CHAPTER 1

WIRELESS INSTALLATION

▶ (Includes Mods 1309, 1430 and 1481) ◀

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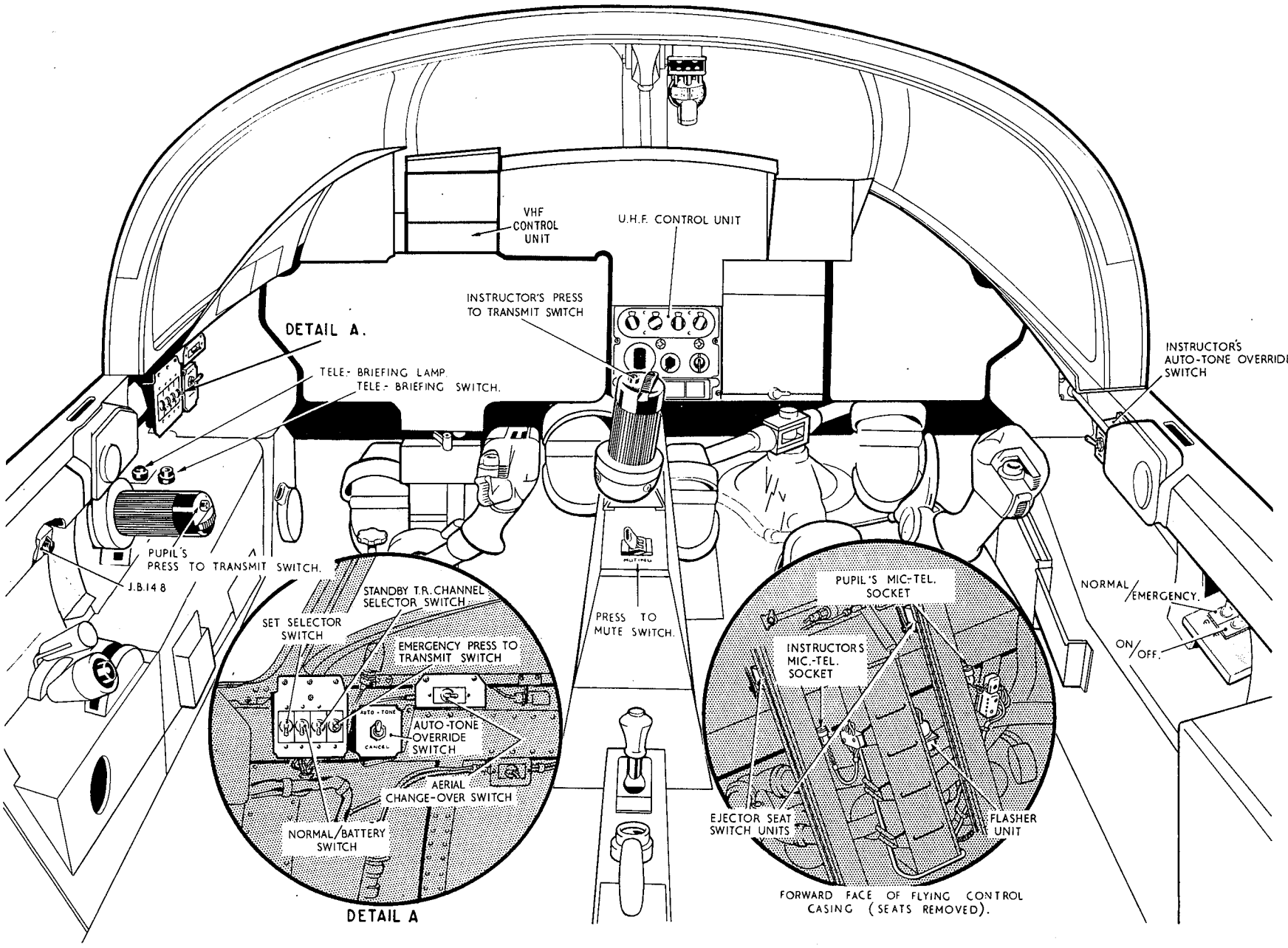

Fig.1 Wireless installation — location (1)

TABLE 1

Equipment type and Air Publication reference

Equipment Type	Air Publication
▶ Main UHF - ARI 18124/1 (pre Mod 1481) ◀	
Transmitter-receiver, Type TR 5/ARC 52 Mounting tray, Type MT 1477/ARC 52 Control unit, Type C 1607/ARC 52 Blade aerial, Derveau, Type 248 or McMichael, Type EDC/18136 Mic-tel sockets, Type 359	AP 116D-0133-1
▶ Main UHF - ARI 23301/80 - Mod 1481	
As detailed in Appendix 2 ◀	AP 116D-0154-1
VHF - ARI 23288 (AD 120) - Mod 1430	
Transmitter-receiver, Type AA 1201-2 Amplifier, Type A 01-5208-03 Mounting tray, Type AA 1205-1 Control unit, Type AA 1202-2 Aerial, Type 244	AP 116D-0150-1
Radio selector JB - Mod 1430	BAe design
Radio-relay box	BAe design
Standby UHF - ARI 23057	
Transmitter-receiver, Type M4 or M6 Mounting tray, Type 1031 Whip aerial, Type 11789 Interference filter 5915-99-970-0362	AP 116D-0110-16
Standby battery, Type Voltabloc	AP 113C-0300 Series
Intercommunication	
Amplifier, Type A 1961 Mounting tray, Type 936 Junction box, Type 154	AP 110G-0312-15F
Tele-briefing - ARI 18012	AP 116N-0301-1

Introduction

1. This chapter contains a description of the aircraft's wireless installation and also includes information on the servicing necessary to maintain the installation in an effecient condition, with recommended procedures for ▶ removing the equipment from the aircraft. For aircraft embodying Mod 1309 and Mod 1481 refer to Appendix 1 and Appendix 2 in this chapter. Complete descriptions, and servicing ◀ information on the equipment used is given in the Air Publications listed in Table 1.

DESCRIPTION

General

▶ **2.** The wireless equipment includes an ARI 18124/1, pre-Mod 1481, or an ARI 23301/80, post-Mod 1481, main UHF installation, and an ◀ ARI 23057 standby UHF installation with an A 1961 intercommunication amplifier and an ARI 18012 tele-briefing system. Mod 1430 introduces an ARI 23288 (AD 120) VHF communication installation in addition to the UHF installations. These installations are interconnected as illustrated in fig.5, 5A, 5B and 6. From the aircraft's Tacan installation (Sect 6, Chap 2) coded identification signals can be fed to the intercom system by means of a beacon junction box, and provision is also made for an audio signal to be produced in the telephones to give warning of loss of hydraulic pressure.

Power supplies

3. The power supplies for the installations are taken from the aircraft's supply panel (Sect 5, Chap 1, Group A.1) and are protected by two circuit breakers mounted below the panel and labelled respectively UHF SERVICES, and ARC 52. The UHF SERVICES circuit breaker feeds the fuse busbars in the radio relay box (para 13) and also feeds the ARC 52 circuit breaker,

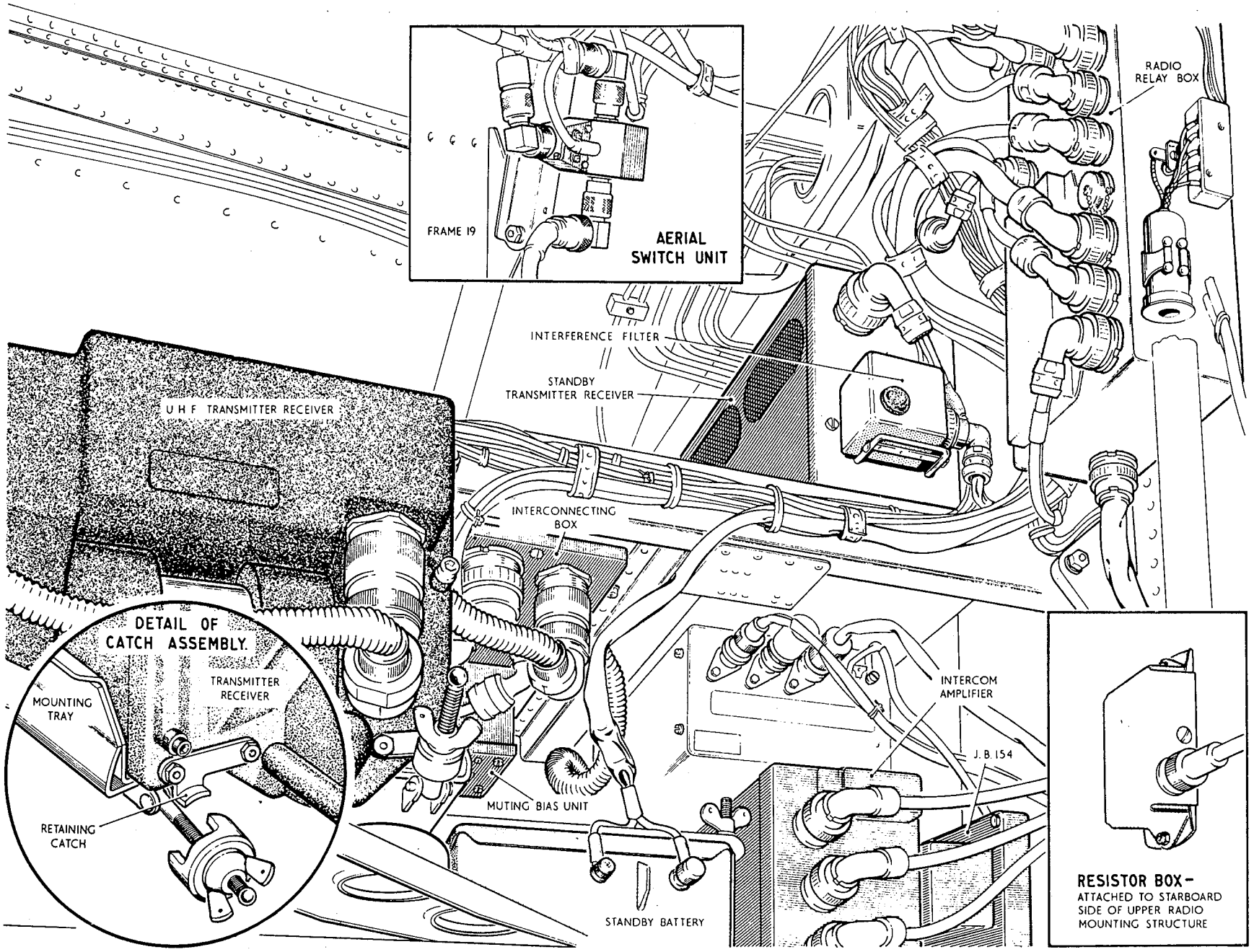

Fig.2 Wireless installation – location (2)

which supplies the main UHF transmitter-receiver; the supply being routed to the set via an interconnection box which is mounted on the underside of the radio mounting structure. When Mod 1430 is embodied, the UHF SERVICES circuit breaker also feeds power, via a fuse in the supply panel, to the VHF transmitter-receiver. In the event of failure of the aircraft's electrical supply, the transmitter-receiver can be supplied from an emergency battery which is situated on the floor of the radio bay. The radio supplies circuits are described and illustrated in Sect 5, Chap 1, Group H1.

Operating frequencies

4. The main UHF transmitter-receiver operates over the frequency band 225.0 MHz to 399.9 MHz, and may be set to operate on any one of the 1750 channels within this range. Provision is made to enable any eighteen of the frequencies to be pre-set. In addition, the equipment incorporates a fixed tuned guard receiver operating in the frequency range of 238 MHz to 248 MHz. The guard receiver is normally tuned to the frequency 243 MHz. The standby transmitter-receiver operates in the frequency range 238 MHz to 248 MHz, but is normally used as a single frequency equipment operating at the 243 MHz frequency. Facilities are included to permit an additional channel to be used at a frequency between 242 MHz and 244 MHz. The VHF transmitter-receiver operates within a frequency range of 118.0 MHz to 135.975 MHz in 25 kHz increments which provides for 720 channels.

Radio bay and mounting structure

5. The radio bay, to which access is gained via doors in the aircraft's undersurface, extends aft from frame 15 to the forward transport joint. In addition to radio equipment, the equipment in the bay also includes the supply and generator control panels, and the batteries. The radio mounting structure extends along the port side of the radio bay, and consists of two platforms, one above the other, each of which supports anti-vibration racks for the transmitter-receivers and their associated equipment.

ARI 18124/1 – UHF Main

6. The ARI 18124/1 is a multi-channel UHF communication installation using a transmitter-receiver carried in a mounting tray secured at the aft end of the lower mounting platform in the radio bay. The transmitter-receiver is held in the mounting tray by two spring-loaded dowels at the rear, and at the front by two wing nut fasteners that engage with clips on the transmitter-receiver front panel. The transmitter-receiver is pressurized, and contains its own cooling facilities, which permit its use in ambient temperatures between –55 deg C and +55 deg C.

7. A power unit on the transmitter-receiver incorporates a rotary transformer *(dynamotor)* which provides the different voltages required to operate the equipment. The dynamotor is controlled by an ON/OFF relay, whose contacts are connected to the aircraft supply, and whose coil is energized by operation of the function switch on the UHF control unit *(para 15)*. A test socket for the transmitter-receiver is incorporated in the interconnection box *(para 3)*.

