Chapter 5
A.R.I.23023

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Introduction

1. The chapter deals with the A.R.I.23023, which is an airborne automatic direction finding installation. The installation provides the following facilities:-

(1) Automatic relative bearing indication from the source of radio signals.

(2) Aerial relative bearing determination by null signal method, the loop aerial being remotely controlled.

(3) Aerial reception of modulated or unmodulated radio signals, either by loop or sense aerial.

(4) Radio range reception.

2. A location illustration of the major components is provided in fig.1. A routing chart and a connector table will be found at the end of the text.

3. Descriptive and servicing details for the A.R.I. are given in A.P.116B-0107-1.

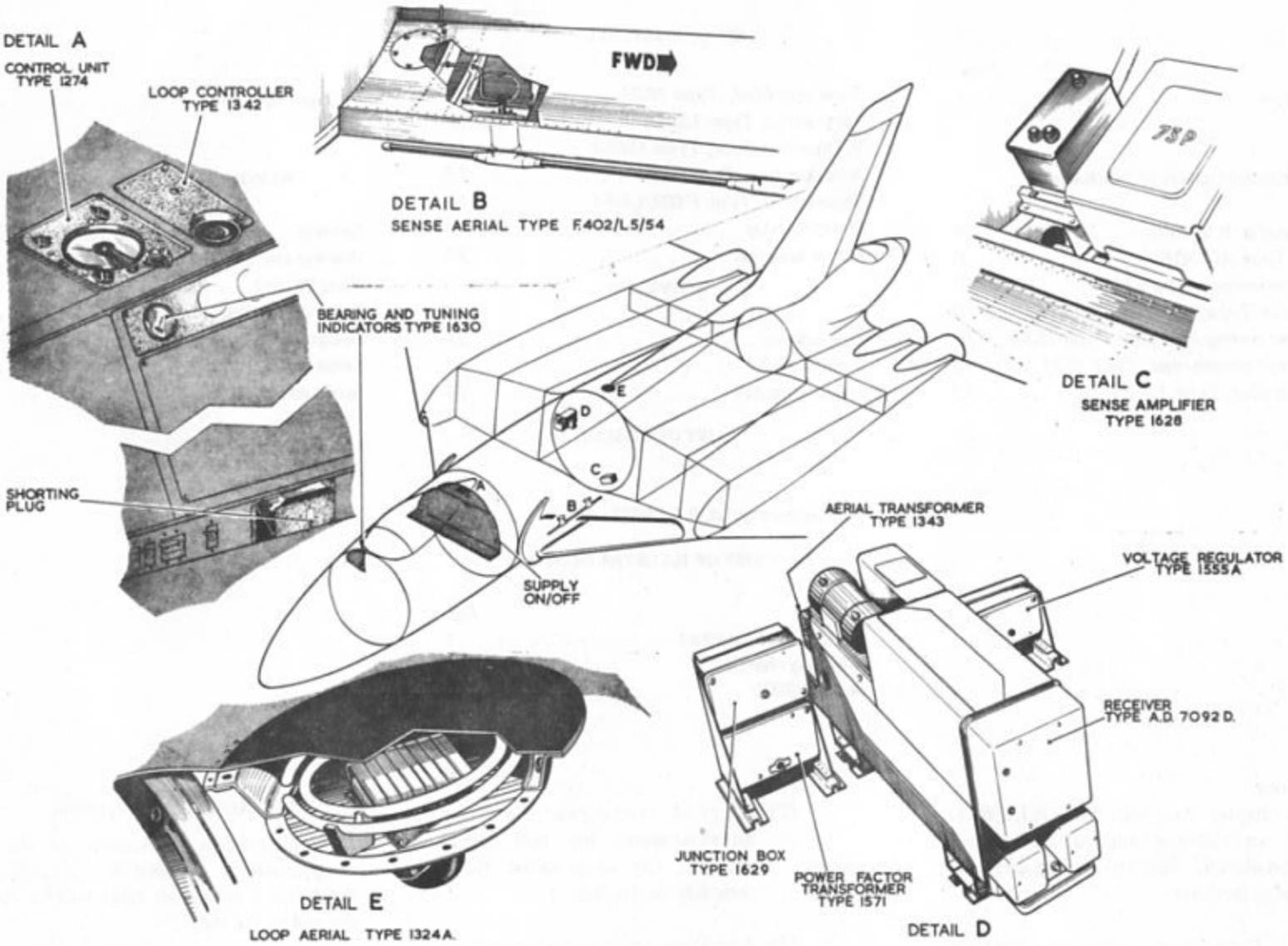

Fig.1 Component location

DESCRIPTION AND OPERATION

CONTROLS AND UNIT LOCATION

4. The installation is controlled from a control unit, Type 1274, at the navigator's station. Other controls fitted on the navigator's panel consist of a loop controller, Type 1342, a bearing and tuning indicator, Type 1630, and a shorting plug. In addition a second bearing and tuning indicator is provided on the second pilot's panel. A change-over switch for A.D.F./TACAN/I.L.S. is located on the port console, and a single-pole switch on the R/T panel at the A.E.O.'s station controls the 28-volt d.c. supply to the system.

5. The bulk of the equipment is mounted above the fuselage tank bay and consists of the following units:-

Receiver	Type A.D.7092D
Aerial transformer	Type 1343
Power factor transformer	Type 1571
Voltage regulator	Type 1555A
Junction box	Type 1629

The receiver is fitted on an anti-vibration mounting tray, and connections to the units are made at the rear by plugs and sockets.

6. A loop aerial, Type 1324A, is mounted at the forward end of the bomb bay roof, and a 'towel rail' sense aerial, Type F.402/L5/54, is mounted on the port nose wheel door.

7. The sense aerial is connected to an amplifier, Type 1628, which is located on the port side of the nose wheel bay adjacent to panel 73P.

Receiver, Type A.D.7092D

8. The receiver is a complete unit, fitted in a light alloy case. A small rotary transformer is fitted to the rear of the receiver case for H.T. supply. Motors for driving the tuning condensers and control switches are mounted on the front of the unit, and are accessible by removing the covers on the front panel.

Aerial transformer, Type 1343

9. The aerial transformer unit is secured to the back plate of the receiver and serves to match the impedance of the co-axial aerial cable to the input circuits of the receiver.

Control unit, Type 1274

