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USER HANDBOOK
for
STATION RADIO C13

WARNING

The voltages employed in this equipment can be sufficiently high to endanger human life. Every reasonable precaution has been observed in design to safeguard operating personnel. The power must be switched off before handling connections or making internal adjustments. For first aid in case of electric shock, see the inside front cover of this handbook

PUBLISHED UNDER THE AUTHORITY OF
THE SIGNAL OFFICER-IN-CHIEF
THE WAR OFFICE
WHITEHALL S.W.1.

NOVEMBER 1960

ASSOCIATED PUBLICATIONS

Nomenclature	WO Code
Wireless Control Harness Type A	11374
•Wireless Control Harness Type B	11195
•Apparatus Loudspeaking No. 19	11356
Mast Telescopic 27-ft. .. ..(SRDE Handbook No. 877A)	
Braid Aerials .. .. (SRDE Handbook No. 1038 (Trials)	

Ground and Sky-wave ranges:- For use in Europe
Middle East
India
Malaya and E. Africa

S Y N O P S I S

STATION RADIO C13

(1) The Station Radio C13 is an HF, VOICE(RT)-CW sender-receiver for use in vehicles, or as a ground station.

(2) Amplitude or Phase modulation is available for use on VOICE (RT). Operating from either a 12 or 24 volt supply the power output is approximately 10 watts AM, or 20 watts PM, into 70 ohms.

(3) A SENDER POWER HIGH-LOW switch makes it possible to select a low power output of approximately one tenth of the full power.

(4) Frequency coverage is 1.5 to 12.0 Mc/s providing 1050 channels at 10.0 kc/s spacing, or 2100 channels at 5.0 kc/s. The number of channels can be doubled again by interpolating to 2.5 kc/s spacing between the 5.0 kc/s markings of the CHANNEL scale.

(5) Four types of aerial can be used.

(a) A vertical 8, 12 or 16 feet whip aerial consisting of up to four 4-feet F sections.

(b) A vertical 27 to 43 feet aerial (Mast Telescopic 27 feet) plus up to four 4-feet F sections.

(c) A braid end fed aerial, continuously variable in length and calibrated for the frequency in use.

(d) A calibrated braid dipole.

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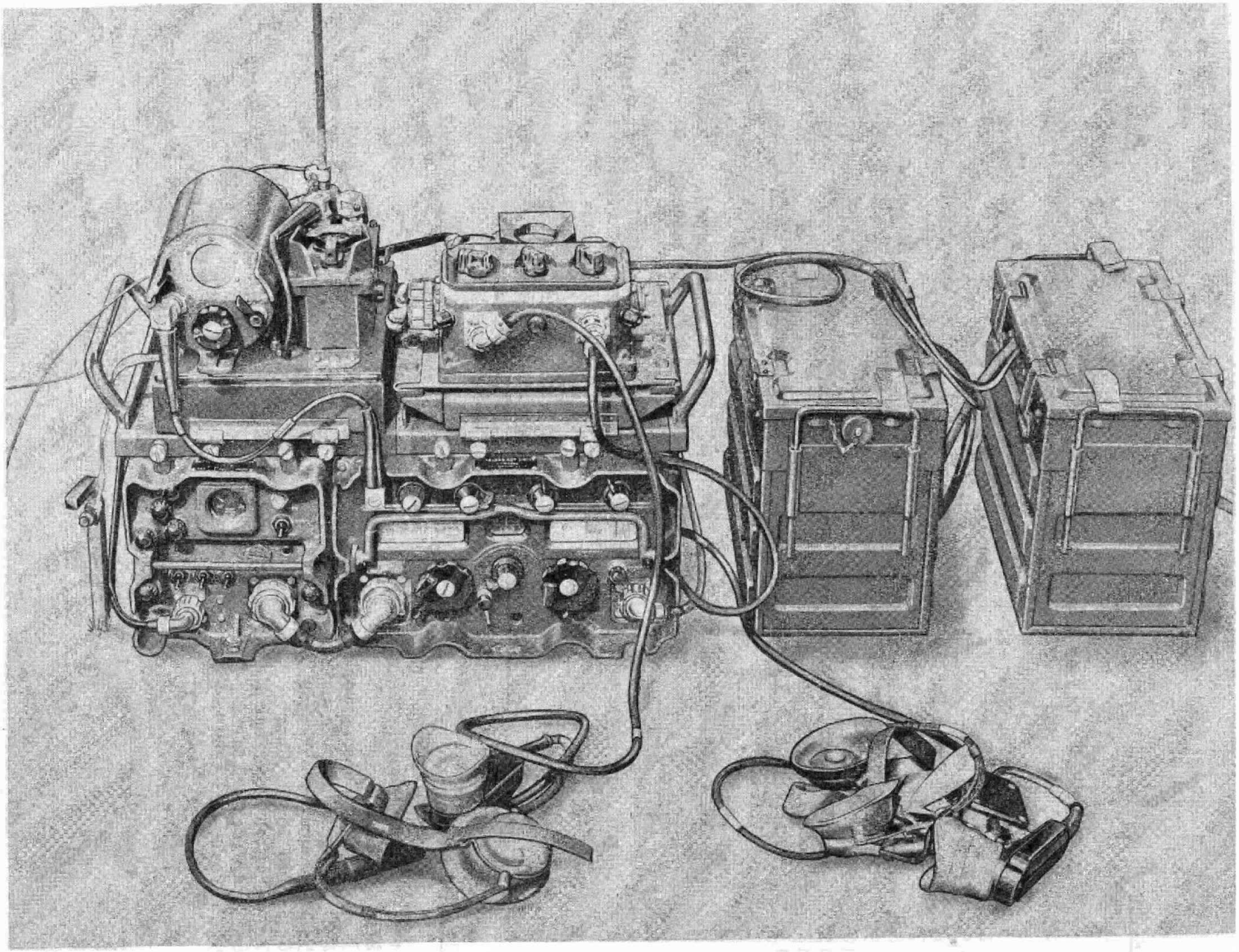


FIG. I STATION RADIO C13 AS GROUND STATION

CHAPTER I

GENERAL DESCRIPTION

Section 1. Purpose and Facilities

(1) The Station Radio C13 is an HF, VOICE(RT)-CW sender-receiver intended for use in vehicles, or as a ground station.

(2) The complete vehicle equipment consists of three main units, the sender-receiver, the power supply unit, and the aerial tuning unit, plus various ancillary items.

(3) The PSU may be either 12 or 24 volts, determined by the vehicle DC supply. (Check that the set is adjusted for the correct voltage. (See Fig. 6).

(4) The ATU will be used for both vehicle and ground station installations, using the aerials specified. Except in the case of the dipole which is connected directly to the set, the equipment should never be operated without the ATU and aerial, or damage may be caused to the sender-receiver.

(5) The ancillary items are the appropriate harness, morse key, headsets, the aerial with its base, the remote aerial adaptor and various connectors.

(6) The sender-receiver cannot be operated without an 'O' box or a Wireless Control Harness Type A or B, details of which are given in a separate user handbook (see page -ii-).

(7) The following facilities are included:

(a) A crystal controlled calibrator to ensure accurate tuning, and to dispense with the necessity for netting.

(b) Automatic control of the modulation level to compensate for varying speech levels into the microphones.

(c) An amplifier, for inter-communication between members of the crew of a vehicle.

(d) Amplitude (AM) or Phase modulation (PM) may be used on VOICE (RT). An increased power output is obtained on RT when PM is used.

(e) Two levels of transmitted power, controlled by the SENDER POWER HIGH-LOW switch as shown in Table 1.

TABLE 1 - APPROXIMATE SENDER POWER RATINGS

	High	Low	
CW	10 watts	1 watt	Into 10 ohm rod aerial through ATU
VOICE (AM)	5 watts	½ watt	
VOICE (PM)	10 watts	1 watt	

(f) Manual re-broadcast between Station Radio C13 and any other set in the same installation controlled by switches in the harness system.

(g) A TRAFFIC-STANDBY switch on the PSU which can be used to switch off the sender valves while on STANDBY, thus reducing power consumption.

(h) A quieting circuit which reduces background noise to the headsets in the absence of signals. (It is not possible to make HF receivers completely noise-free).

Section 2. Frequency Range

(1) Frequency range is 1.5 to 12.0 Mc/s, providing frequency setting points as in Table 2.

TABLE 2 - FREQUENCY SETTING POINTS

Frequency setting points	Spacing	How obtained
1050	at 10.0 kc/s	From 10.0 kc/s points on CHANNEL scale
2100	at 5.0 "	From 5.0 kc/s points on CHANNEL scale)
4200	at 2.5 "	By interpolating between 5.0 kc/s points) on CHANNEL scale

Section 3. Power Supply and Consumption

(1) Power for the sender-receiver is taken from a supply unit of which there are two types. They are designed to operate from 12 or 24 volts, respectively. (Supply Unit Vibratory No. 16 - 24 volts input, or, Supply Unit Vibratory No. 16 - 12 volts input).

(2) In mobile installations the equipment may be connected to the vehicle battery if the voltage is correct for the PSU being used. It is normal practice however to use separate batteries.

(3) Voltage controlling relays incorporated in the power supply unit and junction box JB1 are arranged to reduce variations in output voltages due to changes in the battery voltage. In the case of the SUV No. 16, however, only the relay in the equipment itself is needed, and the wiring is not taken to the harness box. Therefore the Station Radio C13 may be used with an "O" box only.

(4) The relays will select a high voltage tap when a battery of over 25.5 (or 12.75) volts is connected, or a low voltage tap for a battery of less than 25.5 (or 12.75) volts.

(5) Should the installation be working from a battery which was originally over 25.5. (or 112.57) volts, and is now falling, the relay will hold until the battery voltage falls below 23.5 (or 11.75). (The two volts overlap is unavoidable, and must be accepted as an operating characteristic of the relay). This condition can be avoided by switching the PSU power switch off and on after the voltage has fallen below 25V.

(6) Approximate power consumption figures are shown in Table 3.

TABLE 3 - CURRENT CONSUMPTION

Units On	23.0V Input	11.5V Input
IC only	0.4 amps	0.65 amps
IC + Standby	2.0 "	3.20 "
IC + Traffic-receive	3.1 "	4.70 "
IC + Send (LP.RT.AM.)	3.5 "	5.50 "
IC + " (HP.RT.AM.)	5.0	8.50 "
IC + " (LP.CW and RT.FM.)	4.0 "	6.50 "
IC + " (HP.CW and RT.FM.)	6.0 "	10.50 "

Section 4. Aerials

(1) Four basic types of aerial will be used with the Station Radio C13:

(a) A vertical 3, 12 or 16 feet whip aerial consisting of 4-feet 'F' sections.

(b) A vertical 27 to 43 feet aerial consisting of Mast Telescopic 27 feet plus up to four 'F' sections.

(c) A calibrated braid, end-fed horizontal aerial for sky-wave working.

(d) A calibrated braid dipole assembly, (ATU not used). Aerial current is shown on the set meter. Fed by 50 ft. or more of coaxial feeder.

(2) Types (a), (b) and (c) may be used either with the ATU adjacent to the set, or, as remote aerials with the ATU fed by 50 feet of coaxial connector.

(3) A remote aerial adaptor is provided which must be used when the set is operating from a remote aerial. It consists of a sealed die-cast metal box with coaxial input and output connectors, and contains an aerial current meter, and a matching capacitor controlled by a knob adjacent to the meter.

(4) When remote aerial operation is required, or if the set is dismountable for use as a ground station, the ATU will normally be mounted on an Aerial Base and Coupling Unit Assembly (see Fig. 11). This is turn is fixed to a metal tray above the radio set. The Aerial Base and Coupling Unit Assembly may be quickly detached from the metal tray for remote operation. It consists of a metal box upon which are mounted the Remote Aerial Adaptor and an Aerial Base No. 31, and within which can be stowed the counter-poise leads and earth-spike when not in use.

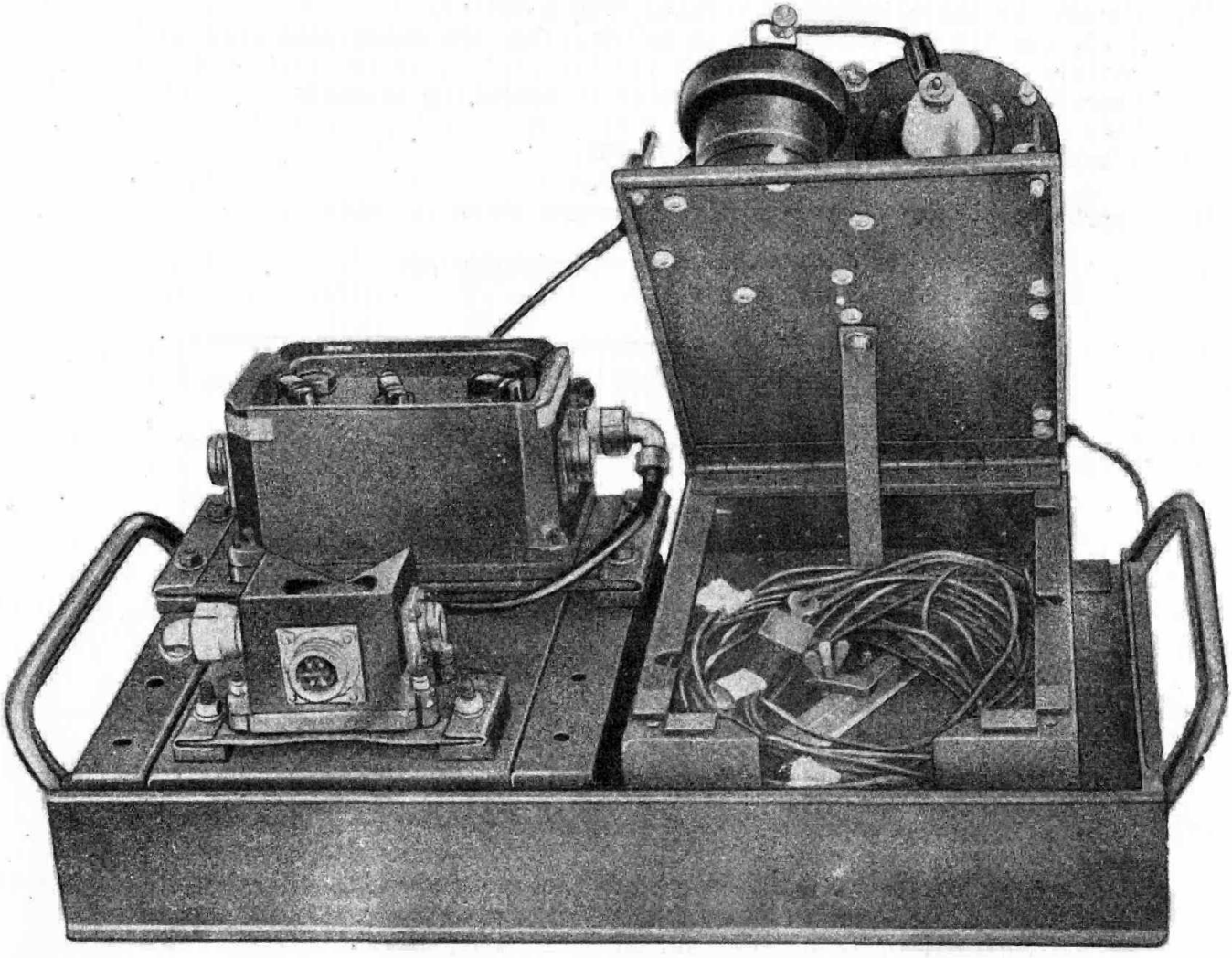


FIG. 2 AERIAL BASE AND COUPLING UNIT ASSEMBLY WITH SPIKE AND RADIALS STOWED

Section 5. Aerial Tuning Unit No. 11

(1) An aerial tuning unit is necessary to match the sender-receiver to the aerial.

