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WIRELESS STATIONS, BURNDIPT,

BE. 201

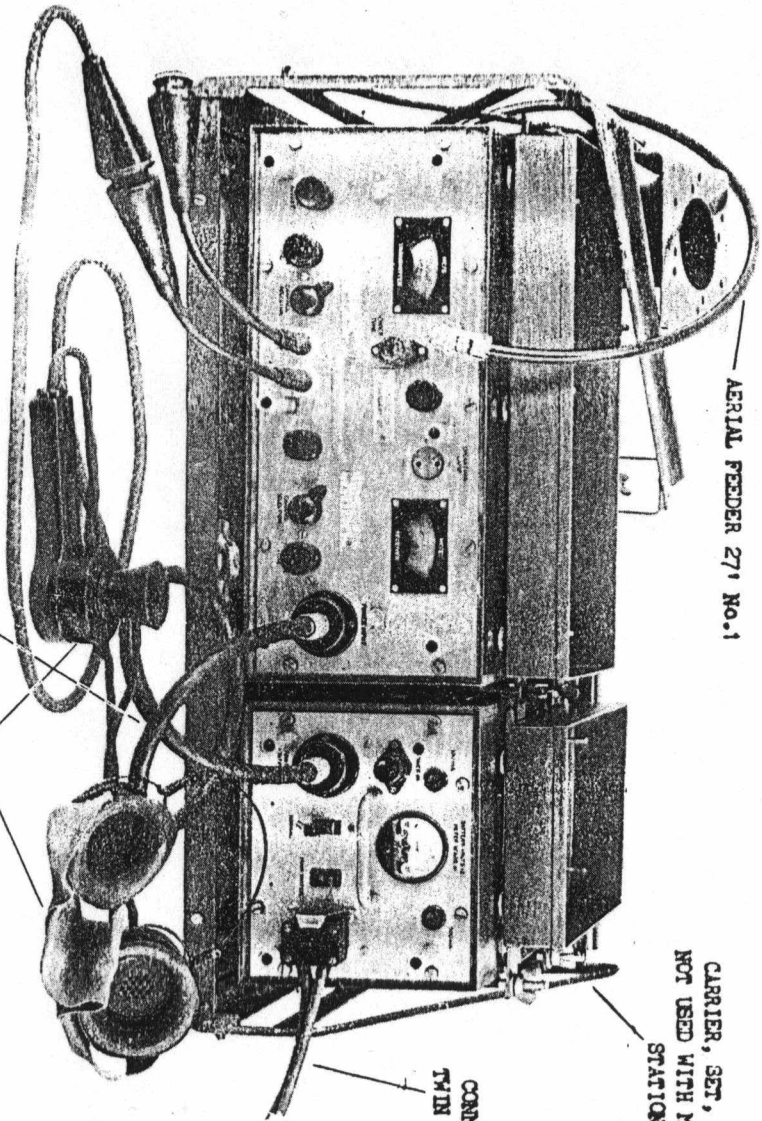
Working Instructions

WARNING

The voltages employed in this equipment are sufficiently high to endanger human life, the 6 pt. output socket on the power unit carrying H.T. Every reasonable precaution has been observed in design to safeguard operating personnel. The power must be switched off before changing valves or making internal adjustments to either unit. In case of electric shock refer to the First Aid Instructions at the back of the pamphlet.

Published under the authority of the Director of Signals.

The WAR OFFICE



AERIAL FEEDER 27' No. 1

CARRIER, SET, No. 67
NOT USED WITH MAN-PACK
STATION

CONNECTOR
TWIN No. 290

CONNECTOR 6 PT. No. 62

MICROPHONE & RECEIVER HEADGEAR No. 10

C O N T E N T S

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WIRELESS STATIONS, BURNLEPT, BE. 201

USER HANDBOOK

CHAPTER I GENERAL DESCRIPTION

1. Purpose and facilities

Wireless Set BE.201 is an amplitude modulated mobile sender/receiver (frontispiece) primarily intended for ground to air R.T. communication. It is arranged as a man-pack station to be carried in four loads but may also be fitted as a vehicle station. It is splash proof and rain proof but is not hermetically sealed.

The sender/receiver is simple to operate. It can be tuned to any one of four spot frequencies, which are crystal controlled. Netting operations are therefore eliminated. One way communication only is possible so that an over/over method of operation must be used. All the controls, with the exception of the power switch and FLOAT CHARGE--NORMAL switch, are situated on the front panel of the sender/receiver.

2. Frequency range

The frequency band covered is 100-156 Mc/s. The sender/receiver operates on four crystal controlled spot frequencies within this band, any one of which may be selected by means of two channel selector switches, one in the sender and one in the receiver.

CHAPTER I -- Sections 3-4

3. Range of working

The range of the equipment is dependent upon the height at which the aircraft, with which it is desired to communicate, is flying. The normal range is approximately 60 miles when working with an aircraft flying at 5,000 ft. but will be much less for low flying aircraft.

4. Controls

The controls on the front panel of the sender/receiver are illustrated in Fig. 3 and are as follows:-

CONTROL	PURPOSE
1 Channel Selection	Two switches, one on the receiver to select one of the four crystals in the receive circuit and one on the sender to select one of the four crystals in the send circuit.
2 Sender Tune	Sending tuning condenser - calibrated in Mc/s.
3 AE Trim	Aerial trimming condenser.
4 Drive Adjust	For fine tuning adjustment of input to last sender valve.
5 Rec Gain	Manual volume control.
6 Receiver Tune	Receiving tuning condenser - calibrated in Mc/s.

Also on the front panel of the sender/receiver are the AE FEEDER socket, two five-point drop leads for the microphone headgear, the SENDER TUNE lamp, the OPERATOR'S LAMP socket and the POWER INPUT socket (for connection to power unit).

The controls on the front panel of the power unit are:-

CONTROL	PURPOSE
MAIN SWITCH	12 V. Battery Supply switch.
FLOAT CHARGE- NORMAL	In the NORMAL position, the accumulator supplies the set and providing the voltage (as read on the meter) does not exceed 13.5 V. It may be float charged. In the FLOAT CHARGE position resistances are introduced by this switch, so that when the battery voltage reaches or exceeds 13.5 volts, the voltages supplied to the set are substantially the same.

Also on the front panel of the power supply unit are the H.T. sender and H.T. receiver fuses, marked 500 mA. and 150 mA. respectively, POWER ON indicator lamp, a meter for measuring the accumulator voltage, 6-point POWER OUTPUT socket and 2-point 12 V. battery input socket.

5. Power supply and consumption

The power supply unit is fed normally from a 12 V. 22 Ah. lead-acid battery (Battery Secy. Port., 12 volt Mk. I), when used as a man-pack station. When the equipment is fitted in a vehicle or trailer, two 12 V. 75 Ah. batteries are carried in place of the single 22 Ah. battery (Batteries Secy. Port., 12 V. 75 Ah.). A Charging Set, lightweight 80 watt No.1 Petrol Driven is included in both stations.

Power consumption of the set is 12.5 amps. when sending and 6 amps. when receiving.

6. Transport

As a man-pack station, the equipment is divided into four loads. Separate man-pack carriers are provided for the sender/receiver, the Power Unit, the Charging Set and the battery. Other lighter items of equipment, i.e. the Aerial Assembly, the receiver headgear, etc., are divided as equally as possible among the four porters.

7. Aerials (Fig.2)

The dipole aerial assembly consists of two sets of rods, an insulator block and a hinged wooden arm fitted to a mounting plate for attaching the assembly to any convenient pole or tree.

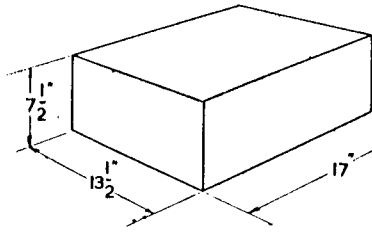
The shorter pair of rods are mounted on the assembly when the higher frequency range of 128-156 Mc/s. is to be used. These rods are 17.13/16 inches long and are colour coded red.

The longer pair of rods are mounted when the lower frequency range of 100-128 Mc/s. is to be used. These are 24 inches long and colour coded green.

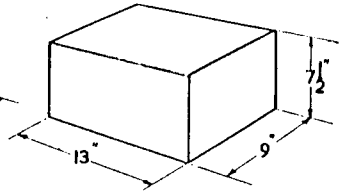
A 27 ft. length of co-axial feeder (Aerial Feeder 27 ft. No.1), fitted with plugs is used to connect the aerial to the set.

8. General construction

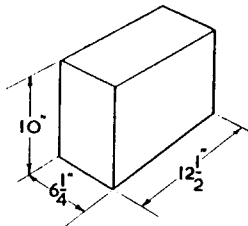
The sender/receiver and the power unit are separately housed in steel cases having removable steel covers which fit over the front panels and afford protection during transit. Access to the interiors of the units is obtained by loosening the holding screws dispersed around the edges of the front panels and withdrawing the chassis from the cases by means of the handles provided. To facilitate changing crystals a removable plate is provided at the back of the sender/receiver unit (Fig. 5).



