Chapter 7

A.R.I. 23084

LIST OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

Introduction

1. The installation is a service version of the Marconi automatic direction finder, Type AD.712, and provides relative bearing information on the source of radio signals by direct reading indicators and by simultaneous audio reception. The receiver operates on the frequency ranges 100 Kc/s to 419.5 Kc/s, and 489.5 Kc/s to 1799.5 Kc/s in steps of 0.5 Kc/s. The connector assemblies are listed in Table 1 and the major items of equipment are listed in Table 2.

2. Tuning and other facilities are effected from a remote control unit. Although two controllers are fitted, (one at the pilots' canopy panel and one at the navigation station) only one unit can have control of the equipment at any one time. Control is gained by pressing the changeover push-switch on the respective control unit thereby causing the changeover switch unit to operate and connect the desired controller to the receiver backplate junction box.

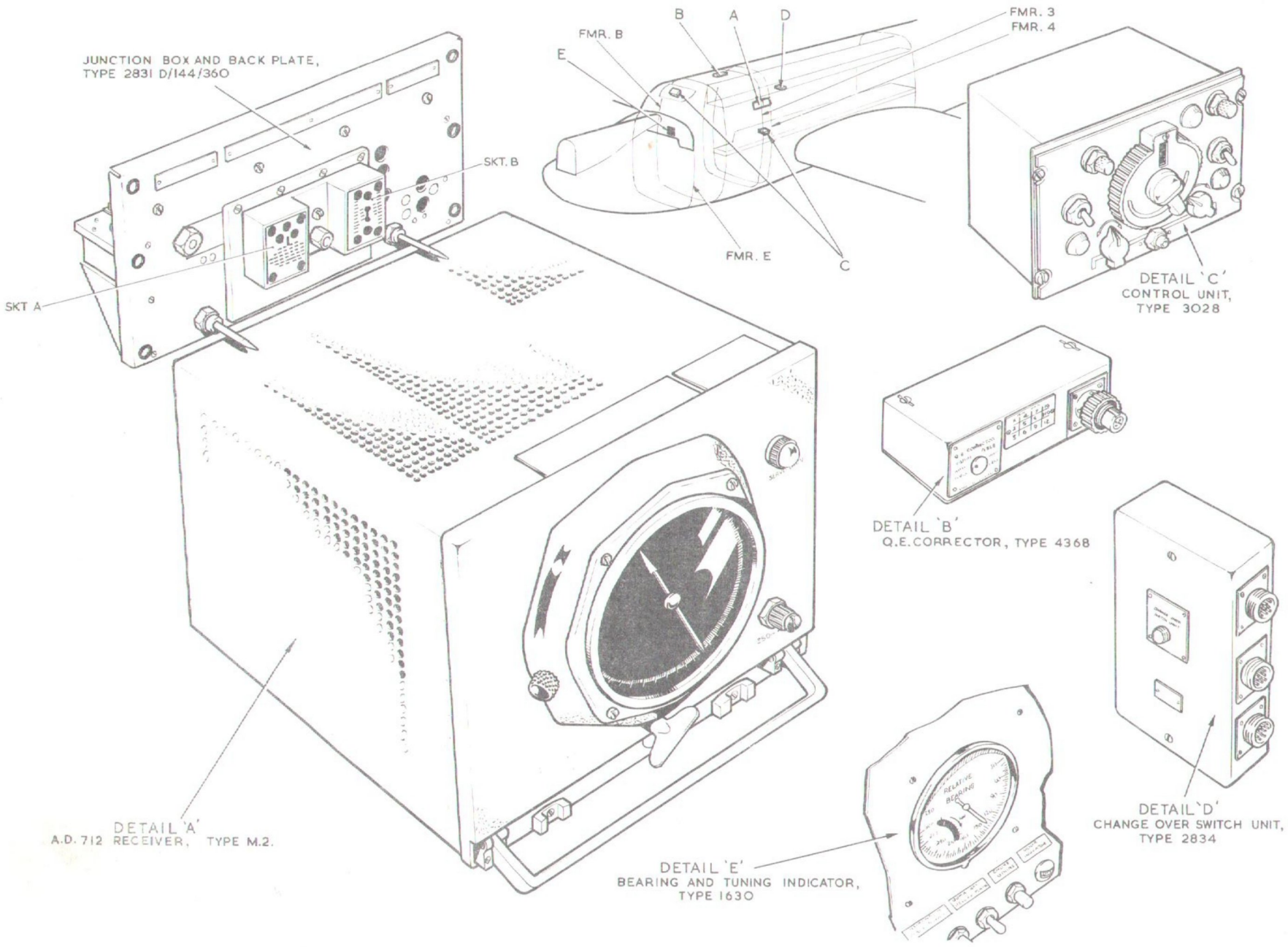

Fig.1. Location of A.R.I. 23084 equipment

◂Backplate Type No. corrected▸

DESCRIPTION AND OPERATION

Receiver

3. The receiver is mounted in the console at former 3, between the tactical and routine attack navigators, as illustrated in fig.1. A 5 inch diameter goniometer indicator mounted on the front face of the receiver provides relative bearing information. The bearing scale of the indicator may be rotated by means of the "Set scale" control to allow the aircraft magnetic heading to be applied. The damping of the indicator pointer can be adjusted by means of the "SERVO GAIN" control. Also mounted on the front panel of the receiver is a 250 mA fuse to protect the H.T. circuits.

4. Electrical connections to the unit are made via two plugs mounted on the rear face of the unit. Two holes in the rear face accommodate the locating spigots on the receiver backplate and ensure correct mating of the receiver plugs with the sockets on the backplate..

Control units

5. All tuning and switching operations for the receiver are effected at the control units. Two controllers are fitted, but only one unit has control of the equipment at any one time (para.2).

6. Three concentrically mounted controls are provided for frequency selection, the "hundreds Kc/s", "tens Kc/s" and "units Kc/s" being switched separately. The selected frequency is indicated in a window within the control switches.

7. Arranged round the frequency control switches are controls for the following:-

GAIN
SELECTIVITY (Sharp/Broad)