(2) The design of the ATU is such that the single control knob performs two purposes. It operates the range switch at the upper and lower limits of rotation, and between those limits provides the movement which constitutes the tuning action of the unit.

(3) The 70 ohm coaxial connectors between the set and the ATU should not exceed the lengths specified, and the coloured socket should always be connected to the ATU.

(4) The ATU will function with aerials (a), (b) and (c), and will match them to the sender-receiver, whether used as local or remote aerials.

(5) The aerial tuning unit should NOT be operated without an aerial, or damage to the sender may be caused.

Section 6. General construction

The Power supply unit, the Sender-Receiver and the Aerial Tuning Unit, are in die-cast sealed metal cases and provided with internal disiccators.

Section 7. Weights and Dimensions

TABLE 4

Unit	Length	Height	Depth	Weight
* Sender receiver	14 in.	8½ in.	14¼ in.	46 lb.
* PSU	8 in.	8½ in.	14¼ in.	35 lb.
ATU	5¼ in. diameter		12¼ in.	9 lb.
			Total	92 lb.

* Identical in size to Station Radio C42, including fixing dimensions.

Section 8. Ground Wave Ranges

Ground-wave ranges, in miles. between two moving vehicles fitted with twelve feet whip aerials, and operating on a frequency of 3.0 Mc/s are shown in Table 5.

Reference should, whenever possible, be made to War Office Ground and Sky Wave Ranges.

TABLE 5

NOTE: These figures are intended only as a rough guide.

	HP		LP	
	Voice (RT) AM	CW	Voice	CW
DAY				
Good country	25	50	15	30
Poor country	13	30	7	15
NIGHT				
Good country	10	20	5	10
Poor country	3	8	2	5
Ranges for FM (VOICE) are approximately 30 per cent greater than AM.				

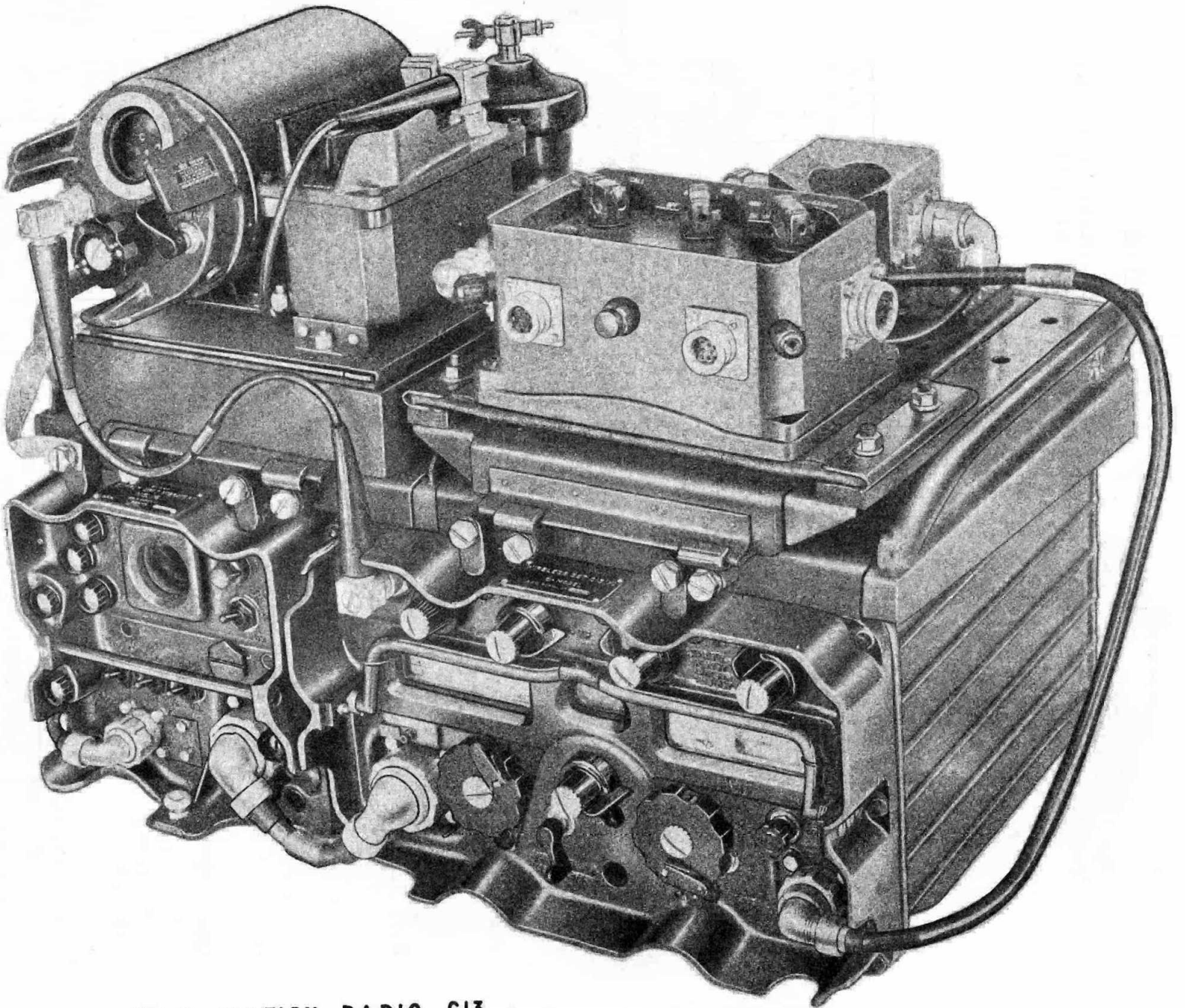


FIG. 3 STATION RADIO C13

CHAPTER 2

OPERATION

WARNING

The voltages employed in this equipment can be sufficiently high to endanger human life. Every reasonable precaution has been observed in design to safeguard operating personnel. The power must be switched off before handling connections or making internal adjustments. For first aid in case of electric shock, see the inside front cover of this handbook

Section 9. Installation Check

(1) The following points should be checked before putting the equipment into use.

(a) That the PSU is connected to the battery via the two-pin plug on the front panel.

(b) That the PSU is connected to the sender-receiver unit via the eighteen-way connector.

(c) That the harness is connected to the twelve-way socket in the lower right-hand corner of the Sender-Receiver.

(d) That the ATU is connected via the 70 ohm coaxial connector to the sender-receiver. (The coloured socket being connected to the ATU).

(e) That the high voltage connector is connected between the base of the aerial and the ATU.

(f) For vehicle use: that the rod aerial is fitted into the Aerial base No. 31, and that the wingnut has been tightened.

(g) That all earth braid connections are made.

(h) That the locking rings of all connectors are tightened firmly by hand.

(j) That the Sender-Receiver has been set to the correct voltage for the vehicle supply. This is indicated by the figure beside a small plate just above the 18-way plug. The front panel of the Sender-Receiver bears both the 12V and 24V legends under the word SUPPLY. The appropriate figures are left uncovered by the mechanic after setting the internal switches to the required voltage. See Fig. 7.T)

(k) Finally, fit the morse key and headsets into appropriate sockets, and if applicable, ascertain that the set selection switch on the control unit is switched to the correct position for the set which is to be used.

Section 10. Operation with Remote Aerials

(1) Preliminary

(a) Remove the complete Aerial Base and Coupling Unit Assembly by detaching it from the tray above the set, and take it to the site chosen for the remote aerial.

(b) Connect the Remote Aerial Adaptor to the ATU with the short length of coaxial cable, then connect the Remote Aerial Adaptor to the set via the 50-ft. coaxial connector.

(c) Remove the four 10-ft. counterpoise leads from their stowage compartment and lay them out symmetrically upon the ground.

(d) Drive the earth spike into the ground, and connect the two earth terminals with the lead provided.

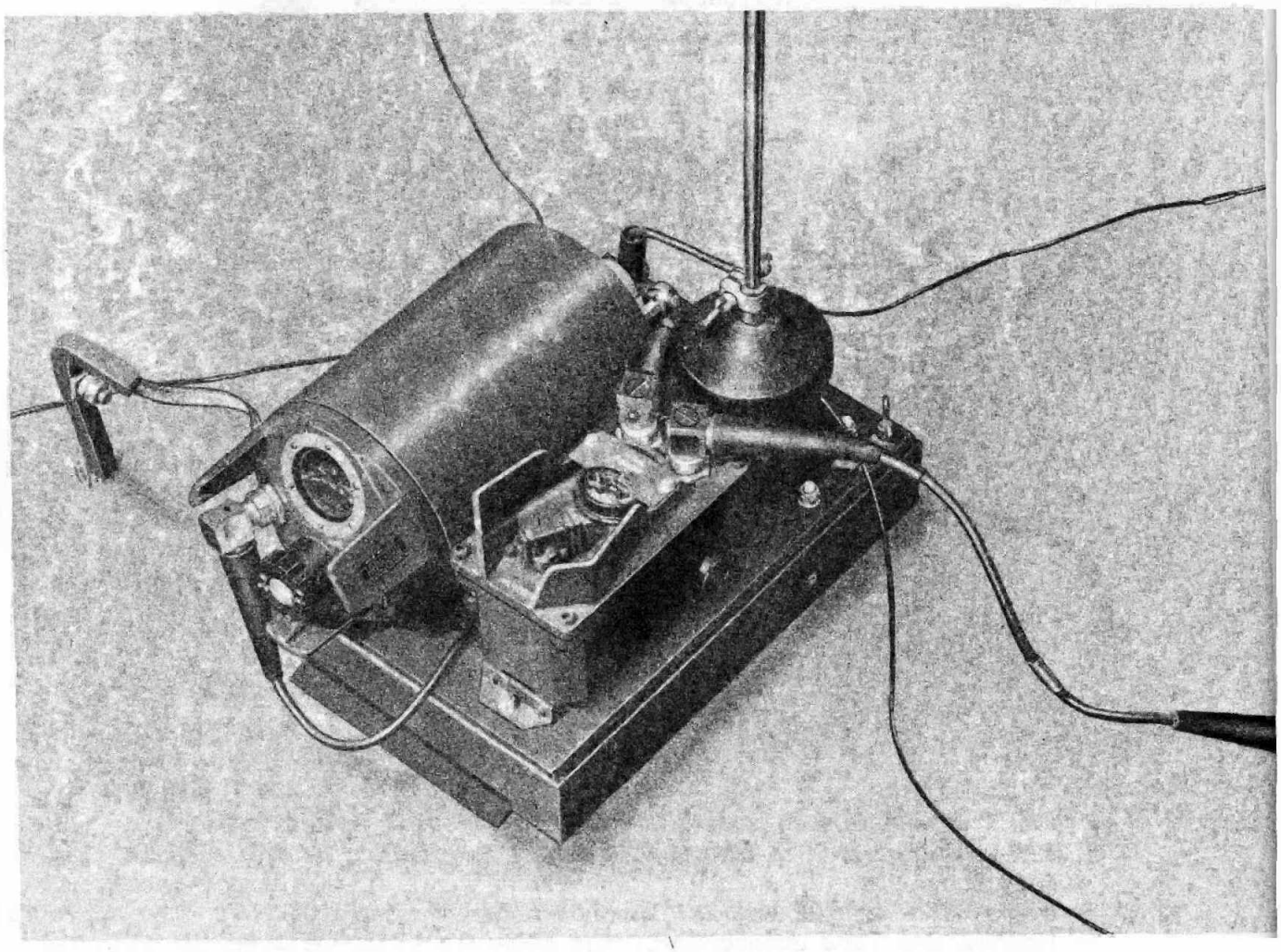


FIG. 4 ROD AERIAL 8 TO 16 FEET REMOTE OPERATION

(2) <u>Erecting the Aerial required</u> (See Fig. 4)

(a) The 8 to 16-feet rod:

(i) Fit the two, three or four 4-feet sections together.

(ii) Insert the rod into the socket on the Aerial base No. 31.

(iii) Tighten the wing nut.

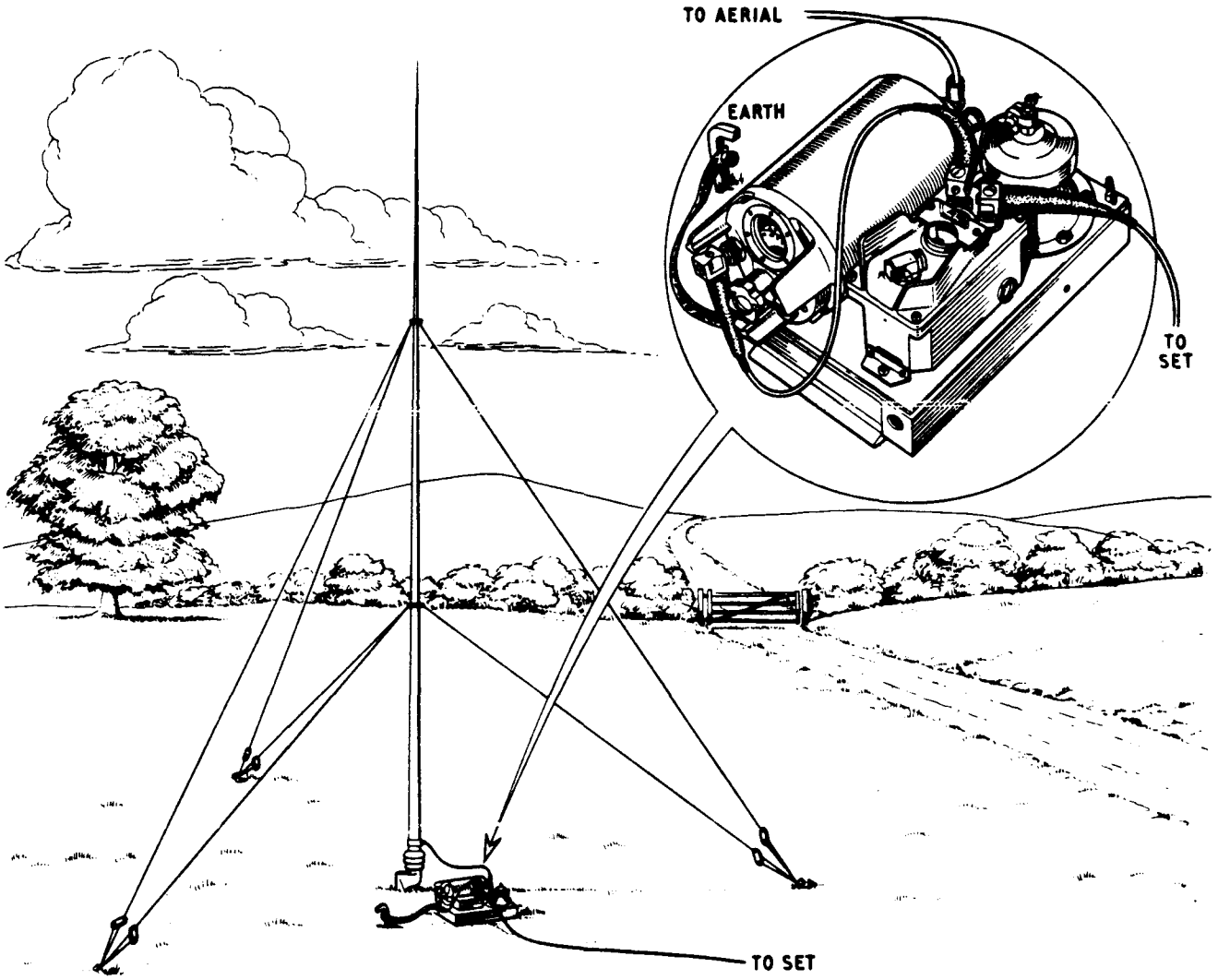


FIG.5 TELESCOPIC AERIAL 27 TO 43 FEET, REMOTE OPERATION

(b) The 27 to 43 feet telescopic aerial.
(See SRDE Handbook No. 877A Mast telescopic 27-ft.)

