Appendix 1 - MOD.613 - INTRODUCTION OF E.C.M.

(Completely revised)

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Introduction

1. This appendix contains information on the changes made to the radar installation by the introduction of Mod.613. Information is also provided on A.R.I.5924, which is introduced on Mk.1A aircraft by Mod.958. Descriptive and servicing information is provided, along with detailed illustrations and routing charts.

DESCRIPTION AND OPERATION

A.R.I.5919

2. With the introduction of Mod. 613, A.R.I.5800 is replaced by A.R.I.5919. This is an X-band search radar which operates in conjunction with A.R.I.18105, and detects and gives warning of other aircraft approaching from the rear. This installation comprises a tail mounted radar unit and a control and indicator unit fitted on the navigator's panel.

3. In flight, the A.R.I.5919 is normally maintained in a standby condition (not transmitting) due to the A.R.I.18105 installation. When required, it can be switched to transmit in order to find the exact range and bearing of approaching aircraft. For a complete description of the A.R.I.5919, including operating instructions, reference should be made to A.P.2891J, Vol.1.

Radar head, Type 6932

4. The radar head, Type 6932, consists of a radar unit, Type 6934 with associated radome and mounting rings, and is mounted at the extreme end of the rear fuselage so that the radome forms the tail cone of the

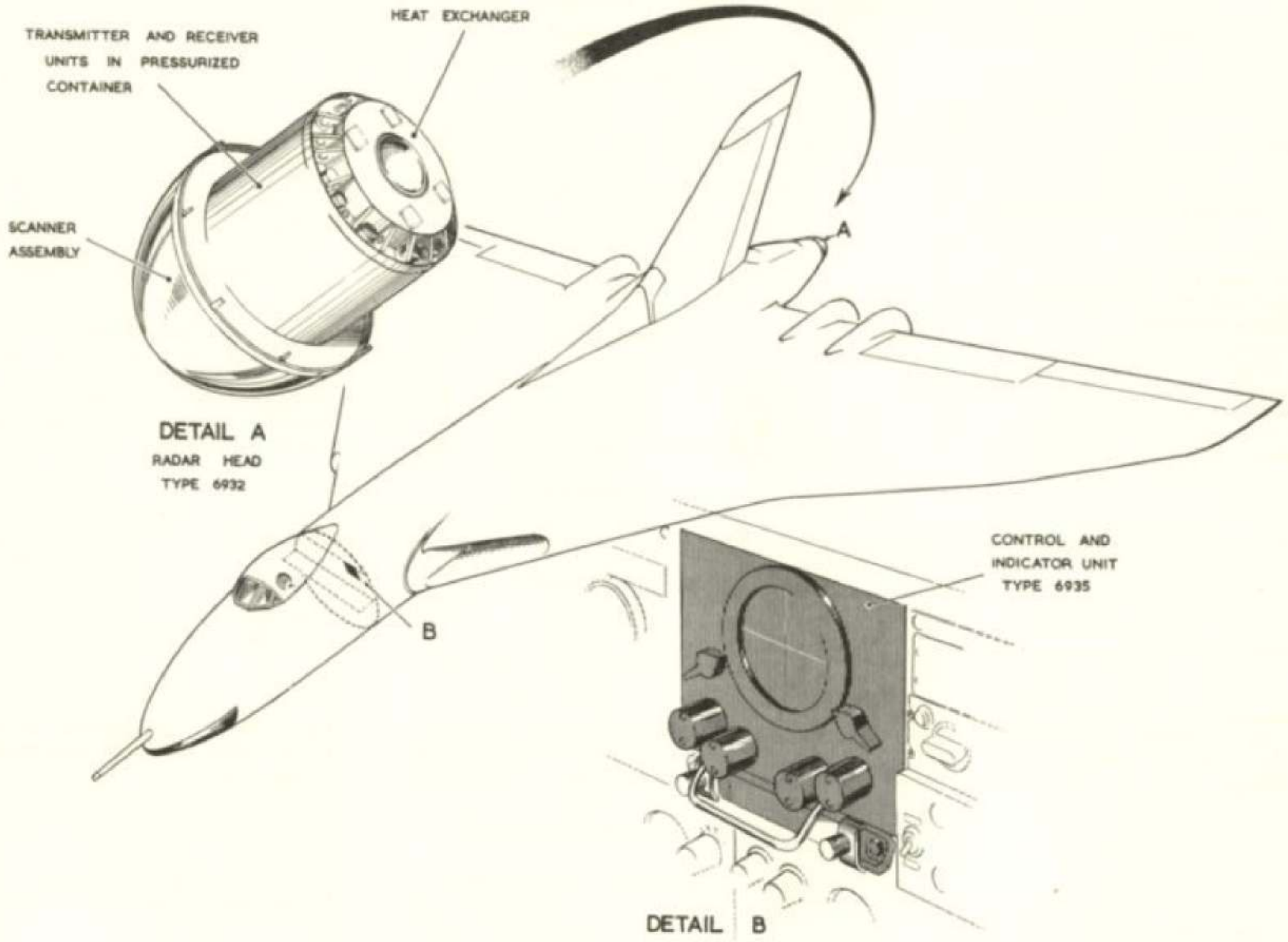

Fig. 1. Location of A.R.I. 5919 equipment

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aircraft. The unit is a pressurised cylindrical canister containing a scanner assembly together with transmitting and receiving units.

5. Pressurisation of the canister at 20 p.s.i. absolute is provided by two air bottles mounted adjacent to the radar unit. The pressure first inflates the radome sealing ring to seal the unit, and then pressurises the remainder of the unit via a differential valve. Cooling of the canister is effected by a heat exchanger, which is supplied by ram air from an intake on the port side of the tail structure. An electrically actuated valve, controlled by a thermostat, regulates the flow of ram air. The mechanical aspect of the pressurisation and cooling systems are described in Book 1, Sect.3, Chap.16, and the electrical circuit for the cooling system is outlined in Book 2, Sect.5, Chap.1, Group 15.

