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Colin Hinson

In the village of Blunham, Bedfordshire.

AIR PUBLICATION
116K-0402-1
Formerly part of A.P.116D-0105-1)

**UHF TRANSPORTABLE
RADIO INSTALLATION
TGRI(AT).26005/1**

GENERAL AND TECHNICAL INFORMATION

OBsolete MARCH 2005

Promulgated by Command
of the Air Council

M. J. Dean

AIR MINISTRY

(Prepared by the Ministry of Technology)

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- 2 Setting up and operating instructions
- 3 Procedure for use with carbon microphones
- 4 Servicing information and installation testing

LIST OF ASSOCIATED PUBLICATIONS

		<i>A.P.</i>
<i>UHF Transmitter-receiver ARC52 (ARI.18124)</i>	116D-0105-1 (2nd Edn.)
<i>UHF Transmitter-receivers (ARC52 and Derivatives)</i>	..	116D-0133-1A and -10
<i>Special Test Equipment</i>	116D-0133-1B
<i>Power Unit (A.C.) 5821-99-943-7136</i>	116E-0102-1B6
<i>Dynamotor Power Supply 6125-99-999-1276</i>	116E-0101-1B6
<i>Test Set UHF Equipment Type 15056</i>	117M-0101-1

Chapter 1

GENERAL DESCRIPTION

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Introduction

1. The TGRI(AT).26005/1 is a transportable ground to air u.h.f. installation, capable of operating independently or augmenting existing facilities at an airfield or airstrip. Provision is made for either local or remote operation of the equipment.

2. The installation incorporates a transmitter receiver TR5/ARC52 and an a.c. power supply unit. It provides amplitude modulated radio-telephone facilities in the u.h.f. band, 225 MHz to 399.9 MHz.

3. The power supply required is 1 kVA at 230-volts 50 Hz single-phase a.c. For special purposes, the a.c. power supply unit can be removed and a d.c. power supply unit installed in its place. However the d.c. power supply unit is not supplied as part of the equipment.

4. The installation is mounted in two partially shock-proofed metal cases, and is designed to withstand the shocks of cross country travel in vehicles. It is also capable of being carried in all types of transport aircraft. Under these conditions it can be handled by a crew of four men.

Equipment

5. The installation, a general view of which is shown in fig. 9, consists of the following main items of equipment. To avoid any confusion of terms used in describing the items, the list includes the official nomenclature together with the descriptive terms used in the text of this chapter. The Ref. No. is given in brackets after the official nomenclature for each item.

6. In transit, the transmitter-receiver and the accessory containers are separated. When set up for operation, the T/R container is mounted on

top of the accessory container (fig. 1), the latter forming a stand to raise the T/R container to a convenient operating height. The transmitter-receiver container holds the items listed in Table 1 and the accessory container holds the items listed in Table 2. The aerial haversacks Nos. 1 and 2 and the cable reel holder contain the items listed in Table 3. The official nomenclature with the descriptive term is given in each case.

Nomenclature and Reference No.	Descriptive term
(1) Radio set group Type S1/1 (Ref. No. 10D/23902)	Transmitter-receiver container
(2) Base stand (Ref. No. 10AR/5418)	Accessory container
(3) Canvas bag part A (Ref. No. 10B/17129)	Aerial haversack No. 1
(4) Canvas bag part B (Ref. No. 10B/17130)	Aerial haversack No. 2
(5) Cable reel holder (Ref. No. 10AP/1735)	Cable reel holder

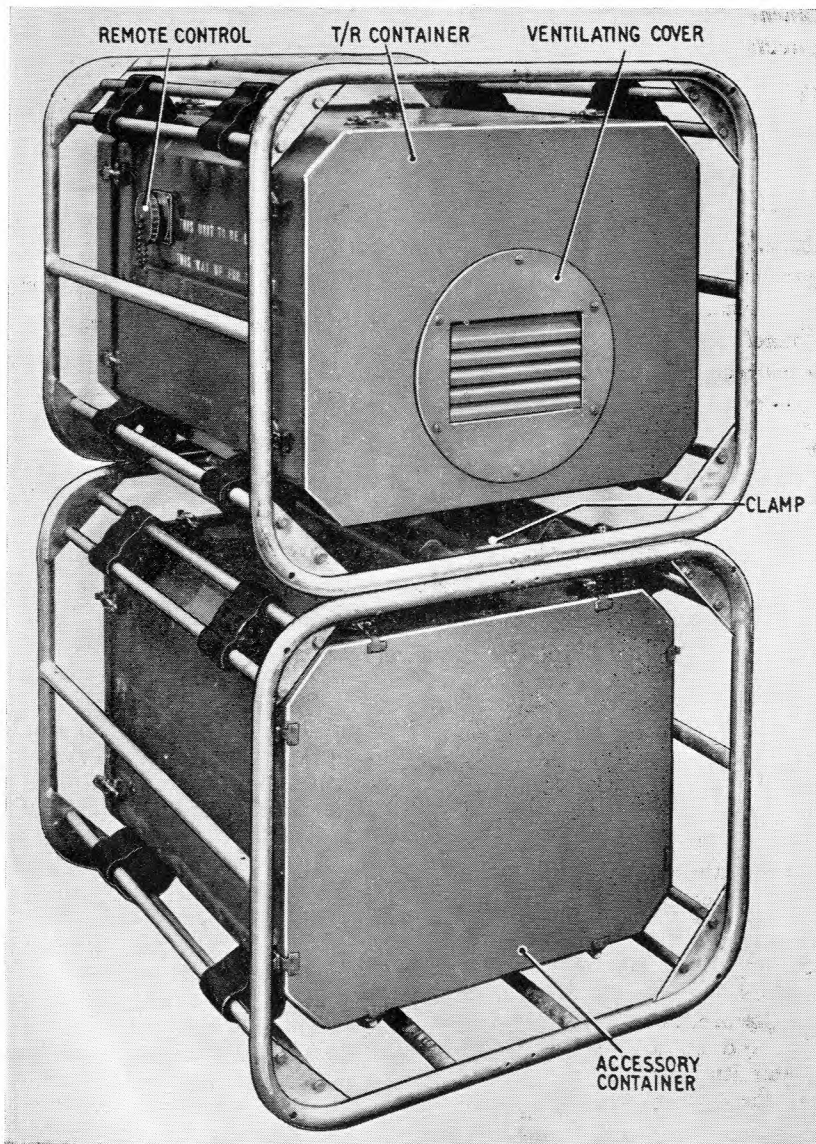


Fig. 1. T/R and accessory containers—covers fitted

TABLE 1
Transmitter-receiver container items

Ref. No.	Nomenclature	Descriptive term	Qty.
10D/5821-99-942-8542	Transmitter-receiver radio	Transmitter-receiver	1
10K/5821-99-943-7136	Power Unit	Power Unit	1
10L/16589	Control, remote switching S17/1	Remote control box	1
10J/5821-99-942-8543	Control unit, Type C1607/ARC52 transmitter-receiver	Control unit	1
10G/13119	Telephone P.O. Type 184B	Microphone-telephone assembly	1

TABLE 2
Accessory container items

Ref. No.	Nomenclature	Descriptive term	Qty.
10S/6625-99-943-4149	Test set u.h.f. Type 15056	u.h.f. test set	1
10B/5985-99-999-3304	Aerial, mast	u.h.f. aerial	1
10AP/1734	Transmitter-receiver cover	Tent canopy	1
10AQ/8340-99-945-7481	Canopy support	Canopy poles	4
10B/8340-99-945-7480	Tent pins	Tent pegs	8
5E/6145-99-910-0295	Cable, radio frequency	Aerial feeder	70 ft
10HA/5995-99-933-1029	Cable assembly, power	A.C. power cable	1
10HA/5995-99-933-1023	Cable assembly, power	D.C. power cable	1
—	Clamp assembly	Securing clamps	2

TABLE 3
Aerial haversack and cable reel holder items

Ref. No.	Nomenclature	Descriptive term	Qty.
10B/18535	Earth rod Type 5	Earth rod Type 5	1
10B/17128	Mast, Type 64	Aerial mast Type 64	1 set
10B/20159	Mast, Section	Aerial mounting	1
—	Cable reel	Cable reel	1
10HA/5995-99-933-1024	Cable assembly special purpose	Remote control cable (40-way)	1

Weight and dimensions

7. The approximate weight and dimensions of the main items are as follows:—

- (1) Transmitter-receiver container:
 - Weight 260 lb
 - Dimensions height 30in depth 25in width 33in
- (2) Accessory container
 - Weight 260 lb
 - Dimensions height 30in depth 25in width 33in
- (3) Aerial haversacks (complete):
 - Weight No. 1 85 lb
No. 2 65 lb
 - Dimensions length 53in
diameter 12in

(4) Cable drum (with remote control cable and holder):

Weight	75 lb
Dimensions	width 12 in diameter 18in

Transmitter-receiver container

8. The transmitter-receiver container illustrated in fig. 2 consists of a tubular steel protective framework in which is housed an aluminium container supported by eight shockproof mountings. The container houses a transmitter-receiver TR5/ARC52, a control unit Type C1607/ARC52 and an a.c. power supply unit. It also provides a stowage for the remote control box, and the microphone-telephone assembly, when these are not in use, or when the installation is in transit.