(c) The braid, end-fed, aerial (Sky-wave aerial).
(See User Handbook No. 1038, Braid Aerials 1.5 to 16.0 Mc/s).

(d) The choice of aerial will be governed by conditions of use, the nature of the terrain, the distance over which communication is required, and by light or dark hours. The reader is referred to the range tables on page 5 and to the WO propagation charts listed under Associated Publications on page -ii- .

Section 11. Power Supply Unit (See Fig. 6)

(1) Check the battery voltage by the meter in the PSU. This will read permanently while the supply is connected, irrespective of the switches.

(2) Put the POWER ON/OFF (C) to ON. The POWER ON lamp (A) should light. If it is too bright, turn the lamp cover in a clockwise direction.

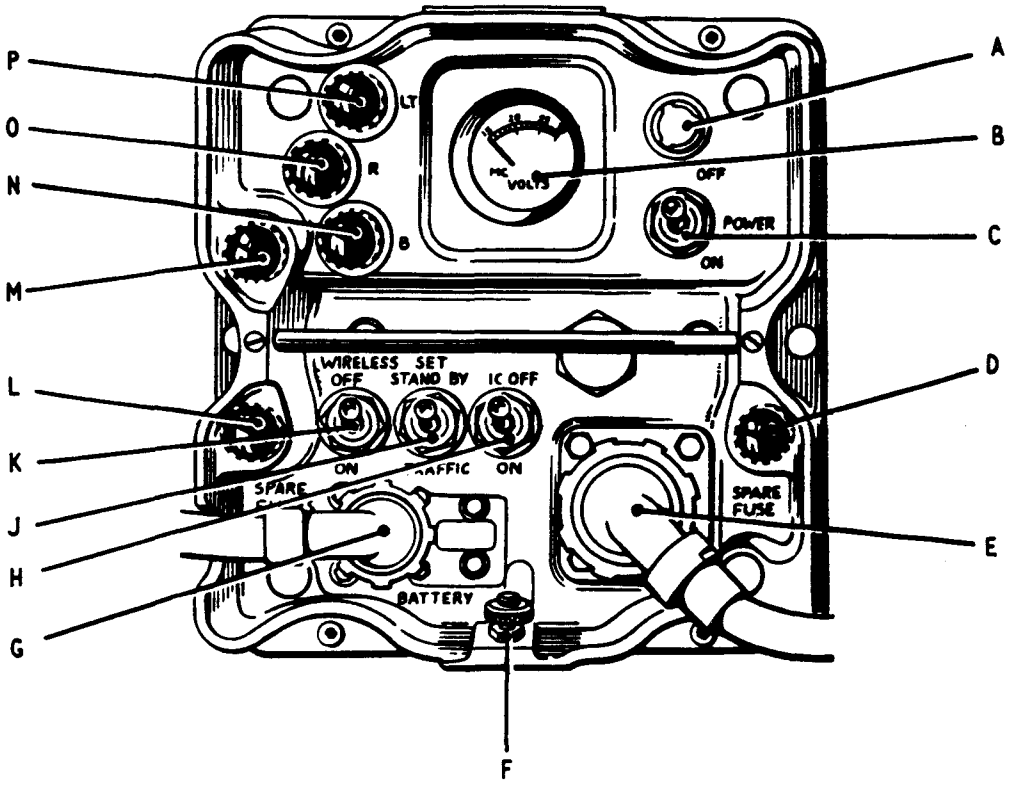
(3) Put the WIRELESS SET ON/OFF switch (K) to ON.

(4) Put the STANDBY-TRAFFIC switch (J) to TRAFFIC.

(5) If inter-communication facilities are required, set the IC ON/OFF switch (H) to ON.

(6) Before tuning, allow at least FIVE MINUTES for the sender-receiver to warm up.

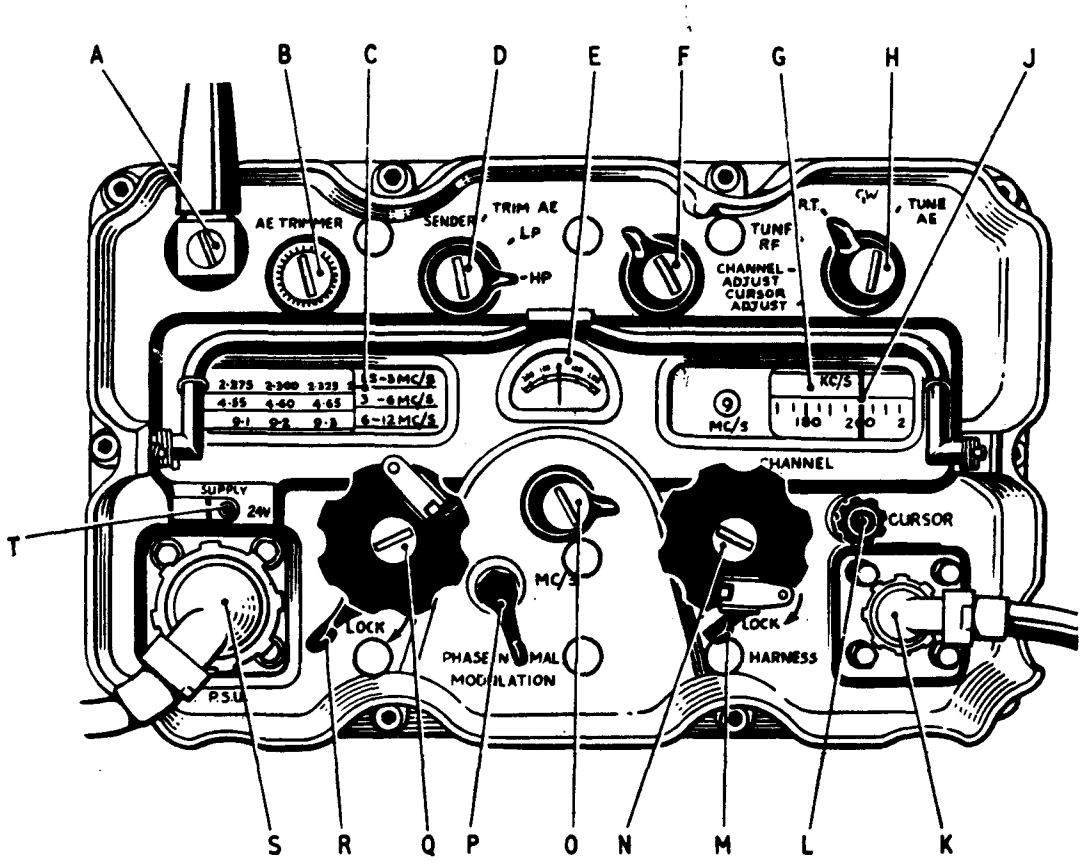
NB: The set may be used 1 minute after switching on but should be recalibrated after five minutes.



KEY

A. POWER ON LAMP	F. EARTH TERMINAL	L. SPARE FUSE
B. METER	G. BATTERY INPUT	M. SPARE FUSE
C. ON/OFF SWITCH	H. I.C. ON/OFF	N. FUSE - LT
D. SPARE FUSE	J. STANDBY TRAFFIC	O. FUSE - RECEIVER
E. OUTPUT SOCKET	K. WIRELESS SET ON/OFF	P. FUSE - SENDER

FIG. 6 CONTROLS, POWER SUPPLY UNIT



KEY

A	AERIAL PLUG	L	CURSOR ADJUSTER
B	AERIAL TRIMMER	M	CHANNEL LOCKING LEVER
C	R.F. SCALE	N	CHANNEL TUNING CONTROL
D	SENDER POWER HIGH-LOW	O	MC/S SWITCH
E	METER	P	NORMAL-PHASE SWITCH
F	C.W. TONE	Q	R.F. TUNING CONTROL
G	CHANNEL SCALE	R	R.F. LOCKING LEVER
H	CALIBRATOR SWITCH	S	BATTERY INPUT
J	CURSOR	T	VOLTAGE SETTING INDICATOR
K	OUTPUT SOCKET		

FIG.7 SENDER RECEIVER

Section 12. Tuning the sender-receiver (See Fig. 7 or 9)

(1) Switch the harness to ON by the switch on the JD9 (Harness Type A) or J1 or J2 box (Harness type B).

(2) Turn the NORMAL/PHASE switch (P) to the type of modulation required. When working CW the switch must be turned to NORMAL.

(3) Set the calibrator switch (H) to CURSOR ADJUST. In this position the crystal calibration points occur every 100 kc/s on the CHANNEL scale (G).

NOTE: The two scales and the centre zero meter are illuminated when the calibrator switch is in positions CURSOR ADJUST, CHANNEL ADJUST, TUNE RF and TUNE AE. The scale lights go out when the switch is set to VOICE (RT) or CW, but the meter scale is illuminated again when the sender-receiver is switched to send.

(4) Set the Cursor (J) near the middle of the "channel" window.

(5) Set the Mc/s switch (O) so that the correct Mc/s figure appears in the window beside the channel scale (G).

NOTE: In the examples in para. 8, the megacycles figures are those which appear before the commas.

(6) Unlock the RF and CHANNEL tuning knobs (N) and (Q) by turning the LOCK levers (M) and (R) anti-clockwise.

(7) Turn the RF tuning knob (Q) until the RF scale (C) shows the required frequency near the middle of the window.

(8) Turn the CHANNEL tuning knob (N) until the CHANNEL scale (G) reads the nearest 100 kc/s to the required frequency.

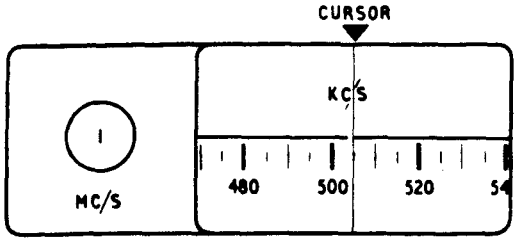
Example:	Required Frequency	Set CHANNEL to
	1,510 kc/s	1,500 kc/s
	5,840 "	5,800 "
	5,860 "	5,900 "
	10,240 "	10,200 "

(9) Carefully turn the CHANNEL tuning knob (N) until the pointer of the centre zero meter (E) reads zero, ensuring that the meter pointer MOVES IN THE SAME DIRECTION AS THE CHANNEL SCALE, AND THE TOP OF THE TUNING KNOB. If the movements of the meter pointer (E) and the CHANNEL scale (G) are in opposite directions, the correct tuning point has not been found, and the process should be repeated turning the knob the other way.

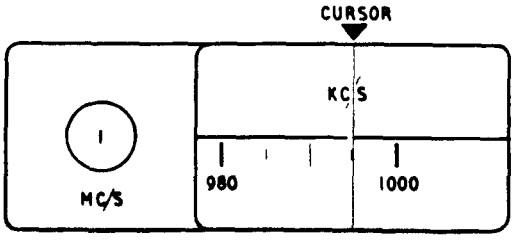
(10) Turn the CURSOR control (L) until the cursor line (J) covers the required 100 kc/s line on the CHANNEL scale (G).

(11) Set the CHANNEL scale to the nearest 10.0 kc/s to the required frequency.

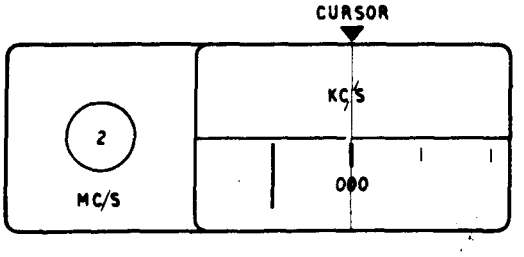
(12) Turn the calibrator switch (H) to CHANNEL ADJUST. The crystal controlled calibration points now occur at every 10.0 kc/s on the CHANNEL scale.



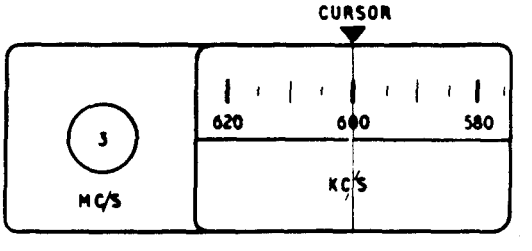
1·5050 MC/S OR 1,505·0 KC/S



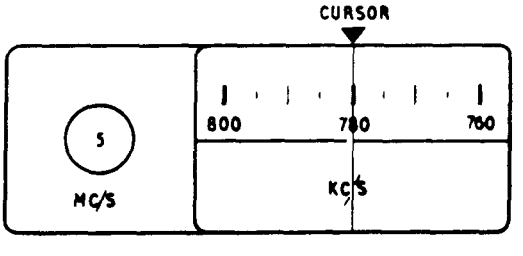
1·9975 MC/S OR 1,997·5 KC/S



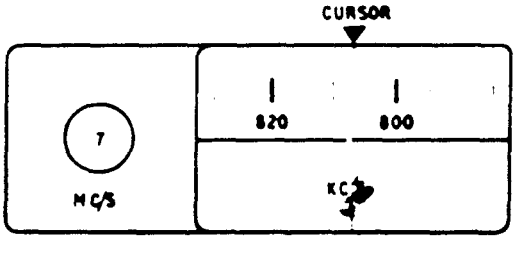
2·000 MC/S OR 2,000·0 KC/S



3·600 MC/S OR 3,600·0 KC/S



5·780 MC/S OR 5,780·0 KC/S



7 8075 MC/S OR 7,807 5 KC/S

FIG. 8 EXAMPLES OF 'CHANNEL' SCALE SETTINGS

(13) Carefully adjust the CHANNEL tuning control (N) until the centre zero meter (E) reads zero, ensuring that the meter pointer moves in the same direction as the CHANNEL scale, as in para (9).

(14) Reset the cursor control (L) so that the cursor line (J) covers the required 10 kc/s line on the channel scale (G).

(15) Now set the CHANNEL scale (G) to the required frequency. (Fig. 8 shows examples of scale setting).

(16) Lock the CHANNEL tuning control (N) by turning the LOCK lever (M) fully clockwise.

NOTE:

(a) If the ordered frequency is an exact multiple of 10 kc/s, steps (14) and (15) may be omitted.

(b) If the ordered frequency is an exact multiple of 100 kc/s, steps (11) to (15) may be omitted.

(17) Set the calibrator switch (H) to TUNE RF.

(18) Now carefully "swing" the TUNE RF control (Q) to check that full-scale deflection can be obtained on BOTH sides of the zero reading, then set the RF scale so that the meter pointer reads the normal zero. The reason for this procedure is that the meter may read zero when the RF tuning is incorrect, but there can be only a small movement of the meter pointer when the RF tune control is rotated. Having tuned the RF, check that the ordered frequency is visible on the RF window.

(19) Lock the RF tune control (Q) by turning the LOCK lever (R) fully anti-clockwise.

(20) Lift the SENDER switch (D) fully upwards in the spring-loaded position, and adjust the AERIAL TRIMMER (B) for maximum deflection on the set meter, (this may be quite a small reading).

