

Section 2

FIRST LINE SERVICING

RESTRICTED

Chapter 1

AIRCRAFT INSTALLATION TESTING

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General

1. This chapter, although written specifically for installations comprising the ARC52 or PTR175 series equipments, may also be interpreted for testing the R/T facilities of the following derivatives:—

- X11672 (ARI.18168/1)
- PTR177 (ARI.23141/1)
- PTR174 (ARI.23150/1).

Precise details are given in the instructions in the lid of the test set Type 15056. For tests other than

of the R/T facility reference should be made to the appropriate publication for the specific equipment. The servicing of aircraft installations is limited to a series of functional tests which can be made periodically (as instructed) in order to establish that the equipment is in satisfactory working order. In the event of a defect, either a part or the whole of the equipment must be removed from the aircraft and serviceable items substituted. The procedure for subsequent servicing of the faulty transmitter-receiver or its component units is described in Part 2, Sect. 3 of this Volume. A list of the test equipment which should be available at first line servicing is given in Table 1.

TABLE 1
List of test equipment

Item	Ref. No.	Nomenclature	Para.	Further details		
1	6625-99-949-1999 or 6625-99-943-1524 or 6625-99-943-1532 or 5QP/16411 or 6625-99-943-1523	Multimeter CT498 (was Type 12889) Multimeter set Multimeter Type 9980 Multimeter Type 1 Multimeter CT497	2(3)	Avo 9S Avo 8SX (with carrying case, etc.) Avo 8SX Avo 8S Avo 7		
2	5G/152 or F1C/5047	Tester, insulation resistance Type C Tester, insulation			2(3)	A.P.4343S
3	6625-99-943-4149	Test set, UHF equipment, Type 15056			3	Part 2, Sect. 1, Chap. 2
4	10AH/14	Headset, telephone, Type 9			8(4), 9(1)	A.P.2876A
5	10AH/18	Microphone assembly Type 71			8(4), 9(1)	
6	6B/117	Stop watch Mk. 3	9(4)	—		
7	4G/2595	Gauge, pressure	33(5)	A.P.2563BZ		
8	4G/5435	Pump, pressurizing, for AC equipment	33(5)			
9	10S/16589	Leak indicator kit CT106	33(5)			

2. A thorough examination should be made, covering the complete installation, before power is applied and before any tests are made. The following is a summary of the points to be examined:—

- (1) Ensure that the mounting tray front wing-nuts are tightened sufficiently to prevent the equipment from moving or vibrating in the mounting. See that the locking wire is fitted.
- (2) Inspect all mounting bolts for security and ensure that locking wire is fitted where necessary.
- (3) Ensure that the installation wiring and connectors are in good condition, using the multimeter and insulation tester (Table 1, items 1 and 2), if necessary.
- (4) Examine all connection plugs and sockets for correct mating and security.
- (5) Operate all controls and verify that they are undamaged and serviceable.

Testing

3. When it has been determined that the complete installation is securely mounted and all electrical connections are correctly made, the transmitter-receiver is ready for testing. A complete test of ARI.18124 series or ARI.23143 series can be implemented using the functional test set, UHF equip-

ment, Type 15056 (Table 1, item 3), which includes the test set, UHF, Type 15077 (6625-99-943-3488) and the connector set, Type 15057 (6625-99-943-4146). The meter on the Type 15077 test set has its scale divided up into sections marked A, B, C, D, which are referred to in the following tests.

4. The test set operates from the nominal 27.5V d.c. power supply to the equipment and consumes approximately 2A. The following performance tests can be made on the ARI.18124 series and ARI.23143 series installations using this test equipment (fig. 1):—

- (1) Primary power supplies.
- (2) Intercommunication.
- (3) Receiver audio output (main, auxiliary and guard).
- (4) Guard receiver sensitivity.
- (5) Main receiver sensitivity and squelch circuit.
- (6) Frequency accuracy of the receiver.
- (7) Transmitter power output.
- (8) Transmitter modulation depth and quality.