10. This unit permits full remote control of the receiver and incorporates an illuminated tuning scale calibrated in frequencies. The following controls are provided:-

System switch
Frequency range switch
R.T./C.W. selecting switch
Tuning control
Gain control
Light switch

Two spare dial lamps are included on the unit.

Bearing and tuning indicator, Type 1630

11. The indicator contains two separate movements providing both relative bearing and tuning indication. The relative bearing indicator is operated by the transmitting element in the loop and has a direct current (Desynn) movement. The tuning indicator is a 500 micro-amp F.S.D. moving coil meter. In addition to its function as a tuning indicator, it also provides an indication of the strength of the received signal.

Power factor transformer, Type 1571

12. This unit is installed to improve the power factor of the load on the a.c. supply to the receiver.

Loop controller, Type 1342

13. This unit provides for the remote rotation of the loop when using the aural D.F. facility.

Sense amplifier, Type 1628

14. This amplifier is required when the loop aerial, Type 1324A, is installed, in order to transform the sense aerial impedance to match that of the receiver aerial cable.

Loop aerial, Type 1324A

15. This loop aerial is an iron core recessed unit, contained in a shallow tray. The loop shaft is supported in suitable bearings, on a chassis beneath the loop baseplate, electrical connections to the loop being made by means of slip rings and silver faced brushes in holders attached to the chassis. A two-phase a.c. motor drives the loop through a suitable reduction gear train.

Voltage regulator, Type 1555A

16. This voltage regulator is connected in series with the aircraft 28-volt d.c. supply, to provide a stabilized 19-volt d.c. output for the receiver circuits.

Junction box, Type 1629

17. This junction box, serves to form a connection point between the sense amplifier, loop aerial and the receiver installation.

Sense aerial, Type F402/L5/54

18. The sense aerial is an omni directional type and is used initially for the reception of a broadcast station prior to actual direction finding via the loop aerial and the associated ADF equipment. This aerial is also used for ARI-23180 on aircraft in the MR role see Chap.5A fig.1.

Shorting plug

19. The shorting plug (fig.2) which is attached to a panel in the navigator's plotters position, is only removed when a voice range filter unit, Type 1275, is fitted.

Power supplies

20. A 28-volt dc supply is fed from fuse 670 in panel 3P, to the voltage regulator, Type 1555A via the ADF supply switch. A 115-volt 400 Hz supply is fed from fuse 251-R in panel 24P, to the power factor transformer, Type 1571. A routing chart of the supplies is contained in Sect.6, Chap.7 of this publication.