Control and indicator unit, Type 6935

6. This unit is installed on an anti-vibration mounting tray on the navigator's panel as shown in fig.1 and provides bearing and range information of other aircraft within a 90 deg. cone to the rear. The unit has six main controls on the front viz., a rotary switch labelled, OFF-WARM UP - STANDBY, a similar switch, labelled RANGE 5-10-18, and four potentiometers labelled, GAIN, BRILL., CONTRAST and MARKER BRILL. respectively. In addition, two toggle switches, labelled SW. GAIN and marker are provided. Further details of the unit will be found in the associated Air Publication.

Control unit lighting

7. Diffused lighting for the dials of the A.R.I.5919 control and indicator unit and the A.R.I.18105 control unit is controlled by two dimmer switches mounted together on the navigator's panel. Each switch comprises two ganged variable resistors to which supplies are fed from 28-volt fuses 23 and 1045 in each case. Connections to the dimmer switches are shown in fig.3, and the supplies are shown in Book 2, Sect.5, Chap.1, Group 14.

Power supplies

8. The equipment is fed with 200-volt, 3-phase, 400 c/s a.c. from fuses 1099R, Y and B in panel 68P, and 28-volt d.c. from fuse 1128 in panel 3P. Both supplies are fed via relay 630 in panel 44P, which is controlled by two push-switches, labelled TAIL WARNING ON-OFF on the E.C.M. control panel 81P at the A.E.O.'s station. When the ON switch is pressed, relay 630 is energised to complete the a.c. and d.c. supplies to the equipment. At the same time the relay is retained closed by a hold-in circuit. When the OFF switch is pressed, the hold-in circuit is broken, the relay de-energised and the supplies disconnected. A full description of the power supplies for the installation is contained in Book 2, Sect.5, Chap.1, Group 14.

A.R.I.5851

9. When Mod.613 is embodied, an additional cable is taken from the tracking unit of the A.R.I.5851 to the blanking unit of A.R.I.18105. A new routing chart (fig.4) is provided showing the additional cable and a change in the existing cable Ref.No. at the tracking unit.