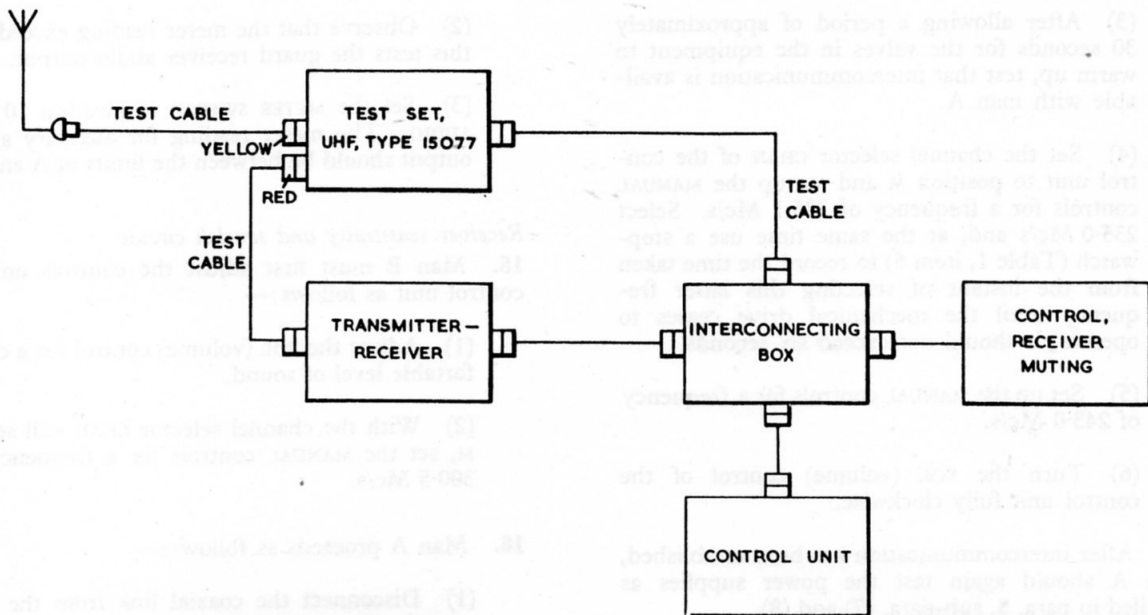


Fig. 1. Interconnections using test set, UHF, Type 15077

- (9) Tone modulation depth.
- (10) R.F. sidetone during transmission.
- (11) Reflection coefficient of installation, aerials and cables.

5. A table of readings and operational procedure for the functional test set is provided in the lid of the test set UHF, Type 15077.

6. The following ground power supplies are required:—

- (1) Nominal 27.5V d.c. supplies for ARI.18124/1, ARI.18124/2, ARI.23143/1 and ARI.23143/2.
- (2) Nominal 115/200V, 400 c/s, 3-phase a.c. phase to neutral (earth) supply for ARI.18124/2 and ARI.23143/2.

Preliminary adjustments

7. Two persons are required for testing the installation, viz. man A operating the test set and man B at the control unit in the pilot's cockpit. A Type C1607/4 or a Type C1607/ARC52 control unit is used in the ARI.18124 series and a Type C1607/4 in the ARI.23143 series.

8. After connecting the appropriate ground power supplies to the aircraft and ensuring that the GROUND/FLIGHT switch (where fitted) is in the GROUND position, the following connections and adjustments must be made by man A:—

- (1) Connect the test set to the test socket of the installation interconnecting box by means of the 12-way test connector provided.

- (2) Disconnect the u.h.f. aerial lead from the transmitter-receiver and connect it to the AERIAL socket (yellow) on the test set through the coaxial connector provided.

Note . . .

The aerial lead must not be connected to the test set under conditions of radio silence.

- (3) Connect the RADIO socket (red) of the test set to the aerial socket (P.1402) of the transmitter-receiver by means of the coaxial connector provided.
- (4) Plug a headset complete with microphone (Table 1, items 4 and 5) to the MIC/TEL socket of the test set.
- (5) Connect the coaxial link between the SIG. GEN. and RX sockets of the test set.
- (6) Set the supply switch of the test set to ON.
- (7) Test the d.c. supply with the METER SWITCH set to position DC 1; the meter reading at the test set should be within the blue zone.
- (8) For a.c. installations only, test the a.c. supply with the METER SWITCH set to position AC 2; the meter reading should be within the yellow zone.

9. Connections and adjustments to be made by man B are as follows:—

- (1) Plug a headset complete with microphone (Table 1, items 4 and 5) into the pilot's mic/tel socket.
- (2) Set the function switch of the control unit to the position T/R.

(3) After allowing a period of approximately 30 seconds for the valves in the equipment to warm up, test that intercommunication is available with man A.

(4) Set the channel selector CHAN of the control unit to position M and set up the MANUAL controls for a frequency of 235.1 Mc/s. Select 235.0 Mc/s and, at the same time use a stopwatch (Table 1, item 6) to record the time taken from the instant of selecting this latter frequency until the mechanical drive ceases to operate; it should not exceed six seconds.

(5) Set up the MANUAL controls for a frequency of 243.0 Mc/s.

(6) Turn the VOL (volume) control of the control unit fully clockwise.

10. After intercommunication has been established, man A should again test the power supplies as detailed in para. 8, sub-para. (7) and (8).

U.H.F. channels

11. In ARI.23143 series installations, tests on both u.h.f. and v.h.f. channels must be made. The recommended procedure is to deal with the u.h.f. channels first, as described in para. 12 to 32, and then to rearrange the test set interconnections and test the v.h.f. channels in accordance with para. 24 to 32.

Receiver audio outputs and muting facility

12. Controls of the test set must first be adjusted by man A as follows:—

(1) Set the SIG. GEN. FREQ. switch to position X.

(2) Set the METER SWITCH to position AF POWER 3.

13. The following operations must then be carried out by man B:—

(1) When a tone is heard in the headset, operate the pilot's press-to-mute switch and verify that the tone is muted.

(2) Remove the plug of the headset from the pilot's mic/tel socket; allow about half a minute for man A to complete the operations given in para. 14 (1) and then set the function switch of the control unit to the position T/R+G. Allow another quarter of a minute for man A to complete the operation given in para. 14 (2), then return the control unit function switch to the T/R position. Allow one quarter of a minute for man A to complete operation 14 (3) and then put the plug of the headset back into the pilot's mic/tel socket.

14. When man B has released the press-to-mute switch and removed his headset, man A must proceed as follows:—

(1) Observe that the meter reading exceeds B; this tests the main receiver audio output.

(2) Observe that the meter reading exceeds B; this tests the guard receiver audio output.

(3) Set the METER SWITCH to position 10 AUX AUDIO. The meter reading for auxiliary audio output should be between the limits of A and B.

Receiver sensitivity and squelch circuit

15. Man B must first adjust the controls on the control unit as follows:—

(1) Adjust the VOL (volume) control for a comfortable level of sound.

(2) With the channel selector CHAN still set to M, set the MANUAL controls for a frequency of 300.5 Mc/s.

