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TRANSMITTER-RECEIVER, RADIO, A41

TECHNICAL HANDBOOK - UNIT REPAIRS

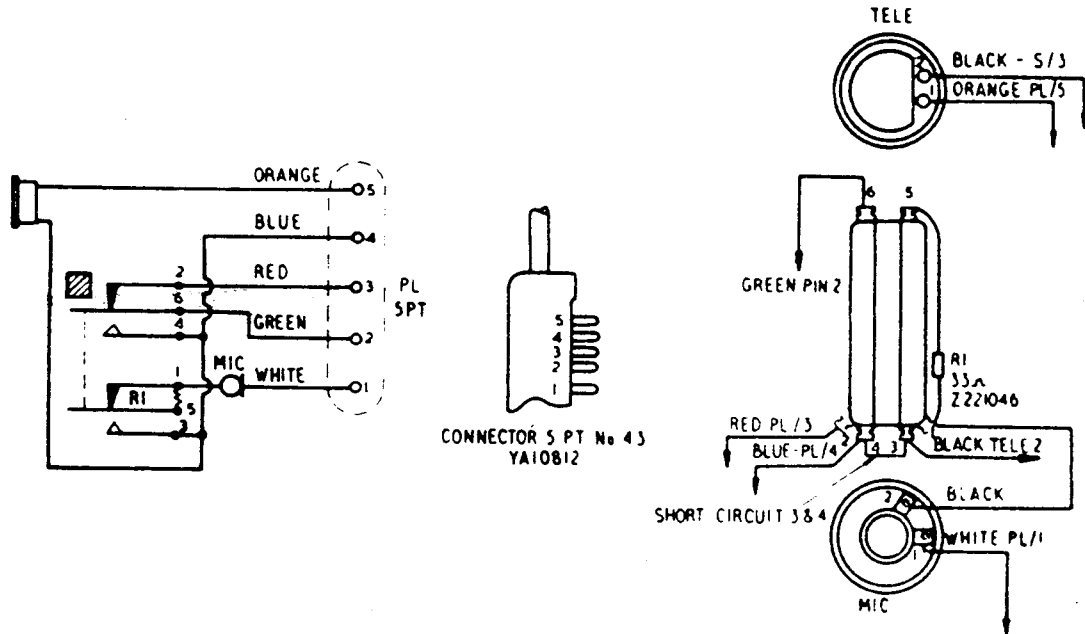
This EER must be read in conjunction with Tels F 482 Part 2 which contains figures and tables to which reference is made

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. Only in the case of an emergency may action be taken to replace valves and plug-in units within the sealed set. Under no circumstances will repairs to these assemblies and the wired in units be attempted in unit lines.

2. Where action has been taken which involves unsealing the equipment the following points must be observed:-

- (a) The seal should be broken only in the driest and most dust-free conditions and the set will not 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.



