Chapter 6

ARI-18107/13

(Completely revised)

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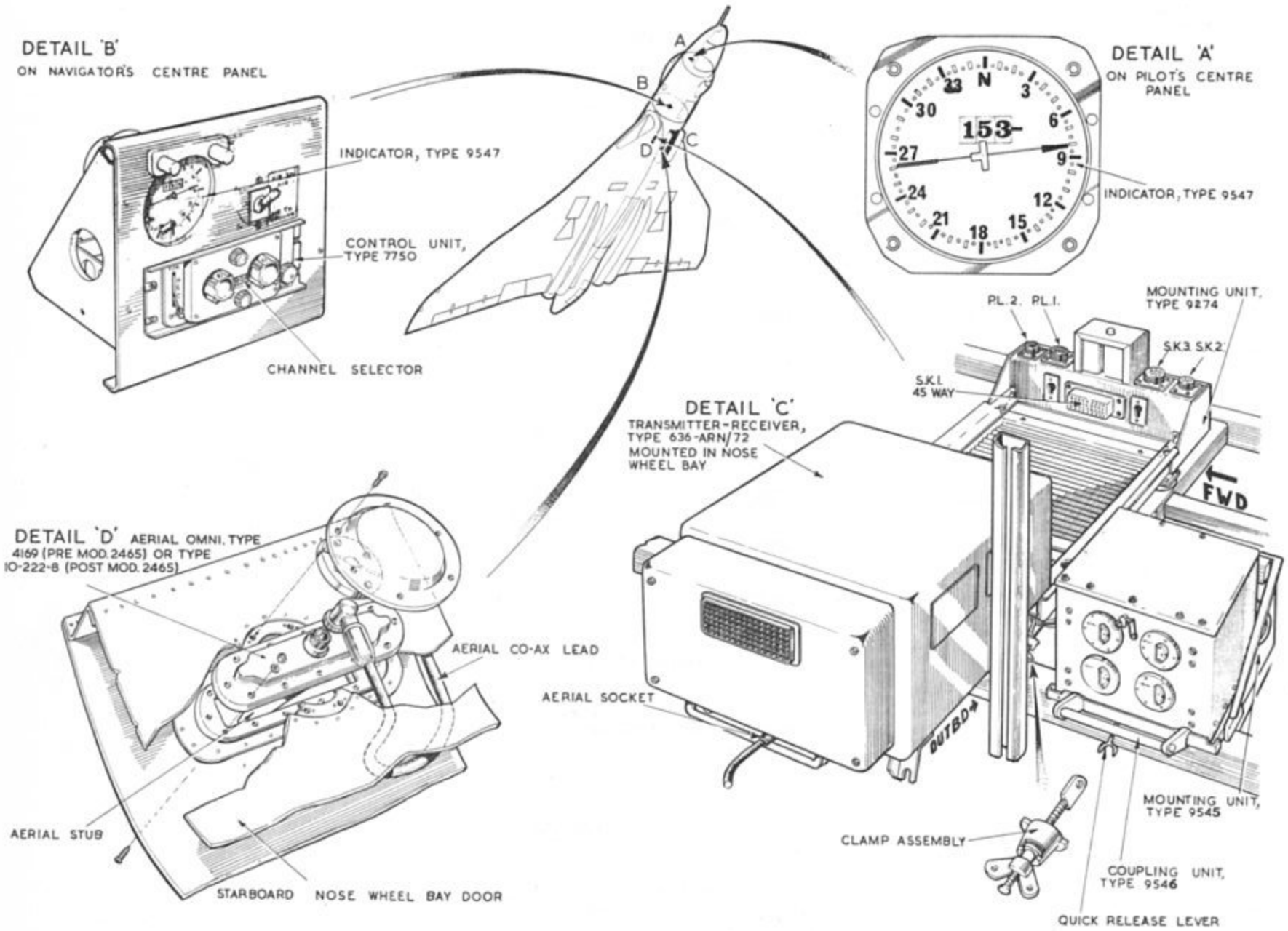

Fig.1 Location of equipment

► *Mod. 2465* ◄

Introduction

1. This chapter deals with the navigational system installation A.R.I. 18107/13 introduced by Mod.1631 and modified by Mod.2304. The A.R.I. provides distance and bearing information that will indicate the position of the aircraft relative to a surface beacon to which the equipment has been tuned. A facility for interrogating tanker aircraft is also provided.

