

British airways
OVERSEAS DIVISION

Concorde

FLYING MANUAL

Volume I

Copy No.....

STATEMENT OF INITIAL CERTIFICATION.

This Manual is approved by British Airways Overseas Division
in accordance with T.S.S Standard No. 02.

This Publication forms part of the British Airways Overseas
Division Approved Operations Manual.

Prepared by Technical Information Services.

REVISION RECORD

British airways
OVERSEAS DIVISION

FLYING STAFF COMMENT SHEET

Flying Staff will please note on this sheet any comments as to the condition or deficiencies in this Manual

PLEASE DO NOT REMOVE THIS SHEET FROM THIS MANUAL YOUR COMMENTS ARE FOR THE INFORMATION OF THE DISTRIBUTION STAFF WHEN CHECKING THIS MANUAL.



BRITISH AIRWAYS OVERSEAS DIVISION

FROM: Technical Information Services TO: All Copy Holders
G.2.
Technical Block A. DATE: 12 August 1976

CONCORDE FLYING MANUAL VOLUME 1
FIRST ISSUE DATED 21 JULY 1976

TEMPORARY REVISION 13.01 Facing Page 02.
" " 13.02 Facing Page 05.

The above T/Rs were printed on blue paper in error.

Please replace these pages with the attached pages
now printed on yellow paper.

TECHNICAL INFORMATION SERVICES.

**British
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CONCORDE FLYING MANUAL

Volume I

LETTER OF TRANSMITTAL - NO 13

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AND

LIST OF EFFECTIVE PAGES

The contents of this permanent revision are approved by BA-OD in accordance with TSS Standard No. O-2.

This manual consists of the following pages, listed to show the latest issue date of each enabling a complete check of all pages to be made.

1. INSERT and/or REMOVE pages, as stated below.
2. REMOVE & DESTROY superseded pages.
3. Record this revision number on the Record Sheet.

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PROCEDURE:

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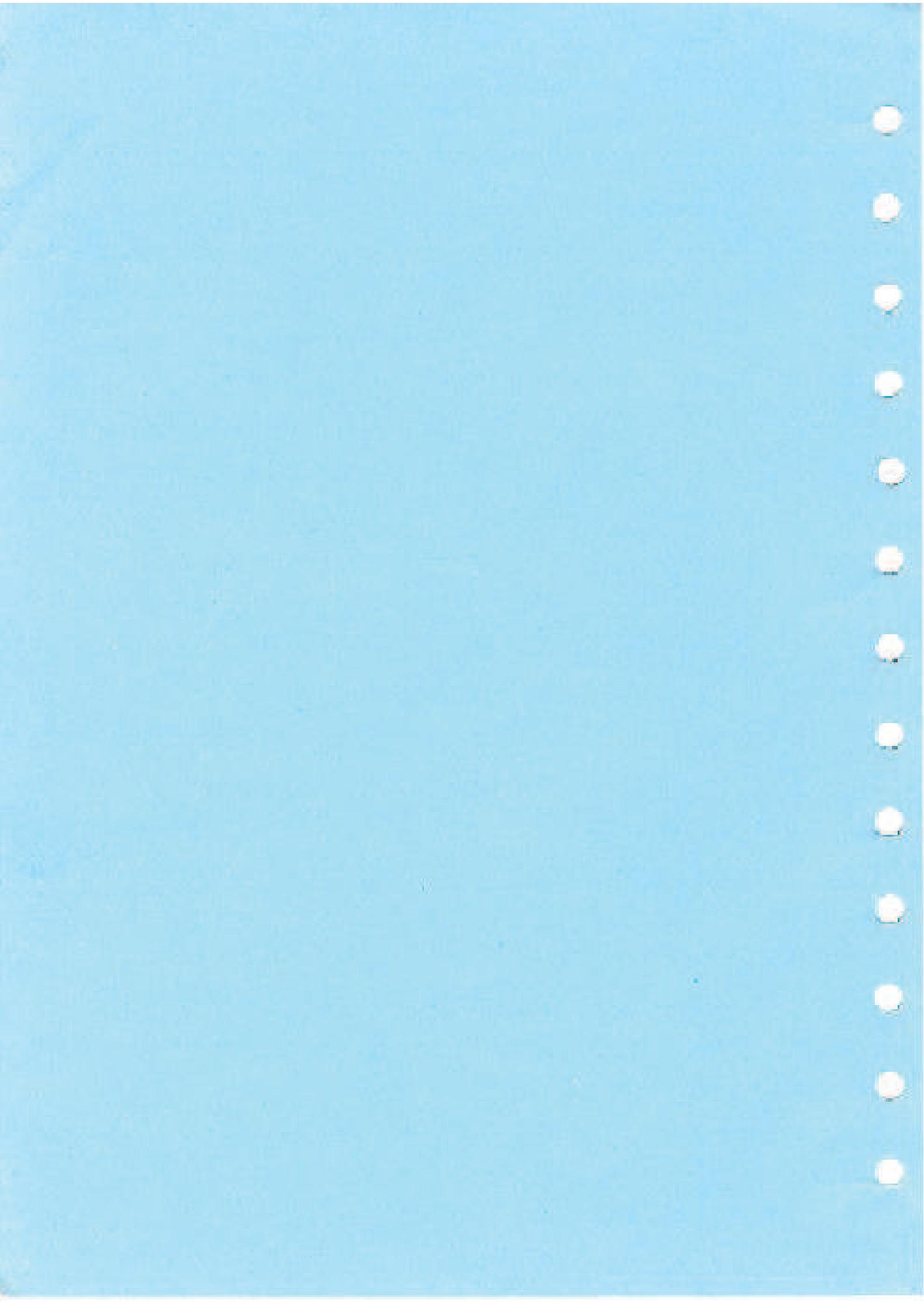
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The contents of this supplementary revision index are approved by BA-OD in accordance with TSS Standard No. O-2.

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FLIGHT COMPARTMENT AND PANELS

INTRODUCTION

The flight deck compartment is designed to accomodate three operating crew members and a supernumerary crew member. In addition full provision is made for accommodating a second supernumerary crew member.

Oxygen and communication facilities are provided at each station.

INSTRUMENT AND CONTROL PANELS

The Captains' and First Officers' panels comprise a dash panel in front of each pilot displaying flight instruments and a centre dash panel containing engine instruments. Above the centre dash panel is a glareshield panel containing auto-pilot, flight director auto throttle mode selection as well as control for VOR/ILS frequency selection for each pilot.

The left and right side consoles provide controls for nosewheel steering, weather radar and panel lighting.

The centre console provides mounting for the throttles and reverse thrust controls together with visor and droop nose standby control, parking and emergency braking selectors, standby landing gear controls, communication and navigation control panels.

The roof panel, mounted centrally between the two pilots is presented as a series of stepped sub-panels normal to the line of sight and a flat panel to the rear of the sub-panels. The sub-panels contain master warning indications, switches for external lighting, controls and overheat warning lights for the de-icing and de-misting equipment, flying control inverter switches, autostabilizer, auto trim, artificial feel switches and engine shut down controls. The rear panel is accessible to all three operating crew members. It contains throttle system switches, HP valves, ignition controls, flying control hydraulic changeover, systems heater controls and anti-icing controls.

The systems management panels are located at the Flight Engineers' station immediately aft of the First Officer. It is arranged so that the more important switches and controls are accessible to the captain when his seat is in the rearmost position. The panel layout comprises sub-sections presenting information on the power plant, fuel, hydraulic, electrics, air conditioning and pressurization, oxygen, fire detection and anti-icing systems. Where appropriate, panels are engraved with a logic diagram of the system.

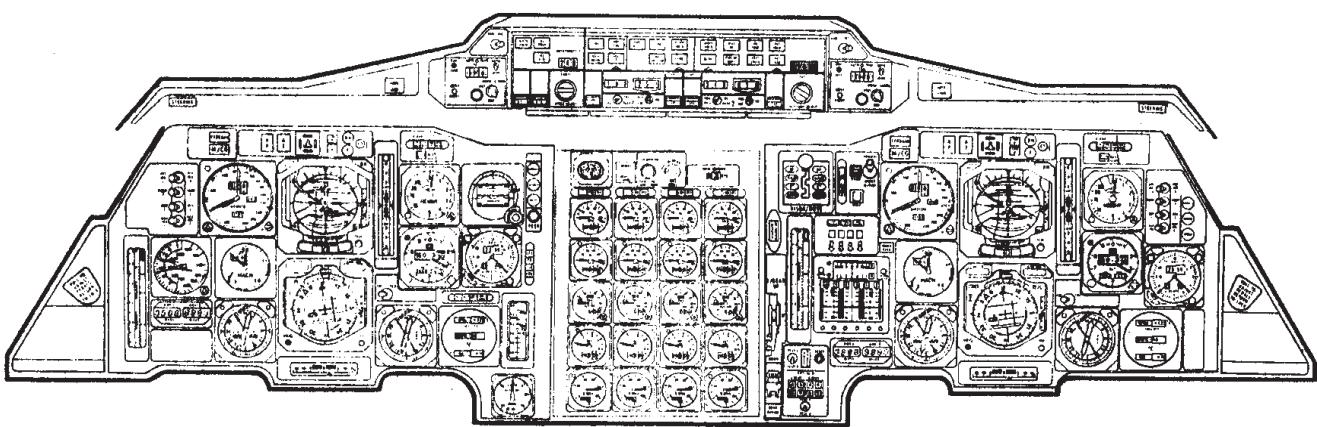
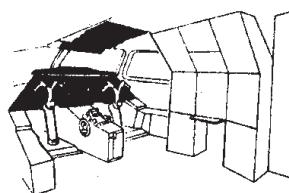
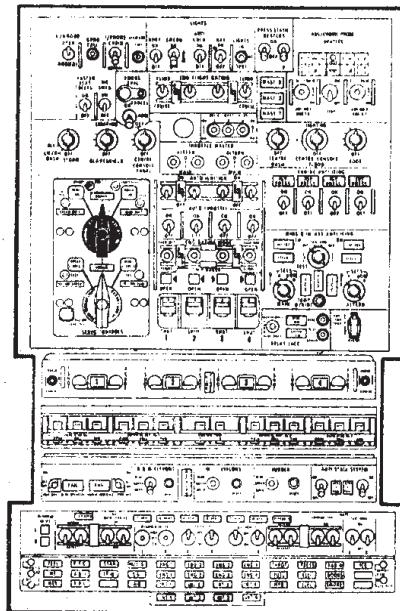
01.01.02
21 JUL.76

CONCORDE FLYING MANUAL

British airways
OVERSEAS DIVISION

FLIGHT COMPARTMENT PANEL LOCATION

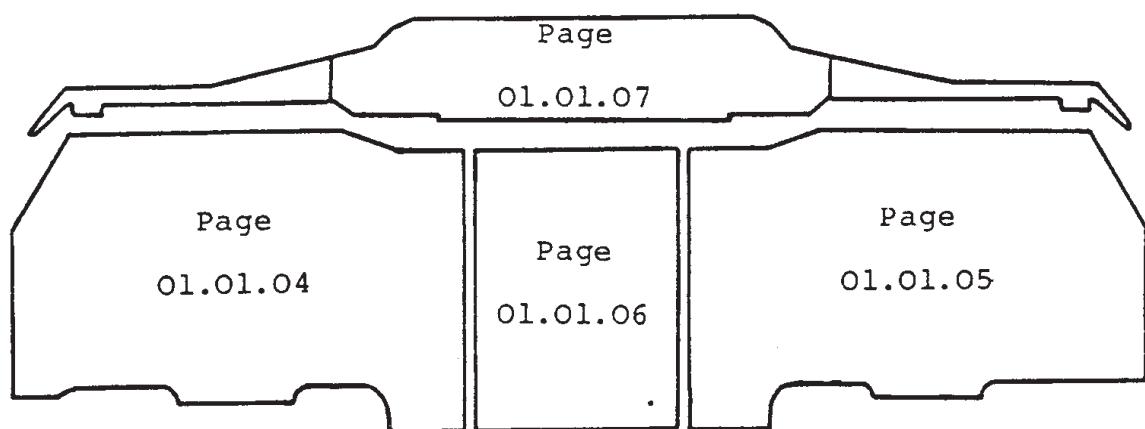
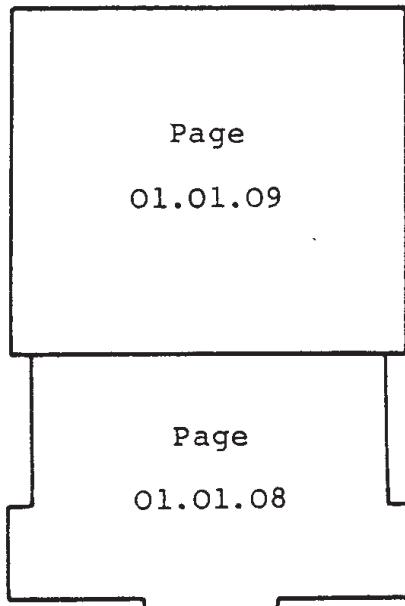
PILOT'S PANELS AND ROOF PANELS
(Sheet 1 of 2)



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ENGLAND

FLIGHT COMPARTMENT PANEL LOCATION

**PILOT'S PANELS AND ROOF PANELS
(Sheet 2 of 2)**



(Unchanged)

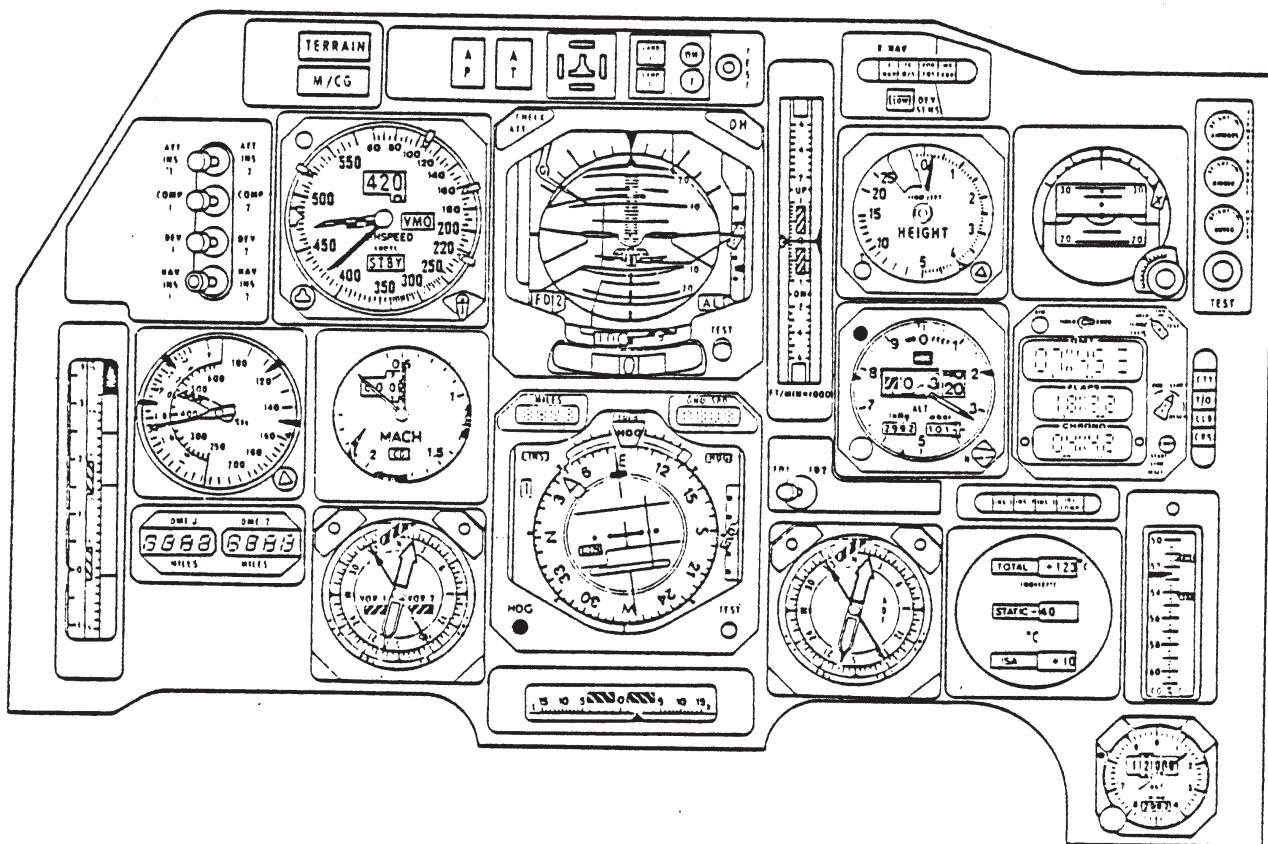
01.01.04
24 MAY 79

CONCORDE FLYING MANUAL

British airways

FLIGHT COMPARTMENT PANEL LOCATION

CAPTAIN'S DASH PANEL

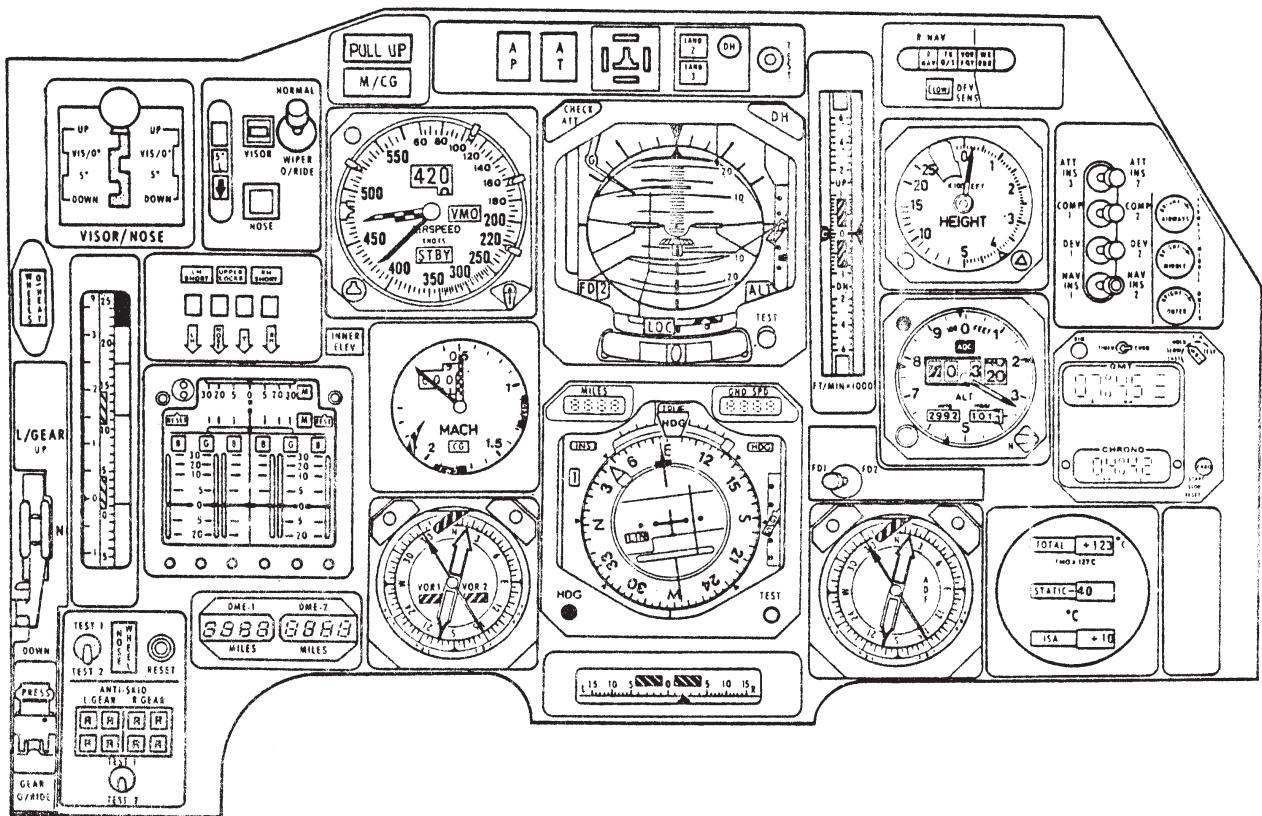


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FLIGHT COMPARTMENT PANEL LOCATION

FIRST OFFICER'S DASH PANEL



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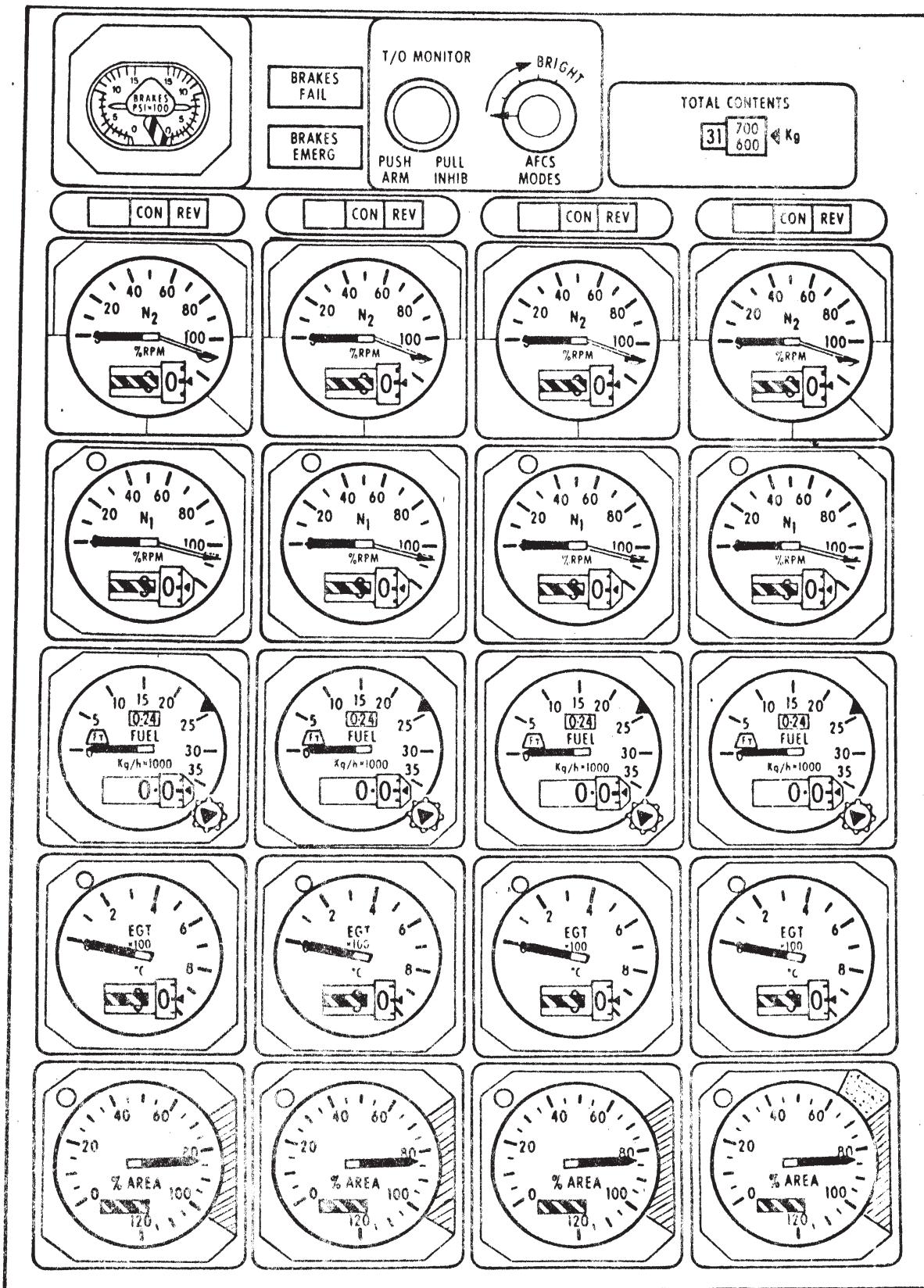
CONCORDE FLYING MANUAL

British airways

28 FEB. 79

FLIGHT COMPARTMENT PANEL LOCATION

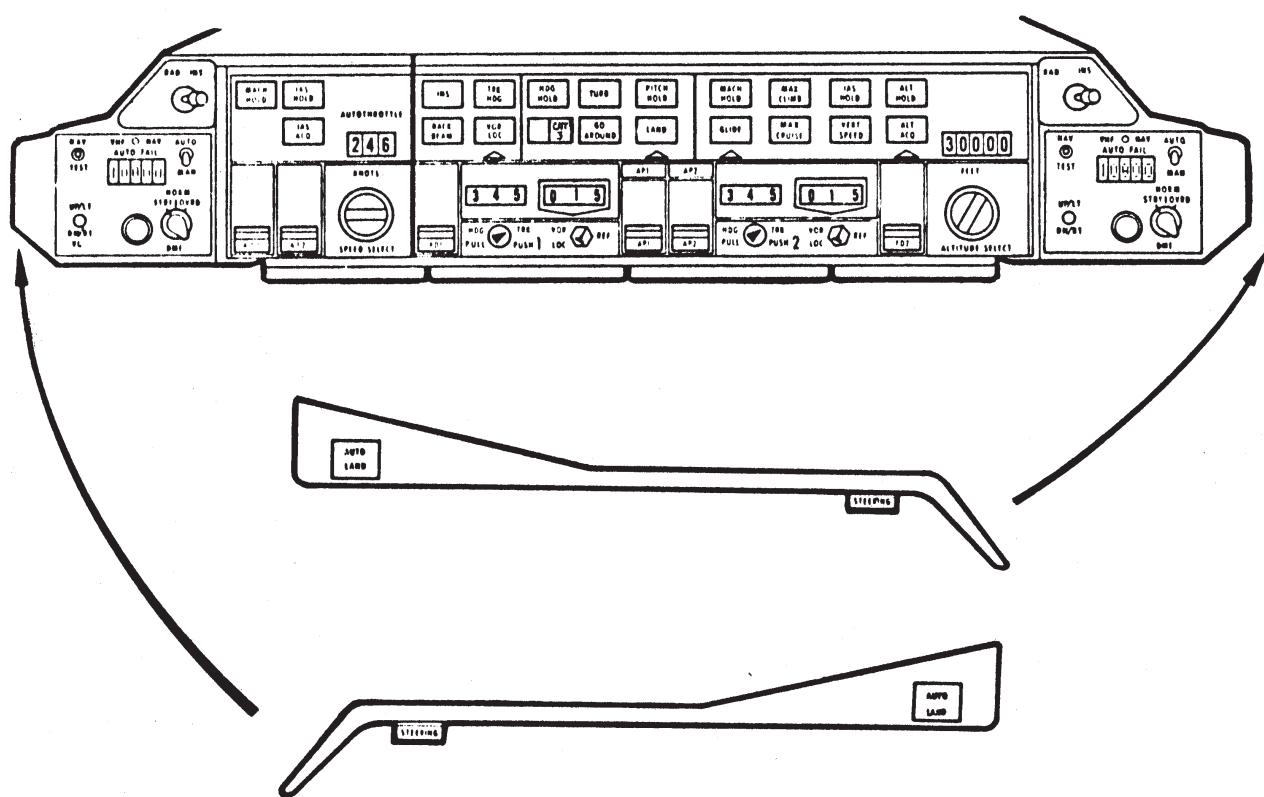
CENTRE DASH PANEL



(Unchanged)

FLIGHT COMPARTMENT PANEL LOCATION

GLARESHIELD PANEL



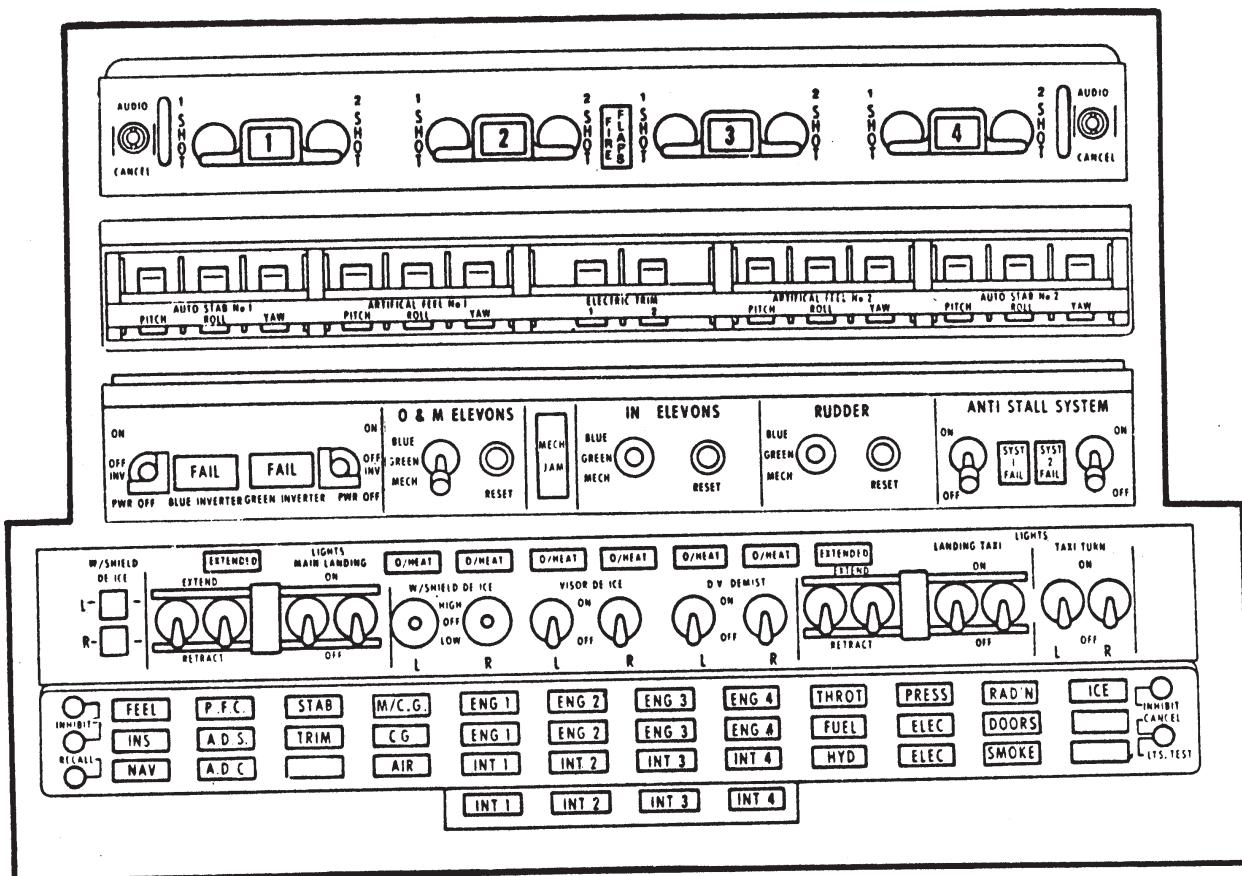
01.01.08
6 NOV. 78

CONCORDE FLYING MANUAL

British airways

FLIGHT COMPARTMENT PANEL LOCATION

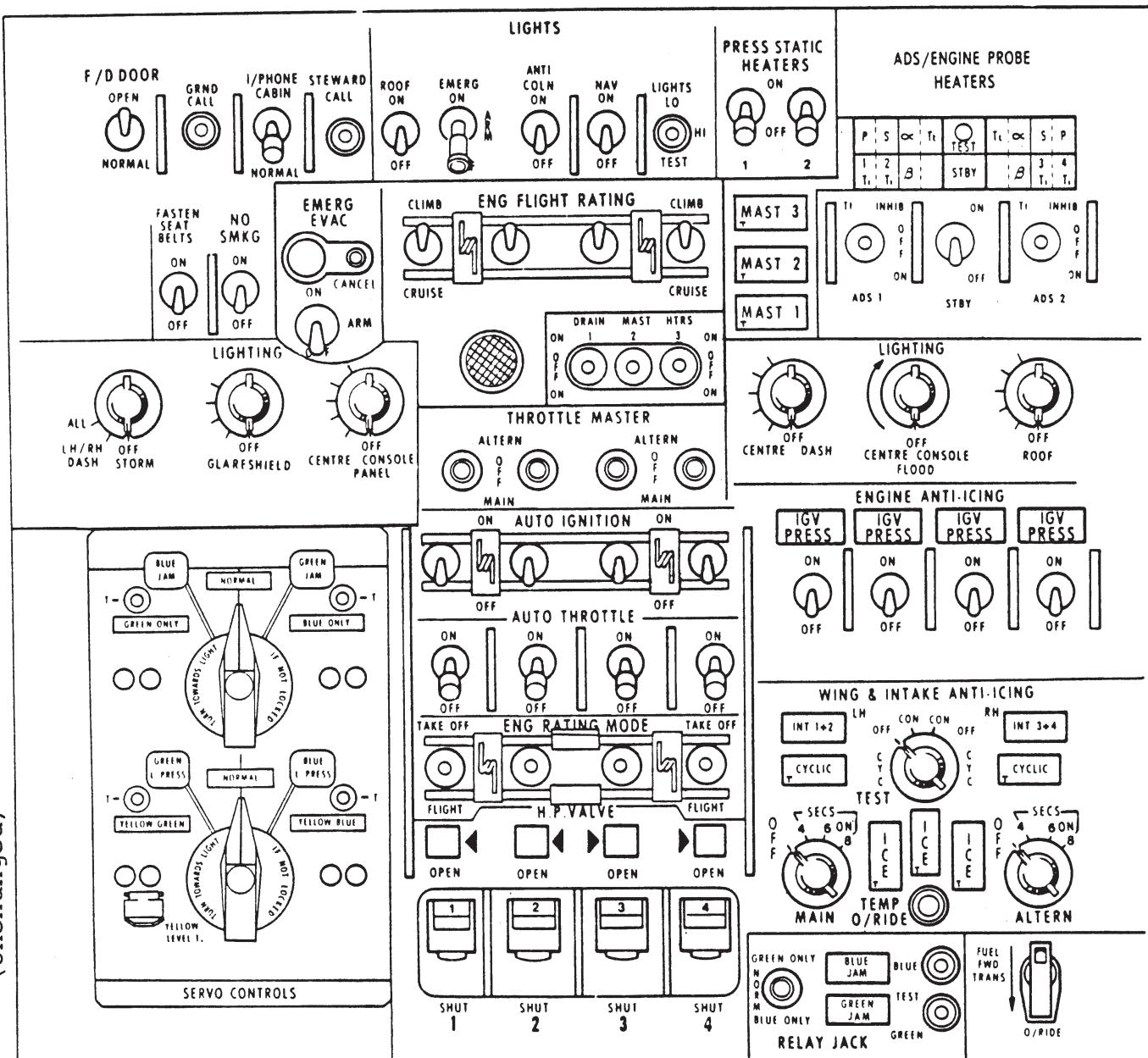
ROOF PANEL (FORWARD)



(Unchanged)

FLIGHT COMPARTMENT PANEL LOCATION

ROOF PANEL (AFT)



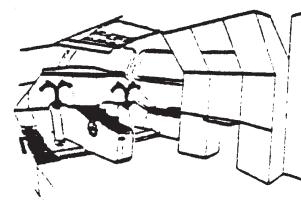
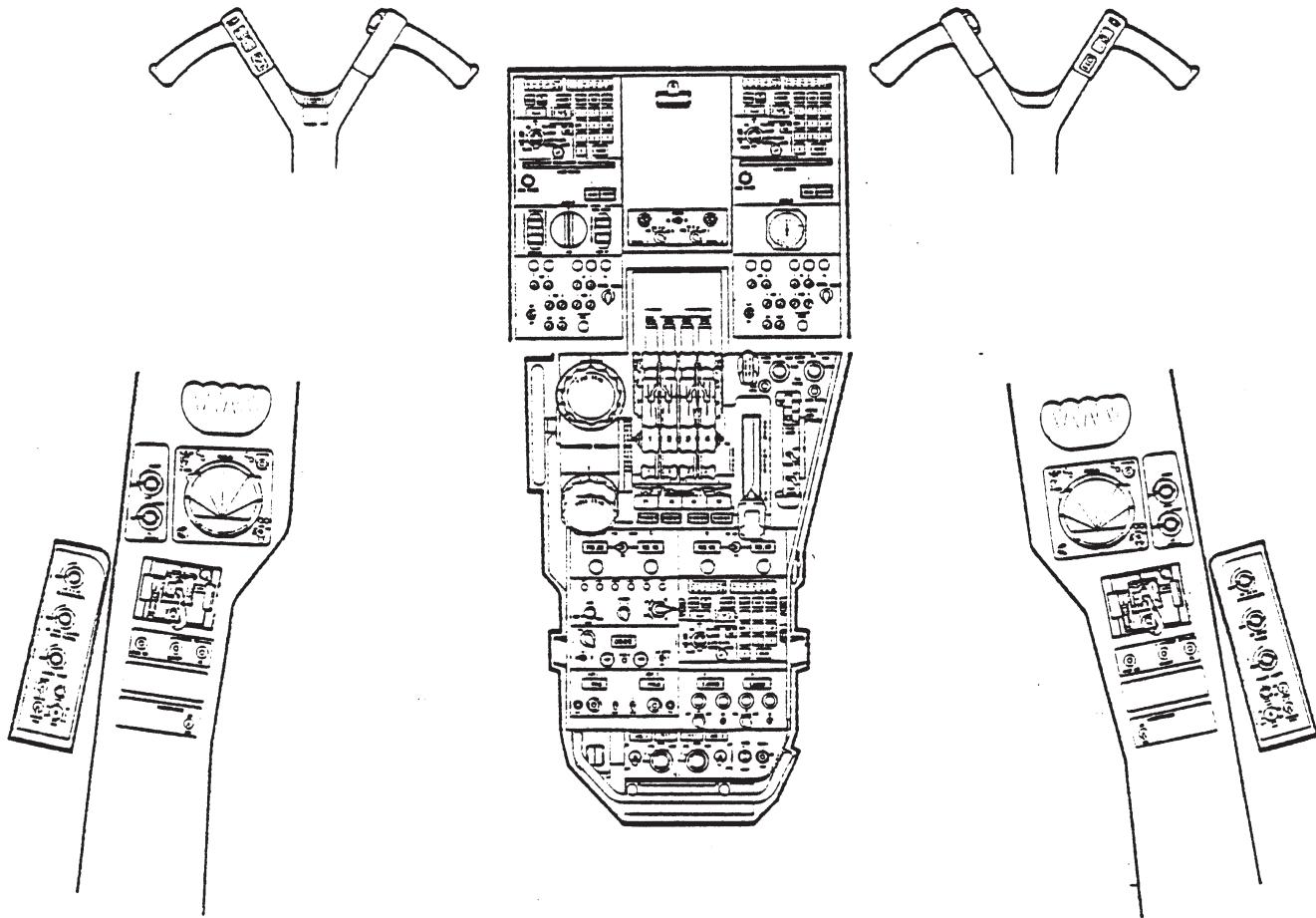
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24 MAY 79

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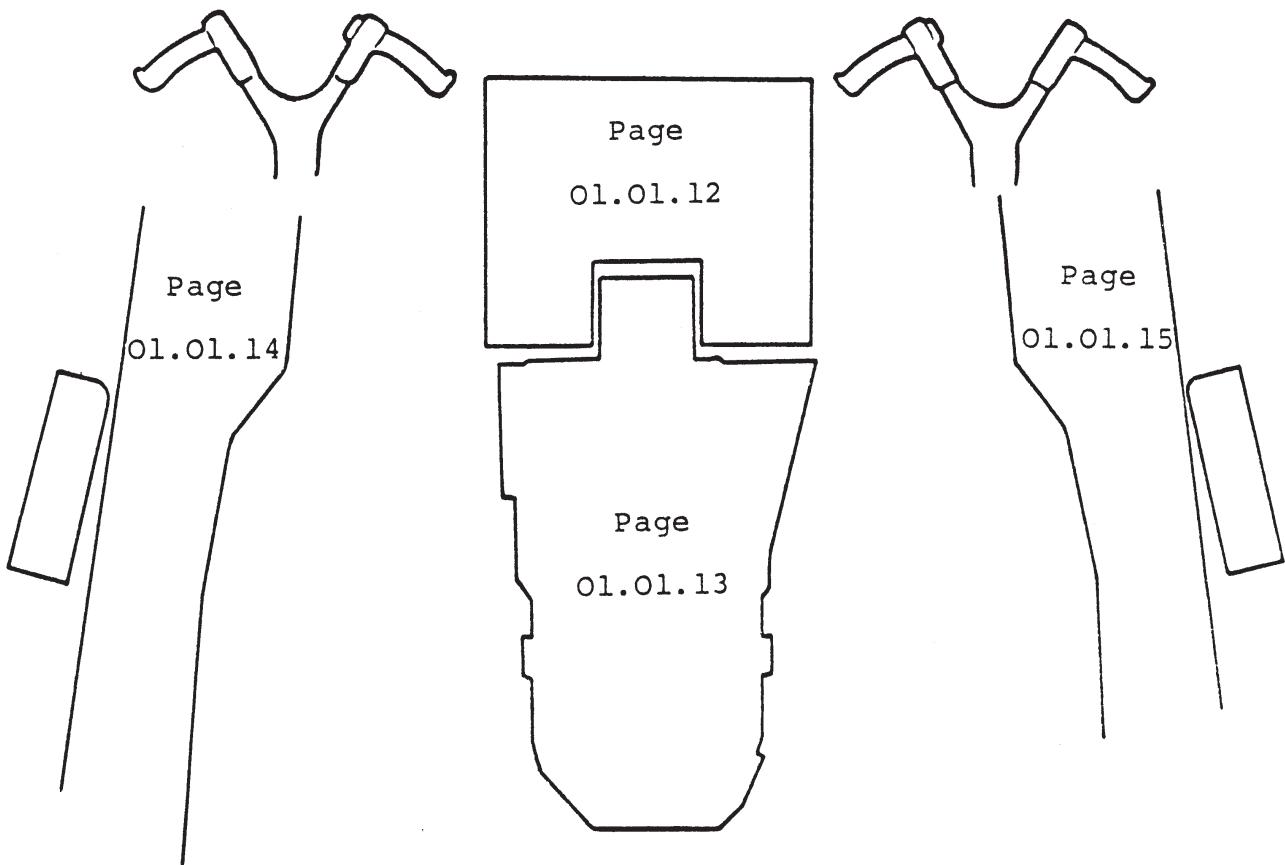
British airways

FLIGHT COMPARTMENT PANEL LOCATION

CENTRE, SIDE CONSOLES AND CONTROL COLUMNS
(Sheet 1 of 2)



FLIGHT COMPARTMENT PANEL LOCATION

CENTRE, SIDE CONSOLES AND CONTROL COLUMNS
(Sheet 2 of 2)UNITED II
AND

(Unchanged)

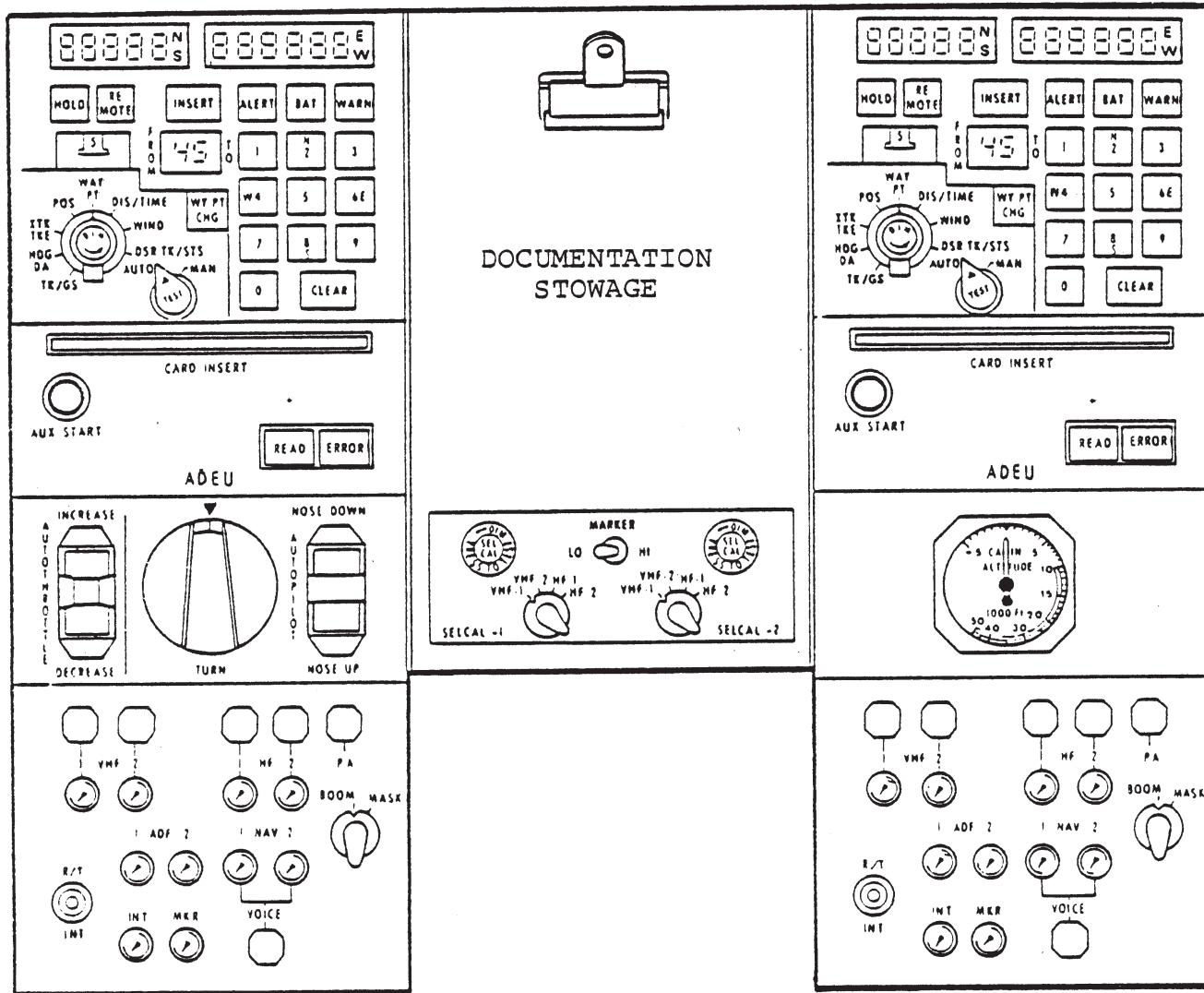
01.01.12
24 MAY 79

CONCORDE FLYING MANUAL

British airways

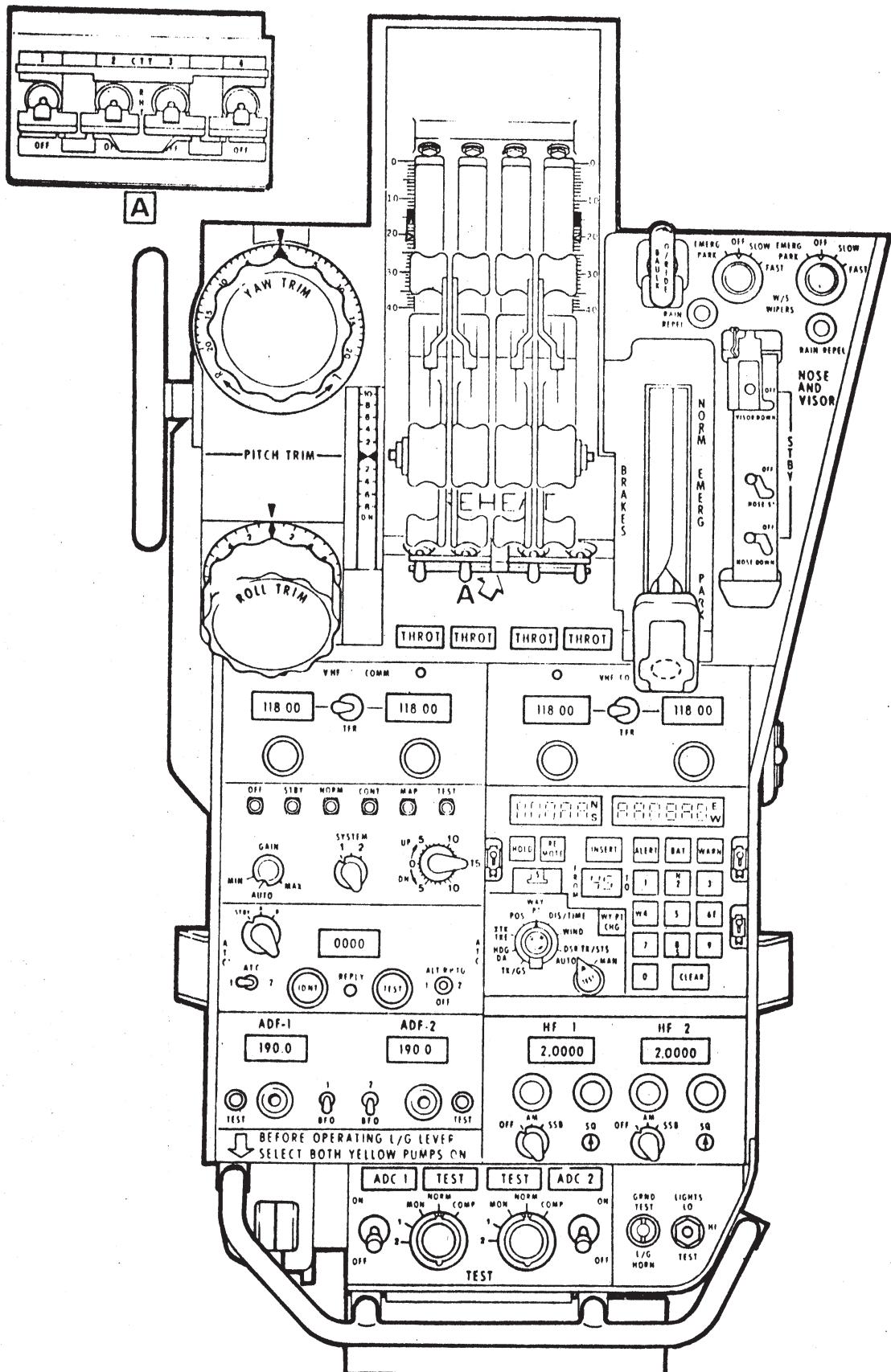
FLIGHT COMPARTMENT PANEL LOCATION

CENTRE CONSOLE (FORWARD)



FLIGHT COMPARTMENT PANEL LOCATION

CENTRE CONSOLE (AFT)

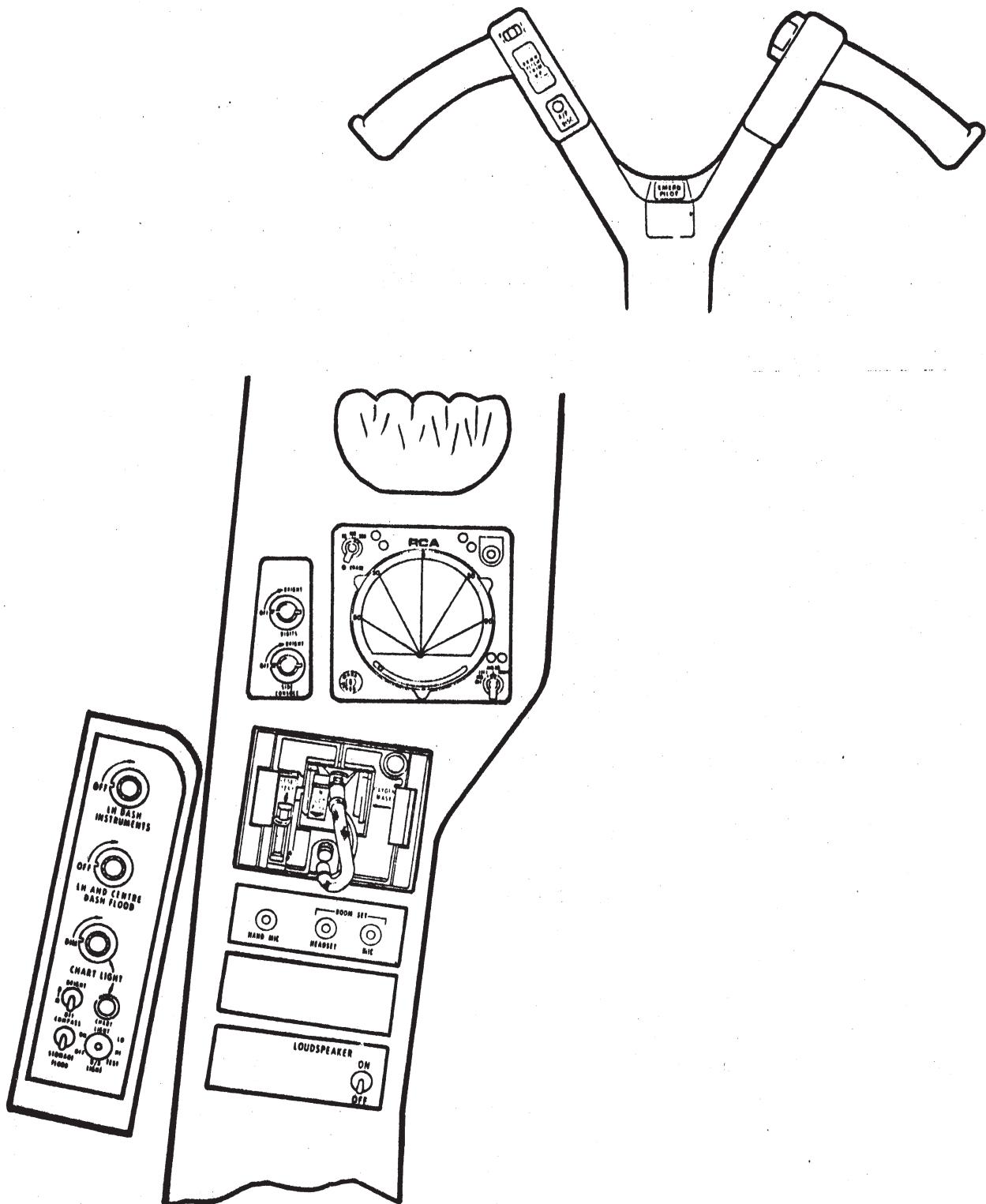


CONCORDE FLYING MANUAL

British airways
OVERSEAS DIVISION01.01.14
21 JUL.76

FLIGHT COMPARTMENT PANEL LOCATION

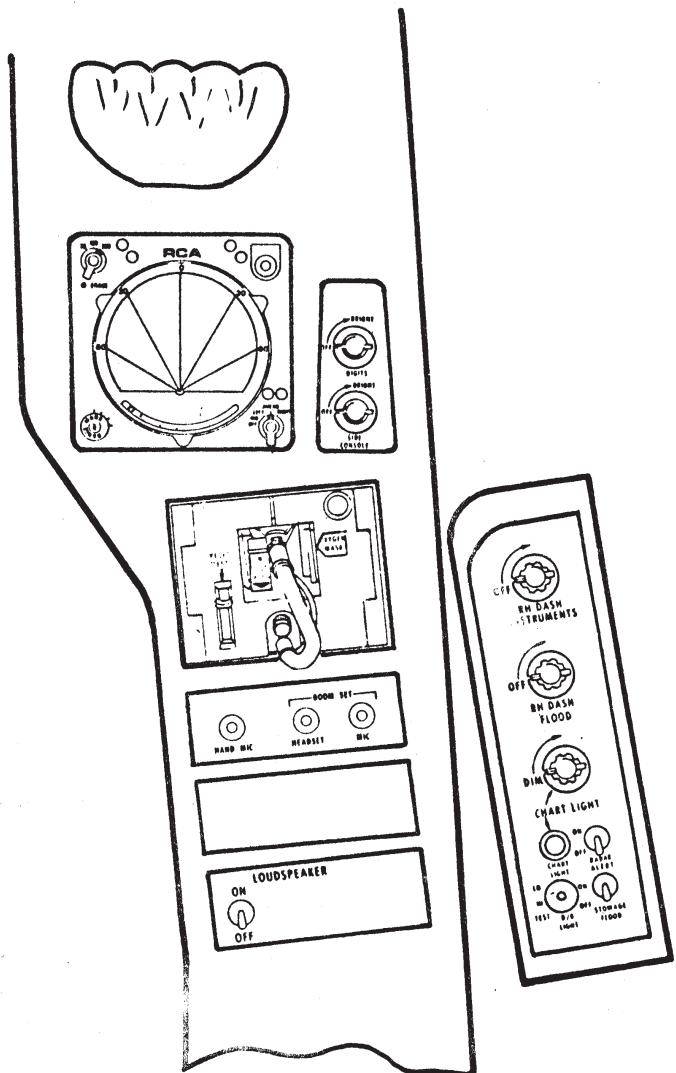
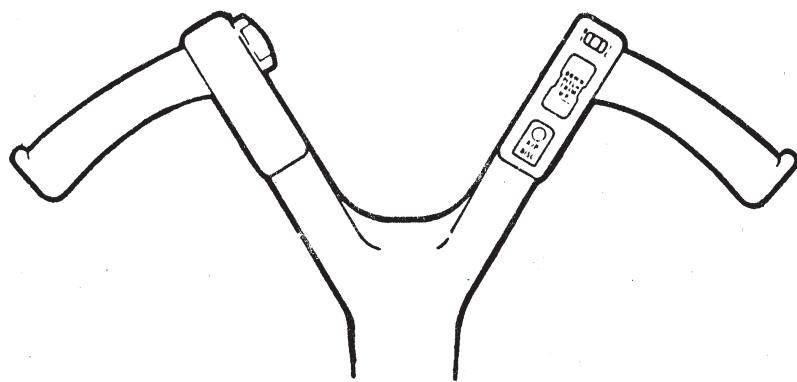
CAPTAIN'S SIDE CONSOLE AND CONTROL COLUMN



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FLIGHT COMPARTMENT PANEL LOCATION

FIRST OFFICER'S SIDE CONSOLE AND CONTROL COLUMN



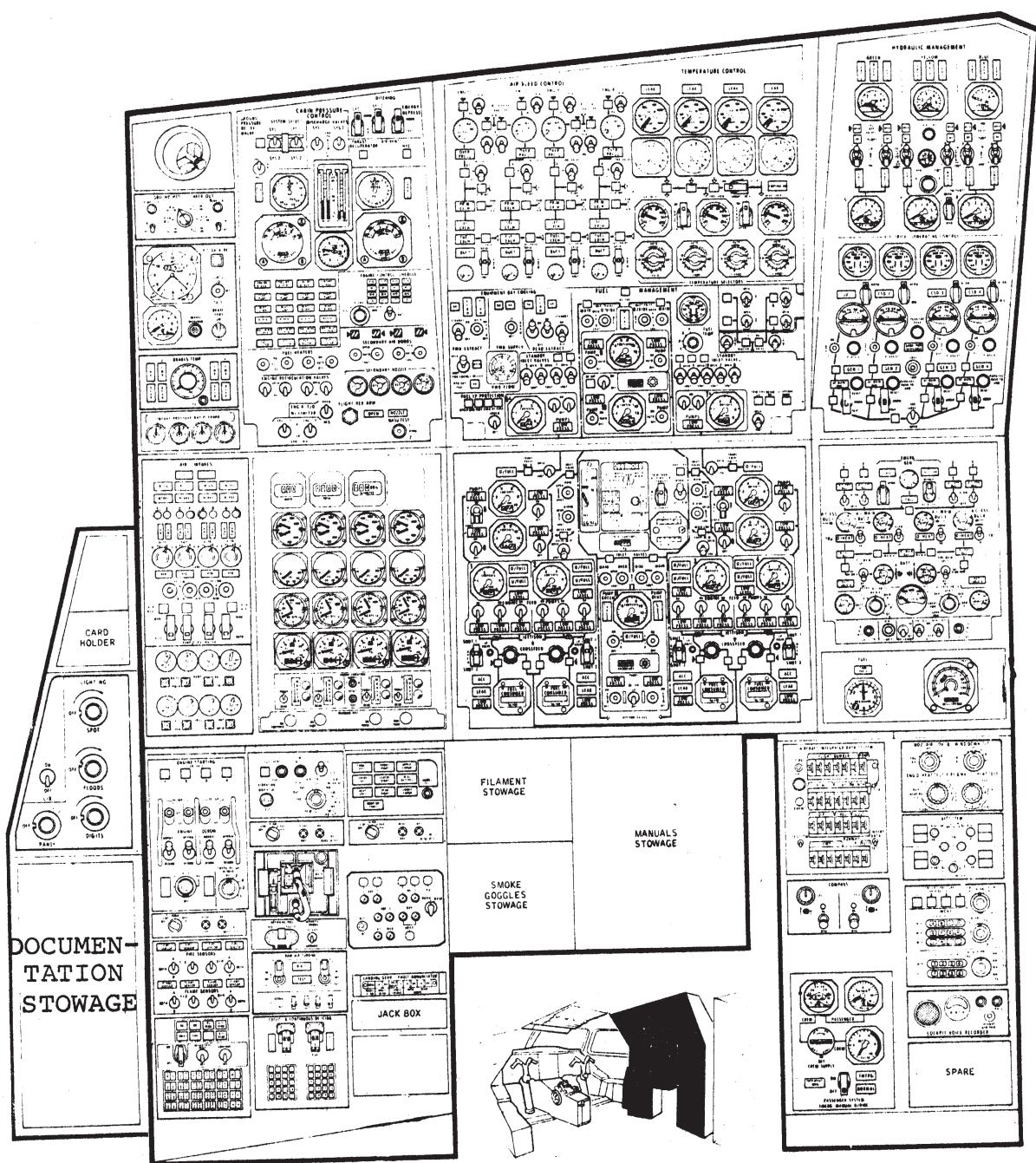
CONCORDE FLYING MANUAL

01.01.16
4 MAY 77

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OVERSEAS DIVISION

FLIGHT COMPARTMENT PANEL LOCATION

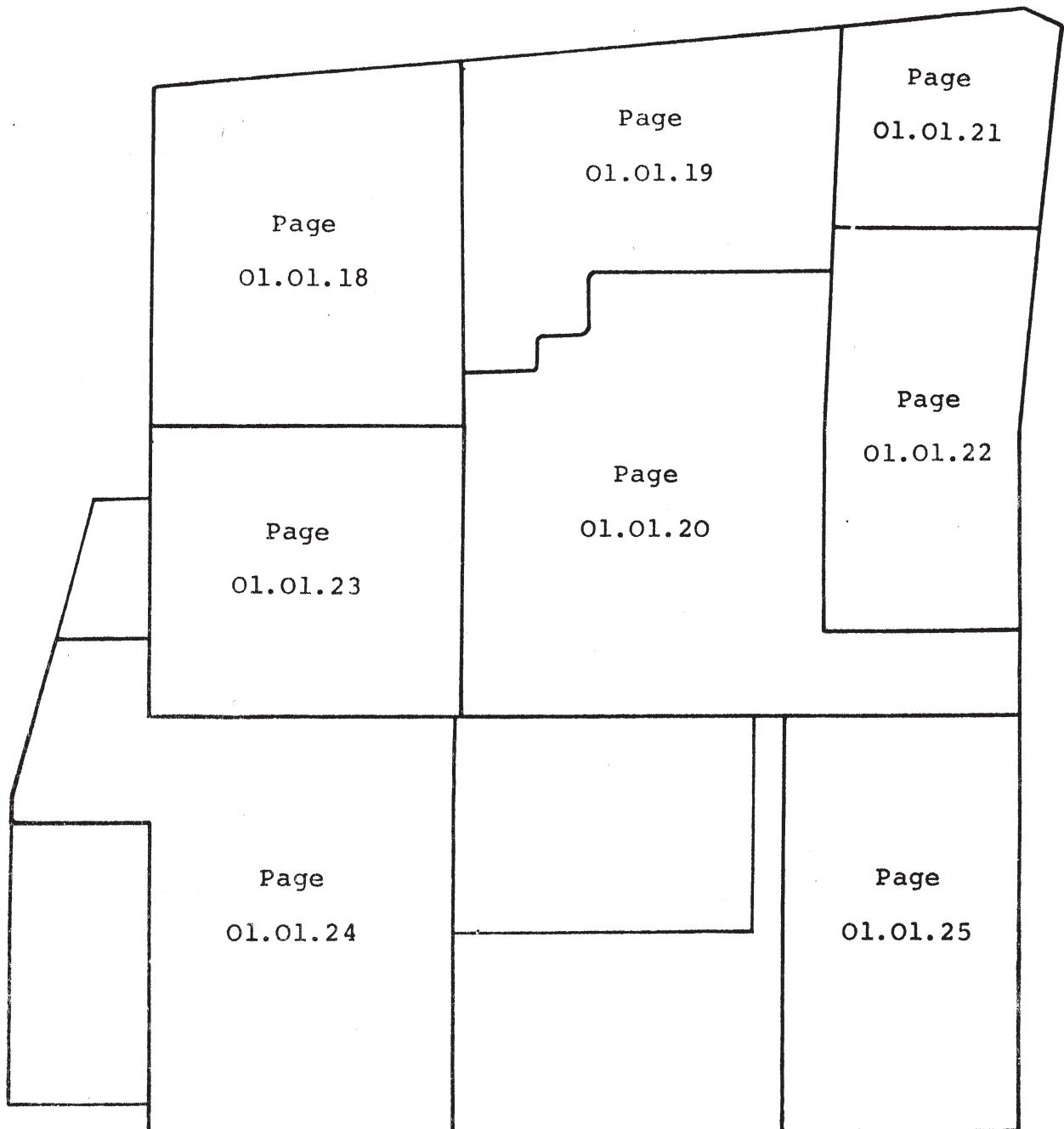
FLIGHT ENGINEER'S PANEL (Sheet 1 of 2)



FLIGHT COMPARTMENT PANEL LOCATION

FLIGHT ENGINEER'S PANEL
(Sheet 2 of 2)

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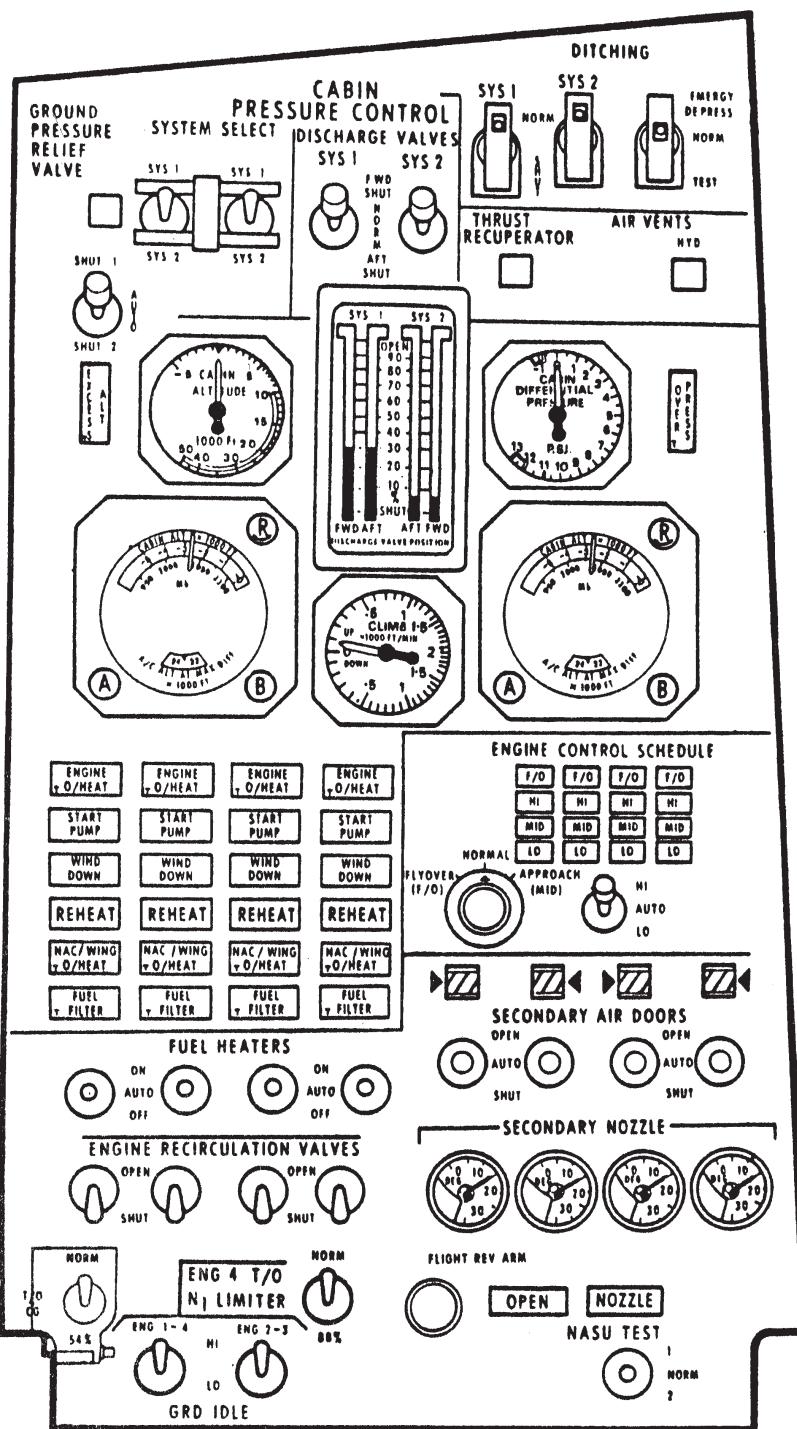
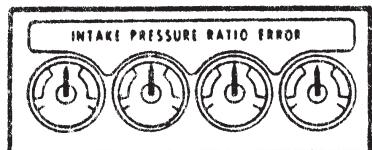
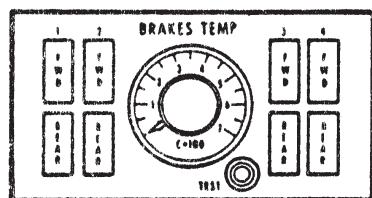
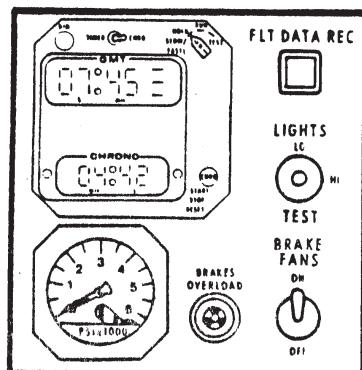
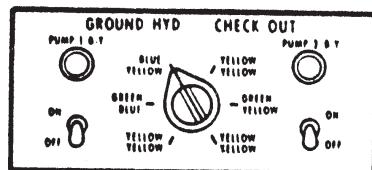
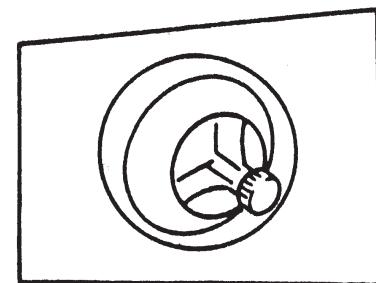
01.01.18
28 FEB. 79

CONCORDE FLYING MANUAL

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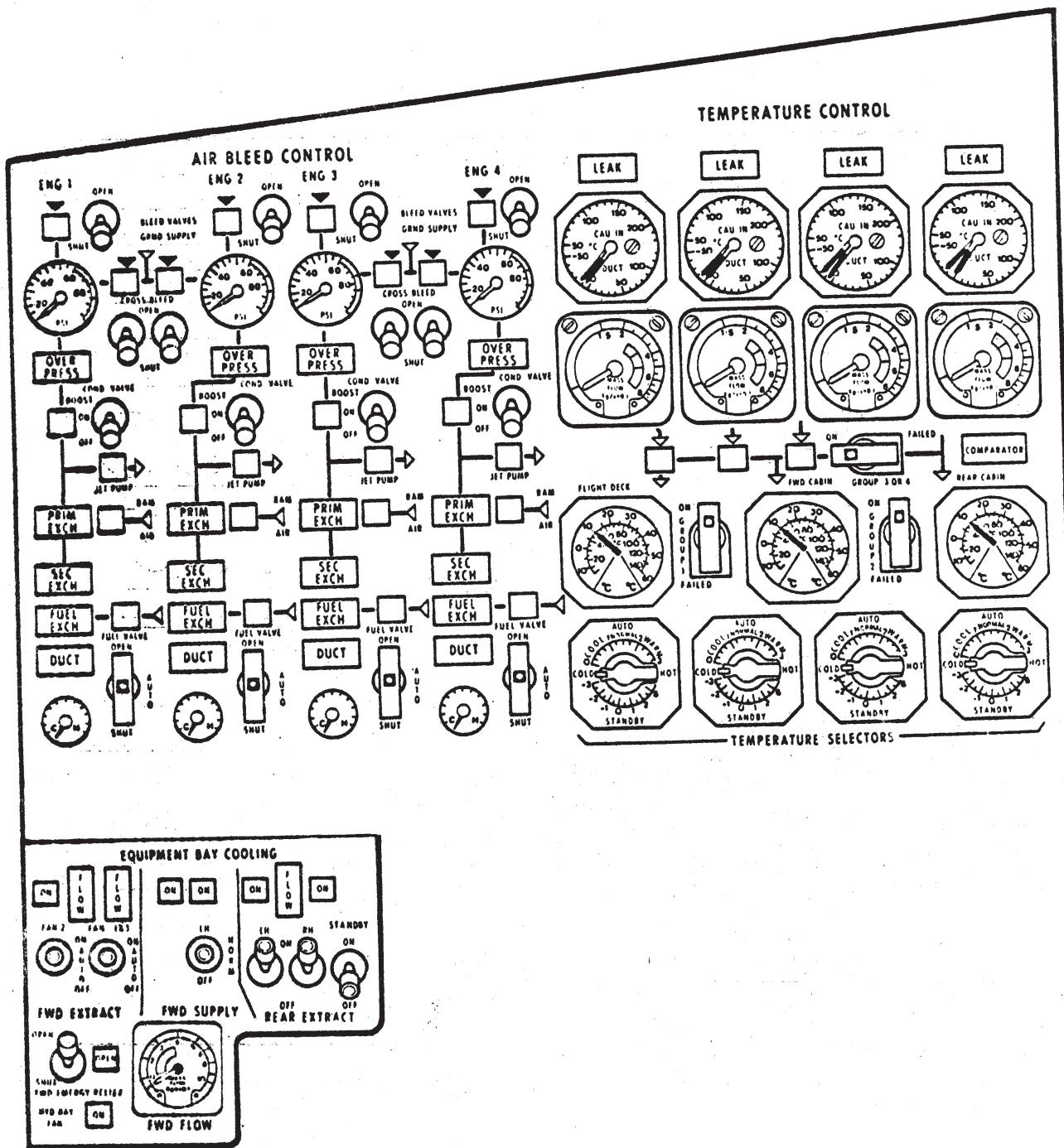
FLIGHT COMPARTMENT PANEL LOCATION

LEFT TOP PANEL



FLIGHT COMPARTMENT PANEL LOCATION

AIR BLEED, CABIN TEMPERATURE, EQUIPMENT COOLING PANELS



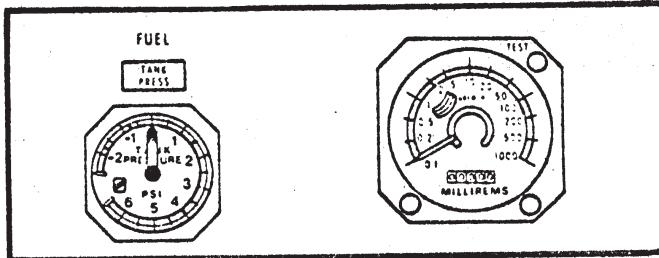
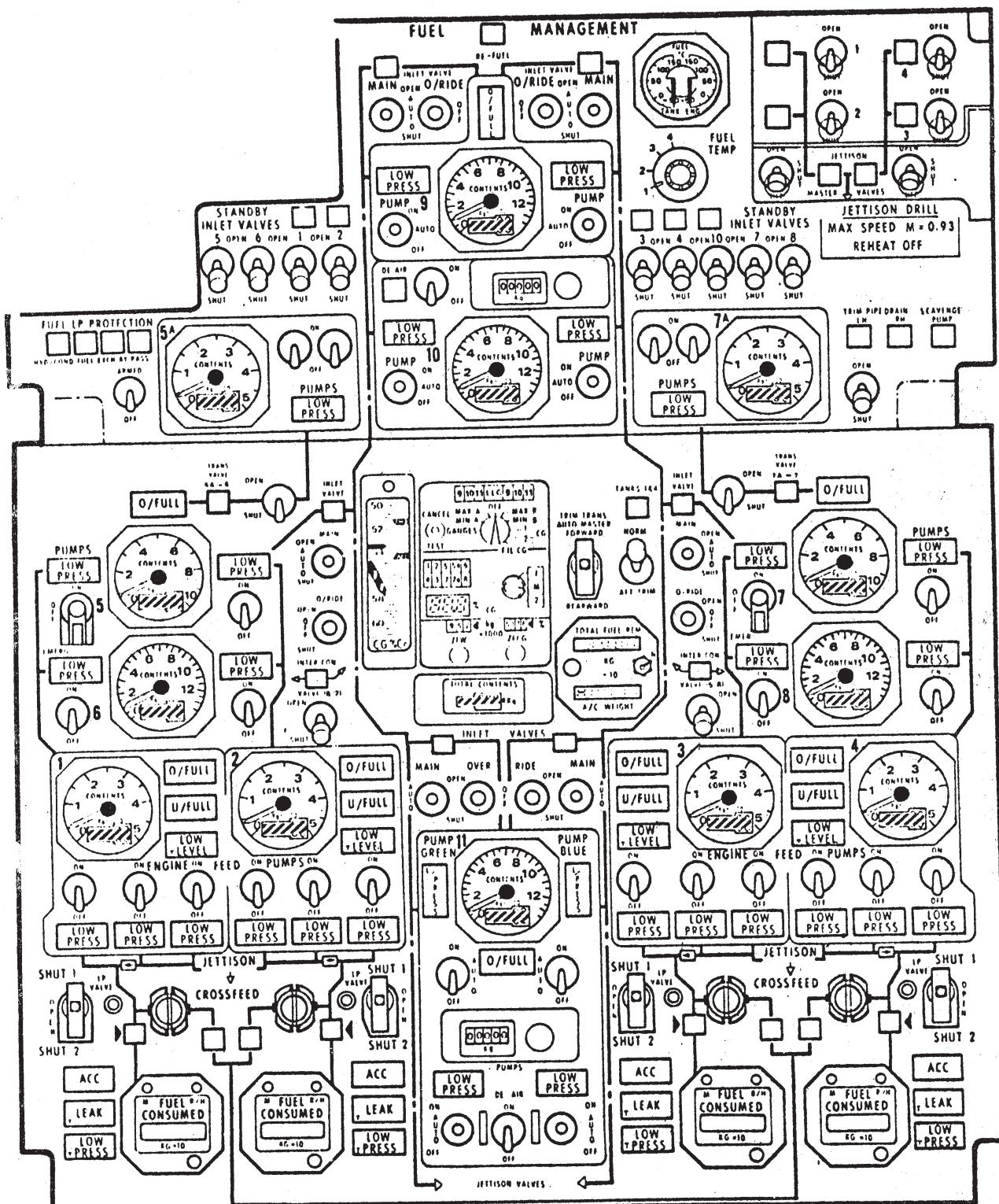
CONCORDE FLYING MANUAL

01.01.20
4 MAY 77

British airways
OVERSEAS DIVISION

FLIGHT COMPARTMENT PANEL LOCATION

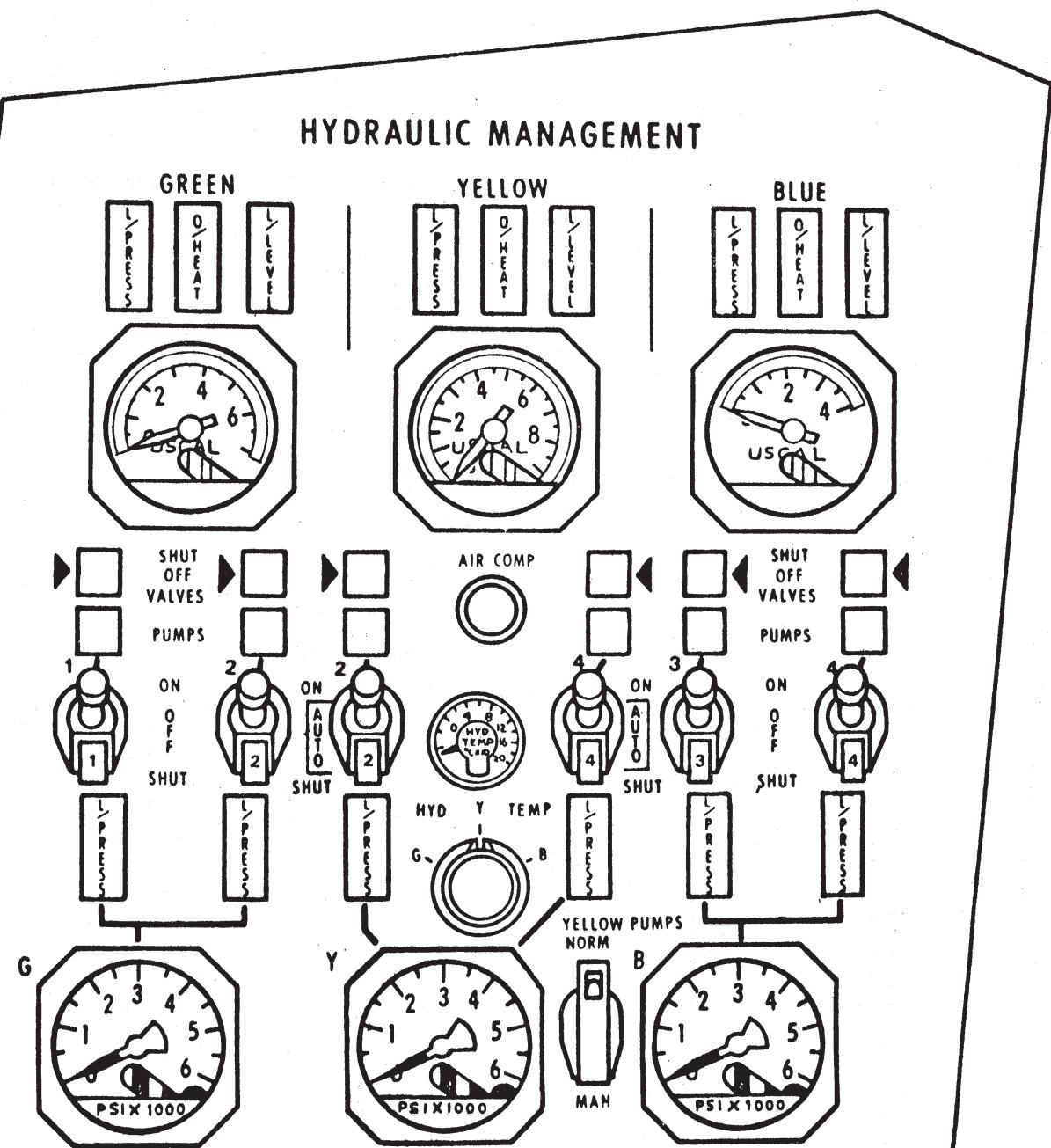
FUEL MANAGEMENT AND FUEL PRESSURIZATION PANELS



FLIGHT COMPARTMENT PANEL LOCATION

HYDRAULIC MANAGEMENT PANEL

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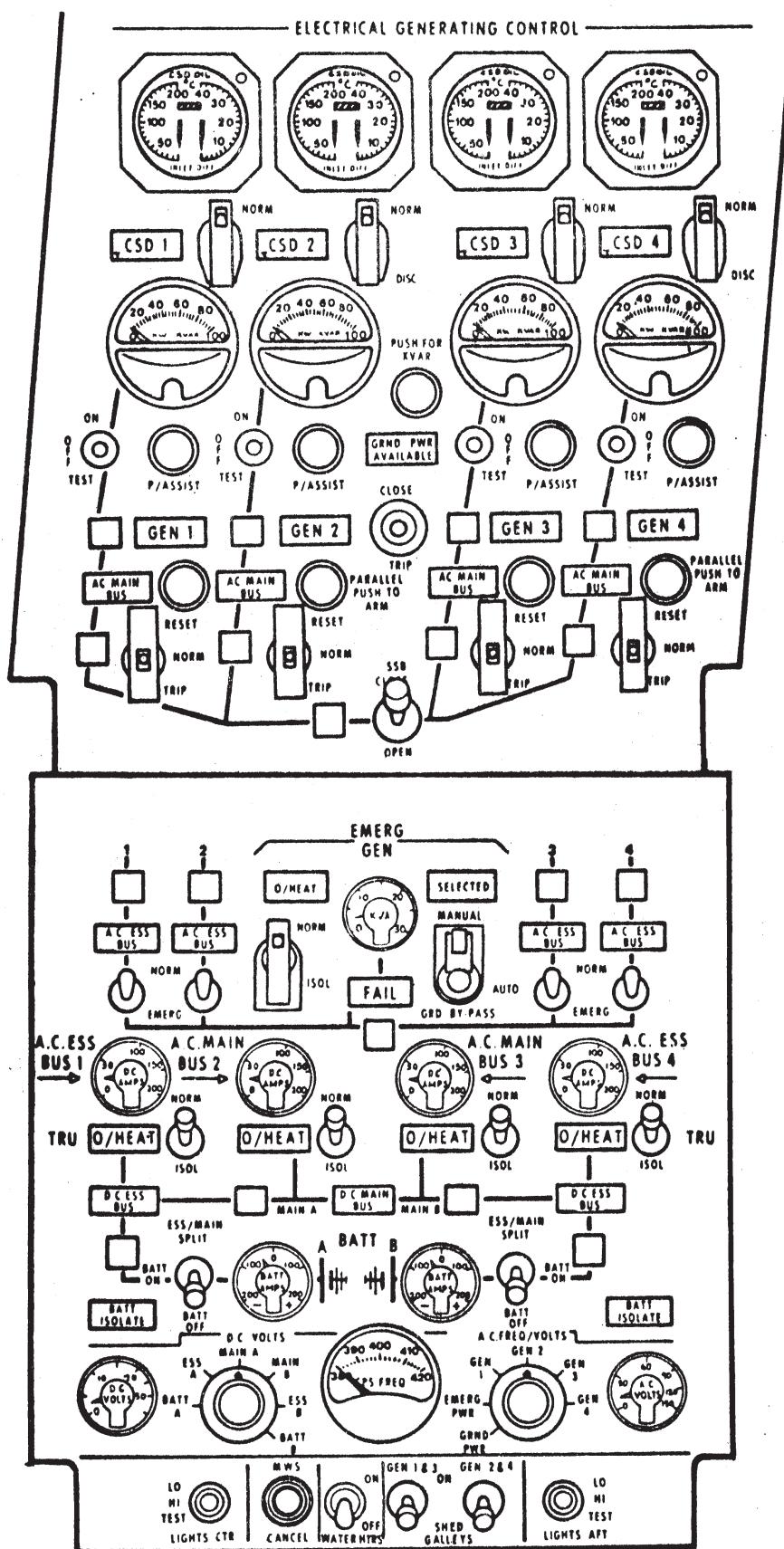
01.01.22
21 JUL. 76

CONCORDE FLYING MANUAL

British airways
OVERSEAS DIVISION

FLIGHT COMPARTMENT PANEL LOCATION

ELECTRICAL CONTROL PANEL

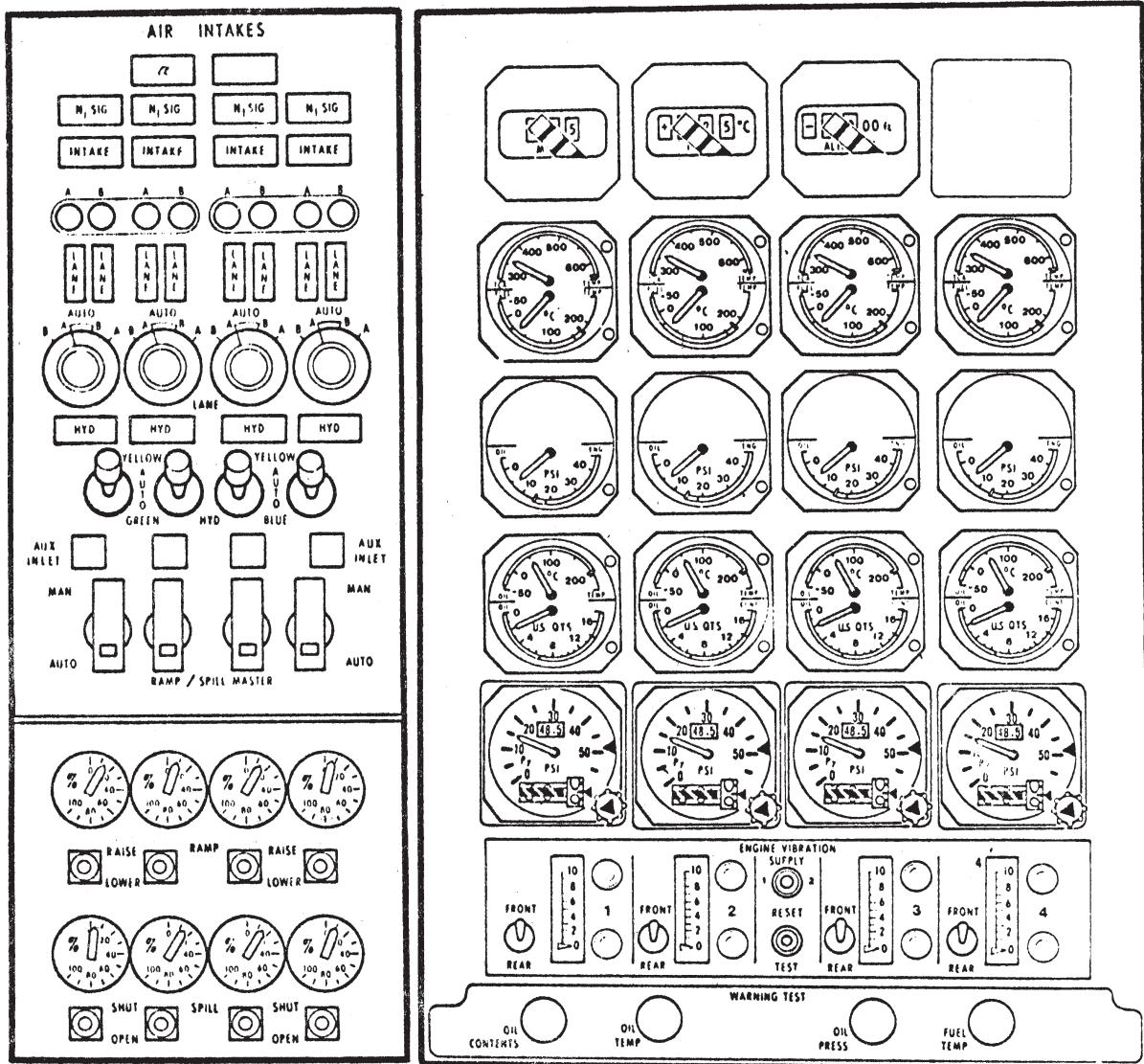


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FLIGHT COMPARTMENT PANEL LOCATION

AIR INTAKES AND ENGINE SECONDARY INSTRUMENTS PANEL



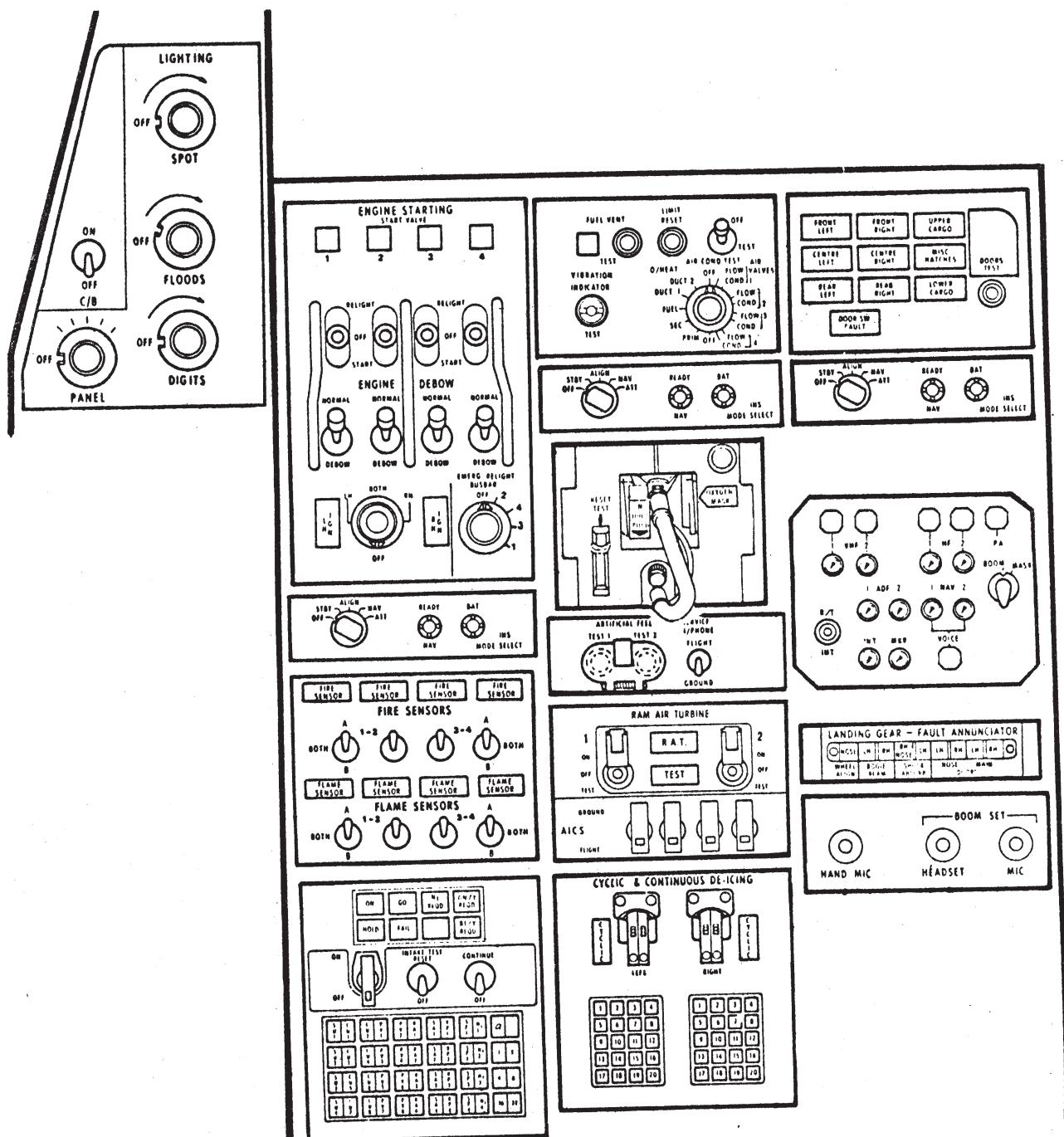
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4 MAY 77

CONCORDE FLYING MANUAL

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OVERSEAS DIVISION

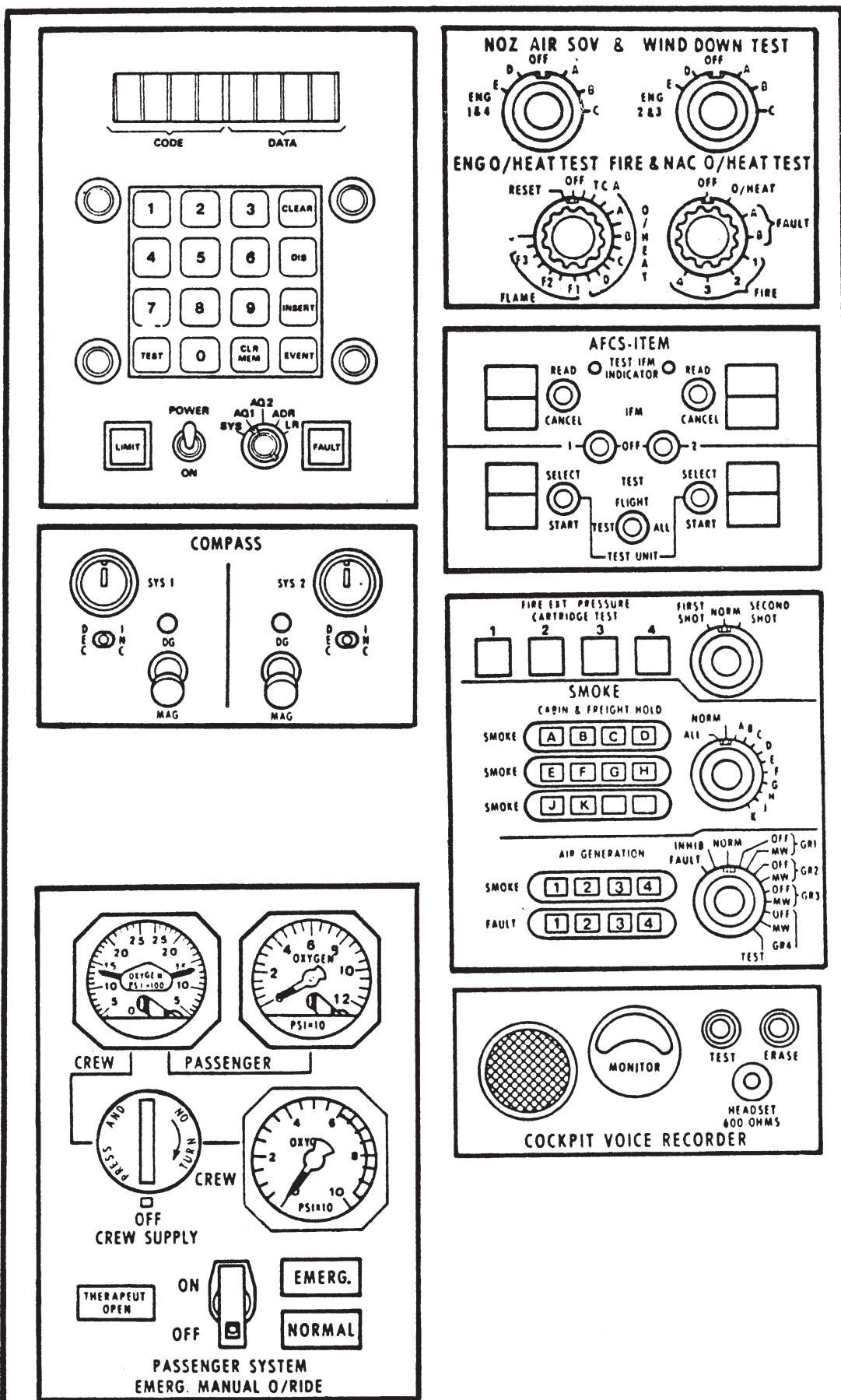
FLIGHT COMPARTMENT PANEL LOCATION

FORWARD LEG PANEL



FLIGHT COMPARTMENT PANEL LOCATION

AFT LEG PANEL



(Deletion)

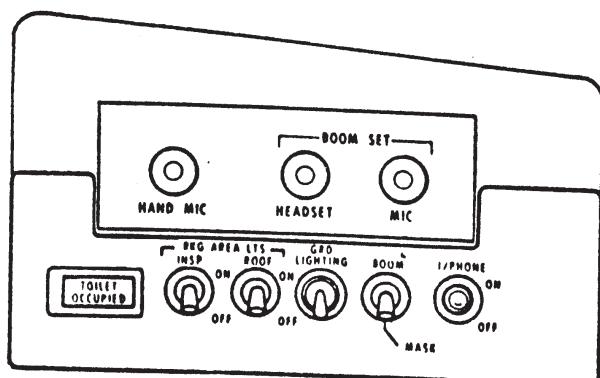
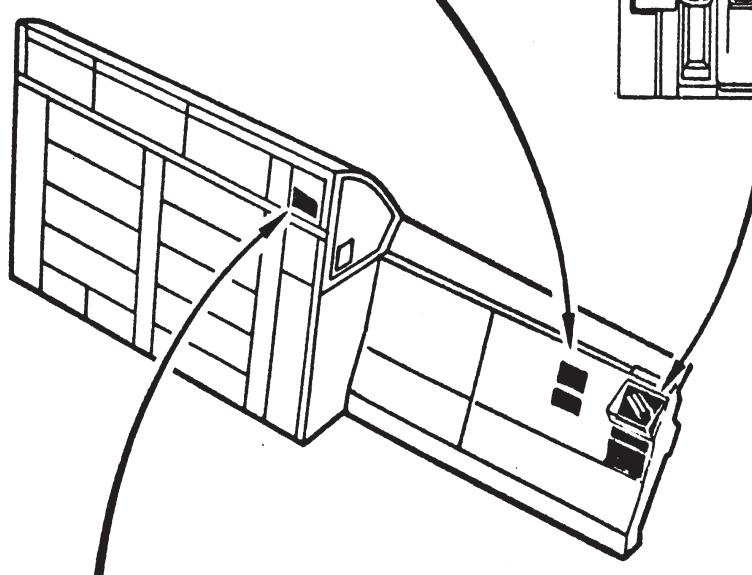
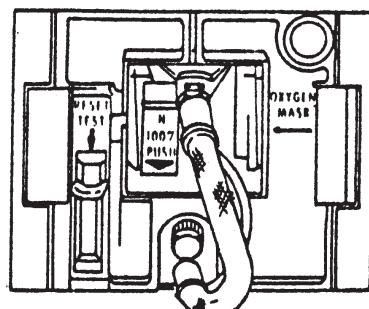
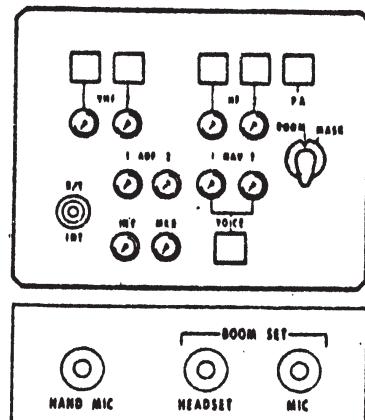
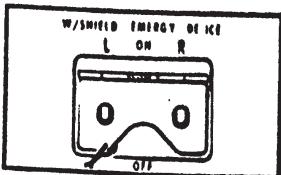
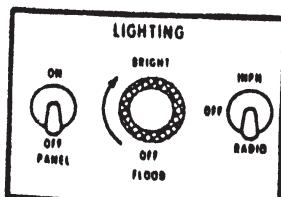
01.01.26
17 MAY 78

CONCORDE FLYING MANUAL

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FLIGHT COMPARTMENT PANEL LOCATION

FIRST AND SECOND SUPERNUMERARYS' PANELS



(Unchanged)

PTC
ENGLA

DESCRIPTION

FUSELAGE

The fuselage comprises five major sections: nose, forward, intermediate, centre and rear which are permanently joined to form a single unit. The basic structure consists of a skin supported by extruded stringers and fabricated hoop frames.

A single row of windows extends along each side of the pressurized cabin. Each cabin window comprises a pressure panel and an outer thermal insulation panel. Both panels consist of two layers of toughened glass separated by plastic interlayers.

The lower half of the fuselage is divided in various compartments to accommodate baggage, fuel, the nose and main landing gear and systems components etc. The upper half of the fuselage is occupied by the main cabin, the flight deck and a baggage hold incorporating a diplomatic mail locker.

The upper and lower halves are separated by a floor built as a number of sections and supported by a structure. The structure is free to expand longitudinally and thus minimise the thermal stresses arising from the temperature differentials between the fuselage skin and the longitudinal floor members.

The intermediate section of the fuselage houses the underfloor baggage compartment.

WING

The wing is a multi-spar structure skinned with integral panels manufactured from pre-stretched planks. Easily removable panels, together with the general use of latticed and lightened internal members, provide access to any structure or fuel tank area even in the thinnest section of the wing. There are three elevons at the trailing edge of each wing.

FIN AND RUDDER

The fin is a torsion box structure formed by a series of vertical spars and horizontal ribs which are covered with integrally machined skin panels. Attached to the torsion box are the dorsal fin and leading edge structure, the rudder jack attachments and their fairings, and the rudder hinges. The rudder is a single spar light-alloy structure, manufactured in two parts (top and bottom) coupled together.

NACELLES

Each engine nacelle accommodates two engines and is divided into two structurally independent parts: the air intakes and the engine bays. An extension of the engine bays incorporates the secondary nozzles. The intakes and engine bays are attached to the wing by flexible joints which ensure complete sealing and continuity of form.

01.02.02
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CONCORDE FLYING MANUAL

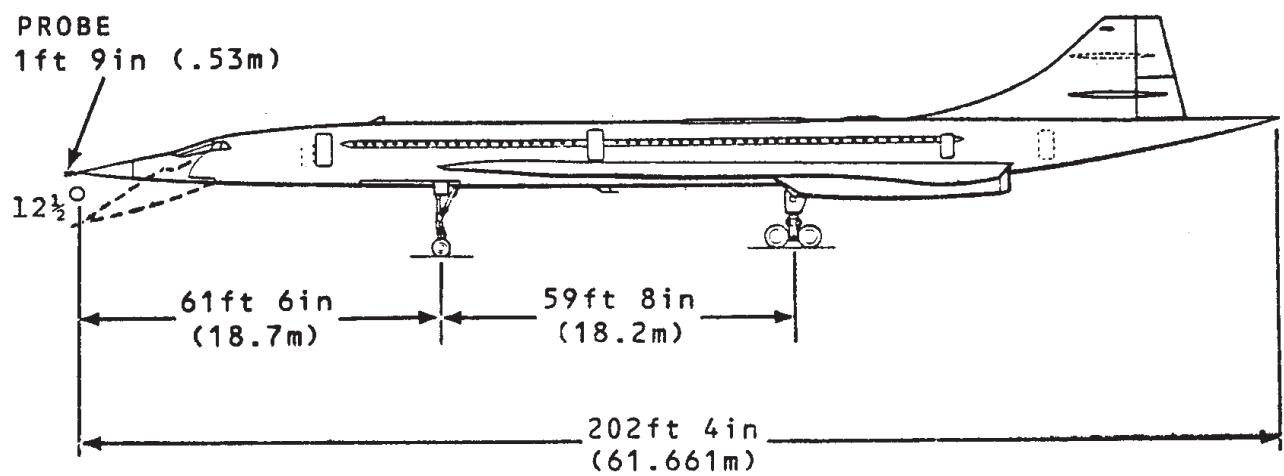
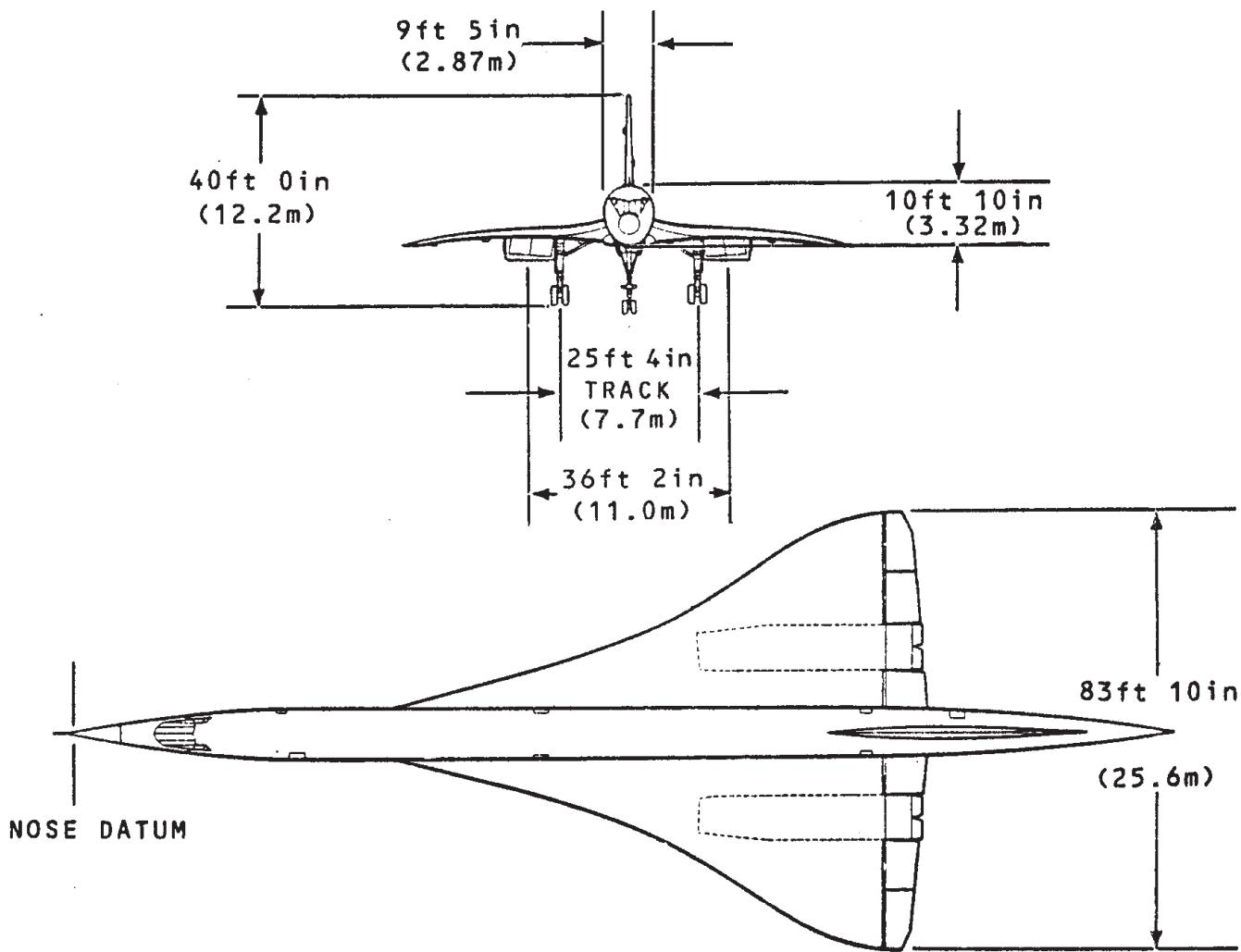
British airways
OVERSEAS DIVISION

PRN

INGLAN

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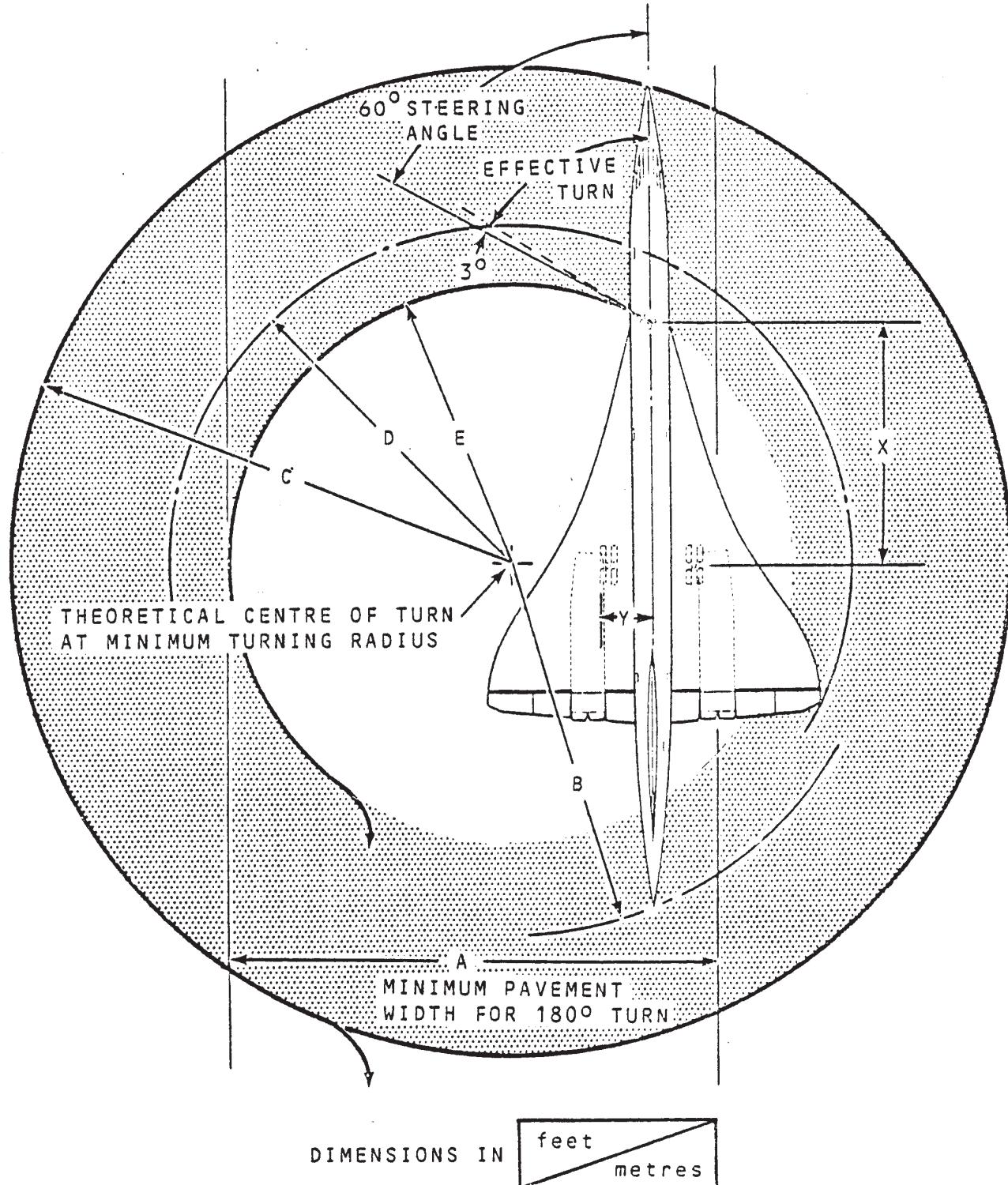
AIRCRAFT DIMENSIONS



01.02.04
24 MAY 79

MINIMUM TURNING RADII

NOTE: 60° IS MAXIMUM POWERED STEERING ANGLE
3° SLIPPAGE HAS BEEN ASSUMED TO OCCUR
GIVING AN EFFECTIVE ANGLE OF 57°

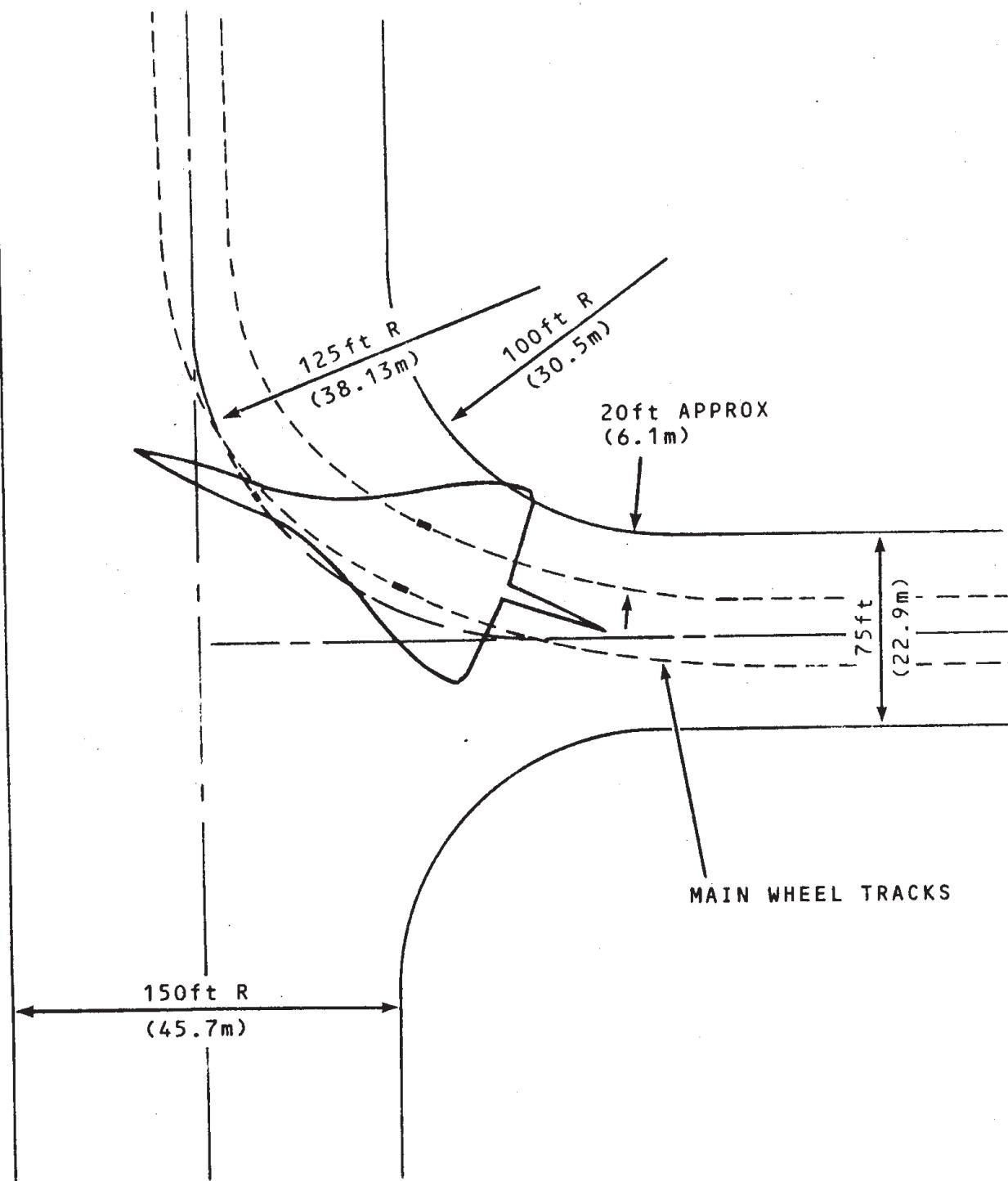


X	Y	A	B	C*	D	E
59.7 18.2	14.5 4.3	127 38.7	91 27.8	127 38.7	88 26.8	71 21.7

*NOSE FULLY RAISED Probe not included

(Unchanged)

90° TAXIWAY TO RUNWAY TURN



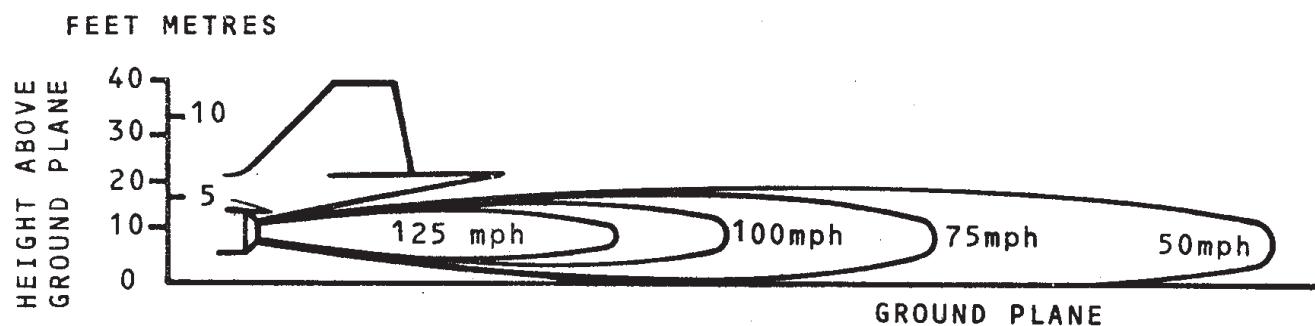
01.02.06
21 JUL.76

CONCORDE FLYING MANUAL

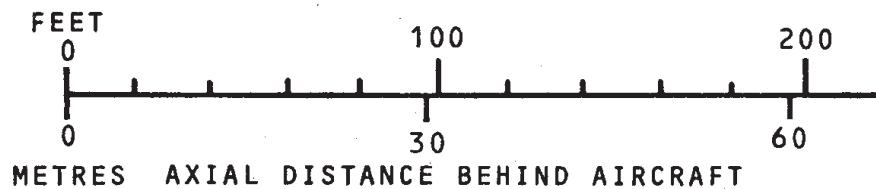
British airways
OVERSEAS DIVISION

EXHAUST VELOCITY CONTOURS, BREAKAWAY POWER

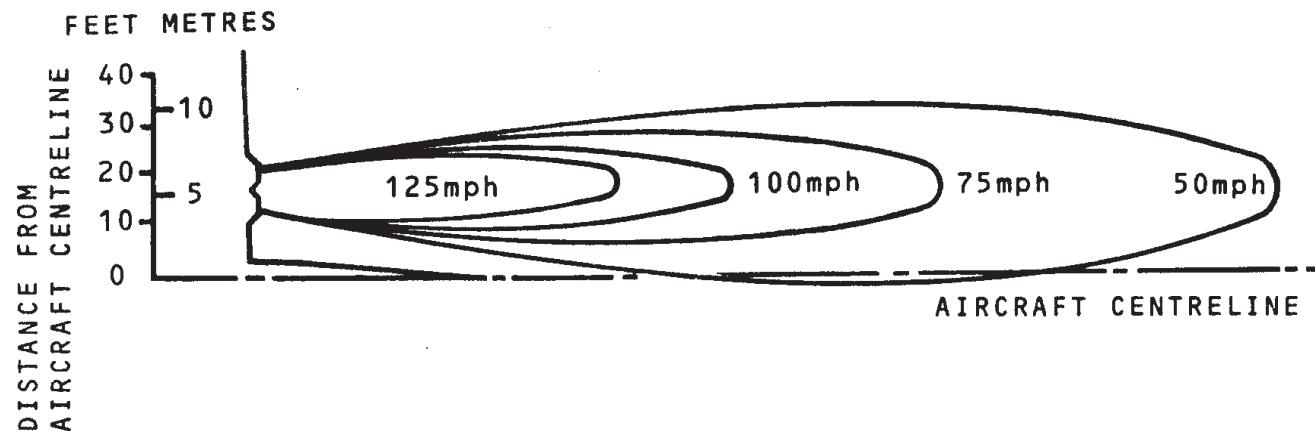
ELEVATION



NOTE: ALL VELOCITY VALUES
ARE STATUTE MILES PER
HOUR SEA LEVEL STATIC

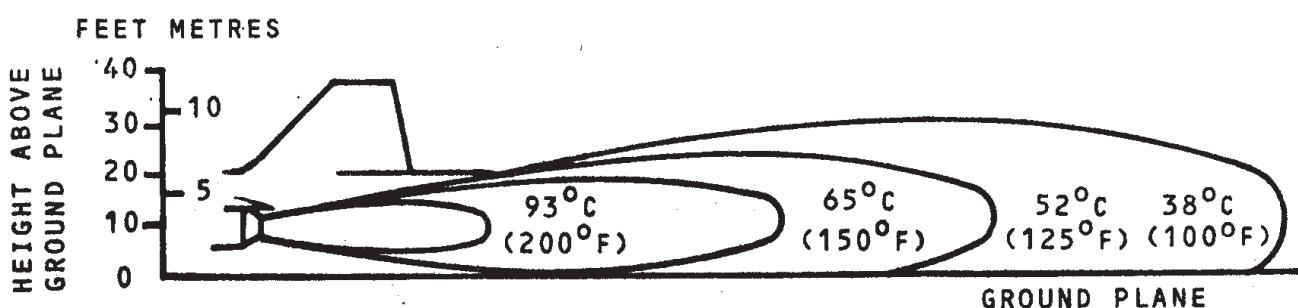


PLAN

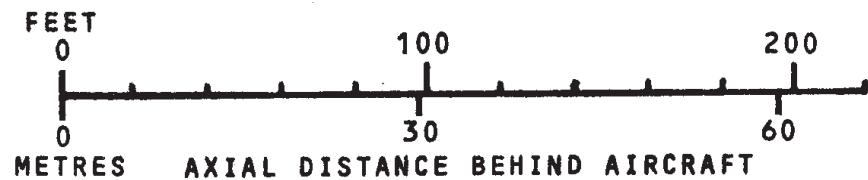


EXHAUST TEMPERATURE CONTOURS, BREAKAWAY POWER

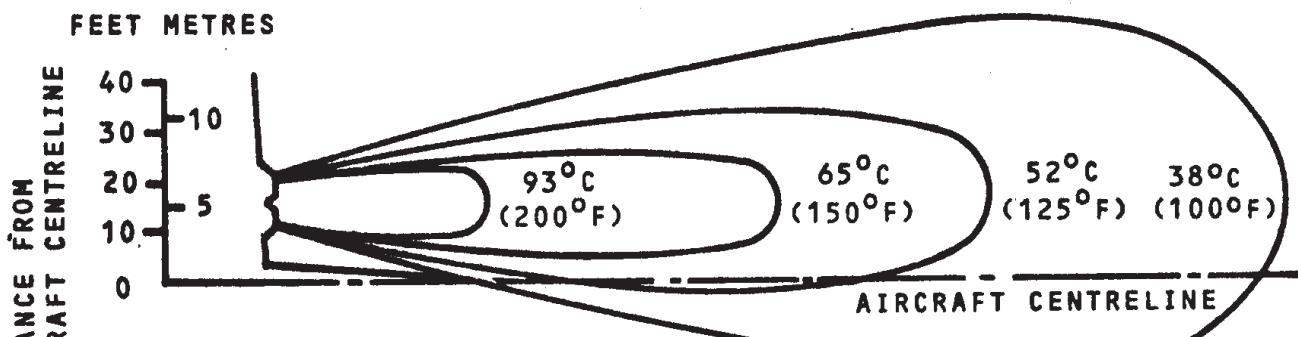
ELEVATION



NOTE: SEA LEVEL STATIC



PLAN



GENERAL

The flight compartment warning concept includes an audio warning system, a master warning system and individual warnings and indications within associated systems. The warning and indications are divided into four categories.

- (1) Class 1. Warnings of serious faults or emergency conditions requiring to be brought to the immediate attention of the crew. Immediate action is generally required.
- (2) Class 2. Warnings of less serious faults or abnormal conditions requiring to be brought to the immediate attention of the crew. Immediate action not generally required.
- (3) Class 3. Abnormal or fault conditions requiring monitoring which may, if left unattended, result in a class 2 warning.
- (4) Class 4. Miscellaneous indications.

The class 1 and 2 warnings are presented by the audio and master warning system display panels with associated display on the systems management panel.

Audio Warnings

A number of distinctive audio warnings are used to give an audible indication of class 1 and 2 warnings. The audio warnings are relayed via the flight compartment loudspeaker system. Facilities are provided to cancel certain warnings but others can only be cancelled by rectification of the fault condition.

Visual Warnings and Indications

The colour of the warnings and indication given is determined by the classification of the warning/indication:

- (1) Class 1. Red
- (2) Class 2. Amber
- (3) Class 3. Yellow
- (4) Class 4. Blue, Green or White

Master Warning System

The Master Warning System (MWS) gives visual warning and system identification of class 1 and class 2 failures. A single stroke gong calls attention to a master warning light.

Each master warning light on the MWS panel monitors a number of warning sources. The light can be cancelled by rectifying the fault or, by pressing the light, the CANCEL/LTS TEST push button or the MWS CANCEL push button. The gong will operate for each fault whether or not the associated MWS has been cancelled.

01.03.02
1 DEC.76

CONCORDE FLYING MANUAL
AIRPLANE GENERAL

British airways
OVERSEAS DIVISION

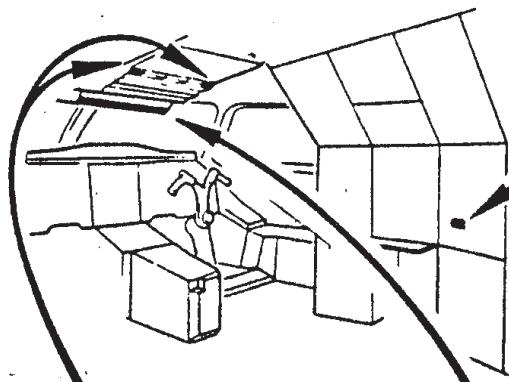
AUDIO & MASTER WARNINGS

If any red MWS light remains on and is unrecognized, a further single stroke gong will sound every ten seconds. Loss of the primary gong or total loss of the MWS is indicated by operation of the health monitor gong at one second intervals.

The MWS amber lights, certain red lights and the associated primary gong, can be inhibited from the MWS panel. A recall facility is provided which relights a MWS warning light that has previously been cancelled or inhibited but is still receiving a fault signal.

Individual system fault indication lights associated with the master warning system, having a letter T engraved in the bottom left corner, can be pressed to test the light and its associated master warnings.

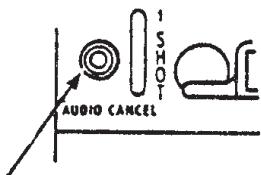
AUDIO AND MASTER WARNINGS



MWS CANCEL PUSH BUTTON

Pressing - causes complete cancellation of the master warning lights.

NOTE: The MWS CANCEL push button and CANCEL/LTS TEST push button should only be used during the Pre-Flight phases.



AUDIO CANCEL SWITCH (2)

Pressing - cancels all audio warnings with the exception of the following:

Overspeed audio (warble) and L/gear horn (if nose is below 12°)

INHIBIT PUSH BUTTON

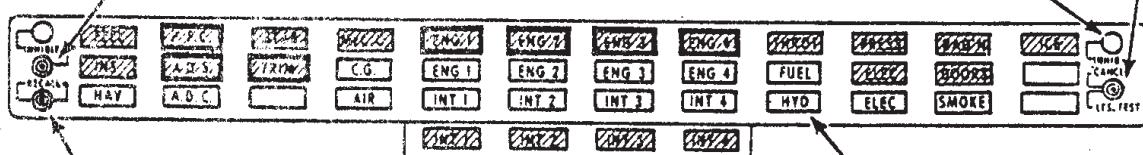
Pressing - inhibits the excess cabin altitude specific audio warning and all master warnings with the exception of the following red lights and associated audios (gong): ADS, TRIM, PFC, ENG.1, ENG.2, ENG.3, ENG.4.

CANCEL/LTS TEST PUSH BUTTON

Pressing - tests the master warning lights filaments. Releasing - causes complete cancellation of the master warning lights.

INHIBIT LIGHT (Amber) (2)

On - indicates the inhibit function is operating.



(Unchanged)

RECALL PUSH BUTTON

Reinstates all valid master warning lights and cancels the INHIBIT function but does not recall the associated MWS primary gong

MASTER WARNING LIGHTS (37)

Pressing the relevant light cancels the existing warning and keeps the light available for other warnings from that system.

The system panel lights will remain on until the malfunction is corrected.

01.03.04
28 FEB.79

CONCORDE FLYING MANUAL

British airways

AUDIO & MASTER WARNINGS

RED WARNING PARTICULARS

SYSTEM	AURAL WARNING CHARACTERISTIC	VISUAL INDICATION	CONDITION INDICATED								
Power Plant	Single stroke gong AND Distinctive fire warning audio (bell) Single stroke gong	MWS <table border="1"><tr><td>ENG 1</td><td>lt (red)</td></tr><tr><td>ENG 2</td><td></td></tr><tr><td>ENG 3</td><td></td></tr><tr><td>ENG 1</td><td></td></tr></table> Appropriate engine shut down handle lt (red) flashing Engine shut down handle lt (red) on steady Red warning light on OIL ENG instrument LEAK lt (red) (4) TCA HIGH TEMP lt (red) Engine O/HEAT lt (red) (4)	ENG 1	lt (red)	ENG 2		ENG 3		ENG 1		than an engine fire has been detected. high temperature in the engine turbine cooling air system, or, low pressure in the engine oil system, or, an overheat condition within the engine, or, flame breakout from the combustion chamber, or, a fluid leak into the bay above the engine. On indicates that the engine oil pressure is less than 15 psi that a leakage of fluid into the bay above the engine has been detected. that a high temperature exists in the turbine cooling air system. that a high temperature exists at No.2 and No.3 bearing air vent or No.4 and No.5 bearing cold vent or No.5 bearing hot vent or No.12 labyrinth seal vent, or, a combustion chamber flame breakout exists, and is accompanied by a MWS ENG lt (amber)
ENG 1	lt (red)										
ENG 2											
ENG 3											
ENG 1											

(continued)

AUDIO & MASTER WARNINGS

RED WARNING PARTICULARS

SYSTEM	AURAL WARNING CHARACTERISTIC	VISUAL INDICATION	CONDITION INDICATED
Power Plant (continued)	Single stroke gong	MWS THROT lt (red) THROT 1-4 lt (red) and associated THROTTLE MASTER sel lt (red)	that the selected throttle control system has failed (all MWS INT reds on) (without INT lts, when) (any one AICS ground/) (flight sw at GROUND.)
	Single stroke gong	MWS INT 1 lt (red) INT 2 INT 3 INT 4 INT lt (red)	that the air intake, ramp and spill doors are not under the control of the associated air intake automatic control system
		Intake test ON lt (red)	that the test master switch is operated
Flight Controls	Single stroke gong	MWS PFC lt (red) BLUE FAIL lt (red) GREEN FAIL lt (red) BLUE INVERTER fail lt (red) GREEN INVERTER fail lt (red) BLUE JAM lt (red) GREEN JAM lt (red) Channel MIs (2 or 4) show G or M Flight Control position indicator (2 or 4) (red) MECH JAM lt (red) BLUE L/PRESS lt (red)	that the relay jack spool valve has jammed that the output from the inverter is outside limits and the d.c. supply has been cut that a PFCU spool valve has jammed that on the corresponding flight control surface group, a channel change-over has been signalled by the comparator system. The warning lights remain on steady until an ALARM RESET is made. a mechanical channel jamming downstream of the pitch or roll relay jack a low pressure downstream of the blue system PFC servos selector, or, if YELLOW BLUE is selected low pressure downstream of the yellow/blue PFC servos selector. (Continued)

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CONCORDE FLYING MANUAL

British airways

AUDIO & MASTER WARNINGS

RED WARNING PARTICULARS

SYSTEM	AURAL WARNING CHARACTERISTIC	VISUAL INDICATION	CONDITION INDICATED
Flight Controls (continued)		GREEN L/PRESS lt (red) INNER ELEV lt (red) MWS [TRIM] lt (red) ELECTRIC TRIM sw drops to off	a low pressure downstream of the green systems PFC servos selector or, if YELLOW GREEN is selected low pressure downstream of the yellow/green PFC servos selector inner elevon desynchronisation that the electric trim systems have failed
	Single stroke gong	MWS [FEEL] lt (red) Artificial feel system No.1 and No.2 (PITCH ROLL or YAW) sws drop to off	loss of both artificial feel systems on one axis.
	Single stroke gong	MWS [STAB] lt (red) autostab No.1 and No.2 PITCH, ROLL or YAW sws drop to off	loss of both autostab systems on one axis
Navigation	Single stroke gong	MWS [ADS] lt (red) Failure flag on ASI if functioning in normal mode Red AUTOLAND lt in LAND or GLIDE mode and aircraft below 600 ft	that a discrepancy has been sensed by the comparator system of both air data computers
	Single stroke gong	MWS [INS] lt (red) INS 1, 2 or 3 lt (red)	ADS discrepancy in computed speed An INS internal auto detected failure or, a failure detected by the comparator on attitude outputs or, vertical acceleration (if LAND or GLIDE mode selected and altitude less than 600 feet) or, compass coupler 1 and 2 with INS 3 platform heading (if land mode selected and altitude less than 600 feet)

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AUDIO & MASTER WARNINGS

RED WARNING PARTICULARS

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SYSTEM	AURAL WARNING CHARACTERISTIC	VISUAL INDICATION	CONDITION INDICATED
Electrical	Single stroke gong	MWS ELEC lt (red) AC ESS BUS lt (red) DC ESS BUS lt (red) Emerg gen O/HEAT lt (red)	a failure of supply at the a.c. essential busbar that the d.c. essential busbar is not supplied an emergency generator stator or bearing high temperature
Air Conditioning	Single stroke gong	MWS PRESS lt (red) O/PRESS lt (red)	that cabin differential pressure exceeds 11 psi (758 mb)
	Intermittent horn	EXCESS ALT lt (red)	that the cabin altitude is above 10,000 ft
Airplane General Doors	Single stroke gong	MWS DOORS lt (red) FRONT LEFT FRONT RIGHT UPPER CARGO CENTRE LEFT CENTRE RIGHT REAR LEFT REAR RIGHT LOWER CARGO doors lts (red) MISC HATCHES lt (red)	ON if individual door not locked shut ON if the four servicing hatches are not all shut
Fuel System M/CG	Single stroke gong	MWS M/CG lt (red) Red warning light on both CG indicators AND Red M/CG lights in front of each pilot	Infringement of either forward or aft boundary of the defined CG corridor.
	Single stroke gong	MWS M/CG lt (red) Red warning light on both CG indicators and red M/CG lights in front of each pilot NOTE: over the range M 0.45 to M 1.6 the red warning light on both CG indicators and red M/CG lights in front of each pilot, flash and stick shaker operates EXCEPT IF $V_C \geq V_{MO} - 7kt$	Infringement of aft extreme boundary (MWS M/CG light repeated if cancelled from previous infringement.) (continued)

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AUDIO & MASTER WARNINGS

RED WARNING PARTICULARS

SYSTEM	AURAL WARNING CHARACTERISTIC	VISUAL INDICATION	CONDITION INDICATED
Fuel System M/CG (continued)	Single stroke gong	MWS M/CG lt (red) AND the red warning light on both CG indicators, and red M/CG lights in front of each pilot flash	Infringement of forward extreme boundary (MWS M/CG light repeated if cancelled from previous forward infringement)
Ice & Rain Protection	Single stroke gong	MWS ICE lt (red) ICE lt (red)	that icing conditions have been detected and one or more ENGINE ANTI-ICING switches are at OFF or both the MAIN and ALTERN WING & INTAKE ANTI-ICING rotary selectors are at OFF
Flight Instruments Radiation Detection	Single stroke gong	MWS RADN lt (red) Red lt on radiation meter	When 50 and above millirems per hour displayed on meter.

AUDIO & MASTER WARNINGS

AMBER WARNING PARTICULARS

SYSTEM	AURAL WARNING CHARACTERISTIC	VISUAL INDICATION	CONDITION INDICATED
Power Plant	Single stroke gong	MWS ENG 1 lt (amber) ENG 2 ENG 3 ENG 4 Engine vibration warning lt (amber)	an engine front bearing vibration level greater than 5 ins/sec, or, a rear (jet pipe) vibration level greater than 4 ins/sec
		FUEL FILTER lt (amber)	an excess differential pressure across the engine fuel filter
		NAC/WING O/HEAT lt (amber)	an overheat condition in the wing rear equipment bay over an engine or in an engine bay
		Fuel HIGH TEMP lt (amber)	that a high fuel temperature exists in the fuel burner manifold
		Oil temp instrument warning lt (amber)	that a high temperature exists in the engine oil entering the oil pressure pump
		FIRE SENSOR lt (amber)	a fault exists on one of the two fire detection loops of the engine
		FLAME SENSOR lt (amber)	with the FLAME SENSOR selector at BOTH indicates that one of the two engine flame breakout detection loops is signalling a warning
Intake Control	Single stroke gong	MWS INT 1 lt (amber) INT 2 INT 3 INT 4 N_1 SIG lt (amber)	a failure of the LP spool speed signal to the intake control unit in use
		LANE lt (amber)	a failure of the associated intake lane A or B whether it is in use or not
		HYD lt (amber)	a failure of the main hydraulic operation of the associated intake
		α lt (amber)	a failure of the aircraft incidence signal to one or more of the intake control units in use

(continued)

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AUDIO & MASTER WARNINGS

AMBER WARNING PARTICULARS

SYSTEM	AURAL WARNING CHARACTERISTIC	VISUAL INDICATION	CONDITION INDICATED
Power Plant (continued)	Single stroke gong	& lt contd. amber light in the N ₁ indicator	NOTE: As the alpha light may be on for failure of the incidence signal to any intake the MWS INT light is the only positive indication of the affected intake(s) a failure of the intake to control N ₁
Fuel System	Single stroke gong	MWS FUEL lt (amber) Fuel LOW PRESS lt (amber) LOW LEVEL lt (amber) TANK PRESS lt (amber)	that a low pressure condition exists upstream of the engine pump that a low level condition exists in a collector tank one of these conditions: the fuel vent gallery to atmosphere differential pressure is high and rising, or, low and falling or, the vent gallery absolute pressure is below 2 psi at altitude
Fuel System (M/CG)	Single stroke gong	MWS CG (lt amber) Amber captions 1, M or 2 on FQI control panel	failure of selected CG channel
Hydraulics	Single stroke gong	MWS HYD lt (amber) Pump L/PRESS lts (amber) L/LEVEL lt (amber) O/HEAT lt (amber)	a low pressure condition downstream of the engine driven pump on when the hydraulic fluid quantity gauge pointer reaches the upper gap in the yellow band on the blue or green hydraulic system reservoir comes on when the hydraulic temperature in a hydraulic reservoir exceeds 140 deg C
Navigation	Single stroke gong	MWS ADC lt (amber) ADC 1 or 2 lt (amber)	that the ADC monitor system has detected a fault that has remained for 2 seconds or, the power supply has been interrupted for more than 1 second

AUDIO & MASTER WARNINGS

AMBER WARNING PARTICULARS

SYSTEM	AURAL WARNING CHARACTERISTIC	VISUAL INDICATION	CONDITION INDICATED
Electrical	Single stroke gong	MWS ELEC lt (amber) CSD 1-4 lt (amber) GEN 1-4 lt (amber) AC MAIN BUS 1-4 lt (amber) DC MAIN BUS lt (amber) BATT ISOLATE lt (amber)	a low oil pressure in the constant speed drive the generator control breaker is not connecting the generator to the associated a.c. main bus bar a failure of supply to the main a.c. busbar that one or both parts of the busbar are at less than 25 volts and are automatically disconnected from the associated d.c. essential busbar that the battery is disconnected from its associated d.c. essential busbar
Air Conditioning	Single stroke gong	MWS AIR lt (amber) OVER PRESS lt (amber) PRIM EXCH lt (amber) SEC EXCH lt (amber) DUCT lt (amber) Fwd extract FLOW left hand lt (amber) Fwd extract FLOW right hand lt (amber) Rear extract FLOW lt (amber)	that the air pressure downstream of the corresponding bleed valve exceeds 85 psi that the air temperature downstream of the primary exchanger exceeds 220 deg C that a high temperature exists downstream of the secondary exchanger that a high temperature exists downstream of the fuel/air heat exchanger, or, the temperature downstream of the cold air unit exceeds 120 deg C, or, a high differential pressure exists between the cold air unit outlet and the pressurised fuselage May also indicate a high temperature exists in the duct upstream of the distribution manifold that the mass flow upstream of the three forward extract fans is below approximately 50% normal. that the mass flow upstream of the three rear extract fans is below approximately 50% normal

(Unchanged)

(continued)

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AUDIO & MASTER WARNINGS

AMBER WARNING PARTICULARS

SYSTEM	AURAL WARNING CHARACTERISTIC	VISUAL INDICATION	CONDITION INDICATED
Air Conditioning (continued)	Single stroke gong	MWS SMOKE lt (amber) SMOKE CABIN & FREIGHT HOLD lts (amber)	that smoke is detected in an areas as follows: A. left forward electrical racking, B. forward cabin pressurisation discharge valves, C. forward lower freight hold, D. left rear electrical racking, E. rear cabin pressurisation discharge valves, F. right rear electrical racking, G. upper rear freight hold, H. right underfloor electrical racking, J. right forward electrical racking, K. left underfloor electrical racking. NOTE: More than one light may be on as a result of smoke emanating from a single source
Air Conditioning Smoke	Single stroke gong	MWS SMOKE and AIR lts (amber) SMOKE 1, 2, 3 or 4 lt (amber)	that smoke has been detected in the associated AIR GENERATION GROUP

AUDIO & MASTER WARNINGS

Audio warnings with no associated master warning

SYSTEM	AURAL WARNING CHARACTERISTIC	VISUAL INDICATION	CONDITION INDICATED
Selcal	Two tone chime repeated every 5 secs	SELCAL lt (blue) flashing	Selcal
MWS HEALTH MONITORING	Continuous single stroke gongs		total loss of the MWS or malfunction of the single stroke gong. Cancellation of this tone can be accomplished by the normal audio cancel push button
MWS Auxiliary Warning	Single stroke gong (functions every 10 sec)		that a class 1 (red) light remains illuminated and unrecognised
Autopilot Disconnect	Cavalry Charge	AP lts (2) (red)	failure of an autopilot or two autopilots in LAND mode.
A/C Overspeed	Warble		The visor down and nose down more than 5° at speeds greater than 270 kt or, the visor not locked up at speeds greater than M = 0.95 or, aircraft attitude nose down pitch is greater than 6° at speeds greater than M = 1.0 or, aircraft speed has exceeded V _{MO} /M _{MO} /T _{MO} limit
Altitude Alert	C Chord 1-5 sec. burst	Amber altitude lights on each pilots' altimeter	the approach to and divergence from a selected altitude
Landing Gear	Continuous horn		landing gear not selected down, or, any landing gear not locked down, AND Aircraft less than 180 kt AND Any two throttles less than 95% NOTE: The continuous warning cannot be cancelled if the droop nose is at DOWN in addition to the other stated condition

(Unchanged)

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AUDIO & MASTER WARNINGS

SYSTEM	AURAL WARNING CHARACTERISTIC	VISUAL INDICATION	CONDITION INDICATED
Ground Proximity Warning System	"Whoop Whoop pull up", repeated	PULL UP lights (2) (red)	PULL UP lights (2) (red) On flashing - indicates Mode 1 - excessive rate of descent near the ground (active below 2500 ft) or Mode 2 - excessive closure rate with the ground or Mode 3 - loss of altitude when the aircraft is below 700 ft after take-off or go-around or Mode 4 - proximity to the ground with the landing gear retracted (active below 500 ft)
Audio Tones not associated with the audio warning system			
Ground Proximity Warning System	"Glideslope" repeated	NIL	Mode 5 - inadvertent duck under the glideslope during approach. NOTE - from 1000 feet to 300 ft the audio warning is 'soft'. The audio warning is repeated at an increasing rate as the mode 5 envelope is penetrated more deeply. Below 300 ft the audio warning is 'hard'. A 'soft' warning will disappear if the aircraft is brought back onto the glideslope.

TEMPORARY REVISION
Insert Facing 01.03 Page 14

REASON FOR ISSUE!

Fitment of Marconi-Litton GPWS.

SYSTEM	AURAL WARNING CHARACTERISTIC	VISUAL INDICATION	CONDITION INDICATED
Ground Proximity Warning System	"Whoop Whoop pull up", repeated	Pull up lights (2) (red)	Pull up lights (2) (red) on flashing - indicates Mode 1 - excessive rate of descent near the ground (active below 2500 ft) or Mode 2 - excessive closure rate with the ground or Mode 3 - loss of altitude when the aircraft is below 700 ft after take-off or go-around or Mode 4 - proximity to the ground with the landing gear retracted (active below 500 ft) or nose not fully down below 200 ft.

Audio Tones not associated with the audio warning system

Ground Proximity Warning System	"Glideslope" repeated	NIL	Mode 5 - inadvertent duck under the glideslope during approach.
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AUDIO & MASTER WARNINGS

Audio Tones not associated with the audio warning system (continued)

SYSTEM	AURAL WARNING CHARACTERISTIC	VISUAL INDICATION	CONDITION INDICATED
Airplane General	Low tone Two stroke, two tone (high low) High tone		Seat belts and No smoking signs Attendant (passenger to steward) Crew to passenger
Emergency Equipment	Two tone bleeper	Red flashing lt in roof panel (flight deck) Red flashing lts (3) one in each vestibule cabin staff panel.	Evacuation alert
Flight Controls	Rattle	Stick shaker	Stall warning (16.5 deg incidence or AFT M/CG warning or V_C less than V_{LA} - 20kt)
Navigation Markers	High interphone tone (continuous) High interphone tone (pulsating) Medium interphone tone Low interphone tone		Airways marker Inner marker Middle marker Outer marker
Navigation INS	Flight deck to ground crew horn		INS running without cooling air
Navigation Radio Altimeter	Continuous high tone, horn increasing in volume.		Approach to decision height; the warning cancels at the decision height.

DOORS

GENERAL

The aircraft has two passenger and four cabin service exterior doors, upper and a lower baggage compartment doors and several miscellaneous ground servicing doors. The interior doors consist of four lavatory doors and a flight deck door. All the doors are operated manually.

DESCRIPTION

Passenger and Service Doors

Two outward opening doors in the left-hand side of the fuselage, one forward and the other midway along the passenger compartment, provide normal entry and exit for passengers and crew, and may be opened from inside or outside the aircraft.

Four outward opening doors, two in the right-hand side of the fuselage opposite the passenger doors, and two, one each side of the fuselage, at the rear end of the passenger compartment, provide access to crew and passenger compartment for servicing between flights, and may be opened from either inside or outside the aircraft.

All the doors may be used for emergency evacuation of the aircraft and are provided with escape equipment (Refer to Chapter 7 for description of escape and emergency equipment).

The two passenger doors and the intermediate cabin service door are fitted with slide/raft escape facilities, while the forward and two rear cabin service doors are fitted with escape slide only. Each forward passenger and forward cabin service door is fitted with an observation window.

Baggage Compartment and Miscellaneous Doors.

The upper baggage compartment door is normally opened from outside but a means of opening the door from inside by an emergency handle is provided. When not in use the handle is clipped to the door surround structure. To retain the door in its fully open position it is necessary to utilize a separately stowed retention pin.

The lower baggage compartment and miscellaneous doors can only be opened from outside.

Flight Deck Door

An electrically operated lock striking plate controlled by a switch on the flight compartment roof panel, provides the crew with an independent means of unlocking the door. The door can be opened from inside the flight compartment at any time by turning the door knob, and from the cabin side only by a key. The door is fitted with a manually operated latch bolt, a mirror, and a cabin observerscope on the forward face.

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DOORS

Lavatory Doors

The operation of all lavatory doors is manual and self explanatory. A locked door can be removed from outside of the compartment if necessary without the use of special tools.

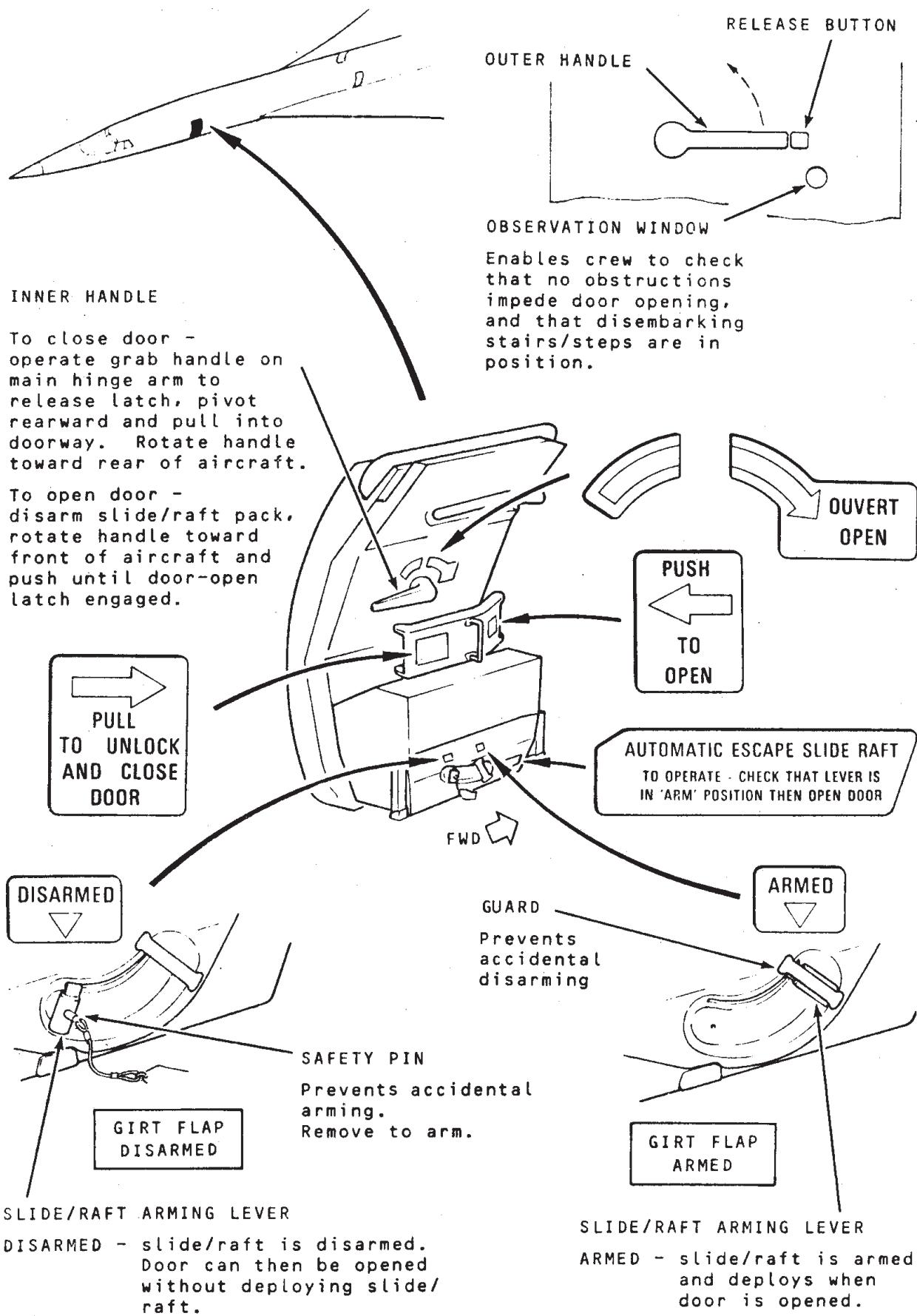
Door Warning

The door warning system is an automatically controlled electrical system which, when a door in the pressure hull is not properly locked in position, gives an indication on the door warning panel located at the flight engineer's panel. The master warning system is also activated when the door warning operates.

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FORWARD PASSENGER DOOR

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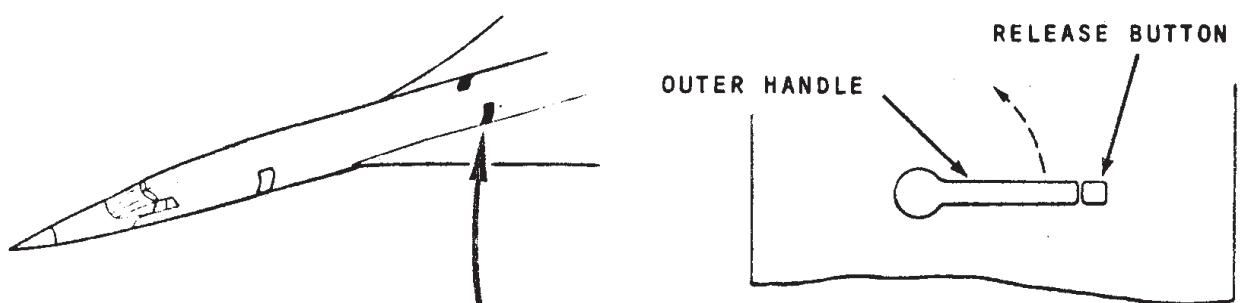
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INTERMEDIATE PASSENGER DOOR

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INNER HANDLE

To close door - operate grab handle on main hinge arm to release latch, pivot rearward and pull into doorway. Rotate handle toward rear of aircraft.

To open door - disarm slide/raft pack, rotate handle toward front of aircraft and push until door-open latch engaged.

PULL TO UNLOCK AND CLOSE DOOR

DISARMED

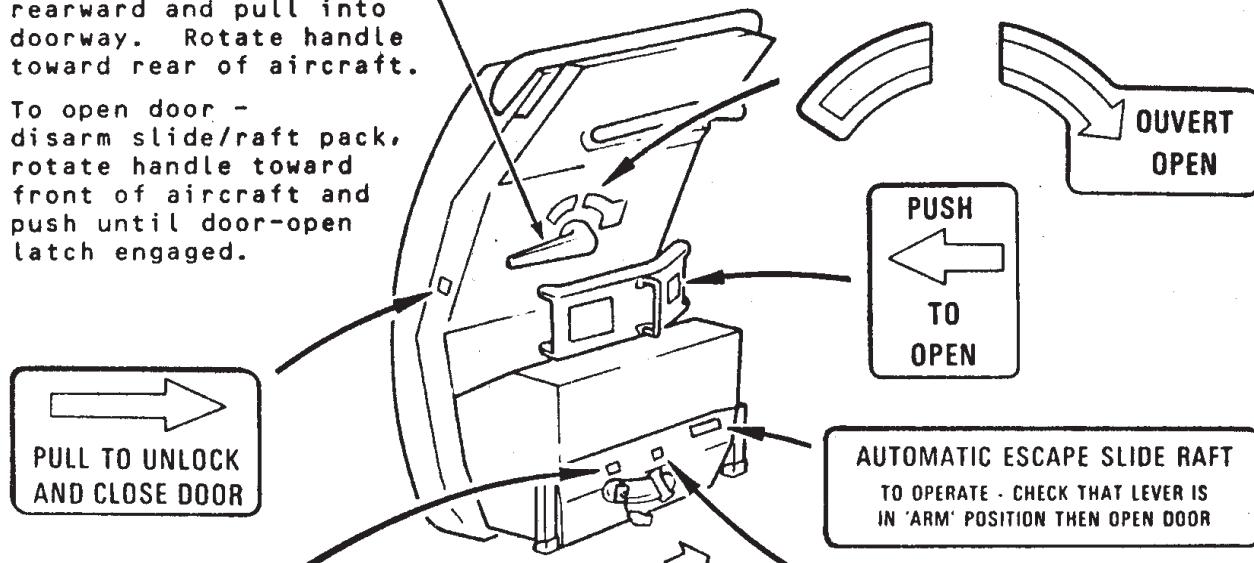
GIRT FLAP DISARMED

SLIDE/RAFT ARMING LEVER

DISARMED - slide/raft is disarmed.
Door can then be opened without deploying slide/raft.

OUTER HANDLE

RELEASE BUTTON



GUARD

Prevents accidental disarming

SAFETY PIN

Prevents accidental arming.
Remove to arm.

ARMED

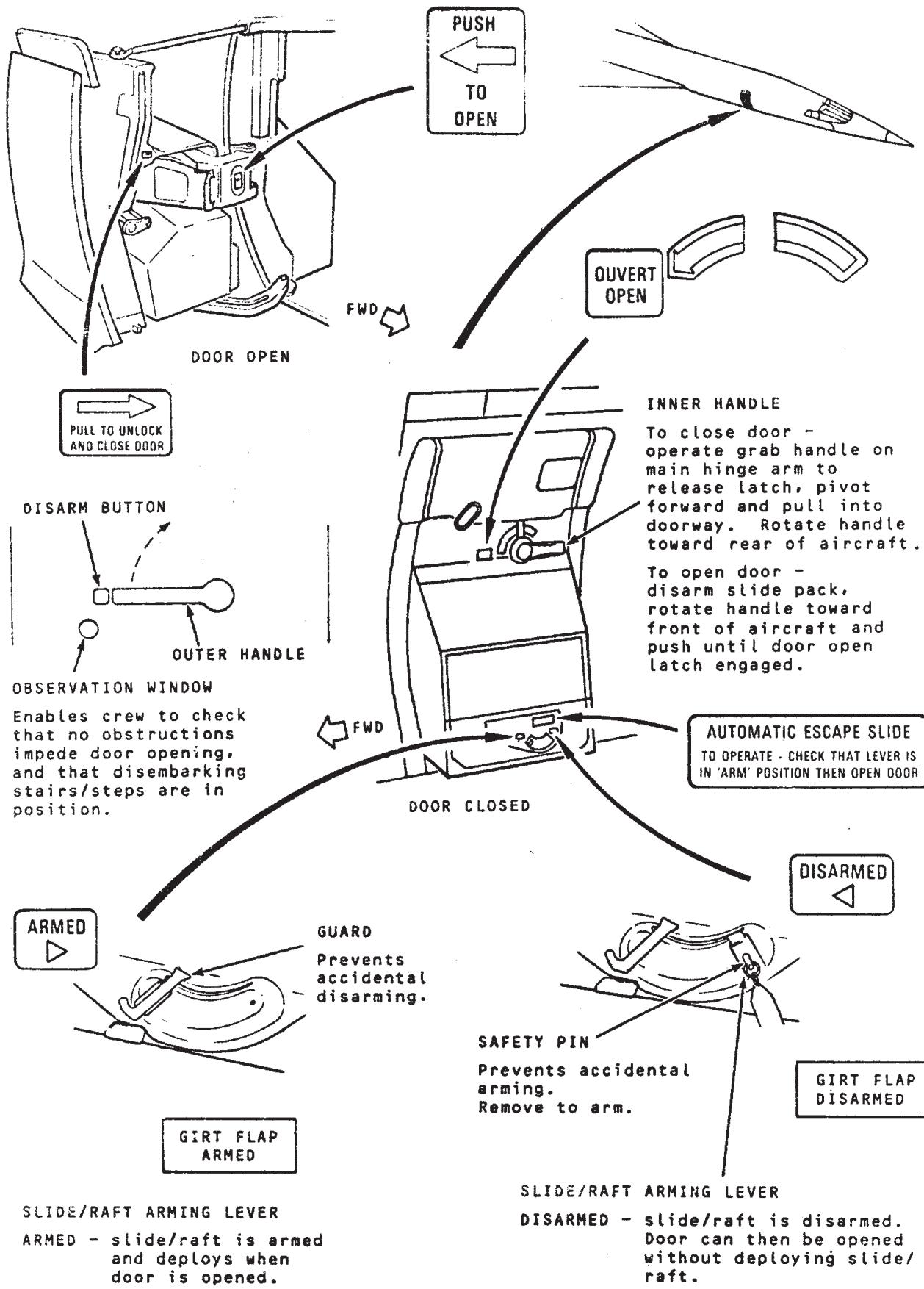
GIRT FLAP ARMED

SLIDE/RAFT ARMING LEVER

ARMED - slide/raft is armed
and deploys when door is opened.

FORWARD SERVICE DOOR

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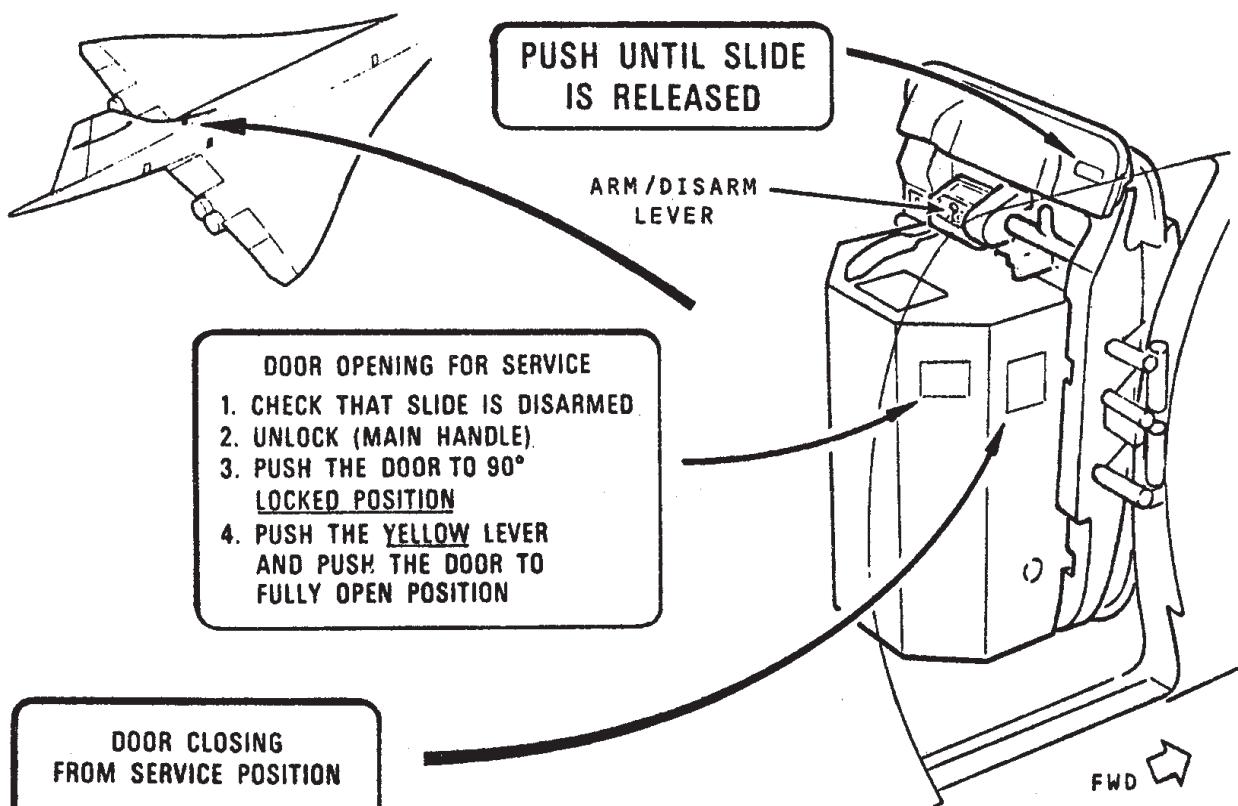


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AFT DOORS (Sheet 1 of 2)

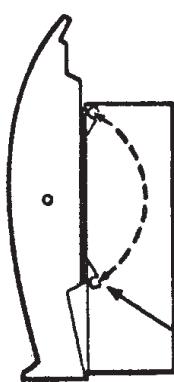


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Door has two open positions.
The intermediate position at
90° (shown), for escape slide
operation and fully open for
easier access during servicing.

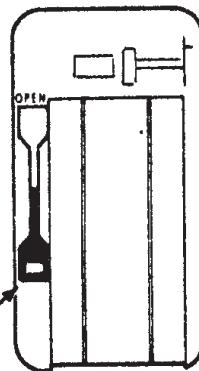
NOTE: Slide must be disarmed
before opening door for
normal use.

HINGE ASSEMBLY



INNER HANDLE

Pull handle out
and up to open
door.



OUTER HANDLE

Push in flap at
grip to release
lock. Pull out
and up to open.

(Unchanged)

AFT DOORS (Sheet 2 of 2)

AUTOMATIC ESCAPE SLIDE

TO OPERATE - CHECK THAT LEVER IS
IN 'ARM' POSITION THEN OPEN DOOR

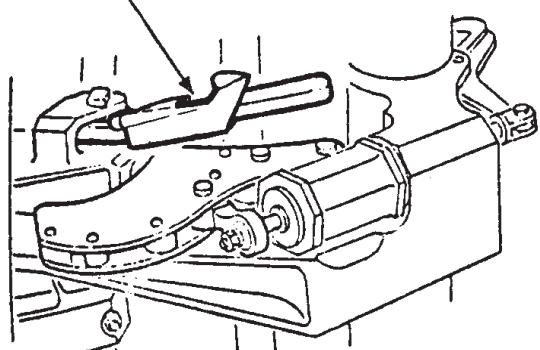
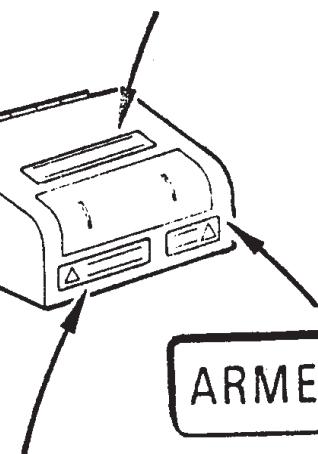
**OUVERT
OPEN**



LOCKED

LATCH RELEASE HANDLE (YELLOW)

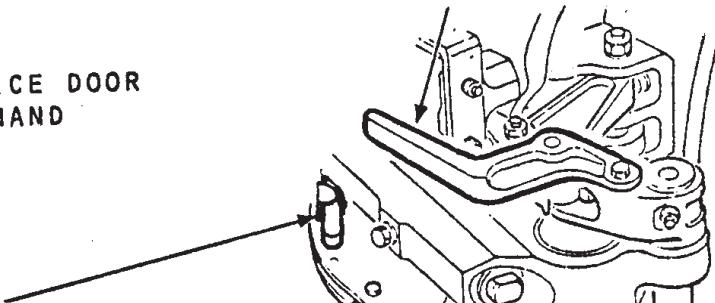
Release latch to open fully
from 90°, and to release to lock
from fully open to 90°.
(Depress thumb trigger to permit
handle movement).

**SLIDE ARMING**

DISARMED

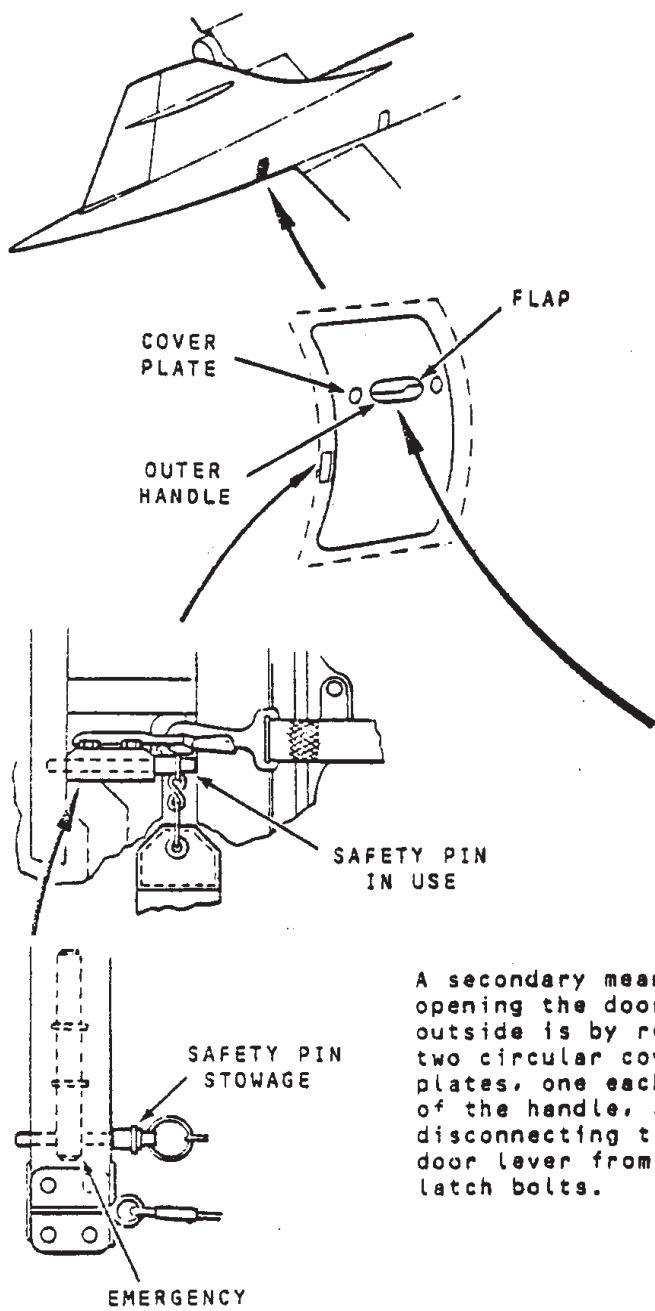
LOCK RELEASE HANDLE (Blue)

Pull to unlock and close
door from 90° position.