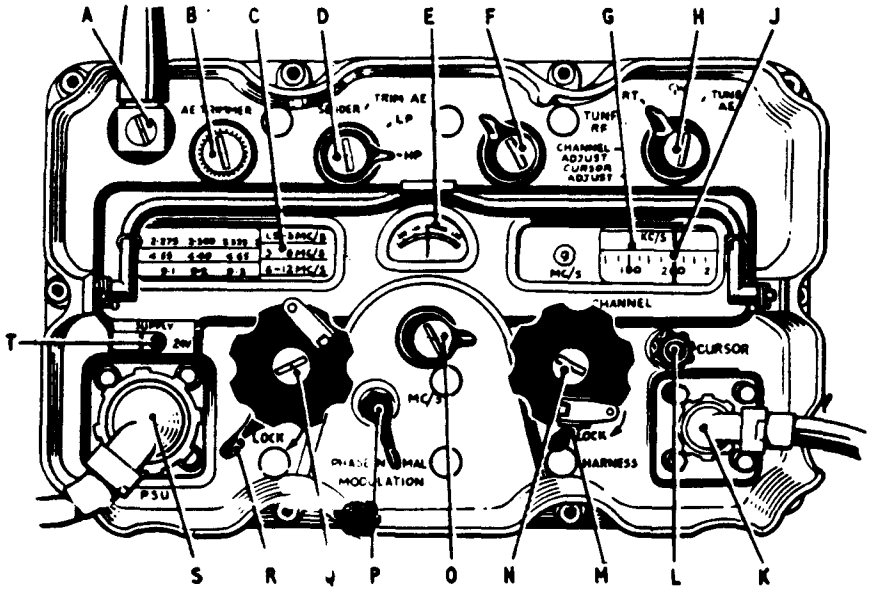


FIG.9 CONTROLS, SENDER-RECEIVER

Section 13. Aerial Tuning Unit (See Fig. 10)
(With local aerial)

(1) Unlock the ATU control (Fig. 10.G). From Table 6 find the approximate setting band required for the ordered frequency and type of aerial to be used, then turn control knob (B) until the scales (D) and (E) indicate the setting.

(2) During a wireless silence the ATU may be temporarily adjusted for maximum noise in the headsets.

(3) In the absence of a wireless silence or when the one in force has been lifted, set the calibrator switch Fig. 7 (H) to TUNE AE. Switch (D) Fig. 7 to "H.P."

(4) Swing the ATU tuning over the band, and tune for maximum deflection of the meter in the set. Any setting which brings the red line of the dial into full view must be ignored, and the unit should be switched to the next range. A setting which brings the red line partly into view must be treated as suspect, and search continued on the next range for a setting giving improved results.

(5) Adjust the AE TRIMMER Fig. 7 (B) for maximum reading of the meter in the set.
(Do NOT switch control (D) to TRIM AE).

(6) The controls of the two units should be re-adjusted alternately until the maximum possible deflection of the meter in the set has been obtained.

(7) Set the SYSTEM switch Fig. 7 (H) to the system required (RT or CW) and check that the NORMAL/PHASE switch is correct (NORMAL for RT-AM or CW, PHASE for RT-PM).

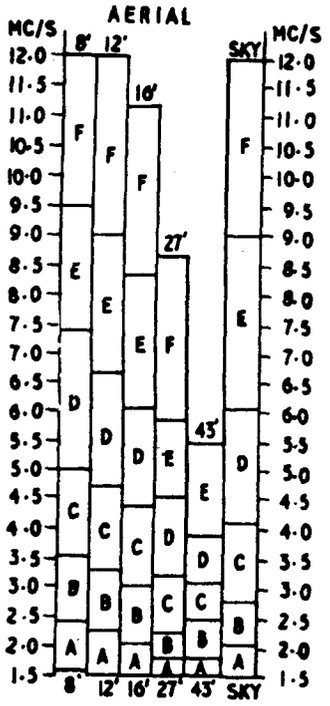


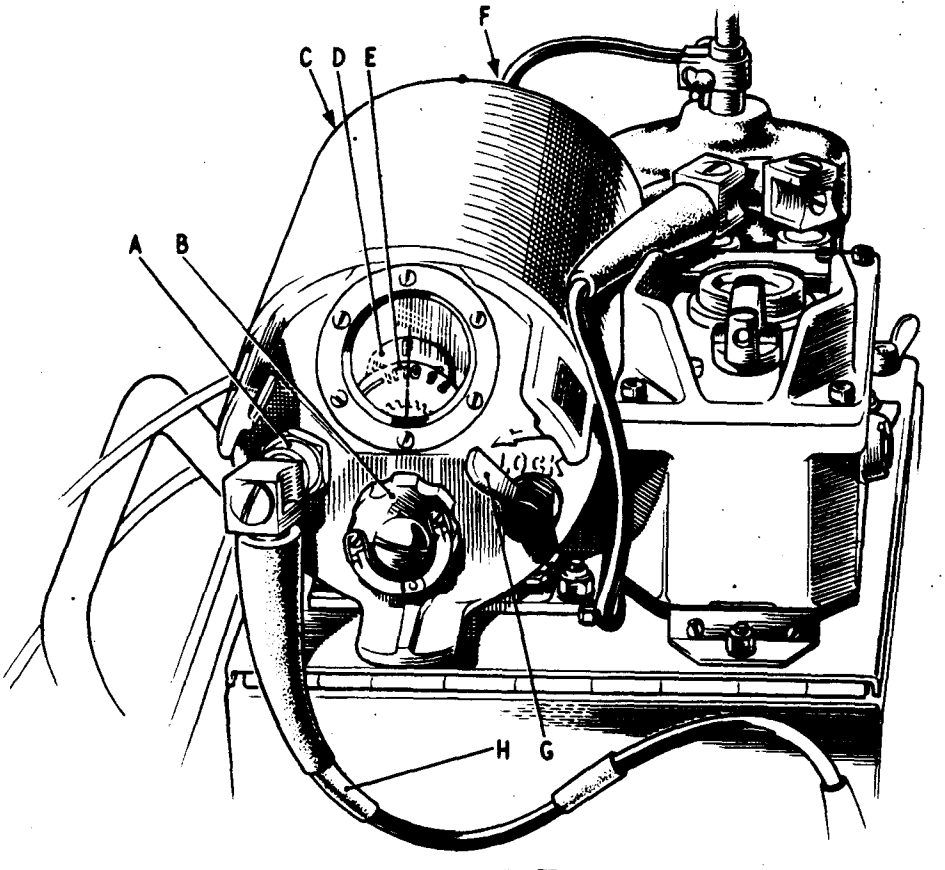
TABLE 6

TABLE 7 - SWITCH POSITIONS

System Required	System Switch (H) to	NORMAL/PM switch to
RT-AM	RT	NORMAL
RT-PM	RT	PHASE
CW	CW	NORMAL

Operate the morse key or pressel switch to send and make final adjustments as follows:-

(a) Adjust the AE TRIMMER Fig. 7 (B) for maximum deflection of the meter in the set. Do not re-tune the ATU on RT-AM.



KEY

A. INPUT SOCKET ATU.
B. TUNING CONTROL ATU.
C. EARTH TERMINAL ATU.
D. RANGE SCALE
E. TUNING SCALE.
F. AERIAL TERMINAL ATU.
G. TUNING CONTROL LOCK
H. CONNECTOR ATU. TO WS. C15

FIG.10 AERIAL TUNING UNIT

(b) When using PM retune both the AE TRIMMER (as in (a)) and if necessary, the ATU.

(c) Lock the ATU control knob by turning the LOCK knob (Fig. 10.G) fully anti-clockwise.

NOTE: The meter will read constantly while sending, so that any marked departure from the reading obtained in (a) would indicate that the installation needs re-tuning, or that a fault has developed. Modulation can be seen on the meter on AM (NORMAL) but NOT on PM.

(8) Set the SENDER POWER HIGH-LOW switch Fig. 7 (D) to the output power required.

Section 14. Aerial Tuning Unit (See Fig. 11)
(With remote aerial)

(1) Unlock the ATU control. From Table 6, page 16, find the approximate setting band required for the ordered frequency and the type of aerial to be used, then turn control knob (D) until the scales (B) and (C) indicate this setting.

(2) During a wireless silence the ATU may be temporarily adjusted for maximum noise in the headsets.

(3) In the absence of a wireless silence or when the one in force has been lifted, set the calibrator switch Fig. 9 (H) to TUNE AE. Switch (D) to "H.P."

(4) At the remote aerial, swing the ATU tuning control Fig. 11 (d) over the band, and tune for maximum deflection of the meter Fig. 11 (H) in the Remote aerial adaptor, then tune the remote aerial adaptor matching knob (Fig. 11 (f)) for maximum deflection of the meter. It may be necessary to adjust the controls of both units alternately to obtain the maximum possible deflection. Any setting of the ATU which brings the red line of the dial into full view must be ignored and the unit should be switched to the next range. A setting which brings the red line partly into view is suspect, and search should be continued on the next range for a setting giving improved results.

(5) Set the SYSTEM switch Fig. 7 (H) to the system required (RT or CW) and check that the NORMAL/PHASE switch is correct (NORMAL for RT-AM or CW, PHASE for RT-PM).

TABLE 7 - SWITCH POSITIONS

System Required	System Switch (H) to	NORMAL/PM switch to
RT-AM	RT	NORMAL
RT-PM	RT	PHASE
CW	CW	NORMAL

Operate the morse key or pressel switch to send and make final adjustments as follows:

(a) Adjust the AE TRIMMER Fig. 7 (B) for maximum deflection of the meter in the set. Do not re-tune the ATU on RT-AM.

(b) When using PM retune both the AE TRIMMER (as (a) above) and if necessary, the ATU.

(c) Lock the ATU control knob by turning the LOCK knob Fig. 11(E) fully anti-clockwise.

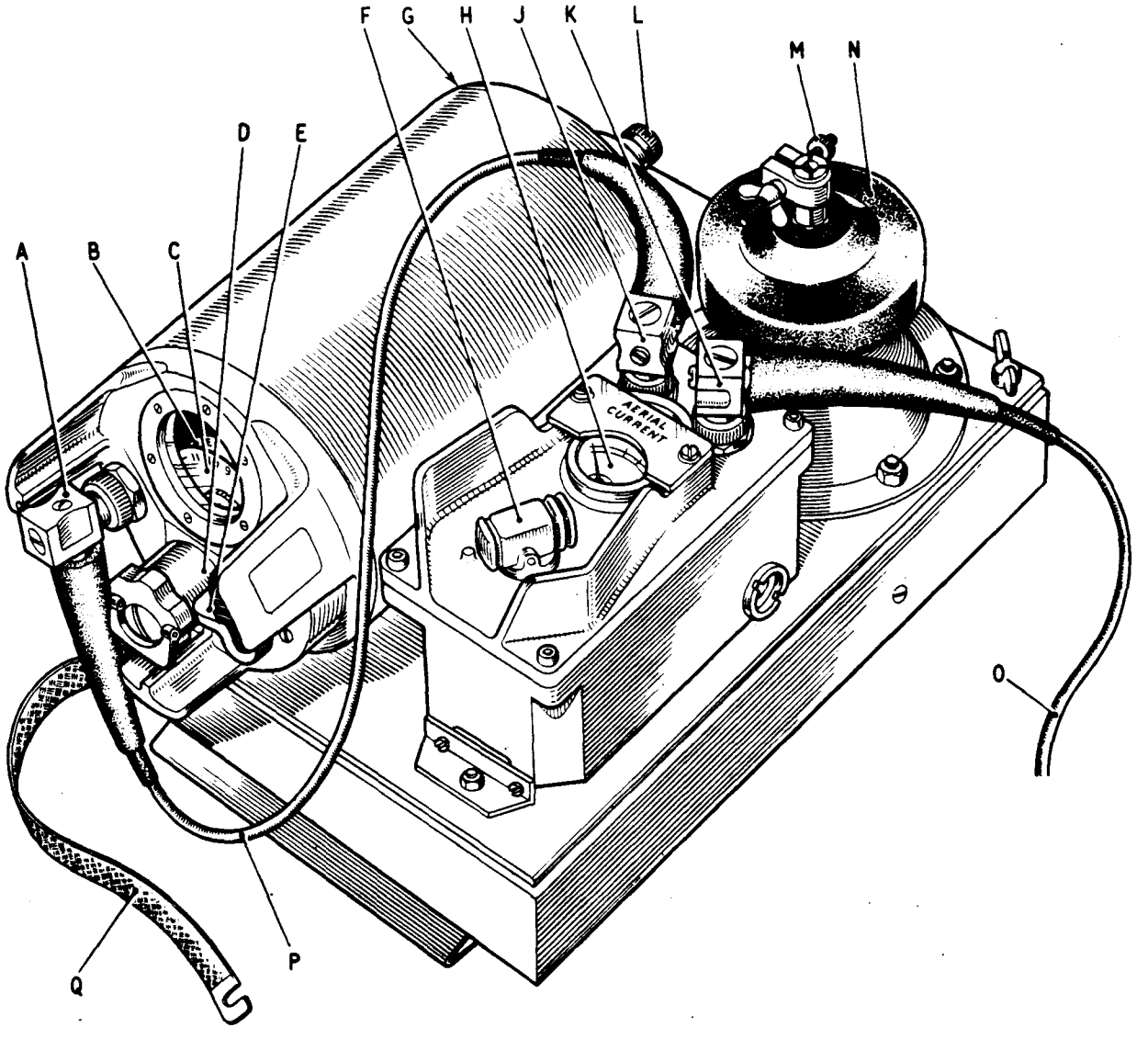
NOTE: See Note on page 17.

(6) Set the SENDER POWER HIGH-LOW switch Fig. 7 (d) to the output required.

Section 15. Mode of Operation

(1) To Use the Installation on:

(a) VOICE: Set the calibrator switch Fig. 7(H) to RT, and depress any pressel button to switch on the sender. Set the volume of sound in the headsets by individual adjustment of the GAIN controls in the junction boxes.



KEY

A	INPUT SOCKET, ATU	J	REM. AE. ADAPTOR OUTPUT SOCKET
B	RANGE SCALE	K	REM. AE. ADAPTOR INPUT SOCKET
C	TUNING SCALE	L	AE. TERMINAL-ATU
D	TUNING CONTROL ATU	M	AE. TERMINAL - AERIAL BASE
E	TUNING CONTROL LOCK	N	AERIAL BASE
F	MATCHING CONTROL - REM. AE. ADAPTOR	O	CONNECTOR TO WS. C 13.
G	EARTH TERMINAL	P	CONNECTOR - REM. AE. ADAPTOR TO ATU
H	ATU & REM. AE. ADAPTOR TUNING METER	Q	EARTH STRIP

FIG. 11 ATU AND REMOTE AE. ADAPTOR

(b) CW: Set the calibrator switch (H) to CW. This prepares the sender for transmissions using the morse key. The sidetone on CW transmission is derived from an internal neon oscillator, the pitch of the note being fixed. When receiving CW, the pitch of the note may be varied to suit the operator by adjustment of the control marked CW TONE (F). The volume is adjusted as in (a) above.

(2) Set the SENDER POWER switch (D) to HIGH or LOW as required.

(3) The set is now ready for use.

(4) When the Sender is not required (during wireless silence) switch to STANDBY (Fig. 6 (J)).

