 350 volt D.C. working, mica, moulded end, wires
10C/5703	Type 3128 .	2	C_{10}, C_{13}	0·1±25 per cent., 350 volt D.C. working, paper, tubular, waxed end wires. 1⅜ in. long by ½ in. dia. tropical
10C/2627	Type 1251	1	C_7	0·005μF.±15 per cent., 450 volt D.C. working, paper, tubular end wires 1 7/16 in. long max. by 1 3/32 in. dia.
10C/2718	Type 1321	4	C_2, C_4, C_8, C_{11}	50$\mu\mu$F.±5 per cent., 500 volt D.C. working, ceramic tube

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Receiver, type R3102A (contd.) *Consisting of* (contd.) *Condenser* (contd.) :—		Fig. 27	
10C/2624	Type 1248 ..	1	C_{48}	$0 \cdot 1\mu F. \pm 25$ per cent., 450 volt D.C. working, paper, tubular end wires
10C/4485	Type 2311	3	C_6, C_{14}, C_{16}	$8\mu\mu F. \pm 10$ per cent., 500 volt D.C. working, ceramic tube
10C/4484	Type 2310	1	C_1	$3\mu\mu F. \pm 10$ per cent., 500 volt D.C. working, ceramic tube
10C/4501	Type 2327	1	C_{40}	$50\mu F. +$infinity-10 per cent., 6 volt D.C. working, electrolytic, one hole fixing, end wires
10C/4502	Type 2328 ..	6	C_5, C_{36} to C_{39}, C_{47}	$0 \cdot 001\mu F. +$infinity-25 per cent., 350 volt D.C. working, mica, moulded, end wires
10C/5425	Type 2927	1	C_{12}	$0 \cdot 002\mu F. \pm 10$ per cent., 350 volt D.C. working, mica, moulded
10C/963	Type 895	1	C_{50}	$0 \cdot 0001\mu F. \pm 15$ per cent., 500 volt D.C. working, mica, moulded, tag end
10C/2719	Type 1322	1	C_{15}	$0 \cdot 0002\mu F. \pm 10$ per cent., 350 volt D.C. working, mica, moulded, end wires
10C/4470	Condenser unit, type 57 ..	1		Tag and insulating panels, nuts and screws
	Fitted with :—			
10C/8382	Condenser, type 172 ..	1	C_{49}	$0 \cdot 25\mu F. \pm 15$ per cent., 375 volt D.C. working, paper, tubular end wires
10C/11623	Resistance, type 490 ..	1	R_{41}	10,000 ohms, ± 10 per cent., 2 watts
10A/12380	Coupling, type 5	1		Flexible, for $\frac{1}{4}$ in. spindles
10A/13791	Dial, type 18	1		Local tuning dial—complete
	Fitted with :—			
10A/13792	Knob, type 163 ..	1		Moulded black, $\frac{1}{4}$ in. spindle, $1 \cdot 7$ in. o.d., fitted with stop lever
10A/13793	Scale, type 10	1		Engraved "0–5" and "TUNE"
10A/13794	Washer	1		Phos. bronze
10A/13795	Washer	1		Cork
10A/13796	Washer	1		M.S.
10A/13797	Spindle	1		M.S.
10A/13798	Stop pin	1		Brass
10A/13799	Control head mounting	1		
	Holder, valve :—			
10H/491	Type 72	3		British octal, moulded oval flange $1\frac{7}{8}$ in. $1\frac{3}{32}$ in., $1\frac{1}{2}$ in. fixing centres
10H/499	Type 75	1		4-pin for V.U.39 and V.U.39A
10H/379	Type 62	7		9-pin for V.R.91
10H/150	Type 40	2		For V.R.92 (diode) with clip
10H/517	Type 76	1		Ceramic, for V.U.134
	Inductance :—			
10C/3166	Type 209	1	L_{19}	Compensating coil, 2 coils wound in series, each of 130 turns of 40 s.w.g., D.S.C. cu. wire, on moulded former fitted with 4 tags

Ref. No	Nomenclature	Quantity	Ref. in fig.	Remarks
	Receiver, type R.3102A (contd.)		Fig. 27	
	Consisting of (contd.)			
	Inductance (contd.) :—			
10C/5382	Type 457	1	L_4	Tuning coil assembly comprising 4½ turns of 24 s.w.g. D.S.C. cu. wire wound on bakelite former complete with collet, brass fixing nut, slug, spindle assembled on mounting plate, 2½ in. by 1 1/16 in. by 0·064 in. thick M.S.
10A/13800	Knob, type 164	1		Moulded black, drilled for ¼ in. spindle, 1·218 in. outside dia., fitted with cranked stop lever and inner friction cone
10A/13801	Friction cone	1		Outer cone, 1 in. inside dia. by ½ in. deep
	Plug :— ..			
10H/391	Type W.198	1		4-pole
10H/394	Type W.201	1		6-pole
10H/528	Type 229	1		S.P. coaxial
10H/628	Type 246	10		S.P. coaxial
10C/5273	Resistance-unit, type 184	1		S.R.B.P. sheet, 4½ in. by 13/16 in. by 3 mm. and spring clips
	Fitted with :—			
10C/6928	Resistance, type 6928 ..	1		10,000 ohms, ± 10 per cent., wire wound, vitreous, 30 watt max. rating
	Resistance :—			
10C/7780	Type 7780	1	VR_1	20,000 ohms, ± 10 per cent., wire wound potentiometer, plain spindle 0·875 in. long by ¼ in. dia. metal case
10C/7781	Type 7781	1	VR_2	100,000 ohms, ± 15 per cent., potentiometer, rotary composition strip type linear, plain spindle 1 in. long by ¼ in. dia., moulded case
10C/1458	Type 1458	3	R_{20}, R_{26}, R_{38}	18 ohms, ± 10 per cent., 1/10 watt carbon
10C/1460	Type 1460	3	R_{19}, R_{27}, R_{34}	150 ohms, ± 10 per cent., 1/10 watt carbon
10C/1359	Type 1359	2	R_4, R_8	150 ohms, ± 10 per cent., ¼ watt carbon, insulated
10C/1461	Type 1461	1	R_{43}	180 ohms, ± 10 per cent., ¼ watt carbon, insulated
10C/1462	Type 1462	1	R_{11}	390 ohms, ± 10 per cent., ¼ watt carbon, insulated
10C/1463	Type 1463	12	R_{14}, R_{15}, R_{18}, R_{21}, R_{22}, R_{25}, R_{28}, R_{29}, R_{32}, R_{35}, R_{36}, R_{38}	1,000 ohms, ± 10 per cent., 1/10 watt carbon
10C/753	Type 891	1	R_{44}	4,700 ohms, ± 10 per cent., ½ watt carbon, insulated
10C/1465	Type 1465	1	R_{39}	5,600 ohms, ± 10 per cent., 1/10 watt carbon
10C/6922	Type 6922	2	R_2, R_7	8,200 ohms, ± 10 per cent., ½ watt carbon, insulated
10C/1839	Type 74/7B	5	R_{23}, R_{30}, R_{31}, R_{37}, R_{51}	10,000 ohms, ± 10 per cent., 1/10 watt carbon
10C/1925	Type 77/7B	1	R_{16}	18,000 ohms, ± 10 per cent., 1/10 watt carbon

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Receiver, type R.3102A (contd.) *Consisting of* (contd.) *Resistance* (contd.) :—		Fig. 27	
10C/783	Type 908	2	R_1, R_5	18,000 ohms, ± 10 per cent., ½ watt, carbon, insulated
10C/1697	Type 1697	1	R_{17}	22,000 ohms, ± 10 per cent., 1/10 watt carbon, insulated
10C/1799	Type 1799	1	R_{50}	33,000 ohms, ± 10 per cent., ½ watt carbon, insulated
10C/29	Type 546	1	R_{48}	82,000 ohms, ± 10 per cent., ½ watt carbon, insulated
10C/11499	Type 487	3	R_9, R_{10}, R_{52}	100,000 ohms, ± 10 per cent., ¼ watt carbon, insulated
10C/33	Type 550	1	R_{42}	2,700 ohms, ¼ watt carbon, insulated
10C/1339	Type 1339	1	R_3	12,000 ohms, ± 10 per cent., 2 watt carbon
10C/548	Type 811	1	R_6	270,000 ohms, ± 10 per cent., ¼ watt carbon, insulated
10C/11691	Type 525	3	R_{12}, R_{24}, R_{46}	100,000 ohms, ± 10 per cent., ½ watt carbon, insulated
10C/1089	Type 1089	1	R_{13}	3,900 ohms, ± 10 per cent., ½ watt, carbon insulated
10C/11667	Type 500	1	R_{49}	1,000 ohms, ± 10 per cent., ¼ watt, carbon, insulated
10C/453	Type 771	1	R_{53}	100,000 ohms, ± 10 per cent., 2 watt, carbon
10C/1038	Type 1038	1	R_{40}	180 ohms, ± 10 per cent., ¼ watt, carbon, insulated
10C/948	Type 975	1	R_{45}	4,700 ohms, ± 10 per cent., ¼ watt, carbon, insulated
	Retainer, valve :—			
10A/13802	Type 49	1		Comprising 11 in. of mercerised cord, 2 springs and tags
10A/13153	Type 28	7		Phos. bronze, 0·022 in. thick by 1·75 in dia., hole 1·5 in. dia.
10A/13803	Type 50	1		S.R.P.B. sheet, fitted with 2 in. by 5½ in. lengths of mercerised (doubled) cord, tags and springs
10A/13804	Type 51	3		Complete with top cap, S.R.B.P. sheet fitted with 2 in. by 5 in. lengths of mercerised (double) cord, tags and springs
10B/13218	Ring, rubber, type 4 ..	1		1 1/16 in. to 1⅛ in. o.d., by ⅞ in. to 15/16 in. i.d. by ⅝ in. to ¾ in. long. Sulphur free rubber protector for condenser (10C/2634)
	Screen :—			
10AB/815	Type 32	1		Small I.F.
10AB/817	Type 34	1		R.F.
10AB/1357	Type 44	1		3rd I.F.
10AB/1358	Type 45	1		Large I.F.
10AB/1359	Type 46	1		Oscillator
10AB/1360	Type 47	1		Intervalve, M.S. 3¼ in. by 2 in. incl. feet by 0·032 in. thick, 2·875 in. fixing centres
10A/13805	Screws, special ..	3		M.S. 4 B.A. by 7/16 in. Ch. Hd. drilled with a 0·040 in. dia. hole per pin
10FB/198	Switch-unit, type 39 ..	1		24-volt D.C. motor driven aerial switch