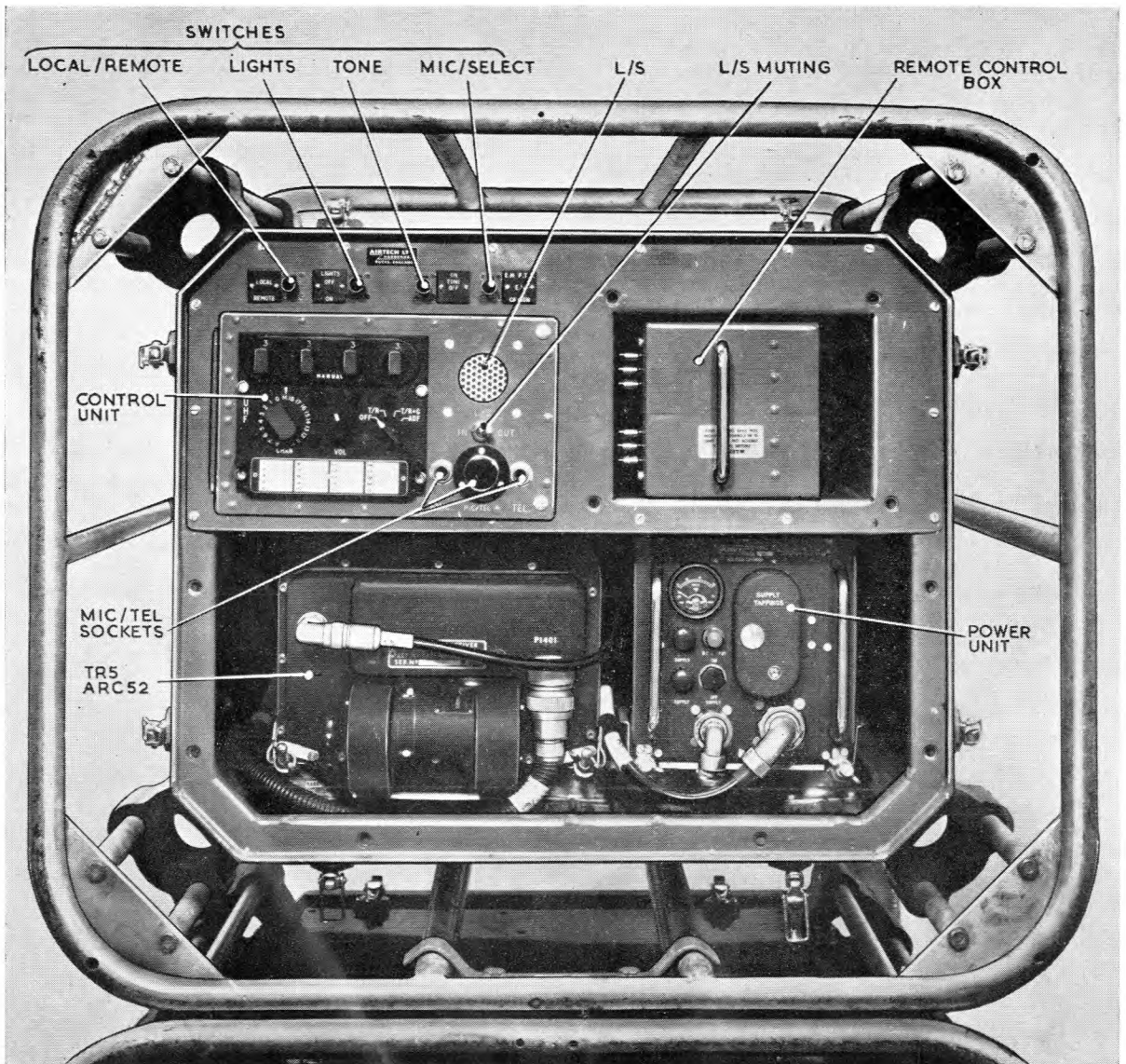


Fig. 2. T/R container—equipment fitted

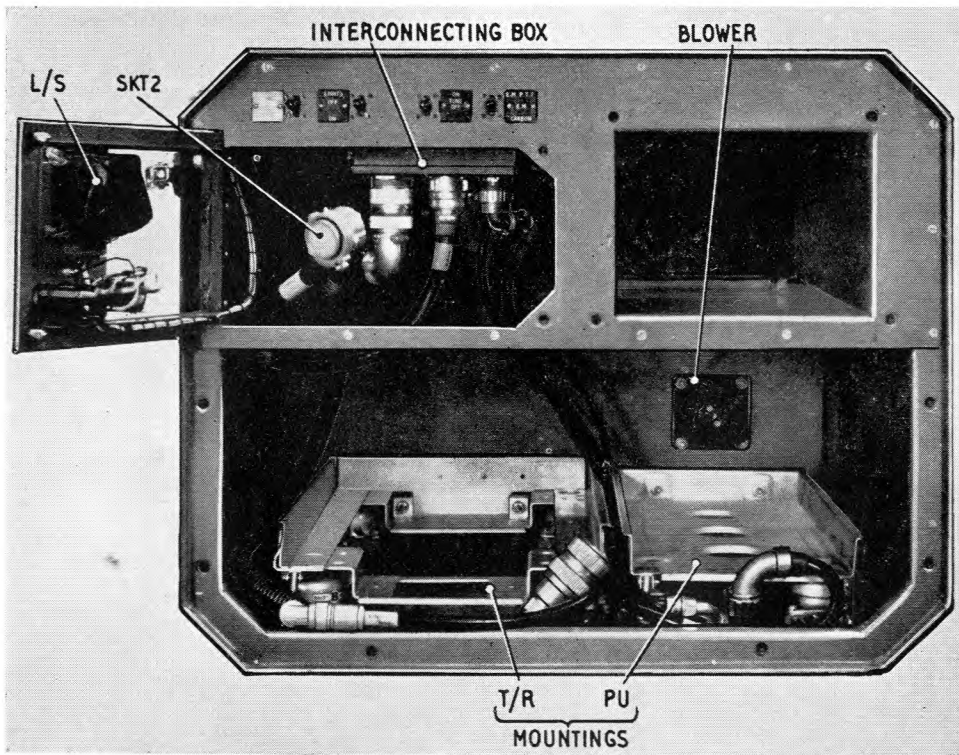


Fig. 3. T/R container—equipment removed

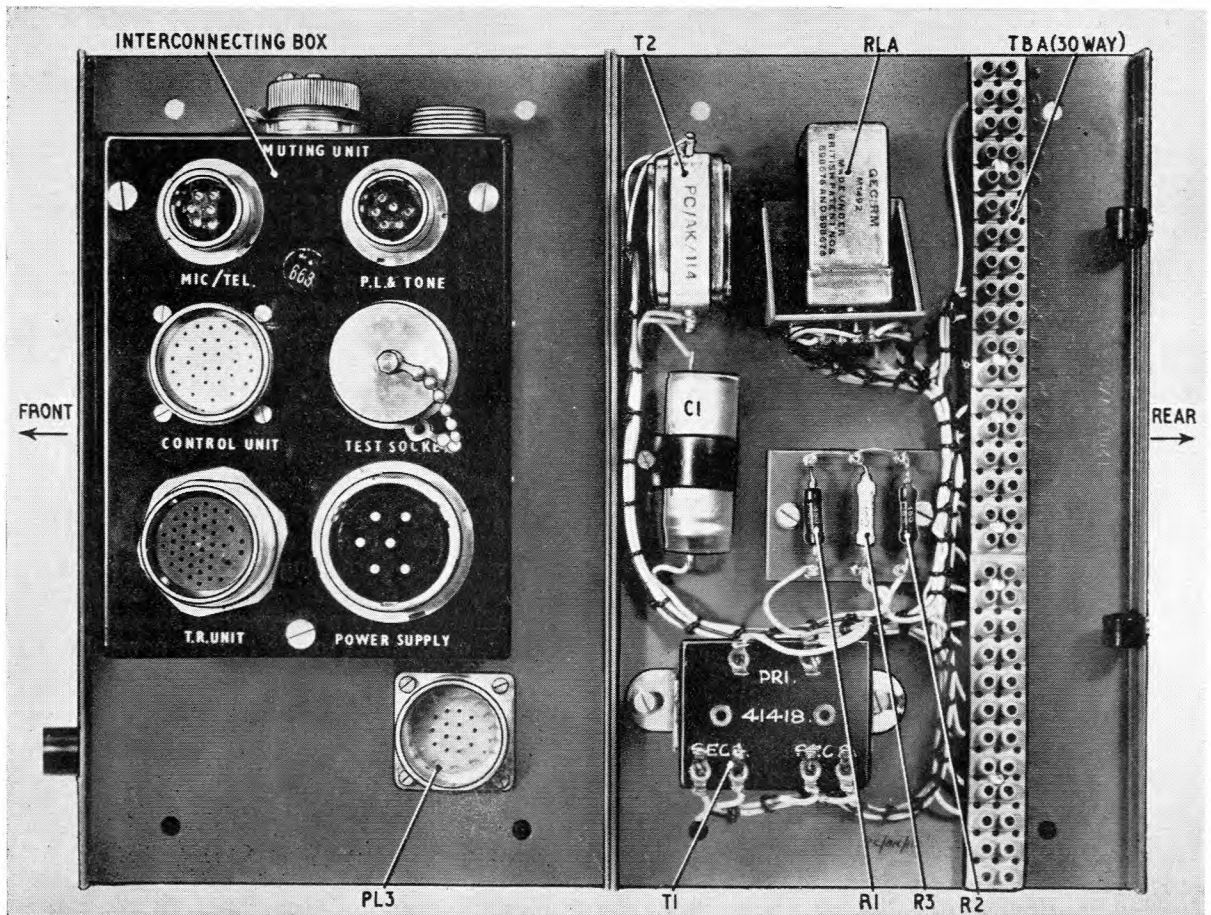


Fig. 4. Connecting panel

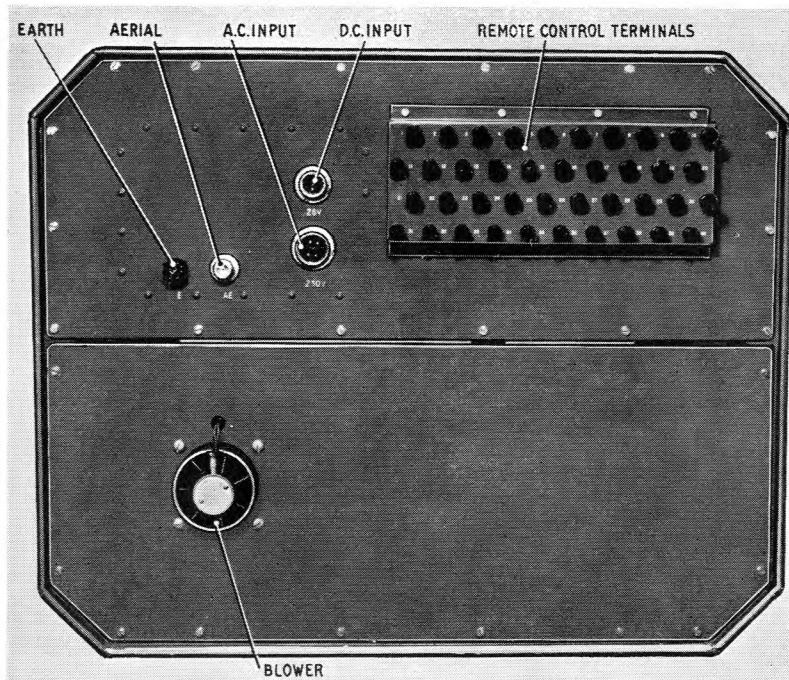


Fig. 5. T/R container—rear view

9. In addition to the control unit, the front panel accommodates the operational controls listed in para. 8, chap. 2, the loudspeaker for the local position, and the microphone and telephone sockets.

10. Mounting trays are fitted inside the case, to accommodate the transmitter-receiver TR5/ARC52 and the power supply unit (fig. 3). The units are secured in position by two bolts on each of the mounting trays. When installed in the T/R container, the transmitter-receiver carrying handle is removed and stowed separately in the container.

11. Also shown in fig. 3 is the position of the interconnecting box. This together with the remote control relay and associated components, is mounted on a connecting panel attached to the roof inside the T/R container. The layout of this panel is shown in fig. 4.

12. The 28V and 230V input sockets, aerial socket, earthing terminal and the 40 terminals for remote control are mounted on the rear of the case, as shown in fig. 5. The remote control terminals are used as an alternative to the 42-pole remote control socket and cable. The 42-pole remote control socket is mounted on the left-hand side of the container (fig. 1).

13. Cooling is provided by an axial fan blower incorporated in the rear wall of the case (fig. 3 and 5). In addition, apertures are provided in the front and rear protective covers, to allow direct coupling to an air cooling plant when operating the equipment under tropical conditions. Under normal operating conditions ventilating panels are fitted to these apertures. Each cover is held in position by eight toggle fasteners.

Accessory container

14. The accessory container with the front protective cover in position, is shown in fig. 1, and fig. 6 shows the container with the cover removed. It consists of a tubular steel protective framework, and an aluminium container of similar size and shape to that of the T/R container.

15. The container houses part of the ancillary equipment of the installation, in four separate compartments. This equipment consists of the tent canopy, canopy poles and tent pegs, the u.h.f. aerial, aerial feeder, u.h.f. test set Type 15056, and the haversack containing the power supply cables, test connectors, earth cable, and the securing clamps, when these are stowed for transit. Covers are fitted to the front and rear of the container. Each cover is held into position by eight toggle fasteners.

Remote control

16. Remote control facilities are provided by the remote control box, (fig. 7) connected to the pack set by a 40-way remote control cable, terminated at one end with a plug and the other end with a socket. The cable allows remote control of the installation up to a distance of 50 yards. Alternatively, connection to the remote control box may be made by Don 10 cable running from the remote control terminals.

Remote control box

17. The remote control box (fig. 7), provides a housing for control unit Type C1607/ARC52, when the installation is being operated from a remote position. It contains, in addition to the control unit, a small loudspeaker, the controls listed in para. 8, chap. 2, microphone socket, telephone socket and a combined microphone/telephone socket. A 42-pole plug, complete with a protective

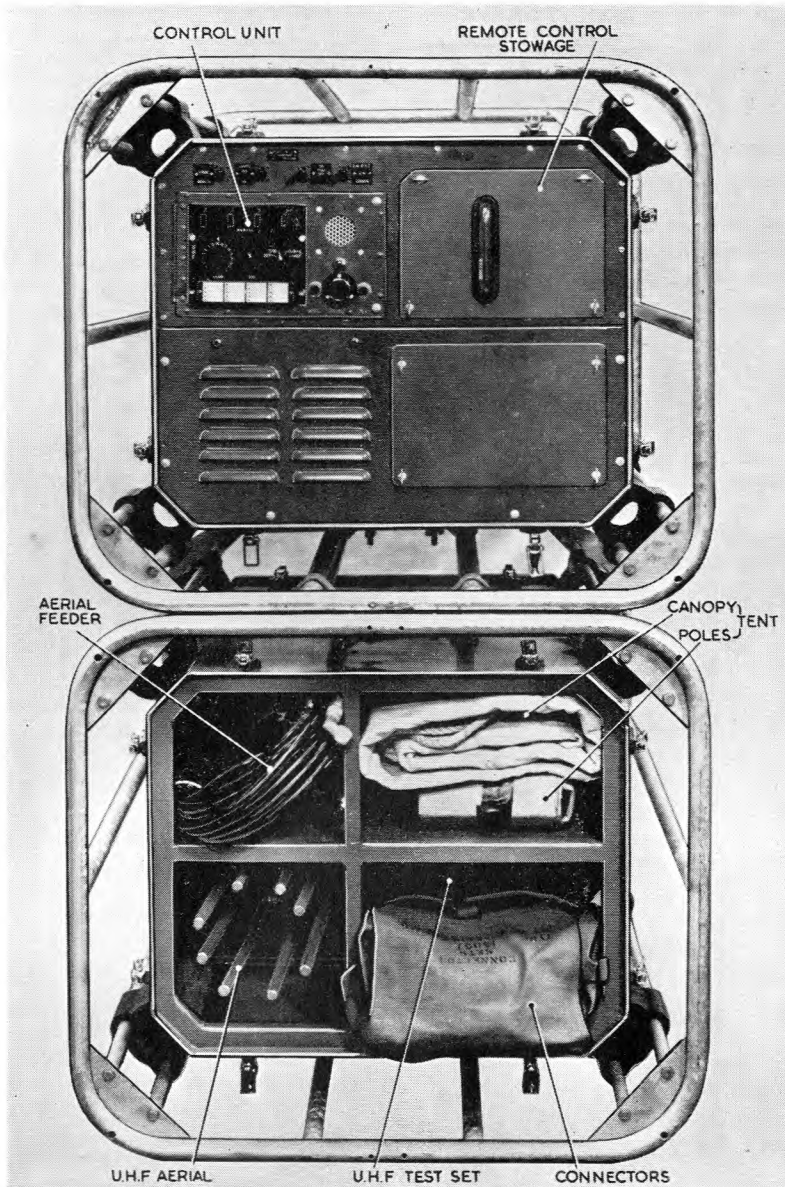


Fig. 6. T/R and accessory containers—covers removed

cap, is fitted to the left-hand side of the box, and a U-shaped carrying handle on the right-hand side. The 40 terminals for remote plug control, used as an alternative to the 42-pole plug, are mounted on the rear of the box.