A.R.I. 5924

10. A.R.I.5924, which is introduced by Mod.958, radiates interrogation pulses and receives reply and identification pulses from A.R.I.5922 fitted in tanker aircraft. The information is displayed continuously on the C.R.T. screen of an indicator unit. The trace provides range, heading and identification information at distances up to a maximum of 100 nautical miles and a minimum of 400 yds.

Main units

11. The main units of the installation are shown in fig.2 and described briefly in the paragraphs that follow. For more detailed information, reference should be made to A.P.2914 AN.

T.R. unit, Type 6649

12. The T.R. unit is mounted on the auxiliary top shelf at the navigator's station as shown in fig.2. A receiver unit, transmitter unit, I.F. amplifying unit, video amplifier, sweep generator and power unit are housed in the assembly and are readily detachable for servicing purposes. Corona discharge is prevented by housing the transmitter unit in a pressurised compartment, which is charged from a valve on the front face of the unit. An internal blower is provided for cooling purposes.

13. The unit operates on a frequency band of 420-460 Mc/s and employs motor driven tuning to select any of the eight channels in the receiver and transmitter. Interconnection to other units of the installation is made by plugs and sockets on the front of the unit.

Indicator, unit, Type 6651

14. The indicator unit is mounted below the rear edge of the first pilot's floor, with the controls facing aft, as illustrated in fig.2. The unit contains a cathode ray tube and its associated power unit, the focus and brilliancy controls being positioned at the front. The trace is read against range scales presented on an edge-lit graticule. Graticule illumination is controlled by a knob on the control unit.

Control unit, Type 6652

15. The control unit is mounted below the rear edge of the first pilot's floor, adjacent to, and inboard of the indicator unit. The unit provides remote control of

