

ELECTRICAL AND MECHANICAL ENGINEERING REGULATIONS

TELECOMMUNICATIONS FZ 253/3

WIRELESS SET (CDN.) No. 19, Mk. III

First Echelon Work

NOTE:—This information is provisional and is supplied for guidance pending the issue of more complete instructions. All errors of a technical nature should be notified through the usual channels to Command Headquarters. An overseas command will forward a consolidated report with comments direct to D.M.E. (E 5) Ottawa, with a copy to the War Office (M.E. 10) and B.A.S. (E.M.E. 5) Washington. A U. K. command will forward a consolidated report with comments to the War Office (M.E. 10) for onward transmission to D.M.E. (E 5) Ottawa, and B.A.S. (E.M.E. 5) Washington.

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WIRELESS SET CDN. No. 19, Mk. III

FIRST ECHELON WORK

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WIRELESS SET (CDN.) No. 19, Mk III

First Echelon Work

1. First echelon work may be subdivided into:
 - (a) The operator's maintenance and responsibility.
 - (b) Instrument Mechanics, R.C. Signals, and/or Electricians, Signal, R.C. Signals, maintenance and responsibility.

Operator's Maintenance

2. The operator is NOT expected to be an expert electrician or instrument mechanic, but, in addition to actual operation of the set he has four compulsory maintenance responsibilities. He must be able to:—

- (a) Properly connect the set for operation and change major parts of the complete station.

- (b) Perform DAILY MAINTENANCE tests to ascertain that every portion of the set is working properly. (See Table 1).
- (c) Carry out WEEKLY MAINTENANCE—cleaning, etc.
- (d) Perform RUNNING REPAIRS—the more common minor faults. It is vitally important that faults be found and reported IMMEDIATELY to the Unit or Formation Signal Officer so the set will be repaired prior to action.

INTER UNIT CONNECTIONS:

3. Fig. 1 shows how the various components and cables of the set are connected.

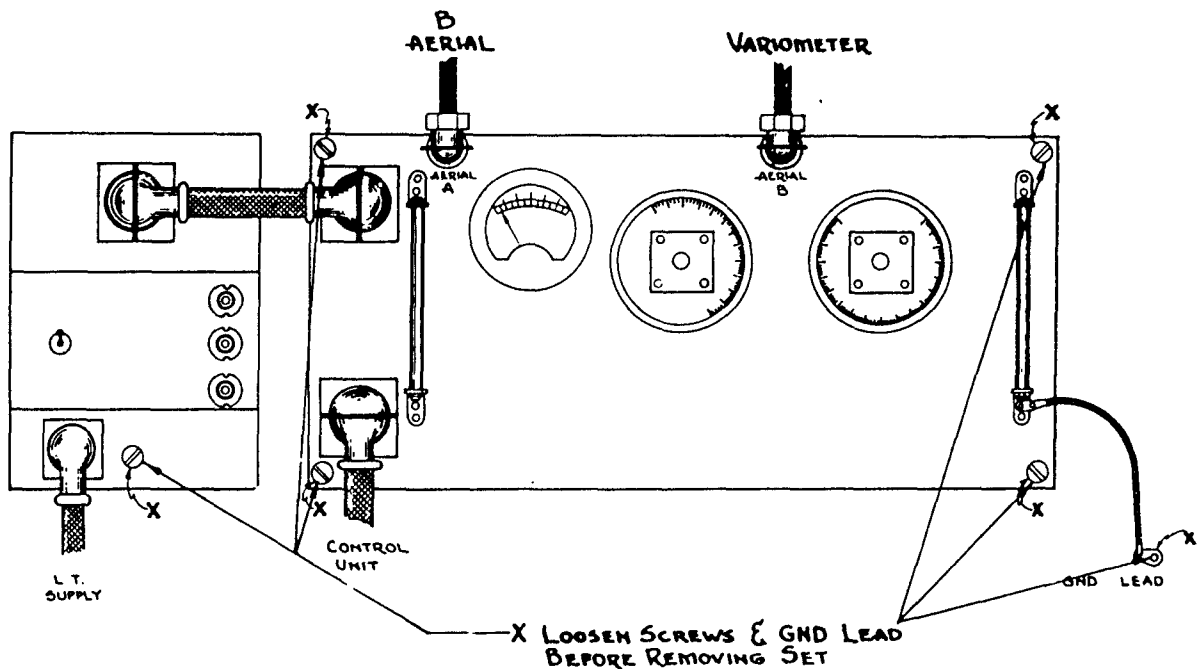


FIG. 1—COMPONENTS AND CABLES OF WIRELESS SET (CDN) No. 19 MK. III

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REMOVAL OF UNITS

4. To remove the set or supply unit from its case proceed as follows:—

- (a) To take off the grills, as illustrated in Fig. 2.

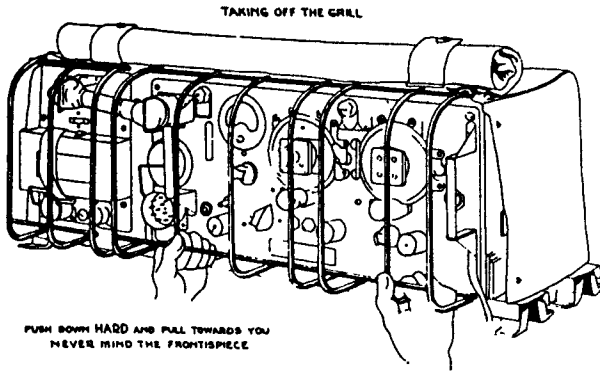


FIG. 2—REMOVING THE GRILLS

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1 - 2

- (b) Remove all cables and leads from the sockets on the front panels of the supply unit and set.
- (c) To remove the supply unit, loosen, but do NOT remove the large screw on the bottom centre of the front panel, and then pull the supply unit out of its case.
- (d) To remove the set, loosen, but do NOT remove the screw located at each of the four corners of the front panel of the set. Grasp the two handles on each side of the front panel and pull the set from its case.

5. Fig. 3 shows the proper method of inserting a connector plug. GREAT CARE MUST BE TAKEN WHEN PERFORMING THIS OPERATION OR SERIOUS DAMAGE MAY RESULT.