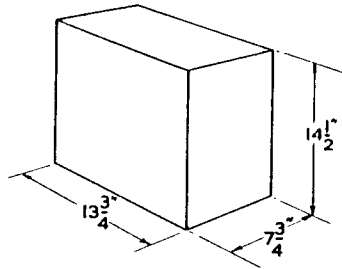
SENDER/RECEIVER WEIGHT $29\frac{1}{2}$ LBS



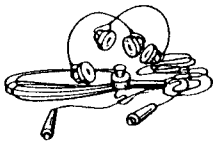
POWER SUPPLY UNIT WEIGHT 23 LBS



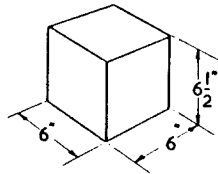
ACCUMULATOR WEIGHT 35 LBS
(BATT. SECY. PORT. 12 V. 22 AH. MK.1)



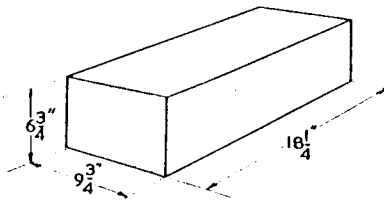
CHARGING SET WEIGHT (DRY) 46 LBS



ACCESSORIES WEIGHT $10\frac{1}{2}$ LBS



SPARE VALVES CASE WEIGHT $4\frac{1}{4}$ LBS



AERIAL ASSEMBLY (FOLDED) - WEIGHT 6 LBS

Fig. 1 Weights and Dimensions

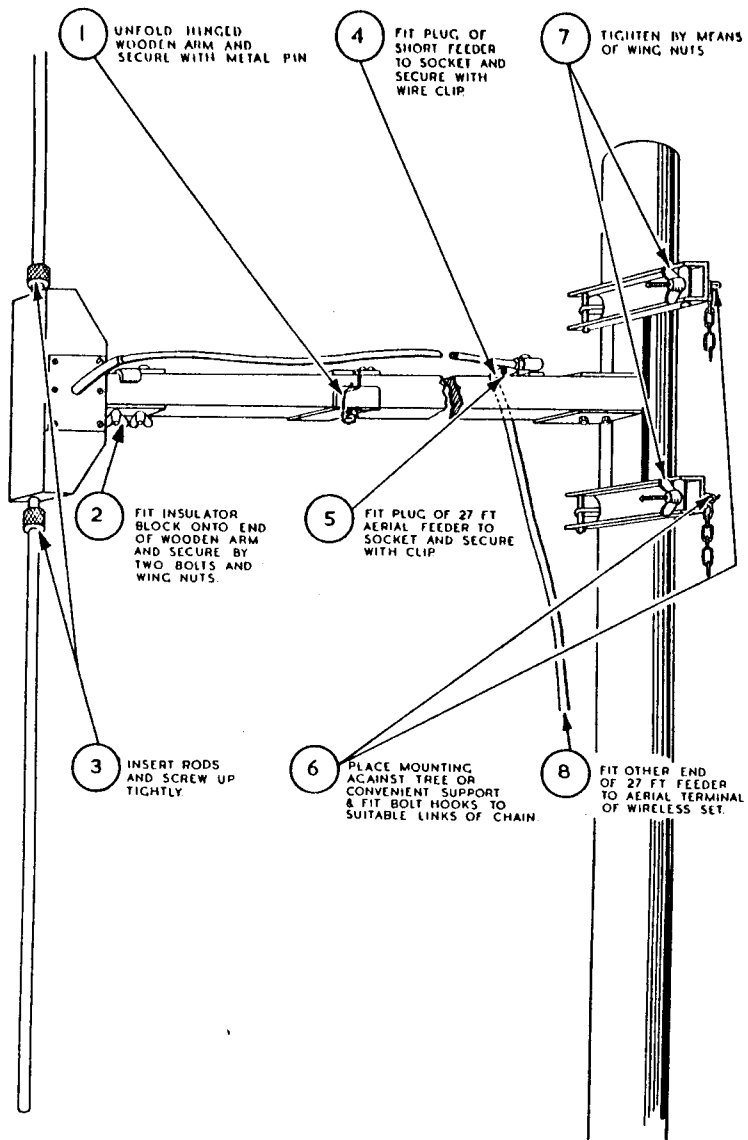


FIG.2 ERECTION OF DIPOLE AERIAL

9. Weights and Dimensions (see Fig.1)

(1) The sender/receiver :-

Length	17 inches
Height	7½ inches
Depth	13½ inches
Weight	29½ lbs.

(2) The Power Supply Unit :-

Length	9 inches
Height	7½ inches
Depth	13 inches
Weight	23 lbs.

(3) The Aerial Assembly (folded) :-
(Aerial, dipole, No.24)

	18½ ins. x 9½ ins. x 6½ ins.
Weight	6 lbs

(4) The Charging Set (80 watt, Petrol Driven)

Length	13½ inches
Height	14½ inches
Width	7½ inches
Weight	(dry) 45 lbs.

(5) Batteries Secondary Portable 12 V. 22 Ah. MK.I

Length	12½ inches
Height	10 inches
Width	6¼ inches
Weight	35 lbs.

(6) The Spare Valves Case (No.21)

	6 ins. x 6 ins. x 6½ ins.
Weight	4½ lbs.

CHAPTERS I & II -- Sections 9-10

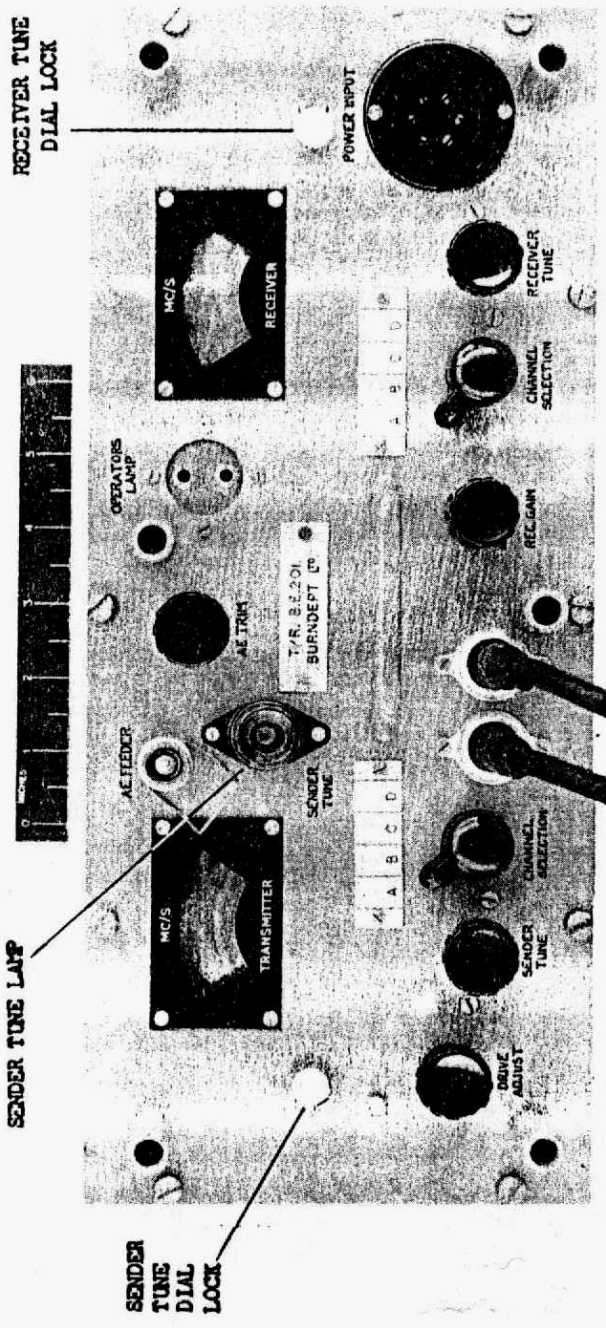
(7) Accessories :-

Microphone and receiver headgear assemblies No.10
Lamps, operator, No.2
Hydrometer, secy., cell, port., ball type, No.1
Connectors, twin, No.273
Connectors, twin, No.290
Connectors, 5-point, No.34, 10' 5"
Connectors, 6-point, No.62, 3' 6"
Total weight - 10½ lbs.

CHAPTER II OPERATOR'S INSTRUCTIONS

10. Erecting the Aerial (Fig. 2)

- (1) Unfold the hinged wooden arm of the aerial assembly and secure it in the extended position by means of the captive metal pin.
- (2) See that the insulator block is fitted on the end of the wooden arm and secured in position by means of the two bolts and wing nuts.
- (3) Select the appropriate pair of rods for the frequency used, insert them into the sockets on the insulator block and screw up the knurled nuts tightly.
The longer pair are used for 100-128 Mc/s band and the shorter pair must be used when operating between 128-156 Mc/s.
- (4) Fit the plug on the free end of the short feeder attached to the insulator block into the socket on the wooden arm and secure it in position with the wire clip.
- (5) Fit one of the plugs on the 27 ft. aerial feeder into the other socket on the wooden arm and secure it in position with the wire clip.