Aerial equipment

18. The installation uses a wide band u.h.f. aerial mounted on the top of an aerial mast Type 64. A special type of mounting is used to attach the aerial to the mast (fig. 8).

19. The aerial provides omni-directional cover, up to a height of 60,000 ft, over the frequency band covered by the installation. This is subject to

propagation conditions existing at the time of operation.

20. The aerial mast Type 64 consists of eight mast sections, assembly equipment, and the necessary guy lines and pegs, details of which are given in para. 28 to 39.

Weather protection

21. A tent canopy provides protection against the weather, for the transmitter-receiver and accessory containers. A view of it erected and in position is given in fig. 9 and stowed for transport in fig. 6. Instructions for its erection are given in para. 25 to 27. It does not in any way interfere with the operation of the equipment.

Site

22. The choice of a site for the installation will depend to a large extent upon operational requirements and limitations. But, subject to these requirements, the site should be firm and level with sufficient space to allow for the erection of the aerial mast Type 64.

Setting up the station

23. The steps to be taken in setting up the station are given in the following para. 24 to 42. This includes, where required, detailed instructions for the assembly of the main items of equipment.

Transmitter-receiver erection

24. Figs. 1 and 9 show the two containers in their operational position. The accessory container is placed in the position chosen for the erection of the station. The T/R container is placed on top of the accessory container and secured by the two securing clamps provided. Remove the tent canopy, connector haversack, and aerial feeder cable from the accessory container.

Test canopy erection

25. The tent canopy is supported on four poles, each pole is divided into three sections for stowage in transit.

26. To erect the canopy, first assemble the four poles from the sections provided. Lay out the canopy centrally over the top of the containers. Insert one of the poles in each of the locating holes, which will be found at the corners where the four canopy flaps join the canopy.

27. Fix eight tent pegs into the ground in line with the bottom corners of the four canopy flaps and loop the guy lines over their respective tent pegs. Raise the poles to a vertical position and adjust the guy lines in turn until the tent canopy is held firmly in position above the containers.

Aerial mast erection

28. To erect the aerial mast reference should be made to fig. 10 of this chapter and the following instructions read in conjunction with it. Unpack the equipment from the two aerial haversacks. Select the required position for the mast.

29. In the centre of the selected area locate the swivel pin of the marking cord. Using the cord taut from this point, describe a circle 30 feet in diameter. Locate four pegs at right-angles on the circumference of this circle, numbering them 1 to 4. The pegs should be driven into the ground at an angle of 45 degrees, with the flat side of the peg facing the mast. Locate a fifth peg two feet out from, and in line with, peg No. 4. Hook a double guy adjuster to each peg Nos. 1, 2 and 3 also one single guy adjuster to each peg Nos. 1 and 3. Remove the swivel pin and locate the mast base at this point. The mast base has two plugs, one for the mast, and one for the derrick arm.

30. The eight mast sections should now be laid out from the base, in line with peg No. 2 position. The mast sections, numbering outward from the base should be fitted together, at the same time placing the lower guy anchorage plate immediately above the lower shoulder of the fifth section.

31. Line the base pivot movement with No. 2 and No. 4 pegs keeping the clamped plug (which is for the mast) facing No. 2 peg position. Insert the lower end of the first section of the mast into the clamped plug of base pivot. Fit the aerial mounting (fig. 8) to the eighth section of the mast. The mounting drops onto the section and is held in position by the four long guy lines.

32. The four short guy lines should be fitted to the lower guy anchorage plate, and the four long lines to the upper anchorage on the aerial mounting. Secure the other ends of three long and three short guy lines to the double guy adjusters on peg Nos. 1, 2 and 3.

33. The four sections forming the derrick arm of the erection equipment should be joined together and one end inserted into the second plug on the base pivot. The guy anchorage should be fitted to the derrick arm beyond the shoulder of the outermost section. The fourth set of long and short guy lines should be fitted to the upper point of the guy anchorage on the derrick arm, using a double guy adjuster, and the two short guys of the erection equipment to the two side points of the same anchorage. Attach the single sheave of the lifting tackle to the lower point of the guy anchorage and the other end to peg No. 5. This completes stage 1 of the assembly.

34. Attach one of the erection equipment guy lines to the single guy adjuster at peg No. 1. Haul the derrick arm to the vertical position by the other erection equipment guy line. Attach this guy line to the single guy adjuster at peg No. 3. Adjust lifting tackle, mast and derrick guys, until all guys are taut and the derrick arm vertical. This completes stage 2 of the assembly.

35. Remove the u.h.f. aerial from the accessory container and retain the stowage fixing bolts. Assemble the aerial and attach the aerial feeder cable. The assembled aerial should be fitted to the aerial mounting using the stowage bolts for fixing. The aerial feeder cable should be cleated along the mast at convenient points.

36. The mast is now ready for erection, check that the derrick arm is vertical, all guy lines tidy, and that the aerial system is complete for erection.

37. The crew should now haul on the lifting tackle until the mast is in a vertical position. The derrick arm, now horizontal, should be securely tied down, and the upper and lower guy lines transferred from the arm to No. 4 peg. All guy lines should now be trimmed in turn, until the mast is vertical and stable. This completes stage 3 of the assembly.

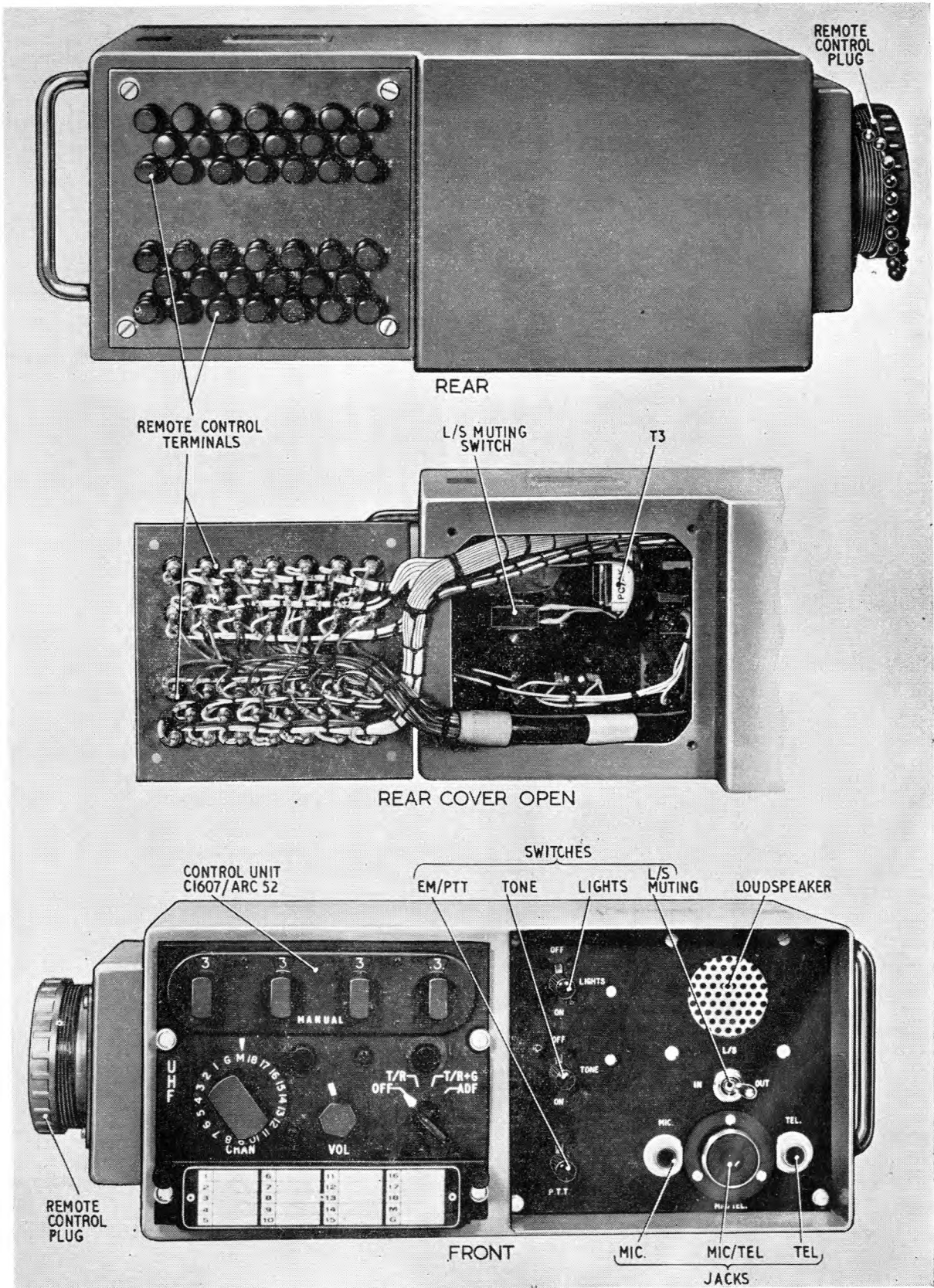


Fig. 7. Remote control box

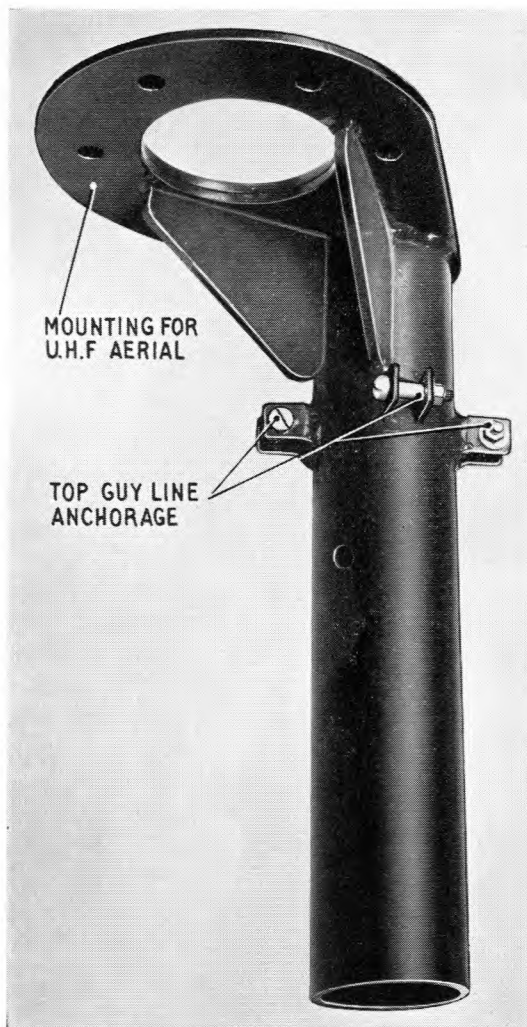


Fig. 8. UHF aerial mounting

38. The aerial feeder should be run to the site selected for the containers, taking care to support it as necessary, and protect it from accidental damage that might be caused by pedestrian or vehicular traffic.

39. On completion, dismantle the erecting gear (derrick arm, lifting tackle etc.) and stow them in the aerial haversack.

Transmitter-receiver preparation

40. Remove the front cover from the transmitter-receiver container and ensure that all fuses and panel lights are in position. Connect the aerial feeder to the aerial socket on the rear of the T/R container. Drive the earth rod Type 5 into the ground and connect the earth lead to the earth terminal on the T/R container.

41. Ensure that the input voltage taps on the power unit are set to suit the supply voltage (a.c. power unit only), and connect the power supply cable between appropriate socket on the T/R container and the supply to be used. The rear protective cover of the T/R container need not be removed to fit these connections. A smaller cover

on the protective cover should be removed, exposing the connecting points, and refixed after fitting the connectors.

42. Before the equipment is put into service ensure that the carbon/dynamic microphone links situated inside the transmitter-receiver, are set according to the type of microphone to be used, and also the EM/CARBON switch on the transmitter-receiver container. Test, and if necessary, reset the depth of modulation as described in A.P.116D-0105-1 (2nd. Edn.) for a dynamic microphone, or chap. 3 of this publication for a carbon microphone.

Note . . .

In an emergency, either type of microphone may be used with the EM/CARBON switch set appropriately. It must be appreciated however that without making changes to the transmitter-receiver links a severe loss of quality and range will result (Chap. 3).

Channel selection

43. Pre-set channels can be selected, using the channel selector switch on the control unit from both the remote and local control positions. Full details of setting up the TR5/ARC52 set are given in chap. 2.

Dismantling the station

44. The following steps should be taken in dismantling the station, after ensuring the equipment is switched off. If the installation is being operated from the remote position, all the steps should be included; if only from the local position, step 2 is omitted.