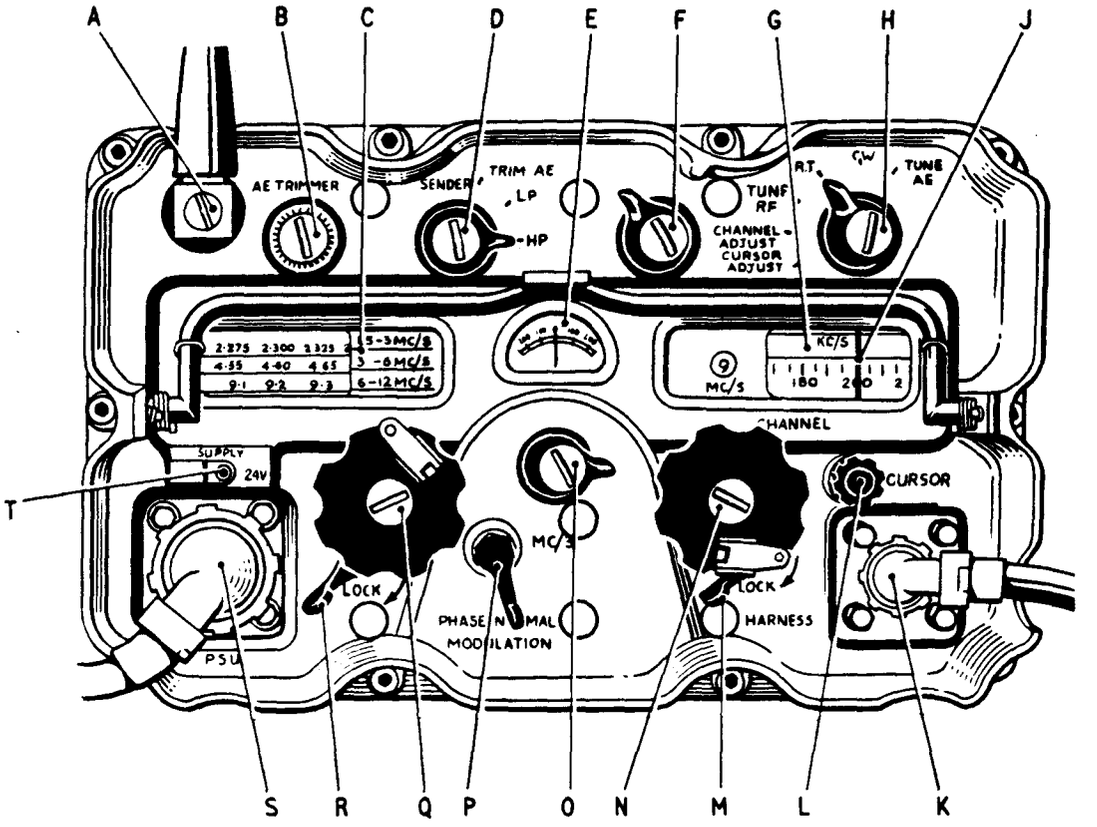


FIG.12 SENDER RECEIVER

Section 16. To Re-check the Tuning

(1) To check that the tuning is still correct, set the calibrator switch (H) to ADJ CHANNEL. If operating frequency is an exact multiple of 10 kc/s proceed to (3).

(2) If the operating frequency is not an exact multiple of 10 kc/s, unlock the CHANNEL tuning control (N) and set the CHANNEL scale (G) to the nearest 10 kc/s dial marking.

(3) If the meter Fig. 7 (E) no longer shows a central reading, unlock and carefully adjust the CHANNEL tuning control (N) until the meter again reads zero.

NOTE: In paras. (3) and (7) the amount of adjustment required should be only fractional. If this is not so, refer to Section 10, and completely retune the sender-receiver.

(4) Reset the CURSOR control (L) so that the cursor line covers the required 10 kc/s line.

(5) Reset the CHANNEL scale (G) to the required frequency and lock the tuning control.

(6) Reset the calibrator switch (H) to RT or CW as required.

(7) To check the RF tuning, set the calibrator switch (H) to TUNE RF.

(8) If the centre zero meter (E) does not read zero, unlock the RF tuning control (Q) and carefully adjust it until the meter again reads zero.

(9) Relock the RF tuning control (Q) and return the calibrator switch (H) to the RT or CW position as required.

Section 17. To change Frequency

(1) To change to a different frequency, repeat the procedure outlined in Sections 12, 13 and 14.

Section 18. "Searching"

(1) Under exceptional circumstances it is possible to "search" on either side of the operating frequency, with little loss of signal strength.

(2) This is achieved by de-tuning the CHANNEL scale to either side of the operating frequency, but without disturbing any of the other controls. The AFC circuits will hold the sender frequency to the same frequency as the receiver, within the limits shown in Table 8 as follows:

TABLE 8 - A.F.C. LIMITS

Frequency	Control Limits
1.5 to 3.0 Mc/s	± 10.0 kc/s
3.0 to 6.0 "	± 10.0 "
6.0 to 12.0 "	± 16.0 "

(3) The following is quoted as an example: a station within a net fails to make contact, and is heard by the control station operator, searching as suggested, to be calling off frequency. Without further alteration of any of the set

controls the delinquent station may be called and coached to the correct frequency.

(4) The control station operator need only reset the CHANNEL scale to the original frequency, and lock the CHANNEL tuning control. It should not be necessary to repeat the setting up procedure.

Section 19. Station Radio C13 as Outstation - Old type set as Control Station

It may be necessary to use Station Radio C13 in conjunction with HF radio sets of other types. If the control station is of modern design it may be set accurately to the ordered frequency without reference to any other equipment. Examples of these sets are Station Radio C11/R210, and A510. The normal setting up procedure described in Section 11 may then be used for Station Radio C13.

If the control station set is an older design, a "netting" drill may be required because the control station may not be exactly on the ordered frequency but only near to it. Examples of these are Station Radio No. 19, No. 62 and C12. Control station procedure for these sets will be found in the appropriate handbook.

So far as the Station Radio C13 is concerned, the control station will transmit a "netting" call to which the Station Radio C13 must be tuned. Under these conditions the following procedure should be followed.

(1) Set up to the ordered frequency as in Sections 11, 12 and 13.

(2) Turn the SYSTEM switch to RT or CW, depending upon which is to be used.

(3) Adjust the CHANNEL control only until the control station is heard calling. If the control station is not heard, it may be a long way off frequency, in which case a large detuning of the channel dial may be necessary, involving adjustments to the TUNE R.F. control for maximum noise in the phones.

(4) Having identified the control station, wait for a netting call, or any suitable long transmission.

(5) Turn the system switch (H) to CW.

(6) Set the CW TONE control to the pointer (this may be done by squeezing the control knob and the pointer between the finger and thumb).

(7) Adjust the CHANNEL control for zero beat with the control station signal in the phones.

(8) Turn system switch to TUNE R.F.

(9) Adjust the R.F. tuning control for centre-zero on the set meter.

(10) Set system switch to the required system.

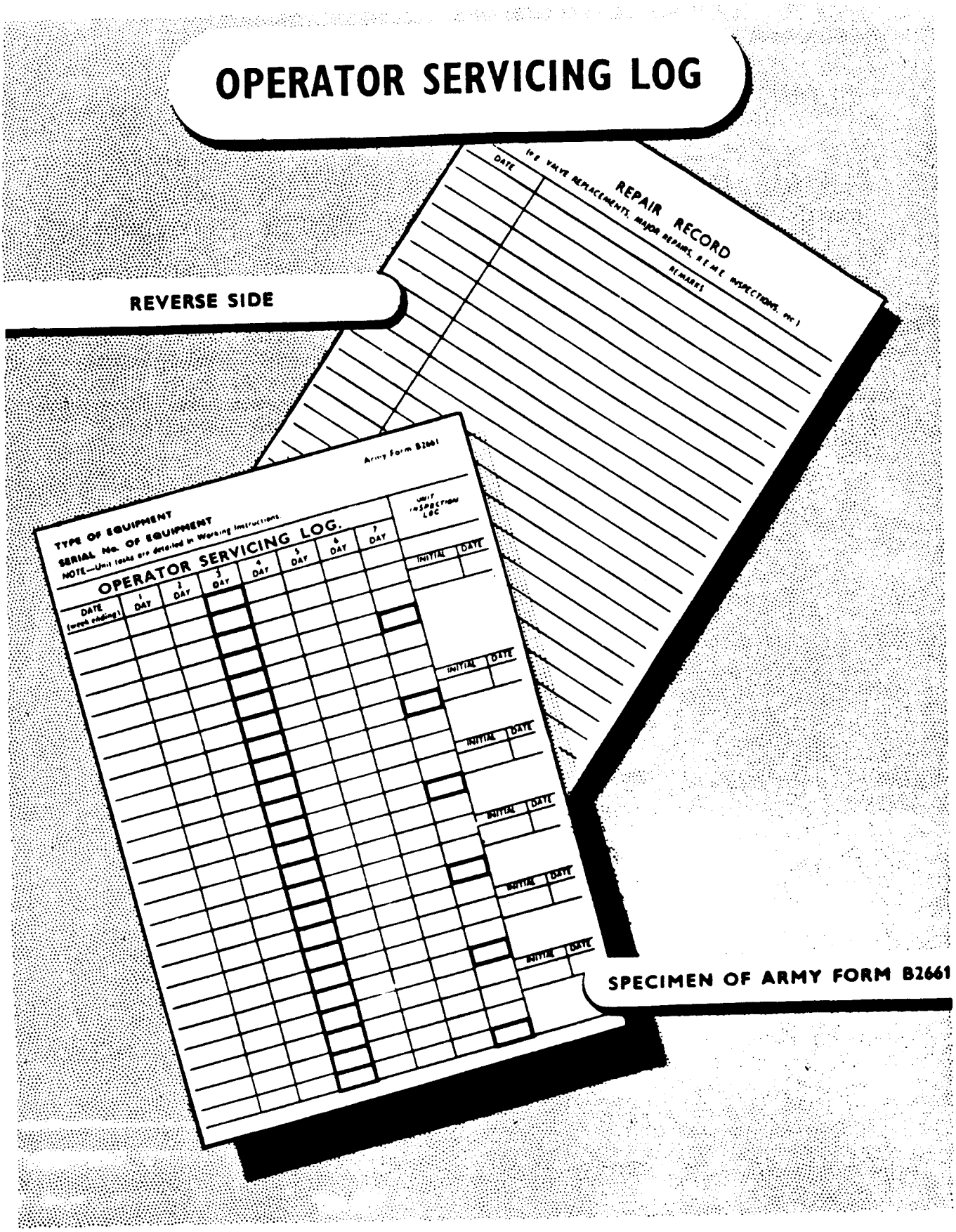
(11) Readjust aerial tuning if necessary, as in Section 12 or 13.

Section 20. Station Radio C13 as Control - Old Type Set as Outstations

Section 19 describes a suggested procedure when Station Radio C13 is joining a net which is controlled by an older type of set. It may, alternatively, happen that Station Radio C13 is control station in a net which includes or is joined by older type sets. In this case the normal procedure for establishing communication may be used, as detailed in Signal Training (all arms) Pamphlet No. 7, Chapter 5, Section 19. For the "netting" call (paragraph 7) the Station Radio C13 operator will simply hold the pressel switch depressed for the appropriate time.

OPERATOR SERVICING LOG

REVERSE SIDE



SPECIMEN OF ARMY FORM B2661

CHAPTER 3

USER SERVICING

WARNING

The voltages employed in this equipment can be sufficiently high to endanger human life. Every reasonable precaution has been observed in design to safeguard operating personnel. The power must be switched off before handling connections or making internal adjustments. For first aid in case of electric shock, see the inside front cover of this handbook

Section 21. General

(1) No equipment can be expected to work properly unless it is kept in first class condition by regular servicing, conscientiously carried out. This is the responsibility of the NCO or man who is in direct charge of the equipment and responsible for its operation, and NOT of workshop or repair staffs, though workshop personnel may be called upon to carry out certain servicing tasks.

(2) To guide the NCO or man responsible for servicing, and to ensure that it is carried out regularly, Signal equipment is serviced on a task system.

The Tasks in the case of the Station Radio C13, are very simple and few in number. They are detailed in Section 22.

Instructions regarding supervision of servicing, frequency of carrying out each task and recording of completion of tasks will be issued by Unit Commanders. Army Form B2661 may be used for recording purposes.

Section 22. Operator's Servicing

(1) Servicing Tasks

(a) Keep the equipment clean and dry, and remove any dirt from plugs and sockets, dials, and control knobs. In extreme cases the aerial plugs and sockets may be rinsed out with clean carbon tetrachloride, and allowed to dry out thoroughly before being connected.

(b) Check all switches and controls to ensure that they are working correctly.

(c) Examine all connectors for frayed ends or damaged insulation. Connectors with metal braid covering should have the braid securely bonded to the metal plugs. If any connectors appear to be faulty, report this to the appropriate technician.

(2) Replacement of Faulty Items

(a) If the POWER ON lamp in the PSU is faulty, unscrew the cover and replace the bulb. The correct replacement is Type 'F', 12.0 volts, 0.1A.

(b) The fuses are arranged as follows: (Fig. 6)

(i) Upper fuse LT (P)

(ii) Middle fuse, receiver (O)

(iii) Lower fuse, sender (N)

(c) To check the fuses, proceed as shown:

(i) The meter in the PSU is reading, therefore the LT fuse is serviceable and power is reaching the set.

(ii) No meter reading, change upper fuse. The correct replacement is Fuse link, cartridge, glass, 10A, 440V AC, X2/5920-99-011-9925.

(iii) Receiver appears to be dead, and the scale lights are out, but aerial meter reads when key or pressel switch is depressed. Change centre fuse. The correct replacement is Fuse link, cartridge, glass, ferrule contact, 4A, 250V AC, X2/5920-99-943-9273.

(iv) Lights and receiver normal, sender fails to work when key or pressel switch is depressed. Change the lower fuse. The correct replacement is Fuse type 7 amp for 24V or Fuse type 10 amp for 12V units.

(v) Three spare fuses will be found in stowage spaces at the edge of the PSU. Spare caps are also provided in case of loss.

TABLE 9 - FAULT LOCATION

NOTE: Table 9 should be used only after the set has been rechecked to Sec. 9.

