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STATION RADIO, A40

TECHNICAL HANDBOOK - UNIT REPAIRS

This EMER must be read in conjunction with
Tels F 462 Part 2 which contains figures
and tables to which reference is made.

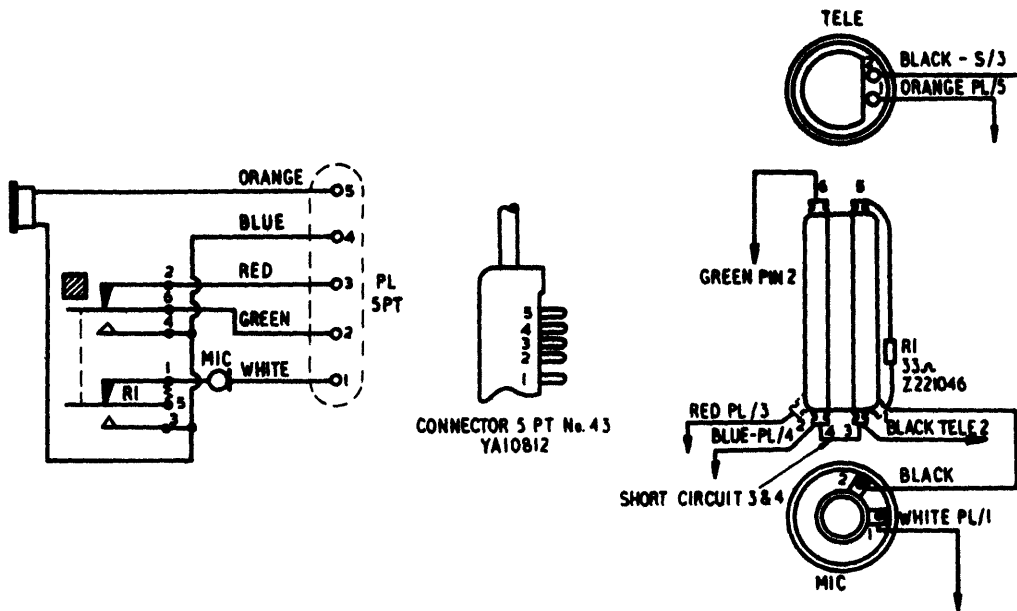
INTRODUCTION

1. This regulation details the procedure to be followed for unit repairs. The normal repairs should be restricted to those which can be carried out without unsealing the equipment, ie repairs to headgear, aerials, etc. Only in the case of an emergency, may action be taken to:-

- (a) Tune the preset trimmers to a new series of frequencies using the Functional tester No 2 (F.T.2).
- (b) Tune the preset trimmers using the F.T.2 to obtain optimum performance.
- (c) Replace plug-in units within the sealed set. Under no circumstances will repairs to these assemblies be attempted in unit lines.

2. Where action has to be taken which involves unsealing, the following points be observed:-

- (a) The seal should be broken only in the driest and most dust-free conditions and the set should not, in any case, remain open for more than one hour.
- (b) A new desiccator should be fitted immediately before resealing.
- (c) The equipment must be returned to workshops for drying and seal-testing as soon as possible after the repair.

