Chapter 7
MILITARY FLIGHT SYSTEM

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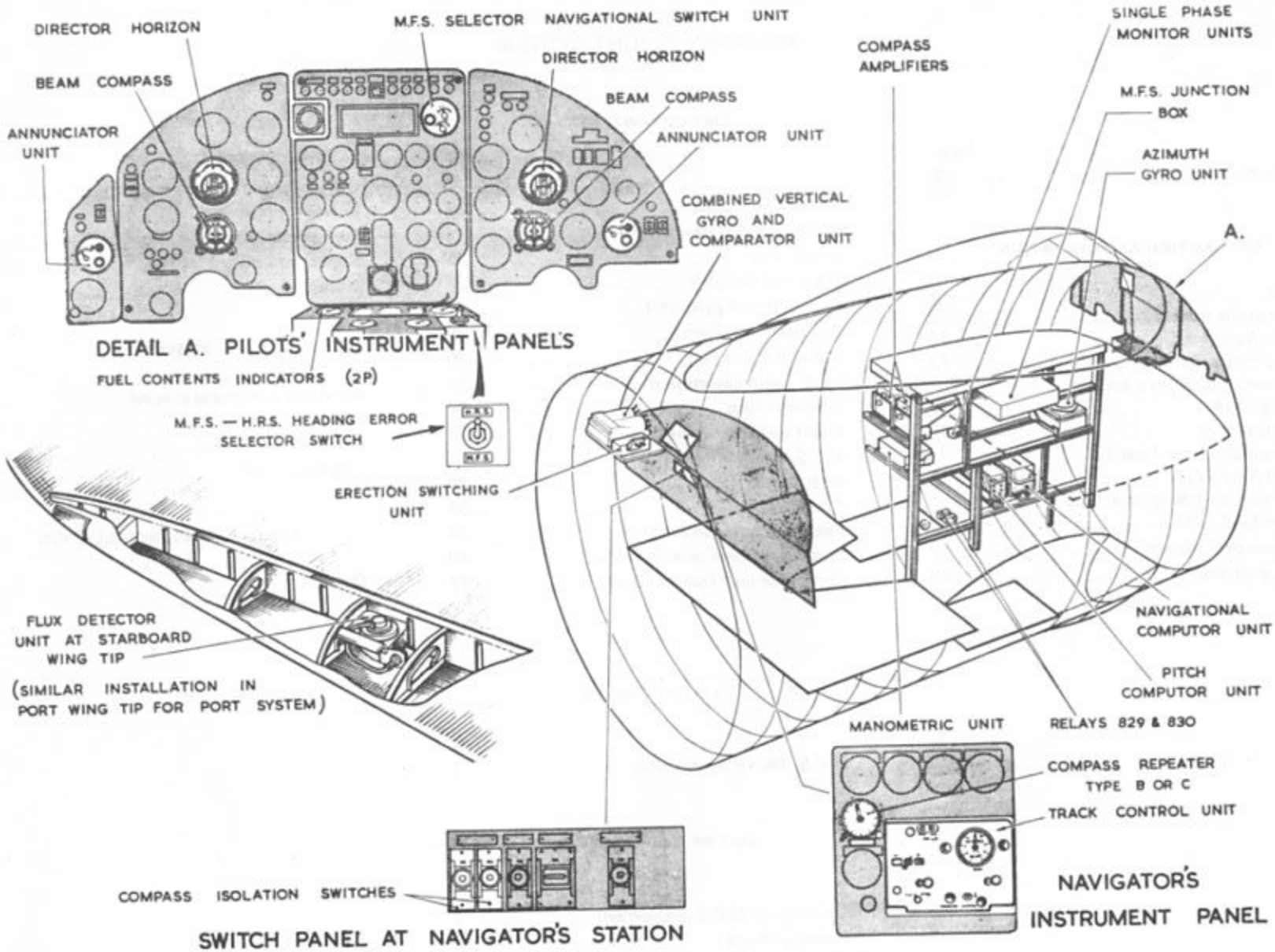

Fig.1 Location of M.F.S. equipment

Introduction

1. The military flight system (M.F.S.) is a system of flight instrumentation designed to reduce pilot fatigue and provide increased safety and efficiency. In the M.F.S. several instrument facilities have been correlated to provide heading and attitude information, radio beam displacement and comprehensive flight director displays on two instruments, namely the director horizon and the beam compass.

2. A duplicate pair of instruments is provided for the second pilot and the systems can therefore be referred to as the twin attitude and twin compass systems. The navigator can monitor the heading shown on the pilots' instruments via the navigator's compass repeater located on the Nav./plotter control panel.

3. The M.F.S. can be coupled with other equipment to provide complete instrument control of flight in all weather conditions and in all phases of manual flight director and fully automatic flight operations.

4. The installations associated with the M.F.S. are as follows:-

Mk.10A Autopilot	Chap.6
or	
Mk.10B Autopilot	Chap.6, App.1
N.B.S.	Chap.5
H.R.S.	Chap.10
A.R.I.18011	Sect.8 Chap.6
A.R.I.5972	Sect.9 Chap.4
A.R.I.5959	Sect.9 Chap.7

5. This chapter contains an outline of the M.F.S., it's operation and equipment location, together with servicing and removal information. The instruments and associated equipment locations are detailed in fig.1 and the relevant routing chart contained in fig.2. Brief details of the power supplies are given, for more detailed information, reference should be made to Sect.6, Chap.4 of this publication. A complete and detailed description of the M.F.S. is given in A.P.112C-0600-1A.

