SUPPLEMENT 1

Mod 5466 removes certain ECM and navigation equipment and introduces a revised ECM equipment fit, plus the Omega navigation system.

SUPPLEMENT 1

Contents

1 Introduction

(a) Modification 5466 revises the special equipment fits, installs an Omega navigation system and adds an air-to-air facility to the Tacan. Controls, indicators and switches at the navigator's and AEO's stations are rearranged. The following equipments are removed:

(i) Green Satin (ARC 5951) and GPI Mk 4, except aerial dielectric panel.

(ii) AN-APR-9 (ARI 23287), except aerial retained for Spectrum Analyser.

(iii) ECM (ARI 23165), except waveguide systems.

(iv) ECM (ARC 18207), except antenna required for I/J jammer.

(v) VOR/ILS voice/range filter switch.

(vi) Radio compass voice/range filter switch.

(b) This Supplement describes the major changes resulting from the embodiment of Mod 5466; illustrations showing the revised locations of switches and control panels are included.

ELECTRICAL SYSTEM

2 Alternator Controls

Except for the MAIN SUPPLY/No 1 INV switch, all the controls for the two 30 kVA, 3-phase, 400 Hz, 200-volt alternators are grouped on a panel on the cabin left wall, below the hatch jettison switch.

3 Static Inverter

A static inverter is provided for the Omega navigation system. It is controlled by a switch above the navigator's station box.

FLIGHT INSTRUMENTS

4 Standby Altimeter

The standby Mk19F altimeter is outboard of the compass master indicator on the navigator's control panel. ◆◆

RADIO AND RADAR

5 Intercom Master Switch

The I/COMM MASTER - ON/OFF switch is adjacent to the IFF/SSR control unit on the navigator's instrument panel; the switch is gated to lock the dolly at the ON position.

6 Station Boxes

The override facility is removed from the station boxes and is provided by a button switch adjacent to each station box. The button functions on the station boxes are re-allocated to include dedicated Sylvania switch positions.

7 Radio Relay Link

The radio relay link utilizes the intercom system and the Sylvania communications jammer equipment to relay signals from a transmitting source to a receiving source which would otherwise be out of range. With UHF 2 selected, the COMM LINK switch at the AEO's station set to COMM JAM and the Tx switch on the AEO's station box set to LINK, the signals received by UHF 2 are retransmitted. Communications link select lights are adjacent to the pilot's and to the navigator's station box respectively; the lights come on when the system is in operation.

8 Hand/Foot/Jam Changeover Switch

The HAND/FOOT/JAM changeover switch is on the right side of the navigator's instrument panel.

9 UHF 2 (ARI 23301/3)

The following switches are between the navigator's instrument panel and the centre pedestal:

(a) UHF 2 TONE. A 3-position (on/off/on) switch, spring-loaded from the up position to off.

(b) UHF 2 MUTE. Spring-loaded to off.

10 HF (ARI 23090/2)

The HF control unit is on the centre pedestal and the tuning light is adjacent on the navigator's control panel.

11 Radio Compass (ARI 5877)

The radio compass control unit is on the navigator's control panel and has the radio compass bearing indicator below.

12 Tacan (ARI 18107/18)

The Tacan control unit is on the navigator's control panel and has a switch which selects an air-to-air or air-to-ground facility; the indicator is on the panel immediately above.

13 IFF/SSR (ARI 23134)

The IFF/SSR control unit is on the navigator's control panel and has the fail light adjacent to it. The aerial test switch is outboard of the navigator's ventilation louvre.

14 ◆◆ *Not used*

15 ECM Equipment

The control units for the ECM equipment are on the navigator's control panel, The control pedestal, above the navigator/AEO walkway and on the right wall panel; a panel lighting box, carrying four dimmer switches, is below the panel.