16. Man A proceeds as follows:—

(1) Disconnect the coaxial link from the SIG. GEN. socket on the test set (para. 8 (5)) and connect it between the NOISE GEN. socket and the RX socket.

(2) Set the METER SWITCH to position RX SENS 4.

(3) Depress the NOISE GEN. switch on the test set; a tone should now be heard in the headset.

17. Man B now sets the channel selector CHAN to the first preset channel 1, and man A then tests this channel as follows:—

(1) Set the NOISE GEN. switch to MOD. ON and adjust the DC CAL controls FINE and COARSE for a meter reading of C.

(2) Return the NOISE GEN. switch to the MOD. OFF position and note the new meter reading. This should be less than A.

18. Repeat the procedure detailed in para. 17 for each of the other preset u.h.f. channels.

Guard receiver sensitivity

19. Man B must first adjust the controls on the control unit as follows:—

(1) Set the function switch to T/R+G.

(2) Adjust the VOL (volume) control to maximum (fully clockwise).

20. Man A proceeds as follows:—

(1) Remove the coaxial link from the NOISE GEN. socket and the RX socket (para. 16 (1)) and restore it to its stowage position in the lid.

(2) Remove the attenuator from the stowage clip and connect it between the RX socket and the SIG. GEN. socket.

(3) Set the METER SWITCH to position AF POWER 3.

Note . . .

In addition to its normal function for testing the receiver audio outputs, position 3 of the METER SWITCH is also used for testing the guard receiver sensitivity in accordance with Modification No. 5776.

- (4) The meter reading should be greater than A.
- (5) Remove the attenuator from the RX and SIG. GEN. sockets (sub-para. (2)) and replace it in the stowage clip.

Transmitter power output

21. In the following procedure for testing transmitter power output, operation (3) is performed by man B, whilst the others are performed by man A:—

- (1) Remove the coaxial link from the lid and connect it between the LOAD and TX sockets.
- (2) Set the METER SWITCH to position RF POWER 5 and the POWER switch to LOW.
- (3) Select the first preset u.h.f. channel on the control unit, wait approximately six seconds, and press the pilot's press-to-transmit switch button.
- (4) The meter reading on the test set should exceed B.
- (5) Operations (3) and (4) above must now be repeated by man B and man A respectively on the remaining u.h.f. channels and G. Channel changing should not take place with the press-to-transmit switch operated.

Modulation depth and quality

22. With the channel selector CHAN set to the guard channel G, and the pilot's microphone switched off by man B, man A then proceeds as follows:—

- (1) Set the METER SWITCH to position 6 DC CAL.
- (2) Operate the TALK switch on the test set and adjust the DC CAL controls FINE and COARSE for full-scale deflection (D) on the meter.
- (3) With the TALK switch at ON, set the METER SWITCH to position 7, % MOD; the meter reading should exceed B.
- (4) Return the TALK switch to OFF, operate the TONE MOD. switch and repeat (2) and (3) above. Switch OFF the TONE MOD. switch.
- (5) Set the METER SWITCH to position 9, TX QUAL.
- (6) Man A operates the TALK switch and speaks into the microphone while man B listens to the sidetone in the headphones and assesses the modulation quality.
- (7) Return the TALK switch to the OFF position.

*Reflection coefficient***Note . . .**

This test must not be implemented during conditions of radio silence.

23. For testing the reflection coefficient of the installation aerials and feeders, man B must first set the channel selector CHAN to any little used preset u.h.f. channel other than G. The following operations are then performed by man A:—

- (1) Disconnect the coaxial link from the LOAD socket on the test set (para. 21 (1)) and connect it between the AERIAL socket (small) and the TX socket.
- (2) Set the METER SWITCH to position 5, RF POWER.
- (3) Listen out before transmitting, set the METER SWITCH to position 6, DC CAL, then operate the TALK switch and adjust the DC CAL controls for full-scale deflection (D) on the meter.
- (4) With the TALK switch still depressed, set the METER SWITCH to position 8, REFL. COEFF; the meter reading must not exceed B. Return the TALK switch to the OFF position.
- (5) Remove the coaxial link from the AERIAL socket (small) and the TX socket (sub-para. (1)) and replace it in its stowage position in the lid.

V.H.F. channels

24. In ARI.23143 series installations only, rearrange the test set equipment as follows in order to test the transmitter-receiver on the v.h.f. channels:—

- (1) Man B sets the control unit function switch to OFF.
- (2) Man A should rearrange the test set as follows:—
 - (a) Switch off the test set.
 - (b) Transfer the coaxial connector (from the RADIO socket of the test set) from aerial socket P1402 to socket P1403.
 - (c) Disconnect the coaxial connector (from the AERIAL socket on the test set) from the u.h.f. aerial lead and reconnect it to the v.h.f. aerial lead.
 - (d) Connect the coaxial link between the SIG. GEN and RX sockets on the test set.
 - (e) Set the SUPPLY switch of the test set to ON.

Receiver audio output

25. Man A should adjust the test set as follows:—

- (1) Set the SIG. GEN. FREQ. switch to position X.
- (2) Set the METER SWITCH to position 3, AF POWER.

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26. Man B carries out the following operations:—

- (1) Remove the plug of the headset from the pilot's mic/tel socket.
- (2) Set the function switch on the control unit to the T/R position.
- (3) Set the VOL (volume) control to maximum (fully clockwise).
- (4) Select a frequency of 121.5 Mc/s by adjusting the MANUAL controls and ensure that the CHAN switch is at M.