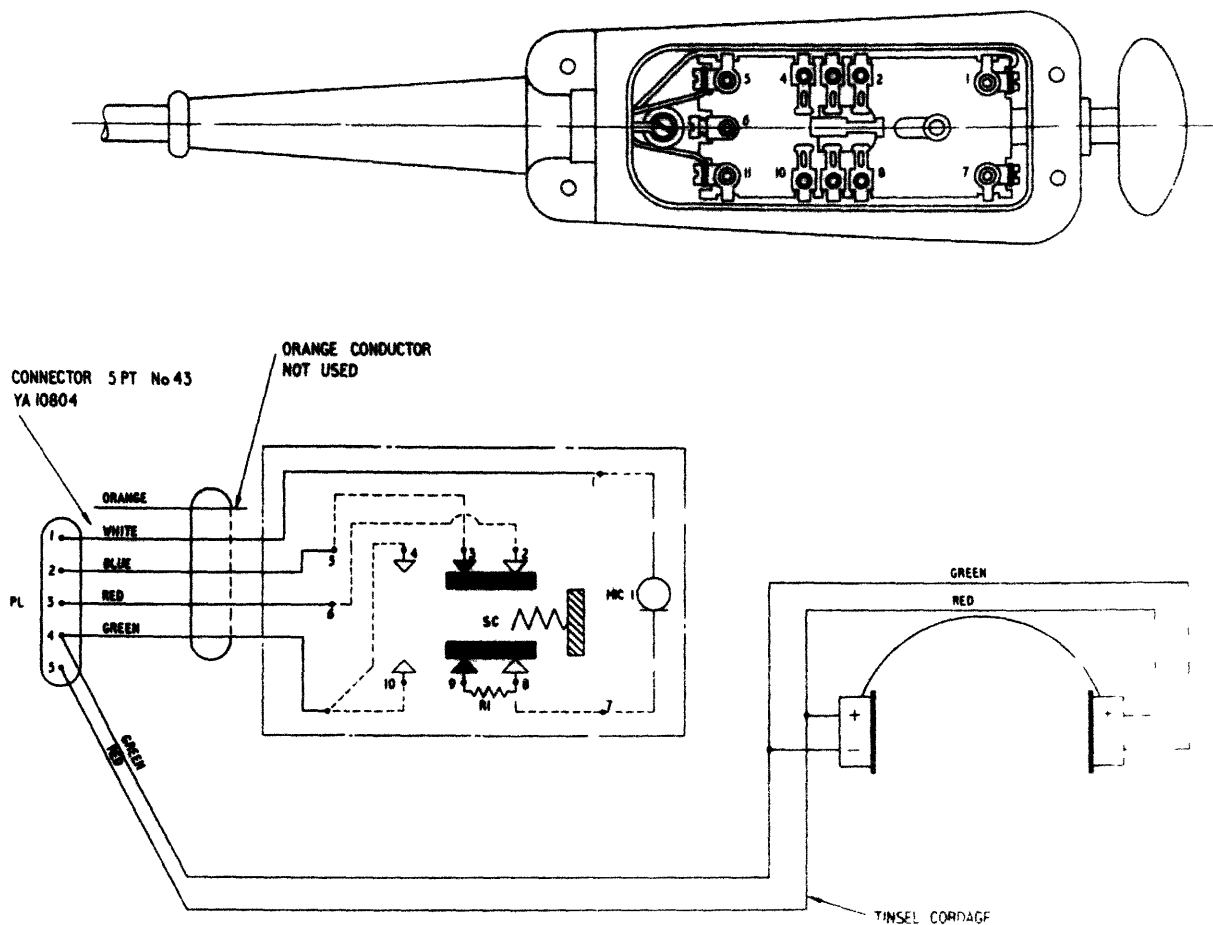


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Fig 1 - Circuit and connections for Telephone, hand, SI, No 4G

3. Circuit and wiring diagrams of the two types of headgear are given in Fig 1 and 2. Since the 5-pin audio plugs are filled with Boscoprine cement the complete connector should normally be replaced. Part numbers for the various components are as follows:-

Microphone and receiver headgear assembly No 1A	YA 10717
using Connector, 5-pt, No 43, 4 ft 6 in.	YA 10804
Telephones, hand, S.I., No 5G	YA 10708
using Connector, 5-pt, No 43, 4 ft 6 in.	YA 10812
In both cases insets are:-	
Inset, standard, microphone, carbon, No 1	YA 8741
Inset, standard, receiver, EM, No 2	YA 10432



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Fig 2 - Circuit and connections for Microphone and receiver headgear assembly No 1A

Testing the TR A40 (sealed) using the F.T.2

4. Full details for using the F.T.2 are contained in the User Handbook supplied with the instrument but the test relative to the A.C are repeated here for easy reference. Tests are given in the order suggested for the technician to follow to diagnose a fault. Fig 3001 shows the front panel controls of the F.T.2.

5. Before any test, set the F.T.2 switches as follows:-

- S1 to OFF
- S2 to TEST VOLTS, DRAIN & TUNE
- S3 to TEST UNITS VALVES & INTERNAL VALVE
- S4 to REC.