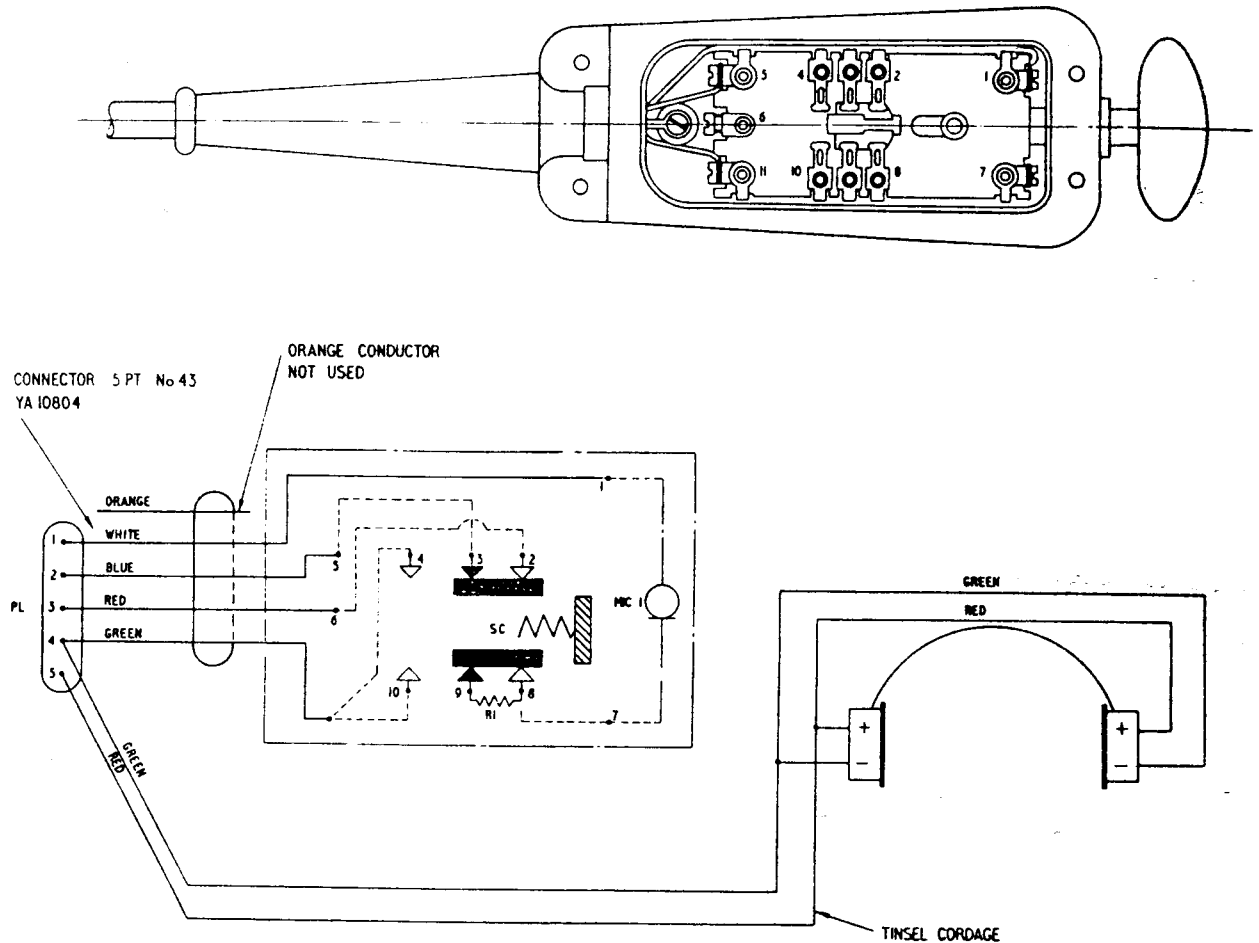
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Fig 1 - Circuit and connections for Telephone, hand, SI, No 4G

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 boscoprime the complete connector will normally be replaced. Part numbers for the various components are as follows:-

Microphone and receiver headgear assembly, No 1A	YA 10717
using Connector, 5pt, No 43, 4 ft 6 in.	YA 10812
Telephone, hand, SI, No 4G	YA 10708
using Connector, 5pt, 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

Functional test of the TR A41

Calibration check

4. (a) Set the TR A41 gain control to maximum, switch to CAL and plug in the handset.
- (b) Tune the receiver for zero-beat at the 38.7Mc/s calibration point, set the cursor on this adjustment. Tune the receiver to 53.75Mc/s and adjust the tuning for zero-beat note. The cursor adjustment must not be more than half a channel from the 53.75Mc/s calibration mark.

Transmitter check

5. Switch the TR A41 on and tune to 38Mc/s, depress pressel switch on handset and connect 'condition unit' to AUX AE, short AE, and long AE connections in turn, the condition unit should light. Repeat the test at 46Mc/s and 55Mc/s.

Communication check

6. Plug in the short aerial, switch to CAL, tune the receiver for zero-beat at the 38.7Mc/s-calibration point, set the cursor, switch to ON and tune the receiver to 40Mc/s. Establish communication with a distant set, slight retuning may be necessary for satisfactory reception. Communication should be loud and clear, repeat at 53Mc/s using the 53.8Mc/s calibration point. Check sidetone.

7. These frequencies are approximate and may be varied to clear-interference etc. This test must not be carried out during periods of radio silence.

Testing the TR A41 (sealed) using the FT2

8. Full details for using the FT2 are contained in the User Handbook (WO Code No 12437) supplied with the instrument, but the tests relative to the A41 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 FT2.

9. Before any test, set the FT2 switches as follows:-

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

Battery check

10. (a) Connect the battery to be checked to the FT2 using Connector No 1.
- (b) Switch S3 to BATTERY VOLTS - L.T.; S1 to A41 OR A42 and wait 30 sec. The meter should read on the GOOD sector of the scale.
- (c) Repeat the check with S3 set in turn to BATTERY VOLTS - H.T.1, H.T.2 and BLAS. Replace the battery if any reading falls into the BAD category.