8. The installation is equipped with two blade type aerials, either of which can be connected to the transmitter-receiver by means of an aerial relay. The relay unit is bolted to a strut attached to frame 19, and is controlled by a change-over switch marked AERIAL 1, and AERIAL 2, mounted on a bracket attached to the port windscreen platform. No.1 aerial projects upwards from the hood fairing above the radio bay. No.2 projects downwards from the fuel pump access door in the undersurface of the centre fuselage. With the change-over switch at the AERIAL 1 position, the relay is not energized, and No.1 aerial is connected to the set. With the switch in the AERIAL 2 position, the relay is energised, connecting No.2 aerial to the set. The change-over facility is used to provide better signal coverage when the aircraft's attitude changes.

9. The transmitter-receiver is controlled by a control unit *(para 15)* mounted below the centre instrument panel, and by Press-to-transmit switches which are incorporated in each of the throttle handle twist grips. Other controls include a Press-to-mute switch mounted on the centre console, and an Emergency Press-to-transmit switch mounted on the port windscreen platform switch bracket. Also on this bracket is a two-position switch marked ARC 52, and STANDBY. The normal position of this switch is at ARC 52. In this position the switch completes the energizing circuit for two switching relays C and D, in the radio relay box *(para 13)* whose contacts connect the crew's mic-tel and Press-to-transmit lines to the main transmitter-receiver. With Mod 1430 embodied, the mic-tel and Press-to-transmit lines from relays C and D to the main transmitter-receiver are connected via the radio selector JB. In the STANDBY position, the switching relays are not energized, and their contacts connect the lines to the standby transmitter-receiver.

10. Operation of either throttle twist grip Press-to-transmit switch changes the set from the 'receive' to the 'transmit' condition. It effects this by completing an earth return, and thereby energizing a relay in the transmitter-receiver which switches the set to 'transmit'. The Emergency Press-to-transmit switch achieves the same effect by energizing a relay in the radio relay box whose contacts provide an alternative earth return for the transmitter-receiver relay.

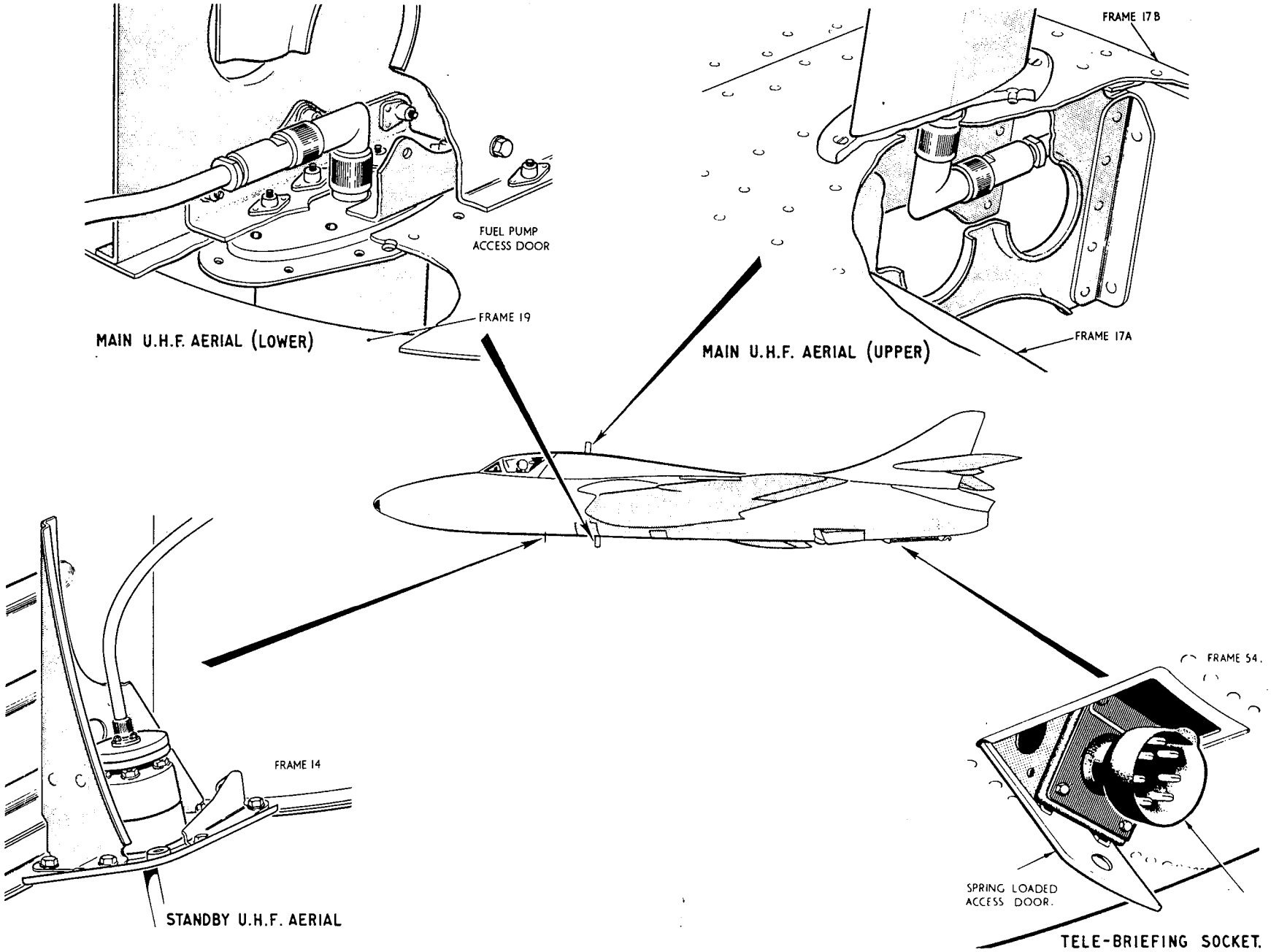

Fig.3 Wireless installation — location (3)

The Press-to-mute switch is used to connect a muting bias unit to the receiver circuit, thereby eliminating unwanted signals from the telephones and thus enabling the instructor and pupil to communicate without interference. The muting bias unit is attached to the underside of the top radio mounting platform *(fig. 2)*. For connecting the crew's headsets, two mic-tel pull-out sockets are clamped one on each ejection seat gun, behind the seats.

11. The automatic tone transmission facility on ejection of either or both seats from the aircraft is initiated by ejector seat switch units, which are mounted, one on each seat top mounting link, and operated, when the seats are ejected, by spring-loaded lever mechanisms attached to the hood diaphragm. The tone is generated by a resistor-capacitor feed-back loop between the microphone and telephone circuits and the transmission is automatically pulsed on and off by the operation of a special flasher unit carried on a mounting bracket attached to the port side of the flying control casing in the cabin. Override switches which are marked AUTO-TONE CANCEL, are located in the cabin to enable either crew member to cancel the transmission if able to return the aircraft to base. The Instructor's switch is located on a bracket attached to the cabin side above the starboard shelf and the Pupil's switch is situated on a bracket adjacent to the UHF radio control switches.

Beacon junction box

12. The beacon junction box is mounted adjacent to frame 10, on the port side of the cabin. The switch control on the box has three positions: R.T., MIX, and BEAC. In the R.T. position, the crew's telephones are connected to the transmitter-receiver in use. In the MIX position, the telephones are connected to the transmitter-receiver and also to the output from the Tacan installation *(Sect 6, Chap 2)*, so that signals from both the UHF and Tacan receivers will be heard. In the BEAC. position, only signals from the Tacan installation will be heard.

Radio relay box

13. The radio relay box is attached to the aft face of frame 15 in the radio bay by a quick-release mounting. The box houses the radio supply fuses and most of the relays that interconnect the radio circuits with the intercommunication and tele-briefing systems. All the fuses in the box except No.1 and No.2 are supplied from the UHF SERVICES circuit breaker. No.1 fuse is supplied from the emergency battery. No.2 fuse is supplied from the essential load line *(Sect 5, Chap 1, Group B1)*. The equipment in the box includes a resistor/capacitor element, which, with two of the relays, provides an audio warning signal in the telephones in the event of loss of hydraulic pressure. The operation of this, and of the other relays in the box is described in Sect 5, Chap 1, Group H1. A test socket for the standby transmitter-receiver is incorporated in the relay box, which also has a mic-tel test socket held in a spring clip outside the box.

Radio selector JB – Mod 1430

14. The radio selector JB is located in the radio bay on the starboard side of the aft face of frame 15 *(fig.4)*. The box houses three relays, energized via the transmitter-receiver from the VHF control unit, which select the mic-tel, Press to Transmit and muting circuits to enable either the main UHF or VHF transmitter-receiver to operate.

UHF control unit

15. The UHF control unit, which controls the main transmitter-receiver, carries on its front panel the following controls:-

(1) **Function switch**

This has four positions to permit selection of one of the following services:-

OFF

T/R — In this position the equipment is switched on for normal use.

T/R + G — As for T/R but with the guard receiver on, in addition to the main receiver.

ADF — This position is for use when when the equipment is used in conjunction with homing equipment.

(2) **Channel selector (CHAN) switch**

This has 20 positions. Those numbered 1 to 18 provide facilities for selecting the required pre-set frequency channel. The two remaining positions are:-

M — This position transfers the selection of the frequency to MANUAL control.

G — This position is normally set up to the same frequency as the guard receiver and thus enables the main transmitter-receiver to be used on this frequency.

(3) **Frequency (MANUAL) switches**

There are four MANUAL switches corresponding to the hundreds, tens, units and decimals of the frequency in megacycles per second. Thus any one of the 1750 channels in the frequency range may be selected.

(4) **Volume control (VOL)**

This is the volume control which is used to adjust the level of the audio signals in the telephones.

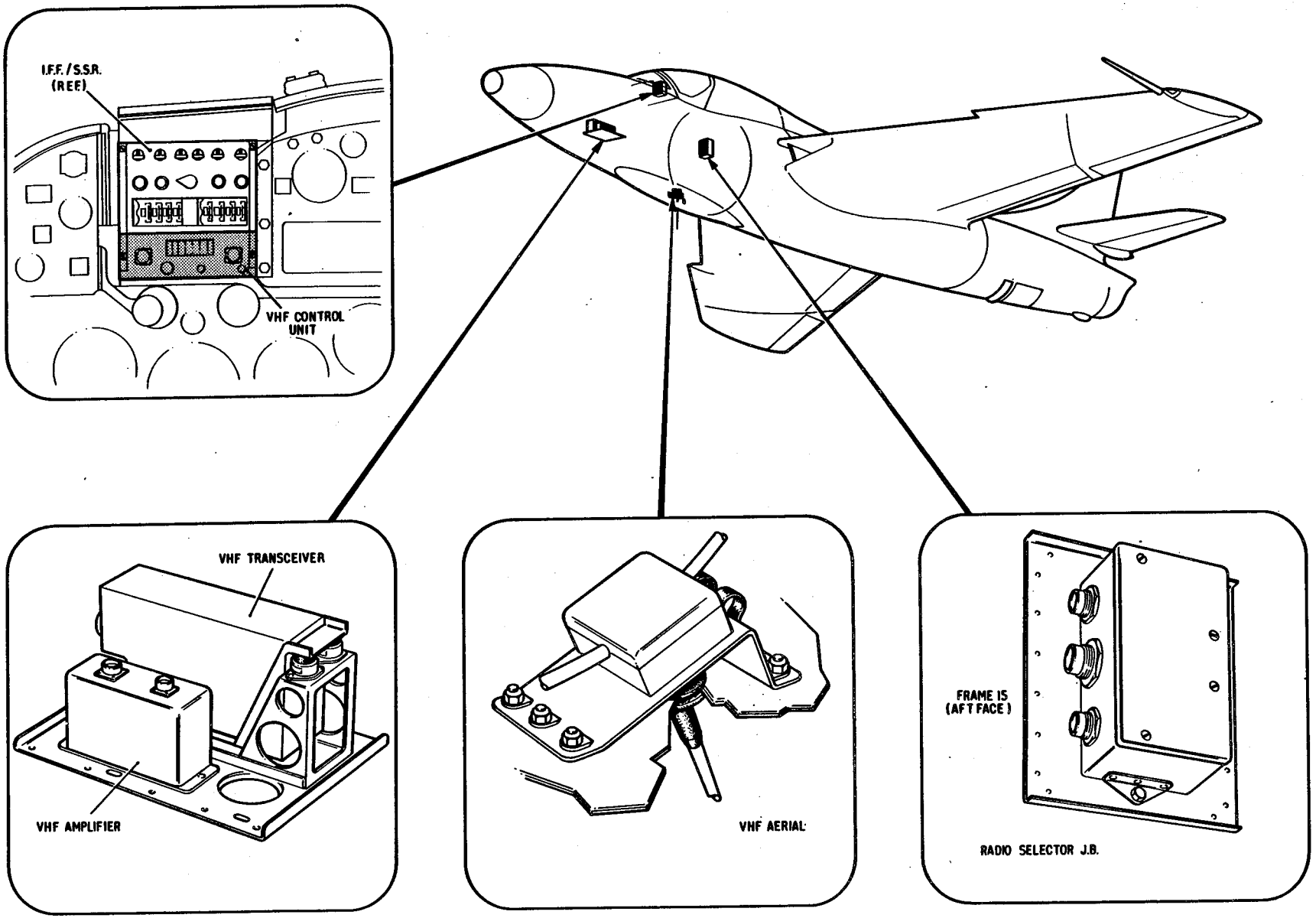

Fig.4 Wireless installation — location (4)

ARI 23057 – UHF Standby

16. The ARI 23057 is a UHF standby communication installation for use in the event of failure of the main installation. It employs a pre-set two channel transmitter-receiver, carried in a mounting tray which is secured on four anti-vibration mountings at the forward end of the top radio mounting platform. The transmitter-receiver chassis is fitted with two spring-loaded dowels which locate into two holes at the rear of the mounting tray. At the front of the tray, two bolts carry knurled nut fasteners which engage with projections on the front of the transmitter-receiver and secure the latter in position. The installation uses a whip aerial which projects from a mounting plate bolted to the access door between frames 12 and 14 on the port undersurface of the front fuselage.