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Receiver, type R.3102A (contd.) *Consisting of* (contd.)		Fig. 27	
	Fitted with :— ..			
10FB/393	Contact assemblies ..	8		
10FB/394	Back nuts (special) ..	8		
10FB/395	Contact rings	2		
10FB/396	Contact posts	8		
10FB/397	Ball races	2		Complete with insulating ring
	Tag boards :—			
10AB/13806	Type 39	4		"Tufnol" sheet 1·093 in. by 1·437 in. by $1\frac{1}{2}$ mm. fitted with 6 tags
10AB/13807	Type 40	5		"Tufnol" sheet 1·375 in. by 0·812 in. by $1\frac{1}{2}$ mm. fitted with 3 tags
10AB/13808	Type 41	1		"Tufnol" sheet $1\frac{15}{16}$ in. by $\frac{7}{8}$ in. by $1\frac{1}{2}$ mm. fitted with 3 tags
	Transformer :—			
10K/13140	Type 779	1	T_1	Receiver, 80 volt A.C. input, 300, 6, and 4 volt D.C. output. Laminated iron core. Primary: 113 turns of 20 s.w.g. En.Cu. wire. Secondary: 1,220 turns of 31 s.w.g. En.Cu. tapped at 610 turns L.T.1.: 10 turns of 16 s.w.g. En.Cu. wire tapped at $9\frac{1}{2}$ turns L.T.2: 6 turns of 19 s.w.g. En.Cu. wire
10K/13141	Type 780	1	T_2	High voltage, 80 volt A.C. input 1800, 2 and 4 volt D.C. output. Laminated iron core Primary: 338 turns of 34 s.w.g. En.Cu. wire Secondary: 7,020 turns of 44 s.w.g. En.Cu. wire L.T.1: 9 turns of 19 s.w.g. En.Cu. wire L.T.2: 19 turns of 19 s.w.g. En.Cu. wire
10A/13817	Tube (cable)	1		Paxolin, 11 in. $\pm\frac{1}{8}$ in. long by $\frac{7}{16}$ in. i.d. $\frac{17}{32}$ in. to $\frac{9}{16}$ in. o.d.
	Valves :—			
10E/92	Type V.R.91	4	V_3, V_5, V_6, V_7	
10E/105	Type V.R.92	2	V_8, V_{11}	
10E/9600	Type V.U.39	1	V_{13}	
10E/121	Type V.U.120	1	V_{14}	
10E/386	Type V.R.136	2	V_1, V_2	
10E/394	Type V.R.137	1	V_4	
10E/11446	Type V.R.65	3	V_9, V_{10}, V_{12}	
	Accessories :—			
10DB/857	Case, transit	1		
10QB/32	Indicating unit, type 20 ..	1	Fig. 33	Fitted with V.C.R. A.41G.4A.
	Consisting of :—			
10QB/64	Bush, paxolin	4		$\frac{9}{16}$ in. dia.
10C/2590	Condenser, type 1228 ..	4	C_6 to C_9	0·01μF. $\pm$10 per cent., 3,000 volt D.C. working, paper, tubular
10C/4055	Condenser and resistance unit, type 121.	1		$\frac{1}{16}$ in. thick, bakelite panel and tags

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Indicating unit, type 20 (contd.) *Consisting of* (contd.) *Fitted with* :—			
10C/2025	Condenser, type 935 ..	1	C_2	$0 \cdot 001 \mu F$. $^{+00}_{-25}$ per cent. 350-volt D.C. working, mica, moulded, sidewires
10C/1684	Resistance, type 1684 ..	1	R_3	$2 \cdot 1$ megohms, ± 10 per cent., $\frac{1}{4}$ watt, carbon rod type
10C/10843	Resistance, type 426 ..	1	R_6	1,500 ohms, ± 10 per cent., 1 watt, carbon rod type
10C/808	Resistance, type 914 ..	1	R_5	300 ohms, ± 10 per cent., $\frac{1}{4}$ watt, carbon rod type
10C/4056	Condenser and resistance unit, type 122	1		$\frac{1}{16}$ in. thick bakelite panel and tags L.H.
	Fitted with :—			
10C/2590	Condenser, type 1228 ..	1	C_3	$0 \cdot 01 \mu F$., ± 10 per cent., 3,000-volt D.C. working, paper, tubular
10C/1454	Resistance, type 1454 ..	1	R_{22}	15,000 ohms, ± 10 per cent., $\frac{1}{4}$ watt, carbon rod type
10C/819	Resistance, type 925 ..	1	R_{20}	$\frac{1}{4}$ megohm, ± 10 per cent., $\frac{1}{4}$ watt, carbon rod type
10C/1831	Resistance, type 1831 ..	1	R_{24}	$\frac{1}{2}$ megohm, ± 5 per cent., 1 watt, carbon rod type
10C/4057	Condenser and resistance unit, type 123	1		$\frac{1}{16}$ in. thick bakelite panel and tags R.H.
	Fitted with :—			
10C/2590	Condenser, type 1228 ..	1	C_4	$0 \cdot 01 \mu F$., ± 10 per cent., 3,000-volt. D.C. working, paper, tubular
10C/1454	Resistance, type 1454 ..	1	R_9	15,000 ohms, ± 10 per cent., $\frac{1}{4}$ watt, carbon rod type
10C/819	Resistance, type 925 ..	1	R_{14}	$\frac{1}{4}$ megohm, ± 10 per cent., $\frac{1}{4}$ watt, carbon rod type
10C/1831	Resistance, type 1831 ..	1	R_{11}	$\frac{1}{2}$ megohm, ± 5 per cent., 1 watt, carbon rod type
10C/4058	Condenser and resistance unit, type 124	1		$\frac{1}{16}$ in. thick bakelite panel with tags
	Fitted with :—			
10C/3030	Condenser, type 1441 .	1	C_1	$0 \cdot 25 \mu F$., ± 10 per cent., 450-volt, D.C. working, paper, tubular, wire ends
10C/1658	Resistance, type 1658 ..	1	R_1	150,000 ohms, ± 10 per cent., $\frac{1}{4}$ watt, carbon rod type
10C/819	Resistance, type 925 ..	1	R_{13}	$\frac{1}{4}$ megohm, ± 10 per cent., $\frac{1}{4}$ watt, carbon rod type
10C/2025	Condenser, type 935 ..	1	C_5	$0 \cdot 001 \mu F$., $^{+00}_{-25}$ per cent., 350-volt, D.C. working, mica, moulded, side wires
	Grommet :—			
10A/12488	Type 5	1		1 in. inside dia.
10A/12489	Type 6	1		Para rubber
	Holder, valve :—			
10H/379	Type 62	2		9-pin with centre earth clip, loctal
10H/821	Type 103	2		9-pin for C.R.T. type A.41 G.4A
10A/12308	Knob, type 34			Moulded, black, with white spot, drilled for $\frac{1}{4}$ in. spindle
10AB/312	Mask, C.R.T., type 2 ..			Moulded rubber

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Indicating unit, type 48 (contd.) *Consisting of:—*			
10C/4058	Condenser-resistance unit, type 124	1		
	Fitted with :—			
10C/221	Condenser, type 2958 ..	1	C_1	$0 \cdot 25\,\mu$F., ± 15 per cent., 450 volt D.C. working paper, tubular side wires, non-inductive, tropical
	Resistance :—			
10C/1658	Type 1658	3	R_1, R_{29}, R_{30}	150,000 ohms, ± 10 per cent., $\frac{1}{4}$ watt
10C/819	Type 925	3	R_{14}, R_{20}, R_{13}	250,000 ohms, ± 10 per cent., $\frac{1}{4}$ watt
10C/4129	Condenser-resistance unit, type 129	1		Bakelite panel and tags, L.H., $2\frac{3}{4}$ in. by 2 in. by $\frac{1}{16}$ in. thick
	Resistance :—			
10C/1454	Type 1456	2	R_9, R_{22}	2,500 ohms, ± 10 per cent., $\frac{1}{4}$ watt
10C/7602	Type 72	2	R_{11}, R_{24}	500,000 ohms, ± 5 per cent., 1 watt
	Cover :—			
10AB/1378	Type 144	1		Mild steel, $15\frac{1}{4}$ in. by $12\frac{7}{16}$ in. by 20 B.G. with insulating plate
10AB/1287	Type 128	2		Rubber, cover for $\frac{7}{8}$ in. dia. hole in panel
	Grommet :—			
10A/12488	Type 5	1		1 in. inside dia.
10A/12489	Type 6	1		Para rubber
	Holder, valve :—			
10H/379	Type 62	2		9 pin, with centre earth clip for V.R.91
10H/274	Type 169	2		12 side connections with keyway for C.R.T., type V.C.R. 138
	Knob :—			
10A/12308	Type 34	7		Moulded black, engraved with white spot for $\frac{1}{4}$ in. spindle
10AB/1196	Type 139	2		Moulded, preset, $\frac{9}{16}$ in. dia. by $\frac{3}{4}$ in. long for $\frac{1}{4}$ in. spindle, complete with three 6 B.A. set screws
10AB/539	Mask, C.R.T., type 3 ..	2		Moulded rubber
10AB/1212	Mounting, type 190 ..	2		Potentiometer mounting comprising insulated mountings and insulated pillars
	Plug :—			
10H/528	Type 229	5		S.P. concentric
10H/394	Type 201	1		6-way, H.T.
	Resistance :—			
10C/1450	Type 1450 .. .	2	R_{29}, R_{30}	200,000 ohms, ± 10 per cent., $\frac{1}{4}$ watt, carbon. These may replace resistances, type 1658 in condenser-resistance unit, type 124, depending on cathode ray tube
10C/820	Type 926	1	R_3	2 megohms, ± 10 per cent., $\frac{1}{4}$ watt carbon
10C/11667	Type 500	1	R_4	1,000 ohms, ± 10 per cent., $\frac{1}{4}$ watt, carbon, insulated
10C/1023	Type 1023	2	R_{25}, R_{26}	300,000 ohms, ± 5 per cent., $\frac{1}{4}$ watt, carbon, insulated