16 Tektronix Spectrum Analyser and Computor/Controller (ARI 23361)

ARI 23361 comprises a spectrum analyser above the walkway with a computer and control panel on the cabin right wall panel at the AEO's station. The computer displays received D band to J band signals. The system uses the former ARI 23287 aerial, and is operated as follows:

(a) The analyser is used as a wide band receiver; frequency band selection is made via the computer. After initial tuning to a known frequency the analyser front controls become energized and permit adjustment for optimum signal display. If the computer fails, the analyser can be operated manually. An output to the aircraft intercom system provides the AEO with audio information contained in the displayed signal.

(b) The operating software, loaded into the computer from a data cartridge, consists of a sortie profile tailored to suit the sortie requirements. A library of frequencies allows the analyser to monitor any signal by single-key selection from the computer keyboard. Further software facilities include addition/deletion of library frequencies, a received video record, limited signal analysis, and a stopwatch.

17 Sylvania Communications Jammer (ARI 23362)

The ARI 23362 equipment replaces the ARI 23165 and ARI 18207 ECM installations. A control and display unit is in the cabin on the central pedestal and is accessible to the navigator and the AEO. The equipment is liquid cooled; the coolant is circulated by a pump which is activated via an undercarriage microswitch whenever the aircraft weight is off the wheels. A PUMP GROUND/FLIGHT switch, at the right on the navigator's coaming panel, permits testing of the coolant pump on the ground. A low flow light, adjacent to the test switch, comes on whenever the fluid flow falls below a set rate. The Sylvania system is switched on whenever power is on the aircraft; its power consumption is ◆ approximately 12.5 amps and the system cannot be shed. The inlet scoops are to be OPEN when the equipment is operated. The system operation is temporarily restricted in both altitude and speed. ◆

18 REL I/J Jammer Systems (ARI 23363)

Two REL I/J jammer units are installed. The control panel for the rear system is on the navigators control panel above the right end of his table; the control panel for the front system is ◆ at the top of the control pedestal in the cabin. Operation of the systems is restricted in altitude. They may interfere with IFF/SSR and the radio altimeter. ◆

19 Omega (ARI 23314)

An Omega long range navigation system is installed. It operates in the very low frequency (VLF) band of 10 to 14 kHz. Global coverage is provided by eight Omega stations. The system is also capable of receiving signals from up to four VLF transmitters, automatically selected from nine available, in lieu of normal Omega signals. The major components of the system are an antenna coupler unit (ACU) under the fuselage, a receiver processor unit (RPU) in the rear equipment bay and a control and display unit (Fig 1) on the navigator's instrument panel. The system is interconnected with the G 4B master compass indicator. A static inverter is provided and is controlled by a switch above the navigator's station box. The system provides a display, by selection, of present position track and groundspeed, heading and drift, cross-track distance and track and estimated flight time between any two waypoints or between the present position and any waypoint, and wind velocity. Monitor the equipment closely in comparison to other navigation aids and, when planning the sortie, consider the loss of Omega information.

(a) Receiver/Processor Unit. The major components of the receiver/processor unit are the Omega receiver and the computer/processor. The receiver module processes the signals from the ACU and provides information to the computer in digital form; it also uses computer derived signals to control antenna loop selection, plus calibration and self-test functions. The computer is an integrated navigation sub-system containing the central processor, and aircraft and control and display unit (CDU) interface functions; it also incorporates extensive built-in-test facilities.

(b) Control and Display Unit. The CDU has the following controls and indicators:

(i) *Mode Switch.* The mode switch has the following settings:

1. OFF - All power supplies are disconnected.

2. A - Automatic (system-initiated) sequential track leg changes are provided. This setting also permits manual override.

3. M - Track leg changes are initiated only by manual insertion.

4. R - Remote ranging features are provided between waypoints, from present position to any waypoint and along flight plan.

(ii) *TK CHG Button.* When pressed, the button allows initiation of manual track leg change.

(iii) *Keyboard.* The keyboard has ten buttons, labelled 0 to 9, used to insert data; all carry additional captions for use in reference to specific data entries. The following additional three buttons, with integral lights are used to complete the action initiated by pressing the numerical buttons:

1. CLR - When pressed, clears all displayed data. This prevents input of inaccurate data to the computer and allows for a reselection of numerical buttons. The integral light comes on when an operator entry is incorrect or incomplete.

