Group 6

ARMAMENT INSTRUMENTS

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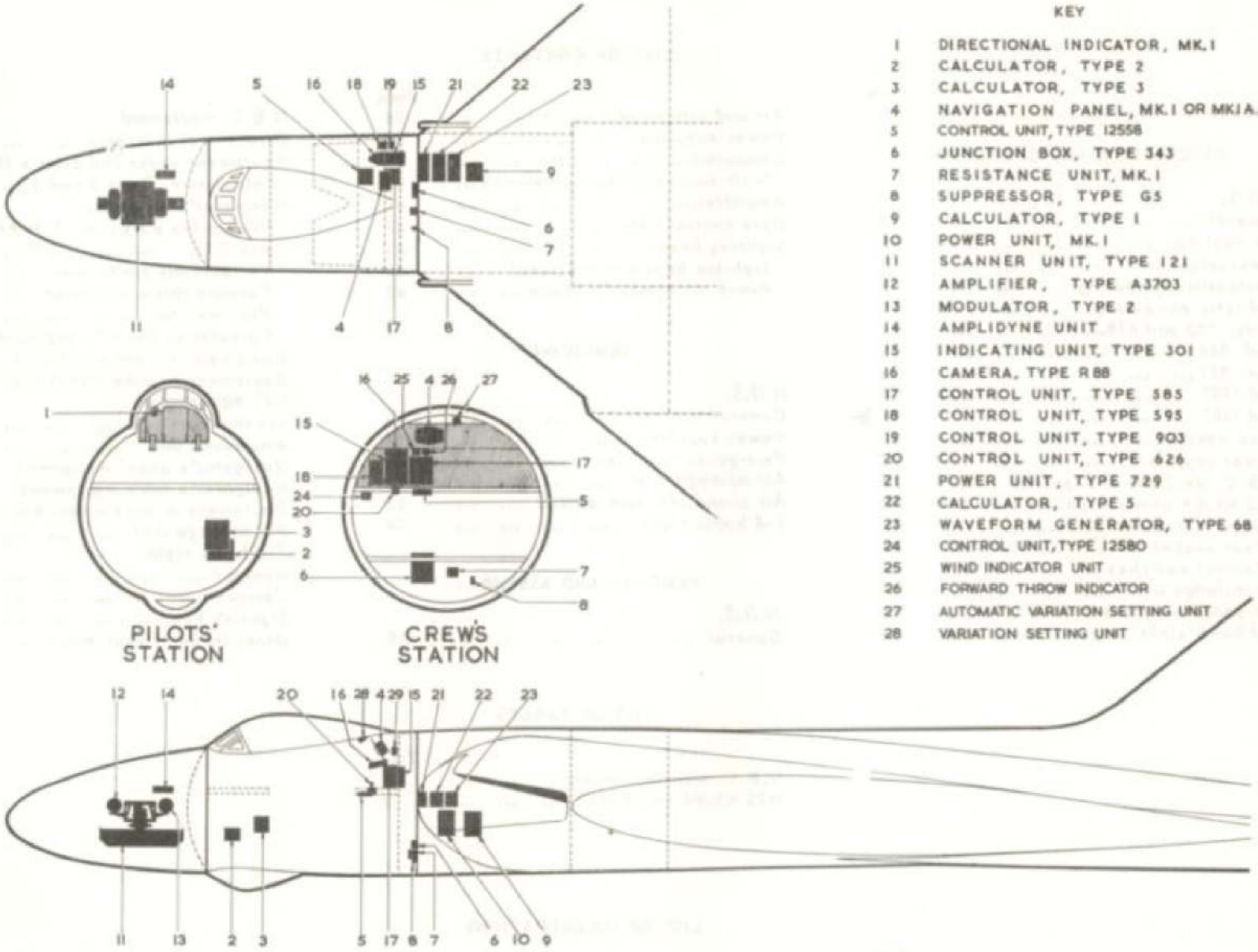

KEY

1	DIRECTIONAL INDICATOR, MK.1
2	CALCULATOR, TYPE 2
3	CALCULATOR, TYPE 3
4	NAVIGATION PANEL, MK.1 OR MK.1A.
5	CONTROL UNIT, TYPE 12558
6	JUNCTION BOX, TYPE 343
7	RESISTANCE UNIT, MK.1
8	SUPPRESSOR, TYPE G5
9	CALCULATOR, TYPE 1
10	POWER UNIT, MK.1
11	SCANNER UNIT, TYPE 121
12	AMPLIFIER, TYPE A3703
13	MODULATOR, TYPE 2
14	AMPLIDYNE UNIT
15	INDICATING UNIT, TYPE 301
16	CAMERA, TYPE R88
17	CONTROL UNIT, TYPE 585
18	CONTROL UNIT, TYPE 595
19	CONTROL UNIT, TYPE 903
20	CONTROL UNIT, TYPE 626
21	POWER UNIT, TYPE 729
22	CALCULATOR, TYPE 5
23	WAVEFORM GENERATOR, TYPE 68
24	CONTROL UNIT, TYPE 12580
25	WIND INDICATOR UNIT
26	FORWARD THROW INDICATOR
27	AUTOMATIC VARIATION SETTING UNIT
28	VARIATION SETTING UNIT

Fig. 1 Location of N.B.S. equipment

Introduction

1. This group deals with the instruments employed in the Navigation and Bombing System Mk.1, and the T-4 bombsight installation for both Mk.1 and 1A aircraft. Descriptive and servicing information is provided on the controls and power supplies for the equipment, and detailed instructions for the removal of certain components are given. Full details of the source of the power supplies are contained in Book 2, Sect.5, Chap.1, Group 3A. The N.B.S. is fully dealt with in A.P. 2894K, Vol.1, Parts 1, 2 and 3, and the T-4 bombsight in A.P.1275D, Vol.1, Sect.7.

2. Information is also provided on an air speed pressure switch, which is connected to the pitot-static system and forms part of the 7,000 lb. bomb fuzing and release circuit described in Book 2, Sect.5, Chap.1, Group 13.

3. The N.B.S. combines the facilities of various computing instruments and a radar service, and is used in conjunction with the bomb fuzing and stores release system. Appropriate signals are fed to the equipment from an air mileage unit, details of which are given here, and the G4B compass, and provision is made for direct coupling with the autopilot, Mk.10. Fig.1 shows the location of the equipment and a list of the various units, including Ref. Nos. and location is given in Tables 1 and 2. Where the power supplies for the system are described, the equipment is divided into its computor and radar sections for ease of reference.

DESCRIPTION AND OPERATION

N.B.S.

General

4. The Navigation and Bombing System, Mk.1, comprises a Navigation and Bombing Computor (N.B.C. Mk.2) and a range-finding radar (H2S Mk.9A), and is designed for use in medium and long range aircraft operating beyond the range of ground based aids. When required, the system can produce steering signals for the aircraft, response to which may be manual or automatic. In the latter case the N.B.S. is linked with the autopilot Mk.10.

Air cooling

5. Air cooling is provided for the operating units of the system to prevent overheating and subsequent loss of efficiency when the system is in use. A supply of cool air for the H2S scanner unit and amplidyne unit in the radome is taken from the cabin air conditioning system, and is fed via a combined valve assembly mounted close to the pressure dome in the nose. Note that when Mod.812 is embodied the air supply to the amplidyne unit is deleted. A ground air supply connection on the port side of the nose is used to supply cooling air to the scanner equipment during ground operation. The air conditioning system is described in Book 2, Sect.5, Chap.1, Group 8A, and in Book 1, Sect.3, Chap.8A.

6. Air is ducted from the starboard air intake for cooling the equipment in the nose wheel bay radar crate, and the ducting is arranged to allow the air to flow upwards and around each unit. The dispersal of air about the N.B.C. power unit and calculator, Type 1, is further assisted by a muff assembly fitted underneath each of those units.

Pressurised air

7. Air is supplied to the H2S scanner system at a controlled pressure of 15 p.s.i. absolute. This air is fed from a storage cylinder located in the nose of the aircraft on the port side. The cylinder is charged at 1,800 p.s.i., which is subsequently reduced by a pressure reducing valve and regulator to the required pressure. Control of the air supply is made by an electromatic tap situated in the line between the reducing valve and the regulator. At this point the pressure is 30 p.s.i. The tap is operated by a single pole switch situated at the starboard side of the navigator's station.

8. Two pressure gauges are provided, one on the air charging panel in the nose, and one adjacent to the control switch at the navigator's station. Further information on the gauges will be found in Group 5 of this chapter. A routing chart of the circuit for the electromatic tap is contained in Book 2, Sect.5, Chap.1, Group 8.

Navigation computing

9. The navigation computor is fed with inputs representing true air speed from the air mileage unit, and compass heading from the G4B compass. From this information, and from N/S and E/W components of wind velocity set into the equipment either manually or semi-automatically, aircraft track and ground speed are computed and displayed. From the N/S and E/W components of ground velocity, the aircraft's ground displacement (N/S and E/W) from a starting point is also calculated. The present position is recorded on position numerators in terms of latitude and longitude, except in position fixing when the position recorded is that of the fixing point.