LOOP ROTATION (i.e. goniometer)
CHANGEOVER (push-switch)
OFF/ADF/ANT/LOOP (Function switch)
B.F.D. (on/off switch)
B.F.D. note.

8. Three lamps in the controller facia panel provide edge lighting. The lamps are controlled by dimmer switches at the pilots' canopy panel and the navigator's station.

9. To enable the bearing indication to be checked, the service version of the control unit, Type 3028, is modified to provide manual override of the indicator drive system when A.D.F. is selected. If the loop control is operated when A.D.F. is in use, the indicator pointer will be driven to a new position. If the original pointer indication was in fact, a bearing, the pointer will return to this position when the loop control is released. However, if the original position was not a bearing, but a "rest position", then no re-setting of the pointer will occur on release of the loop control.

Junction Box

10. This junction box forms an interconnecting unit for all the items of equipment, with the exception of the control units Type 3028. Contained in the box are circuits for compensating the aerial circuits and trimming the capacitance of the sense aerial. A small plate on the top of the box provides access to a sense aerial trimmer.

11. The two suffix numbers forming part of the junction box type number (144/360) indicate that the unit is matched to a loop aerial feeder 144 inches long and a sense aerial feeder 360 inches long. In the case of the loop aerial connector, the 144 inches is the total length from the junction box to the loop aerial, via the Q.E. corrector unit.

Loop aerial

12. The loop aerial is mounted on the centre line of the upper fuselage at former 2 and consists of two centre tapped coils wound on ferrite rods mutually at right angles. The loops are sealed in a resin moulding encased in a fibre-glass cover. Connections to the aerial are via a six-way plug on the base of the unit. A fixed quadrantal error correction of 15.5 degrees is built into the loop aerial assembly.

Sense Aerial

13. Sense aerial requirements are provided by a rod aerial, Type T, mounted on the starboard bomb door, combining the following items:-

Aerial rod	Type 402.2R.120
Lead-in mast	Type 402.A8
Dead-end mast (2-off)	Type 402.B8

14. The aerial rod passes through collets in the masts, the collets being tightened by locknuts. The centre mast has an insulated aerial feed-in passing down the centre of the mast and through to the inside of the bomb door. Warning flags are provided to fit on each end of the sense aerial when the aircraft is on the ground.