6. The following modifications are included in this chapter:-

Mod.2033	H.R.S. – to provide read-out of heading at pilots' position.
Mod.2116	Introduction of gyro director horizon Mk.2, Type B and comparator unit, Type C.
Mod.2124	Removal of the azimuth repeater unit and mounting tray.
Mod.2251	Electrical changes to ensure fast erection of M.F.S.
Mod.2256	Introduction of A.R.I.5972 in lieu of A.R.I.5951.
Mod.2263	Removal of autoland leader cable and auto-throttle facility from aircraft fitted with Mk.10B autopilot.
Mod.2349	Introduction of test plug to enable the stbd. vertical gyro secondary roll potentiometer to be simulated during test procedures.
▶ Mod.2453	Introduction of comparator unit Type D and a compatible erection switching unit Type C. ◀

DESCRIPTION AND OPERATION

General

7. Although the military flight system operates as a single combined unit, it consists of several separate systems. These systems, although separate, are closely related and form an integrated group. Basically the M.F.S. comprises an attitude system, a compass system and a flight director system. The compass and attitude systems are each split into two similar but completely independent systems, so as to form a port compass system and a starboard compass system, a port attitude system and a starboard attitude system. Consequently these systems are referred to as the twin compass system and the twin attitude system.

8. As previously stated the instrument display consists of a beam compass and director horizon for each pilot. The first pilot's instruments are operated by the port compass and attitude systems; the second pilot's instruments by the starboard compass and attitude systems. This arrangement gives maximum reliability and an accurate failure warning. The instruments may also be used to display radio beam displacement information as an additional function.

TWIN ATTITUDE SYSTEM

9. The twin attitude system consists of two identical distant-reading attitude indicating systems. The two systems are completely independent in all aspects including the power supplies. As stated in the previous paragraph the systems are referred to as port and starboard although the gyros are mounted on a combined assembly at the port side of the aircraft.

Director horizons

10. The port and starboard director horizons are mounted on the first and second pilots' instrument panels respectively, as shown in fig.1. Separate indications are given for pitch, roll and azimuth direction; pitch attitude by a pitch pointer, roll attitude by an horizon bar and azimuth direction by an azimuth director pointer.

11. The pitch pointer, in the form of a miniature aircraft, moves over a linear pitch scale which can be moved up and down to provide a fixed datum, in order that the aircraft may be easily maintained at a given pitch altitude.

12. The horizon bar has a bank ring-sight pointer which moves over a scale at the bottom of the instrument dial to indicate precise angle of bank. The azimuth director pointer is used in conjunction with the bank ring-sight and indicates the heading error derived from the associated beam compass (para.20).

Warning indication

13. Both director horizons normally indicate the same aircraft attitude. If this is not the case it may be assumed that one half of the twin attitude system is faulty. Warning flags will appear in the director horizons if the indications differ by more than 3.5 deg. in pitch and 5 deg. in roll. The warning flags are controlled by the comparator unit which is mounted on a common assembly with the gyros.

Combined vertical gyro and comparator unit

14. This combined assembly consists of two vertical gyros, a vertical gyro comparator unit and an erection switching unit. These items are all fitted onto a mounting tray, Type F, which is fitted onto a mounting tray, Type A, located behind the navigator's sloping panel as shown in fig.1. This latter tray is set $7.5 \pm {}^{0.5}_{0}$ deg. nose down from the wing chord line.

Vertical gyro

15. The vertical gyro provides pitch and roll attitude information for the M.F.S. Mk.1B and uses, as a reference, a gyroscope spinning about a vertical axis. As the unit is a precision instrument all vital parts are housed in a hermetically sealed case, with only the test points and connectors easily accessible.

16. An individual transmission link is fitted between each gyro and its corresponding director horizon. The seconday potentiometers of the stbd. vertical gyro provides pitch information for the pitch computor unit (para.42), and roll information to the auto-pilot. Mod.2349 introduces a test plug into the connector from the stbd. gyro socket GV3 to the pitch computor. This provides a facility for simulating the gyro secondary roll potentiometer during test procedures.

▶ Comparator unit Type D (Post Mod.2453)

17. The comparator unit contains two magnetic amplifiers which compare the two pitch signals and the two roll signals of the twin attitude system. When the pitch or roll signals differ by a predetermined amount the attitude failure flags in the director horizons come into view. Pitch trim potentiometers are fitted which permit adjustment of pitch signals to provide an accurate indication at any given pitch attitude. The comparator unit provides a stabilized d.c. supply to the signal comparators and a 28V d.c. supply to the vertical gyro pitch signal potentiometers.

Erection switching unit Type C (Post Mod.2453)

18. The erection switching unit operates and controls the two vertical gyros, providing facilities for the erection of the gyros so that both instruments are fully operational in less than 30 secs. ◀

TWIN COMPASS SYSTEM

19. The twin compass system consists of two identical, but independent compass systems. Separate power supplies are provided for each system as described in para.34. The systems are referred to as port and starboard and operate the first pilot's beam compass and second pilot's beam compass respectively.