10. Connections for the compass heading signals are made from the G4B junction box mounted on the rear pressure bulkhead in the cabin. A suppressor, Type G5, is provided in the circuit and is positioned adjacent to the junction box.

11. Provision is also made for the comparison of the N/S and E/W components of ground speed with similar components produced by the G.P.I. Mk.4. These components from the G.P.I. are derived from the ground speed measured by A.R.I. 5851 (Sect.6, Chap.2) and are instantaneously more accurate than those provided by the navigation computing of the N.B.S.

Ballistic computing

12. Ballistic information relevant to the type of bomb to be dropped is fed from a short length of 35 m.m. film into the calculator, Type 3, Mk.1, which is connected to the starboard pitot-static system. The equipment then calculates the required track to the release point and provides steering signals to the pilot's directional indicator, Mk.1, and through a bombing coupling unit to the autopilot, Mk.10. Signals to open the bomb doors and initiate bomb release are also provided.

13. A camera, Type R88, which is positioned above the indicating unit, Type 301, on the navigator's panel, is used to photograph the P.P.I. display at intervals of 8 seconds. At the point of bomb release the film is marked automatically, and the P.P.I. will continue to be photographed until completion of the bombing run.

Mods. 780 and 818

14. With the introduction of Mod. 780 (Mk.1 aircraft) or Mod.818 (Mk.1A aircraft), a forward throw indicator, Ref.No. 9D/1400, is fitted on the navigator's panel above the control unit, Type 585. The indicator, which connects direct to the junction box, Type 343, shows the computed forward throw of the bomb on a scale calibrated 0-14 nautical miles.

Mod. 864

15. Mod. 864 introduces a variable air speed unit, Ref. No. 9D/1566, on both Mk.1 and Mk.1A aircraft. The unit is fitted in the roof near the navigator's station, and enables the navigator to apply a manually set air speed input to the calculator, Type 2 in place of the normal input from the A.M.U., Mk.4B, should the normal input be considered unsatisfactory.

Mod. 827

16. Mod. 827 is applicable to Mk.1A aircraft only. This Mod. introduces a navigation panel, Mk.1A, in lieu of the navigation panel Mk.1, and also instals an automatic variation setting unit (A.V.S.U.) Ref.No.6B/2958, in the roof at the navigator's station. A pillar lamp provides illumination for the A.V.S.U. and is fitted, with its control switch, on a bracket positioned in front of the unit. The circuit for the lamp is shown on the appropriate routing chart in Sect.5, Chap.1, Group 10.

17. The A.V.S.U. operates in conjunction with the navigation panel, Mk.1A from which it accepts an automatic variation signal for conversion, and applies it to the G4B compass to give true heading information. Connections from the unit to the G4B compass are shown on the appropriate routing chart in Group 3. A full description of the unit and its function is contained in A.P. 1275B, Vol.1, Sect.11, Chap.7, App.5.

◀ **Mod.1707**

18. Mod.1707 deletes Rebecca Mk.10 (A.R.I.5924) which was introduced on Mk.1A aircraft by Mod.958. This installation changed N.B.C. connector 47/T3409 to 66/T3409, which now no longer applies. ▶

Mod.1201

19. With the introduction of Mod.1201, the fixed fittings for the calculator, Type 7 and associated remote control unit, Mk.2A, are deleted on both Mk.1 and 1A aircraft. This includes deletion of the power supplies to the calculator from the a.c. fuse and relay panel 11P.

Wind monitor

20. The wind monitor comprises the wind unit, Ref.No. 9D/756, and the indicator unit, Ref.No. 9D/757. This equipment compares and indicates the N.B.S. ground speed components with the more accurate ground speed components of the A.R.I. 5851 as already mentioned in para.11. Both units are fitted at the navigation station, the indicator on the navigator's panel, and the wind unit on the navigator's top shelf. Note that when the wind monitor is not required, the two connectors at plug 2A and socket 22B on the wind unit are connected to a stowage bracket adjacent to the unit.

Power supplies

21. Power supplies for the N.B.S. are fed from the screened (lower) portion of the a.c. fuse and relay panel 11P. A routing chart of the supplies is contained in Sect.5, Chap.1, Group 3A, where the a.c. power and distribution system is described. The routing chart bears the title *Screened Radio and Radar Supplies*, and is simplified by a theoretical circuit diagram.

22. The a.c. power for the system is supplied by No.1 inverter, Type 350. Three neon lamps on the a.c. supplies switch panel at the navigator's station are connected across the inverter's 115-volt outputs, and provide indication when the 400 and 1,000 c/s supplies are available. The supplies can be checked from two test sockets. One, socket 595, is fitted on panel 11P, and the other, socket 594, is located adjacent to junction box 4J in the nose. In the event of supply failure, the load can be transferred to No.2 inverter by selecting the appropriate control switches on the switch panel. Full details of the normal and emergency

operation of the inverters will be found in Chap.1, Group 3 and 3A as indicated in in the previous paragraph.

N.B.C. Mk.2 power supplies

23. Power for the N.B.C. is provided at three supply values, 28-volt d.c., 115-volt, 3-phase, 400 c/s a.c., and 115-volt, single-phase 1,600 c/s a.c. The supplies are fed from 11P to the Type 343 junction box on the rear pressure bulkhead in the cabin. Assuming that No.1 inverter is running, the three supplies will be connected to the equipment via the contacts of relay 167, when circuit breaker No.1 on 3P is engaged, and the N.B.C. control switch on the navigator's a.c. supplies switch panel is ON.

24. Prior to Mod.1201 (para.19), power supplies of 28-volt d.c. and 115-volt, 3-phase, 400 c/s a.c. are fed from the unscreened portion of 11P to the time of fall calculator, Type 7. The 115-volt a.c. is supplied by No.3 inverter and is connected to the calculator via fuses 245 and 246 when the inverter is switched on. The supplies are shown on a routing chart bearing the title *Unscreened Radio Supplies* in Chap.1, Group 3 and 3A.

H2S Mk.9A power supplies

25. Power for the H2S is provided at four supply values, 28-volt d.c., 112-volt d.c., 115-volt, 3-phase, 400 c/s a.c., and 115-volt, single-phase, 1,600 c/s a.c. The 112-volt d.c. is fed from fuses 413 and 414 in the 112-volt distribution panel 19P, and the other supplies from the relevant fuses in 11P. The necessary supply connections for the scanner equipment in the nose are made from junction box 4J and T.B.785, both located in the starboard side of the nose section.

Neon indicators

26. Two power failure neon lamps are positioned on the navigator's radar panel to provide indication that the 115-volt, 3-phase, 400 c/s a.c. supply from No.1 inverter is available for the H2S equipment. Failure of the supply will cause the indicators to go out.

Test socket 594

27. Test socket 594, in the starboard side of the nose section, provides the means of testing the 115-volt, 1,600 c/s supply to the scanner unit. Supply to the socket is controlled by the H2S control switch (para. 28).

Control switches

28. Three control switches for the equipment are provided, one on the a.c. supplies switch panel, labelled H2S 112-V D.C., and two on the navigator's radar panel, labelled SCANNER STABILIZATION and SCANNER ROTATION respectively. The H2S control switch acts as a master switch for all four power supplies and is itself controlled by circuit breaker No.2 on 3P.

29. The stabilization switch is a double-pole, rotary switch, labelled OFF/EMERGENCY/STAND-BY/ON, and according to selection will maintain a 28-volt d.c. supply to the emergency or stand-by circuits of the scanner unit, and a 112-volt d.c. supply to the amplidyne motor generator. The single-pole ON/OFF switch for scanner rotation provides a 28-volt d.c. supply only to the unit.

30. Assuming that No.1 inverter is running, reference to the appropriate theoretical circuit diagram in Chap.1, Group 3 and 3A will show that with circuit breaker No.2 engaged and the H2S control switch ON, the various power supplies will be fed to the H2S equipment with the exception of the 28-volt and 112-volt d.c. supplies to the scanner unit, which are controlled by the stabilization and rotation switches.

AIR MILEAGE UNIT

31. The A.M.U. Mk.4B is connected to the starboard pitot-static system and is situated below the starboard engine air intake. The location of the unit is shown in Group 1, fig.2.

32. The A.M.U. operates from the 28-volt d.c. supply, and the associated control panel, Mk.4, is located on the navigator's radar panel. A suppressor, Type B4, mounted behind the control panel, is connected in the supply line, and the circuit is fed from fuse 208 in 11P. A routing chart of the circuit is contained in fig.6, and a full description of the A.M.U. and control panel is provided in A.P.1275B, Vol.1, Sect.16, Chap.10.

AIR SPEED PRESSURE SWITCH

33. An air speed pressure switch, Type TP.5099, is connected in the 7,000 lb. store control circuit described in Book 2, Chap.1, Group 13, and is operated by the starboard pitot-static system. The switch is mounted on the starboard side of the bomb bay near the front spar, and the switch contacts are designed to close at a rising air speed equivalent to approximately 150 knots. Further information on the pressure switch is contained in A.P.1275A, Vol.1, Sect.24.