SENDER/RECEIVER FRONT PANEL

FIG 3

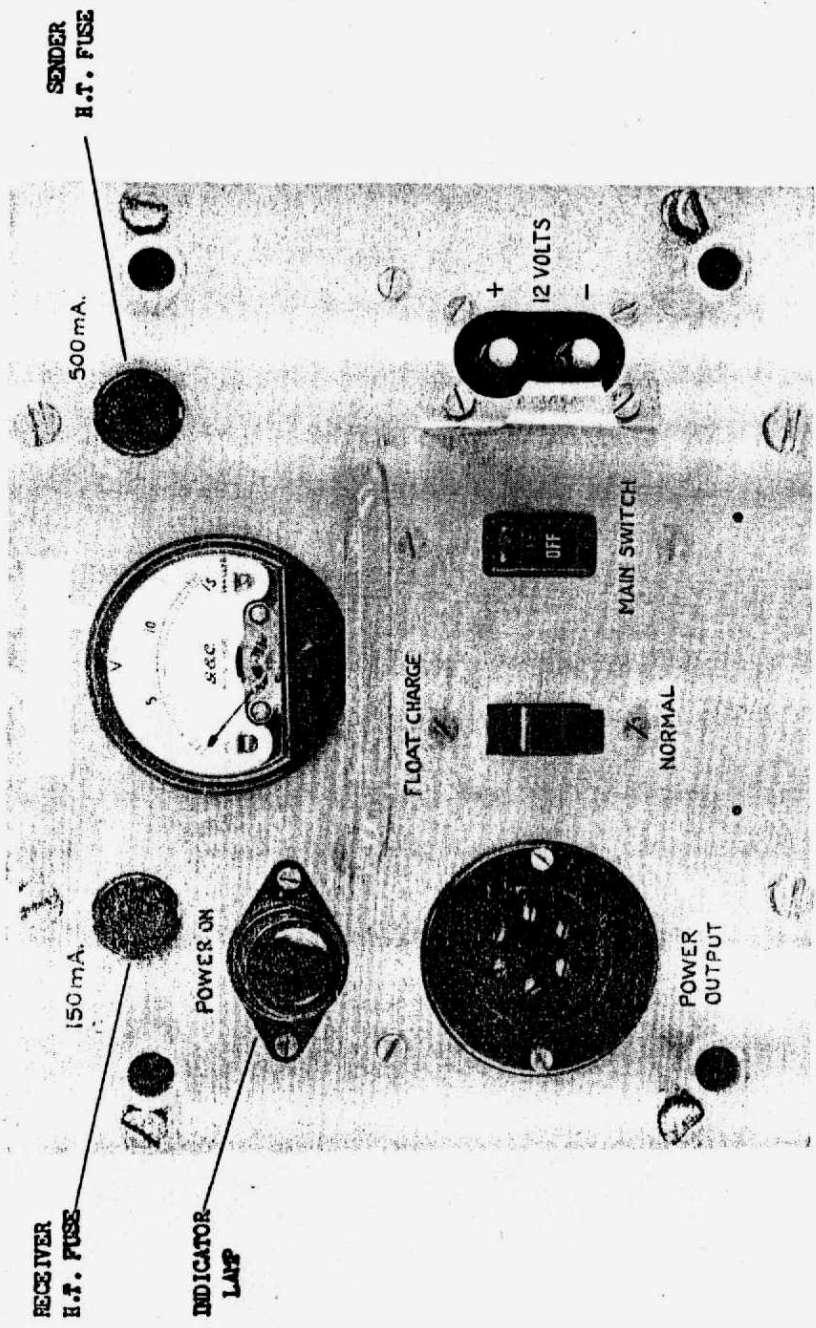


FIG. 1. POWER SUPPLY UNIT FRONT PANEL

C H A P T E R I -- Sections 10, 11 & 12

- (6) See that the wing nuts of the metal mounting are unscrewed as far as possible and place the mounting against a suitable pole or tree. Pass the loose chains round the back of the support, and keeping the chains fairly taut, fit the belt hooks into suitable links.
- (7) Tighten up the chains by screwing up the wing nuts.

11. Connecting up
(Frontispiece & Figs. 3 & 4)

- (1) Remove the front covers from the sender/receiver unit and from the power supply unit and place the two units close to one another.
- (2) By means of Connector 6-point No.62 connect the POWER OUTPUT plug of the power supply unit to the POWER INPUT plug of the sender/receiver unit.
- (3) By means of Connector Twin No.290 connect the battery to the 12 V. plug on the power supply unit, seeing that the clip fits over the socket.
- (4) Fit the snatch plugs on the ends of the Microphone and receiver headgear assembly No.10 to the snatch sockets on the sender/receiver unit.
- (5) Connect the end of the Aerial Feeder 27 ft. No.1 (Fig.2) to the terminal engraved AE FEEDER and secure it by means of the wire clip.

12. Operating Instructions (Figs. 3 & 4)

- (1) If required insert plug of operator's lamp into socket marked OPERATOR'S LAMP.
- (2) On the power unit, set FLOAT CHARGE switch to NORMAL but see Section 13 below.
- (3) Set sender and receiver CHANNEL SEL switches to the channel it is desired to use, i.e. A, B, C or D.

C H A P T E R II -- Sections 12-13

- (4) Set SENDER TUNE dial to the frequency to be used.
- (5) On the power unit set MAINS SWITCH to its ON position and wait 2 minutes for the valves to warm up.
- (6) Operate PRESS to SEND (Pressel) switch on microphone and without speaking into the microphone adjust (a) SENDER TUNE and (b) AE TRIM controls for maximum brightness of SENDER TUNE lamp. As a final fine adjustment turn DRIVE ADJUST for maximum brightness of lamp.
- (7) Note that the brightness of the lamp increases on speaking into the microphone. Check at the same time that side-tone is present in the headset.
- (8) Having tuned the sender as above, set RECEIVER TUNE dial to the sender frequency or to the receive frequency specified.
- (9) When receiving, keep the REC. GAIN control turned well up and if necessary readjust the RECEIVER TUNE dial for good reception.
- (10) Lock RECEIVER TUNE and SENDER TUNE dials.

NOTE: The set is now ready for operation, but the above procedure must also be carried out whenever the frequency is changed. Also when changing frequency see that the set is in the receive condition, i.e. pressel switch released.

13. Charging the Battery (Fig. 4)

The battery must be charged when the voltage as shown on the meter falls to 10.8 V.

To charge the battery connect it to the charger by means of the two point lead provided. Set the switch on the power supply unit at NORMAL, but switch to FLOAT CHARGE when using the set if the battery voltage rises to 13.5 V. as indicated on the meter.

14. Changing crystals

To change crystals, unfasten the coin-slotted bolts securing the panel to the back of the sender/receiver case and remove the panel. The two sets of four crystals will be seen plugged into sockets at the rear of the chassis (Fig. 5). The four pairs of sockets for each half of the set are marked A, B, C and D to correspond with the four switch positions (marked on the front panel) of each CHANNEL SEL switch.

Withdraw the crystal to be changed by pulling it out from its socket and insert the new crystal.

Note that if a crystal has to be changed on one side of the set, the corresponding crystal on the other side of set should also be changed. For instance, if crystal B on the receive side is changed, then crystal B on the transmitter side should also be changed.

The nominal crystal frequency is marked on the crystal holder. In the case of the sender, the channel frequency (operating frequency) is 18 times the crystal frequency. After changing the crystal, correct the channel frequency figure marked on the front panel strip above the appropriate letter (A, B, C or D).

The above paragraph applies also to the receiver but the channel frequency (incoming signal frequency) is 18 times the crystal frequency plus 9.72 Mc/s (9.72 is the I.F.).

Replace the panel on the back of the set, taking care that the rubber gasket is in its correct position.

Crystal installation and channel marking will normally be carried out at the base before operation in the field is required.

CHAPTER III OPERATOR'S MAINTENANCE

15. General

Appendix I has been designed as a means of recording completion of maintenance tasks, repairs and inspections. It has been produced separately as Army Form B.2661 - Unit Maintenance Log and covers a period of 24 weeks. The completed and current sheets will be kept in the pocket provided in the back cover of this publication. The form has been promulgated in Army Orders and may be obtained on indent in the normal manner.

The completion of maintenance tasks will be recorded by initialling in the spaces provided. Minor repairs and valve replacements will be recorded on the reverse of Army Form B.2661.

Further instructions for the Unit Commander are promulgated in A.C.I. 1076 of 1945.

The following is a list of maintenance tasks to be carried out by the Operator. The frequency with which they will be carried out will be detailed by the Unit Commander. The tasks are laid down as suggestions to the Unit Commander and he may omit or add to them at his discretion. It is advised, however, that all these tasks are carried out especially in the case of new equipments.

16. Suggested daily tasks

Mechanical Check

- (1) Keep exteriors of sender/receiver and power supply units in a clean and dry condition.
- (2) Check over all flexible leads and plug and socket connections, making sure that all contacts are tight and dry.
- (3) Check that all knobs, etc., are secure on their shafts and tighten the grub screws if necessary.

- (4) Check that all tuning and other controls work smoothly.
- (5) Check that all switches move correctly into their various positions and, without forcing them, ensure that they bed firmly against their end stops.

Electrical Check

- (6) Set up the aerial and the station as described in Sections 10 and 11 above.
- (7) On the test meter check the L.T. voltage. The battery requires charging when its terminal voltage falls to 10.8 volts.
- (8) Tune the sender and the receiver as described in Section 12 above on each of the four crystal controlled channels in turn. Check that the transmitted and received frequencies in each case are equal to the frequency indicated on the sender and receiver dials when accurately tuned (see Section 14). Any discrepancies should be reported.

Accumulator

- (9) Clean the vent of each cell of the battery and check that the electrolyte covers the plates. When necessary top up with distilled water. If distilled water is not available then in an emergency use the purest water available.
- (10) By means of a hydrometer test the specific gravity of the acid in each cell. If the specific gravity is below 1100 the battery should be charged.
- (11) Remove any corrosion from the terminals, connecting plugs and sockets, etc.
- (12) Check that the straps to the cells are tightly connected.
- (13) Examine the battery leads to ensure that they are not frayed.

CHAPTER III -- Sections 16-17

Dipole Aerial Assembly

- (14) Maintain in a clean condition, particularly the contact surfaces at the inner ends of the aerial rods.
- (15) Clean and lightly grease the pole clamp screws to prevent rusting.
- (16) Check that the feeder plugs and sockets are making good contacts.

Power Supply

- (17) Charging Set Lightweight 80 watt No.1 Petrol Driven. Perform normal daily tasks as suggested in appropriate working instructions.

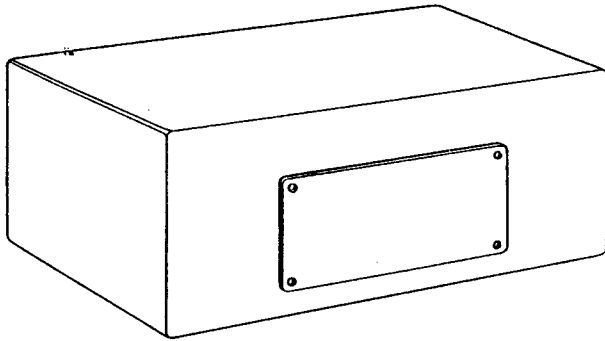
17. Suggested weekly maintenance

Sender/Receiver

- (1) Switch off the current: remove the sender/receiver chassis from the case and see that it is kept in a clean condition. Inspect for loose connections and fixing bolts, taking care not to disturb the physical position or the dimensions of the R.F. coils. Check that all valves are firmly seated in their holders.
- (2) Check that the two slow motion dials operate smoothly. Check the operation of the Send/Receive Relay (RLA/1). Replace the chassis in its case. Check that the rubber gasket is undamaged and ensure that the panel beds down evenly upon it.

Power Supply Unit

- (3) Remove the power supply unit from its case and see that the interior is kept in a clean condition. Inspect for loose connections and fixing bolts, particularly the holding down bolts for the two rotary transformers. Run up both rotary transformers and report if excessive sparking occurs at the brushes. Care must be taken before touching the transformers to see that the current is switched off, otherwise the hands may be badly cut.