Beam compasses

20. The two beam compasses, port and starboard, are mounted on the first and second pilots' instrument panels as shown in fig.1. Heading information is presented on each compass by a heading pointer which takes the form of a minature aircraft and ring-sight moving over a normally fixed compass card. The card may be rotated to set any desired scale marking at the top of the dial. So doing will not affect the heading, as the heading pointer will be moved at the same time and thus continue to indicate the same information. The card is rotated by pressing, and then turning, the setting knob at the bottom right corner of the instrument.

21. When the heading pointer or the heading index is displaced by the setting knob, a potentiometer wiper in the instrument picks off a voltage which represents the direction and magnitude of the displacement. This heading error signal is applied to the associated director horizon and in turn controls the movement of the azimuth director pointer (para.12).

◀ 22. An alternative heading error signal, derived from the H.R.S. (Chap.10), may be displayed by the azimuth director pointer. The signal is fed via a selector switch labelled H.R.S. - M.F.S. mounted adjacent to the fuel contents panel 2P (fig.1). Circuit details are contained in fig.3. ▶

Annunciator units

23. The port and starboard compass systems are each provided with an annuciator unit. These units are mounted on the first and second pilot's panels as shown in fig.1 and provide a means of synchronizing the two compass systems. Synchronization, or otherwise, is indicated by the position of two small arrow heads when viewed through a small circular window immediately above the synchronizing knob. The presence of an arrow head in the window indicates that the systems are not synchronized. Synchronization is achieved by rotating the synchronizing knob in the direction shown by the arrow head. When the arrow head disappears, and the shafts of both arrows are centrally placed over the fixed datum mark, the systems are synchronized.

24. Also fitted on each annunciator is a COMP/DG switch. When the switch is in the COMP position the system operates as a normal gyro - magnetic compass. Selecting D.G. on the switch converts the compass system to an unmonitored directional gyro system. Whenever the D.G. function is selected, a flag marked D.G. will appear in the face of the appropriate beam compass. Either or both halves of the twin compass system may be operated in this way.

M.F.S. selector navigational switch unit

25. This unit, which is mounted on the pilots' centre panel, is the primary control unit through which almost all the various functions of the M.F.S. may be selected. The unit carries two five-position selector switches and a two-position compass selector switch. The switch unit is shown in fig.1. Although many of the switch positions are connected only with the flight director system, certain positions affect the heading information displayed on the beam compasses.

26. When the upper five-position switch is set to LOC or LOC and GP, or is in the central unmarked position, the port and starboard beam compasses will show the magnetic heading of the aircraft, providing both systems are synchronized. If the switch is set to the REMOTE or BOMB positions the information presented on the beam compasses is controlled by the navigator, who, by means of the track control unit, can cause true track to be shown by both beam compasses.

Track control unit

27. This unit distributes heading information to other aircraft equipment and provides, among other things, the facility for presenting true track on the beam compasses and navigators' compass repeater. Magnetic variation information from the N.B.S. and drift information from A.R.I.5972 are fed to the unit along with magnetic heading information from the compass system. Three synchronous outputs of true heading are provided for the G.P.I. Mk.6, N.B.S. and the H.R.S. (Chap.10) when fitted.

Twin azimuth gyro unit

28. The twin compass system employs two magnetically monitored azimuth gyroscopes

which act as a director reference. The hermetically sealed gyros are mounted side-by-side on a common mounting under the first pilot's floor. Magnetic monitoring is by two flux detector units which are fitted one in each wing tip. Pendulous elements within the detector units sense the earth's field and provide the monitoring signal for the gyros.

Compass amplifiers

29. Signals from the port and starboard detector units are fed to their respective amplifier units which are mounted side-by-side under the first pilot's floor as shown in fig.1. The resolver unit shaft in each amplifier drives five servos, which feed heading information to the track control unit for distribution to the beam compasses and other equipment.

Warning indication

30. A warning lamp is fitted at the lower left corner of each beam compass. The warning lamps will light whenever the beam compass indications differ by more than 5 deg. A comparison of the beam compass readings is made by two resolver synchros which are fitted one in each beam compass. A delay switch prevents a warning indication being given if the misalignment signal is of only short duration.

I.L.S. BEAM DEVIATION DISPLAY

31. Radio information from an I.L.S. equipped airfield can be displayed on the M.F.S. instruments by appropriate selection of the M.F.S. selector navigational switch unit. Provided that A.R.I.18011 is switched on and functioning correctly, localiser beam displacement signals will be presented when the upper switch is set to LOC. Localiser and glidepath deviation will be shown simultaneously when the switch is set to LOC AND GP.

NOTE. . .
Strong interference with the I.L.S. signals may be experienced if the auto-pilot locking unit has no gearing pad fitted.

32. The two elements of radio beam information are displayed separately. Deviation from the localiser beam is indicated by the beam bar fitted in each beam compass. Glidepath deviation is shown by the glidepath pointer of each director horizon.

33. Presenting the information in this manner ensures that the localiser beam displacement is related to the aircraft magnetic heading and the glidepath displacement is related to the aircraft pitch attitude.

Indicator flags

34. An indication that the I.L.S. beams have been selected, and that everything is functioning correctly, is provided by two flags which appear in each director horizon. One flag, marked BEAM, indicates selection and correct functioning of the I.L.S. localiser beam information. The other flag, marked G.P., indicates selection and correct functioning of the glidepath information. Weak radio signals will be indicated by pulsating of the flags. A failure in the equipment will prevent the flags from coming into view.

FLIGHT DIRECTOR SYSTEM

35. Flight director information is presented on the director horizons in addition to the normal aircraft attitude information. By presenting these two distinct indications together the pilot can see not only the movement demanded by the director, but also the actual manoeuvre he is performing at that moment.