Battery drain

11. (a) Connect the FT2 to the battery and to the A41 using Connectors No 1 and 3 respectively.
- (b) ~~Connect~~ the TO-AUDIO SOCKET of the FT2 and the audio socket of the A41 with Connector No 5.
- (c) Connect the TO AUX AERIAL socket of the FT2 with Connector No 7 to the AUX AE socket on the A41.
- (d) Set S1 to A41 OR A42 and switch on the A41.

- (e) Set S3 to DRAIN - H.T.1 and H.T.2 in turn, S4 to REC. There should be no indication on H.T.2.
- (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 sector of the scale should result.

12. If with a known good battery the meter indicates in the red sector of the scale or moves to the right beyond the green sector of the scale there is a fault in the radio set.

13. Warning: After any test on the A41 with the FT2, ensure that S1 on the FT2 is switched to OFF. Due to earth wiring in the FT2 and A41, certain supplies are not controlled by the radio set on/off switch.

Transmitter power

- 14. (a) Carry out para 11(a) to (c).
- (b) Set S3 to TUNE - P.A.(S), S4 to SEND and S1 to A41 OR A42.
- (c) Switch on the A41, the meter should read on the GOOD sector of the scale.

Testing the TR A41 (unsealed) using the FT2

15. To carry out further tests or repairs 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).

16. All subsequent tests using the FT2 make use of the internal valve in the FT2 which should be checked before carrying out the required test. The procedure is:-

- (a) Connect the FT2 to the battery with Connector No 1.
- (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 A41 OR A42 and S2 to INTERNAL VALVE. If the reading is not on the GOOD sector of the scale, change the valve as detailed in Tels M 263 or the FT2 User Handbook.

Testing receiver sensitivity with the FT2

- 17. (a) Connect the battery to the FT2 with Connector No 1 and the FT2 to the radio set with Connector No 3.
- (b) Connect the TO TEST SOCKET of the FT2 to the A41 test socket with Connector No 6.
- (c) Set S3 to R.F.(R), S1 to A41 OR A42 and switch on the A41.
- (d) Adjust the ADJUST METER control to bring the meter needle to the BAD/GOOD line.

- (e) Short the inner conductor of the A41 auxiliary aerial socket to the case and note the reading on the meter. The meter reading should rise into the 0.5 sector of the scale.

To locate a faulty unit or valve

18. It is possible to localize a fault in the TR A41 by studying the symptoms on receive and send. The indications present when any unit or valve is faulty are given in Table 1.

Receive condition	Send condition	Possible fault
Dead	R.F. output, no sidetone	V10 output stage
Low noise level, weak or no signals	Correct	A.F. discriminator
Low noise and no signals	Flutter on r.f. output, no sidetone	4th i.f. stage
As above	R.F. output, no sidetone and steady clicking in phones	1st, 2nd, 3rd i.f.
Correct	Off frequency	Sweep oscillator
Correct	No r.f. output and flutter in phones	V1 or modulator stage
High noise level	No r.f. output, no sidetone, steady flutter in phones	V2 or stage
Noise, no signal	Correct	V3 or stage
As above and no calibration check	Correct	V4 or stage
As above	Weak and fluttering r.f. output	V5 or V12 or fault in mixer or oscillator stage
Correct, no calibration check	Correct	V11 or stage

Table 1 - Fault finding guide

Testing valves and plug-in units

19. To replace radio set plug-in units:-

- (a) Remove set from case (two allen headed screws).
- (b) Remove securing plate from the i.f. unit (four No 6 BA screws and washers).

- (c) Pull the unit gently from the base (ensure that no h.t. or l.t. voltages are on the unit).
20. When removing valves and sub-assemblies from a radio set, do so carefully:-
- (a) Do not bend the units sideways or the pins will be damaged.
- (b) When extracting units from the centre of a radio set, first pull out the units on either side, the centre unit can then be withdrawn without difficulty.
21. The following units and valves contained within the A41 can be tested with the FT2. The switch position of each item is indicated. CV4097 cannot be tested in the FT2, if this valve is suspected change it for a spare:-

<u>Unit or valve</u>	<u>Colour of unit</u>	<u>Switch position</u>
I.F. amplifier	Orange	SWP OSC - LIM - I.F.
Sweep oscillator	Uncoloured	SWP OSC - LIM - I.F.
CV4093) CV4096)		CV2254 & MIX
CV4094) CV4095)		CV2237 & R.F.A.
CV4092		CV2238 & A.F.