Symptom	Possible Fault	Remedy
(1) Set apparently dead	(a) Supply not switched on	(a) Switch on
	(b) Batteries low (indicated	(b) Replace with fully charged batteries
	(c) Fuse blown	(c) Replace with new fuse
	(d) Internal fault in Set	(d) Report to technician
(2) Set working but no signals	(a) Faulty headset (Receivers or microphone)	(a) Change the headset
	(b) Aerial broken off	(b) Replace the aerial
	(c) Incorrect tuning	(c) Re-tune
	(d) Internal fault	(d) Report to technician
(3) Fuses repeatedly blowing	(a) Internal fault	(a) Report to technician

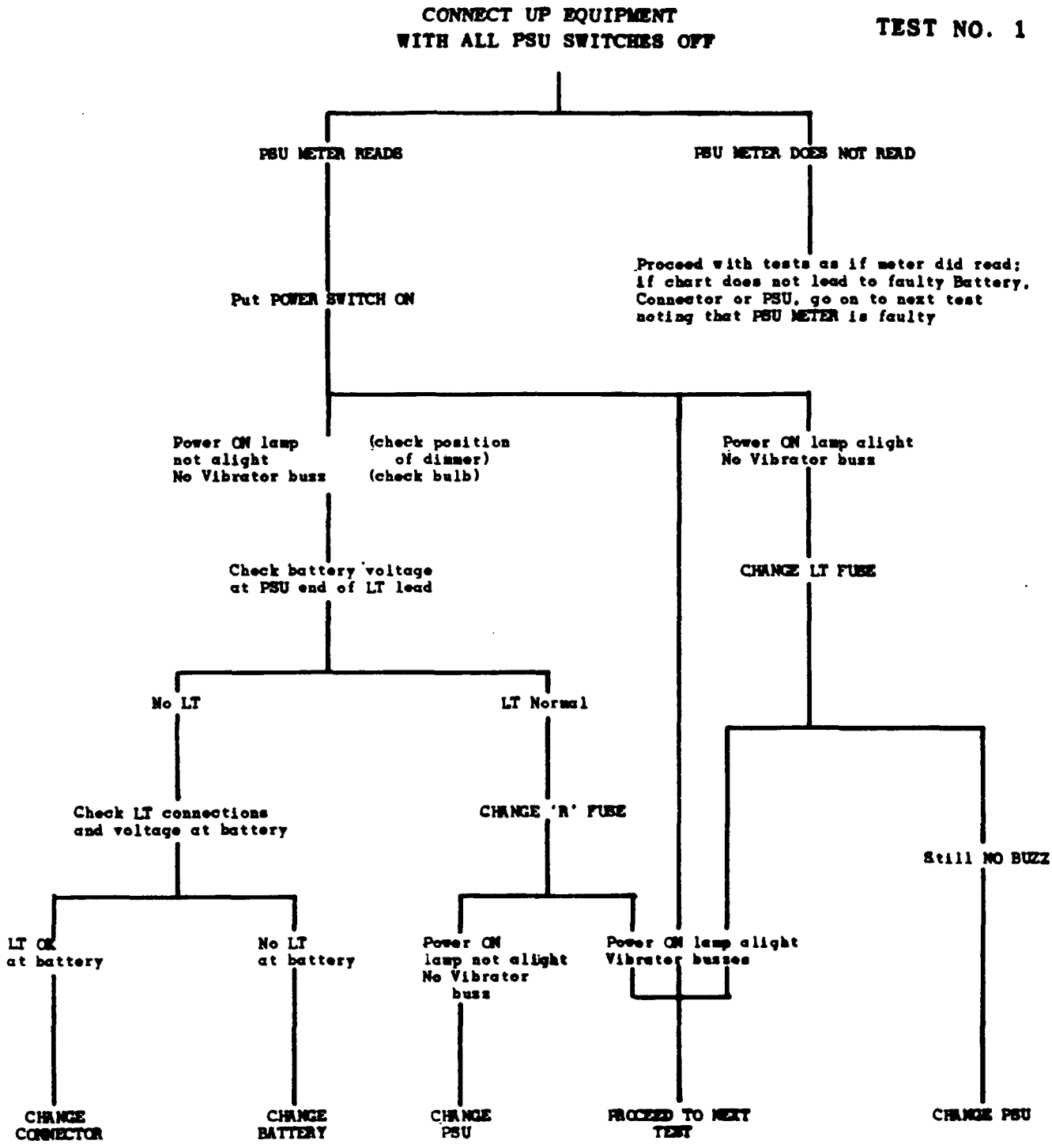
Section 23. Technicians Servicing Notes

The following charts present a systematic method of checking the performance of a Station Radio C13 without opening any of the units, and using only an FT1. If the equipment satisfies the following checks then it is reasonably certain to be in good working order. If the equipment is faulty then the checks will indicate in which unit the fault lies.

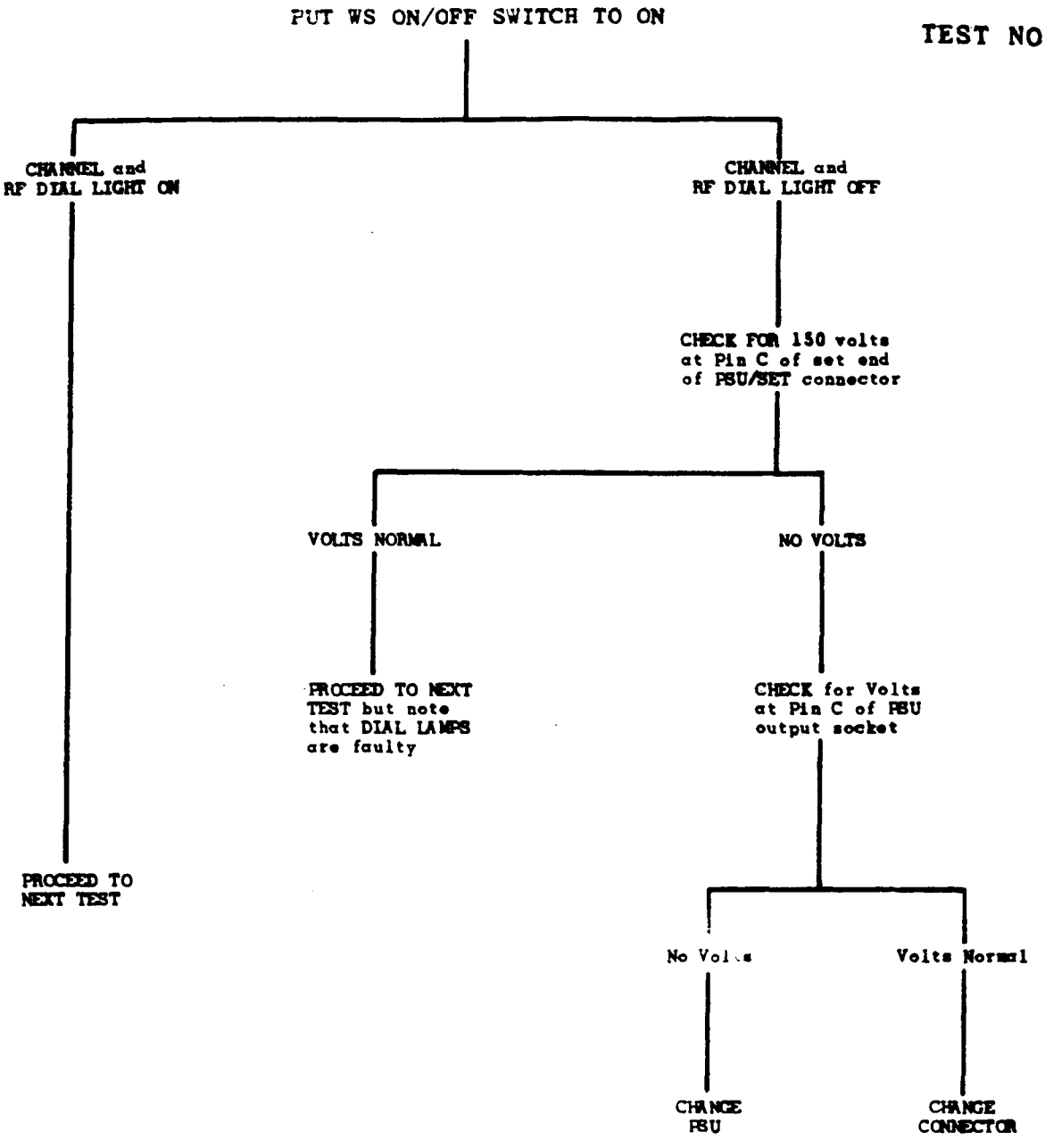
It should be noted that these charts are not intended to be used for locating faulty items in the control harness (control or junction boxes, microphone and receiver assemblies, or connecting leads between the set and harness or between harness boxes). These are dealt with in the appropriate installation handbook.

In some of the checks a specific frequency is quoted. It is advisable to repeat these tests using the same frequency on which the operator failed to make contact.

TEST NO. 1


CONNECT UP EQUIPMENT
WITH ALL PSU SWITCHES OFF
PSU METER READS
PSU METER DOES NOT READ
Proceed with tests as if meter did read; if chart does not lead to faulty Battery, Connector or PSU, go on to next test noting that PSU METER is faulty
Put POWER SWITCH ON
Power ON lamp not alight No Vibrator buzz
(check position of dimmer) (check bulb)
Power ON lamp alight No Vibrator buzz
Check battery voltage at PSU end of LT lead
CHANGE LT FUSE
No LT
LT Normal
Check LT connections and voltage at battery
CHANGE 'R' FUSE
Still NO BUZZ
LT OK at battery
No LT at battery
Power ON lamp not alight No Vibrator buzz
Power ON lamp alight Vibrator buzzes
CHANGE CONNECTOR
CHANGE BATTERY
CHANGE PSU
PROCEED TO NEXT TEST
CHANGE PSU

TEST NO. 2


PUT WS ON/OFF SWITCH TO ON
CHANNEL and RF DIAL LIGHT ON
CHANNEL and RF DIAL LIGHT OFF
CHECK FOR 150 volts at Pin C of set end of PSU/SET connector
VOLTS NORMAL
NO VOLTS
PROCEED TO NEXT TEST but note that DIAL LAMPS are faulty
CHECK for Volts at Pin C of PSU output socket
PROCEED TO NEXT TEST
No Volts
Volts Normal
CHANGE PSU
CHANGE CONNECTOR

TEST NO. 3

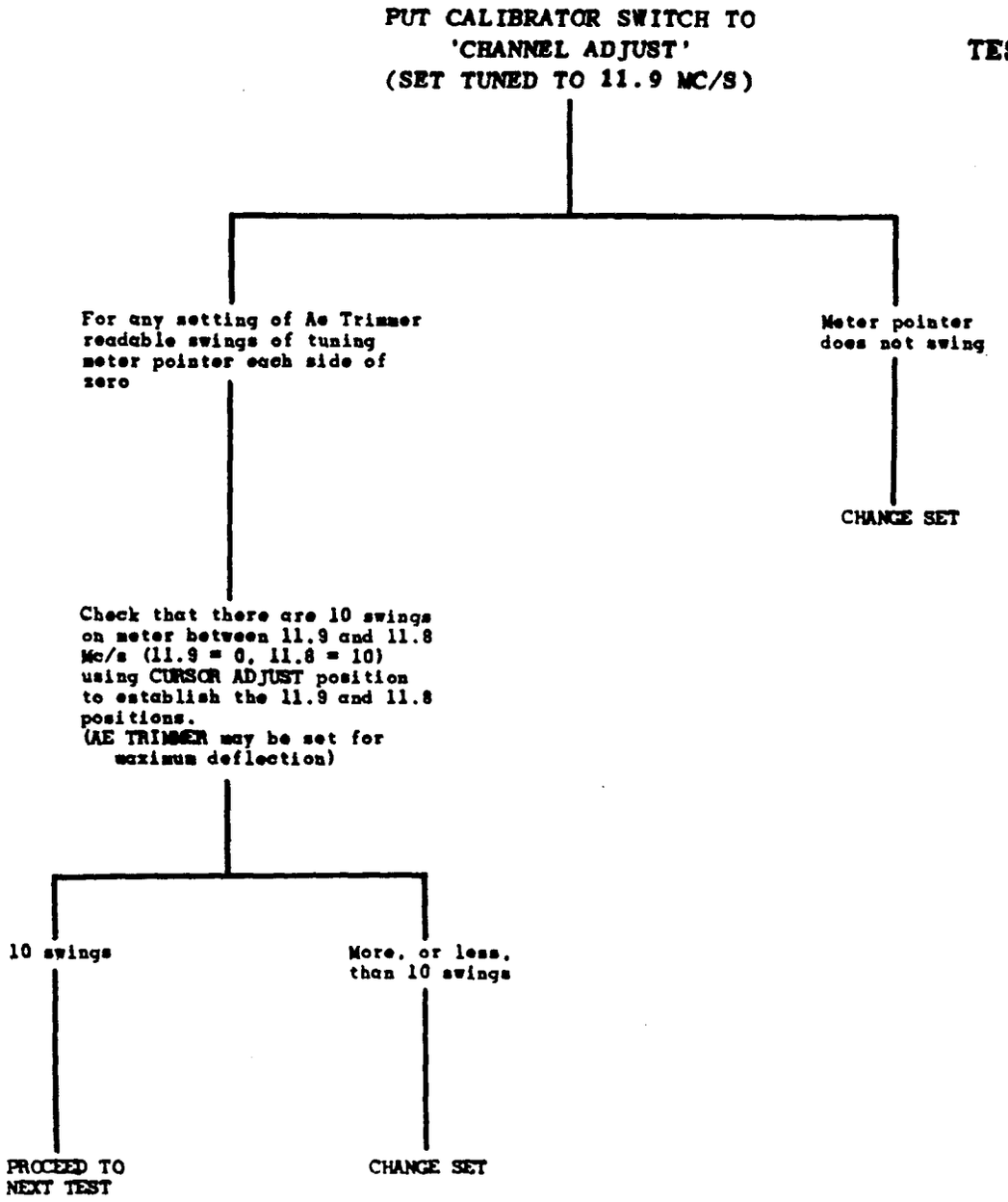
PUT CALIBRATOR SWITCH TO 'CURSOR ADJUST'
AND TUNE SET TO 11.9 MC/S (SEE SECTION 12)

- Tuning meter swings at least 2/3 of scale each side of zero but no calibration noises in phones
  - PROCEED TO NEXT TEST but bear in mind possible fault in Receiver AF circuit or Harness
- For any setting of Ae Trimmer tuning meter swings at least 2/3 of scale each side of zero. Calibration noises in phones
  - PROCEED TO NEXT TEST
- Meter pointer does not swing
  - Check for LT Voltages at set end of PSU/SET connector as follows:

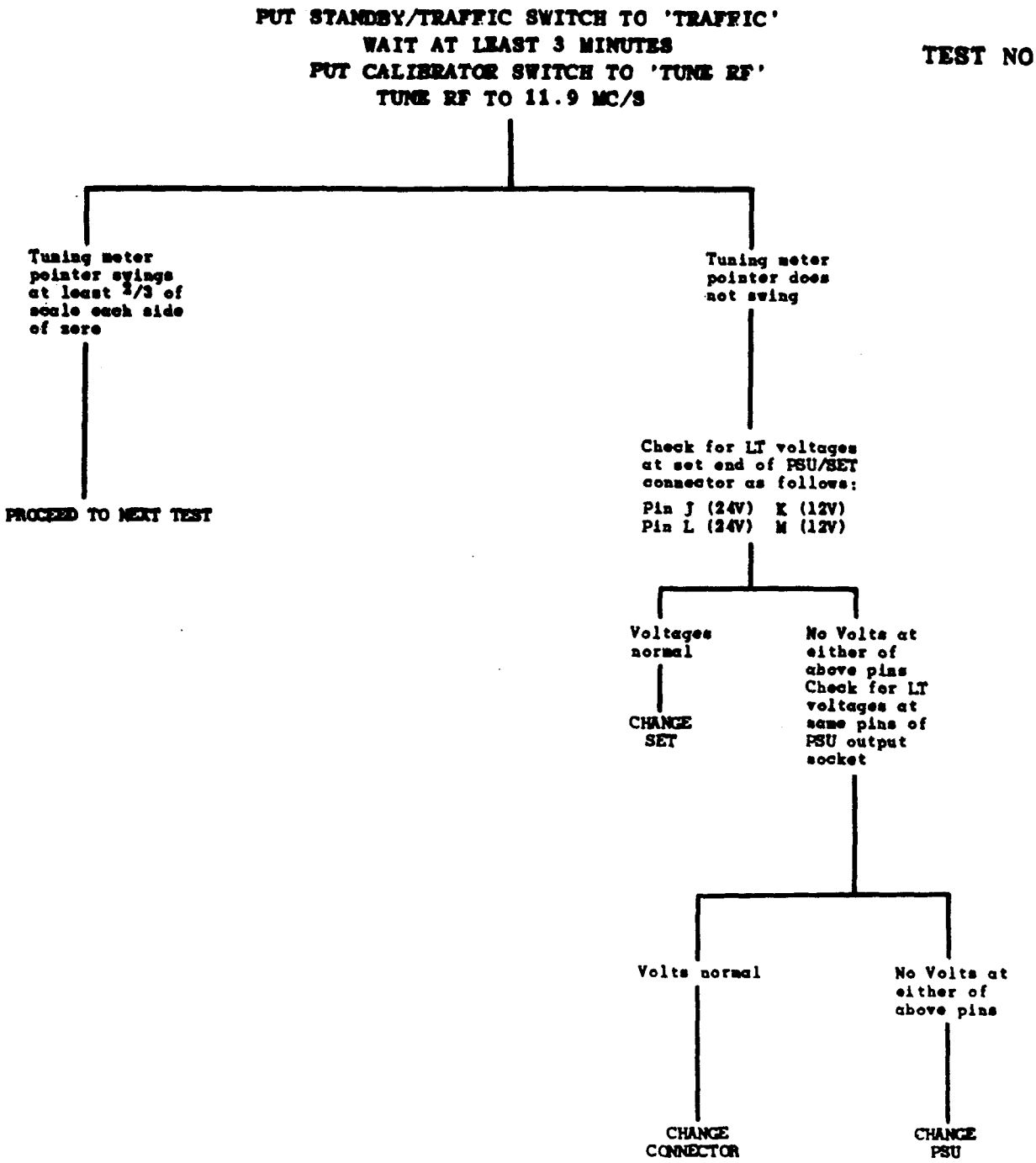
    Pin E 12 or 24V
    Pin J 24V (24V supply only)
    Pin K 12V (12V supply only)
    Pin R 12V