SH.1485

Q.E. corrector

15. The quadrantal error correction unit is mounted in the fuselage roof at formers 1 and 2 directly below the loop aerial and is used to supplement the built in correction of the loop aerial. By soldering shorting links across wiring tags within the unit, the fixed correction of 15.5 deg. may be varied by ± 7 deg.

Change-over switch unit

16. This unit is mounted on the navigator's top shelf at formers 4 and 5 and provides a means of switching full control of the receiver to either of the two control units. The unit contains an electro-mechanical switch, operated by depressing the change-over push-switch on whichever controller is required for use.

Pilots' indicator

17. A synchro repeater system allows for the operation of a remote bearing indicator on the first pilot's panel. It should be noted that the TUNE facility on the pilot's indicator is not used in this installation.

Power supplies

18. The equipment requires two sources of electrical power.

(1)	28-volt d.c.	Aircraft busbar via fuse BT.12. Port fuse panel.
(2)	115-volt, 400 c/s single phase, a.c.	No.4 inverter (Type 108) via fuse CF.2. Nose radio crate.

19. The equipment is switched on at the controllers, by selecting the function switch to a position other than off, but

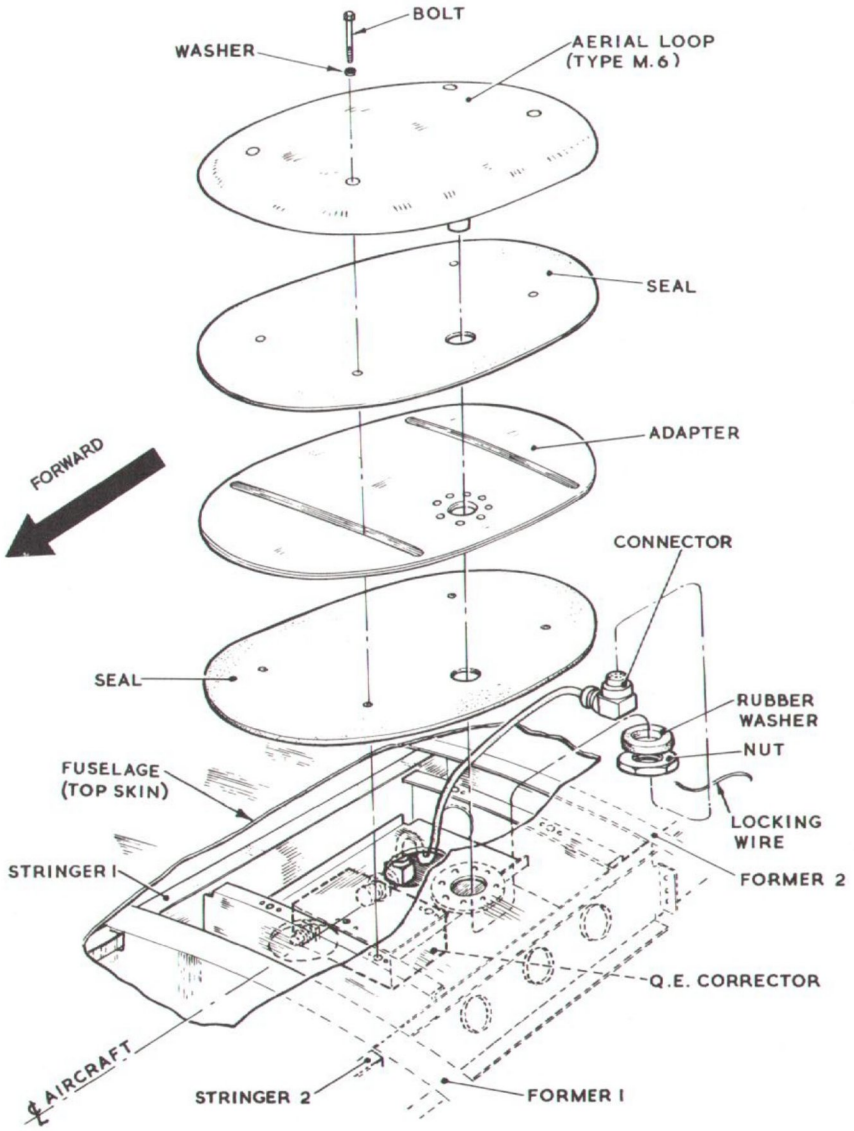

Fig.2 - Assembly of loop aerial

it may be necessary to depress the change-over push after this selection has been made. Prior to switching on however, it is necessary to start the No.4 inverter; control of this inverter being from the radio power panel at former 7. For further information on the power supply circuits, refer to Book 2, Sect.6, Chap.2A, 2B and 2C of this publication.