VIEW OF BACK OF SENDER/RECEIVER SHOWING BACK PLATE

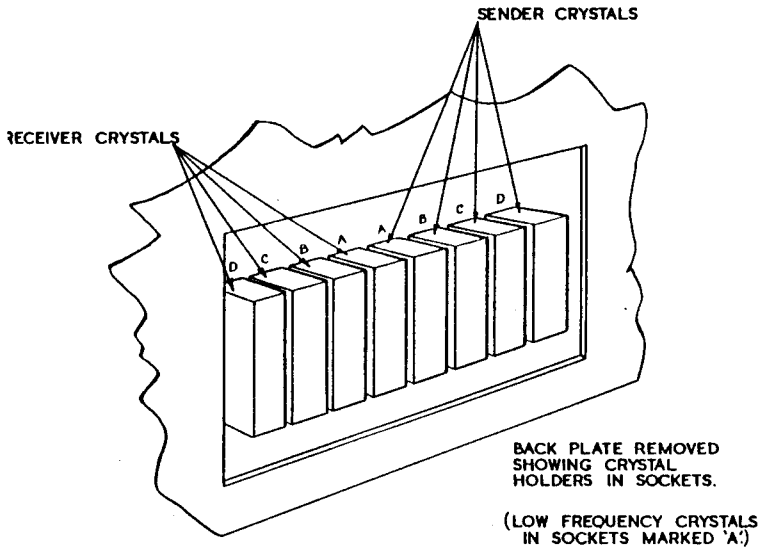
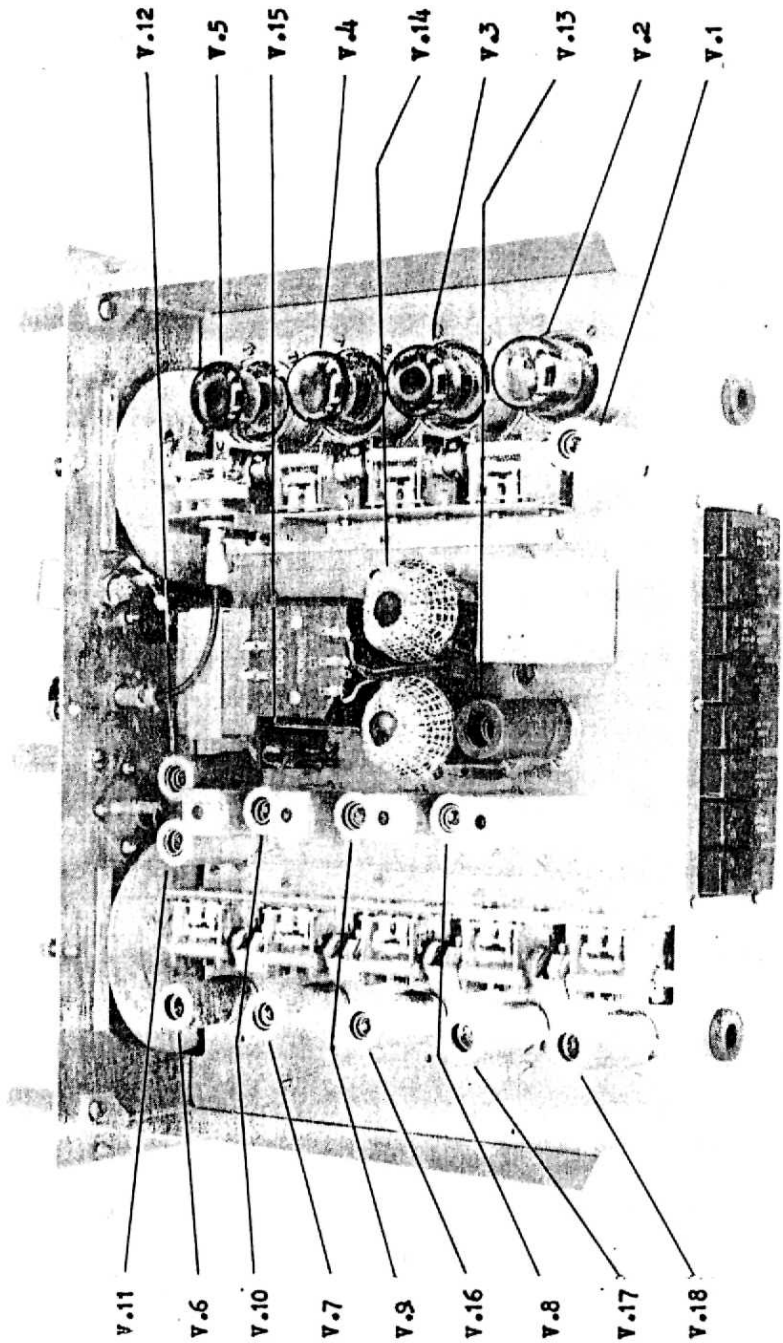


Fig. 5 Access door to Crystals



V.12

V.5

V.15

V.4

V.14

V.3

V.13

V.2

V.1

V.11

V.6

V.10

V.7

V.9

V.16

V.8

V.17

V.18

- (4) Switch MAIN SWITCH to ON and note that the receiver rotary transformer starts up. Switch FLOAT CHARGE switch from NORMAL to FLOAT CHARGE and note that the receiver rotary transformer slows down and that the reading on the meter is reduced. Return FLOAT CHARGE switch to NORMAL.

Operate PRESS TO SEND switch, check action of Send/Receive relay (RLA/1) and note that the sender rotary transformer slows down when the switch is at FLOAT CHARGE. Switch MAIN SWITCH to OFF. Examine S/R relay contacts and if they appear burnt or out of adjustment, report. Replace the power unit in its case, checking the rubber gasket for damage and ensure that the panel beds down evenly upon it.

Battery

- (5) Check the specific gravity of the electrolyte, thoroughly clean the battery, removing any spilt acid with water. Clean and re-grease the terminals with vaseline. Note the maker's instructions regarding the care of the battery.

Charging Set

- (6) Perform normal weekly tasks as given in the appropriate working instructions.

FAULT LOCATION TABLE

IMPORTANT NOTE

It should be noted that the heaters of the following valves are in series :-

- V.14 (sender) and V.15 (sender)
- V.4 (sender) and V.5 (sender)
- V.2 (sender) and V.3 (sender)
- V.1 (sender) and V.7 (receiver)
- V.11 (receiver) and V.12 (receiver)
- V.9 (receiver) and V.10 (receiver)
- V.8 (receiver) and V.18 (receiver)
- V.16 (receiver) and V.17 (receiver)

C H A P T E R III --- Section 17

FAULT LOCATION TABLE (Contd.)

and if any heater goes out the other one of the pair will also go out, with the exception of V.8 and V.18. As V.8 has a resistance across it, V.18 will light dimly if V.8 fails but if V.18 fails V.8 heater will not light.

Symptom (1)	Possible Fault (2)	Action (3)
(1) With MAIN SWITCH on, POWER ON lamp does not light.	(1) Faulty lamp. (2) Battery leads making bad contact.	Replace. Inspect and if necessary clean terminals.
(2) With MAIN SWITCH on, POWER ON lamp does not light, and there is no sound of receive rotary transformer starting.	(1) Battery lead (Connector Twin No.290). (2) Battery run-down or faulty.	Examine and replace if necessary. Check voltage and if necessary recharge (see Section 13).
(3) With MAIN SWITCH on, POWER ON lamp lights, but there is no sound of receive rotary transformer starting.	(1) Send/receive relay. (2) Internal fault in power unit.	Report. Report.
(4) With MAIN SWITCH on, and pressel switch depressed, no sound of sender rotary transformer starting.	(1) Send/receive relay faulty. (2) Faulty snatch plug. (3) Faulty pressel switch.	Report. Change mic. and receiver assembly to the other snatch plug. Change mic. and receiver assembly.

FAULT LOCATION TABLE (Contd.)

Symptom (1)	Possible Fault (2)	Action (3)
(5) On send - no light in SENDER TUNE on one crystal channel only.	(1) Defective or badly fitting crystal.	See that crystal is pushed firmly home into the socket. Examine crystal holder and replace crystal if necessary (see Section 14).
(6) On send - no light in SENDER TUNE on all crystal channels with sender properly tuned.	(1) Bad lamp contact. (2) Faulty lamp. (3) Broken aerial connection (internal) or defective contact on send/receive relay. (4) Faulty valves.	Tighten lamp. Replace lamp. (Note: The lamps in the two units are not interchangeable.) Examine aerial feeder and connection to aerial, also send/receive relay and report. Check that sender valves V.1, V.2, V.3, V.4 and V.5 light up. Replace any that do not light. Then if necessary, replace valves one at a time in the following sequence:- V.5, V.4, V.1, V.2, V.3 (See Fig.6). Mark the faulty valve and exchange for a good one at the first opportunity.

C H A P T E R III -- Section 17

FAULT LOCATION TABLE (Ccntd.)

Symptom (1)	Possible Fault (2)	Action (3)
(7) SENDER TUNE lamp is dim when set is properly tuned up on send.	(1) Faulty power amplifier valve.	Replace V.5.
(8) SENDER TUNE lamp does not change in brightness when pressel switch is pressed and when speaking into mic.	(1) Bad connection in drop leads. (2) Faulty headset or mic. (3) Weak modulation or faulty modulator valves.	Examine. Push plug firmly into socket. Try another headset and mic. Try changing modulator valves V.13, V.14 and V.15 (see Fig. 6).
(9) On send - SENDER TUNE lamp operates but SENDER TUNE dial does not indicate the correct frequency on any crystal channel.	(1) Internal fault.	Report.
(10) On send - no sidetone audible when speaking into mic.	(1) Faulty mic. or headphones. (2) Faulty valves V.13, V.14 or V.15. (3) Internal fault. (Output transformer)	Try a new mic. and receiver assembly. Check that V.13, V.14 and V.15 light up. Replace any that do not light up. Then, if necessary, replace one at a time. Mark faulty valve and exchange for a good one at first opportunity. Report.