    - All Volts normal
      - CHANGE SET
    - No Volts at any of above pins
      - Check for LT voltages at same pins of PSU output socket
        - All Volts normal
          - CHANGE CONNECTOR
        - No Volts at any of above pins
          - CHANGE PSU

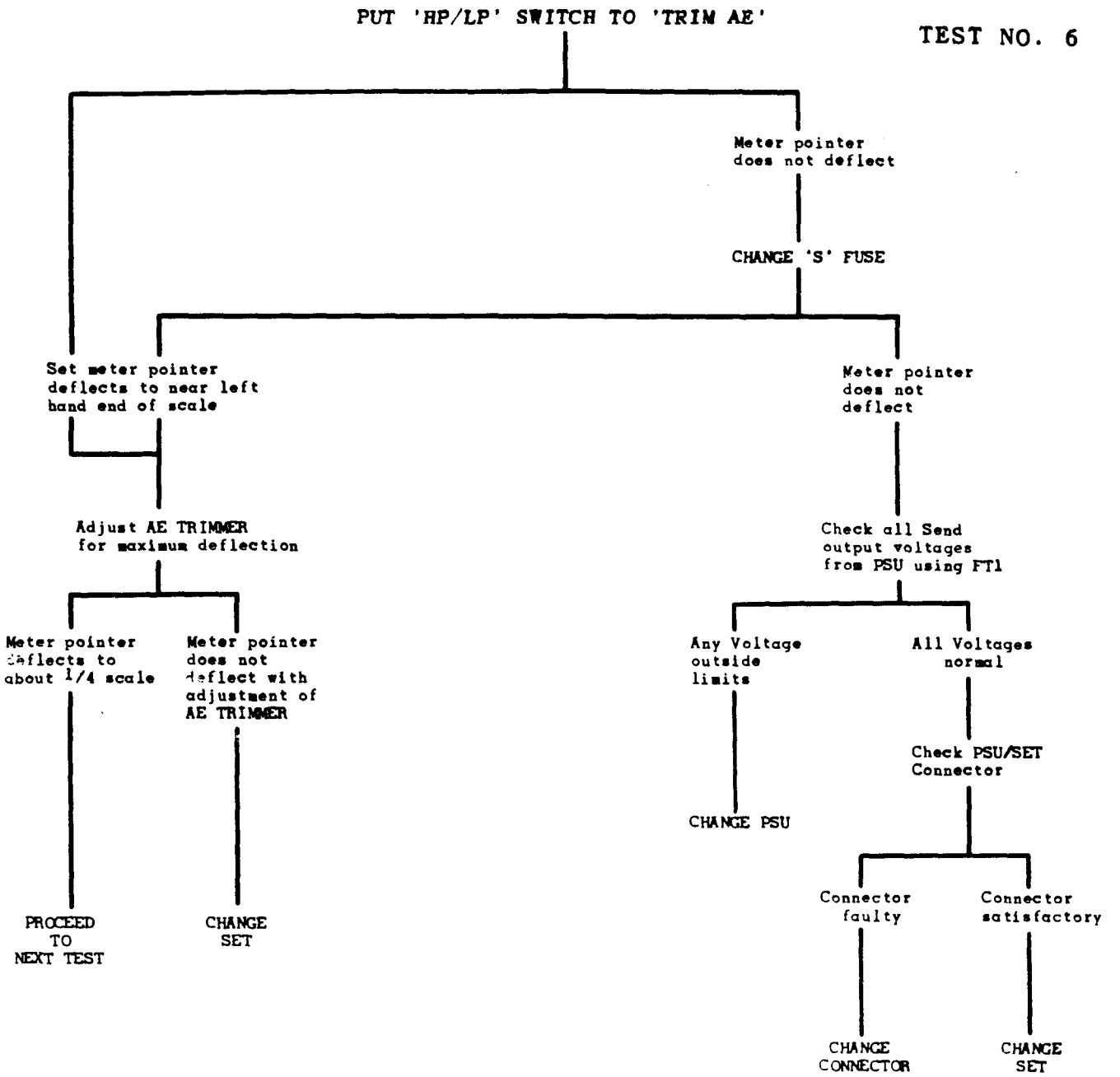
TEST NO. 4


PUT CALIBRATOR SWITCH TO
'CHANNEL ADJUST'
(SET TUNED TO 11.9 MC/S)
For any setting of Ae Trimmer readable swings of tuning meter pointer each side of zero
Meter pointer does not swing
CHANGE SET
Check that there are 10 swings on meter between 11.9 and 11.8 Mc/s (11.9 = 0, 11.8 = 10) using CURSOR ADJUST position to establish the 11.9 and 11.8 positions.
(AE TRIMMER may be set for maximum deflection)
10 swings
More, or less, than 10 swings
PROCEED TO NEXT TEST
CHANGE SET

TEST NO. 5


PUT STANDBY/TRAFFIC SWITCH TO 'TRAFFIC'
WAIT AT LEAST 3 MINUTES
PUT CALIBRATOR SWITCH TO 'TUNE RF'
TUNE RF TO 11.9 MC/S
Tuning meter pointer swings at least 2/3 of scale each side of zero
PROCEED TO NEXT TEST
Tuning meter pointer does not swing
Check for LT voltages at set end of PSU/SET connector as follows:
Pin J (24V) K (12V)
Pin L (24V) M (12V)
Voltages normal
CHANGE SET
No Volts at either of above pins Check for LT voltages at same pins of PSU output socket
Volts normal
CHANGE CONNECTOR
No Volts at either of above pins
CHANGE PSU

TEST NO. 6


PUT 'HP/LP' SWITCH TO 'TRIM AE'
Meter pointer does not deflect
CHANGE 'S' FUSE
Set meter pointer deflects to near left hand end of scale
Meter pointer does not deflect
Adjust AE TRIMMER for maximum deflection
Check all Send output voltages from PSU using FT1
Meter pointer deflects to about 1/4 scale
Meter pointer does not deflect with adjustment of AE TRIMMER
Any Voltage outside limits
All Voltages normal
Check PSU/SET Connector
CHANGE PSU
PROCEED TO NEXT TEST
CHANGE SET
Connector faulty
Connector satisfactory
CHANGE CONNECTOR
CHANGE SET

MEASURE RF OUTPUT POWER USING FT1

TEST NO. 7

Readings obtained as follows:

HP/LP Switch	Phase/Normal Switch	Calibrate Switch	Approx. Power
HP	NORMAL	RT	6W
HP	NORMAL	CW	12W
HP	PHASE	RT	6W
LP	NORMAL or PHASE	RT or CW	½-2W
HP	NORMAL	TUNE AE	2-4W

AE TRIMMER should be adjusted for maximum output

If FT1 is not available check roughly on LP and TUNE AE, but NOT on HP, by using bulb from PSU indicator lamp. This should be connected across the set aerial plug (centre of bulb to centre of plug, outer to outer). Bulb should light on SEND and AE TRIMMER should be adjusted for maximum brightness.