T-4 BOMB SIGHT

34. The T-4 bomb sight is fitted at the prone air bomber's position in the cabin. This instrument is a visual impact bomb sight which computes and indicates continuously the point on the ground to be struck at any instant when the bomb is released. The sight also utilises the accurate drift and ground speed information fed from the A.R.I.5851 equipment, connection being made between the bomb sight computor and the A.R.I.5851 indicator.

35. The bomb sight installation comprises the following main items, the location of which is shown in fig.2:-

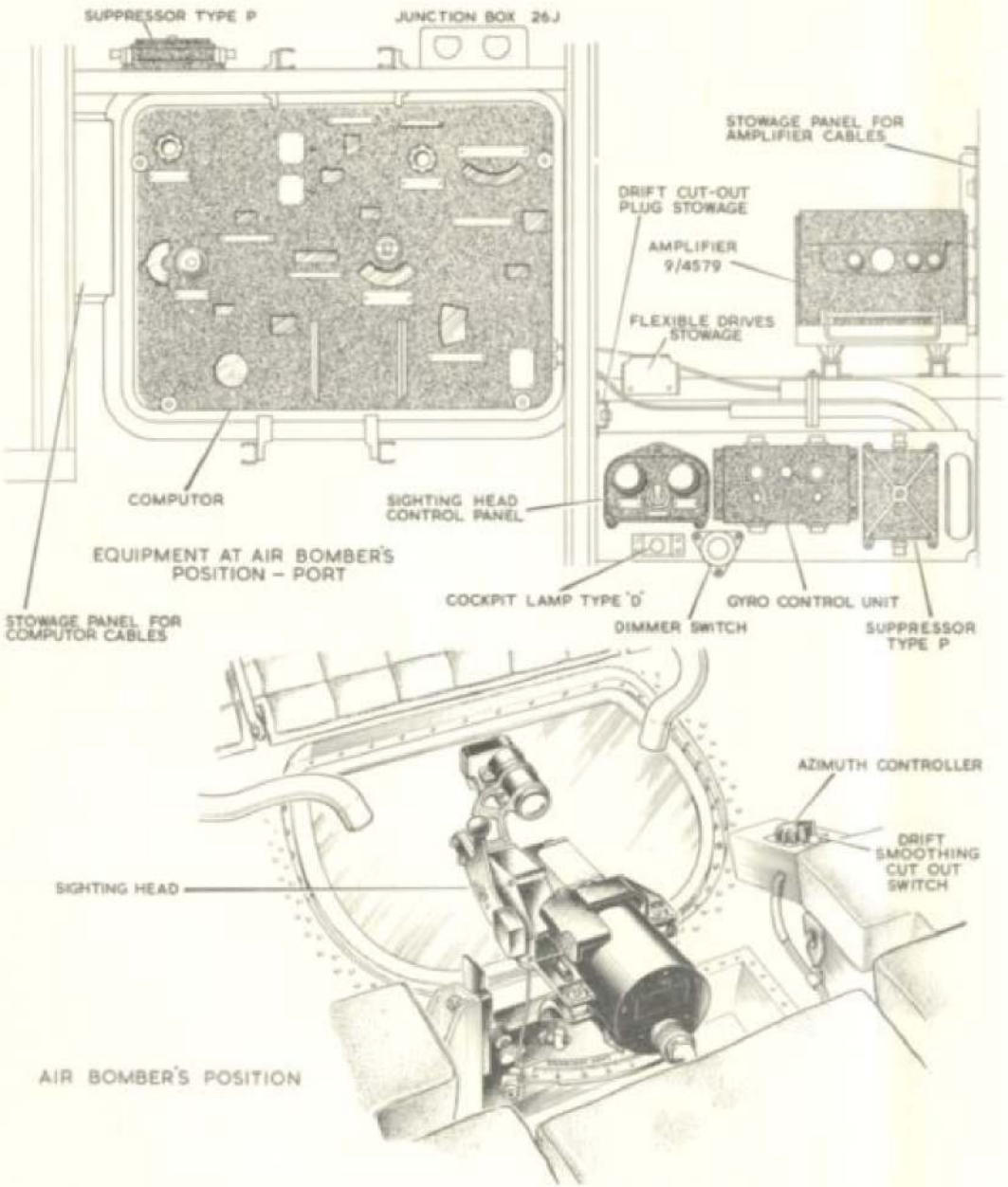

Fig.2 T-4 bomb sight installation

(1) Computor

(2) Sighting head

(3) Amplifier

(4) Gyro control unit

(5) Sighting head control panel

(6) Flexible drives and gear boxes

(7) Mounting bracket for sighting head

(8) Amplifier mounting tray

A brief description of each item is provided in the following paragraphs. Full details of the bomb sight are contained in A.P.1275D, Vol.1, Sect.7. Note that the air bomber's azimuth controller (fig.2) is part of the autopilot, Mk.10. (See A.P.1469E, Sect.2, Chap.3).

Air and pitot-static supplies

36. A pressurised air supply at 60 p.s.i. is fed to the computor to perform certain functions. The air is stored st 2,000 p.s.i. in a bottle located under the 2nd pilot's floor, and is conveyed to the computor via a reducing valve and air dryer. The supply to the computor is indicated by a gauge, scaled 0-80 p.s.i., fitted at the aft end of the 1st pilot's floor structure. A high pressure gauge for the bottle, scaled 0-3,000 p.s.i., is situated on an air charging panel on the aft pressure bulkhead in the nosewheel bay. Full details of the air supply system are provided in Book 1, Sect.3, Chap.7.

37. A pitot-static supply is also fed to the computor from the starboard pitot-static system as shown in Group 1, fig.2. Both air supply and pitot-static connections are made to the left hand side of the computor.

Power supplies

38. Power supplies for the bomb sight are supplied as follows:-

(1) 115-volt, 3-phase, 400 c/s a.c. to the gyro control unit from No.3 inverter, via fuses 731 and 732 in 11P.

(2) 115-volt, single-phase, 1,600 c/s a.c. to the amplifier from No.3 inverter, via fuse 738 in 11P.

(3) 28-volt d.c. to the computor via fuse 41 in 3P.

(4) 28-volt d.c. to the gyro control unit via fuse 214 in 11P.

(5) 28-volt d.c. to the sighting head control panel via fuse 42 in 3P.

A further 28-volt d.c. supply is made to the gyro control unit from the bomb doors closed micro switches when the bomb doors are open (para.42). All supplies are shown on the routing chart, fig.7.

Computor

39. The computor is supported on anti-vibration mountings fixed to a tubular mounting frame, which is secured to the 1st pilot's floor structure. The basic function of the unit is to calculate in terms of sighting angle and drift angle the various inputs of height, air speed, drift and ground speed, and to transmit these settings to the sighting head via two flexible drives. Pressurised air and and pitot-static supplies are provided (para.36-37), and a stowage panel, fitted adjacent to the computor, is used to secure the supply cables when the computor is removed. A second stowage panel is provided for the flexible drives.

Drift smoothing cut out switch

40. When the aircraft is turning it is desirable to cut out the drift smoothing control within the computor and thus increase the follow up rate of the drift mechanism. This is effected by a single-pole switch, which connects to the computor via a 2-pole socket on the right-hand side, and is fitted on the same mounting bracket as the azimuth controller (fig.2). The switch is normally in the ON position and is placed to OFF to apply drift smoothing cut-out. A stowage bracket near the computor is provided for the connecting cable.

Amplifier

41. The amplifier is fitted on a tray with anti-vibration mountings, and is used to amplify the signals from the drift and ground speed synchro motors within the computor, so that the associated servo motors are driven to cause follow-up movement in their respective mechanisms. A stowage panel for the connecting cables is provided adjacent to the amplifier.

Gyro control unit

42. The gyro control unit carries the necessary control switches for the supplies to the Mk.8 and Mk.9 gyro units integral with the sighting head and computor respectively. In addition, two indicator lamps, one red and one green, are provided on the front cover of the control unit. The green lamp will light when the gyro fast erection push switch on the unit is pressed; the red lamp will light by the operation of the bomb doors closed micro switches when the bomb doors are open. At the same time as the red lamp is lit, the erection signals in the control unit are cut off to reduce vertical errors due to the deceleration of the aircraft by the opening of the bomb doors. A stowage panel behind the control unit is provided for the connecting cables.

Sighting head

43. The sighting head is secured to the spigot of a universal mounting bracket by a locking catch which must be pressed down when installing or removing the head. In flight, the sighting head enables the air bomber to see a graticule in the form of a sword-shaped cross moving over the ground. Any point on the ground covered by the intersection of the cross represents the point of impact of a bomb released at that instant. The apparent ground position of the graticule image is controlled by the computor via the two flexible drives. Two lamps, one for illuminating the collimator and the other for the drift scale, are incorporated in the sighting head. A cover, Avro Part No.Z8600, to protect the sighting head is raised to rest against the front pressure bulkhead when the sighting head is in operation. A stowage bracket for the two flexible drives is also provided.

Sighting head control panel

44. The sighting head control panel carries a master switch and two rheostats for control of the supplies to the collimator lamp and drift scale lamp in the sighting head.