- (1) The mast Type 64 should be lowered, by working in the reverse sequence to that described in para. 28 to 39. The assembly equipment used in erecting the mast should be used for dismantling.
- (2) If the installation has been used from the remote control position the following steps should be implemented.
 - (a) Remove the control unit from the remote control box and refit to the T/R container, after removing the blanking plate.
 - (b) Disconnect socket SKT2 from plug PL3 and reconnect it to the control unit.
 - (c) Fit the blanking plate to the remote control box.
 - (d) Disconnect and stow the remote control cable on the cable reel, then repack into the cable holder.
 - (e) Stow the remote control box in its stowage position in the T/R container.
- (3) Stow the microphone telephone assembly in its stowage position in the T/R container.
- (4) Disconnect the power supply cable from power supply.
- (5) Disconnect the aerial feeder, earth lead, and power supply cable from the T/R container, and stow in their correct places in the accessory container.

(6) Remove the earth rod from the ground, clean and lightly oil if necessary. Stow the earth rod in the aerial haversack.

(7) Dismantle the tent canopy by performing in the reverse order, the steps given in para. 25 to 27 and stow in its correct place in the accessory container.

(8) Remove the securing clamps from the assembly and stow them in the connector haversack. Lift the T/R container from the accessory container.

(9) Check that all the ancillary equipment in

the accessory container is packed securely for transport.

(10) Refit all covers and ensure that they are fastened securely. The installation is now ready for transport.

Connectors

45. A diagram of the connectors, both external and those fitted in the T/R container, is given in fig. 11, and listed in Table 4 below. The internal connectors normally remain connected, but the external connectors are removed and stowed during transit.

TABLE 4
TGRI(AT).26005/1 connectors

Item No. (fig. 11)	Catalogue No.	Description
1	5995-99-933-1018	Aerial cable (bulkhead to trans-receiver)
2	5995-99-933-1020	Aerial feeder cable (aerial to T/R container)
3	5995-99-933-1025	Connector (trans-receiver to inter-connecting box)
4	5995-99-933-1026	Connector (control unit to inter-connecting box)
5	5995-99-933-1019	Connector (connecting panel (plug PL3) to remote control terminals)
6	5995-99-933-1027	Connector (in remote control box)
7	5995-99-933-1021	Connector (power unit to inter-connecting box)
8	5995-99-933-1028	Connector (power unit to bulkhead (a.c.))
9	5995-99-933-1029	Power supply cable (a.c.)
10	5995-99-933-1031	Connector (interconnecting box to 30 way T.B. (Nos. 1-4))
11	5995-99-933-1022	Connector (interconnecting box to 30 way T.B. (Nos. 9-15))
12	5995-99-933-1024	Remote control cable (remote control box to T/R container)
13	5995-99-933-1023	Power supply cable (d.c.)
14	5995-99-933-1032	Connector (Power unit to bulkhead (d.c.))
15	—	Earth cable (earth pin to T/R container)
16	5985-99-999-3304	U.h.f. aerial
17	5821-99-942-8542	Transmitter-receiver TR5/ARC52
18	5821-99-942-8543	Control unit Type C1607/ARC52
19	5821-99-932-6361	Interconnecting box
20	5821-99-943-7136	Power unit (a.c.)
21	6125-99-999-1276	Dynamotor Power supply (alternative special purposes only not supplied with equipment)

Circuit description

46. The circuit description of the transmitter-receiver TR5/ARC52 and its ancillary equipment is given in A.P.116D-0105-1 (2nd Edition), the Power Unit (A.C.) in A.P.116E-0102-1B6, and the Dynamotor Power Supply in A.P.116E-0101-1B6. A brief description of the remainder of the circuit follows. Reference should be made to fig. 4 and fig. 12 of this chapter.

47. When the microphone selector switch S1 is set to the CARBON position, the microphone transformer T1 is brought into circuit. At the same time, capacitor C1 is connected to provide a path for the audio current, between the two halves of the primary winding of T1. The relay RLA is connected in series with the supply voltage, the primary windings of T1, and the microphone.

48. The circuit is completed by closing the microphone "press to talk" switch (fitted to the microphone/telephone assembly), thus providing current to energize the microphone and operate the relay. Operation of the relay closes contact

RLA/1, which switches the transmitter-receiver to transmit. At the same time, contacts RLA/2 and RLA/3 close, and switch in the resistance network R1, R2 and R3 to the telephone circuit. This attenuates the telephone circuit to minimize acoustic feedback, while still allowing signals to produce sidetone.

49. When the microphone selector switch S1 is set to the E.M. position, the microphone transformer T1 is switched out of circuit, and the microphone is fed directly into the transmitter-receiver. To transmit, the microphone selector switch S1 is pressed to the EM/PTT position, this operates relay RLA thus switching the set to transmit and attenuating the telephone circuit in the same manner as described in para. 42.

50. The two loudspeakers in the local and remote positions each have an impedance of 30 ohms. These are matched to the transmitter-receiver output by two audio transformers T2 (fig. 4) and T3 (fig. 7). A muting switch in each loudspeaker position switches them in and out of circuit.

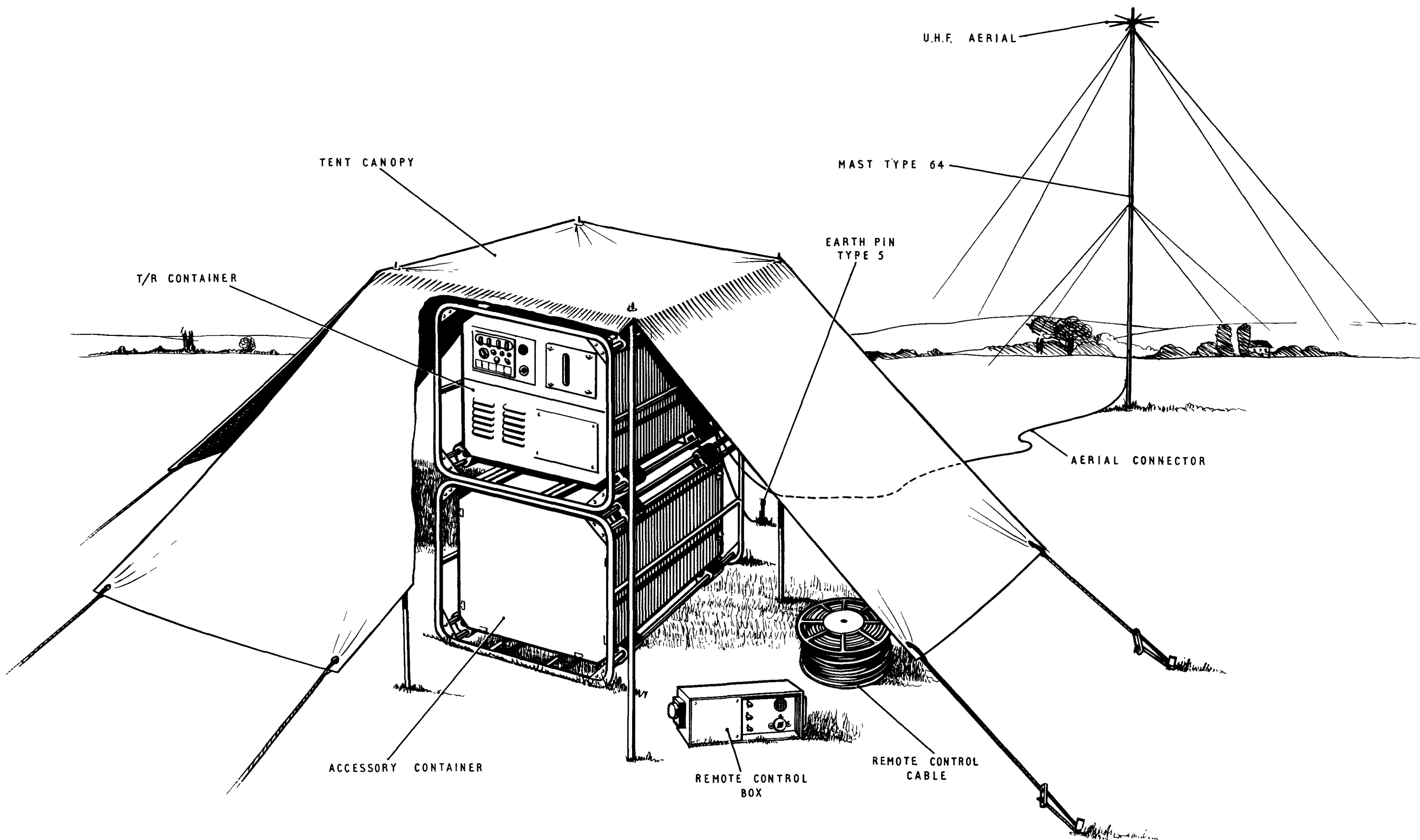


Fig. 9
Issued Sept. 67

TGR1 (A.T.) 26005/1 installation - general view

Fig. 9
1

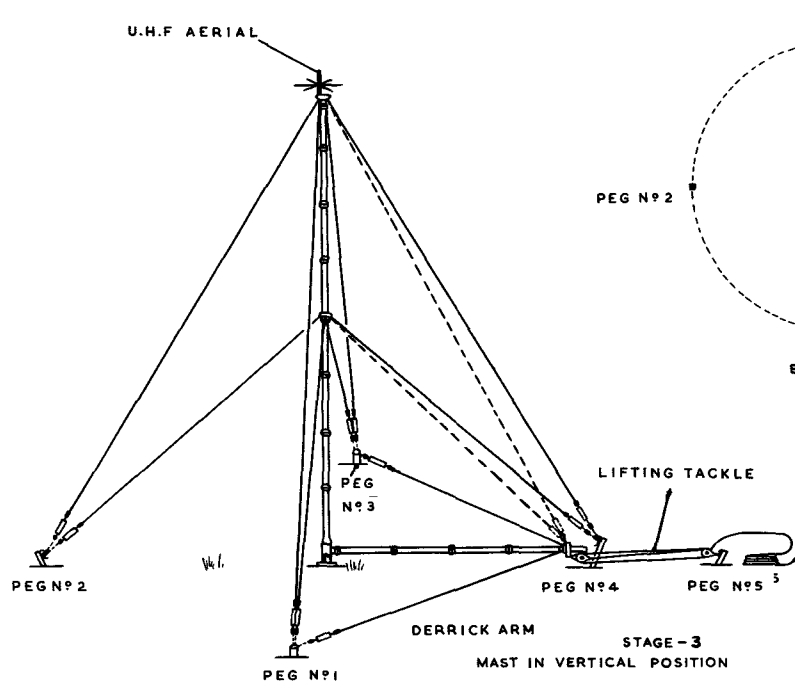
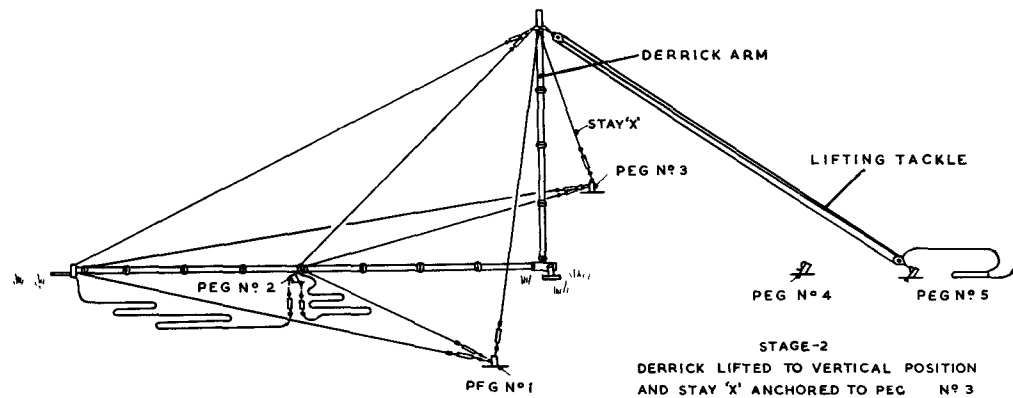
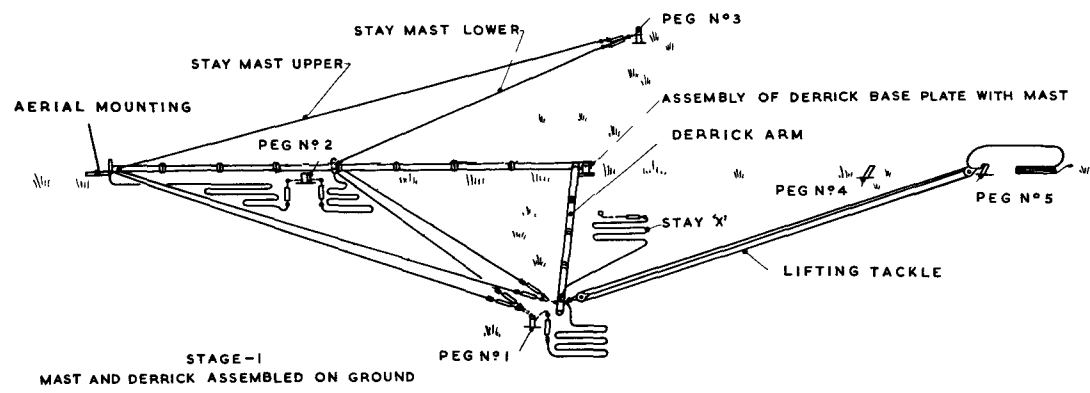
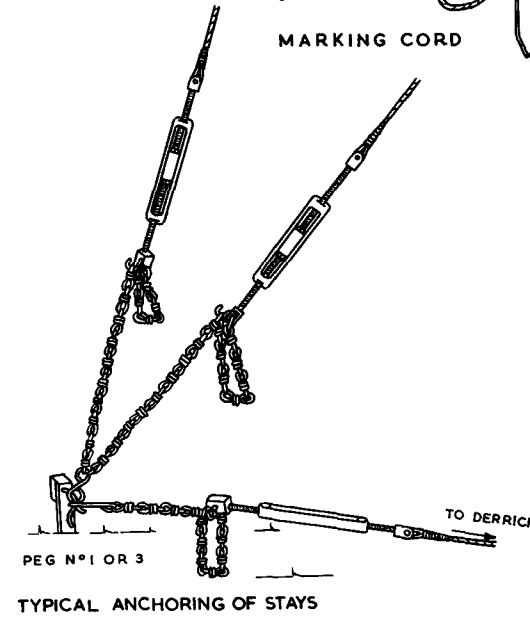
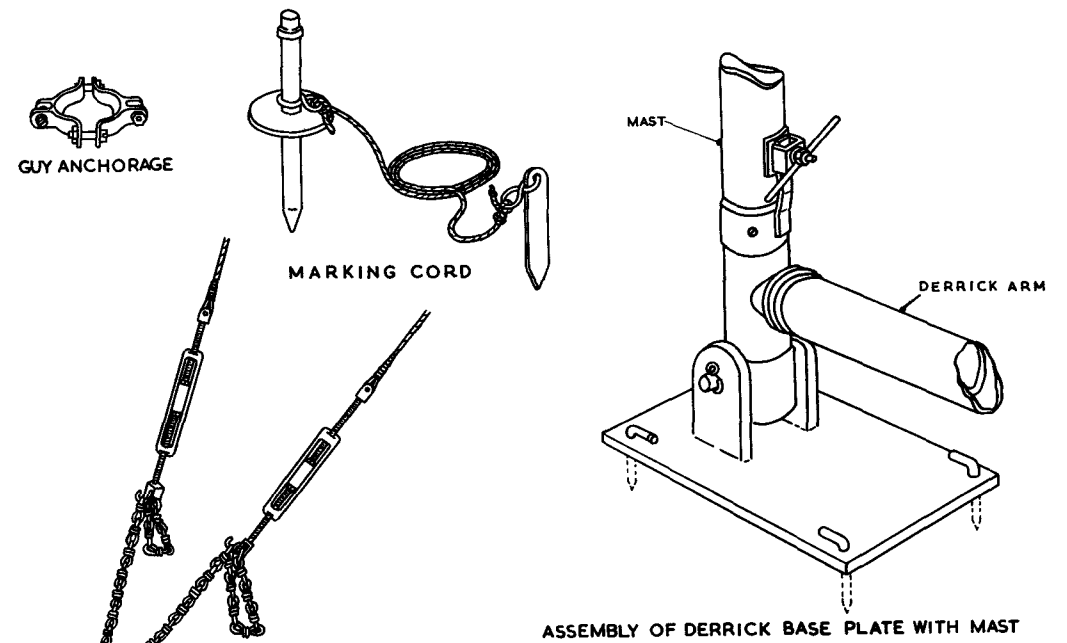
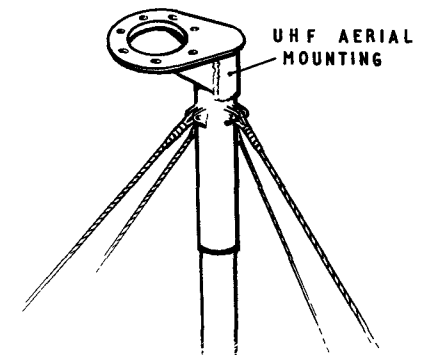