2. HLD - A multifunction key which, when pressed, permits position check and update, display of action/ malfunction codes, and waypoint editing.

3. ENT - When pressed, the ENT button transfers data entered via the numerical buttons onto the computer, or calls attention to the operator that further input data is required.

(iv) *WPT Thumbwheel.* The thumbwheel enables up to nine waypoints to be inserted via the keyboard, and allows the lat/long co-ordinates of inserted waypoints to be displayed when WPT is set on the display switch. It also allows various auxiliary functions to be monitored when AUX is set on the display switch; these functions are shown in Table 1.

(v) *From/To Waypoint Display.* A 2-digit display shows the waypoint numbers between which the current track leg is being flown; with the display switch at WPT, the setting of the WPT thumbwheel appears as the correct 'to' digit.

Table 1 - Omega Auxiliary Function Monitoring

WPT Setting	*Function*	*Remarks*
0	Re-laning	
1	Drift and groundspeed inputs	
2	Memory display	For ground crew use
3	Frequencies being used for each station	Displayed Digit / Frequency 10.2 / 13.6 / 11.33: 0 - - -; 1 - - x; 2 - x -; 3 - x x; 4 x - -; 5 x - x; 6 x x -; 7 x x x
4	Test purposes only	For ground crew use
5	VLF station status	
6	Grid offset angle	
7 and 8	Spare	
9	Lamp test	

(vi) *Dim Control.* The DIM control varies the light intensity of the numerical and waypoint displays.

(vii) *Display Switch and Numerical Displays.* The functions of the display switch and the numerical displays provided by the various selections are detailed in Table 2.

(viii) *Annunciator Display.* The system has the following annunciators:

1. ALR. The alert (ALR) light comes on (provided that the groundspeed exceeds 100 knots) when within two minutes of a selected waypoint. With the mode switch at A, the light goes out when a track leg change is made automatically. With the mode switch at M, the light flashes 30 seconds before reaching the waypoint and until a new track leg is inserted manually.

Table 2 - Omega Display - Switch Settings and Displayed Data

Switch Setting	*Parameter*	*Coverage*		*Remarks*
		Left-hand Display	*Right-hand Display*	
GMT/DAT	Greenwich Mean Time and date	0000 to 2359Z	Month, day, year	Automatically updated after initial manual insertions
TK/GS	Aircraft track and groundspeed	000.0 to 359.9°T	000 to 999 knots	Normally both parameters are automatically updated; abnormally, in DR mode, groundspeed must be periodically updated
HDG/DA	Aircraft true heading and drift	000.0 to 359.9°T	000.0 to 039.9° left or right	Heading is derived from the G4B compass system, computer-converted from magnetic to true. In DR mode, drift (like GS) must be manually updated
XTK/TKE	Cross-track distance and track angle error	000.0 to 399.9NM left or right	000.0 to 180.0° left or right	Data not displayed until a track leg is initiated
POS	Present position	Latitude to 0.1' North or South	Longitude to 0.1' East or West	Geographic position is always displayed, even with a gyro heading input
WPT	Waypoint	Latitude to 0.1' North or South	Longitude to 0.1' East or West	The lat/long co-ordinates of the waypoint number set at the WET thumbwheel where 0 is reserved for aircraft present position
DIS/TIME	Distance and time to next waypoint	0000 to 9999NM	000.0 to 999.9 minutes	If track leg or remote ranging inserted, time-to-go displayed assumes groundspeed of 480 knots if TAS less than 110 knots. ETA can be shown if GMT button is pressed
WIND	Wind direction and speed	000 to 359°T	000 to 250 knots. Above 250 knots 999 is displayed	Only displayed when TAS exceeds 100 knots, computer-derived if not in 0-mode. Abnormally manually inserted
MH/TAS	Magnetic heading and true airspeed	000.0 to 359.9°M	000 to 999 knots	Heading as directly supplied by the G4B compass system; TAS supplied by the TAS computer. Abnormally, both parameters manually inserted
STA	Station status	1, 2, 3 and 4 (or zero in lieu) flashing or steady	5, 6, 7 and 8 (or zero in lieu) flashing or steady	1 - Norway 5 - La Réunion Digit steady = Presently being used 2 - Liberia 6 - Argentina Digit flash = Available, not used 3 - Hawaii 7 - Australia Zero steady = Auto de-select 4 - North Dakota 8 - Japan Zero flash = Manual de-select
AUX	Auxiliary functions	-	-	Various auxiliary functions are enabled depending on the setting of the 10-position WPT thumbwheel (see Table 1)
DTK/STS	Desired track and system status	000.0 to 359.9°T	Action or malfunction (malf) and status codes	Desired track readout is blank until track leg/remote ranging inserted. Action code number displayed if fault detected, replaced by malfunction code number on subsequent switching. Final right-hand digits display systems status code as follows:

Action Code	*Malf Code*	*Fault*	*Action Code*	*Malf Code*	*Fault*	*System Status Code*	*System Operation*
1	01	Check sum	2	11	Loss of heading	90	Self-test
1	02	Arithmetic check	2	12	Loss of TAS and heading	80	Below operating temperature
1	03	Analogue/digital conversion	2	13	Power interrupt more	60	Synchronization
					than 7 seconds	30	Station selection
1	04	Memory address	2	14	No synchronization after	04	Grid navigation mode
1	05	Data check			3 minutes	03	Dead reckoning (DR) mode
1	06	Multiple inputs selected				02	VLF navigation mode
1	07	RF antenna	2	15	Initial data incomplete	01	Normal operating mode
2	10	Loss of TAS	4	30	VLF self-test		

2. DR. The dead reckoning (DR) light comes on at switch-on following insertion of present position coordinates and whenever the OMEGA/ VLF operating mode is not available (system status 03); this includes periods when re-laning is in progress. It remains on until system status 01 is achieved or regained. The light remains out during power transfer on the ground if system status 01/02 is attained within two minutes of power transfer.

3. VLF. The VLF light comes on whenever the system is operating predominantly with signals from VLF communications transmitters, ie, less than two Omega stations in use.

4. AMB. The ambiguity (AMB) light comes on whenever ambiguous positions are calculated. If ambiguity persists, re-laning can be initiated (DR light on); both AMB and DR lights go out when re-laning is complete.

5. MAN. The manual (MAN) light comes on whilst a manual entry of TAS or heading is present. The light goes out when the entries are reset to zero.

6. WRN. The warning (WRN) light comes on (if a fault is detected) to prompt the operator to select DTK/STS at the display switch and complete the fault analysis. A flashing WRN light occurs following failure of the sub-assembly self-test (action code 1 or 4) or when any fault is detected which is appropriate to action code 2,

◆ (c) *UTM Switch.* A switch, labelled OMEGA - UTM/ LAT/LONG, on the navigator's instrument panel, allows UTM information to be displayed if required. ◆

(d) *Power Supplies.* Power supplies are 115 volts 400 Hz AC and 26 volts AC; consumption is approximately 0.75 amps.

(e) *Operation.* The procedure for operating Omega is as follows:

(i) *Initial Position Insertion.* To insert present position:

1. Set the Omega inverter switch to ON and the mode switch to M.

2. Press the N(2) or S(8) button as required for north or south latitude.

3. Starting with the most significant digit, enter latitude to an accuracy of 0.1 minute ofarc.

4. Check the co-ordinates displayed. If correct, press ENT; if incorrect, press CLR and restart at action 3.

5. Press the W(4) or E(6) button as required and insert longitude as in actions 3. and 4.

6. When ENT button is pressed, the DR annunciator comes on.

(ii) *Time and Date Insertion.* To insert time and date:

1. Set the display switch to GMT/DAT.

2. Press the GMT (L7) button.

3. Enter hours and minutes using the 24 hour clock and GMT

4. Check the data displayed. If correct, press ENT; if incorrect, press CLR and restart at action 3.

5. Press the DAT (R9) button.

6. Insert initial zero if appropriate then enter month, day and year.

7. Check the data displayed. If correct, press ENT; if incorrect, press CLR and repeat actions 6. and 7.

(iii) *Waypoint Insertion.* To insert waypoint positions:

1. Set the display switch to WPT.

2. Set the WPT thumbwheel to 1.

3. Insert waypoint 1 lat/long co-ordinates using the procedure at para (i), 2. to 5.

4. Repeat for waypoints 2 to 9 as required.

(iv) *Initial Track Selection.* To select track to first waypoint:

1. Check that mode switch is at A or M.

2. Press the TK CHG button; verify that TK CHG and ENT lights come on.

3. Press the STA(O) button, then the number of the first en route waypoint.

4. Press ENT; check TK CHG and ENT lights out.

(v) *System Status Check.* To check system status:

1. Set the display switch to DTK/STS.

2. Check the right numerical display for left to right action and status codes. If an action code is displayed, press the HLD button to display malfunction codes, these are listed in Table 1.

(vi) *Manual Station De-selection and Re-selection.* For Omega stations, set display switch to STA; for VLF stations set display switch to AUX and WPT thumbwheel to '5', then:

1. For Omega de-selection, press the STA(O) button, check ENT light on.

2. Press the button corresponding to the code or station to be de-selected.

3. Press ENT; check ENT light out.

4. Omega re-selection is a repeat of actions 1. to 3. above, except that the flashing '0' is replaced by a steady '0', and possibly by a steady or flashing station code. If a button corresponding to a station which is producing a flashing '0' code is inadvertently pressed, that station is manually de-selected, and the intended re-selection is non-effective, a double re-selection is then required.

5. For VLF de-selection/re-selection, press ENT (light out), and check that readout code changes to an alternative flashing number.

(vii) *Manual Track Change.* To complete a manual track change from present position:

1. Set the mode switch to A or M.

2. Set the display switch to any position other than WPT or Aux.

3. Press the TK CHG button.

4. Press the STA(O) button, followed by the button corresponding to the number of the next intended waypoint.

5. Press ENT. Check that the TK CHG, ENT and ALR lights are out.

(viii) *Position Check and Updating.* To check and/or update a position:

1. Set the display switch to POS.

2. Set the WPT thumbwheel to any number but 0.

3. Press the HLD button at time of fix.

4. If the fix is considered more accurate than the displayed Omega position, insert the lat and long of the fix position.

5. Press the HLD button again.

6. Where fix position is known only to within approximately 60 NM, repeat actions 1. to 5. but with thumbwheel set to 0. This causes Omega to find its own position by reference to centilanes if the signals are sufficiently strong.

(ix) *Manual Re-laning.* If a persistent AMB (ambiguity) indication occurs, use the following procedure for manual initiation of re-laning, (DR light also on). Do not attempt to carry out the procedure during sunrise or sunset, or if the accuracy of the Omega position is in doubt. The Omega readout position must be within 60 NM of the aircraft actual position for the procedure to be successful:

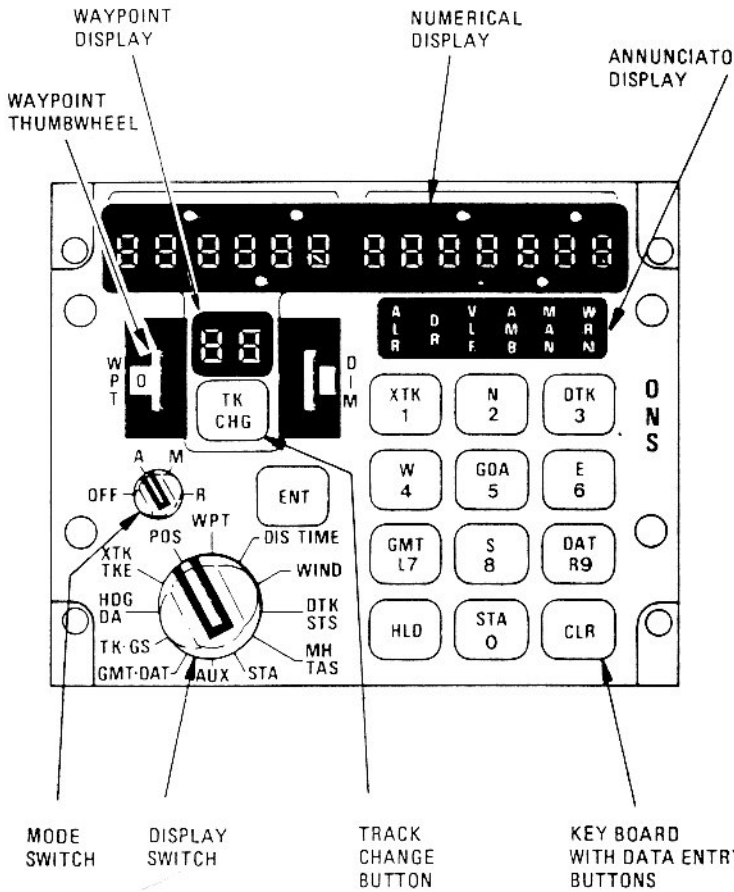
1. Set the display switch to AUX.

2. Set the WPT thumbwheel to 0.

3. Press the STA(0) and ENT button.

4. Check that the AMB and DR lights go out

◆◆



Supplement 1 Fig 1 Omega Control and Display Unit

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Supplement 1 Fig 2 *Not Used*

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Key to Fig 3 Navigator's Station

1 Alternator control panel

2 PEC card holder

3 Hatch jettison switch

4 Deviation card holder

5 Comms link select lamp

6 Omega inverter switch

7 Omega ground/flight switch

8 Navigator's intercom override pushbutton switch

9 IFF aerial test switch

10 Radio compass control unit

11 OAT gauge

12 Standby altimeter

13 Lighting dimmer for:
Sylvania control unit
AEO station box
AEO intercom override
I/J band control box (front)
No 2 UHF control unit
HF control unit

14 Lighting dimmer for:
Tacan control unit
Navigator's station box
IFF control unit
Navigator's intercom override
I/J band control unit (rear)