C H A P T E R III -- Sections 17-18

FAULT LOCATION TABLE (Contd.)

Symptom (1)	Possible Fault (2)	Action (3)
(11) No. signals when on receive.	(1) Valve fault.	Check that all valves light up (V.6, V.7, V.8, V.9, V.10, V.11, V.12, V.16, V.17 & V.18). Replace any that do not.
	(2) Faulty crystal contacts.	Check that crystals are pushed home in their sockets.
	(3) Faulty oscillator tripler or doubler valves.	Change V.18, V.17 and V.16 in this sequence.
	(4) Faulty RF IF detector and amplifier valves.	Try changing V.12, V.11, V.10, V.9, V.8, V.7 and V.6 in this sequence.

18. Replacements

A Spare Valve Case No.21, containing spares to replace those valves which have ceased to function in the set, is included in the kit.

When valve inspection is necessary care must be taken to disconnect the set from its power supplies before removing the chassis from its case. If this is not done, there is danger of electric shocks and burns.

Care must also be used when inserting fresh valves to avoid damage to the pins by bending them and to the retaining rings by crossing the threads.

CHAPTER III -- Section 18

Generally a faulty valve may be seen to be defective by its heating filament failing to glow. In this connection it should be borne in mind that the majority of the heating elements are in series parallel, the exceptions being V.6 and V.13. The heating elements of the following valves are coupled in pairs :- V.1 and V.7, V.2 and V.3, V.4 and V.5, V.8 and V.18 (should V.8 be faulty, V.18 will glow faintly) V.9 and V.10, V.11 and V.12, V.14 and V.15, V.16 and V.17. If the filament of one of the above pairs of valves fail, the filament of the other valve will also fail to glow as there will be no voltage across it.

When worn brushes are to be replaced in the power supply unit, it is most important to switch off the power supply before removing the cover. Neglect to do this may result in electric shock and/or badly cut hands from the blades of the fans. After removing the cover from the power supply unit, examine the brushes for wear and remove any that are badly worn. Unscrew the brush holder cap (Fig.7). Take out the spring and the worn brush. Insert a new brush and replace spring and screw cap. Replace the case, taking care that the rubber gasket is undamaged and that the panel beds down evenly upon it.

Switch off before changing fuses (to avoid overloading new fuses on insertion).