SH.1487

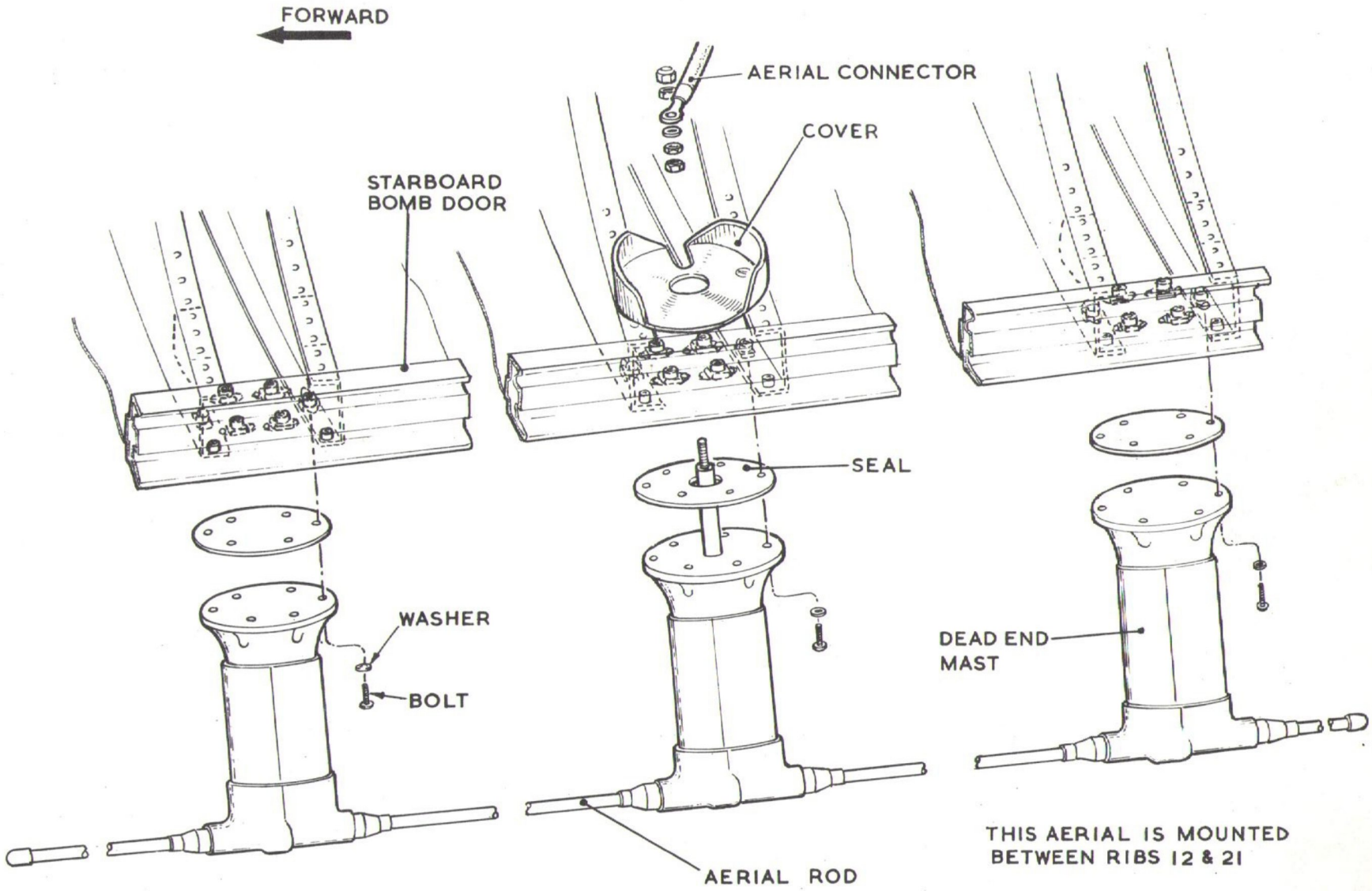

Fig.3 - Assembly of sense aerial

Precautions

20. Before any servicing is attempted, the general servicing precautions outlined in Chapter 1 of this Section should be noted.

General

21. All interconnecting plugs and sockets, including the sense aerial plug break in the bomb bay, should be examined periodically for security, damage and corrosion. The receiver should be checked for security and bonding, and condition of the anti-vibration mountings.

Aerials

22. As no servicing is possible on the loop aerial, it requires only an in situ check for security and corrosion. The connections to the Q.E. corrector should also be examined. The sense aerial should be checked for security and corrosion and the connection examined through the access panel provided on the inner skin of the starboard bomb door.

NOTE . . .

On no account should either the loop aerial or the sense aerial be painted.

Voltage Tests

23. When making voltage tests, it is essential that a ground supply (28-volt) is connected to the aircraft.

Q.E. Corrector

24. For the method of determining and applying Q.E. correction, together with full servicing and setting-up notes, reference should be made to the publication listed in Table 1.

NOTE . . .

2 deg. negative correction is required for this installation.

REMOVAL AND INSTALLATION

Receiver

25. This unit is mounted in the console at the navigator's station. A thumbscrew located centrally at the base of the receiver front panel controls a screw jack which runs through the unit from front to rear. This screws into a block on the receiver backplate and ensures correct location of the plugs and sockets. The screw also serves to "jack" the receiver away from the backplate.

26. By loosening the two wingnuts on the receiver mounting tray and operating the thumbscrew, the receiver may be removed from its mounting. A soft metal shear pin is inserted near the thumbscrew to prevent undue strain being placed on the jacking assembly during installation or removal. Should this pin shear, reference should be made to A.P.2530P, Vol.1, Part 2, Sect.1, Chap.1.