15 Navigator's instrument panel lighting dimmer

16 Radio magnetic indicator

17 Mk 30A altimeter

18 Tacan indicator

19 Stopwatch holder

20 I/J band control box (front)

21 Lighting dimmer for:
Radio and chaff dispenser switch
Starboard instruments

22 AEO intercom override pushbutton switch

23 Comms link reverse switch

24 Coolant pump test switch

25 Coolant low flow indicator

26 AEO press-to-transmit switch

27 Tektronix spectrum analyser

28 HF control unit

29 Sylvania control unit

30 HF tune light

31 Hand/foot/jam switch

32 Davall recorder

33 UHF control panel

34 Chaff selector and remote pushbutton

35 Foot operated press-to-transmit switch

36 UHF tone switch

37 UHF mute switch

38 I/J band control box (rear)

39 Tacan control unit

40 IFF/SSR control unit

41 Omega control and display unit

42 Intercom master switch

43 IFF fail light

44 Radio compass bearing indicator

45 Navigator's press-to-transmit switch

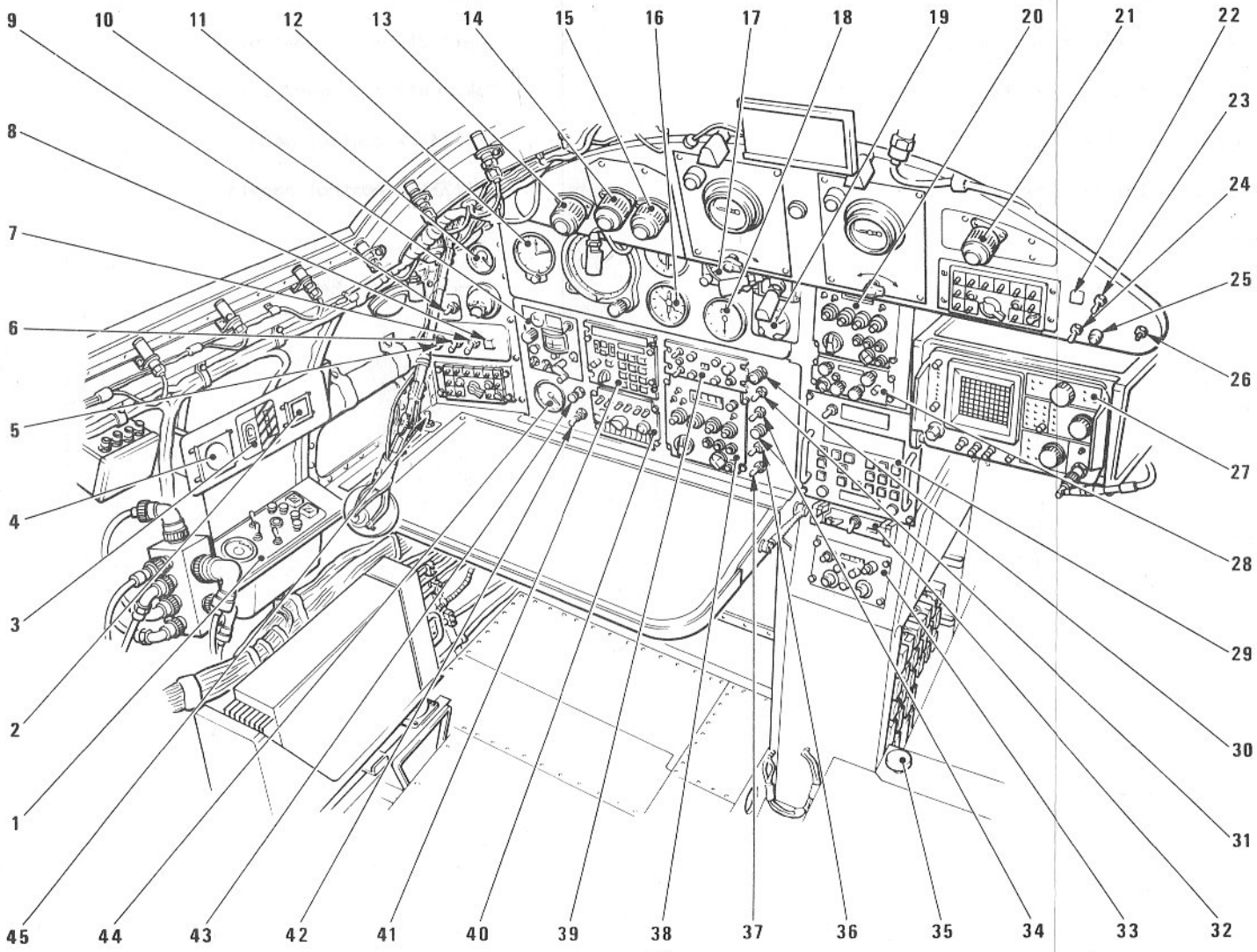

Fig 3 Navigator's Station

Key to Fig 4 Cabin, Starboard Wall

1 G4B compass controller
1A Pack bay overheat warning and 'Press to Test'
2 Inlet scoop switch and lamps
3 Pack bay fire warning lamp
4 Forward aerial switch
5 D-band aerial lamp and switch
6 Hatch jettison switch
7 Aft aerial switch
8 Davall control switch
9 Chaff dispenser controller
10 Tektronix computer/controller
11 ARI123167 control panel to be removed
12 ARI123166 control panels
13 Fan
14 Fire extinguisher