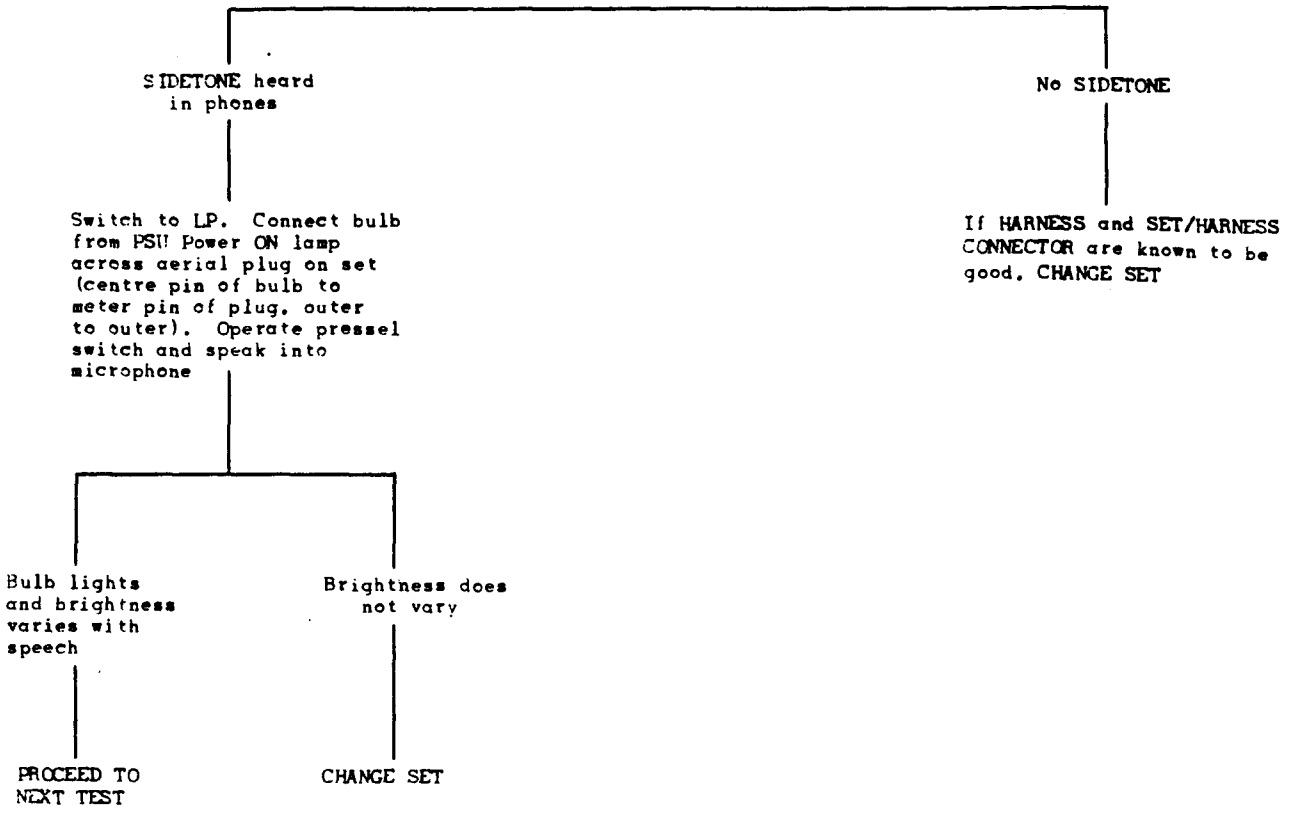
PROCEED TO NEXT TEST

No power output or very low power output

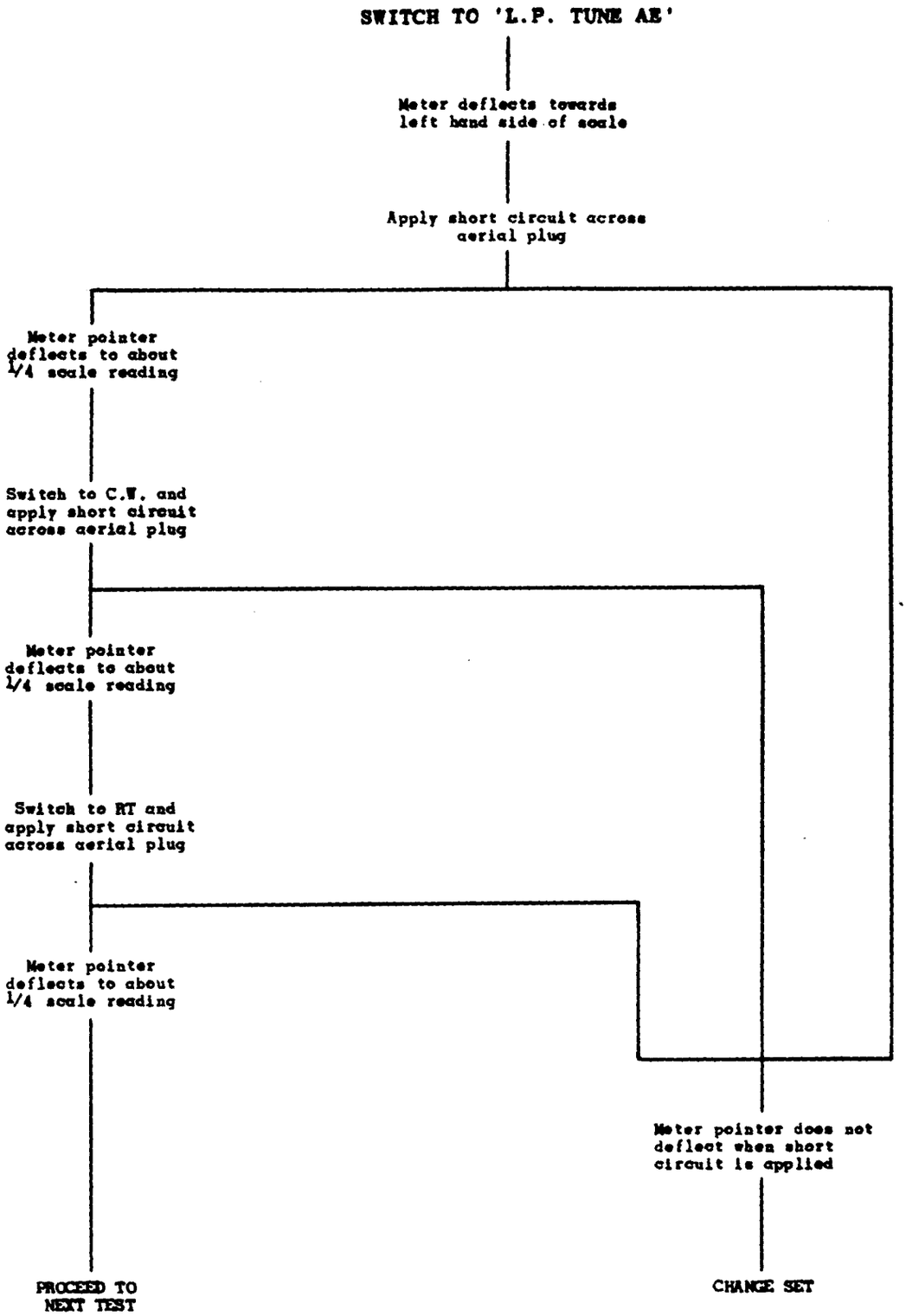
CHANGE SET

SWITCH TO NORMAL RT.
OPERATE PRESSEL SWITCH
AND SPEAK INTO MICROPHONE

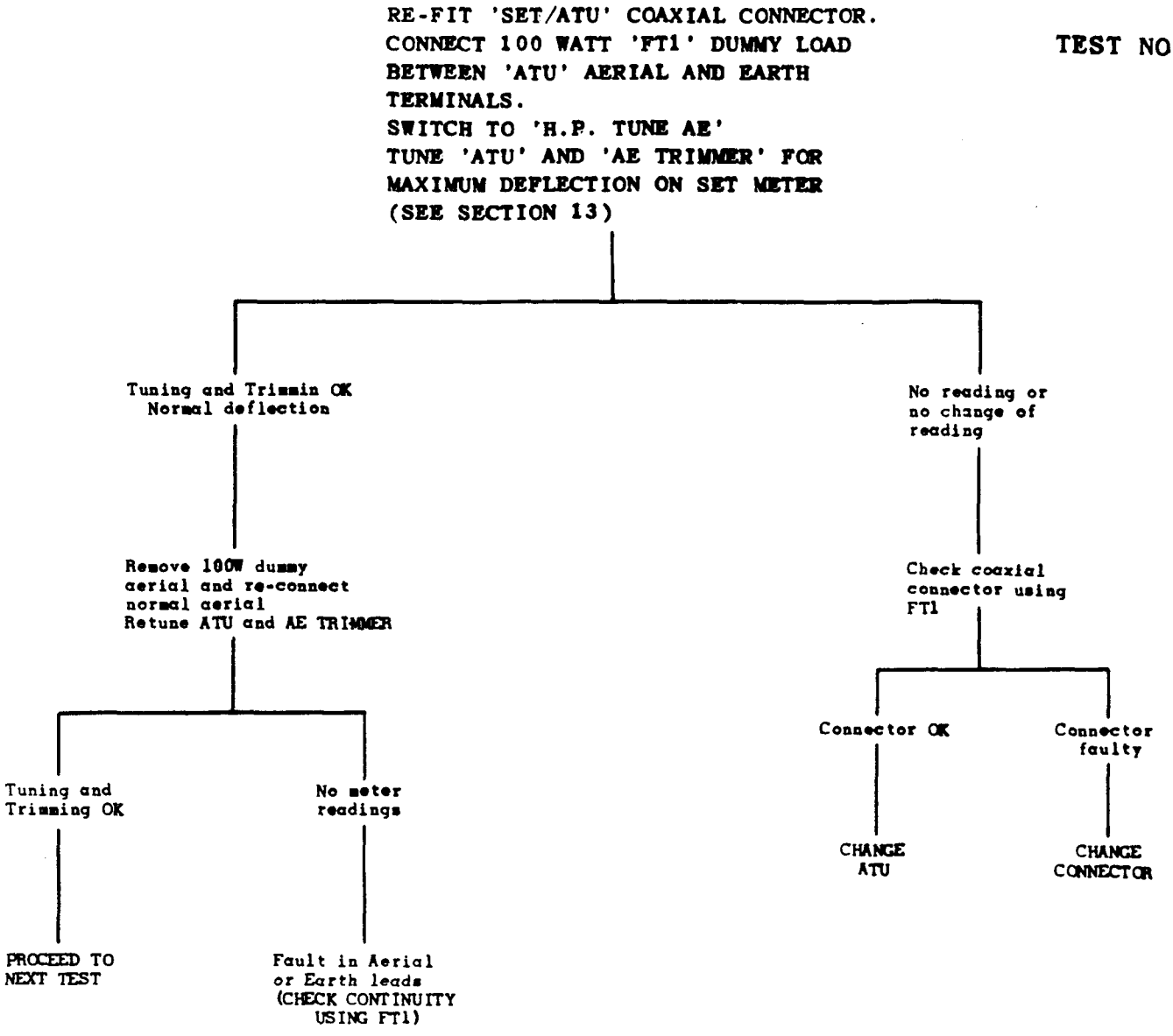
TEST NO. 8



TEST NO. 9


SWITCH TO 'L.P. TUNE AE'
Meter deflects towards left hand side of scale
Apply short circuit across aerial plug
Meter pointer deflects to about 1/4 scale reading
Switch to C.W. and apply short circuit across aerial plug
Meter pointer deflects to about 1/4 scale reading
Switch to RT and apply short circuit across aerial plug
Meter pointer deflects to about 1/4 scale reading
Meter pointer does not deflect when short circuit is applied
PROCEED TO NEXT TEST
CHANGE SET

TEST NO. 10


RE-FIT 'SET/ATU' COAXIAL CONNECTOR.
CONNECT 100 WATT 'FT1' DUMMY LOAD BETWEEN 'ATU' AERIAL AND EARTH TERMINALS.
SWITCH TO 'H.P. TUNE AE'
TUNE 'ATU' AND 'AE TRIMMER' FOR MAXIMUM DEFLECTION ON SET METER
(SEE SECTION 13)
Tuning and Trimmin OK
Normal deflection
No reading or no change of reading
Remove 100W dummy aerial and re-connect normal aerial
Retune ATU and AE TRIMMER
Check coaxial connector using FT1
Tuning and Trimming OK
No meter readings
Connector OK
Connector faulty
CHANGE ATU
CHANGE CONNECTOR
PROCEED TO NEXT TEST
Fault in Aerial or Earth leads
(CHECK CONTINUITY USING FT1)

TEST NO. 11

SWITCH TO RT 'NORMAL'
VARY 'CHANNEL TUNING'.
NOISE AND STATIONS
HEARD IN PHONES.
TUNE IN TO STATION
SWITCH TO CW.

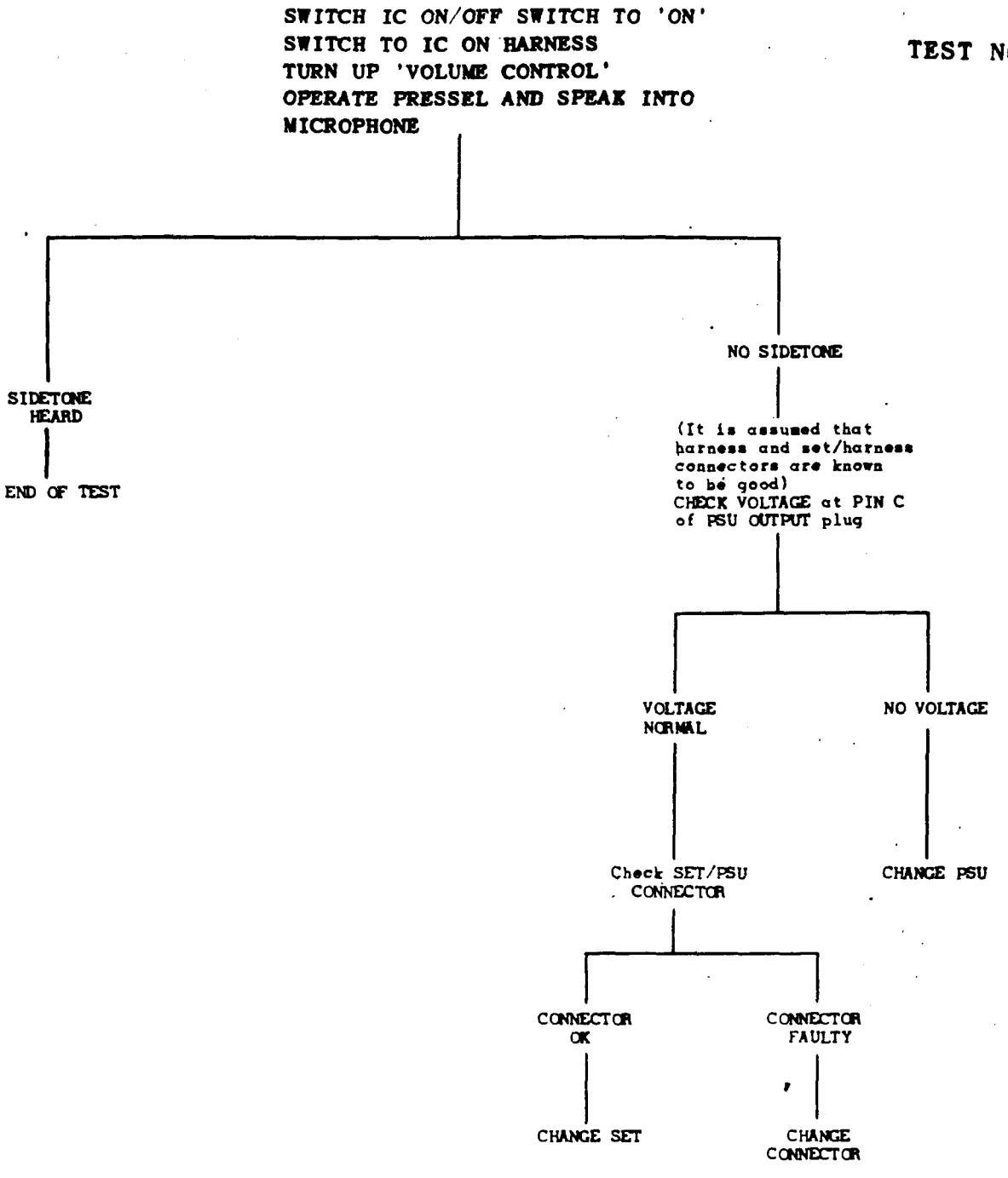
Audible note;
Pitch variable
by means of CW
Tone control

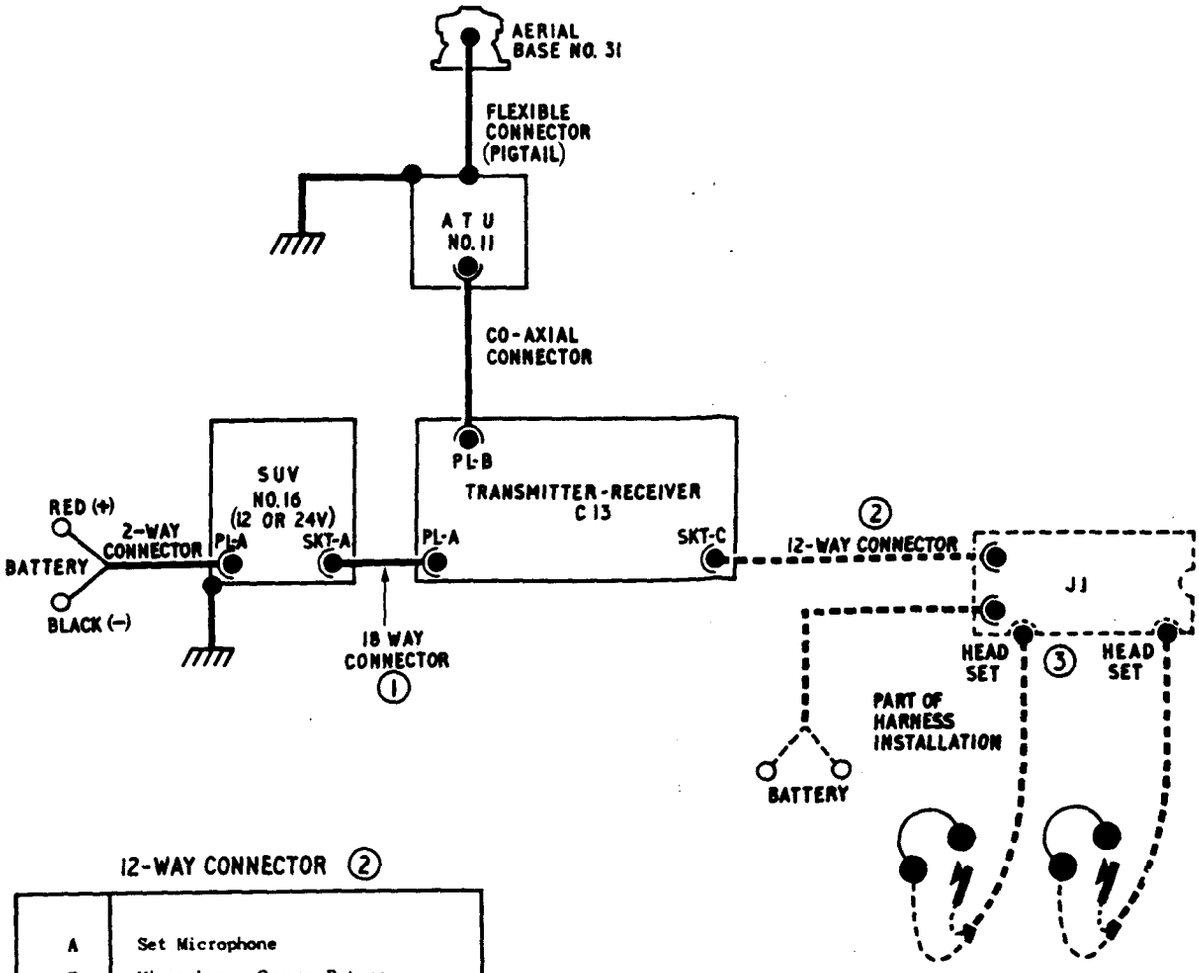
PROCEED TO NEXT
TEST

No note
or note not
variable

CHANGE SET

TEST NO. 12


SWITCH IC ON/OFF SWITCH TO 'ON'
SWITCH TO IC ON HARNESS
TURN UP 'VOLUME CONTROL'
OPERATE PRESSEL AND SPEAK INTO MICROPHONE
SIDETONE HEARD
END OF TEST
NO SIDETONE
(It is assumed that harness and set/harness connectors are known to be good)
CHECK VOLTAGE at PIN C of PSU OUTPUT plug
VOLTAGE NORMAL
NO VOLTAGE
Check SET/PSU CONNECTOR
CHANGE PSU
CONNECTOR OK
CONNECTOR FAULTY
CHANGE SET
CHANGE CONNECTOR



12-WAY CONNECTOR 2

A	Set Microphone
B	Microphones Common Return
C	I.C. Microphone
D	Pressel Switch (S/R switching)
E	-
F	Battery Voltage
G	Phones Common Return
H	Detector Current
J	I.C. Phones
K	-
L	-
M	Set Phones

HEADSETS 3

A	Microphone
B	Microphone Return
C	Pressel Switch
D	Phone Pressel Return
E	-
F	Phone

SEE ALSO TECHNICIAN'S SERVICING. SECTION 23

18-WAY CONNECTOR ①

REMARKS	PIN	VOLTAGE	FUNCTION	P.S.U. SWITCH POSITIONS			
				POWER	W.S.	STANDBY/ TRAFFIC	I.C.
	A	300/150V D.C.	P.A. screen (voltage switched by HP/LP)	ON	ON	TRAFFIC	ANY
	B	600/300V D.C.	P.A. anode (voltage switched by HP/LP)	ON	ON	TRAFFIC	ANY
	C	150V D.C.	Main H.T.	ON	ANY	ANY	ANY
	D	-	-	-	-	-	-
	E	Battery voltage	Relays	ON	ON	ANY	ANY
	F	-	-	-	-	-	-
	G	-	-	-	-	-	-
	H	Earth	-	-	-	-	-
24V PSU only	J	24V D.C.	Receiver filaments	ON	ON	ANY	ANY
12V PSU only	K	12V D.C.	Receiver filaments	ON	ON	ANY	ANY
24V PSU only	L	24V D.C.	Sender filaments	ON	ON	TRAFFIC	ANY
12V PSU only	M	12V D.C.	Sender filaments	ON	ON	TRAFFIC	ANY
	N		Send/receive switching (earth to send)	-	-	-	-
	O	12V D.C.	I.C. filaments	ON	ANY	ANY	ON
	P	-	-	-	-	-	-
	Q		High/low power switching (earth for HP)	-	-	-	-
	R	12V D.C.	Calibrator filament	ON	ON	STANDBY	ANY
	S	12V D.C.	Calibrator filament	ON	ON	TRAFFIC	ANY

FIG. 13 STATION RADIO C13 DIAGRAM OF INTER-CONNECTIONS