27. Man A observes the meter reading on the test set which should exceed B.

Receiver sensitivity and squelch circuit

28. Repeat the procedure given in para. 15 and 16 but with the MANUAL controls adjusted to 121.5 Mc/s.

29. Repeat the tests given in para. 17 and 18 on each of the preset v.h.f. channels.

Transmitter power output

30. Proceed as follows, operation (3) is performed by man B whilst the remainder are performed by man A:—

- (1) Remove the coaxial link from the lid and connect it between the LOAD and TX sockets on the test set.
- (2) Set the METER SWITCH to position 5, RF POWER, the POWER switch at LOW and the TALK switch to ON.
- (3) Select the first preset v.h.f. channel on the control unit; wait approximately six seconds.
- (4) The meter reading on the test set should exceed 40.
- (5) Switch to each of the remaining preset v.h.f. channels in turn and verify that the meter reading is in excess of 40 in each case.

Modulation depth

31. Man B should set the control unit to a MANUAL

frequency of 121.5 Mc/s and man A proceeds as follows:—

- (1) Set the METER switch to position 6, DC CAL., the TALK switch to ON and adjust the DC CAL controls FINE and COARSE for a meter reading of B.
- (2) Turn the METER switch to position 7, % MOD. when the meter reading should be greater than 25.
- (3) Return the TALK switch to OFF and switch the TONE MOD. switch to ON and repeat (1) and (2) above. Switch off the TONE MOD. switch.

Reflection coefficient

32. Repeat the procedure given in para. 23 with the channel selector CHAN on the control unit set to a v.h.f. channel. Having switched to position 8 REFL. COEFF on the test set, man A should obtain a meter reading of less than 12 in this case. Remove the coaxial link between AERIAL and TX on the test set and replace it in its stowage position in the lid.

Completion of tests

33. When the foregoing tests have been completed, proceed as follows:—

- (1) Remove the test equipment and restore the aircraft installation to normal, but leave the ground power supply or supplies connected.
- (2) If possible, test two-way communication with the control tower or workshop (local orders may preclude this).
- (3) Remove the ground power supply or supplies.
- (4) Ensure that all the plugs and sockets remain correctly mated and secure, also ensure that all the mounting bolts and nuts are secure and that locking wire is in position where necessary.
- (5) Test the transmitter-receiver case pressure with a pressure gauge (4G/2595). It should be not less than 3 lb per sq. in. above atmospheric pressure at sea level. If this figure is not met, increase the pressure by means of the pump (4G/5435) to between 4 and 5 lb per sq. in. Test for leakage with the leak indicator kit CT106. Replace the cap on the Schraeder valve.

Chapter 2

FGRI.23065 SERIES

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General

1. First line servicing of the transmitter-receiver and associated equipment comprising FGRI.23065 installations is limited to a series of functional tests which are made periodically (as instructed in the servicing schedule) in order to establish that the equipment is in satisfactory operating order. In the event of a defect, either a part or the whole of the equipment must be removed from the rack housing and serviceable items substituted for those suspected of faulty operation. The procedure for subsequent servicing of a faulty transmitter-receiver Type TR5/ARC52 or any of its component modules is fully described in Section 3 of this Part.

2. Faults attributed to the wiring of the rack, mounting, Type 2 or of the panel, distribution, Type 21A included in this installation must be rectified in accordance with local instructions for the servicing of such equipment.

3. Before applying power to the equipment and prior to any testing, a thorough examination should be made of all units in the installation. The points to watch for in this preliminary inspection are summarized as follows:—

(1) Ensure that all component units are securely mounted in the rack and are clean and dry. Include in this inspection the control unit Type C1607/ARC52 which is usually mounted remote from the transmitter-receiver equipment.

(2) Carefully examine all installation wiring to be sure that it is connected correctly and remains in good condition. Where station supply cables are installed in underfloor ducting ensure that the floor channel is dry.

(3) See that all connectors are in good condition and securely fitted to the appropriate unit plugs or sockets. It is a good plan periodically to smear the threads of plugs and sockets (very lightly) with a silicone grease in order to prevent binding of the threads and also to help in forming a damp-proof connection.

(4) Operate all controls and verify that they are undamaged and operable.

Testing

4. When the complete installation is thus examined and correctly connected up, the transmitter-receiver is ready for an operational test. A list of test equipment which should be available at first line of servicing is given in Table 1.

TABLE 1
List of test equipment

Item	Ref. No.	Nomenclature	Further details
1	6625-99-943-1524	Multimeter set	A.P.2536C
	<i>or</i> 5QP/16411	Multimeter Type 1	AVO 8S
	<i>or</i> 6625-99-943-1532	Multimeter unit	AVO 7X
	<i>or</i> 5QP/1	Testmeter Type F	AVO 7
	<i>or</i> 5QP/10610	Testmeter Type D1	
2	5G/152	Tester, insulation, resistance, Type C	A.P.4343S
	<i>or</i> F1C/5047	Tester, insulation	
3	6625-99-943-4149	Test set, UHF equipment, Type 15056	Part 2, Sect. 1, Chap. 2
4	10AH/14	Headset Type 9	A.P.830
5	10AH/18	Microphone assembly Type 71	
6	6B/117	Stop watch, Mk. 3	

5. A complete operational test can be made using the test set, UHF equipment, Type 15056 (Table 1, item 3) which includes the test set, UHF, Type 15077 (6625-99-943-3488) and the matched connector set Type 15057 (6625-99-943-4146) both of which are described in full detail in Sect. 1, Chap. 2 of this Part.