17. The standby transmitter-receiver normally operates on a supply derived from the UHF SERVICES circuit breaker via fuse No.9 in the radio relay box. A plug-in resistor located in the radio bay reduces the supply voltage to 24 volts. When the Type M6 transmitter-receiver is installed, the power supply is taken through an interference filter *(Mod 1226)* to limit interference caused by the converter in the set. The filter is secured by spring-tension clips to the front of the set. This supply is wired to a change-over switch marked NORMAL, and EMERGENCY BATTERY, which, in the NORMAL position connects the transmitter-receiver to the aircraft supply. When the switch is in the EMERGENCY BATTERY position, it connects the transmitter-receiver to the emergency battery supply, via fuse No.1 in the radio relay box. The change-over switch is mounted on the port windscreen platform switch bracket. Also on this bracket is the channel change-over switch, which is marked GUARD, and A, *(A representing an alternative channel).*

18. The set is brought into operation by use of the ARC 52 - STANDBY change-over switch *(para 9)* which, in the STANDBY position completes an earth return for the coil of a power relay in the transmitter-receiver which switches the power on to the equipment. At the same time, putting the switch to the STANDBY position disconnects the earth return from the coils of the switching relays in the radio relay box. In the de-energized condition, the contacts of these relays connect the mic-tel lines to the standby transmitter-receiver. When switched on, the set is in the 'receive' condition; it can be switched to 'transmit' by use of either the throttle twist grip Press-to-transmit switches, or the Emergency Press-to-transmit switch *(para 10).*

ARI 23288 – VHF

19. ARI 23288 (AD 120) is a solid state VHF (AM) communication system which provides two-way voice communication. The system consists of a transmitter-receiver, an audio amplifier, a control unit and a whip aerial. The transmitter-receiver and audio amplifier are secured to a mounting situated on the port side of the nose wheel bay whilst the whip aerial projects from the gun fairing on the starboard fuselage between frames 13 and 14. The system is remotely controlled by the control unit and either of two press-to-transmit switches. The control unit, which incorporates panel and dial lighting, is situated above the cabin port instrument panel. Press-to-transmit and mic-tel switching is accomplished through the radio relay box, the radio selector JB *(para 14)* and the audio amplifier. Power to the transmitter-receiver is supplied from the UHF SERVICES circuit breaker by way of a link to the ARC 52 circuit breaker and then via a fuse in the supply panel.

Intercom amplifier

20. The intercom amplifier is carried in a mounting tray which is bolted to the floor of the radio bay, just forward of the emergency battery. The amplifier is supplied from a fuse in the radio relay box, the supply being connected to the coil and contacts of a power relay in the amplifier unit. For connecting the crew's mic-tel lines to the amplifier and to the transmitter-receiver in use, the lines are routed via the contacts of two relays contained in a junction box, which is mounted on the aft face of frame 15, adjacent to the amplifier. These relays, known as the transmitting relay and the normal/emergency relay, are supplied with power from the amplifier power relay. The transmitting relay functions to connect the microphone lines to the transmitter-receiver or to contacts on the normal/emergency relay; the normal/emergency relay functions to connect the microphone lines and the telephone line either to the transmitter-receiver, or to the amplifier.

21. The amplifier is controlled, via the relays in the junction box, by two single-pole switches on a small shelf situated between frames 10 and 11 above the cabin starboard shelf. One of these switches is marked ON and OFF, and is used to control the supply to the amplifier whilst the other switch, marked NORMAL and EMERGENCY, is a change-over switch and controls the amplifier power relay. With the ON/OFF switch to ON, the amplifier power relay is energized, supplying the amplifier equipment, and also making the supply available to the coils of the two relays. With the NORMAL/ EMERGENCY switch to NORMAL, the normal/emergency relay is