Fig.10

Aerial mast Type 64 : method of erection



ASSEMBLY OF DERRICK BASE PLATE WITH MAST



ATTACHMENT OF STAYS TO MASTHEAD

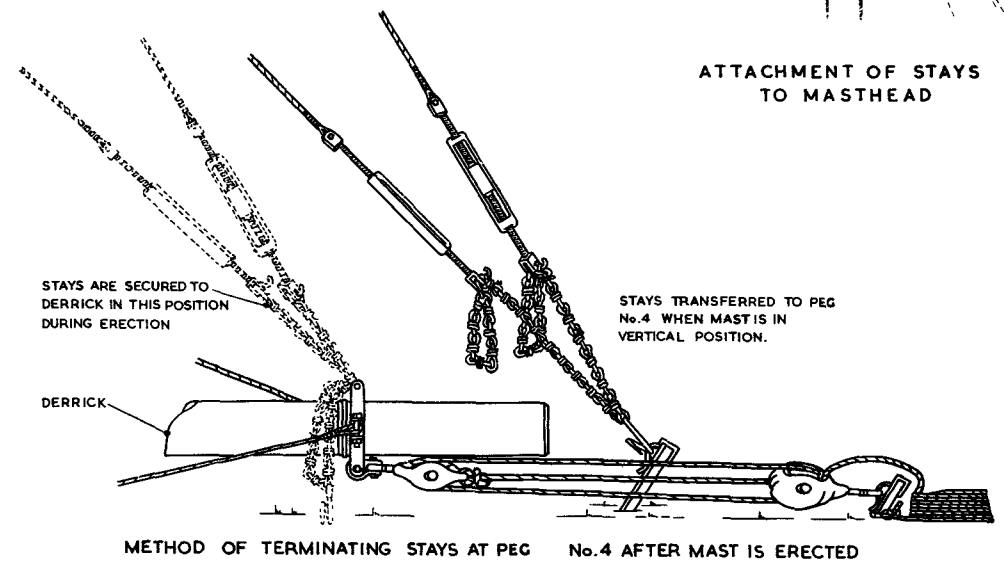
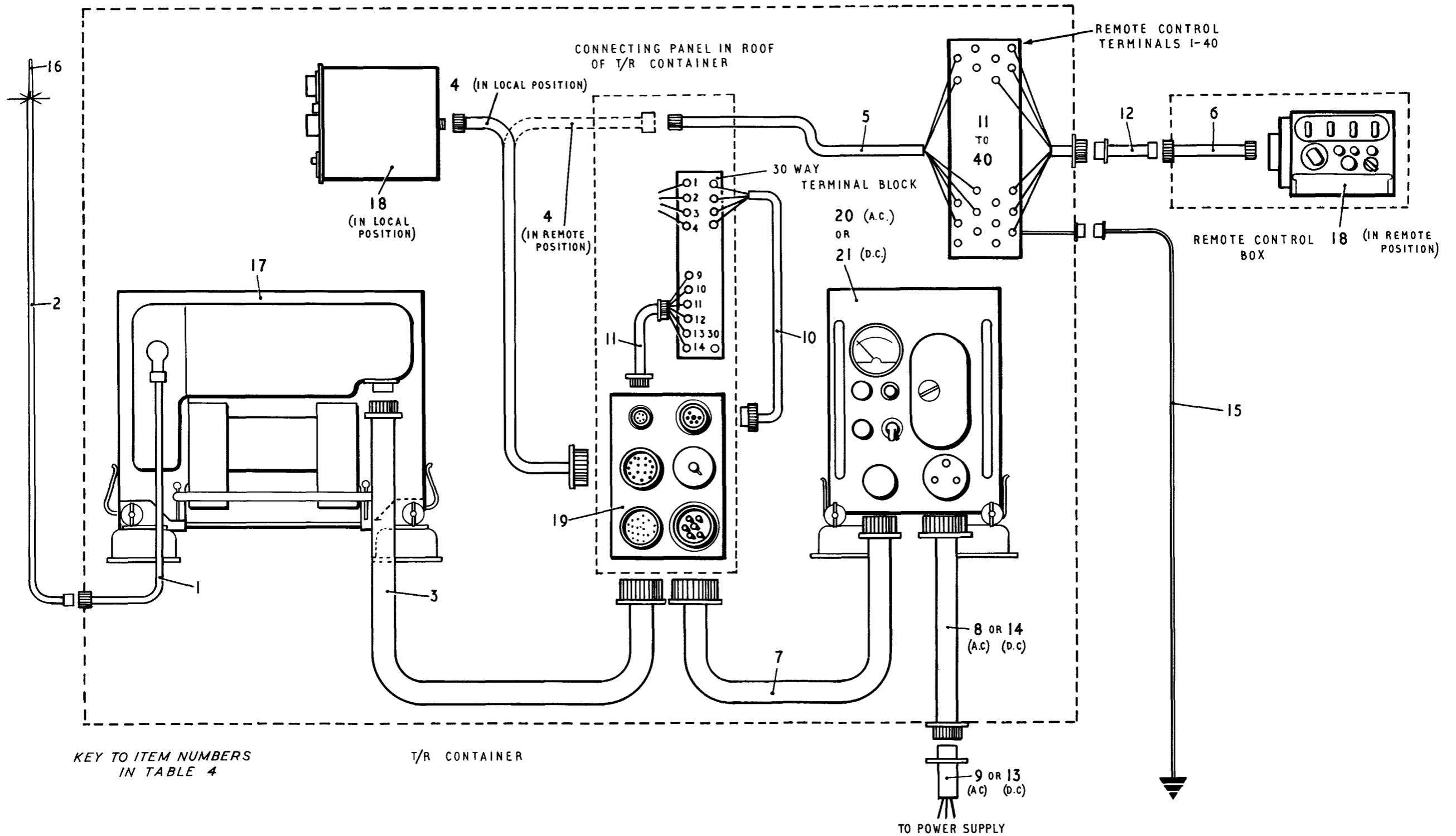


Fig.10



KEY TO ITEM NUMBERS
IN TABLE 4

T/R CONTAINER

TO POWER SUPPLY

Fig. II
Issued Sept. 67

T G R I (AT) 26005/1 — installation diagram

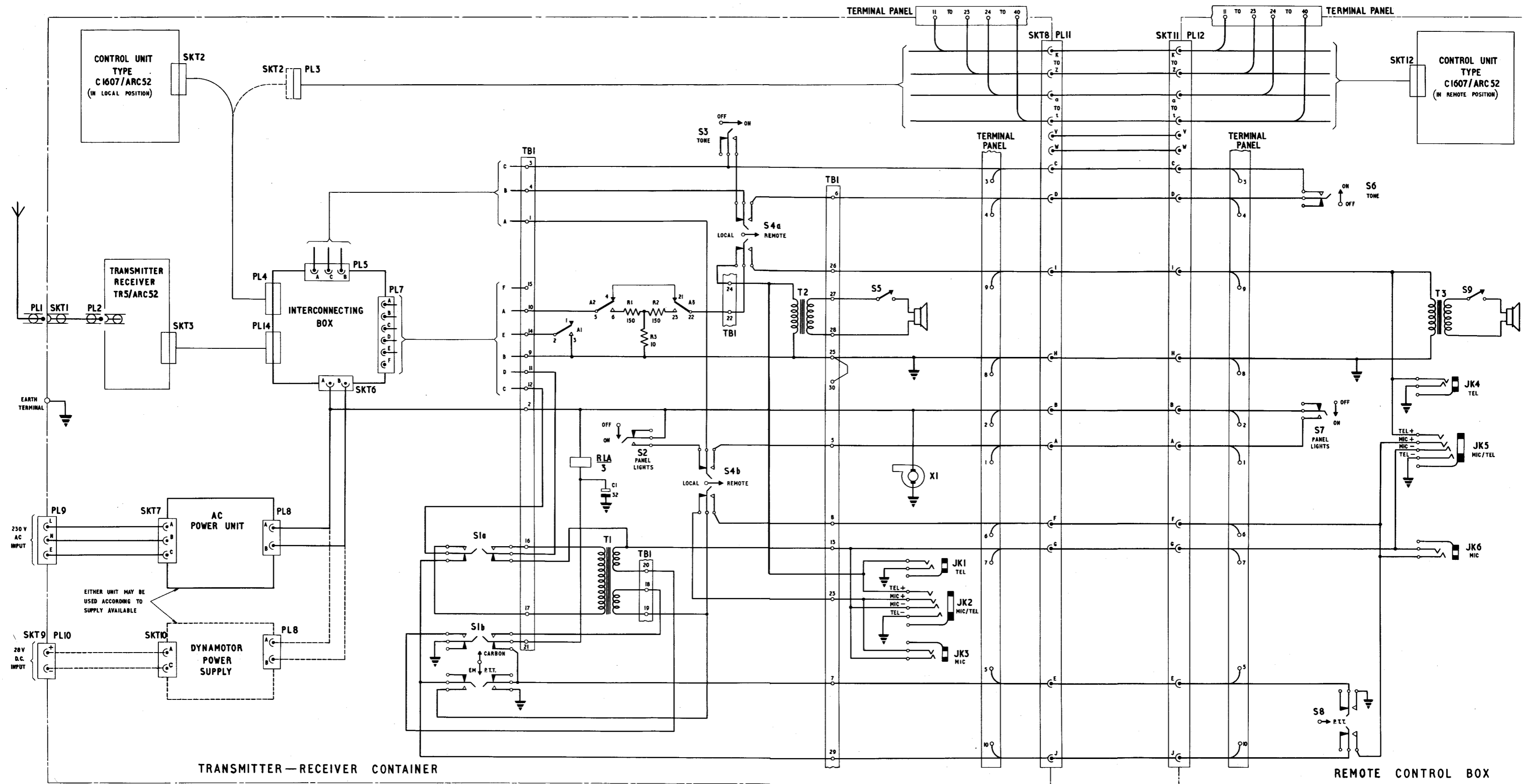


Fig.12
Issued Sept. 67

TG R1 (AT). 26005/l: circuit

Fig.12

Chapter 2

SETTING UP AND OPERATING INSTRUCTIONS

LIST OF CONTENTS

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<i>Control unit, Type C1607/ARC52, showing the selector system</i>	1
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Functions of the equipment

1. The type ARC52 equipment incorporates a transmitter-receiver capable of operating on any of 1750 frequency channels, spaced 100 KHz apart, within the ultra high frequency range of 225.0 MHz to 399.9 MHz. The installations are primarily intended for R/T simplex communication between aircraft and ground, aircraft and ships. The various operational controls are incorporated in the control unit (Type C1607/ARC52) which provides for manual selection of the required frequency channel or automatic selection of any one of eighteen preset frequency channels. In addition, the preselector system includes a guard channel frequency. Direction finding facility is also provided on the control unit but is not used with this installation.