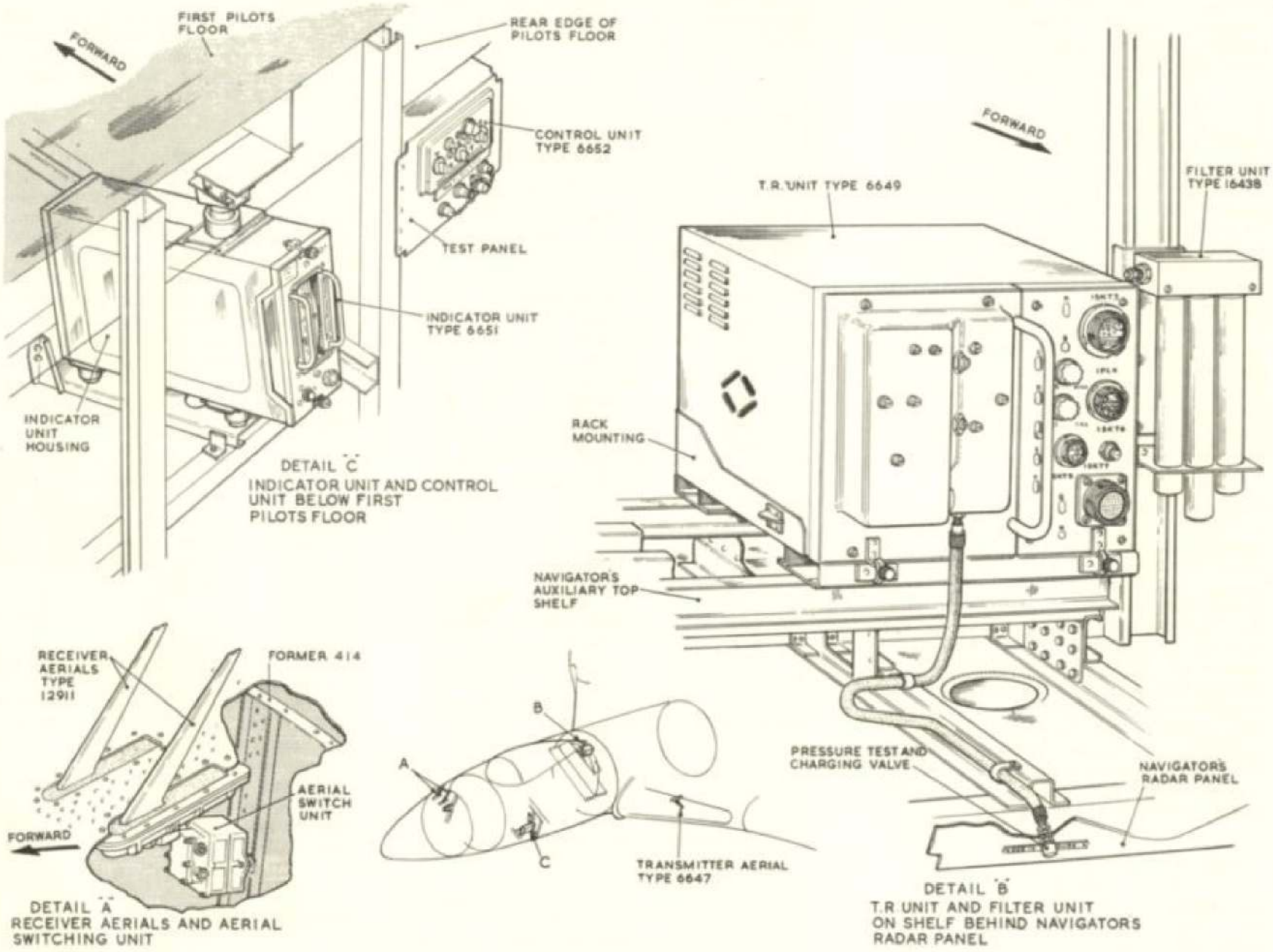

Fig. 2 Location of A.R.I. 5924 equipment

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the installation and carries the following controls:-

Transmitter channel switch
Receiver channel switch
Function switch
Manual code key
Receiver gain control
Graticule illumination control

The two latter controls, receiver gain and graticule illumination are used in conjunction with the indicator unit.

Aerials

16. Three aerials are used with the installation, one the transmitter aerial, and the other two, the port and starboard receiver aerials.

Transmitter aerial, Type 6647

17. The transmitter aerial is of modified shark fin design and is mounted on the underside of the aircraft centre section (fig.2).

Receiver aerials, Type 12911

18. The two receiver aerials are of similar shape to the transmitter aerial, and are mounted side by side on top of the aircraft nose structure (fig.2).

Aerial switch unit, Type 16498

19. This unit is fitted in the nose of the aircraft on the forward face of former 14. When in use, the unit switches the receiver alternately to the port and starboard receiver aerials.

Filter unit, Type 16438

20. This unit is mounted adjacent to the T.R. unit on the navigator's top shelf, and is used in conjunction with a similar unit of A.R.I.18124/1 (Chap.1) to prevent interference between the two installations. The filter unit of A.R.I.18124/1 is introduced by Mod.958 simultaneously with A.R.I.5924.

Power supplies

21. The T.R. unit is fed with 115-volt, single-phase, 400 c/s a.c. from fuse 263 in panel 11P. This supply is also connected to pin A of the power supply test socket on the test panel, which is part of the control unit mounting (para.28). Two 28-volt d.c. supplies for the operation of small motors and relays in the T.R. unit are fed from fuses 210 in 11P and 93 in 3P. A third d.c. supply is fed from fuse 94 in 3P via a dimmer switch for panel lighting. Further details of the supplies will be found in Book 2, Sect.5, Chap.1, Group 3A.

SERVICING

Precautions

22. Servicing personnel particularly are warned that a.c. and d.c. voltages in excess of 100 volts can be dangerous to the extent of causing personal injury, fatal or otherwise. It is essential, therefore, that the utmost attention be paid to servicing instructions where matters of safety are concerned, and that maximum co-operation be maintained between trades mutually concerned in servicing operations.

A.R.I.5919

Installation

23. Full instructions for setting up, operating and servicing the A.R.I.5919 will be found in A.P.2891J. In addition to these instructions, checks should be made at regulator intervals to ensure that all units, cables and connectors are secure and free from damage and moisture.