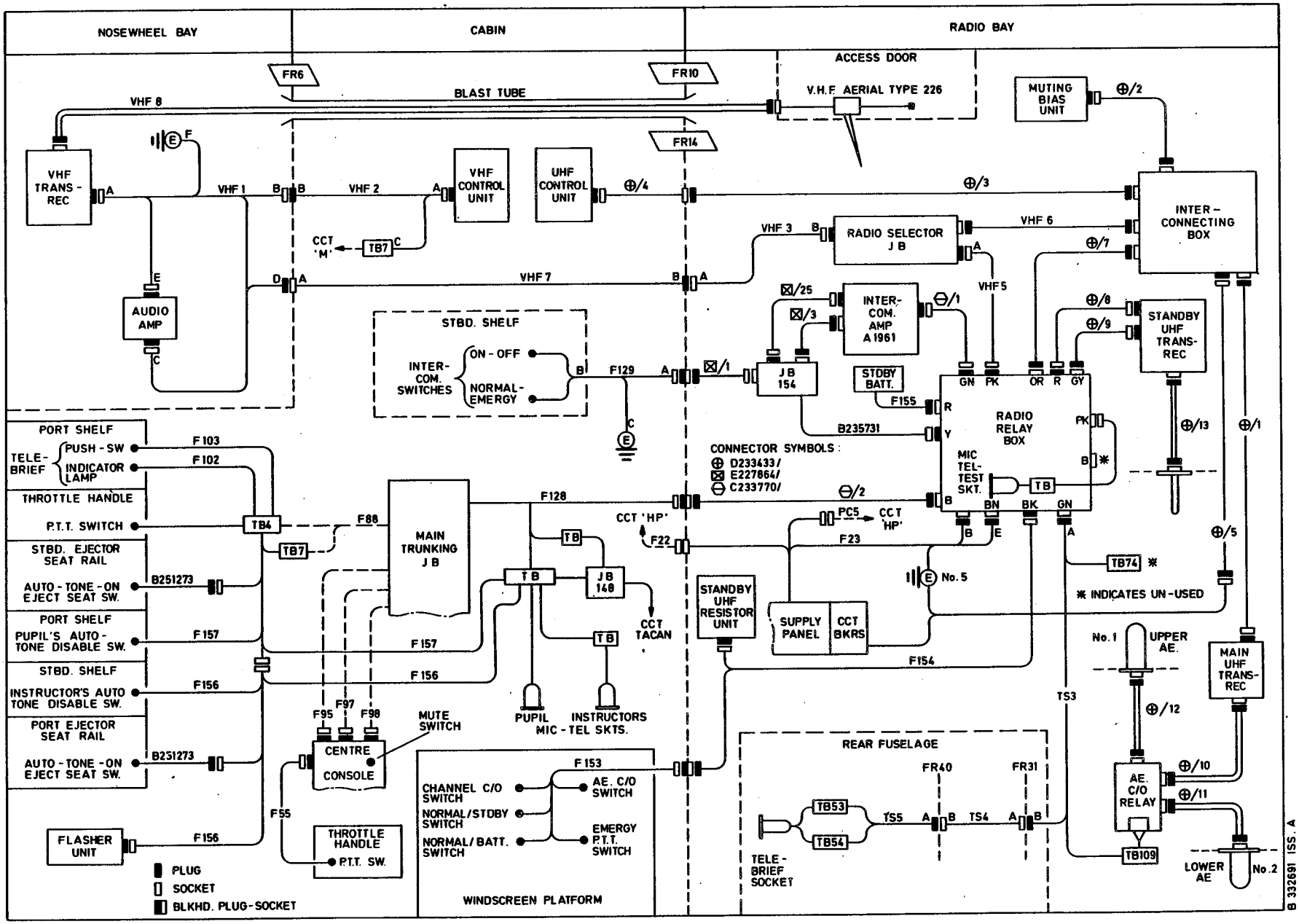

Fig.5 Wireless installation — interconnection

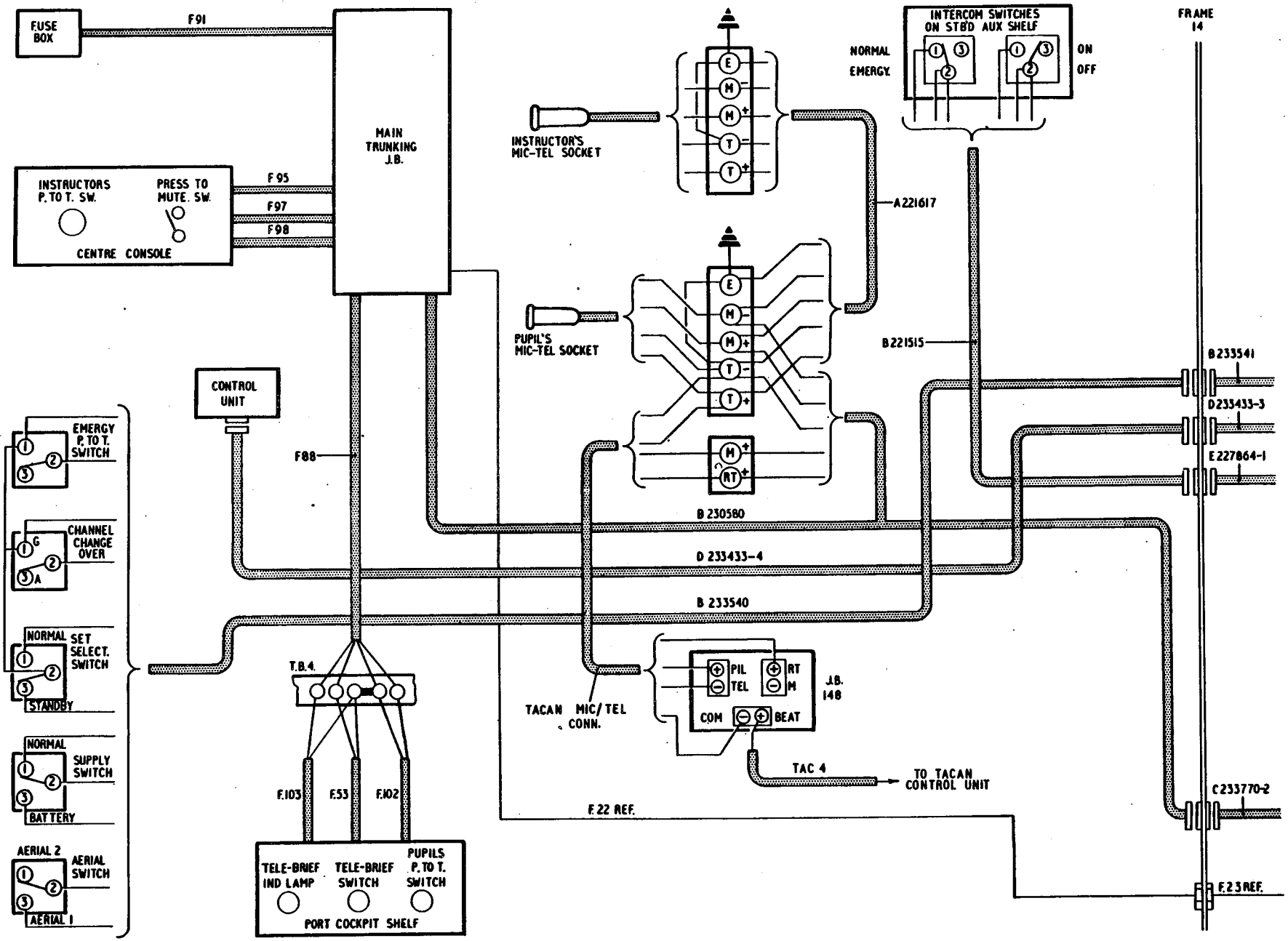

Fig.5A Wireless installation – interconnection (1) – pre-Mod 1430

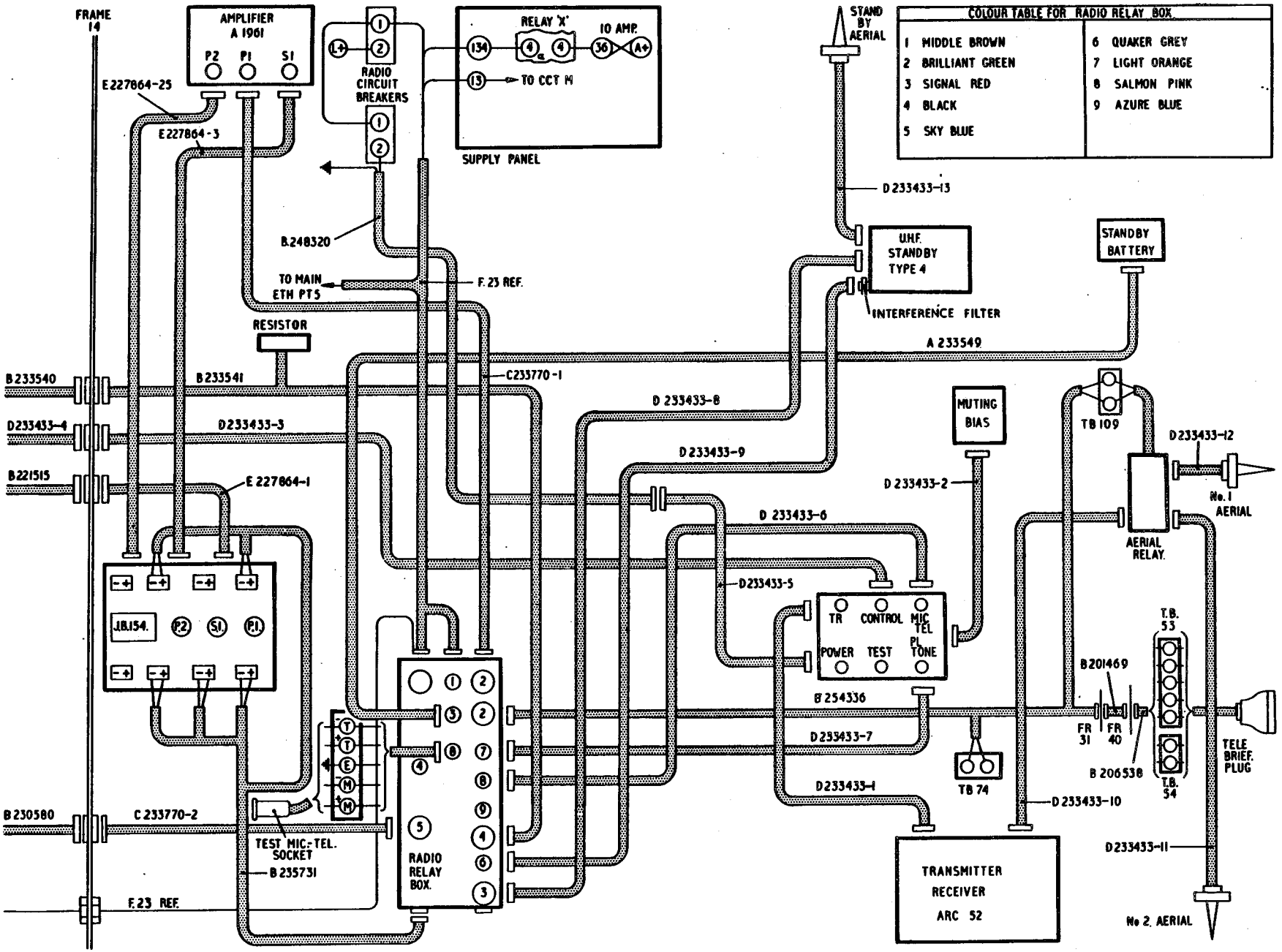

Fig.5B Wireless installation — interconnection (2) — pre-Mod 1430

energized, and its contacts connect the mic-tel lines to the amplifier. The telephone line from the transmitter-receiver is wired to the amplifier input, hence the crew can communicate, and also hear any incoming signals via the amplifier.

22. The energizing circuit of the transmitting relay is completed by operation of either of the main Press-to-transmit switches, or by the Emergency Press-to-transmit switch. When the relay is energized, its contacts connect the crew's microphone lines to the transmitter-receiver in use. In the event of the amplifier becoming defective, the NORMAL/EMERGENCY switch can be put to the EMERGENCY position, thereby de-energizing the normal/emergency relay, and thus connecting the mic-tel lines direct to the transmitter-receiver. The crew can then communicate via the latter's audio-frequency stages.

ARI 18012 – Tele-briefing

23. The tele-briefing push-switch and indicator lamp are mounted at the forward end of the cabin port shelf. A plug to accommodate the socket connector of the external tele-briefing cable is mounted on a spring-loaded access door in the under-surface of the rear fuselage, between frames 53 and 54. In the radio relay box, relays A, G and H, whose coils derive a supply from the essential load line *(Sect 5, Chap 1, Group B1)* via the radio relay box fuse No.2, are energized by pressing the tele-brief P to S switch. Relay A completes a hold on circuit via the tele-brief plug for the relays when the tele-brief switch is released. When the tele-briefing connection is made the supply from the essential load line is also connected to the coil of a switching relay in the tele-briefing building.

24. The contacts of relays H and G connect the crew's mic-tel lines to the tele-briefing system, and one contact of relay G passes a supply to light the tele-briefing indicator lamp in the aircraft. Operation of the tele-briefing push-switch provides an earth return, via contacts in relay A, by which the switching relay in the tele-briefing building is energized. This relay connects the aircraft's microphone lines to the tele-briefing amplifier.

Operation

General

25. When the battery master switch is ON, the power supply is available, via the UHF SERVICES and ARC 52 circuit breakers, at the power relay in the main transmitters-receivers and also at the fuses in the radio relay box. Thus, supplies are also available at the respective power supply relays in the standby transmitter-receiver, and intercom amplifier.

UHF – Main

26. With the ARC 52 - STANDBY selector switch in its normal position, i.e. at ARC 52, the two switching relays in the radio relay box are energized, thus connecting the crew's mic-tel and Press-to-transmit lines to the main transmitter-receiver. The set is brought into operation by use of the UHF control unit, i.e. by putting the function switch to position T/R, the power relay in the transmitter-receiver is energized, passing supplies to the equipment, which warms up ready for operation.

27. Channel selection can be made either automatically, by putting the twenty-position CHAN selector to the number corresponding with that of one of the pre-set channels, or manually, by setting the four manual control knobs to indicate the frequency of the channel required. With the intercom ON/OFF switch to ON, and the NORMAL/EMERGENCY switch to NORMAL, the intercom amplifier and the Normal/Emergency relay will be energized, and the latter will connect the crew's microphone lines to the input of the amplifier, and the telephone line to its output. The telephone output of the transmitter-receiver is connected to the amplifier input. Hence, any signals received on the selected channel pass via the intercom amplifier and the beacon junction box to the crew's headsets. With the switch on the beacon junction box at the position T/R, only the output of the intercom amplifier will be heard in the telephones. With the junction box switch at the MIX position, any signal output from the Tacan installation *(Sect 6, Chap 2)* will also be heard.

28. To transmit, operation of either of the main Press-to-transmit switches provides an earth return by which the transmitting relay in the intercom junction box, and the switching relay in the transmitter-receiver are energized. The switching relay switches the set to the 'transmit' condition, and the transmitting relay connects the crew's microphone lines to the transmitter-receiver; the telephone line remaining connected as before, to the amplifier output. Operation of the Emergency Press-to-transmit switch similarly provides an earth return; in this instance the effect is to energize a relay E in the radio relay box, in which a contact completes an alternative earth return for the switching relay and also for the transmitting relay in the intercom junction box.

UHF – Standby

29. The standby transmitter-receiver is brought into use by putting the ARC 52-STANDBY selector switch to the STANDBY position. By this operation the switch disconnects the earth return from the coils of the switching relays in

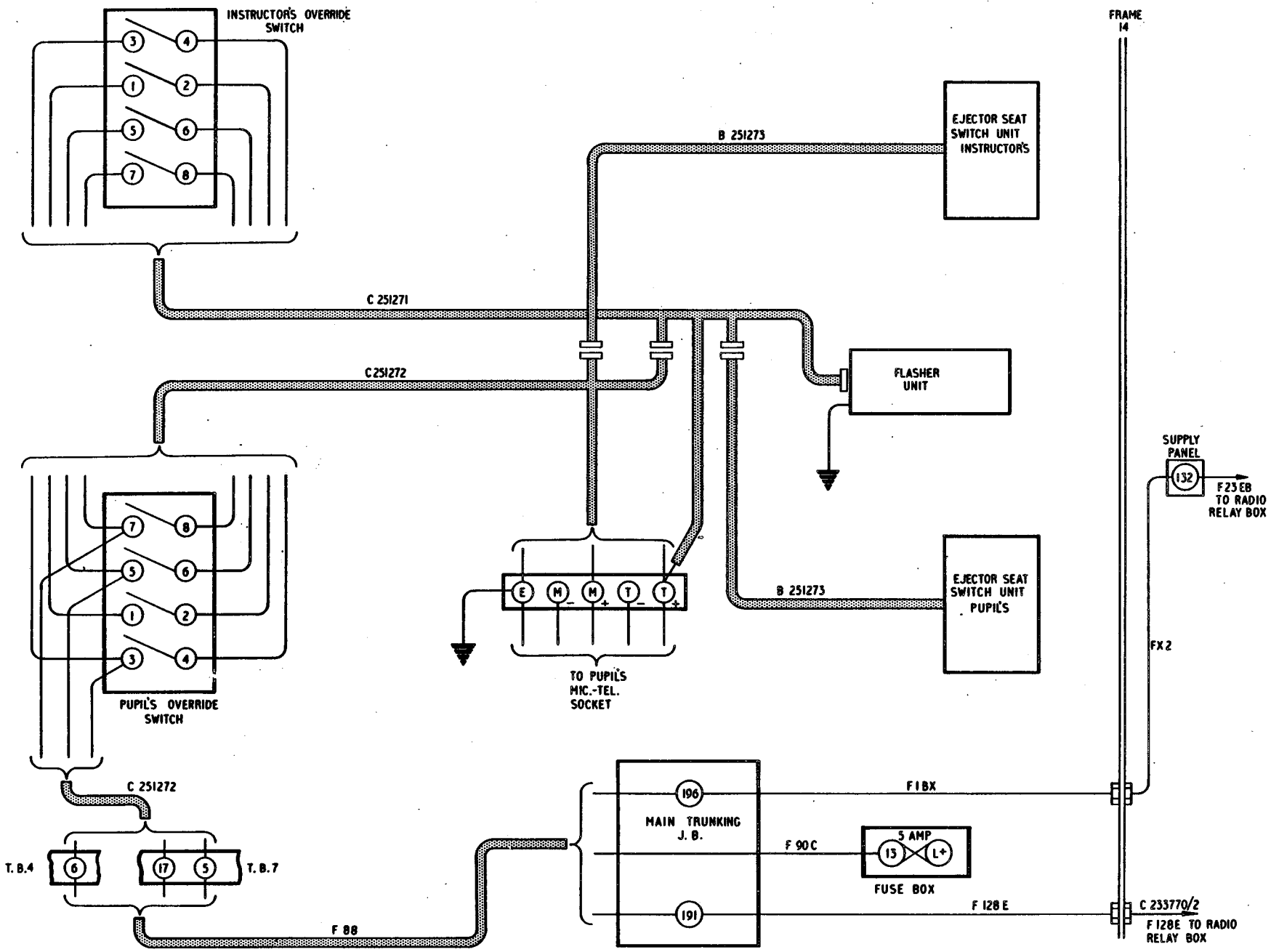

Fig.6 Wireless installation — interconnection (auto-tone)

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the radio relay box and connects it to the coil of the power relay in the transmitter-receiver. Thus the power relay switches the transmitter-receiver on, and the contacts of the de-energized switching relays in the radio relay box connect the crew's mic-tel and Press-to-transmit lines to the standby transmitter-receiver. The latter, in the 'receive' condition, and tuned to either the GUARD or A channel *(according to the position of the channel change-over switch)* will receive any signals being transmitted on the selected channel, and also, Tacan signals may be received, as described in paragraph 27.

30. The intercom facility can be used as already described, and switching the set from 'receive' to 'transmit' is effected as described *(para 28)*, except that for energizing the switching relay in the transmitter-receiver, the earth return is completed by a contact on a radio relay box relay F, which is energized by operation of the Press-to-transmit switch. Operation of the Emergency Press-to-transmit switch provides an earth return whereby the transmitter-receiver switching relay, and the radio relay box relay E are energized; a contact on the latter completes an earth return by which the transmitting relay in the intercom junction box is energized.

31. In the event of a power supply failure, the standby transmitter-receiver can be supplied from the emergency battery by putting the NORMAL/EMERGENCY BATTERY switch to EMERGENCY BATTERY, thereby connecting the battery supply to the set, which will function as before. In these conditions, ie with the intercom amplifier and its associated relays de-energized, the relay contacts connect the mic-tel lines to the transmitter-receiver, and the crew can communicate via the audio-frequency stages of the set. Switching from 'receive' to 'transmit' is effected by use of the Emergency Press-to-transmit switch, which completes an earth return, thereby energizing the switching relay in the transmitter-receiver.