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Indicating unit, type 48 (contd.) *Consisting of* (contd.) *Condenser-resistance unit, type 129* (contd.) *Resistance* (contd.) :—			
10C/816	Type 922	4	R_{16}, R_{17}, R_{18}, R_{19}	50,000 ohms, ± 10 per cent., ¼ watt, carbon
10C/7851	Type 7851	1	R_2	1 megohm, ± 20 per cent., potentiometer, linear, tropical
10C/195	Type 663	2	R_{10}, R_{23}	500,000 ohms, ± 20 per cent., potentiometer, linear, tropical
10C/462	Type 780	1	R_{12}	250,000 ohms, ± 20 per cent., potentiometer, linear, tropical
10C/193	Type 661	2	R_8, R_{21}	50,000 ohms, ± 20 per cent., potentiometer, linear, tropical
10C/1224	Type 1224	1	R_7	20,000 ohms, ± 10 per cent., potentiometer, wire-wound, 1 in. long spindle, tropical
10AB/541	Screen, type 15	4		Mu-metal, for V.C.R. 138. (This Ref. No. stands for one-half screen, 2 required per tube.)
10F/183	Switch, type 256 ..	1	S_1	D.P.C.O.
10KB/357	Transformer, type 532 ..	1	T_1	L.T.
10QB/129	Tube support assembly	2		M.S. saddle with soft rubber pad and strip, Phos. bronze, spring clip
	Valve :—			
10E/92	Type V.R.91 ..	2	V_1, V_2	9-pin, 6·3 V heater, screened pentode
10E/407	Type V.C.R.138 ..	2	C.R.T.$_1$, C.R.T.$_2$	Cathode ray tube
10AB/311	Visor, type 3	1		Sheet-steel with rubber edging
10QB/65	Washer, paxolin ..	8		¾ in. dia.
10QB/110	Indicating unit, type 48A :—	1		
	Consisting of :—			
10A/13809	Bracket, type 89 ..	2		C.R.T. support, 3⅛ in. by 2 in. by 1/16 in. thick, M.S.
	Washer :—			
10A/13810	Rubber (A.15124) ..	2		Soft para. rubber, 1½ in. dia. by 5/32 in. thick with raised boss, 7/16 in. high by ½ in. dia., 3/16 in. dia. hole in centre. Used with bracket, type 89
10A/13811	Rubber (A.15125) ..	2		Soft para. rubber, 1½ in. dia. by 5/32 in. thick, ½ in. dia. hole in centre. Used with bracket, type 89
10A/13812	M.S. (A.15126)	2		1½ in. dia. by 0·048 in. thick, with 0·189 in. dia. hole in centre. Used with bracket, type 89
10A/13813	M.S. (A.15390)	2		0·687 in. dia. by 0·048 in. thick with 0·193 in. dia. hole csk to 0·324 in. dia. at 90 deg. in centre
10A/13184	Bracket, type 90	4		Instrument mounting, fitted to outside of case. 1½ in. by 1¾ in. by 1 in. wide, 90 deg. angle, M.S.
	Clip :—			
10H/13694	Type 81	6		Condenser (10C/2634) Clip, 1 in. i/d, 0·032 in. thick, M.S.
10H/13803	Type 83	1		M.S., ½ in. wide by 0·032 in. thick, 1 fixing hole

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Indicating unit, type 48A (contd.) *Consisting of* (contd.)			
10AB/1252	Bush, type 17	1		Moulded bakelite, $1\frac{15}{16}$ in. dia. by $\frac{33}{64}$ in. depth
	Cover :—			
10AB/1361	Type 139	1		Dust cover
10AB/1362	Type 140	2		3 in. by $2\frac{1}{4}$ in. by 0·036 in. thick, M.S., dished
10AB/1287	Type 128	2		Rubber, cover for $\frac{7}{8}$ in. dia. hole in panel
	Condenser :—			
10C/5461	Type 2962	1	C_1	0·1 μF, ± 25 per cent., 400 volt D.C. working, paper, tubular, waxed, end wires, tropical
	or			
10C/3128	Type 3128	1	C_1	0·1 μF, ± 25 per cent., 350 volt D.C. working, paper, tubular, waxed, end wires
10C/5645	Type 3070 ..	6	C_3, C_4, C_6 to C_9	0·01 μF, ±20 per cent., 2,500 volt D.C. working, aluminium, tubular case, paper, terminal at top, clip mounting
	Holder, valve :—			
10H/1055	Type 125	2		Moulded, 12 side contacts with circumferential tags
10H/491	Type 72	2		British octal, moulded oval flange
	Knob :—			
10AB/1254	Type 148	2		Moulded, black, engraved BRILLIANCE $1\frac{1}{16}$ in. dia. by $1\frac{5}{8}$ in. long for $\frac{1}{4}$ in. spindle
10AB/1255	Type 149 ..	2		As knob, type 148 but engraved FOCUS
10AB/1196	Type 139 ..	5		Moulded preset, $\frac{9}{16}$ in. dia. by $\frac{3}{4}$ in. long, metal insert for $\frac{1}{4}$ in. spindle, complete with two 6 B.A. set screws
10AB/1417	Type 168	1		Moulded, black, for $\frac{1}{4}$ in. spindle, lever type, fixed with one 4 B.A. csk (inst.) head screw
10QB/130	Lock spindle (A.15104) ..	2		M.S. clip complete with pinch bolt. To lock potentiometer spindles
10AB/719	Mask C.R.T., type 6	2		Moulded rubber for V.C.R.138
10AB/1212	Mounting, type 190 ..	6		Insulated potentiometer spindles
	Comprising :—			
10AB/1252	Bush, type 17 ..	1		Moulded bakelite $1\frac{5}{16}$ in. dia. by $\frac{33}{64}$ in. overall depth, 3 brass inserts for fixing pillars
10AB/1253	Pillar, bakelite ..	3		Moulded, 0·828 in. long by 0·391 in. dia. with brass inserts at ends
	Plug :—			
10H/394	Type W.201	1		6-pole (H.T.)
10H/528	Type 229	5		S.P. concentric
10C/5390	Resistance-condenser unit, type 162	1		S.R.B.P. sheet, $3\frac{1}{8}$ in. by $2\frac{3}{4}$ in. by 1 mm. fitted with 20 tags

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Indicating unit, type 48A (contd.) *Consisting of* (contd.) *Resistance-condenser unit, type 162* (contd.)			
	Fitted with :—			
	Resistance :—			
10C/11691	Type 525	1	R_1	100,000 ohms, ± 10 per cent., ½ watt, carbon, insulated
10C/11384	Type 480	1	R_{28}	1 megohm, ± 10 per cent., ¼ watt
10C/548	Type 811	1	R_{13}	270,000 ohms, ± 10 per cent., ¼ watt, carbon, insulated
10C/553	Type 815	2	R_{15}, R_3	2·2 megohms, ± 10 per cent., ¼ watt, carbon, insulated
10C/1078	Type 1078	1	R_5	330 ohms, ± 10 per cent., ¼ watt, carbon, insulated
10C/8247	Type 137	1	R_6	15,000 ohms, ± 10 per cent., ½ watt, carbon
	Condenser :—			
10C/5441	Type 2943	1	C_{10}	0·0004 μF, ± 15 per cent., 350 volt D.C. working, mica, moulded, end wires
	or			
10C/5468	Type 2969	1	C_{10}	0·0004 μF, ± 15 per cent., 350 volt D.C. working, mica, moulded end wires
10C/651	Type 782	1	C_5	0·001 μF, ± 15 per cent., 350 volt D.C. working, mica, moulded, end wires
	or			
10C/5253	Type 2845	1	C_5	0·001 μF, ± 15 per cent., 350 volt D.C. working, mica, moulded end wires
10C/24	Type 580	1	C_2	0·002 μF, ± 15 per cent., 350 volt D.C. working, mica, moulded end wires
	or			
10C/5469	Type 2970	1	C_2	0·002 μF, ± 15 per cent., 350 volt D.C. working, mica, moulded end wires
	Resistance :—			
10C/11691	Type 525	1	R_{27}	100,000 ohms, ± 10 per cent., ½ watt, insulated
10C/548	Type 811	2	R_{14}, R_{20}	270,000 ohms, ± 10 per cent., ¼ watt, insulated
10C/11667	Type 500	1	R_4	1,000 ohms, ± 10 per cent., ¼ watt, insulated
10C/33	Type 550	2	R_9, R_{22}	2,700 ohms, ± 10 per cent., ¼ watt, insulated
10C/7801	Type 7801	2	R_{11}, R_{24}	560,000 ohms, ± 10 per cent., ½ watt
10C/1592	Type 1592	2	R_{25}, R_{26}	150,000 ohms, ± 10 per cent., ½ watt, insulated
10C/546	Type 809	4	R_{16}, R_{17}, R_{18}, R_{19}	47,000 ohms, ± 10 per cent., ¼ watt, insulated
10C/7852	Type 7852	1	R_2	1 megohm, ± 15 per cent., potentiometer, linear moulded case, plain spindle, ¼ in. dia., 0·875 in. long
10C/7854	Type 7854	3	R_{12}, R_{29}, R_{30}	¼ megohm, ± 15 per cent., potentiometer, linear, moulded case, plain spindle, ¼ in. dia., 0·875 in. long

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Indicating unit, type 18A (contd.) *Consisting of* (contd.) *Condenser* (contd.)			
10C/7855	Type 7855	2	R_8, R_{21}	50,000 ohms, ± 15 per cent., potentiometer, linear, moulded case, plain spindle, ¼ in. dia., 0·875 in. long
10C/7856	Type 7856	2	R_{10}, R_{23}	½ megohm, ± 15 per cent., potentiometer, linear moulded case, plain spindle, ¼ in. dia., 0·875 in. long
10C/7780	Type 7780	1	R_7	2,000 ohms, ± 10 per cent., wire wound, potentiometer, plain spindle, ¼ in. dia., 0·875 in. long, metal case
	Scale, time base :—			
10AB/1382	Type 12	1		Perspex, 3·312 in. by 2·562 in. by 1½ mm. slotted on centre line for location. Supplied un-engraved
10AB/1132	Type 13			As scale, time base, type 12, but supplied engraved
10QB/131	Guide (A.16205)	4		Brass or M.S., angle 3·312 in. long by 0·516 in. wide by 0·028 in. thick. For scale, time base, type 12 or 13
10AB/720	Screen, type 27	2		Cathode ray tube mu-metal screen
10F/13176	Switch, type 843	1		1 wafer, 2-pole, changeover ¼ in. dia. spindle drilled and tapped
10K/13139	Transformer, type 778 ..	1		Heater, laminated iron core, input 4 volt 2 amps. Output 4 volt 2 amps. + 4 volt 2 amps. Primary 36 turns of 21 s.w.g. En. cu. wire. Secondaries 1 and 2 : 37 turns of 24 s.w.g. En. cu. wire each
	Valve :—			
10E/11446	Type V.R.65	2	V_1, V_2	6·3 V. heater. British octal
10E/407	Type V.C.R.138.. ..	2	$C.R.T._1$, $C.R.T._2$	Side contact 12
10AB/1251	Visor, type 10	1		Moulded rubber
10AB/1383	Windows, type 21 ..	2		Perspex, clear, 3½ in. sq. by ⅛ in. thick, 4 holes 0·120 in. dia. at corners
	Accessories :—			
10QB/139	Case, transit	1		
	Mounting :—			
10AB/232	Type 77	1		Metal tray, 9 in. by 10⅞ in., with rigid spacers, for panel control
10A/9277	Type 3	2		Load 10 lb. rubber with square flange
10A/11205	Type 10	2		Load 10 lb. rubber with square pedestal holder
10AB/424	Type 107	1		Metal frame with cross bracing
	Fitted with :—			
10A/9334	Mounting, type 4 ..	2		Load 6 lb. rubber, with square pedestal holder
10A/11206	Mounting, type 11 ..	2		Load 4 lb. rubber with square pedestal holder