HINGE ASSEMBLY

UPPER AND LOWER CARGO DOORS

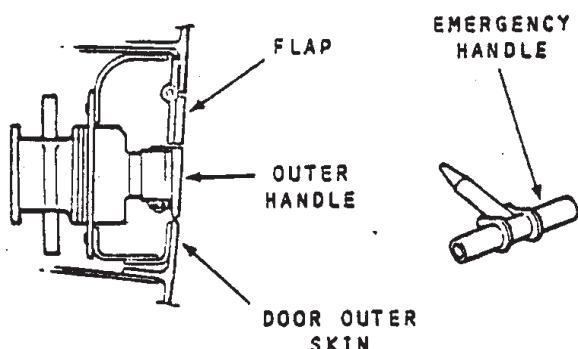


UPPER CARGO DOOR

To open from outside-depress flap over door handle, pull handle out and turn clockwise.
To move door - push in, lift up and over. The door is counterbalanced by cables and spring loaded drum mechanism.

To retain door in its fully open position - use separately stowed retention pin.

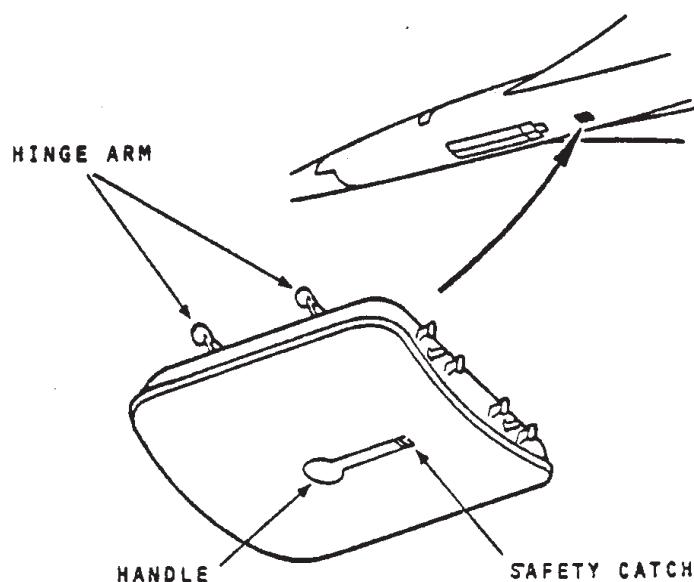
NOTE - The door may be opened from inside the baggage compartment by an emergency handle which is inserted into the centre shaft and turned counter clockwise. When not in use the handle is clipped to the door surround structure.



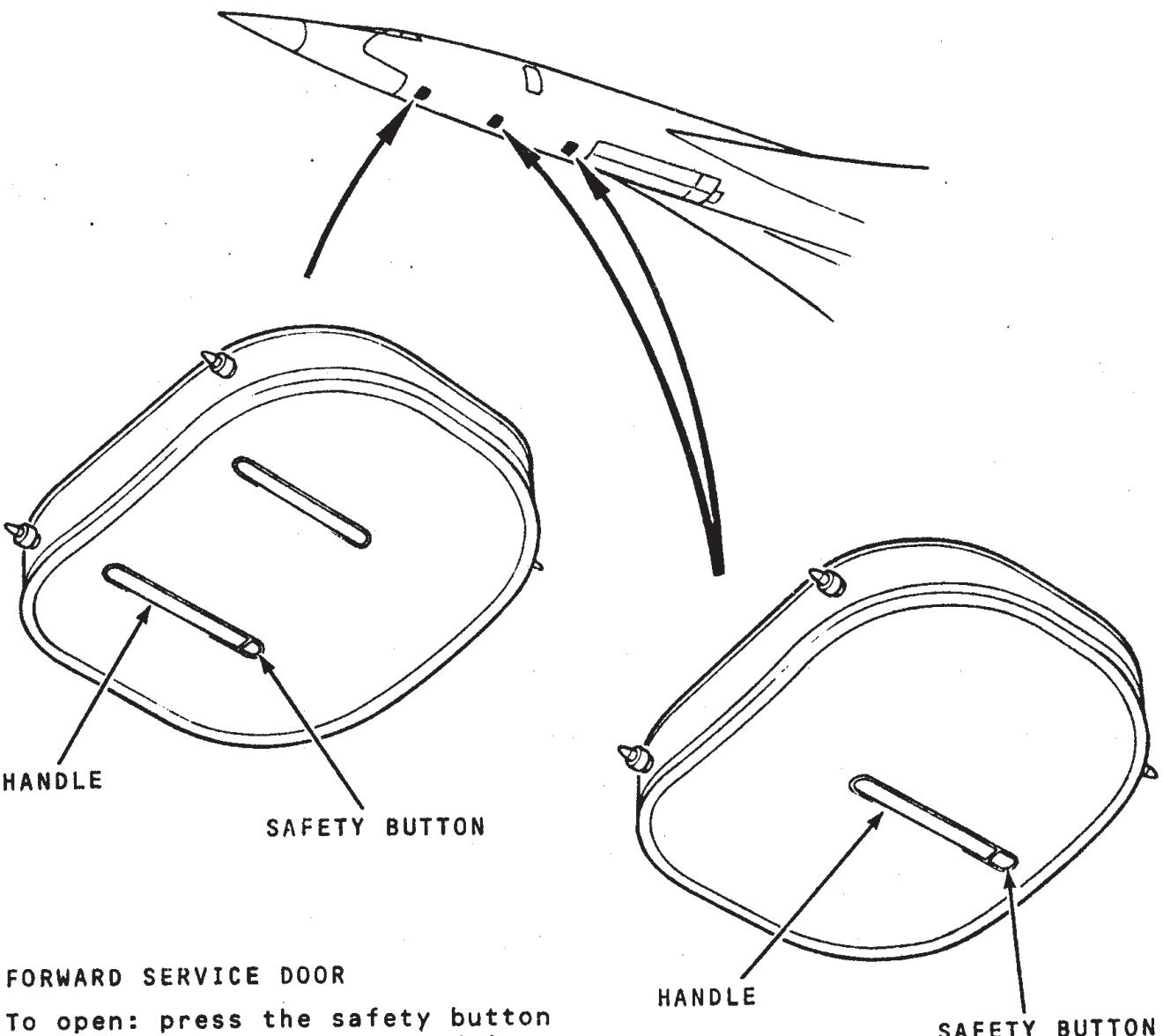
A secondary means of opening the door from outside is by removing two circular cover plates, one each side of the handle, and disconnecting the door lever from the latch bolts.

LOWER CARGO DOOR

Can be opened only from the outside, hinged on the left hand side and counterbalanced by a system of springs and cables.
To open: depress the safety catch on trailing end of handle to spring handle out, pull outward and turn counterclockwise. Door opens inward.



(Unchanged)

FORWARD UNDER FLOOR
SERVICE COMPARTMENT DOORS

FORWARD SERVICE DOOR

To open: press the safety button to spring the handle out of its recess and pull handle outwards, this action retracts the latch bolts.

The forward service door can then be lifted inward and manoeuvred out of the aperture.

To close: pull handle outwards, this action retracts the latch bolts. Manoeuvre into aperture, push handle inward and stow.

ELECTRONIC BAY ACCESS DOORS

The forward and rear electronic bay access doors are hinged on the left hand side and it is not necessary to remove them after unlatching.

To open: press the safety button to spring the handle out of its recess and pull handle outwards, this action retracts the latch bolts. Push door inwards and latch in the fully open position.

To close: operate the door handle to retract the latch bolts, position door and push handle inward and stow.

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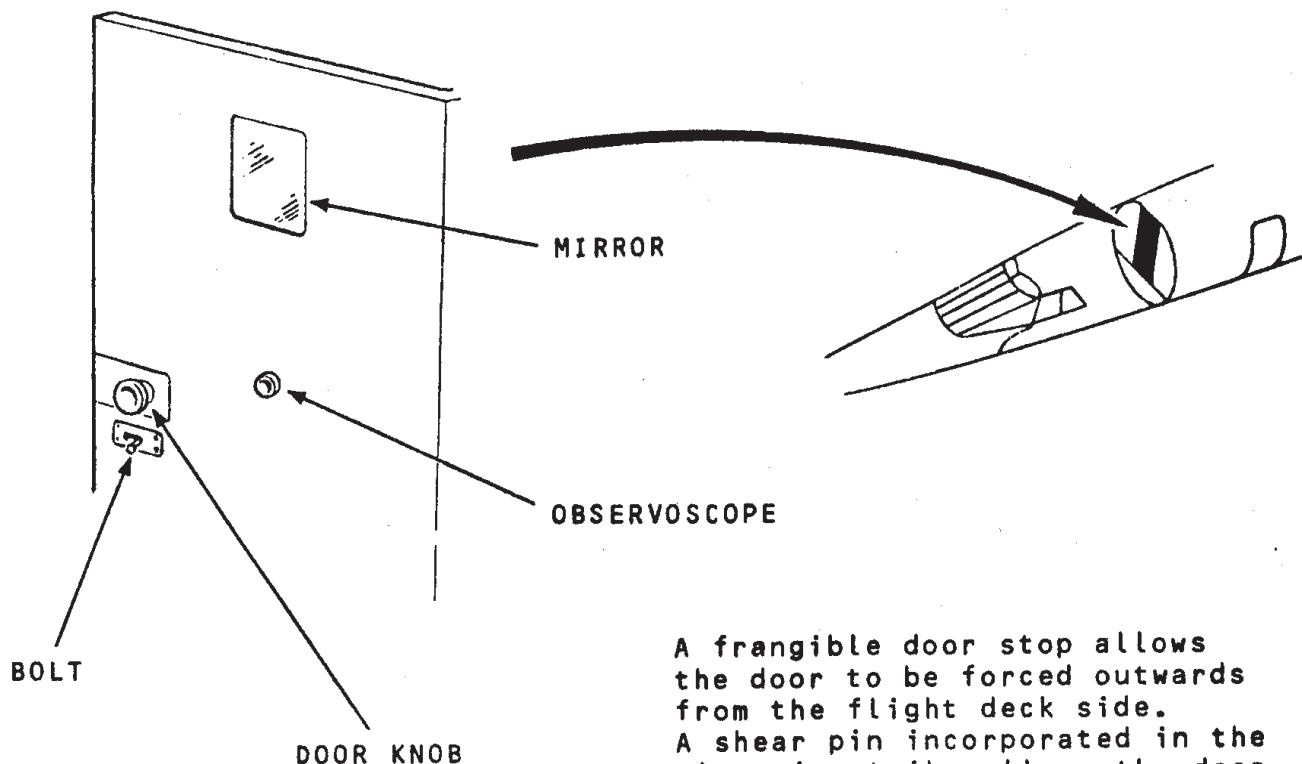
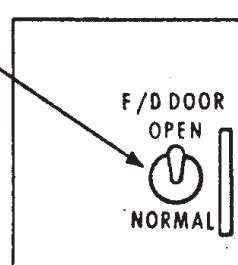
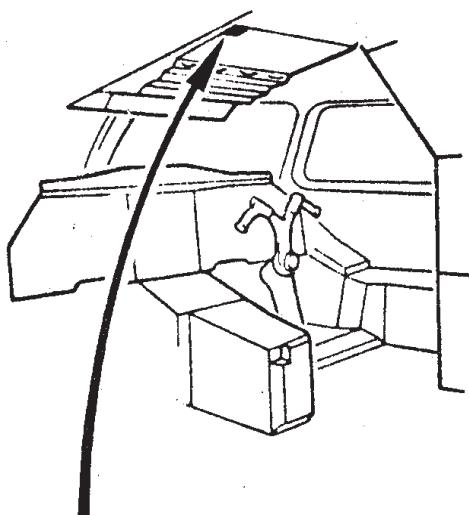
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FLIGHT DECK DOOR

FLIGHT DECK DOOR SWITCH

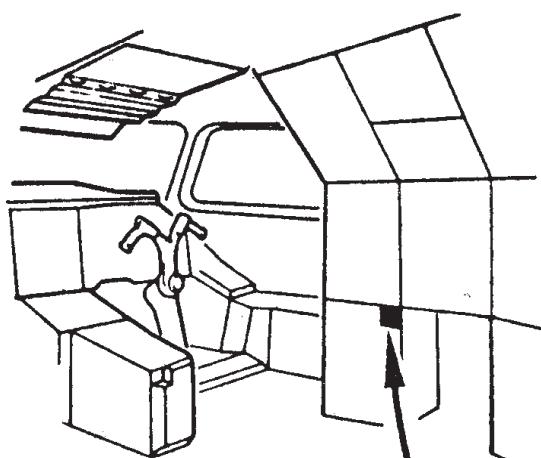
OPEN - the door lock electric strike is de-energized. In this condition the door can be opened from either side without turning the knob or using the key.

NORMAL - the door lock electric strike is energized. In this condition the door can be opened from the flight deck side by turning the knob and from the cabin side, only by using a key.



A frangible door stop allows the door to be forced outwards from the flight deck side. A shear pin incorporated in the electric strike allows the door to be forced from the cabin side. An independent bolt is fitted on the flight deck side. There is a thumb catch on the flight deck side of the door lock. This should be kept in the locked position.

DOOR WARNING CAPTION LIGHTS

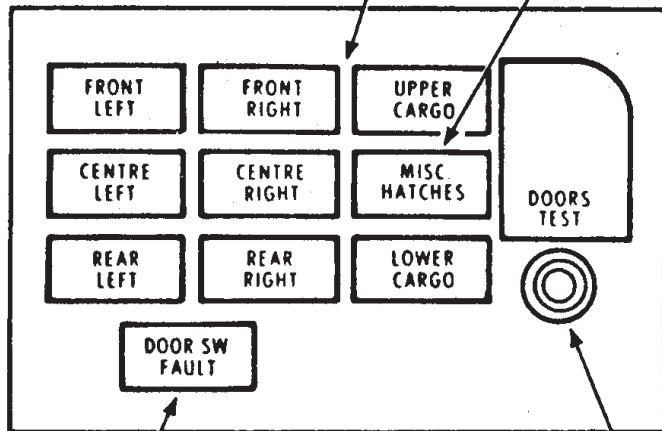


DOOR LIGHTS (Red)

On - indicates that the corresponding door is not locked.
Accompanied by a MWS DOOR light (red) and audio (gong).

MISCELLANEOUS HATCHES LIGHT (Red)

On - indicates that servicing hatches are not shut.
Accompanied by a MWS DOOR light (red) and audio (gong).



DOORS TEST PUSH BUTTON

Pressed - tests the door lights and their connection to the master warning system.

DOOR SWITCH FAULT LIGHT (Yellow) (SIX CABIN DOORS ONLY)

On - indicates that one or more door indication circuits are giving an incorrect indication. Each main door has two switches for indication. If one is sensing open and one sensing shut then a disparate signal is sent.

SEATS

GENERAL

Four seats are mounted on rails in the flight compartment; three of the seats, captain, first officer and flight engineer, are electrically operated. The fourth seat which accommodates the first supernumerary crew member is wholly manual in operation. A fifth seat, which is not mounted on rails and has a fixed position at the rear of the other seats, can accommodate a second supernumerary crew member. The disposition of the seat rails provides maximum mobility for the operating crew.

The captain's seat can be tracked aft to allow him access to the seat and to monitor the systems management panel at the flight engineer's station as necessary. The first officer's seat tracks aft and outboard to provide access between the centre console and the seat. Both seats are electrically power operated for tracking and height adjustment with manual reversion if required. In addition the seat pans and seat backs are adjustable for tilt. The arm-rests are adjustable.

The flight engineer's seat can be turned outboard to face the systems management panels or forward for take-off and landing. The floor rails allows the flight engineer to track forward to within easy reach of the centre console and is power operated for fore and aft movement and height adjustment with manual reversion if required. The flight engineer is automatically prevented from selecting crashlock pin disengagement unless the seat is positioned within a band of 2 inches to the right hand side of the aircraft centre line. When not in used the seat can be stowed by tracking it transversely across the trolley into the knee recess in the systems management panels.

To prevent a collision between the flight engineer's and the captains seats when the former is motored forward or the latter rearward an inter-seat strut is positioned on the inboard rail at the rear of the captain's seat. The front end of the strut, is attached to the base structure of the captains seat, the rear end has a projecting striker pad to operate a limit switch on the flight engineer's seat to disarm the relevant circuits of both seats. A foot pedal on the secondary trolley of the flight engineer's seat, when operated, permits the strut to override the micro switch mechanism thus allowing the captain's seat to proceed rearward if unobstructed.

To prevent injury to the occupant of the first supernumerary seat when the captain's seat is motored rearward a detachable strut is fitted to the first supernumerary's seat. Contact between the two seats is prevented by the front end of the strut tripping a micro switch on the captain's seat breaking the tracking circuit of that seat.

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SEATS

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airways**

The first supernumerary crew member's seat is manually operated and is mounted on rails behind the captain's seat. The seat can be moved forward or rearwards and adjusted in height and partly rotated on its base. When not in use the seat pan is stowed by lifting and folding it against the seat back where it is held in position by the safety harness. The latchplate is operated to disengage the detachable strut and the seat is moved rearward to stow at an angle to the aircraft centre line in the rear left hand corner of the flight compartment.

When lowering the seat pan from the stowed position

- depress the seat pan lock control
- ensure that the seat pan moves into a fully lowered position
- release the seat pan lock control
- confirm seat pan locked down.

Do not sit on the seat until correct lock engagement is confirmed otherwise damage to the locking mechanism will occur.

The second supernumerary crew member's seat is stowed flat against the left hand equipment rack, held by a claw arm catch, when not in use. When the catch is released the seat may be swung down, the legs locked into receptacles in the floor and the back raised into position. Operation of a lever mounted on the forward leg frees the legs from the floor. It also releases the back so that it may be placed in position for stowing.

An inertia reel safety harness is fitted to each seat with the exception of the second supernumerary seat. This harness is clasped to a single anchorage point on the floor and three seat anchorage points.

SEATS

PILOT'S SEAT

ARMREST RELEASE LEVER

For use when armrest stowed forward.
Spring loaded to lock armrest in stowed position.
Pressing allows manual adjustment in forward stowed position.

FORE AND AFT SWITCHES

Ganged switches operate in the correct sense.
Spring loaded centre off.

CRASHLOCK RELEASE LEVER

Lifting disengages seat crashlock pin.

EMERGENCY CRASHLOCK AND MOTOR DRIVE DISCONNECT LEVER

Lifting allows manual adjustment of the seat, fore and aft.

SEAT BACK ADJUSTMENT LOCK LEVER

Lifting unlocks the seat back allowing manual adjustment.
Spring-loaded to lock when released.

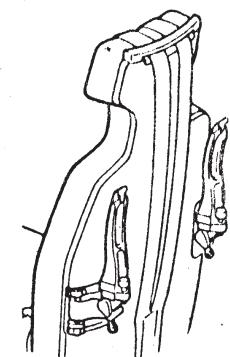
SHOULDER HARNESS INERTIA REEL CONTROL LEVER

FWD - Inertia reel unlocks Spring return to centre.
CENTRE - Inertia reel allows withdrawal of harness but locks with sudden forward movement.
REAR - Inertia reel locks.

SEAT HEIGHT MANUAL ADJUSTMENT HANDLE

Pull and rotate in the required direction.
Spring loaded to lock when released.

ARMREST FINE ADJUSTMENT CONTROL



ARMRESTS STOWED AFT

ARMREST STOWED FORWARD

SEAT HEIGHT CONTROL SWITCHES

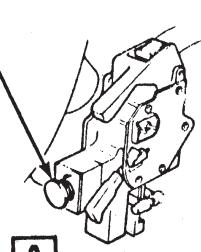
Switches operate in the correct sense and must be operated together.
Spring-loaded centre off.

SEAT PAN ADJUSTMENT LOCK LEVER

Lifting unlocks seat pan allowing manual adjustment.
Spring-loaded to lock when released.

SEAT POWER SWITCH

PULL - power on.
ILLUMINATED - green.
PUSH - power off.
TURN - to vary light intensity.



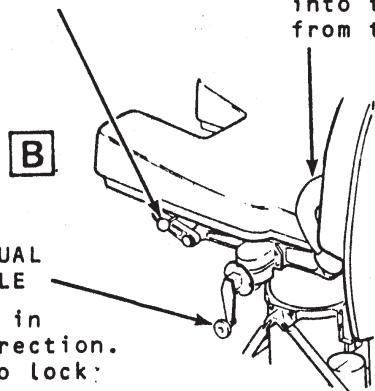
A

HARNESS LAP STRAPS

Allows straps to retract fully into the reel before removing from the locked position.

NOTE:
CAPTAIN'S SEAT shown.
FIRST OFFICER'S SEAT

The control console is on the left hand side, and the inertia reel lever and manual seat height adjustment lever is on the right hand side.
Right hand armrest cannot be stowed.



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CONCORDE FLYING MANUAL

British airways
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SEATS

FLIGHT ENGINEER'S SEAT

SEAT ROTATION LOCK LEVER

PRESS - to rotate seat through 90° outboard from forward facing position.
Spring loaded to lock at 15° intermediate positions.

SEAT HEIGHT CONTROL SWITCHES

Switches operate in the correct sense and must be operated together.
Spring-loaded centre off.

TRANSVERSE TRAVEL LOCK LEVER

Lifting removes the lock to allow transverse travel.
Release to lock in any one of seven positions.

FORE AND AFT CONTROL SWITCHES

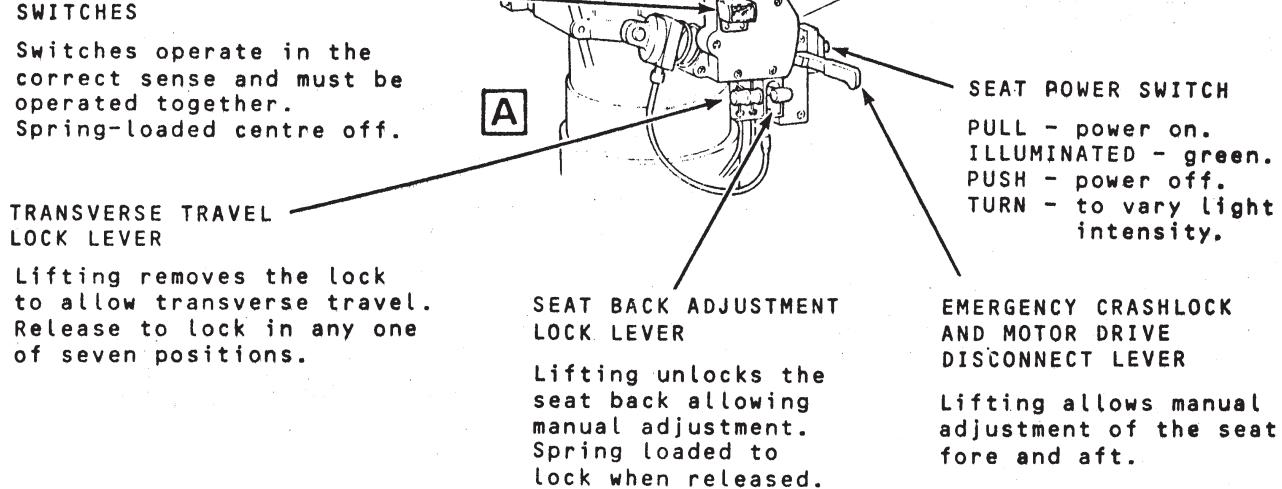
Ganged switches operate in the correct sense. Spring-loaded centre off.

CRASHLOCK RELEASE LEVER

Lifting disengages seat crashlock pins.

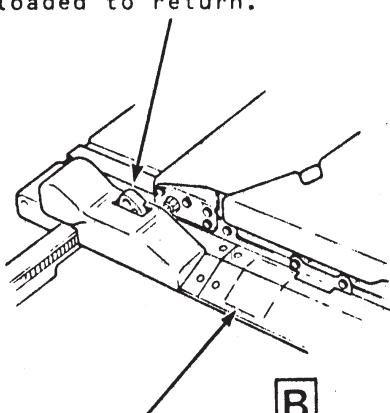
SEAT POWER SWITCH

PULL - power on.
ILLUMINATED - green.
PUSH - power off.
TURN - to vary light intensity.



FOOT OPERATED PEDAL

Allows rearward movement of Captain's seat past Flight Engineer's seat. Spring loaded to return.



Crashlock pin disengagement band.

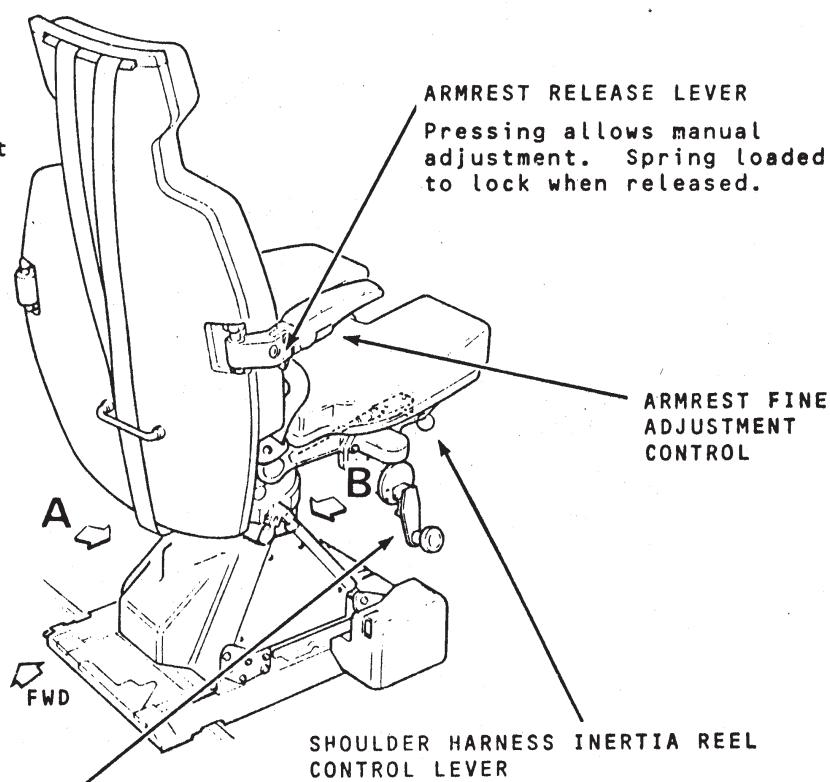
SEAT HEIGHT MANUAL ADJUSTMENT HANDLE

Pull and rotate in the required direction.
Spring loaded to lock when released.

ARMREST RELEASE LEVER

Pressing allows manual adjustment. Spring loaded to lock when released.

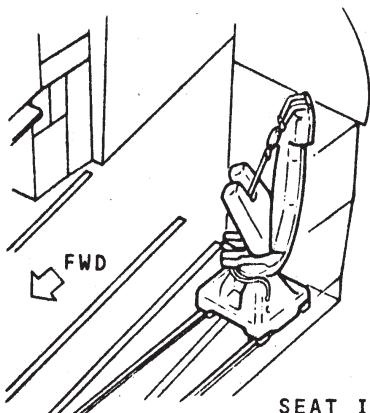
ARMREST FINE ADJUSTMENT CONTROL



SHOULDER HARNESS INERTIA REEL CONTROL LEVER

FWD - Inertia reel unlocks
Spring return to centre.
CENTRE - Inertia reel allows withdrawal of harness but locks with sudden forward movement.
REAR - Inertia reel locks.

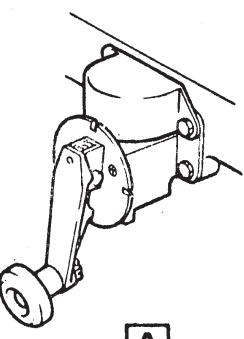
FIRST SUPERNUMERARY'S SEAT



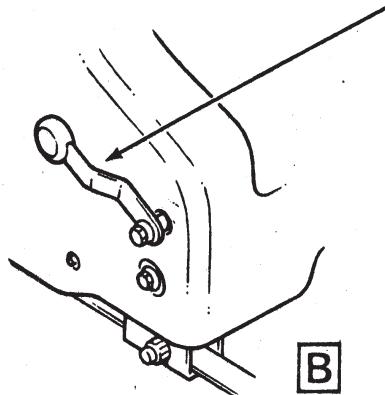
SEAT IN STOWED POSITION

SEAT HEIGHT ADJUSTMENT HANDLE

Pull out from detent and rotate in the required direction. Spring-loaded to lock when released.



A



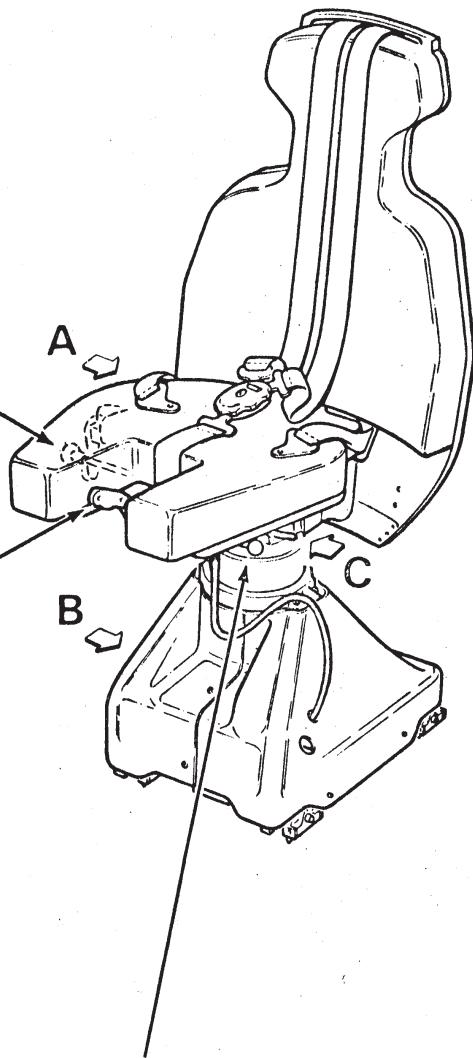
FORE AND AFT LEVER

Allows movement of seat by Flight Engineer.

B

SEATPAN LOCK CONTROL

Press - to release.
Press - to re-engage lock.



A

C

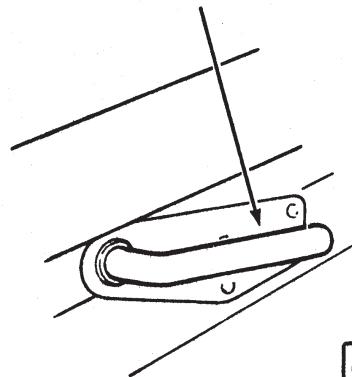
CRASHLOCK RELEASE LEVER

Lifting disengages seat crashlock pins.

B

SEAT ROTATION CATCH LEVER

Lifting allows seat to rotate inboard to an angle 41 degrees to the aircraft centre line for stowage.



C

SHOULDER HARNESS INERTIA REEL CONTROL LEVER

FWD - Inertia reel unlocks.
Spring return to centre.

CENTRE - Inertia reel allows withdrawal of harness but locks with sudden forward movement.

REAR - Inertia reel locks.

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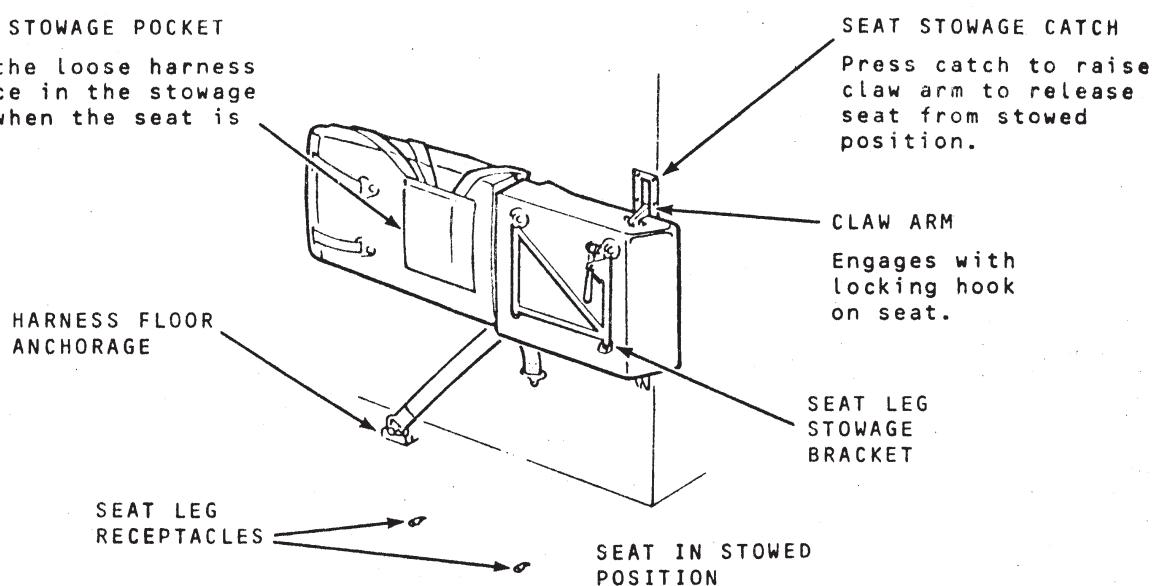
British airways
OVERSEAS DIVISION

SEATS

SECOND SUPERNUMERARY'S SEAT

HARNESS STOWAGE POCKET

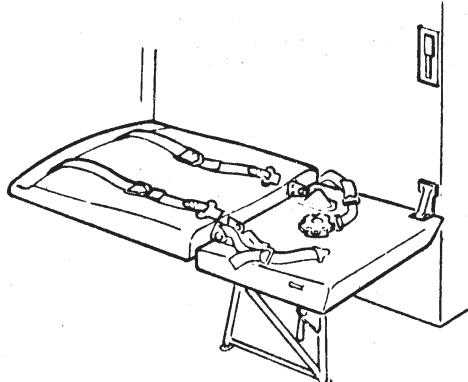
Gather the loose harness and place in the stowage pocket when the seat is stowed.



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QUICK RELEASE HARNESS ATTACHMENT PLATE
Three attachments on seat, one on floor.

HARNESS FLOOR ANCHORAGE



SEAT BACK REST

SAFETY HARNESS

LOCKING HOOK

LEG LOCKING PLUNGER

SEAT STOWAGE CATCH
Press to raise claw arm, to engage it with seat locking hook, when stowing seat.

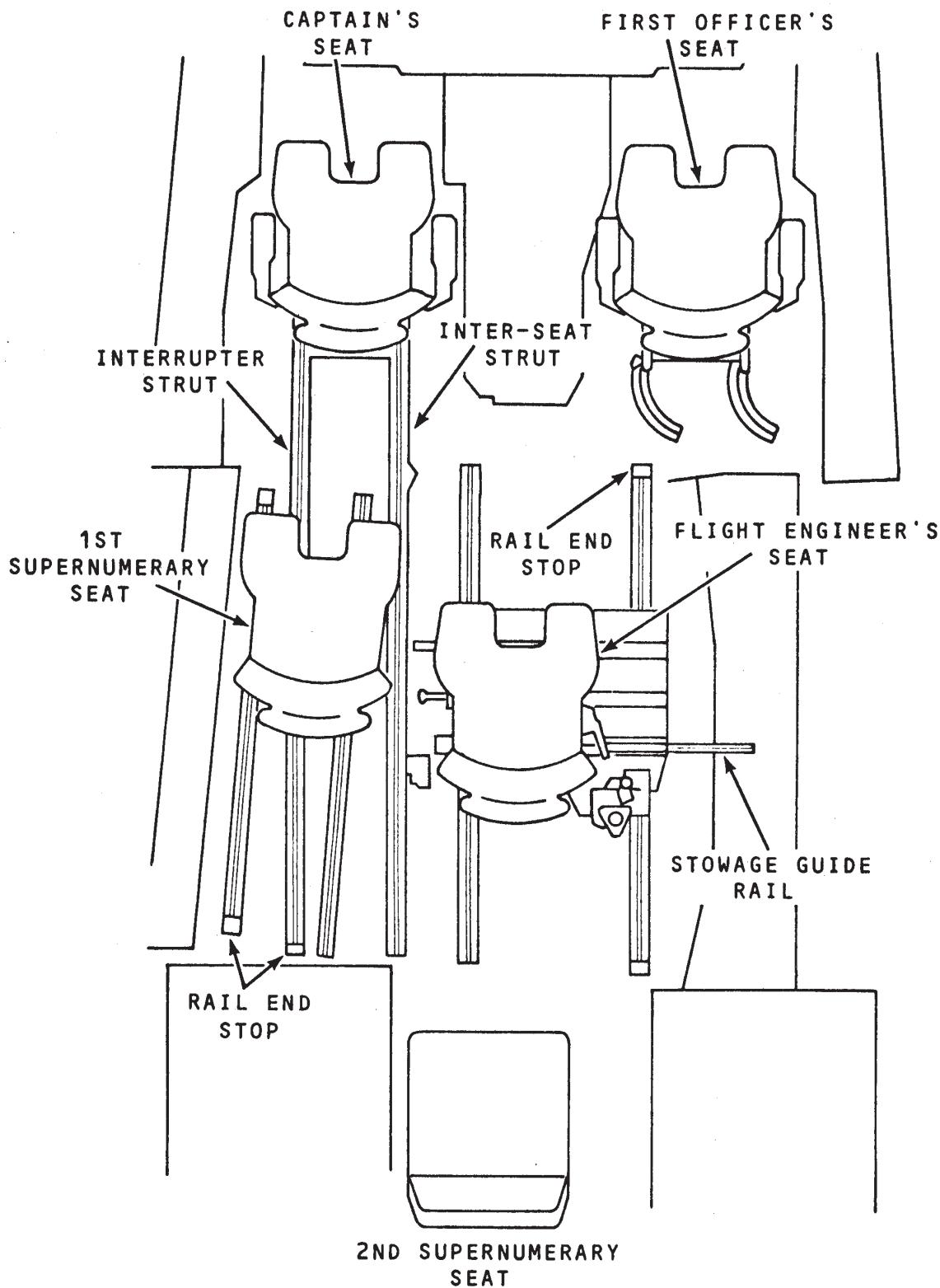
SEAT HINGE PIVOT ATTACHMENT

SEAT BACK AND LEG RELEASE LEVER

Support seat back with left hand, grasp forward leg and lever with right hand and squeeze lever towards leg to release seat back and leg locking plunger.

SEAT READY FOR USE

SEATS AND RAILS



LIGHTS

DESCRIPTION

Internal lighting is by a mixture of fluorescent, electro-luminescent, instrument integral, spot and flood.

GENERAL ILLUMINATION

Two fluorescent lights are fitted for illumination in the racking area, they are controlled by two-way switching at the forward end of the circuit breaker panels and the cabin crew forward control panel.

Two spotlights are fitted as boarding lights in the forward vestibule.

One fluorescent light in the roof illuminates the flight compartment.

CREW MEMBERS' STATIONS

Each crew member has independent control of his panel and general lighting.

STORM

The STORM lighting is high intensity fluorescent lighting in combination with a high intensity roof mounted floodlight which illuminates the dash panels to overcome the effects of glare through the windshields.

EXTERNAL LIGHTING

One anti-collision light is situated in each wing root leading edge and one is situated at the end of the tailcone. The three lights flash simultaneously.

The taxi-turn lights are situated on the left and right side of the front fuselage.

The landing taxi lights are situated on the right hand and left hand nose gear doors. A landing taxi light will not illuminate until it has left the retracted position even if the lamp is switched on. On the ground, a nose gear switch circuit ensures that a 400 W filament is operated. When airborne, a 600 W filament is operated and the lamp angle is depressed to compensate for the approach attitude.

(Unchanged) The main landing lights are situated in the right and left wing leading edge roots. A main landing light will not illuminate until it has left its retracted position even if the lamp is switched on. Automatic blowback occurs at 365 knots.

The navigation lights are situated one in the outer leading edge of each wing and one in the tailcone.

PILOTS' FLIGHT DECK LIGHTING CONTROLS

(Sheet 1 of 2)

EMERGENCY LIGHTS SELECTOR AND LIGHT (Yellow)

ON - test facility.
ARM - all aircraft emergency lights will come on in the event of a failure of the d.c. essential A busbar.
OFF - isolates the battery supplies in the lighting units.
Light (yellow) is on to indicate that the selector is OFF and electrical power is available at the busbars.

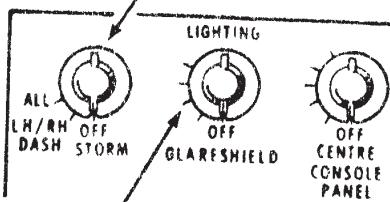
The EMERG switch on forward steward's panel should be at NORM for control by this selector.

ROOF LIGHTS SWITCH

ON - lights two fluorescent tubes in the flight deck roof light.

STORM LIGHTING ROTARY SELECTOR

ALL - lights the LH,RH and centre dash panels.
LH/RH DASH - lights the LH and RH dash panels only.



GLARESHIELD LIGHTING ROTARY SELECTOR

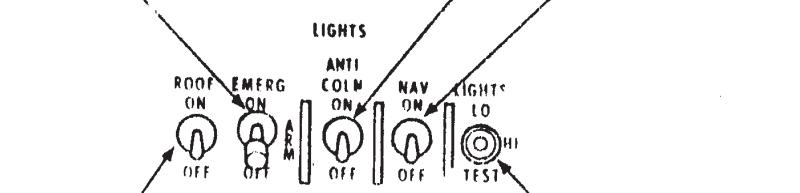
Lights the glareshield and the AFCS panel.

CENTRE CONSOLE PANEL LIGHTING ROTARY SELECTOR

Selects facia lighting on the centre console panel.

LIGHTS SELECTOR

TEST - tests all warning lights on the centre dash panel.

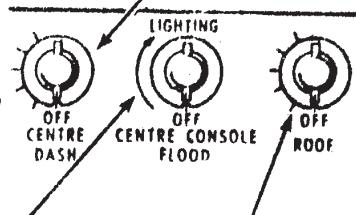


OVERHEAD PANEL WARNING LIGHTS SELECTOR

TEST - tests the Throttle Master sels lts, ADS/Engine probe heater lts. Drain Mast heater lts, Engine Anti-ice lts, Wing and Intake Anti-ice lts, transparency De-ice and Demist lts and the Landing Lights extended lts.

CENTRE DASH ROTARY SELECTOR

Fully lights the centre dash panel electroluminescent lighting at the first graduation. Rotating the selector thereafter increases the brilliance of the instrument integral lighting.



CENTRE CONSOLE FLOODLIGHTING ROTARY SELECTOR

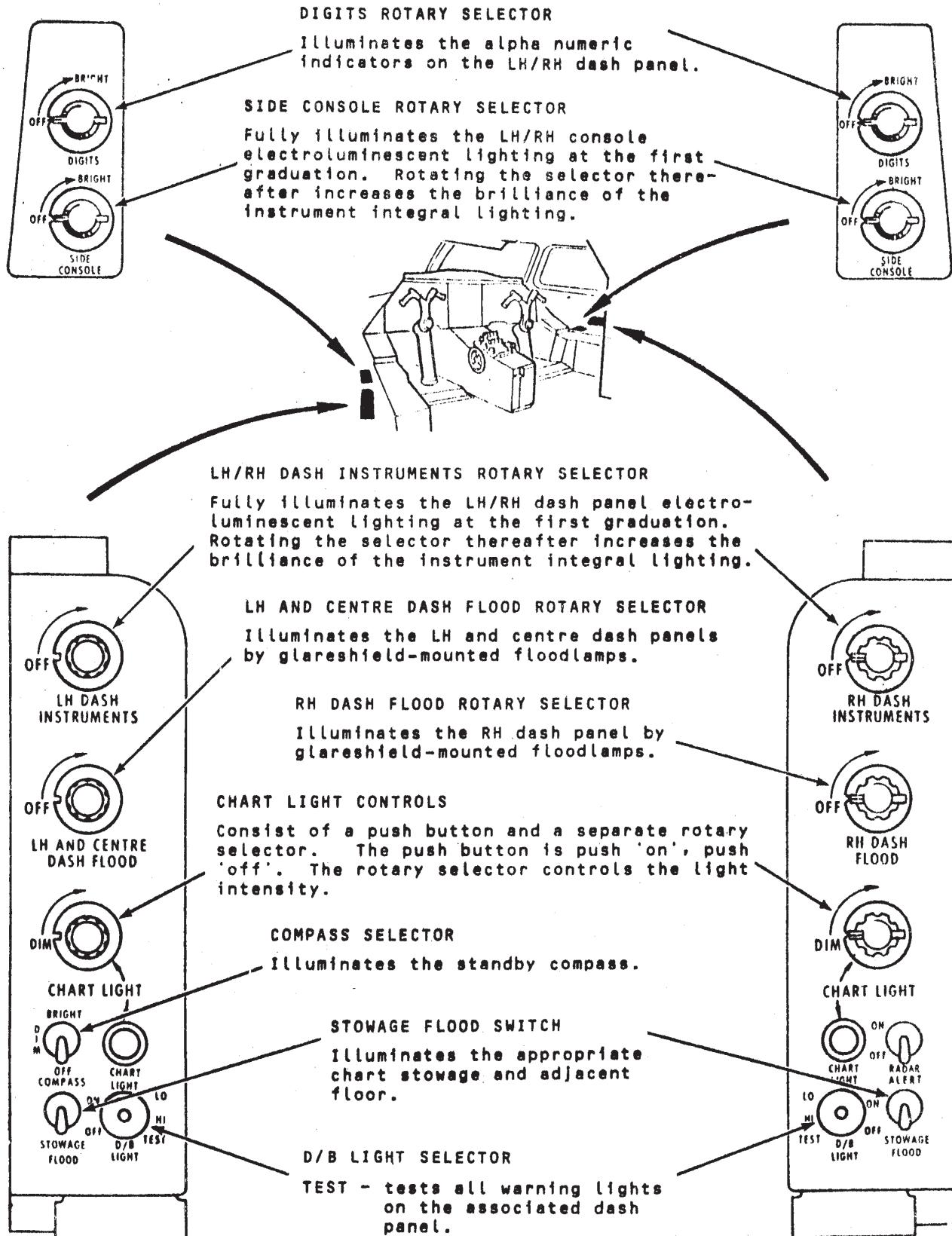
Controls the centre console spotlight.

ROOF LIGHTING ROTARY SELECTOR

Fully lights the roof panel electroluminescent lighting at the first graduation. Rotating the selector thereafter increases the brilliance of the instrument integral lighting.

PILOTS' FLIGHT DECK LIGHTING CONTROLS

(Sheet 2 of 2)

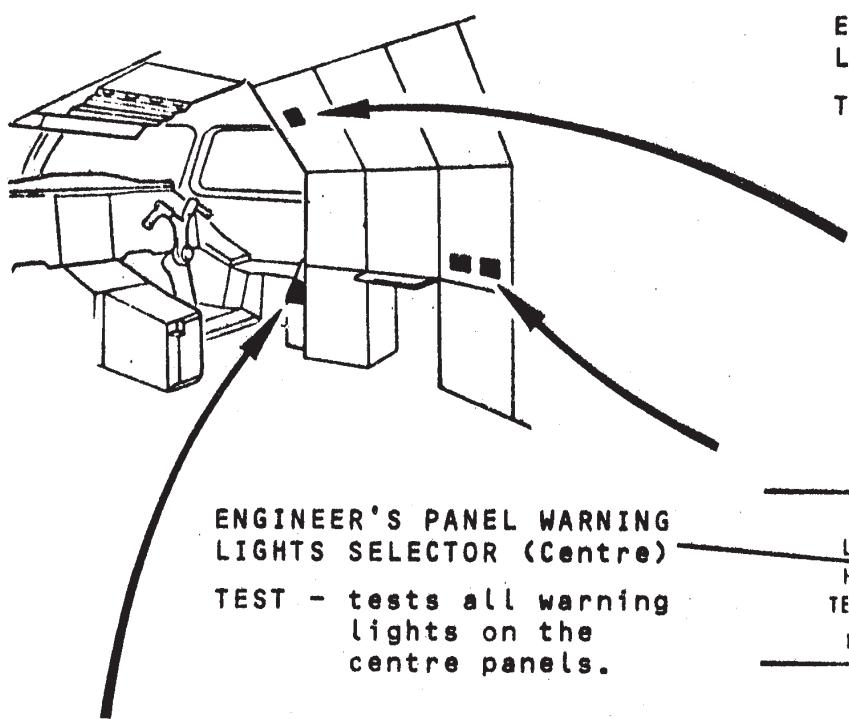


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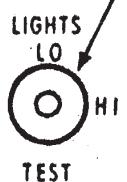
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FLIGHT ENGINEERS' LIGHTING CONTROLS



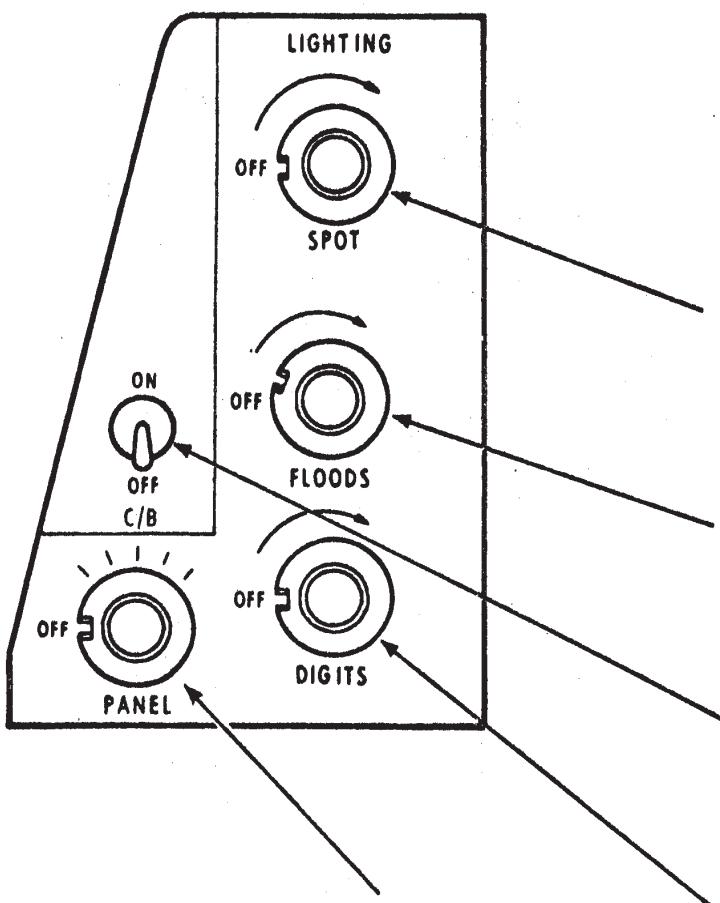
ENGINEER'S PANEL WARNING LIGHTS (Forward)

TEST - tests all warning lights on the forward panels .



ENGINEER'S PANEL WARNING LIGHTS SELECTOR (Centre)

TEST - tests all warning lights on the centre panels.



PANEL ROTARY SELECTOR

Illuminates the engineer's panel electroluminescent lighting.
Rotating the selector increases the brilliance of the integral lighting.

ENGINEER'S PANEL WARNING LIGHTS SELECTOR (Aft)

TEST - tests all warning lights on the aft panels.

SPOT ROTARY SELECTOR

Illuminates the engineer's table.

FLOODS ROTARY SELECTOR

Illuminates the engineer's panels.

CIRCUIT BREAKER SWITCH

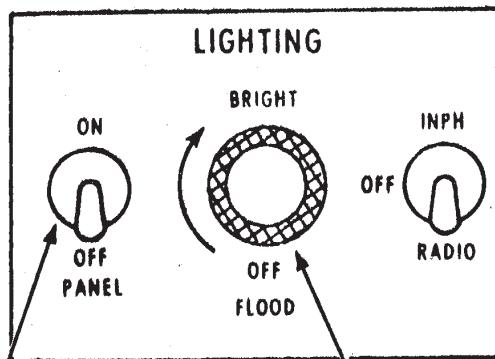
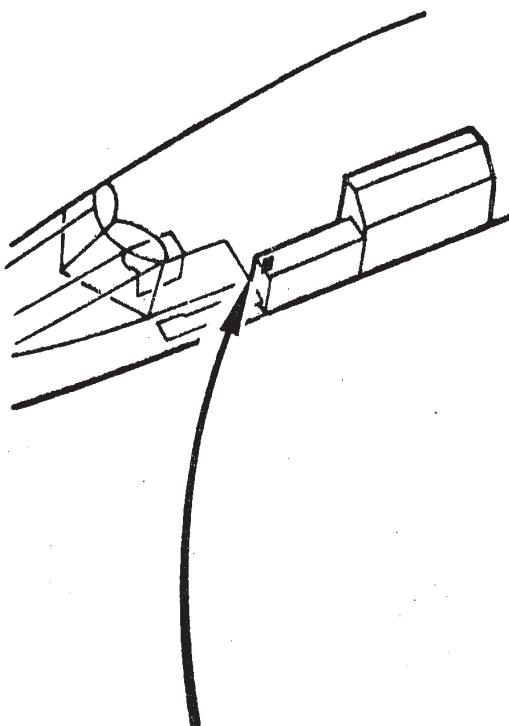
Illuminates the circuit breaker panels on the flight deck.

DIGITS ROTARY SELECTORY

Illuminates the alpha numeric indicators on the fuel panel.

FIRST AND SECOND SUPERNUMERARY LIGHTING CONTROLS

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PANEL SWITCH

ON - selects electroluminescent lighting on the first supernumerary's panel, plus integral lights for the first supernumerary's station box and jack box, also the integral lights for the second supernumerary's jack box.

FLOOD ROTARY SELECTOR

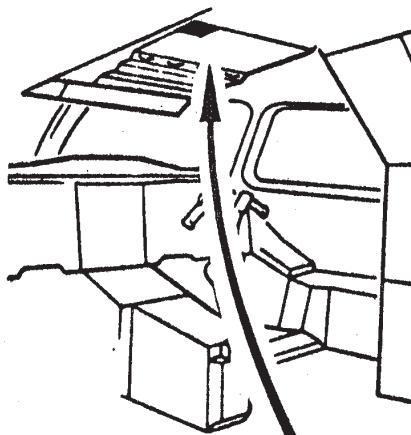
illuminates the first supernumerary's station

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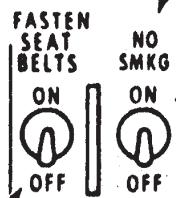
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PASSENGER WARNING SIGN CONTROLS



NO SMKG SWITCH

ON - Lights the NO SMOKING signs in the passenger cabin, the NO SMOKING lights (amber) on each stewards panel, the cabin EXIT signs and switches on the standby lighting in the passenger cabin, vestibule, galley and toilets.
Accompanied by an audio tone on the public address.



FASTEN SEAT BELTS SWITCH

ON - Lights the FASTEN SEAT BELTS signs in the passenger cabin, the FASTEN SEAT BELTS lights (amber) on each stewards panel and the RETURN TO SEATS lights in the toilets.
Accompanied by an audio tone on the public address.

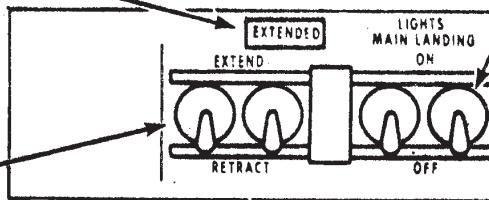
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EXTERNAL LIGHTING CONTROLS

EXTENDED LIGHT (Blue)

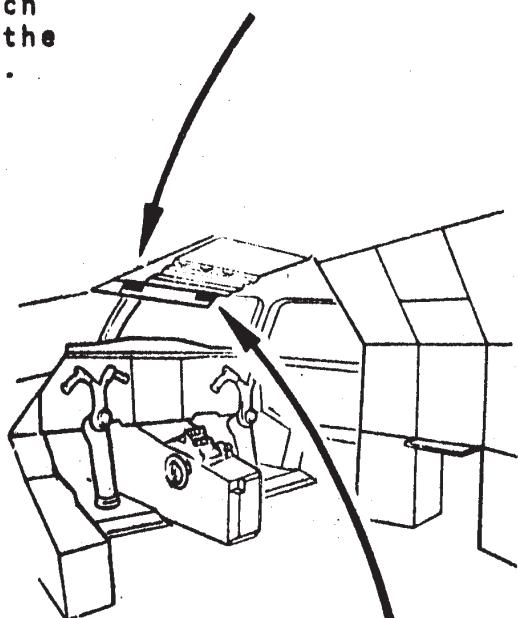
On - at least one light
is not fully retracted.

MAIN LANDING LIGHTS SWITCHES



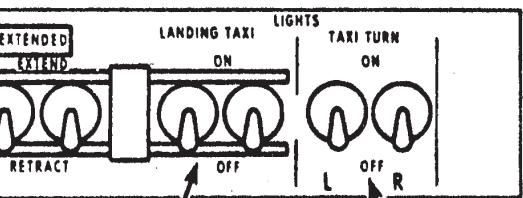
MAIN LANDING LIGHTS
RETRACT/EXTEND SWITCHES

EXTEND - a motor drives each
landing light to the
extended position.



EXTENDED LIGHT (Blue)

On - at least one light
is not fully retracted.



LANDING TAXI
LIGHTS SWITCHES

TAXI TURN LIGHTS
SWITCHES

LANDING TAXI LIGHTS
RETRACT/EXTEND SWITCHES

EXTEND - a motor drives each
landing taxi light to
the extended position.

Chapter 2

AIR CONDITIONING & PRESSURIZATION

AIR CONDITIONING
AND PRESSURISATION

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AIR CONDITIONING AND PRESSURIZATION

GENERAL

The air conditioning system consists of four independent groups. The groups take high pressure air from the engines and condition it by cooling, heating and dehumidification. The air is then used to pressurize the pressurised areas and for cooling and ventilation of the equipment racks.

AIR BLEED

Each air conditioning group is supplied from an engine high pressure compressor through a bleed valve which comprises a shut-off valve and a pressure reducing valve. The shut-off valve allows air direct from the source to the pressure reducing valve which limits the supply pressure to 65 psi.

Four cross-bleed valves, downstream of the bleed valves, allow cross feeding between two adjacent supplies on each side of the aircraft. Each cross-bleed valve also permits the ground supply of air from a high pressure ground start truck for air conditioning purposes.

AIR CONDITIONING

An air conditioning valve downstream of the cross-bleed valve controls the entry of bleed air into the air conditioning system.

The bleed air is cooled in a primary heat exchanger then, after passing through the cold air unit compressor, by a secondary heat exchanger and a fuel/air heat exchanger.

The primary and secondary heat exchanger cooling air is taken from an air intake, located on the engine nacelle, at low speeds and, from a bleed inside the air intake, at high speeds. Two jet pumps supplement the ram air flow through the primary and secondary heat exchangers when the landing gear is down.

Upstream from each primary heat exchanger a ram air valve regulates the ram air inlet flow to maintain the air temperature, upstream of the cold air unit, greater than 100 degrees C when the ram air inlet is below 25 degrees C. The fuel/air heat exchangers provide additional air cooling in supersonic flight.

An overheat condition in the primary heat exchanger, in the secondary heat exchanger, in the duct downstream of the fuel/air heat exchanger or in the duct downstream of the cold air unit, will close and latch the conditioning valve.

An overpressure condition downstream of the bleed valve will close and latch the bleed valve.

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British airways
OVERSEAS DIVISION

AIR CONDITIONING AND PRESSURIZATION

A high differential pressure between the cold air unit and the pressurized cabin will close and latch the conditioning valve.

Pre-conditioned air can be supplied through an external ground air supply connection located at the rear of the fuselage. The air is supplied directly to the distribution manifold.

TEMPERATURE CONTROL

The four air conditioning groups supply air to a manifold which distributes the air to the flight deck and the cabin. The manifold shape is such that with all four groups operating normally:

- group 1 supplies the flight deck
- group 2 supplies the forward cabin
- group 3) supplies the rear cabin
- group 4)

Temperature control is normally automatic through group temperature selectors. Normally:

- group 1 selector controls the flight deck
- group 2 selector controls the forward cabin
- group 4 selector controls the rear cabin

A standby temperature control permits a semi-automatic control of the temperature of each group.

PRESSURE CONTROL

Cabin pressure is controlled and maintained by using discharge valves and a ground pressure relief valve to control the outflow of conditioned air from the pressurized zones. Cabin pressure control includes two identical systems SYS 1 and SYS 2. There are two discharge valves, one forward and one aft for each system. Both systems are automatic and operate to the requirements selected on the cabin altitude selector, throttle settings and weight switches. Limited manual control of the pressurization is provided on each system. This permits the direct selection of either of the discharge valves to shut.

The cabin differential pressure is limited to 10.7 psi by the amplifier of the selected system and to 11.2 psi by the cabin pressure limiter of each discharge valve.

The cabin altitude is limited to 11,000 ft by a cabin altitude limiter on each discharge valve and to 15,000 ft by the discharge valve geometry when all four air conditioning groups are operating.

Provision is made for rapid dumping of cabin pressure within the range of the cabin altitude limiters.

A thrust recuperator is fitted to SYS 1 forward discharge valve; it is controlled by differential pressure.

EQUIPMENT BAY COOLING

Two fans extract air from the cabin and exhaust into the forward racks.

Three fans extract air from the forward electronic racks, instrument panels, consoles, weather radar, TRU and INS crates and exhaust the air through the operating forward discharge valve.

Two main fans, and a standby fan in case of failure, extract air from the rear racks and exhaust the air underfloor to the aft discharge valve region.

A non-return valve allows extraction of air from the underfloor region into the extract ducting, then to the forward discharge valves.

A forward emergency relief valve is provided to ensure extraction of air in abnormal conditions.

VENTILATION

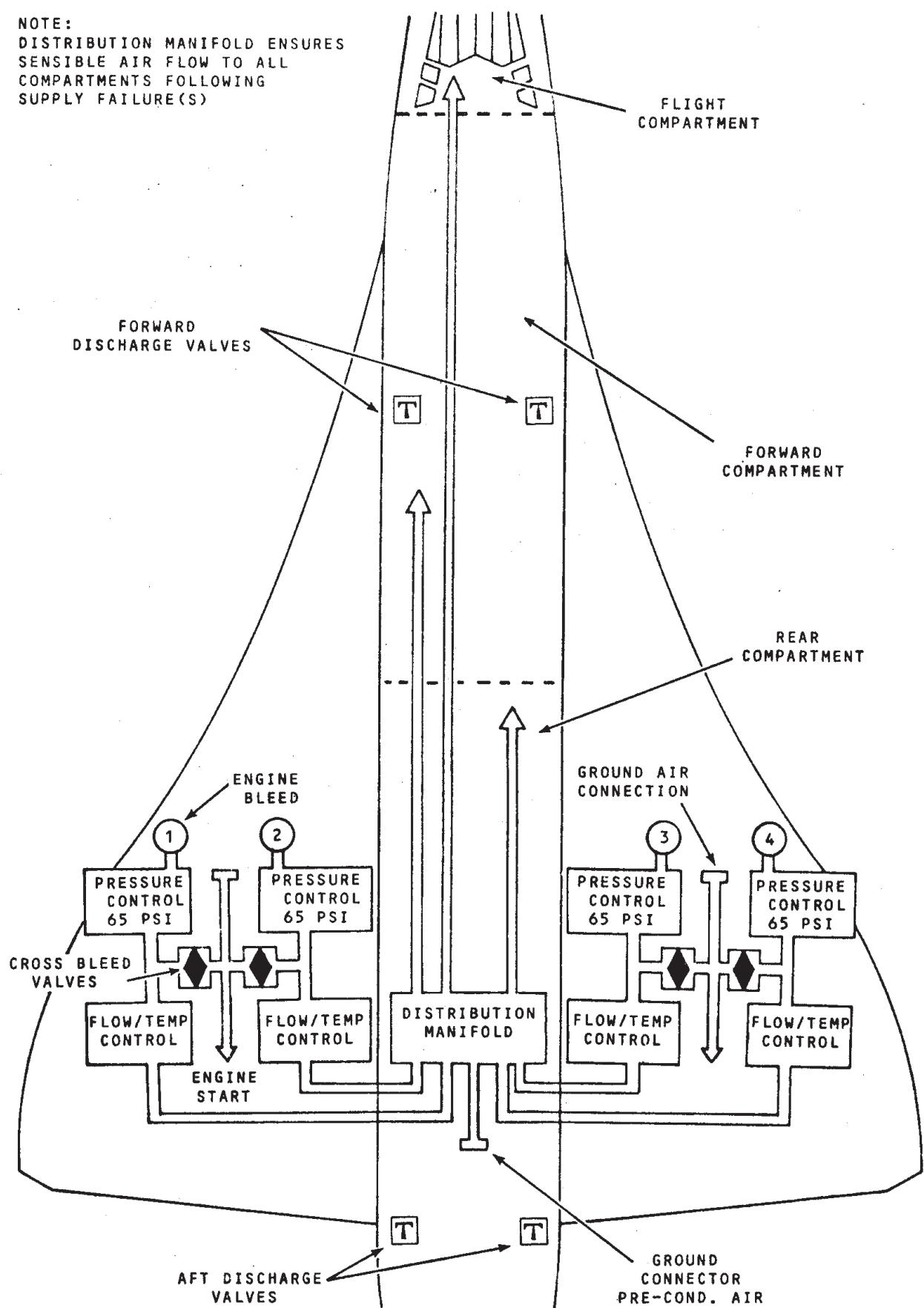
The main landing gear bay and flying control chassis bay are ventilated, using conditioned air from the cabin.

The main landing gear bay is cooled by air bled from the cabin underfloor area. The hydraulic (flying control chassis bay) ventilation valve is controlled by a barometric pressure switch.

The hydraulic bay at the rear of the aircraft is normally ventilated, using air bled from the cabin. The ventilation is assisted by a fan, drawing air from outside the aircraft when the cabin differential pressure is low.

GA OF AIR CONDITIONING AND PRESSURIZATION

NOTE:
DISTRIBUTION MANIFOLD ENSURES
SENSIBLE AIR FLOW TO ALL
COMPARTMENTS FOLLOWING
SUPPLY FAILURE(S)

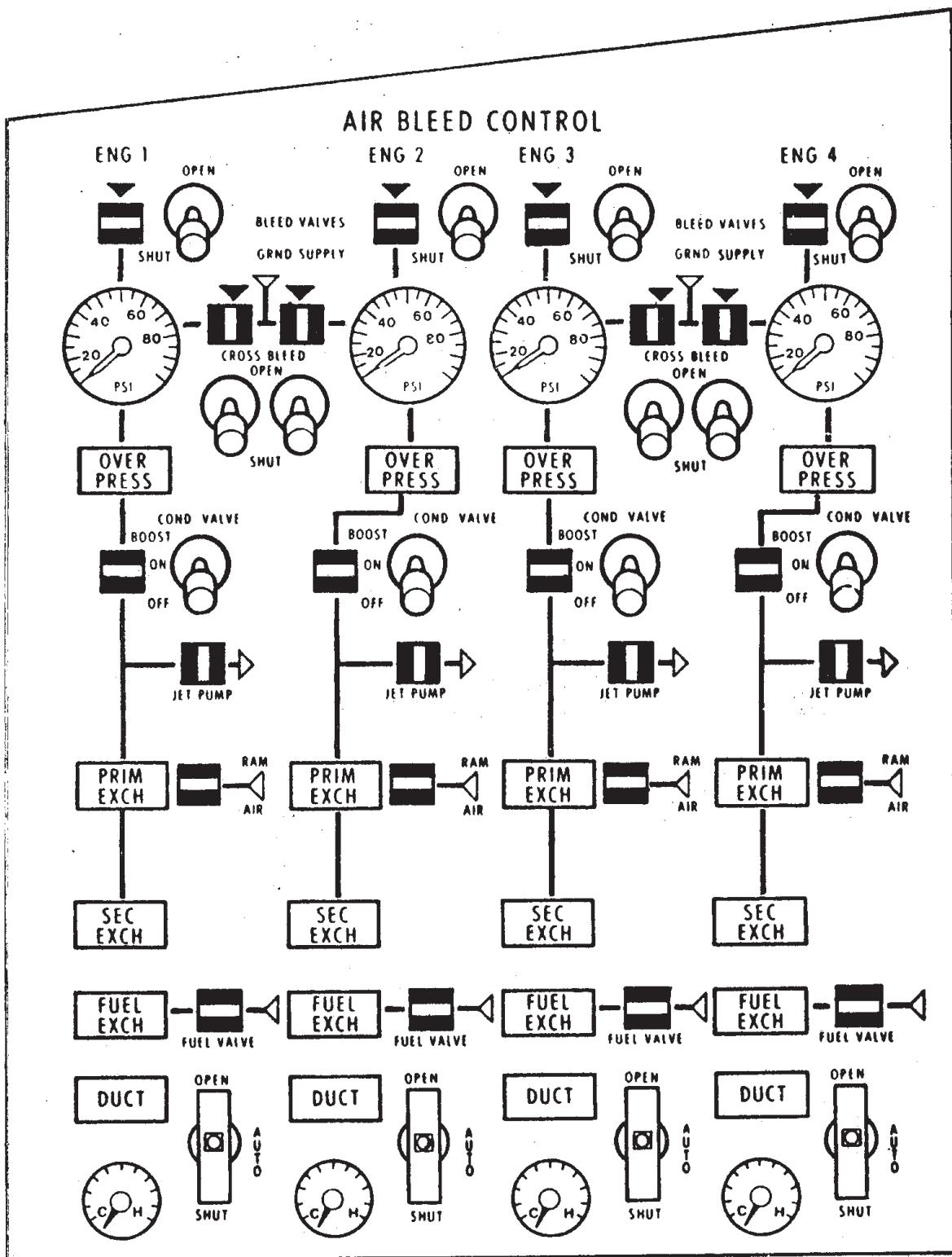


02.02.02
21 JUL.76

CONCORDE FLYING MANUAL

British airways
OVERSEAS DIVISION

AIR BLEED CONTROL AND
INDICATION (SHEET 1 of 2)

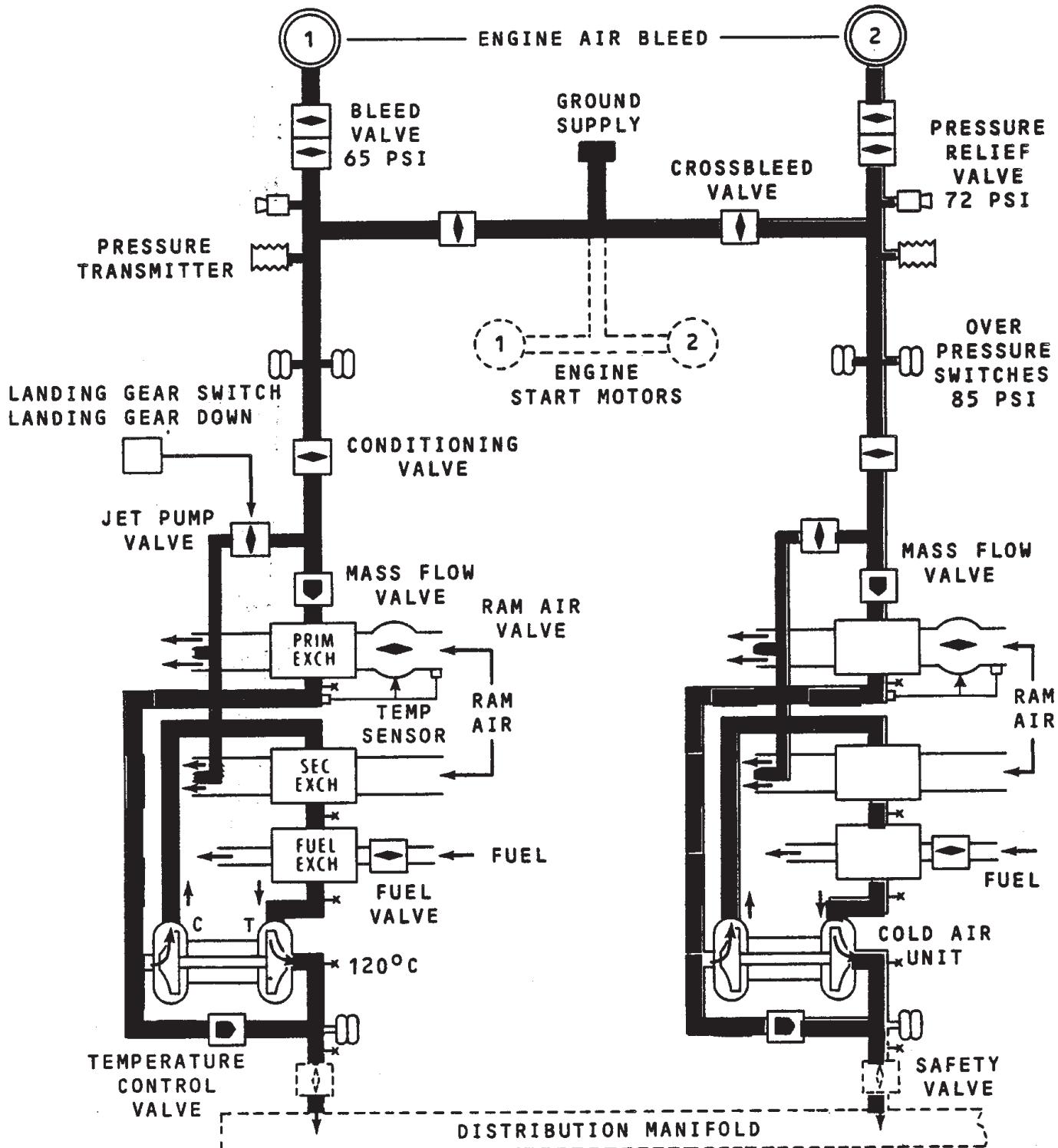


AIR BLEED CONTROL AND
INDICATION (SHEET 2 OF 2)

NOTE: GROUPS 3 AND 4 SIMILAR

OO OVERPRESSURE SENSORS

X OVERHEAT SENSORS



02.02.04
17 MAY 78

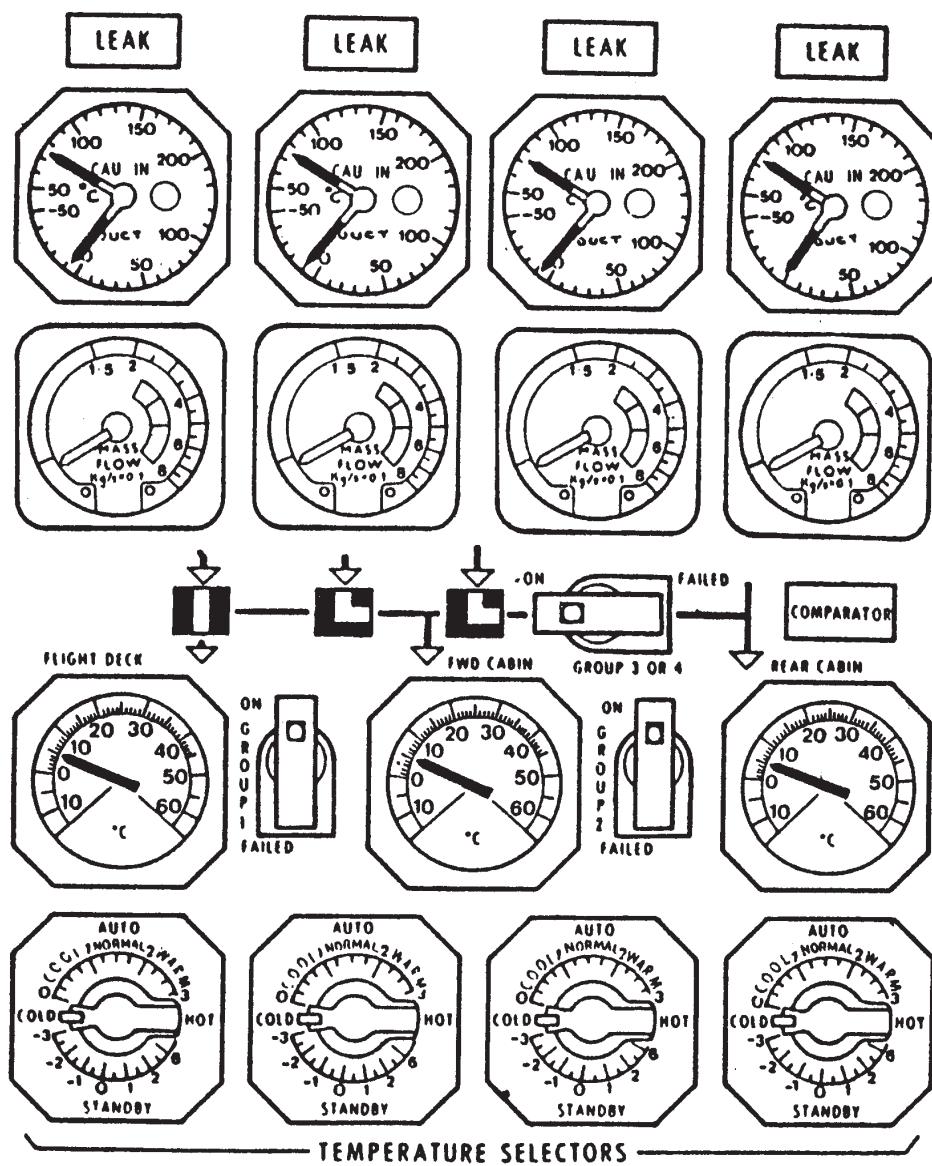
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TEMPERATURE CONTROL AND
INDICATION (SHEET 1 OF 2)

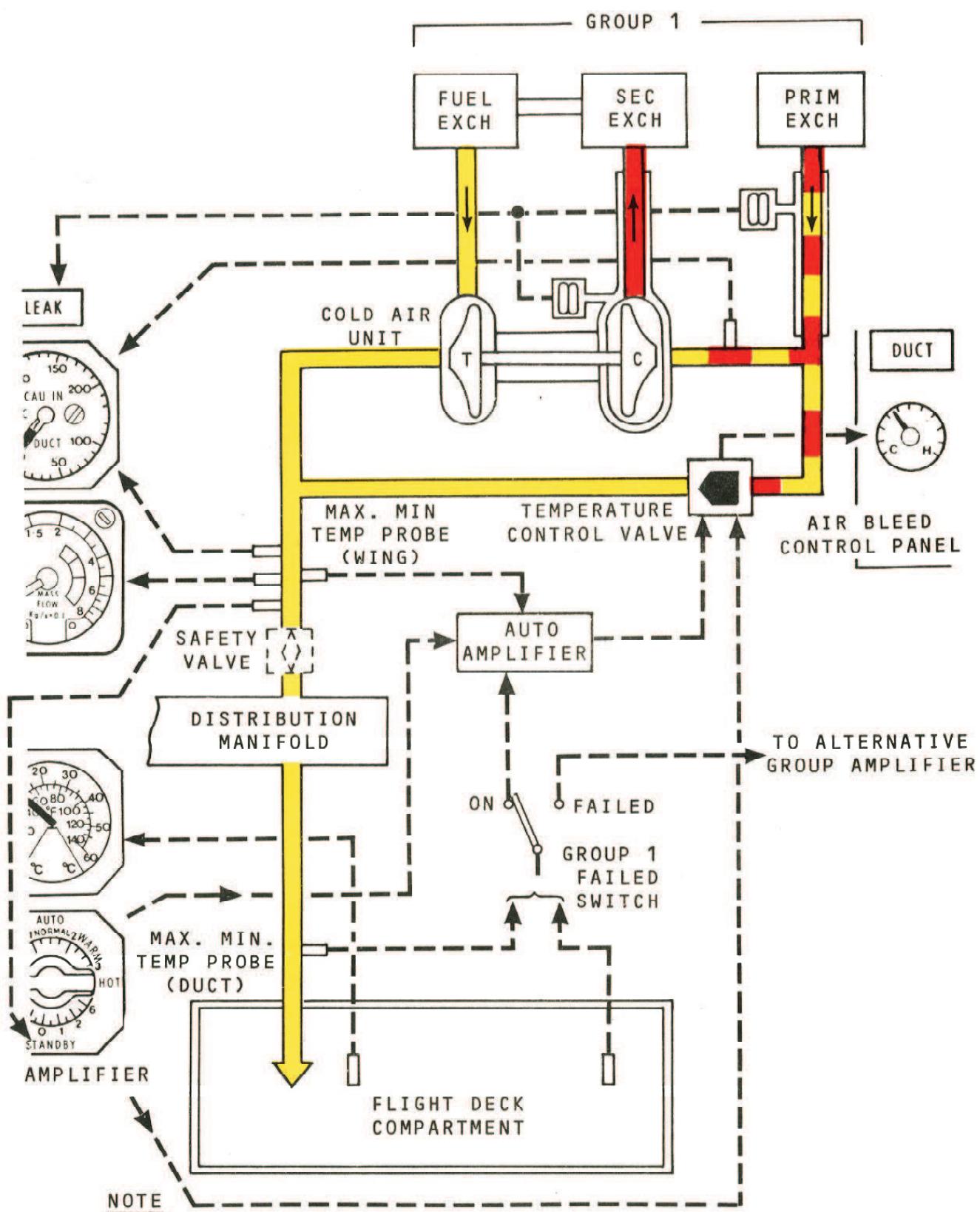
P-TEC ENG

TEMPERATURE CONTROL



(Unchanged)

TEMPERATURE CONTROL AND
INDICATION (SHEET 2 OF 2)



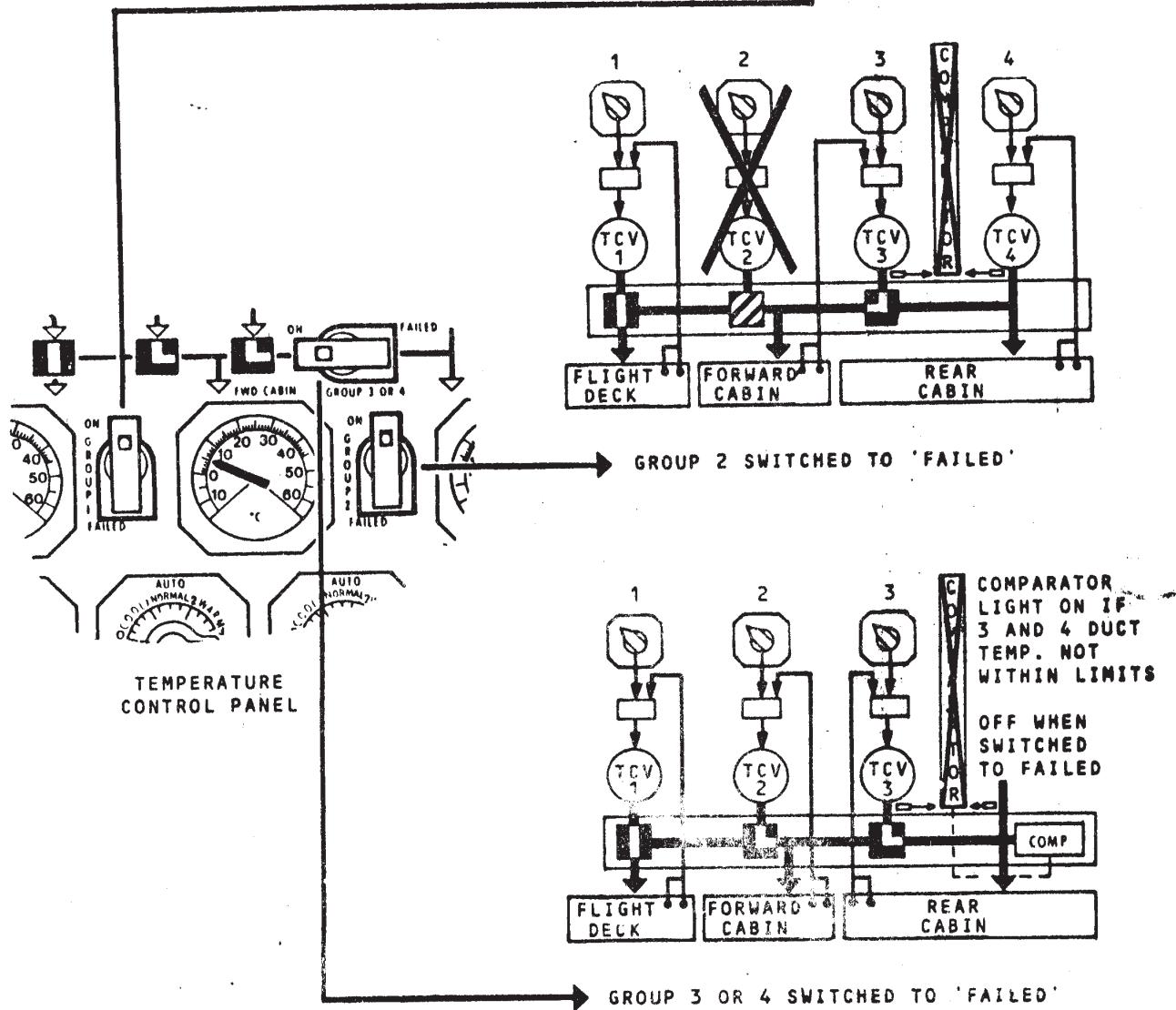
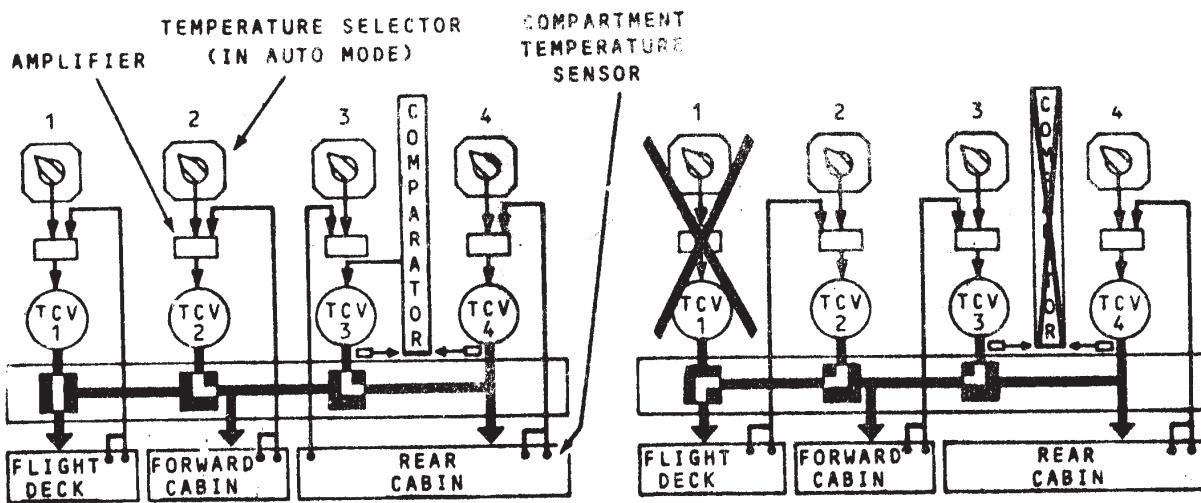
ONE GROUP ONLY SHOWN.
OTHER THREE GROUPS SIMILAR
EXCEPT GROUPS 3 & 4 SLAVING

02.02.06
1 DEC. 76

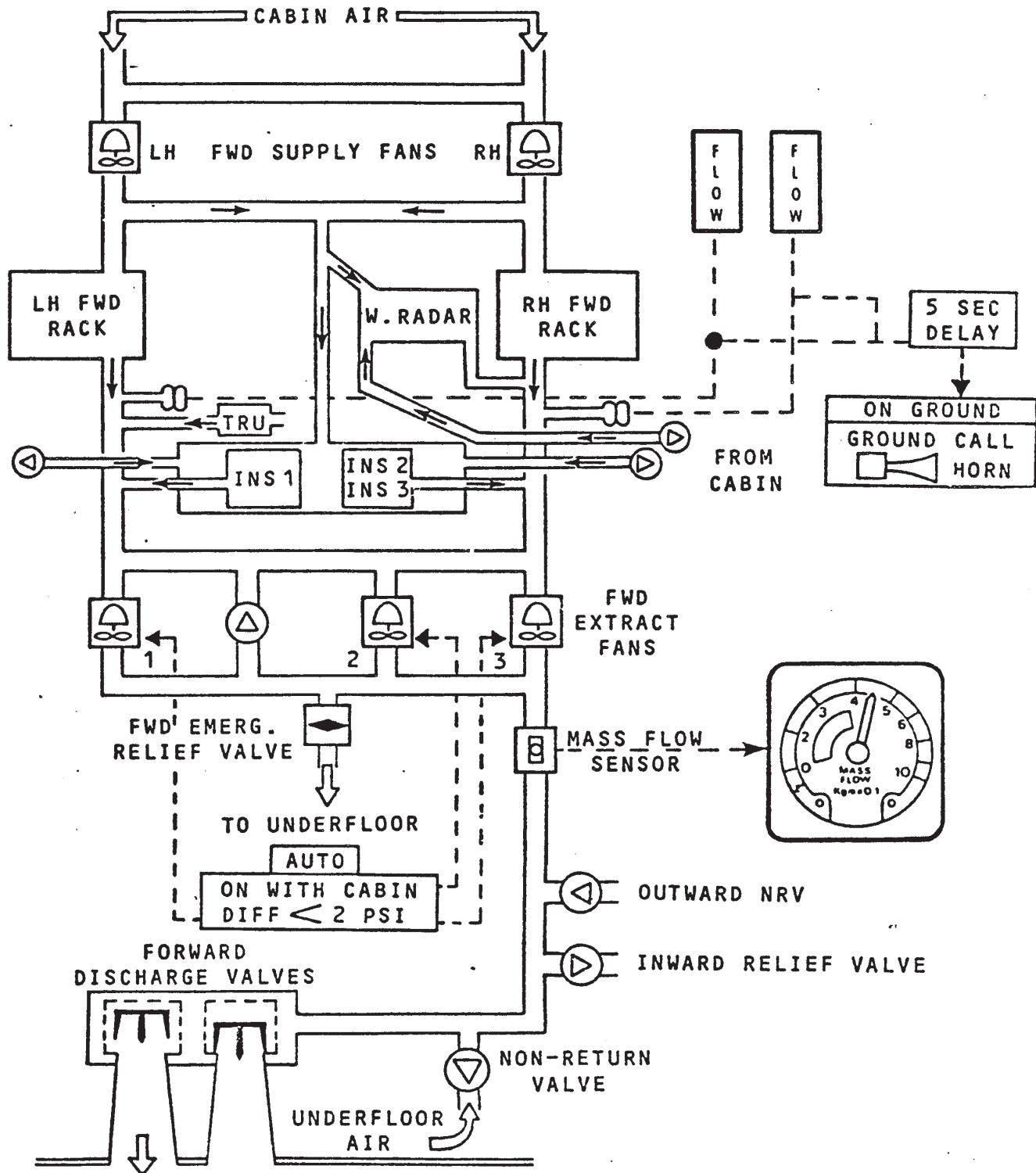
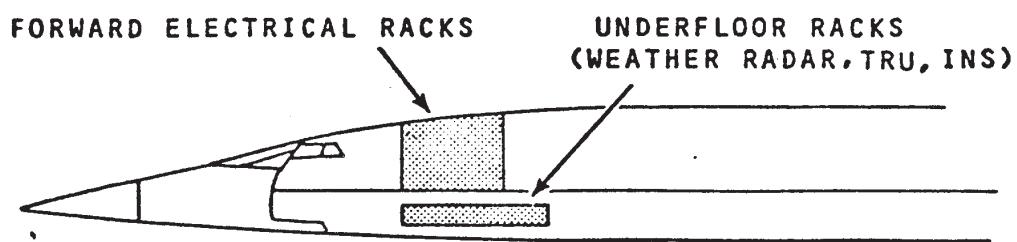
CONCORDE FLYING MANUAL
AIR CONDITIONING
AND PRESSURIZATION

British airways
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TEMPERATURE CONTROL -
SUPPLY GROUP FAILURES



17 MAY 78



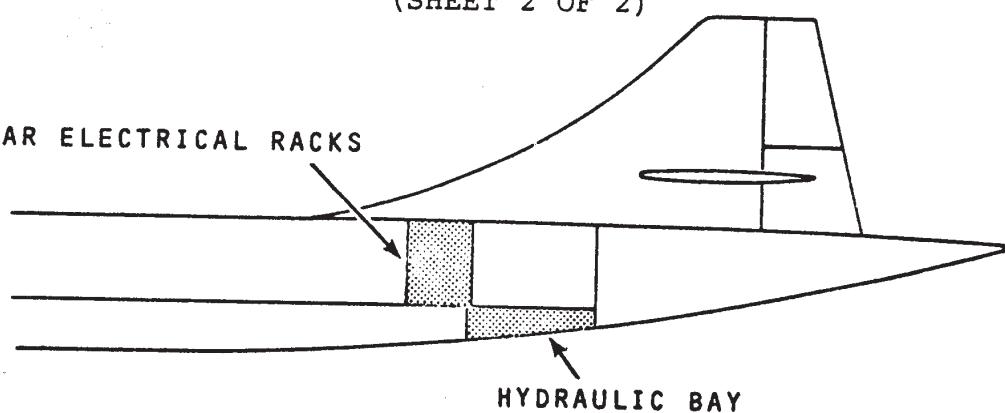
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17 MAY 76

CONCORDE FLYING MANUAL

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EQUIPMENT BAY COOLING
(SHEET 2 OF 2)

REAR ELECTRICAL RACKS



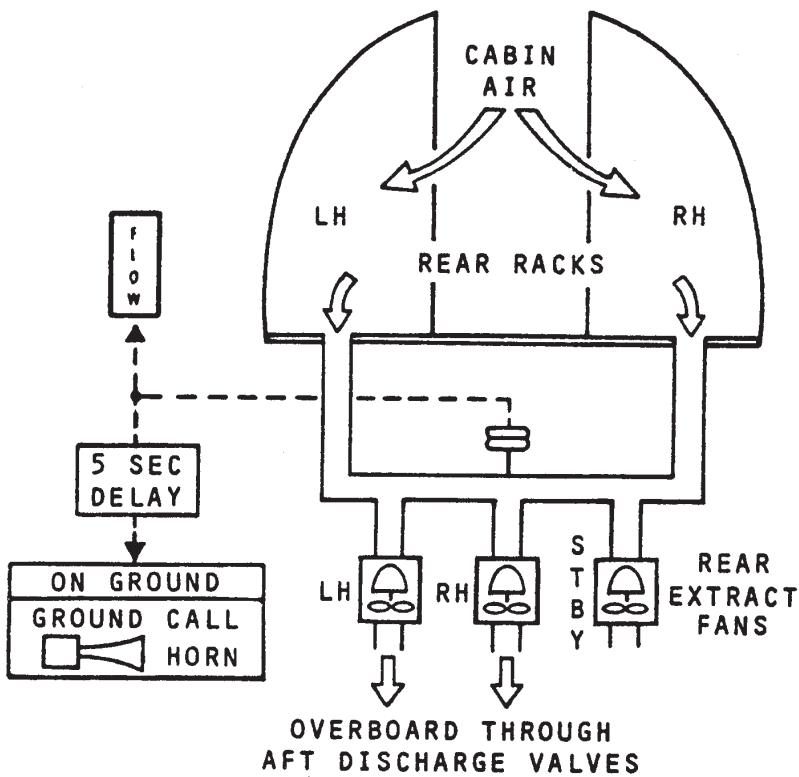
HYDRAULIC BAY

CABIN AIR

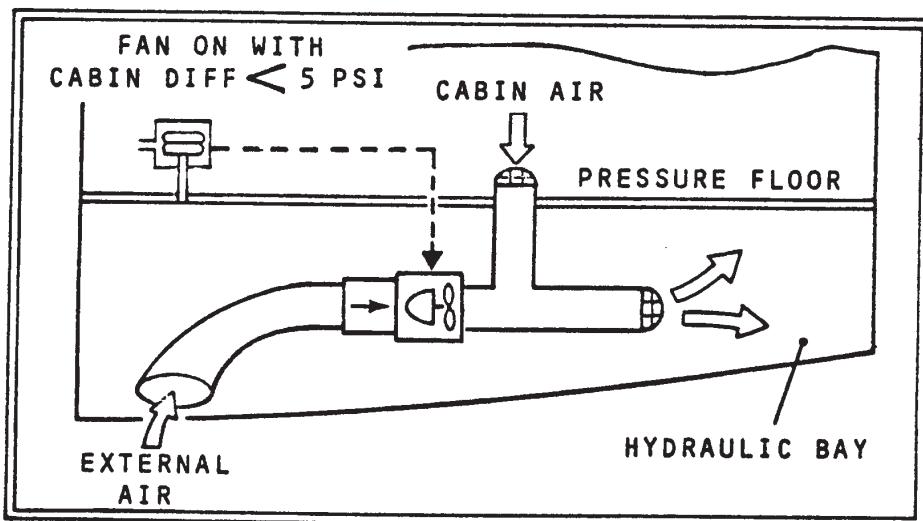
LH

RH

REAR RACKS

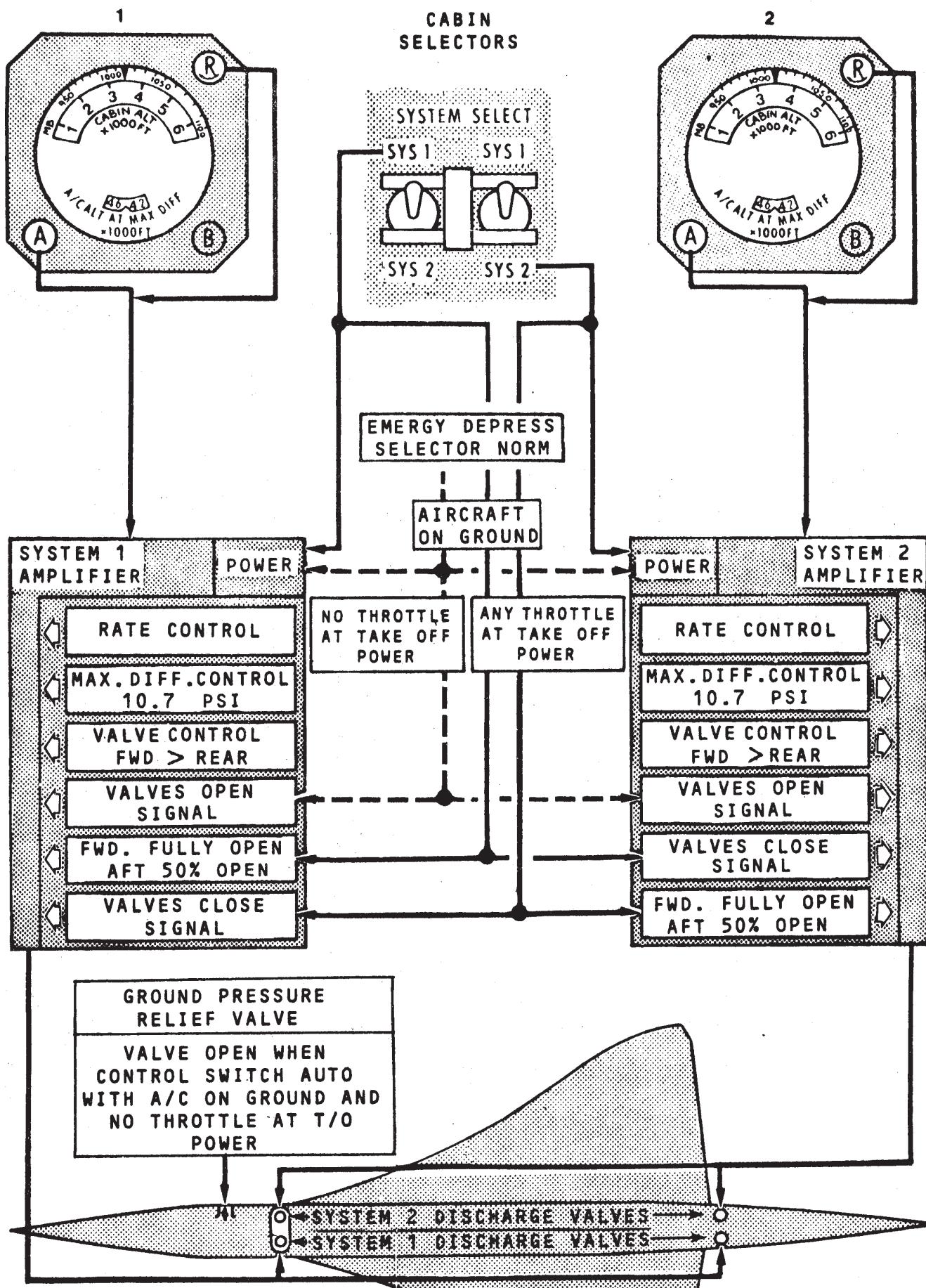


OVERBOARD THROUGH
AFT DISCHARGE VALVES



(Unchanged)

PRESSURE CONTROL

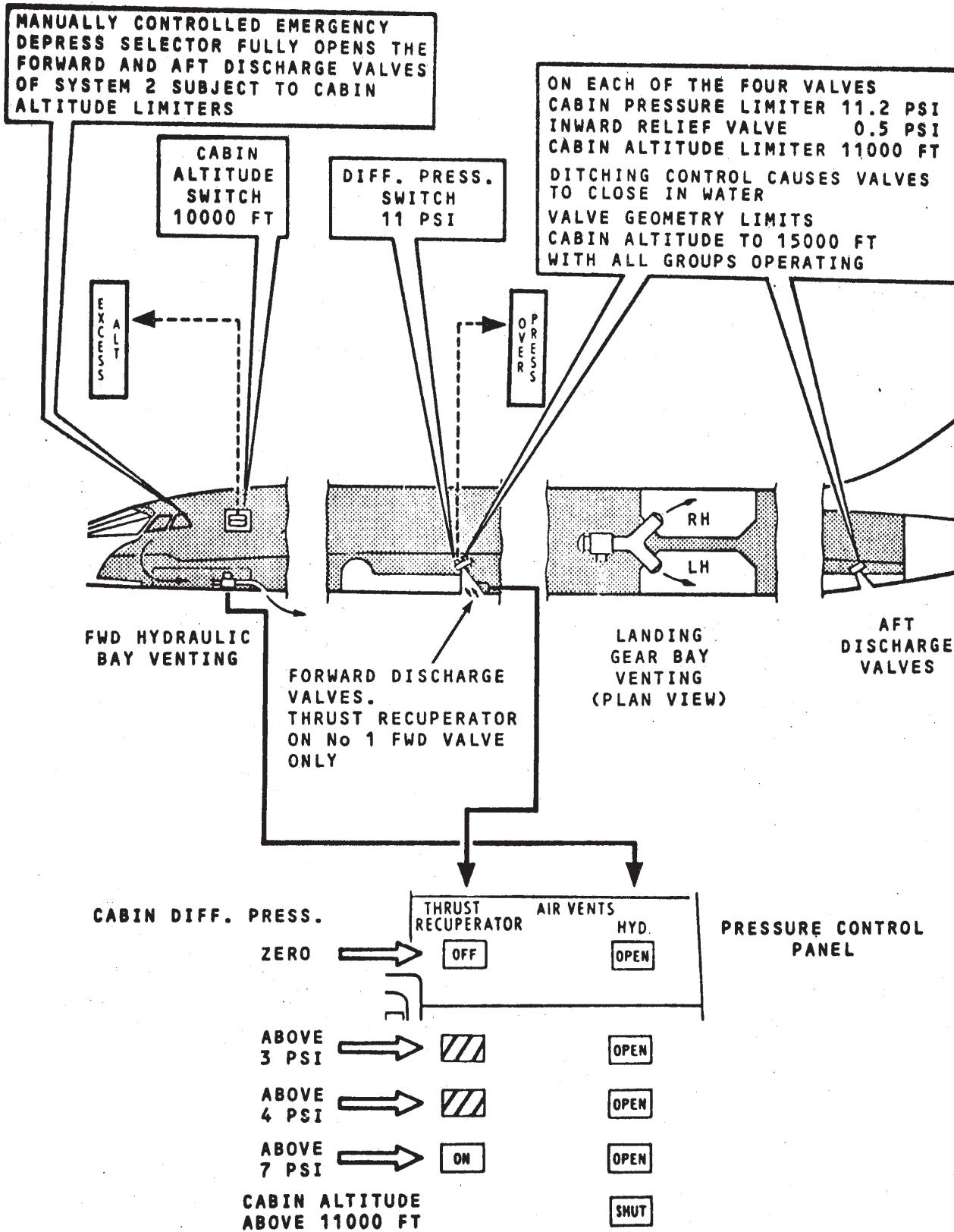


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21 JUL. 76

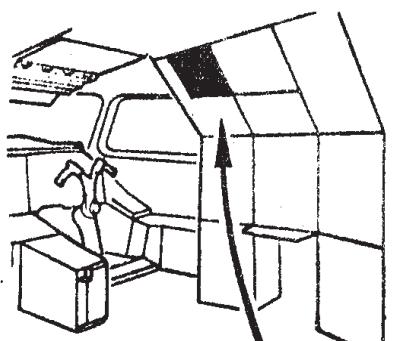
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PRESSURIZATION - SAFETY DEVICES

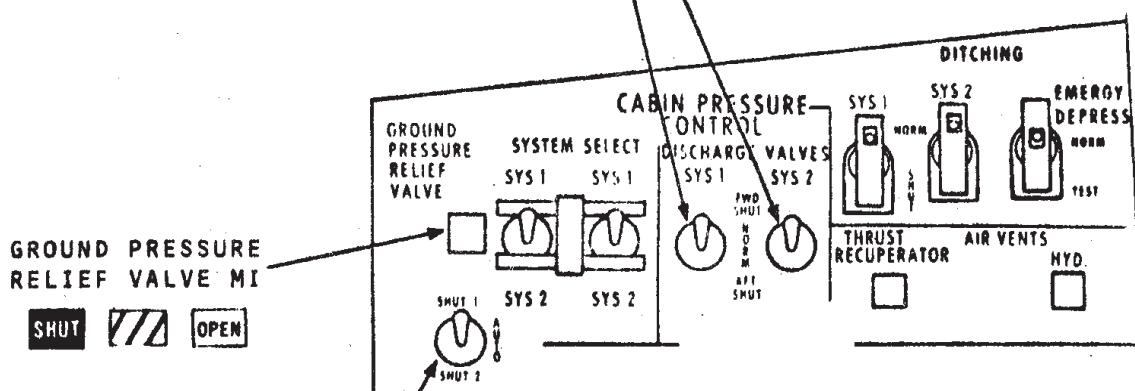


CABIN PRESSURE CONTROL PANEL (Sheet 1 of 3)



DISCHARGE VALVES SYSTEM 1 AND SYSTEM 2 SELECTORS

- FWD SHUT - energizes a solenoid on the forward discharge valve of the corresponding system causing it to shut.
- NORM - allows normal control of the discharge valves.
- AFT SHUT - energizes a solenoid on the aft discharge valve of the corresponding system causing it to shut.



GROUND PRESSURE RELIEF VALVE SELECTOR

- SHUT 1 - the No. 1 motor is energized and shuts the ground pressure relief valve.
- AUTO - the ground pressure relief valve opens or shuts according to the position of the throttle levers and the aircraft weight switches. When the aircraft is on the ground and the four throttle levers are at a setting less than the take off power the ground pressure relief valve will be open. The ground pressure relief valve is normally operated by both electric motors.
- SHUT 2 - the No. 2 motor is energized and shuts the ground pressure relief valve.

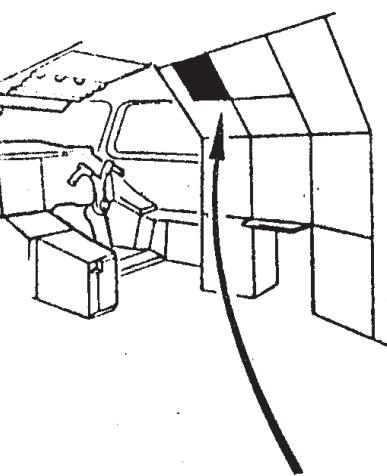
A locking safety system operates when the differential pressure exceeds 1.45 psi and prevents opening.

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CABIN PRESSURE CONTROL PANEL (Sheet 2 of 3)



DITCHING VALVES SYSTEM 1
AND SYSTEM 2 SWITCHES

NORM - allows normal control of the discharge valves.

SHUT - overrides normal control and ensures that the discharge valves will shut when the aircraft is ditched thus preventing ingress of water through the discharge valves.

EMERGENCY DEPRESSURIZATION
SELECTOR

EMERG DEPRESS - Allows the cabin differential pressure to reduce to zero if flight altitude is less than 11,000 ft or to the differential pressure corresponding to a cabin altitude of 11,000 ft if the flight altitude is more than 11,000 ft

NORM - allows normal control of the discharge valves.

TEST - cancels the normal function and is only used for maintenance purposes.

AIR VENTS HYDRAULIC MI



- when cabin altitude exceeds 11,000 ft.

THRUST RECUPERATOR MI



- when the differential pressure is less than 3 psi.

SYSTEM SELECT SWITCHES (2)

SYS 1 - the system 1 discharge valves are controlled by the system 1 cabin altitude selector. The system 2 discharge valves are closed except when the aircraft is on the ground and the throttles are away from the fully forward position.

SYS 2 - the system 2 discharge valves are controlled by the system 2 cabin altitude selector. The system 1 discharge valves are closed except when the aircraft is on the ground and the throttles are away from the fully forward position.

NOTE: both switches should always be in the same position

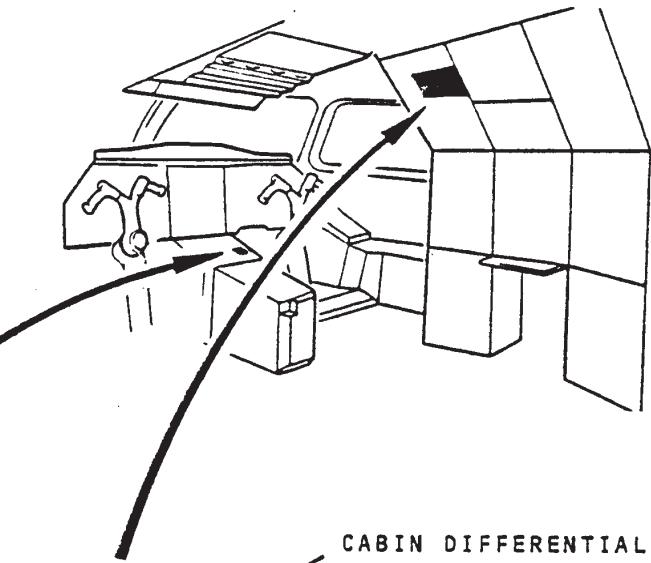
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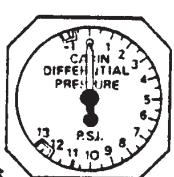
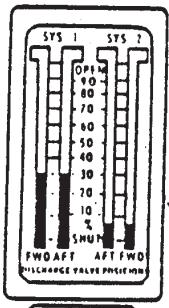
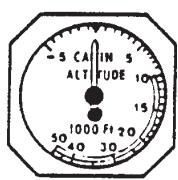
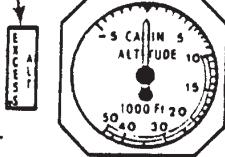
CABIN PRESSURE CONTROL PANEL (Sheet 3 of 3)

EXCESS ALT LIGHT (Red)

Indicates - cabin altitude is above 10,000 feet.
Accompanied by a master warning PRESS light (red) and audio (gong).
Is also accompanied by a distinctive audio (intermittent horn).

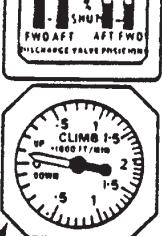
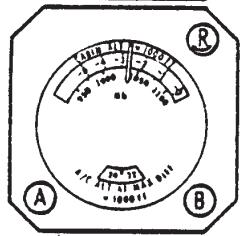


CABIN ALTITUDE INDICATOR



OVER PRESS LIGHT (Red)

Indicates - cabin differential pressure exceeds 11 psi.
Accompanied by a master warning PRESS light (red) and audio (gong).



CABIN RATE OF CLIMB INDICATOR

SYSTEM 1 AND SYSTEM 2 ALTITUDE SELECTORS

R - sets rate of change of cabin altitude, the white dot indicates approximately 400 fpm setting.

B - sets the barometric pressure datum.

A - sets the required cabin altitude.

At the same time the bottom window shows the altitude at which maximum differential pressure will be reached with the required cabin altitude.

DISCHARGE VALVE POSITION INDICATOR

In flight the forward indicator of the operating system normally indicates a greater opening than the aft indicator. A red and black striped flag appearing at the top of a discharge valve position scale indicates loss of electrical power to that indication.

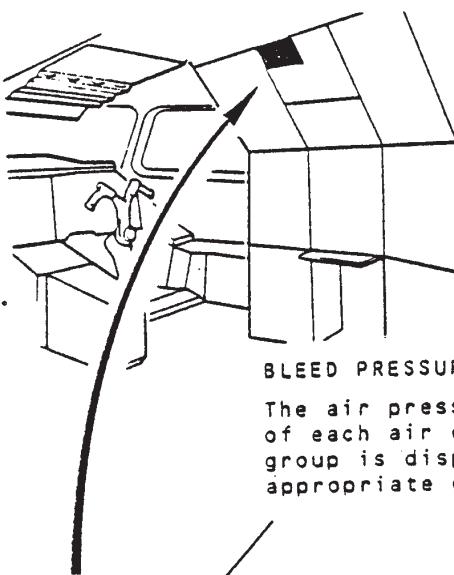
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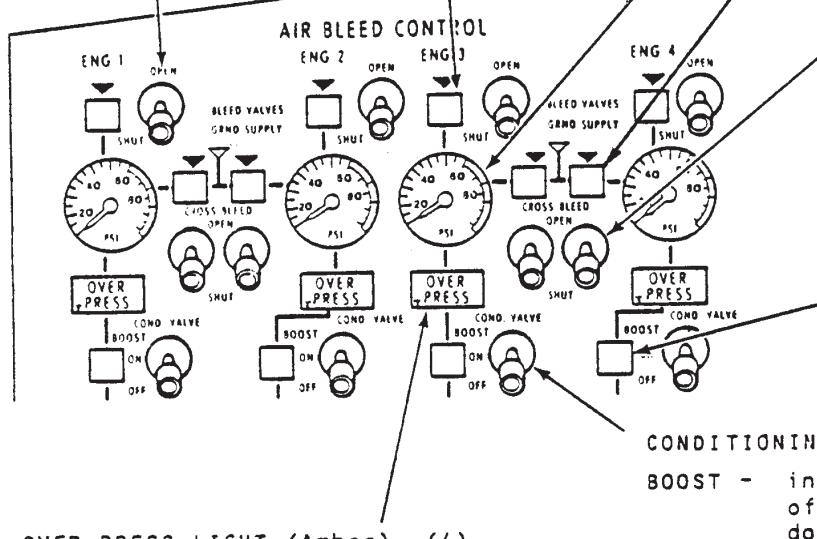
AIR BLEED CONTROL PANEL (Sheet 1 of 3)

BLEED VALVES MI (4)



BLEED VALVES SWITCH (4)

OPEN - signals the bleed valve to open except when the engine shut down handle is pulled or when the cabin inlet safety valve is closed.



OVER PRESS LIGHT (Amber) (4)

On - indicates that the air pressure downstream of the corresponding bleed valve exceeds 85 psi.
Accompanied by MWS AIR (amber)

The overpressure detection latches the light on and closes and latches the bleed valve.

NOTE: When the OVER PRESS light is pressed it closes the bleed valve; it opens after an 8 seconds delay.

BLEED PRESSURE GAUGE (4)

The air pressure at the inlet of each air conditioning group is displayed on the appropriate gauge

CROSS BLEED VALVE MI (4)



CROSS BLEED VALVE SWITCH (4)

OPEN - allows cross bleeding between two adjacent supplies on the same side of the aircraft, except when the shut down handle is pulled or when the cabin inlet safety valve is closed.

CONDITIONING VALVE MI (4)



CONDITIONING VALVE SELECTOR (4)

BOOST - increases the regulation value of the mass flow valve located downstream of the conditioning valve.

ON - allows the supply air to flow into its air conditioning group, powers the automatic temperature control system and for groups 3 and 4, the comparator unit.
A 30 seconds opening time ensures a smooth entry of air into the system.

OFF - the conditioning valve is shut thus isolating the air conditioning group from the air supply.

NOTE - PRIM EXCH, SEC EXCH and DUCT warnings will automatically shut the conditioning valve and mass flow valve regardless of the selector position.

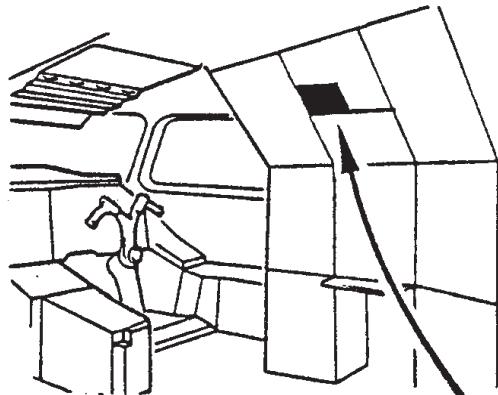
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AIR BLEED CONTROL PANEL (Sheet 2 of 3)

PRINTED IN AND

(Unchanged)



PRIMARY EXCHANGER LIGHT (Amber) (4)

Indicates that a high temperature exists downstream of the primary exchanger. Accompanied by the master warning AIR light (amber) and audio (gong). The overheat detection latches the PRIM EXCH light on and rapidly closes and latches the conditioning valve and the mass flow valve.

JET PUMP MI (4)

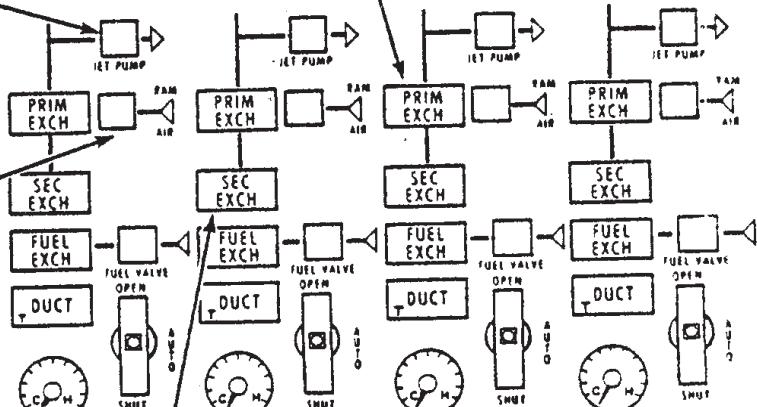


RAM AIR MI (4)

- Crossline indicates that the valve is not fully open.



- Inline indicates that the valve is fully open.



SECONDARY EXCHANGER LIGHT (Amber) (4)

Indicates that a high temperature exists downstream of the secondary exchanger. Accompanied by the master warning AIR light (amber) and audio (gong). The overheat detection latches the SEC EXCH light on and rapidly closes and latches the conditioning valve and the mass flow valve.

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AIR CONDITIONING
AND PRESSURIZATION

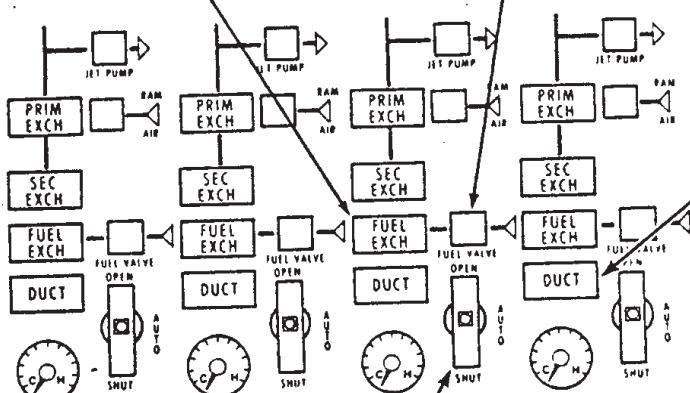
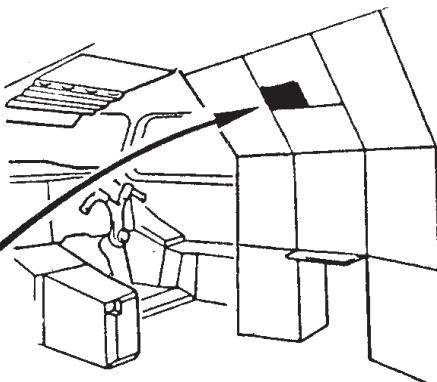
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AUR BLEED CONTROL PANEL (Sheet 3 of 3)

FUEL EXCHANGER LIGHT
(Yellow) (4)

Indicates that a high temperature exists downstream of the fuel/air heat exchanger. The overheat detection latches the FUEL EXCH light on and opens and latches the fuel valve. The fuel valve can be reset by selecting the FUEL VALVE selector to OPEN or SHUT.

FUEL VALVE MI (4)

DUCT LIGHT (Amber) (4)

Indicates that a high temperature exists downstream of the fuel/air heat exchanger

or

The temperature downstream of the cold air unit exceeds 120 deg.C

or

A high differential pressure exists between the cold air unit outlet and the pressurized fuselage.

The overheat and overpressure detections latch the DUCT light on and rapidly close and latch the conditioning valve and mass flow valve.

May also indicate a high temperature exists in the duct upstream of the distribution manifold.

This overheat detection latches the DUCT light on and closes and latches the bleed valve, crossbleed valves and cabin inlet safety valves.

Accompanied by a master warning AIR light (amber) and audio (gong).

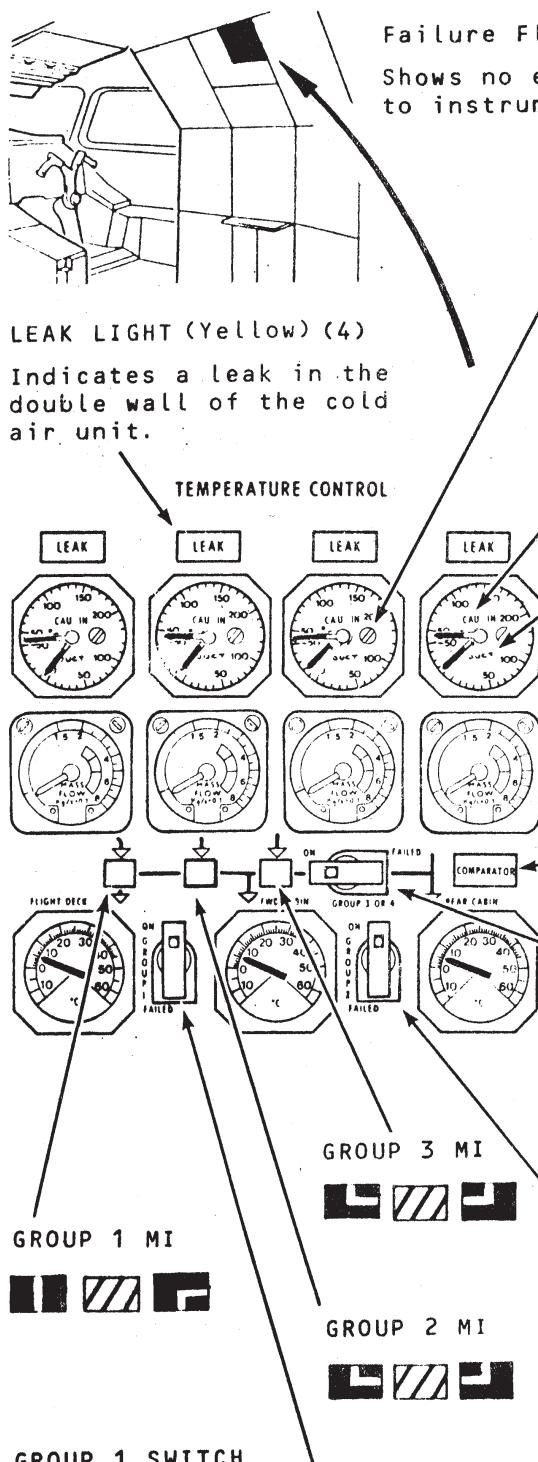
NOTE: Pressing the DUCT light closes the bleed and crossbleed valves. After eight seconds the cabin inlet safety valve is closed and the DUCT light is on.

Eight seconds after releasing the DUCT light, the cabin inlet safety valve is open and the DUCT light is off.

TEMPERATURE CONTROL VALVE POSITION INDICATOR (4)

Shows the position of the temperature control valve which regulates the amount of air by-passing the cold air unit. When the indicator reads C the valve is shut.

TEMPERATURE CONTROL PANEL (Sheet 1 of 2)



Failure Flag (Red and Black)
Shows no electrical power to instrument.

CAU INLET TEMPERATURE GAUGE (4)
Shows the cold air unit inlet temperature

LEAK LIGHT (Yellow) (4)
Indicates a leak in the double wall of the cold air unit.

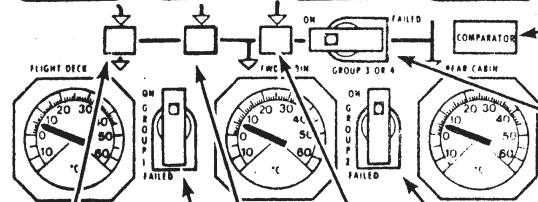
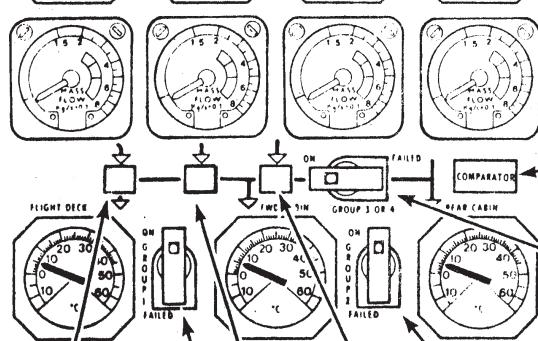
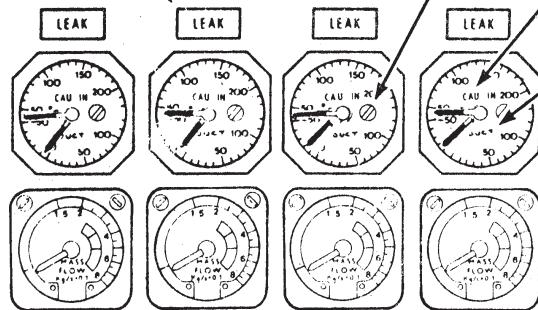
DUCT TEMPERATURE

Shows the air temperature at the mixing point down-stream of the cold air unit.

TEMPERATURE CONTROL

MASS FLOW GAUGE (4)

Shows the air mass flow for each air conditioning group upstream of the distribution manifold.



GROUP 1 MI



GROUP 2 MI



GROUP 1 SWITCH

ON - selects the control of the flight deck temperature to group 1
FAILED - selects the control of the flight deck temperature to group 2, the control of the forward cabin temperature to group 3 and unslaves group 3 and 4 thus:-

Group 2 selector controls the flight deck temperature.
Group 3 selector controls the forward cabin temperature.
Group 4 selector controls the rear cabin temperature.

GROUP 3 OR 4 SWITCH

ON - selects the control of the rear cabin temperature to group 4 and providing the group 3 temperature selector is at AUTO slaves the control of group 3 to group 4.
FAILED - unslaves group 3 from group 4 leaving both under AUTO control and inhibits the comparator system.

GROUP 2 SWITCH

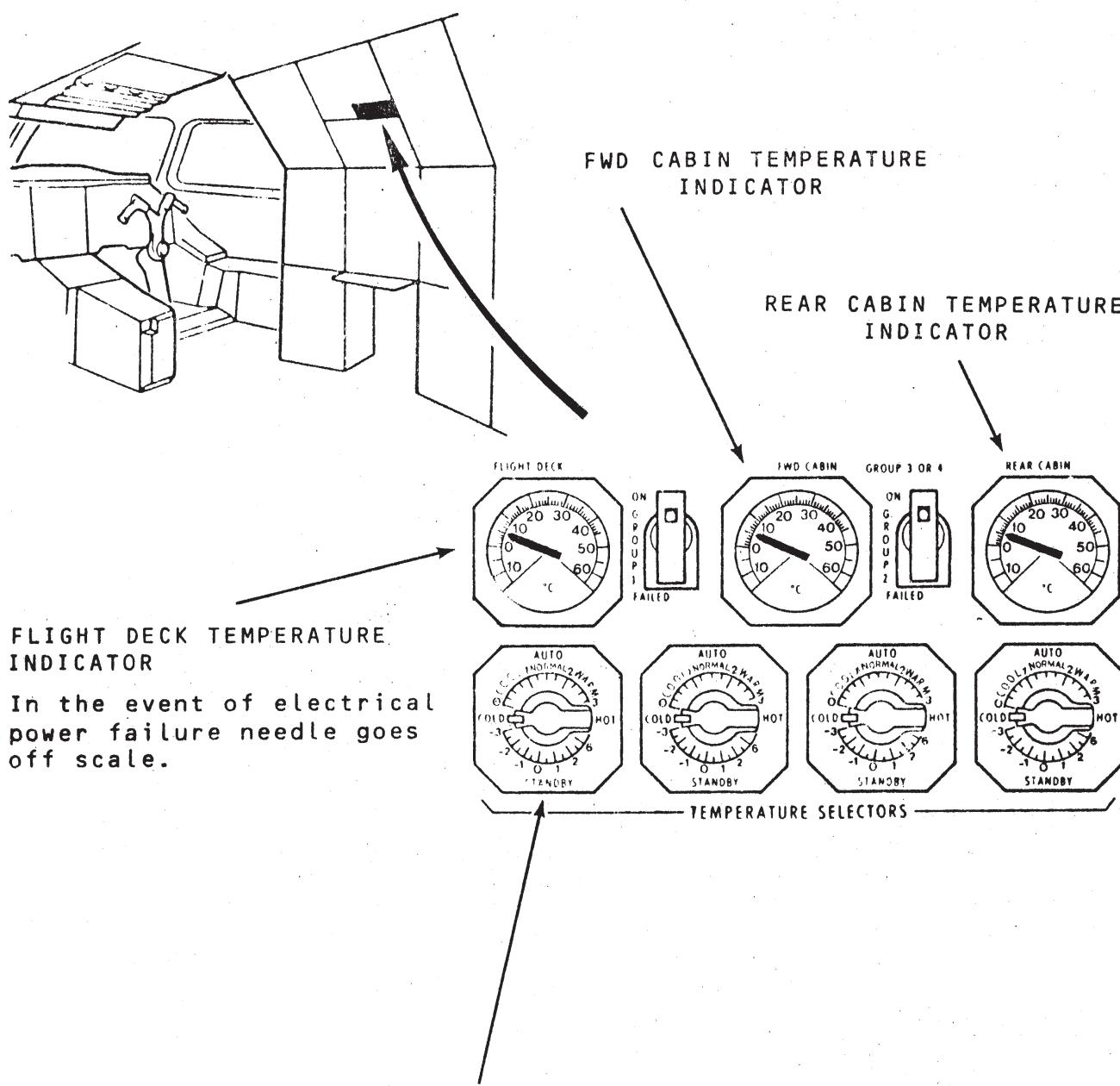
ON - selects the control of the forward cabin temperature to group 2.
FAILED - selects the control of the forward cabin temperature to group 3 and unslaves group 3 and 4 thus:-
Group 1 selector controls the flight deck temperature.
Group 3 selector controls the forward cabin temperature
Group 4 selector controls the rear cabin temperature.

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TEMPERATURE CONTROL PANEL (Sheet 2 of 2)

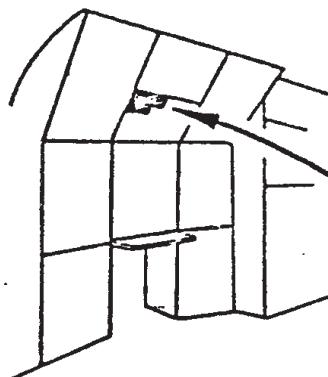


FLIGHT DECK TEMPERATURE INDICATOR

In the event of electrical power failure needle goes off scale.

TEMPERATURE ROTARY SELECTOR (4)

- AUTO - sends a signal to the temperature control valve, through the auto amplifier, which varies the duct air temperature, until the difference between the selected compartment temperature and actual compartment temperature is approximately zero.
- STANDBY - sends a signal to the temperature control valve, through the standby amplifier, which varies the duct air temperature, until the difference between the selected and actual duct air temperature is approximately zero.
- The AUTO mode of the affected group is inoperative and if groups 3 or 4 are affected the COMPARATOR function is inhibited.
- Once the rotary selector is in the STANDBY arc the required duct temperature is set on the numerical scale.



FWD SUPPLY
LH AND RH MI (2)

OFF / / / FWD

**REAR EXTRACT FLOW LIGHT
(Amber)**

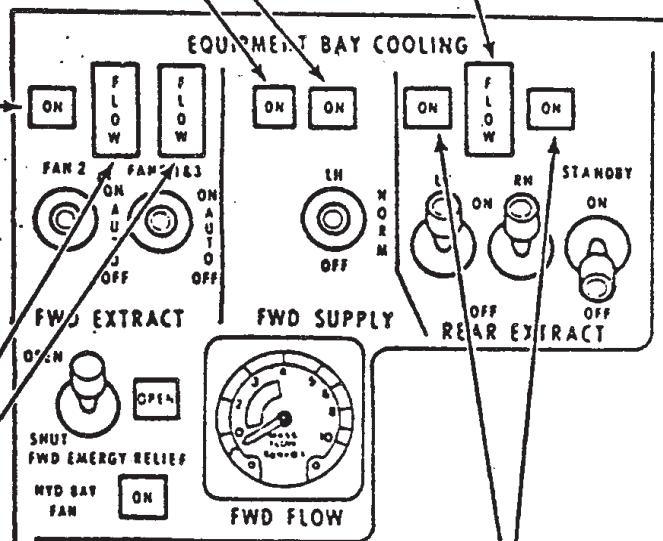
On - indicates that the mass flow upstream of the three rear extract fans is low. Accompanied by a master warning AIR light (amber) and audio (gong). In addition while the aircraft is on the ground, a ground call (horn) will operate after approximately 5 seconds delay.

FWD EXTRACT MI

OFF - When less than three fans are electrically supplied.



FWD - When all (3) forward extract fans are electrically supplied.



FWD EMERGENCY RELIEF MI

OPEN / / / SHUT

REAR EXTRACT LH and RH MI (2)

Each main rear extract fan is monitored by a MI.

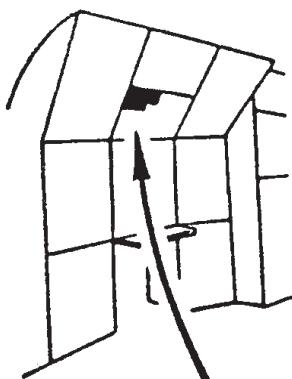
OFF / / / FWD

FWD EXTRACT FLOW LIGHTS (Amber)
- LH and RH

On - indicates that the mass flow from the affected side is below approximately 50% normal. Accompanied by a master warning AIR light (amber) and audio (gong). In addition while the aircraft is on the ground, a ground call (horn) will operate after approximately 5 seconds delay.

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**FORWARD EXTRACT FANS 1 & 3 SELECTOR**

- ON** - No.1 & 3 forward extract fans run regardless of the differential pressure. Overrides its AUTO position.
- AUTO** - No.1 & 3 forward extract fans run so long as the cabin differential pressure is lower than 2 psi.

FORWARD SUPPLY SELECTOR

- LH** - The right hand fan is switched off.
- NORM** - two fans extract air from the cabin and exhaust it into the forward racks, the weather radar crate and inertial navigation crate.

FORWARD EXTRACT FAN NO.2 SELECTOR

- ON** - No.2 forward extract fan runs regardless of the differential pressure. Overrides its AUTO position.
- AUTO** - No.2 forward extract fan runs so long as the cabin differential pressure is lower than 2 psi.

FORWARD EMERGENCY RELIEF SWITCH

- OPEN** - the forward emergency relief valve permits flow of rack exhaust air to the underfloor area and then to the rear discharge valves.

HYDRAULIC BAY FAN MI

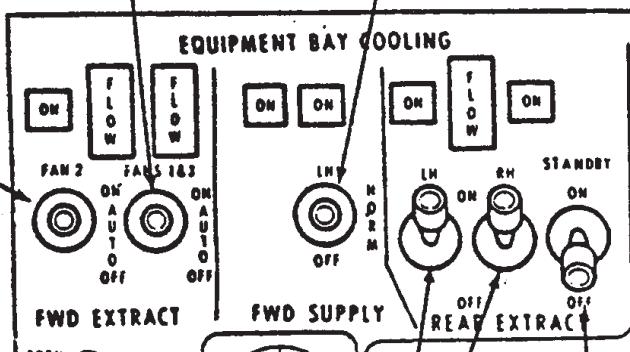
- On** - when the cabin differential is less than 5 psi.

FORWARD FLOW INDICATOR

Shows the mass flow downstream of the forward extract fans.

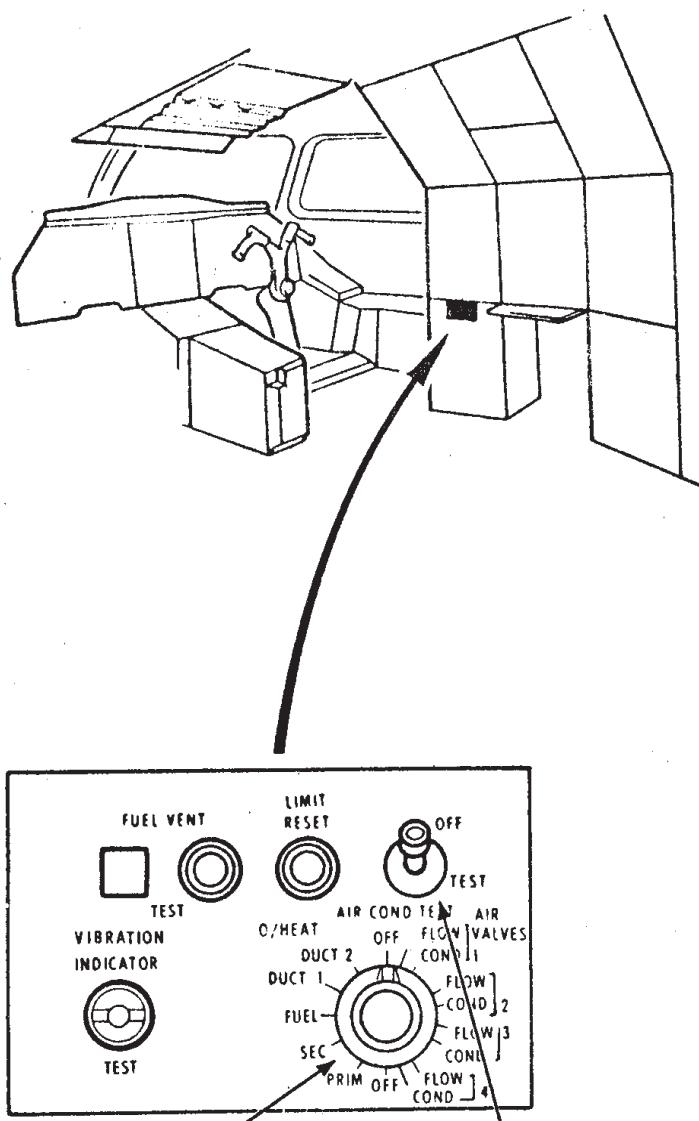
REAR EXTRACT STANDBY SWITCH

There is no MI associated with this fan.

**REAR EXTRACT LH AND RH SWITCHES**

- LH ON** - left hand fan runs.
- RH ON** - right hand fan runs.

AIR CONDITIONING TEST



**AIR CONDITIONING TEST
ROTARY SELECTOR**

When the AIR COND TEST switch is at TEST the AIR COND TEST rotary selector is used to test the electrical circuits of the air conditioning system warnings and the electrical operation of the safety closing for the conditioning valves and mass flow valves.

AIR CONDITIONING TEST SWITCH

- OFF - cuts the electrical supply to the AIR COND TEST rotary selector.
- TEST - arms the AIR COND TEST rotary selector.

Chapter 3

**AUTOMATIC
FLIGHT**

AUTOMATIC FLIGHT

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GENERAL

The automatic flight control system (AFCS) is designed to provide the capability for 'hands off' flight during climb, cruise and let down to a cat III landing and, if required, a go-around. The AFCS comprises the following subsystems, autothrottle, auto-pilot, warning and landing display and an interlock failure monitor and test system.

AUTOTHROTTLE

The autothrottle system provides thrust control of speed for approach and cruise flying. The system includes airspeed and Mach hold modes (with datum adjust provision) and an airspeed acquire mode which captures a selected speed in the range 130-400 kts subject to a longitudinal acceleration limit of 0.1g. The autothrottle system also provides protection against overspeeds when the autopilot is engaged in the MAX CRUISE mode. Throttle reduction is initiated by the autopilot during an automatic landing.

The autothrottle system comprises two separate channels each engaged by a separate switch. Both channels are normally engaged, channel 1 having control authority and channel 2 being in a synchronised standby condition. Each channel is self monitored and disengages automatically in the case of a self detected failure or a failure of the air data system or inertial system supplying it with manometric and attitude data.

The autothrottle is rate limited (5 degrees pilots lever angle/second) and authority limited (-1 degree to - 36.5 degrees pilots lever angle). If engaged with the throttles reduced beyond the -36.5 degree position they automatically advance to it. Auto-throttle switches allow autothrottle commands to be isolated from individual throttle levers so that individual adjustments may be made. Instinctive disconnect switches on outboard throttle levers disengage the autothrottle and as an ultimate safety measure slip clutches in the autothrottle drive mechanism allow direct manual override.

AUTOPILOT AND FLIGHT DIRECTOR

The aircraft installation comprises two separate channels each providing integrated autopilot and flight director systems. The input signals and computing are common to the autopilot and flight director. The autopilot signals operate the pitch, roll and yaw relays jacks in their autopilot mode (input lever locked, electrical input stages energised) and via the mechanical control linkages displace the pilots controls.

Normally both flight director channels are engaged but both autopilots may only be engaged after LAND mode is selected.

Selection of modes for both autopilot and flight director is common. If an autopilot is engaged with flight director already engaged the mode reverts to PITCH HOLD and HDG HOLD except if the flight director is in the LAND mode then the autopilot will also

engage in LAND mode unless a GO-AROUND has been initiated, in which case engaging an autopilot will cause reversion to basic modes. If the flight director is engaged after autopilot the flight director engages in the modes already held by the autopilot. Modes which may be selected prior to automatic capture are provided with 'prime' lights to indicate successful arming. Subsequent selection of PITCH HOLD will de-select the 'primed' mode and extinguish the 'prime' light.

The autopilot is authority limited to plus or minus 0.15g and plus or minus 30° roll (plus 35° in turn control) and rate limited to plus or minus 0.10g per sec and 5° per sec except in LAND mode after glide slope capture, and in GO-AROUND when in pitch it is rate limited to plus 0.25g per sec. The autopilot servo loops are fully self monitored at all times. An autopilot instinctive disconnect button is placed on each handwheel and as an ultimate safety measure the mechanical linkage between the relay jack and the control column contains a compressible strut which allows the pilot to directly override the autopilot commands.

The approach modes are fully self-monitored and with both autopilots engaged in LAND mode full failure survival is provided (autopilot 1 having priority with autopilot 2 engaged in a synchronised standby state).

A failure of peripheral systems will cause the autopilot to disconnect if it is engaged in a mode which uses data from that system. A failure of ILS data on the approach does not cause the autopilot to disconnect if radio altitude exceeds 600 feet to avoid nuisance disconnects (the autopilot signal is zeroed and the flight director bars removed); an ILS failure before capture will inhibit capture of that beam. A simultaneous failure of both Glide receivers between 200 feet and 75 feet radio altitude, or both Localiser receivers below 200 feet, (most probably caused by interference with the beam or transmitter) will not disconnect the autopilot but will bring on the AUTOLAND light

DATUM ADJUST

A datum adjust unit allows small adjustments to the speed hold modes of the autothrottle and the pitch modes of the autopilot. The pitch datum adjust is zeroed and inhibited in MAX CRUISE mode. In heading hold mode an autopilot turn knob allows adjustment of heading at a fixed roll rate.

WARNING AND LANDING DISPLAY

The system provides information on the operational status and functional capability of the automatic flight control system in its automatic approach and landing role and displays autopilot and auto throttle warnings during cruise flying.

The system comprises two independent channels which operate at the same time. Channel 1 feeds the Captain's display and channel 2 the First Officer's but the most important warnings are cross fed so that both pilots receive key information even when one channel has failed.

Certain malfunctions in the latter stages of an automatic landing cause illumination of the AUTOLAND light which indicates that either a manual take over or an Automatic Go Around must be initiated.

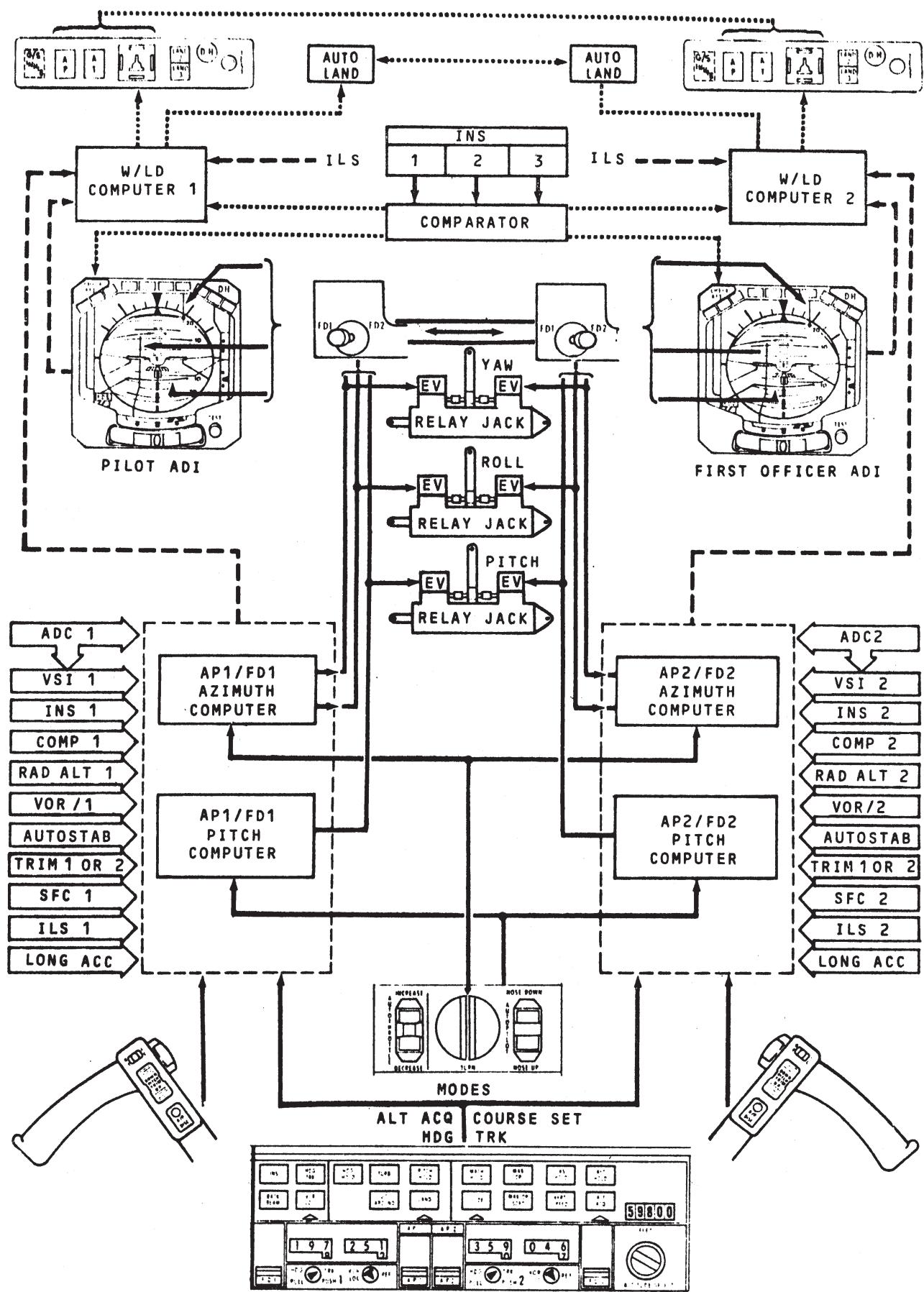
ALTITUDE ALERT SYSTEM

This provides audible and visual warning of approach to and deviation from the altitude selected on the AFCS control panel. Although integrated with the autopilot/flight director for economy and ease of operation the function is independent of AFCS engagement states. The warning of deviation from the selected altitude is inhibited with landing gear down when airborne.

INTERLOCK FAILURE MONITOR & TEST SYSTEM

This system continually surveys the engagement states of the auto-pilot, flight director, autothrottle, autostab, trim, safety flight and warning and landing display systems and all the peripheral systems which supply them with data. Any unintentional disengagement is analysed to determine the root cause and this item is displayed on the panel and stored for subsequent recall by ground crew even after power removal.

AUTOFLIGHT SYSTEM

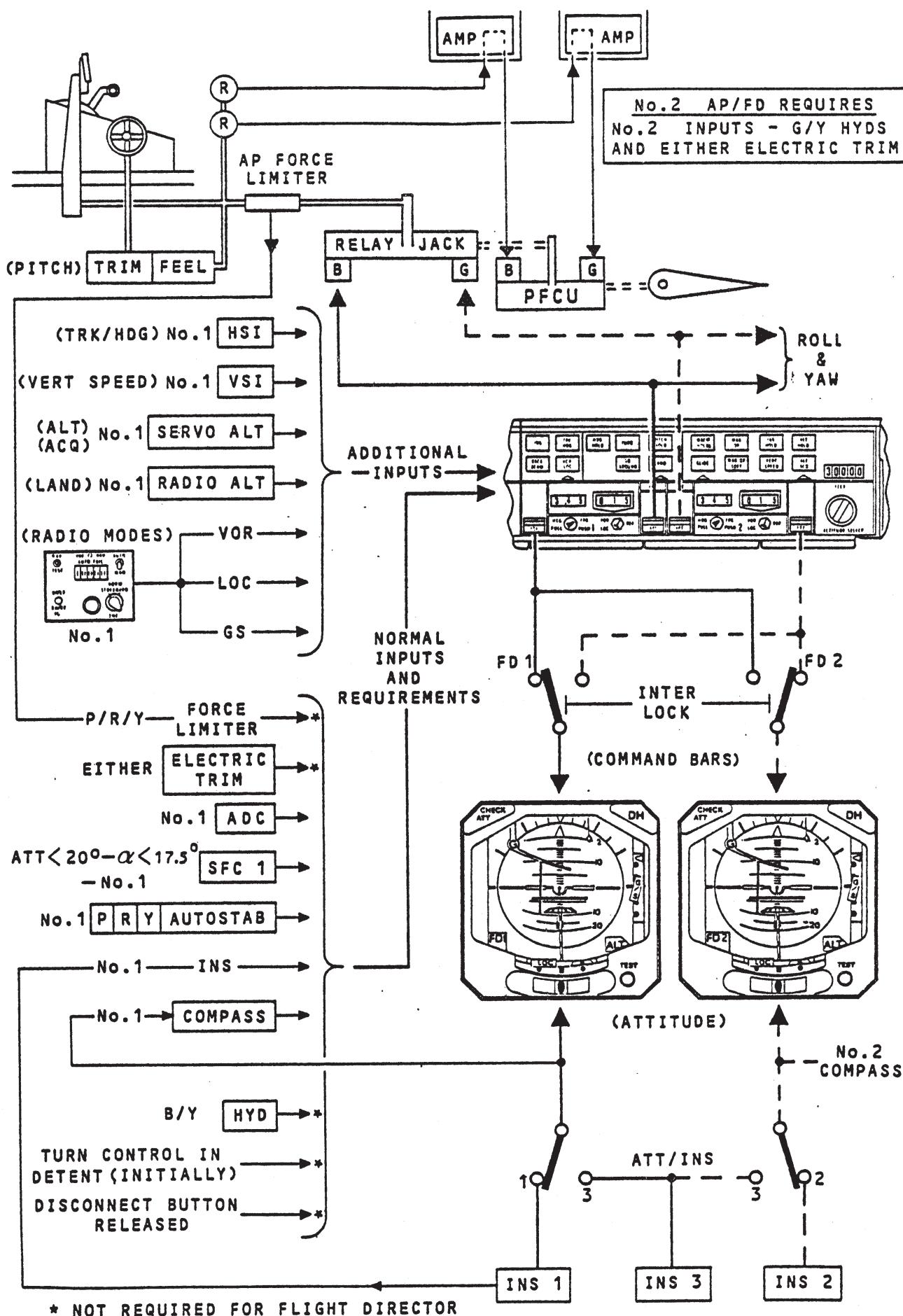


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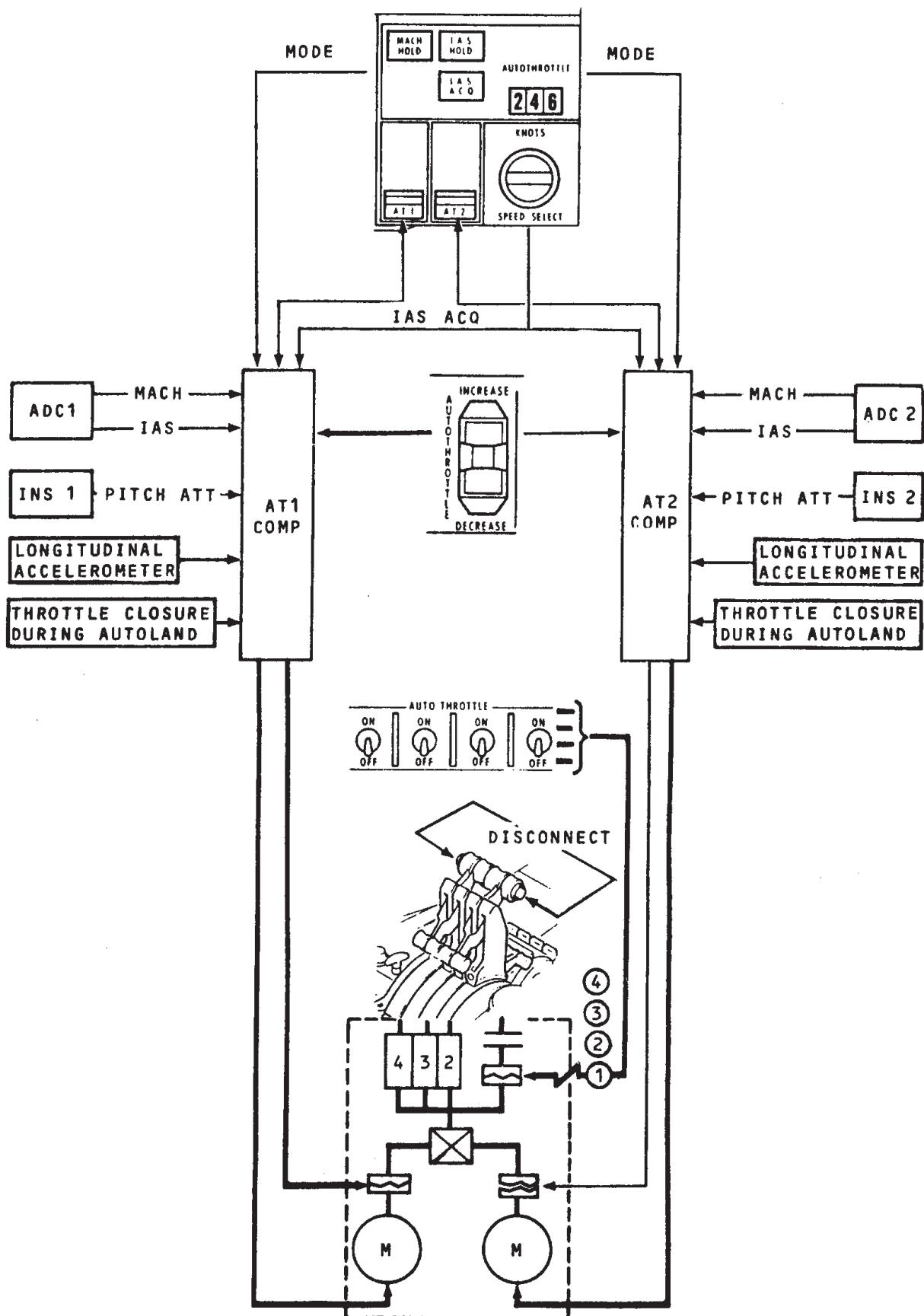
CONCORDE FLYING MANUAL
AUTOMATIC FLIGHT
AUTOPilot/FLIGHT DIRECTOR (NO.1)

British airways



unchanged)

AUTOTHROTTLE



03.02.04
23 SEP.77

CONCORDE FLYING MANUAL

British airways

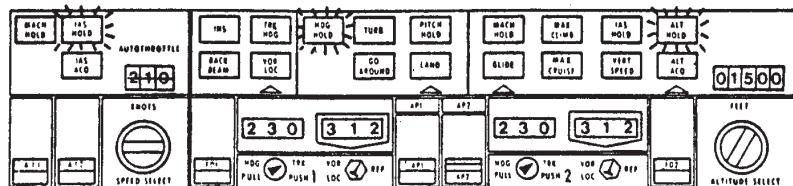
AUTOMATIC LANDING PHASES
(Sheet 1 of 2)

1

INITIAL CONFIGURATION

1.1. HEADING HOLD

1.2 ALTITUDE HOLD

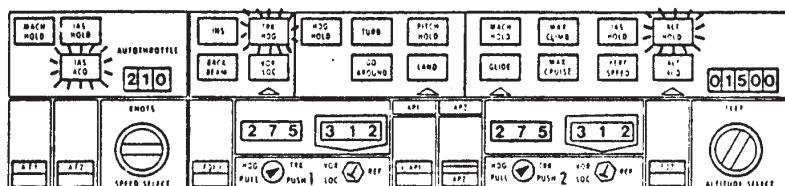


2

2.1 SELECT INTERCEPTION
HEADING AND RUNWAY
HEADING ON BOTH TRK
AND COURSE
SET POINTERS FOR BOTH
SYSTEMS

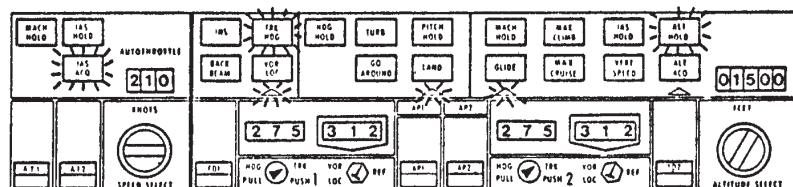
2.2 SELECT SPEED

2.3 ENGAGED IAS ACQ



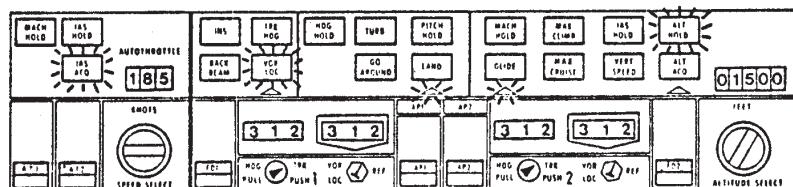
2.4 DEPRESS LAND MODE

2.5 ENGAGE AP2



3

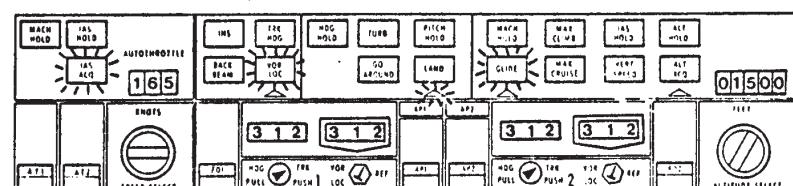
- LOCALIZER CAPTURE



4

- GLIDE CAPTURE

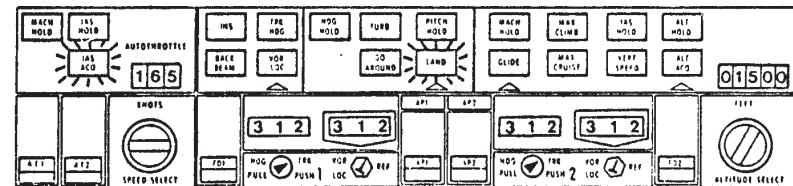
DIAL BACK TO APPROACH
SPEED AT ONE DOT
GLIDE SLOPE DEVIATION



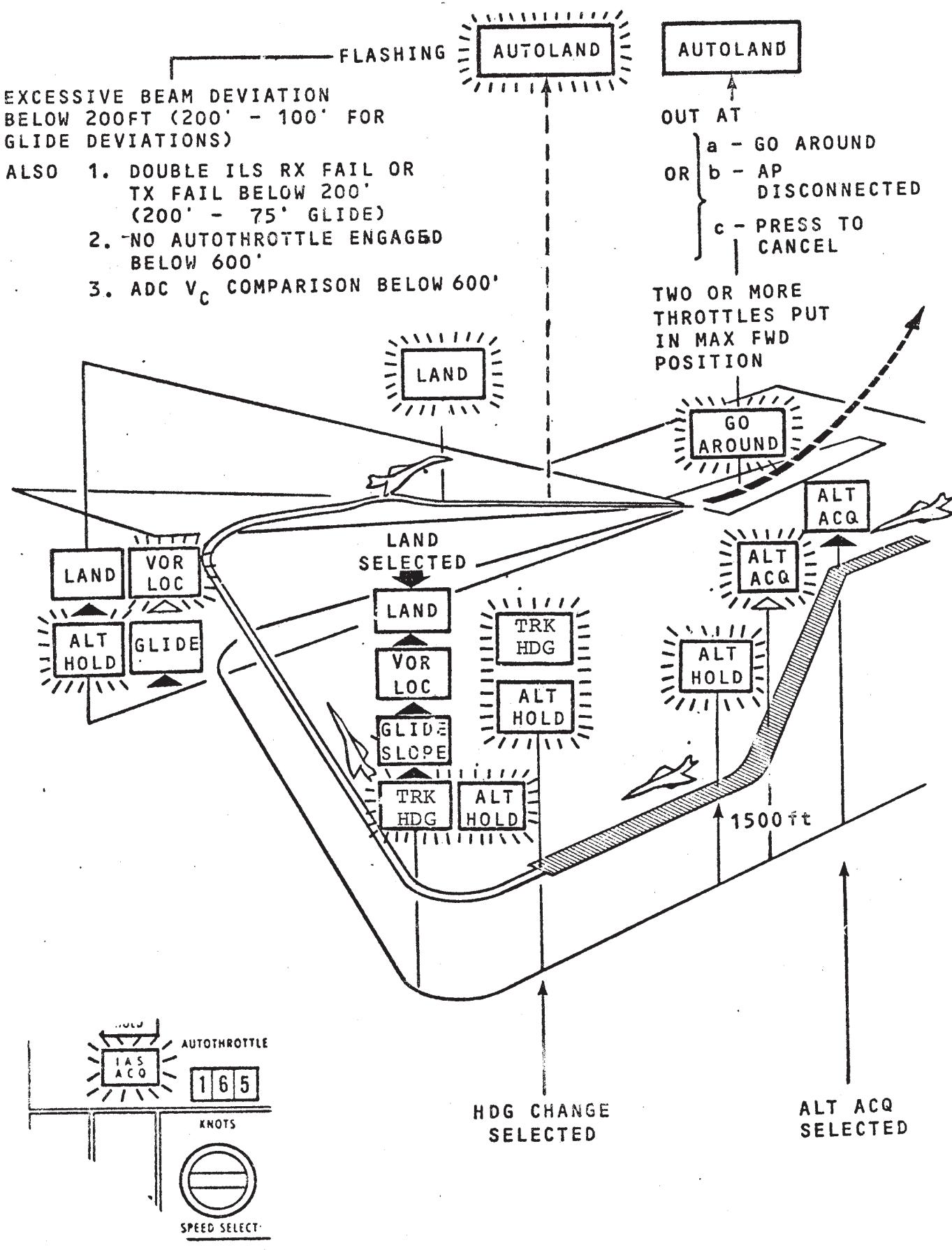
5

- LAND ENGAGED

NOTE: USUALLY INSTANTANEOUS
WITH 4



AUTOMATIC LANDING PHASES



03.02.06
4 MAY 77

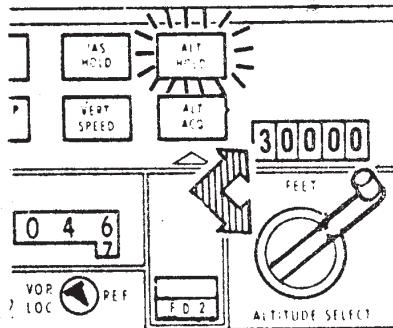
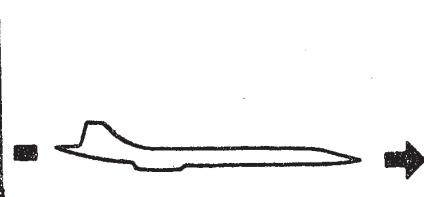
CONCORDE FLYING MANUAL

British airways
OVERSEAS DIVISION

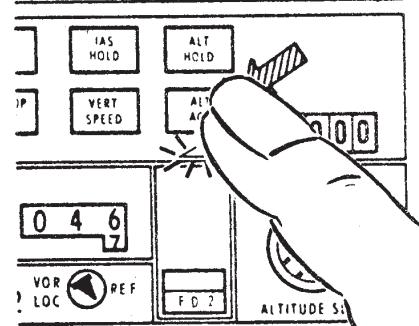
ALTITUDE ACQUIRE - VISUAL INDICATION

1 - BEFORE CHANGE
OF ALTITUDE

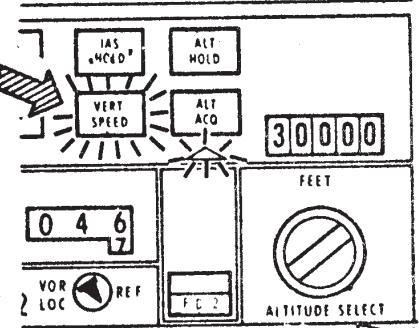
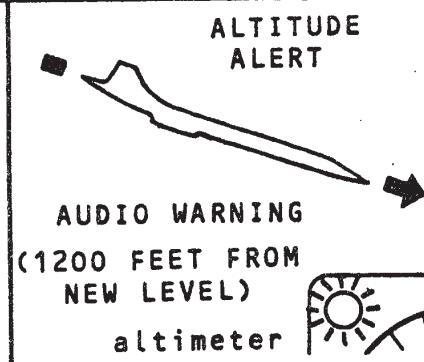
1-1 - SELECT NEW
FLIGHT LEVEL



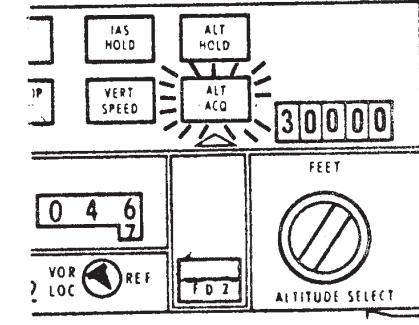
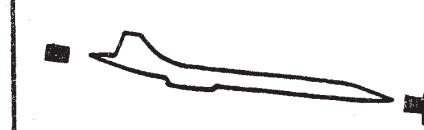
1-2 - "ALT ACQ" MODE
(PRIME) ENGAGEMENT



2 - AT 800FT/MIN
VERT SPEED
AUTOMATICALLY
ENGAGED

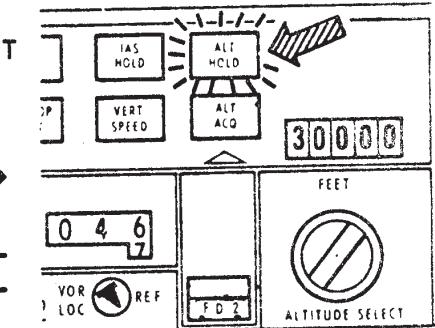
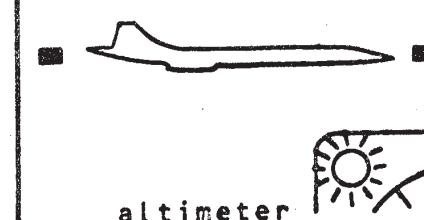


3 - ACTUAL ACQUIREMENT
AT CAPTURE LEVEL



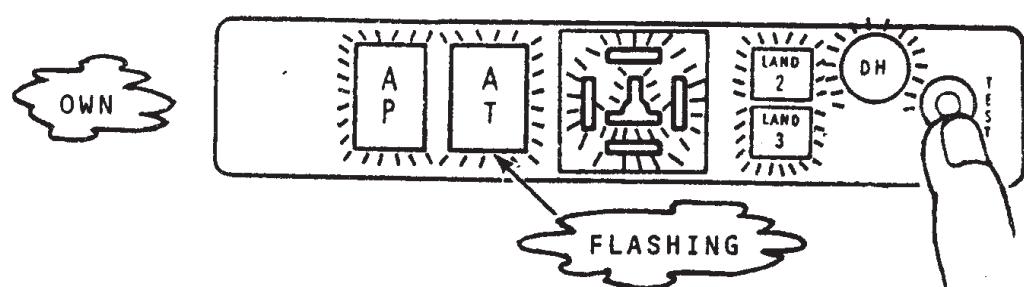
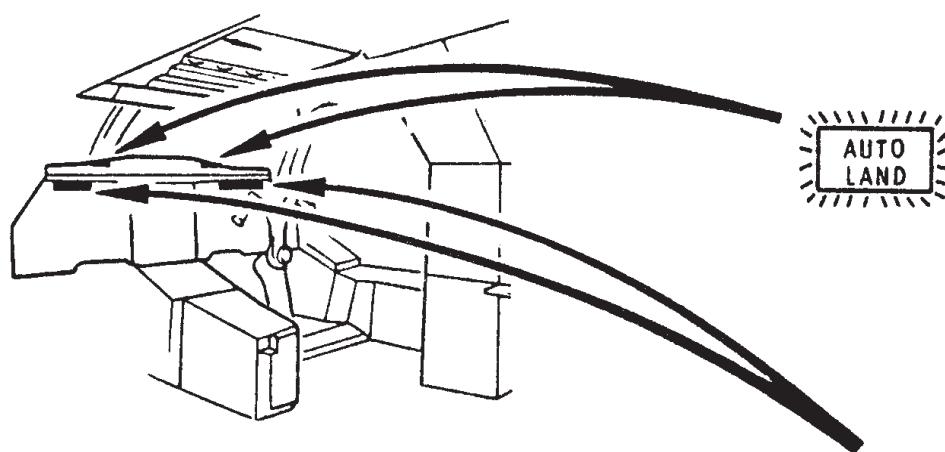
3-2 - AT NEW LEVEL

AUDIO WARNING
(IF DEVIATE + 300 FEET
FROM LEVEL)

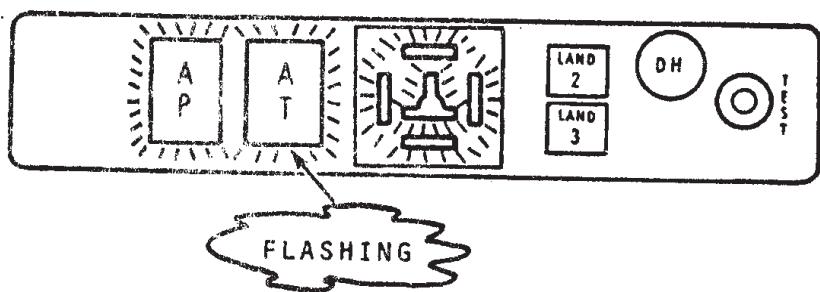


(Unchanged)

LANDING DISPLAY TEST

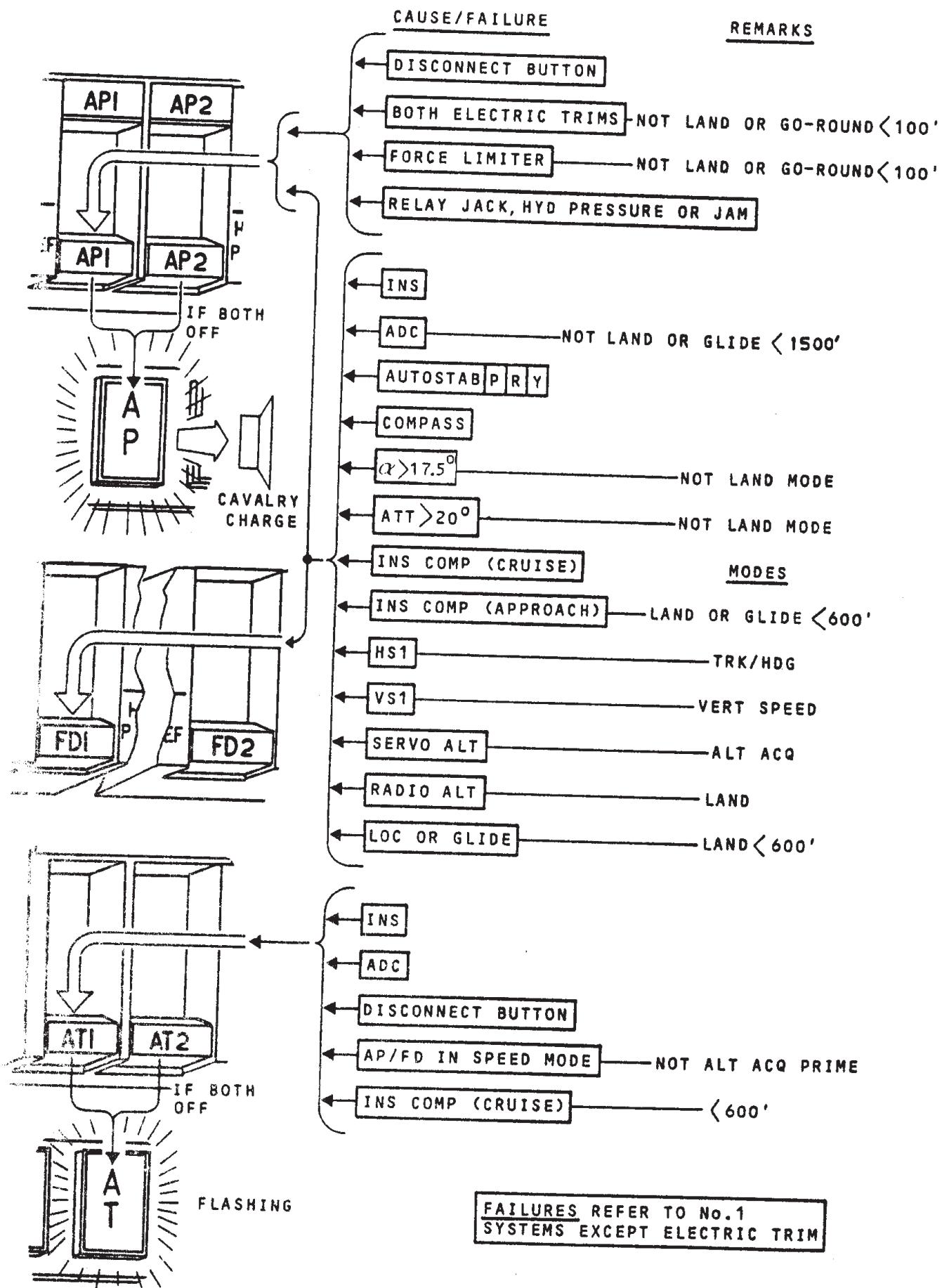


(Deletion)

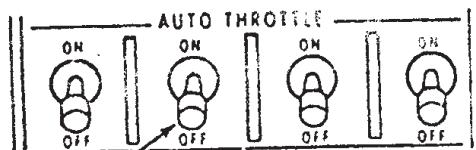


OTHER

NO.1 AFCS DISCONNECTS

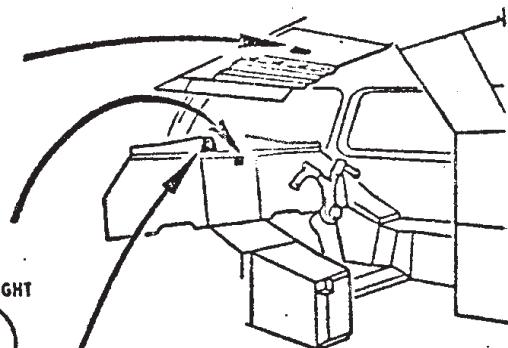


AUTOTHROTTLE



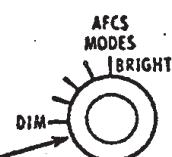
AUTOTHROTTLE MASTER SWITCHES

ON - connects the associated engine to the auto-throttle system.