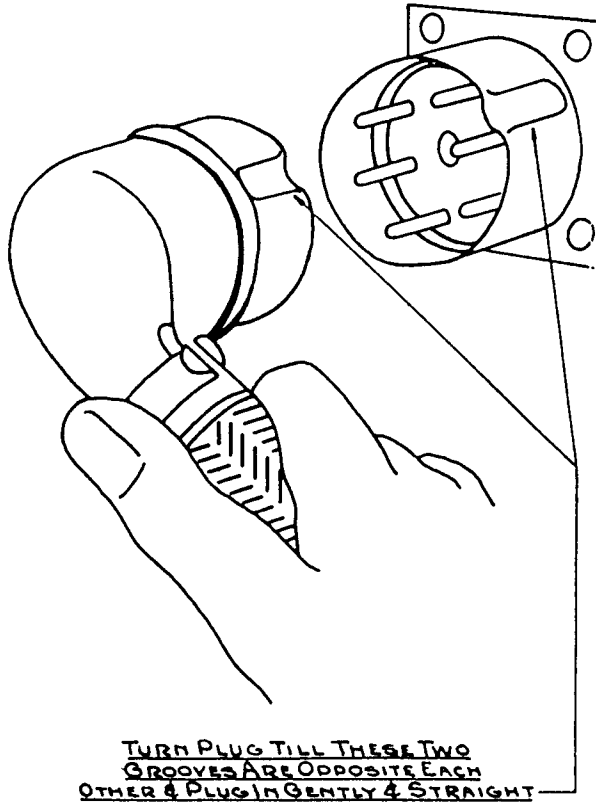


FIG. 3—INSERTING A CONNECTOR

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PLUG

6. To remove Control Unit No. 1, proceed as illustrated in Fig. 4. Other types of control units are removed similarly.

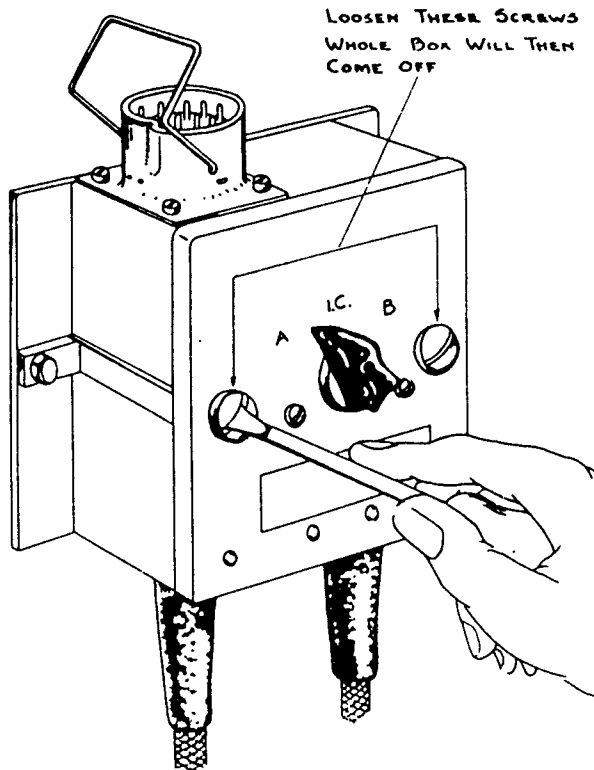


FIG. 4--REMOVING CONTROL UNIT

No. 1

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DAILY MAINTENANCE:

7. Daily Maintenance is outlined in Table 1. These tasks MUST be carried out DAILY by all operators even though use of the set may not be anticipated. THESE TESTS MUST ALSO BE DONE IN SEQUENCE, FOR EXAMPLE--THE INDICATIONS OF TEST 9 WILL BE FALSE UNLESS THE PRECEDING TESTS HAVE BEEN CARRIED OUT. If a test indicates a fault that cannot be corrected by the operator (See Para. 2), report it IMMEDIATELY to the Unit or Formation Signal Officer. DO NOT take the set to pieces in hopes of locating the fault.

TABLE 1—DAILY TASK TABLE

Wireless Set (Cdn.) No. 19 Mk. III properly connected for operation.

Part Tested	Test No.	Test Action	What Should Happen	What Should NOT Happen	Probable Fault	Action
Supply Unit No. 2	1.	Switch to DYN.	Red lamp lights and dynamotor runs properly	Dynamotor does not run and lamp does not light.	1. Vehicle master switch OFF.	Switch ON
					2. Vehicle fuses blown.	Replace
					3. Bty. not connected properly.	Correct, if possible; otherwise, report.
					4. L.T. leads to Supply Unit.	Check
				Dynamotor runs, but lamp does not light.	Bulb burned out.	Replace
				Lamp lights but dynamotor does not run properly.	1. Bty. improperly connected.	Correct, if possible; otherwise, report.
					2. L.T. leads to Supply Unit.	Check connections.
					3. Supply Unit internal 12V.-24V. switch in wrong position.	Remove Supply Unit from case and check switch position.
					4. Dynamotor out of order.	Report—in an emergency check L.T. brushes. (See Para. 26.)
				2.	Switch Supply Unit on VIBR. (Except on 2-wire, 24V. operation.)	Red lamp lights and Vibr. operates—faint hum.
L.T. Voltage Supply	3.	Meter Switch to L.T.	Meter reads normally 11-12 V.	Meter reads below 10.5V.	Btys. need recharging.	Replace or recharge batteries.

Part Tested	Test No.	Test Action	What Should Happen	What Should NOT Happen	Probable Fault	Action
H.T. Voltage Supplies	4.	Meter Switch to HT 1. Supply Unit Switch to DYN.	Meter reads approx. 265 V.	Meter reads zero.	1. HT1 fuse blown.	Replace with 250 Ma. fuse.
					2. Internal fault.	Report—in an emergency check HT1 brushes. (See Para. 26.)
				Meter reads below 150 V.	Internal fault.	As above.
	5.	Meter Switch to HT2. Supply Unit DYN.	Meter reads approx. 540 V. on Rec.	Meter reads zero.	1. HT2 fuse blown.	Replace fuse.
					2. Internal fault.	Report—in an emergency check HT2 brushes. (See Para. 26.)
				Meter reads below 400 V.	Internal fault.	As above.
	6.	Meter Switch to HT 1. Supply Unit to VIBR. (Not applicable on 2-wire 24 V. operation.)	Meter reads approx. 265 V.	Meter reads zero.	1. Vibr. points stuck.	Slap Supply Unit Case with hand.
					2. Vibr. fuse blown.	Replace BLUE Vibr. fuse (10 amp.)
					3. Vibr. Unit defective.	Replace plug—in vibrator in supply unit.
					4. Rectifier valve defective.	Replace rectifier valve in Supply Unit (OZ4A).
					5. Internal fault.	Report.
	7.	Set on R/T and control Unit to VIBR. Press Microphone pressel switch. (For security remove "A" AE. during this test.)	Dynamotor should start on pressing pressel switch. Dynamotor should stop and vibrator start on releasing pressel.	Dynamotor does not start on using pressel OR does not stop on releasing pressel switch.	Internal fault.	Report.
H.T.2 meter reading should drop approx. 40V.			Meter drops approx. 20V.	Internal fault.	Report.	