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Indicating unit, type 48A (contd.) *Consisting of* (contd.) :—			
5C/445	Box, fuse, type A	1		S.P. without fuse
5C/204	Fuse, type A	2		20 amp. cartridge. One as spare in lid
5C/543	Switchbox, general purpose, type B	1		S.P. ON–OFF, moulded, flange mounting
5J/1383	Battery, grid bias, 4·5 volt	1		Socket connections. For receiver
	Block, terminal, type B :—			
5C/430	2-way, No. 1	As reqd.		Moulded, with 2 terminals and cover
5C/432	3-way, No. 1	As reqd.		Moulded with 3 terminals and cover
10H/3092	Spring, plug 229 or 246, standard	As reqd.		To retain right-angle socket, type 187, 213, 214, etc.
10H/13510	Spring, plug 229 or 246, long	As reqd.		To retain socket, type 281 when capped by right-angle socket
	ITEMS PECULIAR TO BEAUFIGHTER AEROPLANES			INSTALLATION SUFFIX P
	Cable :—			
5E/758	H.T. uniplugmet No. 1 .	4 ft. 9 in.		40/·010 rubber insulated metal braided. Modulator to T.3065, 3 ft. 6 in. anode, 15 in. grid
5E/1328	L.T. Dumet 4 ..	2 ft. 6 in.		Twin 23/·0076 V.I.R. taped metal braided. Modulator to T.3065 blower
5E/1349	L.T. Dumet 19	17 ft.		Twin 110/·0076 V.I.R. taped metal braided. 2 ft. modulator to T.3065 (filaments). 15 ft. switchbox to block, terminal 5C/432
5E/	H.F. Duradio No. 11 ..	28 ft		Twin coaxial. Transmitter to box, junction, type 25
10AB/285	Box, junction, type 25 ..	1		Rectangular, metal with ferrule for B.A.4C
	Fitted with :—			
10H/398	Plug, type W.205	1		2-pin H.F. panel mounting. Square flange
5U/1271	Generator, A.C. engine-driven, type R.			Output : 80 volt, 500 watt, A.C. Excitation : 24 volt, D.C.
10AB/310	Impedance matching unit, type 35	2		Aerial matching transformer. Coaxial tubes with brackets
	Fitted with :—			
5E/	13 ft. 2 in. cable, H.F. Uniradio No. 4			Single coaxial. 50 cms. at one end ; 11 ft. 6 in. at other to socket
10H/701	Socket, type 213 ..	1		S.P. coaxial, right angle for P.T.5C

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Items peculiar to Beaufighter aeroplanes (contd.) :—			
10BB/289	Aerial, aircraft, type 19 ..	1		Transmitting array on support tube, with cable
	Consists of :—			
10BB/1435	Rod, aerial, type 83 ..	1		Director on support tube
10BB/1436	Rod, aerial, type 84 ..	1		Folded dipole 23·88 in. overall. Steel tube, $\frac{3}{8}$ in. o/d by 20 s.w.g.
10BB/475	Insulator, type 165/4 ..	1		Moulded body streamlined, 3 in. max. o/d by $5\frac{5}{8}$ in. Used with type 166 series
10BB/483	Insulator, type 166/3 ..	1		Moulded nose cap, streamlined, 3 in. max. o/d by $2\frac{1}{8}$ in. Used with type 165 series
10BB/1437	Nut, round ..	2		Mild steel, $\frac{3}{8}$ in. dia. by $\frac{1}{2}$ in. long, tapped 4 B.A.
28C/2791	Screw, 4 B.A. by 1 in. long	2		Mild steel, cheese head, cadmium plated, A.G.S.247/26
28C/6201	Screw, 4 B.A. by $1\frac{1}{4}$ in. long	3		Steel, cheese head, cadmium plated, A.G.S.247/27
10AB/939	Cover, type 95	2		
28C/	Screw, 4 B.A. by $\frac{9}{16}$ in. long	2		Mild steel, cheese head cadmium plated, A.G.S.247/23 modified
10BB/1438	Screw, special	2		Mild steel, $\frac{1}{4}$ in. dia. by $1\frac{1}{32}$ in. long, screwed 4 B.A. by $\frac{9}{32}$ in. long, saw-cut $\frac{1}{32}$ in. wide by $\frac{1}{16}$ in. deep. Cadmium plated
10BB/1439	Screw, special	2		Mild steel, $\frac{1}{4}$ in. dia. by $\frac{29}{32}$ in. long, screwed 4 B.A. by $\frac{9}{32}$ in. long, saw-cut $\frac{1}{32}$ in. wide by $\frac{1}{16}$ in. deep, cadmium plated
10BB/1440	Spacer, type 38	2		Wood, beech, $\frac{1}{2}$ in. thick by 0·997 o/d by $\frac{11}{16}$ in. i/d $\frac{3}{8}$ in. radius on inside surface
10BB/1441	Spacer, type 39	2		Bakelite, black, $\frac{11}{16}$ in. by $\frac{15}{16}$ in. by $\frac{3}{8}$ in. thick, $\frac{3}{16}$ in. rod on $1\frac{1}{16}$ in. centre with line of $\frac{3}{4}$ in. dimension slot $\frac{9}{32}$ in. wide on centre
10BB/1442	Support, aerial, type 12 ..	1		
10BB/1443	Washer, rubber	2		
10BB/1444	Washer, rubber	1		
5E/	Cable, electric, Duradio No. 11	5 ft. 3 in.		
10AB/721	Berry Wiggins compound, No. 998	As reqd.		Plastic for filling insulators. Packed in 7 lb. tins
10AB/1124	Berry Wiggins compound, No. 667A	As reqd.		Plastic for sealing outer joints. Packed in 7 lb. tins
10BB/291	Aerial, aircraft, type 21 ..	1		Receiving array, azimuth, port, wing mounting with cable
	Consisting of :—			
10AB/1221	Clamp, type 58	1		Brass, $\frac{1}{4}$ in. thick by 1·02 in. dia. semi-circular, with 2—6 B.A. tapped holes, 1—4 B.A. tapped and countersunk hole and $\frac{5}{32}$ in. radius. For use with clamps, type 59
10AB/1222	Clamp, type 59	1		Brass, $\frac{1}{4}$ in. thick by $\frac{7}{8}$ in. by $\frac{3}{16}$ in. with two holes 0·120 in. dia. and $\frac{5}{32}$ in. radius
10BB/473	Insulator, type 165/2 ..	1		Moulded body streamlined 3 in. max. o/d by $5\frac{5}{8}$ in. Used with type 166 series

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Aerial, aircraft, type 19 (contd.) *Consisting of* (contd.) :—			
10BB/361	Insulator, type 166/1 ..	1		Moulded nose cap, streamlined, 3 in. max. o/d by $2\frac{1}{8}$ in. Used with type 165 series
10BB/1445	Rod, aerial, type 85 ..	2		Steel, streamlined section, $14\frac{3}{4}$ in. long
28C/2773	Screw, 4 B.A. by $\frac{5}{8}$ in. long	2		Mild steel, cheese head, cadmium plated, A.G.S.247/23
28C/	Screw, 4 B.A. by $\frac{9}{16}$ in. long	2		Mild steel, cheese head, cadmium plated, A.G.S.247/23 modified.
28C/	Screw, 4 B.A. by $\frac{3}{8}$ in. long	1		Steel head, 0·248 in.–0·242 in. dia. by 0·199 in. with slot 0·032 in. wide by 0·53 in. deep and 0·089 in. dia. hole drilled diametrically $\frac{5}{64}$ in. from underside of head
28C/6201	Screw, 4 B.A. by $1\frac{1}{4}$ in. long	3		Steel, cheese head, cadmium plated. A.G.S.247/27
28C/2864	Screw, 6 B.A. by $\frac{1}{2}$ in. long	2		Steel, round hole, cadmium plated. A.G.S.245/31
10BB/1446	Spacer, type 40	1		Ebonite or tufnol, $\frac{1}{4}$ in. thick by 1·124 in. o/d by $\frac{7}{16}$ in. i/d
10BB/1447	Spacer, type 41	2		Ebonite or tufnol, $\frac{1}{4}$ in. thick by 1·028 in. o/d by $\frac{7}{16}$ in. i/d
10BB/1448	Support, aerial, type 13 .	1		
10BB/1449	Washer, rubber	1		$\frac{1}{16}$ in. thick by $2\frac{7}{8}$ in. o/d by $2\frac{9}{16}$ in. i/d
5E/	Cable, H.F. Uniradio No. 4	11 ft. $1\frac{1}{2}$ in.		
10H/701	Socket, type 213	1		S.P. coaxial, right-angle cable entry
10AB/721	Berry Wiggins compound No. 998	As reqd.		Plastic, for filling insulators. Packed in 7 lb. tins
10AB/1124	Berry Wiggins compound No. 667A	As reqd.		Plastic, for sealing outer joints. Packed in 7 lb. tins
10BB/292	Aerial, aircraft, type 22 ..	1		Receiving array, azimuth starboard, wing mounting, with cable
	Consisting of :—			
10AB/1221	Clamp, type 58 ..	1		Brass, $\frac{1}{4}$ in. thick by 1·02 in. dia. semi-circular, with 2—6 B.A. tapped holes, 1—4 B.A. tapped and countersunk hole and $\frac{5}{32}$ in. radius. For use with clamps, type 59
10AB/1222	Clamp, type 59	1		Brass, $\frac{1}{4}$ in. thick by $\frac{7}{8}$ in. by $\frac{3}{16}$ in. with 2 holes 0·120 in. dia. and $\frac{5}{32}$ in. radius
10BB/473	Insulator, type 165/2 ..	1		Moulded body, streamlined, 3-in. max. o/d by $5\frac{5}{8}$ in. Used with type 166 series
10BB/361	Insulator, type 166/1 .	1		Moulded nose cap, streamlined, 3-in. max. o/d by $2\frac{1}{8}$ in. Used with type 165 series
10BB/1445	Rod, aerial, type 85 ..	2		Length $14\frac{3}{4}$ in. overall, steel, streamlined section
28C/2773	Screw, 4 B.A. by $\frac{5}{8}$ in. long	2		Mild steel, cheese head, cadmium plated. A.G.S.247/23
28C/	Screw, 4 B.A. by $\frac{9}{16}$ in. long	2		Mild steel, cheese head, cadmium plated. A.G.S.247/23 modified