Prone air bomber's lamps

45. Illumination at the sighting head is provided by two red lamps. One, a cockpit lamp, Mk.2, is fitted with its dimmer switch on the prone air bomber's panel 8P; the other, an instrument lamp, Type D, is fitted with its dimmer switch on the structure on the port side. Further details will be found in Book 2, Sect.5, Chap.1, Group 10.

N.B.S.

General

46. The N.B.S. equipment should be checked periodically for security of the units and tightness of plug and socket connections. It is important that, prior to the removal of units suspected of being defective, the associated connector assemblies be tested for continuity and

SERVICING

insulation. Full information on servicing the system will be found in A.P.2894K, Vol.1, Part 2.

Power supplies

47. Indication that the a.c. supplies from No.1 inverter are available is given by the associated neon indicators on the a.c. supplies switch panel. The inverter is started by selecting the control switch on the panel to ON. The supplies should be checked at test socket 595 on 11P for the correct operating values during the normal inspection periods. In the event of an electrical failure, the correct fuses in 11P should be checked as a preliminary measure in checking the fault. Both 28-volt and 112-volt d.c. supplies should be tested between the outgoing side of the appropriate fuses and earth in 11P and 19P respectively.

48. Indication that the 115-volt, 400 c/s supply is available to the H2S equipment is given by the two neon lamps on the navigator's radar panel. The 115-volt, 1,600 c/s supply can be checked at test socket 594 in the nose when the H2S control switch is ON.

49. Prior to Mod.1201, testing of the 115-volt, 400 c/s supply to the time of fall calculator requires No.3 inverter to be switched on. The check should then be made between fuses 245 and 246 in 11P and earth.

Emergency supplies

50. Instructions for testing the emergency changeover of supplies from No.1 to No.2 inverter are as follows:-

(1) Switch on No.1 inverter, and check that the appropriate neon lamps on the a.c. supplies switch panel and those on the navigator's radar panel are ON.

(2) Switch on No.2 inverter and switch off No.1 inverter. All neon lamps should now be OFF.

(3) Select the emergency changeover switch to position 1 and the neon lamps should indicate that supplies are again available.

51. The emergency changeover from No.3 inverter to No.2 inverter is effected in the same way, using the respective switching. Full instructions on the testing of the a.c. power supplies will be found in Book 2, Sect.5, Chap.1, Group 3 and 3A.

AIR MILEAGE UNIT

52. Detailed instructions for servicing the A.M.U., Mk.4B, including the necessary Standard Serviceability Test and a fault finding table, are contained in A.P.1275B, Vol.1, Sect.16.

AIR SPEED PRESSURE SWITCH

53. All necessary information for servicing and applying the Standard Serviceability Test for the air speed pressure switch, Type TP.5099, is provided in A-P-1275A, Vol.1, Sect.24.

T-4 BOMB SIGHT

54. Servicing instructions for the T-4 bomb sight installation, including information on the associated test equipment, are contained in A.P.1275D, Vol.1, Sect.7, Chap.7. The method of levelling the sight, as applicable to Vulcan aircraft is described in Chapter 6 of the same Air Publication.

REMOVAL AND ASSEMBLY

N.B.S.

General

55. In order to ensure the smooth and efficient removal of the N.B.S. equipment, the procedure recommended for each unit is outlined in the following paragraphs. Where equipment is installed in the nose wheel bay the use of a "safety raiser" or similar elevating trestle is required. To remove the N.B.C. calculators from the cabin, an Avro built hoist is available and is illustrated in fig.3. Special equipment is also required for the removal of the H2S scanner unit, and instructions for this operation are given in detail. In all cases the method of assembly is the reverse of that for removal.

N.B.C. EQUIPMENT

Directional indicator

56. This instrument can easily be removed from the first pilot's instrument panel when the panel is detached in accordance with the instructions contained Group 1 of this chapter.

Equipment under 2nd pilot's floor

Calculators, Type 2 and 3

57. The calculators, Type 2 and 3, are in each case fitted to four resilient mountings on a sliding tray installed in the starboard radar crate. The Type 2 calculator is located in front of the Type 3, and quick release "pip" pins are used to lock the trays in position.

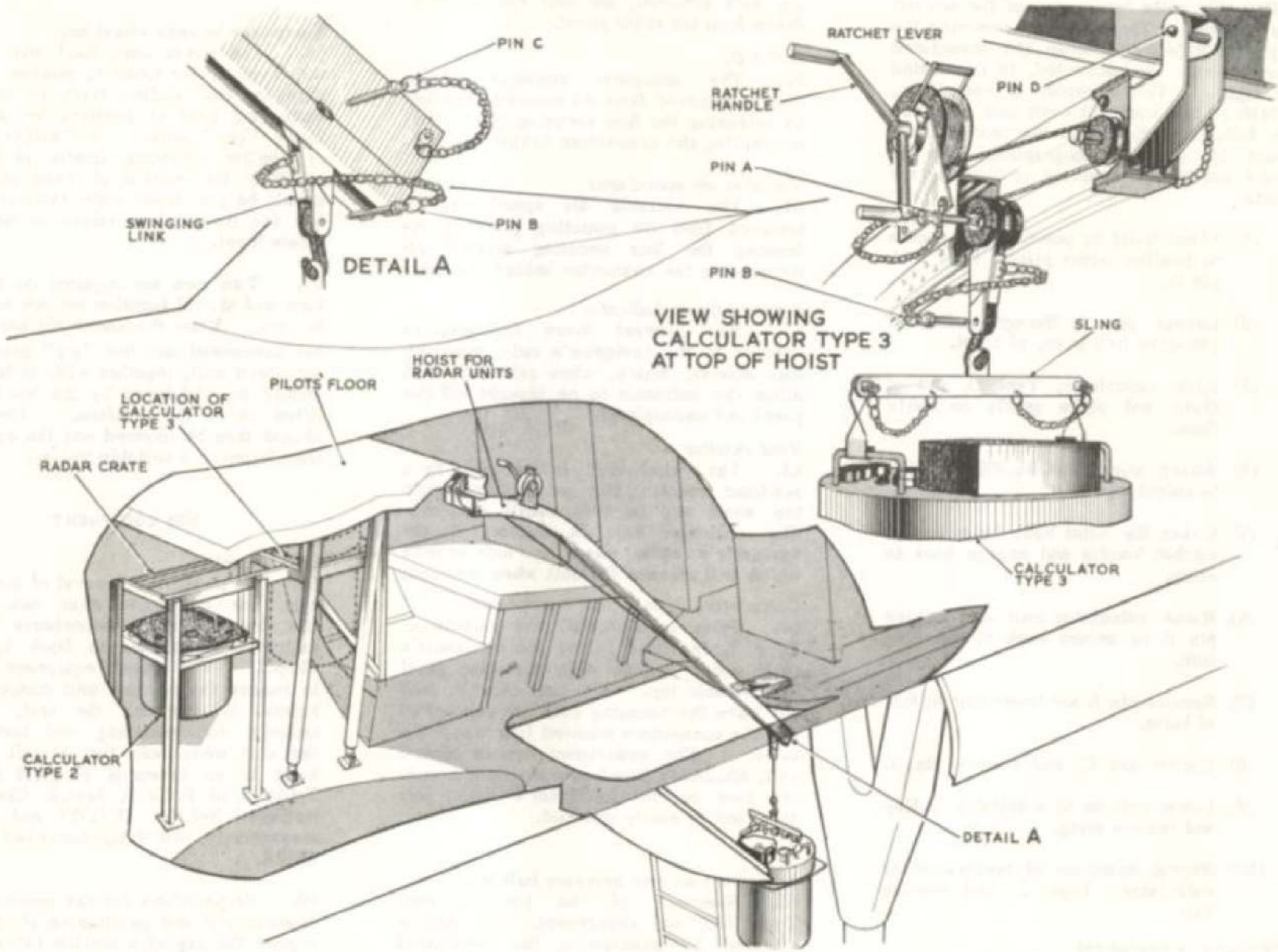

Fig. 3 Removal of N.B.C. calculators
(* Mod G.E. 1370 *)

RESTRICTED

58. The hoist, Ref.No.26DC/95083, is fitted between the pilots' floor and the bottom fuselage and provides the means of lifting the units into or out of the aircraft as required. The method of removing the Type 3 calculator, when the associated connections are uncoupled, is illustrated in fig.3. The sequence of operations, which is the same for each unit, is given as follows. Note that the ratchet lever must be used in conjunction with the hoist handle when raising or lowering the units.

(1) Place hoist in position and secure to bracket under pilots' floor with pin D.

(2) Locate pin A through pulley of swinging link at top of hoist.

(3) Slide calculator, Type 3, out of crate and place gently on cabin floor.

(4) Attach sling, Ref.No.26DC/95094, to calculator.

(5) Lower the hoist hook by means of ratchet handle and engage hook in sling.

(6) Raise calculator unit and engage pin B to secure hook to swinging link.

(7) Remove pin A and lower unit to foot of hoist.

(8) Locate pin C, and remove pin B.

(9) Lower unit on to a suitable trolley and remove sling.

(10) Repeat sequence of operations for calculator, Type 2, and remove hoist.