6. The arrangement of interconnections between the test set, UHF equipment and the installed units is shown in schematic form in fig. 1. When so arranged, the following performance tests can be made:—

- (1) Primary power supplies.
- (2) Receiver audio output (main, auxiliary and guard).
- (3) Guard receiver sensitivity.
- (4) Main receiver sensitivity and squelch circuit.
- (5) Frequency accuracy of the receiver.
- (6) Transmitter power output.
- (7) Transmitter modulation depth and quality.
- (8) Tone modulation depth.
- (9) R.F. sidetone of transmission.
- (10) Reflection coefficient of installation aerials and cables.
- (11) Intercommunication facilities, when incorporated in the installation.

7. A table of readings and operational procedure for the test set is provided in the lid of the main equipment unit, i.e. test set, UHF, Type 15077.

8. Two persons will normally be required for testing the installation; that is, one man operating the test set and another at the control unit Type C1607/ARC52. After connecting the appropriate power supplies and making the interconnections

shown in fig. 1, the man at the test set should disconnect the aerial lead from the transmitter-receiver and connect it to the large AERIAL socket on the test set through the coaxial test connector provided. The aerial lead must not be connected to the test set under conditions of radio silence.

9. The test set operator should then connect the RADIO socket of the test set to the aerial socket of the transmitter-receiver by means of the coaxial cable connector provided. He should then plug in a headset complete with microphone (Table 1, items 4 and 5) to the MIC/TEL socket of the test set and connect the coaxial link of the test set between the sockets marked SIG. GEN AND RX. The test set SUPPLY switch should then be operated to the ON position and the d.c. supply tested with the test set METER SWITCH set to position D.C.1; the meter reading on the test set should be within the blue zone.

10. Meanwhile, the man at the control unit Type C1607/ARC52 should have established intercommunication with the test set operator, either by means of the equipment intercommunication facility (if provided) or by telephone. He should then set the channel selector (CHAN) of the control unit to the position M and set up the four MANUAL controls for a frequency of 235.1 Mc/s. Using a stop watch (Table 1, item 6) he should then record the time taken from the instant of selecting a new frequency of 235.0 Mc/s until the mechanical drive ceases to operate. The selection time should not exceed six seconds. Before any further tests, the volume control (VOL) of the control unit Type C1607/ARC52 must be turned fully clockwise.

11. The tests outlined in para. 6 can then proceed. These are given in detail in Chap. 1 of this Section, with the duties of each of the two men for the tests clearly defined. Reference to that chapter should be made for the establishment of the procedure to be adopted and for the observations and readings that must be made.

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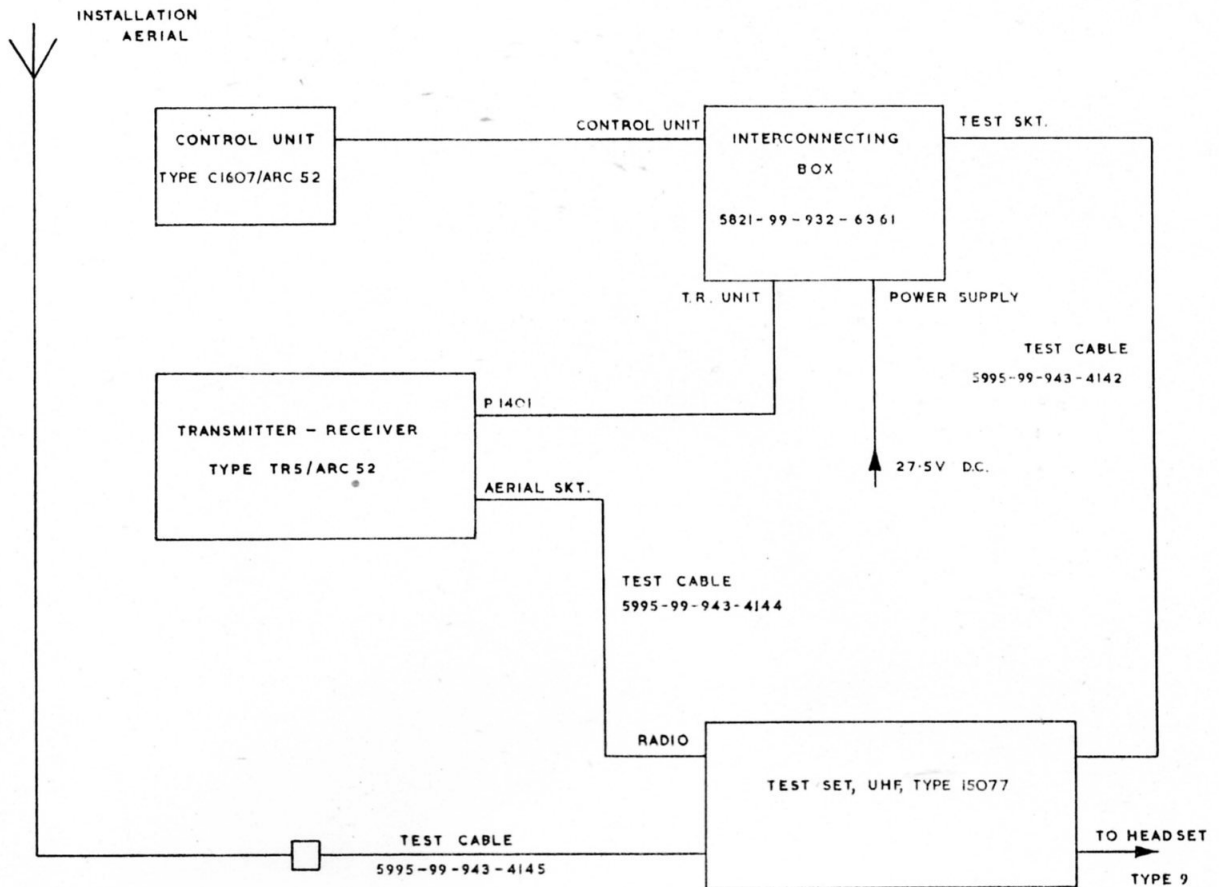


Fig. 1. Interconnections of test set, UHF equipment with the installation

12. For all ground installations of this equipment, the procedure given in previous chapters for the pressurization of the transmitter-receiver can be dispensed with.