Part Tested	Test No.	Test Action	What Should Happen	What Should NOT Happen	Probable Fault	Action
I.C. System and Headsets.	8.	Switch Control Units to I.C. and "N". I.C. Sw. to ON. Press Mic. pressel switch and speak. Test all headsets and Mics.	Speech heard loudly and clearly in all vehicle headsets including your own.	Nothing heard	1. Poor snatch plug connection.	Clean and check.
					2. Faulty headsets.	Replace.
					3. Internal fault.	Report— (See Running Repairs Nos. 12 and 13.)
	9.	Press Buzzer on Driver's Box. (Junction Distribution No. 1 or 3.)	Buzz heard in all phones on I.C., and in crew commander's on "A", "B" or I.C.	No buzz in phones.	Buzzer needs adjusting.	Adjust— (See Para. 10.)
"A" Receiver	10.	Switch control Units to "A"; No. 19 set function switch to R/T and meter switch to AVC. AVC Sw. ON and R.F. Gain and A.F. Gain fully clockwise. Tune set to any strong R/T station.	Station heard clearly in phones.	1. Station not heard.	1. AE. disconnected.	Examine all AE. connections including pigtail.
					2. Internal fault.	Report— See Running Repairs Nos. 3 and 6.
				2. Station heard but very noisy.	Loose AE. connections.	Check AE. connections, including sockets on coaxial cables.
				Meter reading should drop when tuned to station; reading also controlled by R.F. GAIN.	Meter reading does not alter when set is tuned to strong station.	Internal fault.
	11.	Flip NET toggle switch to NET and tune set.	Whistle heard when tuning past station.	No whistle heard.	Internal fault.	Report—See Running Repairs No. 5.

Part Tested	Test No.	Test Action	What Should Happen	What Should NOT Happen	Probable Fault	Action	
"A" Sender. (Do not test if under Wireless Silence unless ordered to do so using dummy Ae.)	12.	Meter Switch to DRIVE. Press operator's pressel switch. Tune MC dial across both bands.	Meter should read approx. 5 on 15V. scale, and hold approx. steady over both bands.	No meter reading	1. Pressel switch not working.	Replace headset. If still no reading, report.	
					2. Internal fault.	Report—See Running Repairs No. 9.	
				Unsteady reading.	Internal fault.	As above.	
	13.	Meter Switch to AE. Press Operator's pressel switch. Adjust P.A. tuning and variometer for max.	Meter reading approx. normal. See AE reading on—normal meter reading chart (See section FZ 251/3 Table 1).	Meter does not read or reads very low.	1. AE. connection faulty.	Check all AE. connections.	
					2. Internal fault.	Report—See Running Repairs Nos. 4, 5, 7 and 8.	
	14.	As in Test 13. Speak loudly into Mic. or whistle sharply.	Meter needle kicks up.	Meter reading kicks down.	Internal fault.	Retune Sender—If still faulty, report.	
					Meter reading does not alter.	Internal fault.	Report—See Running Repairs No. 6.
					Sidetone is heard.	No sidetone	Internal fault.
	"A" Sender on C.W. and M.C.W.	15.	Switch set to C.W. Plug in key and press.	Meter reads normal as in AE. Reading Chart.	Meter does not read.	1. Fault in key or lead.	Check key, lead and plug.
						2. Internal fault.	Report.
				Meter reads very low.	Internal fault.	Report.	
	16.	Switch set to M.C.W. and press key.	M.C.W. musical note heard in phones.	No M.C.W. note	Internal fault.	Report.	

Part Tested	Test No.	Test Action	What Should Happen	What Should NOT Happen	Probable Fault	Action
"A" Sender on C.W. and M.C.W. (Contd.)	17.	Switch back to C.W. and pull key plug half way out.	Receiver operates and if tuned past a station a whistle and distorted speech or music is heard.	No whistle.	Internal fault.	Report—See Running Repairs No. 5.
"B" Receiver	18.	Control Unit switch to "B" & "N" "B" set switched ON. "B" GAIN fully clockwise.	Loud hiss in phones.	No hiss.	Internal fault.	Report—See Running Repairs No. 15.
				Hiss in phones but reception very noisy.	Loose AE. connections or leads.	Check AE. leads. Report—See Running Repairs No. 16.
"B" Sender (Not under Wireless Silence.)	19.	Press Operator's pressel switch and speak.	Hiss disappears and sidetone heard.	Hiss is still heard, or sidetone is not heard.	Internal fault.	Report—See Running Repairs No. 14.
"A" Unattended Lamp.	20.	Switch both control Units to "B"	Red lamp lights on operator's Control unit.	Lamp does not light.	1. Bulb burnt out.	Replace.
					2. Fuse blown.	Replace fuse in Control Unit No. 1.
General	21.	Check all controls when receiving, including flick positions.	Controls should operate smoothly.	Controls jam, feel rough, or fail to work.	Internal fault.	Report.

REPLACEMENTS AND ADJUSTMENTS:

8. To change a pilot bulb, unscrew the transparent red lens using a counterclockwise motion. When this is removed, the bulb is accessible.

9. To change an "A" aerial pigtail, remove the aerial base by removing the six fixing bolts. Then proceed as in Fig. 5. Have Signals personnel perform this, if possible.

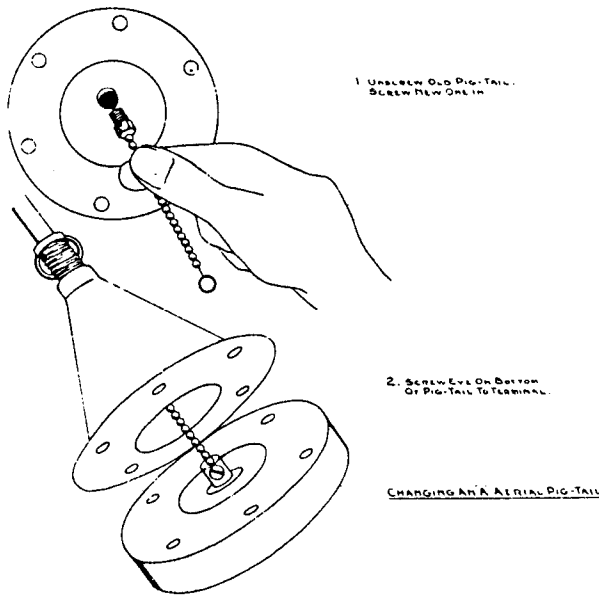


FIG. 5—CHANGING "A" AERIAL
PIGTAIL

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1 - 5

10. To adjust the driver's buzzer (in Junctions Distribution Nos. 1 and 3) take off the box as for Control Unit No. 1 (See Para. 6) and adjust buzzer as in Fig. 6. DO NOT NEEDLESSLY ADJUST except when buzzer fails.

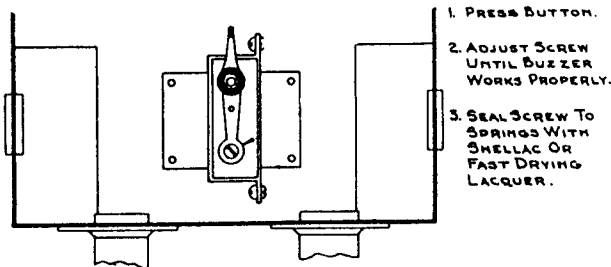


FIG. 6—ADJUSTING DRIVER'S BUZZER

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11. To change a fuse in Control Unit No. 1, proceed as illustrated in Fig. 7.