27. Care should be taken not to damage the indicator mounted on the receiver front panel. When fitting a receiver ensure that the plug pins at the rear of the set are not damaged or distorted. The receiver weighs approximately 33 lb. and is provided with a transport handle.

Loop aerial

28. If a loop aerial is known to be defective, replacement should be carried out as follows:-

(1) Disconnect cable, Pt. No.13/T.5410, from the base of the aerial, after removing the locking wire.

(2) Remove and retain the nut, metal washer and rubber seal from the connector plug pillar.

(3) Remove and retain the four ¼ inch bolts, Pt. No.AS.2992/14E and washers, Pt. No.SP.11/E, attaching the aerial to the upper fuselage.

(4) The aerial may now be removed from the aircraft. When performing this operation, care should be taken not to damage the seals beneath the aerial and the adapter plate, or the seal between the adapter and the fuselage (Pt. No. 3/T.5290, 2/T.5290 and 4/T.5290 respectively).

(5) The nut and washer removed in (2) should be fitted to the unserviceable aerial. (The rubber seal, Pt. No.5/T.5290 is needed for the new loop aerial.)

(6) Before attempting to fit a new loop aerial, the nut and washer on the plug pillar should be removed and retained.

(7) Ensure that the seals and adapter beneath the new aerial are fitted correctly.

(8) Check that the aerial is aligned to the fore-and-aft axis of the aircraft to within 0.25 degrees. A notch at each end of the aerial indicates the electrical centre line of the loop.

(9) The attachment bolts should be tightened gradually and diametrically, to avoid distortion of the loop.

WARNING . . .

Excessive tightening of the bolts may cause distortion and thereby damage the ferrite rods inside the aerial.

(10) Re-fit the seal, washer and nut to to the plug pillar.