Battery check

6. (a) Connect the battery to be checked to the F.T.2 using Connector No 2.

- (b) Switch S3 to BATTERY VOLTS - L.T.; S1 to CPRC-26 OR A40 and wait 30 secs. The meter should read on the GOOD section of the scale.
- (c) Repeat the check with S3 set in turn to BATTERY VOLTS - H.T.1, - H.T.2. and BIAS.
- (d) Replace the battery if any reading falls into the BAD category.

Battery drain

7. Note that this test is useful as a check for open- or short-circuits on the h.t. lines. Small changes of current, eg one plug-in unit not taking current, may not be evident, since actual readings greatly depend upon battery conditions.

- (a) Connect the F.T.2 to the battery and to the A40 using Connectors No 2 and 4 respectively.
- (b) Connect the TO AUDIO SOCKET of the F.T.2 with Connector No 5 to the audio socket of the A40.
- (c) Connect the TO AUX. AERIAL socket on the F.T.2 with Connector No 7 to the A40 coaxial aerial socket.
- (d) Set S1 to CPRC-26 OR A40 and switch on the A40.
- (e) Set S3 to DRAIN - H.T.1. and - H.T.2. in turn.
- (f) Set S4 to SEND and S3 to DRAIN - H.T.1. and - H.T.2. in turn.
- (g) In each case, if the set is operating correctly, a reading on the GOOD part of the scale should result.

Transmitter power

- 8. (a) Connect the transmitter-receiver to the battery either directly or via the F.T.2 using Connectors No 2 and No 4.
- (b) Connect the TO AUX AERIAL socket on the F.T.2 with Connector No 7 to the coaxial aerial socket on the A40.
- (c) Connect the audio socket of the A40 and the TO AUDIO SOCKET of the F.T.2 with Connector No 5.
- (d) Switch S1 to CPRC-26 OR A40, S3 to TUNE - P.A.(S) and S4 to SEND.
- (e) Switch on the A40. The meter should read on the GOOD part of the scale. If not, suspect the m.o. valve, p.a. valve or alignment.

9. To carry out any further tests or adjustment it is necessary to unseal the set and this should, therefore, be restricted to emergency conditions unless drying and sealing facilities exist (see also para 2).

10. All subsequent tests using the F.T.2 make use of the internal valve in the F.T.2 which should be checked before carrying out the required test. The procedure is:-

- (a) Connect F.T.2 with Connector No 2 to the battery.
- (b) Set S1 to OFF, S2 to TEST VOLTS, DRAIN & TUNE, S3 to TEST UNITS VALVES & INTERNAL VALVE and S4 to REC.
- (c) Set S1 to CPRC-26 OR A40 and S2 to INTERNAL VALVE.
- (d) If the reading is not on the GOOD section change the valve as detailed in Tels M 263 or F.T.2 User Handbook.

11. To open the test set:-

- (a) Release the webbing and remove the battery compartment.
- (b) Remove the four nuts and bolts securing the test set, using item 13 of the test set accessories, 3/32 in. Allen wrench and the No 4 BA spanner provided.
- (c) Withdraw the test set from the case.

