

Group 3

NAVIGATION INSTRUMENTS  
(Completely revised)

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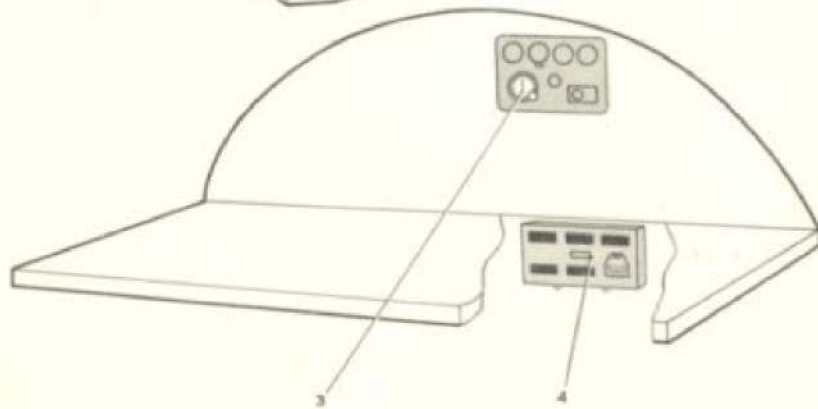
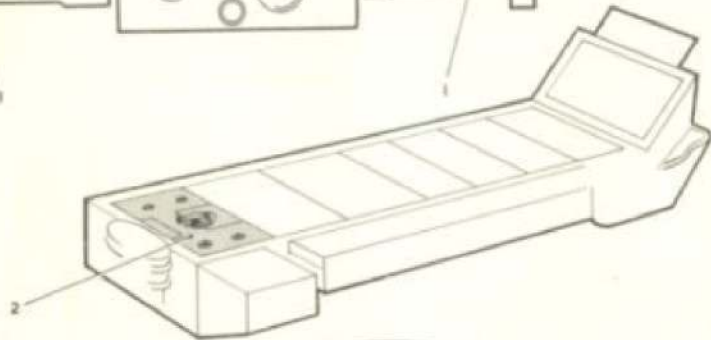
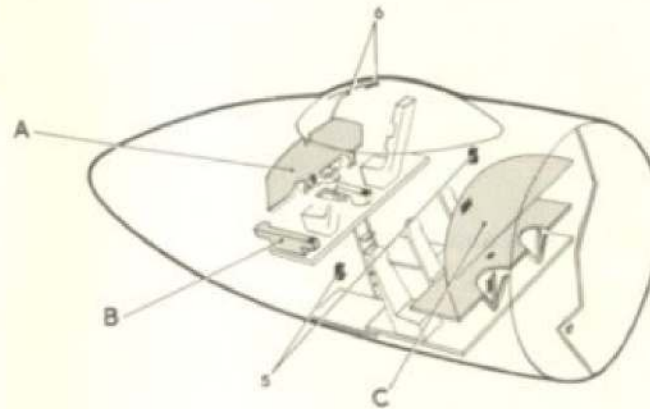
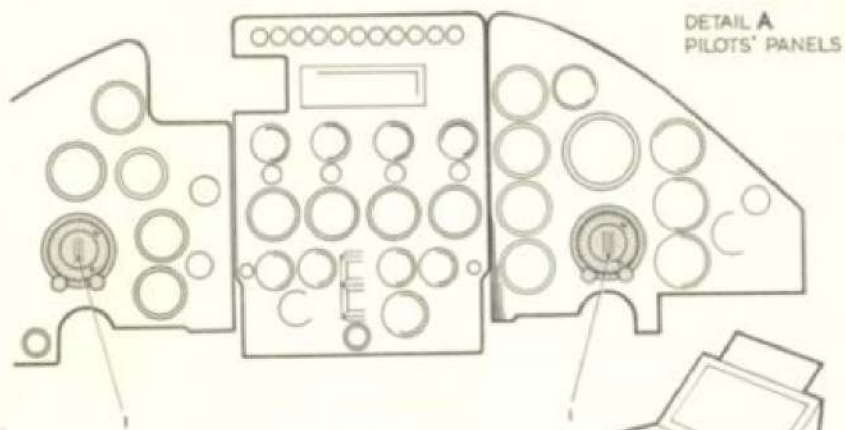
**Introduction**

1. This group contains descriptive and servicing information on those instruments associated with navigation of the aircraft. The instruments fitted for this purpose are the G4B compass, two standby compasses, and two periscopic sextants. Illustrations in the text show

where the instruments are mounted and routing charts are provided for the electrical instruments.