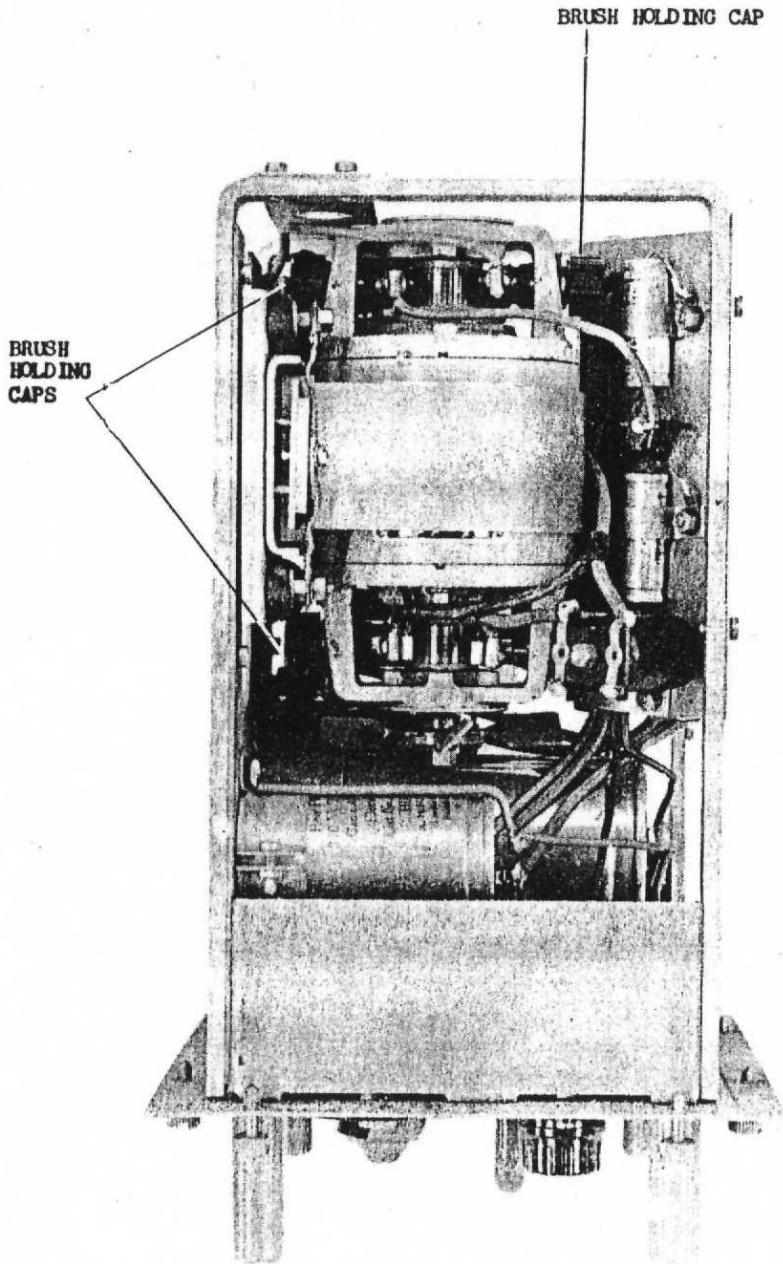


FIG.7a INTERIOR VIEW (L.H. SIDE) OF POWER SUPPLY UNIT

BRUSH HOLDING CAPS

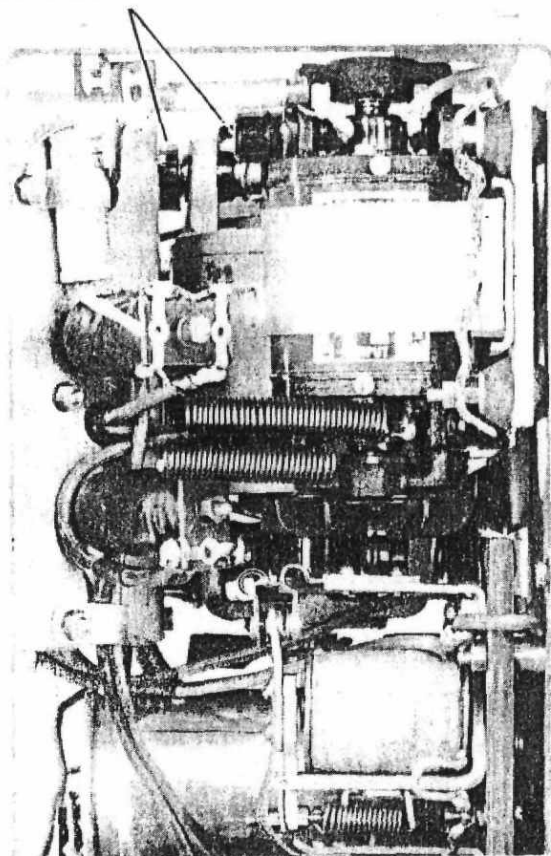


FIG. 7b INTERIOR VIEW (R.H. SIDE) OF POWER SUPPLY UNIT

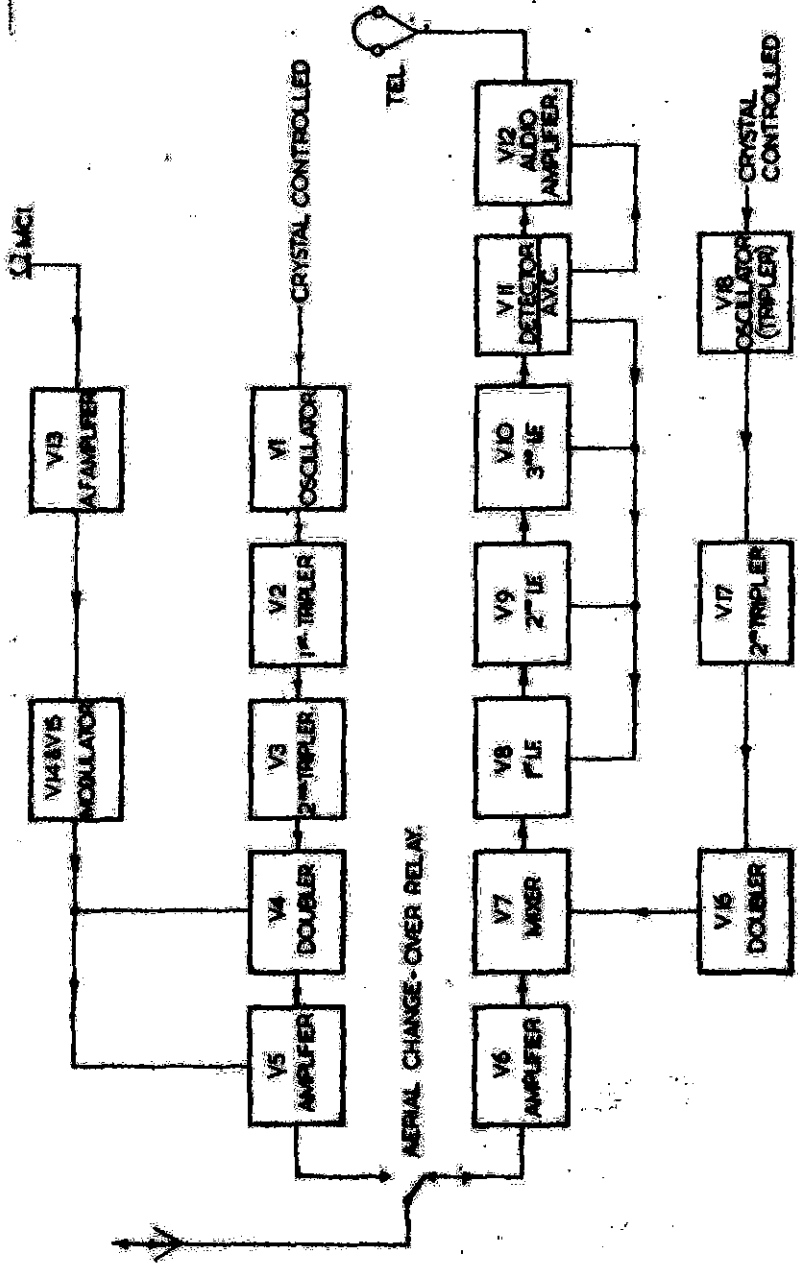


FIG. 8 BLOCK DIAGRAM OF CIRCUIT

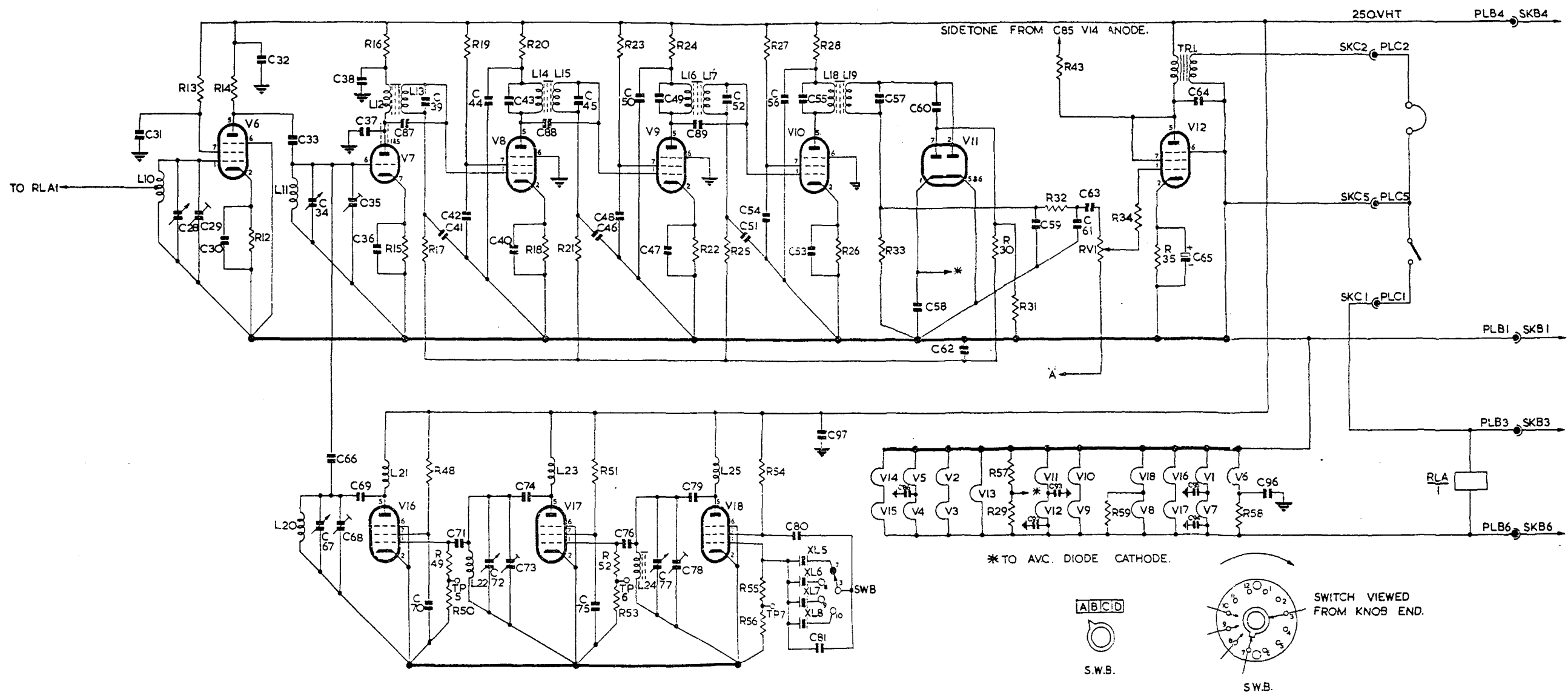


Fig. 9b Receiver circuit diagram

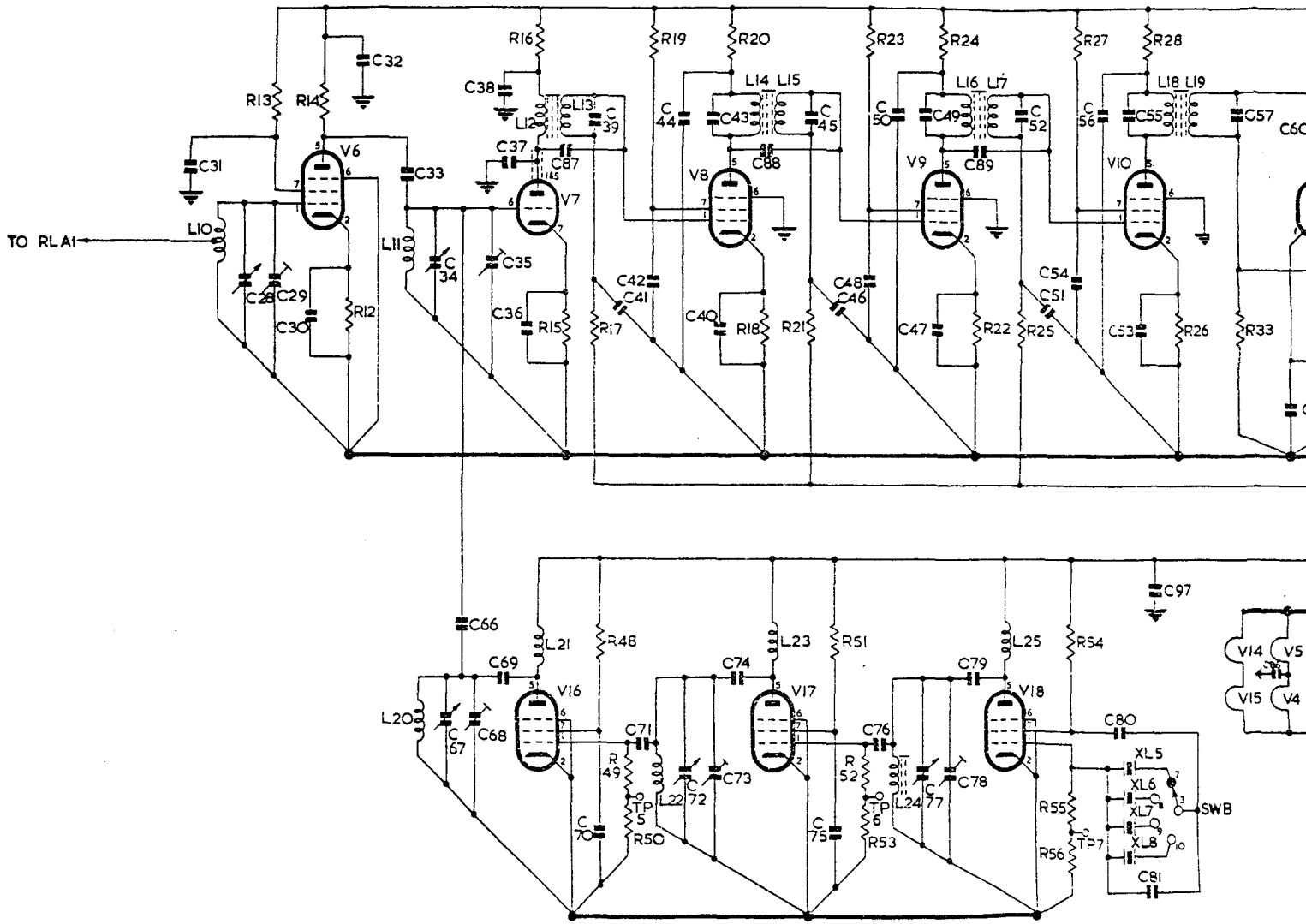
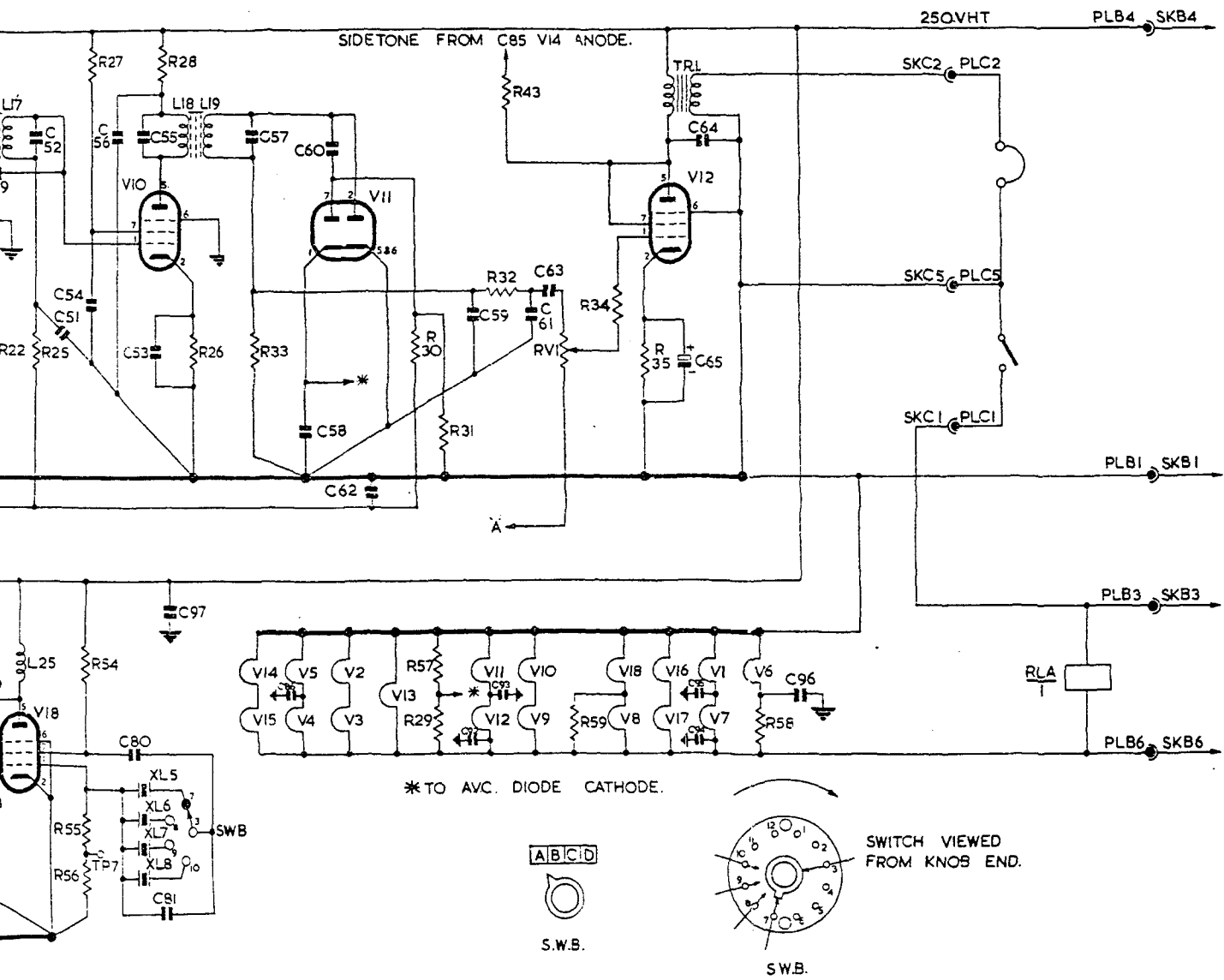