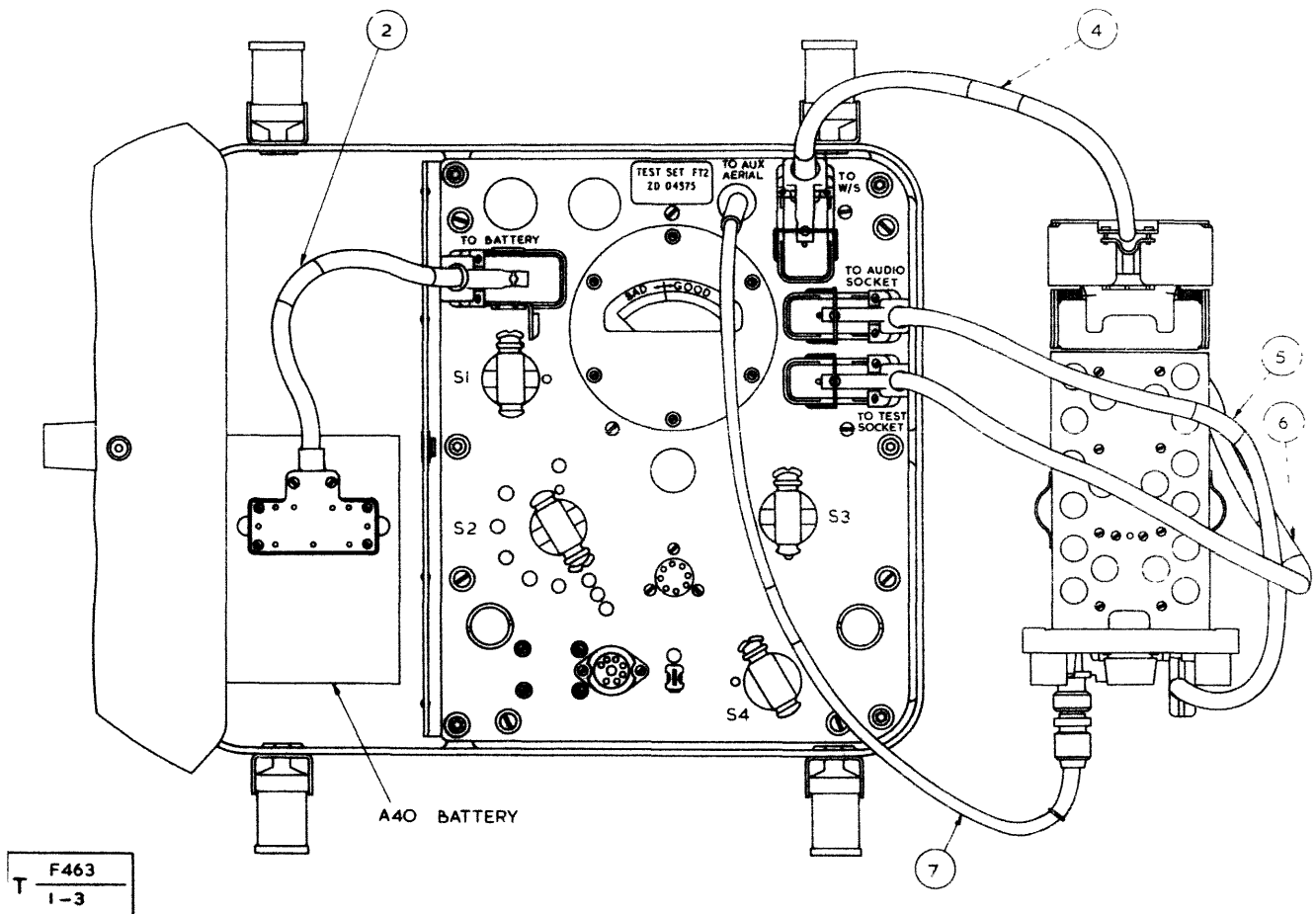


Fig 3 - F.T.2. connections to TR A40 (unsealed)

12. Fig 3 shows the standard layout and connector numbers for testing an unsealed TR A40. Connector No 5 must be connected to the OPERATOR socket on the A40. A hand-set or headset may be used in the parallel socket when testing but SEND/REC switching will be carried out using S4 on the F.T.2.

To check the tuning of the TR A40

13. (a) Connect the A40 and the F.T.2 as shown in Fig 3 (controls in standard conditions (para 5)).
- (b) Set S1 to CPRC-26 OR A40 and S3 to TUNE - R.F.(R).
- (c) Switch on the A40 and set it to required channel.
- (d) Using the trimming tool provided (item 10 of the test set accessories), adjust the appropriate channel R.F. and P.A. trimmers on the A40 for maximum meter reading. The needle should be adjusted by the ADJUST METER control to give a convenient deflection.
- (e) Set S3 to TUNE - M.O.(S) and S4 to SEND.
- (f) Depress B2 and set the ADJUST METER control until the F.T.2 meter reads on the GOOD/BAD line.
- (g) Release B2 and adjust the appropriate M.O. trimmer to again bring the meter to the GOOD/BAD line.
- (h) Depress B2 and, using the ADJUST METER control, again set the F.T.2 meter to the GOOD/BAD line.
- (j) Repeat (f) to (h) until with B2 pressed or released, the pointer remains on the GOOD/BAD line.
- (k) Set S3 to TUNE - P.A.(S) and adjust the appropriate P.A. trimmer for maximum meter reading.