2. In the paragraphs which describe a particular instrument, reference will be

found to the appropriate volume of the 1275 series of Air Publications, where more detailed information may be found. Only brief details of the power supplies to electrical instruments are given here. Further information will be found in Chapter 1 of this section.



- 1. G4B COMPASS
- 2. G4B CONTROL PANEL
- 3. MASTER INDICATOR
- 4. G4B COMPASS AMPLIFIER
- 5. PERISCOPIC SEXTANTS
- 6. E2A COMPASSES

Fig 1. Navigation instruments

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**G4B COMPASS**

3. The G4B compass is designed to combine the functions of a directional gyro and magnetic compass, utilising the advantages of each. Indications shown by the compass are gyro stabilised, and synchronised with the earth's magnetic field by a remote detector unit and monitoring system. Indications are provided for the 1st pilot, 2nd pilot and navigator. In addition, outputs are provided for the auto-pilot, G.P.I. and radar installations. A control on the navigators indicator permits magnetic variations to be set into the compass so that the true heading of the aircraft is displayed on the indicators and fed to the other equipment.

4. The G4B compass consists of the following units.

Detector unit, Type A  
Master indicator, Type A  
Amplifier, Type A  
Gyro unit, Type A (2 off)  
Control panel

Each unit is briefly described in the paragraphs that follow. A more detailed description of the units will be found in A.P.1275B, Vol.1, Sect.11, Chap.7.

**Detector unit**

5. The detector unit Type A is installed in the outboard edge of the port wing tip and consists of a sensitive pendulous element and an electromagnetic deviation compensator. The unit is designed to sense the direction of the earth's magnetic field and provide signals for monitoring the compass. When installed in the aircraft the unit must be aligned with the fore and aft axis of the aircraft. Consequently, the mounting flange of the unit is marked 'FORE' and 'AFT' and carries a

**DESCRIPTION AND OPERATION**

datum scale for use when adjusting the unit.

**Master indicator**

6. The master indicator is mounted on the plotter's instrument panel at the navigator's station as shown in fig.1. Signals from the detector unit are fed to the indicator which is synchronised to the pilots gyro units by a signal transmission system. An annunciator flag, marked with a dot and a cross, is provided on the front face of the indicator to verify that the gyro units are correctly synchronised.

**Amplifier unit**

7. The amplifier unit Type B is mounted below the navigator's table at the port side of the aircraft as shown in fig.1. The unit contains two separate amplifiers, one a precession amplifier, the other a follow-up amplifier.

8. The precession amplifier is part of the monitoring system between the detector unit and the gyro units. Signals from the rotor of the signal selsyn in the master indicator are amplified by the precession amplifier before being fed to the precession coils of the gyro units.

9. The follow-up amplifier forms part of the follow-up system between the gyro units and the master indicator. Signals from the rotor of the data selsyn in the master indicator are amplified by the follow-up amplifier before being fed to the control phase of the motor in the master indicator.

**Gyro units**

10. A gyro unit, Type A is fitted on each pilot's panel. This unit is essentially an electrically-driven directional gyro

and can be used as such if required. When in use as a directional gyro, a flag marked D.G. appears in the front face of the instrument, covering an annunciator flag which normally indicates, with a dot and cross, whether or not the gyro unit is synchronised with the master indicator.

11. During flight, the compass card of each instrument is synchronised with the earth's magnetic field, via the master indicator and detector unit. The card thus provides a continuous indication of the magnetic heading of the aircraft. Course setting and synchronising controls are provided on the front face of each gyro unit.

**Control panel**

12. The control panel is fitted on the port console as shown in fig.1, and controls the monitoring signal to the gyro units by means of a 3-position selector switch. Either gyro unit can be made to function as a compass by selection of the switch. When the switch is in the OFF position, both gyro units will run as directional gyros. The other two switch positions are COMPASS-PORT and COMPASS-STARBOARD.

**Suppressor**

13. A suppressor Type G5 is connected in circuit with the master indicator to minimise radio interference. The suppressor is mounted under the navigators table, port side.