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

- (a) Connect the battery to the FT2 with Connector No 1.
- (b) Set S3 to TEST UNITS VALVES AND INTERNAL VALVE and S2 to the appropriate position for the unit or valve to be tested. For plug-in units the colour dot on S2 denotes the colour of the unit.
- (c) Insert the unit or valve first into the PIN STRAIGHTENER socket and then into the UNIT & VALVE SOCKET.
- (d) Set S1 to A41 OR A42 and depress B1. The meter should read on the GOOD sector of the scale.

Note: Amend equipment title on Page 1 to 'Transmitter-receiver, radio, A41, No 1 and No 2'.
These pages 8 - 10, Issue 1 contain additional information.
Delete 'Note: The next page is Page 1001' from page 7.

TRANSMITTER-RECEIVER, RADIO, A41, No 2

Introduction

23. The information in the proceeding paragraphs applies to the No 2 set except in the following particulars:

- (a) The audio equipment is different.
- (b) The functional test incorporates a muting check.
- (c) Use of the FT2 requires special test leads.

Audio gear

24. The No 2 set uses miniature Bendix Thorn (type 105) connectors the pin numbering of which goes from A-E (F spare) instead of 1-5 as on the No 1 set. Otherwise the audio gear is identical.

25. Full details of the handset will be found in Tels C 702 (to be published). Part number is as follows:

Y1/5965-99-901-4287 Handset, SI, No 4, w/switch, 4 ft 6 in. cord,
terminated plug 6-pole.

26. Full details of the headset will be found in Tels C 722 (to be published). Part number is as follows:

Y1/5965-99-901-4288 Headset, microphone, SI, No 1 type: magnetic type
earphone, carbon type microphone, terminated plug
6-pole.

27. In both cases, insets are the same as on the No 1 set (para 3).

Functional test of the TRA41, No 2

Calibration check

- 28. (a) Set the gain control to maximum, switch to CURSOR and plug-in the handset.
- (b) Tune the receiver for zero-beat at 39Mc/s and set the cursor on this point. Tune the receiver for zero-beat at 54Mc/s. The cursor must not be more than 100kc/s from this point.

Transmitter check

29. Tune the set to 38Mc/s. In the transmit condition, connect the Indicator, condition unit to the AUX, short and long aerial connections in turn and check that it lights in each position. Repeat at 46 and 55Mc/s.

Communication check

30. Carry out para 6 and 7 at 40 and 53Mc/s.

31. With no input signal, switch to MUTE and adjust the muting control to a point where the noise is just muted. Check that communication can again be established with the distant station.

Testing the TRA41, No 2 using the FT2

32. The tests detailed in para 8 - 22, apply also to the testing of the No 2 set but connectors No 5 and 6 cannot be used for audio and test sockets. When available, new connectors will be issued for the FT2 for this purpose.

Part numbers are as follows:

Z4/6625-99-106-0513 Connector assembly, power electrical - (Audio lead)
Z4/6625-99-106-0514 Connector assembly, power electrical - (Test lead)

REBROADCAST AND RELAY UNITS

Introduction

33. As these are sealed units, para 1 and 2 apply. No attempt must be made to repair the printed boards.

Audio gear

34. The part number of the headgear is as follows:

Y1/5965-99-949-9294 Headset, microphone, SI, No 1 type; magnetic type earphones, carbon type microphone, termination plug 6-pole.

Full details will be found in Tels C 722 (to be published).

Functional test

35. Connect the rebroadcast (RB) unit and the relay unit to two known good sets and join the two units by a suitable length of cable. Switch on the sets and the RB unit.

Manual.