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Aerial, aircraft, type 21 (contd.) *Consisting of* (contd.) :—			
28C/	Screw, 4 B.A. by $\frac{3}{8}$ in. long	1		Steel, head 0·248–0·242 in. dia. by 0·199 in., with slot 0·032 in. wide by 0·053 in. deep and 0·089 in. dia. hole drilled diametrically $\frac{5}{64}$ in. from underside of head
28C/6201	Screw, 4 B.A. by $1\frac{1}{4}$ in. long	3		Steel, cheese head, cadmium plated, A.G.S.247/27.
28C/	Screw, 4 B.A. by $\frac{3}{8}$ in. long	2		Steel, hexagon head
28C/2864	Screw, 6 B.A. by $\frac{1}{2}$ in. long	2		Steel, round head, cadmium plated. A.G.S.245/31
10BB/1446	Spacer, type 40			Ebonite or tufnol, $\frac{1}{4}$ in. thick by 1·124 in. o/d by $\frac{7}{16}$ in. I/d
10BB/1447	Spacer, type 41	2		Ebonite or tufnol, $\frac{1}{4}$ in. thick by 1·028 in. o/d by $\frac{7}{16}$ in. i/d
10BB/1450	Support, aerial, type 14 ..	1		
10BB/1449	Washer, rubber	1		$\frac{1}{16}$ in. thick by $2\frac{7}{8}$ in. o/d by $2\frac{9}{16}$ in. i/d
10BB/1430	Washer, locking	2		Phosphor-bronze, $\frac{7}{16}$ in. square by 0·015 in. thick, 0·147 in. dia. hole drilled centrally
5E/	Cable, electric, Uniradio No. 4	11 ft. $1\frac{1}{2}$ in.		
10H/701	Socket, type 213	1		S.P. coaxial, right-angle cable entry.
10AB/721	Berry Wiggins compound No. 998	As reqd.		Plastic, for filling insulators. Packed in 7 lb. tins
10AB/1124	Berry Wiggins compound No. 667A	As reqd.		Plastic, for sealing outer joints. Packed in 7 lb. tins
10BB/290	Aerial system, type 25 ..	1		Receiving array, elevation
	Consisting of :—			
10BB/347	Aerial, aircraft, type 62 .. *Fitted with* :—	2		Wing mounting
10BB/342	Rod, aerial, type 20 ..	1		Length 12·78 in. at angle to mounting flange, streamlined section.
10BB/512	Insulator, type 269/2 ..	1		Moulded body, streamlined, to fit on skin of aeroplane. 3 in. max. width by $5\frac{1}{4}$ in. at base
10BB/517	Insulator, type 270/1 ..	1		Moulded nose cap, streamlined, to fit on skin of aeroplane 3 in. max. width by $5\frac{1}{4}$ in. at base
28C/2773	Screw, 4 B.A. by $\frac{5}{8}$ in. long	1		Steel, cheese head, A.G.S.247/23
28C/	Screw, 4 B.A. by $\frac{3}{8}$ in. long	1		Steel, cheese head
10BB/1430	Washer, locking.. ..	1		Phosphor-bronze, $\frac{7}{16}$ in. square by 0·015 in. thick, 0·147 in. dia. hole drilled centrally
10BB/1431	Washer, rubber	1		$\frac{1}{16}$ in. thick, semi-circular. $1\frac{9}{32}$ in. inside radius by $1\frac{7}{16}$ in. outside radius
10BB/343	Rod, aerial, type 21	2		Length, 15·56 in. at angle to mounting flange, streamlined section
10BB/1432	Washer, rubber .. .			Streamlined base, $\frac{3}{32}$ in. thick, for use with insulators, type 269 and 270 series
28C/	Bolt, $\frac{1}{4}$ B.S.F. by $\frac{1}{2}$ in. long			Mild steel, hexagon head, cadmium plated

	Nomenclature	Quantity	Ref. in fig.	Remarks
	Aerial system, type 25 (contd.) *Consisting of* (contd.) :—			
28C/3099	Washer, spring, single ..	8		Steel, 0·27 in. int. dia. by 16 s.w.g. A.G.S.162D
28C/6201	Screw, 4 B.A. by 1¼ in. long	4		Steel, cheese head, cadmium plated
10AB/721	Berry Wiggins compound No. 998	As reqd.		Plastic for filling insulators. Packed in 7 lb. tins
10AB/1124	Berry Wiggins compound, No. 667A	As reqd.		Plastic for sealing outer joints. Packed in 7 lb. tins
10H/628	Plug, type 246	4		S.P. coaxial double-ended panel mounting. Used at wing break
10H/420	Socket, type W.166	1		2-pole H.F., right-angle, for Duradio No. 11. Fits plug, type W.205, on box, junction, type 25
10A/12477	Mounting, type 61	4		Load, 4 lb., rubber, with square flange. For indicating unit
10AB/265	Mounting, type 79	1		Metal tray, 9 in. by 12 3/16 in. For modulator
	Fitted with :—			
10A/11205	Mounting, type 10 ..	4		Load, 10 lb., rubber, with square pedestal holder
10A/12349	Mounting, type 46 ..	1		Metal strip, ½ in. by ⅛ in. by 7⅝ in. with upturned ends. For transmitter
	Fitted with :—			
10A/11206	Mounting, type 11	2		Load, 4 lb., rubber, with square pedestal holder
10A/12350	Mounting, type 47	1		Metal strip, ½ in. by ⅛ in. by ⅞ in., with upturned ends. For transmitter
	Fitted with :—			
10A/9334	Mounting, type 4	2		Load, 6 lb., rubber, with square pedestal holder
	The last two items, together, form a direct replacement for the next item used on earlier installations			
10AH/424	Mounting, type 107 ..	1		Metal frame, with cross bracing. *Fitted with* :— 2 mountings, type 4, 10A/9334 2 mountings, type 11, 10A/11206
10H/13251	Connector set, type ARI/5003 and 5010P	1 if required		
	Comprising :—			
	Connector :—			
10H/944	Type 384/1	1		Sextomet 4, 31 ft. 0 in., fitted with 1 socket, W.154, 10H/408
10H/945	Type 385/1	1		4-way cable form, No. 2, ¼ in. conduit, 2 ft. 3 in., fitted with 1 socket, W.150, 10H/404
10H/947	Type 387/1	1		4-way cable form, No. 2, ¼ in. conduit, 4 ft. 5 in., fitted with 2 sockets, W.150, 10H/404
10H/948	Type 388/1	1		6-way cable form, No. 7, ⅜ in. conduit, 6 ft. 0 in., fitted with 2 sockets, W.160, 10H/414
10H/950	Type 390/1	1		Uniradio No. 6, 8 ft. 0 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774. Coded orange

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Connector set type ARI/5003 and 5010/P (contd.) *Comprising* (contd.) *Connector* (contd.)			
10H/951	Type 391/1	1		Uniradio No. 6, 3 ft. 6 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded orange
10H/955	Type 395/1	1		Dumet 19, 10 ft. 0 in., fitted with 1 socket, W.165, 10H/419
10H/1451	Type 484/3 ..	1		Uniradio No. 6, 4 ft. 9 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded violet
10H/949	Type 904/1	1		Uniradio No. 6, 6 ft. 0 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded red
10H/13345	Type 905/1	1		Uniradio No. 6, 6 ft. 0 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded green
10H/13353	Type 906/1	1		Uniradio No. 6, 6 ft. 0 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded white
10H/13361	Type 907/1	1		Uniradio No. 6, 6 ft. 0 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded yellow
10H/958	Type 910/1 ..	1		Uniradio No. 4, 31 ft. 0 in., fitted with 2 sockets, type 213, 10H/701, 2 grips, cable, 10H/1774, coded red
10H/13377	Type 911/1	1		Uniradio No. 4, 31 ft. 0 in., fitted with 2 sockets, type 213, 10H/701, 2 grips, cable 10H/1774, coded green
10H/13384	Type 912/1	1		Uniradio No. 4, 31 ft. 0 in., fitted with 2 sockets, type 213, 10H/701, 2 grips, cable, 10H/1774, coded white
10H/13387	Type 913/1	1		Uniradio No. 4, 31 ft. 0 in., fitted with 2 sockets, type 213, 10H/701, 2 grips, cable, 10H/1774, coded yellow
10H/1882	Connector set, type ARI/5003/P	1 if required		10H/13251, type ARI/5003 and 5010/P, less :—1 connector, type 484/3, 10H/1451

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	ITEMS PECULIAR TO HAVOC I AND II			INSTALLATION SUFFIX Q
	Cable :—			
5E/758	H.T., uniplugmet No. 1 ..	4 ft. 9 in.		40/·010, rubber insulated, metal braided. Modulator to T.3065, 3 ft. anode ; 21 in. grip
5E/1328	L.T., Dumet 4 ..	3 ft.		Twin 23/·0076 V.I.R., taped metal braided. Modulator to T.3065 blower
5E/1349	L.T., Dumet 19 ..	20 in.		Twin 110/·0076 V.I.R., taped, metal braided. Modulator to T.3065 filaments
10AB/417	Impedance matching unit, type 73	2		Coaxial tubes with brackets and integral plug to fit socket, type 43
	Fitted with :—			
5E/	Cable, H.F., Uniradio No. 4..	19·7 in. (50 cm.)		Single, coaxial
10BB/330	Aerial, aircraft, type 41 ..	1		Transmitting array on support tube with cable. Used on aeroplanes with normal nose.
	Consisting of :—			
10BB/1435	Rod, aerial, type 83 ..	1		Director on support tube
10BB/1436	Rod, aerial, type 84 ..	1		Folded dipole, 23·88 in. overall, steel tube $\frac{3}{8}$ in. o/d by 20 s.w.g.
10BB/475	Insulator, type 165/4 ..	1		Moulded body, streamlined, 3 in. max. o/d by $5\frac{5}{8}$ in. Used with type166 series
10BB/483	Insulator, type 166/3 ..	1		Moulded nose cap, streamlined, 3 in. max. o/d by $2\frac{1}{8}$ in. Used with type 165 series
	Cover, type 95	2		
10BB/1437	Nut, round	2		Mild steel, $\frac{3}{8}$ in. by $\frac{1}{2}$ in. long, tapped 4 B.A.
28C/2791	Screw, 4 B.A. by 1 in. long	2		Mild steel, cheese head, cadmium plated. A.G.S.247/26
28C/6201	Screw, 4 B.A. by $1\frac{1}{4}$ in. long	3		Steel, cheese head, cadmium plated. A.G.S.247/27
28C/	Screw, 4 B.A. by $\frac{9}{16}$ in. long	2		Mild steel, cheese head, cadmium plated. A.G.S.247/23 modified.
10BB/1438	Screw, special	2		Mild steel, $\frac{1}{4}$ in. dia by $1\frac{1}{32}$ in. long, screwed 4 B.A. by $\frac{9}{32}$ in. long, saw-cut $\frac{1}{32}$ in. wide by $\frac{1}{16}$ in. deep, cadmium plated
10BB/1439	Screw, special	2		Mild steel, $\frac{1}{4}$ in. dia. by $\frac{29}{32}$ in. long, screwed 4 B.A. by $\frac{9}{32}$ in. long, saw-cut $\frac{1}{32}$ in. wide by $\frac{1}{16}$ in. deep, cadmium plated.
10BB/1440	Spacer, type 38	2		Wood, beech, $\frac{1}{2}$ in. thick by 0·997 in. o/d by $\frac{11}{16}$ in. i/d. $\frac{3}{8}$ in. radius on inside surface.
10BB/1441	Spacer, type 39 ..	2		Bakelite, black, $\frac{11}{16}$ in. by $\frac{15}{16}$ in. by $\frac{3}{8}$ in. thick, $\frac{3}{16}$ in. radius on $1\frac{1}{16}$ in. centres, with slot $\frac{9}{32}$ in. wide on centre line of $\frac{3}{4}$ in. dimension.