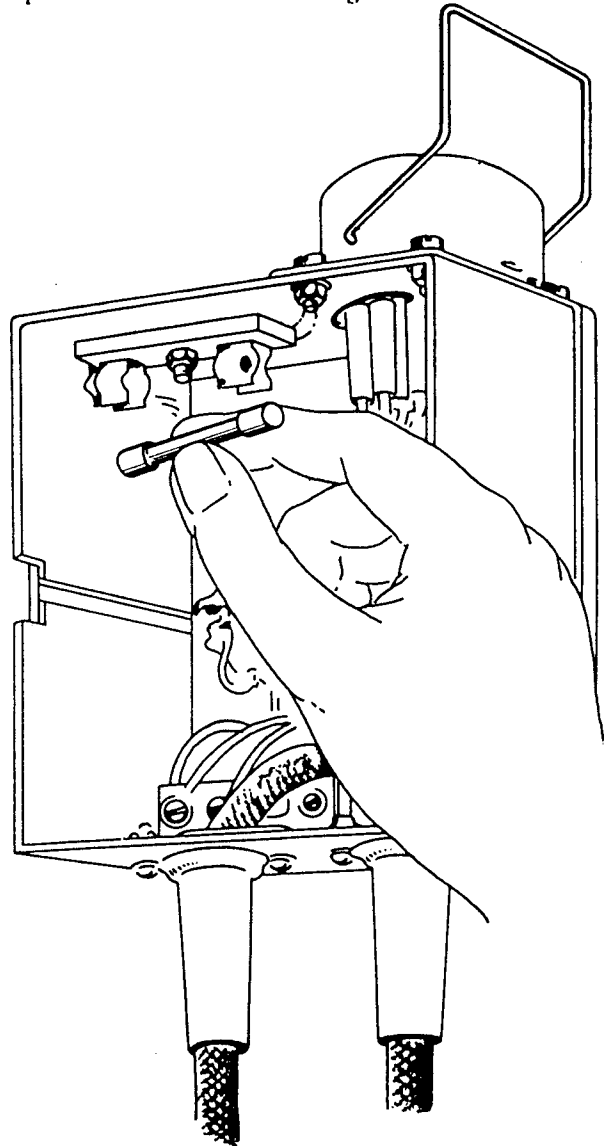


FIG. 7—CHANGING A FUSE IN CONTROL
UNIT No. 1

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12. To change a fuse in the Supply Unit, proceed as illustrated in Fig. 8. Do NOT put blown fuses back in spare parts kit. Exchange for sound ones as soon as possible, and place sound fuses in kit.

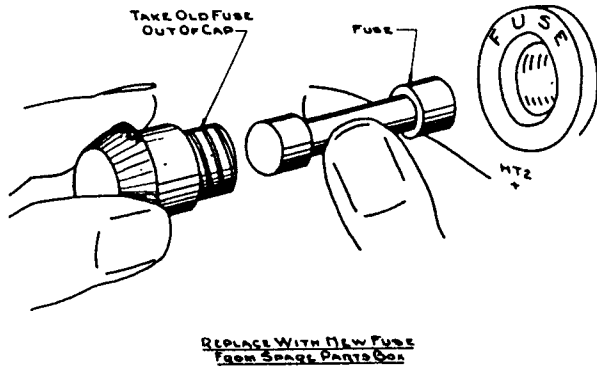


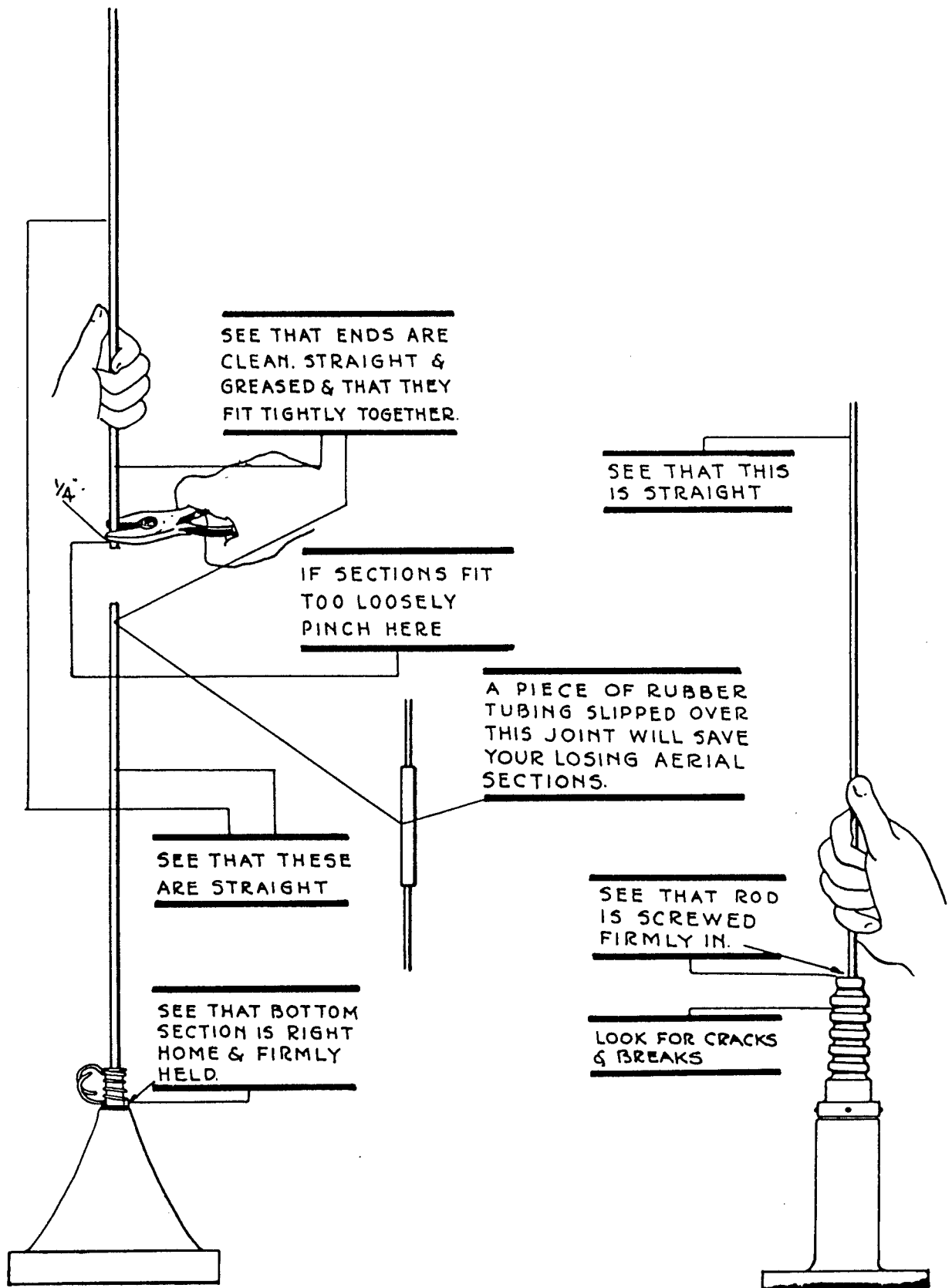
FIG. 8—CHANGING A FUSE IN THE
SUPPLY UNIT

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WEEKLY MAINTENANCE:

13. The following tasks must be carried out WEEKLY by the operator:—

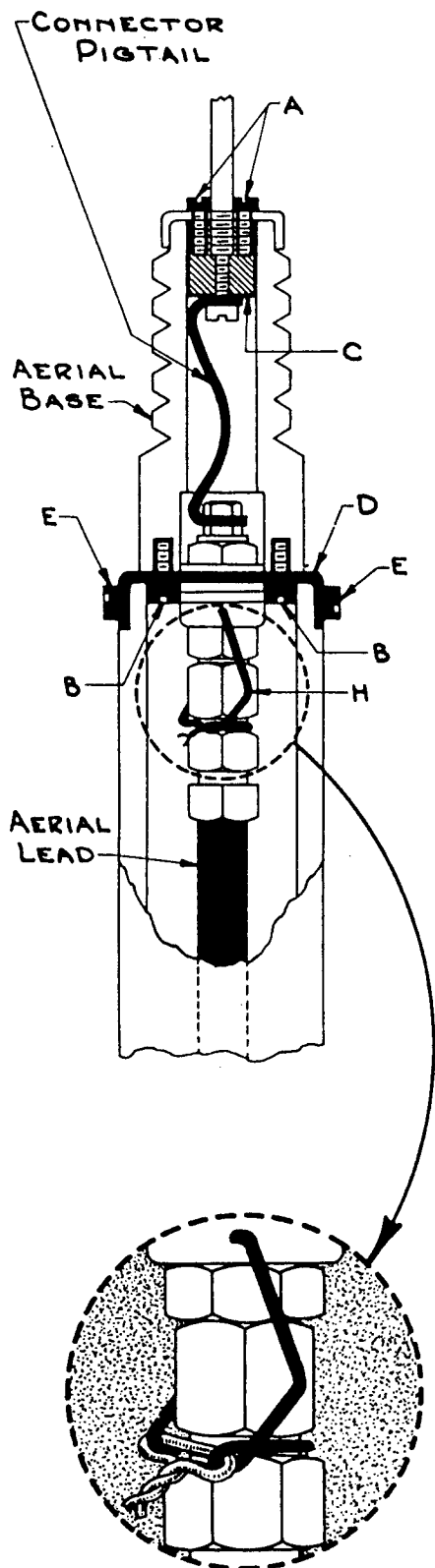
- (a) Complete the daily tasks outlined in Table 1.
- (b) Clean the outside of the set, supply unit and variometer with a cloth to remove dirt and grease. Never use water, brasso, petrol or other cleansing mediums; just use a dry cloth.
- (c) Lightly grease aerial sections ("A" set) where they fit together. The spring and the brass socket on the aerial base should also be thoroughly greased. Too much grease acts as an insulant. Fig. 9 is self-explanatory.



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FIG. 9—"A" AERIAL MAINTENANCE

(d) Weekly care of the "B" set aerial is illustrated in Fig. 10.



TO REMOVE AERIAL BASE

1. REMOVE SCREWS "E".
2. RELEASE SPRING "H", LIFTING AERIAL BASE FAR ENOUGH TO ALLOW THIS TO BE DONE.
3. WITHDRAW AERIAL LEAD.

TO REPLACE AERIAL BASE

1. REPLACE AERIAL LEAD.
2. CLIP SPRING "H" IN POSITION ON PLUG.
3. SECURE SPRING "H" WITH A PIECE OF COPPER WIRE AS SHOWN IN INSET DIAG., TO PREVENT SPRING FROM COMING LOOSE.
4. PUSH AERIAL BASE DOWN ON TO THE MOUNTING. SECURE SCREWS "E".

TO RENEW CONNECTOR PIGTAIL

1. REMOVE AERIAL BASE.
2. REMOVE FIXING SCREWS "A" & "B".
3. PUSH INSERT "C" THROUGH MOULDING USING AERIAL ROD, AT THE SAME TIME REMOVING CAP "D".
4. RENEW PIGTAIL.
5. RE-ASSEMBLE BY PULLING INSERT "C" THROUGH MOULDING BY MEANS OF ROD.
6. REPLACE SCREWS "A" & "B".
7. REPLACE AERIAL BASE.

FIG. 10—"B" AERIAL MAINTENANCE

- (e) Check that all controls are neither jamming nor turning so easily that their settings would be altered by the shaking of the vehicle. Check to see that no knobs are loose.
- (f) Check that the spare parts kit is complete according to the list on its lid.
- (g) See that the spare valve case is full.
- (h) Check that the supply unit has spare vibrator and spare OZ4A rectifier valve in internal holders
- (i) Check for number of spare headsets.
- (j) Disconnect headsets and clean plugs and sockets, using a dry cloth. Petrol, used sparingly, will remove oil in an emergency, but it is detrimental to the rubber.
- (k) Check all electrical cords, cables and coaxial feeders for wear or damage. Check all EXTERNAL screws, nuts and bolts

for tightness, and tighten all EXTERNAL components and accessories whose parts screw together.

- (l) Report AT ONCE to the Unit or Formation Signal Officer any faults that require the attention of an instrument mechanic, wireless mechanic or electrician, and any missing pieces of kit.
- (m) If the set, or any part thereof, works badly, or stops working, try the cure for that particular stoppage as outlined in Table 2.

CHANGING VALVES:

14. Valves need never be changed, unless noise develops, sensitivity decreases or sender output drops. When this happens, it may be necessary to change one or more valves, according to the information contained in Tables 1 and 2. When replacing valves, work on the following lines:—

- (a) Failure No. 3 on Table 2 (due to V1B burning out).

Procedure	Results	Conclusions
Insert new V1A and test set	No result	
Insert new V1B and test set	Set works	V1B faulty
Replace old V1A and test set	Set still works	Old V1A good

- (b) Failure No. 4 on Table 1 (due to V2B and V5A both burning out).

Procedure	Result	Conclusion
Insert New V2B and test set	No result	
Insert new V4A and test set	No result	
Insert new V5A and test set	Set works	V5A faulty
Replace old V4A and test set	Set works	Old V4A good
Replace old V2B and test set	Set does not work	V2B faulty
Insert new V2B and test set	Set works	

In other words, change valves one at a time until the set works. Then replace the original valves one at a time to determine which are faulty.

- (c) DO NOT put faulty valves back in spare valve case. Exchange them for sound ones as soon as possible, and put the sound ones back in the case.