Pressure check

24. Periodic checks should be made on the pressure within the radar head using a suitable pressure gauge at the Schrader valve marked TEST. A pressure reading of approximately 5 p.s.i.g. should be obtained. Should the reading not correspond with this figure, the system should be checked as outlined in Book 1, Sect.3, Chap.16.

Power supplies

25. The power supplies may be checked with a suitable meter at the radar head supply socket when disconnected. The 200-volt, 3-phase a.c. should be available across pins AD-BF-CH, and the 28-volt d.c. supply across pins K-M as indicated in fig.3.

A.R.I.5924

Installation

26. Detailed instructions for setting up, operating and servicing the installation will be found in A.P.2914AN. All components should be checked at regular intervals for security of attachment. Cables and connections should be examined for signs of damage and a check made to ensure that all plugs and sockets are correctly mated.

Pressure check

27. At the appropriate inspection periods

the case pressure of the transmitter should be checked, which should not be less than 3 p.s.i. If below this figure, the pressure should be raised to 4 - 5 p.s.i. using a pressurising pump, Ref.No.4G/5435. The T.R. unit is connected by a short length of flexible tubing to a pressure charging point on the navigator's panel, as shown in fig.2.

Test panel

28. The test panel forms part of the mounting for the control unit, and carries three aerial adapters and a test socket for the 115-volt, single-phase 400 c/s supply. The adapters are labelled TX AERIAL, PORT RX AERIAL and STBD. RX AERIAL, and are used in conjunction with the test equipment described in A.P.2914 AN.

REMOVAL AND ASSEMBLY

A.R.I.5919

Control and indicator unit

29. This unit is easily removed from its rack mounting in the navigator's panel by releasing the two knurled screws at the front of the unit and drawing the unit forward.

Radar head

30. The radar head, comprising the radar unit, heat exchanger, radome and mounting ring is removed and installed as a complete unit. Detailed instructions for removing the radar head will be found in Book 1, Sect.3, Chap.16 of this publication.

A.R.I.5924

Cabin equipment

31. The main units in the cabin are readily accessible and no special removal instructions are required.

Aerials

32. The aerials may be conveniently reached by the use of a servicing ladder, Type D4. When the aerial securing screws have been removed, the aerials may be lifted from the aircraft skin to disconnect the associated cables.

Aerial switch unit

33. This unit is mounted in the nose of the aircraft immediately behind the receiver aerials, to which access is gained by opening the port-hole in the front pressure bulkhead. The unit can then be removed by releasing the three securing screws and disconnecting the associated cables.

TABLE 1

Connectors for A.R.I.5919

Avro Part No.	Cable form	Connecting between
5/T4511	Miniature 6A	Radar head and plug 916
6/T4511	Miniature 25C	Radar head and plug 915
3/T4713	Miniature 6E	Plug 916 and plug 189
4/T4713	Miniature 25C	Plug 915 and plug 917
38/T4510	Uniradio 70	Radar head and A.R.I.18105

TABLE 2

Connectors for A.R.I.5924

Avro Part No.	Cable form	Connecting between
2/T5122	Uniradio 43	Port receiver aerial and aerial switch unit
3/T5122	Uniradio 43	Stb'd. receiver aerial and aerial switch unit
4/T5122	Uniradio 43	Port receiver aerial and plug 1003
5/T5122	Uniradio 43	Stb'd. receiver aerial and plug 1002
6/T5122	Uniradio 43	Aerial switch unit and plug 1004
7/T5122	Uninyvin 22	Aerial switch unit and plug 1005
8/T5122	Uniradio 43	Control unit and plug 1002
9/T5122	Uniradio 43	Control unit and plug 1003
10/T5122	Uninyvin 22	T.R. unit and plug 1005
11/T5122	Uniradio 43	Filter unit and plug 1004
12/T5122	Uniradio 43	T.R. unit and filter unit
13/T5122	Uninyvin 22	Fuse 94 and dimmer switch
14/T5122	Unithenemet 2.5) Uninyvin 22) Equipment wire,) Type 27/0076)	T.R. unit and indicator unit
16/T5122	Uniradio 67	T.R. unit and plug 1000
17/T5122	Uniradio 43	Control unit and plug 1001
18/T5122	Uninyvinmetsheath 22	Control unit and plug 440
19/T5122	Uniradio 43	Transmitter aerial and plug 1001
20/T5122	Uniradio 67	Transmitter aerial and plug 1000
21/T5122	Uniradio 43	Port receiver aerial and stb'd. receiver aerial