Navigator's equipment

Navigation panel, Mk.1 or 1A

59. The navigation panel, Mk.1 or 1A is secured to the navigator's radar panel by four screws. When the connector assemblies are uncoupled and the fastening nuts removed, the unit can be withdrawn from the radar panel.

A.V.S.U.

60. The automatic variation setting unit is removed from its mounting bracket by releasing the four securing screws and uncoupling the connectors behind the unit.

Variable air speed unit

61. The variable air speed unit is removed from its mounting plate by releasing the four securing screws and uncoupling the connector behind the unit.

Forward throw indicator

62. The forward throw indicator is secured to the navigator's radar panel by four screws, which, when released, will allow the indicator to be brought off the panel and uncoupled.

Wind monitor

63. The wind unit is secured to a resilient mounting tray on the navigator's top shelf and is thus easily removed. The indicator unit is secured to the navigator's radar panel by four screws which will release the unit when removed.

Calculator, Type 7, and control unit

64. Prior to Mod.1201 the calculator, Type 7, is fitted inside the navigator's table and is uncovered by a sliding panel in the table top. The unit can be lifted out when the securing nuts are unscrewed and the connectors removed from under the table. The associated remote control unit, Mk.2A, is fitted on a resilient mounting tray on the navigator's floor, port side, and is easily removed.

Equipment on rear pressure bulkhead

65. Removal of the junction box, Type 343, and suppressor, Type G5, is effected by unscrewing the associated plug and socket connections and removing the screws securing the units. The resistance unit, Mk.1, is fitted to resilient mountings and will be released when the fixing bolts are removed.

Equipment in nose wheel bay

66. The power unit, Mk.1 and calculator, Type 1, are fitted to resilient mountings on two sliding trays in the radar crate and held in position by quick release "pip" pins. A "safety raiser" or similar elevating trestle is required to effect the removal of these units, and should be positioned under the nose wheel bay and the platform raised to the appropriate level.

67. Two men are required on the platform and should together remove each unit in turn. When the connector assemblies are unscrewed and the "pip" pins pulled out, each unit, together with sliding tray, should be withdrawn by the handles and lifted on to the platform. The trestle should then be lowered and the equipment transferred to a suitable trolley.

H2S EQUIPMENT

Scanner unit

68. To permit the removal of the scanner unit, the composite nose radome must first be removed in accordance with the instructions outlined in Book 1, Sect.3, Chap.1. The ground equipment required to remove the scanner unit comprises two hoists for lowering the unit, and two trolleys for receiving and transporting the unit away from the aircraft. Each hoist is an assembly of parts listed in Table 1 of Book 1, Sect.2, Chap.4; the trolleys, Ref.No. 4F/1787 and 4F/2202 respectively, are fully described in A.P. 4552A.

69. Preparations for the removal of the scanner unit and positioning of the hoists require the use of a service ladder. The removal operation should be carried out by four men to the following instructions:-

(1) Prepare trolley, Ref.No.4F/2202 to receive the scanner unit.

(2) Remove and stow all aircraft connectors to the scanner unit.

(3) Disconnect the air pressure line and the air cooling ducts at the scanner unit.

(4) Attach hoists, one each side, to the hook-up points on the structure above the scanner unit.

(5) Pull the hoist cables downwards and attach each hook end to the support points on the scanner unit.

(6) Winch up the cables until taut.

(7) Remove the bolts securing the scanner unit.

(8) Position the receiving trolley below the scanner unit.

(9) Lower the scanner unit gently to disengage the dowel pins.

(10) Lower carefully into position on the trolley and bolt the unit to the cradle.

(11) Unhook the cables and remove the hoists.

(12) Attach trolley, Ref.No.4F/1787, for transportation.

Amplidyne unit

70. The amplidyne unit in the nose is removed complete with its associated mounting. The mounting is secured to the structure by four bolts with distance tubes, and is free to pivot on two pins when the bolts are unscrewed. Note that the removal operation does not require the nose radome to be removed as in the case of the scanner unit. Access to the nose section is made from the porthole in the pressure dome.

71. With the bolts removed, and the cooling duct to the amplidyne disconnected, the mounting should be slid backwards, using the handle, and lowered from the front end, until hanging vertically. The cables can then be disconnected, and the unit, together with its mounting, lifted off at the pivot pins and brought away from the structure.

Navigator's panel equipment

72. The indicating unit, Type 301, and control units, Type 585 and 595, are secured to the navigator's radar crate by two knurled nuts in each case and held by retaining wires. To withdraw the units from the crate, the connector assemblies should be removed, the knurled nuts slackened and the retaining wires released. The camera fitted to the indicating unit should be swivelled to one side on its hinge and eased upwards after releasing the screw on the right-hand side. The control unit, Type 903, fitted behind the indicating unit, can be removed by uncoupling the connectors and removing the three fixing screws.

Navigator's table equipment

73. The control unit, Type 626, on the navigator's table, can be removed by uncoupling the connector from underneath the table and removing the four securing screws on the table top. The control unit, Type 12558, takes the position inside the navigator's table vacated by the calculator, Type 7, (para.64) and is similarly removed. The control unit, Type 12580, mounted at the forward edge of the table is removed by releasing the four securing screws and disconnecting the associated cables.

Equipment in nose wheel bay

74. The power unit, Type 729, calculator, Type 5, and waveform generator, Type 68, are fitted to resilient mountings at the top of the radar crate, and held by two knurled nuts in each case. A "safety raiser" is required for the removal operation and should be positioned under the nose wheel bay and the platform raised to the appropriate level. The units can then be removed when the knurled nuts are slackened and the connectors uncoupled. When this has been carried out, the units should be lowered on the trestle and transferred to a suitable trolley.

AIR MILEAGE UNIT

75. The A.M.U. is mounted under the starboard engine air intake with the necessary connections facing inboard. Two round access panels are fitted side-by-side flush with the aircraft skin, and provide facilities for removing the instrument. Access to the electrical and pitot-static connections is gained from the inboard panel, and the A.M.U. securing bolts are uncovered when the other panel is removed. When the connections are uncoupled, the A.M.U. can be unbolted and lifted downwards from the aircraft.

T-4 BOMB SIGHT

General

76. Removal of the T-4 bomb sight equipment presents no difficulty. However, a few brief instructions are offered in the following paragraphs to provide assistance where necessary. Note that when units have been removed, all associated connections must be secured on the stowage panels or brackets provided.

Computor

77. The computor unit frame is secured to the aircraft structure by four saddle brackets, two at the top and two at the bottom. By unscrewing the brackets, the computor unit complete with its mounting frame can be withdrawn from the crate structure. Prior to disconnecting the air supply line from the computor the air supply should be turned off at the shut-off valve above the computor.

Sighting head

78. Before removing the sighting head,

the brake should be set to prevent the sight from swinging, by raising the release lever. The connecting cables and flexible drives should then be uncoupled and and stowed, and the sight removed by pressing down the locking catch and sliding the instrument off the spigot.

Other items of equipment

79. The other items of equipment of the installation are all easily removed, and no further instructions are required.

TABLE 1

N.B.C. MK.2 EQUIPMENT

Unit	Ref.No.	No.off	Location
Directional indicator, Mk.1	9D/8	1	1st pilot's instrument panel
Calculator, Type 2	9D/3	1	Under 2nd pilot's floor
Calculator, Type 3	9D/4	1	Under 2nd pilot's floor
Navigation panel, Mk.1 (Mk.1 aircraft only)	9D/10	1	Navigator's panel
Navigation panel, Mk.1A (Mk.1A aircraft only)	9D/1141	1	Navigator's panel
Variable air speed unit	9D/1566	1	Navigator's roof
Forward throw indicator	9D/1400	1	Navigator's panel
Wind unit	9D/756	1	Navigator's top shelf
Wind indicator unit	9D/757	1	Navigator's panel
Calculator, Type 7 (Pre.Mod.1201)	9D/110	1	Navigator's table
Remote control unit (Pre.Mod.1201)	9D/111	1	Navigator's floor, port
Junction box, Type 343	9D/15	1	R.P.B. (cabin)
Resistance unit, Mk.1	9D/12	1	R.P.B. (cabin)
Suppressor, Type G5	5CY/5151	1	R.P.B. (cabin)
Calculator, Type 1	9D/2	1	Nose wheel bay
Power unit, Mk.1	9D/11	1	Nose wheel bay

TABLE 2

H2S MK.9A EQUIPMENT

Unit	Ref.No.	No.off	Location
Scanner unit, Type 121	10B/16327	1	Nose radome
Amplifier, Type A3703	10U/16761	1	On scanner unit
Modulator, Type 2	10D/18638	1	
Transmitter-receiver, Type TR3702	10D/18637	1	
Gyro unit, Mk.6	6W/5	1	
Analyser unit	-	1	
Amplidyne unit	5U/5748	1	Nose radome
Indicating unit, Type 301	10QB/6493	1	Navigator's panel
Camera, Type R88	14A/4260	1	On indicating unit
Control unit, Type 585	10LB/6366	1	Navigator's panel
Control unit, Type 595	10LB/6376	1	Navigator's panel
Control unit, Type 903	10L/16154	1	Behind Type 595 control unit
Control unit, Type 626	10L/16060	1	Navigator's table
Control unit, Type 12558	10L/16493	1	Navigator's table
Control unit, Type 12580	10L/16495	1	Navigator's table
Power unit, Type 729	10DB/8811	1	Nose wheel bay
Calculator, Type 5	10D/18640	1	Nose wheel bay
Waveform generator, Type 68	10VB/6250	1	Nose wheel bay