15. WHEN THE FOLLOWING VALVES ARE CHANGED THE SET MUST BE TURNED IN TO R.C.O.C. TELECOMMUNICATIONS FOR CHECKING AT THE EARLIEST OPPORTUNITY:

V2A	V2B
V7A	V4A
V5A	V6A

16. The location of each valve is shown in Fig. 11.

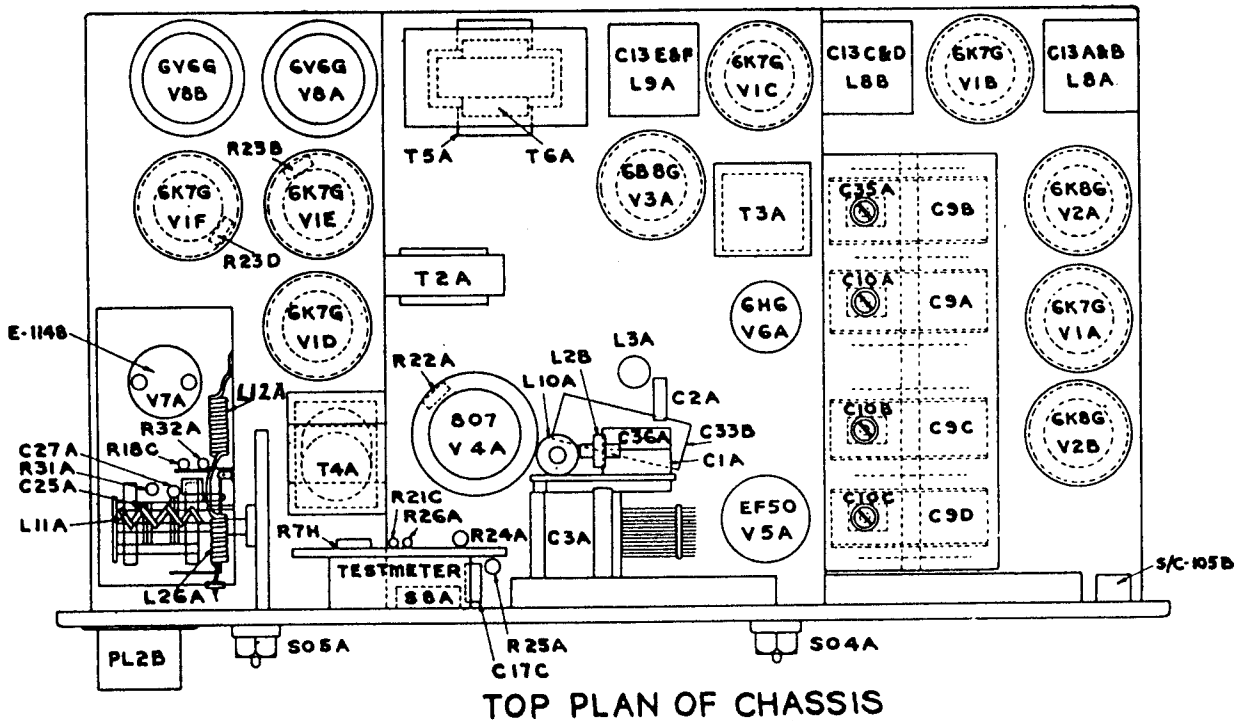


FIG. 11—VALVE POSITIONS (Top View of Chassis)

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1 - 11

TABLE 2—RUNNING REPAIRS CHART

Unit	No.	Failure	Possible Fault	Possible Cure
Power	1.	Entire set completely dead	Power failure	Do tests 1-7 of Daily Task Table
"A" Set	2.	All working except "A" Sender and Receiver	1. AE. disconnected	Examine—replace pig-tail if necessary. Report.
			2. V4A, V2A, V3A, V1A.	Replace valves in turn.
	3.	All working except "A" receiver.	V1A, V1B, V1C.	Replace valves in turn.
	4.	All working except "A" sender.	V2B, V4A, V5A, V6A.	Replace valves in turn.
	5.	All working except "A" sender, but "A" receiver gives no C.W. note or netting whistle.	V2B	Replace valve.
	6.	All working except "A" receiver, and when on Send, the AE. meter reading does not kick UP on loud R/T modulation. Also no sidetone. (See Daily Task No. 14).	V3A	Replace valve.
	7.	"A" sender and receiver not working, but sidetone is heard on Send R/T.	V2A	Replace valve.
	8.	All working except "A" sender, but meter reads DRIVE O.K.	V4A	Replace valve.
	9.	All working except "A" sender. No DRIVE reading or only a very low reading.	V2B V5A V6A	Replace in turn.
	10.	All working except "A" sender on C.W. and M.C.W.	1. Faulty key, key lead, or plug.	Examine—repair if possible, otherwise report.
2. Internal fault.			Report.	

Unit	No.	Failure	Possible Fault	Possible Cure
"A" Set (cont'd.)	11.	"A" Receiver very noisy.	1. Loose AE. connections.	Check and tighten where loose. Replace pigtail if necessary. Examine coaxial cable sockets. Report, if necessary.
			2. Loose valves.	Plug in tightly.
			3. Internal fault.	Report
			4. Interference.	Report.
I.C.	12.	All working except I.C.	V1F, V8B.	Replace valves in turn.
	13.	"B" and I.C. not working	V1F, V1E, V8B, V8A.	Replace valves in turn.
"B" Set	14.	All working except "B" sender and receiver.	V7A, V1D, V1E, V8A..	Replace valves in turn.
	15.	All working except "B" receiver.	V1D	Replace valve.
	16.	"B" receiver very noisy.	1. Loose AE. connection.	Check — Tighten where loose. Examine coaxial cable sockets.
2. Loose valves			Plug in tightly.	
3. Internal fault.			Report.	

Electrician's Maintenance:

17. The operations outlined in Paras. 18 to 27 may be carried out by Instrument Mechanics, R.C. Signals or Electricians, Signal, R.C. Signals. They must NOT be attempted by units or operators, except as in paras. 2-16.

18. Microphone and Receiver Headgear, Assemblies Nos. 1 and 2:—

- (a) Replace headgear assembly.
- (b) Replace capsule, case, and mouthpiece (Mic.)
- (c) Adjust capsule contacts and pressel switch contacts in Mic.
- (d) Replace headband, ear cushions, case or capsule in headphones.
- (e) Replace leads as an assembly.
- (f) Repair insulation on leads.
- (g) Clean units.

19. Control Units and Junctions Distribution:

- (a) Replace as an assembly. (See Fig. 4).
- (b) Replace drop cords or repair insulation on drop cord leads.
- (c) Replace "A Unattended" lamp bulb and cover.
- (d) Replace control knobs.
- (e) Repair broken internal connections.
- (f) Adjust buzzer. (See Fig. 6).
- (g) Clean units.

20. Connectors, 6-point, and 12-point:—

- (a) Replace cable as a unit.
- (b) Replace female sockets.
- (c) Repair connections.
- (d) Replace leads in cable.

The male connector plugs of the No. 19 set and supply unit are illustrated in Fig. 12. It will be noted that the pins are numbered CLOCKWISE. Correspondingly, in order to match up, the CONNECTOR CABLES must have their female sockets numbered COUNTER-CLOCKWISE. On occasion, in the field, it has been noticed that some connector cables have the correct numbering at one end, but the other socket has the wrong fibre insert, and is numbered clockwise. Some spare socket assemblies have also been found this way. On wiring such sockets, the faulty socket

MUST BE CORRECTLY RENUMBERED, otherwise, miswiring and short circuits will result.