36. The normal aircraft attitude display is provided by the pitch pointer and the horizon bar which together indicate the existing attitude of the aircraft. Demand signals from the flight director system are indicated by the large centre dot of the pitch scale and the azimuth director pointer. When following an I.L.S. glidepath beam, pitch director demand signals are shown by the glidepath pointer.

M.F.S. selector navigational switch unit

37. Control of the signals displayed is by means of the M.F.S. selector navigational switch unit (para.16). The sub-paragraphs that follow give a brief description of the signal source and display for each switch position selected.

Upper switch (azimuth selector)

BOMB position

With the azimuth selector switched to BOMB, bombing steering signals are fed to the azimuth director pointer. The steering signals are fed from either the N.B.S. or the bomb aimer's turn controller, depending upon the position of the NBS/VISUAL switch on the bombing system selector. The azimuth demand signals may be complied with either manually or by engaging the autopilot selector switchbox. With the autopilot engaged the director horizons

will provide a visual indication of the autopilot performance.

REMOTE position

With the selector in this position, variation and drift signals are fed into the compass system so that the beam compasses display true track. Consequently the azimuth director will be used to turn on to new tracks as selected by the pilot on his beam compass. The signal for the azimuth director is derived from a heading error potentiometer in the beam compass.

Central position

When the switch is in the central position, signals proportional to the angular difference between a selected heading and the heading pointer, are fed from the heading error potentiometer, in the beam compass, to the azimuth director pointer.

LOC and LOC AND GP positions

When the selector is set to either of these positions I.L.S. localiser deviation signals are available from A.R.I.18011 for the M.F.S. and the autopilot. The I.L.S. signal is mixed with heading error signals before being displayed on the azimuth director pointers. The beam compass display when the selector is in this position is described in para.22.

Lower switch (pitch selector)

MACH position

This position is provided for selecting mach lock direction when a suitable source of mach error signals becomes available. Until this equipment is introduced the MACH position is inoperative.

HEIGHT position

Pitch director signals which enables the pilot to maintain a constant pressure height are displayed on the director horizons when HEIGHT is selected on the pitch selector. The signals are produced by the manometric unit and are fed, together with a signal from the pitch computor unit, to the pitch scale servo. If the aircraft departs from a selected height by more than a predetermined amount a limit switch will operate to disengage the height lock facility. The manometric unit, which is sensitive to altitude, is fed with a static supply from the starboard pitot-static system and is mounted with the other M.F.S. equipment under the first pilot's floor.

Central position

No pitch director signals are displayed when the pitch selector is in the central position.

DATUM position

This position is not normally selected until the pilot, having decided to use the glidepath facility, and having previously selected LOC or LOC AND GT, has established the aircraft on the centre line of the localiser beam. He will select DATUM immediately before beginning his descent. This will move the pitch scale to a point which represents the known approximate attitude of the aircraft when following a glidepath beam. This datum is preset to suit the particular aircraft type.

APPROACH position

The selector switch is spring-loaded to move back to this position immediately after release from the DATUM position. This action will then bring into circuit a drift unit which is contained in the pitch computor unit. The drift unit will ensure that the aircraft is maintained along the localiser beam centre line in the presence of cross winds. The switch will remain in the APPROACH position only when LOC AND GP is selected on the azimuth selector.

Pitch flags

38. An indication that a pitch director function has been selected is provided by two flags marked 'P' which will appear one in the face of each director horizon. Like most other flags in the M.F.S., the pitch flags indicate correct functioning; not failure.

Beam compass sense knob

39. Each beam compass has radio coupled range marks set at the top and bottom of the scale A sense knob fitted at the top left corner of the compass enables the pilot to select the range with which he desires radio coupling. The knob is engraved with an arrow which, by its position, indicates which range is coupled to the radio information. Both ranges, top and bottom, are radio coupled when the arrow

points to port. With the arrow pointing upright, radio coupling is with the top range only, whilst with the arrow pointing down, radio coupling is with the bottom range only.

Compass system selector switch

40. In addition to the azimuth selector and the pitch selector, the selector navigational switch unit has a third switch mounted at the left. This two-position switch, marked 'COMP', is the compass system selector switch which enables the pilot to choose which compass system will provide heading signals for the autopilot and other associated equipment.

Computor unit (navigational)

41. This unit, which is mounted under the first pilot's floor as shown in fig.1, receives and controls signals selected by the selector navigational switch unit. Signals fed to the computor unit are from the I.L.S. equipment, the bombing selector switch and the heading error potentiometer in the beam compass. After passing through the selector navigational switch unit the signals are routed to the M.F.S. display and the Mk.10A or 10B autopilot. This unit also contains the necessary interlocks with the autopilot system.

Computor unit (pitch)

42. This unit is mounted on a common mounting with the computor unit (navigational), under the first pilot's floor. In addition to the pitch direction relay switching, the unit contains the pitch scale servo amplifiers, the pitch datum unit, the pitch datum amplifier and the drift unit.

POWER SUPPLIES

43. Reference has been made in earlier paragraphs to the twin compass system and the twin attitude system, and it was shown how each of these systems contains a port system and a starboard system. To maintain the independence of the systems, two separate sources of supply are provided, and these in turn are referred to as the port and starboard power supplies.