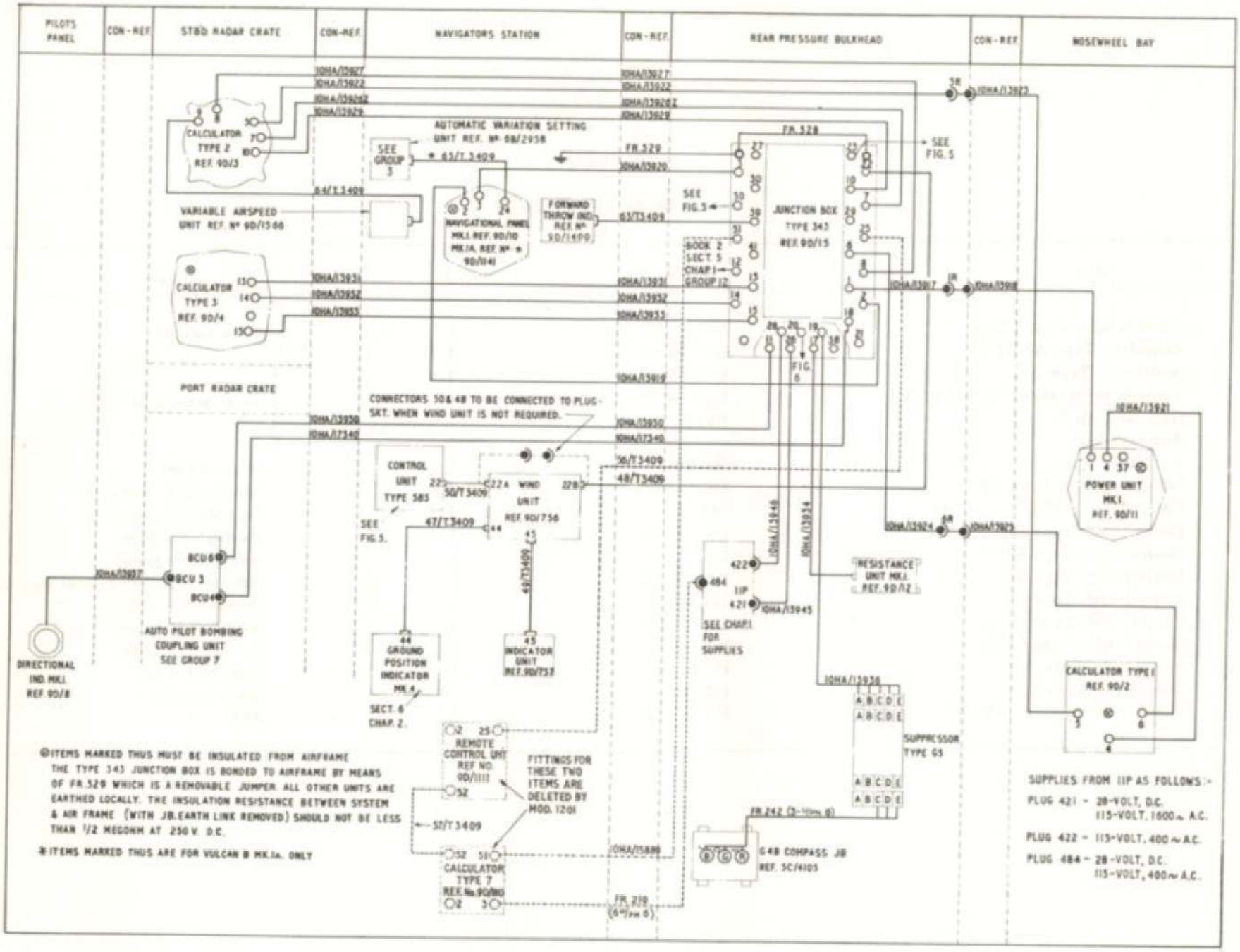

Fig. 4 N.B.C. Mk. 2 equipment

◄Mod 1707►

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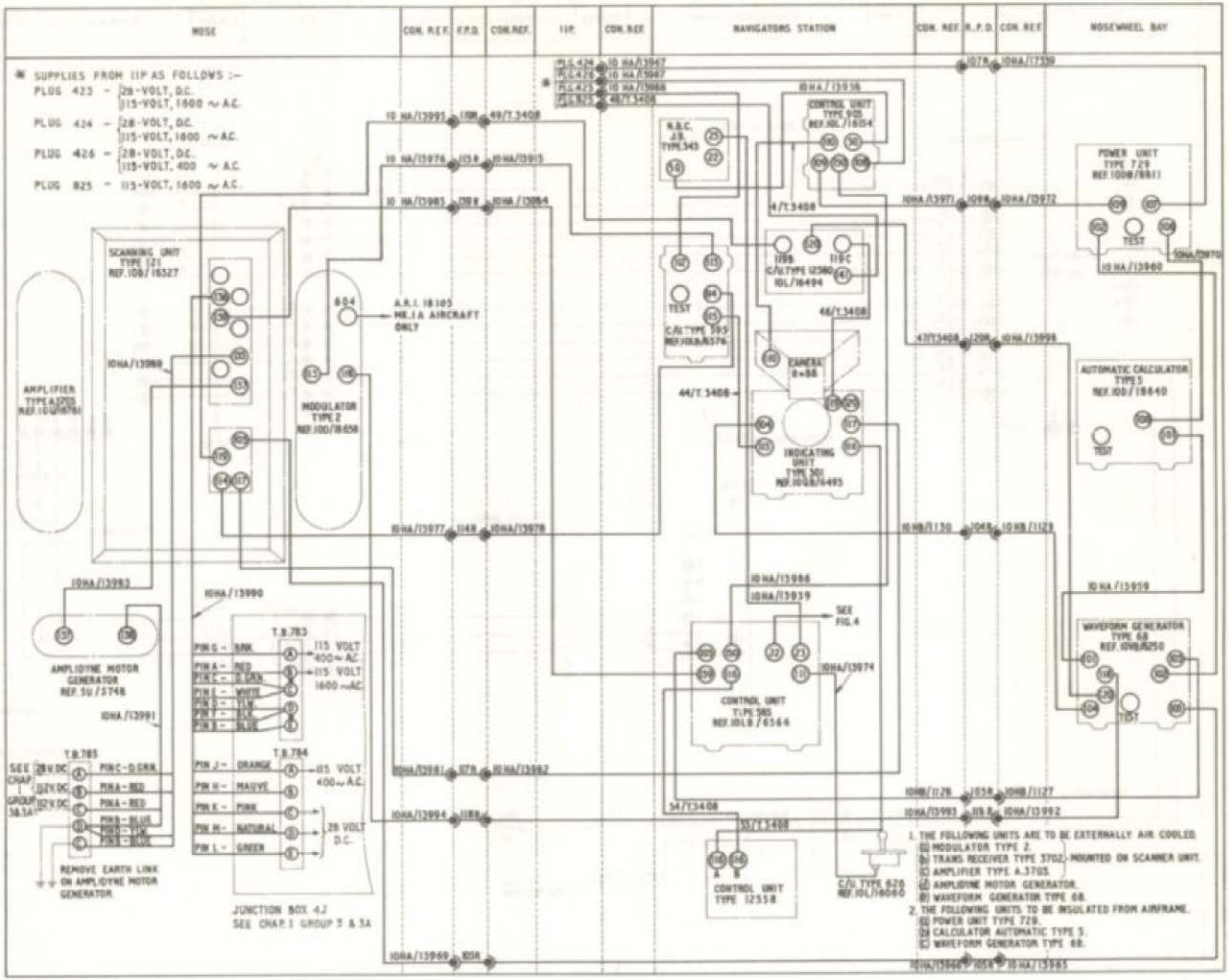