Servicing

13. Daily servicing of the component items of equipment should only be concerned with the cleaning of the exterior casings of all units, and with the verification of clean, dry connections between all unit connectors and equipment units. The power unit (AC) 5821-99-943-7136 should, in addition, be given a short functional test in the following manner:—

(1) Switch on and ensure that the DC OUTPUT lamp lights up and that the DC OUTPUT meter indicates an output voltage of 27.5V.

(2) Vary the load by switching the transmitter-receiver from the receive condition to transmit and back again; the reading on the DC OUTPUT meter should not change by more than 1V.

14. The extent of the cleaning necessary at each servicing will depend, of course, on local climatic conditions and the site of the installation; but every effort should be made to avoid the condensation of moisture upon the equipment units and connectors, or the ingress of dust and sand.

Chapter 3

MGRI.23073 SERIES

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General

1. Servicing of the component equipments comprising the MGRI.23073 series installations is limited to a series of short functional tests in order to establish that the equipment is in satisfactory working order and to daily cleaning and maintenance. In the event of a defect, involving either a part or the whole of the installed equipment, the appropriate units must be removed and serviceable items substituted. Investigation and rectification of faults in sub-units is the subject of the appropriate chapters in Section 3 of this Part, fault diagnosis charts and details for the transmitter-receiver Type TR5/ARC52 incorporated and for the control unit Type C1607/ARC52, and the dynamotor-power supply are included in the allotted chapters of Part 3 of this Volume.

2. Before power is applied and before any testing is started, make a thorough examination of all units of the installed equipment. Points to be examined during this preliminary inspection can be summarized as follows:—

- (1) Ensure that all equipment units are securely mounted in the allotted position. The securing wing nuts on unit mounting trays should be tightened sufficiently to prevent the equipment from moving or vibrating in the mounting. Take care not to overtighten the locking nuts or any other method of fixing employed, however, since this action may lead to distortion or damage to equipment units or the mountings. If locking wire should be fitted to securing nuts, it must be intact and correctly fitted to prevent the locking device from becoming unfastened through vibration.
- (2) Examine all cabling and connectors for serviceability. They should be clean, dry and mating securely with the appropriate terminal plug or socket of the equipment units. A light smear of silicone grease on the threads of connector terminations will help to avoid the binding of mating threads and will also assist in forming a damp-proof seal to the connector.
- (3) Operate all controls and verify that they are undamaged and serviceable.

(4) Look to the security of the aerial system and ensure that the aerial feeder is securely cleated to the mast at intervals sufficient to prevent the slapping or whipping of the coaxial cable.

Test equipment

3. When it has been determined that the complete installation is securely mounted and that all electrical connections have been made correctly, the transmitter-receiver may be tested. A complete functional test can be implemented using the test set, UHF equipment, Type 15056 which includes the test set, UHF, Type 15077 (6625-99-943-3488) and the appropriate connector set Type 15057 (6625-99-943-4146). This test set operates from a source of d.c. power at 27.5V (nominal) and consumes approximately 2A. A full description of the test set is given in Sect. 1, Chap. 2 of this Part to which reference should be made for any required details of operating procedure.

4. The following performance tests can be made on the equipment in this installation, using the test set, UHF equipment:—

- (1) Primary power supplies.
- (2) Receiver audio output (main, auxiliary and guard).
- (3) Guard receiver sensitivity.
- (4) Main receiver sensitivity and squelch circuit.
- (5) Frequency accuracy of the receiver.
- (6) Transmitter power output.
- (7) Transmitter modulation depth and quality.
- (8) Tone modulation depth.
- (9) R.F. sidetone of transmission.
- (10) Reflection coefficient of installation aerial and cable.
- (11) Intercommunication (when this facility is provided in the installation).

5. To implement the tests thus briefly summarized, additional test equipment also is required. These items are listed in Table 1 (items 1-5) for easy reference. All items except the test set, UHF equipment, are standard equipment which should be available for all stations.

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TABLE 1
List of test equipment

Item	Ref. No.	Nomenclature	Further details
1	6625-99-943-1524	Multimeter set	A.P.2536C
	<i>or</i> 5QP/16411	Multimeter Type 1	AVO 8S
	<i>or</i> 6625-99-943-1532	Multimeter unit	AVO 7X
	<i>or</i> 5QP/1	Testmeter Type F	AVO 7
	<i>or</i> 5QP/10610	Testmeter Type D1	
2	5G/152	Tester, insulation, resistance, Type C	A.P.4343S
	<i>or</i> F1C/5047	Tester, insulation	
3	10AH/14	Headset Type 9	A.P.830
4	10AH/18	Microphone assembly Type 71	
5	6B/117	Stop watch, Mk. 3	
6	6625-99-943-4149	Test set, UHF equipment, Type 15056	Part 2, Sect. 1, Chap. 2

6. A table of readings and operational procedure for the functional test set is provided in the lid of the test set, UHF, Type 15077.