2. The distance and bearing information is presented continuously to both the pilot and navigator by an indicator, Type 9547. A control unit, Type 7750, is positioned below the navigator's indicator, Type 9547, thus enabling the navigator to control the entire system.

3. The transmitter-receiver, Type RT 636-ARN/72, and coupling unit, Type 9546, are both fitted in the nose wheel bay, and the aerial omni, Type 4169 (Pre Mod 2465), or Type 10-222-8 (Post Mod 2465) is fitted to the starboard nose wheel bay door. A location diagram of the equipment is contained in Fig.1 and a routing chart in Fig.3. Full descriptive and servicing information on the complete system can be found in AP 116B-0304-1.

4. Any one of 126 crystal-controlled channels in the 962 to 1214 Mc/s band can be selected by the navigator via control unit, Type 7750. Each channel comprises two frequencies 63 Mc/s apart, one for air-to-ground interrogation and the other for ground-to-air responses.

5. A morse-code recognition signal is transmitted by the surface beacon every 37.5 seconds, and can be heard on the crew's headsets via their respective intercomm. control panels, thus confirming the identity of the selected beacon. The signal level is controlled by a volume control fitted to the navigator's control unit, Type 7750.

DESCRIPTION AND OPERATION

Equipment details

6. The A.R.I. is under the control of the navigator and consists of the following:-

Indicator (2)	Type 9547
Control unit	Type 7750
Coupling unit	Type 9546
Transmitter-receiver	Type RT 636-ARN/72
Aerial omni	Type 4169 (Pre Mod 2465) Type 10-222-8 (Post Mod 2465)
Transmitter-receiver mounting unit	Type 9274
Coupling unit mounting unit	Type 9545

The location of the above equipment in the aircraft is illustrated in fig.1. A full description of the individual units is contained in A.P.116B-0304-1.

Indicator, Type 9547

7. Two indicators are utilized in the system and are positioned on the pilot's and navigator's centre panel respectively. The bearing pointer has a continuous 360 deg. travel. The bearing of the selected beacon from the aircraft is shown by the arrow head of the pointer and the bearing of the aircraft from the selected beacon is indicated by the tail of the pointer.

8. The distance of the aircraft from the selected beacon is shown in a window in the dial of the indicator. The right hand digit shows the 'unit' nautical miles and the next to the left digit shows the 'tens' nautical miles. When the aircraft is over 100 nautical miles from the selected beacon a 'one' appears to the left of the 'tens' digit.

9. When the system is not locked to the beacon transponding signal, the distance digits are partially masked by a flag across the distance window, the flag has a horizontal white line painted on it to improve visibility. When the aircraft is outside the range of the beacon, the bearing pointer will be revolving round the bearing scale, also the distance numbers will be rotating rapidly behind the masking horizontal white line.

Control unit, Type 7750

10. This unit provides the main control for the complete system and is fitted to the navigator's centre panel below the indicator, Type 9547. The following controls are situated on the front of the control unit:-

(1) Two channel selector rotary switches, a 10 way and 13 way, enable the navigator to select any channel from 1 to 126. The number of the selected channel appears in an illuminated window positioned between the two switch knobs. The left hand switch when operated will show numbers 0 to 12 and the right hand switch will show numbers 0 to 9.

(2) A three-position switch which is marked OFF, REC. and T/R is used to energize the system in the two modes of either receive only or transmit and receive for distance measurements.

(3) A control marked VOL. is used for adjusting the surface beacon identity tone to the required level. Note that all crew members can monitor the signal via the aircraft intercomm. system.

Coupling unit, Type 9546

11. This unit is located in the nose wheel bay and provides the servo links for operating the pilot's and navigator's indicators, Type 9547. The unit is secured via rear fitting dowels to a horizontal mounting unit, Type 9545, which is fitted to the aircraft structure by four anti-vibration mountings. A spring-loaded quick release device at the front of the mounting unit enables the coupling unit to be easily released. Four dials on the front panel provide similar information to that displayed by the pilot's and navigator's indicators.