SERVICING

Precautions

21. Servicing personnel in particular are warned that ac and dc voltages in excess of 100-volt can be dangerous, to the extent of causing personal injury, fatal or otherwise. It is essential that the utmost attention be given to servicing instructions where matters of safety are concerned. It is essential that maximum co-operation be employed between trades mutually concerned in servicing operations.

Installation

22. The setting up, operating and servicing instructions for the ARI-23023 and its components are contained in AP 116B-0107-1.

23. The security of all components should be checked regularly. All connectors, plugs, sockets and terminal blocks should be examined for damage and ingress of dirt and moisture.

Power supplies

24. In conjunction with the servicing of the system as laid down in AP 101B-1902-4, and using a ground power electrical servicing trolley, the following periodic checks should be carried out. With a suitable test meter check that the ac supply at TB 1005-A is 115-volt 400 Hz and that the dc supply is 28-volt at TB 1005-D.

Voltage regulator

25. On the front panel of the voltage regulator, at the check voltage socket, connect a suitable test meter. The voltage reading should be 19.2-volt with the receiver switched on. Voltage adjustment is effected by a trimmer on the front panel labelled INCREASE VOLTAGE. Switch supply off and on and re-check voltage; re-adjust the control if necessary.

REMOVAL AND INSTALLATION

General

26. Access to the components is straightforward, but the following points should be observed. When it is necessary to remove or replace any components secure all loose connectors to the adjacent aicraft structure to prevent damage.

Bearing and tuning indicators

27. The second pilot's indicator is removed by disconnecting the connector. supporting the instrument from under the panel and then removing the four countersunk screws. The navigator plotter's indicator is removed by lowering the panel, disconnecting the connector and then removing the four countersunk screws.

Control unit

28. Remove the four securing screws, withdraw unit from panel and then disconnect the connector.

Loop controller

29. Remove the two securing screws, withdraw unit from panel and then disconnect the connector.

Equipment above No.2 tank

30. To remove the receiver, unscrew the knurled nut, securing the handle to the tray, and then slide the unit off its anti-vibration mounting. The power factor transformer, junction box and voltage regulators are removed by disconnecting their connectors and removing the securing screws.

Loop aerial

31. Disconnect the four connectors and then unscrew the twelve bolts securing the mounting plate to the aircraft structure.

Sense amplifier

32. Disconnect the three connectors and then unscrew the four securing bolts and lift the unit off its anti-vibration mounting.

Sense aerial

33. The whole aerial assembly or just the aerial rod may be removed as required. To remove the aerial rod only, release the protective covering from around the two aerial masts. Slacken off the two collet locknuts at each mast in order to release the grip on the aerial rod, by sliding off the protective plastic cap at one end of the rod, the rod can be withdrawn from both aerial masts.

34. To remove the complete aerial assembly from the aircraft, the access panel on the inner skin of the port nose wheel door must first be removed, by removing six securing screws. With the panel removed access to the aerial lead-in connector can be made and then disconnected. After releasing the protective covering around the two aerial masts, both masts can be removed from the outer aircraft skin by releasing six securing bolts from the mast flanges.

TABLE 1

CONNECTORS FOR A.R.I.23023

Part No.	Cable form	Connecting	
1/T4096		A.D.F. loop	to R.P.B. plug 177
2/T4096		A.D.F. loop	to R.P.B. plug 130
3/T4096		A.D.F. loop	to junction box
4/T4096	Uniradio 70 – 2 off	A.D.F. loop	to A.D.F. receiver
5/T4096		A.D.F. receiver	to i/c. tels. T.B.381
6/T4096		A.D.F. receiver	to junction box
10/T4096		A.D.F. receiver	to R.P.B. plug 129
11/T4096		A.D.F. receiver	to voltage regulator
12/T4096		A.D.F. receiver	to P.F. transformer
15/T4096		R.P.B. plug 177	to T.B.'s 100, 1001
21/T4096	Equip. wire 25 (23 x .0076)	P.F. transformer	to T.B.1005
22/T4096	Equip. wire 25 (23 x .0076)	Voltage regulator	to T.B.1005
2/T4276		Indicator (Nav.)	to T.B.'s 1000, 1001
3/T4276		Indicator (2nd pilot)	to T.B.'s 1000, 1001
4/T4276		Loop controller	to R.P.B. plug 130
5/T4276		Receiver controller	to R.P.B. plug 129
6/T4276		R.P.B. plug 112	to shorting plug
7/T4276		A.D.F. receiver	to R.P.B. plug 112
8/T4276		A.D.F. receiver	to sense amplifier
9/T4276		Junction box	to sense amplifier
10/T4276		Sense aerial	to sense amplifier