Preliminary adjustments

7. In those installations fitted on board launches or other vessels, it is usual for the control unit Type C1607/ARC52 to be mounted remote from the transmitter-receiver and power unit etc. e.g. with the control unit in the wheel house and the transmitter-receiver equipment in the radio cabin (probably between decks). In such instances, two men are required for the testing and adjustment of the equipment (para. 9-12).

8. In those installations fitted in control vans, command vehicles, or other mobile units of similar type, the entire equipment will usually be compactly stowed in close proximity. Thus one person only will normally be required for the servicing operations.

9. After a preliminary inspection to ensure that all equipment units are correctly installed and connected up, apply the power supply and connect up the test set as follows:—

(1) Connect the test set to the TEST socket of the installation interconnecting box by means of the 12-way test connector provided.

(2) Disconnect the aerial lead from the transmitter-receiver and connect it to the large AERIAL socket of the test set by way of the coaxial connector provided. It should be noted that the aerial lead must not be connected to the test set under conditions of radio silence.

(3) Connect the RADIO socket of the test set to the AERIAL socket of the transmitter-receiver by means of the coaxial connector provided.

(4) Plug a headset complete with microphone (Table 1, items 3 and 4) into the MIC/TEL socket of the test set.

(5) Set the SUPPLY switch of the test set to the ON position.

(6) Now test the d.c. supply with the METER SWITCH set to position D.C.1; the reading on the test set meter should be within the blue zone.

(7) Connect the coaxial link between the socket marked SIG. GEN. and RX on the test set panel.

A schematic arrangement of the test connections is given in Chap. 2, fig. 1 of this Section.

10. Meanwhile, on installations where the control unit is situated remotely from the transmitter-receiver, the second man should be establishing intercommunication with the test set operator; that is, by normal intercommunication facility or by telephone.

11. He should then test the channel selection time of the control unit; this will be done, of course, in due sequence by the one serviceman employed for compact installations such as van or car mounted equipments. This test is made by first setting the channel selector (CHAN) of the control unit to position M and setting up the four MANUAL controls for a frequency of 235.1 Mc/s; then, after selecting a new frequency of 235.0 Mc/s, using the stop watch (Table 1, item 5) to record accurately the time taken from the instant of selecting the new frequency until the mechanical drive ceases to operate. This time interval should not exceed six seconds.

Testing

12. Set up the four MANUAL controls of the control unit for a frequency of 243.0 Mc/s. Turn

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the volume control (VOL) fully clockwise. Then after intercommunication has been established (if incorporated) the test set operator should again test the power supplies (para. 9 (7)). Operations may now proceed to test receiver audio outputs, main and guard receiver sensitivity (and squelch circuit), transmitter output and modulation depth and quality and reflection coefficient. All these tests are described separately in sequence in Chap. 1, to which reference should be made for all necessary information on detailed procedure. Note, however, that the tests are described for implementing by two men (one at the control unit, the other operating the test set); it will thus apply without modification to certain vessel installations. For the compact installations such as in control vans, the complete series of tests should be made in sequence, as described, by the one serviceman; a little familiarization with this equipment will show that it can be readily and quickly made without undue effort.

Servicing

13. The extent to which servicing and maintenance will be required, will depend to great extent upon the prevailing climatic conditions, but should seldom exceed the simple requirements for daily cleaning and for maintaining the equipment in a clean, dry condition throughout. Equipment installed in marine craft should be carefully examined each day during cleaning to guard against attack

by corrosion. Salt water spray can do considerable damage to the light alloy casings of units and to the connectors. A thin application of petroleum jelly to all exposed metal parts will do much to ward off corrosion. Dust and airborne sand will be the greatest danger on vehicle installations of the equipment, but since most component units are contained in sealed casings, little trouble should arise providing that no attempts at servicing are made in the open atmosphere.

14. The dynamotor-power supply should be tested each day, whether or not the equipment has been in use. An input supply test can be made by verifying that the PSU ON lamp lights up (INPUT LOW lamp not lit) then by setting the METER INPUT/OUTPUT switch to the input position and observing that the METER reading is between 21V and 31V. The INPUT LOW warning lamp will indicate when the supply voltage drops below the working minimum of 21V. The unit output can then be verified by setting the METER INPUT/OUTPUT switch to the OUTPUT position and observing that the METER reading is between 27V and 28V; variations in the load, by switching the transmitter-receiver between the receive condition and transmit and back, should cause no change greater than 1V. During these tests, verify that the cooling fan of this unit is operating by the air induction through the filtering side vents and by the efflux from the rear of the casing.

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General

1. First line servicing of the transmitter-receiver and associated equipment comprising TGRI(AT) 26005/1 installations is limited to a series of functional tests which are made periodically (as instructed in the servicing schedule) in order to establish that the equipment is in satisfactory operating order, and to daily cleaning and maintenance. In the event of a defect involving either a part or the whole of the equipment, the appropriate items must be removed and serviceable items substituted. The procedure for subsequent servicing of a faulty transmitter-receiver Type TR5/ARC52 or any of its component modules is fully described in Section 3 of this part.

2. Before applying power to the equipment and prior to any testing, a thorough examination should be made of all the units in the installation. The points to watch for in this preliminary inspection are summarized as follows:—

(1) Ensure that all component units are securely mounted in the cases and are clean and dry. The securing bolts on the unit mounting trays should be tightened sufficiently to prevent the equipment from moving or vibrating in the mounting.

(2) Examine all cable connections for serviceability. They should be clean, dry and mating securely with the appropriate terminal plug or socket of the equipment units. A light smear of silicone grease on the mating threads will assist in preventing binding and also form a damp proof seal to the connector.