**Junction boxes**

14. Two junction boxes, Ref.No.5C/4105 are provided for interconnection of the units. One is fitted in the rear pressure bulkhead, the other is under the navigator's table, starboard side.

**Power supplies**

15. The compass installation requires

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a 3 phase a.c. supply and a 28-volt d.c. supply. These are fed to the amplifier unit via the multi-pin plug which is colour-coded WHITE. The 3-phase a.c. is at 115 volts, 400 c/s, and is fed from fuses 253 and 254 in panel 11P. The 28-volt d.c. supply is from fuse 218 in the same panel. A second d.c. supply is fed to the master indicator from fuse 27 in the port fuse and relay panel 3P.

16. The a.c. power is obtained from the No.3, Type 350 inverter. The operation of this inverter is fully described in Book 2, Chap.1, Group 3a of this section.

#### Mod.353

17. Mod.353 introduces a zero reader flight director into the aircraft and the G4B compass then provides heading information to this equipment. Full details of the zero reader will be found in Group 7.

#### Mod.347

18. When Mod.347 is embodied, a turn cut-out switch is introduced into the G4B compass circuit. The use of this switch prevents small turning errors being fed to the N.B.S. and G.P.I. when the aircraft is turning. With the switch set to ON, any angle of bank in excess of 6° will cause

#### G4B COMPASS

25. The compass should be tested for correct functioning at the periods laid down in the servicing schedule. The various components should be examined for security during routine checks and the instrument glasses kept clean. Power supplies should be checked at the amplifier if the compass is not functioning correctly.

the detector unit to be cut out, and both gyro units will operate as directional gyros.

#### Mod.827

19. Mod.827 introduces an auto variation setting unit into the N.B.S. installation. When this unit is fitted wiring which was previously fed direct to the master indicator is now fed via the A.V.S.U. Further details of the N.B.S. will be found in Group 6.

#### Mod.1122

20. On aircraft with Mod.1122 fitted the G4B compass amplifier Ref.No.6B/652 is replaced by a compass amplifier Ref.No. 6B/3126 as shown in the routing chart fig.4.

#### E2A COMPASSES

21. Two E2A magnetic compasses are fitted to the pilot's windscreen, above the instrument panels. These compasses are for use in the event of failure of the G4B compass. They also provide a rough check on the functioning of the G4B compass during normal operation. A datum

#### SERVICING

Full servicing instructions together with fault finding tables will be found in A.P.1275B, Vol.1, Sect.3, Chap.16.

#### Compass correction

26. The compass should be checked and adjusted at suitable intervals to ensure that the system maintains a high degree of accuracy. Compass swinging should take place on a suitable compass base which

scale is provided on each compass for use during installation and correction.

#### PERISCOPIC SEXTANTS

22. Mountings are provided in the aircraft for the installation of two Mk.2 periscopic sextants, one port and one starboard. These instruments, when fitted, are used for position fixing, and checking, by observing the position of celestial bodies.

23. Each mounting, Mk.1B, is fitted to a fairing on the upper skin and is secured from the outside by eight countersunk screws. A connector plate on each assembly makes the necessary electrical connections to the aircraft 28-volt d.c. supply and also carries a control switch. These switches are normally left in the ON position, as more readily accessible control switches are provided on panels 3P and 4P. The d.c. supply controlled by these switches is fed to heating elements integral with each mounting, and then to the sextant.

24. A routing chart of the electrical supplies is provided in Sect.5, Chap.1, Group 8 and a full description of the periscopic sextant Mk.2, along with the Mk.1B mountings will be found in A.P.1275B, Vol.1, Sect.13, Chap.6.

has been previously surveyed for freedom from magnetic interference. The routine calibration procedure will be found in A.P.1275B, Vol.1, Sect.9, Chap.1. Instructions for adjusting the G4B compass will be found in A.P.1275B, Vol.1, Sect.3, Chap.16

#### Sighting rods

27. A box, Ref.No.26DC/95422 contain-

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ing the necessary sighting rods is available as ground equipment. The box contains a front sighting rod, Ref.No.26DC/95238 and a rear sighting rod, Ref.No.26DC/95239. Suitably screwed brackets are provided on the aircraft structure to receive the front and rear sighting rods respectively.

#### G4B COMPASS

30. Removal of the compass system units is straightforward and no special instructions are required. Care should be taken when refitting the detector unit to ensure that only non-magnetic screws and bolts are fitted in the near vicinity of the unit.