(11) Reconnect cable, Pt.No.13/T.5410, to the plug pillar and wire lock to the aerial.

Q.E. Corrector

29. Removal of this item is straight forward, but ensure that the shorting links in the replacement item are correctly set.

Sense aerial

30. The aerial masts are attached to the bomb door by six 2BA bolts, Pt.No.AS.2922/5C and washers Pt.No.SP.14/C. Seals are fitted between the masts and bomb door, a seal Pt.No.2/T.5373 being used at the dead-end masts, and a seal, Pt.No.3/T.5373 at the lead-in mast.

31. Access doors are provided in the inner skin of the bomb door over the aerial connector at the aerial, and the aerial feeder plug break.

32. Replacement of the aerial rod may be carried out as follows:-

(1) Release the protective aluminium caps from each mast, and slacken the collet locknuts.

(2) Remove the red plastic protective cap from one end of the aerial rod and draw the rod through the masts. Retain the protective caps.

(3) When fitting a new rod, pass the appropriate caps over the rod before feeding through each mast.

(4) Tighten the collet lock nuts on each mast to retain the rod.

(5) Re-fit the aluminium caps over the masts and the plastic cap on the rod.

33. If a mast is to be replaced, the rod need only be drawn through sufficiently to allow removal of the mast concerned.

34. The insulation between the aerial rod and the aircraft skin should be at least 40 megohms when checked with an insulation tester, Type E. The resistance between the aerial rod and the terminal pillar should be less than 1 ohm when tested with a low voltage continuity tester.

Control units

35. Removal of these units is straightforward, but prior to re-fitting ensure that the miniature plug pins on the rear face of the item are not damaged or distorted.

SH.1489

TABLE 1

Connectors for A.R.I.23084

Part No.	Cable Form	Connecting
2/T.5958	Equipment wire (DEF.12B) Type 2 -7/.0076 - 28 off Type 2 -14/.0076 - 1 off Type 2 -14/.0076 - 4 off Uninyvin 20 - 1 off	Pilots control unit to C/O switch unit QW2 and canopy dimmer switch
3/T.5958	Equipment wire (DEF.12B) Type 2 - 14/.0076 - 4 off	Pilots indicator to receiver backplate QV
4/T.5958	Equipment wire (DEF.12B) Type 2 - 23/.0076 - 2 off	T.B.722(A) and (B) to receiver backplate QZ
5/T.5958	Equipment wire (DEF.12B) Type 2 - 14/.0076 - 1 off Type 2S - 14/.0076 - 1 off	T.B.477(B) and T.B.711(D) to receiver backplate QX
4/T.5671	Equipment wire (DEF.12B) Type 2 - 7/.0076 - 29 off Type 2 - 14/.0076 - 2 off Type 2SM - 14/.0076 - 4 off	C/O switch unit RG to receiver backplate RG
5/T.5671	Equipment wire (DEF.12B) Type 2 - 23/.0076 - 2 off	Signaller's station fuse BT.12 and earth point 36 to receiver backplate QY
7/T.5671	Equipment wire (DEF.12B) Type 2 - 7/.0076 - 28 off Type 2 - 14/.0076 - 1 off Type 2 SM - 14/.0076 - 4 off Uninyvin 20 - 1 off	C/O switch unit QW1 to Nav. control unit and dimmer switch
9/T.5671	Special Marconi cable	Receiver backplate QN to Q.E. corrector QN
10/T.5377	Modified Uniradio 64 (Marconi)	Receiver backplate QP to Bomb door plug break
16/T.5377	Modified Uniradio 64 (Marconi)	Bomb door plug break to Sense aerial
13/T.5410	Special Marconi cable	Q.E. corrector QM to loop aerial

TABLE 2

Major items of equipment

Equipment	Type	Ref.No.	A.P. Reference
Receiver	M.2.	10D/23299	◀ A.P.116B-0103-1 ▶
Backplate junction box	2831D/144/360	-	
Control unit (2 off)	3028	10L/16814	
Change-over switch unit	2834	10F/21092	
Bearing and tuning ind.	1630	10Q/16314	
Loop aerial	M.6	10B/19995	
Q.E. corrector unit	4368	10D/23300	
Sense aerial (Chelton)	F.402/T8/120	-	-