AFCS MODES LIGHTING ROTARY SELECTOR

Permits DIM to bright AFCS modes. Even with the minimum setting on the rotary selector the modes push button lights are illuminated on the AFCS panel.



IAS HOLD PUSH BUTTON LIGHT (White)

Pressed - holds the existing airspeed.
On - indicates engagement of the mode.

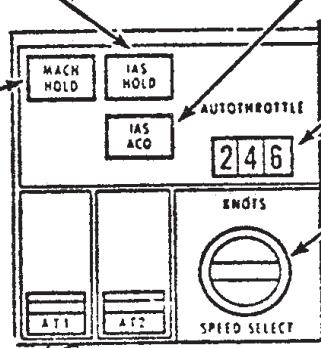
IAS HOLD is the basic autothrottle mode and is engaged when autothrottle is selected.

MACH HOLD PUSH BUTTON LIGHT (White)

Pressed - hold the existing Mach No.
On - indicates engagement of the mode

OR

On (one filament only) - indicates, when autopilot is engaged in MAX CRUISE, that the autothrottle is intervening to prevent an overspeed situation developing.



IAS ACQ PUSH-BUTTON LIGHT (White)

Pressed - initiates the acquisition and subsequent hold of speed set on the SPEED SELECT. On - indicates engagement of the mode.

SPEED SETTING INDICATOR

SPEED SELECT CONTROL

For autothrottle IAS ACQ Mode, speed datum range available is 130-400 ft Knob detent feel at 1 kt. increments, one revolution changes index by 20 kt.

AUTOTHROTTLE SWITCHES

The engage switch for each AT channel is solenoid held in the engage position only when the associated channel has been satisfactorily engaged, or when satisfactorily primed when the autopilot is in the ALT ACQ mode or MAX CLIMB or MAX CRUISE mode. Thus the position of the switch always indicates the engagement state of the channel.

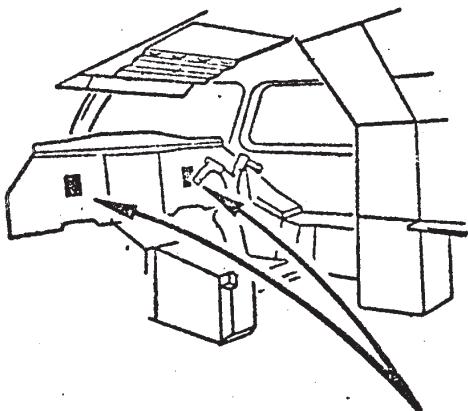
Normally both autothrottle switches are engaged except when an autothrottle is engaged with the autopilot in MAX CLIMB or MAX CRUISE mode. In this case autothrottle 1 must be engaged with autopilot 1 or autothrottle 2 with autopilot 2. The disengagement of both autothrottle systems is accompanied by the AT light (red) flashing on both landing displays and, if the aircraft is below 600 ft in LAND or GLIDE mode, AUTOLAND lights (red) flashing on both dash panels.

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CONCORDE FLYING MANUAL

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ATTITUDE DIRECTOR INDICATOR



PITCH INDEX

Preset by rotary selector on the control columns.

ROLL COMMAND BAR

Provides roll guidance commands from the selected Flight Director.

HORIZON INDEX

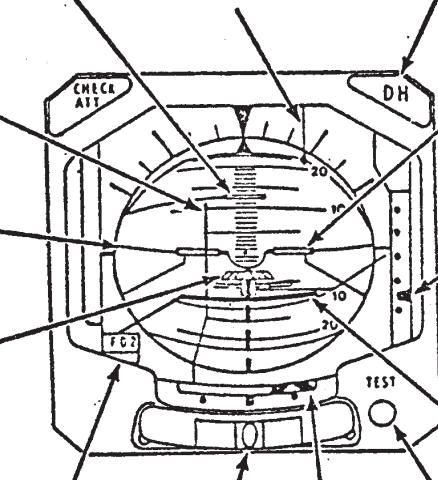
Provides the horizon position reference related to the fixed aircraft symbol.

RISING RUNWAY

Shows the radio altimeter height, it appears as soon as the associated radio altimeter reads 200 ft. The No.1 radio altimeter feeds the First Officer's ADI and vice versa.

FLIGHT DIRECTOR SOURCE

Shows which Flight Director is providing command bar information.



GROUND ROLL GUIDANCE

Provides guidance commands from the selected Flight Director. In view only after touchdown or autopilot disconnection with flight director in LAND mode and radio altimeter height below 100 ft.

DH LIGHT (Amber)

On - indicates that the aircraft is at or below the decision height set into either radio altimeter.

FIXED AIRCRAFT SYMBOL

Shows the position of the aircraft in relation to the horizon index.

GLIDE SLOPE POINTER

Shows vertical position relative to glide slope - 2 dots represent half a degree. The pointer is out of view when ILS frequency is not selected.

PITCH COMMAND BAR

Provides pitch guidance commands from the selected Flight Director.

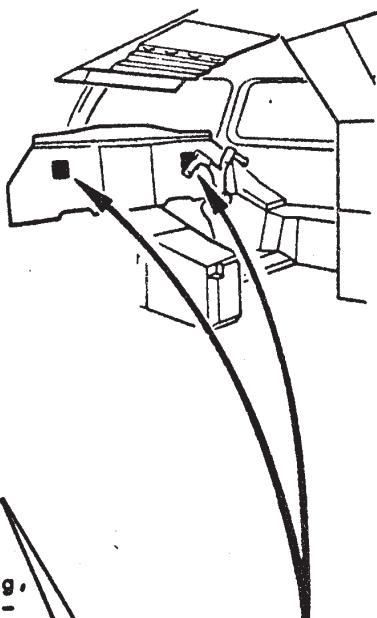
TEST PUSH BUTTON

Pressed - tests the ADI functioning, the operation of the failure flag G and the CHECK ATT lights.

(Completely Revised)

ATTITUDE DIRECTOR INDICATOR (Sheet 2 of 2)

PRINTED IN STAND



CHECK ATT LIGHT (Amber)
AND PLATFORM FLAG
(Black G on a red background)

G - indicates either an ADI internal failure or selected INS attitude failure.

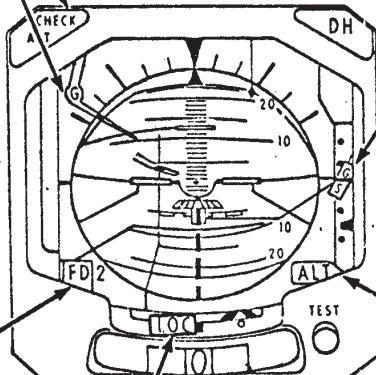
If three INSs are operating, the G flag may be accompanied by the CHECK ATT light (amber) on both ADIs and by tilt to 90 degrees dive of the faulty ADI drum.

If only two INSs are operating the G flag may be accompanied by the CHECK ATT light (amber) on both ADIs.

If the warning is due to an INS attitude failure, the associated autopilot, flight director and auto-throttle will disengage.

FLIGHT DIRECTOR FLAG
(Black FD on a red background)

FD - indicates failure of the selected flight director. Accompanied by the disappearance of the pitch and roll command bars.



GLIDE SLOPE FLAG
(Black G/S on a red background)

G/S - indicates that the glide slope is not valid. Accompanied by the disappearance of the glide slope pointer.

LOCALISER FLAG
(Black LOC on a red background)

LOC - indicates that the localiser data is not valid. Accompanied by the disappearance of the localiser index.

RADIO ALTIMETER FLAG
(Black ALT on a red background)

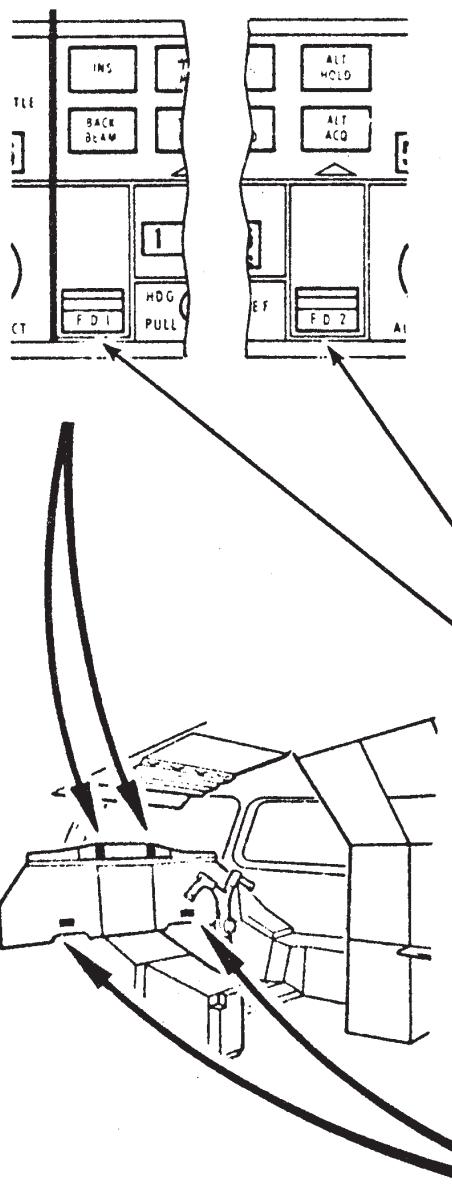
ALT - indicates that the associated radio altimeter data is not valid. Accompanied by the disappearance of the rising runway symbol.

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CONCORDE FLYING MANUAL

British airways
OVERSEAS DIVISION

FLIGHT DIRECTOR SWITCHES



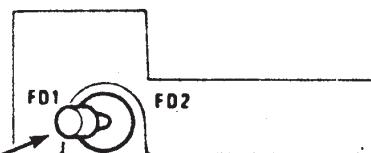
The basic Flight Director engagement mode is PITCH HOLD and will be engaged on selection of a Flight Director if no autopilot is engaged.

If a Flight Director is engaged when an auto-pilot is already engaged the Flight Director will assume the established mode.

If PITCH HOLD is engaged on the auto-pilot the Pitch Command bar will be biased out of view.

FLIGHT DIRECTOR SWITCH

The engage switch for each Flight Director is solenoid held in the engage position only when the associated channel has been satisfactorily engaged. Thus the position of the switch always indicates the engagement state of the channel.



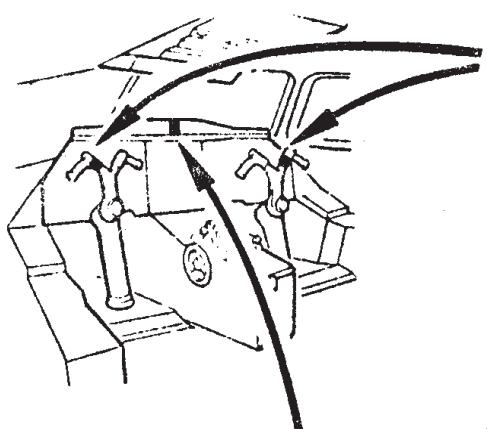
CAPTAIN'S AND FIRST OFFICER'S FD1/FD2 SWITCH

FD1 - the data display on the associated ADI is obtained from Flight Director computer No.1.

FD2 - the data display on the associated ADI is obtained from Flight Director computer No.2.

It is possible to supply both ADI's from the same Flight Director computer, but the system will not allow cross coupling i.e. the captain's ADI on FD2 and the first officer's ADI on FD1, although switch positioning is possible.

AUTOPILOT SWITCHES

AUTOPILOT DISCONNECT
BUTTON

AUTOPILOT SWITCHES

The engage switch for each autopilot channel is solenoid held in the engage position only when the associated channel has been satisfactorily engaged. Thus the position of the switch always indicates the engagement state of the channel.

The successful engagement requires the following; successful internal monitoring of the autopilot system, no excess incidence or attitude warnings and healthy operation of the associated INS and compass coupler, all three axes of the associated autostabilization system, either electric trim channel and the associated ADC.

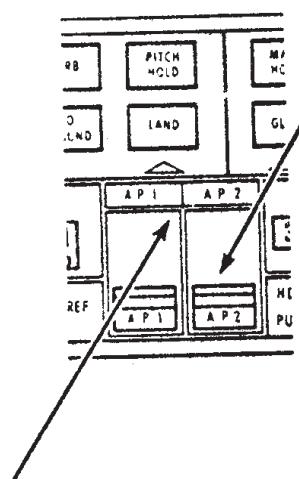
At engagement the autopilot maintains the pitch attitude and engaged heading. Should the aircraft not be in a wings level condition upon engagement, automatic wings levelling and attainment of the engaged heading will be initiated.

Only one autopilot may be engaged except with LAND mode selected, when engagement of both autopilot channels is possible.

The loss of autopilot control is accompanied by the AP light (red) on both landing displays, accompanied by an audio (cavalcade charge).

AP1 AND AP2 LIGHTS
(Green)

On - indicates engagement of the associated autopilot channel.



NOTES

If engagement of an autopilot channel is attempted when a Flight Director is already engaged the system will return to the basic autopilot modes irrespective of the previously established mode associated with the Flight Director, except after LAND mode is selected when the autopilot will also engage in LAND mode. If the Flight Director is engaged in GO-AROUND mode autopilot engagement causes reversion to basic mode.

If an autopilot is engaged when the autothrottle is already engaged and a non-compatible mode is selected on the autopilot, both channels of the autothrottle will disengage. If an autothrottle is engaged when the autopilot is engaged in a non-compatible mode the autopilot reverts to basic modes.

Engagement of an autopilot inhibits the pilot control of electric trim and auto-trim is automatically engaged thus ensuring that the aircraft is in a trimmed condition when the autopilot is disengaged.

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CONCORDE FLYING MANUAL

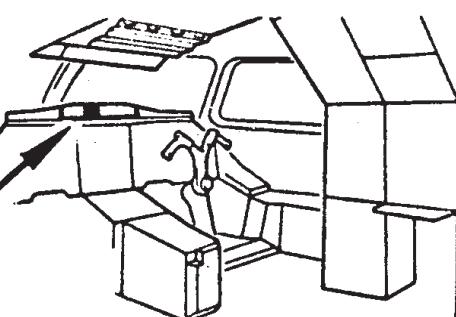
British airways
OVERSEAS DIVISION

AUTOFLIGHT MODES (Sheet 1 of 4)

INS PUSH BUTTON LIGHT (White)

Pressed - initiates the acquisition and subsequent hold of the track between two way points set in the INS.
On - indicates engagement of the mode.

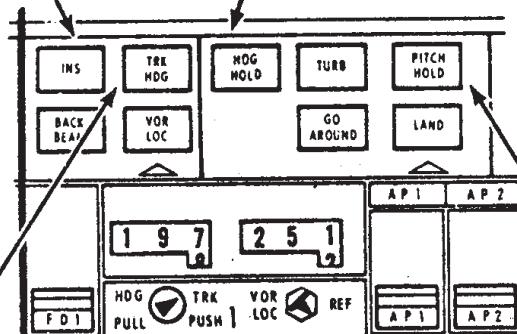
During the acquisition the aircraft will roll at a rate of 2.5 degrees per second to a maximum bank angle of 30 degrees in subsonic flight and 20 degrees in supersonic flight.



HDG HOLD PUSH BUTTON LIGHT (White)

Pressed - holds the existing magnetic heading.
On - indicates engagement of the mode.

HDG HOLD is a basic autopilot mode and is engaged when autopilot is selected.



PITCH HOLD PUSH BUTTON LIGHT (White)

Pressed - holds the existing attitude
On - indicates engagement of the mode.

PITCH HOLD is a basic autopilot mode and is engaged when autopilot is selected.

If an incompatible autothrottle mode is selected the autopilot will revert to this basic mode.

TRK HDG PUSH BUTTON LIGHT (White)

Pressed - initiates the acquisition and subsequent hold of the preselected track or heading using a bank angle not greater than 30 degrees.

On - indicates engagement of the mode.

Providing the change in TRK HDG is not greater than 200 degrees the aircraft will turn on to the preselected TRK HDG in the sense used to select the TRK HDG.

PRINTED IN ENGLAND

AUTOFLIGHT MODES (Sheet 2 of 4)

TURB PUSH BUTTON LIGHT
(White)

Pressed - holds the existing pitch attitude and heading and reduces the trim rate of the electric trim system.

TURB mode is specific to the autopilot.

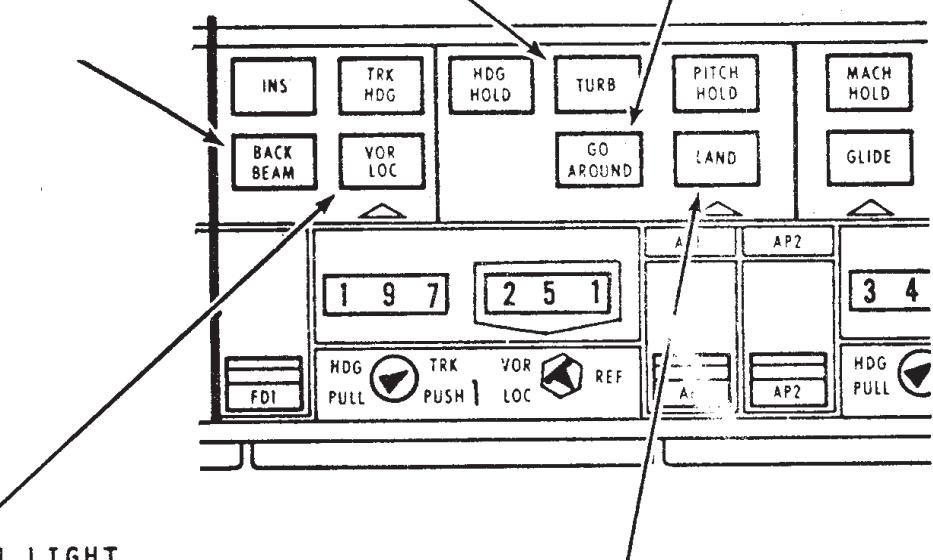
BACK BEAM PUSH BUTTON LIGHT
(White)

This mode is specific to the flight director and can only be used with the autopilot disengaged

Pressed - permits capture and tracking of a BACK BEAM LOC.

GO-AROUND LIGHT (White)

On - indicates that automatic go-around has been initiated. Automatic go-around is initiated if at least two throttle levers are pushed fully forward with the autopilot engaged in LAND or GLIDE mode and autothrottles disengaged. If an autopilot and flight director are engaged the autopilot will pitch the aircraft 15° up and hold wings level and the ADI will show the appropriate command signals. The mode is disengaged by disengagement of the autopilot or selection of HDG HOLD.



VOR LOC PUSH BUTTON LIGHT
(White)

Pressed - initiates the acquisition and subsequent hold of the selected VOR radial (or LOC). On - indicates successful capture of the radial.

During the acquisition the prime light is on (white)

NOTE: During transition of the cone of confusion the autopilot and Flight Director maintain heading.

LAND PUSH BUTTON LIGHT (White)

Pressed - primes both the VOR LOC and GLIDE modes. On - indicates successful capture of the LOC beam and GLIDE beam in LAND mode.

Before acquisition the prime light (white) is on accompanied by VOR LOC prime (white) and GLIDE prime light (white).

After LAND mode is selected the second autopilot can be engaged.

AUTOFLIGHT MODES

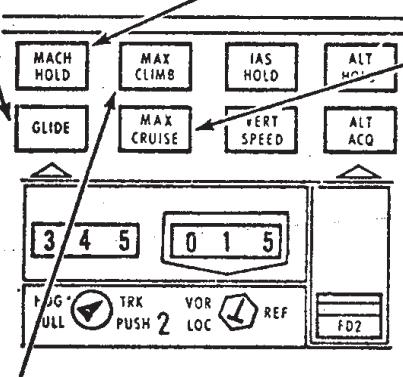
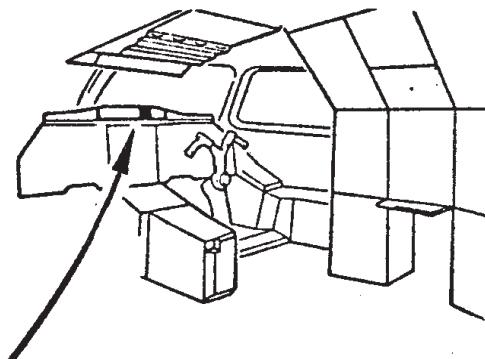
GLIDE PUSH BUTTON LIGHT (White)

Pressed - primes both GLIDE and LOC modes
 On - indicates successful capture of the GLIDE beam; successful capture of the LOC beam is indicated by the VOR/LOC light on.

Before acquisition the prime lights (white) of both GLIDE and VOR/LOC are on.

NOTE: Glide mode is intended for use on lower quality ILS beams down to CAT1 limits.

No automatic landing facility is available in this mode.



MAX CLIMB PUSH BUTTON LIGHT (White)

Pressed - When at or near V_{MO} constrains the airspeed to V_{MO} . This mode is automatically disengaged at the "corner point" between 530 kts and $M = 2.00$ or when T_{MO} is reached.

On - indicates engagement of the mode.

NOTE

After the automatic engagement of MAX CRUISE the MAX CLIMB light stays on.

MACH HOLD PUSH BUTTON LIGHT (White)

Pressed - holds the existing Mach number.
 On - indicates engagement of the mode.

MAX CRUISE LIGHT (White)

On - indicates engagement of the mode.

MAX CRUISE is automatically engaged from the MAX CLIMB mode when the "corner point" between 530 kts and $M = 2.00$ or T_{MO} is reached in a climb.

Once engaged it constrains the aircraft to the lesser of $M = 2.00$ or the airspeed associated with T_{MO} .

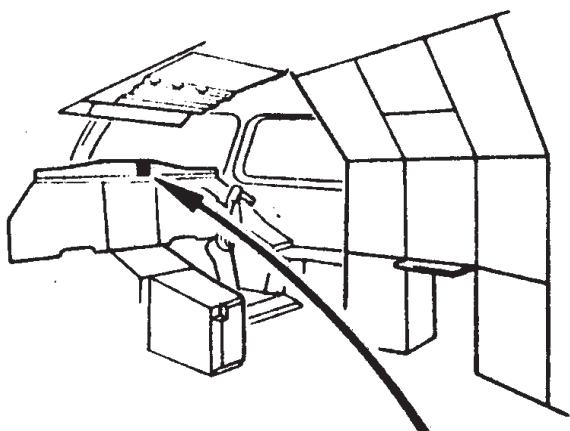
The MAX CRUISE mode is normally used with the associated autothrottle primed. In this case as the autopilot engages in MAX CRUISE mode the autothrottle will latch in MACH HOLD and remain latched for at least 100 seconds or longer as is necessary to guard against any tendency to overspeed. The autothrottle will then revert to its primed condition and intervene only when an approaching overspeed is sensed.

MAX CRUISE will disengage and MAX CLIMB re-engage when the aircraft descends below the "corner point".

CAUTION

IN MAX CLIMB AND MAX CRUISE MODES COMBINED USE OF AUTOPILOT 1 WITH AUTOTHROTTLE 2 OR AUTOPILOT 2 WITH AUTOTHROTTLE 1 IS PROHIBITED BECAUSE SMALL DIFFERENCES BETWEEN THE OUTPUTS FROM ADC 1 AND ADC 2 MAY JEOPARDIZE THE PROPER SIMULTANEOUS FUNCTIONING OF THE AUTOPILOT AND AUTOTHROTTLE.

AUTOFLIGHT MODES (Sheet 4 of 4)

**ALT HOLD PUSH BUTTON LIGHT
(White)**

Pressed - holds the existing altitude.
On - indicates engagement of the mode.

**IAS HOLD PUSH BUTTON LIGHT
(White)**

Pressed - holds the existing airspeed.
On - indicates engagement of the mode.

**VERT SPEED PUSH BUTTON LIGHT
(White)**

Pressed - holds the existing vertical speed.
On - indicates engagement of the mode.

NOTE:
In the event of a VSI instrument failure the VERT SPEED mode of the associated autopilot will be inoperative.
An instrument failure while the VERT SPEED mode is engaged will cause a complete disengagement of the autopilot.

HDG PULL/TRK PUSH SELECTORS (2)

Selects heading or track on the corresponding HSI.

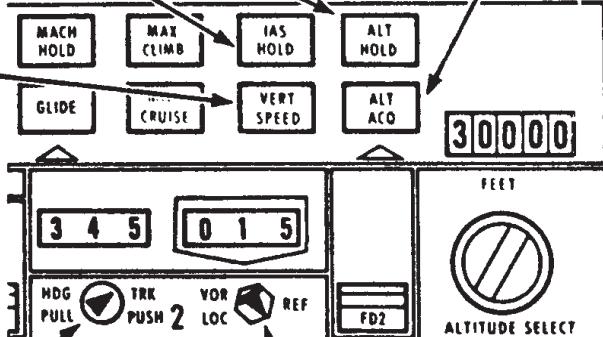
ALT ACQ PUSH BUTTON LIGHT (White)

Pressed - initiates the acquisition of the altitude set on the ALTITUDE SELECT.

Upon selection of ALT ACQ the prime light will come on and the aircraft will remain under the control of the previous mode except in the case of ALT HOLD when VERT SPEED is automatically engaged at 800 ft per min. to intercept the selected altitude. At the capture point, capture will be automatically initiated, this being indicated by the previous mode and the prime light going off and the ALT ACQ light coming on. At the selected altitude the ALT ACQ light will go off and the ALT HOLD light will come on.

NOTE: If at the capture point an autothrottle is not engaged the AT light (red) will flash continuously on both landing situation displays.

NOTE: If, during capture, altitude is reselected, pitch hold is engaged until the new capture point is reached. If selected altitude passes through the present altitude, ALT HOLD is engaged at that level.

**HDG PULL/TRK PUSH SELECTORS (2)**

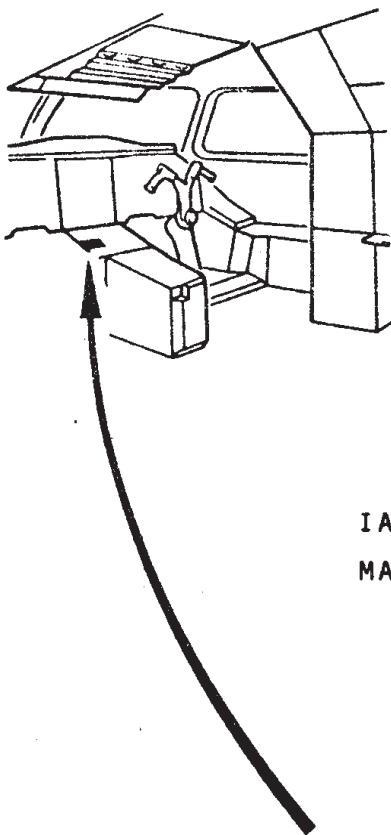
Selects VOR LOC course on the corresponding HSI.

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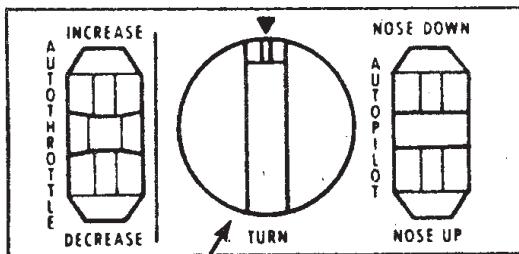
AUTOTHROTTLE DATUM ADJUST AND
AUTOPILOT TURN CONTROLS



AUTOTHROTTLE DATUM ADJUST

The autothrottle datum adjust is a spring return to centre selector. The function of the selector is dependent on the speed mode in control.

<u>MODE</u>	<u>PARAMETER/RANGE</u>	<u>ADJUSTMENT</u>
IAS HOLD	Airspeed ± 22 kt	2 kt/sec
MACH HOLD	Mach No ± 0.06 M	0.006 M/sec



AUTOPILOT TURN KNOB

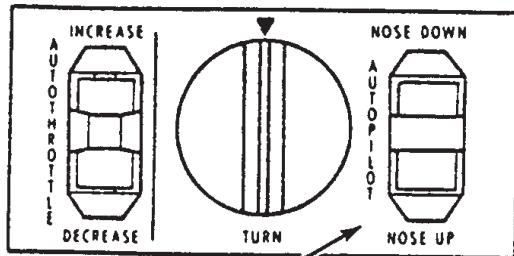
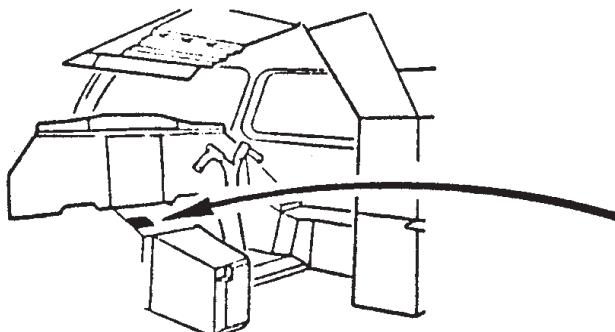
In HDG/HOLD the TURN knob will demand a bank angle, at a roll rate of 5 degrees per second, proportional to the amount of movement of the knob but not exceeding 35 degrees.

Use of the TURN knob will cause reversion to the autopilot basic heading mode. The TURN knob must then be returned to the centre detent position before any further heading mode selection will engage. The TURN knob is inoperative with LAND selected.

NOTE: The TURN knob must be in its centre detent position before autopilot engagement is attempted.

(unchanged)

AUTOPILOT DATUM ADJUST CONTROL



AUTOPILOT PITCH DATUM ADJUST

The autopilot pitch datum adjust is a spring return to centre selector with two pressures in each direction. The function of the selector is dependent on the pitch mode in control

MODE	PARAMETER/RANGE	SLOW ADJUSTMENT	FAST ADJUSTMENT
PITCH HOLD	* Acceleration	0.05 g	0.15 g
ALT HOLD	Altitude \pm 600 ft	20 ft/sec	60 ft/sec
IAS HOLD	Airspeed \pm 20 kt	0.7 kt/sec	2.0 kt/sec
MACH HOLD	Mach No. \pm 0.06 M	0.002 M/sec	0.007 M/sec
MAX CLIMB	† Airspeed \pm 17.3 kt	0.7 kt/sec	2.0 kt/sec
VERTICAL SPEED	Vertical speed \pm 6000 ft/min	80 ft/min/sec	800 ft/min/sec

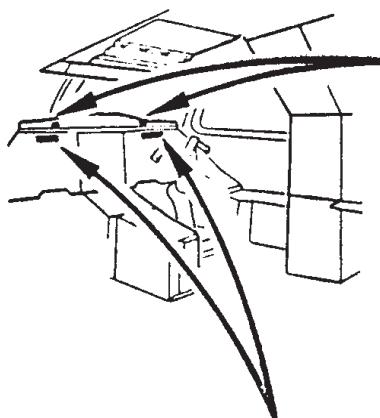
* The normal acceleration demand is a step value irrespective of aircraft speed. The aircraft attitude will be maintained to that existing at the time the switch is released to the centre position.

† In MAX CLIMB mode the pitch datum adjust will operate but at the automatic engagement of MAX CRUISE mode any shift is automatically zeroed.
In MAX CRUISE mode the pitch datum adjust is inhibited.

NOTE

With only the Flight Director engaged the autopilot datum adjust zeroes the ADI pitch command bar and synchronises the clutches in the hold modes except in the case of MAX CLIMB and VERT SPEED modes where operation injects an offset into the control term.

WARNING AND LANDING DISPLAY (Sheet 1 of 3)



AUTO LAND

AUTOLAND LIGHT (Red) (2)

On - flashing - indicates:-
In LAND or GLIDE mode an ADC airspeed comparator warning or loss of both autothrottles below 600 ft
or
in LAND or GLIDE mode an ILS transmitter or double receiver failure below 200 ft for LOC or between 200 and 75 ft for GLIDE
or
in LAND mode an excessive ILS deviation below 200 feet for LOC or between 200 and 100 feet for GLIDE.

AT LIGHT (Red)

Flashing - Indicates total loss of autothrottle control.

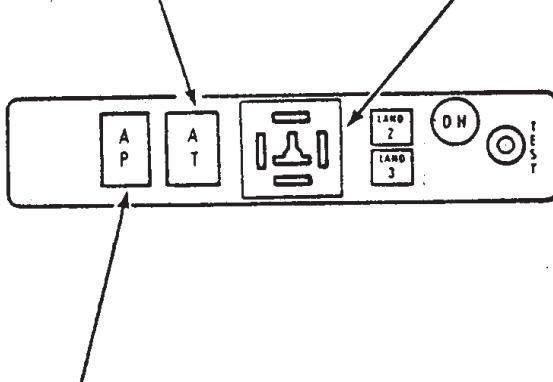
or

if, in autopilot/flight director ALT ACQ mode the autothrottle is not engaged at capture initiation.

or

If, in autopilot/flight director LAND or GLIDE mode the autothrottle is not engaged at glide capture initiation.

The AT light may be cancelled by operation of the AT instinctive disconnect push button.



AP LIGHT (Red)

On - indicates total loss of autopilot control.

Accompanied by an audio (cavalry charge)

The AP light may be cancelled by operation of the AP instinctive disconnect push button.

AIRCRAFT DEVIATION LIGHTS

Associated with the autopilot and/or flight director in the approach modes.

AIRCRAFT SYMBOL LIGHT (Amber)

On - accompanied by left vertical light (White) - indicates that the aircraft has deviated 1/4 dot to the right of the LOC centre line

or

accompanied by right vertical light (White) - indicates that the aircraft has deviated 1/4 dot to the left of the LOC centre line

or

accompanied by upper horizontal light (White) - indicates that the aircraft has deviated one dot below the glide slope.

or

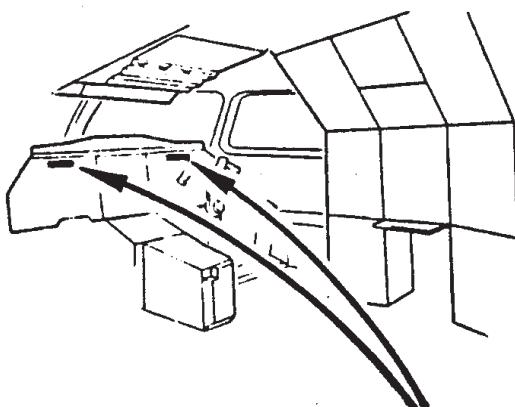
accompanied by lower horizontal light (White) - indicates that the aircraft has deviated one dot above the glide slope.

NOTE: Below 100 ft the glide slope deviation warning is inhibited.

NOTE: Below 200 ft in the LAND mode a localiser or glide deviation warning will be accompanied by the AUTOLAND lights (red) flashing.

(Deletion)

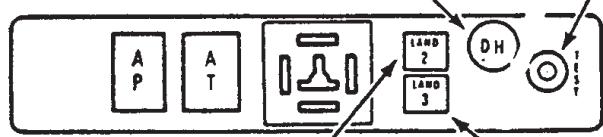
WARNING AND LANDING DISPLAY (Sheet 2 of 3)



DH LIGHT (Amber)

On - indicates that the aircraft is at or below the decision height set into the associated radio altimeter.

NOTE: The DH light is independent of autopilot/flight director engagement.



LAND 2 LIGHT (Green)

Associated with the autopilot in LAND mode.

On - indicates that the capability of the system is that of an automatic landing in category 2 conditions.

Land 2 capability requires:

Flight controls in an electrical mode.

One autopilot engaged in LAND mode.

The flare law test successful.

At least one landing display serviceable.

At least one autothrottle engaged in IAS ACQ mode.

NOTE: Below the alert height the capability indications are latched on except in the event of loss of both autopilots.

TEST PUSH BUTTON

Pressed - tests all the filaments of the Warning and Landing Display and most of the associated logic and excessive deviation thresholds inside the associated computer.

LAND 3 LIGHT (Green)

Associated with the autopilot in LAND mode.

On - indicates that the capability of the system is that of an automatic landing in category 3 conditions.

Land 3 capability requires:
Flight controls in an electrical mode.

Two autopilots engaged in LAND mode.

The flare law tests successful.
At least one landing display serviceable.

At least one autothrottle engaged in IAS ACQ mode.

At least one flight director engaged.

Two ADCs serviceable.

INS 3 serviceable.

INS comparator serviceable.

Green/yellow hydraulic system pressure correct.

Both AFCS VOR LOC selectors at the same course.

Electrical generation split.

NOTE: Below the alert height the capability indications are latched on except in the event of loss of both autopilots.

WARNING AND LANDING DISPLAY (Sheet 3 of 3)

EQUIPMENT FAILURES

The AIRCRAFT DEVIATION lights are also used, with the autopilot and/or flight director in the approach modes, to diagnose faults in the ILS equipment.

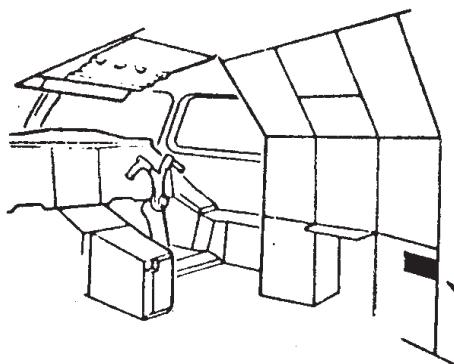
- Localiser receiver failure - flashing vertical lights (white) and aircraft symbol light (amber) if the associated autopilot is engaged and LOC flag visible on ADI whichever autopilot is engaged.
- Localiser transmitter failure - Flashing vertical lights (white) LOC flags visible on both ADIs.
- Glide slope receiver failure - flashing horizontal lights (white) and aircraft symbol light (amber) if the associated autopilot is engaged and G/S flag visible on ADI whichever autopilot is engaged.
- Glide slope transmitter failure - Flashing horizontal lights (white) G/S flags visible on both ADIs.

NOTE

Below 600 feet a single glide slope or localiser failure will disconnect the associated autopilot and withdraw the associated flight director bar. Above 600 feet the associated autopilot signal is zeroed and the aircraft will continue on the flight path immediately preceding the failure. The associated flight director bar is withdrawn. A Localiser transmitter failure or a Glide Slope transmitter failure does not disconnect the autopilot, the input signal to each autopilot is zeroed and each flight director bar withdrawn from view.

Below 200 feet a double glide slope or localiser receiver failure will bring on the AUTOLAND light.

IN-FLIGHT MONITOR



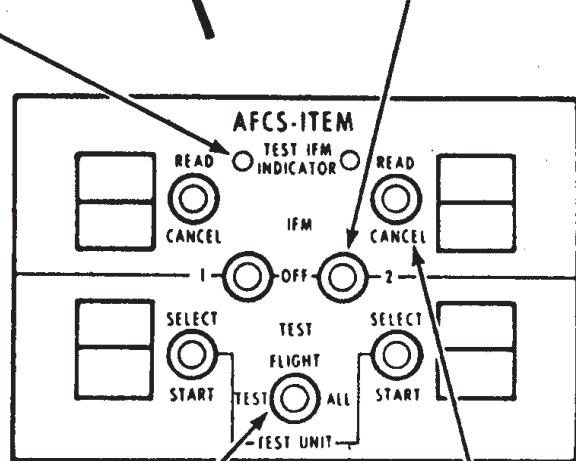
TEST IFM INDICATOR PUSH BUTTON (2)

Pressed and held - tests the associated IFM indication display.

IFM SELECTORS (2)

IFM - providing the TEST selector is at FLIGHT an autotest routine is initiated in the associated channel. After successful completion of the test, all indicators are off and the in-flight monitor is active. Failures are memorised only after the aircraft becomes airborne.

OFF - both the monitoring and test functions are inhibited, however the memory retains all information previously stored.



READ - CANCEL SELECTORS

READ - the failure indications held in the permanent memory are displayed, each one for 2.5 secs followed by a quiescent period of 0.5 secs.

CANCEL - the indication displayed and the store in the permanent memory is cancelled.

TEST SELECTOR

FLIGHT - providing the IFM selector is at IFM a continuous monitoring of the AFCS engagement and interlock status takes place. All indications are stored and retained in a memory that permits subsequent recall by ground crew even after a power shutdown on the ground.

The memory function is inhibited while the aircraft is on the ground.

Chapter 4

**AUXILIARY
POWER**

Chapter 5

COMMUNICATIONS

COMMUNICATIONS

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Boom/Mask Switch Panel	05.03.06

GENERAL

The basic system comprises, VHF and HF communication equipment, SELCAL, ATC transponder, interphone systems service flight and cabin/galley, and passenger address. In addition a cockpit voice recorder is installed.

DESCRIPTION

VHF

Two separate identical VHF radio installations are fitted to provide communication in the 118-135.975 MHz frequency range with 25 kHz channel spacing.

HF

Two separate identical HF radio installations are fitted to provide single side band and amplitude modulated operation, giving two-way communication at 2182 kHz and in the band 2800 kHz to 25 MHz.

SELCAL

Selective calling (SELCAL) is used in conjunction with the aircraft's VHF and HF. SELCAL permits a ground station to call any particular aircraft without the need for pilots maintaining a continuous listening.

When the aircraft is called, a flashing light will tell the pilot on which communication channel he is required (two tone chime repeated every 5 seconds).

ATC TRANSPONDER

A duplicated ATC transponder system is provided. This secondary radar system enables a ground controller to identify an aircraft and determine its height.

AUDIO INTEGRATION

Each flight deck audio select panel provides integration of radio communications and radio navigation systems and the crew's interphone network.

FLIGHT INTERPHONE

The flight interphone system permits communication between the flight crew stations and between the flight crew stations and a ground crew station on the nose landing gear.

The flight interphone can under some circumstances be connected into the service interphone system.

SERVICE INTERPHONE

The service interphone system permits communication between the

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flight crew stations and the cabin crew stations, between cabin crew stations and cabin crew stations and between flight crew stations, cabin crew stations and ground stations throughout the aircraft.

PUBLIC ADDRESS

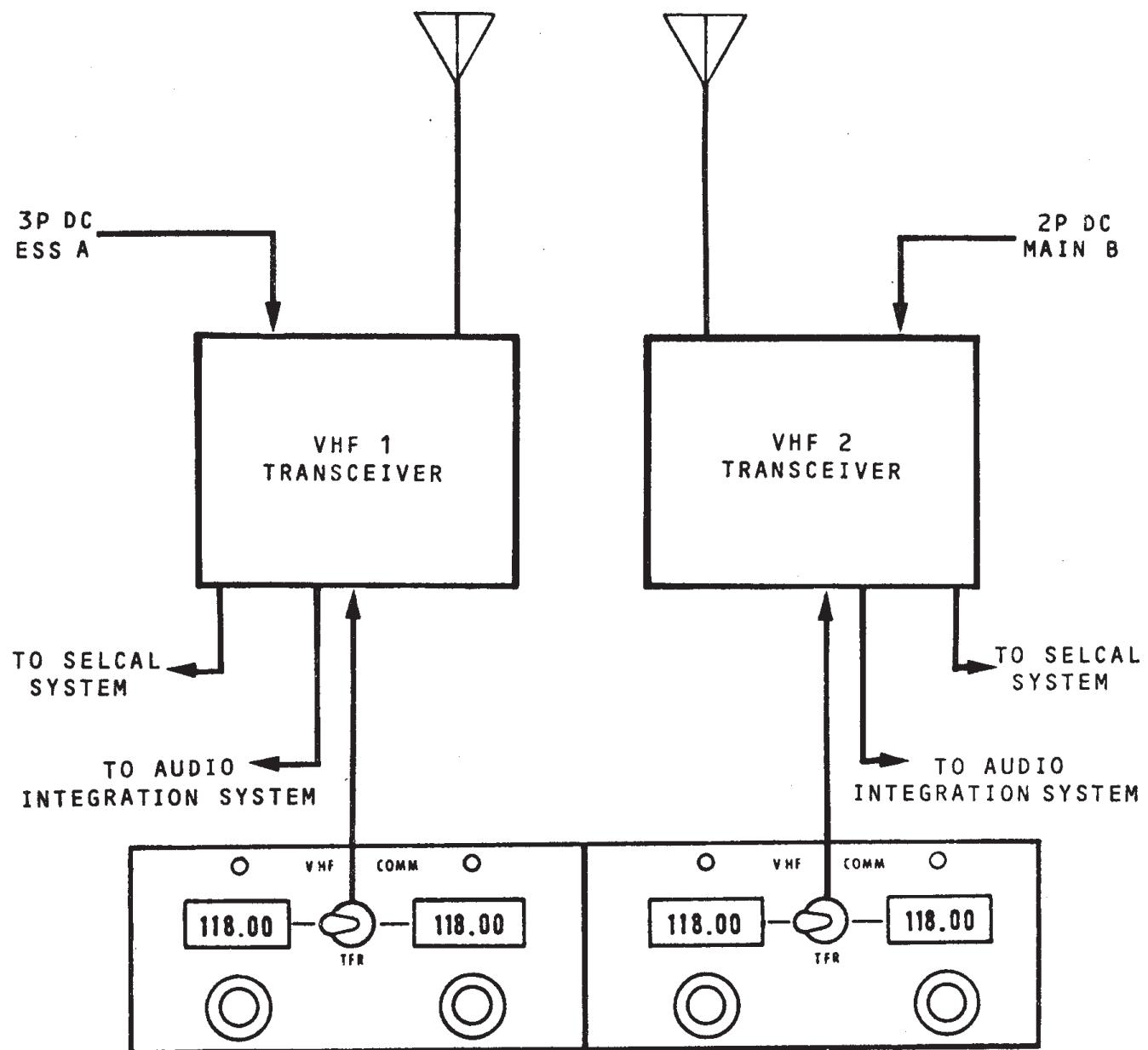
The public address system broadcasts to the passenger cabin from the flight deck or from any of the three cabin crew stations. A tape reproducer can be connected to the public address system to provide routine announcements, emergency announcements (manually selected or automatically when the emergency oxygen drop-out system operates) and music.

COCKPIT VOICE RECORDER

A cockpit voice recorder records all communications arriving at or originating from the Captain's or First Officer's interphone.

In addition, it records the Captain's, First Officer's and Flight Engineer's conversation via the boom microphones regardless of switching. It also records general flight deck noises through an area microphone.

VHF SYSTEM

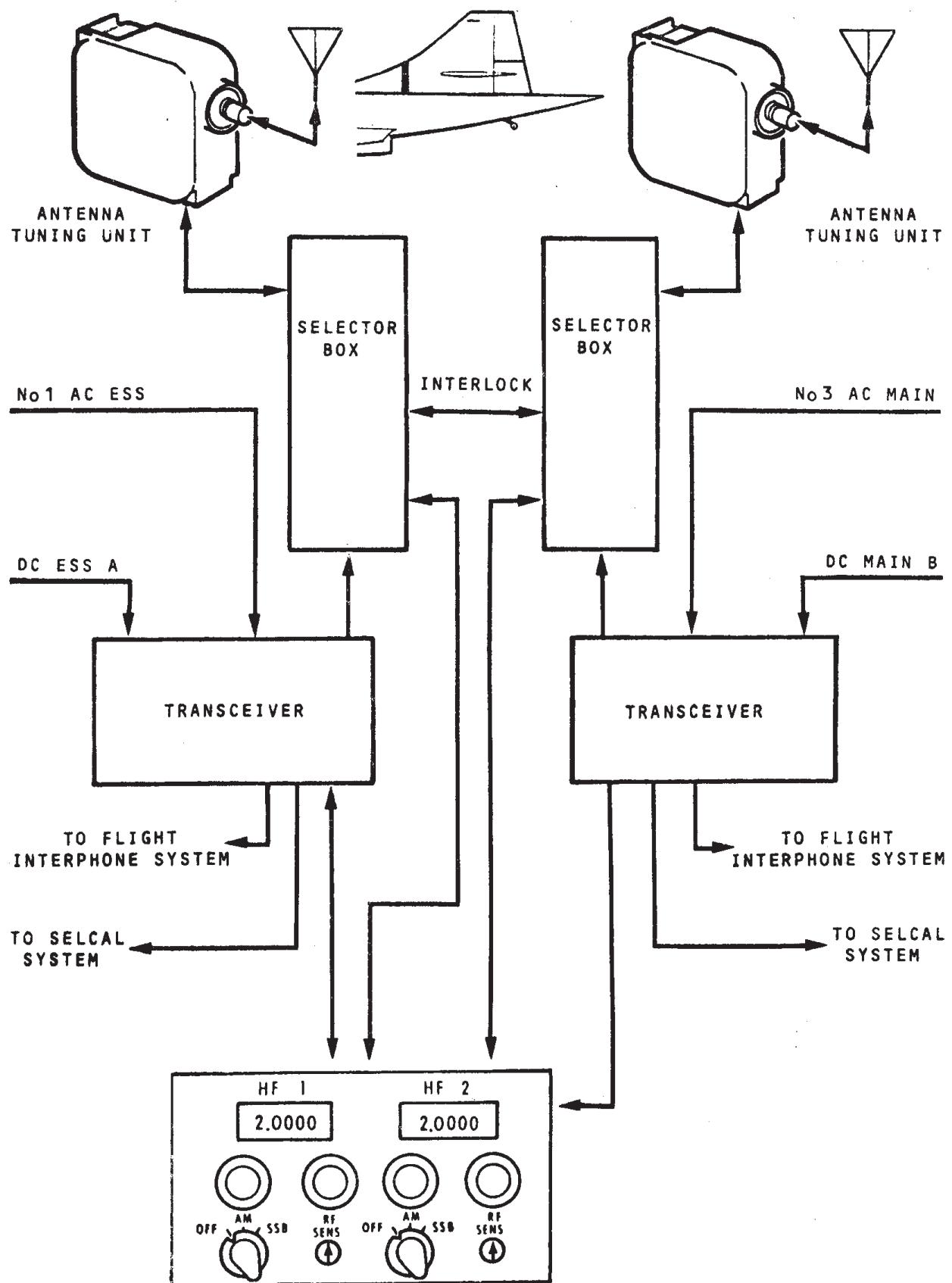


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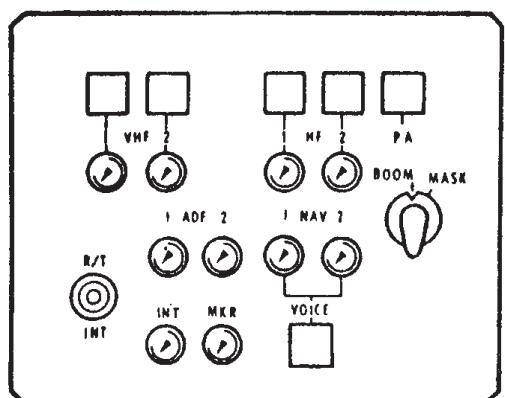
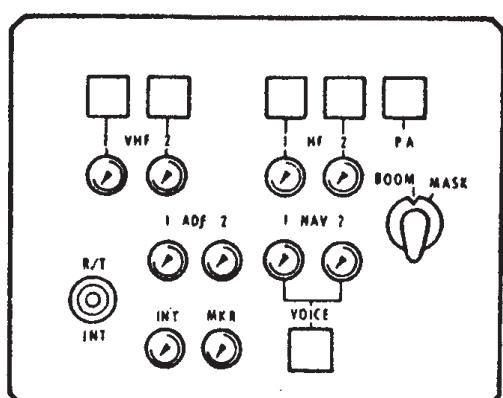
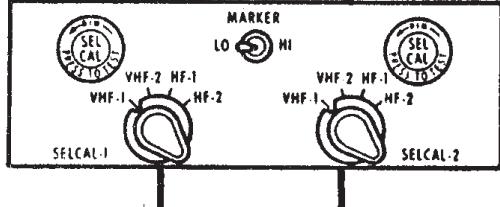
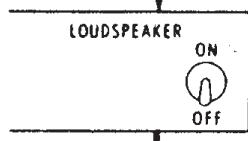
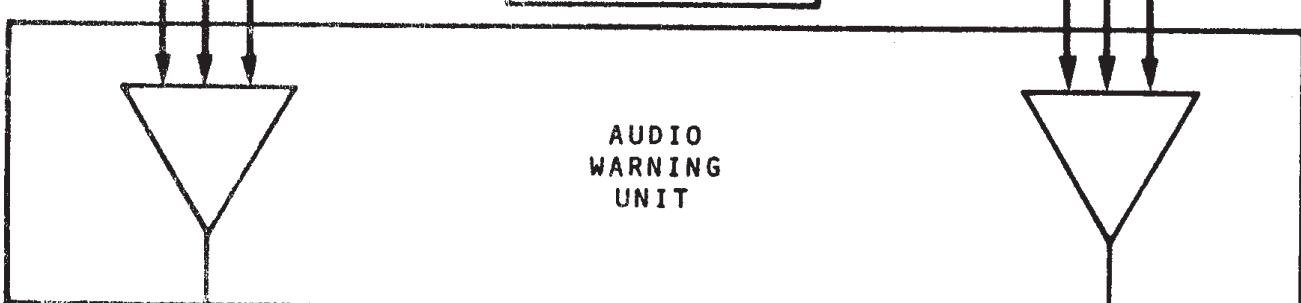
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HF SYSTEM



SELCAL AND SPEAKER CONTROL

CAPTAIN'S
AUDIO SELECTOR PANELF/O'S
AUDIO SELECTOR PANELFROM
VHF/HF
SYSTEMSFLIGHT
DECK
WARNING

(Unchanged)

LEFT

RIGHT

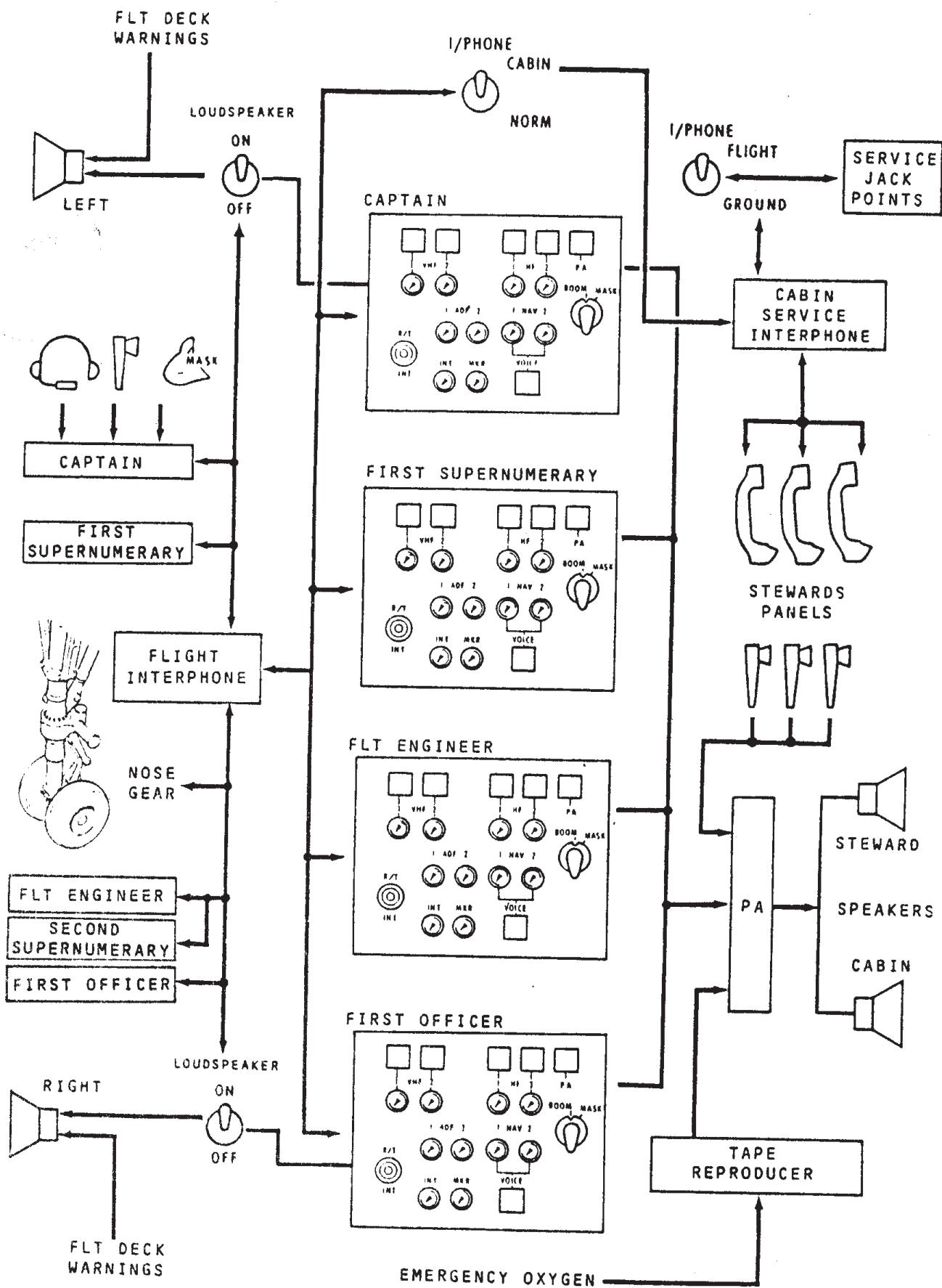
FLIGHT
DECK
SPEAKERS

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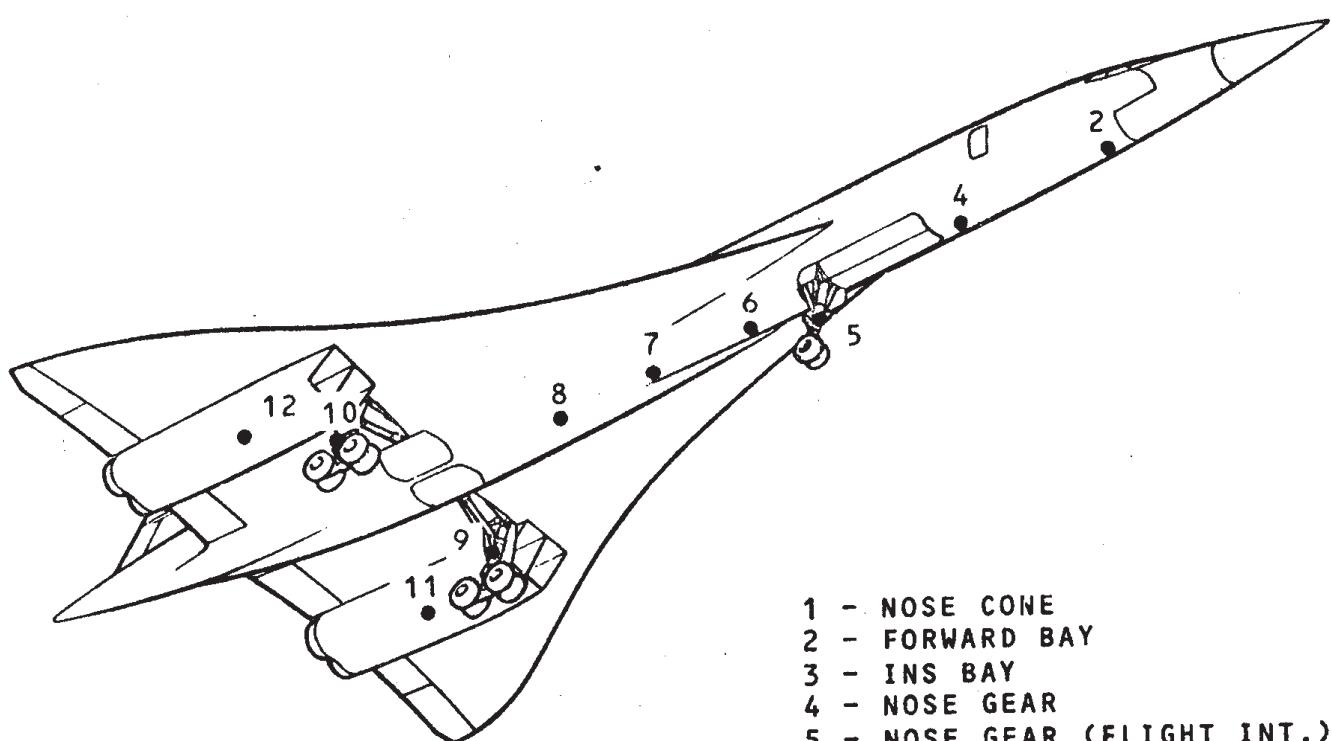
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INTERPHONE AND PA SYSTEM

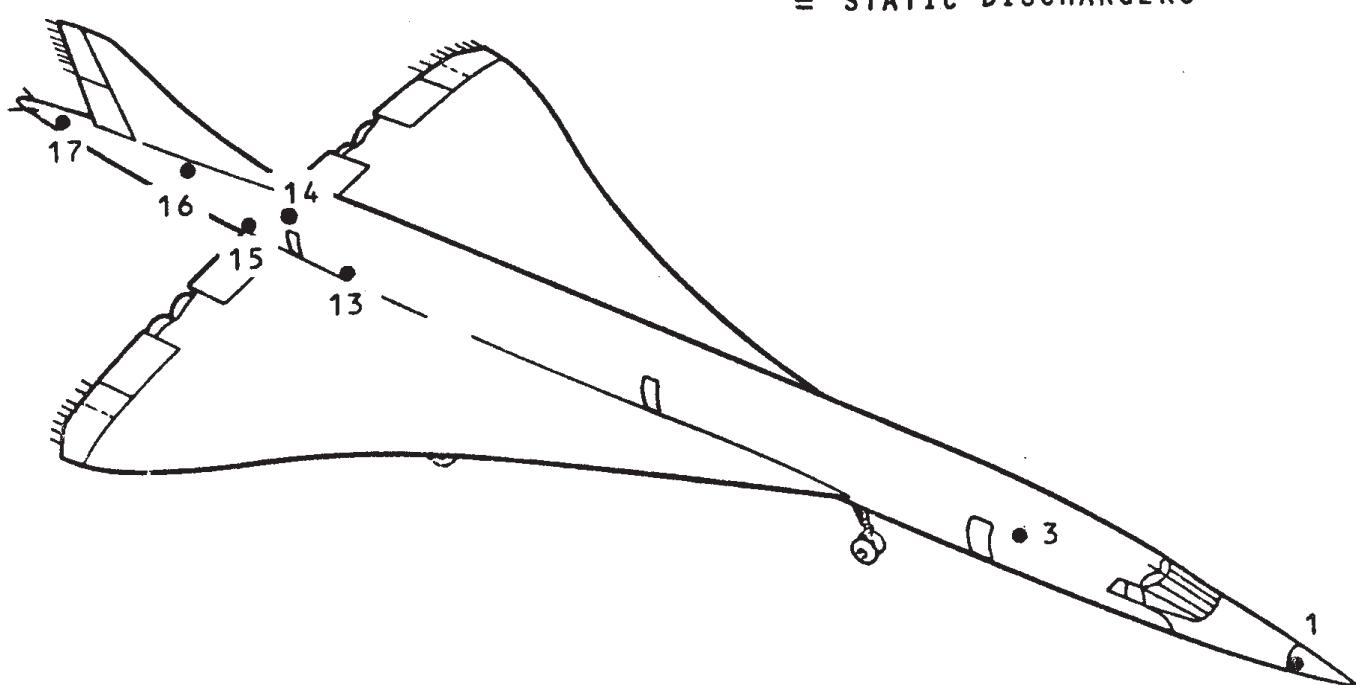


GROUND SERVICE JACK POINTS



- 1 - NOSE CONE
- 2 - FORWARD BAY
- 3 - INS BAY
- 4 - NOSE GEAR
- 5 - NOSE GEAR (FLIGHT INT.)
- 6 - BAY
- 7 - BAY
- 8 - FUEL REFUELLING PANEL
- 9 - LEFT LANDING GEAR
- 10 - RIGHT LANDING GEAR
- 11 - LEFT ENGINE NACELLE
- 12 - RIGHT ENGINE NACELLE
- 13 - AIR BAY
- 14 - HYDRAULIC BAY
- 15 - REAR ELECTRONIC BAY
- 16 - REAR DOOR
- 17 - TAIL CONE

≡ STATIC DISCHARGERS

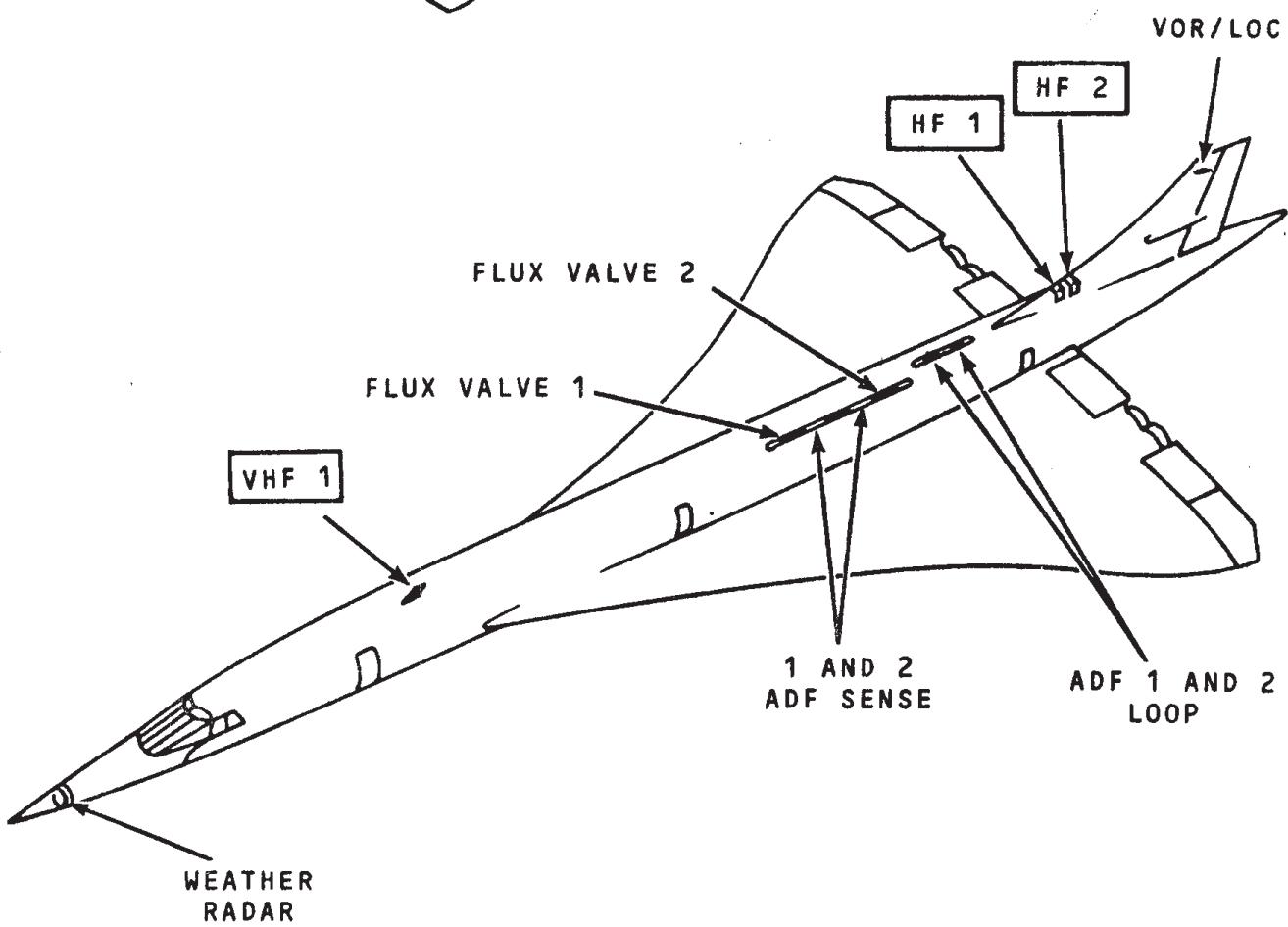
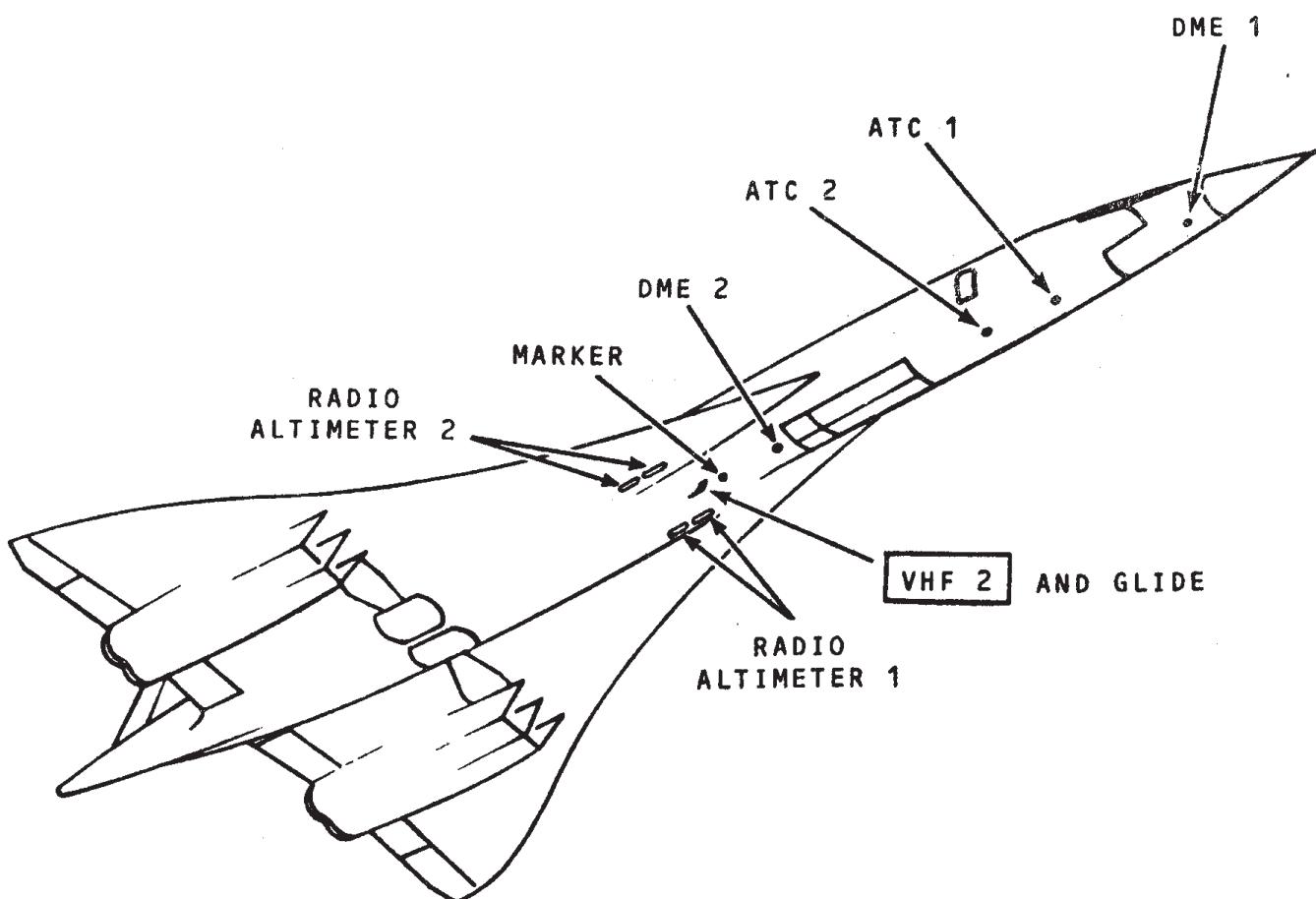


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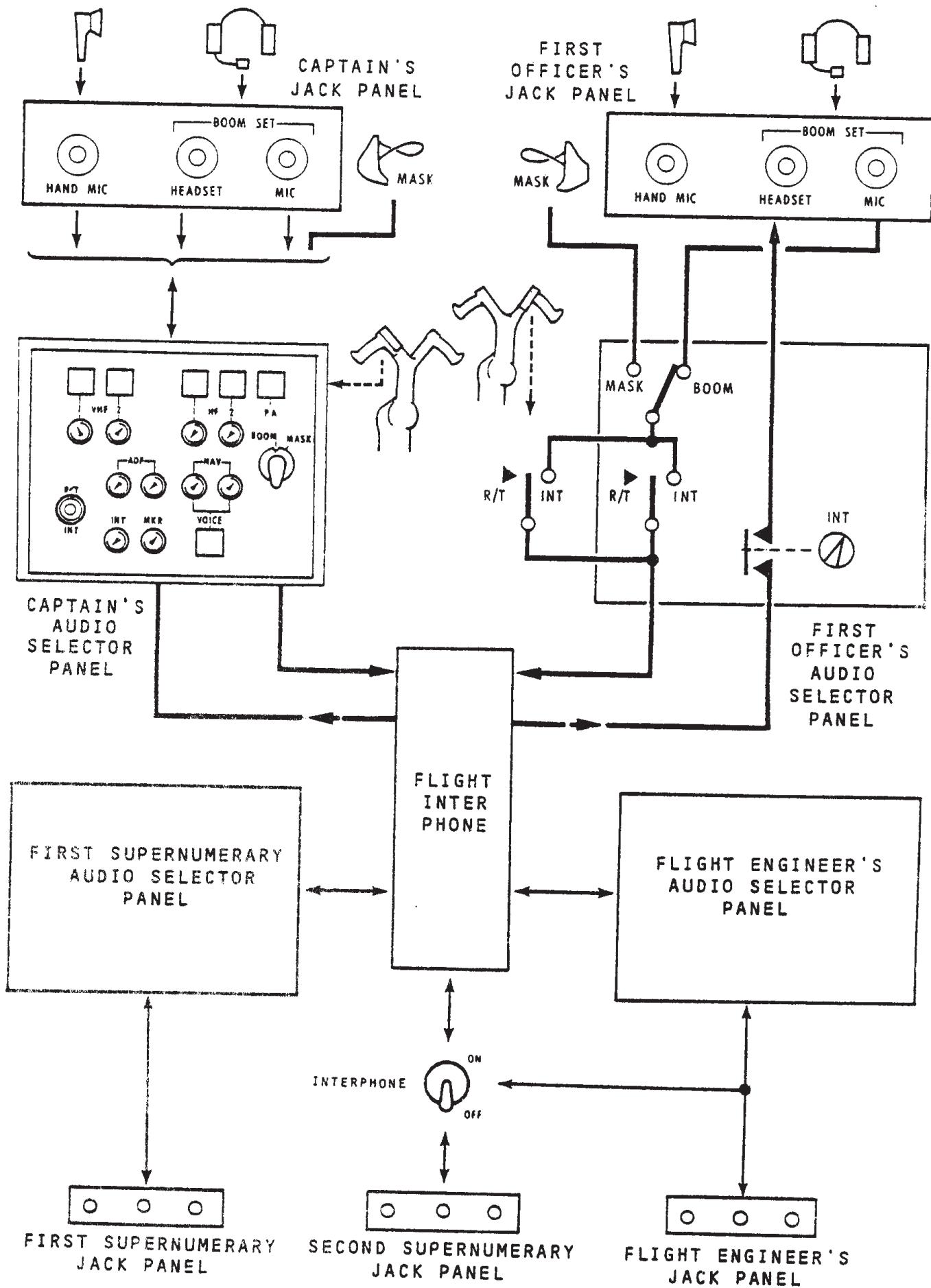
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ANTENNAE LOCATION



AUDIO SELECTOR PANEL FLIGHT INTERPHONE

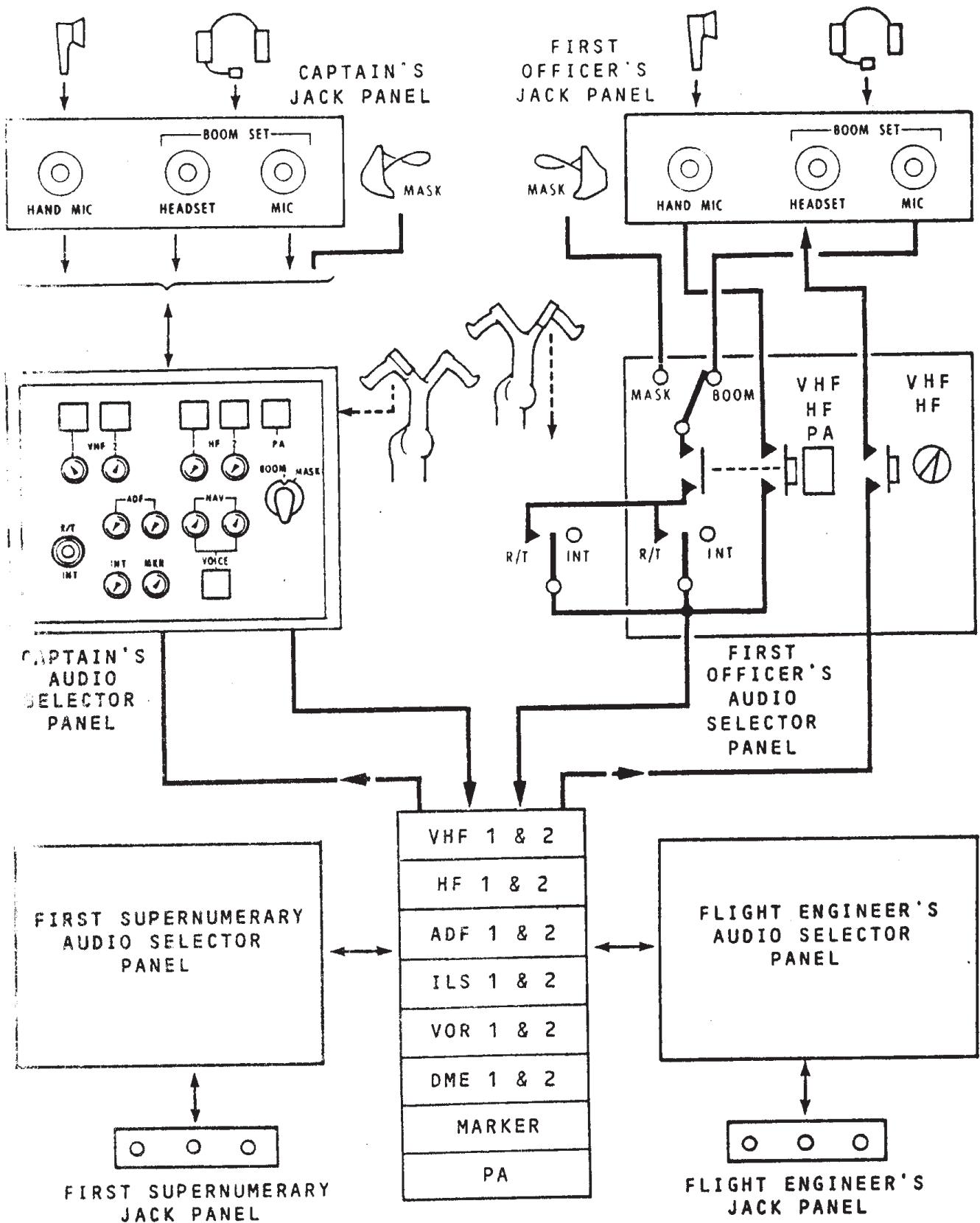


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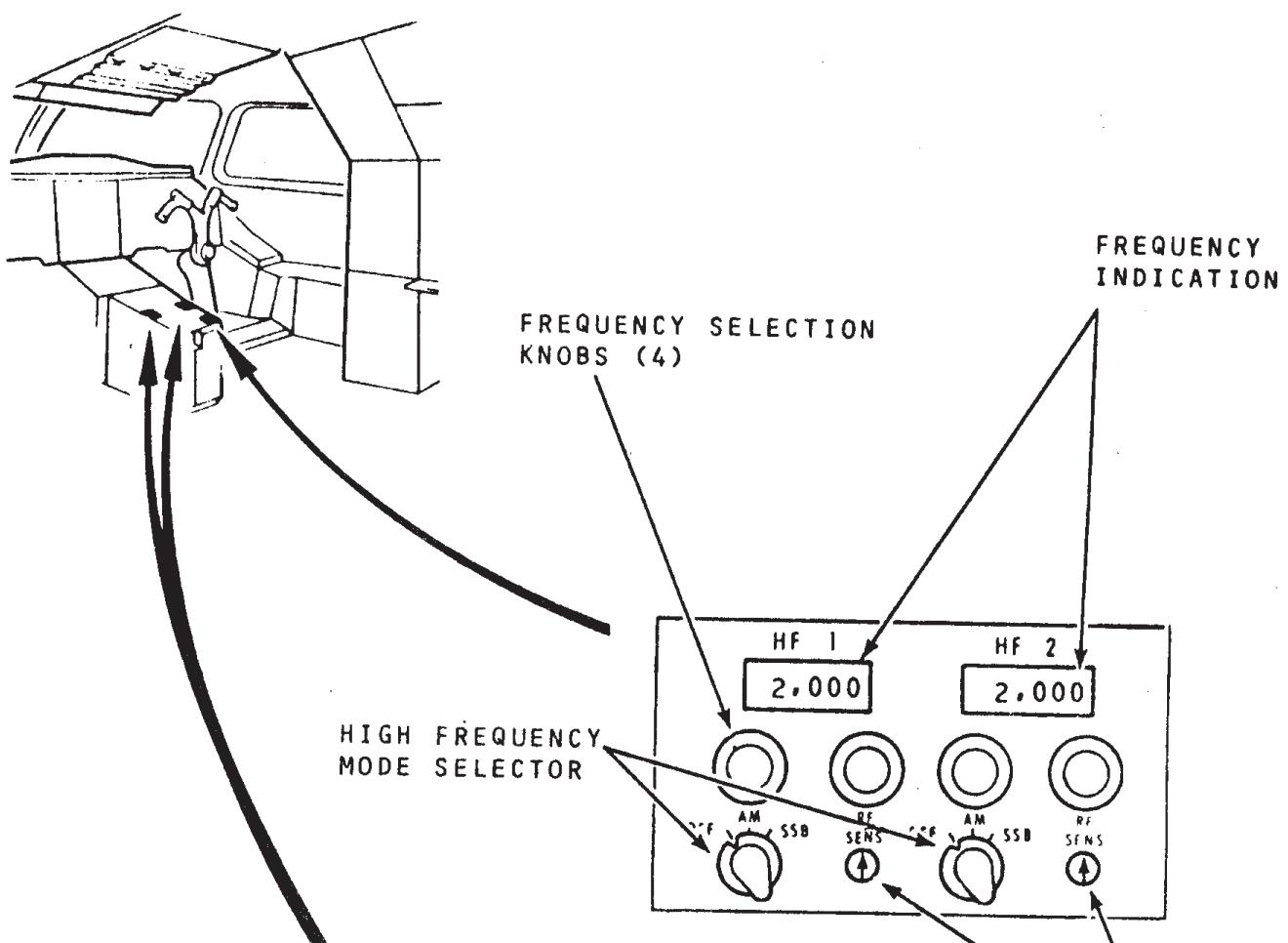
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AUDIO SELECTOR PANEL RADIO



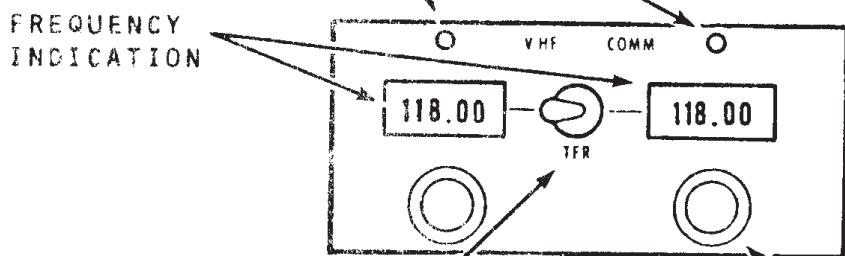
VHF AND HF SELECTION



LIGHT (Green)
On - indicates the frequency in use.

SQUELCH KNOB (2)

(Unchanged)



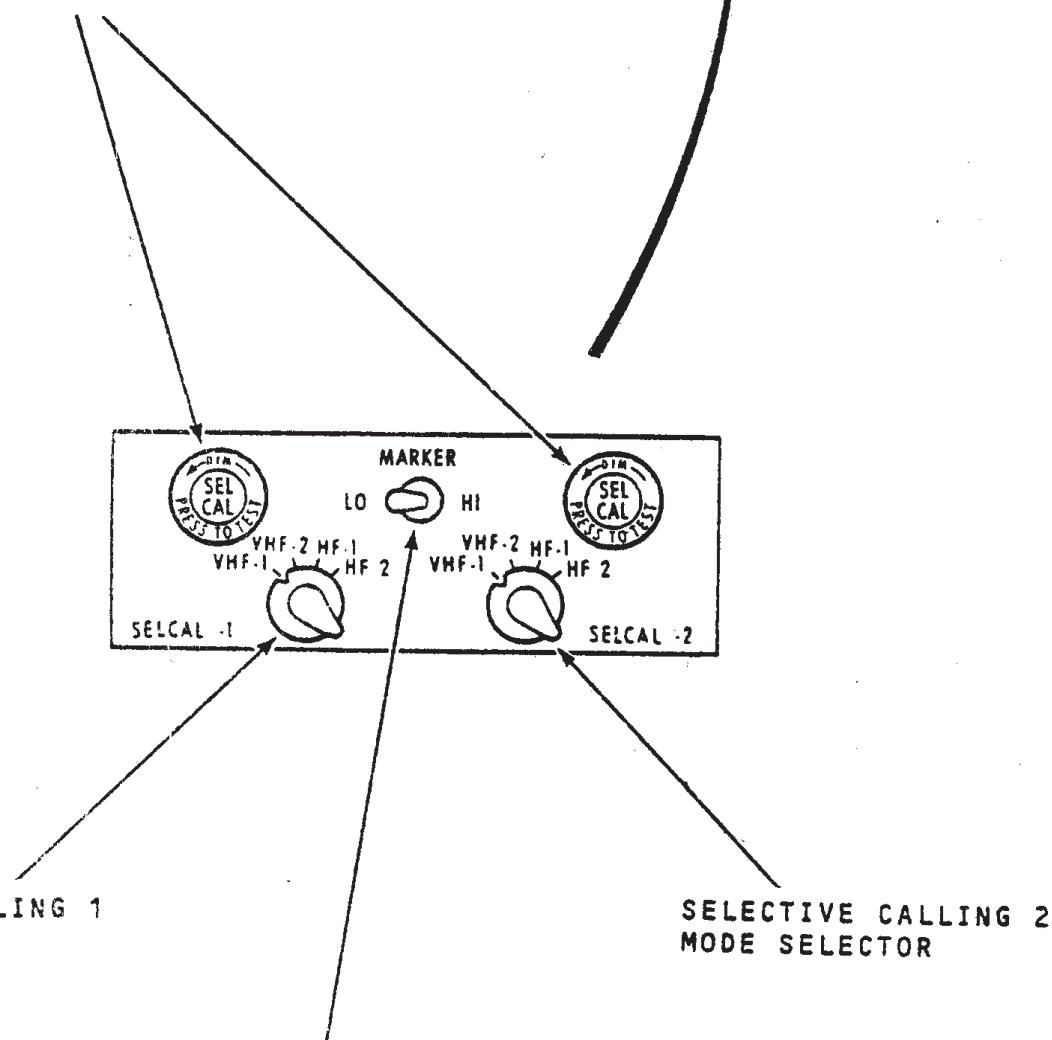
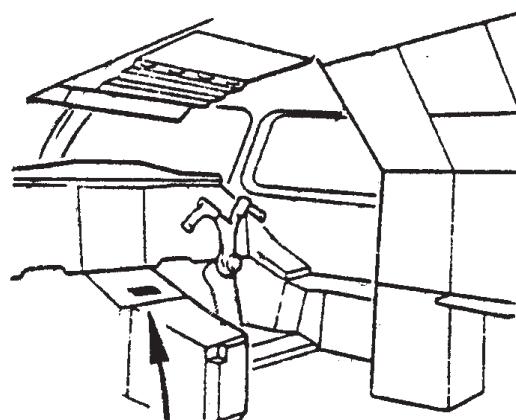
TRANSFER SWITCH
Selects the VHF frequencies to be used.

FREQUENCY SELECTOR KNOBS (2)

SELCAL PANEL

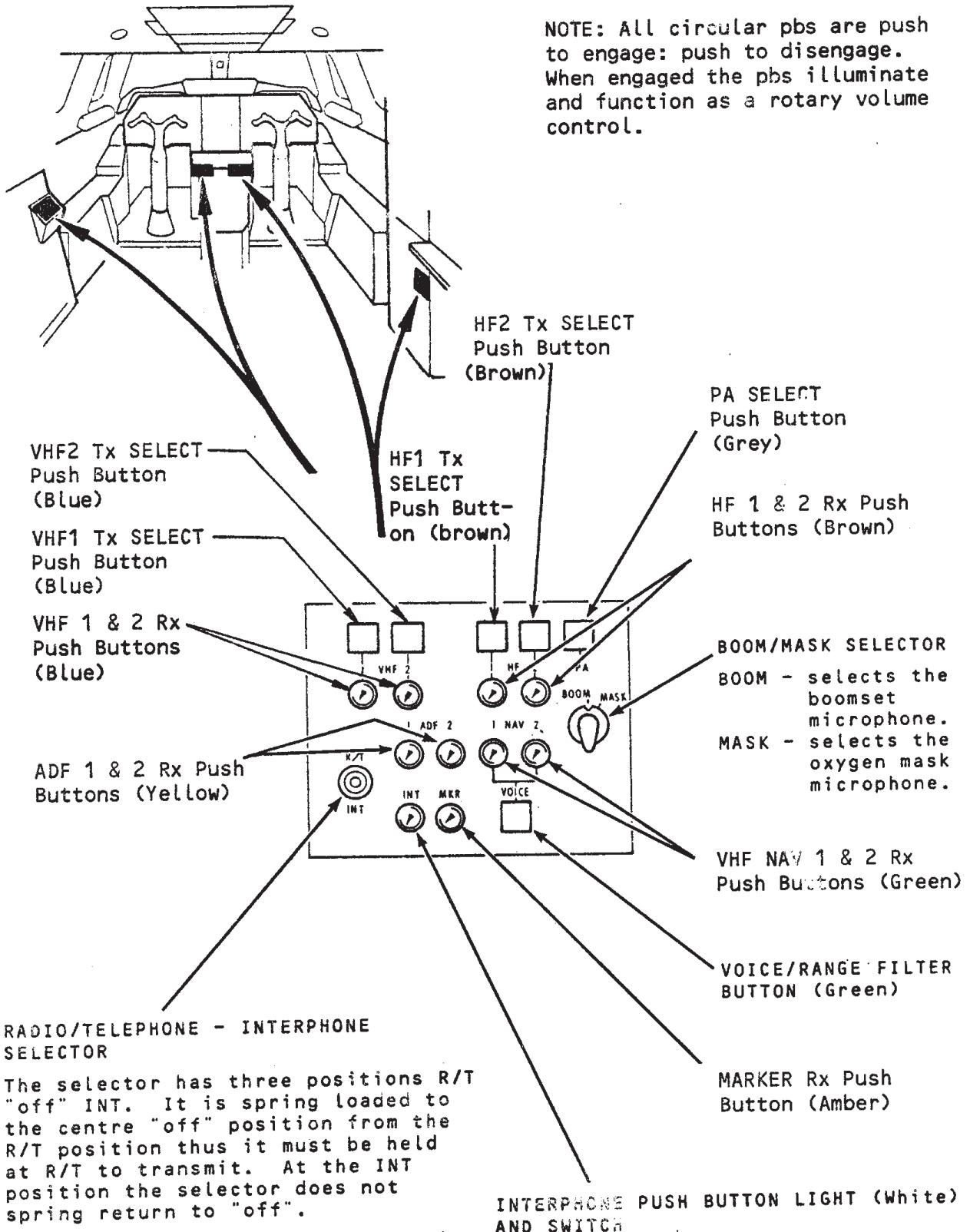
**SELECTIVE CALLING 1 and 2
PUSH BUTTON LIGHTS (Amber)**

- | On (flashing) - indicates the aircraft is being called on the selected channel.
- | Accompanied by an audio (two tone chime) repeated every five seconds.
- | Pressed - tests the associated decoder.
- | Accompanied by SELCAL lights 1 and 2 flashing and audio warning (two tone chime)
- | Repeated every five seconds.



AUDIO PANELS

PRINTED IN ENGLAND



The selector has three positions R/T "off" INT. It is spring loaded to the centre "off" position from the R/T position thus it must be held at R/T to transmit. At the INT position the selector does not spring return to "off".

R/T - transmission is made through the depressed push button.
INT - transmission is made through the interphone regardless of selection channel being depressed.

NOTE: All circular pbs are push to engage: push to disengage. When engaged the pbs illuminate and function as a rotary volume control.

INTERPHONE PUSH BUTTON LIGHT (White) AND SWITCH

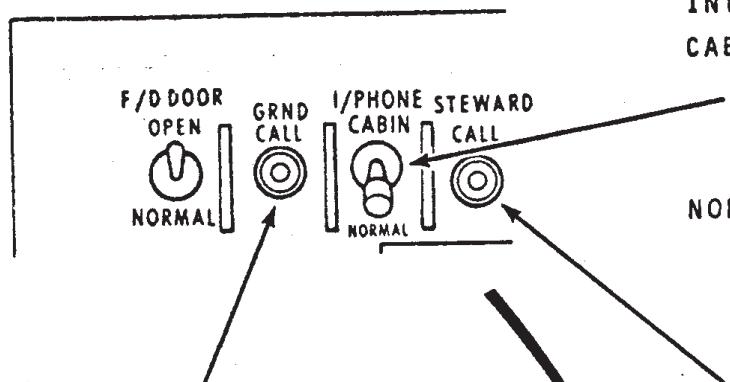
The circular knob is for listening to the transmission and the reply. It is an on/off volume control switch and it illuminates when pressed.

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INTERPHONE SWITCHES



INTERPHONE SWITCH

CABIN - the interphone systems permit communication between the flight crew stations and the cabin attendants' stations.

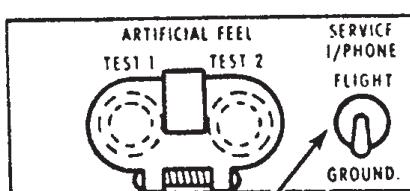
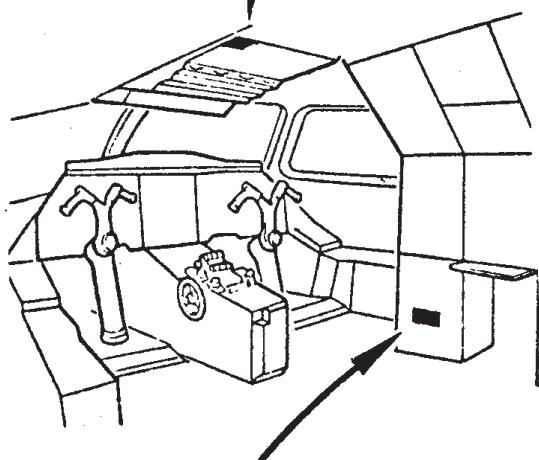
NORMAL - the interphone system permits communication only between the flight crew stations.

GROUND CALL PUSH BUTTON LIGHT (Yellow)

On - indicates the ground crew are calling the flight deck.
Accompanied by an audio (chime).
Pressed - activates a horn on the nose leg to call the ground crew.

STEWARD CALL PUSH BUTTON LIGHT (Yellow)

On - indicates the cabin crew are calling the flight deck.
Accompanied by an audio (chime)
Pressed - activates cabin crew call lights on the cabin crew panels.

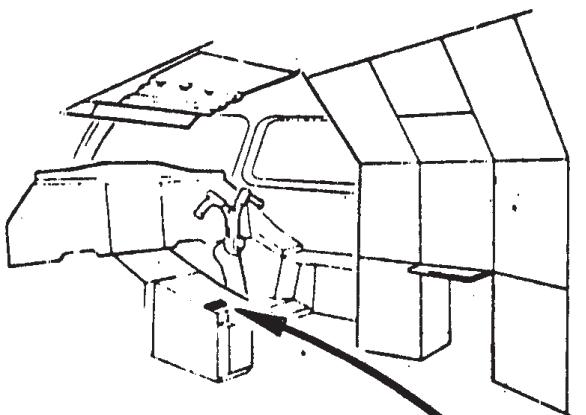


SERVICE INTERPHONE SWITCH

FLIGHT - isolates the maintenance jack boxes from the cabin service interphone system.

GROUND - connects the maintenance jack boxes into the cabin service interphone system.

ATC TRANSPONDER



ATC SWITCH

- 1 - the first of the two transponders is selected for operation.
- 2 - the second of the two transponders is selected for operation.

CODE SELECTOR KNOBS (2)
(Left hand digits)

IDENTIFICATION PUSH BUTTON

Pressed - gives additional pulse reply for positive identification.

TEST PUSH BUTTON

Pressed - tests the transponder function; if the test is successful the REPLY light comes on and remains on for at least 15 seconds.

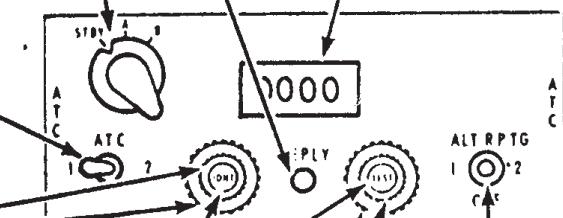
ATC MODE SELECTOR

- STBY - allows warm-up as soon as the aircraft busbars are energized. A one minute warm-up period is necessary, after power on, before engaging the system.
- A-B - position to A or B as requested by air traffic control.

REPLY LIGHT
(Green)

On - indicates that the selected transponder is being interrogated.

ATC DIGITAL CODE DISPLAY.



CODE SELECTOR KNOBS (2)
(Right hand digits)

ALTITUDE REPORTING SWITCH

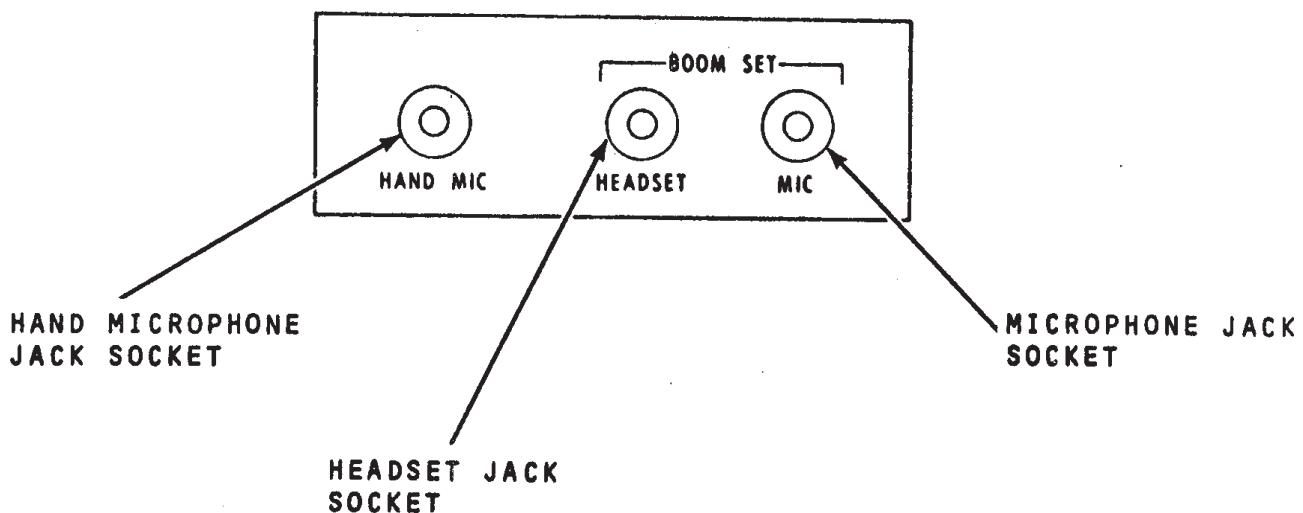
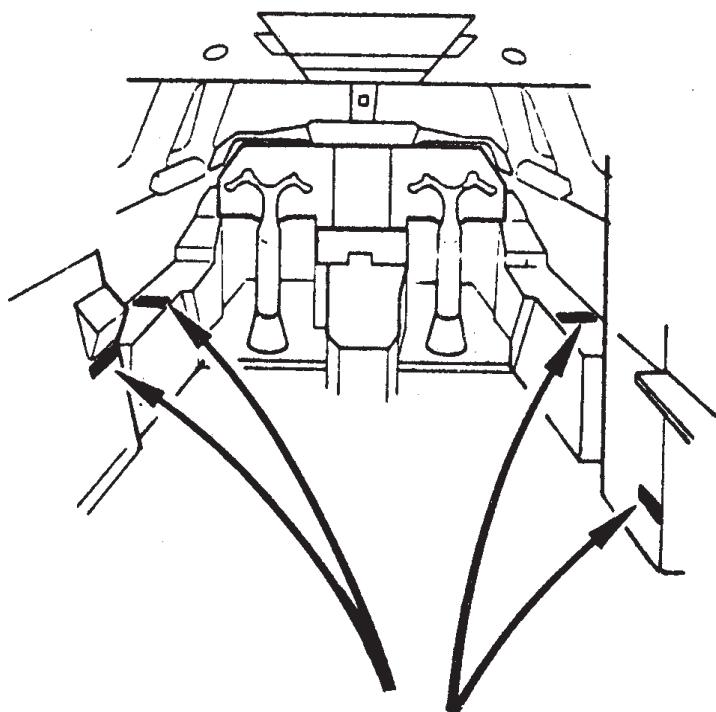
- 1 - the altitude reporting function that transmits altitude information to the ground radar uses the altitude from ADC1.
- 2* - the altitude reporting function uses the altitude from ADC2.

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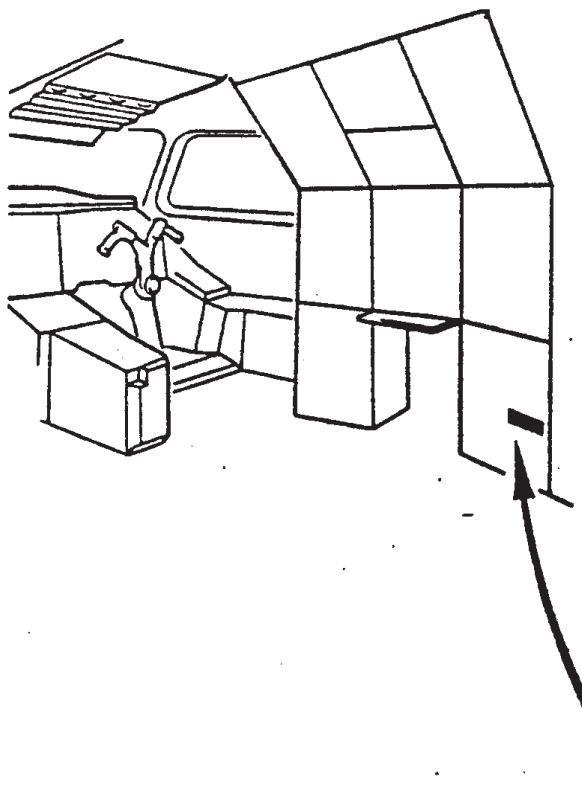
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BOOM/MASK SWITCH PANEL

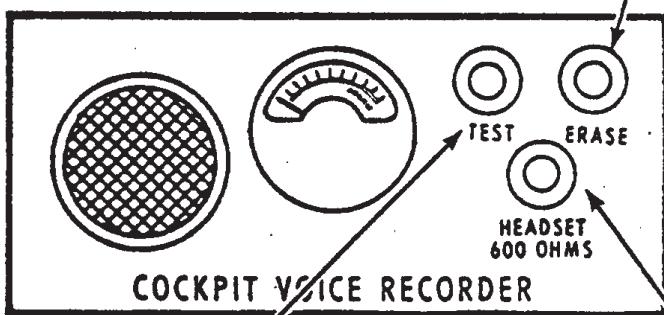


COCKPIT VOICE RECORDER



ERASE PUSH BUTTON

Pressed - with the aircraft on the ground, gear locked down and parking brake on, erases all recorded speech.

MONITOR HEADSET
JACK SOCKET

TEST PUSH BUTTON

Pressed - inserts a test signal for 0.8 secs into each recording channel in turn.

After a pause the meter shows four successive outputs and the monitor headset receives four successive 600 Hz tones.

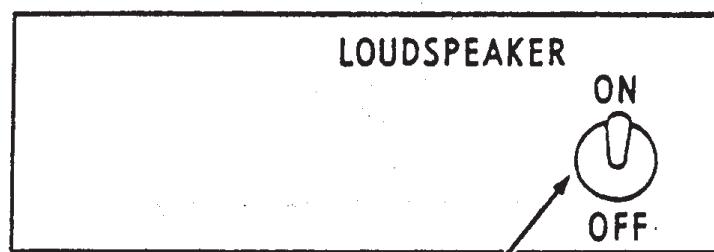
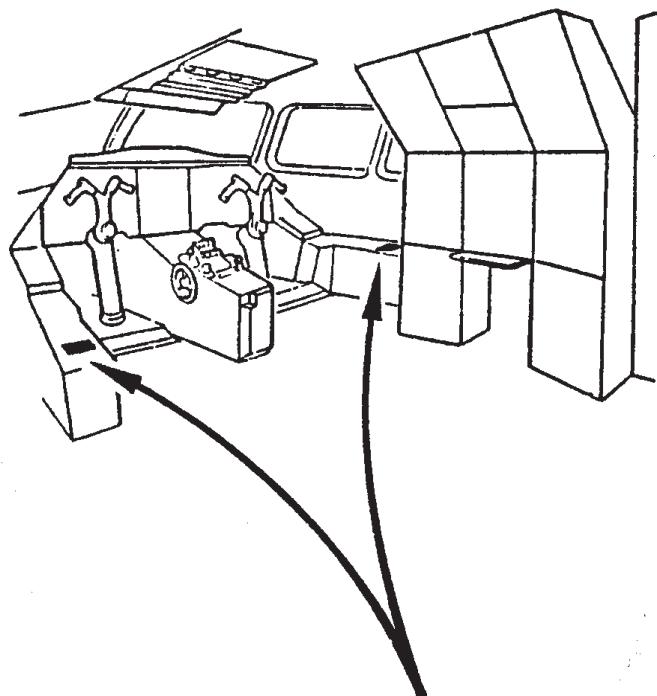
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LOUDSPEAKER



LOUDSPEAKER SWITCH

ON - Communications and MWS
audio warnings are relayed
via the loudspeaker.

OFF - only MWS audio warnings
are relayed via the
loudspeaker.

Chapter 6

ELECTRICAL

ELECTRIC

CIRCUIT BREAKER LIST

The following sections are contained in a separate booklet entitled "CIRCUIT BREAKER LISTING".

06.04	CIRCUIT BREAKER LIST	-	SYSTEMS
06.05	CIRCUIT BREAKER LIST		LOSS OF DC BUSBARS
06.06	CIRCUIT BREAKER LIST		LOSS OF AC BUSBARS

ELECTRICAL

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Essential A.C. (Sheet 2 of 2)	06.03.07
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Circuit Breaker List - Systems	06.04.02
Circuit Breaker List - Loss of D.C. Busbars	06.05.01
Circuit Breaker List - Loss of A.C. Busbars	06.06.01

ELECTRICAL

General

Electrical power for the aircraft is supplied from four engine mounted integrated drive generators (IDG) with a hydraulically driven emergency generator for essential supplies under failure or emergency conditions.

Ground power can be connected to the aircraft distribution system through a single ground connection.

The electrical generating system is a.c. with d.c. power provided by transformer rectifier units (TRU) and batteries.

DESCRIPTIONAC Generating System

During ground operations power is supplied from an external source. When the ground power unit is connected to the aircraft its output is automatically checked for voltage, frequency and direction of rotation.

A ground power breaker is closed to direct the ground supply to the split system breakers, the bus tie breakers and hence the a.c. main busbars.

In flight normal power is supplied by four engine-driven IDGs. At engine start the output from each generator is automatically connected to its a.c. main busbar when minimum control conditions of voltage and frequency are reached and the frequency synchronism is acceptable to the busbar.

Frequency control of each generator is provided by its constant speed drive (CSD). CSD disconnect is available at any time but it can only be reset on the ground with the engine stopped.

The generator is at all times protected from faults and will trip if limits are exceeded.

AC Distribution System

Each generator is connected to its a.c. main busbar (1X 2X 3X and 4X) by a generator circuit breaker (GCB). The generators outputs may be used in parallel combination up to all four in parallel, the busbars being interconnected by means of bus tie breakers (BTB) and split system breakers (SSB). The SSB connect the left hand main a.c. system to the right hand main a.c. system. Each BTB connects an a.c. main busbar in parallel with the other a.c. main busbars.

Normally the a.c. essential busbars (5X 6X 7X and 8X) are powered, each from its associated a.c. main busbar, but if any a.c. main busbar fails the emergency generator automatically starts and connects to the dead a.c. essential busbar.

Emergency Generation

An emergency generator powered by a hydraulic motor supplied from the green hydraulic system is capable of supplying sufficient power for all essential electrical systems in flight. The emergency generator automatically starts if any a.c. main busbar fails or if No. 1 and No. 2 engines fail while airborne.

Emergency Distribution

Under failure conditions the emergency generator is directly connected to 16X and through the auto shed breaker (ASB) to 17X. 16X powers the a.c. essential busbars 5X, 6X and relight busbars 24X, 25X, 26X and 27X. 17X powers the a.c. essential busbars 7X, 8X supplying engine and other services which are not available under engines No. 1 and No. 2 failure conditions which open the ASB.

Standby instrument busbars 32X and 33X, normally powered from the a.c. essential busbar 5X, are automatically powered from the d.c. essential busbar 3P when RAT is selected.

D.C. Generating System

Four transformer rectifier units (TRU) are the primary source of d.c. power. TRU No. 1 and No. 4 are powered from the a.c. essential busbars 5X and 8X. TRU No. 2 and No. 3 are powered from the a.c. main busbars 2X and 3X.

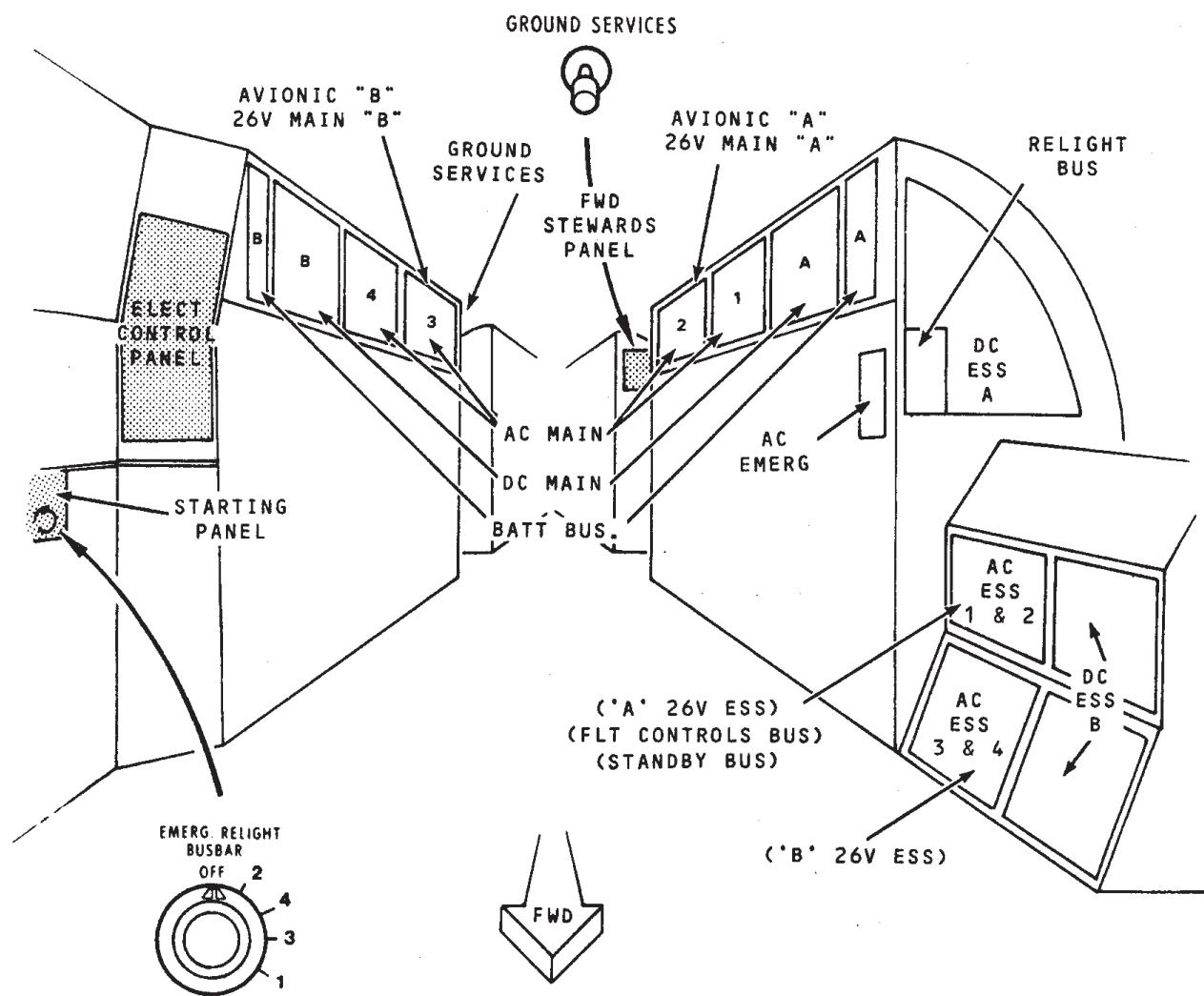
D.C. Distribution System

The TRU No. 2 and No. 3 power the d.c. main busbars 1P and 2P and TRU No. 1 and No. 4 power the d.c. essential busbars 3P and 4P. The d.c. main busbar is in two parts, 1P and 2P, connected by fuses.

One battery is connected to each d.c. essential busbar. The d.c. essential busbars are connected to the d.c. main busbar by fuses and essential/main isolate breakers.

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ELECTRICAL POWER CIRCUIT BREAKER PANELS

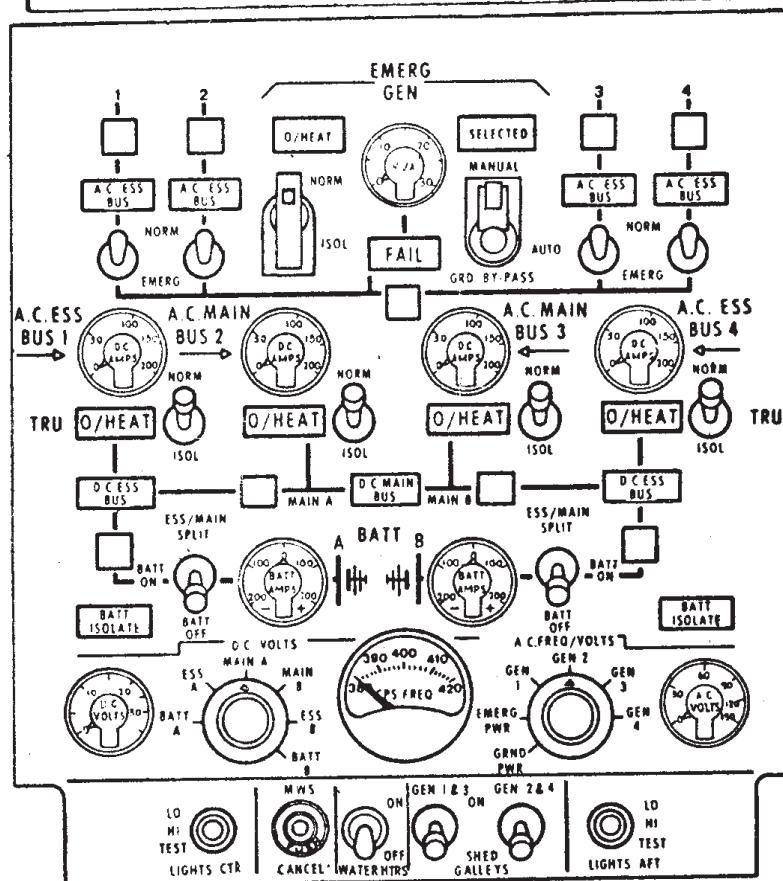
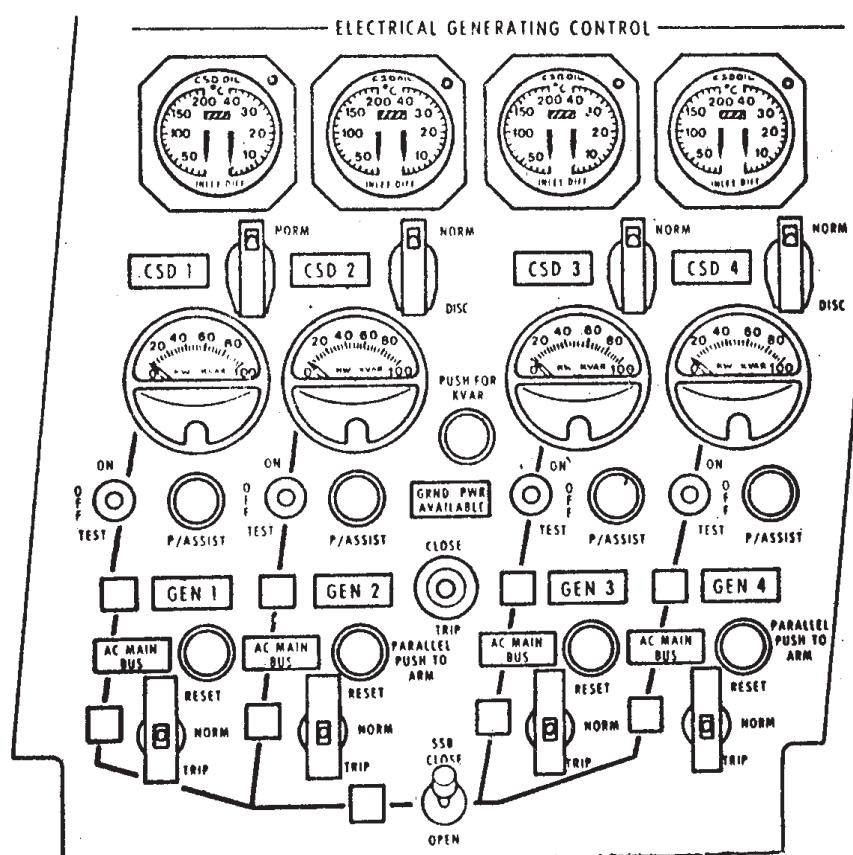


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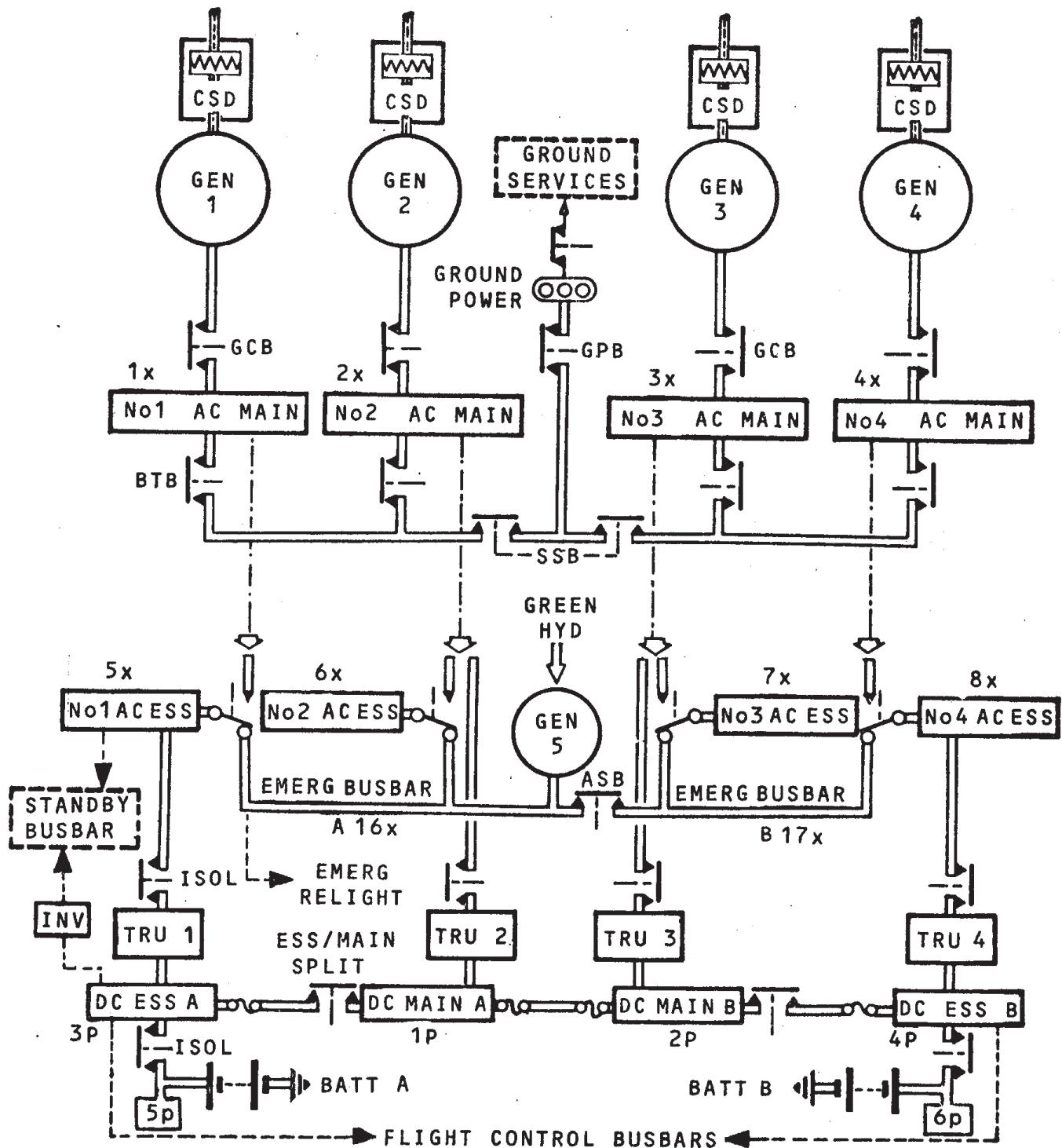
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ELECTRICAL GENERATING CONTROL PANEL



ELECTRICAL SYSTEM SCHEMATIC



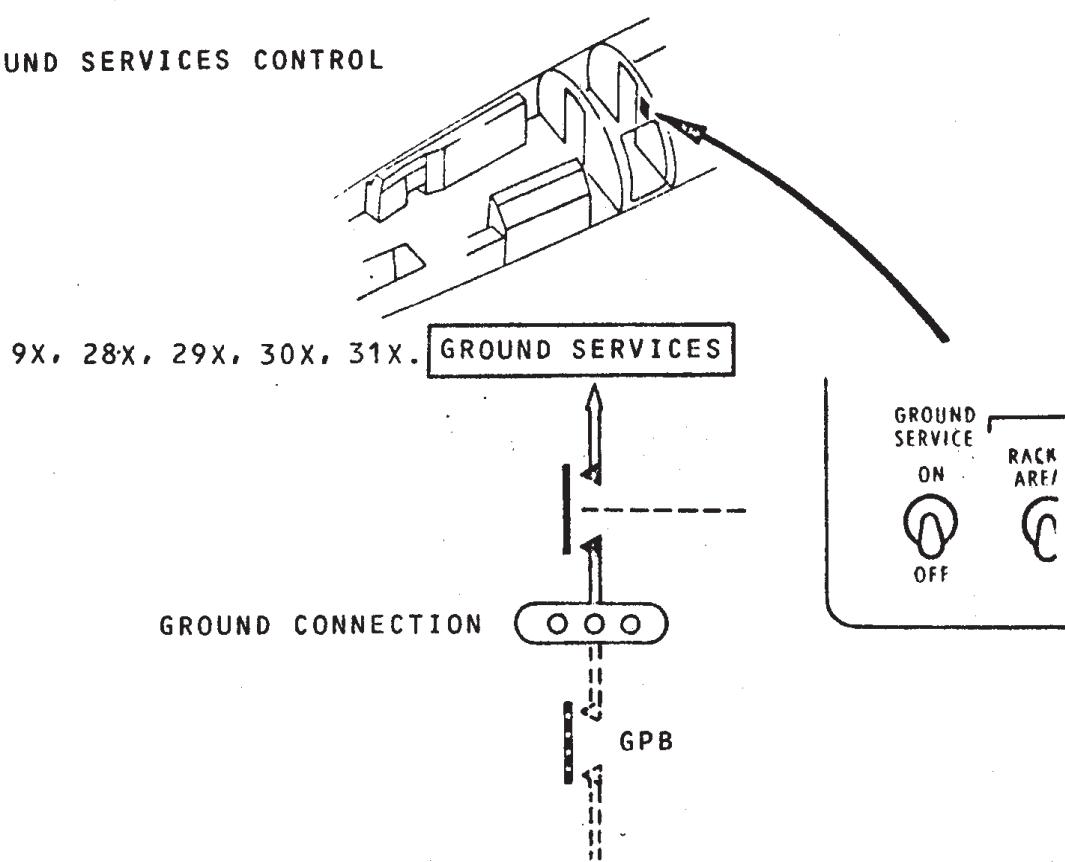
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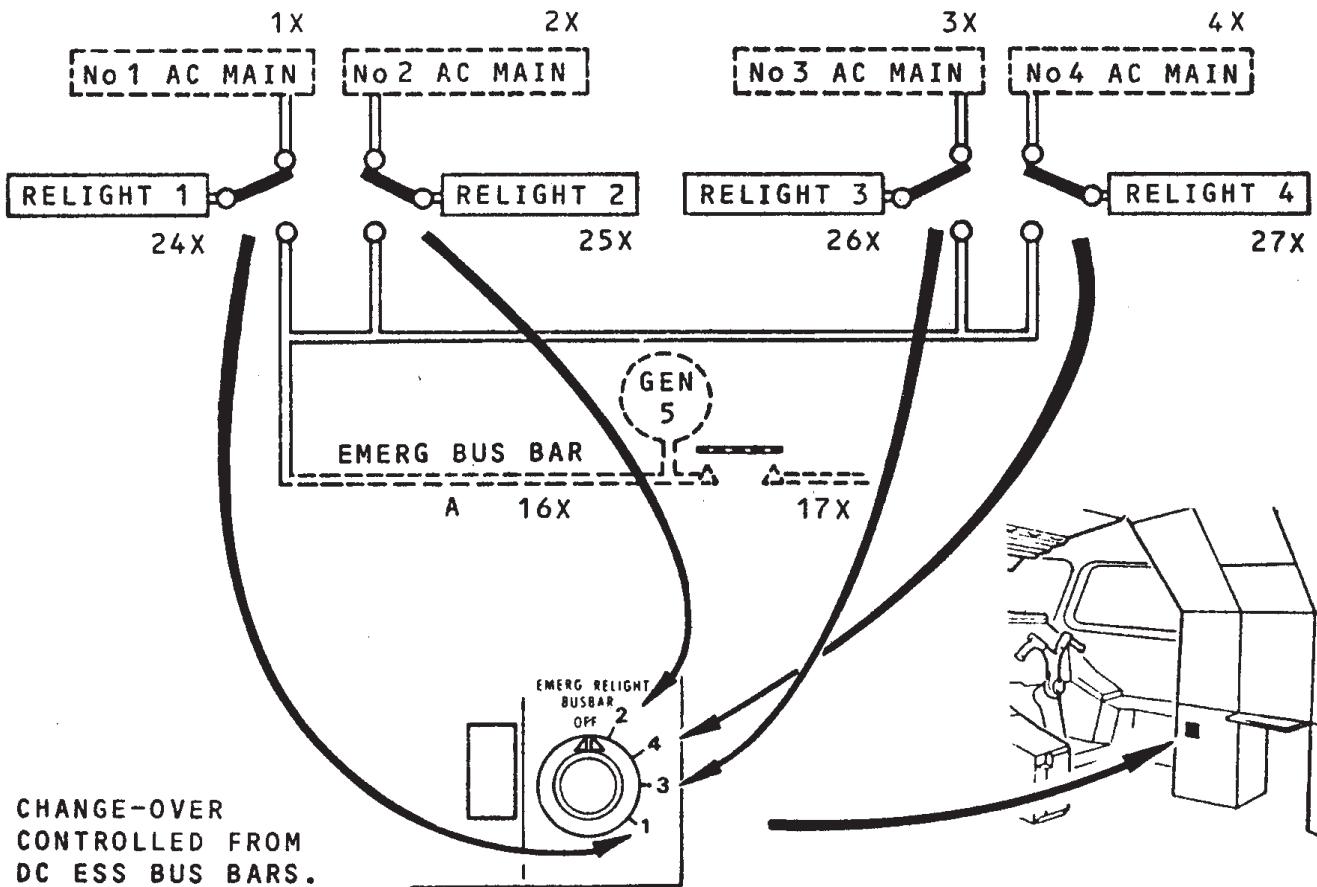
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ANCILLARY BUSBARS

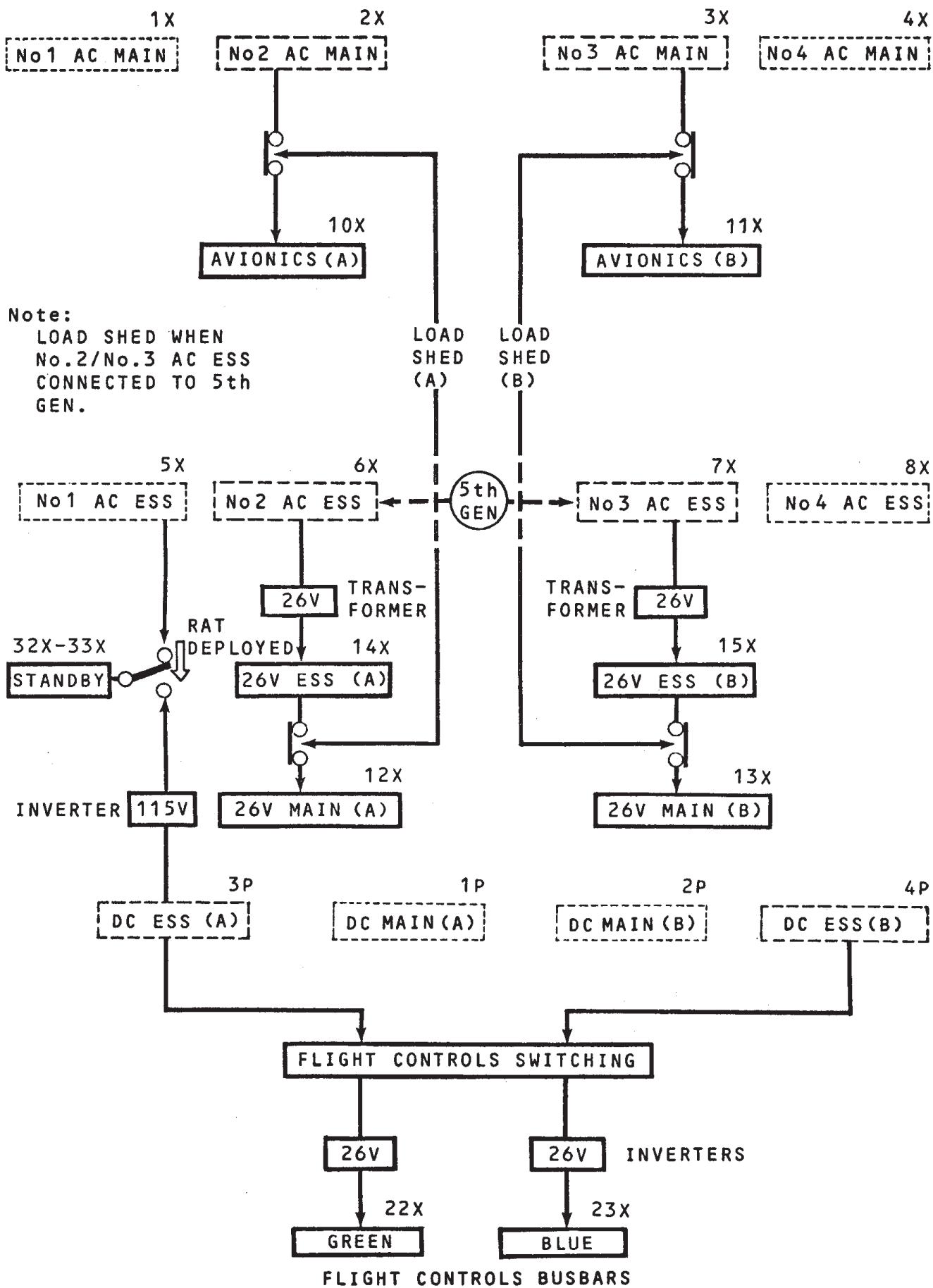
GROUND SERVICES CONTROL



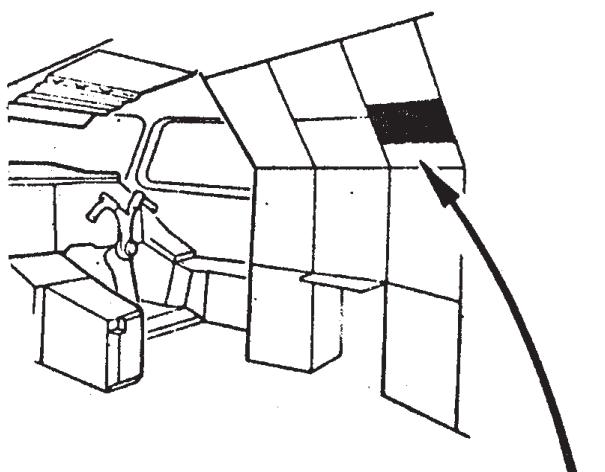
RELIGHT BUSBAR CONTROL



ELECTRONIC SUPPLIES



CONSTANT SPEED DRIVE

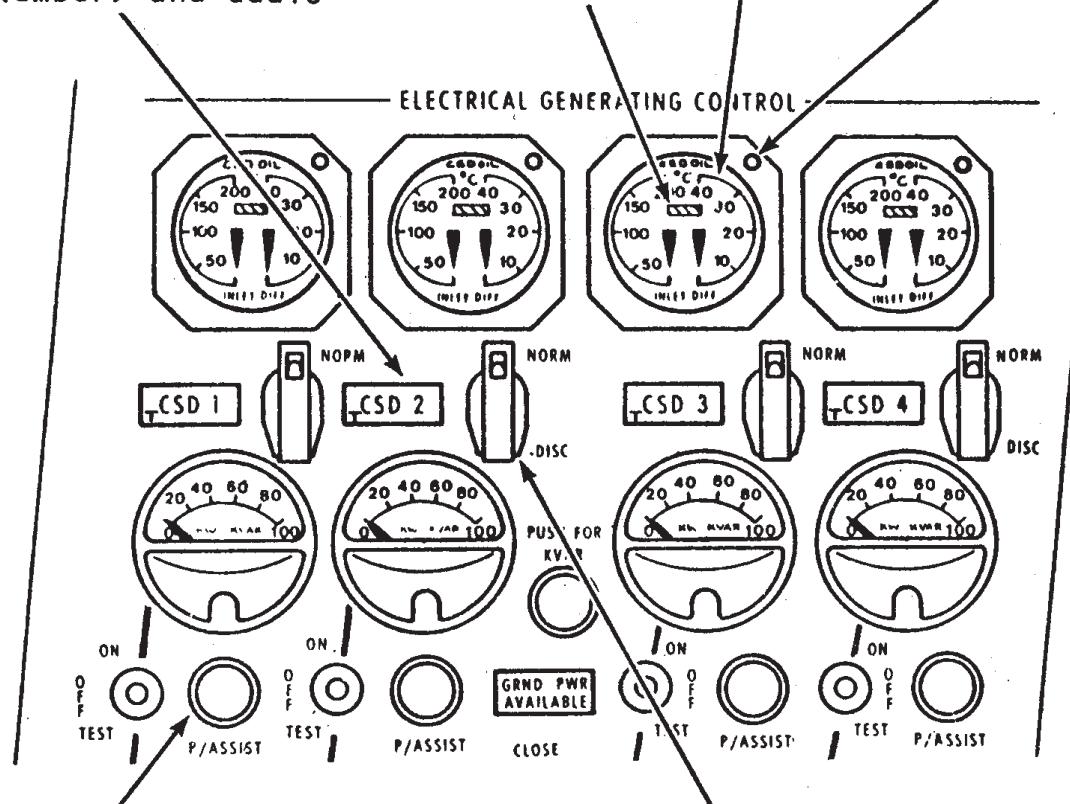


CSD LIGHT (Amber) (4)

On - indicates low oil pressure within the CSD. Accompanied by MWS ELEC light (amber) and audio (gong)

CSD OIL TEMPERATURE INDICATOR (4)

Left hand indicator shows the INLET temperature, the right hand indicator shows the DIFF (differential) between the inlet and outlet temperature. Loss of electrical power to the instrument is indicated by a red and black striped flag.



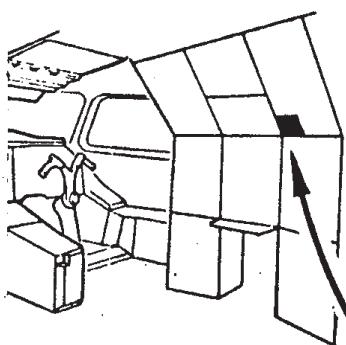
P/ASSIST PUSH BUTTON (4)

Press - to increase the generator frequency by 3Hz thus speeding up the self-paralleling of the generator to the busbar when the frequency difference is greater than 4 Hz or when the phase angles are different but no frequency difference exists.

CSD DISCONNECT SWITCH (4)

DISC - disconnects the CSD from the engine. The CSD speed drops and automatically disconnects the generator from its associated a.c. main busbar.

GENERATOR



GENERATOR LIGHT
(Amber) (4)

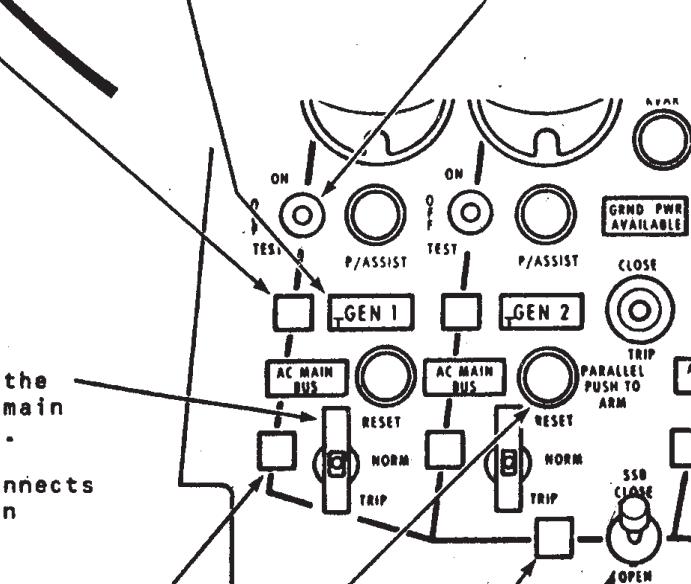
On - when the GCB is not connecting the generator to the associated a.c. main busbar.
Accompanied by MWS ELEC light (amber) and audio (gong).

GCB MI (4)

- generator is connected to the main a.c. busbar. It is a backup to the GEN light.
- generator is disconnected from busbar.

BTB SELECTOR (4)

- RESET - closes the BTB
- NORM - automatically controls the connection of its a.c. main busbar to the other a.c. main busbars.
- TRIP - opens the BTB and disconnects the associated a.c. main busbar from the others.



PARALLEL PUSH TO ARM PUSH
BUTTON LIGHT (Clear) (4)

Push to arm - the push button is in the out position.
Light cycles dim and bright when the associated generator frequency is near to the busbar frequency.
When the light is dim, the generator channel is nearest to synchronization with the other a.c. main busbars.
Push to disarm - the push button is in the in position.

GENERATOR SELECTOR (4)

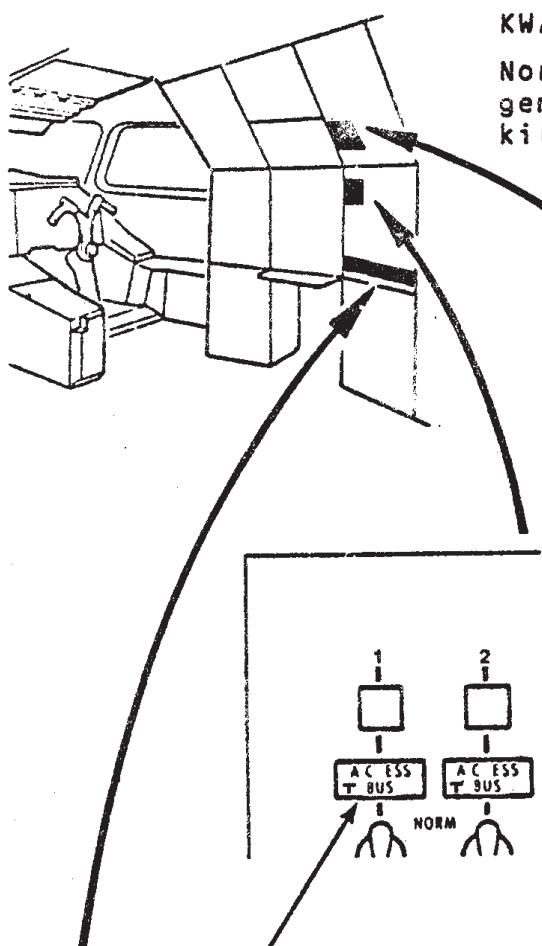
- ON - the output from the generator will be connected to the a.c. main busbar as soon as datum conditions are reached.
- OFF - disconnects the generator from its associated a.c. main busbar and de-excites it.
- TEST - controls the generator at normal volts and frequency but prevents it from connecting to its a.c. main busbar. The selector is spring loaded from TEST to OFF.

SSB MI

SSB SWITCH

- CLOSE - automatically parallels No.1 and No.2 generators with No.3 and No.4 generators when voltage and frequency are compatible.
- OPEN - isolates No.1 and No.2 a.c. main busbars from No.3 and No.4 a.c. main busbars.

AC POWER

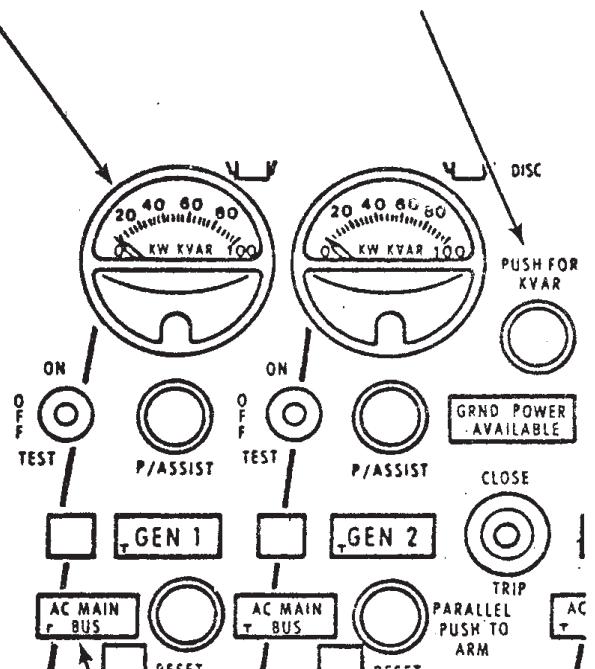


KW/KVAR METER (4)

Normally indicates generator load in kilowatts.

KVAR PUSH BUTTON

Press - to obtain generator load indication in kilo-volt amps (reactive).

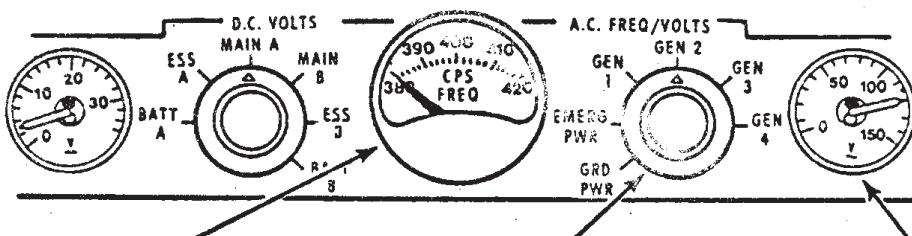


AC ESS BUS LIGHT (Red) (4)

On - indicates a failure of supply at the a.c. essential busbar.
Accompanied by the MWS ELEC light (red) and audio (gong).
Off - when the busbar is powered by either its attendant a.c. main busbar or the emergency generator.

AC MAIN BUS LIGHT (Amber) (4)

On - indicates a failure of supply to the a.c. main busbar. This automatically switches on the emergency generator which remains latched on until switched off by momentary selecting ISOL on the emergency generator NORM/ISOL switch.
Accompanied by the MWS ELEC Light (amber) and audio (gong).
Off - when the busbar is powered by either the ground supply or the aircraft generators.

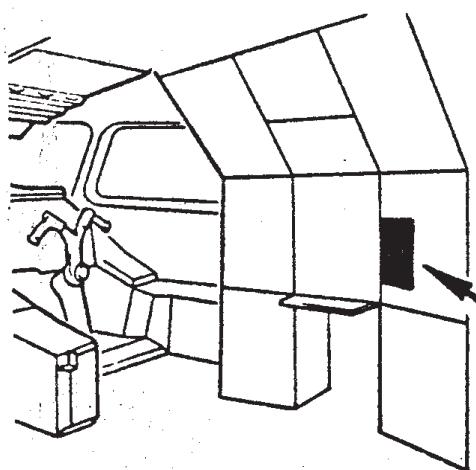


FREQUENCY METER

AC FREQ/VOLT SELECTOR

AC VOLTMETER

DC POWER (Sheet 1 of 2)



DC MAIN BUS LIGHT (Amber)

On - indicates that one or both parts of the busbar are at less than 25 volts and are automatically disconnected from the associated d.c. essential busbar.
Accompanied by MWS ELEC light (amber) and audio (gong).
Off - when the busbar is powered by the TRUs.

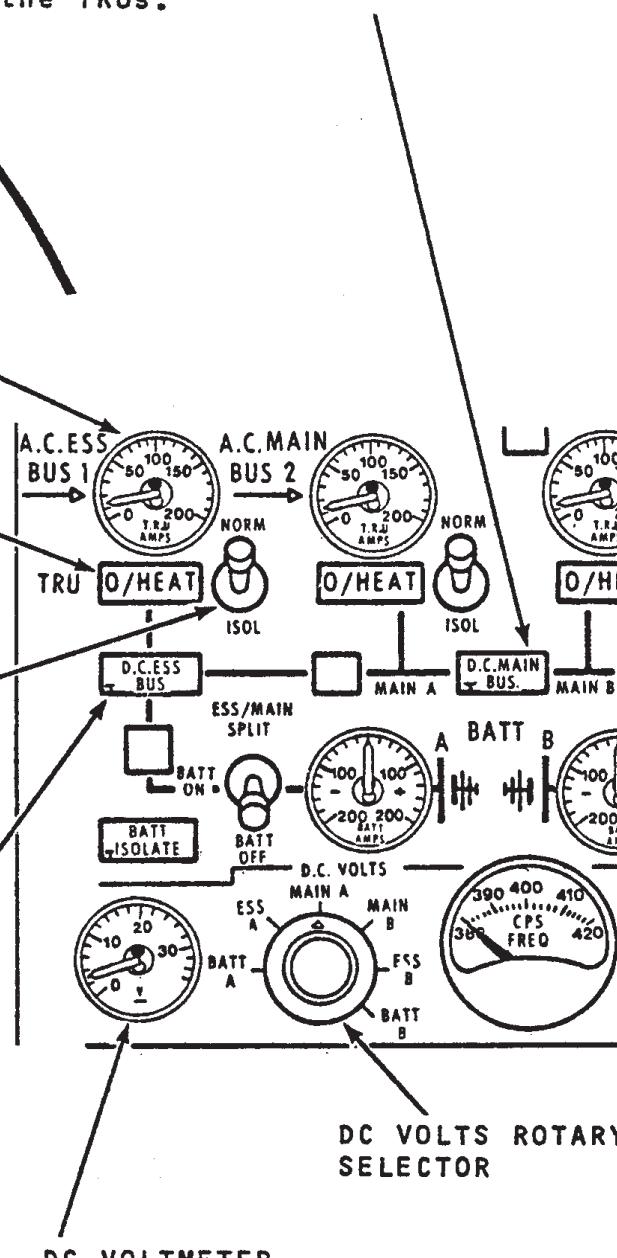
TRU LOAD INDICATOR (4)

TRU O/HEAT LIGHT (Yellow) (4)

On - indicates a TRU excess temperature.
When the temperature drops the light will go off.

TRU SWITCH (4)

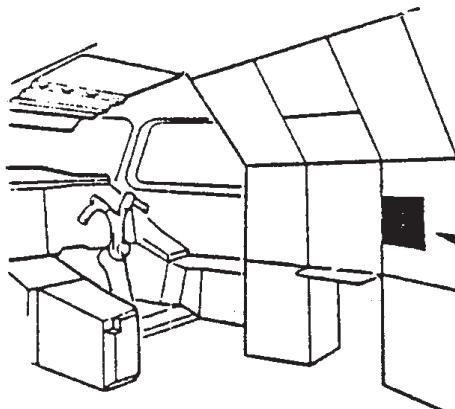
NORM - connects TRU to its a.c. supply.
ISOL - breaks a.c. supply to the TRU



DC ESS BUS LIGHT (Red) (2)

On - indicates that the d.c. essential busbar is not supplied.
Accompanied by MWS ELEC light (red) and audio (gong).
Off - when the busbar is powered by the TRUs or batteries.

DC POWER (Sheet 2 of 2)



ESS/MAIN SPLIT MI (2)



- indicates that the attendant d.c. main and essential busbars are connected.



BATTERY MI(2)

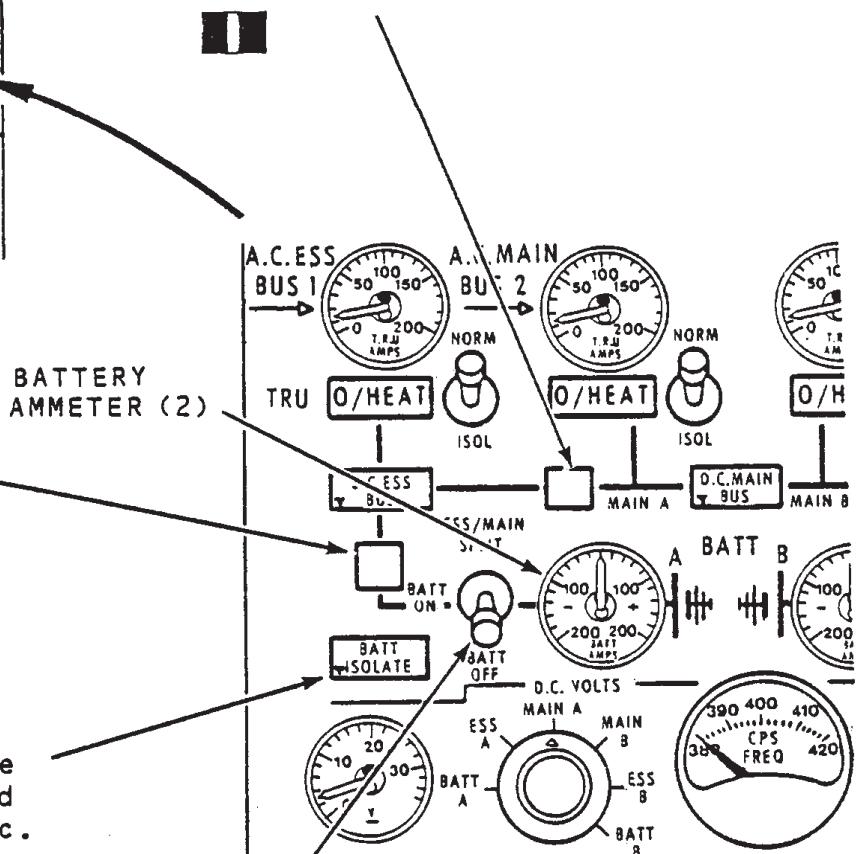
This is a back up to the BATT ISOLATE light.



BATT ISOLATE LIGHT (Amber) (2)

On - indicates that the battery is disconnected from its associated d.c. essential busbar.

Accompanied by MWS ELEC light (amber) and audio (gong).



BATTERY SELECTOR (2)

ESS/MAIN SPLIT - connects the battery to its associated d.c. essential busbar and opens the associated d.c. ess/main isolate breaker, thus disconnecting the d.c. main and d.c. essential busbars from each other.

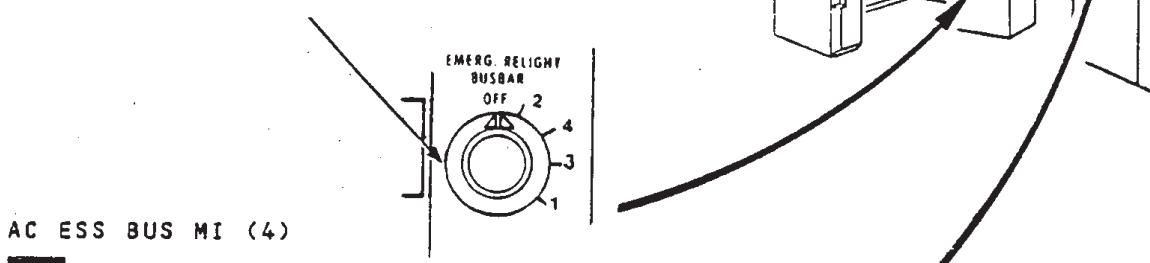
BATT ON - connects the battery to its associated d.c. essential busbar 3P or 4P and arms the associated d.c. essential/main isolate breaker thus connecting the d.c. main and d.c. essential busbars together.

BATT OFF - disconnects the battery from its associated d.c. essential busbar 3P or 4P and arms the associated d.c. essential/main isolate breaker thus connecting the d.c. main and d.c. essential busbars together.

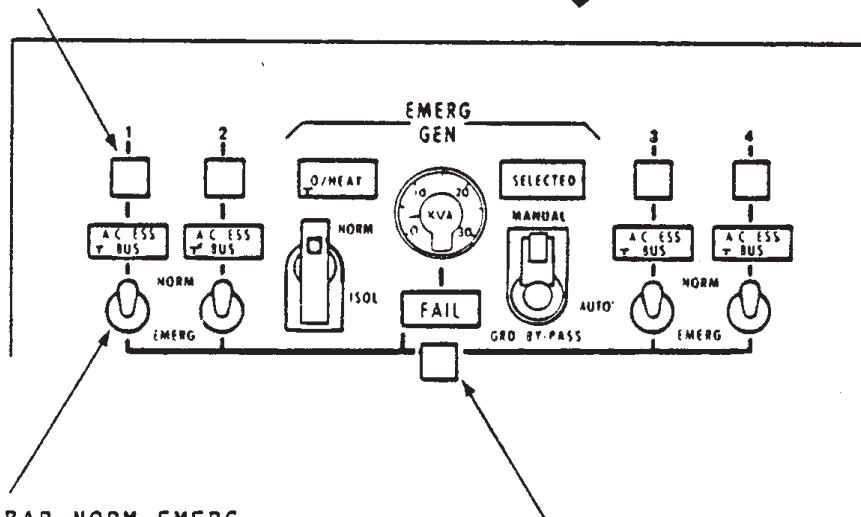
ESSENTIAL AC (Sheet 1 of 2)

EMERGENCY RELIGHT BUSBAR
ROTARY SELECTOR

2,4,3, and 1 - the emergency generator powers the emergency relight busbars 25X,27X,26X and 24X respectively to operate the right hand igniter, the start pump and the main engine feed pump of the associated collector tank.



- indicates that the a.c. essential busbar is connected to its associated a.c. main busbar.



AC ESSENTIAL BUSBAR NORM EMERG SWITCH (4)

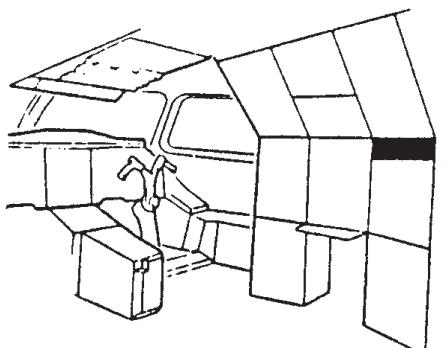
- NORM - connects the a.c. essential busbar 5X,6X,7X or 8X respectively to its associated a.c. main busbar.
Allows the emergency generator to revert to automatic control.
EMERG - selects the emergency generator on and disconnects the a.c. essential busbar from the associated a.c. main busbar and connects it to the emergency generator output busbars 16X or 17X.
- No. 2 switch, sheds the avionics A busbar 10X and the 26V a.c. main A busbar 12X.
 - No. 3 switch, sheds the avionics B busbar 11X and the 26V a.c. main B busbar 13X.

AUTO SHED BREAKER MI

- indicates that the emergency generator can be connected to No. 3 and No. 4 a.c. essential busbars 7X and 8X via busbar 17X.

- indicates that there is no connection between the emergency generator directly connected a.c. emergency busbar 16X and the shippable a.c. emergency busbar 17X. Is automatically opened when No.1 and No.2 engine failure is sensed.

ESSENTIAL AC (Sheet 2 of 2)



EMERG GEN O/HEAT LIGHT (Red)

On - indicates an emergency generator carcase or bearing high temperature. Accompanied by MWS ELEC light (red) and audio (gong).

EMERG GEN SELECTOR

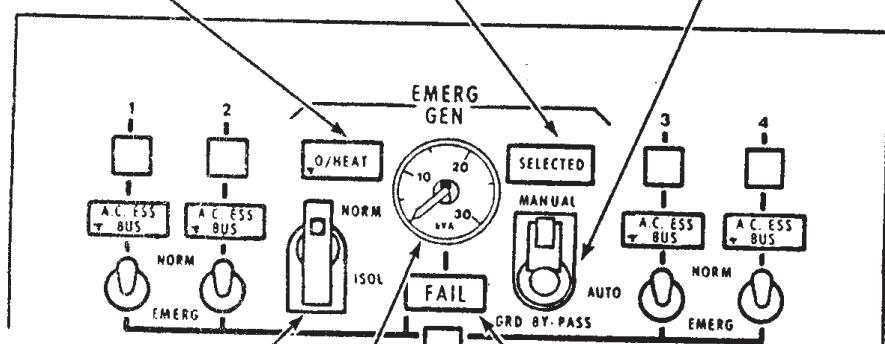
MANUAL - providing the EMERG GEN NORM/ISOL switch at NORM, causes the emergency generator to run by-passing the automatic switching system and regardless of weight switch position. To select MANUAL, move the gate and lift the lock toggle selector.

AUTO - with the selector at this position and the EMERG GEN NORM/ISOL switch at NORM, the emergency generator is armed to operate when any a.c. main busbar loses its supply or when No. 1 and No. 2 engines fail while airborne.

GRD BY-PASS - by-passes the weight switch inhibit circuit of the emergency generator.

EMERG GEN SELECTED LIGHT (Blue)

On - indicates that hydraulic power has been selected to drive the generator.



EMERG GEN LOAD INDICATOR

Reads output of the emergency generator.

EMERG GEN NORM/ISOL SWITCH

NORM - arms the emergency generator for subsequent operation.

ISOL - switches off the emergency generator hydraulic supply and the O/HEAT light supply.

EMERG GEN FAIL LIGHT (Yellow)

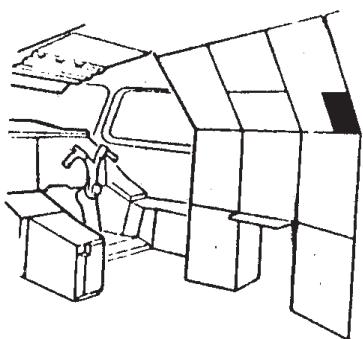
On - indicates that the emergency generator has been selected to run but is outside its operating limits with or without de-excitation. Pressing the light resets the excitation circuit if it has been de-excited.

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EXTERNAL POWER

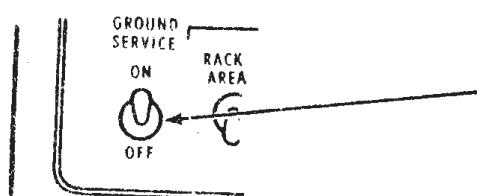
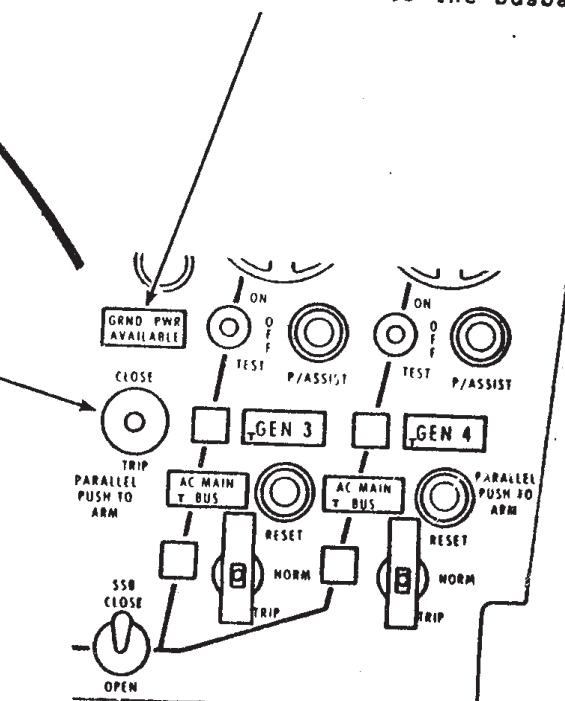


GROUND POWER SWITCH

- CLOSE - closes the ground power breaker and directs ground supply to the split system breakers, the bus-tie breakers, and hence the main a.c. busbars, 1X, 2X, 3X, 4X. On engine shut down, CLOSE arms the ground power breaker circuit. The ground supply will be connected automatically to the busbars as the last generator is disconnected.
- TRIP - disconnects the ground supply from the aircraft busbars.

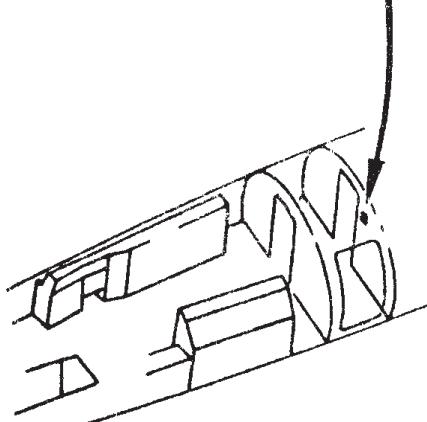
GROUND PWR AVAILABLE LIGHT
(White)

On - indicates that the ground supply is of the required voltage, frequency and direction of rotation and is available for connection to the busbars.