VHF

32. Operation of the VHF system is achieved by use of the VHF control unit *(para 33)*, either of the two press-to-transmit switches and the mic-tel circuits. The system is available for use immediately the control unit is switched ON. Switching the control unit ON enables the power switching circuit in the transmitter-receiver to operate. The ouput from the switching circuit supplies power to the audio amplifier and energizes the three relays in the radio selector JB. With the relays energized the press-to-transmit and mic circuits are connected to the transmitter-receiver via the audio amplifier, and the audio output from the transmitter-receiver is connected to the tel circuits via the volume control in the control unit and the audio amplifier. Muting is also selected to the audio amplifier through the selector box.

Note . . .

The press-to-transmit, mic-tel and mute to the VHF system are interconnected with the main UHF circuits. To enable operation of the VHF system, therefore, the UHF normal/standby switch must be selected to normal.

VHF – Control Unit

33. The control unit provides the following controls:

(1) On/off switch. This is a two-way switch annotated ON. In the ON position the switch connects a 28 V supply to illuminate the dial lamps, and completes a return path to the power circuits in the transmitter-receiver to enable switching of 28 V to the VHF system.

(2) Frequency selection controls. Frequency selection is controlled by two knobs, each having twenty positions, located either side of a frequency display window. The left hand knob selects MHz and the right hand knob selects kHz. The selected frequency is displayed in the central window, with the three left hand digits indicating MHz and the three right hand digits indicating kHz. The MHz and kHz digits are separated by a central decimal point.

(3) Volume control. This is a potentiometer annotated VOL, which is used to adjust the level of the audio signals in the telephones.

(4) Test button. This is a push button switch annotated TST, which provides a built-in test facility to check the operation of the receiver. When pressed, an increase in level of background noise should be heard in the telephones.

Tele-briefing

34. When the tele-brief P to S switch is pressed an earth return is completed whereby three relays in the radio relay box are energized by a supply from the essential load line, one of the relays completing a hold-on circuit, via the tele-briefing connection, for the relays when the tele-brief switch is released. The supply from the essential load line is also made available, via one pin of the tele-briefing connection, to a relay in the tele-briefing building. The relays in the radio relay box connect the crew's mic-tel lines to the tele-briefing system; one relay contact passing a supply to light the tele-briefing indicator lamp in the aircraft, indicating that briefing information may be received.

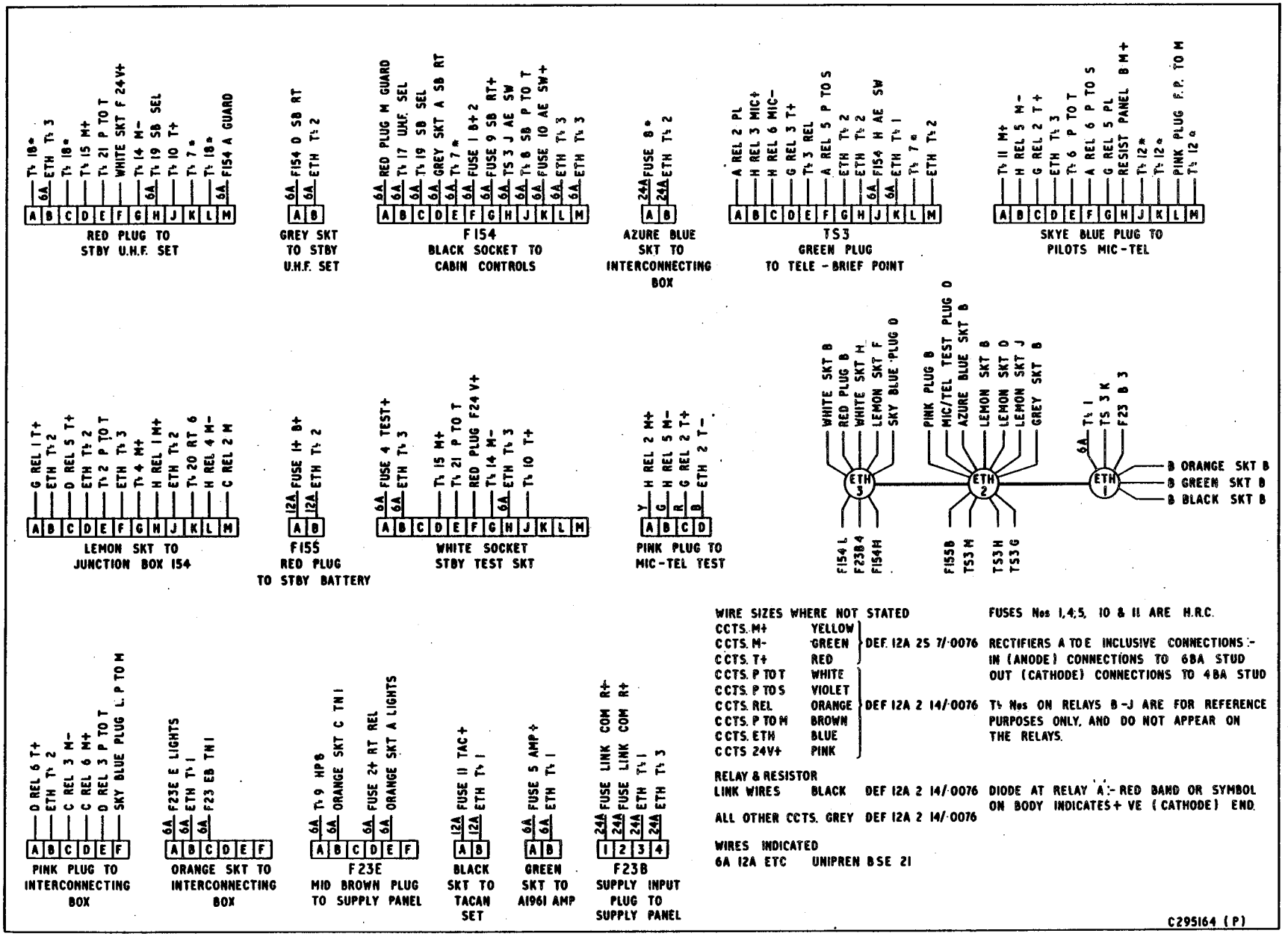

Fig.7 Wiring of radio relay box (1)

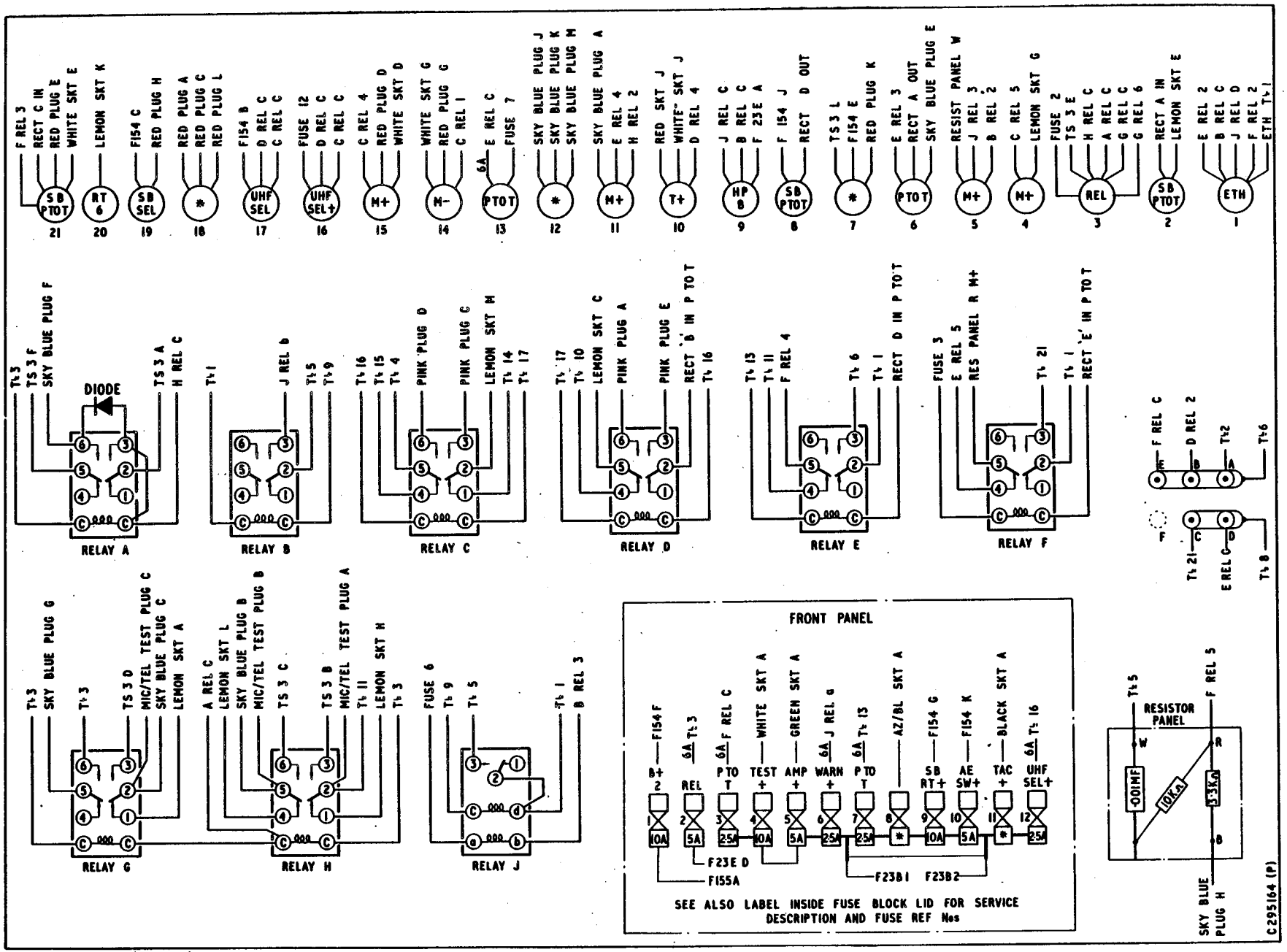

Fig.8 Wiring of radio relay box (2)

35. To speak back over the system, the tele-briefing push-switch must be pressed. This action completes the earth return by which the switching relay in the tele-briefing building is energized, connecting the aircraft's microphone lines to the tele-briefing amplifier, and lighting an indicator lamp in the building. The operation of the tele-briefing system, is described in detail in the Air Publication listed in Table 1.

SERVICING

General

36. Servicing of the wireless equipment is covered in the Air Publications listed in Table 1, but any unit suspected of being unserviceable should be carefully checked in situ, and, if found to be faulty, removed from the aircraft and taken into the workshop for rectification action as necessary. The location of the components is illustrated in fig. 1, 2, 3 and 4, the interconnection is given in fig. 5, 5A, 5B and 6 and a wiring diagram of the power supplies will be found in Sect 5, Chap 1, Group H1.

Power supplies

37. If a fault is reported in the wireless installation, the power supplies should first be checked, in conjunction with the routeing and theoretical diagrams in Sect 5, Chap 1, Group H1 to ensure that the trouble is not in the aircraft's electrical system. The voltage, both on and off load, must be tested, and a check made to ensure that the connectors carrying the supply to the equipment are correctly assembled.

Cables and connectors

38. Servicing of the cables and connectors consists of the standard continuity and insulation resistance tests, together with periodical examinations throughout the entire length for signs of damage to, or deterioration of the insulation. If defects are found, the complete cable or connector must be replaced. The Part Number reference of the connectors are given in fig. 5, 5A and 5B. All the clips securing the cables and connectors to the aircraft's structure must be examined for signs of looseness and any insecure clips tightened as necessary to prevent chafing. Plug and socket connections must be checked to ensure that they are fitting properly, and that the fixings are tightened securely.

Mic-tel test socket

39. To eliminate the necessity of using the cabin mic-tel sockets when adjusting the wireless installation and to enable the adjustments to be made from within the radio bay, a mic-tel test socket, connected in parallel with the cabin sockets and stowed in a spring clip on the outside of the radio relay box, is used in conjunction with a standard headset. It should be noted that before using this test socket, it is necessary to place the set selector switch to the position corresponding to the transmitter-receiver being adjusted and to select the required frequency channel.

Security check

40. The following security checks must be made to ensure that all the wireless equipment is properly installed and secure:-

(1) Ensure that all the units are secure in their mounting racks and that the clamping devices are tightened sufficiently to prevent movement or vibration. Check that locking wire is fitted where necessary.

(2) Inspect all mounting bolts for security, ensure that the anti-vibration mounts are undamaged, and check that the fixed mounting structure is secure.

(3) Check that all control units and switches are securely mounted. With electrical power switched off, operate all the controls and ensure that they are undamaged and serviceable.

(4) Check the security of all the aerials.

(5) Ensure that the radio relay box, the radio selector JB (Mod 1430) and the standby battery are securely mounted.

(6) Examine all the plugs and sockets for correct mating and security.

(7) Check that any strain on the Instructor's and Pupil's mic-tel sockets is taken up by the check-cords, and not by the cables attached to the sockets.

Functional checks

41. To ensure that the wireless installations are set up and operating correctly, the functional checks given in the Air Publications listed in Table 1 must be made, using the test sets and equipment provided. To enable the UHF installation to be ground tested and adjusted in situ, test sockets are provided on the radio relay box and the interconnecting box respectively, in the radio bay. The test sockets are used in conjunction with the UHF test set as described in the appropriate Air Publication.