2. For automatic airborne relay purposes, the installation can be used with identical transmitter-receivers when an extra junction box is employed instead of the control unit. The signal output from one receiver can be fed into the transmitter of the relay equipment and re-transmitted on a different channel.

Caution . . .

Before removing or refitting the 42-way connector at the transmitter receiver, care must be taken to ensure that the function switch on the control unit is at OFF.

Functions of the operating controls

3. The operating controls for the basic equipment consist only of those on the front panel of the control unit (fig. 1) and they are as follows:—

(1) **MANUAL** frequency controls—In the Type C1607/ARC52 the four controls at the top of

the control unit front panel are for manually selecting the operating frequency of the transmitter-receiver when the CHAN selector switch is in the M position. When the CHAN selector switch is not in the M position, the MANUAL selectors do not affect the operating frequency.

(2) **CHAN** selector switch—In addition to the M position (sub-para. (1)) there are eighteen positions for the preset channels of operation (para. 4), and also a G position for the guard frequency of 243.0 MHz.

(3) **VOL** control—This permits the level of the audio signals in the telephones to be set to the required level.

(4) **Function** switch—the four positions of this switch on the Type C1607/ARC52 unit are as follows:—

(a) **OFF**. The power supplies are switched off.

(b) **T/R**. The power supply is switched on and the equipment is automatically set for receiving purposes. When it is required to transmit, the press-to-transmit switch must be operated.

(c) **T/R+G**. The guard receiver is switched on, while normal transmit-receiver facilities on the selected channels are retained.

(d) **ADF**. This position is for use with both British and American direction finding equipment. The British equipment includes facilities to permit normal transmission and reception when the ADF position is in use. The American equipment does not include this facility.

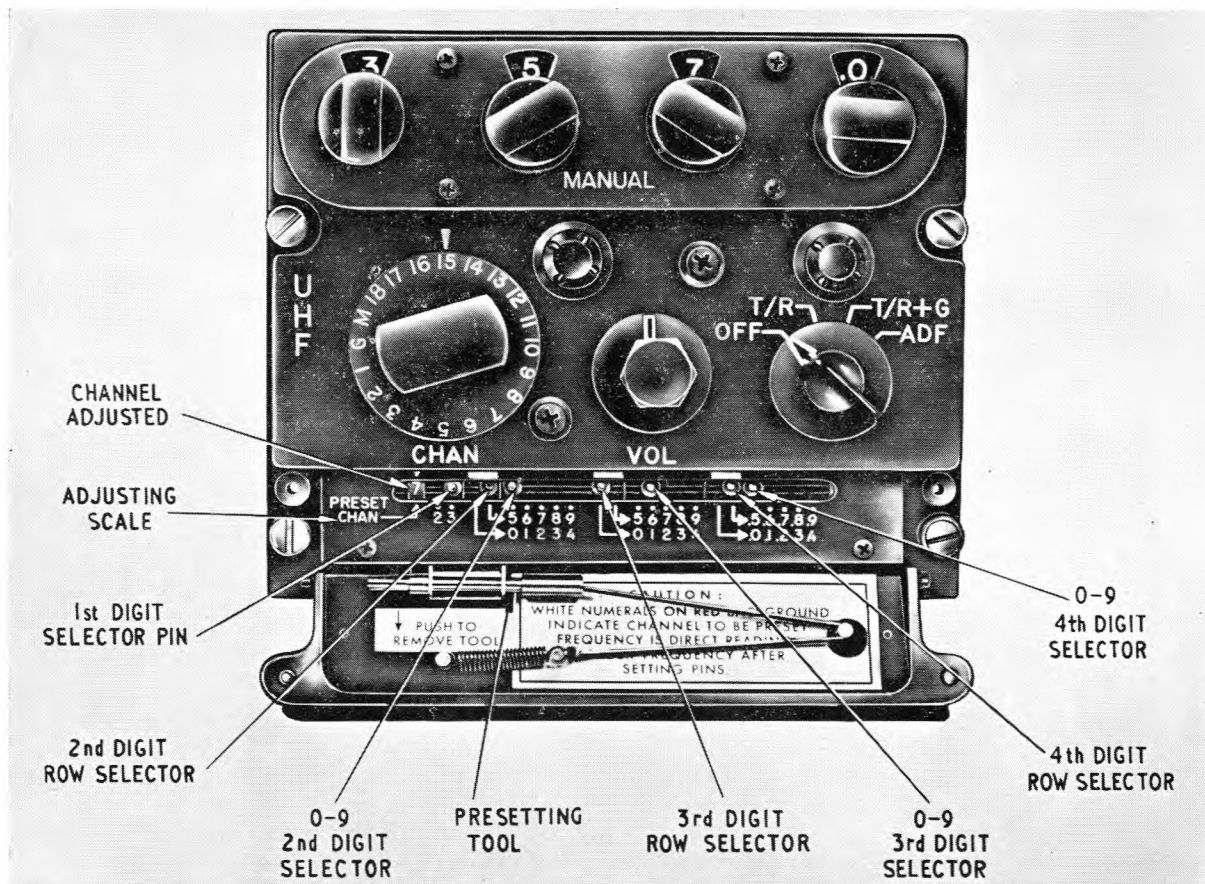


Fig. 1. Control unit, Type C1607/ARC52, showing the selector system

Setting up the preset channels

4. Access to the setting up scale on the control unit Type C1607/ARC52 (fig. 1), for the eighteen preset channels, is obtained by unscrewing the two milled headed screws and opening the small cover plate of the bottom of the front panel of the control unit (fig. 2). The channel to be set up is indicated by a white number on a red background at the extreme left-hand end of the scale. The channel number is rotated into the setting up position by the channel selector switch CHAN. Because of the method used for setting up purposes, the channel number indicated on the channel selector switch CHAN does not agree with that appearing on the setting up scale and, therefore, the setting of the CHAN switch should be ignored during the procedure.

5. Setting up is done by means of switch actuators mounted on a drum, there being one bank of actuators for each channel. A special presetting tool (fig. 1) is provided for sliding the actuators to the required positions. The actuators operate switches mounted inside the control unit. The position of the channel selector switch CHAN determines the bank of actuators which will operate the switches to obtain the operating frequency, and this bank corresponds with the number indicated

in the channel selector switch. The bank of actuators accessible for adjustment is that indicated by a white number on a red background at the left-hand end of the scale.

6. The scale has four groups of digits and, reading from the left-hand to the right-hand side, they represent the frequency in MHz as follows:—

(1) On the Type C1607/ARC52, the first group consists of digits 2 and 3; these represent the hundreds of MHz within the frequency range of 225.0 MHz to 399.9 MHz. One actuator is used to select the digit 2 or 3 as required.

Note that the digits 2 and 3 are in the reverse order.

(2) The second group consists of two rows of five digits which represent the tens of MHz within the frequency range. Two actuators are used with these digits, one to select the required row and the other to select the actual digit required.

(3) The third group is similar to the second group and represents the units of MHz.

(4) The fourth group is also similar to the second group and represents the tenths of MHz.

7. The procedure for setting up the frequency channel is as follows:—

- (1) The power supplies need not be switched off during the setting up procedure.
- (2) Assume that channel 7, as shown in fig. 1, is to be set to a frequency of 351.5 MHz.
- (3) Rotate the channel selector CHAN switch until the channel number 7 appears in the aperture adjacent to the setting up scale, that is, opposite the arrow pointing to PRESET CHAN.
- (4) Remove the presetting tool from its stowage and set up the actuators in sequence, commencing from the left-hand side of the control unit as follows:—
 - (a) Hundreds MHz, digit 3, first group. Set the first actuator over the digit 3.
 - (b) Tens MHz, digit 5, second group. Set the second actuator over the arrow pointing to the upper row which includes the digit 5. Set the third actuator over the digit 5.
 - (c) Units MHz, digit 1, third group. Set the fourth actuator over the arrow pointing to the lower row which includes the digit 1. Set the fifth actuator over the digit 1.
 - (d) Tenths MHz, digit 5, fourth group. Set the sixth actuator over the arrow pointing to the upper row containing the digit 5. Set the seventh actuator over the digit 5.

- (5) The remaining channels can be set to the required frequency by first turning the CHAN switch so that the required channel number appears in the PRESET CHAN position (sub-para. (3)) and then repeating the procedure contained in sub-para. (4) to set the actuators to the frequency required.
- (6) Channel G (guard frequency) is normally set to 243.0 MHz.
- (7) Channel M. The actuators cannot be moved, they are fixed in position to actuate the switch contacts which enable the MANUAL controls to be used for selecting a required frequency channel.
- (8) After completing the setting up procedure put the presetting tool back into its stowage position and refit the cover plate.

OPERATING INSTRUCTIONS

8. The main controls for the transmitter-receiver are housed in the control unit Type C1607/ARC52. The additional controls for this installation are as follows:—

- (1) Transmitter-receiver container (fig. 2, chap. 1).
 - (a) LOCAL/REMOTE switch. This effects the changeover from local to remote operation of the equipment.
 - (b) LIGHTS switch. This operates the panel lights on the control panel.

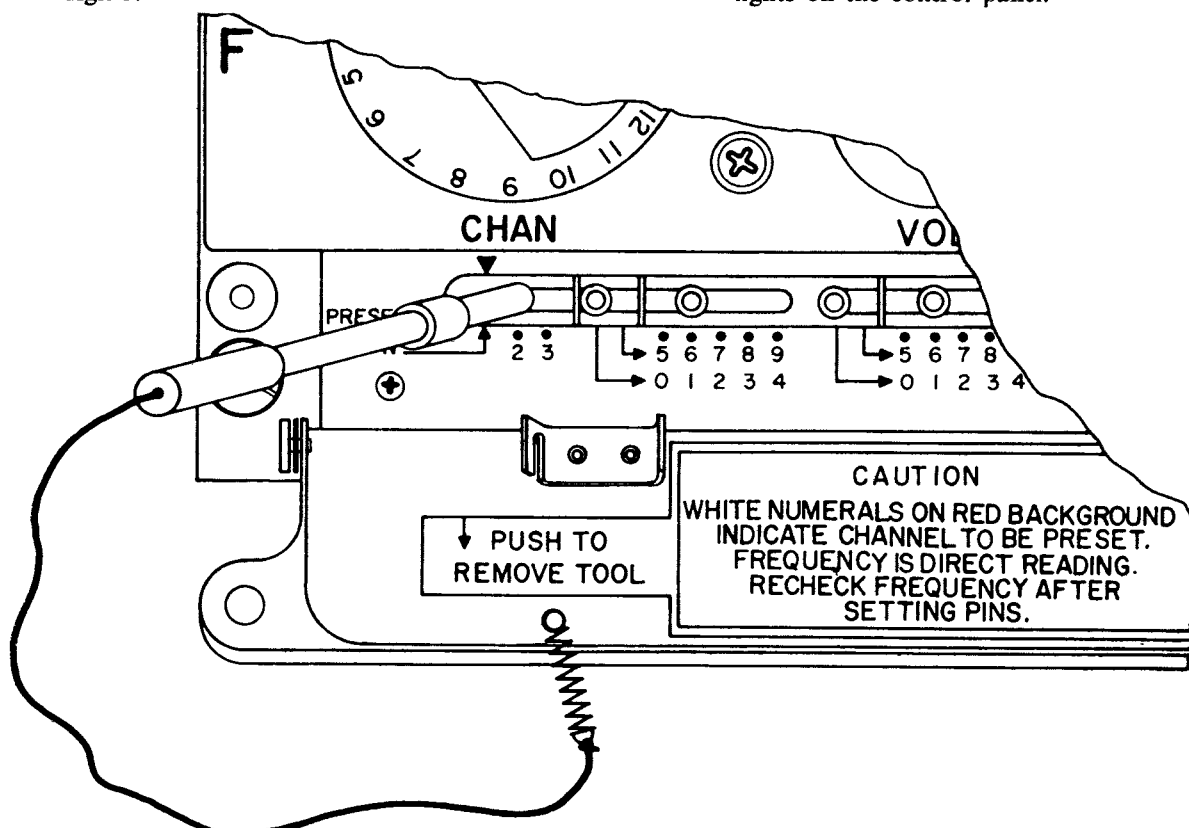


Fig. 2. Switch actuators and pre-setting tool, Type C1607/ARC52

(c) TONE switch. This switches the sidetone in and out when the equipment is in the transmit condition.