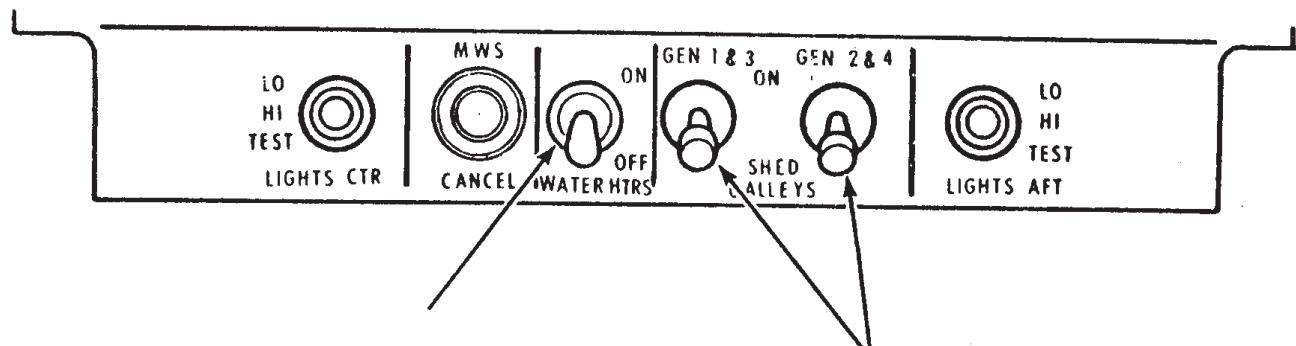
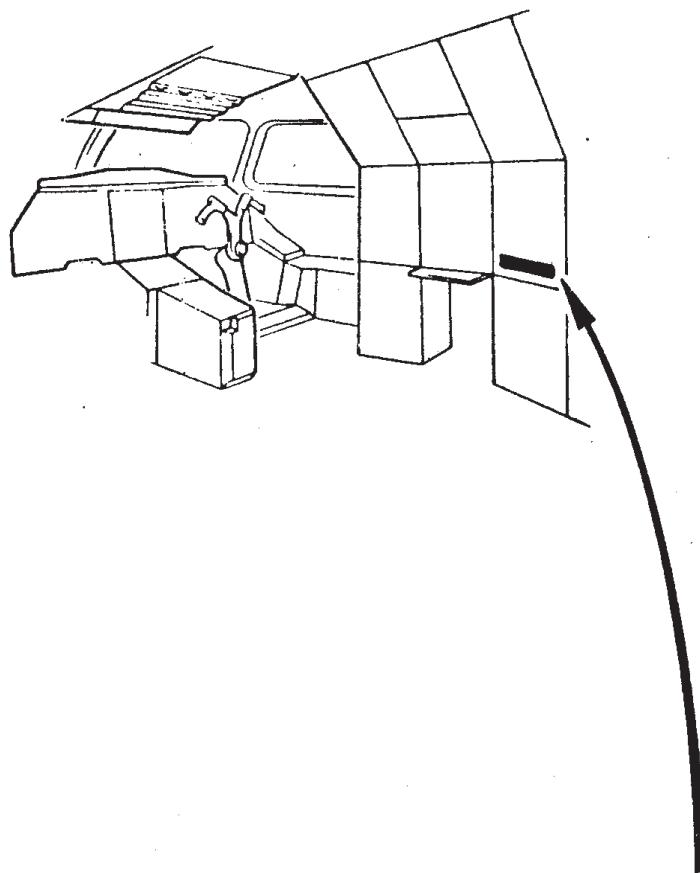
GROUND SERVICE SWITCH

- ON - directs a supply through the ground power busbar 9X to supply:-
- Directly.
 - Vacuum cleaner sockets.
 - Refuel control and indicators.
 - Vestibule, cabin and toilet fluorescent lights.
 - Via ground/flight changeover relays, ground/flight busbars 28X and 29X.
 - Drain mast heaters.
 - Navigation and anti-collision lights.
 - Toilet, cabin, flight deck and aft freight hold lights.
 - Via transformers, ground busbars 30X and 31X.
 - Emergency brake accumulator pressure and brake pressure instruments.
 - Water system anti-ice heating.
 - Forward freight hold, toilet, boarding and service lights.
 - Refuel panel lights.



(Unchanged)

GALLEY EQUIPMENT CONTROLS



WATER HEATERS
SWITCH

GALLEYS SWITCH

Controls supply to the galley equipment.

The rear galleys are off loaded when the GROUND HYDRAULIC CHECK OUT PUMPS are on.

Chapter 7

EMERGENCY EQUIPMENT

(ATA CHAPTER 25)

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EMERGENCY EQUIPMENTGENERAL

The emergency equipment section describes and illustrates the systems and equipment which are essential to the safety of passengers and crew during adverse operational conditions. These include the emergency evacuation alert system, emergency equipment locations, passenger and crew oxygen system and escape equipment.

PRINTED IN ENGLAND

EMERGENCY EVACUATION ALERT SYSTEM

The emergency evacuation alert system provides aural and visual warnings for the flight crew and cabin staff. It also permits the cabin staff at the forward door to operate the flight compartment visual warning by remote control.

The system consists of an audio (bleeper) warning and a flashing light in the flight compartment and in each of the three vestibules. The system is automatically actuated at all stations whenever the arming and control switch in the flight deck is set to the ON position or, provided the control switch is set in the ARM position whenever the cabin crew's ON/OFF switch is set to ON. The system cannot be actuated when the arming and control selector is in the OFF position. However, if the cabin crew's ON/OFF switch in the forward vestibule is set to ON and the flight compartment control switch is in the OFF position, only the flight compartment flashing light will be actuated. The audio warnings may be individually shut off at each applicable station.

EMERGENCY AND SURVIVAL EQUIPMENT STOWAGE LOCATIONA. Flight Compartment

Torch:

Stowed at the flight engineer's station.

Smoke goggles:

One pair at each position:-

Captain - in the LH side console.

First Officer - in the RH side console.

Flight Engineer - at his station.

Portable oxygen equipment:

One mask and one pack in the miscellaneous equipment rack.

Fire extinguisher: (CO₂)

Asbestos gloves:

Fire axe:

One extinguisher mounted on the miscellaneous equipment rack, one pair of gloves in a rack compartment and one axe on rack 215.

Escape ropes:

One rope is stowed in each side console

Life jackets:

Five life jackets are stowed in the miscellaneous equipment rack for the use of the flight crew.

B. Passenger Cabin

Fire Extinguishers, CO₂:

Fwd LH door, Centre LH door and Rear RH door.

Fire Extinguisher, Water:

Centre RH door.

Ditching Lines:

One on each side of the aircraft in the centre amenity stowages.

Escape Rope:

One rope is stowed in the forward amenity stowage.

Escape Slides:

One on each door. Those at the forward passenger door and at the centre doors are slide/rafts.

Slide/Rafts:

One at the forward passenger door and one at each intermediate door. The associated canopies are packed with the relevant emergency packs.

Life raft:

One at the rear of the aft cabin. (RH side)

Emergency Packs:

One in the forward amenity stowage. Two at the rear of the forward cabin. One supplementary pack at rear of rear cabin on left hand side.

Radio Beacon:

One at the rear of the forward cabin (RH) and one at the rear of the aft cabin. (LH)

Life jackets:

- | | |
|----------------|---|
| Passenger | - one under each passenger seat |
| Infant | - six in the RH rear amenity stowage. (L.H. rear amenity Post Mod) |
| Cabin crew | - one in each amenity stowage and one on the RH side of the forward vestibule, adjacent to RH Stewards seat |
| Demonstration- | one in the forward and two in the RH centre amenity stowages. |

First aid kits:

Three kits; one each in the forward, RH centre and RH rear amenity stowages.

EMERGENCY EQUIPMENT

Megaphone:

- One in fwd LH supplementary galley (No.4) (Pre mod)
- One in rear LH supplementary galley (No.5)
- One at fwd L.H. door.
- One at rear R.H. door. (Post Mod).

Fire Axe:

- One in rear RH stowage.

Crew Portable oxygen set:

- Fwd LH door and Fwd RH door
- Centre LH door and Centre RH door.
- Two at Rear RH door.

ESCAPE SLIDES AND SLIDE/RAFTS

Inflatable slides and slide/rafts are used in the evacuation of the aircraft. They can be separated from the aircraft and the slide/rafts can be converted to life rafts. The slides may be used as aids to floating but are not intended to be used as free rafts. There is sufficient rated capacity in the slide/rafts and life raft for all the occupants of the aircraft. If the largest slide/raft cannot be used all the occupants can be accommodated within the overload capacity of the remainder and that of the liferaft. Should evacuation be possible on one side of the aircraft only, the available overload capacity of the slide/rafts and the life raft capable of being launched from either side is sufficient for all occupants. The forward left hand slide/raft pack can be removed from its location, taken through either centre doorway and opened and deployed in this position.

LIFE RAFT AND EMERGENCY PACK

The 36 person life raft has an emergency pack stowed within the raft valise. The pack contains rations and other survival equipment. The raft with pack is released from the stowage by use of quick release straps and is launched through either of the aft cabin doorways. (A supplementary emergency pack is located near the raft).

SLIDE/RAFT EMERGENCY PACKS

One emergency pack is carried for each of the three slide/rafts and contains rations and other survival equipment for occupants of the appropriate slide/rafts. Each pack contains a canopy for its slide/raft.

MEGAPHONES

These are hand held, battery operated units.

SEARCH AND RESCUE RADIO BEACONS

Two emergency radio beacons are carried in the passenger cabin for use in the event of a forced landing or ditching. Each beacon is a self-buoyant, dual frequency, battery operated, radio distress beacon transmitter.

ESCAPE ROPE IN FWD AMENITY STOWAGE

This rope can be attached to the doorway grab handle at either the forward passenger or service doors. It permits a crew member to descend to the ground in an emergency evacuation when wind conditions limit the normal deployment of slides, some of which can be made usable by ground handling.

EMERGENCY LIGHTING

There are two facilities for control of emergency lighting, a selector on the rear overhead panel and a switch on the forward steward's panel. With the LIGHTS EMERG selector at ARM all aircraft emergency lights will come on in the event of a failure of the d.c. essential busbar A. With selector or switch at ON emergency lighting is selected.

OXYGEN

GENERAL

Two emergency oxygen systems are provided, one for the flight crew and one for the passengers and cabin crew. The two systems are completely independent and employ gaseous oxygen from storage cylinders. There is however an interconnect facility which allows the flight crew system to draw on the cabin supply. In addition portable cylinders are located in the flight deck and in the cabin.

DESCRIPTION

CREW SYSTEM

The flight crew oxygen system is the pressure breathing, diluter-demand type. Oxygen from a high pressure storage cylinder is reduced to a lower pressure and supplied to the crew stations.

A regulator supplies the oxygen mask on demand up to a cabin altitude of 32,000 feet. Above this altitude the oxygen mask is supplied with undiluted oxygen at a progressively increasing pressure according to the cabin altitude, irrespective of the regulator switch position.

A quick donning oxygen mask is supplied for each crew member. It has an individual stowage box and is automatically supplied with oxygen after withdrawal.

PASSENGER SYSTEM

Three interconnected bottles supply the cabin through a passenger system control panel. A pressure regulator supplies oxygen to the passenger distribution system at a normal pressure of 40 psi and an emergency pressure of 90 psi.

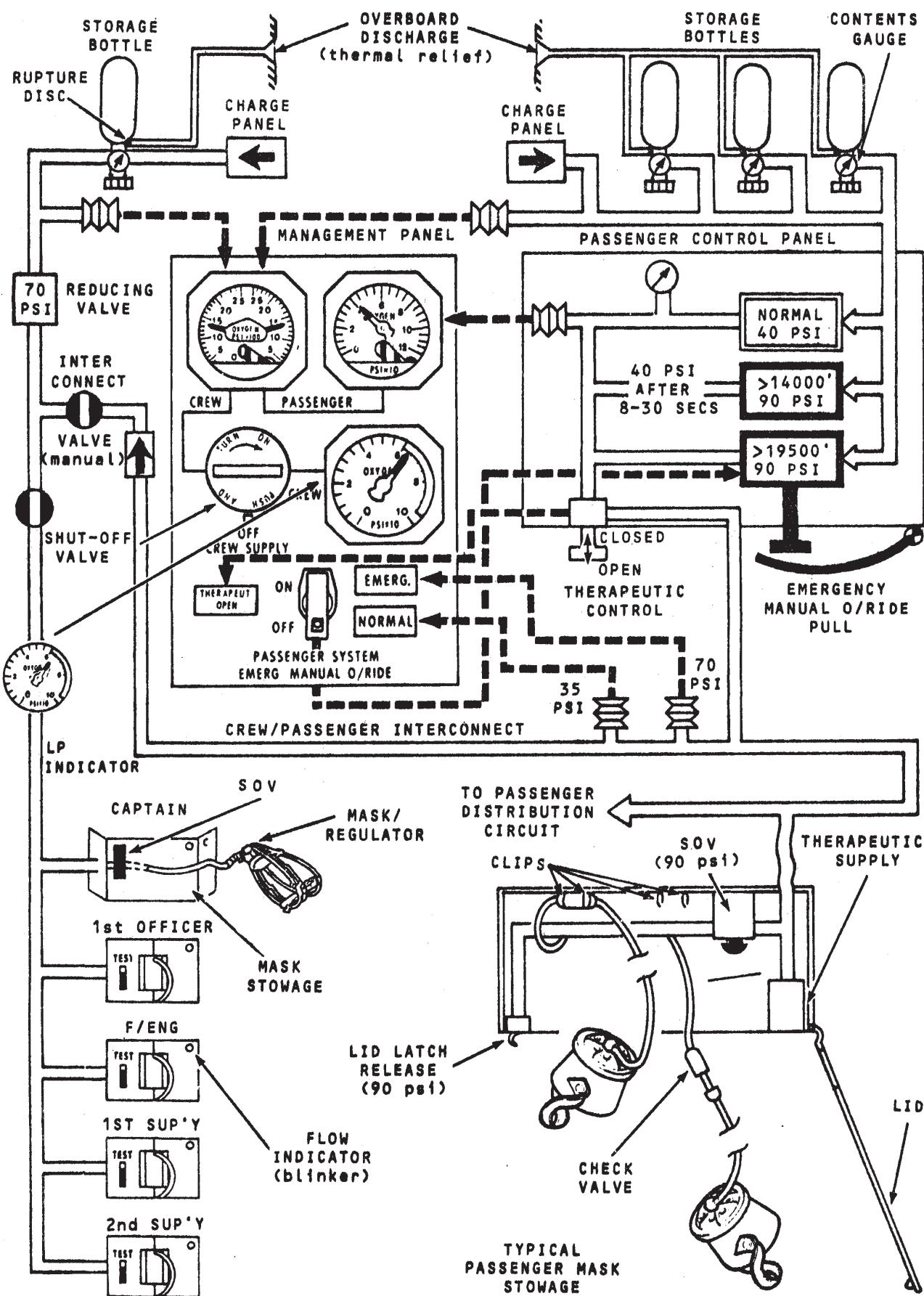
The normal pressure of 40 psi is manually selected and used for therapeutic supply and is supplied to the passengers via a therapeutic supply point in the passenger mask stowage.

The emergency pressure of 90 psi is automatically selected when the cabin altitude exceeds 14,000 feet and causes the automatic presentation of all the mask units in the cabin. Oxygen will flow continuously when the mask is pulled to the users face. There is a twin mask unit and a triple mask unit at each seat row a twin mask unit in each toilet and a mask at each cabin crew station.

PORABLE OXYGEN

One portable oxygen set is positioned in the flight deck and one set for each cabin crew member is positioned in the cabin.

OXYGEN SYSTEM

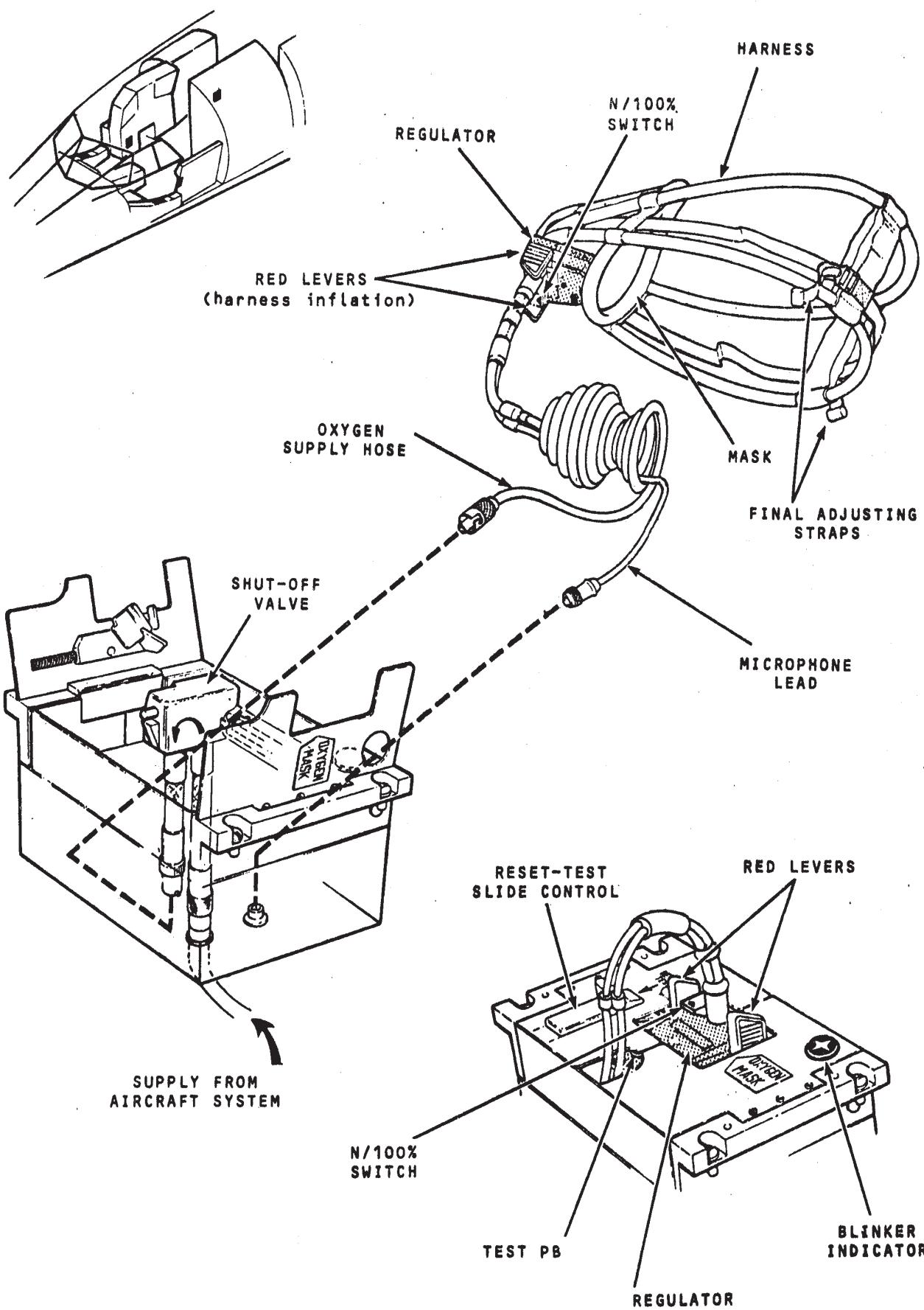


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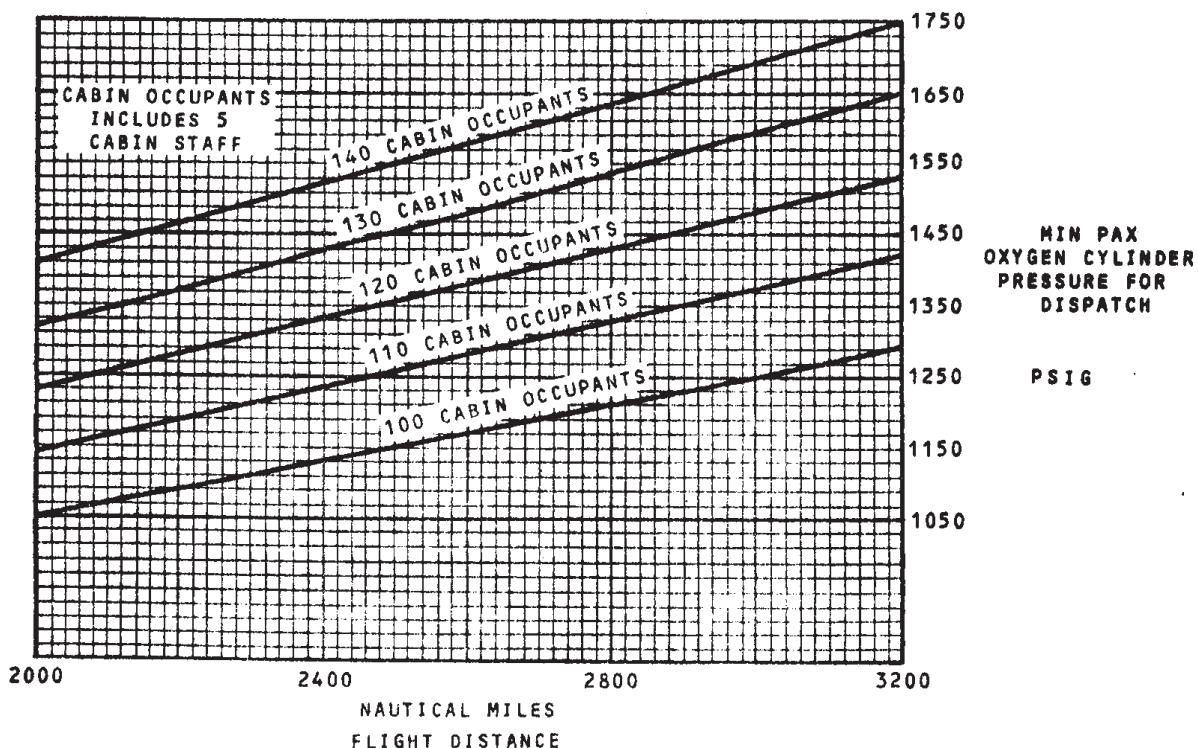
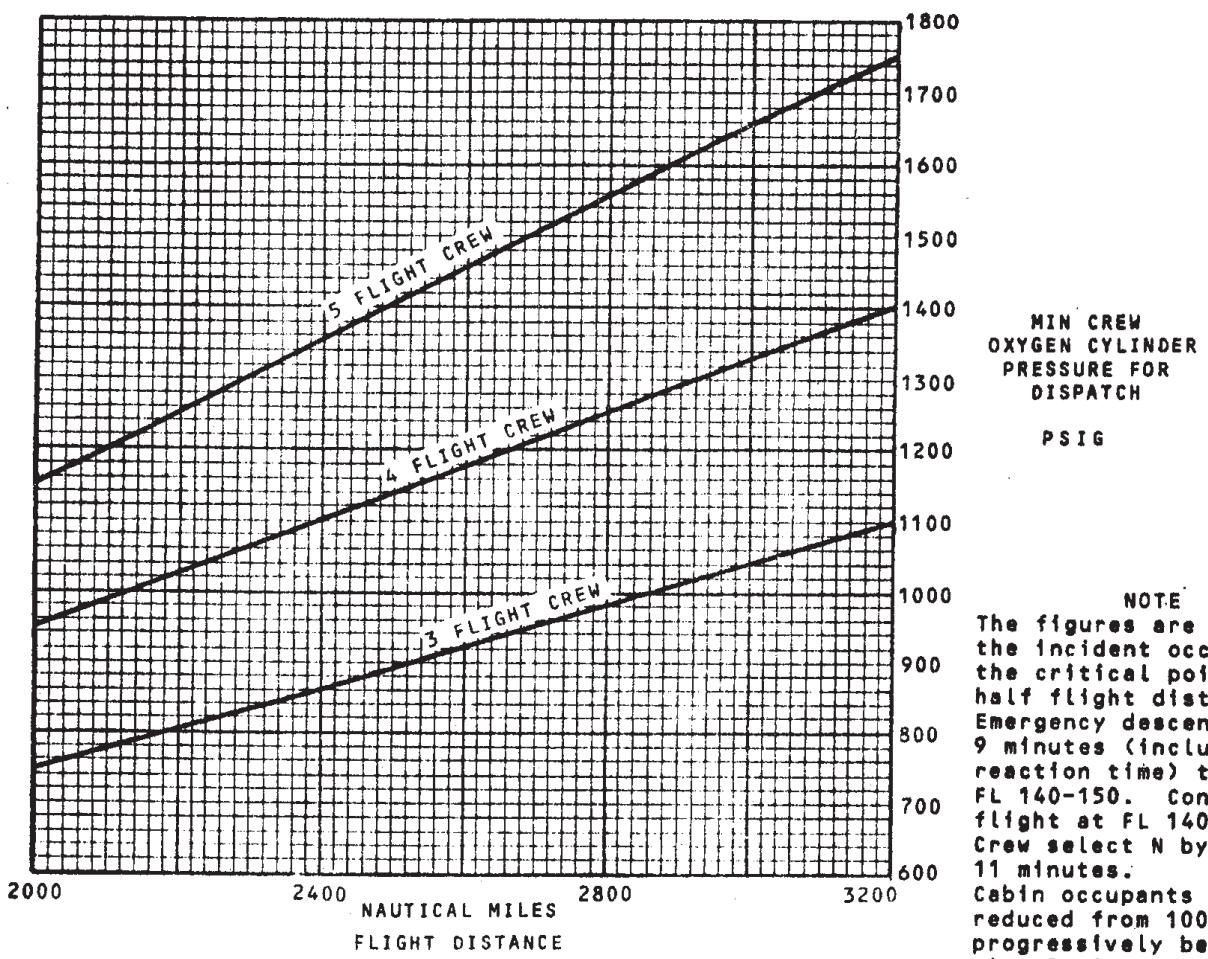
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OXYGEN SYSTEM

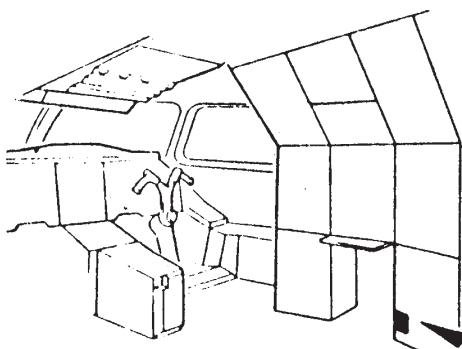


CREW AND PAX MINIMUM OXYGEN PRESSURE



OXYGEN PANEL

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DUAL PRESSURE INDICATOR

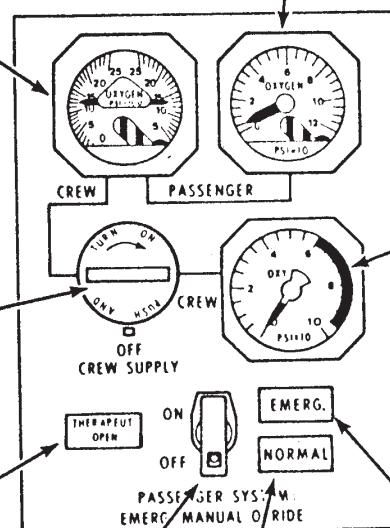
Left Hand pointer - shows crew system bottle pressure.

Right Hand pointer - shows passenger system bottles pressure.

The failure flag with a red background and black stripes indicates a loss of electrical power supply in the dual pressure indicator.

PASSENGER SUPPLY PRESSURE INDICATOR

Shows the pressure upstream of the therapeutic valve. The failure flag with a red background and black stripes indicates a loss of electrical power supply in the supply pressure indicator.



CREW SUPPLY ROTARY SELECTOR

OFF - isolates the crew distribution circuit from the oxygen bottle supply system

THERAPEUT OPEN LIGHT (Green)

On - indicates that the therapeutic supply valve is open.

PASSENGER SYSTEM EMERG MANUAL O/RIDE SWITCH.

ON - electrically overrides the barometric control of the regulator thus pressurizing the passenger mask supply line at emergency pressure. Guarded in the OFF position.

CREW DELIVERY PRESSURE GAUGE

Indicates a direct pressure in the crew delivery system

EMERG LIGHT (Yellow)

On - indicates that the pressure in the passenger mask supply line exceeds 70 psi. Accompanied by FASTEN SEAT BELTS signs RETURN TO SEATS signs NO SMOKING signs and an audio tone in the public address.

NORMAL LIGHT (Green)

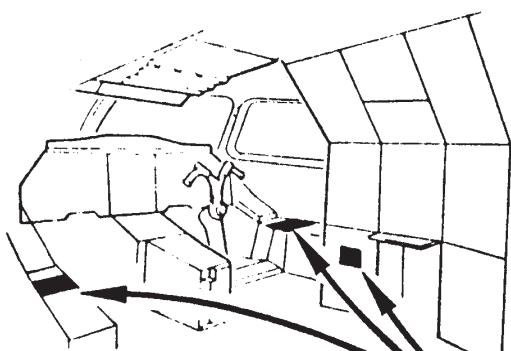
On - indicates that the pressure in the passenger mask supply line exceeds 35 psi.

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OXYGEN MASK

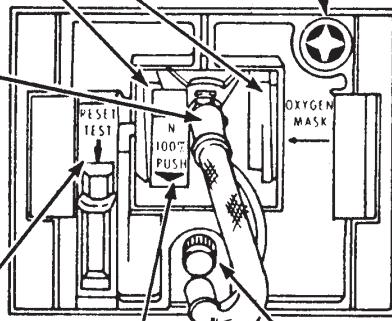


RED LEVERS

Squeezing - opens the inflation valve in the regulator allowing oxygen to flow to the harness.
Releasing the red levers vents the oxygen from the harness.

BLINKER INDICATOR

- (black) - indicates there is no flow downstream of the shut-off valve.
- (yellow cross) - indicates flow downstream of the shut-off valve.



RESET TEST SLIDE CONTROL

TEST - the shut-off valve is opened allowing oxygen to flow to the regulator.

RESET - the shut-off valve is closed.
Spring returned to the RESET position

At the upper part of the RESET-TEST slide control a white area, when completely masked, indicates the correct closure of the shut-off valve.

TEST PUSH BUTTON

Pressed - overrides the regulator demand function.

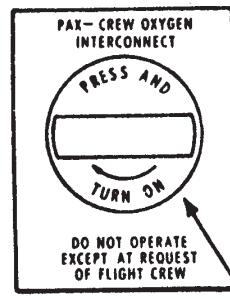
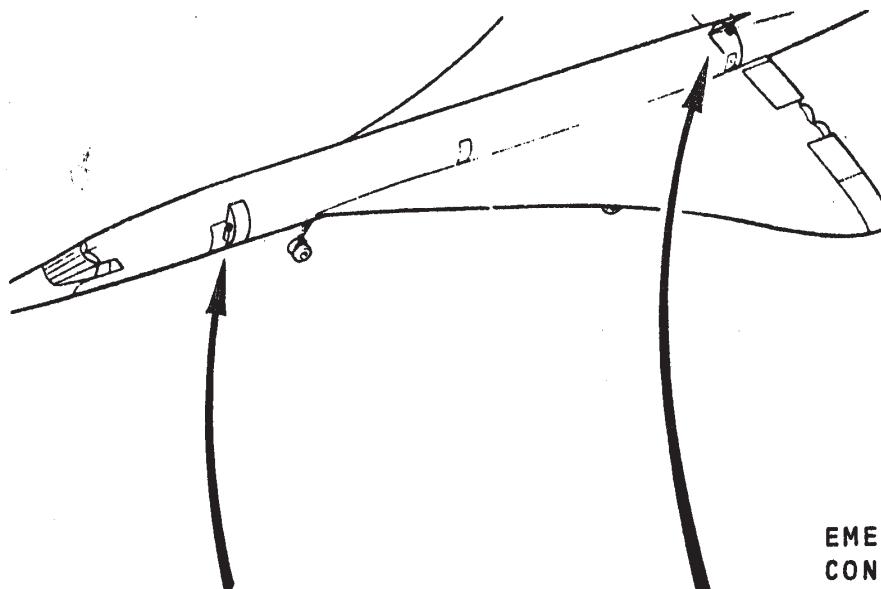
N (NORMAL) - 100% SWITCH

N - the regulator supplies the oxygen mask on demand up to a cabin altitude of 32,000 ft. Above this altitude the oxygen mask is supplied with undiluted oxygen at a progressive increase in pressure according to the cabin altitude, irrespective of the N-100% switch position.

100% - the regulator supplies undiluted oxygen at any altitude.

(Unchanged)

PASSENGER SYSTEM CONTROL PANELS

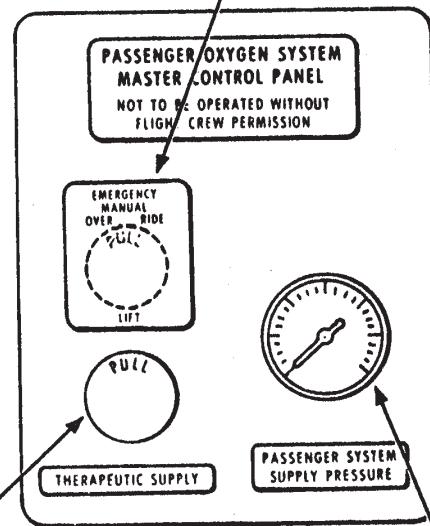


PASSENGER - CREW OXYGEN INTERCONNECT VALVE

Press and turn - supplies the flight crew with oxygen from the passenger system in the event of loss of pressure in the crew system.

EMERGENCY MANUAL OVERRIDE CONTROL

Pull - supplies emergency pressure oxygen and mask presentation at any cabin altitude.



THERAPEUTIC VALVE CONTROL

Pull - supplies therapeutic oxygen in normal flight conditions.

Push - shuts off supplies when requirement for therapeutic oxygen has ceased.

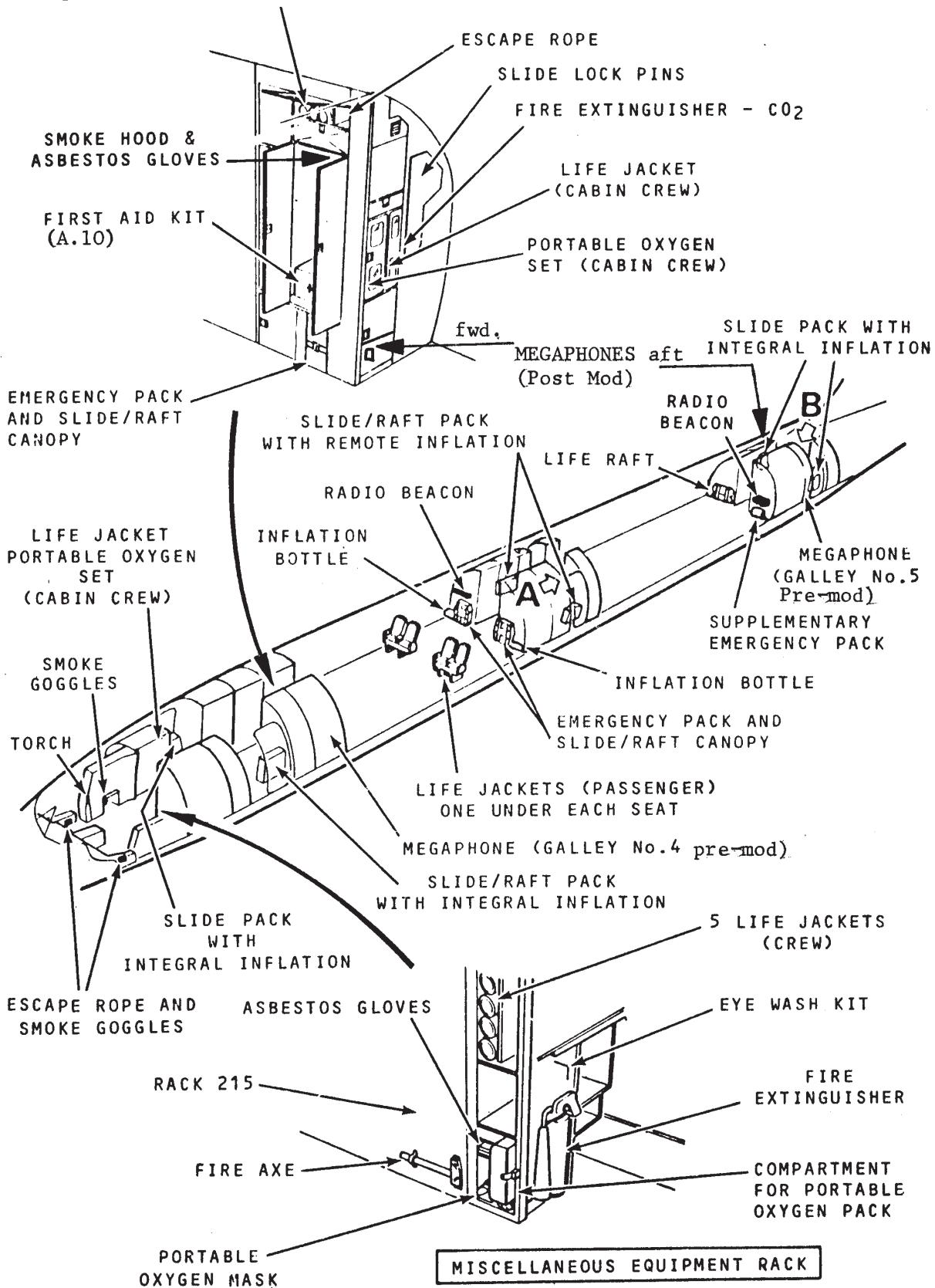
PASSENGER SYSTEM SUPPLY PRESSURE INDICATOR

Indicates passenger main pressure available.

FLIGHT COMPARTMENT AND FORWARD VESTIBULE

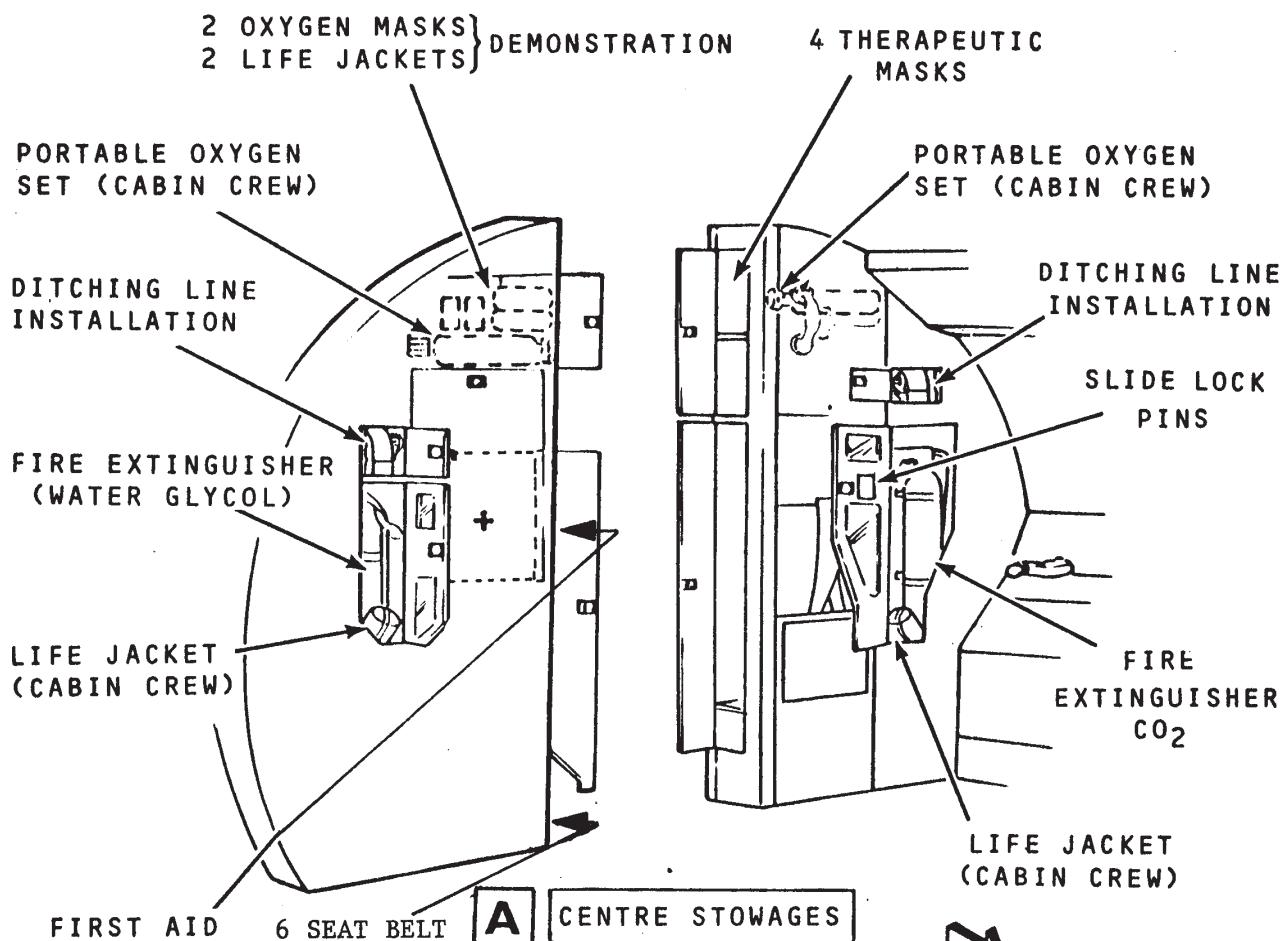
1 OXYGEN MASK (DEMONSTRATION)
1 LIFE JACKET (DEMONSTRATION)

FORWARD AMENITY STOWAGE

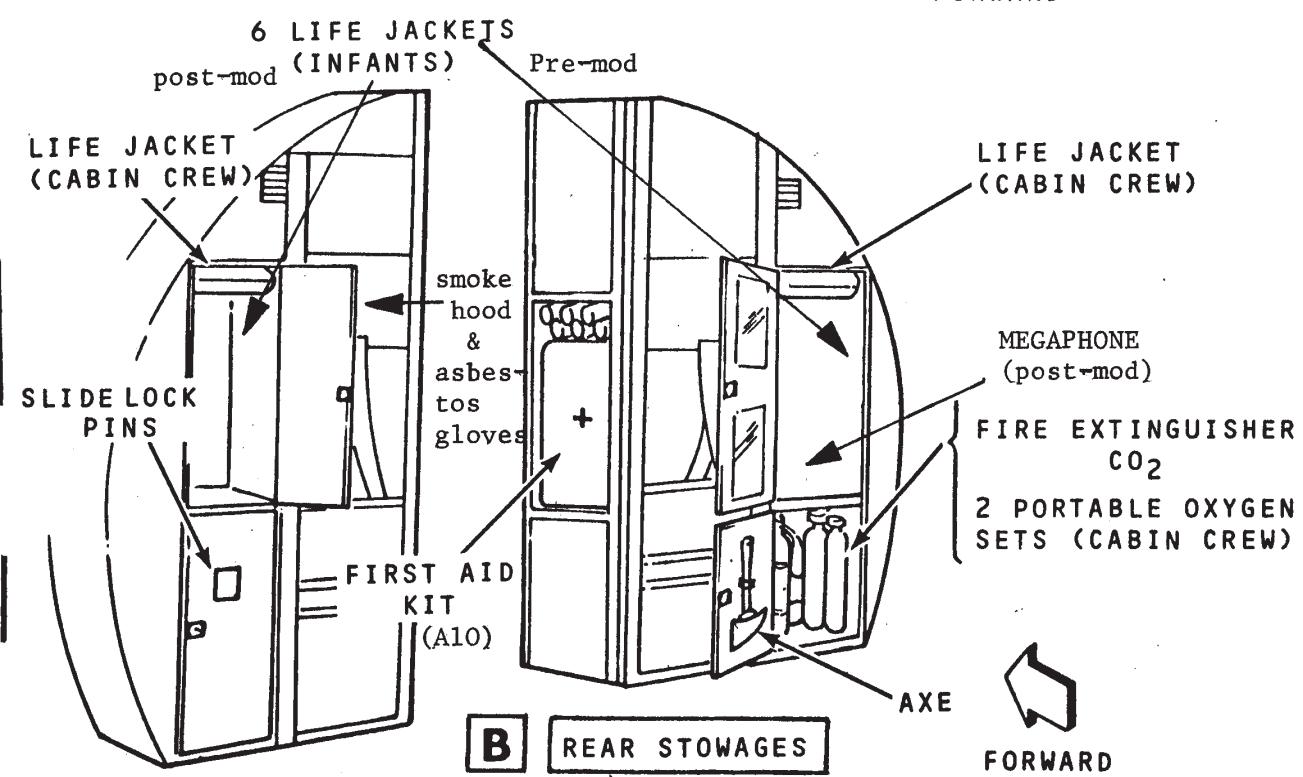


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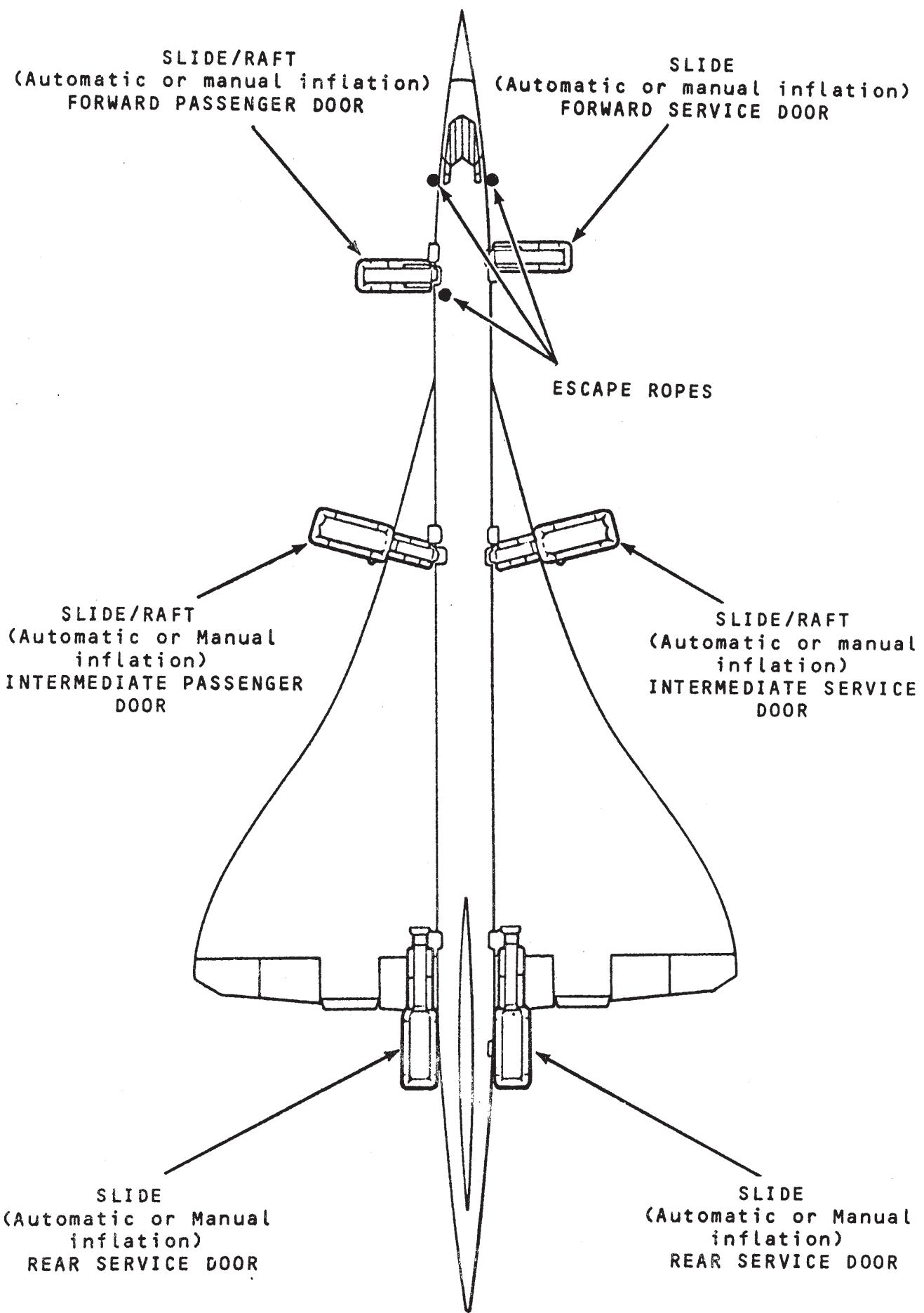
INTERMEDIATE AND REAR VESTIBULES



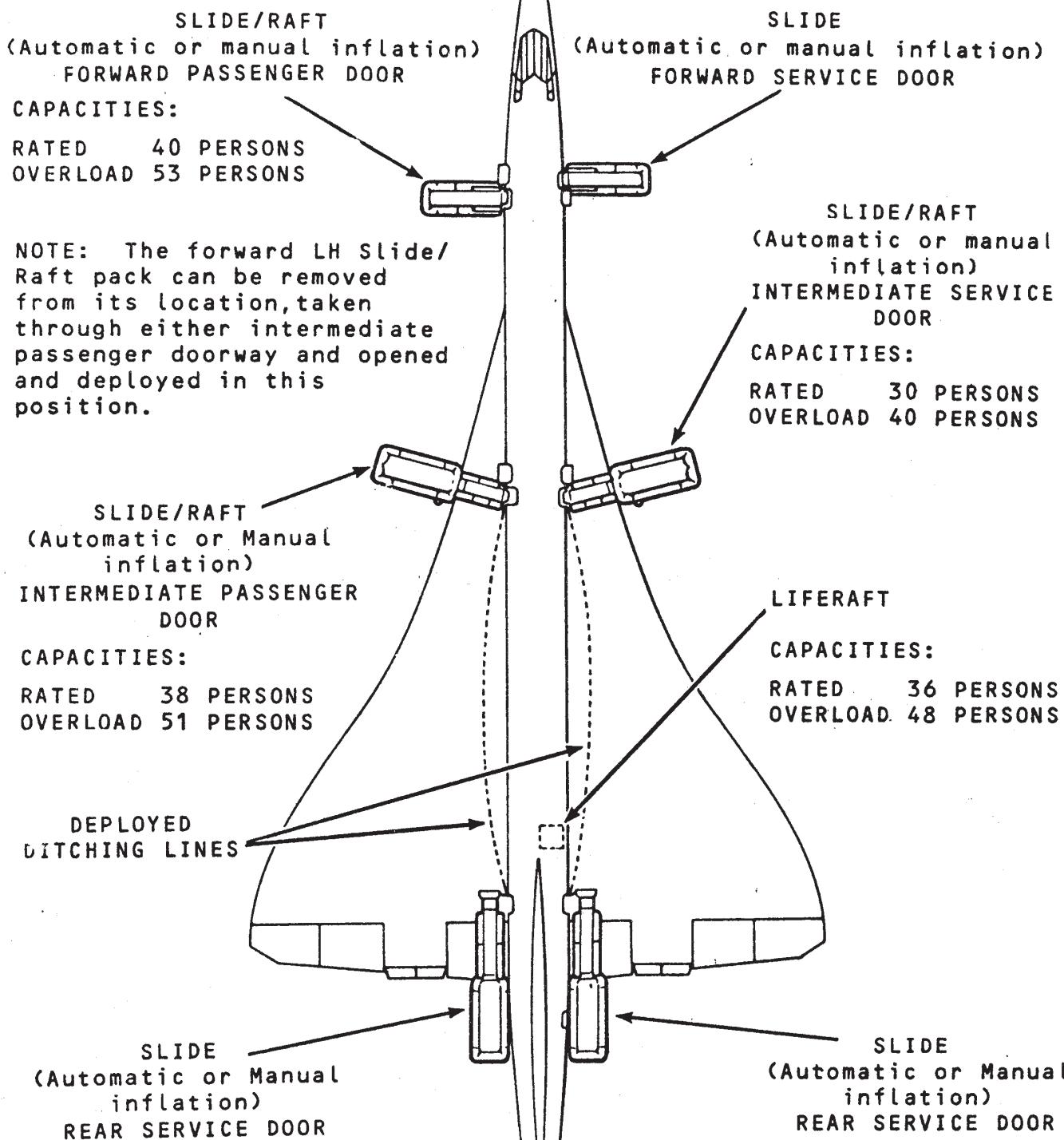
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SLIDE/RAFT AND SLIDE DEPLOYMENT
EMERGENCY LANDING

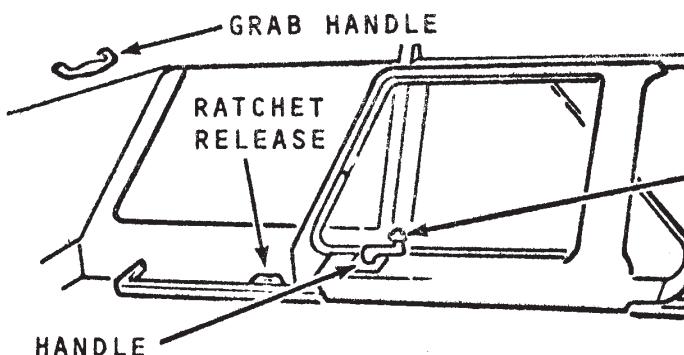


SLIDE/RAFT AND SLIDE DEPLOYMENT
DITCHING



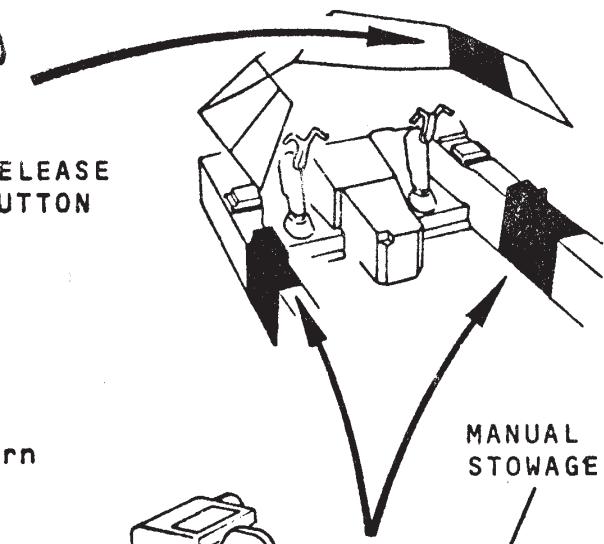
ALL SLIDE/RAFTS & SLIDES DISENGAGE AT DOOR SILL TO SERVE AS RAFTS AND FLOTATION AIDS

ESCAPE ROPES



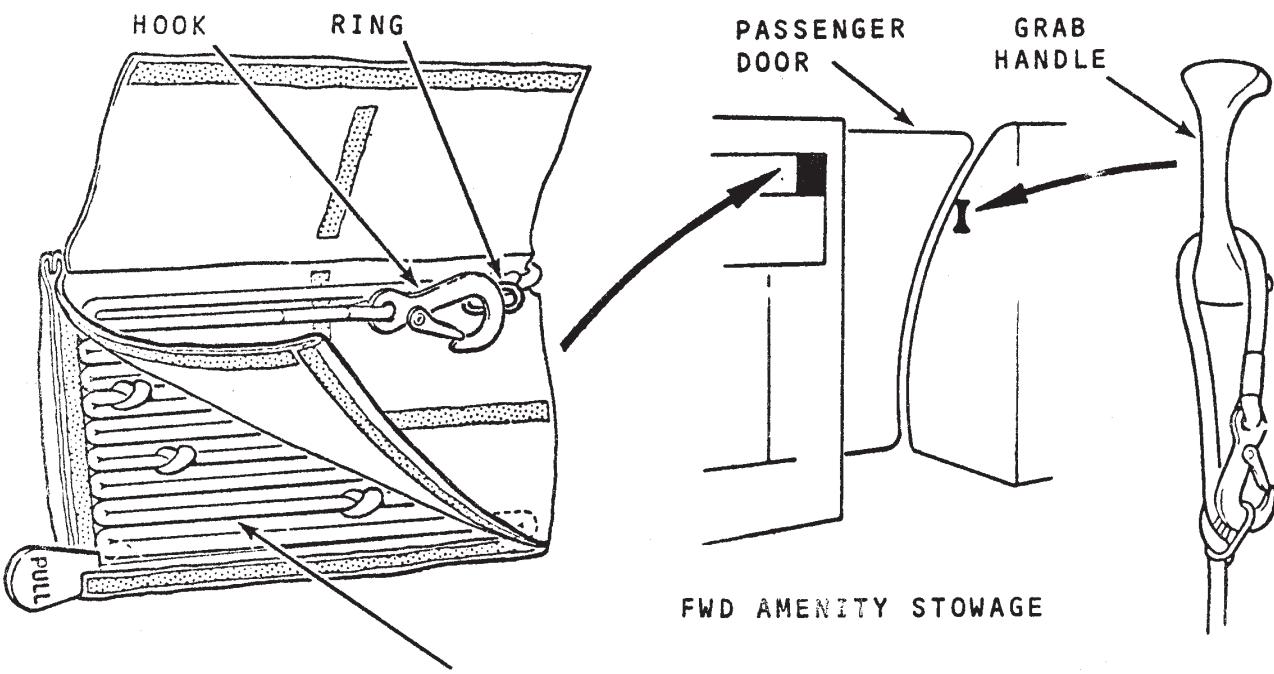
Locks sliding side window in closed position.

To open - depress release button, turn handle inboard to withdraw window inwards and slide window rearwards where it is retained in the fully open position by a pawl and ratchet. To close - depress ratchet release, slide window forward into frame, turn handle outboard until spring loaded plunger engaged.



FLIGHT COMPARTMENT
ESCAPE ROPES (2)

Clasp hook to pilot's grab handle and deploy white rope overboard through sliding side window. Red section remains shackled to aircraft structure:



FORWARD VESTIBULE ESCAPE ROPE

Pass hook through grab handle, clip into ring and deploy rope overboard. This rope can be used at either the Forward passenger or Forward service doors.

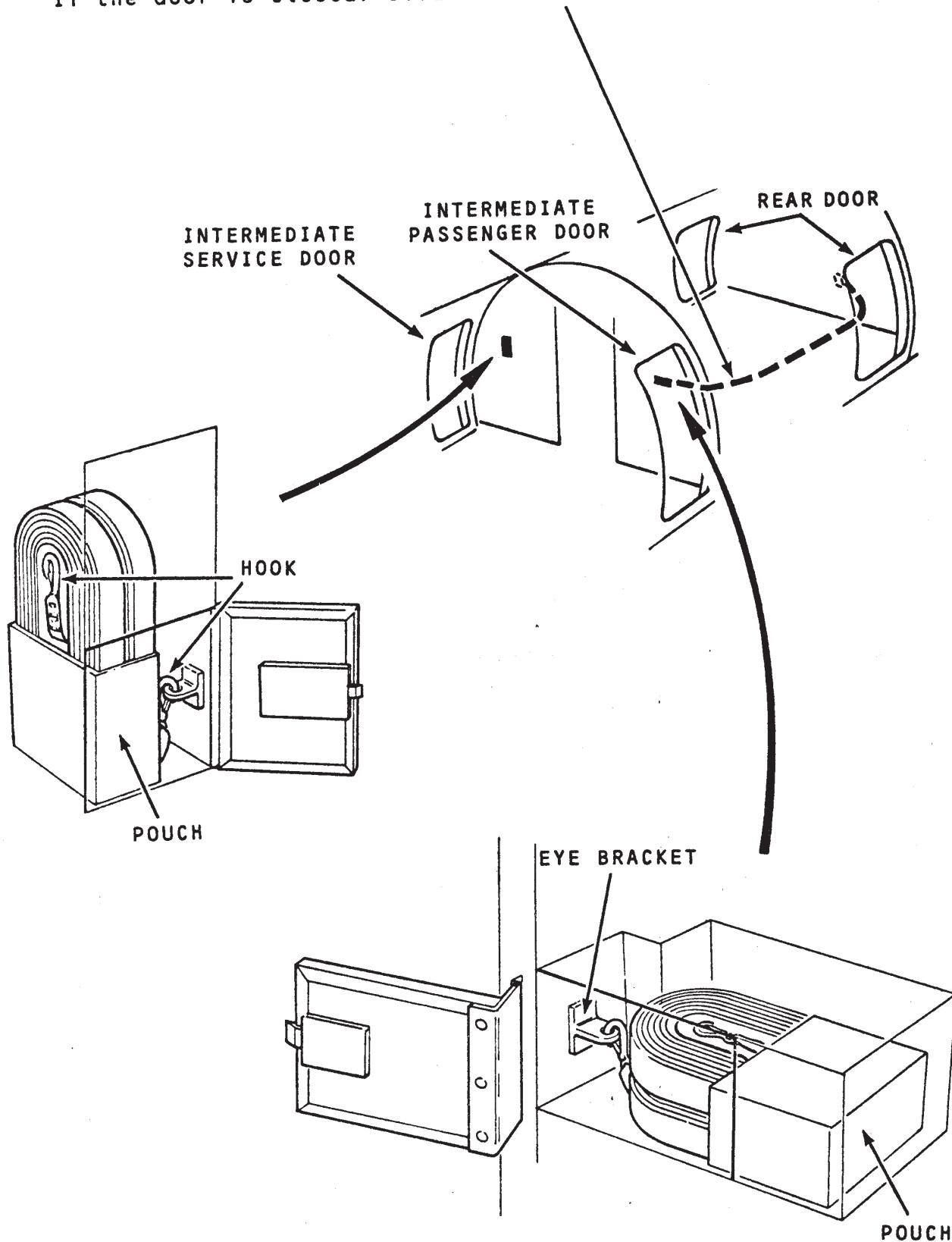
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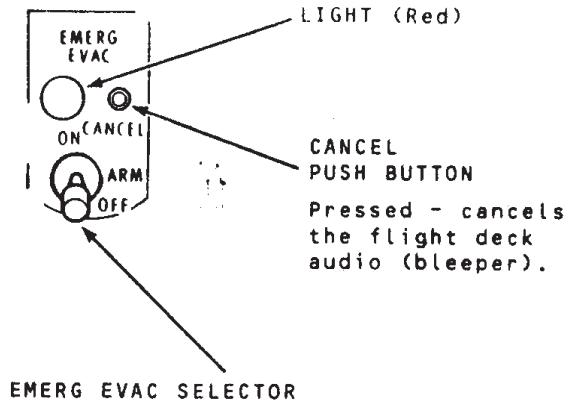
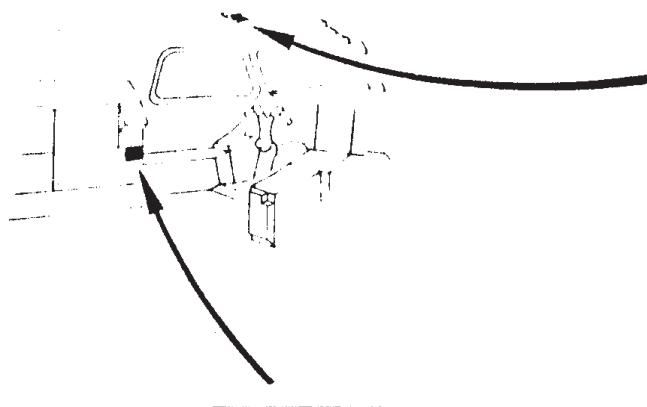
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DITCHING LINES

Remove line and pouch from its stowage, ensuring that one end of the line remains attached. Take the free end of the line along the wing around the rear door and clip it to the bracket provided on the hinge side of the doorway. If the door is closed, secure the line to the outer handle.



EMERGENCY EVACUATION ALERT SYSTEM

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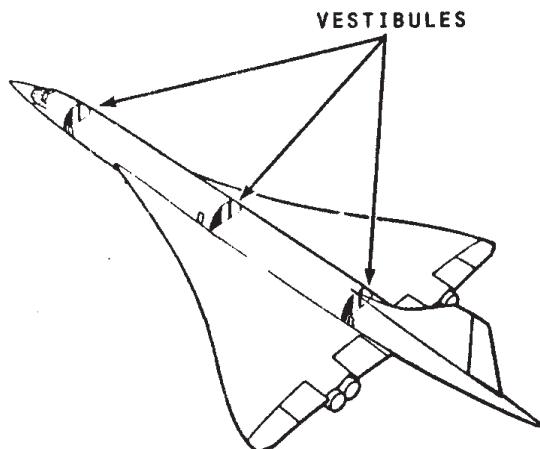
EMERG EVAC SELECTOR

ON - operates an EMERG EVAC flashing light (red) on the rear overhead panel and a flight deck audio (bleeper) also an EVAC flashing light (red) and an associated audio (bleeper) on the forward, centre and rear cabin staff panels.

ARM - arms the EVACUATION ALERT ON/OFF switch on the forward cabin staff panel,

OFF - breaks power supply to the main emergency evacuation alert system.

EVAC HORN
(Beeper 2 x sec)



PUSH - HORN SHUT-OFF

Push button on the forward, centre and rear cabin staff panels cancels the associated audio (bleeper).

SYSTEM CONTROL SWITCH
(Forward vestibule only)

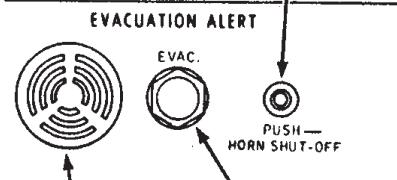
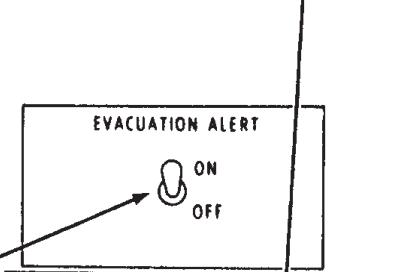
With EMERG EVAC selector on Flight deck rear o/head panel at OFF:

If EVACUATION ALERT ON/OFF switch is set to ON the EMERG EVAC light (red) on rear overhead panel will flash.

With EMERG EVAC selector at ARM:

EVACUATION ALERT switch at ON operates EMERG EVAC flashing light (red) on the rear overhead panel and a flight deck audio (bleeper), also an EVAC flashing light (red) and associated audio (bleeper) on the forward, centre and rear cabin staff panels.

(Unchanged)



EVAC HORN
(Beeper 2 x sec)

LIGHT (Red)

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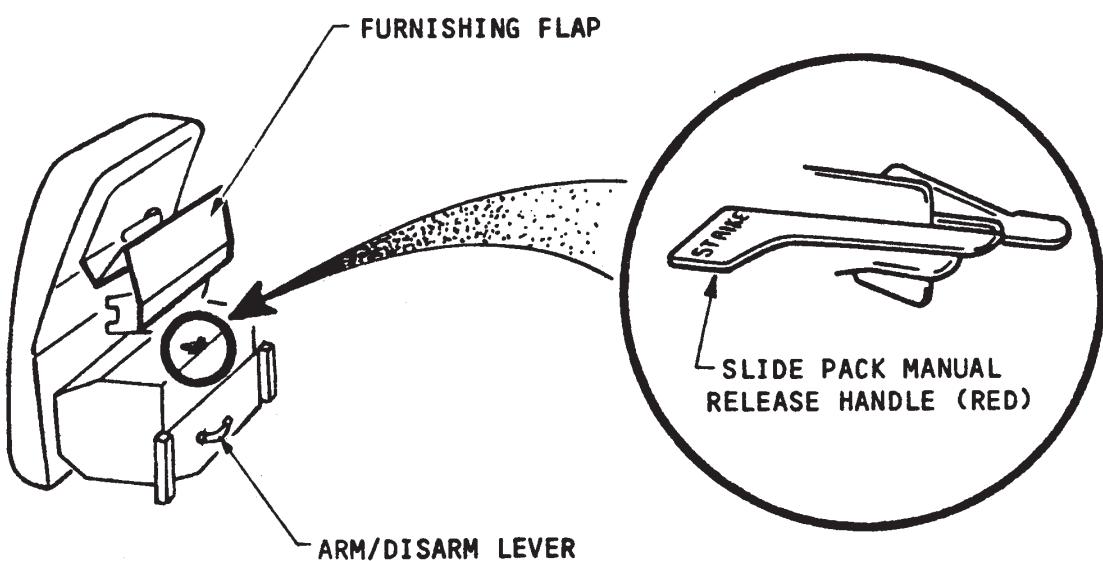
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SLIDE RAFT AND SLIDE MANUAL RELEASE

If pack does not drop automatically when opening armed door, do not attempt to force the door fully open:-

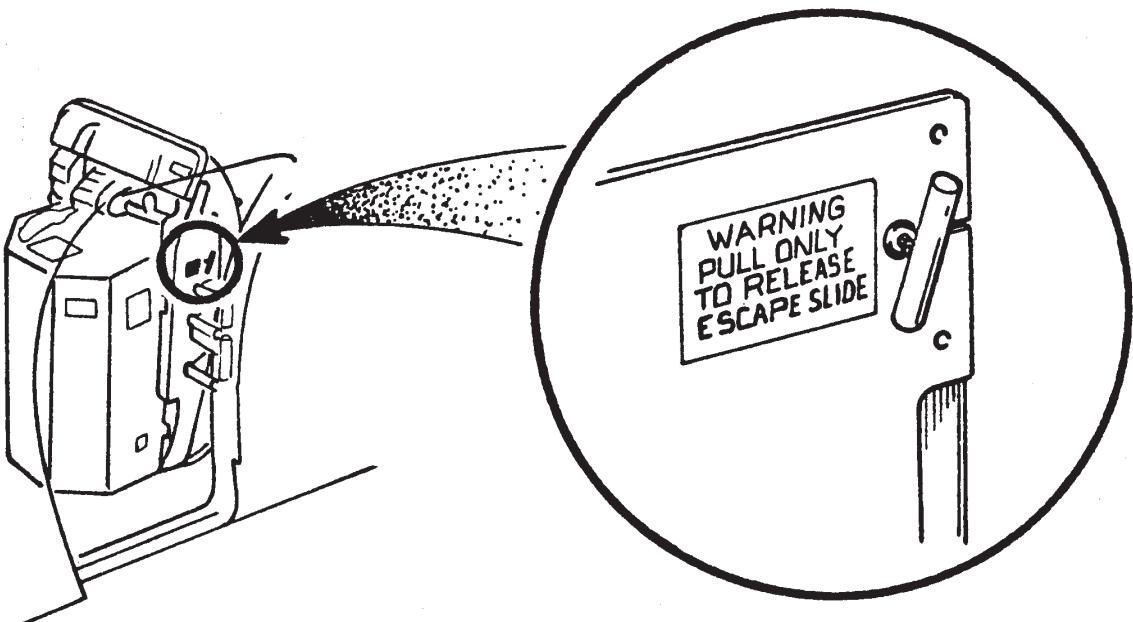
FRONT AND CENTRE DOORS

- Lift hinged furnishing flap on door if necessary
- Strike pack release handle downwards to drop pack from door
- Continue to open door into the fully open position.



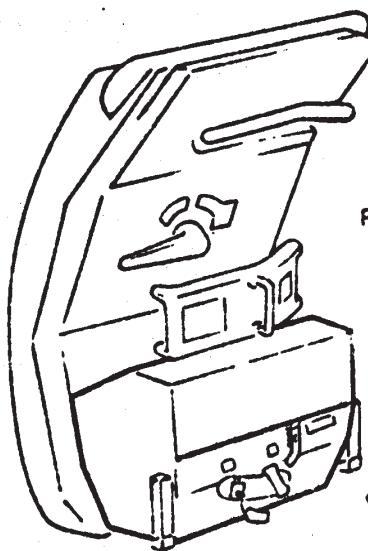
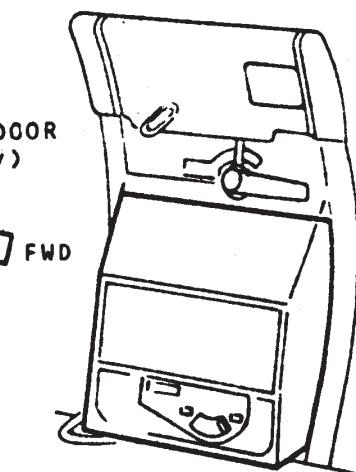
REAR DOORS

- Pull the red 'T' handle on the forward flank of the door to drop pack from door
- Continue to open door into its normal open position.



(Completely Revised)

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SLIDE/RAFT AND SLIDE DISCONNECTION
AND POSITION INDICATOR
FORWARD AND INTERMEDIATE DOORFORWARD AND INTERMEDIATE
PASSENGER DOORS AND
INTERMEDIATE SERVICE DOOR
SLIDE/RAFT (Typical)FWD SERVICE DOOR
(slide only)

SLIDE/RAFT DETAILS
REEFING RELEASE HANDLE (Blue)
(Visible when slide/raft deployed)

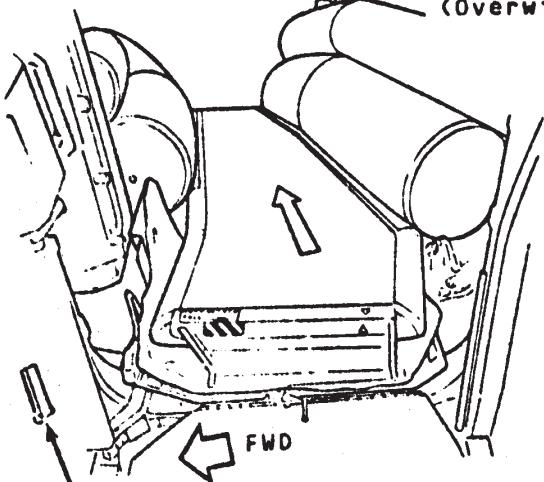
To use slide/raft as a liferaft
pull blue webbing handles (one
each side) and outriggers deploy.

COVER FLAP
(Yellow diagonal stripes)

Pull back striped cover to
expose slide/raft disconnect
handle. To disengage slide/raft
from aircraft, pull webbing
handle and cut/release mooring
line.

MOORING LINE
POCKET

INTERMEDIATE DOOR
SLIDE/RAFT POSITION
INDICATOR
(Overwing only)

MANUAL INFLATION HANDLE (Red)
ON DOOR SURROUND AT BOTH
INTERMEDIATE DOORS.

MANUAL INFLATION
HANDLE (Red)
AT BOTH FORWARD DOORS

NOTE: Fwd service and rear service
door slides can be detached
from aircraft and used as
additional flotation aids in
the event of ditching.

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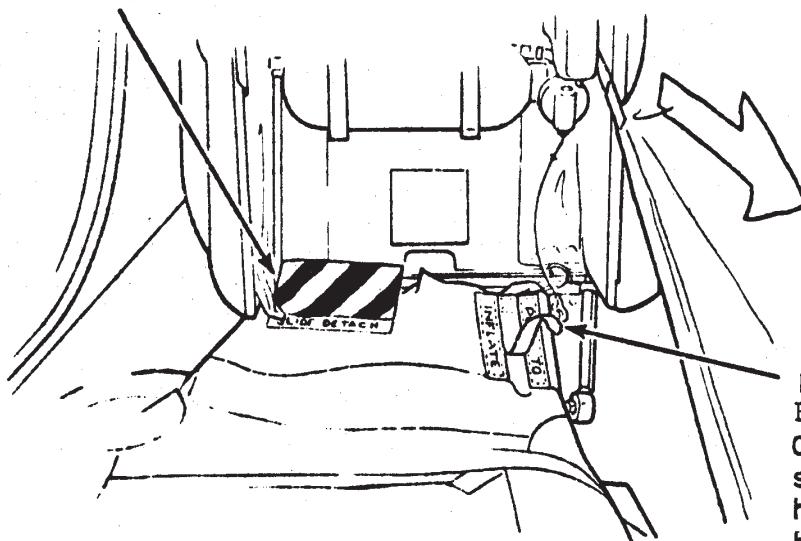
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SLIDE/RAFT AND SLIDE DISCONNECTION
AND POSITION INDICATOR
REAR DOOR

REAR SERVICE DOOR (RH)
OPPOSITE HAND SIMILAR

SLIDE DISCONNECT
HANDLE UNDER
STRIPED COVER



MANUAL INFLATION
HANDLES (Red)
One for Walkway, one for
slide; stowed Walkway
handle on top of slide
handle. Therefore only
sequential operation
possible, Walkway first
then slide.

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MOVING FORWARD SLIDE/RAFT TO
INTERMEDIATE DOOR EXIT

AFTER DITCHING

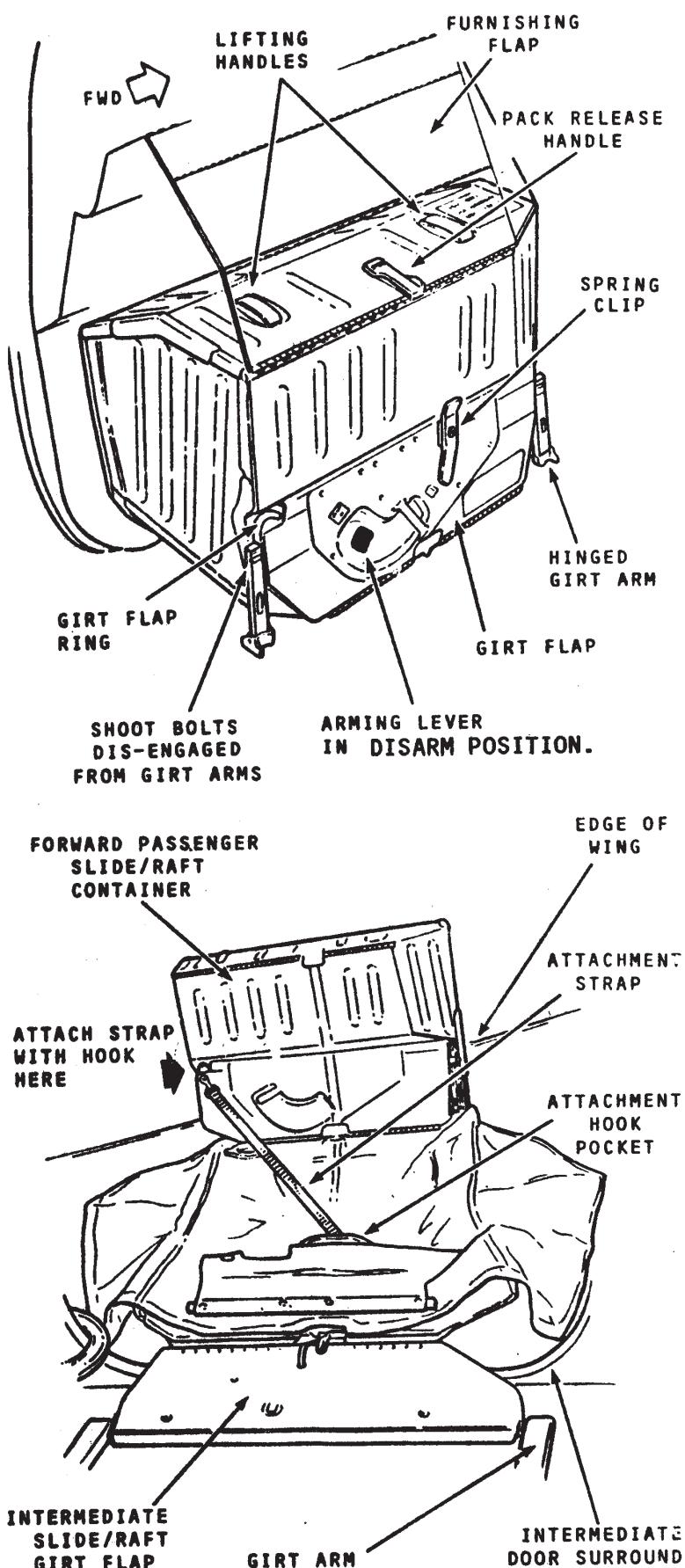
When forward passenger door cannot be opened, the escape slide/raft container pack can be removed from the door and taken to an intermediate door exit. The slide/raft mounted on intermediate door must be fully deployed and disconnected from aircraft, but mooring line need not be removed. Remove attachment hook and strap from pocket in liner of used container and lay out in readiness for attaching to other pack.

To remove slide/raft pack from forward door and move to another door:

Set arming lever to DISARM. Lift door trim covering container, and strike trip lever downward. Container will fall free from carriage. Use lifting handles to carry pack to another door.

CAUTION: TO PREVENT SLIDE/RAFT FOULING DOOR DURING INFLATION, PLACE CONTAINER OUTSIDE OF DOOR SO THAT HOOK ATTACHMENT STRAP IS FULLY EXTENDED BEFORE SECURING HOOK TO GIRT FLAP.

Secure attachment hook to girt flap ring on left side of flap, rotate spring clip through 90° then set arming lever to ARM, push container across wing and unroll slide/raft to expose manual operating handle and mooring line hook. Attach mooring line to aircraft structure, pull red operating handle to inflate slide/raft. Pull blue webbing handles marked PULL FOR RAFT to deploy raft. Pull handle marked RAFT DETACH. Raft is now ready for boarding. When ready to leave vicinity of aircraft pull and cut mooring line.



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CONCORDE FLYING MANUAL

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LIFERAFT TYPE 36UA MK 1

36 PERSON LIFERAFT

Stowed rear of rear cabin on
RH side.

To use:

Remove from stowage and carry
to nearest exit.

Peel open cover flap and attach
operating cord to strong point
using the dog clip.

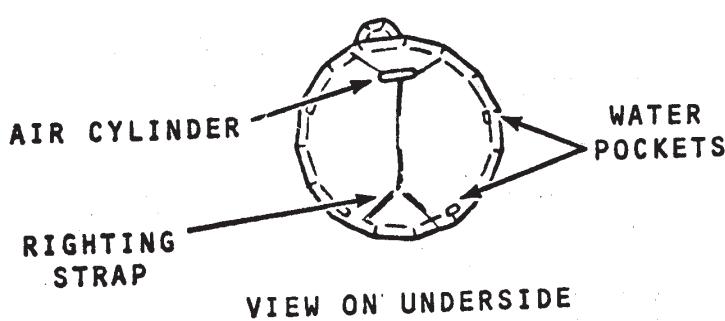
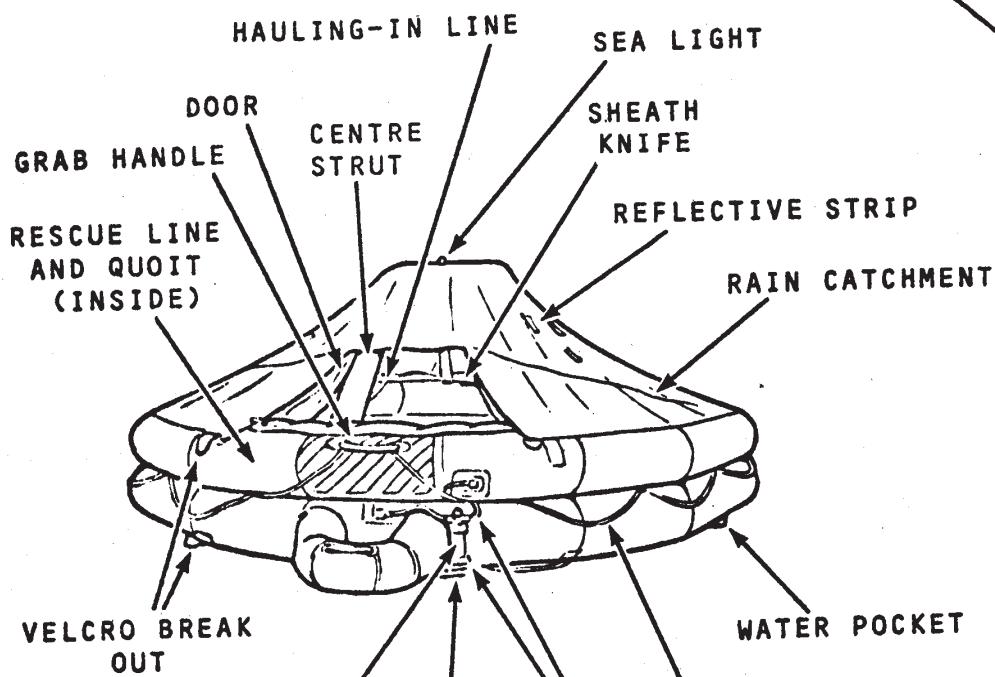
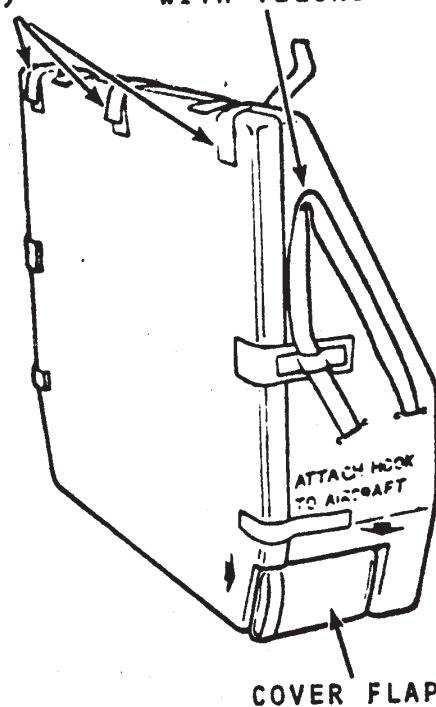
Open aircraft door and throw
container into the sea.

Pull operating cord sharply.
Liferaft will inflate and deploy.

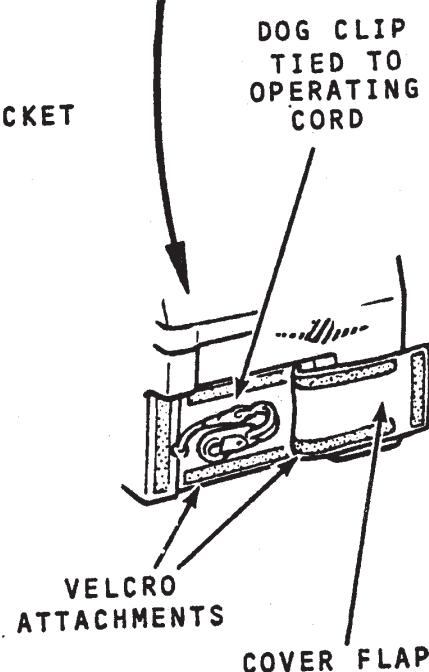
NOTE: The operating cord is used
as a mooring line to position
and secure the liferaft

VELCRO
BREAKOUTS
(TOTAL OF 7)

CARRYING HANDLE
SECURED TO SIDE
WITH VELCRO



VIEW ON UNDERSIDE



Chapter 8

FIRE PROTECTION

FIRE PROTECTION

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Engine Bay Fire Extinguishing and Fuel Vent	08.03.01
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Fire and Nacelle Overheat Test	08.03.05
Fire and Flame Sensors	08.03.06
Engine Warning Lights	08.03.07

GENERAL

The fire protection system provides the means to detect and extinguish a fire and/or overheat condition in the engine nacelles, a smoke detection system in the air generation ducts, and cabin and freight hold areas. Aural and visual indications are provided to alert the flight crew to fire, overheat or smoke conditions.

ENGINE BAY FIRE DETECTION

A conventional engine bay fire detection system, consisting of dual sensing loops, is so controlled that normally both loops must detect a fire condition before the warnings are triggered. The control enables a failed loop to be isolated and its operation to continue with the remaining loop.

ENGINE OVERHEAT DETECTION

An engine overheat detection system monitors specific points in the engine for high temperature.

NACELLE OVERHEAT DETECTION

A nacelle overheat detection system consisting of simple temperature sensing elements connected in series to form loops on the engine nacelle doors, is provided to cover areas where air or gas leaks may impinge.

WING OVERHEAT DETECTION

A wing overheat detection system, consisting of thermal switches, is provided in the rear equipment bay above each engine to sense any leakage of hot air from the air conditioning system.

TORCHING FLAME DETECTION

An engine bay flame detection system monitors the combustion chamber area of the engine for flame breakout. The system consists of dual detector loops so controlled that normally both loops must detect a flame breakout before the warnings are triggered. The control enables a failed loop to be isolated and operation to continue with the remaining loop.

ENGINE FIRE EXTINGUISHING

Four fire extinguisher bottles, one in each engine dry bay, are electrically discharged from the flight deck. Each extinguisher bottle has two firing heads and is capable of discharging into its own or the adjacent engine bay. When an extinguisher is fired, the contents of the bottle are discharged through nozzles around the engine and act to close a fire valve across the cooling air flow to the air conditioning primary and secondary heat exchangers of the engine.

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FIRE FLAPS

A fire flaps system seals off the engine bay to starve any fire of oxygen. Fire flaps is the term used to identify the secondary air doors and engine bay vent in the engine fire zone. They are shut when the engine shut down handle is pulled.

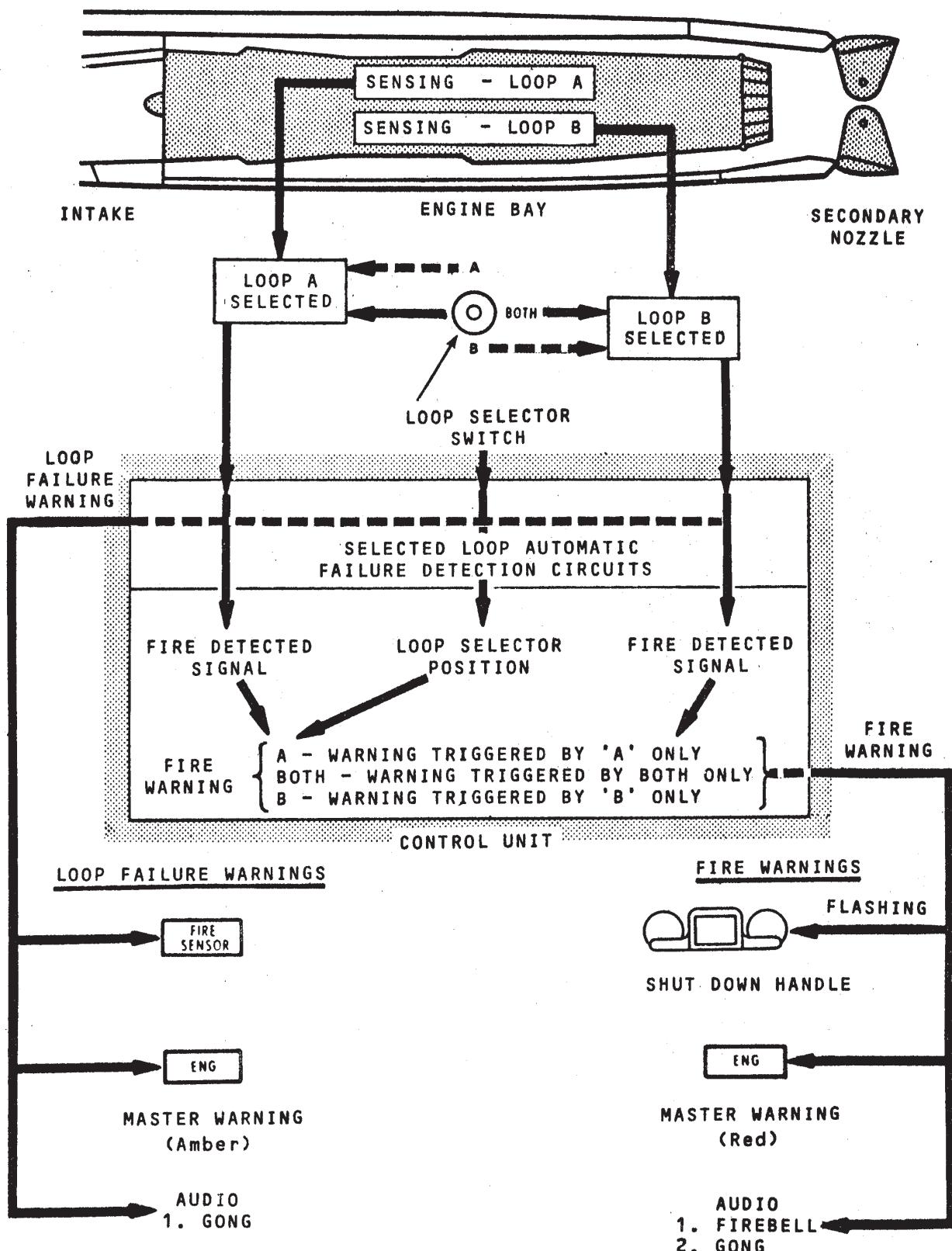
FUEL TANK VENT IGNITION SUPPRESSION

A fuel tank vent ignition suppression system uses a flame detector that automatically triggers the discharge of an extinguishant into the vent pipe between the detector and the fuel tanks. This ensures that any external ignition of the vented fuel vapour cannot propagate back to the fuel tanks.

SMOKE DETECTION

Smoke detection systems are installed in the air generation ducts and the cabin and freight hold areas.

ENGINE BAY FIRE DETECTION

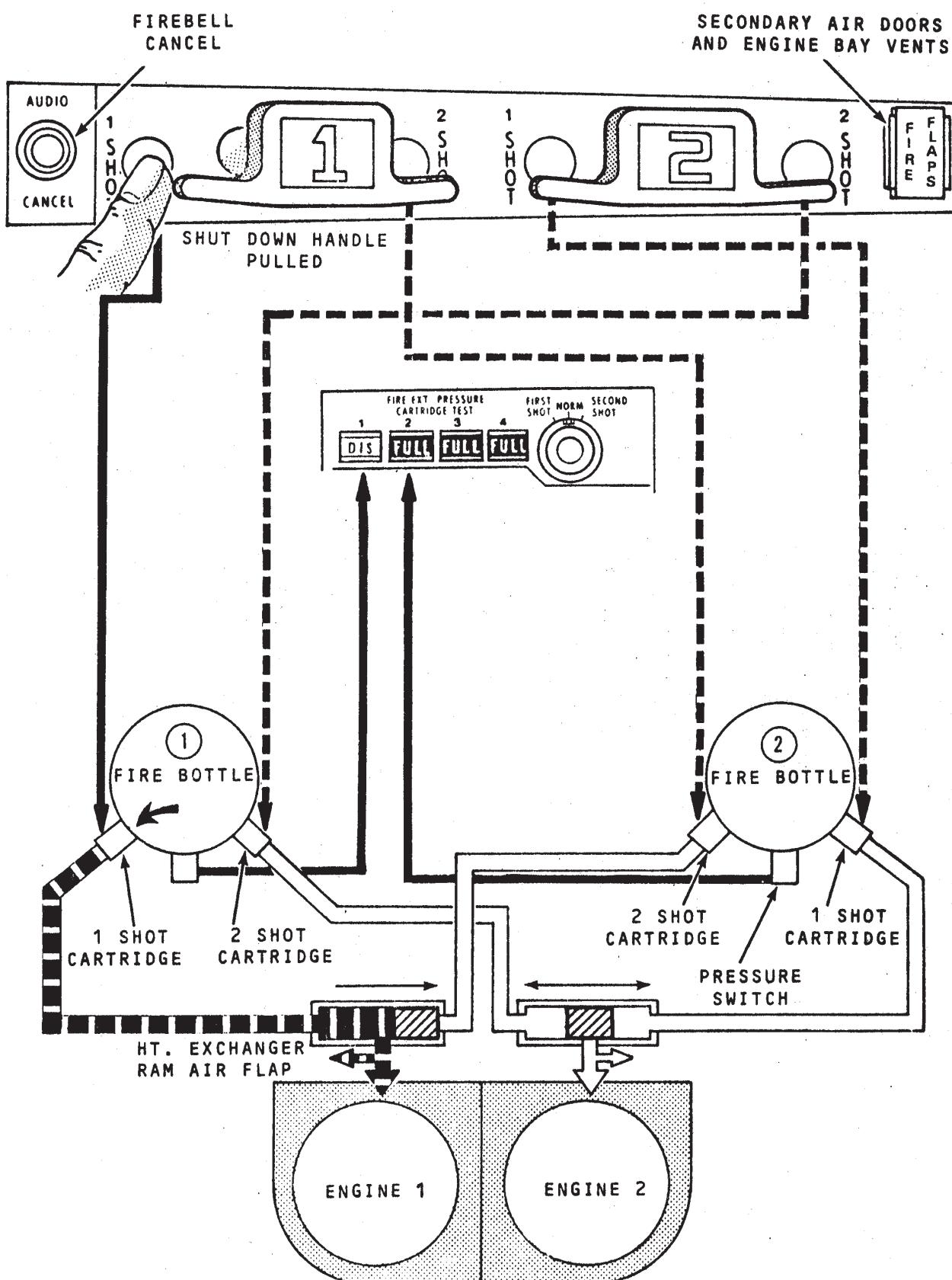


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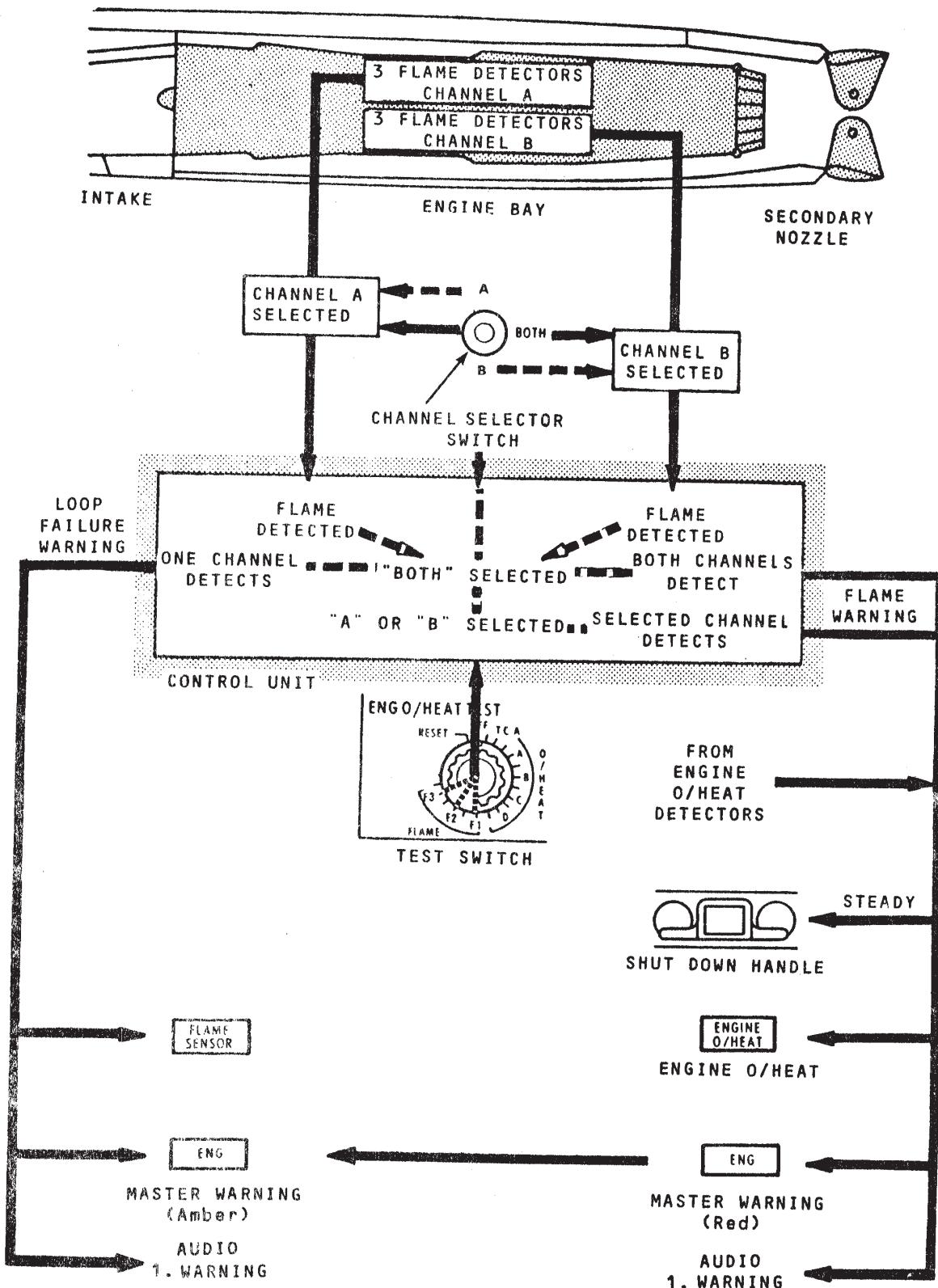
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ENGINE BAY FIRE PROTECTION



LEFT NACELLE SHOWN.
RIGHT NACELLE SIMILAR.

ENGINE BAY TORCHING FLAME DETECTION

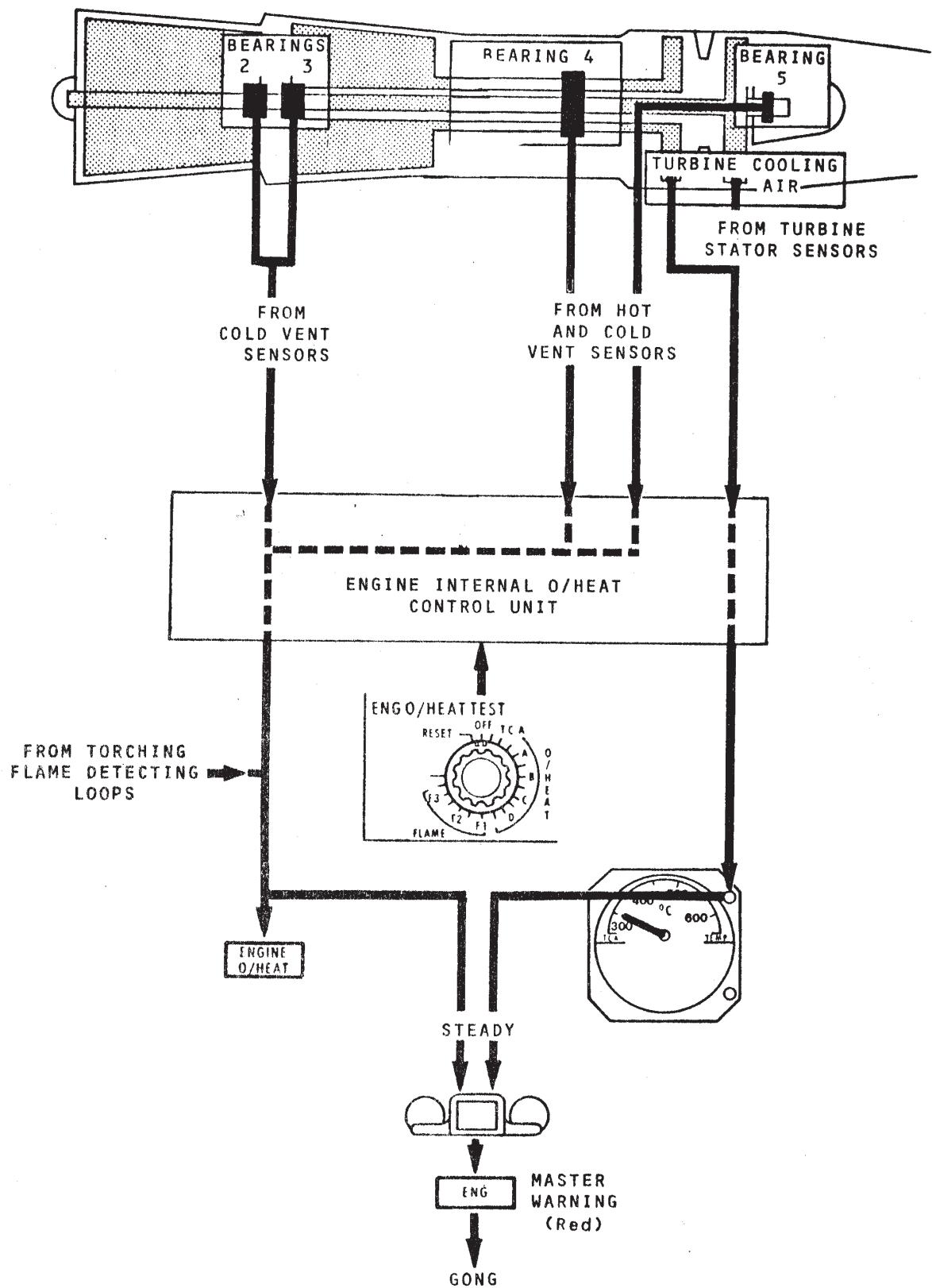


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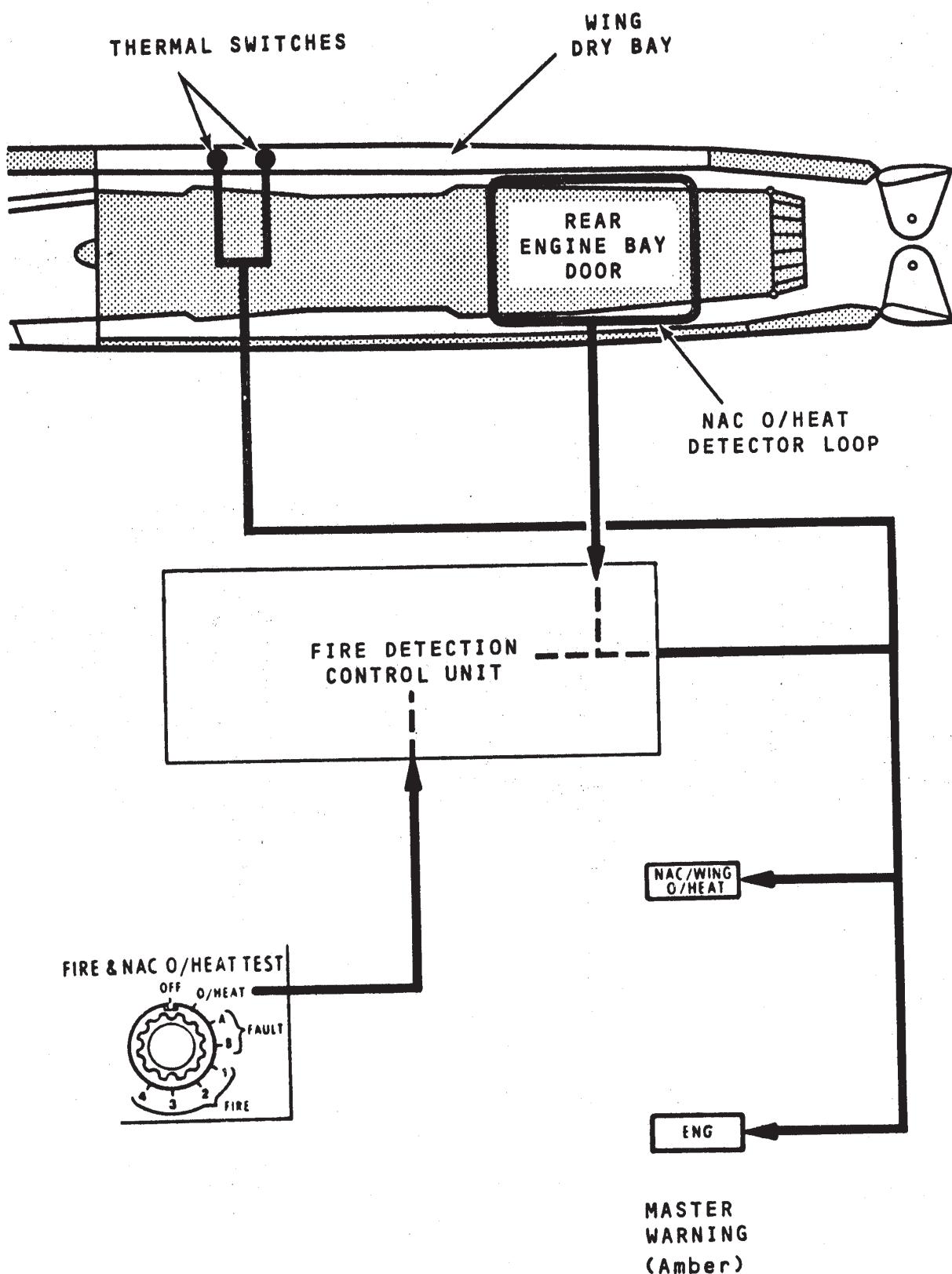
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ENGINE OVERHEAT



WING/NACELLE OVERHEAT

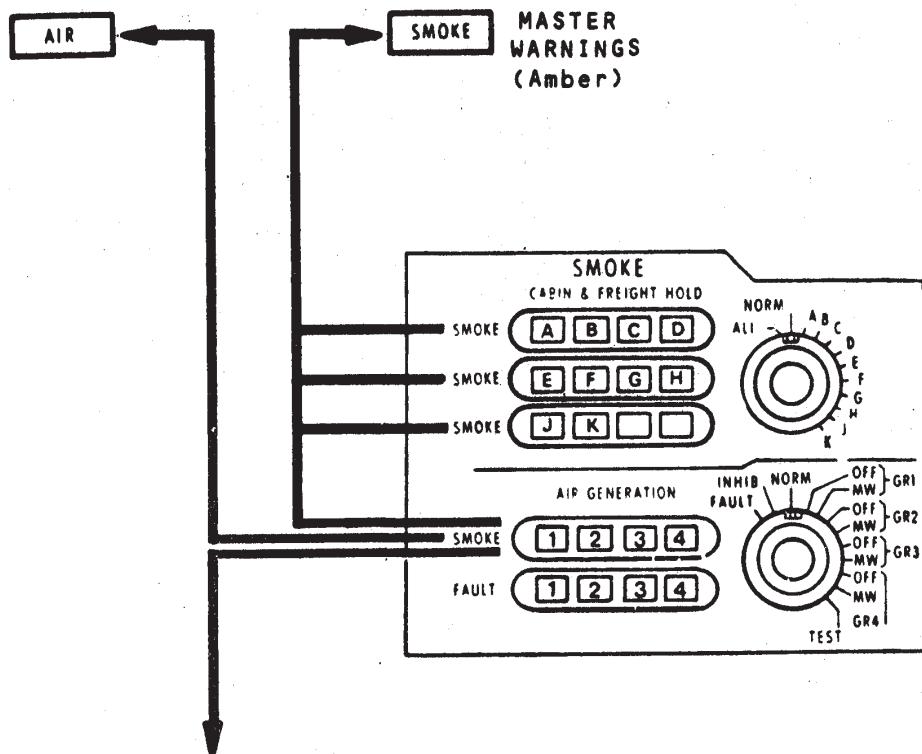
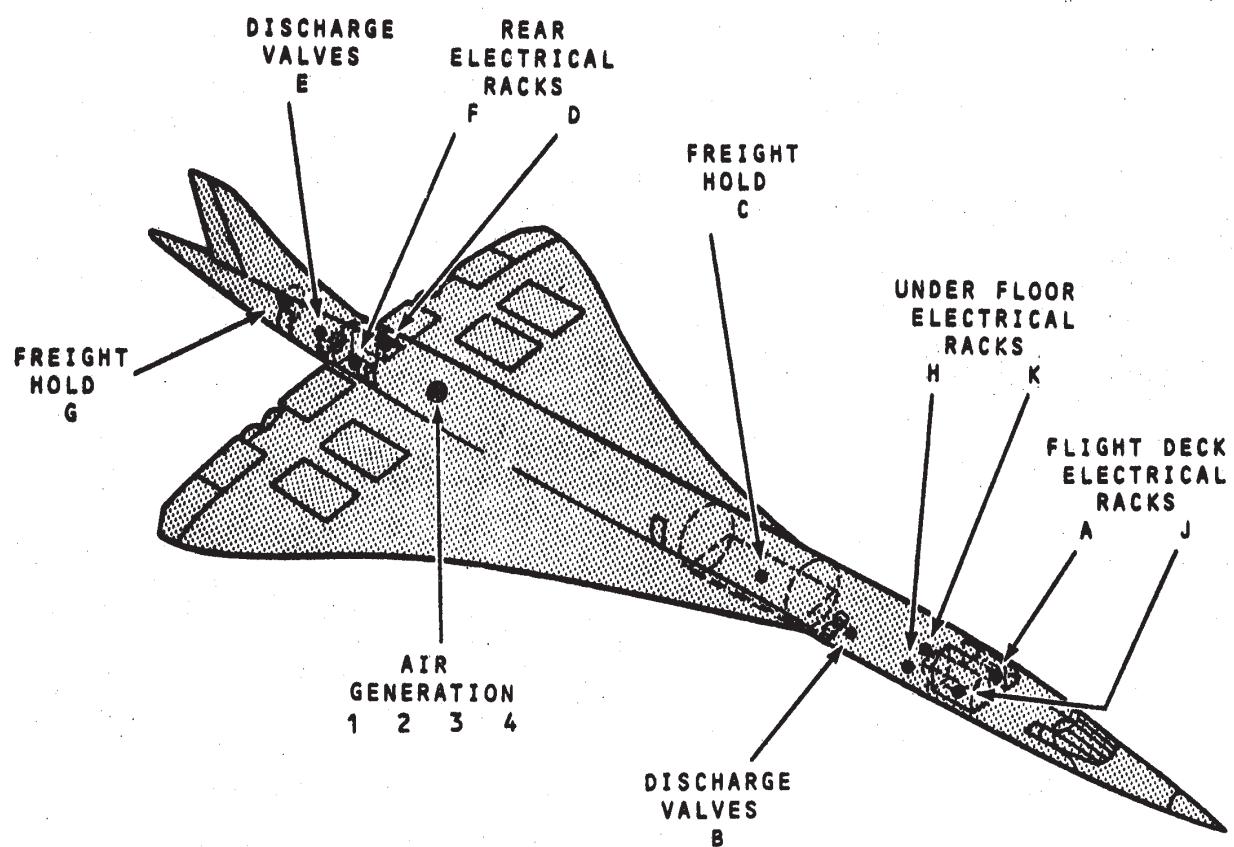


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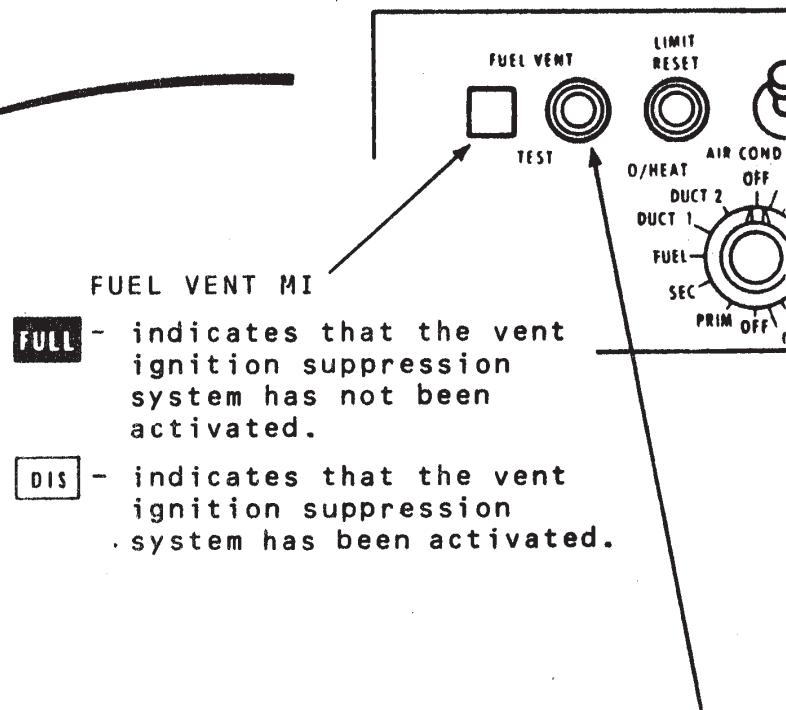
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SMOKE DETECTION



SYSTEM AUTO SHUT-DOWN
(EXCEPT DURING TEST)

ENGINE BAY FIRE EXTINGUISHING & FUEL VENT



FUEL VENT TEST PUSH BUTTON

Pressed - the fuel vent MI changes from FULL to DIS to indicate a serviceable suppression circuit.

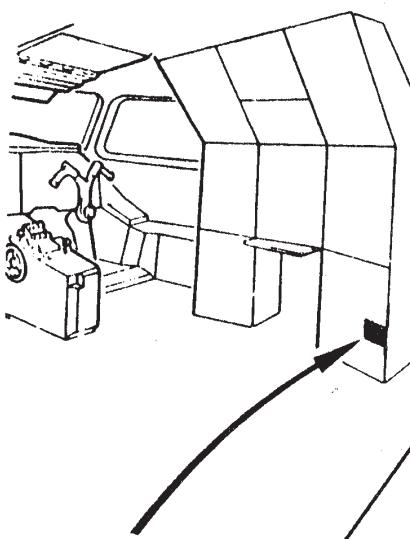
FIRE EXT PRESSURE CARTRIDGE TEST SELECTOR

NORM - checks the pressure of the fire extinguisher bottle. There is one bottle per engine. Correct charge pressure of the bottle is indicated when its relevant magnetic indicator reads FULL. A discharged or low pressure bottle is indicated by the same magnetic indicator reading DIS.

FIRST SHOT - checks the continuity of the first shot electrical firing circuit to the first shot cartridge of the dual operating head of the fire extinguisher bottle. Satisfactory check operation is shown by the magnetic indicator reading DIS.

SECOND SHOT - checks the continuity of the second shot electrical firing circuit to the second shot cartridge of the dual operating head of the fire extinguisher bottle. Satisfactory check operation is shown by the magnetic indicator reading DIS.

SMOKE DETECTION AND AIR GENERATION

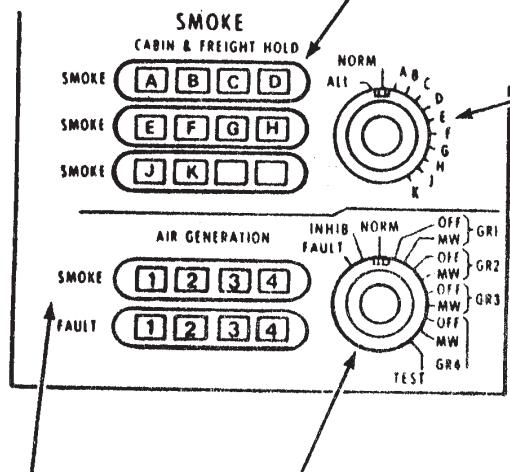


SMOKE, CABIN AND FREIGHT HOLD, LIGHTS (Amber) (10)

On - indicates that smoke is detected in an area as follows:

- A - Left forward electrical racking.
- B - Forward cabin pressurization discharge valves.
- C - Forward lower freight hold.
- D - Left rear electrical racking.
- E - Rear cabin pressurization discharge valves.
- F - Right rear electrical racking.
- G - Upper rear freight hold.
- H - Right underfloor electrical racking.
- J - Right forward electrical racking.
- K - Left underfloor electrical racking.

Accompanied by MWS SMOKE light (amber) and audio (gong).



CABIN AND FREIGHT HOLD ROTARY SELECTOR

Used to test the smoke detection system.

ALL - tests the continuity of the electrical circuits of the 10 smoke detectors in the cabin and freight hold simultaneously. The areas of surveillance are identified by a letter.

NORM - the detection circuits are armed and the test circuits are off.

A to K - check individual smoke detectors.

AIR GENERATION ROTARY SELECTOR

FAULT - tests continuity of AIR GENERATION smoke detection circuits.

INHIB - overrides the auto shut down of AIR GENERATION group(s) by associated AIR GENERATION smoke detection system(s).

NORM - connects the AIR GENERATION smoke detection system to the MWS.

GR1 OFF - cancels the SMOKE 1 light and the MWS SMOKE light.

GR1 MW - tests the No 1 AIR GENERATION smoke detection system's connection with the MWS.

GR2 OFF	}	MW
GR3 OFF		

as GR1 OFF

GR3 OFF	}	MW
GR4 OFF		

GR4 MW

TEST - tests the continuity of the detectors and circuits of the four AIR GENERATION smoke detection systems simultaneously.

NOTE: TEST must be selected before the individual group tests will operate.

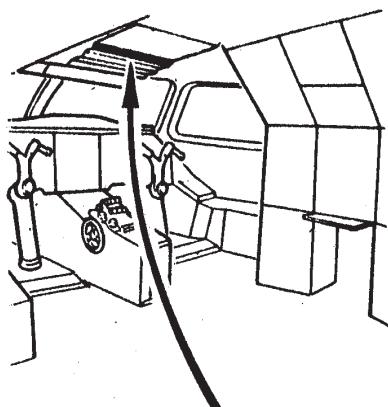
SMOKE 1 2 3 4 LIGHTS (Amber)

On - indicates smoke detected in associated AIR GENERATION group, accompanied by MWS SMOKE (amber) and MWS AIR (amber)

FAULT 1 2 3 4 LIGHTS (Yellow)

On - indicates a fault in the smoke detection system of the associated AIR GENERATION group.

ENGINE SHUT DOWN

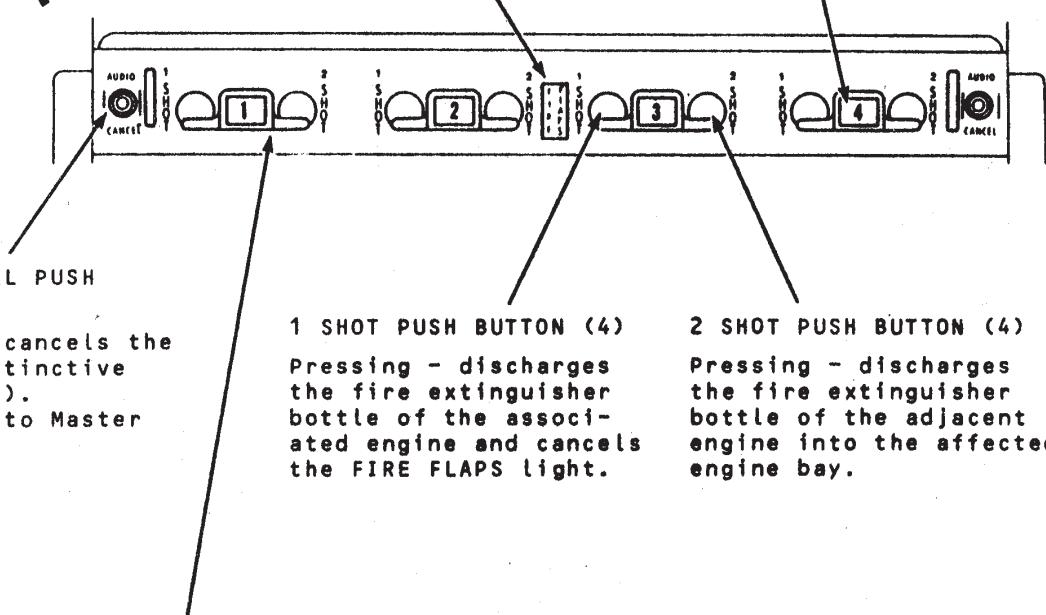


FIRE FLAPS LIGHT (Green)

On - indicates that the secondary air doors and engine bay vents are shut.

ENGINE SHUT DOWN HANDLE LIGHT (Red) (4)

Flashing - indicates that an engine fire has been detected.
Accompanied by a MWS ENG (red) plus the distinctive fire warning audio (bell).



AUDIO CANCEL PUSH BUTTON (2)

Pressing - cancels the warning distinctive audio (bell). Refer also to Master Warning.

1 SHOT PUSH BUTTON (4)

Pressing - discharges the fire extinguisher bottle of the associated engine and cancels the FIRE FLAPS light.

2 SHOT PUSH BUTTON (4)

Pressing - discharges the fire extinguisher bottle of the adjacent engine into the affected engine bay.

ENGINE SHUT DOWN HANDLE (4)

Pulling the engine shut down handle when its light (red) is flashing, dims the light and:

- Shuts the HP VALVE
- Switches the HP VALVE switch light (white) on.
- Shuts the LP VALVE.
- Shuts the HYDRAULIC SHUT OFF VALVE(s)
- Shuts the REHEAT fuel shut off valve.
- Shuts the air BLEED VALVE.
- Shuts the air CROSS BLEED valves.
- Shuts the cabin inlet safety valve.
- Shuts the SECONDARY AIR DOORS and engine bay vents, thus causing the FIRE FLAPS light (green) to come on.
- Onloads the standby (yellow) hydraulic system.
- Opens the ENGINE RECIRCULATION VALVE.
- Inhibits the engine igniters.
- Inhibits the T₁ engine probe heater, thus causing the T₁ light (yellow) to come on.

NOTE: The triangle (orange) next to the following MIs:

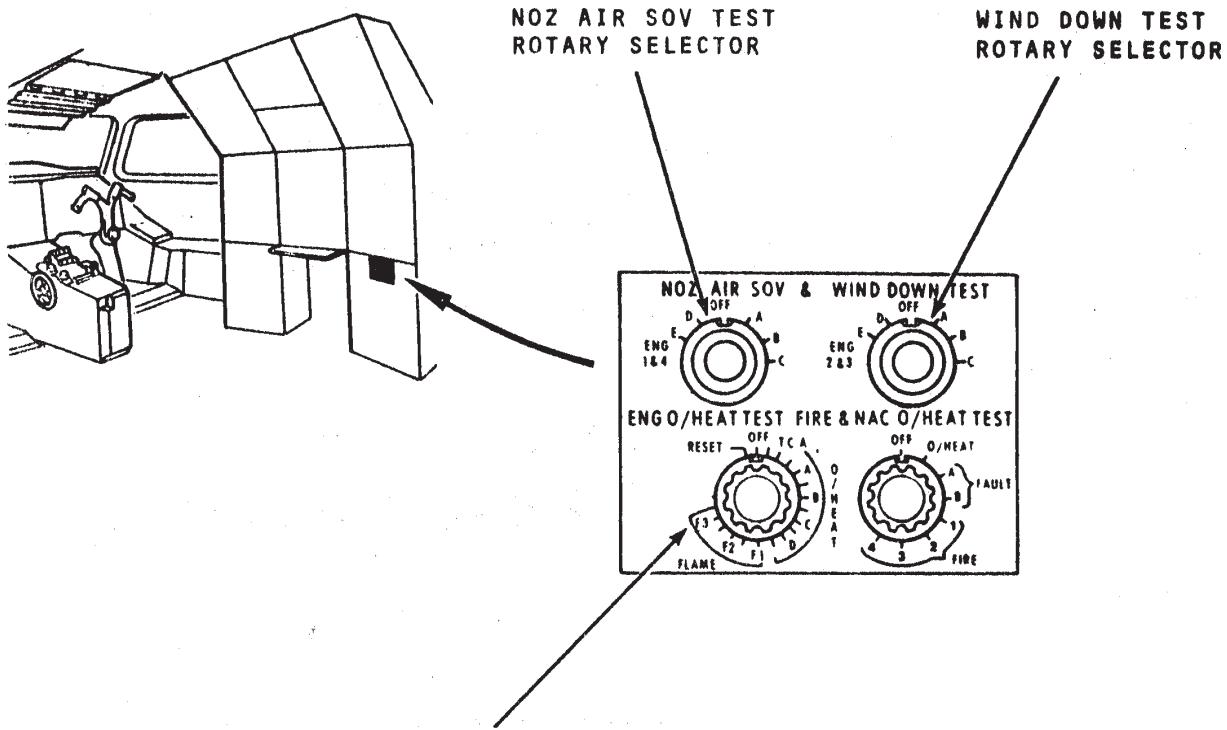
- HP VALVE
 - LP VALVE
 - Hydraulic SHUT OFF VALVE
 - Air BLEED VALVE
 - Air CROSS BLEED
 - SECONDARY AIR DOORS
- Indicates that the associated valves and doors are shut by pulling the engine shut down handle.

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ENGINE OVERHEAT TEST



ENGINE O/HEAT TEST ROTARY SELECTOR

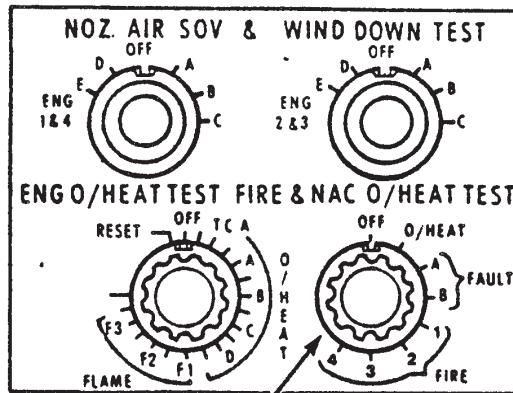
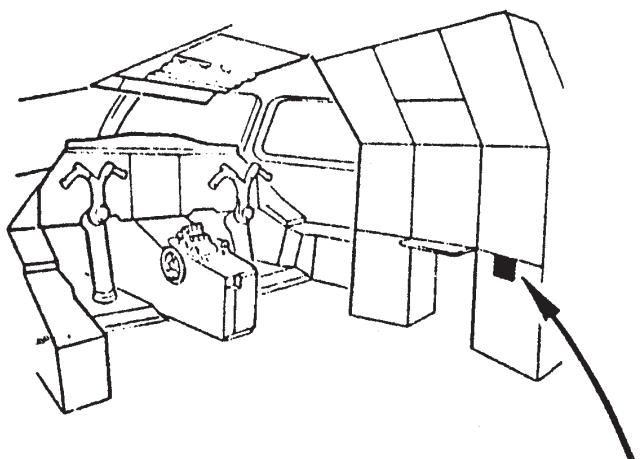
- RESET - then OFF, cancels the warning light(s)
TCA - the turbine cooling air high temperature warning system is being tested by a simulated overheat condition.
O/HEAT A - the high temperature warning of the cooling air for engines Nos.2 and 3 bearings is being tested by a simulated overheat condition.
O/HEAT B - the high temperature warning of the cooling air for the engines' Nos.4 and 5 bearings is being tested by a simulated overheat condition.
O/HEAT C - the high temperature warning of the engines' high pressure compression seal vent is being tested by a simulated overheat condition.
O/HEAT D - the high temperature warning of the engines' turbine bearing seal vent is being tested by a simulated overheat condition.
FLAME F₁ - providing the FLAME SENSOR selector is at BOTH, both detectors of the twin detector unit of each engine's flame breakout detection system, positioned on the nacelle centre wall, are being tested by simulating a flame at the detectors.
FLAME F₂ - providing the FLAME SENSOR selector is at BOTH, both detectors of the twin detector unit of the engine's flame breakout detection system, positioned on each engine bay rear door, are being tested by simulating a flame at the detectors.
FLAME F₃ - providing the FLAME SENSOR selector is at BOTH, both detectors of the twin detector unit of each engine's flame breakout detection system, positioned on the engine bearer, are being tested by simulating a flame at the detectors.

The unmarked positions (8) between TCA and RESET are reset positions.

- NOTE: (1) The selector must remain at the reset position between F₁, F₂, F₃ and RESET for 5 secs to enable the reset to be effective.
(2) All four engines are tested simultaneously.

(Deletion)

FIRE AND NACELLE OVERHEAT TEST



FIRE & NAC O/HEAT TEST ROTARY SELECTOR

- O/HEAT** - tests the nacelle overheat detection systems by simulating an overheat condition.
- FAULT A** - tests the engine fire detection system's loop A amplifiers fault detection circuit.
- FAULT B** - tests the engine fire detection system's loop B amplifiers fault detection circuit.
- FIRE 1** - providing the FIRE SENSOR selector is at BOTH, the electrical continuity of both the No.1 engine fire detection firewire loops is tested by simulating a warning to operate the detection relays.
- FIRE 2** - providing the FIRE SENSOR selector is at BOTH, the electrical continuity of both the No.2 engine fire detection firewire loops is tested by simulating a warning to operate the detection relays.
- FIRE 3** - providing the FIRE SENSOR selector is at BOTH, the electrical continuity of both the No.3 engine fire detection firewire loops is tested by simulating a warning to operate the detection relays.
- FIRE 4** - providing the FIRE SENSOR selector is at BOTH, the electrical continuity of both the No.4 engine fire detection firewire loops is tested by simulating a warning to operate the detection relays.

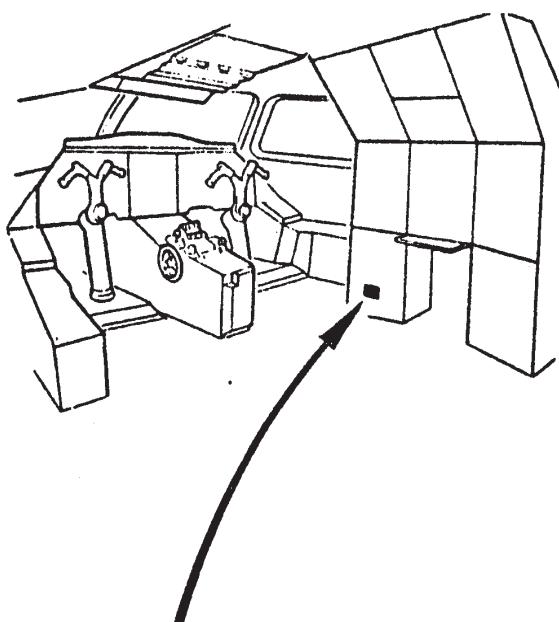
NOTE: All four engines are tested simultaneously during the O/HEAT, FAULT A and FAULT B tests.

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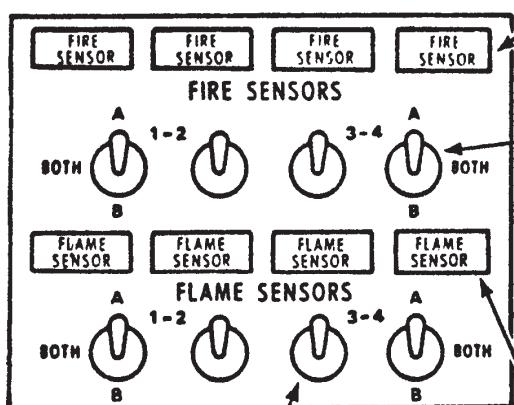
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FIRE AND FLAME SENSORS



FIRE SENSOR LIGHT
(Amber) (4)

On - indicates a fault exists on one of the two fire detection loops of the engine.
Accompanied by a MWS ENG (amber).



FIRE SENSORS SELECTOR (4)

A or B - the other loop is inhibited and the engine fire warnings are armed to operate from the selected loop.

BOTH - both engine fire detection loops are detecting and the engine fire warnings are armed to operate only if both loops detect a fire.

FLAME SENSORS SELECTOR (4)

A or B - the other loop is inhibited, the FLAME SENSOR light is inhibited and the engine overheat warnings are armed to operate from the selected loop.

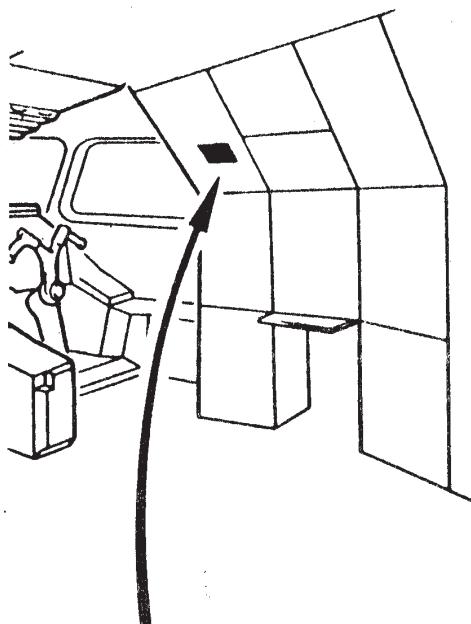
BOTH - both the combustion chamber flame breakout detection loops are detecting and the engine overheat warnings are armed to operate only if both loops detect a flame breakout.

FLAME SENSOR LIGHT (Amber) (4)

On - with the FLAME SENSOR selector at BOTH, indicates that one of the two engine flame breakout detection loops is signalling a warning.
Accompanied by a MWS ENG (amber).

(Deletion)

ENGINE WARNING LIGHTS



ENGINE O/HEAT LIGHT (Red) (4)

On - indicates that a high temperature exists at:-

No 2 and No 3 bearings air vent or
No 4 and No 5 bearings cold vent or
No 5 bearing hot vent or
No 12 labyrinth seal vent or
a combustion chamber flame breakout exists.
Accompanied by an Engine Shut Down Handle light (red) and a MWS ENG (red).

ENGINE O/HEAT	ENGINE O/HEAT	ENGINE O/HEAT	ENGINE O/HEAT
---------------	---------------	---------------	---------------

START PUMP	START PUMP	START PUMP	START PUMP
------------	------------	------------	------------

WIND DOWN	WIND DOWN	WIND DOWN	WIND DOWN
-----------	-----------	-----------	-----------

REHEAT	REHEAT	REHEAT	REHEAT
--------	--------	--------	--------

NAC/WING O/HEAT	NAC/WING O/HEAT	NAC/WING O/HEAT	NAC/WING O/HEAT
-----------------	-----------------	-----------------	-----------------

FUEL FILTER	FUEL FILTER	FUEL FILTER	FUEL FILTER
-------------	-------------	-------------	-------------

START PUMP LIGHT (Yellow) (4)

Refer to POWER PLANT

WIND DOWN LIGHT (Yellow) (4)

Refer to POWER PLANT

REHEAT FAULT LIGHT (Yellow) (4)

Refer to POWER PLANT

FUEL FILTER LIGHT (Amber) (4)

Refer to POWER PLANT

NAC/WING O/HEAT LIGHT (Amber) (4)

On - indicates an overheat condition in the wing rear equipment bay over an engine or in an engine bay.

Accompanied by a MWS ENG (amber)

Chapter 9

FLIGHT CONTROLS

(ATA CHAPTER 27)

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FLIGHT CONTROLS**GENERAL**

The aircraft is controlled in pitch and roll by elevons and in yaw by rudders. Each control surface is independently operated by a Power Flying Control Unit (PFCU).

The three elevons, on each side of the aircraft, are in two groups: the outer and middle elevons because their deflection angles are always synchronised, and the inner elevons because their deflection angles in the roll axis are less than that of the outer and middle elevons.

FLIGHT CONTROL CHANNELS

Conventional flight deck controls actuate three signal channels; two electrical (one called Blue and the other Green) and one Mechanical.

Each electrical flying control channel is supplied from its own inverter which has the same colour code as the channel it supplies. The electrical signalling operates at a different frequency from the main aircraft system.

On both blue and green electrical channels pilot control movements generate, by means of synchro transmitters called resolvers, electrical signals that directly control the PFC servos. Each flight control group, middle and outer elevons, inner elevons and rudders, operates independently through its own resolvers that also ensure the pitch and roll mixing for the elevons.

The mechanical channel also transmits pilot control movements to the PFC servos but is unclutched at the servos when either electrical channel is operating.

Three signals, blue, green and mechanical are therefore available at the PFC servos but only one is activated by the monitoring system that monitors the operation of the control surfaces by groups.

On the mechanical channel of each flight control axis pilot control movements are transmitted to the PFC servos by linkages and cables through a relay jack that compensates for linkage inertia.

Pitch and roll inputs are mixed by a mechanical mixing unit downstream of the pitch and roll relay jacks. This unit also provides in roll the reduced deflection of the inner elevons in order to minimise the aerodynamic interference of the elevons on the fin and rudder and hence the yaw moment in roll. The deflection angles in roll/pitch mixing are limited by mechanical stops such that at full pitch deflection 2.9 degrees of roll deflection are available.

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The control surface deflection angles are limited by mechanical stops on the forward and rear mixing unit and on the individual power flying control units.

Maximum stops (mixing unit)

YAW (rudder)	$\pm 30^\circ$
PITCH (inner elevons)	* 15° UP, 17° DOWN
(outer/middle elevons)	* 15° UP, 17° DOWN
ROLL (inner elevons)	14° UP, 14° DOWN
(outer/middle elevons)	20° UP, 20° DOWN

* The pitch nose up stop of 15° UP can be overridden by pulling more on the control column in order to obtain 17° UP if needed.

The pitch and roll mixing permits additional deflection capability up to mechanical stops on the PFCU's.

Maximum stops (PFCU)

Inner elevons	19° UP, 19° DOWN
Outer/middle elevons	$23\frac{1}{2}^\circ$ UP, $23\frac{1}{2}^\circ$ DOWN

HYDRAULIC SUPPLIES

The PFCUs, relay jacks and artificial feel units are normally supplied with pressure from blue and green hydraulic systems. In the case of the PFCUs and relay jacks only, the yellow standby system may be selected to replace either a failed blue or green main system. Control of these supplies is through selection on the SERVO CONTROLS panel.

FLIGHT CONTROL MONITORING AND COMPARISON

The monitoring system monitors

- flight control inverters
- hydraulic systems pressure to the flight controls
- operation of the servo controls
- operation of the electrical control channels

The monitoring system will automatically reject a flight control channel suffering a failure in these systems and change to the next available channel.

The comparator monitors the pilot (or autopilot) input and surface displacement. Channel changeover will take place when these disagree except when the difference is due to a high rate of input or the surface fails to correspond correctly because of high aerodynamic loads.

FLIGHT CONTROLS

OUTER ELEVON NEUTRALISATION

In order to avoid lateral control reversal in the transonic region at high indicated airspeeds, the neutralisation system returns the outer elevons to the zero position at V_{MO} plus 25 knots. To avoid aircraft disturbance during initiation and removal of the neutralization signal, a short time delay is incorporated to provide a progressive transition. The outer elevon neutralization function only operates in the Blue and Green electrical channels. In mechanical channel, control position is unaffected.

RELAY JACKS

Each relay jack is a twin-ram electro-hydraulic actuator. Each ram displacement in speed and direction is controlled by a spool valve. Each spool valve jamming is monitored by a detector, linked to the BLUE light if the corresponding ram is supplied by the blue hydraulic system or the GREEN light if the ram is supplied by the green hydraulic system.

The detection of a jammed condition automatically signals the relevant relay jack hydraulic selector to shut, thus removing hydraulic power (normal or standby) from the jammed side of the relay jack. This automatic shut-off ensures that a flight control axis cannot be frozen by this single jack failure.

Each relay jack is also used as an auto-pilot input point.

POWER FLIGHT CONTROL UNIT (PFCU)

Each flight control surface is actuated by an electro-hydraulic twin-ram servo control. Each servo control ram displacement in speed and direction is controlled by a spool valve. Each spool valve jamming is monitored by a detector, linked to the BLUE JAM light if the corresponding ram is supplied by the blue hydraulic system or the GREEN JAM light if the ram is supplied by the green hydraulic system.

When a servo control ram spool valve other than the one being signalled jams, the microswitches between the spools are operated by movement of the other valve and signal a jam on the faulty half body. Should it be the valve being signalled which jams, an automatic changeover to the next available signalling channel will occur accompanied by the appropriate valve jam signal.

AUTO-STABILIZATION

The auto-stabilization system improves the natural stability of the aircraft. It minimizes the effect of turbulence and reduces the resulting flight path disturbance following an engine failure.

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The auto-stabilization system comprises two separate channels for each control axis, pitch, roll and yaw. Each axis of each channel is engaged by a separate switch during normal operation. Both channels of each axis are engaged with channel 1 having control authority and channel 2 being in a synchronized standby condition.

The auto-stabilization system generates signals in pitch roll and yaw as a function of aircraft rate of movement and mach number from the ADC.

These signals are independently supplied through both electrical channels direct to the PFCU servos with no feedback to the pilot controls.

In addition to the basic auto-stabilization the system also provides a roll/yaw turn co-ordination function that reduces the side slip angles at slow speed in response to large lateral control demands.

Auto-stabilization No.1, although normally linked to the Blue electrical channel will automatically control through the Green electrical channel in event of failure of the Blue electrical channel.

Auto-stabilization No.2 operates similarly.

ARTIFICIAL FEEL

The artificial feel system comprises two separate channels for each control axis, pitch, roll and yaw. Each axis of each channel is engaged by a separate switch. During normal operation both channels of each axis are engaged, but on each axis a rocking lever linked to both channel jacks gives channel 1 control authority while channel 2 jack is held to its lower stop.

Artificial feel is provided on each control axis pitch, roll and yaw by a spring rod that increases the control stiffness with increasing control deflection supplemented by dual control jacks that change the stiffness as a function of speed at speeds above approach speed. Channel 1 jacks are powered by the blue hydraulic system and channel 2 jacks are powered by the green hydraulic system while jack pressures are controlled by speed signals from the ADC.

The pitch artificial feel maintains a constant load factor throughout the flight envelope. The roll artificial feel maintains a constant relationship between roll rate and control wheel force throughout the flight envelope. The YAW artificial feel limits available rudder demand to meet structural limitations.

Blue or green hydraulic system loss, or failure of ADC1 or ADC2, will cause the loss of the associated artificial feel system.

Failure of the artificial feel system No.1 will cause an automatic changeover to artificial feel system No.2 provided it is engaged.

Failure of artificial feel system No.2 will not make any change because artificial feel system No.1 has priority. There is no change in the FEEL force.

The pitch artificial feel channels also provide the stick wobbler function of the anti-stall system. It is thus necessary for artificial feel to be engaged in order that stick wobbler anti-stall protection be available.

TRIM

Conventional trim is provided in Roll, Yaw and Pitch. The trim cancels the load of the artificial feel by changing the feel datum and consequently the neutral position of the flight controls.

An electric trim system is provided only in pitch and comprises two separate but identical channels. Each channel is engaged by a separate engage switch. During normal operations, both channels are engaged with channel 1 having control authority and channel 2 being in a synchronized standby condition.

The electric trim can be controlled either, directly by the pilot using the PITCH TRIM selector on each control column or independently of the pilot, in auto trim when either autopilot is engaged or for automatic pitch stability correction. The same electric trim is used in both cases.

Automatic Pitch Stability Correction
This mode of operation provides the following

1. Mach Trim

In transonic flight the rearward shift of the centre of pressure reduces pitch stability. To restore pitch stability the mach trim function automatically signals an up elevon demand related to mach number between $M = 0.69$ and $M = 1.34$.

2. Incidence Trim

Incidence Trim compensates for centre of pressure movement due to changes in the aeroplane's angle of attack, it is operative at angles of attack of $10\frac{1}{2}$ degrees and reaches its maximum at $19\frac{1}{2}$ degrees. It has a secondary purpose in that it will increase the stick force required to reach high angles of attack. As the angle of attack increases so the incidence trim applies a nose down pitch trim.

3. Speed Trim

Pitch stability correction is introduced as a function of airspeed, it complements Mach trim and automatically signals an up elevon demand related to airspeed between 200 knots and 600 knots.

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FLIGHT CONTROLS

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4. Speed Trim (above V_{MO})

To give additional protection beyond V_{MO} a term proportional to the extent by which V_{MO} is exceeded signals an up elevon demand. The term is also proportional to Mach number and is introduced when the aircraft speed is more than 5 knots above V_{MO} and the Mach number is above $M = 1.15$.

The automatic pitch stability correction is also active in autopilot auto trim operation but the forces are masked absorbed by the auto trim.

Failure or disengagement of both electric trim systems causes disengagement of both autopilots except below 100ft.

When the aircraft angle of attack exceeds $14\frac{1}{2}$ degrees the auto pilot auto trim is inhibited, except after glide slope capture, by a signal from the anti-stall system. This inhibition does not cause the electric trim systems or switches to disengage. As the auto pilot disengages at $17\frac{1}{2}$ degrees angle of attack nose down pitch occurs.

HIGH INCIDENCE PROTECTION

High incidence protection is provided by

Incidence trim
Stick shaker
Anti-stall system

Incidence Trim

The Incidence trim is part of the automatic pitch stability correction and operates at angles of attack of 11 degrees and above.

Stick Shaker

A single stick shaker on the captain's control column operates at an angle of attack of 16.5 degrees. Both control columns will shake as the movement is transmitted to the first officers control column through the mechanical linkage. The shaker is signalled from either ADC.

Anti-Stall System

The anti-stall system operates, when engaged, from about 10 seconds after lift off at speeds below 270 knots. At high angle of attack conditions the anti-stall system augments the basic pitch autostabilization with a super stabilization function and creates an unmistakeable warning at the approach to very high angles of attack through the artificial feel.

FLIGHT CONTROLS

There are two anti-stall systems, both systems are normally engaged with system 1 having priority whilst system 2 is in a synchronised standby condition.

The super-stabilization function is active at angles of attack greater than 13.5 degrees. It produces a down elevon deflection, through the pitch autostabilization channel, proportional to angle of attack, nose up pitch rate and aircraft deceleration. The deflection is limited to 8 degrees down elevon and 0 degrees up elevon.

The unmistakeable warning (stick wobbler) modulates the pressure in the artificial feel jacks causing both control columns to pulsate against any manual nose up force. The stick wobbler normally operates at an angle of attack of 19 degrees but under dynamic approach to high angle of attack conditions a "phase advance" is invoked that can cause the wobbler to operate at up to 3 degrees before 19 degrees. To prevent the stick wobbler operating before the stick shaker a synchronization signal from the anti-stall system to the stick shaker ensures simultaneous operation under maximum phase advance conditions.

In addition to the basic function, if the conditions for stick wobbler operation happen at less than 140 knots the super-stabilization system commands a simultaneous 4 degrees down elevon.

The stick wobbler is cancelled by pushing the control column forward through the trim neutral position.

Since the superstabilization demands of the anti-stall systems are transmitted through the pitch autostabilization channel the engagement logic of anti-stall is linked to that of the pitch autostabilization system.

EMERGENCY FLIGHT CONTROL

An emergency flight control system provides an additional flight control capability in pitch and roll axes in the event of a control jam between the control column and the relay jacks. This control is achieved by strain gauge bridges, within the control column assembly measuring pitch and roll forces, demanded by the pilot against the jam, and injecting these signals directly into the electrical flight control channels. There is no emergency flight control in yaw.

The control signals are transmitted through the autostabilization pitch and roll channels into the electrical flying control channels. It is therefore necessary for the autostabilization pitch and roll channels to be engaged and healthy with flight controls in an electrical channel. To prevent disconnection of the electrical flying controls through surface comparator action the comparators are inhibited when emergency flight control is engaged.

09-01-08
21 JUL. 76

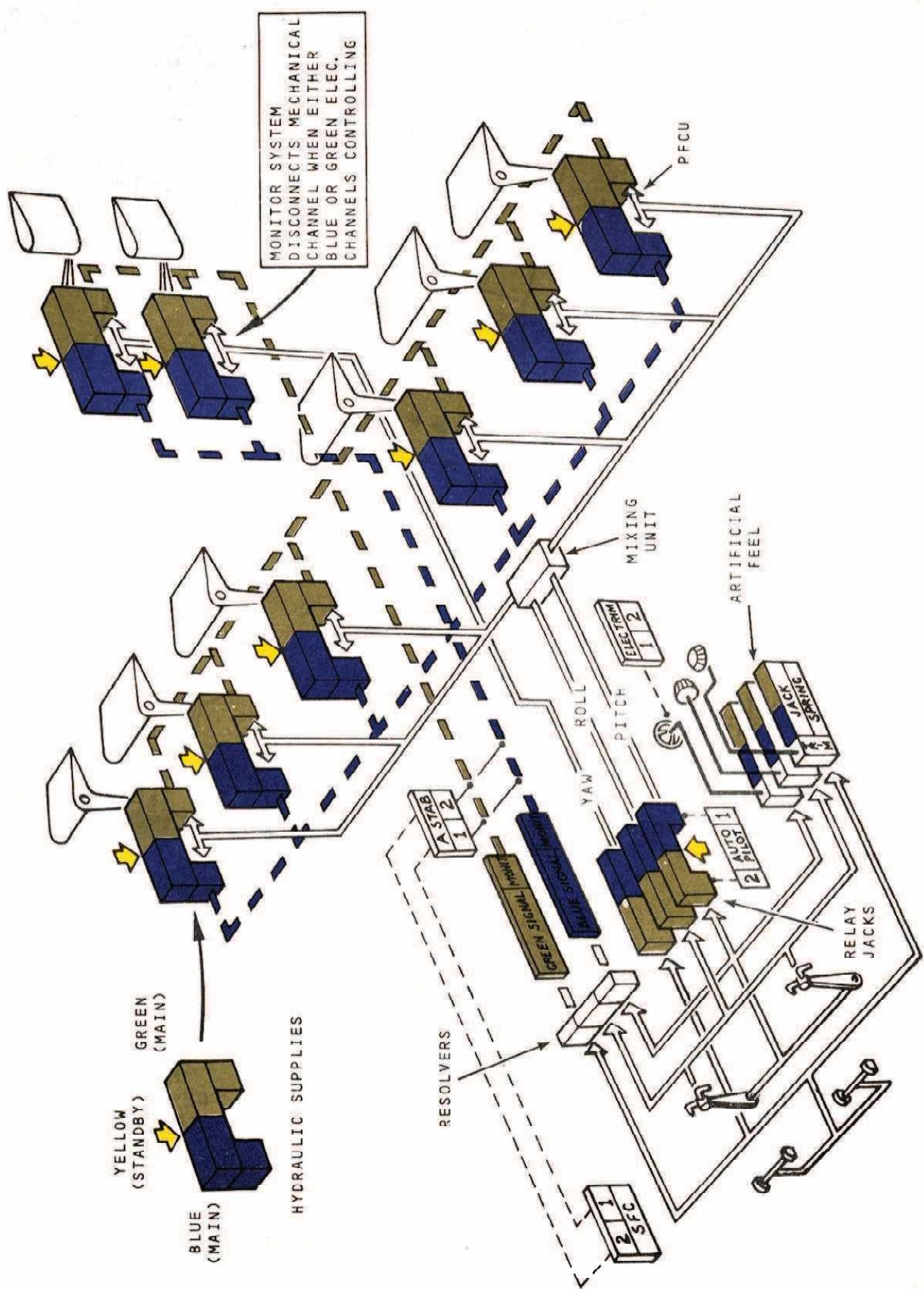
CONCORDE FLYING MANUAL

British airways
OVERSEAS DIVISION

There are two systems, once the systems are engaged System 1 takes priority with System 2 in a synchronized standby condition. If System 1 fails control will automatically switch to System 2 and No.1 Autostabilization pitch and roll channels will disengage.

The control forces experienced are similar to those with the artificial feel system switched off, i.e. only the spring rod operating. Since both pitch and roll are engaged simultaneously a jam affecting one axis will result in the strain gauge signals being added to the normal control commands in the other axis.

SCHEMATIC LAYOUT



09.02.02
21 JUL.76

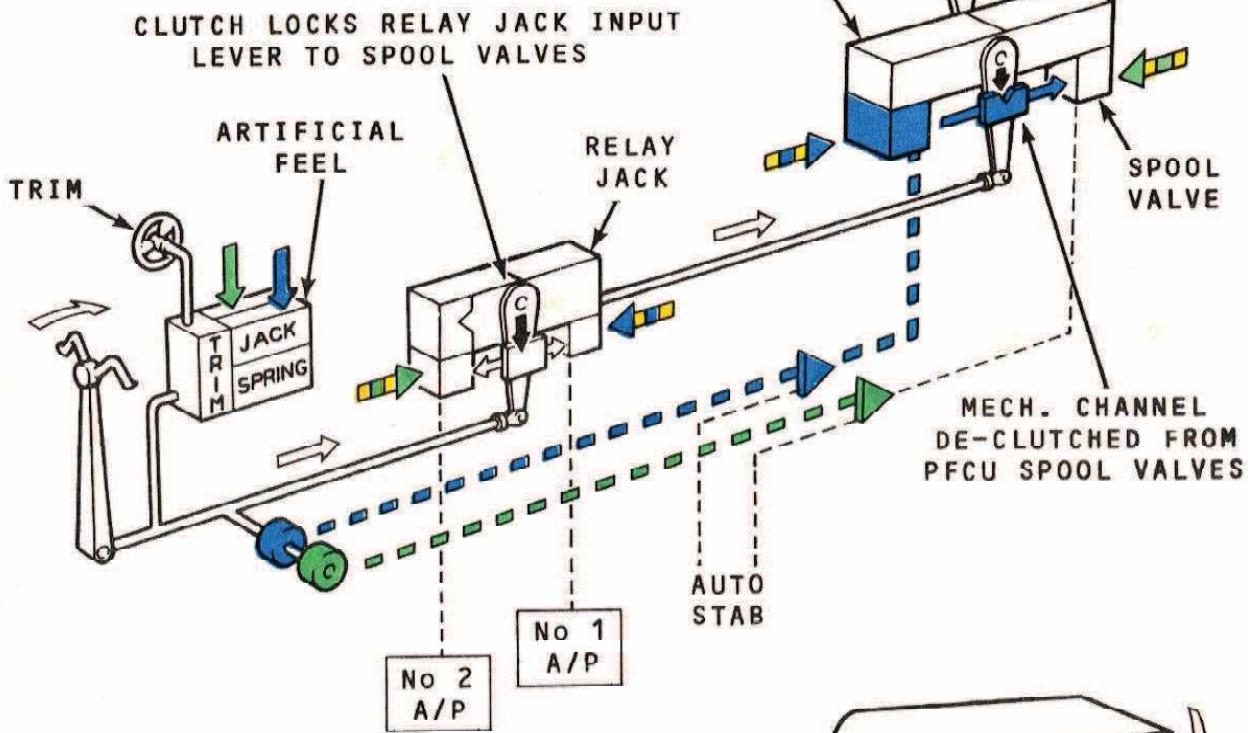
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BASIC CONTROL SYSTEM (Sheet 1 of 3)

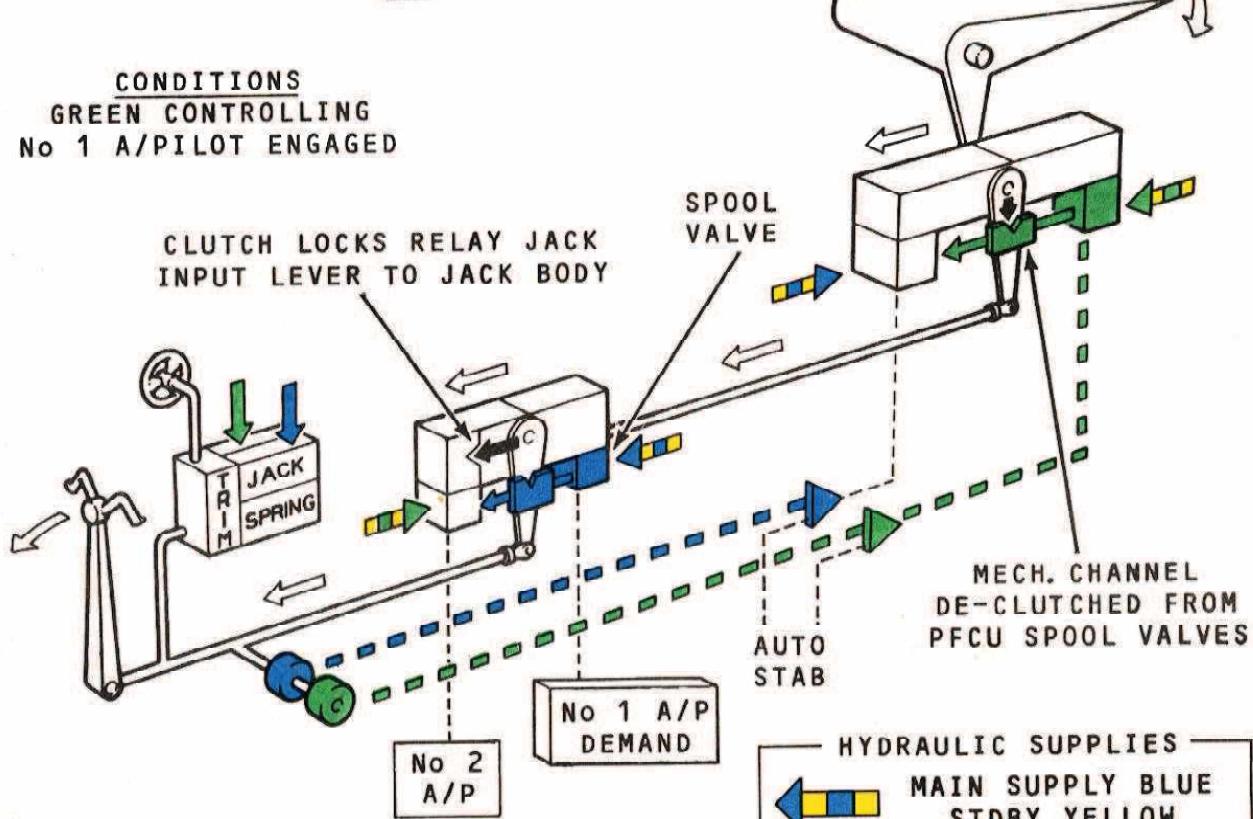
CONDITIONS

BLUE SIGNAL LANE CONTROLLING.
AUTO PILOT NOT ENGAGED.



CONDITIONS

GREEN CONTROLLING
No 1 A/Pilot Engaged

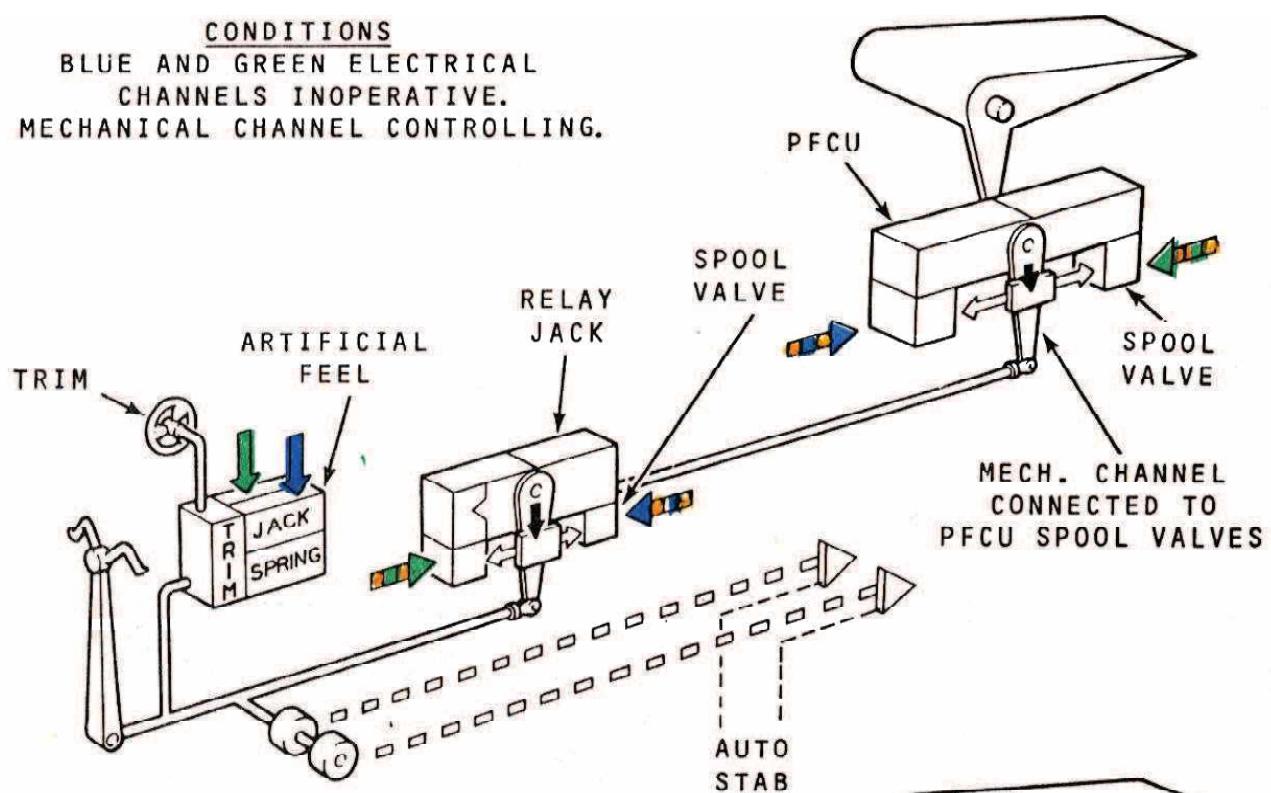


NOTE:- ELEVON PITCH CONTROL
SHOWN ONLY

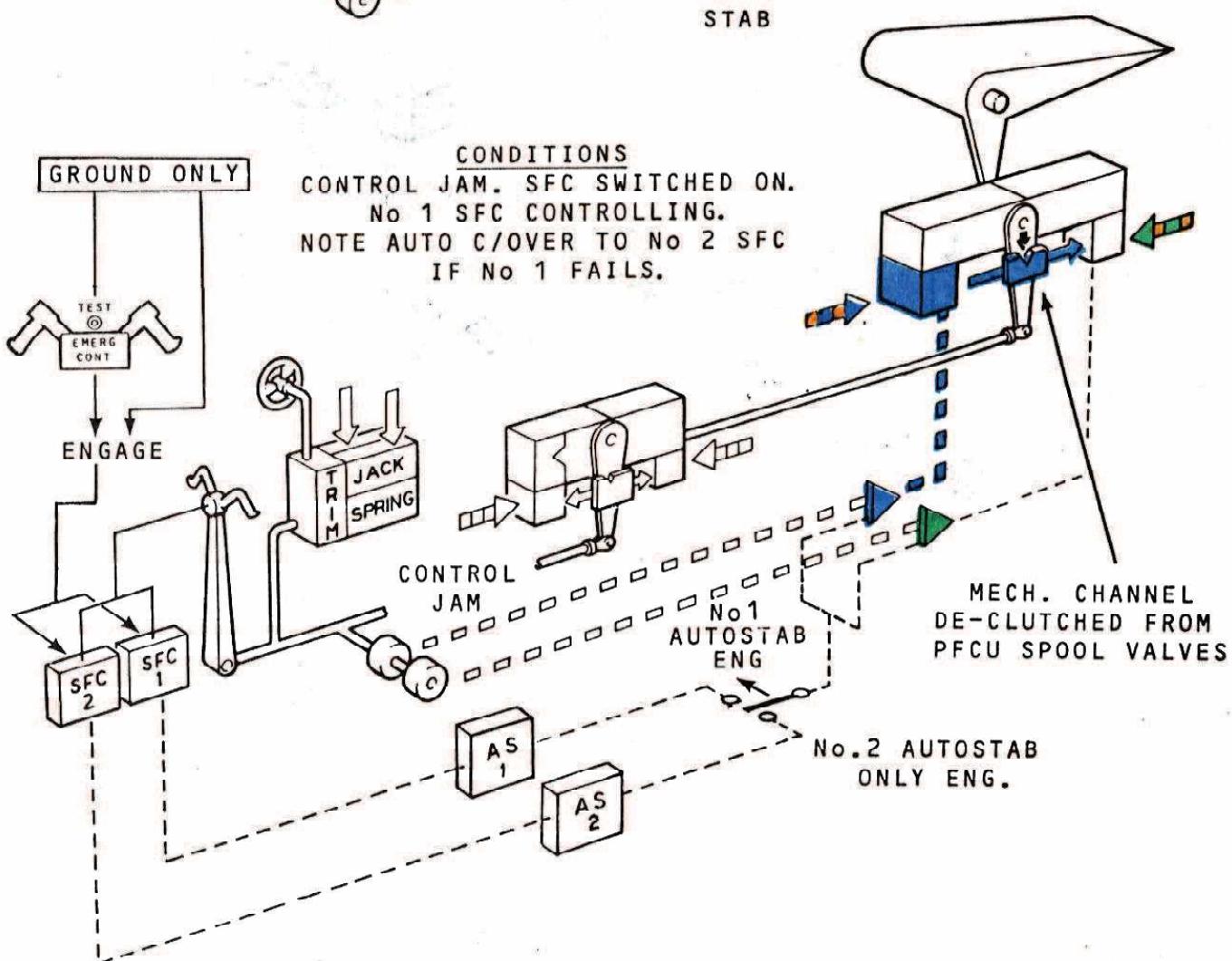
HYDRAULIC SUPPLIES	
MAIN SUPPLY BLUE STDBY YELLOW	MAIN SUPPLY GREEN STDBY YELLOW
MAIN SUPPLY GREEN STDBY YELLOW	MAIN SUPPLY BLUE STDBY YELLOW

BASIC CONTROL SYSTEM (Sheet 2 of 3)

CONDITIONS
 BLUE AND GREEN ELECTRICAL CHANNELS INOPERATIVE.
 MECHANICAL CHANNEL CONTROLLING.



CONDITIONS
 GROUND ONLY
 CONTROL JAM. SFC SWITCHED ON.
 No 1 SFC CONTROLLING.
 NOTE AUTO C/OVER TO No 2 SFC
 IF No 1 FAILS.