To tune the TR A40 to new frequencies

14. If the A40 is to be tuned to new frequencies the procedure is as follows:-
- (a) Insert the new crystals for the channels to be tuned.
 - (b) Screw the three trimmers (R.F., M.O. and P.A.) for the channels to be tuned fully anticlockwise.
 - (c) Adjust the trimmers as in para 13; the first response obtained in a clockwise direction is the correct tuning point.

To locate a faulty plug-in unit

15. It is possible to localise a fault in the TR A40 by studying the symptoms on receive and send. The indications present when any unit is faulty are given in abbreviated form on the unit retaining plate and Table 1 presents the information in a different form.

Receive conditions		Send conditions		Units to be checked in F.T.2 or replaced
Signals	Noise level	R.F. output	Sidetone	
None	None	Correct	None	A.F. amplifier (dark green)
None	None	Correct	Correct	Limiter (yellow) or change A.F. discriminator (light green)
None	Full noise	Correct	Correct	R.F. amplifier (black)
None	Full noise	Correct	None	Crystal oscillator (red) mixer (brown) (or crystal if fault on one channel only)
Weak or None	Low	Correct	Correct	I.F. amplifiers (orange) the lower the noise level the later the i.f. stage
Correct	Correct	None	None	M.O. valve (V2) or m.o. coil (white)
Correct	Correct	None	Correct	P.A. valve (V3)
Correct	Correct	Correct	None	A.F.C. driver (blue) or change a.f.c. discriminator

Table 1 - Fault finding table - plug-in units

16. The four indications can be noted using either:-

- (a) An F.T.2 connected as in Fig 3 to measure r.f. output with a headset or handset in the spare audio socket of the A40 to check noise level and sidetone. Using this method the presence of signals cannot be determined but a variation of meter reading on TUNE - R.F.(R) when the R.F. trimmer is adjusted will give some idea that the set is functioning correctly; or
- (b) An A40 connected as normal with headset or handset on receive using a second A40 on send to give an input signal. The send conditions can be determined using a condition indicator and headset. (This method must obviously not be used during periods of radio silence).

17. In either case the suspected stage or valve should be removed and checked in the F.T.2. The F.T.2 in this role tests the valve emission only and, therefore, faults within plug-in units can exist which are not apparent on the tester but which affect the set performance, eg misalignment or faulty components. The procedure for testing a plug-in unit in the F.T.2 is given in para 19.

18. When a plug-in unit is replaced the faulty unit should be retained and if possible stored in the case which contained the replacement unit. This is important since it is the policy to check and repair these units at REME workshops suitably equipped with test jigs designed for this purpose.

To test a plug-in unit or valve

19. Warning: The switches must be set before inserting the unit to be tested otherwise damage to the valve within the unit may result.

- (a) Connect the battery to the F.T.2 by Connector No 2, if using an A40 battery or by Connector No 1, if using an A41 battery. (The testing of units can be carried out using either type.)
- (b) Set S3 to TEST UNITS VALVES & INTERNAL VALVE and S2 to the appropriate position for the unit or valve to be tested. For plug-in units the colour dot denotes the colour of the unit.
- (c) Insert the unit or valve first in the PIN STRAIGHTENER socket and then in the UNIT & VALVE SOCKET.
- (d) Set S1 to CPRC-26 OR A40 or A41 OR A42 according to the type of battery in use, and depress B1. The meter should read on the GOOD part of the scale.