Fig. 5 H2.S Mk. 9A equipment

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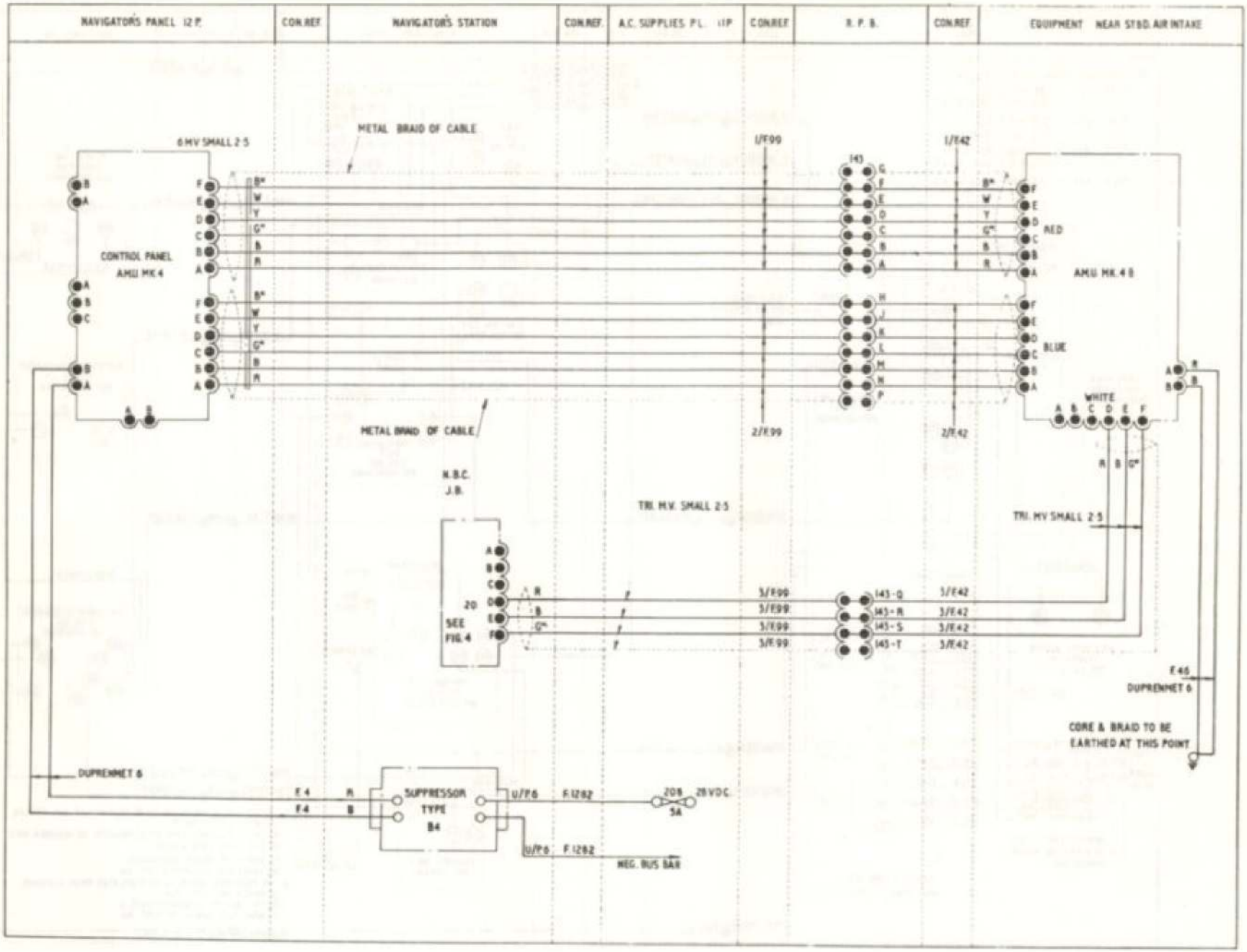

Fig.6 A.M.U. Mk. 4B

◄ Mod 2101 ►

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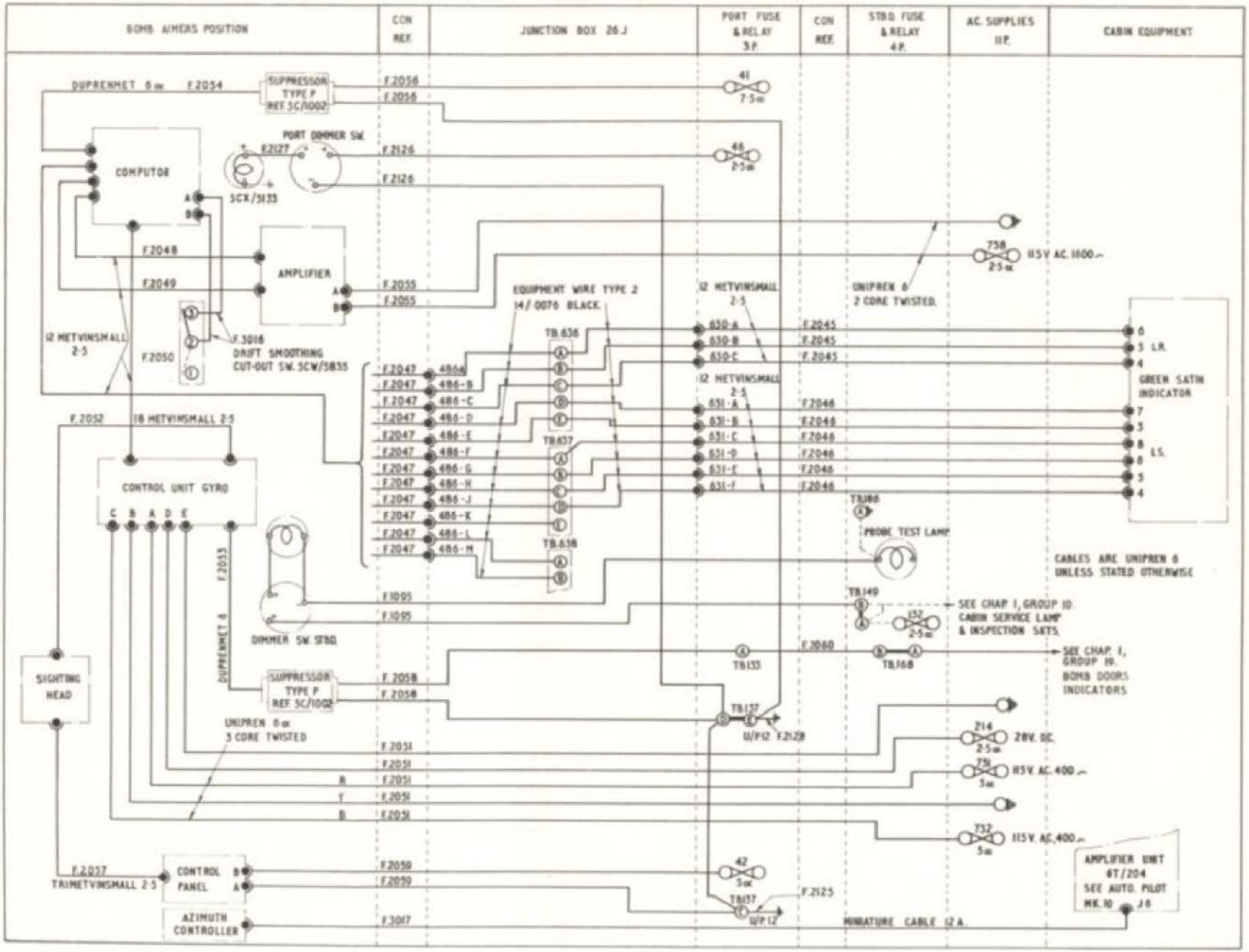