Port power supplies

44. The port attitude and compass systems are provided with a 115-volt, 3-phase, 400 c/s, a.c. supply from fuses 247-R and 247-B in panel 24P. The supply is fed direct to the port fuse and relay panel, 71P, for distribution and fusing, before passing to the M.F.S. junction box, which is mounted under the first pilot's floor with the other equipment.

45. A 28-volt d.c. supply is provided from fuse 941 in panel 3P. The supply is fed direct to the port fuse and relay panel, 71P, for fusing and distribution before passing to the M.F.S. junction box.

46. As the supplies are fed direct, the system would normally operate immediately power supplies were available. However, as the compass system must not be run except during flight or ground functioning checks, the a.c. supply to the compass system is controlled by a relay, No.179, mounted in panel 71P. The relay is controlled by a single-pole compass isolation switch on the navigator's panel. Moving the switch to ON will energize the relay by means of a 28-volt d.c. supply from fuse 942 in panel 3P. Energizing the relay will complete the a.c. supply circuit to the compass system and the compass will run.

Starboard power supplies

47. Power supplies are provided for the starboard systems in a manner similar to that used for the port system. A 115-volt 3-phase, 400 c/s, a.c. supply is taken from fuses 261-R and 261-B in panel 25P, and is fed to the starboard fuse and relay box, 72P, for fusing and distribution before passing to the M.F.S. junction box.

48. A 28-volt d.c. supply is provided from fuse 890 in the starboard fuse and relay panel 4P. The supply is fed direct to panel 72P for fusing and distribution before passing to the M.F.S. junction box.

49. A second compass isolation switch and relay are provided to perform the same function as their counterparts in the port system. The d.c. supply to the switch is from fuse 891 in panel 4P.

Monitor units

50. A monitor unit is connected into each single-phase (red) supply to the comparator unit. Each monitor unit contains a small self-starting single-phase induction motor which operates a mechanically coupled switching device. Should either of the red phase supplies deviate from the limits necessary for efficient operation of the comparator, the switches will open and disconnect the supply. This action will ensure that the director horizon warning flags appear.

SERVICING

51. The fixed components of the system require very little servicing, apart from a periodical check on the connectors and cables for security, cleanliness and signs of damage. Pre-flight ground functioning of the system is described in the paragraphs that follow. More extensive checks upon the system, using the Test Set 273 T.E., are described in A.P.112C-0600-1A.

Pre-flight functional ground check

52. These checks, which are performed without the aid of test equipment, should be carried out daily or at the periods laid down in A.P.101B-1902-4. Proceed as follows:-

(1) Ensure that the 200-volt, a.c. and 28-volt d.c. ground supplies are available and connected.

(2) Switch on the two 3 kVA transformers by means of the two switches on panel 50P at the A.E.O.'s station.

(3) Check that within two minutes the attitude pointers on both director horizons stop oscillating and settle into positions dependent upon the aircraft attitude. Check that both failure warning flags are out of view.

(4) Switch on the port and starboard compass isolation switches at the navigator's panel.

NOTE . . .
The twin compass system must NOT be run unduly whilst the aircraft is on the ground.

53. Wait at least one minute after switching on the compasses, then set both annunciator unit switches to COMP. Synchronize both compass systems by means of the synchronizing knob and indicator on each annunciator unit.

54. Set the compass card of each beam compass so that N is at the top datum mark. Check that both heading pointers indicate approximately the same aircraft heading as the standby magnetic compass.

NOTE . . .
Some differences may be expected between the indicated headings if the aircraft is within a hangar or if some external magnetic influence is in the vicinity of the wing tips.

55. Set the COMP knob on the navigational selector switch unit to port and the upper five-position selector switch to the central position. Check that the lower five-position selector switch is also in the central position and remains so throughout the tests. Set the port annunciator switch to D.G. Check that the D.G. flag appears in the port beam compass face. Repeat for the starboard compass system.

56. Turn the port synchronizing knob so that the port beam compass heading pointer and the port resolver dial rotate. The resolver dials are fitted in the front face of their respective compass amplifiers. Have an assistant check that the resolver dial follows the heading pointer and that the two indications agree at cardinal points. At the same time, check that the turn switch reset indicator (compass amplifier front face) spins while the resolver dial is turning, and stops spinning shortly after the resolver dial stops. Repeat these checks on the starboard system.

57. Turn the synchronizing knob on the port annunciator unit until the port beam compass heading pointer is at least 20 deg. clockwise from the starboard heading pointer. Set both annunciator switches to COMP. Check that both D.G. flags have cleared and that both compass warning lamps light within 45 secs.

58. Rotate the port synchronizing knob slowly so that the port heading pointer is gradually brought towards the same indication as the starboard heading pointer. Check that the warning lamps remain on until the difference between the two pointers is reduced to less than 3 deg.

59. Turn the port synchronizing knob until the port heading pointer is at least 20 deg. anti-clockwise from the starboard heading pointer and then repeat para.57.

60. Turn the port synchronizing knob until the difference between the heading pointer is sufficient to bring on the warning lamps. Check that the warning lamps go out when the port annunciator switch is set to D.G. Restore the switch to COMP and check that the lamps switch on again. Repeat the instructions given in this paragraph, on the starboard system.

61. Rotate, simultaneously, both annunciator unit synchronizing knobs so that both heading pointers turn in a clockwise direction together. Check that the warning

lamps go out while the pointers are rotating and come on again when the pointers stop. Repeat this check in a reverse direction by rotating both synchronizing knobs anti-clockwise. Re-synchronize both compass systems.