Mounting unit, Type 9545

12. The spring loaded quick release device is operated by a lever situated underneath the mounting unit. When the lever is pulled outwards and then to the right the coupling unit is freed from the grip of four heavy gauge springs which hold the four plugs and sockets in their mating position.

Transmitter-receiver Type RT.636-ARN/72

13. The transmitter-receiver is positioned next to the coupling unit in the nose wheel bay, and is fitted into a mounting unit, Type 9274. The transmitter-receiver is secured to the mounting unit by means of two spring-loaded spigots at the rear, and two screw clamps at the front. The mounting unit is installed as an integral part of the aircraft and uses four anti-vibration mountings to cushion movement.

Mounting unit, Type 9274

14. A housing across the rear of the mounting unit contains plugs and sockets and serves as a junction box for ingoing and outgoing supplies for the transmitter-receiver. In addition to the plugs and sockets the housing contains four power control relays and a filter circuit for suppressing unwanted pick-up in the control and power supply cables respectively. Details of the plugs and sockets mounted on the housing are as follows:-

(1) Plug (PL.1) is a 19-pole connector and is used for carrying 'distance' information between the coupling unit, Type 9546, and the mounting unit.

(2) Socket (SK.3) is a 19-pole connector and is used for carrying 'bearing' information between the coupling unit, Type 9546, and the mounting unit.

(3) Socket (SK.2) is a 10-pole connector and is used for inter-connecting the control unit, Type 7750, to the mounting unit.

(4) Plug (PL.2) is a 7-pole connector and carries the aircraft supplies to the mounting unit.

(5) Socket (SK.1) is a 45-pole socket, which mates with a 45-pole plug fitted to the rear end of the transmitter-receiver chassis. The 45-pole plug and socket is used to connect all the ingoing and outgoing supplies from the transmitter-receiver to the mounting unit housing.

Aerial omni, Type 4169 (Pre Mod 2465) or Type 10-222-8 (Post Mod 2465)

15. The aerial is a small metal blade in the shape of a shark fin approximately 3 inches high from its base. It is mounted through the aircraft skin from the inside and positioned on the starboard side of the nose wheel bay door. The aerial is connected via a coaxial cable link and plug to the coaxial socket fitted to the front panel of the transmitter-receiver unit.

Air-to-air and air-to-ground switch

16. This switch is mounted on a panel together with indicator, Type 9547, and control unit, Type 7750, on the navigator's centre panel. The switch is used for changing over from normal operation to that of tanker aircraft interrogation and response.

Power supplies

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The location of the above equipment in the aircraft is illustrated in fig.1. A full description of the individual units is contained in A.P.116B-0304-1.

Indicator, Type 9547

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Coupling unit, Type 9546

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Mounting unit, Type 9545

12. The spring loaded quick release device is operated by a lever situated underneath the mounting unit. When the lever is pulled outwards and then to the right the coupling unit is freed from the grip of four heavy gauge springs which hold the four plugs and sockets in their mating position.

Transmitter-receiver Type RT.636-ARN/72

13. The transmitter-receiver is positioned next to the coupling unit in the nose wheel bay, and is fitted into a mounting unit, Type 9274. The transmitter-receiver is secured to the mounting unit by means of two spring-loaded spigots at the rear, and two screw clamps at the front. The mounting unit is installed as an integral part of the aircraft and uses four anti-vibration mountings to cushion movement.

Mounting unit, Type 9274

14. A housing across the rear of the mounting unit contains plugs and sockets and serves as a junction box for ingoing and outgoing supplies for the transmitter-receiver. In addition to the plugs and sockets the housing contains four power control relays and a filter circuit for suppressing unwanted pick-up in the control and power supply cables respectively. Details of the plugs and sockets mounted on the housing are as follows:-

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Air-to-air and air-to-ground switch

16. This switch is mounted on a panel together with indicator, Type 9547, and control unit, Type 7750, on the navigator's centre panel. The switch is used for changing over from normal operation to that of tanker aircraft interrogation and response.