(3) Operate all controls and verify that they are undamaged.

(4) Look to the security of the aerial system and ensure that the aerial feeder is undamaged.

Test equipment

3. When it has been determined that the complete installation is securely mounted and that all electrical connections have been made correctly, the transmitter-receiver may be tested. A complete list of test equipment which should be available at first line servicing is given in Table 1.

4. A complete operational test can be made using the test set, UHF equipment, Type 15056 (table 1 item 3) which includes the test set, UHF, Type 15077 (6625-99-943-3488) and the matched connector set Type 15057 (6625-99-943-4146) both of which are described in full detail in Sect. 1, Chap. 2 of this Part.

5. The arrangement of interconnections between the test set, UHF equipment and the installed units is shown in fig. 1 of Chap. 2 of this Part. When so arranged, the following performance tests can be made:—

- (1) Primary power supplies.
- (2) Receiver audio output (main, auxiliary and guard)
- (3) Guard receiver sensitivity
- (4) Main receiver sensitivity and squelch circuit.
- (5) Frequency accuracy of the receiver
- (6) Transmitter power output
- (7) Transmitter modulation depth and quality.
- (8) Tone modulation depth
- (9) R.F. sidetone of transmission.

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TABLE 1
List of test equipment

Item	Ref. No.	Nomenclature	Further details
1	6625-99-943-1524 <i>or</i> 5QP/16411 <i>or</i> 6625-99-943-1532 <i>or</i> 5QP/1 <i>or</i> 5QP/10610	Multimeter set Multimeter Type 1 Multimeter unit Testmeter Type F Testmeter Type D1	A.P.2536C AVO 8S AVO 7X AVO 7
2	5G/152 <i>or</i> F1C/5047	Tester, insulation, resistance, Type C Tester, insulation	A.P.4343S
3	6625-99-943-4149	Test set, UHF equipment, Type 15056	Part 2, Sect. 1, Chap. 2
4	10AH/14	Headset Type 9	A.P.2876A
5	10AH/18	Microphone assembly Type 71	
6	6B/117	Stop watch, Mk. 3	

(10) Reflection coefficient of installation aerials and cables.

(11) Intercommunication facilities, when incorporated in the installation.

6. A table of readings and operational procedure for the test set is provided in the lid of the main equipment unit i.e. test set, UHF, Type 15077.

Preliminary adjustments

7. In those installations fitted with a remote control unit two men are required for the testing and adjustment of the equipment, but where the control unit is located by the transmitter-receiver one man only will be able to carry out the servicing operations.

8. After a preliminary inspection to ensure that all equipment units are correctly installed and connected up, apply the power supply and connect up the test set as follows:—

(1) Connect the test set to the TEST socket of the installation interconnecting box by means of the 12-way test connector provided.

(2) Disconnect the aerial lead from the transmitter-receiver and connect it to the large AERIAL socket of the test set by way of the coaxial connector provided. It should be noted that the aerial lead must not be connected to the test set under conditions of radio silence.

(3) Connect the RADIO socket of the test set to the AERIAL socket of the transmitter-receiver by means of the coaxial connector provided.

(4) Plug a headset complete with microphone (Table 1, items 4 and 5) into the MIC/TEL socket of the test set.

(5) Set the SUPPLY switch of the test set to the ON position.

(6) Now test the d.c. supply with the METER switch set to position D.C.1; the reading on the test set meter should be within the blue zone.

(7) Connect the coaxial link between the socket marked SIG. GEN. and R.X. on the test set panel.

9. Meanwhile, on installations where the control unit is situated remotely from the transmitter-receiver, the second man should be establishing intercommunication with the test set operator: that is by normal intercommunication facility or by telephone.

10. He should then test the channel selection time of the control unit; this will be done, of course, in due sequence by the one serviceman employed for compact installations, where the control unit is mounted by the transmitter-receiver. This test is made by first setting the channel selector (CHAN) of the control unit to position M and setting up the four MANUAL controls for a frequency of 235 Mc/s; then, after selecting a new frequency of 235.0 Mc/s using the stop watch (Table 1, item 6) to record accurately the time taken from the instant of selecting the new frequency until the mechanical drive ceases to operate. This time interval should not exceed six seconds.

Testing

11. Set up the four MANUAL controls of the control unit for a frequency of 234.0 Mc/s. Turn the volume control (VOL) fully clockwise. Then after intercommunication has been established (if incorporated) the test set operator should adjust the power supplies (para. 8 (6)). Operations may now proceed to test receiver audio outputs, main and guard receiver sensitivity (and squelch circuit), transmitter output and modulation depth and quality and reflection coefficient. All these tests are described separately in sequence in Chap. 1, to which reference should be made for all necessary information on detailed procedure. Note, however that the tests are described for implementing by two men (one at the control unit, the other operating the test set); it will thus apply without modification to those installations with remote control units fitted and for compact installations will be made in sequence by one serviceman. A little familiarization with this equipment will show that it can be readily and quickly made without undue effort.

Servicing

12. The extent to which servicing and maintenance will be required, will depend to a great extent upon the prevailing climatic conditions, but should seldom exceed the simple requirements for daily cleaning and for maintaining the equipment in a clean, dry condition throughout.

13. The power unit (AC) 5821-99-943-7136 should be given a short functional test in the following manner:—

(1) Switch on and ensure that the DC OUTPUT lamp lights up and that the DC OUTPUT meter indicates an output voltage of 27.5V.

(2) Vary the load by switching the transmitter-receiver from the receive condition to transmit and back again. The reading on the DC OUTPUT meter should not change by more than 1V.