62. Pull and turn the port beam compass setting knob until the heading index is set against the top datum. Push and turn the setting knob to set the heading pointer coincident with the heading index. Check that the azimuth director pointers of both director horizons are at zero.

63. Pull and turn the port beam compass setting knob to rotate the heading index up to 20 deg. either side of the top compass datum. Check that both azimuth director pointers move freely over thier full range of movement. Check that the azimuth director pointers move to starboard when the heading index is set to starboard and vice versa.

64. Set the COMP knob on the navigational selector switch unit to starboard and repeat para.53 and 54 on the starboard system. Check that the BEAM and G.P., flags are not visible on either director horizon. Ensure that the radio beam displacement bars of both beam compasses are central in their scales.

65. Check that when the upper five-position selector switch on the navigational selector switch unit is in any position other than the LOC or G.P. position, rotation of the pitch scale setting knob on the port director horizon causes full range movement of the pitch director pointer. Check that this facility is cancelled by switching to LOC AND G.P.

66. With the five-position switch set to LOC check that both director horizon BEAM flags pulse in and out of view. Select LOC AND G.P. and note that both BEAM and G.P. flags pulsate.

NOTE . . .
The flags will not remain fixed in view unless the I.L.S. equipment is switched ON and a I.L.S. radio signal is being received. The presence of I.L.S. radio signals will be indicated by deflection of the compass beam bars and/or the pitch director pointers.

67. Return the upper selector switch to the central position and check that the BEAM and G.P. flags go out of view. Switch off the compass isolation switches. Switch off the 3 kVA transformer and disconnect the power supplies.

Compass correction

68. The twin compass system 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 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.2. Instructions for adjusting the twin compass system will be found in A.P.112C-0600-1A.

Sighting rods

69. A box, Ref.No. 26DC/95422, containing 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 together with an extension piece, H.S.A. Part No.1U/1651, which is used in conjunction with the front sighting rod. Brackets, having suitably screwed holes, are permanently fixed to the structure at bulkhead 75F and former 487.5, for receiving the front and rear sighting rods respectively.

70. The extension piece is provided to increase the effective length of the front rod, thus enabling it to be seen beyond the projection of rear fuselage. When fitting the front rod, the extension piece is first screwed into the attachment bracket and then the sighting rod screwed into the extension piece. When in use the rods, painted white, are sighted against the nose wheel oleo leg.

REMOVAL AND INSTALLATION

General

71. The major units of the system are all provided with rack mountings which enable the units to be removed and fitted with a minimum amount of trouble. The removal of those units mounted in the pilot's panels will present little difficulty once the panels have been removed in accordance with the instructions given in Chapter 1.

TABLE 1
M.F.S. Mk.1B equipment

Equipment	Type	Sect./Ref.No.	No. Off
Annunciator unit	A	6TB/1507	2
Twin azimuth gyro unit	A	6TB/1410	2
Mounting tray (twin gyros)	B	6TB/1411	1
Mounting tray	C	6TB/1412	1
Beam compass	D	6TB/1523	2
Twin compass amplifier unit	B	6TB/1515	2
Mounting tray	B	6TB/1502	1
Detector unit	A	6TB/2654	2
Computer unit (navigational)	G	6TB/2243	1
Computer unit (pitch) (Pre Mod.2057)	A	6TB/1506	1
Computer unit (pitch) (Post Mod.2057)	B	6TB/2292	1
Mounting tray	E	6TB/1504	1
Director horizon Mk.2 (Post Mod.2116)	B	6TB/2205	2
Track control unit	C	6TB/1466	1
Twin vertical gyro unit (Post Mod.1483)	C	6TB/1467	2
▶ Comparator unit (Post Mod.2453)	D	6TB/6345912	1
Erection switching unit (Post Mod.2453)	C	6TB/6345913	1 ◀
Gyro/comparator mounting tray	F	6TB/1432	1
Mounting tray	A	6TB/1408	1
Junction box with looms (Post Mod.2033)	J	6TB/2199	1
Junction box with looms (Post Mod.2057)	L	6TB/2298	1
Manometric unit	A	6TB/1406	1
Mounting tray	A	6T/402	1
M.F.S. selector switch	D	6TB/1464	1
Navigator's compass repeater	B	6TB/1557	1
Single phase supply monitor	A	6T/1415	1