09.02.04
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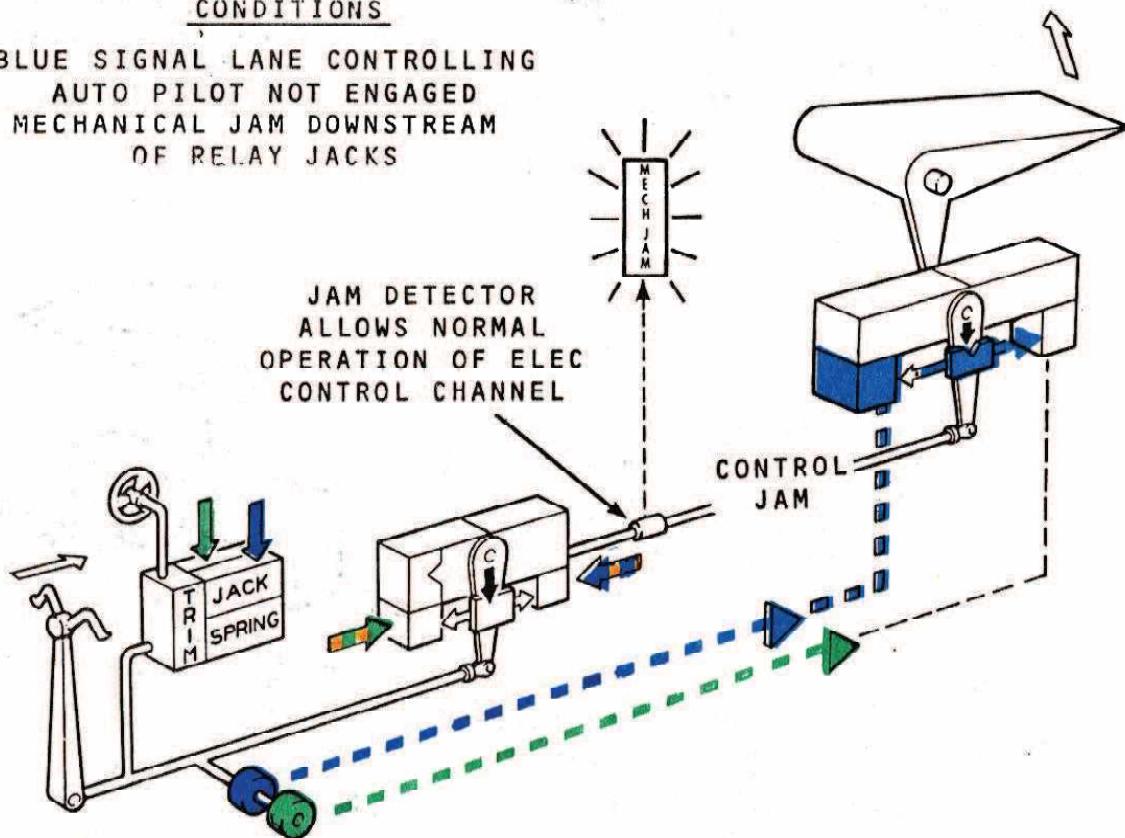
BASIC CONTROL SYSTEM (Sheet 3 of 3)

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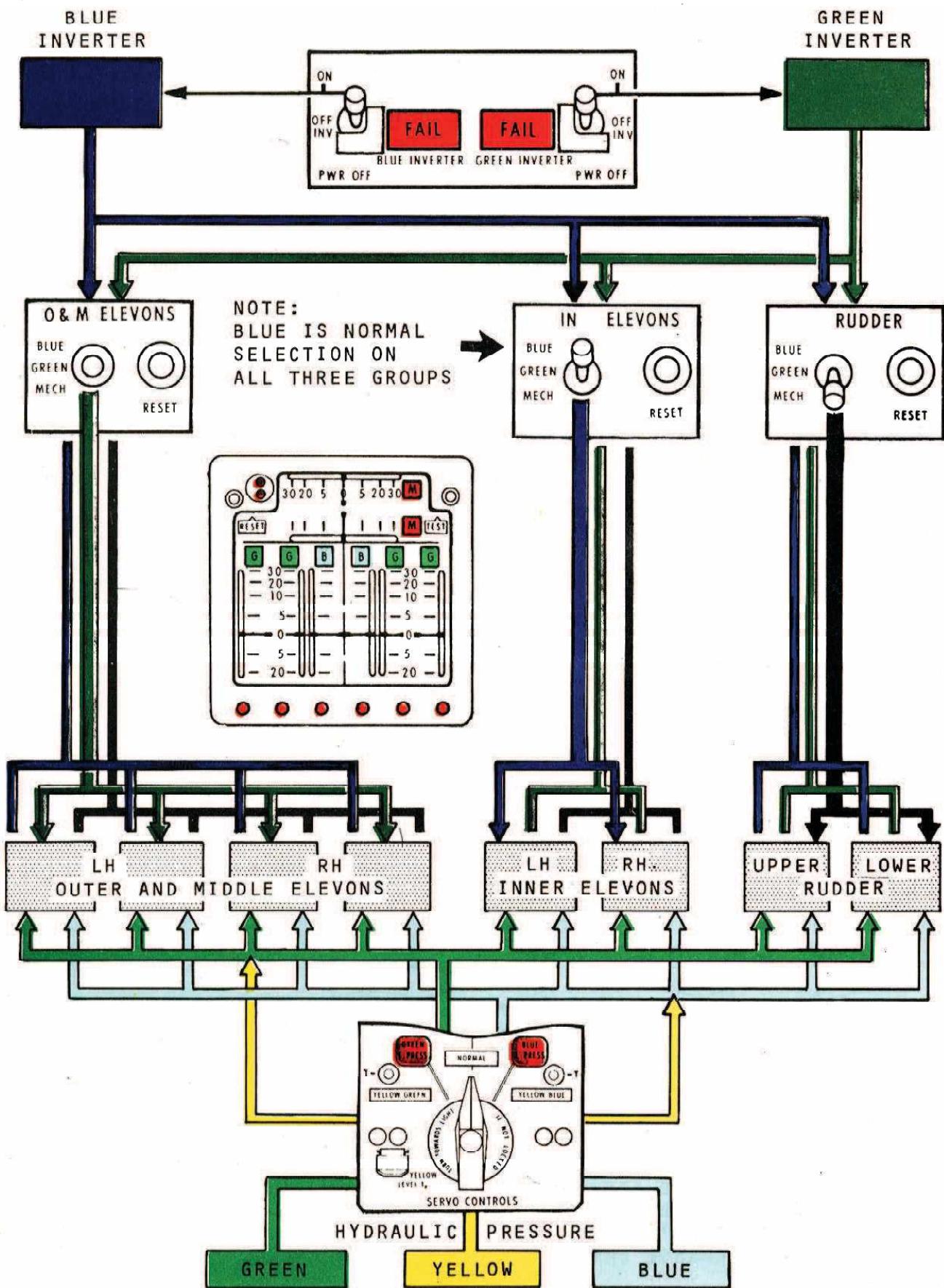
ENGLAND

CONDITIONS

BLUE SIGNAL LANE CONTROLLING
AUTO PILOT NOT ENGAGED
MECHANICAL JAM DOWNSTREAM
OF RELAY JACKS



BASIC PFCU SIGNALLING AND HYDRAULIC CONTROL

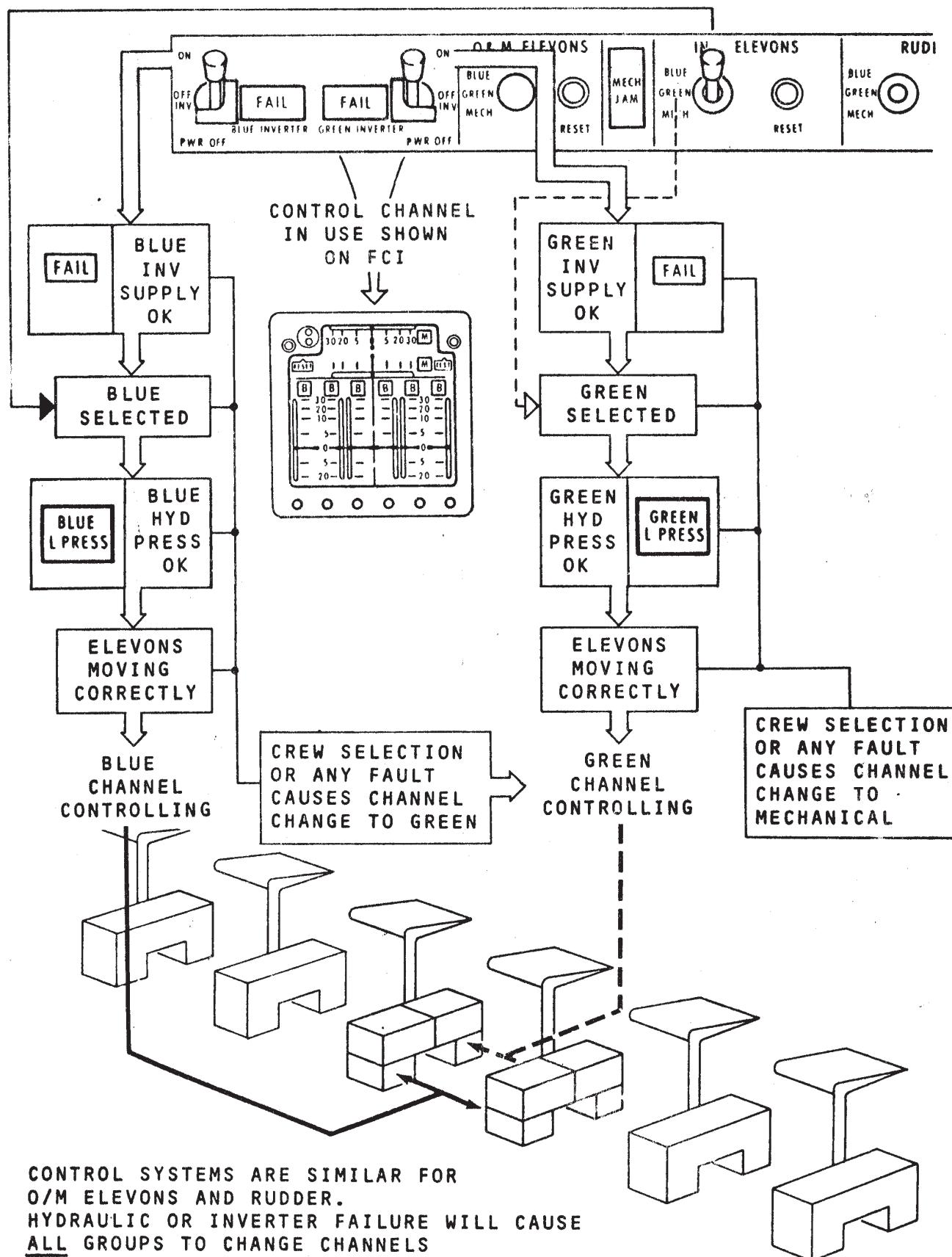


09.02.06
4 MAY 77

CONCORDE FLYING MANUAL

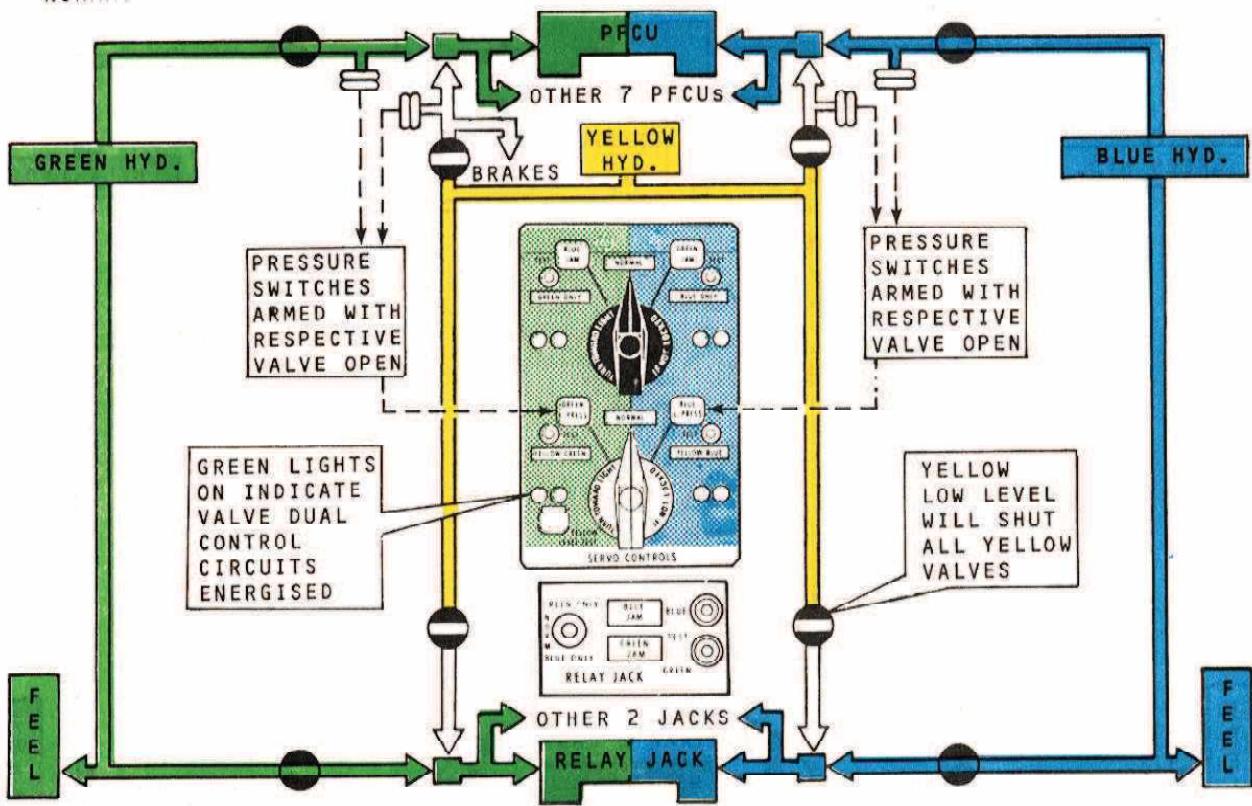
British airways
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CONTROL AND SIGNALLING INNER ELEVONS

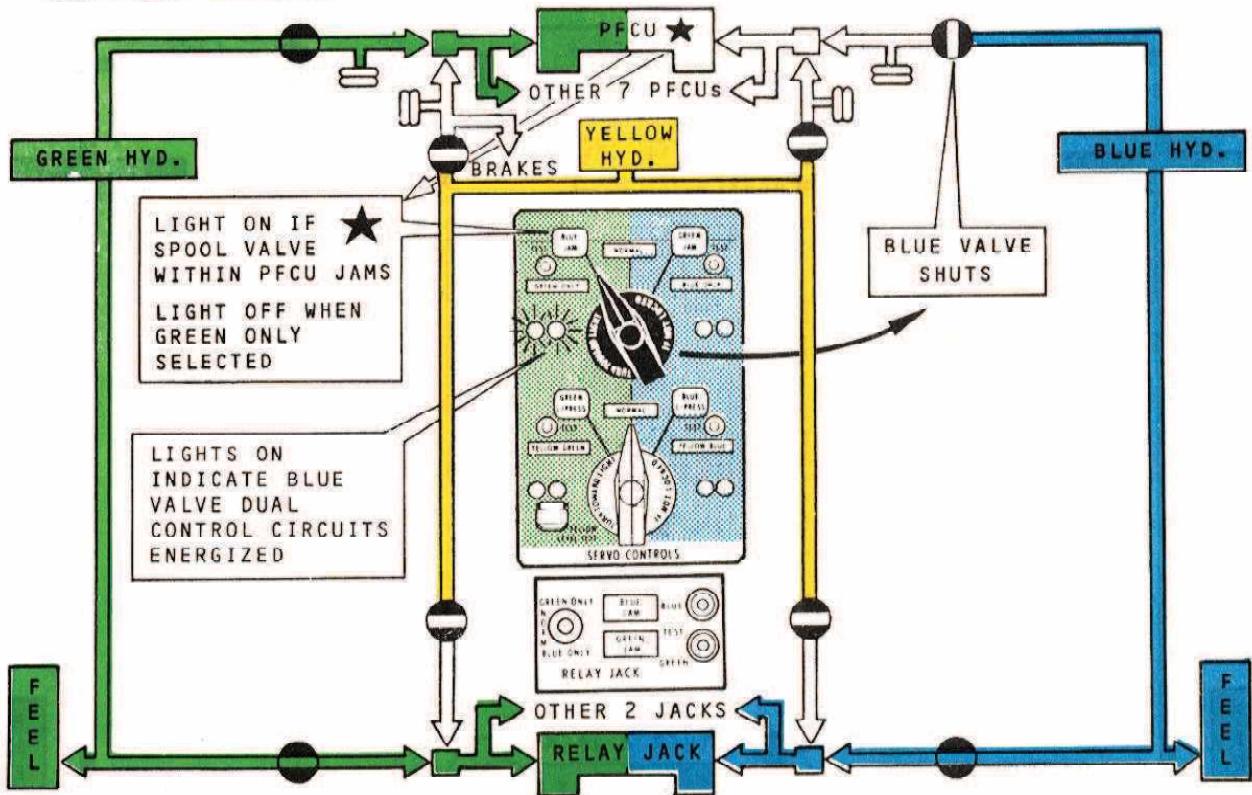


HYDRAULIC SUPPLIES (Sheet 1 of 2)

NORMAL CONDITION

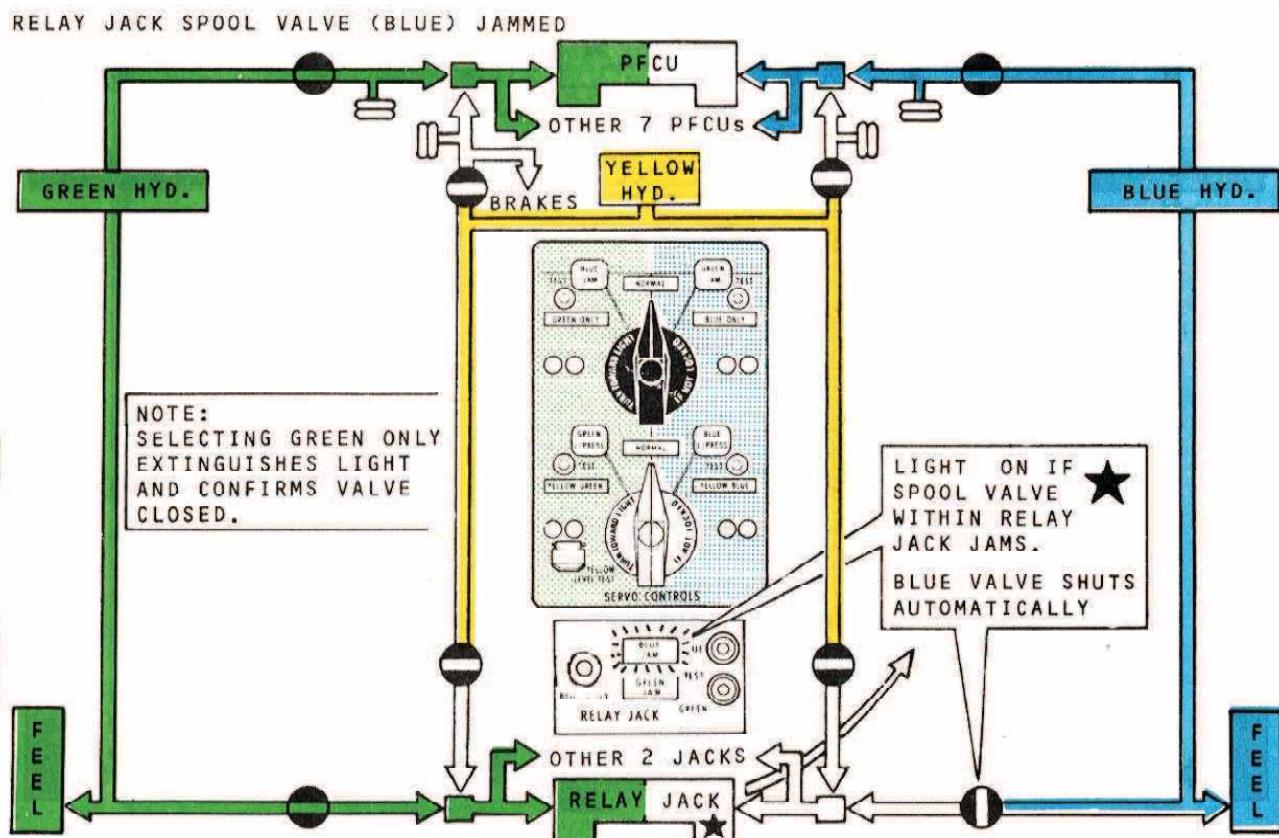
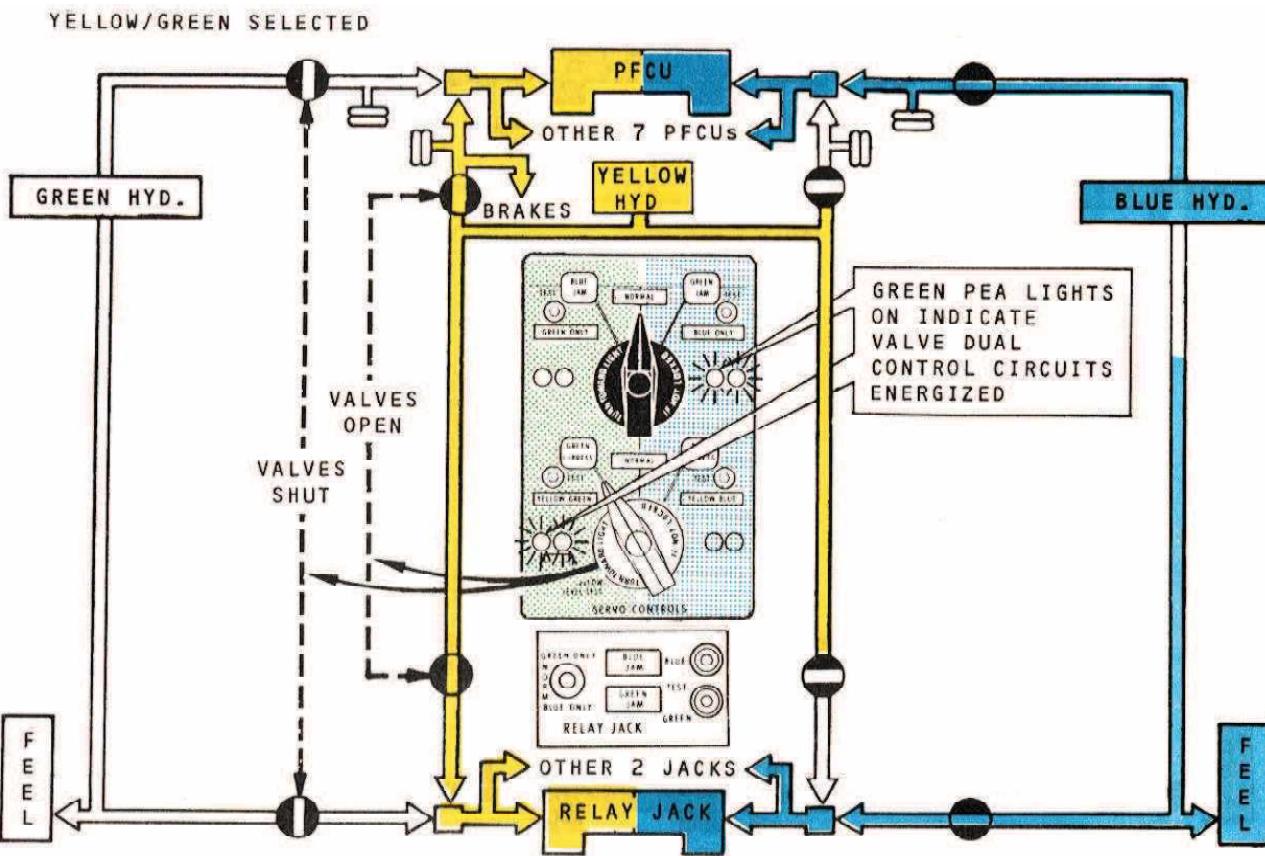


GREEN ONLY SELECTED

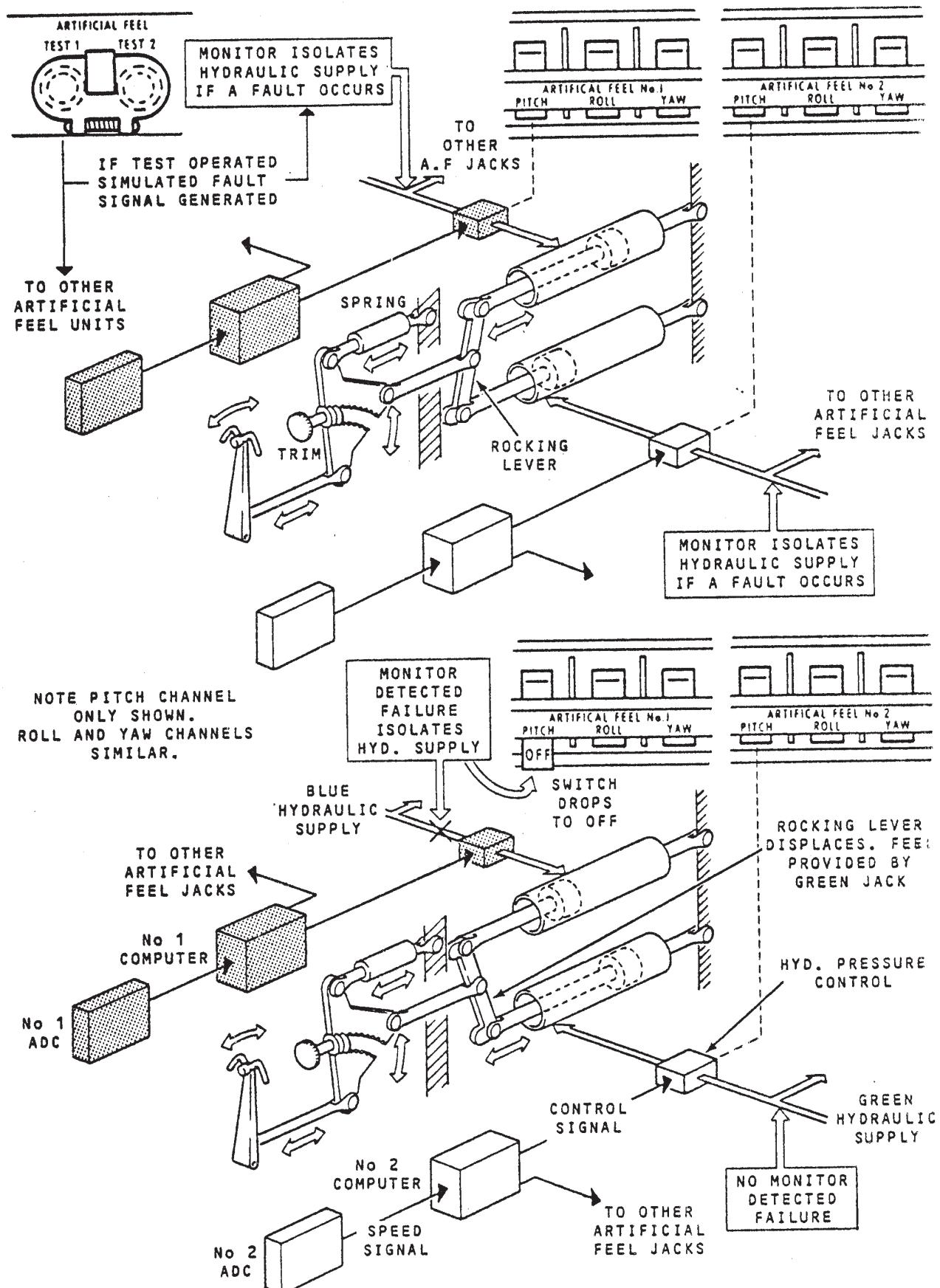


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HYDRAULIC SUPPLIES (Sheet 2 of 2)



ARTIFICIAL FEEL - SCHEMATIC OPERATION

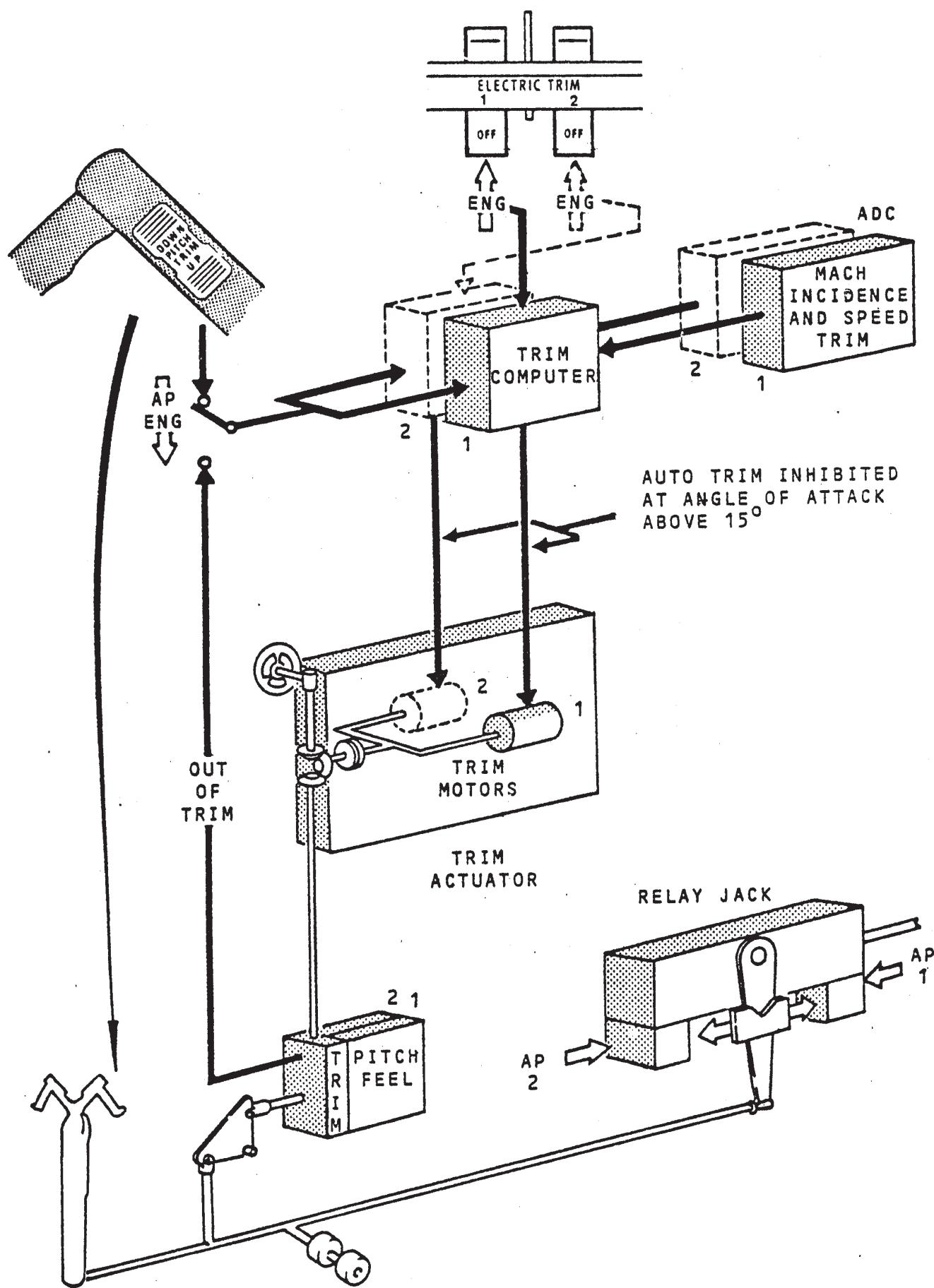


09.02.10
1 DEC.76

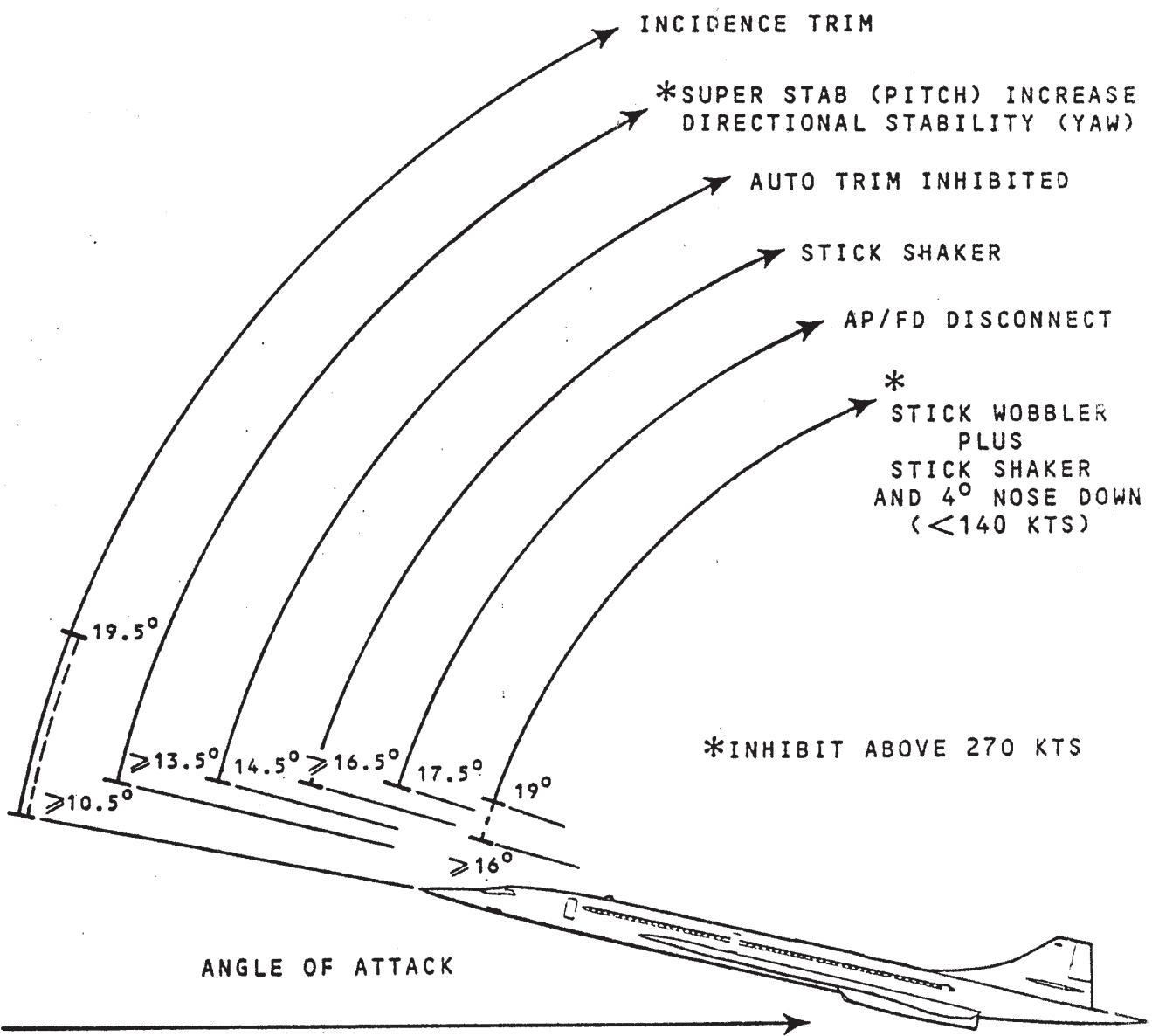
CONCORDE FLYING MANUAL
FLIGHT CONTROLS

British airways
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ELECTRIC TRIM



HIGH INCIDENCE WARNING & PROTECTION

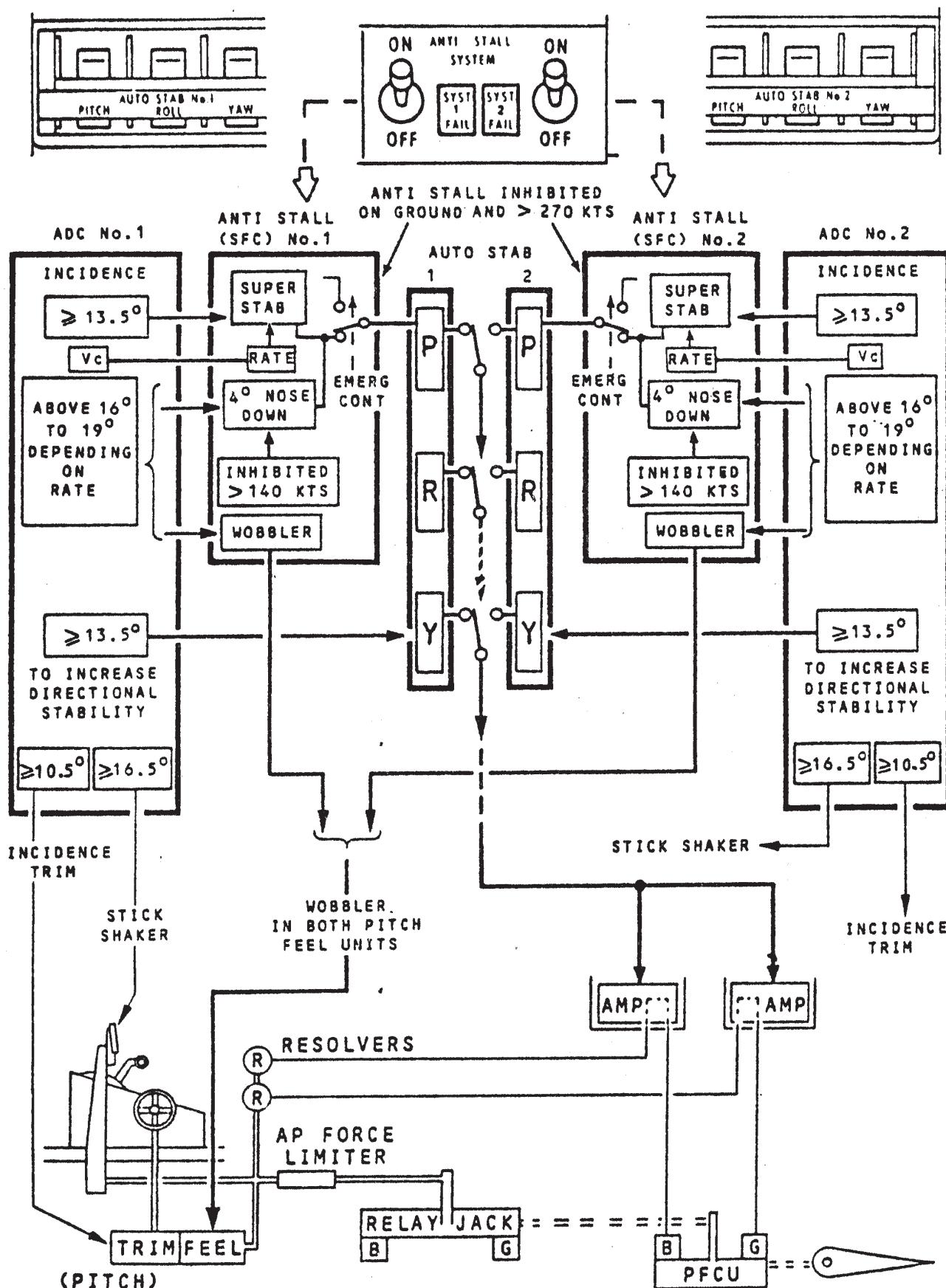


09.02.12
1 DEC. 76

CONCORDE FLYING MANUAL
FLIGHT CONTROLS

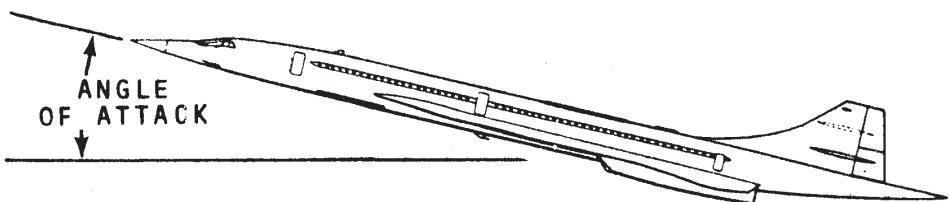
British airways
OVERSEAS DIVISION

HIGH INCIDENCE WARNING & PROTECTION

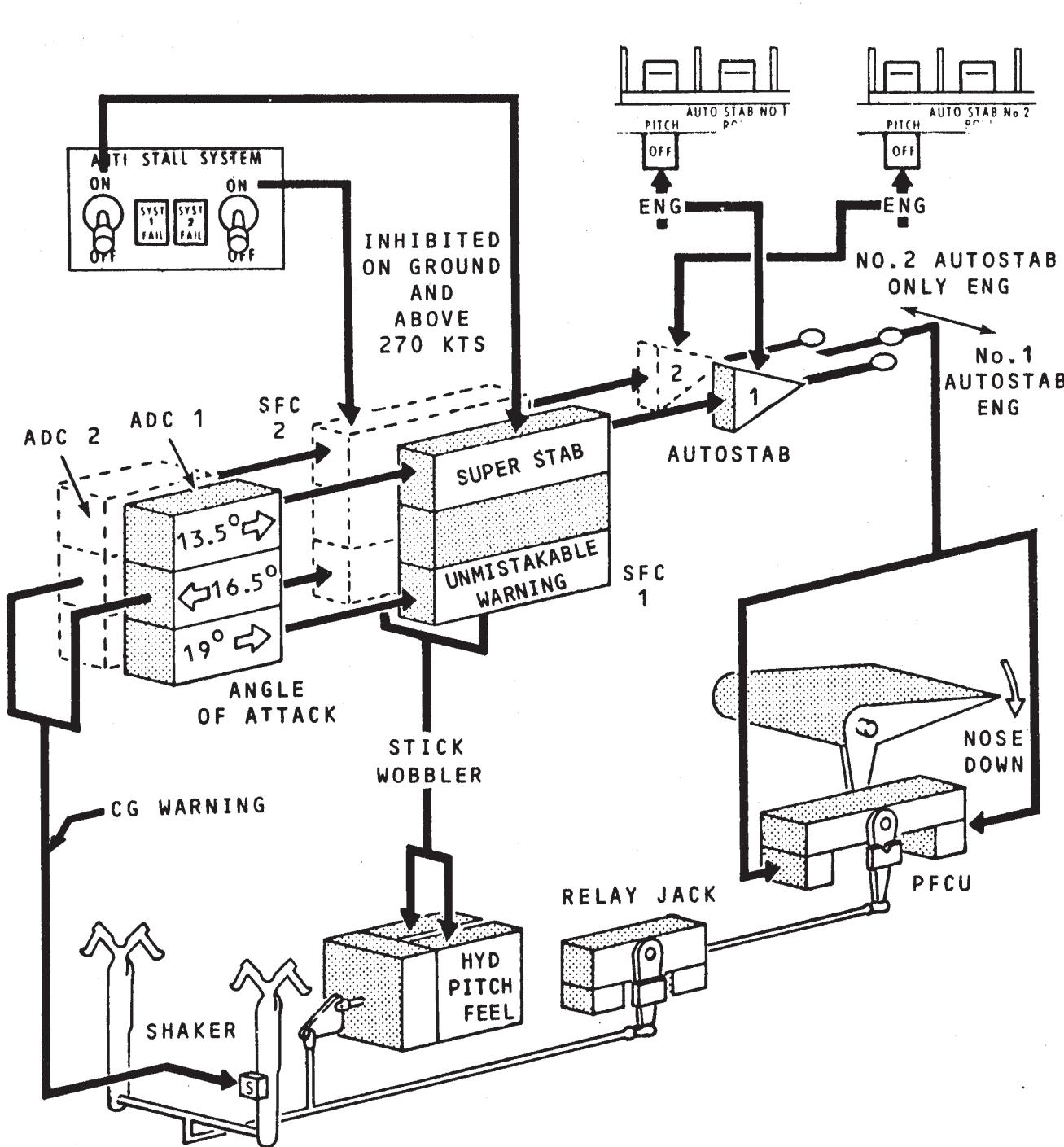


ANTI STALL SYSTEM

19° UNMISTAKABLE WARNING
16.5° STICK SHAKER
13.5° SUPER STAB
(NOSE DOWN)



IN ENGLAND
PRIN

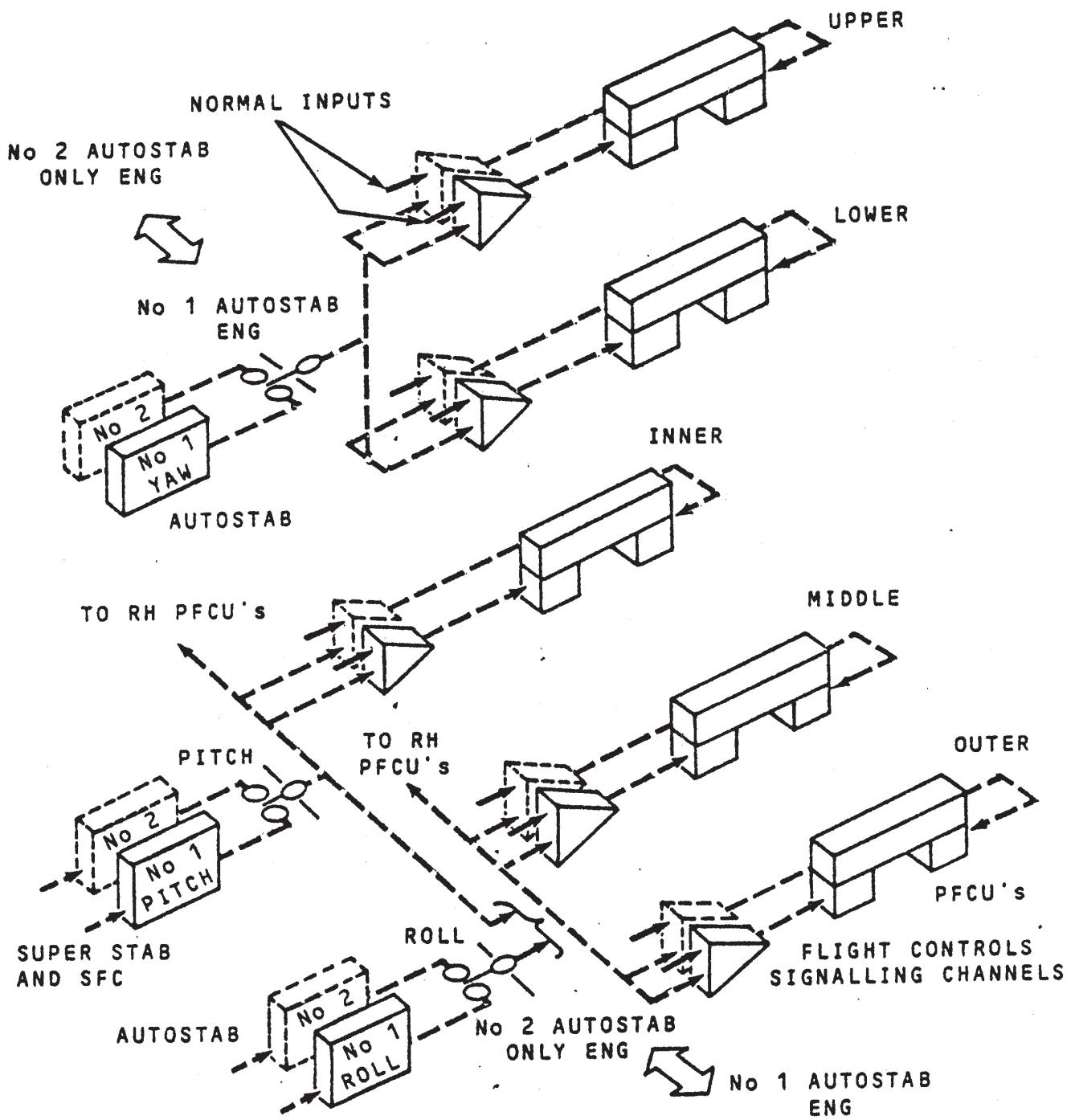
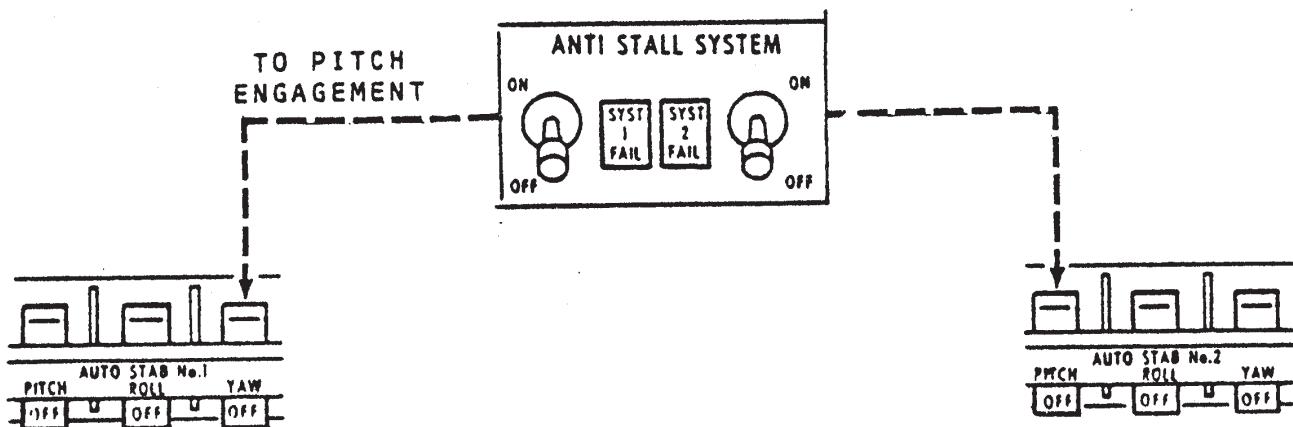


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1 DEC.76

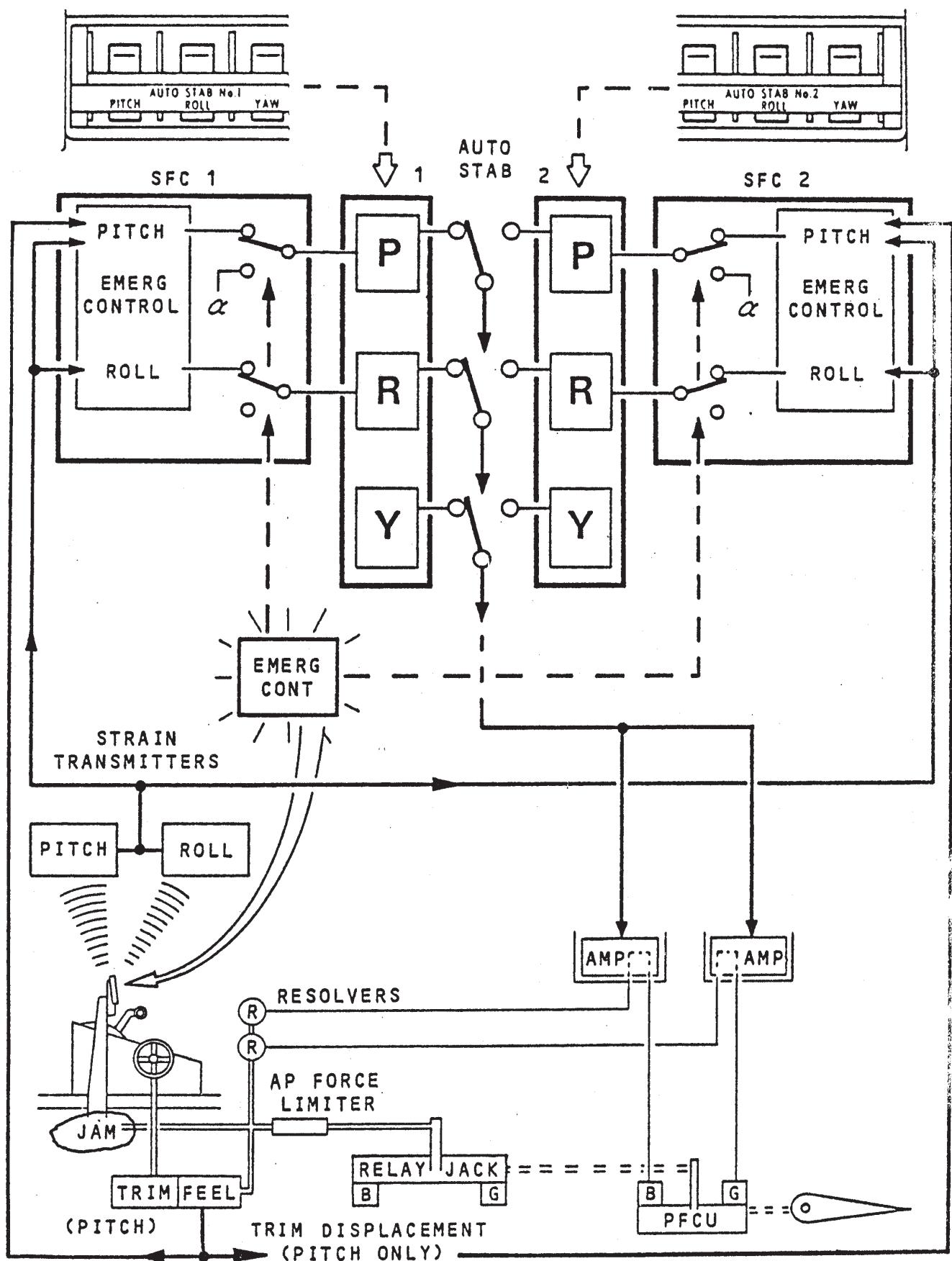
CONCORDE FLYING MANUAL
FLIGHT CONTROLS

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AUTO STABILIZATION SYSTEM



EMERGENCY FLIGHT CONTROL



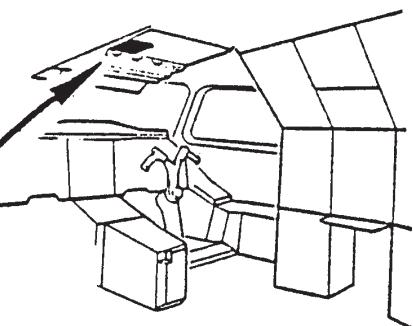
FIRST ISSUE

SERVO CONTROLS PANEL (Sheet 1 of 3)

GREEN LOW PRESSURE LIGHT
(Red)

On - indicates low pressure downstream of the green system PFC servos selector or if YELLOW_GREEN is selected low pressure downstream of the yellow/green PFC servos selector.

Accompanied by MWS PFC light (red) and audio (gong) except when MWS is inhibited.

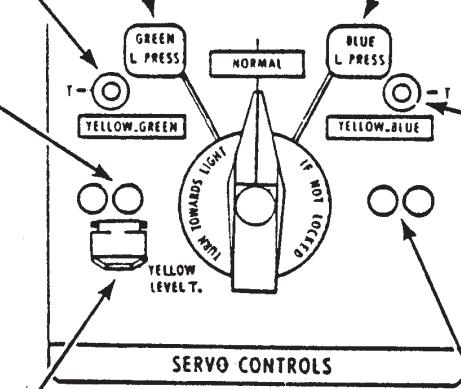


GREEN L. PRESS TEST PUSH BUTTON

Pressed - tests the warning light and its connection to the master warning system.

YELLOW-GREEN PEA LIGHTS (Green)

On - to show both electrical controls of the YELLOW_GREEN system PFC selector are signalled to OPEN.

BLUE LOW PRESSURE LIGHT
(Red)

On - indicates low pressure downstream of the blue system PFC servos selector or if YELLOW_BLUE is selected low pressure downstream of the yellow/blue PFC servos selector.

Accompanied by MWS PFC light (red) and audio (gong).

BLUE L.PRESS TEST PUSH BUTTON

Pressed - tests the warning light and its connection to the master warning system.

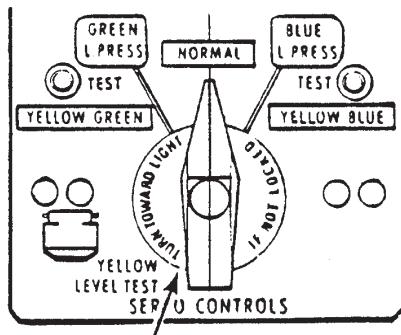
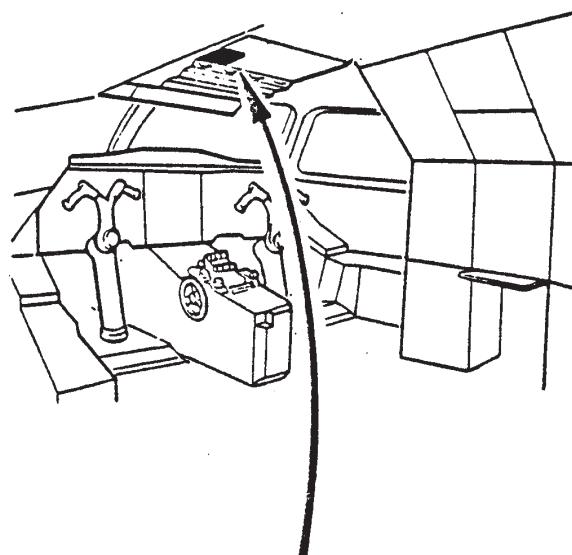
YELLOW LEVEL TEST PUSH BUTTON

Simulates the first low level condition in the hydraulic reservoir. Tests the control which, in the event of a yellow system fluid loss, automatically isolates the yellow system from the side of the PFC and relay jacks previously selected. Also tests the auto change of the yellow system to the unselected system in the event of low pressure in that system.

YELLOW-BLUE PEA LIGHTS (Green)

On - to show both electrical controls of the YELLOW_BLUE system PFC selector are signalled to OPEN.

SERVO CONTROLS PANEL (Sheet 2 of 3)



YELLOW (POWER FLIGHT CONTROL) ROTARY SELECTOR

NORMAL - the yellow hydraulic system is isolated from the flight controls hydraulic system.

NOTE: Movement of the yellow rotary selector away from NORMAL automatically onloads the yellow hydraulic system engine driven pumps (2).

YELLOW GREEN - the green hydraulic system selectors to the green side of the PFC servos and relay jacks are signalled to close and the yellow hydraulic system selectors to the green side of the PFC servos and relay jacks are signalled to open thus the yellow system powers the green ram of each power flight control servo (8) and relay jacks (3). Because the normal brake system is tapped downstream of the power flight controls selectors the yellow system also powers the normal brake system.

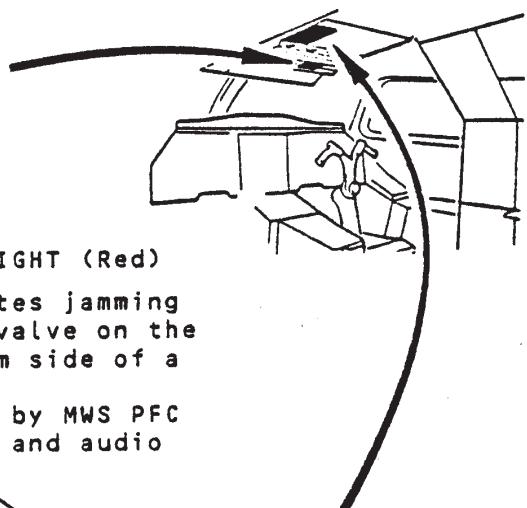
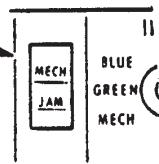
YELLOW BLUE - the blue hydraulic system selectors (2) to the blue side of the PFC servos and relay jacks are signalled to close and the yellow hydraulic system selectors to the blue side of the PFC servos and relay jacks are signalled to open thus the yellow system powers the blue ram of each power flight control servo (8) and relay jacks (3).

(Unchanged)

SERVO CONTROLS PANEL (Sheet 3 of 3)

MECHANICAL JAM LIGHT (Red)

On - indicates mechanical channel jamming downstream of the pitch or roll relay jack.
Accompanied by MWS PFC light (red) and audio (gong).



BLUE JAM LIGHT (Red)

On - indicates jamming of a spool valve on the blue system side of a PFC servo.
Accompanied by MWS PFC light (red) and audio (gong).

GREEN JAM LIGHT (Red)

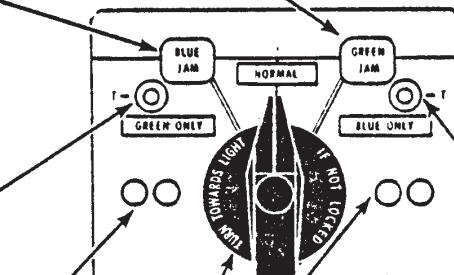
On - indicates jamming of a spool valve on the green system side of a PFC servo.
Accompanied by MWS PFC light (red) and audio (gong).

BLUE JAM TEST PUSH BUTTON

Pressed - tests the warning light and its connection to the master warning system.

GREEN ONLY PEA LIGHTS (Green)

On - to show that both electrical controls of the blue system PFC selectors are signalled to close.



GREEN JAM TEST PUSH BUTTON

Pressed - tests the warning light and its connection to the master warning system.

BLUE ONLY PEA LIGHTS (Green)

On - to show that both electrical controls of the green system PFC selectors are signalled to close.

SERVO CONTROLS BLACK ROTARY SELECTOR

NORMAL - provided the yellow rotary selector is at NORMAL, blue hydraulic pressure is selected to supply the blue side of all PFC servos and green hydraulic pressure to supply the green side.

BLUE JAM - signals both controls of the blue system PFC selectors to close, inhibits the BLUE JAM light, and arms the auto change system that selects yellow/green in the event of green low pressure.

GREEN JAM - signals both controls of the green system PFC selectors to close, inhibits the GREEN JAM light, and arms the auto change system that selects yellow/blue in the event of blue low pressure.

NOTE: Inadvertent selection of crossed positions of the BLACK and YELLOW rotary selectors is prevented by a mechanical interlock.

09.03.04

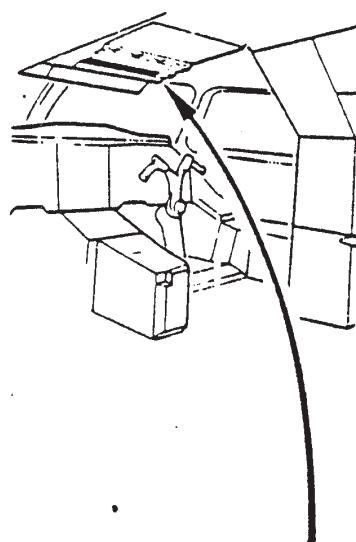
CONCORDE FLYING MANUAL

British airways

24 MAY 79

INVERTERS AND ELECTRICAL CHANNELS

PRINTED IN ENGLAND



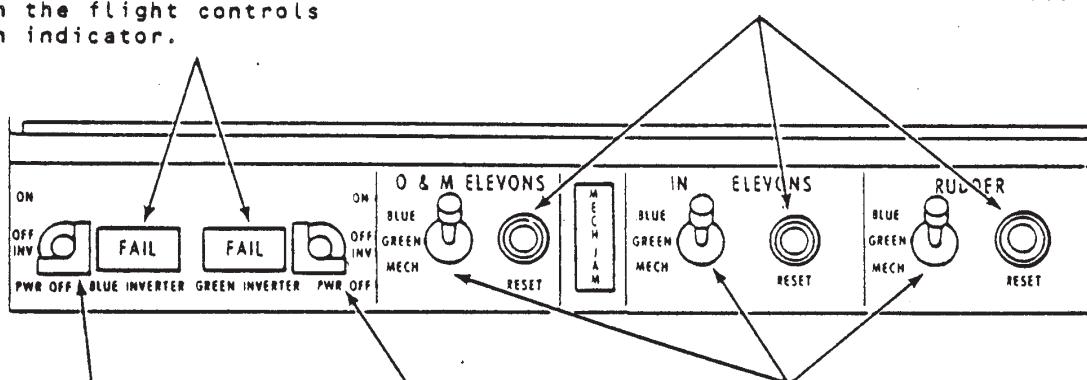
BLUE AND GREEN INVERTER FAIL LIGHT (Red)

On - indicates that the output from the inverter is outside limits and the d.c. supply has been cut.

Accompanied by MWS PFC light (red) and audio (gong), and in some cases warning lights (red) on the flight controls position indicator.

RESET PUSH BUTTON

Pressed - acts from either green or mechanical and will attempt to regain the BLUE channel; if the monitoring system rejects the BLUE channel it will attempt to regain the GREEN channel and if this is rejected will revert to MECH channel.



OUTER AND MIDDLE ELEVONS,
INNER ELEVONS AND RUDDER
SELECTORS

BLUE - selects the blue electrical signalling channel as the primary operating channel for the flight controls.

NOTE: It is the only selection used in flight.

BLUE INVERTER SELECTOR

ON - provides a.c. power to the corresponding blue flight control electrical channel.

OFF INV - cuts the a.c. power to the corresponding blue flight control electrical channel. Inhibits the associated FAIL light.

PWR OFF - Cuts both the a.c. and d.c. power to the corresponding flight control electrical channel, the flight control monitoring system and, when the GREEN INVERTER selector is at PWR OFF, the flight control position indicator.

GREEN INVERTER SELECTOR

ON - connects the a.c. power to the corresponding green flight control electrical channel.

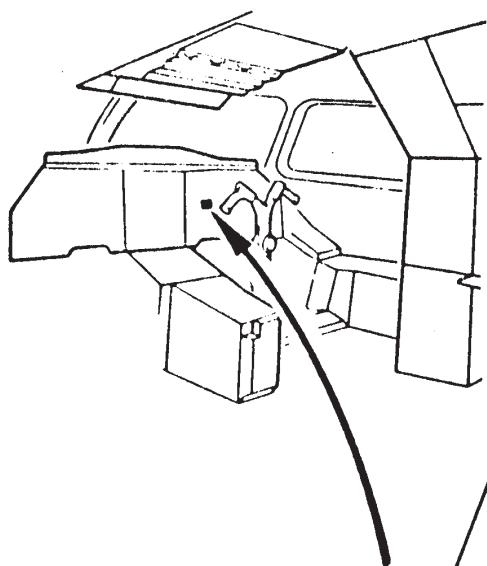
OFF INV - cuts the a.c. power to the corresponding green flight control electrical channel. Inhibits the associated FAIL light.

PWR OFF - cuts both the a.c. and d.c. power to the corresponding flight control electrical channel, the flight control monitoring system and, when the BLUE INVERTER selector is at PWR OFF, the flight control position indicator.

(Unchanged)

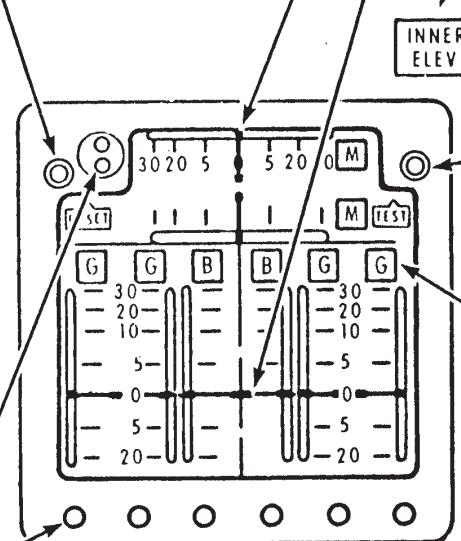
FLIGHT CONTROL POSITION INDICATOR

PRINTED IN ENGLAND



RESET PUSH BUTTON

Pressed - cancels the warning lights.



WARNING LIGHTS (Red) (8)

On steady - indicate that on the corresponding flight control surface group, a channel changeover has been signalled by the comparator system. The lights remain on steady until an alarm RESET is made.

Accompanied by a master warning system PFC light (red) and audio (gong).

On symmetrical pair flashing - indicates an oscillation on one or both of the relevant control surfaces.

FLIGHT CONTROL POSITION INDICATOR

Rudders
Elevons

INNER ELEV LIGHT (Red)

On - indicates that the hinge moment caused by the aerodynamic load on one inner elevon exceeds the power of the servo controls.
or
that the blue and green spool valves on one servo control are not synchronised because of a linkage failure.
Accompanied by MWS PFC light (red) and audio (gong).

TEST PUSH BUTTON

Pressed - tests the warning lights and the flasher unit.
Released - tests the warning lights and their connection to the master warning system.

FLIGHT CONTROL CHANNEL MAGNETIC INDICATORS (8)

The flight control channel in use is displayed by one MI for each control surface.

M - mechanical channel

B - blue electrical channel

G - green electrical channel

ANTI STALL SYSTEM PANEL

ANTI STALL SYSTEM SWITCHES

ON - Engages the anti high incidence system which comprises:

A super autostabilization system that augments the down elevon autostab signal when angle of attack reaches 13.5 degrees.

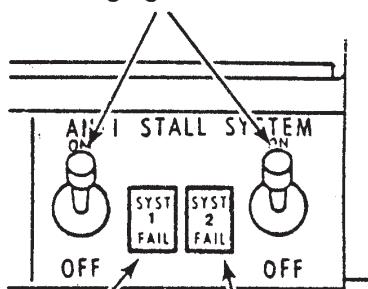
An unmistakable warning ie: a stick wobbler which pulsates the control column at 3 Hz if a nose up force is being applied and the aircraft angle of attack exceeds 19 degrees.

The system operates only below 60 knots on the ground and from about 10 seconds after lift off at speeds below 270 knots.

OFF - Disengages the anti high incidence system and, if the aircraft speed is below 270 knots, causes the disengagement of the associated pitch auto stabilisation channel.

NOTE:

With both anti stall system switches at OFF either one of the two auto stabilisation pitch axes can be re-engaged below 270 knots.



SYST 1 FAIL LIGHT (Amber)

On - at aircraft speeds above 270 knots indicates a power failure within the No. 1 anti stall system

On - at aircraft speeds below 270 knots indicates loss of No. 1 anti stall system or loss of No. 1 pitch autostabilisation system.

SYST 2 FAIL LIGHT (Amber)

On - at aircraft speeds above 270 knots indicates a power failure within the No. 2 anti stall system

On - at aircraft speeds below 270 knots indicates loss of No. 2 anti stall system or loss of No. 2 pitch autostabilisation system.

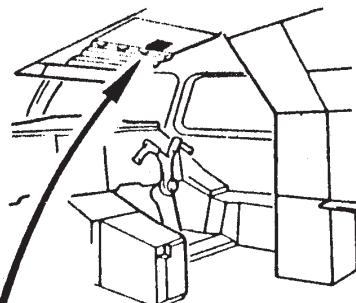
RELAY JACK PANEL

RELAY JACKS SELECTOR

GREEN ONLY - signals the relevant hydraulic selector for the blue side of the relay jack to close and inhibits the BLUE JAM light.

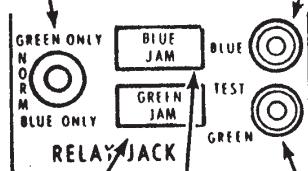
NORM - blue system hydraulic pressure is selected to supply the blue sides of the pitch, roll and yaw relay jacks and green system hydraulic pressure is selected to supply the green sides.

BLUE ONLY - signals the relevant hydraulic selector for the green side of the relay jack to close and inhibits the GREEN JAM light.



BLUE TEST PUSH BUTTON

Pressed - tests the BLUE JAM Warning light and its connection to the master warning system.



GREEN TEST PUSH BUTTON

Pressed - tests the GREEN JAM warning light and its connection to the master warning system.

GREEN JAM LIGHT (Red)

On - indicates that the spool valve on the green side of the relay jack has jammed.

The jam detection automatically signals the relevant hydraulic selector to shut, accompanied by the MWS PFC (red).

Note: If No.2 autopilot is engaged it will disengage.

BLUE JAM LIGHT (Red)

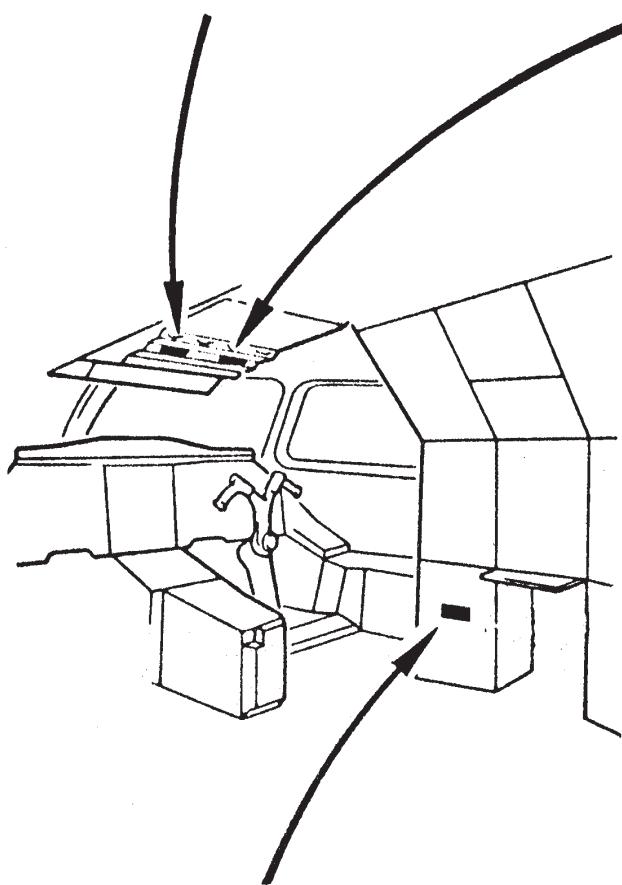
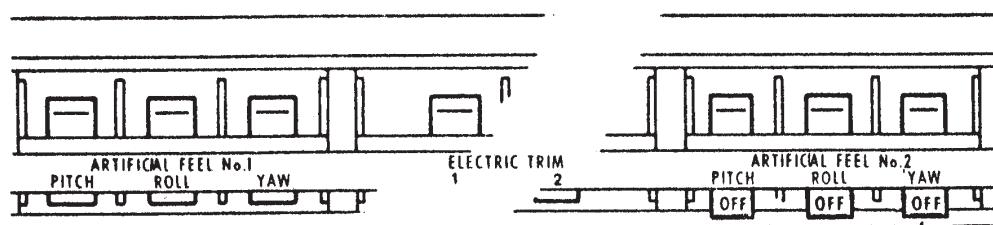
On - indicates that the spool valve on the blue side of the relay jack has jammed

The jam detection automatically signals the relevant hydraulic selector to shut, accompanied by the MWS PFC (red).

Note: If No.1 autopilot is engaged it will disengage.

4 SEP.78

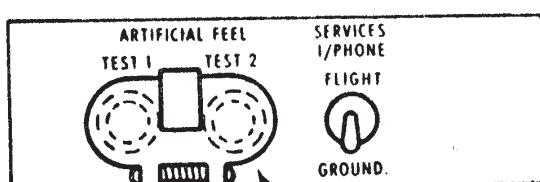
ARTIFICIAL FEEL



ARTIFICIAL FEEL SWITCHES

The engage switch for each artificial feel channel is solenoid held in the engage position only when the associated channel has been satisfactorily engaged. Thus the position of the switch always indicates the engagement state of the channel.

OFF - The axis is disengaged. A switch dropping to OFF indicates a loss of the associated jack, while three switches dropping to OFF indicate a loss of hydraulic pressure, or an artificial feel computor malfunction or an ADC malfunction. The second switch of an axis dropping to OFF is accompanied by MWS FEEL light (red) and audio (gong).

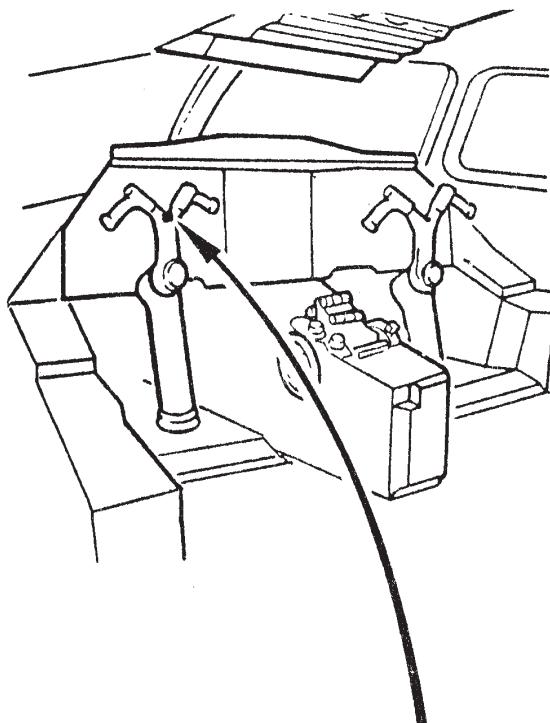
ARTIFICIAL FEEL TEST 1 AND TEST 2
PUSH BUTTON

TEST 1 pressed - tests by simulating an error signal, the artificial feel No.1 monitoring system and its connection to the master warning system.

TEST 2 pressed - identical for system 2.

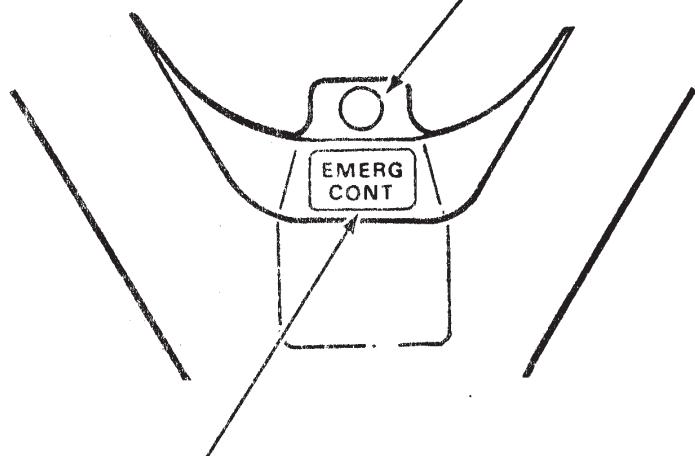
(Unchanged)

EMERGENCY FLIGHT CONTROLS SYSTEM



EMERGENCY CONTROL TEST PUSH BUTTON

Pressed - with AUTO STAB No.1 engaged tests the emergency flight control system No.1; with AUTOSTAB No.2 engaged tests the emergency flight control system No.2



EMERGENCY CONTROL PUSH BUTTON LIGHT (Green)

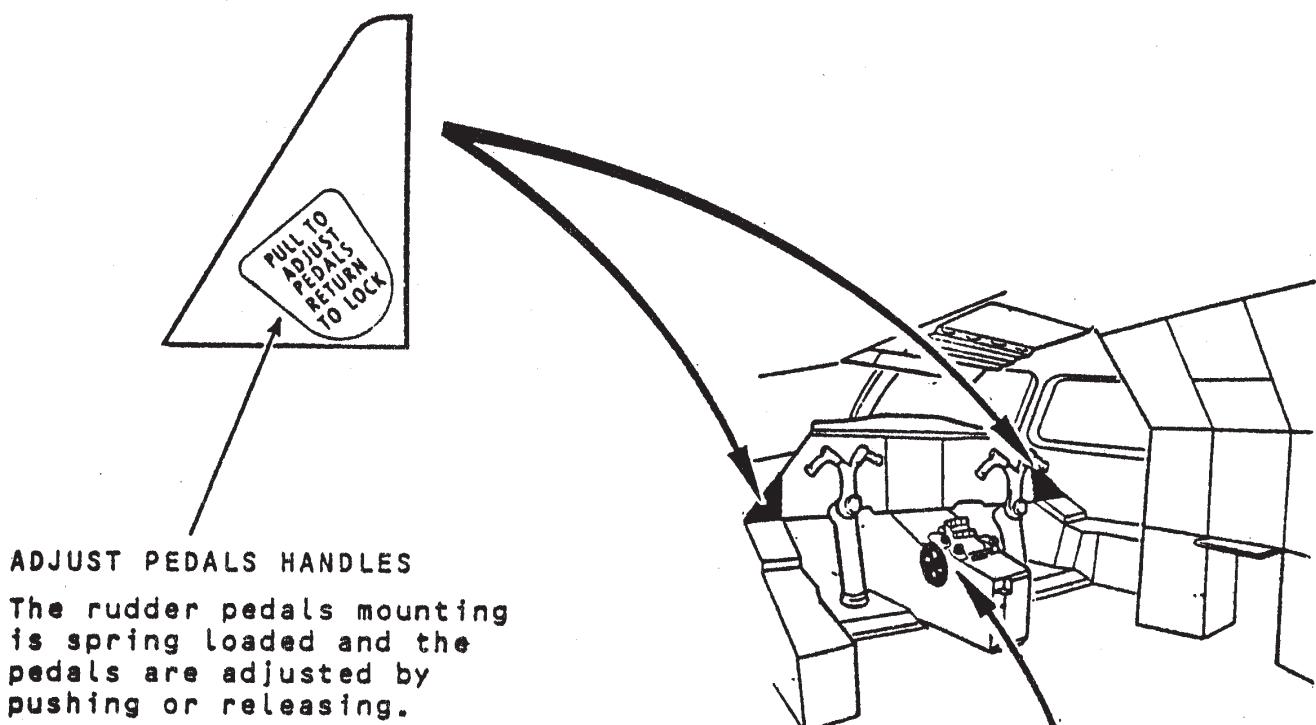
- || Pressed - selects the emergency flight control system, used in case of control column/wheel jamming, EMERG CONT light (green) on indicates successful engagement.
- || Effective only if electrical flight control channel is engaged and pitch and roll auto-stabilization is engaged.
- || Pressed - when emergency flight controls engaged disconnects the system.

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CONCORDE FLYING MANUAL
FLIGHT CONTROLS

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TRIM CONTROL AND RUDDER PEDAL ADJUSTMENT



YAW TRIM CONTROL

Provides manual control of rudder trim.

PITCH TRIM WHEEL

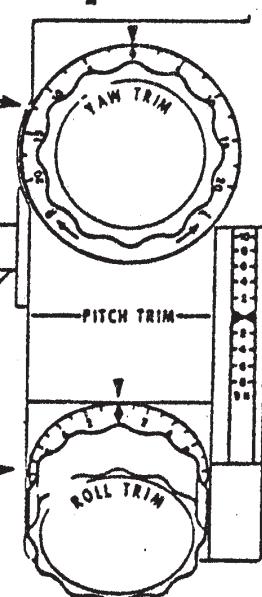
Provides manual control of elevon trim in pitch.

The pitch trim wheel can be used to override the electrical trim.

Movement of the pitch trim wheel is accompanied by a mechanically operated bell.

ROLL TRIM CONTROL

Provides manual control of all elevon trim in roll.



(Unchanged)

ELECTRIC TRIM CONTROL

ELECTRIC TRIM SWITCHES

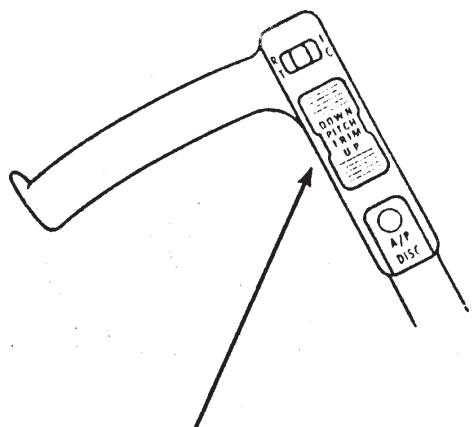
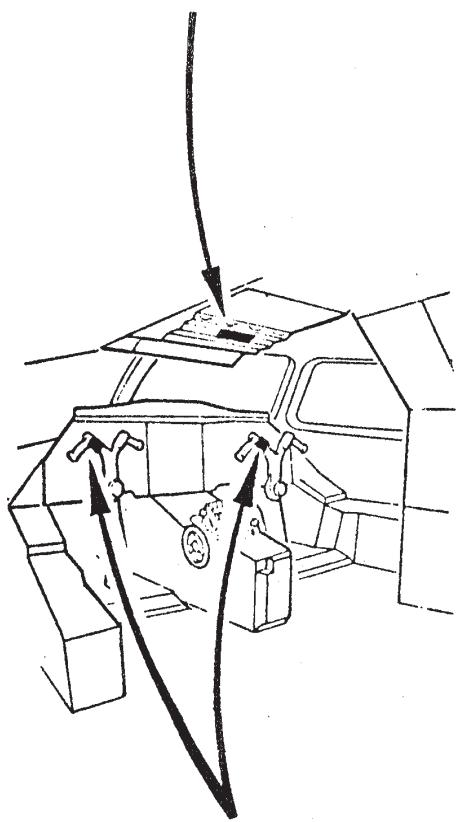
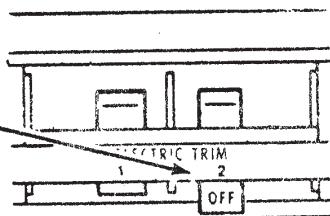
The engage switch for each electric trim channel is solenoid held in the engage position only when the associated channel has been satisfactorily engaged. Thus the position of the switch always indicates the engagement state of the channel.

OFF - The channel is disengaged. Failure of both electrical trim channels is accompanied by a MWS TRIM light (red) and audio (repeating gong) plus the disconnection of engaged autopilot channels and audio (cavalry charge). However, if the autopilots are engaged in LAND mode below 100 ft or in GO-AROUND they are not disconnected and the aircraft continues with fixed trim.

NOTE
Maximum pitch up deflection is approximately 15 deg. At this value the electric trim may automatically disengage and activate warnings (MWS TRIM light (red) and audio (gong)).

NOTE
When the aircraft is on the ground with the main landing gear shock absorbers fully compressed and at least one throttle fully forward the electric trim will disengage if the trim deflection is greater than one degree up or three and a half degrees down. The monitoring remains operative for 10 seconds after lift off.

NOTE: At touch down the monitoring is inhibited for 30 seconds thus avoiding any untimely trim disconnection during touch and go manoeuvres.



PITCH TRIM CONTROL SWITCH

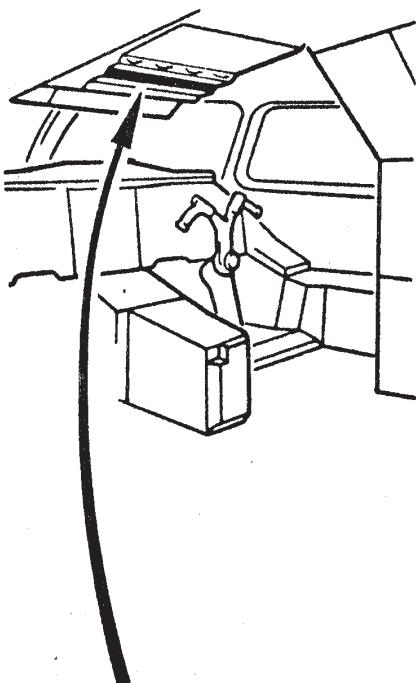
Both control columns have a PITCH TRIM selector that is spring loaded to the centre position.

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British airways
OVERSEAS DIVISION

AUTOSTAB SWITCHES

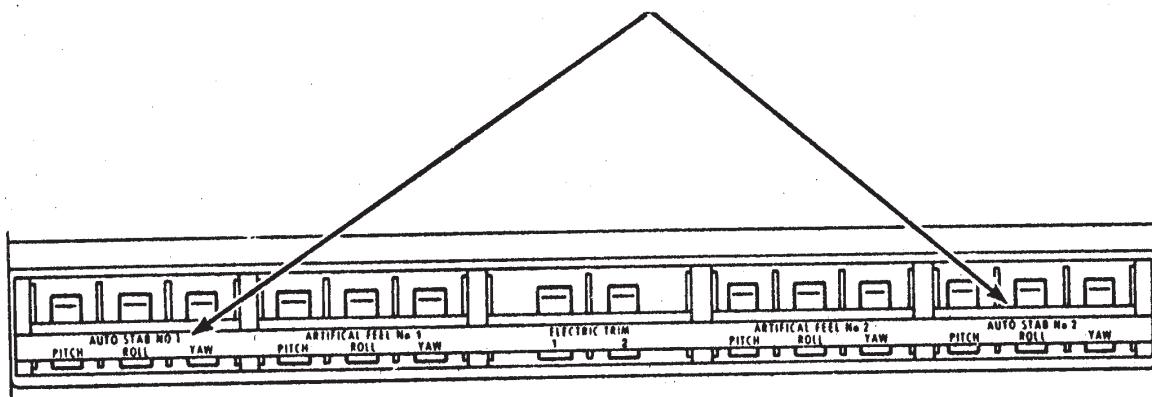


**AUTO-STAB PITCH-ROLL-YAW
SWITCHES**

The engage switch for each AUTO-STAB channel is solenoid held in the engage position only when the associated channel has been satisfactorily engaged. Thus the position of the switch always indicates the engagement state of the channel.

OFF - The axis is disengaged
Accompanied by disconnection
of the associated
autopilot and flight director
HOWEVER if the GO AROUND
mode is engaged the
flight director will not
disconnect.

Failure of both
autostabilisation channels
is accompanied by a
MWS STAB Light (red)
and audio (repeating gong)



(Unchanged)

Chapter 10

**FLIGHT
INSTRUMENTS**



CONCORDE FLYING MANUAL
FLIGHT INSTRUMENTS
(ATA CHAPTER 31)

10.00.01

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Accelerometer/Angle of Attack Indicator	10.02.11
Standby ASI/Machmeter and Standby Altimeter	10.02.12
Flight Engineers Flight Instruments	10.02.13
Clock	10.02.14

FLIGHT INSTRUMENTS

GENERAL

This chapter includes those basic instruments and standby instruments which provide altitude, airspeed, mach number, attitude, true airspeed, vertical speed, side slip, temperature and time information to the crew. The aircraft integrated data system (AIDS) records and stores selected flight parameters. The radiation detection and warning system indicates and monitors the level of cosmic radiation.

FLIGHT INSTRUMENTS

The source of data for the flight instruments are the ADCs.

ADC 1 supplies the Captain's

ASI) Normal mode
Altimeter)
Machmeter
Temperature Indicator
Vertical Speed Indicator
Incidence Indicator
Machmeter

Flight Engineer's

ADC 2 supplies the First Officer's

ASI) Normal mode
Altimeter)
Machmeter
Temperature Indicator
Vertical Speed Indicator
Incidence Indicator
Altimeter

Flight Engineer's

The ADC "servoed" channels have internal monitoring and cross comparison, ADC 1 - ADC 2, circuits which trigger the M.W.S. and cause instrument failure warning flags to appear if the thresholds are exceeded. If an A.D.C. is switched OFF, the instrument displays will remain fixed.

The Captain's and First Officer's A.S.I. and Altimeter in their "Standby" mode of operation are supplied with pitot and static pressures from the nose probe and an independent electrical power supply. The combined Standby ASI/Machmeter and the Standby Altimeter are supplied with pitot/static and static pressure respectively from the nose probe. They are both direct sensing pressure instruments.

Two side-slip angle (β) sensors located along the main fuselage centre-line Fwd & Aft, supply signals to the Captain's and First Officer's instruments respectively.

A second signal from the No 2 Total Temperature probe provides the necessary data to operate the flight engineer's Total Temperature Indicator independently of ADC No 2.

10.01.02

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FLIGHT INSTRUMENTS

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AIRCRAFT INTEGRATED DATA SYSTEM (AIDS)

The PVS 1580 AIDS System comprises,

- a keyboard type Data Management and Entry Panel (DMEP)
- 2 Acquisition Units
- a Long Term Recorder
- an Accident Data Recorder with integral underwater location beacon.

The system has a limit exceedance programme for engine parameters N_1 , N_2 , and EGT. Should a limit be exceeded the green LIMIT light will illuminate which, when pressed, will display the parameter code and the value of the exceedance e.g. an N_1 2% above limit will show as 2.0.

Peak positive and negative 'g' values, in flight or on landing, can be displayed in absolute 'g' terms.

Maximum brake application speed in knots can be displayed.

CLOCK

The Air Precision clock has 3 LED presentations,

- GMT with tendency indicators
- Elapsed Time with Run/Stop/Reset control
- Chrono (timing facility)

The latter function operates in either Timer mode or conventional stop clock mode.

In timer mode, the throttle time will be preset in the display and manually started at the appropriate time. The preset time will then count down to zero.

In Stop Clock mode, the display is controlled by a Start/Stop/Reset control.

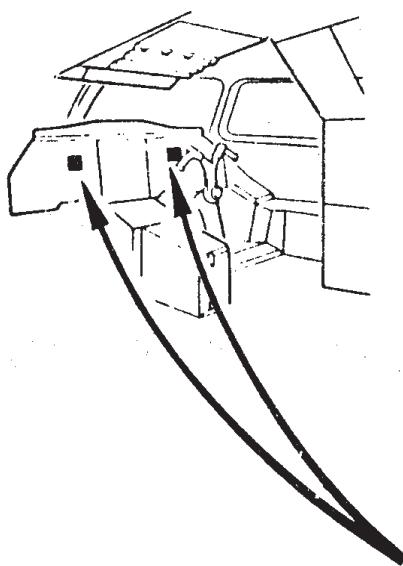
RADIATION METER

Supersonic transport aircraft fly higher than present aircraft and as a result get only a third of the atmosphere shielding from radiation. Consequently there is a possibility that higher levels of radiation than those encountered by current subsonic jets will be experienced.

Regulations require the radiation dose received by both passengers and crew to be limited. Hence a radiation detector sensitive to both ionising and neutron radiation detects both galactic and solar radiation and displays the combined total on a meter.

(U..changed,

ALTIMETER



ALTIMETER

On - steady indicates approach to the altitude selected on the autopilot ALTITUDE SELECT.

On - flashing indicates deviation from the altitude selected on the autopilot ALTITUDE SELECT.

WINDOW

The altitude information appears in digital form, in a window in the centre of the instrument. The altitude information (hundreds of feet) is shown by a pointer. The left part of the window displaying flight levels is outlined with a white line.

DATUM PRESSURE SETTING KNOB

Used to set the datum pressure displayed in two windows marked inHg and mbar. Rotate static pressure knob to set the required setting in corresponding windows.

WARNING FLAG

A pointer/counter flag, red with black stripes, across the digits, together with the less than 10000 ft digit flag indicates:

- When the mode switch is set at N:
loss of ADC validity signal.
loss of normal mode power supply.
loss of ADC altitude signal
slaving error.
- When the mode is set at S:
loss of standby mode power supply.
slaving error.

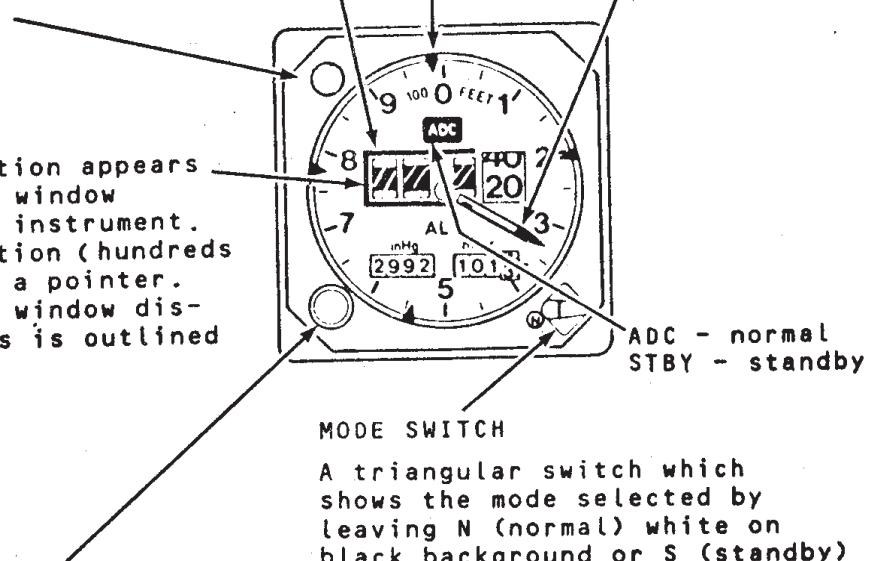
A yellow and white striped flag appearing in lieu of the 10000 ft digit indicates that the altitude is negative. In this case the digital reading is no more available.

BUGS

Set reminder bugs (4)
White, yellow, red and green.

ALTITUDE POINTER

Indicates altitude in hundreds of feet.

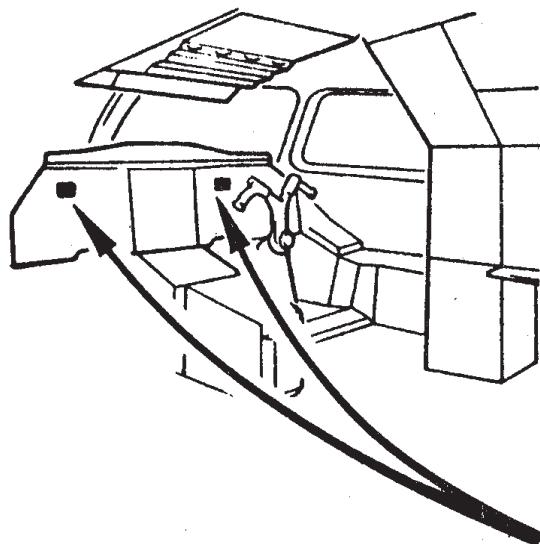


MODE SWITCH

A triangular switch which shows the mode selected by leaving N (normal) white on black background or S (standby) black on orange background visible.

The altimeter receives information directly from the nose probe; operation in the STBY mode will therefore require reference to position error corrections.

AIR SPEED INDICATOR (Sheet 1 of 2)



FAILURE FLAG (OFF)

Covering the speed digits, indicates:

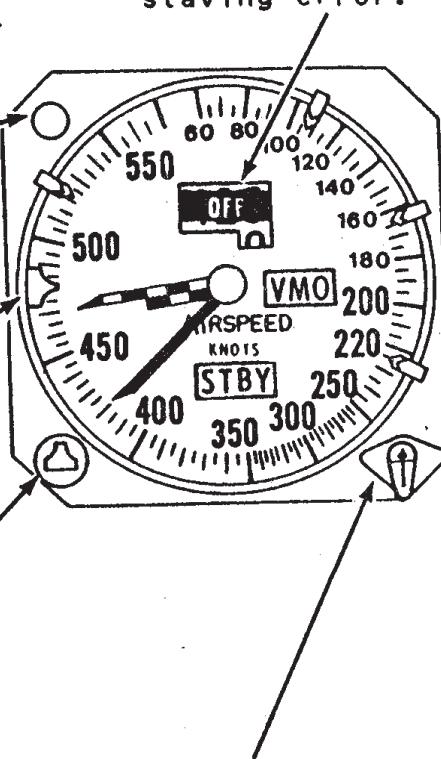
- When the mode switch is set at N:
- loss of ADC Validity signal.
- loss of normal mode power supply.
- loss of ADC speed signal.
- slaving error.

Also appears on both airspeed indicators if a discrepancy is sensed between ADCs' outputs airspeed signals.

- When the mode switch is set at S:
- loss of standby mode power supply
- slaving error.

LIGHT (Amber)

On - indicates a discrepancy between aircraft speed and speed selected on autothrottle.



ASI MODE SWITCH

It is triangular-shaped and shows mode selected by leaving N (normal) in white on a black background or S (standby) in black on an orange background circle visible.

N mode - the ASI receives information through the appropriate ADC.

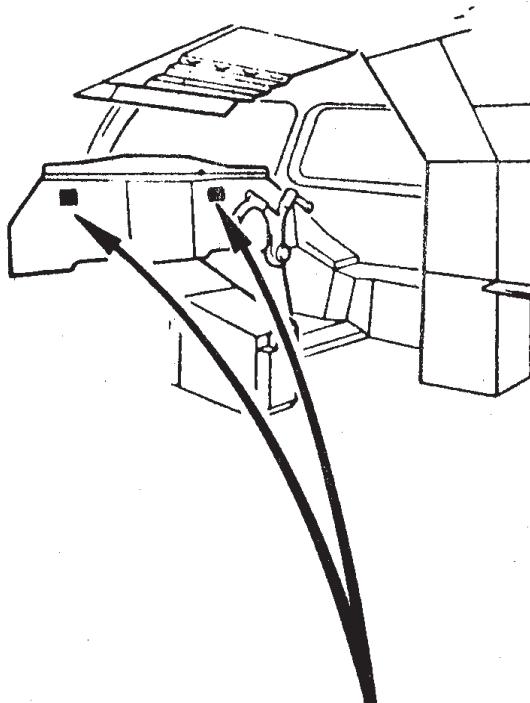
STBY mode - the ASI receives information directly from the nose probe; operation in the STBY mode will therefore require reference to position error corrections.

ORANGE T-SHAPED REMINDER BUG

KNOB

To set the orange T-shaped reminder bug.

AIR SPEED INDICATOR (Sheet 2 of 2)



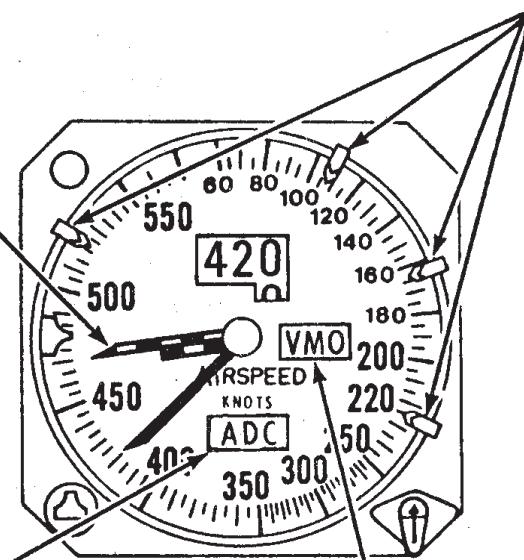
Two pointers show speed information:

MAX SPEED POINTER

An orange and black pointer indicates the limiting value of M_{MO} , V_{MO} or T_{MO} .

CAS POINTER

A white narrow pointer indicates CAS which also appears in digital form.



ASI MODE FLAG

The selected mode is also shown on the ASI mode flag reading ADC (normal) printed white on a black background or STBY printed black on an orange background.

RED FLAG

With VMO painted in black referring only to the limit pointer, indicates regardless of the operating mode:

- loss of ADC validity signal.
- loss of power supply.
- slaving error.

NOTE: Loss of power supply or slaving error has no effect on the operation of accuracy of the VMO audio warning.

BUGS

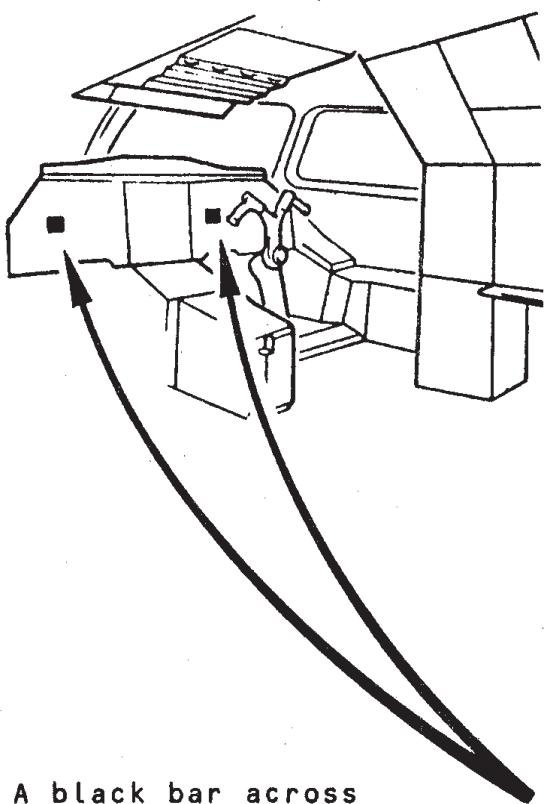
Set reminder bugs (4) white, yellow, red and green.

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British airways
OVERSEAS DIVISION

MACHMETER

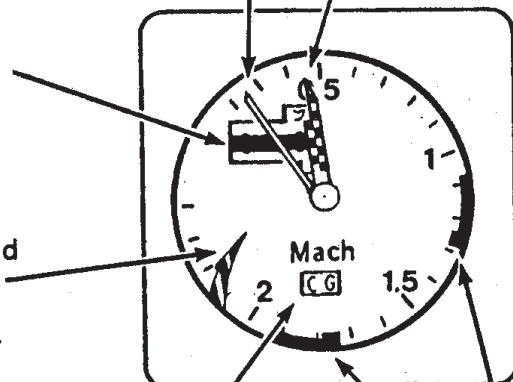


A black bar across counter when Mach number less than 0.45

FAILURE FLAG

A red and black striped arrow-shaped flag, indicates:

- loss of ADC validity signal.
- loss of Mach instrument power supply.
- slaving error.



INDICES

Two orange indices with AFT and FWD respectively printed in black, controlled by the centre of gravity computer, indicate the maximum and minimum allowed Mach number according to the centre of gravity.

C.G. WARNING FLAG

A red flag with letters CG printed in black indicates:

- loss of centre of gravity validity signal.
- loss of Mach instrument power supply.
- slaving error
- loss of FWD and AFT limits bugs.

VERTICAL SPEED INDICATOR AND SIDESLIP INDICATOR

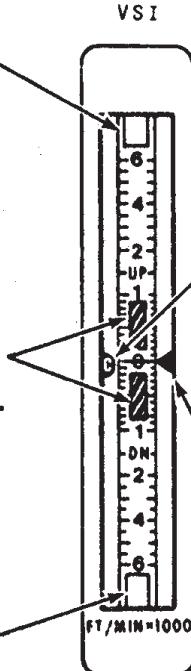
UPPER WINDOW

In excess of plus 6000 ft/min, the vertical speed is indicated in thousands of ft/min by digits 8,9 or 10 appearing in a window.

COMMAND BUG

A bug marked C shows, with the AFCS in VERT SPEED mode, the commanded vertical speed. The command bug is moved using the autopilot datum adjust.

When VERT SPEED is not engaged the command bug is slaved to the yellow index.



ALARM FLAGS

- Two red and black striped flags indicate:
- loss of ADC validity signal.
 - loss of vertical speed signal.
 - loss of instrument power supply.
 - slaving error.

LOWER WINDOW

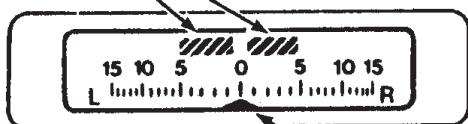
In excess of minus 6000 ft/min, the vertical speed is indicated in thousands of ft/min by digits 8,9,10,15,20,25 or 30 appearing in a window.

INDEX

The vertical speed is indicated by a yellow index running in front of a scale graduated from 0 to plus or minus 6000 ft/min.

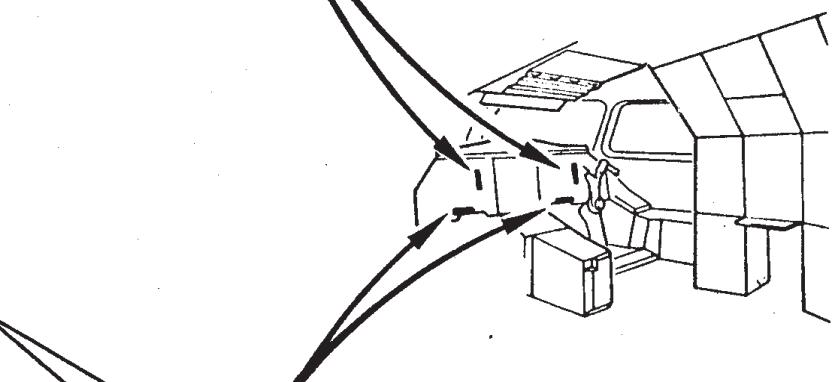
FAILURE FLAGS

- Two red and black striped flags indicate:
- loss of instrument power supply.
 - slaving error.



SIDESLIP INDICATOR

A white index indicates aircraft side slip angle in degrees directly from a sideslip vane.

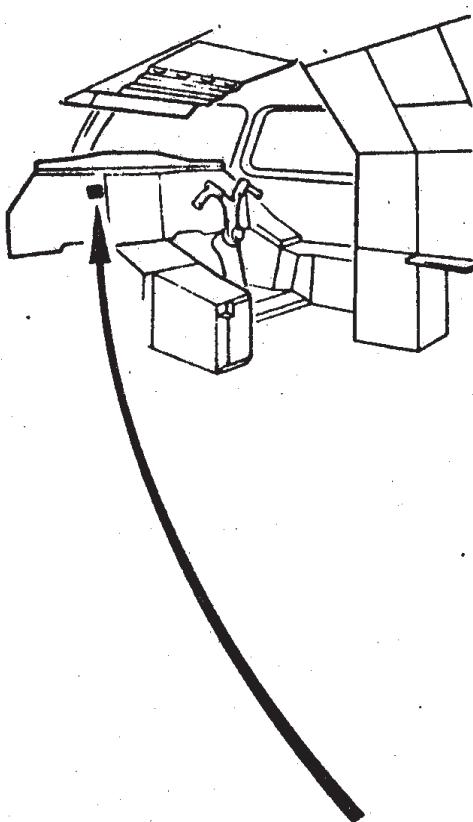


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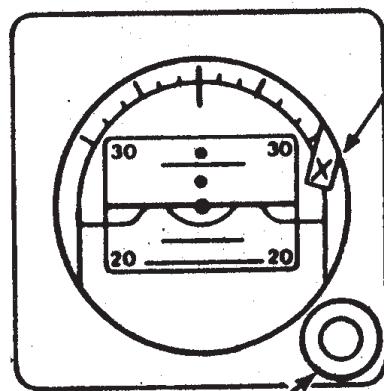
STANDBY HORIZON



PRINTED IN ENGLAND

FAILURE FLAG
(Red - White cross)

Indicates loss of power supply to the instrument.



STANDBY HORIZON

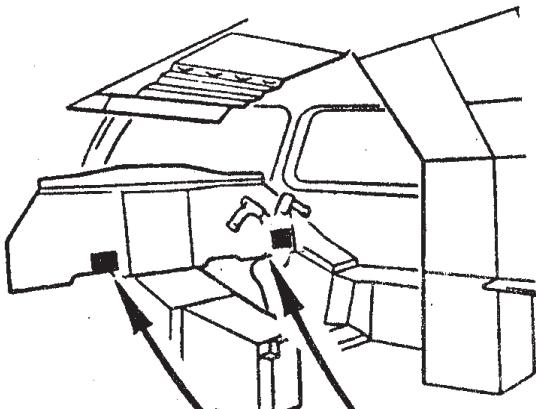
Is supplied from a DC essential busbar through a static inverter.

STANDBY HORIZON KNOB

Quick caging is obtained by pulling the knob slowly.

NOTE: The aircraft reference symbol is non-adjustable.

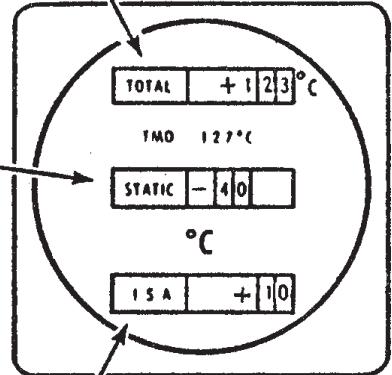
TEMPERATURE INDICATOR

**TOTAL TEMPERATURE
FAILURE FLAG**

A red flag with TOTAL printed in black indicates:

- loss of ADC (OFF)
- loss of instrument power supply.
- slaving error.

NOTE: Loss of power supply or slaving error has no effect on the operation or accuracy of the TMO audio warning.

**STATIC TEMPERATURE
FAILURE FLAG**

A red flag with STATIC printed in black indicates:

- loss of ADC (OFF)
- loss of instrument power supply.
- slaving error.

NOTE: When a fault causes the STATIC flag to appear, the ISA flag will appear at the same time.

**TEMPERATURE IN RELATION TO ISA
FAILURE FLAG**

A red flag with ISA printed in black indicates:

- loss of instrument power supply.
- altitude information slaving error.
- slaving error.
- static temp slaving error.

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CONCORDE FLYING MANUAL
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AIRCRAFT INTEGRATED DATA SYSTEM

CODE DISPLAY -

- displays - inserted data address code when inserting date or when calling up parameter readouts.
- data code associated with parameter exceedance when LIMIT key pressed.

LIMIT KEY/LIGHT (GREEN)

will illuminate for,
- an N_2 exceedance of more than 1.5%
- an N_1 exceedance of more than 1.5% below M 1.6 only
- an EGT exceedance of more than 15°C between 84% and 101.5% N_1 only.

Press the key to cancel the light and display the exceedance in the data display and the parameter code in the code display.

If the key remains illuminated repeat the above procedure as required.

TEST SWITCH

POWER:- spring loaded to this position. Recorders do not run when ground services bus live.

ON:- overrides ground power cut out to permit system test.

FAULT IDENT SELECTOR

SYS:- connects the FAULT light to the complete system. Operation of the Test sw. tests the complete system.

AQ1:- connects Acquisition Unit 1 only, to the FAULT light. Operation of the Test sw. tests Acquisition Unit 1 only.

AQ2:- as above but for Acquisition Unit 2.

ADR:- as above but for the Accident Data Recorder

LR:- as above but for the Long Term Recorder.

DATA DISPLAY

displays inserted or recalled data.

FAULT KEY/LIGHT (AMBER)

ON, indicates one of the following,
- recorders not running
- fault detected in Acquisition Units 1 or 2
- fault detected in Accident Data Recorder
- fault detected in Long Term Recorder

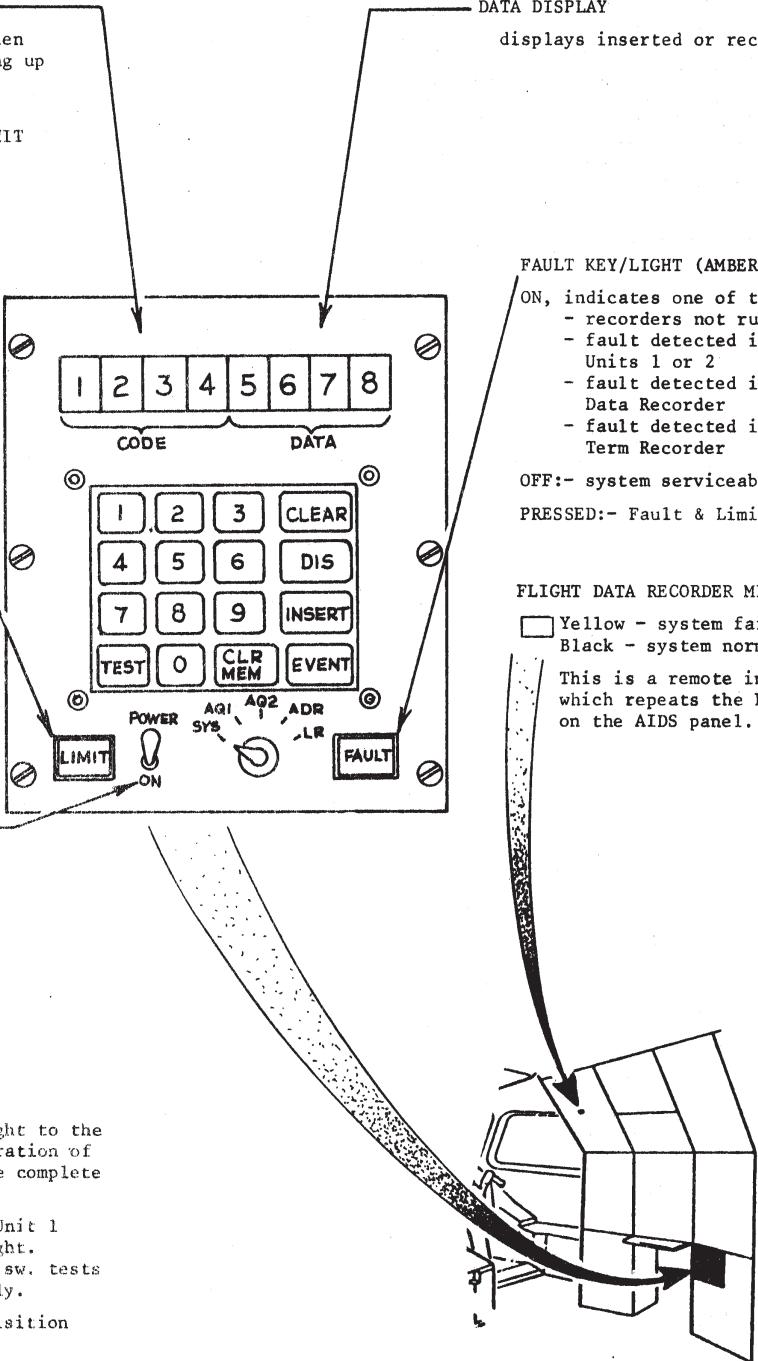
OFF:- system serviceable.

PRESSED:- Fault & Limit lights.

FLIGHT DATA RECORDER MI

Yellow - system failure
 Black - system normal

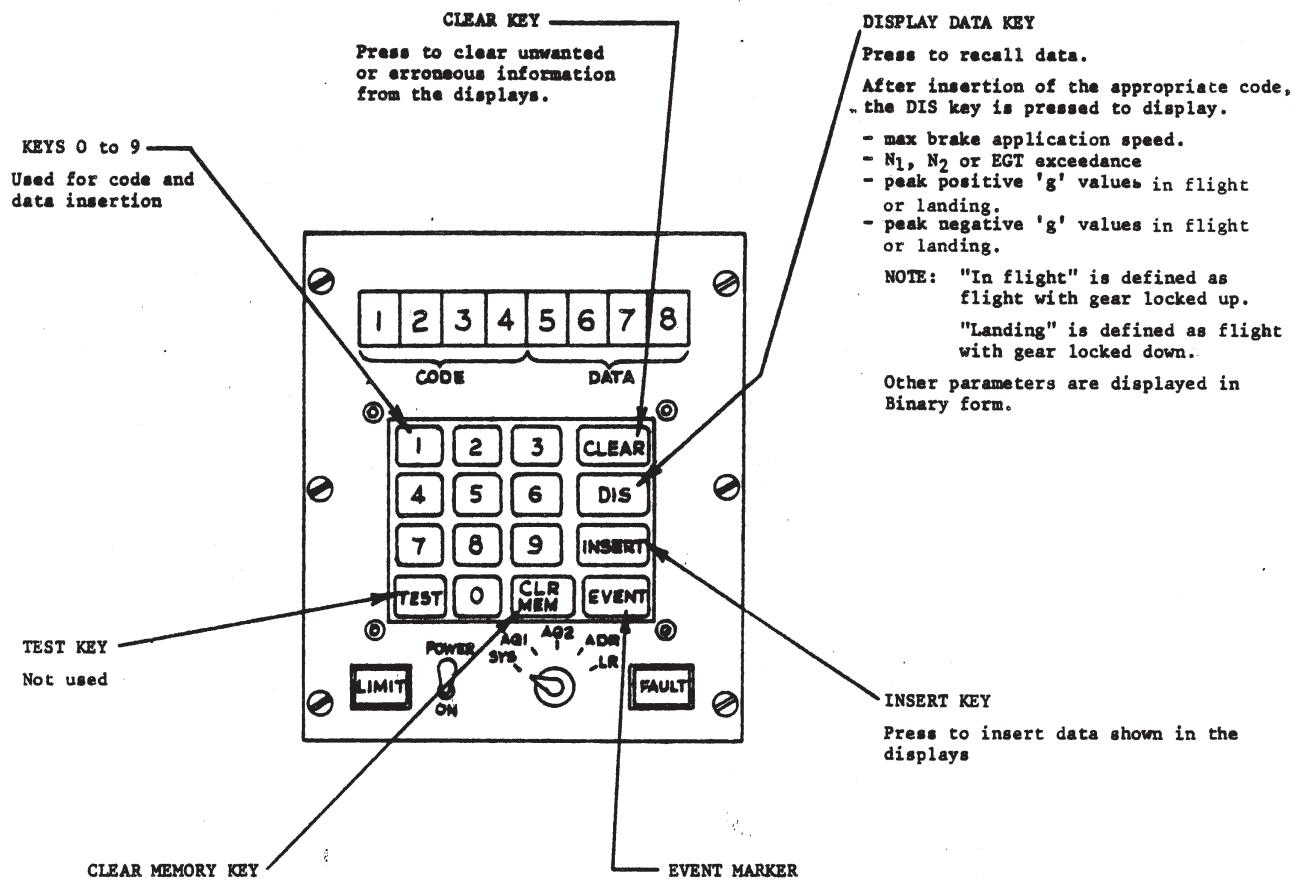
This is a remote indicator which repeats the FAULT light on the AIDS panel.



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AIRCRAFT INTEGRATED DATA SYSTEM

All keys described on this page are white.

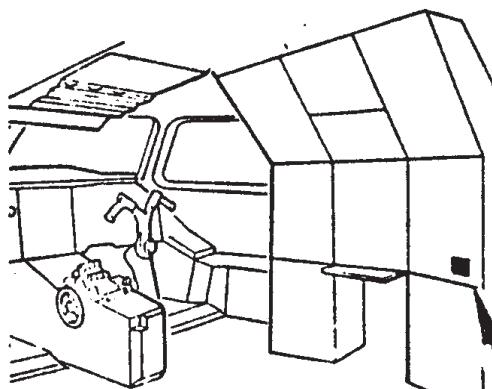


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CONCORDE FLYING MANUAL

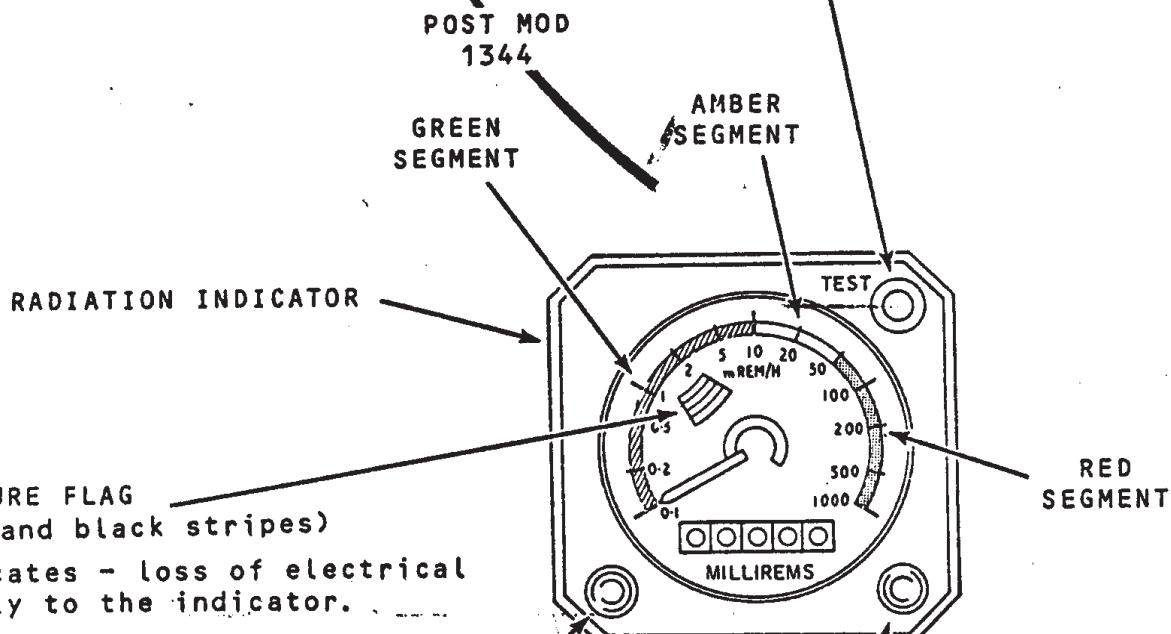
British airways

RADIATION METER



TEST PUSH BUTTON

Pressed - simulates a high level of radiation thus testing the warning lights and the connection to the master warning system.



LIGHT - (Amber)

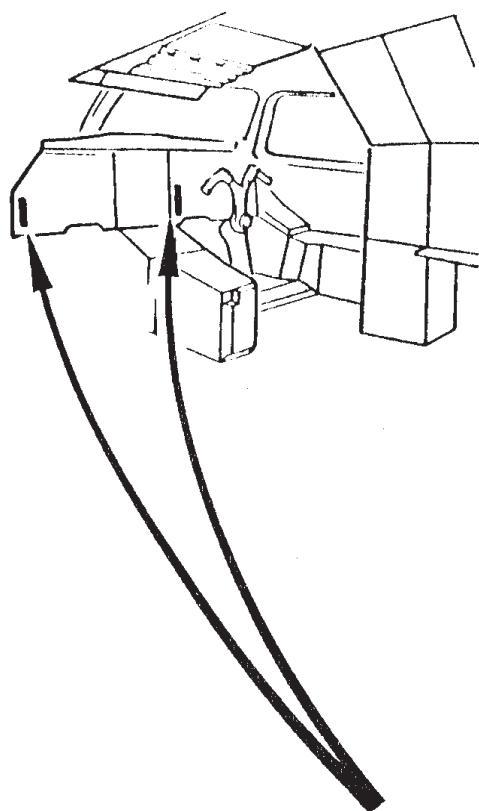
On - indicates an instantaneous radiation level of 10 to 50 mrem/hour.

LIGHT - (Red)

On - indicates an instantaneous radiation level greater than 50 mrem/hour
Accompanied by a MWS RADN light (red) and audio (gong).

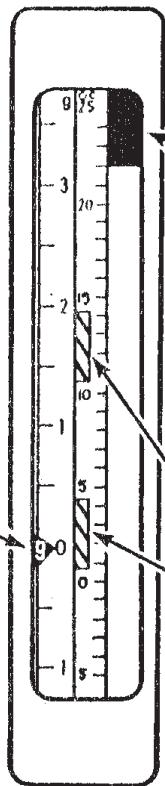
(Unchanged)

ACCELEROMETER/ANGLE OF ATTACK INDICATOR

ACCELEROMETER
MOVING INDEX

The g values are shown by a black index with a letter g printed in white and running alongside a scale.

NOTE: There is no failure indicator for the accelerometer

ANGLE OF ATTACK
MOVING TAPE

The angle of attack value is indicated by a white tape running in front of a scale.

ANGLE OF ATTACK
FAILURE FLAG

Two red and black striped flags indicate:

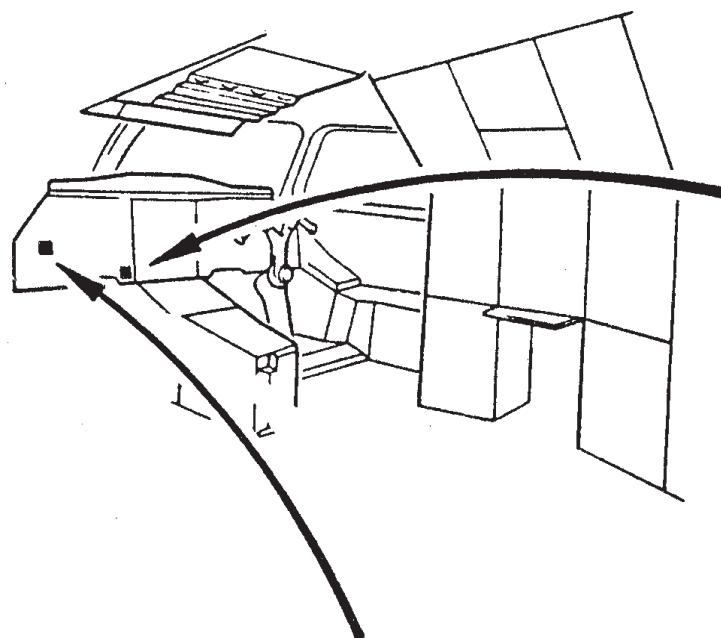
- loss of ADC signal
- loss of instrument power supply.
- loss of ADC synchro transmitter power supply.

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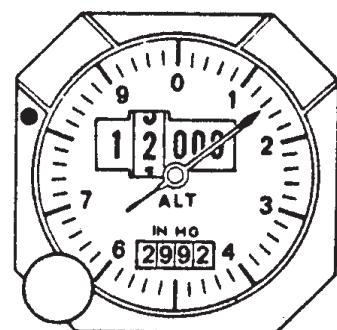
CONCORDE FLYING MANUAL

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STANDBY AIR SPEED INDICATOR/MACHMETER
AND STANDBY ALTIMETER



STANDBY
ALTIMETER



PRINTED IN ENGLAND

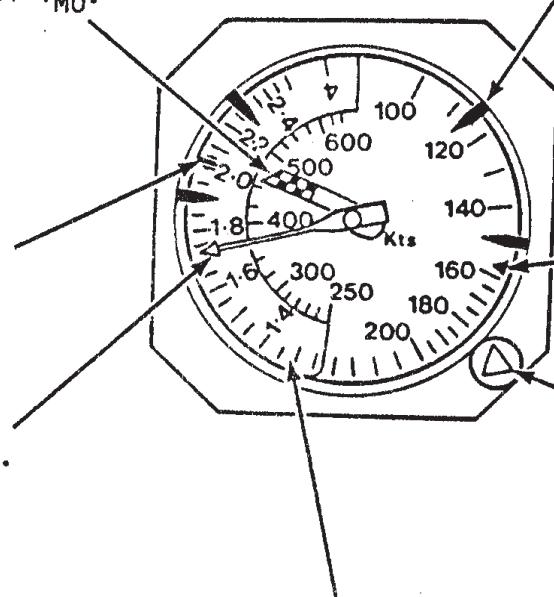
MAX SPEED POINTER

Orange and black pointer
which indicates the
limiting value of V_{MO} .

STANDBY
AIRSPEED/MACHMETER

M_{MO} FIXED ORANGE
RADIAL BUG

AIRSPEED/MACH No.
POINTER



MOVING SCALE

Read against the
airspeed pointer.

ORANGE V REFERENCE
BUG

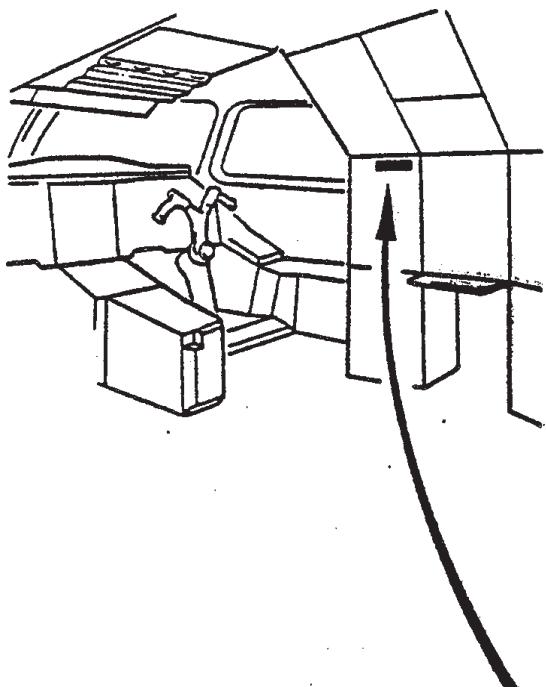
V REFERENCE SETTING
KNOB

Bears V_{REF} orange
bug symbol.

SET REMINDER BUGS

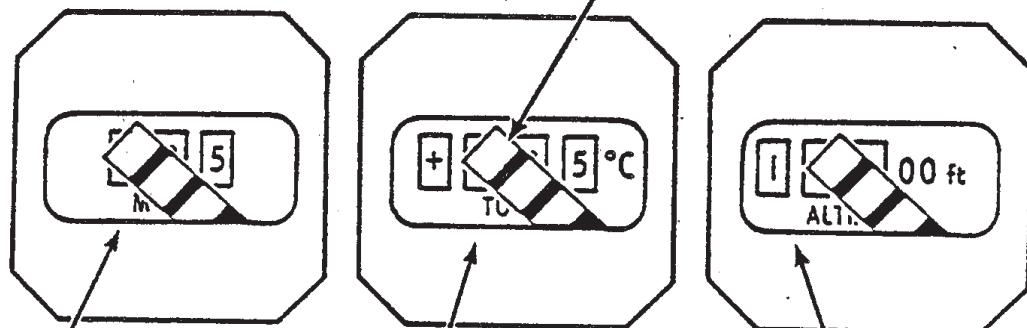
One white, one red, one
yellow, one green.
Manually set around
external bezel.

FLIGHT ENGINEERS FLIGHT INSTRUMENTS

**FAILURE FLAG**
(Red and Black stripes)

When covering digits indicates:

- Power supply failure.
- Data processing error.
- Data sensing error.



MACHMETER

TOTAL TEMPERATURE INDICATOR

The instrument range is:
 - 50°C to + 220°C, but
 the left hand indicator
 always shows:

+

ALTIMETER

When the pressure altitude reading is negative, the left hand indicator shows:

-

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CONCORDE FLYING MANUAL

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**British
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CLOCK

CAPTAIN'S CLOCK as illustrated has three displays, viz, GMT, ELAPS and CHRONO. The CHRONO display can be switched to Timer function to give a noise abatement count down facility.

CO-PILOT'S & FLIGHT ENGINEER'S CLOCKS are the same as Captain's Clock except that there is no ELAPS time facility.

NOTE: Only the Captain's Clock has the AIDS encoder.

CHRO: with switch in this position. The CHRONO indicator operates as a normal stopwatch and is controlled by three-state CHRO pushbutton.
 PUSH - to start
 PUSH - to stop
 'PUSH - to reset
TIMER: with switch in this position. The CHRONO display operates as a countdown timer. Use GMT selector at Slow or Fast to preset the countdown value. To start the countdown, press the CHRO button. Stop & Reset functions are inhibited in this mode.

DIMMER CONTROL
 Controls brightness of indicators and warning lights.

DIVIDER LIGHTS
 Lights "ON" indicate that the particular counter is operating. Lights "OUT" - no signals to the display.

TIMER ALERT LIGHTS
 In the TIMER mode only, the lights begin to flash 5 secs. before the display achieves zero. At zero secs. the lights become steady. The lights are inhibited in the CHRONO mode.

**GMT SELECTOR**

TEST: all display segments lit.
RUN: time of day presented on GMT display.

To achieve the following positions, the selector must first be depressed. The positions control the TIMER functions when the TIMER/CHRO switch is at TIMER and the GMT display with the TIMER/CHRO switch at CHRO.

HOLD: the selected display is frozen.
SLOW: slow slew (1 min/sec).
FAST: fast slew (100 min/sec).

NOTE

When the TIMER/CHRO switch is at TIMER, the GMT display operates as a normal clock regardless of the GMT selector position.

TENMINUTE INDICATOR

0 to 14 seconds no bar lit
 15 to 29 seconds bottom bar lit
 30 to 44 seconds two bottom bars lit
 45 to 59 seconds all three bars lit

ELAPSED TIME SELECTOR

This switch controls Elapsed Time display. It has two stable positions and one springloaded position.

"STOP" (stable) - counter stopped
 "RUN" (stable) - counter operating
 "RESET" (springloaded) - counter reset to zero and indicators out.

CHRO BUTTON

This pushbutton controls CHRONO display.
With TIMER/CHRO switch set to CHRO

Three-state pushbutton

PUSH - starts counter increasing
 PUSH - stops counter
 PUSH - resets counter to zero

With TIMER/CHRO switch set to TIMER
 Single state pushbutton

PUSH - starts counter decreasing

Chapter 11

FUEL SYSTEM

FUEL SYSTEM

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FUEL SYSTEM

GENERAL

Fuel is stored in thirteen sealed tanks which are integral with the wing and fuselage structures. The tanks are arranged in three principal groups:

- Engine Feed
- Main Transfer
- Trim Transfer

This arrangement ensures that fuel is delivered to the engines at suitable flow rates, temperatures and pressures to satisfy all engine operating conditions. It provides a means of controlling and adjusting the aircraft's centre of gravity both prior to take-off and during flight to match the differing aerodynamic centre of pressure positions which occur during transonic acceleration and deceleration. The system also provides a heat sink for the dissipation of heat rejected by the air-conditioning and hydraulic systems and ensures that the temperature increase arising from kinetic heating is kept to a minimum. The use of a number of separate tanks, together with their internal bracing, reduces the amount of surging of the stored fuel. Because of the high climb rate of the aircraft, the tanks that store fuel during the climb require to be de-aerated, to ensure that air in solution in the fuel does not become a hazard.

ENGINE FEED

Each engine has its own feed system from a collector tank, however, a crossfeed system allows any engine or group of engines to be supplied from any collector tank.

An accumulator is used to provide a limited amount of fuel when a low pressure is sensed in the engine feed.

Between the LP valve and engine driven pump each feed system contains air conditioning and hydraulic heat exchangers. A fuel LP protection system, when armed, causes the fuel to the engine to bypass the air conditioning and hydraulic heat exchangers in the event of a low fuel pressure. Disarming the bypass valve circuit ensures a constant fuel flow through the heat exchanger.

MAIN TRANSFER

The collector tanks are replenished from the main transfer tanks 5, 6, 7, & 8 in a sequence that minimises the movement of the aircraft centre of gravity.

The main transfer sequence is manually initiated using the pumps in tanks 5 and 7, and is:-

Tank 5 replenishing tank 1 via the left hand pump, and tank 2 via the right hand pump.

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Tank 7 replenishing tank 3 via the left hand pump, and tank 4 via the right hand pump.

When tanks 5 and 7 are empty, the pumps in tanks 6 and 8 continue the transfer by:-

Tank 6 replenishing tank 1 via the left hand pump, and tank 2 via the right hand pump.

Tank 8 replenishing tank 3 via the left hand pump, and tank 4 via the right hand pump.

Transfer of fuel from the auxiliary tanks 5A and 7A is into their respective main tanks 5 and 7.

TRIM TRANSFER

The trim transfer system is used to redistribute the fuel in the trim tanks and main transfer tanks so that the aircraft centre of gravity can be moved to optimum positions for take off, sub-sonic and supersonic flight.

The trim transfer is normally automatically sequenced and controlled from the Flight Engineer's Panel, however there is a forward transfer override control available to the Pilots for use in abnormal circumstances requiring a rapid forward transfer of fuel.

The aft trim tank (11) has four pumps two of which PUMP GREEN and PUMP BLUE are powered by their respective hydraulic system. Thus forward transfer capability is available using electric or hydraulic power.

The trim transfer system is augmented in the aft trim condition by a reduced level operation in collector tanks 1 and 4. As tanks 1 and 4 are located well forward this moves the aircraft centre of gravity further rearward. The resultant rearward centre of gravity is the optimum for minimum trim drag in supersonic cruise.

VENTING AND PRESSURISATION

The tanks vent into a ring main gallery and thence into a scavenge tank which connects to atmosphere through vents in the rear fuselage. A scavenge pump automatically removes any fuel that has entered the scavenge tank and returns it to tank 3.

At high altitudes the fuel tanks are pressurised, thus facilitating fuel pumping and preventing fuel boiling, to a maximum of between 1.2 and 1.5 psig. This increasing differential pressure is necessary to maintain a minimum absolute tank pressure with increasing altitude.

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FUEL SYSTEM

JETTISON

The fuel jettison system utilizes part of the trim transfer system to move fuel from the trim tanks and collector tanks to a jettison outlet at the rear of the aircraft. Two engine feed pumps in each collector tank supply fuel to the jettison system.

The system ensures that sufficient fuel is retained for operation of the engines.

DE-AERATION

De-aeration is provided in tank 10 by a special pump, and in tanks 11, 6, 8, 5A and 7A by the normal pumps.

De-aeration is required in fuel tanks where the fuel remains static for relatively long periods during the climb. Under these conditions it is possible that as the fuel tank air pressure decreases, air in solution will expand causing fuel pump cavitation or transient increases in tank pressure and subsequent fuel transfer via the vent gallery.

FUEL QUANTITY INDICATION

The fuel quantity indication (FQI) system measures the fuel contents of the tanks by means of capacitance type gauging channels, and provides individual indication of each tank content at the Flight Engineers fuel management panel or alternatively, at the refuel control panel for refuelling.

The fuel gauging information is also used to provide:

- (a) Total fuel indication at the centre dash panel, the fuel management panel and at the refuel control panel.
- (b) Tank load limit control during trim transfer and refuelling operations.
- (c) CG position indication at the pilots dash panels and the fuel management panel.
- (d) CG and mach limits indication at the pilots dash panels and fuel management panel.
- (e) CG and mach limit warnings at two levels within the defined flight envelope.

Load Limit Control

During the normal mode of trim transfer, fuel is pumped either from tanks 9 and 10 into tanks 11, 5 and 7 to obtain a rearward CG shift, or from tank 11 into tanks 9, 5 and 7 to obtain a forward CG shift. The trim tank contents are pre-selected on two load limit selectors, one for tanks 9 and 10 and the other for tank 11. Any fuel in excess of the trim tank requirements is transferred into tanks 5 and 7. The load limit control channels are duplicated and each one automatically continues controlling should the other channel fail.

FUEL SYSTEM

CG Position Indication

Each CG indication is derived from any one of three channels. The Main channel is the one normally used with Standby 1 and Standby 2 channels available in the event of a main channel failure. Each channel has its own CG pack in which the CG position is computed using fuel quantity information and other fixed and manually introduced inputs.

The Main channel uses fuel quantity indication from all tanks in computing the CG.

Standby 1 channel uses fuel quantity indication from only those tanks on the left hand side of the aircraft and channel A of tanks 9, 10 and 11. For computation purposes the sum of the left hand tank moments is doubled.

Standby 2 channel computes the CG in a similar manner to Standby 1 but uses the tanks in the right hand side of the aircraft and channel B of tanks 9, 10 and 11.

CG and Mach Limits Indication

Bugs on the CG Indicators show the forward (fwd) and rear (aft) boundaries of the CG corridor relative to mach number. Bugs on the Machmeters show the maximum and minimum mach limits relative to the aircraft CG position. Both the CG and mach number band widths move relative to mach number and CG respectively.

The limits display is provided by two identical but separate channels. One is contained in the Standby 1 CG pack and serves the Captain's CG Indicator and Machmeter.

The other channel is contained in the Standby 2 CG pack and serves the First Officers Machmeter and the Flight Engineers CG Indicator.

CG and Mach Limit Warnings

CG and Mach Limit warnings are provided at two levels of CG/Mach number values. The first warning activates at a normal boundary level and the second warning activates when the normal boundary limits have been exceeded by a further margin.

The second warning level is defined as an extreme boundary. Its purpose is to indicate when corrective actions, taken at the normal boundary warning, are not producing a rapid enough correction of CG/Mach values.

The warnings are initiated through two separate channels, one in STANDBY 1 CG pack and the other in STANDBY 2 CG pack. Both channels function the master warning system, but STANDBY 1 channel activates the pilots Machmeter/CG indicator warnings and STANDBY 2 channel activates the identical warnings at the First Officer's Machmeter and the Flight Engineer's CG indicator.

FUEL SYSTEM

The signals from the FQI of tanks 1 and 4, 2 and 3, 5 and 7, 5A and 7A, and 6 and 8 that are used in the main CG computer are sensed by a comparator. The comparator automatically disconnects a faulty gauging channel and substitutes a signal equal to the content of the remaining tank of the pair, in the event of failures.

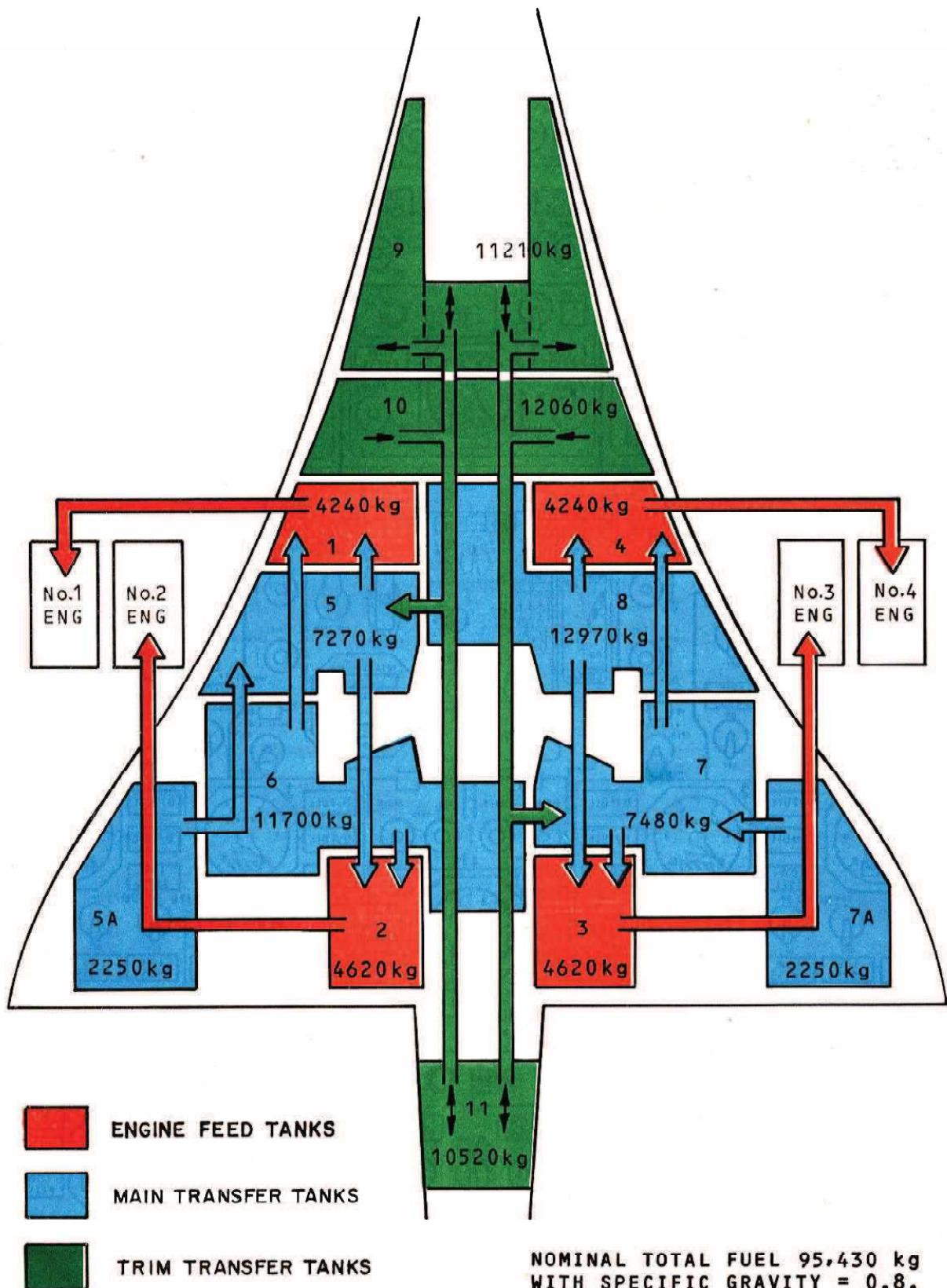
The fuel gauging of tanks 9, 10 and 11 is provided through two channels for each tank. A failure detector compares the signals from each pair of gauging channels. This detector automatically disconnects a faulty channel by removing its power supply in the event of failures.

REFUELLING

Refuelling is carried out through two refuel control units, located in the wing lower fairings forward of the main landing gear bays and connected to the trim transfer pipes. All the tanks can be refuelled simultaneously or each tank separately, for either partial or total filling, from the refuel control panel located next to the RH refuel control unit. Required quantities can be pre-selected on the refuel control panel.

Part or all of the refuelling procedure is stopped in the event of overfilling, excess pressure, inadvertent opening of the trim valves or adverse rearward movement of the aircraft centre of gravity.

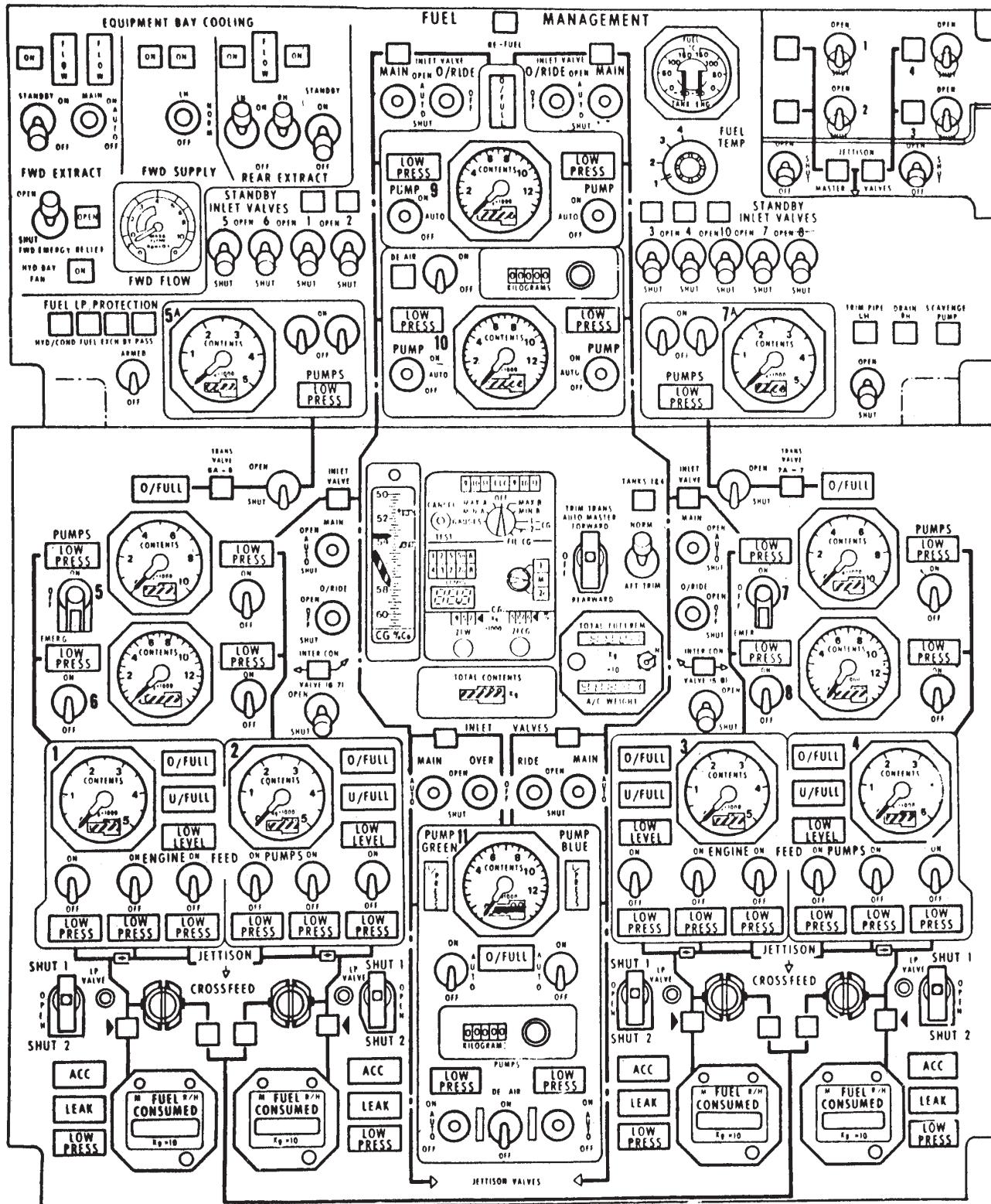
TANK LOCATION



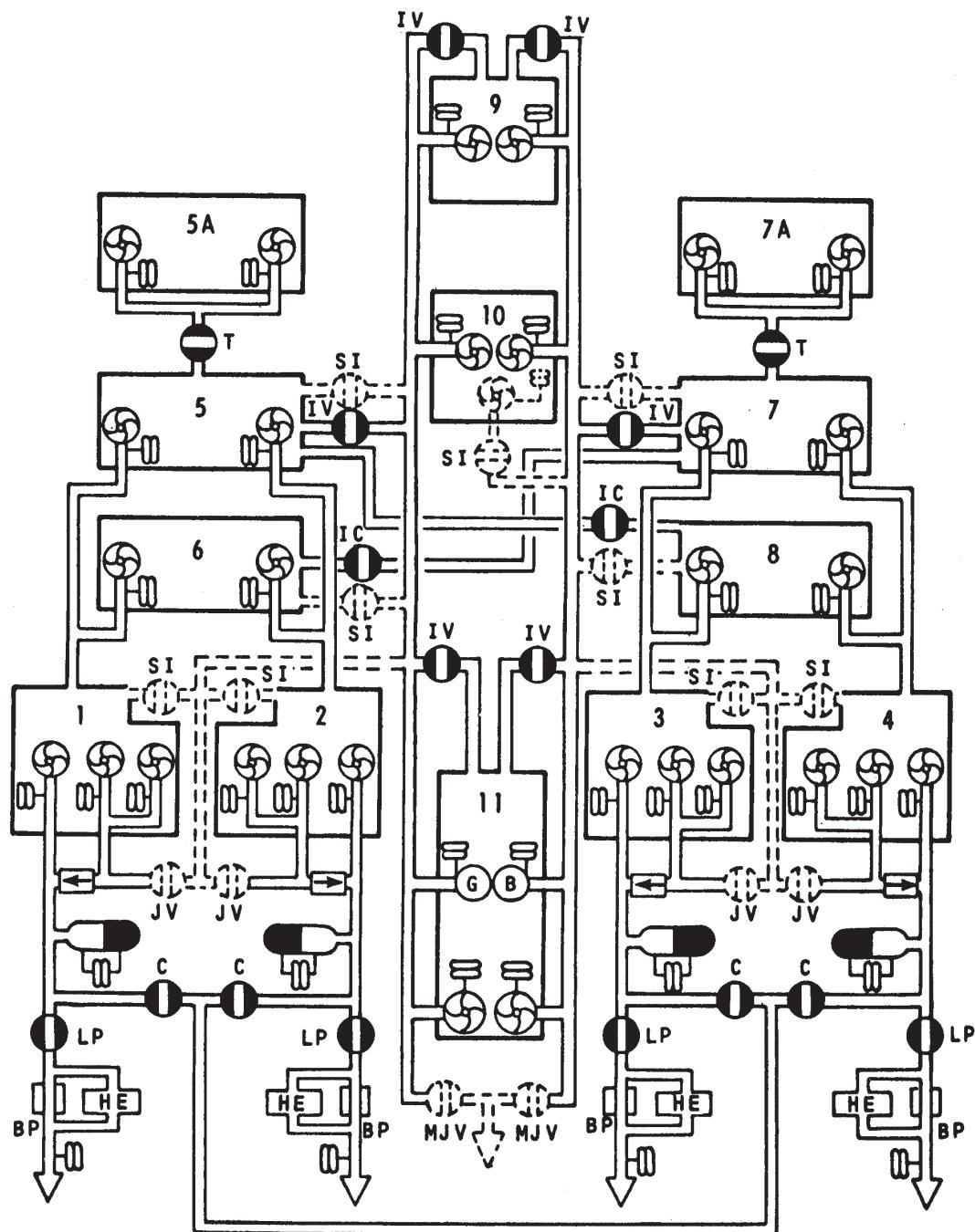
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MANAGEMENT PANEL



SYSTEM SCHEMATIC



IV () INLET VALVE (TRIM TRANSFER)

LP () L.P. FUEL VALVE

C () CROSSFEED VALVE

SI () STANDBY INLET

JV () TANK JETTISON VALVE

MJV () MASTER JETTISON VALVE

T () TRANS VALVE

IC () INTER CONNECT VALVE

() FUEL PUMP (ELECTRICAL)

(G) (B) FUEL PUMP (HYDRAULIC)

BP () BY-PASS VALVE

HE () HEAT EXCHANGER

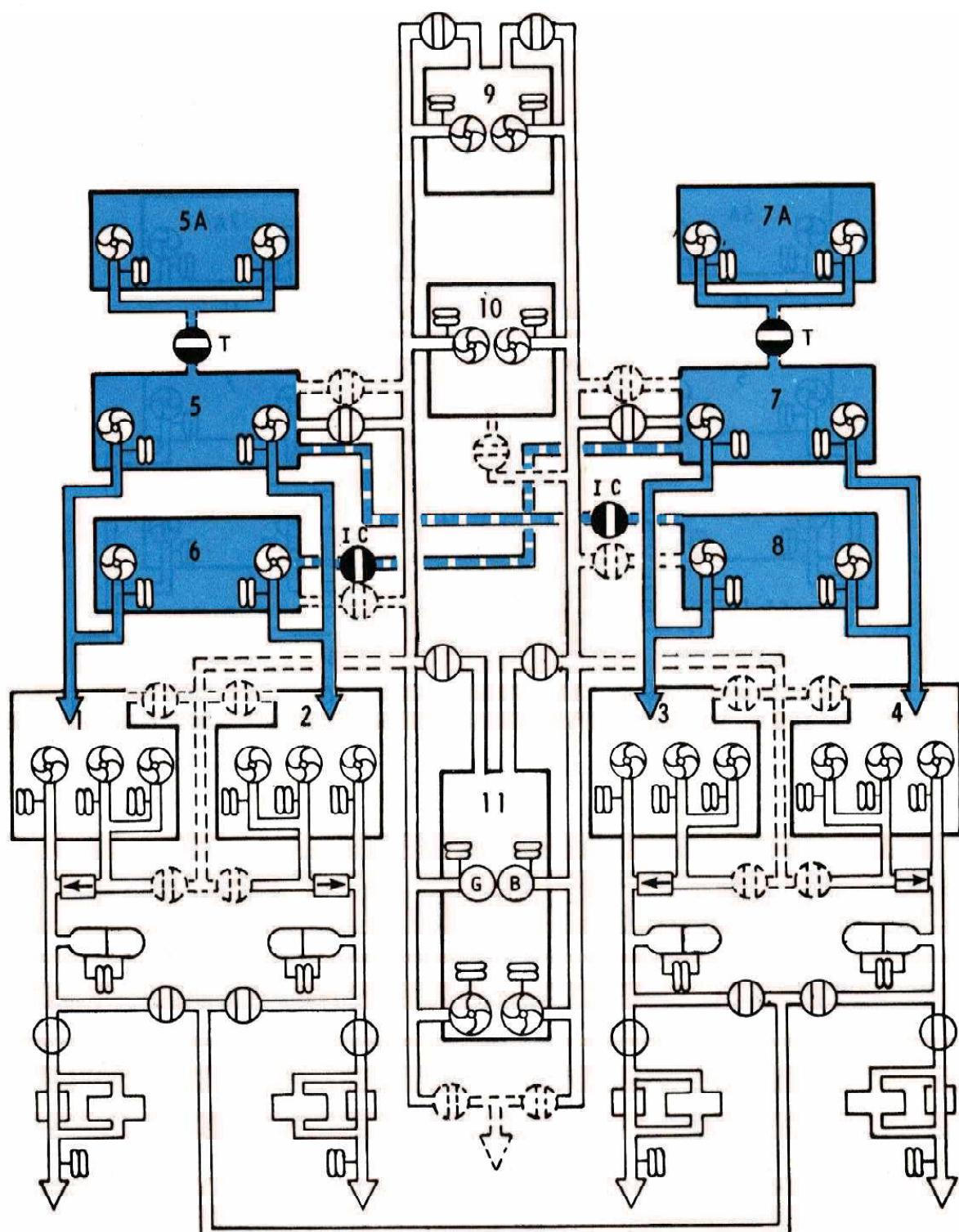
() FUEL ACCUMULATOR

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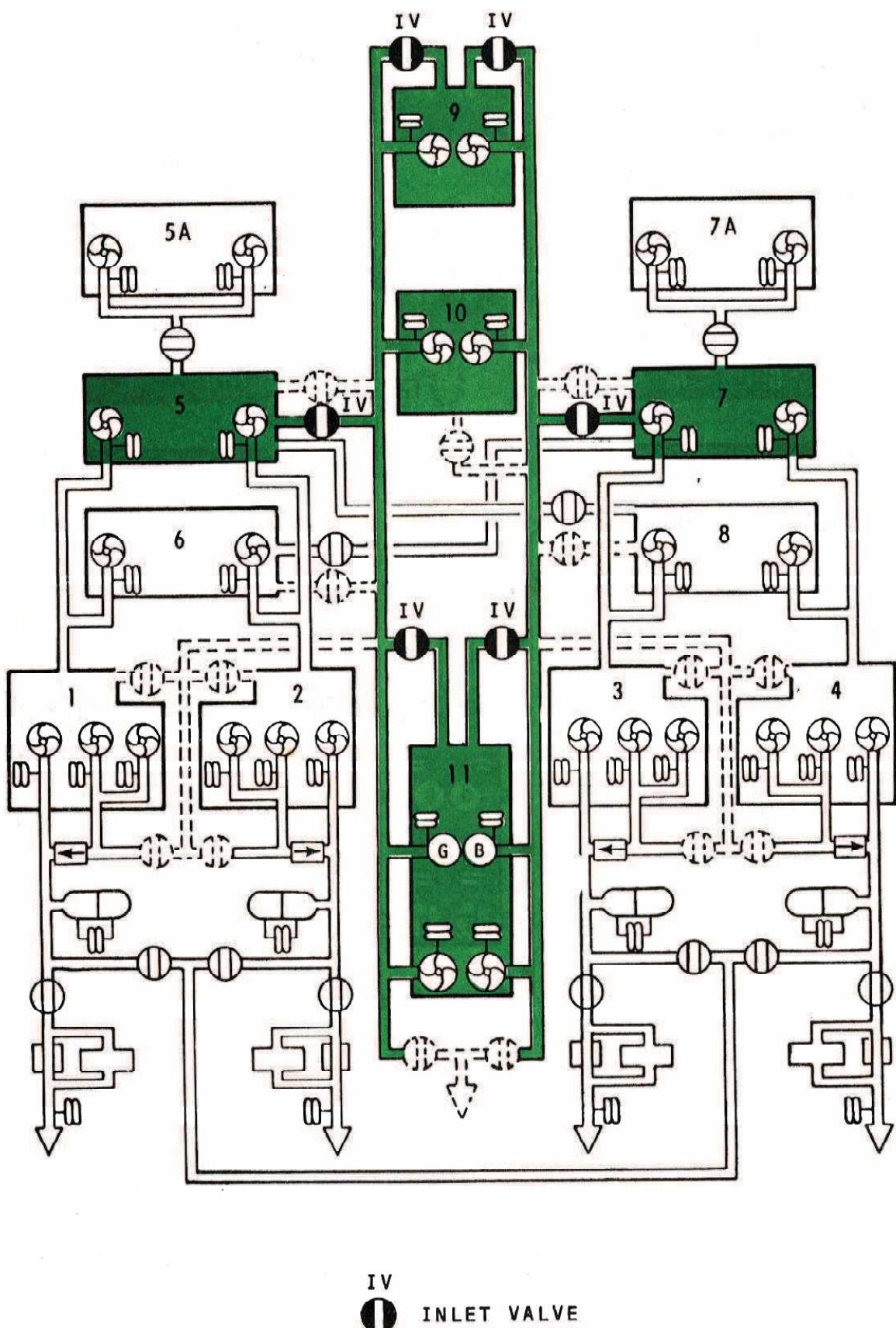
MAIN TRANSFER



T TRANS VALVE

IC INTER CONNECT VALVE

TRIM TRANSFER



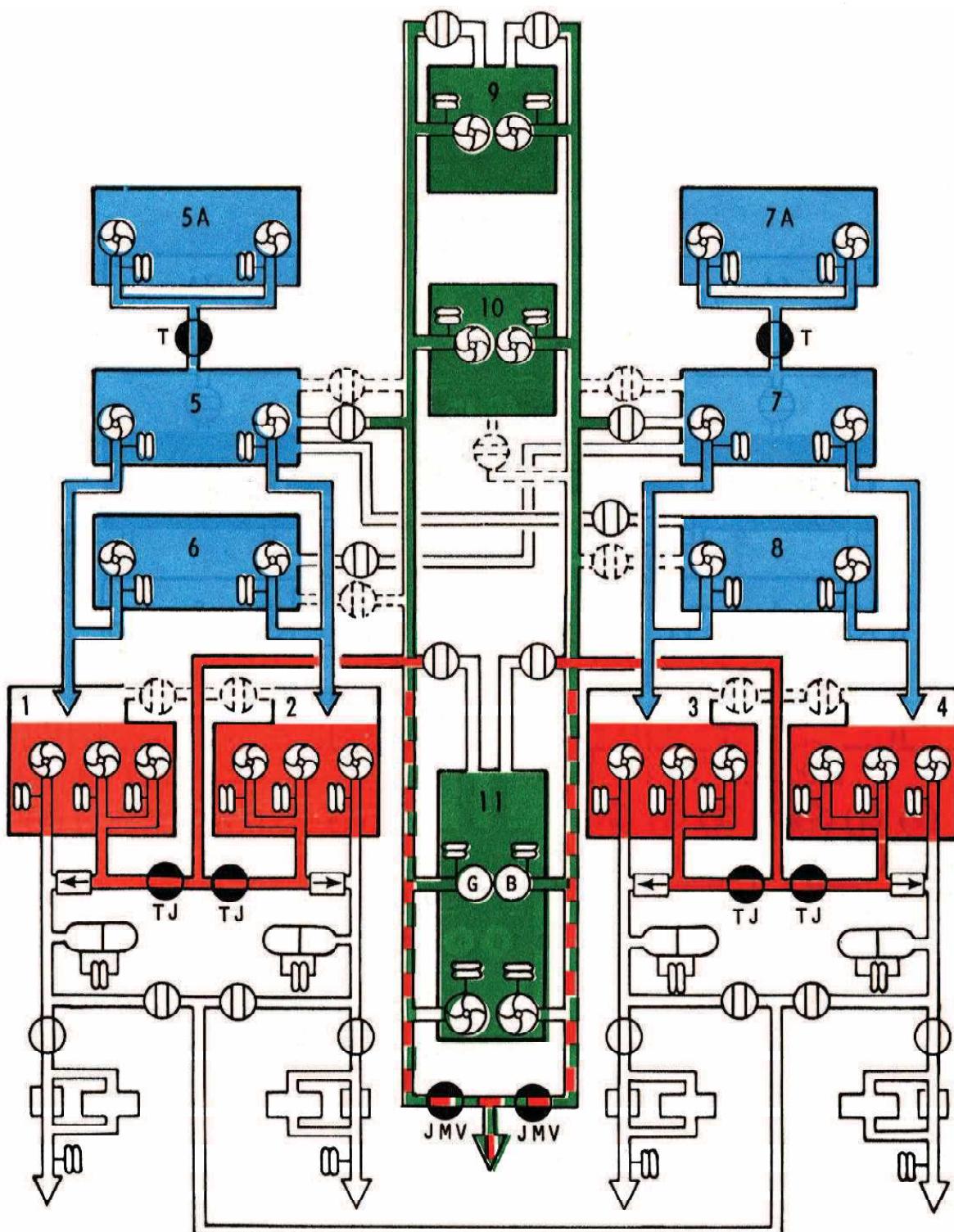
TANKS CONCERNED DIRECTLY WITH
TRIM TRANSFER OPERATIONS

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JETTISON



T

TRANS VALVE

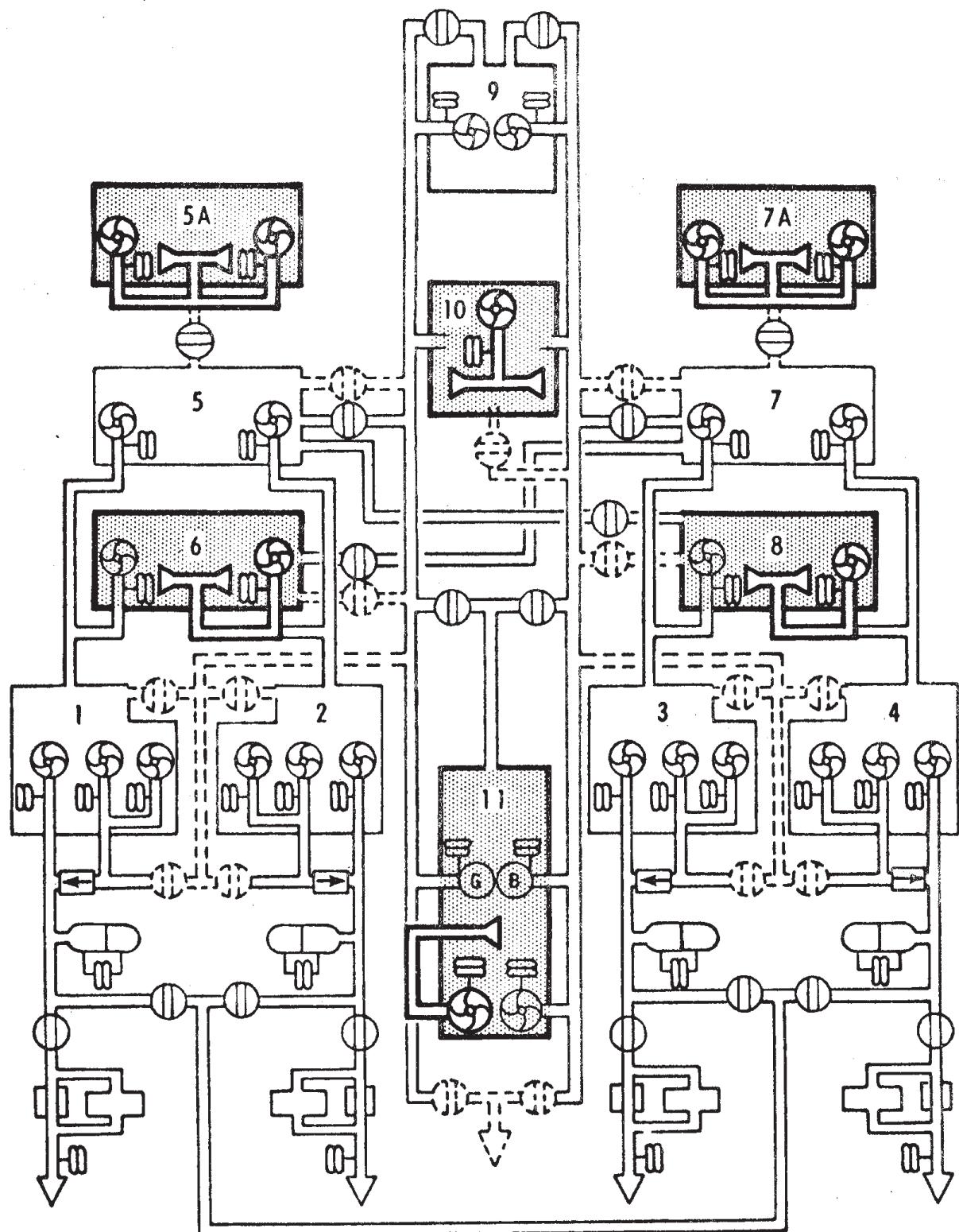
TJ

TANK JETTISON VALVE

JMV

JETTISON MASTER VALVE

DE-AERATION

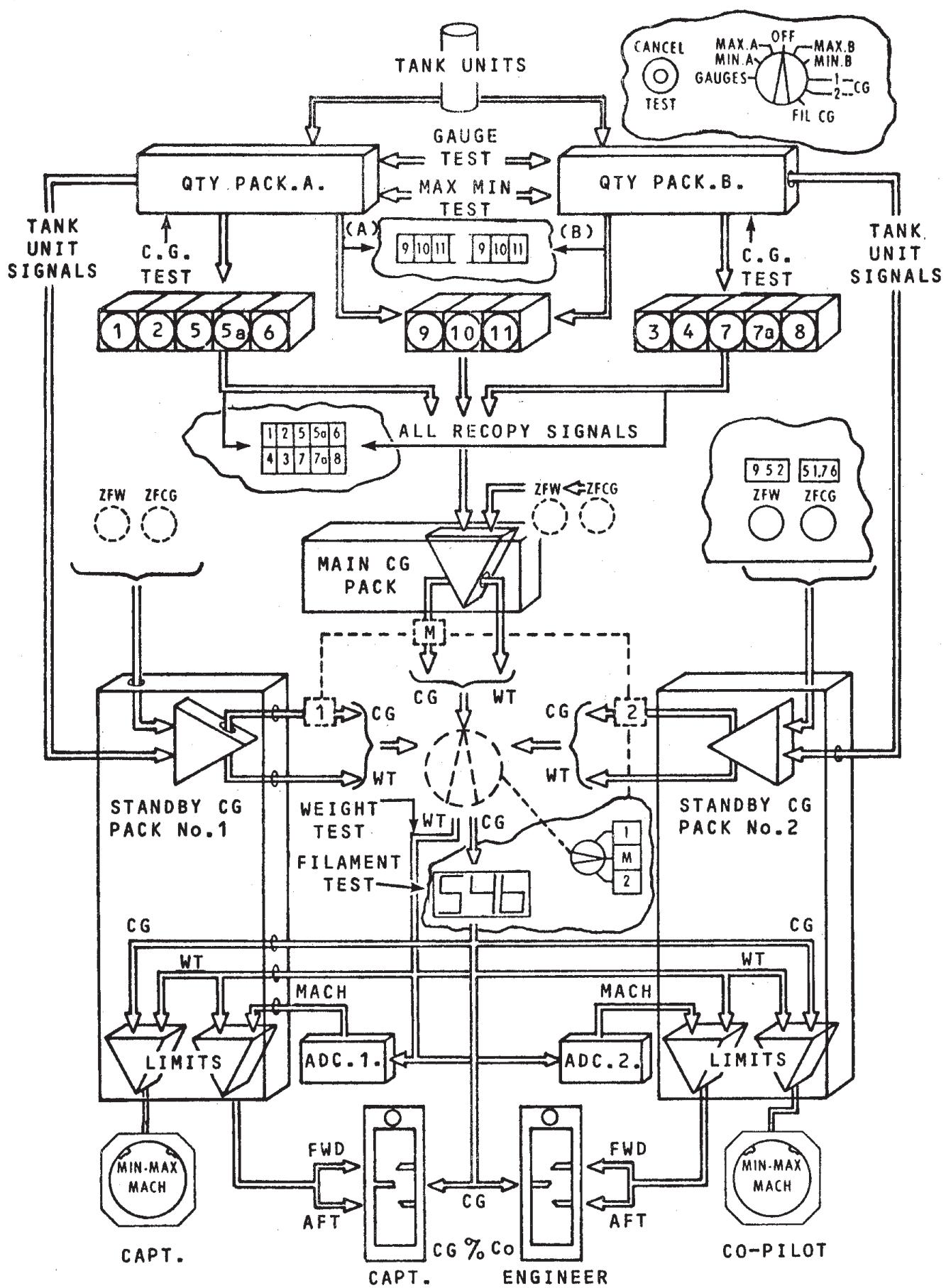


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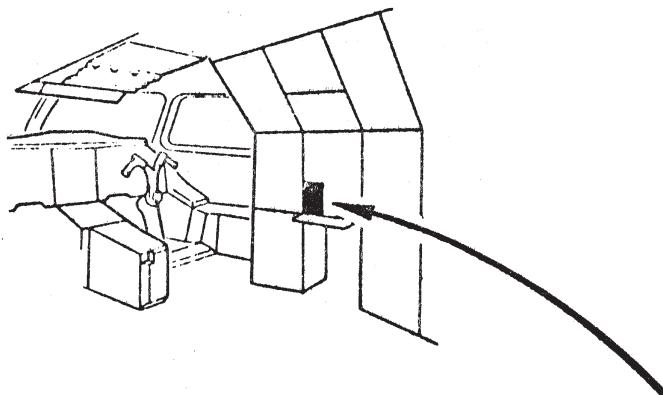
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CG INDICATION AND CG/MACH LIMITS SYSTEM



ENGINE FEED



PUMP LOW PRESS LIGHT
(Yellow) (12)

On - indicates a low pressure condition exists at the pump outlet.