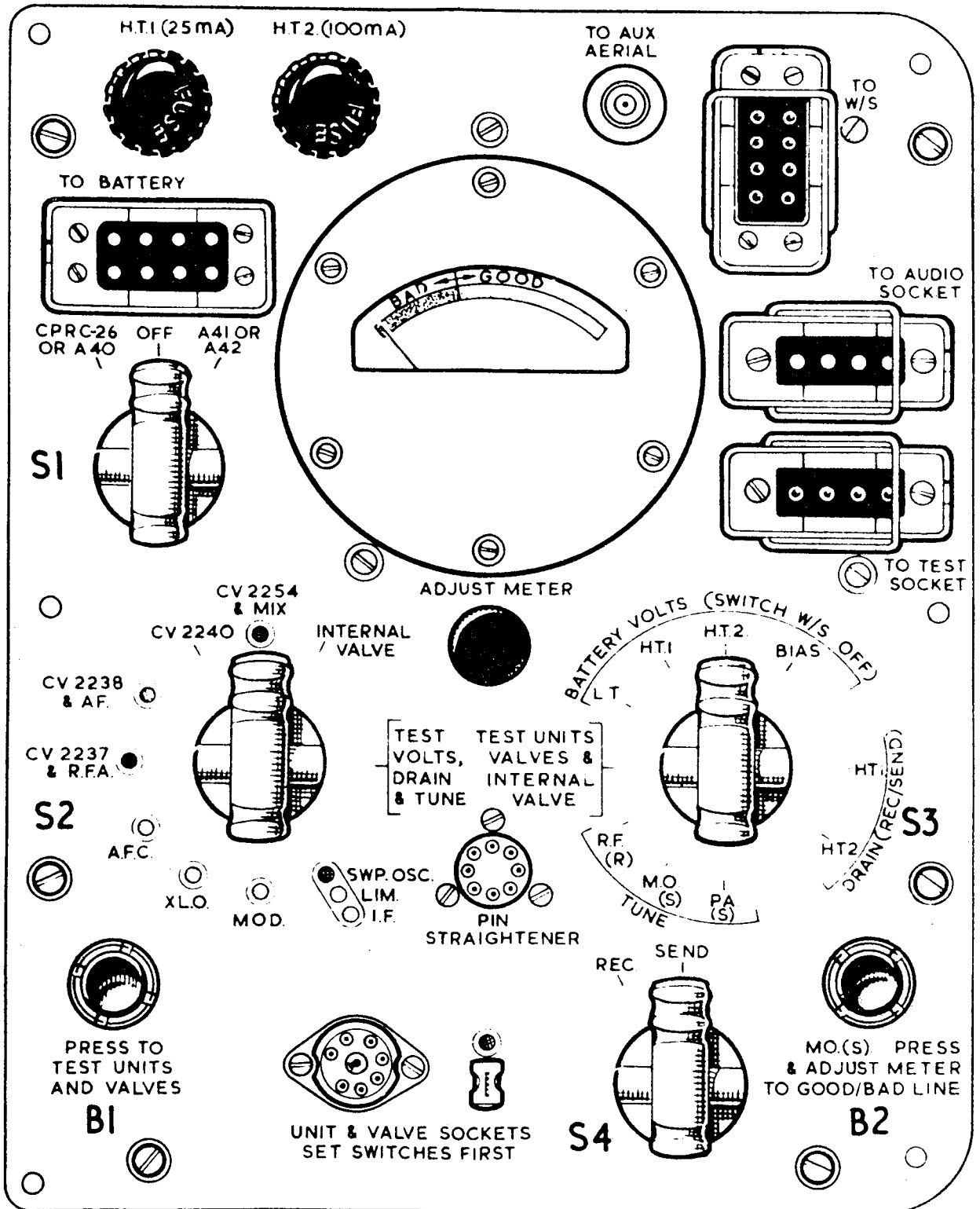
36. Adjust VOL A and VOL B controls for comfortable listening levels in the l.h. and r.h. earphones respectively.

37. (a) Turn the selector switch to WORK A and use the microphone and pressel switch of the headset to call over Set A. Release the pressel and listen for a reply in the l.h. earphone.
- (b) Throw SB to B -- A and check that speech can be passed from set B to set A.
- (c) Throw SB to A -- B and check that speech can be passed from set A to set B.
38. (a) Turn the selector switch to WORK B and use the microphone and pressel switch of the headset to call over set B. Release the pressel and listen for a reply in the r.h. earphone.
- (b) Throw SB to B -- A and check that speech can be passed from set B to set A.
- (c) Throw SB to A -- B and check that speech can be passed from set A to set B.

Auto RB.

39. Carry out level adjustment by turning both ADJUST B -- A and ADJUST A -- B controls to 0.
40. (a) Turn the selector switch to ADJUST B -- A and turn the ADJUST B -- A control slowly clockwise to a point at which the noise in the l.h. earphone suddenly increases. Leave the control at this setting.
- (b) Repeat with switch to ADJUST A -- B using the ADJUST A -- B control.
41. Turn the selector switch to AUTO RB and check that speech from set A is automatically transmitted by set B and vice versa.

Note: The next page is Page 1001.



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Fig 3001 - Front panel controls of Functional tester No 2

ELECTRICAL AND MECHANICAL
ENGINEERING REGULATIONS

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Issue 1, 8 Dec 61