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Aerial, aircraft, type 41 (contd.) *Consisting of* (contd.) :—			
10BB/1451	Support, aerial, type 15 ..	1		
10BB/1443	Washer, rubber	2		0·06 in. thick, semi-circular, $1\frac{7}{16}$ in. radius by $1\frac{9}{32}$ in. radius.
10BB/1444	Washer, rubber	1		$\frac{1}{8}$ in. thick by $1\frac{5}{8}$ in. o/d by $1\frac{1}{8}$ in. i/d
5E/	Cable, electric, Duradio No. 11	35 ft.		
10AB/721	Berry Wiggins compound, No. 998	As reqd.		Plastic for filling insulators. Packed in 7 lb. tins
10AB/1124	Berry Wiggins compound, No. 667A	As reqd.		Plastic for sealing outer joints. Packed in 7 lb. tins
	or			
10BB/1428	Aerial, aircraft, type 128 ..	1		Transmitting array on support tube with cable, type 41. 10BB modified. Used on aeroplanes with 12-gun nose *Note.*—If type 128 is not available when required, type 41 should be supplied unassembled, for modifications to be made before assembly
	Consisting of :—			
10BB/1435	Rod, aerial, type 83 ..	1		Director on support tube
10BB/1436	Rod, aerial, type 84 ..	1		Folded dipole, 23·88 in. overall, brass tube, $\frac{3}{8}$ in. o/d by 20 s.w.g.
10BB/475	Insulator, type 165/4 ..	1		Moulded body, streamlined, 3 in. max. o/d by $5\frac{5}{8}$ in. Used with type 166 series
10BB/483	Insulator, type 166/3 ..	1		Moulded nose cap, streamlined, 3 in. max. o/d by $2\frac{1}{8}$ in. Used with type 165 series
10BB/1437	Nut, round	2		Mild steel, $\frac{3}{8}$ in. dia. by $\frac{1}{2}$ in. long, tapped 4 B.A.
28C/2791	Screw, 4 B.A. by 1 in. long	2		Mild steel, cheese head, cadmium plated. A.G.S.247/26
10AB/939	Cover, type 95 ..	2		
28C/6201	Screw, 4 B.A. by $1\frac{1}{4}$ in. long	3		Steel, cheese head, cadmium plated. A.G.S.247/27
28C/2773	Screw, 4 B.A. by $\frac{5}{8}$ in. long	2		Mild steel, cheese head, cadmium plated. A.G.S. 247/23
10BB/1438	Screw, special	2		Mild steel, $\frac{1}{4}$ in. dia. by $1\frac{1}{32}$ in. long, screwed 4 B.A. by $\frac{9}{32}$ in. long, saw-cut $\frac{1}{32}$ in. wide by $\frac{1}{16}$ in. deep. Cadmium plated
10BB/1439	Screw, special	2		Mild steel, $\frac{1}{4}$ in. dia. by $\frac{29}{32}$ in. long, screwed 4 B.A. by $\frac{9}{32}$ in. long, saw-cut $\frac{1}{32}$ in. wide by $\frac{1}{16}$ in. deep. Cadmium plated
10BB/1440	Spacer, type 38	2		Wood, beech, $\frac{1}{2}$ in. thick by 0·997 in. o/d by $\frac{11}{16}$ in. i/d $\frac{3}{8}$ in. radius on inside surface
10BB/1441	Support, type 39	2		Bakelite, black $\frac{11}{16}$ in. by $\frac{15}{16}$ in. by $\frac{3}{8}$ in. thick, $\frac{3}{16}$ in. radius on $1\frac{1}{16}$ in. centres with slot $\frac{9}{32}$ in. wide on centre line of $\frac{3}{4}$ in. dimension

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Aerial, aircraft, type 128 (contd.) *Consisting of* (contd.) :—			
10BB/1462	Support, aerial, type 20, ..	1		
10BB/1449	Washer, rubber	1		$\frac{1}{16}$ in. thick by $2\frac{7}{8}$ in. o/d by $2\frac{9}{16}$ in. i/d.
10BB/1444	Washer, rubber	1		$\frac{1}{8}$ in. thick by $1\frac{5}{8}$ in. o/d by $\frac{1}{8}$ in. i/d.
5E/	Cable, electric, Duradio No. 11.	35 ft.		
10AB/721	Berry Wiggins compound No. 998	As reqd.		Plastic for filling insulators. Packed in 7-lb. tins
10AB/1124	Berry Wiggins compound No. 667A	As reqd.		Plastic for filling insulators. Packed in 7-lb. tins
10BB/341	Aerial system, type 26 ..	1		Receiving array, elevation
	Consisting of :—			
10BB/347	Aerial, aircraft, type 62 ..			Wing mounting
	Fitted with :—			
10BB/342	Rod aerial, type 20 ..	1		Length 12·78 in. at angle to mounting flange, streamlined section
10BB/512	Insulator, type 269/2 ..	1		Moulded body, streamlined, to fit on skin of aircraft 3 in. max. width by $5\frac{1}{4}$ in. at base
10BB/517	Insulator, type 270/1 .	1		Moulded nose cap, streamlined to fit on skin of aircraft. 3 in. max. width by 2 in. at base. Used with type 269 series
28C/2773	Screw, 4 B.A. by $\frac{5}{8}$ in. long	1		Steel, cheese head, A.G.S. 247/23.
28C/	Screw, 4 BA.. by $\frac{3}{8}$ in. long	1		Steel, hexagon head
10BB/1430	Washer, locking.. ..	1		Phosphor bronze, $\frac{7}{16}$ in. square by 0·15 in. thick ; 0·147 in. dia. hole drilled centrally
10BB/1431	Washer, rubber ..			$\frac{1}{16}$ in. thick, semi-circular. $1\frac{9}{32}$ in. inside radius by $1\frac{7}{16}$ in. outside radius
10BB/348	Aerial, aircraft, type 63			Wing mounting
	Fitted with :—			
10BB/344	Rod, aerial, type 22 ..	1		Length 12·78 in. at angle to mounting flange, streamlined section
10BB/512	Insulator, type 269/2 ..	1		Moulded body, streamlined to fit on skin of aircraft, 3 in. max. width by 2 in. at base. Used with type 269 series
28C/2773	Screw, 4 B.A. by $\frac{5}{8}$ in. long	1		Steel, cheese head, A.G.S.247/23
28C/	Screw, 4 B.A. by $\frac{3}{8}$ in long	1		Steel, hexagon head
10BB/1430	Washer, locking.. ..	1		Phosphor bronze, $\frac{7}{16}$ in. square by 0·015 in. thick by 0·147 in. dia. hole drilled centrally
10BB/1431	Washer, rubber ..	1		$\frac{1}{16}$ in, thick, semi-circular, $1\frac{9}{32}$ in. inside radius by $1\frac{7}{16}$ in. outside radius
10BB/345	Rod, aerial, type 23 ..	1		Length 13·4 in. at angle to mounting flange, streamlined section
10BB/346	Rod, aerial, type 24 ..	1		Length 13·4 in. at angle to mounting flange, streamlined section
10BB/1432	Washer, rubber	1		Streamlined base $\frac{3}{32}$ in. thick, for use with insulators, type 269 and 270 series

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Aerial system, type 26 (contd.) *Consisting of* (contd.) *Aerial, aircraft, type 63* (contd.) *Fitted with* (contd.) :—			
28C/	Bolt, ¼ in. B.S.F. by ½ in. long.	8		Mild steel, hexagon head, cadmium plated
28C/3099	Washer, spring, single ..	8		Steel, 0·27 in. dia. by 16 s.w.g. A.G.S.162/D
28C/6201	Screw, 4 B.A. by 1¼ in. long	4		Steel, cheese head, cadmium plated. A.G.S.247/27
10AB/721	Berry Wiggins compound No. 998.	As reqd.		Plastic for filling insulators. Packed in 7-lb. tins
10AB/1124	Berry Wiggins compound No. 667/A.	As reqd.		Plastic for sealing outer joints. Packed in 7-lb. tins
10BB/736	Aerial system, type 44 ..	2		Receiving array, azimuth, complete with cable. Used port and starboard
	Consisting of :—			
10BB/370	Aerial, aircraft, type 43 ..	1		Dipole on streamlined insulator with support tube and mounting plate
10BB/1433	Director, aerial, type 1 ..	1		Tubular section, streamlined T-shape with mounting and gusset plates. Bright cadmium plated
10BB/1434	Washer	1		Mild steel, 2½ in. o/d by 1⅛ in. i/d by 3/64 in. thick with 8 holes 7/32 in. dia., equally spaced on 2 in. P.C.D. Bright cadmium plated
28C/2820	Screw, 2 B.A. by ⅝ in. long	8		Steel, csk. head, cadmium plated
28C/	Nut, 2 B.A.	8		
28C/	Washer, 2 B.A.	8		
	Aerial, aircraft, type 43 Consisting of :—			
10BB/1463	Feeder, aerial, type 61 *Fitted with* :—	1		
5E/	30 ft. 2 in. cable H.F. uniradio No. 4.			
10AB/1223	Clamp, type 60	1		Brass, ¼ in. thick by 0·99 in. dia. semi-circular with 2—6 B.A. tapped holes, 1—4 B.A. tapped and csk. hole and 5/32 in. radius
10AB/1224	Clamp, type 61	1		Brass, ¼ in. thick by 13/16 in. by 3/16 in. with 2 holes, 0·120 in. dia. and 5/32 in. radius
28C/2864	Screw, 6 B.A., by ½ in. long.	1		Steel, round head, cadmium-plated. A.G.S.245/31
28C/2121	Screw, 4 B.A. by ⅜ in. long.	1		Brass, csk. head, dull nickel plated
10H/701	Socket, type 213 ..	1		S.P. coaxial, right-angle entry
10BB/1452	Spacer, type 42 ..	2		Ebonite or tufnol, ¼ in. thick by 5/16 in. o/d by 27/64 in. i/d
10BB/1440	Spacer, type 38 ..	1		Wood, beech, ½ in. thick by 0·997 in. o/d by 11/16 in. i/d, ⅜ in. radius on inside surface
10BB/502	Insulator, type 268/2 ..	1		Moulded body, streamlined, 3 in. max. o/d by 6⅞ in. Used with type 166 series
10BB/484	Insulator, type 166/4 ..	1		Moulded, nose cap, streamlined, 3 in. max. o/d by 2⅛ in. Used with type 268 series.