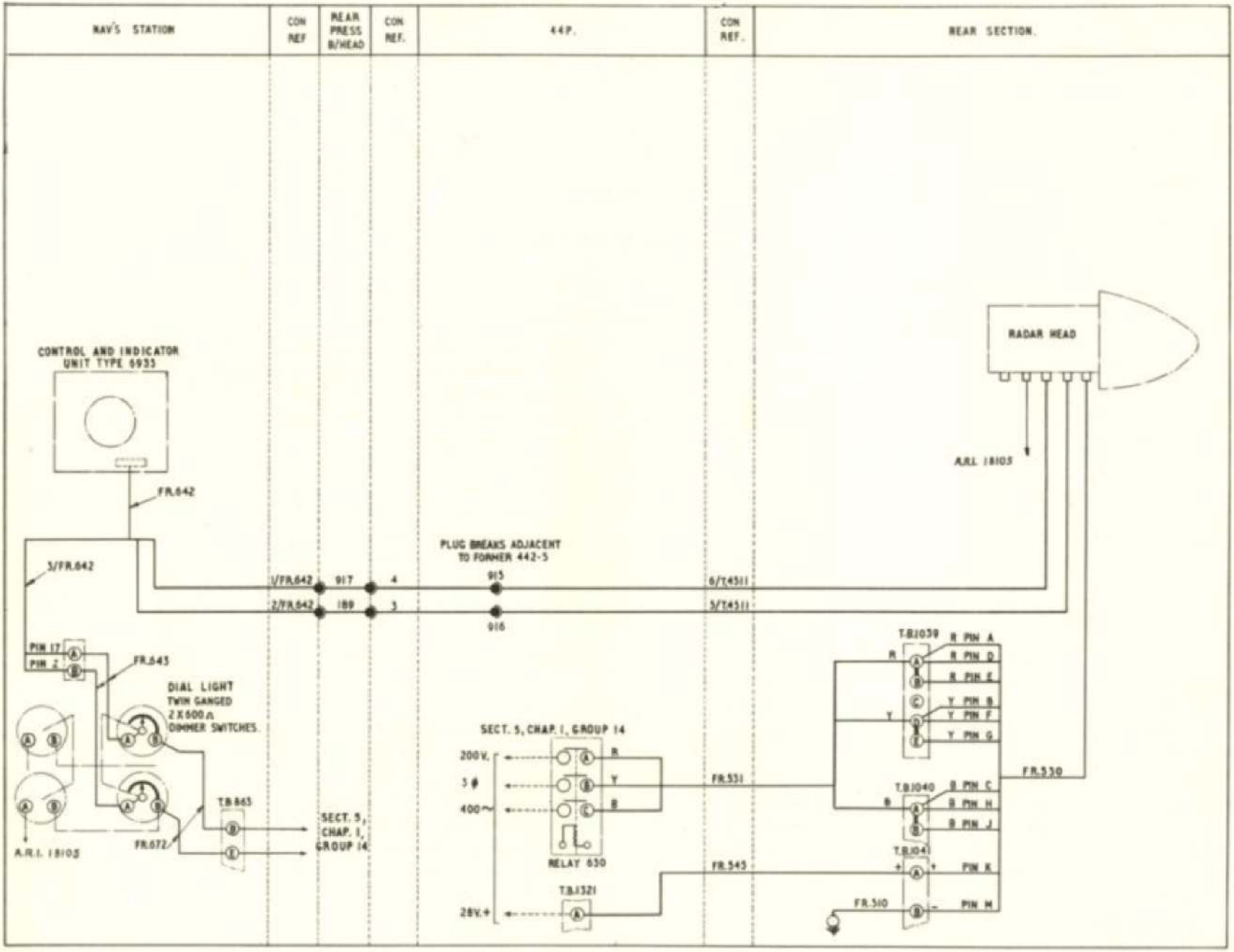

Fig. 3 A.R.I. 5919