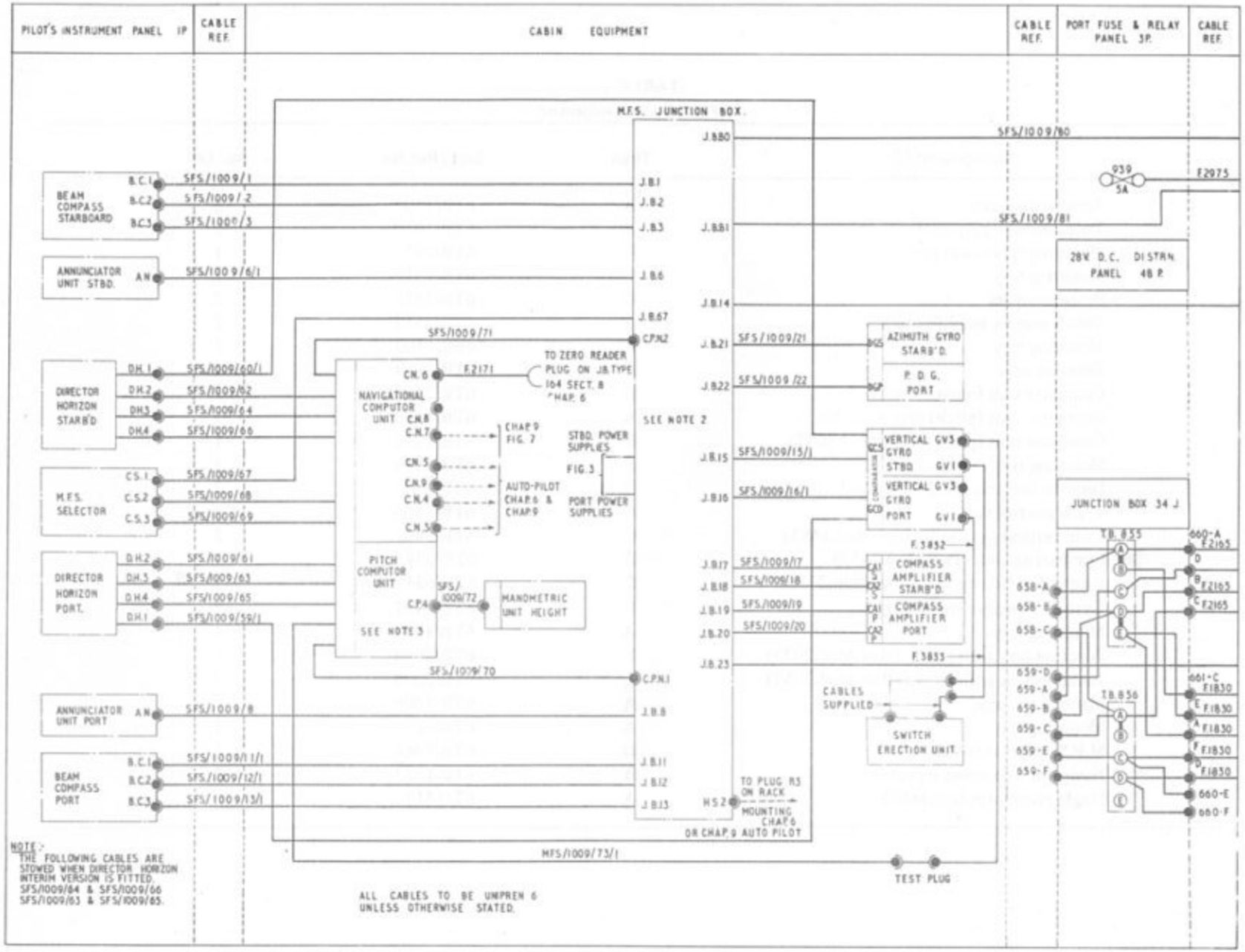

Fig. 2 (1) Military flight system.

(◀ Mod 2349 incorporated ▶)