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Aerial system, type 44 (contd.) *Consisting of* (contd.) *Aerial, aircraft, type 43* (contd.) *Consisting of* (contd.) :—			
10BB/1437	Nut, round	2		Mild steel, $\frac{3}{8}$ in. dia. by $\frac{1}{2}$ in. long tapped 4 B.A.
28/5913	Nut, Simmonds 2 B.A.			Thin hexagon
10BB/1453	Rod, aerial, type 86 ..	1		Folded dipole. Brass tube $\frac{3}{8}$ in. o/d by 20 s.w.g. 27·95 in. overall
28C/2790	Screw, 2 B.A. by 1 in. long.	1		Mild steel, cheese head, cadmium plated
28C/2785	Screw, 4 B.A. by $\frac{7}{8}$ in. long.	2		Mild steel, cheese head, cadmium plated
28C/6201	Screw, 4 B.A. by $1\frac{1}{4}$ in. long.	3		Steel, cheese head, cadmium plated
28C/2791	Screw, 4 B.A. by 1 in. long.	2		Mild steel, cheese head, cadmium plated
10BB/1454	Spacer, type 43 ..	2		Black bakelite, $\frac{3}{4}$ in. by $1\frac{1}{16}$ in. by 0·375 in. grooved $\frac{9}{16}$ in. rod on $1\frac{3}{16}$ in. centres
10BB/1455	Stud, taper			Mild steel, $2\frac{3}{4}$ in. overall. $\frac{1}{2}$ in. straight 0·311–0·310 in. dia. tapering to 0·185 in. in $1\frac{3}{8}$ in. Screwed 2 B.A. by $\frac{1}{2}$ in. long. Saw slot $\frac{3}{64}$ in. wide by $\frac{1}{16}$ in. deep, cadmium plated
10BB/1456	Support, aerial, type 16	1		0·06 in. thick, semi-circular, $1\frac{7}{16}$ in. radius by $1\frac{9}{32}$ in. radius
10BB/1443	Washer, rubber ..	1		Steel, 0·19 in. i/d by 0·50 in. o/d by 0·5 in. thick, cadmium plated. A.G.S.160/C
28C/3071	Washer	1		Steel, 0·19 in. i/d by 0·50 in. o/d by 0·5 in. thick, cadmium plated
28C/	Washer, 2 B.A. ..	1		Mild steel, $\frac{3}{16}$ in. i/d by $\frac{7}{16}$ in. o/d by $\frac{1}{16}$ in. thick, cadmium plated
10AB/715	Berry Wiggins compound No. 998	As reqd.		Plastic, for filling insulators. Packed in 7-lb. tins
10AB/735	Berry Wiggins compound No. 667A	As reqd.		Plastic, for sealing outer joints. Packed in 7-lb. tins
10BB/1487	Fairing, support tube ..	1		To streamline supports, aerial, type 16
10H/13252	Connector set, type ARI/5003 and 5010/Q Comprising :— Connector :—	1 if reqd.		
10H/1074	Type 384/2	1		Sextomet 4, 20 ft. 0 in., fitted with 1 socket W.154, 10H/408
10H/1075	Type 385/2	1		4-way cable-form No. 2. $\frac{1}{4}$ in. conduit, 2 ft. 7 in., fitted with 1 socket. W.150. 10H/404
10H/1077	Type 387/2	1		4-way cable-form No. 2. $\frac{1}{4}$ in. conduit, 7 ft. 0 in., fitted with 2 sockets W.150. 10H/404
10H/1078	Type 388/2	1		6-way cable-form No. 7. $\frac{3}{8}$ in. conduit, 4 ft. 10 in., fitted with 2 sockets W.160, 10H/414

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Connector set, type ARI/5003 and 5010/Q (contd.) *Comprising* (contd.) *Connector* (contd.) :—			
10H/1080	Type 390/2	1		Uniradio No. 6. 3 ft. 6 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774. Coded Orange
10H/1081	Type 391/2	1		Uniradio No. 6. 7 ft. 6 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774. Coded Orange
10H/1085	Type 395/2	1		Dumet 19, 25 ft. 6 in., fitted with 1 socket, W.165. 10H/419
10H/13857	Type 484/11	1		Uniradio No. 6. 7 ft. 6 in. fitted with 2 sockets, type 187. 10H/529, 2 grips, cable, 10H/1774. Coded Violet
10H/1079	Type 904/2	1		Uniradio No. 6. 5ft. 4 in., fitted with 2 sockets, type 187 10H/529, 2 grips, cable 10H/1774. Coded Red
10H/13346	Type 905/2	1		Uniradio No. 6. 5 ft. 4 in., fitted with 2 sockets, type 187, 10H/529. 2 grips, cable, 10H/1774. Coded Green
10H/13354	Type 906/2	1		Uniradio No. 6. 5 ft. 4 in. fitted with 2 sockets, type 187, 10H/529, 2 grips, cable 10H/1774. Coded White
10H/13362	Type 907/2	1		Uniradio No. 6. 5 ft. 4 in., fitted with 2 sockets, type 187, 10H/529. 2 grips, cable 10H/1774. Coded Yellow
10H/1073	Type 912/4	1		Uniradio No. 4. 30 ft. 6 in., fitted with 2 sockets, type 213. 10H/701, 2 grips, cable, 10H/1774. Coded White
10H/13390	Type 913/4	1		Uniradio No. 4. 30 ft. 6 in., fitted with 2 sockets, type 213, 10H/701. 2 grips, cable, 10H/1774. Coded Yellow
10H/1883	Connector set, type ARI/ 5003/Q.	1 if reqd.		10H/13252, type ARI/5003 and 5010/Q, less :—1 connector, type 484/11, 10H/13857
	ITEMS PECULIAR TO BLENHEIM I AEROPLANES			INSTALLATION SUFFIX AY
10BB/398	Aerial, aircraft, type 78 ..	1		Transmitting array on support tube, with cable
10BB/399	Aerial, aircraft, type 79 ..	1		Receiving array, azimuth, port, wing mounting with cable. Similar to type 21, 10BB/291
10BB/402	Aerial, aircraft, type 80	1		Receiving array, azimuth, starboard, wing mounting, with cable. Similar to type 22, 10BB/292
10BB/403	Aerial system, type 63 ..	1		Receiving array, elevation
5E/758	Cable, H.T., uniplugmet No. 1 ..	5 ft. 0 in.		Modulator to T.3065A. 1 ft. 8 in. anode ; 3 ft. 4 in. grid
5E/1328	Cable, L.T., Dumet 4	2 ft. 8 in.		Modulator to T.3065A. (Blower)

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
5E/1348	Cable, L.T., Dumet 7 ..	15 ft. 0 in.		Twin 40/·0076, V.I.R. Taped, metal braided. Pilot's switch wiring
5E/1349	Cable, L.T., Dumet 19 ..	4 ft. 0 in.		Twin 110/·0076, V.I.R. Taped, metal braided. Modulator to T.3065A. (Filaments)
5U/1270	Generator, A.C., engine-driven, type R	1		Output :—80 volts, A.C., 500 watts. Excitation :—12 volts, D.C.
10AB/577	Impedance matching unit, type 92	2		Coaxial tubes with brackets. Type 35, 10AB/310, less cable and socket
10A/11206	Mounting, type 11	4		Load, 4 lb., rubber, with square pedestal holder. For indicating unit.
10AB/265	Mounting, type 79	1		
10A/12349	Mounting, type 46	1		
10A/12350	Mounting, type 47	1		
10H/1837	Connector set, type AR1/5003/AY Comprising :—			
10H/1838	Connector, type 384/3 ..	1		Sextomet 4, length 25 ft. 0 in. *Fitted with :—* 1 socket, W.154, 10H/408
10H/1839	Connector, type 385/3 ..			4-way cable form No. 2. ¼ in. conduit, 3 ft. 0 in., fitted with 1 socket, W.150, 10H/404
10H/1840	Connector, type 387/3 .	1		4-way cable form No. 2. ¼ in. conduit, 3 ft. 0 in., fitted with 2 sockets, W.150, 10H/404
10H/1848	Connector, type 388/4 ..			6-way cable form No. 7. ⅜ in. conduit, 4 ft. 2 in., fitted with 2 sockets, W.160, 10H/414
10H/1850	Connector, type 390/3 ..	1		Uniradio No. 6, 4 ft. 4 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774. Coded Orange
10H/1851	Connector, type 391/3 ..	1		Uniradio No. 6, 3 ft. 8 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774. Coded Orange
10H/1852	Connector, type 395/3 ..	1		Dumet 19, 11 ft. 0 in., fitted with 1 socket, W.165, 10H/419
10H/1849	Connector, type 904/4 ..	1		Uniradio No. 6, 2 ft. 3 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774. Coded Red Formerly type 389/4 with same Ref. No.
10H/13348	Connector, type 905/4 ..	1		Uniradio No. 6, 2 ft. 3 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774. Coded Green
10H/13356	Connector, type 906/4 ..	1		Uniradio No. 6, 2 ft. 3 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774. Coded White
10H/13364	Connector, type 907/4 ..	1		Uniradio No. 6, 2 ft. 3 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774. Coded Yellow

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Connector set, type ARI/5003/AY (contd.)			
	Comprising (contd.):—			
10H/1854	Connector, type 912/5 ..	1		Uniradio No. 4, 35 ft. 0 in., fitted with 2 sockets, type 213, 10H/701, 2 grips, cable, 10H/1774. Coded White. Formerly type 403/3 with same Ref. No.
10H/13391	Connector, type 913/5 ..	1		Uniradio No. 4, 35 ft. 0 in., fitted with 2 sockets, type 213, 10H/701, 2 grips, cable, 10H/1774. Coded Yellow
	ITEMS PECULIAR TO MOSQUITO AEROPLANES		..	INSTALLATION SUFFIX U (24-Volt D.C. Supply)
10BB/735	Aerial, aircraft, type 69 ..	1		Transmitting array on support tube, with cable
10BB/378	Aerial system, type 68 ..	2		Receiving array, azimuth wing mounting
10BB/331	Aerial system, type 66 ..	1		Receiving array, elevation
10AB/288	Box, junction, type 25 ..	1		
5E/758	Cable, H.T., uniplugmet No. 1 ..	4 ft. 0 in.		Modulator to transmitter, 1 ft. 2 in. grid, 2 ft. 10 in. anode
5E/	Cable, H.F., duradio No. 11 ..	9 ft. 6 in.		Twin, coaxial. Transmitter to box, junction, type 25
5E/1328	Cable, L.T., Dumet 4	3 ft. 1 in.		Modulator to transmitter (blower)
5E/1349	Cable, L.T., Dumet 19	1 ft. 8 in.		Modulator to transmitter (filaments)
5E/1355	Cable, L.T., Sextomet 4 ..	8 ft. 6 in.		6-core, 23/·0076, V.I.R., taped. metal braided. Used in A.C, supply wiring
5U/1271	Generator, A.C., engine-driven, type R	1		Output : 80 volts, A.C., 500 watts. Excitation : 24 volts, D.C.
10A/12425	Mounting, type 55	7		Anti-vibration. Rubber blocks bonded to metal strips. 4 for receiver. 3 for ind. unit
10AB/265	Mounting, type 79	1		
10A/12349	Mounting, type 46	1		
10A/12350	Mounting, type 47	1		
10H/628	Plug, type 246	4		S.P. coaxial, double-ended, panel mounting
10H/420	Socket, W.166	1		2-pole, H.F., right-angle, for Duradio No. 11. Fits plug on junction box, type 25
10H/1972	Connector set, type ARI/5003/U	1		
	Comprising :—			
10H/1973	Connector, type 384/4 ..	1		Sextomet 4, 7 ft. 0 in., fitted with 1 socket, W.154, 10H/408
10H/1974	Connector, type 385/4 ..	1		4-way cable form No. 2, ¼ in. conduit, 1 ft. 3 in., fitted with 1 socket, W.150, 10H/404
10H/1975	Connector, type 387/4 ..	1		4-way cable form No. 2, ¼ in. conduit, 10 ft. 10 in., fitted with 2 sockets, W.150, 10H/404
10H/1976	Connector, type 388/5 ..	1		6-way cable, form No. 7, ⅜ in. conduit, 3 ft. 4 in., fitted with 2 sockets, W.160, 10H/414
10H/1978	Connector, type 390/4 ..	1		Uniradio No. 6, 10 ft. 0 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Orange