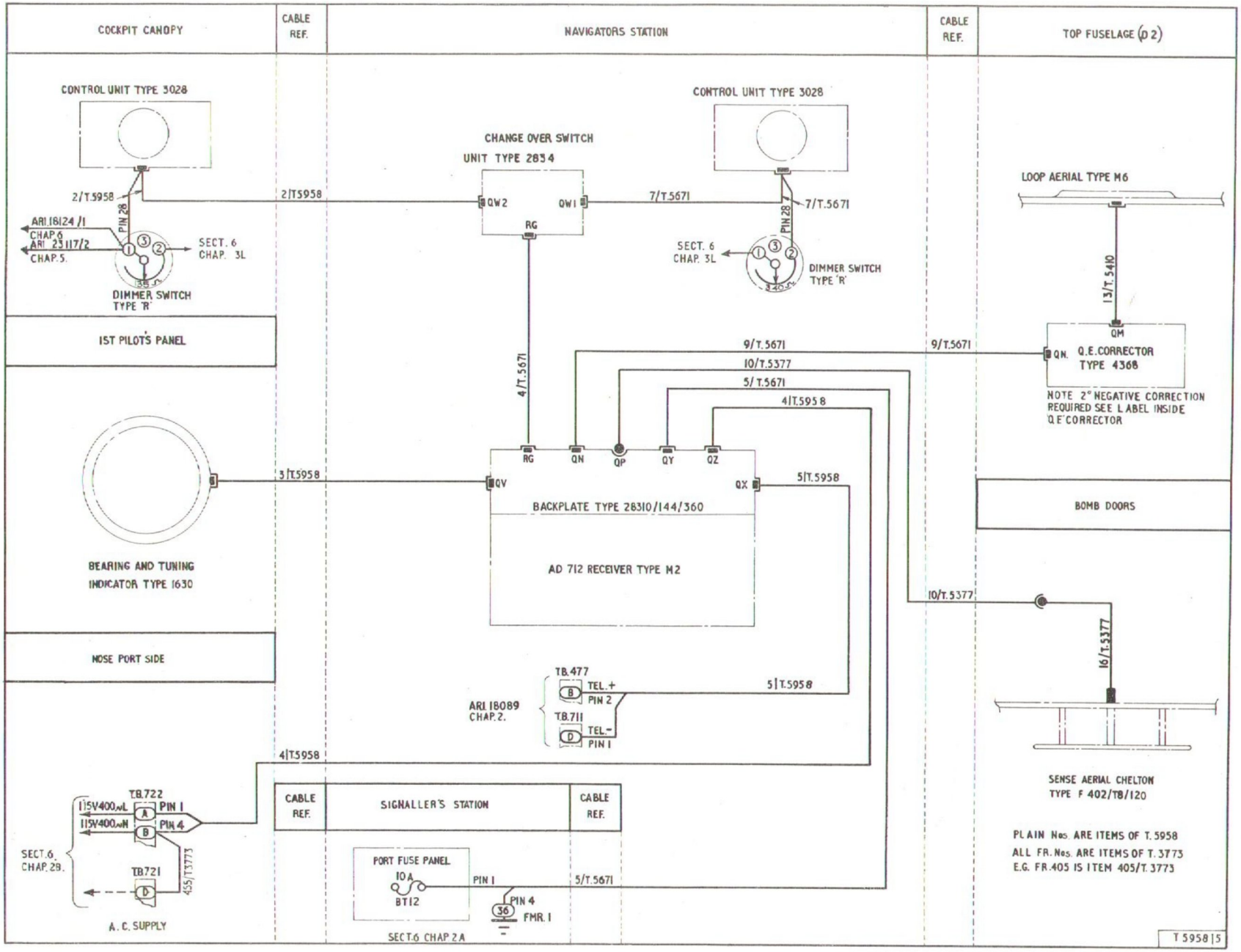

Fig. 4. A.R.I. 23084

A.R.I. No. corrected at dimmer switch (cockpit canopy)