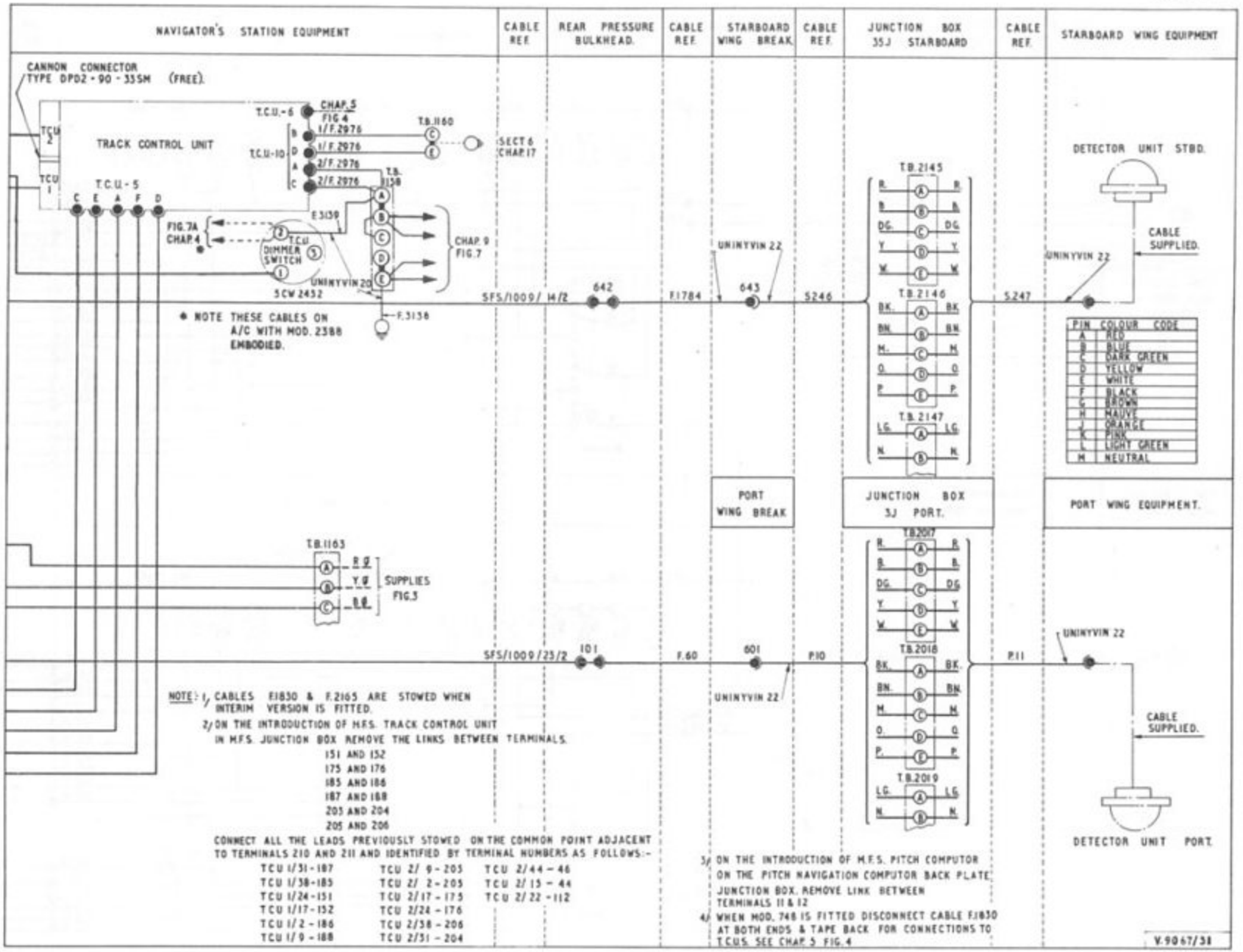

Fig 2 (2) Military flight system.
◀ *Note re Mod. 2388 added.* ▶

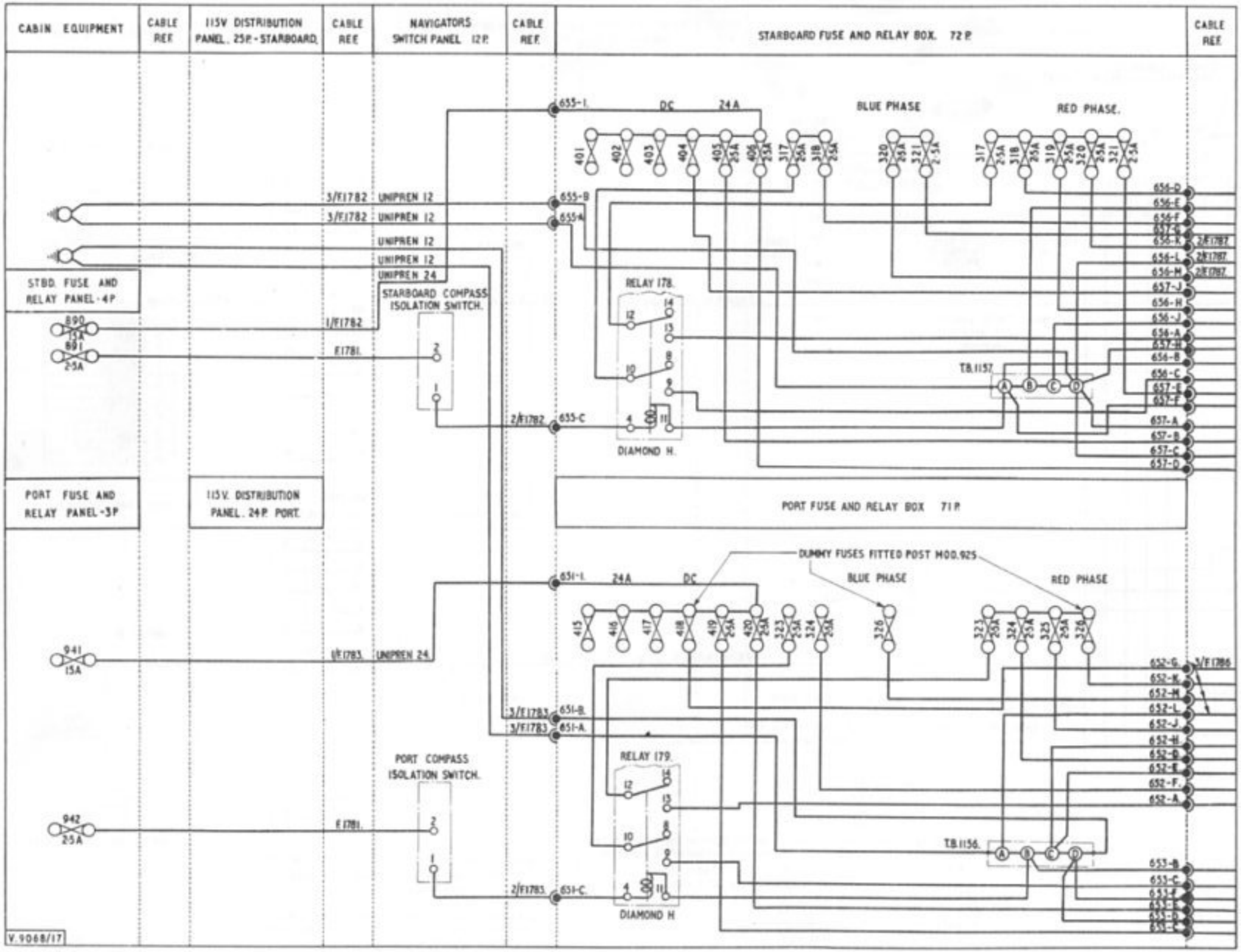

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Fig. 3 (I) Power supplies for M.F.S.