Fig. 9b Receiver circuit diagram



9b Receiver circuit diagram

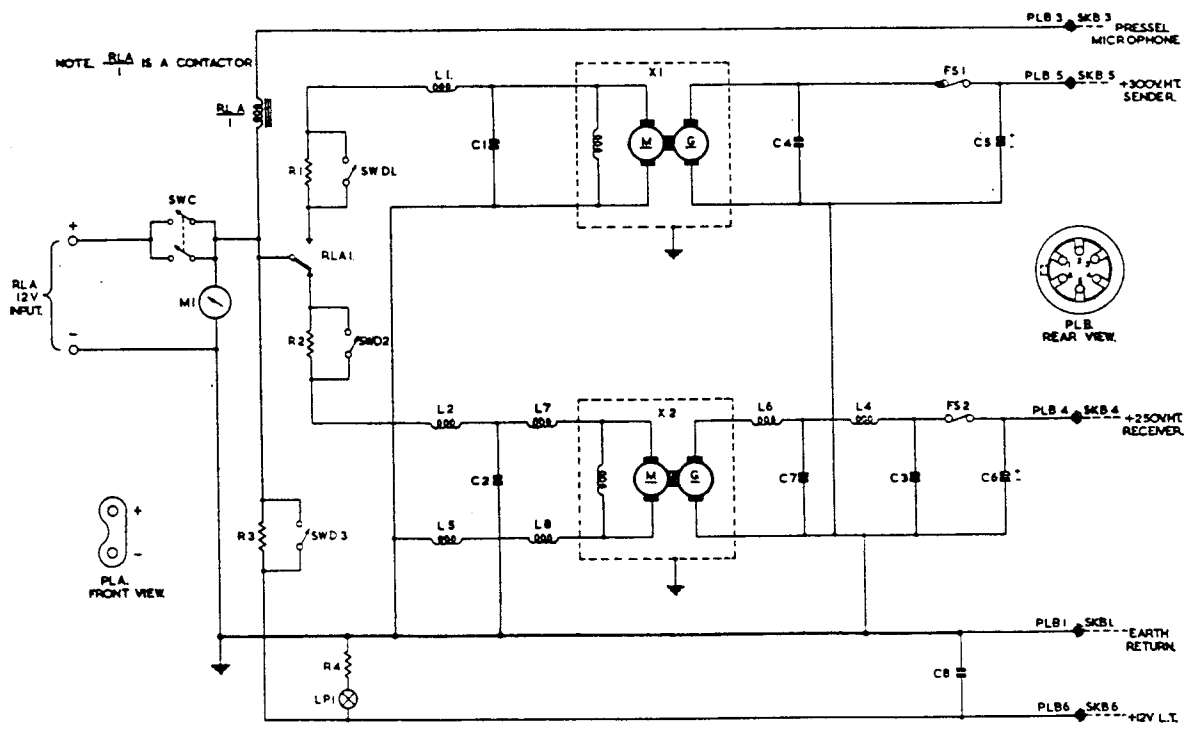


Fig.10 Power Supply Unit circuit diagram

APPENDIX II
COMPONENTS LIST
SENDER/RECEIVER

Circuit Reference	Value	Tolerance	Rating	Type
RESISTORS				
R 1	47 K ohms	+ 10%	½ watt	Carbon
R 2	47 ohms	+ 10%	½ "	"
R 3	3.3 K ohms	+ 10%	½ "	"
R 4	100 K ohms	+ 10%	½ "	"
R 5	100 K ohms	+ 10%	½ "	"
R 6	100 K ohms	+ 10%	½ "	"
R 7	100 K ohms	+ 10%	½ "	"
R 8	100 K ohms	+ 10%	½ "	"
R 9	47 K ohms	+ 10%	½ "	"
R 10	100 K ohms	+ 10%	½ "	"
R 11	15 K ohms	+ 10%	½ "	"
R 12	220 ohms	+ 10%	½ "	"
R 13	47 K ohms	+ 10%	½ "	"
R 14	6.8 K ohms	+ 10%	½ "	"
R 15	10 K ohms	+ 10%	½ "	"
R 16	1 K ohms	+ 10%	½ "	"
R 17	470 K ohms	+ 20%	½ "	"
R 18	220 ohms	+ 10%	½ "	"
R 19	22 K ohms	+ 20%	½ "	"
R 20	1 K ohms	+ 10%	½ "	"
R 21	470 K ohms	+ 20%	½ "	"
R 22	220 ohms	+ 10%	½ "	"
R 23	22 K ohms	+ 20%	½ "	"
R 24	1 K ohms	+ 20%	½ "	"
R 25	470 K ohms	+ 20%	½ "	"
R 26	220 ohms	+ 10%	½ "	"
R 27	22 K ohms	+ 10%	½ "	"
R 28	1 K ohms	+ 10%	½ "	"
R 29	470 ohms	+ 10%	½ "	"
R 30	470 K ohms	+ 20%	½ "	"
R 31	1 M ohms	+ 10%	½ "	"
R 32	47 K ohms	+ 10%	½ "	"
R 33 (RV1)	100 K ohms	+ 10%	½ "	"
R 34	100 K ohms	+ 10%	½ "	"
R 35	150 ohms	+ 10%	½ "	"
R 36	1500 ohms	+ 10%	½ "	"
R 37	39 K ohms	+ 10%	½ "	"

SENDER/RECEIVER (Contd.)

Circuit Reference	Value	Tolerance	Rating	Type
RESISTORS (Contd.)				
R 38	270 K ohms	+ 10%	½ watt	Carbon
R 39	270 K ohms	+ 10%	½ "	"
R 40	470 K ohms	+ 10%	½ "	"
R 41	470 K ohms	+ 10%	½ "	"
R 42	330 ohms	+ 5%	1/4 "	Wire Wound
R 43	270 K ohms	+ 10%	½ "	Carbon
R 44	1 K ohms	+ 10%	½ "	"
R 45	1 K ohms	+ 10%	½ "	"
R 46	1 K ohms	+ 10%	½ "	"
R 47	1 K ohms	+ 10%	½ "	"
R 48	100 K ohms	+ 10%	½ "	"
R 49	100 K ohms	+ 10%	½ "	"
R 50	1 K ohms	+ 10%	½ "	"
R 51	100 K ohms	+ 10%	½ "	"
R 52	100 K ohms	+ 10%	½ "	"
R 53	1 K ohms	+ 10%	½ "	"
R 54	22 K ohms	+ 10%	½ "	"
R 55	100 K ohms	+ 10%	½ "	"
R 56	1 K ohms	+ 10%	½ "	"
R 57	150 ohms	+ 10%	½ "	"
R 58	18 ohms	+ 5%	3 "	Wire Wound
R 59	68 ohms	+ 5%	3 "	" "
R 60	1 M ohms	+ 20%	2 "	Pot ^r . Log Law
R 61	100 K ohms	+ 10%	½ "	Carbon

CAPACITORS

C 1	47 pf	+ 10%	350 V. Wkg.	Silver Mica
C 2	100 pf	+ 5%	500 V "	" "
C 3	300 pf	+ 10%	500 V. "	" "
C 4	.003 µf	+ 20%	350 V. "	Tubular Paper
C 5	330 pf	(Min.cap. at 25°C)	500 V. "	Silver Ceramic
C 6	100 pf	+ 5%	500 V. "	Silver Mica
C 7	6-50 pf			Variable
C 8	3-30 pf			Concentric Trimmer
C 9	100 pf	+ 5%	500 V. "	Silver Mica
C 10	.003 µf	+ 20%	350 V. "	Tubular Paper
C 11	330 pf	(Min.cap. at 25°C)	500 V. "	Silver Ceramic

SENDER/RECEIVER (Contd.)