#### E2A COMPASSES

28. Apart from a routine inspection for security and cleanliness the E2A compasses require no servicing. A faulty or damaged compass should be replaced by a serviceable compass, taking care that the arrow on the mounting plate is parallel with the aircraft datum.

#### REMOVAL AND ASSEMBLY

#### E2A COMPASSES

31. These compasses are easily removed and refitted but care should be taken to ensure that only non-magnetic bolts and screws are used in the near vicinity of the compasses.

#### PERISCOPIC SEXTANTS

29. Servicing of the periscopic sextants is confined to a visual check of the optical systems for cleanliness, and a functional check of the lighting switches and control gear. A sextant suspected of being faulty should be tested in accordance with the Standard Serviceability Test given in the Appendix 1 to A.P.1275B, Vol.1, Sect.13, Chap.6.

#### PERISCOPIC SEXTANTS

32. The removal and replacement of the mountings for the periscopic sextants effects the sealing of the pressurised cabin and instructions for this operation are contained in Book 1, Sect.3, Chap.1.

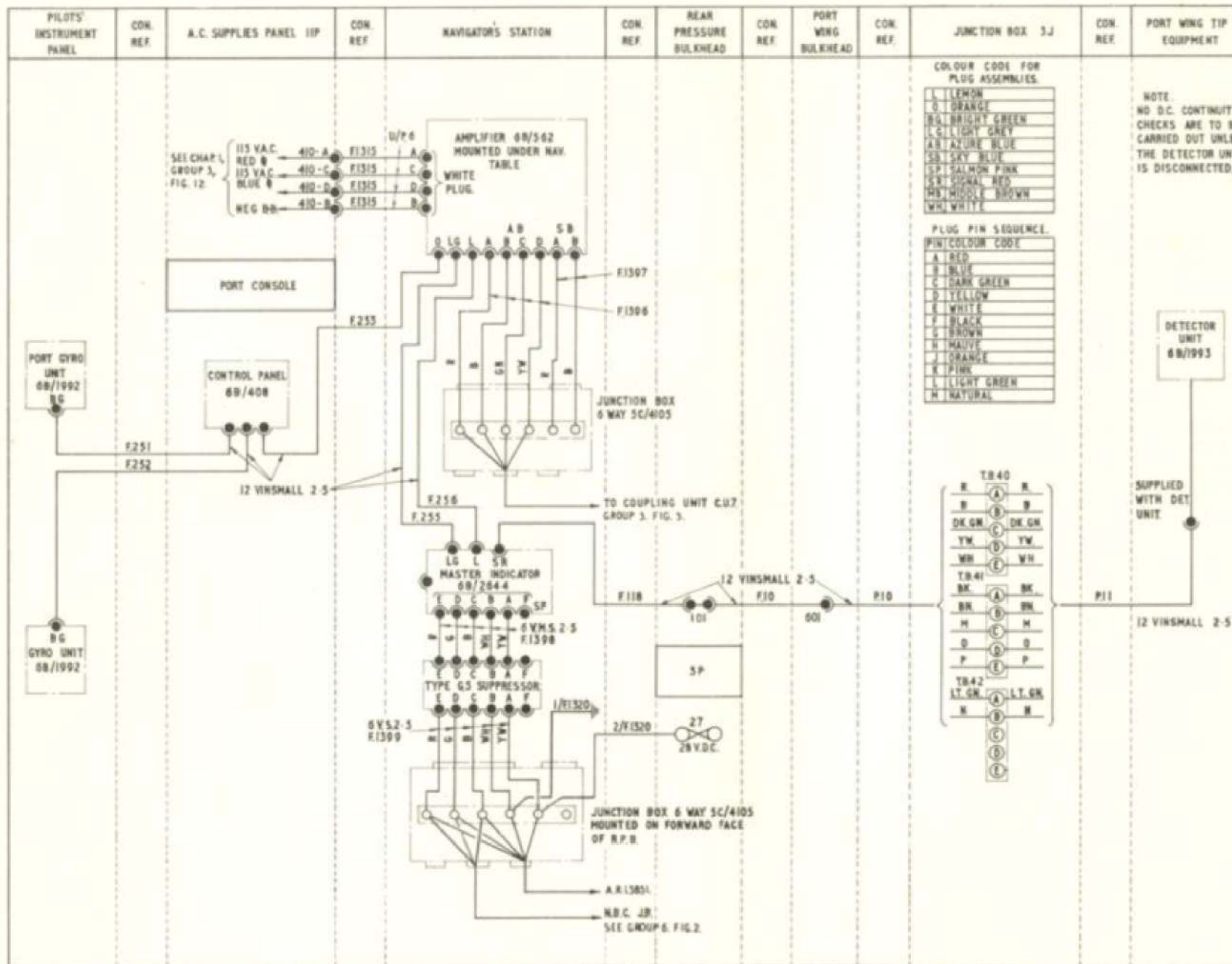


Fig. 2 G4B compass (prior to Mod 347)

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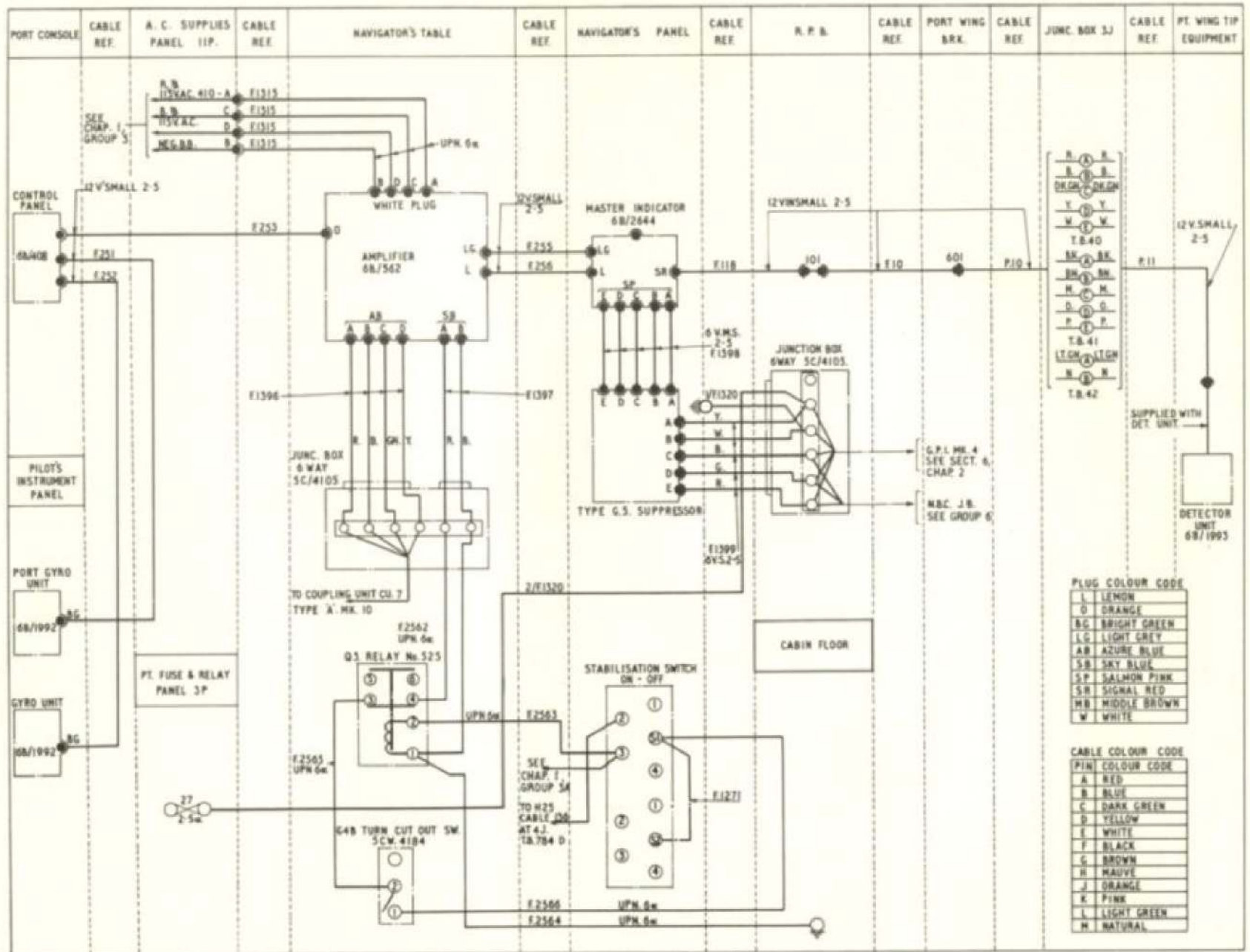