(d) Microphone selector switch. This is set for the type of microphone in use. CARBON for carbon microphone, E.M. for electromagnetic microphone. The EM/PTT position is the 'press to transmit' switch, when using an electromagnetic microphone.

(e) L/S switch. This is the loudspeaker muting switch.

(2) Remote control box (fig. 7, chap. 1).

(a) LIGHTS switch. This operates the panel lights on the control panel, in the remote operating position.

(b) TONE switch. This switches the sidetone in and out from the remote operating position when the equipment is in the transmit condition.

(c) EM/PTT switch. This is the 'press to transmit' switch, when using an electromagnetic microphone in the remote position.

(d) L/S switch. This is the loudspeaker muting switch for the remote operating position.

9. If the equipment is being operated from the remote position, the microphone selection switch must be set before proceeding to the operating position. This facility is not fitted to the remote control box.

In the subsequent instructions, it is assumed that the sensitivity controls, which are on the main chassis right-hand gusset plate of the transmitter-receiver and, therefore, only accessible when the cover is removed, have been set by servicing personnel at the appropriate servicing lines. It is also assumed that an overall test of the installation has been made in accordance with the procedure given and that the frequencies for the preset channels have been previously selected according to the instructions given in para. 7.

Caution . . .

Before removing or refitting the 42-way connector at the transmitter-receiver, care must be taken to ensure that the function switch on the control unit is at OFF.

Local operation

10. To operate the equipment on any of the eighteen preset channels, proceed as follows:—

(1) Set the function switch on the control unit to the T/R position and wait approximately 30 seconds for the valves in the transmitter-receiver to warm up.

(2) Switch the LIGHTS switch to ON and ensure that the panel lights on the control unit are illuminated.

(3) Set the LOCAL/REMOTE SWITCH to LOCAL.

(4) Set the microphone selector switch to suit the type of microphone to be used i.e. carbon or electromagnetic.

(5) Insert the microphone/telephone plug into the corresponding socket on the equipment.

(6) Set the channel selector switch CHAN to the required channel.

(7) Adjust the VOL control to approximately the centre of its travel.

(8) After the first received signal is heard in the headphones, the VOL control may have to be readjusted to give the required level of sound.

(9) To transmit, operate the 'press to talk' switch on the handset, when using a carbon microphone, and switch the microphone selector switch to position EM/PTT, when using an electromagnetic microphone.

(10) To produce sidetone switch the TONE switch to ON.

Remote operation

11. For remote operation the following steps should be carried out. From step 1 to step 10 the equipment should be switched off.

(1) Disconnect socket SKT2 (fig. 3, chap. 1) and remove the control unit from the main equipment.

(2) Connect socket SKT2 to plug PL3. (Plug PL3 is located on the connecting panel (fig. 4, chap. 1) fitted inside the roof of the T/R container behind the control panel).

(3) Remove the blanking plate from the remote control box.

(4) Fit the blanking plate to the T/R container to blank off the control unit position.

(5) Fit the control unit to the remote control box and connect up by means of socket SKT12. (SKT12 is located in the remote control box).

(6) Set the LOCAL/REMOTE switch to REMOTE.

(7) Set the microphone selector switch to suit the type of microphone to be used in the remote position.

(8) Connect the 40-way remote control cable to the remote control socket on the T/R container.

(9) Run the remote control cable to the selected operating position.

(10) Connect the remote control box to the remote control cable by the 42-pole plug and socket.

Note . . .

If any lead in the remote control cable is damaged or disconnected, it is still possible to operate the installation from the remote position. This can be done by using Don 10 cable connected between the appropriate remote control terminals.

(11) The equipment should now be switched ON and 15 minutes allowed for the set to warm up and stabilize.

(12) Switch the LIGHTS switch ON, and ensure that the panel lights on the control unit are illuminated.

(13) The subsequent steps to be taken are those given in para. 10 sub-para. (5) to (10) except, that they are carried out from the remote instead of the local operation position.

Guard receiver

12. The guard receiver is brought into operation by setting the function switch of the control unit to the T/R + G position. The channel selector switch CHAN should be set to any of the channels other than G. Thus watch can be maintained on both the guard frequency and the frequency at which the main transmitter-receiver is being operated. The level of the audio output of the guard receiver relative to that of the main receiver is preset by an internal control, while the level of the audio signals in the telephones is adjustable by the VOL control on the control unit.

Main receiver on the guard frequency

13. Should it be necessary to operate the main receiver at the guard frequency or transmit and receive at this frequency, the function switch should be set to T/R and the CHAN selector switch set to G. The guard receiver output is cut off and the equipment should be operated as described in para. 10.

Manual adjustment of frequencies

14. To operate the equipment on manually adjusted frequencies, proceed as follows:—

- (1) Rotate the channel selector switch CHAN to the M position.
- (2) Set the function switch to the desired type of operation, i.e. T/R or T/R+G.
- (3) Adjust each of the MANUAL frequency controls at the top of the control unit front panel to show the desired operating frequency. Fig. 1 shows the MANUAL controls set to a frequency of 357.0 MHz.
- (4) Operate the equipment as described in para. 10, sub-para. (7) to (9).

Prevention of channel selection cycling

15. With all installations of ARC52 using the Type C1607/ARC52 control unit, in certain circumstances, continuous rotation of the channel selection mechanism can occur with consequent complete loss of communication.

16. To prevent the occurrence of any form of unwanted channel cycling the following instructions should be observed:—

- (1) In no circumstances should the hundreds MANUAL selector switch be set midway between the positions 2 and 3, or flicked rapidly between these positions.
- (2) Whenever a manually selected frequency is not required, all the MANUAL selector switches should be set to their blank positions, or to the guard frequency 243.0 MHz. Setting to the latter frequency provides an alternative method of obtaining the guard channel quickly in an emergency.
- (3) If, during use of a preset channel, it is necessary to communicate on a frequency which is not set up on the channel selector switch CHAN, the equipment should first be set on the channel selector switch CHAN, the equipment should first be set to manual frequency control and the desired frequency then set up on the MANUAL selector switches. The new frequency will then be readily available.

17. *R.M.C. Modification No. 5371* to control unit Type C1607/ARC52 has been introduced to overcome the defect under conditions in para. 16(2) and (3). Further action under *R.M.C. Modification No. 5561* has been taken to eliminate continuous channel changing under the conditions in para. 16(1).

18. Should loss of communication occur during operation, channel cycling should be suspected and the positions of the switches verified.

Chapter 3

SETTING UP PROCEDURE FOR USE WITH CARBON MICROPHONE

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	<i>Para.</i>		<i>Para.</i>
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<i>Test equipment</i>	2	<i>T.R. unit module conversion</i>	4
<i>Setting-up procedure</i>	3	<i>Adjustment of modulation depth</i>	5
		<i>Method A (Monitor available)</i>	6
		<i>Method B (Monitor unavailable)</i>	7

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Introduction

1. Although the facility exists within the transmitter-receiver TR5/ARC52 for the use of either a moving coil (electromagnetic) or carbon microphone (Chap. 1, para. 42) it has been found that when a carbon microphone is used the quality and range of the equipment is impaired. This is attributed to the fact that in normal practice the transmitter-receiver is set up (in production) for use with a moving coil microphone, hence the following procedure has been introduced to enable

the equipment to be set up by servicing personnel using a carbon microphone.

Note . . .

The information contained in this chapter applies to FGRI. 23065, TGRI(AT)26005/1, MGRI.23073 and all similar installations employing transmitter-receiver TR5/ARC52.

Test equipment

2. The test equipment required for the setting-up procedure is listed in Table 1 below.

TABLE 1

List of test equipment

Item	Nomenclature	Ref. No.	Remarks
1	Signal Generator CT394	6625-99-943-1911	
	or		
	Signal generator CT394A	6625-99-901-9983	
2	or		
	Signal generator CT394B	6625-99-106-1189	
2	Oscilloscope set, CT436	6625-99-913-8618	
	or		
	Oscilloscope set, CT436A	6625-99-945-0503	

Table 1 cont.

Item	Nomenclature	Ref. No.	Remarks	
3	Connector (for item 1)	—	50-ohms coaxial (UR67) cable, terminated at both ends with Type N, UG21B/U plug (Ref. 5935-99-940-1095).	
4	Test set, radio CT214	6625-99-943-2784	R.F. power meter.	
5	Connector (for item 4)	—	50-ohms coaxial (UR67) cable, terminated with socket Type 703 (10H/19608) at one end and a Type N plug at the other end.	
6	Impedance matching transformer	A.P.64009	For use with item 4.	
7	Multimeter CT429 or Multimeter electronic CT471C or Multimeter, electronic CT38	6625-99-943-8384 6625-99-955-6255 10S/16308		
8	Wattmeter absorption CT419 or Wattmeter absorption	6625-99-943-5568 10AF/98		
9	Simulator, microphone	6625-99-945-0061	Electromagnetic and carbon	
10	Signal generator or Signal generator Type 16728 or Signal generator CT452A (set)	6625-99-999-9604 — 6625-99-900-8337	} For a.f. tests	
11	*Attenuator	—		Comprising (a) Resistor, fixed, composition 27-ohms $\pm 5\%$, $\frac{1}{4}$ W, Qty. 2 and (b) Resistor fixed, composition 110-ohms $\pm 5\%$, $\frac{1}{4}$ W, Qty. 1.
12	Monitor, audio/ radio frequency	10T/9437328		

***Note . . .**

This attenuator is only necessary where the installation uses a Headset Type 4409 incorporating a carbon microphone Type 4309. It is in effect a "T" pad consisting of two 27-ohms resistors in the series arm, and a 110-ohms resistor in the parallel arm, and when used it is connected between the microphone terminals and the modulator (para. 4(5) (b)).

Setting up procedure

3. The setting-up procedure contained in A.P. 116D-0105-1 (2nd Edn.) Chap. 7 for the transmitter-receiver using a carbon microphone should be strictly adhered to except for the adjustment of modulation depth when the sequence of operation given below should be substituted.

SEQUENCE OF OPERATION

T.R. unit module conversion

4. (1) Remove the T.R. unit from the installation and remove its cover in accordance with the instructions given in A.P.116D-0105-1 (2nd Edn.) Chap. 5.

(2) Remove the modulator unit from the main chassis per the instructions given in the above reference.

(3) Remove the side cover of the modulator unit and connect the links as follows:—

- (a) LKA: Remove link 2 to 3
- (b) LKA: Remove link 5 to 10
- (c) LKA: Remove link 6 to 7
- (d) LKA: Remove link 8 to 9
- (e) LKA: Close link 1 to 4
- (f) LKA: Close link 5 to 6
- (g) LKA: Close link 7 to 8

- (h) LKA: Close link 9 to 10
 - (i) LKB: Close the link
- (4) Refit the modulator unit on the main chassis.

Adjustment of modulation depth

5. Two methods of adjusting the modulation depth are given, one of which should be substituted for the procedure given in A.P.116D-0105-1 (2nd. Edn.) Chap. 7.

Note . . .

Method A should only be attempted when Monitor, audio/ radio frequency (Item 12 in the list of test equipment) is available.

Method A (monitor available)

6. (1) On the control unit set the manual control for a frequency of 335.6 MHz.
- (2) If a headset Type 184B is to be used with the installation, proceed as follows:—
- (a) Connect the signal generator (Item 10) to the 600-ohms and EARTH terminals of the simulator (Item 9).
 - (b) Connect the simulator OUTPUT terminals to the MIC terminals on the MIC terminals on the interconnecting box.
 - (c) Connect links between the O and EARTH terminals, and between the MIC CURRENT terminals of the simulator.
- (3) If a headset Type 4409 incorporating a Type 4309 microphone is to be used with the installation, proceed as follows:—
- (a) Connect the signal generator (Item 10) to the 600-ohms and EARTH terminals of the simulator (Item 9).
 - (b) Connect the attenuator (Item 11) between the simulator OUTPUT terminals and the MIC terminals on the interconnecting box.
 - (c) Connect links between the O and EARTH and between the MIC CURRENT terminals of the simulator.
- (4) On the simulator, adjust the MICROPHONE SELECTOR to the "1 volt, 82 ohms" CARBON MIC setting.
- (5) On the interconnecting box, set the microphone switch to the UNBAL MIC (CARBON) position.
- (6) On the signal generator, set the frequency control to 1.0KHz, and adjust the output level control until the indication of the INPUT VOLTS meter on the simulator is coincident with the calibration reference level.
- (7) On the monitor, audio/radio frequency unit (Item 12) proceed as follows:—

- (a) Connect the TX socket to the aerial socket P1402 on the T.R. unit.
 - (b) Connect the wattmeter (Item 8) to the 50 OHM LOAD socket.
 - (c) Connect the oscilloscope (Item 2) to the OUTPUT socket.
 - (d) Connect the r.f. signal generator (Item 1) to the INPUT socket.
- (8) Set the wattmeter to the "25W range".
- (9) Set the switch on the interconnecting box TO TRANSMIT.
- (10) On the signal generator, adjust the controls for an unmodulated r.f. output of 0.5V (minimum) at a frequency of 300 kHz above or below the transmitter frequency, i.e. 335.6 MHz \pm 300 kHz.