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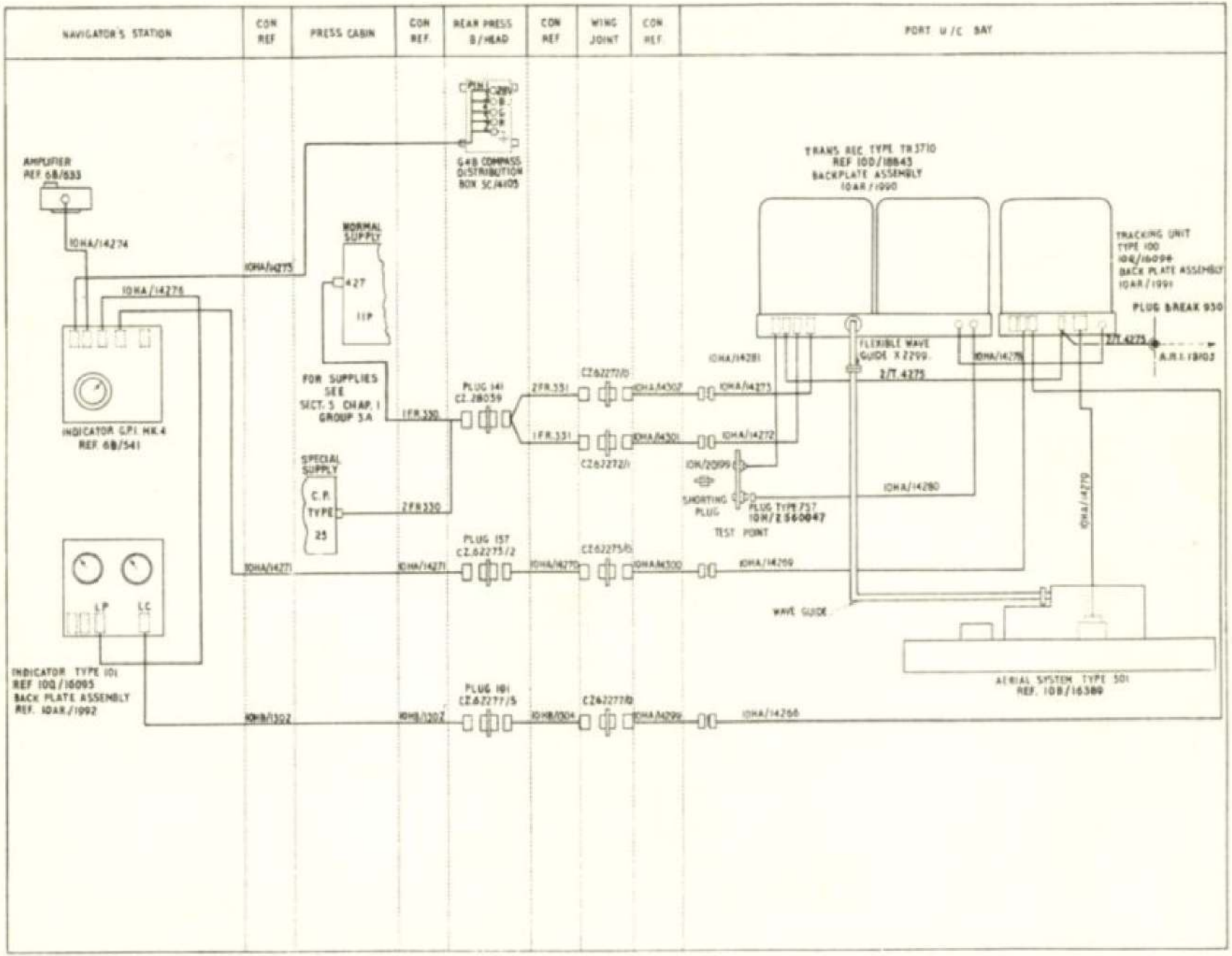