Power supplies

17. The power supplies for the A.R.I. are controlled by a switch labelled

OFF/REC/T/R positioned on the control unit, Type 7750, which is located on the navigator's centre panel. The switch operates relays, via a 28-volt dc supply from fuse 872 in distribution panel 16P, which in turn connects a 115-volt, 400 c/s supply to the transmitter-receiver unit from fuses 301R, 301B, 302R and 302B in distribution panel 28P. A 28-volt dc supply from fuse 975 in panel 3 P is used to change the normal mode of operation to that of tanker aircraft interrogation via the air-to-ground switch. The control panel illumination lamps are fed from a 28-volt dc supply via fuse 974 in distribution panel 3P.

SERVICING

WARNING . . .
Voltages in excess of 30 volts ac (rms) or 50 volts dc can be dangerous under certain conditions. Personnel must therefore ensure that the electrical system is electrically safe before any servicing is attempted. Where it is essential that tests or adjustments be made with the electrical power switched ON the greatest care must be exercised.

Precautions

18. It is essential that the utmost attention be given to servicing instructions where matters of safety are concerned, and that maximum co-operation be maintained between trades mutually concerned in servicing operations.

Installation

19. The setting up, operating and servicing instructions for the installation can be found in AP 116B-0304-1. A test socket mounted on a TEST SET POWER panel is fitted at the radio and radar crate in the nose wheel bay and provides facilities for connecting a 115-volt, 400 Hz ac supply for the performance tester Type 10166A. For further details of the supply refer to Sect.6, Chap.7 of this publication.

REMOVAL AND INSTALLATION

General

20. Access to all the individual units that make up the complete installation is straightforward, but the following points should be observed. When it is necessary to remove or replace a unit, secure all loose connectors to the adjacent aircraft structure to prevent damage.

Equipment in the nose wheel bay

21. When replacing the transmitter-receiver unit into its mounting unit, ensure that the two spring-loaded spigots at the rear are located correctly and that the 45-pole plug and socket has mated properly. Ensure also that the front screw clamps are tight and secure.

22. When replacing the coupling unit into its mounting unit, ensure that the located dowels are correctly aligned and the four plugs mated. A spring-loaded locking device is employed at the front of the unit, ensure that the locking device has operated and that the coupling unit is properly secured.

Aerial, Type 10-222-8

23. Vulcan Mod 2465 makes provision for and introduces Aerial, Type 10-222-8. This modification must have been embodied, or be embodied concurrently, before proceeding with the following removal and installation instructions.

WARNING . . .
The following procedures call for the use of both Trichloroethane and Polysulphide compounds. Care must be exercised when using these materials and reference should be made to the Safety and Servicing notes.

Removal

24. The Aerial, Type 10-222-8 is located on the starboard nosewheel door and should be removed in accordance with the following instructions.

(1) Ensure that the equipment is electrically isolated.

(2) Locate and remove the aerial rear cover plate situated on the inside skin of the nosewheel door.

(3) Disconnect aerial connector Part No 10/T5808 from the aerial.

(4) Using Trichloroethane (Ref 33D/2201949) remove the polysulphide sealant from the four attachment bolts and nuts. Particular attention should be given to the protruding threads.

(5) Supporting the aerial, remove the four securing bolts and remove aerial.

(6) Remove and discard the conductive gasket (Ref 10AL/6491668).

Installation

25. In order to prevent ingress of moisture the aerial must be bonded and sealed. The following instructions, together with illustration fig.2, briefly describe the method to be used but reference should be made to HSA process spec. S26-4613.

(1) Using Trichloroethane remove all traces of polysulphide and grease from the aircraft skin and the replacement aerial.

(2) Apply a thin coat of a suitable, authorised, release agent to the mating surfaces of the aerial and aircraft skin.

(3) Mix a suitable quantity of polysulphide sealant, Type PR 1431 (Ref 33H/2245049).

(4) Apply the sealant to both the aircraft skin and the aerial base and distribute over the area to be sealed.