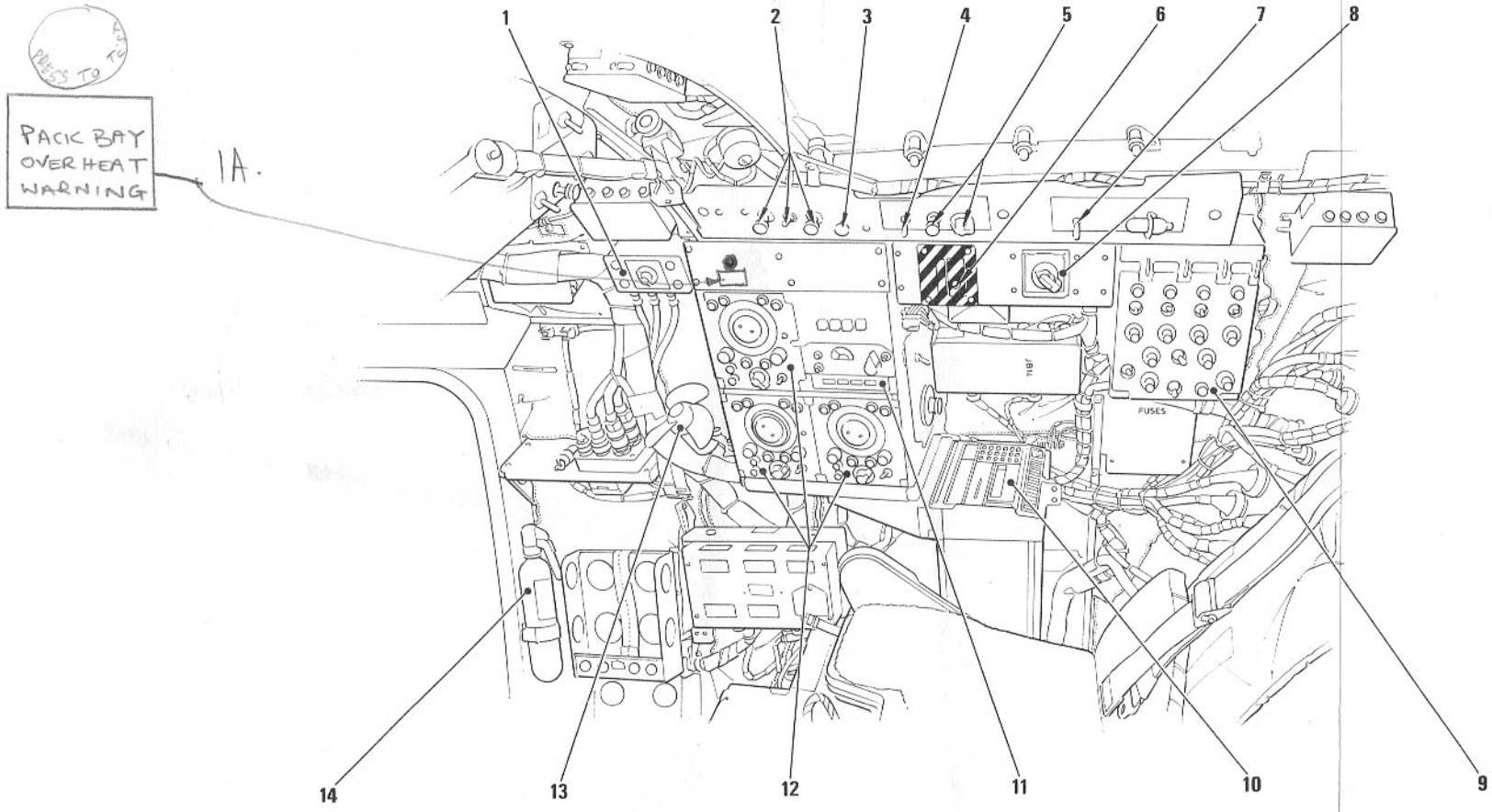

Fig 4 Cabin, Starboard Wall

(Post Mod 5541 added)

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