Fig. 7 T-4 Bomb sight

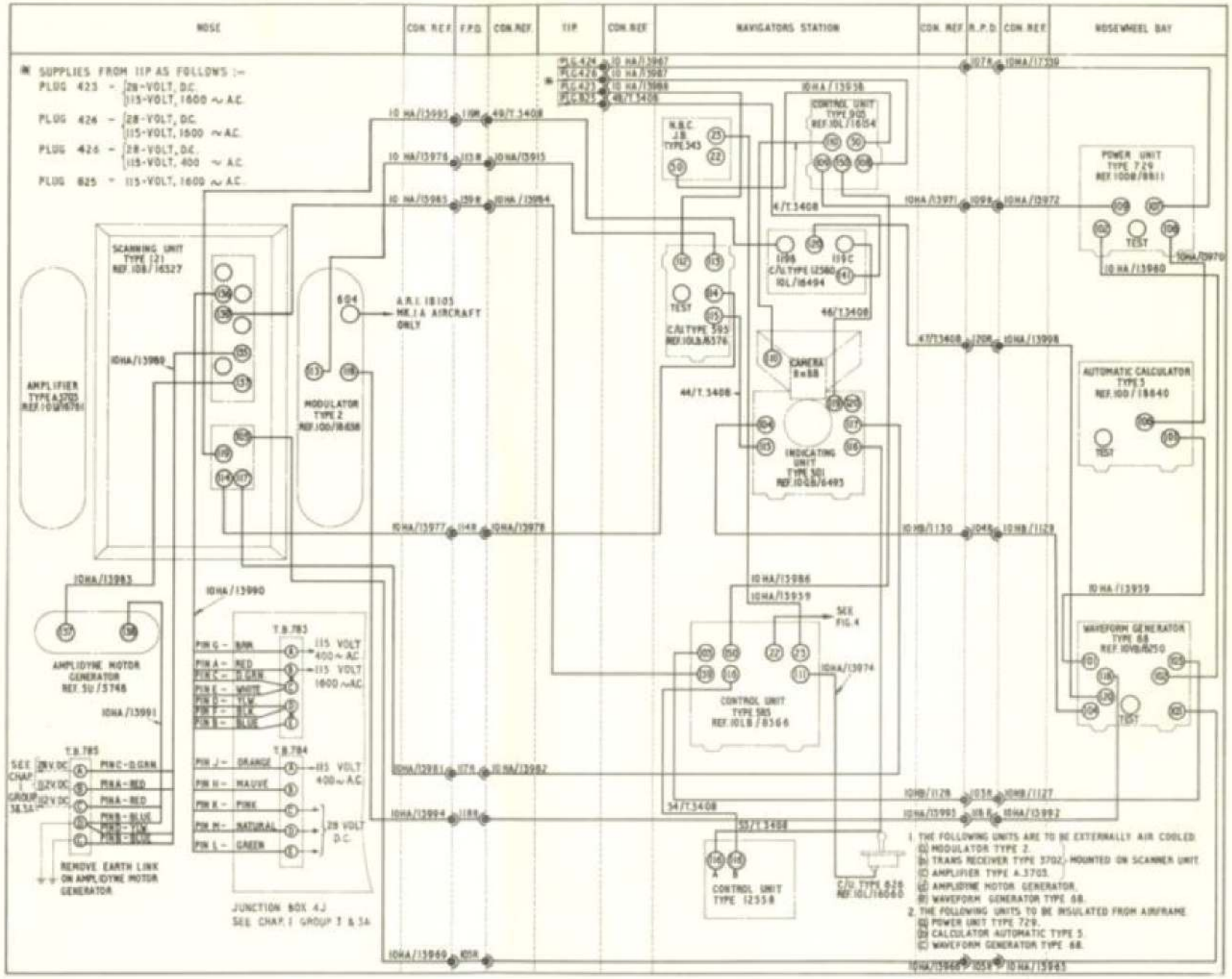

Fig. 5 H2S Mk. 9A equipment

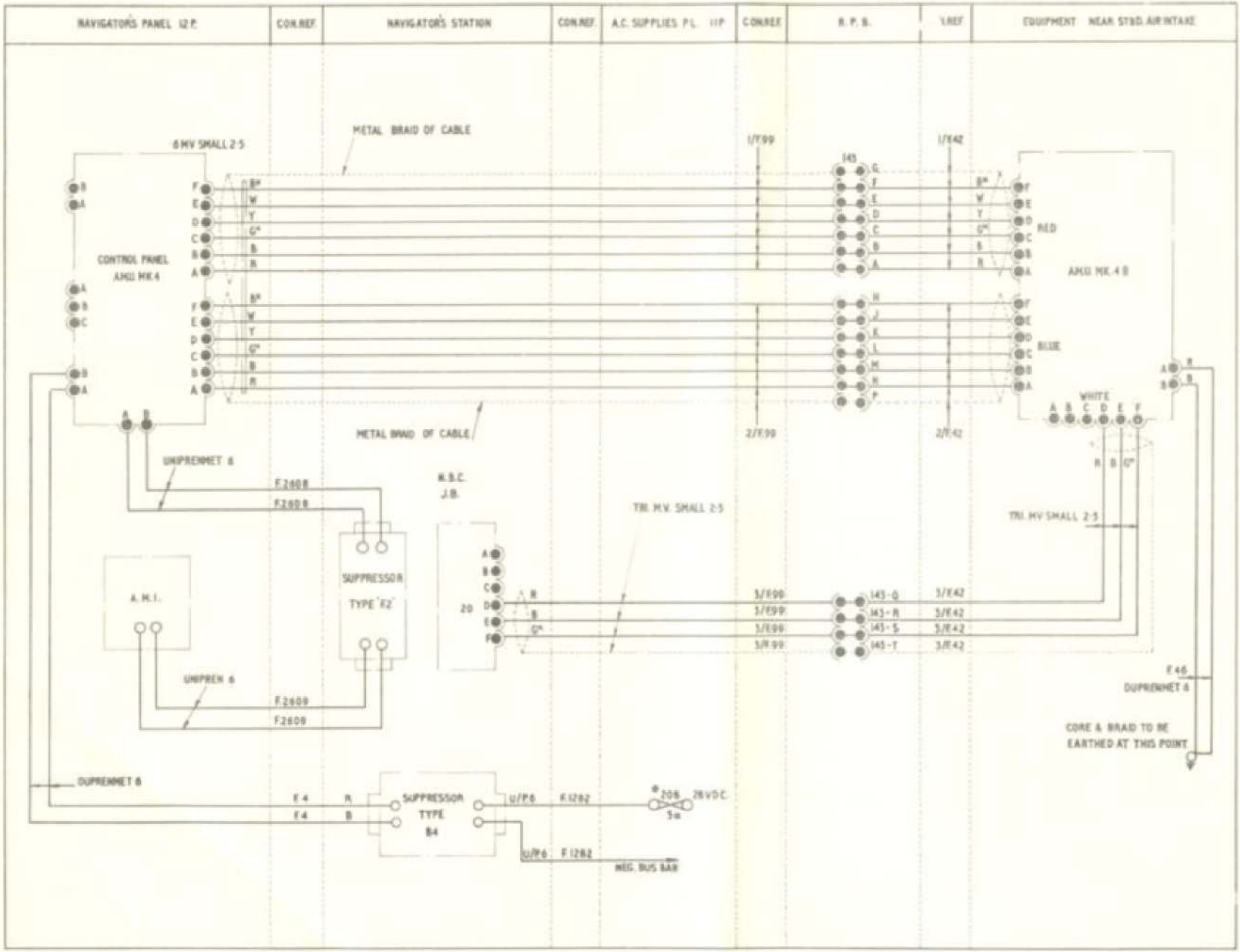

Fig.6 A.M.U. Mk. 4B

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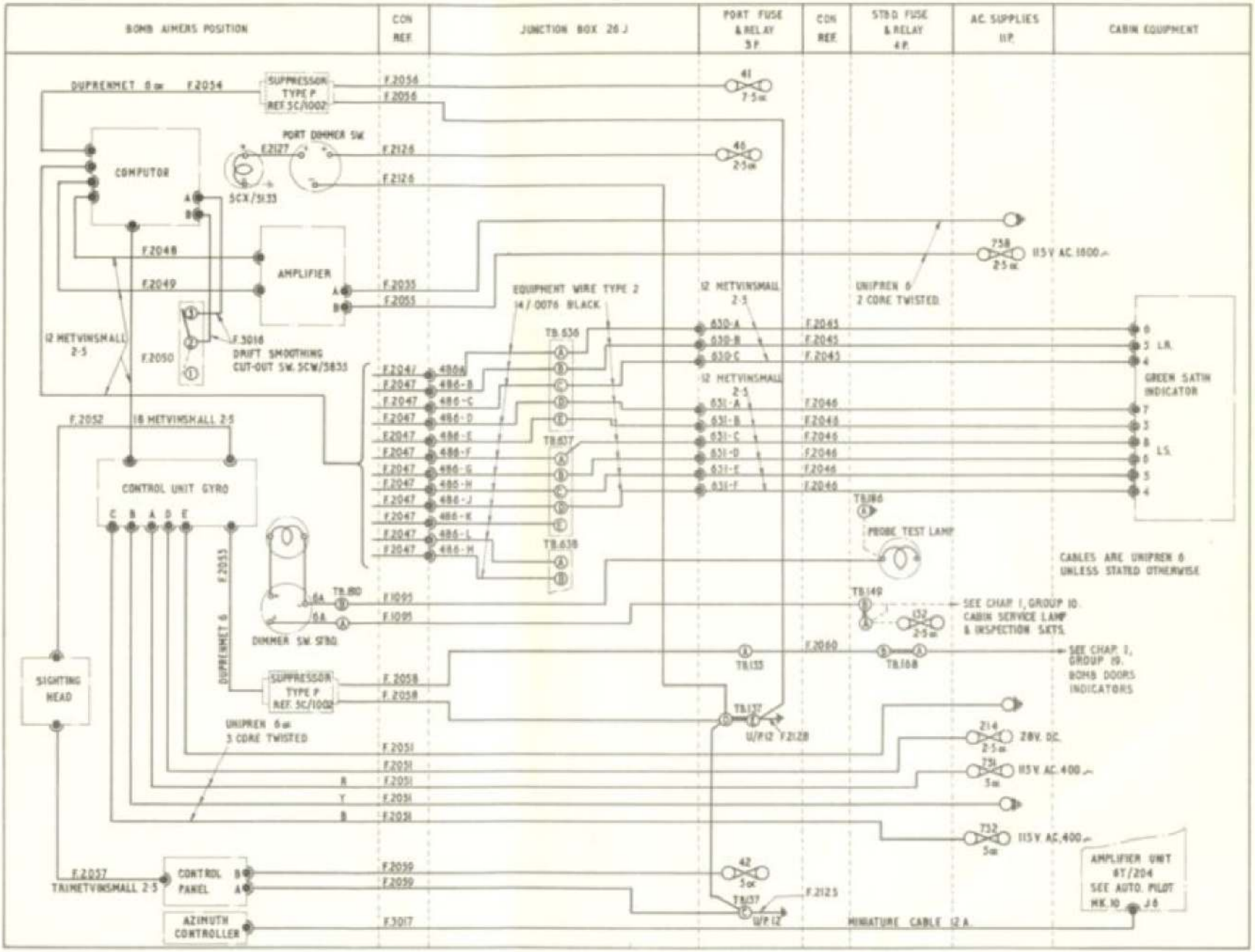

Fig. 7 T-4 Bomb sight