Fig. 3 G4B compass (Post Mod 347)

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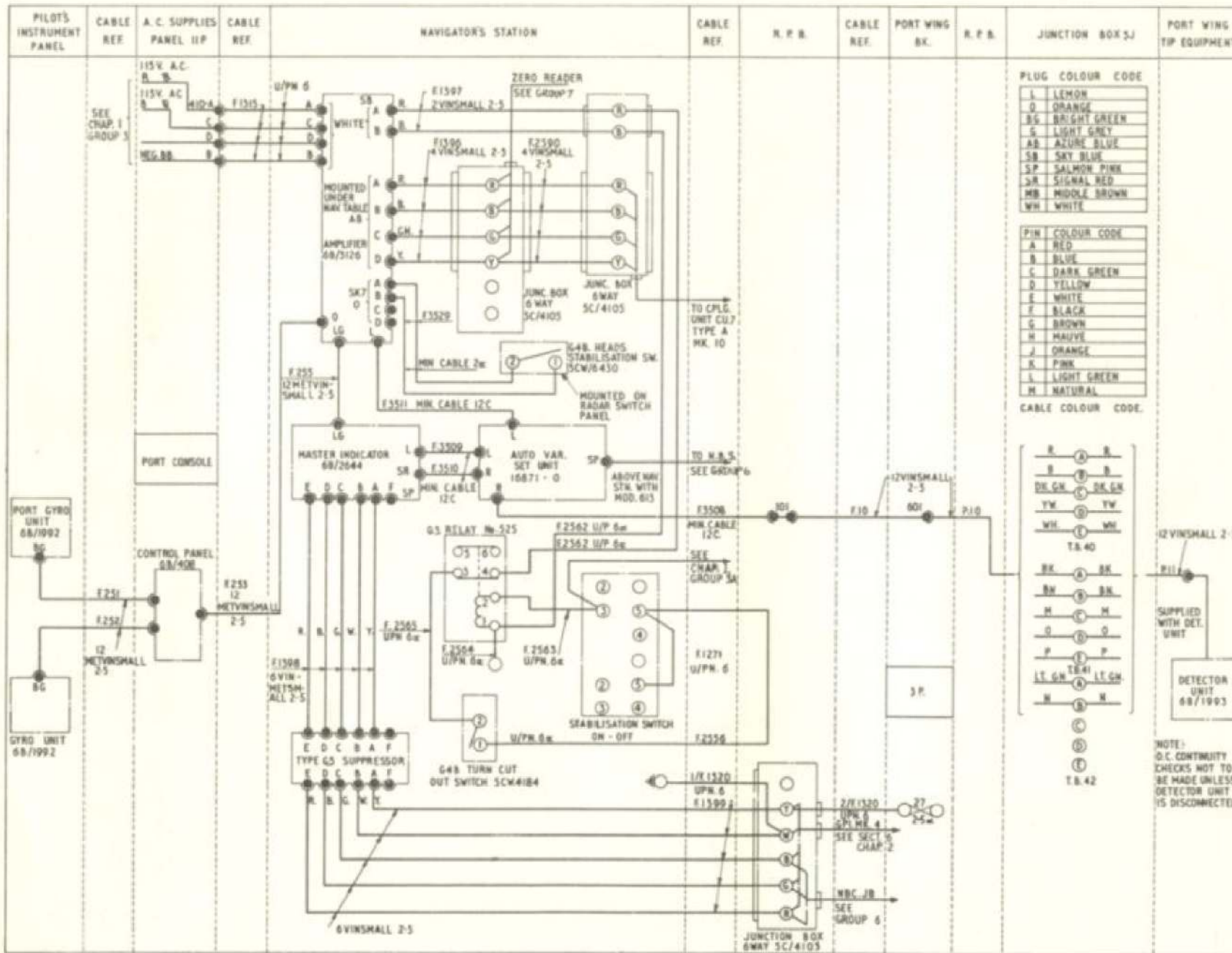


Fig. 4 G4B compass (Post Mod B27 and I122)

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