Note . . .
The sealant must not be applied to the gasket)

(5) Carefully position the new gasket (Ref 10AL/6491668) between the aerial and aircraft skin.

(6) Attach aerial using four securing bolts removed in para 24 operation (5). Wipe all excess sealant from the edges and faces of the aerial and aircraft skin.

(7) Apply a bead seal of polysulphide sealant, Type PR1422B-2 (Ref 33H/2203109) around the complete joint and also over the bolt heads and nuts. Ensure the bead seal is bonded to both the components and the aircraft skin.

(8) Using Bridge Set Resistance (Ref 10S/9532597) ensure that the resistance measured between the aerial outer and the aircraft skin does not exceed 10 milli-ohms.

(9) Reconnect the aerial connector disconnected in para 24, operation (3).

(10) Refit aerial rear cover plate removed in para 24, operation (2).

(11) Carry out functional test using performance tester, Type 10166A (Ref 10S/1158611).

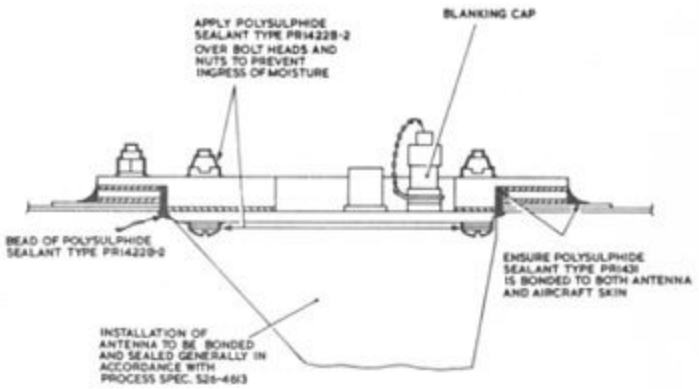


Fig.2 Sealing of Aerial, Type 10-222-8

Navigator's equipment

26. The navigator's indicator and control unit together with the air-to-air/air-to-ground switch are all mounted on a panel fitted to the navigator's centre panel. The panel can be withdrawn by first removing four securing screws from the front of the panel.

Pilot's indicator

27. The pilot's indicator mounted on the pilot's centre panel is easily removed after the centre panel has been removed in accordance with the instructions given in Sect.7, Chap.1.