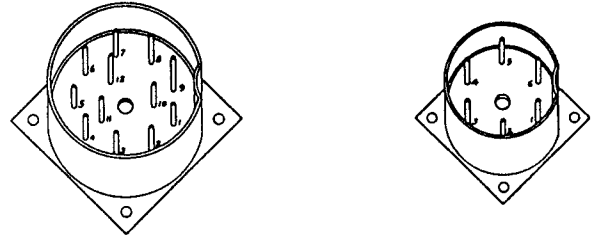


FIG. 12—MALE CONNECTOR PLUG

T ^{FZ 253/3}
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21. Aerial Bases No. 8 ("A" Set) and No. 9 ("B" Set):—

- (a) Replace base.
- (b) Replace mounting.
- (c) Replace pigtails.

22. Aerial Leads Nos. 1, 2, and 3:—

- (a) Replace leads.
- (b) Replace or tighten contact screw in socket.

23. Morse Key Assembly:—

- (a) Replace or repair key, plug and leads.

24. Variometer:—

- (a) Replace unit.

25. Supply Unit No. 2:—

- (a) Replace pilot lamp, lamp socket and lamp cover.
- (b) Replace fuses, Holder No. 1 and cap.
- (c) Replace or repair male connector plug assemblies, PL-1C and PL-2C.
- (d) Replace watch holder.
- (e) Replace vibrator, Mallory G634C.
- (f) Replace valve V/C101A (OZ4A).
- (g) Replace power switch S/C-101A.
- (h) Replace 12V.-24V. switch, S/C-102A.
- (i) Replace chokes L17A and L18A.
- (j) Replace electrolytic condensers, C/C-105A and C/C-105B, and C32A.
- (k) Replace leads and repair connections.
- (l) Replace, bed-in, and adjust brushes on dynamotor. See Section 26).
- (m) Clean commutator, using rag and petrol; also fine glass paper if necessary.

- (n) Check commutator, for protruding mica and wear. When undercutting is required, return supply unit to R.C.O.C. Telecommunications.
- (o) Clean inside of supply unit (using compressed air if available) and tighten all screws and nuts.
- (p) Replace ground strap.
- (q) Replace carrying strap.

26. Whenever brushes are removed from a dynamotor, they should be marked so that they may be replaced in the same holder and in exactly the same relationship as before; otherwise they will not seat properly, and arcing and interference will result. To bed in new brushes, wrap a piece of fine glass paper around the commutator, abrasive side up. Next, properly insert the brushes in their holders, and gently rock the commutator back and forth (or rotate slowly) until the brushes are sanded to the contour of the commutator. Then the glass paper must be removed and the commutator cleaned with a rag and petrol. Any carbon dust getting down between the commutator bars must be carefully cleaned out or it will cause a short circuit. Following this the machine should be operated for several hours to "run in" the brushes to a finer finish.

27. Sender/Receiver Unit:—

- (a) Replace valves.
- (b) Replace the following control knobs:—
HET TONE, Band Switch, MCW CW R/T function switch, A.F. GAIN A, GAIN B, R.F. GAIN, Meter Switch, M.C. dial vernier drive, or a PA dial vernier drive.
- (c) Tighten all control knobs and dials, being careful not to shift calibration. (Grub-screws are located in hub of M.C. and P.A. dials). Be careful that the slotted end of the set screw is not split, by using too much pressure.
- (d) Repair and replace male plug assembly, PL-2A and PL-2B.

- (e) Repair and replace "A" and "B" aerial sockets, S04A and S05A.
- (f) Replace external knob only on flick lever.
- (g) Replace or repair flick flags or flag-arms. Adjust flick discs.
- (h) Tighten all screws, nuts and bolts except those whose movement would affect alignment or adjustment.
- (i) Replace meter.
- (j) Replace ground strap.
- (k) Clean unit (using compressed air if possible). Be very careful not to disturb any adjustments, and treat tuning condensers very carefully.

NOTE:—THE ABOVE MENTIONED R.C. SIGNALS PERSONNEL MAY, WHEN REQUIRED, CARRY OUT INSTALLATION OF THE COMPLETE No. 19 WIRELESS STATION INTO AN A.F.V. UNDER THE SUPERVISION OF AN R.C.O.C. ARMAMENT ARTIFICER (WIRELESS).

ELECTRICIAN'S PERIODIC INSPECTION:

28. The maintenance described in Paras. 29-40 inclusive should be carried out AT LEAST EVERY TWO WEEKS. Whenever the Instrument Mechanic or Electrician maintains a set he should fill in the maintenance chart which is kept by the Signal Officer for each set under his control. A specimen chart is shown in Table 3. After carrying out each item of his maintenance, the electrician should put a tick in the corresponding square on the chart. If he carries out any minor repairs, he puts an "R" in the square and writes out the details in the Remarks column. If he finds that a major repair, which he cannot carry out, is needed, he puts an "X" in the square and turns the set in to stores for R.C.O.C. action. He also notes in the Remarks column the details of any work done since the set was last maintained. The chart thus gives a complete history of the set.

To re-assemble variometer, proceed as follows:—

- (v) Ascertain that the pointer inside the end-cover indicates the same figure as that noted in (i) above. If it does not, then the variometer has been improperly assembled at some previous date, and this internally indicated number should now be taken as the reference.
- (vi) Rotate the knob until this internal pointer is opposite the hairline in the centre of the index window.
- (vii) Rotate the variometer shaft until the coupling fork points to the number on the circumference of the outer case which corresponds to the internally indicated number in (v) above.
- (viii) Carefully replace the end-cover on the variometer case so that the centre line of the index window is opposite the desired number on the outer case, as indicated in (vii) above.
- (ix) Tighten the eight circumference screws on the variometer case.
- (x) Test the action of the variometer.

NOTE:—THE ABOVE SEQUENCE IS IMPORTANT AS IMPROPER ASSEMBLY WILL RESULT IN THE INTERNAL VARIOMETER SERIES-PARALLEL SWITCHING NOT BEING IN THE CHANGE-OVER POSITION WHEN RED SHOWS IN THE INDEX WINDOW.

31. Aerial Leads:—

- (a) Check the lead between the variometer and the "A" aerial for fraying, especially where the feeder passes through the turret and under cleats.
- (b) Check "A" and "B" coaxial feeders. Check grub screw inside feeder sockets for tightness.
- (c) Clean plugs and sockets and check for burning.

32. Supply Unit:—

- (a) Unscrew fuses and check that fuse wires are of correct gauge. Clean ends and screw in firmly.
- (b) Inspect commutators thoroughly. Wipe with clean, soft rag, moistened with petrol if necessary. Replace brushes if too worn or badly bedded. Do NOT oil bearings except in an emergency, since special lubricant is needed.
- (c) Where variometer is mounted on supply unit, check tightness of fixing screws.
- (d) Clean inside thoroughly and dry out if necessary. Inspect plugs.