42. Test the VHF installation as follows:-

(1) Switch ARC 52 ON. Select an active channel on ARC 52 control unit and set volume control to comfortable level.

(2) Switch VHF T/R ON and select an unused channel. Press TEST button and confirm that squelch circuit is disabled,

ie excessive signal noise/hiss apparent in headset. Release button, turn ARC 52 volume fully up and check for cross-talk (breakthrough) of audio signals from ARC 52; any signals present should be at lease 60 dB down on VHF signals being received at the same time, ie the spurious signal is only just audible but not necessarily legible.

(3) Switch ARC 52 OFF. Function VHF T/R in accordance with relevant publications, checking for correct operation of PTT, modulation level and squelch threshold level.

(4) Switch off the VHF T/R.

Fault finding

43. If a fault is reported, an attempt should be made, in situ, to locate the faulty unit. Before any other tests are made, the low tension source should be checked, the voltage, both on and off load, tested, and the tightness of the connectors ensured. Any unit found to be faulty should be taken to the workshop for testing and repair. For full details of the fault finding and testing procedure, reference should be made to the Air Publications listed in Table 1.

44. If the radio relay box is found to be faulty, it should be removed from the aircraft for Bay servicing and replaced by a fully serviceable item. When the aircraft is undergoing its minor servicing, this box should be removed from the aircraft for a thorough check and adjustment to ensure that it is fully serviceable.

Final check

45. After servicing the wireless installations, ensure that all the equipment is switched off, and that all access doors are correctly replaced and secured.

REMOVAL AND ASSEMBLY

General

46. The recommended procedure for removing the main components of the wireless installations is given in the following paragraphs. The method of assembly is, in general, a reversal of the removal sequence, but when there is a special assembly feature it is covered by a note in the appropirate paragraph. Before removing or replacing any component, the aircraft must be rendered electrically safe, as described in Sect 5, Chap 1, Group A1.

UHF main transmitter-receiver

47. The recommended method of removing this transmitter-receiver is as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Disconnect the two connectors from the transmitter-receiver, fit approved caps and covers to the plugs and sockets, and stow the connectors clear of the set.

(3) Remove the locking wire from the two wing-nuts at the front of the mounting tray and unscrew them until they are clear of the retaining catches on the set.

(4) Disengage the rear of the transmitter-receiver from the spring loaded dowels on the mounting tray by using the handle to withdraw the set along the tray. Still using the handle, carefully remove the set from the aircraft.

UHF Main aerial (upper)

48. The method of removing this aerial is as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Remove the hood fairing sufficiently to gain access to the aerial connector and disconnect it from the aerial socket. Fit an approved cap and cover to the plug and socket.

(3) The aerial may now be removed from the hood fairing by removing the eight bolts, nuts and washers securing the aerial base to the mounting plate.

Note . . .

When re-assembling the aerial, ensure good electrical bonding by checking that the mating surfaces are absolutely clean and making perfect contact. Seal the aperture around the aerial base with Bostik compound to prevent the entry of water.

UHF Main aerial (lower)

49. To remove this aerial proceed as follows:-

(1) Render the aircraft electrically safe as descried in Sect 5, Chap 1, Group A1.

(2) Open the fuel pump access door to gain access to the aerial connector.

(3) Disconnect the aerial connector from the socket at the top of the aerial.

(4) The aerial may now be removed from the access door by removing the four nuts and washers from the bolts securing the aerial base to the door.

Note . . .

When re-assembling the aerial, ensure good electrical bonding by checking that all mating surfaces and the door hinge fittings are absolutely clean. Seal the aperture around the aerial base with Bostik compound to prevent the entry of water.

Aerial relay unit

50. The method of removing this unit is as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Disconnect the three connectors from the co-axial sockets on the relay unit and fit approved caps and covers to the plugs and sockets. Stow the connectors clear of the unit box.

(3) Disconnect the two leads attached to the unit from terminal block 109 situated on the underside of the top radio mounting structure. Coil these leads to the relay unit, removing any clips as found necessary.

(4) Remove the relay unit from the aircraft's structure by withdrawing the two attachment bolts.

UHF control unit

51. To remove this control unit proceed as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Disengage the four Dzus fasteners on the face of the control unit. Withdraw the unit from the instrument panel.

(3) Disconnect the connector from the forward face of the control unit, and remove the unit from the aircraft.

Radio relay box

52. This box is designed for easy removal, being supported on quick release mountings. The recommended method of removing the box is as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Disconnect all the connectors and earth lead from the relay box, fit approved caps and covers to the plugs and sockets and stow the connectors clear of the box.

(3) Remove the two bolts passing through the mounting lugs located one on each side of the box casing. Release the box from its attachment brackets by swinging it downwards and to starboard to disengage the locating hooks.

(4) Remove the box from the aircraft.

Note . . .

On assembly of the box ensure that the earth lead is re-fitted.

UHF standby transmitter-receiver

53. To remove the standby transmitter-receiver, proceed as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Disconnect the three connectors from the transmitter-receiver, fit approved caps and covers to the plugs and sockets and stow the connectors clear of the set.

(3) Unscrew the two knurled nut fasteners at the front of the mounting tray and allow them to drop clear of the retaining catches on the set.

(4) Disengage the spring-loaded spigots at the rear of the transmitter-receiver from the mounting tray by using the handle to withdraw the set along the tray. Still using the handle, carefully remove the set from the aircraft.

UHF standby aerial

54. The recommended method of removing this aerial is as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Remove the seven countersunk-headed bolts from around the periphery of the aerial mounting plate in the port under-surface of the front fuselage.

(3) Withdraw the aerial and mounting plate sufficiently to gain access to the aerial connector and disconnect this connector from the aerial socket. Fit an approved cap and cover to the plug and socket.

(4) Remove the aerial from the mounting plate by unscrewing the five nuts from the bolts securing the aerial base to the mounting plate, taking care to retain the washers.

Note . . .

When re-assembling the aerial ensure good electrical bonding by checking that all mating surfaces are absolutely clean. Pay particular attention to the mounting plate landing.

VHF transmitter-receiver

55. The method of removing the transmitter-receiver is as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Disconnect the two connectors from the transmitter-receiver, fit approved caps and covers to the plugs and sockets and stow the connectors clear of the set.

(3) Unscrew the retaining lock and withdraw the set from the mounting tray. Remove the set from the aircraft.

Amplifier

56. The method of removing the amplifier is as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Disconnect the two connectors from the amplifier, fit approved caps and covers to the plugs and sockets and stow the connectors clear of the amplifier.

(3) Remove the two securing bolts and washers.

(4) Lift the amplifier from the mounting and remove from the aircraft.

VHF aerial

57. The method of removing the aerial, is as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Disconnect the aerial cable assembly and remove the gun fairing.

(3) Remove the moulded cover from the base of the aerial.

(4) Unscrew the top retaining nut from the end of the aerial rod and remove the aerial connector from the rod.

(5) Unscrew and remove the two screws and washers securing the bonding strips to the aerial mounting.

(6) Unscrew the four bolts securing the aerial to the mounting bracket then carefully withdraw the aerial from the rubber grommet and remove from the aircraft.

Note . . .

When assembling the aerial, ensure the surfaces between the aerial bonding strips and mounting bracket are thoroughly clean to ensure a good electrical contact.

VHF control unit

58. To remove the control unit proceed as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Release the two Dzus fasteners on the front of the control unit and withdraw unit sufficiently to gain access to the connector.

(3) Disconnect the connector and remove the control unit from the aircraft. Fit approved cap and cover to the plug and socket.

Radio selector JB

59. To remove the radio selector JB proceed as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Disconnect the three connectors from the box and fit approved caps and covers to the plugs and sockets.

(3) Remove the two bolts and washers securing the box to the mounting plate and remove the box from the aircraft.

UHF standby battery

60. The standby battery, which is held in place on the lower platform of the radio mounting structure by two clamping bars, should be removed as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Disconnect the two leads of cable assembly F 155 from the terminals on the standby battery. Insulate the bare ends of these leads and stow clear of the battery.

(3) Remove the locking wire from the wing nuts and slacken off the nuts until the clamping bars can be swung clear of the battery case.

(4) Remove the battery from the aircraft.

Note . . .

After re-assembly and securing the battery with the clamping bars, lock the wing-nuts with 22 swg stainless steel wire to Spec 189 or 161.

Interconnecting box

61. To remove the interconnecting box proceed as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Disconnect the six connectors from the interconnecting box, fit approved caps and covers to the plugs and sockets and stow the connectors clear of the box.

(3) Remove the box from the aircraft by releasing the four nuts, bolts and washers which secure the box to the mounting platform.

Intercom amplifier

62. To remove this amplifier, proceed as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Disconnect the three connectors from the amplifier unit, fit approved caps and covers to the plugs and sockets and stow the connectors clear of the amplifier.

(3) Unscrew the retaining clamp screw on the mounting tray, which grips the transport handle of the amplifier. Disengage the handle and fold it upwards clear of the mounting tray.

(4) Disengage the spigots at the rear of the amplifier from the mounting tray by using the handle to withdraw the amplifier from the tray. Still using the handle, carefully remove the amplifier from the aircraft.

Intercom junction box

63. The method of removing this junction box is as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Gain access to the junction box by removing the intercom amplifier unit *(para 52)*.

(3) Disconnect all the connectors from the plugs, sockets and terminal blocks on the junction box. Fit approved caps and covers to the plugs and sockets, insulate the bared ends of the connector leads and stow the connectors clear of the box.

(4) Release the cable clip from the lower inboard corner of the box by removing the nut from the bolt securing the unit to its mounting lugs. Replace this nut.

(5) The junction box may now be released from frame 15 by removing the four nuts, bolts and washers securing the box mounting lugs to the frame.

Note . . .

When re-assembling the junction box to the frame, check that the local surfaces of the frame and the top outboard mounting lug are clean to ensure a good electrical contact. Also ensure that the earth leads are re-assembled at this point.

Muting bias unit

64. The method of removing this unit is as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Disconnect the connector from the top of the unit, fit an approved cap and cover to the plug and socket and stow the connector clear of the unit.

(3) Release the unit from the mounting platform by unscrewing and removing the four nuts, bolts and washers securing the unit to the platform.

Beacon junction box

65. The method of removing this junction box is as follows:-

(1) Render the aircraft electrically safe as described in Sect 5, Chap 1, Group A1.

(2) Release the junction box from its mounting plate by unscrewing and removing the two bolts securing the box to the mounting plate.

(3) Disconnect the leads of the Tacan mic-tel cable assembly from the terminal blocks on the junction box. Insulate the bared ends of the cable and stow.

(4) Remove the box from the aircraft.

Radio mounting structure

66. When breaking down the aircraft at the front transport joint as described in Book 1, Sect 3, Chap 1, it is necessary to remove the fixing bolt securing the top radio mounting platform to the channel on frame 19. Before this is done, the two UHF transmitter-receivers should be removed *(para 47 and 53)* together with the standby battery *(para 60)* to prevent them from being damaged while the aircraft is being dismantled.

APPENDIX 1 – MOD.1309

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

Introduction

1. This Appendix describes the effect of Mod.1309 on the tele-briefing installation *(A.R.I.18012)*. A brief description of the installation pre Mod.1309 will be found in Sect.6, Chap.1, paras. 23, 24, 30 and 31 and detailed information on the installation in A.P.116N–0301–1. Tele-briefing provides direct land line communication between the pilot and the control tower and a connecting plug for the land line is provided on the underside of the fuselage between frames 53 and 54. Transference of the pilot's head set mic./tel. connections from normal radio communication to tele-briefing is done by relays in the radio relay box and Mod.1309 is essentially concerned with re-routeing the internal wiring of this box. A wiring diagram of the radio relay box is included in this Appendix and a description of the operation of the tele-briefing relays in the radio relay box post Mod.1309 will be found in Sect.5, Chap.1, Group H.1, App.1 of this A.P.