LP VALVE SELECTOR (4)

OPEN - the LP valve is open except when the engine shut down handle is pulled in which case it is shut. Alternate SHUT positions enable selection of either motor.
SHUT 1 and SHUT 2 - select the LP valve to shut using the associated motor.

LP VALVE PEA LIGHT (White) (4)
For maintenance checks only



ACC LIGHT (Yellow) (4)

On - indicates either a low level fuel pressure downstream of the collector tank pumps or a low air pressure in the accumulator.

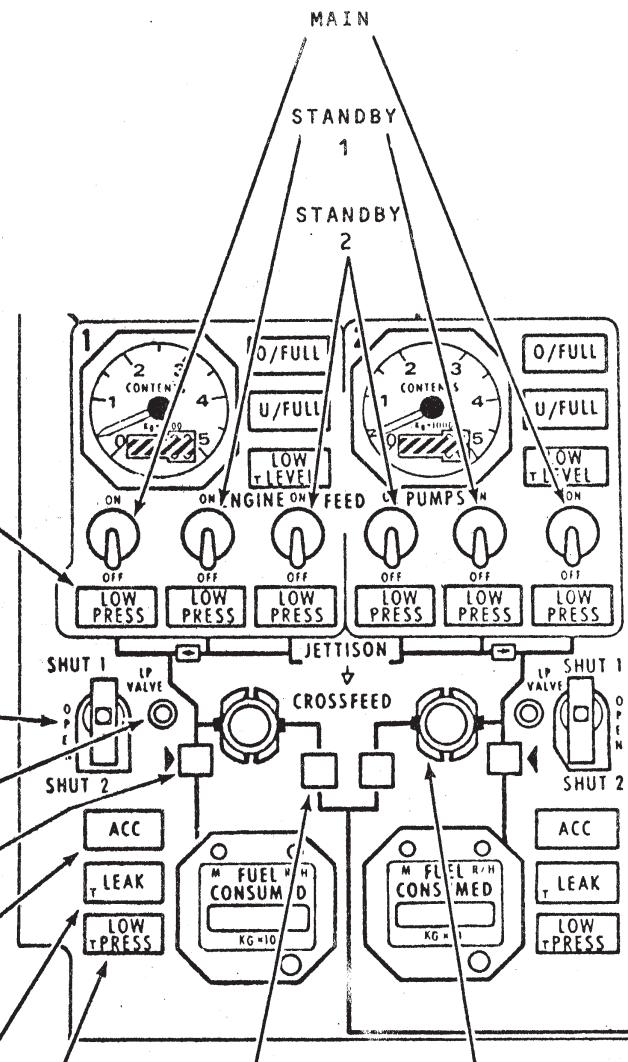
LEAK LIGHT (Red) (4)

Refer to Power Plant Chapter.

ENGINE INLET LOW PRESS LIGHT (Amber) (4)

On - indicates that a low pressure condition exists upstream of the engine pump.
Accompanied by a master warning system FUEL light (amber) and audio (gong).

ENGINE FEED PUMPS SWITCH (12)

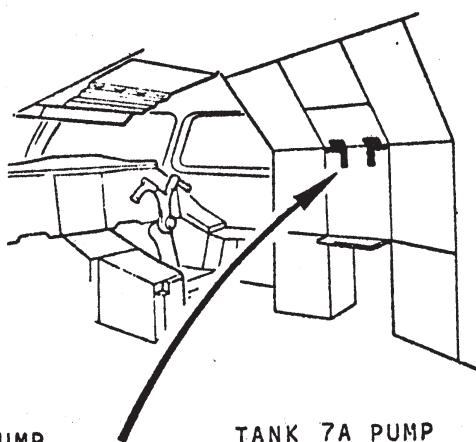


CROSSFEED MI (4)



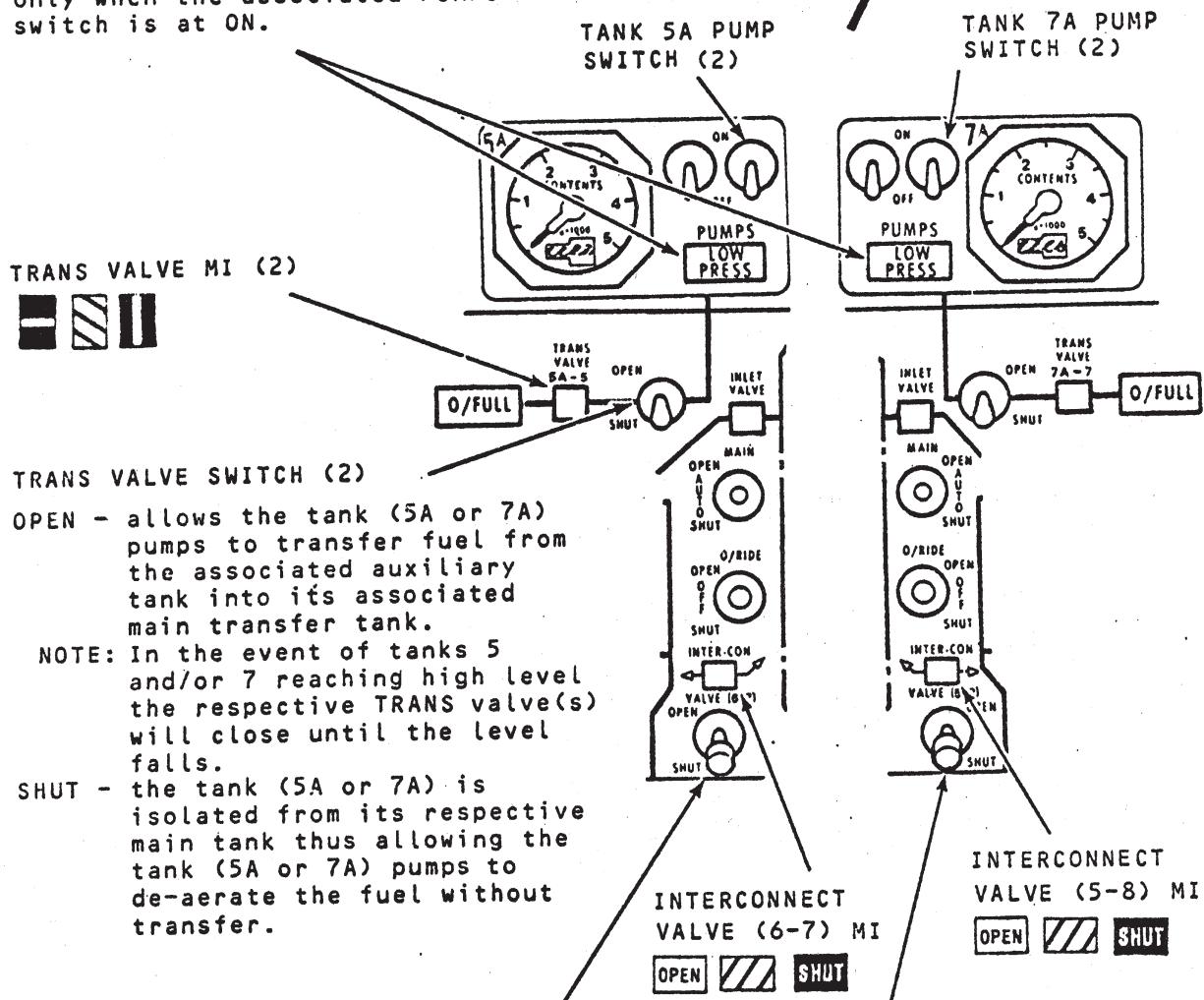
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MAIN TRANSFER (Sheet 1 of 2)



PUMP LOW PRESS LIGHT (Yellow)

On - indicates a low pressure condition at either pump outlet. Is armed for each pump outlet only when the associated PUMPS switch is at ON.



TRANS VALVE SWITCH (2)

OPEN - allows the tank (5A or 7A) pumps to transfer fuel from the associated auxiliary tank into its associated main transfer tank.

NOTE: In the event of tanks 5 and/or 7 reaching high level the respective TRANS valve(s) will close until the level falls.

SHUT - the tank (5A or 7A) is isolated from its respective main tank thus allowing the tank (5A or 7A) pumps to de-aerate the fuel without transfer.

INTERCONNECT VALVE (6-7)
SWITCH

OPEN - allows fuel to flow between tanks 6 and 7. The direction of flow depends only on the relative fuel levels.

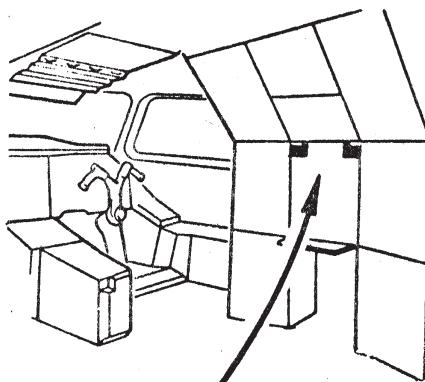
INTERCONNECT VALVE (5-8)
SWITCH

OPEN - allows fuel to flow between tanks 5 and 8. The direction of flow depends only on the relative fuel levels.

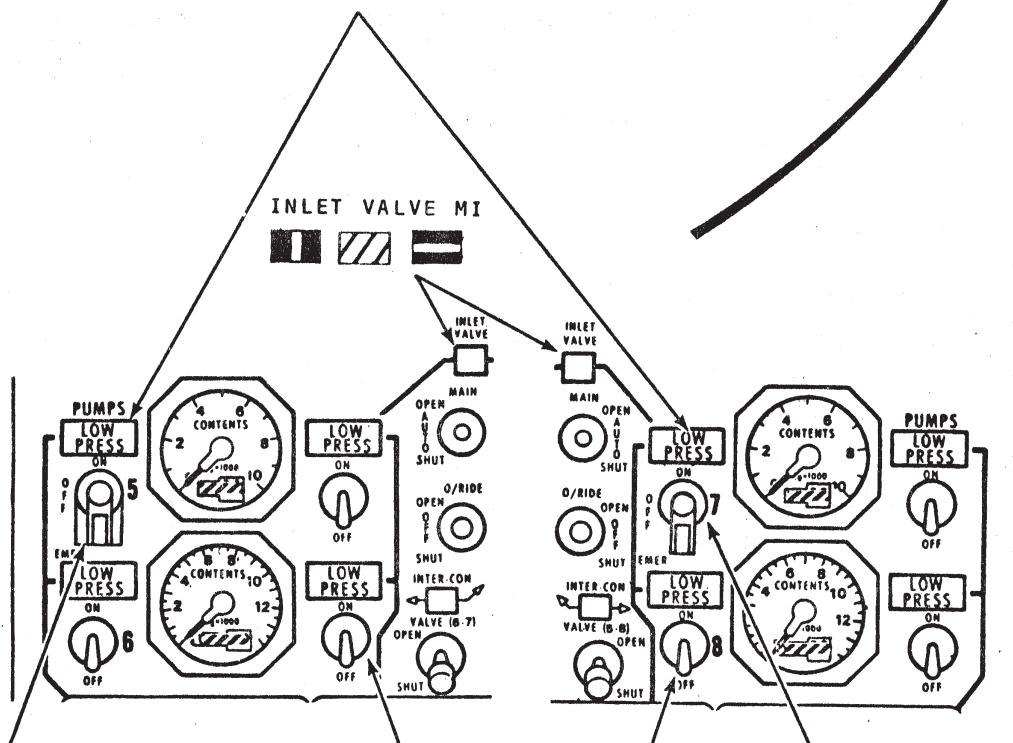
MAIN TRANSFER (Sheet 2 of 2)

MAIN TRANSFER TANK PUMP
LOW PRESS LIGHT (Yellow) (8)

On - indicates a low pressure condition at the pump outlet.
Is armed only when the pump switch/selector is at ON or EMER.



INLET VALVE MI



TANK 5 PUMP SELECTOR

Guarded to prevent inadvertent selection of EMER.
ON - transfers fuel from tank 5 to tank 1
EMER - the pump is powered from an essential busbar and the standby 1 engine feed pump of tank 2 is inhibited.

TANK 7 PUMP SELECTOR

Guarded to prevent inadvertent selection of EMER.
ON - transfers fuel from tank 7 to tank 3
EMER - the pump is powered from an essential busbar and the standby 1 engine feed pump of tank 4 is inhibited.

MAIN TRANSFER TANK PUMP SWITCH (6)

On	-	transfers fuel from tank 5 to tank 2					
"	"	"	"	7	"	"	4
"	"	"	"	6	"	"	1 via the LH pump
"	"	"	"	6	"	"	2 " " RH "
"	"	"	"	8	"	"	3 " " LH "
"	"	"	"	8	"	"	4 " " RH "

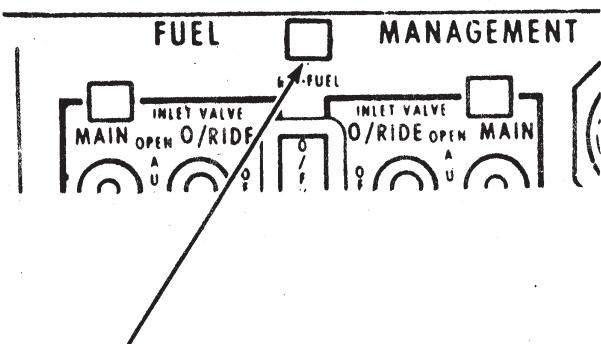
NOTE: When tank 6 and tank 8 right hand pumps are used for de-aeration no transfer occurs as tank 5 and tank 7 fuel is transferred preferentially.

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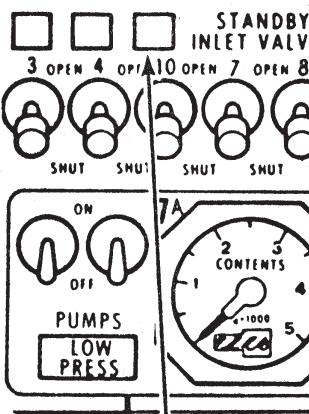
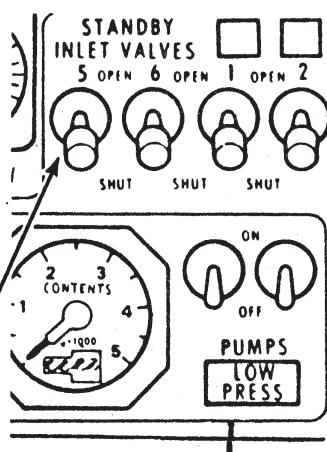
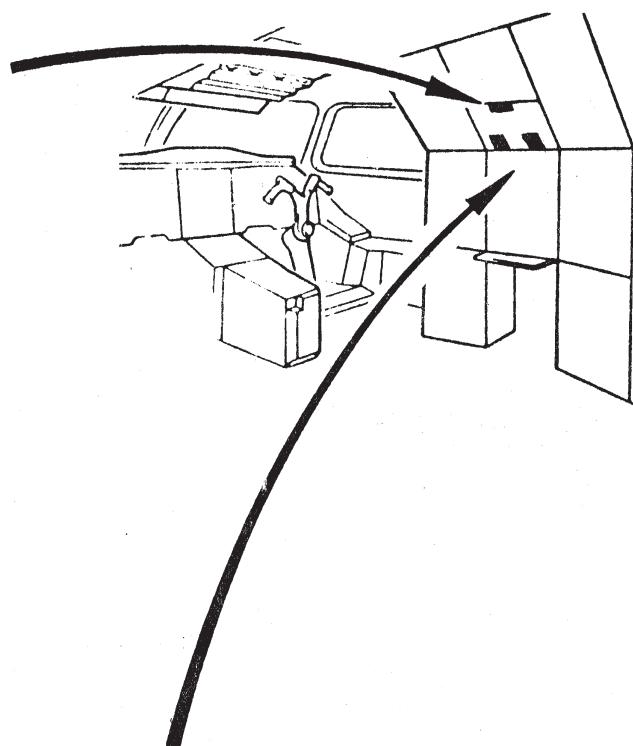
TRIM TRANSFER/REFUEL



REFUEL MI

GRD - indicates that the refuelling access panel is open and/or the REFUEL MASTER selector is not at OFF/DEFUEL

FLT - indicates that the REFUEL MASTER selector is set to OFF/DEFUEL and the refuelling access panel is closed thus isolating the refuel panel from the normal aircraft fuel system.



STANDBY INLET VALVES
SWITCH (9)

OPEN - allows fuel from the main trim transfer pipe to enter directly into the appropriate tank.

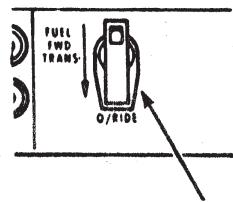
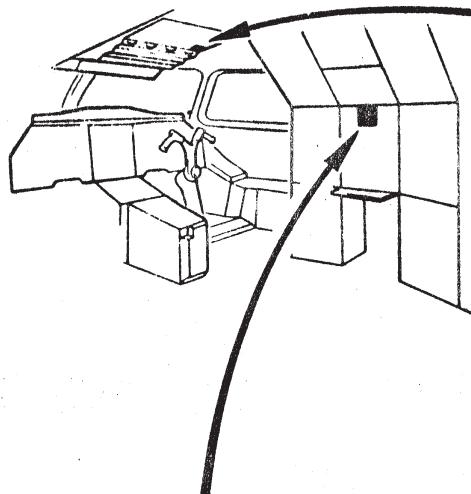
NOTE: During refuelling the standby inlet valves are used as refuelling valves and controlled by switches on the refuel panel.

STANDBY INLET VALVE MIs
(TANKS 1, 2, 3, 4 and 10)

OPEN // **SHUT**

These MIs are provided only for those STANDBY INLET VALVES 1, 2, 3, 4 and 10, that may be used in procedures that require monitoring of the valves.

TRIM TRANSFER (Sheet 1 of 3)



FUEL FORWARD TRANSFER SWITCH

The switch is only removed from its guarded position in an abnormal situation requiring an override of the automatic trim transfer system.

O/RIDE - initiates an automatic forward transfer sequence provided tank 11 pump selectors and tank 9, 5 and 7 inlet valve selectors are at AUTO, whatever the position of the TRIM TRANS AUTO MASTER selector.

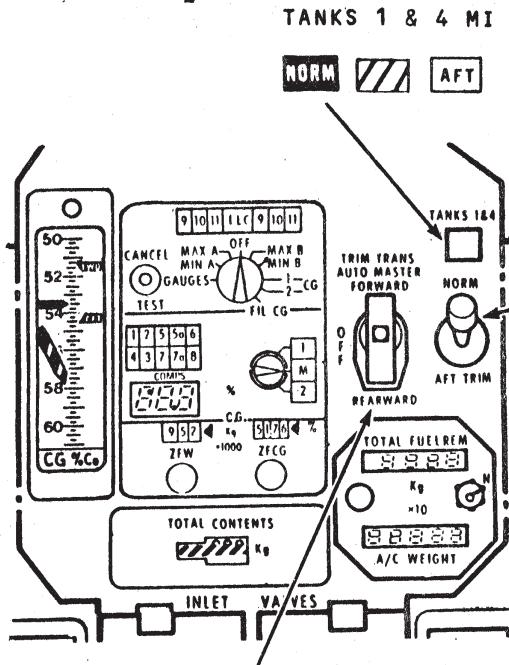
The sequence is:-

Tank 11 pumps on.

Tank 9 inlet valves open.

Then when tank 9 reaches high level.

Tank 9 inlet valves close and tanks 5 and 7 inlet valves open.



TANKS 1 AND 4 SWITCH

NORM - allows the main transfer control valves to maintain tanks 1 and 4 at nearly full level.

AFT TRIM - selects a reduced fuel level operation in tanks 1 and 4 and inhibits the underfull warning. The reduced operating level is 40% of the nominal volume.

TRIM TRANSFER AUTO MASTER SELECTOR

FORWARD - provided the associated inlet valve and pump selector are at AUTO, initiates an automatic forward transfer sequence.

The sequence is:-

Tank 11 pumps on and tank 9 inlet valves open then when tank 9 reaches the preset load limit or high level, tank 9 inlet valves close and tanks 5 and 7 inlet valves open.

Then when tank 11 preset load limit is reached, tank 11 pumps off and tanks 5 and 7 inlet valves close.

REARWARD - switches and latches off the de-aeration mode of tank 11 left-hand pump and provided the associated inlet valve and pump selector are at AUTO, initiates the automatic rearward transfer of fuel.

The sequence is:-

Tank 9 pumps on to pump fuel into the trim transfer pipes and tank 11 inlet valves open to allow the fuel into tank 11.

Then when tank 11 reaches the preset load limit or high level, tank 11 inlet valves close and tank 5 and 7 inlet valves open to allow fuel into tanks 5 and 7 provided their contents are below high level.

Then when tank 9 is empty and its LOW PRESS lights (yellow) come on.

Tank 10 pumps on.

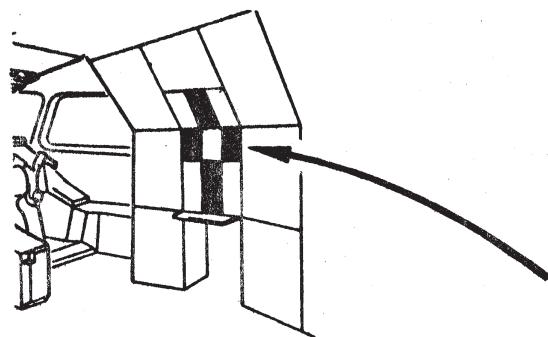
Then when tanks 9 and 10 preset load limit is reached tanks 9 and 10 pumps off and tanks 5 and 7 inlet valves close.

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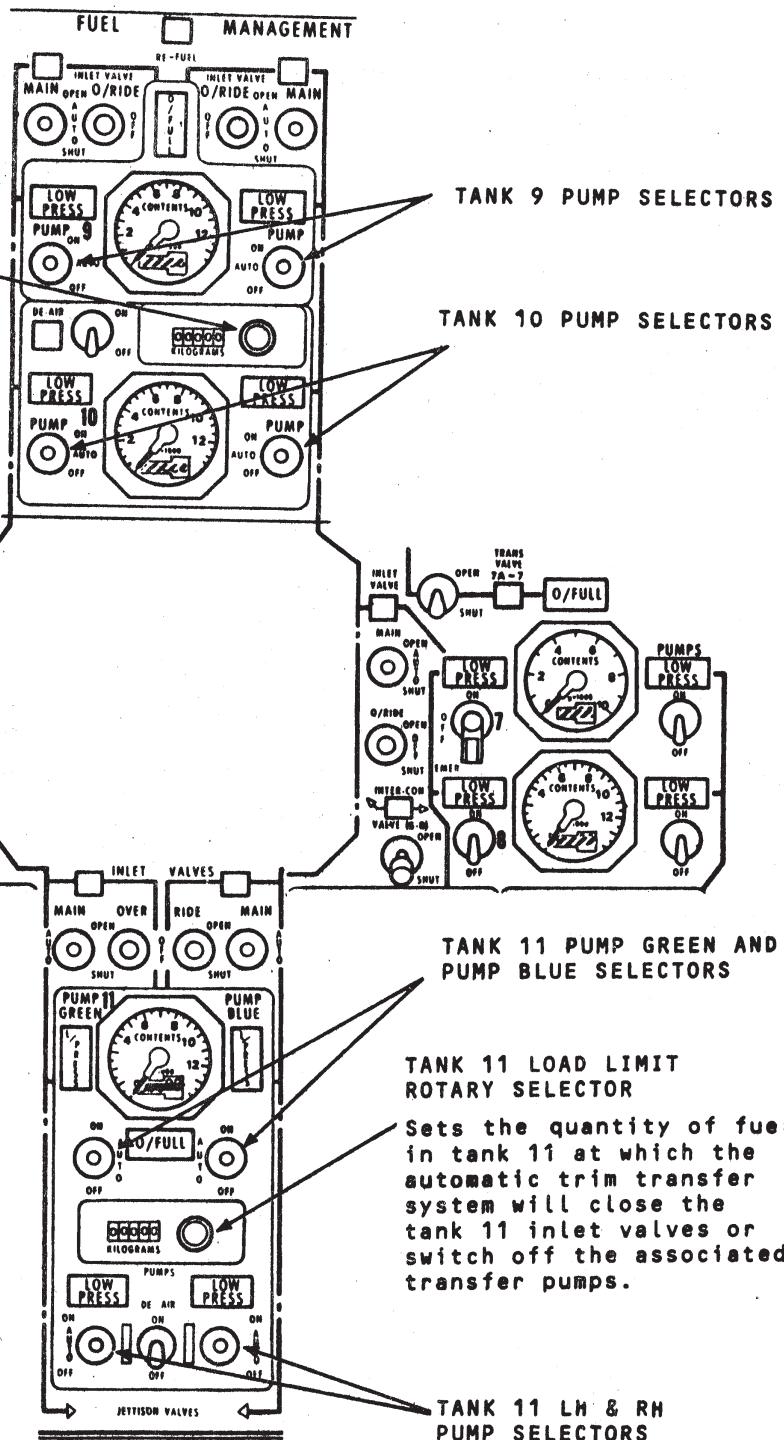
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TRIM TRANSFER (Sheet 2 of 3)



TANK 9 AND 10 LOAD LIMIT ROTARY SELECTOR

Sets the combined quantity of fuel in tanks 9 & 10 at which the automatic trim transfer system will close the tank 9 inlet valves or switch off the associated transfer pumps.



TANKS 9, 10 AND 11 PUMP SELECTORS

ON - removes the pump from the auto control system and selects it to run.
AUTO - each pump is under the control of the TRIM TRANS AUTO MASTER selector, the load limit control system and the FUEL FWD TRANS switch.
OFF - removes the pump from the auto control system and selects it off.

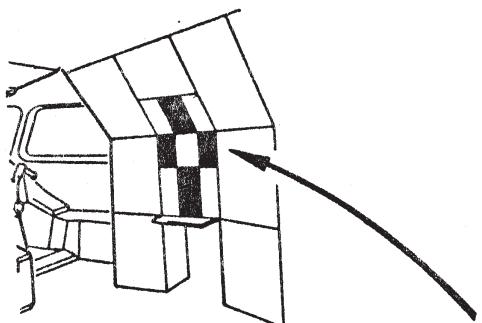
TANK 11 PUMP GREEN AND PUMP BLUE SELECTORS

TANK 11 LOAD LIMIT ROTARY SELECTOR

Sets the quantity of fuel in tank 11 at which the automatic trim transfer system will close the tank 11 inlet valves or switch off the associated transfer pumps.

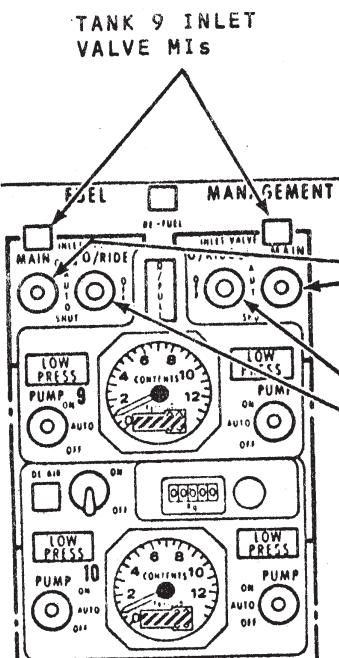
TANK 11 LH & RH PUMP SELECTORS

TRIM TRANSFER (Sheet 3 of 3)



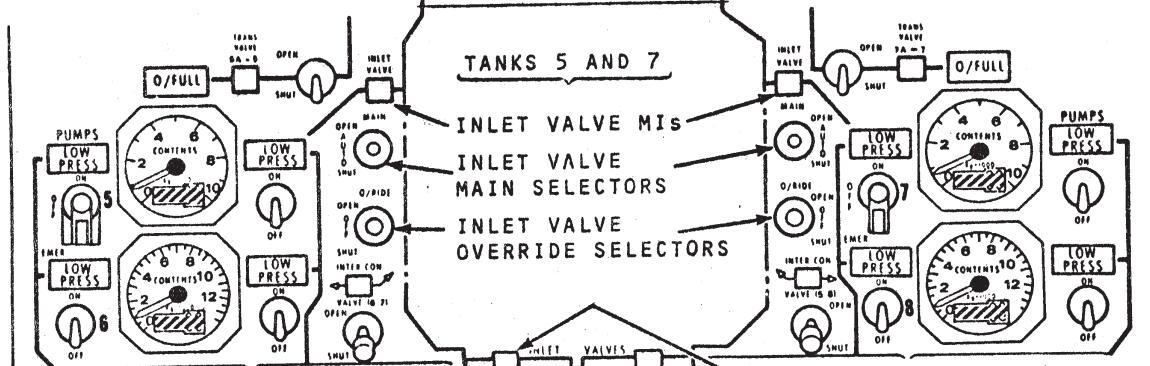
TANKS 5, 7, 9 AND 11
INLET VALVES

Each trim transfer inlet valve has two motors, one controlled by the MAIN selector and the other by the O/RIDE selector.



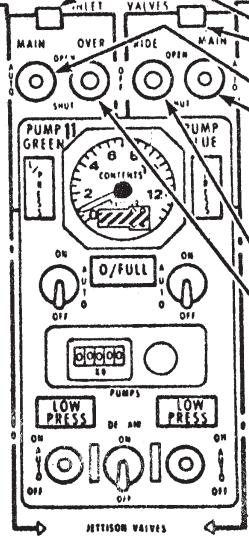
TANK 9 INLET VALVE
MAIN SELECTORS

TANK 9 INLET VALVE
OVERRIDE SELECTORS



TANKS 5 AND 7

INLET VALVE MIS
INLET VALVE
MAIN SELECTORS
INLET VALVE
OVERRIDE SELECTORS



TANK 11 INLET
VALVE MIS

TANK 11 INLET VALVE
MAIN SELECTORS

During refuelling the tank 11 left hand inlet valve is used as a refuelling valve and controlled by a switch on the refuel panel.

TANK 11 INLET VALVE
OVERRIDE SELECTORS

INLET VALVE MIS



INLET VALVE O/RIDE SELECTOR

- OPEN - overrides any selection of the MAIN selector and opens the valve.
- OFF - places the inlet valve under the control of the MAIN selector.
- SHUT - overrides any selection of the MAIN selector and shuts the valve.

INLET VALVE MAIN SELECTOR

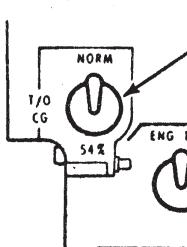
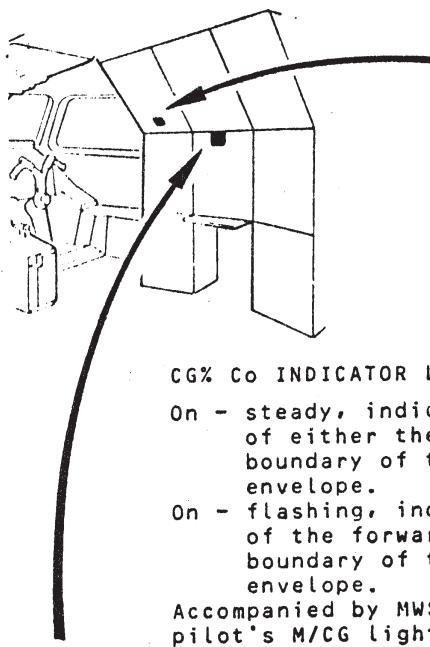
- OPEN - removes the valve from the automatic control system and opens it.
- AUTO - places the inlet valve under the control of the TRIM TRANS AUTO MASTER selector, the load limit control system and the FUEL FWD TRANS switch.
- SHUT - removes the valve from the automatic control system and shuts it.

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QUANTITY AND LEVEL (Sheet 1 of 4)



T/O CG SWITCH

- NORM - the take-off aft CG boundary used by the M/CG warnings is 53.5%
54% - the take-off aft CG boundary used by the M/CG warnings is 54.0%

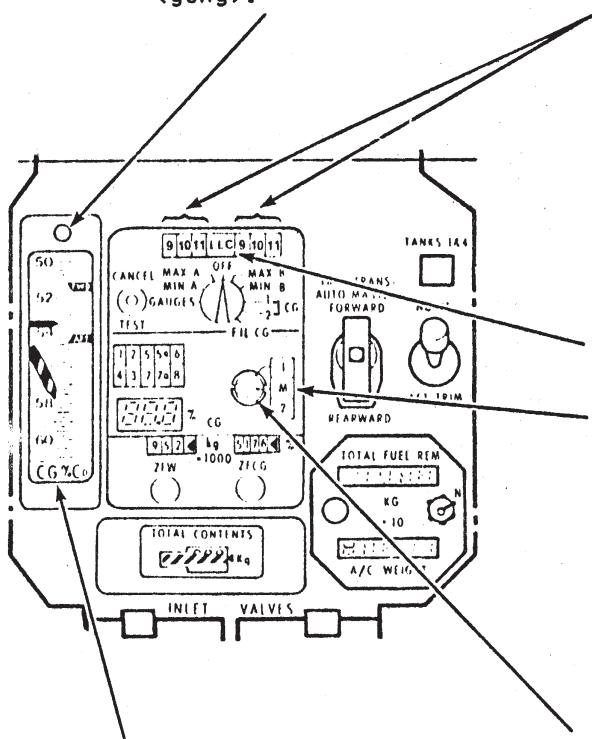
NOTE

The switch is latched at 54% but will automatically unlatch and return to NORM when the tank 9 or 10 pumps come on for rearward fuel transfer.

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CG% Co INDICATOR LIGHT (Red)

- On - steady, indicates infringement of either the forward or aft boundary of the defined flight envelope.
On - flashing, indicates infringement of the forward or aft extreme boundary of the defined flight envelope.
Accompanied by MWS M/CG light (red), pilot's M/CG lights (red) and audio (gong).



9, 10, 11 LIGHTS (Yellow)

- On - indicates that the failure detector has detected a failure in one of the tanks pair of gauging channels and has disconnected it from the FQI drive.

LLC LIGHT (Yellow)

- On - indicates a disparity between the signal from two load limit control channels.

CG CHANNEL LIGHT (Amber) (3)

- On indicates a failure of the channel. If the selected channel fails the light is accompanied by a c.g. flag on the machmeters, a failure flag on the c.g. indicators, the MWS CG light (amber) and audio (gong).

CG CHANNEL ROTARY SELECTOR

- M - selects the main computer for CG system. The main channel uses inputs of ZFW, ZFCG and all (13) FQIs.
1 - selects standby computer 1 for the CG system.
The standby 1 channel uses inputs of ZFW, ZFCG and FQIs for tanks 1, 2, 5, 5A and 6 plus A channel in tanks 9, 10 and 11.
2 - selects standby computer 2 for the CG system.
The standby 2 channel uses inputs of ZFW, ZFCG and FQIs for tanks 3, 4, 7, 7A and 8 plus B channel in tanks 9, 10 and 11.

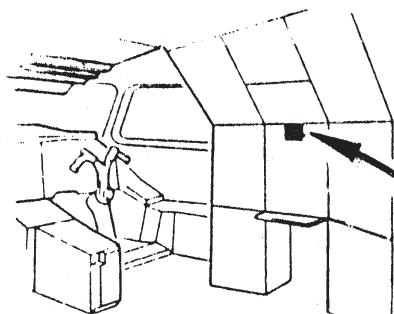
CG% Co INDICATOR (Repeated on Captain's instrument panel).

The CG limit bugs are orange pointers labelled FWD and AFT on the right-hand side of the instrument.

The red and black diagonal striped flag appears across the middle of the scale to indicate a servo imbalance, bugs jammed, loss of power supply and loss of validity signal to the CG pointer.

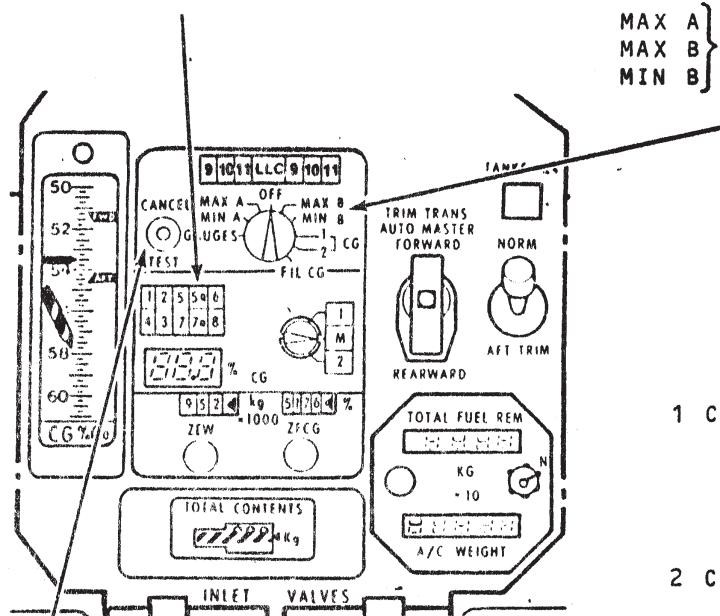
QUANTITY AND LEVEL (Sheet 2 of 4)

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COMPARATOR LIGHT (Yellow) (10)

On - indicates that one channel of the pair has been disconnected by the comparator because of a gauging channel failure and that the signal from the remaining tank of the pair is being used for CG computation.



FQI TEST SWITCH

CANCEL - cancels the test and resets the comparator; also resets the comparator and cancels the comparator warning provided that the difference in the two tanks contents is within the dead band i.e.

Tanks 5A/7A = 375 Kg
 Tanks 5/7 = 2000 Kg
 Tanks 6/8 = 2700 Kg
 Tanks 1,2,3,4 = 750 Kg

TEST - Refer to FQI TEST ROTARY SELECTOR.

The selector is spring returned to the mid position.

(Unchanged)

FQI TEST ROTARY SELECTOR

GAUGES - with TEST selected, signals preset quantity increases to all FQIs. The result of this apparent weight increase and 1% aft CG shift are indicated on, and test all aircraft fuel quantity and CG indications. At the same time the resultant incompatibility between CG and Mach number, tests the MACH/CG warnings, the CG% Co warnings and their connection to the MWS.

MIN A - with TEST selected, simulates a fault in the tanks 9, 10, 11 FQI pointer drive thus testing the fault detection. The test is latched until CANCEL is selected.

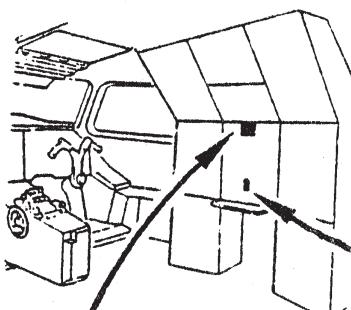
MAX A }
 MAX B }
 MIN B } - MIN and MAX refer to the two independent comparator circuits that sense FQI failures downwards and upwards from the correct reading. A and B refer to the duplicated FQI channels of tanks 9, 10, and 11 provided to give adequate reliability to the automatic transfer system.

1 CG - with TEST selected, tests the CG computer by causing the 1 CG to go in excess of 1% rearward thereby testing the 1-M-2 comparator.

2 CG - with TEST selected, tests the CG computer by causing the 2 CG to go in excess of 1% rearward, thereby testing the 1-M-2 comparator

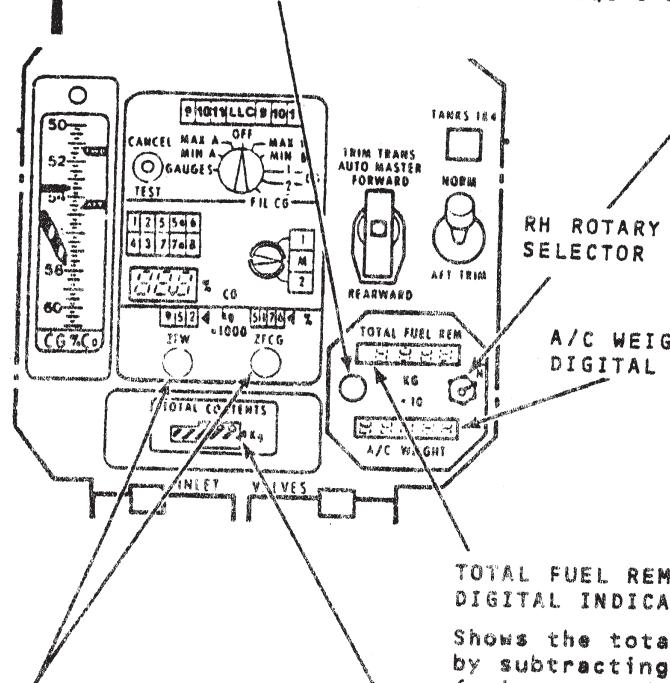
FIL - with TEST selected, tests the filaments of the CG digital display.

QUANTITY AND LEVEL (Sheet 3 of 4)



LH KNOB

Pulling and releasing with RH rotary selector at any position other than "N" zeroes the TOTAL FUEL REM indicator. Pressing and holding - with the RH rotary selector at "N" tests the digital indicators which will all read 8's.



ZFW and ZFCG SETTING KNOBS

Pull to operate.
Turn clockwise to increase digital readings.
Turn counter-clockwise to decrease digital readings.

TOTAL CONTENTS INDICATOR

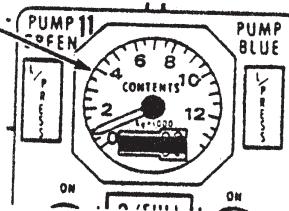
(Repeated on Pilot's centre instrument panel). Shows the total fuel on board by summing the individual FQI readings. A flag across the digital readout indicates either:
A loss of electrical power to instrument,
A jamming of the counters,
or that the contents of two collector tanks indicate less than 1000 kg. each.

NOTE: THE TOTAL CONTENTS indicator should not normally be used as a primary source of information, except as required by the FUEL JETTISON procedure, or in the case of flowmeter failure.

FUEL QUANTITY INDICATOR
(TRIM TANKS 9, 10 and 11)

Black bar obscures the digital counter when there is a digital indication failure.

NOTE: During refuelling the supply to the digital indicator motors of the tanks 9, 10 and 11 FQI is transferred to the refuel panel FQI.



TOTAL FUEL REM AND A/C WEIGHT ROTARY SELECTOR

N - normal position, this rotary selector must be set to "N" in normal use; ie, after insertion of new values, otherwise the A/C WEIGHT and TOTAL FUEL REM will not operate. The A/C WEIGHT indicator displays five digits, one digit at a time starting with the least significant figure. One digit at a time is selected by rotating the rotary selector counter-clockwise from "N" to the first dot and so on to the fifth dot. At each position the digit number is changed by pressing the left hand knob. Each press increases the digit value by one.

The setting procedure for the TOTAL FUEL REM indicator is the same as that for A/C WEIGHT, and as the numbers are set in the TOTAL FUEL REM indicator, they will be added to the A/C WEIGHT indication.

OTHER POSITIONS

RH ROTARY SELECTOR
A/C WEIGHT DIGITAL INDICATOR

TOTAL FUEL REM DIGITAL INDICATOR

Shows the total fuel by subtracting the fuel consumed readings from the datum settings

TOTAL CONTENTS INDICATOR

(Repeated on Pilot's centre instrument panel). Shows the total fuel on board by summing the individual FQI readings.

A flag across the digital readout indicates either:

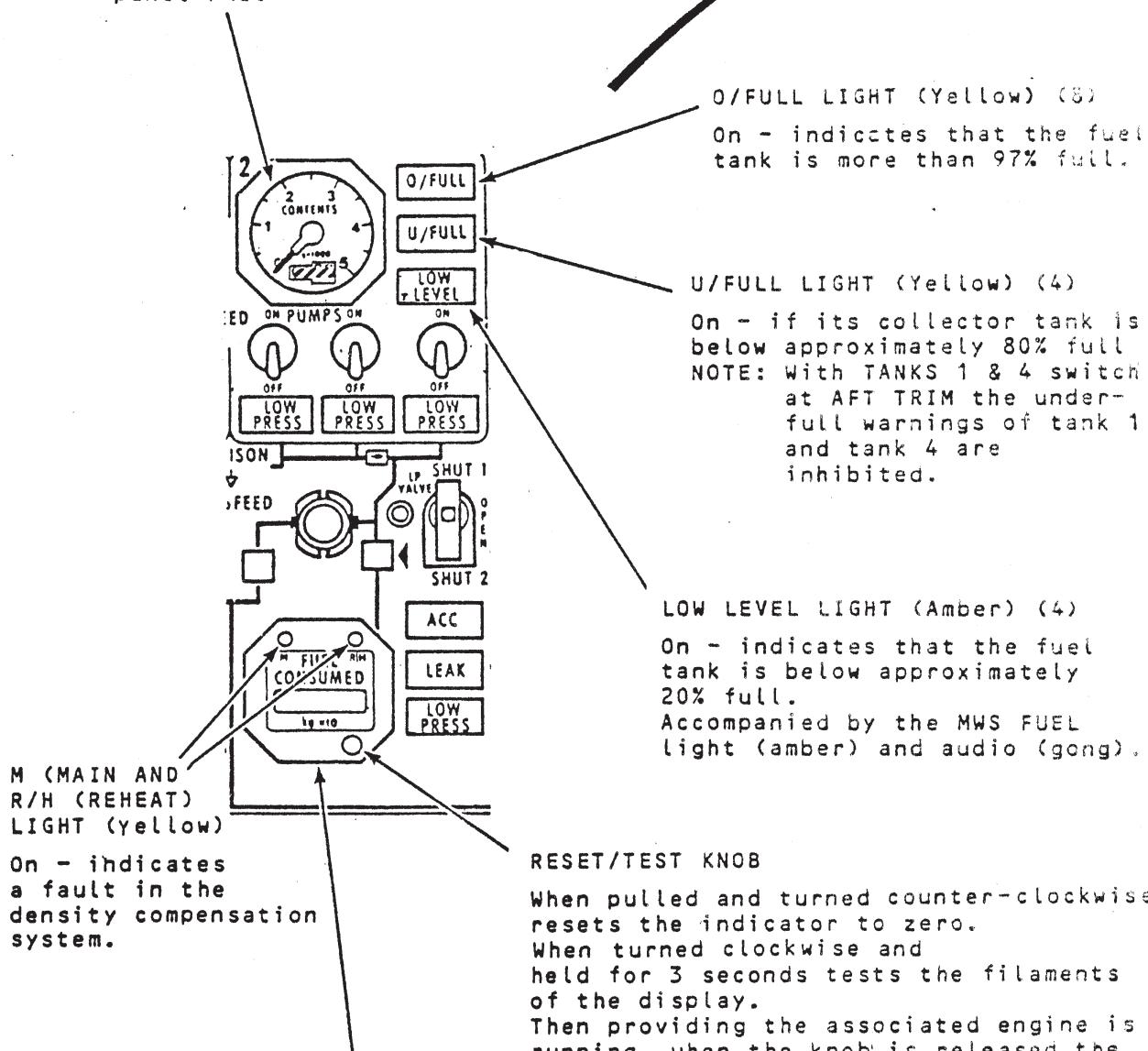
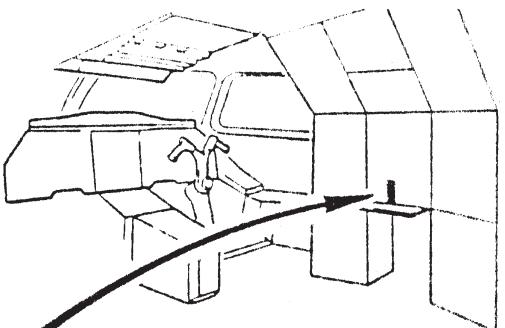
A loss of electrical power to instrument,
A jamming of the counters,
or that the contents of two collector tanks indicate less than 1000 kg. each.

QUANTITY AND LEVEL (Sheet 4 of 4)

FUEL QUANTITY INDICATOR
(FOR TANKS 1 to 8, 5A and 7A (10))

Red and black diagonal striped bar across digital indicators indicates FQI failure.

NOTE : During refuelling the signals from the fuel quantity packs of tanks 1 to 8, 5A and 7A FQI are transferred to the fuel panel FQI.



FUEL CONSUMED INDICATOR (4)

Shows the fuel consumed by the engine integrated from its flow meter.

When pulled and turned counter-clockwise resets the indicator to zero.
When turned clockwise and held for 3 seconds tests the filaments of the display.
Then providing the associated engine is running, when the knob is released the M light (yellow) and R/H light (yellow) illuminate for 3 seconds, to indicate that the density compensation system of the associated fuel flow transmitter is operative. This confirms the integrity of the density compensation and hence the accuracy of the fuel flow signals to the power management lights and reheat control systems.

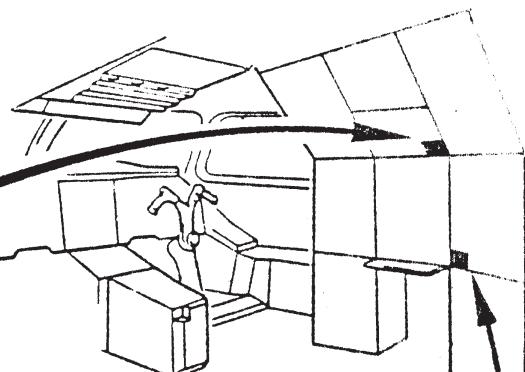
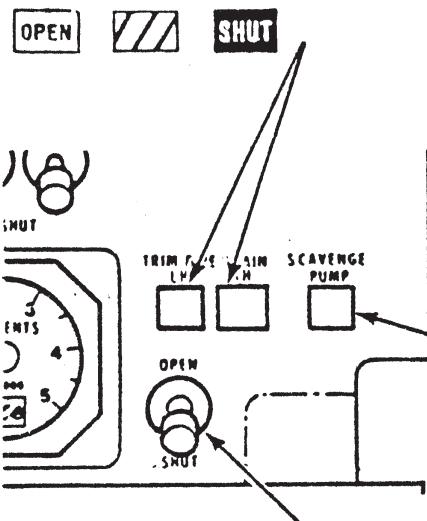
11.03.12
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CONCORDE FLYING MANUAL
FUEL SYSTEM

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SCAVENGE AND TANK PRESSURE

TRIM PIPE DRAIN VALVE MIS



SCAVENGE PUMP MI

OFF

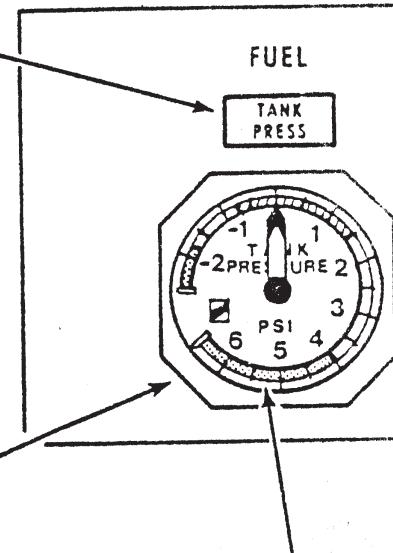
TRIM PIPE DRAIN SWITCH

OPEN - both trim pipe drain valves connect the main trim transfer pipes to the vent scavenging tank.

ON - indicates the pump is running. The scavenge pump removes any fuel that has entered the scavenge tank from the main tanks, through the vent system, and returns it to tank 3. Operation of the pump is automatic.

TANK PRESS LIGHT (Amber)

On - indicates one of three conditions:
The fuel vent gallery to atmosphere differential pressure is high and rising, or low and falling, or the vent gallery absolute pressure is below 2 psi at altitude.
Accompanied by the master warning FUEL light (amber) and audio (gong).



TANK PRESSURE GAUGE

Shows the pressure differential between the pressure in the right-hand vent gallery and static pressure. A red and black flag in a window on the left-hand side of the gauge indicates a power loss or indication failure. Two red secondary pointers remain at the maximum and minimum pressure difference attained during operation. The secondary pointers are reset using the ENG LIMIT RESET push button.

KEY:-

	AMBER
	GREEN
	YELLOW

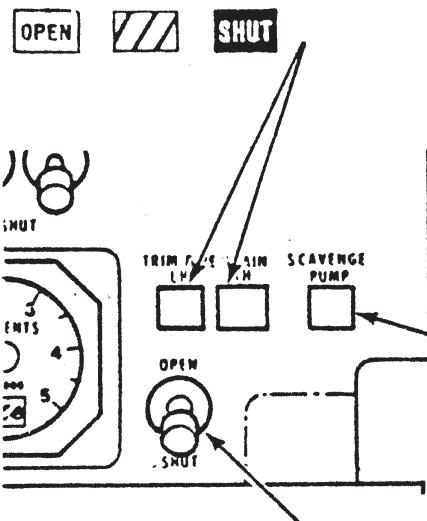
11.03.12
1 DEC.76

CONCORDE FLYING MANUAL
FUEL SYSTEM

British airways
OVERSEAS DIVISION

SCAVENGE AND TANK PRESSURE

TRIM PIPE DRAIN VALVE MIS



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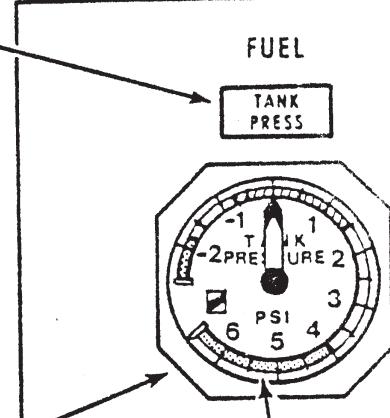
SCAVENGE PUMP MI

OFF

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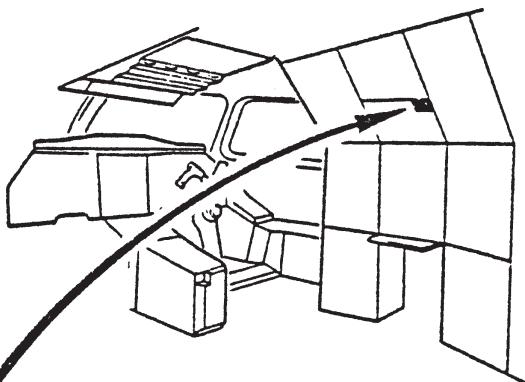
KEY:-

	AMBER
	GREEN
	YELLOW

JETTISON AND TEMPERATURE

COLLECTOR TANKS 1, 2, 3 and 4
JETTISON VALVE SWITCHES

OPEN - the collector tank jettison valves allow fuel to flow from the collector tanks into the trim transfer pipes. However, when the JETTISON MASTER VALVES are open the collector tank jettison valves will be signalled to close if the level falls to underfull.

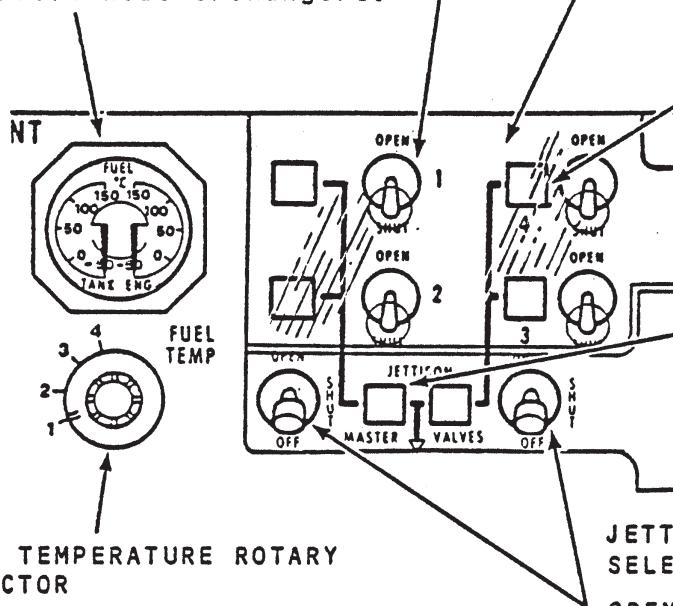


FUEL TEMPERATURE INDICATOR

Shows the temperature of the fuel in the selected engine feed system.

TANK - refers to upstream of airconditioning and hydraulic heat exchangers.

ENG - refers to downstream of the airconditioning and hydraulic heat exchangers.



FUEL TEMPERATURE ROTARY SELECTOR

Selects the fuel feed system to be observed by the temperature indicator. The numbered positions refer to the selected engine.

TRANSPARENT COVERS

The jettison panel transparent covers can only be closed when the collector tank jettison valve switches are at SHUT and the JETTISON MASTER VALVES switches are at OFF.

TANKS 1, 2, 3 and 4
JETTISON VALVE MIS.

JETTISON MASTER VALVES MI(2)



JETTISON MASTER VALVE SELECTOR

OPEN - opens the jettison master valves to allow fuel to flow overboard from the trim pipes at the tailcone.

SHUT - shuts the jettison master valves.

OFF - the jettison master valves are electrically isolated. If the selector is set to OFF before the valve is shut the valve will shut before the electric supply is isolated.

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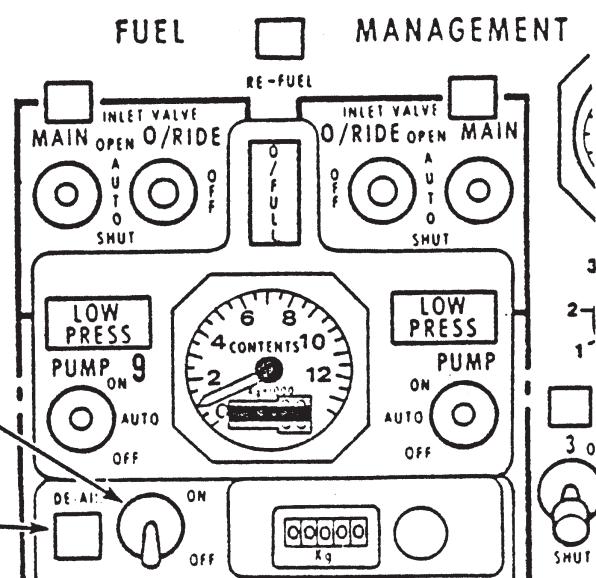
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DE-AERATION AND LP PROTECTION

TANK 10 DE-AIR PUMP SWITCH

ON - the DE-AIR pump circulates fuel through spray nozzles in the tank thus ensuring de-aeration of the fuel.

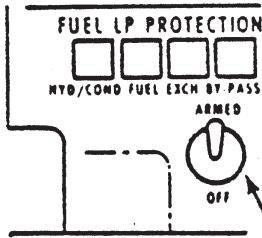


TANK 10 DE-AIR PUMP MI

ON OFF

FUEL LP PROTECTION MI

OPEN

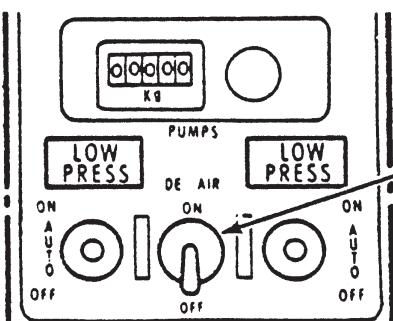


FUEL LP PROTECTION SWITCH

ARMED - in the event of low fuel pressure in the engine feed supply, the by-pass valves will open and cause the fuel supply to the engine to bypass the air conditioning and the hydraulic heat exchangers.

TANK 11 DE-AIR SWITCH (4)

The switch controls tank 11 left-hand electrical pump for de-aeration.



NOTE : With the left hand PUMPS selector at AUTO this switch is inhibited when the TRIM TRANS AUTO MASTER selector is set to REARWARD.

Chapter 12

**HYDRAULIC
POWER**

HYDRAULIC POWER

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Distribution	12.02.01
System Schematic	12.02.02
Ground Power	12.02.03
Ram Air Turbine	12.02.04
Reservoir Pressurization	12.02.05
Hydraulic Management Panel	12.02.06
Controls and Indicators	
Hydraulic Management Panel (Sheet 1 of 3)	12.03.01
Hydraulic Management Panel (Sheet 2 of 3)	12.03.02
Hydraulic Management Panel (Sheet 3 of 3)	12.03.03
Ground Hydraulic Check Out Panel	12.03.04
Ram Air Turbine	12.03.05

GENERAL

Hydraulic power is provided by three independent systems. There are two main systems called Green and Blue and a standby system called Yellow. Each of these systems is powered by two engine-driven pumps.

Emergency power is provided by a ram air turbine.

DESCRIPTIONNormal and Standby

Normal and standby generation is provided by six engine-driven pumps. The two Green system pumps are driven by engines 1 and 2, the two Blue system pumps by engines 3 and 4 and the two Yellow system pumps by engines 2 and 4.

Normal pressure of the three hydraulic systems is 4000 psi and in case of overpressure a pressure limiter allows a maximum pressure of 4500 psi.

To prevent cavitation of the engine-driven hydraulic pumps the three reservoirs must be pressurized.

An auxiliary air compressor is provided to ensure that the three reservoirs are pressurized before engine start.

Emergency

Emergency generation is provided by a ram air turbine (RAT). The RAT is a two-bladed propellor which provides power to drive two hydraulic pumps in the event of the engine windmilling speed being insufficient to provide hydraulic and electrical power at subsonic speeds following a four-engine flame out.

Ground

Ground generation is provided by two electric pumps that can be selected to pressurize the main and standby systems while the aircraft is on the ground. The maximum delivery pressure and flow of the electrical pumps is less than that of the engine-driven pumps.

Green Hydraulic System

This system supplies power for normal operation of the following services:-

- Engines 1 and 2 air intake ramps and spill doors
- One ram of each power flight control
- One ram of each relay jack
- Artificial feel
- One tank 11 fuel pump
- Droop nose and visor
- Landing gear
- Main wheel brakes with anti-skid
- Nosewheel steering

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24 MAY 79

CONCORDE FLYING MANUAL
HYDRAULIC POWER



The Green system also supplies the Emergency Generator hydraulic motor.

Blue Hydraulic System

This system supplies power for normal operation of the following services:-

Engine 3 and 4 air intake ramps and spill doors
One ram of each power flight control
One ram of each relay jack
Artificial feel
One tank 11 fuel pump

Yellow Hydraulic System

This system supplies power for standby operation of the following services:-

Engine 1,2,3 and 4 air intake ramps and spill doors
Flight controls
Droop nose and visor lowering
Landing gear lowering
Main wheel brakes with anti-skid
Emergency and parking brakes without anti-skid
Nosewheel steering

Automatic Protection Following System Failure

In the event of low pressure or a tank low level in Green or Blue systems, a detection system automatically onloads the yellow system engine driven pumps and changes the hydraulic power supply for the appropriate ramp and spill door actuators from Blue or Green system to Yellow.

In the event of a low level in the Yellow system reservoir, the first low level detection automatically inhibits the Yellow supply to:

- (a) Nosewheel steering.
- (b) Flying Controls.
- (c) In the case of a Yellow/Green selection the Yellow supply to main wheel brakes with anti-skid is cut off.

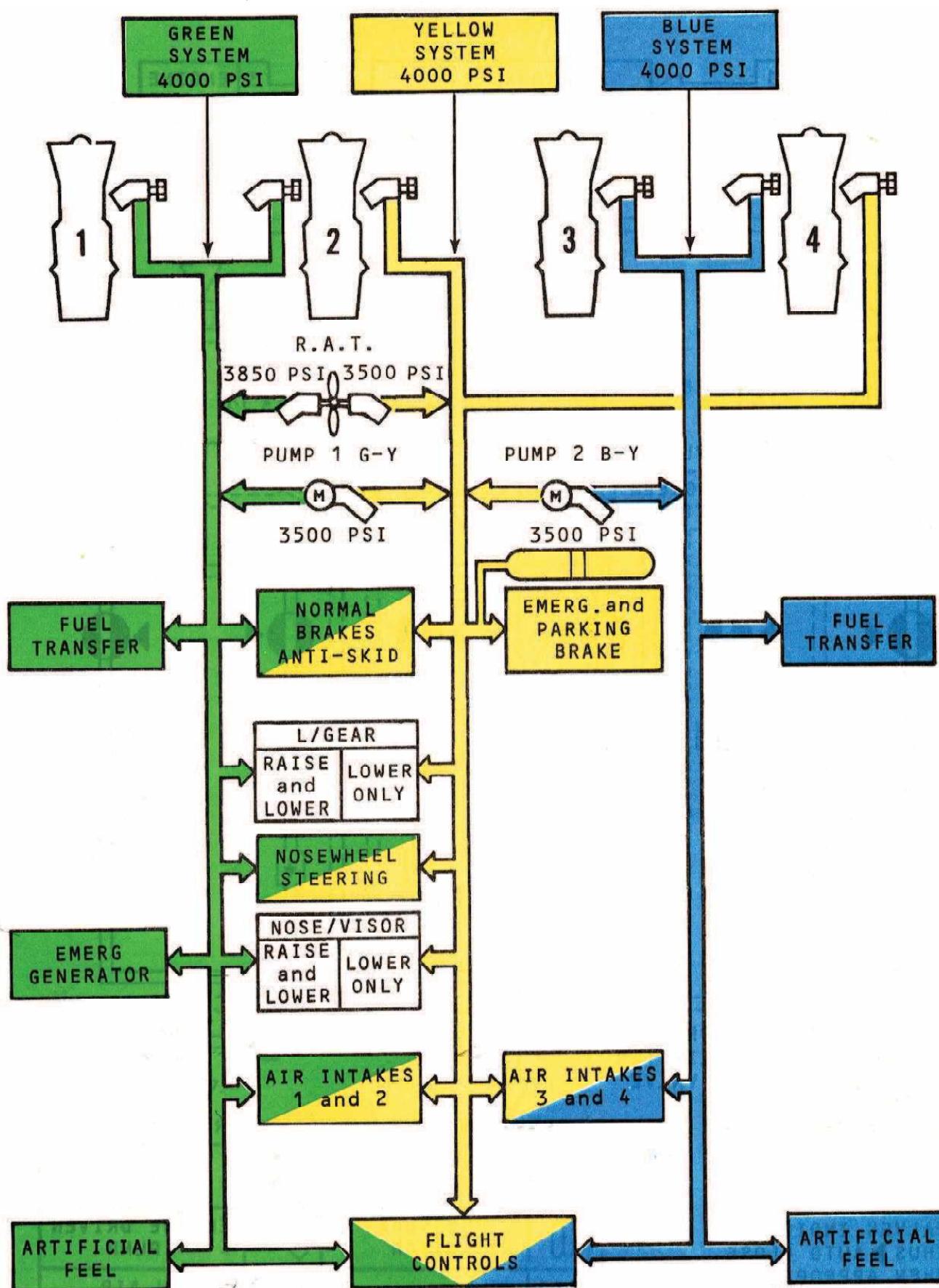
At a second low level, the Yellow supply to the intake spill doors is cut off but this is overridden during manual inching on Yellow.

If a first low level cut off of the selected yellow supply to flying controls occurs and a low pressure exists in the other side of flying controls, there is an automatic change of yellow supply to power the second failed flying control system.

If a GREEN ONLY or BLUE ONLY selection by the PFCU servo selector has been made and low pressure occurs in the selected system there is an automatic change to power the selected system with yellow system.

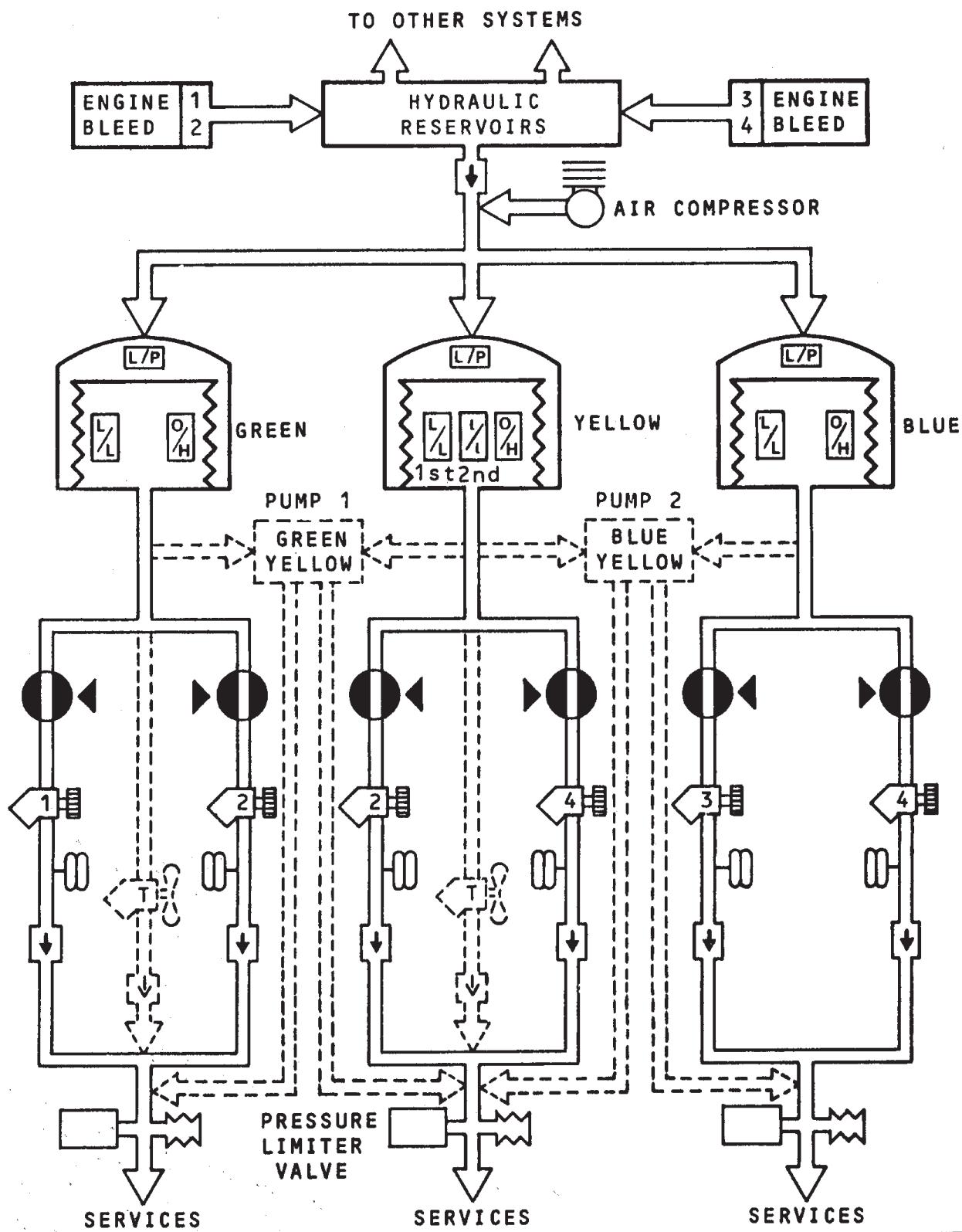
If the flying controls are being powered by a single main hydraulic system after yellow tanks low level cut-off, and transfer of fluid from the operating system to yellow tank causes both a low pressure in the operating system and yellow tanks contents to rise above the low level cut-off, it is a design feature that yellow system pressure will be supplied to both sides of the PFCUs.

DISTRIBUTION



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SYSTEM SCHEMATIC

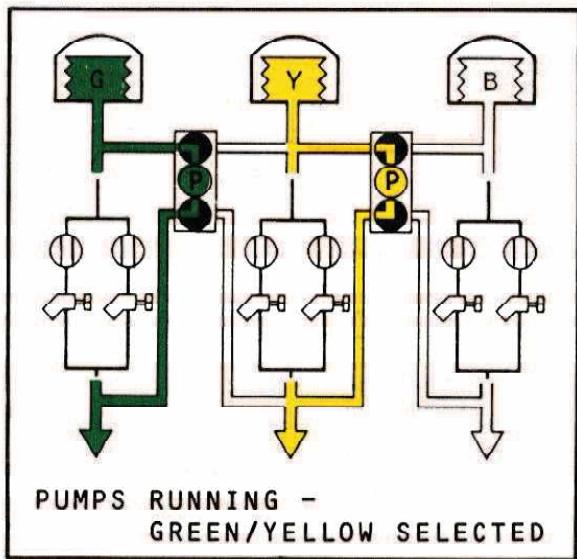
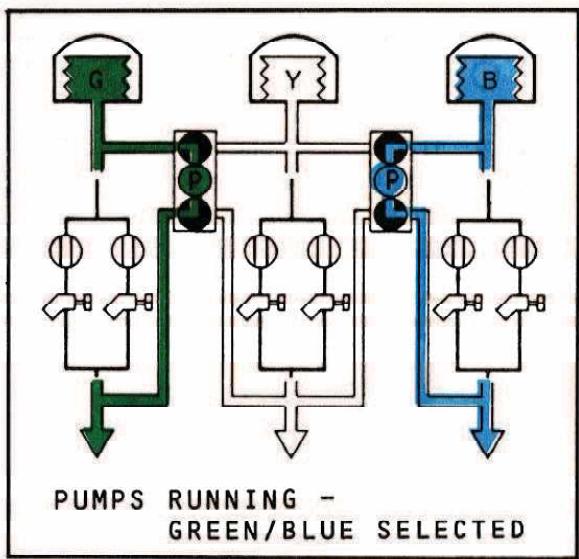
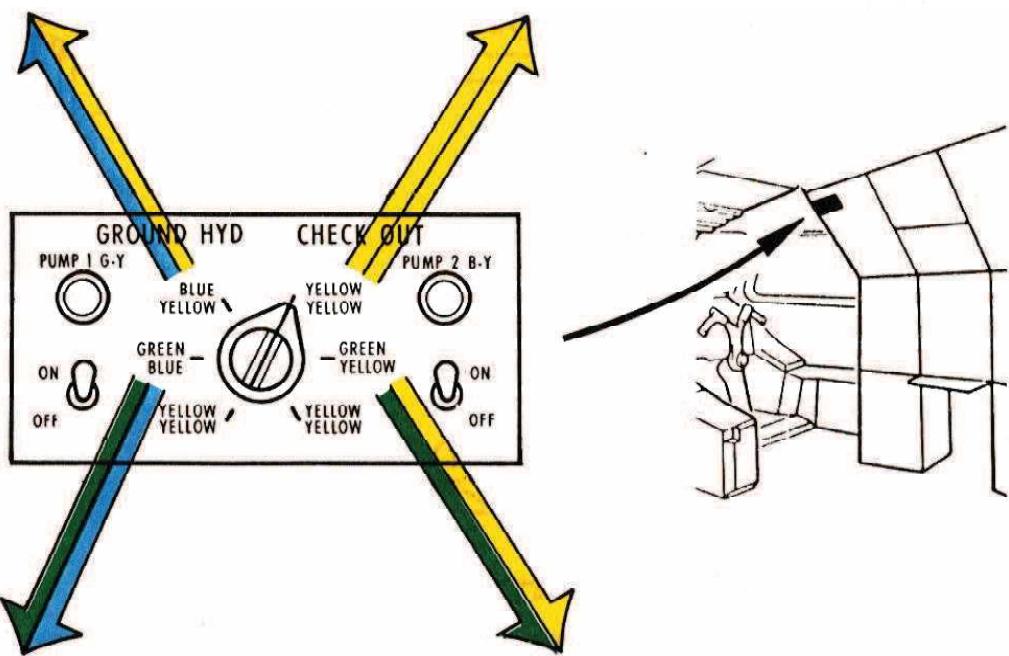
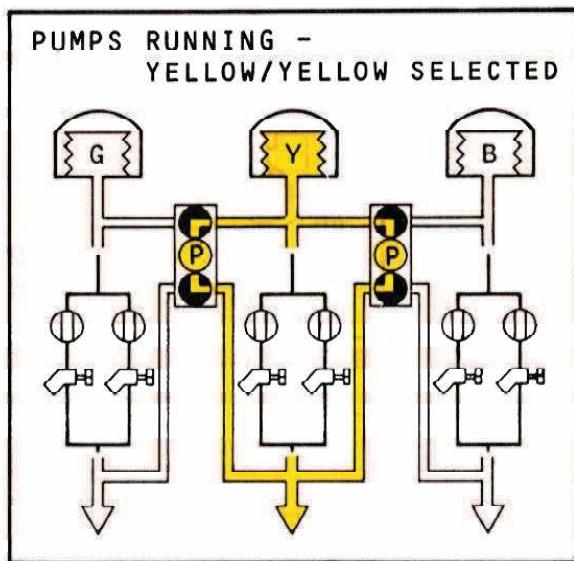
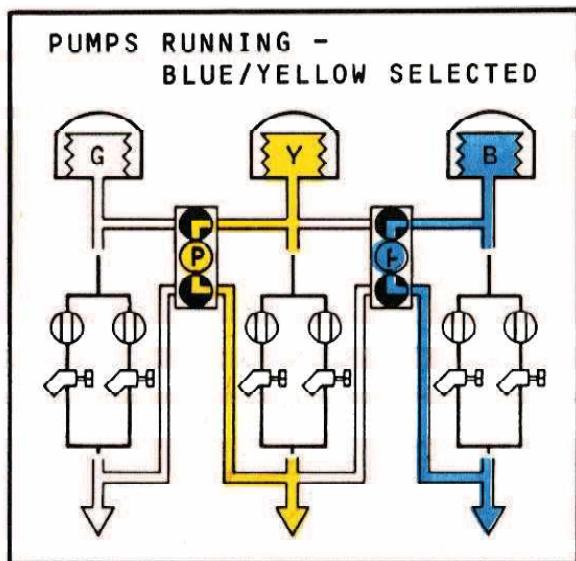


	NON RETURN VALVE		VALVE
↓	NON RETURN VALVE	●	VALVE
↔	PRESSURE SWITCH	↔	ENGINE DRIVEN PUMP
⤒⤓	PRESS TRANS	⤒⤓	RAM AIR TURBINE PUMP

NOTE:

VALVES INDICATED
THUS ➤ AUTO CLOSE
WHEN APPROPRIATE
ENGINE SHUT-DOWN
HANDLE PULLED.

GROUND PUMPS

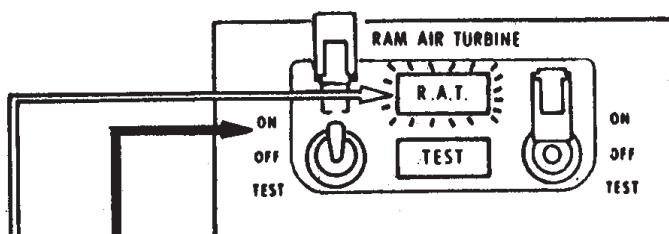


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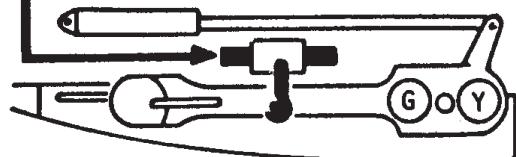
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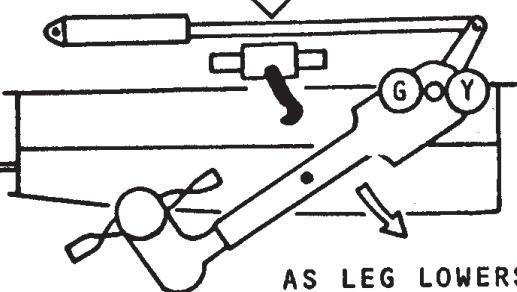
RAM AIR TURBINE



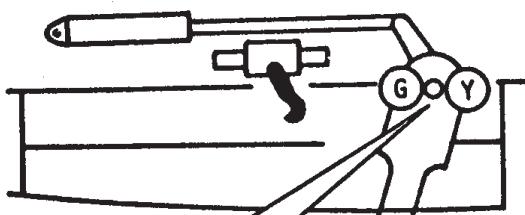
CARTRIDGE FIRED



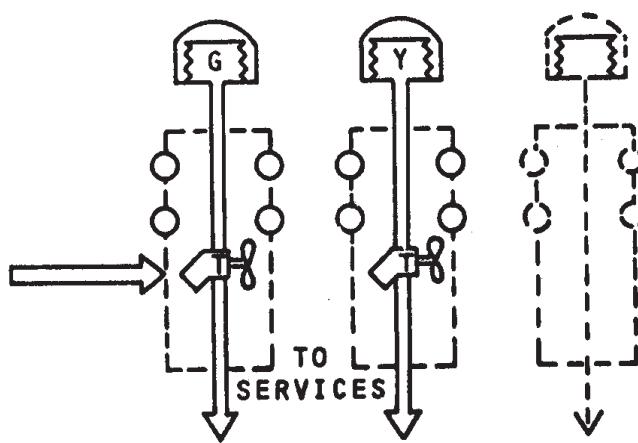
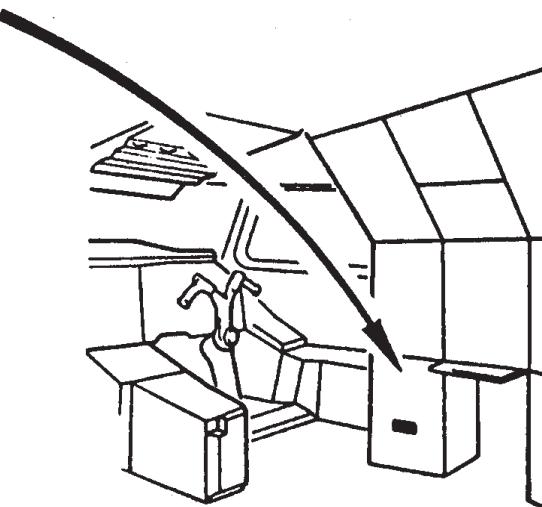
UPLOCK RELEASED
AND LEG LOWERED
BY EXTENSION UNIT



AS LEG LOWERS
DOORS OPEN

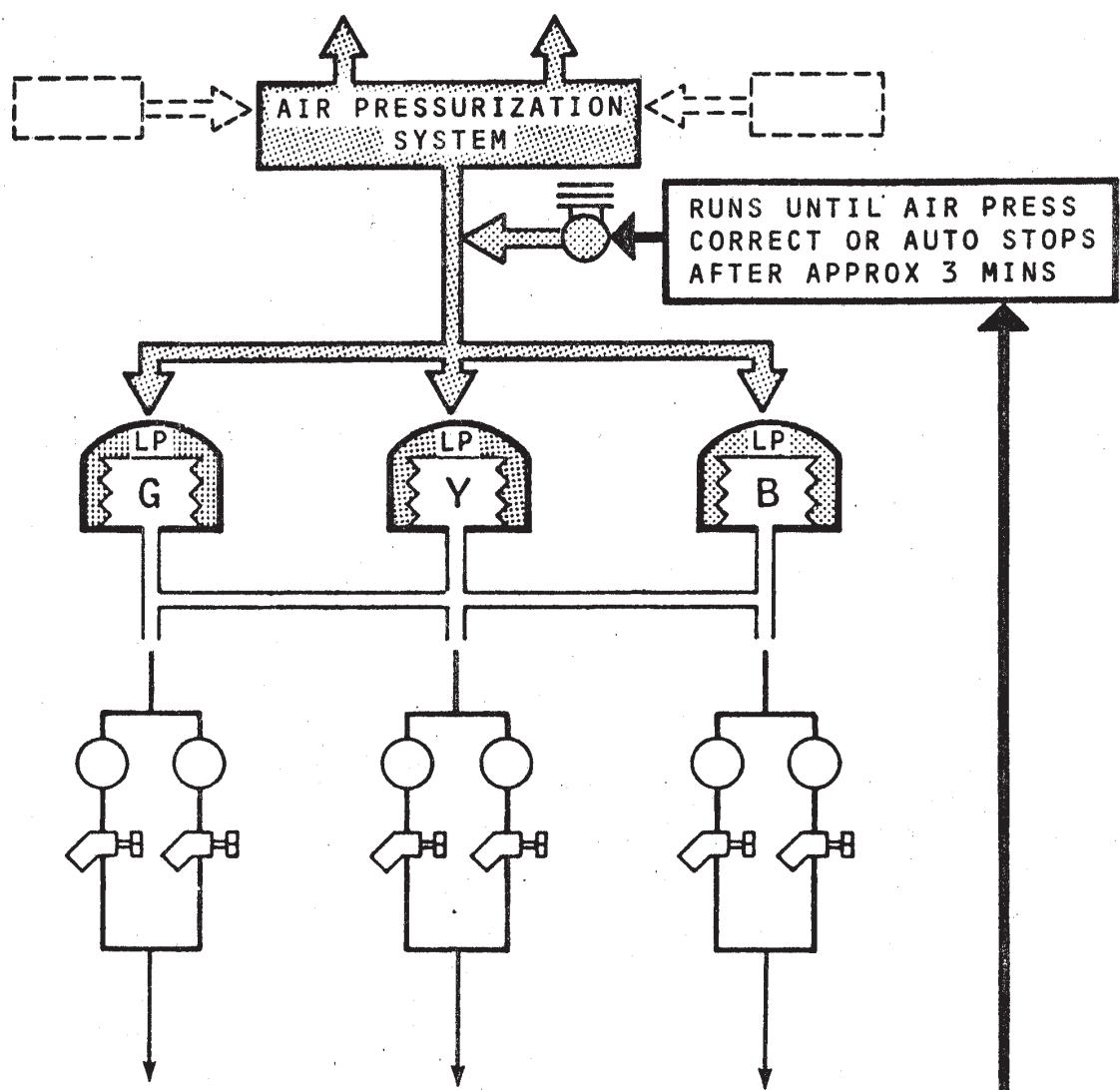


WHEN LEG
LOCKED DOWN
TURBINE DRIVES
G/Y PUMPS



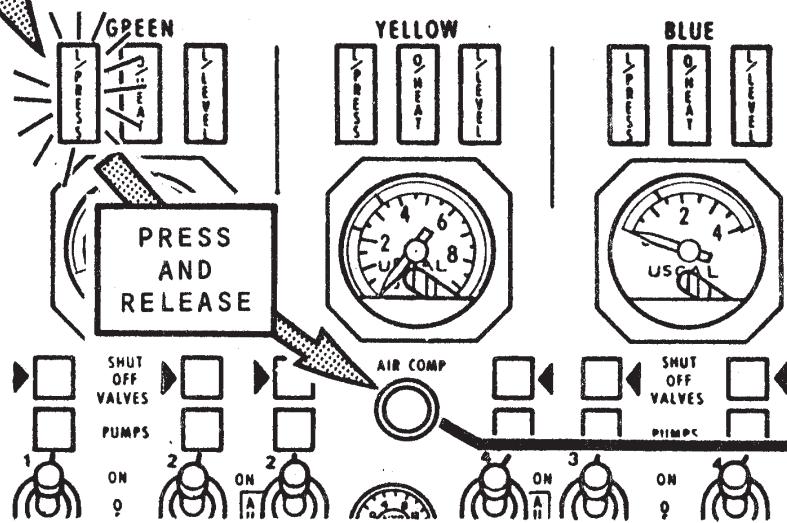
NOTE:
UNIT CAN ONLY
BE RESTOWED
ON GROUND

RESERVOIR PRESSURIZATION



IF ONE OR MORE LOW PRESSURE LIGHTS ON BEFORE ENGINE START

HYDRAULIC MANAGEMENT



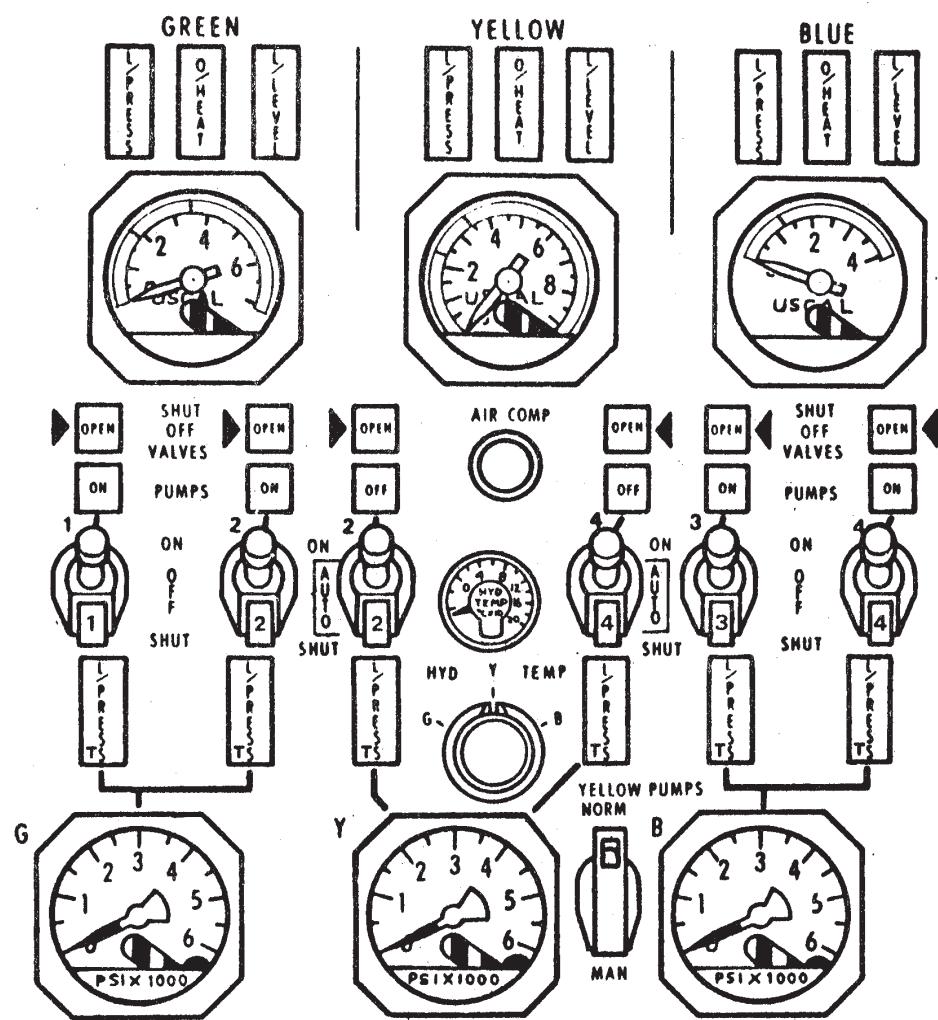
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HYDRAULIC MANAGEMENT PANEL

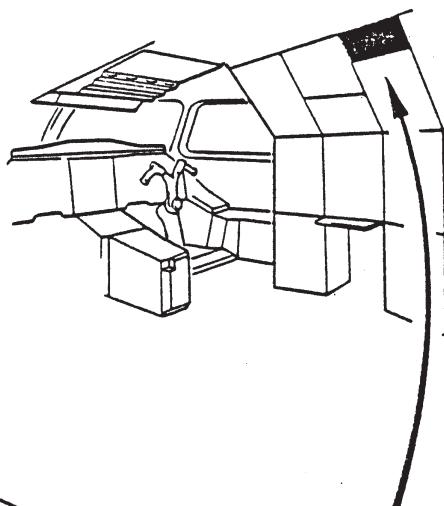
HYDRAULIC MANAGEMENT



HYDRAULIC MANAGEMENT PANEL
(Sheet 1 of 3)GREEN AND BLUE SYSTEM L/LEVEL LIGHT
(Amber) (2)

On - indicates that the hydraulic quantity has fallen to the red mark in the yellow band Accompanied by MWS HYD light (amber) and audio (gong).

At the red mark in the yellow band the yellow hydraulic system engine driven pumps are unloaded and yellow system fluid is supplied directly to the intake spill door actuators and to the standby motors of the intake ramps. At the same time the main system fluid is isolated upstream of the spill door actuators and normal motors of the ramps.



O/HEAT LIGHT (Amber) (3)

On - indicates that the fluid temperature exceeds 140 deg C. Accompanied by a MWS HYD light (amber) and audio (gong).

YELLOW SYSTEM L/LEVEL LIGHT (Amber)

On - indicates that the hydraulic quantity has fallen to the first red mark in the yellow band. Accompanied by MWS HYD light (amber) and audio (gong).

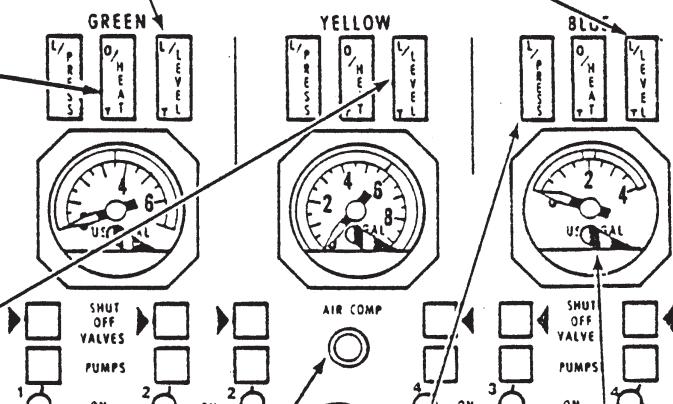
At the first red mark in the yellow band i.e. first low level, the selection of the yellow system fluid to nosewheel steering, normal brakes and the selected flight control system is inhibited. If low pressure also exists in the non-selected flying control system, fluid is automatically supplied to it from the yellow system. At the second red mark in the yellow band i.e. second low level, the selection of the yellow system fluid to the intake spill doors actuators is inhibited.

AIR COMPRESSOR PUSH BUTTON

Pressed - starts the auxiliary air compressor; it will operate until either the reservoir pressure is sufficient or approximately 3 minutes have elapsed.

NOTE: Only used on the ground.

HYDRAULIC MANAGEMENT



L/PRESS LIGHT (Yellow) (3)

On - indicates a low air pressure in the hydraulic reservoir.

SYSTEM RESERVOIR CONTENTS GAUGE (3)

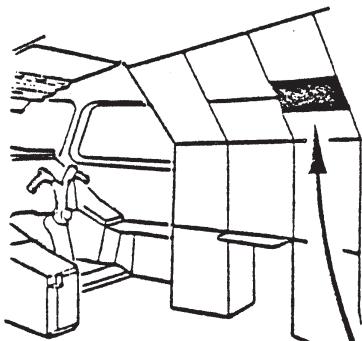
The correct fluid level, with the accumulators unpressurized and a fluid temperature of 20 deg C is shown by a white mark within the green band. The red mark within the yellow band shows the low level switching point. If the electrical supply to the gauge is interrupted a failure flag will be visible.

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HYDRAULIC POWER

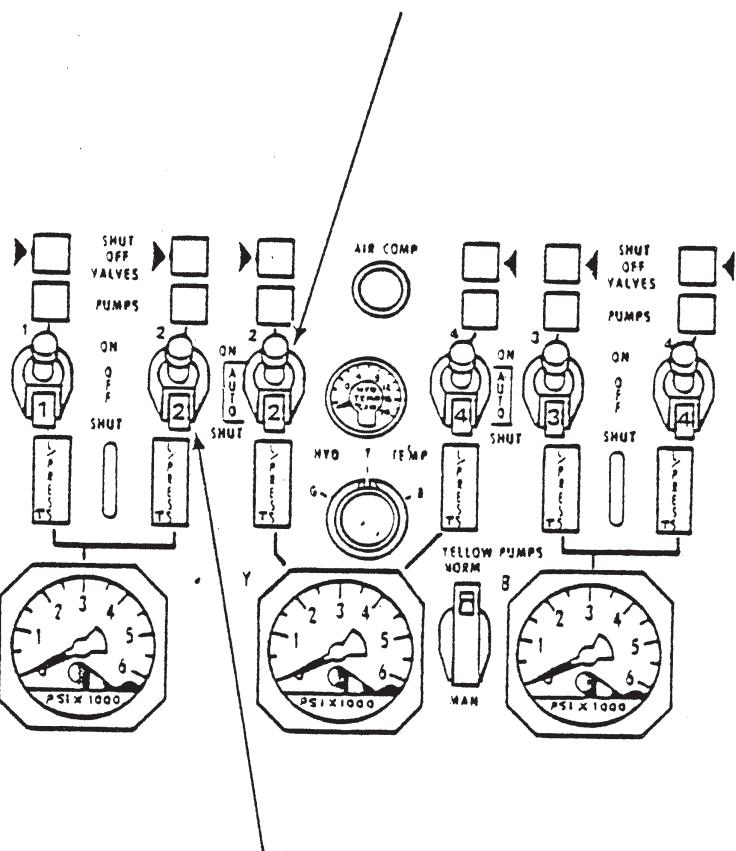
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HYDRAULIC MANAGEMENT PANEL
(Sheet 2 of 3)



YELLOW SYSTEM

- ON - onloads the engine driven pumps.
AUTO - offloads the engine driven pumps except when the landing gear lever is DOWN or when the yellow system is selected or required by other system failures.
SHUT - the engine driven pumps shut-off valve is driven to SHUT and the pumps are offloaded. This position is guarded and wirelocked to prevent inadvertent operation.



HYDRAULIC PRESSURE GAUGE

If the electrical supply to the gauge is interrupted, a failure flag will be visible.

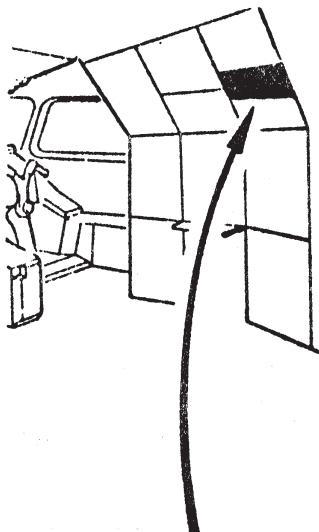
ENGINE DRIVEN HYDRAULIC PUMPS SELECTOR

The guard number identifies the engine which drives the pumps.

BLUE AND GREEN SYSTEM

- ON - onloads the engine driven pumps.
OFF - offloads the engine driven pumps allowing only a small internal cooling/lubrication flow.
SHUT - the engine driven pumps shut-off valve is driven to SHUT and the pumps are offloaded. This position is guarded and wirelocked to prevent inadvertent operation.

(Unchanged)



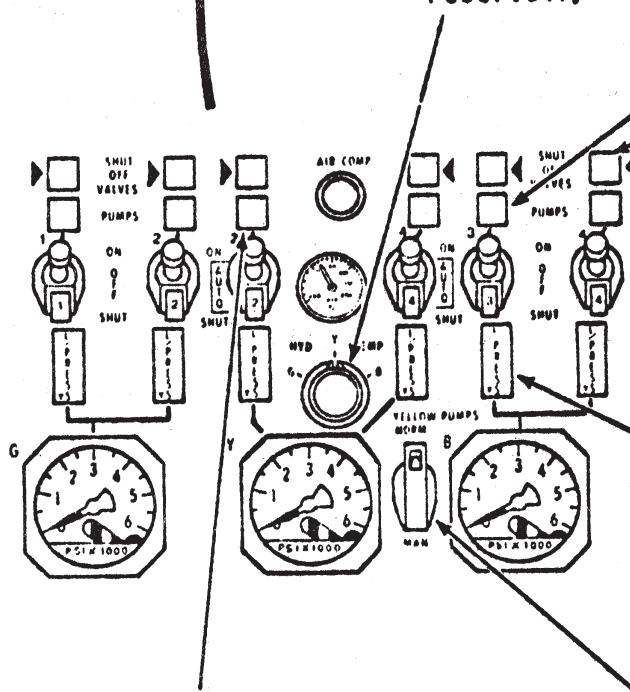
HYD TEMP shows the temperature of hydraulic fluid in the selected reservoir.

HYD TEMP ROTARY SELECTOR

- G - selects temperature gauge to green reservoir.
- Y - selects temperature gauge to yellow reservoir.
- B - selects temperature gauge to blue reservoir.

GREEN AND BLUE HYDRAULIC PUMPS MIs (4)

- ON** - Pump selector at ON, onloaded.
- OFF** - Pump selector at OFF or SHUT, offloaded.



SHUT OFF VALVE MIs (6)

The shut off valves are controlled by the engine driven pumps selectors or by the engine shut down handle

HYDRAULIC PUMP L/PRESS LIGHTS (Amber) (6)

On - indicates a low pressure condition exists downstream of the engine driven pump.
Accompanied by MWS HYD (Amber)
Pressed - offloads the pump.

YELLOW HYDRAULIC PUMPS MIs(2)

- ON** - Pump selector at ON or
Pump selector at AUTO when main system at low level or low pressure.
-Any engine air intake selector at YELLOW.
-Any engine shut down handle pulled.
-Flight controls servo selector at YELLOW/BLUE or YELLOW/GREEN.
-Nose/visor standby control in use or
-Landing gear selected down.
- OFF** - Pump selector at SHUT or
Pump selector at AUTO when landing gear is up.

YELLOW PUMPS SWITCH

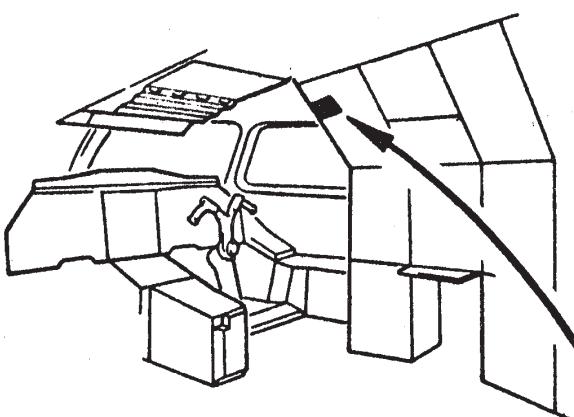
- NORM** - the yellow system engine driven pump AUTO function is armed.
- MAN** - the auto function of the yellow system engine driven pumps is inhibited and the AUTO position of the EDP selectors offloads the engine driven pumps.

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GROUND HYDRAULIC CHECK OUT PANEL

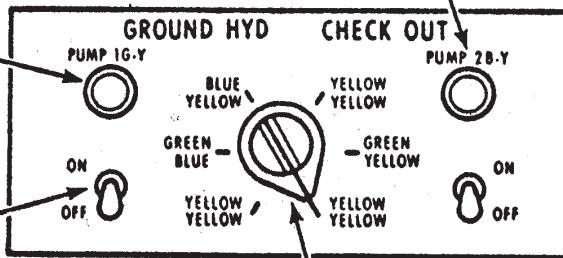


CIRCUIT BREAKER

For the protection of pump 1G-Y.

CIRCUIT BREAKER

For the protection of pump 2B-Y.



PUMP SWITCHES

Are of the magnetic hold type and go to the OFF position when ground power is disconnected.

ON - operates the electric pumps and disconnects the rear galley electric supply.

GROUND HYDRAULICS CHECK OUT SELECTOR

YELLOW YELLOW - both electric pumps are supplying the yellow system.

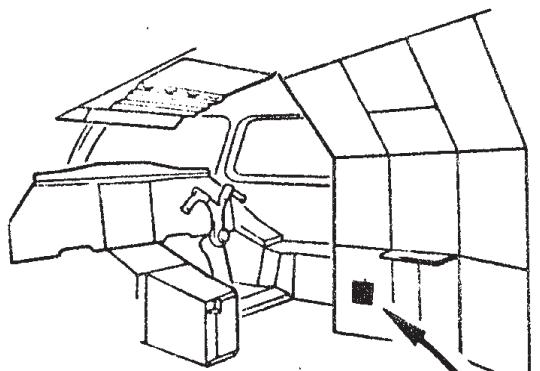
GREEN BLUE - the green system is pressurized by PUMP 1G-Y and the blue system by PUMP 2B-Y.

BLUE YELLOW - the blue system is pressurized by PUMP 2B-Y and the yellow system by PUMP 1G-Y.

GREEN YELLOW - the green system is pressurized by PUMP 1G-Y and the yellow system by PUMP 2B-Y.

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RAM AIR TURBINE



TEST LIGHT (Blue)

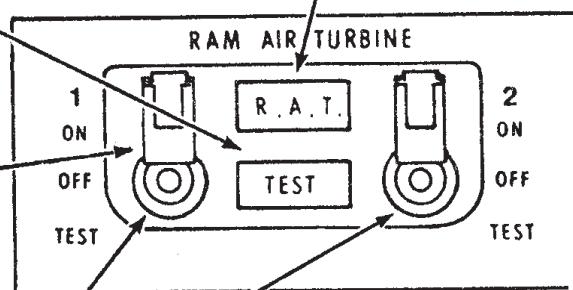
On - indicates a successful test.

SELECTOR GUARD (Wirelocked)

Protects only the ON position.

R.A.T. LIGHT (Green)

On - indicates that the R.A.T. has deployed.



RAM AIR TURBINE SELECTORS

Each selector controls a separate and independent firing circuit.

ON - the cartridge detonates releasing the ram air turbine uplock allowing the ram air turbine to fall to its operating position.

At ON the standby inverter is supplied from DC essential busbar 3P and selected to power the standby instrument busbar 33X supplying No.1 radio altimeter and a 26V transformer which powers the standby instrument busbar 32X supplying the standby ASI and standby altimeter.

At ON, operation of the normal landing gear system is inhibited

The selector is spring returned from TEST to OFF position.

TEST - At TEST the standby inverter is checked and the continuity of the electrical firing circuit of the corresponding cartridge unit used to unlock the R.A.T. uplock.

Chapter 13

**ICE AND RAIN
PROTECTION**

ICE & RAIN PROTECTION

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Engine, Wing and Intake Anti-icing (Sheet 2 of 2)	13.03.02
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Rain Dispersal	13.03.05
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ADS and Engine Probe Heaters	13.03.07

ICE & RAIN PROTECTIONGENERAL

The ice and rain protection system comprises:-

- wing leading edge anti-icing
- intakes anti-icing
- engines anti-icing
- ADS and engine probe heaters
- flight compartment transparency anti-icing and demisting
- windshield rain dispersal
- ice detection system
- pressurisation/static heaters
- drain mast heaters

ICE DETECTION

Two independent and identical ice detection systems each provide a blue ICE warning light when icing conditions are detected. Either blue ICE light arms a red ICE light and the MWS red ICE light which are inhibited when the anti-icing is selected on.

WING AND INTAKE ANTI-ICING

The intake leading edges, rear ramp leading edges, spill doors, high speed air conditioning intakes, and the wing leading edges in front of the intakes and inboard to the fuselage, are de-iced by a combination of continuous and cyclic heating which prevents uncontrolled shedding of ice into the intakes.

The wing and intake anti-icing system is inhibited by weight switches while the aircraft is on the ground and by an ADC signal when the total air temperature is above plus 15 deg. C. The warning lights however are not inhibited.

Two independent control systems are provided, namely, main and alternate. A push button on the alternate system can be used to by-pass the above 'plus 15 deg. C.' inhibition.

ENGINE ANTI-ICING

The engine inlet guide vanes are protected by hot air tapped from the engine. The system can be operated either on the ground or in flight.

ADS AND ENGINE PROBE HEATING

The ADS and engine probe heating consists of the total air temperature heaters 'Tt', static sensor heaters 'S', sideslip sensor heaters 'B', angle of attack sensor heaters ' α ' which are inhibited when the total air temperature is above plus 15 deg. C, the pitot probe heater 'P', standby pitot probe heater 'STBY', and the engine intake temperature probe heaters T_1 .

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ICE & RAIN PROTECTION

WINDSHIELD AND VISOR DE-ICING, SLIDING SIDE WINDOW (DV) DEMISTING

The transparency de-icing and demisting systems are automatically regulated by a normal control channel. If this channel fails, the temperature will be automatically regulated by a second channel operating at a higher temperature.

The windshield heaters have two heating levels, high and low. When high is selected the system will automatically change to the low condition if the visor is raised or if the aircraft is on the ground.

For emergency operation, the windshield de-icing can be selected to by-pass the heat control system and power directly the central part of the windshield at the high heating level.

The visor heater operates only when the visor is locked up.

RAIN DISPERSAL

The windshield wipers and deflectors and the rain repellent system are used in combination to ensure adequate visibility in all rain conditions.

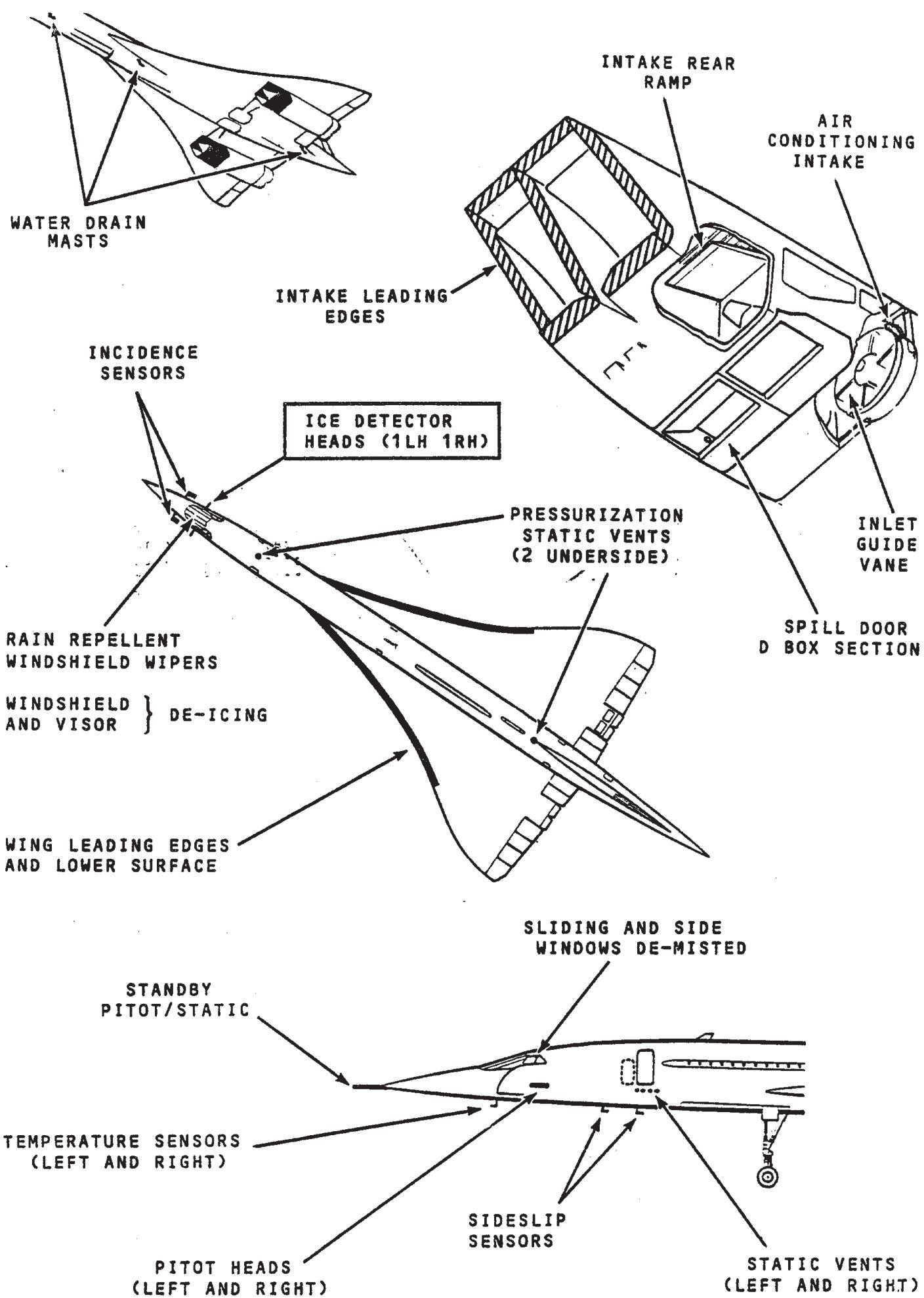
PRESSURISATION STATIC HEATING

The pressurisation static vents are electrically heated.

DRAIN MAST HEATING

The drain masts are electrically heated.

DE-ICING

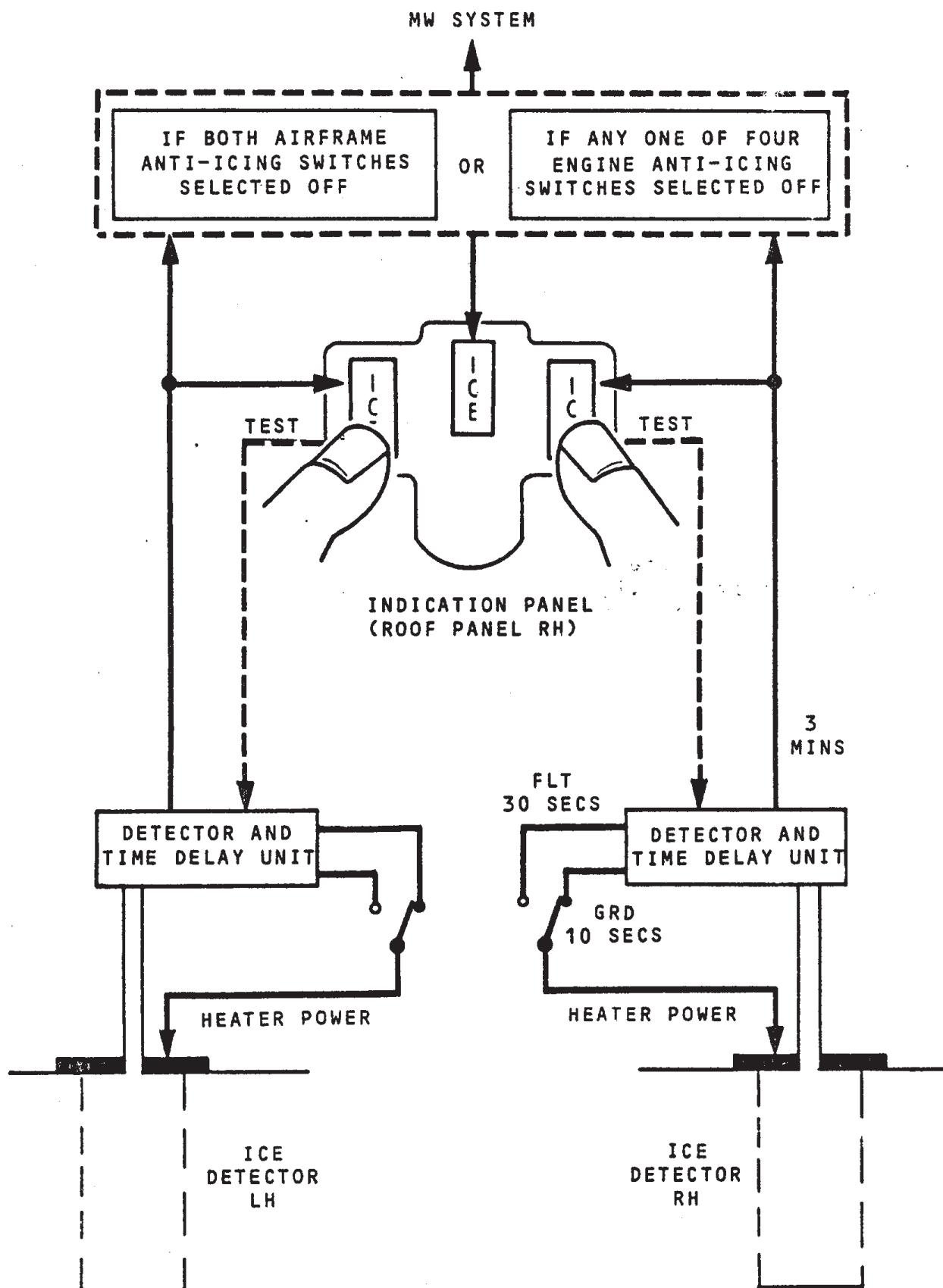
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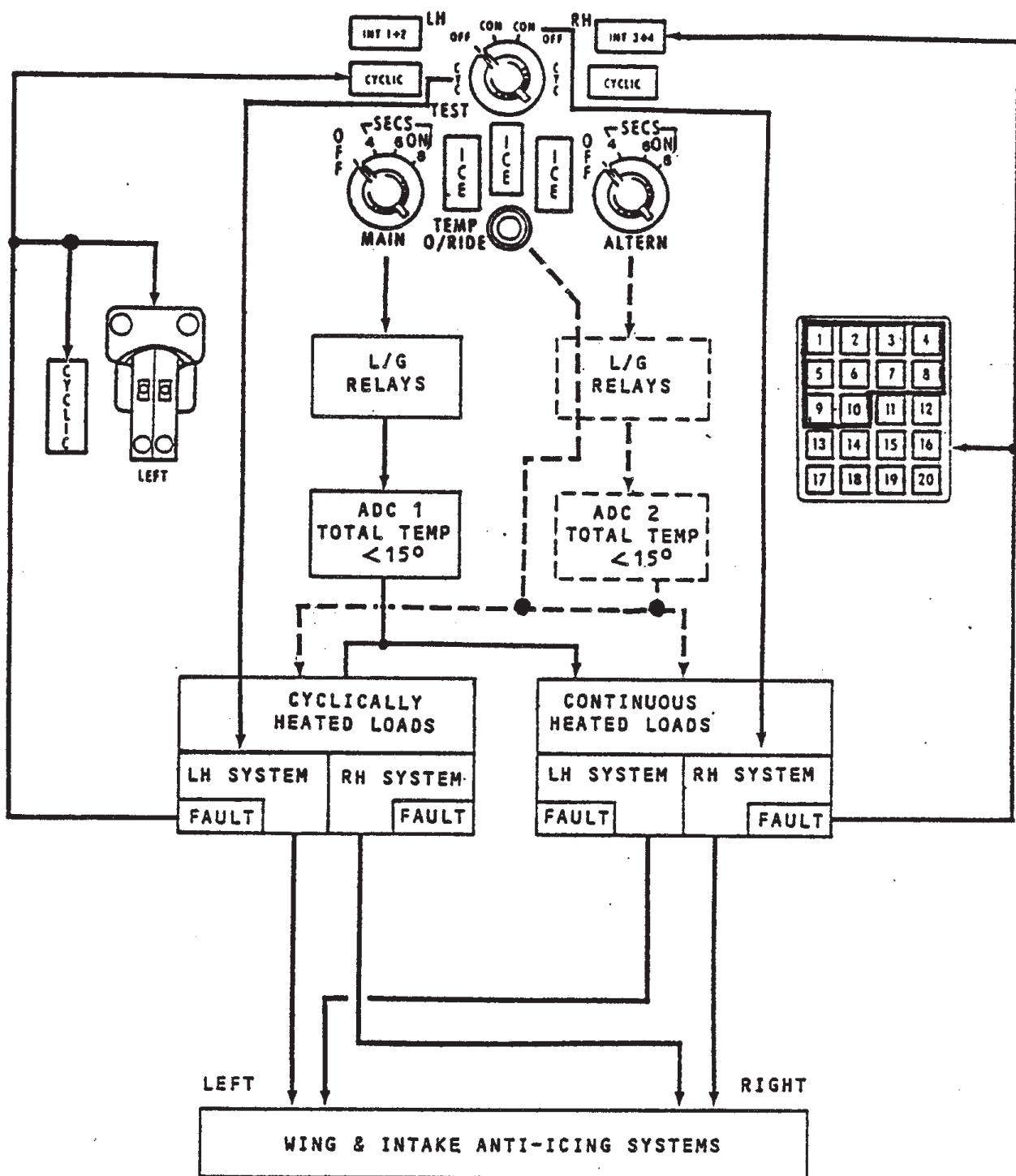
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ICE DETECTION AND INDICATION



WING AND INTAKE ANTI-ICING CONTROL



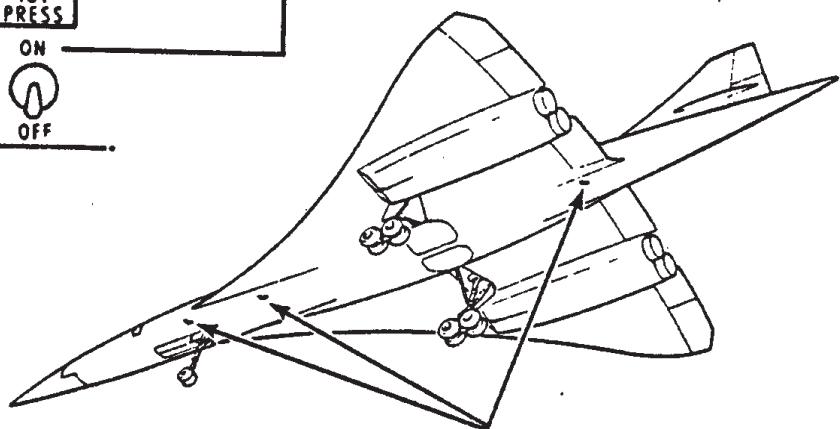
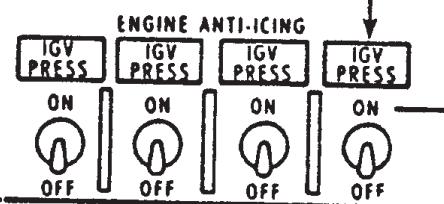
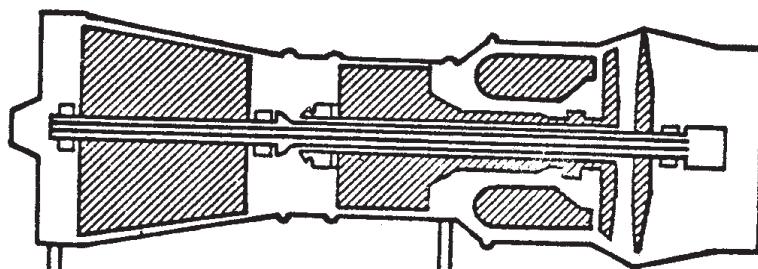
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ICE AND RAIN PROTECTION

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ENGINE ANTI-ICING CONTROL

ENGINE
ANTI-ICING



HEATED
DRAIN MASTS

MAST 3

DRAIN MAST HEATERS
CONTROL INDICATION
AND TEST

MAST 2

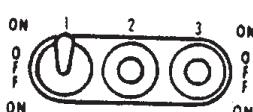
MAST 1

TEST

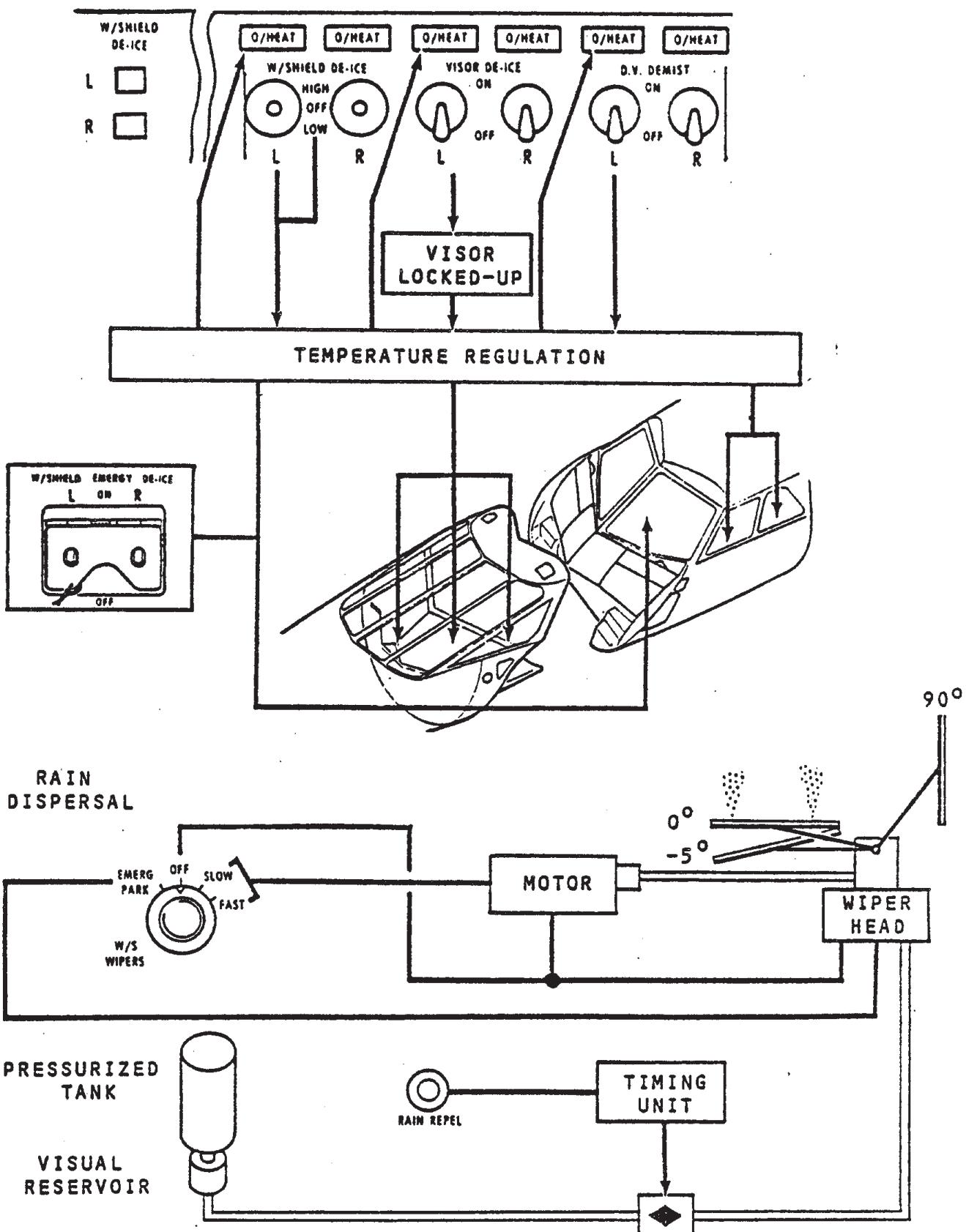
Tt < 15°

CURRENT
SENSOR

DRAIN MAST HEATER



WINDSHIELD AND VISOR DE-ICING
AND RAIN DISPERSAL

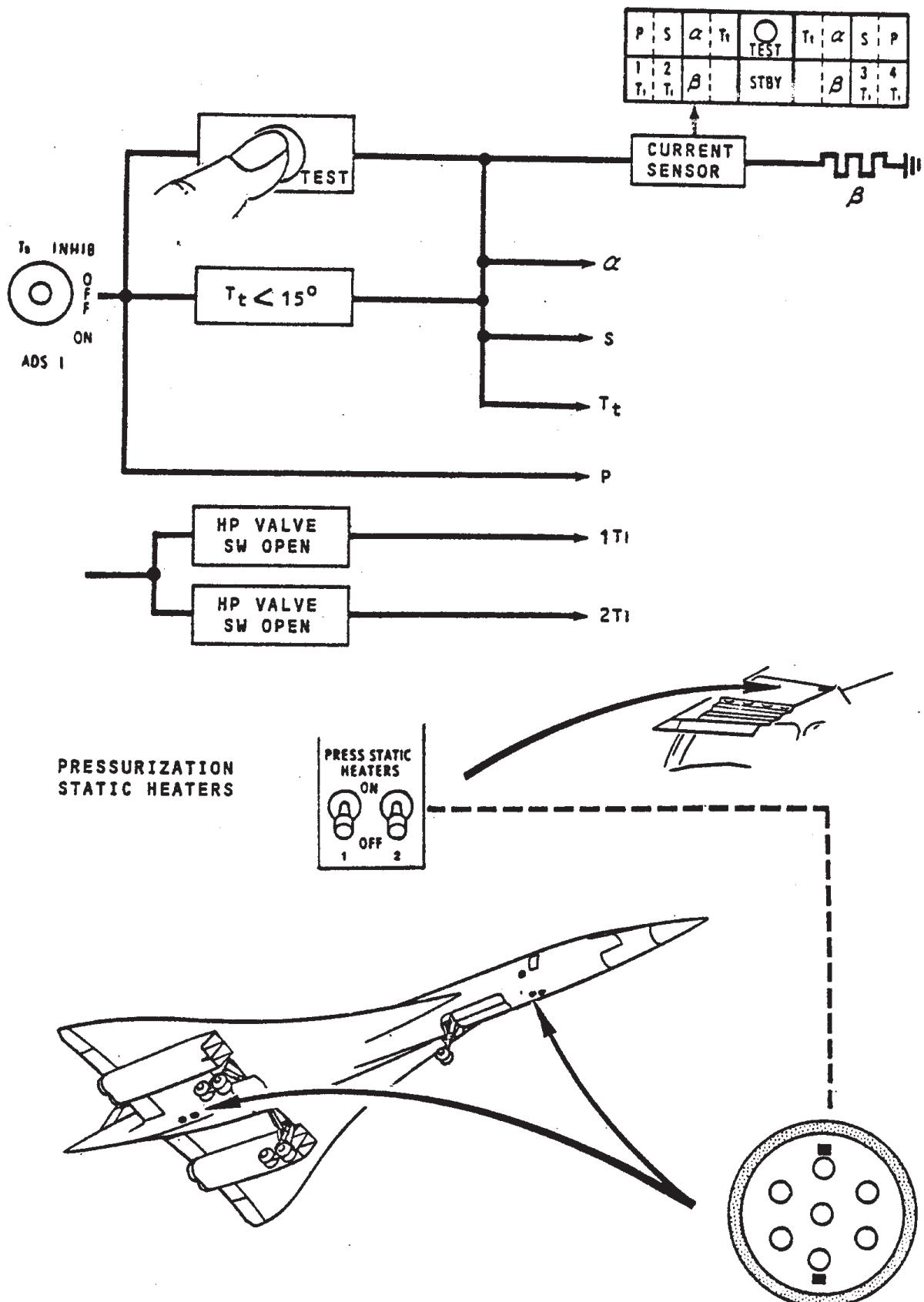


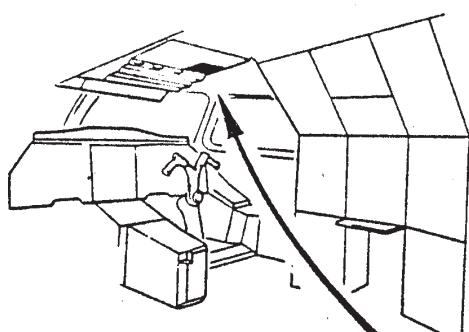
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ICE AND RAIN PROTECTION

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ADS PROBE HEATING





ICE LIGHT (Red)

On - indicates that icing conditions have been detected and one or more ENGINE ANTI-ICING switches are at OFF or both the MAIN and ALTERN WING & INTAKE ANTI-ICING rotary selectors are at OFF.

Accompanied by the MWS ICE light (red) and audio (gong). The ICE light (red) goes off when the ENGINE ANTI-ICING switches (4) are set to ON and the WING & INTAKE ANTI-ICING -MAIN or ALTERN selector is set to ON.

INTAKE LIGHT (Yellow) (2)

INT 1 + 2 or INT 3 + 4 light on indicates a fault in a continuously heated anti-icing area which may allow uncontrolled ice shedding into the indicated intakes.

INT 1 + 2 or INT 3 + 4 light on with the WING & INTAKE ANTI-ICING rotary selectors at OFF indicates that a heated area is powered although not selected.

NOTE: With the aircraft airborne and total temperature below plus 15 deg C, the INT lights (2) and CYCLIC lights (2) on together indicate a failure of the control lane.

CYCLIC LIGHT (Yellow) (2)

On - indicates a faulty heated area, it will be on every time the area is powered.

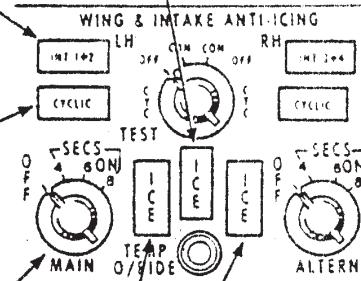
On - with the WING & INTAKE ANTI-ICING rotary selectors at OFF indicates that a heated area is powered although not selected.

After automatic cyclic shutdown set rotary selector momentarily OFF and press CYCLIC light to reset system.

MAIN ROTARY SELECTOR

- 4 SECS ON - the left and right OR wing and intake anti-icing systems are powered.
- 6 SECS ON OR 8 SECS ON The cyclic areas are powered in turn with pulses of the selected duration.

NOTE: The system is inhibited when the aircraft is on the ground or the temperature is above 15 deg C.



ICE LIGHT (Blue) (2)

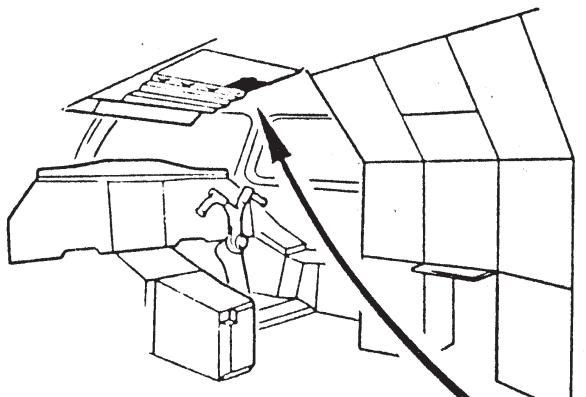
On - indicates that icing conditions have been detected. The ICE lights (blue) will go off 3 mins after leaving icing conditions. Pressing the ICE light (blue) tests the electrical part of the ice detector warning. With the aircraft on the ground it uses a reduced heater voltage and limits the heater operation to approximately 10 secs. The warning remains energized for 3 minutes.

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ICE AND RAIN PROTECTION

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ENGINE WING AND INTAKE ANTI-ICING
(Sheet 2 of 2)



WING & INTAKE ANTI-ICING
TEST ROTARY SELECTOR

CYC - sets in motion a test that powers each cyclically heated area for 0.5 second instead of the normal cyclic time. The test stops when the relevant CYCLIC light comes on, either when the test is completed and the digital indicator on the CYCLIC & CONTINUOUS DE-ICING panel shows 00, or, when a fault is detected and the digital indicator shows the number of the faulty area.

CON - tests the continuously heated areas and the functioning of the fault detection system, these areas are supplied with normal power for 3 seconds, then terminated, leaving the indication system energized for a further 3 seconds, thus giving full fault indication for that time.

TEMPERATURE O/RIDE PUSH
BUTTON

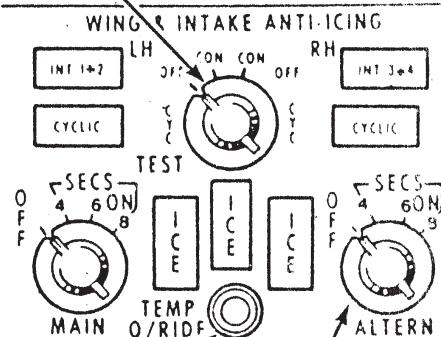
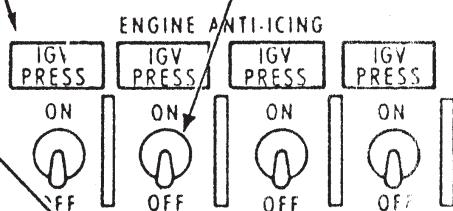
Pressed - with ALTERN selected ON will override the ADC temperature signal that normally inhibits the wing and intake anti-icing at temperatures greater than 15 deg C.

INLET GUIDE VANE PRESSURE
LIGHT (Green) (4)

On - to indicate that adequate hot air pressure is available for the engine anti-icing system.
Off - when the ENGINE ANTI-ICING switch is at ON indicates that hot air pressure is inadequate.

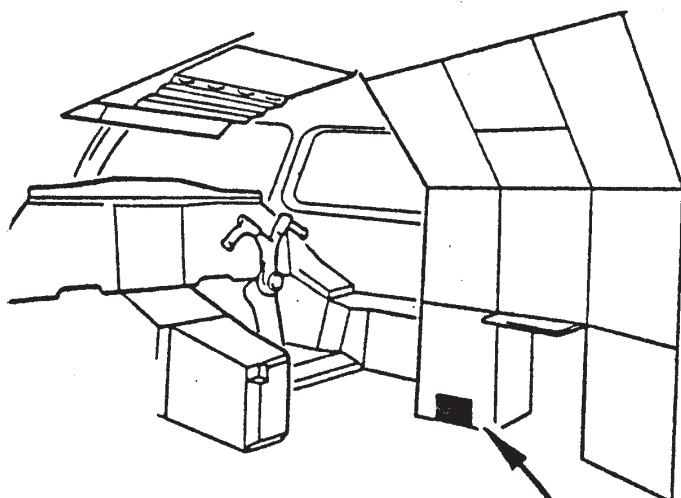
ENGINE ANTI-ICING
SWITCH (4)

ON - hot air is allowed to flow through the nose cone and the engine inlet guide vanes.

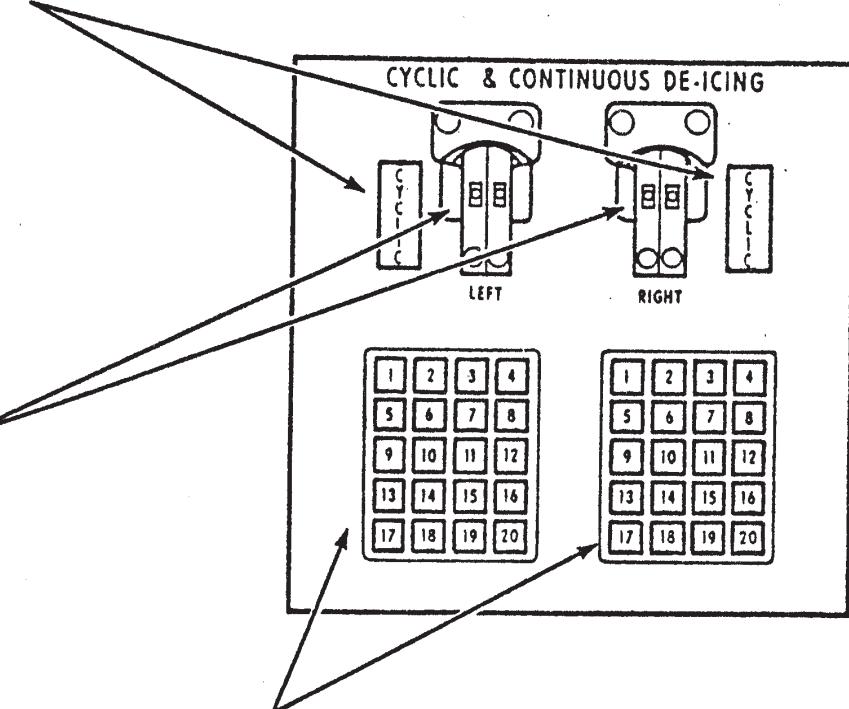


ALTERN ROTARY SELECTOR
Selects an alternative control of the wing and intake anti-icing system.

DE-ICING DIAGNOSIS AND TEST

PRINTED IN
LAND**CYCLIC LIGHT (Yellow)**

The left or right light is coincident with the left or right cyclic light on the rear overhead panel.

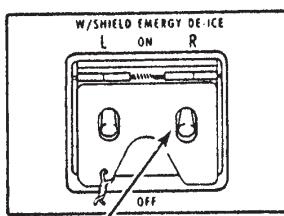
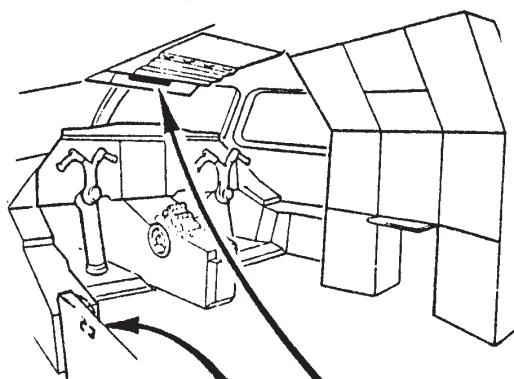
**DIGITAL COUNTER**

Shows the number of the cyclic area being powered.

NUMBERED CAPTION LIGHTS (Yellow)

A block of 20 lights is available for each side of the continuous de-icing system. Only 10 on each side are used. They indicate which continuously heated area is faulty.

VISOR, WINDSHIELD AND D.V. WINDOW HEATING



W/SHIELD ENERGY DE-ICE SWITCH (2)

ON - by-passes the windshield heat control system to power directly the central part of the windshield at the high voltage setting. Lights the O/HEAT light but does not operate the SHIELD DE-ICE MI.

W/SHIELD DE-ICE MI(2)

- INLINE indicates power is supplied to windshield
- DE-ENERGISED
- CROSSLINE indicates panel heating has reached control temperature and power is OFF.

WINDSHIELD DE-ICE SELECTOR (2)

HIGH - windshield panels are heated by high voltage and automatically maintained at working temperature. With a W/SHIELD DE-ICE selector at HIGH the associated windshield de-icing system will automatically change to LOW condition if the visor is raised or the aircraft is on the ground.

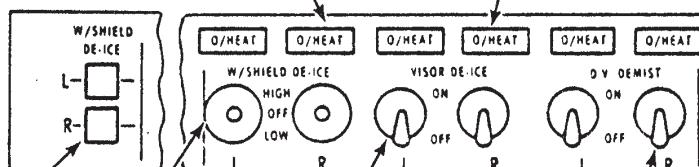
LOW - windshield panels are heated by low voltage and automatically maintained at working temperature.

DE-ICE OR DEMIST O/HEAT LIGHT (Yellow) (6)

On - indicates that panel heating has reached overheat control temperature and power is off. Regulation in the overheat control temperature range is indicated by the O/HEAT light going on and off.

WINDSHIELD DE-ICE O/HEAT LIGHT (Yellow) (2)

On - steady - with W/SHIELD ENERGY DE-ICE selected emergency heating is in operation.



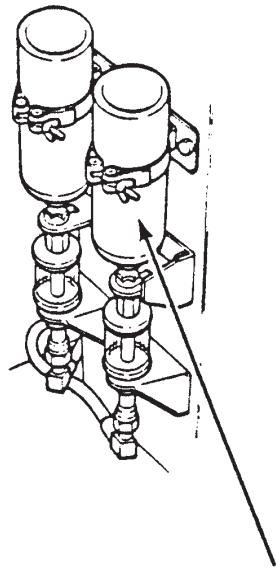
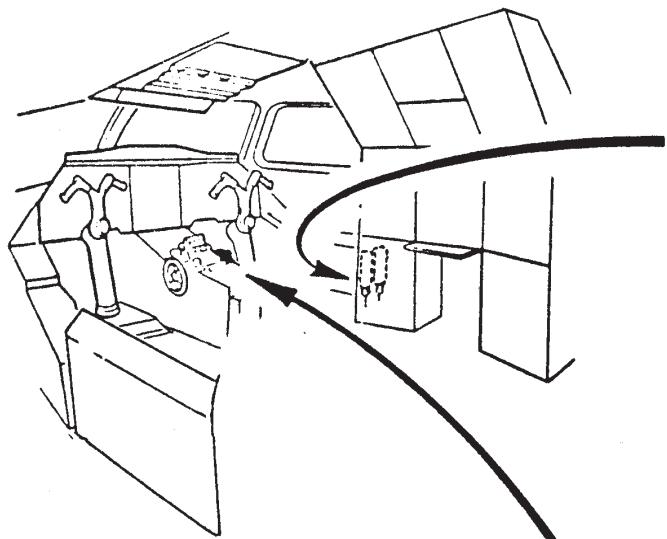
VISOR DE-ICE SWITCH (2)

ON - with the visor locked UP the visor panels are heated and automatically maintained at working temperature. The visor heater operates only when the visor is locked up.

SLIDING SIDE WINDOW DEMIST SWITCH (2)

ON - sliding side panels are heated and automatically maintained at working temperature.

RAIN DISPERSAL



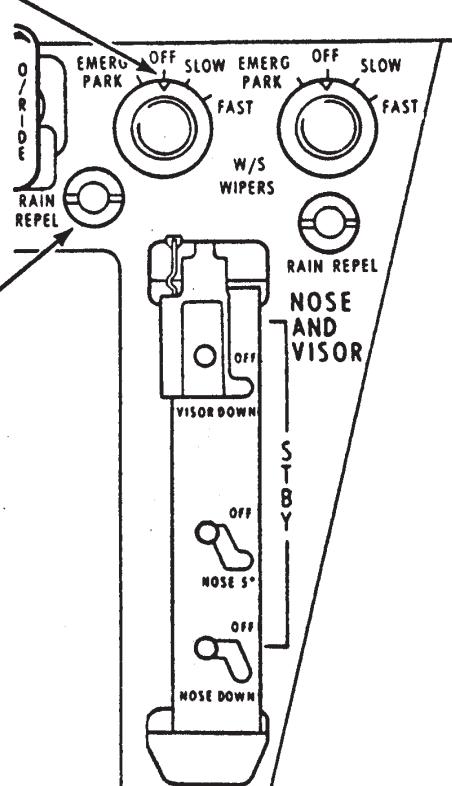
RAIN REPELLENT BOTTLE (2)

Low quantity is indicated when float is below top of sight glass.

WINDSHIELD WIPERS ROTARY SELECTOR (2)

OFF - selects the park position.
With a wiper not fully parked,
the normal operation of the
visor raise sequence is inhibited.
EMERG PARK - provides a second system
to park the wiper.

SLOW }
FAST } - selects wipers on.

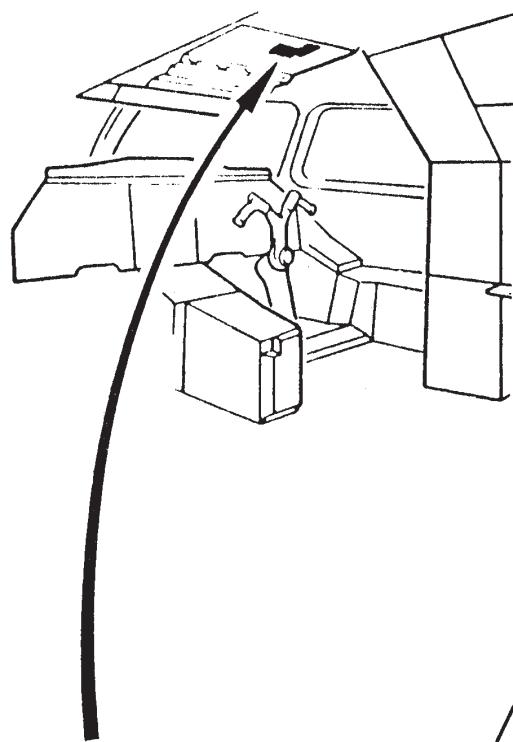


RAIN REPEL PUSH BUTTON (2)

CAUTION
THE RAIN REPEL PUSH BUTTONS
ARE UNGUARDED

Pressing the RAIN REPEL push button applies a predetermined quantity of rain repellent liquid to the windshield.

DRAIN MAST HEATERS

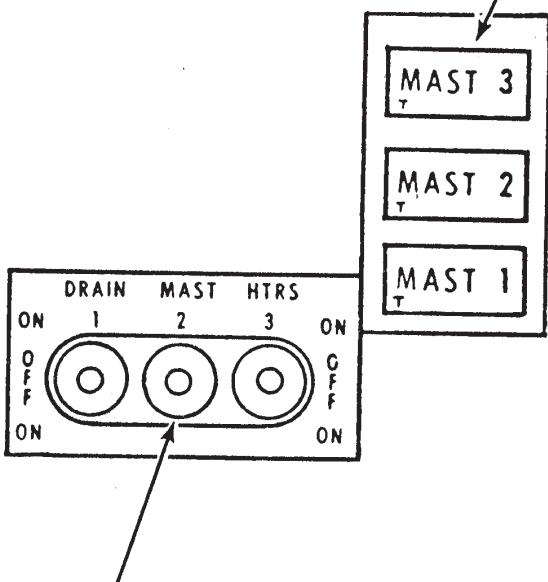


MAST LIGHT (Yellow) (3)

Pressing a MAST light while the selector is at OFF tests the failure warning system. The light on indicates correct operation.

Pressing a MAST light while the selector is at ON tests the failure warning system. The light on (yellow) indicates an inoperative heater.

A MAST light (yellow) on with the DRAIN MAST HTRS selector at ON indicates incorrect mast heater operation.



DRAIN MAST HEATERS
SELECTOR (3)

ON - powers a drain mast heater provided that the ADC switches are at ON and that the total temperature is below plus 15 deg C. There are two ON positions for each selector; each position supplies a separate but similar heater. Either ON position may be used as the normal selection.

(Unchanged)

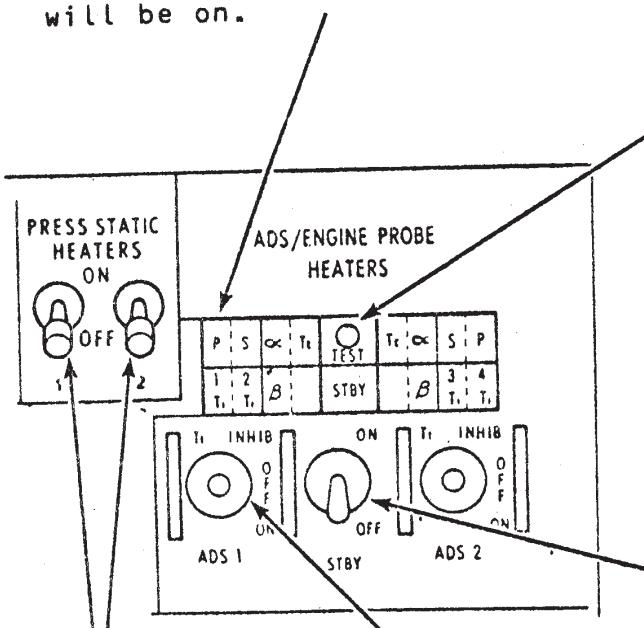
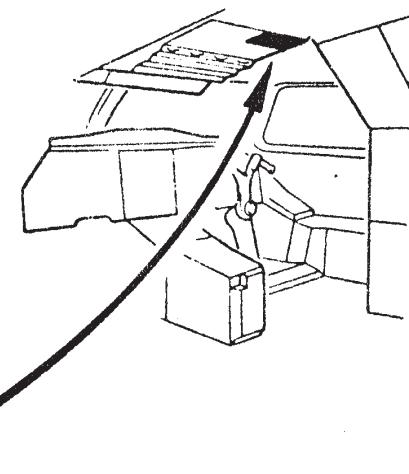
ADS AND ENGINE PROBE HEATERS

AIR DATA SYSTEM/ENGINE PROBE
HEATERS LIGHT (yellow) (15)

On - with selectors at ON. indicates that the associated heater is powered but inoperative.

On - with the ADS probe heaters selectors (2) and the STBY switch at OFF, indicates that the heater failure indication system is serviceable.

NOTE - If the ADS/probe heater selector is at T_tINHIB and the temperature is below plus 15 deg C the associated T_t light (yellow) will be on.

PRESSURIZATION STATIC
HEATER SWITCHES

TEST PUSH BUTTON

Pressed - with the ADC switches (2) at ON, the ADS/probe heaters selectors (2) at ON and total temperature above + 15 deg C, overrides the above 15 deg C inhibition of the S, α, T_t and β sensor heating.

STANDBY SWITCH

ON - powers the heater in the standby pitot static probe.

AIR DATA SYSTEM PROBE HEATERS SELECTOR (2)

T_t INHIB - the pitot probe heaters P are powered. The static sensor heaters S, angle of attack sensor heaters α and sideslip sensor heaters β are powered when the total air temperature is below plus 15 deg C. The total air temperature sensor heaters T_t are inhibited.

ON - the pitot probe heaters P are powered. The total air temperature sensor heaters T_t, the static sensor heaters S, angle of attack sensor heaters α and sideslip sensor heaters β are powered when the total air temperature is below plus 15 deg C.

Chapter 14

LANDING GEAR

LANDING GEAR

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Nose Gear Free Fall	14.03.05
Doors	14.03.06
Brake Control Lever	14.03.07
Braking Control and Indication (Sheet 1 of 2)	14.03.08
Braking Control and Indication (Sheet 2 of 2)	14.03.09
Steering Control	14.03.10
Safety Pins	14.03.11
Fault Annunciator Panel	14.03.12

GENERAL

The aircraft has a tricycle landing gear plus a tail gear; it comprises four wheel bogies on each main gear, twin wheels on the nose gear and a twin wheel tail gear. The landing gears and doors are hydraulically powered.

A standby system, powered and actuated independently of the main system, plus a free fall capability provide two back-up systems. Dual, hydraulic-powered multi-disc wheel brakes, with anti-skid control systems, are provided on the main gear. An accumulator provides emergency braking pressure in the event of the loss of the hydraulic systems.

NORMAL OPERATION

Normal operation of the landing gear is achieved through electrical control by the landing gearlever and hydraulic power supplied by the green system. Once retracted, in addition to mechanical locks, hydraulic pressure holds the gear and doors. However, when the L/GEAR lever is at NEUTRAL, both electrical control and hydraulic supply are shut off leaving the doors held by the mechanical locks, thus preventing inadvertent landing gear extension through control or actuator failure. During the landing gear retraction the main and nose wheels are automatically braked and released.

STANDBY OPERATION

Standby operation of the landing gear is achieved through a separate control lever and is independently powered by the yellow hydraulic system.

FREE FALL OPERATION

Free fall of the nose landing gear is achieved through a mechanical device, situated under the forward cabin floor, that releases the nose landing gear and doors uplocks thus allowing the gear and doors to free fall.

Free fall of the main landing gear is achieved through a mechanical device, situated under the rear cabin floor, that releases the main landing gears and doors uplocks thus allowing the gear and doors to free fall. If the main landing gear does not lock down, pressurized air from the hydraulic reservoir pressurization line can be directed to the telescopic side strut. This air pressure will extend the strut, provided the landing gear is nearly down, thereby engaging the down lock.

To assist in locating the fre fall controls, a starboard hat rack in both the forward and the rear cabin is identified with 1 red and 1 green disc at a position adjacent to each control panel.

BRAKES AND ANTI SKID

Normal brakes and anti-skid systems are supplied by the green hydraulic system. In the event of a green system pressure loss there is an automatic changeover to the yellow hydraulic system provided YELLOW-GREEN has been selected on the SERVO CONTROLS yellow rotary selector.

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A brakes accumulator charged by the yellow hydraulic system supplies the emergency and parking brakes system only.

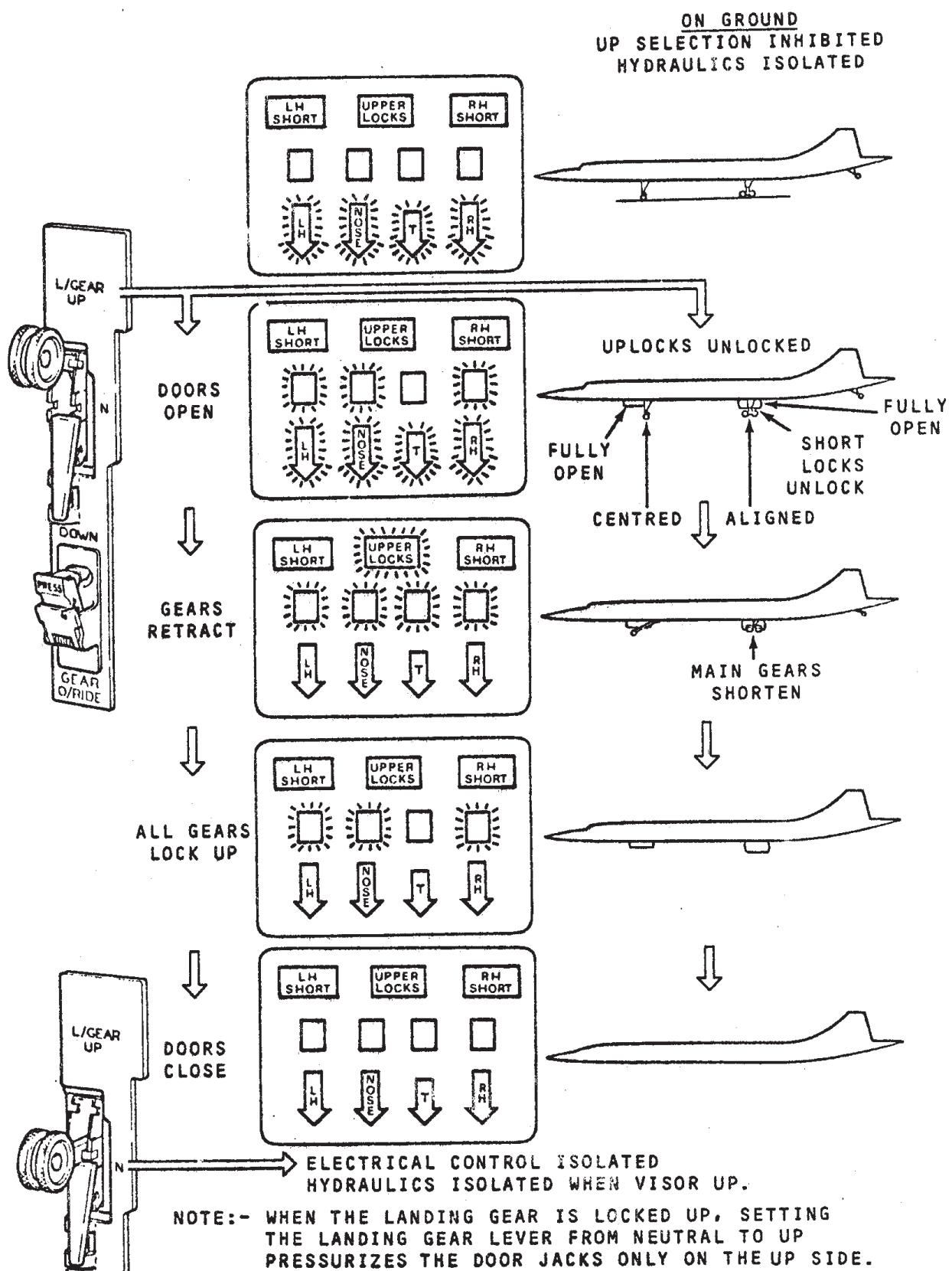
NOSEWHEEL STEERING

The nosewheel steering is electrically controlled, through the rudder pedals and hand wheels, and hydraulically operated. The normal operation uses the green hydraulic system with standby power from the yellow hydraulic system.

ED IN ENG

(Unchanged)

NORMAL 'UP' SELECTION

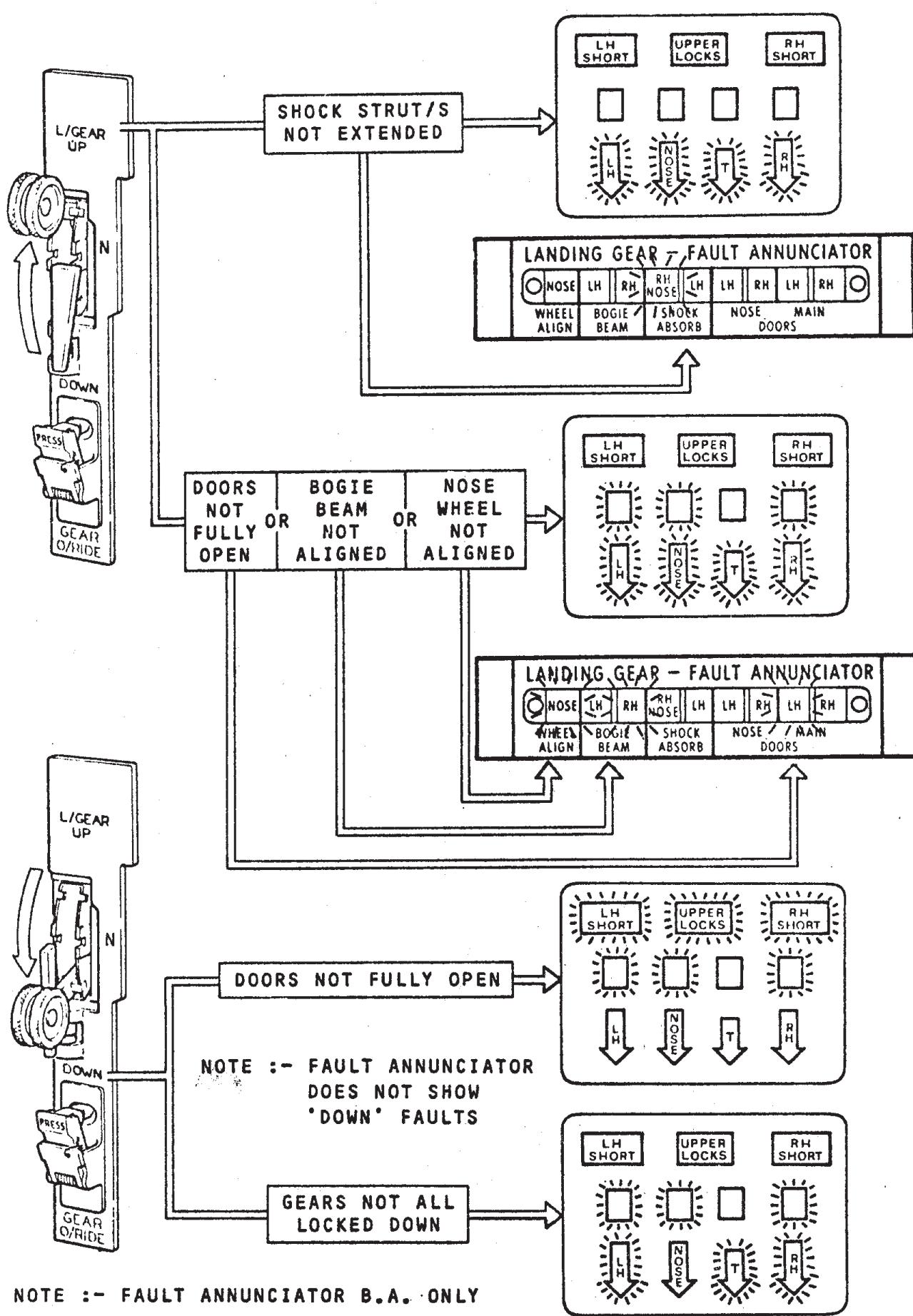


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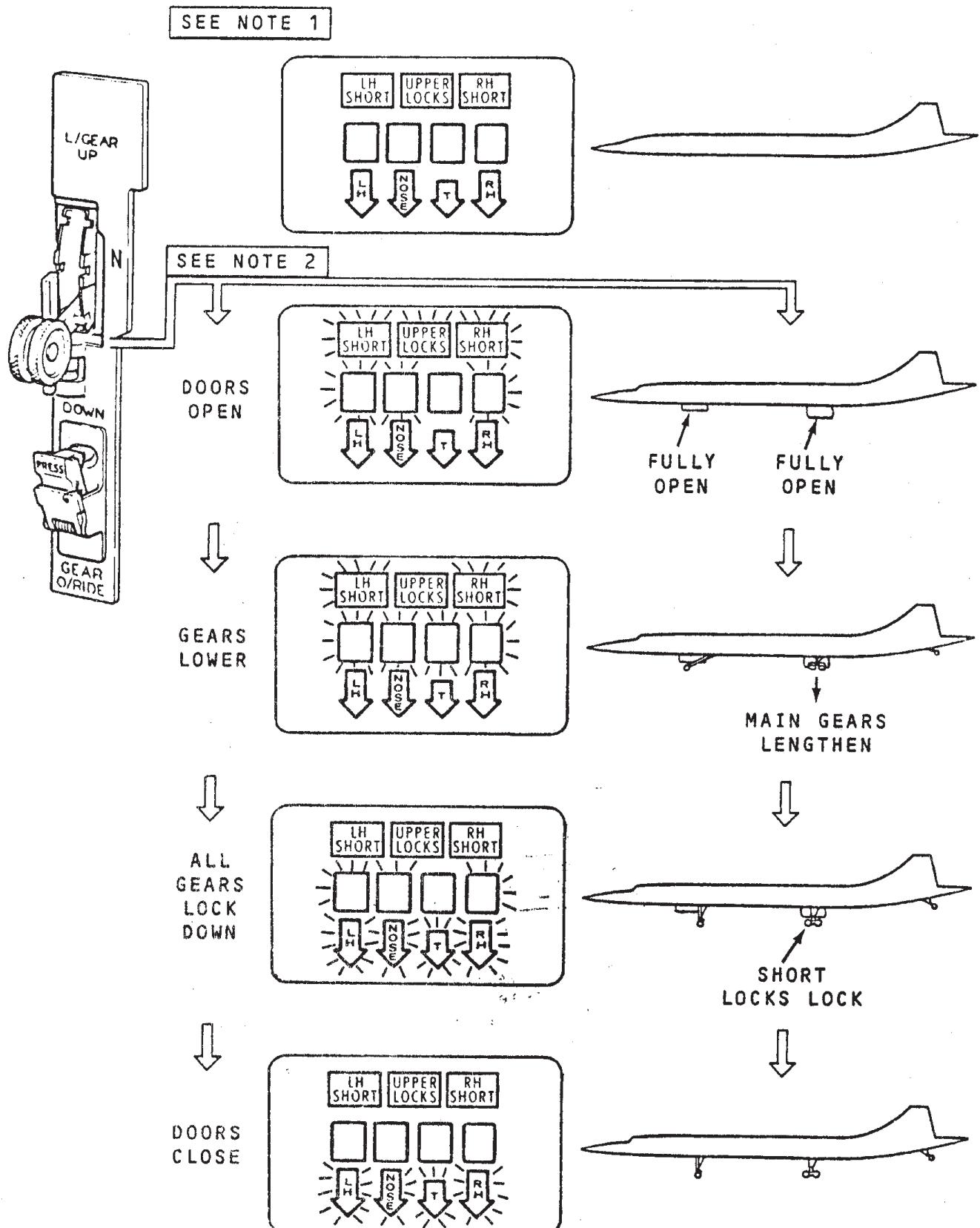
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BASIC SEQUENCING FAULTS



NORMAL 'DOWN' SELECTION



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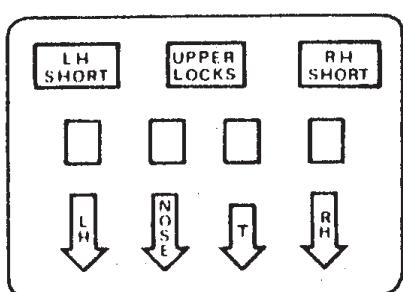
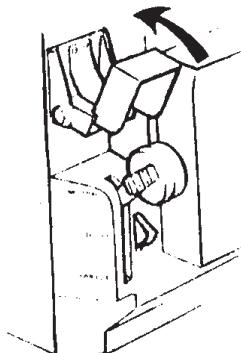
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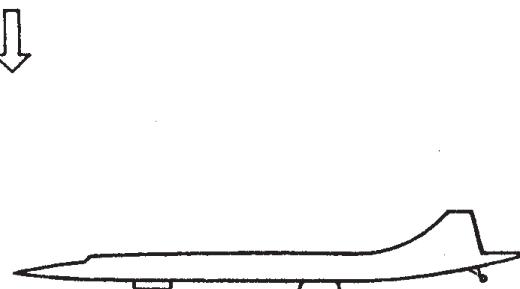
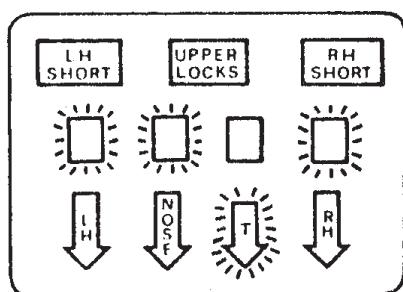
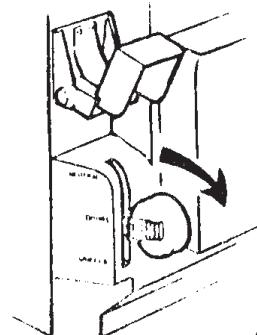
STANDBY 'DOWN' SELECTION

SET NORMAL SELECTOR TO 'NEUTRAL'

CHECK YELLOW SYSTEM HYDRAULIC PRESSURE AVAILABLE



RAISE GUARD



DOORS OPEN - TAIL GEAR EXTENDED

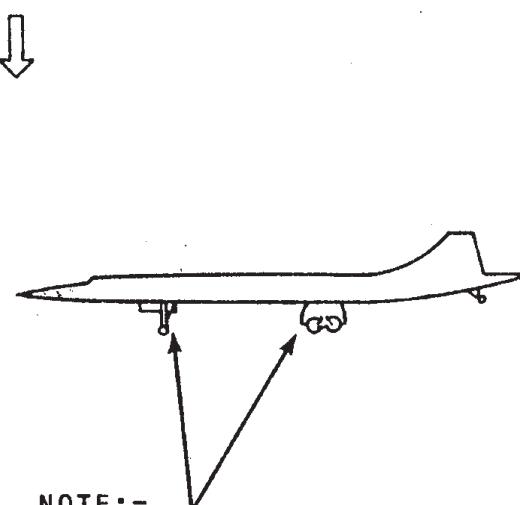
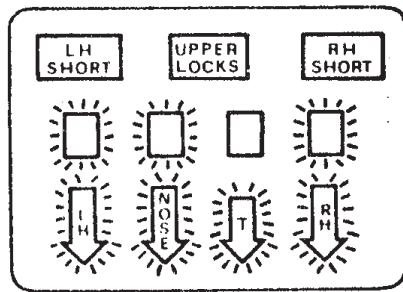
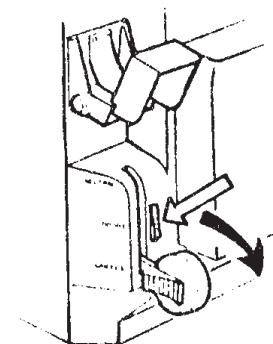
PRESS KNOB CATCH

SELECT DOORS

→ GREEN PRESSURE ISOLATED

WAIT 4 SECS

THEN.....