Fig. 4 A.R.I. 5851

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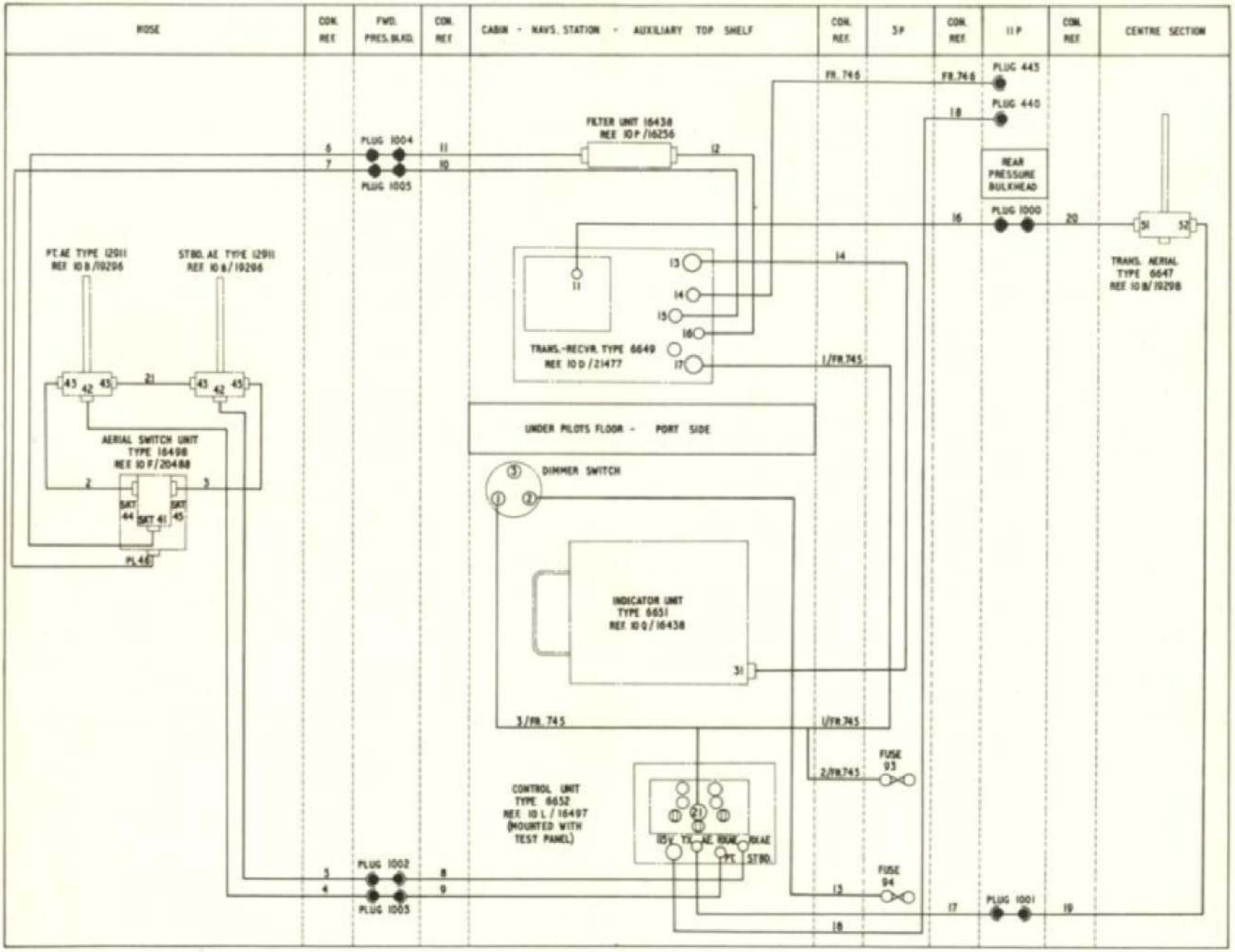

Fig. 5 A.R.I. 5924