DESCRIPTION

General

2. When this modification is incorporated

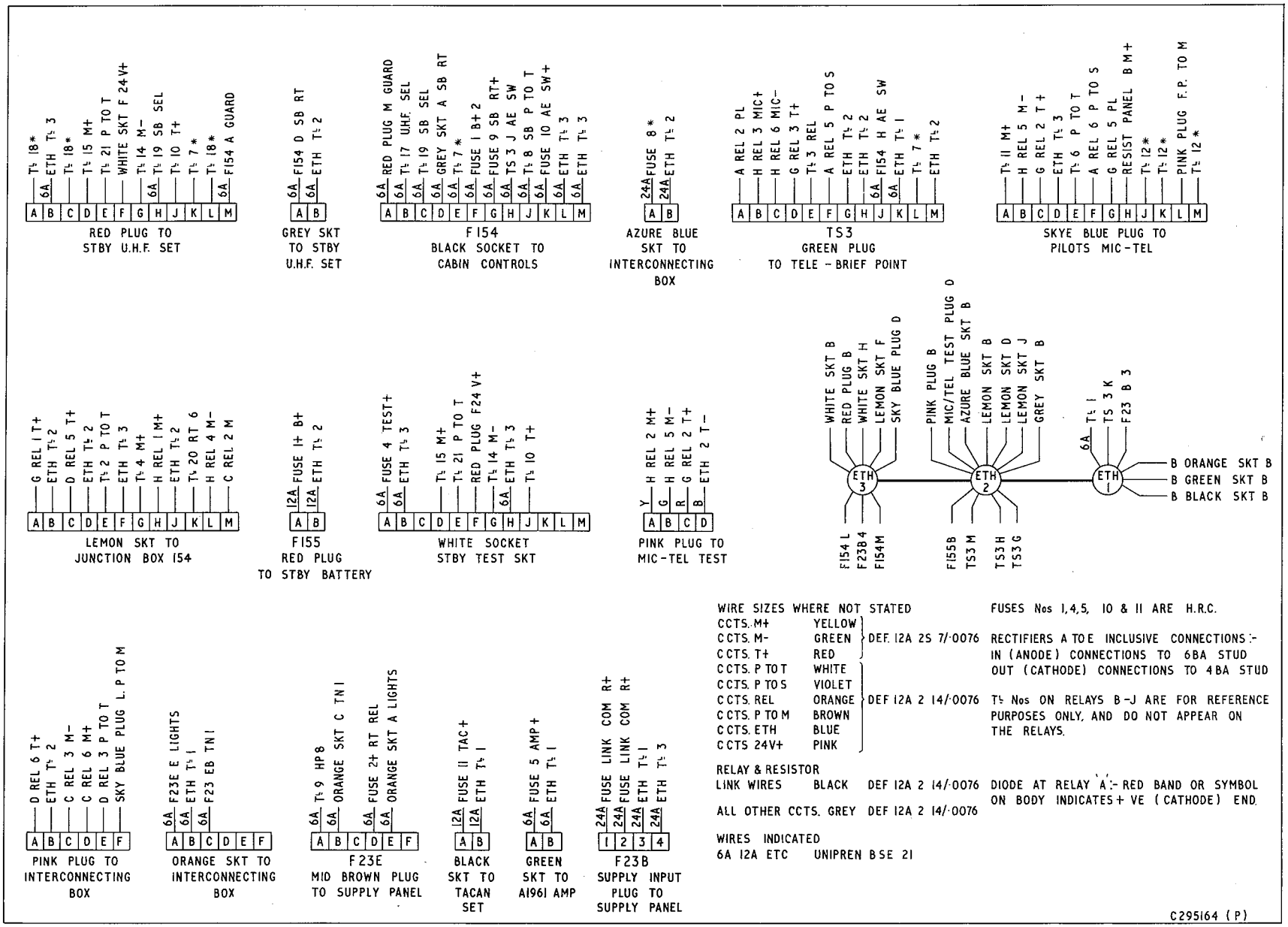

Fig.1 (1) Wiring of radio relay box

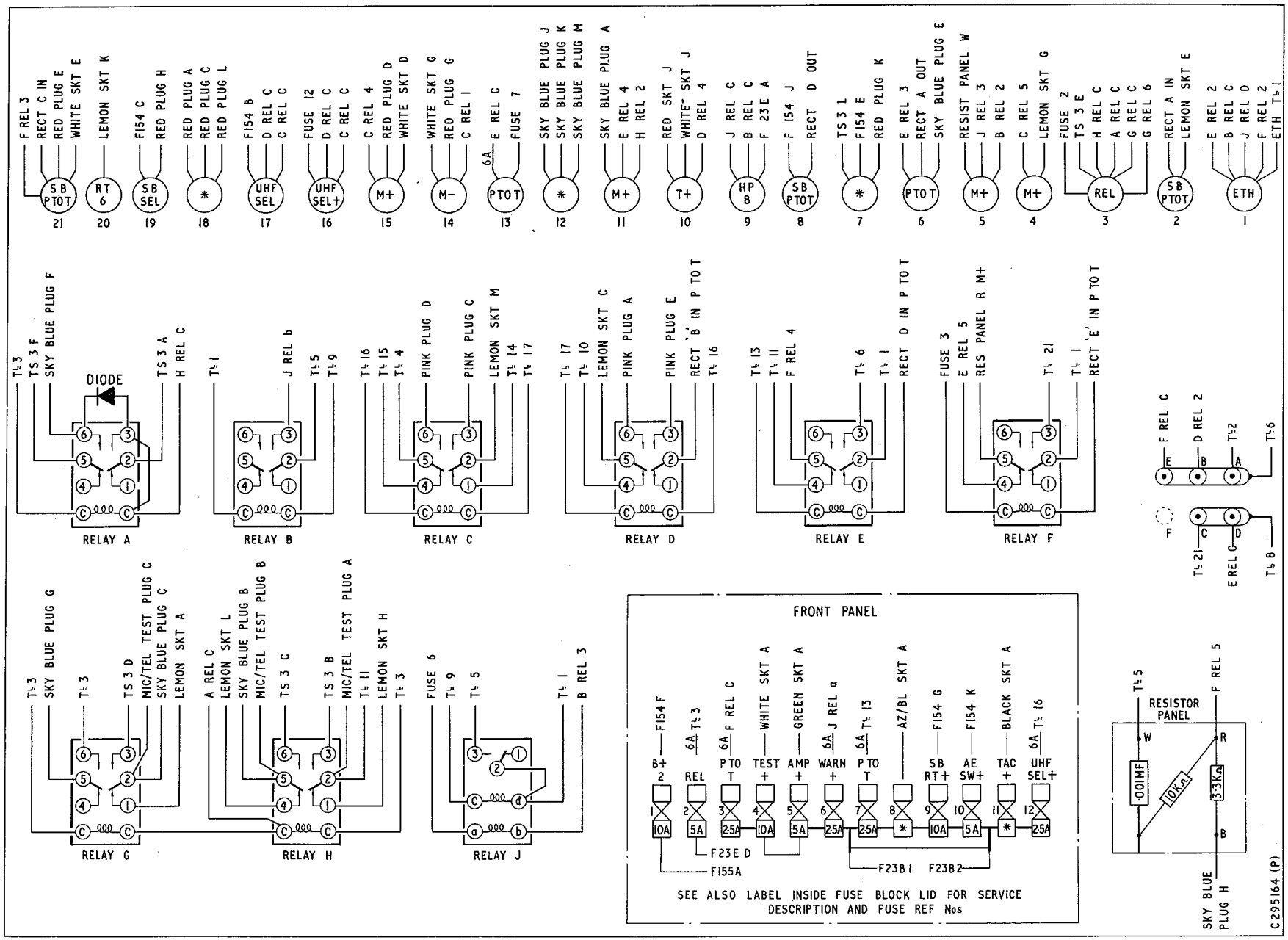

Fig.1 (2) Wiring of radio relay box

in the tele-briefing installation, transfer of the pilot's mic./tel. circuits from normal radio communication to tele-briefing is no longer done automatically on connection of the land line to aircraft plug. The tele-briefing relays in the radio relay box now require the tele-briefing P to S push button switch on the forward portion of the cabin port shelf to be depressed momentarily with the land line connected, before they are energized and complete the circuits from pilot to control tower. Once energized, the relays remain so until the land line is disconnected and normal radio communication is re-established. With the relays energized a supply is passed to the tele-briefing indicator lamp situated adjacent to the T/B push switch. This lamp is lit so long as the circuits between pilot and control tower remain connected and serviceable. Reception of messages by the pilot from the control tower requires no further selection by the pilot, but to talk back, he must hold the tele-briefing push button switch depressed in order to energize a relay in the land line circuit and complete his microphone circuit to the control tower.

SERVICING

General

3. No major component is added by the incorporation of the modification and servicing of the radio installations remain as described in Sect.6, Chap.1 of this A.P.

REMOVAL AND ASSEMBLY

General

4. Removal and assembly of the radio installation components remain as described in Sect.6, Chap.1 of this A.P.

APPENDIX 2 - MOD 1481

MAIN UHF - ARI 23301/80

LIST OF CONTENTS

TABLE 1

Equipment type and Air Publication reference

Equipment Type	Air Publication
Main UHF - ARI 23301/80 Transceiver, UHF, PTR1751WW Interface unit, PV1746BB Control unit, PV1754AA Mounting tray, PV1748B Filter unit, dc, PV1757A	AP 116D-0154-1

Introduction

1. This appendix contains a description of the equipment and modifications introduced by Mod 1481 to replace the obsolete ARC 52 UHF transmitter-receiver and control unit fitted in the main UHF system (ARI 18124/1). With the exception of this modification the main UHF system remains as described in the existing ARI 18124/1 UHF system (refer Sect 6, Chap 1). When the modification is embodied the main UHF system is re-designated ARI 23301/80. Detailed information on the ARI 23301/80 system is contained in AP 116D-0154-1.

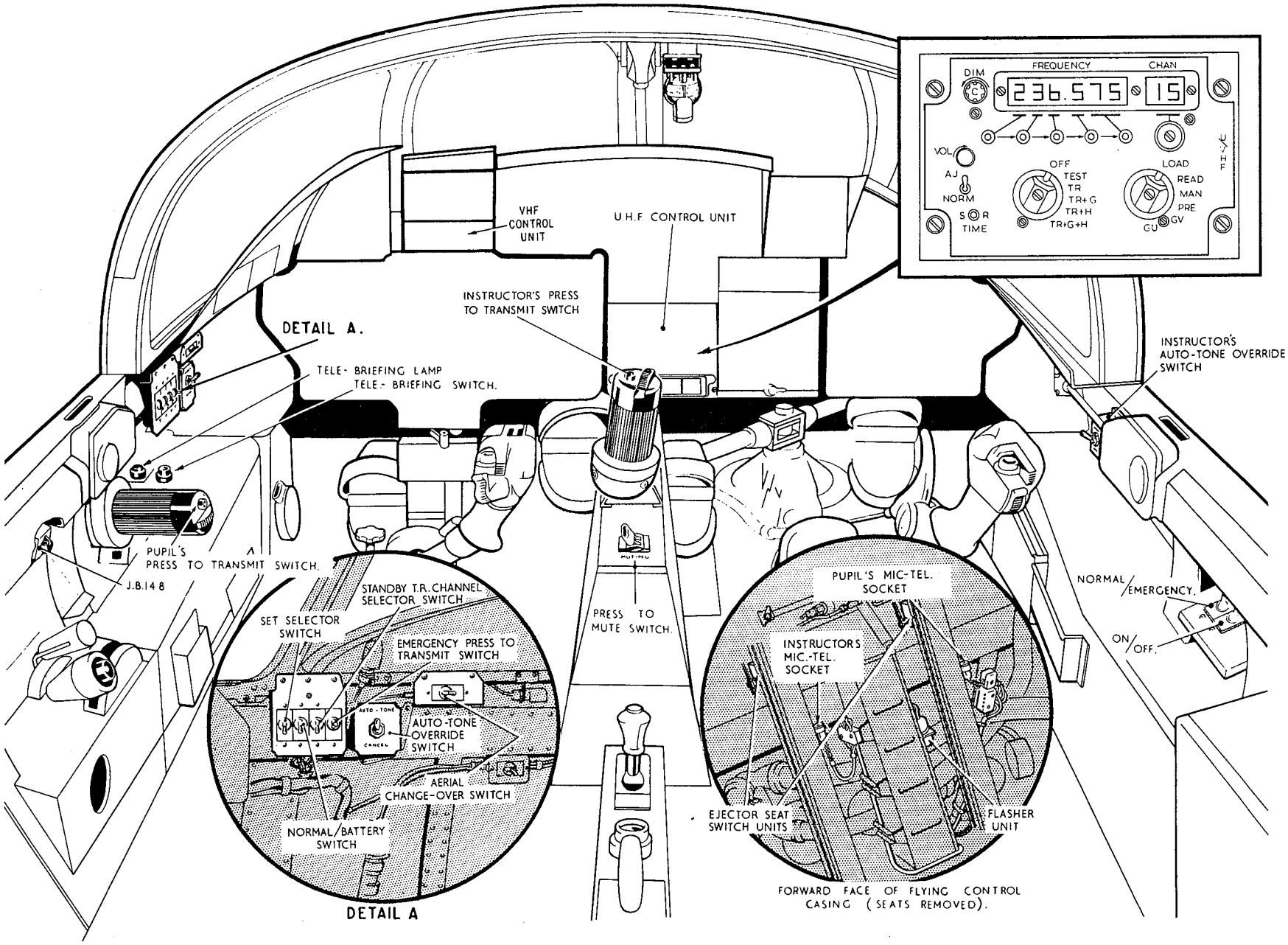

Fig.1 UHF installation – location (1)

DESCRIPTION

General

2. When Mod 1481 is embodied the ARC 52 transmitter-receiver and mounting tray, located in the radio bay, are replaced by mounting tray PV1748B and transceiver PTR 1751WW. The new interface unit PV1746BB is also mounted on the tray and connected between the transceiver and the existing UHF interconnecting box. The ARC 52 control unit, located on the centre instrument panel in the cabin, is replaced by control unit PV1754AA. All the existing UHF cabin control switches are retained by the modification and annotated PTR1751 instead of ARC 52. Mod 1481 also introduces a dc filter unit PV1757A and a replacement circuit breaker into the UHF power supply. The muting bias unit is removed by the modification. Details of the UHF installation locations and interconnections, with Mod 1481 embodied, are shown in figs. 1, 2 and 3.