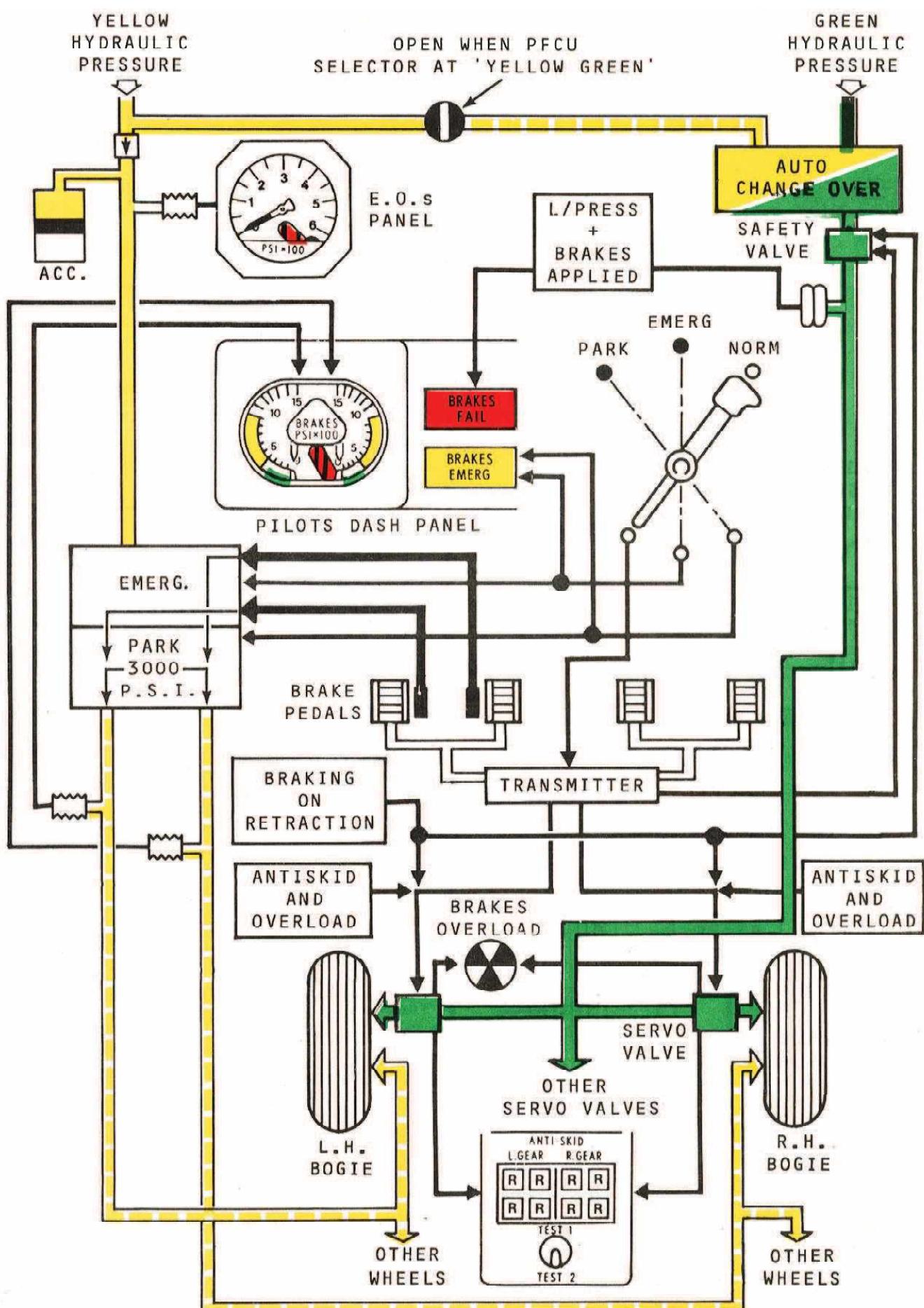


PRESS GATE CATCH
SELECT WHEELS

NOTE:-
DOORS REMAIN OPEN

NOTE:- IN ORDER TO CHECK 'SHORT LOCKS' LIGHTS, NORMAL
SELECTOR MUST BE SET TO 'DOWN'

BRAKES SYSTEM

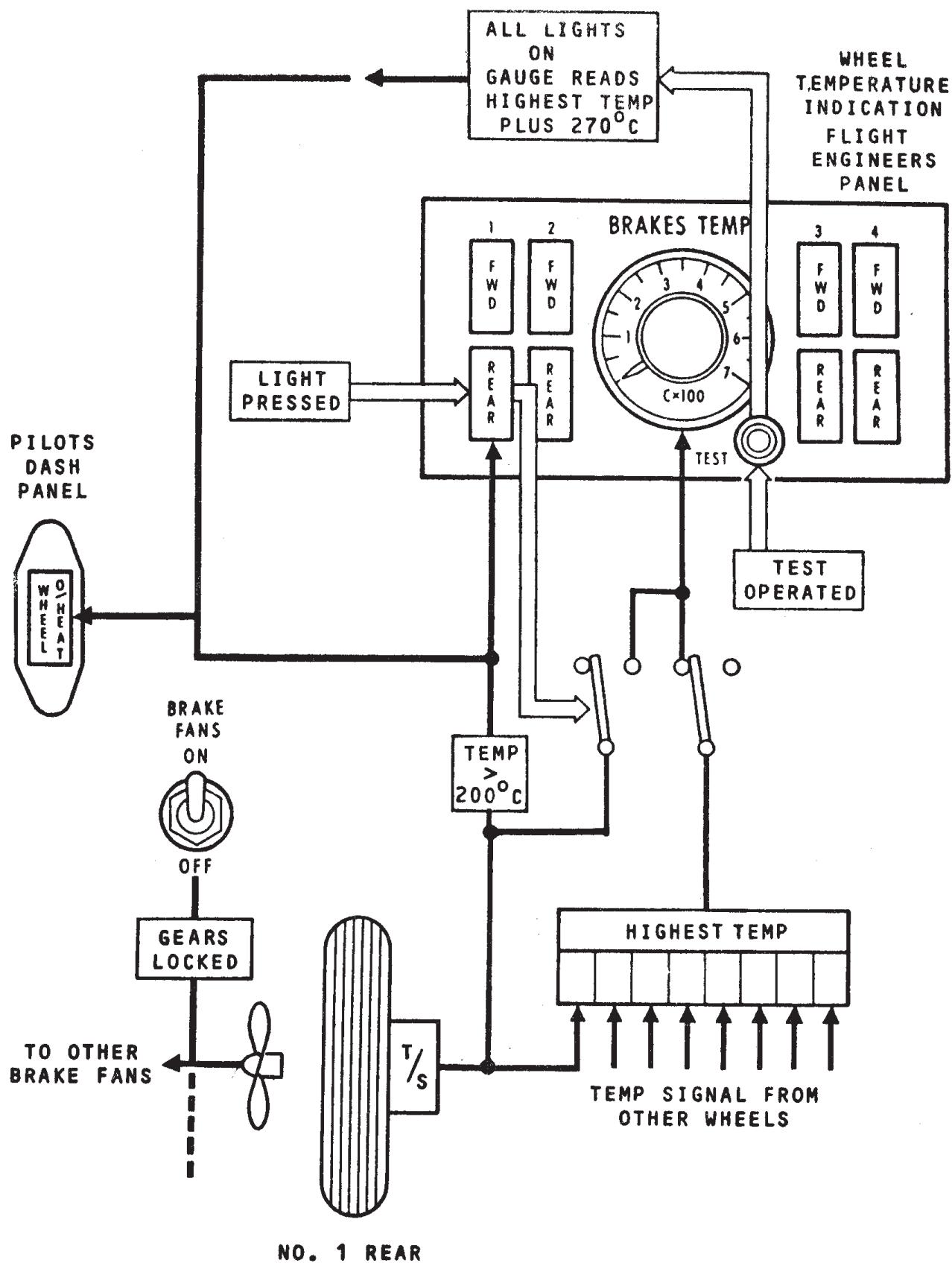


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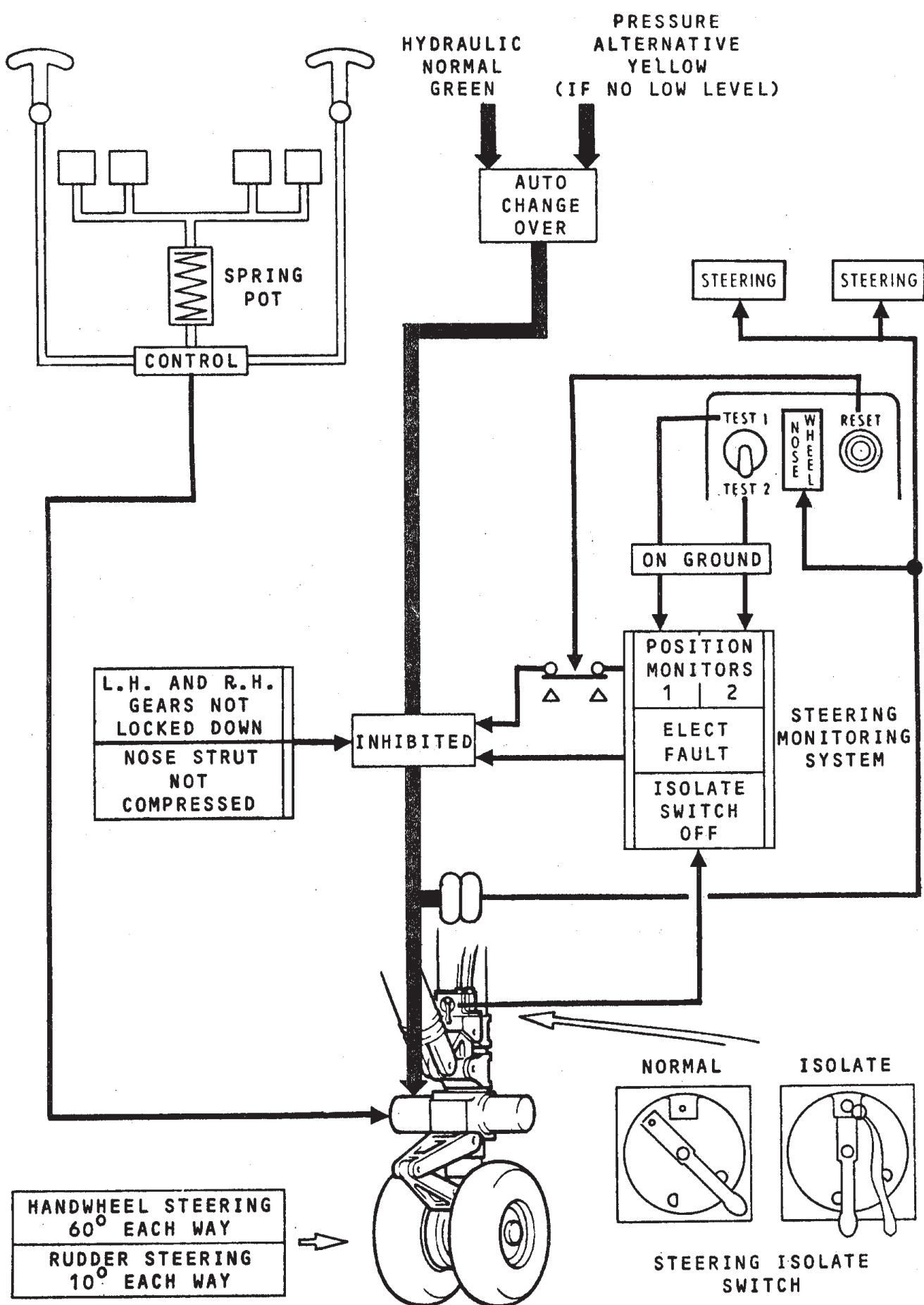
CONCORDE FLYING MANUAL

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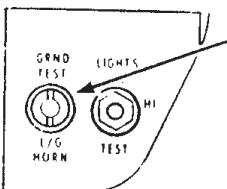
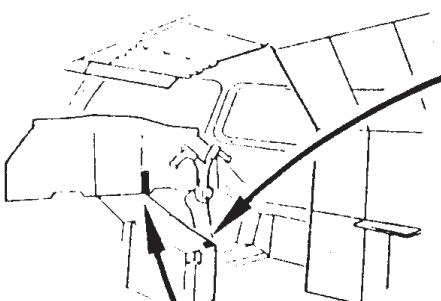
BRAKES TEMPERATURE



STEERING



NORMAL CONTROL



L/G HORN GRND TEST
PUSH BUTTON

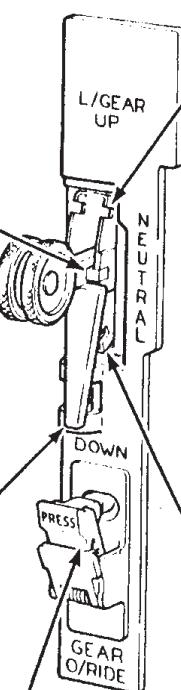
Pressed - with an ADC on and throttles away from maximum power position, tests the Landing Gear Horn.

UP POSITION

To move the L/GEAR lever from down to UP, pull the lever knob and set to UP. The action of pulling the L/GEAR lever removes a safety baulk between NEUTRAL and UP providing the LH main shock absorber is extended.

NEUTRAL POSITION

To move the L/GEAR lever from UP to NEUTRAL, pull the lever knob and set to NEUTRAL. AT NEUTRAL the landing gear electrical control is de-activated, the gear and door selector valves go to their neutral position and the landing gears and doors are held by mechanical locks. In addition, provided the visor is locked in the up position the green hydraulic supply to the landing gear and door selectors is shut off thus preventing any inadvertent landing gear extension in supersonic flight.



SPRING LOADED GUARD

The guard secures the L/GEAR lever in the NEUTRAL position to prevent inadvertent landing gear DOWN selection.

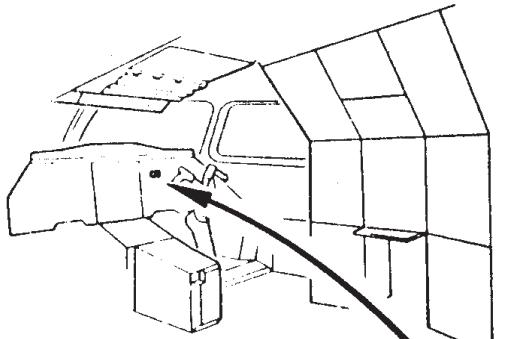
DOWN POSITION

To move the L/GEAR lever from NEUTRAL to DOWN pull the lever knob, move the spring loaded guard to the left, and set to DOWN. NOTE: At DOWN the yellow hydraulic system engine driven pumps are unloaded.

GEAR O/RIDE PUSH BUTTON

Pressed-overrides the safety baulk between NEUTRAL and UP position.
When GEAR O/RIDE has been used a spring loaded flap drops to expose a RED and YELLOW striped flag.

NORMAL ANNUNCIATOR PANEL



LEFT LEG SHORT LIGHT
(Amber)

Armed only when the L/GEAR lever at down.
On - indicates that the shortening lock is not engaged.

LANDING GEAR TRANSIT
LIGHT (Red) (4)

On - indicates that the corresponding main or nose landing gear doors are not closed or in the case of the tail gear it is in transit.

LEFT LEG ARROW LIGHT
(Green)

On - indicates that the left hand leg of the gear is down and locked.

NOSE GEAR ARROW LIGHT
(Green)

On - indicates that the nose gear is down and locked.

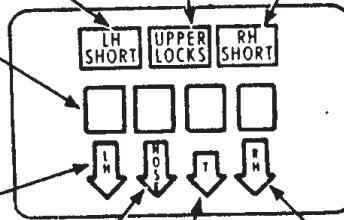
LANDING GEAR UPPER LOCKS
LIGHT (Amber)

On - with the L/GEAR lever at DOWN indicates that a gear uplock is in an engaged condition.

On - with the L/GEAR lever at NEUTRAL or UP indicates that a gear uplock is not engaged.

RIGHT LEG SHORT LIGHT
(Amber)

Armed only when the L/GEAR lever at DOWN. On - indicates that the shortening lock is not engaged.



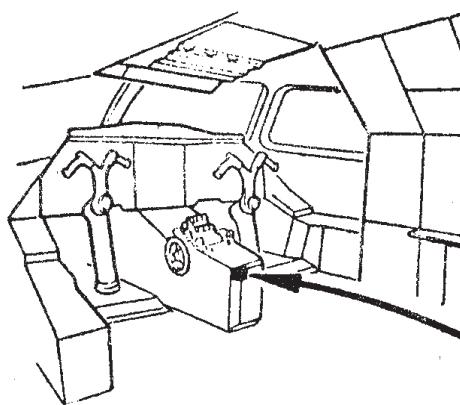
RIGHT LEG ARROW LIGHT
(Green)

On - indicates that the right hand leg of the gear is down and locked.

TAIL GEAR ARROW LIGHT
(Green)

On - indicates that the tail gear is down and locked.

STANDBY LOWERING LEVER



STANDBY LOWERING LEVER

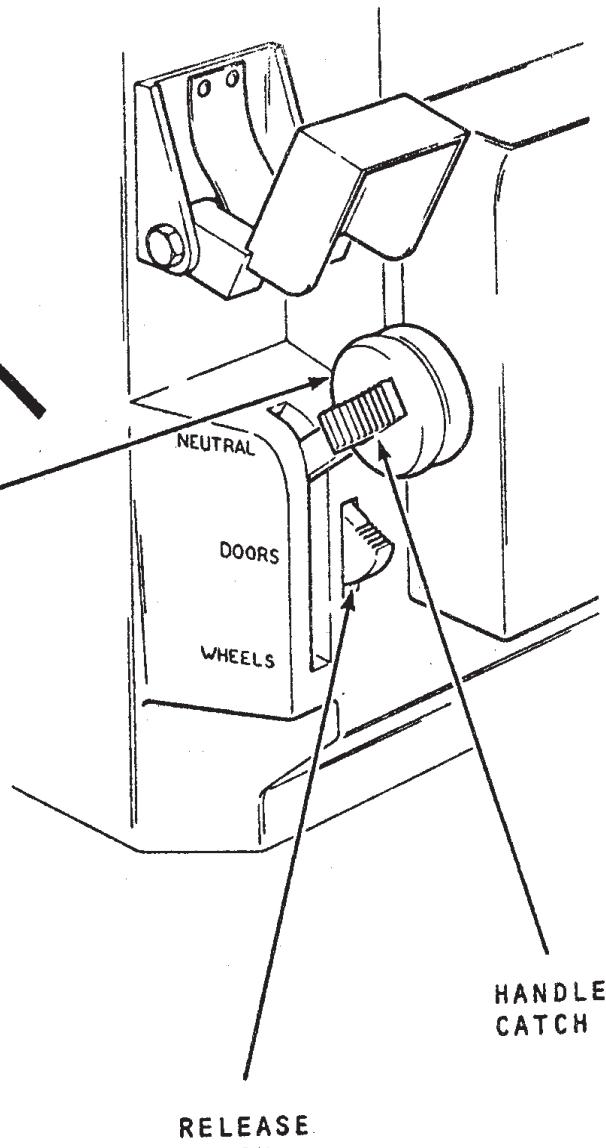
NEUTRAL - the landing gear standby selector valve goes to the neutral position, thus removing yellow hydraulic pressure from the landing gear door and lock jacks.

To set the lever to DOORS, the handle catch must be pressed.
DOORS - the hydraulic fluid return is connected to the yellow hydraulic reservoir and the green hydraulic supply to the gear and doors selector is shut off. The yellow hydraulic system then releases the nose and main landing gear door up-locks and lowers the doors and the tail-wheels. The doors are fully open at approximately 2 seconds.

To set the lever to WHEELS, both the handle catch and the separate release catch must be pressed.

WHEELS - the yellow hydraulic system releases the nose and main gear uplocks and lowers the nose and main gear.

NOTE: The doors will remain fully open.



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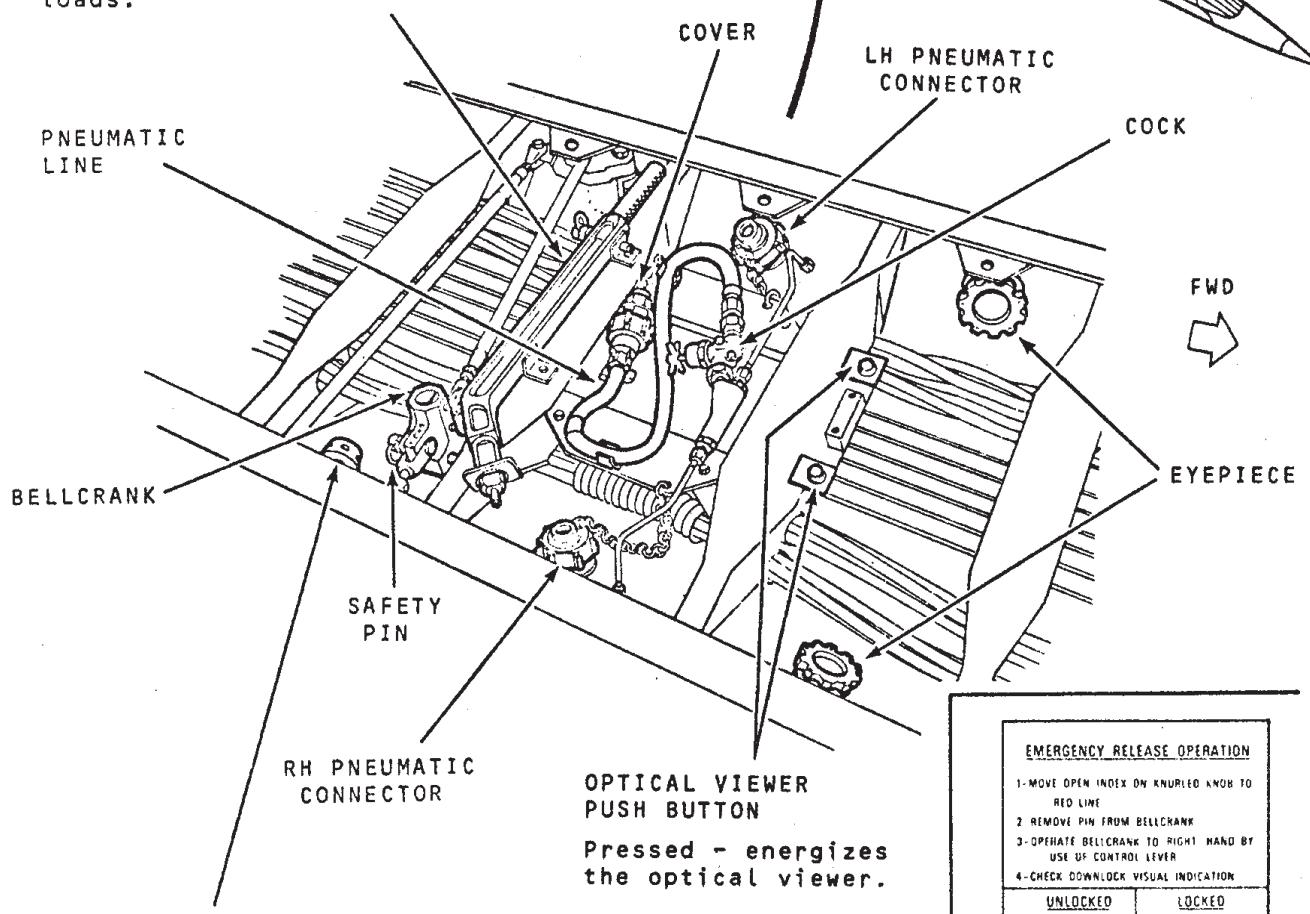
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MAIN GEAR FREE FALL

CONTROL LEVER

When engaged with the bellcrank and moved to the right, through mechanical linkage releases the main landing gear and doors uplocks. The main landing gear and doors then free fall under their own weight and aerodynamic loads.



KNURLED KNOB

Through mechanical linkage, opens an auto-depressurization valve in the main landing gear hydraulic system, thus confirming cut-off of the green hydraulic pressure to the main landing gears. It also vents the return side of the main landing gear and door jack to atmosphere.

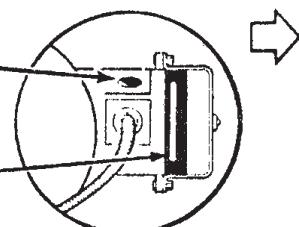
NOTE: The control lever may be used to assist in unscrewing the knurled knob.

A red dot visible through the eyepiece indicates that the power supply and lights of the optical viewer are serviceable.

The bright line (white) indicates that the landing gear is down and locked.

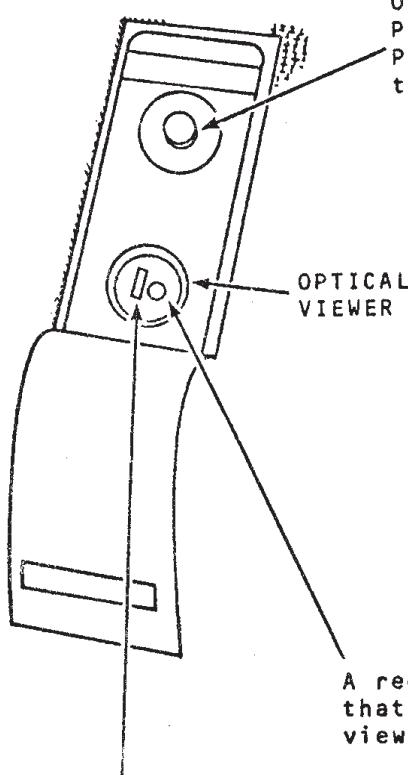
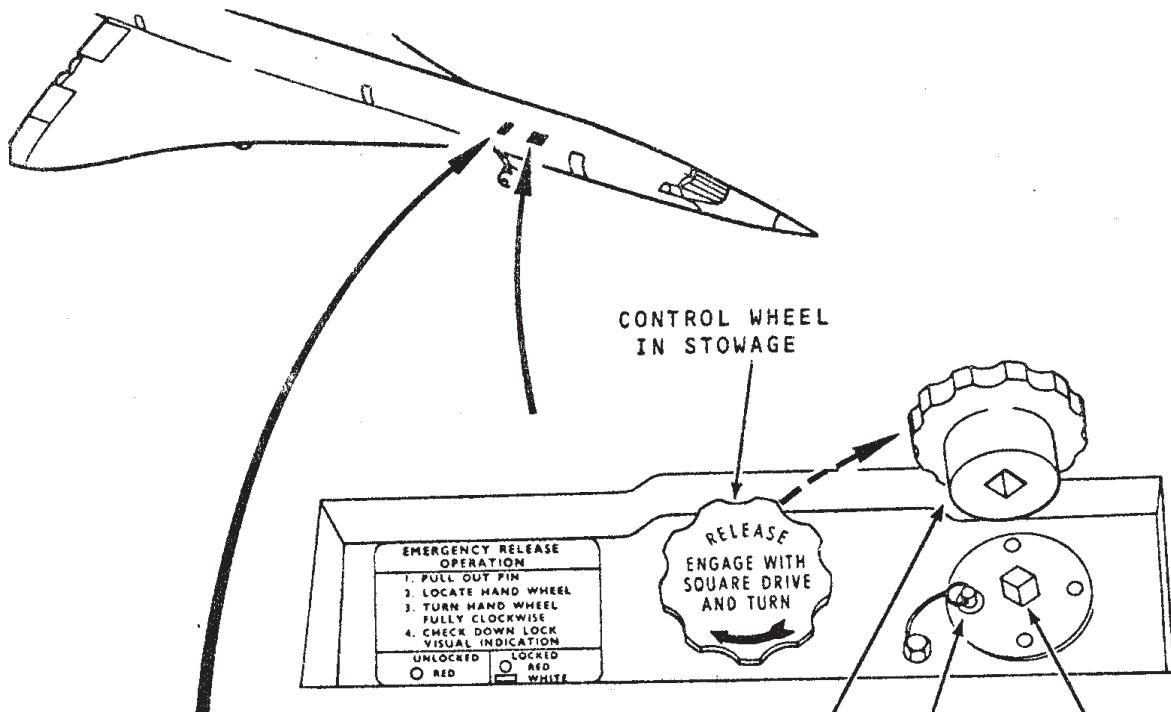
PLACARD
On underside of access panel.

FWD



VIEW THROUGH EYEPIECE

NOSE GEAR FREE FALL



The control wheel, through a mechanical linkage:

- Opens an auto-depressurization valve in the nose landing gear green hydraulic system, thus confirming the cut-off of the green hydraulic pressure to the nose landing gear.
- Vents the return side of the nose landing gear and door jacks to atmosphere.
- Releases the nose landing gear door uplocks.
- Releases the nose landing gear uplock. The nose landing gear and doors then free fall under their own weight and aerodynamic loads.

A red dot visible through the eyepiece indicates that the power supply and lights of the optical viewer are serviceable.

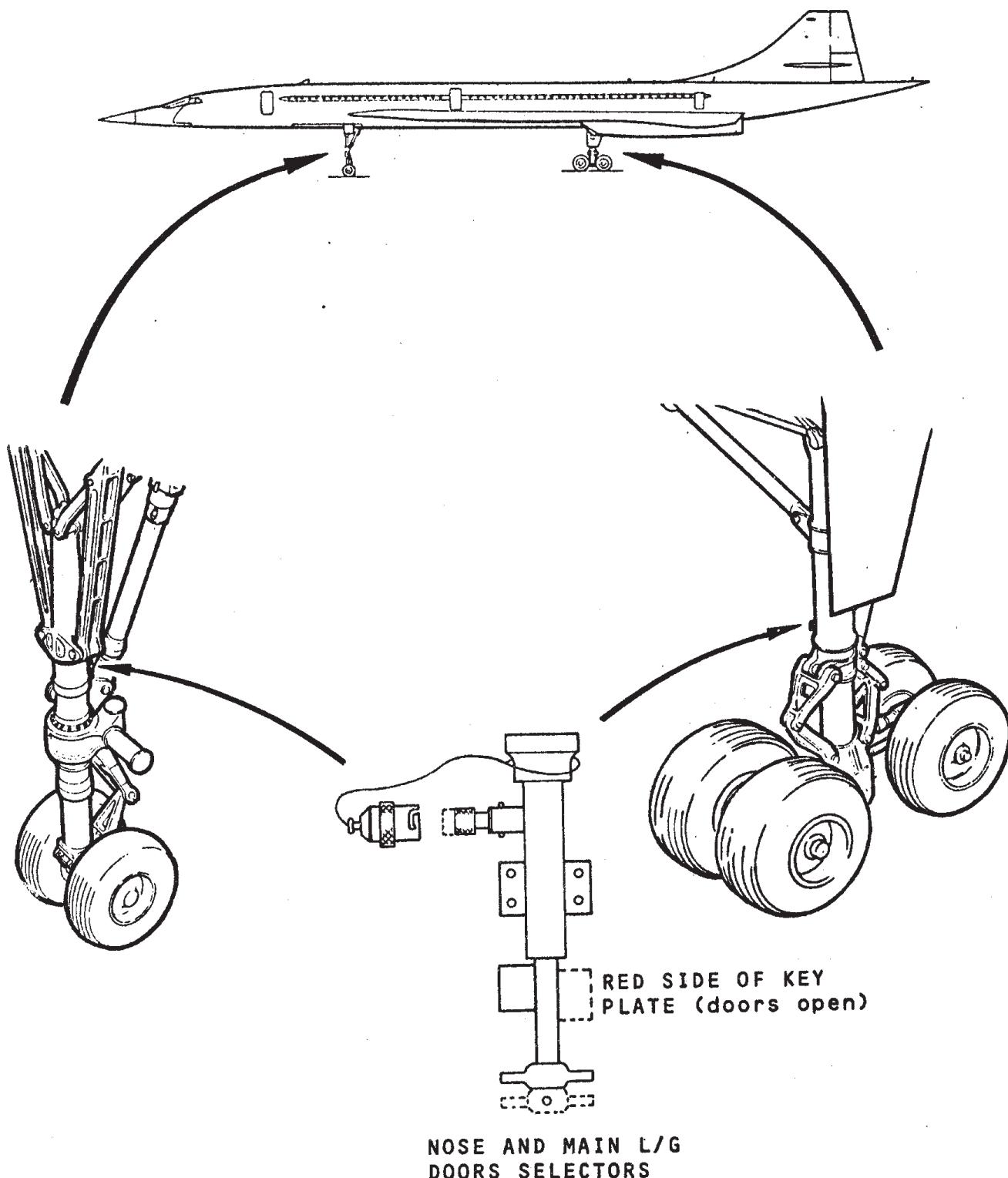
The bright line (white) indicates that the landing gear is down and locked.

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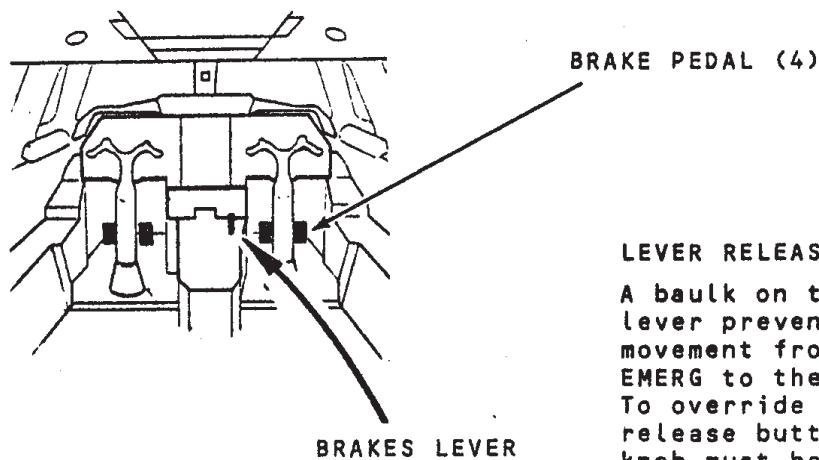
DOORS



With landing gear lever at DOWN, visor down and green system pressurized, both main landing gear doors can be opened simultaneously on the ground by a selector located on the LH gear leg.
Nose landing gear doors can be opened by a selector on the nose gear leg.

(Unchanged)

BRAKES LEVER



NORMAL POSITION

NORM - full anti-skid braking is selected powered by the green hydraulic system or by the yellow hydraulic system if the yellow rotary selector on the servo control panel is set to YELLOW/GREEN and green hydraulic system pressure is low.

LEVER RELEASE BUTTON

A baulk on the brakes lever prevents continuous movement from NORM or EMERG to the PARK position. To override the baulk the release button on the lever knob must be depressed.

NOTE

All movement of the brakes lever between NORM and EMERG in both directions should be made firmly and without hesitation as there is a position between NORM and EMERG where all hydraulic power to the brakes is removed.

EMERGENCY POSITION

EMERG - braking is powered by the yellow hydraulic system but no anti-skid is available.

NOTE

When the brake lever is moved from PARK there is no positive latching at EMERG. Selection of EMERG should therefore always be made from NORM.

PARK POSITION

PARK - the brakes are applied with pressure from the brakes accumulator.

CAUTION

With the aircraft moving PARK should only be used if absolutely necessary. No modulation of the brake pressure is available, because at PARK all available brakes accumulator pressure is delivered to the brakes.

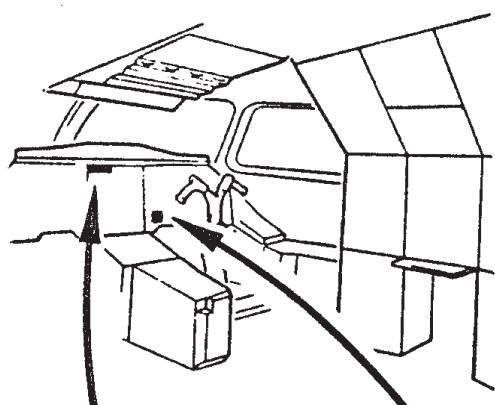
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LANDING GEAR

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BRAKING CONTROL AND INDICATION

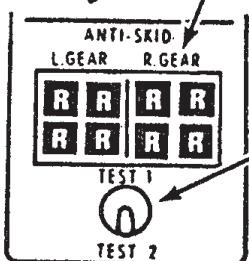
(SHEET 1 of 2)



R LIGHT (White) (8)

Armed when the landing gear is down and locked.

On - indicates that the corresponding brake anti-skid is released.
Off - indicates that the corresponding brake anti-skid is not released.

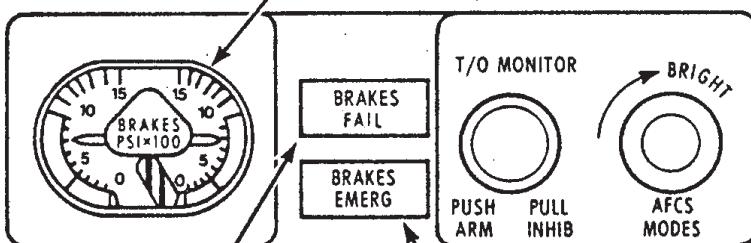


ANTI-SKID SYSTEM TEST
SELECTOR

TEST 1 and TEST 2 are continuity checks of the two channels for aircraft speed detection and the anti-skid units.

DUAL BRAKES PRESSURE GAUGE

Displays only the emergency and parking brakes pressure. The left and right-hand gauges refer to left and right hand gear wheel brakes. A red and black flag indicates loss of gauge power supply.



BRAKES FAIL LIGHT (Red)

On - indicates a low hydraulic pressure condition in the normal brakes system. The warning is only armed when the brake pedals are depressed.

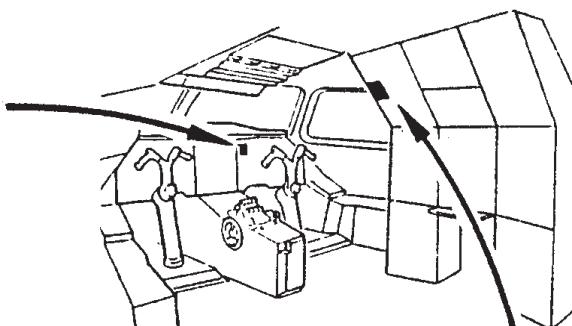
BRAKES EMERGENCY LIGHT
(Amber)

On - indicates the brakes lever is not at the NORM position.

BRAKING CONTROL AND INDICATION
(Sheet 2 of 2)

WHEELS O/HEAT LIGHT (Red)

On - indicates a brake temperature exceeding 220 deg C.

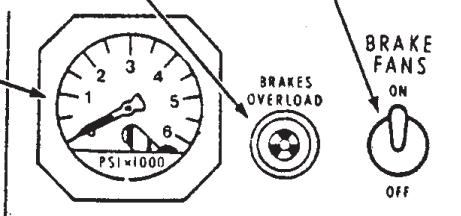


BRAKES OVERLOAD MI

- ➊ Cloverleaf (White) with brake lever at NORM - indicates an overtorque condition has triggered safety circuits to inhibit normal operation of affected brake units. Resetting the safety circuits to restart normal brake operation may be performed by Flight Crew action but the MI will indicate an overtorque condition until reset at the brake adaptor unit.

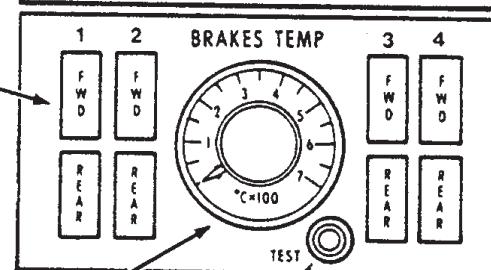
BRAKE FANS SWITCH

ON - the eight brake fans operate providing that the landing gear is down.



BRAKES ACCUMULATOR PRESSURE GAUGE

A red and black striped flag indicates loss of electrical power supply of the accumulator pressure gauge.



BRAKES TEMP FWD AND REAR LIGHT (Red) (8)

On - indicates that the corresponding brake temperature exceeds 220 deg C.

Accompanied by the WHEELS O/HEAT light.
Pressed - causes the BRAKES TEMP gauges to indicate the temperature of the associated brake.

BRAKES TEMP GAUGE

Displays the highest brake temperature or if a BRAKES TEMP light is pressed, the temperature of the associated brake.

BRAKES TEMP TEST PUSH BUTTON

Pressed - tests the wheel overheating warning system by adding 270°C to the gauge reading.

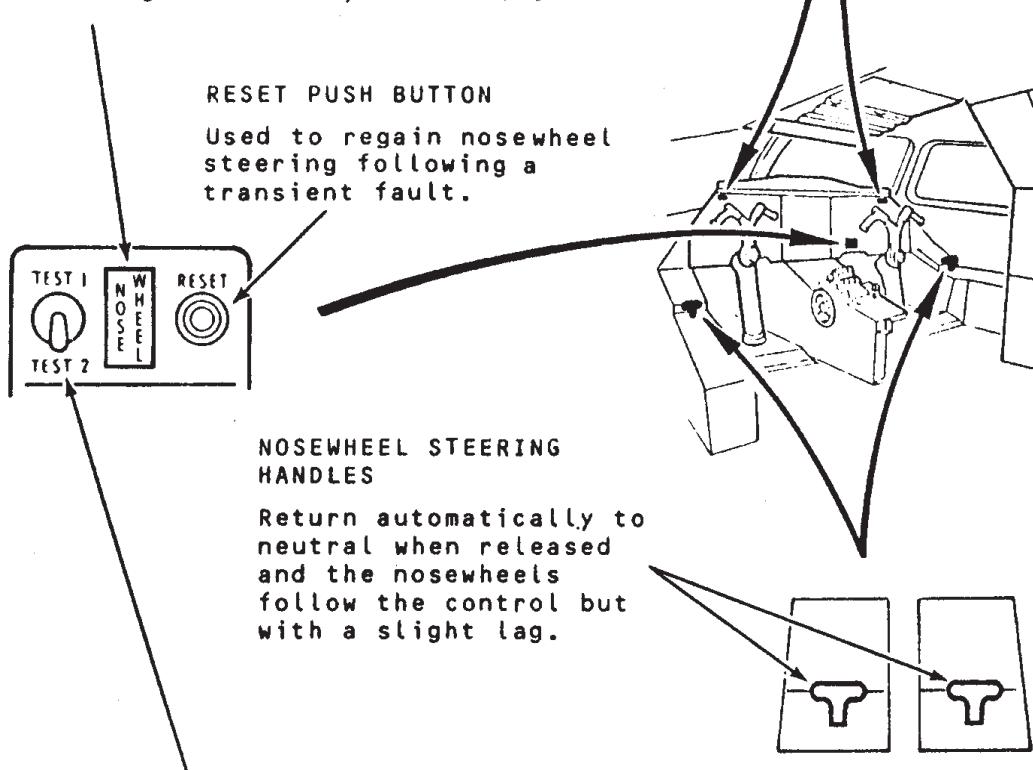
STEERING CONTROL

NOSEWHEEL LIGHT (Red) and STEERING LIGHT (Red) (2)

Armed only while the aircraft is on the ground. On - indicates that the nosewheel steering has been inhibited by the monitoring system. The monitoring system covers loss of hydraulic pressure to the nosewheel steering, discrepancy between the control input and the monitoring system and operation of the steering isolate switch. The system will remain inhibited until the fault is cleared and the system is reset using the RESET push button.

STEERING LIGHT (Red)

STEERING



NOSEWHEEL TEST SELECTOR

TEST 1 - tests operation of the first monitoring channel of the nosewheel steering electric control which monitors discrepancies that may arise between the steering handle control input signal and wheels position.

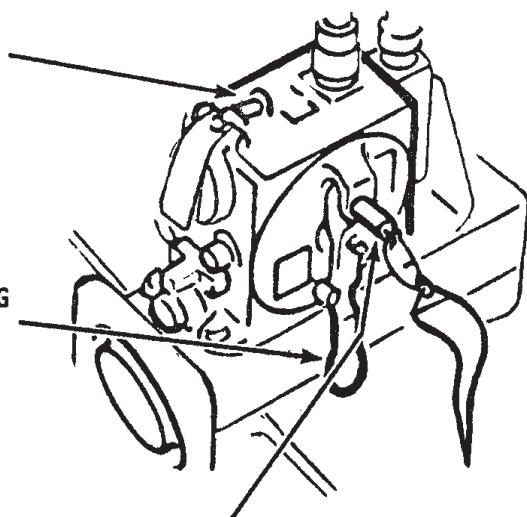
TEST 2 - tests operation of the second monitoring channel of the nosewheel steering electric control which detects nosewheel steering runaway.

Each monitoring channel is associated with a shut-off valve which, when de-energized, inhibits the control by cutting hydraulic pressure.

When the nosewheel test selector is released it resets the nosewheel control system.

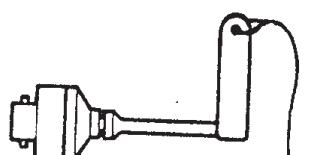
SAFETY PINS

GROUND ENGINEER'S
INTERPHONE BOX

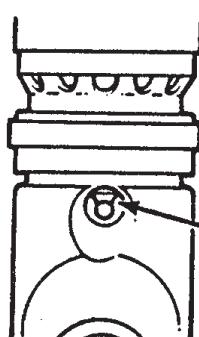
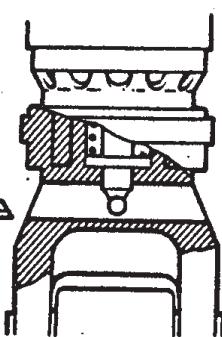
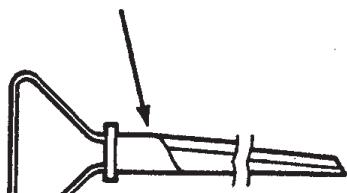
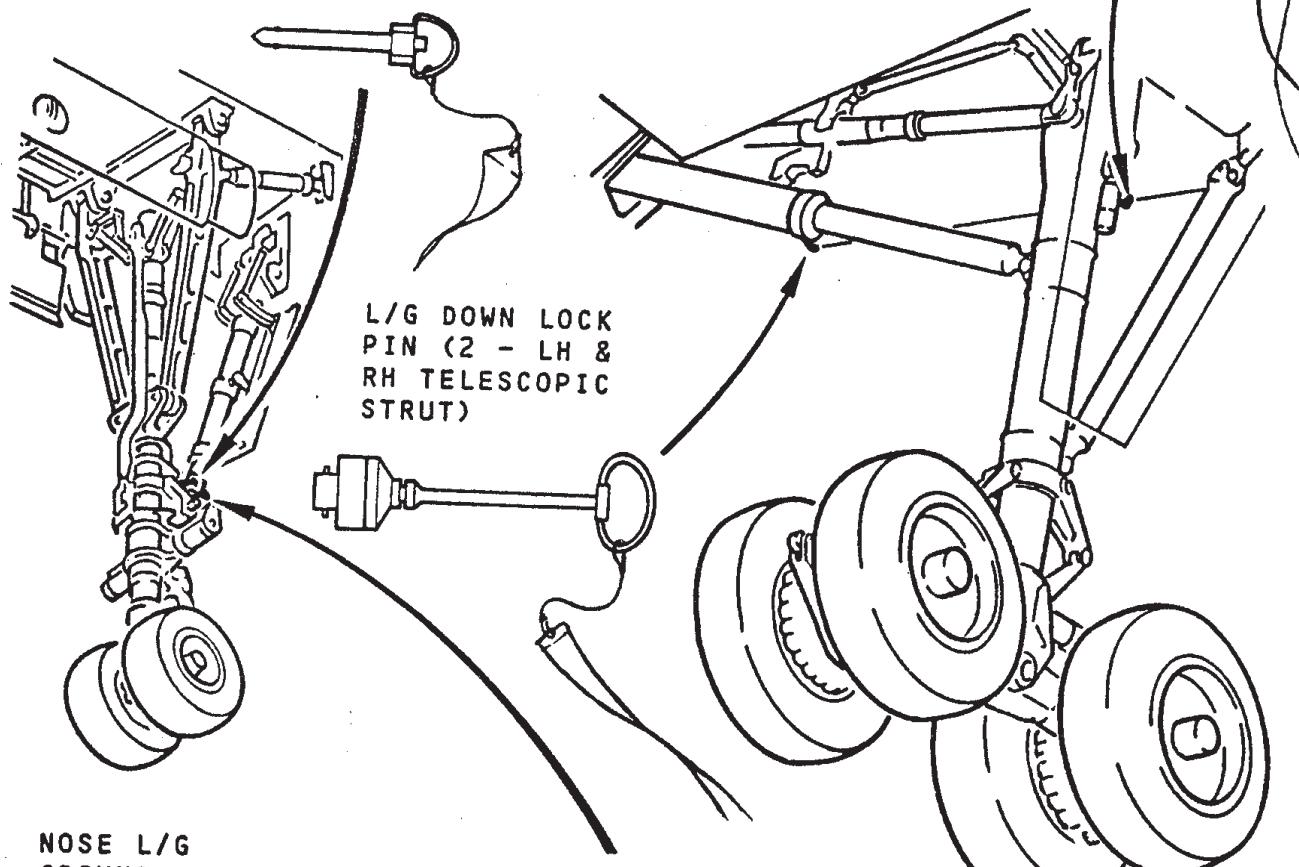


NOSEWHEEL STEERING
CONTROL LEVER

SHORT LOCK PIN
(2 - LH & RH LEG)



NOSEWHEEL STEERING
ISOLATE LOCK PIN



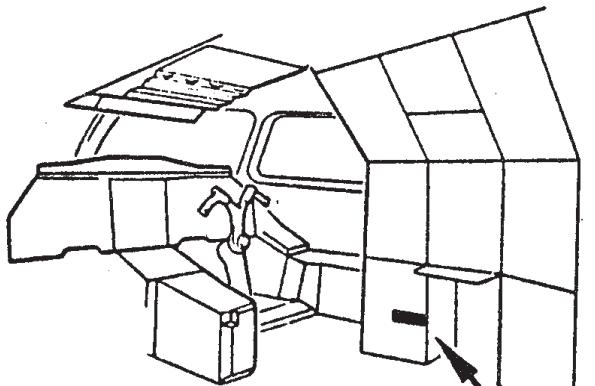
GROUND LOCK
BOLT

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LANDING GEAR

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FAULT ANNUNCIATOR PANEL



PRINTED IN ENGLAND

LANDING GEAR - FAULT ANNUNCIATOR									
	<input type="checkbox"/> NOSE	LH	RH	<input type="checkbox"/> RH NOSE	LH	LH	RH	LH	<input type="checkbox"/> RH
	WHEEL ALIGN	BOGIE BEAM		SHOCK ABSORB		NOSE DOORS		MAIN DOORS	

LANDING GEAR FAULT ANNUNCIATOR

The lights energized only when the L/GEAR lever is set to UP except LH SHOCK ABSORB which is also energized with the selector at NEUTRAL.

(Unchanged)

Chapter 15

**NAVIGATION
SYSTEMS**

(ATA CHAPTER 34)

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NAVIGATION

GENERAL

The navigation system includes those items that provide position and direction data to the flight crew. The system includes both ground dependent and independent position indicating systems.

AIR DATA SYSTEM

Two separate and independent air data systems are supplied by two air data computers, ADC 1 and ADC 2.

The air data computers receive input signals from the following:

	ADC.1	ADC.2
Total Pressure	Located on left hand side of droop nose; Pitot Probe (PO3)	Located on right hand side of droop nose; Pitot Probe (PO2)
Incidence (Local)	Sensor No.1	Sensor No.2
Total Temperature	T _T Sensor No.1	T _T Sensor No.2
Droop Nose Angle	Transmitter Unit Output A	Transmitter Unit Output B
Static Pressure	Cross connected Static ports S17 & S18 on left and righthand side of main fuselage.	Cross connected Static ports S16 & S19 on right and lefthand side of main fuselage.
Aircraft Weight	FQI Panel CG Channel Selector	FQI Panel CG Channel Selector

Each ADC has a built-in servo monitor system which checks the servo channel operation for altitude, airspeed, Mach number, temperature, vertical speed and incidence.

A comparator system compares the altitude, airspeed, Mach number and incidence outputs for the ADC's.

ADC 1 supplies the Captain's dash panel instruments and the Flight Engineer's Machmeter (see chapter 10), all No.1 automatic systems as detailed overleaf, the N₁ limiter of engine 4, the secondary air doors and ground idle control of engines 1 and 4, the ground proximity warning system, No.1 ATC transponder and INS 1 and 3.

ADC 2 supplies the First Officer's dash panel instruments and the Flight Engineer's Altimeter (see chapter 10) all No.2 automatic systems as detailed overleaf, the secondary air doors and ground idle control of engines 2 and 3, No.2 ATC transponder and INS 2.

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NAVIGATION

SUMMARY OF ADC OUTPUTS

INSTRUMENTS	MACH NUMBER	ALTITUDE	AIRSPEED	TRUE AIRSPEED	VERTICAL SPEED	INCIDENCE	TOTAL TEMPERATURE	STATIC TEMPERATURE	M_{MO}	V_{MO}	AIRSPEED - V_{MO}	V_{LA}
POWERED FLIGHT CONTROLS	*	*	*	*	*	*	*	*	*	*	*	*
AUTOSTABILIZATION	*		*								*	
SUPER STABILIZATION	*		*	*		*						
ARTIFICIAL FEEL	*		*									
TRIM	*		*			*					*	
STICK SHAKER						*					*	*
AUTOPILOT	*	*	*	*	*						*	
AUTOTHROTTLE	*		*									
A.T.C. TRANSPONDER	*		*									
I.N.S.		*		*								
GROUND PROXIMITY WARNING												
OVERSPEED WARNINGS	*		*			*						
C.G. & MACH LIMIT WARNINGS	*		*				*				*	
AIDS	*	*	*			*	*	*				*
ANTI ICING							*					
SECONDARY AIR DOORS	*		*									
NASU	*											
GROUND IDLE			*									
N_1 LIMITER ENGINE 4												

NAVIGATION

INERTIAL NAVIGATION SYSTEM

Three separate and independent inertial navigation systems INS 1, INS 2 and INS 3 provide navigation, heading and attitude information.

Normally INS 1 supplies data to the left dash panel and AFCS 1, while INS 2 supplies data to the right dash panel and AFCS 2. INS 3 can supply attitude data to the left or right dash panel by operation of the ATT-INS switches but cannot supply data to either AFCS. Each INS has an associated control module located on the centre console which provides facilities for obtaining current navigation data in digital display form and is also used for loading desired route data.

INS 1 and 2 supply steering commands to AFCS 1 and 2 respectively, to provide automatic navigation when the auto pilot is selected to the INS mode.

Alignment of the inertial platform takes approximately 15 minutes and is initiated by means of the mode selector unit. There is one MSU for each INS and these are located on the Flight Engineer's panel. Once the selector has been set to NAV mode the MSU is not operated unless a failure of the INS occurs.

The INS is continuously self-monitored during flight and a comprehensive system of warning indications is provided, including action and malfunction codes obtainable from the control modules.

External monitoring is provided by a comparator which protects the AFCS against undetected INS failures. This comparator compares signals which the INS send to the AFC systems. The comparator unit examines the outputs from the three inertial platforms and also compares attitude on each ADI with the other and heading on each HSI with the other. At all times above 600 feet the comparator looks at pitch and roll attitude outputs from all three platforms and uses voting logic to decide which platform is faulty in the event of any significant discrepancy. Below 600 feet with LAND or GLIDE selected the comparator reduces the detection threshold on pitch and roll attitude discrepancy and, in addition, looks at vertical acceleration and heading outputs from the INS and course settings on the AFCS.

A comparator warning will normally cause disconnection of the associated AFCS as well as indicating the failed INS. In the case of an attitude failure in INS 1 or INS 2, the sphere in the associated ADI will tilt 90° pitch down, providing the ADI comparison threshold has been exceeded and INS 3 is providing valid attitude data.

In comparing attitude and heading on the ADIs and HSIs of the Captain and First Officer the comparator unit generates a warning when they differ from each other by more than 4°. This monitoring is effective at all times and the detection level is slightly tighter than that for INS attitude monitoring above 600 feet.

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NAVIGATION

In case of failure of INS 1, the Captain can select his NAV-INS switch to INS 2 to regain navigation display on his HSI. Similarly the First Officer can switch his HSI to INS 1.

RADIO NAVIGATION

Duplicated radio navigation systems provide bearings of a VOR or ADF beacon, distance to a DME beacon and localiser and glide slope indications.

In normal operation No.1 compass coupler system feeds the Captain's ADF-RMI and the First Officer's VOR-RMI and No.2 compass coupler system feeds the Captain's VOR-RMI and the First Officer's ADF-RMI.

HORIZONTAL SITUATION INDICATOR

The Horizontal Situation Indicator displays commands from three sources, VOR, ILS and INS. Input source to each HSI is controlled by a RAD/INS switch.

RADIO ALTIMETER

Two independent radio altimeters provide low altitude information in the height range from 0 to 2500 feet. The radio altimeter is used with the automatic landing system and low altitude flight systems. To ensure the best possible integrity of the system, a monitoring system checks the system three times per second.

Height information, from No.1 system is supplied to the Captain's radio altimeter, the First Officer's ADI and No.1 autopilot, and from No.2 system is supplied to the First Officer's radio altimeter, the Captain's ADI and No.2 autopilot.

The decision height is adjustable and visual and aural warnings are given at the selected height.

GROUND PROXIMITY WARNING SYSTEM

A single Ground Proximity Warning System provides warning of impending collision with terrain. The system uses inputs of radio altitude and vertical speed, plus glideslope deviation during approach, to provide five different modes of protection.

1. Excessive rate of descent with respect to terrain.
2. Excessive closure rate with terrain.
3. Loss of altitude below 700 feet after take off.
4. Proximity to ground with aircraft not in landing configuration.
5. 'Duck under' the glideslope.

For modes 1, 2, 3 and 4 the warning takes the form of a flashing red TERRAIN light on the captain's and first officer's panels plus an aural warning - "Whoop, Whoop, Pull-Up" from the audio warning

NAVIGATION

system.

For mode 5 the warning is aural only; this is independent of the other aural warning and says "Glide-Slope".

Both aural warnings are repeated until the aircraft is out of the hazardous situation. However the repetition rate of the "Glide-Slope" warning is dependent on the degree to which the warning envelope is penetrated, the rate increasing as penetration deepens. In addition, a Mode 5 warning occurring above 300 feet is classified as 'soft' and the "Glide Slope" warning is attenuated. Below 300 feet, if a glideslope deviation of more than 2 dots fly-up is achieved, the "Glide-Slope" warning level is increased to add more urgency.

A 'soft' Mode 5 warning may be cancelled by pressing either TERRAIN switch-light. A 'hard' Mode 5 warning cannot be cancelled. Mode 5 may be inhibited before a warning occurs by pressing either TERRAIN switch-light when the aircraft has descended below 1000 feet.

A 'Pull Up' warning always overrides a 'Glide Slope' warning and cannot be cancelled. The Ground Proximity Warning System is inhibited by a 'Stall' warning.

MARKER BEACON SYSTEM

The pre-tuned marker beacon system provides visual and aural signals to the flight crew.

WEATHER RADAR

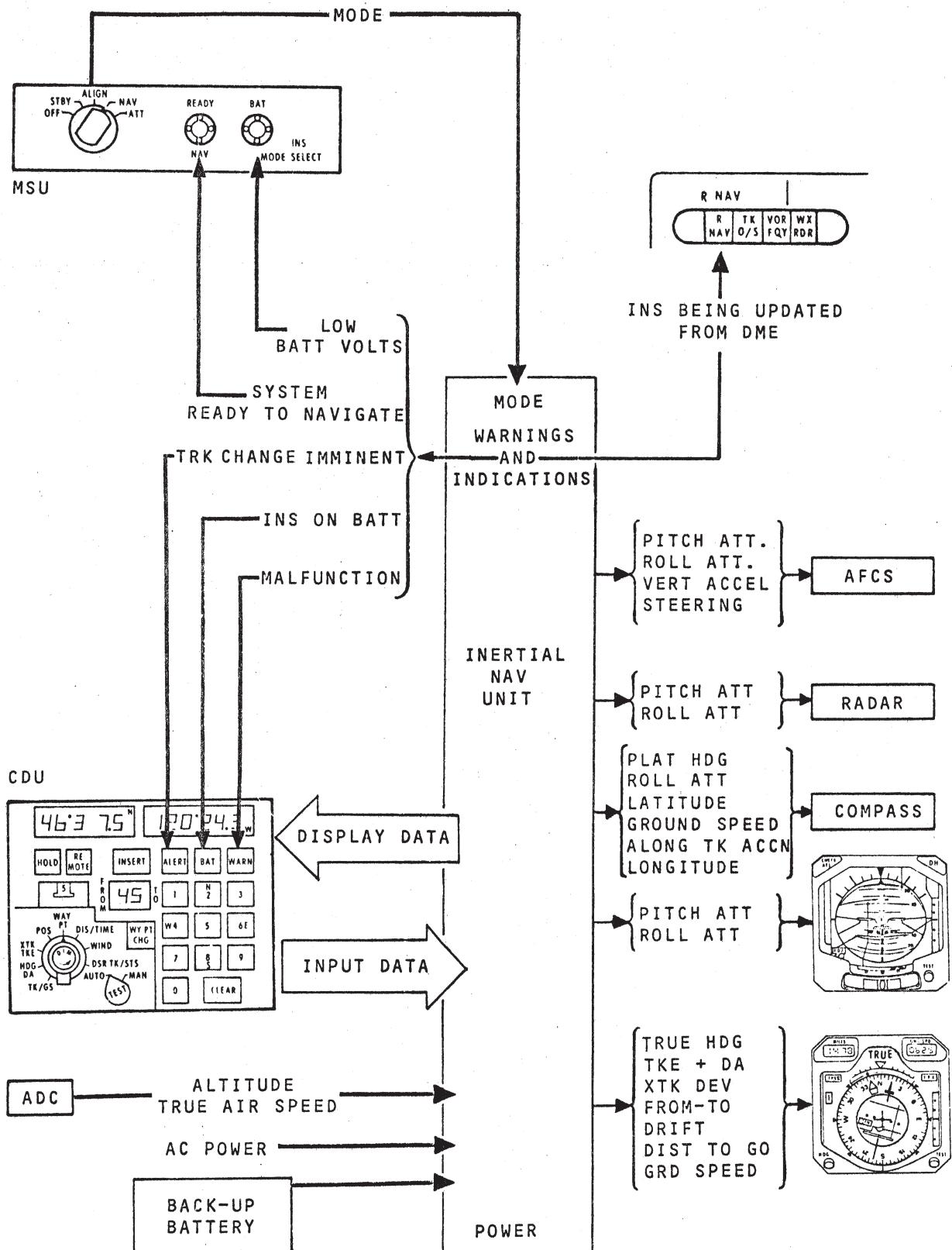
The weather radar system comprises duplicated radar displays and transceivers and a single radar antenna controlled through one control unit.

The weather radar system provides continuous information for weather observation or ground mapping within a 170 degree sector centred on the aircraft to a maximum range of 300 nautical miles.

The pre-selected tilt angle, the antenna tilt control is plus or minus 15 degrees, is automatically maintained during aircraft attitude changes by the INS and by a position transmitter during changes of droop nose angle.

INERTIAL NAVIGATION SYSTEM

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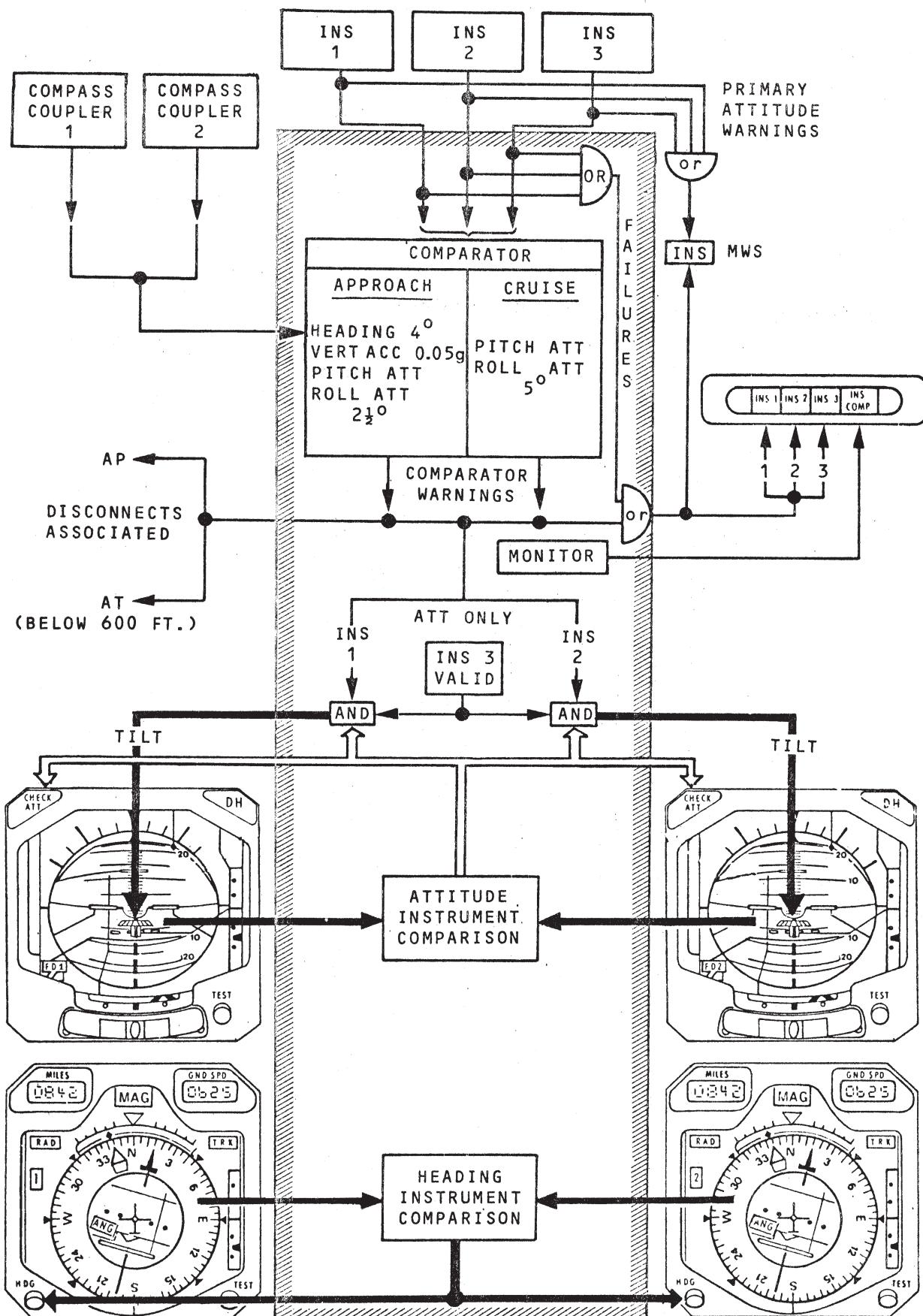


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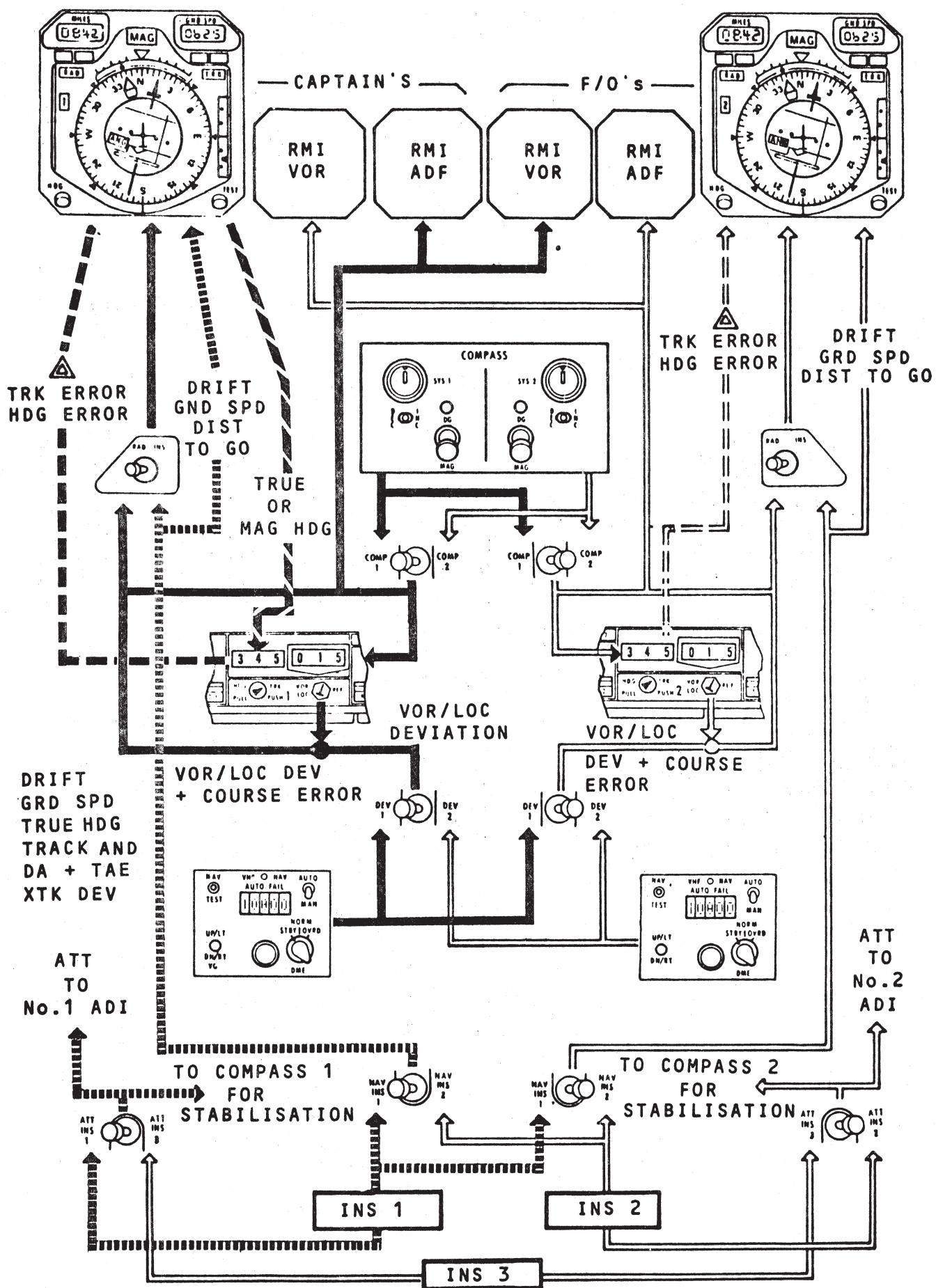
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British airways
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INERTIAL COMPARATOR WARNING



NAVIGATION SWITCHING

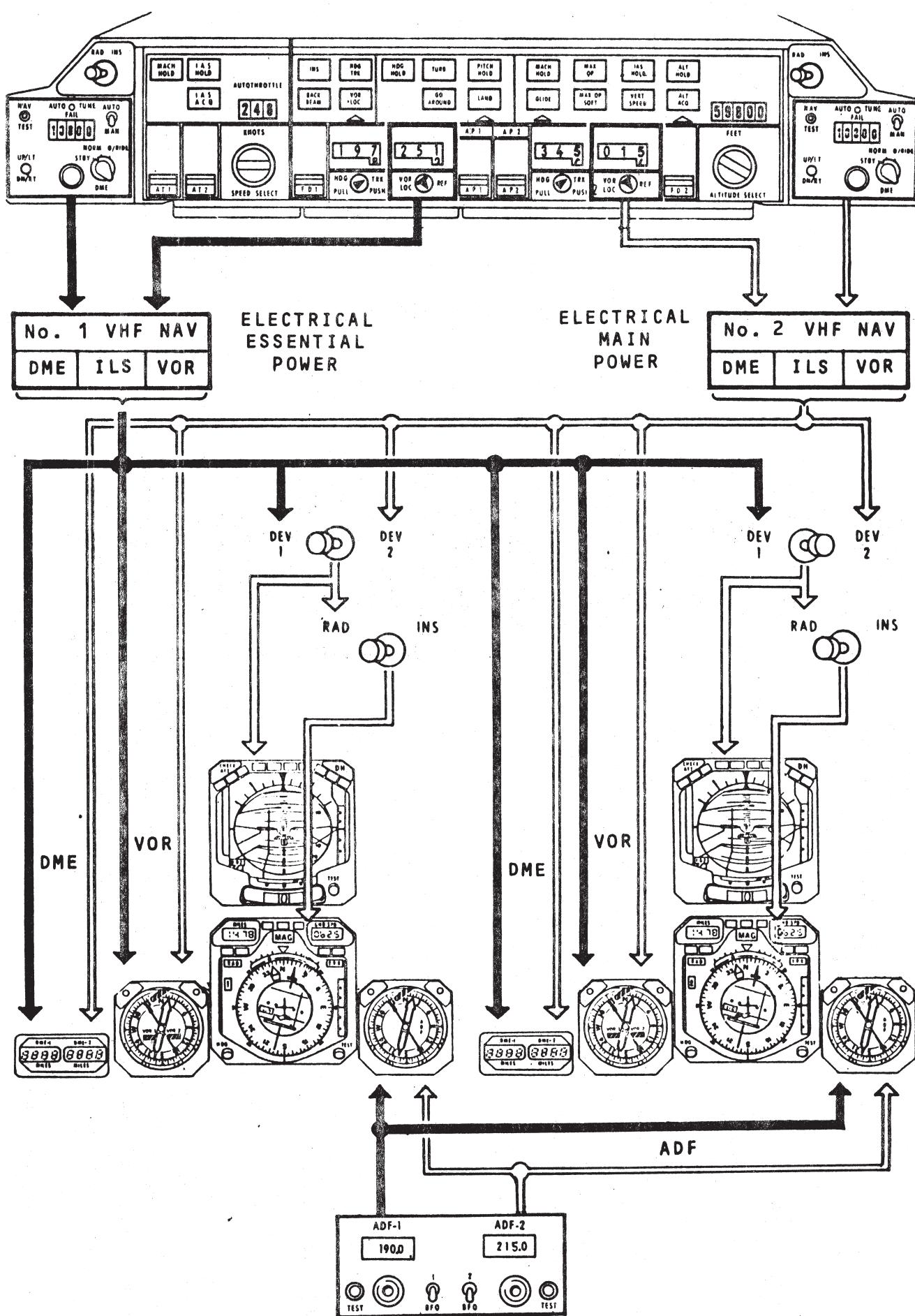


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21 JUL.76

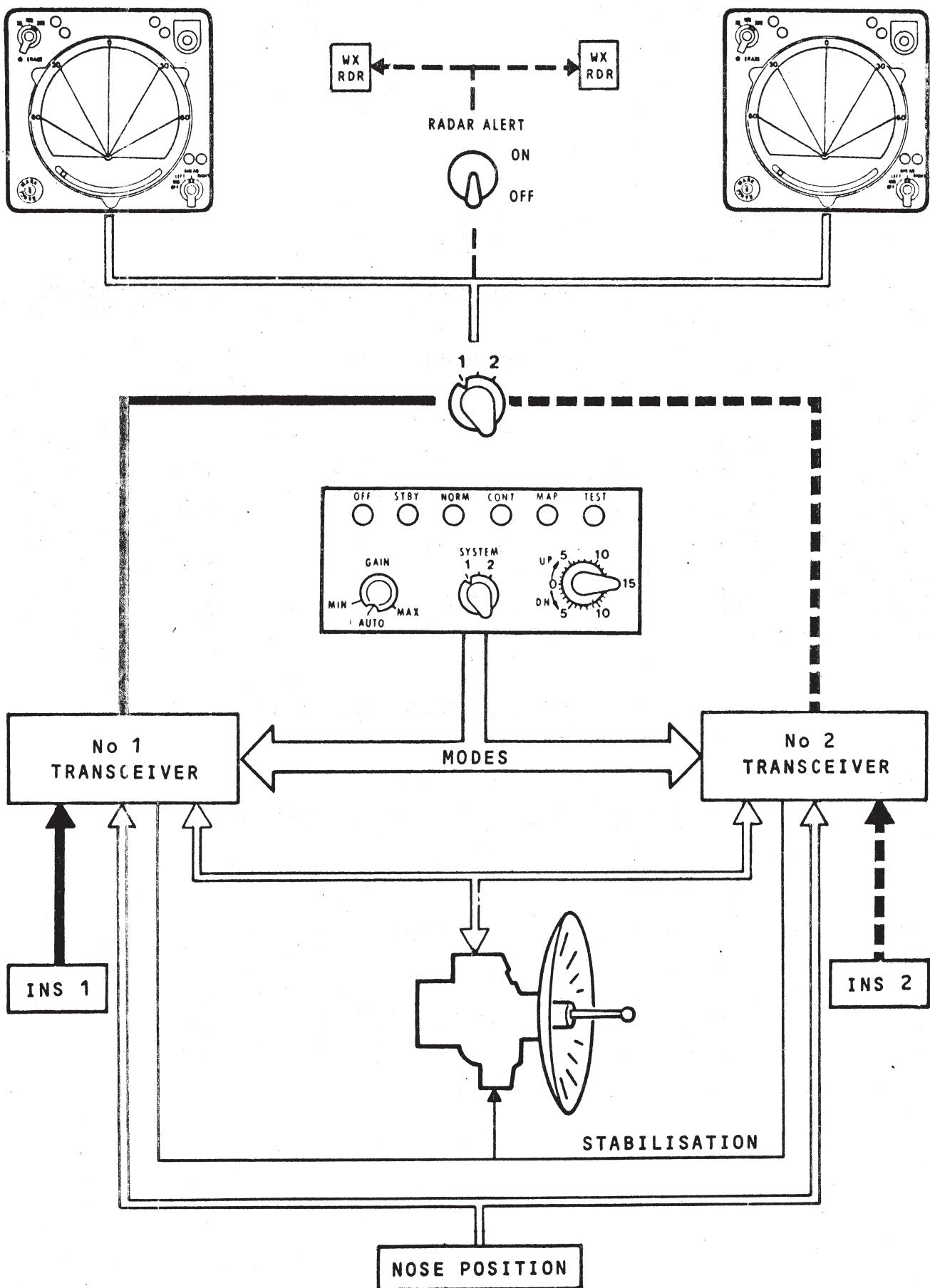
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RADIO NAVIGATION



WEATHER RADAR

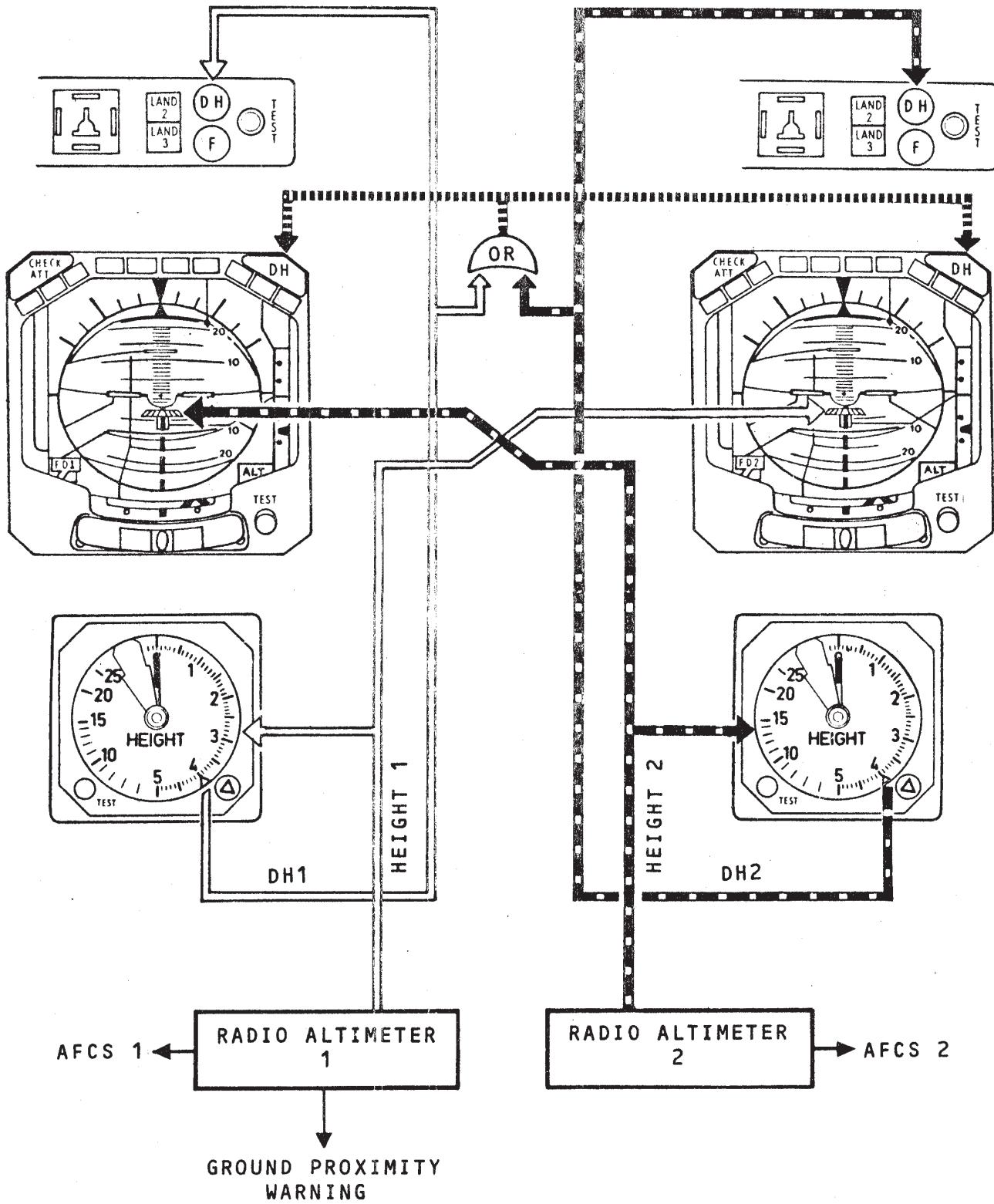


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21 JUL.76

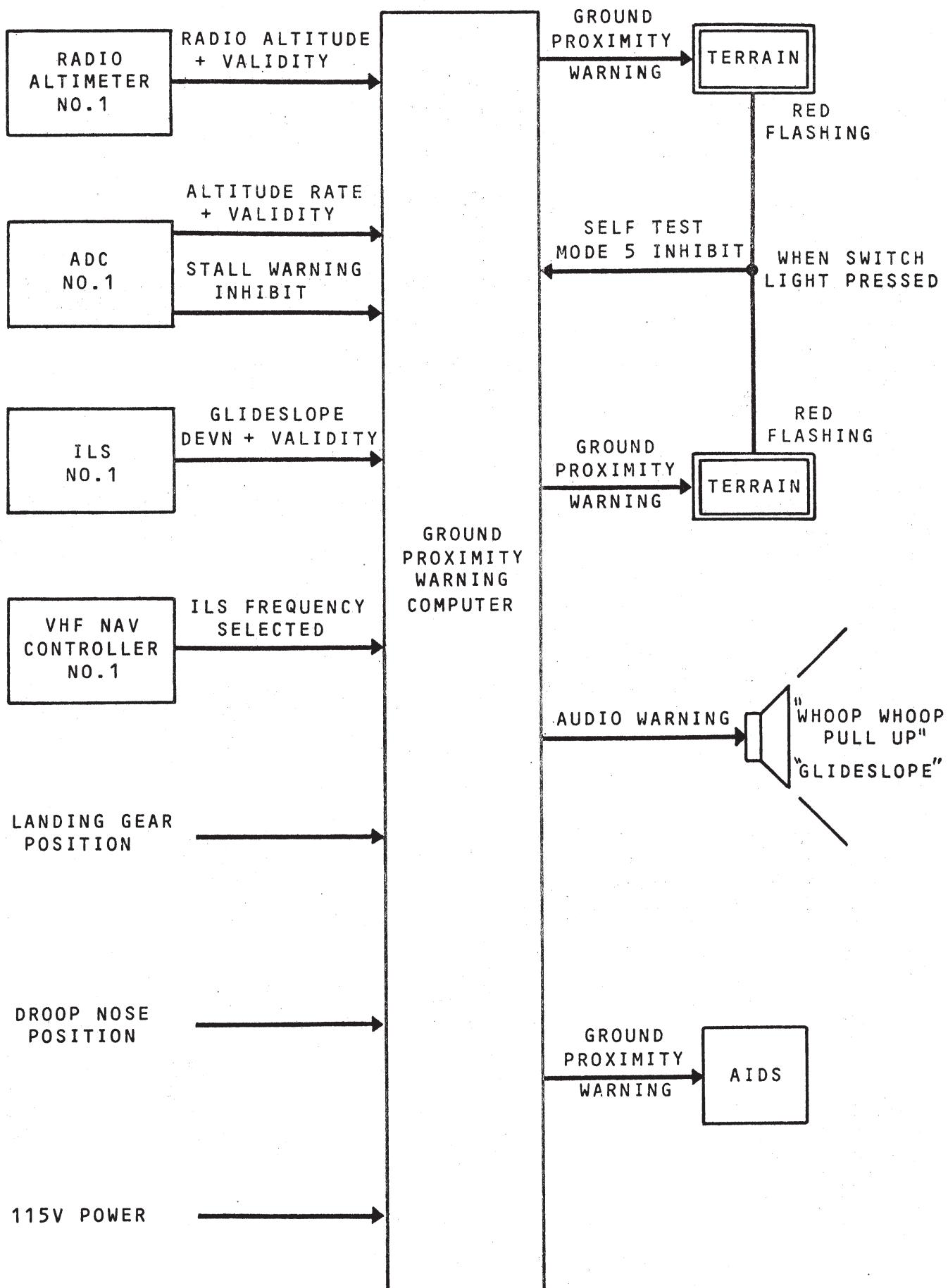
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RADIO ALTIMETER



GROUND PROXIMITY WARNING SYSTEM

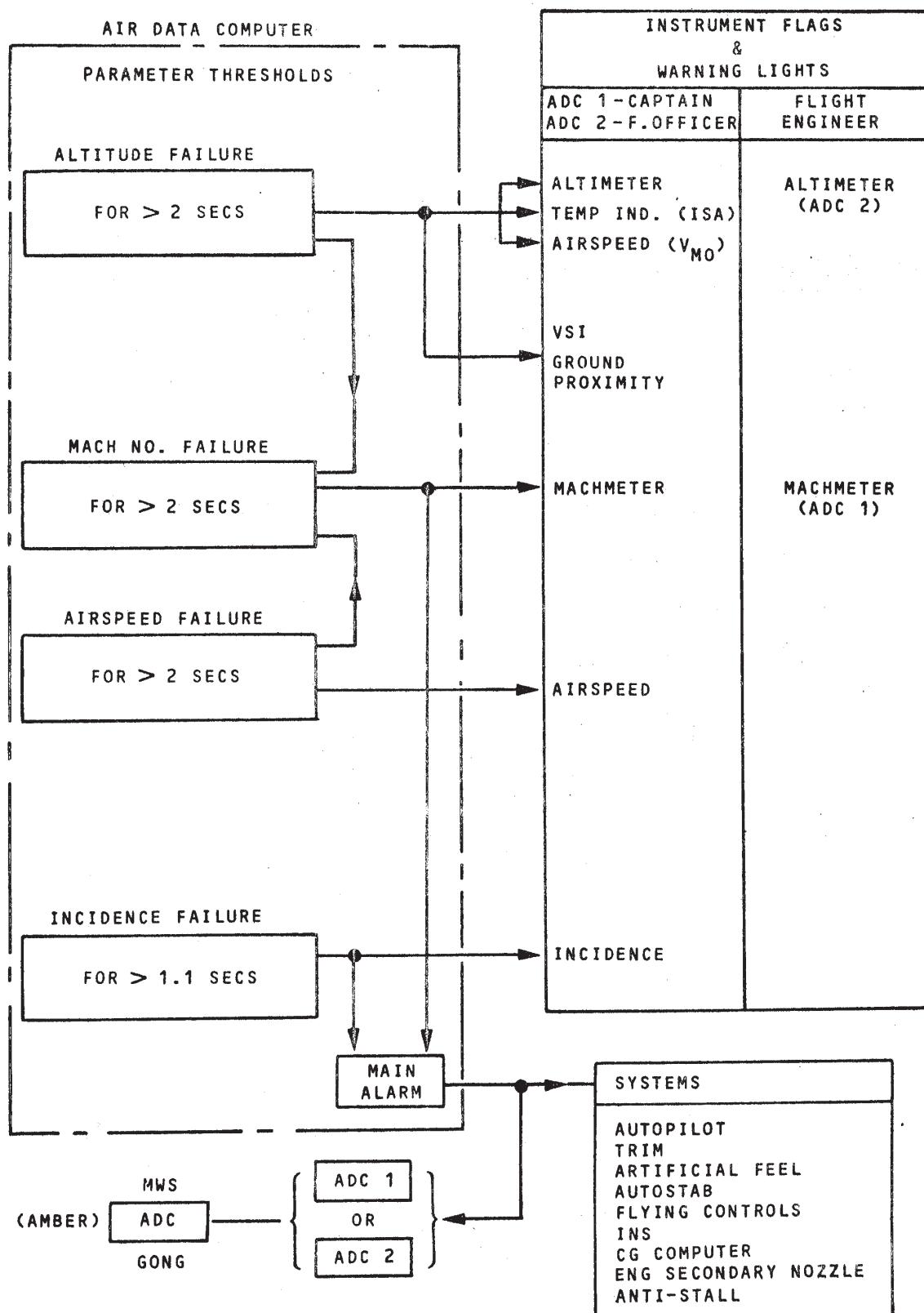


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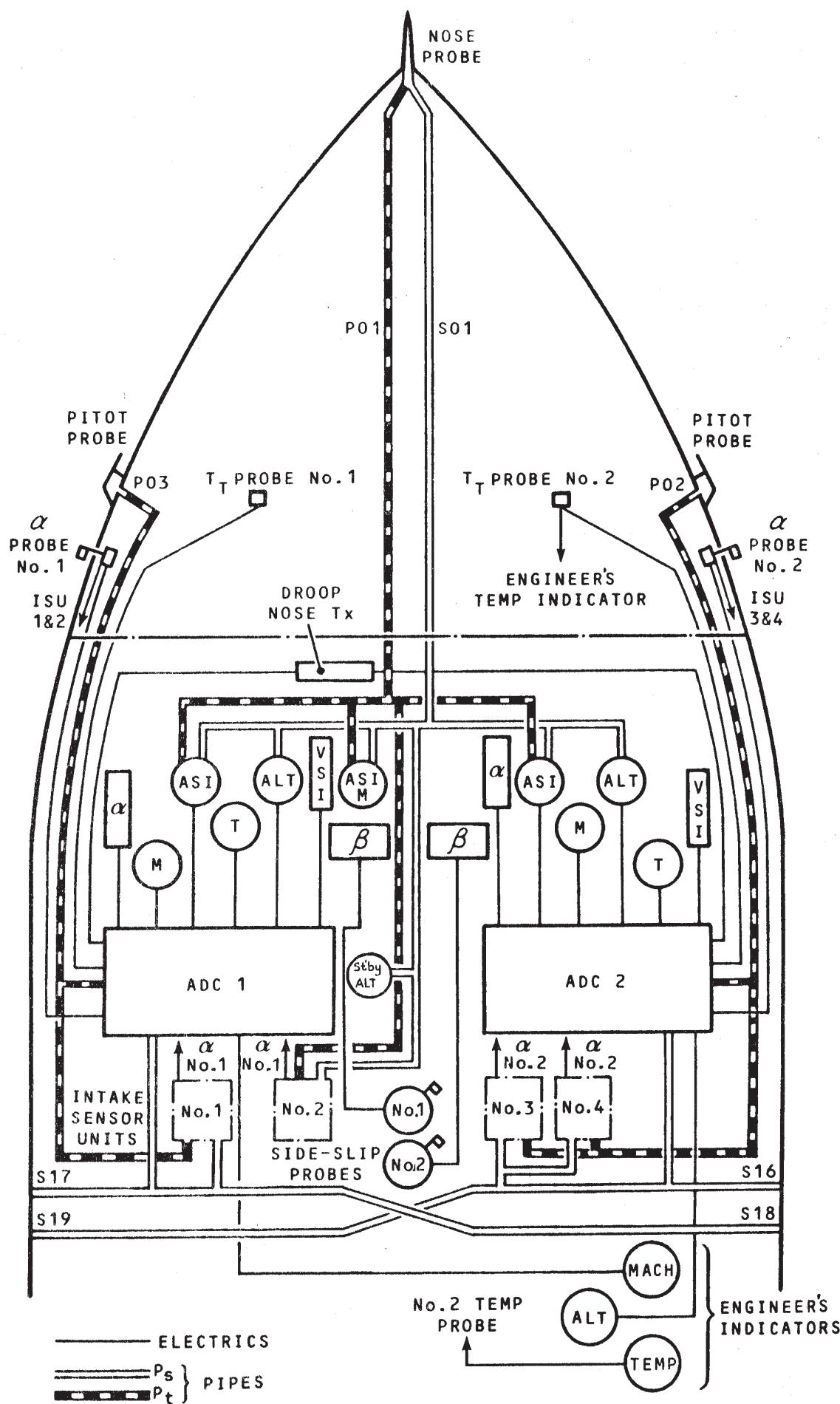
ADC FAILURE MONITORING



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AIR DATA SYSTEM

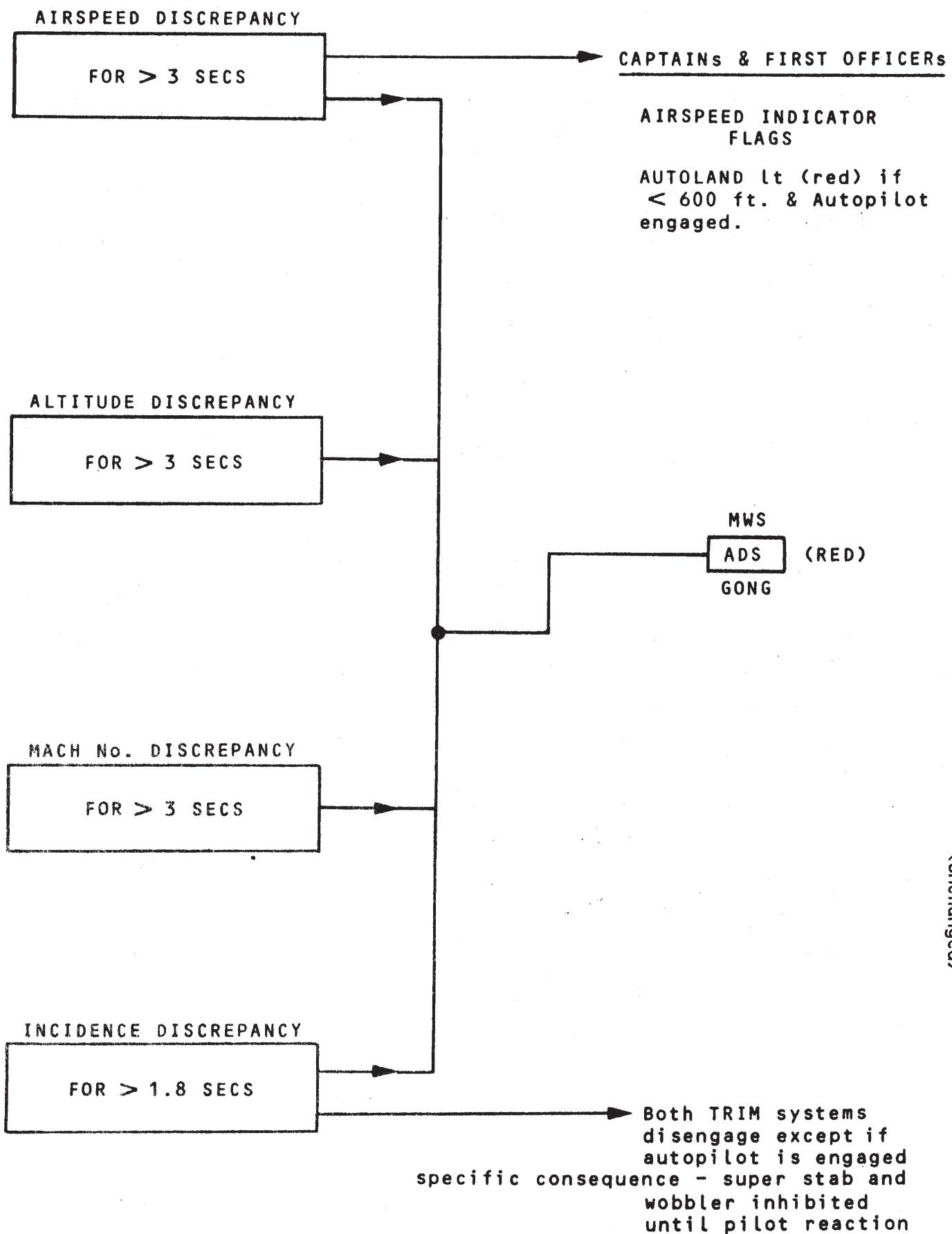


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ADS COMPARISON WARNINGS



AIR DATA SYSTEM

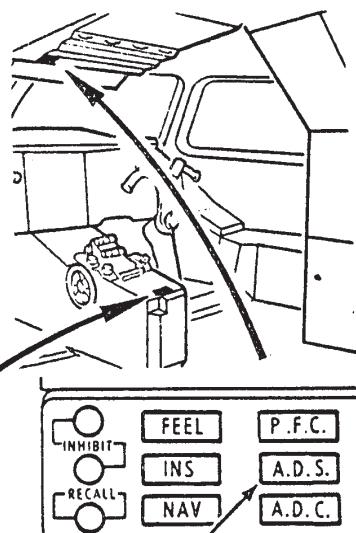
ADC 1 AND ADC 2 LIGHT (Amber)

On - indicates that the associated monitor system has detected a fault that has remained for two seconds or the power supply has been interrupted for more than one second.

The warning is locked on once activated.

Accompanied by the MWS ADC light (amber) and audio (gong).

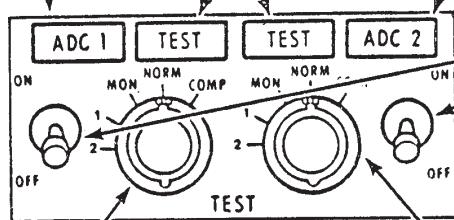
Pressed - resets the monitor warning system thus allowing the warnings to disappear if the fault no longer exists.



TEST LIGHT (Blue)

On - indicates the successful conclusion of a test selected on the TEST rotary selector.

Pressed - cancels the overspeed audio (warble) during tests.



MWS ADS LIGHT (Red)

On - indicates that a discrepancy has been sensed by the comparator system of both air data computers. Accompanied by audio (gong).

ADC SWITCH

ON - the air data computer is powered and the ADS/ENGINE PROBE HEATER failure indications are armed.

OFF - isolates the ADC and de-energizes the warnings.

ADC 1 TEST ROTARY SELECTOR AND ADC 2 TEST ROTARY SELECTOR

2 - tests the overspeed warning system by simulating an overspeed condition of V_{MO} , T_{MO} , M_{MO} , nose down and visor down. At the same time the relevant instruments and systems are driven to supersonic values.

Test 2 is only available on the ground.

1 - tests the stall warning system by simulating an excessive angle of attack. At the same time the relevant instruments and systems are driven to subsonic values.

Test 1 is only available on the ground.

MON - tests the ADC monitoring system operation by simulating faulty conditions on some parameters. At the same time the instruments show failure indications.

Test MON is only available on the ground.

NORM - each air data system is supplied the following by its own ADC: pressure altitude, airspeed, Mach number, vertical speed, total temperature, static temperature, true airspeed and incidence.

COMP - tests the comparator system by simulating excessive differences between the outputs of the ADCs. Altitude, Airspeed, Mach No. & Incidence.

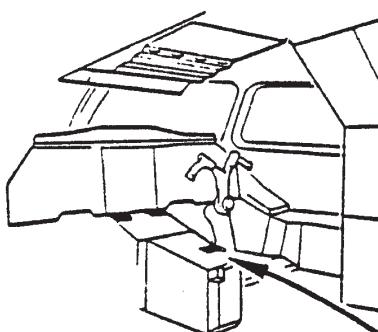
COMP test can be made with ADC 1 or ADC 2 TEST rotary selector.

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INERTIAL NAVIGATION SYSTEM CONTROL MODULE
(Sheet 1 of 4)



REMOTE SWITCH LIGHT (Amber)

On - when pressed, permitting simultaneous loading and inserting of waypoint and DME station data in multiple system installations with a single control module.

LEFT DATA INDICATOR

Displays latitude, track, heading, cross track distance, wind direction, or desired track as selected by the data selector. Altitude of DME station and the computer programme designation can also be displayed.

ALERT LIGHT (Amber)

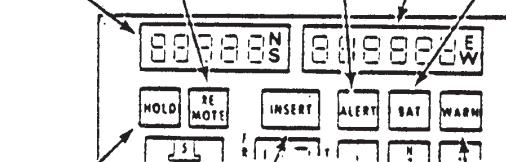
On - one minute before track change is due.
Flashing - when past waypoint in MAN mode when ground speed is in excess of 250 knots.
Off - when INS automatically switches to next navigation leg in AUTO mode.

RIGHT DATA INDICATOR

Displays longitude, ground speed, drift angle, track angle error, time, wind speed, or system status, as selected by the data selector. Frequency of DME station can also be displayed.

BAT LIGHT (Amber)

On - when system is operating on battery power.



INSERT SWITCH LIGHT (White)

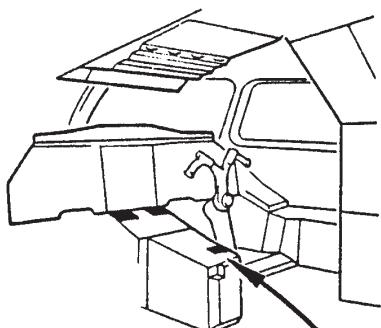
On - whenever the keyboard is armed.
Controls entry of keyboard data into the computer.

WARN LIGHT (Red)

On - when system self-check circuits detect an out of tolerance condition.

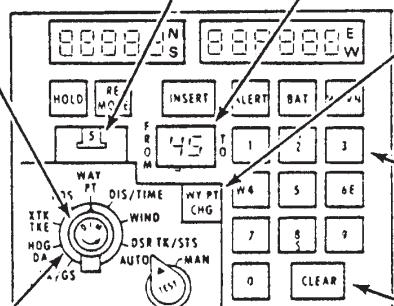
HOLD SWITCH LIGHT (White)

On - when pressed permits, in conjunction with other controls, freezing of displayed present position, to perform a manual position update, to display inertial present position, programme designation and recorded malfunction codes.

INERTIAL NAVIGATION SYSTEM CONTROL MODULE
(Sheet 2 of 4)

DIM CONTROL

Used to vary the intensity of the following data displays:
left and right data indicators,
FROM/TO indicator,
ALERT light,
HOLD, REMOTE, INSERT
and WY PT CHG switches



DATA SELECTOR

Used to select data to be displayed in the data indicators.

WAYPOINT/DME SELECTOR

Used in conjunction with WAY PT on the data selector. Selecting 1 through 9 determines the waypoints and DME stations for which data is to be inserted or displayed. Selecting 0 displays either the co-ordinates of the original departure point inserted during alignment, or the co-ordinates of the last manually inserted position update or course change.

FROM - TO INDICATOR

Indicates the flight leg for which navigation data is being computed. Automatically goes to 12 when system is turned on and waypoint data has been inserted. When keys 7 and 9, or 3 and 9 are pressed simultaneously, FROM indicator goes blank and TO indicator flashes number of DME station currently loaded.

WY PT CHG SWITCH

Allows different waypoint or DME station numbers to be loaded into FROM-TO indicator through the keyboard.

KEYBOARD (Buttons 0-9)

Used to load data into data indicators and to change numbers in FROM - TO indicators.

CLEAR SWITCH

Used to clear data indicators when erroneous data has been loaded.

TEST PUSH BUTTON/AUTO-MAN SWITCH

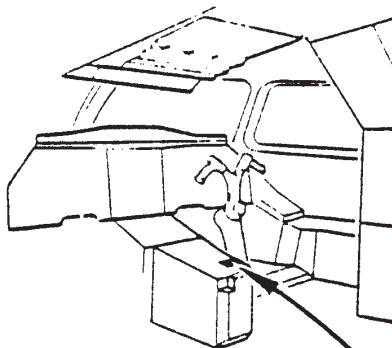
TEST:

Pressed - left and right data displays and FROM - TO indicator display all 8s.
HOLD, REMOTE, INSERT, ALERT, BAT, WARN and WY PT CHG lights on CDU and READY NAV and BAT lights on MSU are on. Digital displays on associated HSI read 0888 and R NAV light on associated dash panel is on.
When WARN light is on and data selector on DSR TK/STS, pressing TEST switch causes action code in right hand display. Further pressings of TEST switch causes malfunction codes to replace action code.

AUTO-MAN:

AUTO - the waypoint numbers in the FROM-TO indicator automatically sequence to the next flight leg when waypoint is reached.
MAN - the next flight leg number must be set manually through the keyboard.

INERTIAL NAVIGATION SYSTEM CONTROL MODULE
(Sheet 3 of 4)



WAY PT

Used with waypoint/DME selector and keyboard to insert and display waypoint and DME station data. Latitude or altitude in left data indicator; longitude or frequency in right data indicator. Also used to display inertial present position (see HOLD switch).

DIS/TIME

Distance to waypoint or DME station in TO indicator is displayed in left data indicator; time to waypoint in TO indicator is displayed in right data indicator.

POS

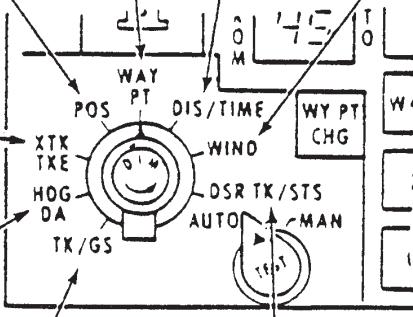
Position latitude displayed in left data indicator; longitude in right data indicator.

WIND

Wind direction displayed in left data indicator; wind velocity in right data indicator.

XTK TKE

Cross track distance (L or R) displayed in left data indicator; track error in right data indicator.



HOG DA

Airplane true heading displayed in left data indicator; drift angle in right data indicator.

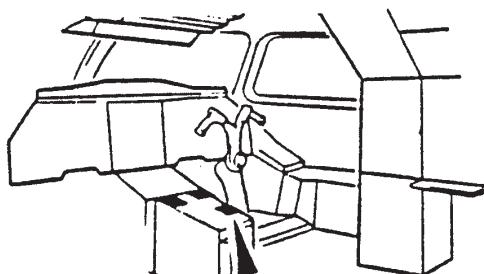
DSR TK/STS

Desired track displayed in left data indicator; system status (alignment status, performance index, or malfunction codes) in right data indicator.

On pressing the HOLD switch the left data indicator will display computer programme designation.

TK/GS

Present track displayed in left data indicator; ground speed in right data indicator.
(If GS < 75kt, true heading is displayed instead of present track).

INERTIAL NAVIGATION SYSTEM CONTROL MODULE
(Sheet 4 of 4)

ACTION CODES

01 CODE - OFF

02 CODE - ATT

03 CODE - ATT if navigation data degrades

04 CODE - GROUND OPERATION ONLY

05 CODE - CHECK MAL CODE

MAL CODE 55 - RELOAD NAV AID DATA

06 CODE - CHECK MAL CODE

MAL CODE 41 OR 43 - RELOAD PRESENT POSITION

MAL CODE 49 - CHECK MANUAL UPDATE AND
FLUSH IF NECESSARYSTATUS DISPLAY
(R.H. Indicator)

102 55

1 2 3 4 5 6

1st digit - 0 = INS in ALIGN mode
1 = INS in NAV mode

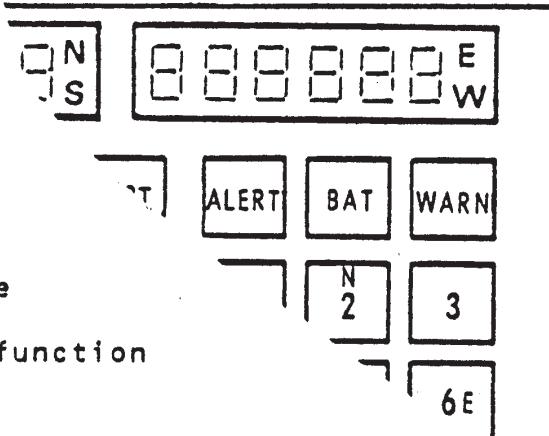
2nd & 3rd digits - Action or Malfunction
Codes

5th digit - Accuracy Index.
Sequences through A.I.
9-8-7-6-5 during align-
ment. 5 = alignment
achieved.
If NAV mode is not sel-
ected, A.I. continues
sequencing through 4-3-2-
1 - 0 indicating quality
of alignment.
When NAV mode is selected,
A.I. indicates quality of
indicated position data,
ranging from 1 through 9.
(1 = good, 9 = poor)

6th digit - Mode Index.
During alignment, indicates
mode index required for normal
alignment (always 5).

In NAV mode, MI=5 indicates independent INS operation,
and MI=4 indicates aided operation.

When '1' is keyed and inserted the unit goes into
position update eradicate mode then automatically
reverts to independent operation with MI=5 displayed.

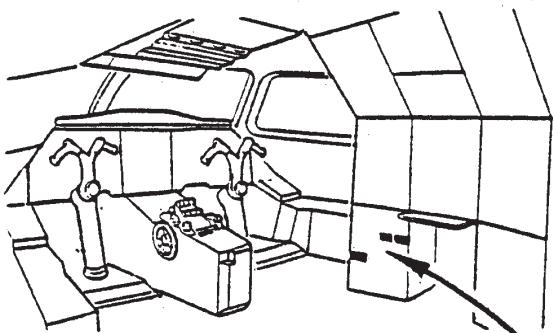


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CONCORDE FLYING MANUAL
NAVIGATION

British airways

INERTIAL NAVIGATION SYSTEM MODE SELECTOR UNIT

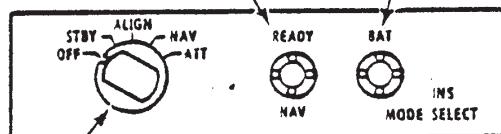


BAT LIGHT

On - only if while operating on battery power the INS automatically shuts down due to low battery unit voltage. The INS operates on battery for one 12 seconds period during coarse levelling. If the battery unit charge is below the required minimum level during this period, the INS shuts down and the BAT and WARN lights (red) are on.

READY/NAV LIGHT (Green)

On - with the mode switch in ALIGN, when the alignment status of the INS reaches 55. Remains lit until NAV is selected. Is on momentarily when alignment is accomplished with the mode selector in NAV.



MODE ROTARY SELECTOR

This rotary selector selects the modes of the INS. The knob must be pulled for rotation across mechanical stops between STBY and ALIGN and between NAV and ATT.

STBY - used only during ground operation; starts fast warm-up.

ALIGN - used only during ground operation while the airplane is parked. Starts gyro operation and automatic INS alignment provided the unit is warmed up.

Fine alignment does not start until present position is inserted at the control module.

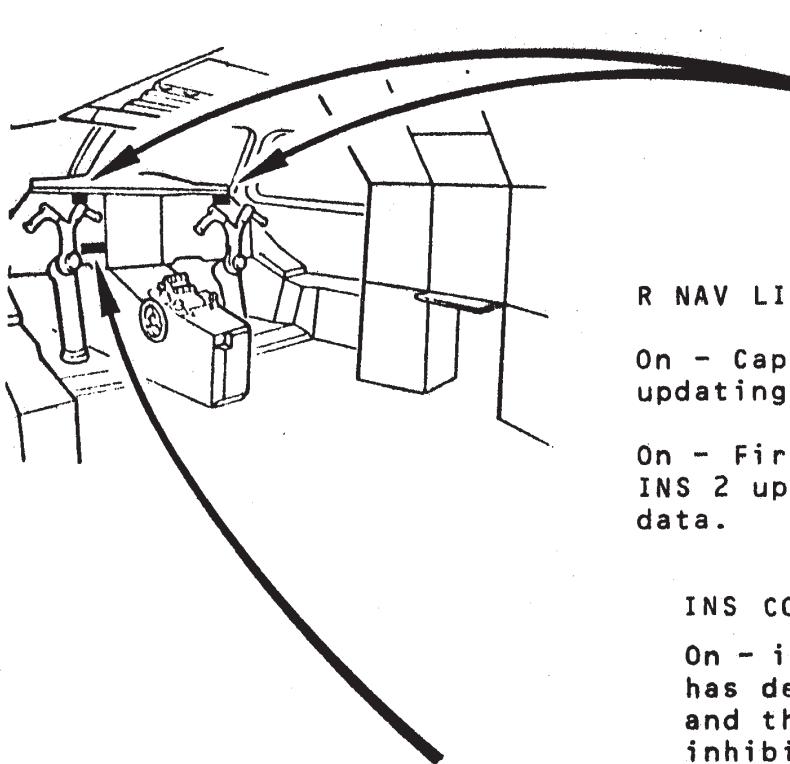
NAV - used for normal operation after automatic alignment is complete. Must be selected before moving the airplane. The INS automatically sequences through the standby and alignment modes of operation when the NAV position is selected from any other position provided the airplane is parked and present position is inserted. Going directly from OFF to NAV eliminates the automatic shutdown feature in the event of an overheat. The automatic battery check is also eliminated.

ATT - used to provide only INS attitude signals. Shuts down the computer so that navigation and steering signals are not provided. Can be selected from any other position. Once selected, INS alignment is lost and it must be re-aligned on the ground before the navigation mode can again be used.

(Unchanged)

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INS 1, INS 2, INS 3, & INS COMP LIGHTS



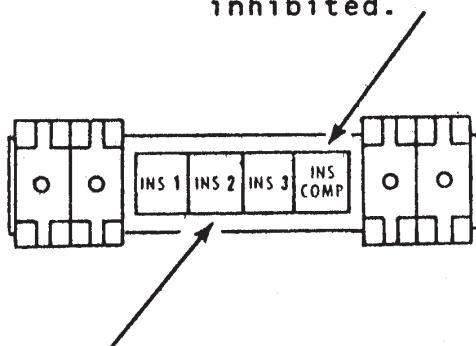
R NAV LIGHT (Yellow)

On - Captain's side, indicates INS 1 updating position from DME 1 data

On - First Officer's side, indicates INS 2 updating position from DME 2 data.

INS COMP LIGHT (Amber)

On - indicates that the comparator has detected an internal failure and the comparator functions are inhibited.



INS 1 - INS 2 - INS 3 LIGHTS (Red)

On - indicates internal auto detected failure or a failure detected by the comparator.

Comparator detected warning is caused by an error in one of the following:-

Pitch or roll attitude during cruise (above 600 ft).

Pitch or roll attitude, vertical acceleration or compass coupler 1 and 2 magnetic heading and INS 3 platform heading during approach (below 600 ft).

Threshold for attitude comparison is tighter during approach than in cruise.

Accompanied by the master warning system INS light (red) and audio (gong).

If the failure is detected by the comparator only (e.g. for INS 2):-

AP2 is disengaged

AT2 is disengaged (cruise threshold) if altitude is less than 600 ft.

If the failure is detected by the comparator and INS 2, then AP2 and AT2 may be disengaged depending on the AFCS mode engaged. When only two INSSs are operating, a failure detected by the comparator causes the INS lights for both these INSSs to come on.

RADIO NAVIGATION

DME MODE SELECTOR

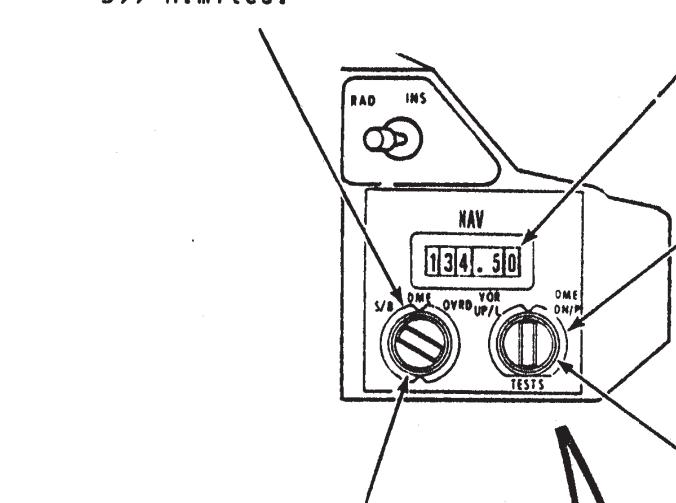
S/B - DME interrogator is warmed up for 45 secs and not operative.

DME - normal position.

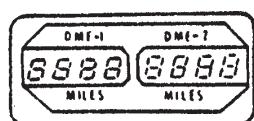
Distance information is available up to 200 n.miles.

OVRD (Override) - distance information is available up to 399 n.miles.

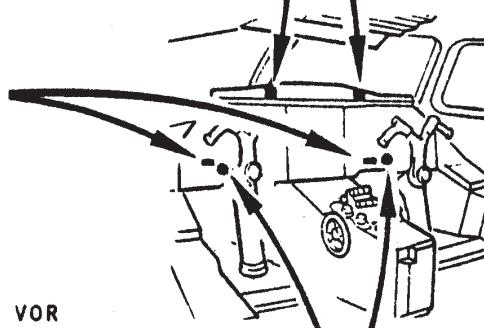
SELECTED FREQUENCY WINDOW (VOR OR ILS)



SETTING FREQUENCY ROTARY SELECTOR
(Units and Tens of MHz)

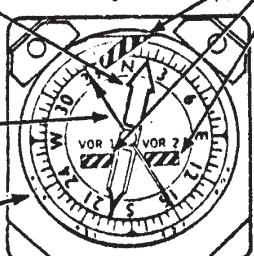


DME INDICATOR



No. 2 VOR
POINTER

No. 1 VOR
POINTER



VOR RADIO MAGNETIC INDICATOR

COMPASS CARD

Captain's - fed from No. 2 compass coupler providing the instrument transfer COMP switch is in its normal operating position.

First Officer's - fed from No. 1 compass coupler providing the instrument transfer COMP switch is in its normal operating position.

TEST ROTARY SELECTOR

VOR UP/L - an internal test system simulates an up deviation of glide and a left deviation of localiser, provided ILS frequency is selected.

DME DN/R - an internal test system simulates a down deviation of glide and a right deviation of localiser provided ILS frequency is selected.

The TEST function is inhibited when the AP/FD is selected in VOR/LOC, GLIDE or LAND modes.

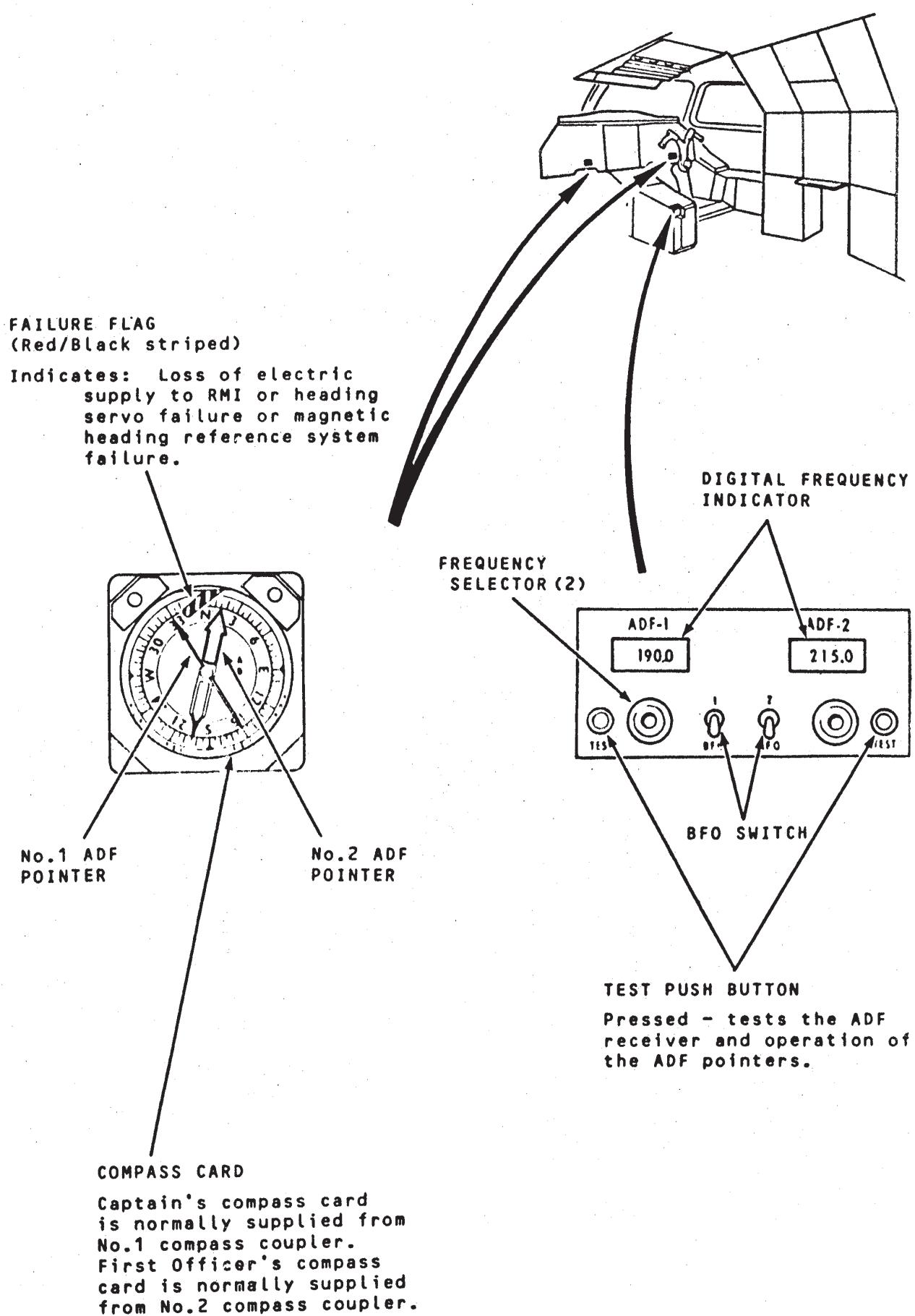
SETTING FREQUENCY ROTARY SELECTOR
(Fractions of MHz by 0.05 MHz increments)

FAILURE FLAGS
(Red/Black striped)

Top - loss of electric supply to RMI or heading servo failure or magnetic heading reference system failure.

Windows - VOR failure or Station out of range.

AUTOMATIC DIRECTION FINDER

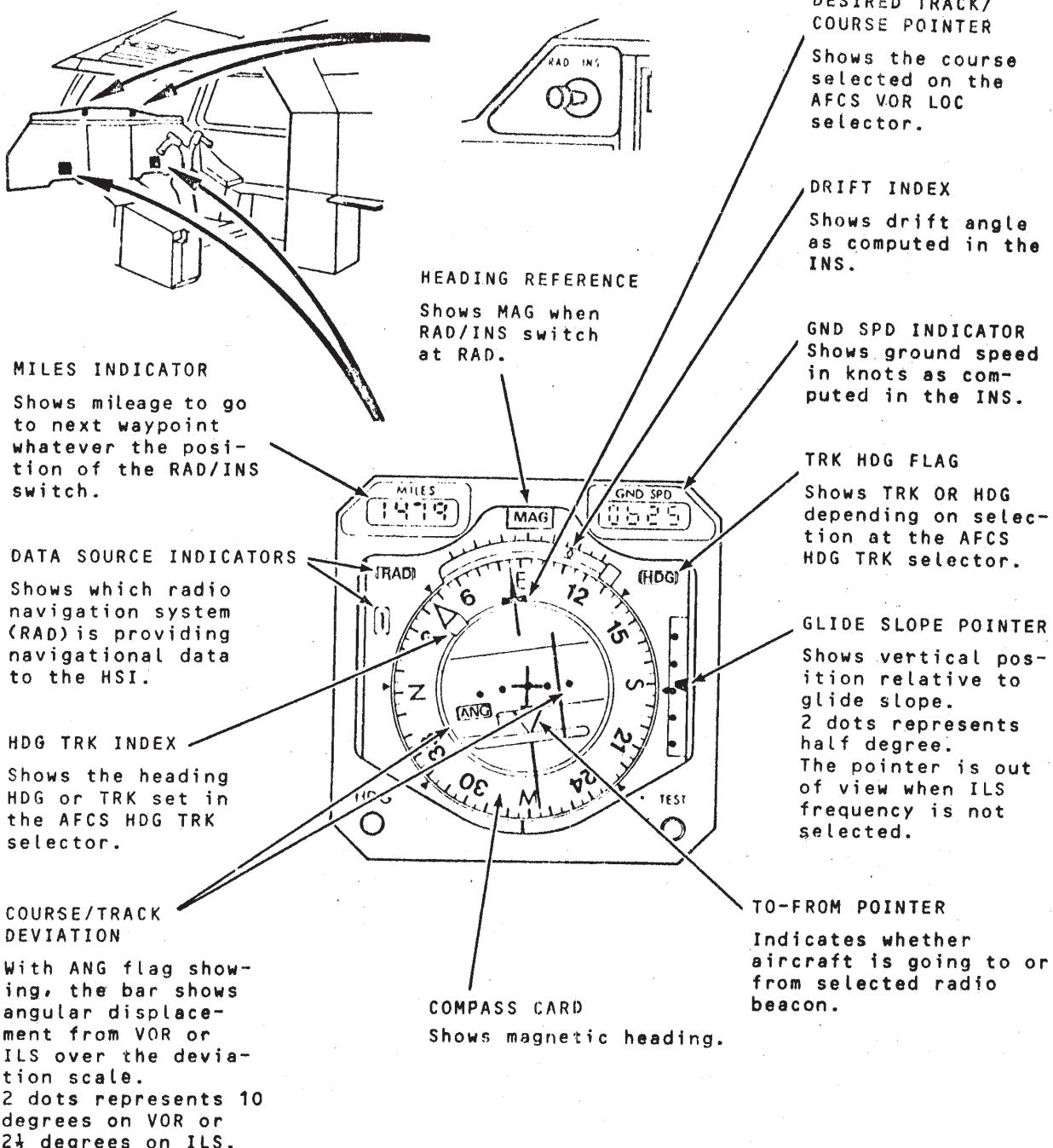


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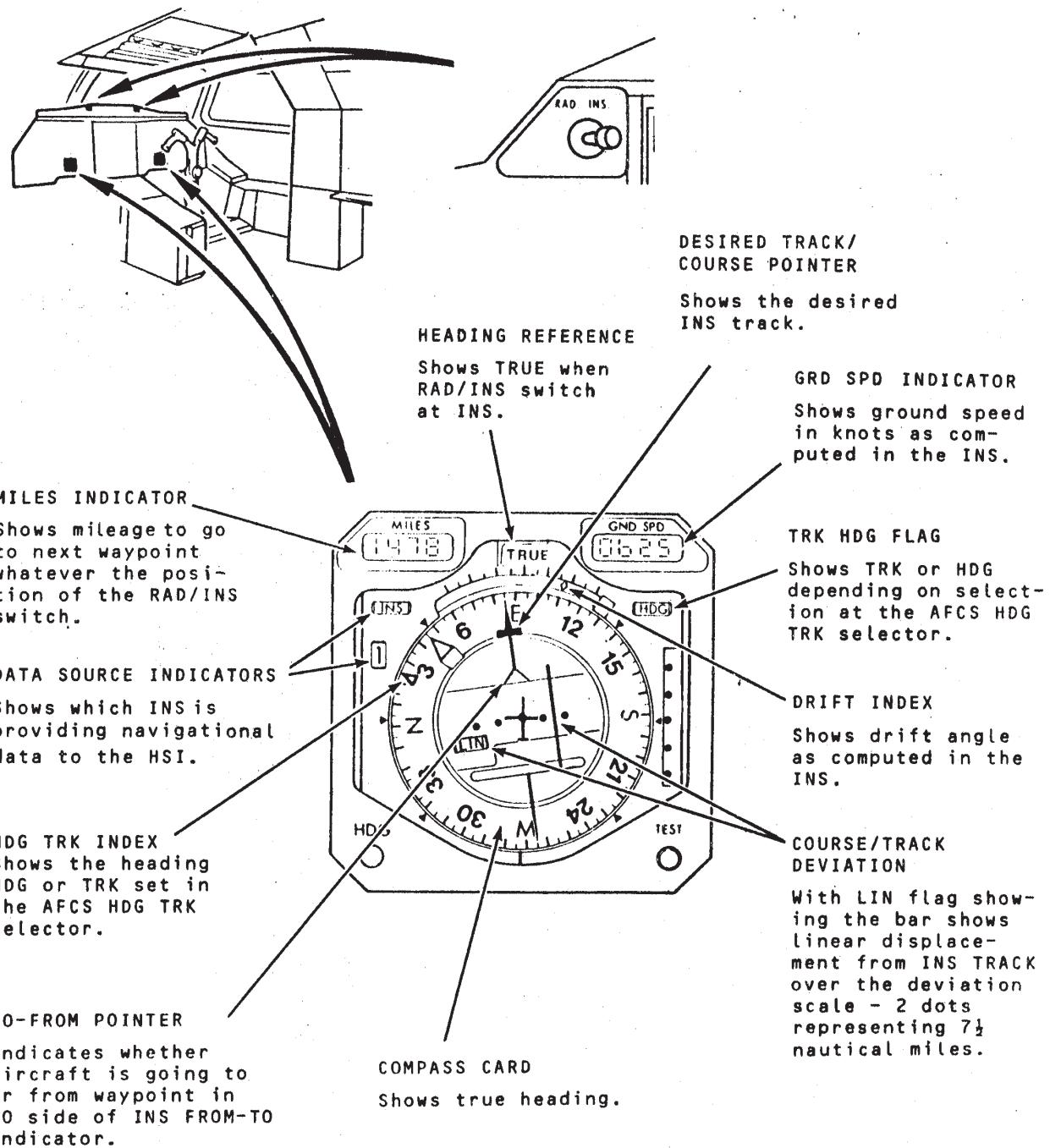
HORIZONTAL SITUATION INDICATOR (MAG)



PRINT

ENGLAND

HORIZONTAL SITUATION INDICATOR (TRUE)

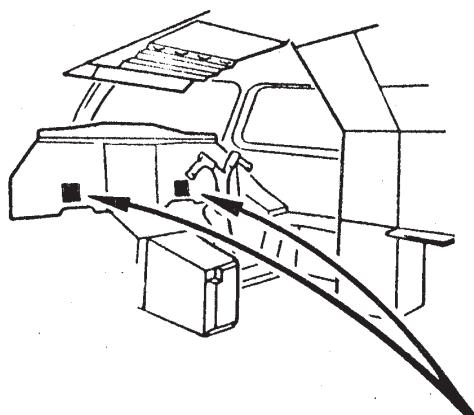


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HORIZONTAL SITUATION INDICATOR FAILURES AND WARNINGS



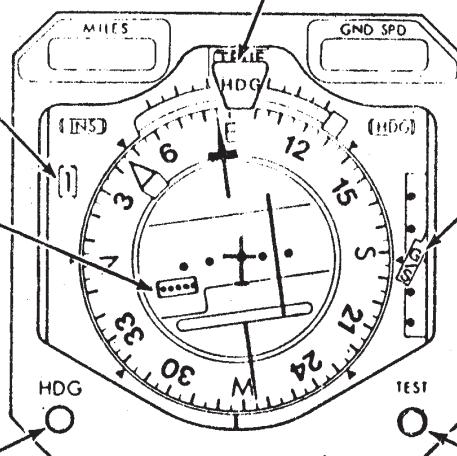
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ENGLAND

DATA SOURCE INDICATOR

May indicate 3 under certain failure conditions.

NAVIGATION FLAG
(5 White dots on a red background)

White dots - indicates loss of selected navigational system.



HDG LIGHT (Amber)

On - indicates, when both RAD/INS switches are at the same selection, a discrepancy between the two HSIs.

HEADING FLAG
(Black HDG on a red background)

HDG - indicates that the selected heading reference is not valid.

GLIDE SLOPE FLAG
(Black G/S on a red background)

G/S - indicates that the glide slope signal is not valid.

TEST PUSH BUTTON

Pressed - tests the digital readouts of MILES and GND SPD displays (all 8's) and turns the compass card thus testing the source and discrepancy warnings.

RADIO ALTIMETER AND GROUND PROXIMITY WARNING

PULL UP LIGHTS (2) (Red)

On flashing - indicates:

Excessive rate of descent near the ground (active below 2500 ft) (Mode 1)
OR

Excessive closure rate with the ground (Mode 2)
OR

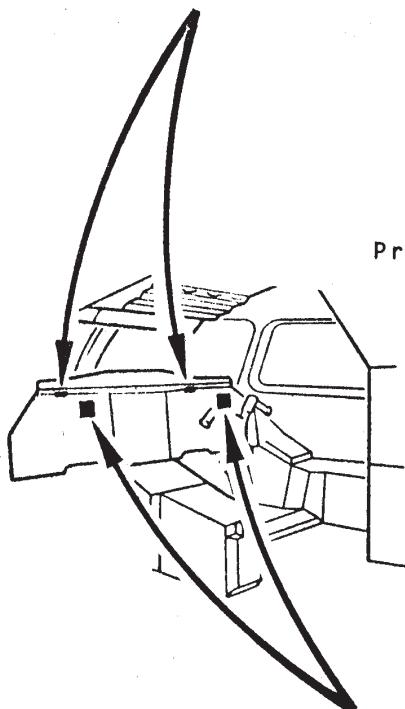
Loss of altitude when the aircraft is below 700 ft after take-off or on go-around (Mode 3)
OR

Landing gear retracted when aircraft descends below 500 ft or droop nose not at DOWN when aircraft descends below 200 ft (Mode 4)

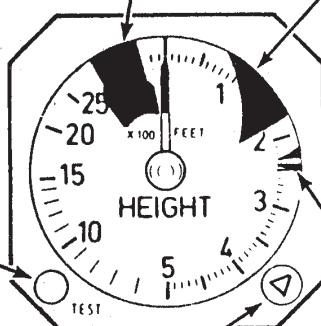
Accompanied by a repeated audio (Whoop Whoop Pull Up). The audio is repeated until the aircraft is out of the hazardous situation.

Pressed - tests the Ground Proximity warning system
OR

If the aircraft is below 1000 ft and descending, inhibits the audio warning of Mode 5 (Mode 5 is an audio (glide slope) only with no visual warning) or if the Mode 5 warning has already been triggered will cancel it, if it is a "soft" warning.



POINTER MASK (Black)



FAILURE FLAG (Red)

Indicates:

- loss of instrument power supply.
- radio altimeter transceiver failure
- slaving error.

TEST PUSH BUTTON

Pressed - tests the radio altimeter and its connection to the ADIS.

DH (Decision Height) SETTING KNOB

The DH setting knob sets the index to the decision height

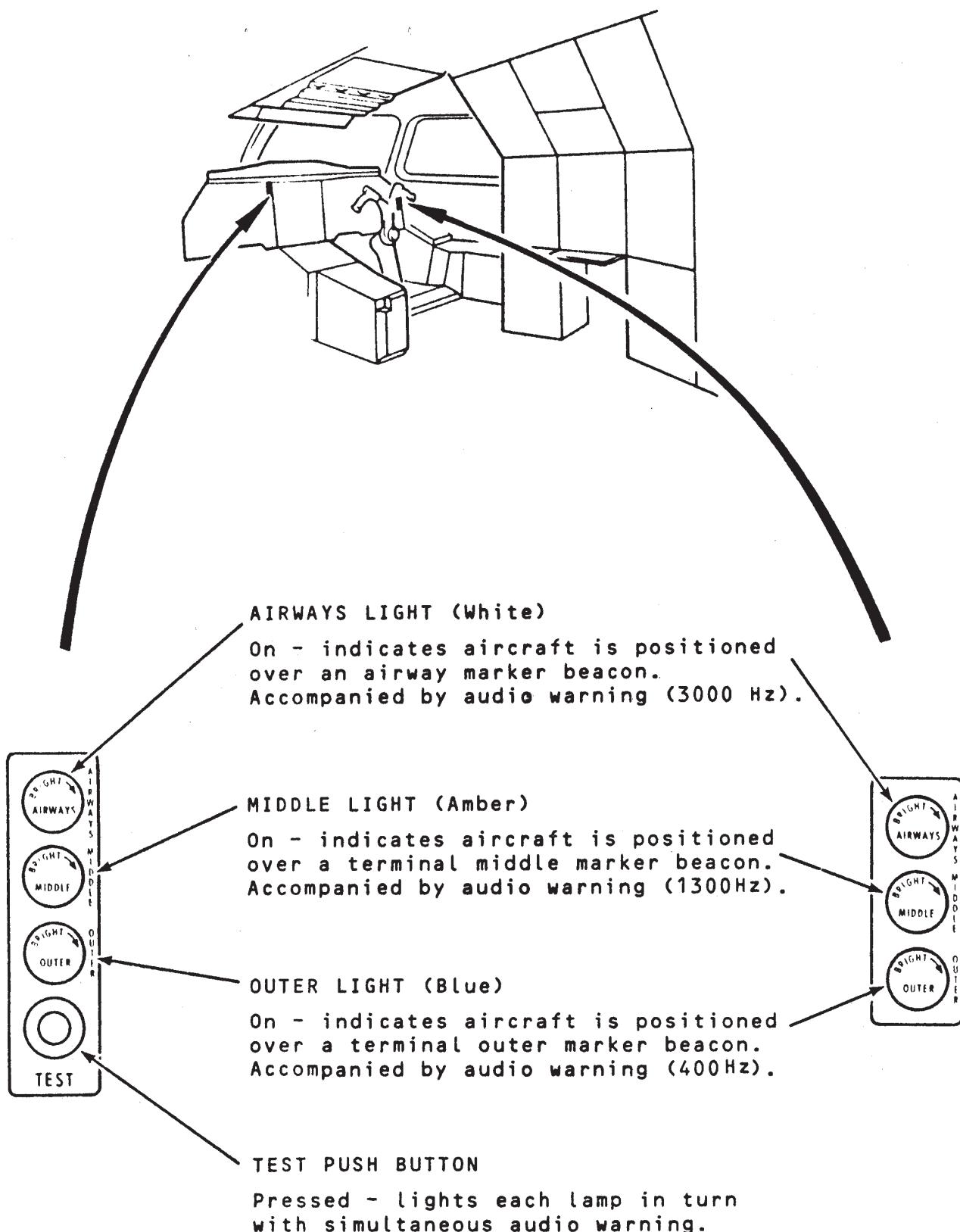
Pressed - cancels the DH warnings on both ADIS and Warning and Landing Displays.

INDEX (Amber)

Shows the selected decision height.

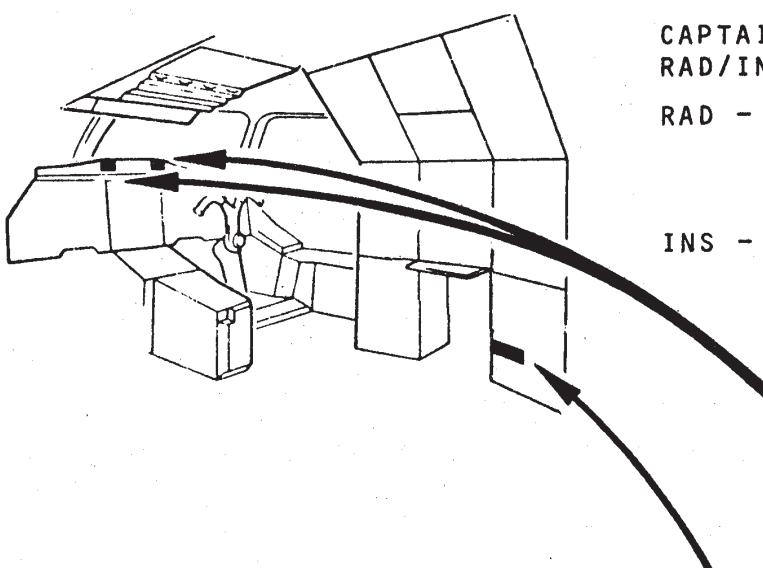
15.03.14
30 JUL.79

MARKER BEACON SYSTEM



(Unchanged)

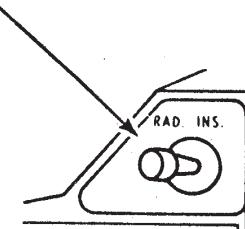
COMPASS CONTROL



CAPTAIN'S and FIRST OFFICER'S RAD/INS SWITCH

RAD - the associated HSIs display radio navigation data referenced to the magnetic heading.

INS - the associated HSIs display inertial navigation data referenced to true heading.



DUAL COMPASS CONTROLLER

Provides operational control and information display for two magnetic heading reference systems.

SYNCHRONIZATION ANNUNCIATOR (2)

Indicates the magnitude of system error in MAG mode by the amount of deflection.

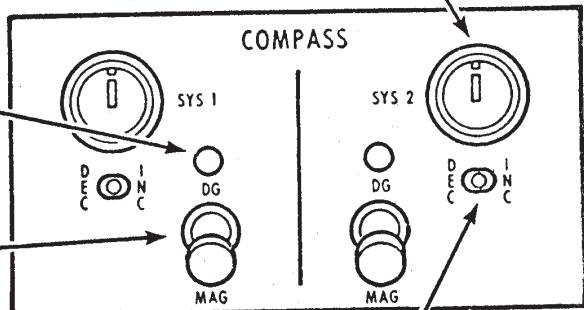
SLAVING CUT-OUT INDICATOR LIGHT (Yellow) (2)

On - during slaving cut-out or when in DG mode.

DG MAG SWITCH (2)

DG - the system follows the gyro heading supplied by the inertial navigation system. The slaving cut-out indicator will light and the synchronization annunciator is inhibited.

MAG - the system provides gyro-stabilized magnetic heading outputs. When the annunciator needle is centred the system is synchronized. The slaving cut-out indicator is off when the system is operating in MAG mode.



DEC INC SELECTOR (2)

Permits setting of an arbitrary heading. The selector is spring loaded to the centre and has two positions, DEC to the left and INC to the right to control the desired rotation.

DEC - the system drives down-scale, and decreases the heading.

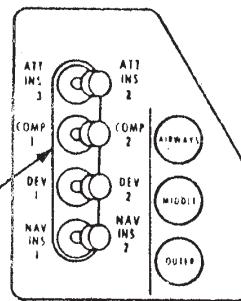
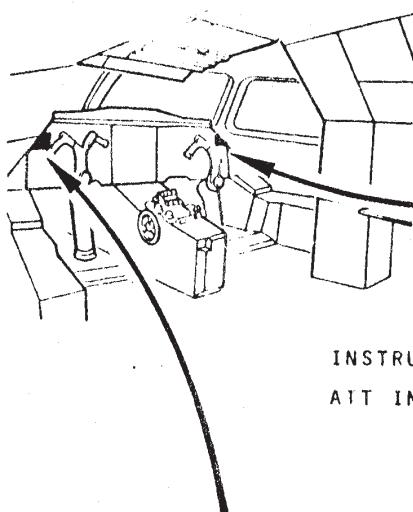
INC - the system drives up-scale, and increases the heading.

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INSTRUMENT TRANSFER SWITCHES



INSTRUMENT TRANSFER SWITCHES - FIRST OFFICER

- ATT INS 2 - INS 2 supplies attitude signals to the First Officer's ADI, roll, platform heading, digital data (ground speed, latitude, longitude, and along track acceleration) to compass coupler 2.
- ATT INS 3 - INS 3 supplies attitude signals to the First Officer's ADI, roll, platform heading, digital data (ground speed, latitude, longitude and along track acceleration) to compass coupler 2.
- COMP 2 - magnetic heading information source to the First Officer's HSI and ADF/RMI and the Captain's VOR/RMI is compass coupler 2.
- COMP 1 - compass coupler 1 supplies magnetic heading to First Officer's HSI and ADF/RMI, and Captain's VOR/RMI.
- DEV 2 - the First Officer's HSI is supplied from No.2 VOR and ILS receivers.
- DEV 1 - the First Officer's HSI is supplied from No.1 VOR and ILS receivers.
- NAV INS 2 - INS 2 supplies First Officer's HSI with navigational and heading data
- NAV INS 1 - INS 1 supplies First Officer's HSI with navigational and heading data

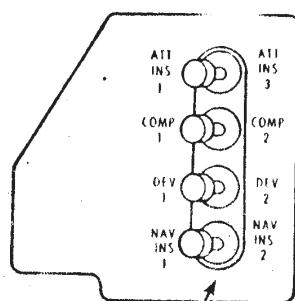
The normal position for the First Officer's instrument transfer switches is to the right.

INSTRUMENT TRANSFER SWITCHES - CAPTAIN

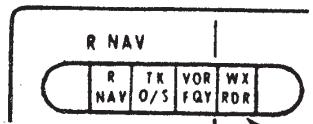
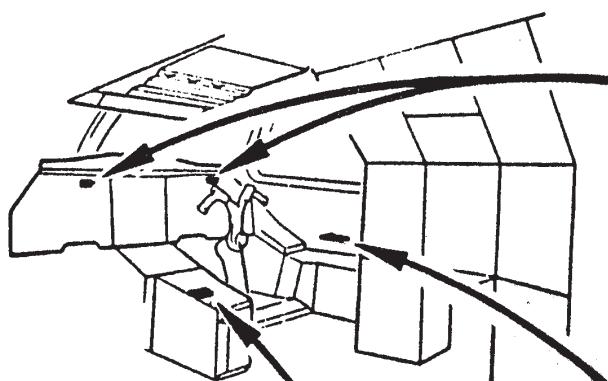
- ATT INS 1 - INS 1 supplies attitude signals to the Captain's ADI, roll, platform heading, digital data (ground speed, latitude, longitude and along track acceleration) to compass coupler 1.
- ATT INS 3 - INS 3 supplies attitude signals to the Captain's ADI, roll, platform heading, digital data (ground speed, latitude, longitude and along track acceleration) to compass coupler 1.
- COMP 1 - magnetic heading information source to the Captain's HSI and ADF/RMI and the First Officer's VOR/RMI is compass coupler 1.
- COMP 2 - compass coupler 2 supplies magnetic heading to Captain's HSI and ADF/RMI, and First Officer's VOR/RMI.
- DEV 1 - the Captain's HSI is supplied from No.1 VOR and ILS receivers.
- DEV 2 - the Captain's HSI is supplied from No.2 VOR and ILS receivers.
- NAV INS 1 - INS 1 supplies Captain's HSI with navigational and heading data.
- NAV INS 2 - INS 2 supplies Captain's HSI with navigational and heading data.

The normal position for the Captain's instrument transfer switches is to the left.

Captain's and First Officer's COMP NAV-INS and DEV transfer switches have an electrical interlock between them to avoid cross feeding.



WEATHER RADAR CONTROL UNIT (Sheet 1 of 2)

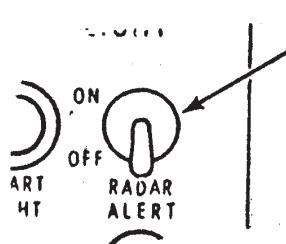


WEATHER RADAR LIGHT (Yellow)

On - flashing indicates receipt of a high strength return within plus or minus 10 degrees of aircraft heading and in the range 100-200 nm.

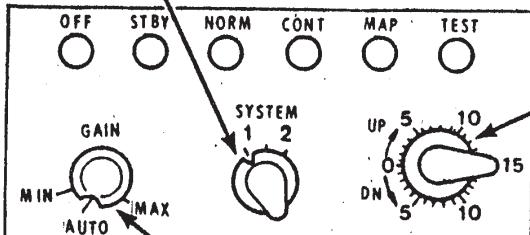
SYSTEM ROTARY SELECTOR

Selects either No.1 or No.2 radar transceiver.



RADAR ALERT SWITCH

ON - radar warning light circuit is armed.



TILT ROTARY SELECTOR

Selects the elevation and depression of the scanner from the horizontal.
0 - the scanner is horizontal whatever the aircraft attitude and position of the droop nose.

GAIN CONTROL

AUTO - automatically controls the receiver sensitivity to signals of varying intensity.

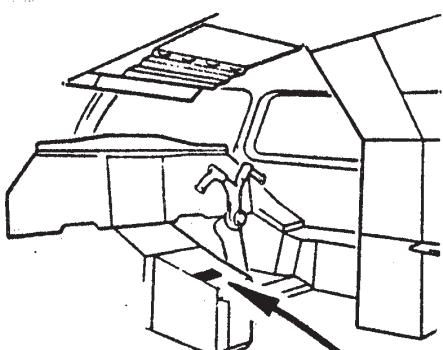
Used in conjunction with the function push button lights.
At NORM and CONT the adjustment is fixed at an average value.
At TEST the adjustment is inoperative but the gain is normal.

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NAVIGATION

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WEATHER RADAR CONTROL UNIT (Sheet 2 of 2)



NORM PUSH BUTTON LIGHT (Green)

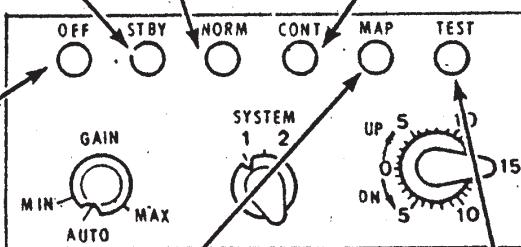
Press - the beam remains conical for maximum range coverage. Corresponds to a normal meteorological detection.

STBY PUSH BUTTON LIGHT (White)

Press - the radar transceiver selected is energized but no transmission occurs. After selection of STBY a 3 minute warm-up period should be allowed before an operating function is engaged.

OFF PUSH BUTTON LIGHT (White)

On - as soon as the aircraft busbars are supplied.



CONT PUSH BUTTON LIGHT (Green)

Press - selects contour. The circuit is the same as for NORM but an additional circuit is brought into operation. This contour circuit causes a black level instead of white peaks.

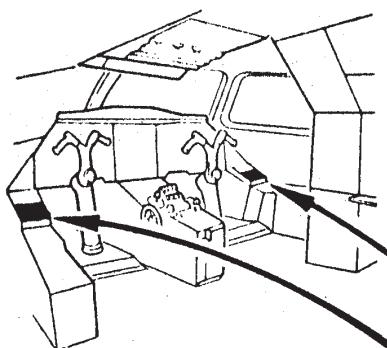
MAP PUSH BUTTON LIGHT (Green)

Press - the antenna radiates a beam of radio frequency (RF) energy, which with a downward tilt appropriate to the aircraft height, has a vertical dimension most suitable for terrain mapping at short to medium range.

TEST PUSH BUTTON LIGHT (Green)

Press - energizes the test circuitry of the radar system and ensures that the operating functions can be tested without transmission. The antenna sweeps during the test.

WEATHER RADAR SCREEN UNIT



ERASE PUSH BUTTON.

POLAROID FILTER SLIDE

When fully to the left, picture is at maximum brightness (yellow/green). For night flying, the image is selected to dark red by moving the slide towards the right.

RANGE MARKS CONTROL

Adjusts the brightness of the marks.

INTENSITY (INT) CONTROL

Adjusts the sensitivity of the indicator. The echo (snow) disappears between 0 and 25 nautical miles and the brightness is adequate above 70 nautical miles.

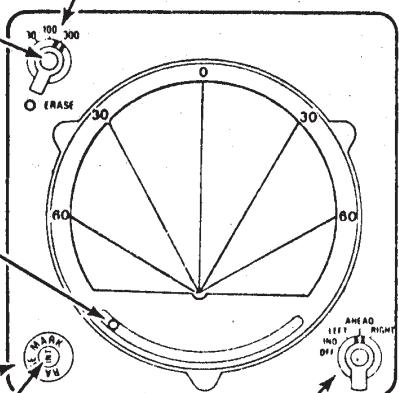
RANGE ROTARY SELECTOR

Selects the scale projected on the screen. There are three possible selections, the numbers being the actual range in nautical miles 30, 100 and 300.

30 - one mark appears at 25NM.
100 - four marks appear; one every 25NM.

300 - six marks appear, one every 50NM.

Pictures on the screen are automatically erased when another range is selected.



RADAR SCREEN ROTARY SELECTOR

IND OFF - radar screen is de-energized but the transceiver is still operational.

LEFT - the sweep centre is displaced to the right. Distant clouds to the left of the heading and not visible on the AHEAD position will be shown.

AHEAD - the sweep centre is on the aircraft longitudinal axis and covers a sector of 170 degrees.

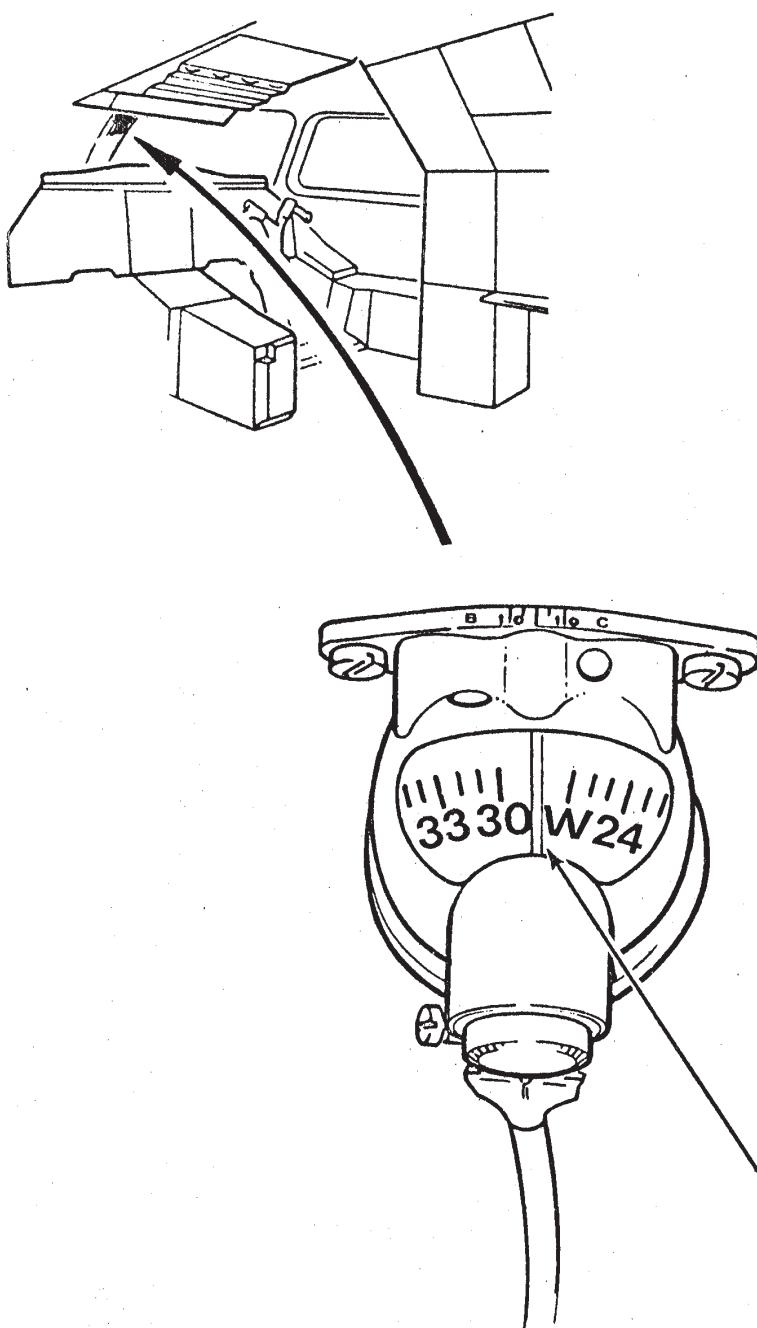
RIGHT - the sweep is displaced to the left.

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STANDBY COMPASS

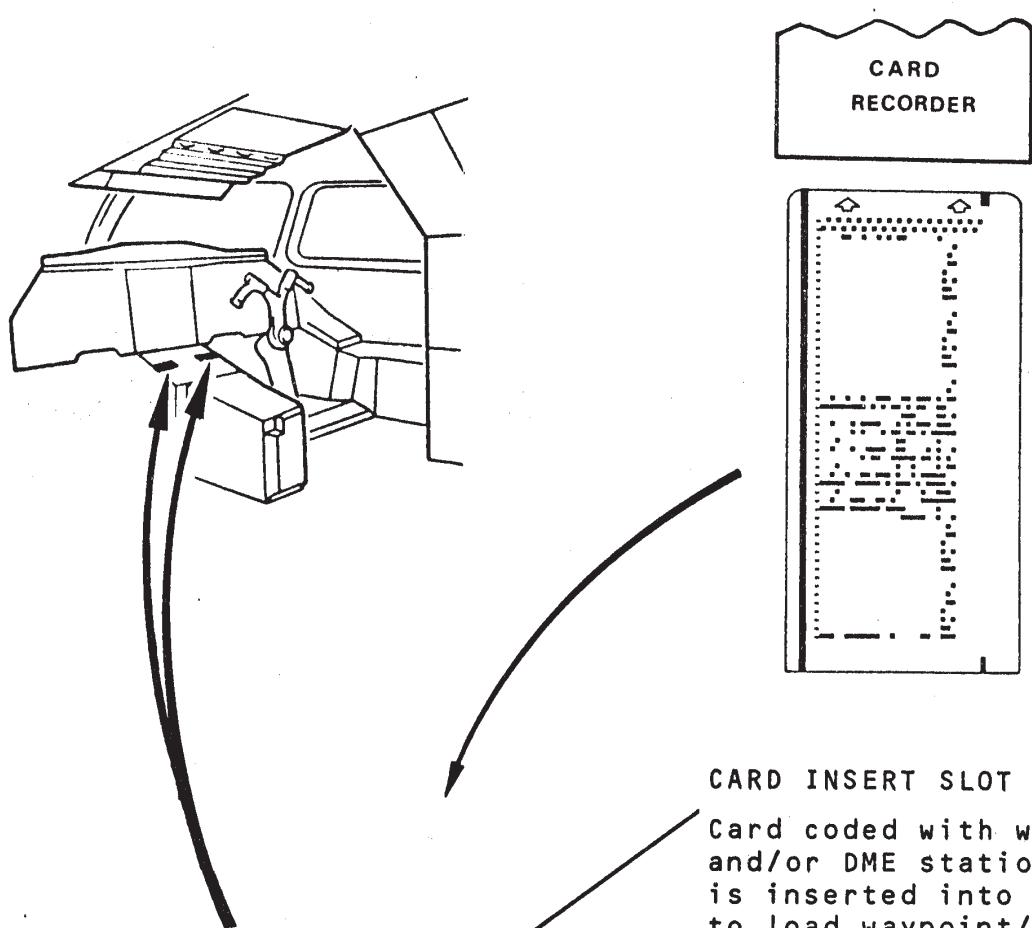


STANDBY COMPASS

Magnetic heading is read from the compass card against the lubber line. A deviation card is located immediately above the standby compass. This indicates the error in the compass readings over the range of indication and the deviation must be added to or subtracted from the indicated heading as appropriate.

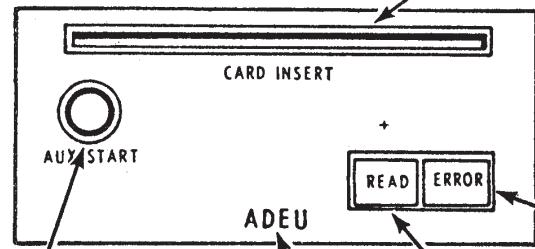
INS CARD READER UNIT

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CARD INSERT SLOT

Card coded with waypoints and/or DME station data is inserted into this slot to load waypoint/DME data into INS. Insertion of card automatically starts feed mechanism and unit stops automatically when reading has been completed.



AUX START BUTTON

Pressed - starts feed mechanism.
Used if mechanism stops before card has been released.

ERROR LIGHT (Red)

On - indicates an error has been detected in the card reading process.

READ LIGHT (Green)

On - when reading is in progress.

ADEU = Auxiliary Data Entry Unit

Chapter 16

NOSE AND VISOR

NOSE AND VISOR

LIST OF CONTENTS

Description and Operation	16.01.01
Schematics	
Normal Operation Sequence Diagram (Green Hydraulics)	16.02.01
Standby Operation Sequence Diagram (Yellow Hydraulics)	16.02.02
Emergency Operation Sequence Diagram	16.02.03
Controls and Indicators	
Normal Control	16.03.01
Indication	16.03.02
Standby Control	16.03.03
Emergency Control	16.03.04

NOSE AND VISOR

GENERAL

On take-off and landing the entire nose fairing forward of the windshield, including the visor, is drooped to improve visibility. When raised the nose and visor give the aircraft a clean aerodynamic shape. The visor, which also protects the windshield from the effects of kinetic heating, has large transparent panels which provide a good field of vision around the flight path.

DESCRIPTION

The visor has two positions: Up and down

- Up position is maintained by a mechanical uplock
- Down position is maintained by hydraulic pressure and mechanical springs.

The nose has three positions: Up, 5° , down ($12\frac{1}{2}^\circ$)

- Up position is maintained by two mechanical uplocks
- 5° down position is maintained by 2 jacks internal locks
- Down position is maintained by hydraulic pressure, aerodynamic loads and nose weight.

This gives 4 normal configurations:

1. Visor up, nose up
2. Visor down, nose up
3. Visor down, nose 5°
4. Visor down, nose down

The visor/nose configuration is easily recognizable from the flight deck.

OPERATION

There are three different operational modes:

Normal

Green hydraulic power supplies

- a single jack which operates the visor
- a pair of jacks working in parallel to operate the nose.

It also supplies power to release visor and nose uplocks.

Standby

The yellow system is available only for lowering the visor and nose. This standby system unlocks and lowers the visor through the normal jack but only releases the locks of the nose thus allowing its own weight and aerodynamic loads to lower it to the 5° or down ($12\frac{1}{2}^\circ$) positions.

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NOSE AND VISOR

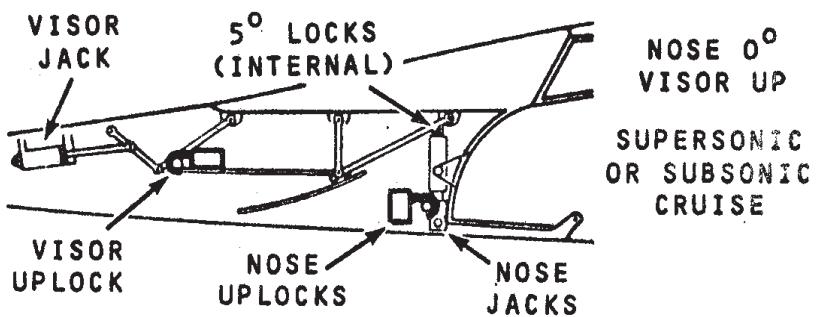
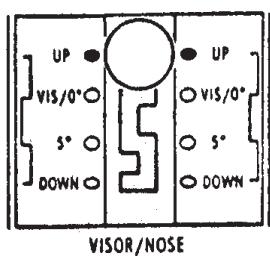
Emergency Operation

Should there be a complete failure of the green and yellow hydraulic systems the nose uplocks can be released mechanically thereby allowing the nose to fall freely to the 5° position. The downward movement of the nose automatically releases the visor uplock and the visor is then lowered by gravitational and aerodynamic loads assisted by spring action.

Controls and Indications

Each mode of operation has its own control.
The indication system is common to all modes of operation.

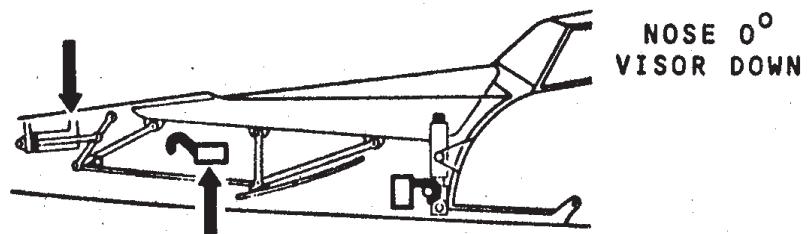
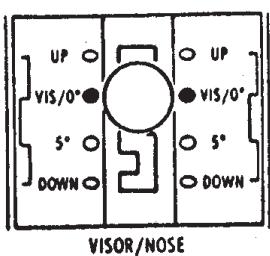
NORMAL OPERATION SEQUENCE DIAGRAM (GREEN HYDRAULICS)



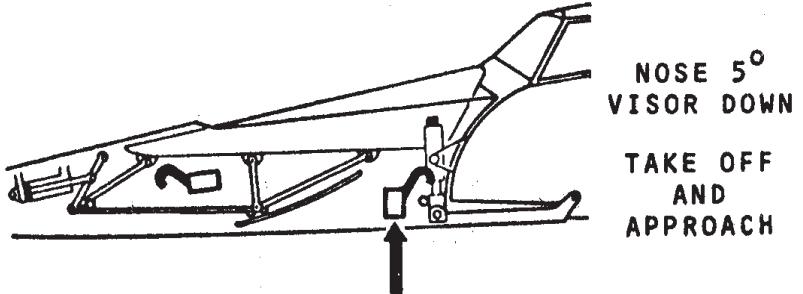
NOSE 0°
VISOR UP

SUPersonic OR SUBSONIC CRUISE

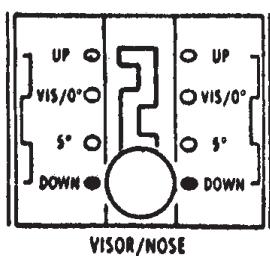
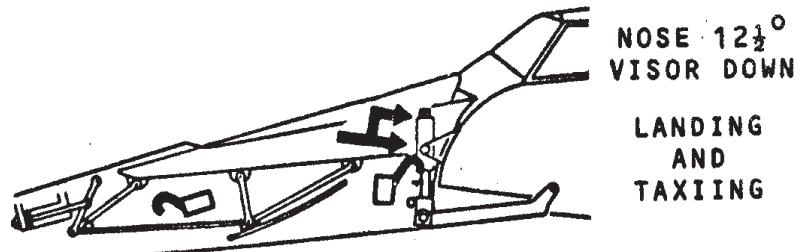
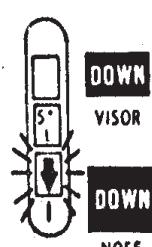
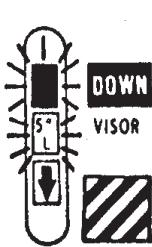
← VISOR IN TRANSIT
6-8 SECs



← NOSE IN TRANSIT (0°-5°)
4-6 SECs



← NOSE IN TRANSIT (5°-12½°)
5-7 SECs

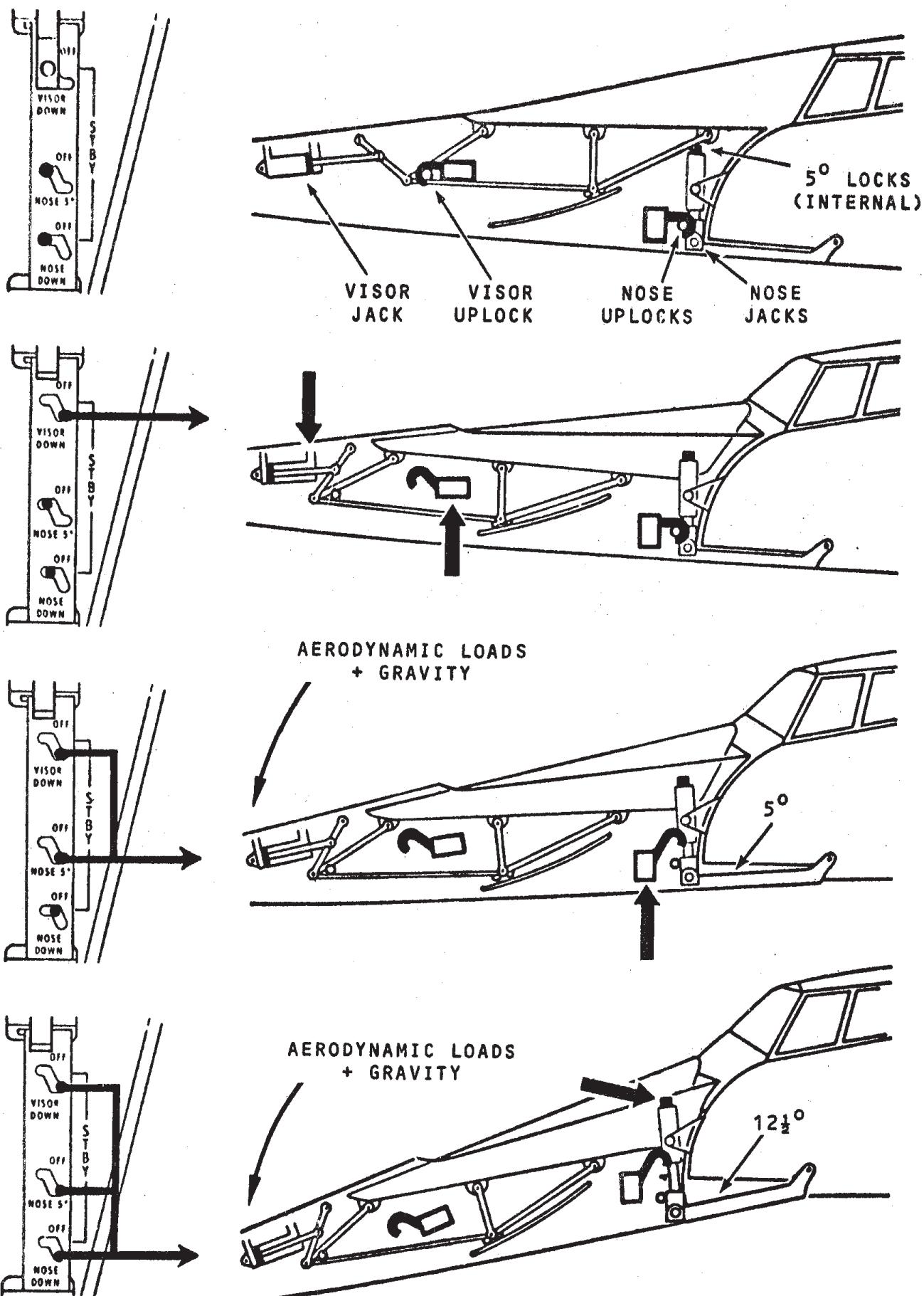


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21 JUL.76

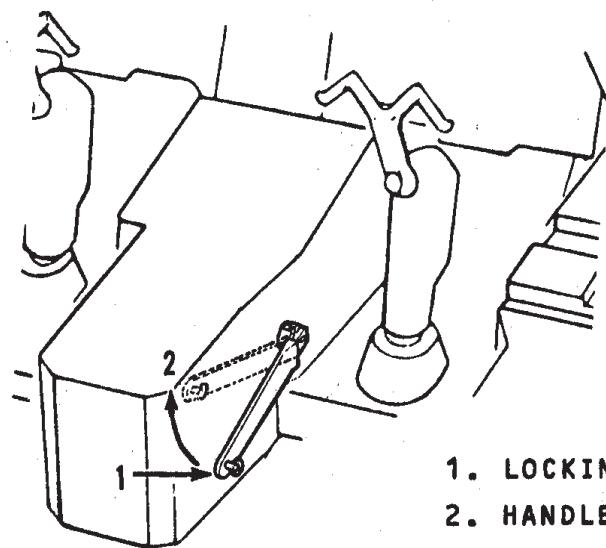
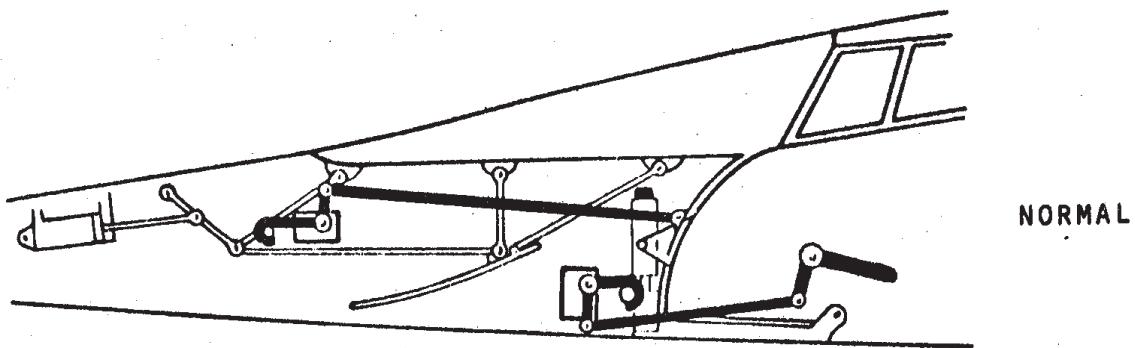
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STANDBY OPERATION SEQUENCE DIAGRAM (YELLOW HYDRAULICS)

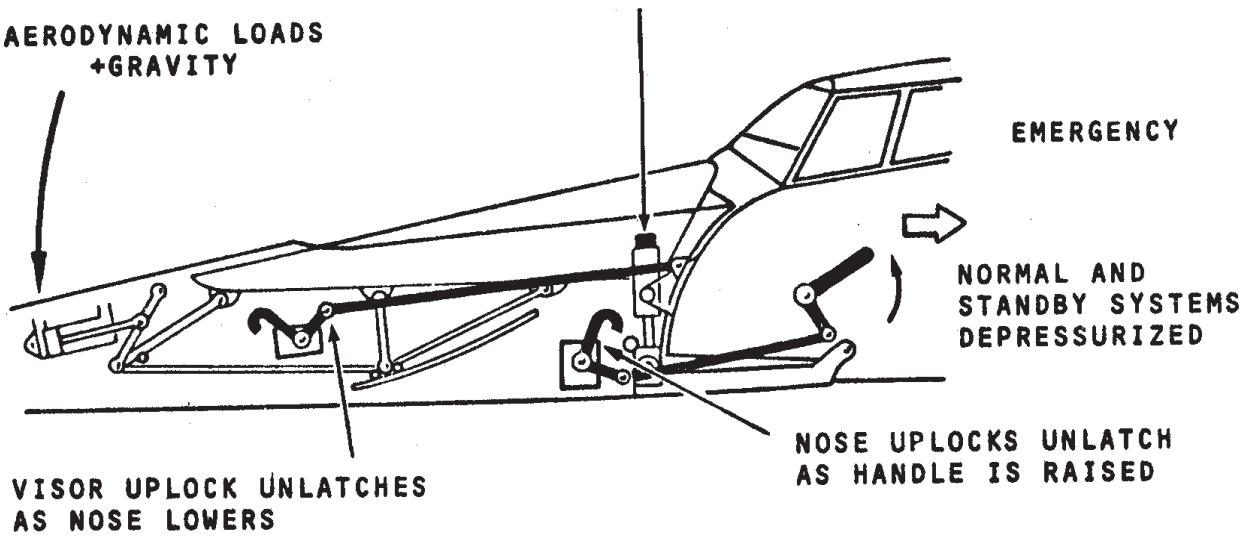


EMERGENCY OPERATION SEQUENCE DIAGRAM



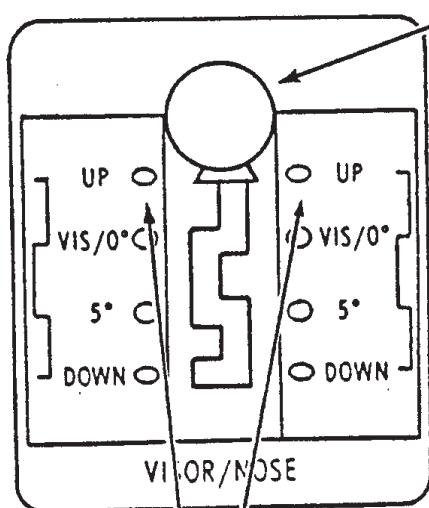
INTERNAL 5° LOCKS PREVENT
FURTHER LOWERING OF NOSE

AERODYNAMIC LOADS
+ GRAVITY



VISOR MOVES DOWN - UNDER AERODYNAMIC LOAD, SPRING ASSISTED.