TABLE 1

Connectors for A.R.I.18107/13

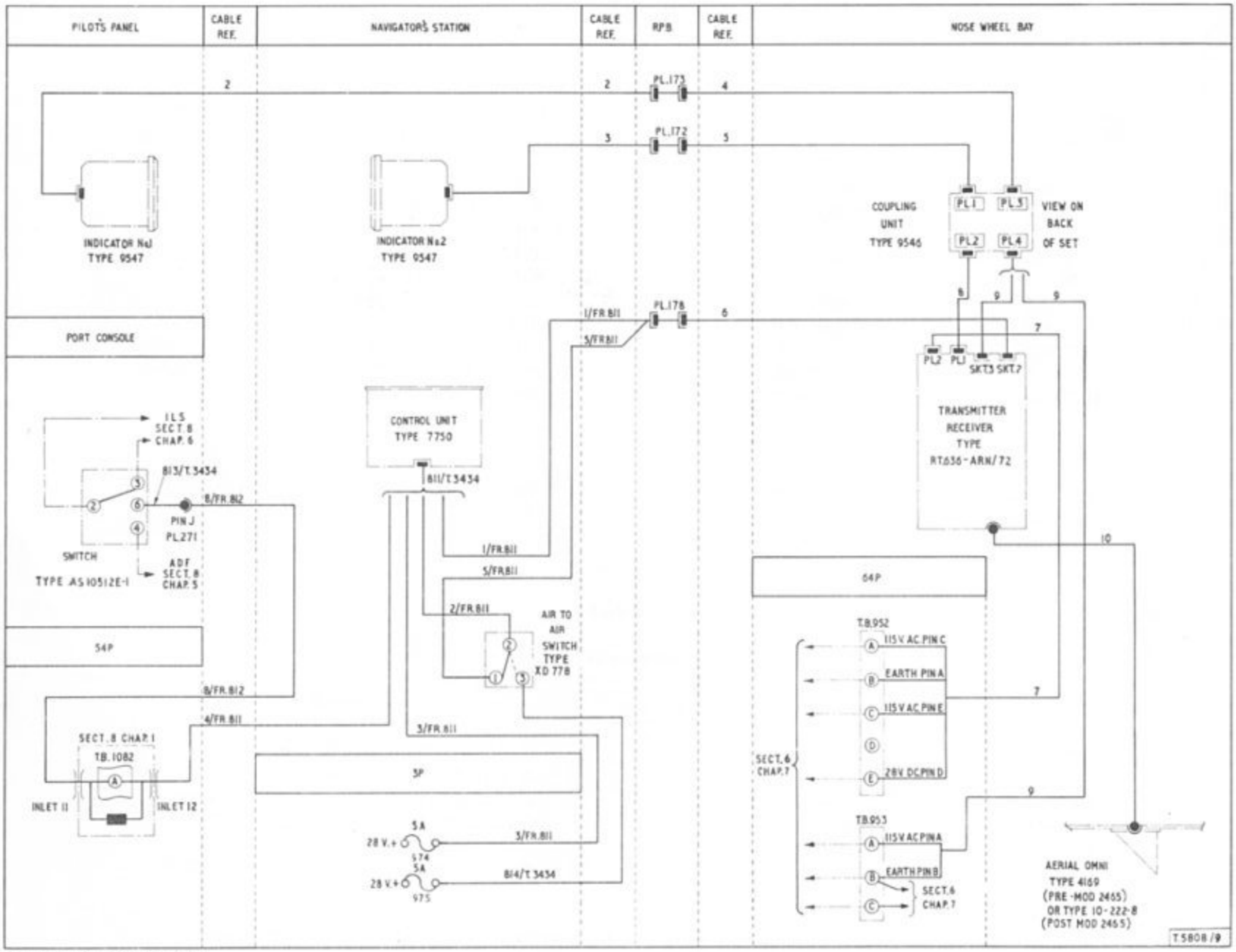
Ref.No.	Cable form	Connecting
2/T5808	Miniature 12C	Indicator No.1 Type 9547 to R.P.B. plug 173
3/T5808	Miniature 12C	Indicator No.2 Type 9547 to R.P.B. plug 172
4/T5808	Miniature 12C	R.P.B. plug 173 to coupling unit (PL3)
5/T5808	Miniature 12C	R.P.B. plug 172 to coupling unit (PL1)
6/T5808	Uninyvin 20 10 cores	R.P.B. plug 178 to T.R. unit (SK2)
7/T5808	Uninyvin 20 4 cores	T.R. unit (PL2) to panel 64P
8/T5808	Miniature 18H	T.R. unit (PL1) to coupling unit (PL2)
9/T5808	Miniature 18H	T.R. unit (SK3) to coupling unit (PL4)
	Twisted uninyvin 20	Panel 64P to coupling unit (PL4)
10/T5808	Uniradio 67	Aerial to T.R. unit aerial socket
814/T3434	Uninyvin 20	Fuse 975 in 3P to air-to-air switch pin 3
811/T3434	Uninyvin 20	See Table 2

TABLE 2

Cable form 811/T3434

Ref.No.	Cable	Connecting
1/FR811	Uninyvin 20 10 cores	Control unit plug pins A - K to R.P.B. plug 178 pins A - K (connected pin to pin) *
2/FR811	Uninyvin 20	Control unit plug pin K to air-to-air switch pin 2 *
3/FR811	Uninyvin 20	Control unit plug pin M to fuse 974 in panel 3P
4/FR811	Uninyvinmetsheath 20	Control unit plug pin N to panel 54P entry 12
5/FR811	Uninyvin 20	Air-to-air switch pin 1 to R.P.B. plug 178 pin M

** Note Pin K on control unit plug is common to pin K on R.P.B. plug 178 and air-to-air switch pin 2*



8233471 403 7 81 BAe 1354

Fig 3 A.R.I. 18107/13
▶Mod. 2465 incorporated◀