Circuit Reference	Value	Tolerance	Rating	Type
C A P A C I T O R S (Contd.)				
C 11	330 pf	(Min.cap. at 25°C)	500 V. Wkg.	Silver Ceramic
C 12	100 pf	± 5%	500 V. "	Silver Mica
C 13	6-50 pf			Variable
C 14	2-8 pf			Concentric Trimmer
C 15	.001 µf	± 20%	350 V. "	Tubular Paper
C 16	330 pf	(Min.cap. at 25°C)	500 V. "	Silver Ceramic
C 17	100 pf	± 5%	500 V. "	Silver Mica
C 18	6-50 pf			Variable
C 19	2-6 pf			Variable Trimmer
C 20	100 pf	± 5%	500 V. "	Silver Mica
C 21	100 pf	± 5%	500 V. "	" "
C 22	15 pf	± 5%	500 V. "	" "
C 23	330 pf	(Min.cap. at 25°C)	500 V. "	Silver Ceramic
C 24	6-38 pf			Variable
C 25	2.3-5 pf			"
C 26	100 pf	± 5%	500 V. "	Silver Mica
C 27	4 pf	± 20%	500 V. "	Silver Ceramic
C 28	6-50 pf			Variable
C 29	3-30 pf			Concentric Trimmer
C 30	330 pf	(Min.cap. at 25°C)	500 V. "	Silver Ceramic
C 31	330 pf	(Min.cap. at 25°C)	500 V. "	" "
C 32	330 pf	(Min.cap. at 25°C)	500 V. "	" "
C 33	100 pf	(Min.cap. at 25°C)	500 V. "	" "
C 34	6-50 pf			Variable
C 35	3-30 pf			Concentric Trimmer
C 36	330 pf	(Min.cap. at 25°C)	500 V. "	Silver Ceramic
C 37	55 pf	± 2%	350 V. "	Silver Mica
C 38	.01 µf	± 20%	350 V. "	Tubular Paper
C 39	65 pf	± 2%	350 V. "	Silver Mica

SENDER/RECEIVER (Contd.)

Circuit Reference	Value	Tolerance	Rating	Type
C A P A C I T O R S (Contd.)				
C 40	.01 μ f	$\pm 20\%$	350 V. Wkg.	Tubular Paper
C 41	.01 μ f	$\pm 20\%$	350 V. "	" "
C 42	.01 μ f	$\pm 20\%$	350 V. "	" "
C 43	65 pf	$\pm 2\%$	350 V. "	Silver Mica
C 44	.01 μ f	$\pm 20\%$	350 V. "	Tubular Paper
C 45	65 pf	$\pm 2\%$	350 V. "	Silver Mica
C 46	.01 μ f	$\pm 20\%$	350 V. "	Tubular Paper
C 47	.01 μ f	$\pm 20\%$	350 V. "	" "
C 48	.01 μ f	$\pm 20\%$	350 V. "	" "
C 49	65 pf	$\pm 2\%$	350 V. "	Silver Mica
C 50	.01 μ f	$\pm 20\%$	350 V. "	Tubular Paper
C 51	.01 μ f	$\pm 20\%$	350 V. "	" "
C 52	65 pf	$\pm 2\%$	350 V. "	Silver Mica
C 53	.01 μ f	$\pm 20\%$	350 V. "	Tubular Paper
C 54	.01 μ f	$\pm 20\%$	350 V. "	" "
C 55	65 pf	$\pm 2\%$	350 V. "	Silver Mica
C 56	.01 μ f	$\pm 20\%$	350 V. "	Tubular Paper
C 57	65 pf	$\pm 2\%$	350 V. "	Silver Mica
C 58	.01 μ f	$\pm 20\%$	150 V. "	Tubular Paper
C 59	330 pf	(Min.cap. at 25°C)	500 V. "	Silver Ceramic
C 60	330 pf	(Min.cap. at 25°C)	500 V. "	" "
C 61	330 pf	(Min.cap. at 25°C)	500 V. "	" "
C 62	.01 μ f	$\pm 20\%$	350 V. "	Tubular Paper
C 63	.01 μ f	$\pm 25\%$	350 V. "	" "
C 64	.001 μ f	$\pm 25\%$	500 V. "	" "
C 65	25 pf		12 V. "	Electrolytic
C 66	2 pf	$\pm \frac{1}{2} \mu$ f	500 V. "	Silver Ceramic
C 67	6-38 pf			Variable
C 68	2-8 pf			Concentric Trimmer
C 69	330 pf	(Min.cap. at 25°C)	500 V. "	Silver Ceramic
C 70	330 pf	(Min.cap. at 25°C)	500 V. "	" "
C 71	100 pf	$\pm 10\%$	350 V. "	Silver Mica
C 72	6-50 pf			Variable
C 73	2-8 pf			Concentric Trimmer

SENDER/RECEIVER (Contd.)

Circuit Reference	Value	Tolerance	Rating	Type
C A P A C I T O R S (Contd.)				
C 74	330 pf	(Min.cap. at 25°C)	500 V. Wkg.	Silver Ceramic
C 75	330 pf	(Min.cap. at 25°C)	500 V. "	" "
C 76	100 pf	± 10%	350 V. "	Silver Mica
C 77	6-50 pf			Variable
C 78	2-8 pf			Concentric Trimmer
C 79	330 pf	(Min.cap. at 25°C)	500 V. "	Silver Ceramic
C 80	100 pf	± 10%	350 V. "	Silver Mica
C 81	15 pf	± 5%	350 V. "	Silver Mica
C 82	4 μf		350 V. "	Electrolytic
C 83	.01 μf	± 25%	350 V. "	Tubular Paper
C 84	.01 μf	± 25%	350 V. "	" "
C 85	.01 μf	± 25%	1000 V. "	" "
C 86	330 pf	(Min.cap. at 25°C)	500 V. "	Silver Ceramic
C 87	.01 μf	± 20%	350 V. "	Tubular Paper
C 88	1 pf	± ½ pf	500 V. "	Silver Ceramic
C 89	1 pf	± ½ pf	500 V. "	" "
C 91	330 pf	(Min.cap. at 25°C)	500 V. "	" "
C 92	330 pf	(Min.cap. at 25°C)	500 V. "	" "
C 93	330 pf	(Min.cap. at 25°C)	500 V. "	" "
C 94	330 pf	(Min.cap. at 25°C)	500 V. "	" "
C 95	330 pf	(Min.cap. at 25°C)	500 V. "	" "
C 96	330 pf	(Min.cap. at 25°C)	500 V. "	" "
C 97	.01 μf	± 20%	350 V. "	Tubular Paper

SENDER/RECEIVER (Contd.)

I N D U C T A N C E S

Circuit Reference	Description	Circuit Reference	Description
L.1	R.F. Choke	L.16	I.F. Trans-) former)
L.2	R.F. Choke		Primary) 3.287
L.3	1st Tripler Anode Coil	L.17	I.F. Trans-) former) Secondary)
L.4	R.F. Choke	L.18	I.F. Trans-) former)
L.5	2nd Tripler Anode Coil		Primary)3.287
L.6	R.F. Choke	L.19	I.F. Trans-) former) Secondary)
L.7	Doubler Anode Coil	L.20	3rd Multiplier Anode Coil
L.8	R.F. Choke	L.21	R.F. Choke
L.9	Amplifier Anode Coil	L.22	2nd Multiplier Anode Coil
L.10	Receiver A.E. Coil	L.23	R.F. Choke
L.11	Receiver H.F. Coil	L.24	Crystal Osc. Multiplier Anode Coil
L.12	I.F. Trans-) former) Primary) 3.287	L.25	R.F. Choke
L.13	I.F. Trans-) former) Secondary)		
L.14	I.F. Trans-) former) Primary)3.287		
L.15	I.F. Trans-) former) Secondary)		

Circuit Reference	Description
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R E L A Y

RL A.1	Single Pole Change Over 12 V. Coil R.F. Contacts
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T R A N S F O R M E R S

TR.1	Output Transformer
TR.2	Mic. Input Transformer ZA.2834
TR.3	Modulation Transformer WODEN 15048

SENDER/RECEIVER (Contd.)

Circuit Reference	Description
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S W I T C H E S

SWA	Rotary 1-Pole 4-Way
SWB	Rotary 1-Pole 4-Way

L A M P

LP 1	Bulb 6 V. J WB.0071
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V A L V E S

Circuit Reference	Type	Circuit Reference	Type
V.1	CV.133	V.10	CV.131
V.2	CV.309	V.11	CV.140
V.3	CV.309	V.12	CV.138
V.4	CV.309	V.13	CV.492
V.5	CV.309	V.14	CV.511
V.6	CV.138	V.15	CV.511
V.7	CV.133	V.16	CV.138
V.8	CV.131	V.17	CV.138
V.9	CV.131	V.18	CV.138

POWER SUPPLY UNIT

Circuit Reference	Value	Tolerance	Rating	Type
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R E S I S T O R S

R.1	0.095 ohms		18 watt	Wire Wound
R.2	0.86 ohms		9 watt	" "
R.3	0.66 ohms		7 watt	" "
R.4	22 ohms	+ 20%	1/2 watt	Carbon

C O N D E N S E R S

C.1	.1 µf	+ 20%	350 V. Wkg.	Tubular Paper
C.2	.1 µf	+ 20%	350 V. "	" "
C.3	.1 µf	+ 20%	350 V. "	" "
C.4	.1 µf	+ 20%	500 V. "	" "
C.5	32 µf		500 V. "	Electrolytic
C.6	32 µf		350 V. "	"
C.7	.1 µf	+ 20%	350 V. "	Tubular Paper
C.8	330 pf	+ 10%	350 V. "	Silver Mica

POWER SUPPLY UNIT (Contd.)

Circuit Reference	Description
TRANSFORMERS	
X.1	Rotary Transformer 50 watt ZA.29647 Input 11.5 V. D.C. Output 300 V. D.C. 200 mA
X.2	Rotary Transformer Midget Input 11.5 V. D.C. Output 250 V. D.C. 40 mA
INDUCTANCES	
L.1	Sender L.T. H.F. Choke
L.2	L.T. H.F. Choke
L.4	Receiver H.T. H.F. Choke
L.5	L.T. H.F. Choke
L.6	Receiver H.T. V.H.F. Choke
L.7	L.T. V.H.F. Choke
L.8	L.T. V.H.F. Choke
METERS	
M.1	15 V. D.C. M.C.F.G.
SWITCHES	
SWC	Switch 2-Pole On-Off
SWD	Switch 3-Pole On-Off
FUSES	
FS.1	Cartridge Fuse 500 mA ZA.3577
FS.2	Cartridge Fuse 150 mA ZA.0852
LAMP S	
LP.1	Bulb 12 V. FWB.1490
RELAYS	
$\frac{RLA}{1}$	Relay 100 ohms Coil. Single Pole Change Over 25A