NORMAL CONTROL

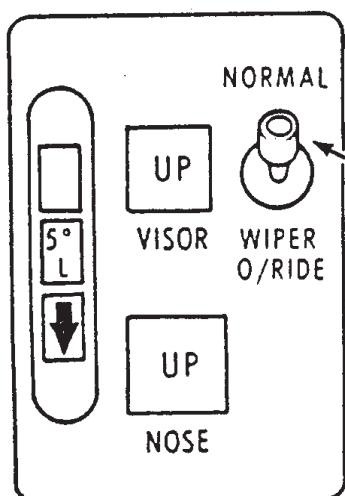
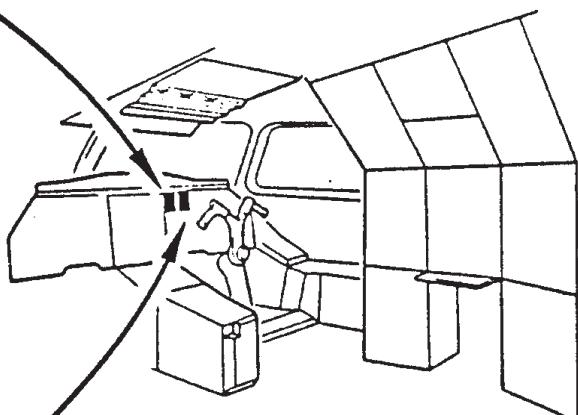


VISOR/NOSE CONTROL LEVER

The VISOR/NOSE lever is fitted with a collar beneath the knob. This collar must be raised before the lever is moved, thus preventing inadvertent operation. A baulk is fitted to prevent inadvertent selection of DOWN from UP or VIS/0°. At the 5° lever position the collar must be released and lifted again before DOWN can be selected.

LEVER POSITION LIGHTS (Green)

There are two lights at each lever position for each visor/nose selection. They are on to indicate only the position of the lever.



WIPER O/RIDE SWITCH

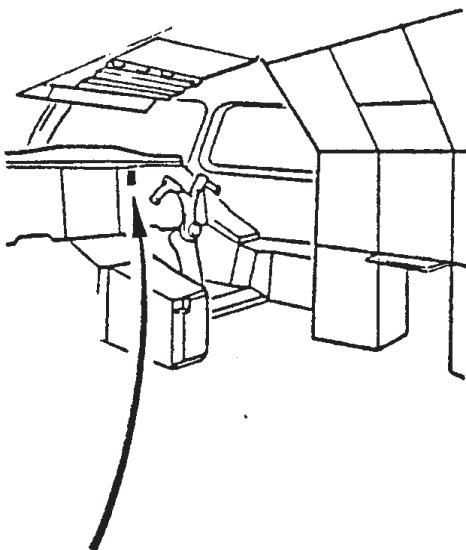
NORMAL - inhibits the visor raise operation if one of the windscreen wipers is not correctly parked

O/RIDE - if the visor raise sequence remains inhibited, with the windscreen wipers correctly parked, O/RIDE is used to bypass the inhibition.

INDICATION

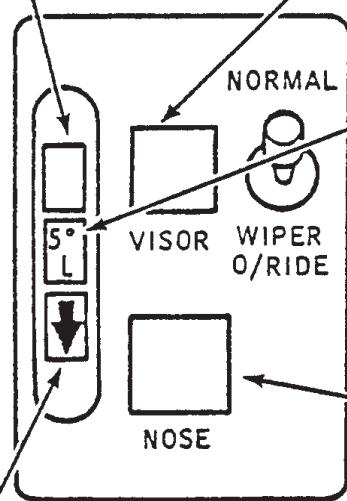
OVERSPEED WARNING (Warble)

The overspeed warning (warble) sounds when the visor uplock is released at a speed greater than $M = 0.95$ or when the nose is below the 5° position at a speed greater than 270 kt.



UNLOCK LIGHT (Red)

On - indicates that either the visor or nose is not at a specified position or is not positively locked.
The light may come on to indicate mechanical disconnect of nose position transmitter.



VISOR MAGNETIC INDICATOR

- UP** Visor fully raised.
- DOWN** Visor fully lowered.
- /** Visor in transit.

 5° L LIGHT (Amber)

On - indicates that one or both of the nose 5° locks is or are released.

NOTE:

The light goes off, though the 5° locks remain released, when the nose down position is reached.

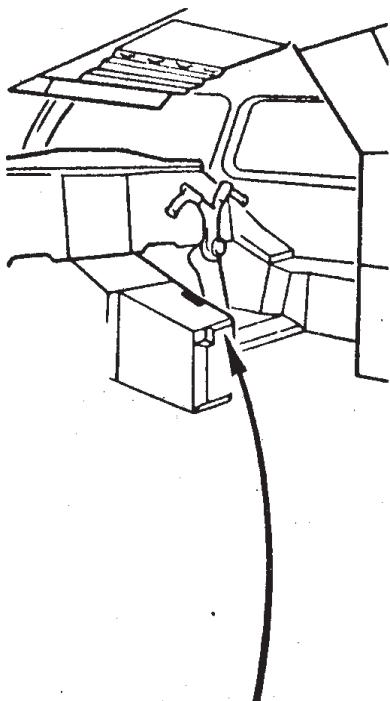
NOSE MAGNETIC INDICATOR

- UP** Nose fully raised
- 5°** Nose 5° down
- DOWN** Nose fully lowered
- /** Nose in transit

DOWN LIGHT (Green)

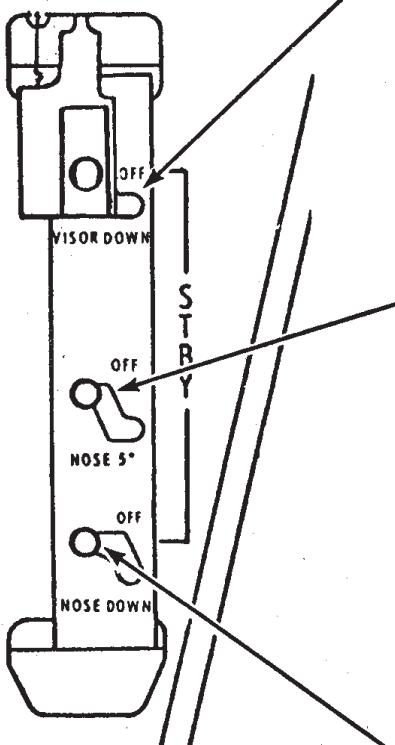
On - indicates that the nose and visor are both fully down.

STANDBY CONTROL



NOSE/VISOR STBY CONTROL

The nose/visor STBY control comprises 3 switches guarded by a lock and slotted plate that ensures correct sequencing of the system.



STBY CONTROL SWITCH TO VISOR DOWN

Setting the STBY control switch to VISOR DOWN onloads the yellow hydraulic system and selects it to release the visor uplock and drive the visor down.

STBY CONTROL SWITCH TO NOSE 5°

Setting the STBY control switch to NOSE 5°, selects the yellow hydraulic system to release the nose uplocks, thus allowing the nose to fall to the 5° position under its own weight and aerodynamic loads.

If the visor is up as the nose falls the visor uplock is released by a mechanical linkage and the visor is then lowered by yellow hydraulic pressure.

STBY CONTROL SWITCH TO NOSE DOWN

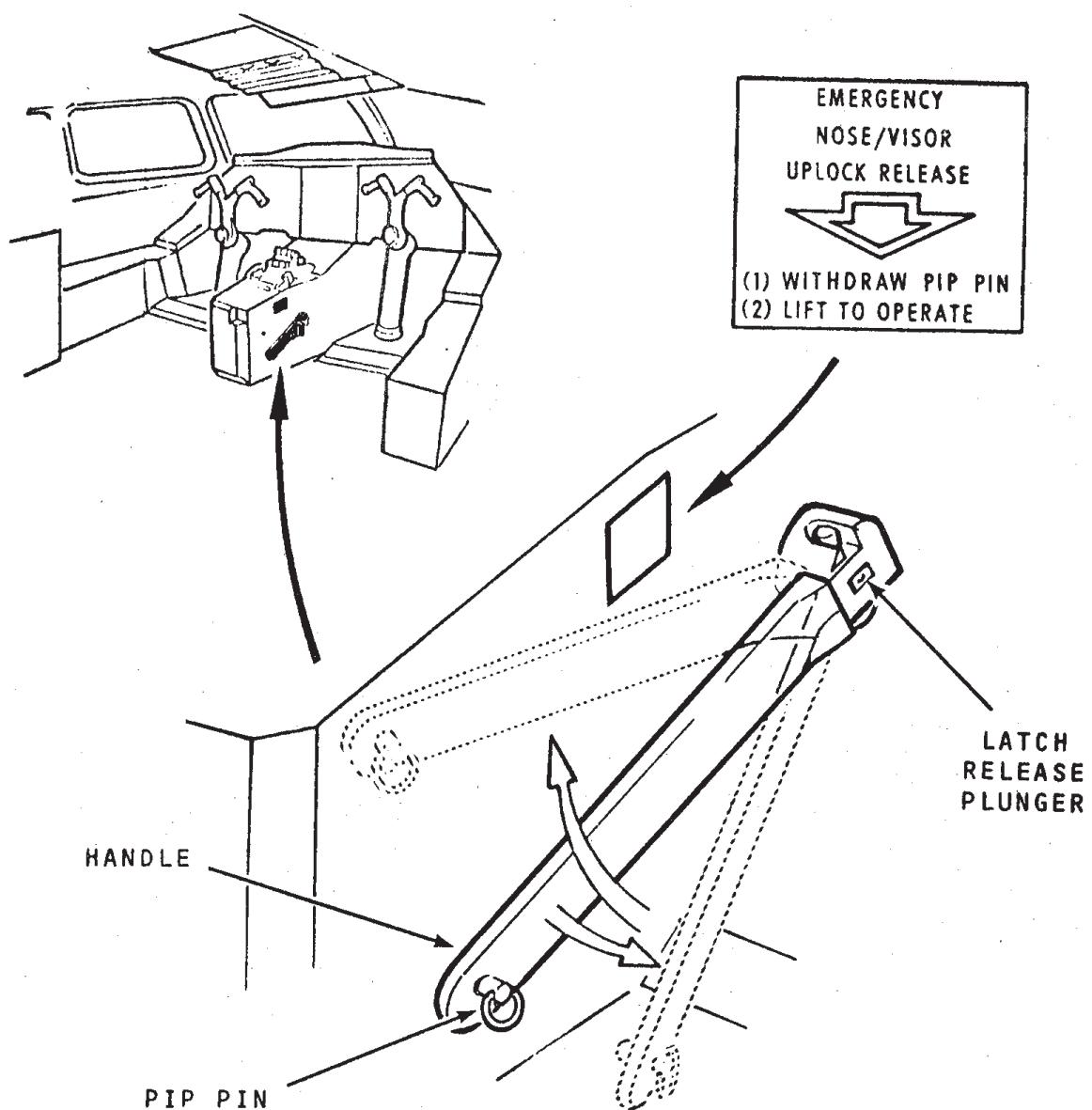
Setting the STBY control switch to NOSE DOWN selects the yellow hydraulic system to release the 5° locks (2) allowing the nose to fall to the down position.

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EMERGENCY CONTROL



EMERGENCY NOSE/VISOR UPLock RELEASE HANDLE

Pulling the handle out and upwards, releases the nose uplocks (2) through a mechanical linkage thus allowing the nose to fall to the 5° position under its own weight and aerodynamic loads.

The handle is self locking in the raised position. With the handle raised, the normal and standby systems are inhibited, therefore there are no means of lowering the nose below 5°.

If the visor is in the up position as the nose falls the visor uplock is released by a mechanical linkage allowing the visor to fall to the down position assisted by aerodynamic loads and the mechanical spring pots.

Chapter 17

PNEUMATICS

Chapter 18

POWER PLANT

POWER PLANT

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GENERAL

The power plant comprises four identical propulsion units mounted in nacelles beneath the wings. Each nacelle contains two propulsion units separated by a centre wall forming a firewall, each propulsion unit comprising:-

- A variable-geometry engine air intake.
- A Rolls-Royce OLYMPUS 593 Mark 610 engine with reheat, aligned with the air intake. The engine is contained within an engine bay formed by the centre wall, access doors and, forward, a firewall separating the engine bay from the intake structure.
- A secondary nozzle structure which provides a mounting for the thrust reverser buckets forming the variable area secondary nozzle.

ENGINE AIR INTAKES

Each engine air intake is basically rectangular in cross section with a moveable ramp in the roof and spill door in the floor. Hydraulic actuators position the ramp to vary the intake capture area and open the spill door to augment the spill of unwanted air.

At take off and low speeds an auxiliary inlet vane, integral with the spill door, provides extra air to the engine. This vane is operated by differential pressure only. During operation of the spill door the vane is locked in the closed position.

A perforated bleed through the lower surface of the intake aids inlet performance at high Mach numbers. The flow through this bleed is limited by the exit cross section only and is not mechanically controlled.

OPERATION

At speeds below $M=1.3$ the ramps remain fully up and the spill doors closed. At speeds above $M=1.3$ the ramps and spill doors are positioned between scheduled maximum and minimum angular positions determined by the prevailing control parameters, namely intake pressure ratio, Mach number, engine speed N_1 , angle of attack and actual ramp and spill door positions. The change in ramp angle varies the intake capture area, controls the fore spillage of air and creates a shockwave system originating at the ramp angle. This shockwave system slows the air entering the intake to approximately $M=0.5$. In the optimum configuration at any Mach number the ramp is positioned to cause the shockwaves to converge on the lower lip of the floor.

When the predetermined scheduled ramp angle is reached any excess air entering the intakes (e.g. during very high ambient temperatures or during throttling) is dumped through the spill door. In addition, as the angle of the spill door increases the scheduled maximum ramp angle is increased by an incremental function of the spill door angle.

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The hydraulic actuators of the ramps and spill doors are supplied by the two main hydraulic systems. Intakes 1 and 2 are supplied by the green system and intakes 3 and 4 by the blue system. The standby supply for all intakes is the yellow system.

There are two identical control lanes per intake. A failure of the lane in control will cause an automatic changeover to the other lane. A method of manual control of the ramps and spill doors is provided.

When hydraulic pressure to an intake is low or when the intake is not being auto-controlled, ramp movement is prevented by auto-application of a brake. Spill door movement is prevented by hydraulic locking of its operating jack.

ENGINE BAY VENTILATION

Engine bay ventilation is provided by air from the engine air intakes passed to the engine bay by way of secondary air doors in the firewall between the intake structure and the engine bay.

The secondary air doors are opened to provide a cooling ventilating flow of air around the engine, and are automatically controlled to open when the aircraft speed exceeds $M = 0.26$ for engines No.1, 2 and 3 and 220 kt for engine No.4.

ENGINE FUEL FEED

Fuel under aircraft collector tank pump pressure is delivered to the engine first stage pump and on through a fuel filter and oil cooler to the second stage pump in the fuel control unit. The fuel then passes through the throttle valve, the HP shut-off valve, a flow meter and a dump valve to the burners. Reheat fuel is taken from the first stage pump outlet and delivered via a flow meter to the reheat spray ring.

ENGINE OIL SYSTEM

The engine lubrication system lubricates the five main bearings of the engine, accessory drives and gears. Scavenge pumps return the oil from the five main bearings and gearbox through a fuel-cooled oil cooler to the tank.

REHEAT SYSTEM

The reheat system operates by burning fuel within the jet pipe to increase the temperature of the turbine exhaust gases. This increases the velocity of the exhaust gases thereby producing additional thrust.

The reheat is normally used at take off and during the transonic acceleration.

ENGINE CONTROL

Two identical, electrical throttle control systems control each engine; a failure of the system in control will cause an auto-

matic changeover to the other system.

The throttle control units control the engine, using the position of the throttle levers, the engine control schedules and the engine limiters.

The engine control schedule is the schedule of the relationship between the low pressure spool (N_1) and high pressure spool (N_2) speeds. The twin-spool engine is fitted with a variable primary nozzle that enables the jet pipe pressure to be varied. The jet pipe pressure acts upon the low pressure spool thus allowing controlled variation of N_1 without affecting the N_2 speeds. This facility allows matching of the N_1 and N_2 speeds in a series of engine control schedules that allow optimum operation of the engine while ensuring adequate compressor surge margins throughout the operating range of the engine.

The four schedules are, flyover, high, mid and low.

Flyover (F/O) is required during flyover noise abatement at speeds greater than 220 knots and for prolonged flying within the range M 0.80 to M 1.00 provided that the throttle levers are not advanced more than 95% of travel.

High (HI) is required during dry engine operation at speeds greater than 220 knots. It provides maximum fuel economy.

Mid is required during reheated engine operation in CLIMB rating at speeds greater than 220 knots. Mid also protects against excessive N_1 overspeed when reheat is cancelled and during the approach for noise abatement to touch down.

Low (LO) is required during dry engine operation at speeds less than 220 knots and during reheated engine operation in T/OFF rating at any speed; it also protects against excessive N_1 overspeed when reheat is cancelled.

The engine limiters automatically control the engines to the limitations appropriate to the prevailing phase of flight. Thus the need for fine tuning of the throttle levers to remain within limitations is avoided and the throttle levers are only used when thrust below the appropriate limitation is required. The engine limiters are by switch action.

ENGINE IGNITION

There are two igniters per engine, identified as left hand and right hand. They may be used together or individually.

An auto-ignition system provides a rapid automatic relight facility. The N_2 rpm is monitored and should a rapid decay of N_2 occur, or N_2 fall below 58%, the auto ignition system signals the engine fuel throttle valve to close, the start pump to run and the ignitors to spark. When light-up of the engine is detected the fuel throttle valve is opened to correspond to the throttle lever position and the start pump, together with the ignitors, is switched off.

ENGINE STARTING

The engines are started by low pressure air acting on an air starter to crank the engine. The air may be supplied independently to each wing from a ground supply or cross bleed from the adjacent engine if it is already running.

DEBOWING

Following an engine shutdown, cooling of the engine interior is not uniform and the temperature differences are such that the high pressure spool shaft distorts. Starting the engine in this condition causes vibration. Therefore it is necessary during starting to rotate the engine at sub-idle rpm for one minute to obtain uniform temperatures and to re-align the high pressure spool shaft. This operation is automatic and is known as debowing.

ENGINE RELIGHTING

The auto ignition system will normally operate in the event of engine flame out, however, should it fail to provide an immediate relight a manual relight facility is provided.

Emergency relight busbars are used to relight the engine(s) after loss of the a.c. main busbars.

SECONDARY NOZZLE

The variable area secondary nozzle is formed by the thrust reverser buckets. The secondary nozzle is positioned fully open at speeds greater than $M = 1.1$. At lower speeds a nozzle angle scheduling unit (NASU) positions the secondary nozzle as a function of Mach number and also provides the appropriate signals for the automatic selection of the engine control schedules. There are two NASU systems; No.1 system signals engines 1 and 4 and No.2 system signals engines 2 and 3.

Protection against inadvertent bucket movement toward the reverse thrust position is afforded in the following manner. Should the buckets move beyond the 27 degree position an air shut off valve cuts the air supply to the bucket drive motor. This should prevent bucket movement beyond 35 degrees, if however the buckets move beyond 42 degrees a "wind down" system operates and signals via the selected throttle control system a reduction of N_2 to idle.

REVERSE THRUST

Reverse thrust is provided on all four engines for use on the ground.

Reverse thrust may also be used in flight but is limited by a control system such that only two engines (2 and 3) are used and these only at reverse idle power.

This limitation is necessary because at altitude insufficient bleed air is available from one engine to move its own buckets to the reverse position; to overcome this problem bleed air from No.1 engine assists No.2 engine and bleed air from No.4 engine assists No.3 engine.

When the secondary nozzle buckets on each engine are being used as thrust reversers the buckets are fully closed (73 degrees) across the jet discharge to deflect the exhaust gas above and below the nacelle through gaps created by the forward edges of the buckets.

Control of the thrust reverse mode of the buckets is direct to bucket control units and does not pass through the NASU's.

AUTOMATIC SHUTDOWN

To prevent severe turbine overspeed and minimise damage should the low pressure compressor shaft fail, an automatic quick engine shutdown device is provided. A signal tube within the LP shaft enables relative twisting movement between front and rear sections of the LP shaft to be detected. Excessive shaft twisting causes operation of a mechanical device that operates a quick shut down valve and high speed fuel dump in the burner fuel line.

NOZZLE ANGLE SCHEDULING UNIT

The NASU system automatically positions the clamshell type buckets, when they are being used in their secondary nozzle mode, as a function of Mach number. The control is achieved through bucket control units on each power plant.

There are two NASU's and normally each NASU controls two symmetrically disposed bucket control units, there being one bucket control unit per engine.

In the event of failure of a NASU the remaining NASU automatically signals all four bucket control units and if both NASU's fail the secondary nozzle will be signalled to 0° bucket angle.

In addition to the secondary nozzle control the NASU's also control through the throttle control units;

the selection of the Engine Control Schedules in AUTO mode,
the engine limiters in CRUISE rating and
signal the closing of the air shut off valve on the air motor that drives the buckets at speeds above M = 1.2.

In the event of a failure of a NASU some of the signals to the throttle control units are supplied by the other NASU. Some signals are still supplied by the NASU which is nominally off line, except when the failure is caused by a NASU power supply loss, in which case all signals from the failed NASU are lost.

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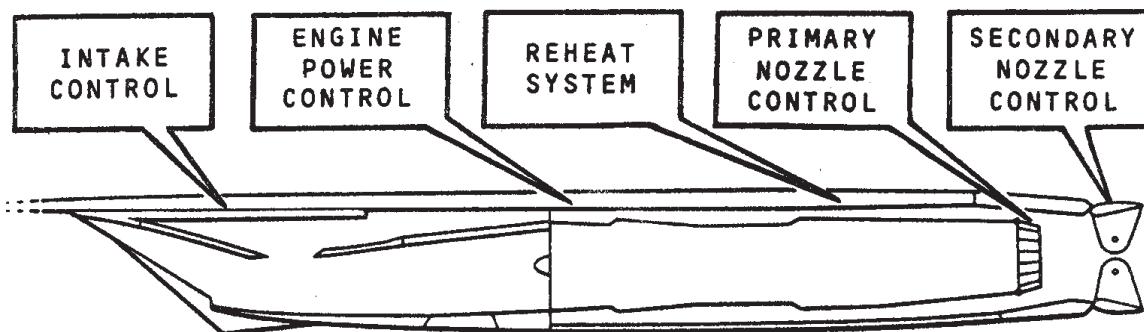
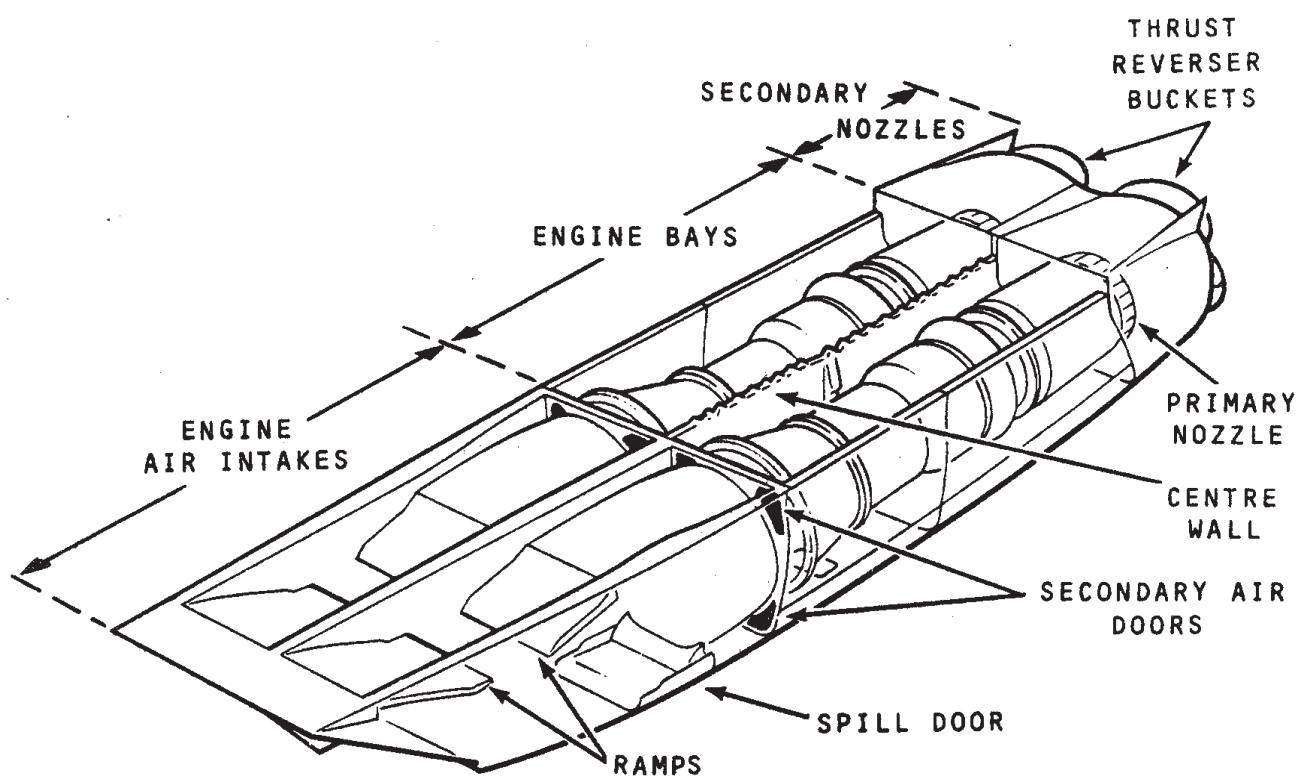
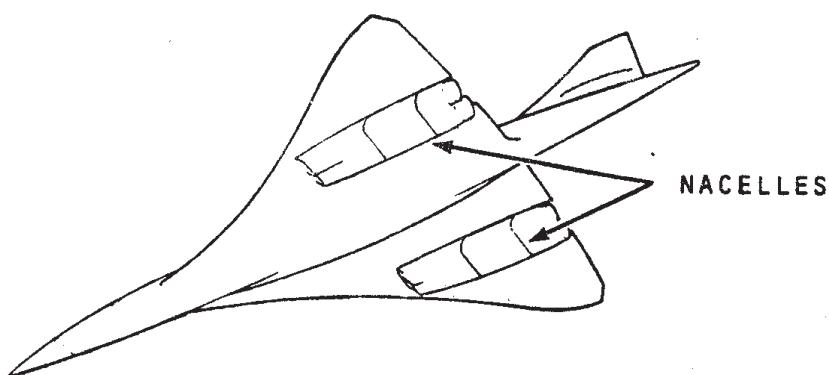
GROUND IDLE

A facility is provided to reduce the idle thrust on the ground.

TAKE OFF N₁ LIMITER

A facility is provided to limit the N₁ of engine number 4 to a maximum of 88% below 60 knots. This is necessary because airflow patterns within the intake at forward speeds below 60 knots cause airflow distortion at the engine face leading to LP compressor blade vibration at N₁ greater than 88%.

POWER PLANT GENERAL ARRANGEMENT



(unchanged)

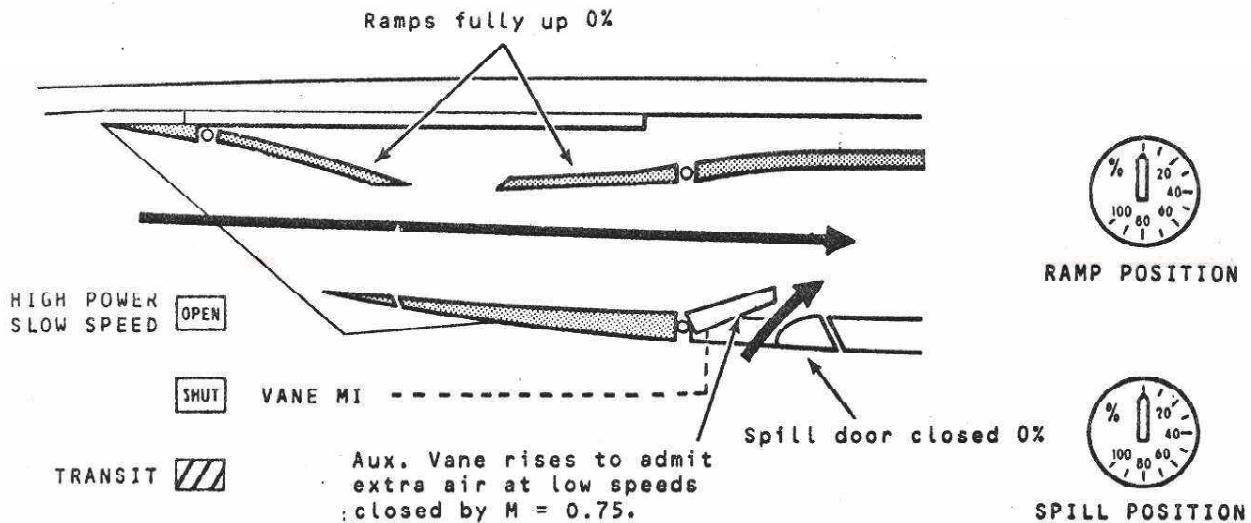
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INTAKE CONFIGURATION

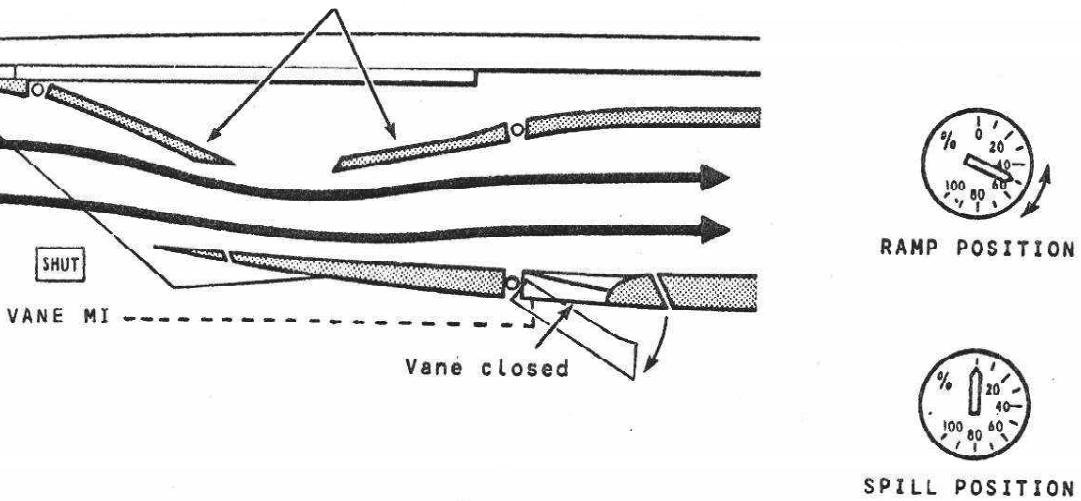
INTAKE CONFIGURATION BELOW M = 1.3



Ramps may lower and spill door open if engine fails above M = 0.7.
or if the engine is throttled to idle.

INTAKE CONFIGURATION ABOVE M = 1.3

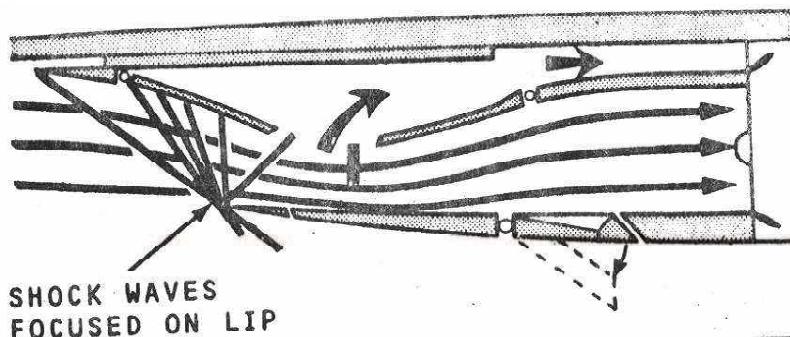
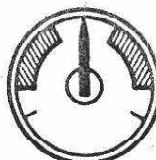
Ramps lowering with increasing mach; Approx. 50% by M = 2.02.
Ramps will move as intake compensates for ambient temperature changes or engine throttling.



Spill door normally closed, but may open to dump excess air from intake if engine throttled back or ambient temperature very high.

INTAKE SUPERSONIC AIRFLOWS

CRITICAL (NORMAL) CONDITION

SHOCK WAVES
FOCUSED ON LIPINTAKE PRESSURE RATIO
ERROR INDICATOR

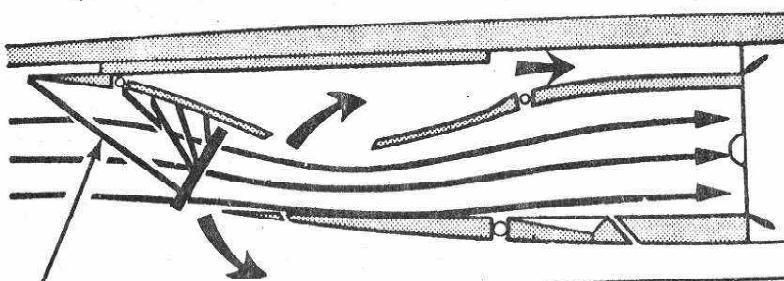
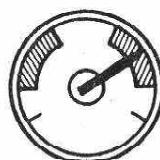
1. ENGINE THROTTLED BACK
OR AMBIENT TEMPERATURE
INCREASED

RAMPS MOVE DOWN TO COMPENSATE
FOR REDUCED ENGINE DEMAND
SPILL DOOR MAY OPEN

2. AMBIENT TEMPERATURE
DECREASED

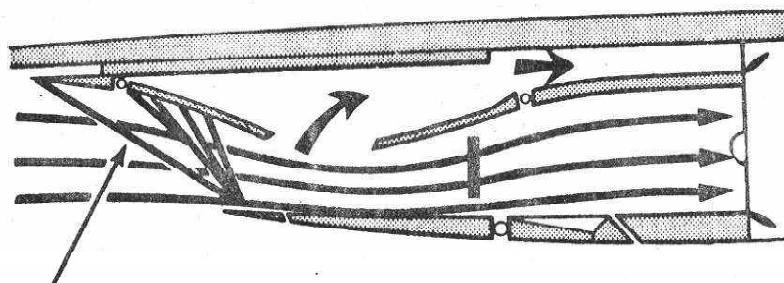
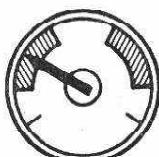
RAMPS MOVE UP TO COMPENSATE
FOR INCREASED ENGINE DEMAND
 N_1 MAY BE AUTOMATICALLY REDUCED

SUBCRITICAL CONDITION

SHOCK WAVES PUSHED OUT
OF INTAKE, CAUSING
UNCONTROLLED SPILLAGE
OF AIR ROUND LIP

IF CONTROL SYSTEM FAILS TO
MOVE RAMPS TO COMPENSATE
FOR REDUCED ENGINE DEMAND

SUPERCRITICAL CONDITION

SHOCK WAVES SUCKED
INTO INTAKE

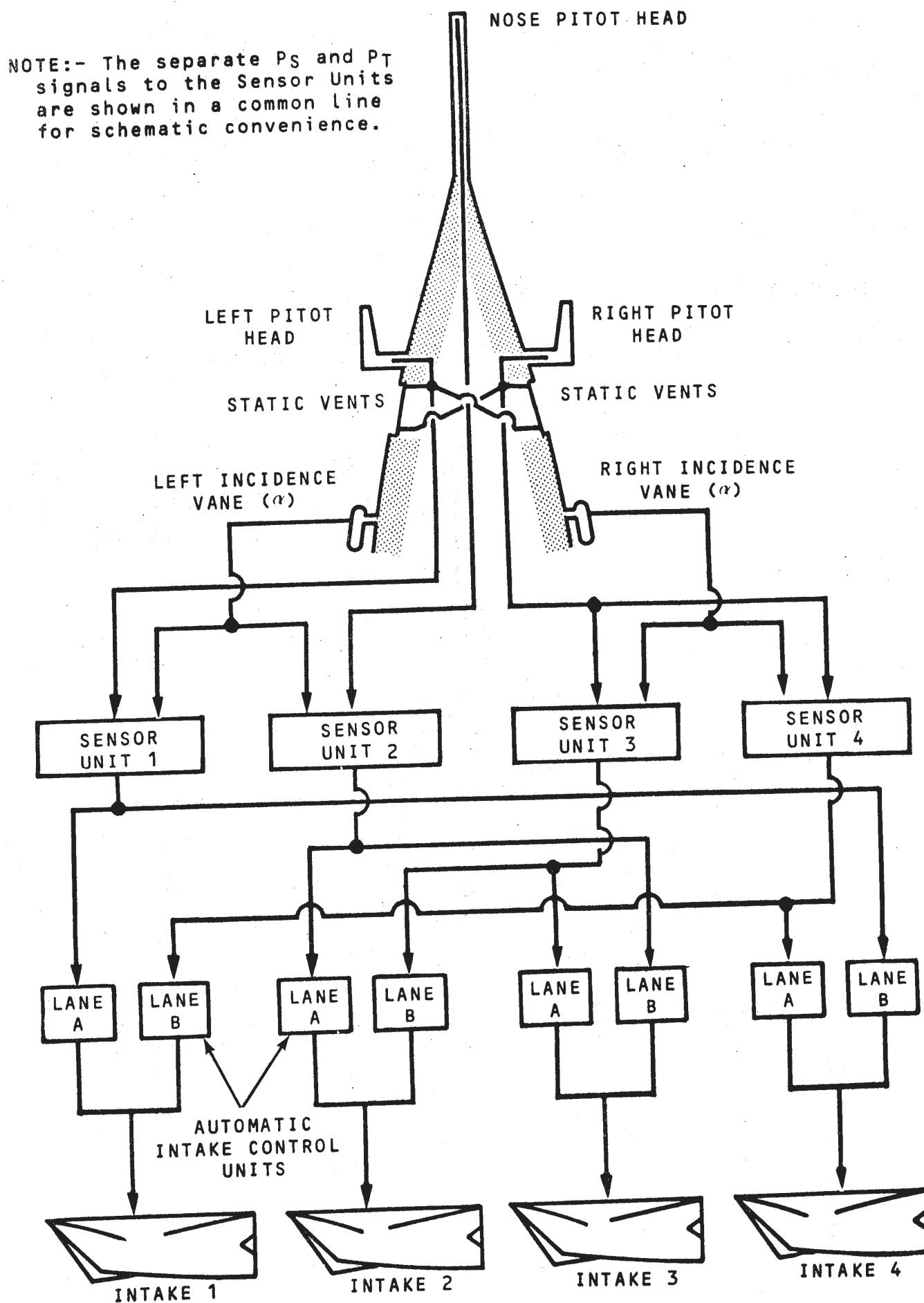
IF CONTROL SYSTEM FAILS TO
MOVE RAMPS TO COMPENSATE
FOR INCREASED ENGINE DEMAND

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INTAKE CONTROL GENERAL ARRANGEMENT

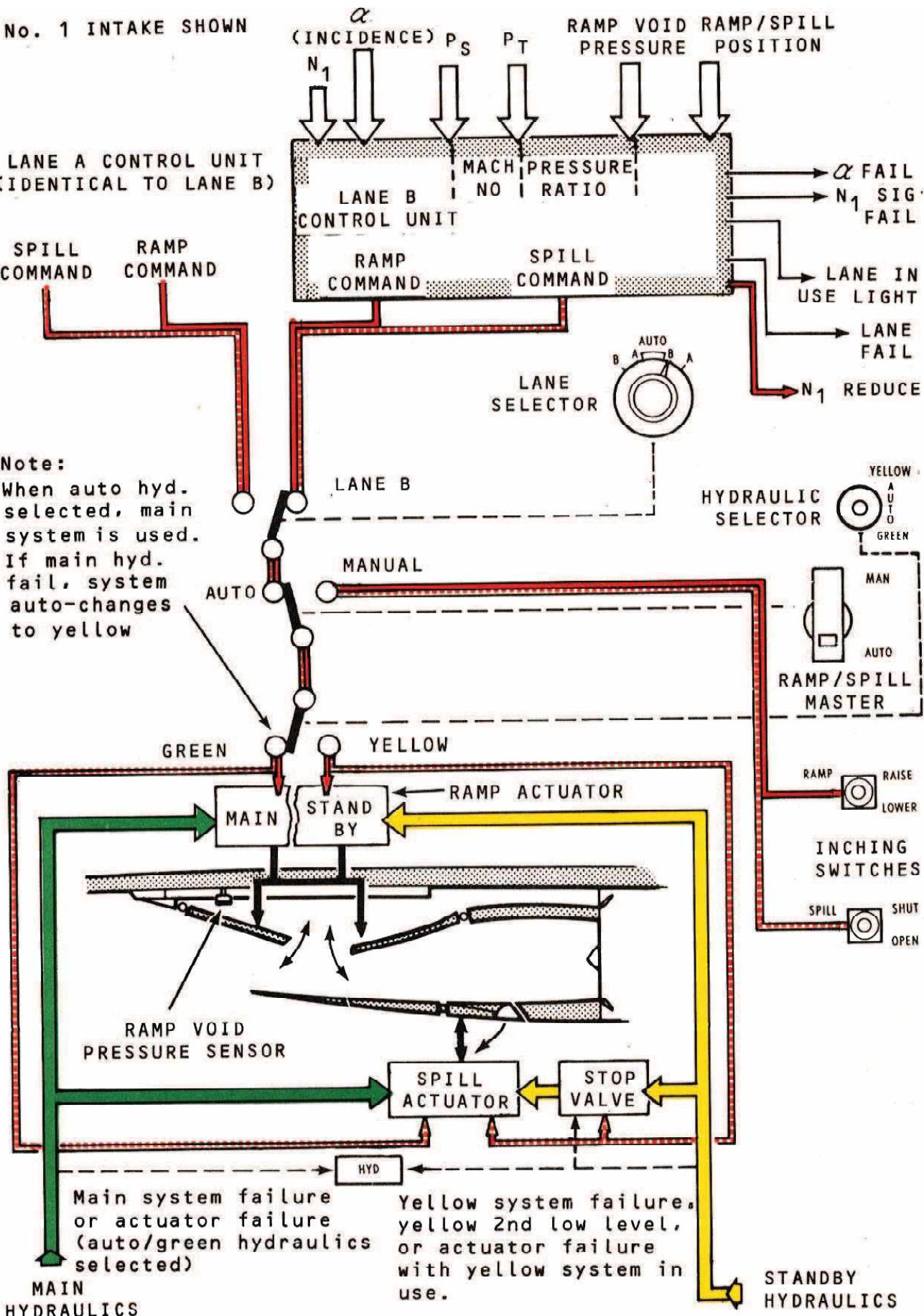


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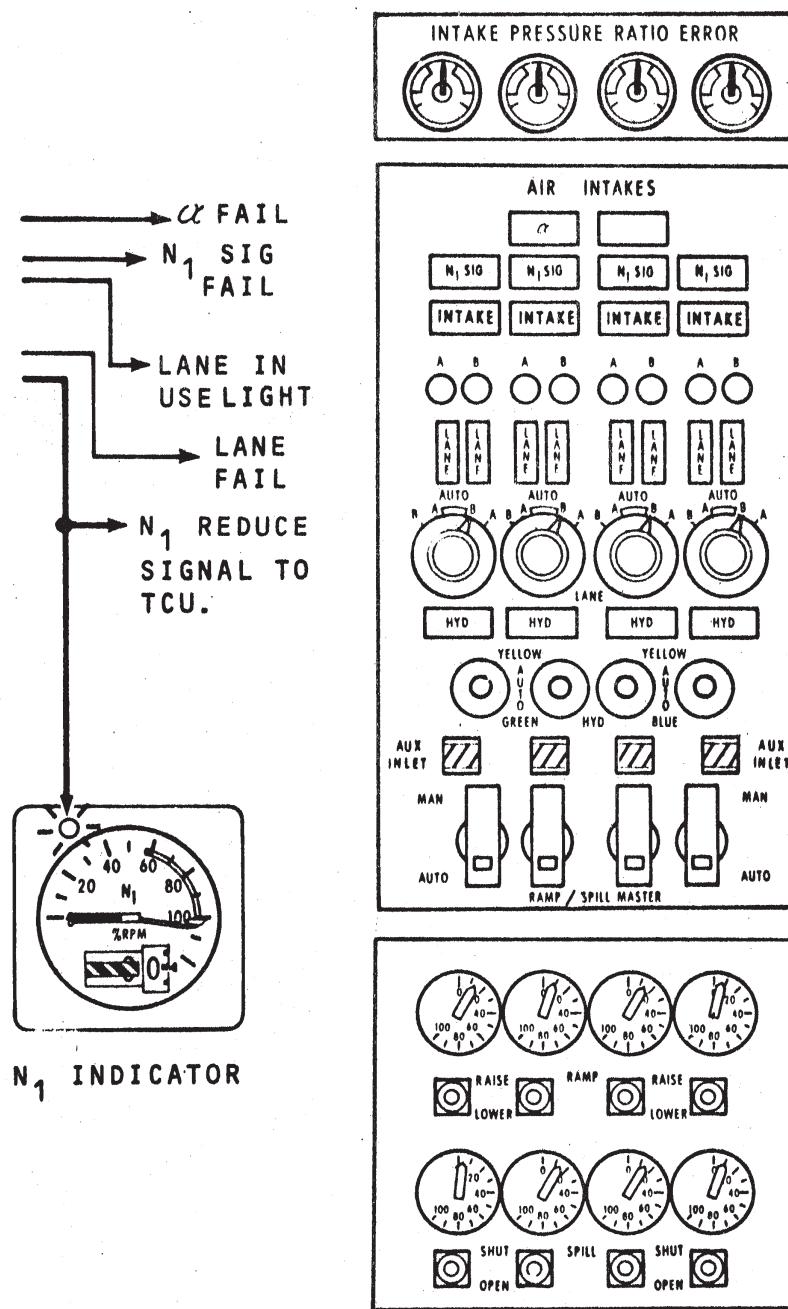
INTAKE CONTROL SCHEMATIC

(Sheet 1 of 2)

NO. 1 INTAKE SHOWN



INTAKE CONTROL SCHEMATIC
(Sheet 2 of 2)



NOTE:

- 1 RED 'INTAKE' LIGHT ON TO SIGNAL LOSS OF AUTOMATIC CONTROL OF INTAKE
- 2 HYDRAULIC SUPPLIES:-

INTAKES	MAIN	STANDBY
1 and 2	GREEN	YELLOW
3 and 4	BLUE	YELLOW

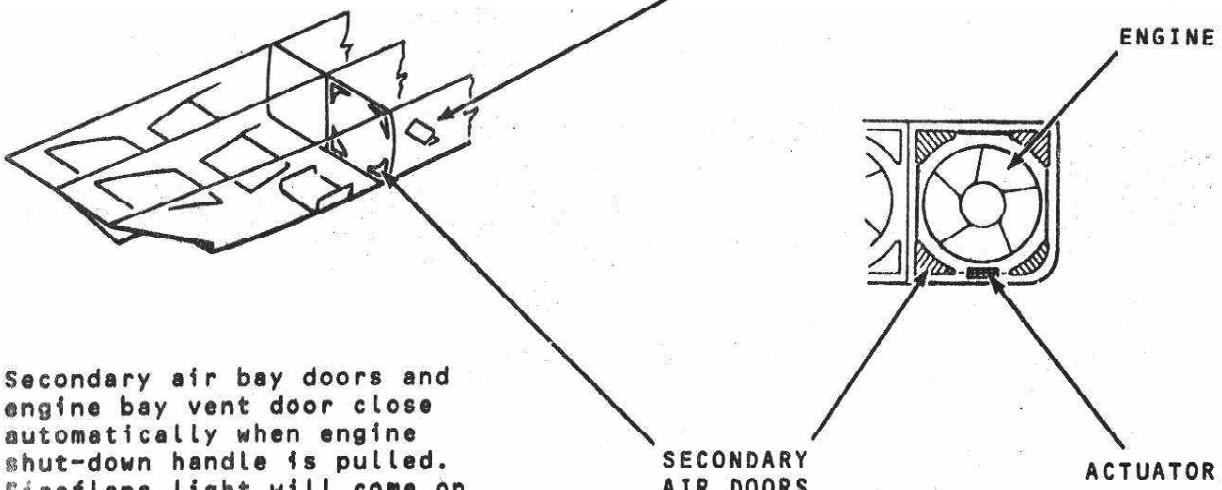
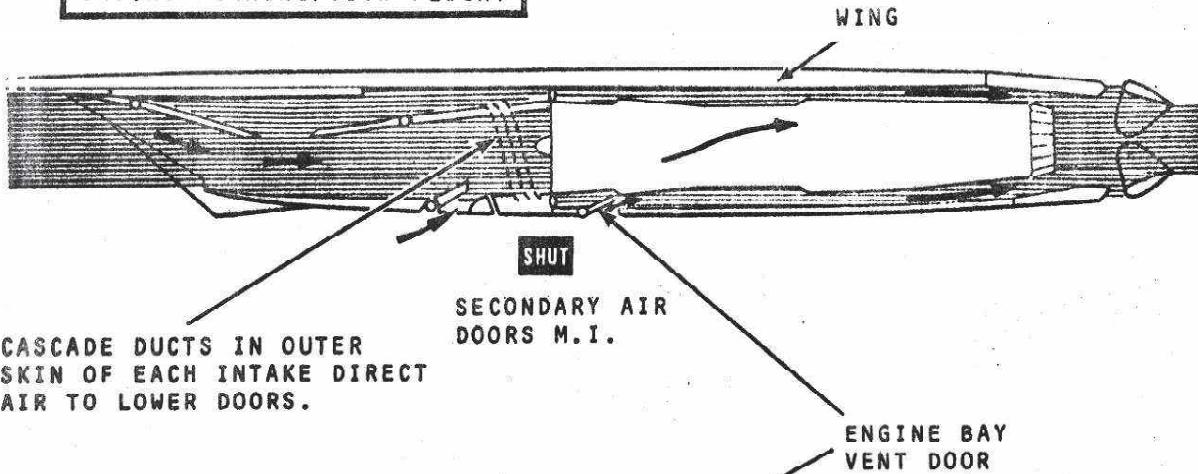
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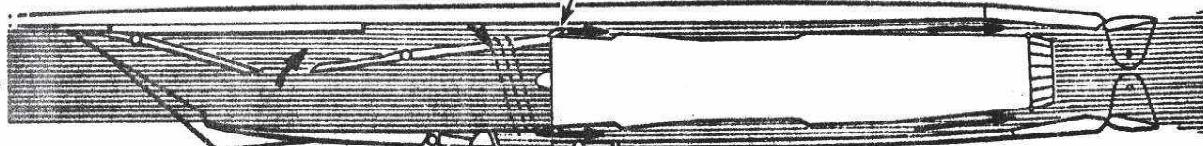
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NACELLE VENTILATION

GROUND RUNNING/SLOW FLIGHT



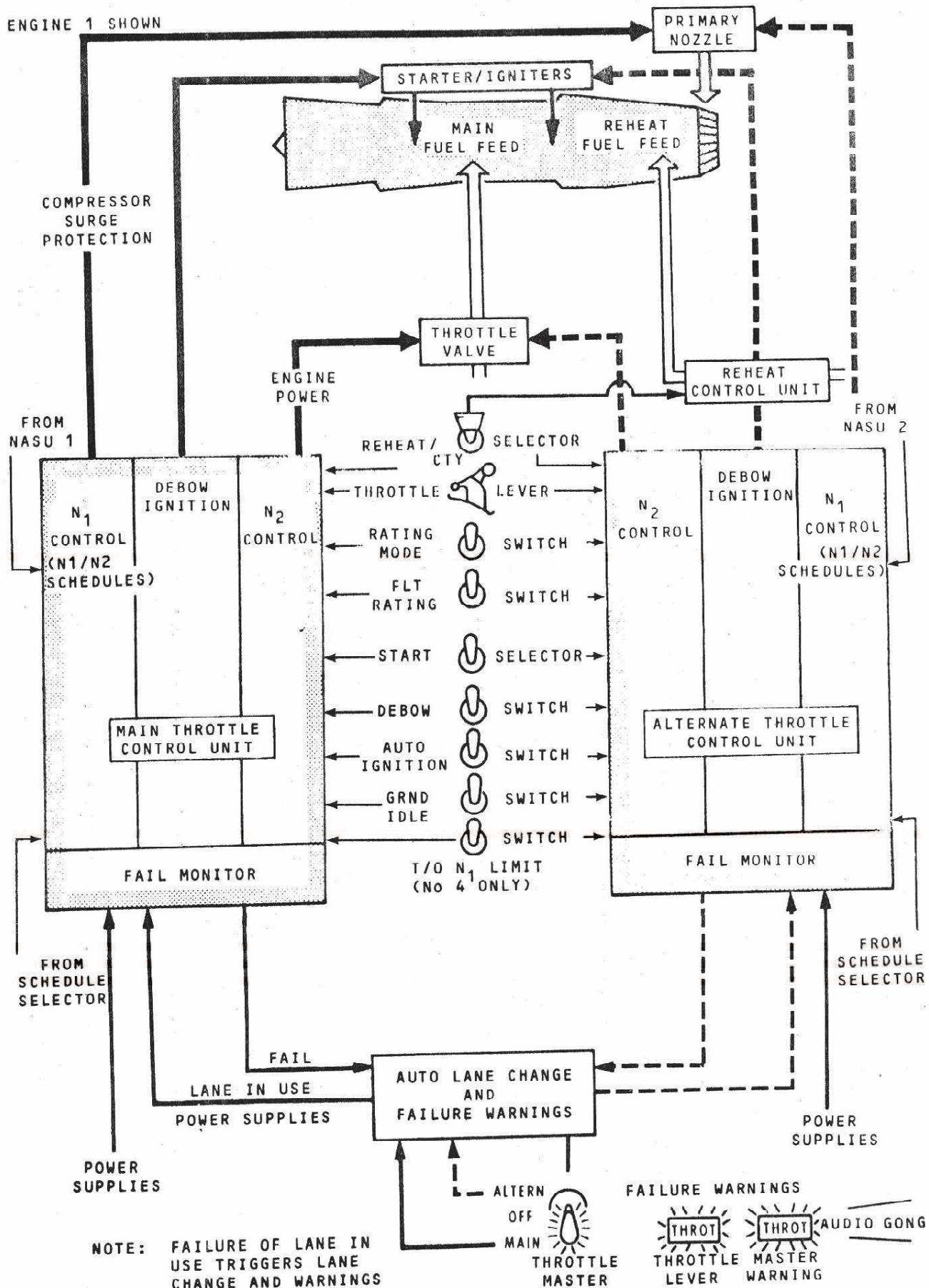
SUPersonic FLIGHT



OPEN

SECONDARY AIR
DOORS M.I.

BASIC ENGINE CONTROL

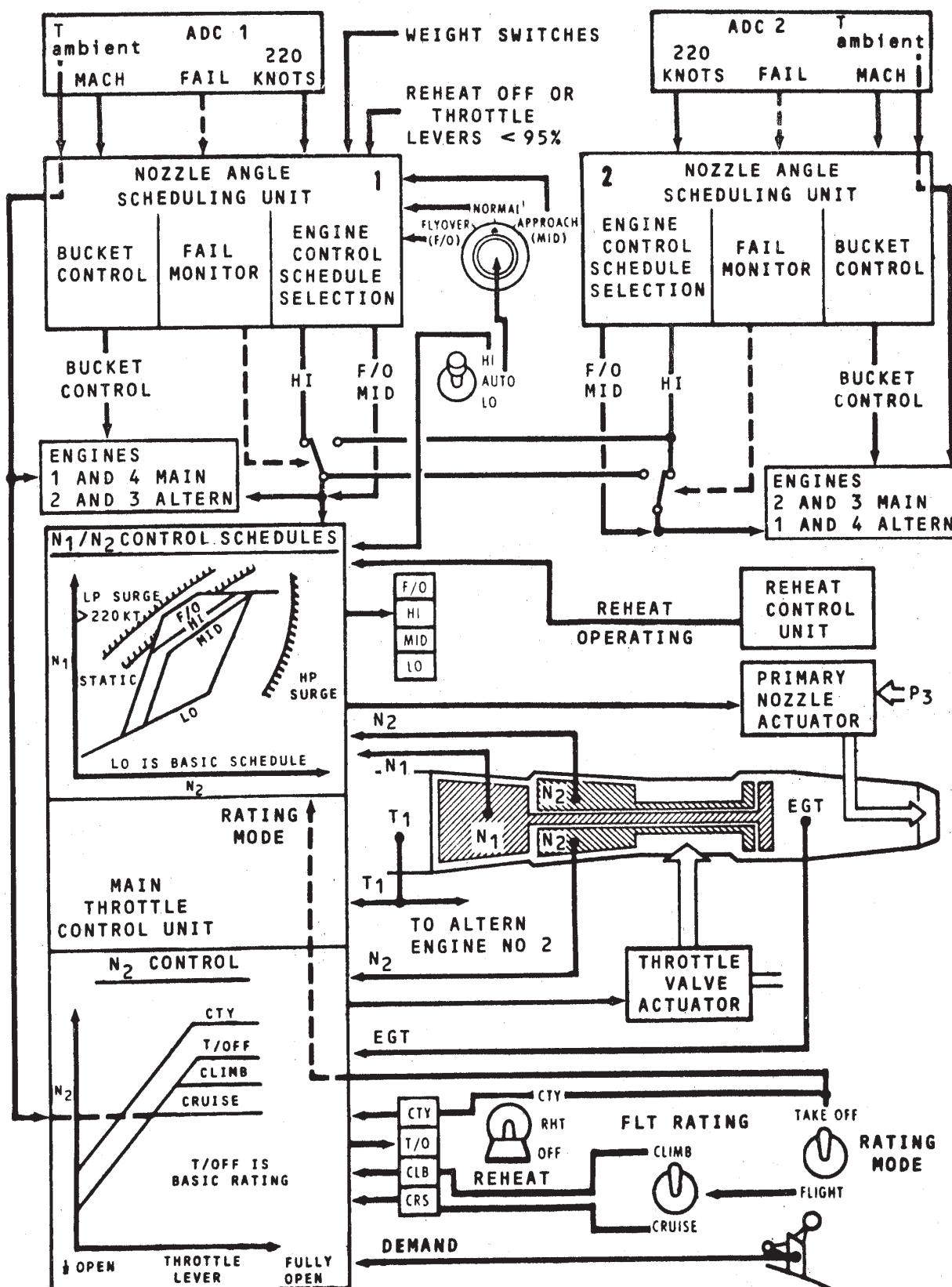


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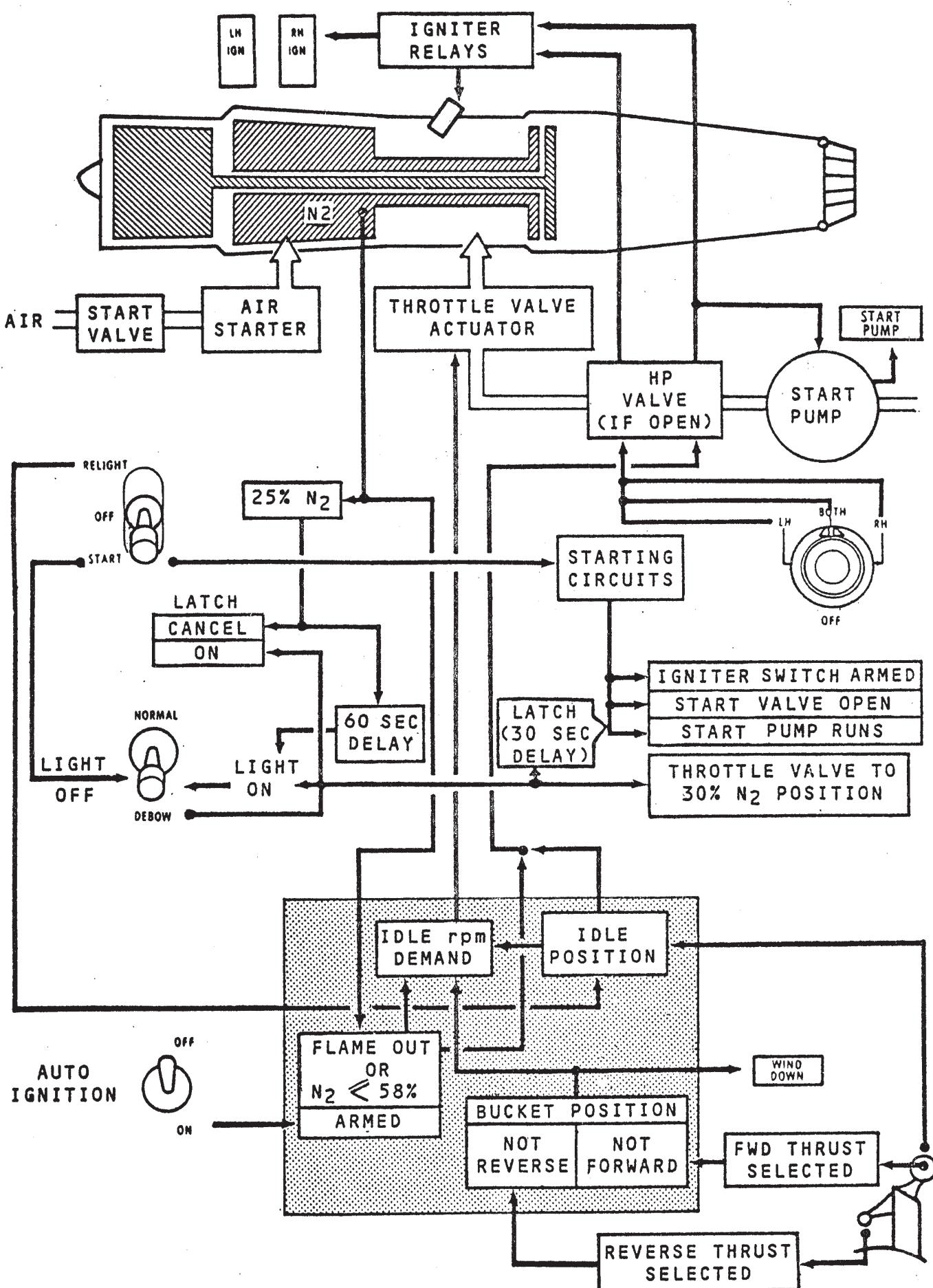
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BASIC ENGINE CONTROL. ENGINE 1



ENGINE CONTROL.
WIND DOWN, IGNITION AND STARTING

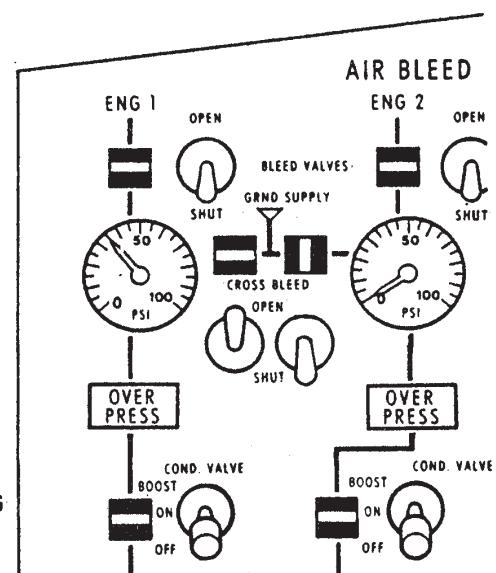
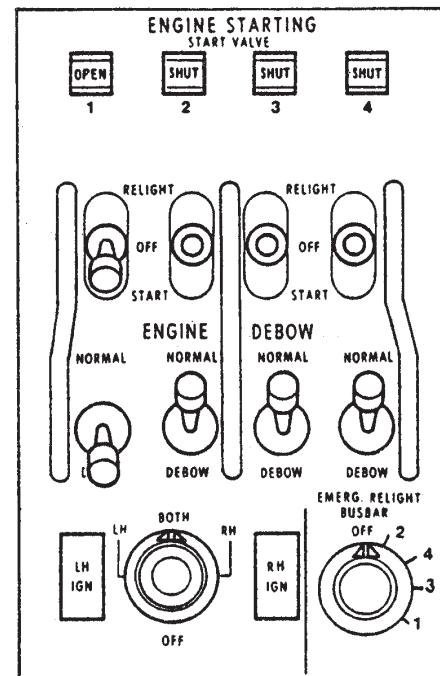
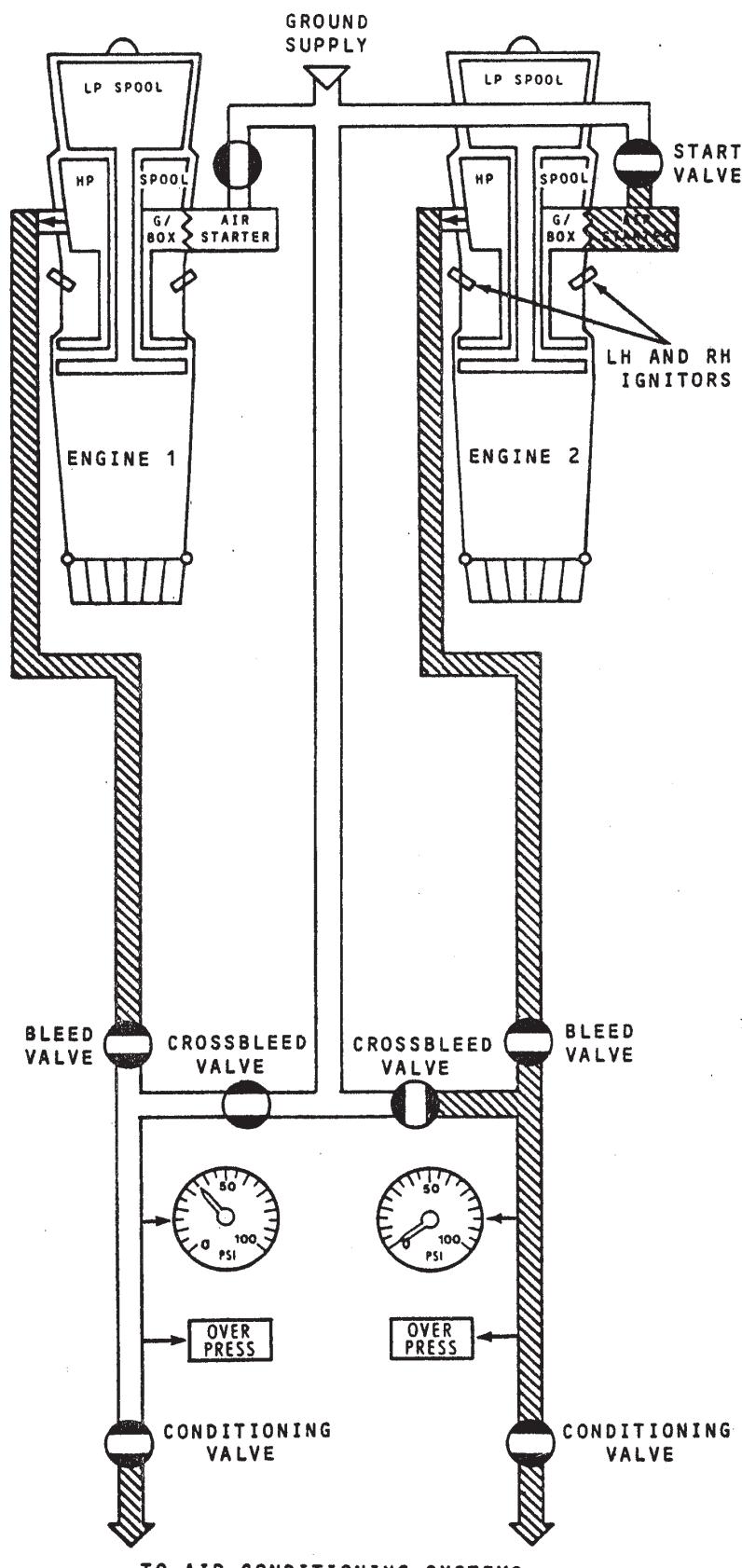


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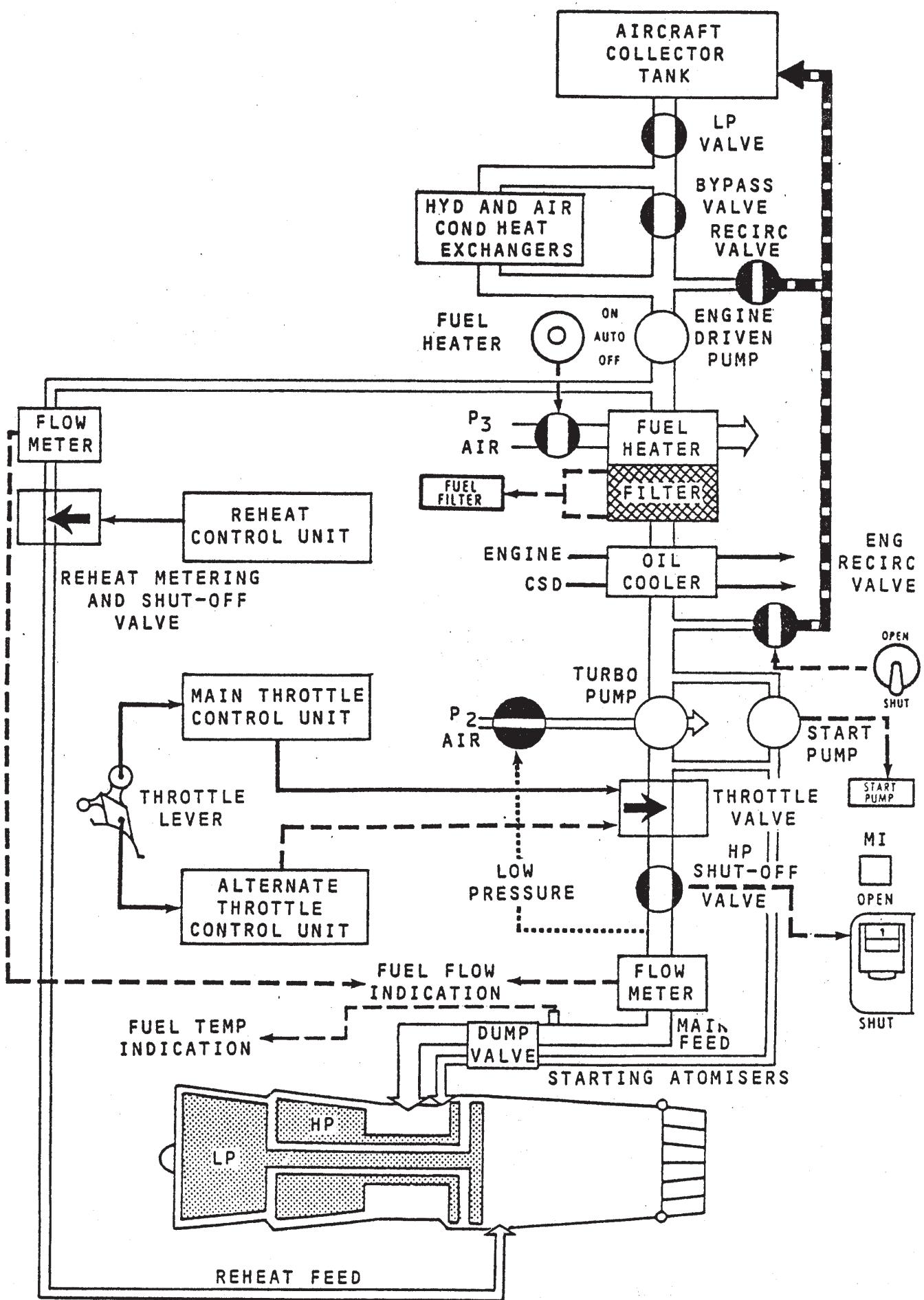
ENGINE STARTING - AIR SUPPLIES



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ENGINE FUEL FEED SCHEMATIC

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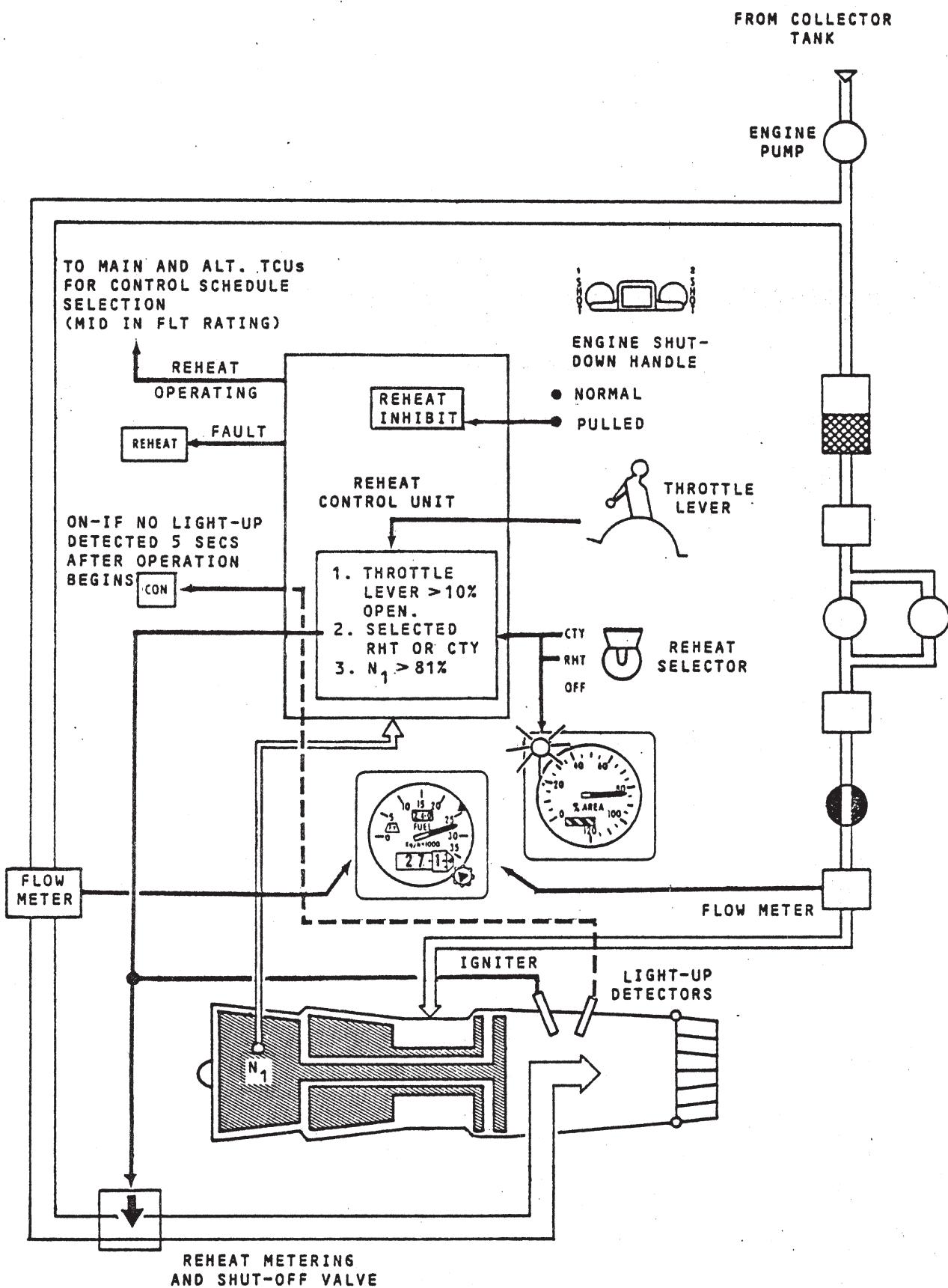


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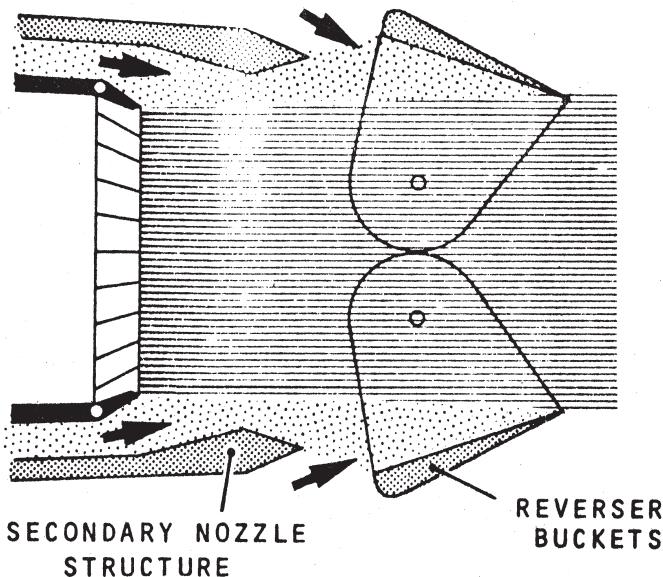
REHEAT SYSTEM SCHEMATIC



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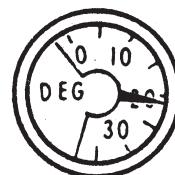
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BUCKET CONFIGURATION

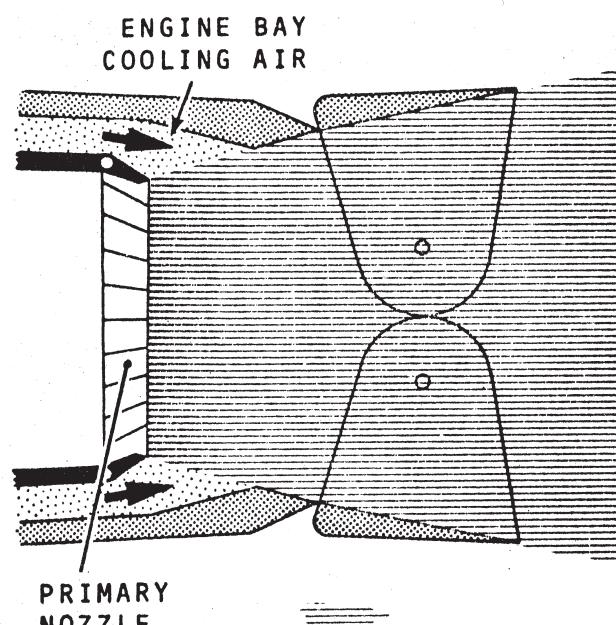


GROUND RUNNING, TAKE OFF,
SLOW SPEED FLIGHT $M < 0.55$
BUCKET POSITION 21°

Buckets are set to contain slowly expanding exhaust gases and prevent induction of ambient air around trailing edge which would cause drag.

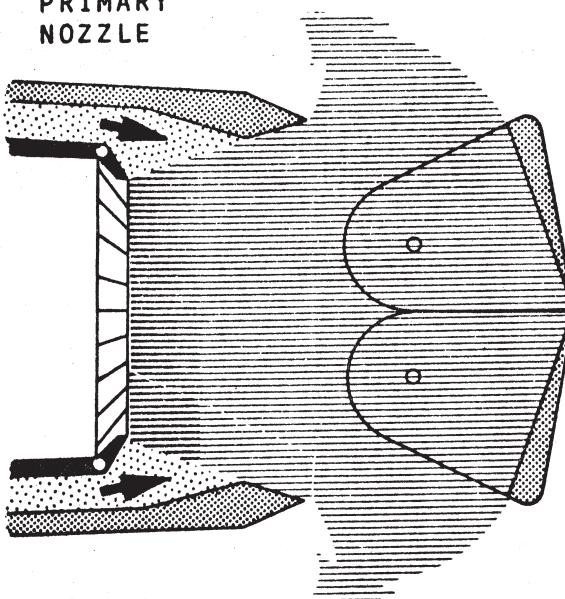


BUCKETS MODULATING $21^\circ - 0^\circ$
BETWEEN $M = 0.55$ AND $M = 1.1$



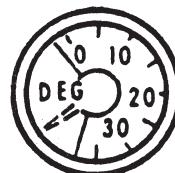
SUPersonic FLIGHT $M > 1.1$
BUCKET POSITION 0°

Buckets are set to form divergent duct to contain rapidly expanding exhaust gases and augment thrust.



REVERSE THRUST
BUCKET POSITION 73°

Primary nozzle is closed to increase exhaust gas velocity and thus increase aerodynamic braking effect.

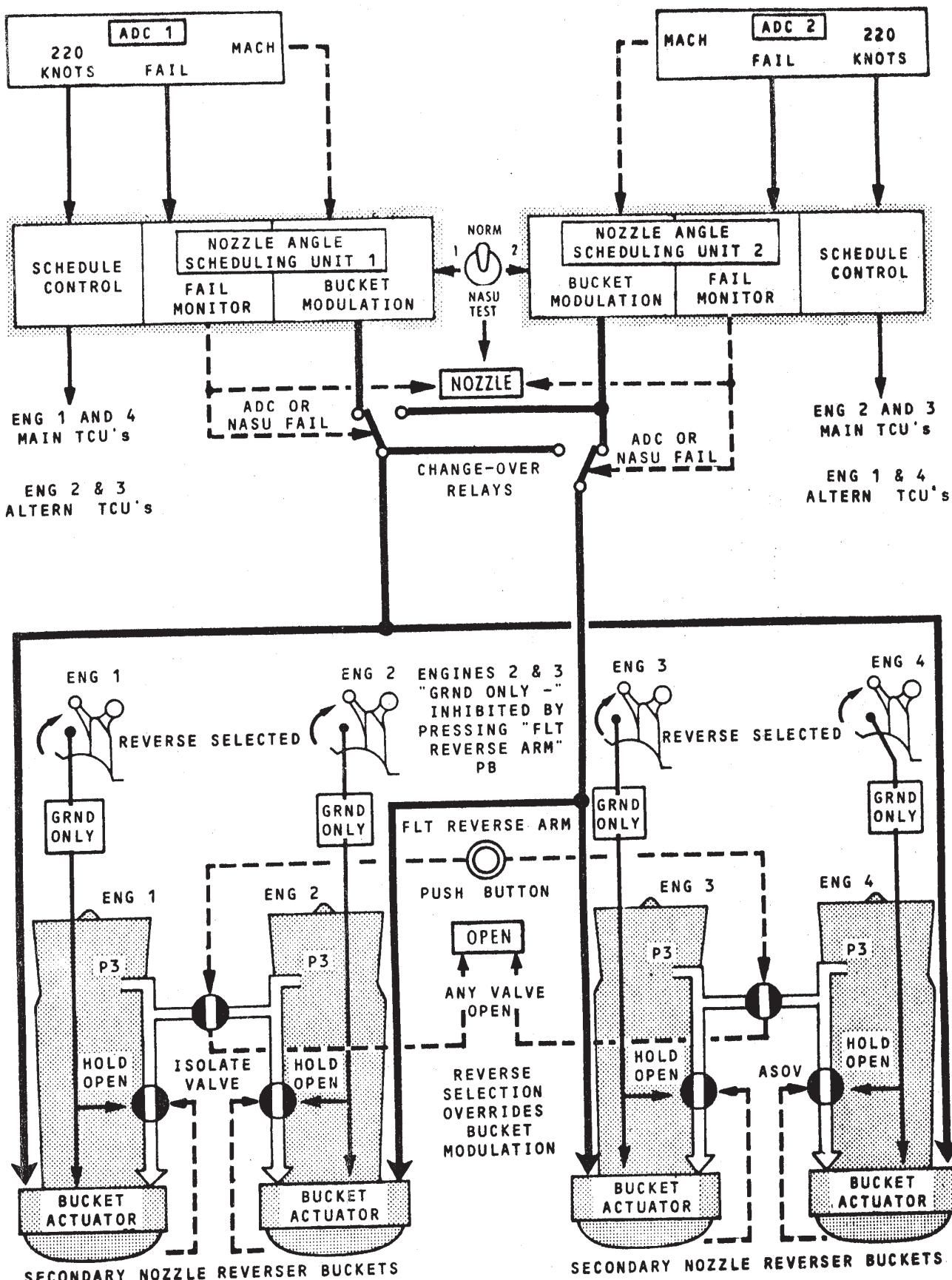


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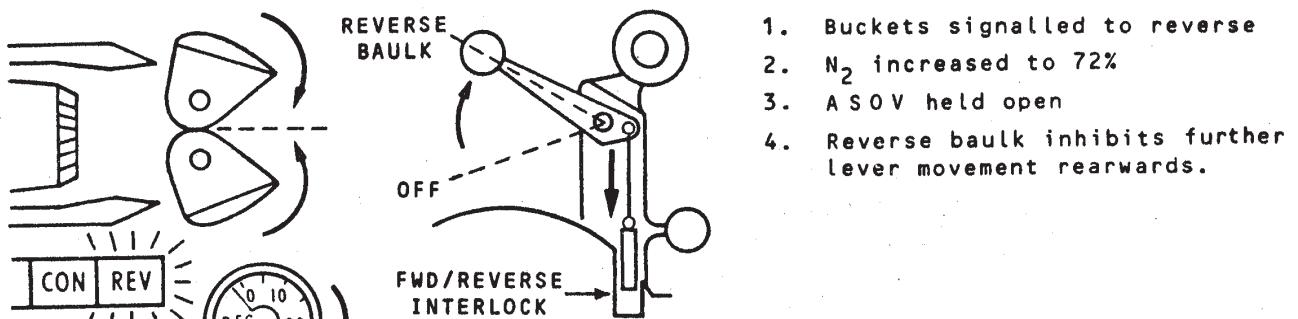
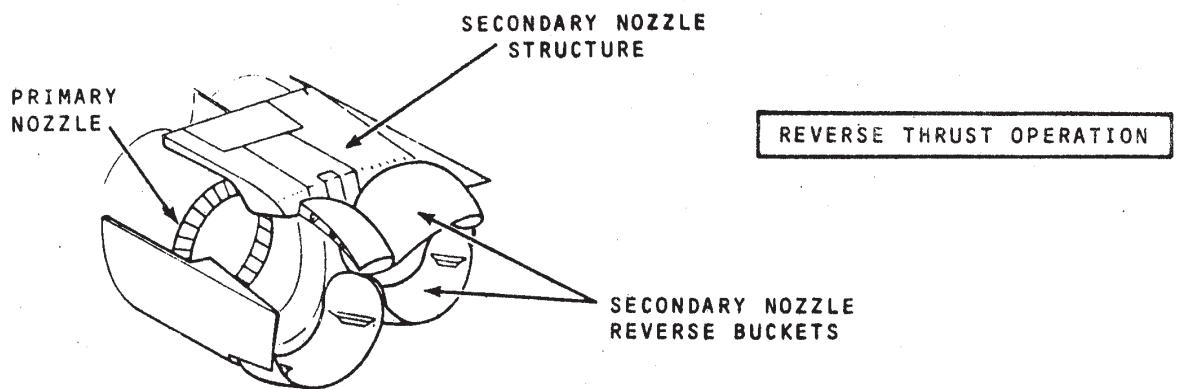
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SECONDARY NOZZLE/REVERSER THRUST CONTROL

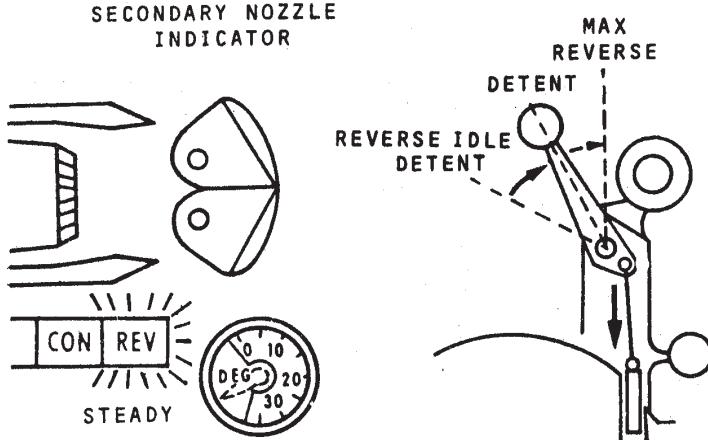


REVERSE THRUST-GROUND



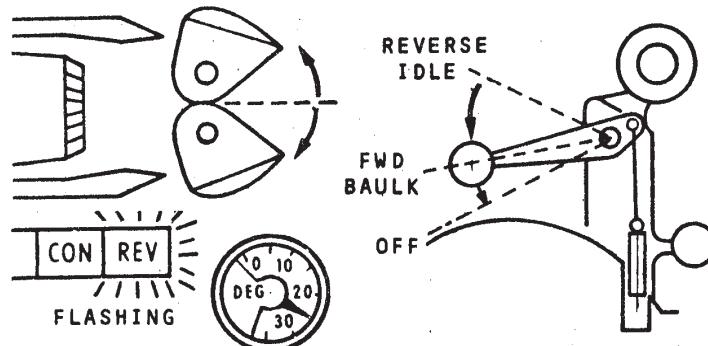
REVERSE THRUST SELECTED

1. Buckets signalled to reverse
2. N₂ increased to 72%
3. ASOV held open
4. Reverse baulk inhibits further lever movement rearwards.



BUCKETS AT REVERSE

1. Reverse baulk released providing a/c on ground.
2. Primary nozzle signalled to < 15%
3. CON light on if primary nozzle area greater than 15% (after 5 secs)
4. Reverse lever may be pulled back to increase reverse power.
5. Reverse idle detent prevents inadvertent de-selection when reducing power.



REVERSE THRUST DE-SELECTED

1. Lever baulked until buckets reach forward thrust range 0° - 21°
2. REV Light flashing whilst buckets in transit, then off.
3. FWD/REVERSE interlock engaged until baulk released and lever set to the OFF position.
4. Adjacent baulk o/ride lever may be used if baulk fails to release.

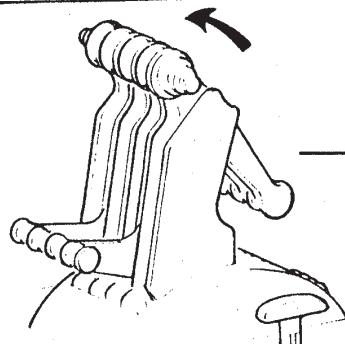
18.02.18
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CONCORDE FLYING MANUAL

British airways
OVERSEAS DIVISION

REVERSE THRUST-FLIGHT

1. ARM SYSTEM



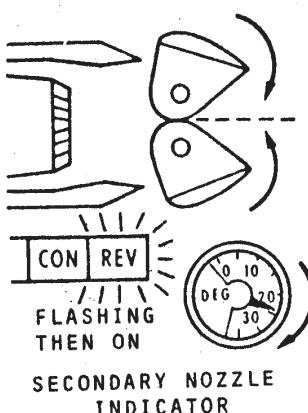
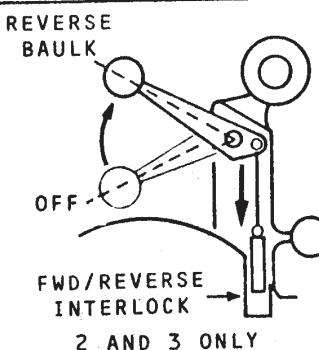
FLT REVERSE ARM



1. Button latches in
2. Isolate valves (P₃ interconnect) open - light ON.
3. Flight reverse system armed

IDLE

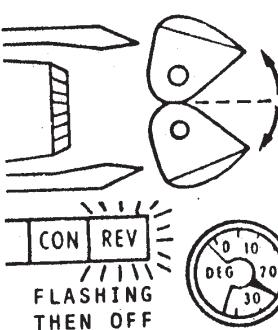
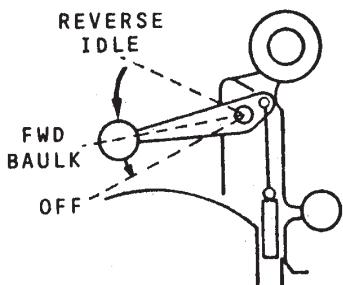
2. SELECT REVERSE



SECONDARY NOZZLE INDICATOR

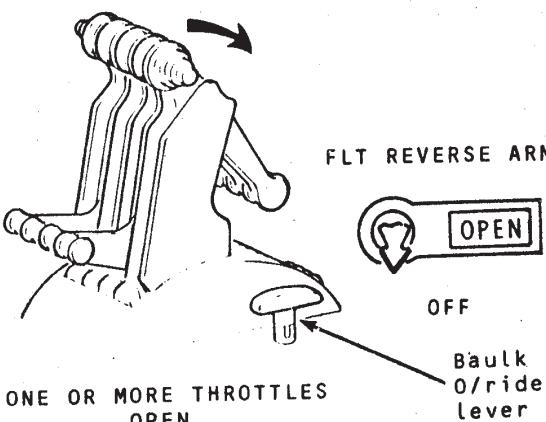
1. 2 and 3 levers to reverse baulk (NOT released in flight).
2. 2 and 3 buckets to reverse
3. During bucket transit:-
 - (i) 2 and 3 primary nozzles to MAX
 - (ii) 1 and 4 fuel flow increase both to reduce bucket transit time
 - (iii) 2 and 3 REV lights flashing
4. When buckets at reverse:-
 - (i) 2 and 3 primary nozzles to MIN
 - (ii) 1 and 4 fuel flow normal
 - (iii) 2 and 3 REV lights ON (CON light on after 5 secs if A_J > 15%)

3. CANCEL REVERSE

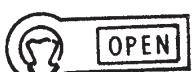


1. 2 and 3 levers to fwd baulk (released when buckets reach fwd thrust)
2. 2 and 3 buckets to fwd thrust
3. During bucket transit:-
 - (i) 2 and 3 primary nozzles to MAX
 - (ii) 1 and 4 fuel flow increase
 - (iii) 2 and 3 REV lights flashing
4. When buckets at fwd thrust:-
 - (i) 2 and 3 primary nozzles to normal
 - (ii) 1 and 4 fuel flow normal
 - (iii) 2 and 3 REV lights OFF.
5. 2 and 3 levers to OFF-use baulk o/ride if baulk fails to release.

4. DIS-ARM SYSTEM

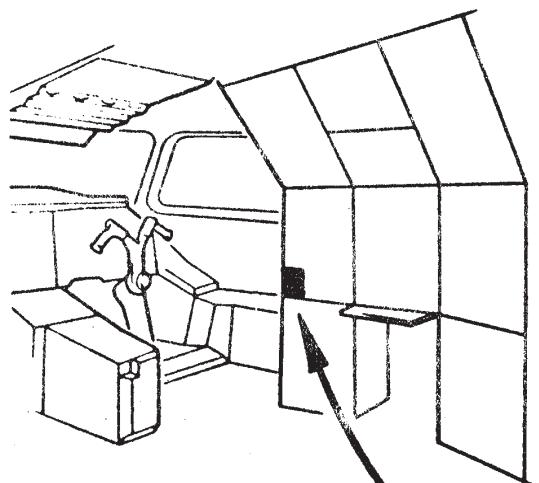


FLT REVERSE ARM



1. Button latch cancels
2. Isolate valves close - light OFF
3. Flight reverse system dis-armed

INTAKE CONTROLS AND INDICATORS
(Sheet 1 of 3)



RAMP/SPILL MASTER SWITCH (4)

MAN - The RAMP AND SPILL inching switches are armed.

The auto control of the air intake, the auto change facility of lane and hydraulics, together with yellow hydraulic system second low level cut off are inhibited. With the exception of the INTAKE light all intake warnings for the affected intake are inhibited.

AUTO - the intake control system controls the intake ramp and spill doors. Below $M = 0.7$ the ramp remains fully up and the spill door is closed.

RAMP INDICATOR (4)

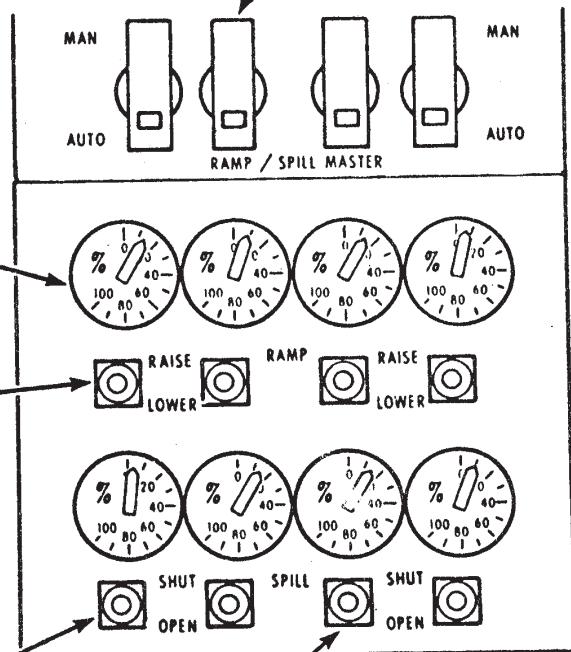
Show ramp position as a percentage of its movement from fully up. Loss of electrical supply to the indicator is shown by the pointer being off scale below 0%.

RAMP INCHING SWITCH (4)

Enables the ramp to be raised and lowered providing the RAMP/SPILL MASTER switch is at MAN and hydraulic pressure is available. It is spring returned to the centre position.

SPILL INDICATOR (4)

Show spill door position as a percentage of its movement from fully closed. Loss of electrical supply to the indicator is shown by the pointer being off scale below 0%.



SPILL INCHING SWITCH (4)

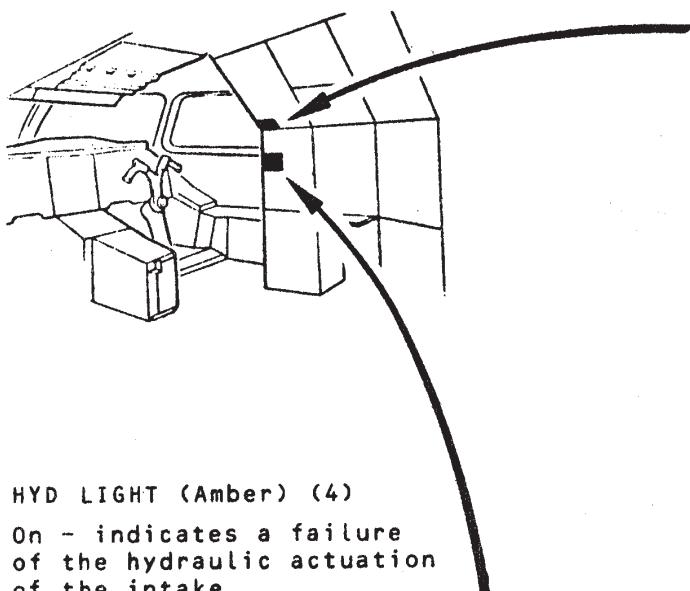
Enables the spill door to be opened and shut providing the RAMP/SPILL MASTER switch is at MAN and hydraulic pressure is available. It is spring returned to the centre position.

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CONCORDE FLYING MANUAL

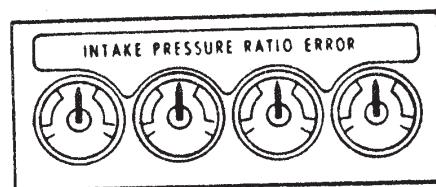
British airways
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INTAKE CONTROLS AND INDICATORS
(Sheet 2 of 3)



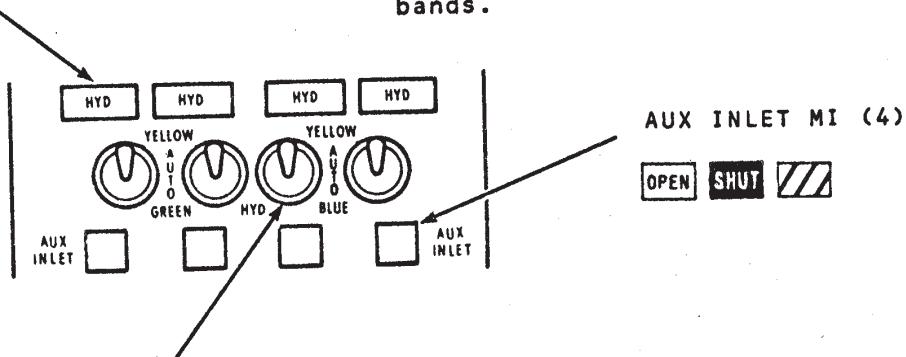
HYD LIGHT (Amber) (4)

On - indicates a failure of the hydraulic actuation of the intake.
Accompanied by a MWS INT (Amber)



INTAKE PRESSURE RATIO ERROR INSTRUMENT (4)

Shows the intake status at aircraft speeds above M=1.3 following an intake control failure, the pointer shows the direction in which the throttle lever is to be moved to obtain intake - engine matching. If the pointer lies in the left amber band the throttle lever must be retarded, if the pointer lies in the right amber band the throttle lever must be advanced. Correct intake - engine matching is indicated when pointer is between amber bands.



HYDRAULIC SELECTOR (4)

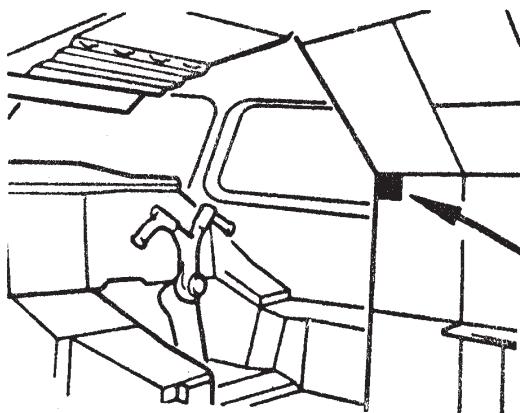
YELLOW - the yellow hydraulic system is selected to supply the intake and the yellow hydraulic pumps are unloaded.
AUTO - the main hydraulic operating system for each intake is selected and the automatic changeover facilities are armed. The automatic changeover will occur when a failure of the main hydraulic operation or a low level in a main hydraulic reservoir is sensed.

NOTE: At both yellow and auto the cut-off of yellow hydraulic system supply to the spill door actuators will occur when the second low level in the yellow hydraulic system is sensed.

GREEN AND BLUE - selected the appropriate hydraulic system with no automatic changeover facility.

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INTAKE CONTROLS AND INDICATORS
(Sheet 3 of 3)



α LIGHT (Amber)

On - indicates a failure of the aircraft incidence signal of one or more of the intake control units in use.
Accompanied by MWS INT(S) (amber)

N_1 SIG LIGHT (Amber) (4)

On - indicates a failure of the LP spool speed signal to the intake control unit in use.
Accompanied by a MWS INT (amber)

INTAKE LIGHT (Red) (4)

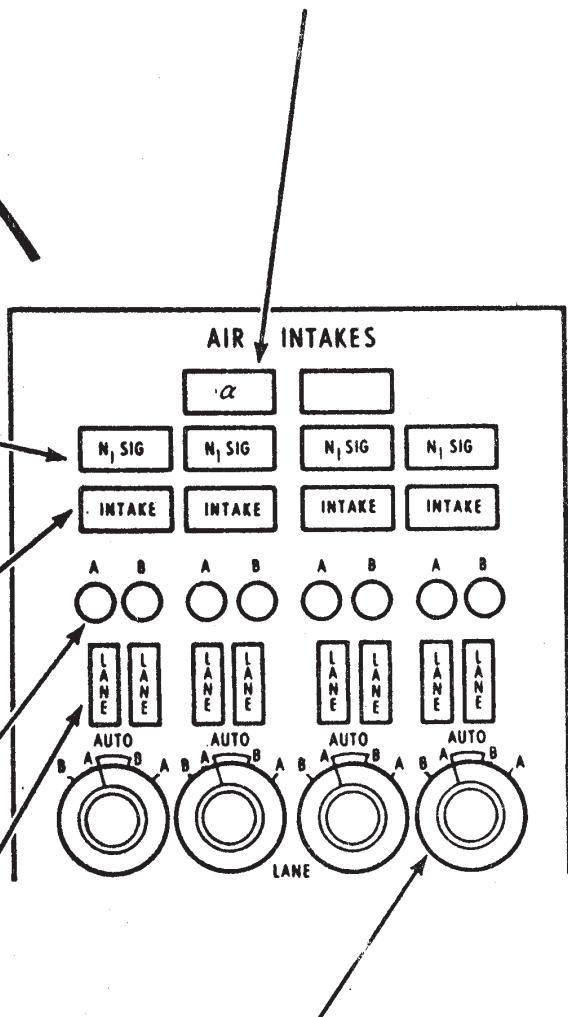
On - indicates that the air intake ramp and spill doors are not under the control of the air intake automatic control system.
Accompanied by a MWS INT (red)

LANE IN USE LIGHT
(Green) A(4) AND B(4)

On - indicates the lane controlling the intake.

LANE LIGHT (Amber) (8)

On - indicates a failure of the associated intake lane A or B, whether it is in use or not.
Accompanied by the MWS INT (amber)



LANE ROTARY SELECTOR (4)

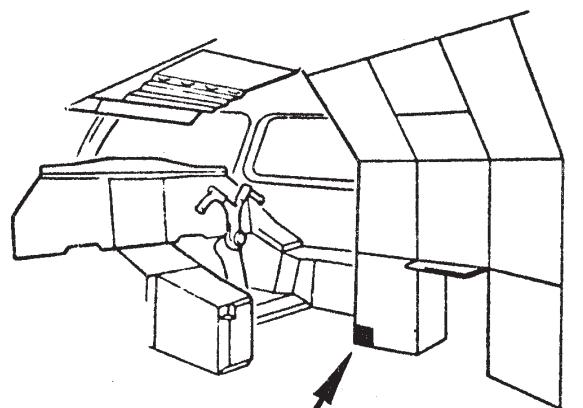
There are two identical control lanes per intake identified as A and B. Either may be used as the first selection. With AUTO A or AUTO B selected failure of the lane causes automatic change-over to the other lane. The non-auto positions A and B are selections of the appropriate lane with no auto-change capability.

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CONCORDE FLYING MANUAL

British airways
OVERSEAS DIVISION

INTAKE TEST AND FAULT IDENTIFICATION
(Sheet 1 of 2)



INTAKE TEST ON LIGHT (Red)

On - when the test master switch is operated. It is accompanied by the MWS INT (red)

INTAKE TEST LIGHT (7)

INTAKE TEST
CONTINUE SWITCH
Spring returned to OFF.

INTAKE TEST RESET
SWITCH

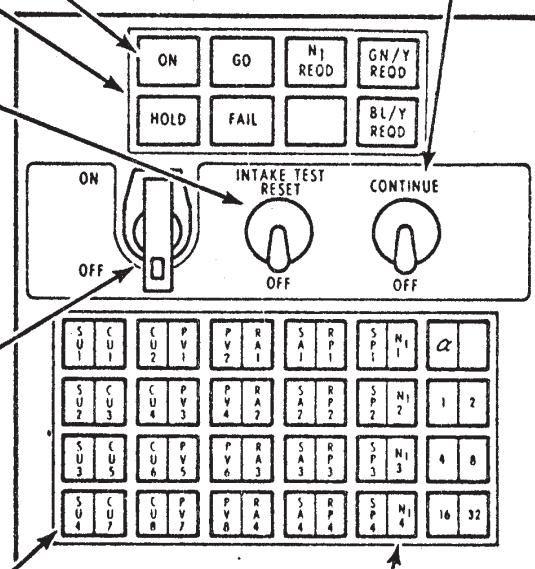
Spring returned to OFF.
When electrical power is removed from the air intake systems random indication of failure may be latched on.
When electrical power is re-established, setting the INTAKE TEST RESET switch to RESET, resets the system and removes false warnings from the panel.

INTAKE TEST MASTER SWITCH

CAUTION: MUST NOT BE MOVED
FROM ITS GUARDED OFF
POSITION IN FLIGHT

FAULT IDENTIFICATION LIGHT
(White) (47)

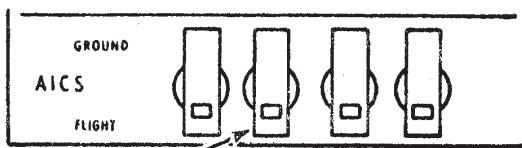
Used to identify line replacement units (LRU) in the air intake control systems when they have failed. The lights indicate failure during test or normal operation of the intakes.



N₁ FAULT IDENTIFICATION
LIGHT (White) (4)

On - indicates that there is no LP spool speed signal to the air intake control systems.

INTAKE TEST AND FAULT IDENTIFICATION
(Sheet 2 of 2)

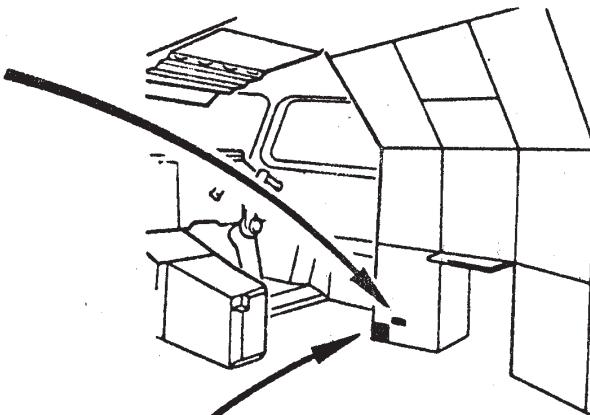


AICS GROUND/FLIGHT SWITCHES (4)

GROUND - in conjunction with the INTAKE TEST panel enables the air intakes to be tested.

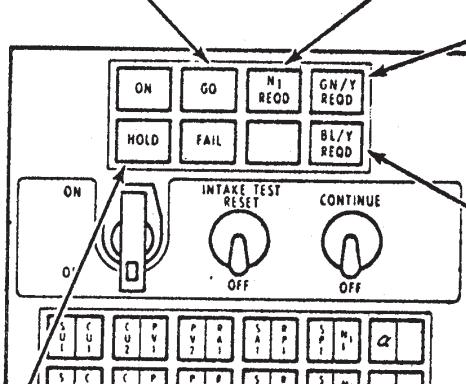
FLIGHT - inhibits the INTAKE TEST function

NOTE: If any one switch is set to GROUND, all 4 MWS INT (red) will operate.



**INTAKE TEST GO LIGHT
(Green)**

On - indicates a successful test of the air intake system and deselection of the intake test switch.



**INTAKE TEST HOLD LIGHT
(Yellow)**

On - 7 secs after setting the INTAKE TEST master switch to ON, providing the RAMP/SPILL master switch is at MAN indicates a successful self test of the intake test unit circuits.

INTAKE TEST N₁ REQD LIGHT (Yellow)

On - indicates no N₁ signal to air intake test unit.

INTAKE TEST GN/Y REQD LIGHT (Yellow)

On - indicates a change required to setting of ground hydraulic check out panel to enable air intake test to be performed.

INTAKE TEST BL/Y REQD LIGHT (Yellow)

On - indicates a change required to setting of ground hydraulic check out panel to enable air intake test to be performed.

INTAKE TEST FAIL LIGHT (Red)

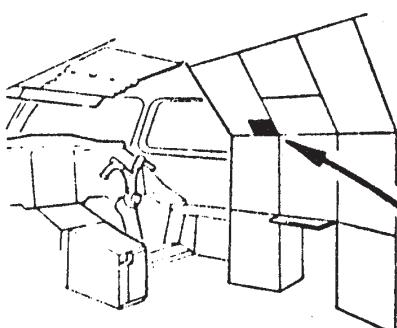
On - indicates an unsuccessful air intake test.

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CONCORDE FLYING MANUAL

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SECONDARY AIR DOORS AND NOZZLES



SECONDARY AIR DOOR SELECTOR (4)

AUTO - opening of the secondary air doors is controlled by ADC signals. The doors for engines 1, 2 and 3 are opened at speeds in excess of $M = 0.26$ and those of engine 4 at speeds in excess of 220 knots.

- closing of the secondary air doors of engine 4 is by ADC signal at speeds less than $M = 0.26$ providing that the landing gear is down and those of engines 1, 2 and 3 on touch down, via weight switches, providing that the speed is less than $M = 0.26$.

The AUTO position may be overridden by selection of OPEN or SHUT.

SECONDARY NOZZLE INSTRUMENT (4)

Shows the secondary nozzle bucket position within the range 0-37.5 deg. When the buckets are being used as thrust reversers the instrument pointer is hidden behind the mask. Loss of electrical power supply to the instrument is indicated by the pointer being off scale 0 deg end.

FLIGHT REV ARM PUSH BUTTON

Pressed - opens the air supply isolation valve between engines 1 and 2 and the air supply isolation valve between engines 3 and 4 and providing the four throttle levers are at idle, arms the flight reverse system.

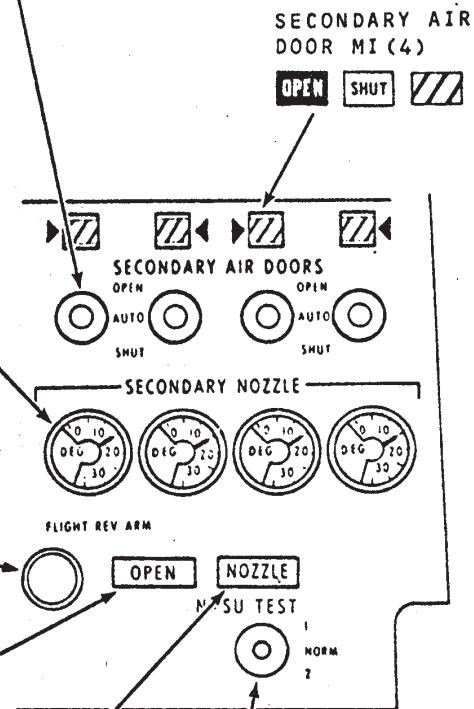
The button is magnetically held in the armed position. When any of the throttle levers is advanced more than 10% from idle the magnetic latch of the FLIGHT REV. ARM push button is released disarming the in-flight reverse system, which causes the air supply isolation valves to shut.

FLIGHT REV ARM OPEN LIGHT (Blue)

On - indicates that at least one of the two air supply isolation valves is open.

NOZZLE LIGHT (Yellow)

On - indicates a loss of one or both NASUs, or, that FLYOVER engine schedule is selected above $M = 1.0$.

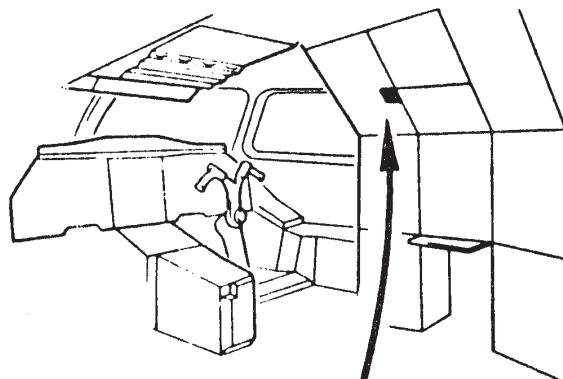


NOZZLE ANGLE SCHEDULING UNIT (NASU) TEST SELECTOR

- 1 - the failure detection circuits of No 1 NASU system are being tested.
- 2 - the failure detection circuits of No 2 NASU system are being tested.

ENGINE CONTROL SCHEDULE

(Sheet 1 of 2)



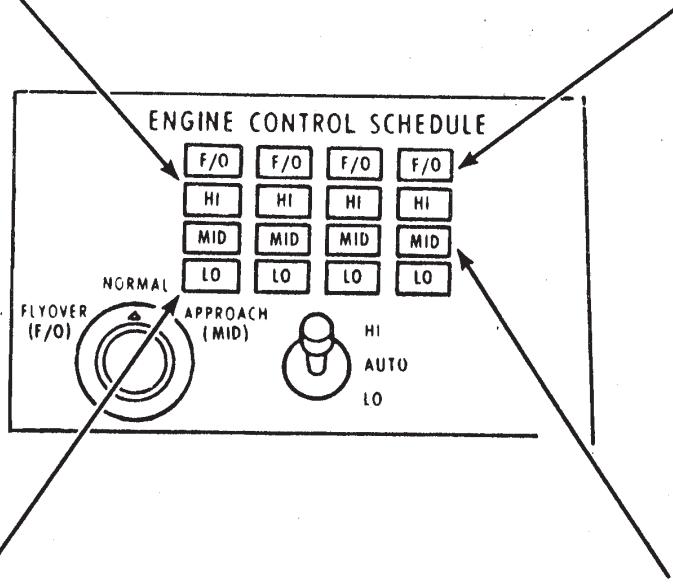
ITFD IN FNC

ENGINE CONTROL SCHEDULE
HI LIGHT (White) (4)

On - indicates that the high ENGINE CONTROL SCHEDULE is operating.

ENGINE CONTROL SCHEDULE
F/O LIGHT (White) (4)

On - indicates that the flyover ENGINE CONTROL SCHEDULE is operating.



(Unchanged)

ENGINE CONTROL SCHEDULE
LO LIGHT (Green) (4)

On - indicates that the low ENGINE CONTROL SCHEDULE is operating.

ENGINE CONTROL SCHEDULE
MID LIGHT (White) (4)

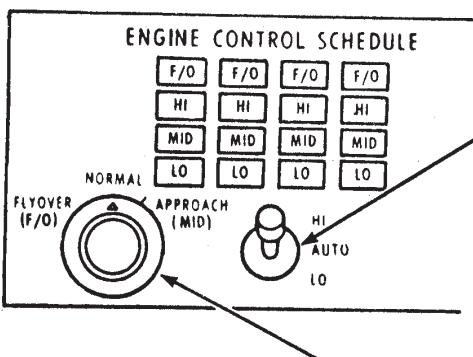
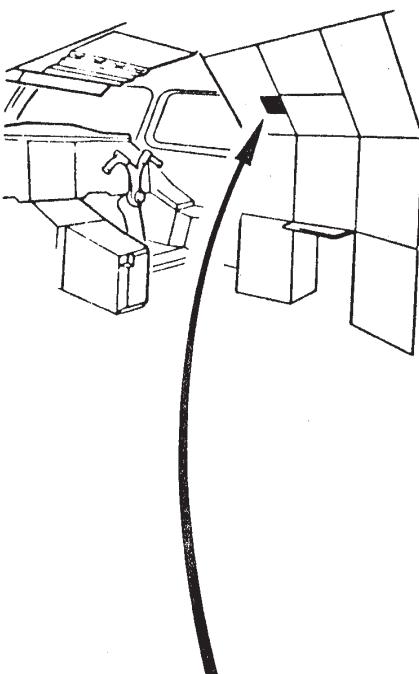
On - indicates that the mid ENGINE CONTROL SCHEDULE is operating.

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CONCORDE FLYING MANUAL

British airways
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ENGINE CONTROL SCHEDULE
(Sheet 2 of 2)



ENGINE CONTROL SCHEDULE
SELECTOR (ALL ENGINES)

- HI - selects the high engine control schedule once the conditions demanding an alternative engine control schedule no longer exist; these conditions are; with the landing gear down the controlling schedule will be LO (low).
With the landing gear up, the ENG RATING MODE switch at TAKE OFF and reheat selector at RHT, the controlling schedule will be LO (low).
With the landing gear up, the ENG RATING MODE switch at FLIGHT and reheat selector at RHT, the controlling schedule will be MID.
AUTO - allows the selection of engine control schedule using the rotary selector.
LO - selects the low ENGINE CONTROL SCHEDULE

ENGINE CONTROL SCHEDULE ROTARY SELECTOR

AT ANY POSITION - with the aircraft on the ground, or flying at a speed less than 220 knots, or during reheat operation with EXCEPT the ENG RATING MODE switch at TAKE OFF, and the ENGINE CONTROL SCHEDULE selector at AUTO selects the low engine (APPROACH) control schedule.

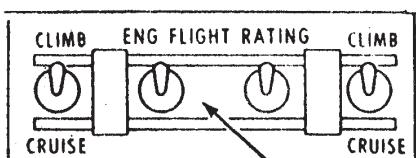
NORMAL - with the aircraft speed greater than 220 knots, reheat cancelled and the ENGINE CONTROL SCHEDULE at AUTO selects the high engine control schedule.
- with the aircraft speed greater than 220 knots, the ENG FLIGHT RATING switch at CLIMB, the ENG RATING MODE switch at FLIGHT, reheat operating and the ENGINE CONTROL SCHEDULE selector at AUTO selects the mid engine control schedule.

FLYOVER (F/O) - with the aircraft speed greater than 220 knots, but less than M = 1.0, reheat cancelled, and the ENGINE CONTROL SCHEDULE selector at AUTO selects the flyover engine control schedule.

- with the aircraft speed greater than M = 1.0, reheat cancelled, and the ENGINE CONTROL SCHEDULE selector at AUTO selects the high engine control schedule.

APPROACH (MID) - providing the ENGINE CONTROL SCHEDULE selector is at AUTO the mid engine control schedule is selected except when aircraft on the ground.

THROTTLE AND IGNITION SWITCHES

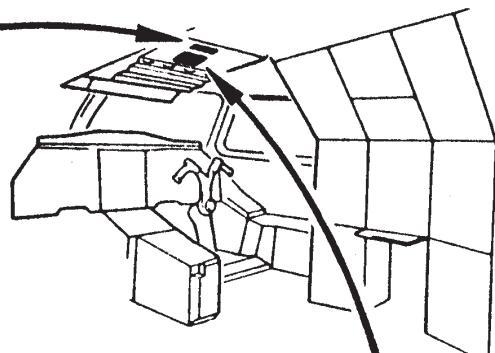


ENG FLIGHT RATING SWITCH (4)

CLIMB - providing the ENG RATING MODE switch is at FLIGHT, the engine N₁, N₂ and EGT will be limited to the climb rating.

CRUISE - providing the ENGINE RATING MODE switch is at FLIGHT, the engine N₁, N₂ EGT will be limited to the cruise rating.

AUTO IGNITION SWITCH (4)
ON - the auto ignition system is armed.

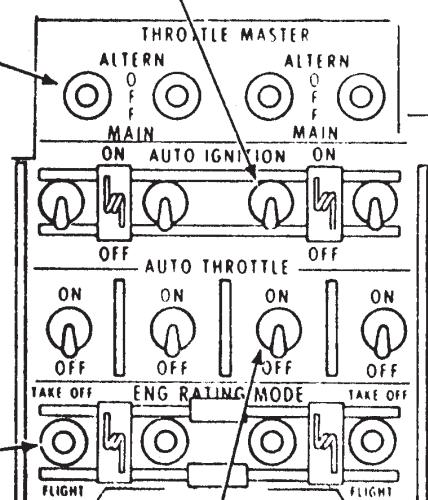


THROTTLE MASTER SELECTOR AND LIGHT (Red) (4)

ALTERN - the engine is being controlled OR by one of two identical throttle MAIN control systems.

Light in selector on - indicates that the selected throttle control system has failed.

NOTE: The light is inhibited when the HP VALVE switch is at SHUT and the THROTTLE MASTER selector is at OFF.



ENG RATING MODE SWITCH (4)

TAKE OFF - the engine N₁, N₂ and EGT will be limited to the take-off rating and the contingency is armed.

FLIGHT - the ENGINE FLIGHT ratings are armed.

NOTE: When the main landing gears are locked down the magnetic latches that hold the ENG RATING MODE switches in the FLIGHT position are released, and the switches are spring returned to the TAKE OFF position. Engine 1 and 4 switches are released by the left gear and those for engines 2 and 3 by the right gear.

AUTO THROTTLE SWITCH (4)

(unchanged)

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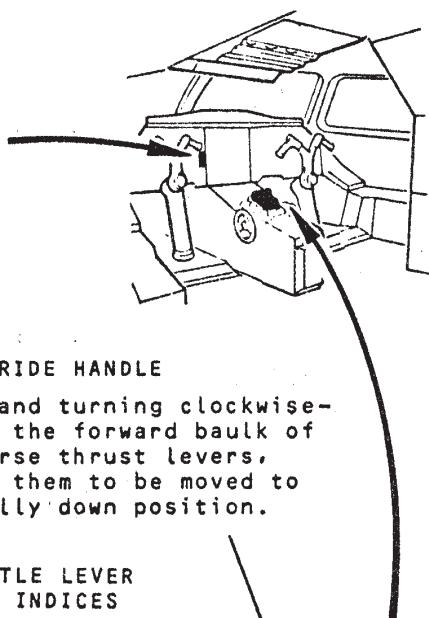
THROTTLE CONTROL AND REHEAT SELECTORS

CTY (contingency) LIGHT (Yellow)

On - indicates that at least one of the four reheat selectors is at CTY.

On flashing - indicates automatic selection of contingency rating.

CTY
T/O
CLB
CRS



T/O (take off) LIGHT (White)

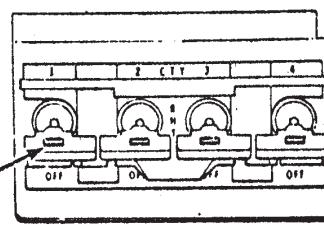
On - indicates that at least one of the four ENG RATING MODE switches is at TAKE OFF.

CLB (climb) LIGHT (White)

On - indicates that at least one of the four ENG FLIGHT RATING switches is at CLIMB and its associated ENG RATING MODE switch is at FLIGHT.

CRS (cruise) LIGHT (White)

On - indicates that at least one of the ENG FLIGHT RATING switches is at CRUISE and its associated ENG RATING MODE switch is at FLIGHT.



REHEAT SELECTOR (4)

CTY (contingency) - provided the ENG RATING MODE switch is at TAKE OFF the engine N₂ and EGT will be limited to the contingency rating.

RHT (REHEAT) - Take-off arms the reheat circuits and CON lights and providing the TAKE OFF MONITOR button has been pressed, the auto selection of contingency rating is armed.

Transonic: arms the reheat circuits and CON light and providing the ENG RATING MODE switch is at FLIGHT, the mid engine control schedule is armed.

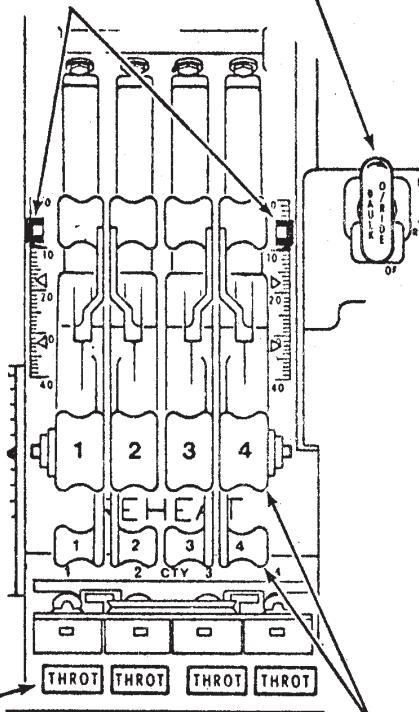
OFF - stops the reheat fuel flow, disarms auto selection of contingency rating, and providing the engine control schedule selectors are at FLYOVER and AUTO the flyover engine control schedule is armed.

BAULK O/RIDE HANDLE

Lifting and turning clockwise-releases the forward baulk of the reverse thrust levers, enabling them to be moved to their fully down position.

THROTTLE LEVER ANGLE INDICES

The index is in the form of a light which is set against a scale.



THROTTLE LEVER (4)

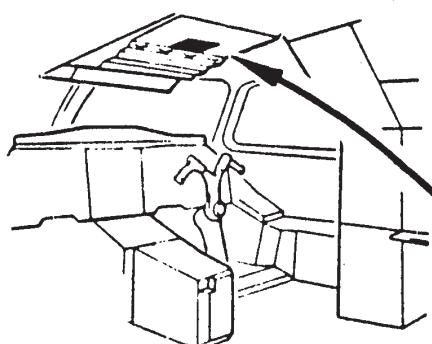
THROT LIGHT (Red) (4)

On - indicates that the selected throttle control system has failed.

Accompanied by a MWS THROT (red) and the associated THROTTLE MASTER selector light (red). Pressed - tests the light and its connections to the MWS and THROTTLE MASTER lighted switch.

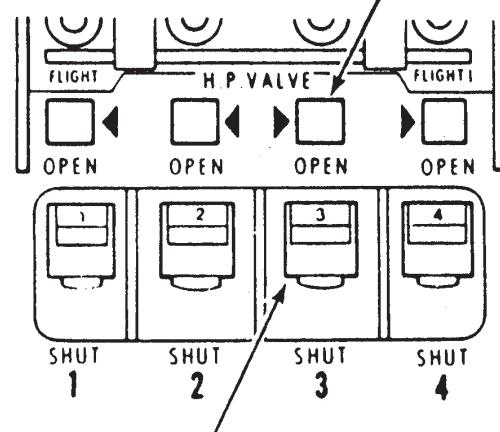
NOTE: The light is inhibited when the HP valve switch is at SHUT and the THROTTLE MASTER selector is at OFF.

HP VALVE SWITCHES



HP VALVE MI (4)

OPEN	SHUT
------	------



HP VALVE SWITCH AND LIGHT (White) (4)

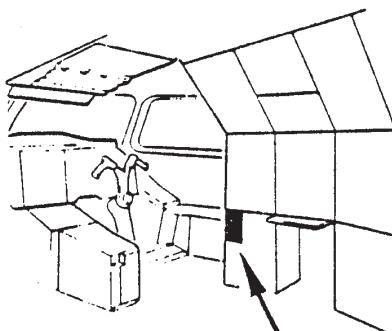
SHUT - the valve stops the high pressure fuel flow to the engine.
 This position regardless of the following systems switch positions:-
 Opens the engine recirculation valves.
 Inhibits the engine igniters.
 Inhibits the engine T₁ probe heater.
 Inhibits the THROT fail lights if the THROTTLE MASTER SELECTOR is at OFF.
 Reduces public address volume if all other HP VALVE switches are at SHUT.
 Cancels its own switch light if it is on.
 Inhibits the engine shut-down handle lights except during engine fire warnings.
 Light in switch on - indicates the associated engine shut down handle is pulled.

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CONCORDE FLYING MANUAL

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ENGINE START AND RELIGHT



RELIGHT/START SELECTOR (4)

Master selector for engine starting.

RELIGHT - providing the throttle lever is at idle and the HP VALVE switch is at OPEN, the start electrical fuel pump will run and both engine igniters will be energized irrespective of the ignition selector position.

NOTE: With only the essential busbars (4) operating only the left hand igniter is powered.

START - opens an air valve to allow air to turn the engine via an air starter. It also energizes the start fuel pump and allows selective ignition through the ignition rotary selector.

The selector is magnetically held at START until 25% N_2 then it returns to OFF. The magnetic latch can be overridden by setting the selector to OFF.

START VALVE MI (4)

OPEN / SHUT

ENGINE DEBOW SWITCH AND LIGHT (Yellow) (4)

NORMAL - N_2 will automatically rise to clear compressor rotating stall speeds and drop to idle.

DEBOW - during starting the HP spool (N_2) r.p.m. is kept below normal idle until the HP spool shaft temperature is constant around its circumference ensuring the shaft rotates true.

Switch light on indicates that the switch is set at DEBOW and that the engine is not in the DEBOW condition, or, that the 60 secs DEBOW cycle has been completed.

IGNITION ROTARY SELECTOR

BOTH - igniters used together.

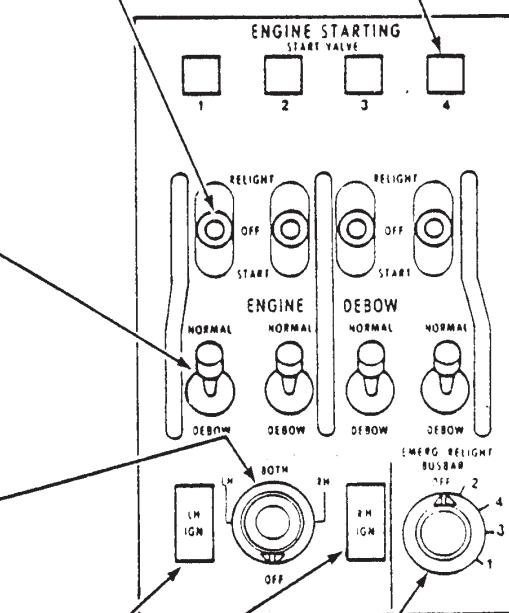
LH - LH igniter only operating

RH - RH igniter only operating

NOTE: The ignition system is inhibited until the HP valve switch is set to OPEN.

LH and RH IGN LIGHT (Green)

On - indicates that the selected system(s) is/are energized.

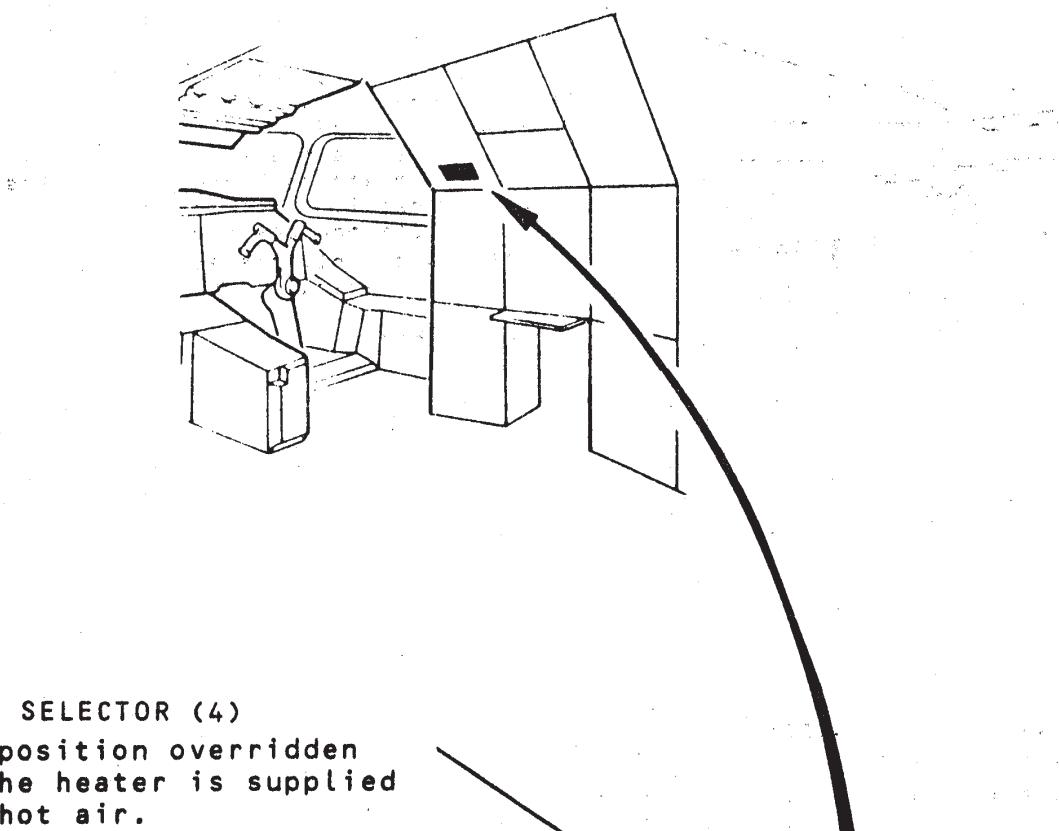


EMERG. RELIGHT BUSBAR ROTARY SELECTOR

2 - the emergency generator powers the emergency relight busbar 25X to operate the right hand igniter, the start pump and the main engine feed pump of collector tank 2.

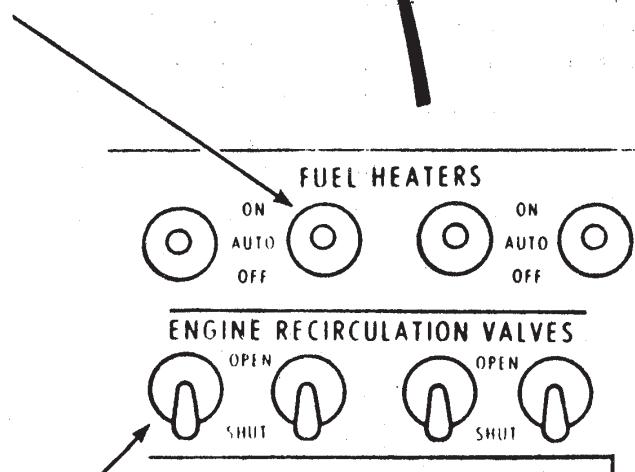
4,3,1 - the emergency generator powers the emergency relight busbars 27X, 26X and 24X respectively.

FUEL HEATING AND RECIRCULATION



FUEL HEATERS SELECTOR (4)

- ON** - AUTO position overridden and the heater is supplied with hot air.
- AUTO** - the fuel heater is supplied with hot air when the fuel inlet temperature is less than plus 5 deg C. There is no positive indication of operation.



ENGINE RECIRCULATION VALVES SWITCH (4)

- OPEN** - the recirculation valves allow the recirculation of fuel from downstream of the engine and CSD oil coolers back to the engine feed tanks. This maintains the cooling flow of fuel across these coolers when engine feed flow is reduced by the engine's low demand for fuel.
- SHUT** - recirculation of the fuel back to the collector tanks is stopped.

NOTE: The recirculation valve is opened automatically when the associated engine shut down handle is pulled or the associated HP VALVE switch is set to SHUT irrespective of the ENGINE RECIRCULATION VALVES switch position.

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CONCORDE FLYING MANUAL

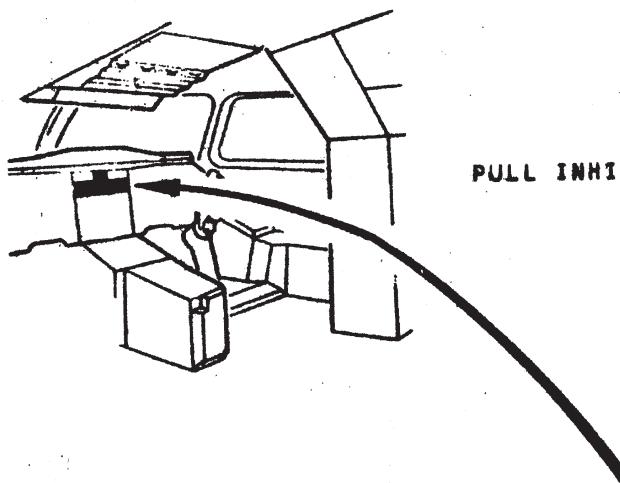
British airways
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TAKE OFF MONITOR AND PRIMARY INDICATION

TAKE-OFF MONITOR CONTROL BUTTON

PUSH ARM - arms the clear to go (green) lights for monitoring, the engine thrust during the take off run, and providing the reheat selector is at RHT arms the autoselection of the engine contingency rating

PULL INHIB - disarms the clear to go (green) lights and the auto selection of the engine contingency rating.



POWER MANAGEMENT LIGHTS

Clear to go Light (Green) (4)

CON (configuration) light (Amber) (4)

REV (reverse) light (Blue) (4)

Clear to go light on - indicates that the secondary nozzle buckets are positioned within limits, the CON light is off and the set bug values of P7 and FUEL FLOW have been achieved, and the ENG 4 T/O N1 LIMITER has returned to NORMAL position.

CON light on - with no decrease in N₂, indicates loss of reheat thrust.

CON light on - with REVERSE selected indicates that the primary nozzle is greater than 15%.

REV light flashing - indicates that the buckets are in transit.
REV light on - indicates that the buckets are closed.

REV light off - indicates that the buckets are within the forward thrust range.

DIGITAL COUNTER

FLAG

OVERLIMIT
POINTER

N₂ INSTRUMENT (4)

Indicates a percentage rpm of the high pressure spool on the dial scale and digital counter.

The instrument incorporates an overlimit pointer which remains at 110% or the highest value the main pointer has indicated until it is reset. Loss of electric power supply to the instrument is shown by a red and black striped flag across the digital counter.

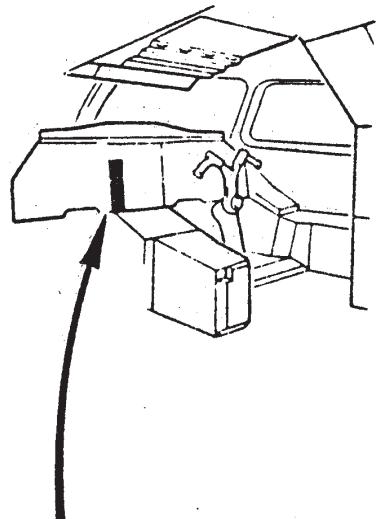
PRIMARY INDICATION (Sheet 1 of 2)

N₁ INSTRUMENT (4)

Indicates a percentage rpm of the low pressure spool on the dial scale and digital counter.

It incorporates an overlimit pointer which remains at 108.5% or the highest value the main pointer has indicated until it is reset.

Loss of electric power supply to the instrument is shown by a red and black striped flag across the digital counter.

**N₁ REDUCE LIGHT (Amber)**

On - indicates that the affected intake is operating supercritically and the propulsion unit is not operating at optimum efficiency.

Accompanied by a MWS INT (amber)

UPPER DIGITAL COUNTER**LOWER DIGITAL COUNTER****F_T/F_E INSTRUMENT (4)**

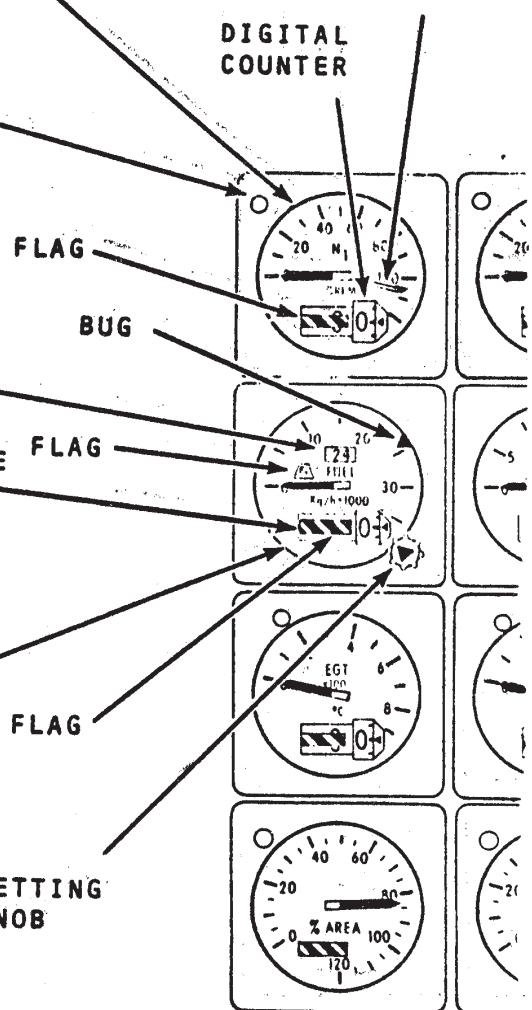
Indicates the fuel flow rate in kg/hr x 1000 on the dial scale and lower digital counter.

The instrument F_T/F_E flag shows F_E when fuel flow to the reheat system has reduced to less than 330 kg/hr. It shows F_T when the fuel flow to the reheat system has increased to greater than 680 kg/hr.

The setting knob adjusts the bug and upper digital counter to the required take-off value.

The bug setting also forms part of the take-off monitoring system.

Loss of electrical power supply to the instrument is shown by a red and black striped flag across the lower digital counter.

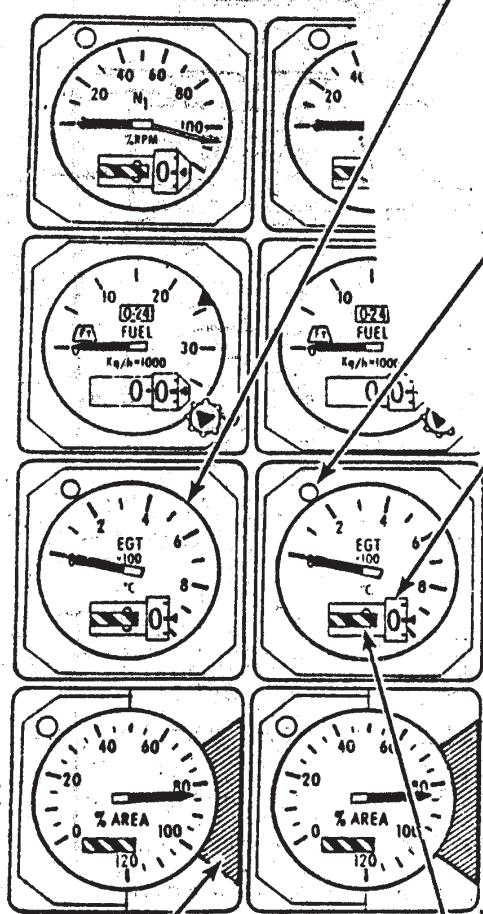
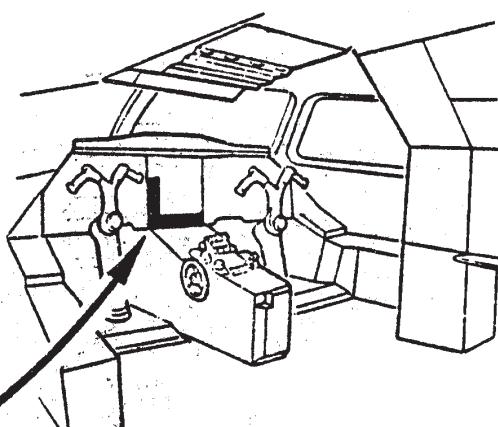


PRIMARY INDICATION

(Sheet 2 of 2)

EXHAUST GAS TEMPERATURE (EGT)
GAUGE (4)

Indicates the gas temperature in the jet pipe on the dial scale and digital counter. Loss of electric power supply to the gauge is shown by a red and black striped flag across the digital counter. Loss of EGT information to the gauge is shown by the pointer being at 0°. At a temperature colder than -50°C at the EGT thermocouple, the EGT gauge pointer will indicate 0° and the striped flag will appear across the digital counter.

EGT GAUGE
DIGITAL COUNTER

WARNING LIGHT (Yellow)

On - indicates the loss of EGT information to the selected throttle control system.

REHEAT SELECTED LIGHT
(White)

On - indicates that the reheat selector is away from the OFF position

ADDITIONAL YELLOW SECTOR
(Engine No.4 only)

Indicates correct reheat operation below 60 kts.
Range 60-70%.

FLAG

WHITE SECTOR
(on each instrument)

Indicates correct reheat operation.
Range 70-100% all engines.

FLAG

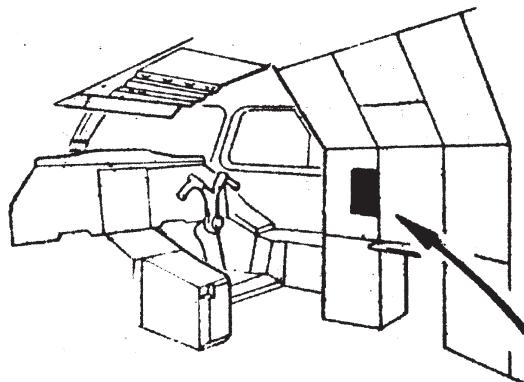
AREA INSTRUMENT (4)

Indicates the primary nozzle exhaust gas discharge area as a percentage of the range between minimum and maximum area.

Loss of electric power supply to the instrument is shown by a red and black striped flag.

ENGINE INSTRUMENTS

(Sheet 1 of 2)



TCA HIGH TEMP LIGHT (Red)

On - indicates that a high temperature exists in the turbine cooling air system. Accompanied by a MWS ENG light (red), an engine shut down handle light (red) and audio (gong)

**TURBINE COOLING AIR (TCA)
TEMP INSTRUMENT (4)**

Shows the temperature of the cooling air after it has passed across the face of the HP turbine.

FUEL TEMP INSTRUMENT (4)

Shows the temperature of the fuel at the fuel burner manifold.

FUEL HIGH TEMP LIGHT (Amber)

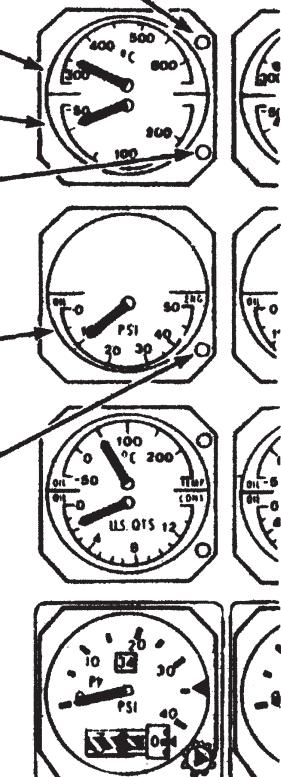
On - indicates that a high fuel temperature exists in the fuel burner manifold. Accompanied by a MWS ENG light (amber) and audio (gong).

OIL ENG INSTRUMENT (4)

Shows the pressure in the engine oil system.

OIL ENG LOW PRESSURE LIGHT (Red)

On - indicates that the oil pressure is less than 15 psi. Accompanied by a MWS ENG light (red), an engine shut down handle light (red) and audio (gong).



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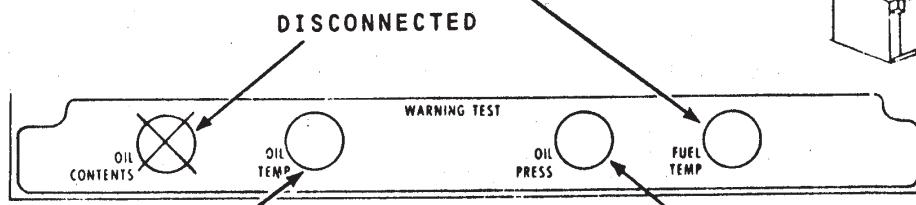
British airways
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ENGINE INSTRUMENTS

(Sheet 2 of 2)

FUEL TEMP WARNING
TEST PUSH BUTTON

Pressed - tests the high fuel temperature warning lights and their connections to the MWS.



OIL TEMP WARNING
TEST PUSH BUTTON

Pressed - tests the high oil temperature warning lights and their connections to the MWS.

OIL TEMP INSTRUMENT WARNING
LIGHT (Amber)

On - indicates that a high temperature exists in the engine oil entering the oil pressure pump.
Accompanied by MWS ENG light (amber) and audio (gong).

OIL TEMP INSTRUMENT (4)

Shows the temperature of the engine oil entering the oil pressure pump.

OIL CONT INSTRUMENT (4)

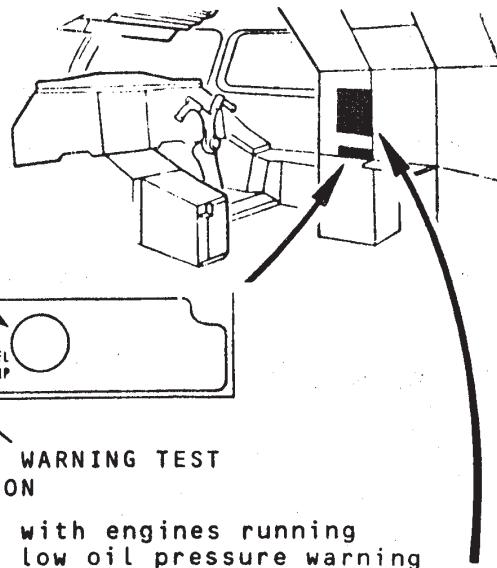
Shows the content in the engine oil tank.

OIL CONT INSTRUMENT WARNING
LIGHT (Yellow).

On - indicates that the content of the engine oil tank is greater than 14 U.S quarts.

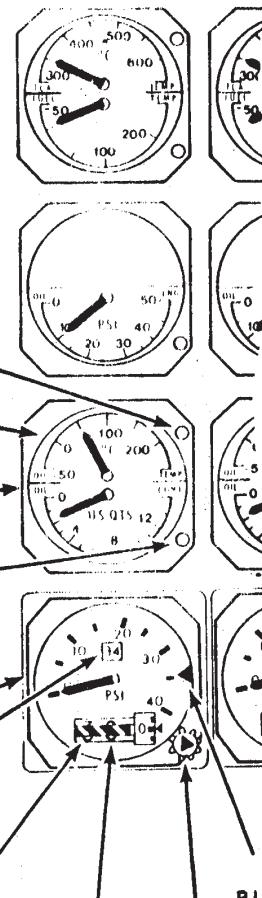
P₇ INSTRUMENT (4)

Shows the pressure in the jet pipe. The setting knob adjusts the bug and upper digital counter to the required take-off value. The bug setting also forms part of the take-off monitoring system. A red and black striped flag across the lower digital counter shows loss of electrical power supply or failure of the instrument servo system.



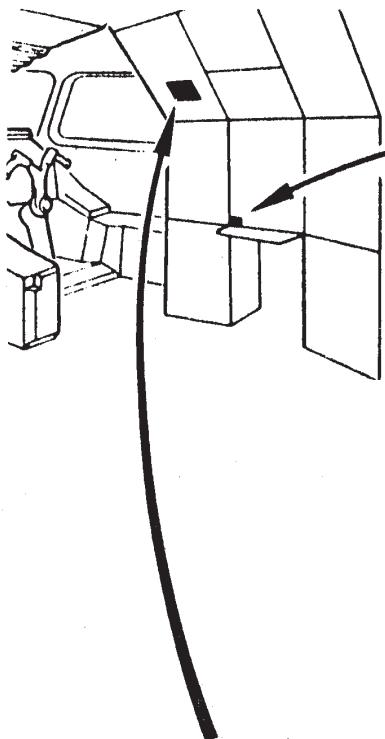
OIL PRESS WARNING TEST
PUSH BUTTON

Pressed - with engines running tests the low oil pressure warning lights and their connections to the MWS.



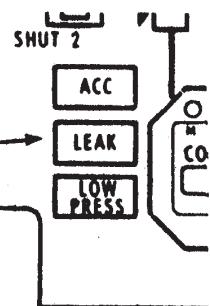
LOWER
DIGITAL
COUNTER

ENGINE WARNING LIGHTS



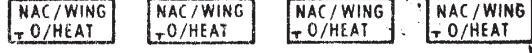
LEAK LIGHT (Red) (4)

On - indicates that a leakage of fluid into the bay above the engine has been detected.
Accompanied by the engine shut down handle light (red) and MWS ENG (red)



ENGINE O/HEAT LIGHT (Red) (4)

Refer to FIRE PROTECTION



START PUMP LIGHT (Yellow) (4)

On - indicates that an electrically driven fuel start pump is running.

WIND DOWN LIGHT (Yellow) (4)

On - indicates that the wind down system has operated.

REHEAT FAULT LIGHT (Yellow) (4)

On - indicates a fault in the reheat system.

FUEL FILTER LIGHT (Amber) (4)

On - indicates an excess differential pressure across the engine fuel filter.
Accompanied by a MWS ENG (amber)

NAC/WING O/HEAT LIGHT (Amber) (4)

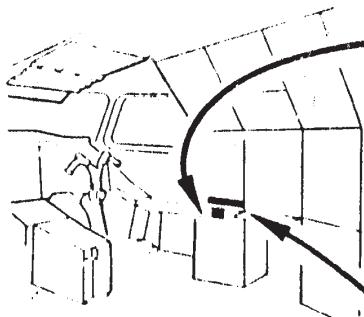
Refer to FIRE PROTECTION

(Unchanged)

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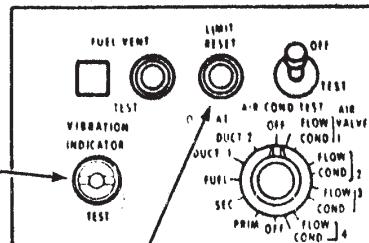
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ENGINE VIBRATION



VIBRATION INDICATOR
TEST PUSH BUTTON

Pressed - arms the ENGINE VIBRATION test circuit. The button must be pressed throughout the test.



LIMIT RESET BUTTON

Pressed - resets the N₁ and N₂ overlimit pointers; also resets the Fuel Tank Pressure gauge secondary pointers.

ENGINE VIBRATION WARNING LIGHT (White) (4)

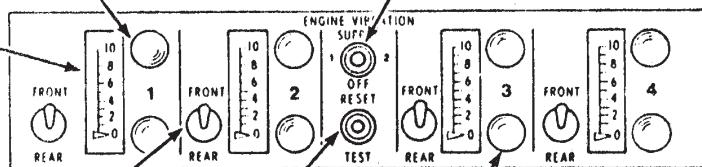
On - indicates a front bearing vibration level of 10 ins/sec has been exceeded.

ENGINE VIBRATION SUPPLY SELECTOR

The engine vibration instrument is powered by two electrical supplies identified as SUPPLY 1 and SUPPLY 2.

ENGINE VIBRATION INSTRUMENT (4)

A loss of electrical supply is shown by the pointer being below the scale.



ENGINE VIBRATION FRONT/REAR SWITCH (4)

FRONT - the engine front main bearing vibration level is displayed on the instrument.

REAR - the engine jet pipe vibration level is displayed on the instrument.

ENGINE VIBRATION WARNING LIGHT (Amber) (4)

On - indicates an engine front bearing vibration level greater than 5 ins/sec or a rear (jet pipe) vibration greater than 4 ins/sec.

Accompanied by a MWS ENG (Amber)

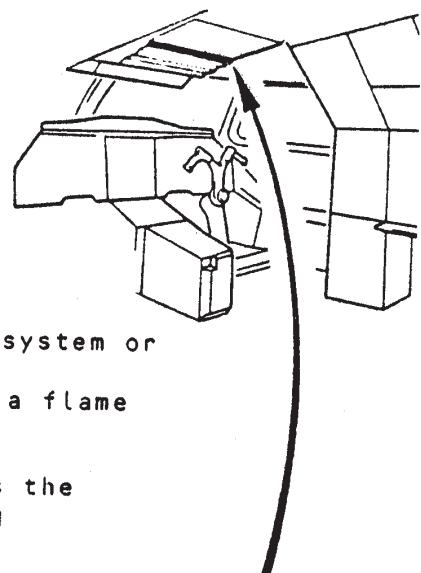
ENGINE VIBRATION RESET/TEST SELECTOR

RESET - cancels the engine vibration warning lights.

TEST - with the FRONT/REAR switch at FRONT and the VIBRATION INDICATOR TEST push button pressed the vibration detection system of the engine's front bearing is being checked.

- with the FRONT/REAR switch at REAR and the VIBRATION INDICATOR TEST push button pressed the vibration detection system of the engine jet pipe is being checked.

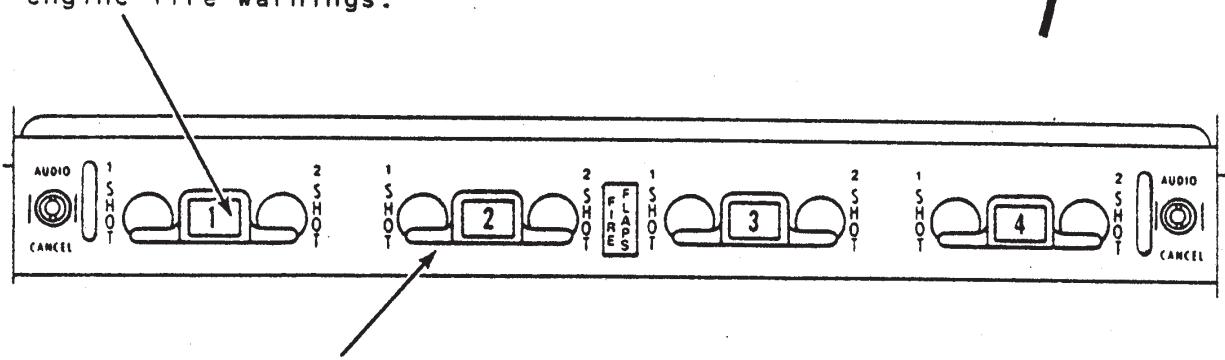
EMERGENCY SHUT DOWN



ENGINE SHUT DOWN HANDLE LIGHT (Red) (4)

On steady - indicates:
high temperature in the engine cooling air system or
low pressure in the engine oil system or
an overheat condition within the engine or a flame
breakout from the combustion chamber or
a fluid leak into the bay above an engine.

NOTE: At SHUT the HP VALVE switch inhibits the
engine shut down handle light except during
engine fire warnings.



ENGINE SHUT DOWN HANDLE (4)

Pulling the engine shut down handle when its light is on steady
cancels the light and:

Shuts the HP VALVE.

Switches the HP VALVE switch light (white) on.

Shuts the LP VALVE.

Shuts the hydraulic SHUT OFF VALVE(S).

Shuts the reheat fuel shut off valve.

Shuts the air BLEED VALVE.

Shuts the air CROSS BLEED valves.

Shuts the cabin inlet safety valve.

Shuts the SECONDARY AIR DOORS and engine bay vent thus causing
the FIRE FLAPS light (green) to come on.

Onloads the standby (yellow) hydraulic system pumps.

Opens the ENGINE RECIRCULATION VALVE.

Inhibits the engine igniters.

Inhibits the T₁ ENGINE PROBE HEATER thus causing the T₁ light
(yellow) to come on.

NOTE : The triangle (orange) next to the following MIs:

HP VALVE.

LP VALVE.

Hydraulic SHUT OFF VALVE.

Air BLEED VALVE.

Air CROSS BLEED.

SECONDARY AIR DOORS

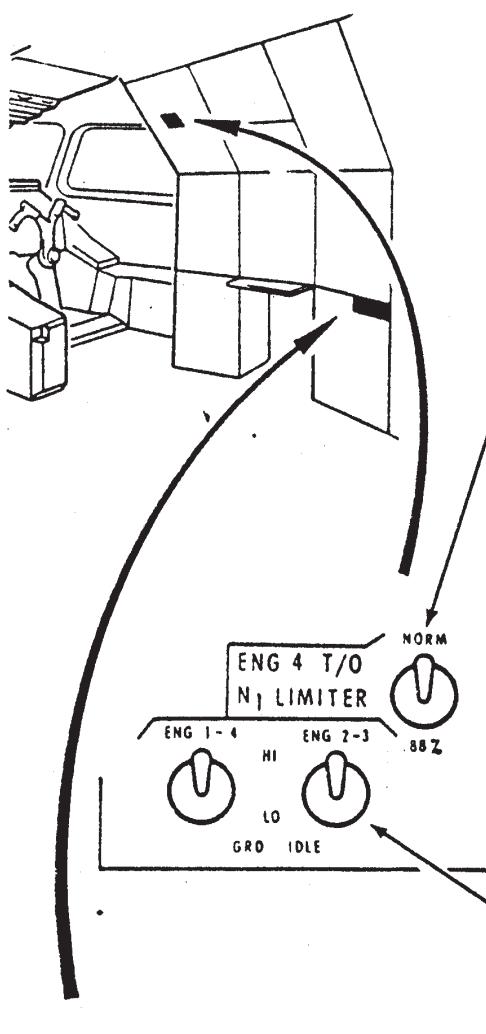
indicates that the associated valves and doors are
shut by pulling the engine shut down handle.

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CONCORDE FLYING MANUAL

British airways

NOZZLE AIR SOV & WIND DOWN TEST AND
GROUND CONTROL SWITCHES



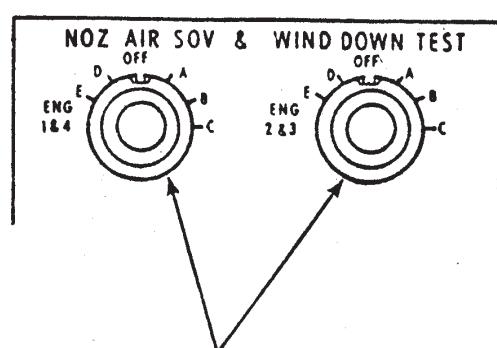
ENG 4 T/O N₁ LIMITER SWITCH

NORM - engine control is normal.

88% - the N₁ of number 4 engine is limited to a maximum value of 88%. This is necessary because airflow patterns within number 4 intake below 60 knots with the N₁ above 88% causes airflow distortion at the engine face leading to LP compressor blade vibration. 88% is magnetically latched at speeds below 60 knots.

With the switch at 88% the GO lt for No. 4 engine is inhibited.

At temperatures colder than -35°C. the eng 4 T/O N₁ LIMITER will have no effect on engine 4 since the engine control schedule will limit the N₁ of all engines to 88% or less.



NOZ AIR SOV & WIND DOWN TEST ROTARY SELECTOR

- A - Not used by aircrew.
- B - Checks the control switch that triggers the wind down system should inadvertent forward thrust occur.
- C - Not used by aircrew.
- D - Not used by aircrew.
- E - Checks the operation of the air shut-off valve.

GRD IDLE SWITCH (2)

HI - fuel flow is normal.

LO - fuel flow to the engine is reduced thereby enabling lower engine thrust to be obtained for use during taxiing. LO is magnetically latched at speeds below 60 knots.

(Unchanged)

SCHEMATIC LAYOUT