- (11) Adjust the oscilloscope controls for a clearly defined sinusoidal waveform.
- (12) Carefully adjust the signal generator frequency control until the amplitude of the modulation envelope on the oscilloscope is at a maximum.
- (13) Adjust the preset control R702 on the modulator unit until the peaks of the displayed waveform just begin to flatten.

- (14) Calculate the average modulation depth from the expression

$$\frac{A - B}{A + B} \times 100\%$$

where A = peak to peak value of the waveform and B = trough to trough value.

- (15) Verify that the result obtained is not less than 70%.
- (16) Set the switch on the interconnecting box to RECEIVE.
- (17) Repeat the procedure given in sub-para. (9) to (16) with the transmitter frequency at 225.0 MHz and 399.9 MHz.
- (18) If the modulation depth obtained at 399.9 MHz is less than 80% proceed as follows:—
- (a) With the transmitter frequency at 399.9 MHz, set the switch on the interconnecting box TO TRANSMIT.
 - (b) Repeat the procedure given in sub-para. (10) to (14) and verify that a modulation depth of 80% minimum is obtainable.
 - (c) Set the switch on the interconnecting box to RECEIVE and adjust the transmitter frequency to 335.6 MHz.

- (d) Repeat sub-para. (9) to (12) and (14).
- (e) Verify that the modulation depth obtained is not less than 70%.

(19) Set the switch on the interconnecting box to RECEIVE and disconnect the monitor, audio/radio frequency unit from the aerial socket P1402.

(20) Proceed with the remainder of the setting-up procedure as given in A.P.116D-0105-1 (2nd Edn.) Chap. 7.

Method B (monitor unavailable)

7. (1) Set the wattmeter (Item 8) to the "25W range" and connect it to aerial socket P1402 on the T.R. unit.

(2) Proceed as in sub-para. (1) to (6) of Method A (para. 6).

(3) Connect the oscilloscope (Item 2) between terminal 1 of tag-board TB1501 on the T.R. unit (underside of chassis) and chassis.

(4) Set the multimeter (Item 7) to a low A.C. VOLTS range and connect it in parallel with the oscilloscope (sub-para. (3)).

(5) Set the interconnecting box switch to TRANSMIT.

(6) Adjust the oscilloscope controls for a clearly defined sinusoidal waveform.

(7) On the modulator unit, adjust the preset R702 until the peaks of the displayed waveform just begin to flatten.

(8) Record the multimeter indication.

(9) Temporarily disconnect the multimeter and adjust the controls to a low D.C. VOLTS range.

(10) Reconnect the multimeter (negative to chassis) and record the indication.

(11) Set the switch on the interconnecting box to RECEIVE.

(12) Using the multimeter indications recorded in sub-para. (8) and (10) determine the percentage modulation from the chart given in A.P.116D-0105-1 (2nd Edn.), Chap. 7.

(13) Verify that the result obtained is not less than 70%.

(14) Repeat the procedure given in sub-para. (5) to (13) with the transmitter frequency at 225.0 MHz and 399.9 MHz.

(15) If the percentage modulation obtained at 399.9 MHz is less than 80% repeat sub-para. (5) to (12) with the transmitter frequency at 399.9 MHz and ensure that 80% modulation (minimum) is obtainable.

(16) Set the interconnecting box switch to RECEIVE and adjust the transmitter frequency to 335.6 MHz.

(17) Repeat sub-para. (5), (6) and (8) to (12), and verify that the percentage modulation is 70% (minimum).

(18) Set the interconnecting box switch to RECEIVE and disconnect the oscilloscope and multimeter.

(19) Proceed with the remainder of the setting up procedure as given in A.P.116D-0105-1 (2nd Edn.), Chap. 7.

Chapter 4

SERVICING INFORMATION AND INSTALLATION TESTING

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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 A.P.116D-0105-1 (2nd Edition).

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 and special attention shall be given to the following:

- (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) Inspect the aerial system and ensure that the aerial feeder is undamaged.

SERVICING

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 (6625-99-843-3488) and the matched connector set Type 15057 (6625-99-943-4146) all of which are described in full detail in A.P.117M-0101-1.

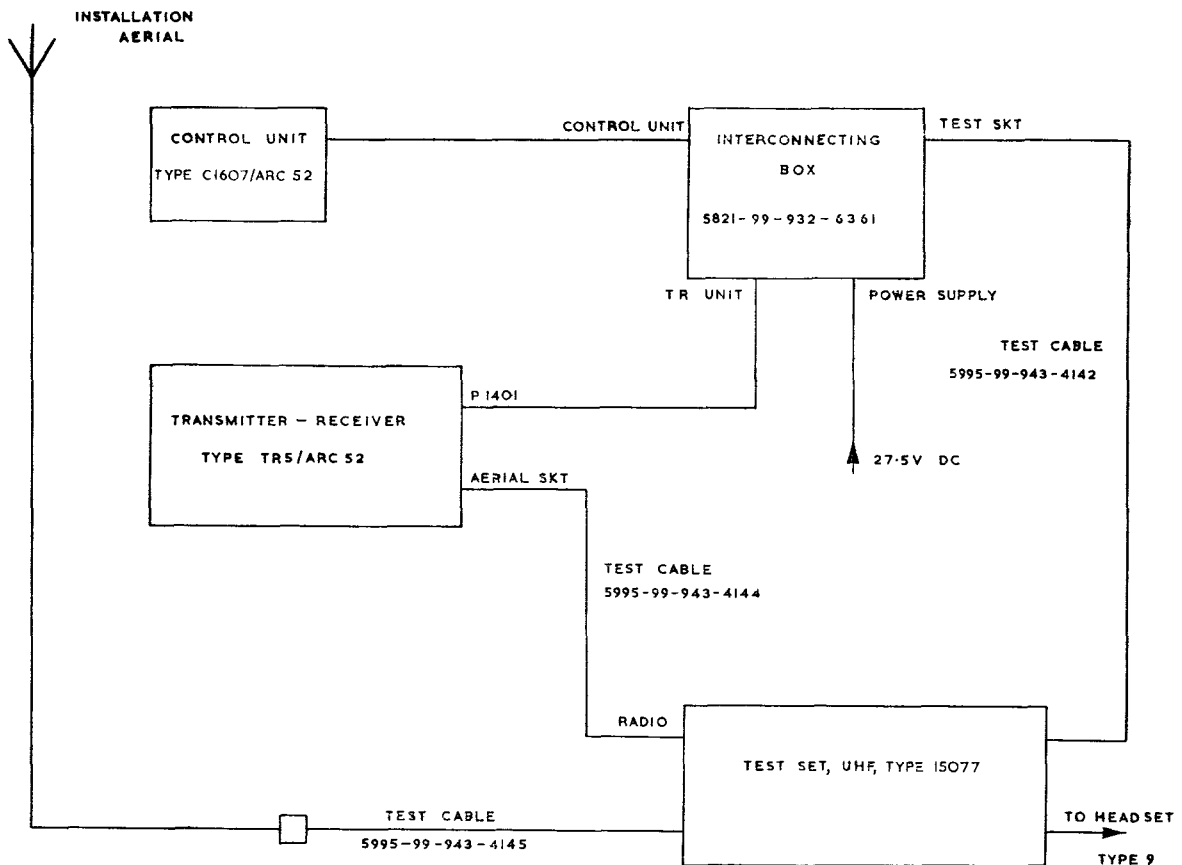


Fig. 1. Interconnection of test set, U.H.F. equipment with the installation

Interconnections

5. The test set operates from the nominal 27.5V d.c. power supply for the main equipment. The arrangement of interconnections between the test set, UHF equipment and the installed units is shown in fig. 1. When connected in this way 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.

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.

7. 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.

8. 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.

TABLE 1

List of test equipment

Item	Ref. No.	Nomenclature	Further details
1	6625-99-105-7049	Multimeter Set CT498A	
	6625-99-949-1999	Multimeter CT498 (was Type 12889)	Avo 9S
2	5G/152	Tester, insulation resistance, Type C	A.P.4343S
	or		
	FIC/5047	Tester, insulation	
3	6625-99-943-4149	Test set, UHF equipment, Type 15056	A.P.117M-0101-1
4	10AH/14	Headset, telephone, Type 9	A.P.2876A
5	10AH/18	Microphone assembly Type 71	
6	6B/117	Stop watch Mk. 3	—
7	4G/2595	Gauge, pressure	A.P.2563BZ
8	4G/5435	Pump, pressurising for AC equipment	
9	10S/16589	Leak indicator kit CT106	

INSTALLATION TESTING

Inspection

9. 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.

Preliminary adjustments

10. 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.

11. 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.

Note . . .

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 to the test set of 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.
- (8) For a.c. installations only, test the a.c. supply with the METER switch set to position AC2: the meter reading should be within the yellow zone.

12. If the tests in para. 11(6) and (8) are satisfactory, proceed in the following manner:—

- (1) Plug a headset complete with microphone (Table 1, items 4 and 5) into the 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, set the channel selector CHAN of the control unit to position M and set up the MANUAL controls for a frequency of 235.1 MHz. Select 235.0 MHz and, at the same time use a stop-watch (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.

(4) Set up the MANUAL controls for a frequency of 243.0 MHz.

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

Note . . .

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.

Receiver audio outputs and muting facility

13. Adjust the test set controls as follows:—

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

14. Where a tone is heard in the headset, proceed thus:—

- (1) Operate the 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 and observe that the meter reading exceeds B; this tests the main receiver audio output.
- (3) Set the function switch on the control unit to the T/R+G position. After about 15 seconds, check that the meter indication exceeds B. This is an indication of the guard receiver audio output.
- (4) Reset the control unit function switch to the T/R position, and wait for 15 seconds.
- (5) On the test set, set the METER SWITCH to the 10 AUX.AUDIO position. The meter indication for auxiliary audio output should be between the limits 25 to 55.
- (6) Replace the headset plug in the MIC/TEL socket.

Receiver sensitivity and squelch circuit

15. On the control unit make the following adjustments:—

- (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 MHz.

16. On the test set proceed as follows:—

- (1) Disconnect the coaxial link from the SIG.GEN. socket on the test set (para. 11(7)) 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. On the control unit set the channel selector CHAN to the first preset channel 1, and proceed as follows:—

- (1) On test sets pre-mod 8263:—
 - (a) Operate the NOISE GEN. switch to MOD. ON and adjust the NOISE CONTROL for a meter indication of B.
 - (b) Release the NOISE GEN. switch to MOD. OFF and ensure that the meter indication is now less than A.
- (2) On test sets post mod. 8266:—
 - (a) Operate the NOISE GEN. switch to MOD. ON and adjust the D.C. CAL. controls, FINE and COARSE for a meter indication of C.
 - (b) Release the NOISE GEN. switch to MOD. OFF and observe the meter indication. The indication shall be less than 20.

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

Guard receiver sensitivity

19. On the control unit, proceed thus:—

- (1) Set the function switch to T/R+G.
- (2) Adjust the VOL (volume) control to maximum (fully clockwise).

20. Adjust the test set 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. The following procedure for the testing of the transmitter power output is carried on the test set, but for operation (3) which is carried out on the control unit. Proceed thus:—

- (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.

(3) Select the first preset u.h.f. channel on the control, unit wait approximately six seconds, and press the 'press-to-transmit' switch button.

(4) Check that the meter reading on the test set exceeds B.

(5) Release the 'press-to-transmit' switch.

(6) Repeat operations (3) and (4) on the control and test set respectively, for the remaining u.h.f. channels and channel G.

WARNING . . .

DO NOT CHANGE CHANNELS WITH THE PRESS-TO-TRANSMIT SWITCH DEPRESSED.

Modulation depth and quality

22. With the channel selector CHAN set to the guard channel G, and the microphone switched off proceed as follows:—

(1) Set the METER SWITCH to position 6 DC CAL.

(2) Operate the TALK switch on the test set and adjust the D.C.CAL. control (both FINE and COARSE on test sets post mod. 8266) 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) Operate the TALK switch and get someone to speak into the microphone whilst the operator listens to the sidetone in the headphones. Assess the modulation quality.

(7) Return the TALK switch to the OFF position.

Reflection co-efficient

Note . . .

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

23. For testing the reflection coefficient of the installation aerials and feeders, first set the control unit channel selector CHAN to any little used preset u.h.f. channel other than G, and then proceed with the following operations on the test set:—

- (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 (both FINE and COARSE on test sets post mod. 8266) 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.

Completion of tests

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

- (1) Remove the test equipment and restore the installation to normal, but leave the power supply or supplies switched on.
- (2) If possible, test two-way communications with the control tower or workshop (local orders may preclude this).
- (3) Switch off the 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.