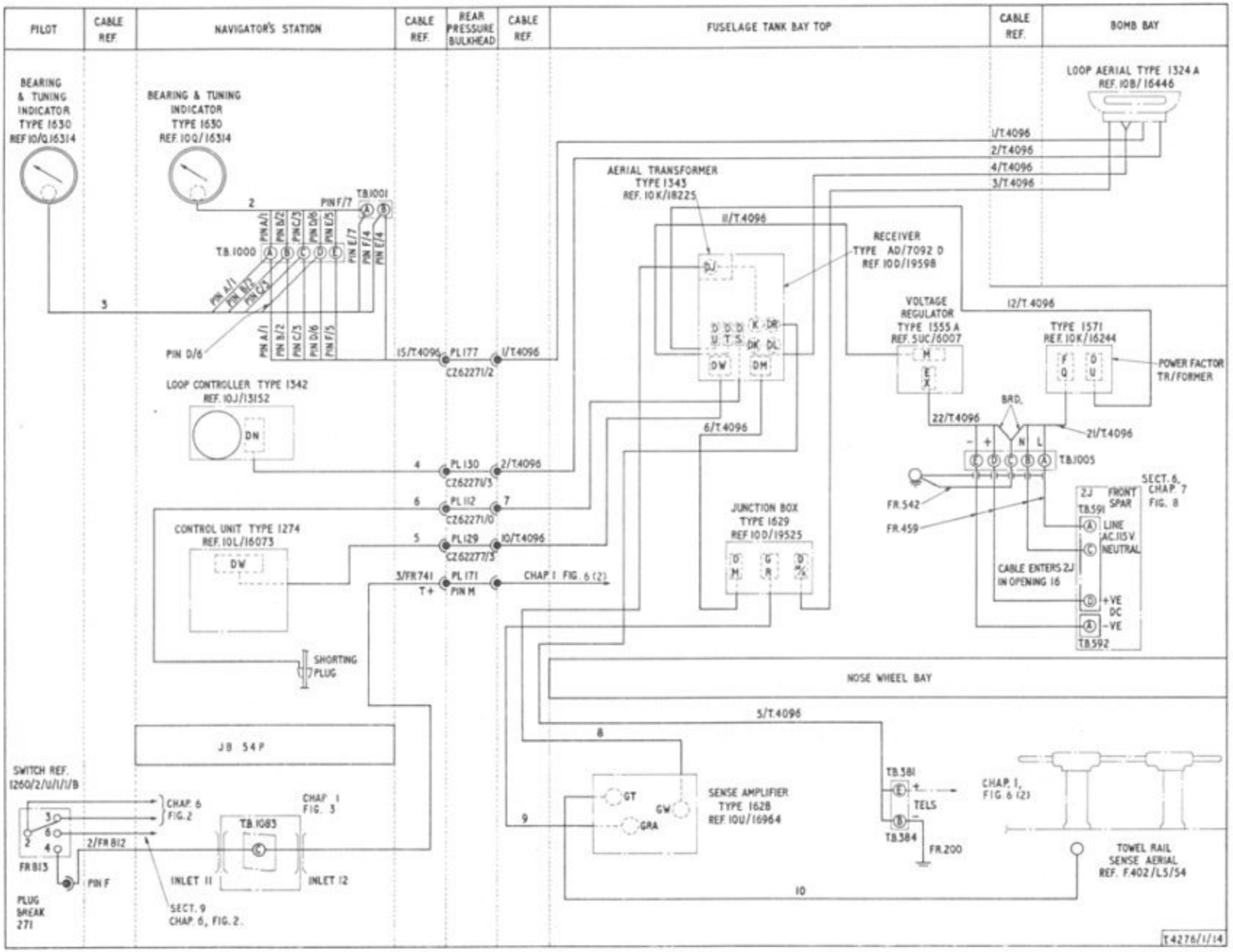

Fig. 2 A.R.I. 23023

▶ Panel 54 P cross reference added ◀