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks.
	Connector set, type ARI/5003/U (contd.)			
	Comprising (contd.) :—			
10H/1979	Connector, type 391/4 ..	1		Uniradio No. 6, 9 ft. 2 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Orange
10H/1980	Connector, type 395/4 ..	1		Dumet 19, 2 ft. 8 in., fitted with 1 socket, W.165, 10H/419
10H/1977	Connector, type 904/5 ..	1		Uniradio No. 6, 2 ft. 9 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774. Coded Red. Formerly type 389/5 with same Ref. No.
10H/13349	Connector, type 905/5 ..	1		Uniradio No. 6, 2 ft. 9 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Green
10H/13357	Connector, type 906/5 ..	1		Uniradio No. 6, 2 ft. 9 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded White
10H/13365	Connector, type 907/5 ..	1		Uniradio No. 6, 2 ft. 9 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Yellow
10H/1981	Connector, type 910/2 ..	1		Uniradio No. 4, 11 ft. 0 in., fitted with 2 sockets, type 213, 10H/701, 2 grips, cable, 10H/1774, coded Red. Formerly type 298/2 with same Ref. No.
10H/13378	Connector, type 911/2 ..	1		Uniradio No. 4, 11 ft. 0 in., fitted with 2 sockets, type 213, 10H/701, 2 grips, cable, 10H/1774, coded Green
10H/13385	Connector, type 912/2 ..	1		Uniradio No. 4, 11 ft. 0 in., fitted with 2 sockets, type 213, 10H/701, 2 grips, cable, 10H/1774, coded White
10H/13388	Connector, type 913/2 ..	1		Uniradio No. 4, 11 ft. 0 in., fitted with 2 sockets, type 213, 10H/701, 2 grips, cable, 10H/1774, coded Yellow
	ITEMS PECULIAR TO ANSON AIRCRAFT			INSTALLATION SUFFIX AJ (12 VOLT, D.C. SUPPLY)
10BB/357	Aerial, aircraft, type 97 ..	1		Transmitting array, on support tube
10BB/358	Aerial, aircraft, type 98 ..	1		Receiving array, azimuth, port, wing mounting
10BB/359	Aerial, aircraft, type 99 ..	1		Receiving array, azimuth, starboard, wing mounting
10BB/356	Aerial system, type 79 ..	1		Receiving array, elevation
10AB/1144	Box, junction, type 54 ..	1		Metal, rectangular, $6\frac{5}{8}$ in. by $1\frac{7}{8}$ in. by $1\frac{1}{4}$ in. deep
	Fitted with :—			
10H/528	Plug, type 229	5		S.P. coaxial, panel mounting, single-ended

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
10AB/1145	Box, junction, type 55 ..	1		Metal, 7·3 in. by 5½ in. by 1¼ in. deep
	Fitted with :—			
10H/528	Plug, type 229	16		
5E/758	Cable, H.T., uniplugmet No. 1 ..	8 ft. 6 in.		Mod. unit to T.3065A, 4 ft. 4 in. anode. 4 ft. 2 in. grid
5E/1328	Cable, L.T., dumet 4	3 ft. 8 in.		Mod. unit to T.3065A (blower)
5E/1349	Cable, L.T., dumet 19	4 ft. 2 in.		Mod. unit to T.3065A (filaments)
5U/1270	Generator, A.C., engine-driven, type R	1		Output : 80 volts, 500 watts, A.C. Excitation : 12 volts, D.C.
10A/11206	Mounting, type 11	12		Load, 4 lb., rubber, with square pedestal holder. For indicating units
10AB/265	Mounting, type 79			
10AB/1143	Mounting, type 183	1		Sheet metal tray, 4¾ in. by 10 in. For power unit, type 77A
	Fitted with :—			
10A/9334	Mounting, type 4	2		Load, 6 lb., rubber, with square pedestal holder
10A/11206	Mounting, type 11	2		Load, 4 lb., rubber, with square pedestal holder
10A/12349	Mounting, type 46	1		
10A/12350	Mounting, type 47	1		
10KB/472	Power unit, type 77A	1		Type 77, in metal case, 4¾ in. by 10 in. by 7⅜ in. H. Supplementary supply for 2nd and 3rd indicating units
	Fitted with :—			
10H/391	Plug, W.198	1		4-pole, panel mounting, square flange
10H/394	Plug, W.201	2		6-pole, H.T., panel mounting, square flange
10KB/140	Power unit, type 77	1		
	Consisting of :—			
10A/12390	Cap, valve, type 4	1		
10C/2592	Choke, L.F., type 87 ..	1		Smoothing
	Condenser :—			
10C/2590	Type 1228 ..	1		0·01 μF. ± 10 per cent. 3,000 volts, D.C., working, paper, tubular
10C/2037	Type 941 ..	2		0·5 μF. ± 15 per cent., 450 volts, D.C., working, paper, tubular
10C/1450	Resistance, type 1450 ..	2		200,000 ohms ± 10 per cent., ¼ watt
10KB/141	Transformer, type 288 ..	1		Mains, with tag plate assembled
10H/483	Holder, valve, type 69 ..	1		1/16 in. by 2¼ in. by 4¼ in. bakelite panel fitted with :— 1—4-pin valve holder 1—8-pin valve holder
10E/100	Valve VU.134	1		
10E/157	Valve UU.4	1		
10H/13178	Connector set, type ARI/5003 and 5010/AJ			
	Comprising :—			
10H/13395	Connector, type 384/7 ..	1		Sextomet 4, 13 ft. 6 in., fitted with 1 socket, W.154, 10H/408
10H/1974	Connector, type 385/4 ..	1		4-way cable form No. 2, ¼ in. conduit, 1 ft. 3 in., fitted with 1 socket, W.150, 10H/404
10H/13396	Connector, type 386/1 ..	1		4-way cable, form No. 2, ¼ in. conduit, 6 ft. 0 in., fitted with 2 sockets, W.150, 10H/404

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Connector set, type ARI/5003 and 5010/AJ (contd.)			
	Comprising (contd.) :—			
10H/13397	Connector, type 387/8 ..	1		4-way cable, form No. 2, ¼ in. conduit, 4 ft. 0 in., fitted with 2 sockets, W.150, 10H/404
10H/13398	Connector, type 388/6 ..	1		6-way cable, form No. 7, ⅜ in. conduit, 5 ft. 0 in., fitted with 2 sockets, W.160, 10H/414
10H/13399	Connector, type 390/5 ..	1		Uniradio No. 6, 2 ft. 4 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Orange
10H/13400	Connector, type 390/70 ..	1		Uniradio No. 6, 5 ft. 2 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Orange
10H/13401	Connector, type 391/6 ..	1		Uniradio No. 6, 4 ft. 4 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Orange
10H/13425	Connector, type 395/7 ..	1		Dumet 19, 9 ft. 3 in., fitted with 1 socket, W.165, 10H/419
10H/13424	Connector, type 484/70 ..	1		Uniradio No. 6, 1 ft. 4 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Violet
10H/13402	Connector, type 904/9 ..	1		Uniradio No. 6, 1 ft. 7 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Red
10H/13403	Connector, type 904/70 ..	1		Uniradio No. 6, 5 ft. 6 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Red
10H/13404	Connector, type 905/9 ..	1		Uniradio No. 6, 1 ft. 7 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Green
10H/13405	Connector, type 905/70 ..	1		Uniradio No. 6, 5 ft. 6 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Green
10H/13406	Connector, type 906/9 ..	1		Uniradio No. 6, 1 ft. 7 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded White
10H/13407	Connector, type 906/70 ..	1		Uniradio No. 6, 5 ft. 8 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded White
10H/13408	Connector, type 907/9 ..	1		Uniradio No. 6, 1 ft. 7 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Yellow
10H/13409	Connector, type 907/70 ..	1		Uniradio No. 6, 5 ft. 8 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Yellow
10H/13410	Connector, type 912/6 ..	1		Uniradio No. 4, 27 ft. 0 in., fitted with 2 sockets, type 213, 10H/701, 2 grips, cable, 10H/1774, coded White

Ref. No.	Nomenclature	Quantity	Ref. in fig.	Remarks
	Connector set, type ARI/5003 and 5010/AJ (contd.) *Comprising* (contd.) :—			
10H/13411	Connector, type 913/6 ..	1		Uniradio No. 4, 27 ft. 0 in., fitted with 2 sockets, type 213, 10H/701, 2 grips, cable, 10H/1774, coded Yellow
10H/13412	Connector, type 916/1 ..	1		6-way cable, form No. 7, $\frac{3}{8}$ in. conduit, 4 ft. 8 in., fitted with 2 sockets, W.160, 10H/414
10H/13413	Connector, type 917/1 ..	1		6-way cable, form No. 7, $\frac{3}{8}$ in. conduit, 1 ft. 4 in., fitted with 2 sockets, W.160, 10H/414
10H/13414	Connector, type 918/1 ..	1		Uniradio No. 6, 8 ft. 2 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Orange
10H/13415	Connector, type 919/1 ..	1		Uniradio No. 6, 9 ft. 0 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Orange
10H/13416	Connector, type 920/1 ..	1		Uniradio No. 6, 8 ft. 3 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Red
10H/13417	Connector, type 921/1 ..	1		Uniradio No. 6, 8 ft. 3 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Green
10H/13418	Connector, type 922/1 ..	1		Uniradio No. 6, 7 ft. 6 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded White
10H/13419	Connector, type 923/1 ..	1		Uniradio No. 6, 7 ft. 6 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Yellow
10H/13420	Connector, type 924/1 ..	1		Uniradio No. 6, 8 ft. 6 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Red
10H/13421	Connector, type 925/1 ..	1		Uniradio No. 6, 8 ft. 6 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Green
10H/13422	Connector, type 926/1 ..	1		Uniradio No. 6, 8 ft. 6 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded White
10H/13423	Connector, type 927/1 ..	1		Uniradio No. 6, 8 ft. 6 in., fitted with 2 sockets, type 187, 10H/529, 2 grips, cable, 10H/1774, coded Yellow