33. Sender/Receiver Unit:—

- (a) Clean slow motion drives, rims of dials and flick discs (behind panel), using a rag moistened with petrol and wrapped round a sharpened stick similar to a toothpick. Apply oil to all these, or, if none is available, thick oil. Check tightness of screws securing flick arms and dial stops. If latter are loose, adjust them so that condensers are just prevented from fully opening and closing.
- (b) Check mechanical action of all controls. Work from left to right. Tuning B should have no side-play. Check tightness of grub screw on hub. Check stops. The Quench control should make 12 revolutions and should work stiffly but smoothly. The HET TONE should turn through 360°.
- (c) Remove lids of screening cans over valves and see that they make good contact with cans. Check that screening cans are pushed home into bases. Check that valves are firmly held in sockets. Check that clips fit firmly on top caps of valves. Inspect grid leads where they pass through screening cans. If worn, replace, if possible, or insulate with tape.
- (d) Clean interior of set, and inspect for loose or dirty connections. Dry out if necessary. Inspect carefully, aerial terminals, 12-point connector plugs, and lid of "B" set screening box.

34. Control Units and Junctions, Distribution.
- (a) Check action of switches and buzzer.
 - (b) Clean interior of boxes.
 - (c) Inspect 12-point sockets.
 - (d) Inspect drop cords for fraying and snatch sockets for cracks.
35. Connectors:—
- (a) Examine for external fraying.
 - (b) Inspect pins in all connector plugs.
 - (c) Check that heads cannot rotate.
36. Headsets:—
- (a) Inspect leads for fraying and snatch plugs for cracks.
 - (b) Clean out microphone, checking terminals and capsule contacts.
 - (c) Check action of pressel switch, adjusting contacts if necessary.
 - (d) Inspect connection and anchoring of leads to headphones.
37. Key:—
- (a) Clean and check leads for fraying.
38. Meter:—
- (a) Switch supply unit on and check freedom of movement on L.T.
 - (b) Switch off and set zero of meter.
39. Test the set by performing Daily Maintenance as outlined in Table 1.

VALVE TESTS:

40. Check all valves in set on a valve tester, if available. If not, a check of valve emission may be undertaken as outlined in Paras. 41 and

42, Tables 4-8 inclusive. By noting at regular intervals the performance of certain valve stages, the electrician can detect when any one of these stages become inefficient, and can thereby keep the general performance of the set at a high level.

41. The value of the test figures in these tables depends on their being taken under the same conditions on each occasion. These conditions are:—

- (a) "A" set switched to R/T.
- (b) Four-foot rod or dummy aerial on "A" set (the same on each occasion).
- (c) "A" set tuned to about 3500 Kc/s., except where otherwise stated. The set must NOT be tuned to an incoming signal.
- (d) Batteries at least three-quarters charged and battery leads of such a resistance as to give a reading of 11 volts on the set meter. Electricians should use their own batteries, whose values of charge they know, and should have a stock of leads of various resistances.
- (e) The same voltmeter must be used on every occasion. A Universal Avometer is preferable, but a Voltmeter Pocket No. 2 or No. 3 is also suitable. If no high resistance voltmeter is available, the meter in the set may be disconnected and used. A length of wire with a prod on it should be connected to one terminal and two lengths, in parallel, each with prods, to the other. These latter two lengths should have high quality series resistors in them of 6000 ohms and 200,000 ohms respectively.

42. The tables below show readings which may be expected. Those measured with the set meter are only a very rough indication.

NOTE:—GREAT CARE SHOULD BE TAKEN NOT TO DISTURB THE RELATIVE POSITION OF ANY WIRING OR COMPONENTS, AS THIS WILL AFFECT PERFORMANCE AND CALIBRATION OF THE SET.

TABLE 4—VALVE TEST FIGURES WITH "A" SET RECEIVING

Circuit Tested	Positive of Meter to	Negative of Meter to	Voltage	Series Resistor	Set Meter Reading on 600 scale
V1A	Pin 8	Chassis	3	6000	450
V2A Hexode	Pin 8	Chassis	2½	6000	400
V2A Triode	Pin 6	Chassis	80	200000	425
V1B	—	—	Normal A.V.C. reading		
V1C	Pin 8	Chassis	2½	6000	400
V3A	Pin 8	Chassis	30	200000	150

TABLE 5—VALVE TEST FIGURES WITH "A" SET SENDING

Circuit Tested	Positive of Meter to	Negative of Meter to	Voltage	Series Resistor	Set Meter Reading on 600 Scale
V2B (Hexode)	Pin 8	Chassis	2¼	6000	400
DRIVE	Check reading over whole frequency range. If difference is more than 1.5 V. (3 small divisions), check V2B, V2A and V5A.				
V2B (Triode)	Pin 6	Chassis	95	200000	475
V5A	Pin 6	Chassis	1¼	6000	220
V6A	Record DRIVE readings at 2500 and 4000 Kc/s.				
V4A	Record AE. readings at 2500; 4000, 5000 and 7500 Kc/s.				

TABLE 6—VALVE TEST FIGURES WITH "B" SET RECEIVING

Circuit Tested	Positive of Meter to	Negative of Meter to	Voltage	Series Resistor	Set Meter Reading on 600 Scale
V1D	Pin 3	Chassis	70	200000	355
V1E	Pin 8	Chassis	1¾	6000	300
V8A	Pin 8	Chassis	22	200000	110

TABLE 7—VALVE TEST FIGURES WITH "B" SET SENDING

Circuit Tested	Positive of Meter to	Negative of Meter to	Voltage	Series Resistor	Set Meter Reading on 600 Scale
V7A	H.T. 1	Plate	60	200000	300

TABLE 8—VALVE TEST FIGURES ON I.C.

Circuit Tested	Positive of Meter to	Negative of Meter to	Voltage	Series Resistor	Set Meter Reading on 600 Scale
V1F	Pin 8	Chassis	1 $\frac{3}{4}$	6000	280
V8B	Pin 8	Chassis	18	200000	108

43. Loss of emission is indicated by a fall in the test reading in the case of all valves except V1D and the triode portions of V2A and V2B. Loss of emission in V2A and V2B is indicated by a variation of the drive reading at various frequencies.

44. To check the "A" send-receive alignment, set a wavemeter to 7500 Kc/s. and tune the receiver to it, tuning for maximum dip on the A.V.C. meter (Do NOT net). Press the pressel switch and set the wavemeter to the frequency at which the set is sending. If the reading is more than 1.5 Kc/s. away from 7500 Kc/s., the set should be handed in to R.C.O.C. Telecommunications.

45. Check calibration of the "A" set by setting a wavemeter to 2100 Kc/s. and tuning the receiver to it. Record the setting of the A FREQUENCY MC dial. Repeat this at 2500, 3000, 3500, 4000, 5000, 6000, 7000, and 7900 Kc/s. In the last case, if using a Wavemeter, Class C, set it to 3950 Kc/s. and tune the set to the second harmonic (i.e.—7900 Kc/s.) If the set calibration is in error more than ± 50 Kc/s., on high band, or ± 25 Kc/s. on low band, it must be turned in to R.C.O.C. Telecommunications for alignment.

46. Operate the set in the vehicle, with the engine running and all electrical gear (e.g.—fans, power-operated turrets, etc.) switched on. If bad crackling is heard, the suppression and screening system of the engine and charging equipment are probably faulty. This fault should be reported to the Unit Formation Signal Officer.

END.