UHF transceiver

3. The transceiver, PTR1751WW, provides simplex AM communications over 7000 channels with 25 kHz channel spacing in the frequency range of 225.00 MHz to 399.975 MHz. Up to 30 channels may be preset in the transceiver as selected from the control unit.

4. The transceiver is connected to the UHF antenna system using the existing antenna feeder and to the interface unit with fly leads from the unit.

Control unit

5. The control unit, PV1754AA, is mounted in the centre instrument panel and is connected to the system using the existing ARC 52 cableform. The unit controls the operation of the transceiver and has the following front panel displays and controls:-

(1) Frequency display
The frequency display is a 6 digit display providing an indication of any selected frequency in MHz and BIT results.

(2) Channel display
The channel display is a 2 digit display and indicates the number of a selected preset channel which may be from 1 to 30.

(3) DIM control
Controls the brilliance of the frequency and channel number display.

(4) Manual frequency select switches
These are five centre biased toggle switches which control the selection of the required frequency in incremental steps. Indication of each step is provided on the frequency display in hundreds, tens, units and decimals. The up position of a switch decreases the frequency and the down position increases the frequency. When a switch is held operated, the display increments continuously at approximately 2 Hz.

(5) Channel switch
This switch is used to select any one of the preset channels in the transceiver with the selected channel number indicated on the display. Up to 30 preset channels are available.

(6) Mode switch
This switch has six positions and selects the required system operating mode as follows:

GU	System operates at a UHF frequency of 243.000 MHz.
GV	Not used.
PRE	System operates at the preset frequency selected by the channel switch.
MAN	System operates at the manual frequency selected by the five toggle switches.
READ	Installation operates at the manually selected frequency but the frequency display can be changed by operation of the manual select switches.
LOAD	The frequency indicated in the READ position is transferred to the memory location selected by the preset channel switch.

(7) Function switch
This switch has six positions and selects the required system operational functions as follows:

OFF	System off.
TEST	Initiates BIT facility. With the mode switch in the PRE or GU positions, causes the frequency display to show the operating frequency. With the mode switch in the MAN position, all display elements show the figure 8. A 1 kHz tone will be audible in this position.

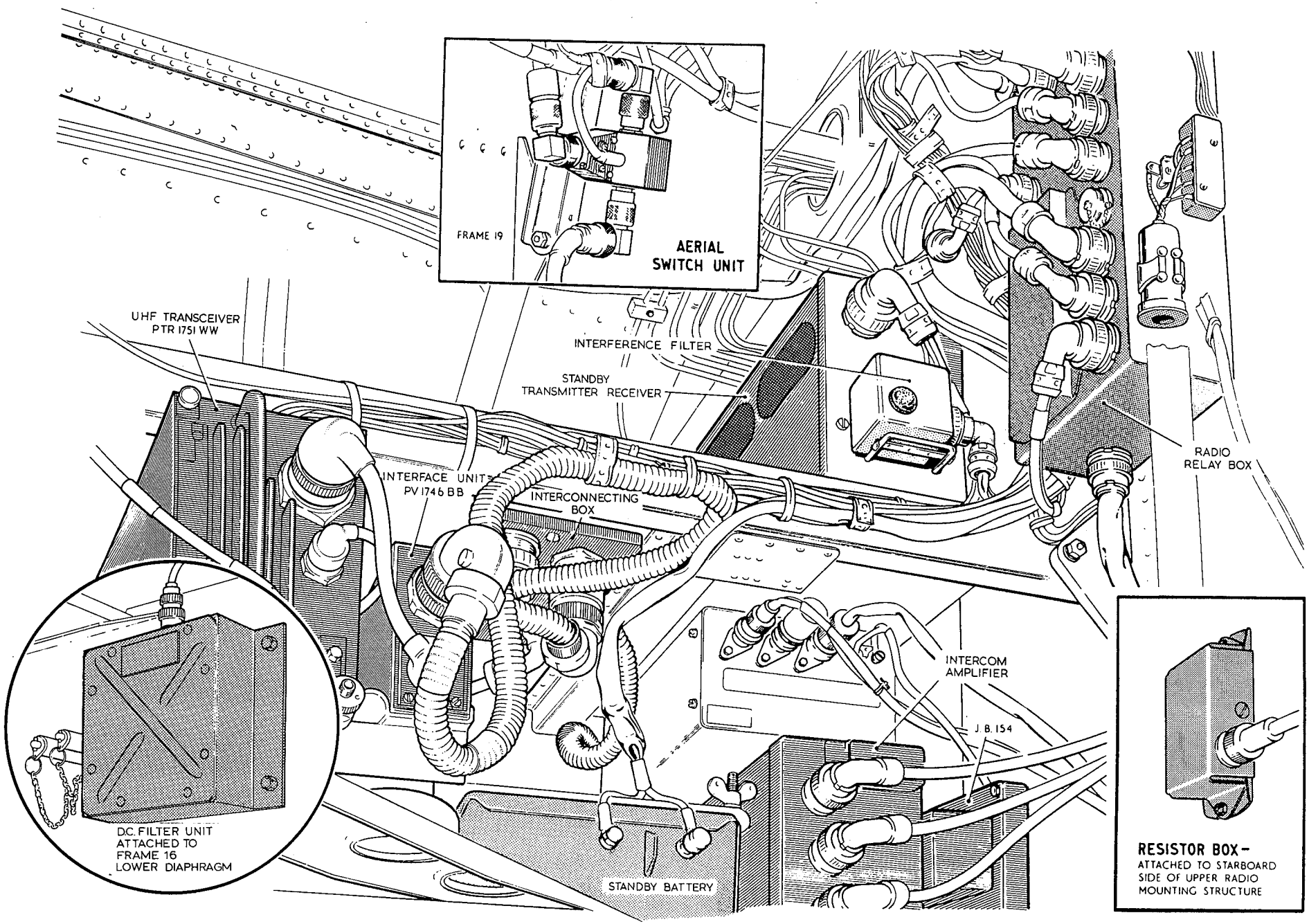

Fig. 2 UHF installation - location (2)

TR Main transceiver operative. UHF Guard receiver off.

TR+G Main transceiver and UHF guard receiver operative.

TR+H Main transceiver and ADF operative.

TR+G+H Main transceiver, UHF guard receiver and ADF operative.

(8) AJ/NORM switch
The AJ position of the switch is not used and the switch must be used with the NORM position selected.

(9) TIME S/R switch
Not used.

(10) VOL control
Controls the level of the transceiver audio output.

Interface unit

6. The interface unit, PV1746BB, provides interconnections between the transceiver and the existing UHF interconnecting box. Connection to the transceiver is via fly leads terminated with two plugs and connection to the interconnecting box is via the existing 42-way cableform.

Filter unit,dc

7. The dc filter unit, PV1757A, is mounted on the lower forward bulkhead in the radio bay. The filter unit is connected in series between the UHF Services circuit breaker (45A) and the UHF circuit breaker (7.5A) to reduce the effects of interference from the aircraft inverters. The 7.5A circuit breaker is a replacement breaker for the existing 25A breaker and is annotated PTR1751. With the exception of this modification the power supply circuits remain as described in Sect 6, Chap 1.

Muting bias unit

8. When Mod 1481 is embodied the muting bias unit is removed and a shorting plug is fitted in the mute input socket on the interconnecting box. The mute input line to the interconnecting box is now routed directly to the muting switch in the cabin via relay B in the radio selector junction box.

SERVICING

General

9. Servicing and function tests of the equipment embodied by this modification are detailed in AP 116D-0154-1. Any unit suspected of being unserviceable should be checked in situ for power supplies and security of connectors before removal to the servicing bay.

REMOVAL AND ASSEMBLY

General

10. The procedures for removing the main components are detailed in the following paragraphs. Assembly of the components is a reversal of the removal procedures. Before removing or replacing any component the aircraft must be rendered electrically safe as described in Sect 5, Chap 1, Group A1.

Transceiver

11. The procedure for removing the transceiver is as follows:-

(1) Render the aircraft electrically safe.

(2) Disconnect the two connectors, antenna feeder and earthing strap from the transceiver. Fit approved blanking caps to the plugs and sockets and stow connectors clear of unit.

(3) Release the catches securing the transceiver to the mounting tray and carefully withdraw the unit from the tray. Remove unit from aircraft.

Note...

On transceiver assembly the self locking nuts on the catches should be hand tightened only.

Control unit

12 The procedure for removing the control unit is as follows:-

(1) Render the aircraft electrically safe.

(2) Release the four Dzus fasteners on the front of the control unit. Carefully withdraw and support the unit.

(3) Disconnect the connector from the rear of the unit, fit blanking caps to the plug and socket and remove unit from aircraft.

Interface unit

13. The procedure for removing the interface unit is as follows:-

(1) Render the aircraft electrically safe.

(2) Disconnect the connector from the unit and the connectors from the transceiver. Fit blanking caps to the plugs and sockets.

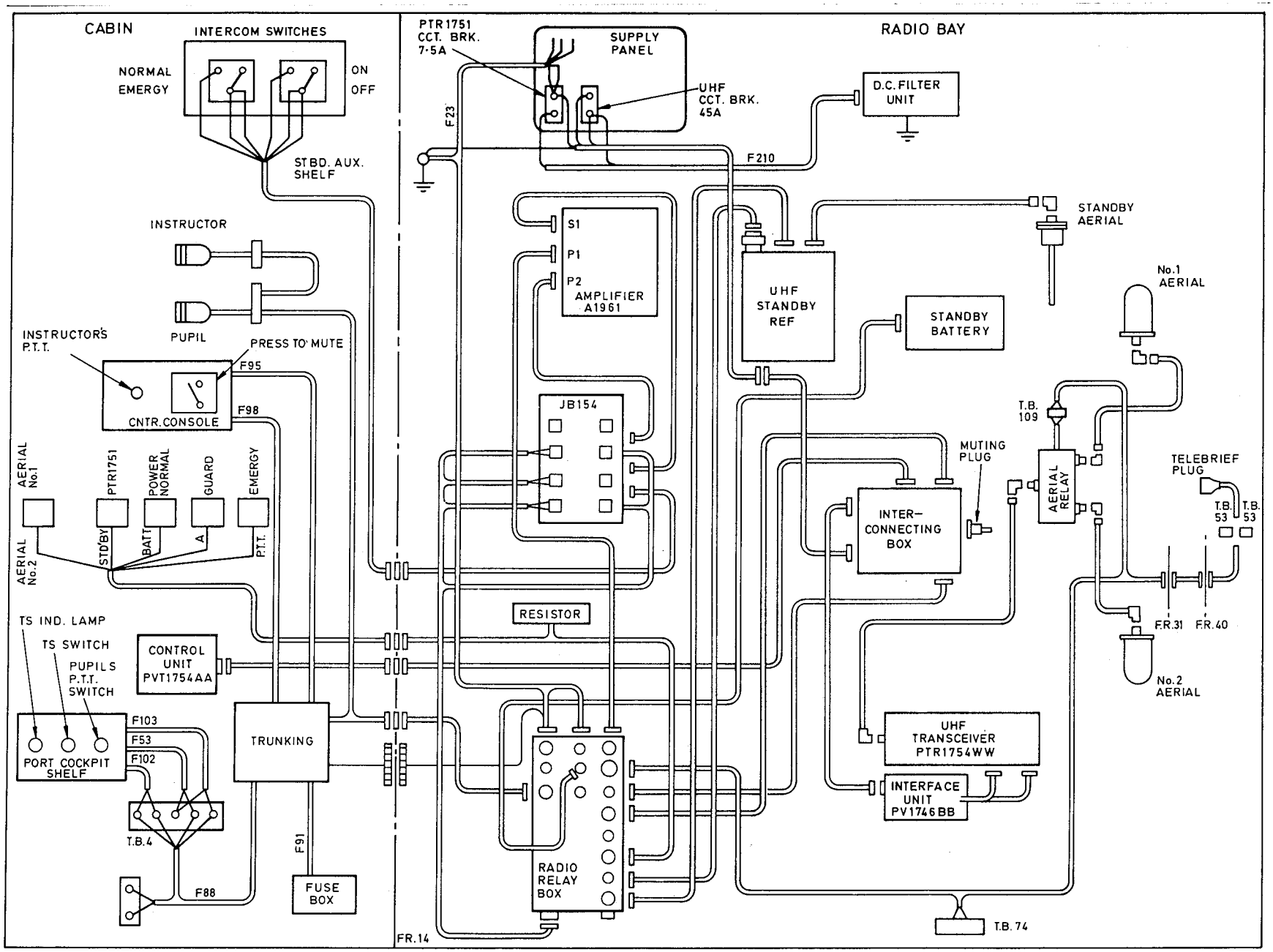

Fig. 3 UHF installation - interconnection

(3) Release the catch securing the interface unit to the mounting tray and carefully withdraw the unit from the tray. Remove unit from aircraft.

Filter unit, dc

14. The procedure for removing the filter unit is as follows:-

(1) Render the aircraft electrically safe.

(2) Disconnect the connector from the unit and fit blanking caps to the plug and socket.

(3) Remove and retain the four bolts, nuts and washers securing the unit to the bulkhead. Remove unit from aircraft.