Checks after replacement of plug-in units

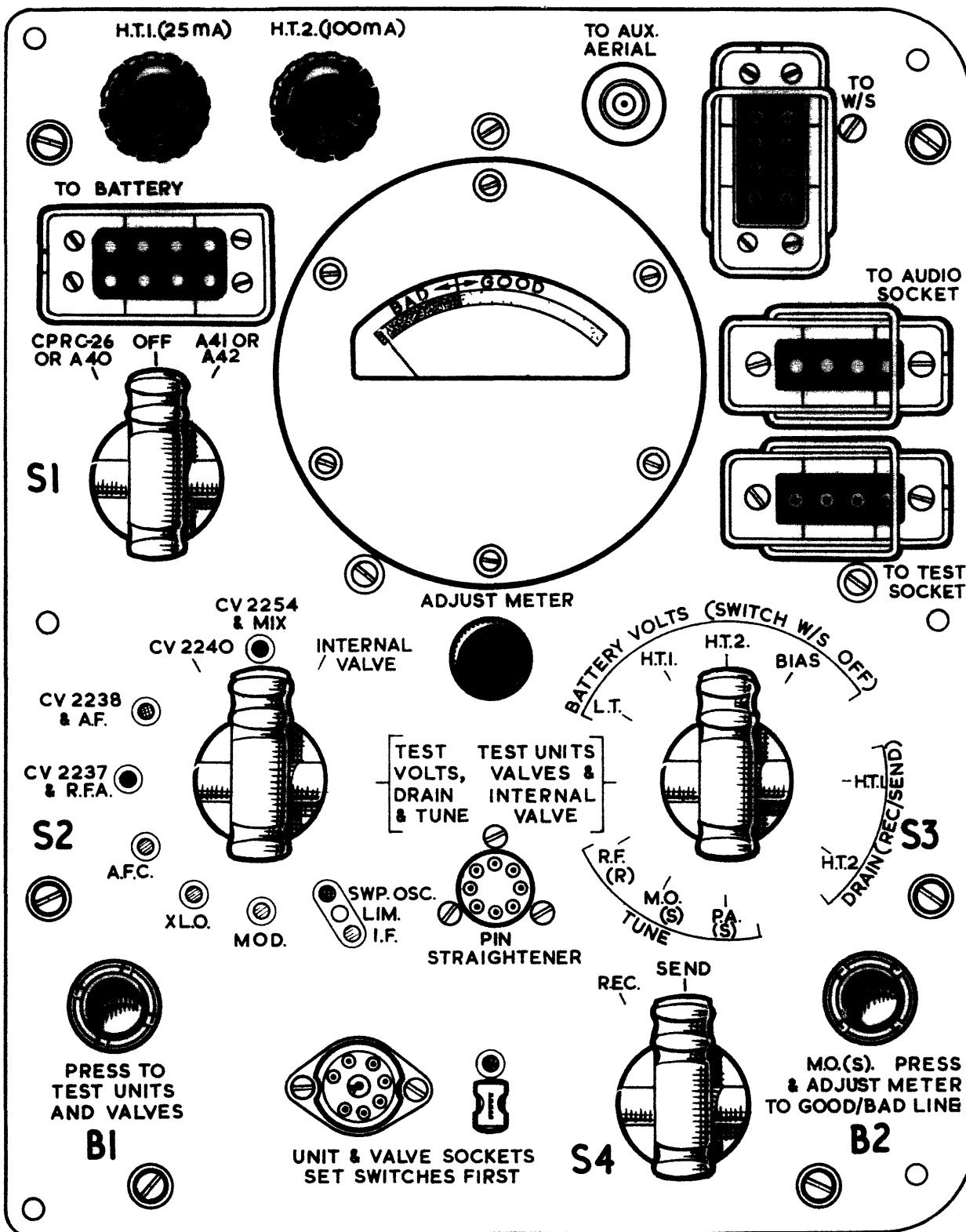
20. When some plug-in units are replaced, it is important to re-adjust the preset R.F., M.O. and P.A. trimmers. These units are listed in Table 2.

21. Plug-in units not included in Table 2 will not affect the pre-aligned sections of the A40. It is, however, often advantageous to retune the set according to para 13 if any unit or other repair has been carried out to ensure optimum performance.

Unit	Colour	Trimmers to be checked on replacement (see para 13)
R.F. amplifier	Black	R.F. and P.A.
Mixer	Brown	R.F.
M.O. valve V2		M.O. and P.A.
P.A. valve V3		M.O. and P.A.
M.O. coil	White	M.O. and P.A.
Modulator	Grey	M.O. and P.A.

Table 2 - Trimmers to be checked after unit replacement

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Fig 3001 - Front panel controls of Functional tester No 2